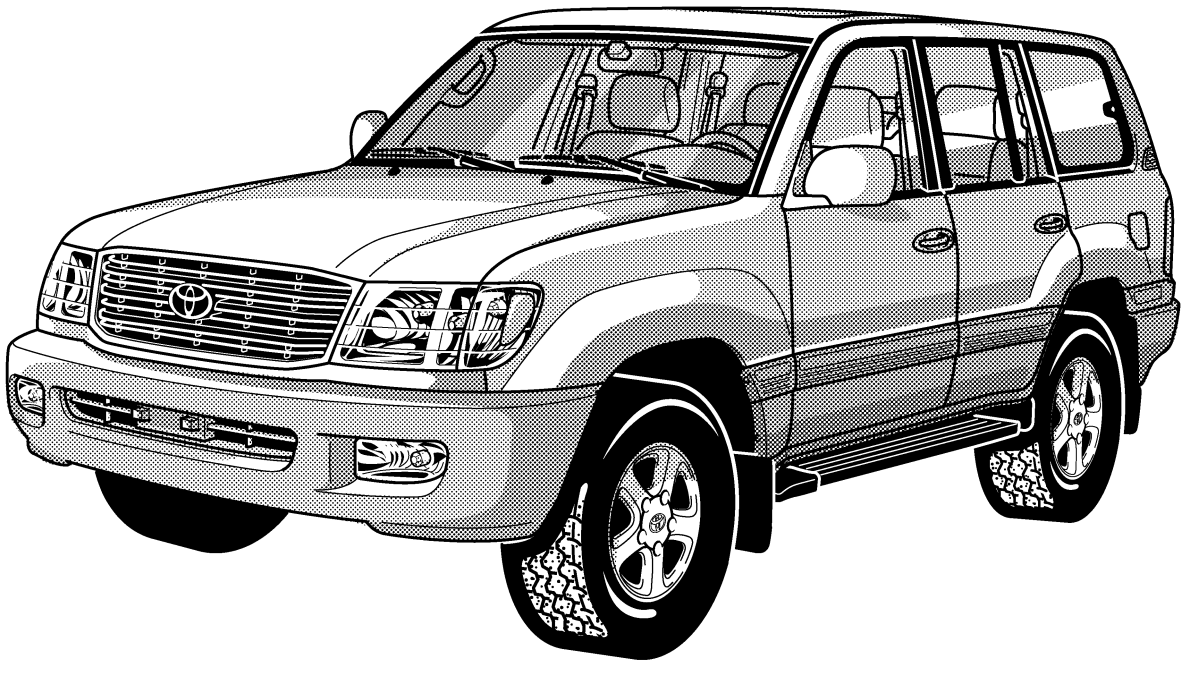
EXTERIOR APPEARANCE



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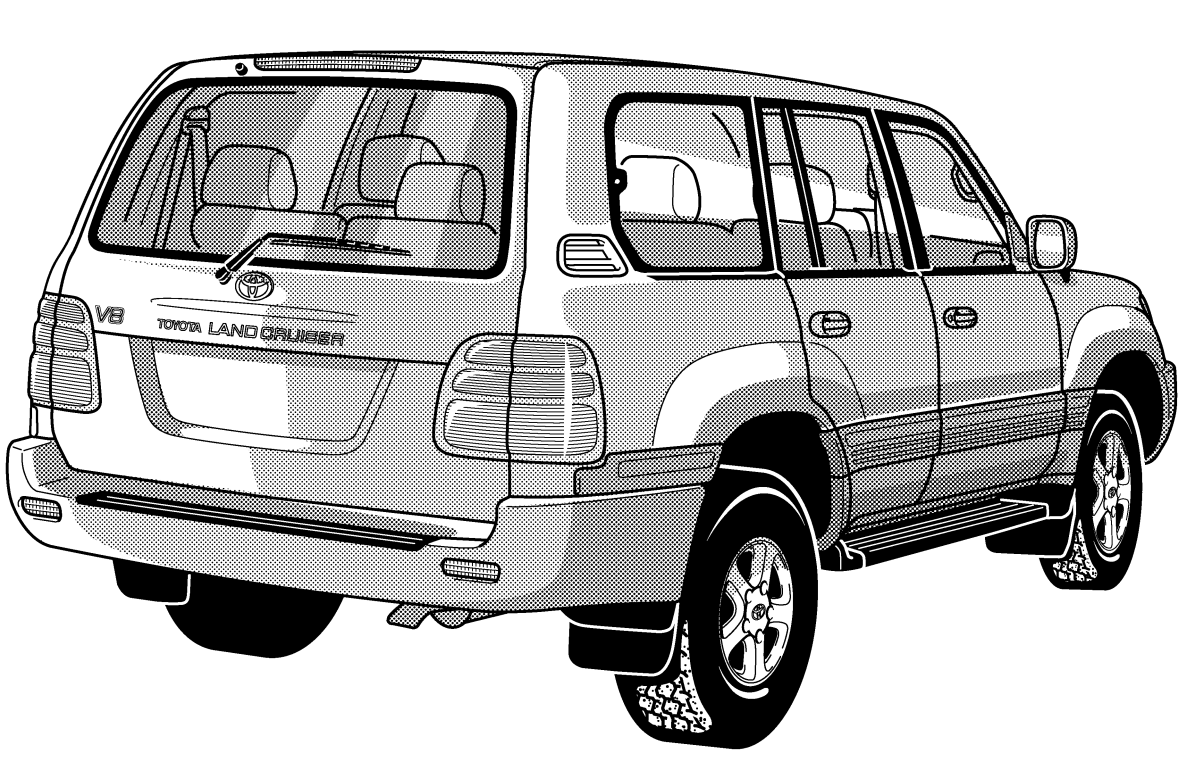

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MODEL CODE AND MODEL LINE-UP

MODEL CODE

UZJ100 L - G N P E K A

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①	**BASIC MODEL CODE** UZJ100 : With 2UZ-FE Engine
②	**STEERING WHEEL POSITION** L : Left-Hand Drive
③	**BODY TYPE** G : Station Wagon
④	**BACK DOOR TYPE** N : Lift-Up Back Door
⑤	**GEARSHIFT TYPE** P : 4-Speed Automatic, Floor
⑥	**GRADE** E : VX
⑦	**ENGINE SPECIFICATION** K : DOHC and SFI
⑧	**DESTINATION** A : U.S.A.

MODEL LINE-UP

TRANSMISSION					4-Speed Automatic
DESTINATION	ENGINE	BACK DOOR	GRADE	DRIVE TYPE	A343F
U.S.A.	2UZ-FE	Lift-Up	VX	Full-Time 4WD	UZJ100L-GNPEKA

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– MEMO –

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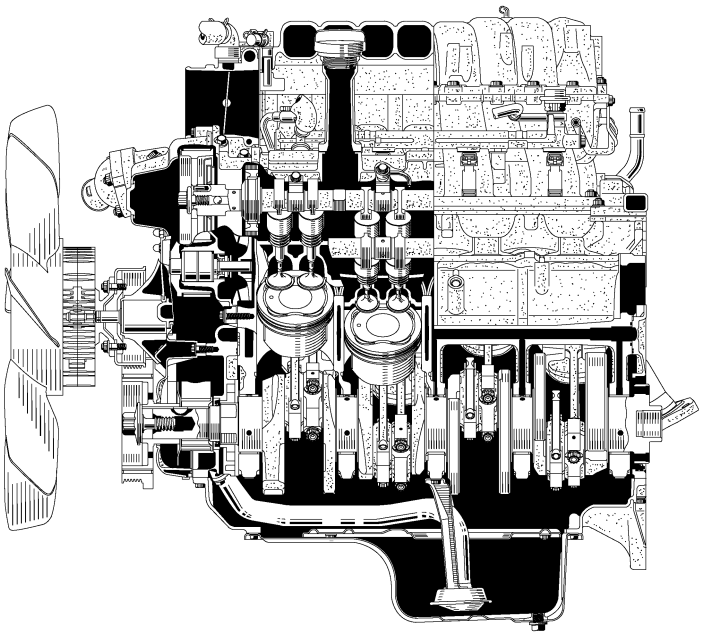
ENGINE

2UZ-FE ENGINE

■ DESCRIPTION

The 2UZ-FE engine, which has been newly developed to replace the 1FZ-FE engine, is a V8, 4.7-liter, 32-valve DOHC engine. This engine has been developed to realize high performance, quiet operation, and fuel economy. In addition, it has adopted the ETCS-i (Electronic Throttle Control System-intelligent) to ensure excellent controllability of the vehicle and to improve its comfort.



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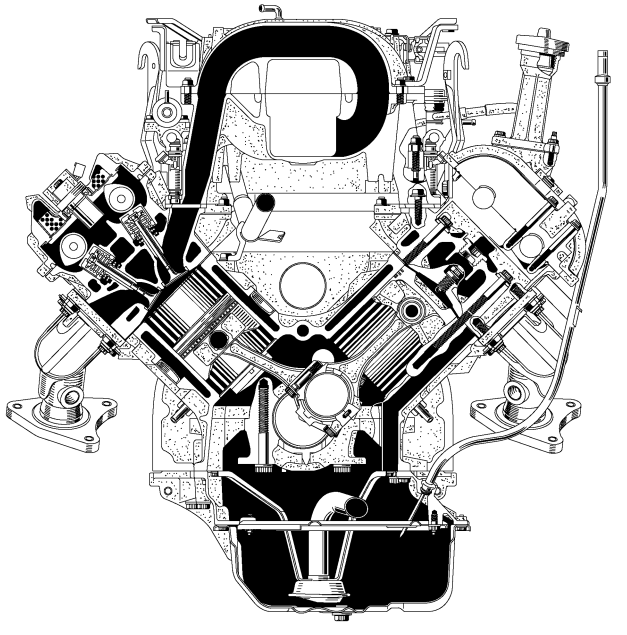

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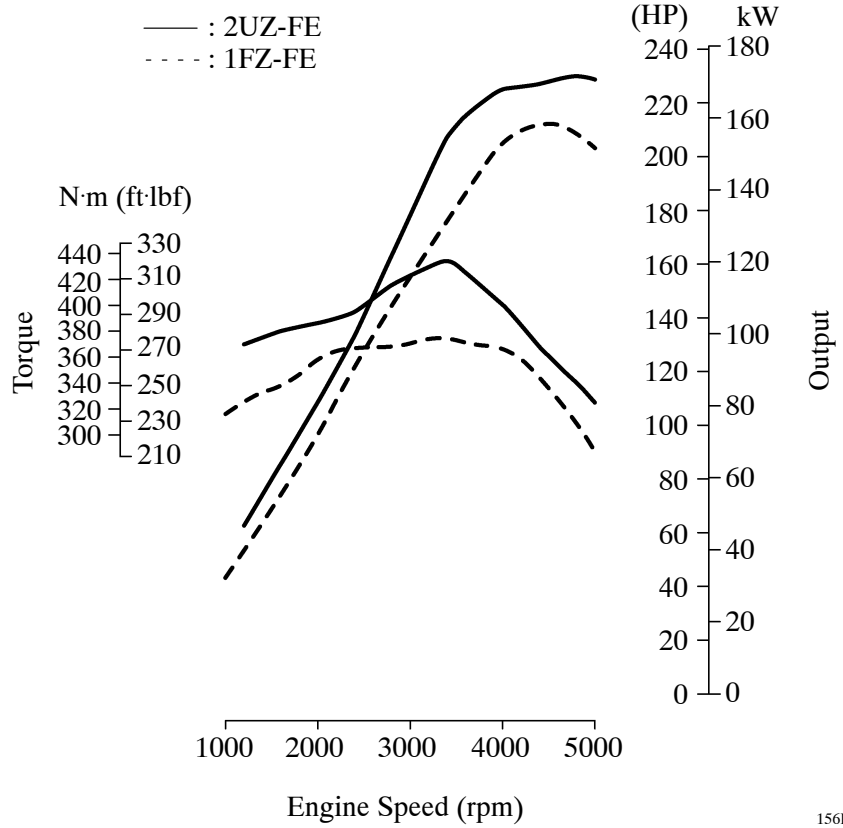
■ENGINE SPECIFICATIONS AND PERFORMANCE CURVE

Item \ Engine			2UZ-FE	1FZ-FE
No. of Cyls. & Arrangement			8-Cylinder, V Type	6-Cylinder, In-Line
Valve Mechanism			32-Valve, DOHC, Belt & Gear Drive	24-Valve, DOHC Chain & Gear Drive
Combustion Chamber			Pentroof Type	←
Manifolds			Cross-Flow	←
Fuel System			SFI	←
Displacement	cm^3 (cu. in.)		4664 (284.5)	4477 (273.1)
Bore x Stroke	mm (in.)		94.0 x 84.0 (3.70 x 3.31)	100.0 x 95.0 (3.94 x 3.74)
Compression Ratio			9.6 : 1	9.0 : 1
Max. Output	[SAE-NET]		172 kW @ 4800 rpm (230 HP @ 4800 rpm)	158 kW @ 4600 rpm (212 HP @ 4800 rpm)
Max. Torque	[SAE-NET]		434 N·m @ 3400 rpm (320 ft·lbf @ 3400 rpm)	373 N·m @ 3200 rpm (275 ft·lbf @ 3200 rpm)
Valve Timing	Intake	Open	3° BTDC	5° BTDC
		Close	36° ABDC	40° ATDC
	Exhaust	Open	46° BBDC	40° BBDC
		Close	3° ATDC	5° ATDC
Fuel Octane Number	(RON)		96	91
Oil Grade			API SH EC-II, SJ EC or ILSAC	←



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■ FEATURES OF 2UZ-FE ENGINE

Features of the 2UZ-FE engine are listed below.

System	Features
Engine Proper	● An upright intake port has been adopted to improve the intake efficiency. ● A taper squish configuration has been adopted to improve the combustion efficiency. ● A steel laminate type cylinder head gasket has been adopted to improve its reliability. ● An aluminum oil pan that is integrated with stiffeners has been adopted to reduce noise and vibration. ● The skirt portion of the piston has been changed in shape and applied with resin coating to reduce friction.
Valve Mechanism	● Inner shim type valve lifters have been adopted. ● Large-diameter intake and exhaust valves have been adopted to reduce the intake and exhaust resistance.
Intake and Exhaust System	● A long port intake manifold is used to improve the engine's torque in the low-to mid speed range. ● A 2-way exhaust control system has been adopted to improve engine performance and to ensure an even quieter operation.
Fuel System	● 4-hole type fuel injectors have been adopted to improve the atomization of fuel. ● A quick connector is used to connect the fuel filter and the fuel hose together to improve serviceability. ● A fuel pump inertia switch, which stops the fuel pump if an extremely strong impact such as that of a collision is detected, has been adopted to realize excellent safety performance.
Ignition System	● The DIS (Direct Ignition System) is used to enhance the reliability of the ignition system. ● Iridium-tipped spark plugs have been adopted to improve ignition.
Engine Control System	● ETCS-i has been adopted to realize excellent controllability and comfort of the vehicle. ● The cruise control system and the engine immobiliser system have been integrated with the ECM.

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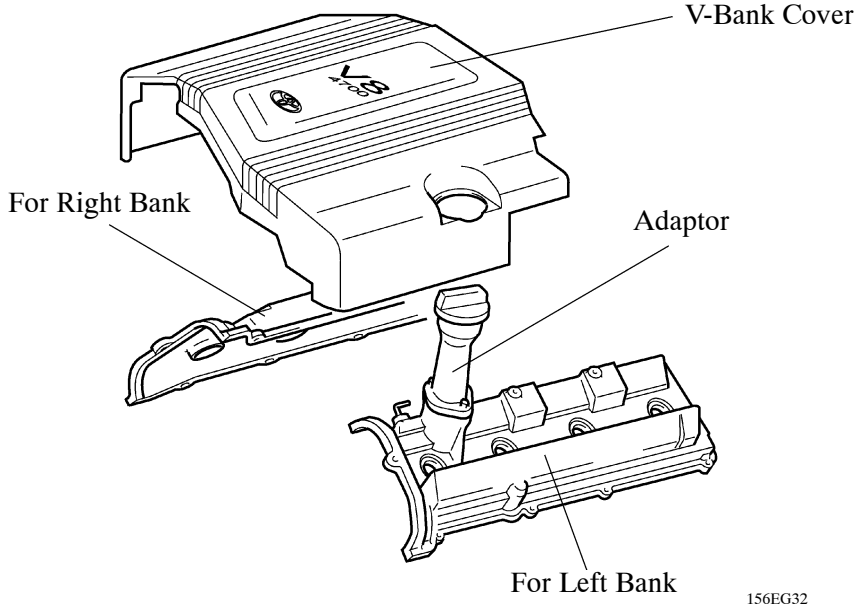
■ENGINE PROPER

1. Cylinder Head Cover

- Lightweight yet high-strength aluminum head covers are used.
- An adapter has been provided on the left bank cylinder head cover to improve the serviceability when filling the engine oil.
- The cylinder head cover gaskets have adopted a double-bead cross-sectional construction to improve their reliability.
- A large V-bank cover has been adopted for improved design effect.



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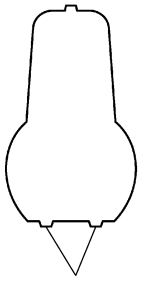
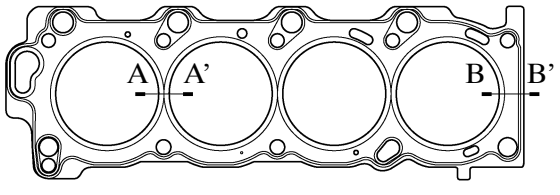


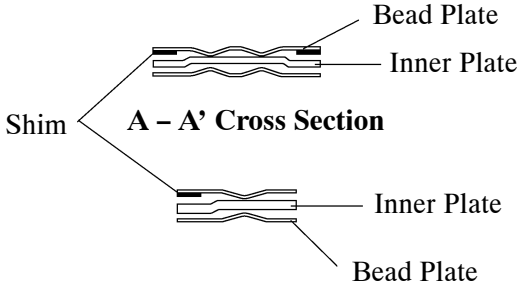
151EG33

Cylinder Head Cover Gasket Cross Section

2. Cylinder Head Gasket

3-layer cylinder head gaskets with shims have been adopted to improve reliability and to minimize the deformation of the cylinder bore. This resulted in improved fuel economy and reduced the consumption rate of engine oil and the emission of exhaust gases.





B – B' Cross Section

156EG33

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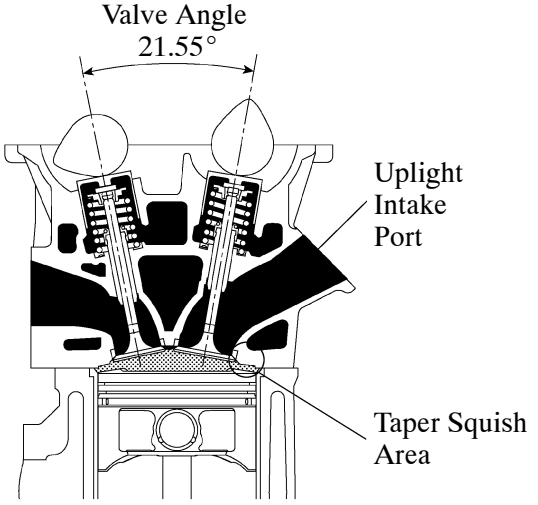
3. Cylinder Head

- The cylinder head, which is made of aluminum, has adopted a pentroof-type combustion chamber. The spark plug has been located in the center of the combustion chamber in order to improve the engine's anti-knocking performance.
- The angle of the intake and exhaust valves is narrowed and set at 21.55° to permit a compact cylinder head.
- Uplight intake port have been adopted to improve the intake efficiency.
- A taper squish combustion chamber has been adopted to improve anti-knocking performance and intake efficiency. In addition, engine performance and fuel economy have been improved.
- Plastic region tightening bolt is used for the cylinder head bolts for good axial tension.



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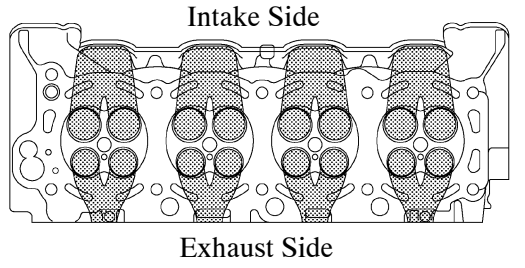

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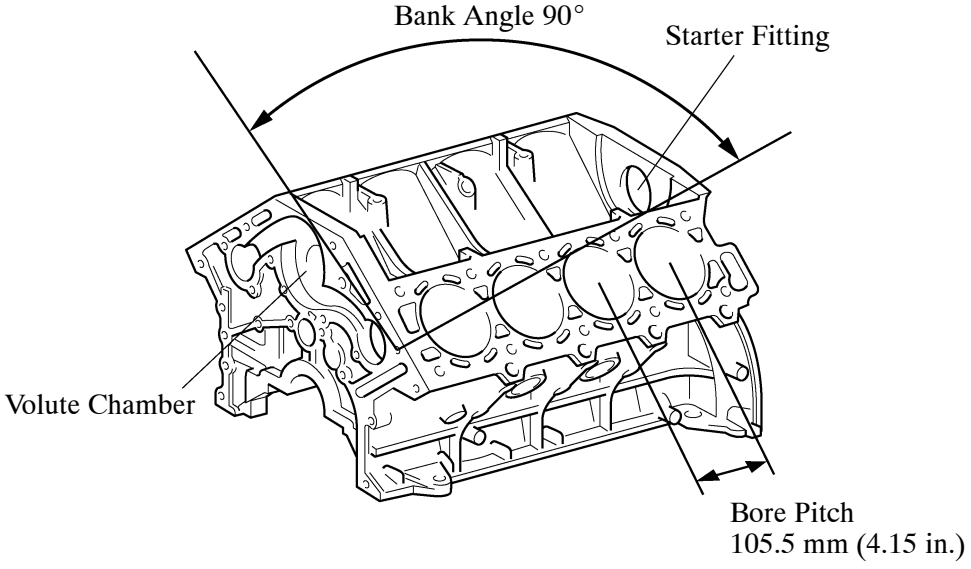
4. Cylinder Block

- The cylinder block is made of cast iron.
- The cylinder block has a bank angle of 90°, a bank offset of 21 mm (0.827 in.) and a bore pitch of 105.5 mm (4.15 in.), resulting in a compact block in its length and width even for its displacement.
- Part of the volute chamber of the water pump is incorporated into the cylinder block to shorten the engine length.
- Installation bosses of the two knock sensors are located on the inner side of left and right banks.
- The plastic region tightening bolts are used, for the crankshaft bearing caps.
- The starter is located inside the V-bank.



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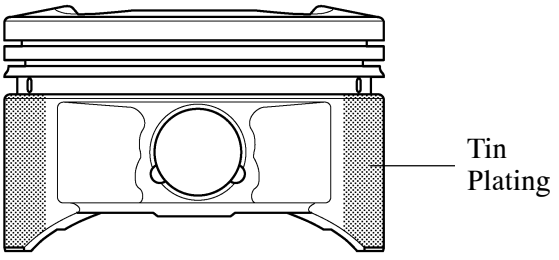
5. Piston

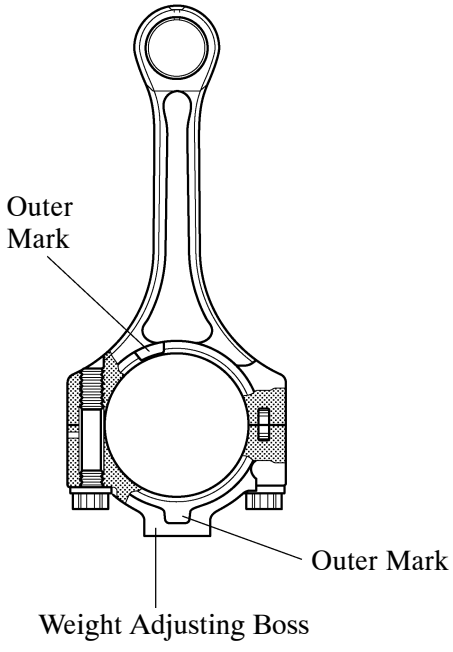
- The piston is made of aluminum alloy.
- The piston head portion has adopted a taper squish to improve the fuel combustion efficiency.
- The piston ring grooves have been treated with alumite coating to improve the piston's wear resistance.
- Semi floating type piston pinsare used.



156EG02

6. Connecting Rod

- The sintered and forged connecting rod is very rigid and has little weight fluctuation.
- A weight-adjusting boss is provided at the big end to reduce fluctuation of weight and balance the engine assembly.
- The connecting rod cap is held by plastic region tightening bolts.
- The connecting rods for the right and left banks are placed in opposite directions with the outer marks facing the crankshaft.
- The connecting rod bearing is made of aluminum alloy.



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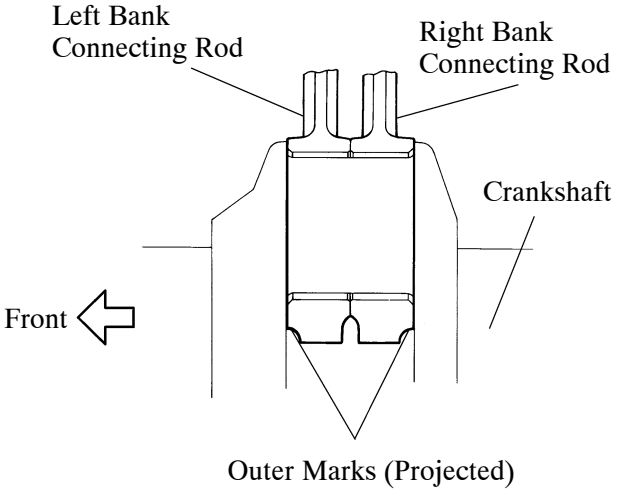

156EG09

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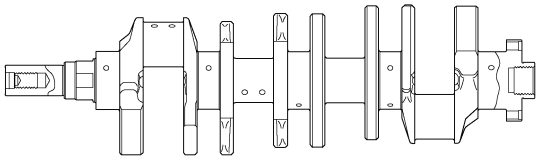
7. Crankshaft

- A crankshaft made of steel, which excels in rigidity and wear resistance, has been adopted.
- The crankshaft has 5 jounals and 8 counter weights.
- The crankshaft bearing is made of aluminum alloy.



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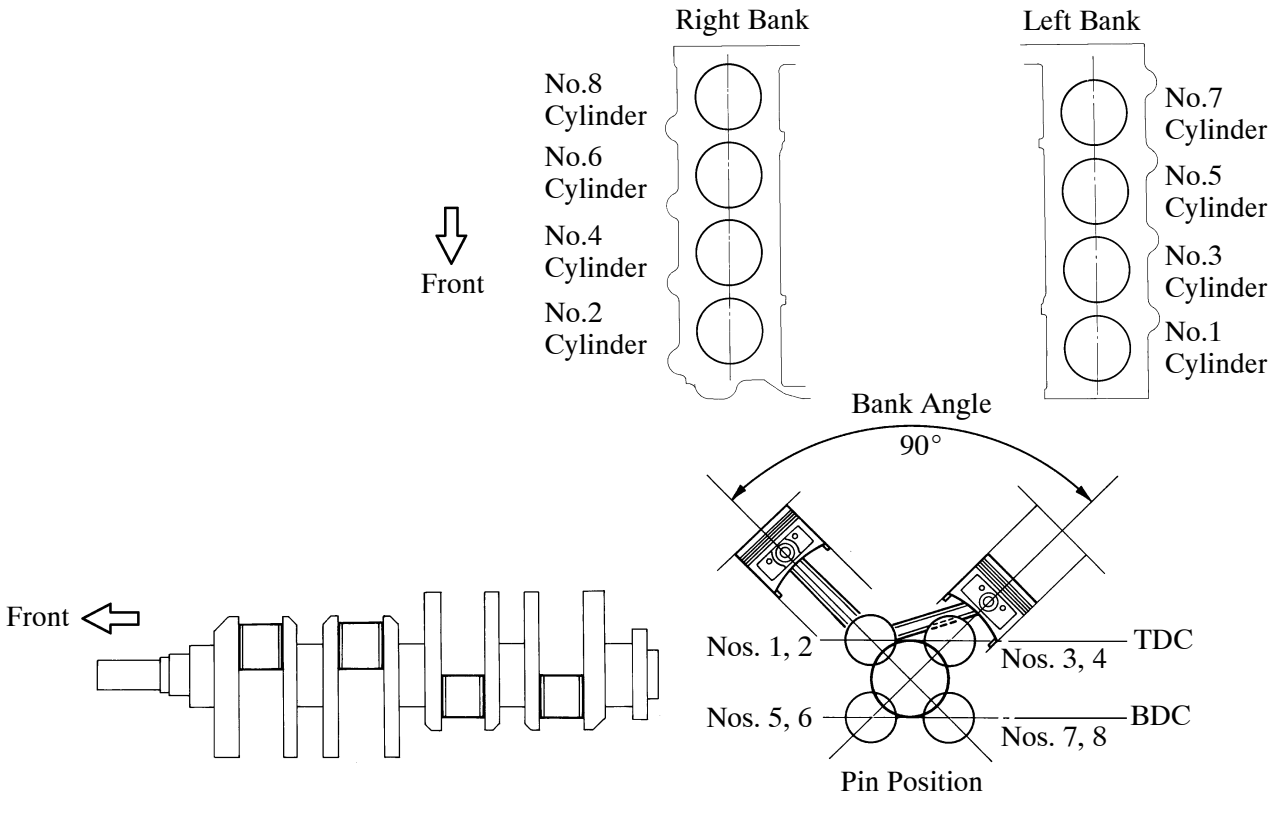
NOTE: The positions of the crankshaft pins and pistons are illustrated below. The numbers of the crankshaft and the pistons are shown on the right.



156EG10

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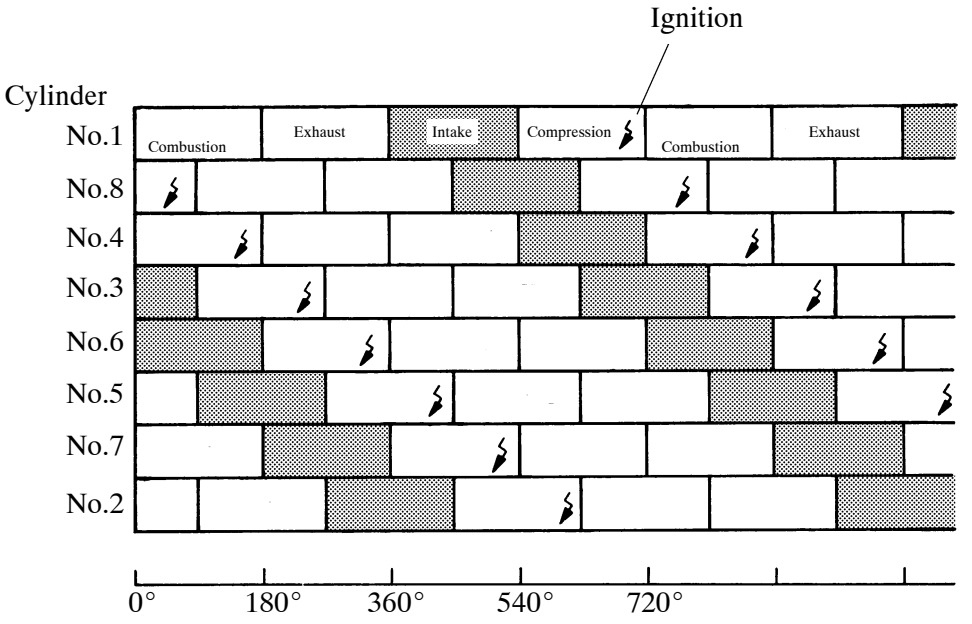
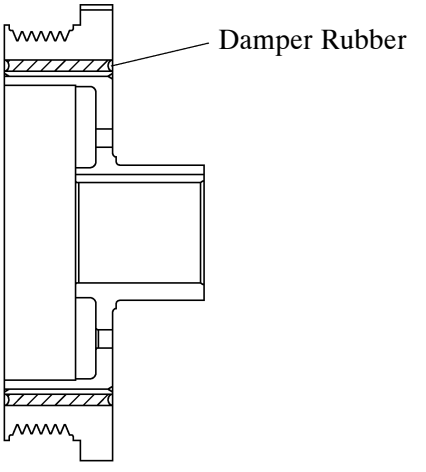
- Crankshaft angles and engine strokes (intake, compression, combustion and exhaust) are shown in the table below. The firing order is 1 – 8 – 4 – 3 – 6 – 5 – 7 – 2.



156EG11

8. Crankshaft Pully

The rigidity of the torsional damper rubber has been optimized to reduce noise.



156EG37

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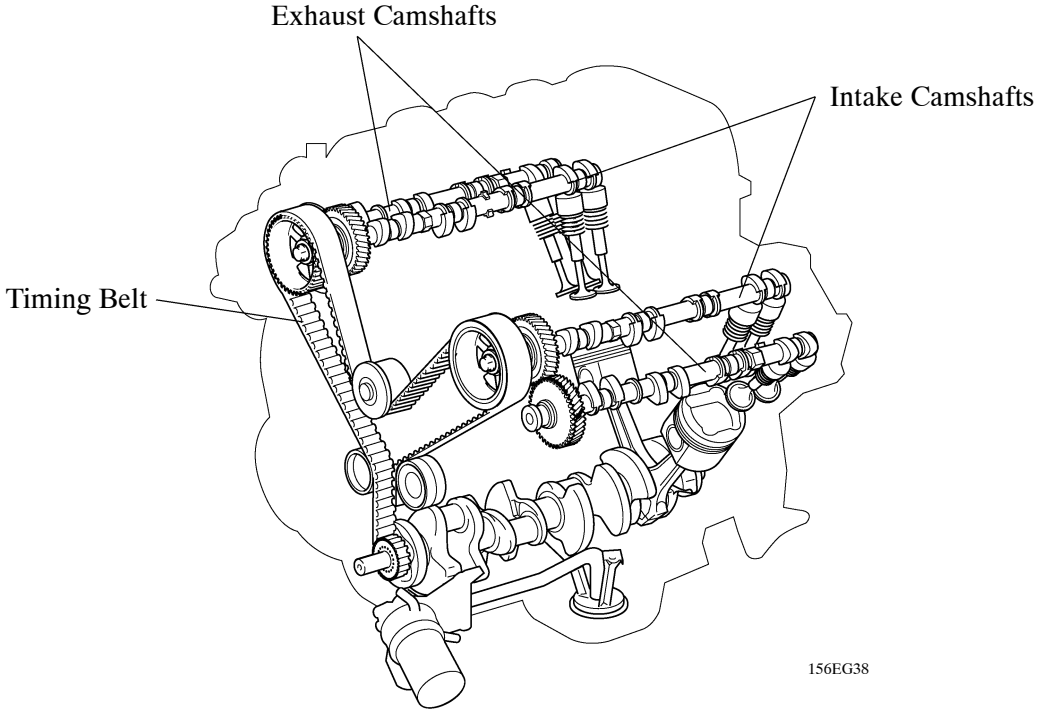
■ VALVE MECHANISM

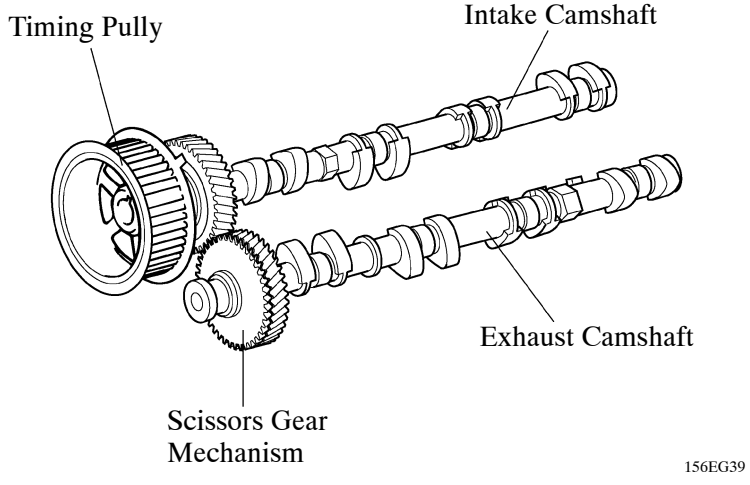
1. General

- Each cylinder has 2 intake valves and 2 exhaust valves. Intake and exhaust efficiency is increased by means of the larger total port areas.
- The valves are directly opened and closed by 4 camshafts.
- The intake camshafts are driven by a timing belt, while the exhaust camshafts are driven through gears on the intake camshafts.



2. Camshafts

- The camshafts are made of cast iron alloy. The cam nose has been chill treated to increase its abrasion resistance.
- The exhaust camshafts are driven by gears on the intake camshafts. The scissors gear mechanism is used on the exhaust camshaft to control backlash and suppress gear noise.



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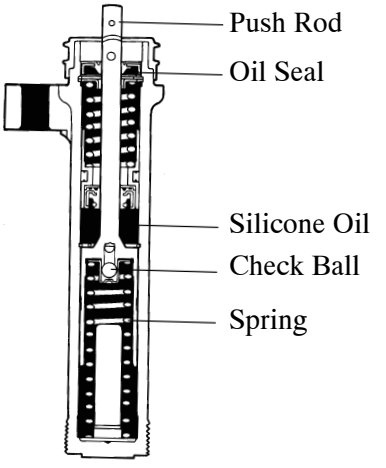
3. Automatic Tensioner

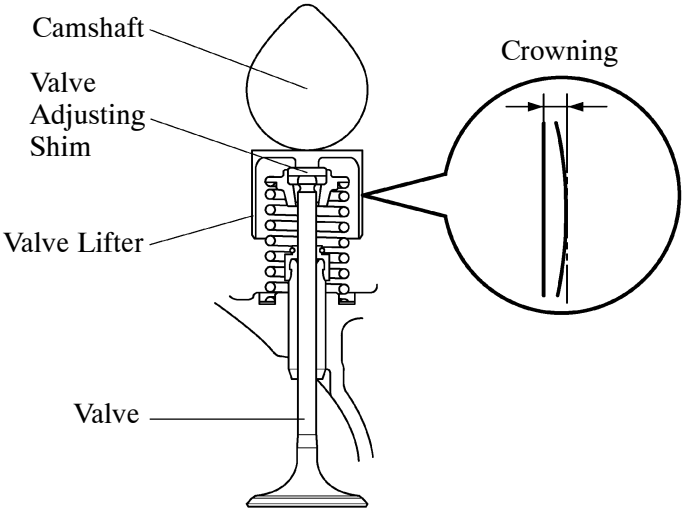
The automatic tensioner is made up of a spring and oil damper, and maintains proper timing belt tension at all time. The automatic tensioner suppresses noise generated by the timing belt.



Automatic Tensioner 156EG12

4. Intake and Exhaust Valve and Valve Lifter

- Intake and exhaust valves with large-diameter valve face have been adopted to improve the intake and exhaust efficiency. In addition, narrower valve stems have been adopted to reduce the intake and exhaust resistance and for weight reduction.
- Inner shim type valve adjusting shims, which allow a greater amount of valve lift, have been adopted.
- Valve lifters made of steel have been adopted.
  The valve lifter, which has been made lighter and thinner, provides crowning on its side sliding portion to reduce noise and friction.



151EG34

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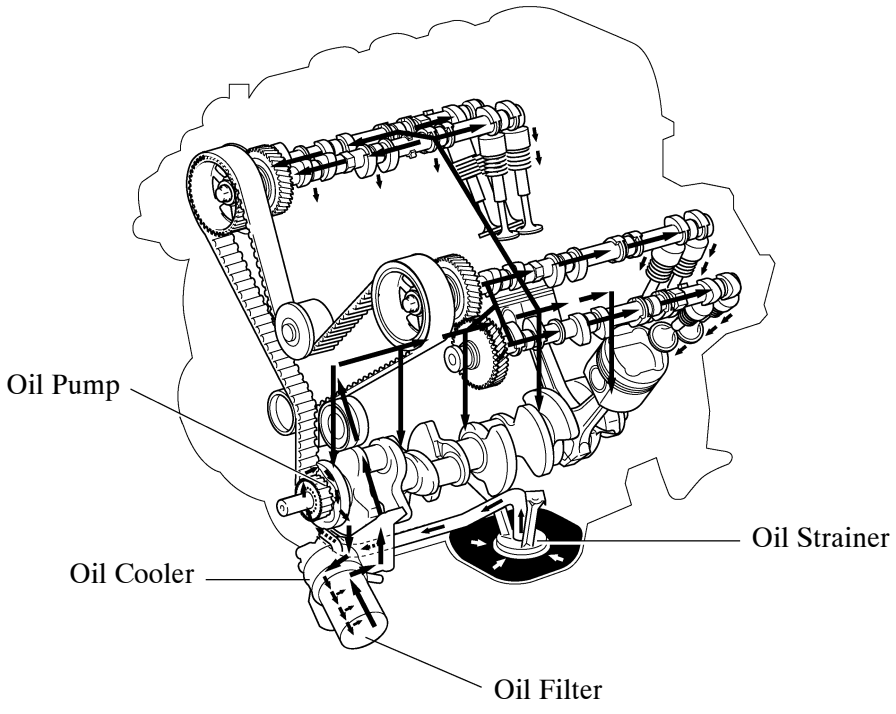
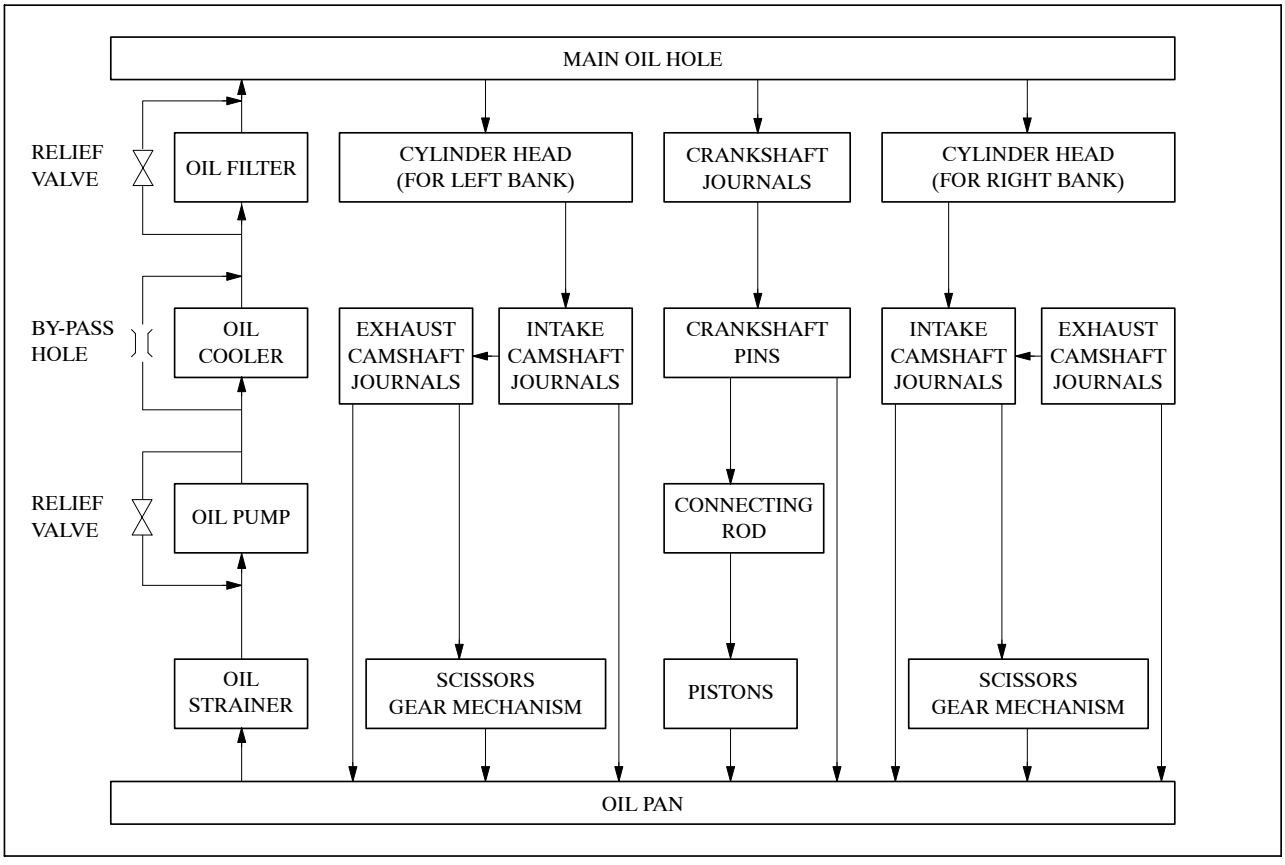
■LUBRICATION SYSTEM

1. General

- The lubrication circuit is fully pressurized and all oil passes through an oil filter.
- A trochid gear type oil pump is directly driven by crankshaft.
- The water-cooled type engine oil cooler is used to lower the oil temperature.





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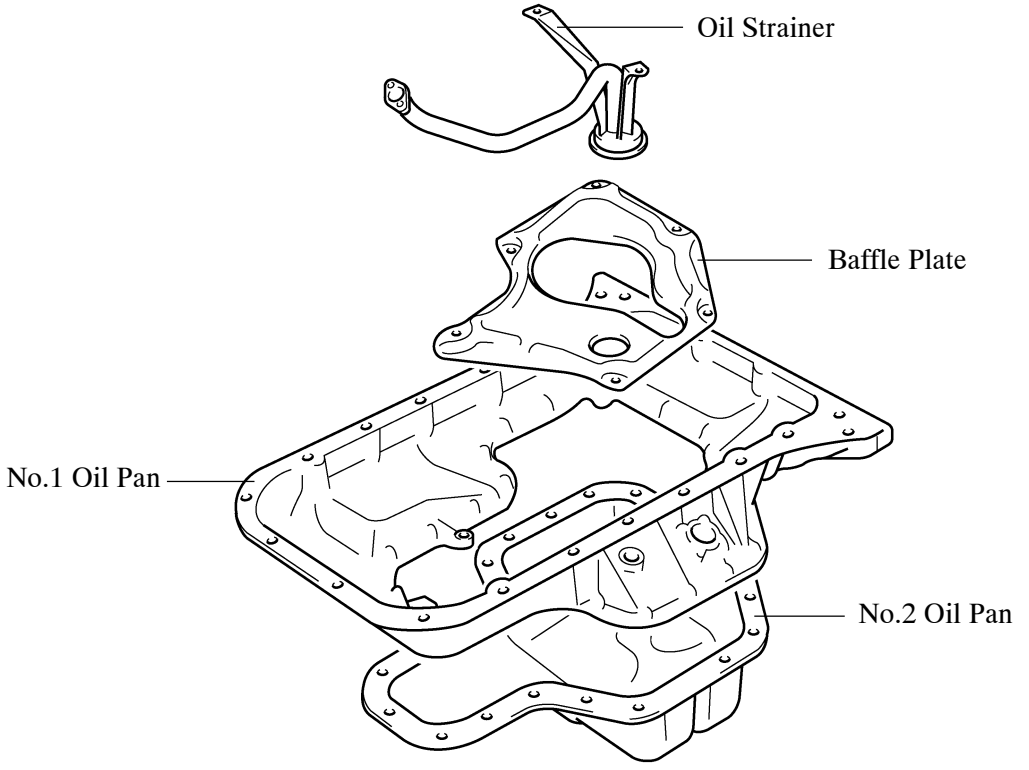
2. Oil Pan

- The oil pan is made up of 2 pieces. No.1 oil pan is made of aluminum alloy and No.2 oil pan is made of steel sheet.
- No.1 oil pan is secured to the cylinder block and the torque converter housing and is increasing rigidity.



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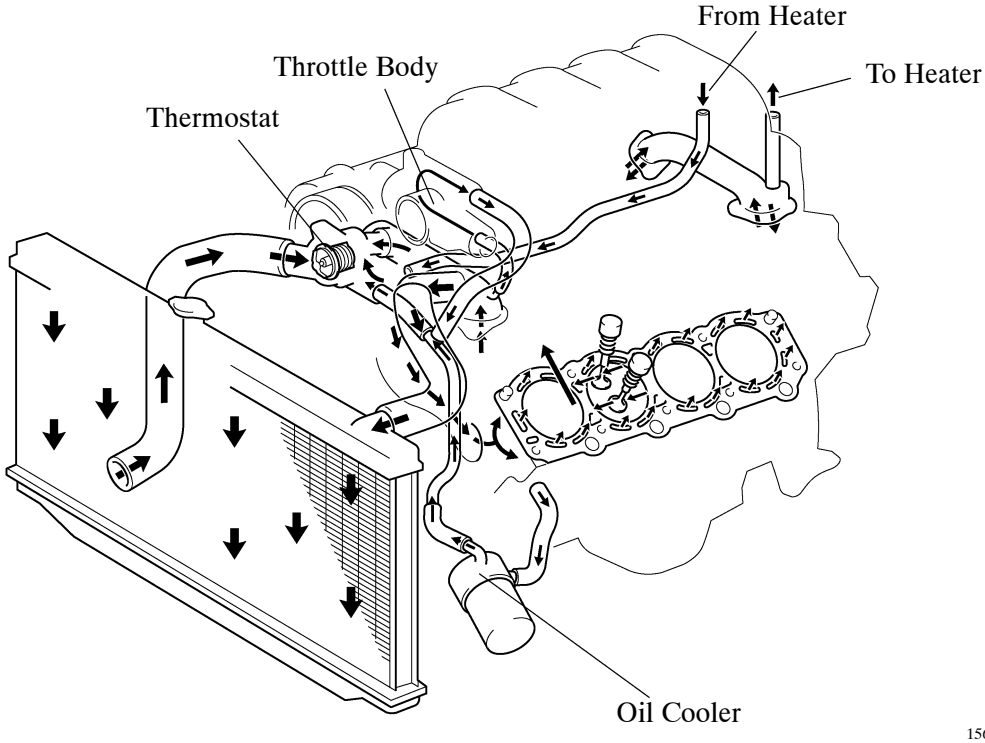
■COOLING SYSTEM

1. General

- The cooling system is a pressurized, forced-circulation type.
- A thermostat with a bypass valve is located on the water inlet housing to maintain suitable temperature distribution in the cooling system.
- An aluminum radiator core is used for weight reduction.



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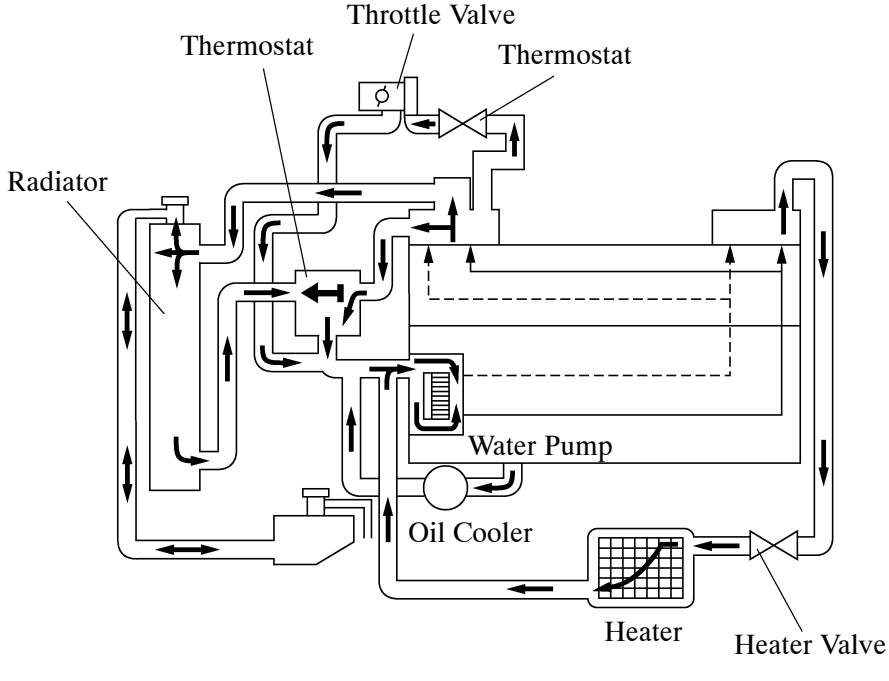

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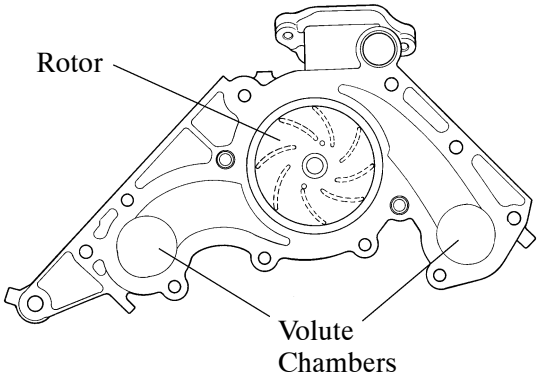
2. Water Pump

- The water pump has two volute chambers, and circulates coolant uniformly to the left and right banks of the cylinder block.
- The water pump is driven by the back of the timing belt.
- The rotor is made of resin.



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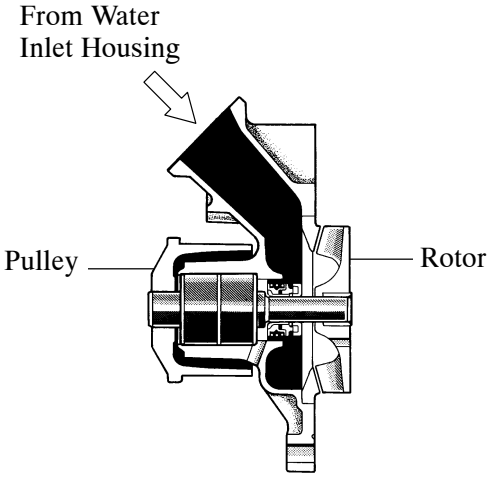

156EG14

3. Coupling Fan

A 3-stage temperature-controlled coupling fan is used. It rotates at lower speeds when the engine is started to minimize the fan noise.

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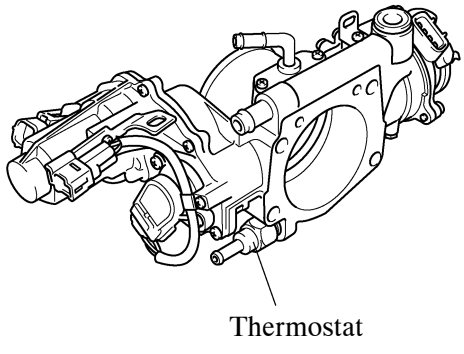
■INTAKE AND EXHAUST SYSTEM

1. Throttle Body

- The adoption of the ETCS-i has realized excellent throttle control.
- The ISC system and cruise control system are controlled comprehensively by the ETCS-i. Thus, the IAC valve has been discontinued.
- A thermostat is installed in the throttle body. The thermostat uses the thermal expansion of the wax to open and close the valve to shut off the flow of warm coolant when the coolant temperature is high in the throttle body's warm coolant passage. This prevents the throttle body temperature from rising more than the needed level, thus restraining the rise in the intake air temperature.



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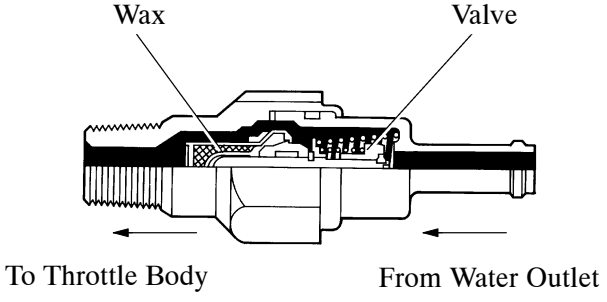
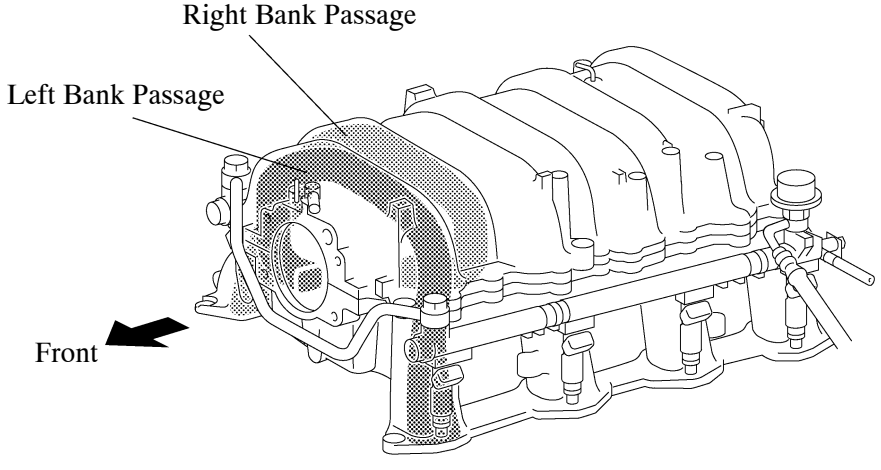


Thermostat

150EG21

2. Intake Manifold

The low-to mid-speed range torque has been improved by increasing the length of the intake manifold port.



156EG44

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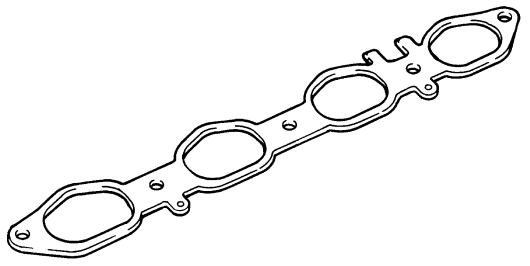
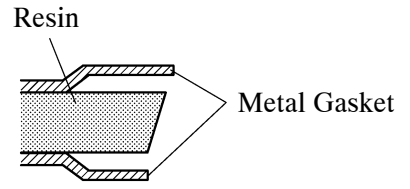
3. Intake Manifold Gasket

- A heat-barrier gasket has been adopted for use between the cylinder head and the intake manifold. This gasket, which restrains the heat transfer from the cylinder head to the intake manifold, helps restrain the intake air temperature and improve the charging efficiency.
- The construction of the gasket consists of resin that is sandwiched between metal gaskets.



151EG69

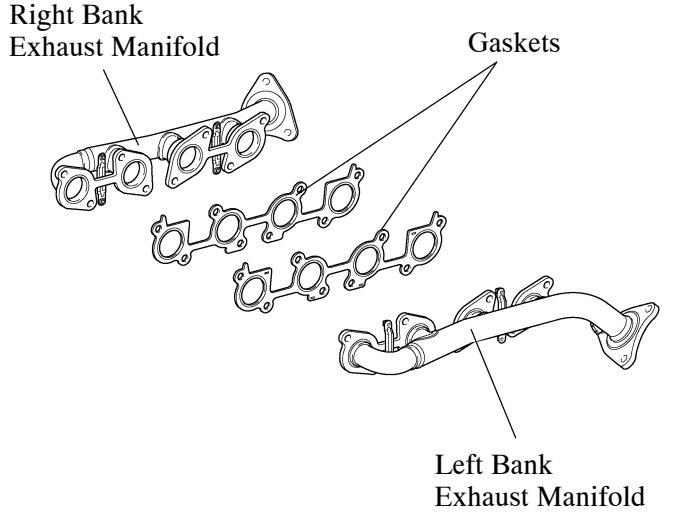


Cross Section

144EG04

4. Exhaust Manifold

The exhaust manifolds are made of stainless steel for weight reduction.



156EG04

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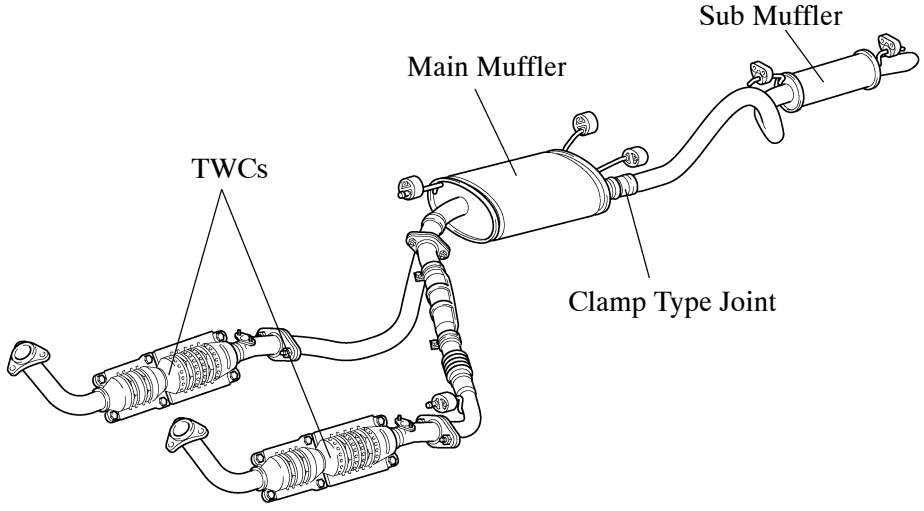
5. Exhaust Pipe

General

- The exhaust pipe is made of stainless steel for improved rust resistance.
- A clamp type joint is used to join the center pipe and tail pipe to realize weight reduction.
- A 2-way exhaust control system has been adopted to improve engine performane and to ensure an even quieter operation.



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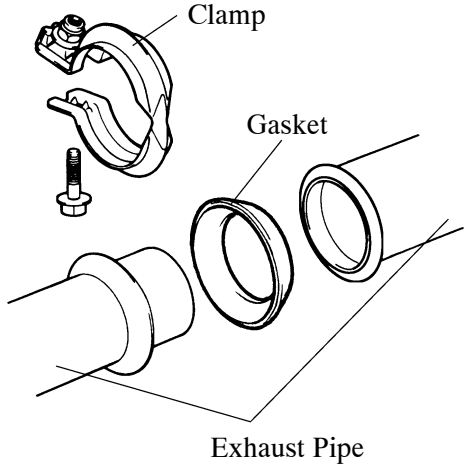

Connecting Exhaust Pipe

156EG06

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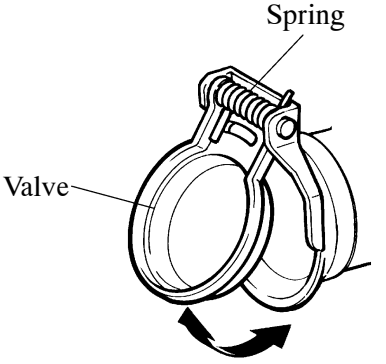
2-Way Exhaust Control System

- A 2-way exhaust control system is used. This system reduces the back pressure by opening and closing a variable valve that is enclosed in the main muffler, thus varying the exhaust gas passage.
- The valve opens steplessly in accordance with the operating condition of the engine, thus enabling a quieter operation at lower engine speeds, and reducing back pressure at higher engine speeds.

1) Construction

The control valve is enclosed in the main muffler. When the exhaust gas pressure overcomes the spring pressure, the control valve opens steplessly in accordance with the exhaust gas pressure.



156EG01

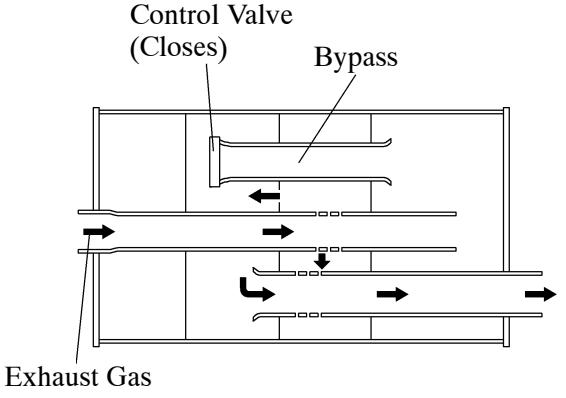
2) Operation

a. When Control Valve is Closed (low engine speed)

Since the pressure in the main muffler is low, the control valve is closed. Hence exhaust gas does not pass the bypass passage, and exhaust noise is decreased by the main muffler.

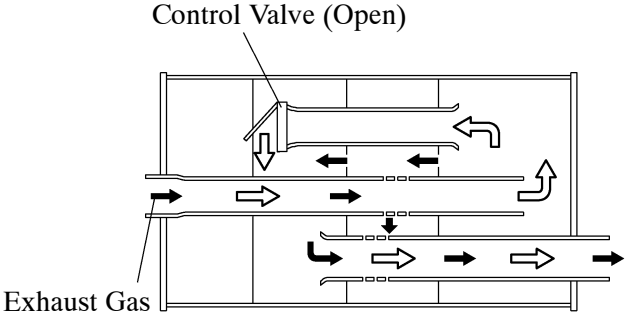
b. When Control Valve is Open (middle to high engine speed)

The valve opens more as the engine speed and the back pressure in the muffler increase. This allows alarge volume of exhaust gas to pass the bypass passage, thereby substantially decreasing the back pressure.



Control Valve Closed

156EG07



Control Valve Open

156EG08

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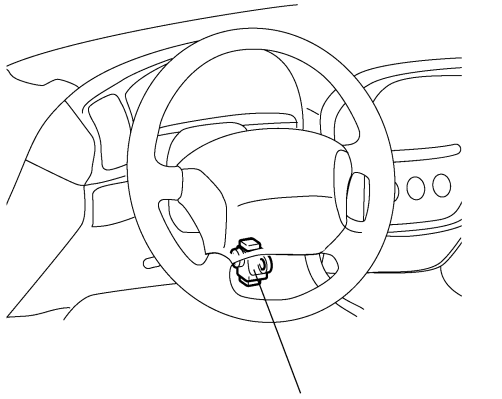
■FUEL SYSTEM

1. Fuel Pump Inertia Switch

General

- A fuel pump inertia switch, which stops the fuel pump if the vehicle is involved in a violent collision, has been adopted to minimize fuel leakage.
- The fuel pump inertia switch maintains a circuit between the ECM and the fuel pump ECU, and if a collision is detected, it cuts off the circuit to the fuel pump ECU.
- By taking the ease of its operation into consideration, the fuel pump inertia switch has been located in the vicinity of the instrument panel.



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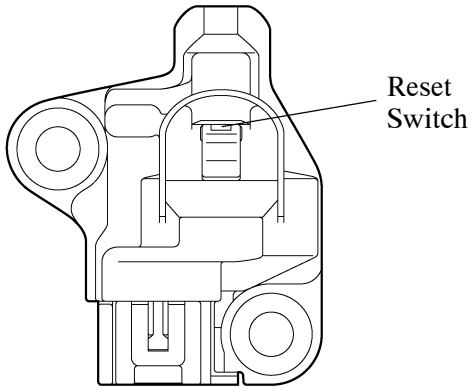
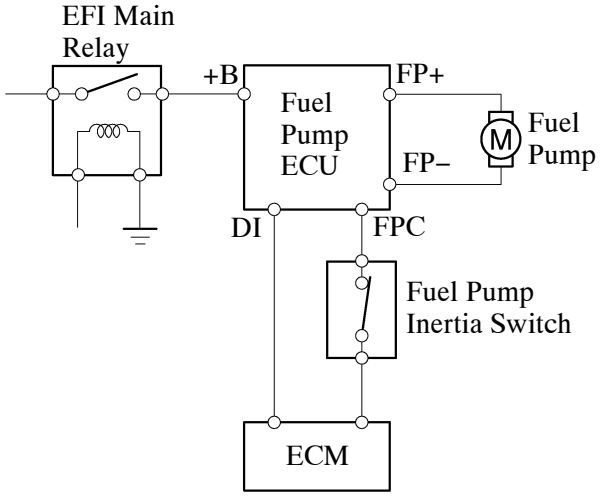


Fuel Pump Inertia Switch

156EG19

▶ System Diagram ◀



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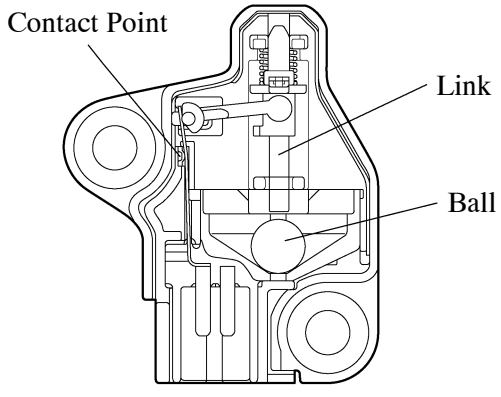

Cross Section

156EG20

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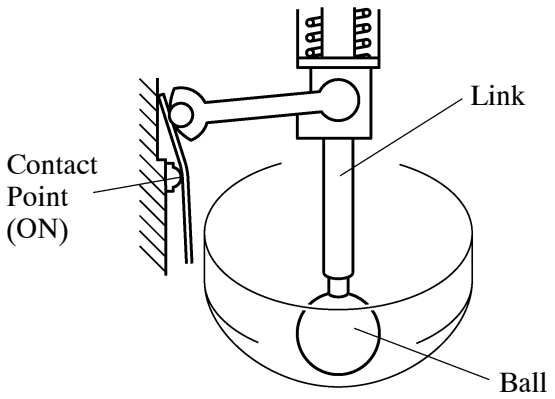
Construction and Operation

The fuel pump inertia switch consists of a ball that detects a collision, link, contact point, and reset switch. When the acceleration that is generated during a collision of the vehicle exceeds a predetermined value, the ball moves, the link moves downward, and the contact point opens. As a result, the circuit to the fuel pump ECU is cut off.



Normal

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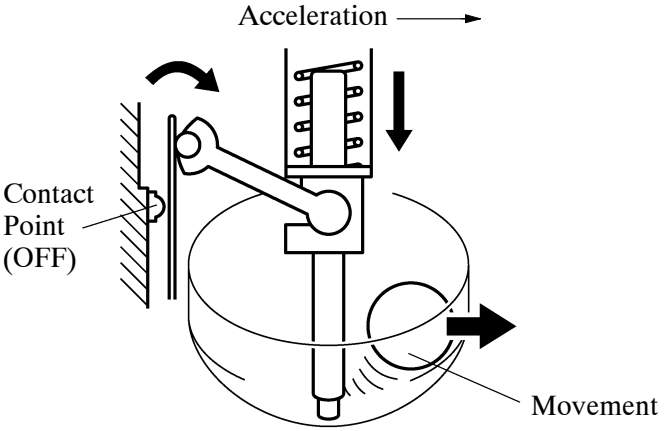


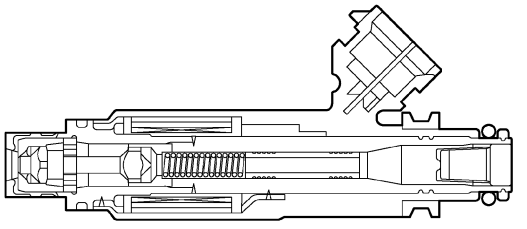
Detecting a Collision

156EG46

NOTE: In the event that the fuel pump inertia switch has tripped, and the switch must be reinstated, push up the reset switch for 1 second or longer.

2. Injector

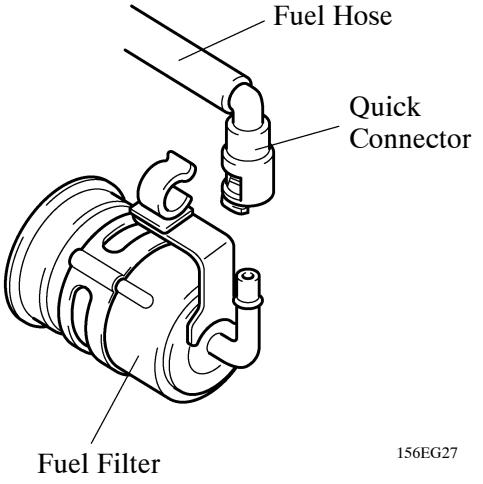
A compact 4-hole type injector has been adopted to improve the atomization of fuel.



156EG15

3. Quic Connector

A quick connector is used to connect the fuel filter and the fuel house together to improve service-ability.



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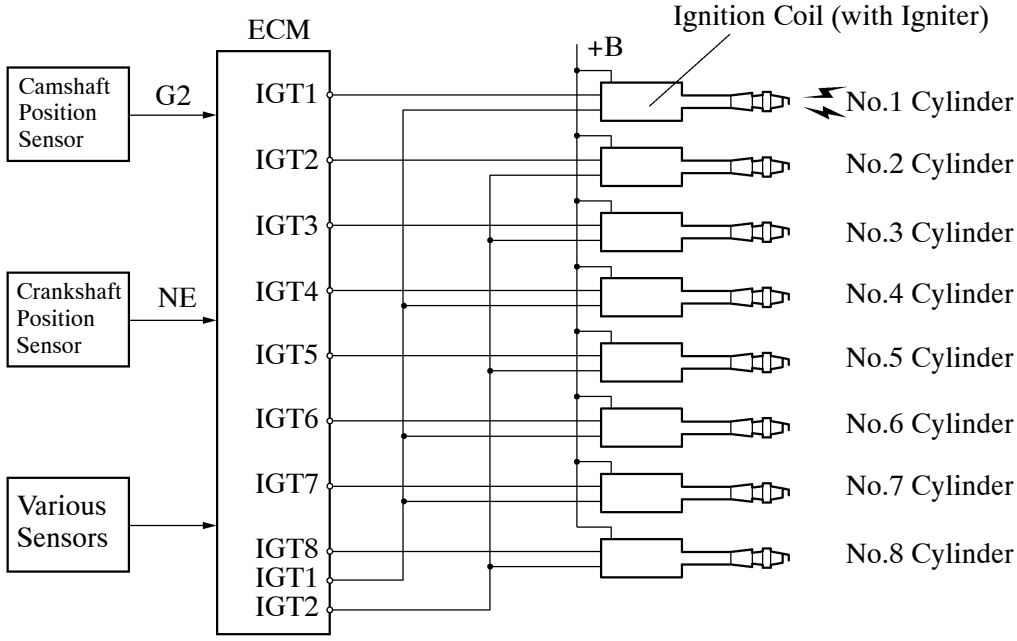
■IGNITION SYSTEM

1. General

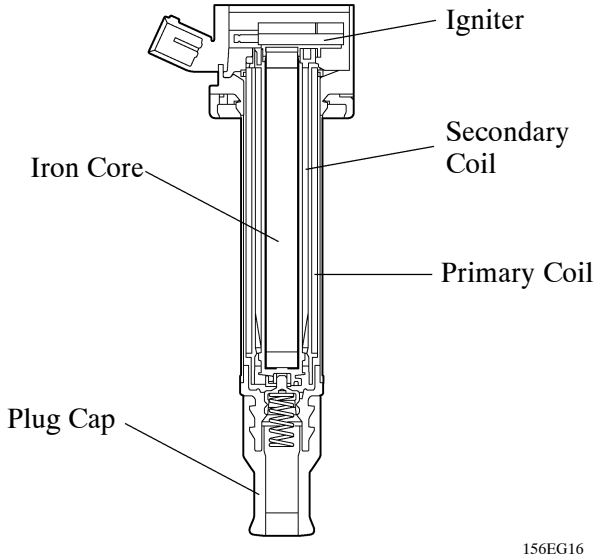
A DIS (Direct Ignition System) has been adopted in the 2UZ-FE engine. The DIS improves the ignition timing accuracy, reduces high-voltage loss, and enhances the overall reliability of the ignition system by eliminating the distributor.
The DIS in 2UZ-FE engine is an independent ignition system which has one ignition coil for each cylinder.



151EG05

2. Ignition Coil

The DIS provides 8 ignition coils, one for each cylinder. The spark plug caps, which provide contact to the spark plugs, are integrated with an ignition coil. Also, an igniter is enclosed to simplify the system.



156EG16

Ignition Coil Cross Section

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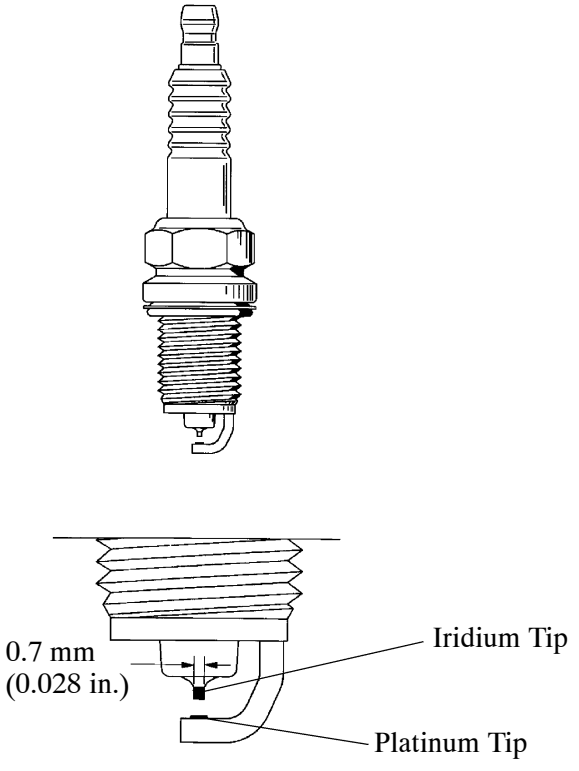
3. Spark Plug

Iridium-tipped spark plugs have been adopted. Their center electrode is made of iridium, which excels in wear resistance. As a result, the center electrode is made with a smaller diameter and improved the ignition performance.



▶ Recommended Spark Plugs ◀

DENSO	SK20R11
NGK	IFR6A11
Plug Gap	1.0 – 1.1 mm (0.039 – 0.043 in.)

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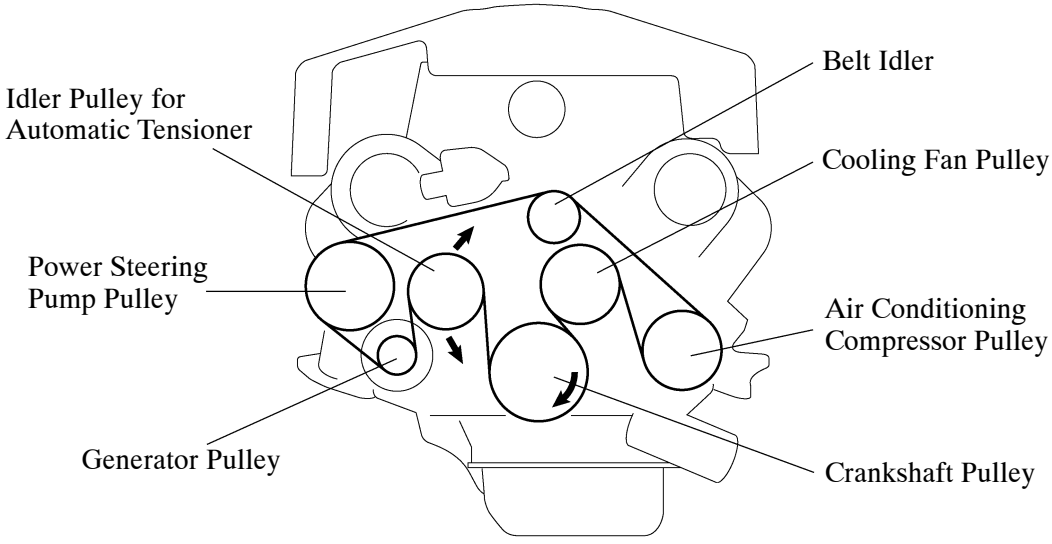
■SERPENTINE BELT DRIVE SYSTEM

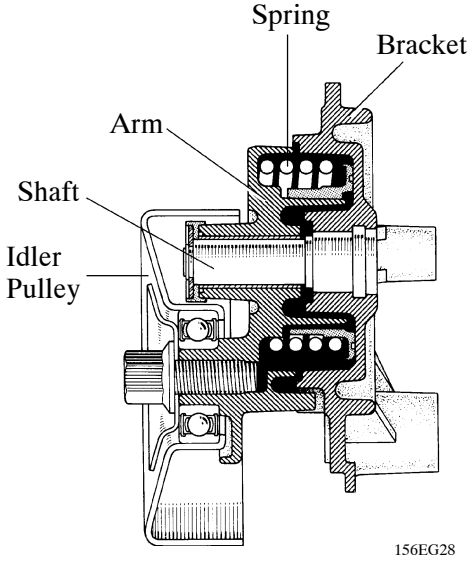
1. General

- The serpentine belt drive system drives accessory components with a single V-ribbed belt. It reduces the overall engine length, weight and number of engine parts.
- An automatic tensioner eliminates the need for tension adjustment.

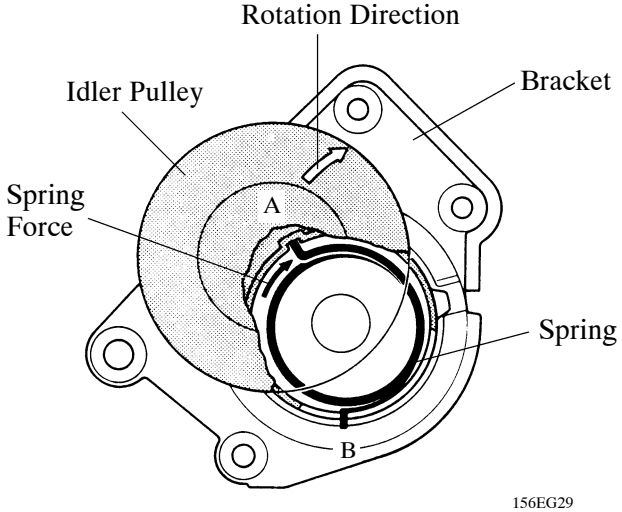


2. Automatic Tensioner

The tension of the V-ribbed belt is properly maintained by the torsion spring that is enclosed in the automatic tensioner.



Cross Section



A: Fixed to the Arm
B: Fixed to the Bracket

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■ENGINE CONTROL SYSTEM

1. General

In addition to the SFI (Sequential Multiport Fuel Injection) system and the ESA (Electronic Spark Advance) system, the ETCS-i (Electronic Throttle Control System-intelligent) has been adopted in the engine control system to realize excellent vehicle maneuverability and comfort. Also, the cruise control system and the engine immobiliser system have been integrated in the ECM.
The engine control system for the 2UZ-FE engine has following system.

System	Outline
SFI (Sequential Multiport Fuel Injection)	● An L-type SFI system directly detects the intake air volume with a hot-wire type mass air flow meter. ● The fuel injection system is a sequential multiport fuel injection system.
ESA (Electronic Spark Advance)	● Ignition timing is determined by the ECM based on signals from various sensors. Corrects ignition timing in response to engine knocking. ● The torque control correction during gear shifting has been used to minimize the shift shock. ● 2 knock sensors are used to further improve knock detection.
ETCS-i (Electronic Throttle Control System-intelligent)	Optimally controls the throttle valve opening in accordance with the amount of the accelerator pedal effort, and the conditions of the engine and the vehicle, and comprehensively controls the ISC, and cruise control.
Fuel Pump Control	Under light engine loads, pump speed is low to reduce electric power loss.
Oxygen Sensor Heater Control	Maintains the temperature of the oxygen sensor at an appropriate level to increase accuracy of detection of the oxygen concentration in the exhaust gas.
Air Conditioning Cut-Off Control	By controlling the air conditioning compressor ON or OFF in accordance with the engine condition, drivability is maintained.
Evaporative Emission Control	The ECM controls the purge flow of evaporative emissions (HC) in the charcoal canister in accordance with engine conditions.
Engine Immobiliser	Prohibits fuel delivery and ignition if an attempt is made to start the engine with an invalid ignition key.
Diagnosis	● When the ECM detects a malfunction, the ECM diagnoses and memorizes the failed section. ● The diagnosis system includes a function that detects a malfunction in the evaporative emission control system.
Fail-Safe	When the ECM detects a malfunction, the ECM stops or controls the engine according to the data already stored in the memory.

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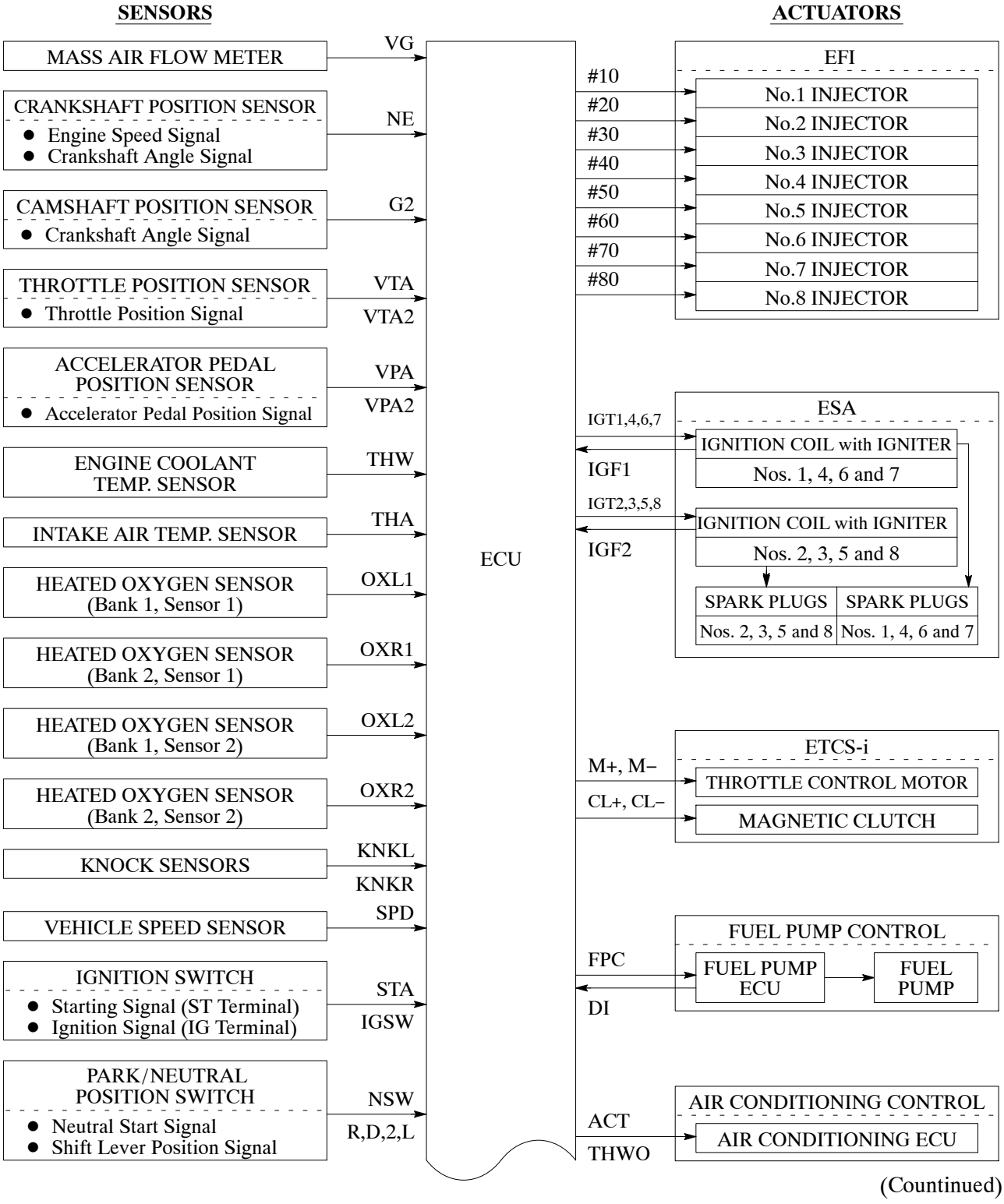
2. Construction

The contigration of the engine control system in the 2UZ-FE engine is shown in the following chart.



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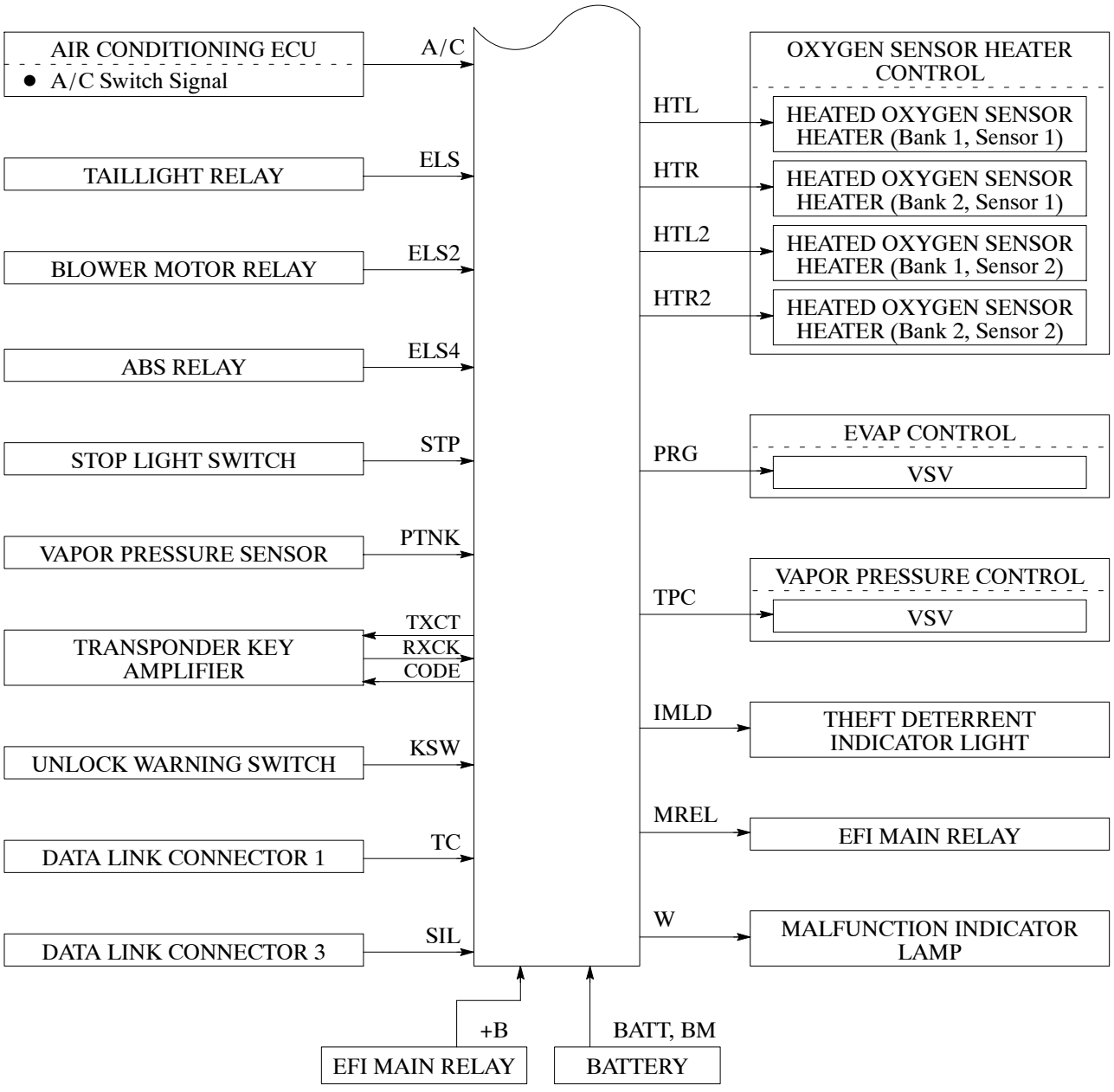

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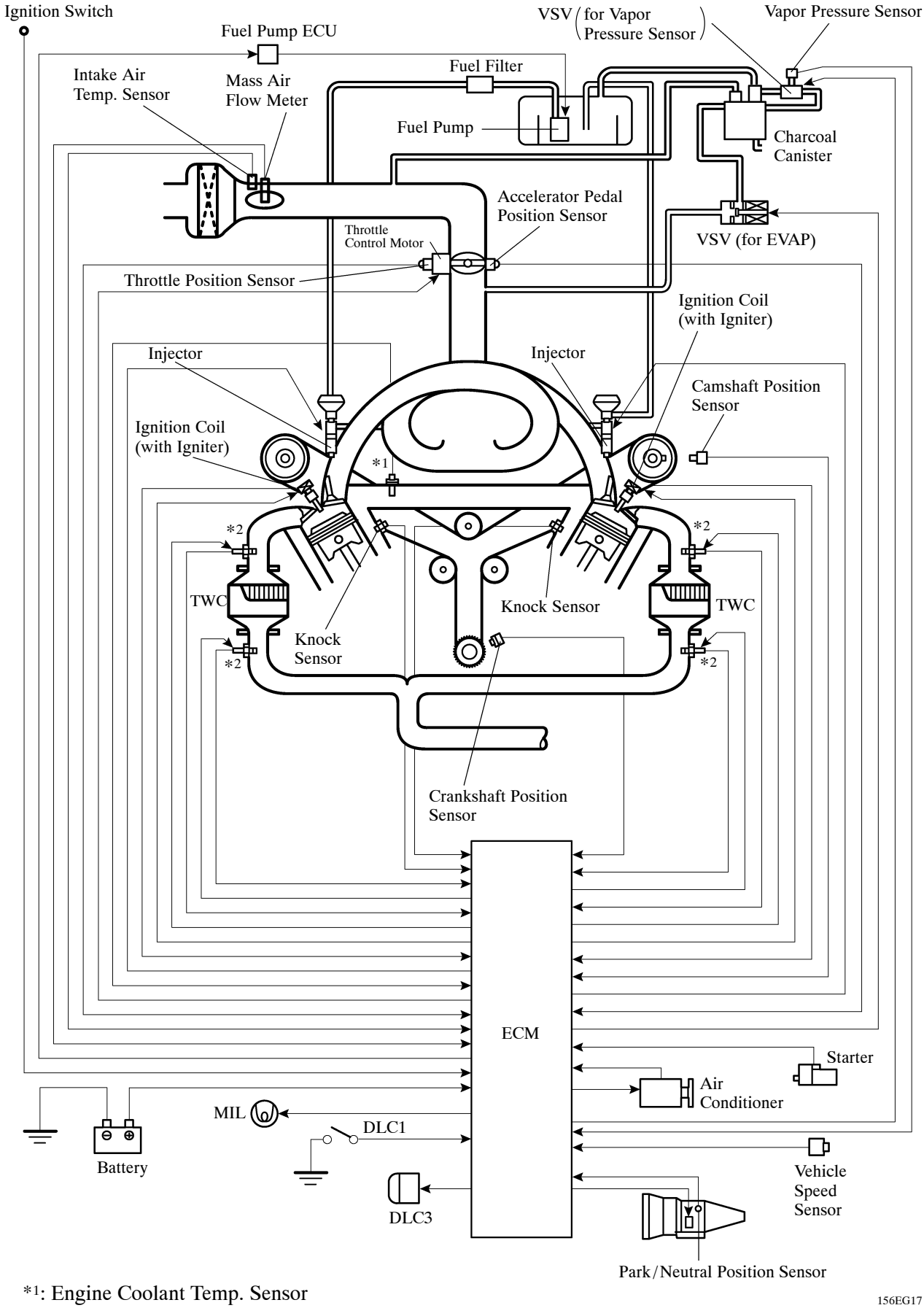
3. Engine Control System Diagram



*1: Engine Coolant Temp. Sensor

*2: Heated Oxygen Sensor

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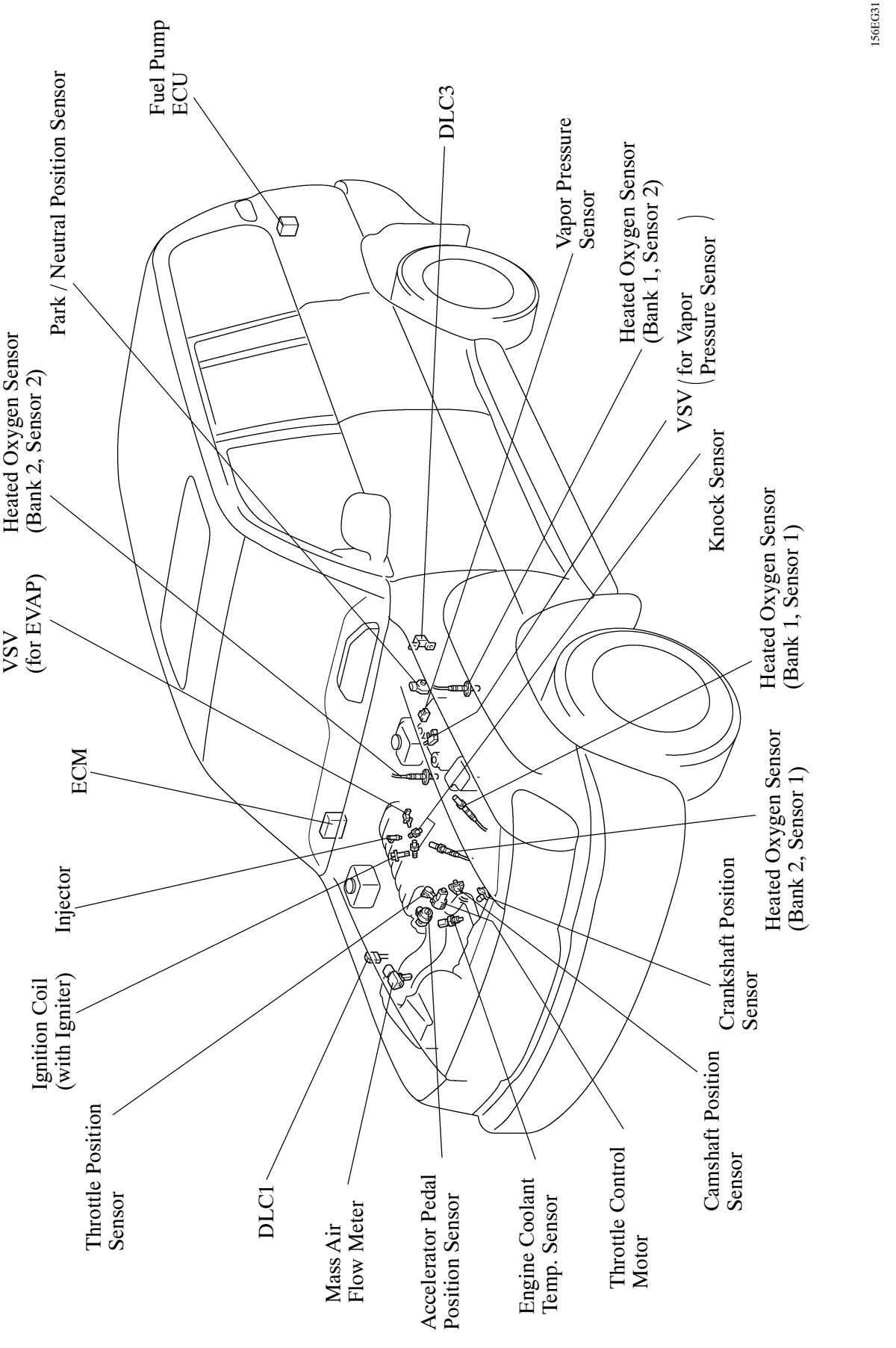
4. Layout of Components



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5. Main Components of Engine Control System

General

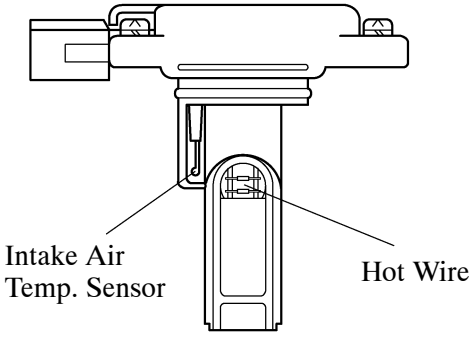
The main components of the 2UZ-FE engine control system are as follows:

Components	Outline
Mass Air Flow Meter	Hot-Wire Type
Crankshaft Position Sensor	Pick-Up Coil Type, 1
Camshaft Position Sensor	Pick-Up Coil Type, 1
Throttle Position Sensor	Linear Type, 2
Accelerator Pedal Position Sensor	Linear Type, 2
Knock Sensor	Built-In Piezoelectric Type, 2
Oxygen Sensor	Heated Oxygen Sensor (Bank 1, Sensor 1) (Bank 2, Sensor 1) (Bank 1, Sensor 2) (Bank 2, Sensor 2)
Injector	4-Hole Type

Mass Air Flow Meter

The 2UZ-FE engine adopts the hot-wire type mass air flow meter designed for direct electrical measurement of the intake air mass flow.
This mass air flow meter offers superior measuring precision and its plastic housing is shaped for minimal flow resistance. It has the following features:

- Compact and lightweight
  The pressure loss caused by this sensor is small and offers only slight intake air flow resistance.
- Superior response and measuring accuracy
- Ability to measure a wide airflow range
- Having no mechanical functions, it offers a superior durability.



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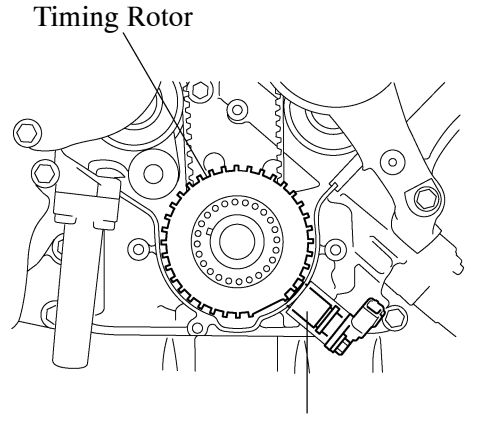
Crankshaft Position Sensor

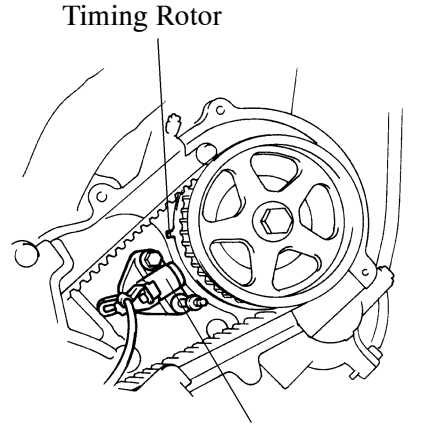
The crankshaft position sensor is mounted on the timing chain cover as illustrated below.
The timing rotor is integrated with the crankshaft pulley. The rotor's teeth are spaced 10° apart, according to crankshaft angle, but since there are 2 teeth missing, as illustrated below, there is a total of 34 teeth.
Accordingly, the ECM can detect the crankshaft angle in addition to the crankshaft speed.



151EG18

Camshaft Position Sensor

The camshaft position sensor is mounted on the left bank cylinder head. To detect the camshaft position, a protrusion that is provided on the timing pulley is used to generate 1 pulse for every 2 revolutions of the crankshaft.



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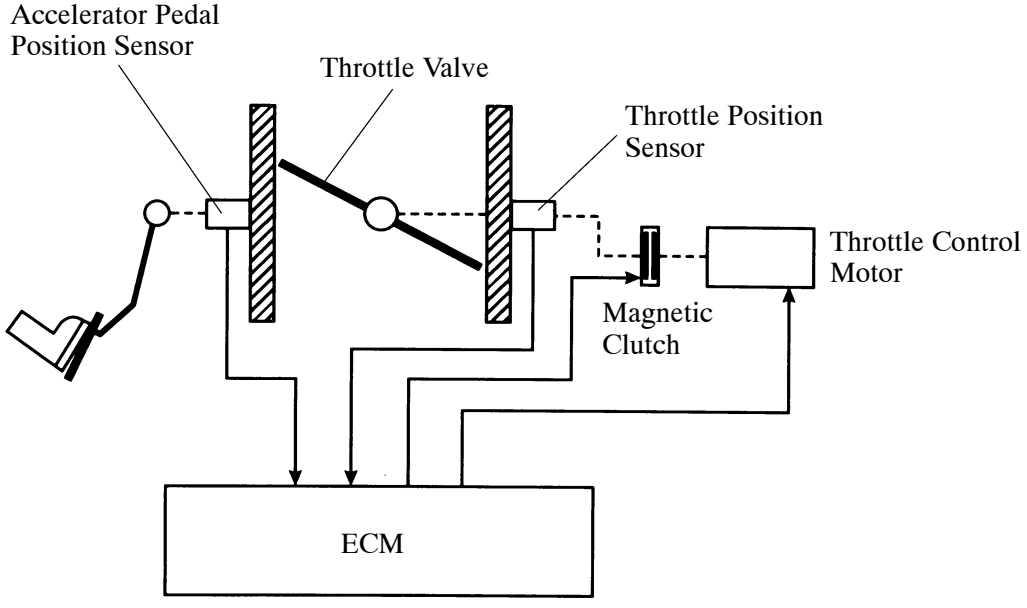
6. ETCS-i (Electronic Throttle Control System-intelligent)

General

- The ETCS-i system, which realizes excellent throttle control in all the operating ranges, has been adopted.
- In the conventional throttle body, the throttle valve opening is determined invariably by the amount of the accelerator pedal effort. In contrast, the ETCS-i uses the ECM to calculate the optimal throttle valve opening that is appropriate for the respective driving condition and uses a throttle control motor to control the opening.
- The ETCS-i controls the ISC (Idle Speed Control) system and the cruise control system.
- A duplicate system is provided to ensure a high level of reliability, and the system shuts off in case of an abnormal condition. Even when the system is shut off, the accelerator pedal can be used to operate the vehicle in the limp mode.



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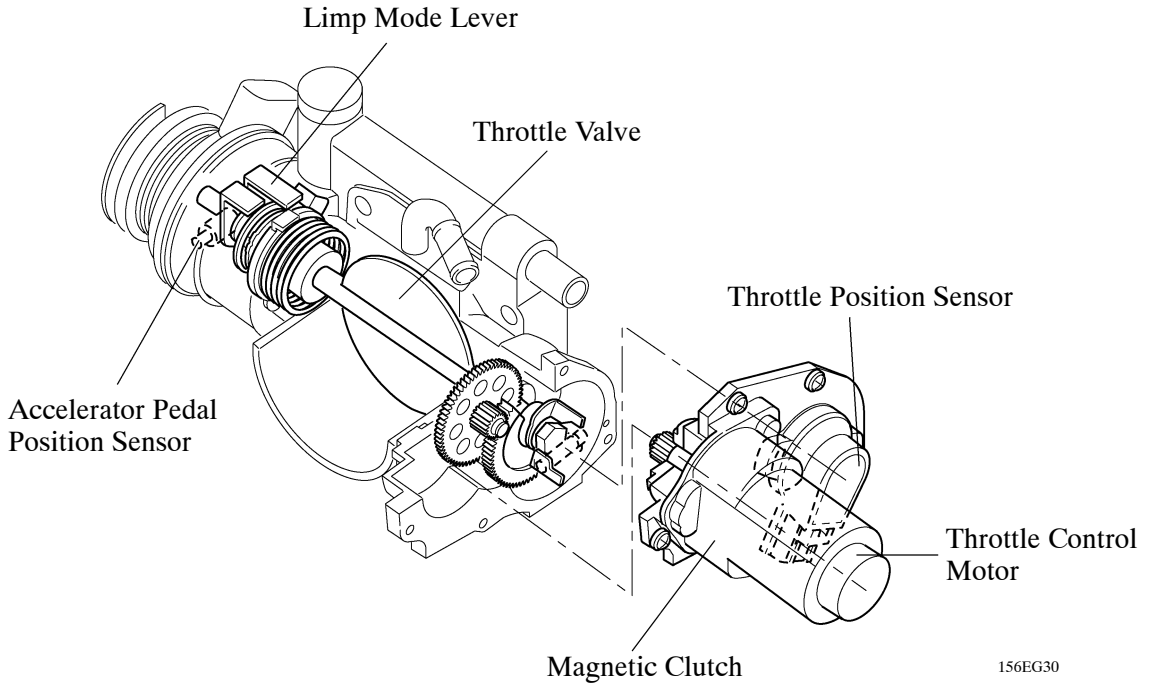
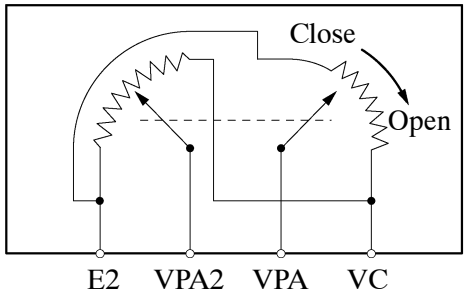
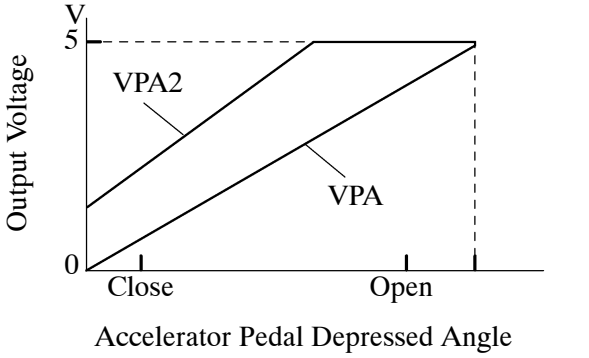
Construction



1) Accelerator Pedal Position Sensor

The accelerator pedal position sensor, which is mounted on the throttle body, is integrated with the throttle lever, which is connected to the cable that extends from the accelerator pedal.
The accelerator pedal position sensor converts the amount of accelerator pedal effort into two types of electrical signals with distinct output characteristics. The signals are then input into the ECM.





2) Throttle Position Sensor

The throttle position sensor converts the throttle valve opening into an electrical signal and inputs into the ECM. The output characteristics are the same as those of the accelerator position pedal sensor.

3) Throttle Control Motor

A DC motor with excellent response and minimal power consumption is used for the throttle control motor. The ECM performs the duty ratio control of the direction and the amperage of the current that flows to the throttle control motor in order to regulate the opening of the throttle valve.

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4) Magnetic Crutch

Ordinarily, the magnetic clutch engages the clutch to enable the throttle control motor to open and close the throttle valve. In case that a malfunction occurs in the system, this clutch is disengaged to prevent the throttle control motor to open and close the throttle valve.

Operation

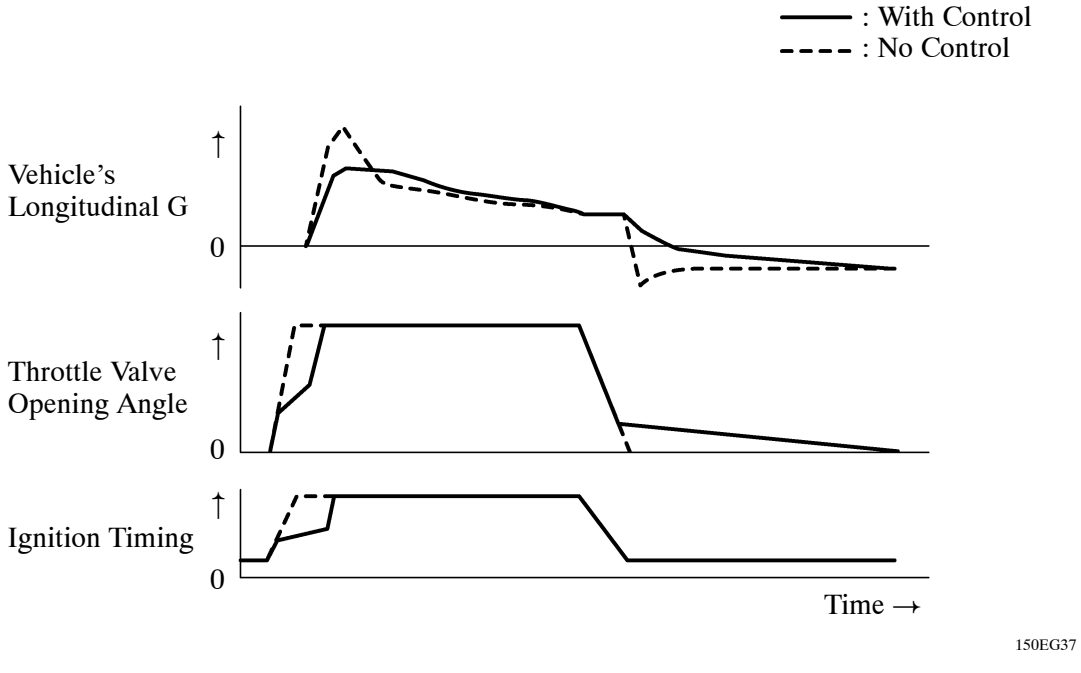
The ECM drives the throttle control motor by determining the target throttle valve opening in accordance with the respective operating condition.

1) Non-Linear Control
2) Idle Speed Control
3) Cruise Control

1) Non-Linear Control

Controls the throttle to an optimal throttle valve opening that is appropriate for the driving condition such as the amount of the accelerator pedal effort and the engine speed in order to realize excellent throttle control and comfort in all operating ranges.

▶ Control Examples During Acceleration and Deceleration ◀



2) Idle Speed Control

Previously, a step motor type IAC valve was used to perform idle speed control such as fast idle during cold operating conditions and idle-up. In conjunction with the adoption of the ETCS-i, idle speed control is now performed by the throttle control motor, which controls the throttle valve opening.

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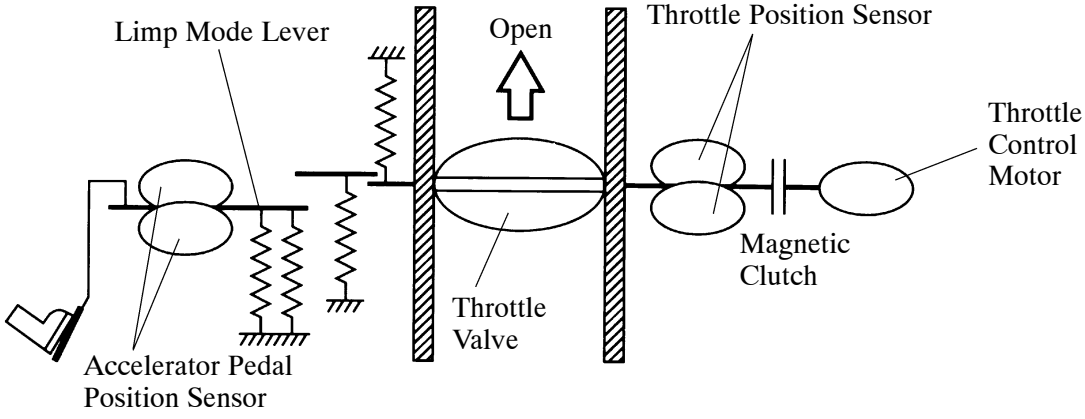
3) Cruise Control

Previously, the vehicle speed was controlled by the cruise control actuator, which opened and closed the throttle valve. Along with the adoption of the ETCS-i, the vehicle speed is now controlled by the throttle control motor, which controls the throttle valve.

Fail-Safe

If an abnormal condition occurs with the ETCS-i, the MIL illuminates to alert the driver. At the same time, the current to the throttle control motor and magnetic clutch are cut off in order not to operate the ETCS-i. This enables the return spring to close the throttle valve.
Even in this situation, the accelerator pedal can be used to operate the limp mode lever, which operates the throttle valve to enable the vehicle to be driven in the limp mode.



150EG42

Diagnosis

The diagnostic trouble codes can be output via DLC3 to an OBD-II scan tool or a hand-held tester. For details, refer to the '98 Land Cruiser Repair Manual (Pub. No. RM615U).

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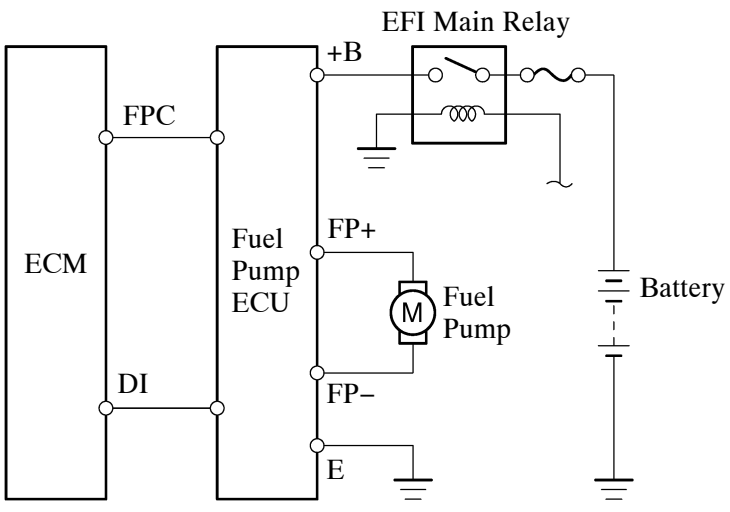
7. Fuel Pump Control

The fuel pump speed control has adopted a fuel pump ECU to execute 3-step fuel pump speed control.

▶ System Diagram ◀



152EG11

FPC Signal	Fuel Pump Speed
5V / 0V	Hi
8.2 ms, 5V / 0V	Mid
4.1 ms, 5V / 0V	Low
5V / 0V	Stop

152EG12

EG

8. Engine Immobiliser System

The engine immobiliser system has been designed to prevent the vehicle from being stolen. This system uses a ECM that stores the ID code of the authorized ignition key. If an attempt is made to start the engine using an unauthorized key, the ECM prohibit fuel delivery and ignition, effectively disabling the engine.

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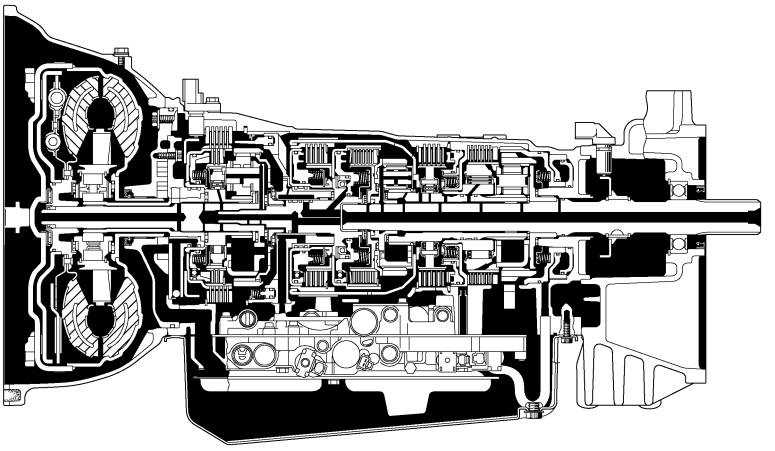
CHASSIS

A343F AUTOMATIC TRANSMISSION

■DESCRIPTION

As in the previous model, the A343F automatic transmission is used on the new model. However, the followings are changed;

- In conjunction with the adoption of the 2UZ-FE engine, the torque converter clutch and the planetary gear unit have been redesigned to accommodate the high power output.
- The ECM regulates the solenoid valve SLT to control the line pressure.
- An O/D direct clutch speed sensor has been adopted to detect the input shaft speed in order to realize smooth shift characteristics.



155CH01

▶ Specifications ◀

Model / Transmission Type / Engine Type / Item		New A343F 2UZ-FE	Previous A343F 1FZ-FE
Gear Ratio	1st	2.804	←
	2nd	1.531	←
	3rd	1.000	←
	4th (Overdrive)	0.753	←
	Reverse	2.393	←
Fluid Capacity Liters (US qts, Imp. qts)		12.0 (12.7, 10.6)	11.7 (12.4, 10.3)
Fluid Type		ATF D-II or DEXRON®III (DEXRON®II)	←

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■TORQUE CONVERTER CLUTCH AND PLANETARY GEAR UNIT

The following items have been modified to accommodate the high performance 2UZ-FE engine.

- The shape of the turbine blades in the torque converter clutch has been optimized.
- The rear planetary gears have been strengthened by changing from the 4-pinion to 5-pinion configuration.

▶ Torque Converter Clutch ◀

Model / Transmission Type / Engine Type / Item	New A343F 2UZ-FE	Previous A343F 1FZ-FE
Converter Type	3-Element, 1-Step, 2-Phase, with Lock-Up Mechanism	←
Stall Torque Ratio	1.800	←
Nominal Diameter mm (in.)	272 (10.7)	←

▶ Planetary Gear Unit ◀

Model / Transmission Type / Engine Type / Item			New A343F 2UZ-FE	Previous A343F 1FZ-FE
C_0	OD Direct Clutch	No. of Discs	2	←
C_1	Forward Clutch	No. of Discs	7	6
C_2	Direct Clutch	No. of Discs	5	4
B_0	OD Brake	No. of Discs	5	←
B_1	2nd Coast Brake	Band Width mm (in.)	40 (1.57)	←
B_2	2nd Brake	No. of Discs	5	←
B_3	1st & Reverse Brake	No. of Discs	7	←
F_0	OD One-Way Clutch	No. of Sprags	24	←
F_1	No.1 One-Way Clutch	No. of Sprags	22	←
F_2	No.2 One-Way Clutch	No. of Sprags	28	←
Front Planetary Gear		No. of Sun Gear Teeth	42	←
		No. of Pinion Gear Teeth	19	←
		No. of Ring Gear Teeth	79	←
Rear Planetary Gear		No. of Sun Gear Teeth	33	←
		No. of Pinion Gear Teeth	23	←
		No. of Ring Gear Teeth	79	←
OD Planetary Gear		No. of Sun Gear Teeth	31	←
		No. of Pinion Gear Teeth	33	←
		No. of Ring Gear Teeth	95	←

CH

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■ELECTRONIC CONTROL SYSTEM

1. General

Based on the A343F of the previous model, the electronic control system of the new model's A343F automatic transmission has newly adopted the line pressure control using a linear solenoid valve and the O/D direct clutch speed sensor that detects the transmission's input shaft speed.
The electronic control system of the new model's A343F and the previous model's A343F are compared below.

System	Function	New A343F	Previous A343F
Shift Timing Control	The optimum shift pattern is selected from 2 shift patterns in the ECM by the pattern select switch. The ECM sends current to the solenoid valve No.1 and/or No.2 based on signals from each sensor and shifts the gear.	○	○
Lock-Up Timing Control	The optimum lock-up pattern is selected from 2 lock-up patterns in the ECM by the pattern select switch. The ECM sends current to the solenoid valve SL based on signals from each sensor and engages or disengages the lock-up clutch.	○	○
Line Pressure Control	Based on the throttle opening angle, the ECM sends a signal to solenoid valve SLT to generate line pressure according to the engine output, to effect a smooth gear shift change.	○	—
"N" to "D" Squat Control	When the shift lever is shifted from "N" to "D" range, the gear is temporarily shifted to OD and then to 1st to reduce vehicle squat.	○	○
Engine Torque Control	Retards the engine ignition timing temporarily to improve shift feeling during up or down shifting.	○	○
2nd Start System	Enabling the vehicle to take off in the 2nd gear and thus make it easy to take off on snowy, sandy or muddy terrain.	○	○
Self-Diagnosis	Causes the malfunction indicator lamp to turns on to inform the driver when the electrical circuit malfunctions.	○	○
Fail-Safe	Controls other normally operating components, permitting continued driving when malfunctions occur in the electrical circuit.	○	○

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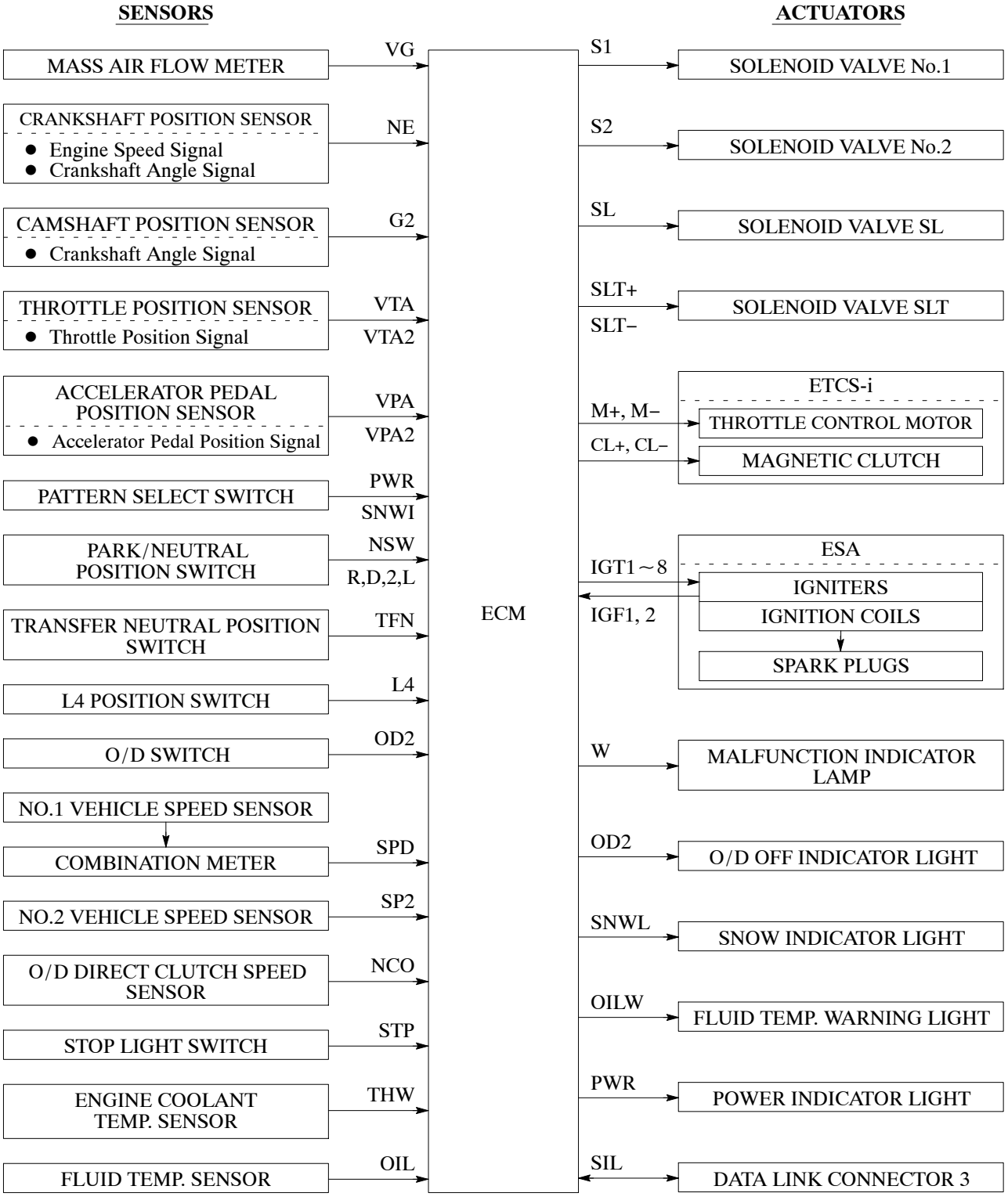
2. Construction

The configuration of the electronic control system in the new model's A343F is as shown in the following chart.



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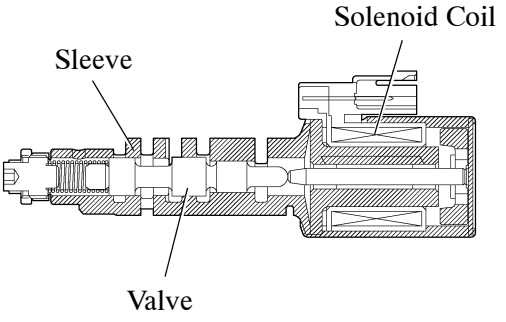
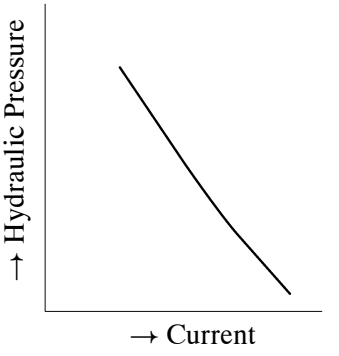
3. Construction and Operation of Main Components

Solenoid Valve SLT

In order to provide a hydraulic pressure that is in proportion to the current that flows to the solenoid coil, the solenoid valve SLT linearly controls the line pressure based on the signals it receives from the ECM.



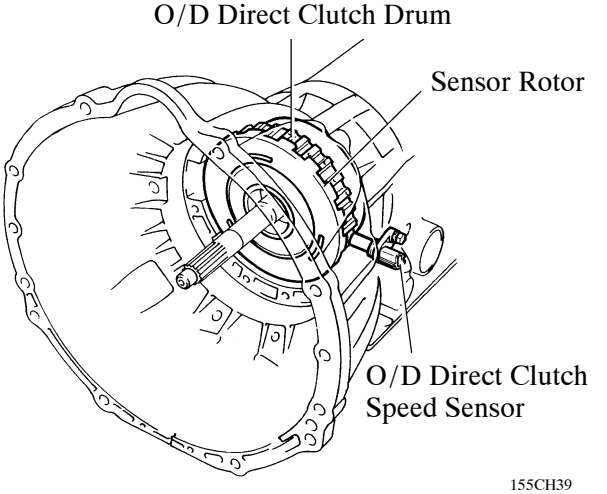
155CH02



155CH03

O/D Direct Clutch Speed Sensor

The O/D direct clutch speed sensor is fitted to the transmission case to detect revolution of the transmission input shaft.
The sensor rotor is fitted to the O/D direct clutch drum.



155CH39

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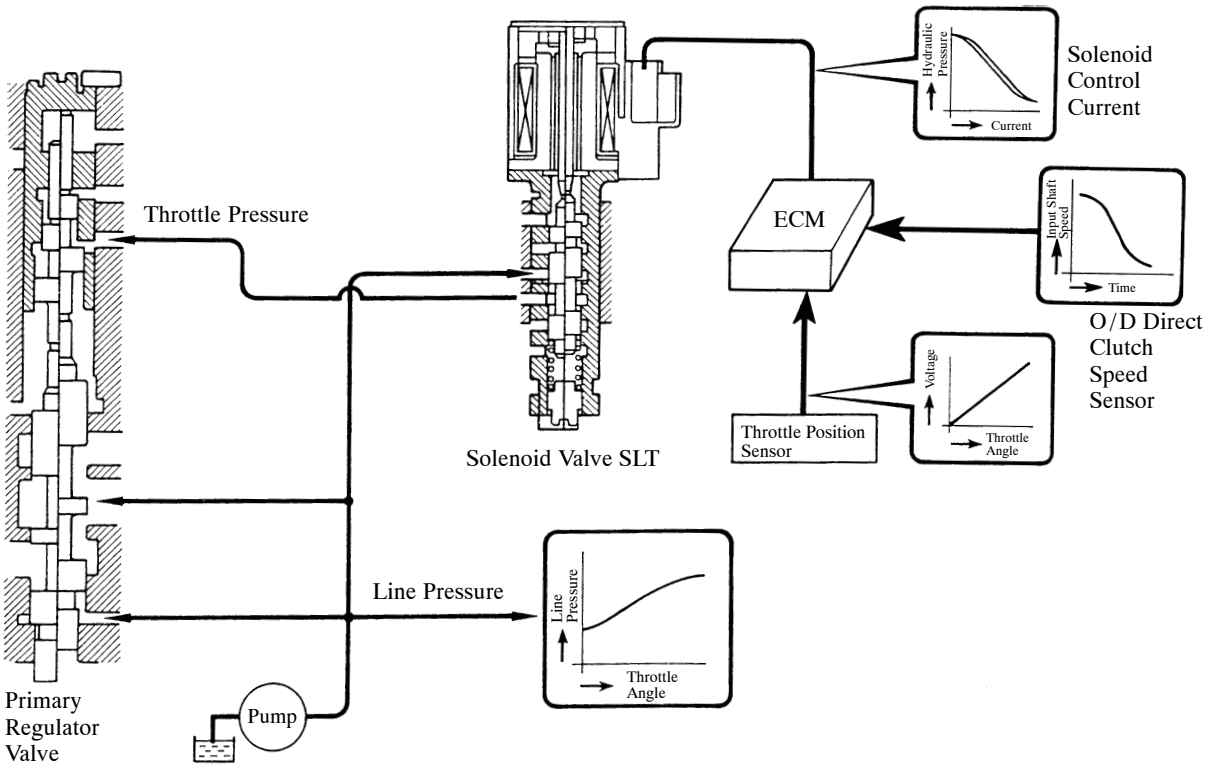
4. Function of ECM

Line Pressure Control

The previous mechanical control, which consisted of a throttle cable, cam, and throttle valve, has been changed to an electronic control system that uses a solenoid valve SLT.
In order to obtain a predetermined line pressure characteristic according to the throttle position sensor (VTA) signal, the ECM activates the solenoid valve SLT to regulate the throttle pressure.
This makes it possible for the primary regulator valve to precisely and minutely control the line pressure, in accordance with the engine output, and thus realize smoother shift characteristics.
And also, the ECM detects the speed of the transmission input shaft to determine whether or not the transmission is shifting properly in order to ensure the smooth engagement of the clutch.
To ensure the optimal speed changes in the transmission input shaft, the ECM controls the solenoid valve SLT to finely regulate the line pressure.



155CH04

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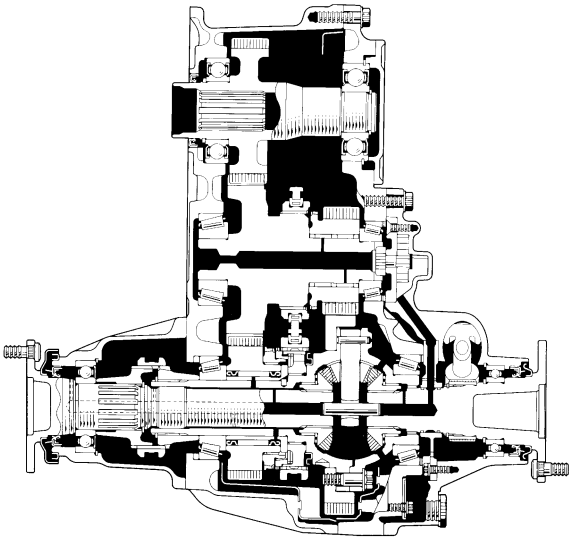
HF2A TRANSFER

■ DESCRIPTION

The new model has adopted an HF2A type full-time 2-speed transfer, which integrates a center differential with a differential lock mechanism.
The basic construction and operation of the transfer are the same as those of the previous HF2AV transfer, from which the viscous coupling type LSD has been excluded.



155CH46

▶ Specifications ◀

Model / Transfer Type / Item		New	Previous
		HF2A	HF2AV
Reduction Gear Type		Idler Gear	←
Gear Ratio	High Speed Range	1.000	←
	Low Speed Range	2.488	←
LSD		–	Viscous Coupling
Oil Capacity	Liters (US qts, Imp. qts)	1.3 (1.4, 1.1)	1.7 (1.8, 1.5)
Oil Viscosity		SAE 75W-90	←
Oil Grade		API GL-4 or GL-5	←

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PROPELLER SHAFT

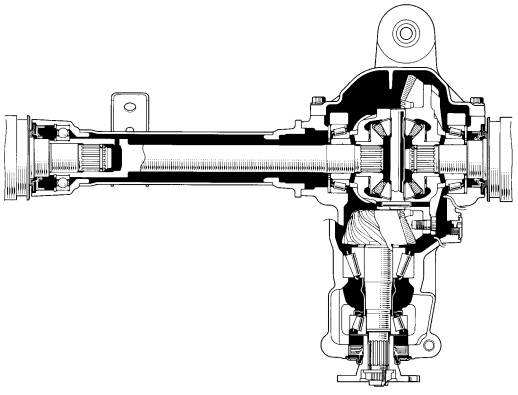
■ DESCRIPTION

As in the previous model, both front and rear propeller shafts have adopted the 2-joint type propeller shaft with a center sliding mechanism.

DIFFERENTIAL

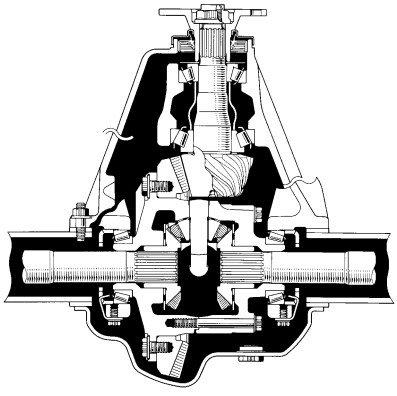
■ DESCRIPTION

- A front differential that supports the independent front suspension has been adopted.
- A 9.5-inch ring gear has been adopted in the rear differential. Also, the differential lock mechanism is available as an option.



155CH47

Front Differential



155CH48

Rear Differential

▶ Specifications ◀

Item \ Differential	Front	Rear
Ring Gear Size in.	8”	9.5”
Reduction Gear Ratio	4.300	←
Number of Differential Pinions	2	4
Oil Capacity liters (US qts, Imp. qts)	1.7 (1.8, 1.4)	3.3 (3.5, 2.9) 3.2 (3.4, 2.8)*1
Oil Viscosity	SAE 90*2, SAE 80W or 80W-90*3	←
Oil Grade	API GL-5	←

*1 With differential lock mechanism
*2 Temperatures above −18°C (0°F)
*3 Temperatures below −18°C (0°F)

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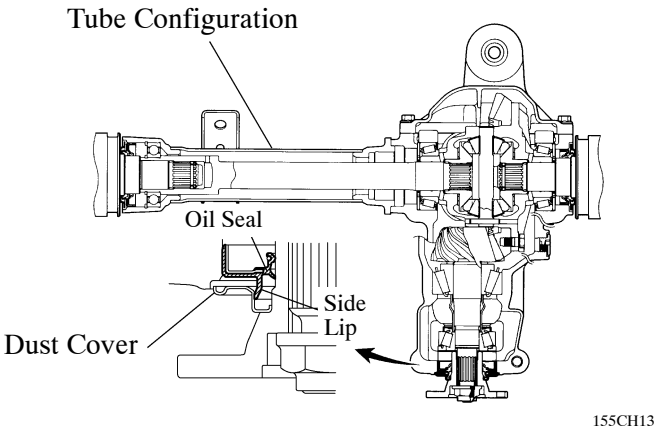
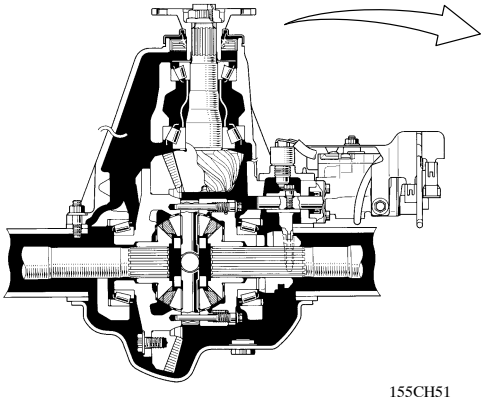
■ FRONT DIFFERENTIAL

- A front differential that supports the independent front suspension has been adopted.
- The differential carrier has adopted a tube configuration to equalize the lengths of the right and left drive shafts.
- For the purpose of improving dust resistance, a type of oil seal with a side lip that contacts the dust cover has been adopted.

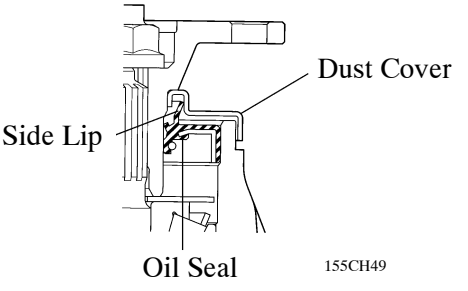


■ REAR DIFFERENTIAL

- The tooth configuration of the gears has been optimized to reduce noise and vibration.
- Similar to the front differential, a type of oil seal with a side lip that contacts the dust cover has been adopted.



With Differential Lock Mechanism



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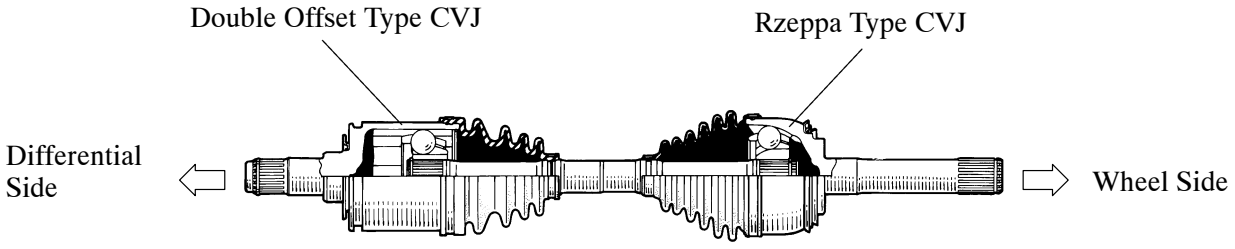
FRONT DRIVE SHAFT

■ DESCRIPTION

In conjunction with the adoption of the independent front suspension, drive shafts which use the double offset type CVJ (Constant-Velocity Joint) on the differential side, and the Rzeppa type CVJ on the wheel side have been adopted.

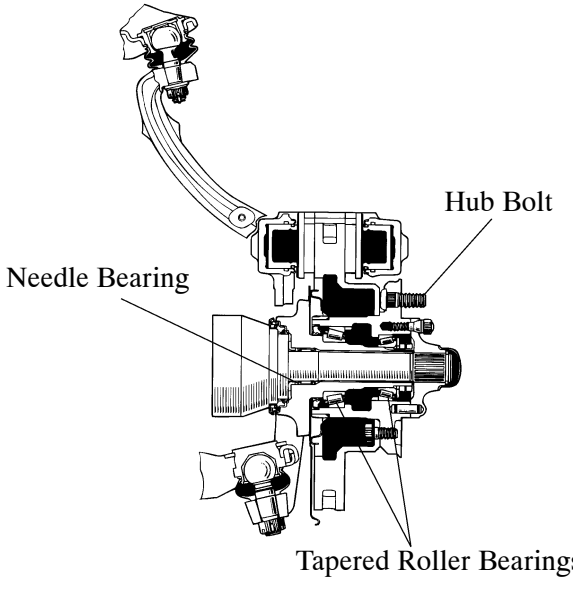


155CH52

AXLES

■ FRONT AXLE

- Tapered roller bearings are used on the front axle. Also, a needle bearing is used between the steering knuckle and the drive shaft.
- The hub bolt's size, quantity, and PCD (Pitch Circle Diameter) have been changed.



155CH53

▶ Specifications ◀

Model / Item	New	Previous
Hub Bolt Size	M14 x 1.5	M12 x 1.5
No. of the Hub Bolt	5	6
P.C.D mm (in.)	150 (5.9)	139.7 (5.5)
Hub Nut Size*	22	21

*: Width Across Flat

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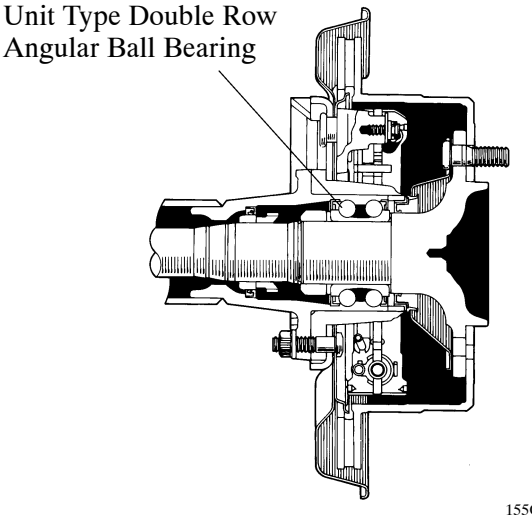
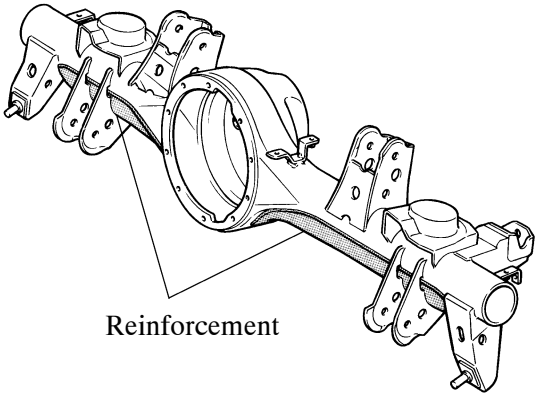
■ REAR AXLE

- The semi-floating axle is used for the rear axle.
- Unit type double-row angular ball bearing is used.
- The axle housing is provided with large reinforcements to realize excellent rigidity.



155CH54



155CH55

BRAKES

■ DESCRIPTION

The brakes of the new model have following features.

- Four-piston opposed type calipers with reduced brake drag are used for the front brakes.
- The rear brake caliper has been changed to the FSX14 type caliper from the FS14 type caliper.
- The shape of the parking brake lever has been changed.
- A double-link type variable lever ratio brake pedal has been adopted.
- A hydraulic brake booster in which the ABS actuator and the P & B valve are integrated has been adopted.

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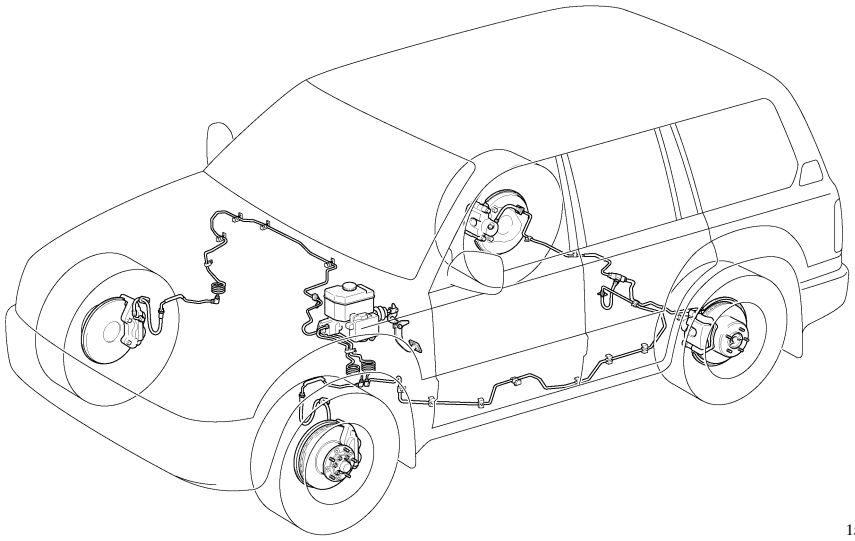

155CH16

▶ Specifications ◀

Model / Item			New	Previous
Master Cylinder	Type		Single (Double Piston)	Tandem
	Diameter	mm (in.)	26.99 (1.06)	25.4 (1.00)
Brake Booster Type			Hydraulic	Vacuum
Front Brake	Type		Ventilated Disc	←
	Caliper Type		S14 + 12	S13 + 13
	Pad Area	cm^2 ($in.^2$)	58 (8.99)	50 (7.75)
	Wheel Cylinder Dia.	mm (in.)	48.1 x 2 + 42.85 x 2 (1.89 x 2 + 1.69 x 2)	45.4 x 2 + 45.4 x 2 (1.79 x 2 + 1.79 x 2)
	Rotor Size (D x T)*1	mm (in.)	313 x 32 (12.32 x 1.26)	311 x 32 (12.24 x 1.26)
Rear Brake	Type		Ventilated Disc	←
	Caliper Type		FSX14	FS14
	Pad Area	cm^2 ($in.^2$)	36 (5.58)	37 (5.74)
	Wheel Cylinder Dia.	mm (in.)	48.1 (1.89)	←
	Rotor Size (D x T)*1	mm (in.)	329.4 x 18 (12.97 x 0.71)	335 x 18 (13.19 x 0.71)
Brake Control Valve Type			P & B Valve*2	LSP & B Valve
Parking Brake	Type		Drum	←
	Size	mm (in.)	230 (9.06)	←
	Lever Type		Center Lever	←
ABS			STD	←

*1: D: Outer Diameter, T: Thickness

*2: Enclosed in Hydraulic Brake Booster

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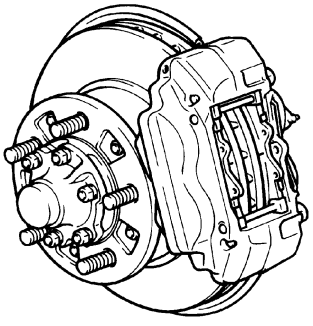
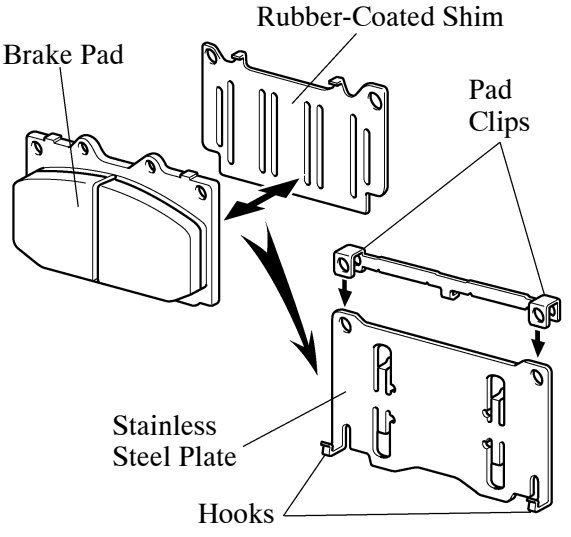
■ FRONT BRAKE

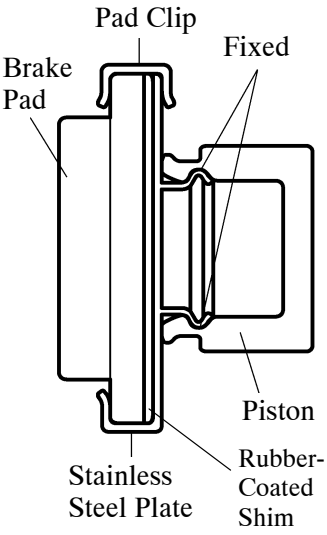
The brake caliper with low brake drag is used on the new model. This caliper uses a stainless steel plate that is secured onto the piston. The plate has hooks that insert into the brake pad, and pad clips are used to secure the brake pad together with the rubber-coated shim onto the stainless steel plate.
When the brake is released, and as the piston retracts, this construction allows the brake pad to separate from the disc rotor, thus reducing the brake drag.
Furthermore, the size of the piston seal has been revised to increase the amount of piston retraction.



155CH56



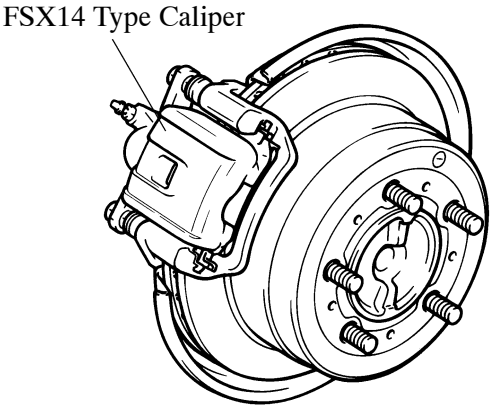
155CH11



155CH12

■ REAR BRAKE

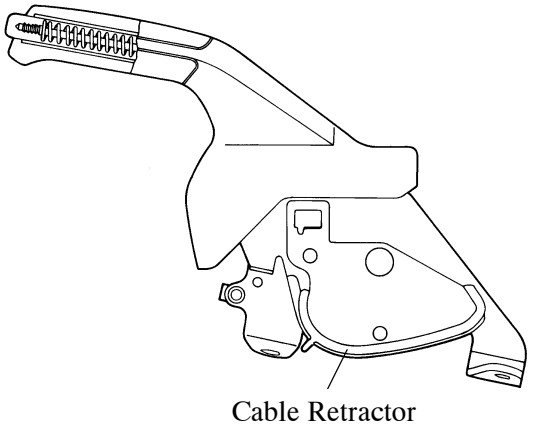
The FSX14 type brake caliper is used on the new model.



155CH57

■ PARKING BRAKE

The shape of the parking brake lever's cable retractor has been changed to reduce the amount of the lever travel and to improve the operating feeling.



155CH58

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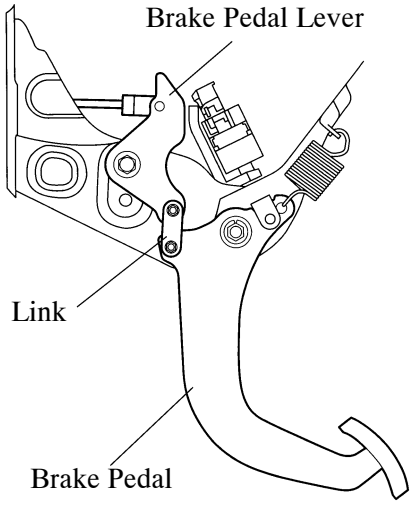
■ BRAKE PEDAL

1. General

A double-link type variable lever ratio brake pedal has been adopted to provide an excellent brake feeling.



155CH59

2. Construction

The link-type variable lever ratio brake pedal has adopted a construction in which the brake pedal and brake pedal lever are joined by a link to vary the lever ratio.

3. Operation

Small Pedal Stroke

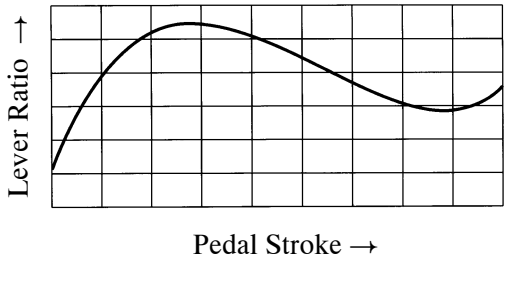
When the pedal stroke is small, the lever ratio is set small, assuming a normal gradual brake application. Thus, the brake fluid is delivered quickly into the calipers to effect smooth braking.

Medium Pedal Stroke

When the pedal stroke is medium, the lever ratio is set large, assuming a full brake application such as sudden braking. Thus, the brake pedal effort is minimized.

Large Pedal Stroke

When the pedal stroke is large, the lever ratio is set small in order to provide an appropriate amount of pedal rigidity. Thus, proper pedal response is realized.



155CH60

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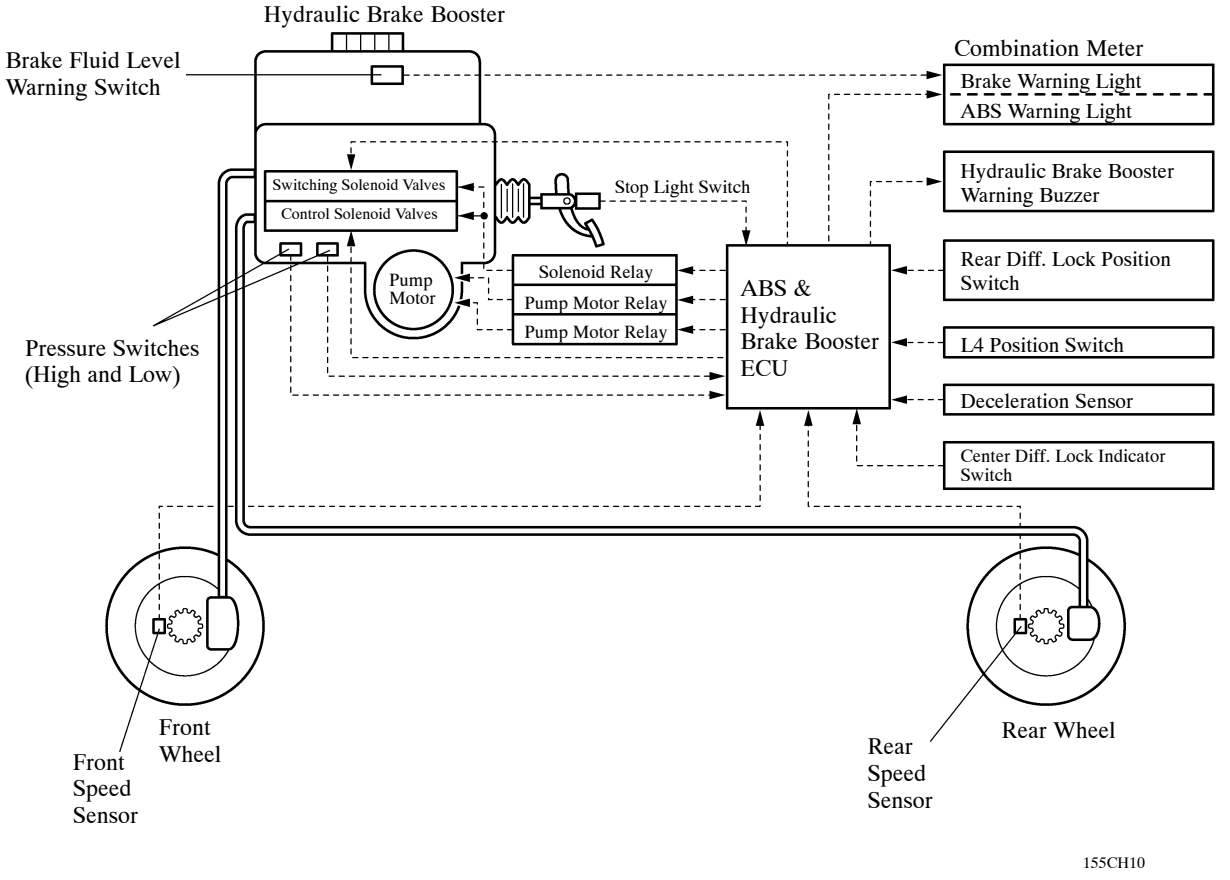
■ABS

1. General

- The ABS actuator and the hydraulic brake booster have been integrated to form a compact actuator.
- The hydraulic brake booster uses the brake fluid that has been stored under high pressure to provide a power assist to the pedal effort that is applied to the brake pedal. Furthermore, the brake fluid that has been stored under high pressure is also used as the hydraulic pressure for controlling the ABS.

2. System Diagram



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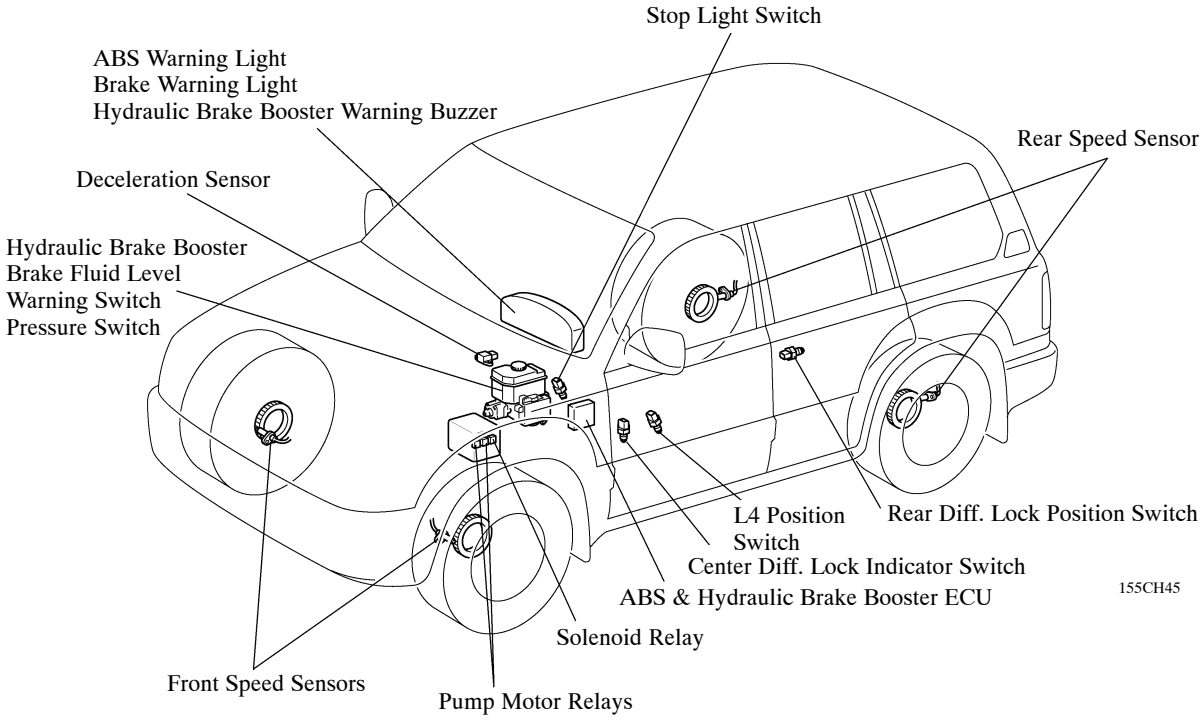
3. Layout of Components



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4. Function of Components

Components	Function
Speed Sensors	Detect the wheel speed of each of four wheels.
Deceleration Sensor	Detects the vehicle's acceleration in the longitudinal direction.
ABS & Hydraulic Brake Booster ECU	Controls the operation of the ABS brake and the hydraulic brake booster based on the signals received from the speed sensors, the deceleration sensor, the pressure switches, etc.
Brake Fluid Level Warning Switch	Detects the brake fluid level.
Hydraulic Brake Booster	● Assists with the pedal effort applied to the brake pedal. ● Changes the fluid path based on the signals from the ABS & hydraulic brake booster ECU during the operation of the ABS, in order to control the fluid pressure that is applied to the wheel cylinders.
Pump Motor Relays	Control the pump motor operation in the hydraulic brake booster.
Solenoid Relay	Supply power to the solenoid valves in the hydraulic brake booster.
ABS Warning Light	Lights up to alert the driver when the ECU detects the malfunction in the ABS.
Brake Warning Light	Lights up to alert the driver when the ECU detects the malfunction in the brake system.
Hydraulic Brake Booster Warning Buzzer	Emits a continuous sound to inform the driver that the ECU detects a malfunction in the hydraulic brake booster.
Stop Light Switch	Detects the brake signal.
Rear Diff. Lock Position Switch	Detects the condition of the rear differential lock.
L4 Position Switch	Detects the transfer shifted in the low.
Center Diff. Lock Indicator Switch	Detects the condition of the center differential lock.
Pressure Switches	Monitors the hydraulic pressure of the accumulator and outputs control signals for the pump motor. There are two types: the pressure switch PH for controlling the pump, and the pressure switch PL for giving a warning when the pressure is low.

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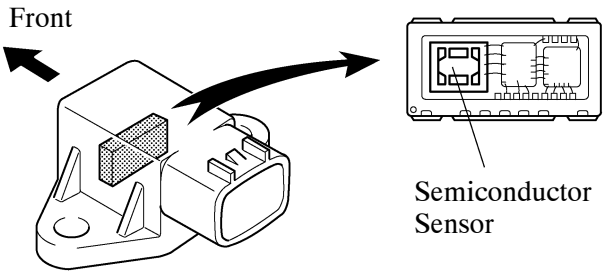
5. Construction and Operation of Main Components

Deceleration Sensor

A deceleration sensor that uses a semiconductor sensor is provided inside the center console.
When a force is applied to the deceleration sensor, the semiconductor sensor flexes, and this distortion is measured and converted into an electric signal.
This semiconductor sensor is used to detect the acceleration and deceleration rate in the vehicle's longitudinal direction.



155CH34

Hydraulic Brake Booster

The hydraulic brake booster consists of the following components:

Components	Function
Pump and Pump Motor	Draws up the brake fluid from the reservoir tank and provides high hydraulic pressure to the accumulator.
Accumulator	Stores the hydraulic pressure that was generated by the pump. The accumulator is filled with high-pressure nitrogen gas.
Pressure Switches	Monitors the hydraulic pressure of the accumulator and outputs control signals for the pump motor. There are two types: the pressure switch PH for controlling the pump, and the pressure switch PL for giving a warning when the pressure is low.
Relief Valve	Returns the brake fluid to the reservoir tank to prevent excessive pressure if the pump operates continuously due to a malfunction of the pressure switch.
Reservoir Tank	Stores the brake fluid.
Brake Fluid Level Warning Switch	Detects the low brake fluid level.
Master Cylinder	Generates the hydraulic pressure that is provided to the wheel cylinders during normal braking.
Brake Booster	Regulates the accumulator pressure in accordance with the pedal effort that is applied to the brake pedal and introduces this pressure to the booster chamber in order to provide a power assist to the brakes.
P & B Valve	Controls the hydraulic pressure of the rear brake system to achieve an appropriate distribution of front/rear braking force. However, if the front brake system fails, the P & B valve does not control the hydraulic pressure of the rear brake system.
Switching Solenoid Valves (SA1, SA2)	Switches the brake hydraulic path when the ABS is activated, or normal braking is applied.
Control Solenoid Valves (Pressure Holding Valves Pressure Reduction Valves)	Controls the hydraulic pressure that is applied to the wheel cylinders during ABS control.

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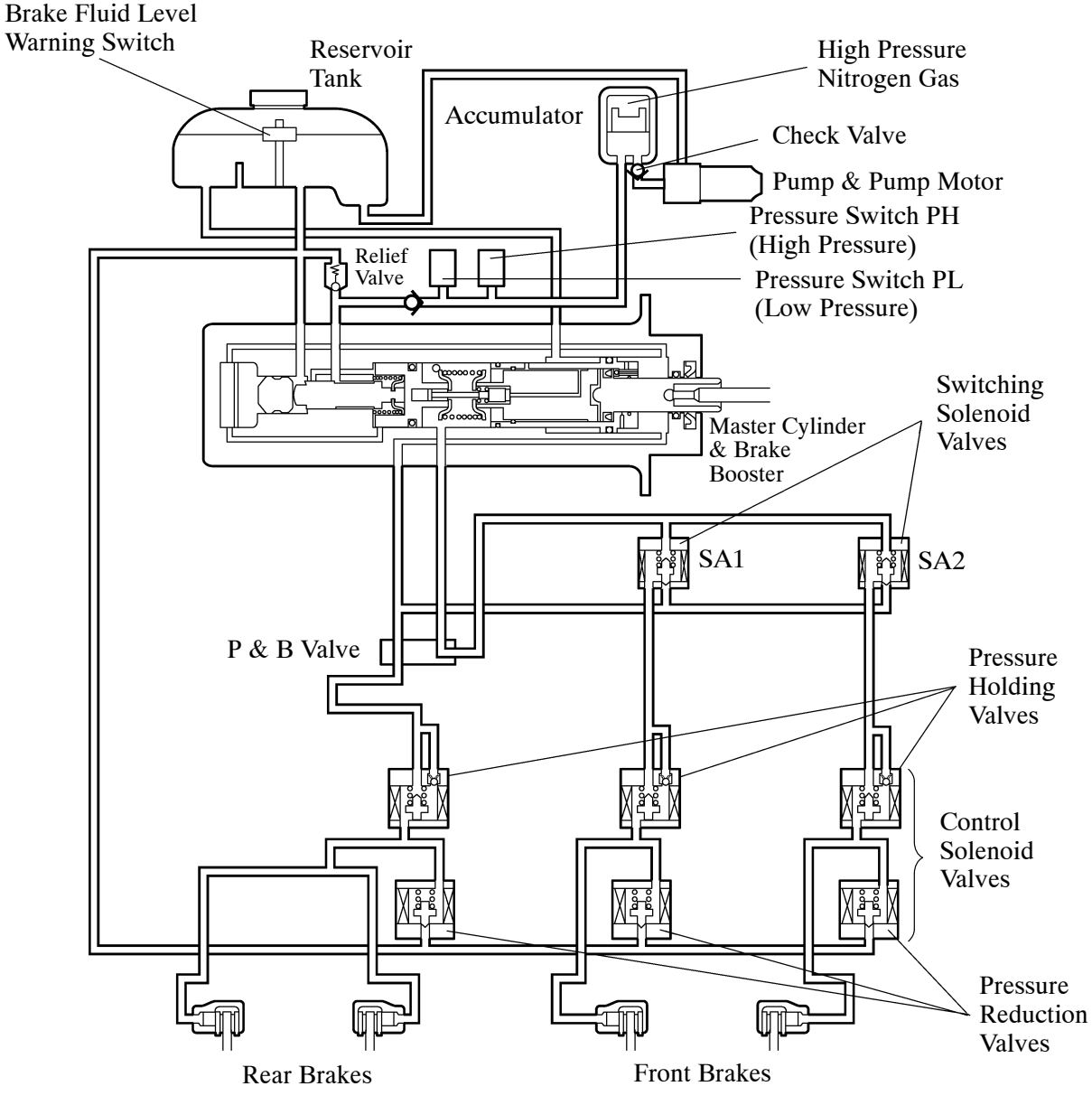
▶ Hydraulic Circuit ◀



155CH61

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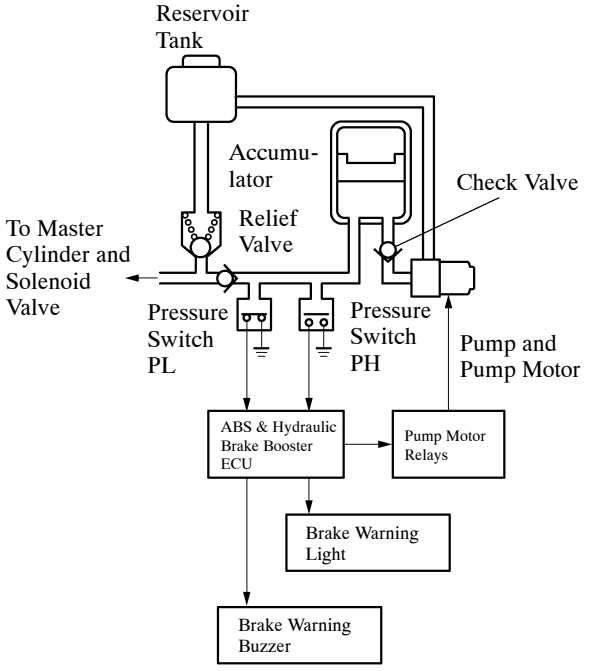
1) Pump, Pump Motor, Accumulator, Pressure Switches and Relief Valve

If the accumulator pressure becomes lower than the pressure that is specified in the pressure switch PH, which is used for detecting high pressure, the pressure switch PH turns OFF. Then, the ABS & hydraulic brake booster ECU turns ON the pump motor relays to operate the pump motor and the pump.
The brake fluid that is discharged by the pump passes through the check valve and is stored in the accumulator. The hydraulic pressure that is stored in the accumulator is used for providing the hydraulic pressure that is needed for normal braking and for operating the ABS.
If the accumulator pressure becomes higher than the pressure that is specified in the pressure switch PH, the pressure switch PH turns ON. Then, after several seconds, the ABS & hydraulic brake booster ECU turns OFF the pump.
At this time, if the pressure switch PH malfunctions and causes the pump to operate continuously, the relief valve opens to prevent excessive pressure from being generated.
Moreover, if the accumulator pressure becomes lower than the pressure that is specified in the pressure switch PL, which is used for detecting low pressure, the pressure switch PL turns OFF. As a result, the brake warning light turns ON and the brake warning buzzer activates.
As this time, the ABS is prohibited from operating.



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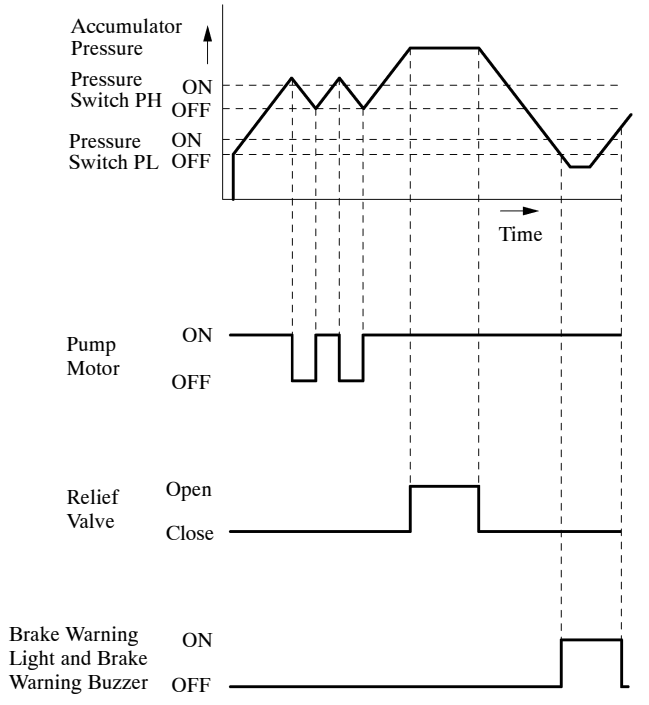

155CH97

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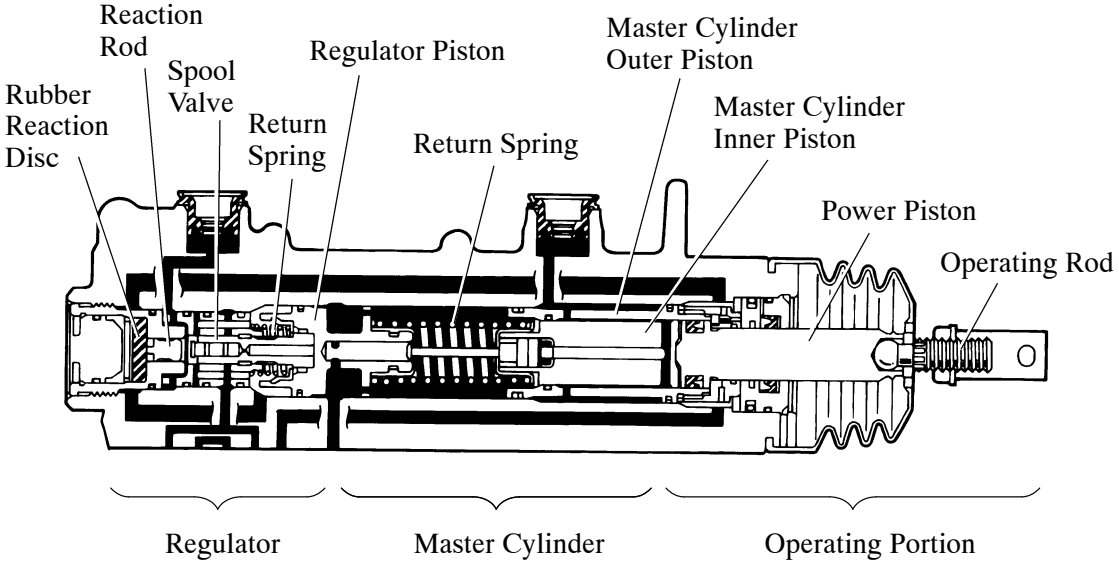
2) Master Cylinder and Brake Booster

a. Construction

- This construction enables the hydraulic pressure that is generated by the brake booster to be applied directly to the rear brakes.
- The master cylinder is the center port type single master cylinder, which is used for the front brakes only.
- The brake booster is integrated with the master cylinder. The operating portion, master cylinder, and regulator are positioned coaxially to achieve a simple and compact construction.
- The master cylinder and brake booster consists of an operating rod, a power piston, master cylinder pistons, a regulator piston, a spool valve, a reaction rod and a rubber reaction disc.
- The operating rod and the power piston are linked directly to transmit the pedal effort that is applied to the brake pedal.
- The regulator piston and the spool valve are linked directly. A forward (leftward) force generated by the master cylinder pressure and a rearward (rightward) force generated by the power assist of the booster are applied to the regulator piston. Both forces maintain a balance.
- The regulator piston's return spring is provided for the regulator piston to ensure the return of the spool valve.
- The master cylinder pistons have adopted a dual construction consisting of outer and inner pistons. Ordinarily, the outer and inner pistons operate in unison. If the accumulator pressure is not applied, only the inner piston operates to ensure braking force.



155CH62

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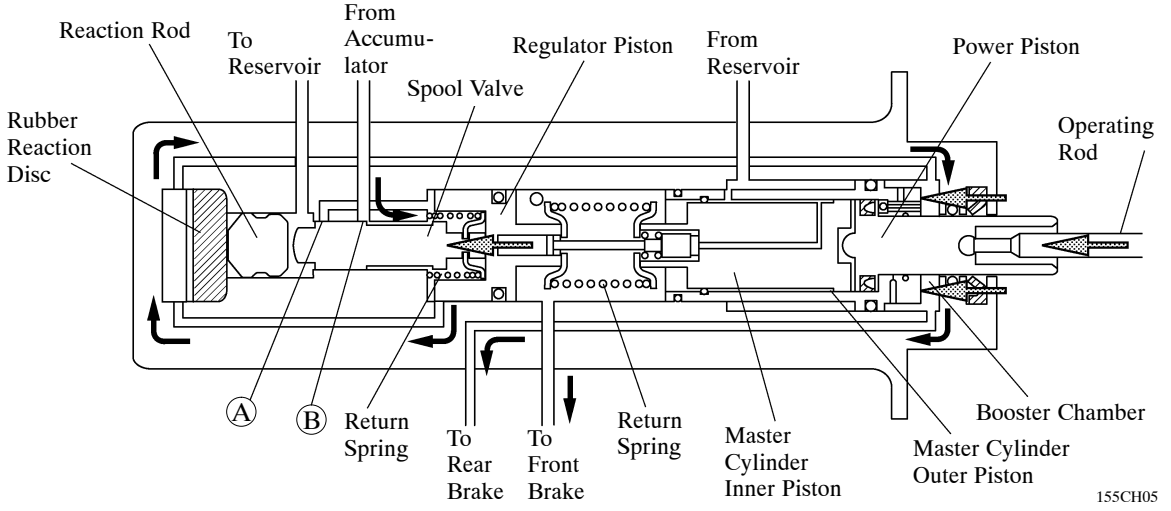
b. Operation

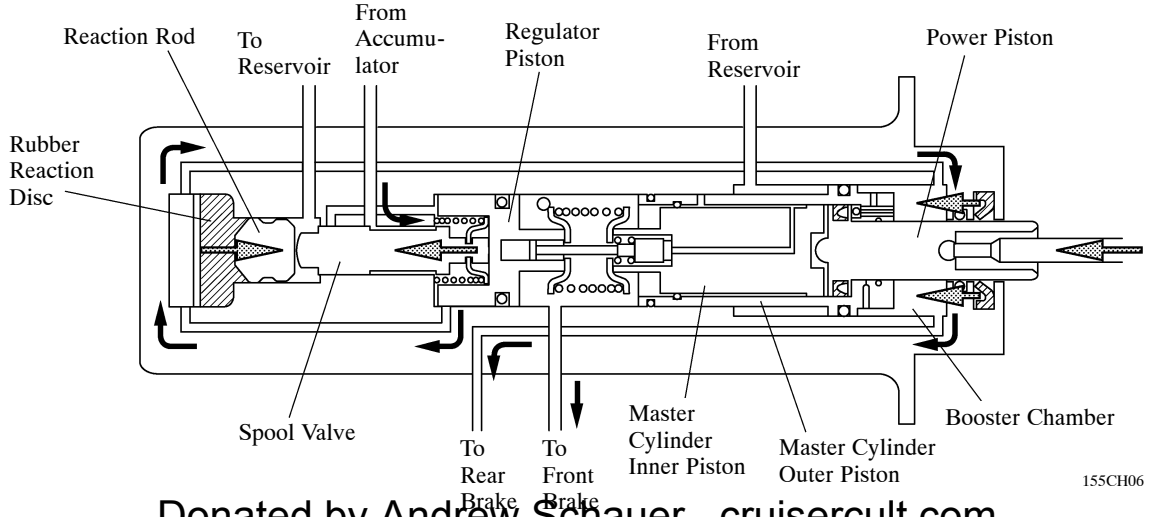
i) Pressure Increase (Low Pressure)

The pedal effort that is applied to the brake pedal is transmitted via the operating rod, power piston, and master cylinder inner piston. However, because the load setting of the master cylinder's return spring is higher than that of the regulator piston's return spring, the regulator piston gets pushed before the volume in the master cylinder becomes compressed. As a result, the spool valve moves forward. The spool valve closes the path Ⓐ between the reservoir and the booster chamber (behind the power piston) and opens the path Ⓑ between the accumulator and the booster chamber. Then, the pressurized brake fluid is introduced into the booster chamber to provide a power assist to the pedal effort.
When the pressure is introduced into the booster chamber, the power assist overcomes the force of the master cylinder's return spring. This causes the volume in the master cylinder to become compressed and increases the pressure that is applied to the front brakes. At the same time, the pressure in the booster chamber increases the pressure that is applied to the rear brakes.
During the initial stage of the brake operation, the booster pressure that is applied to the rubber reaction disc is small. Therefore, a return force in the rightward direction does not apply to the spool valve via the reaction rod.



ii) Pressure Increase (High Pressure)

In contrast to the time when the pressure is low, when the pressure is high, the booster pressure that is applied to the rubber reaction disc increases. Accordingly, the rubber reaction disc deforms and causes a return force in the rightward direction to be applied to the spool valve via the reaction rod. Therefore, in contrast to the time when the pressure is low, a greater reaction force is transmitted to the brake pedal.
As a result, a variable servo mechanism is realized, in which the servo ratio is lower during high pressure than during low pressure.



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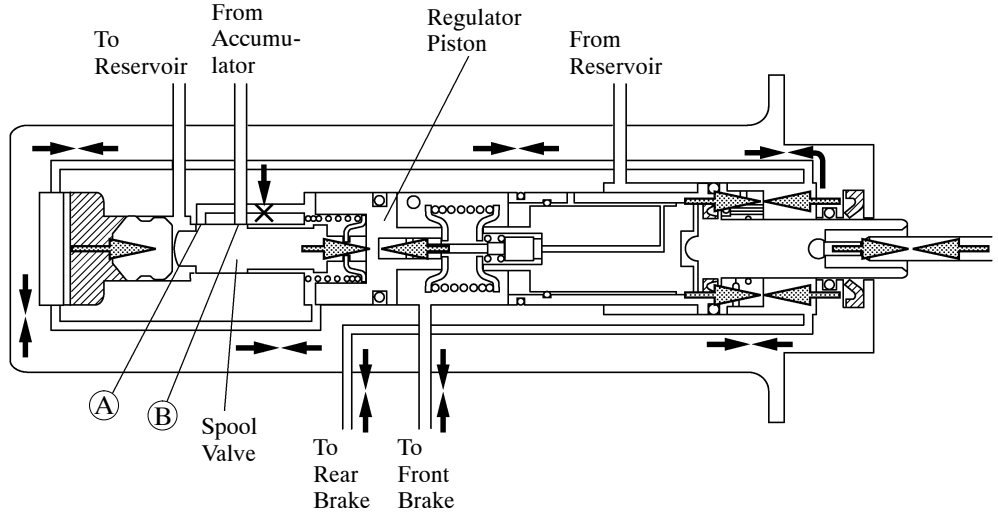
iii) Holding

This is a state in which the force that is applied via the brake pedal and the master cylinder pressure are in balance.

The forces that are applied to the front and the rear of the regulator piston, in other words, forces that are generated by the master cylinder pressure and the regulator pressure become balanced. This causes the spool valve to close both path Ⓑ from the booster chamber to the accumulator and path Ⓐ to the reservoir. As a result, the brake system is in the holding state.

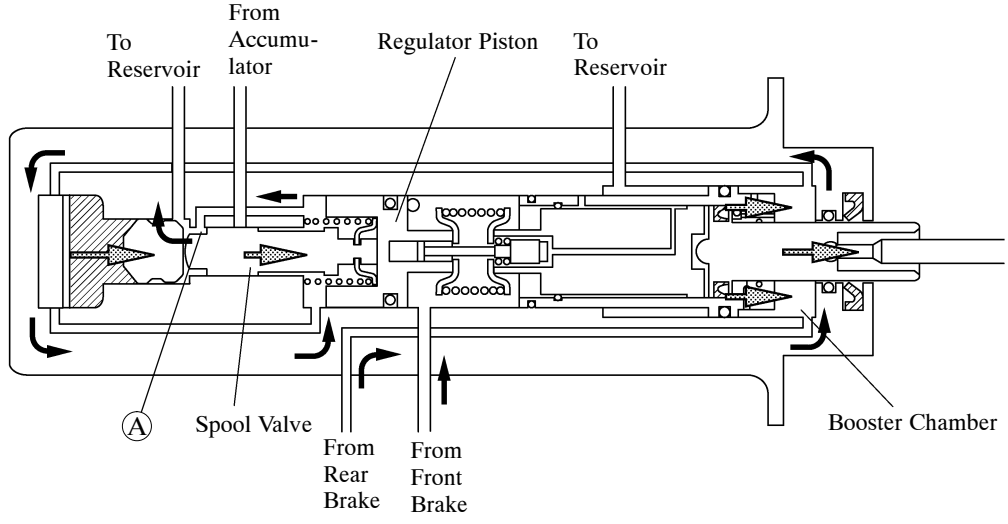


155CH07

iv) Pressure Reduce

When the pressure that is applied to the brake pedal is relaxed, the master cylinder pressure decreases. Then, the regulator piston's return (rightward) force becomes relatively greater, causing the regulator piston to retract and the spool valve to also retract. As a result, the path Ⓐ between the reservoir and the booster chamber opens.

The booster pressure becomes reduced in this state, creating a balance that corresponds to the force that is newly applied via the brake pedal. This process is performed repetitively to reduce the booster pressure and the master cylinder pressure in accordance with the force that is applied via the brake pedal.



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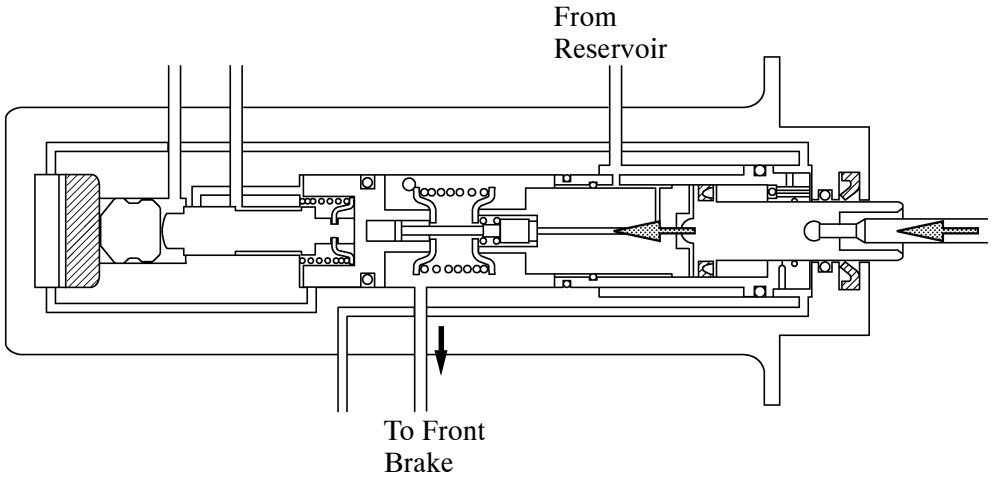
v) During Power Supply Malfunction

If the accumulator pressure is affected due to some type of malfunction, no pressure will be supplied by the regulator. Then, a power assist cannot be provided to the force that is applied via the brake pedal and the pressure to the rear brakes cannot be increased.
Because the power assist is not applied to the master cylinder outer piston, the master cylinder outer piston does not operate and remains in its initial position.
The pressure to the front brakes will be increased by the master cylinder inner piston in accordance with the pedal effort applied to the brake pedal.



3) Solenoid Valves

a. Switching Solenoid Valves

Two switching solenoid valves (SA1 and SA2) are provided.
The control signals from the ABS & hydraulic brake booster ECU open and close the switching solenoid valves to switch the brake fluid paths.
The solenoid valves SA1 and SA2 switch during normal braking of the front brakes and during the activation of the ABS. During normal braking, the path to the master cylinder side is opened, and the path to the booster chamber side is opened during the activation of the ABS.

b. Control Solenoid Valves

The control solenoid valve consists of 3 pressure holding valves and 3 pressure reduction valves.
Each of the brake circuits consists of a pressure holding valve and a pressure reduction valve. The valves are turned ON and OFF during the activation of the ABS. The pressure increase mode, the pressure holding mode, and the pressure reduction mode are effected based on the combination of these valves that are turned ON and OFF, in order to control the hydraulic pressure that is applied to each of the wheel cylinders.

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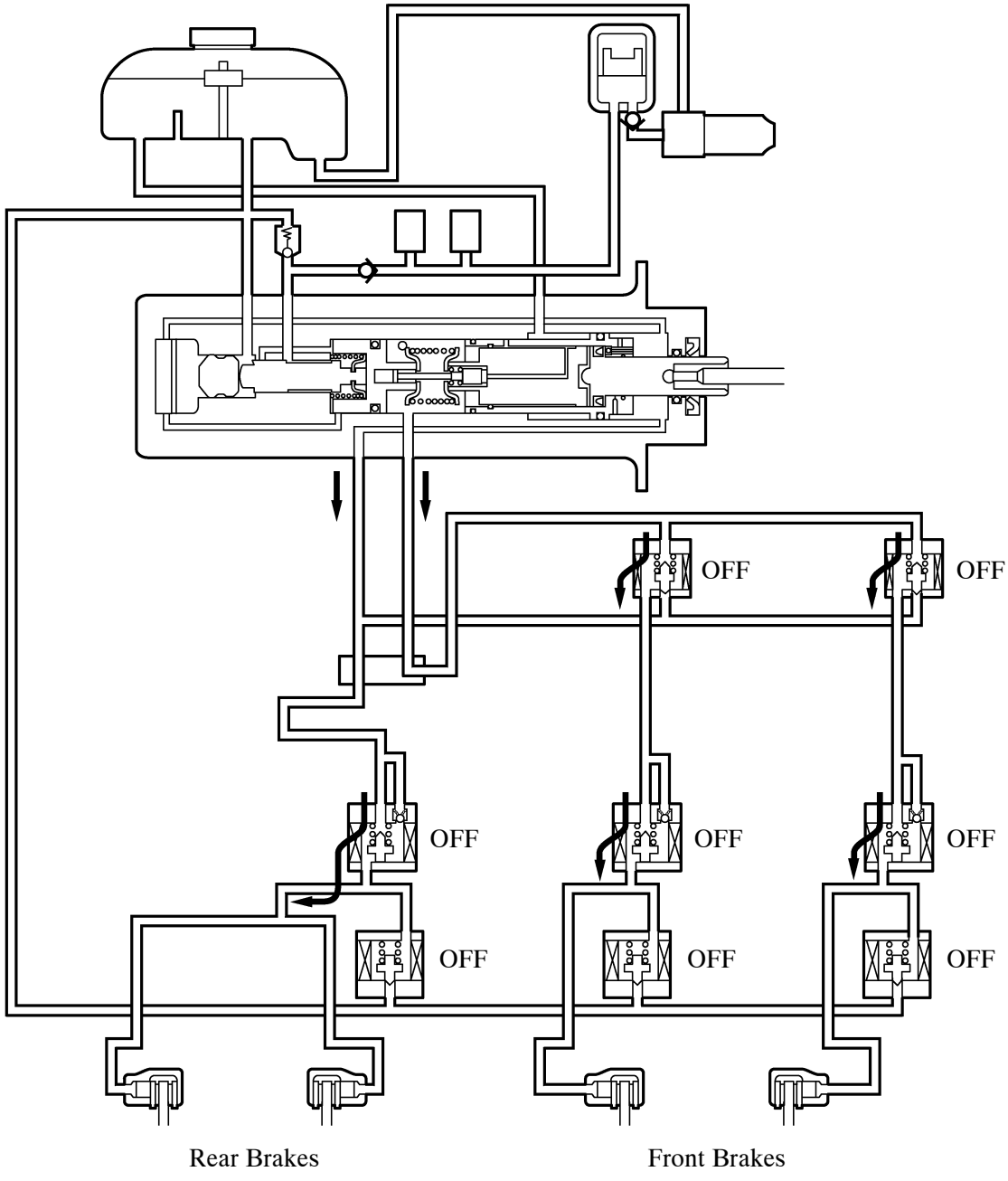
c. System Operation

i) Normal Braking

During normal braking, all solenoid valves are turned OFF.



155CH17

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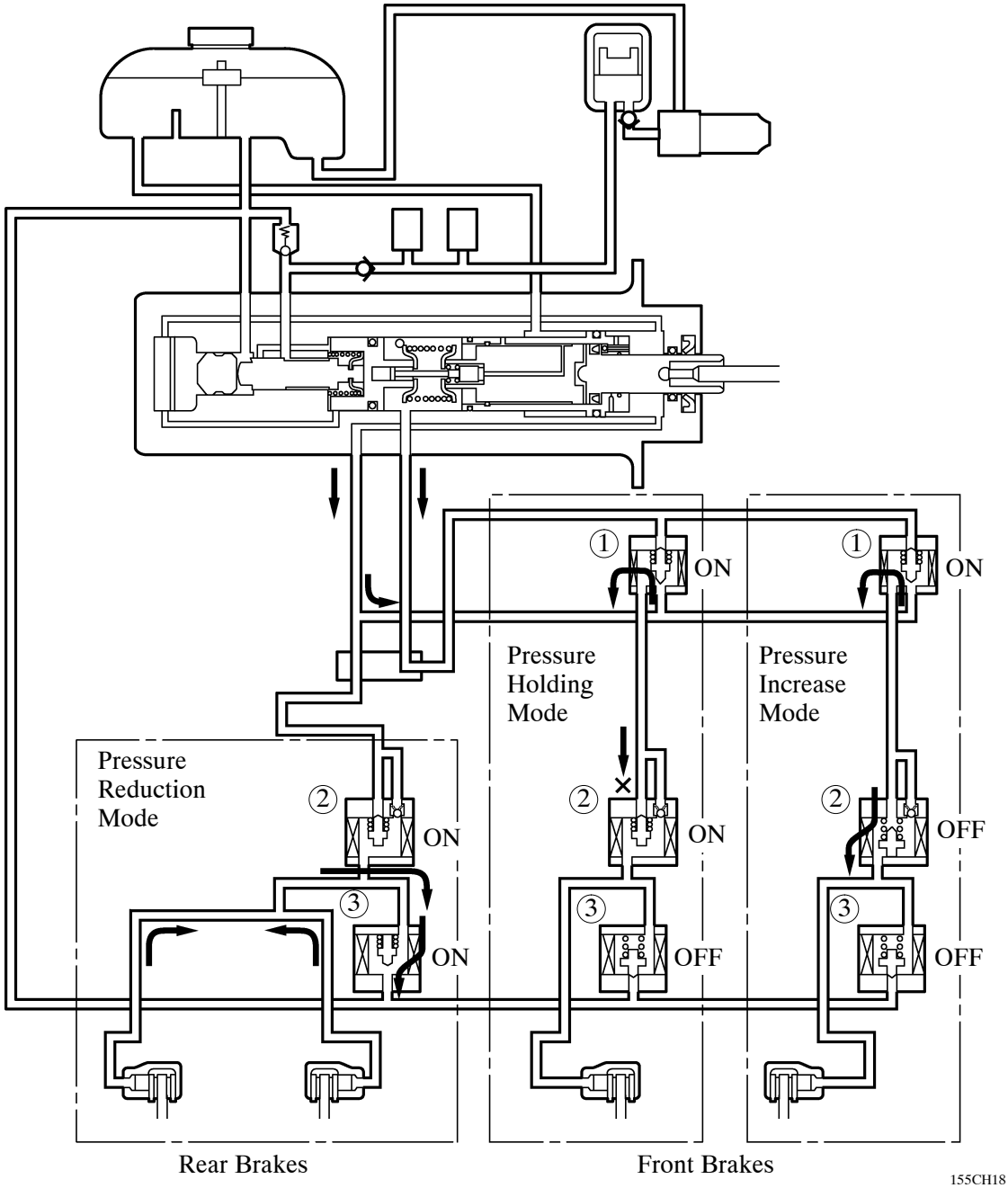
ii) ABS Operation

The solenoid valves are turned ON and OFF as described below to switch the fluid paths in order to control the brakes.
At this time, the hydraulic path between the master cylinder and the front brakes is shut off to prevent the brake pedal from vibrating and to improve the feeling during brake application.



155CH18

Mode / Solenoid Valves		Pressure Reduction Mode	Pressure Holding Mode	Pressure Increase Mode
Front Brake	① Solenoid Valve SA1, SA2	ON	ON	ON
	② Pressure Holding Valve	ON	ON	OFF
	③ Pressure Reduction Valve	ON	OFF	OFF
	Wheel Cylinder Pressure	Reduction	Hold	Increase
Rear Brake	② Pressure Holding Valve	ON	ON	OFF
	③ Pressure Reduction Valve	ON	OFF	OFF
	Wheel Cylinder Pressure	Reduction	Hold	Increase

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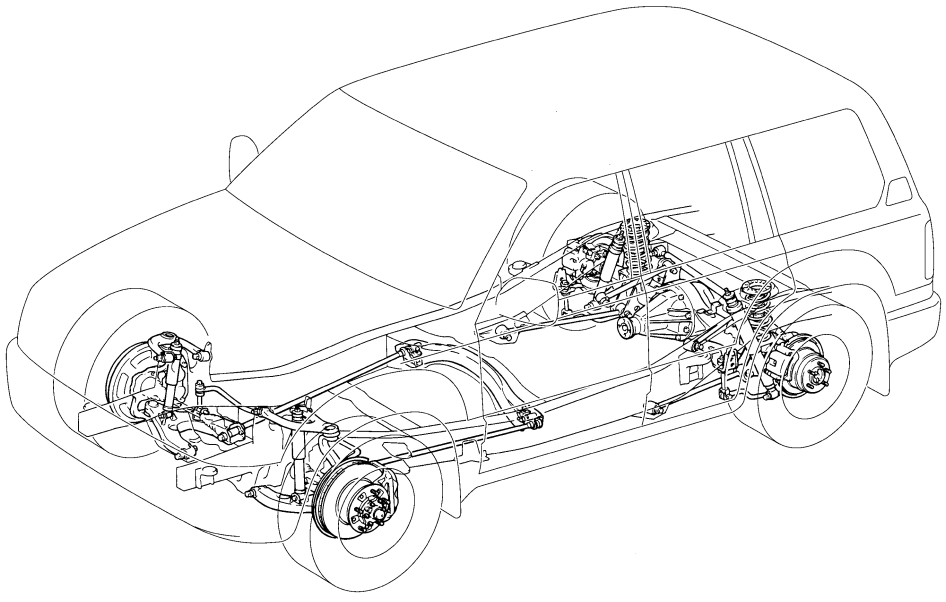
SUSPENSION

■ DESCRIPTION

A lower torsion bar spring type double-wishbone independent suspension has been newly adopted for the front suspension.
The rear suspension uses a 4-link coil spring with lateral rod type suspension as in the previous model.
Excellent offroad drivability has been realized by achieving a longer suspension stroke.



155CH63

▶ Specifications ◀

Model / Item			New	Previous
Tread	Front	mm (in.)	1620 (63.8)	1595 (62.8)
	Rear	mm (in.)	1615 (63.6)	1600 (63.0)
Front Wheel Alignment*	Caster	degrees	2°30’	3°00’
	Camber	degrees	0°05’	1°00’
	Toe-In	mm (in.)	1 (0.04)	2 (0.08)
	King Pin Inclination	degrees	12°10’	13°00’

*: Unloaded Vehicle Condition

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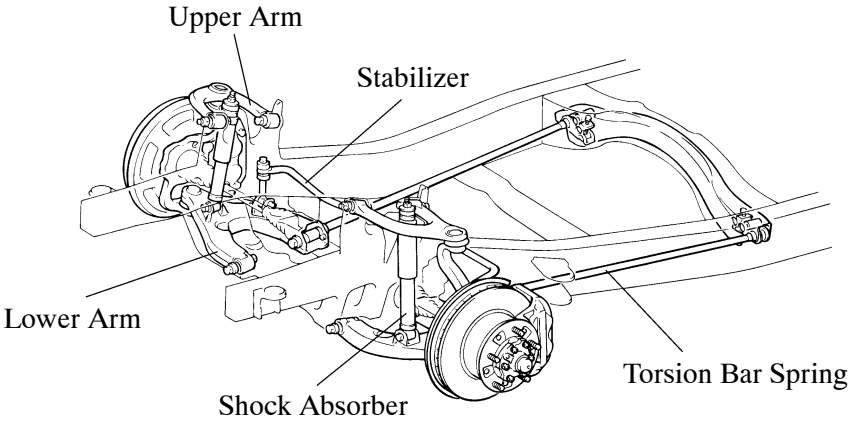
■ FRONT SUSPENSION

1. General

A lower torsion bar type double-wishbone independent suspension is used.
The vehicle's offroad drivability is maintained by optimizing the allocation of the various components, resulting in excellent riding comfort, stability, and controllability.



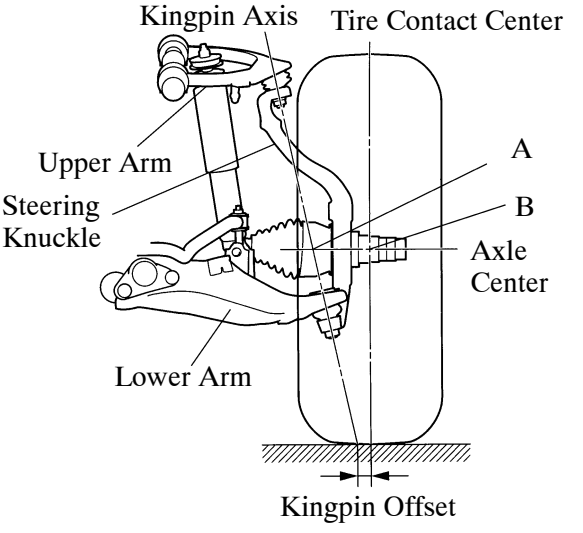
155CH64

2. Geometry

The allocation of the upper and lower arms has been optimized to lower the roll center height during cornering. Accordingly, a stable postural behavior has been ensured during cornering and excellent cornering performance has been realized. In addition, the front suspension has adopted an anti-dive geometry to suppress the front dive during braking.

3. Steering Knuckle

- A steering knuckle that positions the upper arm higher has been adopted to maintain offroad drivability while providing excellent riding comfort, stability, and controllability.
- Through the adoption of this steering knuckle, the A-B distance between the kingpin offset and the axle center has been reduced. Accordingly, the rotational torque that is generated at the kingpin axis has been reduced, thus ensuring the vehicle's stability during braking. In addition, the generation of flutter has been restrained.



155CH65

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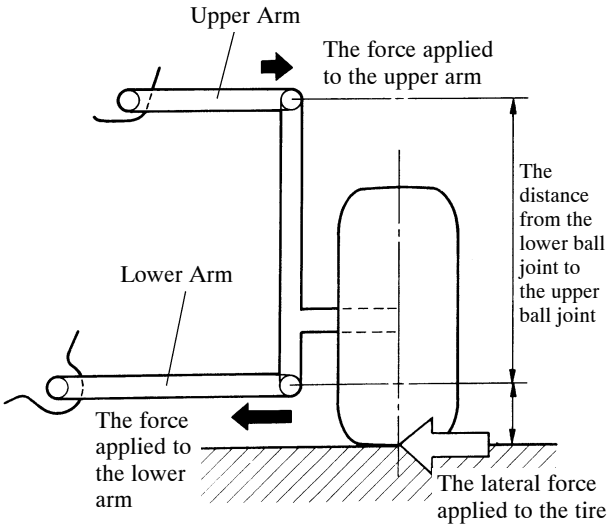
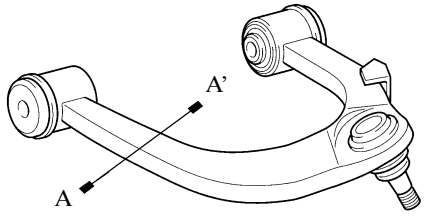
- During cornering, the force from the tire is applied to the arms as illustrated.
  This force, which is applied to the arms, influences the distance between the upper and lower arms, and has a tendency to decrease with the increase in the distance between the arms.
  Through the adoption of the steering knuckle that positions the upper arm higher, the force that is applied to the arms has been reduced. In addition, it enabled the suspension system to sufficiently withstand the lateral force even though a softer suspension arm bushing has been adopted. This resulted in excellent riding comfort, stability, and controllability.



155CH40

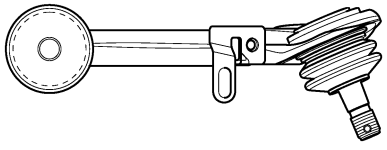
4. Upper Arm

By mounting the upper arm higher, the force that is applied from the road has been reduced. Furthermore, by adopting the type of ball joint that is pressed into the arm, the offset between the ball joint center and the upper arm center has been minimized, thus reducing the torsional force that is applied to the upper arm.
Accordingly, the construction of the upper arm has been simplified to that of a pressed single-sheet product.



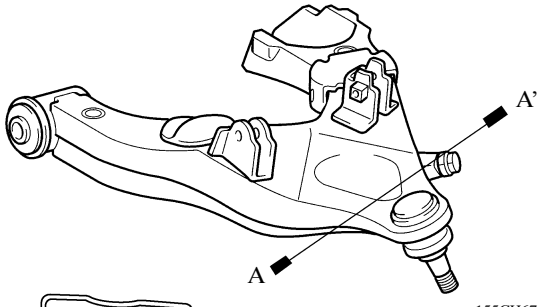
155CH66

A – A' Cross Section 155CH37


155CH38

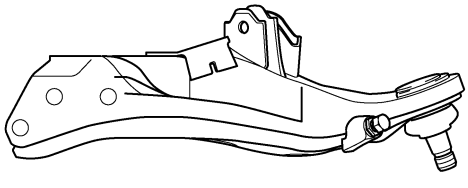
5. Lower Arm

To ensure a long suspension stroke, a long lower arm has been adopted. Also, to prevent road interference, the lower arm has been mounted higher.
The lower arm has adopted a closed cross section to minimize damage in case of road interference.
As in the upper arm, the lower arm has adopted the type of ball joint that is pressed into the arm, thus minimizing the offset between the ball joint center and the lower arm center and reducing the torsional force that is applied to the lower arm.



155CH67

A – A' Cross Section 155CH35


155CH36

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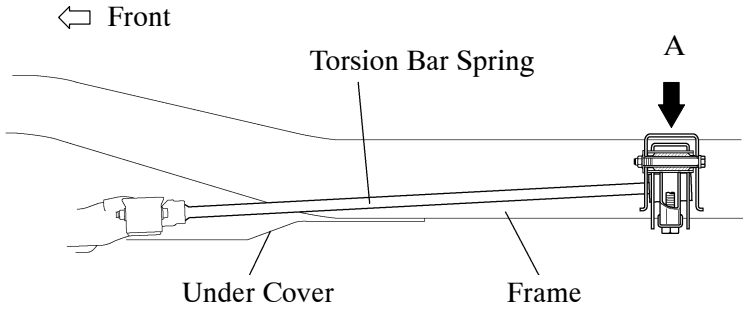
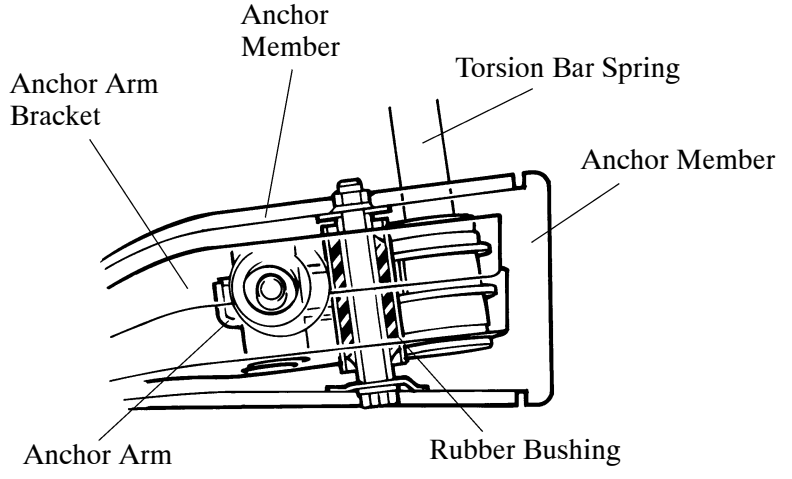
6. Torsion Bar Spring

To obtain a longer suspension stroke a lower torsion bar spring has been adopted.
To prevent road interference, the torsion bar spring has been positioned higher than the under cover and the bottom of the frame.
An anchor arm bracket, which is provided with an anchor arm, has been float-mounted to the anchor member via a rubber bushing. Accordingly, a longitudinal compliance of the front suspension has been ensured to provide excellent riding comfort.



155CH44



155CH68

View A

7. Stabilizer

A solid bar type stabilizer is used to provide excellent riding comfort, stability and controllability.

8. Shock Absorber

As in the previous model, the shock absorbers inhibit cavitation and offer outstanding damping force characteristics through the use of low-pressure nitrogen gas.

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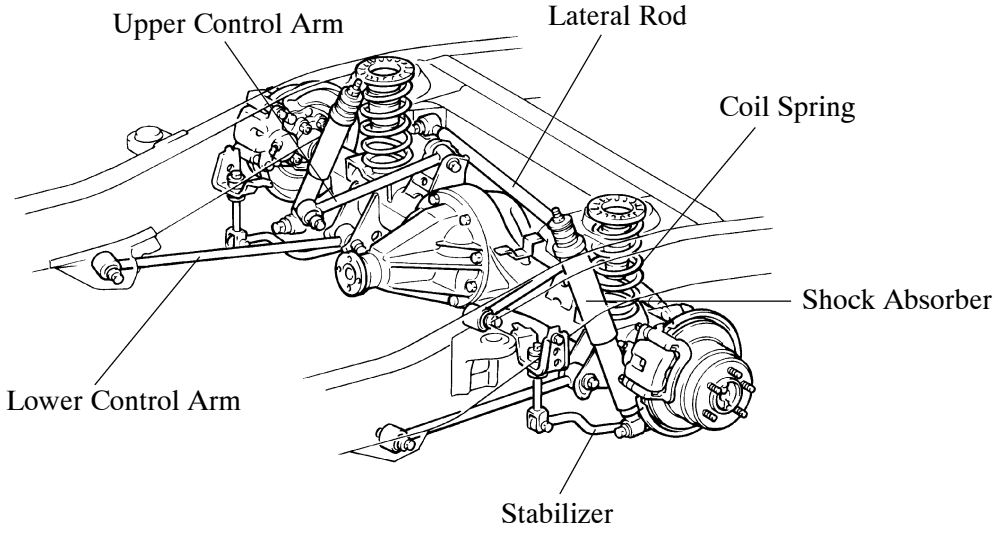
■ REAR SUSPENSION

As in the previous model, a 4-link coil spring with lateral rod type suspension is used.
However, the vehicle's offroad drivability is maintained while providing excellent riding comfort, stability, and controllability by increasing the suspension stroke, increasing the tread, optimizing the bushing shape and characteristics, and optimizing the position of the control arms.



155CH69

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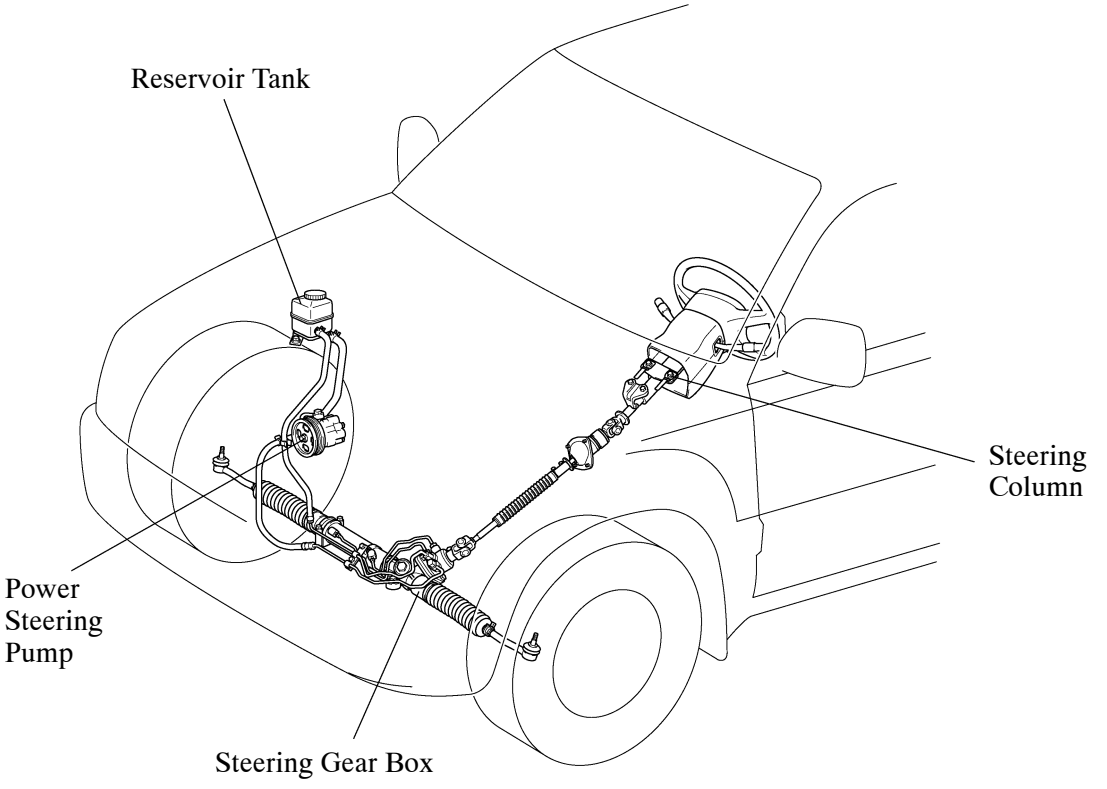
STEERING

■ DESCRIPTION

- The engine revolution sensing type rack and pinion power steering is used.
- A compact and lightweight tilt mechanism is used.
- An energy absorbing plate type energy absorbing mechanism is used in the steering column.



▶ Specifications ◀

Gear Ratio (Overall)		19.8
No. of Turns Lock to Lock		3.8
Rack Stroke	mm (in.)	178 (7.01)
Fluid Type		ATF Type DEXRON®II or III

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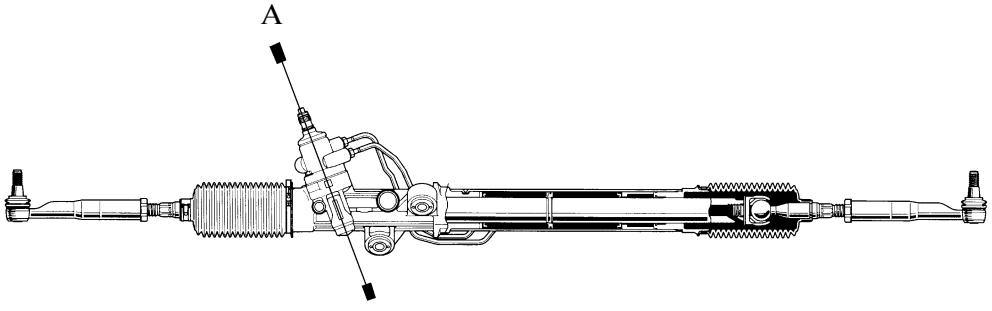
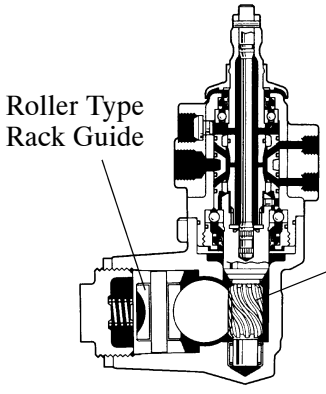
■ STEERING GEAR

- A compact and lightweight rack and pinion type steering gear has been adopted to provide a good steering feeling.
- A cold-forged pinion gear with an improved precision of the gear tooth flank has been adopted to improve the steering feeling.
- The hydraulic characteristics have been optimized to enable the steering to be handled easily during stationary and low-speed conditions and to provide substantial response in the medium- to high-speed range.
- Aroller type rack guide is used to realize smoother steering feeling and excellent steering response.



155CH89



155CH92

A – A' Cross Section

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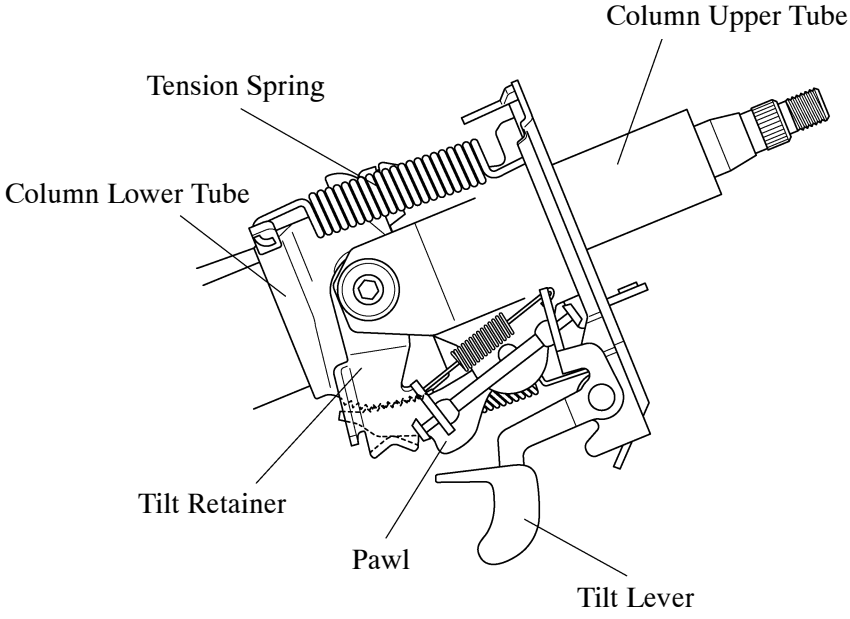
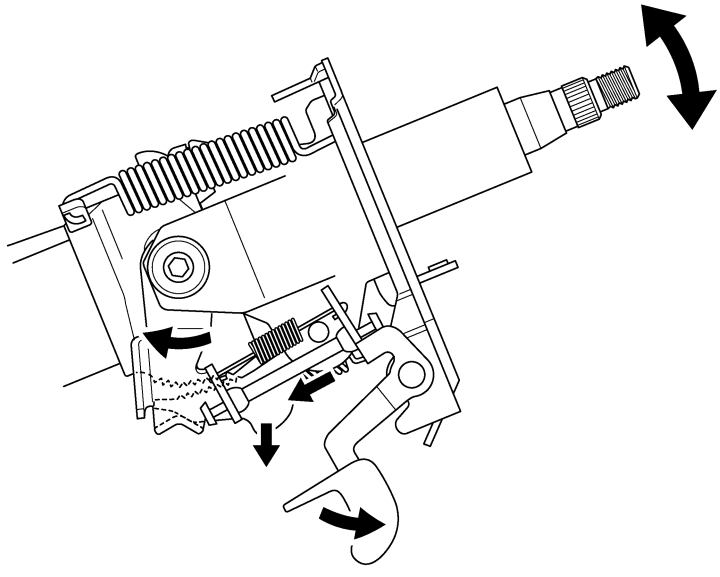
■ TILT STEERING

A tilt mechanism consists of a column upper tube, lower tube, pawl, tilt retainer, tilt lever and tension springs etc.
The pawl is attached to the column upper tube. Under spring tension, the pawl is pushed by the tilt retainer against the ratchet in the lower tube, thus locking the tilt steering.
By operating the tilt lever, the tilt retainer moves in unison to release the pawl. The pawl disengages from the ratchet in the lower tube, allowing the steering to tilt.



156CH02



156CH03

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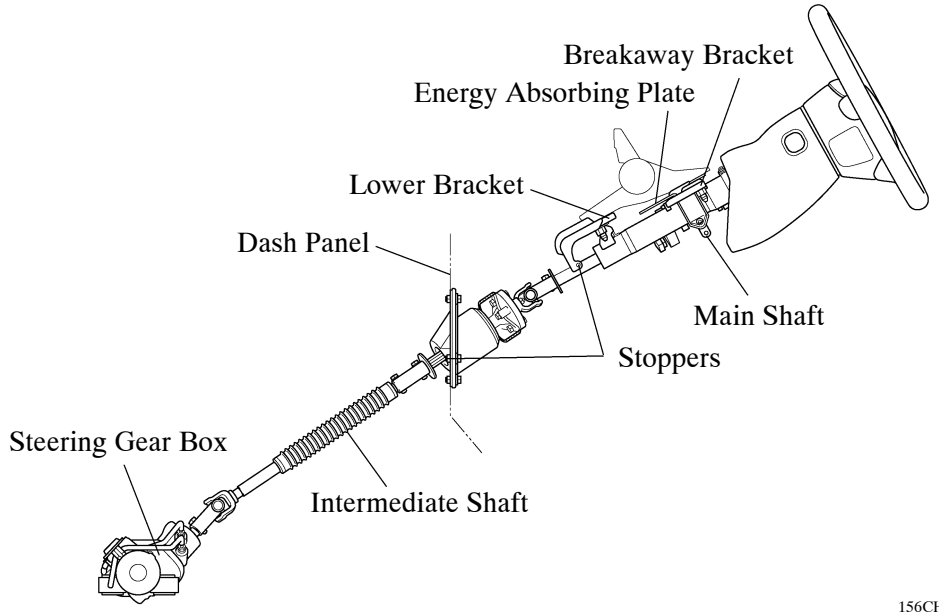
■ ENERGY ABSORBING MECHANISM

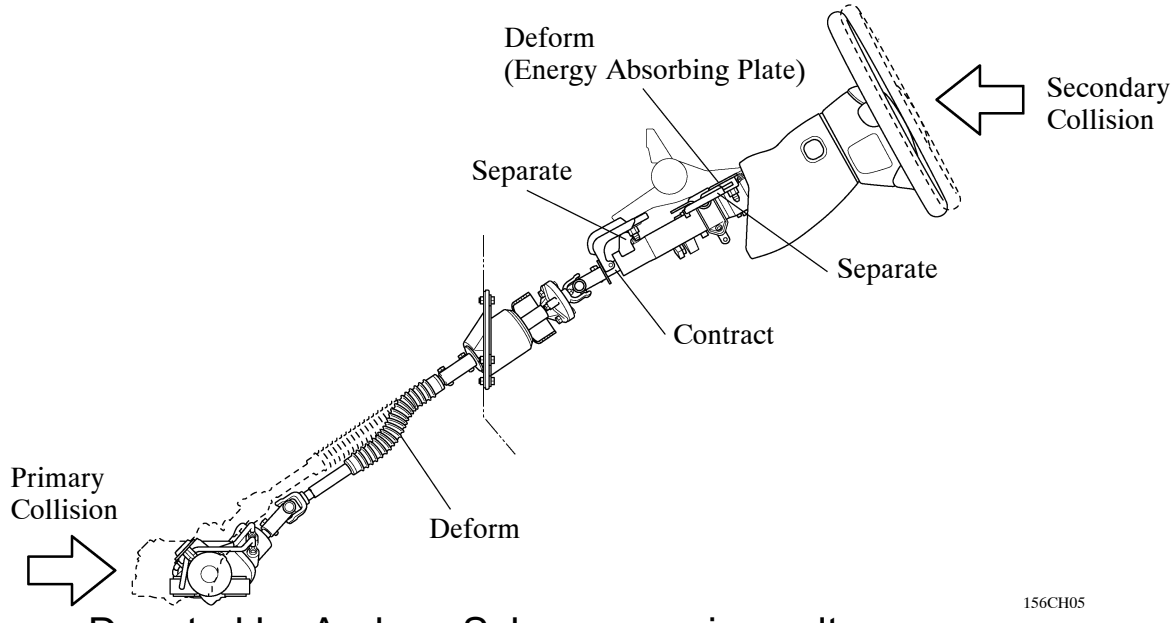
1. Construction

The energy absorbing mechanism in the steering column consists of a lower bracket, breakaway bracket, energy absorbing plate and a contractile main shaft. The steering column is mounted onto the instrument panel reinforcement via a lower bracket and breakaway bracket which is supported via a capsule and energy absorbing plate. The steering column and the steering gear box are connected with an intermediate shaft that contains a corrugated tube. In addition, the stoppers are provided on the lower bracket and the dash panel to regulate the amount of stroke against the impact applied from the gear box.



2. Operation

When the steering gear box moves during a collision (primary collision), the corrugated tube of intermediate shaft deformes and, the main shaft contracts, thus reducing the steering column and the steering wheel from protruding into the cabin.
When an impact is transmitted to the steering wheel in a collision (secondary collision), the steering wheel and the steering wheel pad help absorb the impact. In addition, the breakaway bracket and the lower bracket separate, causing the entire steering column to move forward.
At this time, the energy absorbing plate becomes deformed to help absorb the impact of the secondary collision.



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BODY

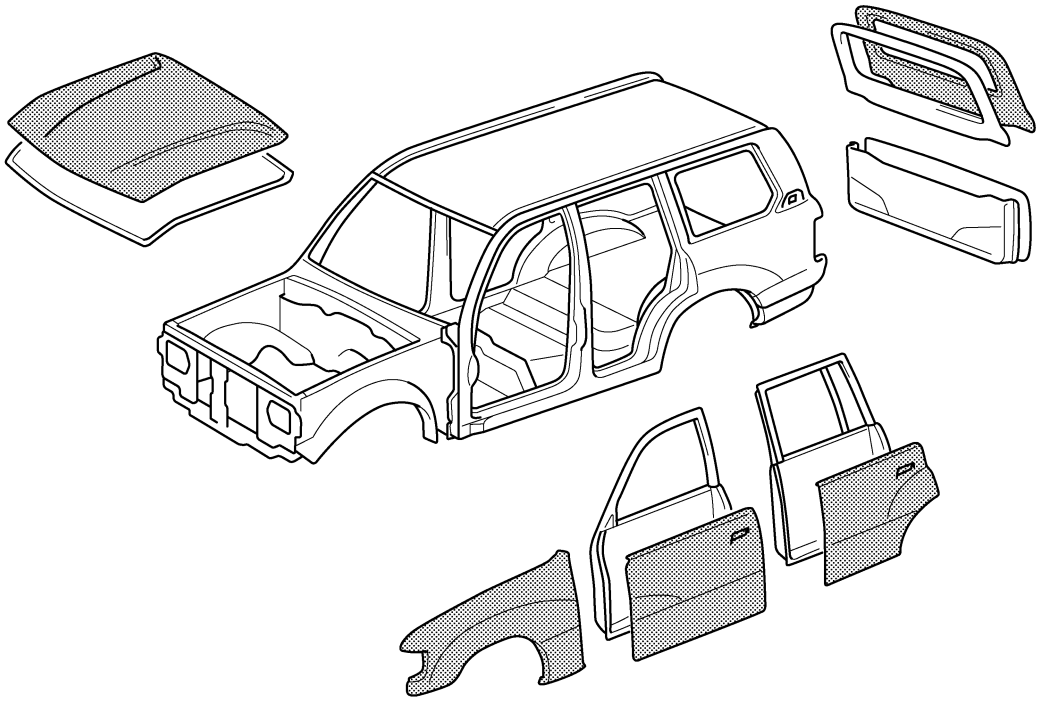
HIGHLY RIGID BODY

The body of the Land Cruiser has been made lightweight and highly rigid through the refinement of the shape and construction of each part, optimized allocation of reinforcements and members, and use of high strength sheet steel.

■HIGH STRENGTH SHEET STEEL

High strength sheet steel is used for the hood and door panels, etc.

: High Strength Sheet Steel



155BO53

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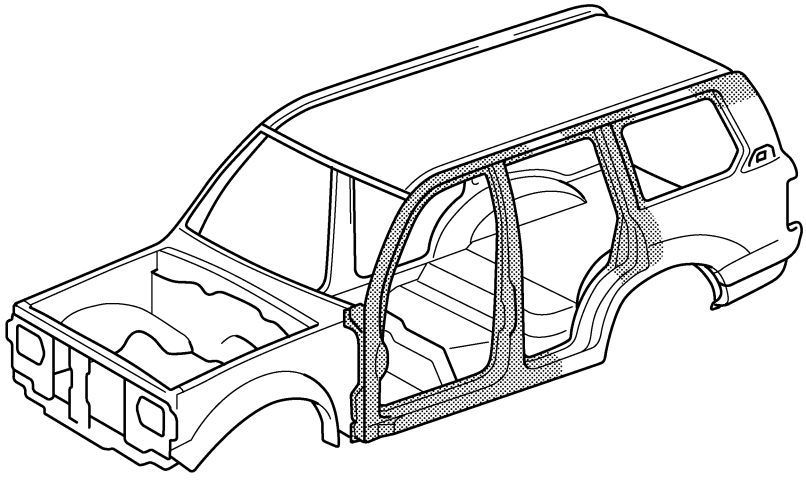
■BODY SHELL

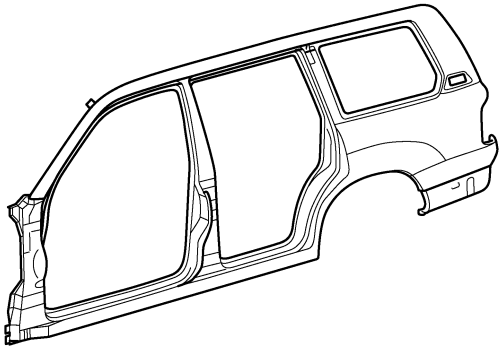
- The areas that join the pillars to the roof side rail or the rocker are provided with reinforcements to ensure a strong pillar construction. In addition, reinforcements are efficiently located throughout the body to realize excellent body rigidity.

: Reinforcements



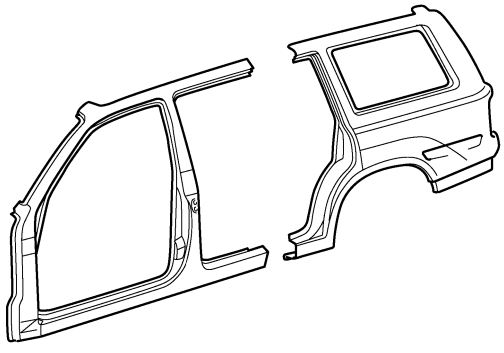
155BO29

- The side member panel has been integrated in order to realize excellent panel precision and joining rigidity.



155BO02

New



155BO03

Previous

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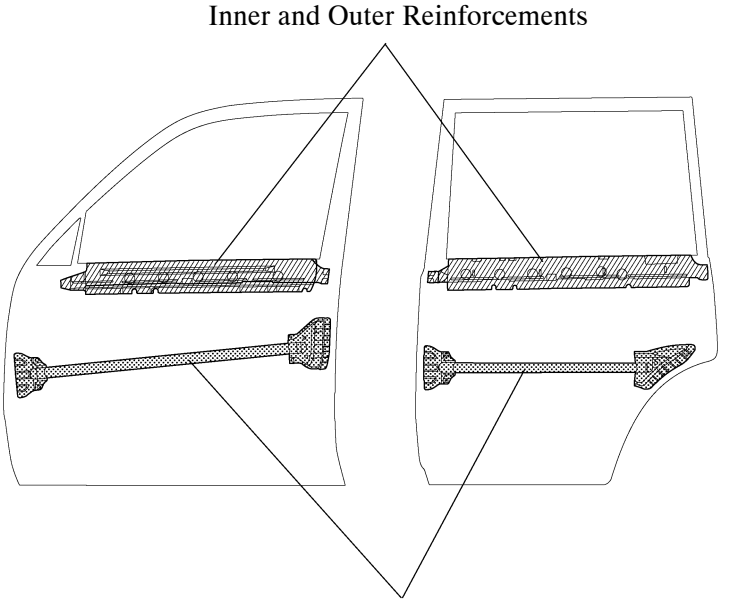
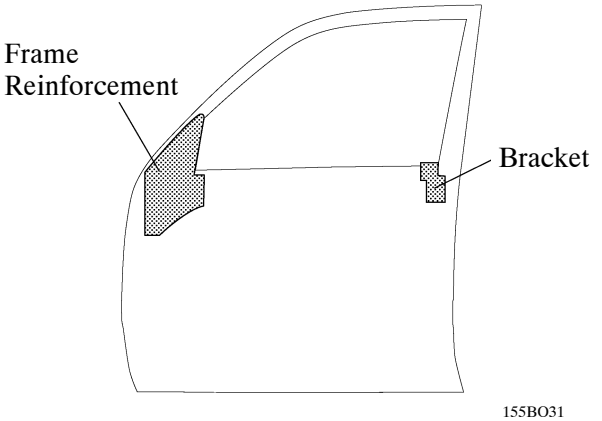
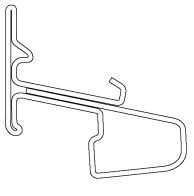
■DOORS

- Pipe type side impact protection beams are mounted in the center space between the outer and inner door panels.
- The inner and outer reinforcements are applied to the belt line area of the front and rear doors to make the doors more energy absorbent.



- The cross section of the door frame has been made smaller to improve the looks.
- The rigidity of the area of the door frame on which the door is installed has been improved and the wind noise has been reduced by changing the shape of the frame reinforcement and adding a bracket.





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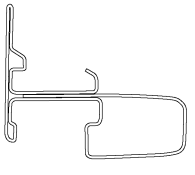

Previous

A – A' Cross Section

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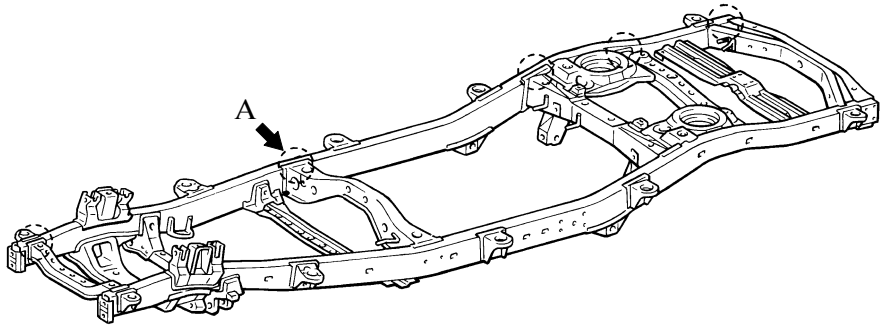
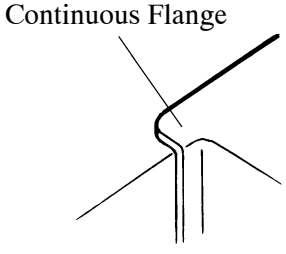
■ FRAME

- The shape of the various areas of the frame has been modified in order to realize excellent collision safety performance, good driving stability and riding comfort.
- A continuous flange type construction has been adopted in the areas that join the side rails to the cross members to realize excellent joining rigidity. Similarly, the continuous flange type construction has been adopted in the areas that join the brackets.

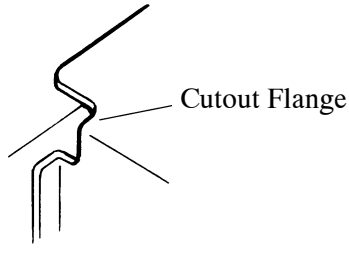


155BO42



155BO43

New



155BO44

Previous

View A

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■IMPACT ABSORBING STRUCTURE

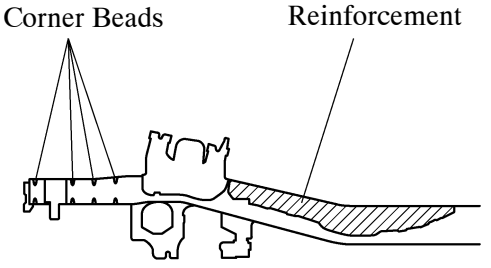
1. General

The impact absorbing structure of the new Land Cruiser provides a body and frame construction that can effectively absorb the energy of impact in the event of a front, rear or side collision.
Also, an excellent occupant protection performance has been realized by adopting a frame construction that effectively absorbs and disperses the impact energy, and a strong body construction has been made possible through the use of the large and optimally allocated frame materials around the cabin.

2. Construction

Impact Absorbing Structure for Front Collision

Corner beads have been provided in the front area of the side rail. Also, the cross section area of the side rail has been enlarged and reinforcements have been provided inside the side rail. Through these measures, the deformation of the frame can be controlled in accordance with the impact energy that is applied during a frontal collision, thus effectively absorbing the impact energy that is transmitted to the cabin and minimizing the deformation of the cabin.



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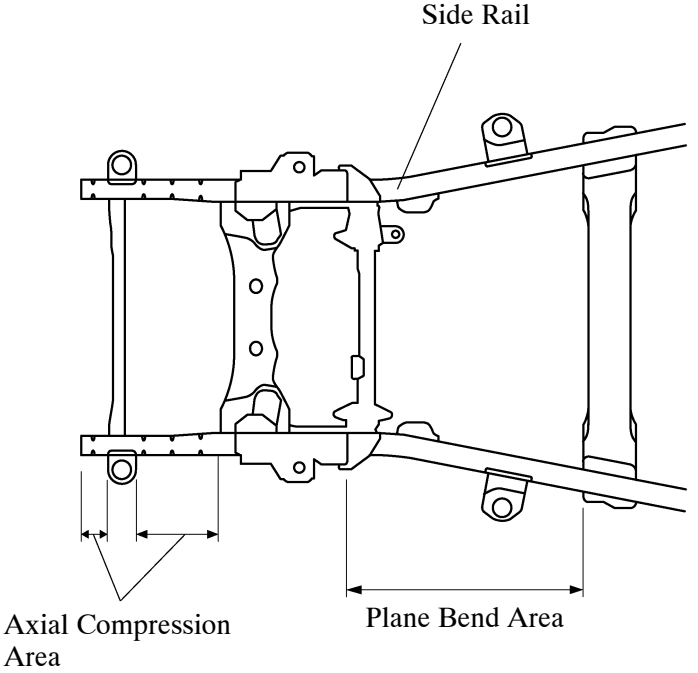

155BO05

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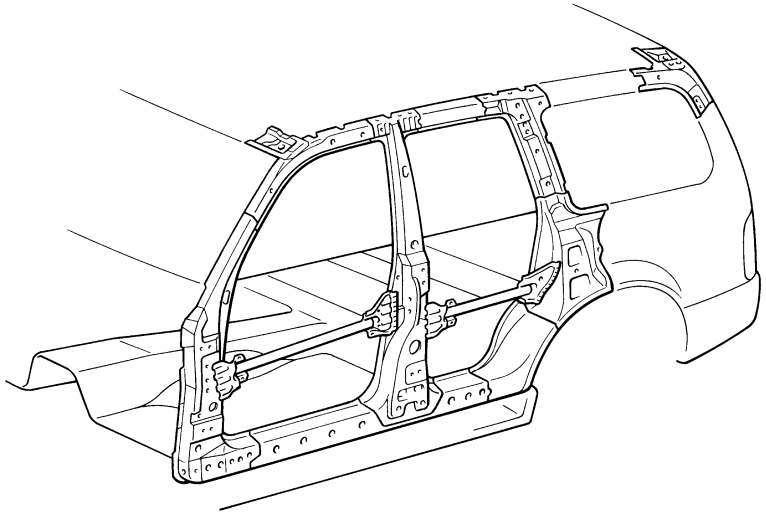
Impact Absorbing Structure for Side Collision

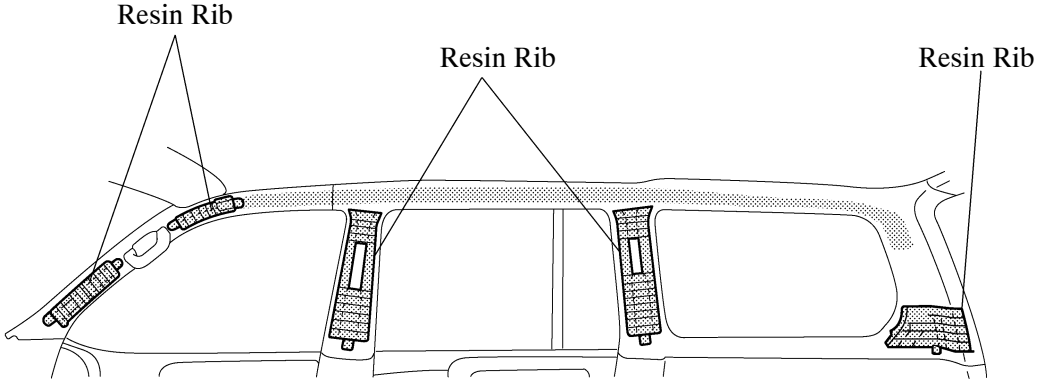
- Impact energy of a side collision directed to the cabin area is dispersed throughout the body via pillar reinforcements, side impact protection beams, floor cross members, etc. This dispersion of energy keeps the energy directed to the cabin to a minimum level.
  As a result, the deformation of the cabin is minimized.
- A Head Impact Protection Structure has been adopted. With this type of construction, if the occupant's head hits against the roof side rail and pillar in reaction to a collision, the inner ribs of the roof side rail and pillars collapses to help reduce the impact.

▶ Impact Absorbing Structure for Side Collision ◀



155BO48

▶ Head Impact Protection Structure ◀



156BO04

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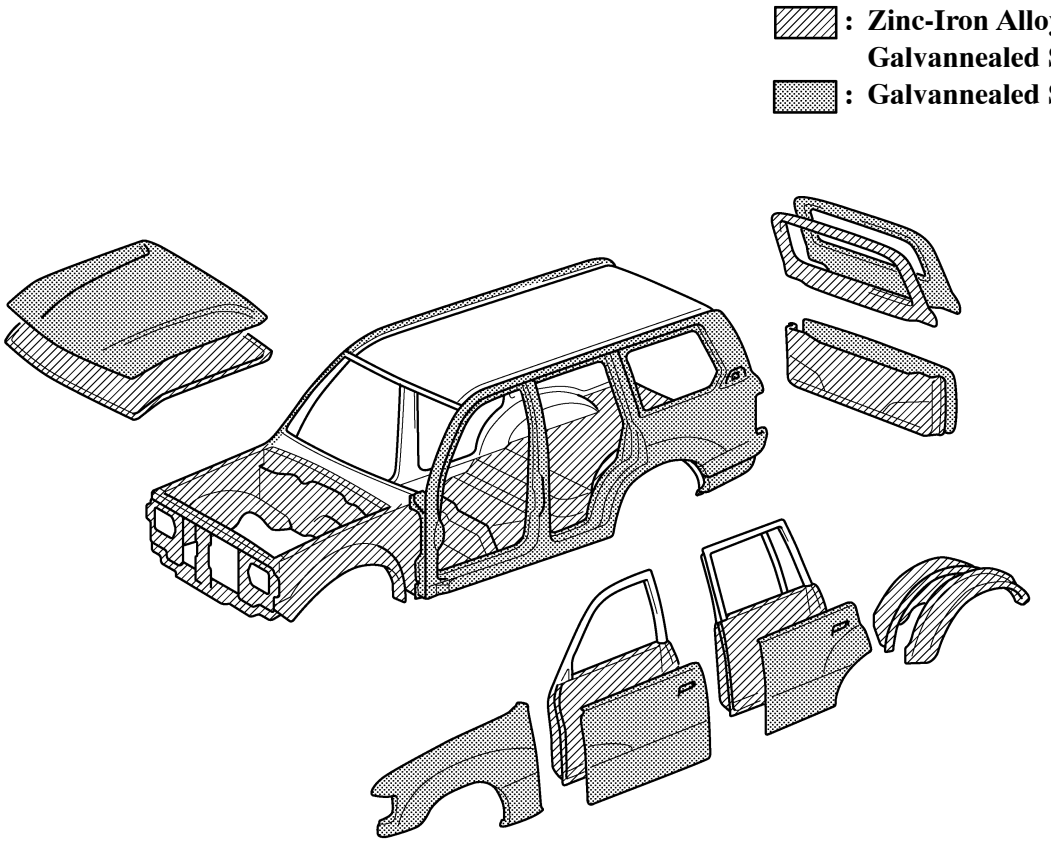
RUST–RESISTANT BODY

Rust-resistant performance is increased by using anti-corrosion sheet steel and anti-corrosion treatment by applying wax, sealer, anti-chipping paint, etc. to easily corroded parts such as the hood, doors, rocker panels, etc.

■ANTI–CORROSION SHEET STEEL

2 types of anti-corrosion sheet steel are used: galvannealed sheet steel and zinc-iron alloy double layer galvannealed sheet steel. Galvannealed sheet steel is used for many inner panels and the engine compartment, etc. Zinc-iron alloy double layer galvannealed sheet steel is used for major outer panels such as the hood, doors and back door.



155BO54

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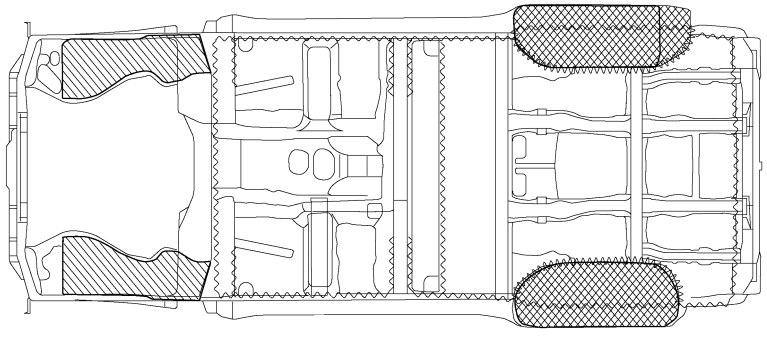
■ WAX AND SEALER

Wax and sealer are applied to the hemmed portions of the hood, door panels, hinge and etc. to improve rust-resistant performance.

■ UNDER COAT

PVC (Polyvinyl Chloride) coating is applied to the under side of the body. The fender apron and other parts which are subject to damage by flying stones, etc. given a thick coating to improve rust-resistant performance.

: PVC Coating Area
: PVC Coating Area (Thick Coating)
: Edge Seal

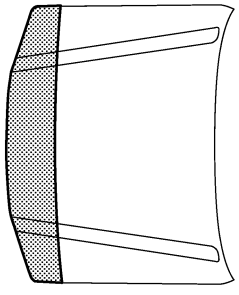


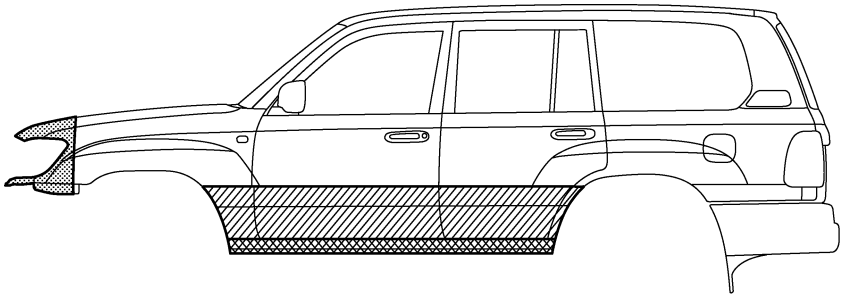
155BO09

■ ANTI–CHIPPING APPLICATION

PVC chipping primer is applied to the rocker panel area to protect them from flying stones Soft-chip primer is applied to the hood and front end panels.
In addition, anti-chipping paint is applied to the lower door panel area on models without side step.

: Soft-Chip Primer
: Anti-Chipping Paint
: PVC Chipping Primer





156BO01

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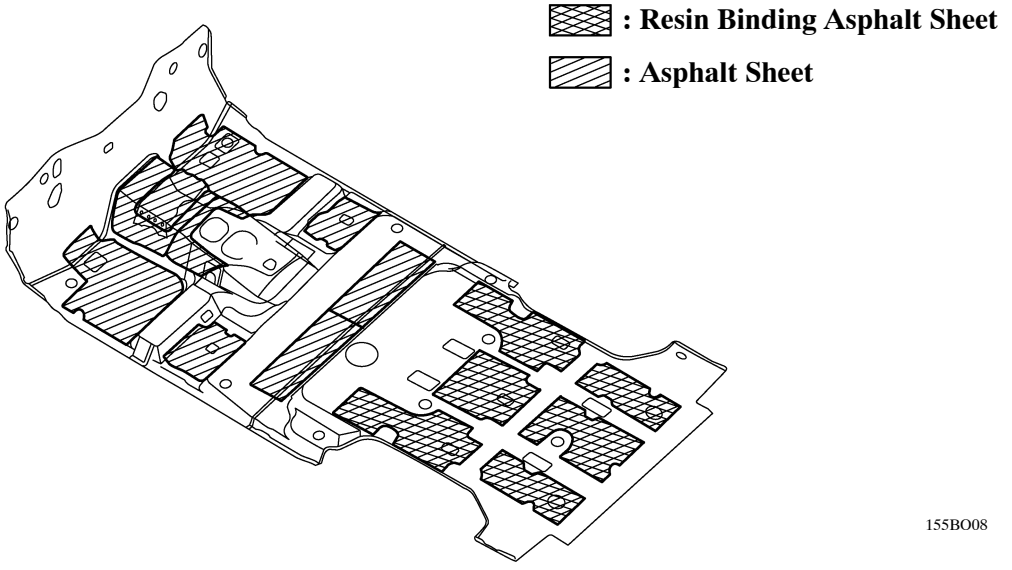
LOW VIBRATION, LOW NOISE BODY

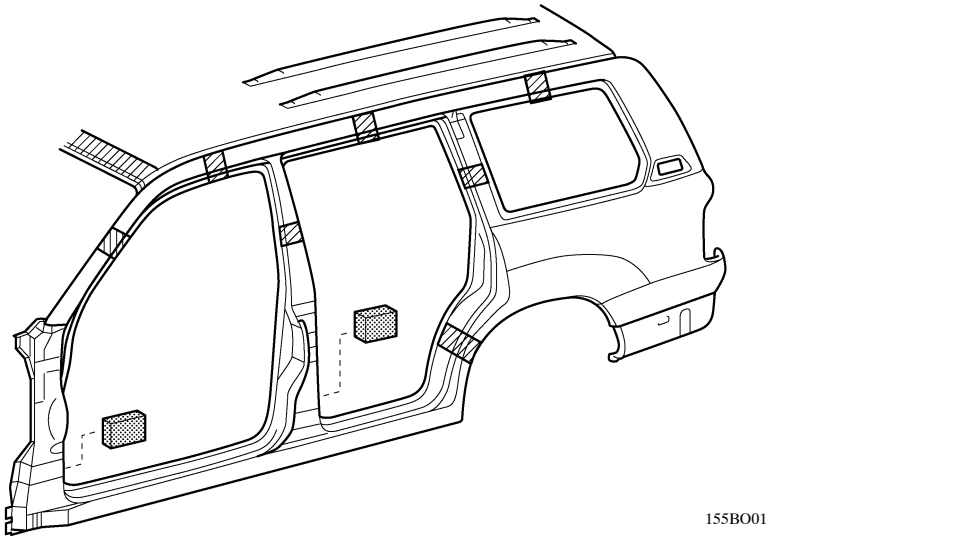
An effective application of vibration damping and noise suppresant materials reduces engine and road noise.

■ SOUND ABSORBING AND VIBRATION DAMPING MATERIALS

- Resin binding asphalt sheets and asphalt sheets are optimally allocated to reduce engine and road noise for quieter vehicle operation.



- Foamed material is provided inside the pillar and the roof rail and urethane pad is provided at the bottom of the pillars. As a result, the wind noise and the road noise that are transmitted to the rockers and the pillars have been reduced.



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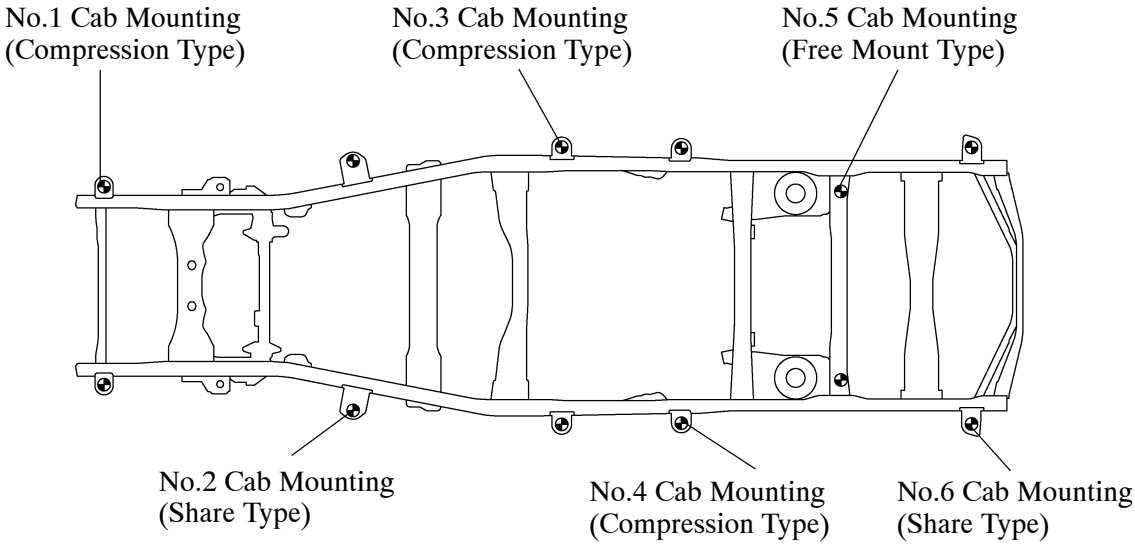
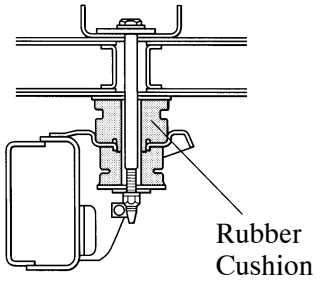
■CAB MOUNTING

- The allocation of the cab mounts have been revised and the characteristics of the rubber cushion of the cab mounts have been optimized. Accordingly, the vehicle's riding comfort has been improved and noise and vibration have been reduced.
- The No.1 mount has been changed from the share-type to the compression type. The No.2 mount has been changed from the compression type to the share type. The remaining cab mounts use the same mounts as those of the previous model.

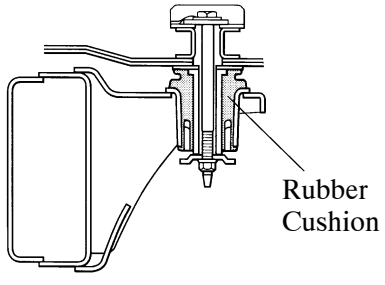


155BO06



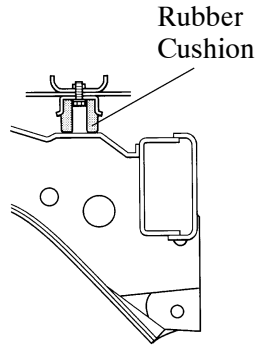
155BO45

No.1 Mounting (Compression Type)



155BO46

No.2 Mounting (Share Type)



155BO47

No.5 Mounting (Free Mount Type)

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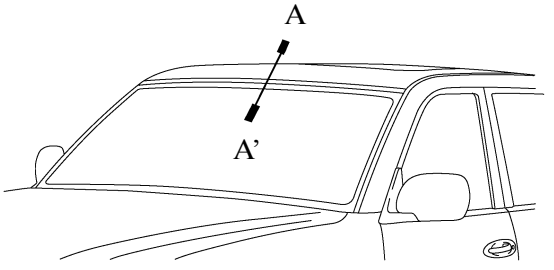
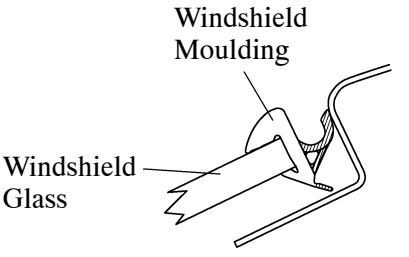
- The fitting construction of the windshield glass and the quarter window glass has been changed. As a result, the height variance between the body and the window has been decreased, thus reducing the wind noise.



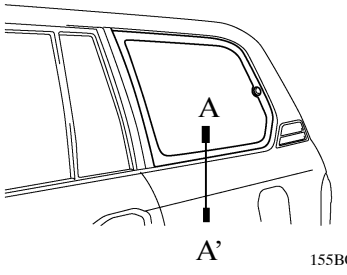
155BO15



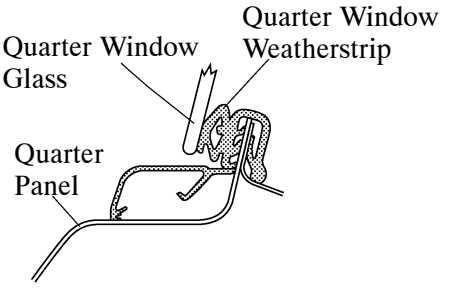
155BO30

A – A' Cross Section

Windshield Glass



155BO16



155BO57

A – A' Cross Section

Quarter Window Glass

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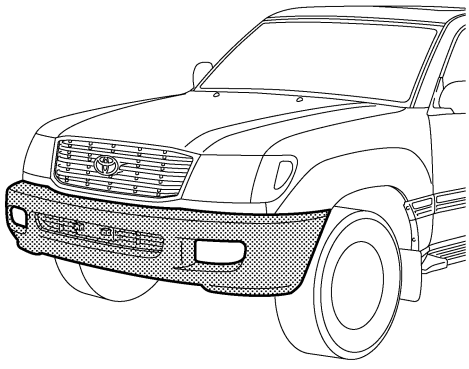
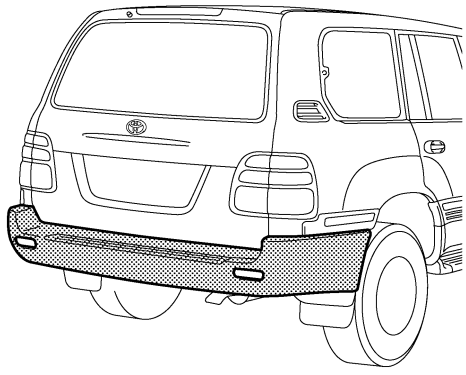
ENHANCEMENT OF PRODUCT APPEAL

■ BUMPER

- A one-piece resin bumper made of TSOP (The Super Olefin Polymer) that excels in recyclability is used for both the front and rear bumpers.

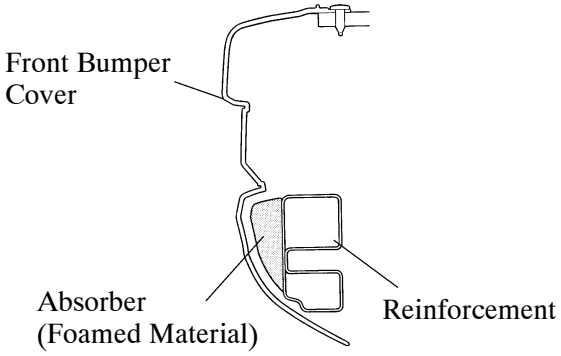


Front 156BO02



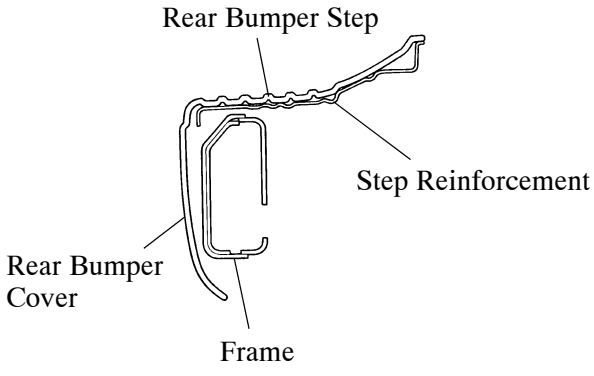
Rear 156BO03

- Reinforcements and an absorber (foamed material) are provided in the front bumper to reduce the damage to the body during a light collision.



155BO50

- The rear bumper step has been integrated with the rear bumper cover through composite manufacturing to improve the looks. Also, a step reinforcement has been provided inside the bumper cover to ensure the level of rigidity that is necessary when using the bumper as a step.



155BO51

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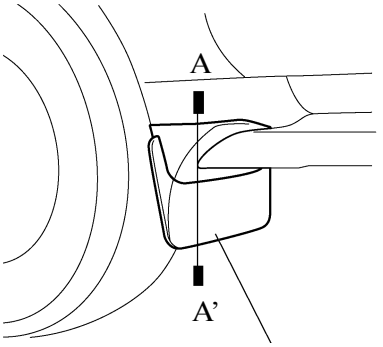
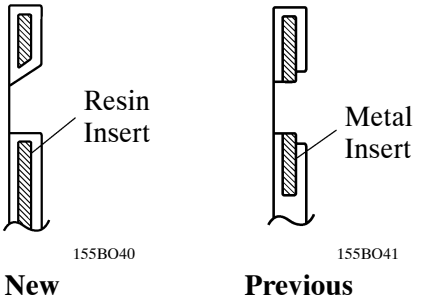
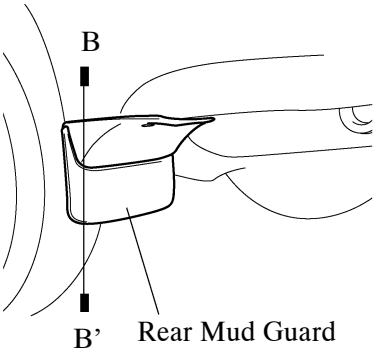
■ MUD GUARD

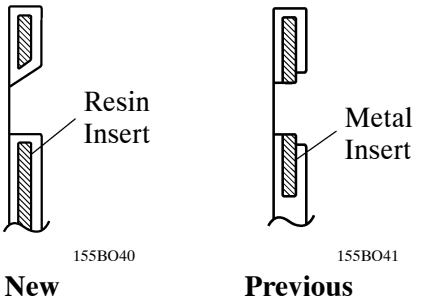
The material of both the front and rear mud guard inserts has been changed from metal to resin for weight reduction and improved corrosion resistance.





A – A' Cross Section

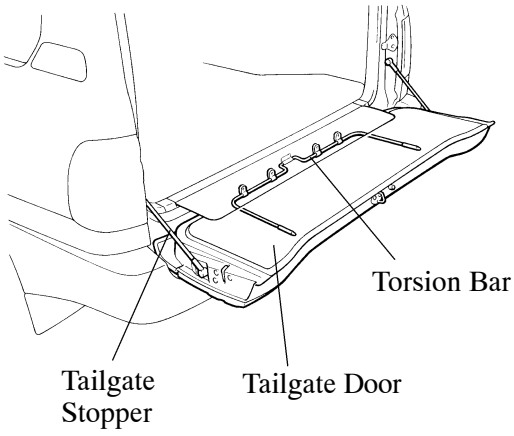




B – B' Cross Section

■ TAILGATE STOPPER

The tailgate stopper has been changed from the folding-arm type to the cable type and a torsion bar has been provided inside the tailgate. As a result, the tailgate can be opened and closed more smoothly.



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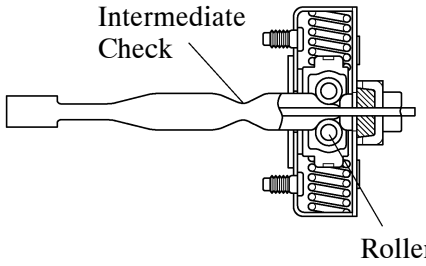
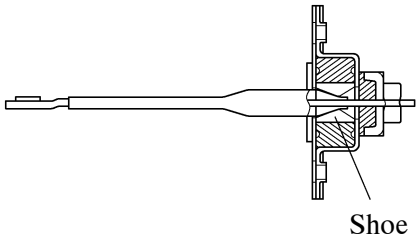
■DOOR CHECK (FRONT AND REAR DOORS)

- The fitting construction of the door check to the body has been changed from the pin-fitted type to the bolt-fitted type. As a result, the appearance and the corrosion resistance of the area where the door check is fitted have been improved.
- The construction of the door check has been changed from the shoe type to the roller type to ensure the smoother operation of the door. In addition, an intermediate check mechanism to maintain the door open at the midway point has been provided for improved convenience.



New

155BO38

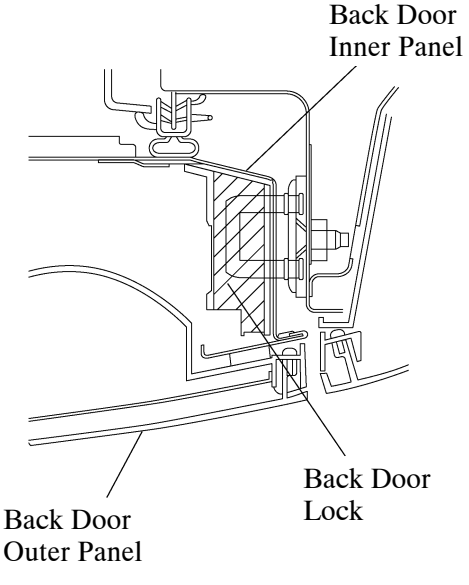


Previous

155BO39

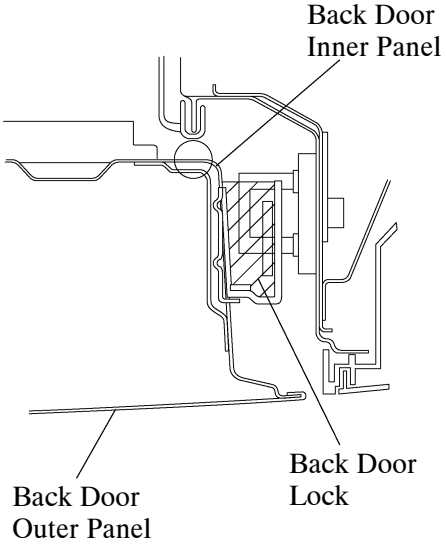
■BACK DOOR LOCK

The position in which the back door lock is fitted has been changed from the outside of the back door to the inside of the back door. Also, the control mechanism of the back door lock has been changed from the link type to the cable type. As a result, the appearance of the back door lock area has been improved and the ease of use of the lock control has been improved.



155BO55

New



155BO56

Previous

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■ SEAT BELT

1. General

- An adjustable shoulder belt anchor is provided for the front seat and the outer seat of No.1 rear seat.
- The front seats are provided with an electrical sensing type seat belt pretensioner and a seat belt force limiter.
- The center seat of the No.1 rear seat is provided with a 3-point ELR (Emergency Locking Retractor) seat belt.

2. Center Seat Belt of No.1 Rear Seat

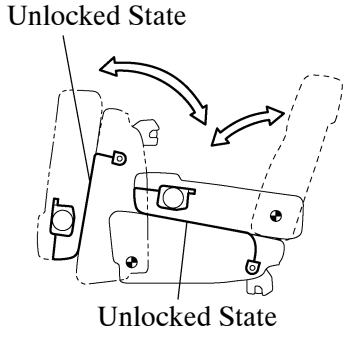
General

- A 3-point ELR seat belt with its retractor enclosed in the seat back is provided as the center seat belt.
- Along with its enclosure in the seat back, the retractor has adopted a mechanism in which the deceleration sensor for activating the ELR unlocks mechanically when the seat belt is fully retracted.
- A reclining detection function has been adopted to constantly maintain the deceleration speed in which the center seat belt ELR activates when the seat back is reclined.

Construction and Operation

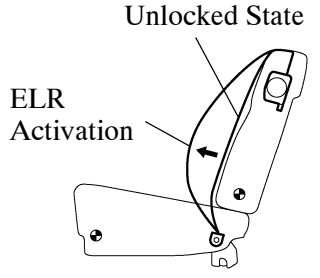
1) ELR Mechanism

The ELR of the center seat belt has adopted a mechanism in which the deceleration sensor for activating the ELR unlocks mechanically when the seat belt is fully retracted. As a result, the ease of tilting forward or folding the seat back has been improved.
When a prescribed amount of the seat belt is pulled out, the deceleration sensor is released from its unlocked state and the ELR assumes the normal ELR operation.



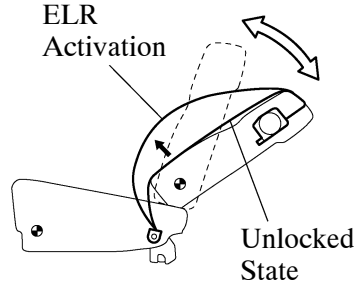
Seat Back in the Tilted Forward or Folded State

155BO33



Normal State

155BO34



Reclined State

155BO35

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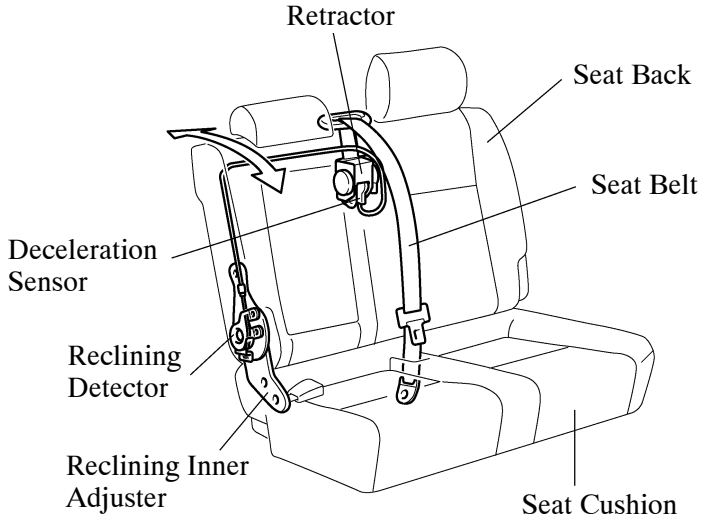
2) Reclining Detection Mechanism

a. Construction

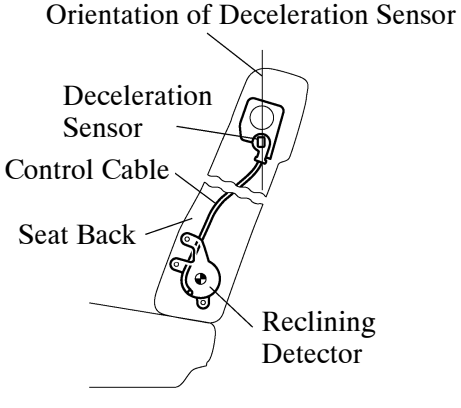
The reclining detection mechanism consists of a retractor, a deceleration sensor for activating the ELR, a reclining detector, and a control cable that connects the deceleration sensor with the reclining detection area. The reclining detector, which is installed on the reclining inner adjuster, detects the difference in the angles of the seat back and the seat cushion.



155BO32

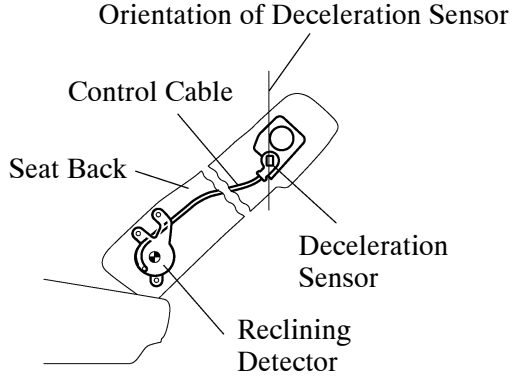
b. Operation

When the seat back is reclined, the retractor moves along with the seat back movement. At the same time, the point on which the control cable is attached to the reclining detector rotates together with the movement of the seat back.
Accordingly, the deceleration sensor that is connected to the control cable rotates, without changing the orientation of the sensor regardless of the reclining angle. Thus, the ELR activates at a prescribed deceleration rate regardless of the reclining angle of the seat back.



155BO36

Normal State



155BO37

Reclined State

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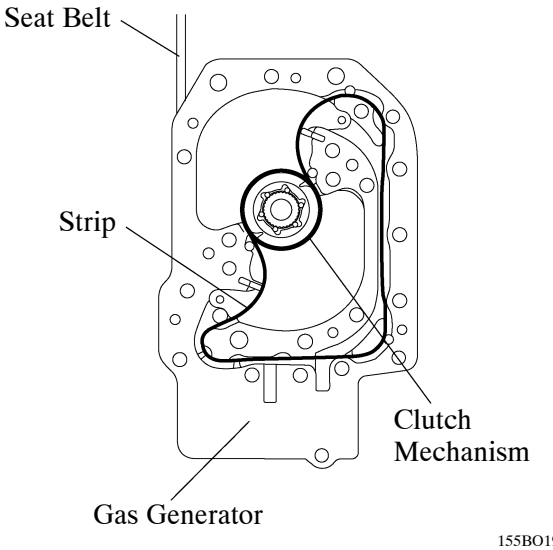
3. Seat Belt Pretensioner

Construction

The seat belt pretensioner consists of the pretensioner mechanism, retracting mechanism, and locking mechanism. The pretensioner mechanism consists of a gas generator, strip, clutch mechanism and etc.

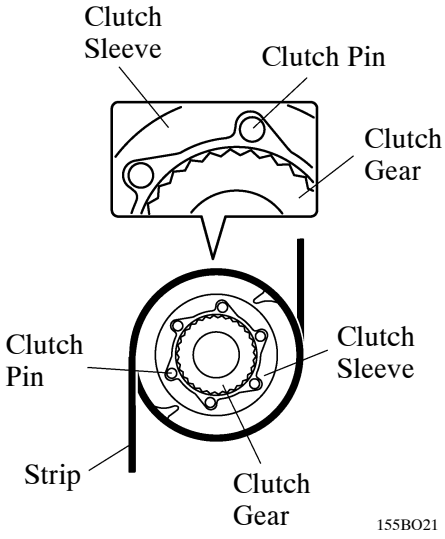


1) Clutch Mechanism

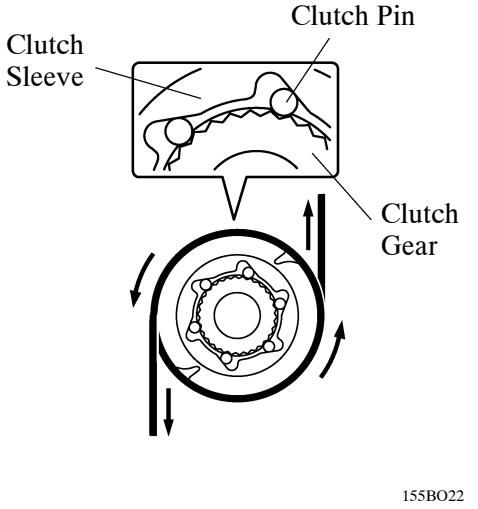
The clutch mechanism consists of a clutch sleeve, clutch pin, clutch gear and etc.. The clutch gear is integrated with the torsion bar and spool. The clutch sleeve has a strip wrapped around it.

Normally, the clutch pin is engaged with the pin holder and chamber so that the rotation of the clutch gear is not obstructed.

The movement of the strip, which is prompted by the gas that is generated by the gas generator, causes the clutch sleeve to rotate. Then, the clutch sleeve causes the clutch pin to shear off from the pin holder, causing the clutch sleeve and clutch gear to engage. As a result, the clutch sleeve and the torsion bar and spool rotate together.



Before Activation



During Activation

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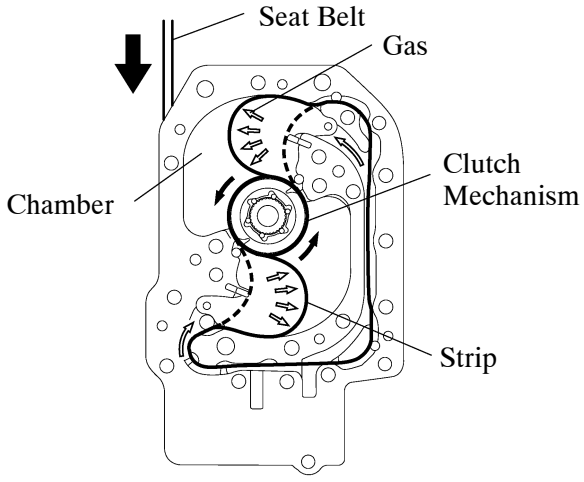
Operation

1) During Activation

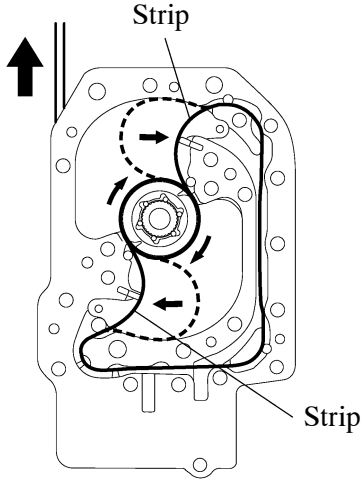
According to the igniter signal received from the airbag computer, the gas generator generates a large volume of high-pressure gas in the chamber. Then, the strip that is wrapped around the clutch sleeve expands, causing the clutch sleeve to rotate. Then, the movement of the clutch mechanism causes the clutch sleeve and the torsion bar and spool to rotate, thus taking up the seat belt.



155BO20

2) After Completing Activation

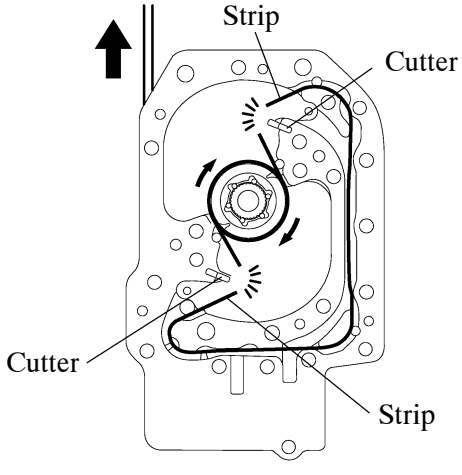
When the activation of the seat belt pretensioner is completed and the seat belt is pulled out by the movement of the occupant, the locking mechanism activates to lock the movement of the belt.
Thereafter, if the force limiter activates, the seat belt is pulled out again. When the spool rotates and the torsion bar is twisted, the clutch gear united with the torsion bar and the clutch sleeve rotate and the strip will become pulled up by the clutch sleeve.



155BO23

3) If the Activation Amount of the Force Limiter is Large

If the amount of seat belt that is pulled out by the activation of the force limiter is greater than the amount of seat belt that is taken up by the activation of the pretensioner, it would prevent the strip from applying resistance to the rotation of the torsion bar. Therefore, the cutter cuts the strip.
Accordingly, the force limiter can be activated, so that the seat belt's force to restrain the occupant does not become excessive.



155BO24

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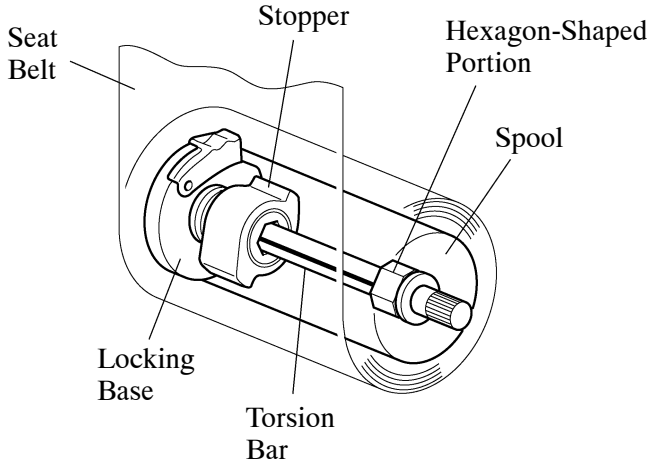
4. Seat Belt Force Limiter

Construction

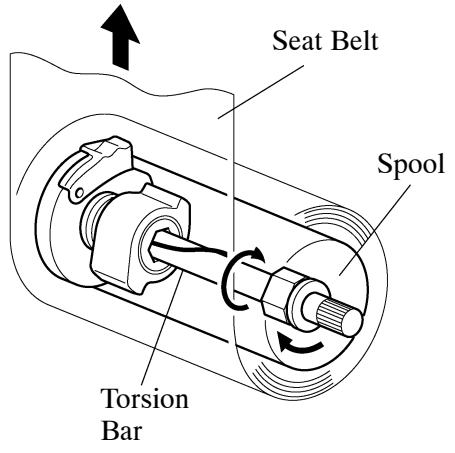
The seat belt force limiter consists of a spool, torsion bar, locking base, and stopper. One end of the torsion bar is secured to the locking base and the other end is integrated via the clutch gear with the hexagon-shaped portion of the spool. The stopper is coupled to the threaded portion of the locking base and rotates in unison with the rotation of the spool.



155BO25

Operation

- When the ELR mechanism is activated, if a force that exceeds a predetermined load is applied to the seat belt, the torsion bar becomes twisted, causing the spool to rotate and the belt to be released.



155BO26

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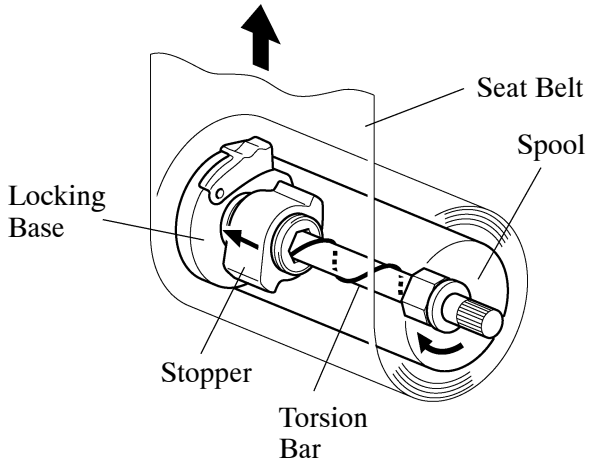
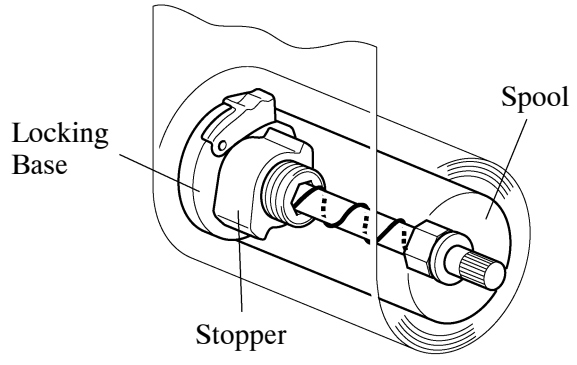
- Along with the movement of the spool, the stopper moves while rotating on the threaded portion of the locking base. The twisting force that is generated in the torsion bar along with the rotation of the spool acts as a resistance against the pulling of the belt.



155BO27

- When the stopper comes in contact with the top of the locking base, the stopper will not be able to rotate any further. As a result, the spool will not rotate, thus stopping the pulling of the belt.



155BO28

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BODY ELECTRICAL

LIGHTING

■DESCRIPTION

The new Land Cruiser has the following systems:

System	Outline
Headlights	A 4-light headlight system with vertically laid out low and high beams has been adopted. Also, the headlight construction of new models has been changed to multi-reflector type headlights. For details, see the next page.
Automatic Light Control System	In accordance with the light availability surrounding the vehicle, this system controls the headlights and the taillights to turn ON and OFF. The basic construction of this system is the same as in the '98 Sienna. However, the construction of automatic light control sensor has been changed. For details, see page 121.
Daytime Running Light System	When the vehicle is being driven in the daytime, this system enables the headlights to illuminate automatically at a reduced intensity.
Light Auto Turn-Off System	When the ignition key is turned from ON to ACC or LOCK position and the driver's door is opened with the taillights and headlights turned on, this system automatically turns them off. The basic operation of this system is the same as in the previous model.
Interior Light Reminder System	If there is no change in the condition of the vehicle during a prescribed length of time in which any of the interior lights such as the dome light or map light illuminate, this system automatically turns OFF the interior lights. For details, see page 122.
Illuminated Entry System	This system is useful when entering the vehicle, fastening the seat belts and inserting the ignition key into the key cylinder in the dark. As in the previous model, when the driver's or passenger's door is opened, the illuminated entry system turns on the illumination lights around the ignition key cylinder, dome light (only when the control switch is at DOOR position) and courtesy light simultaneously. The illumination light around the ignition key cylinder turn off in about 5 seconds. The dome light and courtesy light fade out in about 15 seconds.

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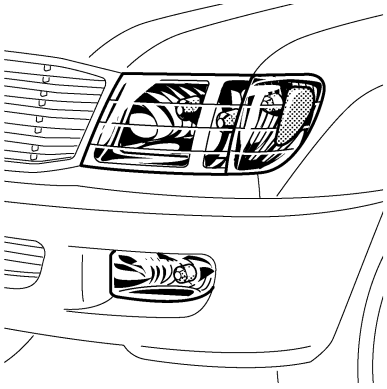
■ HEADLIGHTS

1. General

- A 4-light headlight system with vertically laid out low and high beams has been adopted.
- The multi-reflector type headlight system has been adopted.

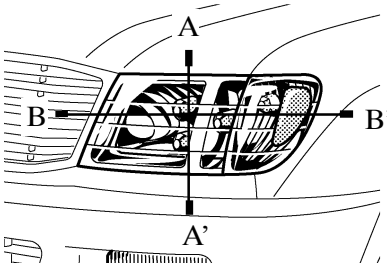


156BE15

2. Construction

4-Light Headlight System

In the new model, the low and high beam headlights and parking lights are integrated into one housing. The low beam headlight bulb is located in the upper part of this housing, and the high beam headlight bulb in the lower part. The parking light is enclosed in the outer side of the headlights.



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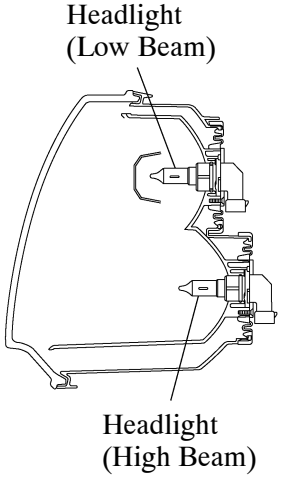
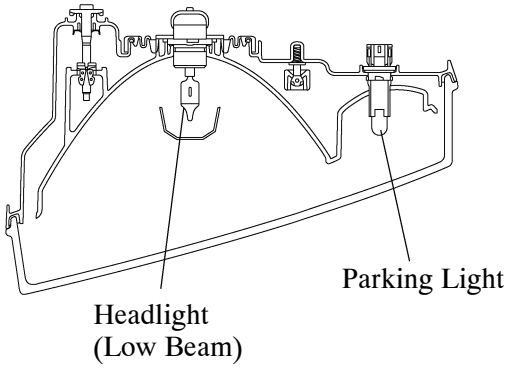


A – A' Cross Section

156BE12



B – B' Cross Section

156BE11

BE

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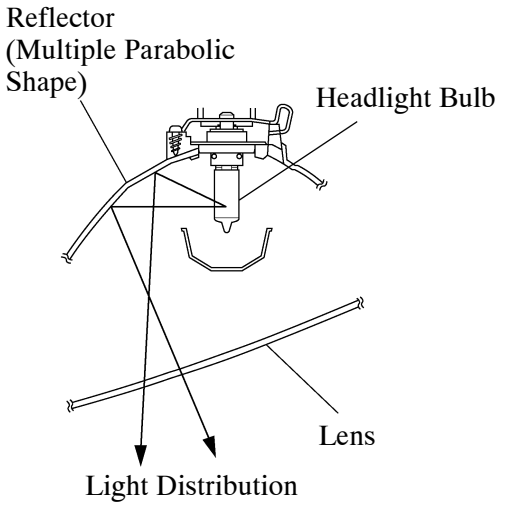
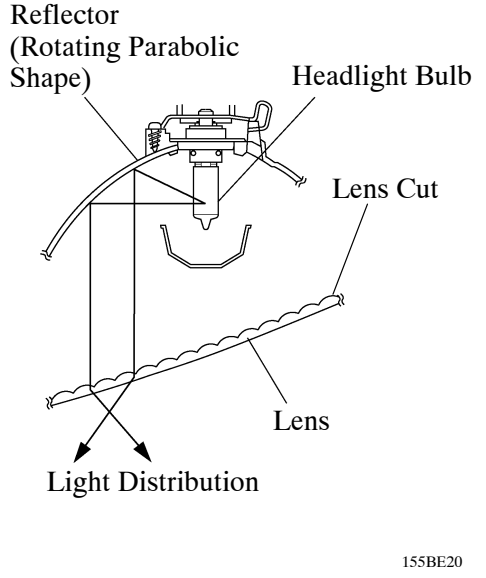
Multi-Reflector Type Headlight

Conventional headlights accomplish the dispersion and distribution of light which is emitted by the bulbs through the lens cut pattern. However, with the multi-reflector type headlights, the light from the bulbs is dispersed and distributed through multiple parabolic shaped reflectors. As a result, the lens cut pattern is no longer provided in the center of the lens, thus realizing a clear look.

▶ Light Distribution Diagram ◀



Multi-Reflector Type Headlight



Conventional Headlight

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■AUTOMATIC LIGHT CONTROL SYSTEM

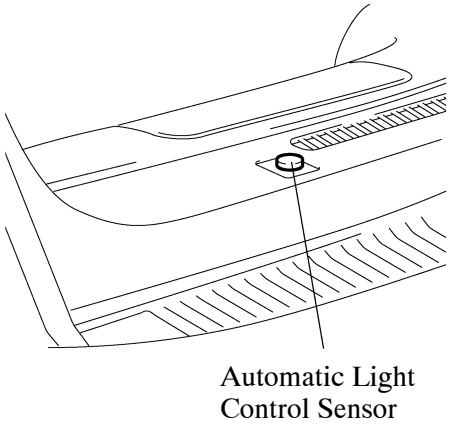
1. General

As long as the light control switch is at AUTO, the automatic light control sensor determines the lighting conditions of the vehicle's surroundings and turns the headlights, taillights and parking lights, etc. on or off automatically.
The basic construction and operation are the same as in the '98 Sienna.

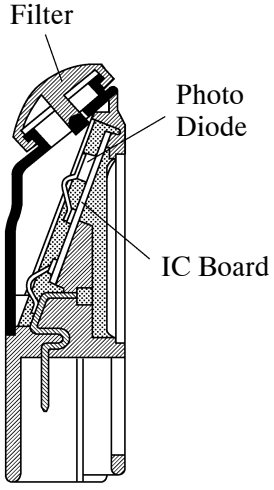
2. Construction and Operation

Automatic Light Control Sensor

The automatic light control sensor is located at the top right area of the instrument panel. It is comprised of a photo diode sensor which senses the available light, and a light control relay (hybrid IC board) which controls the taillight and headlight relays. Also, the light sensitivity is controlled by turning the filter.



156BE21



156BE22

Automatic Light Control Sensor

BE

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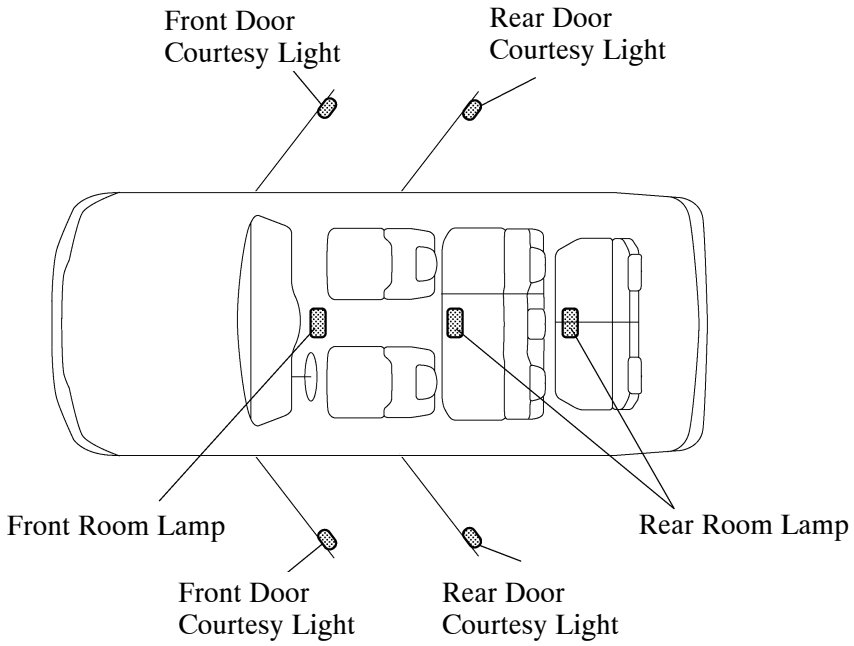
■INTERIOR LIGHT REMINDER SYSTEM

1. General

The interior light reminder system provides two functions: interior light cutoff function and the door courtesy switch linked light cutoff function.
The interior light cutoff function turns OFF the light main relay when the ignition switch is turned OFF and no changes have occurred in all the door courtesy light switches within 15 minutes.
When the ignition switch is turned OFF and if any of the doors remain open longer than 5 minutes, the door courtesy switch-linked light cutoff function automatically turns OFF the lights that are linked to that door.

2. Layout of Interior Light



3. Normal Operation

The interior lights that illuminate along with the opening of the doors are listed in the table below.

◎: ON (With Fade-Out), ○: ON, X: OFF

Interior Light / Door to be opened	Front Door Courtesy Light		Front Room Lamp	Rear Door Courtesy Light		Rear Room Lamp
	Driver	Passenger		Left	Right	
Driver Side Front Door	◎	◎	◎	X	X	X
Passenger Side Front Door	◎	◎	◎	X	X	X
Left Side Rear Door	X	X	X	○	○	○
Right Side Rear Door	X	X	X	○	○	○
Back Door	X	X	X	○	○	○

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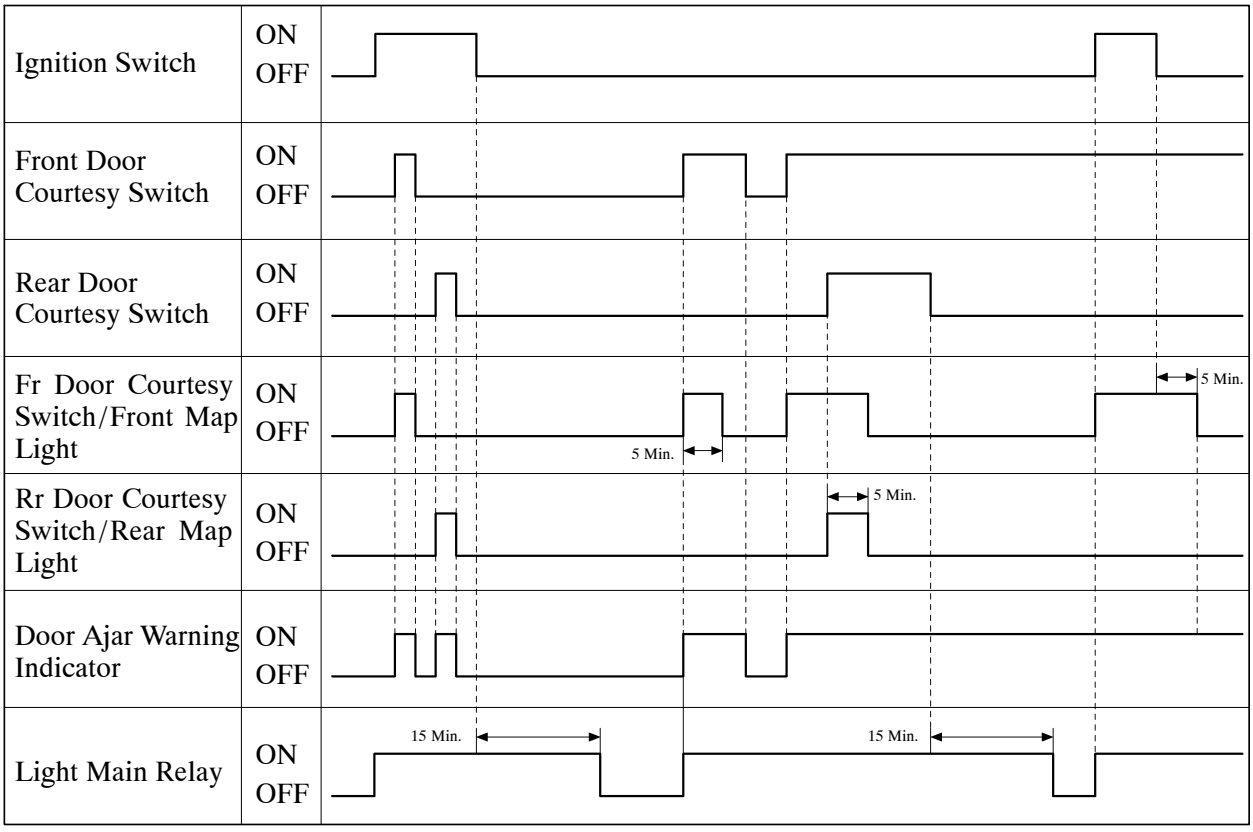
4. Interior Light Cut Off Function

When the ignition switch is turned OFF, the instrument panel ECU monitors the condition of the door courtesy light switches and starts counting time. When 15 minutes have elapsed after no changes have occurred in any of the door courtesy light switches, the instrument panel ECU turns OFF the light main relay to cut off the current to the interior lights. As a result, the interior lights turn OFF.
As a result, the interior light turns OFF.
However, the activation of this function is canceled and the time count is reset if the condition of the vehicle meets any of the items given below.

- The ignition switch is turned to ACC or ON position.
- Any of the doors is opened or closed.

These functions help prevent the light front being left ON.



155BE11

5. Door Courtesy Switch Linked Light Cut Off Function

When the ignition switch is turned OFF and any of the doors are opened, the instrument panel ECU monitors the condition of the door courtesy light switches and starts counting time. When 5 minutes have elapsed after no changes have occurred in any of the door courtesy light switches, the instrument panel ECU turns OFF the interior lights that are linked to the opening of a door.
However, the activation of this function is canceled and the time count is reset if the condition of the vehicle meets any of the items given below.

- The ignition switch is turned to ACC or ON position.
- All doors are closed.

In addition, while the timer is counting time, if any of the previously closed doors are opened, the timer resets itself and starts counting time.
These functions help prevent the interior lights from being left ON if a door is unintendedly left open.

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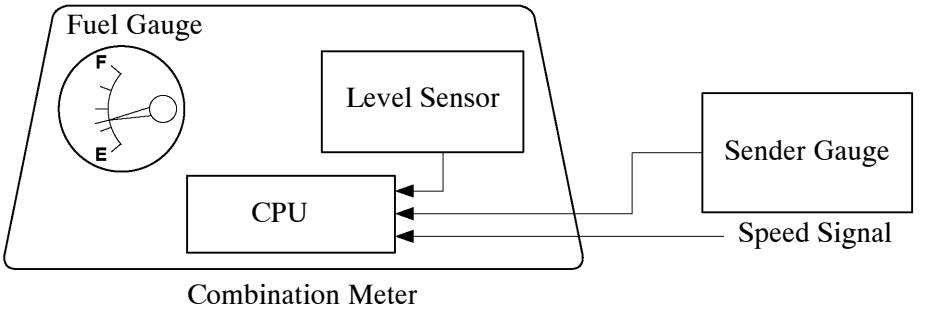
METER

■ COMBINATION METER

The combination meter of new Land Cruiser has the following features:

- A level sensor is provided in the combination meter to detect the inclination of the vehicle. This sensor prevents the fuel gauge from indicating erroneously due to the fluctuation of the fuel surface, which occurs when driving on a slope.

▶ System Diagram ◀



155BE15

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AIR CONDITIONING

■DESCRIPTION

1. General

The air conditioning system in the new Land Cruiser has the following features:

- The front heater and rear heater are standard equipment and the front heater is optional equipment.
- The air conditioner (front only) is standard equipment.
- An easy-to-use rotary switch type front heater control panel is used.
- An easy-to-use rear heater control panel has been newly adopted on the back of the rear console.
- A momentary type switch has been adopted for the rear heater switch that is provided in the instrument panel.
- A 3-flow level type heater unit, which features lower air flow resistance, is used.
- The construction of the evaporator, heater core, and blower fan has been changed.

▶ Performance ◀

Model / Item		New	Previous
Heater	Heat Output W (Kcal/h)	5150 (4430)	4980 (4280)
	Air Flow Volume m^3/h	340	330
	Power Consumption W	195	180
Air Conditioner	Heat Output W (Kcal/h)	6600 (5680)	6050 (5200)
	Air Flow Volume m^3/h	580	580
	Power Consumption W	270	245

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▶ Specifications ◀

Item / Model			New	Previous
Ventilation and Heater	Heater Core	Type	Straight-Flow Type	U-turn Flow Type
		Size W x H x L mm (in.)	216.9 x 140 x 27 (8.5 x 5.5 x 1.1)	155.7 x 200 x 36 (6.1 x 7.9 x 1.4)
		Fin Pitch mm (in.)	1.8 (0.07)	←
	Blower	Motor Type	S80F11.5T	S80F12T
		Fan Size Dia. x H mm (in.)	158 x 80 (6.2 x 3.1)	150 x 85 (5.9 x 3.3)
Air Conditioner	Condenser	Type	Multi-Flow Type (Sub-Cool Type)	3-Passage Flow Type
		Size W x H x L mm (in.)	444.8 x 570 x 16 (17.5 x 22.4 x 0.6)	363 x 706 x 22 (14.3 x 27.8 x 0.9)
		Fin Pitch mm (in.)	3.2 (0.13)	4.5 (0.18)
	Evaporator	Type	Drawn Cup Type	←
		Size W x H x L mm (in.)	266.2 x 255 x 90 (10.5 x 10.0 x 3.5)	279 x 260 x 105 (11.0 x 10.2 x 4.1)
		Fin Pitch mm (in.)	3.5 (0.14)	←
	Compressor	Type	10PA20	10PA17

▶ Performance of Rear Heater ◀

Item / Model		New	Previous
Rear Heater	Heat Output W (Kcal/h)	2100 (1800)	1860 (1600)
	Air Flow Volume m^3/h	110	←
	Power Consumption W	40	50

▶ Specifications of Rear Heater ◀

Item / Model			New	Previous
Rear Heater	Heater Core	Type	U-turn Flow Type	←
		Size W x H x L mm (in.)	140 x 105.3 x 27 (5.5 x 4.1 x 1.1)	120 x 92.7 x 36 (4.7 x 3.6 x 1.4)
		Fin Pitch mm (in.)	1.8 (0.07)	2.8 (0.11)
	Blower	Motor Type	S50FS	50F23T
		Fan Size Dia. x H mm (in.)	120 x 75 (4.7 x 3.0)	115.3 x 65 (4.5 x 2.6)

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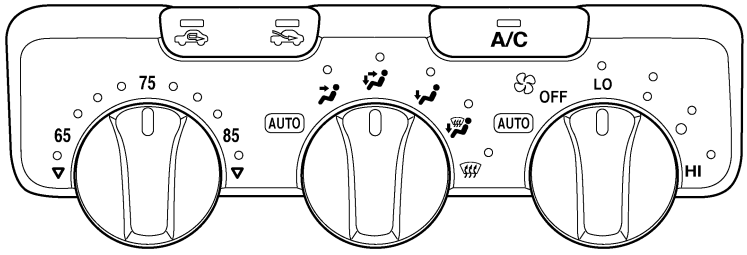
■CONSTRUCTION AND OPERATION

1. Front Heater Control Panel

- An easy-to-use rotary switch type front heater control panel is used. The design of the switches has been optimized to realize excellent ease of use.
- An indicator is provided above the blower switch and the mode switch so that the airflow volume and the air outlet mode can be verified in the automatic mode.



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2. Air Conditioning Unit

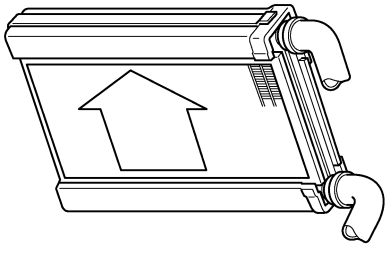
The air conditioning unit incorporates a blower, heater and cooler units. This provides low ventilating resistance and improves quietness and performance.

Blower Fan

A shroud fan has been adopted for the blower fan to achieve both increased airflow and decreased noise. Along with the adoption of the shroud fan, the air inlet at the bottom of the blower unit that was provided in the previous model has been discontinued.

Heater Core

The flow of the heater water in the heater core has been changed from the previous U-turn flow to a full-path flow. Due to the resulting improvement in the heat exchanging efficiency of the heater core, the heater core itself could be made thinner.



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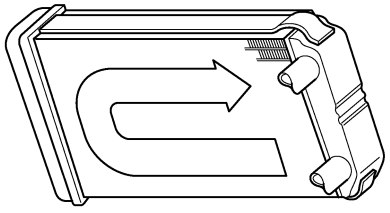
New



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Previous

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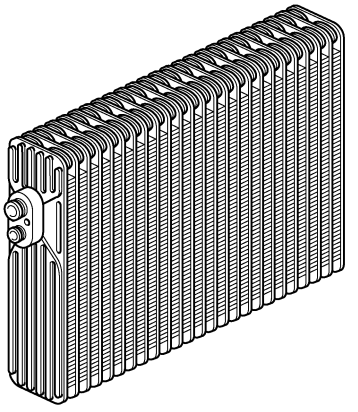
Evaporator

By placing the tanks at the top and the bottom of the evaporator unit and by adopting an inner fin construction, the heat exchanging efficiency has been improved and the evaporator unit's temperature distribution has been made more uniform. As a result, it has become possible to realize a thinner evaporator construction.



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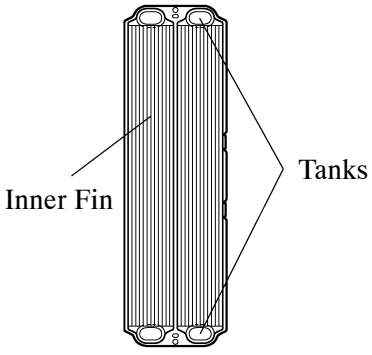

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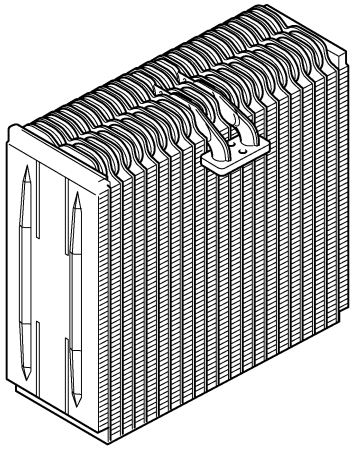
New



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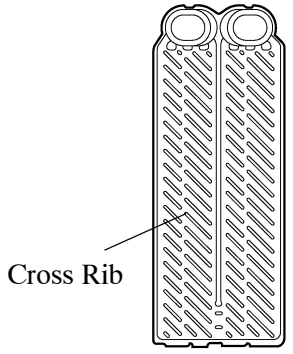

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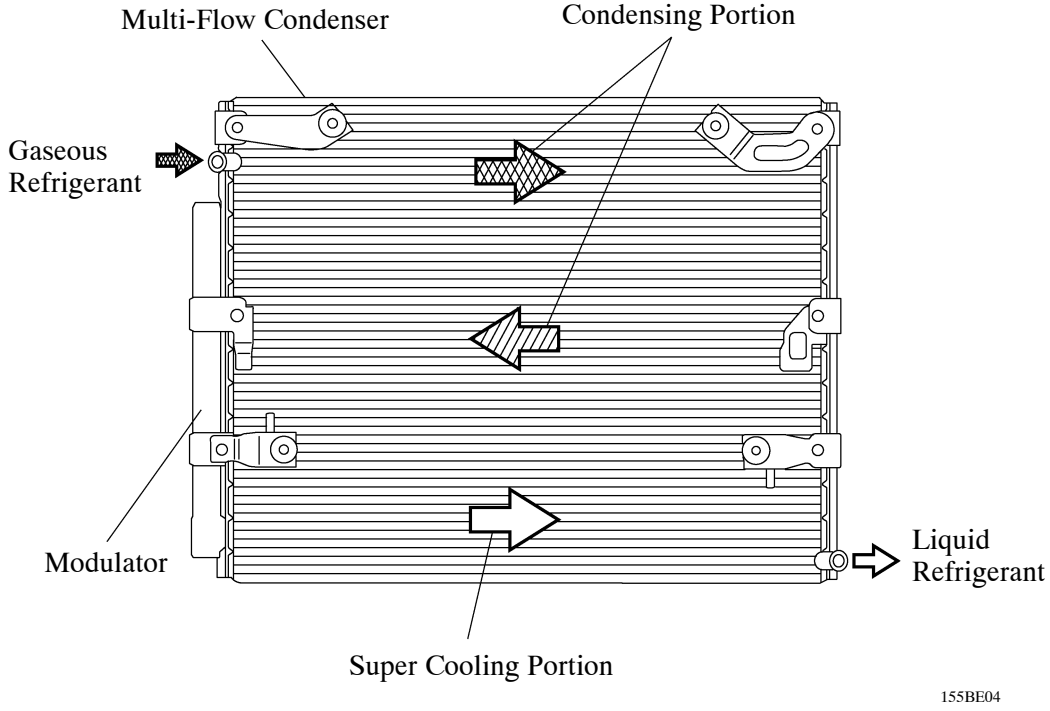
3. Condenser

The Land Cruiser has newly adopted a sub-cool condenser in which a multi-flow condenser (consisting of two cooling portions: a condensing portion and a super-cooling portion) and a gas-liquid separator (modulator) have been integrated. This condenser has adopted the sub-cool cycle for its cooling cycle system to improve the heat exchanging efficiency.

Sub-Cool Cycle

The receiver cycle of the previous condenser could not convert the gaseous refrigerant that was sent by the compressor into a completely liquefied state in the condenser. Thus, a portion of the refrigerant remained in the gaseous state as it was sent to the evaporator.
In the sub-cool cycle of the sub-cool condenser that has been adopted on the new model, after the refrigerant passes through the condensing portion of the condenser, both the liquid refrigerant and the gaseous refrigerant that could not be liquefied are cooled again in the super-cooling portion. Thus, the refrigerant is sent to the evaporator in an almost completely liquefied state.



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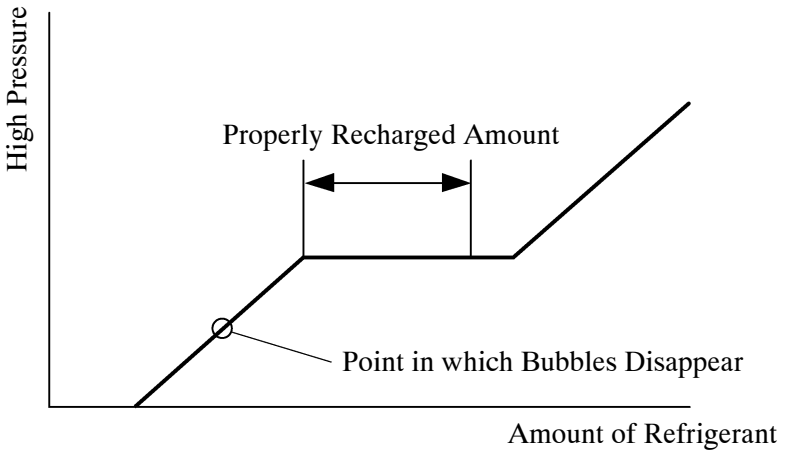
NOTE: The point at which the air bubbles disappear in the refrigerant of the sub-cool cycle is lower than the proper amount of refrigerant with which the system must be filled. Therefore, if the system is recharged with refrigerant based on the point at which the air bubbles disappear, the amount of refrigerant would be insufficient. As a result, the cooling performance of the system will be affected.
For the proper method of verifying the amount of the refrigerant and to recharge the system with refrigerant, see the 1998 Land Cruiser Repair Manual (Pub. No. RM615U).



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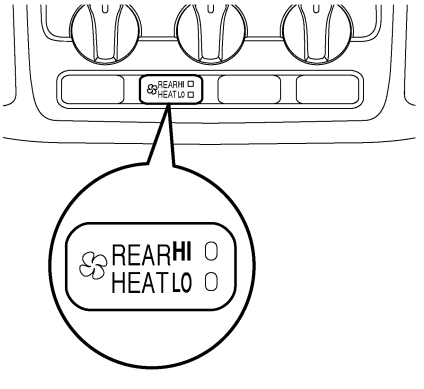
4. Rear Heater Control Switch

As in the previous model, a rear heater control switch is provided in the center console. However, the construction of the switch has been changed from the seesaw type of the previous model to a momentary type.



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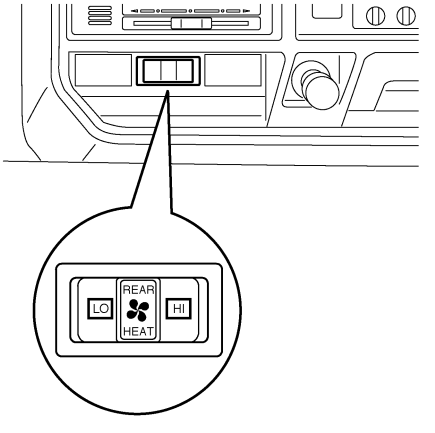
New



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Previous

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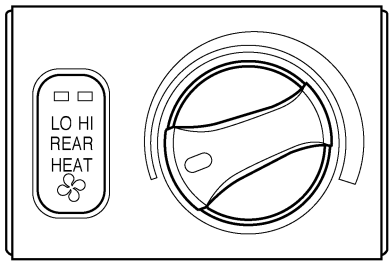
5. Rear Heater Control Panel

The models with rear heater has adopted a push and rotary switch type heater control panel. This control panel is located on the back of the rear console box.



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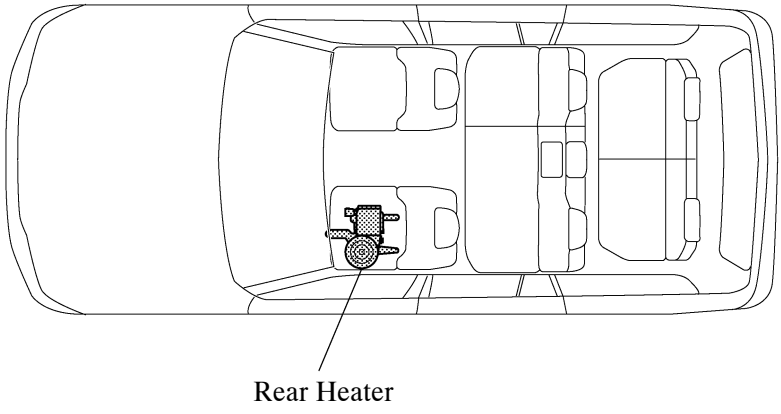
Models with Rear Heater

6. Rear Heater Unit

- The rear heater unit is located under the front seat.
- The rear heater with a full-air mix type temperature control is used.



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ACCESSORIES

■ DESCRIPTION

The new Land Cruiser includes the accessory systems shown in the following table.

System	Outline
Power Window	This system includes one-touch auto up and down and key-off operation functions. The one-touch auto up and down function automatically fully closes and opens the driver's side window. The key-off operation function makes it possible to operate the power windows for approximately 45 seconds after the ignition key is turned to the ACC or LOCK position, if the front doors are not opened. Also, a jam protection function has been newly added. If a foreign object becomes jammed in the window during one-touch auto-up or key-off operation of the driver's window, this function automatically stops the power window and moves it downward. For details, see page 134.
Door Lock Control System	This system has a "key linked lock and unlock function". Lock and unlock are linked with the door key cylinder operation. When the driver's door key cylinder is operated, it is necessary to turn the key 2 times in succession in order to unlock the passenger's door. The basic operation is the same as in the previous model.
Wireless Door Lock Remote Control System	The multi-function type wireless door lock remote control system has been adopted. This system uses a transmitter that can be used to lock and unlock all the doors, operate the panic alarm, etc. For details, see page 137.
Theft Deterrent System	When an attempt is made to forcibly open the doors or the hood without a key, or when the battery terminals are removed and reconnected, this system sounds the horn and flashes the headlights, taillights and turn signal lights for about 1 minute to alert the owner. The basic construction and operation are the same as in the '98 Sienna. On the new Land Cruiser, in conjunction with the adoption of the engine immobiliser system, the starter cutoff function has been discontinued.
Engine Immobiliser System	This is a theft-deterrent system which disables the engine unless the ignition key used to start the engine has an ID code that matches the pre-registered code in the vehicle. For details, see page 142.
Seat Heater	The seat heater system improves the comfort of the driver and the front passenger in a cold weather by heating the surface of the seats. Also, on the new Land Cruiser, the heating area of the seat cushion has been extended to the sides of the cushion.

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System	Outline
SRS Airbag	The SRS (Supplemental Restraint System) airbag is provided for the driver and front passenger. The SRS airbag has been designed to lessen the shock to the head and chest of the driver and front passenger in the event of a frontal impact collision as a supplement to the seat belt. A 3-sensor type airbag system is used in which the detection of deceleration during a collision as well as control of the airbag system is accomplished by the airbag sensor and front airbag sensor and front airbag sensor assembly. The basic construction and operation are the same as in the '98 Sienna. However, the construction and operation of the inflator for the front passenger are different. For details, see page 146.
Cruise Control System	Once it has been set at desired vehicle speed, this system automatically adjusts the engine throttle position to maintain the vehicle speed at the desired speed without operating the acceleration pedal. On the new Land Cruiser, in conjunction with the adoption of the ETCS-i in the engine, a cruise control system that uses the throttle control motor, which is a part of the ETCS-i, has been adopted. Also, the cruise control ECU has been integrated with the ECM. For details, see page 148.
Moon Roof	The moon roof is a tilt-up and sliding type the same as in the previous model. The new Land Cruiser has a newly provided "one-touch slide open and close function" and a "jam protection function". For details, see page 150.
Power Seat	The power seat is assisted by electric motors so that the seat positions can be adjusted easily by a simple switch operation.
Outside Rear View Mirror	An electrical remote control type outside rear view mirror that enables mirror angle to be adjusted by a switch operation is provided.
Seat Belt Warning System	If the driver or the front passenger has not buckled the respective seat belt when the ignition switch is turned ON, the seat belt warning system illuminates the warning light and sounds the buzzer to inform the driver and the front passenger that their seat belts have not been buckled. For details, see page 153.
Key Reminder System	When the driver's door is opened with the ignition key in the ACC or LOCK position, this system sounds a buzzer to warn the driver that the ignition key has not been removed.

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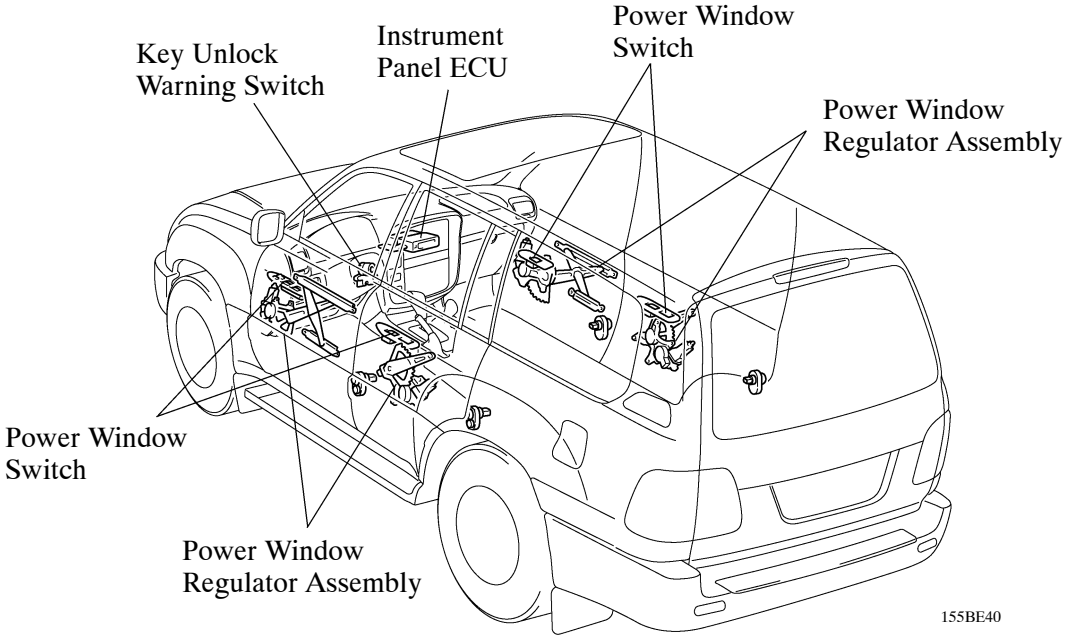
■POWER WINDOW

1. General

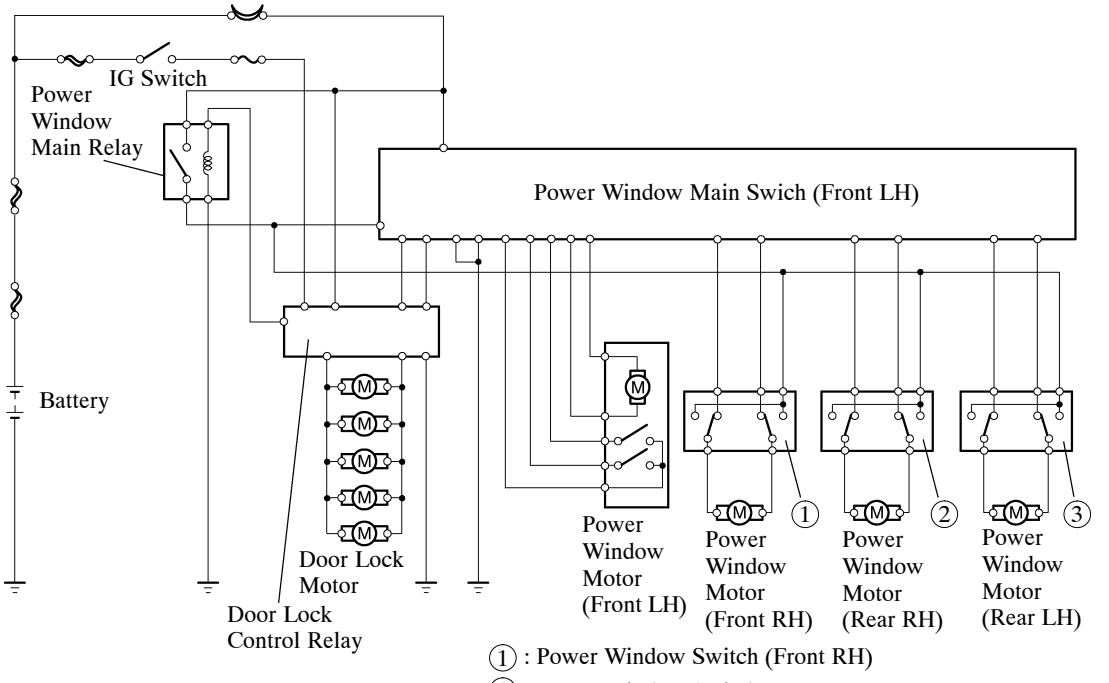
In addition to the previous one-touch auto-down function, a one-touch auto-up function has been added, thus enabling the driver's door window to fully close at the touch of the switch.
In conjunction with this function, a jam protection function has been newly added. If a foreign object becomes jammed between the glass and the window frame during one-touch auto-up operation, this function automatically stops the power window's upward movement and moves it downward.

2. Layout of Components

The major function parts of jam protection function of the power window are shown below.



3. Wiring Diagram



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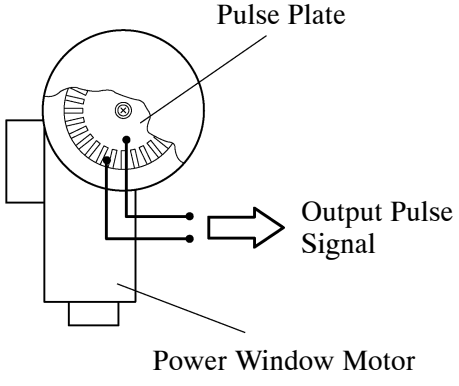
4. Construction

Pulse Sensor and Limit Switch

By way of the pulse plate that is attached to the reduction gear of the power window motor, the pulse sensor outputs a pulse signal with an amplitude that is appropriate for the rpm of the motor to the controller.
In addition, a limit switch is enclosed in the reduction gear. This switch determines the neutral zone in which the jam function does not operate.



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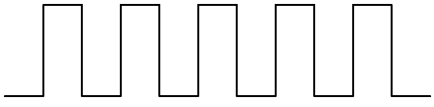

Output Pulse Signal

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Controller

Consisting of a pulse input circuit, jam judgment circuit, and motor drive circuit, the controller is integrated with the power window master switch.
The jam judgment circuit detects if a foreign object is jammed in the window by sensing a change in the signal that is output by the pulse sensor.

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Power Window Master Switch

The power window master switch outputs control signals for the power window's up, down, one-touch auto-up, one-touch auto-down functions to the power window motor.

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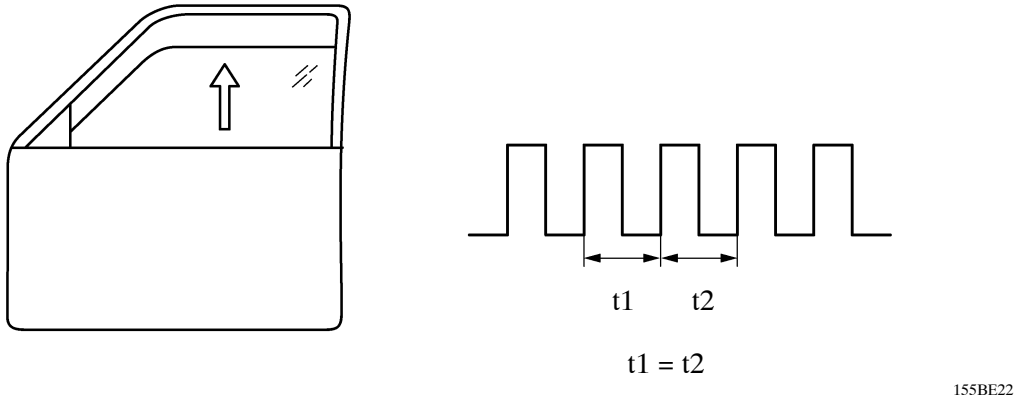
5. Operation

Normal Operation

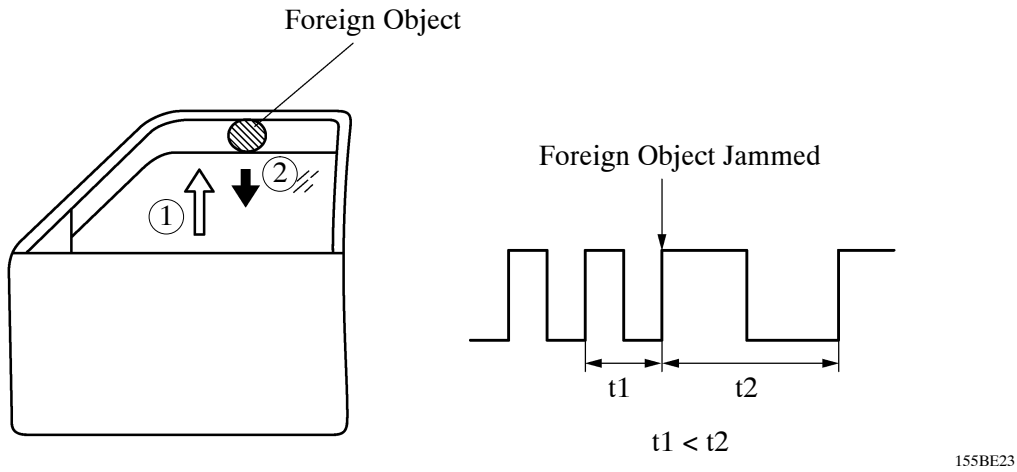
During the normal operation of the power window, the power window motor rotates at a constant speed. Accordingly, the width of the pulse signals that are output by the pulse sensor to the controller is uniform. When the controller receives pulse signals with a uniform width, it determines that no jamming occurred. Thus, the controller determines the power window movement according to the signal that is received by the controller.



Output Pulse Signal

Jam Protection Operation

If an object becomes jammed between the glass and the window frame during one-touch auto-up operation, the power window motor's speed decreases (①). Accordingly, the width of the pulse signals that are output by the pulse sensor to the controller increases. After the motor's deceleration rate exceeds a predetermined value, the jam judgment circuit determines that jamming occurred.
Then, the controller stops the upward movement of the window, and automatically moves the window downward so that there will be a window opening of 200 mm (7.9 in.) or more (②).
The jam protection function operates only during a one-touch auto-up operation.



Output Pulse Signal

NOTE: Immediately before the window is fully closed, there is an area in which the jam protection function does not operate.

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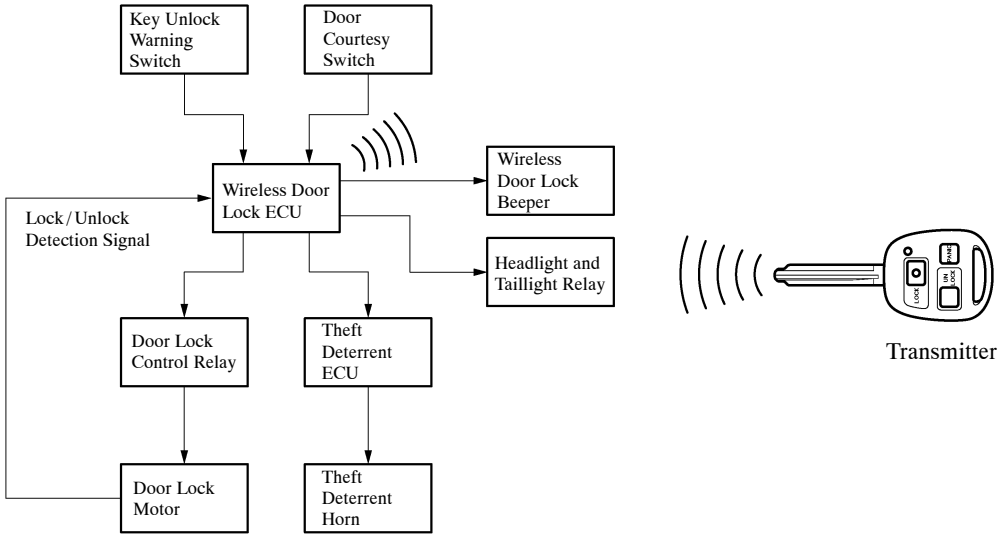
■ WIRELESS DOOR LOCK REMOTE CONTROL SYSTEM

1. General

The wireless door lock remote control system is a convenient system for locking and unlocking all the doors, at a distance. This system in the Land Cruiser has the following features:

- A multi-function type wireless door lock remote control system that provides a lock/unlock function for all doors, panic alarm operation function, etc. has been adopted.
- An easy-to-use key-integrated type transmitter has been adopted.
- An LED (Light Emitting Diode) is enclosed in the transmitter to monitor if the battery is discharged.
- A rolling code function has been adopted, which changes the recognition code each time the transmitter is pressed.
- To facilitate the verification of its operation, this system sounds the beeper and flashes the parking lights and taillights upon completion of each operation.

▶ System Diagram ◀



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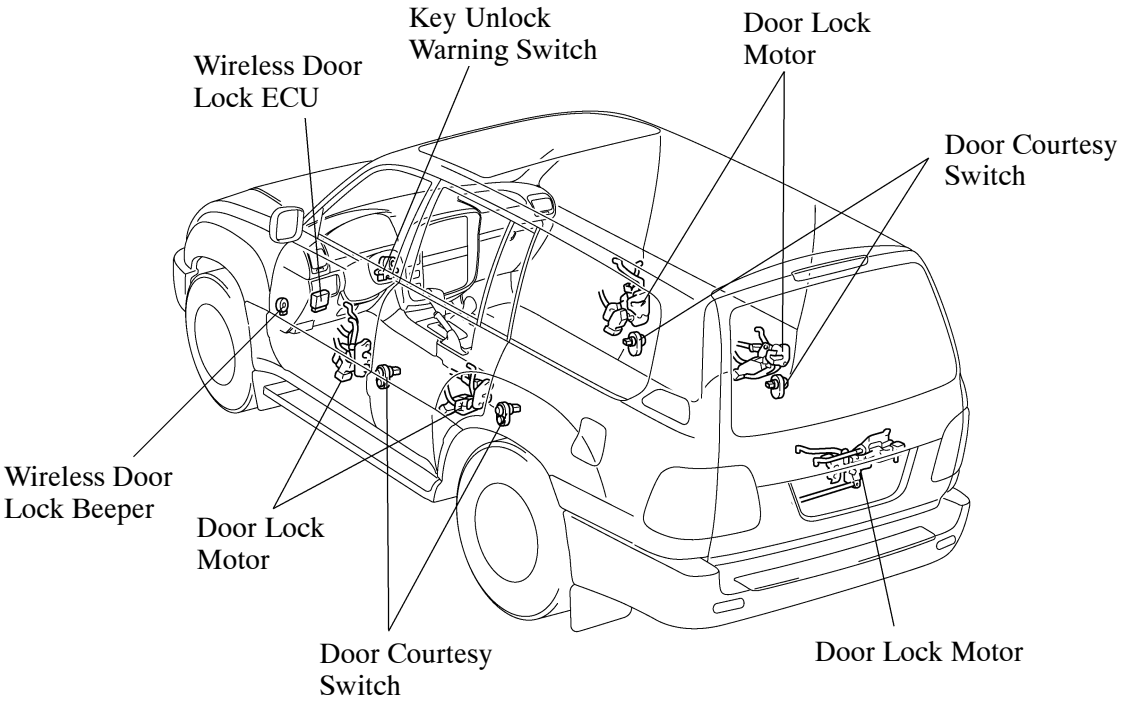
2. Wiring Diagram



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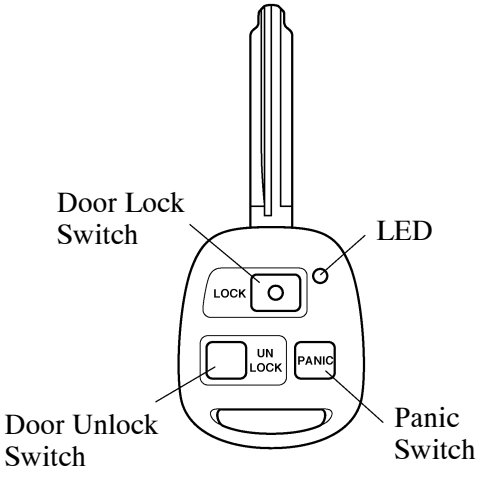
3. Construction

Transmitter

- To accommodate the multiple functions provided in the wireless door lock remote control system, the multi-function type transmitter has been enclosed in the key grip. As a result, a transmitter with excellent portability and ease of use has been realized.
- This transmitter is equipped with a panic switch which activates the security alarm of the theft deterrent system to activate.
- An LED (Light Emitting Diode) is enclosed in the key grip to monitor if the battery is discharged.
- The key mold portion and the transmitter module has been separated to improve their serviceability.



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Wireless Door Lock ECU

- An antenna that receives the signals from the transmitter is enclosed in the ECU.
- The ECU outputs the control signals to the integration relay, buzzer, etc., in accordance with the signals received from the transmitter.
- The wireless door lock ECU is located in the instrument panel on the driver side.

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Door Courtesy Switch

The door courtesy switch detects the operation of a door. It goes on when the door is open and off it is closed.

4. Function

The wireless door lock remote control system in the Land Cruiser has the following functions.

All Doors Lock Function

Pressing the “door lock” switch of the transmitter locks all doors.

Driver’s Door Unlock Function

Pressing the “door unlock” switch of the transmitter once unlocks only the driver’s door.

All Door’s Unlock Function

Pressing the “door unlock” switch twice within 3 seconds opens all doors after opening the driver’s door.

Panic Alarm Function

Pressing the “panic” switch of the transmitter activates the alarm of the theft deterrent system (to sound the horn and flash the headlights and taillights).

Operation Verification Beeper Function

When the doors are locked by the transmitter switch operation, the wireless door lock beeper beeps once to confirm that the operation has been completed.
Similarly, the beeper beeps twice when the doors are unlocked.

▶ Beeper Sound Patterns ◀

Lock	Beeper Sound	ON	0.20 Sec.
		OFF	
Unlock		ON	
		OFF	

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Operation Verification Light Function

When the doors are locked by the transmitter switch operation, the parking light and taillight flashes once to confirm that the operation has been completed.
Similarly, the parking light flashes twice when the doors are unlocked.

▶ Light Flash Patterns ◀

Lock	Light Flash	ON	0.20 Sec.
		OFF	
Unlock		ON	
		OFF	

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Auto Lock Function

If none of the doors are opened within 30 seconds after they are unlocked by the wireless door lock remote control, all the doors are locked again automatically.

Transmitter Switch Misoperation Prevention Function

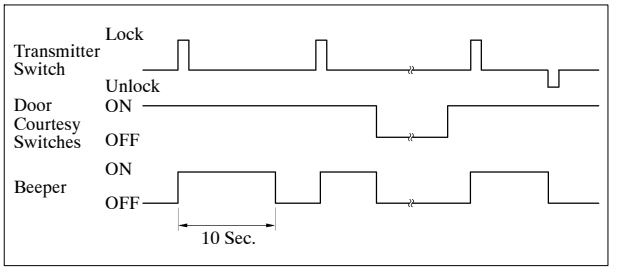
When an ignition key is in the ignition key cylinder or any of the doors is not closed completely, the wireless door lock remote control is temporarily cancelled to prevent misoperation.

Repeat Function

If a door is not locked in response to the locking operation of the transmitter, the wireless door lock ECU will output a lock signal once after 2 seconds.

Door Ajar Warning Function

Pressing the “door lock” switch of the transmitter when any door is open or ajar causes the wireless door lock beeper to beep for 10 seconds. The beeper will stop beeping if the doors are completely closed or if an “unlock” signal is received from the transmitter.



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Security Function

An operation signal is transmitted by a rolling code function in which the recognition code is changed each time the transmitter switch is pressed.

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Transmitter Recognition Code Registration Function

The table below shows the 4 special coded ID registration function modes (rewrite mode, add mode, confirm mode and prohibit mode) through which up to 4 different codes can be registered. The codes are electronically registered (written to and stored) in the EEPROM.
For details of the recognition code registration procedure, refer to the 1998 Land Cruiser Repair Manual (Pub. No. RM615U) to register the codes correctly.

Mode	Function
Rewrite Mode	Erases all previously registered codes and registers only the newly received codes. This mode is used whenever a transmitter or the wireless door lock ECU is replaced.
Add Mode	Adds a newly received code while preserving any previously registered codes. This mode is used when adding a new transmitter. If the number of codes exceeds 4, the oldest registered code is erased first.
Confirm Mode	Confirms how many codes are currently registered. When adding a new code, this mode is used to check how many codes already exist.
Prohibit Mode	To delete all the registered codes and to prohibit the wireless door lock function. This mode is used when the transmitter is lost.

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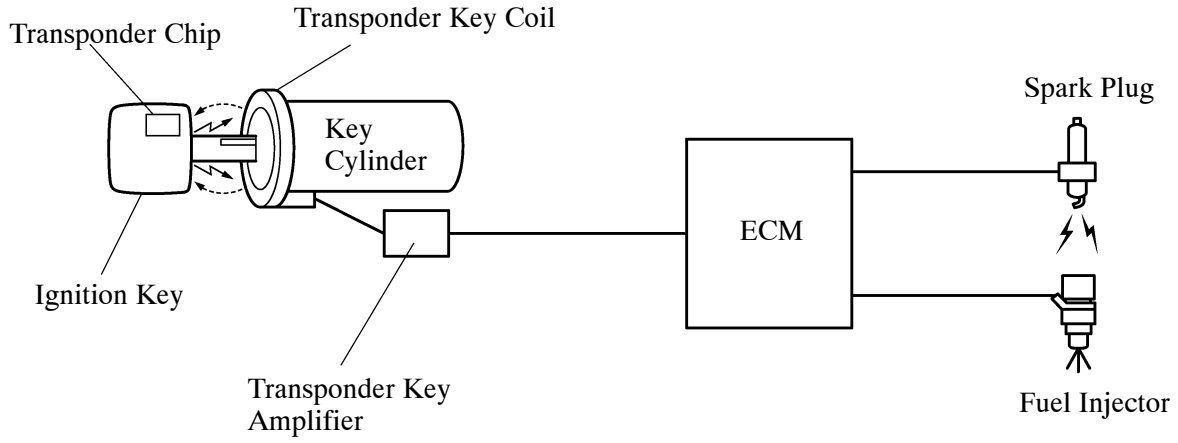
■ENGINE IMMOBILISER SYSTEM

1. Description

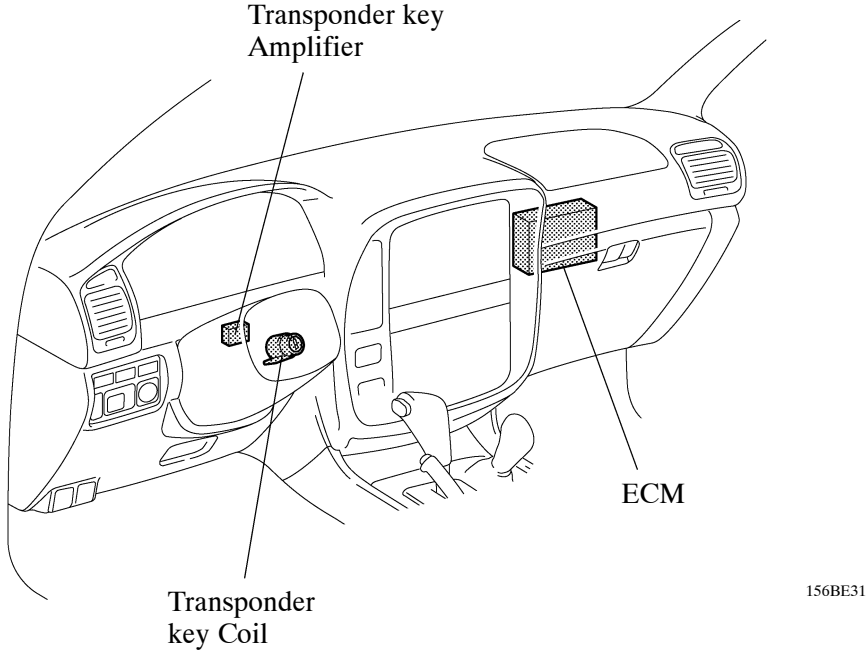
The engine immobiliser system is a theft-deterrent system which disables the engine from starting by using the ignition key with an ID code that matches the pre-registered code in the vehicle.
This system adopts a transponder system which uses a transponder chip embedded in the grip of the ignition key. When the coil located around the ignition key cylinder receives the ID code signal transmitted by the transponder chip, the ECM determines whether or not the ID code matches the code that is stored in the computer.

▶ System Diagram ◀



2. Layout of Components

The major function parts of the engine immobiliser system are shown below.



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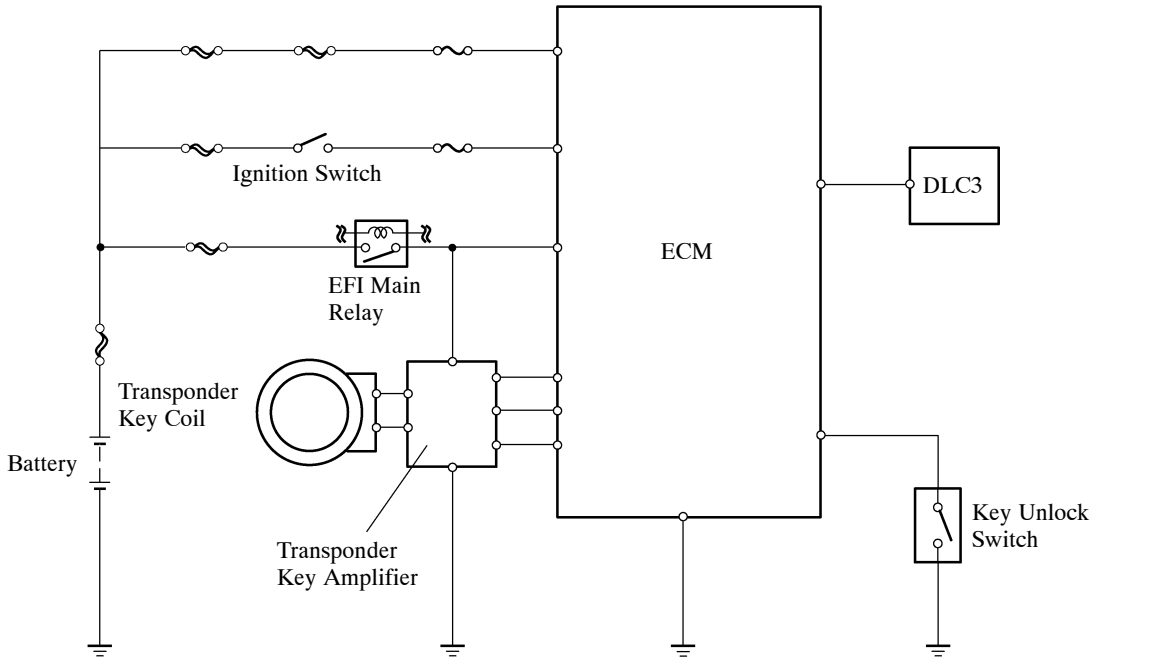
3. Wiring Diagram



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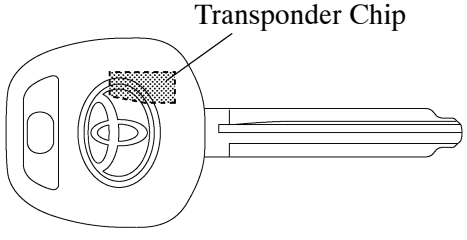
4. Construction

The engine immobiliser system consists of the transponder key (ignition key), transponder key coil, transponder key amplifier, and transponder key computer.

Transponder Key (Ignition Key)

A transponder chip is embedded in the grip of the ignition key. Each transponder chip contains an individual transponder key code (ID code). The key does not need an internal battery to transmit a key code.



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Transponder Key Coil

The transponder key coil is a ring-shaped coil installed around the ignition key cylinder.
The transponder key coil transmits the electromagnetic energy to the transponder chip and receives the key-code signal from the transponder chip.

Transponder Key Amplifier

The transponder key amplifier is installed in the back of the ignition cylinder.
The transponder key amplifier amplifies the key-code signal that has been received by the transponder key coil.

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ECM

- A microcomputer that controls the engine immobiliser system has been enclosed in the ECM.
- A maximum of 10 different transponder key codes (master key: 7 types, sub key: 3 types) can be registered in the ECM.

5. Function

The engine immobiliser system provides the following functions:

Immobiliser Set Function

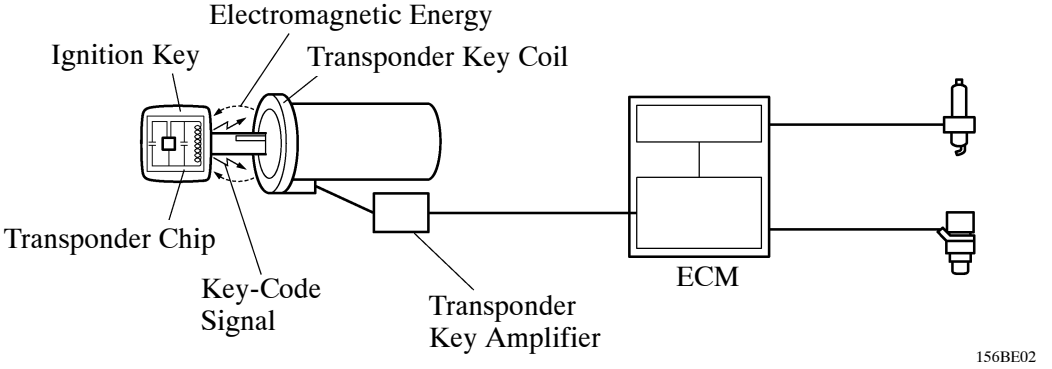
The engine immobiliser system sets under the conditions described below in order to prohibit the operation of the engine through an unauthorized maneuver.

- When the ignition key is removed from the key cylinder, the engine immobiliser system will be set.
- After 20 seconds have elapsed upon turning the ignition key from the ON position to the ACC or LOCK position, the engine immobiliser will be set.

Immobiliser Unset Function

When an ignition key is inserted in the key cylinder and the key is recognized to be legitimate by matching the key-code, the engine immobiliser system unsets and allows the engine to start.
The matching of the key-code and the unsetting of the immobiliser system are performed as follows:

(1) When the ignition key is inserted in the key cylinder, the engine ECU instructs the transponder key coil to supply the electromagnetic energy that enables the transponder chip to transmit a key-code signal. The condenser in the transponder chip converts and stores this energy as electrical energy. The transponder chip then uses this electrical energy to transmit a key-code signal.



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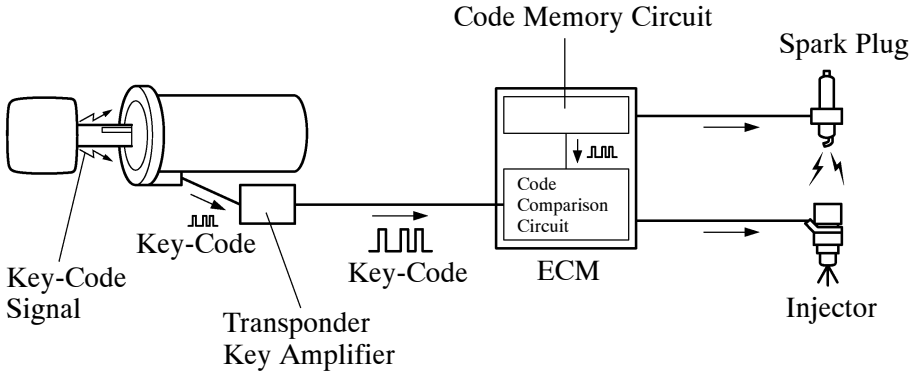
② The key code signal that has been received at the coil is amplified by the transponder key amplifier and sent to the engine ECU. The key code that has been received by the engine ECU is then compared to the key code that is stored in the engine ECU. The code comparison process takes place, and if the codes match in a row, the engine ECU unsets the immobiliser system. As a result, the engine will be able to start.



New Transponder Key Code Registration Function

This function allows the registration of the key code of a new master or sub key to the ECM. A maximum of 10 different transponder key codes (7 for master keys and 3 for sub keys) can be registered in the ECM. This function is used if the ECM is replaced with a new one.

Additional Transponder Key Code Registration Function

This function enables the registration of the key code for a new master key or sub key, while retaining the key codes that are already registered. This function is used for the purpose of adding a new master or sub key.

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Transponder Key Code Delete Function

This function deletes all the transponder key codes that are registered in the ECM except for the key code of the master key that was used to execute the delete function.
For further details on transponder key code registration, addition, and deletion, see the 1998 Land Cruiser Repair Manual (Pub. No. RM615U).

NOTICE

A card holder type flat key does not have a transponder chip enclosed in its grip portion. Therefore, this type of key cannot be used to start the engine.

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■ SRS AIRBAG

1. General

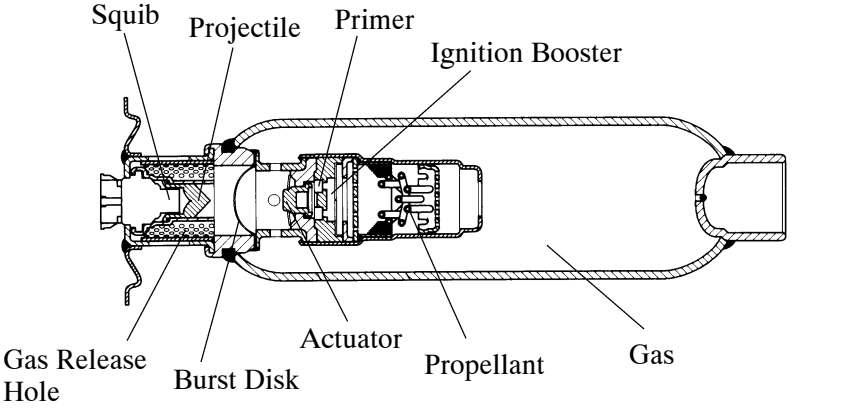
- The SRS (Supplemental Restraint System) airbag is designed to help lessen the shock to the driver and front passenger as a supplement to the seat belt.
  In a collision, the airbag sensor detects the shock and if the front-to-rear shock is greater than a specified value, the airbags stored in the steering wheel pad for the driver and above the glove box for the front passenger inflate instantly to help reduce the likelihood of the driver's or front passenger's head and chest directly hitting the steering wheel or instrument panel.
- As in the '98 Sienna, a 3-sensor type airbag system is used, in which the detection of deceleration during a collision is accomplished by the front airbag sensor and airbag sensor enclosed in the airbag sensor assembly.
- The airbag sensor assembly controls the operation of the SRS airbag and the seat belt pretensioner.

The basic construction and operation of the SRS airbag are the same as in the '98 Sienna.
However, the construction and operation of the inflator for front passenger has been changed.

2. Construction and Operation

The inflator for front passenger is comprised of a squib, projectile, burst disk, propellant, high pressure argon gas and etc.
If the airbag sensor is turned on by deceleration due to frontal collision, electric current then ignites the squib located in the inflator. The projectile which fired by the ignition of the squib pierces through the burst disk and collides with the actuator, which causes the primer to ignite. The flame of the primer spreads instantaneously to the ignition booster and to the propellant. The gas which expanded by the heat of the ignition of the propellant flows into the airbag via the gas release hole, thus inflating the airbag.

▶ Construction ◀



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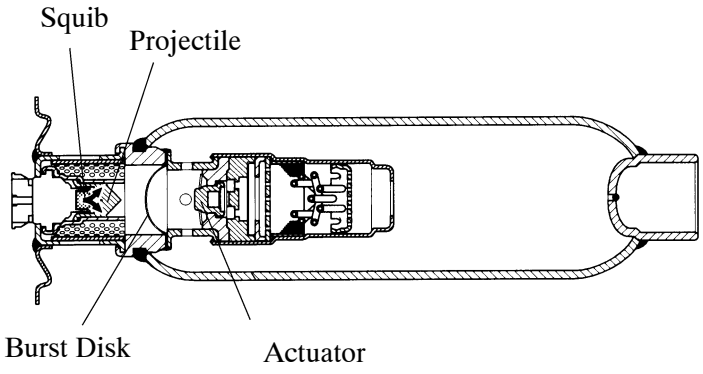
▶ Operation ◀



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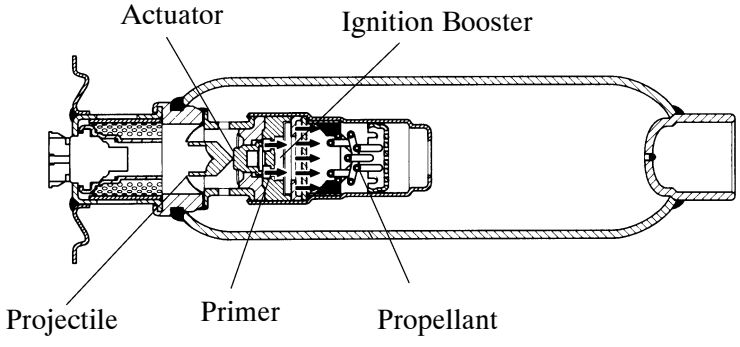

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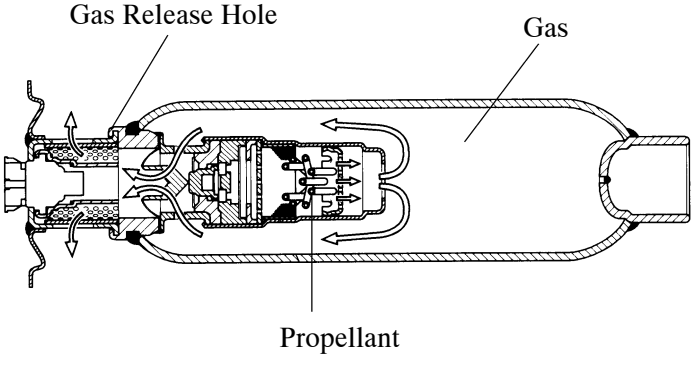

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→ : Propagation of Fire
⇨ : Flow of Argon Gas

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■CRUISE CONTROL SYSTEM

1. General

Once the system is set to a desired vehicle speed, the engine throttle position is adjusted automatically to maintain the vehicle speed at that speed without depressing the accelerator pedal.
The following items have been changed in the new Land Cruiser.

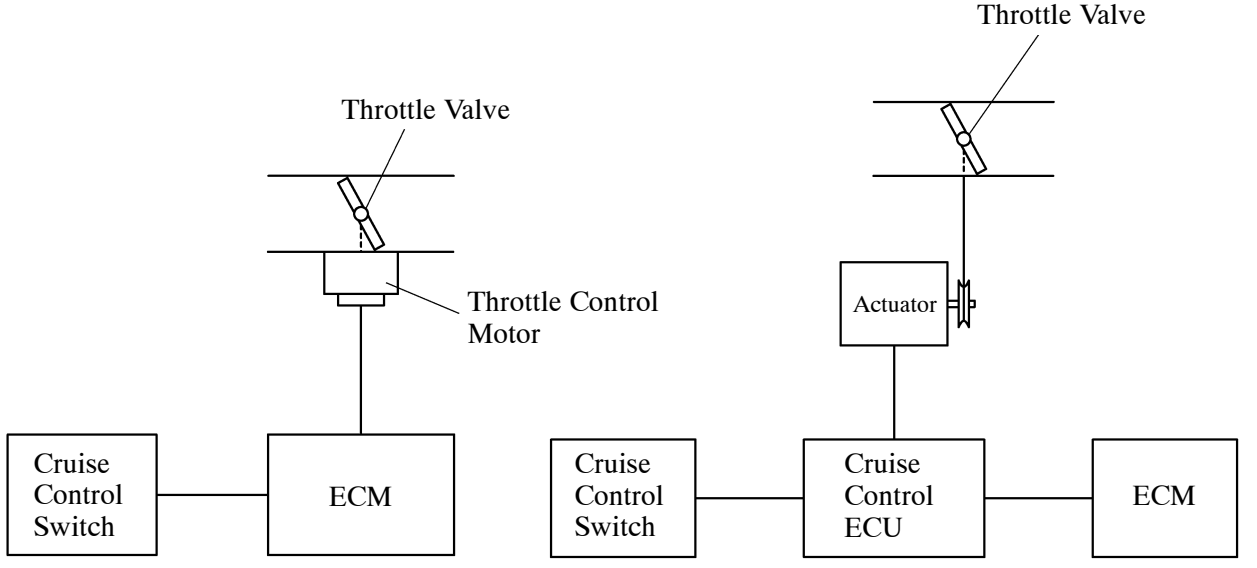
- The throttle control motor, which is a part of the ETCS-i, is used in the actuator for controlling the throttle valve.
- The cruise control ECU has been integrated with the ECM. However, the various functions that control the cruise control system are basically the same as those of the previous model, except for certain functions.

▶ Functions ◀

: Changed

Function of the Cruise Control ECU					
1	Constant Speed Control	6	Low Speed Limit Control	11	Magnetic Clutch Control
2	Set	7	High Speed Limit Control	12	Diagnosis
3	Coast	8	Automatic Transmission Control	13	Fail Safe
4	Accel	9	Manual Cancel	14	Tap-Down Control
5	Resume	10	Auto Cancel	15	Tap-Up Control

▶ System Diagram ◀



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2. Construction and Operation

Actuator

In place of the compact motor type actuator used on the previous model, the new model uses a throttle control motor, which is a part of the ETCS-i (Electronic Throttle Control System-intelligent). Based on the signals received from the ECM, the throttle control motor controls the throttle valve opening so that the current vehicle speed matches the desired vehicle speed that is set in the system.
For details of construction and operation of throttle control motor, see page xx.

ECM

The cruise control ECU has been integrated with the ECM.
The functions of the cruise control system are basically the same as those of the previous model, except for the functions listed below.

1) Auto Cancel Function

When the vehicle is being driven under cruise control, if any of the following conditions is present, the vehicle speed stored in memory is deleted, the control is lifted, the current to the actuator is disrupted, and the power indicator light is made to flash.
The operation of the cruise control is prohibited until the main switch is turned ON again.

- An open or short circuit in the stop light switch.
- An abnormal condition of the vehicle speed signal.

Also, if the following condition is present, the main switch cannot be turned ON until the ignition switch is turned ON again.

- An abnormal condition in the ETCS-i components.

2) Diagnosis Function

Among the conditions in which the cruise control becomes canceled, a diagnosis function which uses a power indicator light, is implemented for some of the conditions. Furthermore, the diagnosis items for the cruise control system have been revised along with the adoption of the throttle actuator in the ETCS-i and the integration of the cruise control ECU with the ECM.
For details of inspection, diagnostic trouble codes and repair procedures, see 1998 Land Cruiser Repair Manual (Pub. No. RM615U).

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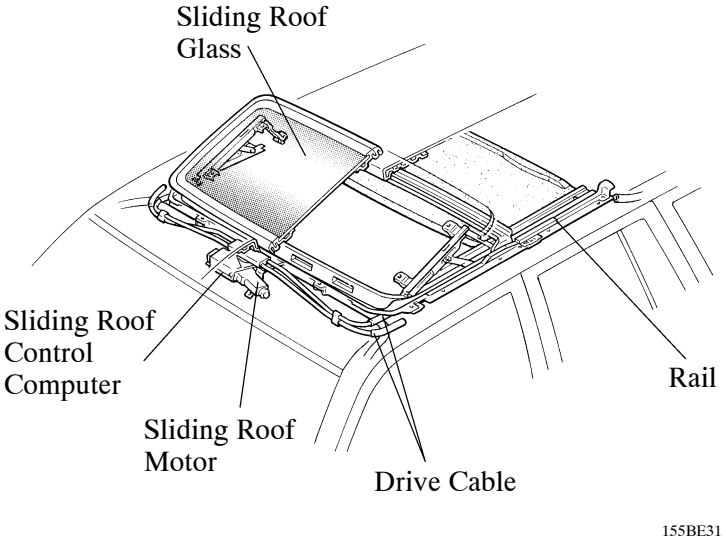
■MOON ROOF

1. General

The moon roof in the new Land Cruiser has the following features:

- A tilt-and-slide type power moon roof with “one-touch operation” and “jam protection” functions has been adopted.
  The “one-touch operation” function enables the moon roof to effect a fully open or a fully closed tilt-and-slide operation.
  The “jam protection” function detects if a foreign object gets caught while the moon roof is closing (in the slide-close mode).
- The sliding roof microcomputer and the sliding roof motor have been integrated to reduce the number of components.

2. Layout of Components



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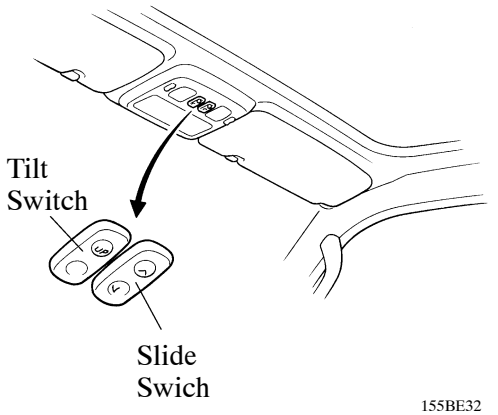

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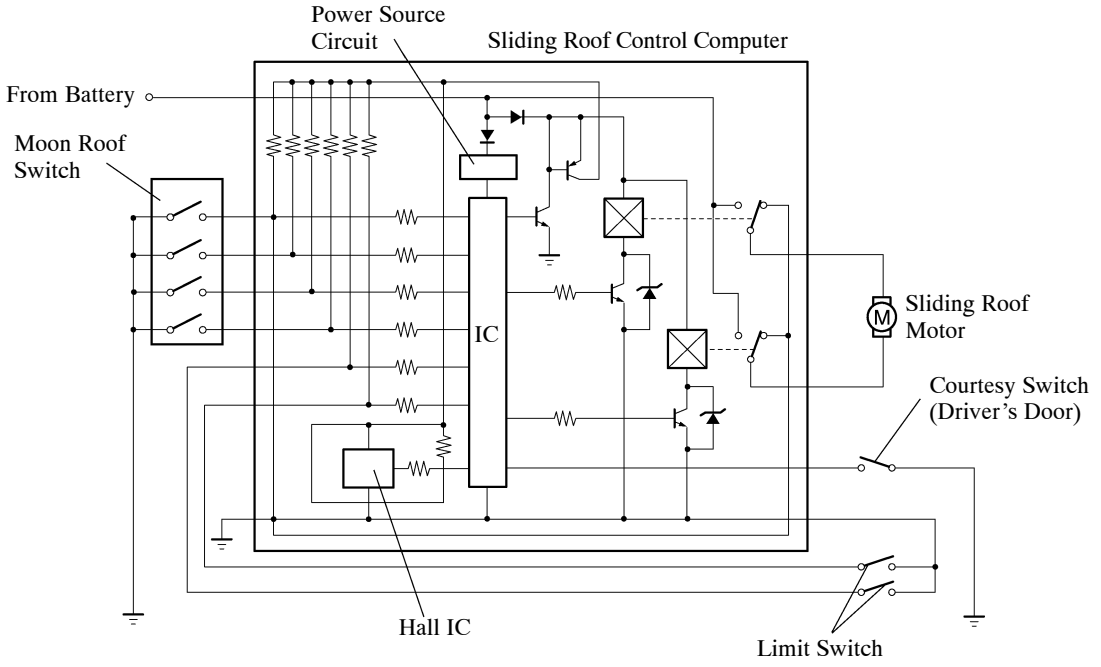
3. Wiring Diagram



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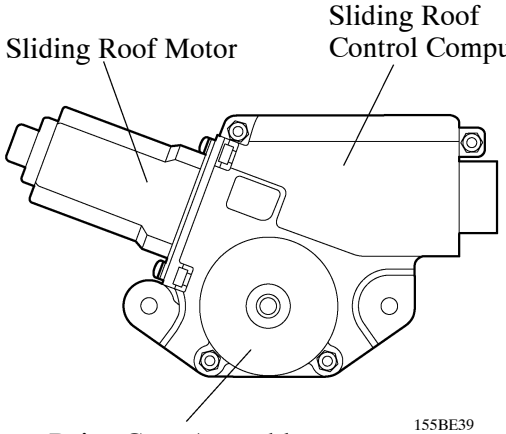
4. Construction

Sliding Roof Drive Gear Assembly

- The sliding roof drive gear assembly consists of a microcomputer that contains a Hall IC and a drive unit that contains a sliding roof motor and a drive gear.
- The sliding roof drive gear assembly contains a pulse sensor to detect if any foreign object gets caught in the sliding roof.
  The pulse sensor consists of a magnet and a hall IC. The magnet rotates with the sliding roof motor. The hall IC detects a polarity change which is caused by the rotation of the magnet, and converts it into a pulse signal. The pulse sensor (hall IC) outputs a pulse signal to the microcomputer.



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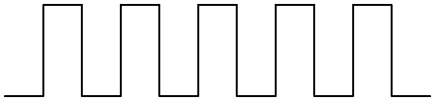

Output Pulse Signal

155BE38

5. Operation

One-Touch Operation

When one of the moon roof switches (the slide switch or the tilt switch) is pressed longer than 0.3 seconds, the microcomputer causes the sliding moon roof motor to rotate in accordance with the switch operation. At the same time, the timer function in the microcomputer activates, allowing the current to be applied to the motor even if the finger is released from the switch. Thus, the moon roof will carry out the slide-open, slide-close, tilt-up, and tilt-down operations even if the switch is no longer pressed.
The one-touch operation stops its operation when one of the conditions given below is met.

- The microcomputer determines that the motor has seized (by the activation of the “jam protection” function), according to the signals from the Hall IC.
- The moon roof fully opens or fully closes during a tilt-up or down operation or a slide-open or close operation.
- One of the moon roof switches (the slide switch or the tilt switch) is pressed during the moon roof operation.
- The slide switch and the tilt switch are turned ON simultaneously.

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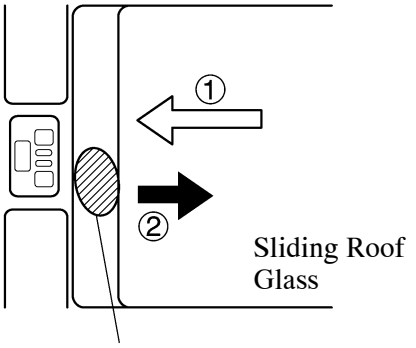
Jam Protection Operation

If an object becomes jammed between the moon roof and the body during slide close operation, the sliding roof motor's speed decrease (①). Accordingly, the amplitude of the pulse signals that are output by the pulse sensor to microcomputer increases.
When the motor's deceleration rate exceeds a predetermined value or the seizure of the motor is detected, the microcomputer determines that jamming has occurred.
Then, the microcomputer stops the close movements of the moon roof, and automatically moves the moon roof open.
If jamming occurs during a slide-close operation, the moon roof slide opens until the roof opening is 200 mm (7.9 in.) or more (②).



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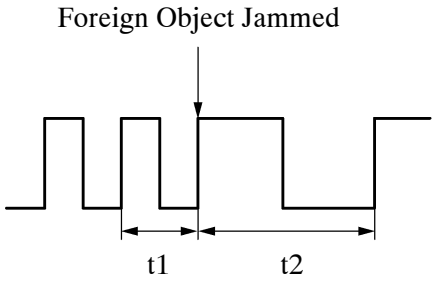
Slide Operation



155BE23

Output Pulse Signal

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■SEAT BELT WARNING SYSTEM

1. General

In the seat belt warning system of the previous model, if the driver does not wear the seat belt when the ignition switch is turned ON, the warning light illuminates and the buzzer sounds for several seconds to inform the driver that the seat belt has not been worn.
However, on the new Land Cruiser, this system has been changed as described below.

- The method for indicating the seat belt warning light for the driver has been changed from the illuminating type to the flashing type.
- A seat belt warning for front the passenger has been newly provided in the center cluster. When the front passenger seat is occupied but its seat belt is not being worn, this function flashes a warning light to inform the front passenger that the seat belt is not being worn.

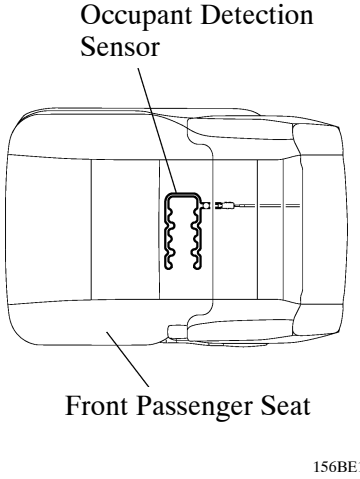
2. Seat Belt Warning for Front Passenger

Construction

The seat belt warning for the front passenger consists of the front passenger seat belt buckle switch, occupant detection sensor, seat belt warning light for the front passenger.

1) Belt Warning Occupant Detection Sensor

The occupant detection sensor, which is enclosed in the seat cushion of the front passenger seat, is used to detect whether or not the front passenger seat is occupied.
This sensor, which is shaped as illustrated below, consists of a construction in which two sheets of electrodes sandwich a spacer. When the occupant is seated, the electrode sheets come in contact with each other through the hole that is provided in the spacer portion, thus enabling the current to flow.
Thus, the sensor detects whether or not an occupant is seated in the front passenger seat.



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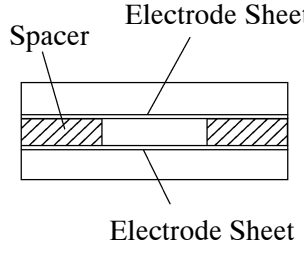

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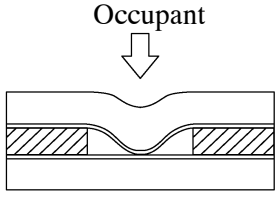
Sensor OFF



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Sensor ON

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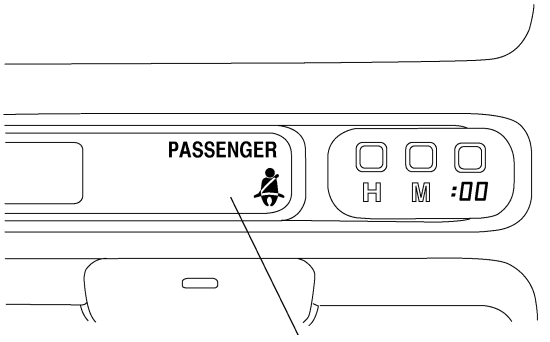
2) Front Passenger Seat Belt Buckle Switch

The front passenger seat belt buckle switch is enclosed in the seat belt buckle of the front passenger seat to detect whether or not the seat belt for the front passenger is being worn.

3) Seat Belt Warning Light for Front Passenger

The seat belt warning light for the front passenger is located in the display of the center cluster. This light flashes to warn if the front passenger does not have the seat belt buckled.



Warning Light for Front Passenger

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Construction

When an occupant is seated in the front passenger seat, the occupant detection sensor activates, thus enabling the system to recognize that the occupant has seated. When the ignition switch is turned ON, a warning light flashes if the front passenger is not wearing the seat belt. The warning light continues to flash until the front passenger wears the seat belt.
If the front passenger seat is not occupied, the warning light remains extinct regardless of the condition of the seat belt.

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MAJOR TECHNICAL SPECIFICATIONS

Item \ Area				U.S.A.
Body Type				Wagon
Vehicle Grade				—
Model Code				UZJ100L-GNPEKA
Major Dimensions & Vehicle Weights	Overall	Length	mm (in.)	4890 (192.5)
		Width	mm (in.)	1940 (76.4)
		Height*	mm (in.)	1860 (73.2)
	Wheel Base		mm (in.)	2850 (112.2)
	Tread	Front	mm (in.)	1620 (63.8)
		Rear	mm (in.)	1615 (63.6)
	Effective Head Room	Front	mm (in.)	1018 (40.1), 995 (39.2)*1
		Rear	mm (in.)	1005 (39.6), 992 (39.1)*1, 993 (39.1)*1, 2
	Effective Leg Room	Front	mm (in.)	1074 (42.3)
		Rear	mm (in.)	870 (34.3), 752 (29.6)*3
	Shoulder Room	Front	mm (in.)	1558 (61.3)
		Rear	mm (in.)	1552 (61.1)
	Cargo Space	Length	mm (in.)	1176 (46.3)
		Wide	mm (in.)	1081 (42.6)
		Height	mm (in.)	1053 (41.5)
	Overhang	Front	mm (in.)	895 (35.2)
		Rear	mm (in.)	1145 (45.1)
	Min. Running Ground Clearance		mm (in.)	250 (9.8)
	Angle of Approach		degrees	31°
	Angle of Departure		degrees	24°
	Curb Weight	Front	kg (lb)	1230 (1605)
		Rear	kg (lb)	1090 (955)
		Total	kg (lb)	2320 (2560)
	Gross Vehicle Weight	Front	kg (lb)	—
		Rear	kg (lb)	—
		Total	kg (lb)	3110 (3495)
	Fuel Tank Capacity		ℓ (US.gal., lmp.gal.)	96 (25.4, 21.1)
	Luggage Compartment Capacity		m^3 (cu.ft.)	—
Performance	Max. Speed		km / h (mph)	175 (109)
	Max. Cruising Speed		km / h (mph)	140 (87)
	Acceleration	0 to 60 km / h	sec.	9.9
		0 to 400 m	sec.	17.6
	Max. Permissible Speed	1st Gear	km / h (mph)	24 (15)*4, 60 (38)*5
		2nd Gear	km / h (mph)	44 (28)*4, 110 (69)*5
		3rd Gear	km / h (mph)	68 (43)*4, 168 (105)*5
		4th Gear	km / h (mph)	—
	Turning Diameter (Outside Front)	Wall to Wall	m (ft.)	12.7 (41.7)
		Curb to Curb	m (ft.)	12.1 (39.7)
Engine	Engine Type			2UZ-FE
	Valve Mechanism			32-Valve, DOHC
	Bore x Stroke		mm (in.)	94.0 x 84.0 (3.70 x 3.31)
	Displacement		cm^3 (cu.in.)	4664 (284.5)
	Compression Ratio			9.6 : 1
	Fuel System			SFI
	Research Octane No.		RON	96
	Max. Output (SAE-NET)		kW / rpm (HP@rpm)	172 / 4800 (230 @ 4800)
	Max. Torque (SAE-NET)		N·m / rpm (lb-ft@rpm)	434 / 3400 (320 @ 3400)
Engine Electrical	Battery Capacity (5HR)		Voltage & Amp. hr.	12-64, 60*6
	Generator Output		Watts	960, 1200*2
	Starter Output		kW	2.0
Chassis	Clutch Type			—
	Transaxle Type			A343F
	Transmission Gear Ratio	In First		2.804
		In Second		1.531
		In Third		1.000
		In Fourth		0.753
		In Fifth		—
		In Reverse		2.393
	Counter Gear Ratio H4 / L4			1.000 / 2.488
	Differential Gear Ratio (Front / Rear)			4.300 / 4.300
	Differential Gear Size (Front / Rear)		in.	8" / 9.5"
	Brake Type	Front		Ventilated Disc
		Rear		Ventilated Disc
	Parking Brake Type			Drum
	Brake Booster Type		in.	Hydraulic
	Proportioning Valve Type			P & B Valve
	Suspension Type	Front		Double Wishbone
		Rear		4-Link with Lateral Rod
	Stabilizer Bar	Front		STD
		Rear		STD
	Steering Gear Type			Rack & Pinion
	Steering Gear Ratio (Overall)			19.8
	Power Steering Type			Integral Type

* : Unladed Vehicle
*1: With Sun Roof
*2: With Dual A/C
*3: Center Seat
*4: Transfer in Low
*5: Transfer in Hi
*6: Option

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HOW TO USE THIS MANUAL

IN00U–06

GENERAL INFORMATION

1. INDEX

An INDEX is provided on the first page of each section to guide you to the item to be repaired. To assist you in finding your way through the manual, the Section Title and major heading are given at the top of every page.

2. GENERAL DESCRIPTION

At the beginning of each section, a General Description is given that pertains to all repair operations contained in that section.
Read these precautions before starting any repair task.

3. TROUBLESHOOTING

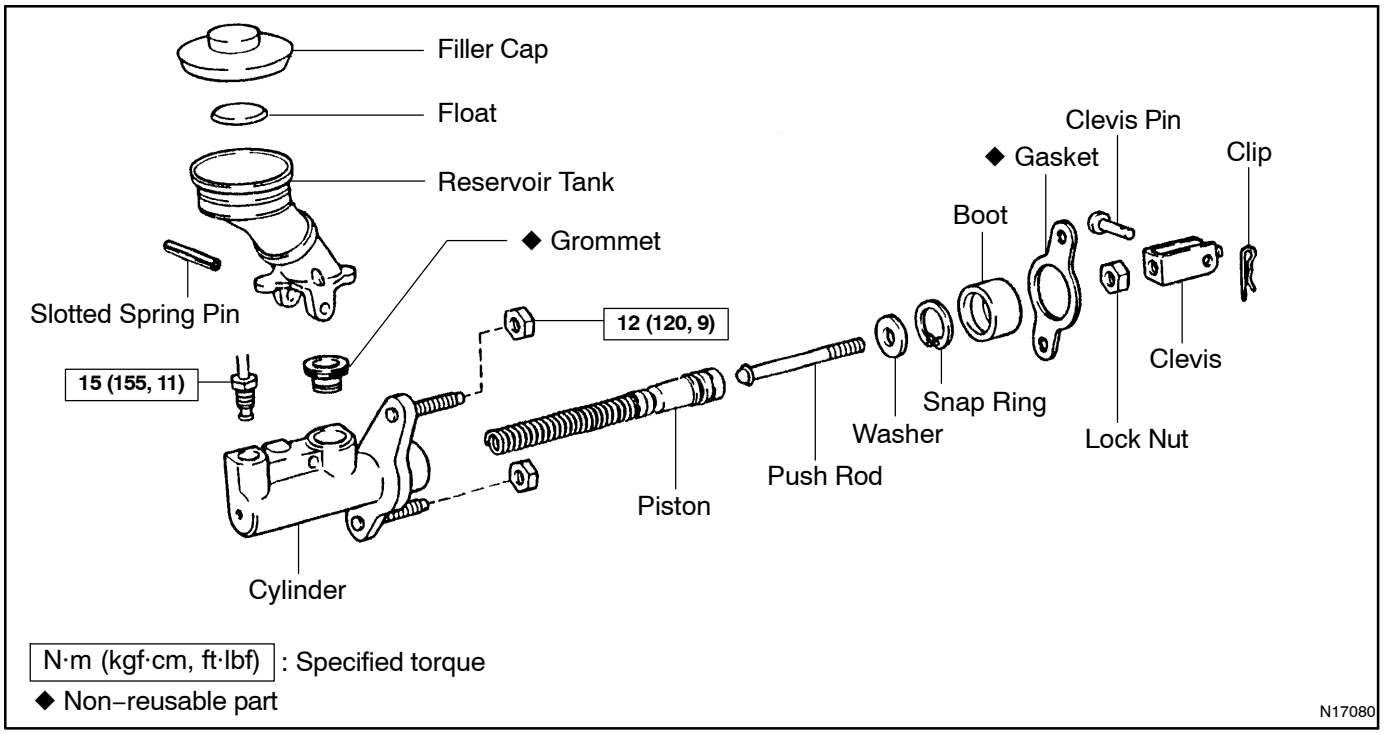
TROUBLESHOOTING tables are included for each system to help you diagnose the problem and find the cause. The fundamentals of how to proceed with troubleshooting are described on page IN–24.
Be sure to read this before performing troubleshooting.

4. PREPARATION

Preparation lists the SST (Special Service Tools), recommended tools, equipment, lubricant and SSM (Special Service Materials) which should be prepared before beginning the operation and explains the purpose of each one.

5. REPAIR PROCEDURES

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



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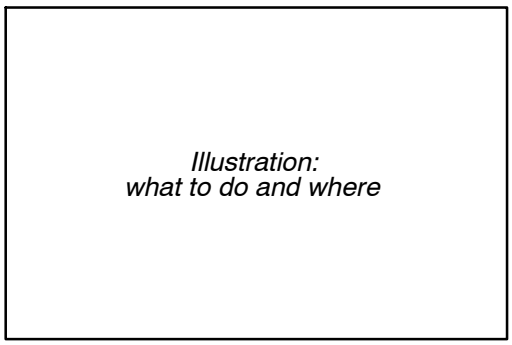
The procedures are presented in a step–by–step format:

- The illustration shows what to do and where to do it.
- The task heading tells what to do.
- The detailed text tells how to perform the task and gives other information such as specifications and warnings.

Example:



Task heading : what to do

21. CHECK PISTON STROKE OF OVERDRIVE BRAKE

(a) Place SST and a dial indicator onto the overdrive brake piston as shown in the illustration.

SST 09350–30020 (09350–06120)

Set part No. *Component part No.*

Detailed text : how to do task

(b) Measure the stroke applying and releasing the compressed air (392 — 785 kPa, 4 — 8 kgf/cm^2 or 57 — 114 psi) as shown in the illustration.

Piston stroke: 1.40 — 1.70 mm (0.0551 — 0.0669 in.)

Specification

This format provides the experienced technician with a FAST TRACK to the information needed. The upper case task heading can be read at a glance when necessary, and the text below it provides detailed information. Important specifications and warnings always stand out in bold type.

6. REFERENCES

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

7. SPECIFICATIONS

Specifications are presented in bold type throughout the text where needed. You never have to leave the procedure to look up your specifications. They are also found in Service Specifications section, for quick reference.

8. CAUTIONS, NOTICES, HINTS:

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

9. SI UNIT

The UNITS given in this manual are primarily expressed according to the SI UNIT (International System of Unit), and alternately expressed in the metric system and in the English System.

Example:

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

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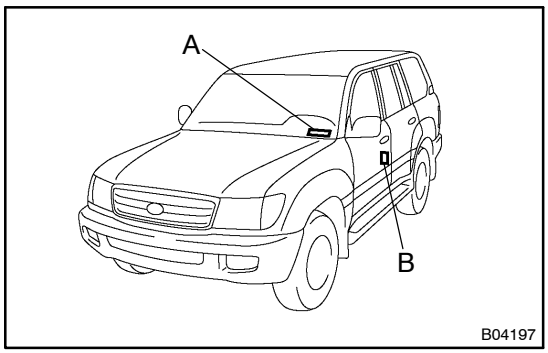
IDENTIFICATION INFORMATION

IN04P–02

VEHICLE IDENTIFICATION AND ENGINE SERIAL NUMBER



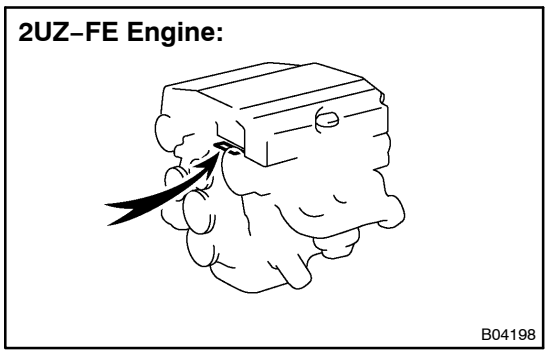
1. VEHICLE IDENTIFICATION NUMBER

The vehicle identification number is stamped on the vehicle identification number plate and the certification label, as shown in the illustration.

A: Vehicle Identification Number Plate

B: Certification Label

2UZ–FE Engine:



2. ENGINE SERIAL NUMBER

The engine serial number is stamped on the engine block, as shown in the illustration.

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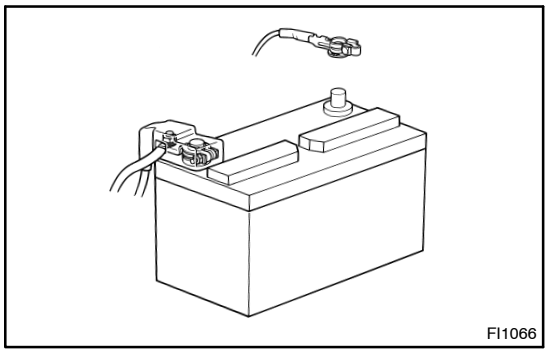

FI1066

REPAIR INSTRUCTIONS

GENERAL INFORMATION

IN07M–01

BASIC REPAIR HINT

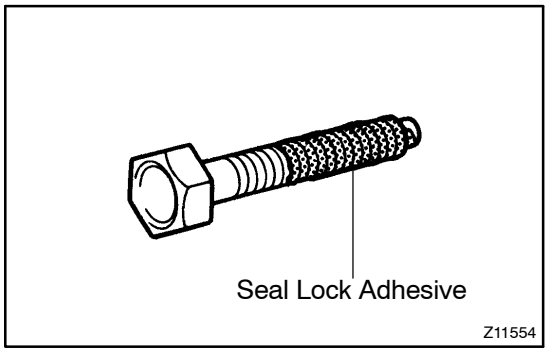
(a) Use fender, seat and floor covers to keep the vehicle clean and prevent damage.

(b) During disassembly, keep parts in the appropriate order to facilitate reassembly.

(c) Installation and removal of battery terminal:
  (1) Before performing electrical work, disconnect the negative (–) terminal cable from the battery.
  (2) If it is necessary to disconnect the battery for inspection or repair, first disconnect the negative (–) terminal cable.
  (3) When disconnecting the terminal cable to prevent damage to battery terminal, loosen the cable nut and raise the cable straight up without twisting or prying it.
  (4) Clean the battery terminals and cable ends with a clean shop rag. Do not scrape them with a file or other abrasive objects.
  (5) Install the cable ends to the battery terminals after loosening the nut, and tighten the nut after installation. Do not use a hammer to tap the cable ends onto the terminals.
  (6) Be sure the cover for the positive (+) terminal is properly in place.

(d) Check hose and wiring connectors to make sure that they are connected securely and correctly.

(e) Non–reusable parts
  (1) Always replace cotter pins, gaskets, O–rings and oil seals, etc. with new ones.
  (2) Non–reusable parts are indicated in the component illustrations by the "◆" symbol.



Z11554

(f) Precoated parts

Precoated parts are bolts and nuts, etc. that are coated with a seal lock adhesive at the factory.
  (1) If a precoated part is retightened, loosened or caused to move in any way, it must be recoated with the specified adhesive.
  (2) When reusing precoated parts, clean off the old adhesive and dry with compressed air. Then apply the specified seal lock adhesive to the bolt, nut or threads.

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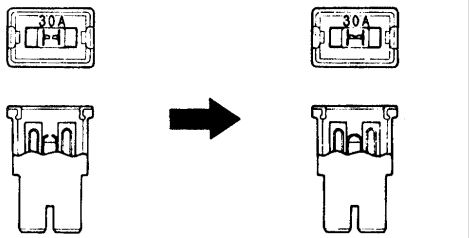
(3) Precoated parts are indicated in the component illustrations by the "★" symbol.

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

(h) Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.

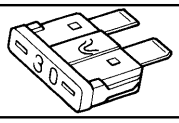
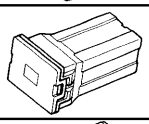
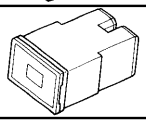
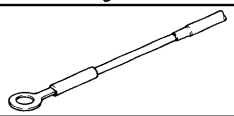
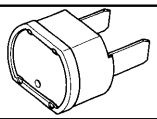
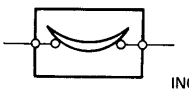
(i) Use of special service tools (SST) and special service materials (SSM) may be required, depending on the nature of the repair. Be sure to use SST and SSM where specified and follow the proper work procedure. A list of SST and SSM can be found in Preparation section in this manual.

Medium Current Fuse and High Current Fuse Equal Amperage Rating



BE1367

(j) When replacing fuses, be sure the new fuse has the correct amperage rating. DO NOT exceed the rating or use one with a lower rating.

Illustration	Symbol	Part Name	Abbreviation
 BE5594	IN0365	FUSE	FUSE
 BE5595	IN0366	MEDIUM CURRENT FUSE	M–FUSE
 BE5596	IN0367	HIGH CURRENT FUSE	H–FUSE
 BE5597	IN0367	FUSIBLE LINK	FL
 BE5598	 IN0368	CIRCUIT BREAKER	CB

V00076

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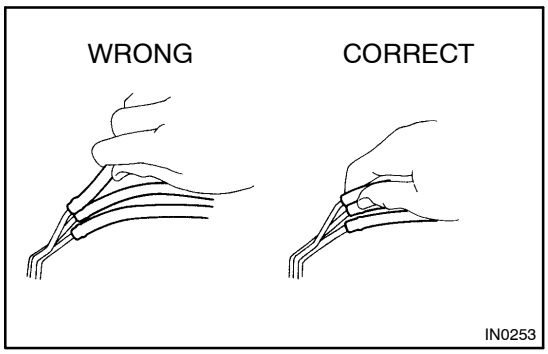
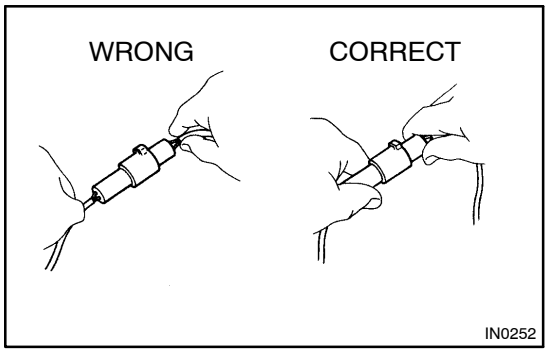
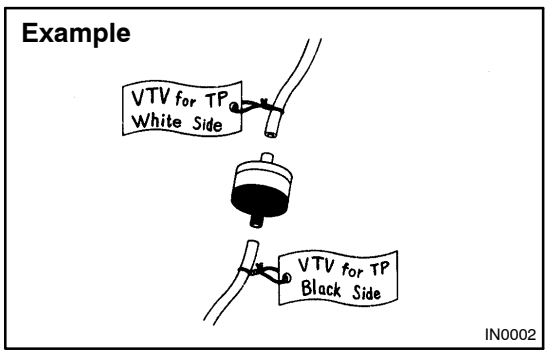
(k) Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations (See page IN–8).
  (1) If the vehicle is to be jacked up only at the front or rear end, make sure to place the stopper under the wheels at the opposite end to block them in order to ensure safety.
  (2) After the vehicle is jacked up, be sure to support it on stands. It is extremely dangerous to do any work on a vehicle raised on a jack alone, even for a small job that can be finished quickly.

(l) Observe the following precautions to avoid damage to the following parts:
  (1) Do not open the cover or case of the ECU unless absolutely necessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)





  (2) To disconnect vacuum hoses, pull off the end, not the middle of the hose.
  (3) To pull apart electrical connectors, pull on the connector itself, not the wires.
  (4) Be careful not to drop electrical components, such as sensors or relays. If they are dropped on a hard floor, they should be replaced and not reused.
  (5) When steam cleaning an engine, protect the electronic components, air filter and emission–related components from water.
  (6) Never use an impact wrench to remove or install temperature switches or temperature sensors.
  (7) When checking continuity at the wire connector, insert the tester probe carefully to prevent terminals from bending.
  (8) When using a vacuum gauge, never force the hose onto a connector that is too large. Use a step–down adapter for adjustment. Once the hose has been stretched, it may leak air.



(m) Installation and removal of vacuum hose:
  (1) When disconnecting vacuum hoses, use tags to identify how they should be reconnected to.
  (2) After completing a job, double check that the vacuum hoses are properly connected. A label under the hood shows the proper layout.

(n) Bleeding of hydraulic brake booster system
When repairing the hydraulic brake booster or ABS, bleeding the air out of the hydraulic brake booster (See page BR–4).

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(o) Unless otherwise stated, all resistance is measured at an ambient temperature of 20˚C (68˚F). Because the resistance may be outside specifications if measured at high temperatures immediately after the vehicle has been running, measurement should be made when the engine has cooled down.

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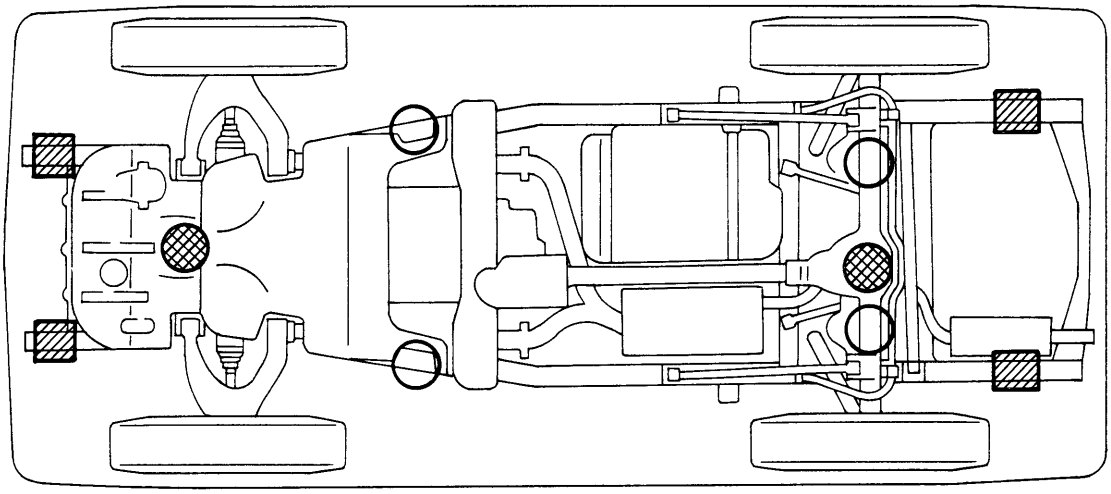
IN04O–02

VEHICLE LIFT AND SUPPORT LOCATIONS

FRONT



JACK POSITION

Front ..... Engine under cover

Rear ..... Rear differential carrier

CAUTION : When jacking–up the front and rear, make sure the car is not carrying any extra weight.

SCREW TYPE JACK POSITION

SUPPORT POSITION

Safety stand .....

B04208

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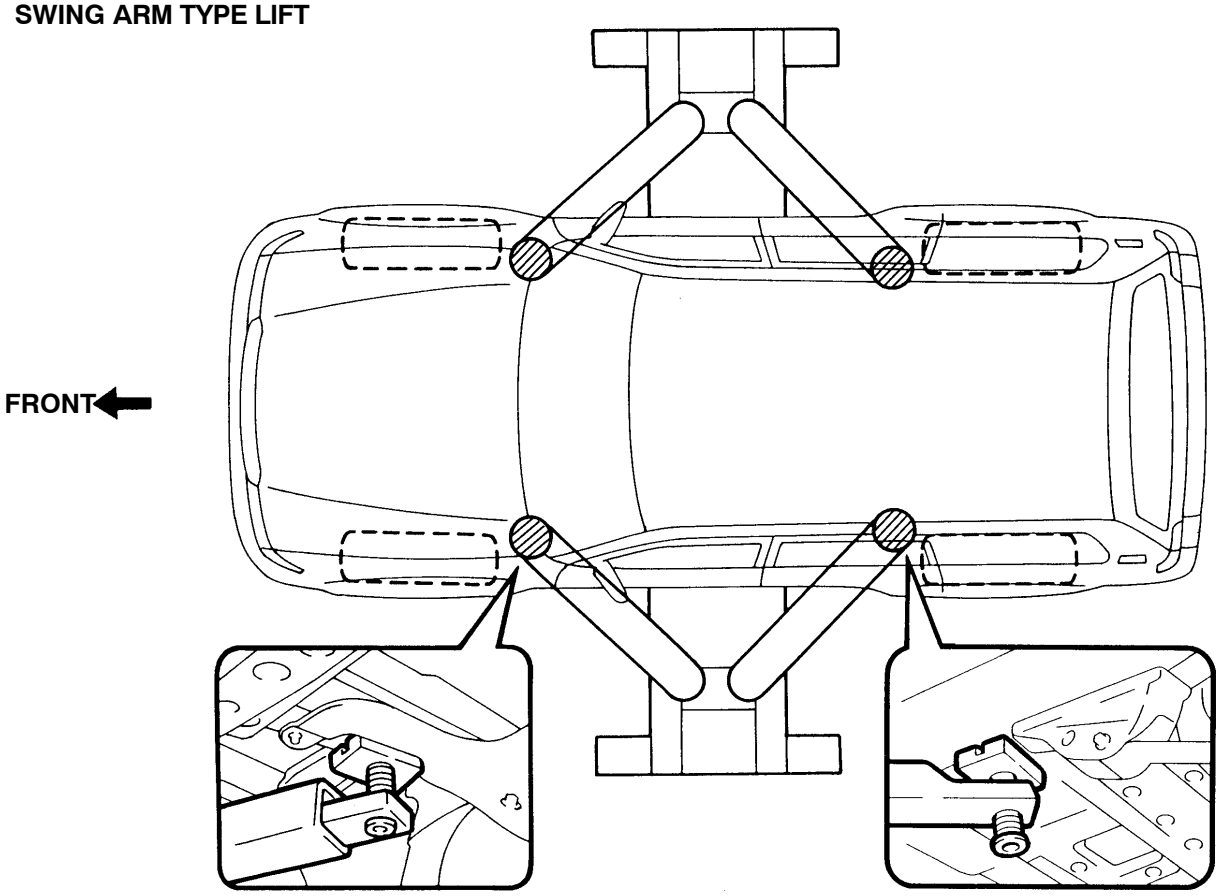
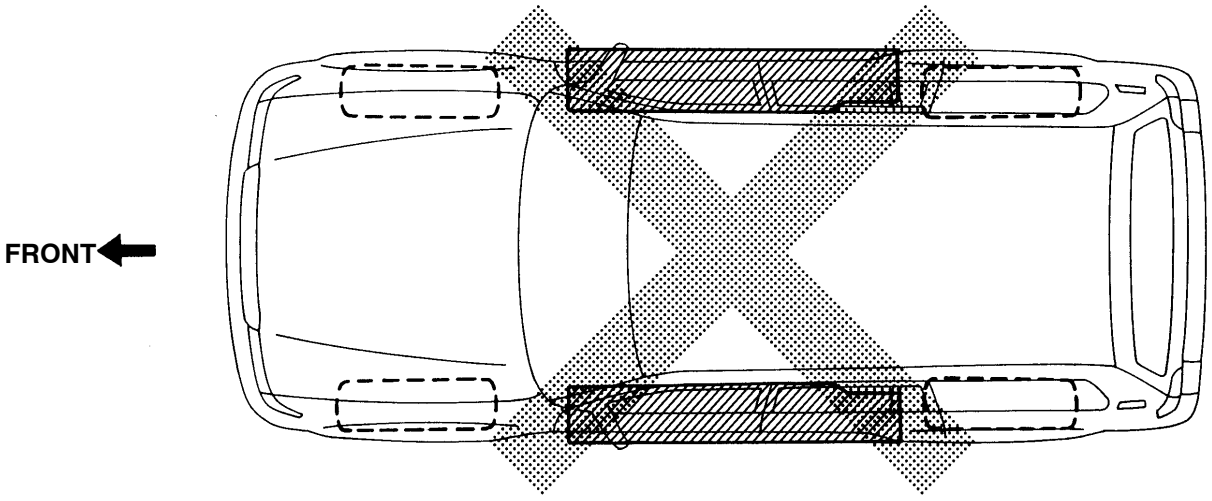
SWING ARM TYPE LIFT



NOTICE: **When lifting the vehicle, place the supports correctly at the positions shown above.**

PLATE TYPE LIFT (DO NOT USE.)



NOTICE: **Never use the plate type lift–using it to lift up the vehicle will cause the body shape to warp.**

B04209

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FOR ALL OF VEHICLES

PRECAUTION

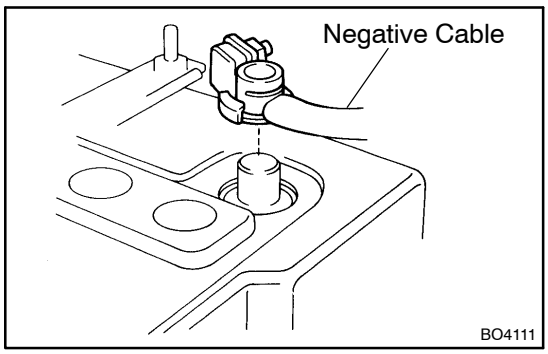
IN07N–01

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

(a) The 1998 LAND CRUISER is equipped with an SRS (Supplemental Restraint System), such as the driver airbag, front passenger airbag assembly and seat belt pretensioner.

Failure to carry out service operations in the correct sequence could cause the supplemental restraint system to unexpectedly deploy during servicing, possibly leading to a serious accident.

Further, if a mistake is made in servicing the supplemental restraint system, it is possible the SRS may fail to operate when required. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the following items carefully, then follow the correct procedure described in this manual.



(b) GENERAL NOTICE

(1) Malfunction symptoms of the supplemental restraint system are difficult to confirm, so the diagnostic trouble codes become the most important source of information when troubleshooting. When troubleshooting the supplemental restraint system, always inspect the diagnostic trouble codes before disconnecting the battery (See page DI–342).

(2) Work must be started after 90 seconds from the time the ignition switch is turned to the ”LOCK” position and the negative (–) terminal cable is disconnected from the battery.

(The supplemental restraint system is equipped with a back–up power source so that if work is started within 90 seconds of disconnecting the negative (–) terminal cable from the battery, the SRS may deploy.)

When the negative (–) terminal cable is disconnected from the battery, memory of the clock and audio systems will be cancelled. So before starting work, make a record of the contents memorized by the each memory system. Then when work is finished, reset the clock and audio systems as before.

To avoid erasing the memory of each memory system, never use a back–up power supply from another battery.

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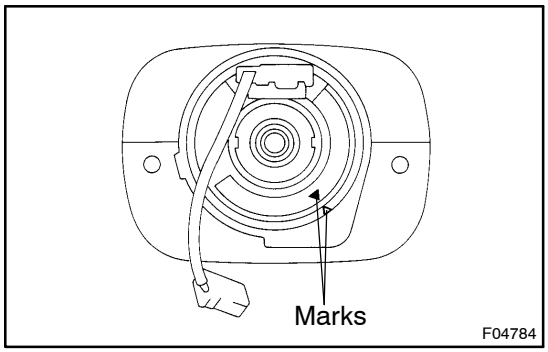
(3) Even in cases of a minor collision where the SRS does not deploy, the steering wheel pad, front passenger airbag assembly and seat belt pretensioner should be inspected (See page RS–12, RS–26 and BO–136).
(4) Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.
(5) Before repairs, remove the airbag sensor if shocks are likely to be applied to the sensor during repairs.
(6) Never disassemble and repair the airbag sensor assembly, steering wheel pad, front passenger airbag assembly or seat belt pretensioner in order to reuse them.
(7) If the airbag sensor assembly, steering wheel pad, front passenger airbag assembly or seat belt pretensioner have been dropped, or if there are cracks, dents or other defects in the case, bracket or connector, replace them with new ones.
(8) Do not directly expose the airbag sensor assembly, steering wheel pad, front passenger airbag assembly or seat belt pretensioner to hot air or flames.
(9) Use a volt/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting of the electrical circuit.
(10) Information labels are attached to the periphery of the SRS components. Follow the instructions on the notices.
(11) After work on the supplemental restraint system is completed, check the SRS warning light (See page DI–342).



(c) SPIRAL CABLE (in Combination Switch)
The steering wheel must be fitted correctly to the steering column with the spiral cable at the neutral position, otherwise cable disconnection and other troubles may result. Refer to SR–32 of this manual concerning correct steering wheel installation.

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(d) STEERING WHEEL PAD (with Airbag)

(1) When removing the steering wheel pad or handling a new steering wheel pad, it should be placed with the pad top surface facing up.
Storing the pad with its metallic surface facing upward may lead to a serious accident if the airbag inflates for some reason. In addition do not store a steering wheel pad on top of another one.

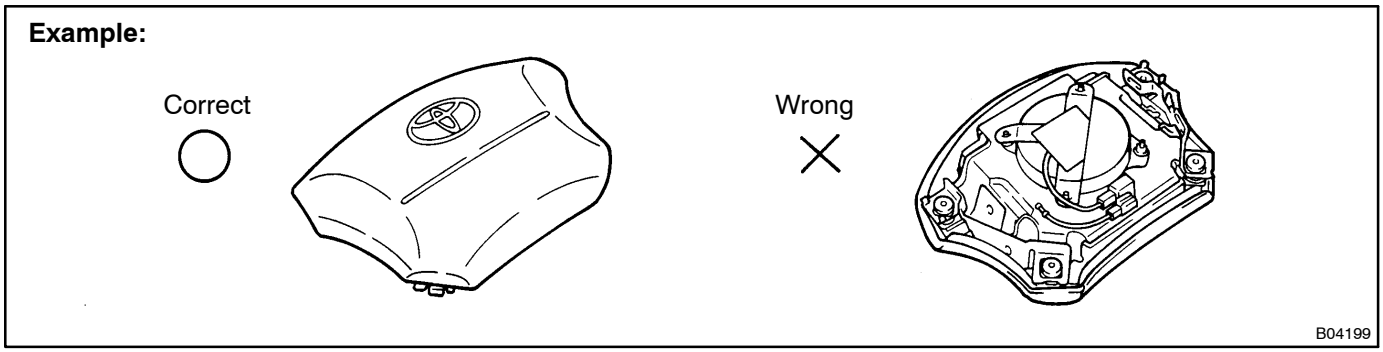
(2) Never measure the resistance of the airbag squib. (This may cause the airbag to deploy, which is very dangerous.)

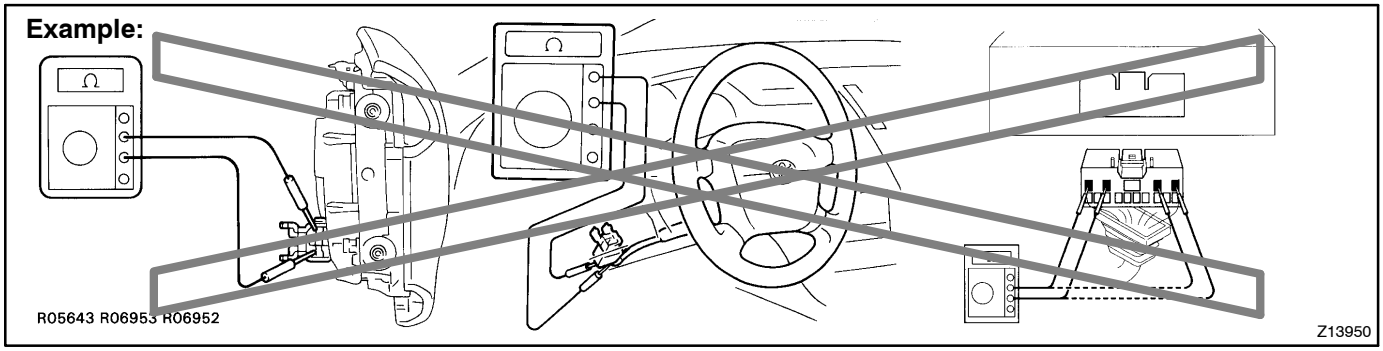
(3) Grease should not be applied to the steering wheel pad and the pad should not be cleaned with detergents of any kind.

(4) Store the steering wheel pad where the ambient temperature remains below 93°C (200°F), without high humidity and away from electrical noise.

(5) When using electric welding, first disconnect the airbag connector (yellow color and 2 pins) under the steering column near the combination switch connector before starting work.

(6) When disposing of a vehicle or the steering wheel pad alone, the airbag should be deployed using an SST before disposal (See page RS–14).
Carry out the operation in a safe place away from electrical noise.





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(e) FRONT PASSENGER AIRBAG ASSEMBLY

(1) Always store a removed or new front passenger airbag assembly with the airbag deployment direction facing up.
Storing the airbag assembly with the airbag deployment direction facing down could cause a serious accident if the airbag inflates.

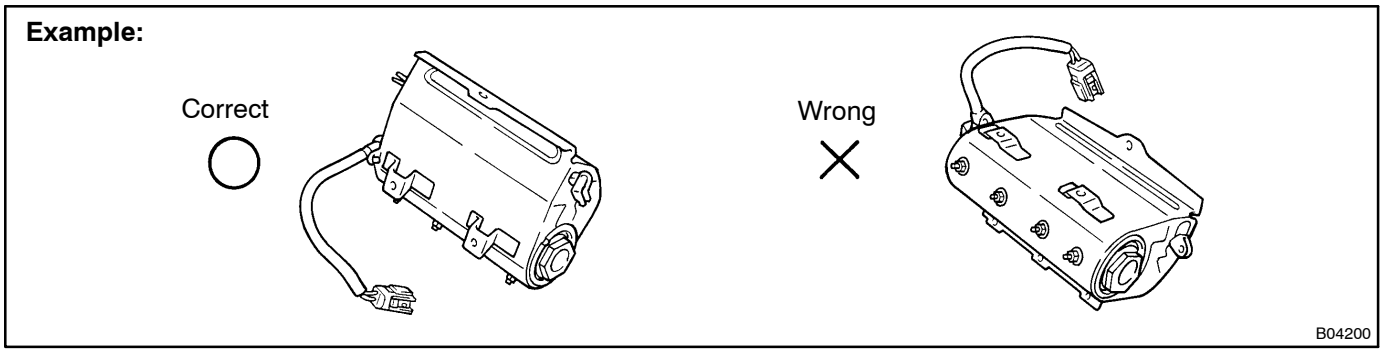
(2) Never measure the resistance of the airbag squib. (This may cause the airbag to deploy, which is very dangerous.)

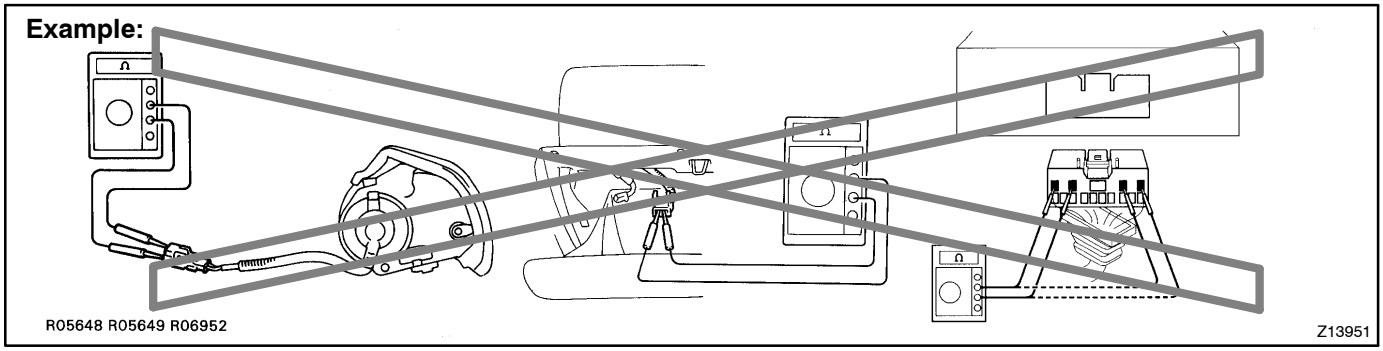
(3) Grease should not be applied to the front passenger airbag assembly and the airbag door should not be cleaned with detergents of any kind.

(4) Store the airbag assembly where the ambient temperature remains below 93°C (200°F), without high humidity and away from electrical noise.

(5) When using electric welding, first disconnect the airbag connector (yellow color and 2 pins) installed on the assembly before starting work.

(6) When disposing of a vehicle or the airbag assembly alone, the airbag should be deployed using an SST before disposal (See page RS–28).
Perform the operation in a safe place away from electrical noise.





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(f) SEAT BELT PRETENSIONER

(1) Never measure the resistance of the seat belt pretensioner. (This may cause the seat belt pretensioner activation which is very dangerous.)

(2) Never disassemble the seat belt pretensioner.

(3) Never install the seat belt pretensioner in another vehicle.

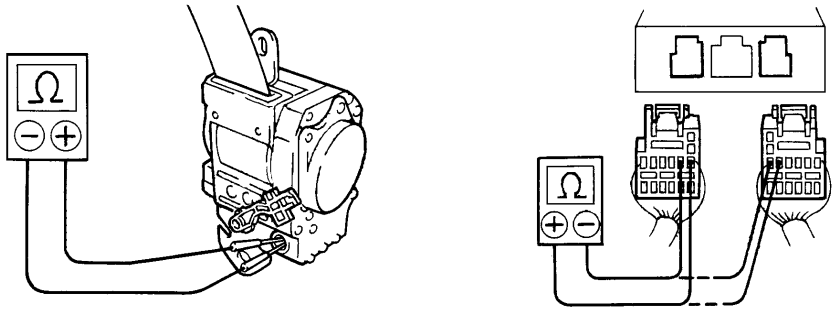
(4) Store the seat belt pretensioner where the ambient temperature remains below 80°C (176°F) and away from electrical noise without high humidity.

(5) When using electric welding, first disconnect the connector (yellow color and 2 pins) before starting work.

(6) When disposing of a vehicle or the seat belt pretensioner alone, the seat belt pretensioner should be activated before disposal (See page BO–137). Perform the operation in a safe place away from electrical noise.

(7) The seat belt pretensioner is hot after activation, so let it cool down sufficiently before the disposal. However never apply water to the seat belt pretensioner.

Example:



B04210

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(g) AIRBAG SENSOR ASSEMBLY

(1) Never reuse the airbag sensor assembly involved in a collision when the SRS has deployed.

(2) The connectors to the airbag sensor assembly should be connected or disconnected with the sensor mounted on the floor. If the connectors are connected or disconnected while the airbag sensor assembly is not mounted to the floor, it could cause undesired ignition of the supplemental restraint system.

(3) Work must be started after 90 seconds from the time the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery, even if only loosing the set bolts of the airbag sensor assembly.

(h) WIRE HARNESS AND CONNECTOR

The SRS wire harness is integrated with the cowl wire harness assembly and floor wire harness assembly. The wires for the SRS wire harness are encased in a yellow corrugated tube. All the connectors for the system are also a standard yellow color. If the SRS wire harness becomes disconnected or the connector becomes broken due to an accident, etc., repair or replace it as shown on page RS–48.

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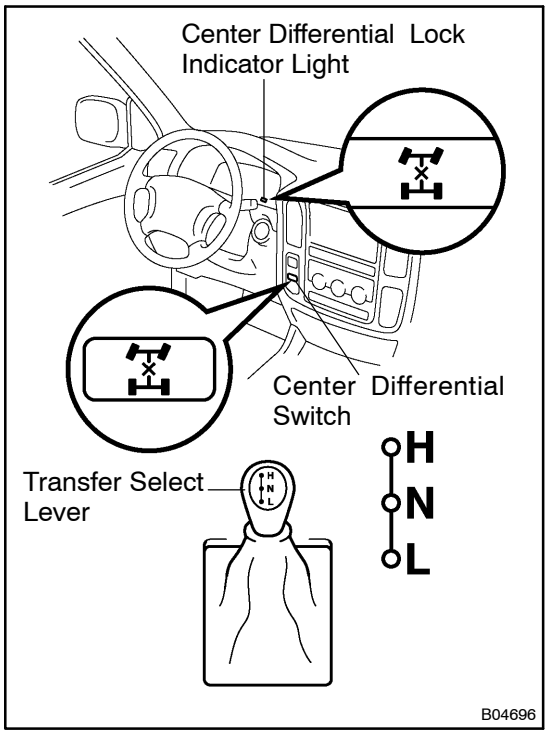

2. WHEN SERVICING FULL–TIME 4WD VEHICLES

The Full–time 4WD LAND CRUISER is equipped with the mechanical lock type center differential system.

When carrying out any kind of servicing or testing on a Full–time 4WD in which the front or rear wheels are made to rotate (braking test, speedometer test, on–vehicle wheel balancing, etc.), or when towing the vehicle, be sure to observe the precautions given below.

If incorrect preparations or test procedures are used, the test will not only be unsuccessful, but may be dangerous as well.

Therefore, before beginning any such servicing or test, be sure to check the following items:

- Center differential mode position (FREE or LOCK)
- Whether wheels should be touching ground or jacked up
- Transmission gear position (N position)
- Transfer gear position (H or L position)
- Maximum testing vehicle speed
- Maximum testing time

CAUTION:

- **Never accelerate or decelerate the vehicle suddenly.**
- **Observe the other cautions given for each individual test.**

(a) Before Beginning Test

During tests with a brake tester or chassis dynamometer, such as braking force tests or speedometer tests, if only the front or rear wheels are to be rotated, it is necessary to set the position of the center differential to the FREE position or to the LOCK position depending on the type of test being performed.

- Select the position of the center differential by pushing the center differential lock switch with the transfer select lever to ”H” position.
- After selecting the position, confirm the operation of indicator light.

HINT:

- Move the vehicle forward or backward slightly if the indicator light does not operate correctly when the center differential lock switch is turned ON or OFF.
- When the transfer select lever is put in ”L” position, the center differential is put in LOCK condition regardless of the position of the center differential lock switch.

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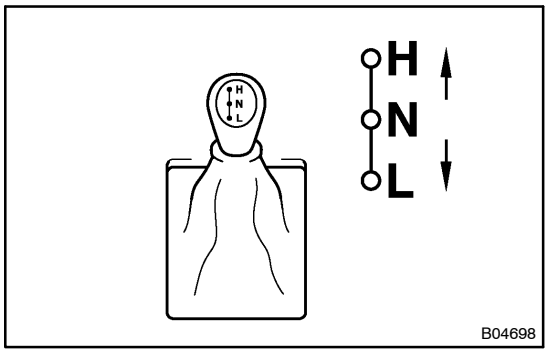
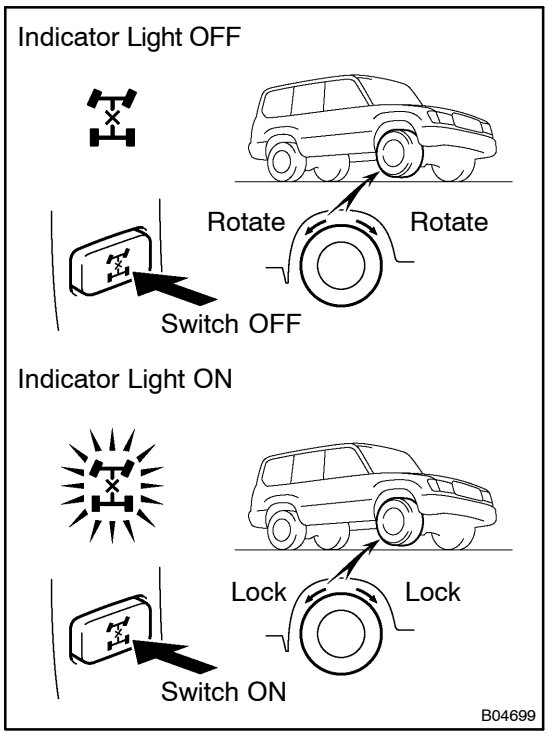


- Transfer gear ”H” ↔ ”L” gear shifting procedure:
  When shifting, always put the shift lever of the transmission in N position. In other positions, the gears of the transfer clash, and switching cannot occur.



CAUTION:
When center differential switch is turned ON:

- **Operate the switch only when all 4 wheels are stopped or when driving with the wheels in a straight line.**
- **Never operate the switch when any tire is slipping.**
- **Never operate the switch when any tire is spinning freely.**
- **Never operate the switch when swerving or cornering.**

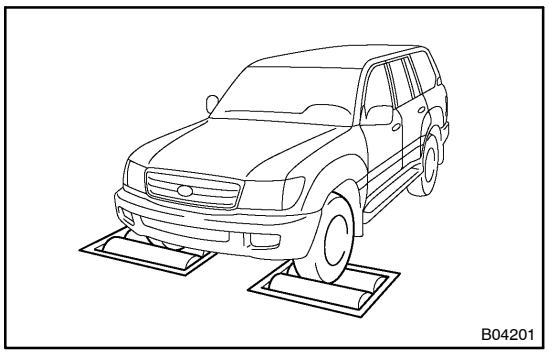
Center differential FREE condition

	Condition	Wheel
Center differential switch	OFF	A lifted wheel can be rotated even if only one wheel is lifted up, as long as transmission is in N position.
Indicator light	OFF	
Transfer select lever	H position	

Center differential LOCK conditions

	Condition	Wheel
Center differential switch	ON	A lifted wheel cannot be rotated even if only one wheel is lifted up, as long as transmission is in N position.
Indicator light	ON	
Transfer select lever	H position	

	Condition	Wheel
Center differential switch	OFF	A lifted wheel cannot be rotated even if only one wheel is lifted up, as long as transmission is in N position.
Indicator light	ON	
Transfer select lever	L position	



(b) Braking Force Test
(Vehicle Speed: Below 0.5 km/h or 0.3 mph)
When performing low–speed type brake tester measurements, observe the following instructions.
(1) Position the wheels to be tested (front or rear) on the tester.
(2) Put the center differential in FREE position.
(3) Shift the transmission shift lever to ”N” position and perform the test.

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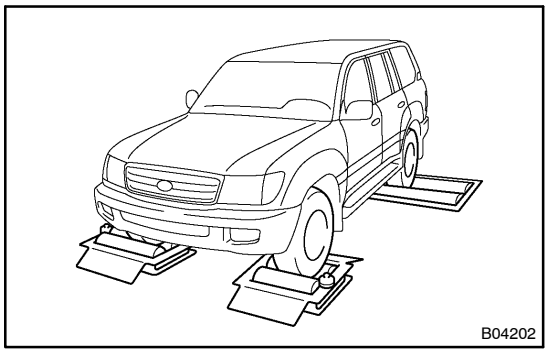
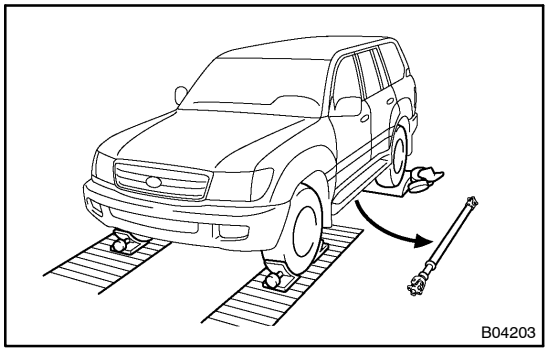


(c) Speedometer Tests or Others Tests
(Using Speedometer Tester)
(1) After checking that the center differential is free, measure the speed with the front wheels on the free roller or jacked up and rear wheels on the tester roller.
(2) When measuring the speed, pay due attention to the points below.
- Check that the center differential is securely free.
- Ensure that the vehicle does not move using wires.
- The maximum speed should be less than 60 km/h (37 mph) and maximum driving time should be 1 minute.
- Never operate sudden shifting, braking, acceleration and deceleration.



(d) Speedometer Tests or Other Tests
(Using Chassis Dynamometer)
(1) Remove the front propeller shaft and lock the center differential. Measure the speed with rear wheels on the tester roller.
(2) When measuring the speed, pay due attention to the points below.
- Check that the center differential is securely locked.
- Ensure that the vehicle is securely fixed.
- Never operate sudden shifting, braking, acceleration and deceleration.

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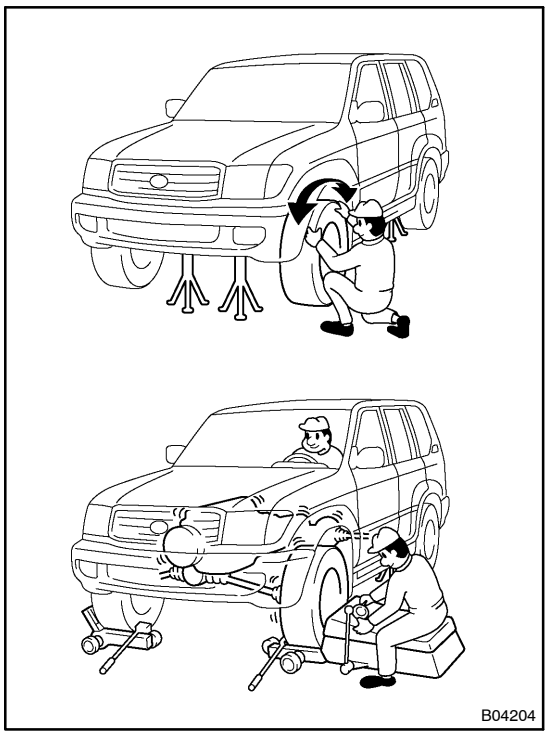
(e) On–Vehicle Wheel Balancing

When doing on–vehicle wheel balancing on a full–time 4WD vehicle, to prevent the wheels from rotating at different speeds in different directions from each other (which could damage the center differential), always be sure to observe the following precautions:



(1) All 4 wheels should be jacked up, clearing the ground completely.
(2) Put the center differential in LOCK position.
(3) The parking brake lever should be fully released.
(4) None of the brakes should be allowed to drag.
(5) The wheels should be driven on the wheel balancer with the engine running.

HINT:

When doing this, be careful of the other wheels, which will rotate at the same time.

(6) Avoid sudden acceleration, deceleration and braking.
(7) Carry out the wheel balancing with the transmission in D position.

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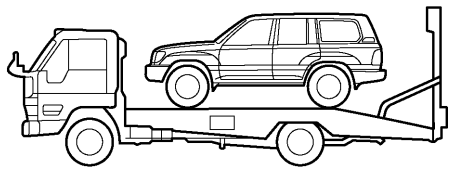
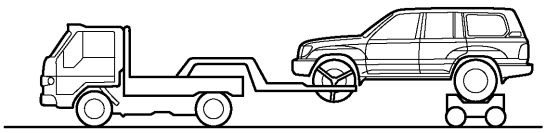
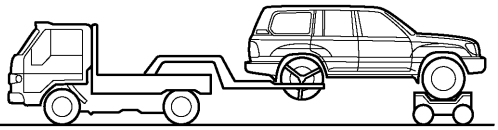
3. WHEN TOWING FULL–TIME 4WD VEHICLES

- Use one of the methods shown below to tow the vehicle.
- If the vehicle has trouble in the chassis and drive train, use method 1 (flat bed truck).

Towing Method \ Conditions	Parking Brake	Transsmission Shift Lever Position
1. Flat Bed Truck 	Applied	Any Position
2. Wheel Lift Type Truck From Front  From Rear 	Applied	Any Position

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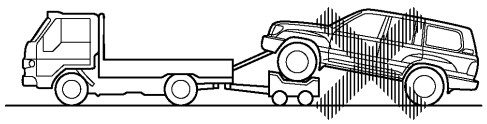
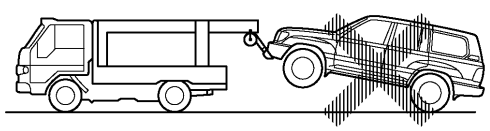
NOTICE:

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

For example, the towing methods shown below are dangerous or damage the vehicle, so do not use them.

NO 	● If this towing method is used, either from the front or rear, there is a danger of the drive train heating up and causing breakdown, or of the front wheels flying off the dolly. ● Never tow the vehicle using a method where the lifted–up wheel cannot rotate.
NO 	● Do not use the sling type towing method, either from the front or rear, as this method causes damage to the body.

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4. FOR VEHICLES EQUIPPED WITH A CATALYTIC CONVERTER

CAUTION:

If large amount of unburned gasoline flows into the converter, it may overheat and create a fire hazard. To prevent this, observe the following precautions and explain them to your customer.

(a) Use only unleaded gasoline.

(b) Avoid prolonged idling.
Avoid running the engine at idle speed for more than 20 minutes.

(c) Avoid spark jump test.
   (1) Perform spark jump test only when absolutely necessary. Perform this test as rapidly as possible.
   (2) While testing, never race the engine.

(d) Avoid prolonged engine compression measurement.
Engine compression tests must be done as rapidly as possible.

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

(f) Avoid coasting with ignition turned off and prolonged braking.

(g) Do not dispose of used catalyst along with parts contaminated with gasoline or oil.

5. IF VEHICLE IS EQUIPPED WITH MOBILE COMMUNICATION SYSTEM

For vehicles with mobile communication systems such as two–way radios and cellular telephones, observe the following precautions.

(1) Install the antenna as far as possible away from the ECU and sensors of the vehicle's electronic system.

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

(3) Do not wind the antenna feeder together with the other wiring as much as possible, also avoid running the antenna feeder parallel with other wire harnesses.

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

(5) Do not install powerful mobile communications system.

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6. FOR USING OBD II SCAN TOOL OR TOYOTA HAND–HELD TESTER

CAUTION:

Observe the following items for safety reasons:

- **Before using the OBD II scan tool or TOYOTA hand–held tester, the OBD II scan tool's instruction book or TOYOTA hand–held tester's operator manual should be read thoroughly.**
- **Be sure to route all cables securely when driving with the OBD II scan tool or TOYOTA hand–held tester connected to the vehicle. (i.e. Keep cables away from feet, pedals, steering wheel and shift lever.)**
- **Two persons are required when test driving with the OBD II scan tool or TOYOTA hand–held tester, one person to drive the vehicle and the other person to operate the OBD II scan tool or TOYOTA hand–held tester.**

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HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS

IN04S–03

GENERAL INFORMATION

A large number of ECU controlled systems are used in the 1998 LAND CRUISER. In general, the ECU controlled system is considered to be a very intricate system requiring a high level of technical knowledge and expert skill to troubleshoot. However, the fact is that if you proceed to inspect the circuits one by one, troubleshooting of these systems is not complex. If you have adequate understanding of the system and a basic knowledge of electricity, accurate diagnosis and necessary repair can be performed to locate and fix the problem. This manual is designed through emphasis of the above standpoint to help service technicians perform accurate and effective troubleshooting, and is compiled for the following major ECU controlled systems:

The troubleshooting procedure and how to make use of it are described on the following pages.

System	Page
1. Engine	DI–1
2. Automatic Transmission	DI–149
3. ABS & Hydraulic Brake Booster Power Supply System	DI–217
4. Power Tilt and Power Telescopic Steering Column	DI–306
5. Supplemental Restraint System	DI–340
6. Wireless Door Lock Control System	DI–440
7. Theft Deterrent System	DI–473
8. Cruise Control System	DI–515
9. Engine Immobiliser System	DI–539
10. Body Control System	DI–561
11. Multiplex Communication System	DI–605
12. Air Conditioning System	DI–618

FOR USING OBD II SCAN TOOL OR TOYOTA HAND–HELD TESTER

- Before using the scan tool or tester, the scan tool's instruction book or tester's operator manual should be read thoroughly.
- If the scan tool or tester cannot communicate with ECU controlled systems when you have connected the cable of the scan tool or tester to DLC3, turned the ignition switch ON and operated the scan tool, there is a problem on the vehicle side or tool side.
  (1) If communication is normal when the tool is connected to another vehicle, inspect the diagnosis data link line (Bus⊕line) or ECU power circuit of the vehicle.
  (2) If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself, so perform the Self Test procedures outline in the Tester Operator's Manual.

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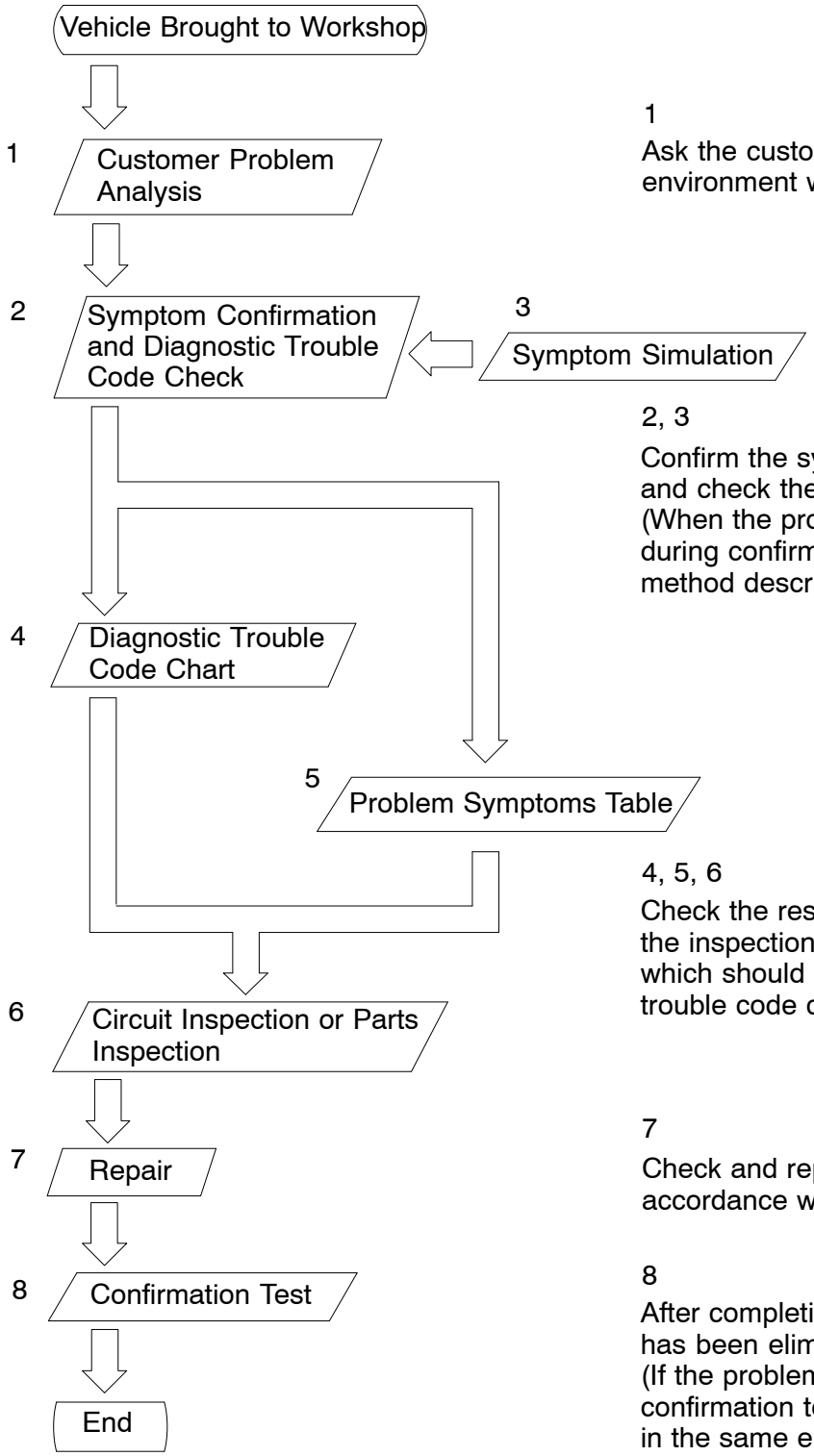
IN04T–02

HOW TO PROCEED WITH TROUBLESHOOTING

Carry out troubleshooting in accordance with the procedure on the following page. Here, only the basic procedure is shown. Details are provided in Diagnostics section, showing the most effective methods for each circuit. Confirm the troubleshooting procedures first for the relevant circuit before beginning troubleshooting of that circuit.



1

Ask the customer about the conditions and the environment when the problem occurred.

2, 3

Confirm the symptoms and the problem conditions, and check the diagnostic trouble codes.
(When the problem symptoms do not appear during confirmation, use the symptom simulation method described later on.)

4, 5, 6

Check the results obtained in Step 2, then confirm the inspection procedure for the system or the part which should be checked using the diagnostic trouble code chart or the problem symptoms table.

7

Check and repair the affected system or part in accordance with the instructions in Step 6.

8

After completing repairs, confirm that the problem has been eliminated.
(If the problem is not reproduced, perform the confirmation test under the same conditions and in the same environment as when it occurred for the first time.)

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1. CUSTOMER PROBLEM ANALYSIS

In troubleshooting, the problem symptoms must be confirmed accurately and all preconceptions must be cleared away in order to give an accurate judgment. To ascertain just what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time it occurred.
Important Point in the Problem Analysis:
The following 5 items are important points in the problem analysis. Past problems which are thought to be unrelated and the repair history, etc. may also help in some cases, so as much information as possible should be gathered and its relationship with the problem symptoms should be correctly ascertained for reference in troubleshooting. A customer problem analysis table is provided in Diagnostics section for each system for your use.

Important Points in the Customer Problem Analysis

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

(Sample) Engine control system check sheet.

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name

Customer's Name		Model and Model Year	
Driver's Name		Frame No.	
Data Vehicle Brought in		Engine Model	
License No.		Odometer Reading	km miles

Problem Symptoms		
	☐ Engine does not Start	☐ Engine does not crank ☐ No initial combustion ☐ No complete combustion
	☐ Difficult to Start	☐ Engine cranks slowly ☐ Other _____
	☐ Poor Idling	☐ Incorrect first idle ☐ Idling rpm is abnormal ☐ High (rpm) ☐ Low (rpm) ☐ Rough idling ☐ Other _____
	☐ Poor Drive ability	☐ Hesitation ☐ Back fire ☐ Muffler explosion (after–fire) ☐ Surging ☐ Knocking ☐ Other _____
	☐ Engine Stall	☐ Soon after starting ☐ After accelerator pedal depressed ☐ After accelerator pedal released ☐ During A/C operation ☐ Shifting from N to D ☐ Other _____
	☐ Others	

☐ Constant ☐ Sometimes (times per day/month)

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2. SYMPTOM CONFIRMATION AND DIAGNOSTIC TROUBLE CODE CHECK

The diagnostic system in the 1998 LAND CRUISER fulfills various functions. The first function is the Diagnostic Trouble Code Check in which a malfunction in the signal circuits to the ECU is stored in code in the ECU memory at the time of occurrence, to be output by the technician during troubleshooting. Another function is the Input Signal Check which checks if the signals from various switches are sent to the ECU correctly. By using these check functions, the problem areas can be narrowed down quickly and troubleshooting can be performed effectively. Diagnostic functions are incorporated in the following systems in the LAND CRUISER.

System	Diagnostic Trouble Code Check	Input Signal Check (Sensor Check)	Other Diagnosis Function
Engine	○(with Test Mode)	○	
Automatic Transmission	○(with Test Mode)	○	
ABS & Hydraulic Brake Booster Power supply System	○	○	
Power Tilt and Power Telescopic Steering Column	○		
Supplemental Restraint System	○		
Cruise Control System	○	○	Cancel Signal Check
Engine Immobiliser System	○		
Multiplex Communication System	○		

In diagnostic trouble code check, it is very important to determine whether the problem indicated by the diagnostic trouble code is still occurring or occurred in the past but returned to normal at present. In addition, it must be checked in the problem symptom check whether the malfunction indicated by the diagnostic trouble code is directly related to the problem symptom or not. For this reason, the diagnostic trouble codes should be checked before and after the symptom confirmation to determine the current conditions, as shown in the table below. If this is not done, it may, depending on the case, result in unnecessary troubleshooting for normally operating systems, thus making it more difficult to locate the problem, or in repairs not pertinent to the problem. Therefore, always follow the procedure in correct order and perform the diagnostic trouble code check.

DIAGNOSTIC TROUBLE CODE CHECK PROCEDURE

Diagnostic Trouble Code Check (Make a note of and then clear)	**Confirmation of Symptoms**	**Diagnostic Trouble Code Check**	**Problem Condition**
Diagnostic Trouble Code Display	Problem symptoms exist	Same diagnostic trouble code is displayed	Problem is still occurring in the diagnostic circuit
⇨		Normal code is displayed	The problem is still occurring in a place other than in the diagnostic circuit (The diagnostic trouble code displayed first is either for a past problem or it is a secondary problem)
⇨	No problem symptoms exist		The problem occurred in the diagnostic circuit in the past
Normal Code Display ⇨	Problem symptoms exist	Normal code is displayed	The problem is still occurring in a place other than in the diagnostic circuit
⇨	No problem symptoms exist	Normal code is displayed	The problem occurred in a place other than in the diagnostic circuit in the past

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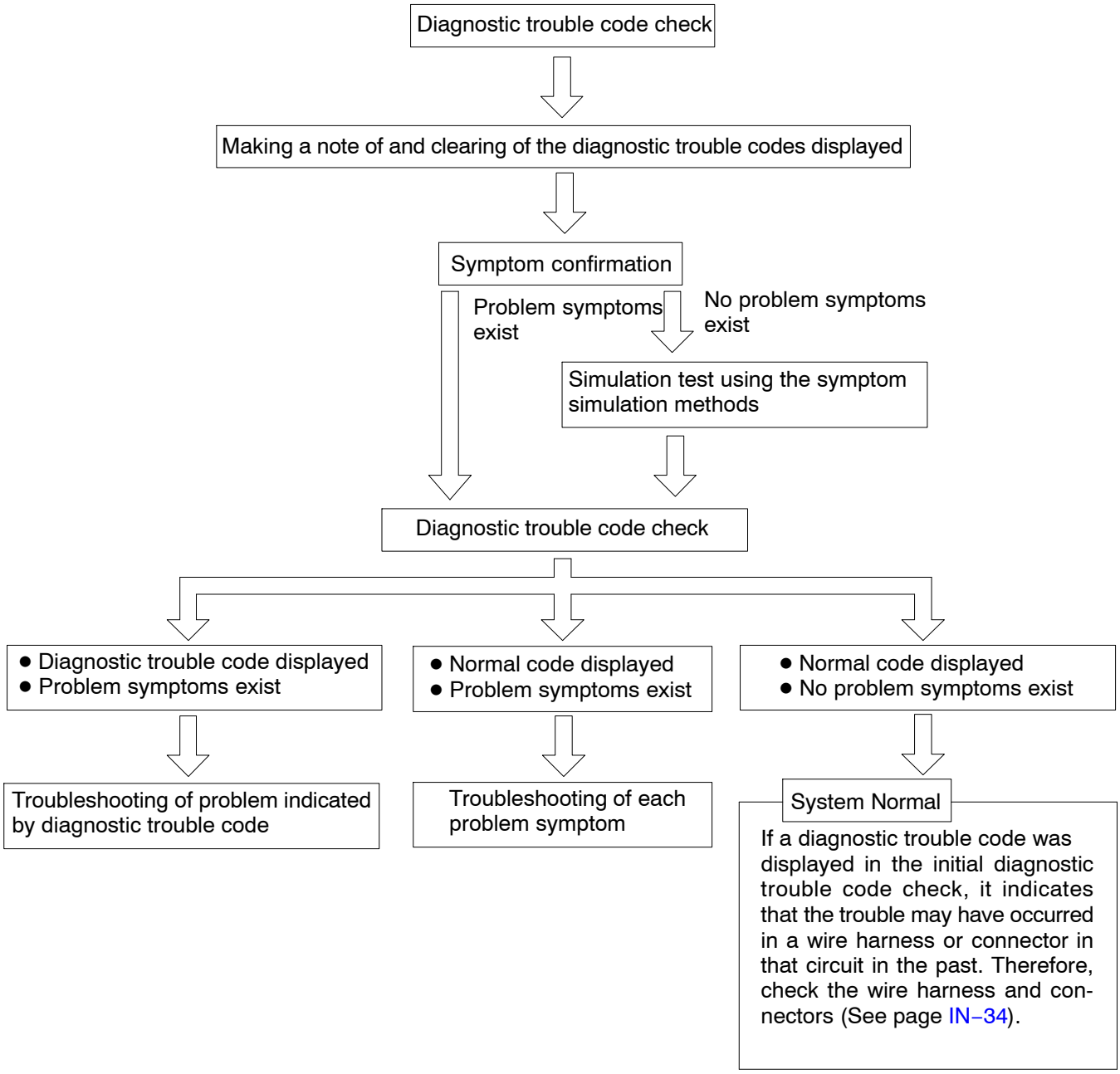
Taking into account the above points, a flow chart showing how to proceed with troubleshooting using the diagnostic trouble code check is shown below. This flow chart shows how to utilize the diagnostic trouble code check effectively, then by carefully checking the results, indicates how to proceed either to diagnostic trouble code troubleshooting or to troubleshooting of problem symptoms table.



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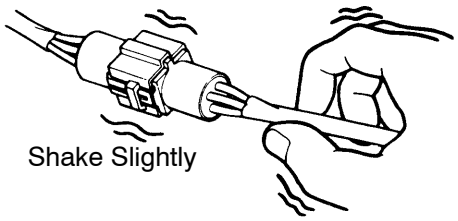
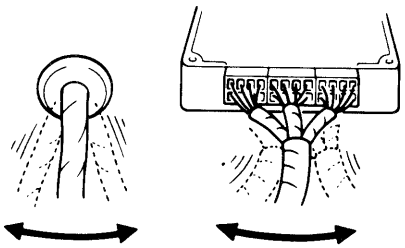
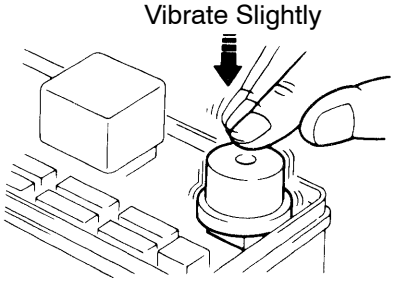
3. SYMPTOM SIMULATION

The most difficult case in troubleshooting is when there are no problem symptoms occurring. In such cases, a thorough customer problem analysis must be carried out, then simulate the same or similar conditions and environment in which the problem occurred in the customer's vehicle. No matter how much experience a technician has, or how skilled he may be, if he proceeds to troubleshoot without confirming the problem symptoms he will tend to overlook something important in the repair operation and make a wrong guess somewhere, which will only lead to a standstill. For example, for a problem which only occurs when the engine is cold, or for a problem which occurs due to vibration caused by the road during driving, etc., the problem can never be determined so long as the symptoms are confirmed with the engine hot condition or the vehicle at a standstill. Since vibration, heat or water penetration (moisture) is likely cause for problem which is difficult to reproduce, the symptom simulation tests introduced here are effective measures in that the external causes are applied to the vehicle in a stopped condition.

Important Points in the Symptom Simulation Test:

In the symptom simulation test, the problem symptoms should of course be confirmed, but the problem area or parts must also be found out. To do this, narrow down the possible problem circuits according to the symptoms before starting this test and connect a tester beforehand. After that, carry out the symptom simulation test, judging whether the circuit being tested is defective or normal and also confirming the problem symptoms at the same time. Refer to the problem symptoms table for each system to narrow down the possible causes of the symptom.

1	**VIBRATION METHOD: When vibration seems to be the major cause.**
CONNECTORS Slightly shake the connector vertically and horizontally. **WIRE HARNESS** Slightly shake the wire harness vertically and horizontally. The connector joint, fulcrum of the vibration, and body through portion are the major areas to be checked thoroughly.	  FI2331 FI2332
PARTS AND SENSOR Apply slight vibration with a finger to the part of the sensor considered to be the problem cause and check that the malfunction occurs. HINT: Applying strong vibration to relays may result in open relays.	 FI2330

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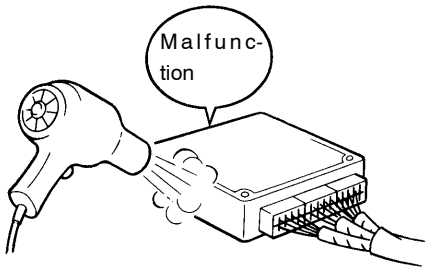
2	HEAT METHOD: When the problem seems to occur when the suspect area is heated.

Heat the component that is the likely cause of the malfunction with a hair dryer or similar object. Check to see if the malfunction occurs.

NOTICE:

(1) Do not heat to more than 60 ˚C (140 ˚F). (Temperature is limited not to damage the components.)

(2) Do not apply heat directly to parts in the ECU.



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3	WATER SPRINKLING METHOD: When the malfunction seems to occur on a rainy day or in a high–humidity condition.

Sprinkle water onto the vehicle and check to see if the malfunction occurs.

NOTICE:

(1) Never sprinkle water directly into the engine compartment, but indirectly change the temperature and humidity by applying water spray onto the radiator front surface.

(2) Never apply water directly onto the electronic components.

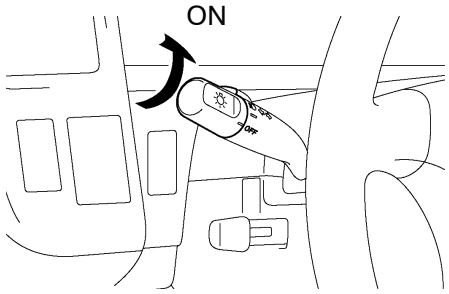
HINT:

If a vehicle is subject to water leakage, the leaked water may contaminate the ECU. When testing a vehicle with a water leakage problem, special caution must be taken.

FI6649

4	OTHER: When a malfunction seems to occur when electrical load is excessive.

Turn on all electrical loads including the heater blower, head lights, rear window defogger, etc. and check to see if the malfunction occurs.



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4. DIAGNOSTIC TROUBLE CODE CHART

The inspection procedure is shown in the table below. This table permits efficient and accurate troubleshooting using the diagnostic trouble codes displayed in the diagnostic trouble code check. Proceed with troubleshooting in accordance with the inspection procedure given in the diagnostic chart corresponding to the diagnostic trouble codes displayed. The engine diagnostic trouble code chart is shown below as an example.

- DTC No.
  Indicates the diagnostic trouble code.
- Page or Instructions
  Indicates the page where the inspection procedure for each circuit is to be found, or gives instructions for checking and repairs.

- Trouble Area
  Indicates the suspect area of the problem.

- Detection Item
  Indicates the system of the problem or contents of the problem.

DTC CHART (SAE Controlled)

HINT:
Parameters listed in the chart may not be exactly the same as your reading due to the type of instrument or other factors.

If a malfunction code is displayed during the DTC check mode, check the circuit for that code listed in the table below. For details of each code, turn to the page referred to under the "See page" for the respective "DTC No." in the DTC chart.

DTC No. (See page)	Detection Item	Trouble Area	MIL*	Memory
P0100 (DI–24)	Mass Air Flow Circuit Malfunction	● Open or short in mass air flow meter circuit ● Mass air flow meter ● ECM	○	○
P0101 (DI–28)	Mass Air Flow Circuit Range/ Performance Problem	● Mass air flow meter	○	○
P0110 (DI–29)	Intake Air Temp. Circuit Malfunction	● Open or short in intake air temp. sensor circuit ● Intake air temp. sensor ● ECM	○	○
P0115 (DI–33)	Engine Coolant Temp. Circuit Malfunction	● Open or short in engine coolant temp. sensor circuit ● Engine coolant temp. sensor ● ECM	○	○
P0116 (DI–37)	Engine Coolant Temp. Circuit Range/ Performance Problem	● Engine coolant temp. sensor ● Cooling system	○	○
	Pedal Position Sensor/Switch unction	● Open or short in throttle position sensor circuit ● Throttle position sensor ● ECM		
	osition Sensor/ Switch rformance Prob-	● Throttle position sensor		

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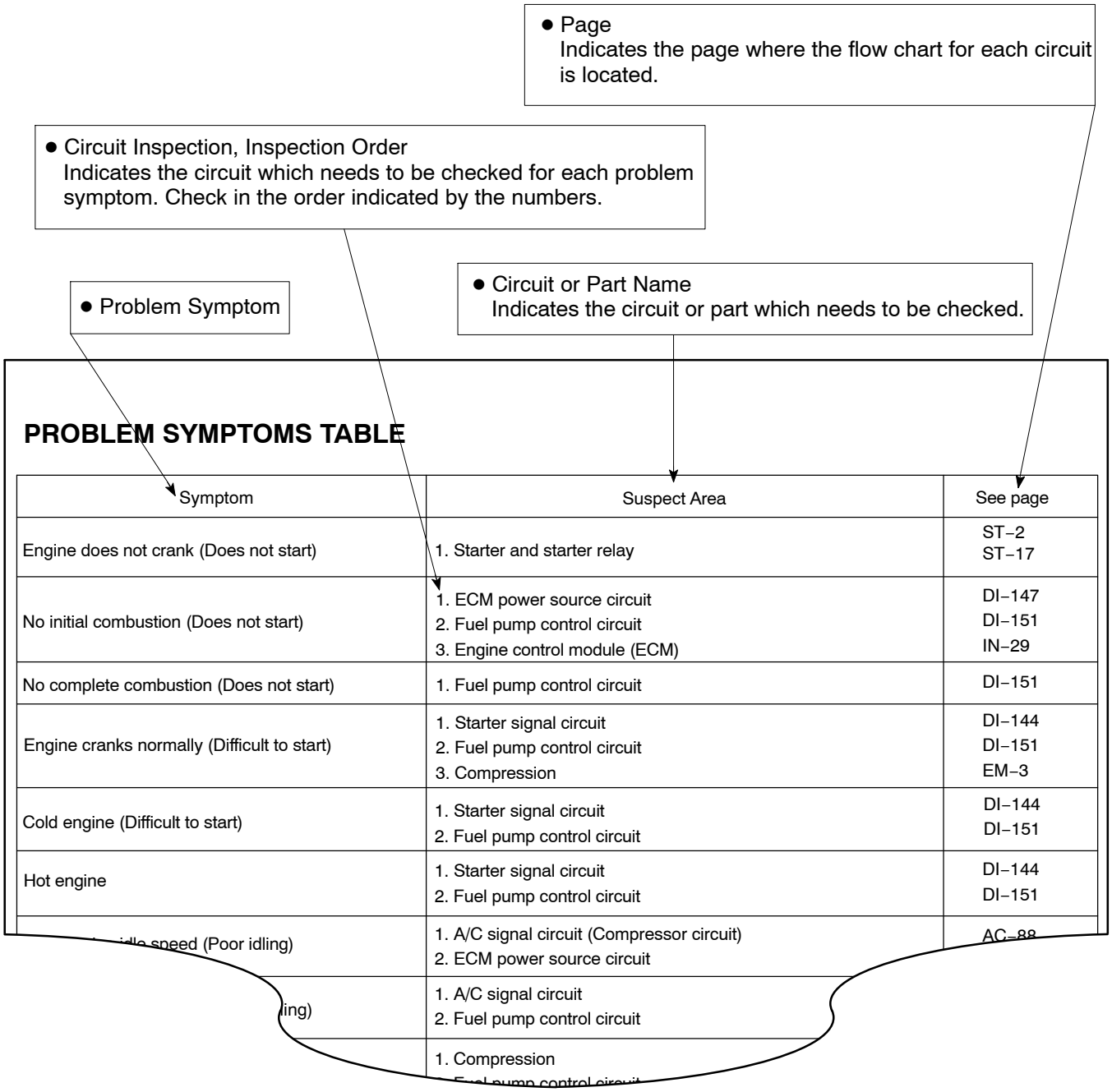
5. PROBLEM SYMPTOMS TABLE

The suspected circuits or parts for each problem symptom are shown in the table below. Use this table to troubleshoot the problem when a ”Normal” code is displayed in the diagnostic trouble code check but the problem is still occurring. Numbers in the table indicate the inspection order in which the circuits or parts should be checked.

HINT:

When the problem is not detected by the diagnostic system even though the problem symptom is present, it is considered that the problem is occurring outside the detection range of the diagnostic system, or that the problem is occurring in a system other than the diagnostic system.



PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Engine does not crank (Does not start)	1. Starter and starter relay	ST–2 ST–17
No initial combustion (Does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. Engine control module (ECM)	DI–147 DI–151 IN–29
No complete combustion (Does not start)	1. Fuel pump control circuit	DI–151
Engine cranks normally (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI–144 DI–151 EM–3
Cold engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI–144 DI–151
Hot engine	1. Starter signal circuit 2. Fuel pump control circuit	DI–144 DI–151
idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. ECM power source circuit	AC–88
ling)	1. A/C signal circuit 2. Fuel pump control circuit	
	1. Compression Fuel pump control circuit	

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6. CIRCUIT INSPECTION

How to read and use each page is shown below.

● Diagnostic Trouble Code No. and Detection Item

● Circuit Description
The major role and operation, etc. of the circuit and its component parts are explained.

DTC	P0325	Knock Sensor 1 Circuit Malfunction

CIRCUIT DESCRIPTION

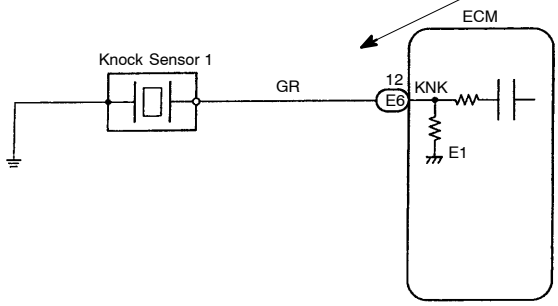
Knock sensor is fitted to the cylinder block to detect engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed, which occurs when the cylinder block vibrates due to knocking. If engine knocking occurs, ignition timing is retarded to suppress it.

DTC No.	DTC Detecting Condition	Trouble Area
P0325	No knock sensor 1 signal to ECM with engine speed, 1,200 rpm or more.	● Open or short in knock sensor1 circuit ● Knock sensor 1 (looseness) ● ECM

If the ECM detects the above diagnosis conditions, it operates the fail safe function in which the corrective retard angle value is set to the maximum value.

● Indicates the diagnostic trouble code, diagnostic trouble code set parameter and suspect area of the problem.

WIRING DIAGRAM



● Wiring Diagram
This shows a wiring diagram of the circuit.
Use this diagram together with ELECTRICAL WIRING DIAGRAM to thoroughly understand the circuit.
Wire colors are indicated by an alphabetical code.
B = Black, L = Blue, R = Red, BR = Brown, LG = Light Green, V = Violet, G = Green, O = Orange, W = White, GR = Gray, P = Pink, Y = Yellow, SB = Sky Blue
The first letter indicates the basic wire color and the second letter indicates the color of the stripe.

V08423

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● Indicates the position of the ignition switch during the check.

LOCK
Ignition Switch LOCK (OFF)

ON
Ignition Switch ON

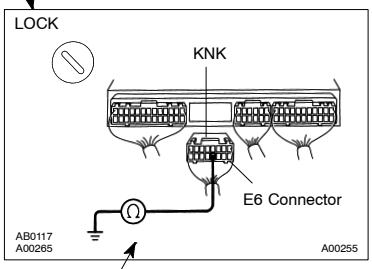
START
Ignition Switch START

ACC
Ignition Switch ACC

● Inspection Procedure
Use the inspection procedure to determine if the circuit is normal or abnormal, and, if it is abnormal, use it to determine whether the problem is located in the sensors, actuators, wire harness or ECU.

INSPECTION PROCEDURE

1 **Check continuity between terminal KNK of ECM connector and body ground.**



PREPARATION:
(a) Remove the glove compartment (See page SF–68).
(b) Disconnect the E6 connector of ECM.

CHECK:
Measure resistance between terminal KNK of ECM connector and body ground.

OK:
Resistance: 1 MΩ or higher

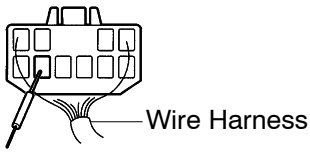
OK → **Go to step 3.**

NG

2 **Check knock sensor (See page SF–61).**

OK → **Replace knock sensor.**

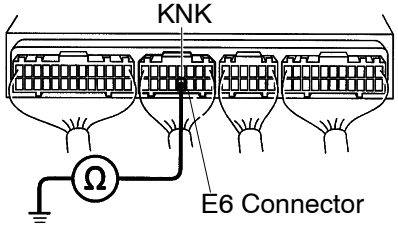
● Indicates the place to check the voltage or resistance.
● Indicates the connector position to be checked, from the front or back side.



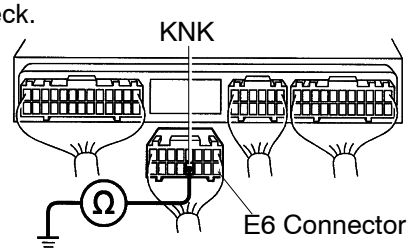
Check from the connector back side. (with harness)

Check from the connector front side. (without harness)
In this case, care must be taken not to bend the terminals.

● Indicates the condition of the connector of ECU during the check.



Connector being checked is connected.



Connector being checked is disconnected.

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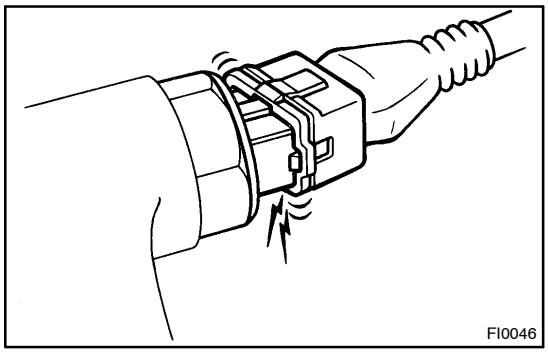
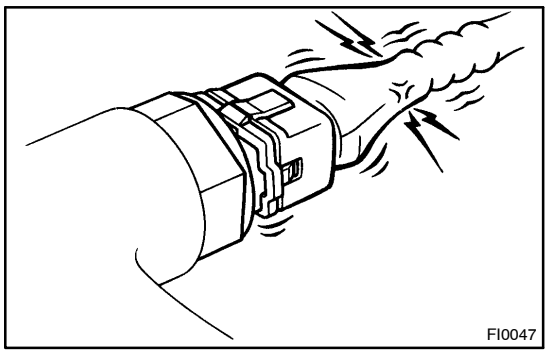
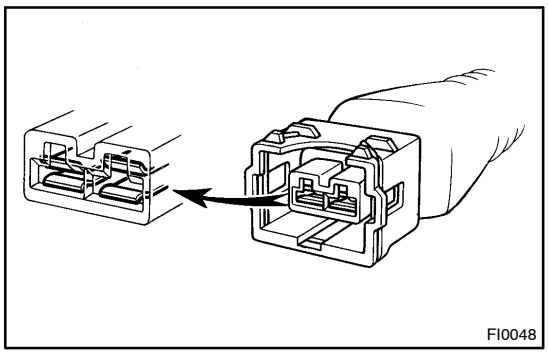
IN011–07

HOW TO USE THE DIAGNOSTIC CHART AND INSPECTION PROCEDURE


FI0046


FI0047


FI0048

1. CONNECTOR CONNECTION AND TERMINAL INSPECTION

- For troubleshooting, diagnostic trouble code charts or problem symptom table are provided for each circuit with detailed inspection procedures on the following pages.
- When all the component parts, wire harnesses and connectors of each circuit except the ECU are found to be normal in troubleshooting, then it is determined that the problem is in the ECU. Accordingly, if diagnosis is performed without the problem symptoms occurring, refer to Step 8 to replace the ECU. So always confirm that the problem symptoms are occurring, or proceed with inspection while using the symptom simulation method.
- The instructions ”Check wire harness and connector” and ”Check and replace ECU” which appear in the inspection procedure, are common and applicable to all diagnostic trouble codes. Follow the procedure outlined below whenever these instructions appear.

OPEN CIRCUIT:

This could be due to a disconnected wire harness, faulty contact in the connector, and a connector terminal pulled out, etc.

HINT:

- It is rarely the case that a wire is broken in the middle of it. Most cases occur at the connector. In particular, carefully check the connectors of sensors and actuators
- Faulty contact could be due to rusting of the connector terminals, to foreign materials entering terminals or a deformation of connector terminals. Simply disconnecting and reconnecting the connectors once changes the condition of the connection and may result in a return to normal operation. Therefore, in troubleshooting, if no abnormality is found in the wire harness and connector check, but the problem disappears after the check, then the cause is considered to be in the wire harness or connectors.

SHORT CIRCUIT:

This could be due to a contact between wire harness and the body ground or to a short circuit occurred inside the switch, etc.

HINT:

When there is a short circuit between the wire harness and body ground, check thoroughly whether the wire harness is caught in the body or is clamped properly.

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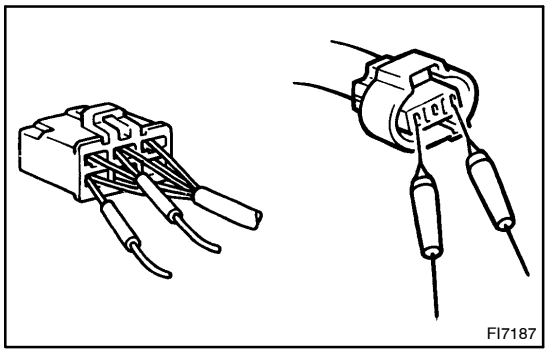
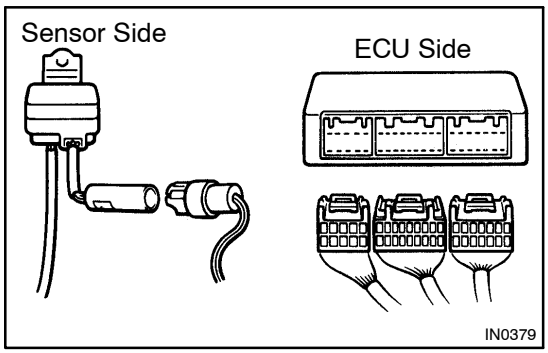


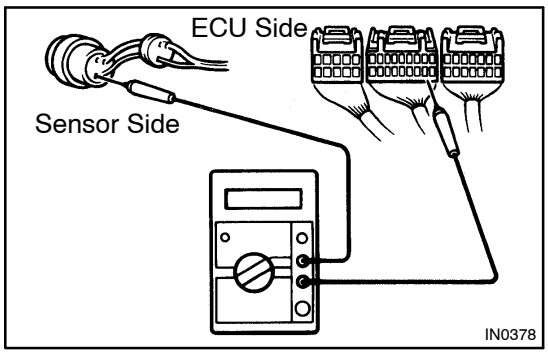
2. CONNECTOR HANDLING

When inserting tester probes into a connector, insert them from the rear of the connector. When necessary, use mini test leads. For water resistant connectors which cannot be accessed from behind, take good care not to deform the connector terminals.



3. CONTINUITY CHECK (OPEN CIRCUIT CHECK)

(a) Disconnect the connectors at both ECU and sensor sides.

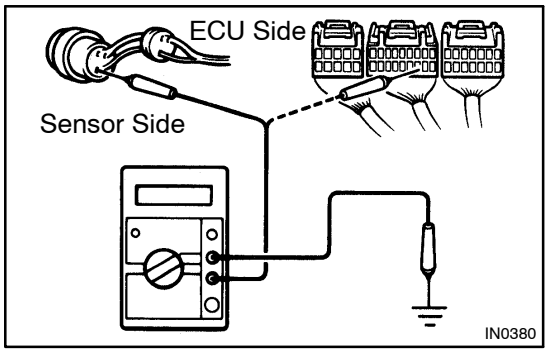


(b) Measure the resistance between the applicable terminals of the connectors.

Resistance: 1 Ω or less

HINT:

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



4. RESISTANCE CHECK (SHORT CIRCUIT CHECK)

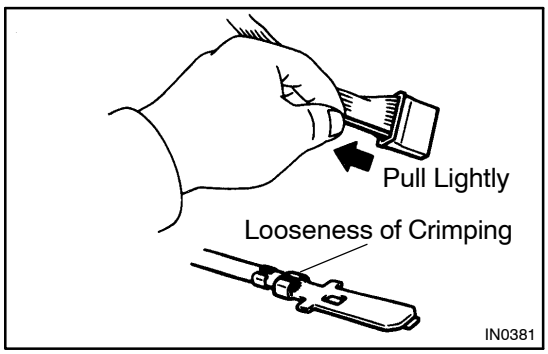
(a) Disconnect the connectors on both ends.

(b) Measure the resistance between the applicable terminals of the connectors and body ground. Be sure to carry out this check on the connectors on both ends.

Resistance: 1 MΩ or higher

HINT:

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



5. VISUAL CHECK AND CONTACT PRESSURE CHECK

(a) Disconnect the connectors at both ends.

(b) Check for rust or foreign material, etc. in the terminals of the connectors.

(c) Check crimped portions for looseness or damage and check that the terminals are secured in lock portion.

HINT:

The terminals should not come out when pulled lightly from the back.

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(d) Prepare a test male terminal and insert it in the female terminal, then pull it out.

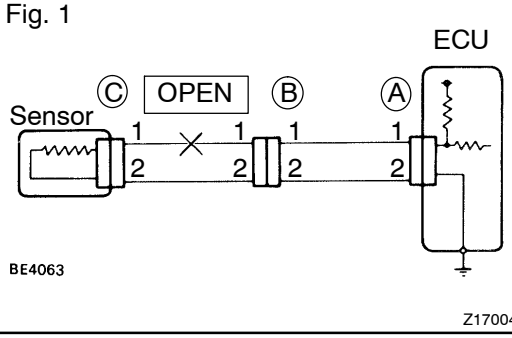
NOTICE:

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

HINT:

When the test terminal is pulled out more easily than others, there may be poor contact in that section.

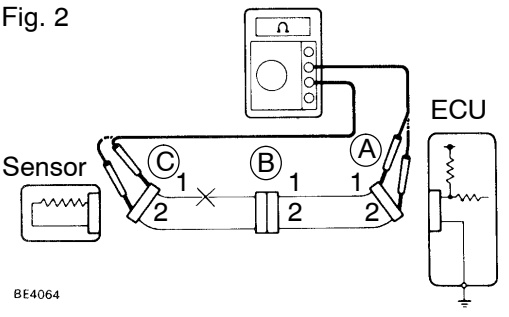
Fig. 1



6. CHECK OPEN CIRCUIT

For the open circuit in the wire harness in Fig. 1, perform "(a) Continuity Check" or "(b) Voltage Check" to locate the section.

Fig. 2



(a) Check the continuity.

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

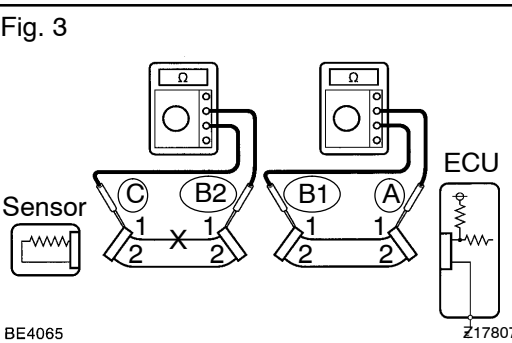
In the case of Fig. 2,

Between terminal 1 of connector "A" and terminal 1 of connector "C" → No continuity (open)

Between terminal 2 of connector "A" and terminal 2 of connector "C" → Continuity

Therefore, it is found out that there is an open circuit between terminal 1 of connector "A" and terminal 1 of connector "C".

Fig. 3



(2) Disconnect connector "B" and measure the resistance between them.

In the case of Fig. 3,

Between terminal 1 of connector "A" and terminal 1 of connector "B1" → Continuity

Between terminal 1 of connector "B2" and terminal 1 of connector "C" → No continuity (open)

Therefore, it is found out that there is an open circuit between terminal 1 of connector "B2" and terminal 1 of connector "C".

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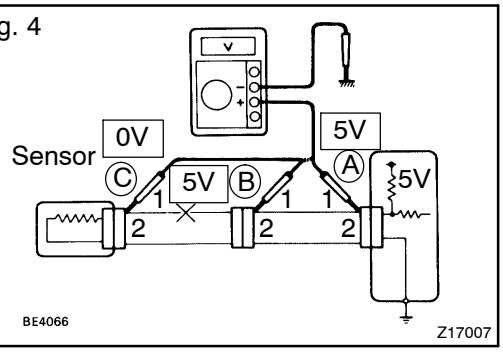
Fig. 4



(b) Check the voltage.

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

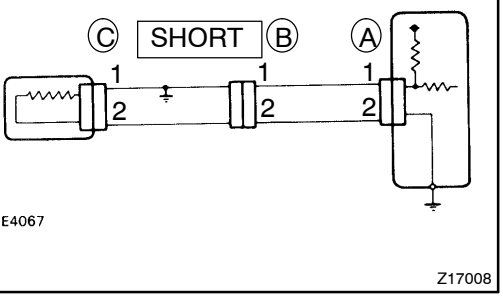
As shown in Fig. 4, with each connector still connected, measure the voltage between body ground and terminal 1 of connector "A" at the ECU 5V output terminal, terminal 1 of connector "B", and terminal 1 of connector "C", in that order.

If the results are:

5V: Between Terminal 1 of connector "A" and Body Ground
5V: Between Terminal 1 of connector "B" and Body Ground
0V: Between Terminal 1 of connector "C" and Body Ground

Then it is found out that there is an open circuit in the wire harness between terminal 1 of "B" and terminal 1 of "C".

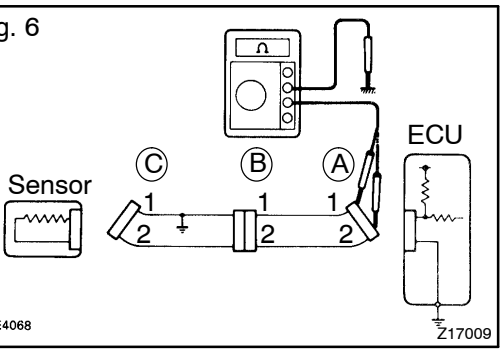
Fig. 5



7. CHECK SHORT CIRCUIT

If the wire harness is ground shorted as in Fig. 5, locate the section by conducting a "continuity check with ground".

Fig. 6



Check the continuity with ground.

(1) Disconnect connectors "A" and "C" and measure the resistance between terminal 1 and 2 of connector "A" and body ground.

In the case of Fig. 6

Between terminal 1 of connector "A" and body ground → Continuity (short)

Between terminal 2 of connector "A" and body ground → No continuity

Therefore, it is found out that there is a short circuit between terminal 1 of connector "A" and terminal 1 of connector "C".

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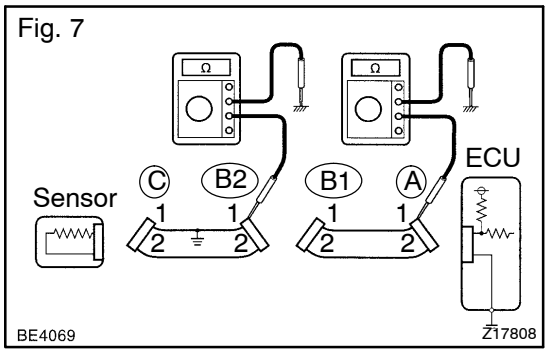
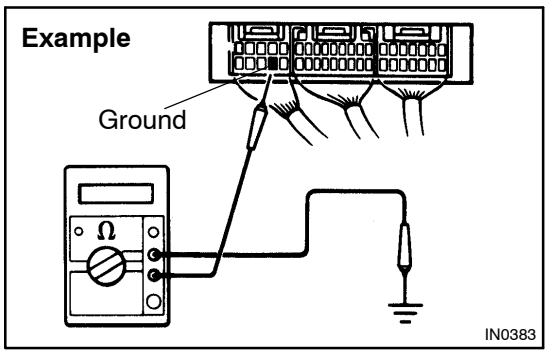
Fig. 7



(2) Disconnect connector ”B” and measure the resistance between terminal 1 of connector ”A” and body ground, and terminal 1 of connector ”B2” and body ground.
Between terminal 1 of connector ”A” and body ground → No continuity
Between terminal 1 of connector ”B2” and body ground → Continuity (short)
Therefore, it is found out that there is a short circuit between terminal 1 of connector ”B2” and terminal 1 of connector ”C”.

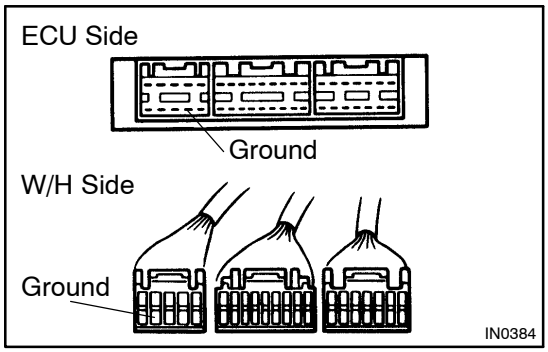
8. CHECK AND REPLACE ECU

First check the ECU ground circuit. If it is faulty, repair it. If it is normal, the ECU could be faulty, so replace the ECU with a normal functioning one and check that the symptoms appear.



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

Resistance: 1 Ω or less



(2) Disconnect the ECU connector, check the ground terminals on the ECU side and the wire harness side for bend and check the contact pressure.

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TERMS

IN04Q–02

ABBREVIATIONS USED IN THIS MANUAL

Abbreviations	Meaning
ABS	Anti–Lock Brake System
A/C	Air Conditioning
ALR	Automatic Locking Retractor
A/T	Automatic Transmission
ATF	Automatic Transmission Fluid
BTDC	Before Top Dead Center
Calif.	California
CB	Circuit Breaker
CRS	Child Restraint System
Diff.	Differential
DEF	Defogger
Diff.	Differential
DOHC	Double Over Head Cam
DP	Dash Pot
D.R.L.	Daytime Running Light
ECU	Electronic Control Unit
E/G	Engine
ELR	Emergency Locking Retractor
EPR	Evaporator pressure Regulator
ESA	Electronic Spark Advance
EX	Exhaust (Manifold, Valve)
FIPG	Formed in Place Gasket
FL	Fusible Link
FPU	Fuel Pressure Up
Fr	Front
HID	High Intensity Discharge (Head Lamp)
HAC	High Altitude Compensation
IG	Ignition
IIA	Integrated Ignition Assembly
IN	Intake (Manifold, Valve)
I/P	Instrument Panel
J/B	Junction Block
J/C	Junction Connector
LED	Light Emitting Diode
LH	Left–Hand
LLC	Long Life Coolant (Year Around Coolant)
Max.	Maximum
Min.	Minimum
MP	Multipurpose
O/D	Overdrive
O/S	Oversize
PCV	Positive Crankcase Ventilation

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PKB	Parking Brake
PS	Power Steering
RH	Right–Hand
Rr	Rear
SRS	Supplemental Restraint System
SSM	Special Service Materials
SST	Special Service Tools
STD	Standard
SW	Switch
TDC	Top Dead center
TEMP.	Temperature
T/F	Transfer
T/M	Transmission
U/S	Undersize
VCV	Vacuum Control Valve
VSV	Vacuum Switching Valve
VTV	Vacuum Transmitting Valve
w/	With
w/o	Without
4WD	Four Wheel Drive Vehicle (4x4)

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IN07O–01

GLOSSARY OF SAE AND TOYOTA 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)

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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

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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	–

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OUTSIDE VEHICLE

MA02P–01

GENERAL MAINTENANCE

These are some maintenance and inspection items which are considered to be the owner's responsibility. They can be done by the owner or they can have them done at a service shop. These items include those which should be checked on a daily basis, those which, in most cases, do not require (special) tools and those which are considered to be reasonable for the owner to do. Items and procedures for general maintenance are as follows.

1. GENERAL NOTES

- Maintenance items may very from country and country. Check the owner's manual supplement in which the maintenance schedule is shown.
- Every service items in the periodic maintenance schedule must be performed.
- Periodic maintenance service must be performed according to whichever interval in the periodic maintenance schedule occurs first, the odometer reading (miles) or the time interval (months).
- Maintenance service after the last period should be performed at the same time interval as before unless otherwise noted.
- Failure to do even one item an cause the engine to run poorly and increase exhaust emissions.

2. TIRES

(a) Check the pressure with a gauge. If necessary, adjust.
(b) Check for cuts, damage or excessive wear.

3. WHEEL NUTS

When checking the tires, check the nuts for looseness or for missing nuts. If necessary, tighten them.

4. TIRE ROTATION

Check the owner's manual supplement in which the maintenance schedule is shown.

5. WINDSHIELD WIPER BLADES

Check for wear or cracks whenever they do not wipe clean. If necessary, replace.

6. FLUID LEAKS

(a) Check underneath for leaking fuel, oil, water or other fluid.
(b) If you smell gasoline fumes or notice any leak, have the cause found and corrected.

7. DOORS AND ENGINE HOOD

(a) Check that all doors and the tailgate operate smoothly, and that all larches lock securely.
(b) Check that the engine hood secondary latch secures the hood from opening when the primary latch is released.

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INSIDE VEHICLE

MA02Q–01

GENERAL MAINTENANCE

These are the maintenance and inspection items which are considered to be owner's responsibility. They can be done by the owner or be can have them done at a service shop. These items include those which should be checked on a daily basis, those which, in most cases, do not require (special) tools and those which are considered to be reasonable for the owner to do. Items and procedures for general maintenance are as follows.

1. GENERAL NOTES

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- Maintenance service after the last period should be performed at the same time interval as before unless otherwise noted.
- Failure to do even one item an cause the engine to run poorly and increase exhaust emissions.

2. LIGHTS

(a) Check that the headlights, stop lights, taillights, turn signal lights, and other lights are all working.
(b) Check the headlights aim.

3. WARNING LIGHTS AND BUZZERS

Check that all warning lights and buzzers function properly.

4. HORN

Check that it is working.

5. WINDSHIELD GLASS

Check for scratches, pits or abrasions.

6. WINDSHIELD WIPER AND WASHER

(a) Check operation of the wipers and washer.
(b) Check that the wipers do not streak.

7. WINDSHIELD DEFROSTER

Check that air comes out from the defroster outlet when operating the heater or air conditioner at defroster mode.

8. REAR VIEW MIRROR

Check that it is mounted securely.

9. SUN VISORS

Check that they move freely and mounted securely.

10. STEELING WHEEL

Check that it has the specified freeplay. Be alert for changes in steering condition, such as hard steering, excessive freeplay or strange noises.

11. SEATS

(a) Check that all front seat controls such as seat adjusters, seatback recliner, etc. operate smoothly.
(b) Check that all latches lock securely in any position.
(c) Check that the head restraints move up and down smoothly and that the locks hold securely in any latch position.
(d) For folding–down rear seat backs, check that the latches look securely.

12. SEAT BELTS

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

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13. ACCELERATOR PEDAL

Check the pedal for smooth operation and uneven pedal effort or catching.

14. BRAKE PEDAL

(See page BR–9)

(a) Check that pedal for smoothly operation.

(b) Check that the pedal has the proper reserve distance and freeplay.

15. BRAKE BOOSTER

(See page BR–36)

Check the brake booster function.

16. BRAKES

At a safe place, check that the brakes do not pull to one side when applied.

17. PARKING BRAKE

(See page BR–11)

(a) Check that the lever has the proper travel.

(b) On a safe incline, check that the vehicle is held securely with only the parking brake applied.

18. AUTOMATIC TRANSMISSION ”PARK” MECHANISM

(a) Check the lock release button of the selector level for proper and smooth operation.

(b) On a safe incline, check that the vehicle is held securely with the selector lever in the ”P” position and all brakes released.

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UNDER HOOD

MA02R–01

GENERAL MAINTENANCE

1. GENERAL NOTICE

- Maintenance items may vary from country to country. Check the owner's manual supplement in which the maintenance schedule is shown.
- Every service item in the periodic maintenance schedule must be performed.
- Periodic maintenance service must be performed according to whichever interval in the periodic maintenance schedule occurs first, the odometer reading (miles) or the time interval (months).
- Maintenance services after the last period should be performed at the same interval as before unless otherwise noted.
- Failure to do even one item can cause the engine to run poorly and increase exhaust emissions.

2. WINDSHIELD WASHER FLUID

Check that there is sufficient fluid in the tank.

3. ENGINE COOLANT LEVEL

Check that the coolant level is between the LEVEL lines on the see–through reservoir at normal temperature (20°C (68°F)).

4. RADIATOR AND HOSES

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

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

5. BATTERY ELECTROLYTE LEVEL

- Check the indicator.
- When the indicator color is blue, the condition is satisfactory. A red color indicates that distilled water must be added, and white indicates that charging is necessary.

6. BRAKE FLUID LEVELS

Check that the brake fluid level is near the upper level line on the see–through reservoir.

7. ENGINE DRIVE BELTS

Check drive belt for fraying, cracks, wear or oiliness.

8. ENGINE OIL LEVEL

Check the level on the dipstick with the engine turned off.

9. POWER STEERING FLUID LEVEL

- Check the level on the dipstick.
- The level should be in the "HOT" or "COLD" range depending on the fluid temperature.

10. AUTOMATIC TRANSMISSION FLUID LEVEL

(a) Park the vehicle on a level surface.

(b) With the engine idling and the parking and foot brake applied, shift the selector into all positions from "P" to "L", and then shift into "P".

(c) Pull out the dipstick and wipe off the fluid with a clean rag. Re–insert the dipstick fully and check that the fluid level is in the HOT range.

(d) Do this check with the fluid at normal driving temperature (70 – 80°C (158 – 176°F)).

If the level is at the low side, add fluid.

NOTICE:

Do not overfill.

HINT:

Wait about 30 minutes before checking the fluid level after extended driving at high speeds in hot weather, driving in heavy traffic or with a trailer.

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11. EXHAUST SYSTEM

Visually inspect for cracks, holes or loose supports.

If any change in the sound of the exhaust or smell of the exhaust fumes is noticed, have the cause located and corrected.

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ENGINE

MA02S–01

INSPECTION

HINT:

Inspect these items when the engine is cold.

1. **REPLACE TIMING BELT**
   (See page EM–15)
2. **INSPECT VALVE CLEARANCE**
   (See page EM–4)
3. **INSPECT DRIVE BELT**
   (See page CH–2)
4. **REPLACE ENGINE OIL AND OIL FILTER**
   (See page LU–2)
5. **REPLACE ENGINE COOLANT**
   (See page CO–2)
6. **INSPECT EXHAUST PIPES AND MOUNTINGS**

Visually inspect the pipes, hangers and connections for severe corrosion, leaks or damage.

7. **REPLACE AIR CLEANER FILTER**

Replace the air cleaner filter with a new one.

8. **INSPECT FUEL LINES, CONNECTIONS AND FUEL VAPOR CONTROL VALVE**
   (See page EC–5)

Visually inspect the fuel lines for cracks, leakage loose connections, deformation or tank band looseness.

9. **INSPECT GASKET IN FUEL TANK CAP**
   (See page EC–5)
10. **REPLACE SPARK PLUGS**
    (See page IG–1)
11. **California, Massachusetts and New York:**
    INSPECT CHARCOAL CANISTER
    (See page EC–5)

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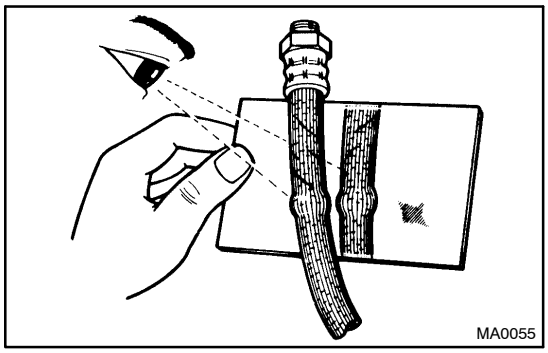

BRAKE

INSPECTION

MA02T–01

1. INSPECT BRAKE LINE PIPES AND HOSES

HINT:

Check in a well lighted area. Check the entire circumference and length of the brake hoses using a mirror as required. Turn the front wheels fully right or left before checking the front brake.

(a) Check all brake lines and hoses for:
- Damage
- Wear
- Deformation
- Cracks
- Corrosion
- Leaks
- Bends
- Twists

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

(c) Check that the hoses and lines are clear of sharp edges, moving parts and the exhaust system.

(d) Check that the lines installed in grommets pass through the center of the grommets.

2. INSPECT FRONT AND REAR BRAKE PADS AND DISCS

(FRONT PADS: See page BR–13)
(REAR PADS: See page BR–22)
(FRONT DISCS: See page BR–18)
(REAR DISCS: See page BR–26)

3. INSPECT PARKING BRAKE LININGS AND DRUMS

(See page BR–32)

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CHASSIS

INSPECTION

MA02U–01

1. INSPECT STEERING LINKAGE

(a) Check the steering linkage for looseness or damage.
Check that:
- Tie rod ends do not have excessive play.
- Dust seals and boots are not damaged.
- Boot clamps are not loose.

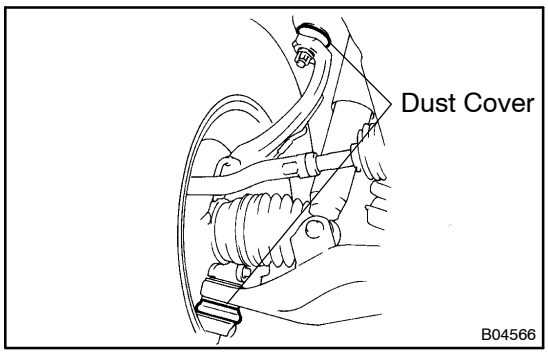
(b) Inspect the dust cover for damage.

2. INSPECT SRS AIRBAG

(See pages RS–12, RS–26)

3. INSPECT STEERING GEAR HOUSING OIL

Check the steering gear housing for oil leakage.
If leakage is found, check for cause and repair.



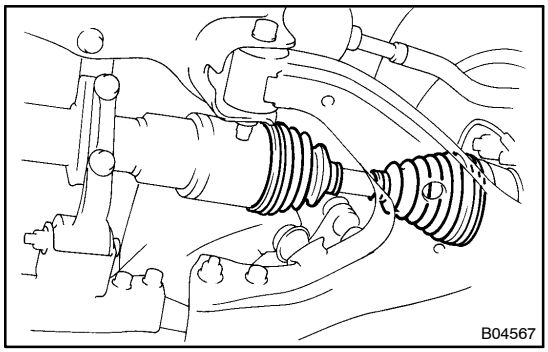
4. INSPECT BALL JOINTS AND DUST COVERS

(a) Jack up the front of the vehicle and support it with stands.

(b) Make sure the front wheels are in a straight–ahead position, and depress the brake pedal.

(c) Jack up the lower suspension arm until there is about half a load on the front suspension.

(d) Inspect the dust cover for damage.

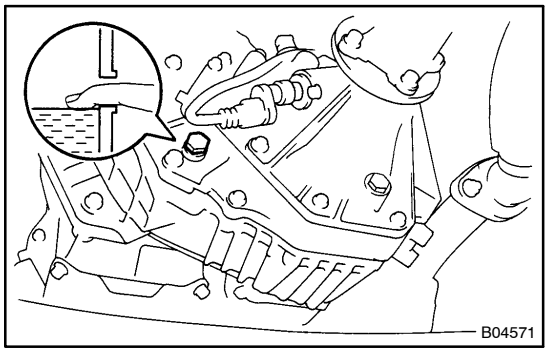


5. INSPECT DRIVE SHAFT BOOTS

Inspect the drive shaft boots for clamp looseness, grease leakage or damage.

6. INSPECT AUTOMATIC TRANSMISSION OIL LEVEL

(See page DI–151)



7. INSPECT TRANSFER AND DIFFERENTIAL OIL LEVEL

(a) (Transfer)
Remove the filler plug and feel inside the hole with your finger. Check that the oil comes to within 5 mm (0.20 in.) of the bottom edge of the hole. If the level is low, add oil until it begins to run out of the filler hole.
Transfer oil: See page TR–6

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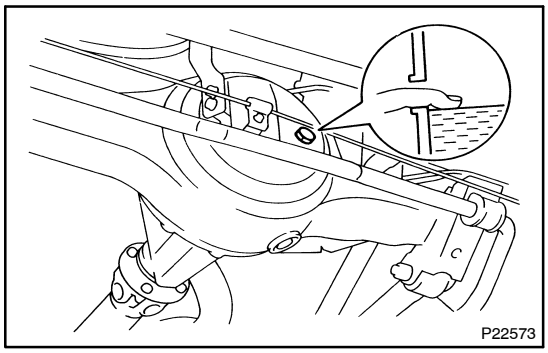
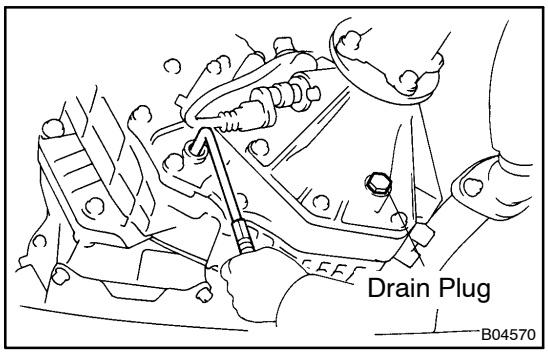
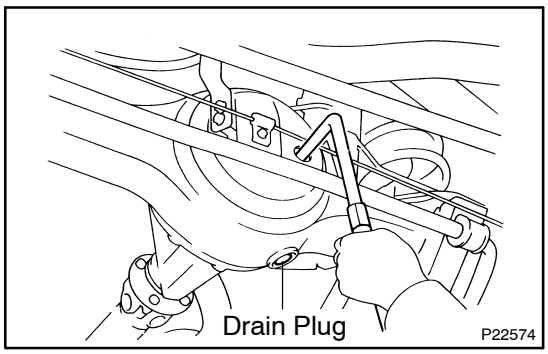


(b) (Differential)
Remove the filler plug and feel inside the hole with your finger. Check that the oil comes to within 5 mm (0.20 in.) of the bottom edge of the hole. If the level is low, add oil until it begins to run out of the filler hole.
Front differential oil: See page SA–32
Rear differential oil: See page SA–92

8. REPLACE AUTOMATIC TRANSMISSION FLUID (See page DI–3)



9. REPLACE TRANSFER AND DIFFERENTIAL OIL
(a) Remove the drain plug and drain the oil.
(b) Reinstall the drain plug securely.
(c) Add new oil until it begins to run out of the filler hole.
Transfer oil: See page TR–6
Front differential oil: See page SA–32
Rear differential oil: See page SA–92



10. REPACK FRONT WHEEL BEARINGS AND DRIVE SHAFT BUSHING GREASE
(a) Change the front wheel bearing grease.
(See page SA–14)

NOTICE:
Maintenance free for rear wheel bearing.

(b) Repack the drive shaft bushing grease.
(See page SA–30)

11. LUBRICATE PROPELLER SHAFT AND TIGHTEN BOLTS
(a) Lubricate chassis components, referring to the lubrication chart. Before pumping in grease, wipe off any mud and dust on the grease fitting.

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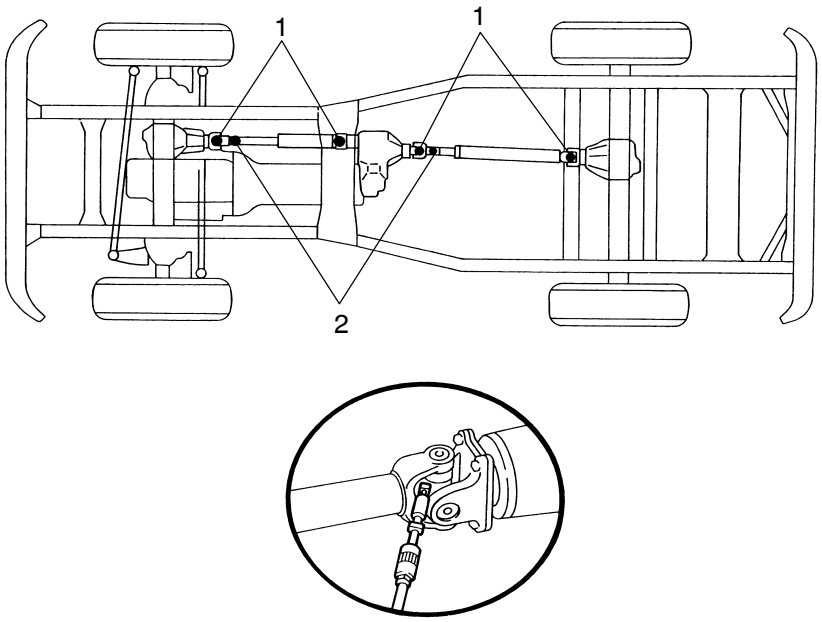
Grease grade:
Lithium base chassis grease (NLGI No.2)



Lubricating Positions: 1. Spider
2. Slide Yoke

MA0621

(b) Tightening bolts for propeller shaft.
(See page PR–7)

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BODY

MA02V–01

INSPECTION

1. TIRE ROTATION

Check the owner's manual supplement in which the maintenance schedule is shown.

2. FINAL INSPECTION

(a) Check the operation of the body parts:
- Hood:
  - Auxiliary catch operates properly
  - Hood locks securely when closed
- Front and rear doors:
  - Door locks operate properly
  - Doors close properly
- Back door:
  - Door lock operates properly
- Seats:
  - Seat adjusts easily and locks securely in any position
  - Front seat back locks securely in any position
  - Folding–down rear seat backs look securely.

(b) Be sure to deliver a clean car. Especially check:
- Steering wheel
- Shift lever knob
- All switch knobs
- Door handles
- Seats

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MAINTENANCE

EQUIPMENT

PP1AY–01

Mirror	Brake hose

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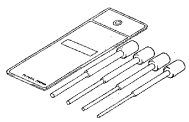
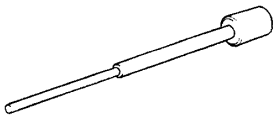
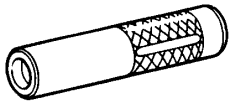
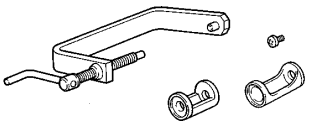
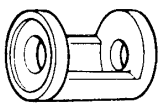
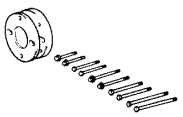
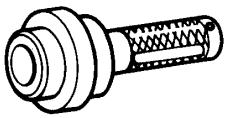
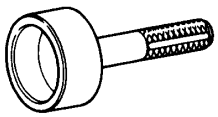
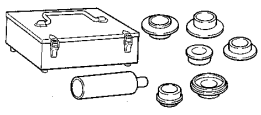
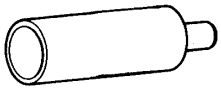
ENGINE MECHANICAL

PP1BK–01

SST (Special Service Tools)

	09201–10000	Valve Guide Bushing Remover & Replacer Set	
	09201–01055	Valve Guide Bushing Remover & Replacer 5.5	
	09201–41020	Valve Stem Oil Seal Replacer	
	09202–70020	Valve Spring Compressor	
	(09202–00010)	Attachment	
	09213–54015	Crankshaft Pulley Holding Tool	
	09222–30010	Connecting Rod Bushing Remover & Replacer	
	09223–46011	Crankshaft Front Oil Seal Replacer	Crankshaft pulley Crankshaft timing pulley
	09223–56010	Crankshaft Rear Oil Seal Replacer	
	09316–60011	Transmission & Transfer Bearing Replacer	
	(09316–00011)	Replacer Pipe	Crankshaft front oil seal
	09330–00021	Companion Flange Holding Tool	Crankshaft pulley

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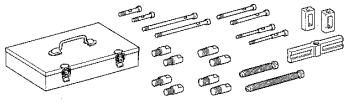
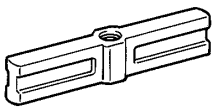
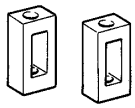
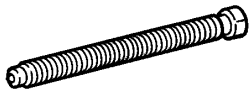
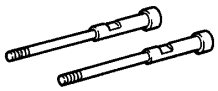
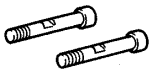
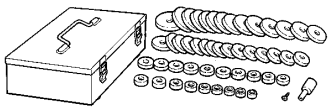
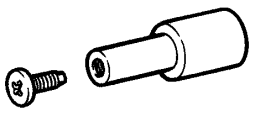
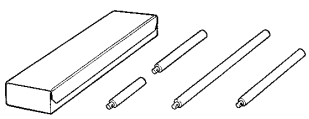
	09843–18020	Diagnosis Check Wire	
	09950–50010	Puller C Set	
	(09951–05010)	Hanger 150	Crankshaft pulley Crankshaft timing pulley
	(09952–05010)	Slide Arm	Crankshaft pulley Crankshaft timing pulley
	(09953–05010)	Center Bolt 100	Crankshaft pulley Crankshaft timing pulley
	(09953–05020)	Center Bolt 150	Crankshaft pulley Crankshaft timing pulley
	(09954–05010)	Claw No.1	Crankshaft timing pulley
	(09954–05020)	Claw No.2	Crankshaft pulley
	09950–60010	Replacer Set	
	(09951–00240)	Replacer 24	
	(09951–00460)	Replacer 46	
	(09952–06010)	Adapter	
	09950–70010	Handle Set	

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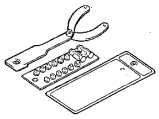
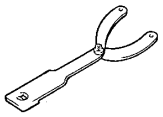
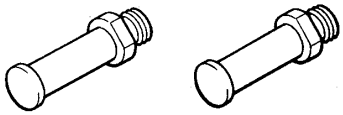
	(09951–07100) Handle 100	Spark plug tube Valve guide bushing
	09960–10010 Variable Pin Wrench Set	
	(09962–01000) Variable Pin Wrench Arm Assy	Camshaft sub–gear
	(09963–01000) Pin 10	Camshaft sub–gear
	(09963–00500) Pin 5	Camshaft sub–gear

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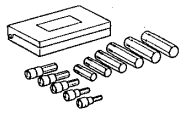
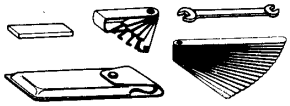
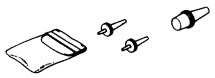
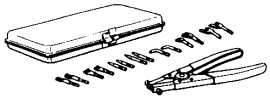
PP1BL–01

RECOMMENDED TOOLS

	09040–00010	Hexagon Wrench Set .	
	09090–04010	Engine Sling Device .	For suspension engine
	09200–00010	Engine Adjust Kit .	
	09258–00030	Hose Plug Set .	Plug for vacuum hose, fuel hose etc.
	09904–00010	Expander Set .	

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PP1BM–01

EQUIPMENT

Caliper gauge	
CO/HC meter	
Compression gauge	
Connecting rod aligner	
Cylinder gauge	
Dial indicator	
Dye penetrant	
Engine tune–up tester	
Groove cleaning tool	
Heater	
Magnetic finger	
Micrometer	
Pin hole grinder	
OBD II scan tool	
Piston ring compressor	
Piston ring expander	
Plastigage	
Precision straight edge	
Press	
Soft brush	
Ridge reamer	
Solvent	
Spring tester	Valve spring
Steel square	Valve spring
Thermometer	
Torque wrench	
Valve seat cutter	
V–block	
Vernier calipers	
Wire brush	Valve

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PP1BN–01

SSM (Special Service Materials)

08826–00080	Seal Packing Black or equivalent (FIPG)	Camshaft bearing cap Cylinder head semi–circular plug Cylinder head cover Rear oil seal retainer
08826–00080	Seal Packing Black or equivalent (FIPG)	Camshaft housing plug
08826–00100	Seal Packing 1282B, THREE BOND 1282B or equivalent (FIPG)	Coolant drain union
08833–00070	Adhesive 1324, THREE BOND 1324 or equivalent	Drive plate bolt Torque converter clutch bolt
08833–00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	No.1 idler pulley bolt

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EMISSION CONTROL

EQUIPMENT

PP1AK–01

Torque wrench	
MITYVAC (Hand–held vacuum pump)	

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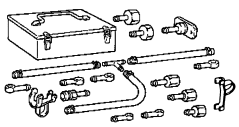
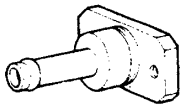
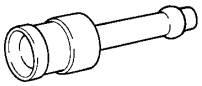
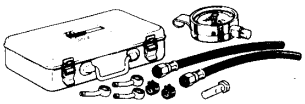
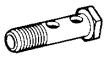
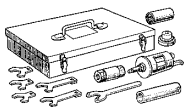
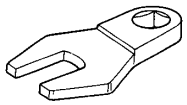
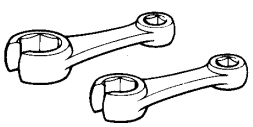
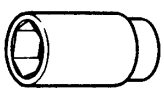
SFI

SST (Special Service Tools)

PP0U3–02

	09268–41047	Injection Measuring Tool Set	
	(09268–41091)	NO.7 Union	
	(09268–41110)	Adaptor	
	(09268–41300)	Clamp	
	09268–45012	EFI Fuel Pressure Gauge	
	(09268–41190)	Adaptor	
	(90405–06167)	I Union	
	09612–24014	Steering Gear Housing Overhaul Tool Set	
	(09617–24011)	Steering Rack Wrench	Fuel pressure pulsation damper
	09631–22020	Power Steering Hose Nut 14 x 17 mm Wrench Set	Fuel line flare nut
	09816–30010	Oil Pressure Switch Socket	Knock sensor
	09842–30070	Wiring ”F” EFI Inspection	

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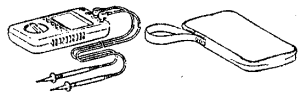
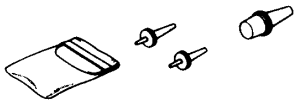
PP0U4–02

RECOMMENDED TOOLS

	09082–00040 TOYOTA Electrical Tester.	
	09258–00030 Hose Plug Set .	Plug for vacuum hose, fuel hose etc.

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PP0NI–02

EQUIPMENT

Graduated cylinder	Injector
OBD II scan tool	
Sound scope	Injector
Torque wrench	
Vacuum gauge	

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COOLING

EQUIPMENT

PP1AQ–01

Heater	Thermostat
Radiator cap tester	
Thermometer	Thermostat
Torque wrench	

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PP1AR–01

COOLANT

Item	Capacity	Classification
Engine coolant		TOYOTA LONG LIFE Antifreeze Coolant or equivalent
w/ Front heater	14.8 liters (15.6 US qts, 13.0 lmp. qts)	
w/ Front heater and rear heater	15.3 liters (16.2 US qts, 13.4 lmp qts)	

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PP1AS–01

SSM (Special Service Materials)

08826–00100	Seal Packing 1282B, THREE BOND 1282B or equivalent (FIPG)	Water pump Water inlet housing

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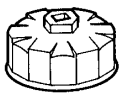
LUBRICATION

PP1AT–01

SST (Special Service Tools)

	09032–00100 Oil Pan Seal Cutter	
	09228–07501 Oil Filter Wrench	

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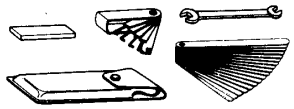
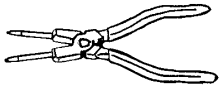
PP1AU–01

RECOMMENDED TOOLS

	09200–00010 Engine Adjust Kit .	
	09905–00013 Snap Ring Pliers .	

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PP1AV–01

EQUIPMENT

Oil pressure gauge	
Precision straight edge	
Torque wrench	

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PP1AW–01

LUBRICANT

Item	Capacity	Classification
Engine oil		API grade SH, Energy–Conserving II or SJ, Energy–Conserving or ILSAC multigrade engine oil. SAE 5W–30 is the best choice for your vehicle, for good fuel economy, and good starting in cold weather.
Dry fill	8.0 liters (8.5 US qts, 7.0 Imp. qts)	
Drain and refill		
w/ Oil filter change	6.8 liters (7.2 US qts, 6.0 Imp. qts)	
w/o Oil filter change	6.4 liters (6.8 US qts, 5.6 Imp qts)	

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PP1AX–01

SSM (Special Service Materials)

08826–00080	Seal Packing Black or equivalent (FIPG)	Oil pump No.1 oil pan No.2 oil pan
08833–00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	Oil pressure switch

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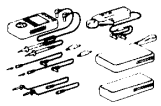
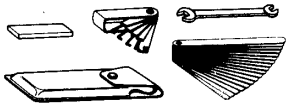
IGNITION

RECOMMENDED TOOLS

PP1AL–01

	09082–00050 TOYOTA Electrical Tester Set.	
	09200–00010 Engine Adjust Kit .	

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PP1AM–01

EQUIPMENT

Megger (Insulation resistance meter)	Spark plug
Spark plug cleaner	
Torque wrench	

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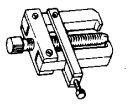
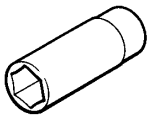
STARTING

PP1AZ–01

SST (Special Service Tools)

	09286–46011	Injection Pump Spline Shaft Puller	Armature front bearing
	09810–38140	Starter Magnet Switch Nut Wrench 14	
	09820–00030	Alternator Rear Bearing Replacer	Armature bearing

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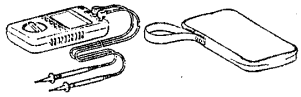
PP1B0–01

RECOMMENDED TOOLS

	09082–00040 TOYOTA Electrical Tester.	

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PP1B1–01

EQUIPMENT

Dial indicator	Commutator
Magnetic finger	Steel ball
Pull scale	Brush spring
Sandpaper	Commutator
Torque wrench	
V–block	Commutator
Vernier calipers	Commutator, Brush

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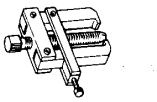
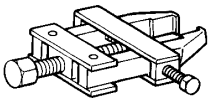
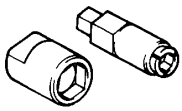
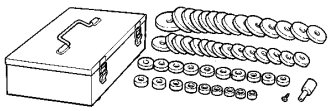
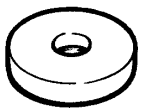
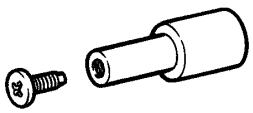
CHARGING

PP1B2–01

SST (Special Service Tools)

	09285–76010	Injection Pump Camshaft Bearing Cone Replacer	Rotor rear bearing cover
	09286–46011	Injection Pump Spline Shaft Puller	Rectifier end frame
	09820–00021	Alternator Rear Bearing Puller	
	09820–00030	Alternator Rear Bearing Replacer	
	09820–63010	Alternator Pulley Set Nut Wrench Set	
	09950–60010	Replacer Set	Rotor front bearing
	(09951–00260)	Replacer 26	
	(09951–00500)	Replacer 50	
	(09952–06010)	Adapter	

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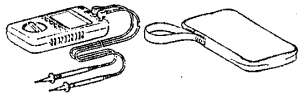
PP1B3–01

RECOMMENDED TOOLS

	09082–00040 TOYOTA Electrical Tester.	

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PP1B4–01

EQUIPMENT

Ammeter(A)	
Torque wrench	
Vernier calipers	Rotor (Slip ring)

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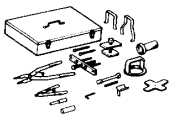
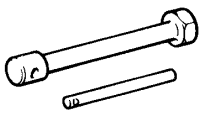
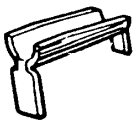
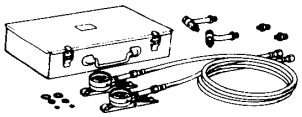
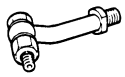
AUTOMATIC TRANSMISSION

PP1BO–01

SST (Special Service Tools)

	09032–00100	Oil Pan Seal Cutter	
	09350–30020	TOYOTA Automatic Transmission Tool Set	
	(09351–32010)	One–way Clutch Test Tool	
	(09351–32020)	Stator Stopper	
	09992–00095	Automatic Transmission Oil Pressure Gauge Set	
	(09992–00231)	Adaptor C	
	(09992–00271)	Gauge Assy	

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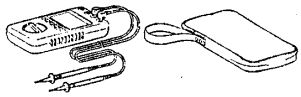
PP1BP–01

RECOMMENDED TOOLS

	09082–00040 TOYOTA Electrical Tester.	

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PP1BQ–01

EQUIPMENT

OBD II scan tool	
Torque wrench	
Calipers	Torque converter clutch
Straight edge	Torque converter clutch
Dial indicator	Drive plate runout

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PP1BR–01

LUBRICANT

Item	Capacity	Classification
Automatic transmission fluid		
Dry fill	11.7 liters (12.0 US qts, 10.0 lmp qts)	ATF D–II or DEXRON®III (DEXRON ®II)
Drain and refill	1.9 liters (2.0 US qts, 1.8 lmp qts)	

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PP1BS–01

SSM (Special Service Materials)

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

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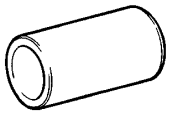
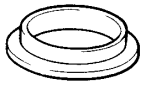
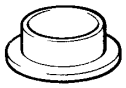
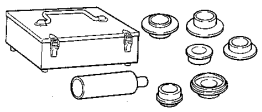
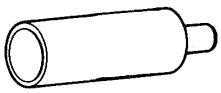
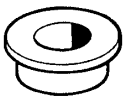
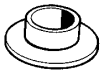
TRANSFER

PP1BF–01

SST (Special Service Tools)

	09223–00010	Cover & Seal Replacer	Center differential
	09223–15020	Oil Seal & Bearing Replacer	Front extension housing
	09316–12010	Transfer Bearing Replacer	Center differential
	09316–20011	Transfer Bearing Replacer	Front extension housing, Rear extension housing, Transfer assembly
	09316–60011	Transmission & Transfer Bearing Replacer	Center differential
	(09316–00011)	Replacer Pipe	Front extension housing, Rear extension housing, Idler gear, Transfer assembly, Center differential
	(09316–00021)	Replacer ”A”	Rear extension housing
	(09316–00031)	Replacer ”B”	Frant extension housing, Rear extension housing, Idler gear, Transfer assembly, Input shaft
	(09316–00041)	Replacer ”C”	Transfer assembly, Front extension housing, Rear extension housing
	(09316–00061)	Replacer ”E”	Front extension housing
	(09316–00071)	Replacer ”F”	Idler gear, Front extension housing
	09325–12010	Transmission Oil Plug	Rear extension housing

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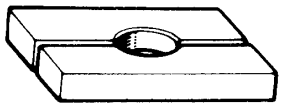
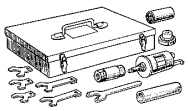
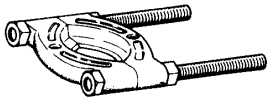
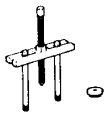
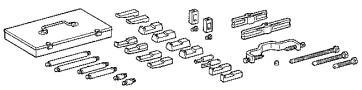
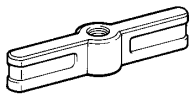
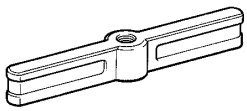
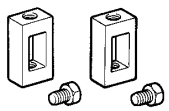
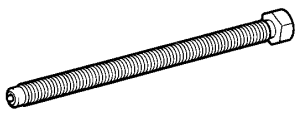
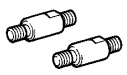
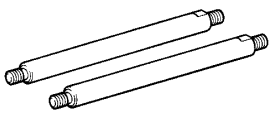
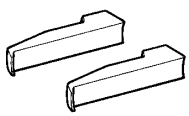
	09527–30010	Rear Axle Shaft Bearing Remover	Input shaft
	09612–24014	Steering Gear Housing Overhaul Tool Set	Center differential
	(09612–10050)	Steering Rack Shaft Bushing Replacer	Center differential
	09950–00020	Bearing Remover	Idler gear, Center differential, Front extension housing
	09950–00030	Bearing Remover Attachment	Center differential
	09950–40011	Puller B Set	Transfer assembly, Front extension housing, Idler gear
	(09951–04010)	Hanger 150	Idler gear
	(09951–04020)	Hanger 200	Input shaft, Front extension housing
	(09952–04010)	Slide Arm	Input shaft, Idler gear, Front extension housing
	(09953–04030)	Center Bolt 200	Input shaft, Idler gear, Front extension housing
	(09954–04010)	Arm 25	Input shaft, Front extension housing
	(09954–04030)	Arm 150	Idler gear
	(09955–04010)	Claw No.1	Input shaft

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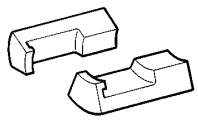
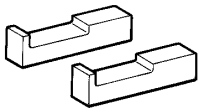
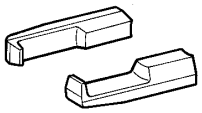
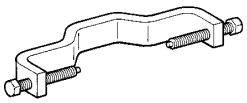
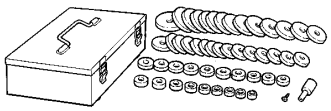
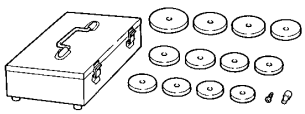
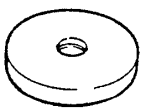
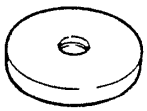
	(09955–04020)	Claw No.2	Front extension housing
	(09955–04050)	Claw No.5	Front extension housing
	(09955–04060)	Claw No.6	Idler gear
	(09957–04010)	Attachment	Input shaft, Idler gear, Front extension housing
	(09958–04010)	Holder	Input shaft, Idler gear, Front extension housing
	09950–60010	Replacer Set	Input shaft, Idler gear, Center differential
	(09951–00270)	Replacer 27	Transfer assembly
	(09951–00320)	Replacer 32	Transfer assembly, Center differential
	(09951–00330)	Replacer 33	Idler gear
	(09951–00400)	Replacer 40	Center differential, Input shaft
	09950–60020	Replacer Set No.2	Transfer assembly
	(09951–00790)	Replacer 79	Transfer assembly
	(09951–00890)	Replacer 89	Transfer assembly

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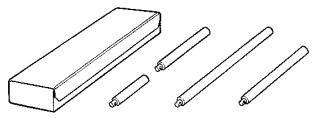	09950–70010 Handle Set	Transfer assembly, Front extension housing, Center differential
	(09951–07150) Handle 150	Transfer assembly

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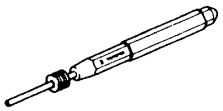
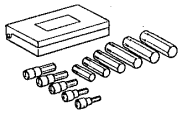
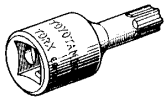
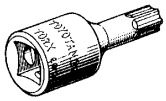
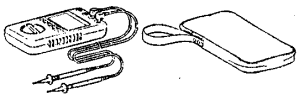
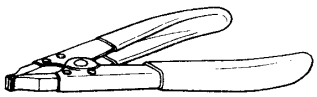
PP1BG–01

RECOMMENDED TOOLS

	09031–00030	Pin Punch .	
	09040–00010	Hexagon Wrench Set .	
	09042–00010	Torx Socket T30 .	
	09042–00020	Torx Socket T40 .	
	09082–00040	TOYOTA Electrical Tester.	
	09905–00012	Snap Ring No.1 Expander .	

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PP1BH–01

EQUIPMENT

Dial indicator	
Straight edge	
Torque wrench	
Magnetic finger	
Feeler gauge	
Vernier calipers	
Micrometer	

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PP1BI–01

LUBRICANT

Item	Capacity	Classification
Transfer oil	1.3 liters (1.4 US qts, 1.1 Imp. qts)	API GL–4 or GL–5 SAE 75W–90

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PP1BJ–01

SSM (Special Service Materials)

08826–00090	Seal Packing 1281, THREE BOND 1281 or equivalent (FIPG)	Front case x Rear case Rear case x Case cover Case x Extension housing Motor actuator x Front case
08833–00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	Straight screw plug Case cover set bolt

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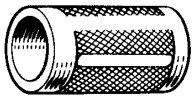
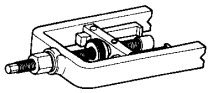
PROPELLER SHAFT

PP19L–01

SST (Special Service Tools)

	09636–20010	Upper Ball Joint Dust Cover Replacer	
	09332–25010	Universal Joint Bearing Remover & Replacer	

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PP19M–01

EQUIPMENT

Torque wrench	
Dial indicator	

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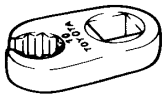
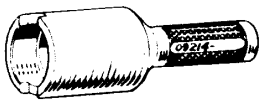
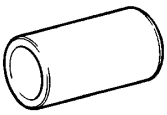
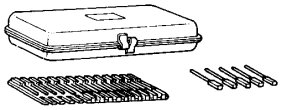
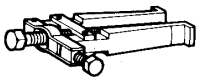
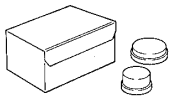
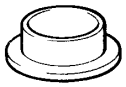
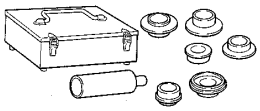
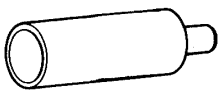
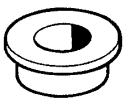
SUSPENSION AND AXLE

PP1BA–01

SST (Special Service Tools)

	09023–00100	Union Nut Wrench 10 mm	Rear axle Rear differential
	09214–76011	Crankshaft Pulley Replacer	Rear differential
	09223–00010	Cover & Seal Replacer	Front differential
	09240–00020	Wire Gauge Set	Front drive shaft
	09308–00010	Oil Seal Puller	Front differential Rear axle Rear differential
	09308–10010	Oil Seal Puller	Front differential Rear differential
	09315–00022	Clutch Release Bearing Remover & Replacer	Front differential
	09316–20011	Transfer Bearing Replacer	Front drive shaft Front suspension
	09316–60011	Transmission & Transfer Bearing Replacer	Front differential Rear differential
	(09316–00011)	Replacer Pipe	
	(09316–00021)	Replacer "A"	
	09330–00021	Companion Flange Holding Tool	Front differential Rear differential

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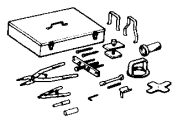
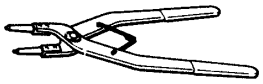
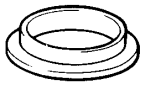
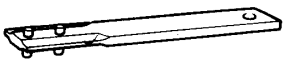
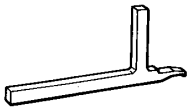
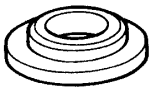
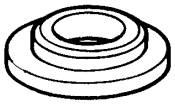
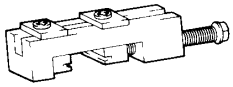
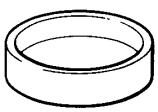
	09350–30020	TOYOTA Automatic Transmission Tool Set	Front differential
	(09350–07060)	No.1 Snap Ring Expander	
	09502–12010	Differential Bearing Replacer	Front differential
	09504–00011	Differential Side Bearing Adjusting Nut Wrench	Rear differential
	09504–22011	Differential Side Bearing Replacer	Front differential Rear differential (w/ Diff. lock)
	09506–30012	Differential Drive Pinion Rear Bearing Cone Replacer	Front differential
	09506–35010	Differential Drive Pinion Rear Bearing Replacer	Front differential Rear differential
	09521–24010	Drive Shaft Boot Clamping Tool	Front drive shaft
	09521–25011	Rear Axle Shaft Puller	Rear axle
	09521–25021	Rear Axle Shaft Puller Attachment	Rear axle
	09527–17011	Rear Axle Shaft Bearing Remover	Front suspension
	09550–00032	Replacer	Front differential
	09550–60010	Differential Side Bearing Replacer	Rear differential (w/ Diff. lock)

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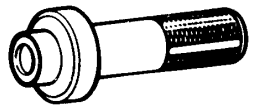
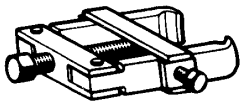
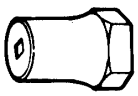
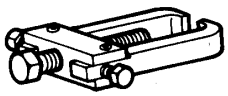
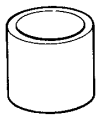
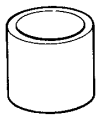
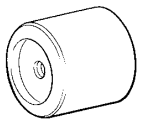
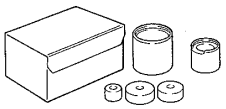
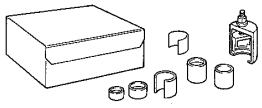
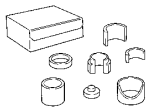
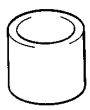
	09554–30011	Differential Oil Seal Replacer	Front differential
	09556–22010	Drive Pinion Front Bearing Remover	Front differential Rear differential
	09607–60020	Front Wheel Adjusting Nut Wrench	Front axle
	09628–62011	Ball Joint Puller	Front drive shaft Front suspension
	09631–12090	Seal Ring Tool	Rear axle
	09631–32020	Seal Ring Tool	Front suspension
	09649–17010	Steering Knuckle Tool	Rear differential (w/ LSD)
	09710–14013	Rear Suspension Bushing Tool Set	Rear suspension
	09710–22021	Front Suspension Bushing Tool Set	Front suspension
	(09710–01071)	Lower Arm Bushing Remover	
	09710–28012	Front Suspension Bushing Tool Set	Front suspension
	(09710–07062)	Bushing Replacer	
	(09710–07031)	Bushing Replacer	

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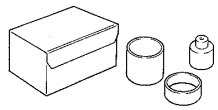
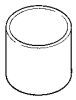
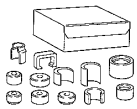
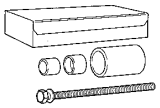
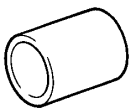
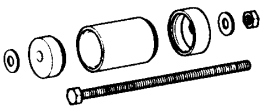
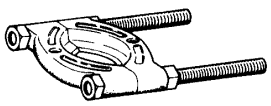
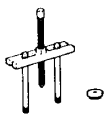
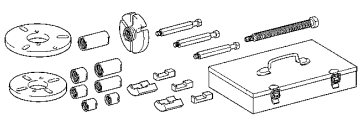
	09710–28021	Front Suspension Bushing Tool Set	Front suspension
	(09710–08031)	Base	
	09710–30021	Suspension Bushing Tool Set	Front suspension
	(09710–03101)	Bushing Replacer	
	09710–30050	Suspension Arm Bushing Replacer	Rear differential
	09726–35011	Front Lower Arm Bushing Remover & Replacer	Front suspension
	(09726–05021)	Gate	
	09726–36010	Lower Control Arm Bushing Replacer	Front suspension
	09726–40010	Lower Control Shaft Bearing Replacer	Rear differential
	09830–36010	Front Mounting Cushion Remover & Replacer	Front suspension
	09950–00020	Bearing Remover	Front drive shaft Front differential Rear differential
	09950–00030	Bearing Remover Attachment	Front suspension Rear differential
	09950–30010	Puller A Set	Front differential Rear differential

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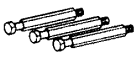
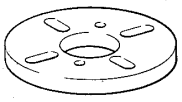
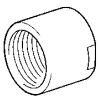
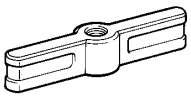
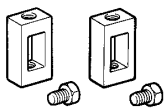
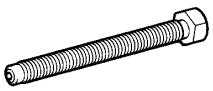
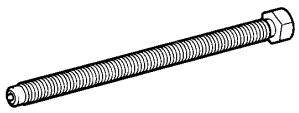
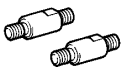
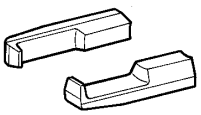
	(09951–03010) Upper Plate	
	(09953–03010) Center Bolt	
	(09954–03010) Arm	
	(09955–03030) Lower Plate 130	
	(09956–03020) Adapter 18	
	(09956–03040) Adapter 22	
	09950–40011 Puller B Set	Front suspension Front differential Rear differential
	(09951–04010) Hanger 150	
	(09952–04010) Slide Arm	
	(09953–04020) Center Bolt 150	
	(09953–04030) Center Bolt 200	
	(09954–04010) Arm 25	
	(09955–04060) Claw No.6	

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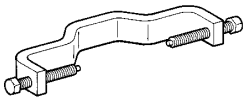
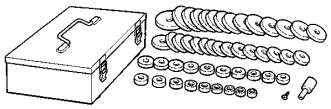
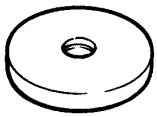
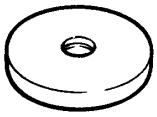
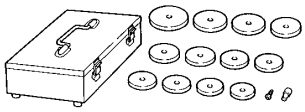
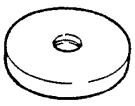
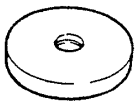
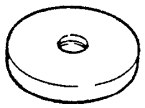
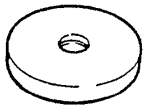
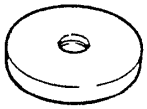
	(09957–04010) Attachment	
	(09958–04010) Holder	
	09950–60010 Replacer Set	Front suspension Rear differential
	(09951–00400) Replacer 40	
	(09951–00410) Replacer 41	
	(09951–00540) Replacer 54	
	(09951–00580) Replacer 58	
	09950–60020 Replacer Set No.2	Front axle Front differential Rear axle Rear differntial
	(09951–00710) Replacer 71	
	(09951–00730) Replacer 73	
	(09951–00780) Replacer 78	
	(09951–00810) Replacer 81	
	(09951–00890) Replacer 89	

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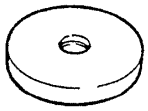
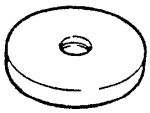
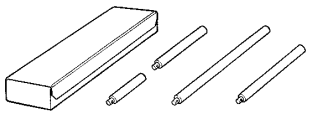
	(09951–00910) Replacer 91	
	(09951–01030) Replacer 103	
	09950–70010 Handle Set	Front axle Front suspension Rear axle Rear differential
	(09951–07100) Handle 100	
	(09951–07150) Handle 150	

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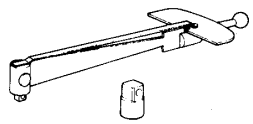
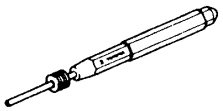
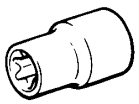
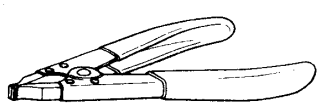
PP1BB–01

RECOMMENDED TOOLS

	09025–00010	Torque Wrench (30 kgf–cm)	
	09031–00030	Pin Punch .	
	09044–00020	Torx Socket E10 .	
	09905–00012	Snap Ring No.1 Expander .	

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PP1BC–01

EQUIPMENT

Dial indicator with magnetic base	
Drill	
Micrometer	
Torque wrench	

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PP1BD–01

LUBRICANT

FRONT DRIVE SHAFT		
Item	Capacity	Classification
Outboard joint grease Inboard joint grease	368 – 378 g (13 – 13.3 oz.) 293 – 303 g (10.3 – 10.7 oz.)	
FRONT DIFFERENTIAL		
Item	Capacity	Classification
Hypoid gear oil	1.70 liters (1.80 US qts, 1.50 lmp.qts)	Hypoid gear oil API GL–5 Above –18 ˚C (0˚F) SAE 90 Below –18 ˚C (0˚F) SAE 80W–90 or 80W
REAR DIFFERENTIAL		
Item	Capacity	Classification
Hypoid gear oil Normal w/ Diff. lock	3.30 liters (3.49 US qts, 2.90 lmp.qts) 3.20 liters (3.38 US qts, 2.82 lmp.qts)	Hypoid gear oil API GL–5 Above –18 ˚C (0˚F) SAE 90 Below –18 ˚C (0˚F) SAE 80W–90 or 80W
Hypoid gear oil LSD w/ LSD	3.30 liters (3.49 US qts, 2.90 lmp.qts)	Hypoid gear oil LSD API GL–5 Above –18 ˚C (0˚F) SAE 90 Below –18 ˚C (0˚F) SAE 80W–90 or 80W

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PP1BE–01

SSM (Special Service Materials)

08826–00090	Seal Packing 1281, THREE BOND 1281 or equivalent (FIPG)	
08833–00070	Adhesive 1324, THREE BOND 1324 or equivalent	
08833–00100	THREE BOND 1360K or equivalent	

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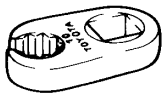
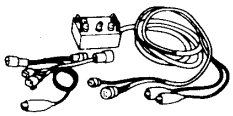
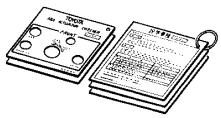
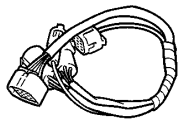
BRAKE

PP0T7–01

SST (Special Service Tools)

	09023–00100	Union Nut Wrench 10 mm	
	09709–29018	LSPV Gauge Set	
	09843–18020	Diagnosis Check Wire	
	09990–00150	ABS Actuator Checker and Sub–harness	
	09990–00240	ABS Actuator Checker Sheet ”G”	
	09990–00480	ABS Actuator Checker Sub–harness ”S”	

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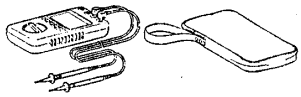
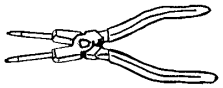
PP0CI–02

RECOMMENDED TOOLS

	09082–00040 TOYOTA Electrical Tester.	
	09905–00013 Snap Ring Pliers .	

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PP0CJ–02

EQUIPMENT

Torque wrench	
Micrometer	Brake disc
Dial indicator	Brake disc
Vernier calipers	Brake disc

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PP0CK–01

LUBRICANT

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

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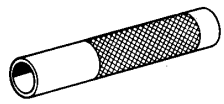
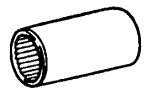
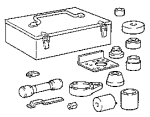
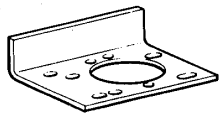
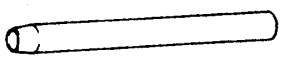
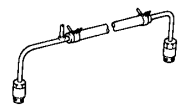
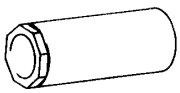
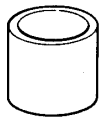
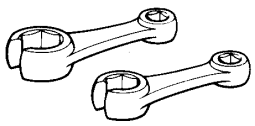
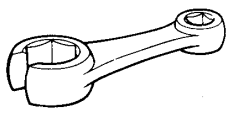
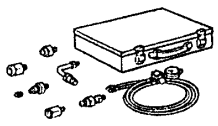
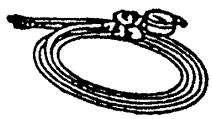
STEERING

SST (Special Service Tools)

PP1B5–01

	09612–22011	Tilt Handle Bearing Replacer	Tilt steering column
	09616–00010	Steering Worm Bearing Adjusting Socket	PS gear
	09630–00014	Power Steering Gear Housing Overhaul Tool Set	
	(09631–00142)	Overhaul Stand	PS gear
	09631–00350	Steering Rack Cover 35	PS gear
	09631–12071	Steering Rack Oil Seal Test Tool	PS gear
	09631–20060	Bearing Guide Nut Wrench	PS gear
	09631–20081	Seal Ring Tool	PS gear
	09631–22020	Power Steering Hose Nut 14 x 17 mm Wrench Set	PS gear
	09633–00020	Power Steering Hose Nut Wrench	PS gear
	09640–10010	Power Steering Pressure Gauge Set	
	(09641–01010)	Gauge Assy	Power steering fluid

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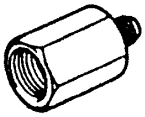
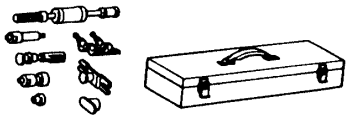
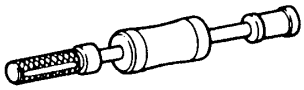
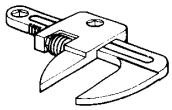
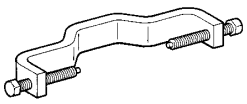
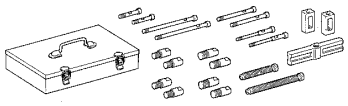
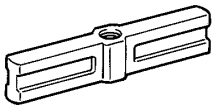
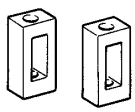
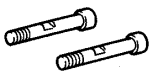
	(09641–01030) Attachment B	Power steering fluid
	(09641–01060) Attachment E	Power steering fluid
	09910–00015 Puller Set	
	(09911–00011) Puller Clamp	Power tilt and power telescopic steering column
	(09912–00010) Puller Slide Hammer	Power tilt and power telescopic steering column
	09922–10010 Variable Open Wrench	PS gear
	09950–40011 Puller B Set	
	(09958–04010) Holder	Tilt steering column Power tilt and power telescopic steering column
	09950–50010 Puller C Set	
	(09951–05010) Hanger 150	Tilt steering column Power tilt and power telescopic steering column
	(09952–05010) Slide Arm	Tilt steering column Power tilt and power telescopic steering column
	(09953–05010) Center Bolt 100	Tilt steering column Power tilt and power telescopic steering column
	(09954–05020) Claw No.2	Tilt steering column Power tilt and power telescopic steering column

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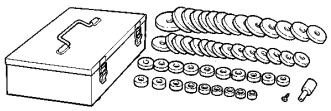
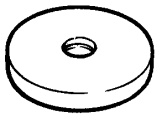
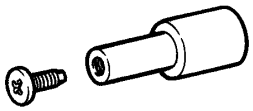
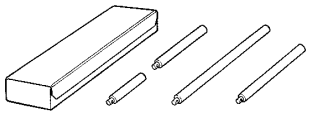
	09950–60010 Replacer Set	
	(09951–00180) Replacer 18	PS gear
	(09951–00260) Replacer 26	PS gear
	(09951–00280) Replacer 28	PS gear
	(09951–00320) Replacer 32	PS gear
	(09951–00330) Replacer 33	PS vane pump PS gear
	(09951–00350) Replacer 35	PS gear
	(09951–00360) Replacer 36	PS gear
	(09951–00550) Replacer 55	PS gear
	(09952–06010) Adapter	PS gear
	09950–70010 Handle Set	
	(09951–07100) Handle 100	PS vane pump PS gear
	(09951–07150) Handle 150	PS gear

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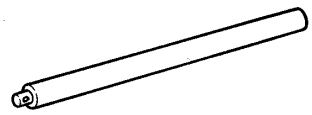
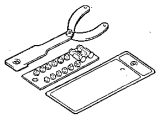
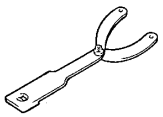
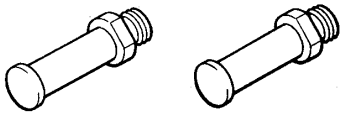
	(09951–07200)	Handle 200	PS gear
	(09951–07360)	Handle 360	PS gear
	09960–10010	Variable Pin Wrench Set	
	(09962–01000)	Variable Pin Wrench Arm Assy	PS vane pump
	(09963–01000)	Pin 10	PS vane pump

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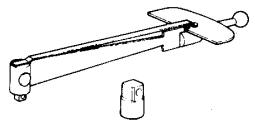
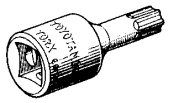
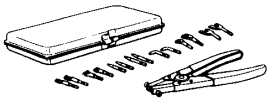
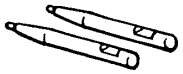
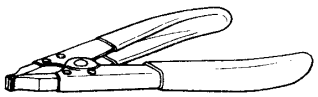
PP1B6–01

RECOMMENDED TOOLS

	09025–00010	Torque Wrench (30 kgf–cm)	PS vane pump PS gear
	09042–00010	Torx Socket T30 .	Tilt steering column Power tilt and power telescopic steering column
	09904–00010	Expander Set .	
	(09904–00050)	No. 4 Claw	
	09905–00012	Snap Ring No.1 Expander .	

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PP1B7–01

EQUIPMENT

Caliper gauge	PS vane pump
Calipers	PS vane pump
Dial indicator	PS gear
Feeler gauge	PS vane pump
Micrometer	PS vane pump
Torque wrench	

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PP1B8–01

LUBRICANT

Item		Capacity	Classification
Power steering fluid	Total	0.8 liters (0.9 US qts, 0.7 lmp.qts)	ATF DEXRON® II or III

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PP1B9–01

SSM (Special Service Materials)

08833–00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	PS gear

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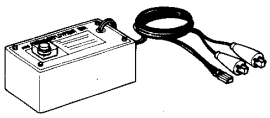
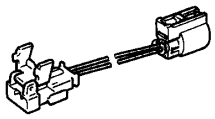
SUPPLEMENTAL RESTRAINT SYSTEM

PP0WS–01

SST (Special Service Tools)

	09082–00700	SRS Airbag Deployment Tool	
	09082–00760	Airbag Deployment Wire Sub–harness No.4	
	09843–18020	Diagnosis Check Wire	

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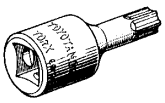
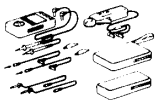
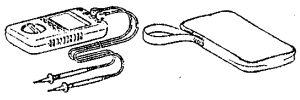
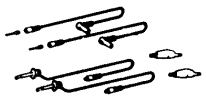
PP0V2–02

RECOMMENDED TOOLS

	09042–00020	Torx Socket T40 .	Airbag sensor assembly
	09082–00050	TOYOTA Electrical Tester Set.	
	09082–00040	TOYOTA Electrical Tester.	
	(09083–00150)	Test Lead Set	Seat belt pretensioner connector

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PP0MS–03

EQUIPMENT

Torque wrench	
Bolt: Length: 35 mm (1.38 in.) Pitch: 1.0 mm (0.039 in.) Diam.: 6.0 mm (0.236 in.)	Airbag disposal
Tire Width: 185 mm (7.28 in.) Inner diam.: 360mm (14.17 in.)	Airbag disposal
Tire with disc wheel Width: 185 mm (7.28 in.) Inner diam.: 360 mm (14.17 in.)	Airbag disposal
Vinyl bag	Airbag disposal

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BODY ELECTRICAL

PP0O0–06

SST (Special Service Tools)

09843–18020 Diagnosis Check Wire	

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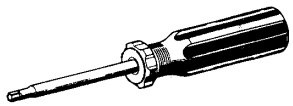
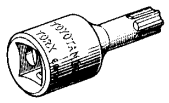
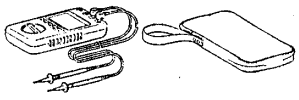
PP0O1–06

RECOMMENDED TOOLS

	09041–00030	Torx Driver T30 .	For removing and installing steering wheel pad
	09042–00010	Torx Socket T30 .	For removing and installing steering wheel pad
	09082–00040	TOYOTA Electrical Tester.	

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PP0O2–06

EQUIPMENT

Voltmeter	
Ammeter	
Ohmmeter	
Test lead	
Thermometer	Engine coolant temperature sender gauge, Engine oil level warning switch, Seat heater
Syphon	Brake fluid level warning switch
Oil bath	Engine oil level warning switch
Bulb (1.4 W)	Defogger switch
Bulb (3.4 W)	Fuel sender gauge, Engine coolant temperature receiver gauge, Seat belt warning relay
Dry cell battery	Fuel sender gauge, Power mirror
Heat light	Seat heater
Hexagon wrench (6 mm)	Power seat
Torque wrench	
Masking tape	Rear window defogger wire
Tin foil	Rear window defogger wire

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PP0T6–01

SSM (Special Service Materials)

08888–88888	DuPont Paste No. 4817 or equivalent	Rear window defogger

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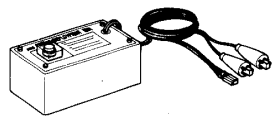
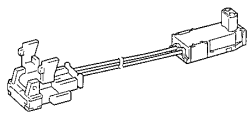
BODY

PP0SG–01

SST (Special Service Tools)

	09082–00700	SRS Airbag Deployment Tool	
	09082–00740	Airbag Deployment Wire Sub–harness No.2	
	09812–00010	Door Hinge Set Bolt Wrench	

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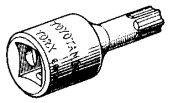
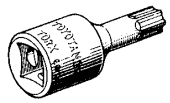
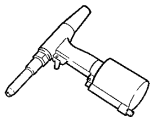
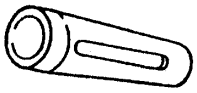
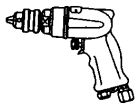
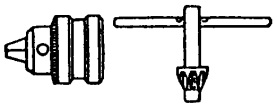
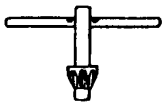
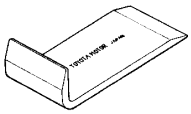
PP1AO–01

RECOMMENDED TOOLS

	09042–00010	Torx Socket T30 .	
	09042–00020	Torx Socket T40 .	
	09050–20010	Air Riveter.	
	(09050–02010)	Dust Cap.	
	(09050–02030)	Nose Piece No.2.	
	09050–00032	Air Drill	
	(09050–00210)	Chuck Set	
	(09050–00220)	Handle	
	09060–60350	Revet Cutter.	
	09070–20010	Moulding Remover .	

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PP0SI–02

EQUIPMENT

Clip remover	
Torque wrench	
Hexagon wrench (6 mm)	
Torx driver	
Hog ring pliers	
Hand riveter	
Tape	To avoid surface damage
Adhesive tape	To avoid surface damage
Double–stick tape	
Adhesive	
Cleaner	
Shop rag	
Knife	
Sealer gun	
Brush	
Putty spatula	
Glass plate or similar object	
Wooden block or similar object	
Heat light	
Piano wire	
Rope (no projections, difficult to break)	Seat belt pretensioner
Tire with disk wheel Width: 185 mm (7.28 in.) Inner diam: 360 mm (14.17 in.)	Seat belt pretensioner
Vinyl bag	Seat belt pretensioner

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PP0B0–01

LUBRICANT

Item	Capacity	Classification
MP grease	–	–

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SSM (Special Service Materials)

08833–00030	Three cement black or equivalent	
08833–00070	Adhesive 1324, THREE BOND 1324 or equivalent	
08850–00801	Windshield Glass Adhesive Set or equivalent	

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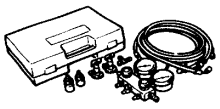
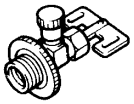
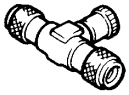
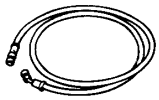
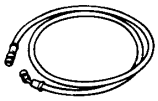
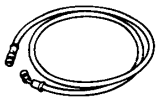
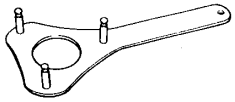
AIR CONDITIONING

PP1AE–01

SST (Special Service Tools)

	07110–58060	Air Conditioner Service Tool Set	
	(07117–58060)	Refrigerant Drain Service Valve	
	(07117–58070)	T–Joint	
	(07117–58080)	Quick Disconnect Adapter	High pressure side
	(07117–58090)	Quick Disconnect Adapter	Low pressure side
	(07117–88060)	Refrigerant Charging Hose	High pressure side (Color: Red)
	(07117–88070)	Refrigerant Charging Hose	Low pressure side (Color: Blue)
	(07117–88080)	Refrigerant Charging Hose	Utility (Color: Green)
	07112–66040	Magnetic Clutch Remover	
	07112–76060	Magnetic Clutch Stopper	
	07114–84010	Snap Ring Pliers	
	07114–84020	Snap Ring Pliers	

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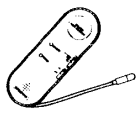
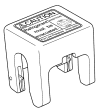
	07116–38360	Gas Leak Detector Assembly	
	09870–00015	A/C Quick Joint Puller No.1	Suction tube
	09870–00025	A/C Quick Joint Puller No.2	Liquid tube

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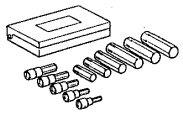
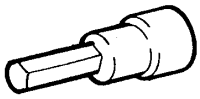
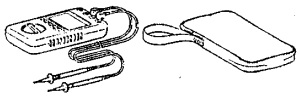
PP1AF–01

RECOMMENDED TOOLS

	09040–00010	Hexagon Wrench Set .	Expansion valve
	(09043–20050)	Socket Hexagon Wrench 5.	5.0 mm (0.20 in.)
	09082–00040	TOYOTA Electrical Tester.	

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PP1AG–01

EQUIPMENT

Voltmeter	
Ammeter	
Ohmmeter	
Test lead	
Thermometer	Sernsor
Torque wrench	
Dial indicator	Magnetic clutch
Plastic hammer	Magnetic clutch

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PP1AH–01

LUBRICANT

Item	Capacity	Classification
Compressor oil	–	ND–OIL 8 or equivalent
When replacing condenser	40 cc (1.4 fl. oz.)	
When replacing evaporator	40 cc (1.4 fl. oz.)	

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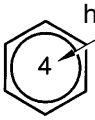
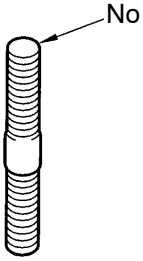
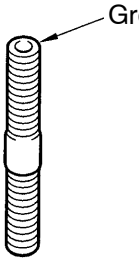
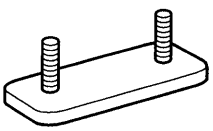
STANDARD BOLT

HOW TO DETERMINE BOLT STRENGTH

SS00F–01

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

V06821

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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

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ENGINE MECHANICAL

SERVICE DATA

SS0OQ–01

Compression pressure	at 250 rpm STD	1,324 kPa (13.5 kgf/cm^2, 192 psi) or more
	Minimum	981 kPa (10.0 kgf/cm^2, 142 psi)
	Difference of pressure between each cylinder	98 kPa (1.0 kgf/cm^2, 14 psi) or less
Valve clearance	at cold Intake	0.15 – 0.25 mm (0.006 – 0.010 in.)
	Exhaust	0.25 – 0.35 mm (0.010 – 0.014 in.)
	Valve clearance adjusting shim No.00	2.000 mm (0.0787 in.)
	No.02	2.020 mm (0.0795 in.)
	No.04	2.040 mm (0.0803 in.)
	No.06	2.060 mm (0.0811 in.)
	No.08	2.080 mm (0.0819 in.)
	No.10	2.100 mm (0.0827 in.)
	No.12	2.120 mm (0.0835 in.)
	No.14	2.140 mm (0.0843 in.)
	No.16	2.160 mm (0.0850 in.)
	No.18	2.180 mm (0.0858 in.)
	No.20	2.200 mm (0.0866 in.)
	No.22	2.220 mm (0.0874 in.)
	No.24	2.240 mm (0.0882 in.)
	No.26	2.260 mm (0.0890 in.)
	No.28	2.280 mm (0.0898 in.)
	No.30	2.300 mm (0.0906 in.)
	No.32	2.320 mm (0.0913 in.)
	No.34	2.340 mm (0.0921 in.)
	No.36	2.360 mm (0.0929 in.)
	No.38	2.380 mm (0.0937 in.)
	No.40	2.400 mm (0.0945 in.)
	No.42	2.420 mm (0.0953 in.)
	No.44	2.440 mm (0.0961 in.)
	No.46	2.460 mm (0.0969 in.)
	No.48	2.480 mm (0.0976 in.)
	No.50	2.500 mm (0.0984 in.)
	No.52	2.520 mm (0.0992 in.)
	No.54	2.540 mm (0.1000 in)
	No.56	2.560 mm (0.1008 in.)
	No58	2.580 mm (0.1016 in.)
	No.60	2.600 mm (0.1024 in.)
	No.62	2.620 mm (0.1031 in.)
	No.64	2.640 mm (0.1039 in.)
	No.66	2.660 mm (0.1047 in.)
	No.68	2.680 mm (0.1055 in.)
	No.70	2.700 mm (0.1063 in.)
	No.72	2.720 mm (0.1071 in.)
	No.74	2.740 mm (0.1079 in.)
	No.76	2.760 mm (0.1087 in.)
	No.78	2.780 mm (0.1094 in.)
	No.80	2.800 mm (0.1102 in.)
Ignition timing	w/ Terminals TC and E1 connected of DLC1	5 –15° BTDC @ idle
Idle speed	–	700 ± 50 rpm
Timing belt tensioner	Protrusion from housing end	10.5 – 11.5 mm (0.413 – 0.453 in.)

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Cylinder head	Warpage	Maximum	0.10 mm (0.039 in.)
	Valve seat		
	Refacing angle		30°, 45°, 60°
	Contacting angle		45°
	Contacting width		1.0 – 1.4 mm (0.039 – 0.055 in.)
	Valve guide bushing bore diameter	STD	10.285 – 10.306 mm (0.4049 – 0.4057 in.)
		O/S 0.05	10.335 – 10.356 mm (0.4069 – 0.4077 in.)
	Cylinder head bolt thread inside diameter	STD	9.810 – 9.960 mm (0.3862 – 0.3921 in.)
		Minimum	9.70 mm (0.3819 in.)
	Protrusion height	Intake	9.2 – 9.8 mm (0.362 – 0.386 in.)
		Exhaust	8.2 – 8.8 mm (0.323 – 0.346 in.)
Valve guide bushing	Inside diameter		5.510 – 5.530 mm (0.2169 – 0.2374 in.)
	Outside diameter (for repair part)	STD	10.333 – 10.344 mm (0.4068 – 0.4072 in.)
		O/S 0.05	10.383 – 10.394 mm (0.4088 – 0.4092 in.)
Valve	Valve overall length	STD Intake	95.05 mm (3.7421 in.)
		Exhaust	95.10 (3.7441 in.)
		Minimum Intake	94.55 mm (3.7224 in.)
		Exhaust	94.60 mm (3.7244 in.)
	Valve face angle		44.5°
	Stem diameter	Intake	5.470 – 5.485 mm (0.2154 – 0.2159 in.)
		Exhaust	5.465 – 5.480 mm (0.2152 – 0.2157 in.)
	Stem oil clearance	STD Intake	0.025 – 0.060 mm (0.0010 – 0.0024 in.)
		Exhaust	0.030 – 0.065 mm (0.0012 – 0.0026 in.)
		Maximum Intake	0.08 mm (0.0031 in.)
		Exhaust	0.10 mm (0.0039 in.)
	Margin thickness	STD IN	1.25 mm (0.049 in.)
		EX	1.4 mm (0.055 in.)
		Minimum	0.5 mm (0.020 in.)
Valve spring	Deviation	Maximum	2.0 mm (0.079 in.)
	Free length		54.1 mm (2.130 in.)
	Installed tension at 35.0 mm (1.378 in.)		204 – 226 N (20.8 – 23.0 kgf·cm, 45.9 – 50.7 lbf)
Valve lifter	Lifter diameter		30.966 – 30.976 mm (1.2191 – 2.2195 in.)
	Lifter bore diameter		31.000 – 31.016 mm (1.2205 – 1.2211 in.)
	Oil clearance	STD	0.024 – 0.050 mm (0.0009 – 0.0020 in.)
		Maximum	0.07 mm (0.0028 in.)
Camshaft	Thrust clearance	STD Intake	0.040 – 0.090 mm (0.0016 – 0.0035 in.)
		Exhaust	0.040 – 0.085 mm (0.0016 – 0.0033 in.)
		Maximum	0.12 mm (0.0047 in.)
	Journal oil clearance	STD	0.030 – 0.067 mm (0.0012 – 0.0026 in.)
		Maximum	0.10 mm (0.0039 in.)
	Journal diameter		26.954 – 26.970 mm (1.0612 – 1.0618 in.)
	Circle runout		0.08 mm (0.0031 in.)
	Cam lobe height	STD Intake	41.94 – 42.04 mm (1.6512 – 1.6551 in.)
		Exhaust	41.96 – 42.06 mm (1.6520 – 1.6559 in.)
		Minimum Intake	41.79 mm (1.6453 in.)
		Exhaust	41.81 mm (1/6461 in.)
	Camshaft gear backlash	STD	0.020 – 0.200 mm (0.0008 – 0.0079 in.)
		Maximum	0.30 mm (0.0188 in.)
	Camshaft gear spring end free distance		18.2 – 18.8 mm (0.712 – 0.740 in.)
Manifold	Warpage	Maximum Intake	0.15 mm (0.0059 in.)
		Exhaust	0.50 mm (0.0197 in.)

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Cylinder block	Cylinder head surface warpage	Maximum	0.07 mm (0.0028 in.)
	Cylinder bore diameter	STD STD Mark 1	94.002 – 94.010 mm (3.7009 – 3.7012 in.)
		Mark 2	94.010 – 94.023 mm (3.7012 – 3.7017 in.)
		Mark 3	94.023 – 94.031 mm (3.7017 – 3.7020 in.)
		Maximum STD	94.231 mm (3.7099 in.)
		O/S 050	94.731 mm (3.7296 in.)
	Main bearing cap bolt tension portion diameter	STD	10.760 – 10.970 mm (0.4236 – 0.4319 in.)
		Minimum	10.40 mm (0.4094 in.)
Piston and piston ring	Piston diameter	STD Mark 1	93.902 – 93.912 mm (3.6969 – 3.6973 in.)
		Mark 2	93.912 – 93.920 mm (3.6973 – 3.6976 in.)
		Mark 3	93.920 – 93.930 mm (3.6976 – 3.6980 in.)
		O/S 0.50	94.402 – 94.430 mm (3.7166 – 3.7177 in.)
	Piston oil clearance	STD	0.090 – 0.111 mm (0.0035 – 0.0044 in.)
		Maximum	0.13 mm (0.0051 in.)
	Piston ring groove clearance	No.1	0.030 – 0.080 mm (0.0012 – 0.0031 in.)
		No.2	0.030 – 0.070 mm (0.0012 – 0.0028 in.)
	Piston ring end gap	STD No.1	0.300 – 0.500 mm (0.0118 – 0.0197 in.)
		No.2	0.400 – 0.650 mm (0.0157 – 0.0256 in.)
		Oil	0.130 – 0.480 mm (0.0051 – 0.0189 in.)
		Maximum No.1	1.10 mm (0.0433 in.)
		No.2	1.20 mm (0.0472 in.)
		Oil	1.15 mm (0.0453 in.)
Connecting rod	Thrust clearance	STD	0.160 – 0.290 mm (0.0063 – 0.0138 in.)
		Maximum	0.35 mm (0.0138 in.)
	Connecting rod thickness		22.880 – 22.920 mm (0.9008 – 0.9024 in.)
	Connecting rod oil clearance	STD	0.027 – 0.053 mm (0.0011 – 0.0021 in.)
		Maximum	0.065 mm (0.0026 in.)
	Connecting rod bearing center wall thickness (Reference)	Mark 2	1.484 – 1.487 mm (0.0584 – 0.0585 in.)
		Mark 3	1.487 – 1.490 mm (0.0585 – 0.0587 in.)
		Mark 4	1.490 – 1.493 mm (0.0587 – 0.0588 in.)
		Mark 5	1.493 – 1.496 mm (0.0588 – 0.0589 in.)
		Mark 6	1.496 – 1.499 mm (0.0589 – 0.0590 in.)
		Mark 7	1.499 – 1.502 mm (0.0590 – 0.0591 in.)
	Rod bend	Maximum per 100 mm (3.94 in.)	0.05 mm (0.0020 in.)
	Rod twist	Maximum per 100 mm (3.94 in.)	0.15 mm (0.0059 in.)
	Bushing inside diameter		22.005 – 22.014 mm (0.8663 – 0.8667 in.)
	Piston pin diameter		21.997 – 22.006 mm (0.8660 – 0.8664 in.)
	Bushing oil clearance	STD	0.005 – 0.011 mm (0.0002 – 0.0004 in)
		Maximum	0.05 mm (0.0020 in.)
	Connecting rod bolt tension portion diameter	STD	7.200 – 7.300 mm (0.2835 – 0.2874 in.)
		Minimum	7.00 mm (0.2756 in.)
Crankshaft	Thrust clearance	STD	0.020 – 0.220 mm (0.0008 – 0.0087 in.)
		Maximum	0.30 mm (0.0118 in.)
	Thrust washer thickness		2.440 – 2.490 mm (0.0961 – 0.0980 in.)
	Main journal bore diameter on cylinder block (with main bearing)		66.986 – 67.000 mm (2.6372 – 2.6378 in.)
	Main journal oil clearance	STD	0.040 – 0.058 mm (0.0016 – 0.0023 in.)
		Maximum	0.070 mm (0.0028 in.)
	Main journal diameter		66.988 – 67.000 mm (2.6373 – 2.6378 in.)

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Crankshaft (cont'd)	Main bearing center wall thickness (Reference)		
	No.1 and No.5	Mark 3	2.481 – 2.484 mm (0.0977 – 0.0978 in.)
		Mark 4	2.484 – 2.487 mm (0.0978 – 0.0979 in.)
		Mark 5	2.487 – 2.490 mm (0.0979 – 0.0980 in.)
		Mark 6	2.490 – 2.493 mm (0.0980 – 0.0981 in.)
		Mark 7	2.493 – 2.496 mm (0.0981 – 0.0983 in.)
	Others	Mark 1	2.481 – 2.484 mm (0.0977 – 0.0978 in.)
		Mark 2	2.484 – 2.487 mm (0.0978 – 0.0979 in.)
		Mark 3	2.487 – 2.490 mm (0.0979 – 0.0980 in.)
		Mark 4	2.490 – 2.493 mm (0.0980 – 0.0981 in.)
		Mark 5	2.493 – 2.496 mm (0.0981 – 0.0983 in.)
	Crank pin diameter		51.982 – 52.000 mm (2.0465 – 2.0472 in.)
	Circle runout	Maximum	0.08 mm (0.0031 in.)
	Main journal taper and out–of–round	Maximum	0.02 mm (0.0008 in.)
	Crank pin taper and out–of–round	Maximum	0.02 mm (0.0008 in.)

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SS0OR–01

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Fan shroud x Radiator assembly		5.5	50	43 in.·lbf
Radiator bracket x Radiator assembly		20	200	15
A/C Compressor x Cylinder block		49	500	36
Generator x Generator bracket		39	400	29
No.1 idler pulley, No.2 idler pulley x Cylinder Block		34.5	350	25
Camshaft timing pulley x Camshaft timing tube		108	1,100	80
Drive belt tensioner x Cylinder block		16	160	12
Timing belt tensioner x Oil pump		26	270	19
Crankshaft pulley x Crankshaft		245	2,500	181
Fan bracket x Cylinder block	12 mm head 14 mm head	16 32	160 330	12 24
No.2 timing belt cover x Cylinder block		16	160	12
No.3 timing belt cover x Cylinder block, cylinder head		7.5	80	66 in.·lbf
Drive belt idler pulley x Fan bracket		37	380	27
Fluid coupling x Fan bracket		21	215	16
Exhaust manifold x Cylinder head		44	450	33
Cylinder head x Cylinder block	1st 2nd 3rd	32 Turn 90° Turn 90°	325 Turn 90° Turn 90°	24 Turn 90° Turn 90°
Camshaft bearing cap x Cylinder head	Bolt C Others	7.5 16	80 160	66 in.·lbf 12
Cylinder head cover x Cylinder head		6.0	60	53 in.·lbf
Engine hanger x Cylinder head		37	380	27
Front water bypass joint, Rear water bypass joint x Cylinder head		18	185	13
Intake manifold x Cylinder head		18	185	13
V–bank cover bracket x Intake manifold		7.5	80	66 in.·lbf
Timing belt rear plate x Cylinder head		7.5	80	66 in.·lbf
Drive plate x Crankshaft	1st 2nd	49 Turn 90°	500 Turn 90°	36 Turn 90°
Transmission x Cylinder block		72	730	53
Transmission x No.1 oil pan		37	380	27
Drive plate x Torque converter clutch		48	490	35
Flywheel housing under cover x Transmission		18	185	13
Frame crossmember x Body		50	510	37
Frame crossmember x Rear engine mounting insulator		74	750	55
Frame bracket x Engine mounting bracket		30	310	22
PS pump x Cylinder head		17	175	13
A/C compressor x Cylinder block, Fan bracket		49	500	36
Main bearing cap x Cylinder block	1st 2nd	27 Turn 90°	275 Turn 90°	20 Turn 90°
Connecting rod cap x Connecting rod	1st 2nd	24.5 Turn 90°	250 Turn 90°	18 Turn 90°
Rear oil seal retainer x Cylinder block		8.0	80	71 in.·lbf
Engine coolant drain union x Cylinder block		49	500	36
Engine mounting bracket x Cylinder block		36	370	27

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Water bypass pipe x Cylinder block	18	185	13
Front exhaust pipe x Exhaust manifold	62	630	46
No.2 front exhaust pipe x Front exhaust pipe	40	408	30
Center exhaust pipe x Front exhaust pipe	40	408	30
Heated oxygen sensor (Bank 1, 2 sensor 2) x Front exhaust pipe	20	200	14

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EMISSION CONTROL

TORQUE SPECIFICATION

SS0O5–01

Part tightened	N·m	kgf·cm	ft·lbf
Charcoal canister x Body	18	185	13
Front exhaust pipe x Exhaust manifold	62	632	46
Front exhaust pipe x Center pipe	40	408	30
Heated oxygen sensor x Front exhaust pipe	20	200	14

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SFI

SS0CB–03

SERVICE DATA

Fuel pressure regulator	Fuel pressure	at no vacuum	265 – 304 kPa (2.7 – 3.1 kgf/cm^2, 38 – 44 psi)
Fuel pump	Resistance	at 20°C (68°F)	0.2 – 3.0 Ω
Injector	Resistance Injection volume Difference between each cylinder Fuel leakage	at 20°C (68°F)	13.4 – 14.2 Ω 56 – 69 cm^3 (3.4 – 4.2 cu in.) per 15 seconds 13 cm^3 (0.8 cu in.) or less 1 drop or less per 12 minutes
MAF meter	Resistance (THA – E2)	at –20°C (–4°F) at 20°C (68°F) at 60°C (140°F)	12.5 – 16.9 kΩ 2.19 – 2.67 kΩ 0.50 – 0.68 kΩ
Throttle body	Throttle body fully closed angle		5.5°
Throttle position sensor	Resistance (VC – E2)	at 20°C (68°F)	1.25 – 2.35 kΩ
Accelerator pedal position sensor	Resistance (VC – E2) Standard throttle valve opening percentage Sensor lever full–open position	at 20°C (68°F)	1.64 – 3.28 kΩ 60 % or more
Throttle control motor	Motor resistance Clutch resistance	at 20°C (68°F) at 20°C (68°F)	0.3 – 100 Ω 4.2 – 5.2 Ω
VSV for EVAP	Resistance	at 20°C (68°F)	30 – 34 Ω
VSV for vapor pressure sensor	Resistance	at 20°C (68°F)	37 – 44 Ω
ECT sensor	Resistance	at –20°C (–4°F) 0°C (32°F) 20°C (68°F) 40°C (104°F) 60°C (140°F) 80°C (176°F)	10 – 20 kΩ 4 – 7 kΩ 2 – 3 kΩ 0.9 – 1.3 kΩ 0.4 – 0.7 kΩ 0.2 – 0.4 kΩ
Vapor pressure sensor	Power source voltage		4.5 – 5.5 V
Heated oxygen sensor	Heater coil resistance	at 20°C (68°F)	11 – 16 Ω
Fuel cut rpm		Fuel return rpm	1,000 rpm

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SS0CC–03

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Fuel line				
Union bolt type		39	400	29
Flare nut type	for use with SST	34	345	25
		38	380	28
Fuel pressure pulsation damper x Delivery pipe	for use with SST	33	340	24
		39	400	29
Fuel pressure regulator x RH delivery pipe		7.5	80	66 in.·lbf
Fuel tank vent tube set plate x Fuel tank		3.5	35	31 in.·lbf
Front fuel pipe x Delivery pipe		39	400	29
Front fuel pipe x Lower intake manifold		7.5	80	66 in.·lbf
Fuel return pipe x LH delivery pipe		7.5	80	66 in.·lbf
Delivery pipe x Lower intake manifold		18	185	13
Fuel sender gauge x Fuel tank		1.5	15	13 in.·lbf
Fuel tank x Body		39	400	29
Drain plug x Fuel tank		6.5	65	58 in.·lbf
Fuel tank filler pipe x Fuel tank		3.5	35	31 in.·lbf
Cutoff valve cover x Fuel tank		1.5	15	13 in.·lbf
Throttle position sensor x Throttle body		2.0	20	18 in.·lbf
Water bypass pipe x Throttle body		5.4	55	48 in.·lbf
Throttle control motor x Throttle body		3.4	35	30 in.·lbf
Throttle control motor cover x Throttle body		3.4	35	30 in.·lbf
Accelerator pedal position sensor x Throttle body		5.4	55	48 in.·lbf
Throttle body x Upper intake manifold, Lower intake manifold		18	185	13
Upper intake manifold, Accelerator cable bracket x Lower intake manifold		18	185	13
ECT sensor x Front water bypass joint		19.6	200	14
Knock sensor x Cylinder block		45	450	33
Heated oxygen sensor x Exhaust manifold		44	450	32
Heated oxygen sensor x Front exhaust pipe		20	200	14

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COOLING

SERVICE DATA

SS0O9–01

Thermostat	Valve opening temperature		80 – 84°C (176 – 183°F)
	Valve lift	at 95°C (203°F)	10 mm (0.39 in.) or more
Radiator cap	Relief valve opening pressure	STD	93 – 123 kPa (0.95 – 1.25 kgf/cm^2, 13.5 – 17.8 psi)
		Minimum	78 kPa (0.8 kgf/cm^2, 11.4 psi)

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SS0OA–01

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Drain plug x Union on cylinder block		12.7	130	9
Water pump x Cylinder block	Bolt	21	215	15
	Stud bolt and nut	18	185	13
Water inlet housing x Water pump		18	185	13
Water inlet x Water inlet housing		19	195	14
Radiator x Fan shroud		5.0	50	44 in.·lbf
Radiator x Radiator side support		12.7	130	9
Radiator side support x Bracket		20	200	15
Radiator mounting bolt		18	185	13
Radiator mounting nut		20	200	15

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LUBRICATION

SERVICE DATA

SS0OB–01

Oil pressure		at idle speed	29 kPa (0.3 kgf/cm^2, 4.3 psi) or more
		at 3,000 rpm	294 – 588 kPa (3.0 – 6.0 kgf/cm^2, 43 – 85 psi)
Oil pump	Tip clearance	STD	0.110 – 0.240 mm (0.0043 – 0.0094 in.)
		Maximum	0.35 mm (0.0138 in.)
	Side clearance	STD	0.030 – 0.090 mm (0.0012 – 0.0035 in.)
		Maximum	0.15 mm (0.0059 in.)
	Body clearance	STD	0.100 – 0.175 mm (0.0039 – 0.0069 in.)
		Maximum	0.30 mm (0.0118 in.)

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SS0OC–01

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
No.2 oil pan x Drain plug		39	400	29
Oil pump body cover x Oil pump body		10	105	8
Oil pump x Cylinder block	14 mm head	30.5	310	22
	12 mm and 6mm hexagon head	15.5	160	11
Oil strainer x Cylinder block, Oil pump		7.5	80	66 in.·lbf
No.1 oil pan x Oil pump, Oil seal retainer		7.5	80	66 in.·lbf
No.1 oil pan x Cylinder block	10 mm head	7.5	80	66 in.·lbf
	12 mm head	28	290	21
Oil pan baffle plate x No.1 oil pan		7.5	80	66 in.·lbf
No.2 oil pan x No.1 oil pan		7.5	80	66 in.·lbf
Oil filter bracket x Oil pump		18	185	13
Oil cooler x Oil filter bracket	Union bolt	68.6	700	51
Oil dipstick guide x Cylinder head		15	155	11

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IGNITION

SERVICE DATA

SS0O6–01

Firing order	–		1 – 8 – 4 – 3 – 6 – 5 – 7 – 2
Spark plug	Recommended spark plug	DENSO made	SK20R11
		NGK made	IFR6A11
	Correct electrode gap for new spark plug		1.1 mm (0.043 in.)
	Maximum electrode gap for used spark plug		1.2 mm (0.047 in.)
Camshaft position sensor	Resistance	Cold	835 – 1,400 Ω
		Hot	1,060 – 1,645 Ω
Crankshaft position sensor	Resistance	Cold	1,630 – 2,740 Ω
		Hot	2,065 – 3,225 Ω

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SS0O7–01

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Spark plug x Cylinder head	17.5	180	13
Ignition coil (with igniter) x Cylinder head cover	7.5	80	66 in.·lbf
Camshaft position sensor x LH cylinder head	7.5	80	66 in.·lbf
Crankshaft position sensor x Oil pump	6.5	65	58 in.·lbf

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STARTING

SERVICE DATA

SS0OD–01

Starter	Rated voltage and output power		12 V 2.0 kW
	No–load characteristics	Current	100 A or less at 11.5 V
		rpm	2,500 rpm or less
	Brush length	STD	15.0 mm (0.591 in.)
		Minimum	9.0 mm (0.354 in.)
	Spring installed load	STD	21.5 – 27.5 N (2.2 – 2.8 kgf, 4.8 – 6.2 lbf)
		Minimum	12.7 N (1.3 kgf, 2.9 lbf)
	Commutator		
	Diameter	STD	35.0 mm (1.378 in.)
		Minimum	34.0 mm (1.339 in.)
	Undercut depth	STD	0.7 mm (0.028 in.)
		Minimum	0.2 mm (0.008 in.)
	Circle runout	Maximum	0.05 mm (0.0020 in.)
	Field frame		
	Shunt coil resistance	at 20˚C (68˚F)	1.5 – 1.9 Ω
	Magnetic switch		
	Contact plate for wear	Maximum	0.9 mm (0.035 in.)

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SS0OE–01

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Terminal 30 nut, Terminal C nut x Terminal bolt	17	170	13
End cover x Magnetic switch housing	3.6	37	32 in.·lbf
End cover x Brush holder	3.8	39	34 in.·lbf
Starter hosing x Magnetic switch	9.3	95	82 in.·lbf
End cover with field frame x Magnetic switch	9.3	95	82 in.·lbf
Lead wire of field coil x Terminal C	5.9	60	52 in.·lbf
Wire clamp, Starter wire x Starter	9.81	100	87 in.·lbf
Starter x Cylinder block	39	400	29

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CHARGING

SS0OF–01

SERVICE DATA

Battery	Specific gravity	at 20˚C (68˚F)	1.25 – 1.29
	Voltage	at 20˚C (68˚F)	12.5 – 12.9 V
Generator	Rated output		12 V 80 A, 12V 100A
	Rotor coil resistance	at 20˚C (68˚F)	2.1 – 2.5 Ω
	Slip ring diameter	STD	14.2 – 14.4 mm (0.559 – 0.567 in.)
		Minimum	12.8 mm (0.504 in.)
	Brush exposed length	STD	10.5 mm (0.413 in.)
		Minimum	1.5 mm (0.059 in.)
Voltage regulator	Regulating voltage		13.2 – 14.8 V

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SS0OG–01

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Bearing cover x Drive end frame		3.0	31	27 in.·lbf
Rectifier end frame without wire clip x Drive end frame		4.5	46	40 in.·lbf
Rectifier end frame with cord clip x Drive end frame	80 A	5.4	55	48 in.·lbf
Generator pulley x Rotor		110.5	1,128	81
Rectifier holder x Lead wire on rectifier end frame		2.94	30	26 in.·lbf
Voltage regulator x Rectifier end frame		2.0	20	18 in.·lbf
Voltage regulator x Rectifier holder		2.0	20	18 in.·lbf
Brush holder x Rectifier holder		2.0	20	18 in.·lbf
Brush holder x Voltage regulator		2.0	20	18 in.·lbf
Rear end cover x Rectifier holder		4.4	45	39 in.·lbf
Plate terminal x Rectifier holder		3.8	39	34 in.·lbf
Rear end cover x Rectifier holder		4.4	45	39 in.·lbf
Terminal insulator x Rectifier holder		4.1	42	36 in.·lbf
Generator x Cylinder block		39	400	29

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AUTOMATIC TRANSMISSION

SS0OO–01

SERVICE DATA

Line pressure (Wheel locked)		
	Engine idling	
	D position	480 – 539 kPa (4.9 – 5.5 kgf/cm^2, 70 – 78 psi)
	R position	696 – 794 kPa (7.1 – 8.1 kgf/cm^2, 101 – 115 psi)
	AT stall (Throttle valve fully opened)	
	D position	1,294 – 1,432 kPa (13.2 – 14.6 kgf/cm^2, 188 – 208 psi)
	R position	1,657 – 1,989 kPa (16.9 – 20.2 kgf/cm^2, 240 – 287 psi)
Engine stall revolution	D and R position	2,300 ± 150 rpm
Time lag	N → D position	Less than 1.2 seconds
	N → D position	Less than 1.5 seconds
Engine idle speed (A/C OFF)		
	N position	700 ± 50 rpm
Speedometer driven gear oil seal drive in depth		25 mm (0.98 in.)
Shift lever grooved pin		13.5 ± 0.3 mm (0.531 ± 0.012 in.)
Drive plate runout	Max.	0.20 mm (0.0079 in.)
Torque converter clutch runout	Max.	0.30 mm (0.0118 in.)
Torque converter clutch installation distance		More than 17.1 mm (0.673 in.)
Shift point		
* D position		
(Throttle valve fully opened)	1 → 2	55 – 60 km/h (34 – 37 mph)
	2 → 3	101 – 111 km/h (63 – 69 mph)
	3 → O/D	154 – 165 km/h (95 – 103 mph)
	O/D → 3	147 – 158 km/h (91 – 98 mph)
	3 → 2	94 – 100 km/h (58 – 62 mph)
	2 → 1	43 – 48 km/h (27 – 30 mph)
* 2 position		
(Throttle valve fully opened)	3 → 2	112 – 122 km/h (70 – 76 mph)
L position		
(Throttle valve fully opened)	2 → 1	54 – 63 km/h (34 – 39 mph)
Lock–up point		
	(Throttle valve opening 5 %)	
	Lock–up ON	61 – 66 km/h (38 – 41 mph)
	Lock–up OFF	54 – 59 km/h (34 – 37 mph)

*: There is no 1 → 2 up–shift and 2 → 1 down shift in the 2nd START switch ON.

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SS0OP–01

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
No.1 vehicle speed sensor lock plate x Transfer case		16	160	12
No.2 vehicle speed sensor x Transmission case		5.4	55	48 in.·lbf
ATF temperature sensor x Oil cooler elbow		15	150	11
Park/neutral position switch	Bolt	13	130	9
	Nut	3.9	40	35 in.·lbf
Transmission control shaft lever x Park/neutral position switch		16	160	12
Transmission control shaft lever x Transmission control rod		13	130	9
Shift solenoid valve x Valve body		11	110	8
Detent spring x Valve body		10	100	7
Valve body x Transmission case		10	100	7
Oil stainer x Valve body		10	100	7
Oil pan x Transmission case		7.4	75	65 in.·lbf
Drain plug x Oil pan		20	205	15
Parking lock pawl bracket x Transmission case		7.4	75	65 in.·lbf
Shift lever assembly x Body		5.4	55	48 in.·lbf
Control rod x Shift lever plate		13	130	9
Oil cooler bracket x Body		11	115	8
Oil cooler bracket x Oil cooler		4.9	50	43 in.·lbf
Oil cooler pipe stay x Body		5.0	51	44 in.·lbf
Oil filler pipe		11.5	120	8
Transfer shift lever boot x Body		5.4	55	48 in.·lbf
Hole plug x Transmission housing		18	185	13
Drive plate x Torque converter clutch		48	490	35
Oil cooler pipe union nut		69	700	51
Crossmember	Bolt	61	620	45
	Nut	74	750	54
Transmission housing x Engine		72	730	53
Drive plate x Crankshaft	1st	49	500	36
	2nd	Turn 90°	Turn 90°	Turn 90°

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TRANSFER

SERVICE DATA

SS0OM–01

Idler gear rear bearing adjusting shim thickness		
	Mark 2	0.30 mm (0.0118 in.)
	Mark 3	0.45 mm (0.0177 in.)
	Mark 4	2.40 mm (0.0945 in.)
	Mark 5	2.60 mm (0.1024 in.)
	Mark 6	2.80 mm (0.1102 in.)
	Mark 7	3.00 mm (0.1181 in.)
	Mark 8	3.20 mm (0.1260 in.)
	Mark 9	3.40 mm (0.1339 in.)
	Mark 10	3.60 mm (0.1417 in.)
	Mark 11	3.80 mm (0.1496 in.)
	Mark 12	4.00 mm (0.1575 in.)
	Mark 13	0.55 mm (0.0216 in.)
Output shaft rear bearing adjusting shim thickness		
	Mark B	0.30 mm (0.0118 in.)
	Mark C	0.45 mm (0.0177 in.)
	Mark D	1.00 mm (0.0394 in.)
	Mark E	1.20 mm (0.0472 in.)
	Mark F	1.40 mm (0.0551 in.)
	Mark G	1.60 mm (0.0630 in.)
	Mark H	1.80 mm (0.0709 in.)
	Mark J	2.00 mm (0.0787 in.)
	Mark K	2.20 mm (0.0866 in.)
	Mark L	2.40 mm (0.0945 in.)
	Mark M	2.60 mm (0.1024 in.)
	Mark N	0.55 mm (0.0216 in.)
Input gear snap ring thickness		
	Mark A	2.90 mm (0.1141 in.)
	Mark B	2.95 mm (0.1161 in.)
	Mark C	3.00 mm (0.1181 in.)
	Mark D	3.05 mm (0.1201 in.)
	Mark E	3.10 mm (0.1220 in.)
	Mark F	3.15 mm (0.1240 in.)
Input shaft rear ball bearing snap ring thickness		
	Mark A	2.00 mm (0.0787 in.)
	Mark B	2.10 mm (0.0827 in.)
	Mark C	2.20 mm (0.0866 in.)
	Mark D	2.30 mm (0.0906 in.)
	Mark E	2.40 mm (0.0945 in.)
Idler low gear thrust clearance	STD	0.125 – 0.275 mm (0.0049 – 0.0108 in.)
	Max.	0.275 mm (0.0108 in.)
Idler low gear radial clearance	STD	0.015 – 0.068 mm (0.0006 – 0.0027 in.)
	Max.	0.068 mm (0.0027 in.)
High speed output gear thrust clearance	STD	0.10 – 0.25 mm (0.0039 – 0.0098 in.)
	Max.	0.25 mm (0.0098 in.)
High speed output gear radial clearance	STD	0.035 – 0.091 mm (0.0014 – 0.0036 in.)
	Max.	0.091 mm (0.0036 in.)
Center differential backlash	Min.	0.05 mm (0.0020 in.)
Idler gear diameter	STD	38.48 – 38.50 mm (1.5149 – 1.5157 in.)
	Max.	38.50 mm (1.5157 in.)
Idler low gear diameter	STD	45.52 – 45.54 mm (1.7922 – 1.7930 in.)
	Max.	45.54 mm (1.7930 in.)

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Shift fork No.2 and clutch sleeve clearance	STD	0.1 – 0.4 mm (0.0039 – 0.0157 in.)
	Max.	0.4 mm (0.0157 in.)
Center differential side gear thrust washer thickness		
		1.70 mm (0.0669 in.)
		1.85 mm (0.0728 in.)
		2.00 mm (0.0787 in.)
		2.15 mm (0.0846 in.)
		2.30 mm (0.0906 in.)
		2.45 mm (0.0965 in.)
		2.60 mm (0.1024 in.)
		2.75 mm (0.1083 in.)
		2.90 mm (0.1142 in.)
		3.05 mm (0.1201 in.)
Front drive gear piece snap ring thickness		
	Mark A	2.00 mm (0.0787 in.)
	Mark B	2.10 mm (0.0827 in.)
	Mark C	2.20 mm (0.0866 in.)
	Mark D	2.30 mm (0.0906 in.)
	Mark E	2.40 mm (0.0945 in.)
	Mark F	2.50 mm (0.0984 in.)
	Mark G	2.60 mm (0.1024 in.)
	Mark H	2.70 mm (0.1063 in.)
	Mark J	2.80 mm (0.1102 in.)
	Mark K	1.80 mm (0.0709 in.)
	Mark L	1.90 mm (0.0748 in.)
Front extension housing ball bearing snap ring thickness		
	Mark A	1.7 mm (0.0669 in.)
	Mark B	1.8 mm (0.0709 in.)
Front output shaft hub snap ring thickness		
	Mark A	1.8 mm (0.0709 in.)
	Mark B	1.9 mm (0.0748 in.)
	Mark C	2.0 mm (0.0787 in.)
	Mark D	2.1 mm (0.0827 in.)
	Mark E	2.2 mm (0.0866 in.)
Oil pump driven rotor body clearance	STD	0.08 – 0.17 mm (0.0031 – 0.0067 in.)
	Max.	0.17 mm (0.0067 in.)
Oil pump driven rotor body tip clearance	STD	0.05 – 0.15 mm (0.0020 – 0.0059 in.)
	Max.	0.15 mm (0.0059 in.)
Oil pump side clearance	STD	0.03 – 0.10 mm (0.0012 – 0.0039 in.)
	Max.	0.10 mm (0.0039 in.)
Rear extension housing ball bearing snap ring thickness		
	Mark A	1.7 mm (0.0669 in.)
	Mark B	1.8 mm (0.0709 in.)
Rear output shaft ball bearing snap ring thickness		
	Mark 1	1.95 mm (0.0768 in.)
	Mark 2	2.05 mm (0.0807 in.)
	Mark 3	2.15 mm (0.0847 in.)
	Mark 4	2.25 mm (0.0886 in.)
Motor actuator		
1 – 5	STD resistance	0.3 – 100 Ω
1 or 5 – body ground	STD resistance	More than 0.5 MΩ
Breather hose (from the hose end to the clip end)		5 mm (0.20 in.) or more

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SS0ON–01

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Crossmember x Frame	50	510	37
Crossmember x Engine rear mounting	74	750	54
Transfer x Transmission	69	700	51
Filler and drain plug	37	380	27
Oil pump plate and separator x Rear extension housing	4.9	50	43 in.·lbf
Oil pump cover x Rear extension housing	4.9	50	43 in.·lbf
Lever lock pin	12	120	9
Oil strainer x Rear case	4.9	50	43 in.·lbf
Oil receiver x Front case	12	120	9
Case cover x Rear case	37	380	27
Rear extension housing x Rear case	37	380	27
Front extension housing x Front case	37	380	27
Center diff. lock indicator switch	37	380	27
L position switch	37	380	27
Neutral position switch	37	380	27
Screw plug x Front case	19	190	14
Screw plug x Rear extension housing	29	300	22
Motor actuator x Front case	18	185	13
Differential front case x Differential rear case (temporarily tighten)	98 88	1,000 900	72 65
Front case x Rear case	37	380	27
Crossmember x Transfer case protector	24	250	18
Speed sensor driven gear	11	115	8
Transfer shift lever rod assembly x Shift outer lever	14	140	10
Transfer control shift lever retainer x Transmission	29	300	22

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PROPELLER SHAFT

SERVICE DATA

SS0NK–01

Shaft runout		Max.	0.8 mm (0.031 in.)
Bearing axial play		Max.	0 mm (0 in.)
Snap ring thickness	Color	Mark	
	–	1	2.28 – 2.30 mm (0.0898 – 0.0906 in.)
	–	2	2.30 – 2.32 mm (0.0906 – 0.0913 in.)
	–	–	2.32 – 2.34 mm (0.0913 – 0.0921 in.)
	Brown	–	2.34 – 2.36 mm (0.0921 – 0.0929 in.)
	Blue	–	2.36 – 2.38 mm (0.0929 – 0.0937 in.)
	–	6	2.38 – 2.40 mm (0.0937 – 0.0945 in.)
	–	7	2.40 – 2.42 mm (0.0945 – 0.0953 in.)
	–	8	2.42 – 2.44 mm (0.0953 – 0.0961 in.)
	–	九	2.44 – 2.46 mm (0.0961 – 0.0969 in.)
	–	10	2.46 – 2.48 mm (0.0969 – 0.0976 in.)

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SS0NL–01

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Front propeller shaft x Front differential	80	820	59
Front propeller shaft x Transfer	80	820	59
Rear propeller shaft x Transfer	106	1,080	78
Rear propeller shaft x Rear differential	106	1,080	78

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SUSPENSION AND AXLE

SERVICE DATA

SS0OJ–01

Cold tire inflation pressure	Tire size P275/70R16	Front	220 kPa (2.2 kgf/cm^2, 32 psi) *220 kPa (2.2 kgf/cm^2, 32 psi)
		Rear	220 kPa (2.2 kgf/cm^2, 32 psi) *240 kPa (2.4 kgf/cm^2, 35 psi)
Front wheel alignment	Vehicle height Front Rear	A – B C – D	71 mm (2.795 in.) 51 mm (2.008 in.)
	Camber		0°05' ± 45' (0.08° ± 0.75°)
		Left–right error	30' (0.5°) or less
	Caster		2°30' ± 45' (2.5° ± 0.75°)
		Left–right error	30' (0.5°) or less
	Steering axis inclination		12°10' ± 45' (12.17° ± 0.75°)
		Left–right error	30' (0.5°) or less
	Toe–in (total)		0°06' ± 12' (0.1° ± 0.2°, 1 ± 2 mm, 0.04 ± 0.08 in.)
		Rack end length difference	3.0 mm (0.118 in.) or less
	Wheel angle	Inside wheel	36°42' (33°42' – 36°42') 36.7° (33.7° – 36.7°)
		Outside wheel	32°36' 32.6°
Front drive shaft	Front drive shaft length		573.9 ± 5 mm (22.594 ± 0.197 in.)
Front suspension	Upper suspension arm ball joint turning torque		1.0 – 4.4 N·m (10 – 45 kgf·cm, 8.7 – 39 in.·lbf)
	Lower suspension arm ball joint turning torque		0.29 – 2.94 N·m (3 – 30 kgf·cm, 2.6 – 26 in.·lbf)
Rear axle shaft	Bearing backlash	Max.	0.6 mm (0.024 in.)
	Axle shaft deviation	Max.	0.05 mm (0.0020 in.)
	Axle shaft runout	Max.	2.0 mm (0.079 in.)
	Axle shaft flange runout	Max.	0.05 mm (0.0020 in.)

*: Trailer towing

A: Ground clearance of spindle center

B: Ground clearance of lower suspension arm front bolt center

C: Ground clearance of rear axle shaft center

D: Ground clearance of lower control arm front bushing center

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Front differential	Companion flange vertical runout	Max.	0.09 mm (0.0035 in.)
	Companion flange lateral runout	Max.	0.09 mm (0.0035 in.)
	Drive pinion preload (at starting)	New bearing	1.0 – 1.6 N·m (10 – 16 kgf·cm, 8.7 – 13.9 in.·lbf)
		Reused bearing	0.5 – 0.8 N·m (5 – 8 kgf·cm, 4.3 – 6.9 in.·lbf)
	Total preload (at starting)		Drive pinion preload plus 0.4 – 0.6 N·m (4 – 6 kgf·cm, 3.5 – 5.2 in.·lbf)
	Ring gear runout		0.07 mm (0.0028 in.)
	Ring gear backlash		0.13 – 0.18 mm (0.0051 – 0.0071 in.)
	Side gear backlash		0.15 mm (0.0059 in.)
	Side gear thrust washer thickness		1.50 mm (0.059 in.) 1.55 mm (0.061 in.) 1.60 mm (0.063 in.) 1.65 mm (0.065 in.) 1.70 mm (0.067 in.) 1.75 mm (0.069 in.) 1.80 mm (0.071 in.) 1.85 mm (0.073 in.) 1.90 mm (0.075 in.)

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Front differential	Side bearing adjusting washer thickness	2.58 mm (0.1016 in.) 2.60 mm (0.1024 in.) 2.62 mm (0.1031 in.) 2.64 mm (0.1039 in.) 2.66 mm (0.1047 in.) 2.68 mm (0.1055 in.) 2.70 mm (0.1063 in.) 2.72 mm (0.1071 in.) 2.74 mm (0.1079 in.) 2.76 mm (0.1087 in.) 2.78 mm (0.1094 in.) 2.80 mm (0.1102 in.) 2.82 mm (0.1110 in.) 2.84 mm (0.1118 in.) 2.86 mm (0.1126 in.) 2.88 mm (0.1134 in.) 2.90 mm (0.1142 in.) 2.92 mm (0.1150 in.) 2.94 mm (0.1157 in.) 2.96 mm (0.1165 in.) 2.98 mm (0.1173 in.) 3.00 mm (0.1181 in.) 3.02 mm (0.1189 in.) 3.04 mm (0.1197 in.) 3.06 mm (0.1205 in.) 3.08 mm (0.1213 in.) 3.10 mm (0.1220 in.) 3.12 mm (0.1228 in.) 3.14 mm (0.1236 in.) 3.16 mm (0.1244 in.) 3.18 mm (0.1252 in.) 3.20 mm (0.1260 in.) 3.22 mm (0.1268 in.) 3.24 mm (0.1276 in.) 3.26 mm (0.1283 in.) 3.28 mm (0.1291 in.) 3.30 mm (0.1299 in.) 3.32 mm (0.1307 in.) 3.34 mm (0.1315 in.) 3.36 mm (0.1323 in.) 3.38 mm (0.1331 in.) 3.40 mm (0.1339 in.) 3.42 mm (0.1346 in.) 3.44 mm (0.1354 in.) 3.46 mm (0.1362 in.) 3.48 mm (0.1370 in.)

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Front differential	Drive pinion bearing adjusting washer thickness	1.70 mm (0.067 in.) 1.73 mm (0.068 in.) 1.76 mm (0.069 in.) 1.79 mm (0.070 in.) 1.82 mm (0.072 in.) 1.85 mm (0.073 in.) 1.88 mm (0.074 in.) 1.91 mm (0.075 in.) 1.94 mm (0.076 in.) 1.97 mm (0.078 in.) 2.00 mm (0.079 in.) 2.03 mm (0.080 in.) 2.06 mm (0.081 in.) 2.09 mm (0.082 in.) 2.12 mm (0.083 in.) 2.15 mm (0.085 in.) 2.18 mm (0.086 in.) 2.21 mm (0.087 in.) 2.24 mm (0.088 in.) 2.27 mm (0.089 in.) 2.30 mm (0.091 in.) 2.33 mm (0.092 in.)

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Rear differential	Companion flange vertical runout	0.10 mm (0.0039 in.)
	Companion flange lateral runout	0.10 mm (0.0039 in.)
	Drive pinion preload (at starting) New bearing Reused bearing	1.3 – 1.8 N·m (13 – 19 kgf·cm, 11.3 – 16.4 in.·lbf) 0.64 – 0.92 N·m (6.5 – 9.4 kgf·cm, 5.6 – 8.2 in.·lbf)
	Total preload (at starting)	Drive pinion preload plus 0.38 – 0.63 N·m (3.9 – 6.5 kgf·cm, 3.4 – 5.6 in.·lbf)
	Ring gear runout	0.05 mm (0.0020 in.)
	Ring gear backlash	0.13 – 0.18 mm (0.0051 – 0.0071 in.)
	Side gear backlash	0.02 – 0.15 mm (0.0008 – 0.0059 in.)
	Differential case runout	0.04 mm (0.0016 in.)
	Side gear thrust washer thickness	1.55 mm (0.061 in.) 1.60 mm (0.063 in.) 1.65 mm (0.065 in.) 1.70 mm (0.067 in.) 1.75 mm (0.069 in.) 1.80 mm (0.071 in.) 1.85 mm (0.073 in.) 1.90 mm (0.075 in.) 1.95 mm (0.077 in.) 2.00 mm (0.079 in.) 2.05 mm (0.081 in.) 2.10 mm (0.083 in.)
	Tooth contact pattern adjusting washer thickness	1.050 mm (0.04134 in.) 1.075 mm (0.04232 in.) 1.100 mm (0.04331 in.) 1.125 mm (0.04429 in.) 1.150 mm (0.04528 in.) 1.175 mm (0.04626 in.) 1.200 mm (0.04724 in.) 1.225 mm (0.04823 in.) 1.250 mm (0.04921 in.) 1.275 mm (0.05020 in.) 1.300 mm (0.05118 in.) 1.325 mm (0.05217 in.) 1.350 mm (0.05315 in.) 1.375 mm (0.05413 in.) 1.400 mm (0.05512 in.) 1.425 mm (0.05610 in.) 1.450 mm (0.05709 in.) 1.475 mm (0.05807 in.) 1.500 mm (0.05906 in.) 1.525 mm (0.06004 in.) 1.550 mm (0.06102 in.)

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Rear differential (w/ Diff. Lock)	Companion flange vertical runout	0.10 mm (0.0039 in.)
	Companion flange lateral runout	0.10 mm (0.0039 in.)
	Drive pinion preload (at starting) New bearing	1.3 – 1.8 N·m (13 – 19 kgf·cm, 11.3 – 16.4 in.·lbf)
	Reused bearing	0.64 – 0.92 N·m (6.5 – 9.4 kgf·cm, 5.6 – 8.2 in.·lbf)
	Total preload (at starting)	Drive pinion preload plus 0.3 – 0.5 N·m (3 – 5 kgf·cm, 2.6 – 4.3 in.·lbf)
	Ring gear runout	0.05 mm (0.0020 in.)
	Ring gear backlash	0.13 – 0.18 mm (0.0051 – 0.0071 in.)
	Side gear backlash	0.02 – 0.15 mm (0.0008 – 0.0059 in.)
	Differential case runout	0.04 mm (0.0016 in.)
	Side gear thrust washer thickness	1.55 mm (0.061 in.) 1.60 mm (0.063 in.) 1.65 mm (0.065 in.) 1.70 mm (0.067 in.) 1.75 mm (0.069 in.) 1.80 mm (0.071 in.) 1.85 mm (0.073 in.) 1.90 mm (0.075 in.) 1.95 mm (0.077 in.) 2.00 mm (0.079 in.) 2.05 mm (0.081 in.) 2.10 mm (0.083 in.)
	Ring gear backlash adjusting washer thickness Mark	
	1	2.67 mm (0.1051 in.)
	2	2.70 mm (0.1063 in.)
	3	2.73 mm (0.1075 in.)
	4	2.76 mm (0.1087 in.)
	5	2.79 mm (0.1098 in.)
	6	2.82 mm (0.1110 in.)
	7	2.85 mm (0.1122 in.)
	8	2.88 mm (0.1134 in.)
	9	2.91 mm (0.1146 in.)
	10	2.94 mm (0.1157 in.)
	11	2.97 mm (0.1169 in.)
	12	3.00 mm (0.1181 in.)
	13	3.03 mm (0.1193 in.)
	14	3.06 mm (0.1205 in.)
	15	3.09 mm (0.1217 in.)
	16	3.12 mm (0.1228 in.)
	17	3.15 mm (0.1240 in.)
	18	3.18 mm (0.1252 in.)
	19	3.21 mm (0.1264 in.)
	20	3.24 mm (0.1276 in.)
	21	3.27 mm (0.1287 in.)
	22	3.30 mm (0.1299 in.)
	23	3.33 mm (0.1311 in.)

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Rear differential (w/ Diff. Lock)	Tooth contact pattern adjusting washer thickness	1.050 mm (0.04134 in.) 1.075 mm (0.04232 in.) 1.100 mm (0.04331 in.) 1.125 mm (0.04429 in.) 1.150 mm (0.04528 in.) 1.175 mm (0.04626 in.) 1.200 mm (0.04724 in.) 1.225 mm (0.04823 in.) 1.250 mm (0.04921 in.) 1.275 mm (0.05020 in.) 1.300 mm (0.05118 in.) 1.325 mm (0.05217 in.) 1.350 mm (0.05315 in.) 1.375 mm (0.05413 in.) 1.400 mm (0.05512 in.) 1.425 mm (0.05610 in.) 1.450 mm (0.05709 in.) 1.475 mm (0.05807 in.) 1.500 mm (0.05906 in.) 1.525 mm (0.06004 in.) 1.550 mm (0.06102 in.)

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Rear differential (w/ LSD)	Companion flange vertical runout	0.10 mm (0.0039 in.)
	Companion flange lateral runout	0.10 mm (0.0039 in.)
	Drive pinion preload (at starting) New bearing	1.3 – 1.8 N·m (13 – 19 kgf·cm, 11.3 – 16.4 in.·lbf)
	Reused bearing	0.64 – 0.92 N·m (6.5 – 9.4 kgf·cm, 5.6 – 8.2 in.·lbf)
	Total preload (at starting)	Drive pinion preload plus 0.38 – 0.63 N·m (3.9 – 6.5 kgf·cm, 3.4 – 5.6 in.·lbf)
	Ring gear runout	0.05 mm (0.0020 in.)
	Ring gear backlash	0.13 – 0.18 mm (0.0051 – 0.0070 in.)
	Side gear backlash	0.02 – 0.15 mm (0.0008 – 0.0059 in.)
	Differential case runout	0.04 mm (0.0016 in.)
	Side gear thrust washer thickness (Reference)	1.97 – 2.06 mm (0.0776 – 0.0811 in.)
	Clutch plate thickness (Reference)	1.97 – 2.03 mm (0.0776 – 0.0799 in.)
	Compression spring free length (Reference)	32.8 mm (1.291 in.)
	Adjusting shim thickness Mark	
	A	0.20 mm (0.0079 in.)
	B	0.25 mm (0.0098 in.)
	C	0.30 mm (0.0118 in.)
	D	0.35 mm (0.0138 in.)
	Tooth contact pattern adjusting washer thickness	1.050 mm (0.04134 in.) 1.075 mm (0.04232 in.) 1.100 mm (0.04331 in.) 1.125 mm (0.04429 in.) 1.150 mm (0.04528 in.) 1.175 mm (0.04626 in.) 1.200 mm (0.04724 in.) 1.225 mm (0.04823 in.) 1.250 mm (0.04921 in.) 1.275 mm (0.05020 in.) 1.300 mm (0.05118 in.) 1.325 mm (0.05217 in.) 1.350 mm (0.05315 in.) 1.375 mm (0.05413 in.) 1.400 mm (0.05512 in.) 1.425 mm (0.05610 in.) 1.450 mm (0.05709 in.) 1.475 mm (0.05807 in.) 1.500 mm (0.05906 in.) 1.525 mm (0.06004 in.) 1.550 mm (0.06102 in.)

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SS0OK–01

TORQUE SPECIFICATION

FRONT			
Part tightened	N·m	kgf·cm	ft·lbf
Hub bolt	131	1,340	97
Steering knuckle x Brake caliper	123	1,250	90
Disc x Axle hub	74	750	54
Flange x Axle hub	33	335	24
Axle hub bearing lock nut	64	650	47
Flexible hose x Bracket	28	290	21
ABS speed sensor installation bolt	8.0	82	71 in.·lbf
Wire harness x Steering knuckle arm	13	130	9
Bracket x Steering knuckle	28	290	21
Steering knuckle arm x Steering knuckle	147	1,500	108
Tie rod end x Steering knuckle arm	122	1,250	90
Upper suspension arm x Steering knuckle	110	1,125	81
Lower suspension arm x Steering knuckle	159	1,625	118
Oil seal x Steering knuckle	18	185	13
Propeller shaft x Companion flange	80	820	59
Body x No.3 frame crossmember	68	695	50
No.3 frame crossmember x Differential support	186	1,900	137
Differential support x Differential tube	78	800	58
Differential support x Differential carrier	78	800	58
Differential support x Body	186	1,900	137
Differential cover x Body	186	1,900	137
Breather hose x Carrier cover	17	173	13
Filler plug	49	500	36
Drain plug	49	500	36
Differential tube x Differential carrier	105	1,070	77
Bearing cap x Differential carrier	85	870	63
Oil deflector x Carrier cover	7.3	74	64 in.·lbf
Carrier cover x Differential carrier	47	475	34
Differential case x Ring gear	97	985	71
Companion flange x Drive pinion	See page SA–44		
Lower suspension arm x Shock absorber	135	1,400	101
Piston rod x Body	68	700	51
Torque arm x Lower suspension arm	225	2,300	166
Wire harness x Upper suspension arm	13	130	9
Upper suspension arm x Body	98	1,000	72
Stabilizer bar link x Lower suspension arm	52	530	38
Lower suspension arm x Body	230	2,350	170
Stabilizer bar x Stabilizer bar link	25	250	18
Stabilizer bar bracket x Body	18	185	13

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REAR			
Part tightened	N·m	kgf·cm	ft·lbf
Hub bolt	131	1,340	97
Axle housing x Brake caliper	103	1,050	76
Axle housing x Backing plate	123	1,250	90
Brake line	15	150	11
Shock Absorber x Axle housing	98	1,000	72
Stabilizer bar bracket x Body	18	185	13
Follow spring x Body	28	290	21
Piston rod x Body	69	704	51
Lateral control rod x Body	150	1,530	111
Upper control arm x Body	150	1,530	111
Upper control arm x Axle housing	150	1,530	111
Lower control arm x Body	150	1,530	111
Lower control arm x Axle housing	150	1,530	111
Heat insulator x Body	18	185	13
Lateral control rod x Axle housing	149	1,520	110
Stabilizer bar x Stabilizer bar link	26	270	19
Stabilizer bar x Bracket	15	150	11
Stabilizer bar bracket x Axle housing	18	185	13
Propeller shaft x Companion flange	106	1,080	78
Companion flange x Drive pinion w/ Diff. Lock w/ LSD	See page SA–104 See page SA–124 See page SA–147		
Differential carrier x Axle housing	72	740	53
Filler plug	49	500	36
Drain plug	49	500	36
Differential case x Ring gear	137	1,400	101
Differential carrier			
Bearing cap x Differential carrier	83	850	61
Adjusting nut lock x Bearing cap	13	130	9
RH differential case x LH differential case	47	480	35
Differential carrier (w/ Diff. Lock)			
No.1 actuator protector x Actuator	15	150	11
No.2 actuator protector x Axle housing	36	367	27
Bearing cap x Differential carrier	113	1,150	83
Cover x Differential carrier	18	185	13
Actuator x Differential carrier	24	240	17
Actuator x Shift fork	20	200	14
Indicator switch	40	410	30
Differential cover x Differential case	58	590	43
Differential carrier (w/ LSD)			
Bearing cap x Differential carrier	83	850	61
Adjusting nut lock x Bearing cap	13	130	9
RH differential case x LH differential case	47	480	35

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BRAKE

SERVICE DATA

SS062–04

Brake pedal height (from asphalt sheet)		183.7 – 193.7 mm (7.232 – 7.626 in.)
Brake pedal freeplay		1.0 – 6.0 mm (0.039 – 0.236 in.)
Brake pedal reserve distance at 490 N (50 kgf, 110.1 lbf)		More than 116 mm (4.57 in.)
Front brake pad thickness	STD	11.5 mm (0.453 in.)
Front brake pad thickness	Minimum	1.0 mm (0.039 in.)
Front brake disc thickness	STD	32.0 mm (1.260 in.)
Front brake disc thickness	Minimum	30.0 mm (1.181 in.)
Front brake disc runout	Maximum	0.07 mm (0.0028 in.)
Rear brake pad thickness	STD	12.0 mm (0.472 in.)
Rear brake pad thickness	Minimum	1.0 mm (0.039 in.)
Rear brake disc thickness	STD	18.0 mm (0.709 in.)
Rear brake disc thickness	Minimum	16.0 mm (0.611 in.)
Rear brake disc runout	Maximum	0.1 mm (0.004 in.)
Rear brake disc inside diameter	STD	230 mm (9.06 in.)
Rear brake disc inside diameter	Maximum	231 mm (9.09 in.)
Parking brake shoe lining thickness for rear disc brake	STD	4.0 mm (0.157 in.)
Parking brake shoe lining thickness for rear disc brake	Minimum	1.0 mm (0.039 in.)
Parking brake lever travel at 196 N (20 kgf, 44 lbf)		4 – 6 clicks
Parking brake clearance between rear shoe and lever		Less than 0.35 mm (0.0138 in.)
Parking brake adjusting shim thickness for rear disc brake		0.3 mm (0.012 in.) 0.6 mm (0.024 in.) 0.9 mm (0.035 in.)

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SS063–04

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Brake line union nut	15	155	11
Hydraulic brake booster clevis lock nut	25	260	19
Hydraulic brake booster x Pedal bracket	13	130	9
Bleeder plug	11	110	8
Front disc brake caliper x Flexible hose	30	310	22
Front disc brake mounting bolt x Steering knuckle	123	1,250	90
Rear disc brake caliper installation bolt	26	270	20
Rear disc brake caliper x Flexible hose	30	310	22
Rear disc brake torque plate x Rear backing plate	103	1,050	76
Reservoir set screw	1.7	17.5	15.2 in.·lbf
Accumulator x Booster pump motor	54	550	36
Front speed sensor installation bolt	8.0	82	71 in.·lbf
Front speed sensor harness clamp bolt	13	130	9
Rear speed sensor installation bolt	8.0	82	71 in.·lbf
Rear speed sensor harness clamp bolt	13	130	9

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STEERING

SERVICE DATA

SS0OH–01

POWER STEERING FLUID		
Oil level rise	Maximum	Below 5 mm (0.20 in.)
Oil pressure at idle speed with valve closed	Minimum	8,336 kPa (85 kgf/cm^2, 1,209 psi)
STEERING WHEEL		
Steering wheel freeplay	Maximum	40 mm (1.58 in.)
Steering effort at idle speed	Maximum	4.9 N·m (50 kgf·cm, 43 in.·lbf)
PS VANE PUMP		
Pump shaft and front housing bushing oil clearance	STD	0.03–0.05 mm (0.0012–0.0020 in.)
Pump shaft and front housing bushing oil clearance	Maximum	0.07 mm (0.0028 in.)
Vane plate height	Minimum	8.6 mm (0.339 in.)
Vane plate thickness	Minimum	1.397 mm (0.0550 in.)
Vane plate length	Minimum	14.991 mm (0.5902 in.)
Vane plate and pump rotor groove clearance	Maximum	0.033 mm (0.0013 in.)
Vane plate length	Pump rotor and cam ring mark	
	None	14.999–15.001 mm (0.59051–0.59059 in.)
	1	14.997–14.999 mm (0.59043–0.59051 in.)
	2	14.995–14.997 mm (0.59035–0.59043 in.)
	3	14.993–14.995 mm (0.59027–0.59035 in.)
	4	14.991–14.993 mm (0.59020–0.59027 in.)
Flow control valve spring length	Minimum	33.2 mm (1.307 in.)
Pump rotating torque	Maximum	0.28 N·m (2.8 kgf·cm, 2.4 in.·lbf) or less
PS GEAR		
Steering rack runout	Maximum	0.3 mm (0.0118 in.)
Total preload	Turning	1.3–1.8 N·m (13.3–18.4 kgf·cm, 11.5–16.0 in.·lbf)

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SS0OI–01

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
STEERING COLUMN			
Steering wheel set nut	34	350	25
Steering wheel pad set screw (Torx screw)	8.8	90	78 in.·lbf
Steering column assembly set nut and bolt	24.5	250	18
Intermediate shaft assembly x Sliding yoke	34	350	25
Sliding yoke x No.2 Intermediate shaft assembly	34	350	25
Control valve shaft x No.2 Intermediate shaft assembly	34	350	25
Main shaft assembly x Intermediate shaft assembly	34	350	25
Hole cover x Body	13	130	9
TILT STEERING COLUMN:			
Tube attachment x Column tube	15	150	11
Tilt lever retainer set nut	20	210	15
No.2 lower cover set nut	24.5	240	17
POWER TILT AND POWER TELESCOPIC STEERING COLUMN:			
Steering column protector No.1 set bolt	15	153	11
Power tilt motor set bolt	20	210	15
Tube attachment x Column tube	15	150	11
Telescopic steering screw set nut	2	20	17 in.·lbf
No.2 lower cover set nut	24.5	240	17
Column upper tube sub–assembly x Column upper tube assembly	20	210	15
Telesco lever lock bolt	10	100	7
PS VANE PUMP			
Union bolt x Pressure feed tube	56	575	42
PS vane pump assembly set bolt	17	175	13
Vane pump pulley set nut	43	440	32
Suction port union set bolt	13	130	9
Pressure port union	83	850	61
Rear housing set bolt	24	240	17
PS GEAR			
Cylinder end stopper	66 (88)	677 (900)	49 (65)
Bearing guide nut	25	250	19
Control valve housing set bolt	18	185	13
Rack guide spring cap	25	250	18
Rack guide spring cap lock nut	51 (69)	521 (700)	38 (51)
Rack x Rack end	76 (103)	770 (1,050)	56 (76)
Tie rod end lock nut	55	560	41
Tie rod end x Steering knuckle	122	1,250	90
Tube support retainer set bolt	19	195	14
Turn pressure tube union nut	20 (25)	203 (250)	15 (18)
PS gear assembly set bolt and nut	100	1,020	74
Return tube x Control valve housing	36 (45)	365 (450)	26 (33)
Pressure feed tube x Control valve housing	49	500	36
Tube clamp set bolt	18	184	13

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SUPPLEMENTAL RESTRAINT SYSTEM

SS061–12

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Steering wheel set nut	34	350	25
Steering wheel pad set screw (Torx screw)	8.8	90	78 in.·lbf
Front passenger airbag assembly x Instrument panel	6.0	61	53 in.·lbf
Front passenger airbag assembly x Instrument panel reinforcement	20	205	15
Airbag sensor assembly x Body	20	205	15
Front airbag sensor x Body	20	205	15

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BODY ELECTRICAL

SERVICE DATA

SS0CN–06

DAYTIME RUNNING LIGHT RELAY (MAIN) (Wire Harness Side)	
3 – Ground (Constant)	Battery positive voltage
8 – Ground (Ignition switch OFF)	No voltage
8 – Ground (Ignition switch ON)	Battery positive voltage
9 – Ground (Terminal 3 ground)	Battery positive voltage
11 – Ground (Rear fog light switch ON, terminal 3 ground)	Battery positive voltage
12 – Ground (Constant)	Battery positive voltage
14 – Ground (Terminal 5 ground)	Battery positive voltage
AUTOMATIC LIGHT CONTROL SENSOR	
(Connector disconnected)	
1 – Ground (Ignition switch ON)	Battery positive voltage
1 – Ground (Ignition switch LOCK or ACC)	No voltage
2 – Ground (Constant)	Battery positive voltage
TURN SIGNAL FLASHER	
1 – Ground (Ignition switch LOCK or ACC)	No voltage
1 – Ground (Ignition switch ON)	Battery positive voltage
4 – Ground (Constant)	Battery positive voltage
SPEEDOMETER (ON–VEHICLE)	
USA:	
Standard indication (mph)	Allowable range (mph)
20	18 – 24
40	38 – 44
60	56 – 66
80	78 – 88
100	98 – 110
120	118 – 132
CANADA:	
Standard indication (km/h)	Allowable range (km/h)
20	17 – 24
40	38 – 46
60	57.5 – 67
80	77 – 88
100	96 – 109
120	115 – 130
160	134 – 151.5
Speedometer	Resistance (Ω)
A – B	160 Ω
C – D	160 Ω
TACHOMETER (ON–VEHICLE)/ DC 13.5 V 25 °C at (77 °F)	
Standard indication	Allowable range
700	630 – 770
1,000	900 – 1,100
2,000	1,850 – 2,150

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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
Tachometer	Resistance (Ω)
A – B	160 Ω
C – D	160 Ω
FUEL RECEIVER GAUGE	Resistance (Ω)
A – B	160 Ω
C – D	160 Ω
FUEL SENDER GAUGE	
Float position mm (in.)	Resistance (Ω)
F: Approx. 131.9 (5.19)	Approx. 0.30 ± 0.1
1/2: Approx. 76.5 (3.01)	Approx. 2.45 ± 0.1
E: Approx. 29.5 (1.16)	Approx. 4.60 ± 0.1
ENGINE COOLANT TEMPERATURE RECEIVER GAUGE	Resistance (Ω)
A – B	226.8 Ω
ENGINE COOLANT TEMPERATURE SENDER GAUGE	
Temperature ˚C (˚F)	Resistance (Ω)
50 (122.0)	160 – 240 Ω
120 (248.0)	17.1 – 21.2 Ω
OIL PRESSURE GAUGE	Resistance (Ω)
A – B	44 Ω
DEFOGGER SWITCH (wire harness side)	
12 – Ground (Constant)	Battery positive voltage
1 – Ground (Ignition switch LOCK or ACC)	No voltage
1 – Ground (Ignition switch ON)	Battery positive voltage
2 – Ground (Ignition switch LOCK)	No voltage
2 – Ground (Ignition switch ACC or ON)	Battery positive voltage
SLIDING ROOF CONTROL ASSEMBLY	
5 – Ground (Constant)	Battery positive voltage
8 – Ground (Ignition switch LOCK or ACC)	No voltage
8 – Ground (Ignition switch ON)	Battery positive voltage
POWER MIRROR SWITCH	
4 – Ground (Ignition switch LOCK)	No voltage
4 – Ground (Ignition switch ACC or ON)	Battery positive voltage
CD AUTO CHANGER	
5 – Ground (Constant)	Battery positive voltage
12 – Ground (Ignition switch LOCK)	No voltage
12 – Ground (Ignition switch ACC or ON)	Battery positive voltage
POWER AMPLIFIER	
(Except Nakamichi made)	
A2 – Ground (Ignition switch LOCK and radio switch ON)	No voltage
A3 – Ground (Constant)	Battery positive voltage
A9 – Ground (Ignition switch LOCK and radio switch ON)	No voltage

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B7 – Ground (Constant)	Battery positive voltage
B16 – Ground (Constant)	Battery positive voltage
RADIO RECEIVER	
A4 – Ground (Constant)	Battery positive voltage
B5 – Ground (Constant)	Battery positive voltage
A3 – Ground (Ignition switch LOCK)	No voltage
A3 – Ground (Ignition switch ACC or ON)	Battery positive voltage
B12 – Ground (Ignition switch LOCK)	No voltage
B12 – Ground (Ignition switch ACC or ON)	Battery positive voltage
POWER AMPLIFIER	
(Nakamichi made)	
A2 – Ground (Constant)	Battery positive voltage
A5 – Ground (Constant)	Battery positive voltage
A6 – Ground (Ignition switch LOCK and radio switch ON)	No voltage
A6 – Ground (Ignition switch ACC or ON and radio switch ON)	Battery positive voltage
ANTENNA MOTOR CONTROL RELAY	
4 – Ground (Constant)	Battery positive voltage
7 – Ground (Ignition switch ACC or LOCK)	No voltage
7 – Ground (Ignition switch ON)	Battery positive voltage
17 – Ground (Ignition switch LOCK)	No voltage
17 – Ground (Ignition switch ACC or ON)	Battery positive voltage
GARAGE DOOR OPENER SWITCH	
2 – Ground (Constant)	Battery positive voltage

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BODY

TORQUE SPECIFICATION

SS0OL–01

Part tightened		N·m	kgf·cm	ft·lbf
FRONT BUMPER		–	–	–
Front bumper cover x Body	Bolt:	8.3	85	74 in.·lbf
Front bumper cover x Body	Screw:	2.9	30	26 in.·lbf
Fog light x Front bumper cover		4.9	50	43 in.·lbf
Front bumper reinforcement x Body		58	590	43
REAR BUMPER		–	–	–
Rear bumper cover x Body		20	200	14
Reflex reflector x Rear bumper cover		4.9	50	43 in.·lbf
Rear bumper reinforcement x Extension mounting bracket		13	130	9
Extension mounting bracket x Body		19	195	14
FRONT DOOR		–	–	–
Door glass x Window regulator		5.0	51	44 in.·lbf
Window regulator x Door panel		5.0	51	44 in.·lbf
Door lock x Door panel		5.0	51	44 in.·lbf
Outside handle x Door panel		5.0	51	44 in.·lbf
Door lock cylinder x Outside handle		5.0	51	44 in.·lbf
Door hinge x Body		26	265	19
Door hinge x Door panel		26	265	19
Door lock striker x Body		11	115	8
REAR DOOR		–	–	–
Door glass x Window regulator		5.0	51	44 in.·lbf
Window regulator x Door panel		5.0	51	44 in.·lbf
Door lock x Door panel		5.0	51	44 in.·lbf
Outside handle x Door panel		5.0	51	44 in.·lbf
Door hinge x Body		26	265	19
Door hinge x Door panel		26	265	19
Door lock striker x Body		11	115	8
UPPER BACK DOOR		–	–	–
Back door hinge x Body		12	122	9
Back door hinge x Door panel		12	122	9
Door lock striker x Door panel		11	115	8
LOWER BACK DOOR		–	–	–
Back door lock x Door panel		7.4	75	65 in.·lbf
Tail gate stay x Door panel		17	170	12
Tail gate stay x Body		17	170	12
Door hinge x Body		18	184	13
Door hinge x Door panel		18	184	13
Door lock striker x Body		11	115	8
BACK DOOR STAY		–	–	–
Back door stay x Body		17	170	12
Back door stay x Door panel		7.4	75	65 in.·lbf

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FRONT WIPER AND WASHER	–	–	–
Wiper arm x Wiper link	20	205	15
Wiper link x Body	5.4	55	48 in.·lbf
REAR WIPER AND WASHER	–	–	–
Wiper motor and link assembly x Door panel	5.4	55	48 in.·lbf
Wiper arm x Wiper link	5.4	55	48 in.·lbf
INSTRUMENT PANEL	–	–	–
Front passenger airbag assembly x Reinforcement	20	204	15
Steering wheel set nut	34	350	25
Front passenger airbag assembly x Instrument panel	6.0	61	53 in.·lbf
SIDE STEP	–	–	–
No.1 side step bracket x Side step	4.9	50	43 in.·lbf
No.1 side step bracket x Body	18	185	13
No.2 side step bracket x Side step	4.9	50	43 in.·lbf
No.2 side step bracket x Body Bolt:	18	185	13
No.2 side step bracket x Body Nut:	12	120	9
No.3 side step bracket x Side step	4.9	50	43 in.·lbf
No.3 side step bracket x Body	18	185	13
FRONT SEAT	–	–	–
Front seat adjuster x Body	37	375	27
Seatback assembly x Seat adjuster	43	440	32
Armrest x Seatback assembly	37	375	27
Seat cushion assembly x Seat adjuster	21	210	15
REAR NO.1 SEAT (LH)	–	–	–
Seat cushion hinge x Body	41	420	30
Seatback assembly x Seat adjuster	41	420	30
Seat adjuster x Seat cushion frame	41	420	30
REAR NO.1 SEAT (RH)	–	–	–
Seat cushion hinge x Body	41	420	30
Seatback assembly x Seat adjuster	41	420	30
Seat adjuster x Seat cushion frame	41	420	30
REAR NO.2 SEAT	–	–	–
Seatback assembly x Reclining adjuster	41	420	30
Reclining adjuster x Seat cushion frame	41	420	30
Seat leg adjuster x Seat cushion frame A Bolt:	18	185	13
Seat leg adjuster x Seat cushion frame B Bolt:	37	380	27
SEAT BELT	–	–	–
Outer belt shoulder anchor x Adjustable anchor	41	420	30
Outer belt shoulder anchor x Body	41	420	30
Seat belt floor anchor x Body	41	420	30
Retractor x Body Upper Side:	4.9	50	43 in.·lbf
Retractor x Body Lower Side:	41	420	30
Retractor x Seatback frame	41	420	30
Inner belt x seat cushion frame	41	420	30

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Lap type center with inner belt x Seat cushion frame	41	420	30
Rear seat shoulder belt guide x Seatback frame	41	420	30

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AIR CONDITIONING

SERVICE DATA

SS0O3–01

Refrigerant charge volume	Single A/C	800 ± 50 g (28.22 ± 1.76 oz.)
	Dual A/C	1,100 ± 50 g (39.00 ± 1.76 oz.)
Idle speed	Magnetic clutch not engaged	750 ± 50 rpm
	Magnetic clutch engaged	800 ± 50 rpm
Magnetic clutch clearance		0.5 ± 0.15 mm (0.020 ± 0.0059 in.)

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SS0O4–01

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Condenser x Discharge hose	10	100	7
Condenser x Liquid tube	10	100	7
Compressor x Discharge hose	10	100	7
Compressor x Suction hose	10	100	7
Expansion valve x Evaporator	5.4	55	48 in.·lbf
Liquid line (Block joint)	10	100	7
Liquid line (Piping line)	14	140	10
Discharge line (Piping joint)	22	225	16
Suction line (Block joint)	10	100	7
Suction line (Piping joint)	32	330	24
Compressor x Cylinder block	49	500	36

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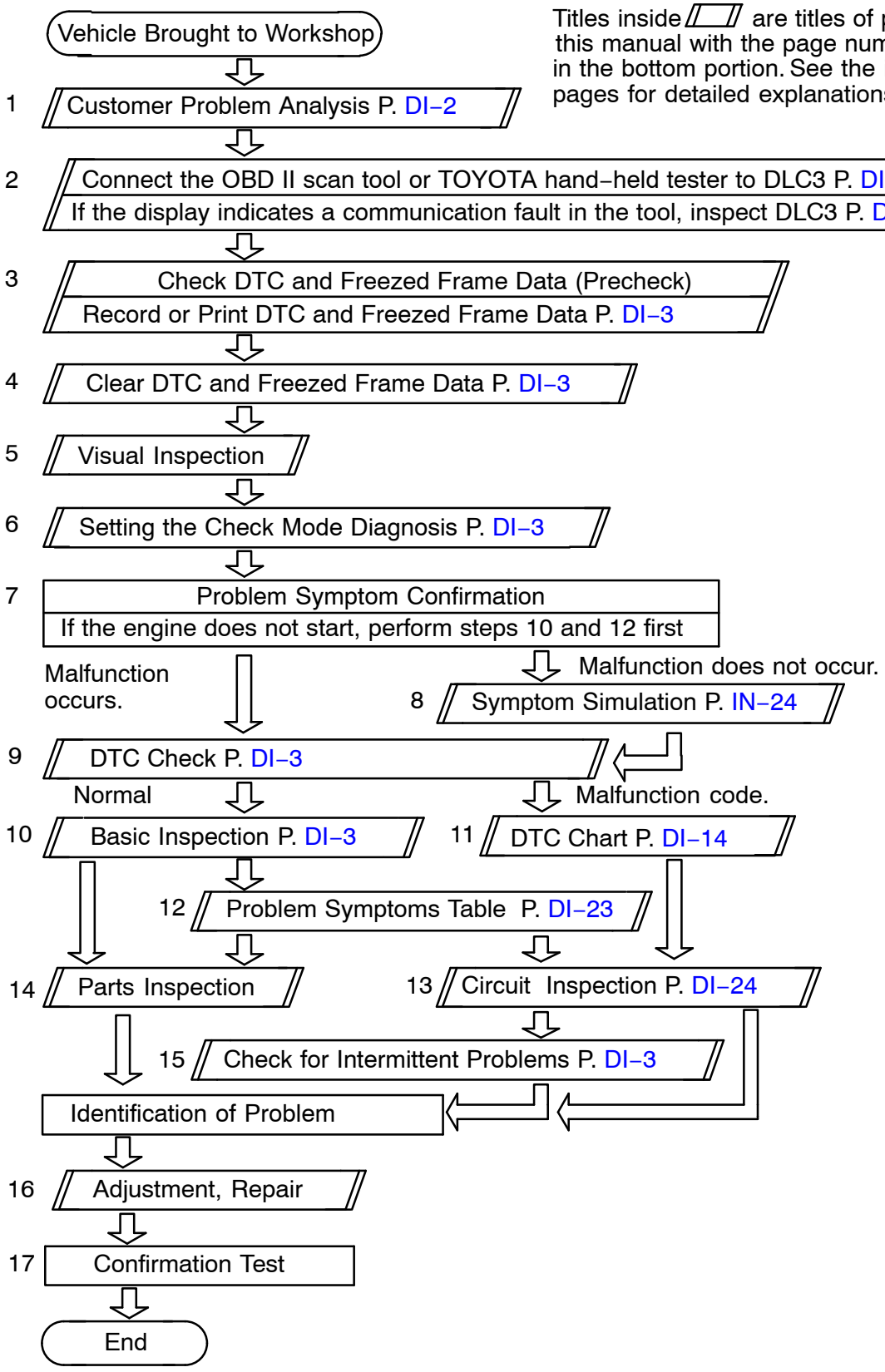
ENGINE

DI078–05

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot 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.

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DI079–05

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 Temperature	☐ Cold ☐ Warming up ☐ After warming up ☐ Any temperature ☐ 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 light up ☐ Does not light up
DTC Inspection	Normal Mode (Precheck)	☐ Normal	☐ Malfunction code(s) (code) ☐ Freezed frame data ( )
	Check Mode	☐ Normal	☐ Malfunction code(s) (code) ☐ Freezed frame data ( )

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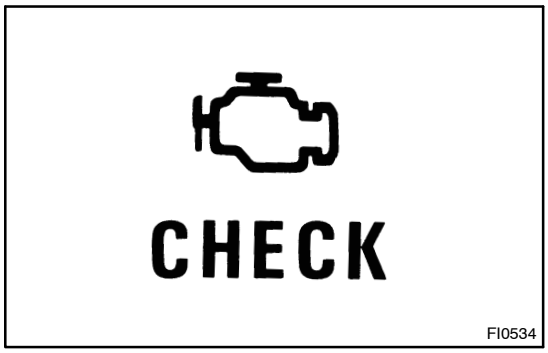
DI1UV–02



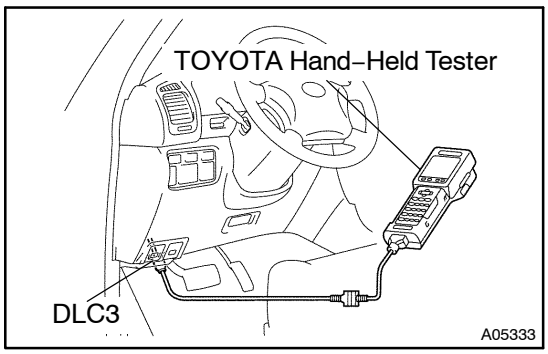
PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) Description

When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is that you connect to the vehicle the OBD II scan tool complying with SAE J1978 or TOYOTA 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 drive system components which affect vehicle emissions. In addition to the MIL lighting up when a malfunction is detected, the applicable Diagnostic Trouble Codes (DTC) prescribed by SAE J2012 are recorded in the ECM memory (See page DI–14). If the malfunction does not reoccur in 3 trips, the MIL goes off automatically but the DTCs remain recorded in the ECM memory.



To check the DTCs, connect the OBD II scan tool or TOYOTA hand–held tester to Data Link Connector 3 (DLC3) on the vehicle. The OBD II scan tool or TOYOTA hand–held tester also enables you to erase the DTCs and check freezed frame data and various forms of engine data. (For operating instructions, see the OBD II scan tool's instruction book.)

DTCs include SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set as prescribed by the SAE, while manufacturer controlled codes can be set freely by the manufacturer within the prescribed limits. (See DTC chart on page DI–14)

The diagnosis system operates in normal mode during normal vehicle use. It also has a check mode for technicians to simulate malfunction symptoms and troubleshoot. Most DTCs use 2 trip detection logic* to prevent erroneous detection, and ensure thorough 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. (TOYOTA hand–held tester only) (See step 2)

*2 trip detection logic: When a logic malfunction is first detected, the malfunction is temporarily stored in the ECM memory. If the same malfunction is detected again during the second drive test, this second detection causes the MIL to light up.

The 2 trip repeats the same mode a 2nd time. (However, the IG switch must be turned OFF between the 1st trip and 2nd trip.)

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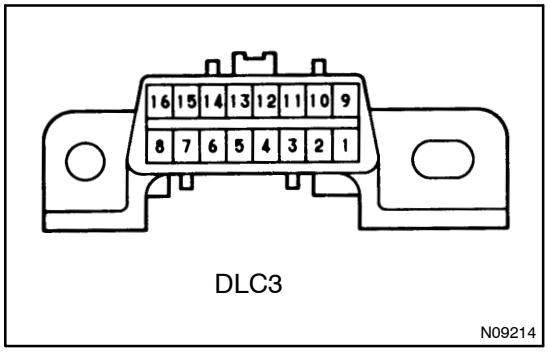
Freeze frame data:
Freeze frame data records the engine condition when a misfire (DTC P0300 ~ P0308) or fuel trim malfunction (DTC P0171, P0172) or other malfunction (first malfunction only), is detected.
Because freeze frame data records the engine conditions (fuel system, calculator load, engine coolant 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 warmed up or not, the air–fuel ratio 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 DTCs according to the following priorities.

(1) DTCs other than fuel trim malfunction (DTC P0171, P0172) and misfire (DTC P0300 ~ P0308).



DLC3

(2) Fuel trim malfunction (DTC P0171, P0172).
(3) Misfire (DTC P0300 ~ P0308).

(b) Check the DLC3.
The vehicle's ECM uses the ISO 9141–2 communication protocol. 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 TOYOTA 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.

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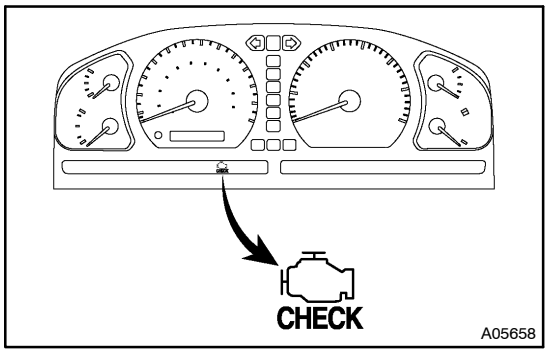

2. INSPECT DIAGNOSIS (Normal Mode)

(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–2).

(2) When the engine started, the MIL should go off. If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system.

(b) Check the DTC.

NOTICE:

TOYOTA hand–held tester only: When the diagnosis system is switched from normal mode to check mode, it erases all DTCs and freezed frame data recorded in normal mode. So before switching modes, always check the DTCs and freezed frame data, and note them down.

(1) Prepare the OBD II scan tool (complying with SAE J1978) or TOYOTA hand–held tester.

(2) Connect the OBD II scan tool or TOYOTA hand–held tester to DLC3 at the lower left of the instrument panel.

(3) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand–held tester switch ON.

(4) Use the OBD II scan tool or TOYOTA hand–held tester to check the DTCs and freezed frame data, note them down. (For operating instructions, see the OBD II scan tool's instruction book.)

(5) See DI–14 to confirm the details of the DTCs.

NOTICE:

When simulating symptoms with an OBD II scan tool (excluding TOYOTA hand–held tester) to check the DTCs, use normal mode. For code on the DTC chart subject to "2 trip detection logic", turn the ignition switch OFF after the symptom is simulated the first time. 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.

(c) Clear the DTC.

The DTCs and freezed frame data will be erased by either action.

(1) Operating the OBD II scan tool (complying with SAE J1978) or TOYOTA 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 and THROTTLE fuses.

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NOTICE:
If the TOYOTA hand–held tester switches the ECM from normal mode to check mode or vice–versa, or if the ignition switch is turned from ON to ACC or OFF during check mode, the DTCs and freezed frame data will be erased.

3. INSPECT DIAGNOSIS (Check Mode)

TOYOTA hand–held tester only:

Compared to the normal mode, the check mode has an increased sensitivity 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.

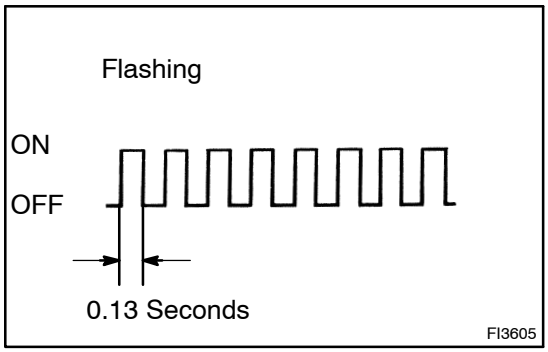
(1) Initial conditions
- Battery positive voltage 11V or more.
- Throttle valve fully closed.
- Transmission in ”P” or ”N” position.
- Air conditioning switched OFF.

(2) Turn the ignition switch OFF.

(3) Prepare the TOYOTA hand–held tester.

(4) Connect the TOYOTA hand–held tester to the DLC3 in the fuse box at the lower left of the instrument panel.

(5) Turn the ignition switch ON and push the TOYOTA hand–held tester switch ON.



(6) Switch the TOYOTA hand–held tester normal mode to check mode. (Check that the MIL flashes.)

NOTICE:
If the TOYOTA hand–held tester switches the ECM from normal mode to check mode or vice–versa, or if the ignition switch is turned from ON to ACC or OFF during check mode, the DTCs and freezed frame data will be erased.

(7) Start the engine. (The MIL goes out after the engine start.)

(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 TOYOTA hand–held tester diagnosis selector to check the DTCs and freezed frame data, etc.

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HINT:
Take care not to turn the ignition switch OFF. Turning the ignition switch OFF switches the diagnosis system from check mode to normal mode. so all DTCs, etc. are erased.

(10) After checking the DTC, inspect the applicable circuit.

4. FAIL–SAFE CHART

If any of the following codes is recorded, the ECM enters fail–safe mode.

DTC No.	Fail–Safe Operation	Fail–Safe Deactivation Conditions
P0100	Ignition timing fixed at 5° BTDC	Returned to normal condition
P0110	Intake air temperature is fixed at 20°C (68°F)	Returned to normal condition
P0115	Engine coolant temperature is fixed at 80°C (176°F)	Returned to normal condition
P0135 P0141 P0155 P0161	The heater circuit in which an abnormality is detected is turned off	Ignition switch OFF
P0325 P0330	Max. timing retardation	Ignition switch OFF
P1300 P1305 P1310 P1315 P1320 P1325 P1330 P1340	Fuel cut	Returned to normal condition

5. CHECK FOR INTERMITTENT PROBLEMS

TOYOTA HAND–HELD TESTER only:
By putting the vehicle's ECM in check mode, 1 trip detection logic is possible instead of 2 trip detection logic and sensitivity to detect open circuits is increased. This makes it easier to detect intermittent problems.

(1) Clear the DTCs.
(2) Set the check mode.
(3) Perform a simulation test (See page IN–24).
(4) Check the connector and terminal (See page IN–34).
(5) Handle the connector (See page IN–34).

6. BASIC INSPECTION

When the malfunction code is not confirmed in the DTC check, troubleshooting should be performed in the order for all possible circuits to be considered as the causes 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, use of this check is essential in engine troubleshooting.

1	**Is battery positive voltage 11 V or more when engine is stopped?**

NO → **Charge or replace battery.**

YES

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2	**Is engine cranked?**

NO → **Proceed to page ST–16, ST–18 and continue to troubleshoot.**

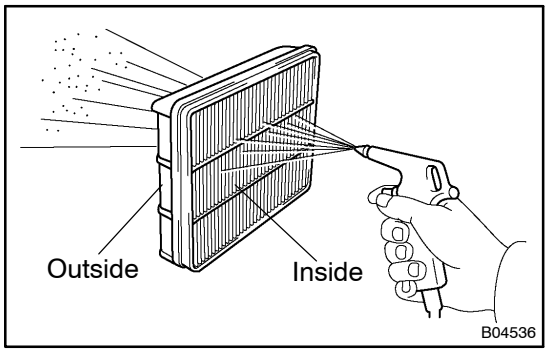
YES

3	**Does engine start?**

NO → **Go to step 7.**

YES

4	**Check air filter.**



PREPARATION:
Remove the air filter.
CHECK:
Visual check that the air filter is not dirty or excessive oily.
HINT:
If necessary, clean the filter with compressed air. First blow from inside thoroughly, then blow from outside of the filter.

NG → **Repair or replace**

OK

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5	Check idle speed.

PREPARATION:

(a) Warm up the engine to normal operating temperature.
(b) Switch off all accessories.
(c) Switch off air conditioning.
(d) Shift transmission into ”N” position.
(e) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3 on the vehicle.

CHECK:

Use CURRENT DATA to check the idle speed.

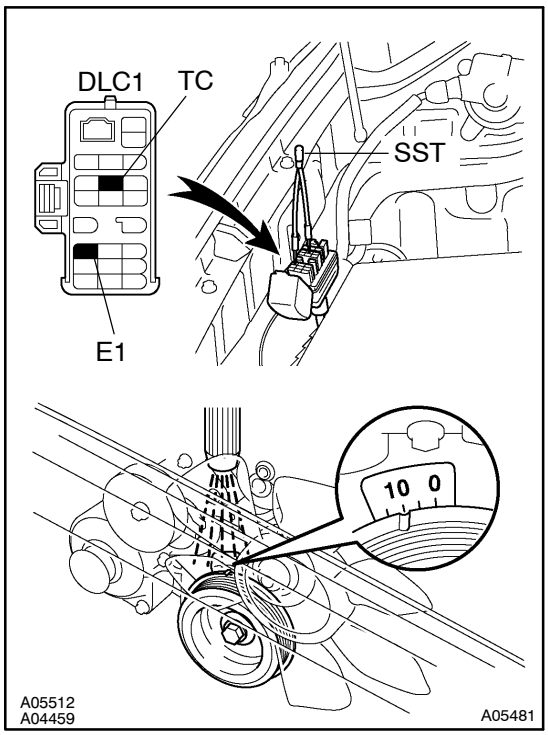
OK:

Idle speed: 650 ~ 750 rpm

NG → **Proceed to problem symptoms table on page DI–23.**

OK

6	Check ignition timing.



PREPARATION:

(a) Warm up the engine to normal operating temperature.
(b) Shift transmission into ”N” position.
(c) Keep the engine speed at idle.
(d) Using SST, connect terminals TC and E1 of the DLC1.
SST 09843–18020
(e) Using a timing light, connect the tester to the ignition coil connector wire (See page EM–9).

CHECK:

Check 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 on page DI–23.

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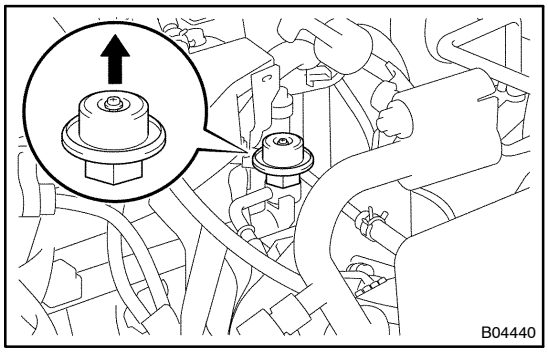
7	Check fuel pressure.



PREPARATION:

(a) Be sure that enough fuel is in the tank.
(b) Connect the TOYOTA hand–held tester to the DLC3.
(c) Turn the ignition switch ON and push TOYOTA hand–held tester main switch ON.
(d) Use ACTIVE TEST mode to operate the fuel pump.
(e) Please refer to the TOYOTA hand–held tester operator's manual for further details.
(f) If you have no TOYOTA hand–held tester, connect the positive (+) and negative (–) leads from the battery to the fuel pump connector (See page SF–7).

CHECK:

Check that pulsation damper screw rises up when fuel pump operates.

HINT:

At this time, you will hear a fuel flowing noise.

NG → **Proceed to page SF–7 and continue to troubleshoot.**

OK

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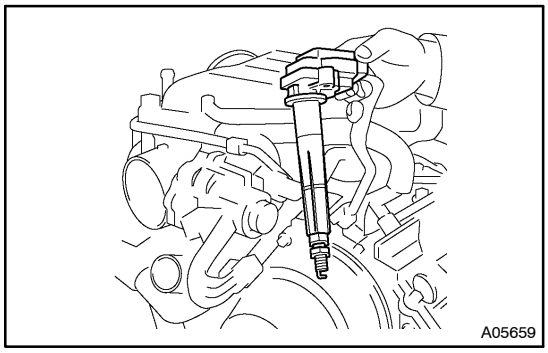
8	Check for spark.



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) Ground the spark plug.

CHECK:

Check if spark occurs while engine is being cranked.

NOTICE:

To prevent excess fuel being injected from the injectors during this test, don't crank the engine for more than 5 ~ 10 seconds at a time.

NG → **Proceed to page IG–1 and continue to troubleshoot.**

OK

Proceed to problem symptoms table on page DI–23.

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 varies from those listed here. So do not decide whether a part is faulty or not solely according to the "Normal Condition" here.

(a) CARB mandated signals.

TOYOTA 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: 12.0 ~ 18.0 % Racing without load (2,500rpm): 11.0 ~ 17.0 %
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 %

*: If no conditions are specifically stated for "Idling", it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.

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TOYOTA hand–held tester display	Measurement Item	Normal Condition*
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 5 ~ 15°
INTAKE AIR	Intake Air Temp. Sensor Value	Equivalent to ambient temp.
MAF	Air Flow Rate Through Mass Air Flow Meter	Idling: 4.5 ~ 5.5 gm/sec. Racing without load (2,500 rpm): 13.0 ~ 20.0 gm/sec.
THROTTLE POS	Voltage Output of Throttle Position Sensor Calculated as a percentage: 0 V → 0 %, 5 V → 100 %	Throttle fully closed: 8 ~ 20 % Throttle fully open: 64 ~ 96 %
O2S B1, S1	Voltage Output of Oxygen Sensor Bank 1, Sensor 1	Idling: 0.1 ~ 0.9 V
O2S B1, S2	Voltage Output of Oxygen Sensor Bank 1, Sensor 2	Driving (50 km/h, 31 mph): 0.1 ~ 0.9 V
O2S B2, S1	Voltage Output of Oxygen Sensor Bank 2, Sensor 1	Idling: 0.1 ~ 0.9 V
O2S B2, S2	Voltage Output of Oxygen Sensor Bank 2, Sensor 2	Driving (50 km/h, 31 mph): 0.1 ~ 0.9 V
O2FT B1, S1	Oxygen Sensor Fuel Trim Bank 1, Sensor 1 (Same as SHORT FT #1)	0 ± 20 %
O2FT B2, S1	Oxygen Sensor Fuel Trim Bank 2, Sensor 1 (Same as SHORT FT #2)	0 ± 20 %

*: If no conditions are specifically stated for ”Idling”, it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.

(b) TOYOTA Enhanced Signals.

TOYOTA 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: 2.1 ~ 3.9 ms
STARTER SIG	Starter Signal	Cranking: ON
A/C SIG	A/C Switch Signal	A/C ON: ON
PNP SW	Park/Neutral Position Switch Signal	P or N position: ON
CTP	Closed Throttle Position	Throttle fully closed: ON
STOP LIGHT SW	Stop Light Switch Signal	Stop light switch ON: 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#8	Abnormal revolution variation for each cylinder	0 %
IGNITION	Total number of ignition for every 1,000 revolutions	0 ~ 4,000
FUEL PUMP	Fuel Pump Signal	Idling: ON
EVAP (PURGE) VSV	EVAP VSV Signal	VSV operating: ON
VAPOR PRESS VSV	Vapor Pressure VSV Signal	VSV operating: ON

*: If no conditions are specifically stated for ”Idling”, it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.

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TOYOTA hand–held tester display	Measurement Item	Normal Condition*
THROTTLE POS #2	Throttle position sensor No.2 output voltage	Throttle fully closed: 2.0 ~ 2.9 V Throttle fully open: 4.7 ~ 5.1 V
ACCEL POS	Accelerator pedal position sensor No.1 output voltage	Accelerator pedal released: 0.3 ~ 0.9 V Accelerator pedal depressed: 3.2 ~ 4.8 V
ACCEL POS #2	Accelerator pedal position sensor No.2 output voltage	Accelerator pedal released: 1.8 ~ 2.7 V Accelerator pedal depressed: 4.7 ~ 5.1 V
THROTTLE TARGET POS	Target position of throttle valve	Idling: 0.4 ~ 1.1 V
THROTTLE OPEN DUTY	Throttle motor opening duty ratio	Throttle fully closed: 0 % When accelerator pedal is depressed, duty ratio is increased
THROTTLE CLOSE DUTY	Throttle motor closed duty ratio	Throttle fully closed: 0 % When accelerator pedal is quick released, duty ratio is increased
THROTTLE MOTOR CTL	Whether or not throttle motor control is permitted	Idling: ON
THROTTLE CLUTCH CTL	Whether or not magnetic clutch control is permitted	Idling: ON
+BM	Whether or not electric throttle control system power is inputted	Idling: ON
ACCEL IDL	Whether or not accelerator pedal position sensor is detecting idle	Idling: ON
THROTTLE IDL	Whether or not throttle position sensor is detecting idle	Idling: ON
FAIL #1	Whether or not fail safe function is executed	ETCS is failed: ON
FAIL #2	Whether or not fail safe function is executed	ETCS is failed: ON
THROTTLE LEAN VALUE	Throttle fully closed learning value	0.4 ~ 0.8 V
ACCEL LEAN VALUE	Accelerator fully closed learning value	0.4 ~ 0.8 V
THROTTLE MOTOR	Throttle motor control current	Idling: 0 ~ 3.0 A
ETCS MAG CLUTCH	Magnetic clutch control current	0.8 ~ 1.0 A
TOTAL FT B1	Total Fuel Trim Bank 1: Average value for fuel trim system of bank 1	Idling: 0.5 ~ 1.4
TOTAL FT B2	Total Fuel Trim Bank 2: Average value for fuel trim system of bank 2	Idling: 0.5 ~ 1.4
O2 LR B1, S1	Oxygen Sensor Lean Rich Bank 1, Sensor 1 Response time for oxygen sensor output to switch from lean to rich	Idling after warming up: 0 ~ 1,000 msec.
O2 LR B2, S1	Oxygen Sensor Lean Rich Bank 2, Sensor 1 Response time for oxygen sensor output to switch from lean to rich	Idling after warming up: 0 ~ 1,000 msec.
O2 RL B1, S1	Oxygen Sensor Rich Lean Bank 1, Sensor 1 Response time for oxygen sensor output to switch from rich to lean	Idling after warming up: 0 ~ 1,000 msec.
O2 RL B2, S1	Oxygen Sensor Rich Lean Bank 1, Sensor 1 Response time for oxygen sensor output to switch from rich to lean	Idling after warming up: 0 ~ 1,000 msec.

*: If no conditions are specifically stated for ”Idling”, it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.

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DI1L4–03

DIAGNOSTIC TROUBLE CODE CHART

1. SAE Controlled

HINT:

Parameters listed in the chart may not be exactly the same as your reading due to the type of instrument or other factors.

If a malfunction code is displayed during the DTC check in check mode, check the circuit for that code listed in the table below. For details of each code, turn to the page referred to under the "See Page" for the respective "DTC No." in the DTC chart.

DTC No. (See Page)	Detection Item	Trouble Area	MIL*	Memory
P0100 (DI–24)	Mass Air Flow Circuit Malfunction	• Open or short in mass air flow meter circuit • Mass air flow meter • ECM	○	○
P0101 (DI–28)	Mass Air Flow Circuit Range/Performance Problem	• Mass air flow meter	○	○
P0110 (DI–29)	Intake Air Temp. Circuit Malfunction	• Open or short in intake air temp. sensor circuit • Intake air temp. sensor (inside mass air flow meter) • ECM	○	○
P0115 (DI–33)	Engine Coolant Temp. Circuit Malfunction	• Open or short in engine coolant temp. sensor circuit • Engine coolant temp. sensor • ECM	○	○
P0116 (DI–37)	Engine Coolant Temp. Circuit Range/Performance Problem	• Engine coolant temp. sensor • Cooling system	○	○
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–44)	Throttle/Pedal Position Sensor/Switch "A" Circuit Range/Performance Problem	• Throttle position sensor • ECM	○	○
P0125 (DI–45)	Insufficient Coolant Temp. for Closed Loop Fuel Control	• Fuel system • Injector • Ignition system • Gas leakage on exhaust system • Open or short in heated oxygen sensor circuit • Heated oxygen sensor	○	○
P0130 (DI–49)	Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 1)	• Heated oxygen sensor • Fuel trim malfunction	○	○
P0133 (DI–52)	Heated Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)	• Heated oxygen sensor	○	○
P0135 (DI–53)	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 1)	• Open or short in heater circuit of heated oxygen sensor • Heated oxygen sensor heater • ECM	○	○
P0136 (DI–55)	Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	• Heated oxygen sensor	○	○
P0141 (DI–53)	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)	• Same as DTC No. P0135	○	○

*: MIL lights up

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DTC No. (See Page)	Detection Item	Trouble Area	MIL	Memory
P0150 (DI–49)	Heated Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 1)	• Same as DTC No. P0130	○ *1	○
P0153 (DI–52)	Heated Oxygen Sensor Circuit Slow Response (Bank 2 Sensor 1)	• Same as DTC No. P0133	○ *1	○
P0155 (DI–53)	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 2 Sensor 1)	• Same as DTC No. P0135	○ *1	○
P0156 (DI–55)	Heated Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)	• Same as DTC No. P0136	○ *1	○
P0161 (DI–53)	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 2 Sensor 2)	• Same as DTC No. P0135	○ *1	○
P0171 (DI–57)	System too Lean (Fuel Trim)	• Air intake (hose loose) • Fuel line pressure • Injector blockage • Heated oxygen sensor malfunction • Mass air flow meter • Engine coolant temp. sensor • Gas leakage on exhaust system	○ *1	○
P0172 (DI–57)	System too Rich (Fuel Trim)	• Fuel line pressure • Injector leak, blockage • Heated oxygen sensor malfunction • Mass air flow meter • Engine coolant temp. sensor • Gas leakage on exhaust system	○ *1	○
P0300 (DI–61)	Random/Multiple Cylinder Misfire Detected	• Ignition system • Injector • Fuel line pressure • Compression pressure • Valve clearance not to specification • Valve timing • Mass air flow meter • Engine coolant temp. sensor • Open or short in engine wire • Connector connection • ECM	○ *2	○
P0301 P0302 P0303 P0304 P0305 P0306 P0307 P0308 (DI–61)	Misfire Detected – Cylinder 1 – Cylinder 2 – Cylinder 3 – Cylinder 4 – Cylinder 5 – Cylinder 6 – Cylinder 7 – Cylinder 8			
P0325 (DI–67)	Knock Sensor 1 Circuit Malfunction	• Open or short in knock sensor 1 circuit • Knock sensor 1 (looseness) • ECM	○ *1	○
P0330 (DI–67)	Knock Sensor 2 Circuit Malfunction	• Open or short in knock sensor 2 circuit • Knock sensor 2 (looseness) • ECM	○ *1	○
P0335 (DI–71)	Crankshaft Position Sensor ”A” Circuit Malfunction	• Open or short in crankshaft position sensor circuit • Crankshaft position sensor • Starter • ECM	○ *1	○

*1: MIL lights up

*2: MIL lights up or blinking

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DTC No. (See Page)	Detection Item	Trouble Area	MIL	Memory
P0340 (DI–74)	Camshaft Position Sensor Circuit Malfunction	• Open or short in camshaft position sensor circuit • Camshaft position sensor • Starter • ECM	○ *1	○
P0420 (DI–76)	Catalyst System Efficiency Below Threshold (Bank 1)	• Gas leakage on exhaust system • Three way catalytic convertor • Open or short in heated oxygen sensor circuit • Heated oxygen sensor	○ *1	○
P0430 (DI–76)	Catalyst System Efficiency Below Threshold (Bank 2)	• Same as DTC No. P0420	○ *1	○
P0440 (DI–79)	Evaporative Emission Control System Malfunction	• Vapor pressure sensor • Fuel tank cap incorrectly installed • Fuel tank cap cracked or damaged • Vacuum hose cracked, hole, blocked, damaged or disconnected • Hose or tube cracked, hole, damaged or loose seal • Fuel tank cracked, hole or damaged • Charcoal canister cracked, hole or damaged	○ *1	○
P0441 (DI–85)	Evaporative Emission Control System Incorrect Purge Flow	• Open or short in VSV circuit for vapor pressure sensor • VSV for vapor pressure sensor • Open or short in vapor pressure sensor circuit • Vapor pressure sensor	○ *1	○
P0446 (DI–85)	Evaporative Emission Control System Vent Control Malfunction	• Open or short in VSV circuit for EVAP • VSV for EVAP • Vacuum hose cracked, hole, blocked damaged or disconnected • Charcoal canister cracked, hole or damaged	○ *1	○
P0450 (DI–97)	Evaporative Emission Control System Pressure Sensor Malfunction	• Open or short in vapor pressure sensor circuit • Vapor pressure sensor • ECM	○ *1	○
P0451 (DI–97)	Evaporative Emission Control System Pressure Sensor Range/Performance		○ *1	○
P0500 (DI–100)	Vehicle Speed Sensor Malfunction	• Open or short in No.1 vehicle speed sensor circuit • No.1 vehicle speed sensor • Combination meter • ECM	○ *1	○
P0505 (DI–103)	Idle Control System Malfunction	• Electric throttle control system • Air intake (hose loose)	○ *1	○

*1: MIL lights up

2. Manufacturer Controlled

DTC No. (See Page)	Detection Item	Trouble Area	MIL*	Memory
P1120 (DI–104)	Accelerator Pedal Position Sensor Circuit Malfunction	• Open or short in accelerator pedal position sensor circuit • Accelerator pedal position sensor • ECM	○	○
P1121 (DI–109)	Accelerator Pedal Position Sensor Range/Performance Problem	• Accelerator pedal position sensor • ECM	○	○

*: MIL lights up

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DTC No. (See Page)	Detection Item	Trouble Area	MIL*	Memory
P1125 (DI–110)	Throttle Control Motor Circuit Malfunction	• Open or short in throttle control motor circuit • Throttle control motor • ECM	○	○
P1126 (DI–113)	Magnetic Clutch Circuit Malfunction	• Open or short in magnetic clutch circuit • Magnetic clutch • ECM	○	○
P1127 (DI–116)	ETCS Actuator Power Source Circuit Malfunction	• Open in ETCS power source circuit • ECM	○	○
P1128 (DI–118)	Throttle Control Motor Lock Malfunction	• Throttle control motor • Throttle body assembly • ECM	○	○
P1129 (DI–120)	Electric Throttle Control System Malfunction	• Electric throttle control system • ECM	○	○
P1200 (DI–121)	Fuel Pump Relay/ECU Circuit Malfunction	• Open or short in fuel pump ECU • Fuel pump ECU • ECM power source circuit • Fuel pump • ECM	–	○
P1300 (DI–126)	Igniter Circuit Malfunction (No.1)	• 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–126)	Igniter Circuit Malfunction (No.2)	• 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–126)	Igniter Circuit Malfunction (No.3)	• 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–126)	Igniter Circuit Malfunction (No.4)	• 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–126)	Igniter Circuit Malfunction (No.5)	• 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–126)	Igniter Circuit Malfunction (No.6)	• Open or short in IGF1 or IGT6 circuit from No.6 ignition coil with igniter to ECM • No.6 ignition coil with igniter • ECM	○	○
P1330 (DI–126)	Igniter Circuit Malfunction (No.7)	• Open or short in IGF1 or IGT7 circuit from No.7 ignition coil with igniter to ECM • No.7 ignition coil with igniter • ECM	○	○

*: – • • • MIL does not light up, ○ • • • MIL lights up

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DTC No. (See Page)	Detection Item	Trouble Area	MIL*	Memory
P1335 (DI–133)	Crankshaft Position Sensor Circuit Malfunction (during engine running)	• Open or short in crankshaft position sensor circuit • Crankshaft position sensor • Starter • ECM	–	○
P1340 (DI–126)	Igniter Circuit Malfunction (No.8)	• Open or short in IGF2 or IGT8 circuit from No.8 ignition coil with igniter to ECM • No.8 ignition coil with igniter • ECM	○	○
P1520 (DI–134)	Stop Light Switch Signal Malfunction	• Short in stop light switch signal circuit • Stop light switch • ECM	○	○
P1600 (DI–137)	ECM BATT Malfunction	• Open in back up power source circuit • ECM	○	○
P1633 (DI–139)	ECM Malfunction (ETCS Circuit)	• ECM	○	○
P1780 (DI–140)	Park/Neutral Position Switch Malfunction	• Short in park/neutral position switch circuit • Park/neutral position switch • ECM	○	○

*: – • • • MIL does not light up, ○ • • • MIL lights up

DTC No. (See Page)	Detection Item	Trouble Area	MIL*	Memory
B2785 (DI–548)	Ignition Switch ON Malfunction	• Ignition switch • Mainrelay • Wireharness	–	○
B2786 (DI–548)	Ignition Switch OFF Malfunction		–	○
B2791 (DI–552)	Key Unlock Warning Switch OFF Malfunction	• Key unlock warning switch • Mainrelay • Wireharness	–	○
B2795 (DI–554)	Unmatch Key Code	• Key • Unregistered key inserted before?	–	○
B2796 (DI–555)	No Communication in Immobilizer System	• Key • Transponder key coil • Amplifier • Wireharness • ECM	–	○
B2797 (DI–557)	Communication Malfunction No.1	• Communication contests • Unregistered key inserted before?	–	○
B2798 (DI–559)	Communication Malfunction No.2	• Key • Transponder key coil • Amplifier • Wireharness • ECM	–	○

*: – • • • MIL does not light up

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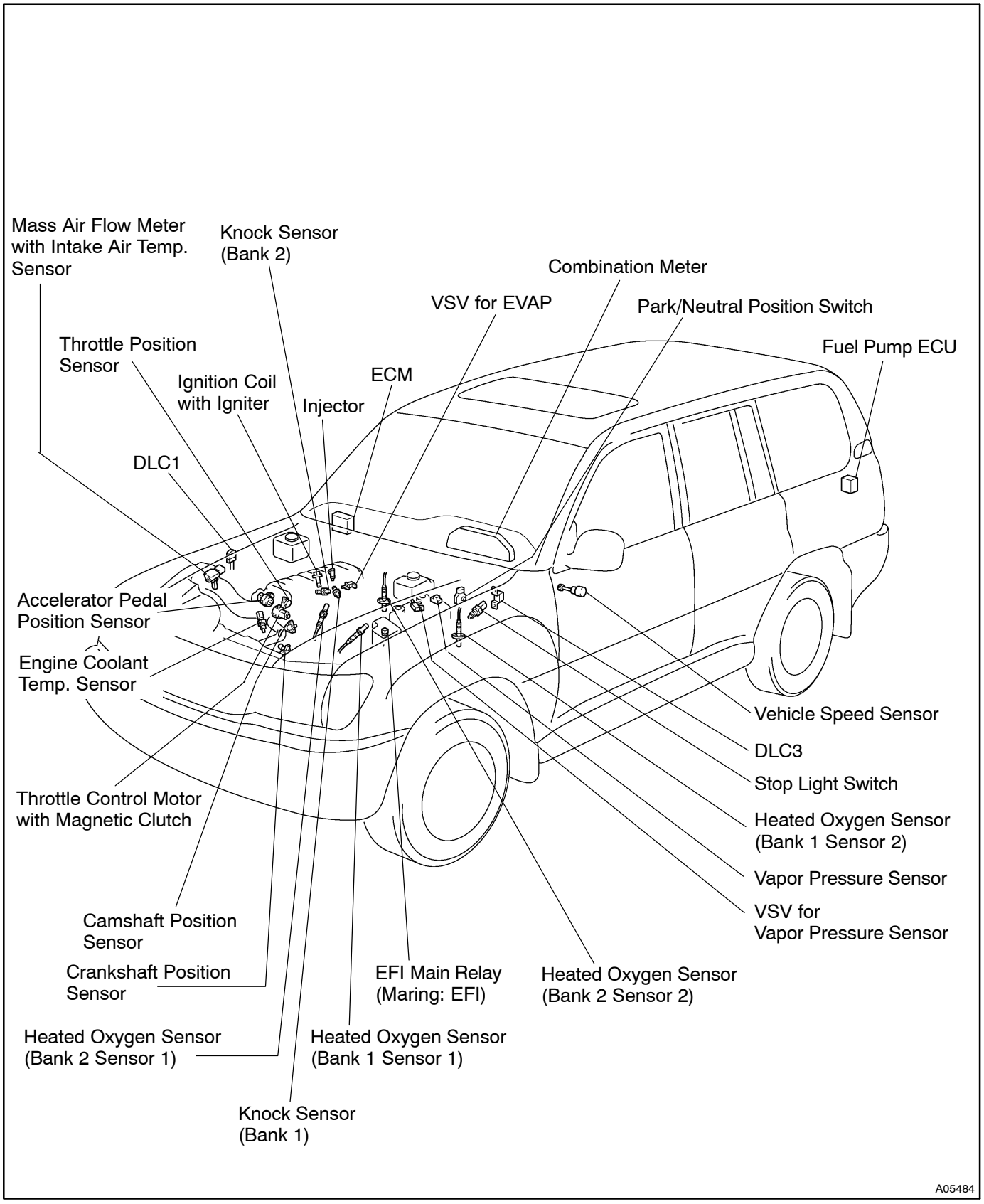
DI1L5–03

PARTS LOCATION



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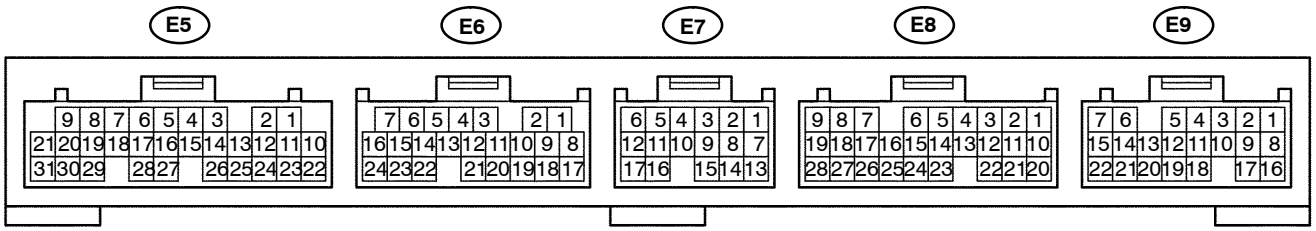
DI1L7–02

TERMINALS OF ECM

ECM Terminals



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Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
BATT (E9–1) – E1 (E6–17)	B–R ↔ BR	Always	9 ~ 14
+BM (E9–7) – E1 (E6–17)	Y–B ↔ BR		
IGSW (E9–9) – E1 (E6–17)	B–R ↔ BR	IG switch ON	9 ~ 14
+B (E9–16) – E1 (E6–17)	B–Y ↔ BR		
+B1 (E9–8) – E1 (E6–17)	B–Y ↔ BR		
MREL (E9–10) – E1 (E6–17)	B–W ↔ BR	IG switch ON	9 ~ 14
VC (E6–2) – E2 (E6–18)	L–R ↔ BR–W	IG switch ON	4.5 ~ 5.5
VG (E6–10) – EVG (E6–19)	L–Y ↔ G–W	Idling, P or N position, A/C switch OFF	0.5 ~ 3.0
THA (E6–22) – E2 (E6–18)	Y–B ↔ BR–W	Idling, Intake air temp. 20°C (68°F)	0.5 ~ 3.4
THW (E6–14) – E2 (E6–18)	G–B ↔ BR–W	Idling, Engine coolant temp. 80°C (176°F)	0.2 ~ 1.0
VTA (E6–13) – E2 (E6–18)	R–Y ↔ BR–W	IG switch ON Accelerator pedal released	0.4 ~ 1.0
		IG switch ON Accelerator pedal depressed	3.2 ~ 4.8
VTA2 (E6–20) – E2 (E6–18)	Y–B ↔ BR–W	IG switch ON Accelerator pedal released	2.0 ~ 2.9
		IG switch ON Accelerator pedal depressed	4.7 ~ 5.1
VPA (E6–21) – E2 (E6–18)	P ↔ BR–W	IG switch ON Accelerator pedal released	0.3 ~ 0.9
		IG switch ON Accelerator pedal depressed	3.2 ~ 4.8
VPA2 (E6–9) – E2 (E6–18)	R–B ↔ BR–W	IG switch ON Accelerator pedal released	1.8 ~ 2.7
		IG switch ON Accelerator pedal depressed	4.7 ~ 5.1
OXL1 (E6–12) – E1 (E6–17) OXL2 (E8–18) – E1 (E6–17) OXR1 (E6–11) – E1 (E6–17) OXR2 (E8–27) – E1 (E6–17)	B ↔ BR B ↔ BR W ↔ BR W ↔ BR	Maintain engine speed at 2,500 rpm for 2 minutes after warming up	Pulse generation (See page DI–76)
HTL (E6–4) – E1 (E6–17) HTL2 (E8–8) – E1 (E6–17)	R ↔ BR L ↔ BR	Idling	Below 3.0
HTR (E6–3) – E1 (E6–17) HTR2 (E8–7) – E1 (E6–17)	Y ↔ BR R–B ↔ BR	IG switch ON	9 ~ 14

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Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
#1 (E6–5) – E01 (E5–21) #2 (E6–6) – E01 (E5–21) #3 (E5–1) – E01 (E5–21) #4 (E5–2) – E01 (E5–21) #5 (E5–3) – E01 (E5–21) #6 (E5–4) – E01 (E5–21) #7 (E5–5) – E01 (E5–21) #8 (E5–6) – E01 (E5–21)	Y ↔ W–B B ↔ W–B L ↔ W–B R ↔ W–B G ↔ W–B R–L ↔ W–B W ↔ W–B B–W ↔ W–B	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–61)
KNKL (E5–18) – E1 (E6–17)	B ↔ BR	Maintain engine speed at 4,000 rpm after warming up	Pulse generation (See page DI–67)
KNKR (E5–17) – E1 (E6–17)	W ↔ BR		
G2 (E5–10) – NE– (E5–22)	R ↔ G	Idling	Pulse generation (See page DI–71)
NE+ (E5–23) – NE– (E5–22)	L ↔ G		
PRG (E6–7) – E1 (E6–17)	L–B ↔ BR	IG switch ON	9 ~ 14
TPC (E8–10) – E1 (E6–17)	L ↔ BR	IG switch ON	9 ~ 14
PTNK (E8–22) – E2 (E6–18)	L–B ↔ BR–W	Ignition switch ON	2.9 ~ 3.7
		Apply vacuum 3.5 kPa (26 mmHg, 1.0 in. Hg)	Below 0.5
SPD (E8–15) – E1 (E6–17)	V ↔ BR	IG switch ON Rotate driving wheel slowly	Pulse generation (See page DI–100)
CL+ (E5–29) – CL– (E5–24)	G–W ↔ G–B	Idling	Pulse generation (See page DI–113)
M+ (E5–8) – E1 (E6–17) M– (E5–7) – E1 (E6–17)	R ↔ BR W ↔ BR	Idling	Pulse generation (See page DI–110)
DI (E9–4) – E1 (E6–17)	G–R ↔ BR	IG switch ON	9 ~ 14
FPC (E9–5) – E1 (E6–17)	G–W ↔ BR	IG switch ON	0 ~ 3.0
IGT1 (E5–11) – E1 (E6–17) IGT2 (E5–12) – E1 (E6–17) IGT3 (E5–13) – E1 (E6–17) IGT4 (E5–14) – E1 (E6–17) IGT5 (E5–15) – E1 (E6–17) IGT6 (E5–16) – E1 (E6–17) IGT7 (E5–25) – E1 (E6–17) IGT8 (E5–26) – E1 (E6–17)	B ↔ BR R ↔ BR L ↔ BR G ↔ BR Y ↔ BR B–Y ↔ BR B–L ↔ BR L–B ↔ BR	Idling	Pulse generation (See page DI–126)
IGF1 (E5–27) – E1 (E6–17) IGF2 (E5–28) – E1 (E6–17)	B–W ↔ BR B–R ↔ BR	IG switch ON	4.5 ~ 5.5
		Idling	Pulse generation (See page DI–126)
STP (E8–6) – E1 (E6–17)	G–W ↔ BR	Brake pedal is depressed	7.5 ~ 14
		Brake pedal is released	Below 1.5
STA (E8–17) – E1 (E6–17)	B–R ↔ BR	Shift lever position P or N position, ignition switch START	6.0 or more
NSW (E8–20) – E1 (E6–17)	B–W ↔ BR	IG switch ON Other shift position in ”P” ,”N” position	9 ~ 14
		IG switch ON Shift position in ”P” ,”N” position	0 ~ 3.0
W (E9–6) – E1 (E6–17)	W ↔ BR	Idling	9 ~ 14
		IG switch ON	Below 3.0
ACT (E8–13) – E1 (E6–17)	L–B ↔ BR	A/C switch OFF	Below 3.0
		A/C switch ON at idling	9 ~ 14
A/C (E8–25) – E1 (E6–17)	W–G ↔ BR	A/C switch ON at idling	Below 1.5
		A/C switch OFF	7.5 ~ 14

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Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
ST1– (E9–19) – E1 (E6–17)	R–G ↔ BR	IG switch ON, Brake pedal is depressed	Below 1.5
		IG switch ON, Brake pedal is released	7.5 ~ 14
SIL (E9–11) – E1 (E6–17)	V–W ↔ BR	During transmission	Pulse generation
ELS (E8–12) – E1 (E6–17)	G–W↔ BR	Taillight switch ON, Defogger switch ON	7.5 ~ 14
		Taillight switch OFF, Defogger switch OFF	0 ~ 1.5
TACH (E8–16) – E1 (E6–17)	B ↔ BR	Idling	Pulse generation
KSW (E9–20) – E1 (E6–17)	R–B ↔ BR	At the time of inserting the key	Below 1.5
		In the condition without the key inserted	4 ~ 5
RXCK (E9–13) – E1 (E6–17)	V–G ↔ BR	At the time of inserting the key	Pulse generation
CODE (E9–12) – E1 (E6–17)	L–B ↔ BR	At the time of inserting the key	Pulse generation
TXCT (E9–14) – E1 (E6–17)	R–Y ↔ BR	At the time of inserting the key	Pulse

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DI1L9–03

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Engine does not crank (Does not start)	1. Starter 2. Starter relay	ST–16 ST–18
No initial combustion (Does not start)	1. Engine immobilizer system 2. ECM power source circuit 3. Fuel pump control circuit 4. Fuel control switch	DI–547 DI–144 DI–121 SF–32
No complete combustion (Does not start)	1. Fuel pump control circuit	DI–121
Under normal condition (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI–141 DI–121 EM–3
Cold engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI–141 DI–121
Hot engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI–141 DI–121
High engine idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. ECM power source circuit	DI–630 DI–144
Low engine idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. Fuel pump control circuit	DI–630 DI–121
Rough idling (Poor idling)	1. Compression 2. Fuel pump control circuit	EM–3 DI–121
Hunting (Poor idling)	1. ECM power source circuit 2. Fuel pump control circuit	DI–144 DI–121
Hesitation/Poor acceleration (Poor driveability)	1. Fuel pump control circuit 2. A/T faulty	DI–121 DI–166
Surging (Poor driveability)	1. Fuel pump control circuit	DI–121
Soon after starting (Engine stall)	1. Engine immobilizer system 2. Fuel pump control circuit	DI–547 DI–121
During A/C operation (Engine stall)	1. A/C signal circuit (Compressor circuit) 2. Engine control module (ECM)	DI–630 IN–24

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DI1LB–02

CIRCUIT INSPECTION

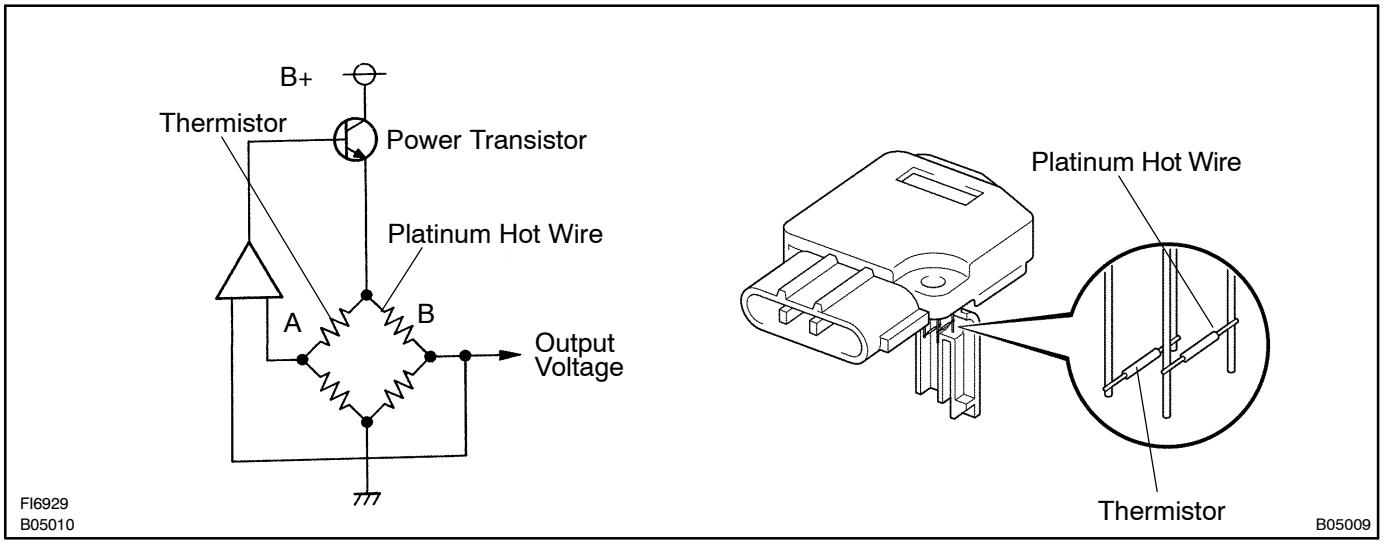
DTC	P0100	Mass Air Flow Circuit Malfunction

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 on the 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 ten measured as the output voltage of the mass air flow meter.

The circuit is constructed so that the platinum hot wire and thermistor provide a bridge circuit, with the power transistor controlled so that the potential of A and B remains equal 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 less than 4,000 rpm	• Open or short in mass air flow meter circuit • Mass air flow meter • ECM
	Open or short in mass air flow meter circuit with more than 3 sec. engine speed 4,000 rpm or more (2 trip detection logic)	

HINT:

After confirming DTC P0100 use the OBD II scan tool or TOYOTA hand–held tester to confirm the mass air flow ratio from CURRENT DATA.

Mass Air Flow Value (gm/sec.)	Malfunction
Approx. 0.0	• Mass air flow meter power source circuit open • VG circuit open or short
271.0 or more	• EVG circuit open

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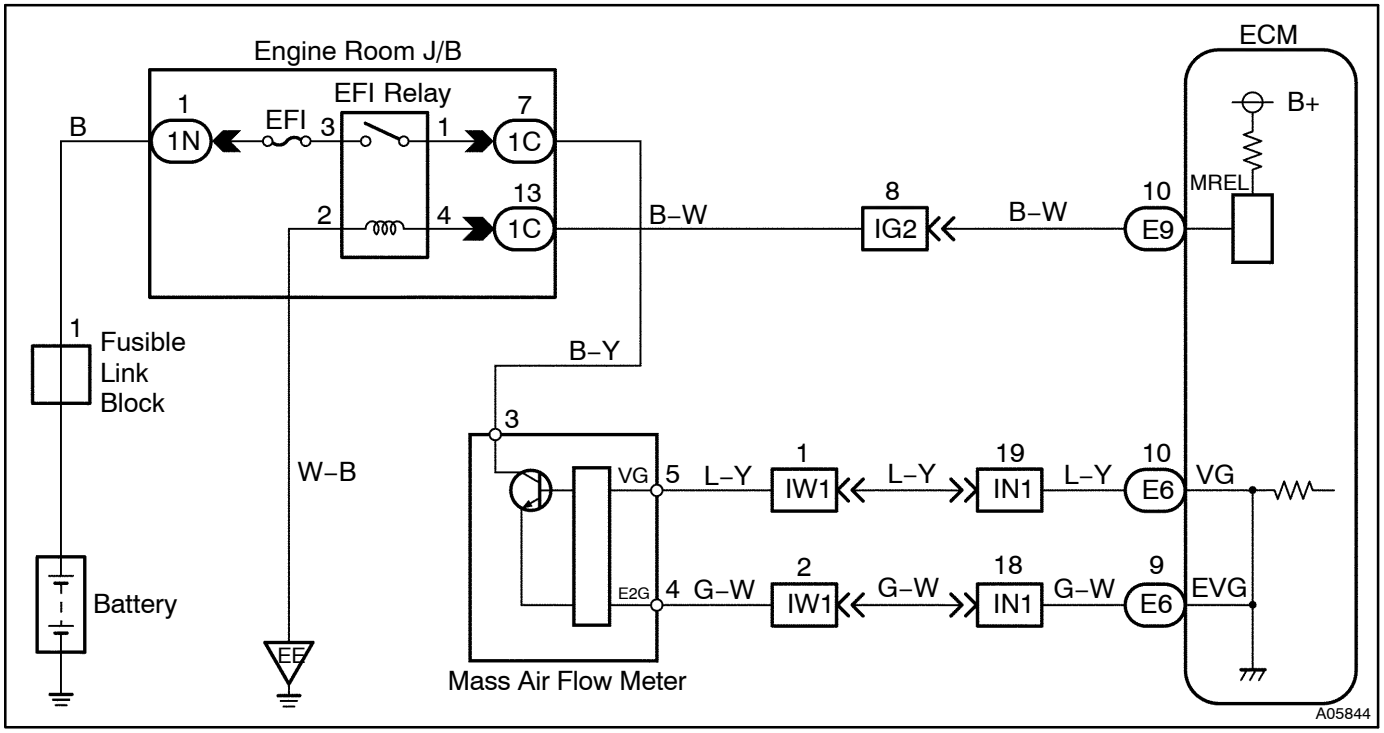
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Connect OBD II scan tool or TOYOTA hand–held tester, and read value of mass air flow rate.**

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand–held tester main switch ON.

(c) Start the engine.

CHECK:

Read mass air flow rate on the OBD II scan tool or TOYOTA hand–held tester.

RESULT:

	Type I	Type II
Mass air flow rata (gm/sec.)	0.0	271.0 or more

Type I	**Go to step 2.**
Type II	**Go to step 5.**

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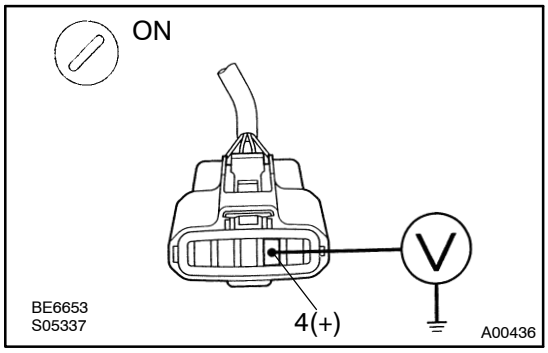
2	Check voltage of mass air flow meter power source.



PREPARATION:

(a) Disconnect the mass air flow meter connector.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal 4 of the mass air flow meter connector and body ground.

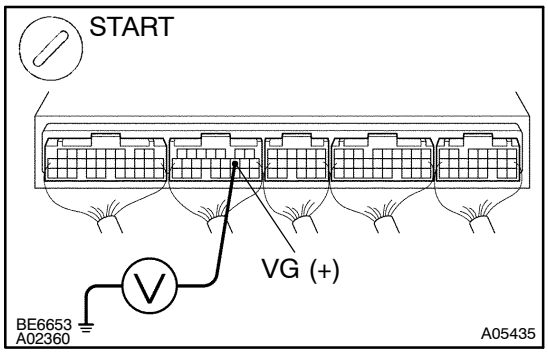
OK:

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–34).

OK

3	Check voltage between terminals VG of ECM connector and body ground.



PREPARATION:

(a) Remove the glove compartment door.

(b) Start the engine.

CHECK:

Measure voltage between terminal VG of the ECM connector and body ground while engine is idling.

OK:

Voltage:
0.5 ~ 3.0 V (P or N position and A/C switch OFF)

OK	Check and replace ECM (See page IN–34).

NG

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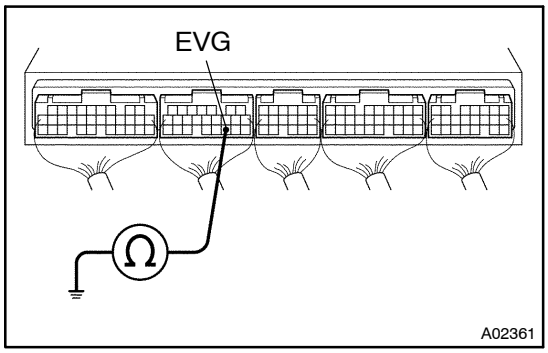
4	**Check for open and short in harness and connector between mass air flow meter and ECM (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Replace mass air flow meter.

5	**Check continuity between terminal EVG of ECM connector and body ground.**



PREPARATION:
Remove the glove compartment door.
CHECK:
Check continuity between terminal EVG of the ECM connector and body ground.
OK:
Continuity (1 Ω or less)

NG → **Check and replace ECM (See page IN–34).**

OK

6	**Check for open in harness and connector between mass air flow meter and ECM (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Replace mass air flow meter.

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DI1LC–02

DTC	P0101	Mass Air Flow Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0100 (Mass Air Flow Circuit Malfunction) on page DI–28.

DTC No.	DTC Detecting Condition	Trouble Area
P0101	After the engine is warmed up, conditions (a) and (b) continue with more than 10 sec. engine speed less than 900 rpm: (2 trip detection logic) (a) Throttle valve fully closed (b) Mass air flow meter output > 2.2 V	• Mass air flow meter
	Conditions (a) and (b) continue with more than 6 sec. engine speed 1,500 rpm or more: (2 trip detection logic) (a) VTA ≧ 0.63 V (b) Mass air flow meter output < 1.0 V	

INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio 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 (See page DI–14).

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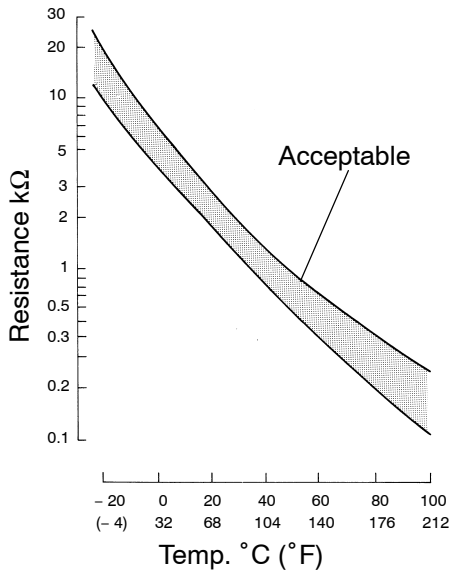
DI1LE–02

DTC	P0110	Intake Air Temp. Circuit Malfunction

(fig. 1)



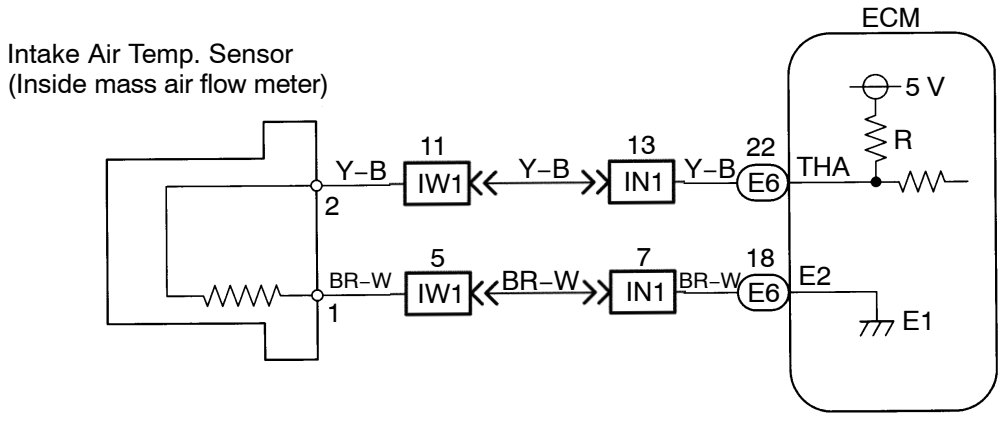
The intake air temp. sensor is built into the mass air flow meter and senses the intake air temperature.
A thermistor built in the sensor changes the resistance value according to the intake air temperature.
The lower the intake air temperature, the greater the thermistor resistance value, and the higher the intake air temperature, the lower the thermistor resistance value (See fig. 1).
The intake air temp. sensor is connected to the ECM (See below). The 5 V power source voltage in the ECM is applied to the intake air temp. sensor from the terminal THA via resistor R.
That is, the resistor R and the intake air temp. sensor are connected in series. When the resistance value of the intake air temp. sensor changes in accordance with 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 cold engine operation.

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 (inside mass air flow meter) • ECM

HINT:
After confirming DTC P0110 use the OBD II scan tool or TOYOTA hand–held tester to confirm the intake air temperature from CURRENT DATA.

Temperature Displayed	Malfunction
–40˚C (–40˚F)	Open circuit
140˚C (284˚F) or more	Short circuit

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

- If DTC P0110 (Intake Air Temp. Circuit Malfunction), P0115 (Engine Coolant Temp. Circuit Malfunction), P0120 (Throttle/Pedal Position Sensor/Switch "A" Circuit Malfunction), P0450 (Evaporative Emission Control System Pressure Sensor Malfunction) and P1120 (Accelerator Pedal Position Sensor Circuit Malfunction) are output simultaneously, E2 (Sensor Ground) may be open.
- Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Connect OBD II scan tool or TOYOTA hand–held tester, and read value of intake air temperature.**

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand–held tester main switch ON.

CHECK:

Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.

OK:

Same as actual intake air temperature

HINT:

- If there is open circuit, OBD II scan tool or TOYOTA hand–held tester indicates –40°C (–40°F).
- If there is short circuit, OBD II scan tool or TOYOTA 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).

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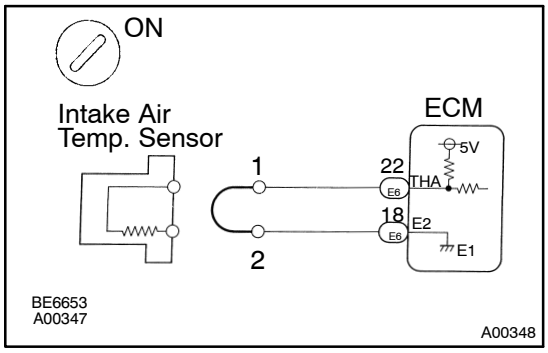
2	Check for open in harness or ECM.



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 temperature value on the OBD II scan tool or TOYOTA hand–held tester.

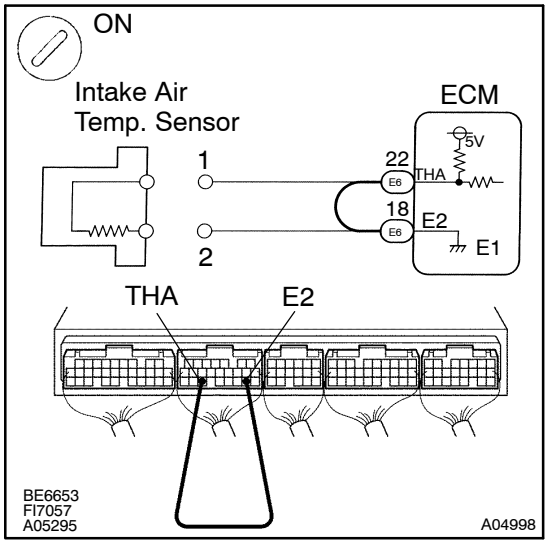
OK:

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 door.
(b) Connect between terminals THA and E2 of the ECM connector.

HINT:

Mass air flow meter connector is disconnected.

Before checking, do a visual and contact pressure check for the ECM connector (See page IN–34).

CHECK:

Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.

OK:

Temperature value: 140°C (284°F) or more

OK	Open in harness between terminals E2 or THA, repair or replace harness.

NG

**Confirm good connection at ECM.
If OK, check and replace ECM.
(See page IN–34)**

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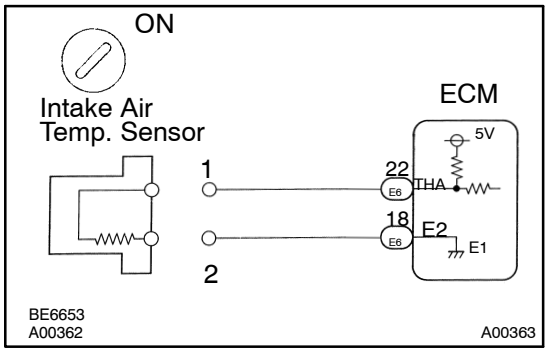
4	Check for short in harness and ECM.



PREPARATION:

(a) Disconnect the mass air flow meter connector.

(b) Turn the ignition switch ON.

CHECK:

Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.

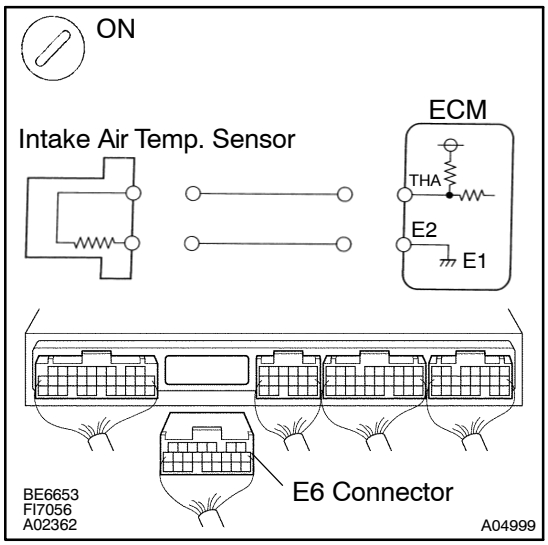
OK:

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 door.

(b) Disconnect the E6 connector of the ECM.

HINT:

Mass air flow meter connector is disconnected.

(c) Turn the ignition switch ON.

CHECK:

Read temperature value on the OBD II scan tool or TOYOTA 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–34).

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DI1LF–02

DTC	P0115	Engine Coolant Temp. Circuit Malfunction

CIRCUIT DESCRIPTION

A thermistor built into the engine coolant temp. sensor changes the resistance value according to the engine coolant temperature.

The structure of the sensor and connection to the ECM is the same as in the DTC P0110 (Intake Air Temp. Circuit Malfunction) shown on page DI–29.

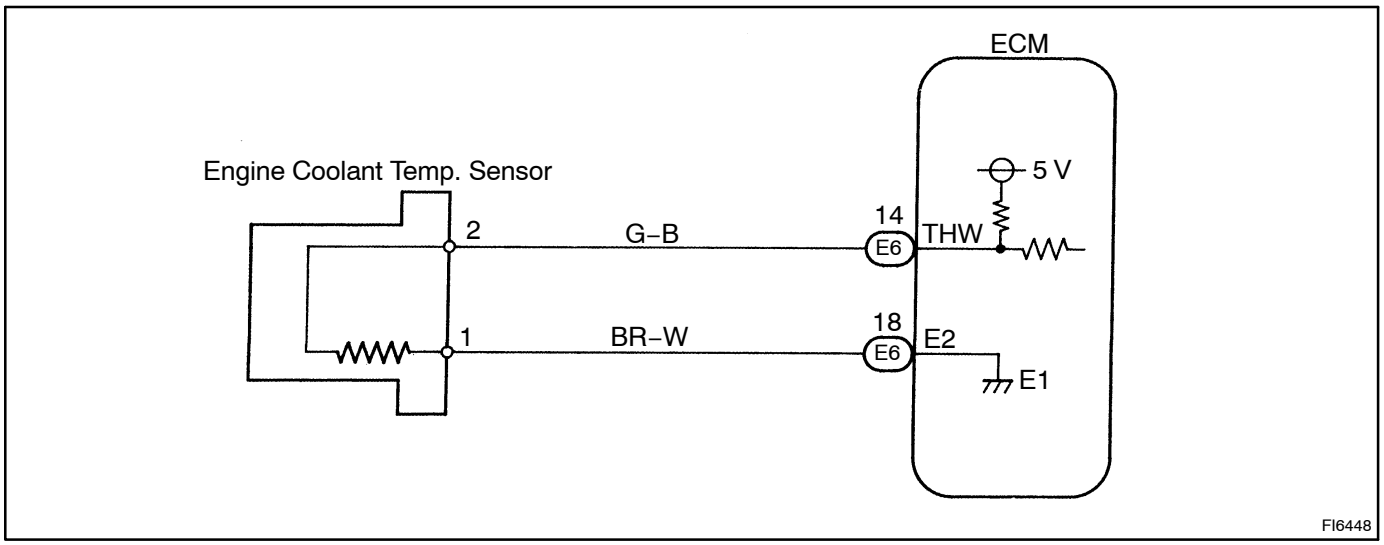
DTC No.	DTC Detecting Condition	Trouble Area
P0115	Open or short in engine coolant temp. sensor circuit	• Open or short in engine coolant temp. sensor circuit • Engine coolant temp. sensor • ECM

HINT:

After confirming DTC P0115 use the OBD II scan tool or TOYOTA hand–held tester to confirm the engine coolant temperature from CURRENT DATA.

Temperature Displayed	Malfunction
–40°C (–40°F)	Open circuit
140C° (284°F) or more	Short circuit

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

- If DTC P0110 (Intake Air Temp. Circuit Malfunction), P0115 (Engine Coolant Temp. Circuit Malfunction), P0120 (Throttle/Pedal/Position Sensor/Switch "A" Circuit Malfunction), P0450 (Evaporative Emission Control System Pressure Sensor Malfunction) and P1120 (Accelerator Pedal Position Sensor Circuit Malfunction) are output simultaneously, E2 (sensor ground) may be open.
- Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Connect OBD II scan tool or TOYOTA hand–held tester, and read value of engine coolant temperature.**

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.

(b) Turn the ignition switch ON and switch the OBD II scan tool or TOYOTA hand–held tester main switch ON.

CHECK:

Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.

OK:

Same as actual engine coolant temperature

HINT:

- If there is open circuit, OBD II scan tool or TOYOTA hand–held tester indicates –40°C (–40°F).
- If there is short circuit, OBD II scan tool or TOYOTA 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).

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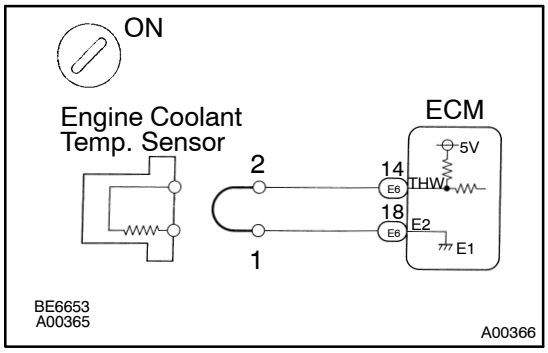
2	Check for open in harness or ECM.



PREPARATION:

(a) Disconnect the engine coolant temp. sensor connector.
(b) Connect sensor wire harness terminals together.
(c) Turn the ignition switch ON.

CHECK:

Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.

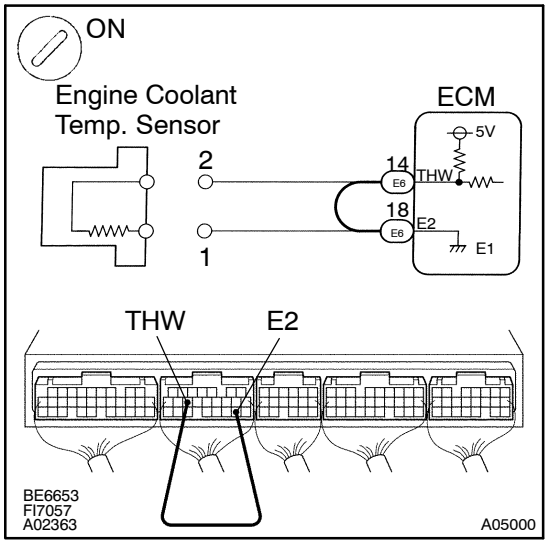
OK:

Temperature value: 140°C (284°F) or more

OK	Confirm good connection at sensor. If OK, replace engine coolant temp. sensor.

NG

3	Check for open in harness or ECM.



PREPARATION:

(a) Remove the glove compartment door.
(b) Connect between terminals THW and E2 of the ECM connector.

HINT:

Engine coolant temp. sensor connector is disconnected.
Before checking, do a visual and contact pressure check for the ECM connector (See page IN–34).

(c) Turn the ignition switch ON.

CHECK:

Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.

OK:

Temperature value: 140°C (284°F) or more

OK	Open in harness between terminals E2 or THW, repair or replace harness.

NG

**Confirm good connection at ECM.
If OK, check and replace ECM.
(See page IN–34)**

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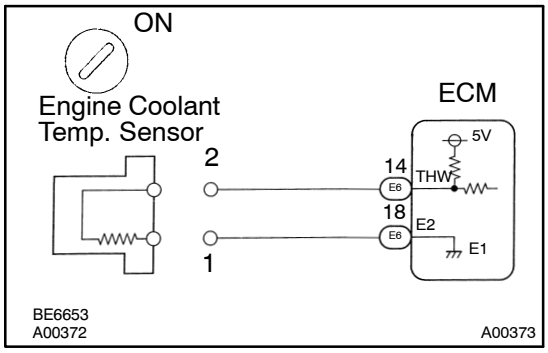
4	Check for short in harness and ECM.



PREPARATION:

(a) Disconnect the engine coolant temp. sensor connector.

(b) Turn the ignition switch ON.

CHECK:

Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.

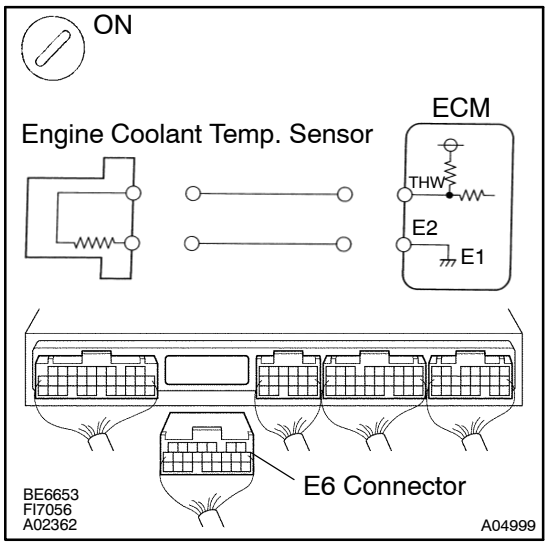
OK:

Temperature value: –40°C (–40°F)

OK	Replace engine coolant temp. sensor.

NG

5	Check for short in harness or ECM.



PREPARATION:

(a) Remove the glove compartment door.

(b) Disconnect the E6 connector of the ECM.

HINT:

Engine coolant temp. sensor connector is disconnected.

(c) Turn the ignition switch ON.

CHECK:

Read temperature value on the OBD II scan tool or TOYOTA 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–34).

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DTC	P0116	Engine Coolant Temp. Circuit Range/ Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0115 (Engine coolant temp. Circuit Malfunction) on page DI–33.

DTC No.	DTC Detecting Condition	Trouble Area
P0116	If THW < –6.4°C (20°F) at engine start, 20 min. or more after starting engine, engine coolant temp. sensor value is 20°C (68°F) or less (2 trip detection logic)	• Engine coolant temp. sensor • Cooling system
	If THW ≧ –6.4°C (20°F) and < 10°C (50°F) at engine start, 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) at engine start, 2 min. or more after starting engine, engine coolant temp. sensor value is 20°C (68°F) or less (2 trip detection logic)	

INSPECTION PROCEDURE

HINT:

- If DTC P0115 (Engine Coolant Temp. Circuit Malfunction) and P0116 (Engine Coolant Temp. Circuit Range/Performance) are output simultaneously, engine coolant temp. sensor circuit may be open. Perform troubleshooting of DTC P0115 first.
- Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio 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 (See page DI–14).**

NO

2	**Check thermostat (See page CO–12).**

NG → **Replace thermostat.**

OK

Replace engine coolant temp. sensor.

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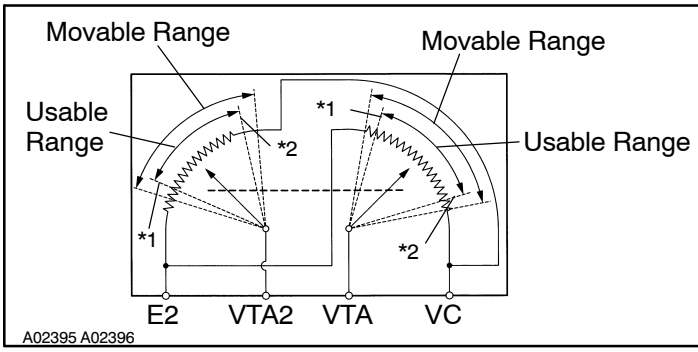
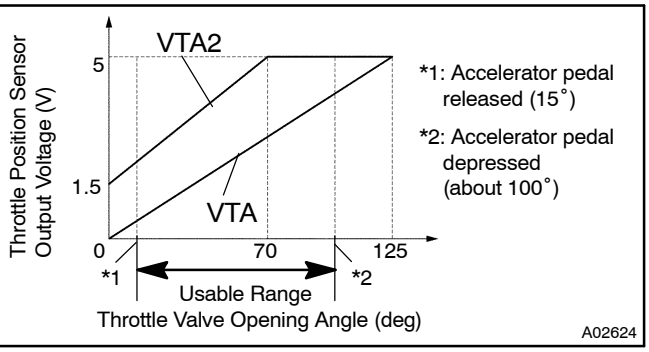
DTC	P0120	Throttle/Pedal Position Sensor/Switch "A" Circuit Malfunction

CIRCUIT DESCRIPTION

Throttle position sensor is mounted on the throttle body and it have the 2 sensors to detect the throttle opening angle and the malfunction of the throttle position sensor's own.
The voltage applied to the terminals VTA and VTA2 of the ECM changes between 0 V and 5 V in proportion to the opening angle of the throttle valve.
The ECM judges the current opening angle of the throttle valve from these signals input from terminals VTA and VTA2, and the ECM controls the throttle motor to make the throttle valve angle properly in response to driving condition.
If this DTC is stored, the ECM shuts down the power for the throttle motor and the electromagnetic clutch, and the throttle valve is fully closed by the return spring.
However, the opening angle of the throttle valve can be controlled by the accelerator pedal through the throttle cable.





DTC No.	DTC Detecting Condition	Trouble Area
P0120	Condition (a), (b), (c), (d) or (e) continues for 2.0 seconds: (a) VTA ≦ 0.2 V (b) VTA2 ≦ 0.5 V (c) VTA ≧ 4.8 V (d) When VTA ≧ 0.2 V and ≦ 2.0 V, and VTA2 ≧ 4.97 V (e) VTA–VTA2 ≦ 0.02 V, or VTA2–VTA ≧ 0.02V	• Open or short in throttle position sensor circuit • Throttle position sensor • ECM
	Condition (a) continues for 0.4 seconds: (a) VTA ≦ 0.2 V and VTA2 ≦ 0.5 V	

HINT:
After confirming DTC P0120 use the OBD II scan tool or TOYOTA hand–held tester to confirm the throttle valve opening percentage and closed throttle position switch condition.

Throttle valve opening position expressed as percentage and voltage				Trouble area
Accelerator pedal released		Accelerator pedal depressed		
THROTTLE POS	THROTTLE POS #2	THROTTLE POS	THROTTLE POS #2	
0 %	0 V	0 %	0 V	VC line open
0 %	2.0 ~ 2.9 V	0 %	4.7 ~ 5.1 V	VTA line open or grand short
8 ~ 20 %	0 V	64 ~ 96 %	0 V	VTA2 line open or grand short
100 %	5 V	100 %	5 V	E2 line open

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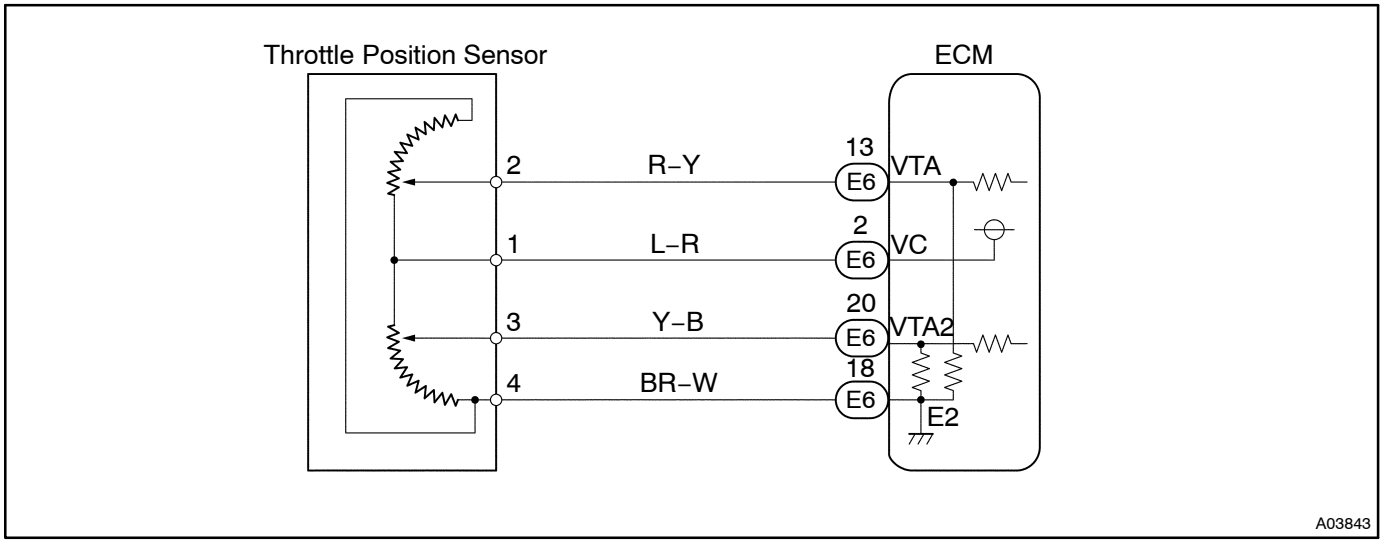
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC P0110 (Intake Air Temp. Circuit Malfunction), P0115 (Engine Coolant Temp. Circuit Malfunction), P0120 (Throttle/Pedal Position Sensor/Switch ”A” Circuit Malfunction), P0450 (Evaporative Emission Control System Pressure Sensor Malfunction) and P1120 (Accelerator Pedal Position Sensor Circuit Malfunction) are output simultaneously, E2 (Sensor Ground) may be open.
- Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

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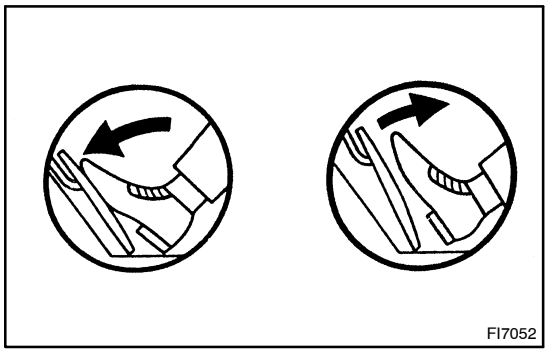
TOYOTA hand–held tester

1	**Connect TOYOTA hand–held tester, read throttle valve opening percentage.**



PREPARATION:

(a) Connect the TOYOTA hand–held tester to DLC3.

(b) Turn the ignition switch ON and switch the TOYOTA hand–held tester main switch ON.

CHECK:

Read the throttle valve opening percentage for VTA circuit and read the voltage for VTA2 circuit.

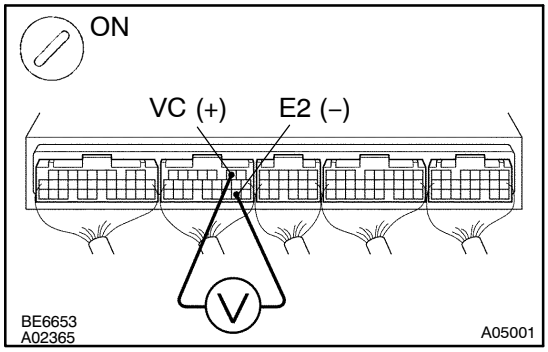
OK:

Accelerator pedal	Throttle valve opening position expressed as percentage (VTA)	Voltage (VTA2)
Released	8 ~ 20 %	2.0 ~ 2.9 V
Depressed	64 ~ 96 %	4.7 ~ 5.1 V

OK → **Check and replace ECM (See page IN–34).**

NG

2	**Check voltage between terminals VC and E2 of ECM connector.**



PREPARATION:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Measure 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–34).**

OK

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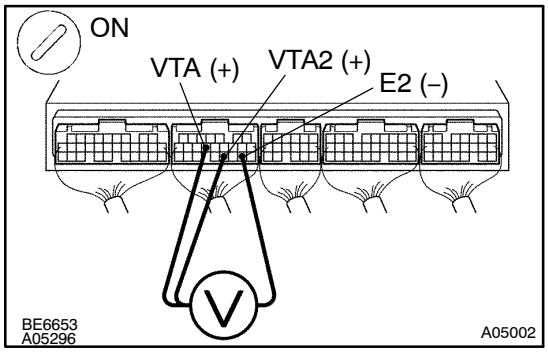
3	Check voltage between terminals VTA, VTA2 and E2 of ECM connector.



PREPARATION:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals VTA, VTA2 and E2 of the ECM connector.

OK:

Accelerator pedal	Voltage	
	VTA	VTA2
Released	0.4 ~ 1.0 V	2.0 ~ 2.9 V
Depressed	3.2 ~ 4.8 V	4.7 ~ 5.1 V

OK → **Check and replace ECM (See page IN–34).**

NG

4	Check throttle position sensor (See page SF–35).

NG → **Replace throttle position sensor (See page SF–40).**

OK

Check for open and short in harness and connector between ECM and throttle position sensor (VC, VTA, VTA2, E2 line) (See page IN–34).

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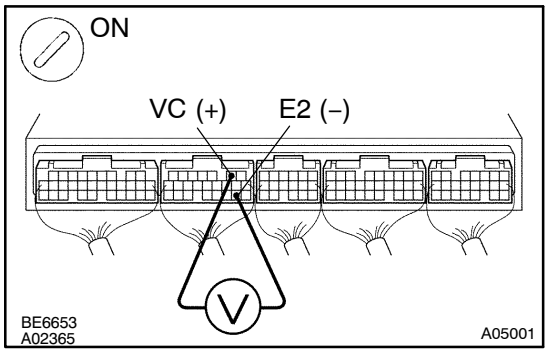
OBD II scan tool (excluding TOYOTA hand–held tester)

1	**Check voltage between terminals VC and E2 of ECM connector.**



PREPARATION:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals VC and E2 of the ECM connector.

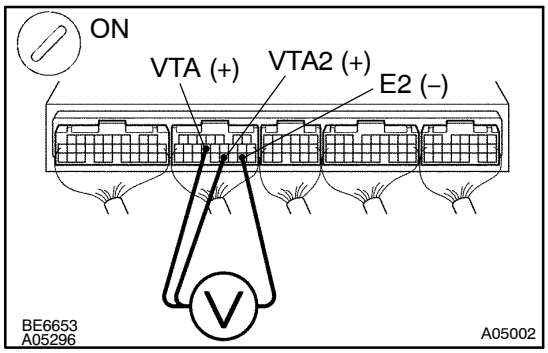
OK:

Voltage: 4.5 ~ 5.5 V

NG	**Check and replace ECM (See page IN–34).**

OK

2	**Check voltage between terminals VTA, VTA2 and E2 of ECM connector.**



PREPARATION:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals VTA, VTA2 and E2 of the ECM connector.

OK:

Accelerator pedal	Voltage	
	VTA	VTA2
Released	0.4 ~ 1.0 V	2.0 ~ 2.9 V
Depressed	3.2 ~ 4.8 V	4.7 ~ 5.1 V

OK	**Check and replace ECM (See page IN–34).**

NG

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3	Check throttle position sensor (See page SF–35).

NG → Replace throttle position sensor (See page SF–40).

OK

Check for open and short in harness and connector between ECM and throttle position sensor (VC, VTA, VTA2, E2 line) (See page IN–34).

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DI1LI–02

DTC	P0121	Throttle/Pedal Position Sensor/Switch ”A” Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0120 (Throttle/Pedal Position Sensor/Switch ”A” Circuit Malfunction) on page DI–38.

DTC No.	DTC Detecting Condition	Trouble Area
P0121	Condition (a) continue for 2.0 seconds: (a) Difference between VTA and VTA2 is out of threshold	• Throttle position sensor • ECM

INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

Replace throttle position sensor (See page SF–40).

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DI1LJ–02

DTC	P0125	Insufficient Coolant Temp. for Closed Loop Fuel Control

CIRCUIT DESCRIPTION

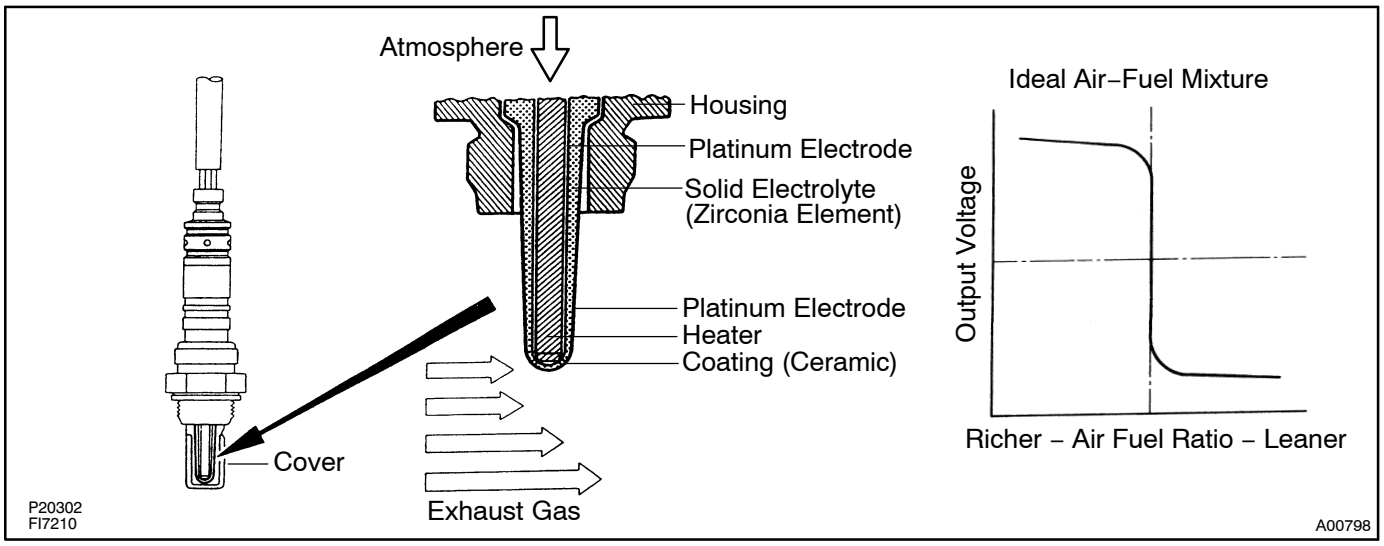
To obtain a high purification rate for the CO, HC and NOx components of the exhaust gas, a three–way catalytic converter is used, but for the most efficient use of the three–way catalytic converter, the air–fuel ratio must be precisely controlled so that it is always close to the stoichiometric air–fuel ratio.

The oxygen sensor has the characteristic whereby its output voltage changes suddenly in the vicinity of the stoichiometric air–fuel ratio. This characteristic is used to detect the oxygen concentration in the exhaust gas and provide feedback to the computer for control of the air–fuel ratio.

When the air–fuel ratio becomes LEAN, the oxygen concentration in the exhaust increases and the oxygen sensor informs the ECM of the LEAN condition (small electromotive force: 0 V).

When the air–fuel ratio is RICHER than the stoichiometric air–fuel ratio the oxygen concentration in the exhaust gas is reduced and the oxygen sensor informs the ECM of the RICH condition (large electromotive force: 1 V). The ECM judges by the electromotive force from the oxygen sensor whether the air–fuel ratio is RICH or LEAN and controls the injection time accordingly. However, if malfunction of the oxygen sensor causes output of abnormal electromotive force, the ECM is unable to perform accurate air–fuel ratio control.

The heated oxygen sensors include a heater which heats the Zirconia element. The heater is controlled by the ECM. When the intake air volume is low (the temperature of the exhaust gas is low) current flows to the heater to heat the sensor for accurate oxygen concentration detection.



DTC No.	DTC Detecting Condition	Trouble Area
P0125	After the engine is warmed up, heated oxygen sensor (bank1, 2 sensor 1) output does not indicate RICH even once when conditions (a), (b), (c) and (d) continue for at least 1.5 min.: (a) Engine speed: 1,500 rpm or more (b) Vehicle speed: 40 ~ 100 km/h (25 ~ 62 mph) (c) Throttle valve does not fully closed (d) 140 sec. or more after starting engine	• Fuel system • Injector • Ignition system • Gas leakage on exhaust sytem • Open or short in heated oxygen sensor circuit • Heated oxygen sensor

HINT:

After confirming DTC P0125 use the OBD II scan tool or TOYOTA hand–held tester to confirm voltage output of the heated oxygen sensor from CURRENT DATA.

If voltage output of the heated oxygen sensor is 0 V, heated oxygen sensor circuit may be open or short.

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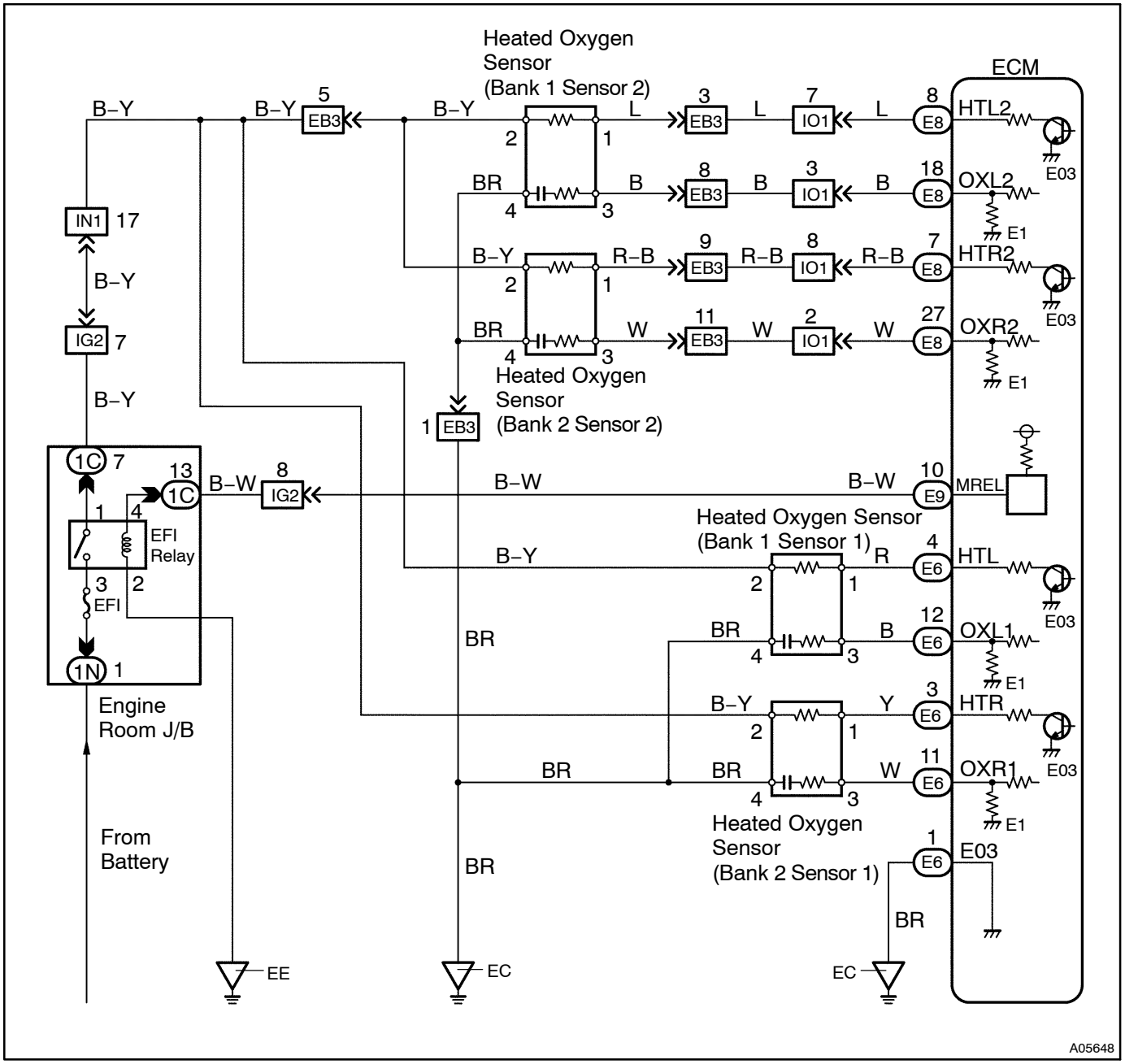
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

- Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- If the vehicle run out of fuel, the air–fuel ratio is LEAN and DTC P0125 will be recorded. The MIL then comes on.

1	**Connect OBD II scan tool or TOYOTA hand–held tester and read value for voltage output of heated oxygen sensor (bank 1 sensor 1).**

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.

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

CHECK:

Read voltage output of the heated oxygen sensor (bank 1, 2 sensor 1) when the engine is suddenly raced.

HINT:

Perform quick racing to 4,000 rpm 3 times using accelerator pedal.

OK:

Heated oxygen sensor (bank 1, 2 sensor 1) output a RICH signal (0.45 V or more) at least once.

OK → **Check and replace ECM (See page IN–34).**

NG

2	**Check for open and short in harness and connector between ECM and heated oxygen sensor (bank 1, 2 sensor 1) (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

3	**Perform diagnosis for misfire (See page DI–61).**

NG → **Repair or replace.**

OK

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4	**Check gas leakage on exhaust system.**

NG → **Repair or replace.**

OK

Replace heated oxygen sensor.

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DTC	P0130	Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 1)

DTC	P0150	Heated Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 1)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control) on page DI–45.

DTC No.	DTC Detecting Condition	Trouble Area
P0130 P0150	Voltage output of heated oxygen sensor remains at 0.35 V or more, or 0.70 V or less, during idling after the engine is warmed up (2 trip detection logic)	• Heated oxygen sensor • Fuel trim malfunction

HINT:
Bank 1 refers to bank that includes cylinder No.1.
Bank 2 refers to bank that does not include cylinder No.1.
Sensor 1 refers to the sensor closer to the engine body.
The heated oxygen sensor's output voltage and the short–term fuel trim value can be read using the OBD II scan tool or TOYOTA hand–held tester.

WIRING DIAGRAM

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control) on page DI–45 for the WIRING DIAGRAM.

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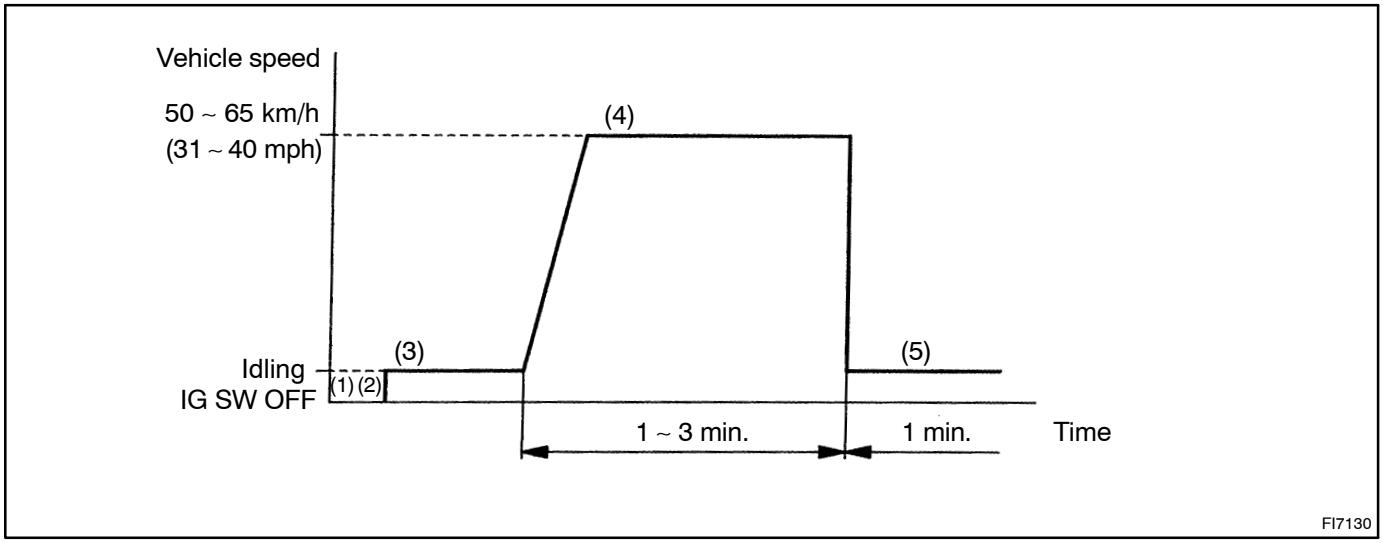
CONFIRMATION DRIVING PATTERN



(1) Connect the TOYOTA hand–held tester to the DLC3.
(2) Switch the TOYOTA hand–held tester from normal mode to check mode (See page DI–3).
(3) Start the engine and warm it up withe all accessory switches OFF.
(4) Drive the vehicle at 50 ~ 65 km/h (31 ~ 40 mph) for 1 ~ 3 min. to warm up the heated oxygen sensor.
(5) Let the engine idle for 1 min.
(6) Perfom steps (3) to (5) three times.

HINT:
If a malfunction exists, the MIL will light up during step (6).

NOTICE:
If the conditions in this test are not strictly followed, detection of the malfunction will not be possible. If you do not have a TOYOTA hand–held tester, turn the ignition switch OFF after performing steps (3) to (6), then perform steps (3) to (6) again.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check for open and short in harness and connector between ECM and heated oxygen sensor (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

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2	**Check for heated oxygen sensor data.**

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.

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

CHECK:

Read the heated oxygen sensor output voltage and short–term fuel trim.

RESULT:

Pattern	Heated oxygen sensor output voltage	Short–term fuel trim
1	Lean condition (Changes at 0.55 V or less)	Changes at about +20 %
2	Rich condition (Changes at 0.35 V or more)	Changes at about –20 %
3	Except 1 and 2	

1, 2 → **Check fuel trim system (See page DI–57).**

3

3	**Check output voltage of heated oxygen sensor during idling.**

PREPARATION:

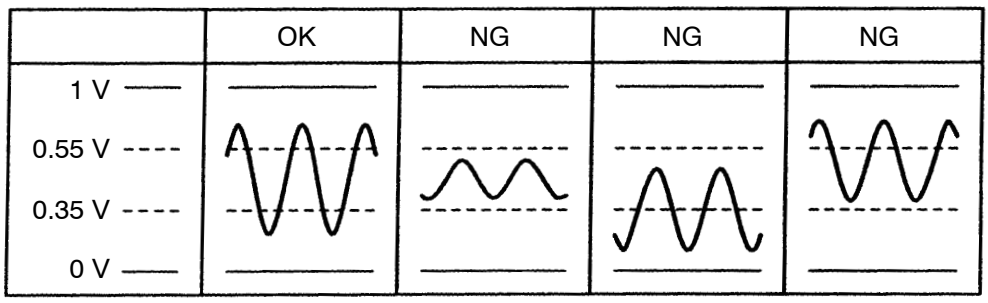
Warm up the heated oxygen sensor with the engine at 2,500 rpm for approx. 90 sec.

CHECK:

Use the OBD II scan tool or TOYOTA hand–held tester read the output voltage of the heated oxygen sensor during idling.

OK:

Heated oxygen sensor output voltage:
Alternates repeatedly between less than 0.35 V and more than 0.55 V (See the following table).



A00292

OK → **Perform confirmation driving pattern.**

NG

Replace heated oxygen sensor.

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DI1LL–02

DTC	P0133	Heated Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)

DTC	P0153	Heated Oxygen Sensor Circuit Slow Response (Bank 2 Sensor 1)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control) on page DI–45.

DTC No.	DTC Detecting Condition	Trouble Area
P0133 P0153	Response time for the heated oxygen sensor's voltage output to change from rich to lean, or from lean to rich, is 1.1 sec. or more during idling after the engine is warmed up (2 trip detection logic)	• Heated oxygen sensor

HINT:
Bank 1 refers to bank that includes cylinder No.1.
Bank 2 refers to bank that does not include cylinder No.1.
Sensor 1 refers to the sensor closer to the engine body.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Are there any other codes (besides DTC P0133, P0153) being output?

YES → Go to relevant DTC chart (See page DI–14).

NO →

Replace heated oxygen sensor.

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DTC	P0135	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 1)

DTC	P0141	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)

DTC	P0155	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 2 Sensor 1)

DTC	P0161	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 2 Sensor 2)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control) on page DI–45.

DTC No.	DTC Detecting Condition	Trouble Area
P0135 P0141 P0155 P0161	When the heater operates, heater current exceeds 2 A (2 trip detection logic)	• Open or short in heater circuit of heated oxygen sensor • Heated oxygen sensor heater • ECM
	Heater current of 0.2 A or less when the heater operates with +B > 10.5 V and < 11.5 V (2 trip detection logic)	
	Heater current of 0.25 A or less when the heater operates with +B ≧ 11.5 V (2 trip detection logic)	

HINT:

- Bank 1 refers to bank that includes cylinder No.1.
- Bank 2 refers to bank that does not include cylinder No.1.
- Sensor 1 refers to the sensor closer to the engine body.
- Sensor 2 refers to the sensor farther away from the engine body.

WIRING DIAGRAM

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control) on page DI–45 for the WIDINRG DIAGRAM.

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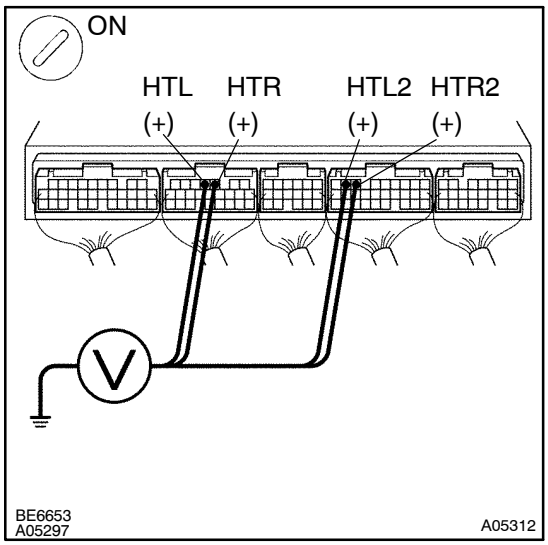
INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check voltage between terminals HTR, HTR2, HTL, HTL2 of ECM connector and body ground.**



PREPARATION:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals HTR, HTR2, HTL, HTL2 of the ECM connector and body ground.

HINT:

- Connect terminal HTR to bank 2 sensor 1.
- Connect terminal HTR2 to bank 2 sensor 2.
- Connect terminal HTL to bank 1 sensor 1.
- Connect terminal HTL2 to bank 1 sensor 2.

OK:

Voltage: 9 ~ 14 V

OK	**Check and replace ECM (See page IN–34).**

NG

2	**Check resistance of heated oxygen sensor heater (See page SF–58).**

NG	**Replace heated oxygen sensor.**

OK

Check and repair harness or connector between main relay and heated oxygen sensor and ECM (See page IN–34).

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DTC	P0136	Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)

DTC	P0156	Heated Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control) on page DI–45.

DTC No.	DTC Detecting Condition	Trouble Area
P0136 P0156	Voltage output of the heated oxygen sensor (bank 1 sensor 2, bank 2 sensor 2) remains at 0.4 V or more or 0.5 V or less when the vehicle is driven at less than 100 km/h (62 mph) after the engine is warmed up. (2 trip detection logic)	• Heated oxygen sensor

HINT:

- Bank 1 refers to bank that includes cylinder No.1.
- Bank 2 refers to bank that does not include cylinder No.1.
- Sensor 2 refers to the sensor farther away from the engine body.

WIRING DIAGRAM

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control) on page DI–45 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0136 or P0156) being output?**

YES → **Go to relevant DTC chart (See page DI–14).**

NO

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2	**Check for open and short in harness and connector between ECM and heated oxygen sensor (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

3	**Check the output voltage of heated oxygen sensor (bank 1, 2 sensor 2).**

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.

(b) After warming up the engine, race engine at 2,500 rpm for 3 min.

CHECK:

Read voltage output of heated oxygen sensor (bank 1 sensor 2, bank 2 sensor 2) when engine suddenly raced.

HINT:

Perform quick racing to 4,000 rpm 3 min. using accelerator pedal.

OK:

Heated oxygen sensor output voltage: Alternates from 0.4 V or less to 0.5 V or more.

OK → **Check that each connector is properly connected.**

NG

Replace heated oxygen sensor.

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DTC	P0171	System too Lean (Fuel Trim)

DTC	P0172	System too Rich (Fuel Trim)

CIRCUIT DESCRIPTION

Fuel trim refers to the feedback compensation value compared against 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 heated oxygen sensor indicates whether the air–fuel ratio is RICH or LEAN compared to the ideal theoretical value, triggering a reduction in fuel volume if the air–fuel ratio is rich, and an increase in fuel volume if it is lean.

Long–term fuel trim is overall fuel compensation carried out long–term to compensate for continual deviation of the short–term fuel trim form the central value due to individual engine differences, wear over time and changes in the usage environment.

If both the short–term fuel trim and long–term fuel trim are LEAN or RICH beyond a certain value, it is detected as a malfunction and the MIL lights up.

DTC No.	DTC Detecting Condition	Trouble Area
P0171	When the air fuel ratio feedback is stable after engine warming up, the fuel trim is considerably in error on the LEAN side. (2 trip detection logic)	• Air intake (hose loose) • Fuel line pressure • Injector blockage • Heated oxygen sensor malfunction • Mass air flow meter • Engine coolant temp. sensor • Gas leakage on exhaust system
P0172	When the air fuel ratio feedback is stable after engine warming up, the fuel trim is considerably in error on the RICH side. (2 trip detection logic)	• Fuel line pressure • Injector leak, blockage • Heated oxygen sensor malfunction • Mass air flow meter • Engine coolant temp. sensor • Gas leakage on exhaust sytem

HINT:

- When DTC P0171 is recorded, the actual air–fuel ratio is on the LEAN side. When DTC P0172 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 is recorded. The MIL then comes on.
- If the total of the short–term fuel trim value and long–term fuel trim value is within ± 25 %, the system is functioning normally.

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INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Ask customer whether runs out of fuel.**

YES → **DTC P0171 was recorded because the vehicle runs out of fuel.**

NO

2	**Check air induction system (See page SF–1).**

NG → **Repair or replace.**

OK

3	**Check for heated oxygen sensor (bank 1, 2 sensor 1) data.**

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.

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

CHECK:

Read the heated oxygen sensor (bank 1, 2 sensor 1) output voltage and short–term fuel trim.

HINT:

Read the values for the same bank.

RESULT:

Pattern	Heated oxygen sensor output voltage	Short–term fuel trim
1	Lean condition (Changes at 0.55 V or less)	Changes at about +20 %
2	Rich condition (Changes at 0.35 V or more)	Changes at about –20 %
3	Except 1 and 2	

3 → **Check for heated oxygen sensor (bank 1, 2 sensor 1) (See page DI–49).**

1, 2

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4	Check fuel pressure (See page SF–7).

NG → Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF–1).

OK

5	Check injector injection (See page SF–24).

NG → Replace injector.

OK

6	Check mass air flow meter and engine coolant temp. sensor (See page SF–34 and SF–51).

NG → Repair or replace.

OK

7	Check for spark and ignition (See page IG–1).

NG → Repair or replace.

OK

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8	Check gas leakage on exhaust system.

NG → Repair or replace.

OK →

Check and replace ECM (See page IN–34).

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DTC	P0300	Random/Multiple Cylinder Misfire Detected

DTC	P0301	Cylinder 1 Misfire Detected

DTC	P0302	Cylinder 2 Misfire Detected

DTC	P0303	Cylinder 3 Misfire Detected

DTC	P0304	Cylinder 4 Misfire Detected

DTC	P0305	Cylinder 5 Misfire Detected

DTC	P0306	Cylinder 6 Misfire Detected

DTC	P0307	Cylinder 7 Misfire Detected

DTC	P0308	Cylinder 8 Misfire Detected

CIRCUIT DESCRIPTION

Misfire: The ECM uses the crankshaft position sensor and camshaft position sensor to monitor changes in the crankshaft rotation for each cylinder.
The ECM counts the number of times the engine speed change rate indicates that misfire has occurred. And when the misfire rate equals 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 catalyst overheating, the MIL blinks when misfiring occurs.

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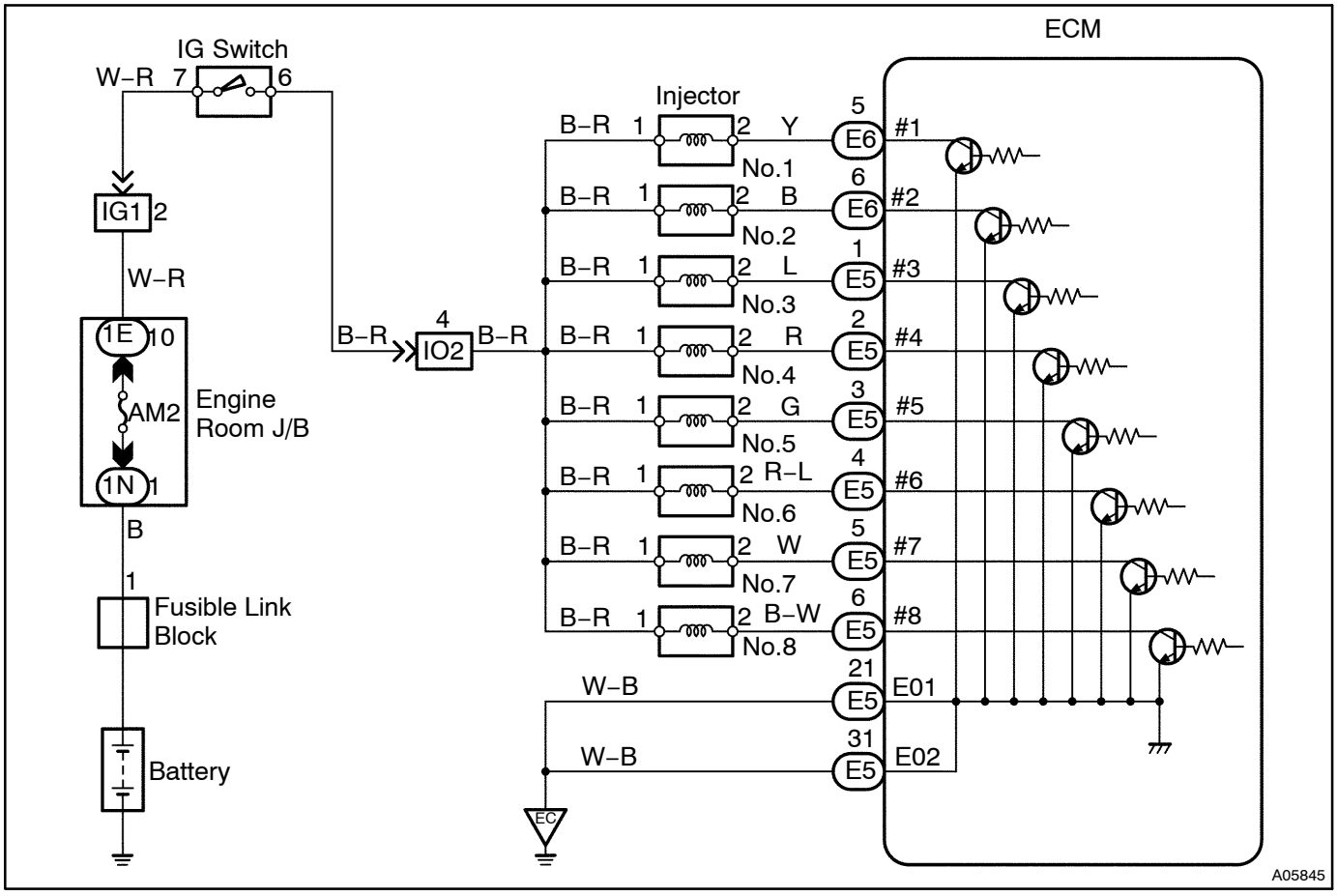
DTC No.	DTC Detecting Condition	Trouble Area
P0300	Misfiring of random cylinders is detected during the any particular 200 or 1,000 revolutions 1trip detection logic: MIL to brink 2trip detection logic: MIL to light up	• Ignition system • Injector • Fuel line pressure • Compression pressure • Valve clearance not to specification • Valve timing • Mass air flow meter • Engine coolant temp. sensor • Open or short in engine wire • Connector connection • ECM
P0301 P0302 P0303 P0304	For any particular 200 revolutions of the engine, misfiring is detected which can cause catalyst overheating (This causes MIL to blink)	
P0305 P0306 P0307 P0308	For any particular 1,000 revolutions of the engine, misfiring is detected which causes a deterioration in emissions (2 trip detection logic)	

HINT:
When codes for a misfiring cylinder is recorded repeatedly but no random misfire code is recorded, it indicates that the misfires were detected and recorded at different times.

WIRING DIAGRAM



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CONFIRMATION DRIVING PATTERN

(1) Connect the TOYOTA hand–held tester or OBD II scan tool to the DLC3.
(2) Record DTC and the freeze frame data.
(3) Use the TOYOTA hand–held tester to set to Check Mode (See page DI–3).
(4) Drive the vehicle several times with the engine speed, load and its surrounding range shown with ENGINE SPD, CALC LOAD in the freeze frame data or MISFIRE RPM, MISFIRE LOAD in the data list. If you have no TOYOTA hand–held tester, turn the ignition switch OFF after the symptom is simulated the first time. Then repeat the simulation process again.

HINT:
In order to memorize DTC of misfire, it is necessary to drive around MISFIRE RPM, MISFIRE LOAD in the data list for the following period of time.

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

(5) Check whether there is misfire or not by monitoring DTC and the freeze frame data. After that, record them.
(6) Turn the ignition switch OFF and wait at least 5 seconds.

INSPECTION PROCEDURE

HINT:

- If it is the case that DTC besides misfire is memorized simultaneously, first perform the troubleshooting for them.
- Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- When the vehicle is brought to the workshop and the misfire is not occurred, misfire can be confirmed by reproducing the condition of freeze frame data. Also, after finishing the repair, confirm that there is no misfire (See 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 besides 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 warmed up.
- In the case that misfire cannot be reproduced, the reason may be because of the driving with lack of fuel, the use of improper fuel, a stain of the ignition plug, and etc.

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1	**Check wire harness, connector and vacuum hose in engine room.**

CHECK:

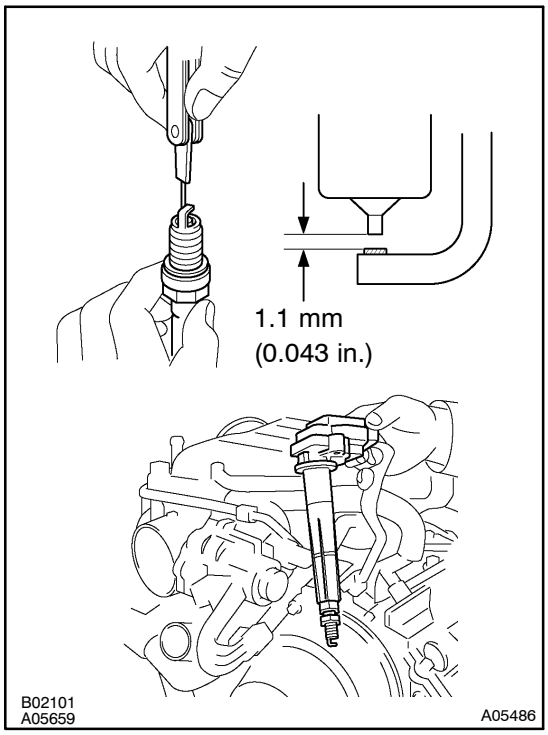
(a) Check the connection conditions of wire harness and connector.

(b) Check the disconnection, piping and break of vacuum hose.

NG → **Repair or replace, then confirm that there is no misfire (See confirmation driving pattern).**

OK

2	**Check spark plug and spark of misfiring cylinder.**



PREPARATION:

(a) Disconnect the ignition coil (See page IG–6).

(b) Remove the spark plug.

CHECK:

(a) Check the spark plug type.

(b) Check the carbon deposits electrode.

(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 ~ 1.2 mm (0.043 ~ 0.047 in.).

PREPARATION:

(a) Install the spark plug to the ignition coil, and connect the ignition coil connector.

(b) Disconnect the injector connector.

(c) Hold the end about 12.5 mm (0.5 in.) from the ground.

CHECK:

Check if spark occurs while the engine is being cranked.

NOTICE:

To prevent excess fuel being injected from the injectors during this test, don't crank the engine for more than 5 ~ 10 seconds at a time.

OK:

Spark jumps across electrode gap.

NG → **Replace or check ignition system (See page IG–1).**

OK

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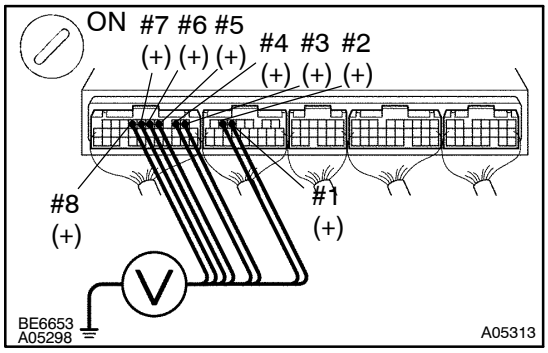
3	Check voltage of ECM terminal for injector of failed cylinder.



PREPARATION:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between applicable terminal of the ECM connector and body ground.

OK:

Voltage: 9 ~ 14 V

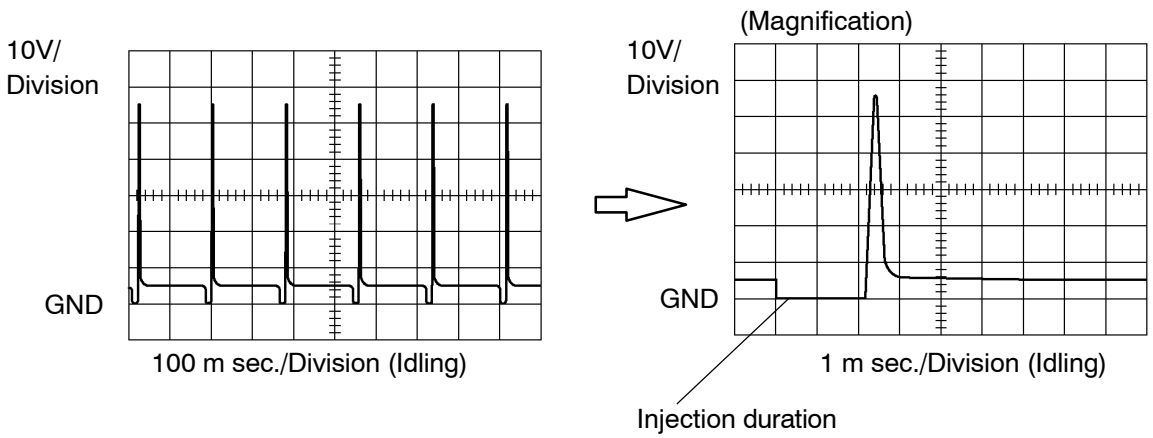
Reference INSPECTION USING OSCILLOSCOPE

With the engine idling, measure between terminals #1 ~ #8 and E01 of the ECM connector.

HINT:

The correct waveforms are as shown.

Injector Signal Waveform



OK	Go to step 5.

NG

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4	Check resistance of injector of misfiring cylinder (See page SF–19).

NG → Replace injector.

OK →

Check for open and short in harness and connector between injector and ECM (See page IN–34).

5	Check fuel pressure (See page SF–7).

NG → Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF–1).

OK →

6	Check injector injection (See page SF–24).

NG → Replace injector.

OK →

7	Check mass air flow meter and engine coolant temp. sensor (See page SF–34 and SF–51).

NG → Repair or replace.

OK →

Check compression pressure (See page EM–3), valve clearance (See page EM–4) and valve timing (See page EM–15).

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DI1LQ–02

DTC	P0325	Knock Sensor 1 Circuit Malfunction

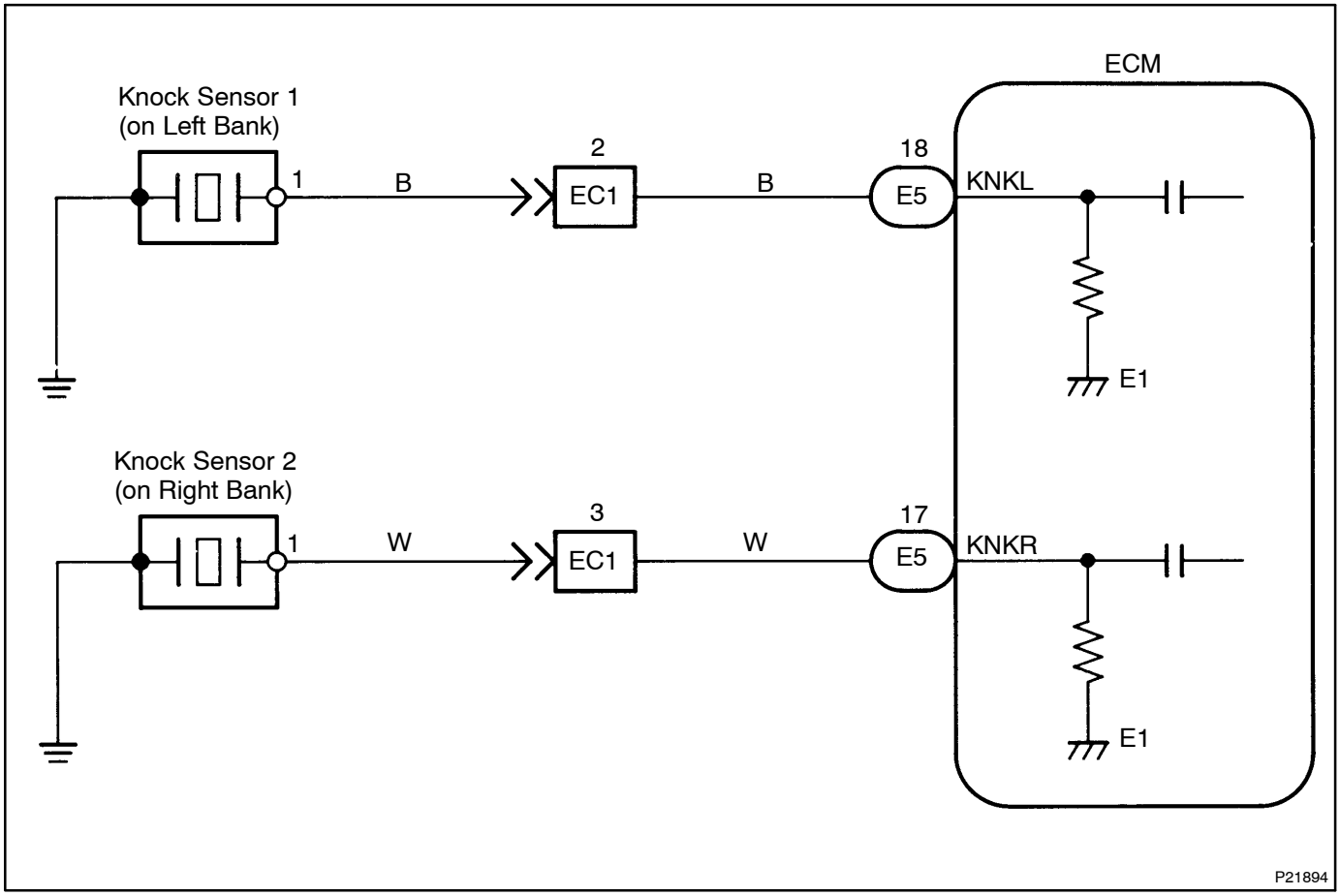
DTC	P0330	Knock Sensor 2 Circuit Malfunction

CIRCUIT DESCRIPTION

Knock sensors are fitted one to the right bank and left bank of the cylinder block to detect engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed, which occurs when the cylinder block vibrates due to knocking. If engine knocking occurs, ignition timing is retarded to suppress it.

DTC No.	DTC Detecting Condition	Trouble Area
P0325	No knock sensor 1 signal to ECM with engine speed between 1,700 rpm and 5,400 rpm	• Open or short in knock sensor 1 circuit • Knock sensor 1 (looseness) • ECM
P0330	No knock sensor 2 signal to ECM with engine speed between 1,700 rpm and 5,400 rpm	• Open or short in knock sensor 2 circuit • Knock sensor 2 (looseness) • ECM

WIRING DIAGRAM



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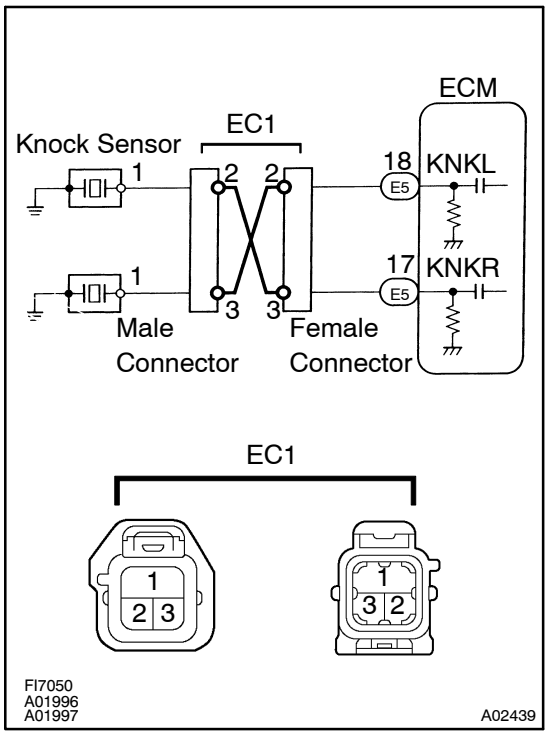
INSPECTION PROCEDURE

HINT:

- DTC P0325 is for the left bank knock sensor circuit.
- DTC P0330 is for the right bank knock sensor circuit.
- Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Connect OBD II scan tool or TOYOTA hand–held tester and check knock sensor circuit.**



PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA 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 ignition switch ON and switch the OBDII scan tool or TOYOTA 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

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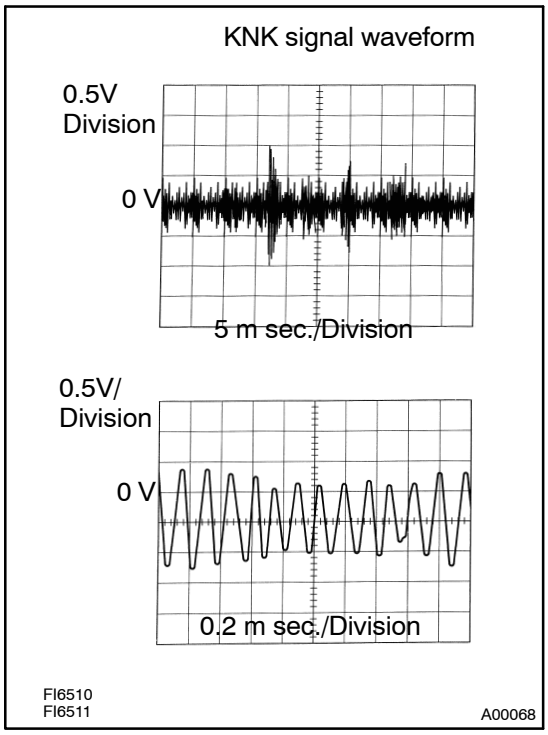

Reference: INSPECTION USING OSCILLOSCOPE

- With the engine racing (4,000 rpm) measure between terminal KNK1, KNK2 of the ECM connector and body ground.

HINT:
The correct waveforms are as shown.

- Spread the time on the horizontal axis, and confirm that period of the wave is 0.13 m sec.
  (Normal mode vibration frequency of knock sensor: 8.1 kHz)

HINT:
If normal mode vibration frequency is not 8.1 kHz, the sensor is malfunctioning.

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–34).**

NG	**Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–34).

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3	**Check for open and short in harness and connector between EC1 connector and knock sensor (See page IN–34).**

HINT:

- If DTC P0325 has changed to P0330, check the knock sensor circuit on the left bank side.
- If DTC P0330 has changed to P0325, check the knock sensor circuit on the right bank side.

NG → **Repair or replace harness or connector.**

OK

Replace knock sensor.

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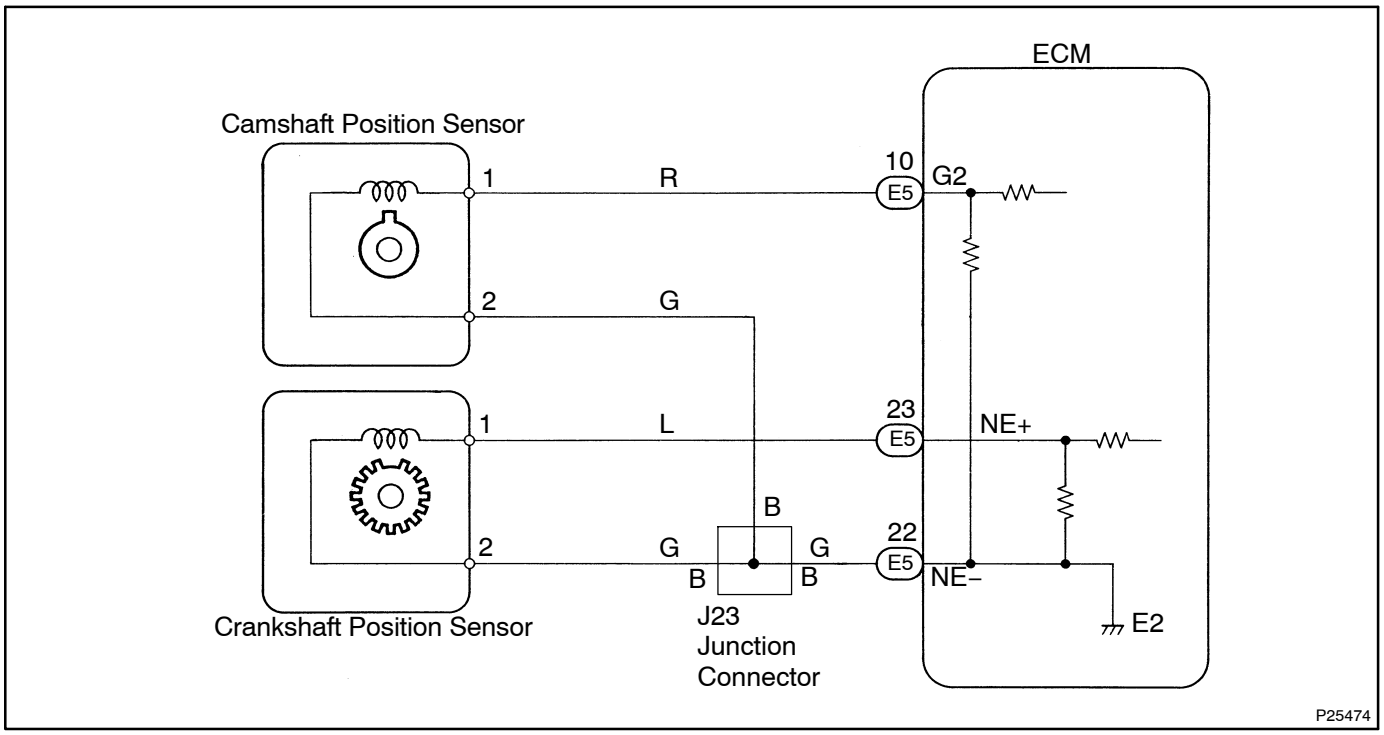
DTC	P0335	Crankshaft Position Sensor ”A” Circuit Malfunction

CIRCUIT DESCRIPTION

The crankshaft position sensor, which detects the engine speed and crankshaft angle signal (NE signal), has been installed on the oil pump body.
The NE signal plate has 34 teeth. The NE signal sensor generates 34 signals of every engine revolution. The ECM detects the standard crankshaft angle based on the G2 signals, and the actual crankshaft angle and the engine speed by the NE signals.

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 • Starter • ECM
	No crankshaft position sensor signal to ECM with engine speed 600 rpm or more (2 trip detection logic)	

WIRING DIAGRAM



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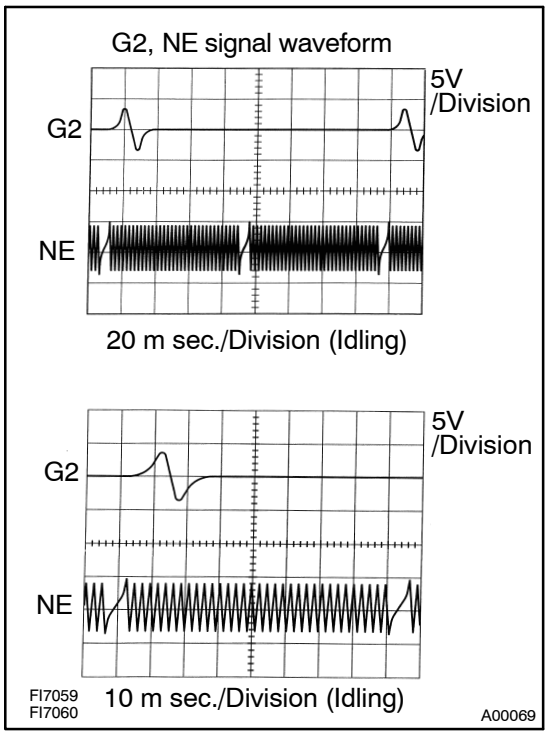
INSPECTION PROCEDURE

HINT:

- Perform troubleshooting of DTC P0335 first. If no trouble is found, troubleshoot the following mechanical systems.
- Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check resistance of crankshaft position sensor (See page IG–1).**



Reference: INSPECTION USING OSCILLOSCOPE

During cranking or idling, check between terminals G2 and NE–, NE and NE– of the ECM connector.

HINT:

The correct waveforms are as shown.

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–34).**

NG → **Repair or replace harness or connector.**

OK

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3	**Inspect sensor installation and teeth of signal plate.**

NG → **Tighten sensor. Replace signal plate.**

OK

Check and replace ECM (See page IN–34).

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DI1LS–02

DTC	P0340	Camshaft Position Sensor Circuit Malfunction

CIRCUIT DESCRIPTION

Camshaft position sensor (G2 signal) consist of a signal plate and pickup coil.
The G2 signal plate has 1 tooth, on its outer circumference and is mounted on the left bank camshafts.
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 NE signal plate has 34 teeth and is mounted on the crankshaft. The NE signal sensor generates 34 signals for every engine revolution. The ECM detects the standard crankshaft angle based on the G2 signal and the actual crankshaft angle and the engine speed by the NE signals.

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 • Starter • ECM
	No camshaft position sensor signal to ECM with engine speed 600 rpm or more	

WIRING DIAGRAM

Refer to DTC P0335 (Crankshaft Positio Sensor ”A” Circuit Malfunction) on page DI–71 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio 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 (Crankshaft Position Sensor ”A” Circuit Malfunction) on page DI–71 for the Reference: INSPECTION USING OSCILLOSCOPE.

NG → **Replace camshaft position sensor.**

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2	**Check for open and short in harness and connector between ECM and camshaft position sensor (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

3	**Inspect sensor installation.**

NG → **Tighten sensor.**

OK

Check and replace ECM (See page IN–34).

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DI1LT–02

DTC	P0420	Catalyst System Efficiency Below Threshold (Bank 1)

DTC	P0430	Catalyst System Efficiency Below Threshold (Bank 2)

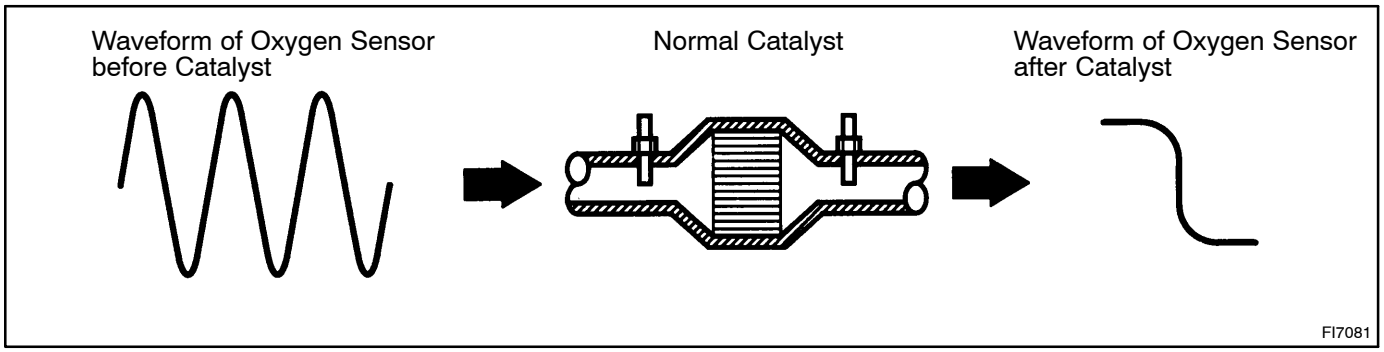
CIRCUIT DESCRIPTION

The ECM compares the waveform of the oxygen sensor located before the catalyst with the waveform of the oxygen sensor located after the catalyst to determine whether or not catalyst performance has deteriorated.

Air–fuel ratio feedback compensation keeps the waveform of the oxygen sensor before the catalyst repeatedly changing back and forth from rich to lean.

If the catalyst is functioning normally, the waveform of the oxygen sensor after the catalyst switches back and forth between rich and lean much more slowly than the waveform of the oxygen sensor before the catalyst.

But when both waveform change at a similar rate, it indicates that catalyst performance has deteriorated.



DTC No.	DTC Detecting Condition	Trouble Area
P0420	After the engine and the catalyst are warmed up, and while the vehicle is driven within the set vehicle and engine speed range, the waveform of the heated oxygen sensors have the same amplitude (2 trip detection logic)	• LH front exhaust pipe (TWC: front and rear catalysts) • Gas leakage on exhaust system • Heated oxygen sensor
P0430	After the engine and the catalyst are warmed up, and while the vehicle is driven within the set vehicle and engine speed range, the waveform of the heated oxygen sensors have the same amplitude (2 trip detection logic)	• RH front exhaust pipe (TWC: front and rear catalysts) • Gas leakage on exhaust system • Heated oxygen sensor

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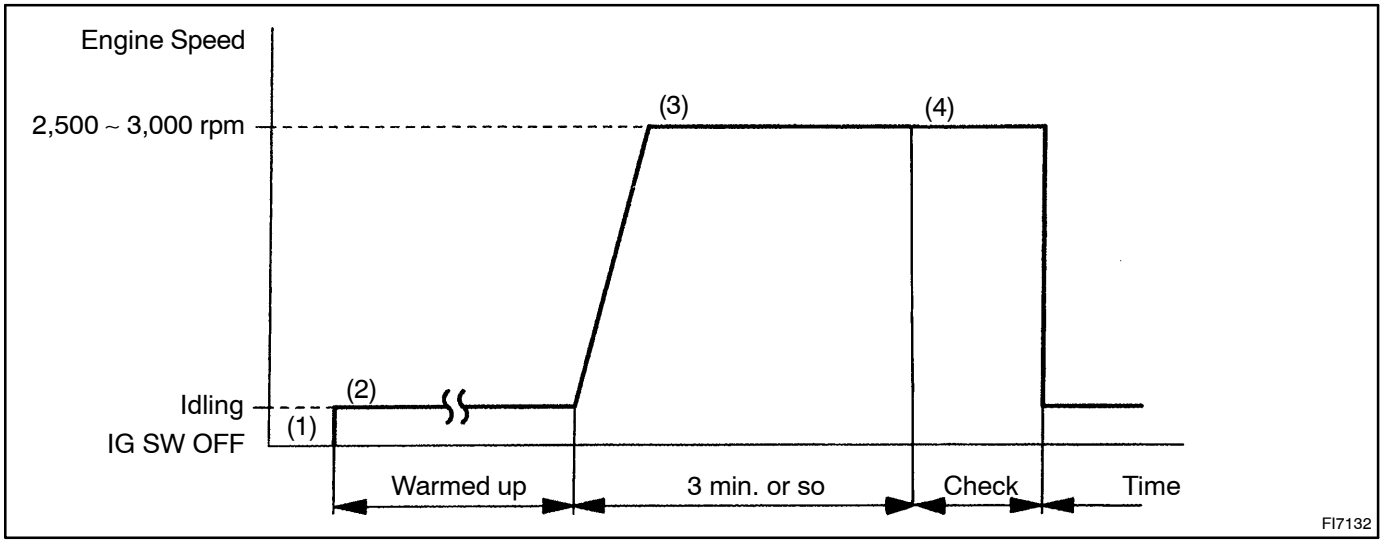
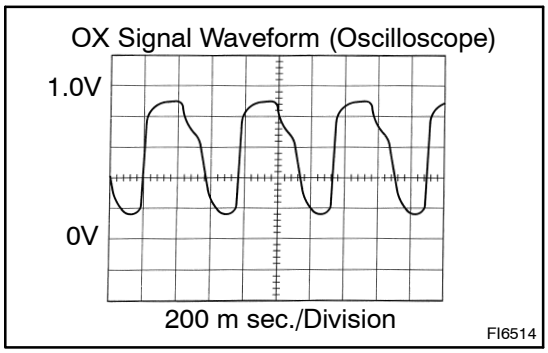
CONFIRMATION ENGINE RACING PATTERN



(1) Connect the TOYOTA hand–held tester to the DLC3, or connect the probe of the oscilloscope between terminals OXL1, OXL2, OXR1, OXR2 and E1 of the ECM connector.
(2) Start the engine and warm it up with all accessories switched OFF until engine coolant temperature is stable.
(3) Race the engine at 2,500 ~ 3,000 rpm for about 3 min.
(4) After confirming that the waveform of the heated oxygen sensor (bank 1, 2 sensor 1 (OXL1, OXR1)), oscillate around 0.5 V during feedback to the ECM, check the waveform of the heated oxygen sensor (bank 1, 2 sensor 2 (OXL2, OXR2)).



HINT:
If there is a malfunction in the system, the waveform of the heated oxygen sensor (bank 1, 2 sensor 2 (OXL2, OXR2)) is almost the same as that of the heated oxygen sensor (bank 1, 2 sensor 1 (OXL1, OXR1)) on the left.
There are some cases where, even though a malfunction exists, the MIL may either light up or not light up.

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INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0420 and P0430) being output?**

YES → **Go to relevant DTC chart (See page DI–14).**

NO

2	**Check gas leakage on exhaust system.**

NG → **Repair or replace.**

OK

3	**Check heated oxygen sensor (bank 1, 2 sensor 1) (See page DI–49).**

NG → **Repair or replace.**

OK

4	**Check heated oxygen sensor (bank 1, 2 sensor 2) (See page DI–55).**

NG → **Repair or replace.**

OK

Replace catalyst (See page EC–7).

If DTC P0420 is present, replace the LH front exhaust pipe (TWC: front and rear catalysts).
If DTC P0430 is present, replace the RH front exhaust pipe (TWC: front and rear catalysts).

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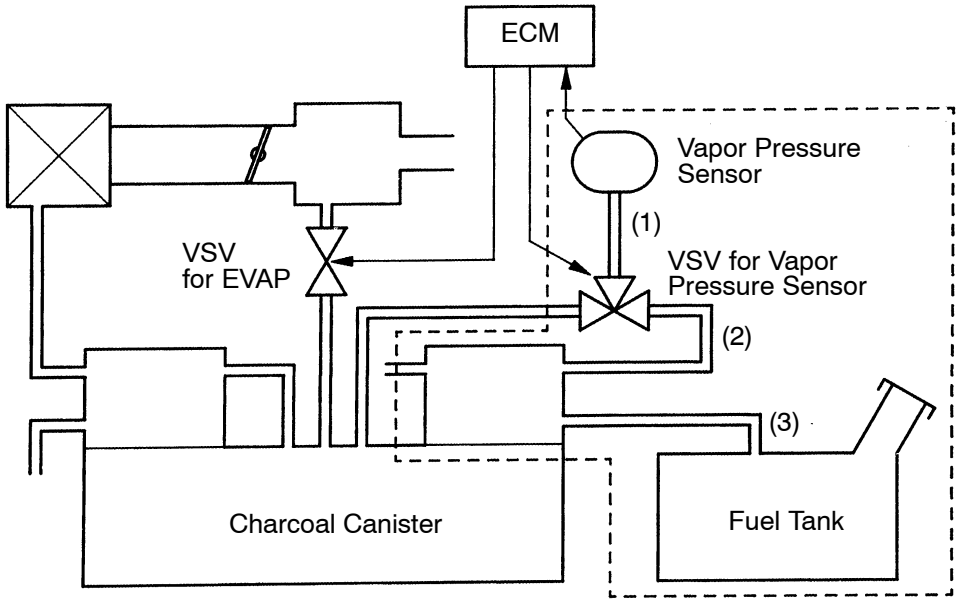
DTC	P0440	Evaporative Emission Control System Malfunction

CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.
DTC P0440 is recorded by the ECM when evaporative emissions leak from the components within the dotted line in fig. 1 below, or when the vapor pressure sensor malfunctions.

fig. 1



S00043

DTC No.	DTC Detecting Condition	Trouble Area
P0440	The fuel tank pressure is atmospheric pressure after the vehicle is driven for 20 min. (2 trip detection logic)	• Vapor pressure sensor • Fuel tank cap incorrectly installed • Fuel tank cap cracked or damaged • Vacuum hose cracked, hole, blocked, damaged, or disconnected ((1) or (2) in fig. 1) • Hose or tube cracked, hole, damaged or loose seal ((3) in fig. 1) • Fuel tank cracked, hole or damaged • Charcoal canister cracked, hole or damaged

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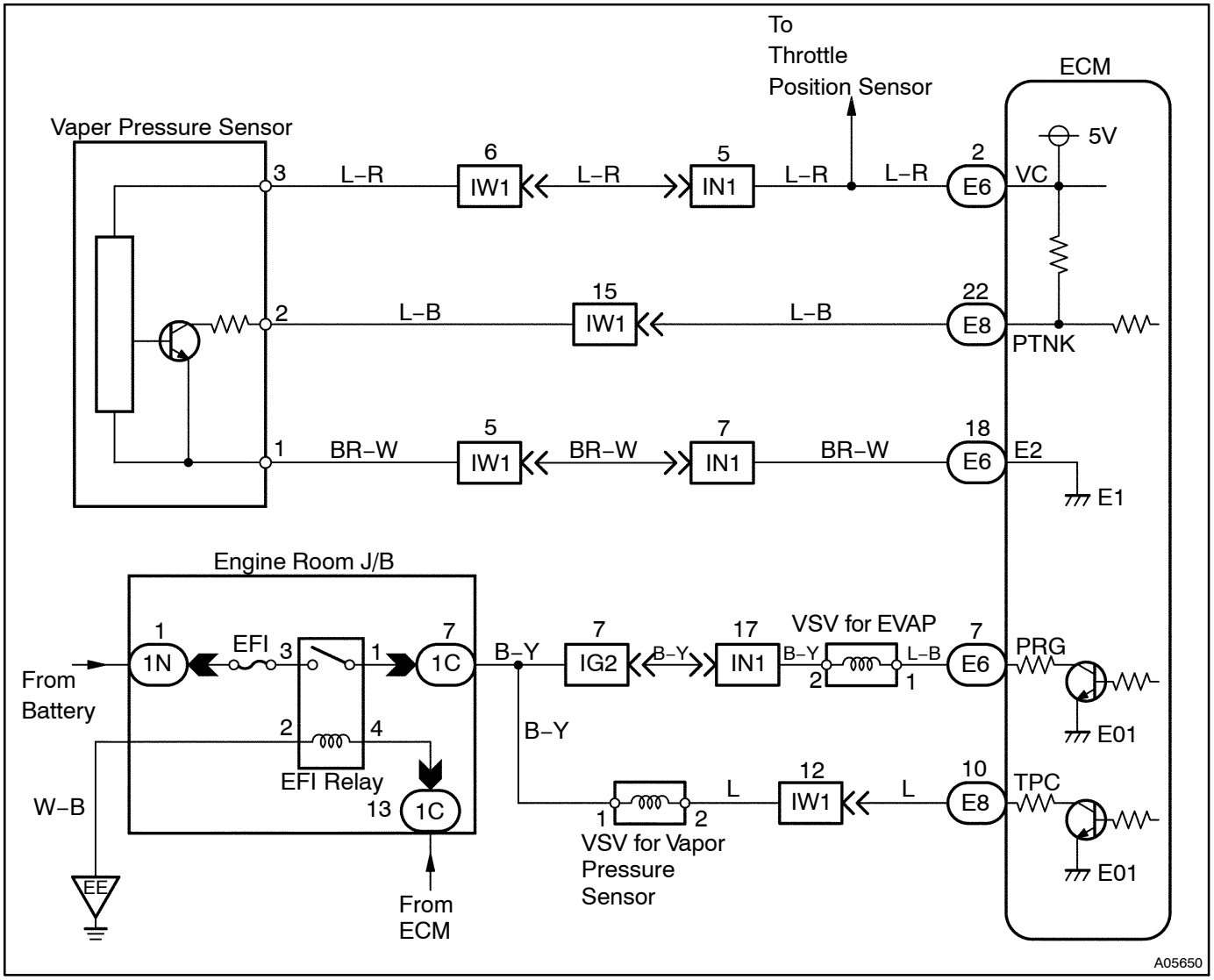
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC P0441, P0446, P0450 or P0451 is output after DTC P0440, first troubleshoot DTC P0441, P0446, P0450 or P0451. If no malfunction is detected, troubleshoot DTC P0440 next.
- Ask the customer whether, after the MIL came on, the customer found the fuel tank cap loose and tightened it. Also ask the customer whether the fuel tank cap was loose when refuelling. If the fuel tank cap was not 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 TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the VSV for EVAP, charcoal canister and vapor pressure sensor.

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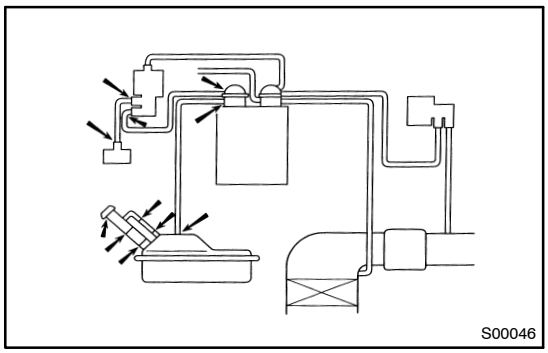
1	**Check whether hose close to fuel tank have been modified, and check whether there are signs of any accident near fuel tank or charcoal canister.**



CHECK:

Check for cracks, deformation and loose connection of the following parts:

- Fuel tank
- Charcoal canister
- Fuel tank filler pipe
- Hoses and tubes around the fuel tank and charcoal canister

NG → **Repair or replace.**

OK

2	**Check that fuel tank cap is TOYOTA genuine parts.**

NG → **Replace to TOYOTA 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–5).**

NG → **Replace fuel tank cap.**

OK

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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 VSV for vapor pressure sensor, and VSV for vapor pressure sensor 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–5), 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–5).**

NG → **Replace charcoal canister.**

OK

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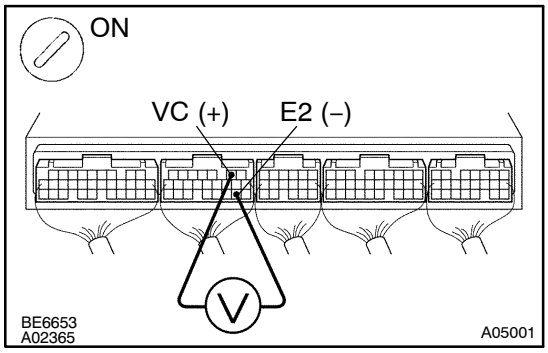
9	Check voltage between terminals VC and E2 of ECM connector.



CHECK:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals VC and E2 of the ECM connector.

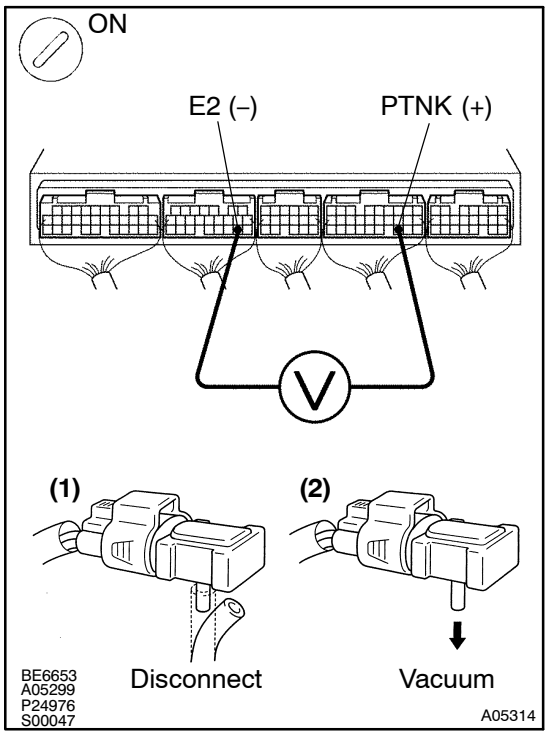
OK:

Voltage: 4.5 ~ 5.5 V

NG	Check and replace ECM (See page IN–34).

OK

10	Check voltage between terminals PTNK and E2 of ECM connector.



PREPARATION:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals PTNK and E2 of the ECM connector.

(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

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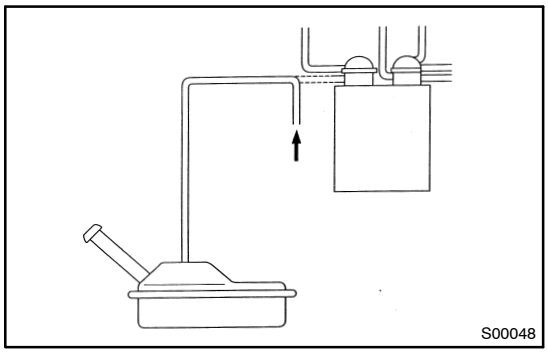
11	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Replace vapor pressure sensor.

12	**Check fuel tank for cracks and damage.**



PREPARATION:

(a) Disconnect the vacuum hose from the charcoal canister.
(b) Correctly install the fuel cap.
(c) Apply a pressure of 5 kPa (50 gf/cm^2, 0.7 psi) to the fuel tank.

CHECK:

Check whether the pressure is maintained after 1 minute.

OK:

Pressure applied to the fuel tank is maintained.

NG → **Replace fuel tank.**

OK

It is likely that vehicle user did not properly close fuel tank cap. Please explain to customer how to properly install fuel tank cap.

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DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow

DTC	P0446	Evaporative Emission Control System Vent Control Malfunction

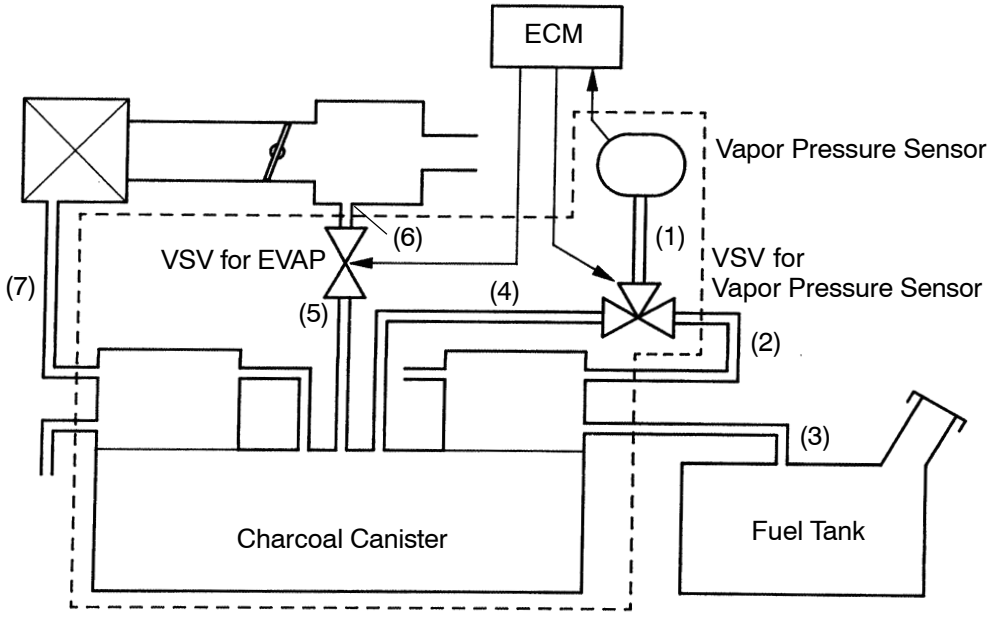
CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.

The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.

DTC 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 vapor pressure sensor, or in the vapor pressure sensor itself.

fig. 1



S00044

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DTC No.	DTC Detecting Condition	Trouble Area
P0441	The pressure in the charcoal canister does not drop during purge control (2 trip detection logic)	• Open or short in VSV circuit for EVAP • VSV for EVAP • Open or short in VSV circuit for vapor pressure sensor • VSV for vapor pressure sensor • Open or short in vapor pressure sensor circuit • Vapor pressure sensor • Vacuum hose cracks, hole blocked, damaged or disconnected ((1), (4), (5), (6) and (7) in fig. 1) • Charcoal canister cracked, hole or damaged
	During purge cut–off, the pressure in the charcoal canister is very low compared with atmospheric pressure (2 trip detection logic)	
P0446	When VSV for vapor pressure sensor is OFF, ECM judges that there is no continuity between vapor pressure sensor and charcoal canister (2 trip detection logic)	
	When VSV for vapor pressure sensor is OFF, ECM judges that there is no continuity between vapor pressure sensor and fuel tank (2 trip detection logic)	
	After the purge cut off operates, the pressure in the charcoal canister is maintained at atmospheric pressure (2 trip detection logic)	

WIRING DIAGRAM

Refer to DTC P0440 (Evaporative Emission Control System Malfunction) on page DI–79 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

HINT:

- If DTC P0441, P0446, P0450 or P0451 is output after DTC P0440, first troubleshoot DTC P0441, P0446, P0450 or P0451. If no malfunction is detected, troubleshoot DTC P0440 next.
- Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the VSV for EVAP, charcoal canister and vapor pressure sensor.

TOYOTA hand–held tester

1	**Check VSV connector for EVAP, VSV connector for vapor pressure sensor and vapor pressure sensor connector for looseness and disconnection.**

NG → **Repair or connect VSV or sensor connector.**

OK

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2	**Check vacuum hose ((1), (4), (5), (6) and (7) 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

3	**Check voltage between terminals VC and E2 of ECM connector (See page DI–79, step 9).**

NG → **Check and replace ECM (See page IN–34).**

OK

4	**Check voltage between terminals PTNK and E2 of ECM connector (See page DI–79, step 10).**

OK → **Go to step 6.**

NG

5	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Replace vapor pressure sensor.

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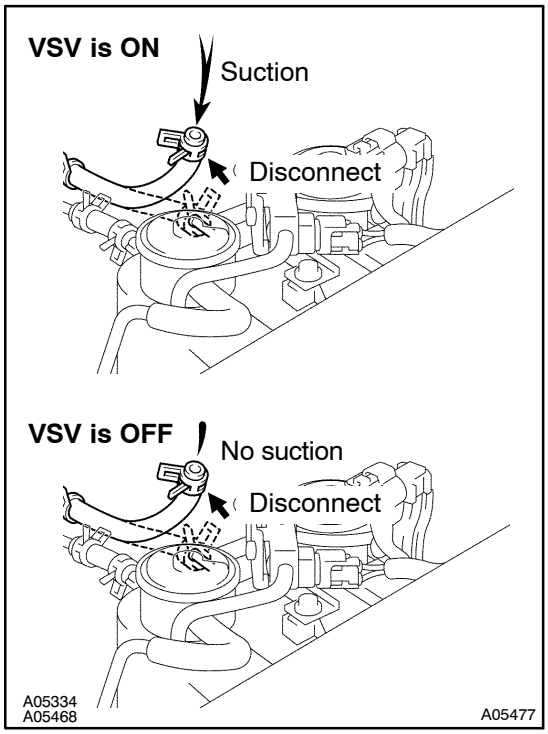
6	Check purge flow.



PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Select ACTIVE TEST mode on the TOYOTA hand–held tester.
(c) Disconnect the VSV vacuum hose for EVAP from the charcoal canister.
(d) Start the engine.

CHECK:

When the VSV for EVAP is operated by the TOYOTA 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 10.

NG

7	Check vacuum hose between throttle body 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

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8	**Check operation of VSV for EVAP (See page SF–47).**

OK → **Go to step 9.**

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.

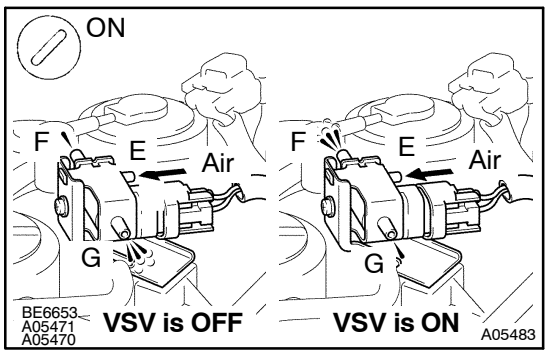
9	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for EVAP and ECM (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–34).

10	**Check VSV for vapor pressure sensor.**



PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and OBD II scan tool or TOYOTA hand–held tester main switch ON.
(c) Select ACTIVE TEST mode on the TOYOTA hand–held tester.

CHECK:

Check the VSV operation, when it is operated by the TOYOTA hand–held tester.

OK:

VSV is OFF:
Air from pipe E is following out through pipe G.
VSV is ON:
Air from pipe E is following out through pipe F.

OK → **Go to step 13.**

NG

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11	Check operation of VSV for vapor pressure sensor (See page SF–49).

OK → Go to step 12.

NG

Replace VSV and charcoal canister, and then clean vacuum hose between charcoal canister and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and vapor pressure sensor.

12	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for vapor pressure sensor and ECM (See page IN–34).

NG → Repair or replace harness or connector.

OK

Check and replace ECM (See page IN–34).

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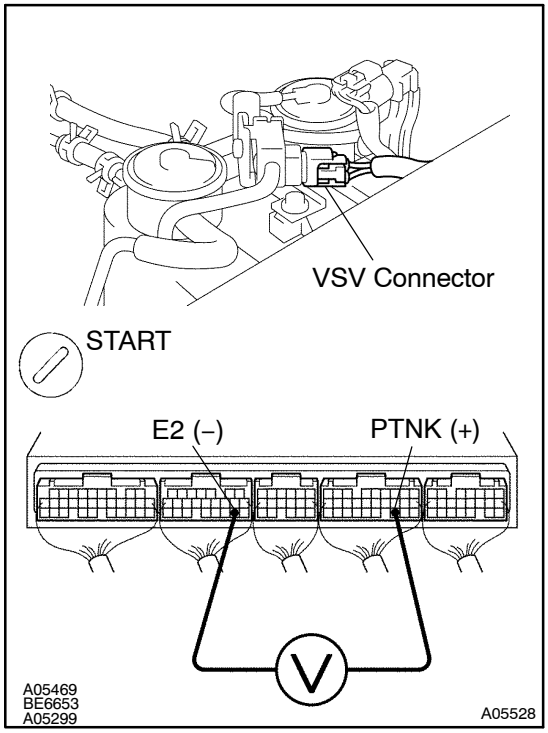
13	**Connect TOYOTA hand–held tester, when VSV connector for vapor pressure sensor is disconnected and VSV for EVAP is ON, measure voltage between terminals PTNK and E2 of ECM connector.**



PREPARATION:

(a) Remove the glove compartment door.
(b) Connect the TOYOTA hand–held tester to the DLC3.
(c) Disconnect the VSV connector for vapor pressure sensor.
(d) Select ACTIVE TEST mode on the TOYOTA hand–held tester.
(e) Start the engine.

CHECK:

Measure voltage between terminals PTNK and E2 of the ECM connector, when VSV for EVAP is ON, using the TOYOTA hand–held tester.

OK:

Voltage: 2.0 V or less

OK	**Go to step 15.**

NG

14	**Check vacuum hose between charcoal canister and VSV for vapor pressure sensor, and vapor pressure sensor and VSV for vapor pressure sensor.**

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

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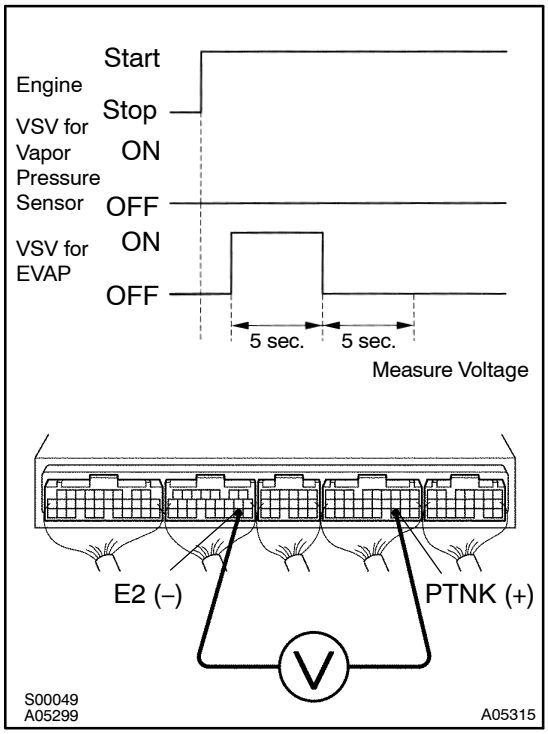
15	**Check charcoal canister.**



PREPARATION:

(a) Remove the glove compartment door.
(b) Connect the TOYOTA hand–held tester to the DLC3.
(c) Remove the fuel tank cap.
(d) Disconnect the VSV connector for vapor pressure sensor.
(e) Select ACTIVE TEST mode on the TOYOTA hand–held tester.
(f) Start the engine.
(g) VSV for EVAP is ON by the TOYOTA hand–held tester and remains on for 5 sec.

CHECK:

Measure voltage between terminals PTNK and E2 of the ECM connector 5 sec. after switching VSV for EVAP from ON to OFF.

OK:

Voltage: 2.5 V or less

NG → **Replace charcoal canister.**

OK

16	**Remove chacoal canister and check it (See page EC–5).**

NG → **Replace charcoal canister.**

OK

Check and replace ECM (See page IN–34).

OBD II scan tool (excluding TOYOTA hand–held tester)

1	**Check VSV connector for EVAP, VSV connector for vapor pressure sensor and vapor pressure sensor connector for looseness and disconnection.**

NG → **Repair or connect VSV or sensor connector.**

OK

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2	**Check vacuum hose ((1), (4), (5), (6) and (7) 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

3	**Check voltage between terminals VC and E2 of ECM connector (See page DI–79, step 9).**

NG → **Check and replace ECM (See page IN–34).**

OK

4	**Check voltage between terminals PTNK and E2 of ECM connector (See page DI–79, step 10).**

OK → **Go to step 6.**

NG

5	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Replace vapor pressure sensor.

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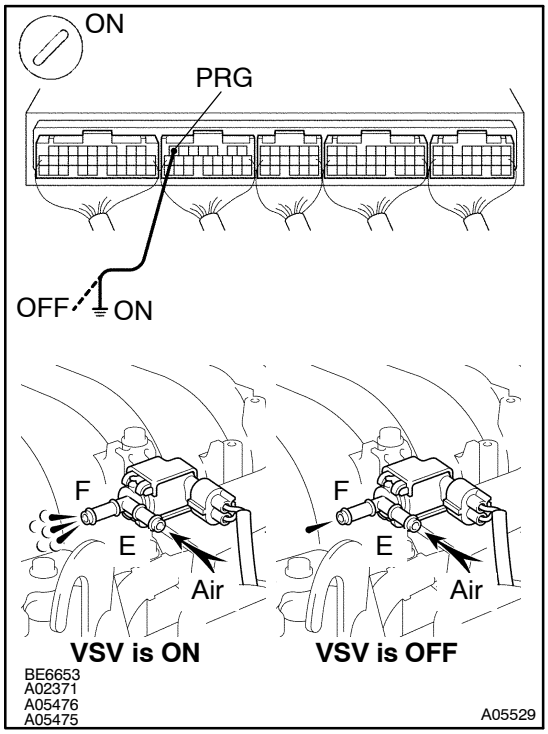
6	Check VSV for EVAP.



PREPARATION:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Check VSV function.

(1) Connect between terminal PRG of the ECM connector and body ground (ON).

(2) Disconnect between terminal PRG of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air from pipe E is flowing out through pipe F.
(2) VSV is OFF:
Air does not flow from pipe E to pipe F.

OK	Go to step 9.

NG

7	Check operation of VSV for EVAP (See page SF–47).

OK	Go to step 8.

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.

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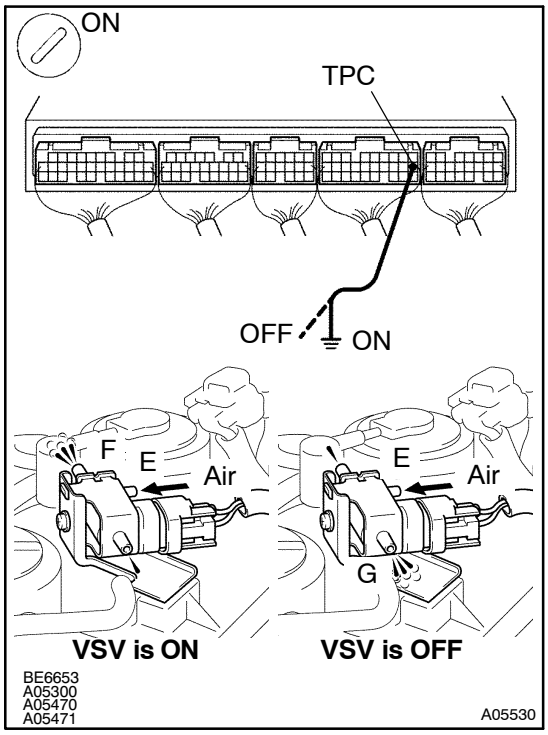
8	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for EVAP and ECM (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–34).

9	**Check VSV for vapor pressure sensor.**



PREPARATION:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Check VSV function.

(1) Connect between terminal TPC of the ECM connector and body ground (ON).

(2) Disconnect between terminal TPC of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air from pipe E is flowing out through pipe F.
(2) VSV is OFF:
Air from pipe E flows out through pipe G.

OK → **Check and replace charcoal canister (See page EC–5).**

NG

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10	Check operation of VSV for vapor pressure sensor (See page SF–49).

OK → Go to step 11.

NG

Replace VSV and charcoal canister, and then clean vacuum hose between charcoal canister and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and vapor pressure sensor.

11	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for vapor pressure sensor and ECM (See page IN–34).

NG → Repair or replace harness or connector.

OK

Check and replace ECM (See page IN–34).

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DTC	P0450	Evaporative Emission Control System Pressure Sensor Malfunction

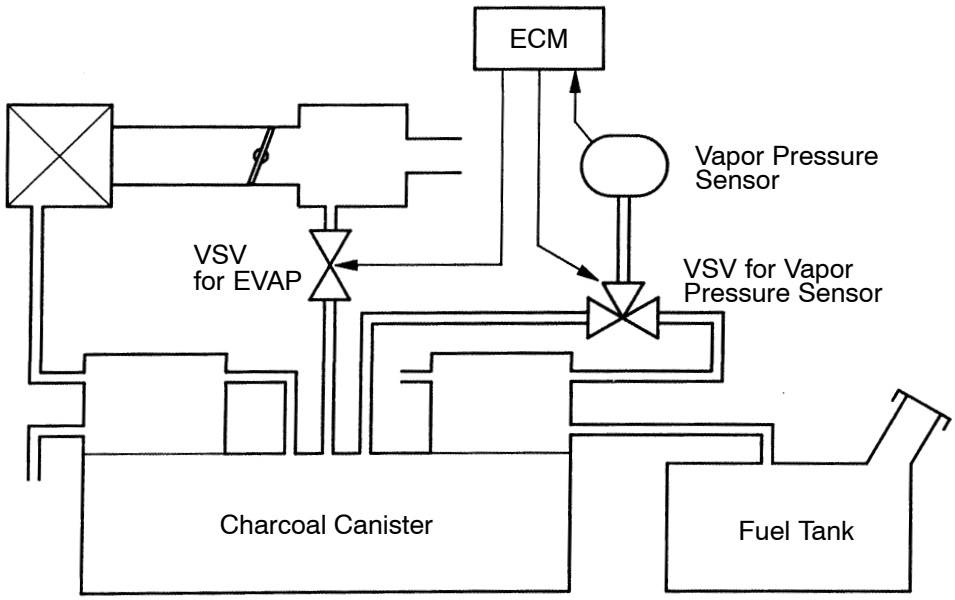
DTC	P0451	Evaporative Emission Control System Pressure Sensor Range/Performance

CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.

The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.

DTC P0450 or P0451 is recorded by the ECM when the vapor pressure sensor malfunction.



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DTC No.	DTC Detecting Condition	Trouble Area
P0450	10 seconds or less after engine starting condition (a) or (b) continuities for 7 seconds or more: (2 trip detection logic) (a) Vapor pressure sensor value > –3.5 kPa (–26 mmHg, –1.0 in.Hg) (b) Vapor pressure sensor value ≧ 2.0 kPa (15 mmHg, 0.6 in.Hg)	• Open or short in vapor pressure sensor circuit • Vapor pressure sensor • ECM
	10 seconds or more after engine starting condition (a) or (b) continuities for 7 seconds or more: (2 trip detection logic) (a) Vapor pressure sensor value < –4.0 kPa (–30 mmHg, –1.2 in.Hg) (b) Vapor pressure sensor value ≦ 2.0 kPa (15 mmHg, 0.6 in.Hg)	
P0451	Vapor pressure sensor output extremely changes under conditions of (a), (b) and (c): (2 trip detection logic) (a) Vehicle speed: 0 km/h (0mph) (b) Engine speed: Idling (c) VSV for vapor pressure sensor is ON.	

WIRING DIAGRAM

Refer to DTC P0440 (Evaporative Emission Control System Malfunction) on page DI–79 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

HINT:

- If DTC P0110 (Intake Air Temp. Circuit Malfunction), P0115 (Engine Coolant Temp. Circuit Malfunction), P0120 (Throttle/Pedal Position Sensor/Switch ”A” Circuit Malfunction), P0450 (Evaporative Emission Control System Pressure Sensor Malfunction) and P1120 (Accelerator Pedal Position Sensor Circuit Malfunction) are output simultaneously, E2 (Sensor Ground) may be open.
- If DTC P0441, P0446, P0450 or P0451 is output after DTC P0440, first trouble shoot DTC P0441, P0446 P0450 or P0451. If no malfunction is detected, troubleshoot DTC P0440 next.
- Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the VSV for EVAP, charcoal canister and vapor pressure sensor.

1	**Check voltage between terminals VC and E2 of ECM connector (See page DI–79, step 9).**

NG → **Check and replace ECM (See page IN–34).**

OK

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2	Check voltage between terminals PTNK and E2 of ECM connector (See page DI–79, step 10).

OK → Check and replace ECM (See page IN–34).

NG

3	Check for open and short in harness and connector between the vapor pressure sensor and ECM (See page IN–34).

NG → Repair or replace harness or connector.

OK

Replace vapor pressure sensor.

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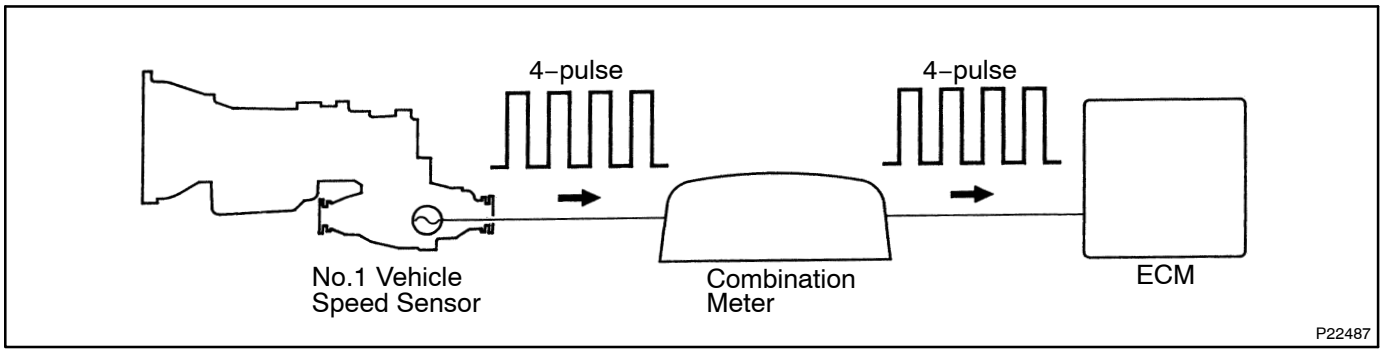
DI3CQ–01

DTC	P0500	Vehicle Speed Sensor Malfunction

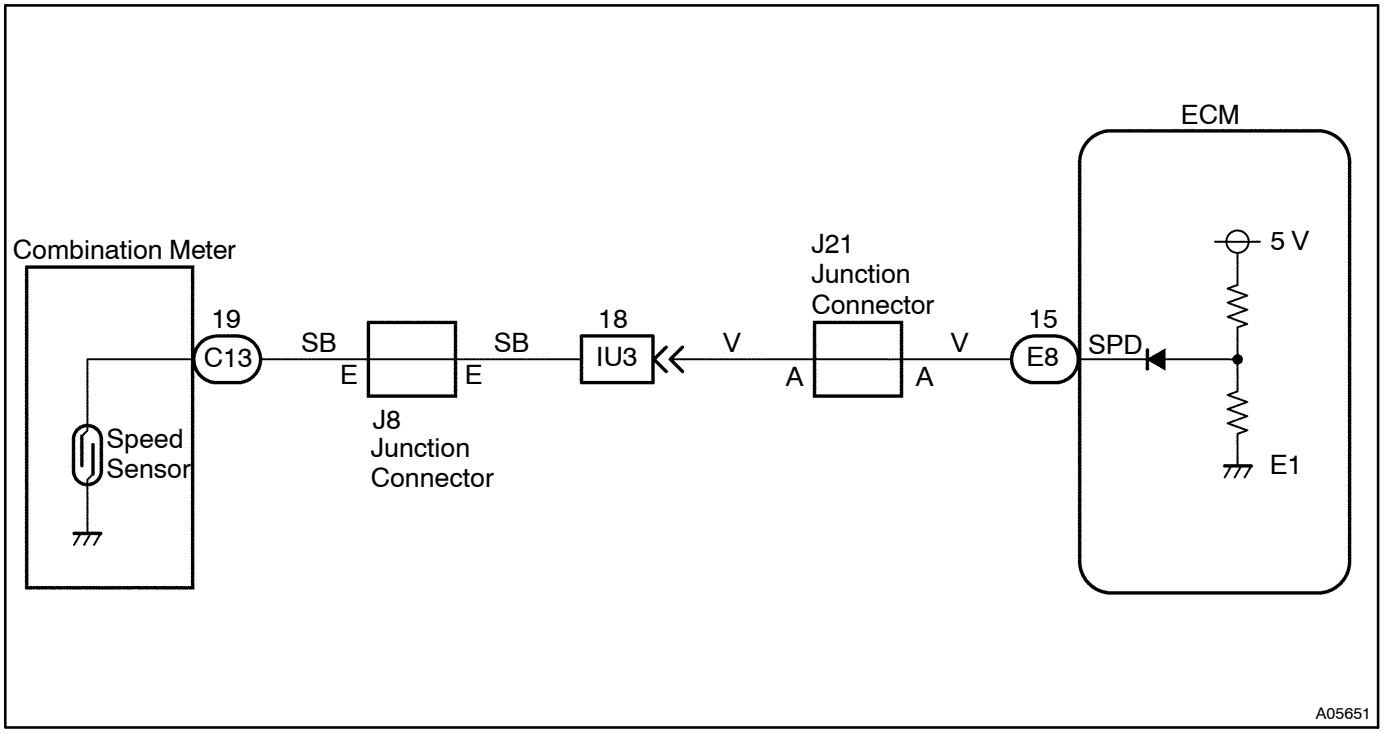
CIRCUIT DESCRIPTION

The No.1 vehicle speed sensor outputs a 4–pulse signal for every revolution of the rotor shaft, which is rotated by the transmission output shaft via the driven gear. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the ECM. The ECM determines the vehicle speed based on the frequency of these pluse signals.



DTC No.	DTC Detecting Condition	Trouble Area
P0500	No vehicle speed sensor signal to ECM under the following conditions (a) and (b): (2 trip detection logic) (a) Park/neutral position switch is OFF (b) Vehicle is being driven	• Open or short in No.1 vehicle speed sensor circuit • No.1 vehicle speed sensor • Combination meter • ECM

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio 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 is operating normally if the speedometer display is normal.

NG → **Check speedometer circuit. See combination meter troubleshooting (See page BE–2).**

OK

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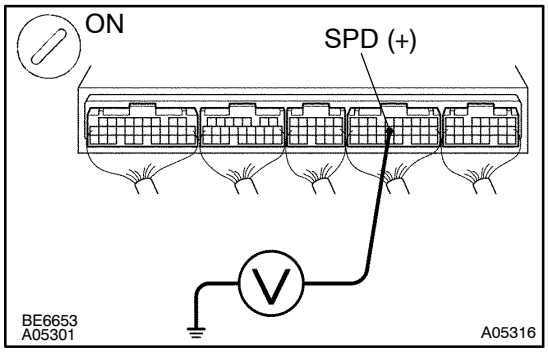
2	Check voltage between terminal SPD of ECM connector and body ground.



PREPARATION:

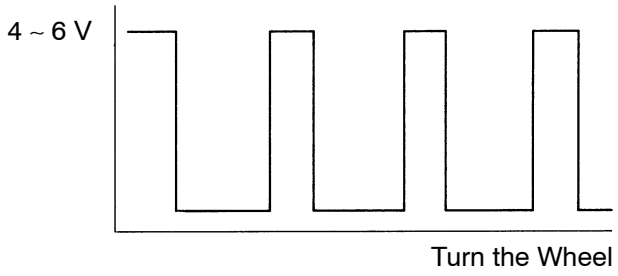
(a) Remove the glove compartment door.
(b) Shift the shift lever to neutral.
(c) Jack up a rear wheel on one side.
(d) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal SPD of the ECM connector and 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.**

OK →

Check and replace ECM (See page IN–34).

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DI1LY-02

DTC	P0505	Idle Control System Malfunction

CIRCUIT DESCRIPTION

The idle speed is controlled by the Electric Throttle Control System (ETCS).
ETCS is composed of the throttle motor to operate the throttle valve, the magnetic clutch to connect the throttle motor with the throttle valve, the throttle position sensor to detect the opening angle of the throttle valve, the accelerator pedal position sensor to detect the accelerator pedal position, the ECM to control the ETCS and the one valve type throttle body.
The ECM controls the throttle motor to make the throttle valve opening angle properly for the target idle speed.

DTC No.	DTC Detecting Condition	Trouble Area
P0505	Idle speed continues to vary greatly from target speed (2 trip detection logic)	• Electric throttle control system • Air intake (hose loose)

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides P0505) being output?**

YES → **Go to relevant DTC chart (See page DI–14).**

NO

2	**Check air induction system (See page SF–1).**

NG → **Repair or replace.**

OK

Check electric throttle control system (See page SF–35).

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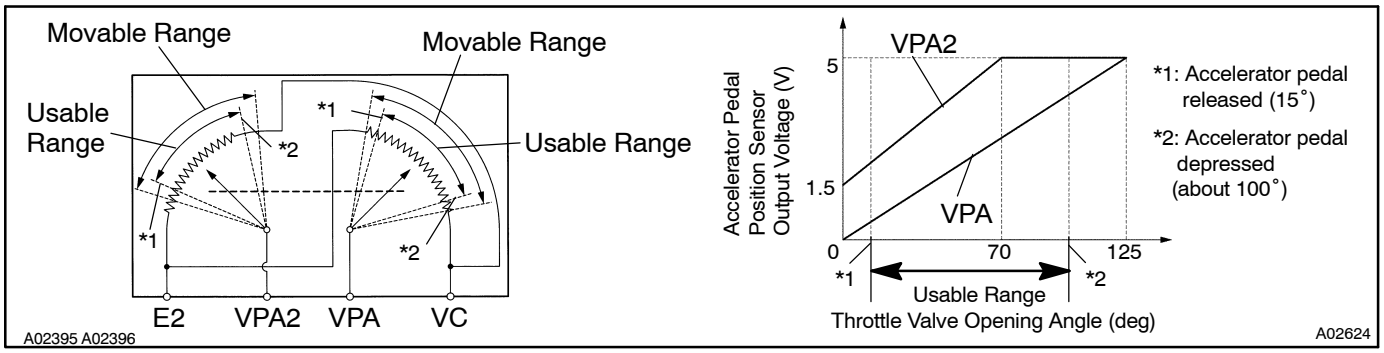
DI1LZ–02

DTC	P1120	Accelerator Pedal Position Sensor Circuit Malfunction

CIRCUIT DESCRIPTION

Accelerator pedal position sensor is mounted on the throttle body and it has the 2 sensors to detects the accelerator position and a malfunction of the accelerator position's own.
The accelerator pedal position sensor is connected with the accelerator pedal by the accelerator wire and the voltage applied to the terminals VPA and VPA2 of the ECM changes between 0 V and 5 V in proportion to the opening angle of the accelerator pedal.
The ECM judges the current opening angle of the accelerator pedal from these signals input from terminals VPA and VPA2 and the ECM controls the throttle motor based on these signals.
If this DTC is stored, the ECM shuts down the power for the throttle motor and the magnetic clutch, and the throttle valve is fully closed by the return spring.
However, the opening angle of the throttle valve can be controlled by the accelerator pedal through the throttle cable.



DTC No.	DTC Detecting Condition	Trouble Area
P1120	Condition (a), (b), (c) (d) or (e) continues for 2.0 seconds: (a) VPA ≦ 0.2 V (b) VPA2 ≦ 0.5 V (c) VPA ≧ 4.8 V (d) When VPA ≧ 0.2 V and ≦ 1.8 V, and VPA2 ≧ 4.97 V (e) VPA–VPA2 ≦ 0.02 V, or VPA2–VPA ≦ 0.02 V	• Open or short in accelerator pedal position sensor circuit • Accelerator pedal position sensor • ECM
	Condition (a) continue for 0.4 seconds: (a) VPA ≦ 0.2 V and VPA2 ≦ 0.5 V	

HINT:
After confirming DTC P1120 use the OBD II scan tool or TOYOTA hand–held tester to confirm the throttle valve opening percentage.

Accelerator pedal position expressed as voltage				Trouble area
Accelerator pedal released		Accelerator pedal depressed		
ACCEL POS #1	ACCEL POS #2	ACCEL POS #1	ACCEL POS #2	
0 V	0 V	0 V	0 V	VC line open
0 V	1.8 ~ 2.7 V	0 V	4.7 ~ 5.1 V	VPA line open or grand short
0.3 ~ 0.9 V	0 V	3.2 ~ 4.8 V	0 V	VPA2 line open or grand short
5 V	5 V	5 V	5 V	E2 line open

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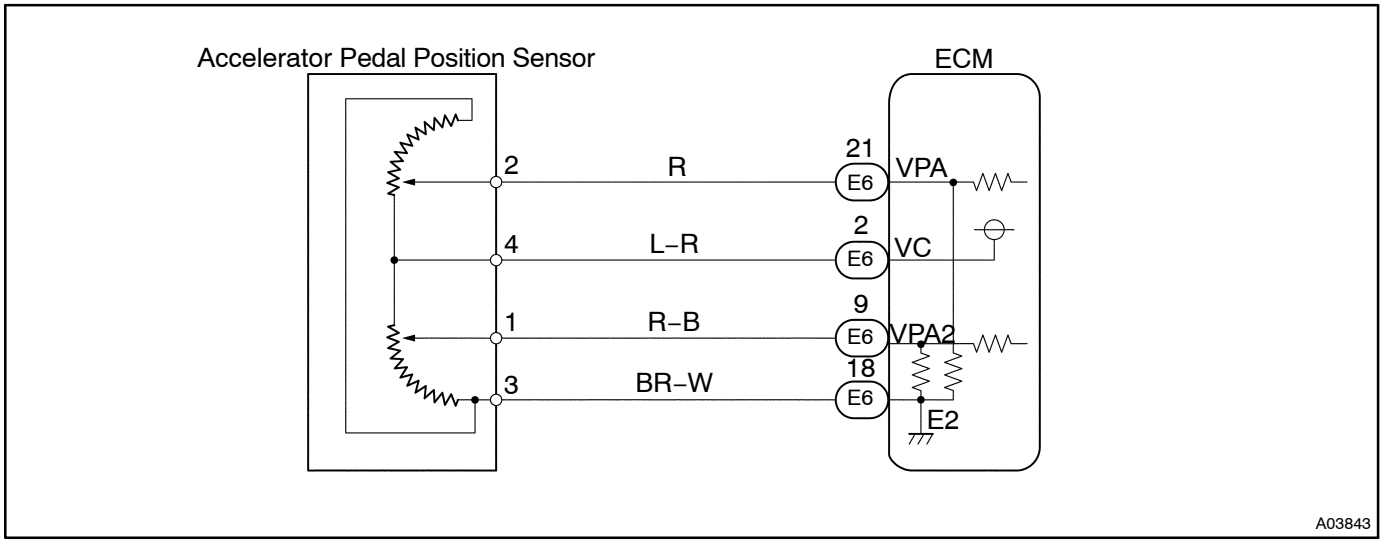
WIRING DIAGRAM



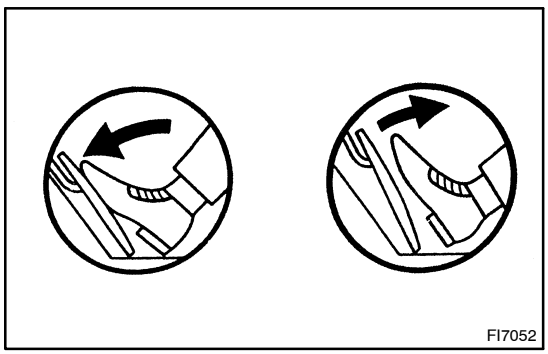
INSPECTION PROCEDURE

HINT:

- If DTC P0110 (Intake Air Temp. Circuit Malfunction), P0115 (Engine Coolant Temp. Circuit Malfunction), P0120 (Throttle/Pedal Position Sensor/Switch "A" Circuit Malfunction), P0450 (Evaporative Emission Control System Pressure Sensor Malfunction) and P1120 (Accelerator Pedal Position Sensor Circuit Malfunction) are output simultaneously, E2 (Sensor Ground) may be open.
- Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

TOYOTA hand–held tester

1	**Connect TOYOTA hand–held tester, read the voltage for accelerator pedal position sensor data.**



PREPARATION:

(a) Connect the TOYOTA hand–held tester to DLC3.

(b) Turn the ignition switch ON and switch the TOYOTA hand–held tester main switch ON.

CHECK:

Read the voltage for the accelerator pedal position sensor data.

OK:

Accelerator pedal	VPA	VPA2
Released	0.3 ~ 0.9 V	1.8 ~ 2.7 V
Depressed	3.2 ~ 4.8 V	4.7 ~ 5.1 V

OK	**Check and replace ECM (See page IN–34).**

NG

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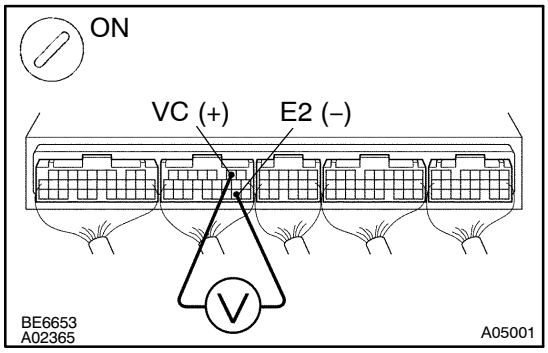
2	Check voltage between terminals VC and E2 of ECM connector.



PREPARATION:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals VC and E2 of the ECM connector.

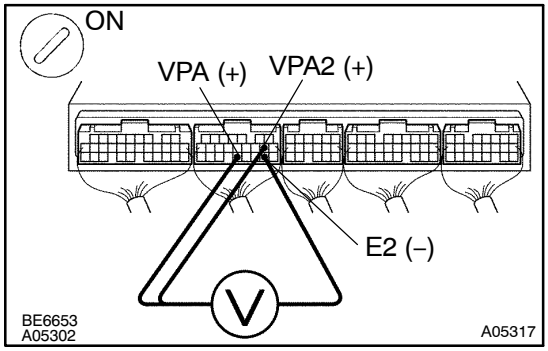
OK:

Voltage: 4.5 ~ 5.5 V

NG	Check and replace ECM (See page IN–34).

OK

3	Check voltage between terminals VPA, VPA2 and E2 of ECM connector.



PREPARATION:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals VPA, VPA2 and E2 of the ECM connector.

OK:

Accelerator pedal	Voltage	
	VPA	VPA2
Released	0.3 ~ 0.9 V	1.8 ~ 2.7 V
Depressed	3.2 ~ 4.8 V	4.7 ~ 5.1 V

OK	Check and replace ECM (See page IN–34).

NG

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4	**Check accelerator pedal position sensor (See page SF–35).**

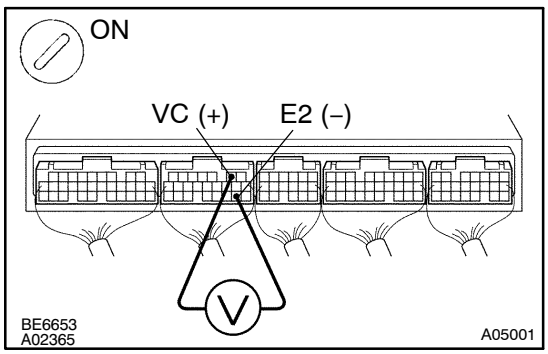
NG → **Replace accelerator pedal position sensor (See page SF–40).**

OK

Check for open and short in harness and connector between ECM and accelerator pedal position sensor (VC, VPA,VPA2, E2 line) (See page IN–34).

OBD II scan tool (excluding TOYOTA hand–held tester)

1	**Check voltage between terminals VC and E2 of ECM connector.**



PREPARATION:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Measure 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–34).**

OK

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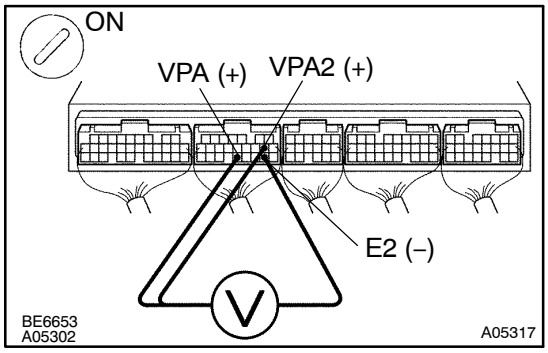
2	**Check voltage between terminals VPA, VPA2 and E2 of ECM connector.**



PREPARATION:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals VPA, VPA2 and E2 of the ECM connector.

OK:

Accelerator pedal	Voltage	
	VPA	VPA2
Released	0.3 ~ 0.9 V	1.8 ~ 2.7 V
Depressed	3.2 ~ 4.8 V	4.7 ~ 5.1 V

OK → **Check and replace ECM (See page IN–34).**

NG

3	**Check accelerator pedal position sensor (See page SF–35).**

NG → **Replace accelerator pedal position sensor (See page SF–40).**

OK

Check for open and short in harness and connector between ECM and accelerator pedal position sensor (VC, VPA,VPA2, E2 line) (See page IN–34).

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DTC	P1121	Accelerator Pedal Position Sensor Range/ Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P1120 (Accelerator Pedal Position Sensor Circuit Malfunction) on page DI–104.

DTC No.	DTC Detecting Condition	Trouble Area
P1121	Condition (a) continue for 2.0 seconds: (a) Difference between VPA and VPA2 is out of threshold	• Accelerator pedal position sensor • ECM

WIRING DIAGRAM

Refer to DTC P1120 (Accelerator Pedal Position Sensor Circuit Malfunction) on page DI–104.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

Replace accelerator pedal position sensor (See page SF–40).

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DI1M1–02

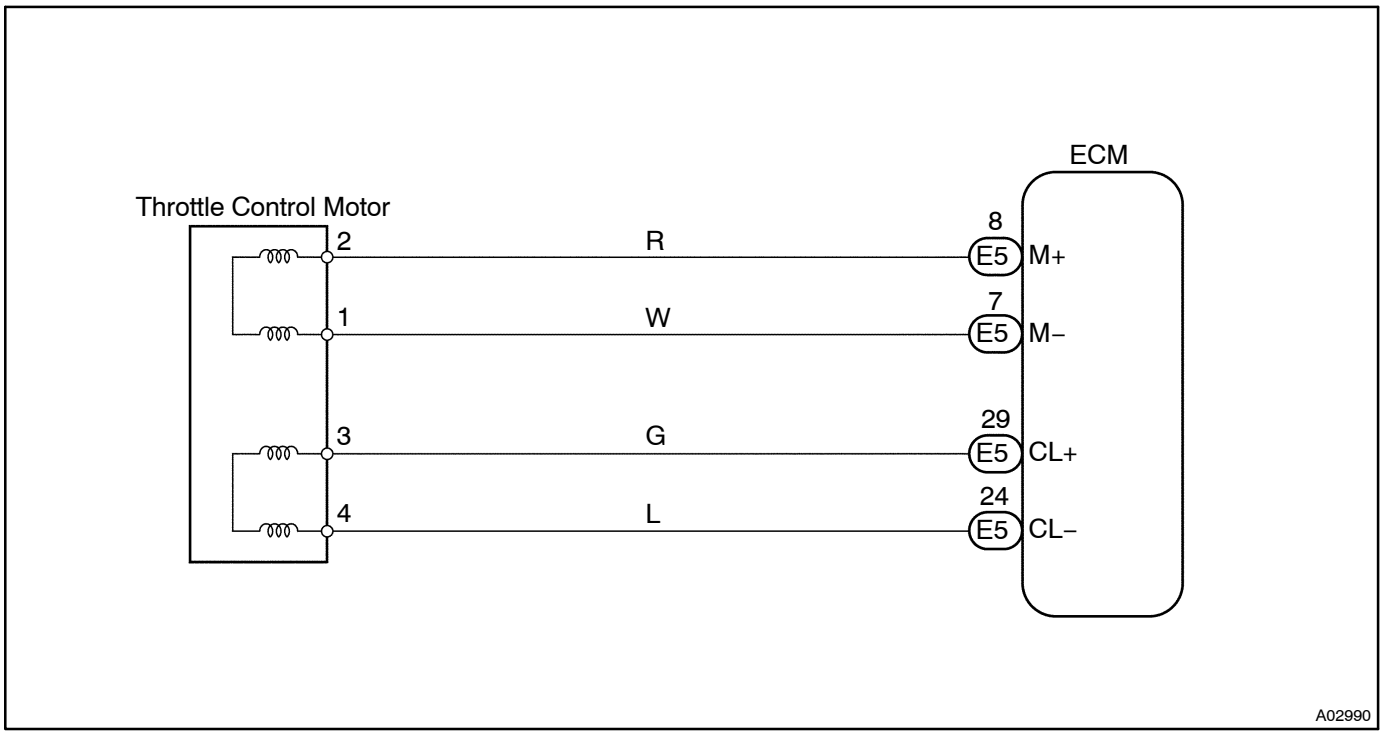
DTC	P1125	Throttle Control Motor Circuit Malfunction

CIRCUIT DESCRIPTION

Throttle motor is operated by the ECM and it opens and closes the throttle valve.
The opening angle of the throttle valve is detected by the throttle position sensor which is mounted on the throttle body and it provides feedback to the ECM to control the throttle motor in order to the throttle valve opening angle properly in response to driving condition.
If this DTC is stored, the ECM shuts down the power for the throttle motor and the magnetic clutch, and the throttle valve is fully closed by the return spring.
However, the opening angle of the throttle valve can be controlled by the accelerator pedal through the throttle cable.

DTC No.	DTC Detecting Condition	Trouble Area
P1125	Condition (a) and (b) continues for 0.5 seconds: (a) Throttle control motor output duty ≧ 80 % (b) Throttle control motor current < 0.5 A	• Open or short in throttle control motor circuit • Throttle control motor • ECM
	Throttle control motor current ≧ 16 A	
	Under condition continue for 0.6 seconds: Throttle control motor current ≧ 7 A	

WIRING DIAGRAM



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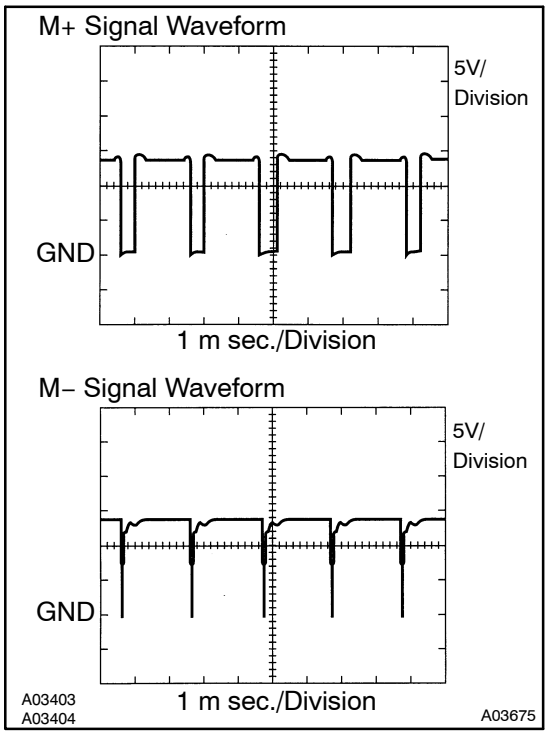
INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check throttle control motor circuit.**



When not using TOYOTA hand–held tester:

PREPARATION:

(a) Connect the oscilloscope between terminals M+ or M– and E1 of the ECM.

(b) Start the engine.

CHECK:

Check the waveform between terminals M+ or M– and E1 of the ECM when engine is idling.

OK:

The correct waveforms are as shown.

HINT:

The waveform frequency varies depending on the throttle opening.

NG

OK → **Check and replace ECM (See page IN–34).**

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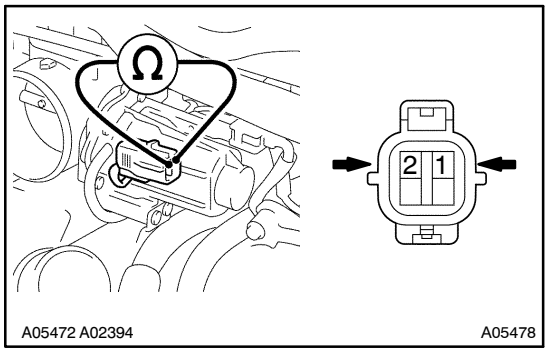
2	**Check throttle control motor.**



PREPARATION:
Disconnect the throttle control motor and magnetic clutch connector.

CHECK:
Measure resistance between terminals 1 and 2 of the throttle control motor and magnetic clutch.

OK:

Resistance: 0.3 ~ 100 Ω at 20°C (68°F)

NG → **Replace throttle control motor (See page SF–40).**

OK

3	**Check for open and short in harness and connector between throttle control motor and ECM (See page IN–34).**

NG → **Repair or replace.**

OK

Check and replace ECM (See page IN–34).

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DI1M3–02

DTC	P1126	Magnetic Clutch Circuit Malfunction

CIRCUIT DESCRIPTION

Magnetic clutch is mounted between the throttle motor and the valve, and it connects the throttle motor with the throttle valve.
Therefore, the throttle motor opens and closes the throttle valve through the magnetic clutch.
If the electric throttle control system has a malfunction, the magnetic clutch separates the throttle motor from the throttle valve in order not to operate the throttle valve by the throttle motor.
If this DTC is stored, the ECM shuts down the power for the throttle motor and the magnetic clutch, and the throttle valve is fully closed by the return spring.
However, the opening angle of the throttle valve can be controlled by the accelerator pedal through the throttle cable.

DTC No.	DTC Detecting Condition	Trouble Area
P1126	Condition (a) continue for 0.8 seconds: (a) Magnetic clutch current ≧ 1.4 A or ≦ 0.4 A	• Open or short in magnetic clutch circuit • Magnetic clutch • ECM
	Condition (a) continue for 1.5 seconds: (a) Magnetic clutch current ≧ 1.0 A or ≦ 0.8 A	

WIRING DIAGRAM

Refer to DTC P1125 (Throttle Control Motor Circuit Malfunction) on page DI–110 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Check magnetic clutch circuit.

When using TOYOTA hand–held tester:

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and TOYOTA hand–held tester main switch ON.

CHECK:

Read the magnetic clutch current value on the TOYOTA hand–held tester.

OK:

Current: 0.8 ~ 1.0 A

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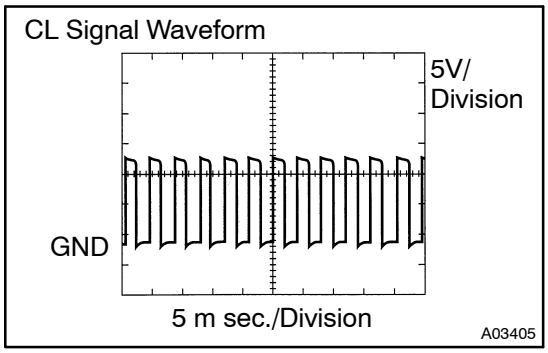


When not using TOYOTA hand–held tester:

PREPARATION:

(a) Connect the oscilloscope between terminals CL+ and CL– of the ECM.

(b) Start the engine.

CHECK:

Check the waveform between terminals CL+ and CL– of the ECM when engine is idling.

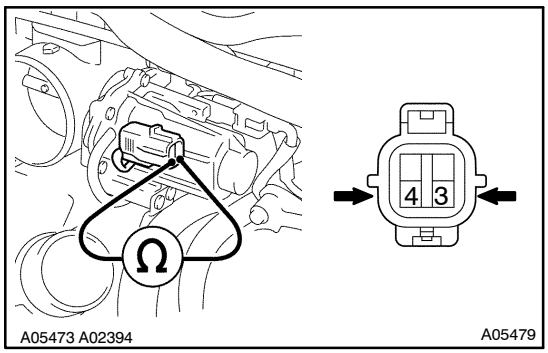
OK:

The correct waveform is as shown.

NG	**Go to step 4.**

OK

2	**Check magnetic clutch.**



PREPARATION:

Disconnect the throttle control motor and magnetic clutch connector.

CHECK:

Measure resistance between terminals 3 and 4 of the throttle control motor and magnetic clutch.

OK:

Resistance: 4.2 ~ 5.2 Ω at 20°C (68°F)

NG	**Replace throttle control motor (with magnetic clutch) (See page SF–40).**

OK

3	**Check for open and short in harness and connector between magnetic clutch and ECM (See page IN–34).**

NG	**Repair or replace.**

OK

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4	**Check operation of magnetic clutch.**

CHECK:

(a) Clear the DTC.

(b) Perform the following steps and check the DTC.

(1) Turn the ignition switch ON.

(2) Start the engine.

(3) Turn the ignition switch OFF and wait 3 seconds.

(4) Turn the ignition switch ON.

OK:

DTC P1126 is not stored

NG → **Replace throttle control motor (with magnetic clutch) (See page SF–40).**

OK

Check and replace ECM (See page IN–34).

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DI1M4–02

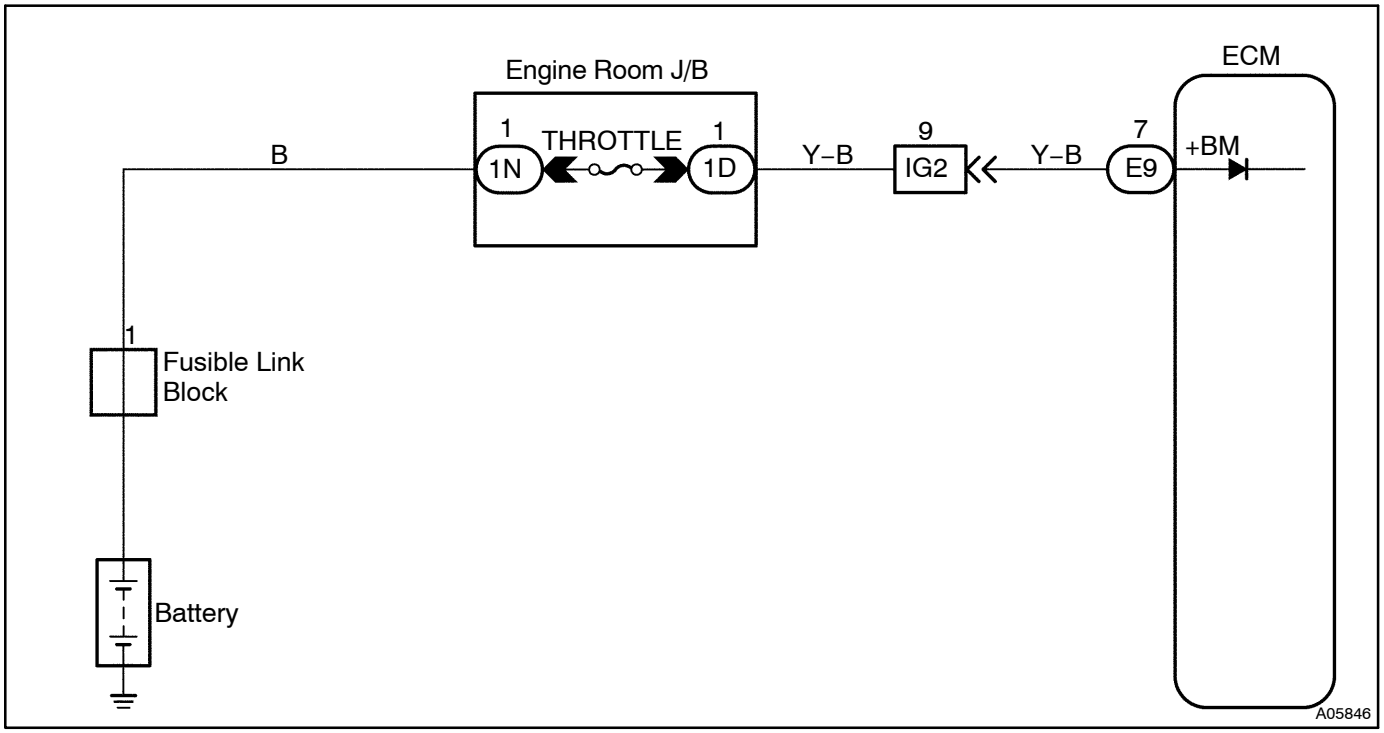
DTC	P1127	ETCS Actuator Power Source Circuit Malfunction

CIRCUIT DESCRIPTION

Battery positive voltage is supplied to terminal +BM of the ECM even once when the ignition switch is OFF for the electric throttle control system.
If this DTC is stored, the ECM shuts down the power for the throttle motor and the magnetic clutch, and the throttle valve is fully closed by the return spring.
However, the opening angle of the throttle valve can be controlled by the accelerator pedal through the throttle cable.

DTC No.	DTC Detecting Condition	Trouble Area
P1127	Open in ETCS power source circuit	• Open in ETCS power source circuit • ECM

WIRING DIAGRAM



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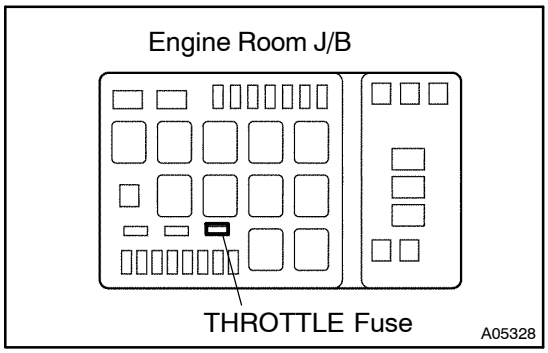
INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check THROTTLE fuse.**



PREPARATION:

Remove the THROTTLE fuse from the engine room J/B.

CHECK:

Check countinuity of the THROTTLE fuse.

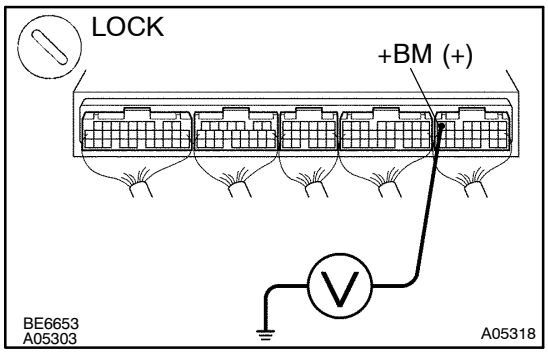
OK:

Continuity

NG	**Check for short in all harness and components connected to THROTTLE fuse.**

OK

2	**Check voltage between terminal +BM of ECM connector and body ground.**



PREPARATION:

Remove the glove compartment door.

CHECK:

Measure voltage between terminal +BM of the ECM connector and body ground.

OK:

Voltage: 9 ~ 14 V

OK	**Check and replace ECM (See page IN–34).**

NG

Check and repair harness or connector between battery and THROTTLE fuse and ECM (See page IN–34).

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DI1M5–02

DTC	P1128	Throttle Control Motor Lock Malfunction

CIRCUIT DESCRIPTION

Throttle motor is operated by the ECM and it opens and closes the throttle valve.
The opening angle of the throttle valve is detected by the throttle position sensor which is mounted on the throttle body and it provides feedback to the ECM to control the throttle motor in order the throttle valve opening angle properly in response to driving condition.
If this DTC is stored, the ECM shuts down the power for the throttle motor and the magnetic clutch, and the throttle valve is fully closed by the return spring.
However, the opening angle of the throttle valve can be controlled by the accelerator pedal through the throttle cable.

DTC No.	DTC Detecting Condition	Trouble Area
P1128	Lock throttle control motor during control throttle control motor	• Throttle control motor • Throttle body assembly • ECM

WIRING DIAGRAM

Refer to DTC P1125 (Throttle Control Motor Circuit Malfunction) on page DI–110 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check throttle control motor (See page DI–110, step 2).**

NG → **Replace throttle control motor (See page SF–40).**

OK

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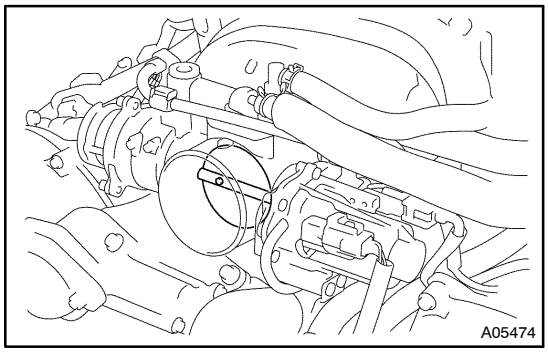
2	**Visualy check throttle valve.**



PREPARATION:
Remove the intake air connector.
CHECK:
Check whether or not a foreign body is caught between the throttle valve and the housing.

NG → **Remove a foreign body and clean throttle body.**

OK

Replace throttle body.

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DI1M6–02

DTC	P1129	Electric Throttle Control System Malfunction

CIRCUIT DESCRIPTION

Electric Throttle Control System (ETCS) is composed of the throttle motor to operate the throttle valve, the electromagnetic clutch to connect the throttle motor with the throttle valve, the throttle position sensor to detect the opening angle of the throttle valve, the accelerator pedal position sensor to detect the accelerator pedal position, the ECM to control the ETCS and the one valve type throttle body.
The ECM controls the throttle motor to make the throttle valve opening angle properly in response driving condition.
The throttle position sensor which is mounted on the throttle body detects the opening angle of the throttle valve, and it provides feedback to the ECM to control the throttle motor.
If the ETCS has a malfunction, the ECM shuts down the power for the throttle motor and the magnetic clutch, and the throttle valve is fully closed by the return spring.
However, the opening angle of the throttle valve can be controlled by the accelerator pedal through the throttle cable.

DTC No.	DTC Detecting Condition	Trouble Area
P1129	Throttle opening angle continues to vary great from target throttle opening angle	• Electric throttle control system • ECM

WIRING DIAGRAM

Refer to DTC P1125 (Throttle Control Motor Circuit Malfunction) on page DI–110 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

Replace ECM, and clear DTC. If DTC P1129 is memorized again, and then replace throttle body.

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DI2CZ–02

DTC	P1200	Fuel Pump Relay/ECU Circuit Malfunction

CIRCUIT DESCRIPTION

The fuel pump speed is controlled at 3 steps (high speed, medium speed, low speed) by the condition of the engine (starting, idling, light load, heavy load), when the engine starts (STA ON) or heavy loads with engine high speed, the ECM sends a Hi signal (about 3.8 V) to the fuel pump ECU (FPC terminal). The fuel pump ECU then outputs Hi voltage (battery positive voltage) to the fuel pump so that the fuel pump operates at high speed. When the heavy loads with engine low spped, the ECM sends a Mid signal (about 2.5 V) to the fuel pump ECU (FPC terminal). The fuel pump ECU then outputs Mid voltage (about 10 V) to the fuel pump so that the fuel pump operates at medium speed.
When the idling or light loads, the ECM sends a Low signal (about 1.3 V) to the fuel pump ECU (FPC terminal). The fuel pump ECU then outputs Low voltage (about 8.5 V) to the fuel pump so that the fuel pump operates at low speed.

DTC No.	DTC Detecting Condition	Trouble Area
P1200	Open or short in fuel pump cirucit for 1 sec. or more with engine speed 1,000 rpm or less (2 trip detection logic)	• Open or short in fuel pump ECU circuit • Fuel pump ECU • ECM power source circuit • Fuel pump • ECM
	Open in input circuit of fuel pump ECU (FPC) with engine speed 1,000 rpm or less (2 trip detection logic)	
	Open or short in diagnostic signal line (DI) of fuel pump ECU with engine speed 1,000 rpm or less (2 trip detection logic)	

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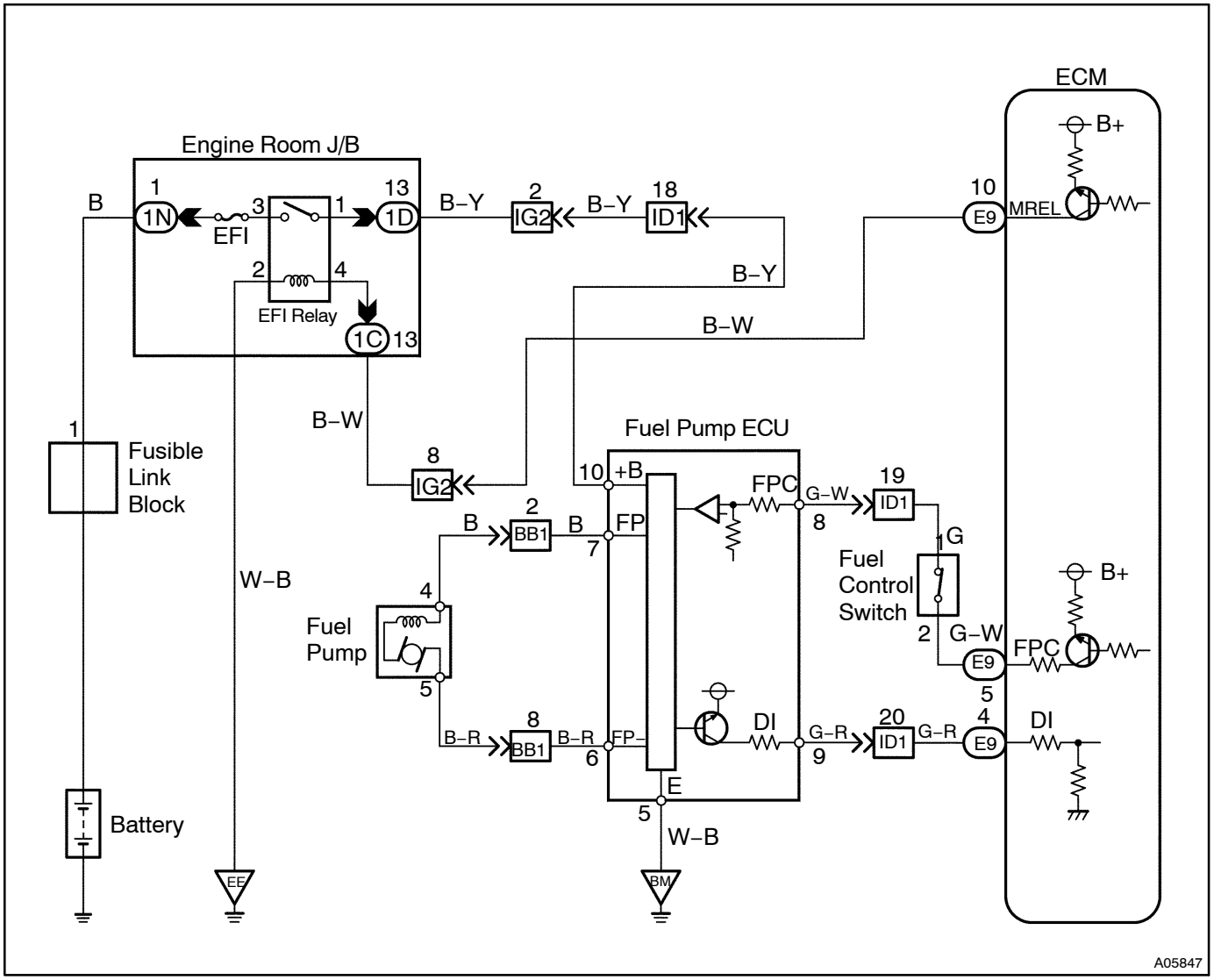
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check operation of fuel pump (See page SF–7).**

OK → **Go to step 7.**

NG

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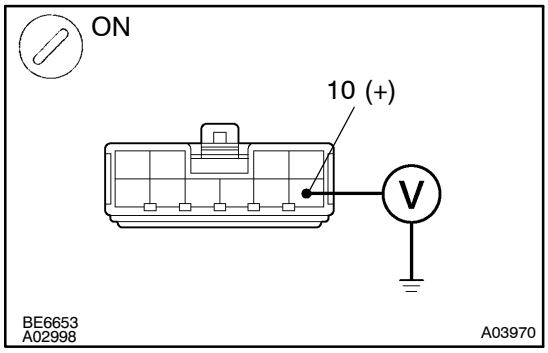
2	Check voltage of fuel pump ECU power source.



PREPARATION:

(a) Remove the LH quater trim (See page SF–59).
(b) Disconnect the fuel pump ECU connector.
(c) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal 10 of the fuel pump ECU connector and body ground.

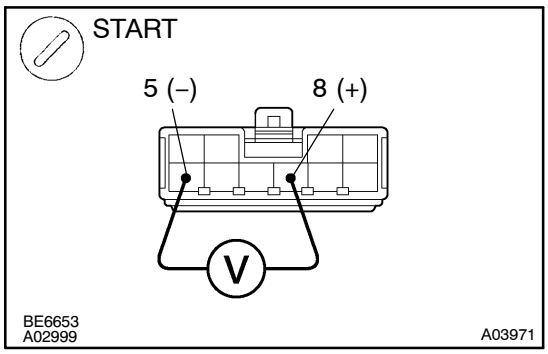
OK:

Voltage: 9 ~ 14 V

NG	Check for open and short in harness and connector between EFI main relay and fuel pump ECU (See page IN–34).

OK

3	Check voltage between terminals 5 and 8 of fuel pump ECU connector.



PREPARATION:

(a) Remove the LH quater trim (See page SF–59).
(b) Disconnect the fuel pump ECU connector.

CHECK:

Measure voltage between terminals 5 and 8 of the fuel pump ECU connector when the ignition switch is turned to START.

OK:

Voltage: 3.3 ~ 4.3 V

OK	Go to step 5.

NG

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4	Check for open and short in harness and connector between terminals FPC of ECM and 8 of fuel pump ECU, terminal 5 of fuel pump ECU and body ground (See page IN–34).

NG → Repair or replace harness or connector.

OK →

Check and replace ECM (See page IN–34).

5	Check fuel pump (See page SF–7).

NG → Repair or replace fuel pump.

OK →

6	Check for open and short in harness and connector between terminal 7 of fuel pump ECU and fuel pump, terminal 6 of fuel pump ECU and fuel pump (See page IN–34).

NG → Repair or replace harness or connector.

OK →

Replace fuel pump.

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7	**Check for open and short in harness and connector between terminals DI of ECM and 9 of fuel pump ECU (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–34).

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DI1M8–02

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)

DTC	P1330	Igniter Circuit Malfunction (No.7)

DTC	P1340	Igniter Circuit Malfunction (No.8)

CIRCUIT DESCRIPTION

A DIS (Direct Ignition System) has been adopted. The DIS improves the ignition timing accuracy, reduces 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 elecrtode to the ground electrode.

The ECM determines ignition timing and outputs the ignition signals (IGT) for each cylinder. Based on IGT signals, the power transistors in the igniter cuts off the current to the primary coil in the ignition coil is supplied to the spark plug that are connected to the end of the secondary coil. At the same time, the igniter also sends an ignition confirmation signal (IGF) as a fail–safe measure to the ECM.

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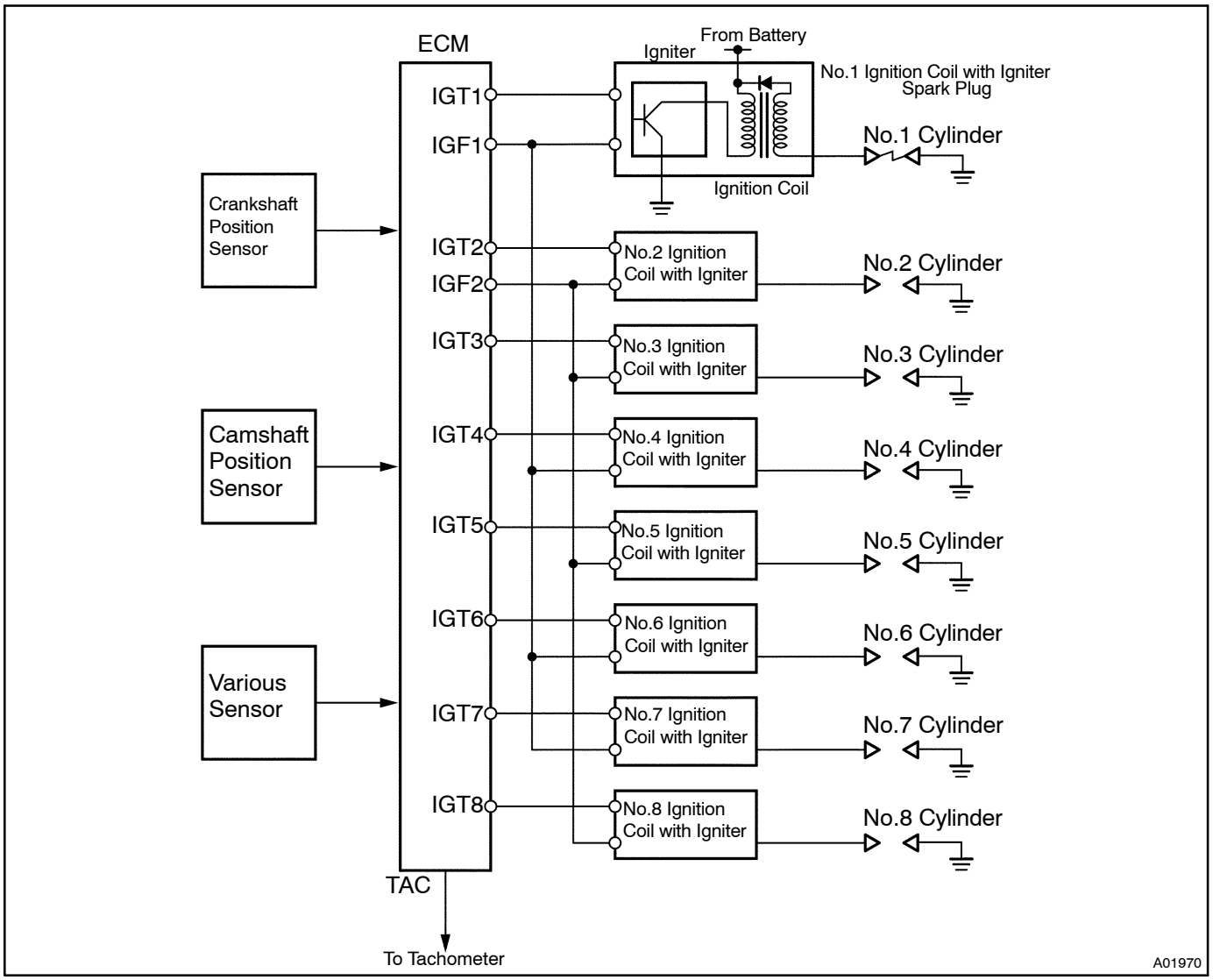

DTC No.	DTC Detecting Condition	Trouble Area
P1300 P1305 P1310 P1315 P1320 P1325 P1330 P1340	No IGF signal to ECM while engine is running	• Open or short in IGF1 or IGF2 and IGT1 ~ 8 circuit from ignition coil with igniter • No.1 ~ No.8 ignition coil with igniter • ECM

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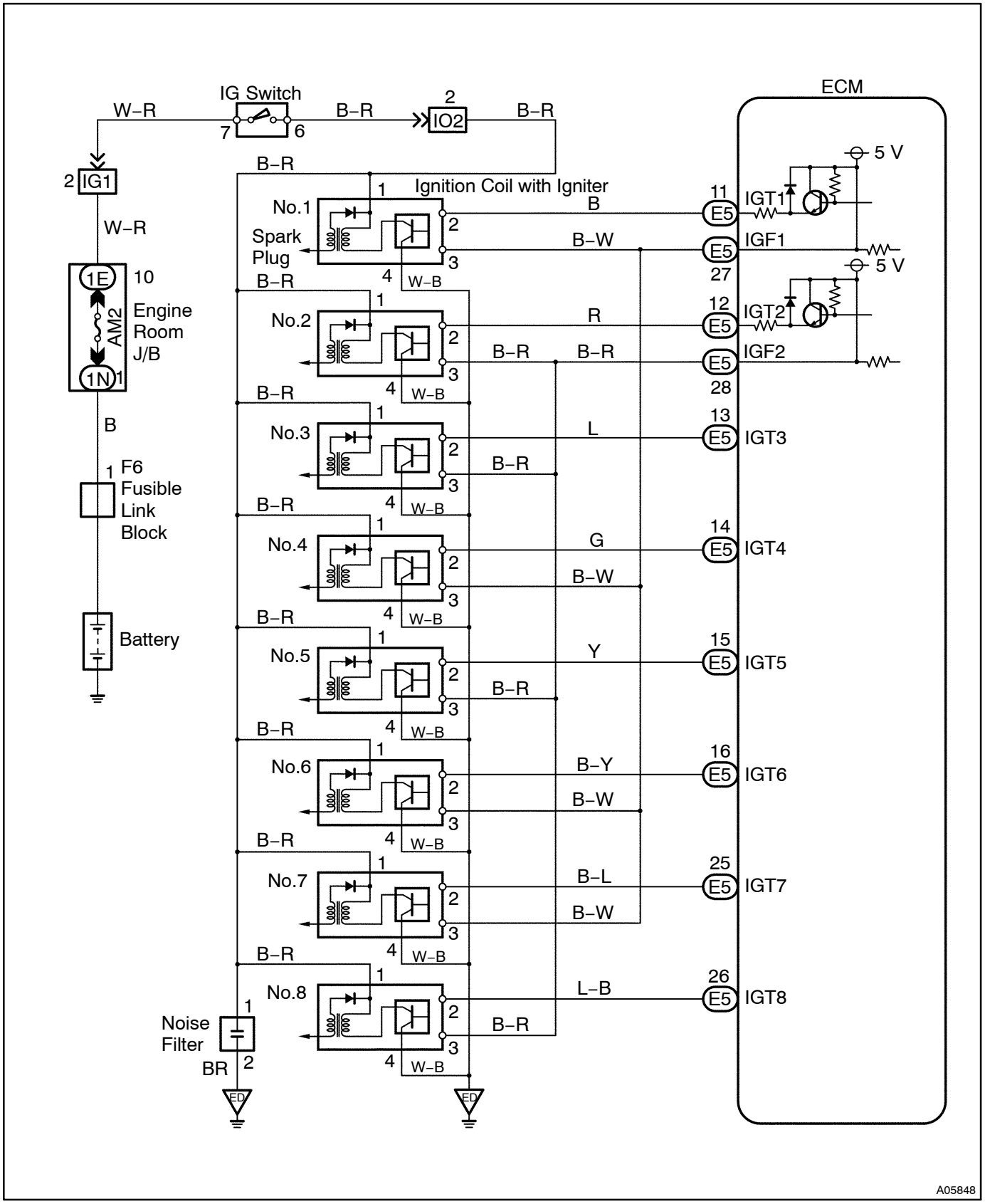
WIRING DIAGRAM



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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.
- If DTC P1330 is displayed, check No.7 ignition coil with igniter circuit.
- If DTC P1340 is displayed, check No.8 ignition coil with igniter circuit.
- If DTC P1300, P1315, P1325, P1330 are output simultaneously, IGF1 circuit may be open or short.
- If DTC P1305, P1310, P1320, P1340 are output simultaneously, IGF2 circuit may be open or short.
- Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check spark plug and spark (See page IG–1).**

NG → **Go to step 4.**

OK

2	**Check for open and short in harness and connector in IGF and IGT signal circuit between ECM and ignition coil with igniter (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

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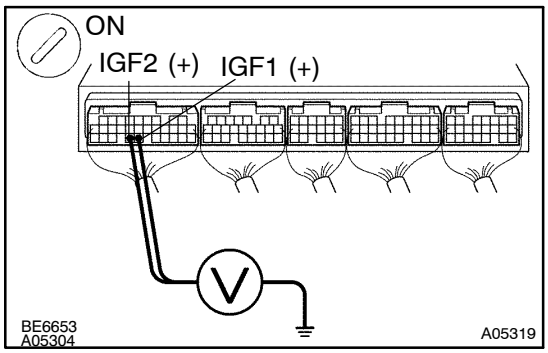
3	**Disconnect ignition coil with igniter connector and check voltage between terminals IGF1, 2 of ECM connector and body ground.**



PREPARATION:

(a) Remove the glove compartment door.
(b) Disconnect the ignition coil with igniter connector.
(c) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals IGF1, 2 of the ECM connector and body ground.

OK:

Voltage: 4.5 ~ 5.5 V

OK → **Replace ignition coil with igniter.**

NG

Check and replace ECM (See page IN–34).

4	**Check for open and short in harness and connector in IGT signal circuit between ECM and ignition coil with igniter (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

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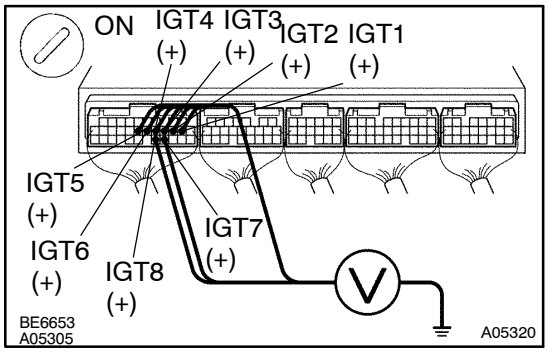
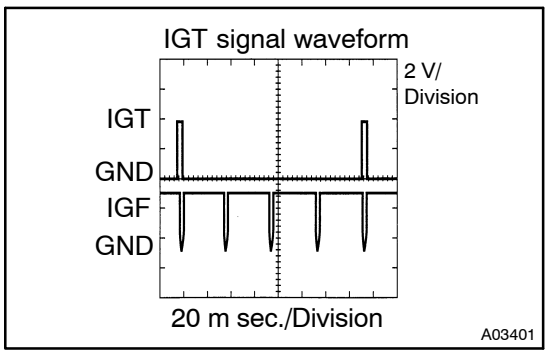
5	Check voltage between terminals IGT1 ~ 8 of ECM connector and body ground.



PREPARATION:
Remove the glove compartment door.
CHECK:
Measure voltage between terminals IGT1 ~ 8 of the ECM connector and body ground when engine is cranked.
OK:

Voltage: More than 0.1 V and less than 4.5 V

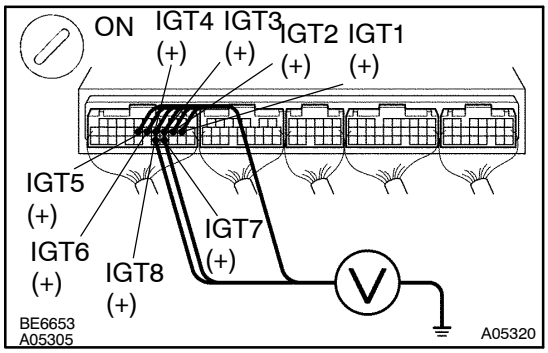


Reference: INSPECTION USING OSCILLOSCOPE
During cranking or idling, check waveform between terminals IGT1 ~ 8 and E1 of the ECM connector.
HINT:
Correct waveform appears as sohwn, with rectangle waves.

NG → **Check and replace ECM (See page IN–34).**

OK

6	Disconnect ignition coil with igniter connector and check voltage between terminals IGT1 ~ 8 of ECM connector and body ground.



PREPARATION:
(a) Remove the glove compartment door.
(b) Disconnect the ignition coil with igniter connector.
CHECK:
Measure voltage between terminals IGT1 ~ 8 of the ECM connector and body ground when engine is cranked.
OK:

Voltage: More than 0.1 V and less than 4.5 V

NG → **Check and replace ECM (See page IN–34).**

OK

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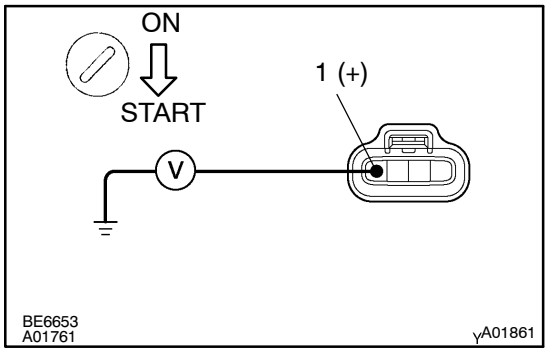
7	Check ignition coil with igniter power source circuit.



PREPARATION:
Disconnect the ignition coil with igniter connector.
CHECK:
Measure voltage between terminal 1 of ignition coil with igniter connector and body ground, when ignition switch is turned to "ON" and "START" position.
OK:

Voltage: 9 ~ 14 V

OK	Repair ignition coil with igniter power source circuit.

NG

8	Check for open and short in harness and connector between ignition switch and ignition coil with igniter (See page IN–34).

NG	Repair or replace harness or connector.

OK

9	Check EFI main relay (Marking: EFI) (See page SF–45).

NG	Replace EFI main relay (marking: EFI).

OK

Replace ignition coil with igniter.

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DTC	P1335	Crankshaft Position Sensor Circuit Malfunction (during engine running)

CIRCUIT DESCRIPTION

Refer to DTC P0335 (Crankshaft Position Sensor ”A” Circuit Malfunction) on page DI–71.

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 • Starter • ECM

WIRING DIAGRAM

Refer to DTC P0335 (Crankshaft Position Sensor ”A” Circuit Malfunction) on page DI–71 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

Refer to DTC P0335 (Crankshaft Position Sensor ”A” Circuit Malfunction) on page DI–71.

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DI1MD–03

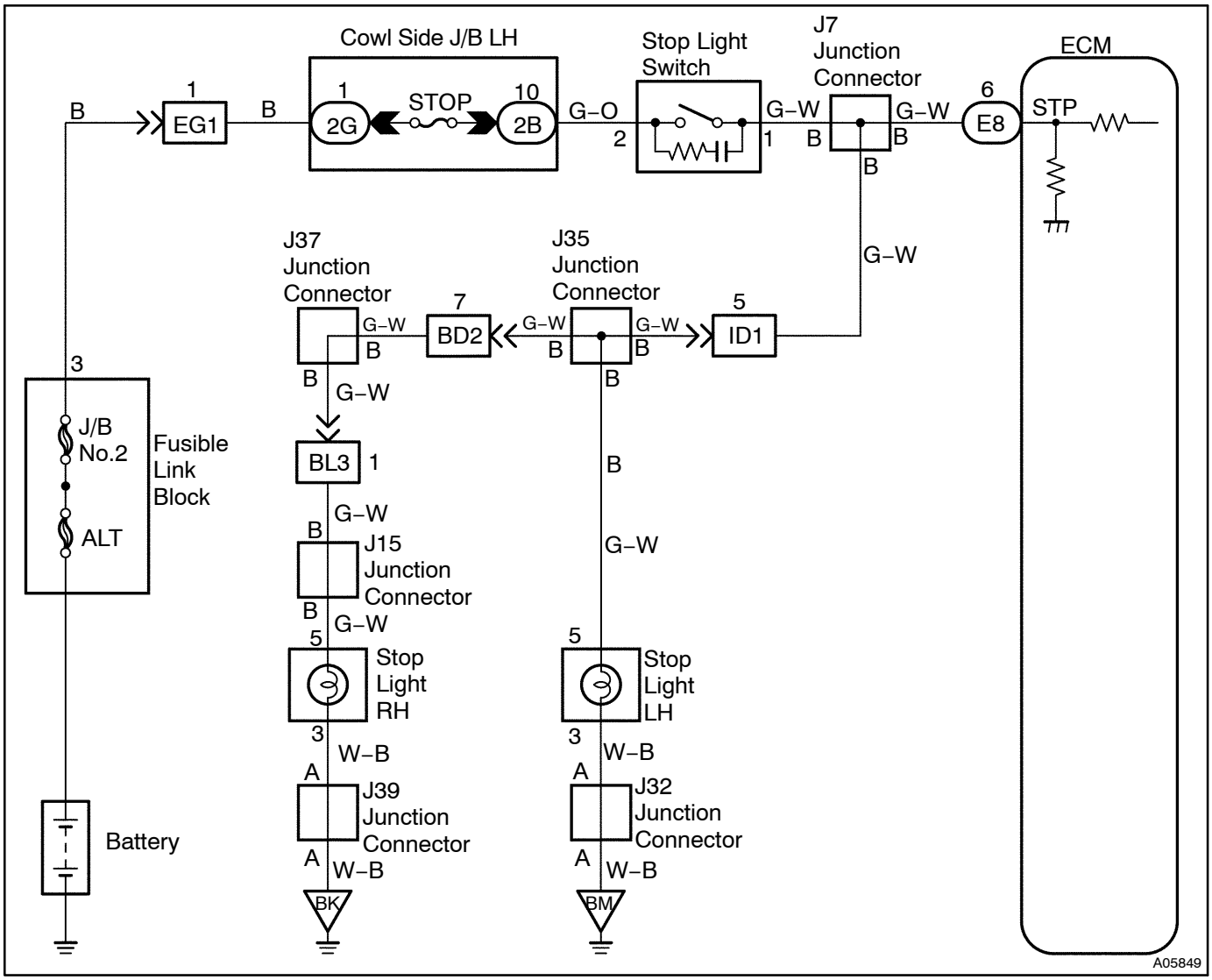
DTC	P1520	Stop Light Switch Signal Malfunction

CIRCUIT DESCRIPTION

This signal is used to detect when the brakes have been applied. The STP signal voltage is the same as the voltage 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	The stop light switch does not turn off even once the vehicle is driven (2 trip detection logic)	• Short in stop light switch signal circuit • Stop light switch • ECM

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio 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

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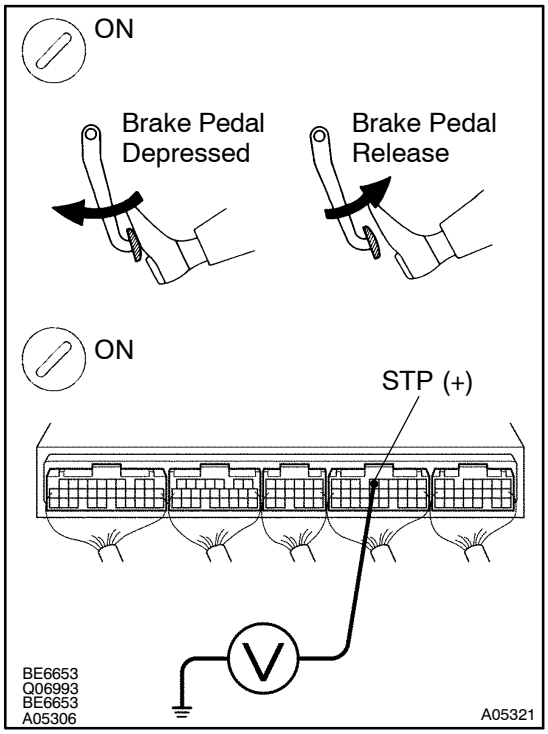
2	Check STP signal.



When using TOYOTA hand–held tester:

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.

(b) Turn the ignition switch ON and TOYOTA hand–held tester main switch ON.

CHECK:

Read the STP signal on the TOYOTA hand–held tester.

OK:

Brake pedal is depressed: STP...ON

Brake pedal is released: STP...OFF

When not using TOYOTA hand–held tester:

PREPARATION:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Check voltage between terminal STP of the ECM and 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–34).

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–34).

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DI1ME–02

DTC	P1600	ECM BATT Malfunction

CIRCUIT DESCRIPTION

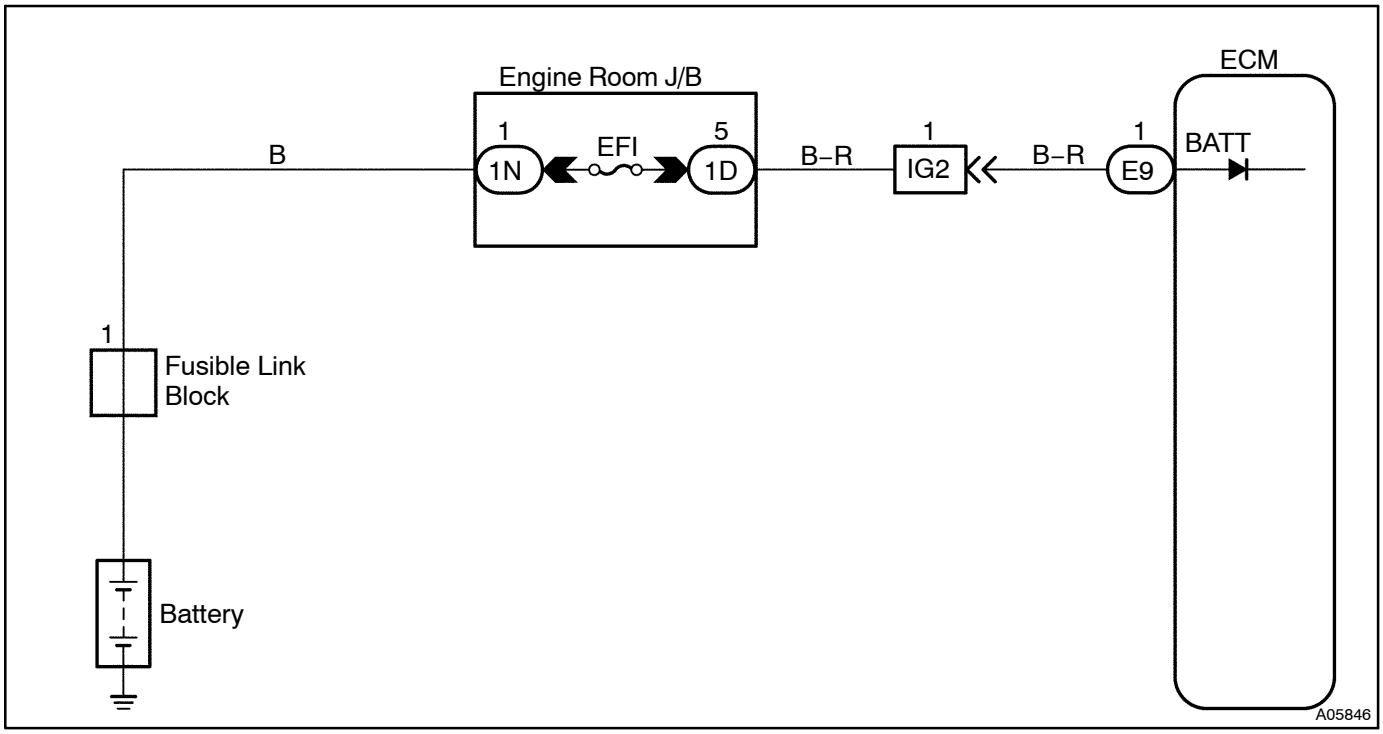
Battery positive voltage is supplied to terminal BATT of the ECM even when the ignition switch is OFF for use by the DTC memory and air–fuel ratio adaptive control value memory, etc.

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 appear, the ECM does not store another DTC.

WIRING DIAGRAM



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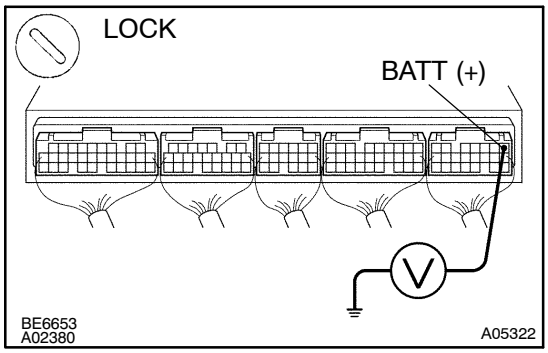
INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio 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 door.

CHECK:

Measure voltage between terminal BATT of the ECM connector and body ground.

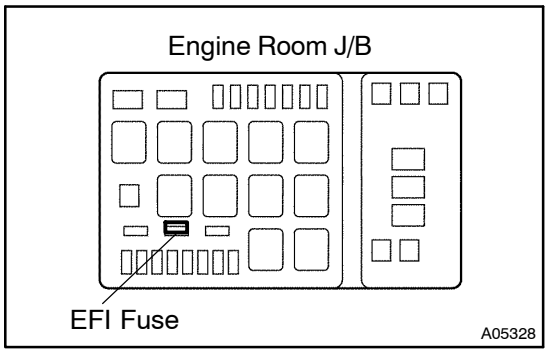
OK:

Voltage: 9 ~ 14 V

OK	**Check and replace ECM (See page IN–34).**

NG

2	**Check EFI fuse of engine rooom J/B.**



PREPARATION:

Remove the EFI fuse from the engine room J/B.

CHECK:

Check 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, EFI fuse and ECM (See page IN–34).

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DI1MF–02

DTC	P1633	ECM Malfunction (ETCS Circuit)

CIRCUIT DESCRIPTION

Refer to DTC P1129 (Electric Throttle Control System Malfunction) on page DI–120.

DTC No.	DTC Detecting Condition	Trouble Area
P1633	ECM malfunction	• ECM

INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

Replace ECM.

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DI1MI–02

DTC	P1780	Park/Neutral Position Switch Malfunction

CIRCUIT DESCRIPTION

The park/neutral position switch go 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 body ground via the starter relay, thus the terminal NSW voltage becomes 0 V. 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, 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 ”P”, ”R”, ”N”, ”D” ”3” and ”2” positions	• Short in park/neutral position switch circuit • Park/neutral position switch • ECM

HINT:
After confirming DTC P1780 use the TOYOTA hand–held tester to confirm the PNP switch signal from CURRENT DATA.

WIRING DIAGRAM

Refer to DTC P1780 (Park/Neutral Position Switch Malfunction) on page DI–200 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
Refer to DTC P1780 (Park/Neutral Position Switch Malfunction) on page DI–200.

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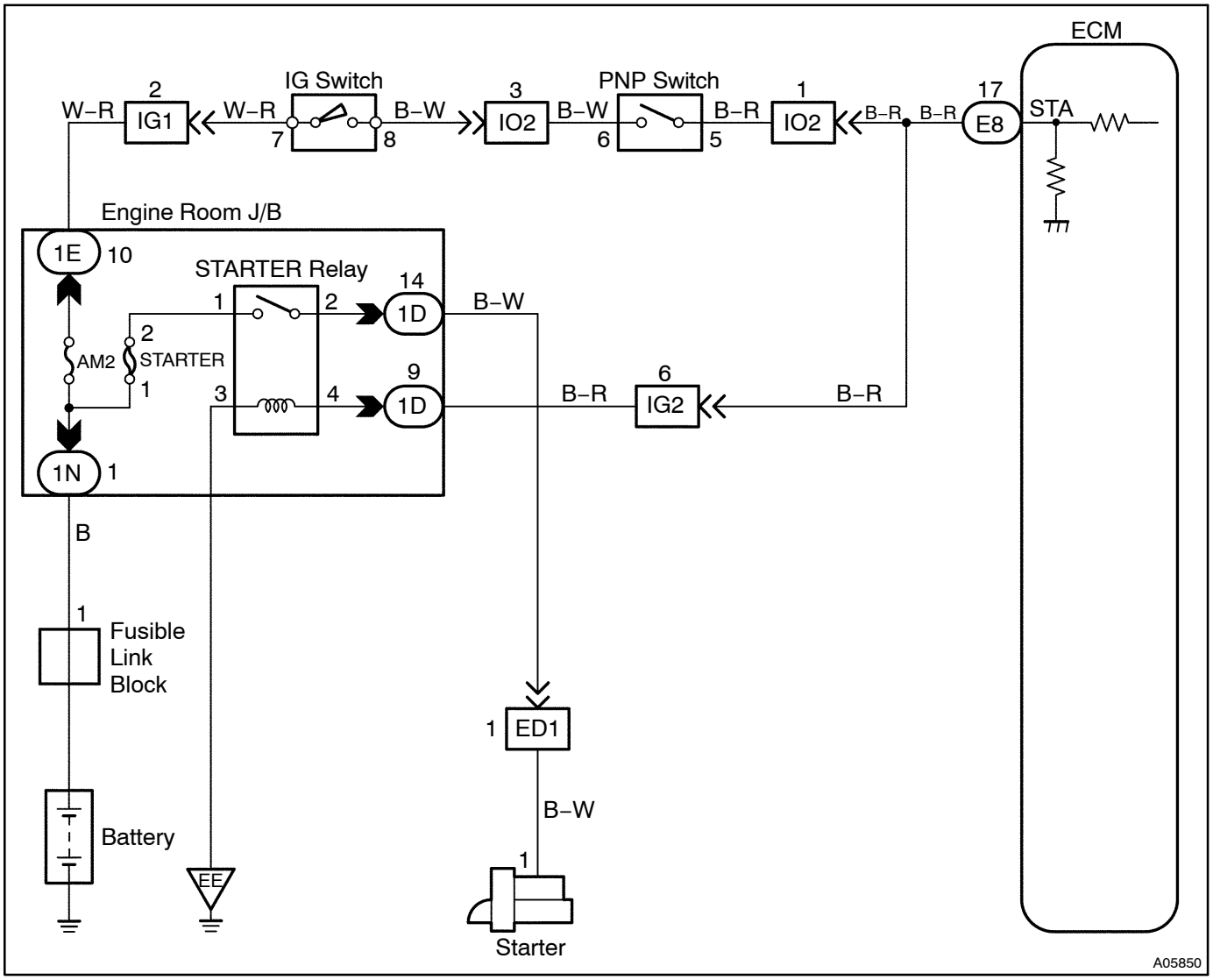
DI1MJ–02

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 id mainly used to increase the fuel injection volume for the starting injection control and after–start injection control.

WIRING DIAGRAM



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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 on page DI–23.

TOYOTA hand–held tester

1	**Connect TOYOTA hand–held tester and check STA signal.**

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.

CHECK:

Read STA signal on the TOYOTA hand–held tester while starter operates.

OK:

Ignition Switch Position	ON	START
STA signal	OFF	ON

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–23).**

NG

2	**Check for open in harness and connector between ECM and starter relay (Marking: STARTER) (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–34).

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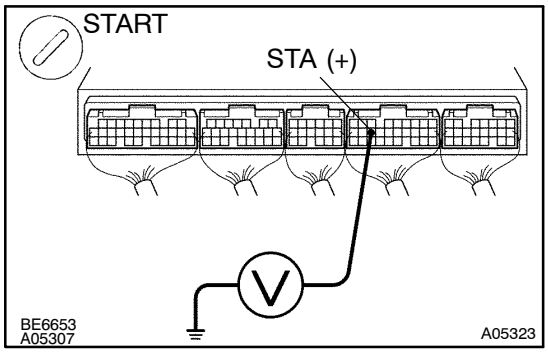
OBD II scan tool (excluding TOYOTA hand–held tester)

1	**Check voltage between terminal STA of ECM connector and body ground.**



PREPARATION:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal STA of the ECM connector and body ground, during engine cranking.

OK:

Voltage: 6 V or more

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI–23).**

NG

2	**Check for open in harness and connector between ECM and starter relay (Marking: STARTER) (See page IN–34).**

NG	**Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–34).

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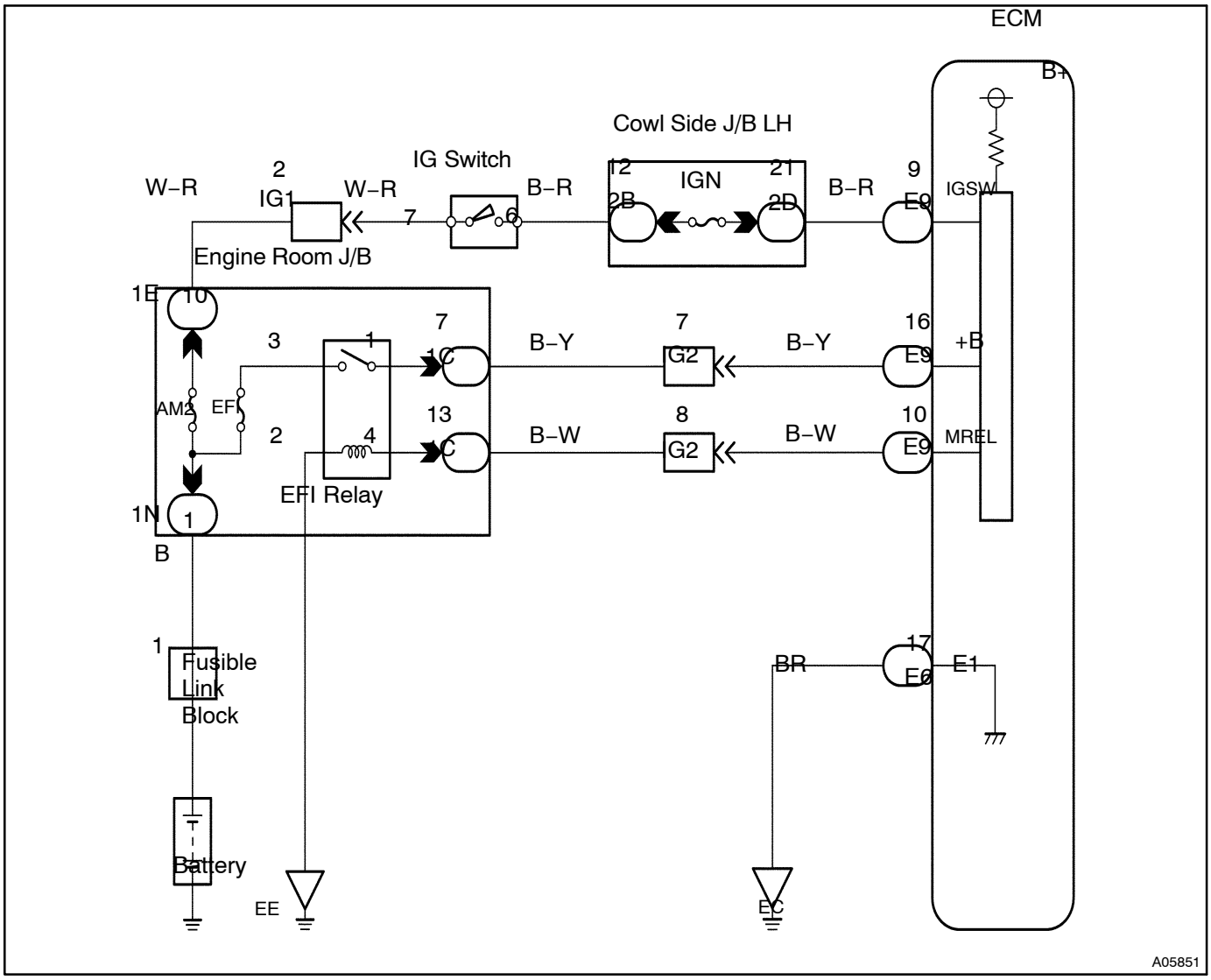
DI3CR–01

ECM Power Source Circuit

CIRCUIT DESCRIPTION

When the ignition switch is turned ON, battery positive voltage is applied to the terminal IGSW of the ECM and the EFI main relay (Making: EFI) control circuit in the ECM sends a signal to the terminal MREL of the ECM 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 the terminals +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



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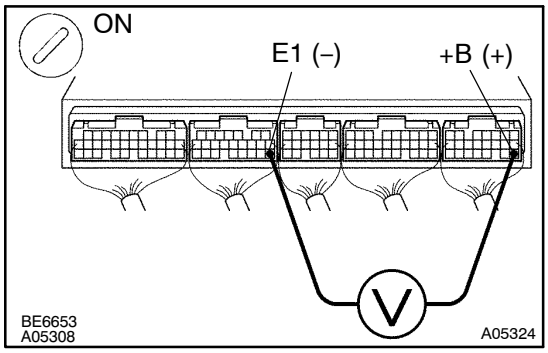
INSPECTION PROCEDURE

1	**Check voltage between terminals + B and E1 of ECM connector.**



PREPARATION:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals +B and E1 of the ECM connector.

OK:

Voltage: 9 ~ 14 V

OK	**Proceed to next circuit inspection shown on Problem symptoms table (See page DI–23).**

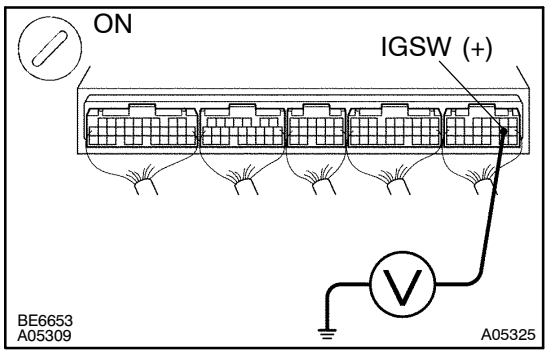
NG

2	**Check for open in harness and connector between terminal E1 of ECM and body ground (See page IN–34).**

NG	**Repair or replace harness or connector.**

OK

3	**Check voltage between terminal IGSW of ECM connector and body ground.**



PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure voltage between terminal IGSW of the ECM and body ground.

OK:

Voltage: 9 ~ 14 V

OK	**Go to step 6.**

NG

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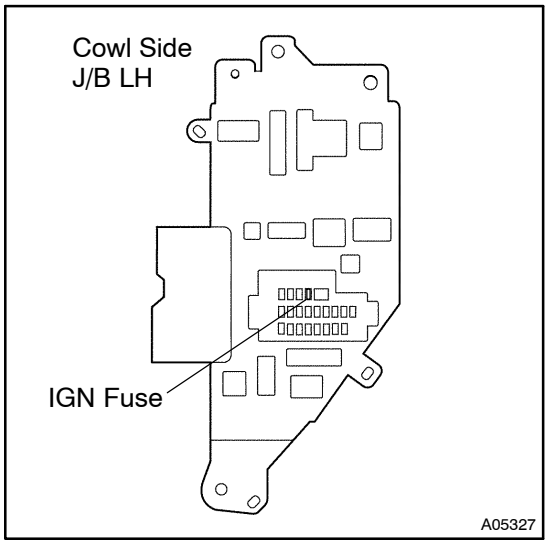
4	**Check IGN fuse.**



PREPARATION:
Remove the IGN fuse from the cowl side J/B LH.
CHECK:
Check continuity of the IGN fuse.
OK:
Continuity

NG → **Check for short in all harness and components connected to IGN fuse.**

OK

5	**Check ignition switch (See page BE–18).**

NG → **Replace ignition switch.**

OK

Check and repair harness and connector between battery and ignition switch, ignition switch and ECM.

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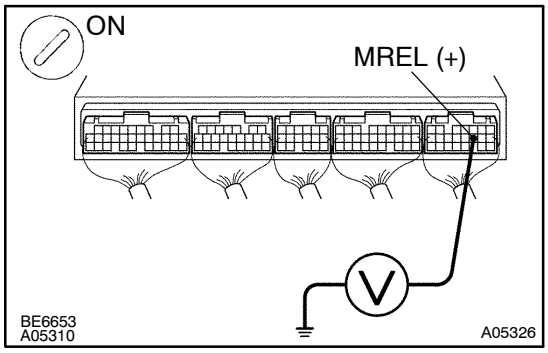
6	**Check voltage between terminal MREL of ECM connector and body ground.**



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure voltage between terminal MREL of the ECM connector and body ground.
OK:
Voltage: 9 ~ 14 V

NG → **Check and replace ECM (See page IN–34).**

OK

7	**Check EFI fuse of engine room J/B (See page DI–137).**

NG → **Check for short in all harness and components connected to EFI fuse.**

OK

8	**Check EFI main relay (Marking: EFI) (See page SF–45).**

NG → **Replace EFI main relay (Marking: EFI).**

OK

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9	**Check for open and short in harness and connector between terminal MREL of ECM and body ground (See page IN–34).**

NG → **Repair and replace harness or connector.**

OK

Check and repair harness or connector between EFI fuse and battery.

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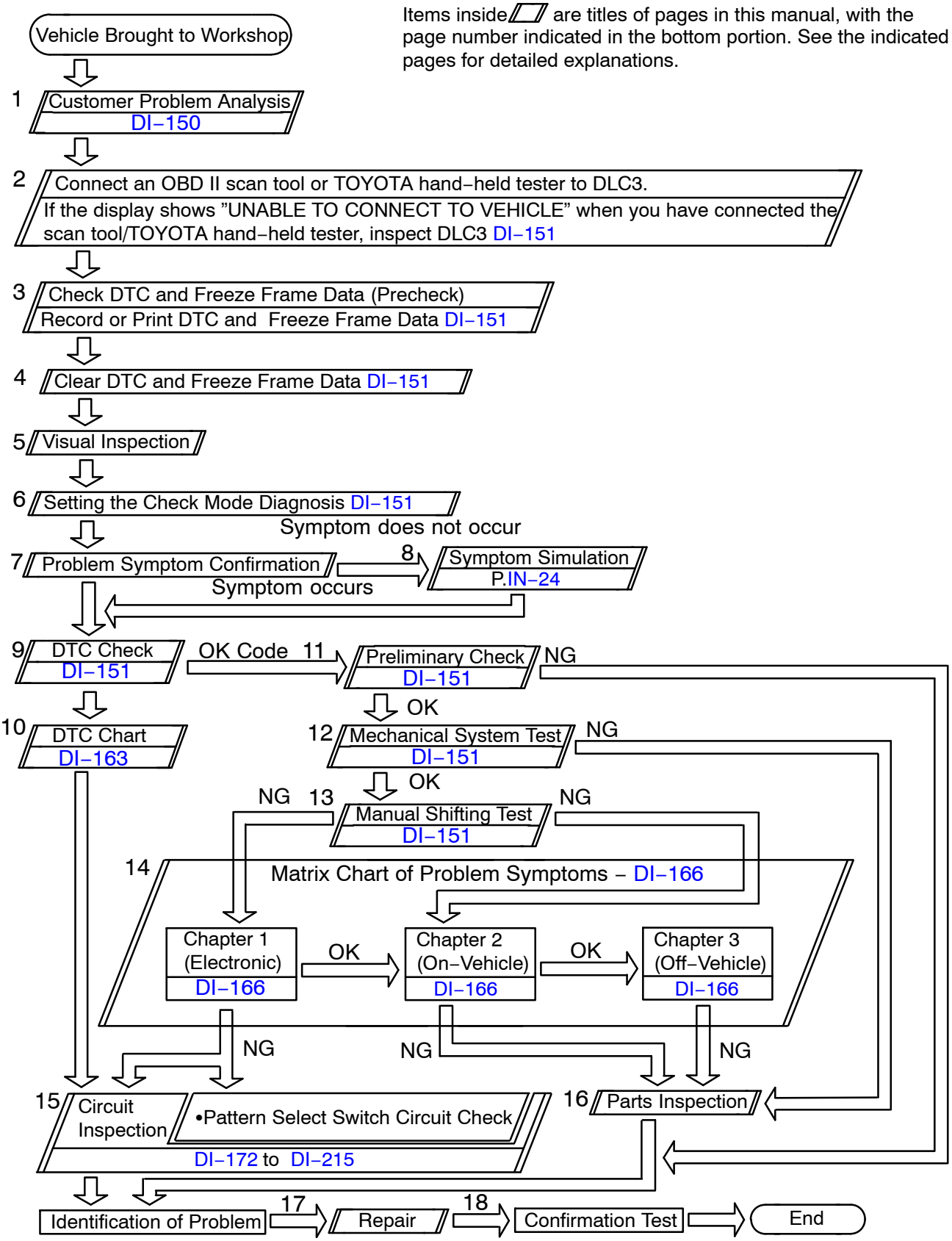
AUTOMATIC TRANSMISSION

HOW TO PROCEED WITH TROUBLESHOOTING

DI3BN–01

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.



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DI3BO–01

CUSTOMER PROBLEM ANALYSIS CHECK

Transmission Control 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	/ /
Frequency Problem Occurs?	☐ Continuously ☐ Intermittently (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 (Code)
	2nd Time	☐ Normal code	☐ Malfunction code (Code)

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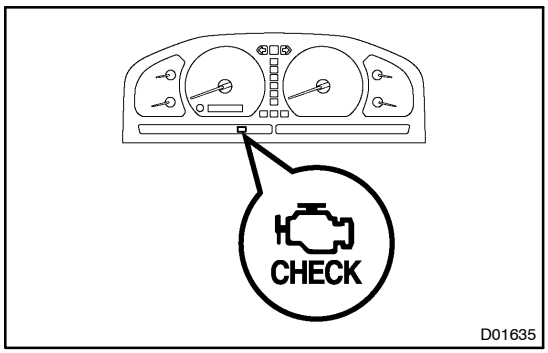
DI3BP–01

PRE–CHECK

1. DIAGNOSIS SYSTEM

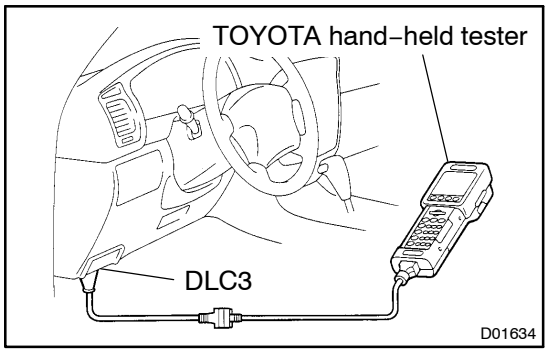
(a) DESCRIPTION

- When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is that you connect to the vehicle an OBD II scan tool complying with SAE J1987 or TOYOTA 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 drive system components which affect 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–163).

If the malfunction only occurs in 3 trips, the MIL goes off but the DTCs remain recorded in the ECM memory.



- To check the DTCs, connect an OBD II scan tool or TOYOTA hand–held tester to DLC3 on the vehicle. The OBD II scan tool or TOYOTA hand–held tester also enables you to erase the DTCs and check freeze frame data and various forms of engine data (For instruction book).
- DTCs include SAE controlled codes and Manufacturer controlled codes.
  SAE controlled codes must be set as prescribed by the SAE, while Manufacturer controlled codes can be set freely by the manufacturer within the prescribed limits (See DTC chart on page DI–163).

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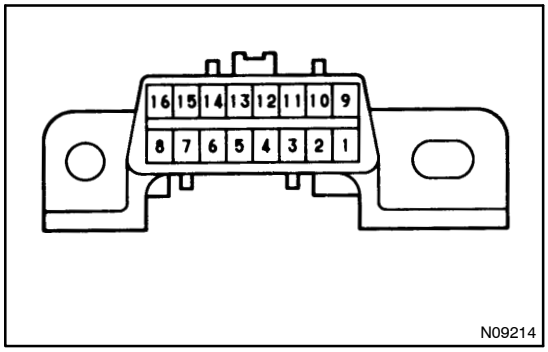
- The diagnosis system operates in normal mode during normal vehicle use, and also has a check mode for technicians to simulate malfunction symptoms and perform troubleshooting. Most DTCs use 2–trip detection logic(*) to prevent erroneous detection. By switching the ECM to check mode when troubleshooting, the technician can cause the MIL to light up and for a malfunction that is only detected once or momentarily.
  (TOYOTA hand–held tester)
- *2–trip detection logic:
  When a logic malfunction is first detected, the malfunction is temporarily stored in the ECM memory. If the same malfunction is detected again during the 2nd test drive, this 2nd detection causes the MIL to light up .



(b) Inspect the DLC3.
The vehicle's ECM uses V.P.W. (Variable Pulse Width) for communication to comply with SAE J1850. The terminal arrangement of DLC3 complies with SAE J1962 and matches the V.P.W. format.

Tester connection	Condition	Specified condition
2 (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 TOYOTA 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.

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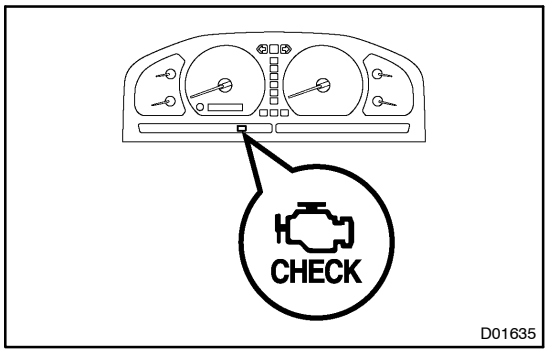


2. INSPECT DIAGNOSIS (NORMAL MODE)

(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–52).

(2) When the engine is started, the MIL should go off. If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system.

(b) Check the DTC.

NOTICE:

(TOYOTA hand–held tester only): When the diagnostic system is switched from normal mode to check mode, it erases all DTCs and freeze frame data recorded in normal mode. So before switching modes, always check the DTCs and freeze frame data, and note them down.

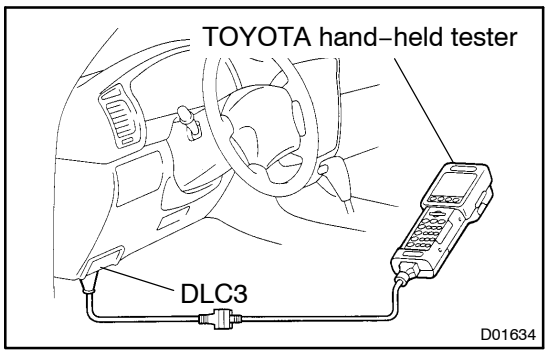
(1) Prepare an OBD II scan tool (complying with SAE J1978) or TOYOTA hand–held tester.

(2) Connect the OBD II scan tool or TOYOTA hand–held tester to DLC3 at the lower of the instrument panel.

(3) Turn the ignition switch ON and turn the OBD II scan tool or TOYOTA hand–held tester switch ON.

(4) Use the OBD II scan tool or TOYOTA 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–163 to confirm the details of the DTCs.



NOTICE:

When simulating symptoms with an OBD II scan tool (excluding TOYOTA hand–held tester) to check the DTCs, use normal mode. For codes on the DTCs chart subject to "2–trip detection logic", turn the ignition switch OFF after the symptoms have been simulated the 1st time. Then repeat the simulation process again. When the program has been simulated twice, the MIL lights up and the DTCs are recorded in the ECM.

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3. INSPECT DIAGNOSIS (CHECK MODE)

HINT:

TOYOTA hand–held tester only: Compared to the normal mode, the check mode has high sensing ability to detect malfunctions. Furthermore, the same diagnostic items which are detected in Normal mode can also be detected in Check mode.

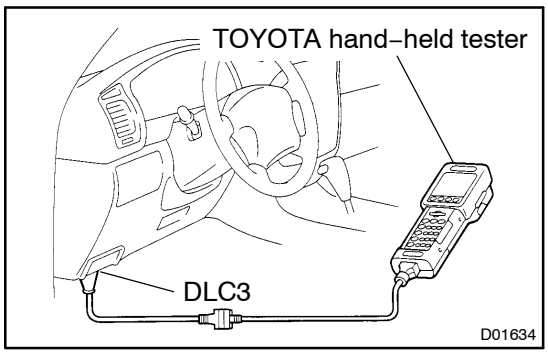
(a) Check the DTC.

(1) Check the initial conditions.

- Battery positive voltage 11 V or more.
- Throttle valve fully closed.
- Transmission in P position.
- Air conditioning switched OFF.

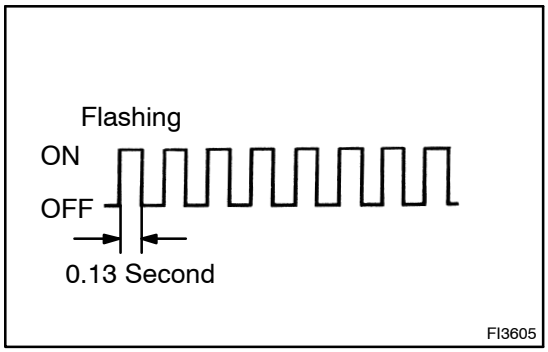
(2) Turn the ignition switch OFF.

(3) Prepare a TOYOTA hand–held tester.



(4) Connect the TOYOTA hand–held tester to DLC3 at the lower of the instrument panel.

(5) Turn the ignition switch ON and switch the TOYOTA hand–held tester ON.



(6) Switch the TOYOTA hand–held tester from Normal mode to Check mode (Check that the MIL flashes).

(7) Start the engine (MIL goes out 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 TOYOTA 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 switches the diagnosis system from Check mode to Normal mode, so all DTCs, etc. are erased.

(10) After checking the DTC, inspect the applicable circuit.

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(b) Clear the DTC.
The following operation will erase the DTC and freeze frame data. Operating an OBD II scan tool (complying with SAE J1978) or TOYOTA hand–held tester to erase the codes.
(See the OBD II scan tool's instruction book for operating instructions.)

NOTICE:
If the TOYOTA hand–held tester switches the ECM from Normal mode to Check mode or vice–versa, or 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 transmission 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 normal operating ATF temperature 50 – 80 °C (122 – 176 °F).

(a) D position test(NORM and PWR pattern)
Shift into the D position and fully depress the accelerator pedal and and check the following points:
(1) Check 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–22).

HINT:
- O/D Gear Lock–up Prohibition Control (1. Brake pedal is depressed. 2. Throttle valve fully closed.)
- When the 2nd start switch is on, there is no 1→2 up–shift and 2→1 down–shift.

(2) Check for shift shock and slip.
Check for shock and slip at the 1 → 2, 2 → 3 and 3 → O/D up–shifts.
(3) Check for abnormal noises and vibration.
Run at the D position lock–up or O/D gear and check for abnormal noises and vibration.

HINT:
The check for the cause of abnormal noises and vibration must be done very thoroughly as it could also be due to loss of balance in the differential torque converter clutch, etc.

(4) Check kick–down operation.
While running in the D position, 2nd, 3rd and O/D gears, check to see that the possible kick–down vehicle speed limits for 2 → 1, 3 → 2 and O/D → 3 kick–downs conform to those indicated on the automatic shift schedule (See page SS–22).
(5) Check abnormal shock and slip at kick–down.
(6) Check the lock–up mechanism.
- Drive in D position, O/D gear, at a steady speed (lock–up ON) of about 80 km/h (50 mph).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

If there is a big jump in engine speed, there is no lock–up.

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(b) 2 position test

Shift into the 2 position and fully depress the accelerator pedal and check the following points:

(1) Check up–shift operation.

Check to see that the 1 → 2 up–shift takes place and that the shift point conforms to the automatic shift schedule (See page SS–22).

HINT:

- There is no O/D up–shift and lock–up in the 2 position.
- When the 2nd start switch is ON, there is no 1→2 up–shift and 2→1 down–shift.

(2) Check engine braking.

While running in the 2 position and 2nd gear, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration, and for shock at up–shift and down–shift.

(c) L position test

Shift into the 2 position and fully depress the accelerator pedal and check the following points:

(1) Check no up–shift.

While running in the L position, check that there is no up–shift to 2nd gear.

(2) Check engine braking.

While running in the L position, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration.

(d) R position test

Shift into the R position and fully depress the accelerator pedal and check for slipping.

CAUTION:

Before conducting this test ensure that the test area is free from people and obstruction.

(e) P position test

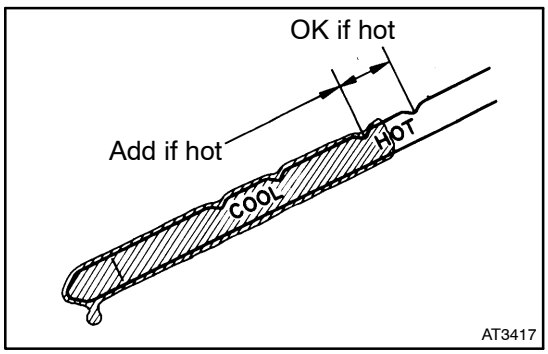
Stop the vehicle on a grade (more than 5°) and after shifting into the P position, release the parking brake. Then, check to see that the parking lock pawl holds the vehicle in place.

6. BASIC INSPECTION

(a) Check the fluid level.

HINT:

- Drive the vehicle so that the engine and transmission are at normal operating temperature.
  Fluid temp.: 70 – 80 °C (158 – 176 °F)
- Only 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 to P position.

(3) Pull out the dipstick and wipe it clean.

(4) Push it back fully into the pipe.

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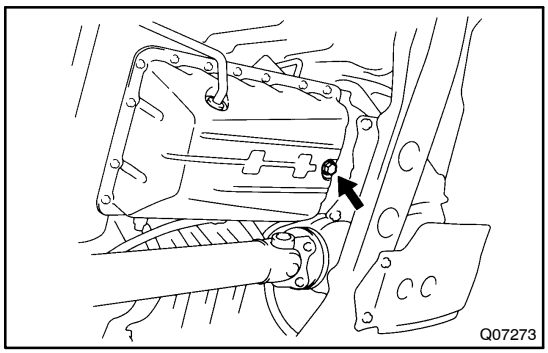
(5) Pull it out and check that the fluid level is in the HOT range.
If the level is at the low side, add new fluid.

Fluid type: ATF D–II or DEXRON®III (DEXRON®II)

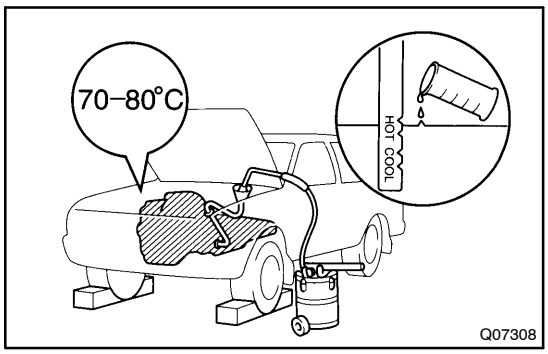
NOTICE:

Do not overfill.

(b) Check the fluid condition.
If the fluid smells burnt or is black, replace it.



(c) Replace the ATF.
(1) Remove the drain plug and drain the fluid.
(2) Reinstall the drain plug securely.

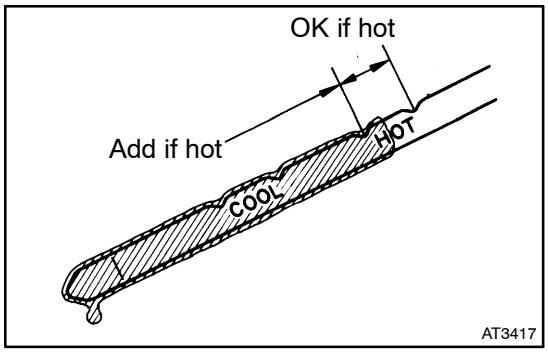


(3) With the engine OFF add new fluid through the oil filler pipe.

Fluid type: ATF D–II or DEXRON®III (DEXRON®II)

Capacity: 1.9 liters (2.0 US qts, 1.7 Imp. qts)

(4) Start the engine and shift the shift lever into all positions from P to L position and then shift into P position.



(5) With the engine idling, check the fluid level. Add fluid up to the COOL level on the dipstick.
(6) Check the fluid level at the normal operating temperature, 70 – 80 °C (158 – 176 °F), and add as necessary.

NOTICE:

Do not overfill.

(d) Check the fluid leaks.
Check for leaks in the transmission.

If there are leaks, it is necessary to repair or replace O–rings, FIPGs, oil seals, plugs or other parts.

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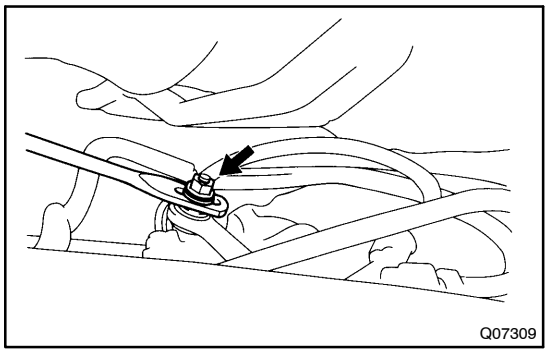
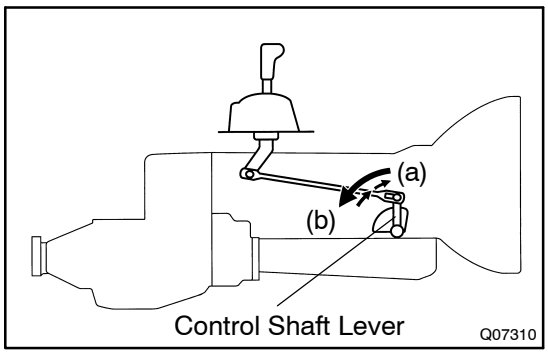

Q07309

(e) Inspect and adjust the shift lever position.
When shifting the shift lever from the N position to other positions, check that the lever can be shifted smoothly and accurately to each position and that the position indicator is not aligned with the correct position.

If the indicator is not aligned with the correct position, carry out the following adjustment procedures.

(1) Loosen the nut on the shift lever.
(2) Push the control shaft fully rearward.
(3) Return the control shaft lever 2 notches to N position.

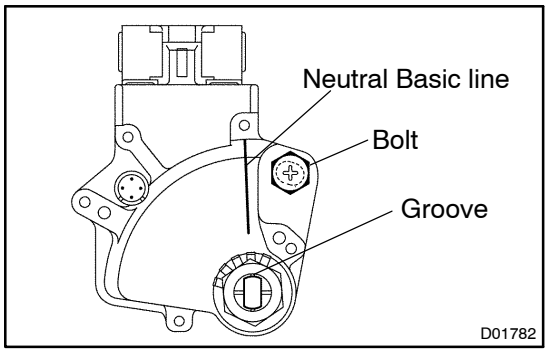


Q07310

(4) Set the shift lever to 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 the N to D position and reverses when shifting it to the R position.



D01782

(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 not in other positions.

If it is not as stated above, carry out the following adjustment procedures.

- Loosen the park/neutral position switch bolt and set the shift lever to the N position.
- Align the groove with neutral basic line.
- Hold in position and tighten the bolt.

Torque:13 N·m (130 kgf·cm, 9 ft·lbf)

- For continuity inspection of the park/neutral position switch, see page DI–200.

(g) Check the idle speed.

Idle speed (In N position and air conditioner OFF): 700 ± 50 rpm

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7. MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

The object of this test is to check the overall performance of the transmission and engine by measuring the stall speeds in the D and R positions.

NOTICE:

- **Do the test at normal operating fluid temperature 70 – 80 °C (158 – 176 °F).**
- **Do not continuously run this test longer than 5 seconds.**
- **To ensure safety, conduct this test in a wide, clear level area which provides good traction.**
- **The stall test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.**

(1) Chock the 4 wheels.

(2) Connect an OBD II scan tool or TOYOTA hand–held tester to DLC3.

(3) Fully apply the parking brake.

(4) Keep your left foot pressing firmly on the brake pedal.

(5) Start the engine.

(6) Shift into the D position. Press all the way down on the accelerator pedal with your right foot. Quickly read the stall speed at this time.

Stall speed: 2,300 ± 150 rpm

(7) Do the same test in R position.

Stall speed: 2,300 ± 150 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 is below the specified value, the torque converter 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 one–way clutch not operating properly
(c) Stall speed high in R position	• Line pressure too low • Direct clutch slipping • 1st and reverse brake slipping • O/D one–way clutch not operating properly
(d) Stall speed high in D and R positions	• Line pressure too low • Improper fluid level • O/D one–way clutch not operating properly

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(b) Measure the time lag.

When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before the shock can be felt. This is used for checking the condition of the O/D direct clutch, forward clutch, and 1st and reverse brake.

NOTICE:

- **Do the test at normal operating fluid temperature 70 – 80 °C (158 – 176 °F).**
- **Be sure to allow 1 minute interval between tests.**
- **Take 3 measurements and take the average value.**

(1) Fully apply the parking brake.

(2) Start the engine and check idle speed.

Idle speed (In N position and air conditioner OFF): 700 ± 50 rpm.

(3) Shift the shift lever from N to D position. Using a stop watch, measure the time from when the lever is shifted until the shock is felt.

Time lag:

N → D Less than 1.2 seconds

(4) In the same manner, measure the time lag for N → R.

Time lag:

N → R Less than 1.5 seconds

Evaluation (If N → D time or N → R time lag is longer than the specified):

Problem	Possible cause
N → D time lag is longer	• Line pressure too low • Forward clutch worn • O/D one–way clutch not operating properly
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

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8. HYDRAULIC TEST

Measure the line pressure.

NOTICE:

- **Do the test at normal operation fluid temperature 70 – 80 °C (158 – 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 transmission case front left side and connect SST.
(See page AT–27 for the location to connect SST)

SST 09992–00095 (09992–00231, 09992–00271)

(3) Fully apply the parking brake and chock the 4 wheels.

(4) Start the engine and check idling speed.

(5) Keep your left foot pressing firmly on the brake pedal and shift into D position.

(6) Measure the line pressure when the engine is idling.

(7) Depress the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.

(8) In the same manner, do the test in R position.

Specified line pressure:

Condition	D position kPa (kgf/cm^2, psi)	R position kPa (kgf/cm^2, psi)
Idling	480 – 539 (4.9 – 5.5, 70 – 78)	696 – 794 (7.1 – 8.1, 101 – 115)
Stall	1,294 – 1,432 (13.2 – 14.6, 188 – 208)	1,657 – 1,989 (16.9 – 20.2, 240 – 287)

Evaluation

Problem	Possible cause
If the measured value at all positions are higher	• Throttle cable out of adjustment • Throttle valve defective • Regulator valve defective
If the measured value at all positions are lower	• Throttle cable out of adjustment • 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 leakage • Forward clutch defective
If pressure is low in the R position only	• R position circuit fluid leakage • Direct clutch defective • 1st and reverse brake defective

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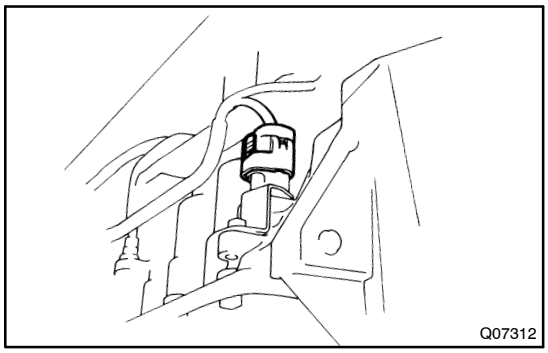

9. MANUAL SHIFTING TEST

The purpose of this manual shifting test is to determine whether a problem is caused by either mechanical or electrical factors. Disconnecting the solenoid wire disables electrically–controlled automatic gear shifting. In this case, operating the shift lever is the only way to shift the transmission gear. If the gear is not changed by shift lever operation, it is assumed that there is a mechanical problem.

(a) Turn the ignition switch OFF.
(b) Disconnect the solenoid wire connector.
(c) Warm up the engine.
(d) Drive the vehicle.
(e) Check the transmission operation when the shift lever is moved into L, 2 and D positions.

Standard:

Shift Lever	Operation
L to 2	Shift up
2 to D	Shift up
D to 2	Shift down
2 to L	Shift down

(f) Turn the ignition switch OFF.
(g) Connect the solenoid wire connector.
(h) Clear DTCs.

HINT:

When the solenoid wire is disconnected, the transmission gear will be set as listed below:

Shift Lever	Gear
P	Parking
R	Reverse
N	Neutral
D	O/D (4th)
2	3rd
L	1st

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DI3BQ–01

DIAGNOSTIC TROUBLE CODE CHART

If a DTC is displayed during the DTC check, check the circuit listed for that code in the table below and proceed to the page given.

* : ●...MIL light up

DTC No. (See Page)	Detection Item	Trouble Area	MIL *	Memory
P0500 (DI–172)	Vehicle Speed Sensor Malfunction (No.1 Vehicle Speed Sensor)	• Open or short in No.1 vehicle speed sensor circuit • No.1 vehicle speed sensor • ECM	●	○
P0710 (DI–174)	Transmission Fluid Temperature Sensor Malfunction (ATF Temperature Sensor)	• Open or short in ATF temperature sensor circuit • ATF temperature sensor • ECM	●	○
P0715 (DI–176)	Input/Turbine Speed Sensor Circuit Malfunction (O/D Direct Clutch Speed Sensor)	• Open or short in O/D direct clutch speed sensor circuit • O/D direct clutch speed sensor • ECM • Automatic transmission assembly	●	○
P0750 (DI–179)	Shift Solenoid A Malfunction (Shift Solenoid Valve No.1)	• Shift solenoid valve No.1 is stuck open or closed • Valve body is blocked up or stuck	●	○
P0753 (DI–181)	Shift Solenoid A Electrical Malfunction (Shift Solenoid Valve No.1)	• Open or short in shift solenoid valve No.1 circuit • Shift solenoid valve No.1 • ECM	●	○
P0755 (DI–179)	Shift Solenoid B Malfunction (Shift Solenoid Valve No.2)	• Shift solenoid valve No.2 is stuck open or closed • Valve body is blocked up or stuck	●	○
P0758 (DI–181)	Shift Solenoid B Electrical Malfunction (Shift Solenoid Valve No.2)	• Open or short in shift solenoid valve No.2 circuit • Shift solenoid valve No.2 • ECM	●	○
P0770 (DI–185)	Shift Solenoid E Malfunction (Shift Solenoid Valve SL)	• Shift solenoid valve SL is stuck open or closed • Valve body is blocked up or stuck • Lock–up clutch	●	○
P0773 (DI–187)	Shift Solenoid E Electrical Malfunction (Shift Solenoid Valve SL)	• Open or short in shift solenoid valve SL circuit • Shift solenoid valve SL • ECM	●	○
P1520 (DI–190)	Stop Light Switch Signal Malfunction	• Short in stop light switch signal circuit • Stop Light Switch • ECM	●	○
P1700 (DI–194)	Vehicle Speed Sensor No.2 Malfunction (No.2 Vehicle Speed Sensor)	• Open or short in No.2 vehicle speed sensor circuit • No.2 vehicle speed sensor • ECM	●	○
P01760 (DI–197)	Linear Solenoid for Line Pressure Control Circuit Malfunction (Shift Solenoid Valve SLT)	• Open or short in shift solenoid valve SLT circuit • Shift solenoid valve SLT • ECM	●	○
P1780 (DI–200)	Park/neutral Position Switch Malfunction	• Short in park/neutral position switch circuit • Park/neutral position switch • ECM	●	○

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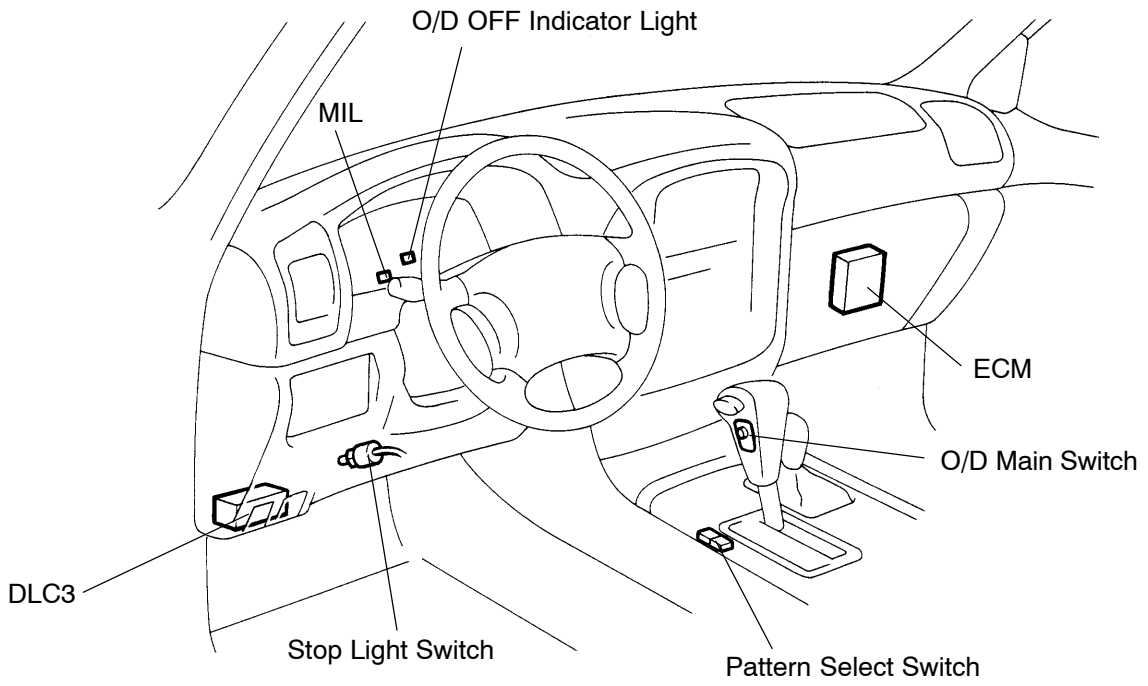
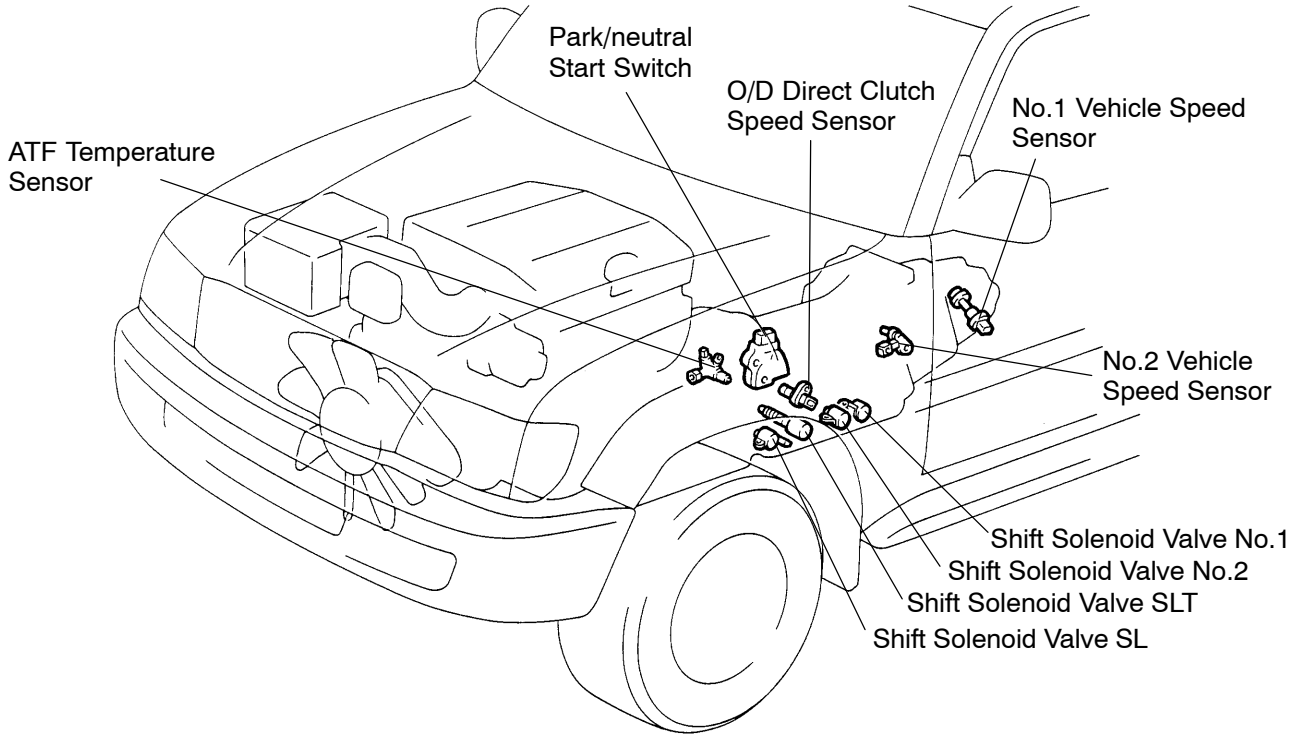
DI3BR–01

PARTS LOCATION





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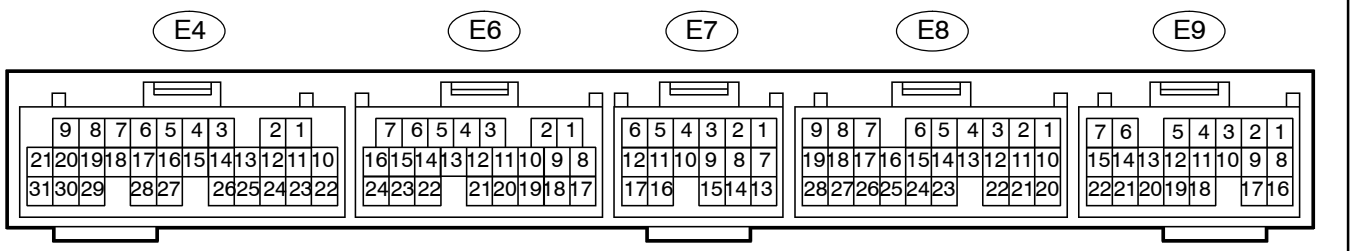
DI3BS–01

TERMINALS OF ECM

ECM Terminals



D01639

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
S1 – E1 (E7, 1 – E6, 17)	R ↔ BR	IG ON	9 ~ 14
		1st or 2nd gear	9 ~ 14
		3rd or O/D gear	Below 1.5
S2 – E1 (E7, 2 – E6, 17)	W ↔ BR	IG ON	Below 1.5
		2nd or 3rd gear	9 ~ 14
		1st or O/D gear	Below 1.5
SL – E1 (E7, 3 – E6, 17)	G ↔ BR	IG ON	Below 1.5
		Vehicle driving under lock–up position	9 ~ 14
SLT^+ – SLT^- (E7, 9, – E7, 15)	G–W ↔ G–B	IG ON	Below 3
		Engine is idling	Pulse signal is output Below 1.5 ↔ 4 ~ 6
$SP2^+$ – $SP2^-$ (E7, 5 – E7, 11)	R ↔ G	Engine is running	Pulse signal is output Below 1.5 ↔ 4 ~ 6
NCO^+ – NCO^- (E7, 4 – E7, 10)	L–R ↔ L–W	Engine is idling	Pulse signal is output Below 1.5 ↔ 4 ~ 6
OD2 – E1 (E8, 1 – E6, 17)	B ↔ BR	O/D main switch ON (O/D OFF)	Below 3
		O/D main switch OFF (O/D ON)	9 ~ 14
OIL – E2 (E7, 17 – E6, 18)	G–Y ↔ BR–W	ATF temperature: 115°C (239°F) or more	Below 1.5
L – E1 (E8, 9 – E6, 17)	G–B ↔ BR	IG ON and Shift lever L position	7.5.~ 14
		IG ON and Shift lever other than L position	Below 1.5
2 – E1 (E8, 3 – E6, 17)	G ↔ BR	IG ON and Shift lever 2 position	7.5 ~ 14
		IG ON and Shift lever other than 2 position	Below 1.5
R – E1 (E8, 19 – E6, 17)	R–B ↔ BR	IG ON and Shift lever R position	7.5 ~ 14
		IG ON and Shift lever other than R position	Below 1.5
NSW – E1 (E8, 20 – E6, 17)	B–W ↔ BR	IG ON and Shift lever P or N position	Below 3
		IG ON and Shift lever other than P or N position	9 ~ 14
TFN – E1 (E9, 15 – E6, 17)	Y–G ↔ BR	IG ON and Transfer shift lever N position	Below 1.5
		IG ON and Transfer shift lever other than N position	9 ~ 14
SNWL – E1 (E9, 2 – E6, 17)	Y ↔ BR	IG ON and 2nd start mode	Below 3
		IG ON and Except 2nd start mode	7.5 ~ 14
SNWI – E1 (E9, 3 – E6, 17)	L–R ↔ BR	IG ON and 2nd start switch ON	Below 1.5
		IG ON and 2nd start switch OFF	7.5 ~ 14
PWR – E1 (E8, 11 – E6, 17)	L–W ↔ BR	IG ON and Pattern select switch ”NORM”	7.5 ~ 14
		IG ON and Pattern select switch ”PWR”	Below 1.5

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DI3BT–01

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the diagnostic trouble code check but 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 for each circuit, proceed to the circuit with the next highest number in the table to continue the check.
- If the trouble still occurs even though there are no abnormalities in any of the other circuits, then check and replace the ECM.

1. Chapter 1: Electronic Circuit Matrix Chart

Symptom	Suspect Area	See page
Vehicle does not move in any forward position and reverse position	1. On–vehicle repair matrix chart 2. Off–vehicle repair matrix chart	– –
Vehicle does not move in particular position or positions	1. On–vehicle repair matrix chart 2. Off–vehicle repair matrix chart	– –
No up–shift (1st → 2nd)	1. Shift solenoid valve No.1 and No.2 circuit 2. Throttle position sensor circuit 3. Vehicle speed sensor circuit 4. On–vehicle repair matrix chart 5. Park/neutral position switch circuit 6. Off–vehicle repair matrix chart 7. ECM	DI–181 DI–38 DI–100 – DI–200 – DI–165
No up–shift (2nd → 3rd)	1. Shift solenoid valve No.1 and No.2 circuit 2. Throttle position sensor circuit 3. Vehicle speed sensor circuit 4. On–vehicle repair matrix chart 5. Park/neutral position switch circuit 6. Off–vehicle repair matrix chart 7. ECM	DI–181 DI–38 DI–100 – DI–200 – DI–165
No up–shift (3rd → O/D)	1. O/D main switch circuit 2. Shift solenoid valve No.1 and No.2 circuit 3. Throttle position sensor circuit 4. Vehicle speed sensor circuit 5. Park/neutral position switch circuit 6. Engine coolant temp. sensor circuit 7. On–vehicle repair matrix chart 8. Off–vehicle repair matrix chart 9. ECM	DI–204 DI–181 DI–38 DI–100 DI–200 DI–33 – – DI–165
No down–shift (O/D → 3rd)	1. Throttle position sensor circuit 2. Shift solenoid valve No.1 and No.2 circuit 3. Vehicle speed sensor circuit 4. On–vehicle repair matrix chart 5. ECM	DI–38 DI–181 DI–100 – DI–165
No down–shift (3rd → 2nd)	1. Throttle position sensor circuit 2. Shift solenoid valve No.1 and No.2 circuit 3. Vehicle speed sensor circuit 4. On–vehicle repair matrix chart 5. ECM	DI–38 DI–181 DI–100 – DI–165

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Symptom	Suspect Area	See page
No down–shift (2nd → 1st)	1. Throttle position sensor circuit 2. Shift solenoid valve No.1 and No.2 circuit 3. Vehicle speed sensor circuit 4. On–vehicle repair matrix chart 5. Off–vehicle repair matrix chart 6. ECM	DI–38 DI–181 DI–100 – – DI–165
No lock–up	1. Shift solenoid valve SL circuit 2. Throttle position sensor circuit 3. Stop light circuit 4. Vehicle speed sensor circuit 5. Park/neutral position switch circuit 6. Engine coolant temp. sensor circuit 7. On–vehicle repair matrix chart 8. Off–vehicle repair matrix chart 9. ECM	DI–187 DI–38 DI–190 DI–100 DI–200 DI–33 – – DI–165
No lock–up off	1. Throttle position sensor circuit 2. Shift solenoid valve SL circuit 3. Stop light circuit 4. Vehicle speed sensor circuit 5. On–vehicle repair matrix chart 6. Off–vehicle repair matrix chart 7. ECM	DI–38 DI–187 DI–190 DI–100 – – DI–165
Shift point too high or too low	1. Throttle position sensor circuit 2. Park/neutral position switch circuit 3. Pattern select switch circuit 4. Vehicle speed sensor circuit 5. ECM	DI–38 DI–200 DI–208 DI–100 DI–165
Up–shift to 2nd while in L position	1. Park/neutral position switch circuit 2. ECM	DI–200 DI–165
Up–shift to 3rd while in L position	1. Park/neutral position switch circuit 2. ECM	DI–200 DI–165
Up–shift to O/D from 3rd	1. O/D main switch circuit 2. ECM	DI–204 DI–165
Up–shift to O/D from 3rd while engine is cold	1. Engine coolant temp. sensor circuit 2. On–vehicle repair matrix chart 3. Off–vehicle repair matrix chart 4. ECM	DI–33 – – DI–165
Harsh engagement (N → D)	1. Throttle position sensor circuit 2. Park/neutral position switch circuit 3. On–vehicle repair matrix chart 4. Off–vehicle repair matrix chart 5. ECM	DI–38 DI–200 – – DI–165
Harsh engagement (Lock–up)	1. Throttle position sensor circuit 2. Shift solenoid valve SL circuit 3. Vehicle speed sensor circuit 4. On–vehicle repair matrix chart 5. Off–vehicle repair matrix chart 6. ECM	DI–38 DI–187 DI–100 – – DI–165
Harsh engagement (Any driving position)	1. Throttle position sensor circuit 2. Vehicle speed sensor circuit 3. On–vehicle repair matrix chart 4. Off–vehicle repair matrix chart 5. ECM	DI–38 DI–100 – – DI–165

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Symptom	Suspect Area	See page
Slip or shudder (Forward and reverse)	1. On–vehicle repair matrix chart 2. Off–vehicle repair matrix chart	– –
Slip or shudder (Particular position)	1. On–vehicle repair matrix chart 2. Off–vehicle repair matrix chart	– –
No engine braking	1. On–vehicle repair matrix chart 2. Off–vehicle repair matrix chart	– –
Poor acceleration	1. Throttle position sensor circuit 2. Vehicle speed sensor circuit 3. Shift solenoid valve No.1 and No.2 circuit 4. Shift solenoid valve SL circuit 5. Off–vehicle repair matrix chart 6. ECM	DI–38 DI–100 DI–181 DI–187 – DI–165
No pattern select	1. Pattern select switch circuit 2. ECM	DI–208 DI–165
No 2nd start	1. Pattern select switch circuit 2. Shift solenoid valve No.1 and No.2 circuit 3. ECM	DI–208 DI–181 DI–165
Large shift shock or engine stalls when starting off or stopping	1. Shift solenoid valve SL circuit 2. Off–vehicle repair matrix chart 3. ECM	DI–187 – DI–165

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2. Chapter 2: On–Vehicle Repair (★: A340F, A343F AUTOMATIC TRANSMISSION Repair Manual Pub. No. RM479U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward position and reverse position	1. Transmission control rod 2. Manual valve 3. Parking lock pawl 4. Off–vehicle repair matrix chart	DI–151 ★ ★ –
Vehicle does not move in R position	Off–vehicle repair matrix chart	–
Vehicle does not move in particular position or positions (except 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)	1. 3–4 shift valve 2. Off–vehicle repair matrix chart	★ –
No down–shift (3rd → 2nd)	1. 2–3 shift valve 2. Off–vehicle repair matrix chart	★ –
No down–shift (2nd → 1st)	1. 1–2 shift valve 2. Off–vehicle repair matrix chart	★ –
No lock–up or No lock–up off	1. Lock–up control valve 2. Lock–up relay valve 3. Off–vehicle repair matrix chart	★ ★ –
Harsh engagement (N → D)	1. Accumulator control valve 2. Solenoid modulator valve 3. C_1 accumulator 4. Orifice control valve 5. Off–vehicle repair matrix chart	★ ★ ★ ★ –
Harsh engagement (Lock–up)	1. Lock–up control valve 2. Lock–up relay valve 3. Solenoid relay valve 4. Off–vehicle repair matrix chart	★ ★ ★ –
Harsh engagement (N → R)	1. Accumulator control valve 2. C_2 accumulator 3. Solenoid modulator valve 4. Off–vehicle repair matrix chart	★ ★ ★ –
Harsh engagement (N → L)	Low coast modulator valve	★
Harsh engagement (1st → 2nd → 3rd → O/D)	1. Accumulator control valve 2. Solenoid modulator valve	★ ★
Harsh engagement (2nd → 3rd)	1. Accumulator control valve 2. Solenoid modulator valve 3. C_2 accumulator 4. Off–vehicle repair matrix chart	★ ★ ★ –
Harsh engagement (3rd → O/D)	1. Accumulator control valve 2. Solenoid modulator valve 3. B_0 accumulator 4. Off–vehicle repair matrix chart	★ ★ ★ –

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Symptom	Suspect Area	See page
Harsh engagement (O/D → 3rd)	1. Accumulator control valve 2. Solenoid modulator valve 3. C_0 accumulator 4. Off–vehicle repair matrix chart	★ ★ ★ –
Slip or shudder (Forward and reverse)	1. Transmission control rod 2. Oil strainer 3. Pressure relief valve 4. Off–vehicle repair matrix chart	DI–151 ★ ★ –
Slip or shudder (Particular position)	1. Transmission control rod 2. Off–vehicle repair matrix chart	DI–151 –
No engine braking (1st: L position)	1. Low coast modulator valve 2. Off–vehicle repair matrix chart	★ –
No engine braking (2nd: 2 position)	1. 2nd coast modulator valve 2. Off–vehicle repair matrix chart	★ –
No kick–down	1. 1–2 shift valve 2. 2–3 shift valve	★ ★

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3. Chapter 3: Off–Vehicle Repair (★: A340F, A343F AUTOMATIC TRANSMISSION Repair Manual Pub. No. RM479U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward position and reverse position	1. O/D one–way clutch (F_0) 2. O/D direct clutch (C_0) 3. O/D planetary gear unit 4. Torque converter clutch	★ ★ ★ AT–32
Vehicle does not move in R position	1. Front and rear planetary gear unit 2. Direct clutch (C_2) 3. 1st and reverse brake (B_3) 4. O/D direct clutch (C_0)	★ ★ ★ ★
No up–shift (1st → 2nd)	1. 2nd brake (B_2) 2. No. 1 one–way clutch (F_1)	★ ★
No up–shift (2nd → 3rd)	Direct clutch (C_2)	★
No up–shift (3rd → O/D)	O/D brake (B_0)	★
No lock–up or No lock–up off	Torque converter clutch	AT–32
Harsh engagement (N → D)	1. Forward clutch (C_1) 2. O/D one–way clutch (F_0) 3. No. 2 one–way clutch (F_2)	★ ★ ★
Harsh engagement (N → R)	1. Direct clutch (C_2) 2. 1st and reverse brake (B_3) 3. O/D one–way clutch (F_0)	★ ★ ★
Harsh engagement (N → 2)	1. Forward clutch (C_1) 2. O/D one–way clutch (F_0) 3. No. 2 one–way clutch (F_2)	★ ★ ★
Harsh engagement (N → L)	1. Forward clutch (C_1) 2. 1st and reverse brake (B_3) 3. O/D one–way clutch (F_0) 4. No. 2 one–way clutch (F_2)	★ ★ ★ ★
Harsh engagement (Lock–up)	Torque converter clutch	AT–32
Slip or shudder (Forward and reverse: After warm–up)	1. Torque converter clutch 2. O/D one–way clutch (F_0) 3. O/D direct clutch (C_0)	★ ★ ★
Slip or shudder (Particular position: Just after engine starts)	Torque converter clutch	AT–32
Slip or shudder (R position)	1. Direct clutch (C_2) 2. 1st and reverse brake (B_3)	★ ★
Slip or shudder (1st)	1. Forward clutch (C_1) 2. No. 2 one–way clutch (F_2)	★ ★
Slip or shudder (2nd)	1. 2nd brake (B_2) 2. 2nd coast brake (B_1) 3. No. 1 one–way clutch (F_1)	★ ★ ★
Slip or shudder (3rd)	Direct clutch (C_2)	★
Slip or shudder (O/D)	O/D brake (B_0)	★
No engine braking (1st ~ 3rd: D position)	2nd brake (B_2)	★
No engine braking (1st: L position)	1st and reverse brake (B_3)	★
No engine braking (2nd: 2 position)	2nd coast brake (B_1)	★
Poor acceleration (All position)	Torque converter clutch	AT–32
Poor acceleration (O/D)	1. O/D direct clutch (C_0) 2. O/D planetary gear unit	★ ★
Engine stalls when starting off or stopping	Torque converter clutch	AT–32

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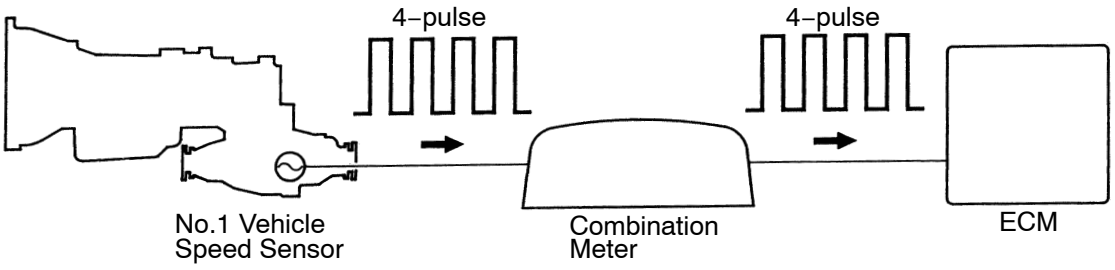
DI3BU–01

CIRCUIT INSPECTION

DTC	P0500	Vehicle Speed Sensor Malfunction (No.1 Vehicle Speed Sensor)

CIRCUIT DESCRIPTION

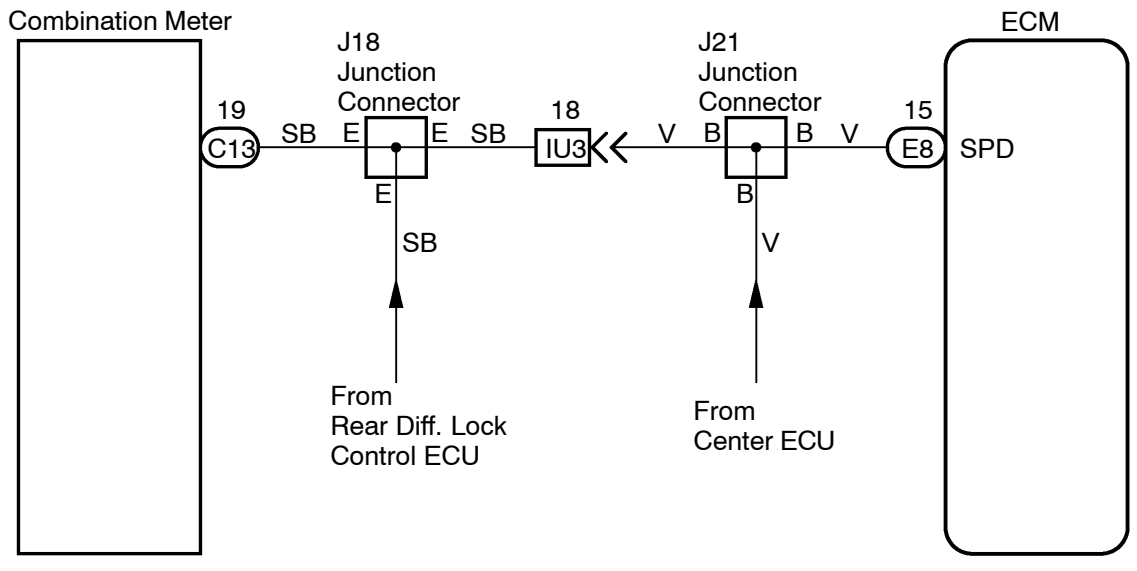
The vehicle speed sensor outputs a 4 – pulse signal for every revolution of the rotor shaft, which is rotated by the transmission output shaft via the driven gear. After this signal is converted into a more precise rectangular wavefrom by the waveform shaping circuit inside the combination meter, it is then transmitted to the ECM. The ECM determines the vehicle speed based on the frequency of these pulse signals.



P22487

DTC No.	DTC Detecting Condition	Trouble Area
P0500	No vehicle speed sensor signal to ECM under conditions (a) and (b) (2–trip detection logic) (a) Park/neutral position switch is OFF. (b) Vehicle is being driven.	• Open or short in No.1 vehicle speed sensor circuit • No.1 vehicle speed sensor • Combination meter • ECM

WIRING DIAGRAM



D03056

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INSPECTION PROCEDURE

1	**Check operation of speedometer.**

CHECK:

Drive the vehicle and check if the operation of the speedometer in the combination meter is normal.

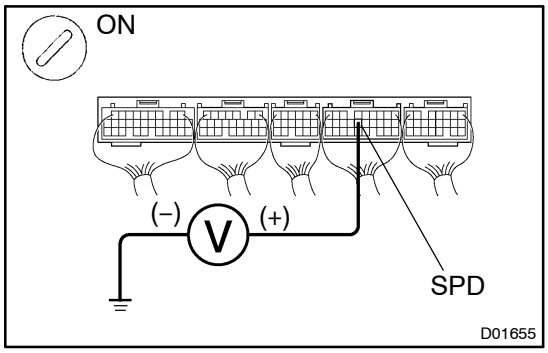
HINT:

The vehicle speed sensor is operating normally if the speedometer display is normal.

NG → **Check speedometer circuit (BE–52).**

OK

2	**Check voltage between terminal SPD of ECM connector and body ground.**



PREPARATION:

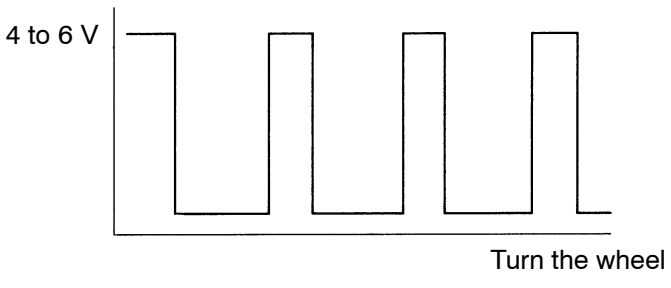
(a) Disconnect the rear diff. lock control ECU connector and the center ECU connector.
(b) Shift the shift lever to neutral.
(c) Jack up a rear wheels on one side.
(d) Turn ignition switch ON.

CHECK:

Measure voltage between terminal SPD of ECM connector and 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.**

OK

Check and replace ECM (See page IN–34).

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DI3BV–01

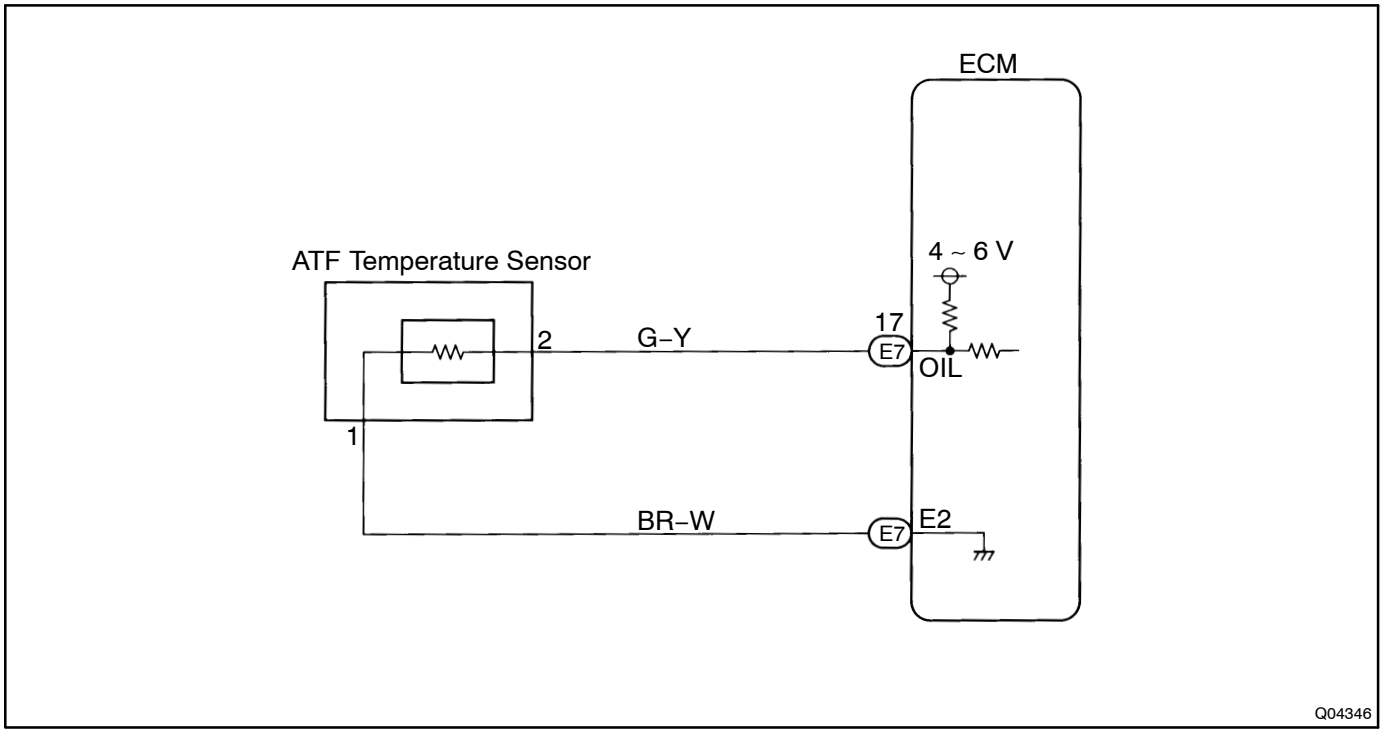
DTC	P0710	Transmission Fluid Temperature Sensor Malfunction (ATF Temperature Sensor)

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. (a) Temp. sensor resistance is less than 79 Ω (b) After the engine has been operating for 15 minutes or more, the temp. sensor resistance is more than 156 kΩ	• Open or short in ATF temp. sensor • ATF temp. sensor • ECM

WIRING DIAGRAM



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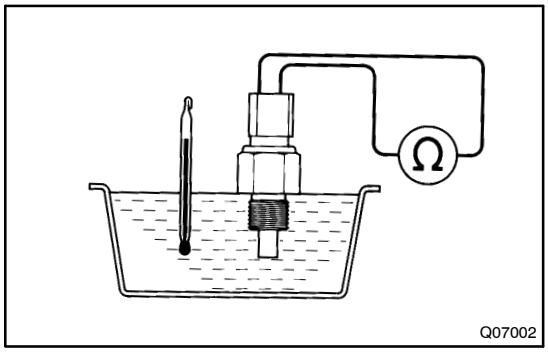
INSPECTION PROCEDURE

1	**Check ATF Temperature Sensor.**



PREPARATION:
Remove the ATF temperature sensor.
CHECK:
Measure resistance between terminals of ATF temperature sensor at 20 °C (68 °F) and 110 °C (230 °F).
OK:

Resistance (Approx.):
20 °C (68 °F): 12.1 kΩ
110 °C (230 °F): 780 Ω

NG → **Replace the ATF temperature sensor.**

OK

2	**Check harness and connector between ATF temperature sensor and ECM (See page IN–34).**

NG → **Repair or replace the harness or connector.**

OK

Check and replace the ECM. (See page IN–34)

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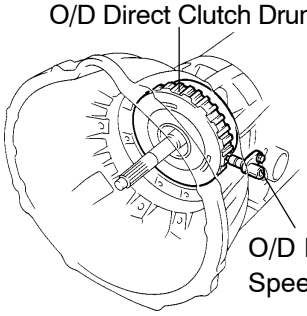
DI3BW–01

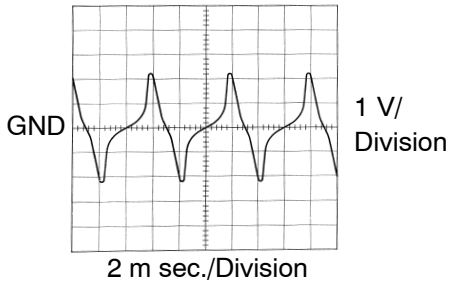
DTC	P0715	Input/Turbine Speed Sensor Circuit Malfunction (O/D Direct Clutch Speed Sensor)

CIRCUIT DESCRIPTION



This sensor detects the rotation speed of the O/D input shaft from the rotation of the O/D direct clutch drum.
Its construction is the same as that of the No.2 vehicle speed sensor (See page DI–194).
By comparing the O/D direct clutch speed signal and No.2 vehicle speed sensor signal, the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure in response to various conditions, thus doing smooth gear shift.

DTC No.	DTC Detection Condition	Trouble Area
P0715	All conditions below are detected for 5 secs. or more (2–trip detection logic) (a) Gear change not being performed (b) Gear position: 1st, 2nd 3rd or 4th (c) T/M input shaft rpm: 300 rpm or less (d) T/M output shaft rpm: 1,000 rpm or more (e) Park/neutral position switch: OFF (f) Shift solenoid valves No.1, No.2, SL and vehicle speed sensor are in normal operation	• Open or short in O/D direct clutch speed sensor circuit • O/D direct clutch speed sensor • ECM • Automatic transmission assembly



HINT:
Waveform between terminals NCO^{+} and NCO^{-} during engine idling.

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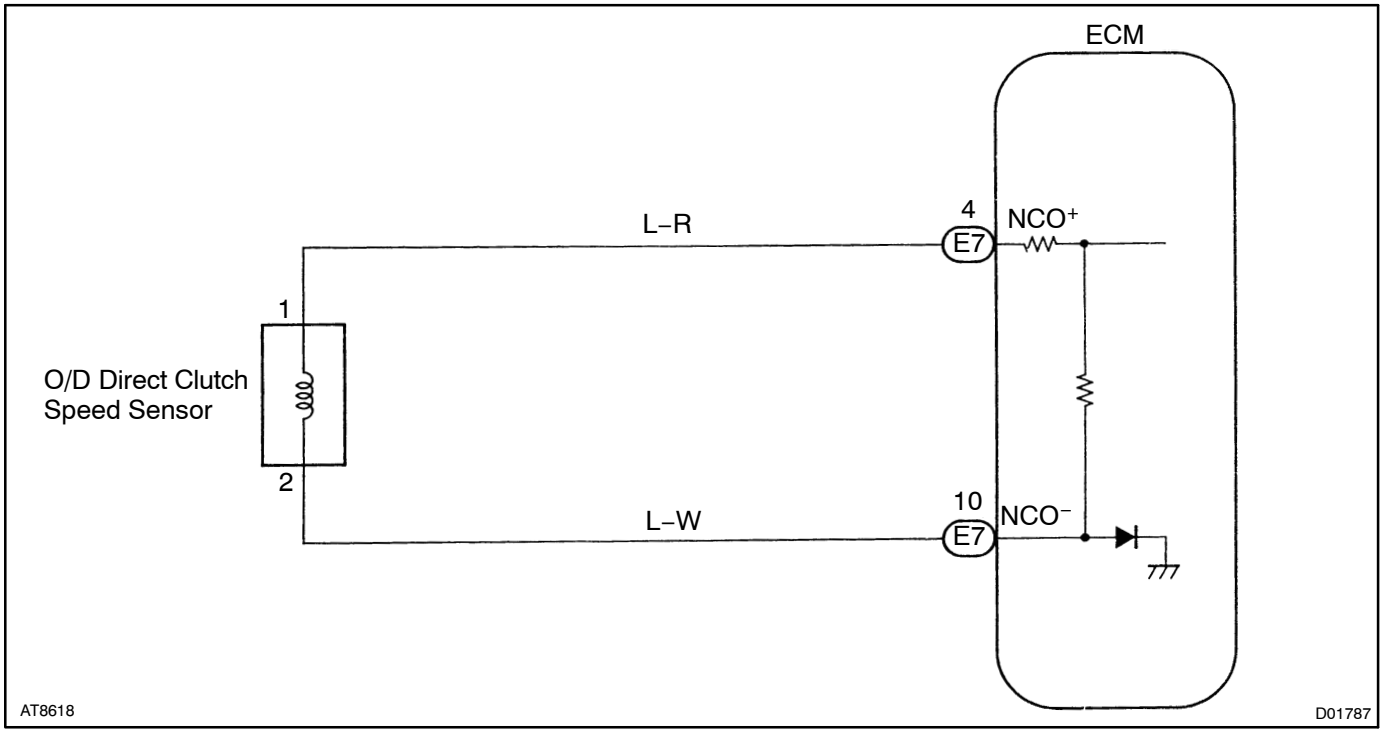
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

In case of using the TOYOTA hand–held tester, start the inspection from step 1 and in case of not using the TOYOTA hand–held tester, start from step 2.

1	**Using TOYOTA hand–held tester, check O/D direct clutch speed signal.**

PREPARATION:

(a) Remove the DLC3 cover.
(b) Connect TOYOTA hand–held tester to the DLC3.
(c) Start the engine (Shift position: P).
(d) Turn the TOYOTA hand–held tester main switch ON.

CHECK:

Read O/D direct clutch speed at engine idling.

OK:

700 ± 50 rpm at engine idling

NG → **Go to step 2.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–166). However, when DTC P0715 is displayed, check and replace ECM (See page IN–34.)

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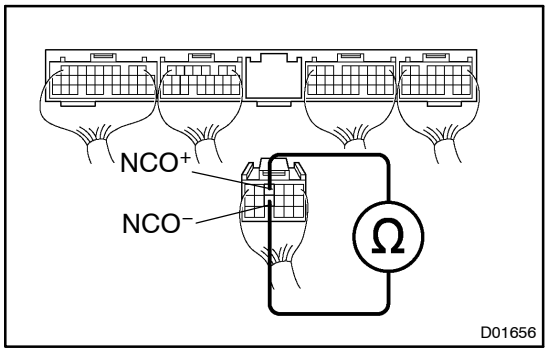
2	Check resistance between terminals NCO+ and NCO– of ECM

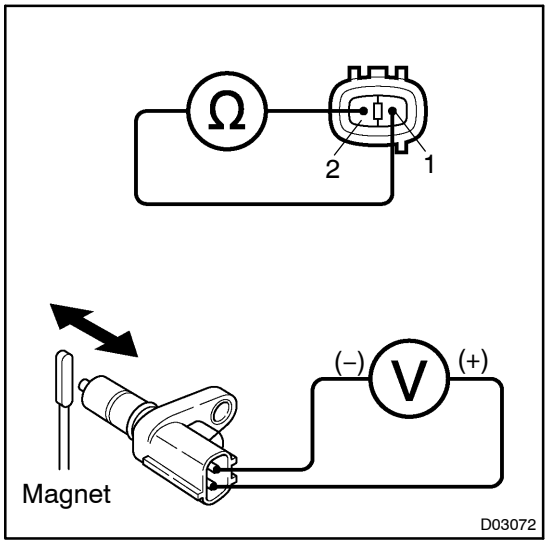


PREPARATION:
Disconnect the connector from ECM.
CHECK:
Check resistance between terminals NCO+ and NCO– of ECM.
OK:
Resistance: 560 – 680 Ω at 20 °C (68 °F)

OK	Check and replace the ECM (See page IN–34.).

NG

3	Check O/D direct clutch speed sensor.



PREPARATION:
Remove the O/D direct clutch speed sensor from the transmission.
CHECK:
(a) Measure resistance between terminals 1 and 2 of O/D direct clutch speed sensor.
(b) Check 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 kept away quickly.
OK:
(a): Resistance: 560 ~ 680 Ω
(b): Voltage is grenerated intermittently
HINT:
The generated voltage is extremely low.

NG	Replace the O/D direct clutch speed sensor.

OK

Check and repair harness and connector between ECM and O/D direct clutch speed sensor (See page IN–34).

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DI3BX–01

DTC	P0750, P0755	Shift Solenoid A/B Malfunction (Shift Solenoid Valve No.1/No.2)

SYSTEM DESCRIPTION

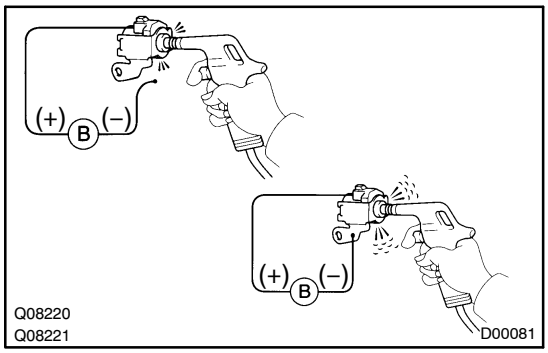
The ECM uses signals from the vehicle speed sensor to detect the actual gear position (1st, 2nd, 3rd or O/D gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical trouble of the shift solenoid valves and valve body.

DTC No.	DTC Detecting Condition	Trouble Area
P0750 P0755	During normal driving, the gear required by the ECM does not match the actual gear (2–trip detection logic)	• Shift solenoid valve No.1/No.2 is stuck open or closed • Valve body is blocked up or stuck

HINT:
Check the shift solenoid valve No.1 when DTC P0750 is output and check shift solenoid valve No.2 when DTC P0755 is output.

INSPECTION PROCEDURE

1	Check shift solenoid valve No.1 or No.2 operation.



PREPARATION:
(a) Remove the oil pan.
(b) Remove the shift solenoid valve No.1 or No.2.

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.

NG → **Replace the shift solenoid valve No.1 or No.2.**

OK

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2	Check valve body (See page DI–166).

NG → Repair or replace the valve body.

OK →

Replace the transmission
(See page AT–27).

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DTC	P0753, P0758	Shift Solenoid A/B Electrical Malfunction (Shift Solenoid Valve No.1/No.2)

CIRCUIT DESCRIPTION

Shifting from 1st to O/D is performed in combination with ON and OFF of the shift solenoid valves No.1 and No.2 controlled by ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valve to allow the vehicle to be operated smoothly (Fail safe function).

Position	NORMAL			SHIFT SOLENOID NO.1 MALFUNCTIONING			SHIFT SOLENOID NO.2 MALFUNCTIONING			BOTH SOLENOIDS MALFUNCTIONING
	Solenoid valve		Gear	Solenoid valve		Gear	Solenoid valve		Gear	Gear when shift selector is manually operated
	No.1	No.2		No.1	No.2		No.1	No.2		
D	ON	OFF	1st	X	ON	3rd	ON	X	1st	O/D
	ON	ON	2nd	X	ON	3rd	OFF	X	O/D	O/D
	OFF	ON	3rd	X	ON	3rd	OFF	X	O/D	O/D
	OFF	OFF	O/D	X	OFF	O/D	OFF	X	O/D	O/D
2	ON	OFF	1st	X	ON	3rd	ON	X	1st	3rd
	ON	ON	2nd	X	ON	3rd	OFF	X	3rd	3rd
	OFF	ON	3rd	X	ON	3rd	OFF	X	3rd	3rd
L	ON	OFF	1st	X	OFF	1st	ON	X	1st	1st
	ON	ON	2nd	X	ON	2nd	ON	X	1st	1st

X: Malfunctions

HINT:
Check the shift solenoid valve No.1 when DTC P0753 is output and check the shift solenoid valve No.2 when DTC P0758 is output.

DTC No.	DTC Detecting Condition	Trouble Area
P0753 P0758	The ECM checks for an open or short circuit in the shift solenoid valves No.1 and No.2 circuit when it changes. The ECM records DTC P0753 or P0758 if condition (a) or (b) is detected once, but it does not light up MIL. After ECM detects condition (a) or (b) continuously 8 times or more in one trip, it causes the MIL light up until condition (a) or (b) disappears. After that, if the ECM detects condition (a) or (b) once, it starts lighting up MIL again. (a) Solenoid resistance is 8 Ω or less (short circuit) when the solenoid is energized. (b) Solenoid resistance is 100 kΩ or more (open circuit) when the solenoid is not energized.	• Open or short in shift solenoid valve No.1/No.2 circuit • Shift solenoid valve No.1/No.2 • ECM

Fail Safe Function:
If either of the shift solenoid valve circuits develops an open or short, the ECM turns the other shift solenoid ON and OFF to shift to the gear positions shown in the table below. The ECM also turns the shift solenoid valve SL OFF at the same time. If both solenoids are malfunctions, hydraulic control cannot be performed electronically and must be done manually.
Manual shifting as shown in the following table must be done (In the case of a short circuit, the ECM stops sending current to the short circuited solenoid).

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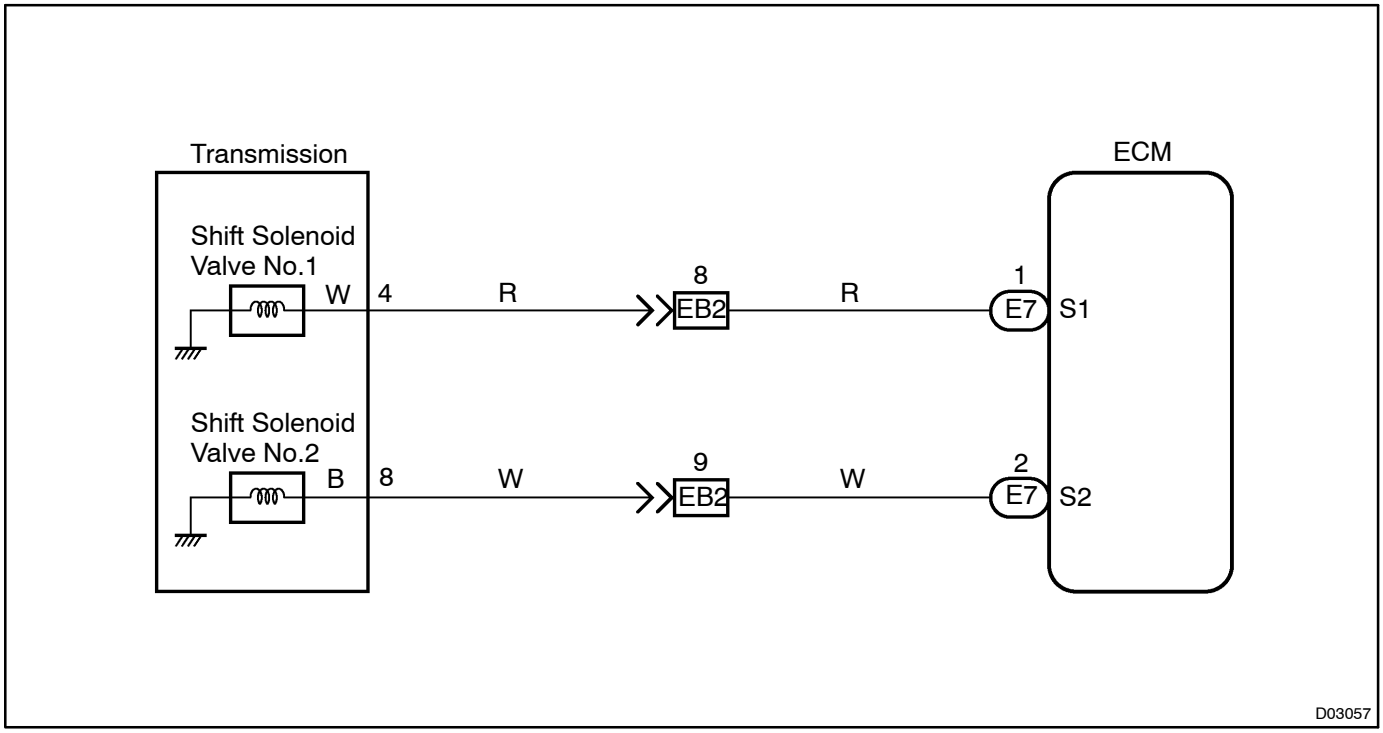
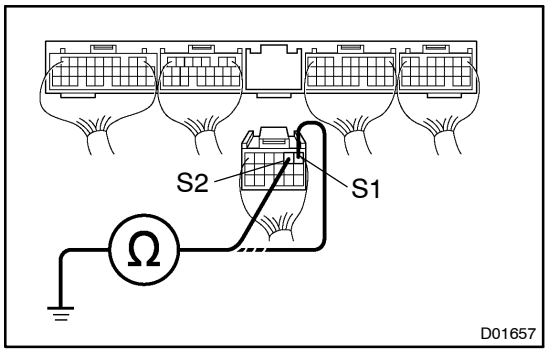
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Measure resistance between terminal S1 or S2 of ECM and body ground.**



PREPARATION:
Disconnect the connector from ECM.
CHECK:
Measure resistance between terminal S1 or S2 of ECM and body ground.
OK:
Resistance: 11 ~ 15 Ω

OK → **Check and replace the ECM (See page IN–34).**

NG

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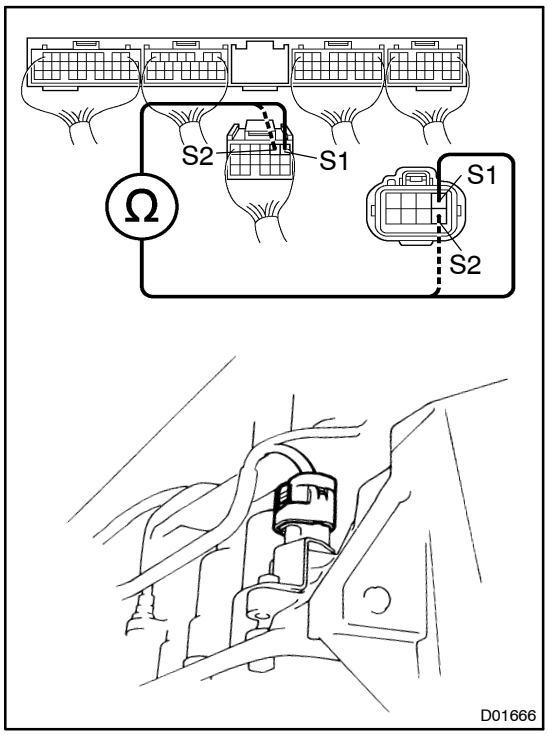
2	**Check harness and connector between ECM and automatic transmission solenoid connector.**



PREPARATION:

Disconnect the solenoid connector from the automatic transmission.

CHECK:

Check the harness and connector between terminal S1 or S2 of ECM and terminal S1 or S2 of solenoid connector.

OK:

There is no open and no short circuit.

NG → **Repair or replace the harness or connector.**

OK

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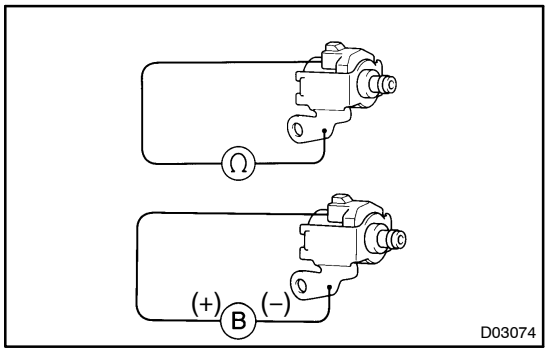
3	Check shift solenoid valve No.1 or No.2.



PREPARATION:

(a) Remove the oil pan.

(b) Remove the shift solenoid valve No.1 or No.2.

CHECK:

(a) Measure resistance between solenoid connector and body ground.

(b) Connect positive ⊕ lead to terminal of solenoid connector, negative ⊖ lead to solenoid body.

OK:

(a) Resistance: 11 ~ 15 Ω

(b) The solenoid makes an operating noise.

NG → **Replace the solenoid valve.**

OK

Repair or replace the solenoid wire.

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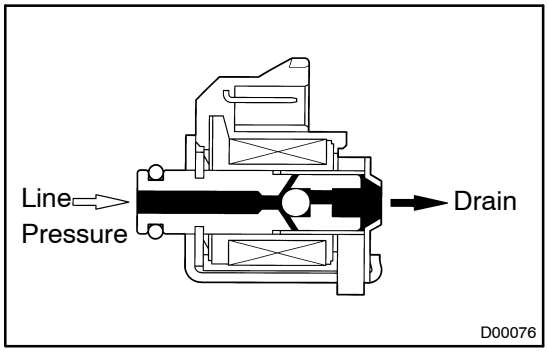
DI3BZ–01

DTC	P0770	Shift Solenoid E Malfunction (Shift Solenoid Valve SL)



SYSTEM DESCRIPTION

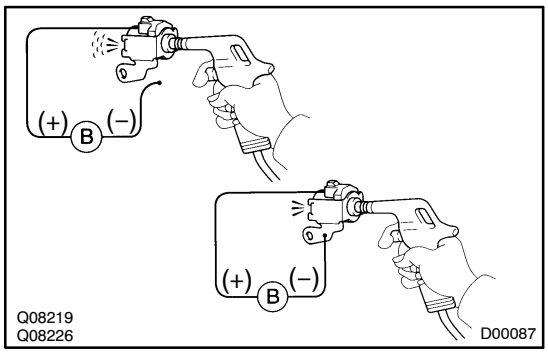
The ECM uses the signals from the throttle position sensor, air–flow meter and crankshaft position sensor to monitor the engagement condition of the lock–up clutch.

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 SL, valve body and torque converter clutch.

DTC No.	DTC Detecting Condition	Trouble Area
P0770	Lock–up does not occur when driving in the lock–up range (normal driving at 80 km/h [50 mph]), or lock–up remains ON in the lock–up OFF range. (2–trip detection logic)	• Shift solenoid valve SL is stuck open or closed • Valve body blocked up or stuck • Lock–up clutch

INSPECTION PROCEDURE

1	Check solenoid valve SL operation.



PREPARATION:

(a) Remove the oil pan.

(b) Remove the shift solenoid valve SL.

CHECK:

(a) Applying 490 kPa (5 kgf/cm^2, 71 psi) of compressed air, check that the solenoid valve opens.

(b) When battery voltage is supplied to the shift solenoid valve, check that the solenoid valve does not leak air.

NG → Replace the solenoid valve SL.

OK

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2	Check valve body (See page DI–166).

NG → Repair or replace the valve body.

OK

Replace the torque converter clutch (See page AT–27).

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DI3C0–01

DTC	P0773	Shift Solenoid E Electrical Malfunction (Shift Solenoid Valve SL)

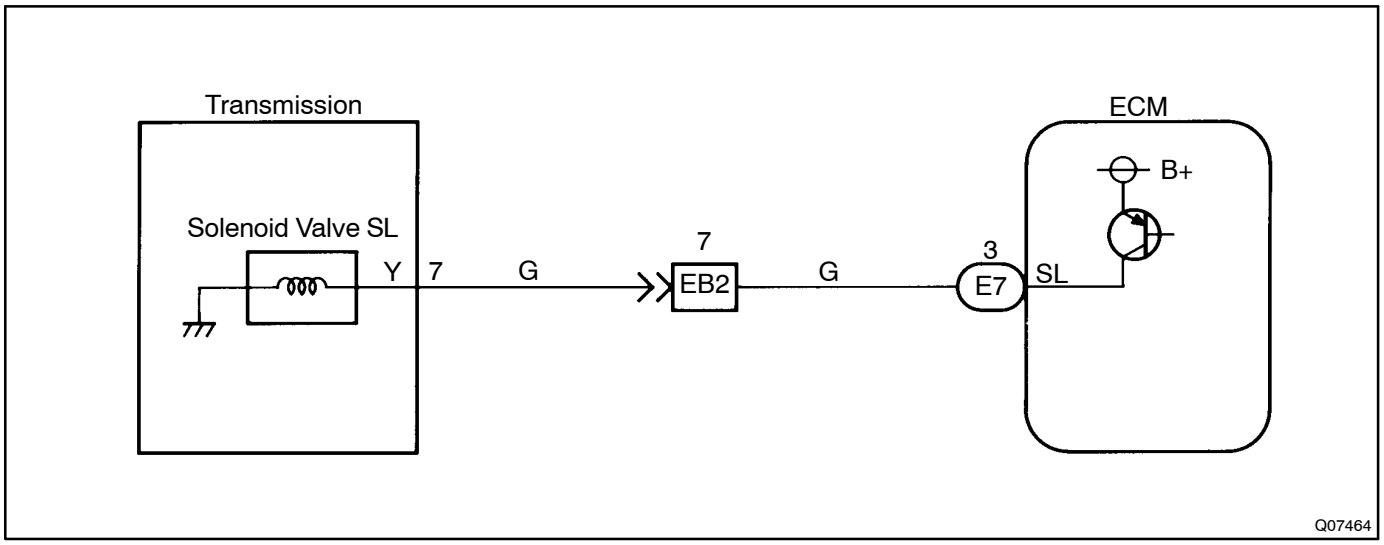
CIRCUIT DESCRIPTION

The shift solenoid valve SL is turned ON and OFF by signals from the ECM to control the hydraulic pressure acting on the lock–up relay valve, which then controls operation of the lock–up clutch.

DTC No.	DTC Detecting Condition	Trouble Area
P0773	Either (a) or (b) is detected 1 time. (2–trip detection logic) (a) Solenoid resistance is 8 Ω or less (short circuit) when the solenoid is energized. (b) Solenoid resistance is 100 kΩ or more (open circuit) when the solenoid is not energized.	• Open or short in shift solenoid valve SL circuit • Shift solenoid valve SL • ECM

Fail Safe Function:
If the ECM detects a malfunction, it turns the shift solenoid valve SL OFF.

WIRING DIAGRAM



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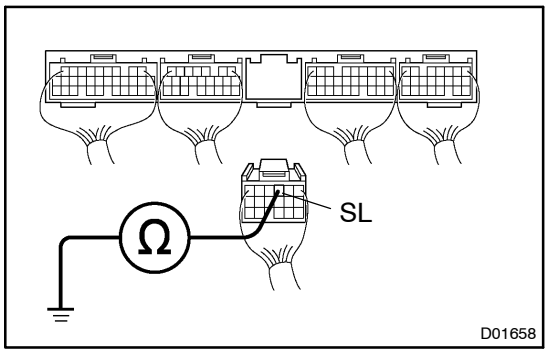
INSPECTION PROCEDURE

1	**Measure resistance between terminal SL of ECM and body ground.**

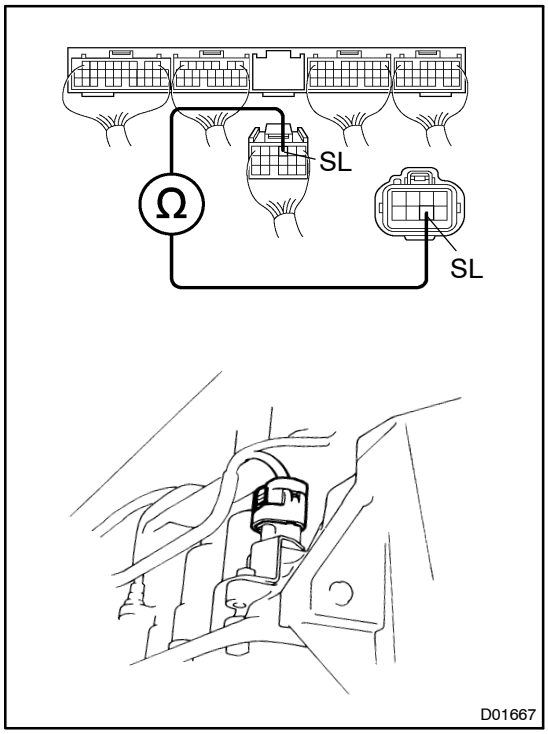


PREPARATION:
Disconnect the connector from ECM.
CHECK:
Measure resistance between terminal SL of ECM and body ground.
OK:
Resistance: 11 ~ 15 Ω

OK → **Check and replace the ECM (See page IN–34).**

NG

2	**Check harness and connector between ECM and automatic transmission solenoid connector.**



PREPARATION:
Disconnect the solenoid connector from the transmission.
CHECK:
Check the harness between terminal SL of ECM and terminal SL of transmission solenoid connector.
OK:
There is no open or short circuit.

NG → **Repair or replace the harness or connector.**

OK

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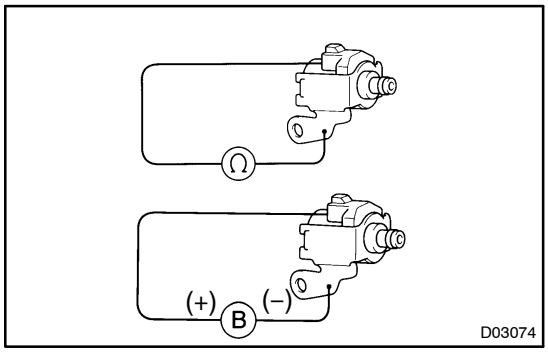
3	Check shift solenoid valve SL.



PREPARATION:

(a) Remove the oil pan.

(b) Remove the shift solenoid valve SL.

CHECK:

(a) Measure resistance between terminal SL of shift solenoid valve and solenoid body.

(b) Connect positive ⊕ lead to terminal of solenoid connector, negative ⊖ lead to solenoid body.

OK:

(a) Resistance: 11 ~ 15 Ω

(b) The shift solenoid valve SL makes operation noise.

NG → **Replace the shift solenoid valve SL.**

OK

Repair or replace the solenoid wire.

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DI3C1–01

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 signal to ECM. Then the ECM cancels operation of the lock–up clutch while braking is in progress.

DTC No.	DTC Detecting Condition	Trouble Area
P1520	The stop light switch does not turn off even once the vehicle is driven (2–trip detection logic)	• Short in stop light switch signal circuit • Stop light switch • ECM

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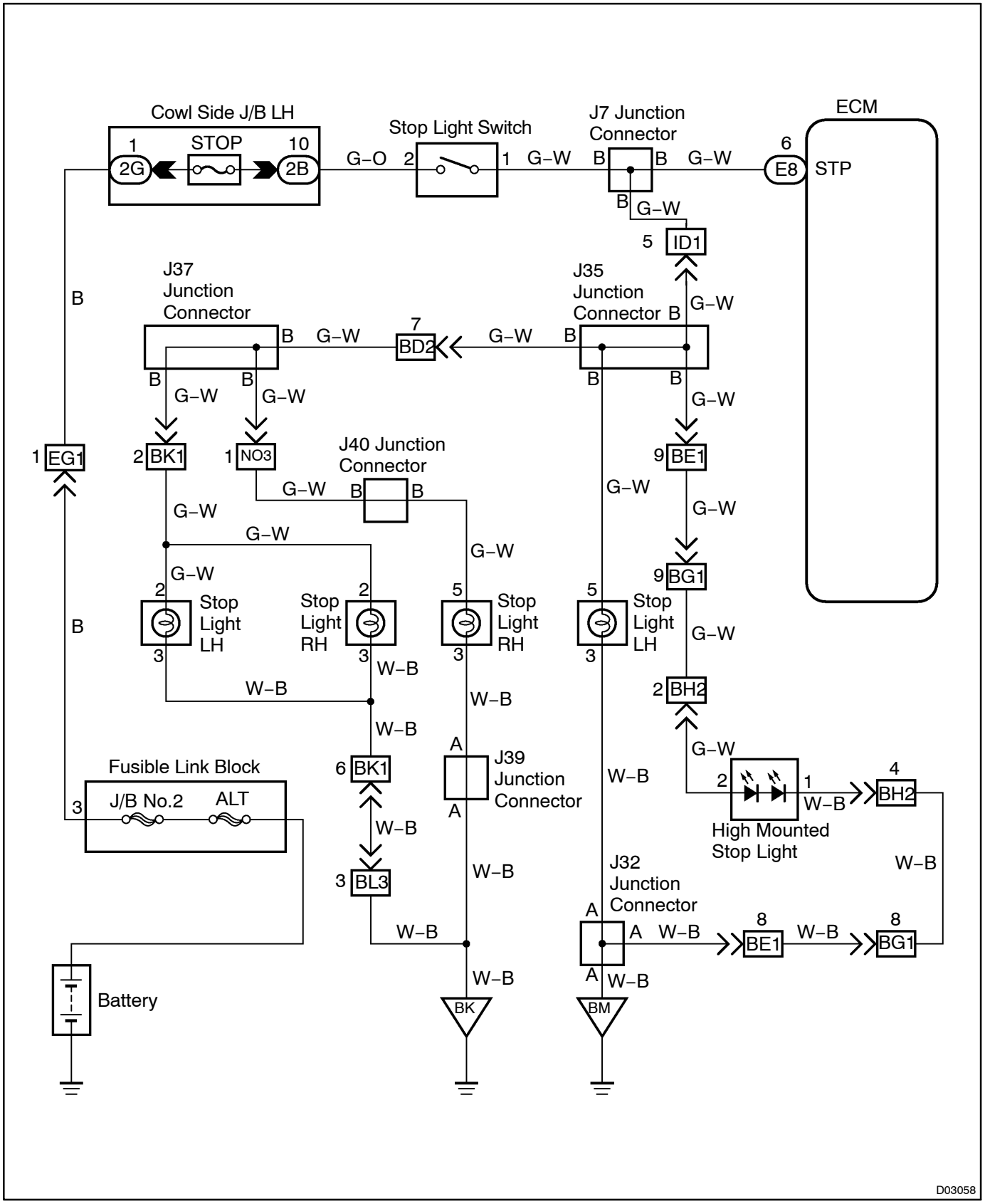
WIRING DIAGRAM



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INSPECTION PROCEDURE

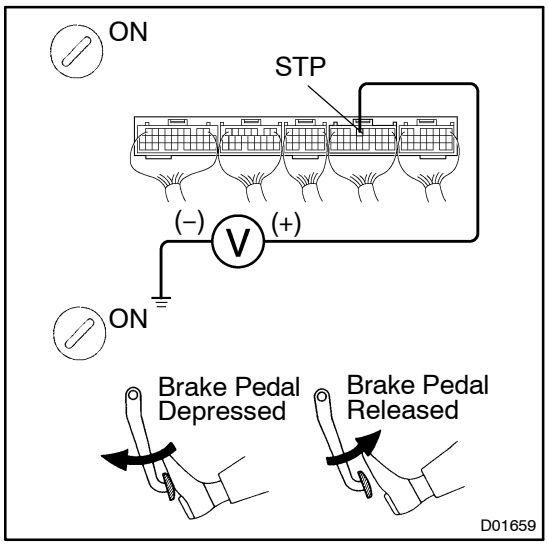
1	**Check operation of stop light.**

CHECK:
Check if the stop lights go on and off normally when the brake pedal is depressed and released.

NG → **Check and repair stop light circuit.**

OK

2	**Check STP signal.**



When using TOYOTA hand–held tester:
PREPARATION:
(a) Remove the fuse cover on the instrument panel.
(b) Connect the TOYOTA hand–held tester to the DLC3.
(c) Turn the ignition switch ON and TOYOTA hand–held tester main switch ON.
CHECK:
Read the STP signal on the TOYOTA hand–held tester.
OK:
Brake pedal is depressed: STP .... ON
Brake pedal is released: STP .... OFF
When not using TOYOTA hand–held tester:
PREPARATION:
Turn the ignition switch ON.
CHECK:
Check voltage between terminal STP of ECM and 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

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3	**Check harness and connector between ECM and stop light switch (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–34).

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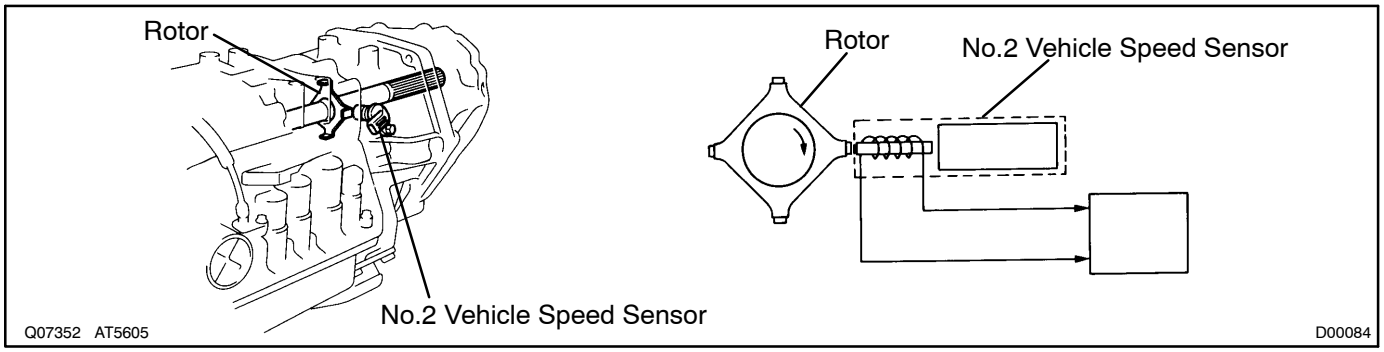
DI3C2–01

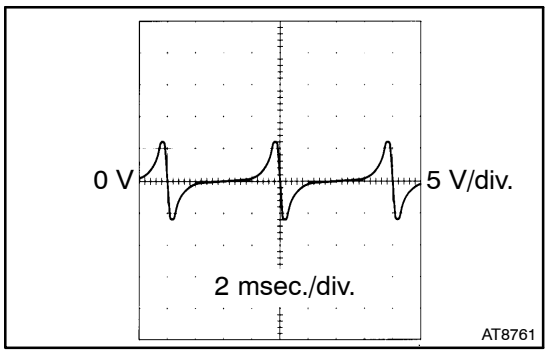
DTC	P1700	Speed Sensor No.2 Circuit Malfunction (No.2 Vehicle Speed Sensor)

CIRCUIT DESCRIPTION

The No.2 vehicle speed sensor detects the rotation speed of the transmission output shaft and sends signals to the ECM. The ECM determines the vehicle speed based on these signals.
An AC voltage is generated in the No.2 vehicle speed sensor coil as the rotor mounted on the output shaft rotates, and this voltage is sent to the ECM.
The gear shift point and lock–up timing are controlled by the ECM based on the signals from this vehicle speed sensor and the throttle position sensor signal.
If the No.2 vehicle speed sensor malfunctions, the ECM uses input signals from the No.1 vehicle speed sensor as a back–up signal.



DTC No.	DTC Detecting Condition	Trouble Area
P1700	All conditions below are detected 500 times or more continuously. (2–trip detection logic) (a) No signal from No.2 vehicle speed sensor is input to ECM while 4 pulses of No.1 vehicle speed sensor signal are sent. (b) Vehicle speed: 9 km/h (5.6 mph) or more for as least 4 seconds (c) Park/neutral position switch: OFF (Other than P or N) (d) Transfer position: Other than N position	• Open or short in No.2 vehicle speed sensor circuit • No.2 vehicle speed sensor • ECM



HINT:
Wavefrom between terminals $SP2^{+}$ and $SP2^{-}$ when vehicle speed is approx. 60 km/h (37 mph).

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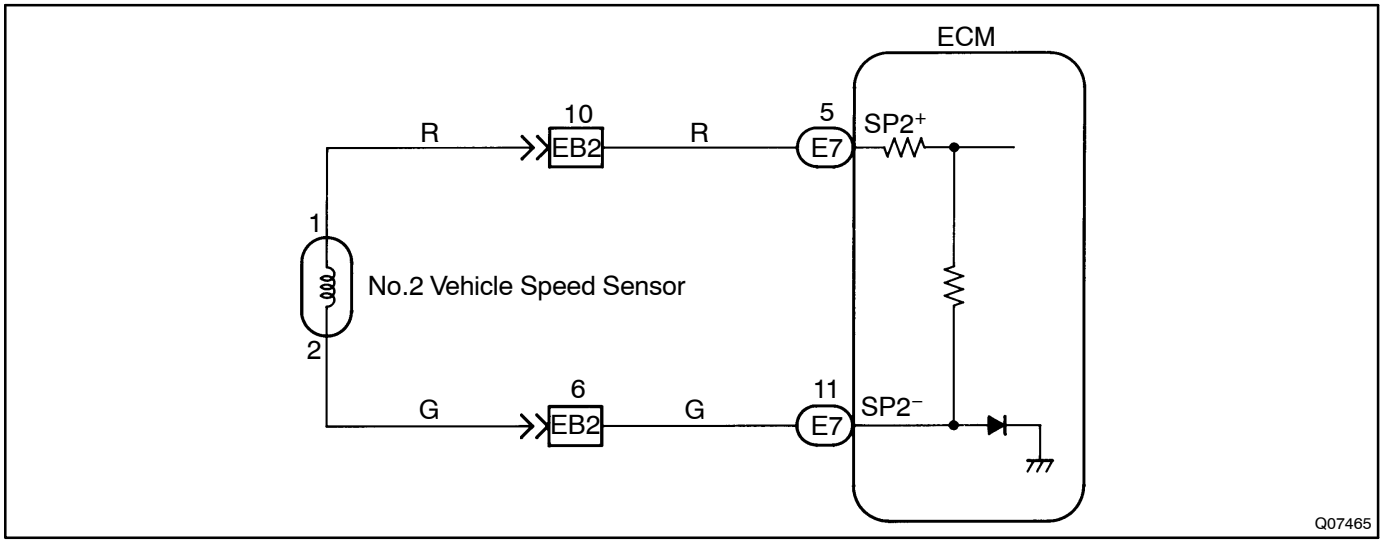
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check vehicle speed value or resistance between terminals SP2+ and SP2– of ECM.**

When using TOYOTA hand–held tester:

PREPARATION:

(a) Connect TOYOTA hand–held tester to the DLC3.

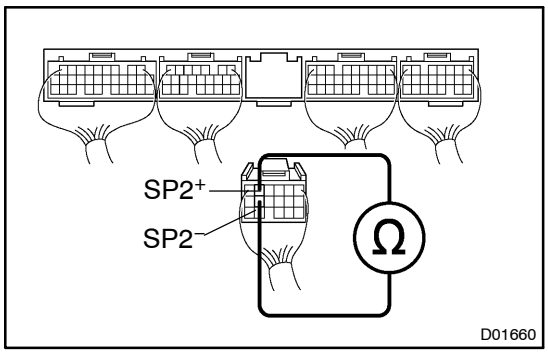
(b) Start the engine and TOYOTA hand–held tester main switch ON.

CHECK:

Drive the vehicle and read vehicle speed value.

OK:

Vehicle speed matches tester speed value.



When not using TOYOTA hand–held tester:

PREPARATION:

Disconnect the connector from ECM.

CHECK:

Check resistance between terminals SP2+ and SP2– of ECM.

OK:

Resistance: 560 ~ 680 Ω

OK	**Check and replace the ECM (See page IN–34).**

NG

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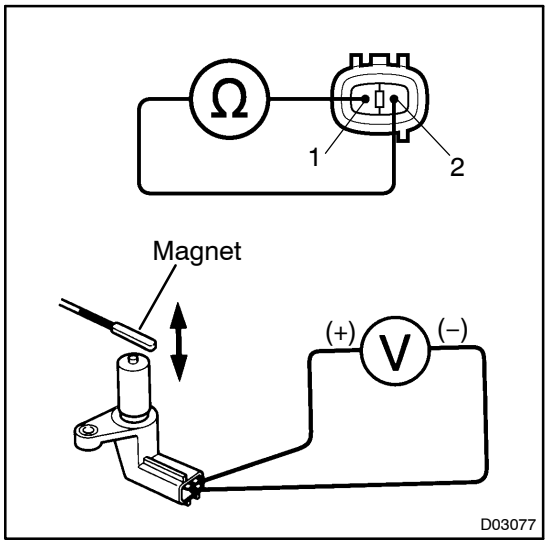
2	Check No.2 vehicle speed sensor.



PREPARATION:

Remove the No.2 vehicle speed sensor from the transmission.

CHECK:

(a) Measure resistance between terminals 1 and 2 of vehicle speed sensor.

(b) Check voltage between terminals 1 and 2 of vehicle speed sensor when a magnet is put close to the front end of the vehicle speed sensor then taken away quickly.

OK:

(a) Resistance: 560 ~ 680 Ω

(b) Voltage is generated intermittently.

HINT:

The voltage generated is extremely low.

NG → **Replace the No.2 vehicle speed sensor.**

OK

Check and repair the harness and connector between ECM and No.2 vehicle speed sensor. (See page IN–34)

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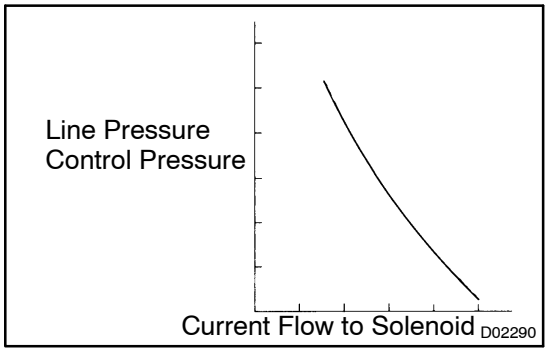
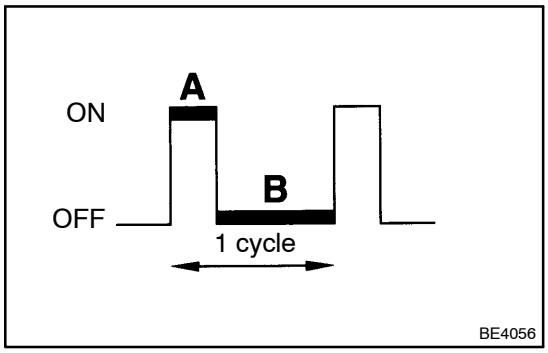
DTC	P1760	Linear Solenoid for Line Pressure Control Circuit Malfunction (SLT)



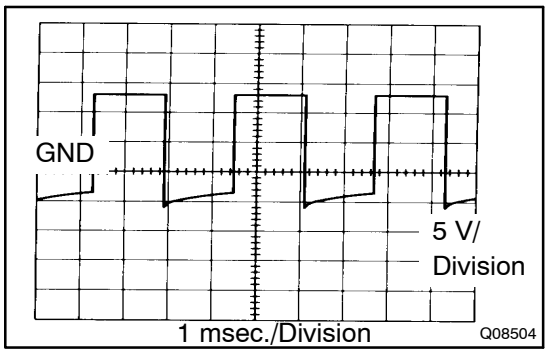


CIRCUIT DESCRIPTION

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 the detected engine power output.
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, and generating throttle pressure.
(*) Duty Ratio
The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non–continuity, then

$$\text{Duty Ratio} = \frac{A}{A + B} \times 100\ (\%)$$

DTC No.	DTC Detecting Condition	Trouble Area
P1760	(a) or (b) condition below is detected for 1 second or more. (a) SLT^- terminal: 0V (b) SLT^- terminal: 12V	• Open or short in shift solenoid valve SLT circuit • Shift solenoid valve SLT • ECM



HINT:
Waveform between terminals SLT^+ and SLT^-during engine idling.

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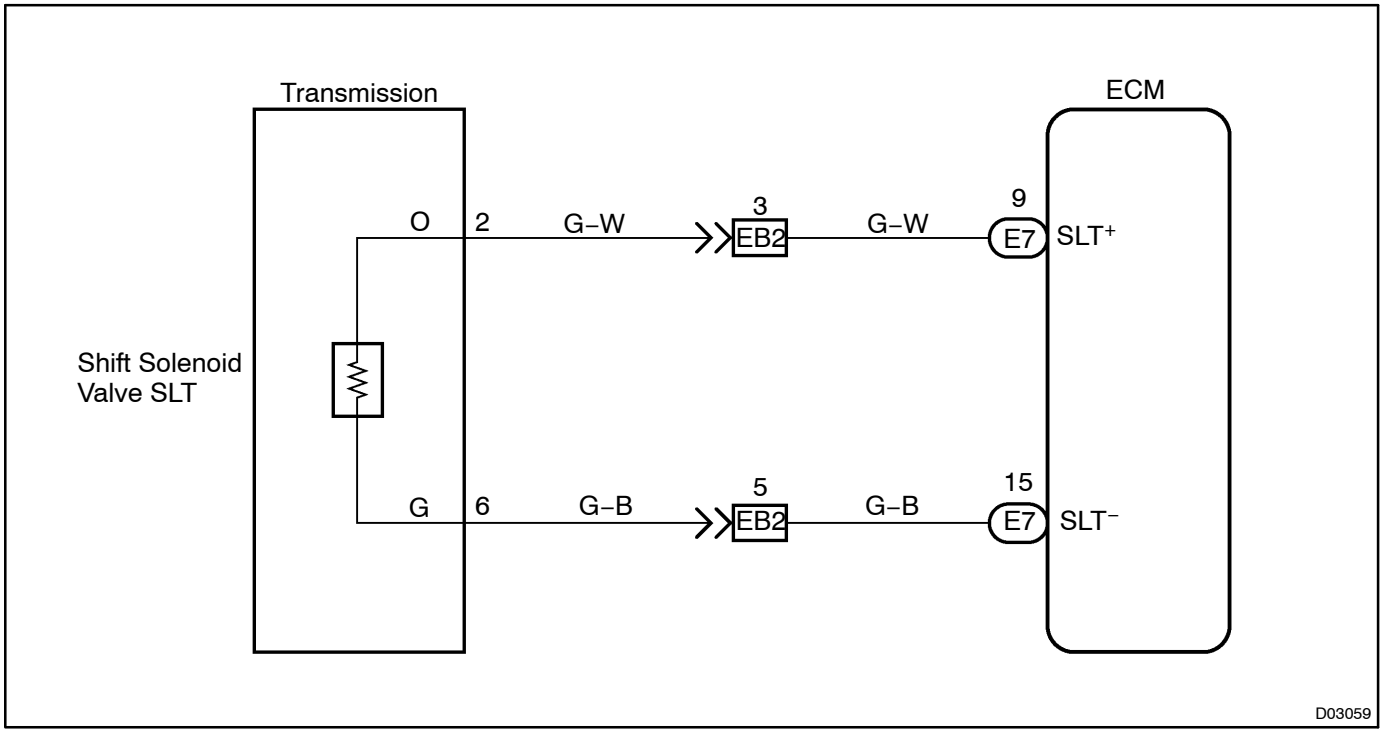
WIRING DIAGRAM



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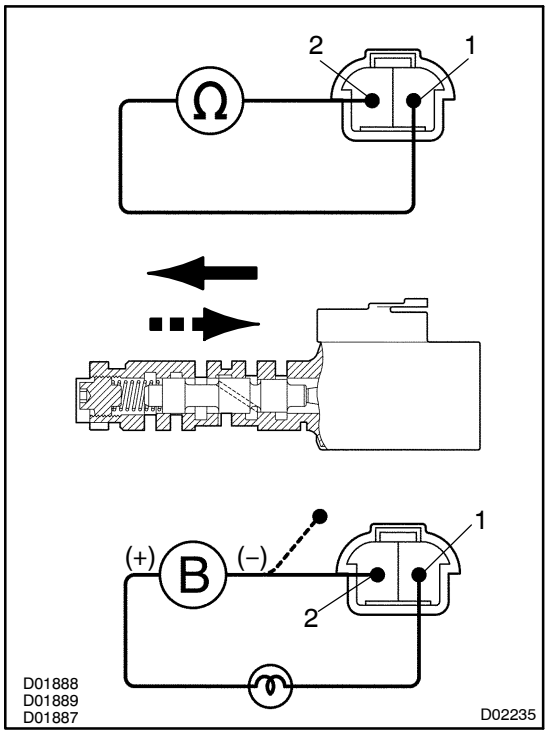
INSPECTION PROCEDURE

1	**Check shift solenoid valve SLT.**



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Disconnect the solenoid connector.

Check solenoid resistance:

CHECK:

Measure resistance between terminals 1 and 2 of solenoid connector.

OK:

Resistance: 5.0 ~ 5.6 Ω

Check solenoid operation:

CHECK:

Connect positive (+) lead with an 8 ~ 10W bulb to terminal 1 of solenoid connector and negative (–) lead to terminal 2, then check the movement of the valve.

OK:

When battery positive voltage is applied.	Valve moves in ◀ direction in illustration at left.
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–34).**

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace ECM (See page IN–34).

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DI3C3–01

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 (NSW, R, D, 2 and L) 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 D position.

DTC No.	DTC Detection Condition	Trouble Area
P1780	2 or more switches are ON simultaneously for N, 2 and L 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 seconds 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	

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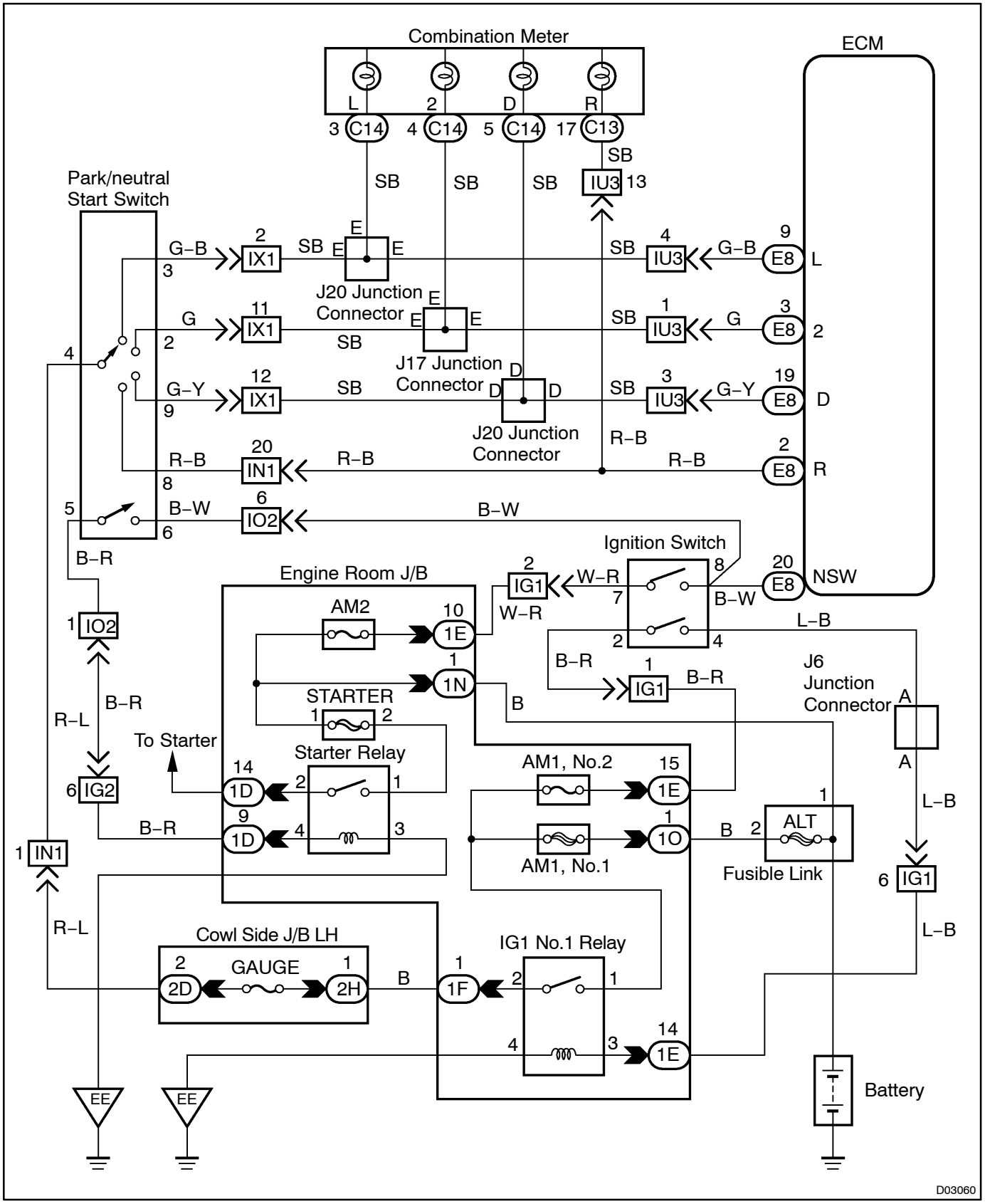
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Read PNP, REVERSE, 2ND and LOW signals.**

When using TOYOTA hand–held tester.

PREPARATION:

(a) Connect a TOYOTA hand–held tester to the DLC3.

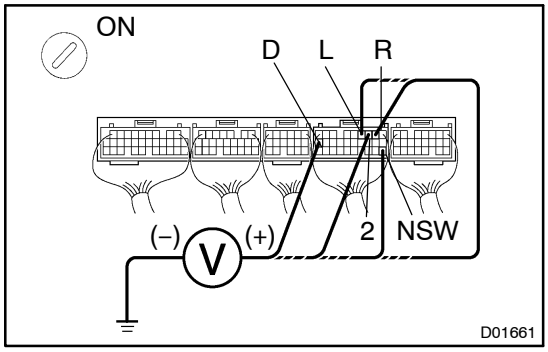
(b) Turn the ignition switch ON and TOYOTA hand–held tester main switch ON.

CHECK:

Shift lever into the P, R, D, N, 2 and L positions, and read the PNP, REVERSE, 2ND and LOW signals on the TOYOTA hand–held tester.

OK:

Shift position	Signal
2	2ND OFF → ON
L	LOW OFF → ON
R	REVERSE OFF → ON
P,N	PNP SW OFF → ON



When not using TOYOTA hand–held tester.

PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure voltage between terminals NSW, R, D, 2 and L of ECM and body ground when the shift lever is shifted to 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 the back up light.

OK → **Check and replace the ECM (See page IN–34).**

NG

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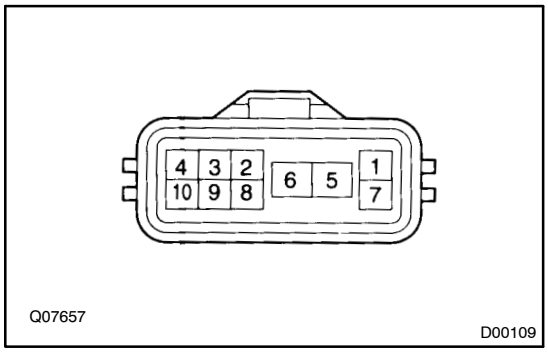
2	Check park/neutral position switch.



PREPARATION:

Remove the park/neutral position switch connector.

CHECK:

Check continuity between each terminal shown below when the shift lever is moved to each position.

OK:

Shift Position	Terminal No. to continuity	
P	4 – 7	5 – 6
R	4 – 8	–
N	4 – 10	5 – 6
D	4 – 9	–
2	2 – 4	–
L	3 – 4	–

NG → **Replace the park/neutral position switch.**

OK →

Repair or replace harness and connector between battery and park/neutral position switch, park/neutral position switch and ECM (See page IN–34).

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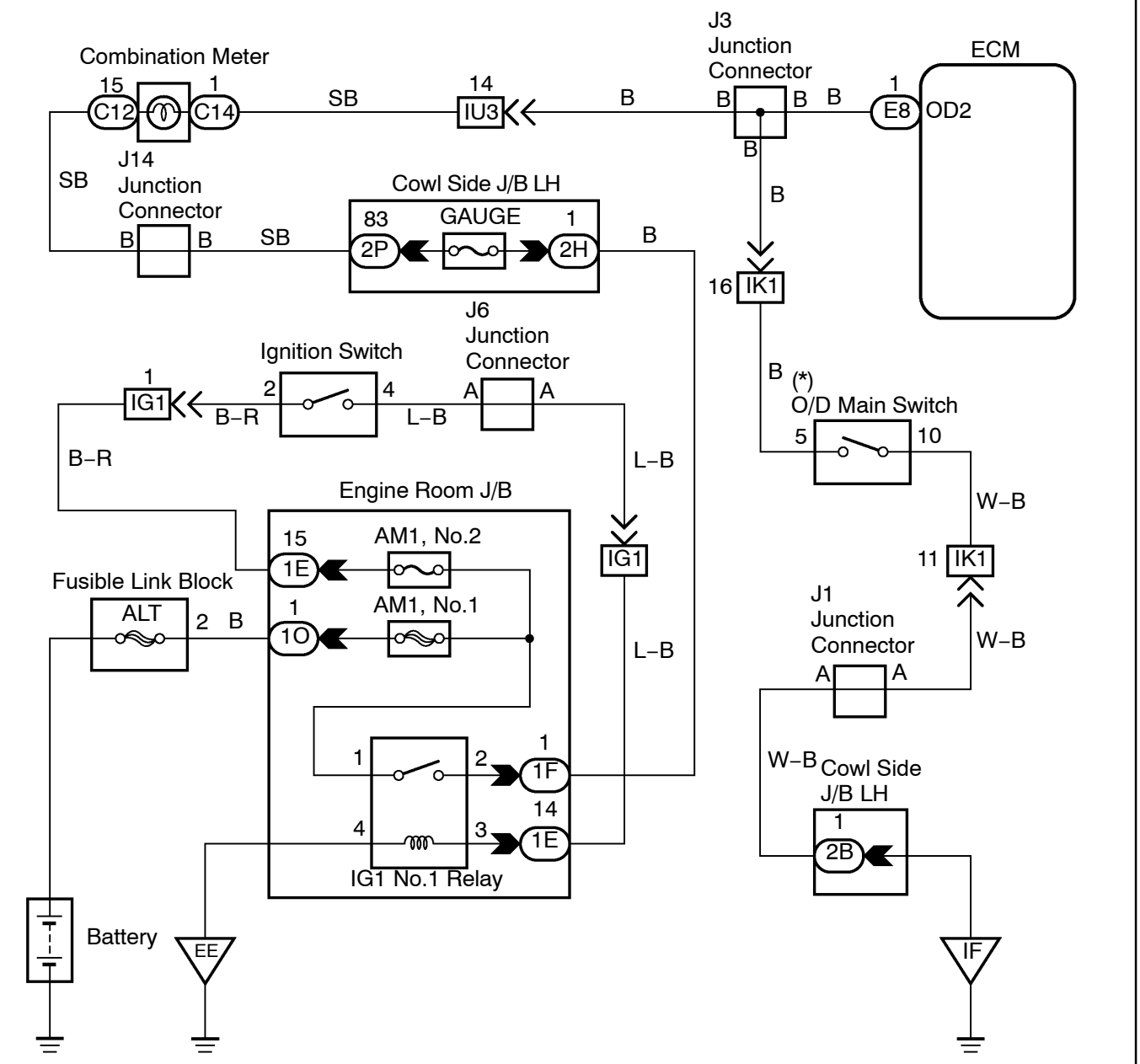
DI3C4–01

O/D Main Switch & O/D OFF Indicator Light Circuit

CIRCUIT DESCRIPTION

The O/D main switch contacts go open when the switch is pushed in and go closed when it is pushed out. In O/D main switch at OFF position, the O/D OFF indicator light lights up, and the ECM prohibits shifting overdrive.

WIRING DIAGRAM



(*) O/D Main Switch
Contacts go off with switch pushed in.
Contacts go on with switch once again.

D03061

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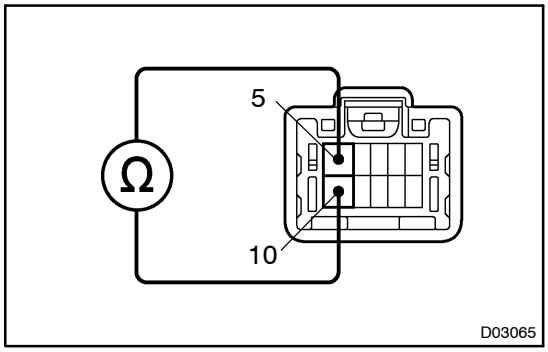
INSPECTION PROCEDURE

O/D OFF indicator light does not light up

1	**Check O/D main switch.**



PREPARATION:
Disconnect the O/D main switch connector.
CHECK:
Check continuity between terminals 5 and 10 of O/D main switch connector.
OK:

O/D main switch	Specified condition
ON	No continuity
OFF	Continuity

NG → **Replace the O/D main switch.**

OK ↓

2	**Check and replace the combination meter (See page BE–50).**

NG → **Replace the combination meter.**

OK ↓

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3	Check OVRDRIVE CUT SW2 signal.

When using TOYOTA hand–held tester

PREPARATION:

(a) Connect a TOYOTA hand–held tester to the DLC3.

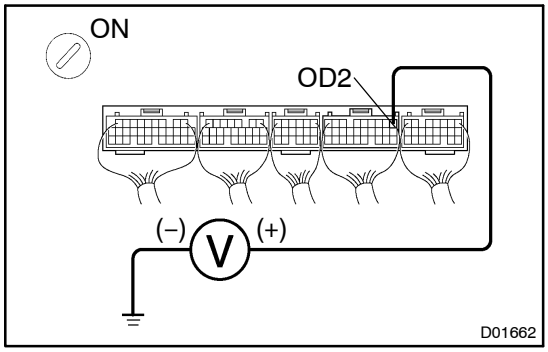
(b) Turn the ignition switch ON and TOYOTA hand–held tester main switch ON.

CHECK:

Read the OVRDRIVE CUT SW2 signal on the TOYOTA hand–held tester.

OK:

O/D main switch condition	OVRDRIVE CUT SW2 signal
O/D ON (Pushed in)	OFF
O/D OFF (Pushed once again)	ON



When not using TOYOTA hand–held tester

PREPARATION:

Turn the ignition switch ON.

CHECK:

Check voltage between terminal OD2 of ECM and body ground.

OK:

O/D main switch condition	Voltage
O/D ON (Pushed in)	9 ~ 14 V
O/D (Pushed once again)	Below 3 V

OK → **Check and replace the ECM (See page IN–34).**

NG

4	Check harness and connector between O/D OFF indicator light and O/D main switch, O/D OFF indicator light and ECM (See page IN–34).

NG → **Repair or replace the harness or connector.**

OK

Check and replace the combination meter (See page BE–52).

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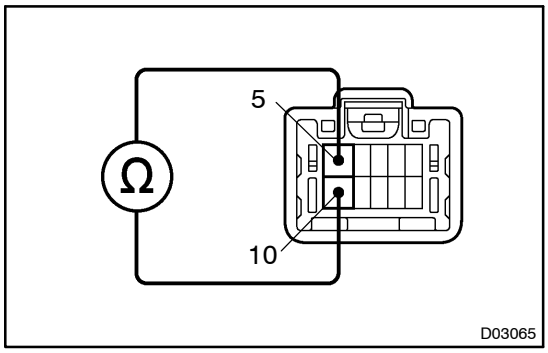
O/D OFF indicator light remains ON

1	**Check O/D main switch.**



PREPARATION:
Disconnect the O/D main switch connector.
CHECK:
Check continuity between terminals 5 and 10 of O/D main switch connector.
OK:

O/D main switch	Specified condition
ON	No continuity
OFF	Continuity

NG → **Replace the O/D main switch.**

OK ↓

2	**Check harness and connector between O/D OFF indicator light and O/D main switch, O/D OFF indicator light and ECM (See page IN–34).**

NG → **Repair or replace the harness or connector.**

OK ↓

Check and replace the ECM (See page IN–34).

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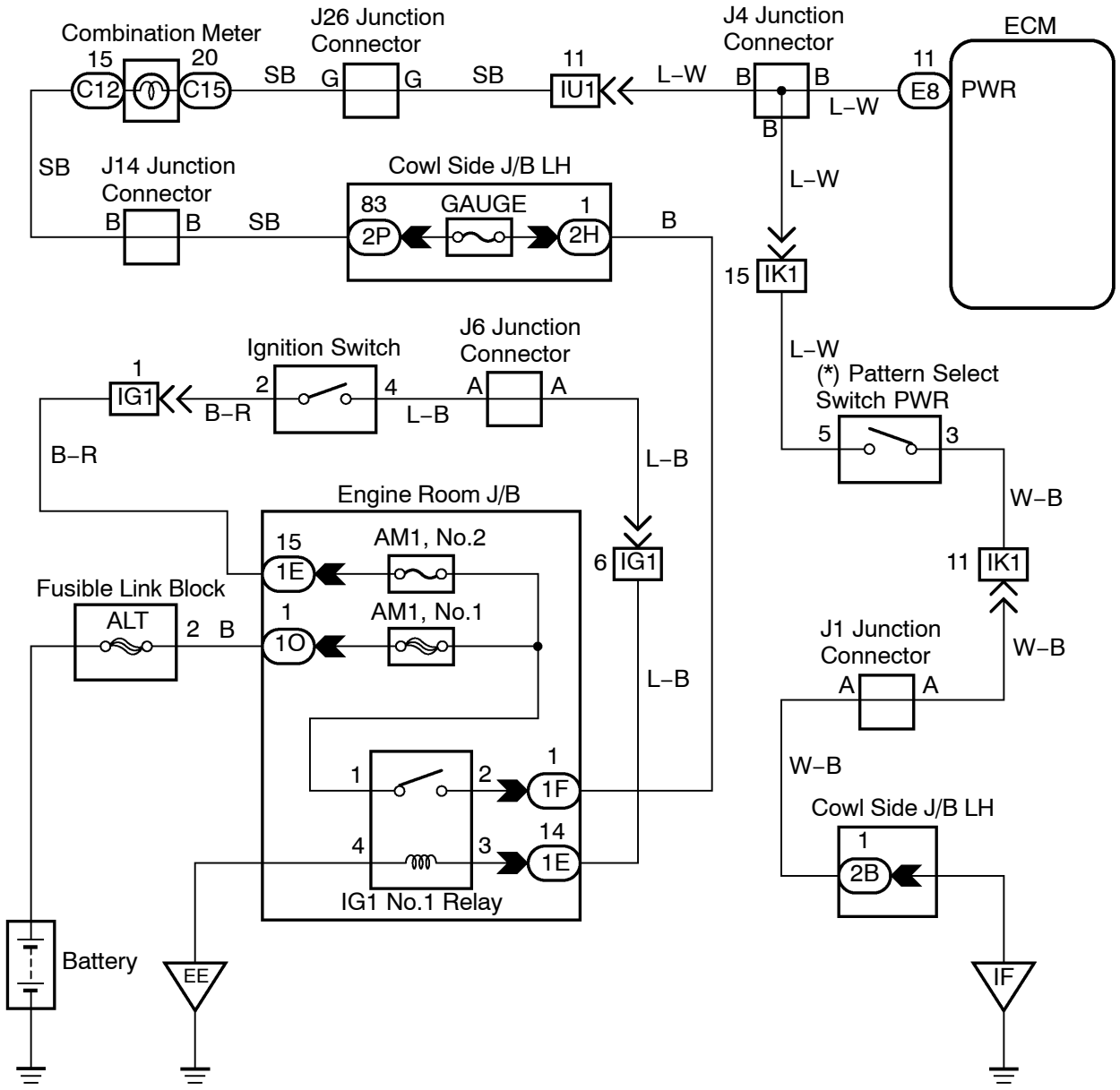
DI3C5–01

Pattern Select Switch Circuit (PWR Mode Switch)

CIRCUIT DESCRIPTION

The ECM memory contains the shift programs for the NORMAL and POWER patterns, 2 position, L position and the lock–up patterns. Following the programs corresponding to the signals from the pattern select switch, the park/neutral position and other various sensors, the ECM switches the solenoid valves ON and OFF, and controls the transmission gear change and the lock–up clutch operation.

WIRING DIAGRAM



(*) Pattern Select Switch (PWR Mode Switch)
When the Pwr mode switch is pushed in, the switch contact is made and the PWR mode is selected.
To cancel the PWR mode, push the PWR mode switch once again.

D03062

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INSPECTION PROCEDURE

1	**Check PATTERN SEL SW signal.**

When using TOYOTA hand–held tester:

PREPARATION:

(a) Connect a TOYOTA hand–held tester to the DLC3.

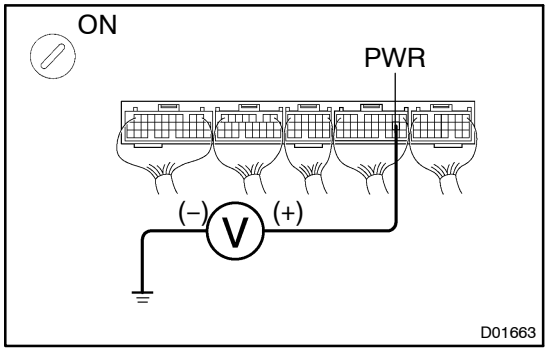
(b) Turn the ignition switch ON and TOYOTA hand–held tester main switch ON.

CHECK:

Read the PATTERN SEL SW signal on the TOYOTA hand–held tester.

OK:

Pattern select switch	PATTERN SEL SW signal
PWR	ON
NORM	OFF



When not using TOYOTA hand–held tester:

PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure voltage between terminal PWR of ECM and body ground when the pattern select switch is set to the PWR (POWER) position and NORM (NORMAL) position.

OK:

Pattern select switch	Voltage
PWR	Below 1.5 V
NORM	10 ~ 14 V

HINT:

The ECM uses the normal pattern signal if the PWR signal is not input.

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–166).**

NG

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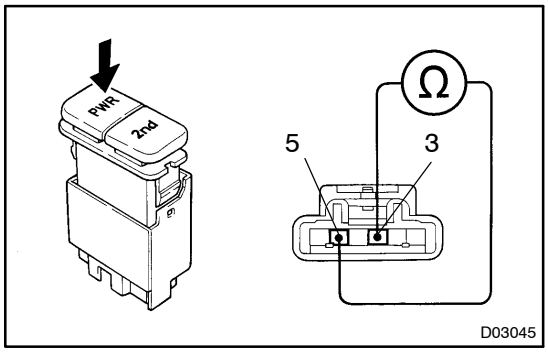
2	Check pattern select switch.



PREPARATION:
Disconnect the pattern select switch connector.
CHECK:
Check continuity between terminals 3 and 5 of pattern select switch connector when the select switch is set to PWR and NORM positions.
OK:

Pattern select switch	Specified condition
PWR	Continuity
NORM	No continuity

NG → **Replace the pattern select switch.**

OK

3	Check harness and connector between battery and pattern select switch, pattern select switch and ECM (See page IN–34).

NG → **Repair or replace the harness or connector.**

OK

Check and replace the ECM (See page IN–34).

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DI3C6–01

Pattern Select Switch Circuit (2nd Start Switch) & 2nd Start Switch Indicator Light Circuit

CIRCUIT DESCRIPTION

When 2nd start mode is selected with the pattern select switch, the ECM controls the solenoid valves and the transmission starts from 2nd gear.
In D position, the transmission automatically shifts up through 3rd to O/D as usual.
In 2nd position, the transmission is held in 2nd gear.

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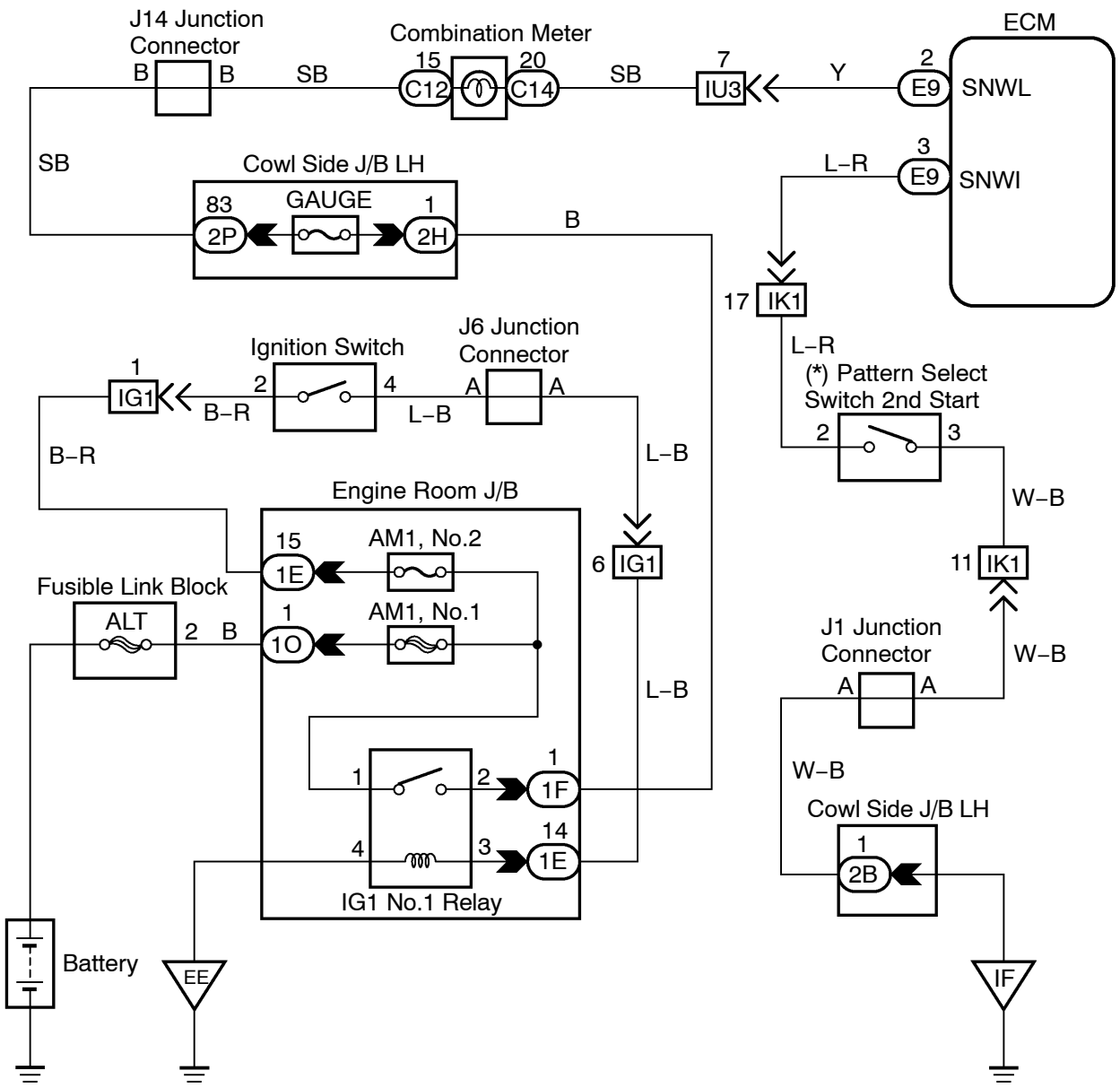
WIRING DIAGRAM



(*) Pattern Select Switch (2nd Start Switch)
When the 2nd start switch is pushed, the switch contact is made and the 2nd mode is selected.
To cancel the 2nd start, push the 2nd start switch once again. The 2nd start is automatically cancelled out when the ignition switch is turned OFF.

D03063

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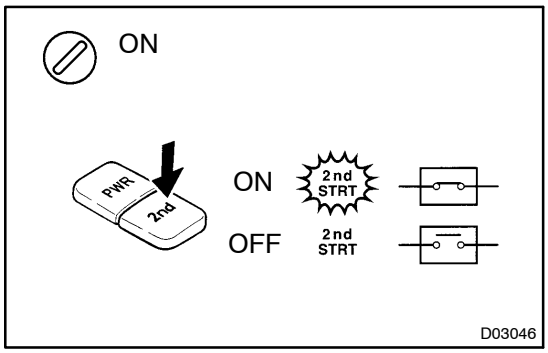
INSPECTION PROCEDURE

1	Check operation of 2nd start switch.



PREPARATION:
Turn the ignition switch ON.
CHECK:
(a) Check "2nd STRT" indicator light when 2nd start switch is pushed in to ON.
(b) Check "2nd STRT" indicator light when 2nd start switch is pushed again, or PWR mode switch is pushed into ON.
OK:
(a)"2nd STRT" indicator light lights up.
(b)"2nd STRT" indicator light goes off. When PWR mode switch is pushed in to ON, "2nd STRT" indicator light goes off, and "PWR" indicator light lights up.

OK	Proceed to next circuit inspection shown on matrix chart (See page DI–166).

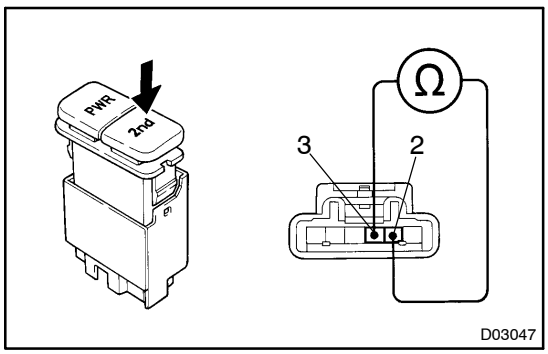
NG

2	Check 2nd start indicator bulb.

NG	Replace the 2nd start indicator bulb.

OK

3	Check 2nd start switch.



PREPARATION:
Disconnect the pattern select switch connector.
CHECK:
Check continuity between terminals 2 and 3 of pattern select switch connector when pattern select switch is set to 2nd start switch ON and OFF.
OK:

2nd start switch	Specified condition
Press continuously "2nd" switch	Continuity
Release "2nd" switch	No continuity

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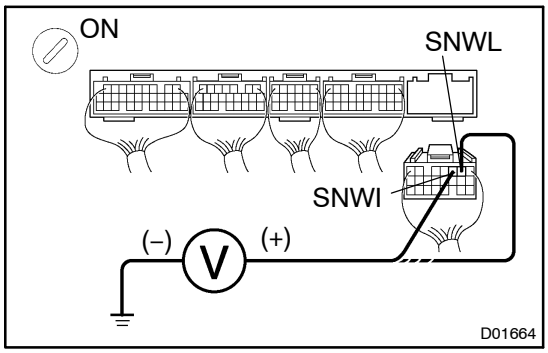
NG → **Replace the 2nd start indicator bulb.**

OK

4	**Check voltage between terminal SNWL and SNWI of ECM and body ground.**



PREPARATION:

(a) Turn the ignition switch ON.

(b) Disconnect the connector of ECM.

CHECK:

Check voltage between terminal SNWI of ECM and body ground when the select switch is set to 2nd start switch ON and OFF.

OK:

2nd start switch	Voltage
ON	Below 1.5 V
OFF	9 ~ 14 V

CHECK:

Check voltage between terminal SNWL of ECM and body ground.

OK:

Voltage: 7.5 ~ 14 V

OK → **Check and replace the ECM (See page IN–34).**

NG

Check and replace harness and connector between battery and patten select switch, pattern select switch and ECM, battery and 2nd start indicator light , 2nd start indicator light and ECM (See page IN–34).

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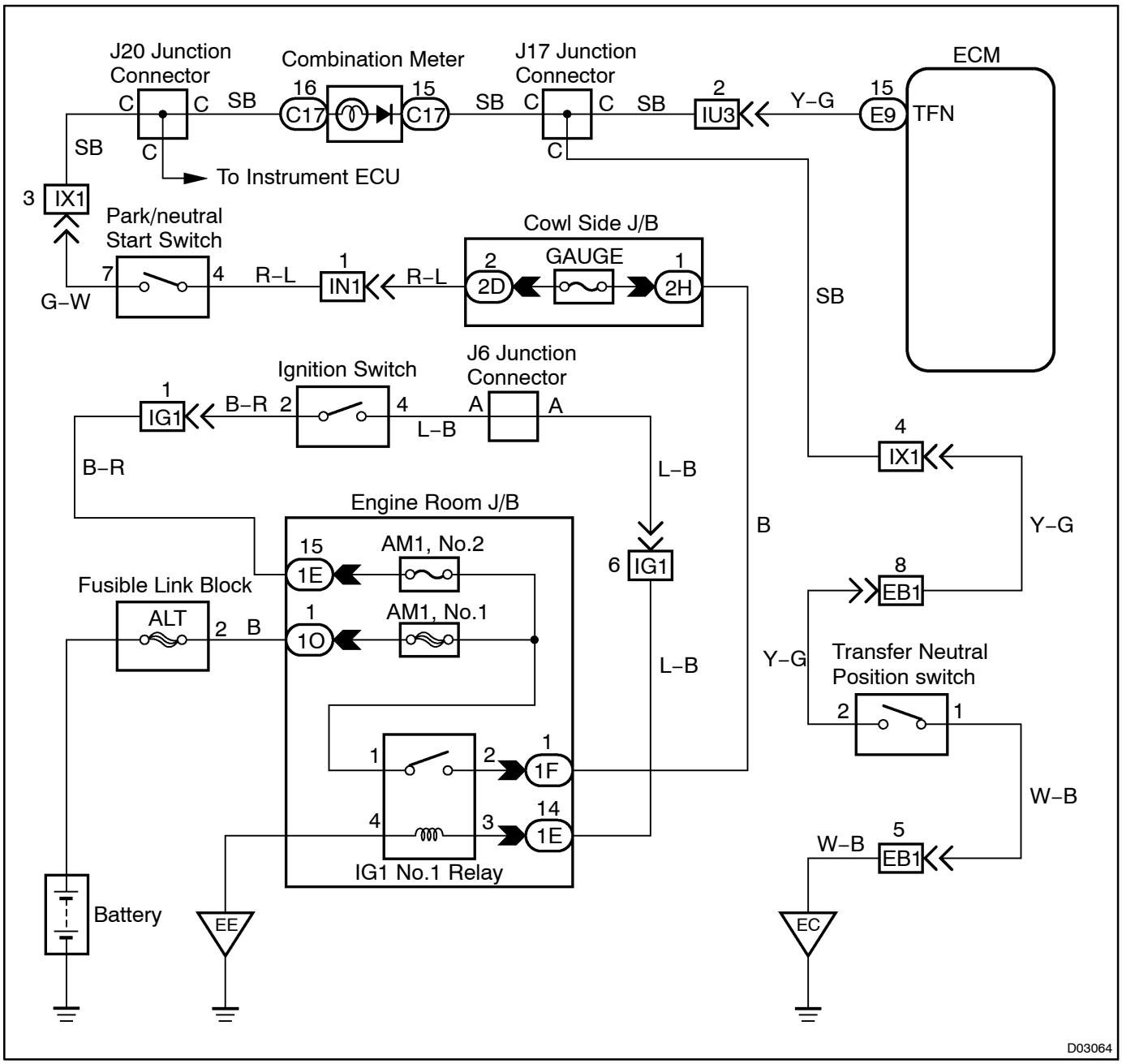
DI3C7–01

A/T. P. (Automatic Transmission Parking) Indicator Circuit

CIRCUIT DESCRIPTION

The propeller shaft and wheels are free even when the transmission shift lever is set to P as long as the transfer shift lever is in Neutral position. The A/T.P. indicator light lights up to warn the driver that the propeller shaft and wheels are not locked.
If the A/T.P. indicator light goes on, the transfer shift lever should be shifted to the positions other than N position.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check park/neutral position switch (See page DI–200).

NG → Replace the park/neutral position switch.

OK

2	Check transfer neutral position switch (See page TR–48).

OK → Replace the transfer neutral position switch.

NG

3	Check combination meter (See page BE–52).

NG → Repair or replace the combination meter.

OK

Check and replace the harness and connector (See page IN–34).

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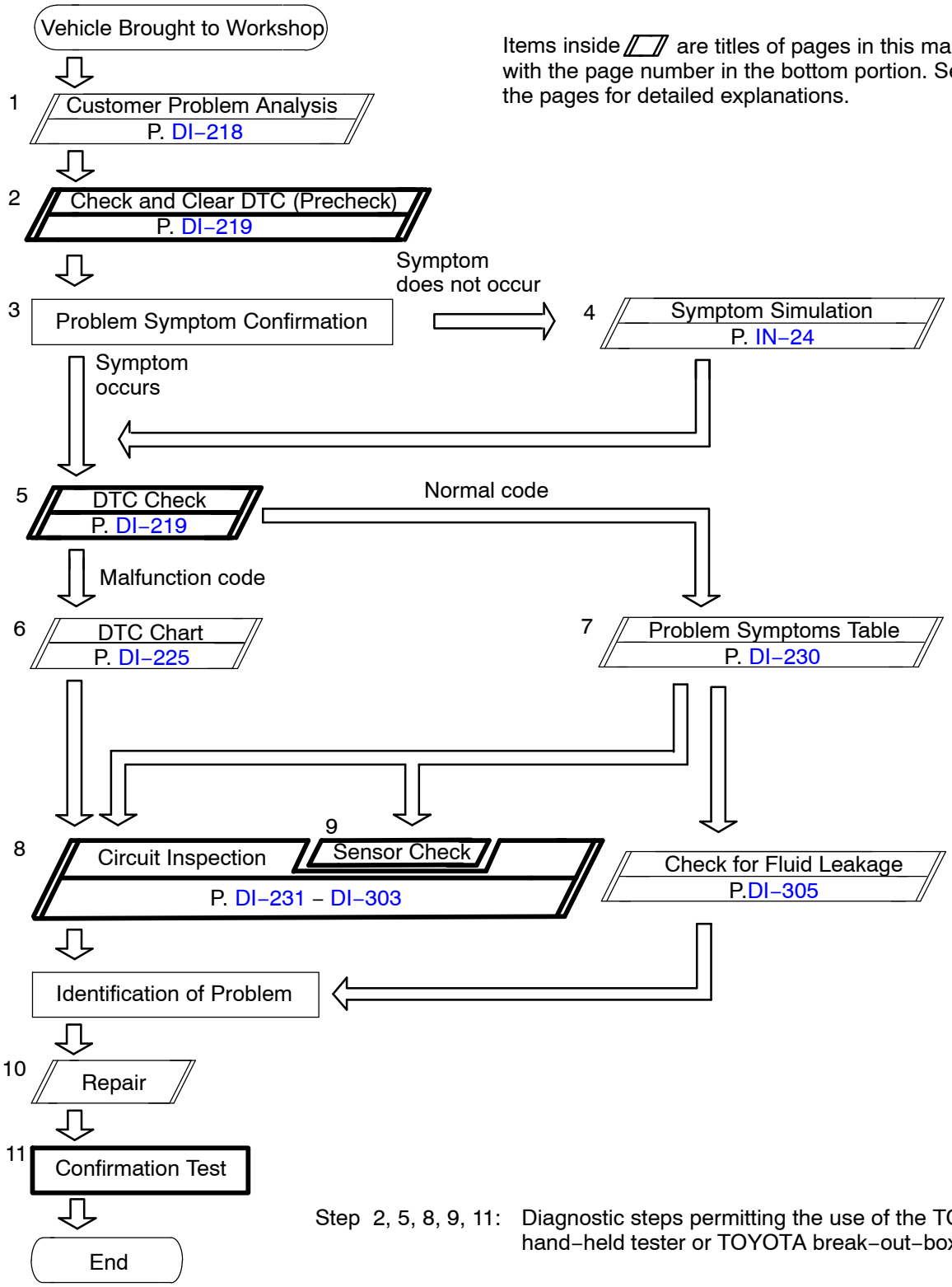
ABS & HYDRAULIC BRAKE BOOSTER POWER SUPPLY SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI284–05

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 TOYOTA hand–held tester or TOYOTA break–out–box.

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DI28S–04

CUSTOMER PROBLEM ANALYSIS CHECK

ABS & Hydraulic Brake Booster Power Supply System

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	☐ 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
	BRAKE Wrning Light Abnormal (PKB released)	☐ Remains ON ☐ Does not Light Up
	BRAKE Wrning Buzzer Abnormal	☐ Sounds ☐ Does not sounds

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

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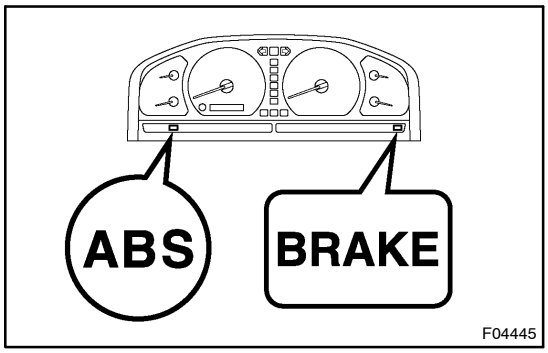
DI28T–03



PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) Check the warning lights and buzzer.

(1) Release parking brake pedal.

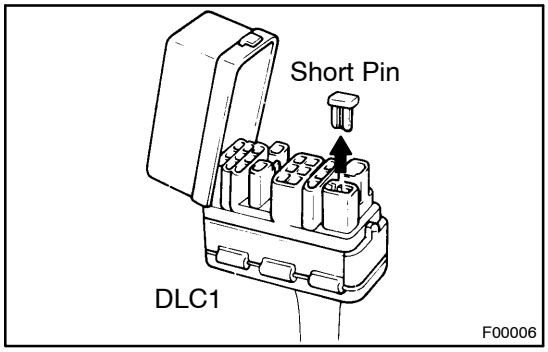
(2) When the ignition switch is turned ON, check that the ABS warning lights go on for 3 seconds.

(3) Check the BRAKE warning light lights up when the ignition switch is turned ON and the light goes off when the engine starts.

(4) When 120 seconds have elapsed after the ignition switch was turned ON, depressing and releasing the brake pedal continuously with full stroke 10 – 20 times within 10 secs. Warning light lights up and buzzer sounds.

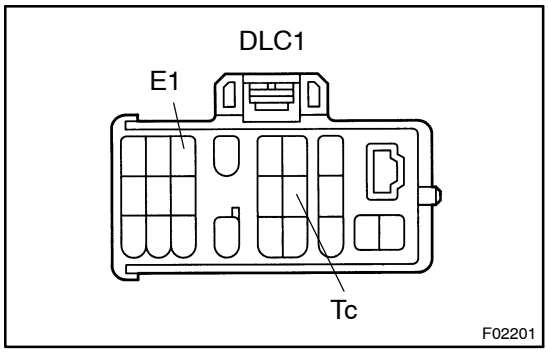
HINT:

If the indicator check result is not normal, proceed to trouble-shooting for the ABS warning light circuit (See page DI–292).



(b) In case of not using TOYOTA hand–held tester :
Check the DTC.

(1) Disconnect the short pin from DLC1.



(2) Using SST, connect terminals Tc and E_1 of DLC1.
SST 09843 – 18020

(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–301 or DI–292).

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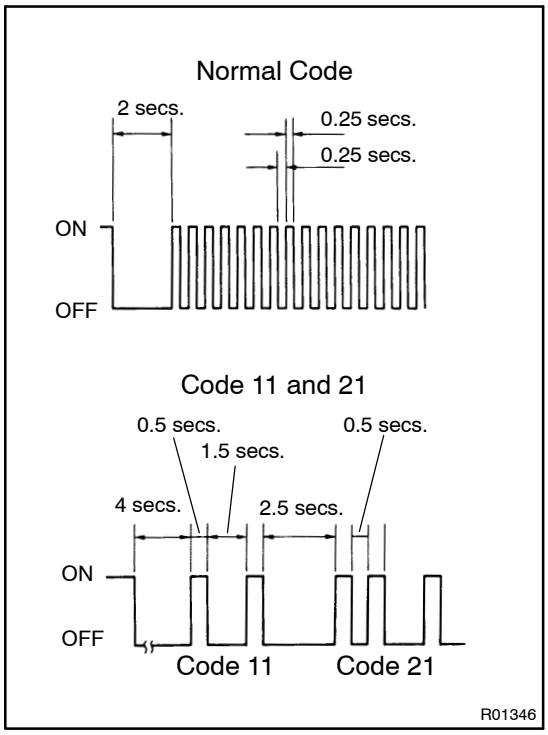
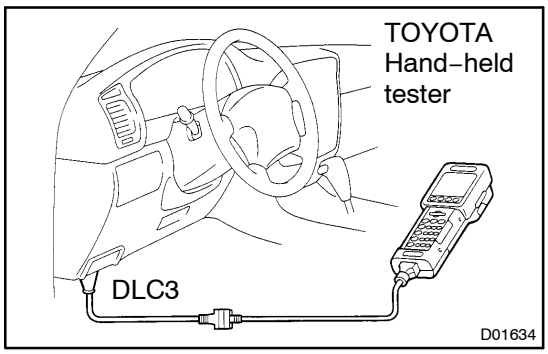


- As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.

(5) Codes are explained in the code table on page DI–225.

(6) After completing the check, disconnect terminals Tc and E_1, and turn off the display.

If 2 or more malfunctions are indicated at the same time the lowest numbered DTC will be displayed 1st.

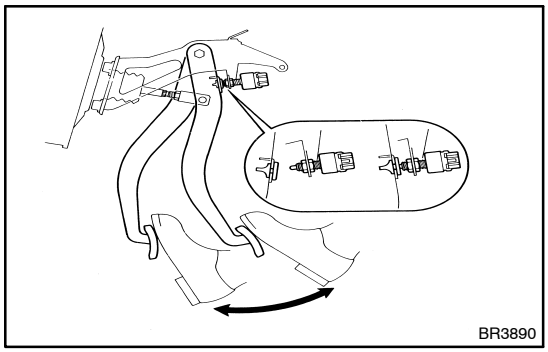


(c) In case of using TOYOTA hand–held tester :
Check the DTC.

(1) Hook up the TOYOTA hand–held tester to the DLC3.

(2) Read the DTC by following the prompts on the tester screen.

HINT:
Please refer to the TOYOTA hand–held tester operator's manual for further details.



(d) In case of not using TOYOTA hand–held tester :
Clear the DTC.

(1) Using SST, connect terminals Tc and E_1 of DLC1 and remove the short pin from DLC1.

SST 09843 – 18020

(2) Turn the ignition switch ON.

(3) Clear the DTC stored in ECU by depressing the brake pedal 8 or more times within 5 seconds.

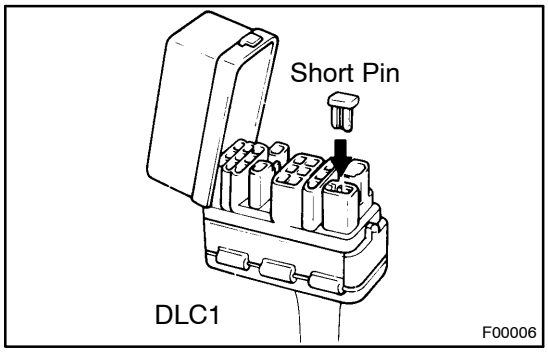
(4) Check that the warning light shows the normal code.

(5) Remove the SST from the terminals of DLC1.

SST 09843 – 18020

(6) Connect the short pin to DLC1.

HINT:
Disconnecting the battery cable during repairs will not erase the DTC in the ECU.



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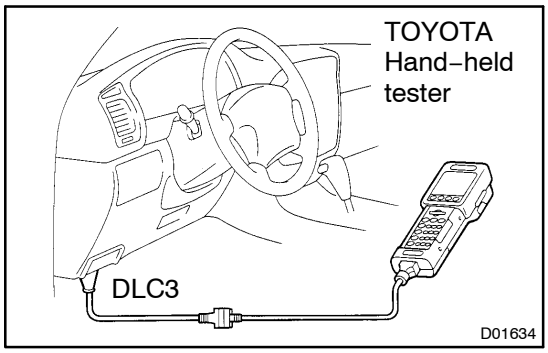
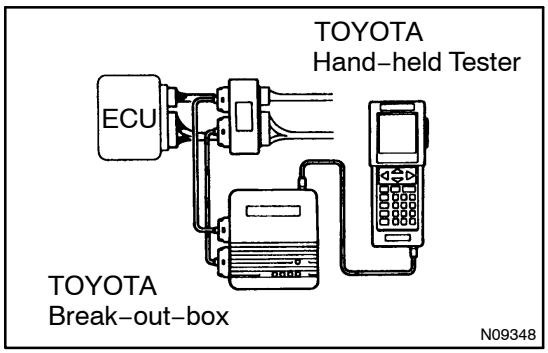
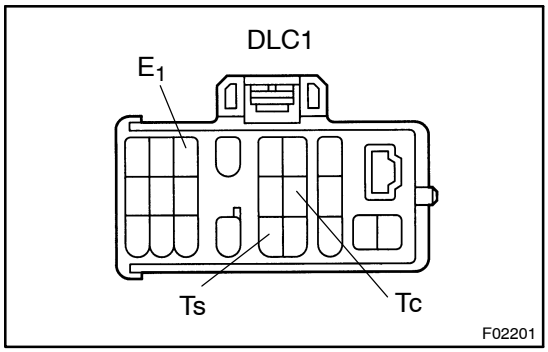


(e) In case of using TOYOTA hand–held tester :
Clear the DTC.
(1) Hook up the TOYOTA hand–held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Operate the TOYOTA hand–held tester to erase the codes.
(See TOYOTA hand–held tester operator's manual.)



(f) (Reference):
Using TOYOTA break–out–box and TOYOTA hand–held tester, measure the ECU terminal values.
(1) Turn the ignition switch OFF.
(2) Hook up the TOYOTA break–out–box and TOYOTA hand–held tester to the vehicle.
(3) Turn the ignition switch ON.
(4) Read the ECU input/output values by following the prompts on the tester screen.

HINT:
- TOYOTA hand–held tester has a "Snapshot" function. This records the measured values and is effective in the diagnosis of intermittent problems.
- Please refer to the TOYOTA hand–held tester/TOYOTA break–out–box operator's manual for further details.



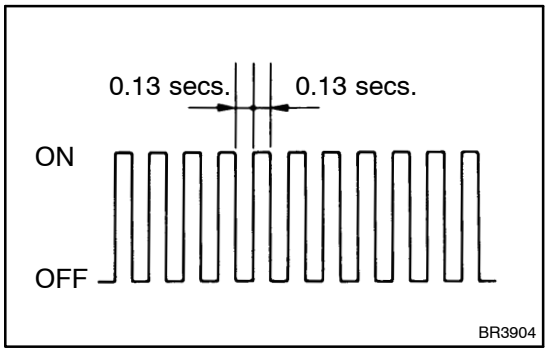
2. SENSOR SIGNAL CHECK (TEST MODE)

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 TOYOTA hand–held tester:
Check the sensor signal.
(1) Turn the ignition switch OFF.
(2) Using SST, connect terminals Ts and E_1 of DLC1.
SST 09843 – 18020
(3) Start the engine.
(4) Check that the ABS warning light blinks.

HINT:
If the ABS warning light does not blink, inspect the ABS warning light circuit and Ts circuit (See page DI–292, DI–303).

(5) Keep the vehicle in the stationary condition on the flat place for 6 sec. or more.
(6) Shift the transfer lever in L4 position and turn the Center diff. lock switch ON.



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(7) Drive vehicle straightforward.
When driving the vehicle with 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.

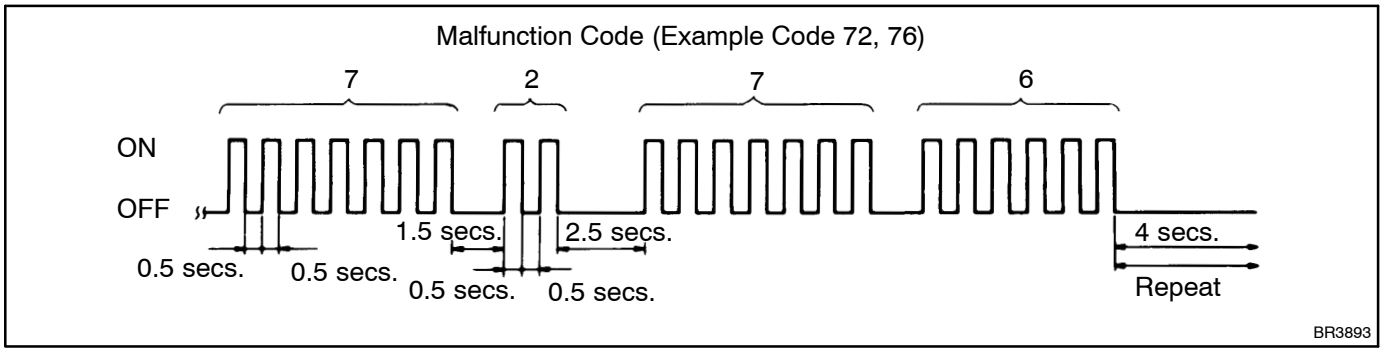
(8) Stop the vehicle.
(9) Check ABS warning light goes off when the rear diff. lock indicator light lights up or flashes.

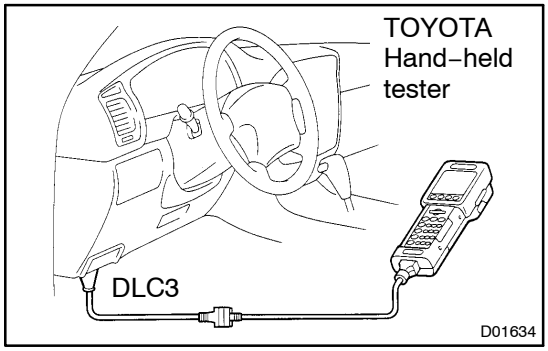
HINT:
While the rear diff. is being locked, ECU records DTC 48.

(10) Using SST, connect terminals Tc and E_1 of DLC1.
SST 09843 – 18020
(11) Read the number of blinks of the ABS warning light.

HINT:
- See the list of DTC on the next page.
- If every sensor is normal, a normal code is output (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated).
- If 2 or more malfunctions are indicated at the same time, the lowest numbered code will be displayed 1st.

(12) After doing the check, disconnect terminals Ts and E_1, Tc and E_1 of DLC1, and turn the ignition switch OFF.





(b) In case of using TOYOTA hand–held tester :
Check the sensor signal.
(1) Hook up the TOYOTA hand–held tester to the DLC3.
(2) Do step (3) to (9) on the previous and this page.
(3) Read the DTC by following the prompts on the tester screen.

HINT:
Please refer to the TOYOTA hand–held tester operator's manual for further details.

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DTC of the 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
C1282 / 82	Center differential lock position switch malfunction	• Center differential lock position switch
C1282 / 83	L4 position switch malfunction	• L4 position switch

3. 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.

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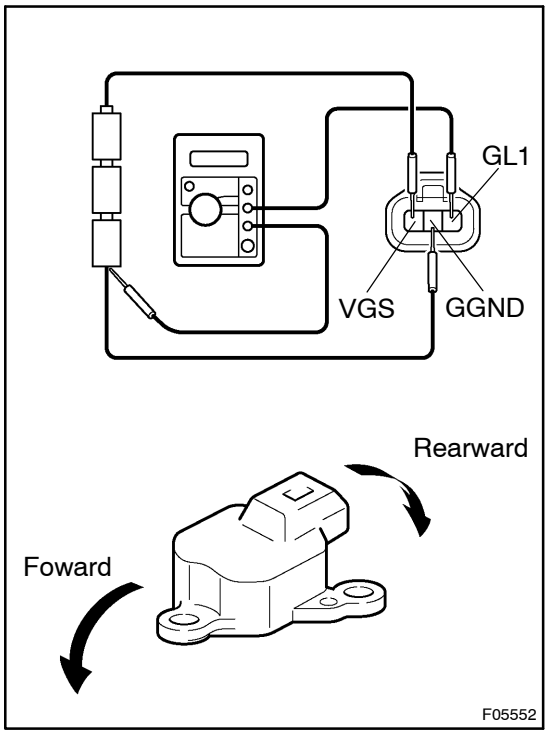

4. DECELERATION SENSOR CHECK

(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 and GGND terminals.

NOTICE:

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

(c) Check the output voltage of GL1 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

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.

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DI28U–04

DIAGNOSTIC TROUBLE CODE CHART

NOTICE:

When removing the part, turn the ignition switch OFF.

HINT:

- Using SST 09843 –18020, connect the terminals Tc and E_1, and remove the short pin.
- If any abnormality is not found when inspecting parts, inspect the ECU.
- If a malfunction code is displayed during the DTC check, check the circuit listed for that code. For details of each code, turn to the page referred to under the "See page" for respective "DTC No." in the DTC chart.

DTC No. (See Page)	Detection Item	Trouble Area
C0278 / 11 (DI–239)	Open or short circuit in ABS solenoid relay circuit	• ABS solenoid relay • ABS solenoid relay circuit
C0279 / 12 (DI–239)	B+ short circuit in ABS solenoid relay circuit	
C0226 / 21 (DI–237)	Open or short circuit in hydraulic brake booster solenoid circuit (SFR circuit)	• Hydraulic brake booster • SFRR or SFRH circuit
C0236 / 22 (DI–237)	Open or short circuit in hydraulic brake booster solenoid circuit (SFL circuit)	• Hydraulic brake booster • SFLR or SFLH circuit
C0246 / 23 (DI–237)	Open or short circuit in hydraulic brake booster solenoid circuit (SRR circuit)	• Hydraulic brake booster • SRH or SRR circuit
C1225 / 25 (DI–237)	Open or short circuit in hydraulic brake booster solenoid circuit (SA1 circuit)	• Hydraulic brake booster • SA1 circuit
C1226 / 26 (DI–237)	Open or short circuit in hydraulic brake booster solenoid circuit (SA2 circuit)	• Hydraulic brake booster • SA2 circuit
C0200 / 31*1 (DI–231)	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–231)	Left front wheel speed sensor signal malfunction	
C0210 / 33*1 (DI–231)	Right rear wheel speed sensor signal malfunction	
C0215 / 34*1 (DI–231)	Left rear wheel speed sensor signal malfunction	
C1237 / 37 (DI–242)	Some tire is different size from the other tires	• Tire size
C1241 / 41 (DI–243)	Low battery positive voltage or open circuit in IG1 circuit	• Battery • IC regulator • Power source circuit
C1242 / 42 (DI–246)	Open circuit in IG2 circuit	• Battery • IC regulator • Power source circuit
C1243 / 43 (DI–249)	Malfunction in deceleration sensor (constant output)	• Deceleration sensor • Wire harness for deceleration sensor system
C1244 / 44 (DI–251)	Open or short circuit in deceleration sensor circuit	• Deceleration sensor • Deceleration sensor circuit
C1245 / 45 (DI–249)	Malfunction in deceleration sensor	• Deceleration sensor • Wire harness for deceleration sensor system
C1248 / 48 (DI–256)	• Open or short circuit in rear differential lock circuit • Rear differential is locking	• Rear differential lock

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C1249 / 49 (DI–256)	Open circuit in stop light switch circuit	• Stop light switch circuit
C1251 / 51*2 (DI–259)	• Pump motor is locked • Open circuit in pump motor ground	• Hydraulic brake booster pump motor
C1252 / 52*2 (DI–263)	Hydraulic brake booster pump motor malfunction	• Hydraulic brake booster pump motor • Hydraulic brake booster pump motor circuit • Pressure switch (PH or PL)
C1253 / 53*2 (DI–269)	Hydraulic brake booster pump motor relay malfunction	• ABS motor relay • ABS motor relay circuit
C1254 / 54*2 (DI–274)	Pressure switch malfunction	• Pressure switch (PH or PL) • Pressure switch circuit
C1256 / 56*2 (DI–278)	Accumulator low pressure malfunction	• Accumulator • Pressure switch (PH or PL) • Hydraulic brake booster pump motor
C1257 / 57*2 (DI–285)	Power supply drive circuit malfunction	• Battery • Power Source circuit • ABS ECU
Always ON (DI–289)	Malfunction in ABS ECU	• Battery • IC regulator • Power source circuit • ABS ECU

*1: As the DTC cannot be erased by replacing parts alone do either of the following operations.

(1) Clear DTC (See page DI–219).

(2) At the vehicle speed of 20 km/h (12 mph), drive the vehicle for 30 secs. or more.

*2: Using the following table, troubled parts can be specified.

DTC		42		51		52		53		54		56		57	
BRAKE warning light and buzzer		Light	Buzzer	Light	Buzzer	Light	Buzzer	Light	Buzzer	Light	Buzzer	Light	Buzzer	Light	Buzzer
Pressure switch	PH					○	○			○		○	○		
	PL					○	○			○		○	○		
Pump motor circuit	Pump motor			○	○	○	○					○	○		
	MTT wire harness					○	○	○							
	MT+ wire harness			○											
	MT− wire harness			○											
Accumulator malfunction												○	○		
Motor relay circuit	MR1 open circuit							○							
	MR2 open circuit							○							
	MR1 welded contact					○	○	○							
	MR2 welded contact					○	○	○							
Hydraulic brake booster	Pressure leaks					○	○					○	○		
Power souce*	IG2 open circuit	○													
ECU	Power supply circuit													○	

*: When IG1 circuit is open, ABS warning light and BRAKE warning light come on.

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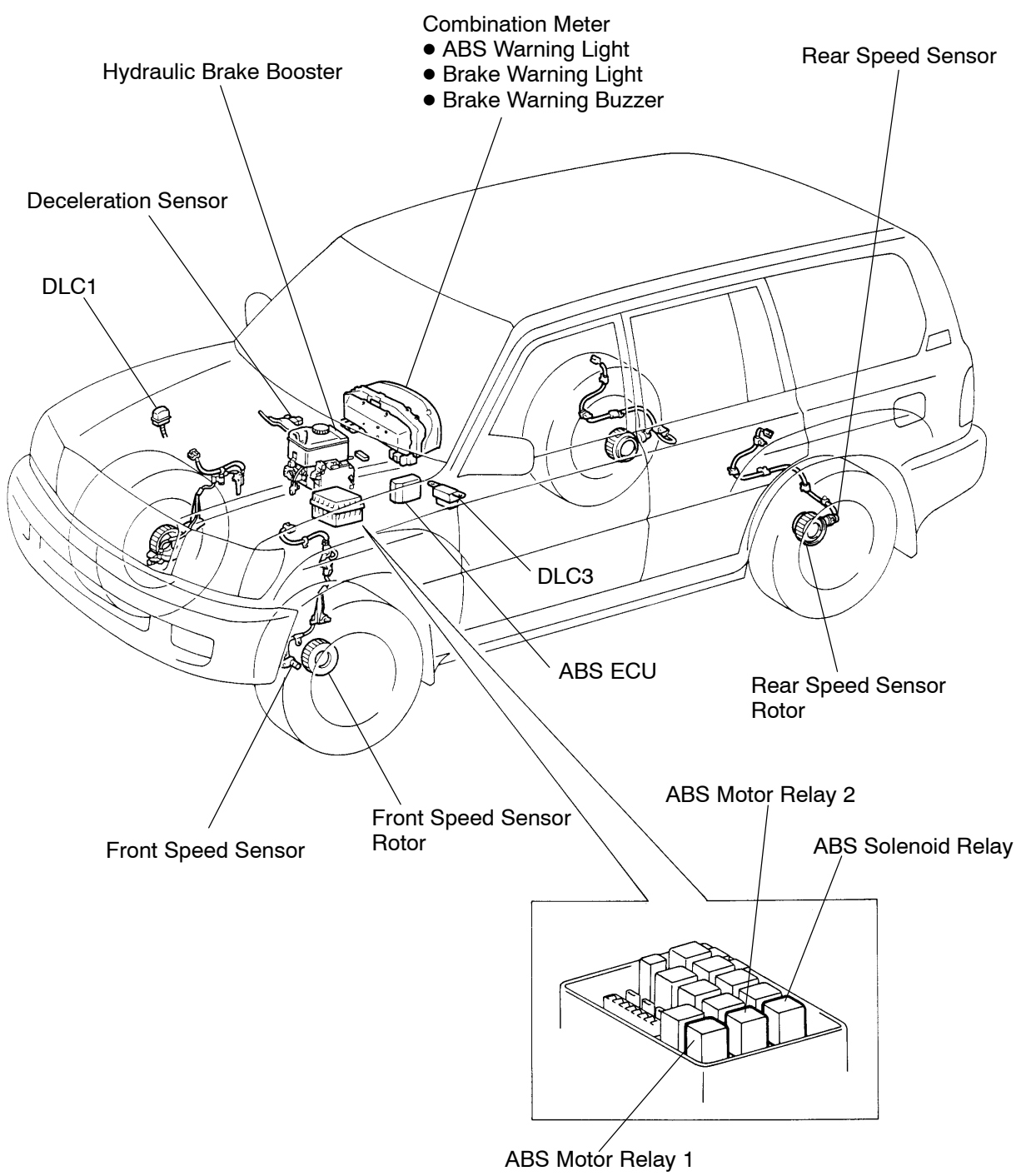
DI3BM–01

PARTS LOCATION



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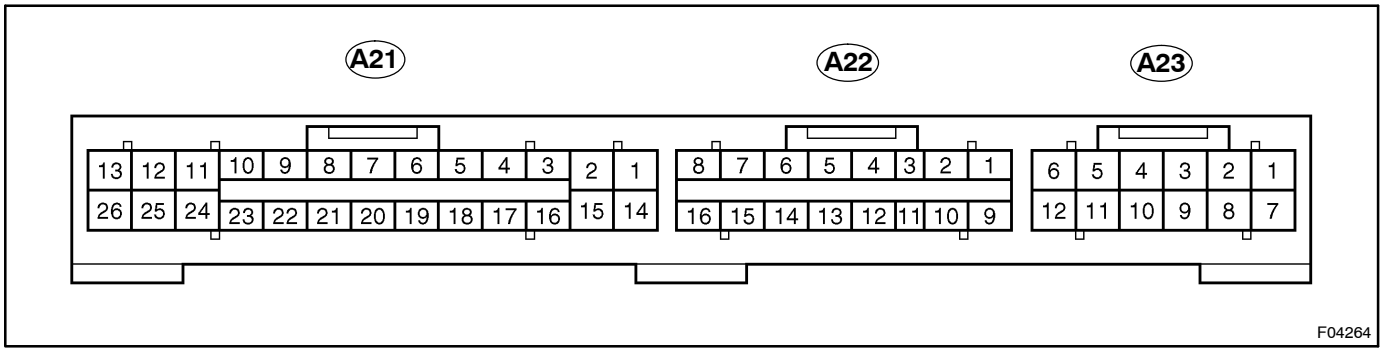
DI28W–04

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
MT (A23 – 2) – GND (A21 – 2, 15, A23 – 1, 7)	B–R ↔ W–B	IG switch ON (Motor relay is OFF)	Below 1.5
Tc (A23 – 4) – GND (A21 – 2, 15, A23 – 1, 7)	P–B ↔ W–B	IG switch ON and terminals Tc–E_1 of DLC1 connected	Below 1.5
		IG switch ON and terminals Tc–E_1 of DLC1 not connected	10 – 14
MR2 (A23 – 5) – GND (A21 – 2, 15, A23 – 1, 7)	Y–B ↔ W–R	IG switch ON, hydraulic brake booster pump motor stops	10 – 14
IG2 (A23 – 6) – GND (A21 – 2, 15, A23 – 1, 7)	B–R ↔ W–B	IG switch ON	10 – 14
Ts (A23 – 10) – GND (A21 – 2, 15, A23 – 1, 7)	W ↔ W–B	IG switch ON and terminals Ts–E_1 of DLC1 connected	Below 1.5
		IG switch ON and terminals Ts–E_1 of DLC1 not connected	10 – 14
VGS (A22 – 1) – GGND (A22 – 10)	W–R ↔ G	IG switch ON	4.5 – 5.5
GL1 (A22 – 2) – GGND (A22 – 10)	W ↔ G	IG switch ON, vehicle is placed on the horizontal surface	2.0 – 3.0
BRL (A22 – 3) – GND (A21 – 2, 15, A23 – 1, 7)	Y–G ↔W–B	IG switch ON, BRAKE warning light ON	Below 2.0
		IG switch ON, BRAKE warning light OFF	10 – 14
RR+ (A22 – 5) – RR– (A22 – 13)	B ↔ W	IG switch ON, slowly turn right rear wheel	AC generation
EXI2 (A22 – 6) – GND (A21 – 2, 15, A23 – 1, 7)	R–L ↔ W–B	IG switch ON, REAR DIFF LOCK switch OFF	8 – 14
		IG switch ON, REAR DIFF LOCK switch ON	Below 2.0
EX1 (A22 – 7) – GND (A21 – 2, 15, A23 – 1, 7)	P–B ↔ W–B	IG switch ON, CENTER DIFF LOCK switch OFF	10 – 14
		IG switch ON, CENTER DIFF LOCK switch ON	Below 2.0
SR (A22 – 8) – GND (A21 – 2, 15, A23 – 1, 7)	G–Y ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
BZ (A22 – 11) – GND (A21 – 2, 15, A23 – 1, 7)	L ↔ W–B	IG switch ON, BRAKE buzzer sounds	Below 1.5
		IG switch ON, BRAKE buzzer does not sound	10 – 14
RL+ (A22 – 12) – RL– (A22 – 4)	R ↔ G	IG switch ON, slowly turn left rear wheel	AC generation
EXI3 (A22 – 14) – GND (A21 – 2, 15, A23 – 1, 7)	B–L ↔ W–B	IG switch ON, transfer in L position	8 – 14
		IG switch ON, transfer in any position except L position	Below 1.5
SA1 (A21 – 1) – GND (A21 – 2, 15, A23 – 1, 7)	G ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
MT+ (A21 – 3) – MT– (A21 – 16)	L ↔ GR	IG switch ON, pump motor does not operate	Below 1
FR+ (A21 – 5) – FR– (A21 – 18)	L ↔ P	IG switch ON, slowly turn right front wheel	AC generation

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MR1 (A21 – 7) – GND (A21 – 2, 15, A23 – 1, 7)	R ↔ W–B	IG switch ON, hydraulic brake booster pump motor stops	10 – 14
WA (A21 – 8) – GND (A21 – 2, 15, A23 – 1, 7)	P–L ↔ W–B	IG switch ON, ABS warning light ON	Below 2.0
		IG switch ON, ABS warning light OFF	10 – 14
IG1 (A21 – 10) – GND (A21 – 2, 15, A23 – 1, 7)	B–W ↔ W–B	IG switch ON	10 – 14
SRH (A21 – 11) – GND (A21 – 2, 15, A23 – 1, 7)	W ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SFLH (A21 – 12) – GND (A21 – 2, 15, A23 – 1, 7)	Y ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SFRH (A21 – 13) – GND (A21 – 2, 15, A23 – 1, 7)	LG ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SA2 (A21 – 14) – GND (A21 – 2, 15, A23 – 1, 7)	B ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
FL+ (A21 – 17) – FL– (A21 – 4)	R ↔ G	IG switch ON, slowly turn left front wheel	AC generation
PH (A21 – 20) – GND (A21 – 2, 15, A23 – 1, 7)	O ↔ W–B	IG switch ON, pressure switch (PH) ON	5 – 8
		IG switch ON, pressure switch (PH) OFF	Below 0.9
D/G (A21 – 21) – GND (A21 – 2, 15, A23 – 1, 7)	V–W ↔ W–B	IG switch ON	10 – 14
STP (A21 – 22) – GND (A21 – 2, 15, A23 – 1, 7)	G–W ↔ W–B	Stop light switch OFF	Below 1.5
		Stop light switch ON	8 – 14
SRR (A21 – 24) – GND (A21 – 2, 15, A23 – 1, 7)	B–O ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SFLR (A21 – 25) – GND (A21 – 2, 15, A23 – 1, 7)	B–Y ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SFRR (A21 – 26) – GND (A21 – 2, 15, A23 – 1, 7)	B–W ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
PL (A23 – 11) – GND (A21 – 2, 15, A23 – 1, 7)	W ↔ W–B	IG switch ON, pressure switch (PL) ON	7 – 10
		IG switch ON, pressure switch (PL) OFF	3 – 5

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DI28X–04

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 ECU, sensor or etc., turn the ignition switch OFF.

Symptom	Suspect Area	See page
ABS does not operate.	Only when 1. – 4. are all normal and the problem is still occurring, replace the ABS ECU. 1. Reconfirm the DTC and check that the normal code is output. 2. IG power source circuit 3. Speed sensor circuit 4. Check the hydraulic brake booster with a ABS actuator checker or TOYOTA hand–held tester. If abnormal, check the hydraulic circuit for leakage (See page DI–305).	 DI–219 DI–243 DI–231 BR–36
ABS does not operate efficiently.	Only when 1. – 4. are all normal and the problem is still occurring, replace the ABS ECU. 1. Recomfirm the DTC and check that the normal code is output. 2. Speed sensor circuit 3. Stop light switch circuit 4. Check the hydraulic brake booster with a ABS actuator checker or TOYOTA hand–held tester. If abnormal, check the hydraulic circuit for leakage (See page DI–305).	 DI–219 DI–231 DI–256 BR–36
ABS warning light abnormal.	1. ABS warning light circuit 2. ABS ECU	DI–292 IN–34
DTC check cannot be done.	Only when 1. and 2. are all normal and the problem is still occurring, replace the ABS ECU. 1. ABS warning light circuit 2. Tc terminal circuit	 DI–292 DI–301
Speed sensor signal check cannot be done.	1. Ts terminal circuit 2. ABS ECU	DI–303 IN–34

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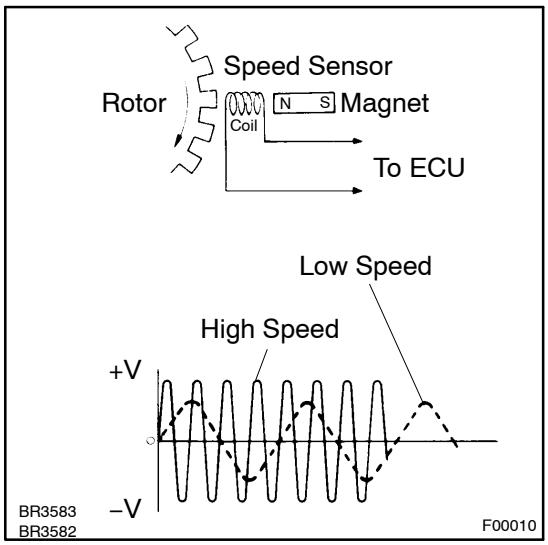
DI28Y–04

CIRCUIT INSPECTION

DTC	C0200 / 31 to C0215 / 34	Speed Sensor Circuit

CIRCUIT DESCRIPTION



The speed sensor detects wheel speed and sends the appropriate signals to the ECU. These signals are used for control of the ABS control system. The front and rear rotors each have 48 serrations.

When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates 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) through (4): (1) At vehicle speed of 12 km/h (6 mph) or more, pulses are not input for 30 secs. (2) Momentary interruption of the speed sensor signal occurs at least 7 times in the time between switching the ignition switch ON and switching it OFF. (3) Continuous noise occurs into the speed sensor signals with the vehicle speed at 20 km/h (12 mph) or more. (4) The condition that the speed sensor signal circuit is open continues for 0.6 secs. 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 trouble occurs in the speed sensor circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control and the brake system becomes normal.

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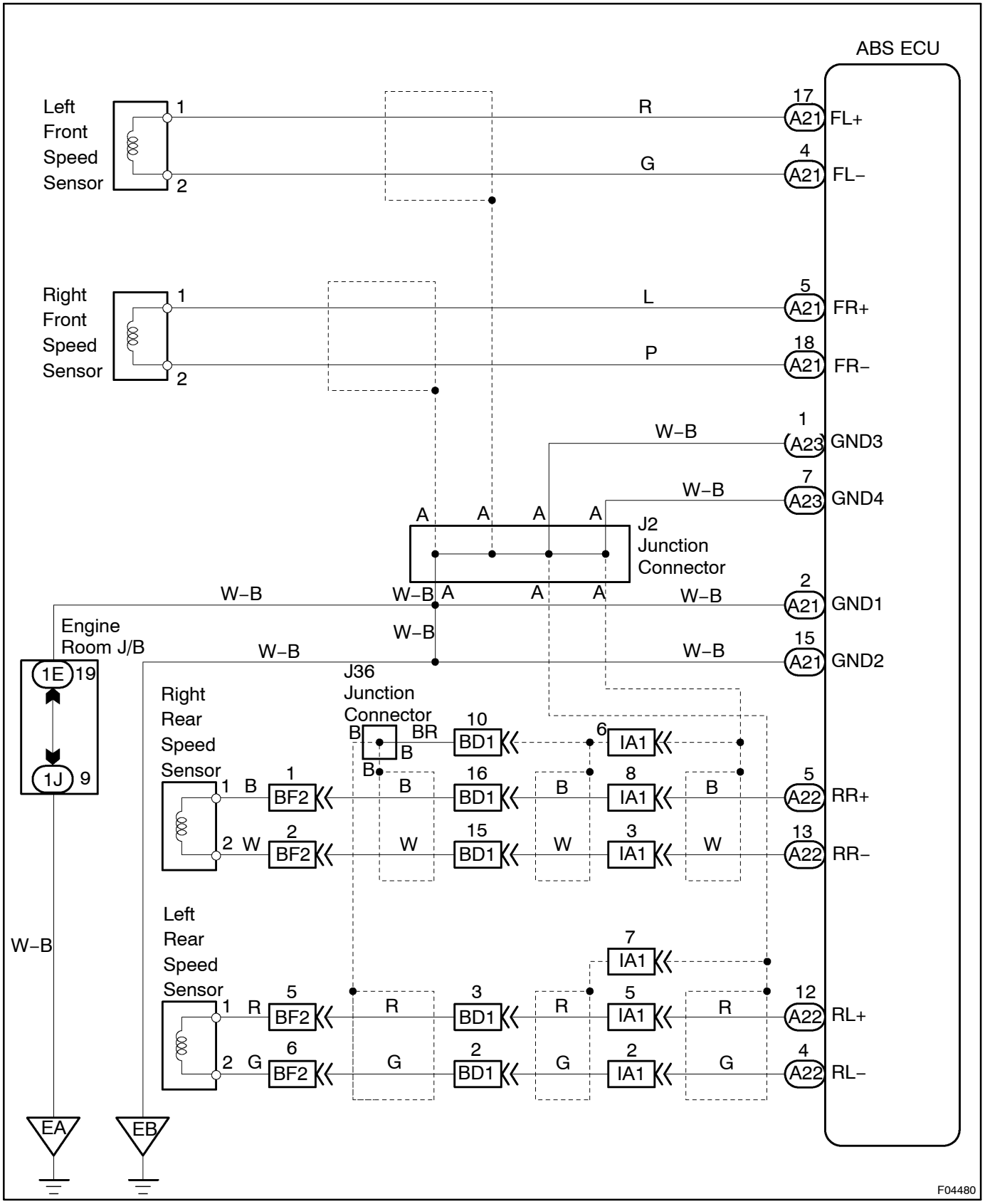
WIRING DIAGRAM



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INSPECTION PROCEDURE

Start the inspection from step 1 in case of using the TOYOTA hand–held tester and start from step 2 in case of not using the TOYOTA hand–held tester.

1	**Check output value of speed sensor.**

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.
(c) Select the DATALIST mode on the TOYOTA hand–held tester.

CHECK:

Check that there is no difference between the speed value output from the speed sensor displayed on the TOYOTA hand–held tester and the speed value displayed on the speedometer when driving the vehicle.

OK:

There is almost no difference from the displayed speed value.

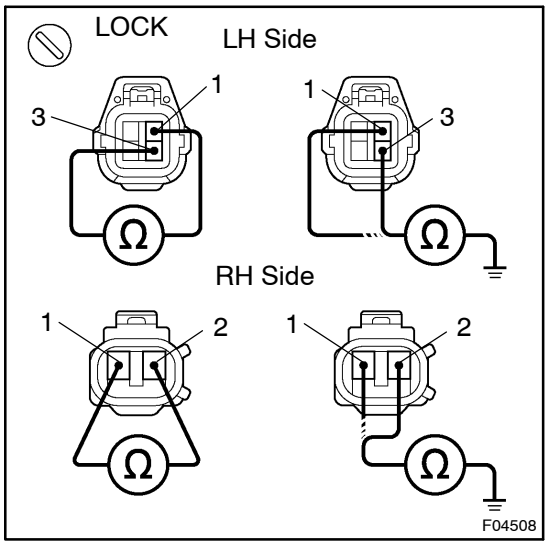
HINT:

There is tolerance of ± 10 % in the speedometer indication.

OK → **Check and replace ABS ECU.**

NG

2	**Check speed sensor.**



FRONT:

PREPARATION:

(a) Make sure that there is no looseness at the connector lock part and connecting part of the connector.
(b) Disconnect speed sensor connector.

CHECK:

LH Side:

Measure resistance between terminals 1 and 3 of speed sensor connector.

RH side:

Measure resistance between terminals 1 and 2 of speed sensor connector.

OK:

Resistance: 0.92 – 1.22 kΩ

CHECK:

LH Side:

Measure resistance between terminal 1 or 3 of speed sensor connector and body ground.

RH Side:

Measure resistance between terminal 1 or 2 of speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher

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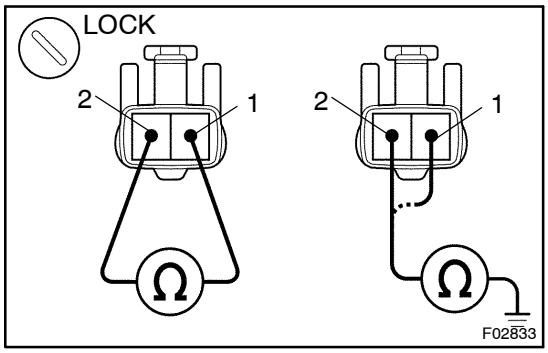

REAR:

PREPARATION:

(a) Make sure that there is no looseness at the connector lock part and connecting part of the connector.

(b) Disconnect speed sensor connector.

CHECK:

Measure resistance between terminals 1 and 2 of speed sensor connector.

OK:

Resistance: 1.0 – 1.4 kΩ

CHECK:

Measure resistance between terminal 1 or 2 of speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher

NG	**Replace speed sensor.**

NOTICE:

Check the speed sensor signal last (See page DI–219).

OK

3	**Check for open and short circuit in harness and connector between each speed sensor and ECU (See page IN–34).**

NG	**Repair or replace harness or connector.**

OK

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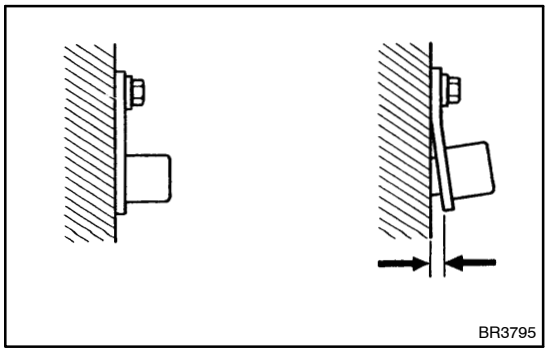
4	Check sensor installation.



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.

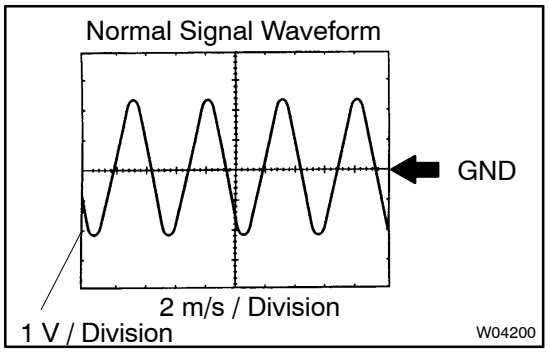
NOTICE:

Check the speed sensor signal last (See page DI–219).

OK

5	Check speed sensor and sensor rotor serrations.

(REFERENCE) INSPECTION USING OSCILLOSCOPE



PREPARATION:

(a) Remove the ABS ECU.

(b) Connect the oscilloscope to the each of terminals FR+, FL+, RR+ or RL+ and GND of the ABS ECU.

CHECK:

Drive the vehicle at about 20 km/h (12 mph), and check the signal waveform.

OK	Check and replace ABS ECU.

NG

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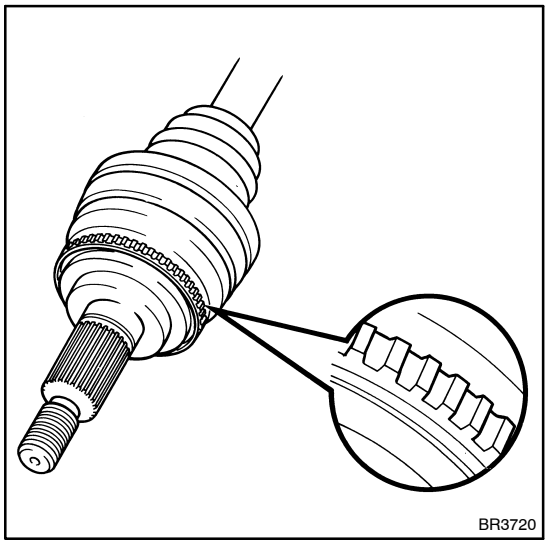
6	**Check sensor rotor and sensor tip.**



FRONT:

PREPARATION:

Remove front drive shaft (See page SA–11).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects.

PREPARATION:

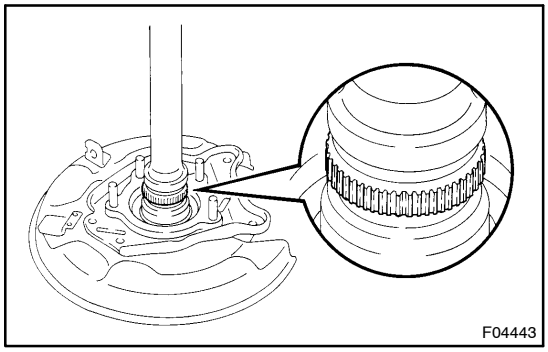
Remove front speed sensor (See page BR–53).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.



REAR:

PREPARATION:

Remove the rear axle shaft (See page SA–81).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects.

PREPARATION:

Remove rear speed sensor (See page BR–56).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

NG → **Replace speed sensor or rotor.**

NOTICE:

Check the speed sensor signal last (See page DI–219).

OK

Check and replace ABS ECU.

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DI28Z–05

DTC	C0226 / 21 to C1226 / 26	ABS Solenoid Circuit

CIRCUIT DESCRIPTION

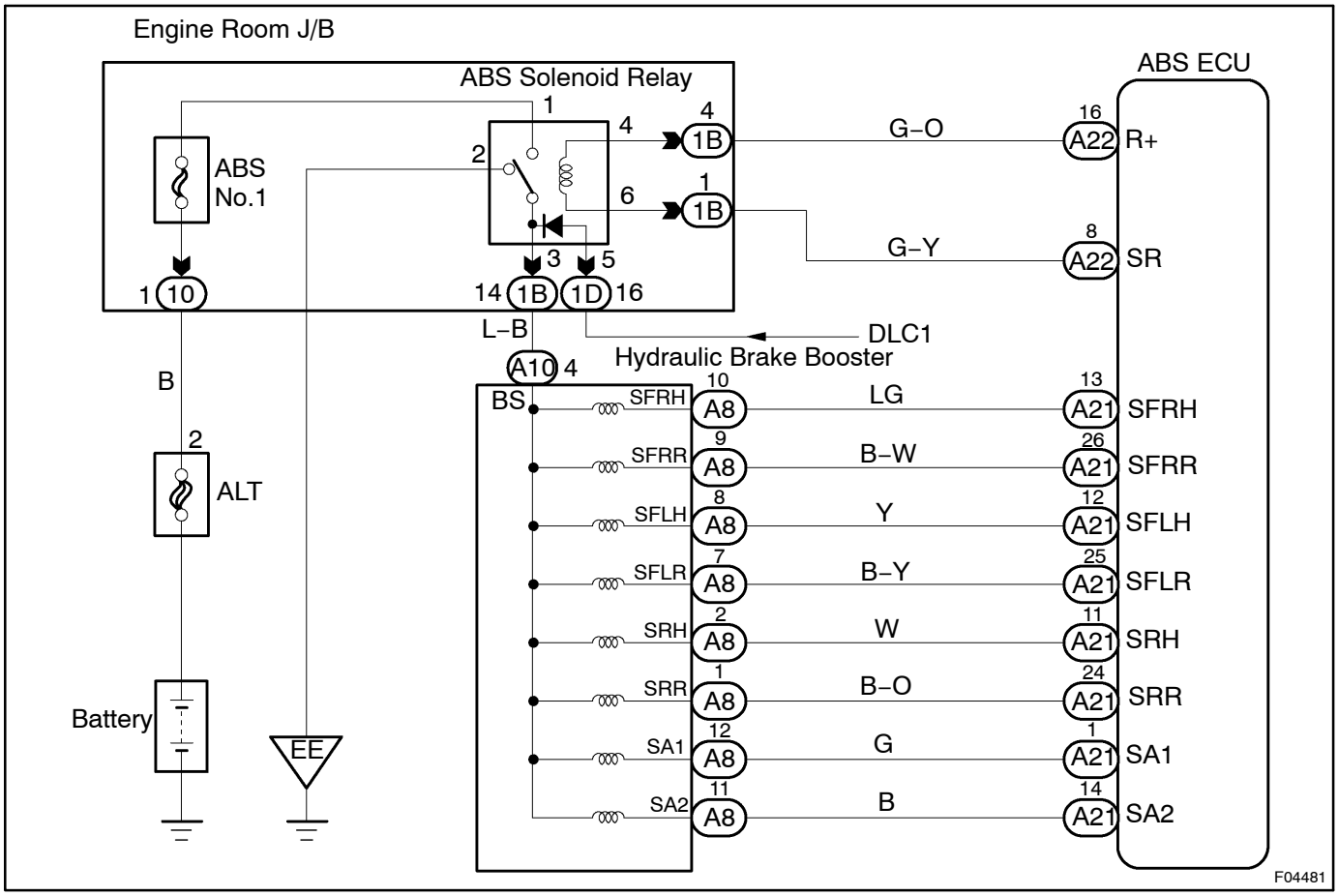
This solenoid goes on when signals are received from the ECU and controls the pressure acting on the wheel cylinders thus controlling the braking force.

DTC No.	DTC Detecting Condition	Trouble Area
C0226 / 21	Open or short in SFRH or SFRR circuit continues for 0.05 sec. or more.	• Hydraulic brake booster • SFRH or SFRR circuit
C0236 / 22	Open or short in SFLH or SFLR circuit continues for 0.05 sec. or more.	• Hydraulic brake booster • SFLH or SFLR circuit
C0246 / 23	Open or short in SRR or SRH circuit continues for 0.05 sec. or more.	• Hydraulic brake booster • SRR or SRH circuit
C1225 / 25	Open or short in SA1 circuit continues for 0.05 sec. or more.	• Hydraulic brake booster • SA1 circuit
C1226 / 26	Open or short in SA2 circuit continues for 0.05 sec. or more.	• Hydraulic brake booster • SA2 circuit

Fail safe function:

If trouble occurs in the actuator solenoid circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control and the brake system becomes normal.

WIRING DIAGRAM



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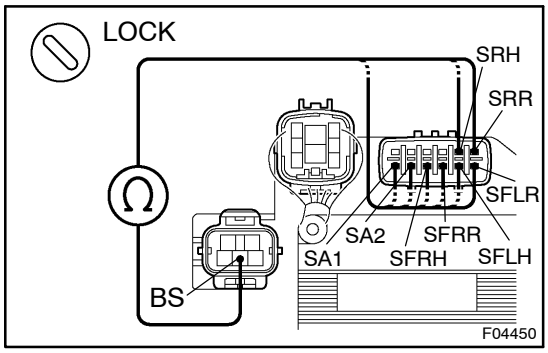
INSPECTION PROCEDURE

1	**Check hydraulic brake booster solenoid.**



PREPARATION:

Disconnect the 2 connectors from hydraulic brake booster.

CHECK:

Check continuity between the terminal BS and each of terminals SFRH, SFRR, SFLH, SFLR, SRH, SRR, SA1 and SA2 of hydraulic brake booster connector.

OK:

Continuity

HINT:

Resistance of each solenoid at 20 °C (68 °F)

SFRH, SFLH, SRH: 4.75 – 5.25 Ω

SFRR, SFLR, SRR: 2.00 – 2.40 Ω

SA1, SA2 : 3.5 – 3.9Ω

NG → **Replace hydraulic brake booster.**

OK

2	**Check for open and short circuit in harness and connector between ABS ECU and actuator (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

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DI3JU–02

DTC	C0278 / 11, C0279 / 12	ABS Solenoid Relay Circuit

CIRCUIT DESCRIPTION

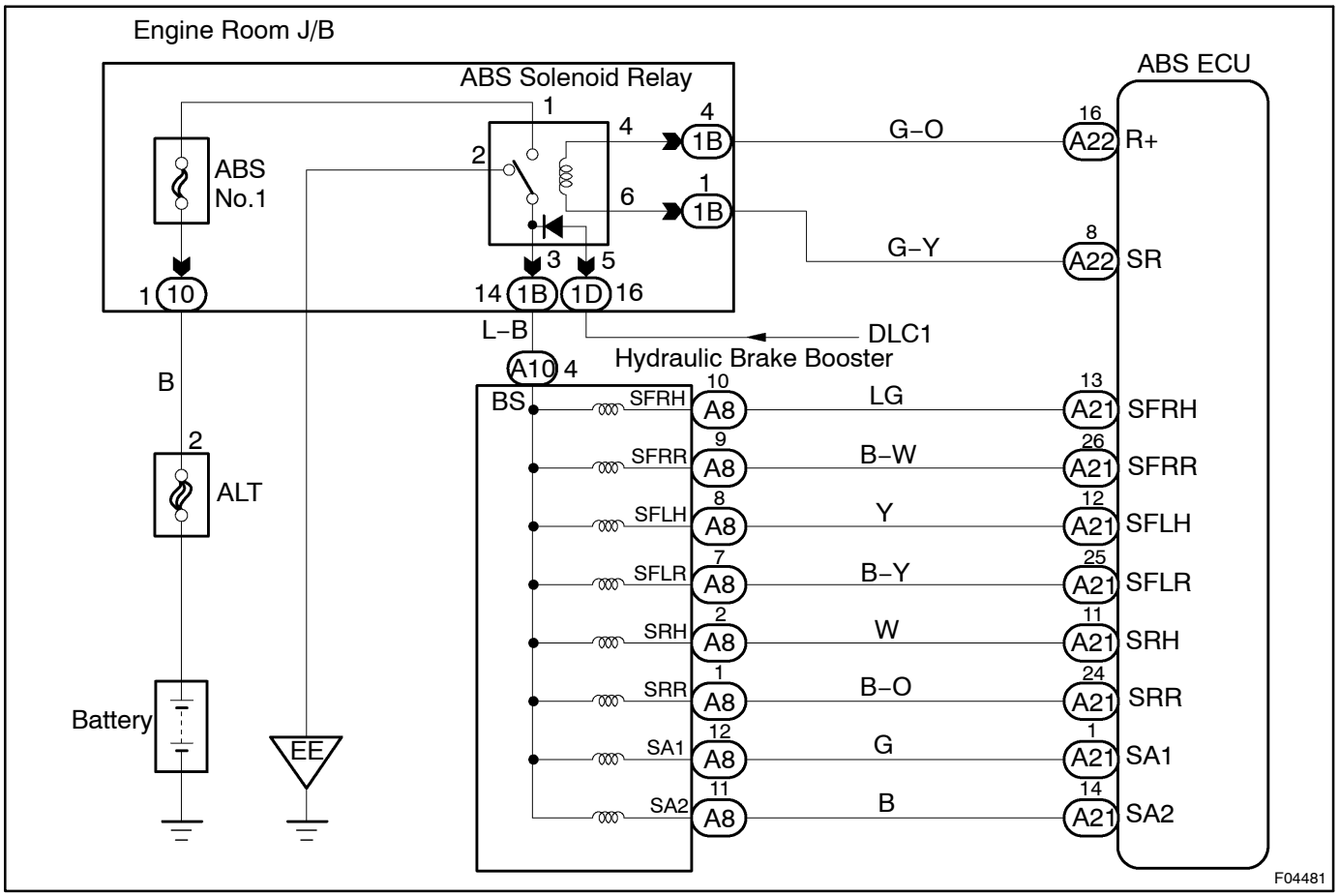
This relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the initial check is OK, the relay goes on.

DTC No.	DTC Detecting Condition	Trouble Area
C0278/11	Conditions (1) and (2) continue for 0.2 secs. or more: (1) ECU terminal IG1 voltage is 9.5 V to 18.5 V and the solenoid relay is ON, however, the contact point of the solenoid relay is OFF. (2) With solenoid relay ON, ECU terminal IG1 voltage becomes 9.5 V or less and the contact point of the solenoid relay does not become ON.	• ABS solenoid relay • ABS solenoid relay circuit
C0279/12	Immediately after ECU terminal IG1 becomes ON, and solenoid relay is OFF, however, when the condition that the solenoid relay due to the contact point is ON continues for 0.2 secs. or more.	

Fail safe function:

If trouble occurs in the ABS solenoid relay circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control and the brake system becomes normal.

WIRING DIAGRAM



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INSPECTION PROCEDURE

Start the inspection from step 1 in case of using the TOYOTA hand–held tester and start from step 2 in case of not using the TOYOTA hand–held tester.

1	**Check ABS solenoid relay operation.**

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.

CHECK:

Check the operation sound of the ABS solenoid relay when operating it with the TOYOTA hand–held tester.

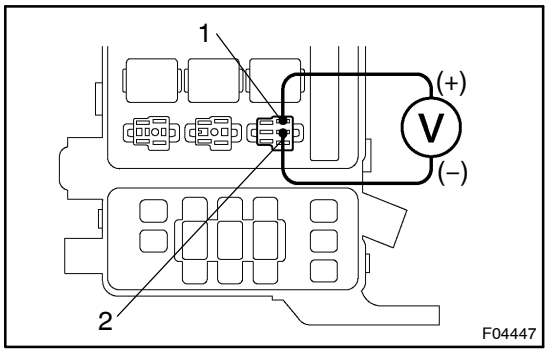
OK:

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 No. 2 (for ABS solenoid relay).**



PREPARATION:

Remove ABS solenoid relay from Engine Room R/B No. 2.

CHECK:

Measure the voltage between terminals 1 and 2 of Engine Room R/B No. 2 (for ABS solenoid relay).

OK:

Voltage: 10 – 14 V

NG → **Check and repair harness or connector.**

OK

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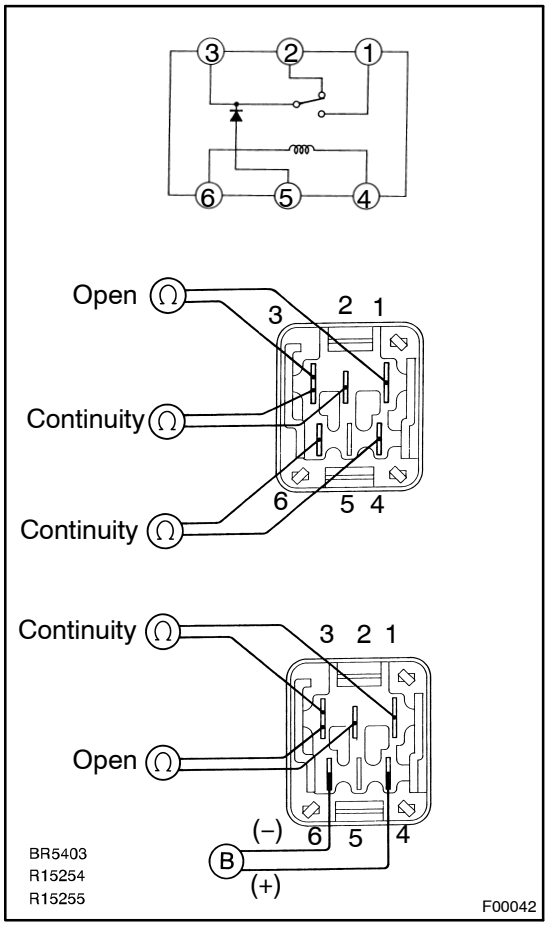
3	Check ABS solenoid relay.



PREPARATION:

Remove ABS solenoid relay from Engine Room R/B No. 2.

CHECK:

Check continuity between each terminal of ABS solenoid relay.

OK:

Terminals 4 and 6	Continuity (Reference value 80 Ω)
Terminals 2 and 3	Continuity
Terminals 1 and 3	Open

CHECK:

(a) Apply battery positive voltage between terminals 4 and 6.

(b) Check continuity between each terminal of ABS solenoid relay.

OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

NG → **Replace ABS solenoid relay.**

OK

4	Check for open and short circuit in harness and connector between ABS solenoid relay and ABS ECU (See page IN–34).

NG → **Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

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DI198–03

DTC	C1237 / 37	Tires of Different Size

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1237/37	Driving at more than 20 km/h (12 mph) for more than 20 seconds with 1 or 2 tires of different size for 3 times continuously.	• Tire size • ECU

INSPECTION PROCEDURE

1	**Check tire size.**

NG → **Replace tires so that all 4 tires are of the same size.**

OK →

Check and replace ABS ECU.

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DI292–04

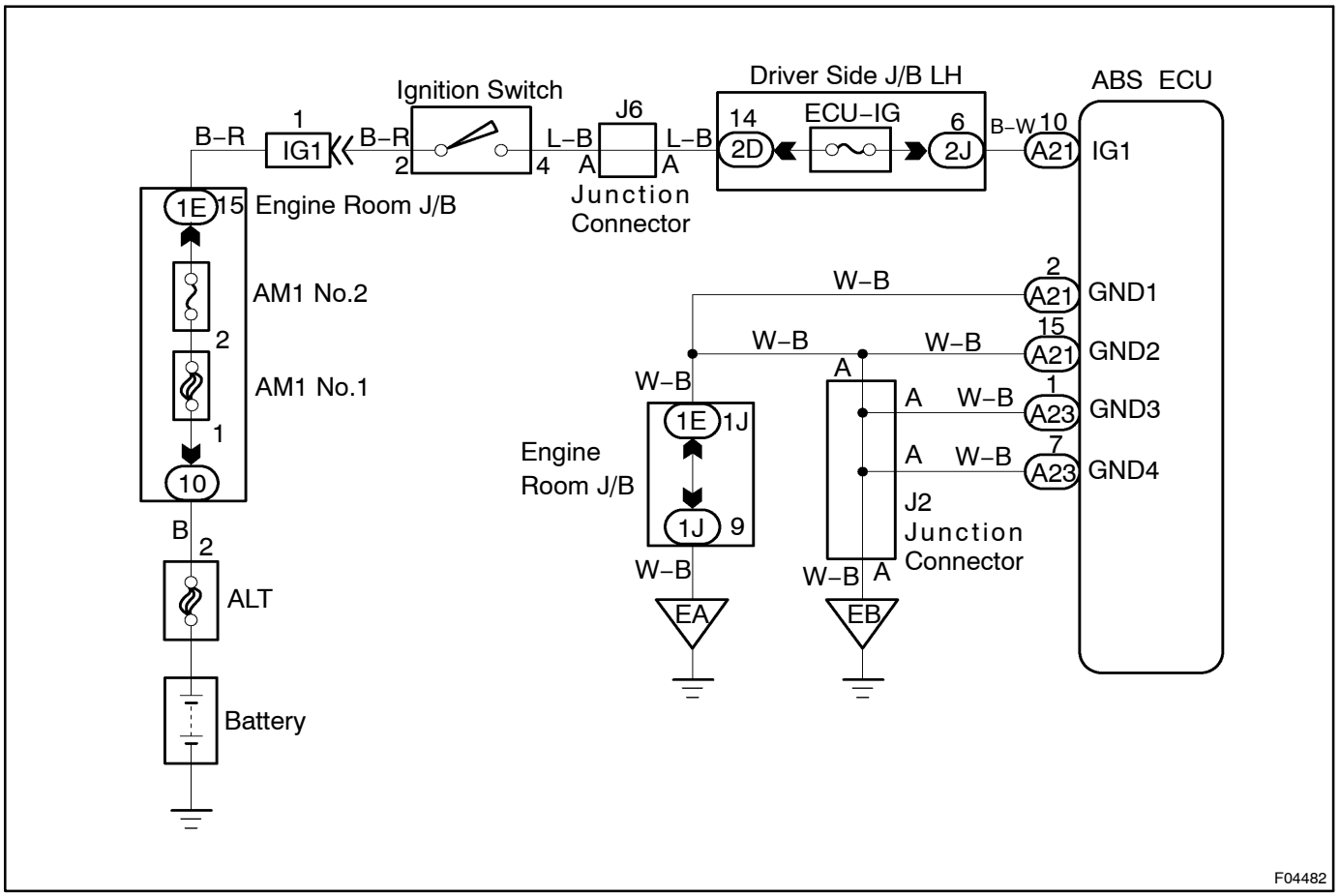
DTC	C1241 / 41	IG Power Source Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1241 / 41	Detection of any of conditions (1) through (4): (1) Vehicle speed is 3 km/h (1.9 mph) or more and voltage of ECU terminal IG remains at below 9.5 V for more than 10 secs. (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 secs. or more. (3) The condition that ECU terminal IG1 voltage is more than 18.5 V continues. (4) While the solenoid relay outputs ON signal, ECU terminal IG1 voltage becomes 9.5 – 18.5 V, and the condition that the contact point of the solenoid relay is OFF continues for 0.2 secs. or more.	• Battery • IC regulator • Power source circuit

Fail safe function:
If trouble occurs in the power source circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control and the brake system becomes normal.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check battery positive voltage.**

OK:

Voltage: 10 – 14 V

NG → **Check and repair the charging system.**

OK

2	**Check voltage of the ECU IG power source.**

IN CASE OF USING TOYOTA HAND–HELD TESTER:

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.
(c) Select the DATALIST mode on the TOYOTA hand–held tester.

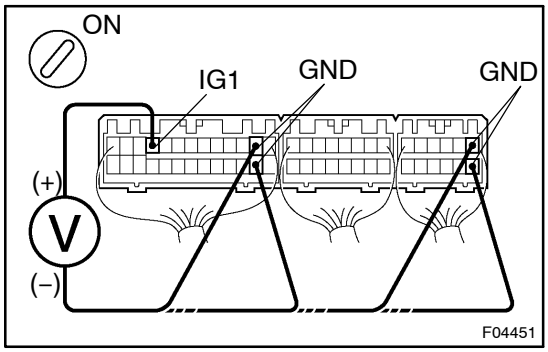
CHECK:

Check the voltage condition output from the ECU displayed on the TOYOTA hand–held tester.

OK:

"Normal" is displayed.

IN CASE OF NOT USING TOYOTA HAND–HELD TESTER:



PREPARATION:

Remove ABS ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.
(b) Measure voltage between terminals IG1 and GND of ABS ECU connector.

OK:

Voltage: 10 – 14 V

OK → **Ignition switch OFF, check and replace ABS ECU.**

NG

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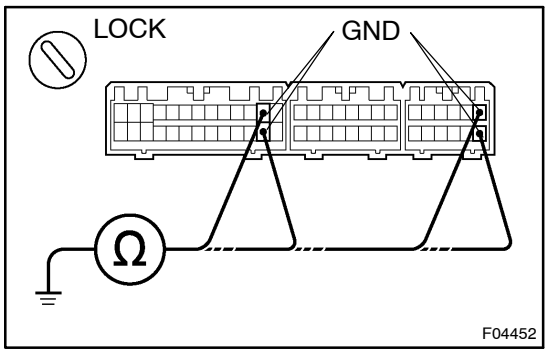
3	Check continuity between terminal GND of ABS ECU connector and body ground.



CHECK:

Measure resistance between terminal GND of ABS ECU connector and body ground.

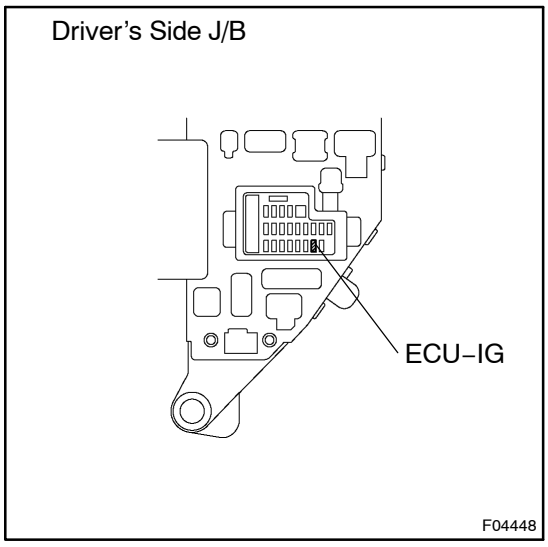
OK:

Resistance: 1 Ω or less

NG → **Repair or replace harness or connector.**

OK

4	Check ECU–IG fuse.



PREPARATION:

Remove ECU–IG fuse from driver's side J/B.

CHECK:

Check continuity of ECU–IG fuse.

OK:

Continuity

NG → **Check for short circuit in all the harness and components connected to ECU–IG fuse (See attached wiring diagram).**

OK

Check for open circuit in harness and connector between ABS ECU and battery (See page IN–34).

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DI293–03

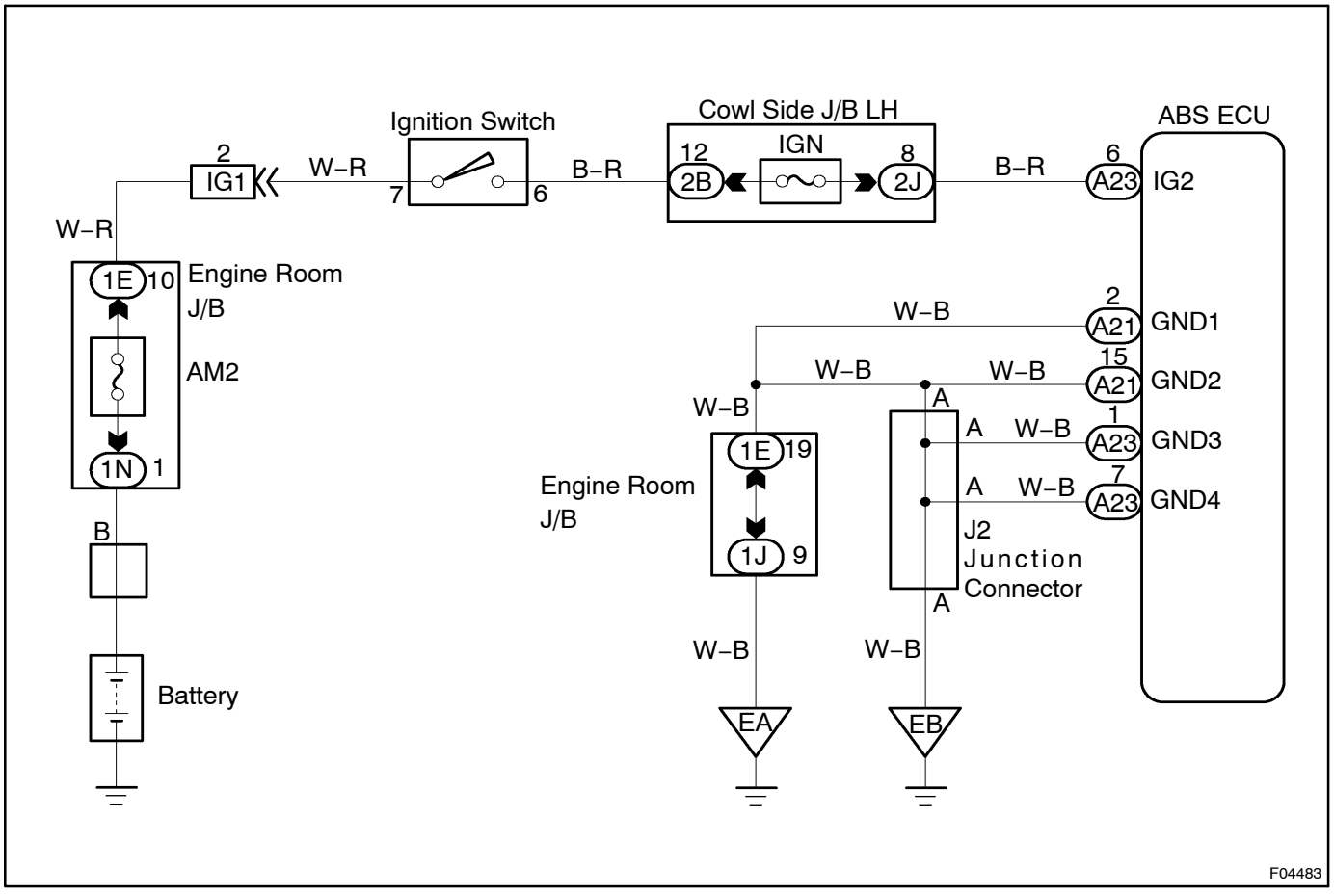
DTC	C1242 / 42	IG2 Power Source Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1242 / 42	With the vehicle running, open in IG2 is detected for more than 7 secs.	• Battery • IC regulator • Power source circuit

Fail safe function:
If trouble occurs in the power source circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control and the brake system becomes normal.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check battery positive voltage.**

OK:

Voltage: 10 – 14 V

NG → **Check and repair the charging system.**

OK

2	**Check voltage of the ECU IG2 power souce.**

IN CASE OF USING TOYOTA HAND–HELD TESTER:

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.
(c) Select the DATALIST mode on the TOYOTA hand–held tester.

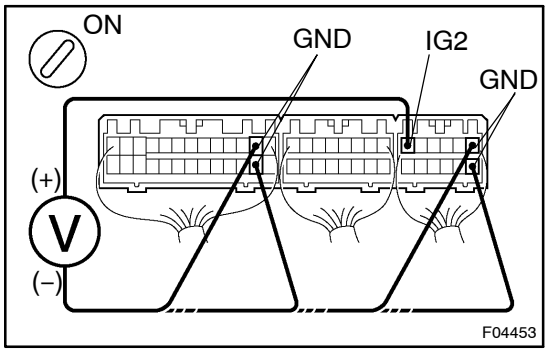
CHECK:

Check the voltage condition output from the ECU displayed on the TOYOTA hand–held tester.

OK:

"Normal" is displayed.

IN CASE OF NOT USING TOYOTA HAND–HELD TESTER:



PREPARATION:

Remove ABS ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.
(b) Measure voltage between terminals IG2 and GND of ABS ECU connector.

OK:

Voltage: 10 – 14 V

OK → **Ignition switch OFF, check and replace ABS ECU.**

NG

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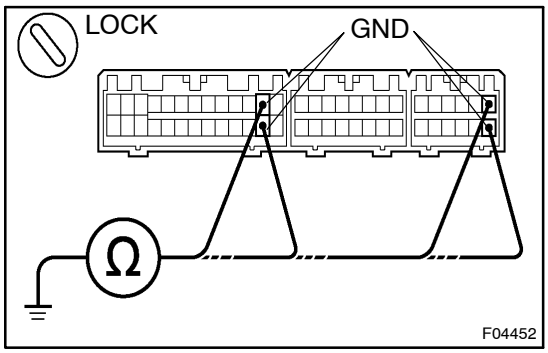
3	Check continuity between terminal GND of ABS ECU connector and body ground.



CHECK:

Measure resistance between terminal GND of ABS ECU connector and body ground.

OK:

Resistance: 1 Ω or less

NG → **Repair or replace harness or connector.**

OK

4	Check IGN fuse.

PREPARATION:

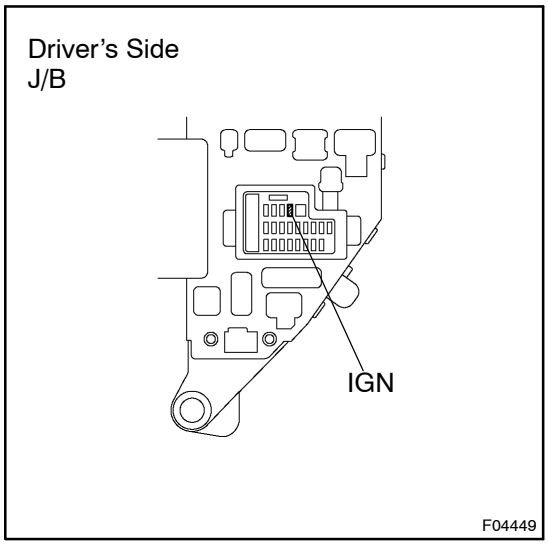
Remove IGN fuse from driver's side J/B.

CHECK:

Check continuity of IGN fuse.

OK:

Continuity



NG → **Check for short circuit in all the harness and components connected to IGN fuse (See attached wiring diagram).**

OK

Check for open circuit in harness and connector between ABS ECU and battery (See page IN–34).

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DI294–03

DTC	C1243 / 43, C1245 / 45	Malfunction in Deceleration Sensor

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1243 / 43	While vehicle speed becomes 0 km/h (0 mph) from 30 km/h (18 mph), and the condition that GL1 signals of ECU terminals do not change 40 mV or less continues 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 secs. or more.	

Fail safe function:
If trouble occurs in the deceleration sensor circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control and the brake system becomes normal.

INSPECTION PROCEDURE

Start the inspection from step1 in case of using the TOYOTA hand–held tester and start from step 2 in case of not using the TOYOTA hand–held tester.

1	Check output value of the deceleration sensor.

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.
(c) Select the DATALIST mode on the TOYOTA hand–held tester.

CHECK:

Check that the deceleration value of the deceleration sensor displayed on the TOYOTA hand–held tester is changing when tilting the vehicle.

OK:

Deceleration value must be changing.

OK → **Check and replace ABS ECU.**

NG

2	Check deceleration sensor (See page DI–219).

NG → **Replace deceleration sensor.**

OK

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3	**Check for open or short circuit in harness and connector between deceleration sensor and ABS ECU (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS ECU.

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DI295–03

DTC	C1244 / 44	Deceleration Sensor Circuit

CIRCUIT DESCRIPTION

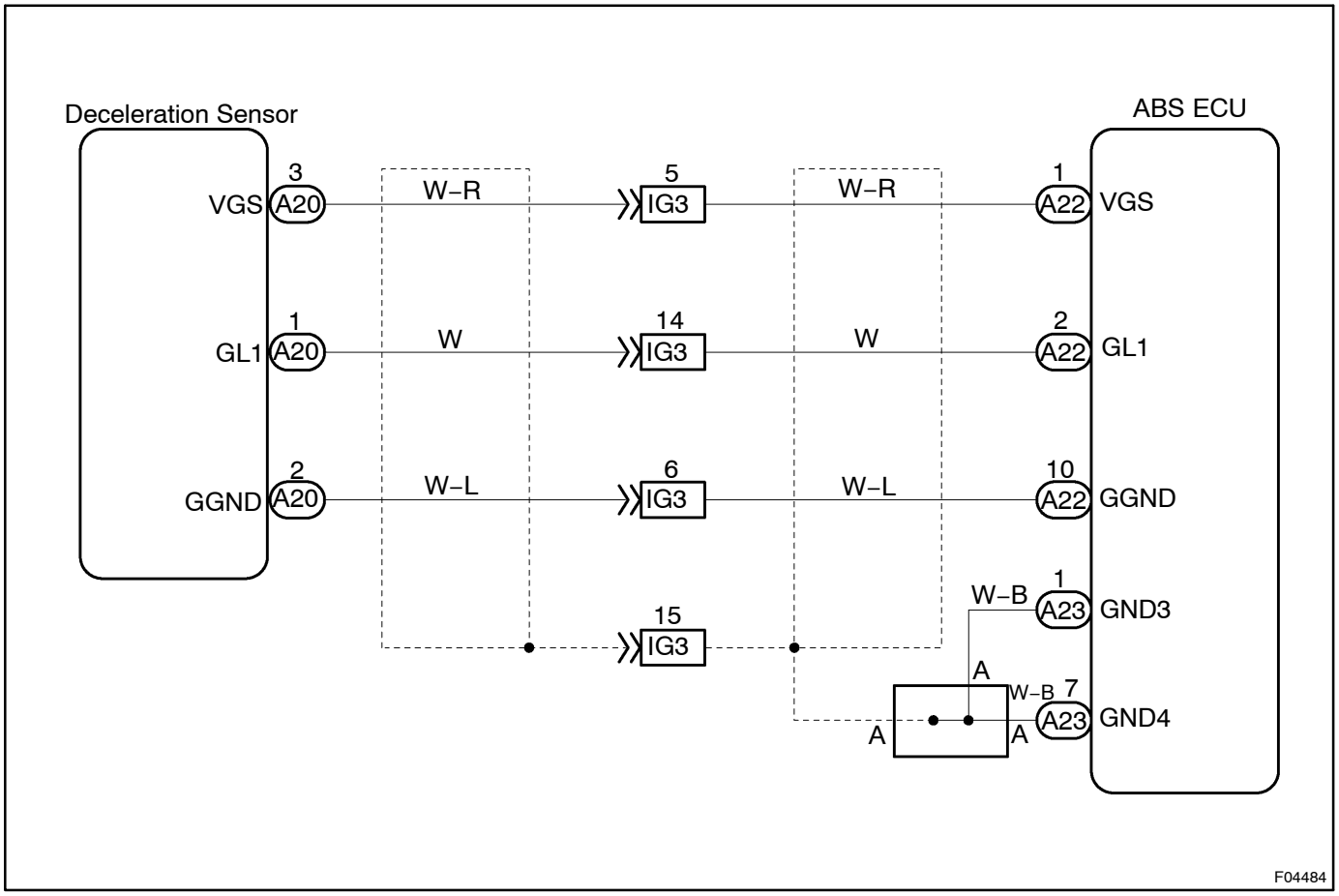
This sensor detects deceleration on the vehicle. The sensor signal is used in ABS control. If the sensor functions abnormally, the ABS warning light comes on.

DTC No.	DTC Detecting Condition	Trouble Area
C1244/44	Either of the following (1), (2), (3) or (4) is detected: (1) The condition that ECU terminals GL1 values are –1.5 G or less or 1.5 G or more continues for 1.2 secs. or more. (2) The condition that the deceleration sensor terminal VGS voltage is 4.4 V or less or 5.6 V or more continues for 1.2 secs. or more. (4) Deceleration sensor signal momentary open occurs for 7 times or more.	• Deceleration sensor • Deceleration sensor circuit

Fail safe function:

If trouble occurs in the deceleration sensor circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control and the brake system becomes normal.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check for open and short circuit in harness and connector between deceleration sensor and ABS ECU (See page IN–34).

NG → Repair or replace harness or connector.

OK ↓

2	Check deceleration sensor (See page DI–219).

NG → Replace deceleration sensor.

OK ↓

Check and replace ABS ECU.

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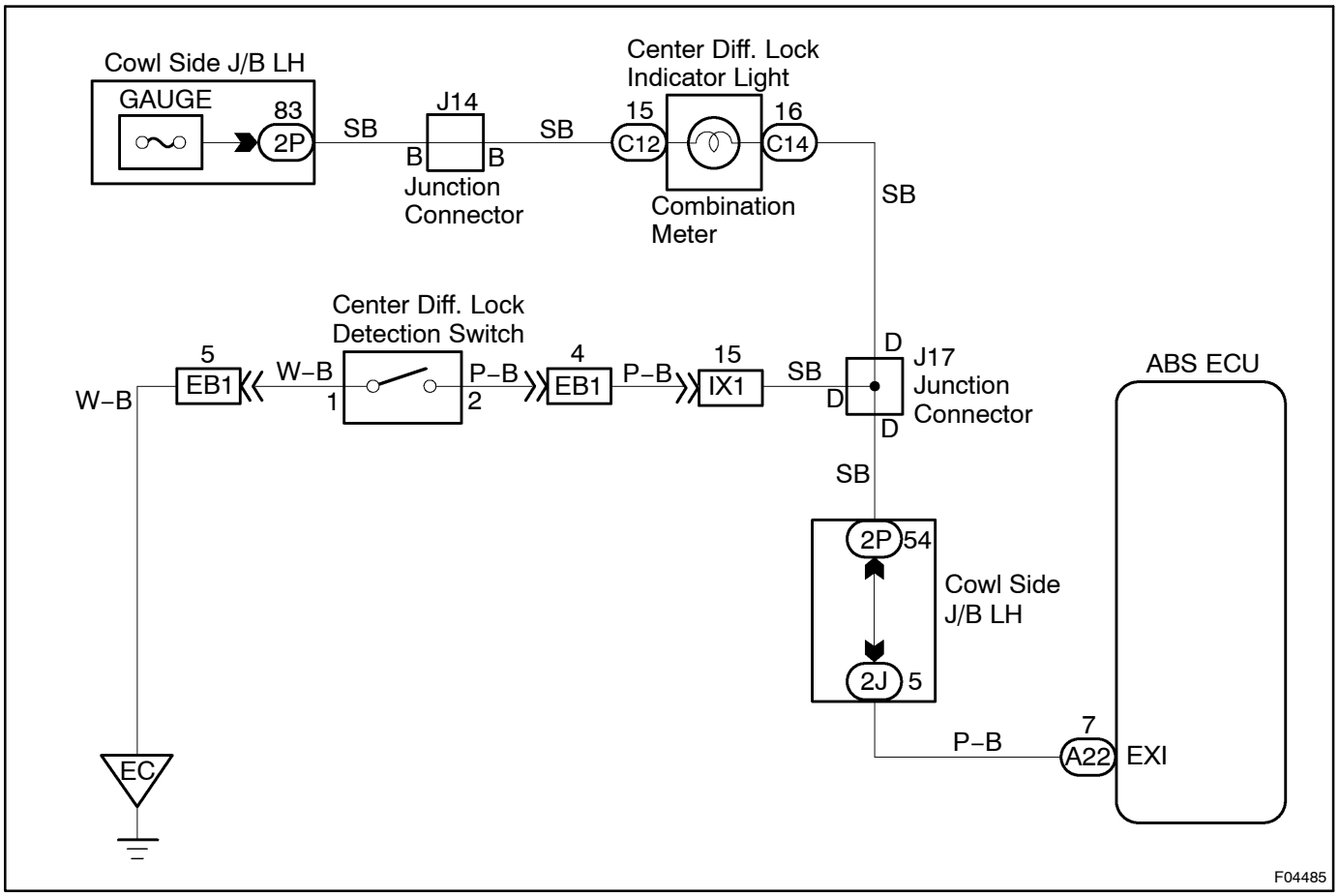
DI13U–02

DTC	C1248 / 48	Rear Differential Lock circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1248 / 48	Open or short circuit in center differential lock circuit. Center differential is locking.	• Rear differential lock • Rear differential lock circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check the rear differential is free and REAR DIFF. LOCK switch is OFF.**

NG → **Repair the rear differential lock system.**

OK

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2	**Is DTC output?**

Check DTC on page DI–219.

NO → **Normal.**

YES

3	**Check that REAR DIFF. LOCK indicator light does not go off.**

NO → **Go to step 6.**

YES

4	**Check that bulb for REAR DIFF. LOCK indicator light is not burnt out.**

YES → **Replace indicator light.**

NO

5	**Check for open circuit in harness and connector between battery and REAR DIFF. LOCK indicator light, REAR DIFF. LOCK indicator light and ABS ECU (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

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6	**Check for short circuit in harness and connector between REAR DIFF. LOCK indicator light and ABS ECU (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS ECU.

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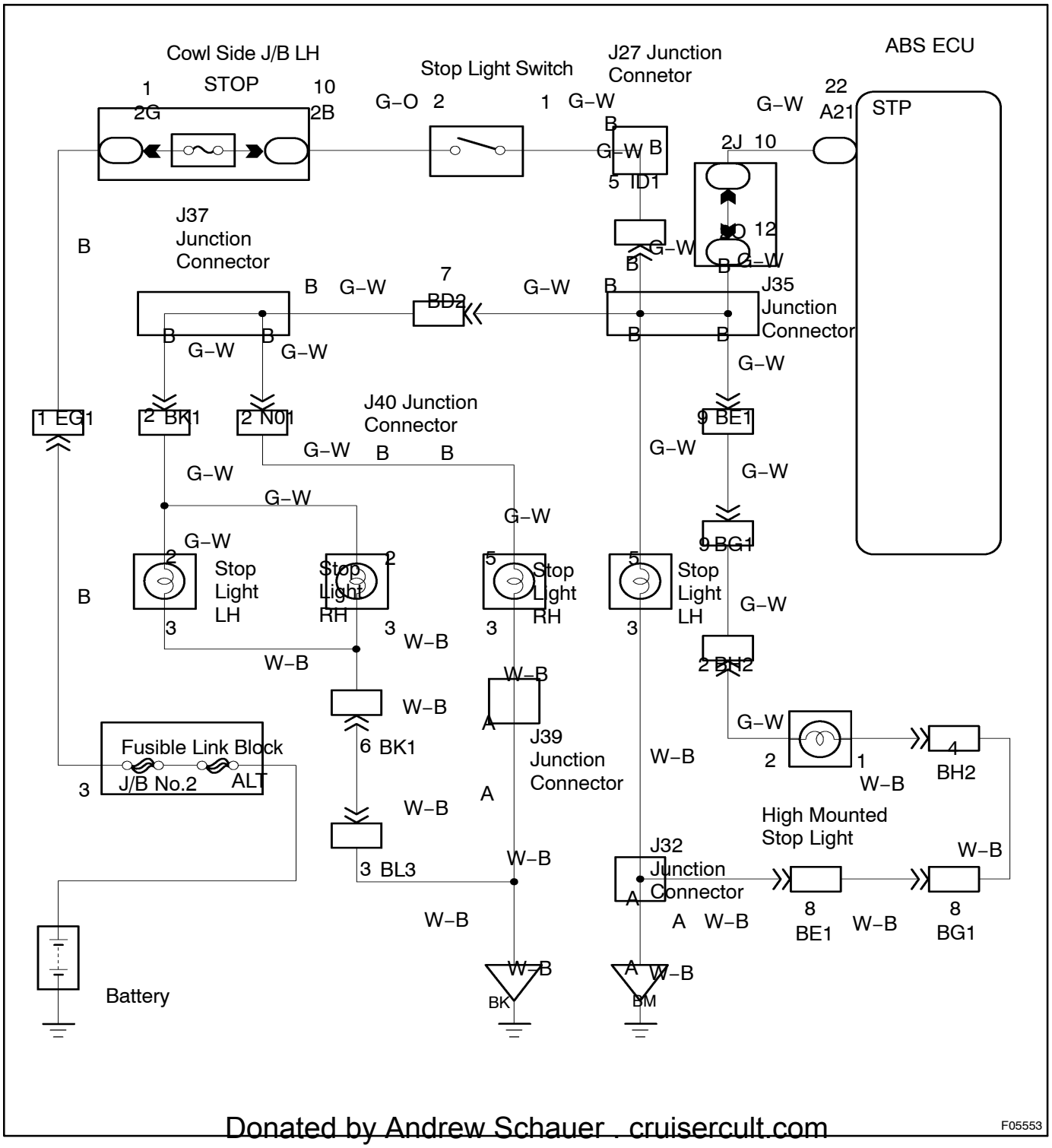
DI297–05

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 19.0 V and ABS is in non–operation, the open in stop light switch circuit continues for 0.3 secs. or more.	• Stop light switch circuit

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check operation of the stop light switch.**

CHECK:

Check that the stop light lights up when brake pedal is depressed and turns OFF when the brake pedal is released.

OK → **Go to step 3.**

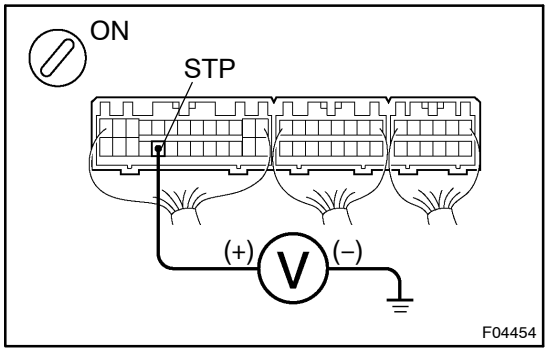
NG

2	**Check stop light circuit (See page BE–44).**

NG → **Repair or replace stop light circuit.**

OK

3	**Check voltage between terminal STP of ABS ECU and body ground.**



PREPARATION:

Remove ABS ECU with connectors still connected.

CHECK:

Measure voltage between terminal STP of ABS ECU and body ground when brake pedal is depressed.

OK:

Voltage: 8 – 14 V

NG → **Go to step 4**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

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4	**Check for open circuit in harness and connector between and stop light switch and ABS ECU (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS ECU.

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DI3BJ–01

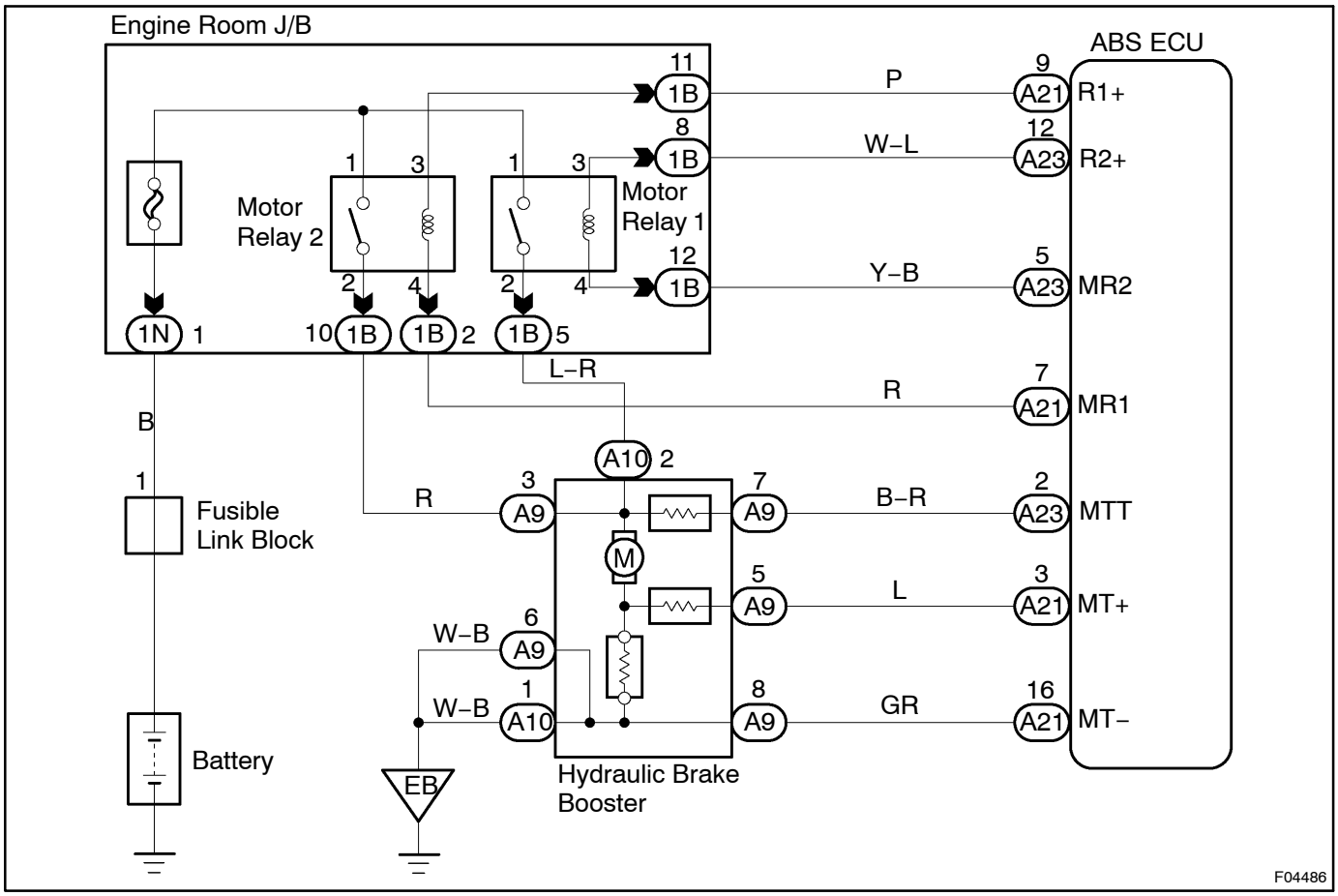
DTC	C1251 / 51	Hydraulic Brake Booster Pump Motor Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1251/51	Either of the following (1) or (2) is detected: (1) After turning the ignition switch ON, the current of more than 34A flows to the motor for more than 1 sec. (2) After turning the ignition switch ON, less than 7A change in current is detected more than 3 times in a low when the motor is ON.	• Hydraulic brake booster pump motor

Fail safe function:
If trouble occurs in the pump motor, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

WIRING DIAGRAM



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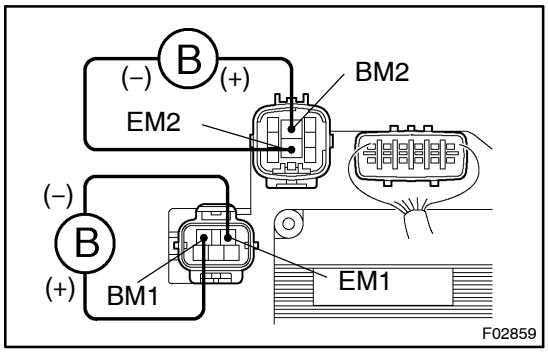
INSPECTION PROCEDURE

1	**Check operation of hydraulic brake booster pump motor.**



PREPARATION:

Disconnect the 2 connectors from the hydraulic brake booster.

CHECK:

Connect battery positive ⊕ lead to BM1 or BM2 terminal and battery negative ⊖ lead to EM1 or EM2 terminal of the hydraulic brake booster (pump motor) connector.

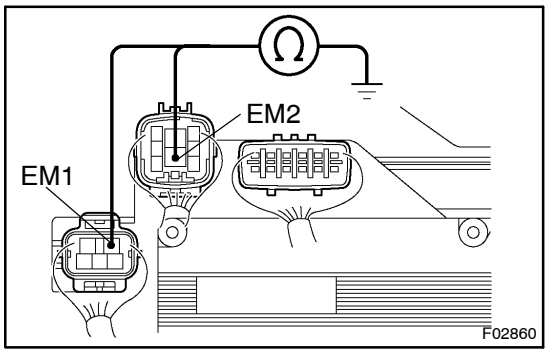
OK:

The operation sound of the pump motor should be heard.

OK	**Go to step 4.**

NG

2	**Check continuity between GND terminal of hydraulic brake booster (pump motor) connector and body ground.**



CHECK:

Check continuity between each of EM1 and EM2 terminals of hydraulic brake booster (pump motor) connector and body ground.

OK:

Continuity

NG	**Repair or replace harness or connector.**

OK

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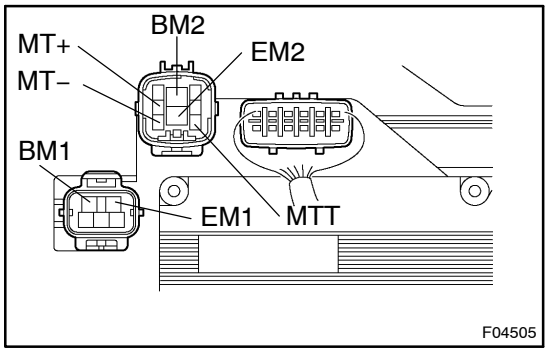
3	**Check hydraulic brake booster resistance.**



PREPARATION:

Disconnect the 2 connectors from the hydraulic brake booster.

CHECK:

Check resistance between terminals MT+ and MT–, BM1 and MTT, BM2 and MTT, EM1 and MT+, EM2 and MT+ of the hydraulic brake booster connector.

OK:

30 – 36 Ω

NG → **Repair the hydraulic brake booster.**

OK

Replace hydraulic brake booster pump motor.

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4	**Check for open circuit in harness and connector between hydraulic brake booster (pump motor) and ABS ECU (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

5	**Check for open or short circuit in harness and connector between pressure switch and ABS ECU (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS ECU.

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DI299–03

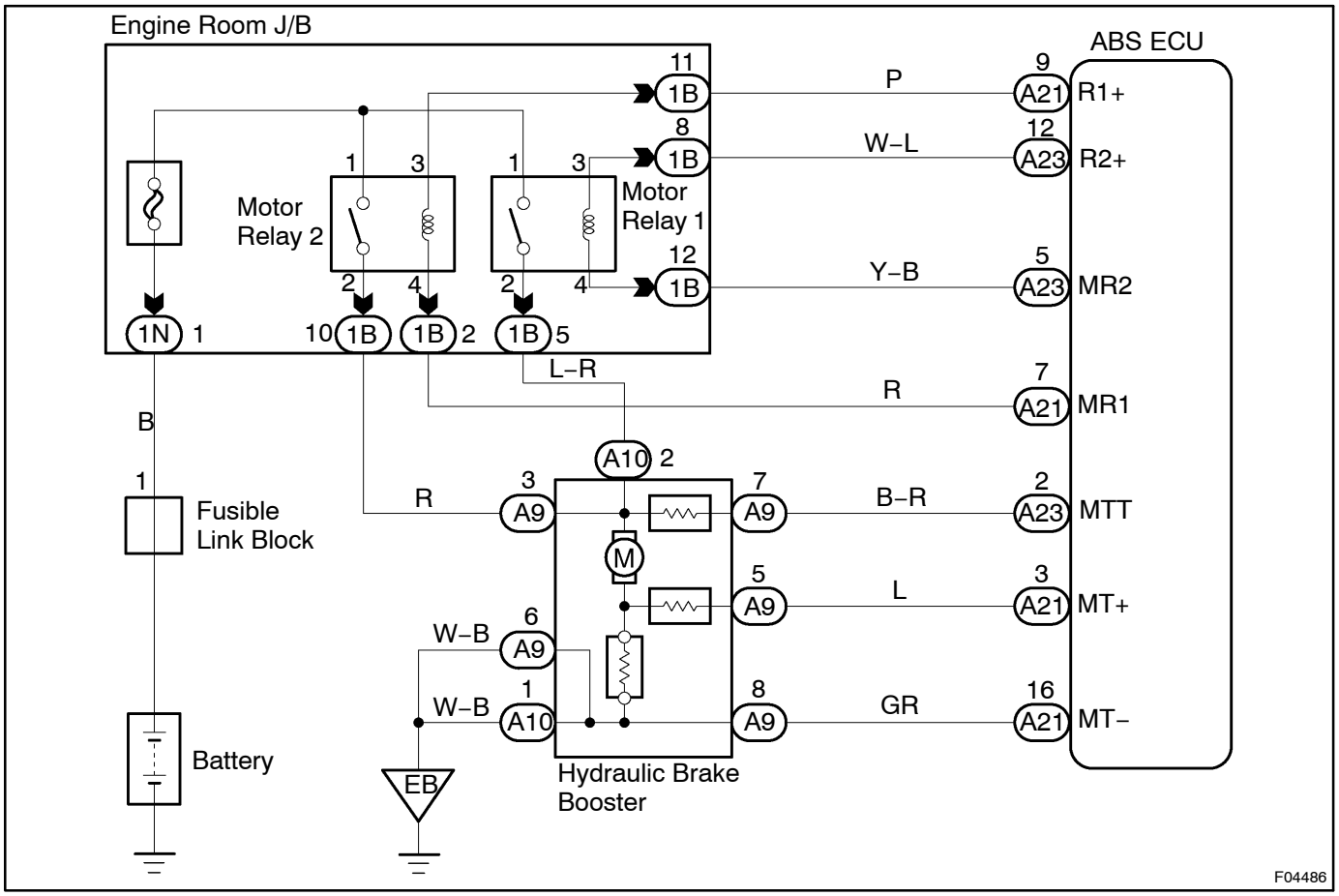
DTC	C1252 / 52	Hydraulic brake booster Pump Motor ON Time Abnormally Long

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1252 / 52	After the ignition switch has been turned ON, when the power is supplied to the pump motor for more than 5 minutes.	• Hydraulic brake booster pump motor • Hydraulic brake booster pump motor circuit • Pressure switch (PH or PL)

Fail safe function:
If trouble occurs in the pump motor, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

WIRING DIAGRAM



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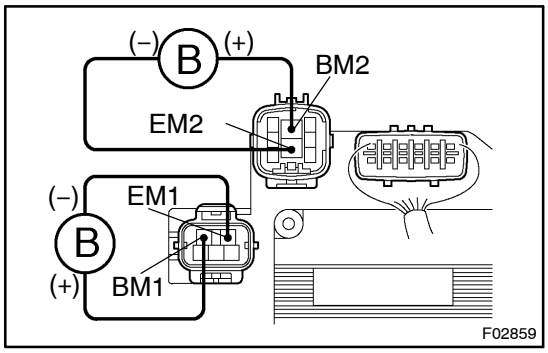
INSPECTION PROCEDURE

1	**Check operation of hydraulic brake booster pump motor.**



PREPARATION:

Disconnect the 2 connectors from hydraulic brake booster connector.

CHECK:

Connect positive ⊕ lead to BM1 or BM2 terminal and negative ⊖ lead to EM1 or EM2 terminal of the hydraulic brake booster (pump motor) connector.

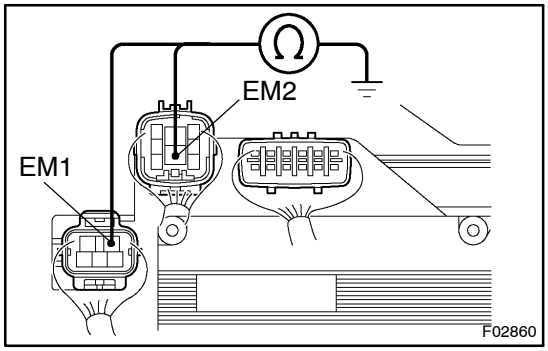
OK:

The operation sound of the pump motor should be heard.

OK	**Go to step 3.**

NG

2	**Check continuity between GND terminal of hydraulic brake booster (pump motor) connector and body ground.**



CHECK:

Check continuity between EM1 or EM2 terminal of hydraulic brake booster (pump motor) connector and body ground.

OK:

Continuity

NG	**Repair or replace harness or connector.**

OK

Replace hydraulic brake booster pump motor.

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3	**Check for short circuit in harness and connector between hydraulic brake booster (pump motor) and ABS ECU (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

4	**Check for short circuit (to B+) in harness and connector between MT of hydraulic brake booster and ABS ECU (See page IN–34).**

OK → **Check and replace ABS ECU.**

NG

5	**Check pressure switch (PH).**

IN CASE OF USING TOYOTA HAND–HELD TESTER:

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.
(c) Select the DATALIST mode on the TOYOTA hand–held tester.

CHECK:

Depress the brake pedal more than 40 times with the ignition switch OFF then turn the ignition switch ON and check the pressure switch (PH) condition.

HINT:

When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

OK:

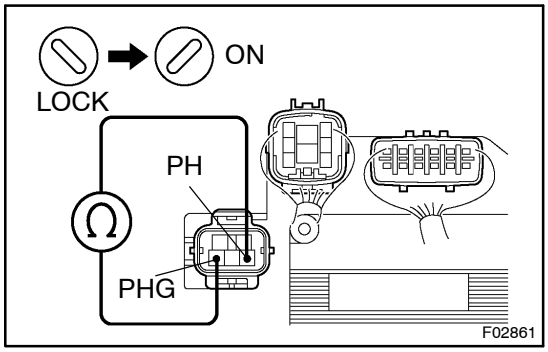
”OFF” turns to ”ON”.

HINT:

OFF: Low pressure

ON: High pressure

IN CASE OF NOT USING TOYOTA HAND–HELD TESTER:



PREPARATION:

(a) Disconnect the connector from the hydraulic brake booster.
(b) With ignition switch OFF, depress the brake pedal more than 40 times to decrease the accumulator pressure.

HINT:

When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

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CHECK:

Measure resistance between terminals PH and PHG of hydraulic brake booster connector.

OK:

Resistance: 0 Ω

PREPARATION:

(a) Connect the connector to the hydraulic brake booster.

(b) Disconnect the connector after ignition switch has been ON and the pump motor has been stopped.

CHECK:

Measure resistance between terminals PH and PHG of hydraulic brake booster connector.

OK:

Resistance: 1 kΩ

HINT:

After inspection, clear the DTC (See page DI–219).

NG → **Replace hydraulic brake booster.**

OK

6	**Check pressure switch (PL).**

IN CASE OF USING TOYOTA HAND–HELD TESTER:

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.

(c) Select the DATALIST mode on the TOYOTA hand–held tester.

CHECK:

Depress the brake pedal more than 40 times with the ignition switch OFF then turn the ignition switch ON and check the pressure switch (PL) condition.

HINT:

When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

OK:

”OFF” turns to ”ON”.

HINT:

OFF: Low pressure

ON: High pressure

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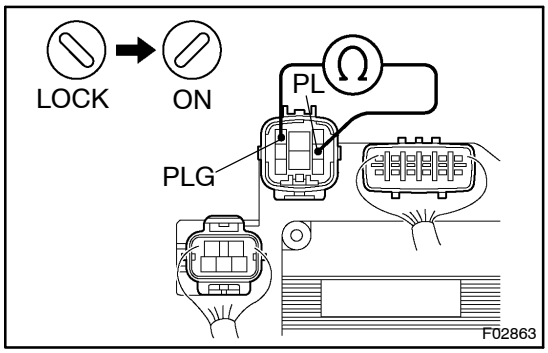
IN CASE OF NOT USING TOYOTA HAND–HELD TESTER:



PREPARATION:

(a) Disconnect the connector from the hydraulic brake booster.

(b) With ignition switch OFF, depress the brake pedal more than 40 times to decrease the accumulator pressure.

HINT:

When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

CHECK:

Measure resistance between terminals PL and PLG of hydraulic brake booster connector.

OK:

Resistance: 1.0 kΩ

PREPARATION:

(a) Connect the connector to the hydraulic brake booster.

(b) Disconnect the connector after ignition switch has been ON and the pump motor has been stopped.

CHECK:

Measure resistance between terminals PL and PLG of hydraulic brake booster connector.

OK:

Resistance: 5.7 kΩ

HINT:

After inspection, clear the DTC (See page DI–219).

NG	**Replace hydraulic brake booster.**

OK

7	**Check for open and short circuit in harness and connector between pressure switch and ABS ECU (See page IN–34).**

NG	**Repair or replace harness or connector.**

OK

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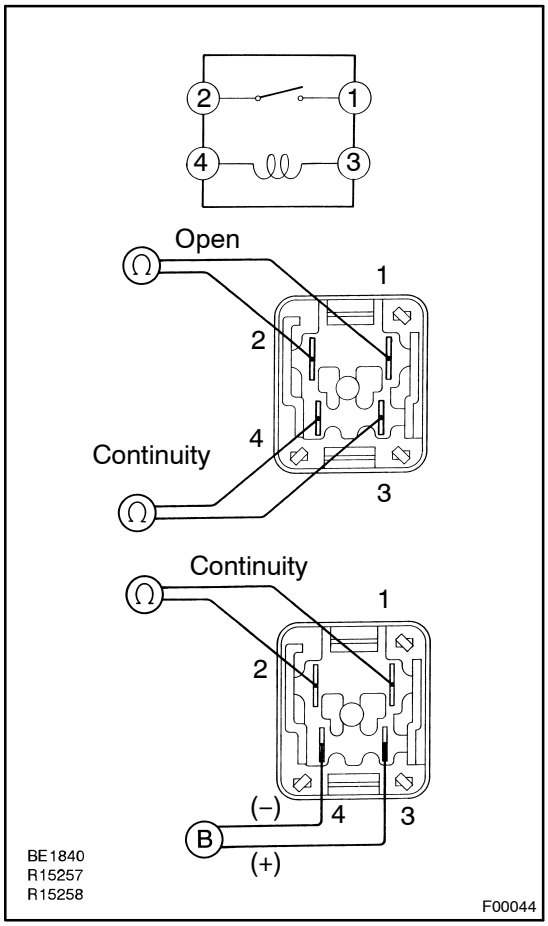
8	Check ABS motor relays.



PREPARATION:

Remove the 2 ABS motor relays from Engine Room R/B No. 2.

CHECK:

Check continuity between each pair of terminal of motor relay.

OK:

Terminals 3 and 4	Continuity (Reference value *1)
Terminals 1 and 2	Open

***1: Motor relay 1 62 Ω**
Motor relay 2 54 Ω

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals.

OK:

Terminals 1 and 2	Continuity

NG → **Replace ABS motor relay.**

OK

9	Check for short circuit in harness and connector between ABS motor relay and ABS ECU (See page IN–34).

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS ECU.

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DI29A–03

DTC	C1253 / 53	Motor Relay Circuit

CIRCUIT DESCRIPTION

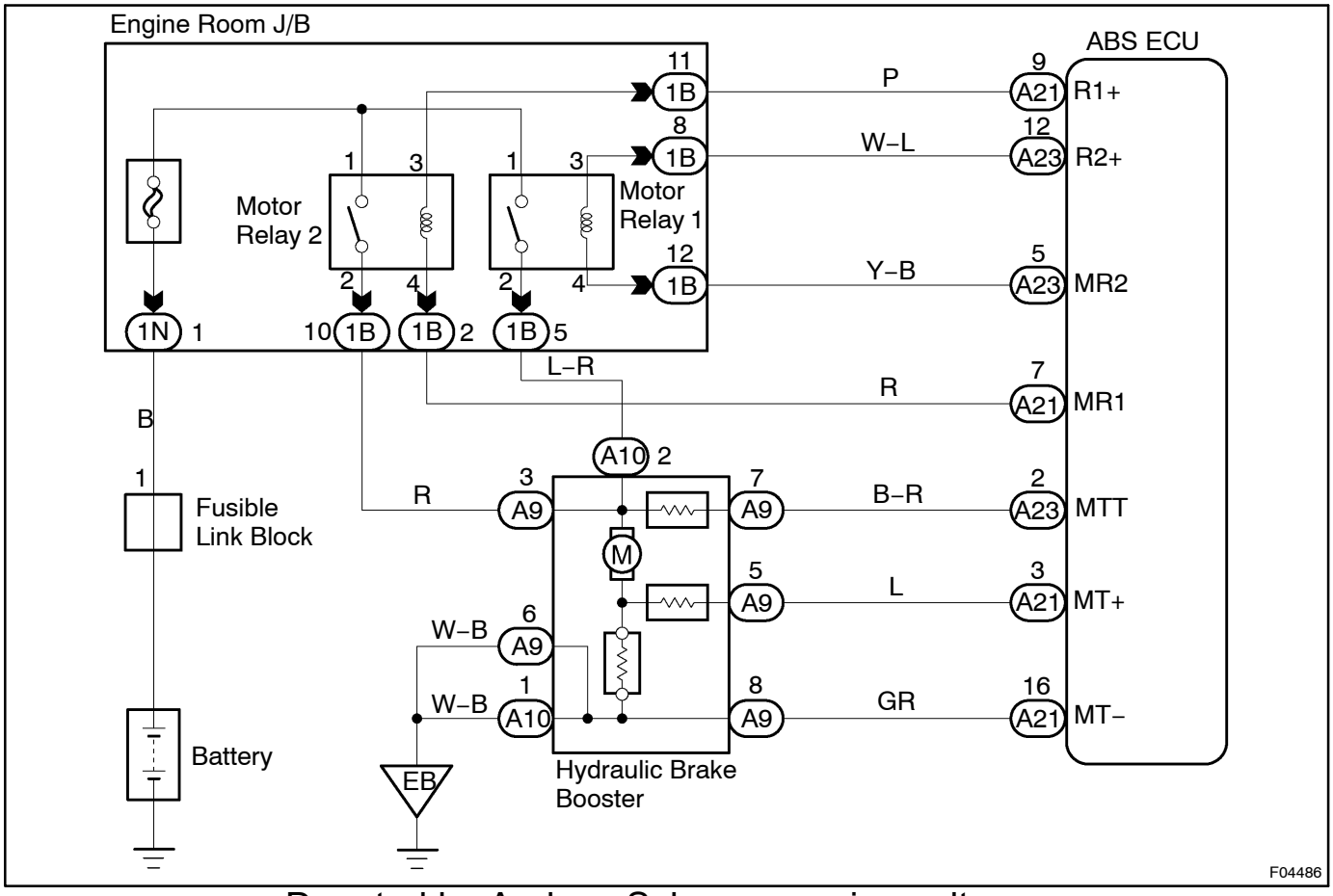
The ABS motor relay supplies power to the hydraulic brake booster pump motor. While the ABS is activated, the ECU switches the motor relay ON and operates the hydraulic brake booster pump motor.

DTC No.	DTC Detecting Condition	Trouble Area
C1253 / 53	When any of the following (1) through (4) is detected: (1) After turning the ignition switch ON, open in the relay coil is detected for more than 1 sec. (2) When the pressure switch does not control motor driving, the condition that the motor relay is always ON continues for more than 1 sec. due to short circuit. (3) When the pressure switch (PH) detects the low pressure or while the pump motor operates to increase the pressure, the condition that the motor relay does not turn ON continues for more than 0.2 secs. (4) When pressure switch does not control motor driving, the condition that the motor relay is always ON due to the welded contact continues for more than 2 secs.	• ABS motor relay • ABS motor relay circuit • Hydraulic brake booster pump motor circuit

Fail safe function:

If trouble occurs in the ABS motor relay circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

WIRING DIAGRAM



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INSPECTION PROCEDURE

Start the inspection from step 1 in case of using the TOYOTA hand–held tester and start from step 3 in case of not using TOYOTA hand–held tester.

1	**Check ABS motor relay operation.**

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.

CHECK:

Check the operation sound of the ABS motor relays individually when operating it with the TOYOTA hand–held tester.

OK:

The operation sound of the ABS motor relay should be heard.

NG → **Go to step 3.**

OK ↓

2	**Check for short circuit (to B+) in harness and connector between MT of hydraulic brake booster and ABS ECU (See page IN–34).**

OK → **Check and replace ABS ECU.**

NG ↓

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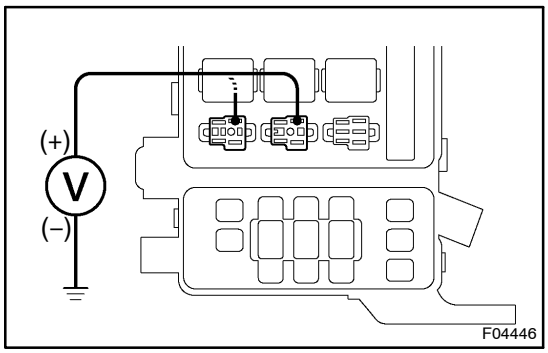
3	**Check voltage between terminal 1 of Engine Room R/B No. 2 (for ABS motor relay) and body ground.**



PREPARATION:

Remove ABS motor relay from Engine Room R/B No. 2.

CHECK:

Measure voltage between terminal 1 of Engine Room R/B No. 2 (for ABS motor relay) and body ground.

OK:

Voltage: 10 – 14 V

NG → **Check and repair harness or connector.**

OK

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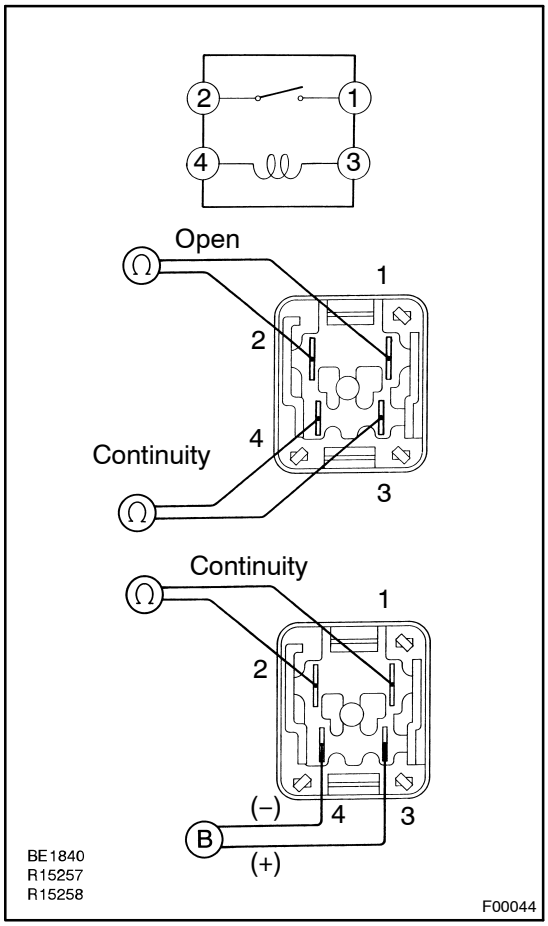
4	Check ABS motor relays.



PREPARATION:

Remove the 2 ABS motor relays from Engine Room R/B No. 2.

CHECK:

Check continuity between each pair of terminal of motor relay.

OK:

Terminals 3 and 4	Continuity (Reference value *1)
Terminals 1 and 2	Open

***1: Motor relay 1 62 Ω**
Motor relay 2 54 Ω

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between 1 and 2 terminals.

OK:

Terminals 1 and 2	Continuity

NG → **Replace ABS motor relay.**

OK

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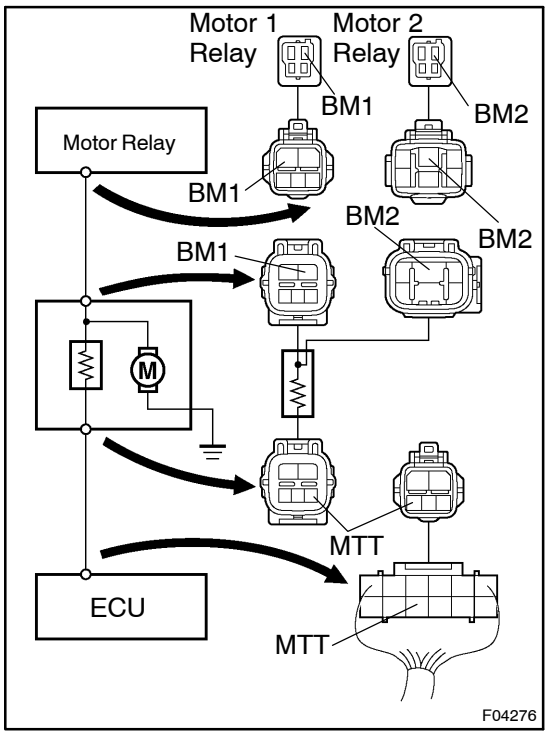
5	Check continuity between each terminal BM1 and BM2 and terminal MTT of ABS ECU.



PREPARATION:

Disconnect the 2 connectors from the hydraulic brake booster.

CHECK:

(a) Check continuity between terminal BM1 of ABS motor relay and terminal MTT of ABS ECU.

(b) Check continuity between terminal BM2 of ABS motor relay and terminal MTT of ABS ECU.

OK:

Continuity

HINT:

There is resistance of 33 ± 3 Ω between terminal BM1or BM2 and MTT of the hydraulic brake booster.

NG → **Repair or replace harness or hydraulic brake booster.**

OK

6	Check for open and short circuit in harness and connector between ABS motor relay and ABS ECU (See page IN–34).

NG → **Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

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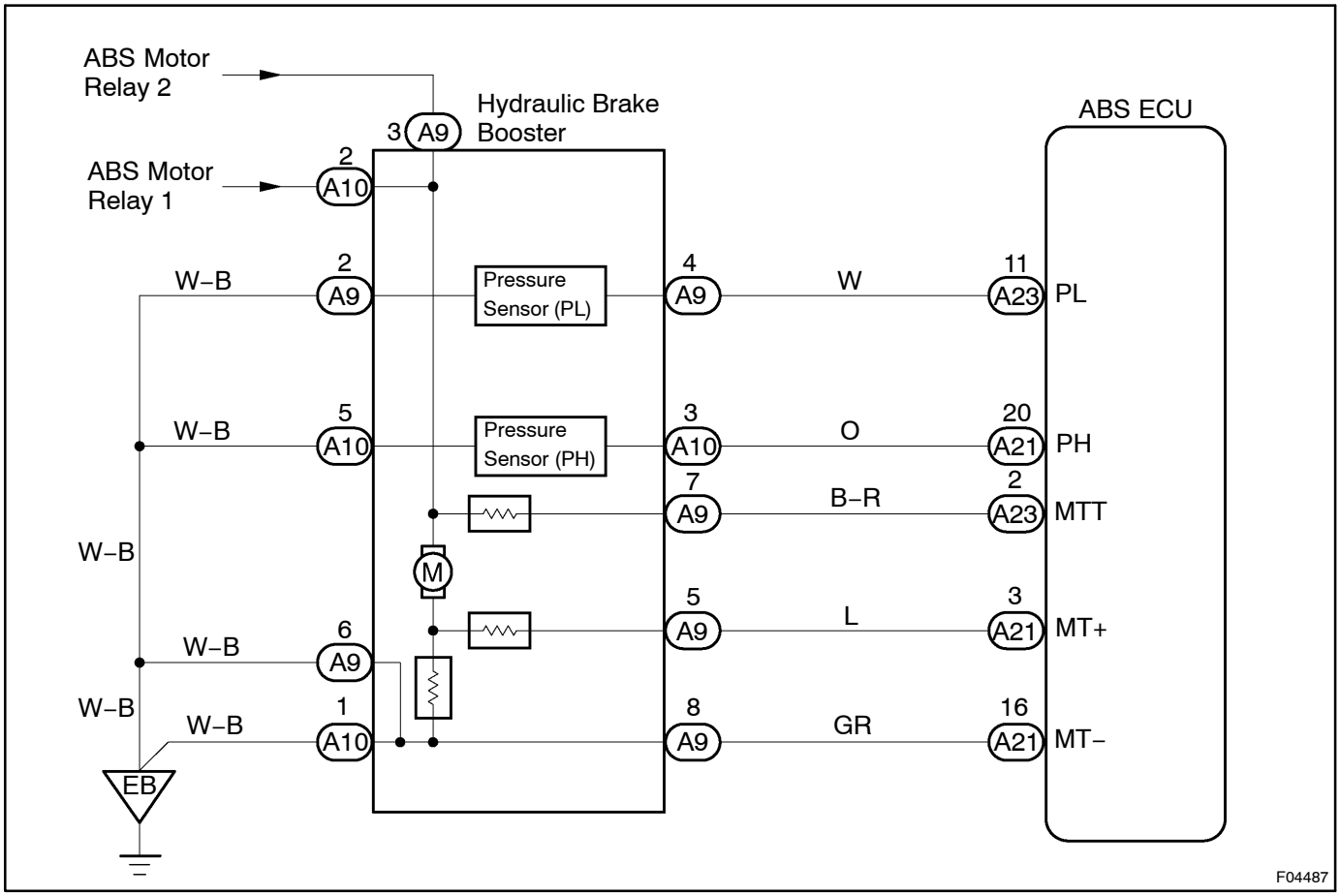
DI29B–03

DTC	C1254 / 54	Pressure Switch Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1254 / 54	Either of the following (1) or (2) is detected: (1) After turning the ignition switch ON, short or open circuit in pressure switch (PL) continues for more than 1 sec. (2) After turning the ignition switch ON open circuit in pressure switch (PH) continues for more than 1 sec.	• Pressure switch (PH or PL) • Pressure switch circuit

WIRING DIAGRAM



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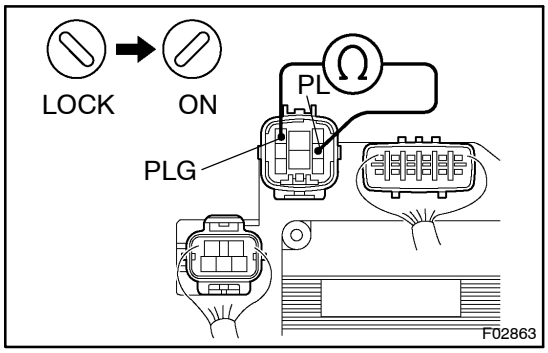
INSPECTION PROCEDURE

1	**Check pressure switch (PL) operation.**



PREPARATION:

(a) Turn the motor switch OFF, and depress the brake pedal 40 times or more.

HINT:

When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

(b) Install the LSPV gauge (SST) to the rear brake caliper and bleed air.

SST 09709 –29018

(c) Disconnect the connector (8P) from the hydraulic brake booster.

CHECK:

While checking the resistance between terminals PL and PLG of hydraulic brake booster, depress the brake pedal with force of more than 343 N (35 kgf, 77 lbf) and turn the ignition switch ON, then check the rear wheel cylinder pressure when the resistance changes from 5.7 kΩ to 1.0 kΩ.

OK:

5,206–9,022 kpa (54–92 kgf·cm^2, 768–1,308 psi)

PREPARATION:

(a) Turn the ignition switch OFF and disconnect the connector (5P) from the hydraulic brake booster.

(b) Turn the ignition switch ON.

CHECK:

While checking the resistance between terminals PL and PLG of hydraulic brake booster, depress the brake pedal changing the force in the range of 197 N (20 kgf, 44 lbf) to 343 N (35 kgf, 77 lbf) and check the rear wheel cylinder pressure when resistance changes from 1.0 kΩ to 5.7 kΩ.

OK:

5,002–8,140 kpa (51–83 kgf·cm^2, 726–1,180 psi)

HINT:

After inspection, clear the DTC (See page DI–219).

NG → **Replace hydraulic brake booster.**

OK

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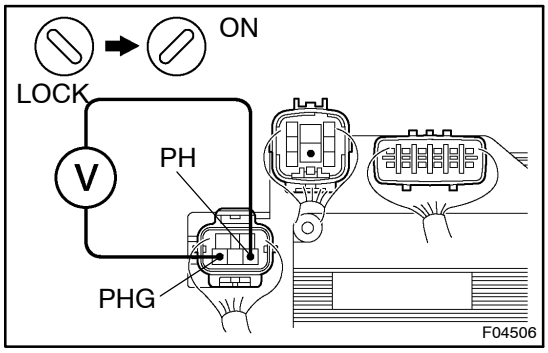
2	Check pressure switch (PH) operation.



PREPARATION:

(a) Turn the ignition switch OFF, and depress the brake pedal 40 times or more.

HINT:

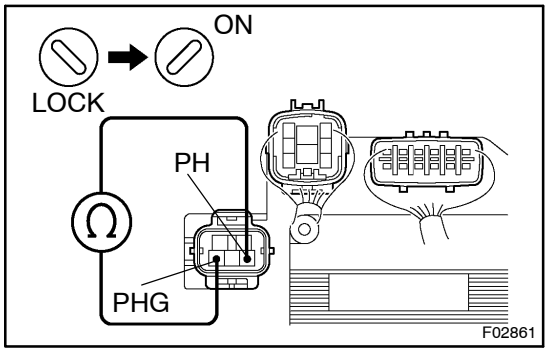
If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit (See page DI–292).

CHECK:

While checking the voltage between terminals PH and PHG of hydraulic brake booster, depress the brake pedal with force of more than 343 N (35 kgf, 77 lbf) and turn the ignition switch ON, then check the rear wheel cylinder pressure when voltage changes from 6V to 0V.

OK:

6,865–11,572 kpa (70–118 kgf·cm^2, 995–1,678 psi)



PREPARATION:

(a) Turn the ignition switch OFF and disconnect the connector from the hydraulic brake booster.

(b) Turn the ignition switch ON.

CHECK:

While checking the resistance between terminals PH and PHG, depress the brake pedal changing the force in the range of 197 N (20 kgf, 44 lbf) to 343 N (35 kgf, 77 lbf) and check the rear wheel cylinder pressure when resistance changes from 0 kΩ to 1 kΩ between PH and PHG.

OK:

6,669–10,591 kpa (68–108 kgf·cm^2, 968–1,647 psi)

HINT:

After inspection, clear the DTC (See page DI–219).

OK	Go to step 4.

NG

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3	**Check pressure switch (PH) and pressure switch (PL)**

CHECK:

Compare the pressure value of the rear wheel cylinder measured in step1 with the one measured in step3.

OK:

- **Pressure when the voltage between PH and PHG becomes 6 to 0 V > pressure when the resistance between PL and PLG becomes 5.7 kΩ to 1.0 kΩ.**
- **Pressure when the resistance between PH and PHG becomes 0 kΩ to 1 kΩ > pressure when the resistance between PL and PLG becomes 1.0 kΩ to 5.7 kΩ.**

NG → **Repair hydraulic brake booster.**

OK

Replace hydraulic brake booster.

4	**Check for open and short circuit in harness and connector between pressure switch and ABS ECU (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS ECU.

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DTC	C1256 / 56	Accumulator low presssure Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1256 / 56	Either of the following (1) through (3) is detected: (1) With the vehicle running, when the pressure switch (PL) detects high pressure, although ABS does not control, the pressure switch (PL) detects low pressure for more than 1.4 secs. (2) With the vehicle running, when the pressure switch (PL) detects high pressure, although ABS control is activated, the pressure switch (PL) detects low pressure for more than 0.2 secs. (3) After the ignition switch is turned ON, the pressure switch (PL) detects low pressure for more than 64 secs. (4) With the vehicle running, after ignition switch has been ON, the pressure switch (PL) detects low pressure for more than 0.2 secs. although ABS does not control and when the pressure switch is ON and stuck to under high pressure. (5) With the vehicle running, after ignition switch is ON, the pressure switch (PL) detects low pressure for more than 0.2 secs. when ABS control is activated, the pressure switch is ON and stuck to under high pressure. (6) With the vehicle running, after ignition switch is ON, the pressure switch (PL) is stuck to under low pressure although ABS does not control for more than 1.4 secs. (7) With the vehicle running, after ignition switch is ON, the pressure switch (PL) is stuck under low pressure when ABS control is activated for more than 0.2 secs.	• Accumulator • Pressure switch (PH or PL) • Hydraulic brake booster pump motor

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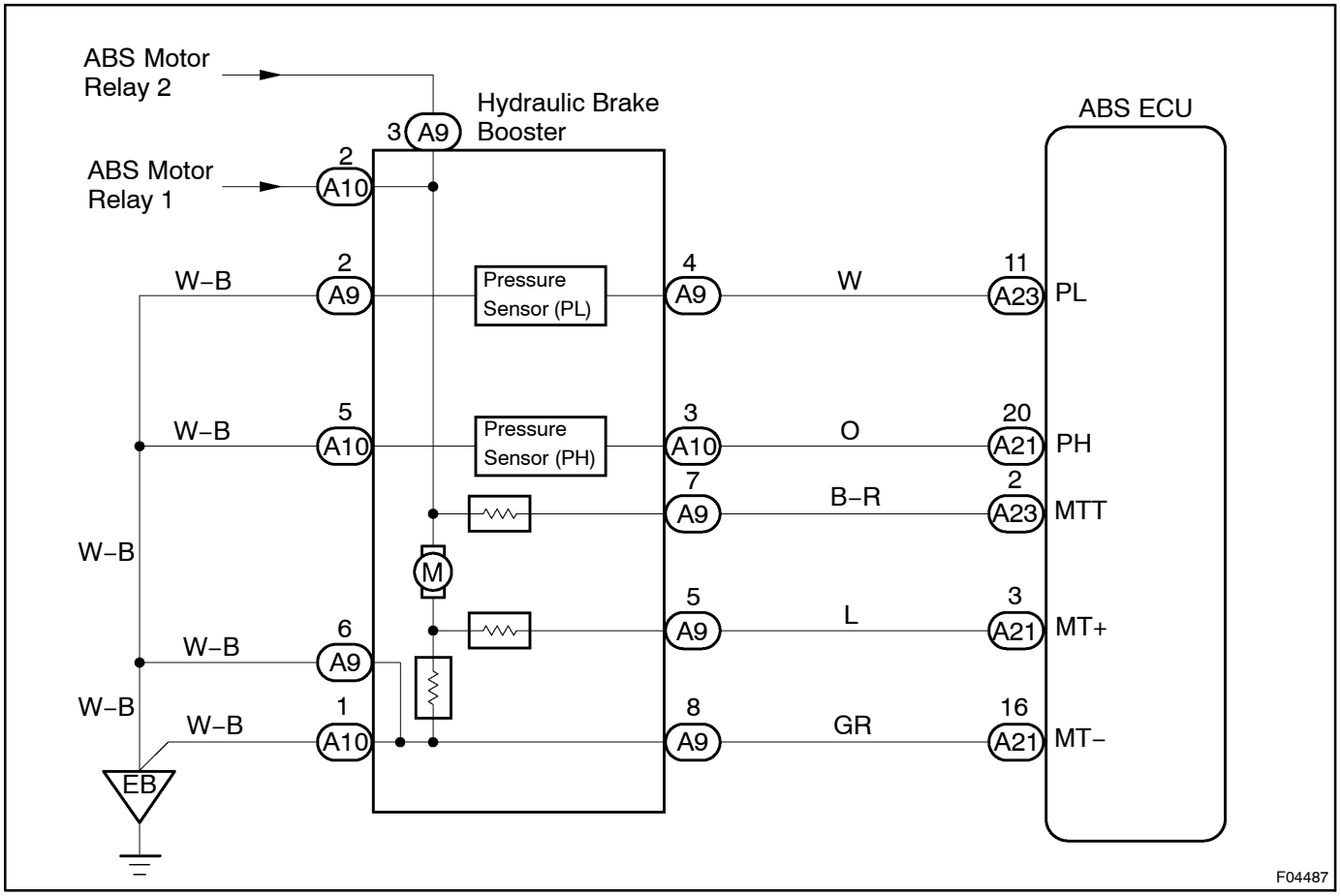
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check accumulator operation.**

PREPARATION:

(a) Turn the ignition switch OFF, and depress the brake pedal 40 times or more.

(b) Install the LSPV gauge (SST) to rear brake caliper and bleed air.
SST 09709–29018

CHECK:

Depress the brake pedal with force of more than 343 N (35 kgf, 77 lbf) and turn the ignition switch ON, then check the rear brake caliper pressure when an increase of pressure changes from acutely to mildly.

OK:

3,432 – 5,884 kPa (35 – 60 kgf/cm^2, 498 – 853 psi) at 20˚C (68˚F)

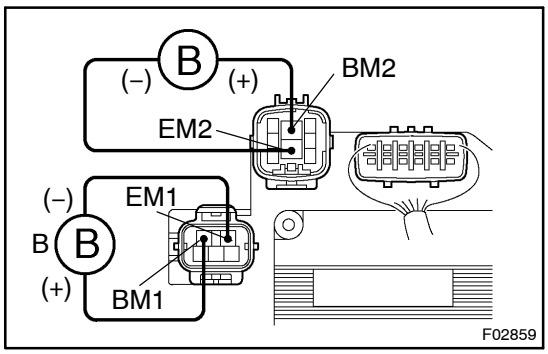
HINT:

If the value is not within the standard, cool the engine room and check it again.

NG → **Replace accumulator.**

OK

2	**Check operation of hydraulic brake booster pump motor.**



PREPARATION:

Disconnect hydraulic brake booster connector.

CHECK:

Connect battery positive ⊕ lead to BM1 or BM2 terminal and battery negative ⊖ lead to EM1 or EM2 terminal of the hydraulic brake booster (pump motor) connector.

OK:

The operation sound of the pump motor should be heard.

OK → **Go to step 4.**

NG

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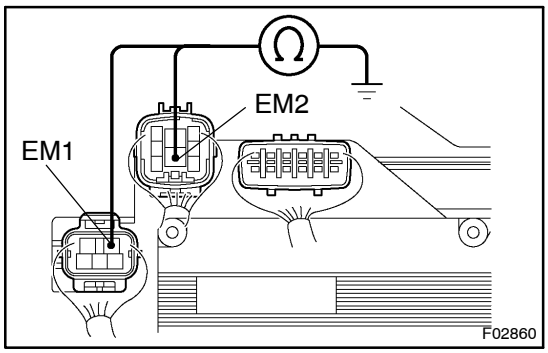
3	**Check continuity between GND terminal of hydraulic brake booster (pump motor) connector and body ground.**



CHECK:

Check continuity between EM1 or EM2 terminal of hydraulic brake booster (pump motor) connector and body ground.

OK:

Continuity

NG → **Repair or replace harness or connector.**

OK →

Replace hydraulic brake booster pump motor.

4	**Check pressure switch (PH).**

IN CASE OF USING TOYOTA HAND–HELD TESTER:

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.

(c) Select the DATALIST mode on the TOYOTA hand–held tester.

CHECK:

Depress the brake pedal more than 40 times with the ignition switch OFF then turn the ignition switch ON and check the pressure switch (PH) condition.

HINT:

When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

OK:

”OFF” turns to ”ON”.

HINT:

OFF: Low pressure

ON: High pressure

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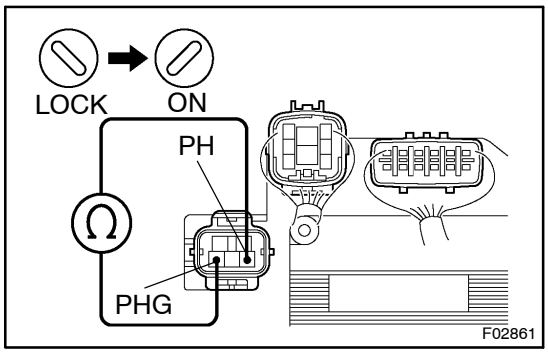
IN CASE OF NOT USING TOYOTA HAND–HELD TESTER:



PREPARATION:

(a) Disconnect the connector from the hydraulic brake booster.

(b) With the ignition switch OFF, depress the brake pedal more than 40 times to decrease the accumulator pressure.

HINT:

When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

CHECK:

Measure resistance between terminals PH and PHG of hydraulic brake booster connector.

OK:

Resistance: 0 kΩ

PREPARATION:

(a) Connect the connector to the hydraulic brake booster.

(b) Disconnect the connector after ignition switch has been ON and the pump motor has stopped.

CHECK:

Measure resistance between terminals PH and PHG of hydraulic brake booster connector.

OK:

Resistance: 1.0 Ω

HINT:

After inspection, clear the DTC (See page DI–219).

OK	**Go to step 6.**

NG

5	**Check for short circuit in harness and connector between pressure switch and ABS ECU (See page IN–34).**

NG	**Repair or replace harness or connector.**

OK

Replace hydraulic brake booster.

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6	**Check pressure switch (PL).**

IN CASE OF USING TOYOTA HAND–HELD TESTER:

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.

(c) Select the DATALIST mode on the TOYOTA hand–held tester.

CHECK:

Depress the brake pedal more than 40 times with the ignition switch OFF then turn the ignition switch ON and check the pressure switch (PL) condition.

HINT:

When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

OK:

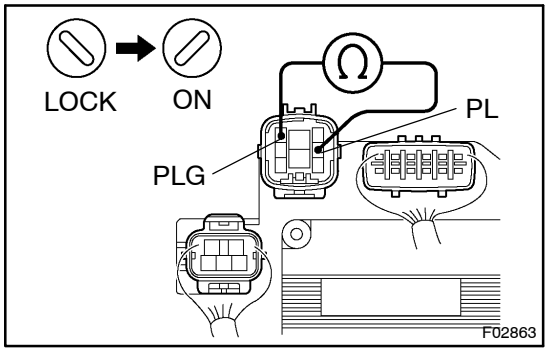
"OFF" turns to "ON".

HINT:

OFF: Low pressure

ON: High pressure

IN CASE OF NOT USING TOYOTA HAND–HELD TESTER:



PREPARATION:

(a) Disconnect the connector from the hydraulic brake booster.

(b) With the ignition switch OFF, depress the brake pedal more than 40 times to decrease the accumulator pressure.

HINT:

When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

CHECK:

Measure resistance between terminals PL and PLG of hydraulic brake booster connector.

OK:

Resistance: 1.0 kΩ

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PREPARATION:

(a) Connect the connector to the hydraulic brake booster.

(b) Disconnect the connector after ignition switch has been ON and the pump motor has stopped.

CHECK:

Measure resistance between terminals PL and PLG of hydraulic brake booster connector.

OK:

Resistance: 5.7 kΩ

HINT:

After inspection, clear the DTC (See page DI–219).

NG → **Replace hydraulic brake booster.**

OK

Check and replace ABS ECU.

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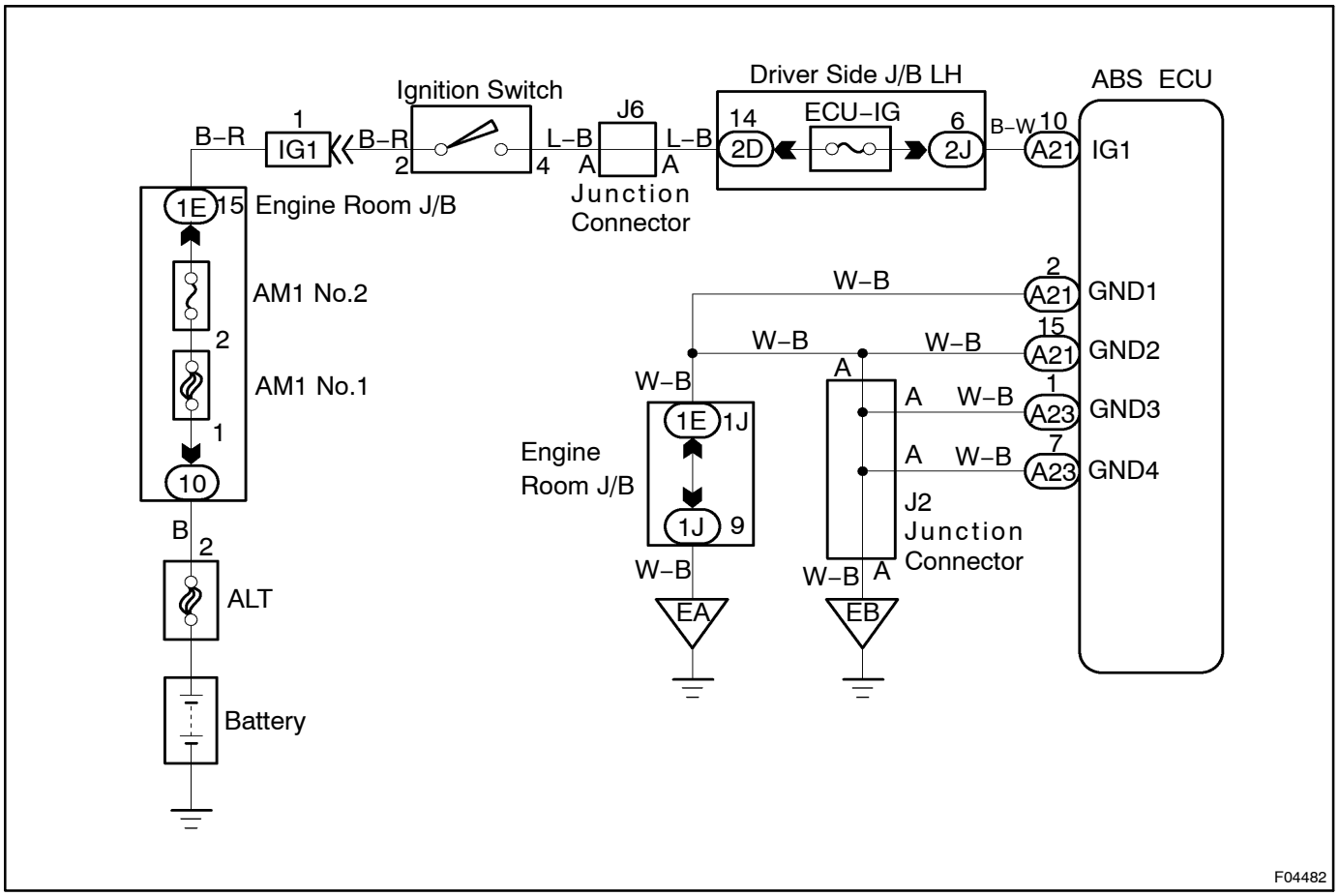
DI3BL–01

DTC	C1257 / 57	Power Supply Drive Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1257 / 57	After the ignition switch has been turned ON, open or short circuit in circuit of power supply drive system inside ECU.	• Battery • Power source circuit • ABS ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check battery positive voltage.**

OK:

Voltage: 10 – 14 V

NG → **Check and repair the charging system.**

OK

2	**Check voltage of the ECU IG power souce.**

IN CASE OF USING TOYOTA HAND–HELD TESTER:

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.
(c) Select the DATALIST mode on the TOYOTA hand–held tester.

CHECK:

Check the voltage condition output from the ECU displayed on the TOYOTA hand–held tester.

OK:

”Normal” is displayed.

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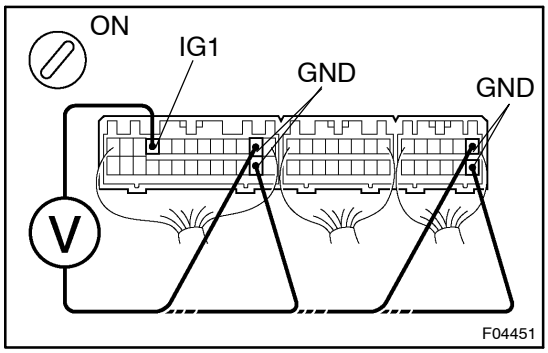
IN CASE OF NOT USING TOYOTA HAND–HELD TESTER:



PREPARATION:

Remove ABS ECU with connectors still connected.

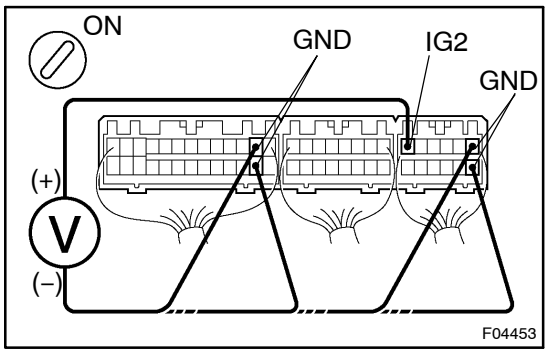
CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals IG1 and GND of ABS ECU connector.

OK:

Voltage: 10 – 14 V



CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals IG2 and GND of ABS ECU connector.

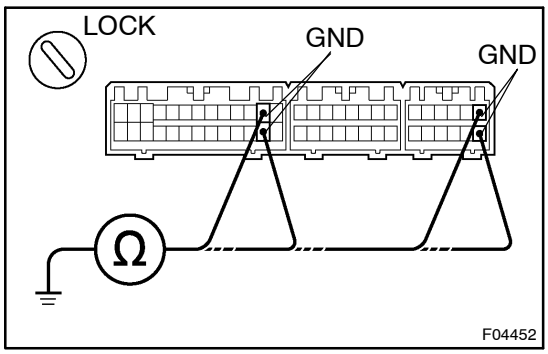
OK:

Voltage: 10 – 14 V

OK	**Ignition switch OFF, check and replace ABS ECU.**

NG

3	**Check continuity between terminal GND of ABS ECU connector and body ground.**



CHECK:

Measure resistance between terminal GND of ABS ECU connector and body ground.

OK:

Resistance: 1 Ω or less

NG	**Repair or replace harness or connector.**

OK

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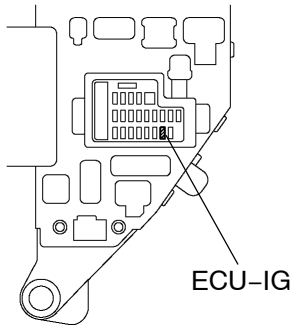
4	**Check ECU–IG fuse.**

Driver's
Side J/B



F04448

PREPARATION:

Remove ECU–IG fuse from the driver's side J/B.

CHECK:

Check continuity of ECU–IG fuse.

OK:

Continuity

NG → **Check for short circuit in all the harness and components connected to ECU–IG fuse (See attached wiring diagram).**

OK

Check for open circuit in harness and connector between ABS ECU and battery (See page IN–34).

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DI29E–04

DTC	Always ON	Malfunction in ECU

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
Always ON	Either of the following (1) through (3) is detected: (1) The ECU connectors are OFF from the ECU. (2) There is a malfunction in the ECU internal circuit. (3) The voltage of terminal IG1 is more than 18.5 V.	• Battery • IC regulator • Power source circuit • ABS ECU

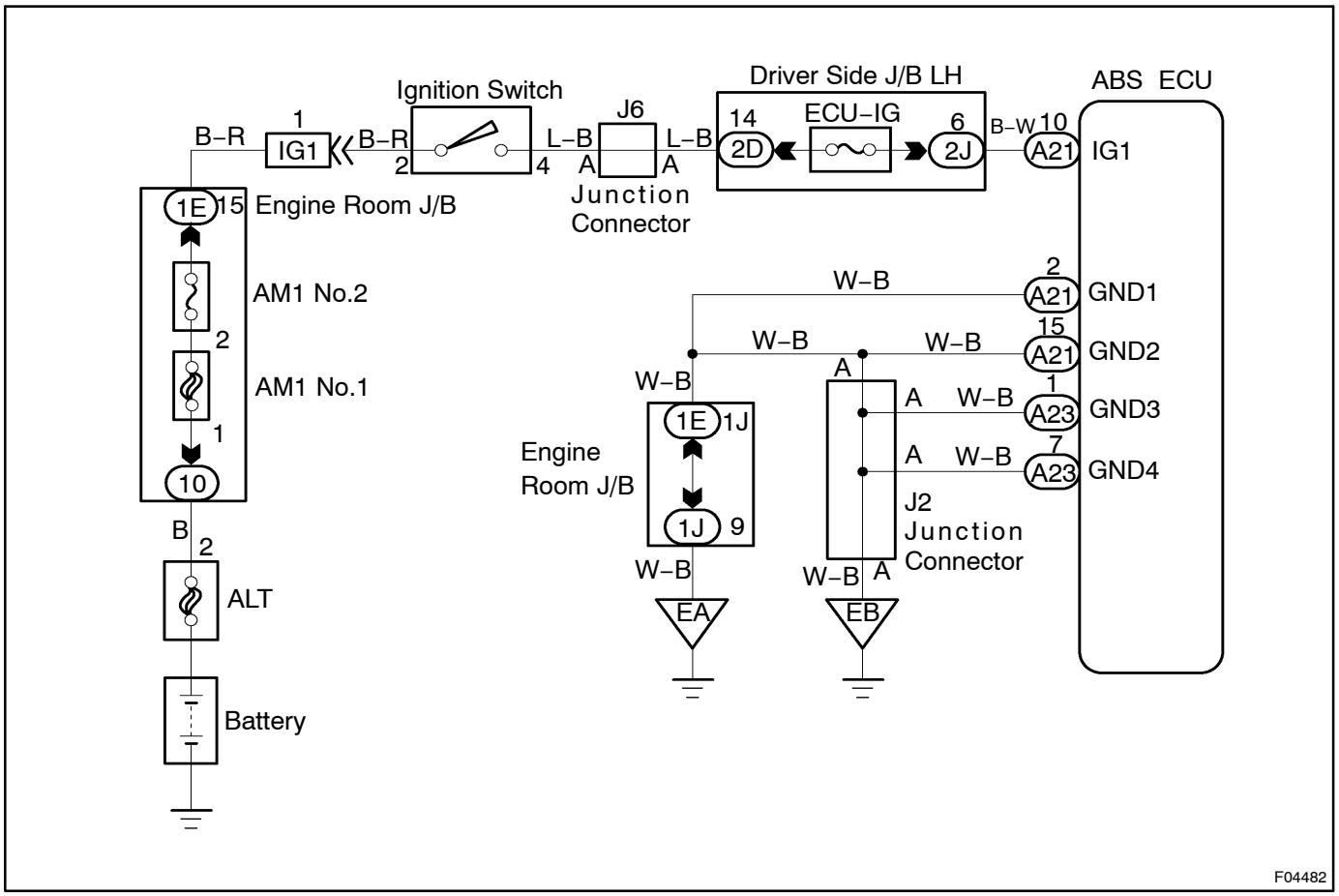
HINT:

There is a case that TOYOTA hand–held tester cannot be used when ECU is abnormal.

Fail safe function:

If trouble occurs in the ECU, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check that the ECU connectors are securely connected to the ECU.**

NO → **Connect the connector to the ECU.**

YES

2	**Is DTC output?**

Check DTC on page DI–219.

YES → **Repair circuit indicated by the output code .**

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–34).**

NO

4	**Does ABS warning light go off?**

YES → **Check for open or short circuit in harness and connector between ECU–IG fuse and ECU (See page IN–34).**

NO

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5	Check battery positive voltage.

CHECK:

(a) Start the engine.

(b) Check the battery positive voltage.

OK:

Voltage: 10 – 16 V

NG → **Check and repair the charging system.**

OK

6	Check operation of the ABS warning light.

IN CASE OF USING TOYOTA HAND–HELD TESTER:

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.

(c) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.

CHECK:

Check that ”ON” and ”OFF” of the ABS warning light can be shown on the combination meter by the TOYOTA hand–held tester.

IN CASE OF NOT USING TOYOTA HAND–HELD TESTER:

PREPARATION:

(a) Turn the ignition switch OFF.

(b) Disconnect the connector from the ABS 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 goes on

OK → **Check and replace ABS ECU.**

NG

Check for short circuit in harness and connector between combination meter and ABS ECU, combination meter and DLC1 (See page IN–34).
Check ABS solenoid relay circuit (See page DI–239).

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DI29F–05

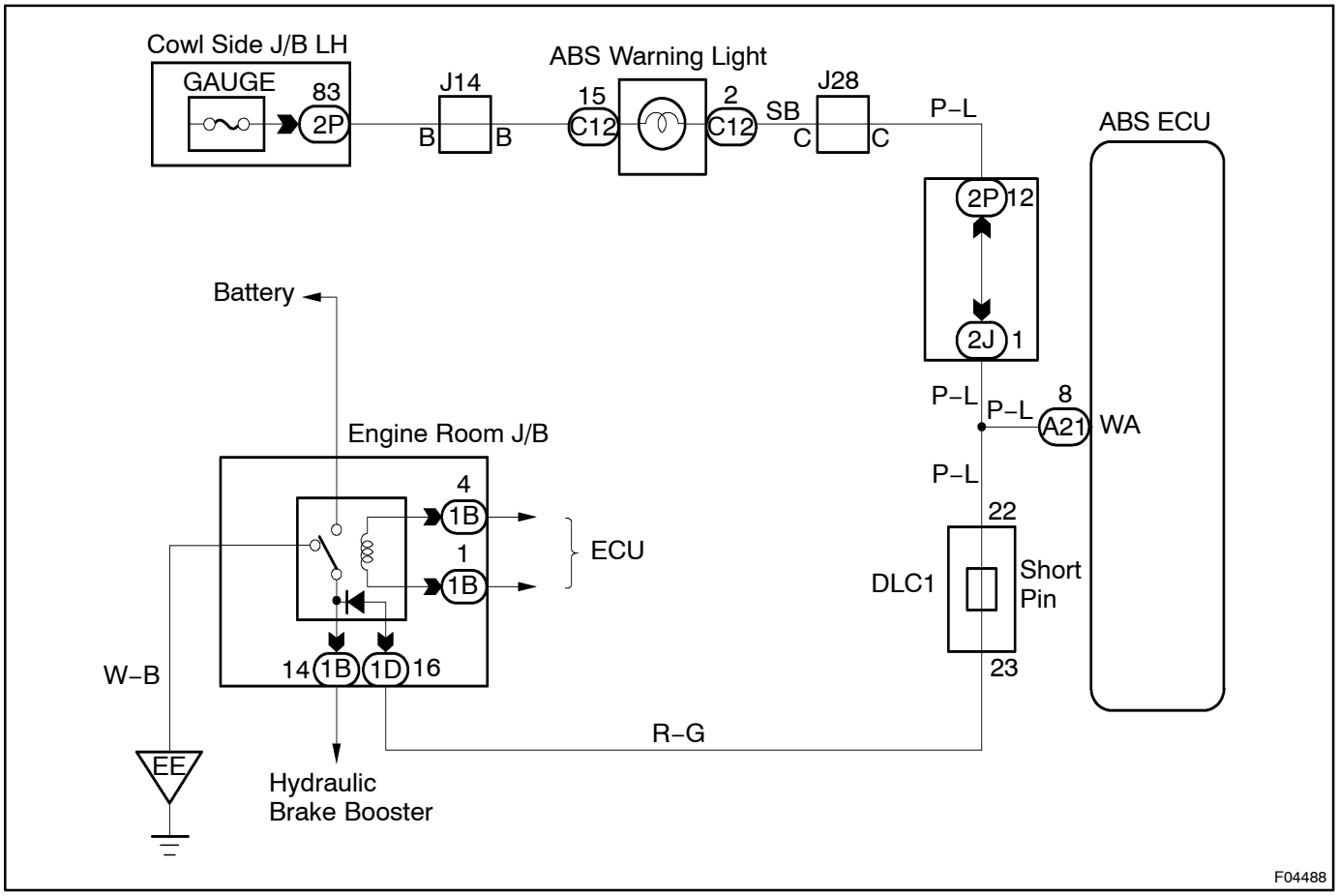
ABS Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU detects trouble, it lights the ABS warning light while at the same time prohibiting ABS control. At this time, the ECU records a DTC in memory.

After removing the short pin of the DLC1, connect terminals Tc and E_1 of the DLC1 to make the ABS warning light blink and output the DTC.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Troubleshoot 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 TOYOTA hand–held tester and start from step 2 in case of not using TOYOTA hand–held tester.

*2: After inspection of step 4, start the inspection from step 5 in case of using the TOYOTA hand–held tester and start from step 6 in case of not using TOYOTA hand–held tester.

1	**Check operation of the ABS warning light.**

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.

(c) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.

CHECK:

Check that ”ON” of the ABS warning light can be shown on the combination meter using the TOYOTA hand–held tester.

HINT:

ABS warning light turns ”OFF” automatically 2 seconds after it is turnd ”ON”.

OK → **Check and replace ECU.**

NG

2	**Check ABS warning light.**

See Combination Meter Troubleshooting on page BE–2.

NG → **Repair bulb or combination meter assembly.**

OK

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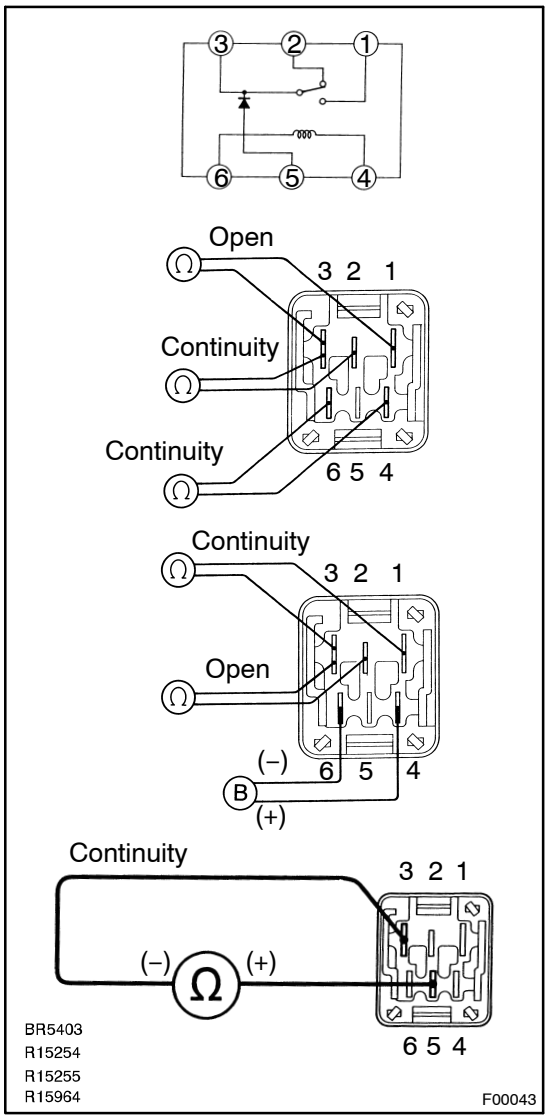
3	Check ABS solenoid relay.



PREPARATION:

Remove ABS solenoid relay from Engine Room R/B No. 2.

CHECK:

Check continuity between each terminal of ABS solenoid relay.

OK:

Terminals 4 and 6	Continuity (Reference value 80 Ω)
Terminals 2 and 3	Continuity
Terminals 1 and 3	Open

CHECK:

(a) Apply battery positive voltage between terminals 4 and 6.

(b) Check continuity between each terminal of ABS solenoid relay.

OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

CHECK:

Connect the ⊕ test lead to terminal 5 and the ⊖ lead to terminal 3. Check continuity between the terminals.

OK:

Continuity

If there is no continuity, connect the ⊖ test lead to terminal 5 and the ⊕ lead to terminal 3. Recheck continuity between 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–34).

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4	**Check that the ECU connectors are securely connected to the ECU.**

NO → **Connect the connector to the ECU.**

YES

5	**Check operation of the ABS warning light (See step 1).**

OK → **Check and replace ABS ECU.**

NG

6	**Is DTC output?**

Check DTC on page DI–219.

YES → **Repair circuit indicated by the output code.**

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–34).**

YES

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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–34).

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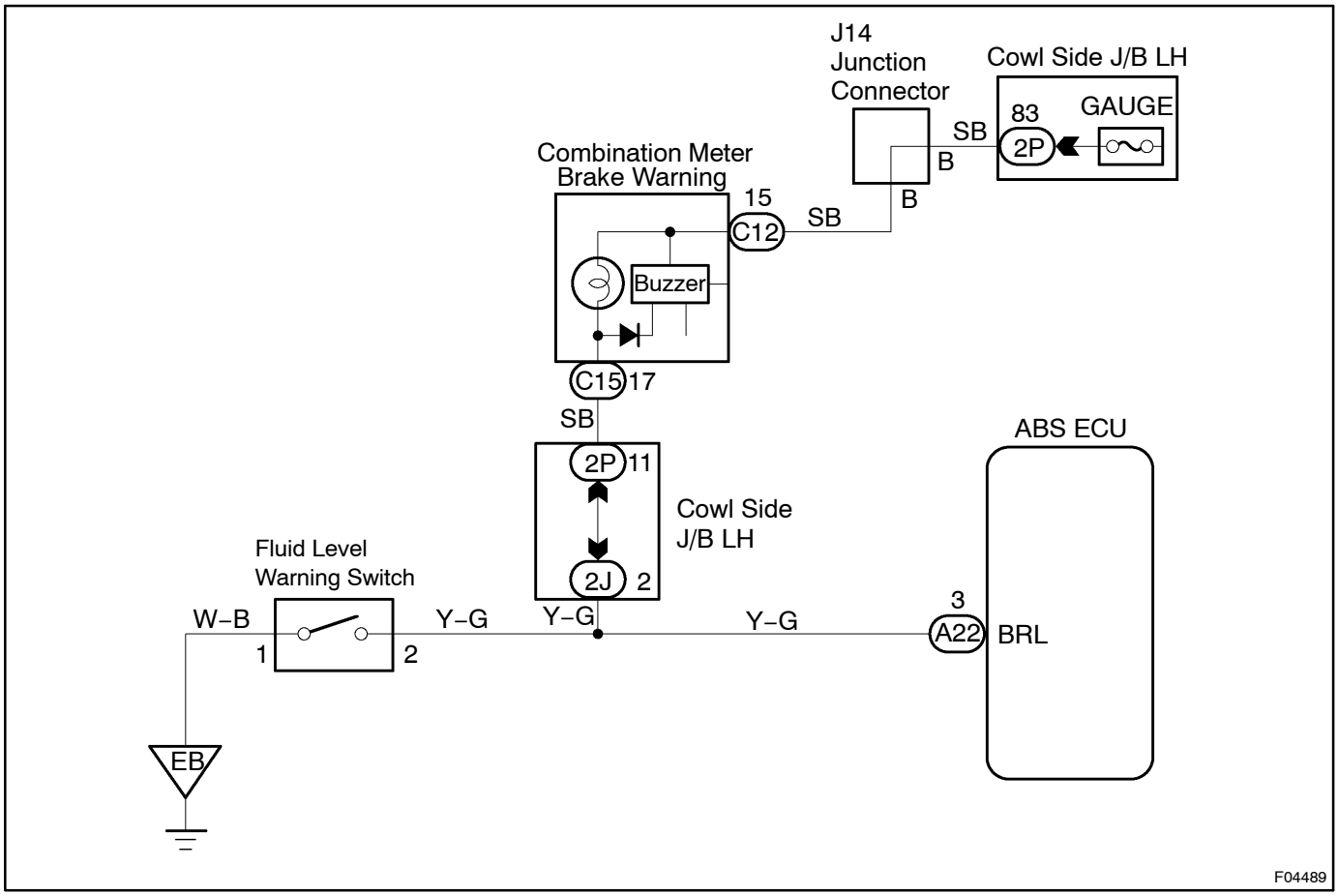
DI29G–05

BRAKE Warning Light Circuit

CIRCUIT DESCRIPTION

The BRAKE warning light lights up when the brake fluid is insufficient and an abnormality occurs in the hydro brake booster.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check parking brake switch circuit (See page BE–57).**

NG → **Repair or replace parking brake switch circuit.**

OK

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2	**Check brake fluid level warning switch circuit (See page BE–57).**

NG → **Repair or replace brake fluid level warning switch circuit.**

OK

3	**Is DTC output for ABS ?**

Check DTC on page BE–44.

Yes → **Repair circuit indicated by the output code.**

No

4	**Check BRAKE warning light.**

See combination meter troubleshooting on page BE–2.

NG → **Repair or replace combination meter.**

OK

5	**Check multiplex communication system (See page DI–607).**

NG → **Repair or replace multiplex communication circuit.**

OK

Check and replace ABS ECU.

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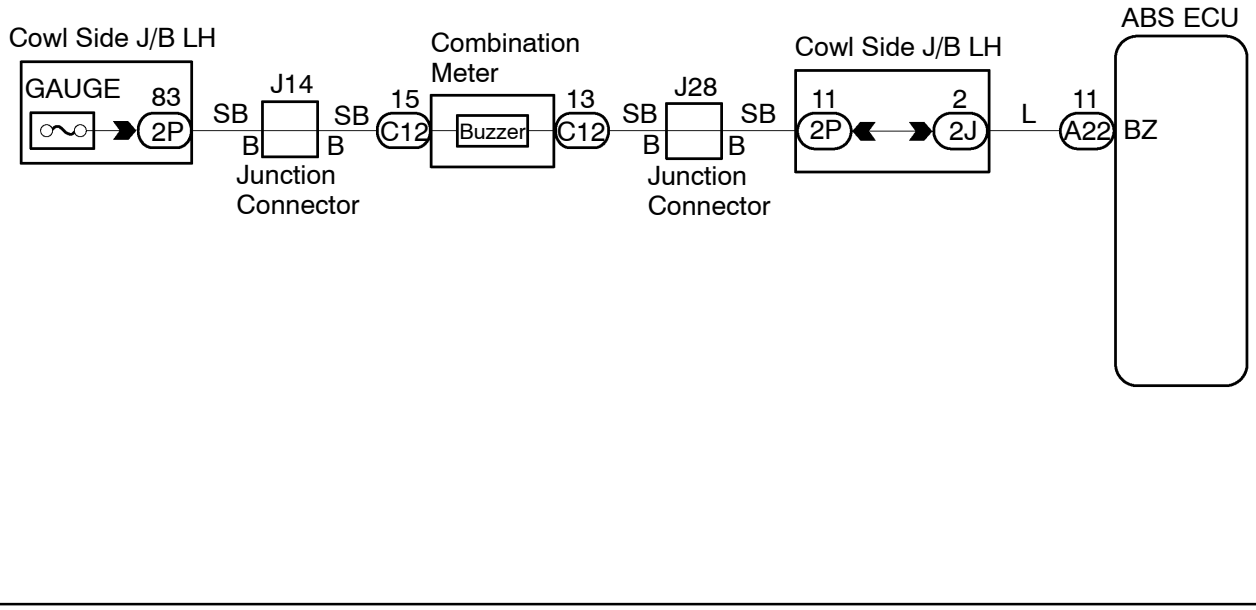
DI3BH–01

BRAKE Warning Buzzer Circuit

CIRCUIT DESCRIPTION

The BRAKE warning buzzer sounds when the accumulator pressure is abnormally low or an abnormality casing low fluid pressure occurs.

WIRING DIAGRAM



INSPECTION PROCEDURE

Start the inspection from step 1 in case of using the TOYOTA hand–held tester and start from step 2 in case of not using the TOYOTA hand–held tester.

1	**Check operation of the BRAKE warning buzzer.**

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.

CHECK:

Check that BRAKE warning buzzer sounds ”ON” using the TOYOTA hand–held tester.
HINT:
BRAKE warning buzzer sounds ”OFF” automatically 2 seconds after it sounds ”ON”.

OK → **Check and replace ABS ECU.**

NG

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2	**Check BRAKE warning buzzer.**

See combination meter troubleshooting on page BE–52.

NG → **Replace BRAKE warning buzzer.**

OK

3	**Check for open and short circuit in harness and connector between BRAKE warning buzzer and ABS ECU (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS ECU.

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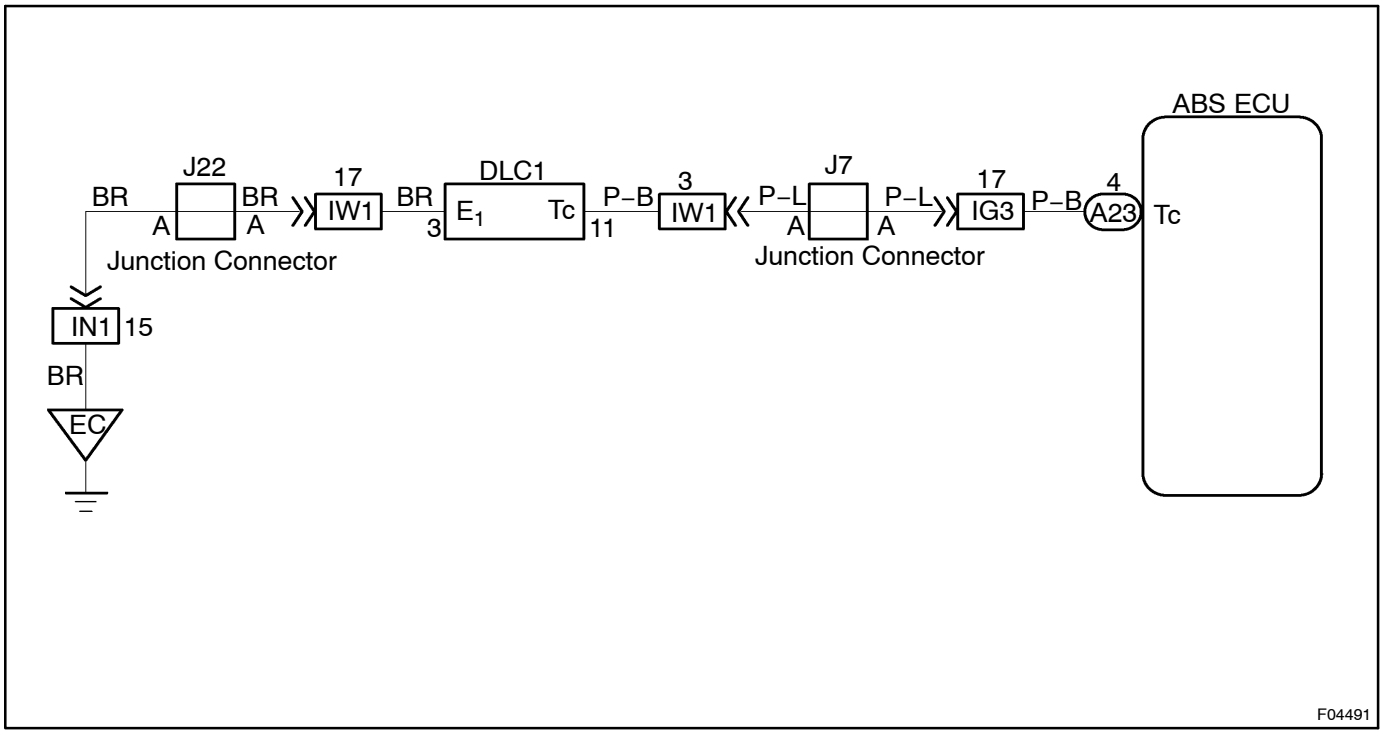
DI29I–04

Tc Terminal Circuit

CIRCUIT DESCRIPTION

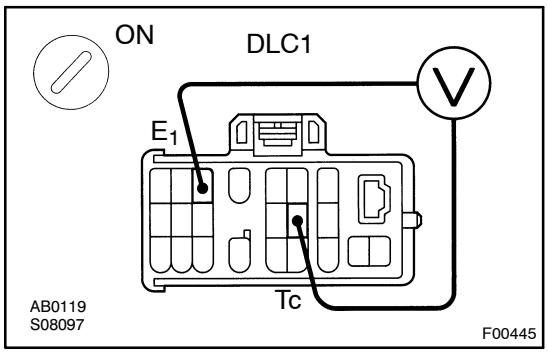
Connecting terminals Tc and E_1 of the DLC1 causes the ECU to display the DTC by flashing the ABS warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Tc and E_1 of DLC1.**



PREPARATION:

Turn ignition switch ON.

CHECK:

Measure voltage between terminal Tc and E1 of DLC1.

OK:

Voltage: 10 – 14 V

OK	**If ABS warning light does not blink even after Tc and E_1 are connected, the ECU may be defective.**

NG

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2	**IG switch OFF, and check for open and short circuit in harness and connector between ABS ECU and DLC1, DLC1 and body ground (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS ECU.

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DI29J–04

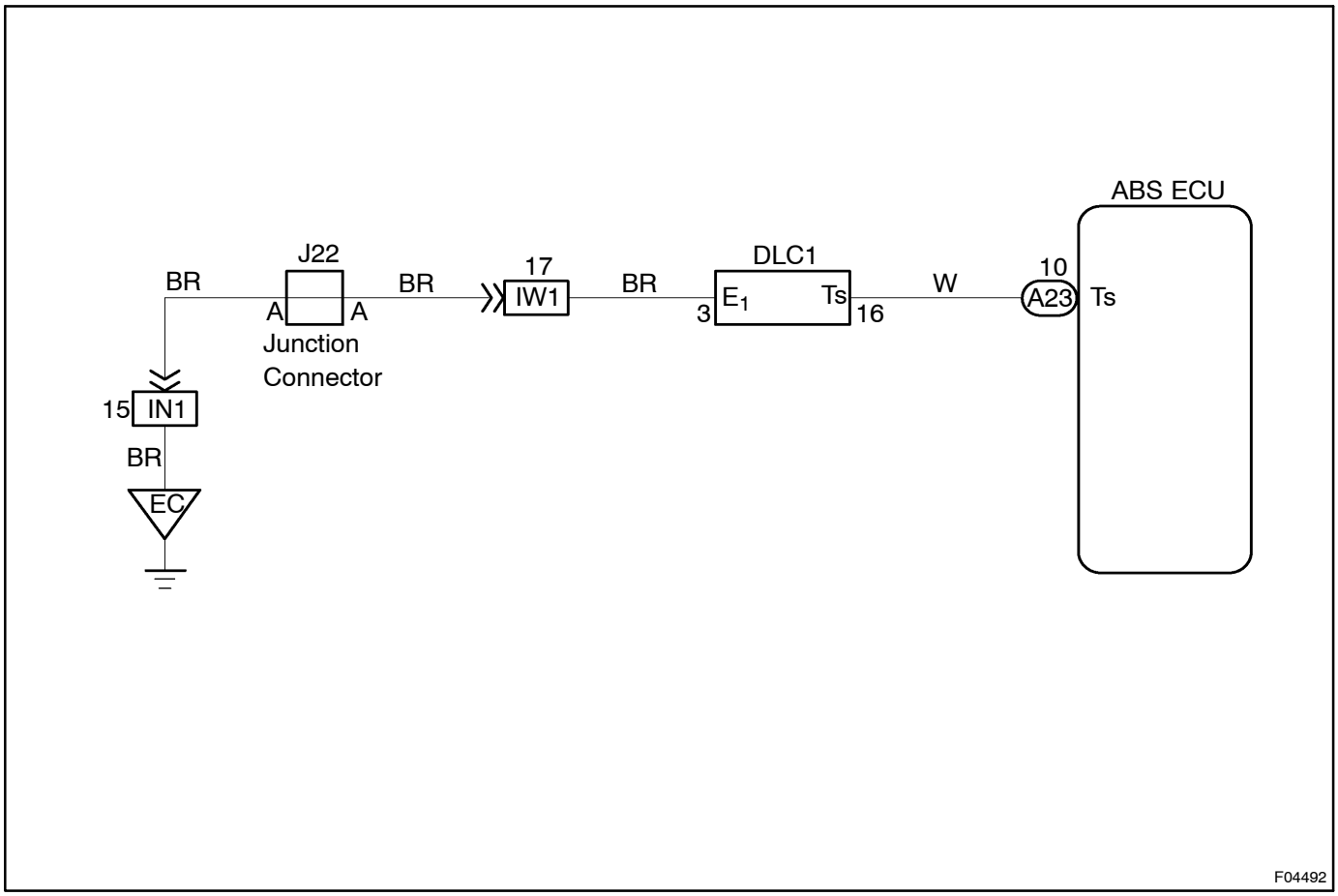
Ts Terminal Circuit

CIRCUIT DESCRIPTION

The sensor check circuit detects abnormalities in the speed sensor signal which cannot be detected by the DTC check.

Connecting terminals Ts and E_1 of the DLC1 in the engine compartment starts the check.

WIRING DIAGRAM



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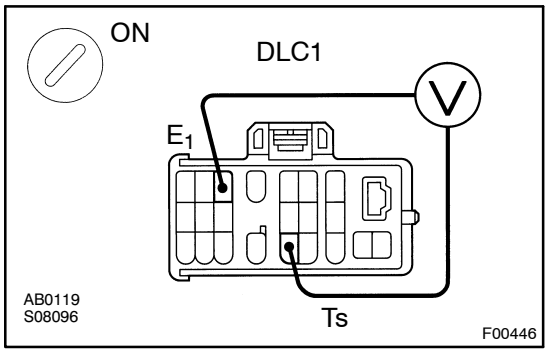
INSPECTION PROCEDURE

1	**Check voltage between terminals Ts and E_1 of DLC1.**



CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals Ts and E_1 of DLC1.

OK:

Voltage: 10 – 14 V

OK → **If ABS warning light does not blink even after Ts and E_1 are connected, the ECU may be defective.**

NG

2	**IG switch OFF, and check for open and short circuit in harness and connector between ABS ECU and DLC1, DLC1 and body ground (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS ECU.

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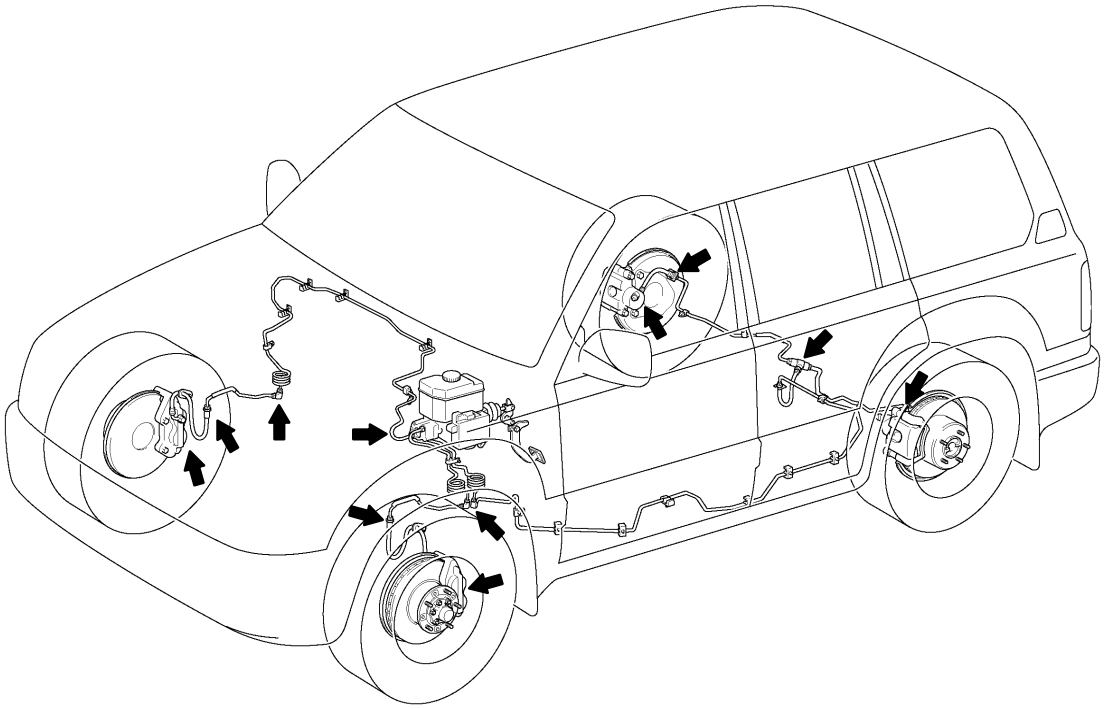
Check for Fluid Leakage

Check for fluid leakage from actuator or hydraulic lines.



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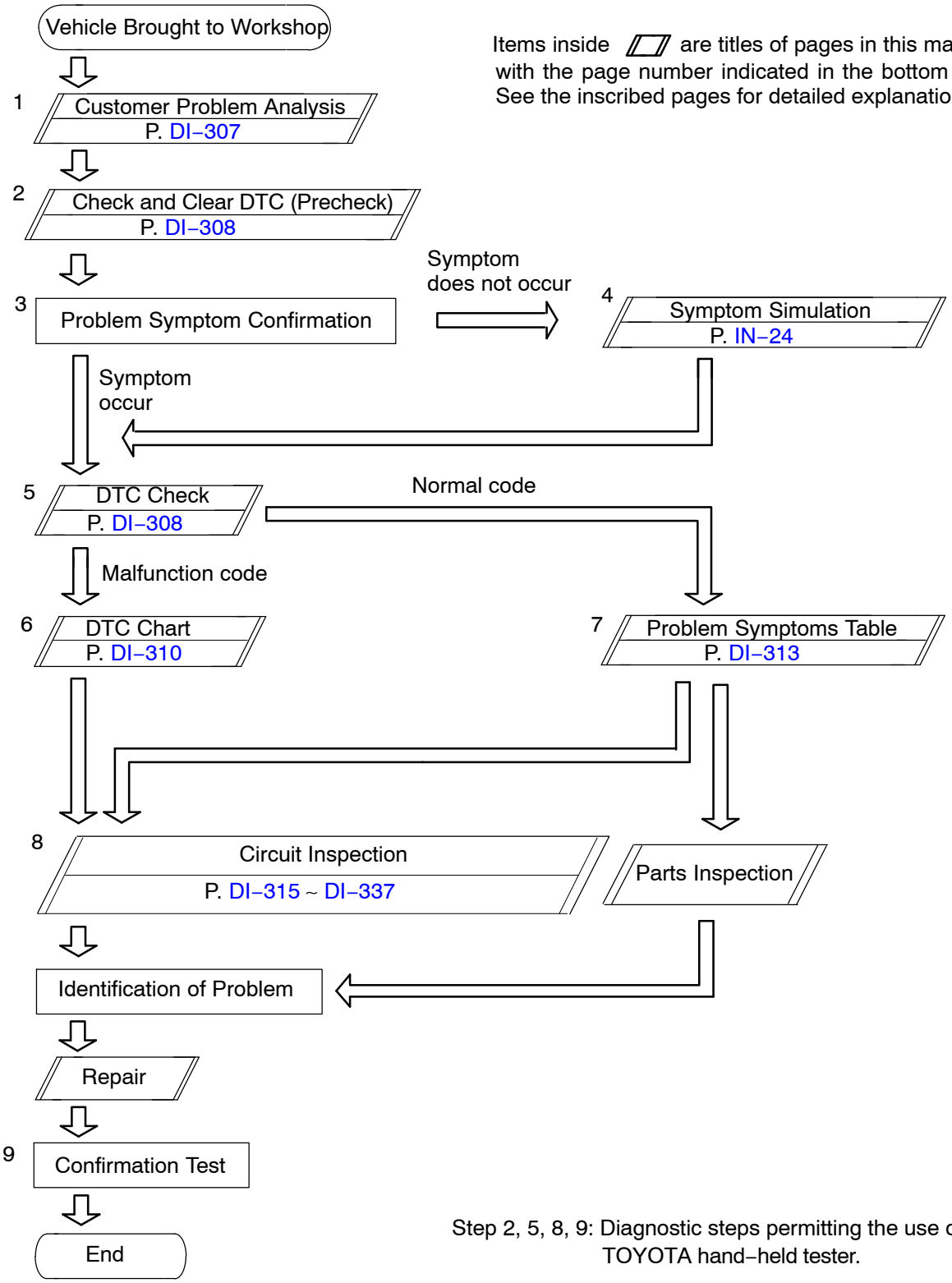
POWER TILT AND POWER TELESCOPIC STEERING COLUMN

HOW TO PROCEED WITH TROUBLESHOOTING

DI237–03

Perform troubleshooting in accordance with the procedure on the following page.



Items inside ▱ are titles of pages in this manual, with the page number indicated in the bottom portion. See the inscribed pages for detailed explanations.

Step 2, 5, 8, 9: Diagnostic steps permitting the use of the TOYOTA hand–held tester.

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DI238–01

CUSTOMER PROBLEM ANALYSIS CHECK

POWER TILT AND POWER TELESCOPIC STEERING SYSTEM CHECK SHEET

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	Manual Function does not Operate	☐ Both Tilt and Telescopic ☐ Tilt only ☐ Telescopic only
	Auto Away/Return Function does not Operate	☐ Both Auto Away and Auto Return ☐ Auto Away only ☐ Auto Return only
	☐ Memory Function does not Operate	

DTC Check	1st Time	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

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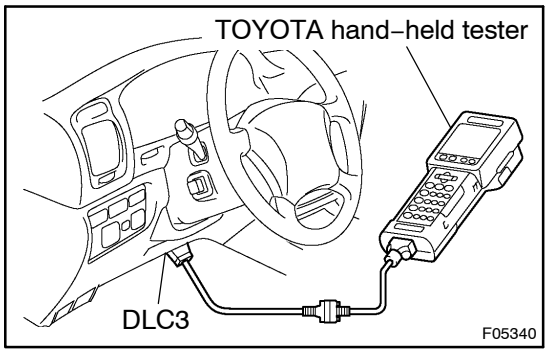
DI239–03



PRE–CHECK

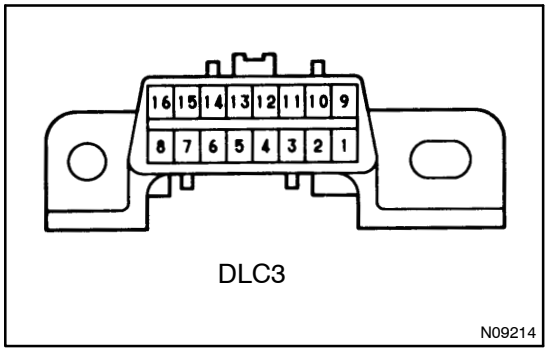
1. DESCRIPTION

(a) DIAGNOSIS SYSTEM

When troubleshooting Multiplex OBD (M–OBD) vehicles, the only difference from the usual troubleshooting procedure is that you connect the TOYOTA hand–held tester to vehicle, and read off various data output from the vehicle's Power Tilt and Telescopic Steering ECU.

The Power Tilt and Telescopic Steering ECU records the applicable DTCs when the computer detects a malfunction in the computer itself or its circuit.

To check the DTCs, connect a TOYOTA hand–held tester to DLC3 on the vehicle. The TOYOTA hand–held tester enables you to erase the DTCs and activate the several actuators and check freeze frame data and various forms on steering data.



(b) DATA LINK CONNECTOR 3 (DLC3)

The Power Tilt and Telescopic Steering ECU uses ISO 14230 for communication. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 14230 format.

Terminal No.	Connection	Voltage or Resistance	Condition
7	Bus + Line	Pulse generation	During transmission
4	Chassis Ground	↔ Body Ground 1 Ω or less	Always
5	Signal Ground	↔ Body Ground 1 Ω or less	Always
16	Battery Positive	↔ Body Ground 9 – 14 V	Always

HINT:

If your display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of TOYOTA hand–held tester to DLC3, turned the ignition switch ON and operated the TOYOTA hand–held tester, there is a problem on the vehicle side or tester side.

(1) If communication is normal when the tester is connected to another vehicle, inspect DLC3 on the original vehicle.

(2) If communication is still not possible when the tester is connected to another vehicle, the problem is probably in the tester itself, so consult the Service Department listed in the tester's Operator's Manual.

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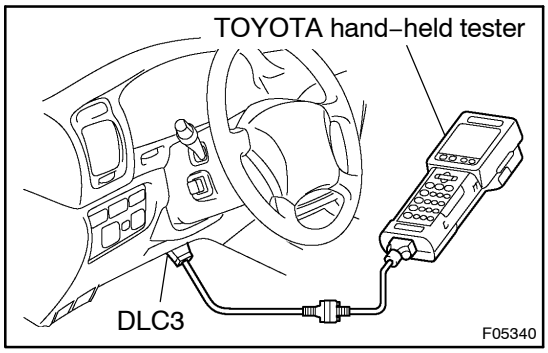

2. DIAGNOSIS INSPECTION

(a) Check the DTC

(1) Prepare the TOYOTA hand–held tester

(2) Connect the TOYOTA hand–held tester to DLC3 at the lower of the instrument panel.

(3) Turn the ignition switch ON and turn the TOYOTA hand–held tester switch ON.

(4) Use the TOYOTA hand–held tester to check the DTCs and freeze frame data, note or print them (See the Operator's Manual for operating instructions.).

(5) See page DI–310 to confirm the details of the DTC.

(b) Clear the DTC

The following actions will erase the DTC and freeze frame data.

- When using the TOYOTA hand–held tester: Operating the TOYOTA hand–held tester to erase the DTCs (See the Operator's Manual for operating instructions.).
- When not using the TOYOTA hand–held tester : Disconnecting the battery terminals.

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DI1T7–03

DIAGNOSTIC TROUBLE CODE CHART

If a DTC is displayed during the DTC check, check the circuit for that code listed in the table below. For details of each code, turn the page referred to under the "See page" for the respective "DTC No." in the DTC chart.

DTC No. (See Page)	Detection Item	Trouble Area
B2602 (DI–315)	Key unlock warning switch malfunction	• Key unlock warning switch
B2603 (DI–316)	Tilt and telescopic manual switch malfunction	• Tilt and telescopic manual switch circuit • Tilt and telescopic ECU
B2610 (DI–318)	Tilt position sensor or tilt motor malfunction	• Sensor power source circuit • Actuator power source circuit • Tilt motor circuit • Tilt and telescopic ECU
B2611 (DI–320)	Telescopic position sensor or telescopic motor malfunction	• Sensor power source circuit • Actuator power source circuit • Telescopic motor circuit • Tilt and telescopic ECU
B2620 (DI–322)	ECU power source circuit malfunction	• Battery • ECU power source circuit • Tilt and telescopic ECU
B2621 (DI–324)	Communication Interruption	• Multiplex communication system • Tilt and telescopic ECU

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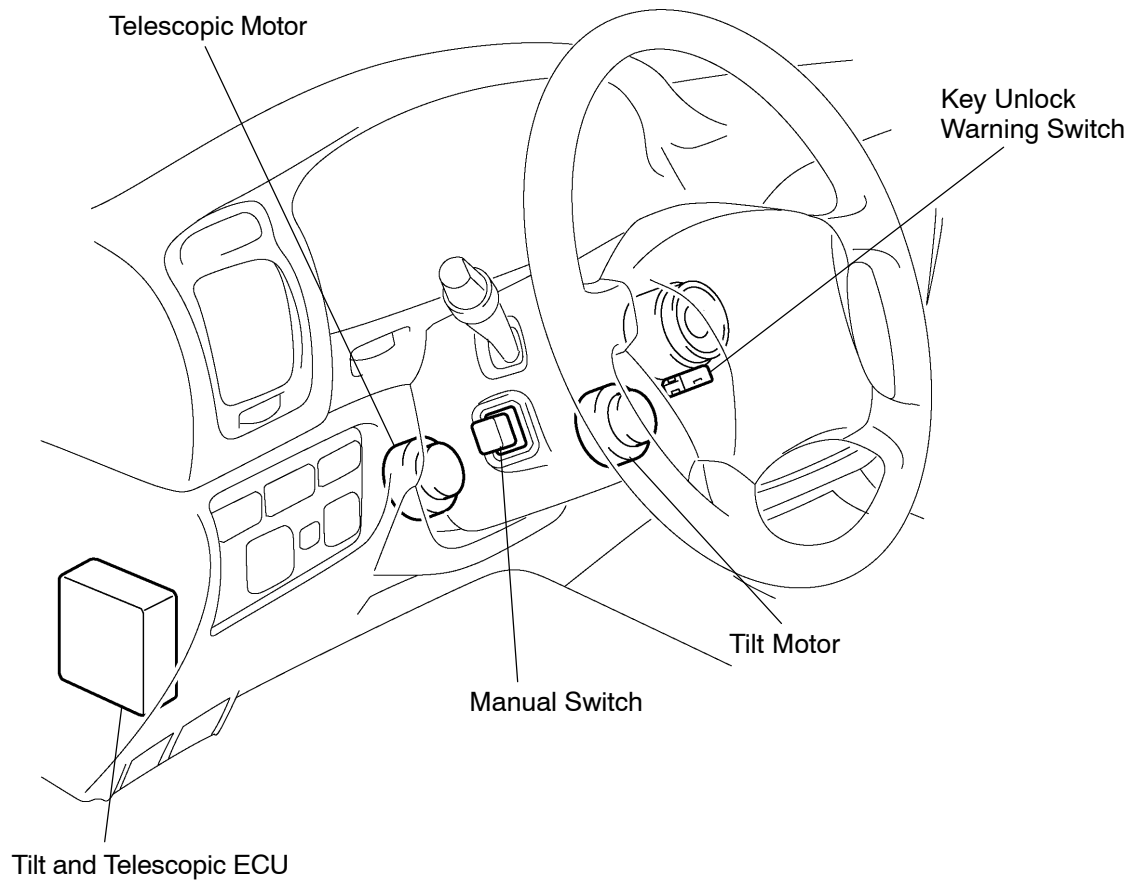
DI23B–03

PARTS LOCATION



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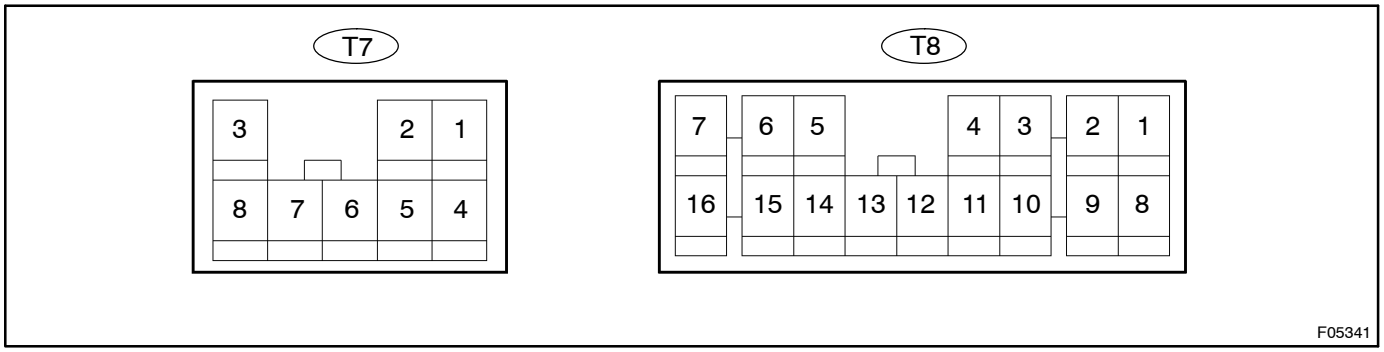
DI23C–03

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
IG – GND (T7–4 – T7–6)	B–W – W–B	IG switch ON	10 – 14 (DC)
		IG switch LOCK	Below 1 (DC)
VC – GND (T7–2 – T7–6)	V – W–B	Always	4.5 – 5.5 (DC)
GND – Body Ground (T7–6 – Body Ground)	W–B – Body Ground	Always	Below 1 (DC)
ECUB – Body Ground (T7–1 – Body Ground)	L–W – Body Ground	Always	10 – 14 (DC)
ECUB – GND (T7–1 – T7–6)	L–W – W–B	Always	10 – 14 (DC)
MSW – GND (T7–5 – T7–6)	V–Y – W–B	Tilt up by manual switch	1.30 – 1.70 (DC)
		Tilt down by manual switch	0.30 – 0.50 (DC)
		Telescopic extended by manual switch	2.05 – 2.75 (DC)
		Telescopic contracted by manual switch	0.65 – 0.95 (DC)
		Manual switch is not operating	Below 0.20 (DC)
+B – GND (T8–4 – T7–6)	R – W–B	Always	10 – 14 (DC)
S5V1 – SG1 (T8–13 – T8–14)	G–W – G–Y	IG switch ON	4.5 – 5.5 (DC)
S5V2 – SG2 (T8–12 – T8–10)	B–W – B–Y	IG switch ON	4.5 – 5.5 (DC)
A1 – COM1 (T8–7 – T8–15)	P – Y	IG switch ON, tilt up or down by manual switch	190 – 230 (AC)
B1 – COM1 (T8–16 – T8–15)	V – Y	IG switch ON, tilt up or down by manual switch	190 – 230 (AC)
A2 – COM2 (T8–1 – T8–9)	W – L	IG switch ON, telescopic extend or contracted by manual switch	190 – 230 (AC)
B2 – COM2 (T8–8 – T8–9)	G – L	IG switch ON, telescopic extend or contracted by manual switch	190 – 230 (AC)

NOTICE:

To distinguish trouble and replace it, take necessary electrical shock prevention operation.

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DI23D–03

PROBLEM SYMPTOMS TABLE

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

The table below will be useful for you in troubleshooting these electrical systems. The most likely causes of the malfunction are shown in the order of their probability. Inspect each part in the order shown, and replace the part when it is found to be faulty.

- If the instruction ”Proceed to next circuit inspection shown on the chart” is given in the flow chart for each circuit, proceed to the circuit with the next highest number in the table to continue the check.
- If the problem still occurs even though there are no abnormalities in any of the other circuits, then check and replace ECU.

Symptom	Suspect Area	See page
Both tilt and telescopic: Manual, auto away/return and memory functions • Do not operate • Stop part way • Do not stop	1. Multiplex communication system 2. ECU power source circuit 3. Key unlock warning switch 4. BODY ECU 5. Actuator power source circuit 6. Sensor power source circuit 7. Tilt motor circuit 8. Telescopic motor circuit 9. Tilt and telescopic ECU	DI–605 DI–325 BE–18 DI–561 DI–327 DI–329 DI–331 DI–334 IN–34
Tilt only: Manual, auto away/return and memory functions • Do not operate • Stop part way • Do not stop	1. Multiplex communication system 2. Sensor power source circuit 3. Tilt motor circuit 4. Tilt and telescopic ECU	DI–605 DI–329 DI–331 IN–34
Telescopic only: Manual, auto away/return and memory functions • Do not operate • Stop part way • Do not stop	1. Multiplex communication system 2. Sensor power source circuit 3. Telescopic motor circuit 4. Tilt and telescopic ECU	DI–605 DI–329 DI–334 IN–34
Both tilt and telescopic: Only tilt and telescopic manual switch function does not operate	1. Multiplex communication system 2. Tilt and telescopic manual switch circuit 3. Tilt and telescopic ECU	DI–605 DI–337 IN–34
Tilt only: Only tilt and telescopic manual switch function does not operate	1. Multiplex communication system 2. Tilt and telescopic manual switch circuit 3. Tilt and telescopic ECU	DI–605 DI–337 IN–34
Telescopic only: Only tilt and telescopic manual switch function does not operate	1. Multiplex communication system 2. Tilt and telescopic manual switch circuit 3. Tilt and telescopic ECU	DI–605 DI–337 IN–34
Both away and return: Only auto away/return function does not operate	1. Check status of auto away function using TOYOTA hand–held tester 2. Multiplex communication system 3. Ignition switch 4. Key unlock warning switch 5. Tilt and telescopic ECU	– DI–605 BE–18 BE–18 IN–34

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Only away: Only Auto away/return function does not operate	1. Multiplex communication system 2. Key unlock warning switch 3. Ignition switch 4. Tilt and telescopic ECU	DI–605 BE–18 BE–18 IN–34
Only return: Only auto away/return function does not operate	1. Multiplex communication system 2. Key unlock warning switch 3. Ignition switch 4. Tilt and telescopic ECU	DI–605 BE–18 BE–18 IN–34

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DI23E–03

CIRCUIT INSPECTION

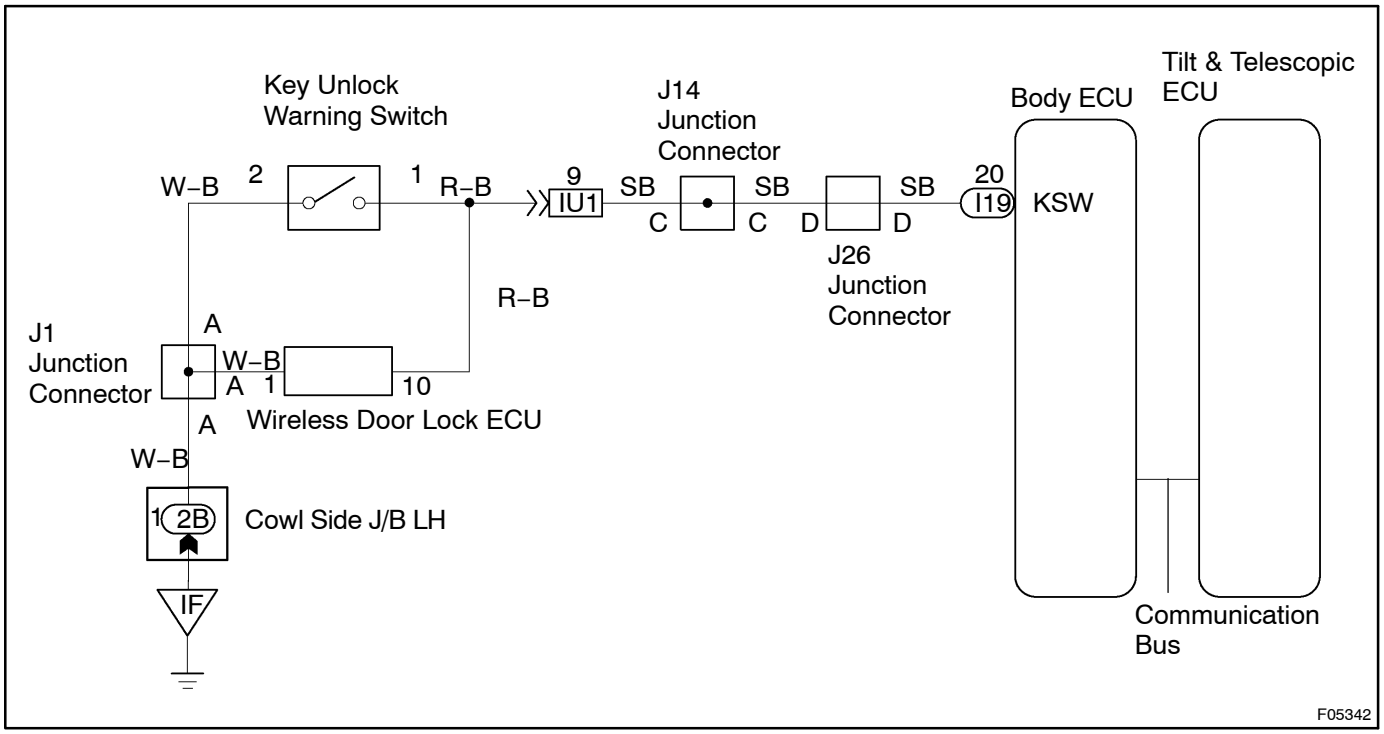
DTC	B2602	Key Unlock Warning Switch Circuit Malfunction

CIRCUIT DESCRIPTION

The different signal (ON or OFF) is sent from Body ECU to tilt and telescopic ECU through the communication bus when the ignition key is inserted into the key cylinder.Tilt and telescopic ECU uses this signal to operate the auto away function or auto return function.

DTC No.	Detection Item	Trouble Area
B2602	The signal (OFF) is sent to tilt and telescopic ECU when the ignition switch is turned to ACC, ON or START position.	• Key unlock warning switch

WIRING DIAGRAM



INSPECTION PROCEDURE

Check the key unlock warning switch.
(See page BE–18)

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DI23F–03

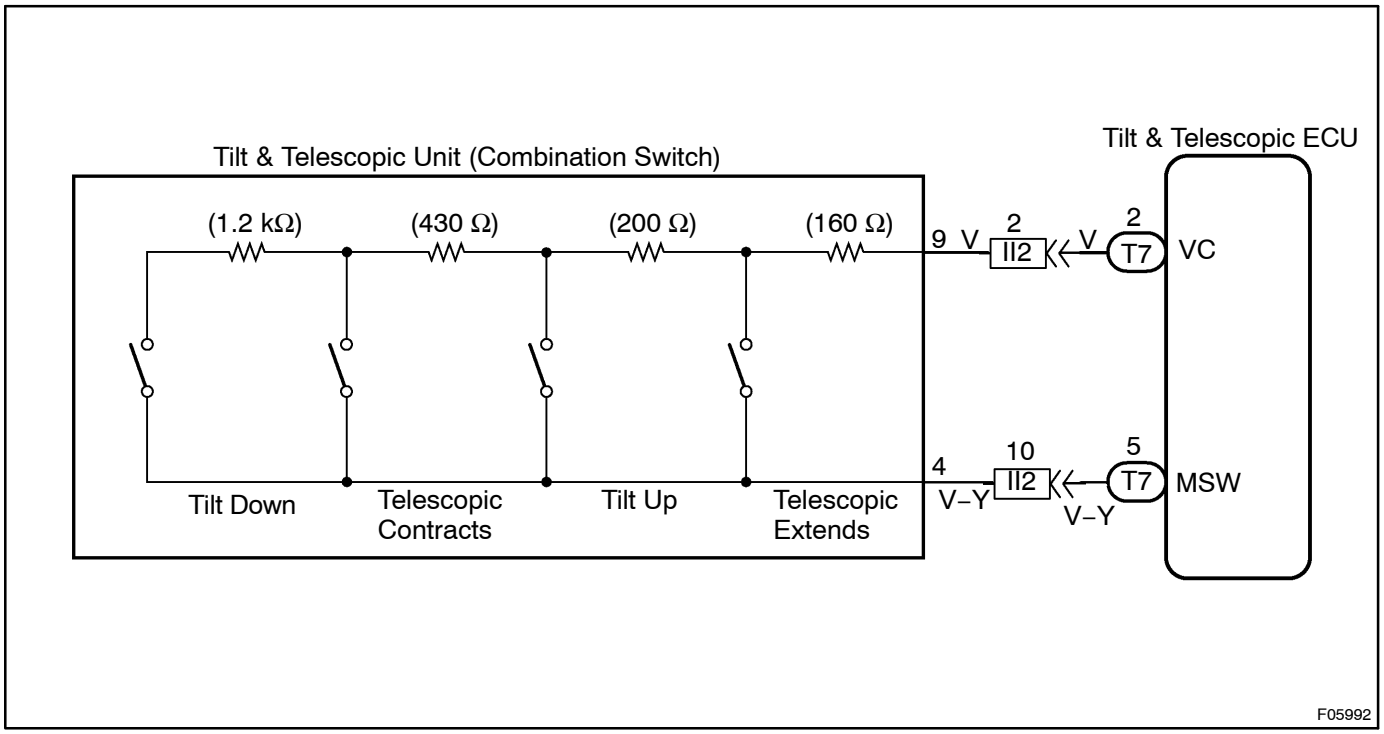
DTC	B2603	Tilt and Telescopic Manual switch circuit Malfunction

CIRCUIT DESCRIPTION

The different voltage value is input to tilt and telescopic ECU by operating the manual switch.Then tilt and telescopic ECU judges which motor and which direction tilt motor or telescopic motor should be moved based on the voltage value.

DTC No.	Detection Item	Trouble Area
B2603	The abnormal voltage value which is not within the specification is input to tilt and telescopic ECU when being operated with the manual switch.	• Tilt and telescopic manual switch circuit • Tilt and telescopic ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check tilt and telescopic manual switch circuit. (See page DI–337)**

NG → **Repair or replace.**

OK

Check and replace the tilt and telescopic ECU.

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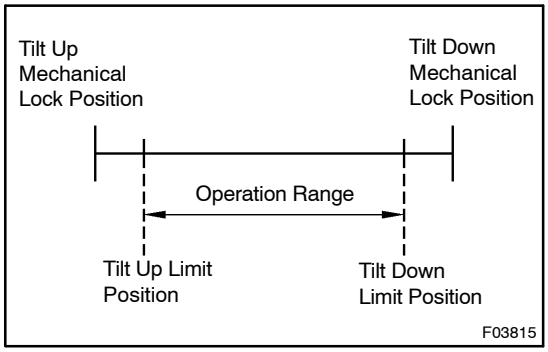
DTC	B2610	Tilt Position Sensor or Tilt Motor circuit Malfunction



CIRCUIT DESCRIPTION

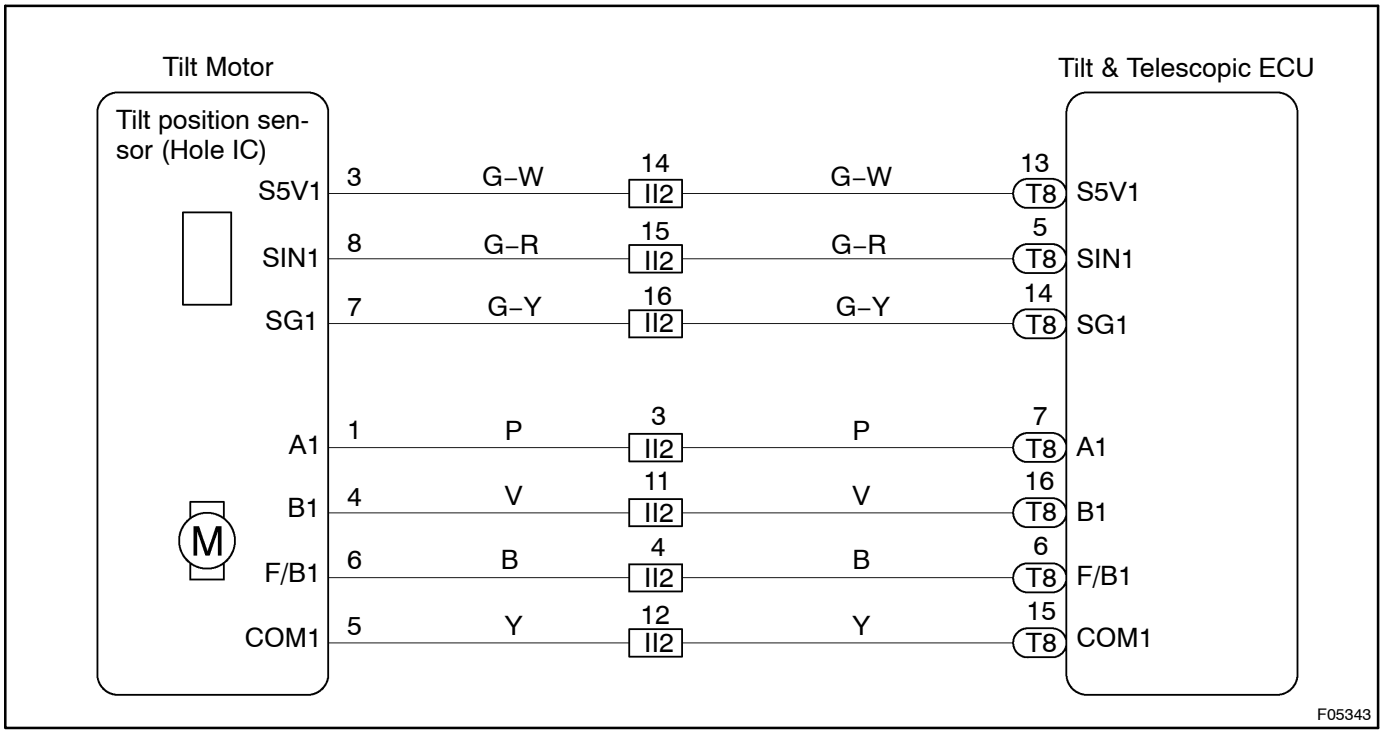
Tilt motor is operated by the power voltage supplied from tilt and telescopic ECU and makes the steering column tilt upward and downward.Tilt position sensor (Hole IC) in the tilt motor detects the tilt of the steering column and outputs the signal to the CPU in response to that tilt.

HINT:

Limit positions can be confirmed on the screen of the TOYOTA hand–held tester.

DTC No.	Detection Item	Trouble Area
B2610	During tilt function operation, tilt operation stops within the operation range.	• Sensor power source circuit • Actuator power source circuit • Tilt motor circuit • Tilt and telescopic ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check sensor power source circuit. (See page DI–329)

NG → Repair or replace.

OK

2	Check actuator power source circuit. (See page DI–327)

NG → Repair or replace.

OK

3	Check tilt motor circuit. (See page DI–331)

NG → Repair or replace.

OK

Check and replace the tilt and telescopic ECU.

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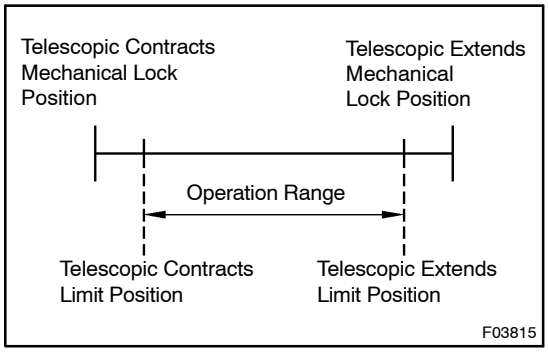
DI23H–03

DTC	B2611	Telescopic Position Sensor or Telescopic Motor Circuit Malfunction



CIRCUIT DESCRIPTION

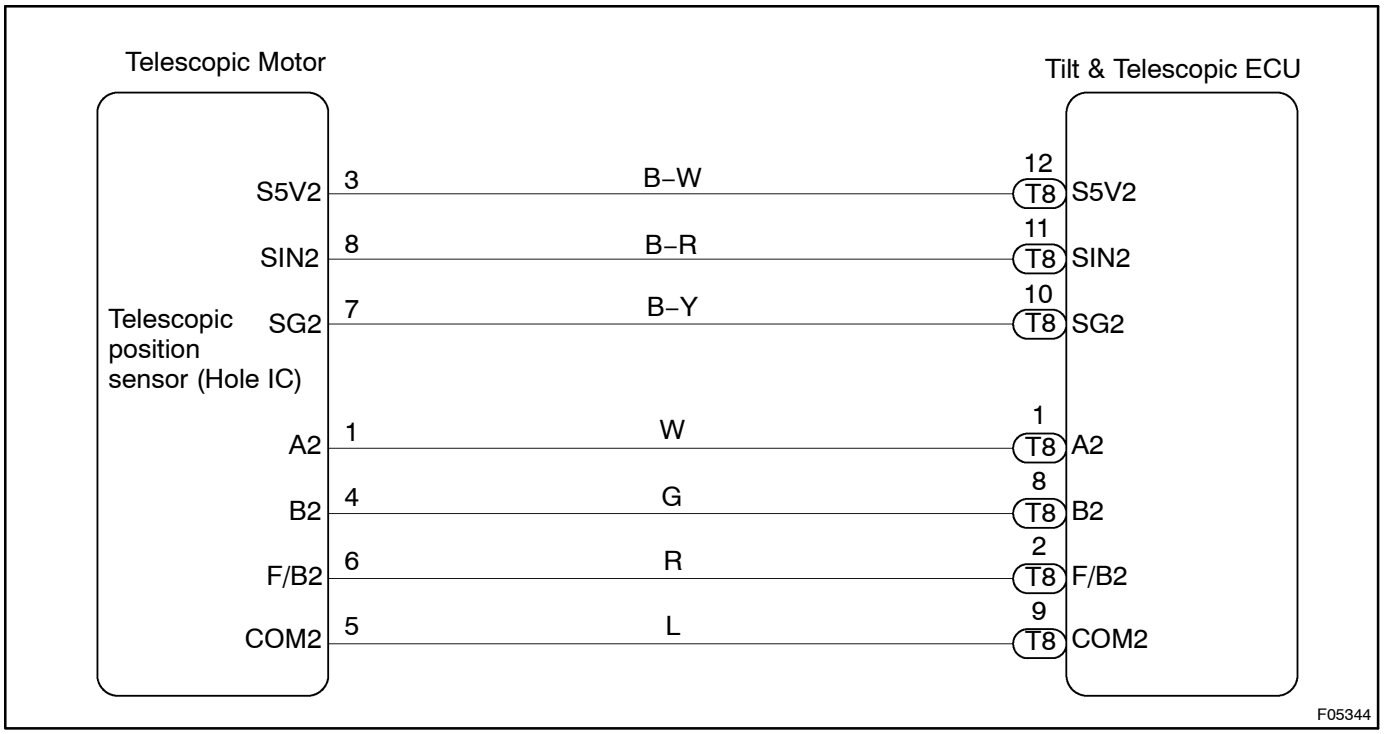
Telescopic motor is operated by the power voltage supplied from tilt and telescopic ECU and makes the steering column slide forward and rearward.Telescopic position sensor (Hole IC) in the telescopic motor detects the sliding position of the forward and rearward direction of the steering column and outputs the signal to the CPU in response to that sliding amount.

HINT:

Limit positions can be confirmed on the screen of the TOYOTA hand–held tester.

DTC No.	Detection Item	Trouble Area
B2611	During telescopic function operation, telescopic operation stops within the operation range.	• Sensor power source circuit • Actuator power source circuit • Telescopic motor circuit • Tilt and telescopic ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check sensor power source circuit. (See page DI–329)

NG → Repair or replace.

OK

2	Check actuator power source circuit. (See page DI–327)

NG → Repair or replace.

OK

3	Check telescopic motor circuit. (See page DI–334)

NG → Repair or replace.

OK

Check and replace the tilt and telescopic ECU.

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DI23I–03

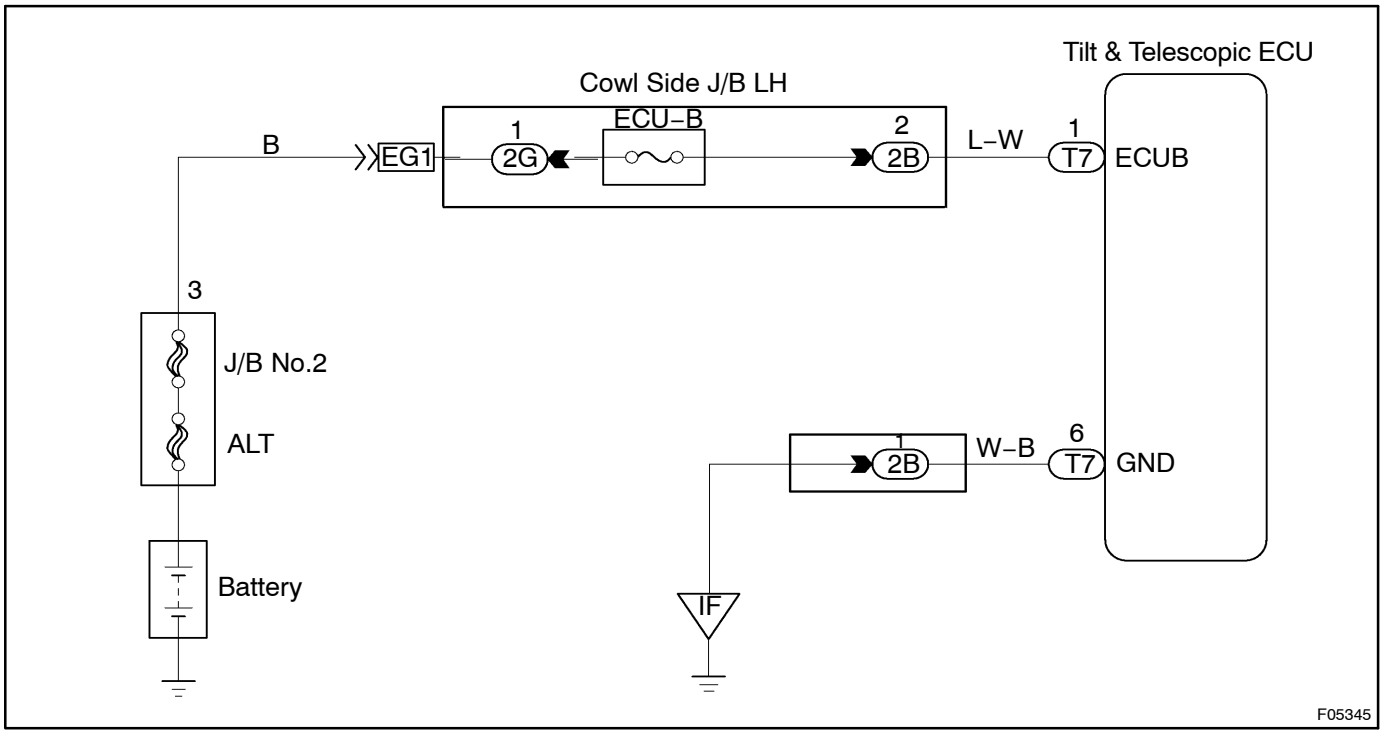
DTC	B2620	ECU Power Source Circuit Malfunction

CIRCUIT DESCRIPTION

ECU power source circuit supply the battery positive voltage to tilt and telescopic ECU.

DTC No.	Detection Item	Trouble Area
B2620	The condition that the voltage of the ECU Power Source circuit drop to be 8V or less continues for 10 seconds or more	• Battery • ECU power source circuit • Tilt and telescopic ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check that the battery positive voltage is 11V or more when engine is stopped.

NG → Charge or replace battery.

OK

2	Check ECU power source circuit. (See page DI–325)

NG → Repair or replace.

OK

Check and replace the tilt and telescopic ECU.

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DI23J–03

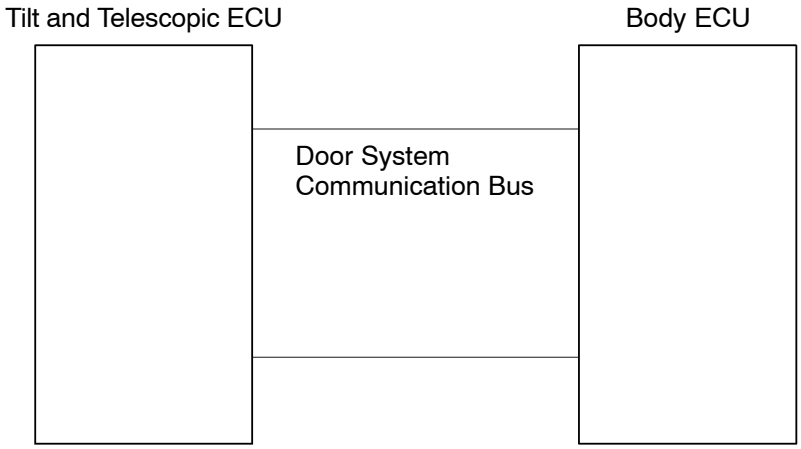
DTC	B2621	Communication Interruption

CIRCUIT DESCRIPTION

Tilt and telescopic ECU forms the network with ECU of other systems through communication bus.Each ECU informs to other ECU of the connection of itself to the network by outputting the specified signal (periodical signal) on to the communication bus with every fixed period of time.Tilt and telescopic ECU detects the connected condition of each ECU based on the signal.

DTC No.	Detection Item	Trouble Area
B2621	• Periodical signal from the specified ECU has stopped. • Periodical signals from the ECU have stopped.	• Multiplex communication system • Tilt and telescopic ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check multiplex communication system. (See page DI–605)**

NG → **Repair or replace.**

OK →

Check and replace the Tilt and Telescopic ECU.

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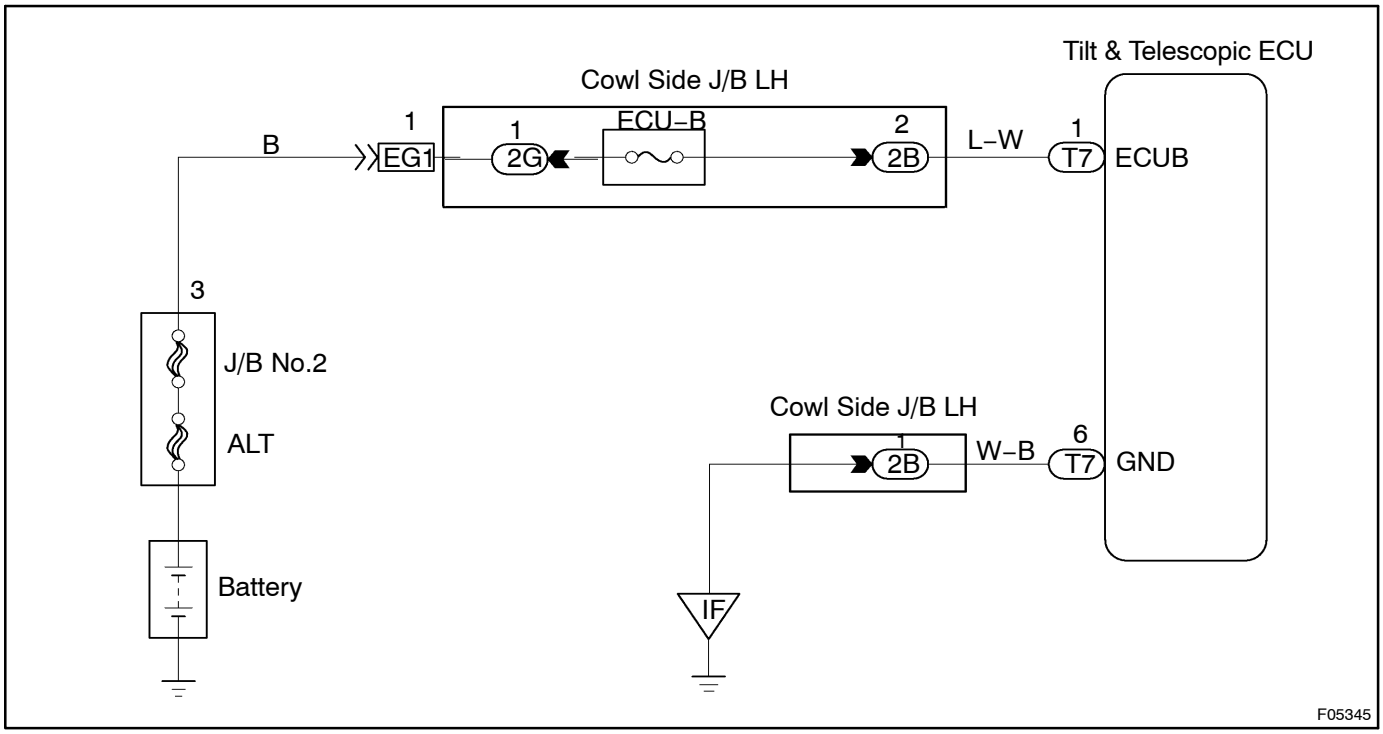
DI23K–03

ECU Power Source circuit

CIRCUIT DESCRIPTION

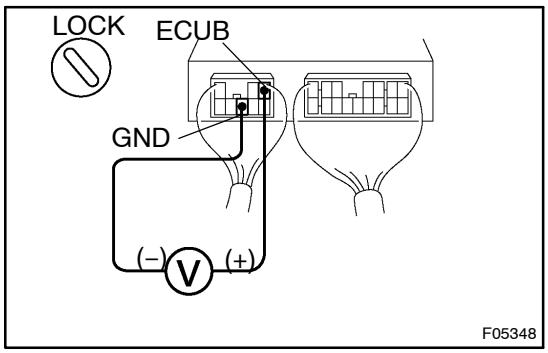
The ECU power source supplies power to the CPU and sensors, etc.power is supplied to the ECU even when the ignition switch is lock position.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals ECUB and GND of ECU connector**



PREPARATION:

Remove ECU with connectors still connected.

CHECK:

Measure voltage between terminals ECUB and GND of ECU connector.

OK:

Voltage: 8 – 16 V

OK	**Proceed to next circuit inspection shown on the Problem Symptom Table. (See page DI–313)**

NG

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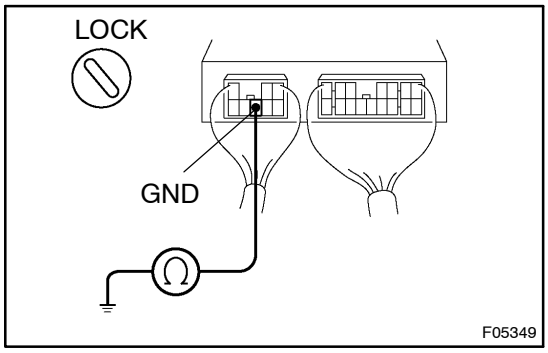
2	**Check continuity between terminal GND of ECU connector and body ground.**



CHECK:
Measure resistance between terminal GND of ECU connector and body ground.
OK:
Resistance: 1 K Ω or less

NG → **Repair or replace harness or connector.**

OK

3	**Check ECU–B fuse.**

PREPARATION:
Remove ECU–B fuse from engine room R/B.
CHECK:
Check continuity of ECU–B fuse.
OK:
Continuity

NG → **Check for short in harness and all components connected to MPX–B fuse.**

OK

Check for open in harness and connector between ECU and battery. (See page IN–34)

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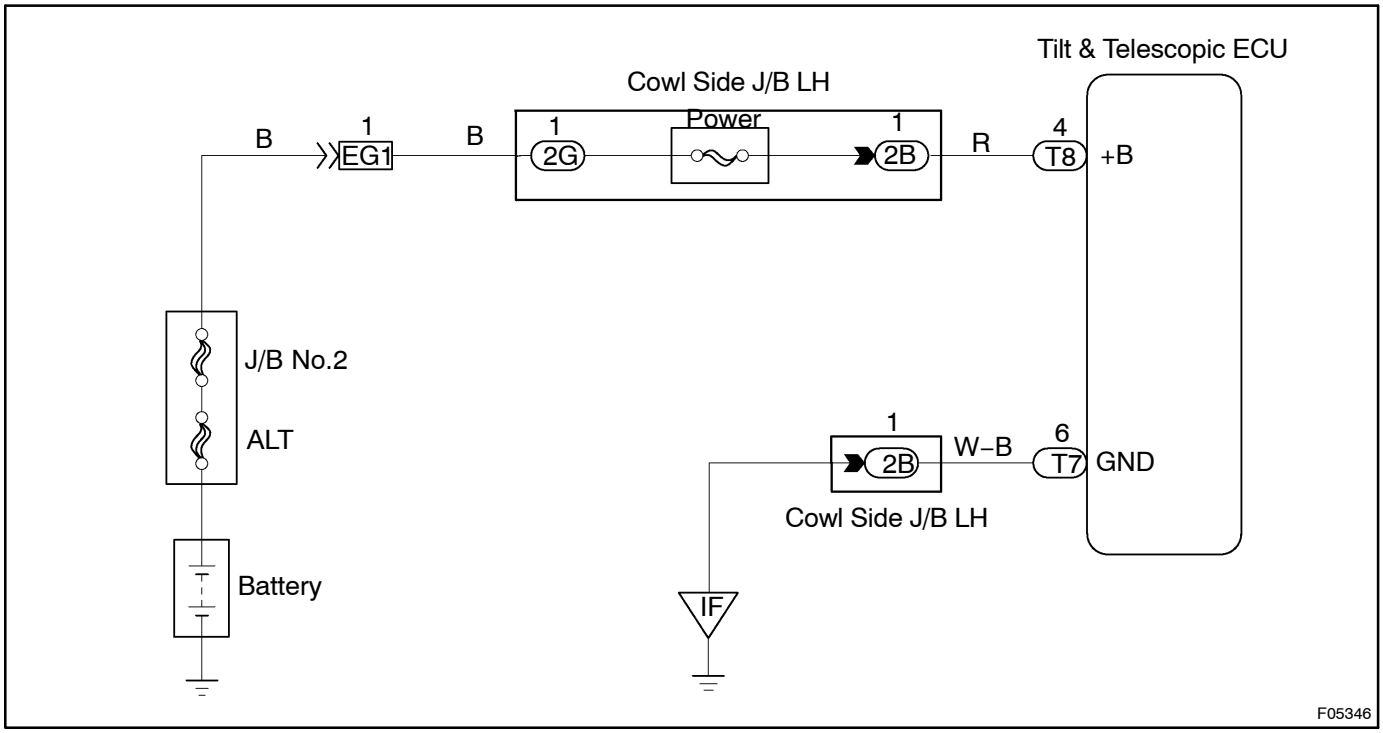
DI23L–03

Actuator Power Source circuit

CIRCUIT DESCRIPTION

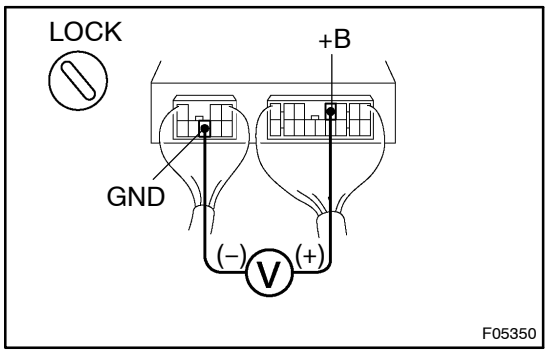
This is the power source for the motors.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals +B and GND of ECU connector**



PREPARATION:

Remove ECU with connectors still connected.

CHECK:

Measure voltage between terminals +B and GND of ECU connector.

OK:

Voltage: 8 – 16 V

OK	**Proceed to next circuit inspection shown on the Problem Symptom Table. (See page DI–313)**

NG

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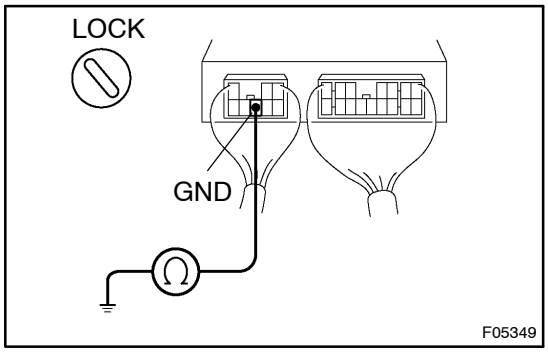
2	**Check continuity between terminal GND of ECU connector and body ground.**



CHECK:
Measure resistance between terminal GND of ECU connector and body ground.
OK:
Resistance: 1 K Ω or less

NG → **Repair or replace harness or connector.**

OK

3	**Check POWER fuse.**

PREPARATION:
Remove POWER fuse from passenger side J/B.
CHECK:
Check continuity of POWER fuse.
OK:
Continuity

NG → **Check for short in harness and all components connected to POWER fuse.**

OK

Check for open in harness and connector between ECU and battery. (See page IN–34)

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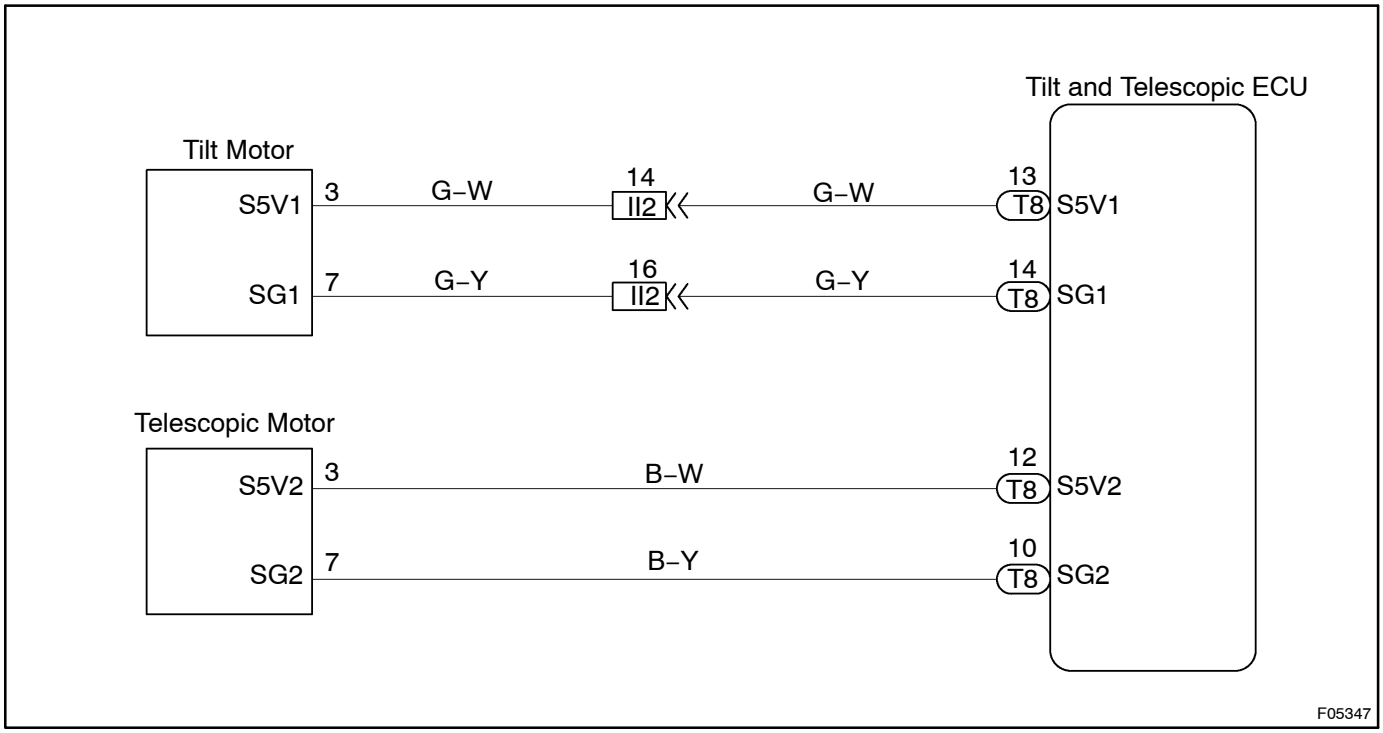
DI1TO–03

Sensor Power Source Circuit

CIRCUIT DESCRIPTION

Power to the position sensor is output from ECU.

WIRING DIAGRAM



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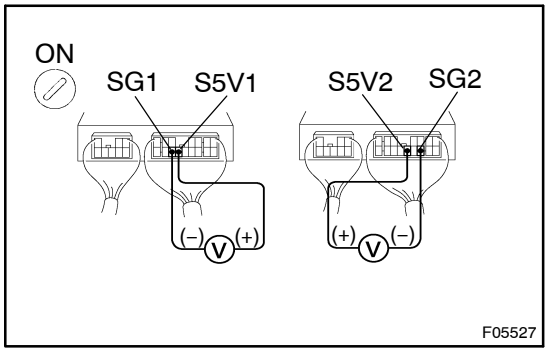
INSPECTION PROCEDURE

1	**Check voltage between terminals S5V1 and SG1, S5V2 and SG2 of ECU connector.**



PREPARATION:
Remove ECU with connectors still connected.
CHECK:
Measure voltage between terminals S5V1 and SG1, S5V2 and SG2 of ECU connector.
OK:
Voltage: 4.5 – 5.5 V

NG → **Go to step 3.**

OK

2	**Check for open in harness and connector between terminals S5V1 and SG1, S5V2 and SG2 of ECU connector.**

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown on the problem symptom tabele.
(See page DI–313)

3	**Check for short in harness between terminals S5V1 and SG1, S5V2 and SG2 of ECU connector.**

NG → **Repair or replace harness or connector.**

OK

Check and replace tilt and telescopic ECU.

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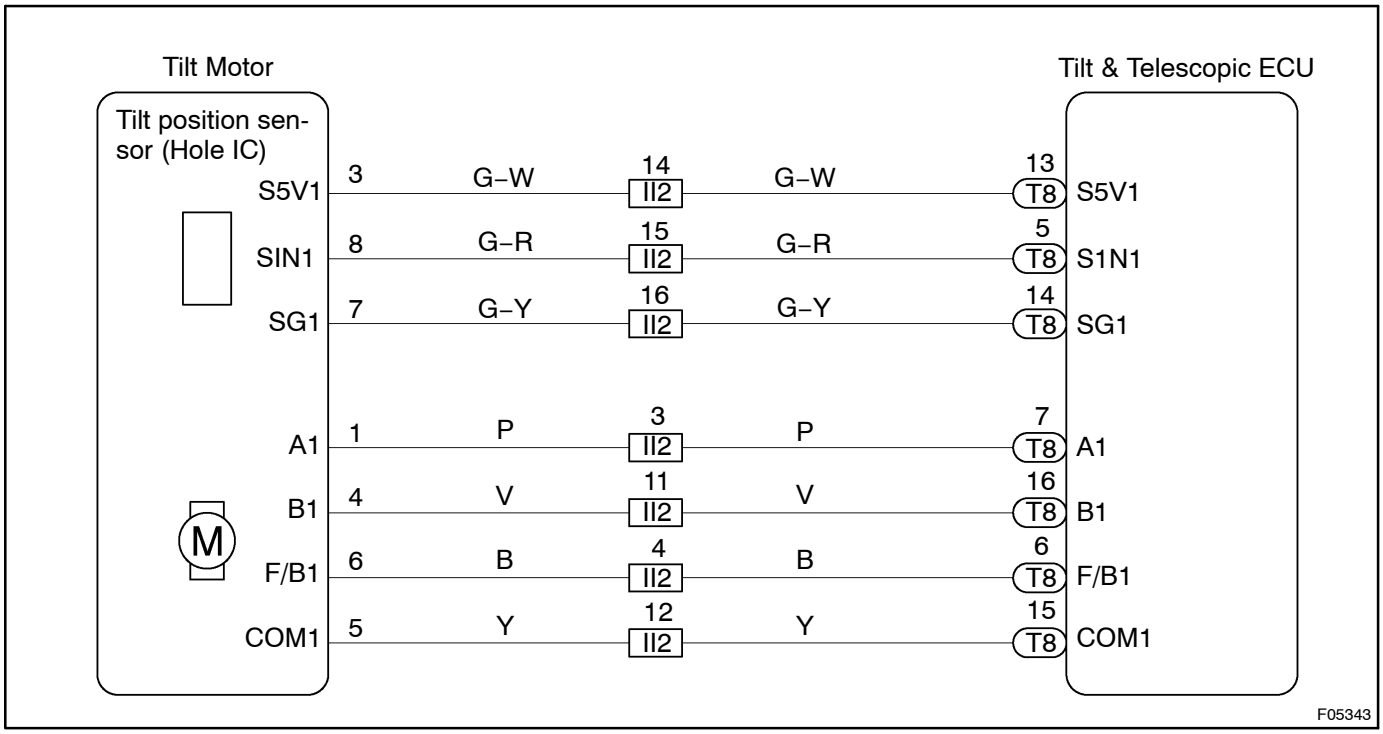
DI23M–03

Tilt Motor circuit

CIRCUIT DESCRIPTION

The ECU provided both +B and ground for the tilt motor.
Reversing polarity of the applied voltage reverses the motor.

WIRING DIAGRAM



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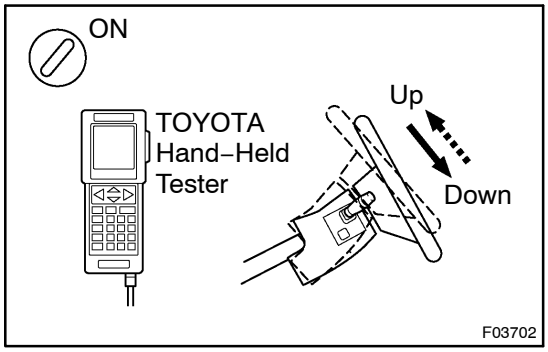
INSPECTION PROCEDURE

In case of using TOYOTA hand–held tester, start inspection from step 1.
Incase of not using TOYOTA hand–held tester, start inspection from step 2.

1	**Check tilt motor operation using TOYOTA hand–held tester.**



PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3
(b) Turn ignition switch ON and push the TOYOTA hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.

CHECK:

Check that the steering wheel tilt up (down) and confirm that tilt position value change when the ACTIVE TEST carried out.

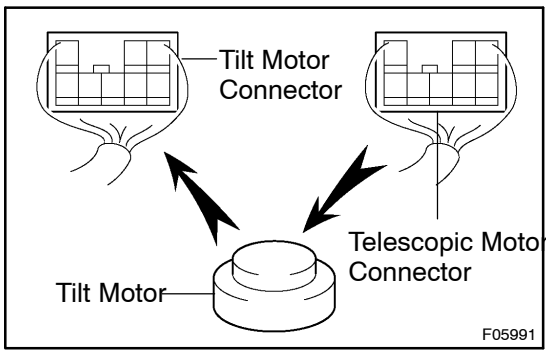
OK:

Steering wheel must be moved upward (downward). Tilt position value must be changed.

OK	**Proceed to next circuit inspection shown on the Problem Symptom Table. (See page DI–313)**

NG

2	**Check tilt motor.**



PREPARATION:

(a) Disconnect tilt motor connector and telescopic motor connector.
(b) Remove tilt motor. (See page SR–26)

CHECK:

Connect telescopic motor connector to tilt motor.Then confirm that tilt motor moved when operating the manual switch.

NG	**Replace tilt motor.**

OK

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3	**Check harness and connector between tilt and telescopic ECU and tilt motor. (See page IN–34)**

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown on the Problem Symptom Table. (See page DI–313)

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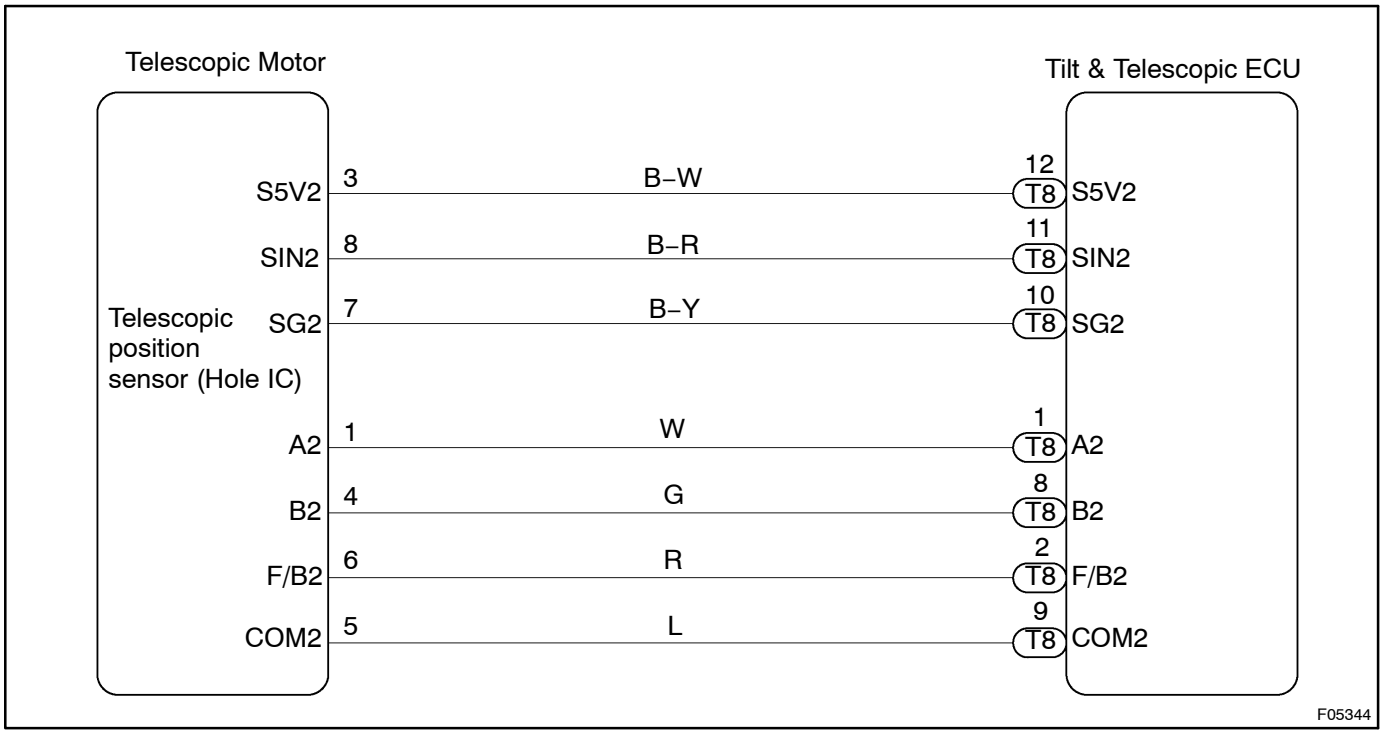
DI23N–03

Telescopic Motor circuit

CIRCUIT DESCRIPTION

The ECU provides both +B and ground for the telescopic motor.
Reversing polarity of the applied voltage reverses the motor.

WIRING DIAGRAM



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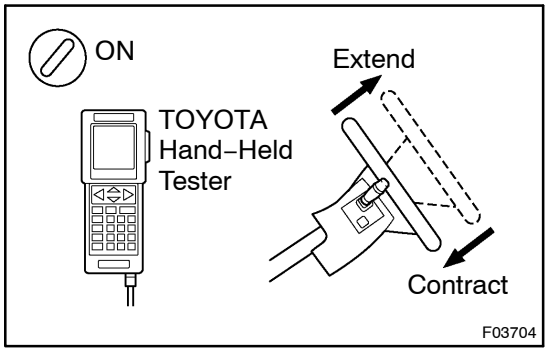
INSPECTION PROCEDURE

In case of using TOYOTA hand–held tester, start inspection from step 1.
In case of not using TOYOTA hand–held tester, start inspection from step 2.

1	**Check telescopic motor operation using TOYOTA hand–held tester.**



PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3
(b) Turn ignition switch ON and push the TOYOTA hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.

CHECK:

Check that the steering column length become short (long) and confirm that telescopic position value change when the ACTIVE TEST carried out.

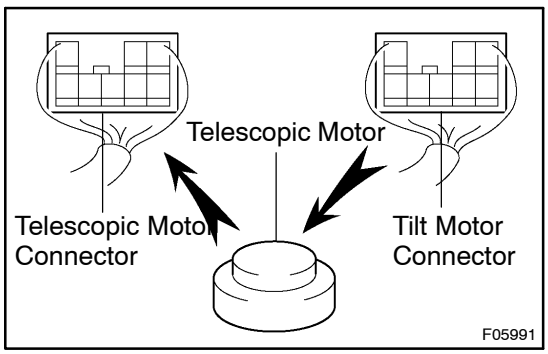
OK:

Steering column length must be short (long).
Telescopic position value must be changed.

OK	**Proceed to next circuit inspection shown on the Problem Symptom Table. (See page DI–313)**

NG

2	**Check telescopic motor.**



PREPARATION:

(a) Disconnect telescopic motor connector and tilt motor connector.
(b) Remove telescopic motor. (See page SR–26)

CHECK:

Connect tilt motor connector to telescopic motor.Then confirm that telescopic motor moved when operating the manual switch.

NG	**Replace telescopic motor.**

OK

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3	**Check harness and connector between Tilt and Telescopic ECU and Telescopic Motor. (See page IN–34)**

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown on the Problem Symptom Table. (See page DI–313)

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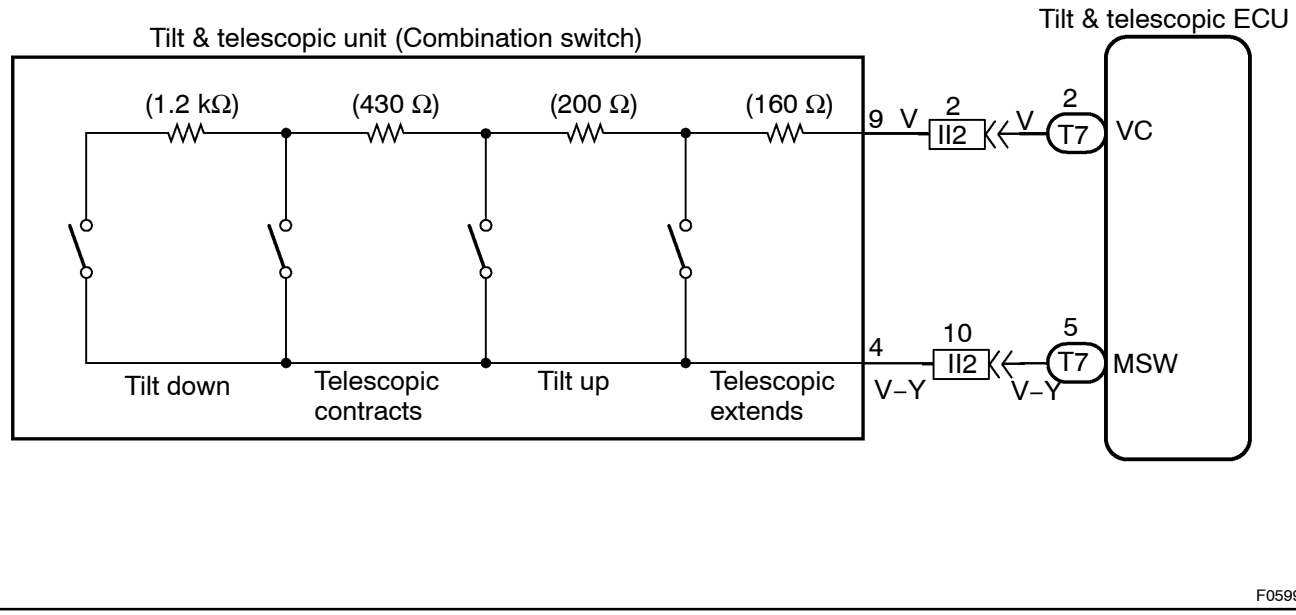
DI23O–03

Tilt and Telescopic Manual switch circuit

CIRCUIT DESCRIPTION

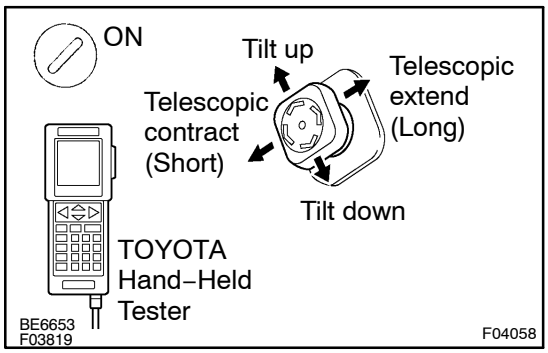
The different voltage signals which are occurred by operating the manual switch are sent to the tilt and telescopic ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check tilt and telescopic manual switch voltage.**



When using TOYOTA hand–held tester

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3

(b) Turn ignition switch ON and push the TOYOTA hand–held tester main switch ON.

(c) Select DATALIST mode on the TOYOTA hand–held tester.

CHECK:

Read the voltages on the tester screen when operating the manual switch.

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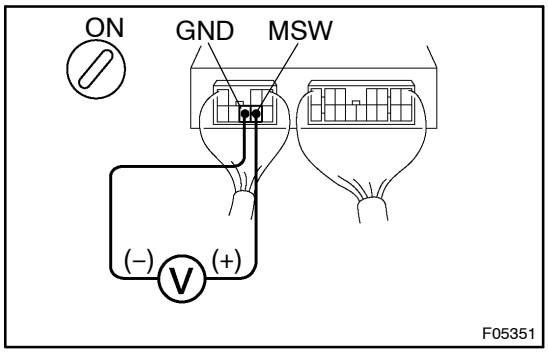


When not using TOYOTA hand–held tester

PREPARATION:

Remove tilt and telescopic ECU with connector still connected.

CHECK:

Measure voltage between terminals MSW and GND of ECU connector when operating the manual switch.

OK:

Manual switch position	Standard voltage
Neutral position	0.00 – 0.20 V
Tilt UP	1.30 – 1.70 V
Tilt DOWN	0.30 – 0.50 V
Telescopic SHORT	0.65 – 0.95 V
Telescopic LONG	2.05 – 2.75 V

RESULT:

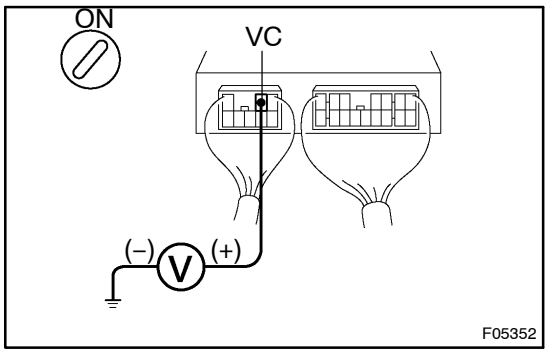
A	Switch voltages in all directions are within the standard.
B	Switch voltage in a certain direction is out of the standard.
C	Switch voltages in all directions are out of the standard.

A → **Proceed to next circuit inspection shown on the Problem Symptom Table. (See page DI–313)**

B → **Replace the manual switch.**

C

2	Check voltage between terminal VC of ECU connector and body ground.



PREPARATION:

Remove ECU with connectors still connected.

CHECK:

Measure voltage between terminal VC of ECU and body ground.

OK:

Voltage: 4.5 – 5.5 V

NG → **Go to step 4**

OK

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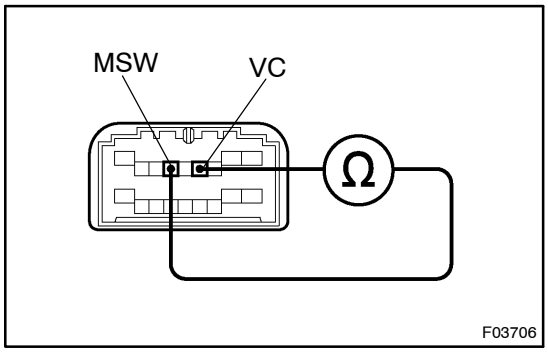
3	Check tilt and telescopic manual switch



PREPARATION:

Disconnect combination switch connector.

CHECK:

Measure resistance between terminals VC and MSW of combination switch connector when operating the manual switch.

OK:

Switch position	Resistance
Tilt up	360 Ω
Tilt down	1,990 Ω
Telescopic short	790 Ω
Telescopic long	160 Ω

NG → **Replace the manual switch.**

OK

4	Check harness and connector between tilt and telescopic ECU and manual switch. (See page IN–34)

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown on the Problem Symptom Table. (See page DI–313)

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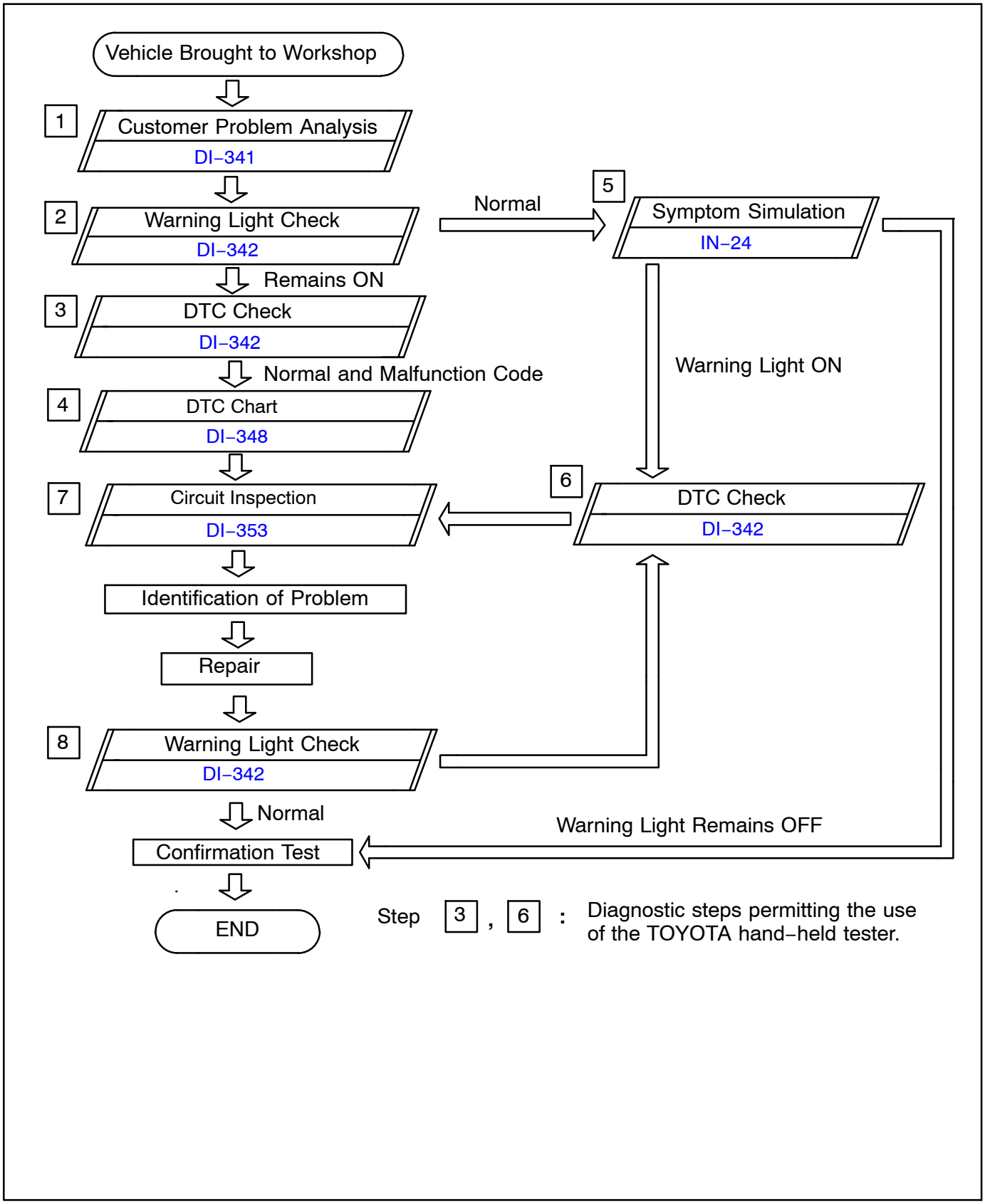
SUPPLEMENTAL RESTRAINT SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI18J–06



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DI18K–03

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 and 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.]

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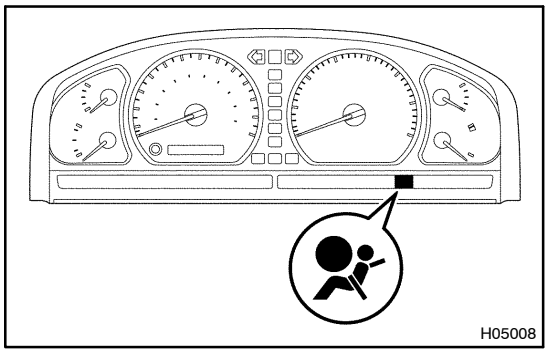
DI2I4–05



PRE–CHECK

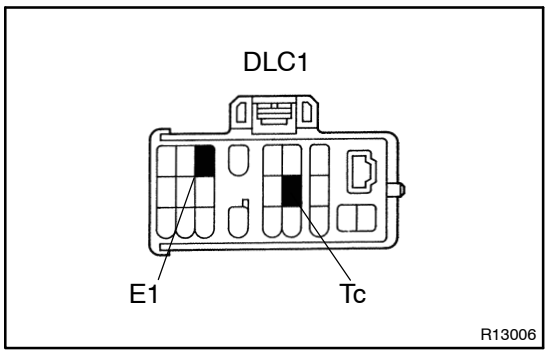
1. SRS WARNING LIGHT CHECK

(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 page DI–430, DI–432.



2. DTC CHECK (Using diagnosis check wire)

(a) Present Trouble 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 Trouble Codes:

Output the DTC.

(1) Using SST, 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.

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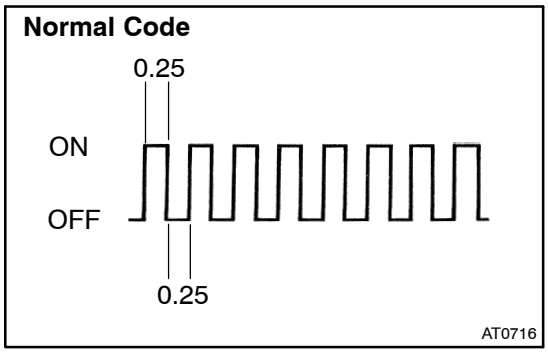
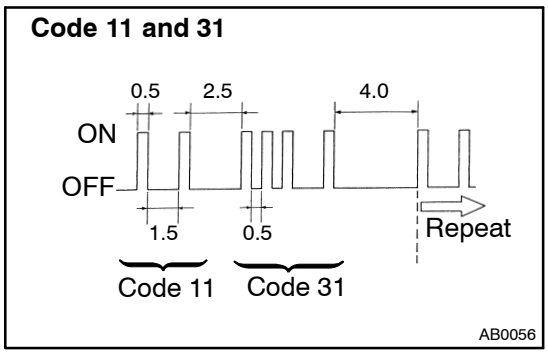


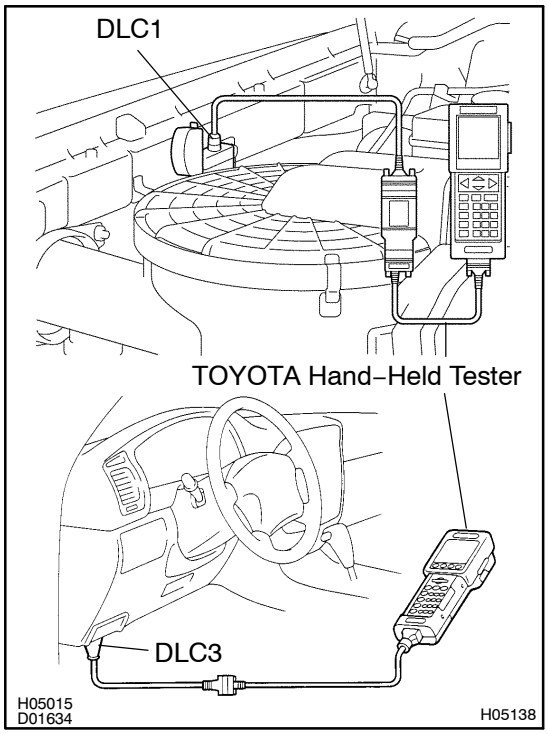
(c) Read the DTC.
Read the 2–digit DTC as indicated by the number of times the SRS warning light blinks. As an example, the blinking patterns, normal, 11 and 31 are shown in the illustration.

- 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–436.



3. DTC CHECK (Using TOYOTA hand–held tester)

(a) Hook up the TOYOTA hand–held tester to the DLC1 or DLC3.

(b) Read the DTCs by following the prompts on the tester screen.

HINT:
Please refer to the TOYOTA hand–held tester operator's manual for further details.

4. DTC CLEARANCE (Not using service wire)

When the ignition switch is turned OFF, the diagnostic trouble code is cleared.

5. DTC CLEARANCE (Using service wire)

(a) Connect the 2 service wires to terminals Tc and AB of check connector.

(b) Turn the ignition switch to ACC or ON and wait for approx. 6 seconds.

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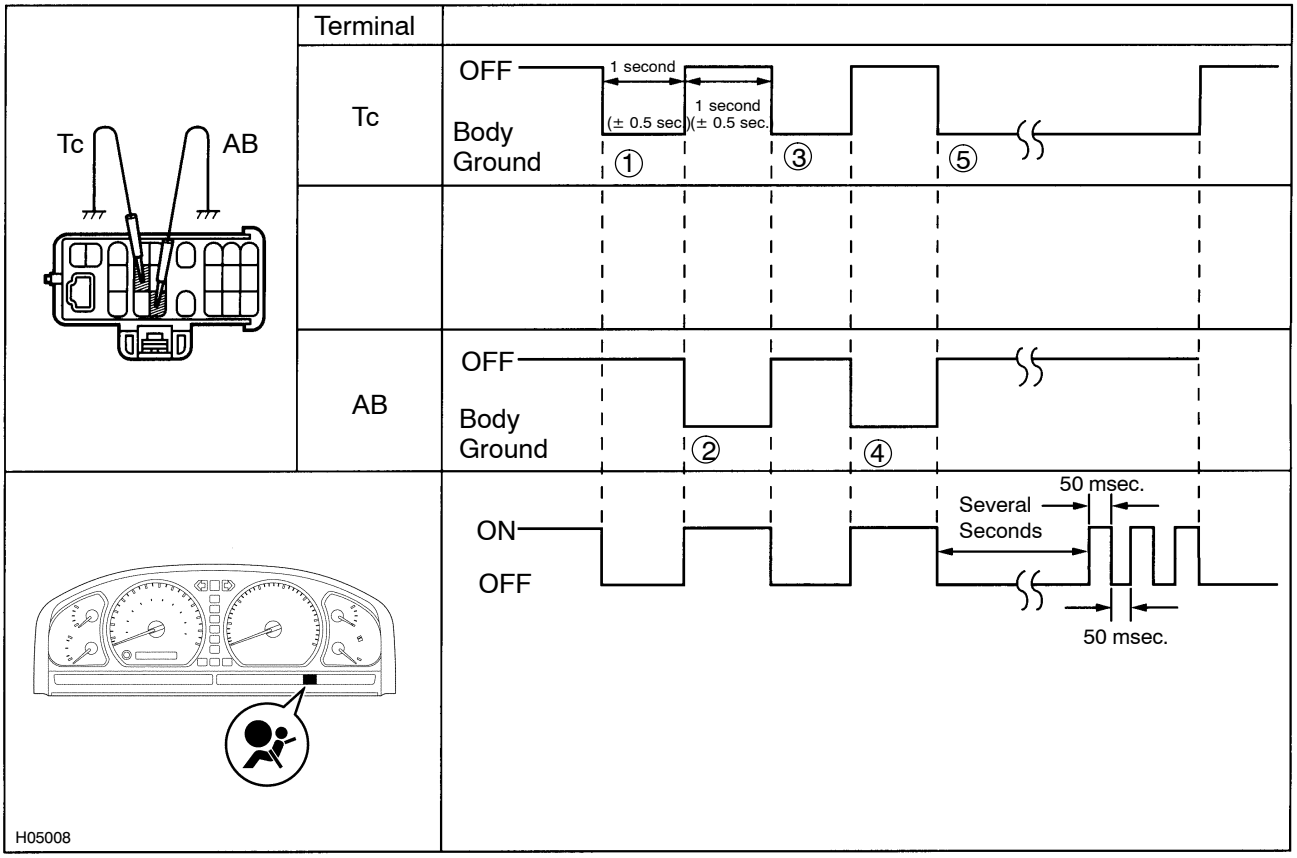
(c) Starting with the Tc terminal, ground alternately terminal Tc and terminal AB twice each in cycles of 1.0 second. Make sure that the terminals are grounded. Ensure the terminal Tc remains grounded.

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

H05018

(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.)

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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 on the following 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.

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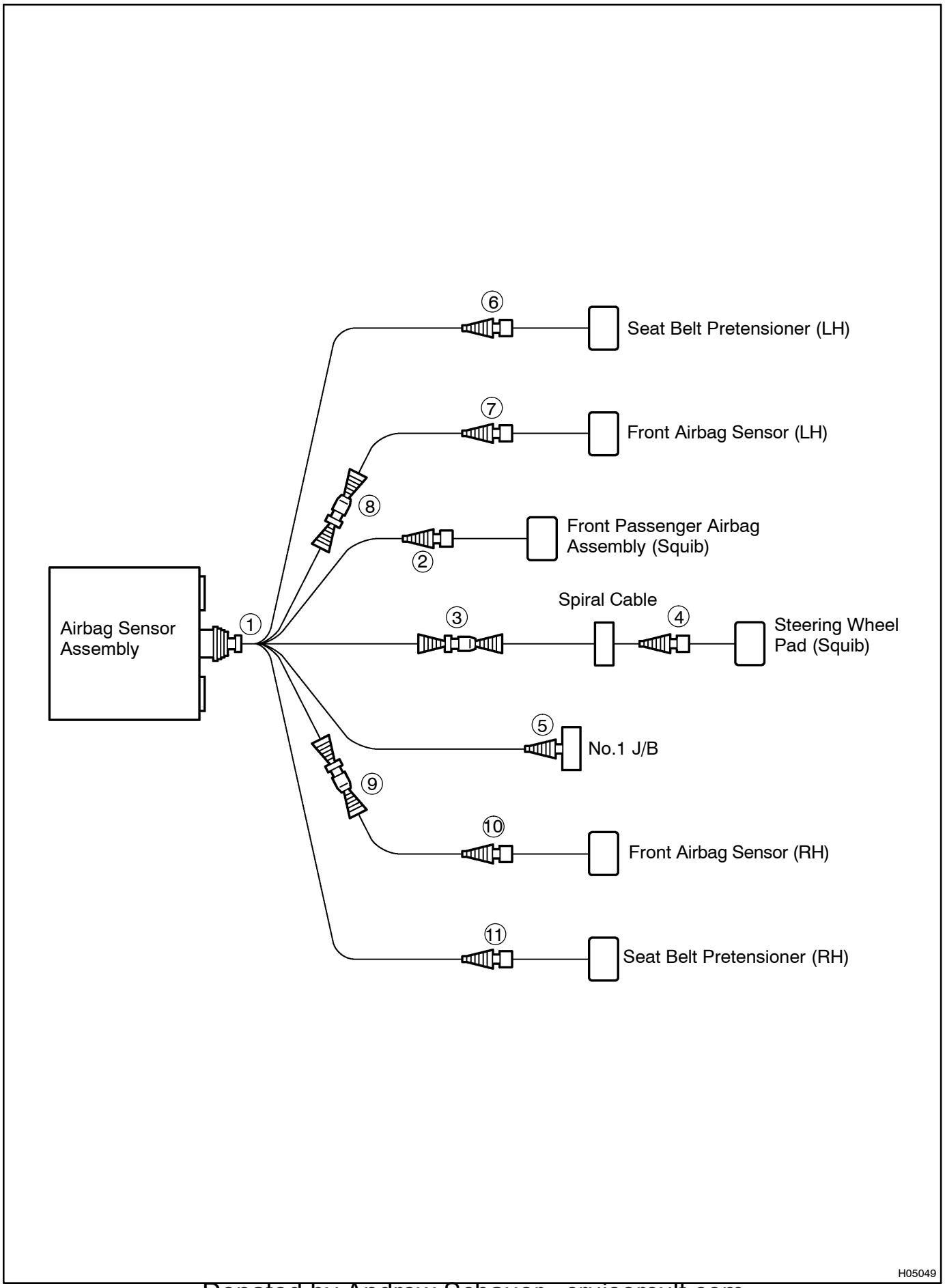

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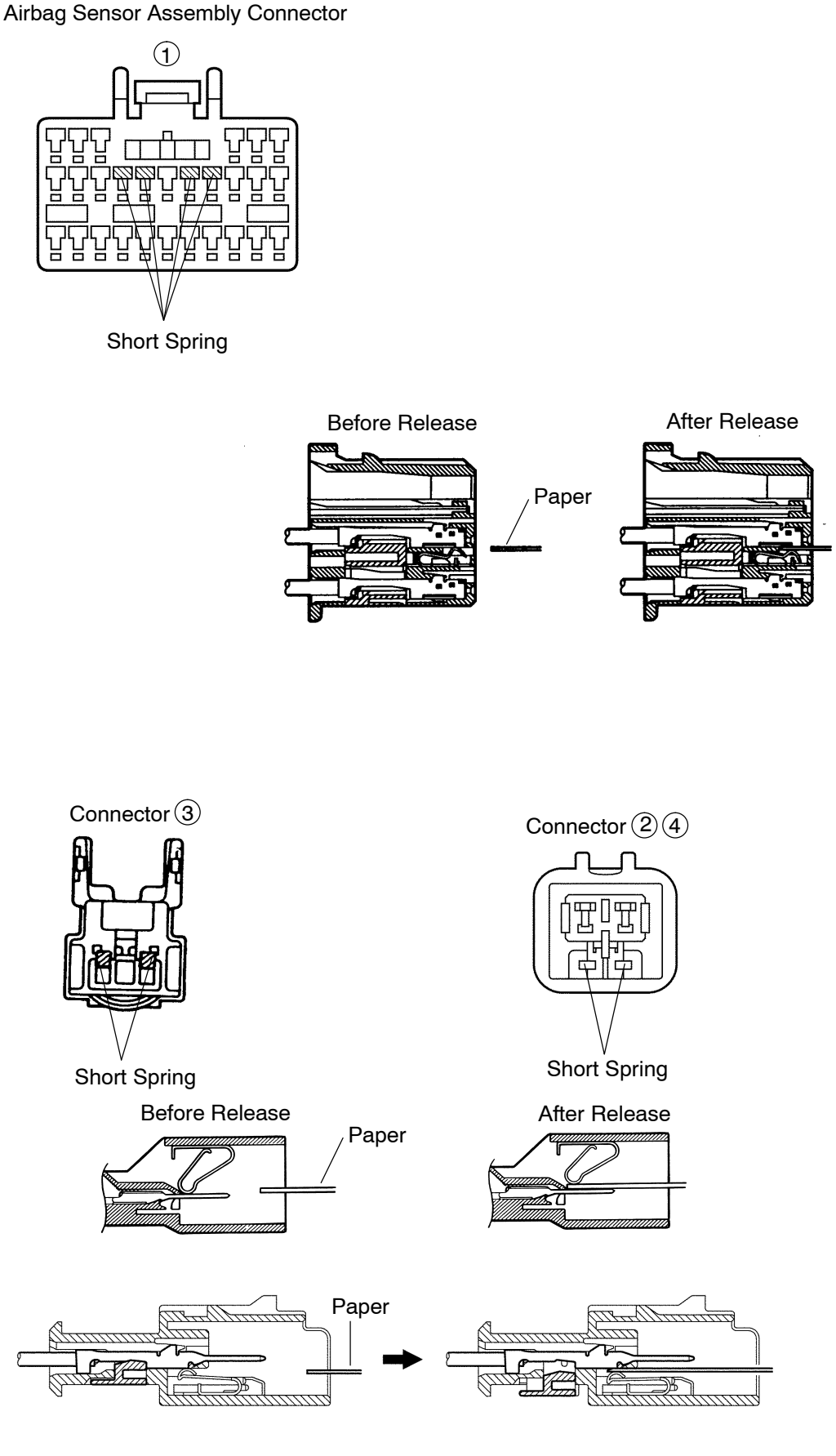

H01309
H01233
AB0130 H02248
AB0045 AB0046
H02249

H05026

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DI161–14

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–353)	Short in D squib circuit	• Steering wheel pad (squib) • Spiral cable • Airbag sensor assembly • Wire harness	ON
B0101/14 (DI–358)	Open in D squib circuit	• Steering wheel pad (squib) • Spiral cable • Airbag sensor assembly • Wire harness	ON
B0102/11 (DI–362)	Short in D squib circuit (to ground)	• Steering wheel pad (squib) • Spiral cable • Airbag sensor assembly • Wire harness	ON
B0103/12 (DI–366)	Short in D squib circuit (to B+)	• Steering wheel pad (squib) • Spiral cable • Airbag sensor assembly • Wire harness	ON
B0105/53 (DI–370)	Short in P squib circuit	• Front passenger airbag assembly (squib) • Airbag sensor assembly • Wire harness	ON
B0106/54 (DI–374)	Open in P squib circuit	• Front passenger airbag assembly (squib) • Airbag sensor assembly • Wire harness	ON
B0107/51 (DI–377)	Short in P squib circuit (to ground)	• Front passenger airbag assembly (squib) • Airbag sensor assembly • Wire harness	ON
B0108/52 (DI–380)	Short in P squib circuit (to B+)	• Front passenger airbag assembly (squib) • Airbag sensor assembly • Wire harness	ON
B0130/63 (DI–383)	Short in P/T squib (RH) circuit	• Seat belt pretensioner RH (squib) • Airbag sensor assembly • Wire harness	Blink
B0131/64 (DI–387)	Open in P/T squib (RH) circuit	• Seat belt pretensioner RH (squib) • Airbag sensor assembly • Wire harness	Blink
B0132/61 (DI–390)	Short in P/T squib (RH) circuit (to ground)	• Seat belt pretensioner RH (squib) • Airbag sensor assembly • Wire harness	Blink
B0133/62 (DI–393)	Short in P/T squib (RH) circuit (to B+)	• Seat belt pretensioner RH (squib) • Airbag sensor assembly • Wire harness	Blink
B0135/73 (DI–396)	Short in P/T squib (LH) circuit	• Seat belt pretensioner LH (squib) • Airbag sensor assembly • Wire harness	Blink
B0136/74 (DI–400)	Open in P/T squib (LH) circuit	• Seat belt pretensioner LH (squib) • Airbag sensor assembly • Wire harness	Blink

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DTC No. (See Page)	Detection Item	Trouble Area	SRS Warning Light
B0137/71 (DI–403)	Short in P/T squib (LH) circuit (to ground)	• Seat belt pretensioner LH (squib) • Airbag sensor assembly • Wire harness	Blink
B0138/72 (DI–406)	Short in P/T squib (LH) circuit (to B+)	• Seat belt pretensioner LH (squib) • Airbag sensor assembly • Wire harness	Blink
B1100/31 (DI–409)	Airbag sensor assembly malfunction	Airbag sensor assembly	ON
B1156/B1157/15 (DI–411)	Front airbag sensor assembly (RH) malfunction	• Front airbag sensor assembly (RH) • Wire harness	ON
B1158/B1159/16 (DI–419)	Front airbag sensor assembly (LH) malfunction	• Front airbag sensor assembly (LH) • Wire harness	ON
Normal (DI–427)	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.

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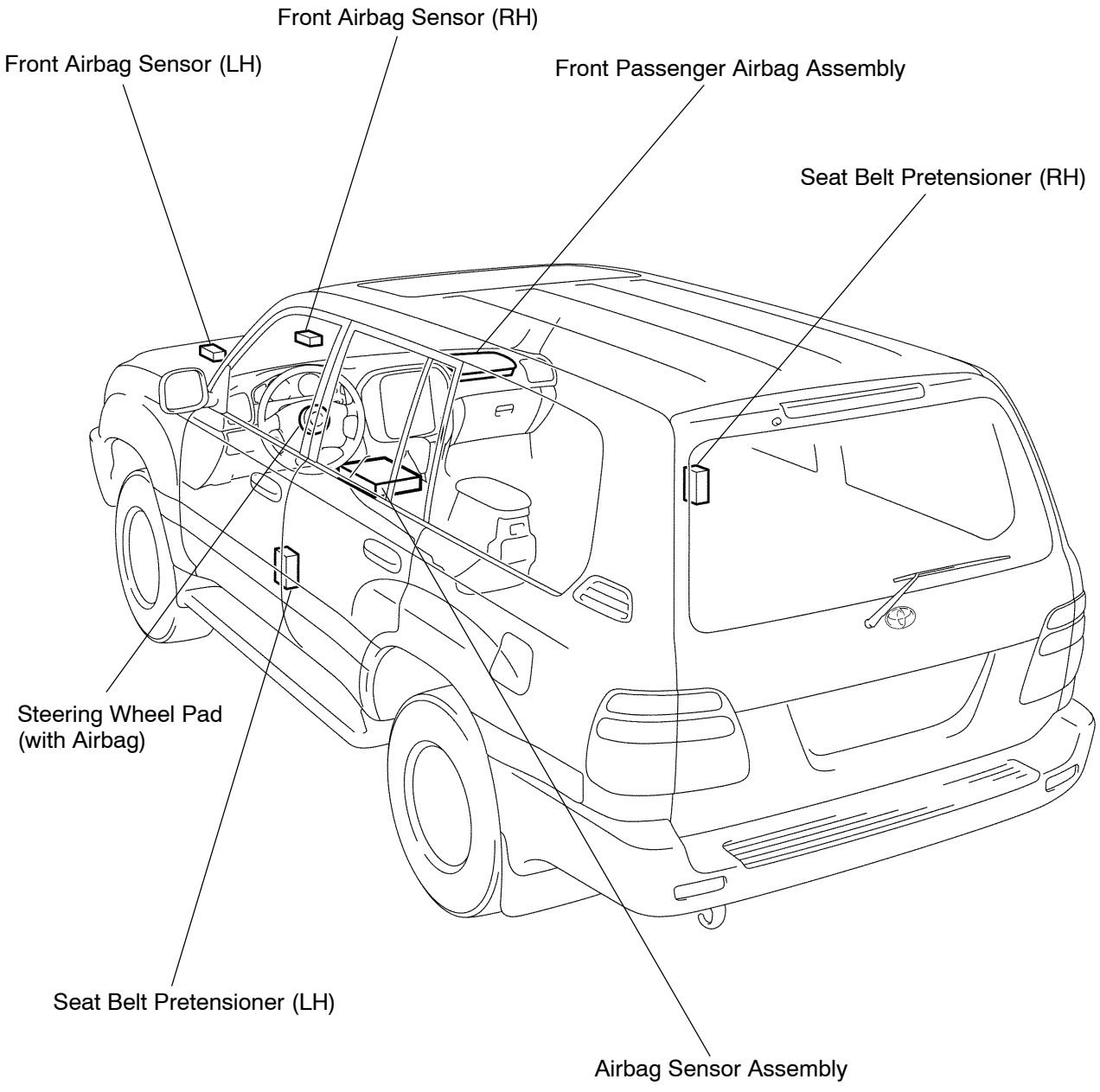
DI1HD–07

PARTS LOCATION



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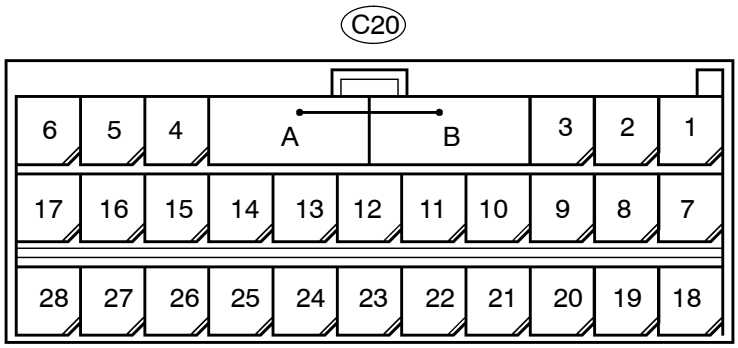
DI1HE–07

TERMINALS OF ECU



H01318

No.	Symbol	Terminal Name
A	–	Electrical Connector Check Mechanism
B	–	Electrical Connector Check Mechanism
C20 – 3	LA	SRS Warning Light
C20 – 5	IG2	Power Source (IGN Fuse)
C20 – 6	ACC	Power Source (CIG Fuse)
C20 – 7	PR–	Squib (Seat Belt Pretensioner, RH)
C20 – 8	PR+	Squib (Seat Belt Pretensioner, RH)
C20 – 9	SR+	Front Airbag Sensor (RH)
C20 – 10	P+	Squib (Passenger)
C20 – 11	P–	Squib (Passenger)
C20 – 12	SIL	Diagnosis
C20 – 13	D–	Squib (Driver)
C20 – 14	D+	Squib (Driver)
C20 – 15	SL+	Front Airbag Sensor (LH)
C20 – 16	PL+	Squib (Seat Belt Pretensioner, LH)
C20 – 17	PL–	Squib (Seat Belt Pretensioner, LH)
C20 – 19	Tc	Diagnosis
C20 – 20	SR–	Front Airbag Sensor (RH)
C20 – 26	SL–	Front Airbag Sensor (LH)
C20 – 27	E1	Ground
C20 – 28	E2	Ground

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DI18P–05

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–430
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–432
DTC is not displayed.	Tc terminal circuit	DI–436
SRS warning light is always lit up in a DTC check procedure.		
DTC is displayed without Tc and E1 terminal connection.		

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DI18Q–06

CIRCUIT INSPECTION

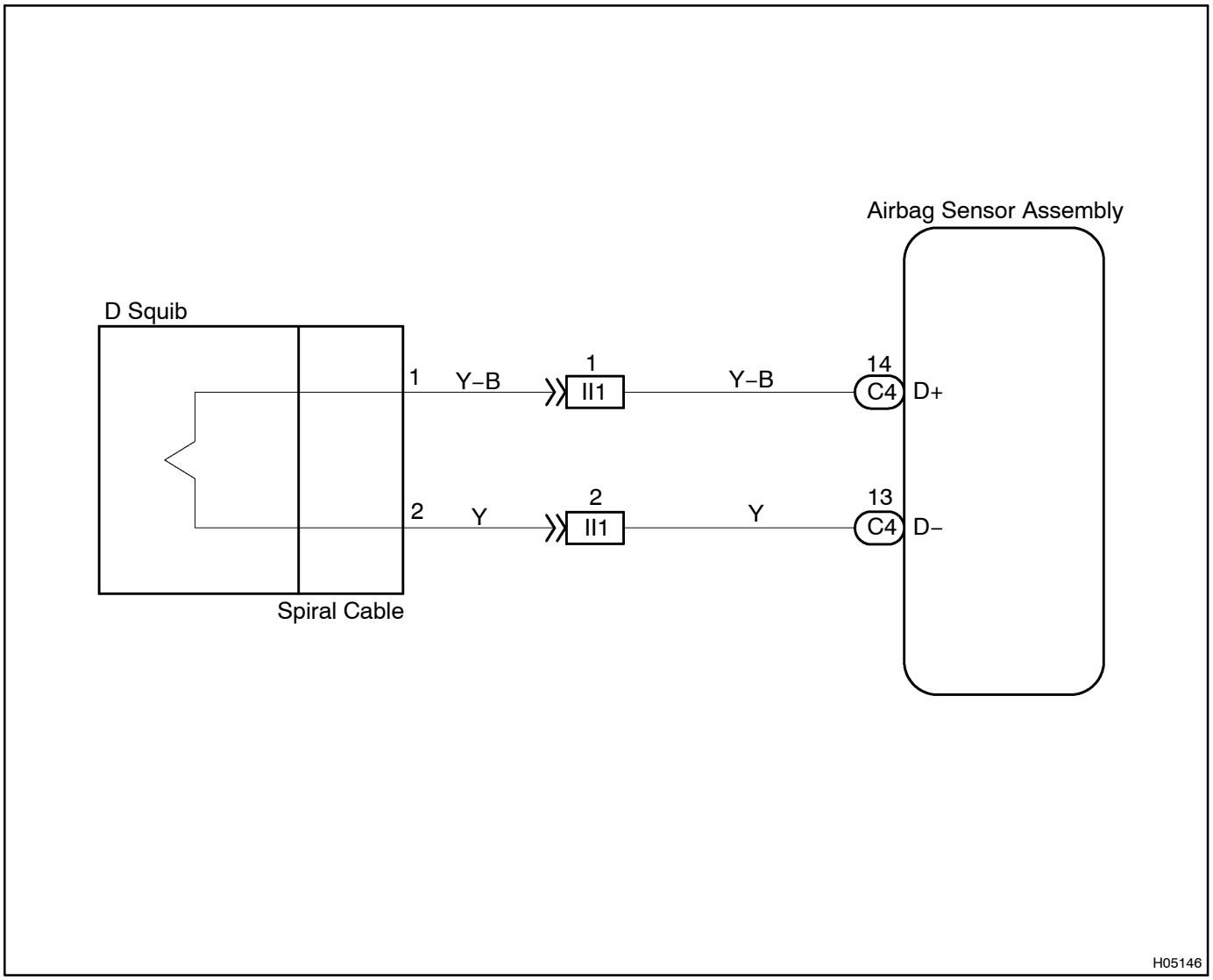
DTC	B0100/13	Short in D Squib Circuit

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



H05146

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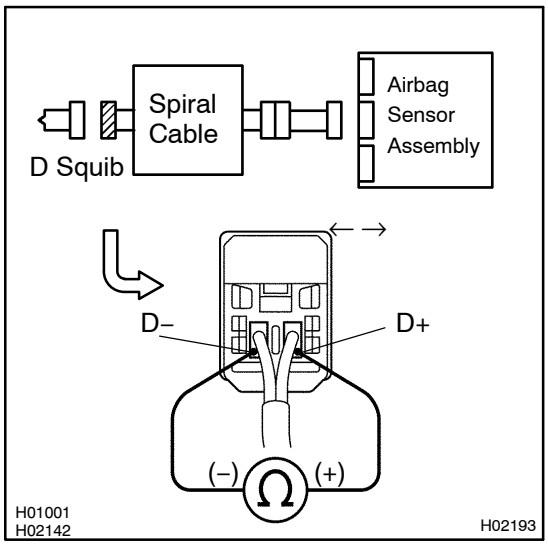
INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–427)**

2	**Check D squib circuit.**



PREPARATION:

Release 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–342)

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

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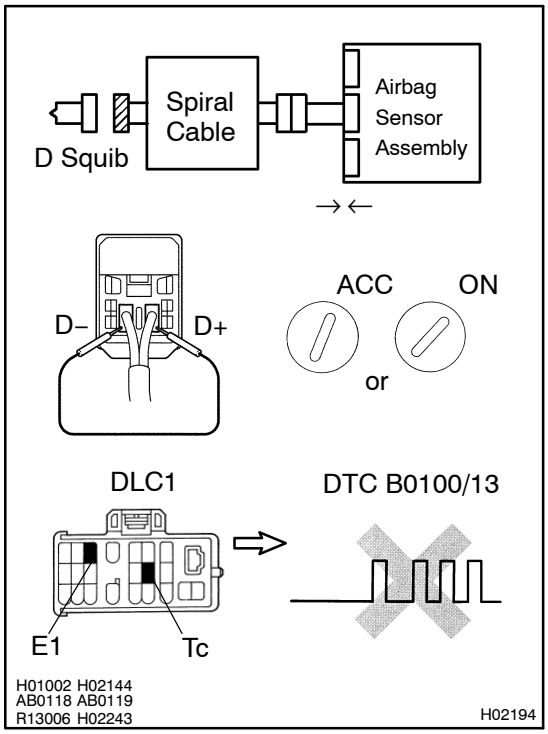
3	Check airbag sensor assembly.



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–342)

(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–342)

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

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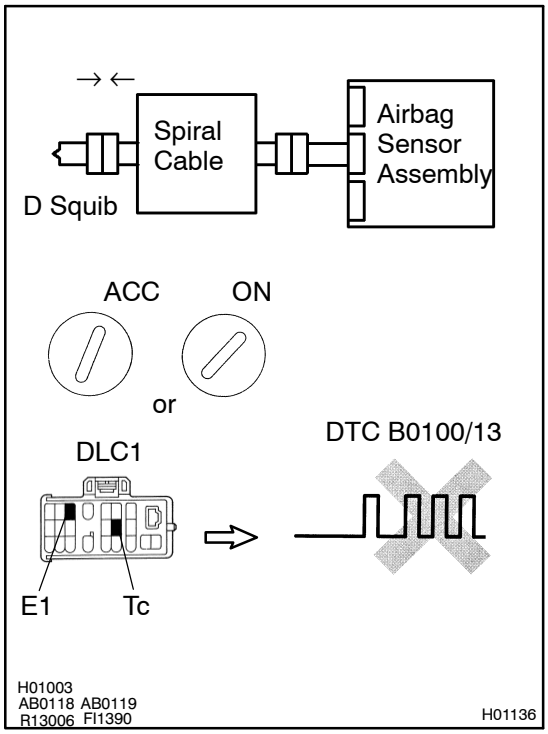
4	Check D squib.



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–342)
(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–342)

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.

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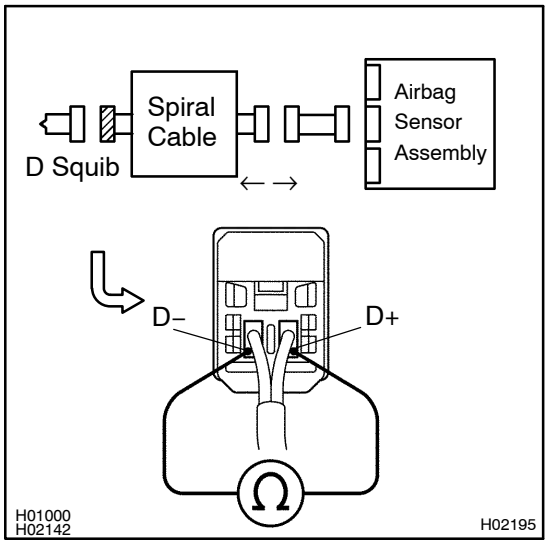
5	Check spiral cable.



PREPARATION:

(a) Disconnect the connector between the airbag sensor assembly and the spiral cable.

(b) Release airbag activation prevention mechanism of the spiral cable connector on the airbag sensor assembly side. (See page DI–342)

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–.

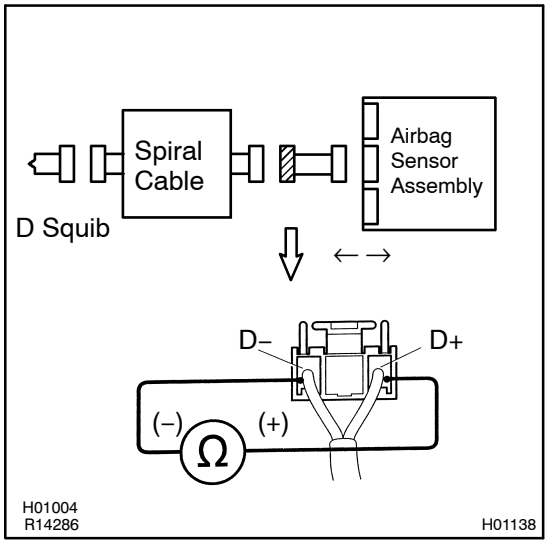
OK:

Resistance: 1 MΩ or Higher

NG	Replace spiral cable.

OK

6	Check harness between airbag sensor assembly and spiral cable.



PREPARATION:

Release 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–342)

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	Replace harness and 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.

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DI18R–09

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

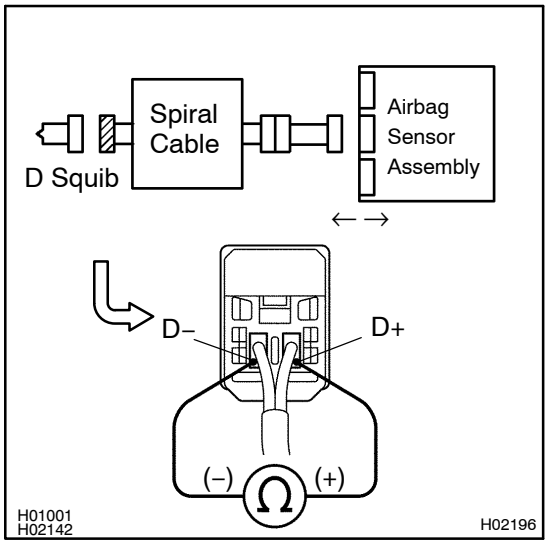
WIRING DIAGRAM

See page DI–353.

INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–427)

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

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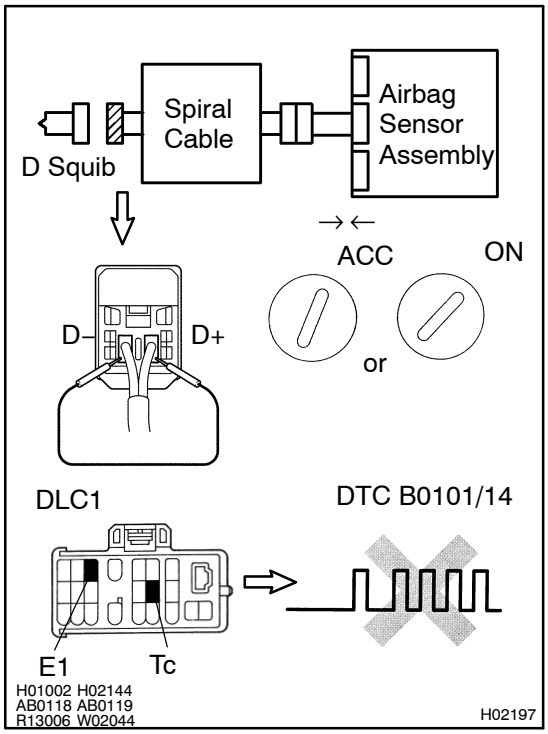
3	Check airbag sensor assembly.



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–342)
(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–342)

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

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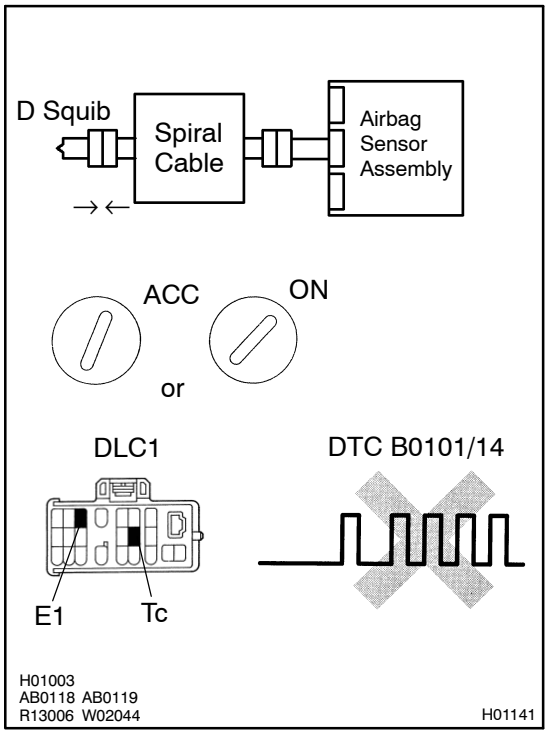
4	Check D squib.



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–342)
(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–342)

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.

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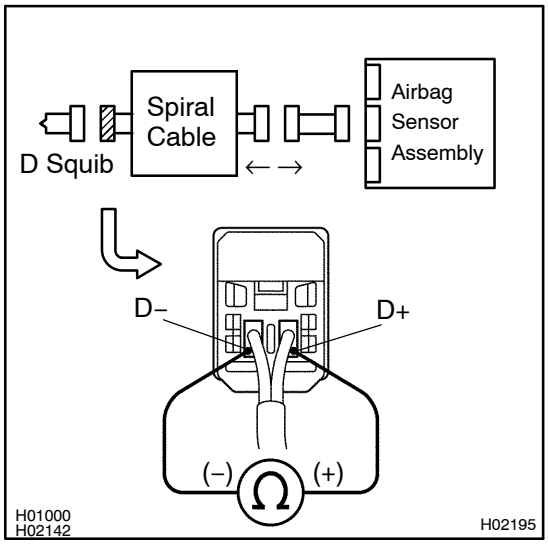
5	Check spiral cable.



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–.

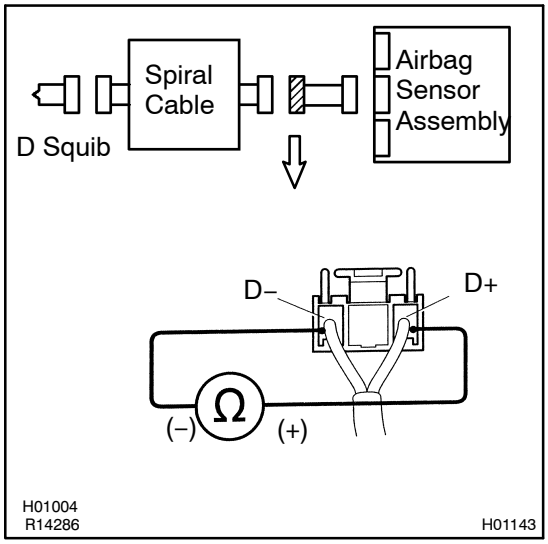
OK:

Resistance: Below 1 Ω

NG	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	Replace harness and 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.

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DI18S–05

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

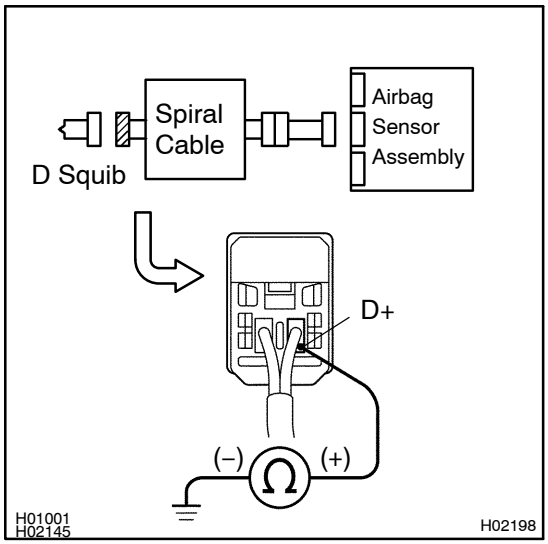
WIRING DIAGRAM

See page DI–353.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–427)**

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

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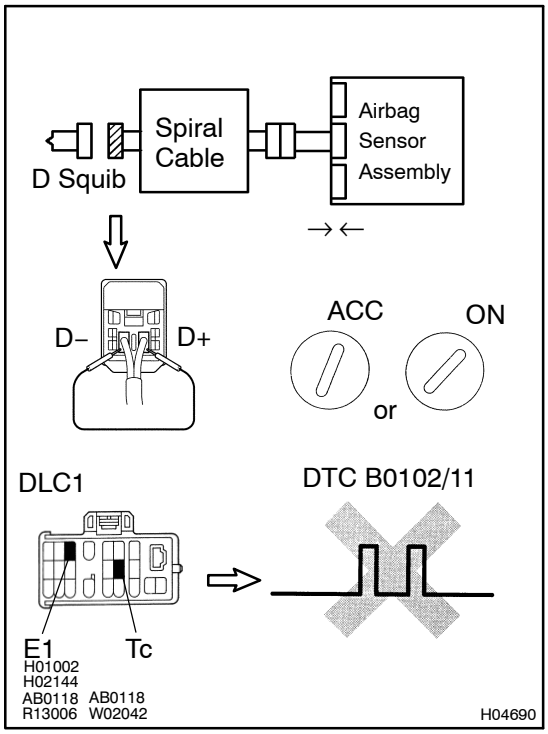
3	Check airbag sensor assembly.



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–342)

(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–342)

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

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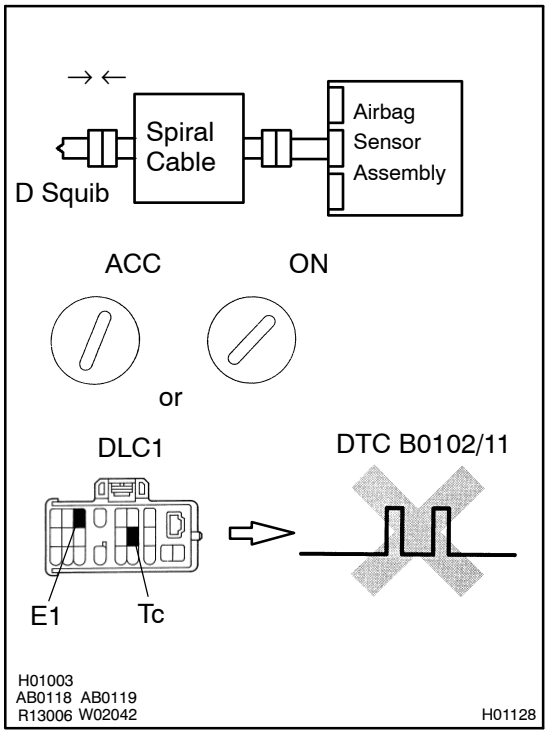
4	Check D squib.



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–342)
(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–342)

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.

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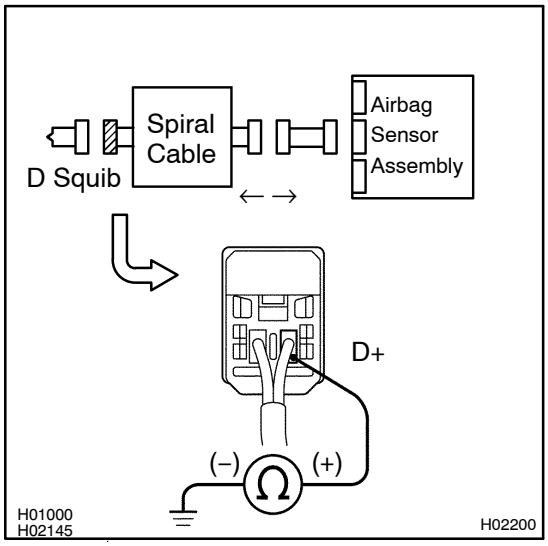
5	Check spiral cable.



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 → **Replace spiral cable.**

OK

Replace harness and connector between airbag sensor assembly and spiral cable.

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DI18T–08

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 components, see page 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

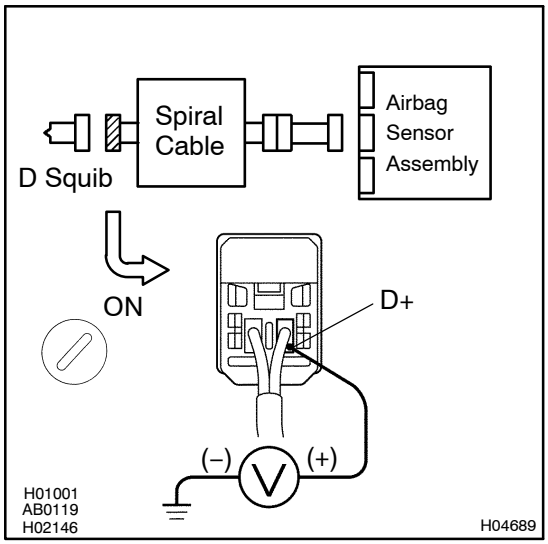
WIRING DIAGRAM

See page DI–353.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–427)**

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

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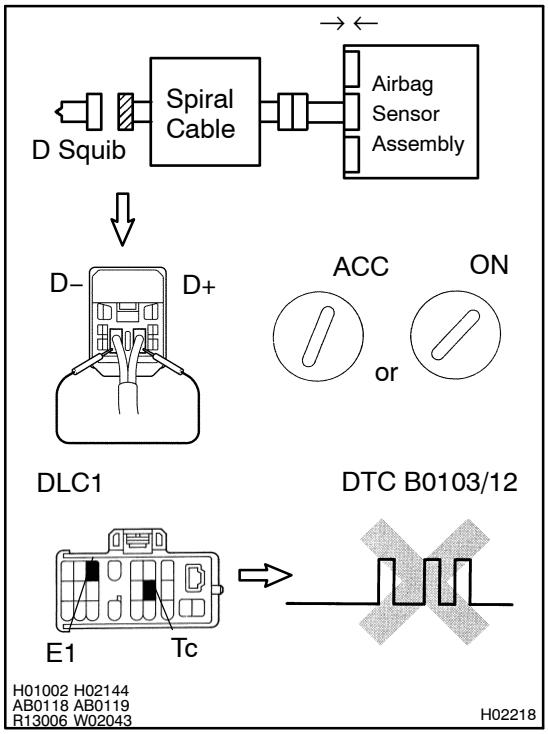
3	Check airbag sensor assembly.



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–342)

(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–342)

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

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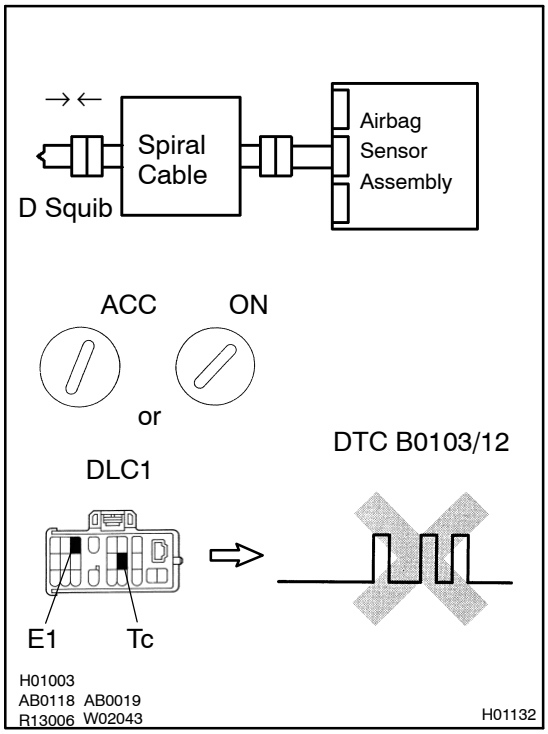
4	Check D squib.



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–342)
(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–342)

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.

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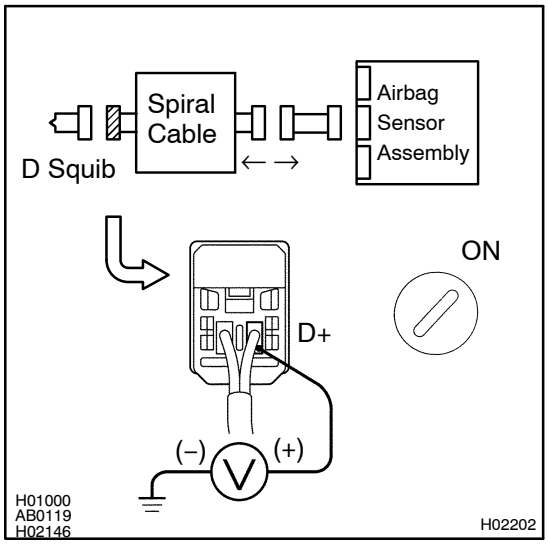
5	Check spiral cable.



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect the connector between the airbag sensor assembly and the spiral cable.
(c) Turn ignition switch ON.

CHECK:

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 → **Replace spiral cable.**

OK

Replace harness and connector between airbag sensor assembly and spiral cable.

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DI1B6–06

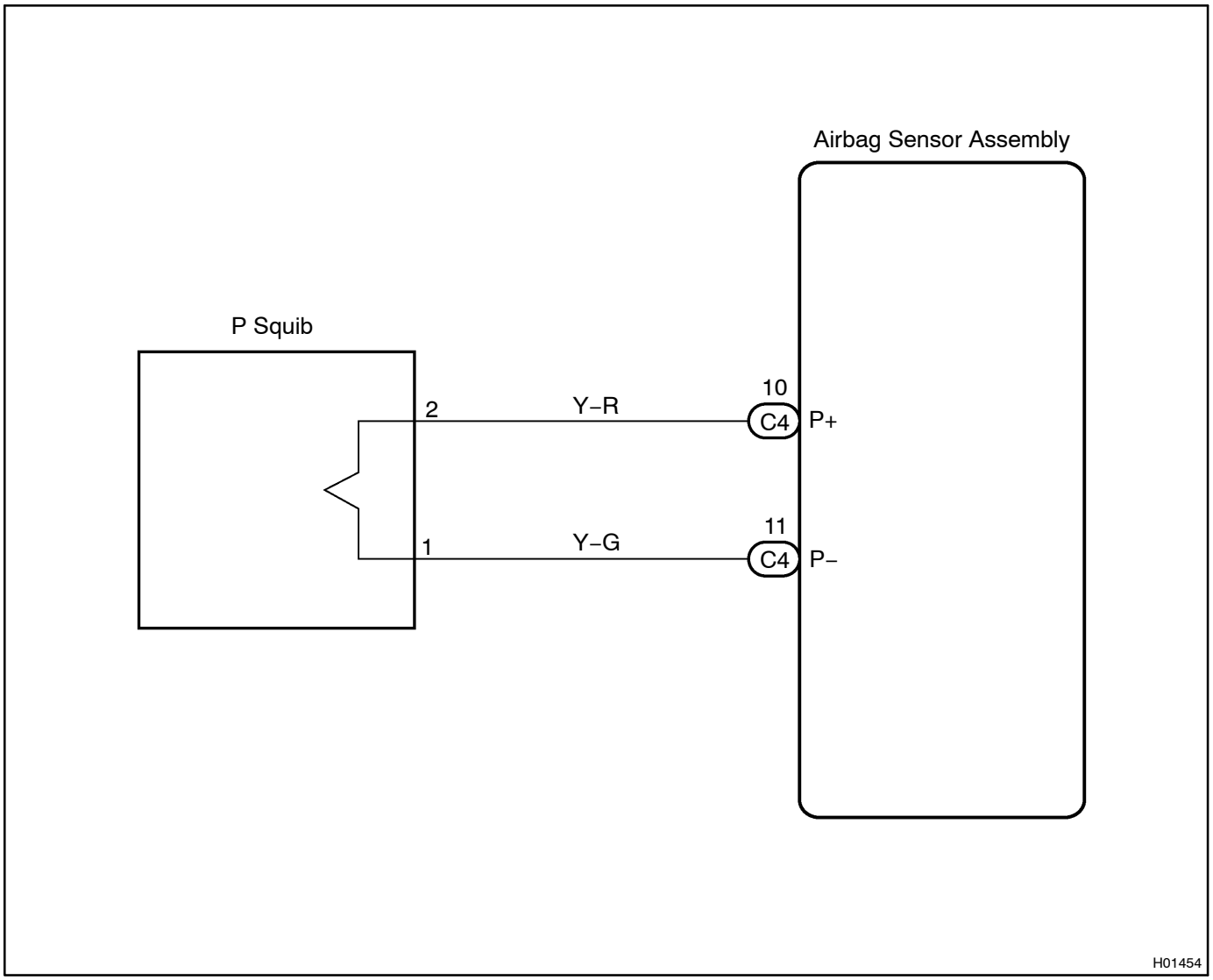
DTC	B0105/53	Short in P Squib Circuit

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



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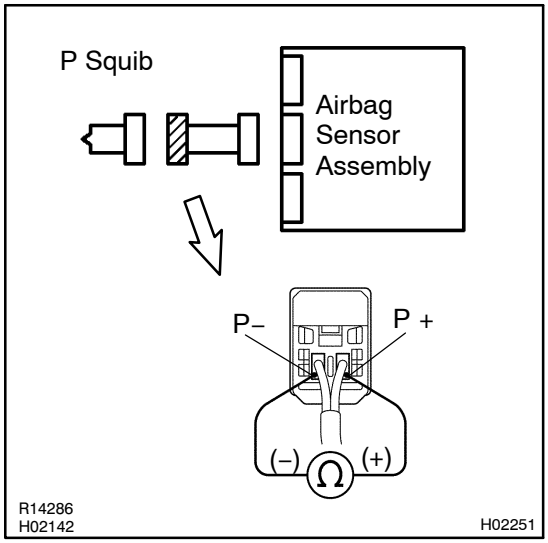
INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–427)**

2	**Check P squib circuit.**



PREPARATION:

Release airbag activation prevention mechanism of the connector (on the airbag sensor assembly side) between the front passenger airbag assembly and the airbag sensor assembly.

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 → **Replace harness and connector between front passenger airbag assembly and airbag sensor assembly.**

OK

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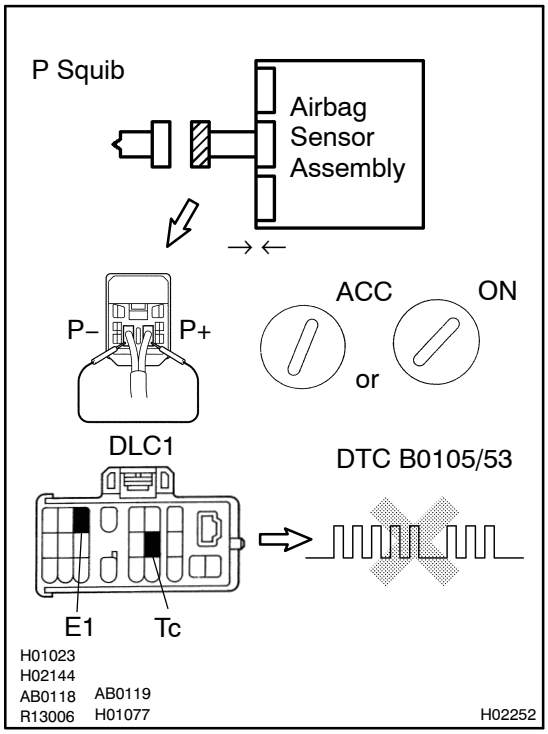
3	Check airbag sensor assembly.



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 airbag sensor assembly and the front passenger airbag 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–342)

(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–342)

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

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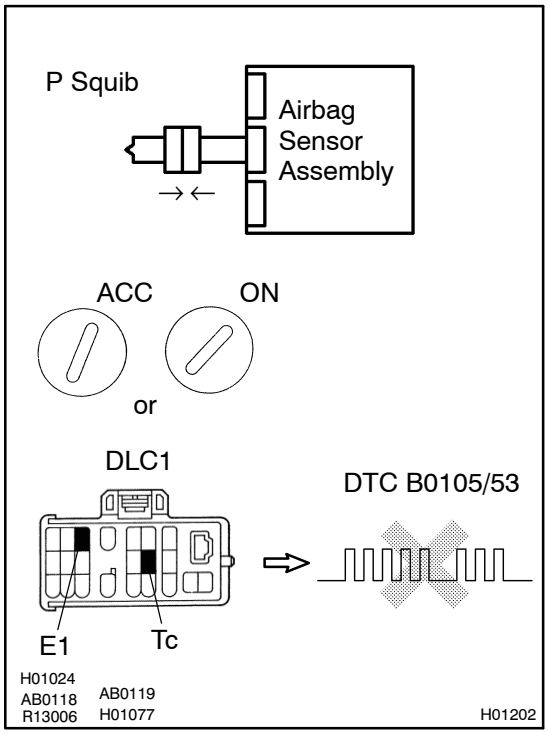
4	Check P squib.



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–342)
(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–342)

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.

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DI1B7–07

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 • P squib malfunction • Airbag sensor assembly malfunction	• Front passenger airbag assembly (P squib) • Airbag sensor assembly • Wire harness

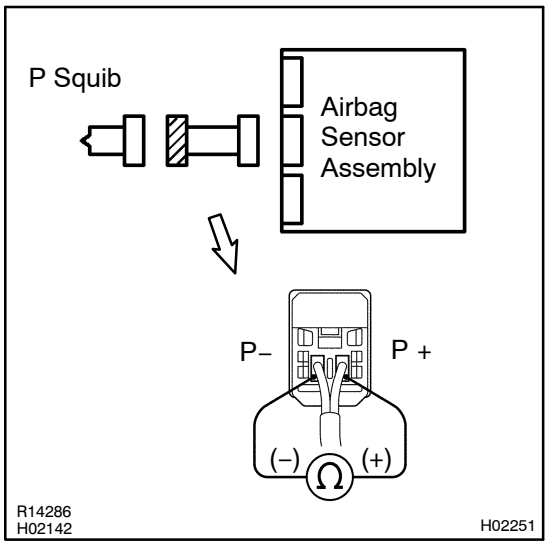
WIRING DIAGRAM

See page DI–370.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–427)**

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 → **Replace harness and connector between front passenger airbag assembly and airbag sensor assembly.**

OK

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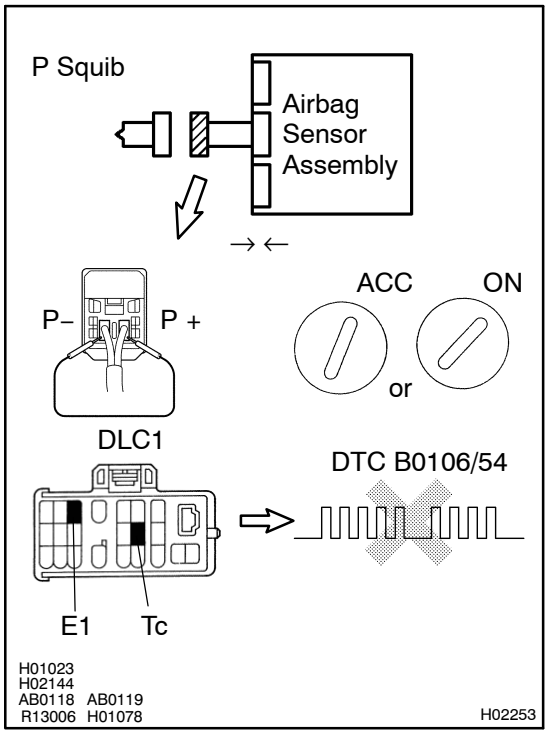
3	Check airbag sensor assembly.



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–342)

(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–342)

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

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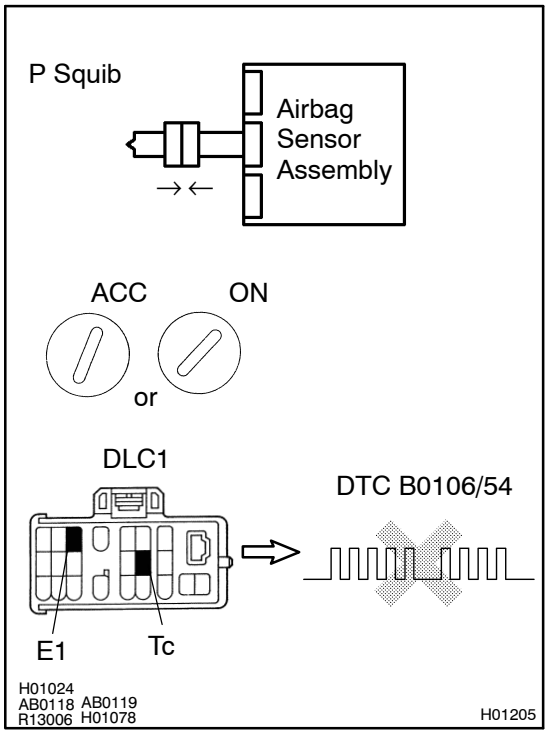
4	Check P squib.



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–342)
(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–342)

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.

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DI1B8–05

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 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

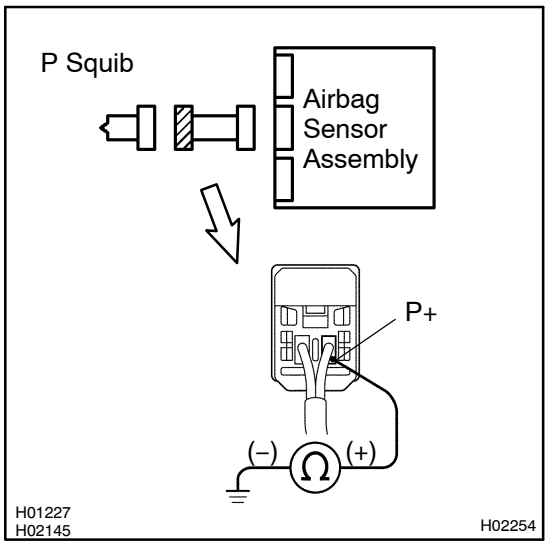
WIRING DIAGRAM

See page DI–370.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–427)**

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 → **Replace harness and connector between front passenger airbag assembly and airbag sensor assembly.**

OK

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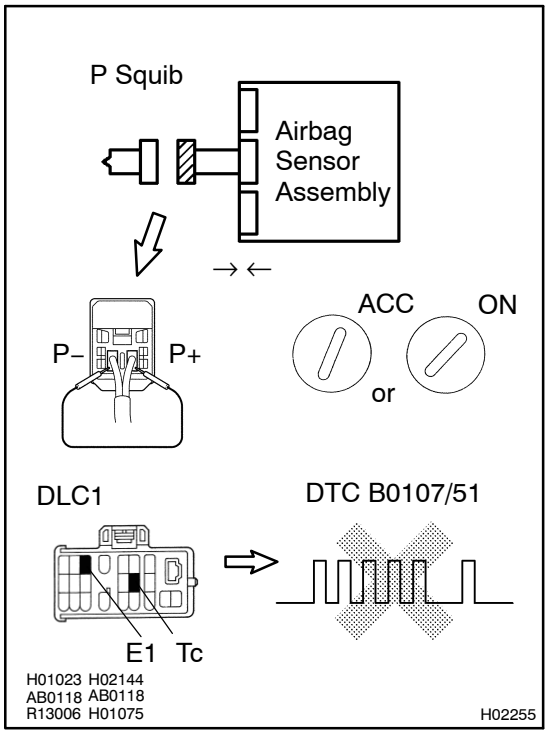
3	Check airbag sensor assembly.



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–342)

(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–342)

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

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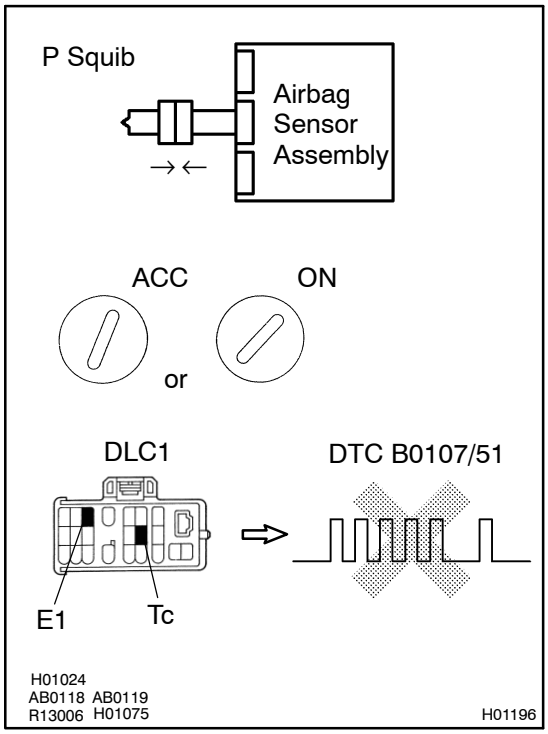
4	**Check P squib.**



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 step 5 on page DI–342)
(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–342)

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.

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DI1B9–06

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

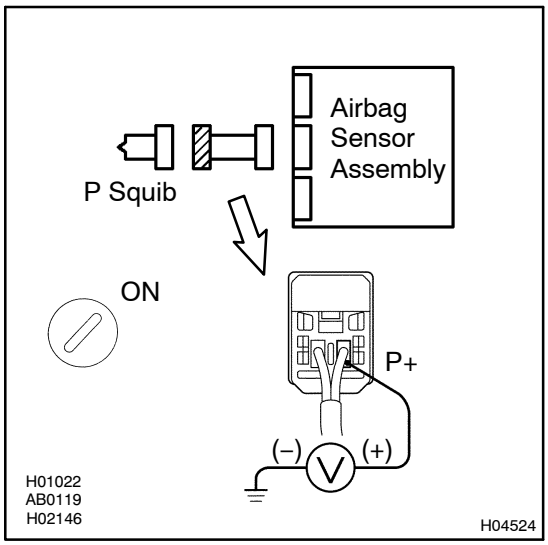
WIRING DIAGRAM

See page DI–370.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–427)**

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 P+ and body ground.

OK:

Voltage: 0 V

NG → **Replace harness and connector between front passenger airbag assembly and airbag sensor assembly.**

OK

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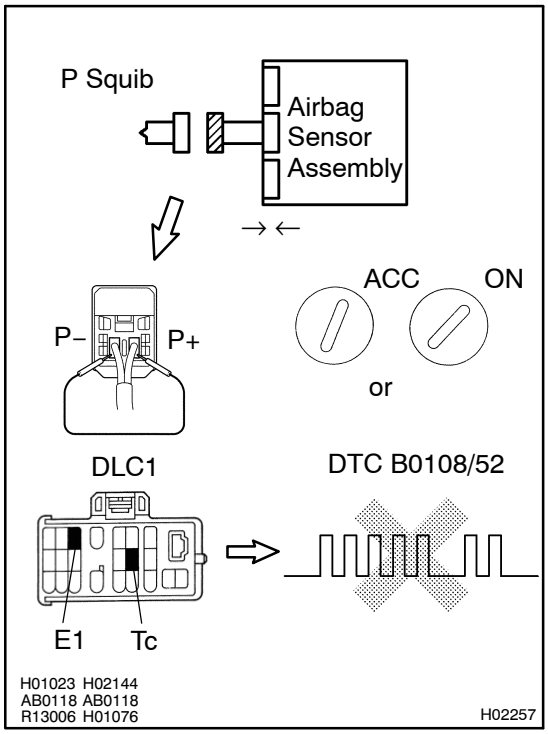
3	Check airbag sensor assembly.



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–342)

(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–342)

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

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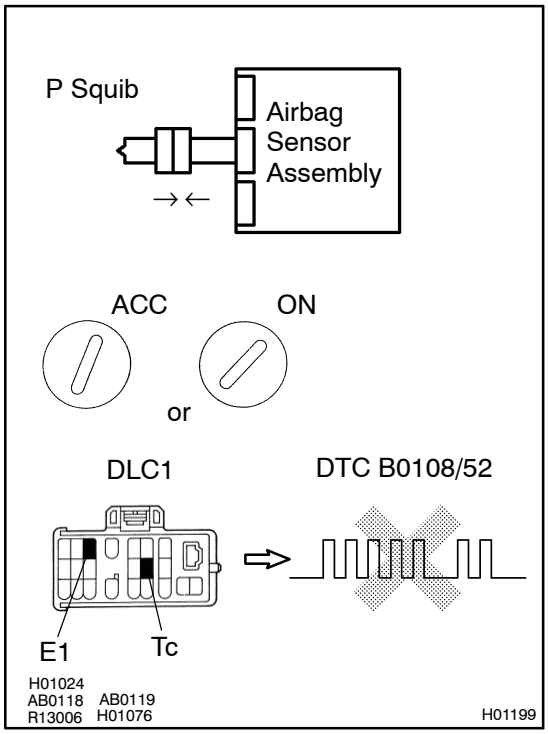
4	Check P squib.



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–342)
(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–342)

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.

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DI16S–11

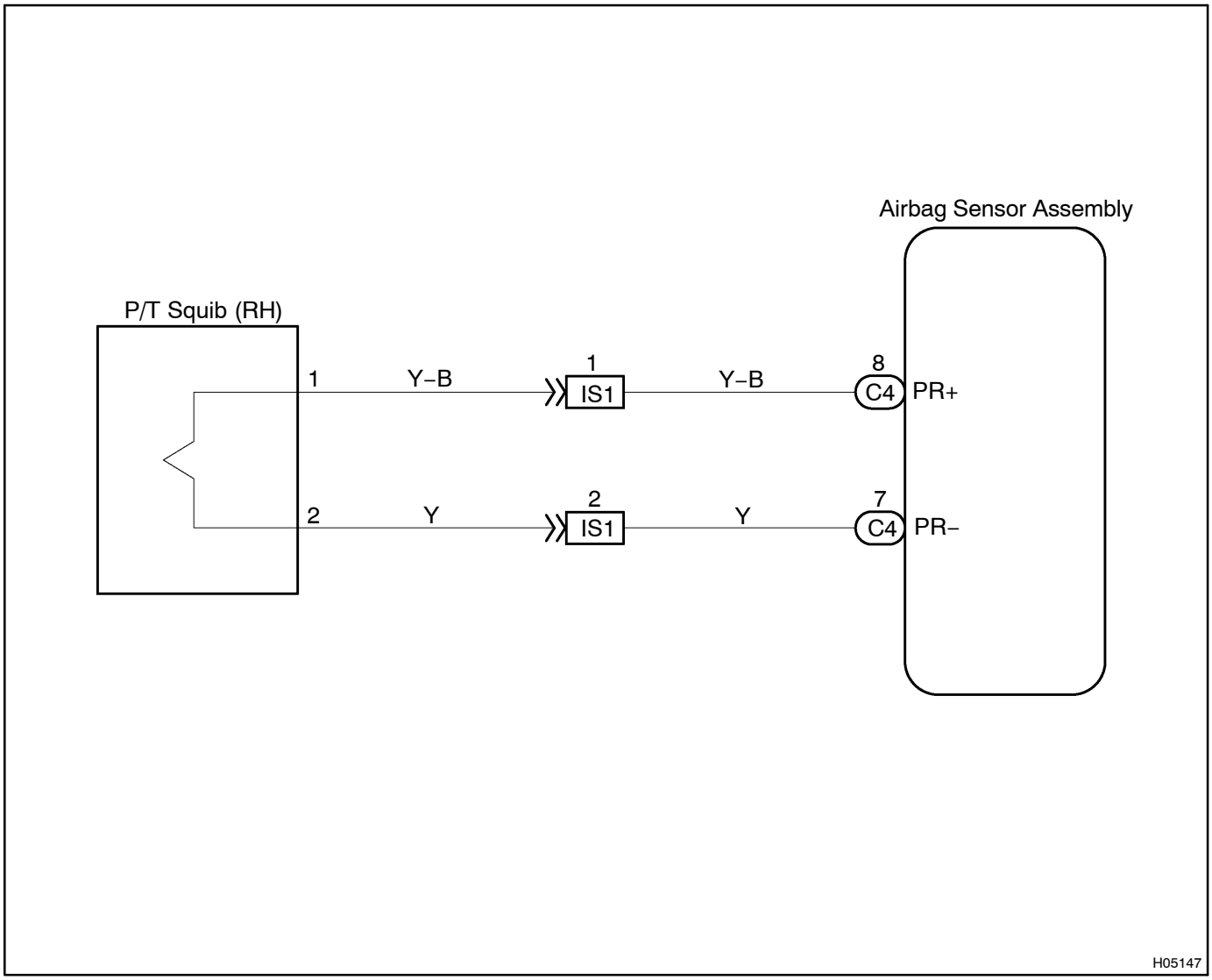
DTC	B0130/63	Short in P/T Squib (RH) Circuit

CIRCUIT DESCRIPTION

The P/T squib (RH) circuit consists of the airbag sensor assembly and seat belt pretensioner (RH).
It causes the seat belt pretensioner (RH) to activate when the seat belt pretensioner (RH) activation 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



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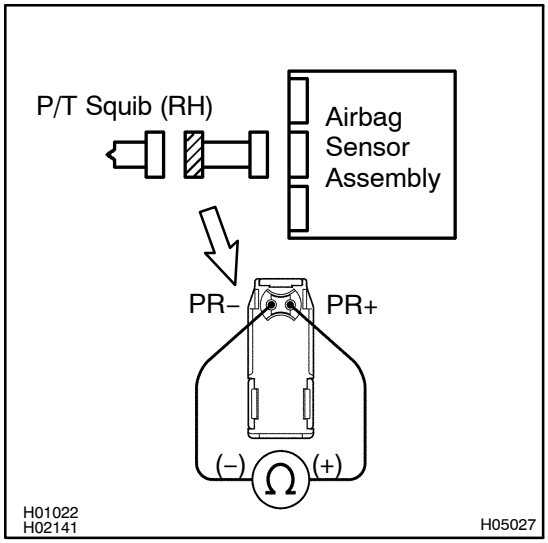
INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–427)**

2	**Check P/T squib (RH) circuit.**



PREPARATION:

Release 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–342)

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 → **Replace harness and connector between seat belt pretensioner (RH) and airbag sensor assembly.**

OK

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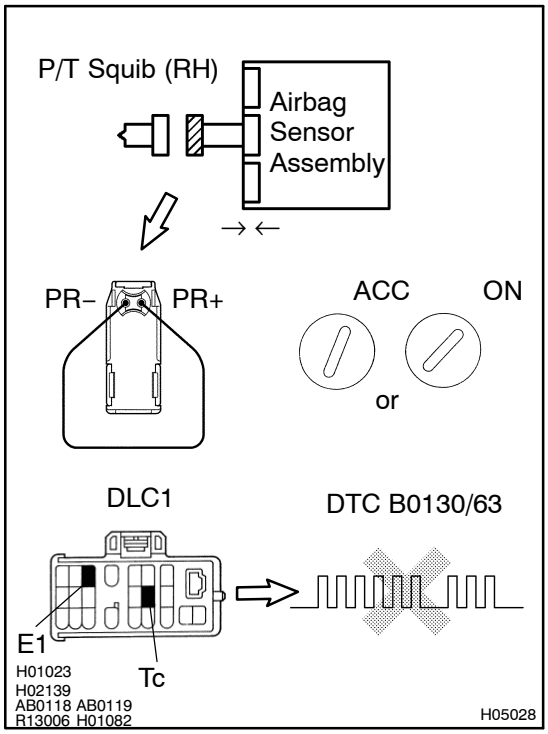
3	Check airbag sensor assembly.



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 airbag sensor assembly and the seat belt pretensioner (RH).

(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–342)

(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–342)

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

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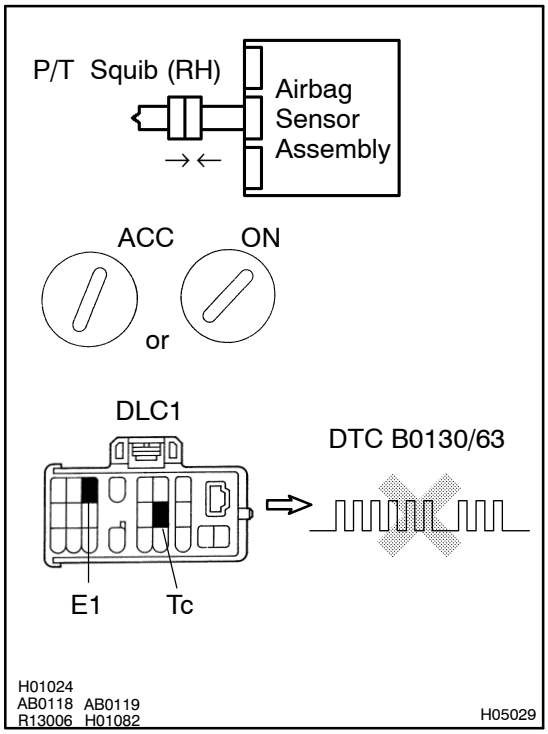
4	Check P/T squib (RH).



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 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–342)
(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–342)

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.

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DI1BG–06

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 seat belt pretensioner (RH) to activate when the seat belt pretensioner (RH) activation 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

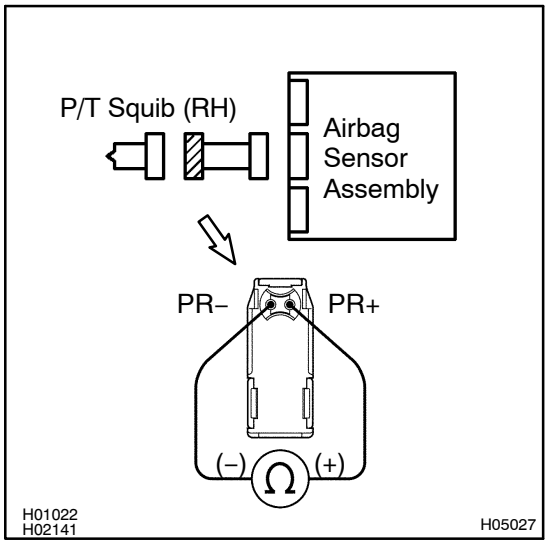
WIRING DIAGRAM

See page DI–383.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–427)**

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 → **Replace harness and connector between seat belt pretensioner (RH) and airbag sensor assembly.**

OK

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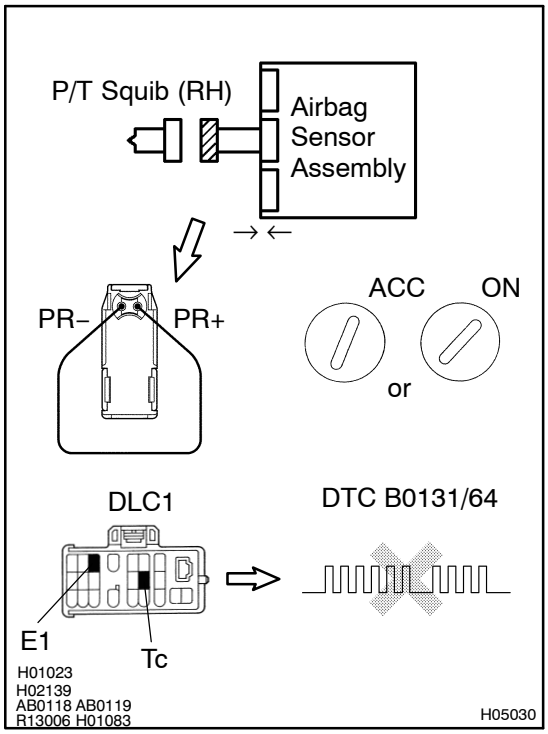
3	Check airbag sensor assembly.



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–342)

(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–342)

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

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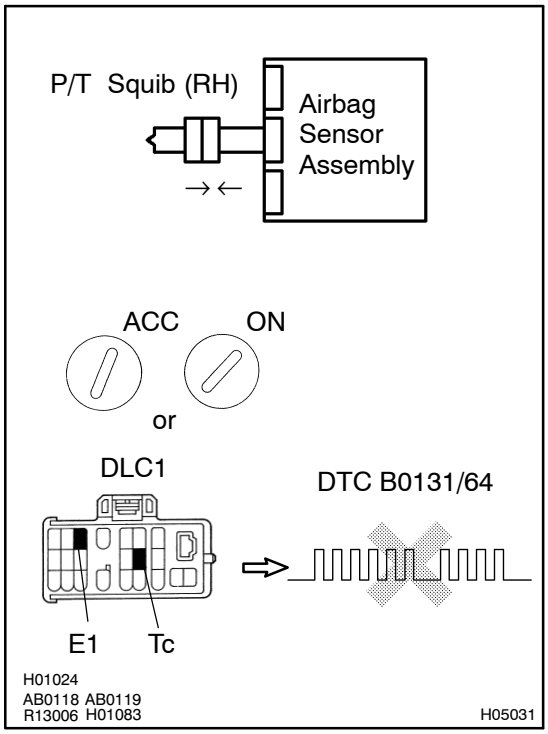
4	Check P/T squib (RH).



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–342)
(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–342)

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.

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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 seat belt pretensioner (RH) to activate when the seat belt pretensioner (RH) activation conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0132/61 is recorded when 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

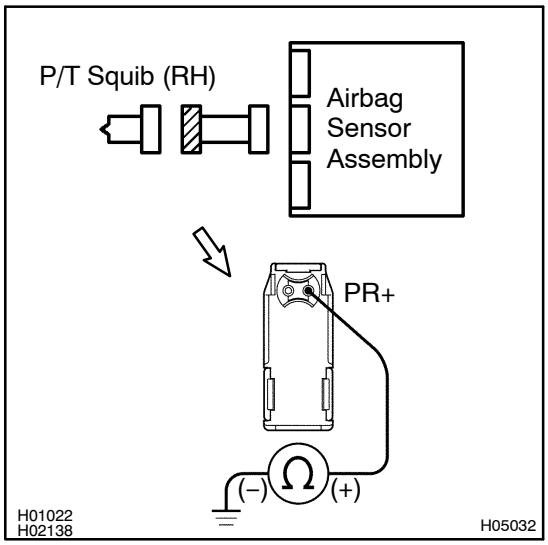
WIRING DIAGRAM

See page DI–383.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–427)**

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 → **Replace harness and connector between seat belt pretensioner (RH) and airbag sensor assembly.**

OK

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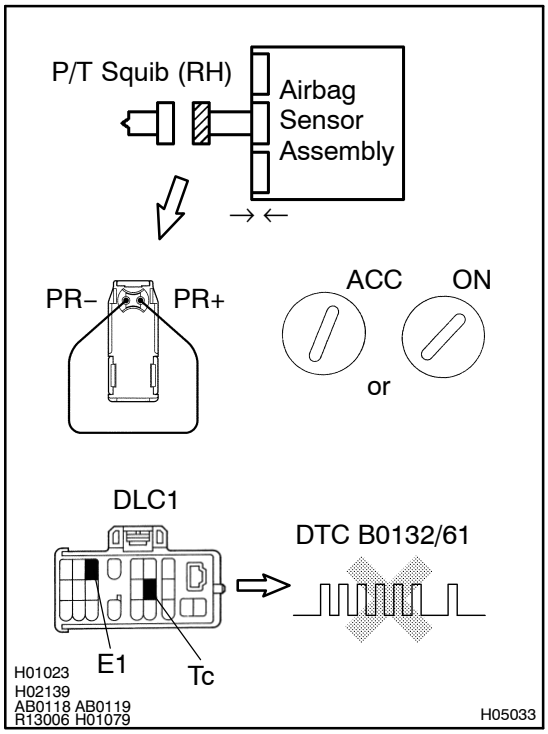
3	**Check airbag sensor assembly.**



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–342)

(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–342)

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

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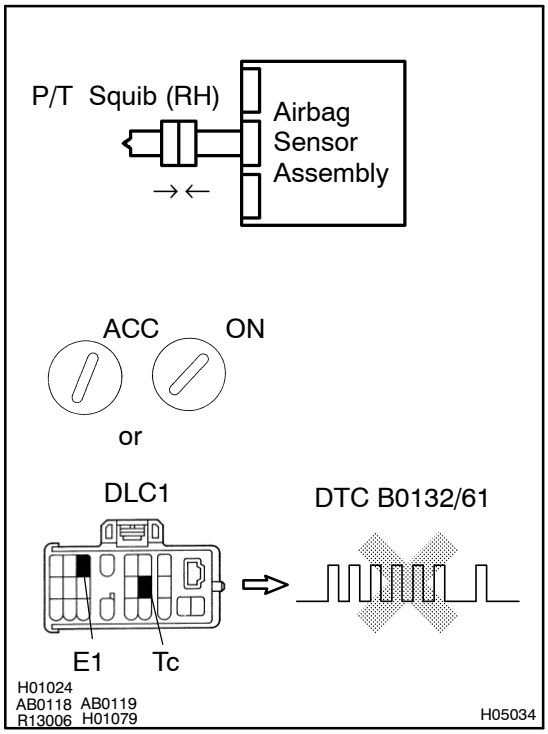
4	Check P/T squib (RH).



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–342)
(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–342)

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.

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DI1BI–06

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 seat belt pretensioner (RH) to activate when the seat belt pretensioner (RH) activation 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

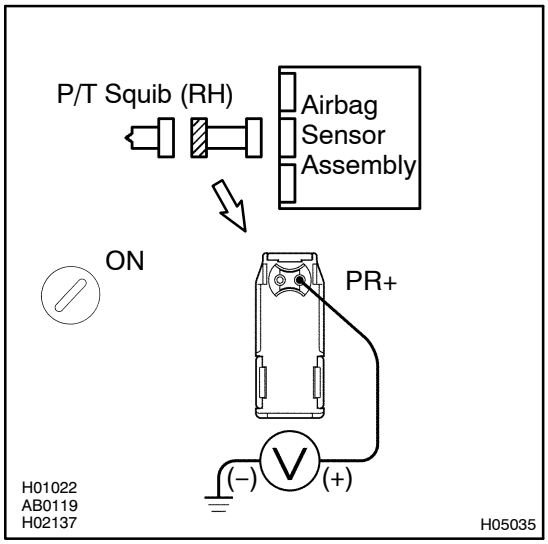
WIRING DIAGRAM

See page DI–383.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–427)**

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 → **Replace harness and connector between seat belt pretensioner (RH) and airbag sensor assembly.**

OK

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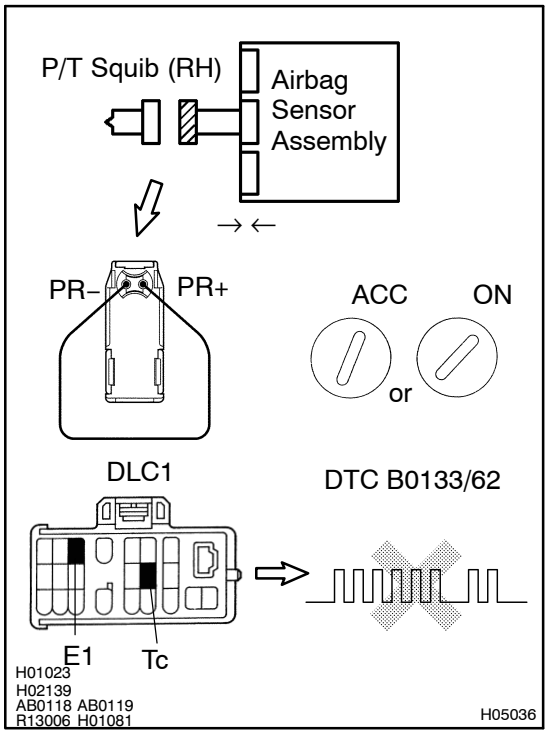
3	Check airbag sensor assembly.



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–342)

(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–342)

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

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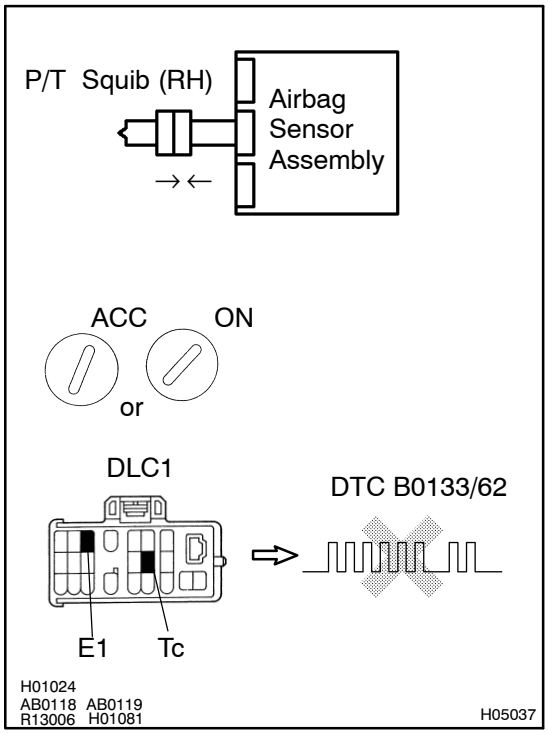
4	Check P/T squib (RH).



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–342)
(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–342)

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.

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DI16W–11

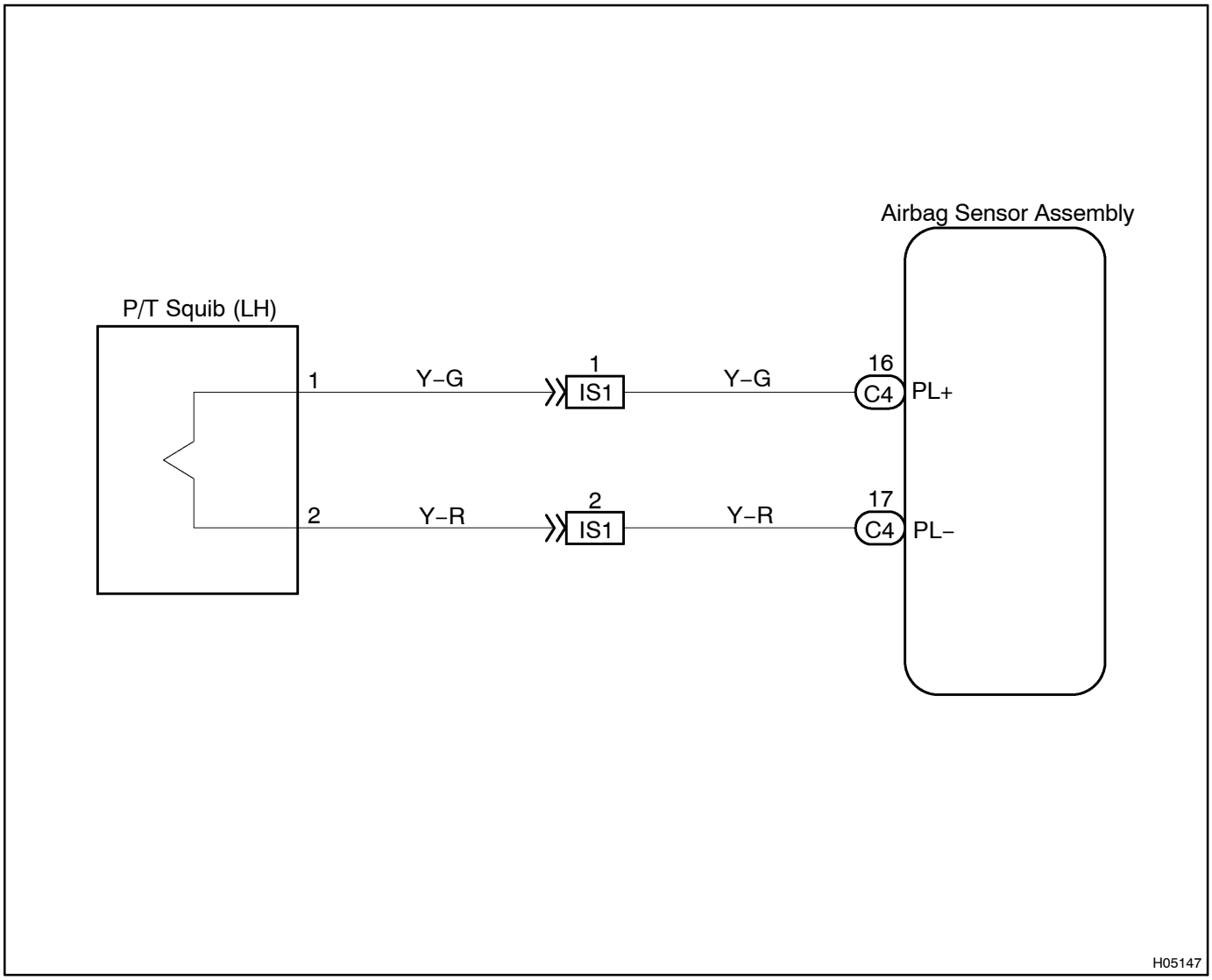
DTC	B0135/73	Short in P/T Squib (LH) Circuit

CIRCUIT DESCRIPTION

The P/T squib (LH) circuit consists of the airbag sensor assembly and seat belt pretensioner (LH).
It causes the seat belt pretensioner (LH) to activate when the seat belt pretensioner (LH) activation 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



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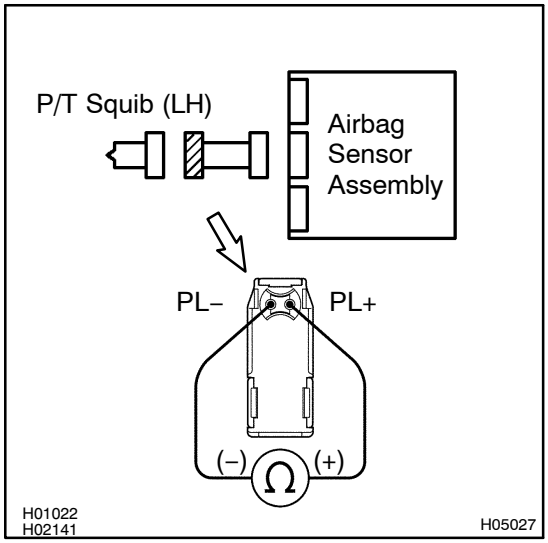
INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–427)**

2	**Check P/T squib (LH) circuit.**



PREPARATION:

Release 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–342)

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 → **Replace harness and connector between seat belt pretensioner (LH) and airbag sensor assembly.**

OK

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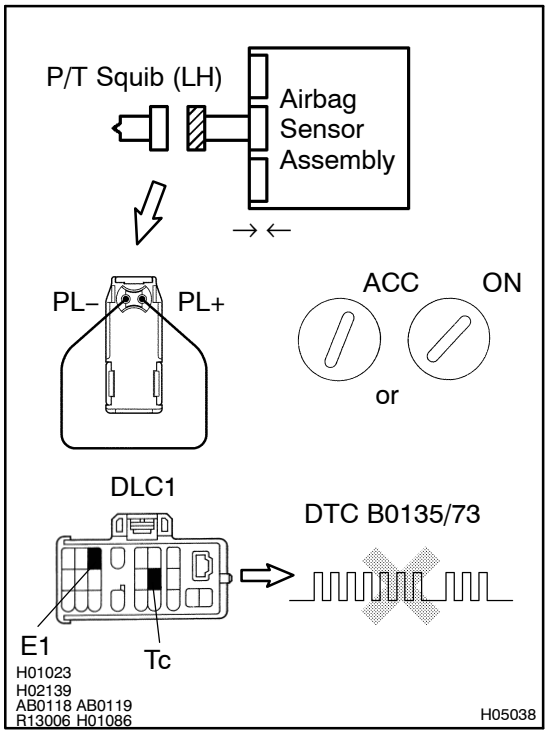
3	Check airbag sensor assembly.



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 airbag sensor assembly and the seat belt pretensioner (LH).

(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–342)

(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–342)

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

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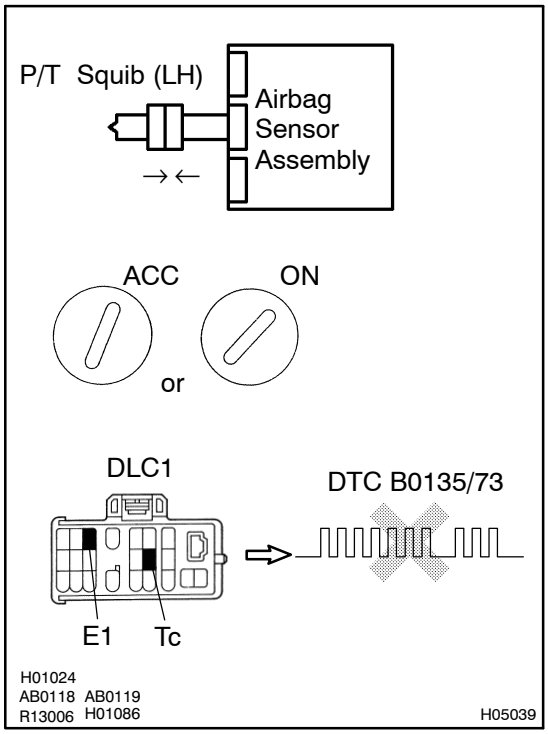
4	Check P/T squib (LH).



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–342)
(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–342)

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.

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DI1BJ–06

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 seat belt pretensioner (LH) to activate when the seat belt pretensioner (LH) activation 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

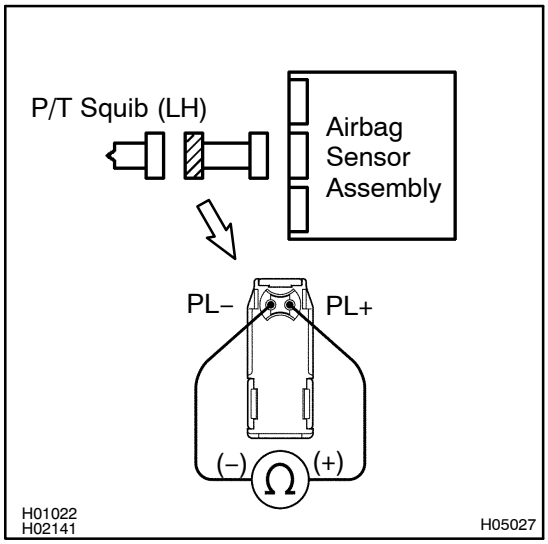
WIRING DIAGRAM

See page DI–396.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–427)**

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 → **Replace harness and connector between seat belt pretensioner (LH) and airbag sensor assembly.**

OK

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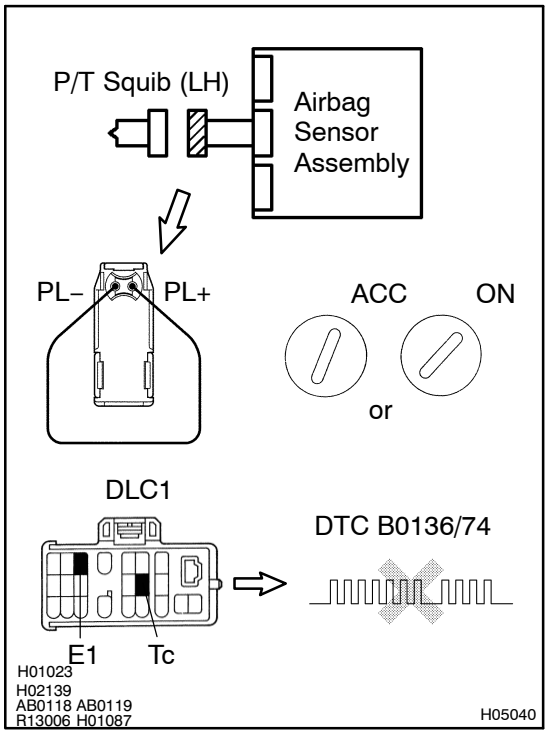
3	Check airbag sensor assembly.



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–342)

(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–342)

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

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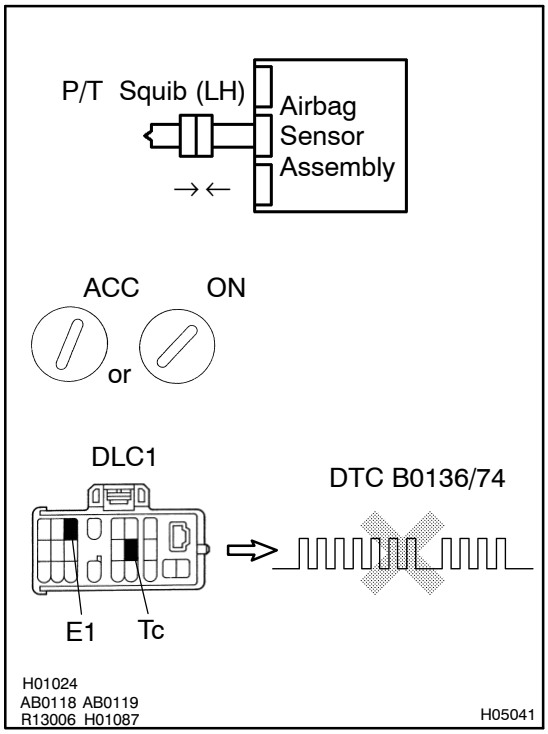
4	Check P/T squib (LH).



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–342)
(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–342)

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.

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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 seat belt pretensioner (LH) to activate when the seat belt pretensioner (LH) activation conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0137/71 is recorded when 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

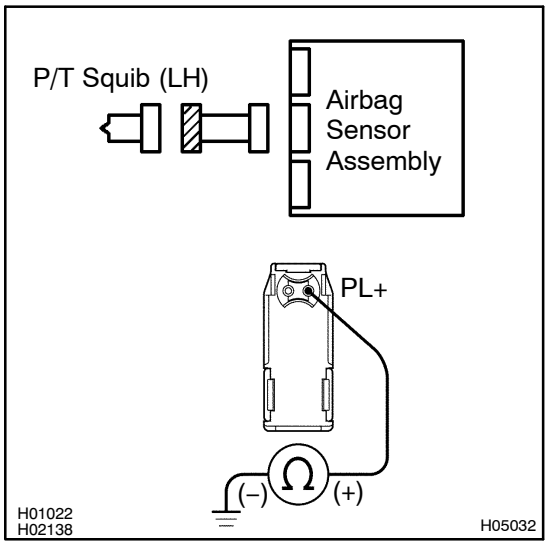
WIRING DIAGRAM

See page DI–396.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–427)**

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 → **Replace harness and connector between seat belt pretensioner (LH) and airbag sensor assembly.**

OK

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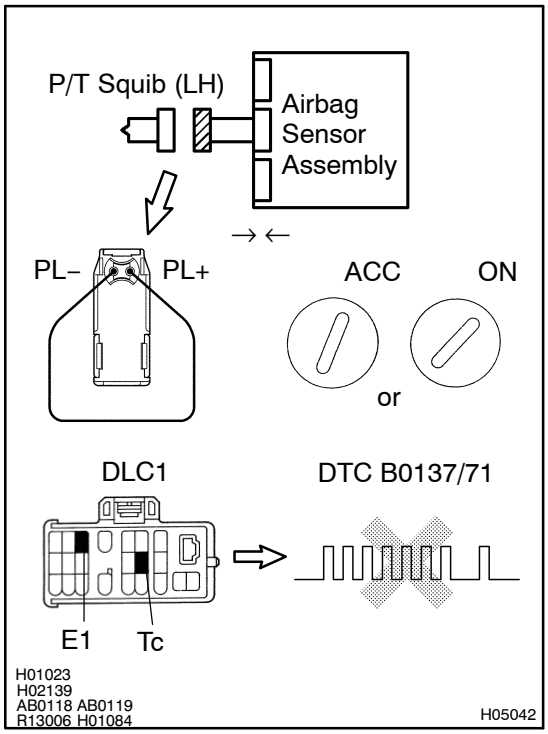
3	Check airbag sensor assembly.



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–342)

(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–342)

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

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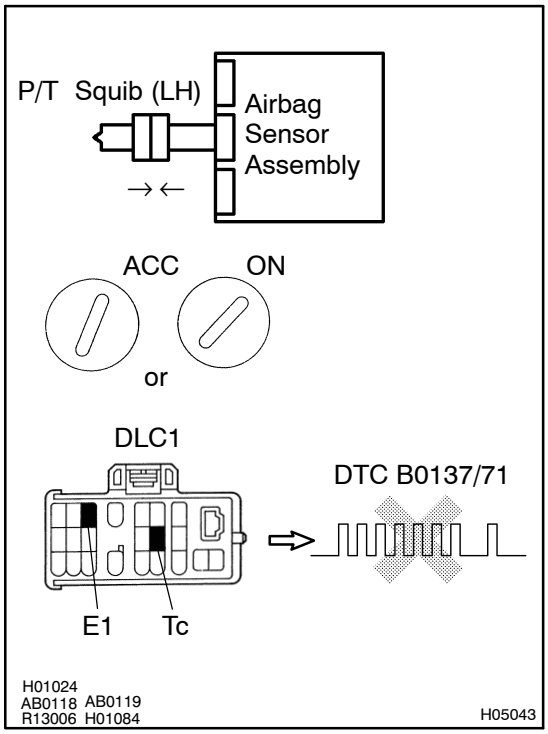
4	Check P/T squib (LH).



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–342)
(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–342)

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.

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DI1BL–06

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 seat belt pretensioner (LH) to activate when the seat belt pretensioner (LH) activation conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0138/72 is recorded when 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

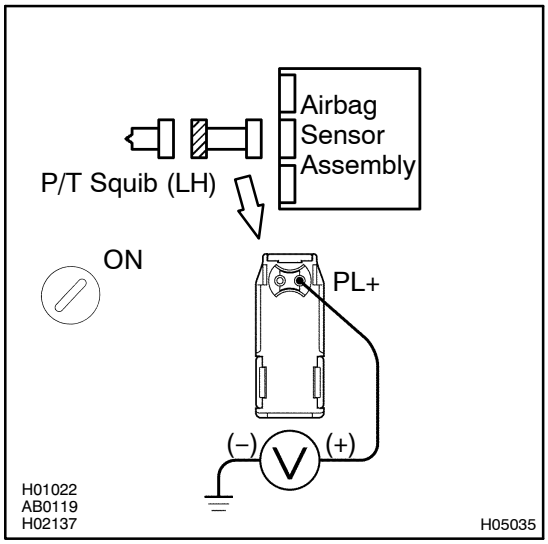
WIRING DIAGRAM

See page DI–396.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–427)**

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 → **Replace harness and connector between seat belt pretensioner (LH) and airbag sensor assembly.**

OK

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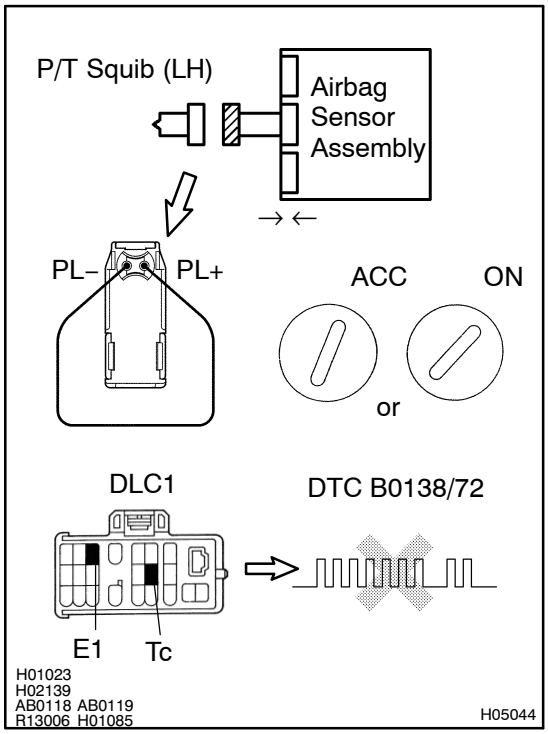
3	Check airbag sensor assembly.



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–342)

(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–342)

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

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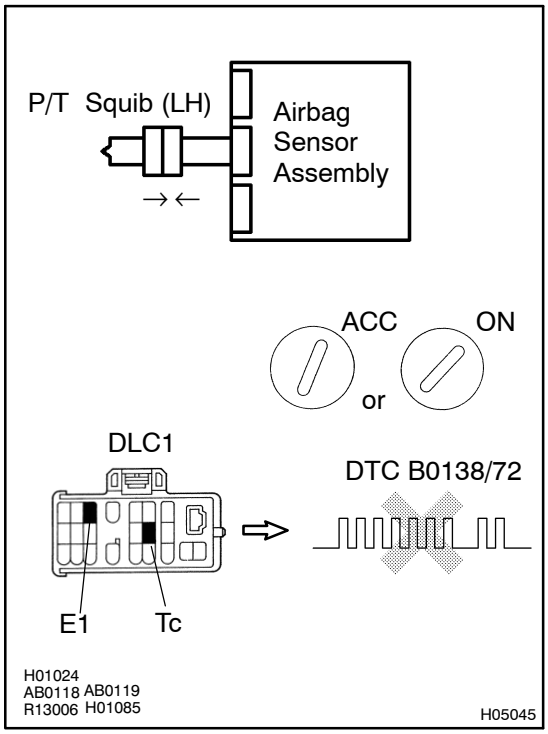
4	Check P/T squib (LH).



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–342)
(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–342)

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.

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DI1BM–07

DTC	B1100/31	Airbag Sensor Assembly Malfunction

CIRCUIT DESCRIPTION

The airbag sensor assembly consists of a 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.

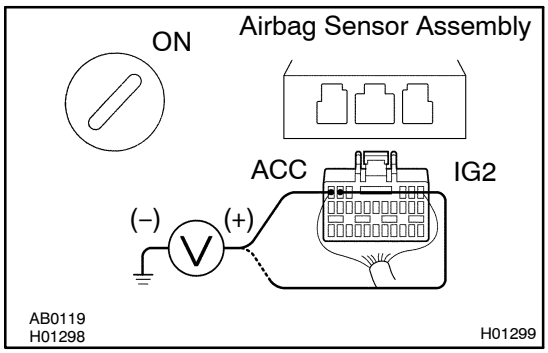
DTC No.	DTC Detecting Condition	Trouble Area
B1100/31	• Airbag sensor assembly malfunction	• Airbag sensor assembly

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–427)**

2	**Check voltage at IG2 and ACC of airbag sensor assembly.**



PREPARATION:
Turn ignition switch ON.
CHECK:
Measure the voltage between body ground and each of terminals IG2 and ACC of the airbag sensor assembly connector.
OK:
Voltage: Below 16 V

NG → **Check that an abnormality occurs on the battery and charging system.**

OK

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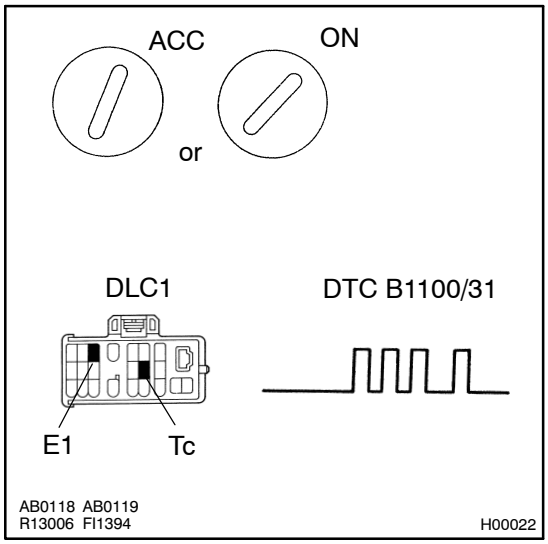
3	Is DTC B1100/31 output again?



PREPARATION:
Clear DTC.
(See step 5 on page DI–342)
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–342)

NO → **Using simulation method, reproduce malfunction symptoms. (See page IN–24)**

YES

Replace airbag sensor assembly.

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DI22Q–04

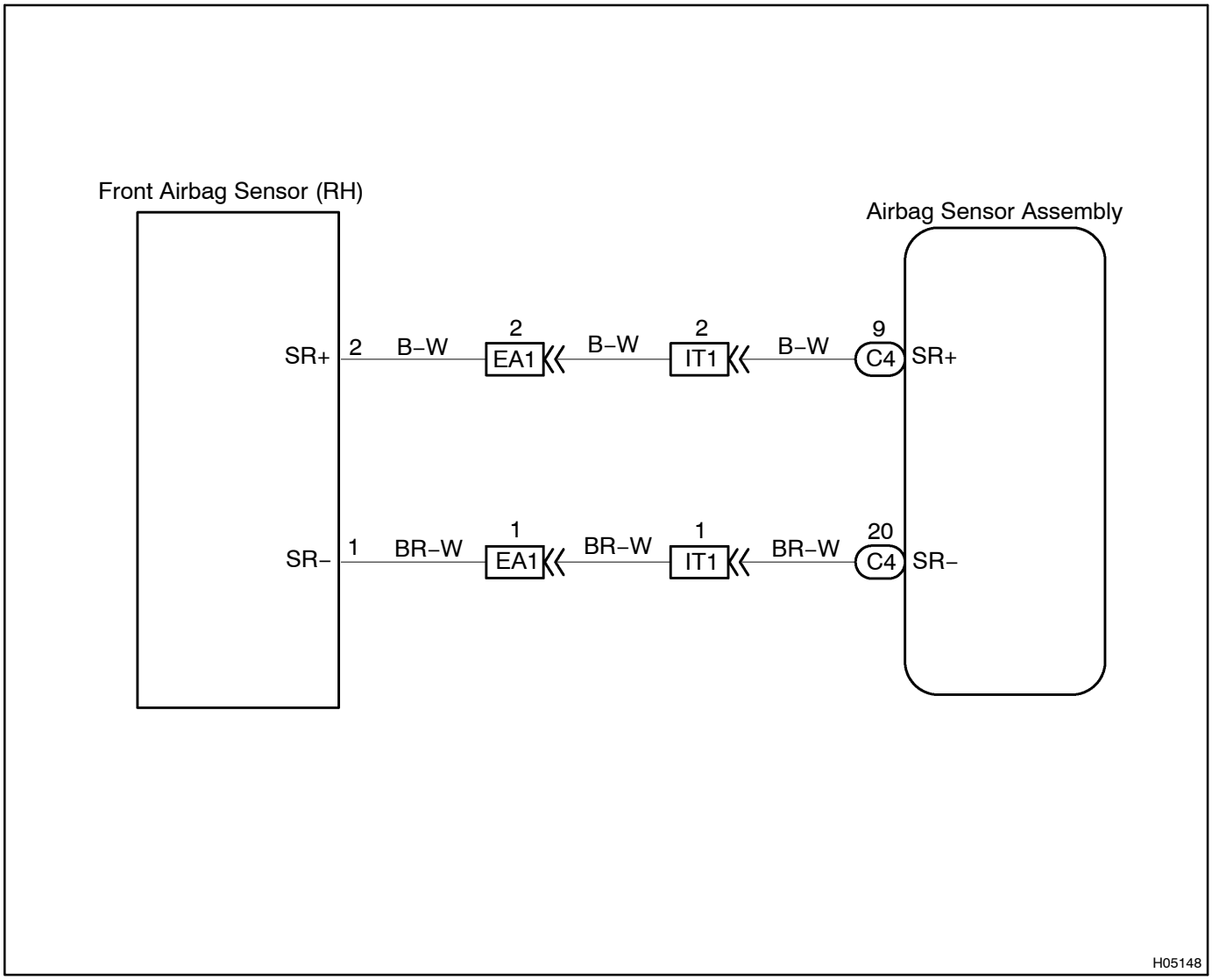
DTC	B1156/B1157/15	Front Airbag Sensor (RH) Malfunction

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) • Wire harness • Relay harness

WIRING DIAGRAM



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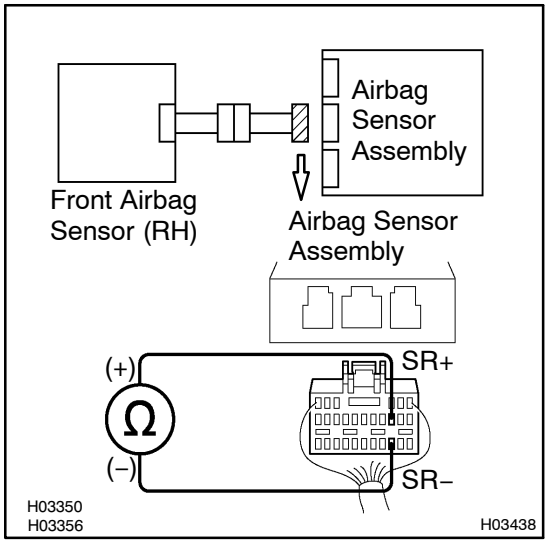
INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–427)**

2	**Check front airbag sensor (RH) circuit.**



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: 754 – 886 Ω

NG → **Go to step 6.**

OK

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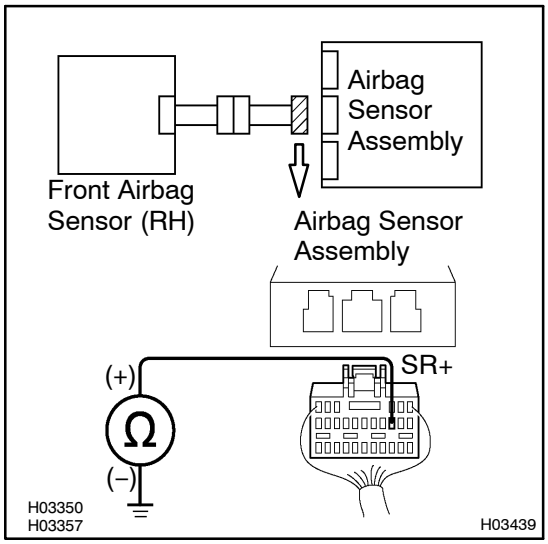
3	Check front airbag sensor (RH) circuit (to ground).



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 SR+ and body ground.

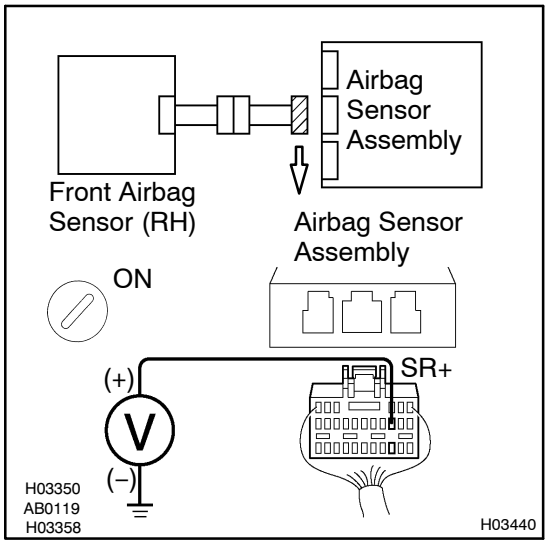
OK:

Resistance: 1 MΩ or Higher

NG → **Go to step 9.**

OK

4	Check front airbag sensor (RH) circuit (to B+).



PREPARATION:

(a) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

(b) Turn ignition switch to ON.

CHECK:

For the connector (on the airbag sensor assembly side) between the front airbag sensor (RH) and the airbag sensor assembly, measure the voltage between SR+ and body ground.

OK:

Voltage: Below 1 V

NG → **Go to step 11.**

OK

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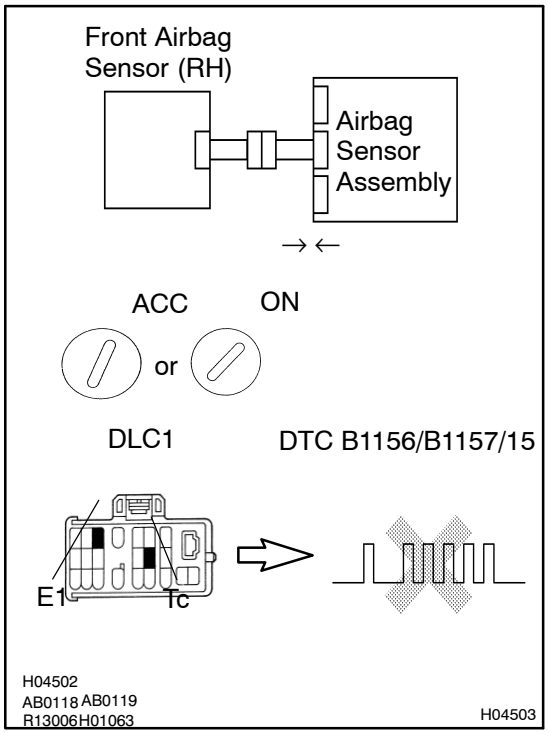
5	Check airbag sensor assembly.



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–342)
(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–342)

OK:

DTC B1156/B1157/15 is not output.

HINT:
Codes other than DTC 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.

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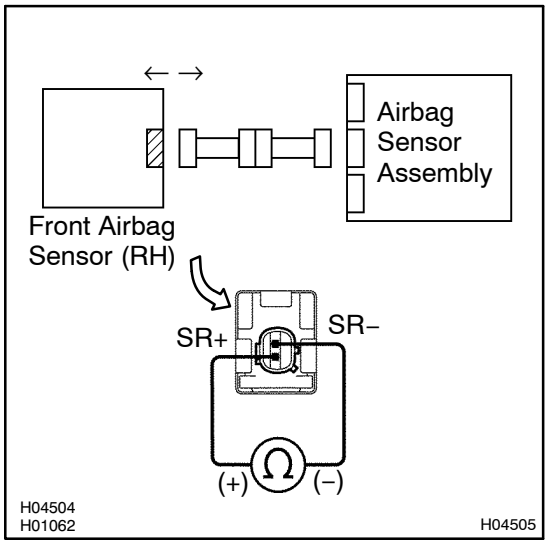
6	Check front airbag sensor (RH).



PREPARATION:

Disconnect the front airbag sensor connector (RH).

CHECK:

For the connector (on the front airbag sensor side), measure the resistance between SR+ and SR–.

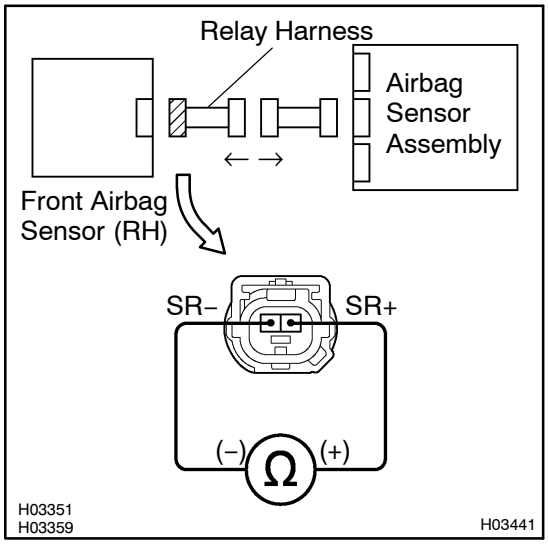
OK:

Resistance: 754 – 886 Ω

NG	Replace front airbag sensor (RH).

OK

7	Check relay harness.



PREPARATION:

Disconnect the relay harness connector on the airbag sensor assembly side.

CHECK:

For the connector (on the relay harness side) between the front airbag sensor (RH) and the relay harness, measure the resistance between SR+ and SR–.

OK:

Resistance: 1 MΩ or Higher

NG	Replace relay harness.

OK

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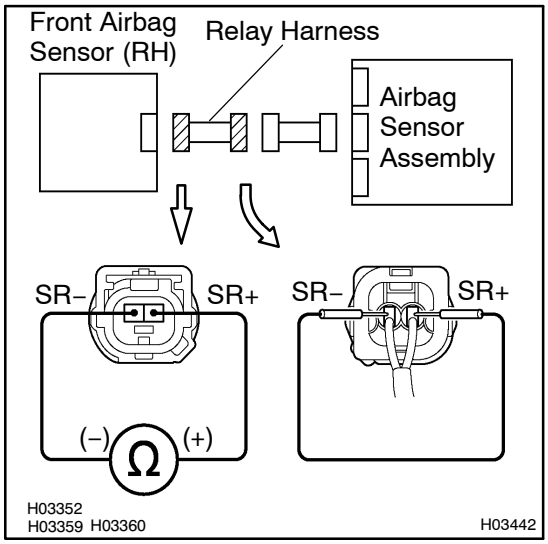
8	Check relay harness.



PREPARATION:

Using service wire, connect SR+ and SR– of the connector (on the relay harness side), between the airbag sensor assembly and the relay harness.

CHECK:

For the connector (on the relay harness side) between the front airbag sensor (RH) and the relay harness, measure the resistance between SR+ and SR–.

OK:

Resistance: Below 1 Ω

NG → **Replace relay harness.**

OK

Replace harness and connector between airbag sensor assembly and relay harness.

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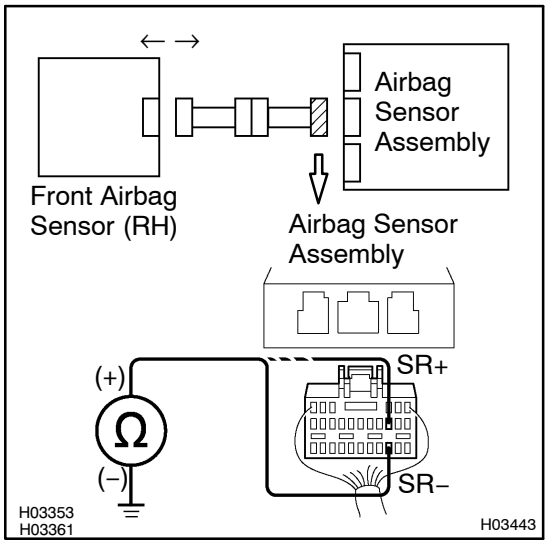
9	Check wire harness (to ground).

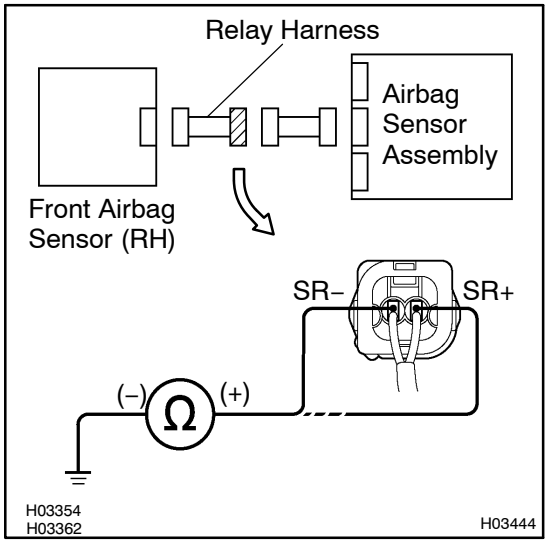


PREPARATION:
Disconnect the front airbag sensor connector (RH).
CHECK:
For the connector (on the airbag sensor assembly side) between the front airbag sensor (RH) and the airbag sensor assembly, measure the resistance between body ground and each of SR+ and SR–.
OK:
Resistance: 1 MΩ or Higher

OK	Replace front airbag sensor (RH).

NG

10	Check relay harness (to ground).



PREPARATION:
Disconnect the relay harness connector on the airbag sensor assembly side.
CHECK:
For the connector (on the relay harness side) between the front airbag sensor (RH) and the relay harness, measure the resistance between body ground and each of SR+ and SR–.
OK:
Resistance: Below 1 MΩ or Higher

NG	Replace relay harness.

OK

Replace harness and connector between airbag sensor assembly and relay harness.

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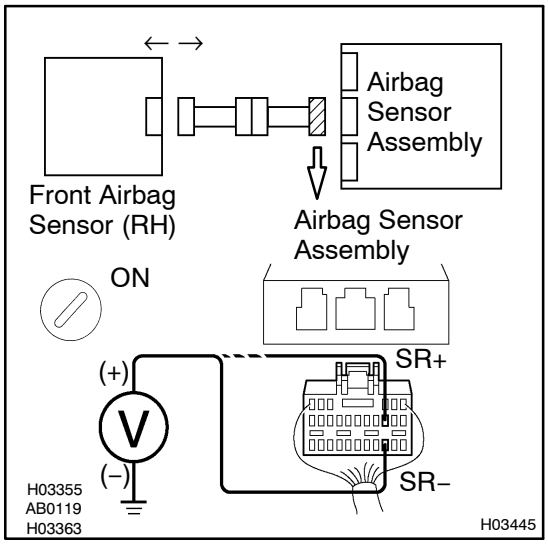
11	Check wire harness (to B+).



PREPARATION:

(a) Disconnect the front airbag sensor connector (RH).

(b) Turn ignition switch to ON.

CHECK:

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–.

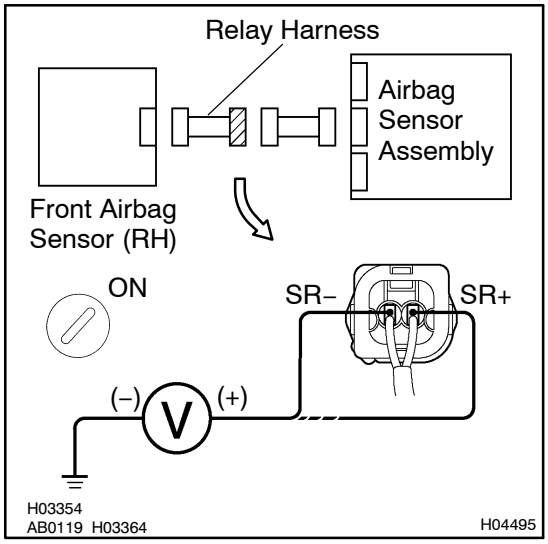
OK:

Voltage: Below 1 V

OK	Replace front airbag sensor (RH).

NG

12	Check relay harness (to B+).



PREPARATION:

Disconnect the relay harness connector on the airbag sensor assembly side.

CHECK:

For the connector (on the relay harness side) between the front airbag sensor (RH) and the relay harness, measure the voltage between body ground and each of SR+ and SR–.

OK:

Voltage: Below 1 V

NG	Replace relay harness.

OK

Replace harness and connector between airbag sensor assembly and relay harness.

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DI22Q–05

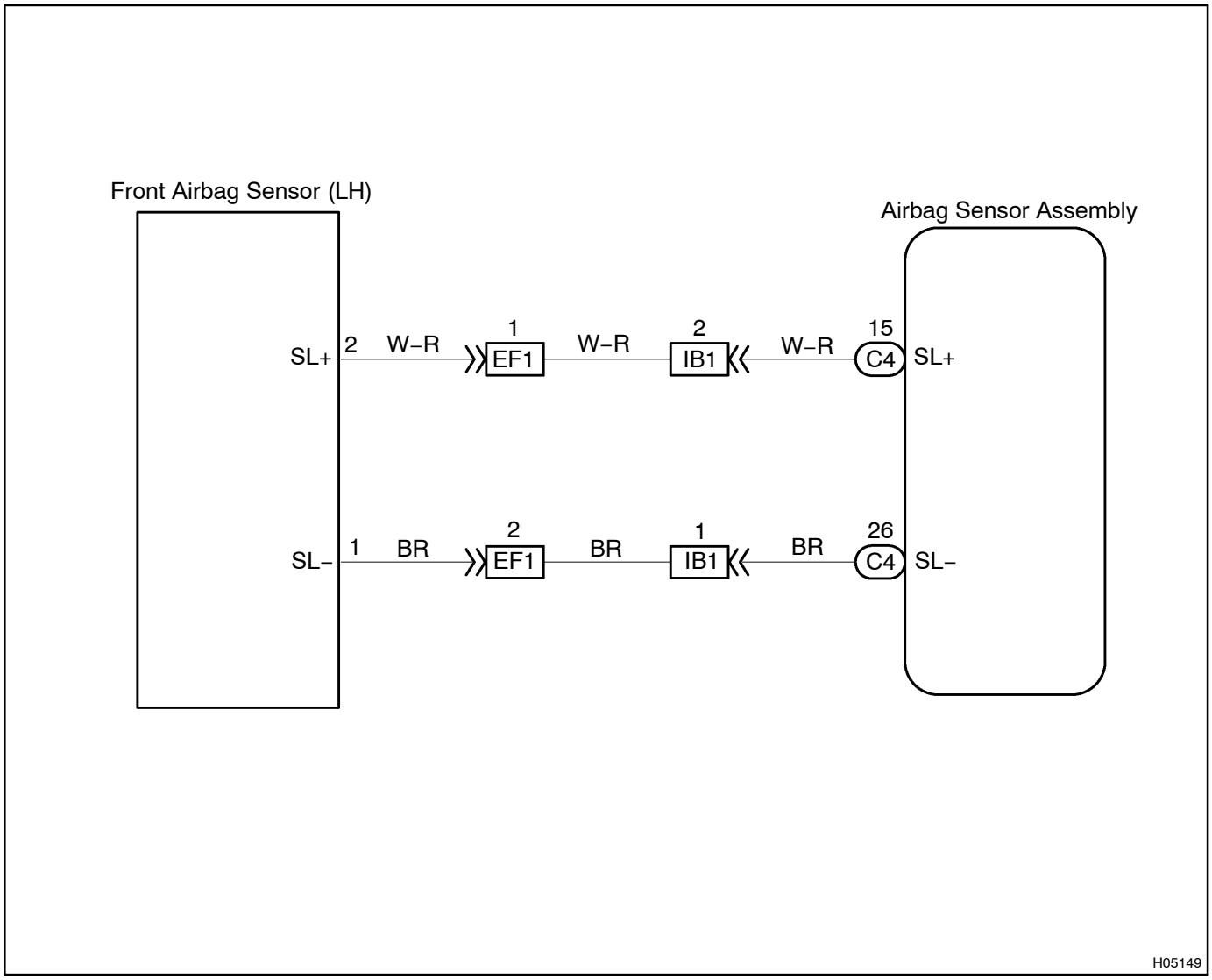
DTC	B1158/B1159/16	Front Airbag Sensor (LH) Malfunction

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 • Relay harness

WIRING DIAGRAM



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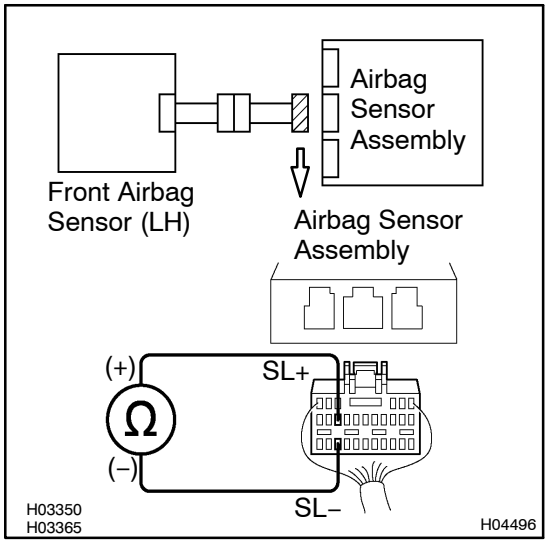
INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–427)**

2	**Check front airbag sensor (LH) circuit.**



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: 754 – 886 Ω

NG → **Go to step 6.**

OK

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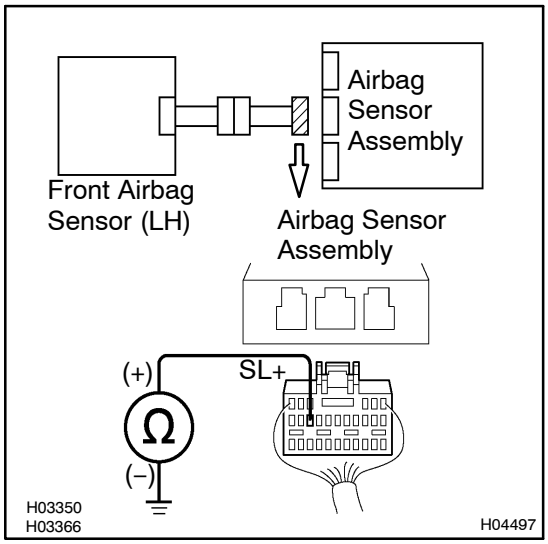
3	Check front airbag sensor (LH) circuit (to ground).



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 SL+ and body ground.

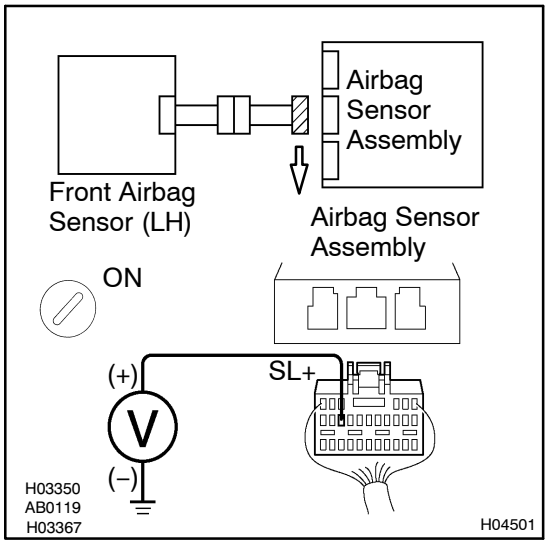
OK:

Resistance: 1 MΩ or Higher

NG → **Go to step 9.**

OK

4	Check front airbag sensor (LH) circuit (to B+).



PREPARATION:

(a) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

(b) Turn ignition switch to ON.

CHECK:

For the connector (on the airbag sensor assembly side) between the front airbag sensor (LH) and the airbag sensor assembly, measure the voltage between SL+ and body ground.

OK:

Voltage: Below 1 V

NG → **Go to step 11.**

OK

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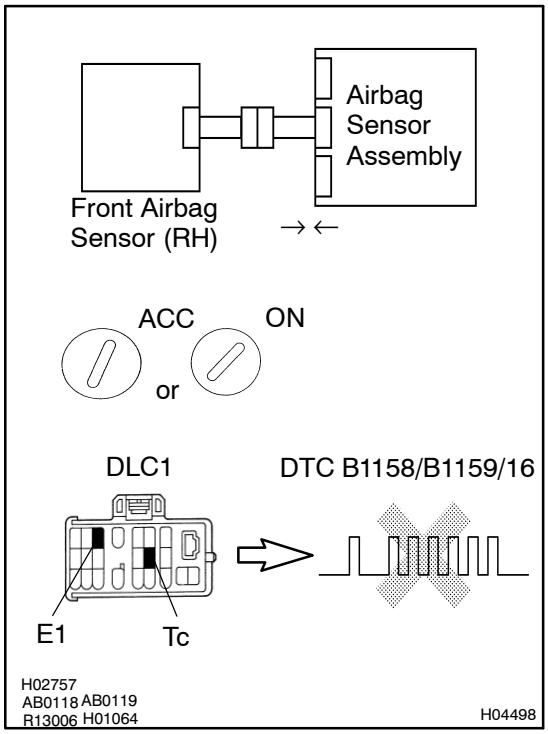
5	Check airbag sensor assembly.



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–342)
(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–342)

OK:

DTC B1158/B1159/16 is not output.

HINT:
Codes other than DTC 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.

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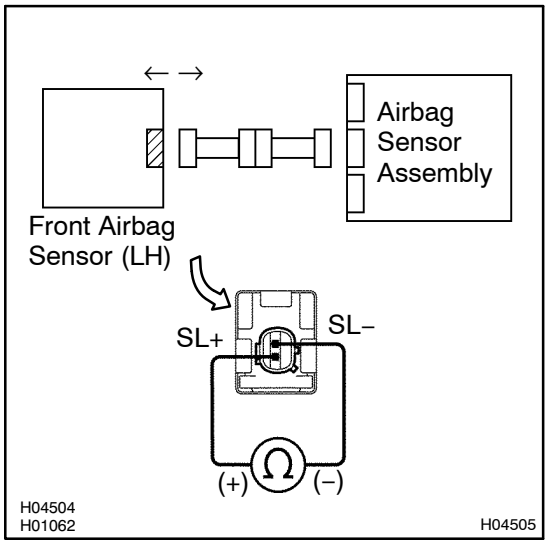
6	Check front airbag sensor (LH).



PREPARATION:

Disconnect the front airbag sensor connector (LH).

CHECK:

For the connector (on the front airbag sensor side), measure the resistance between SL+ and SL–.

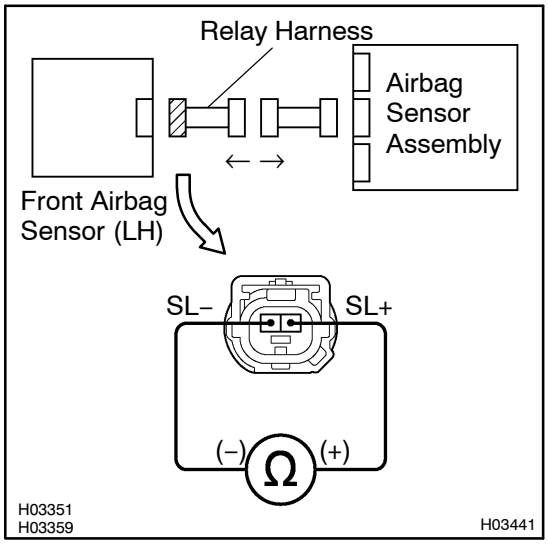
OK:

Resistance: 754 – 886 Ω

NG → **Replace front airbag sensor (LH).**

OK

7	Check relay harness.



PREPARATION:

Disconnect the relay harness connector on the airbag sensor assembly side.

CHECK:

For the connector (on the relay harness side) between the front airbag sensor (LH) and the relay harness, measure the resistance between SL+ and SL–.

OK:

Resistance: 1 MΩ or Higher

NG → **Replace relay harness.**

OK

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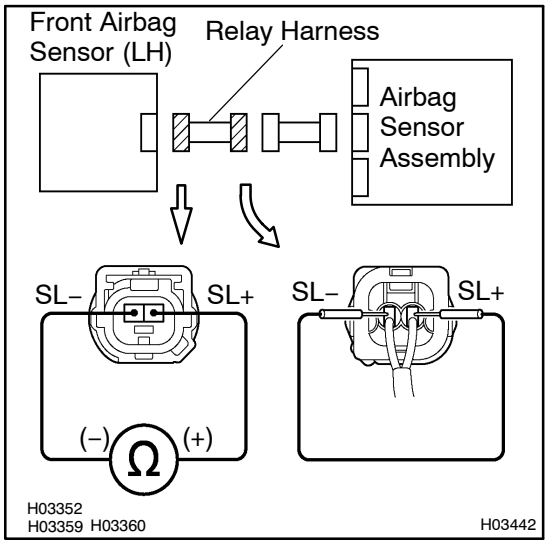
8	Check relay harness.



PREPARATION:

Using service wire, connect SL+ and SL– of the connector (on the relay harness side), between the airbag sensor assembly and the relay harness.

CHECK:

For the connector (on the relay harness side) between the front airbag sensor (LH) and the relay harness, measure the resistance between SL+ and SL–.

OK:

Resistance: Below 1 Ω

NG → **Replace relay harness.**

OK

Replace harness and connector between airbag sensor assembly and relay harness.

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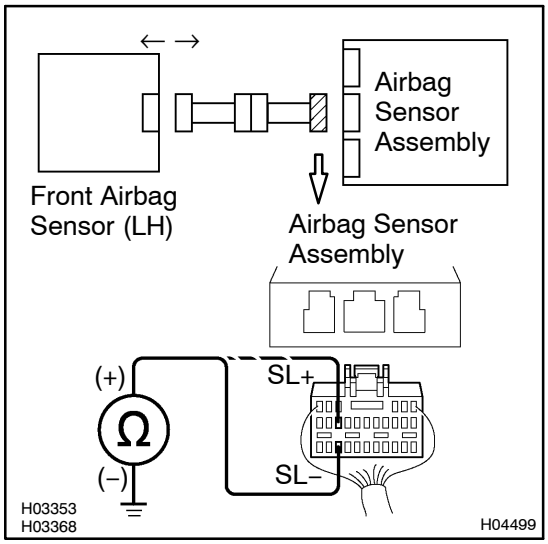
9	Check wire harness (to ground).

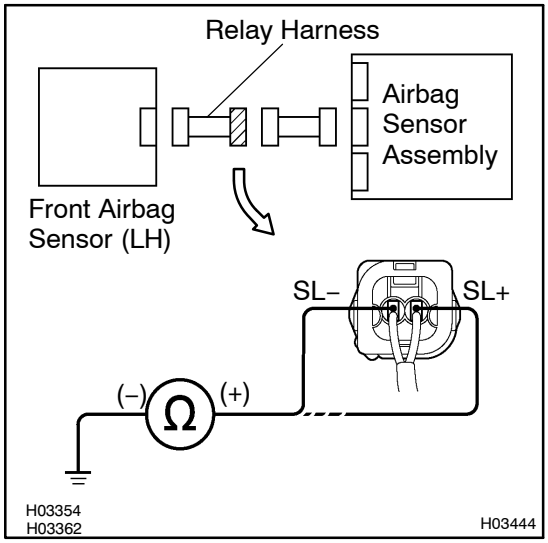


PREPARATION:
Disconnect the front airbag sensor connector (LH).
CHECK:
For the connector (on the airbag sensor assembly side) between the front airbag sensor (LH) and the airbag sensor assembly, measure the resistance between body ground and each of SL+ and SL–.
OK:
Resistance: 1 MΩ or Higher

OK	Replace front airbag sensor (LH).

NG

10	Check relay harness (to ground).



PREPARATION:
Disconnect the relay harness connector on the airbag sensor assembly side.
CHECK:
For the connector (on the relay harness side) between the front airbag sensor (LH) and the relay harness, measure the resistance between body ground and each of SL+ and SL–.
OK:
Resistance: Below 1 MΩ or Higher

NG	Replace relay harness.

OK

Replace harness and connector between airbag sensor assembly and relay harness.

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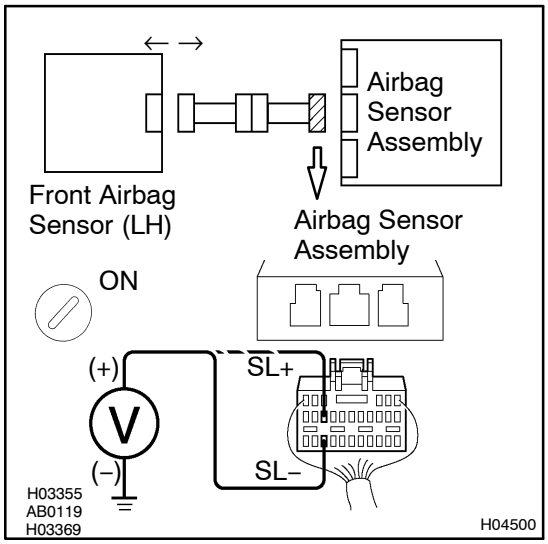
11	Check wire harness (to B+).



PREPARATION:

(a) Disconnect the front airbag sensor connector (LH).

(b) Turn ignition switch to ON.

CHECK:

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–.

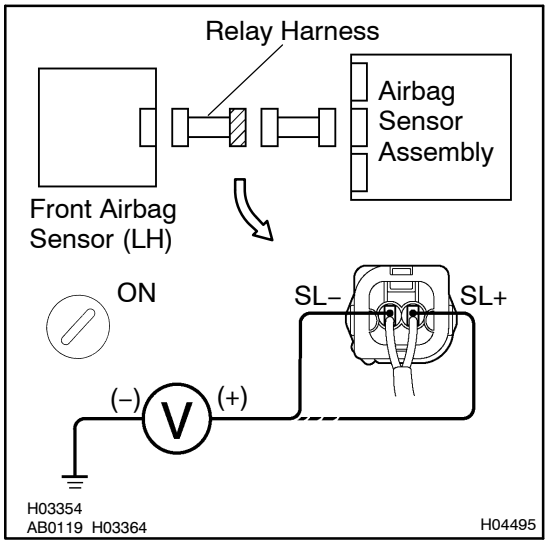
OK:

Voltage: Below 1 V

OK	Replace front airbag sensor (LH).

NG

12	Check relay harness (to B+).



PREPARATION:

Disconnect the relay harness connector on the airbag sensor assembly side.

CHECK:

For the connector (on the relay harness side) between the front airbag sensor (LH) and the relay harness, measure the voltage between body ground and each of SL+ and SL–.

OK:

Voltage: Below 1 V

NG	Replace relay harness.

OK

Replace harness and connector between airbag sensor assembly and relay harness.

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DI18Z–07

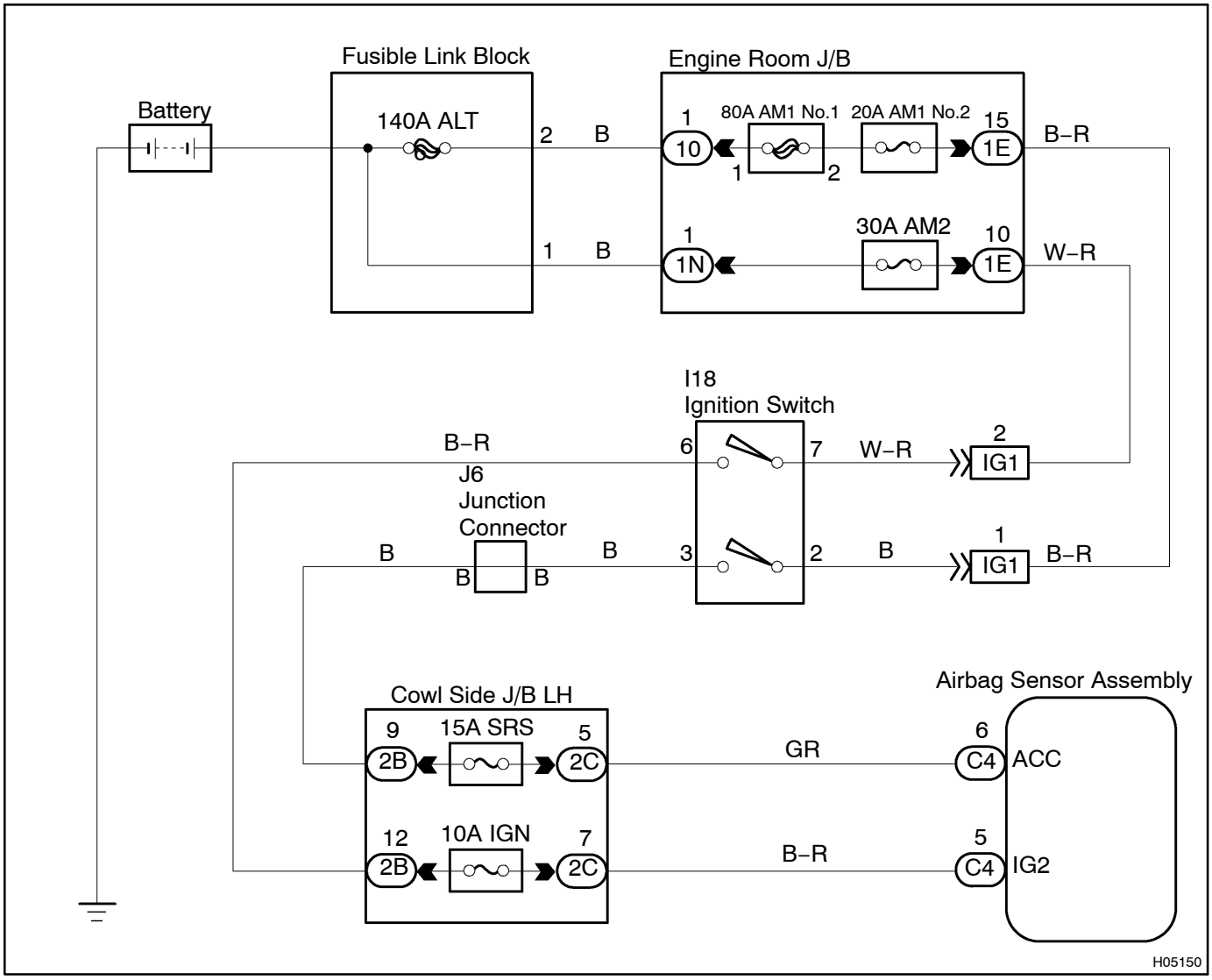
DTC	Normal	Source Voltage Drop

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



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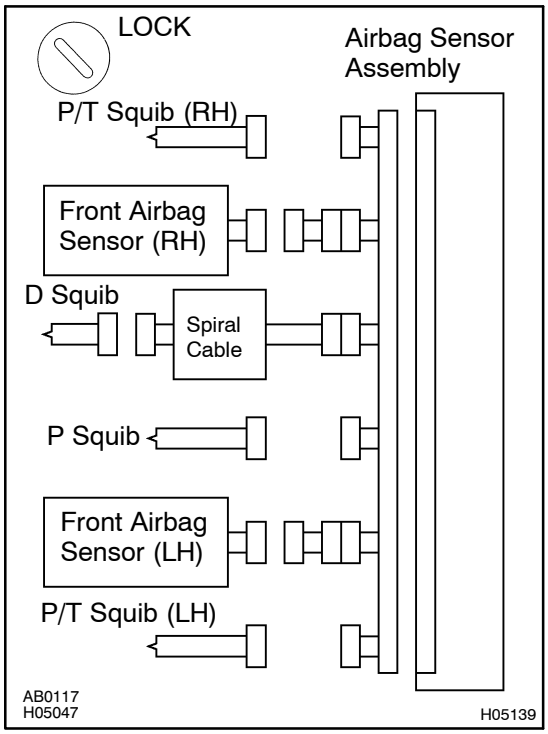
INSPECTION PROCEDURE

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–12)

(c) Disconnect the connector of the front passenger airbag assembly. (See page RS–25)

(d) Disconnect the connectors of the seat belt pretensioner RH and LH. (See page BO–135)

(e) Disconnect the connectors of the airbag sensor assembly. (See page RS–38)

(f) Disconnect the connectors of the front airbag sensor RH and LH. (See page RS–43)

CAUTION:

Store the steering wheel pad with the front surface facing upward.

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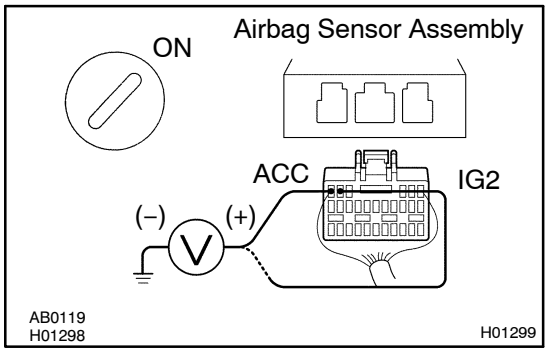
2	Check source voltage.



PREPARATION:

(a) Connect negative (–) terminal cable to the battery.

(b) Turn ignition switch ON.

CHECK:

Operating electric system (defogger, wiper, headlight, heater blower, etc.), measure the voltage between each of IG2 and ACC of sensor and body ground.

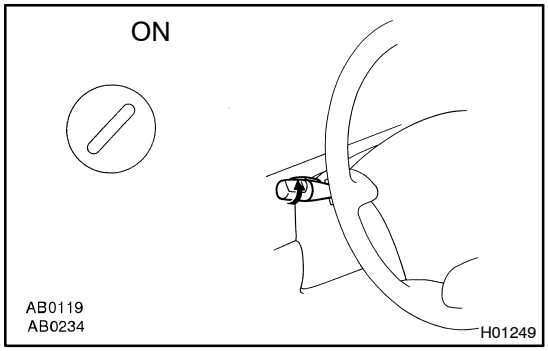
OK:

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 seat belt pretensioner connector RH and LH.

(e) Connect the airbag sensor assembly connector.

(f) Turn ignition switch 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.

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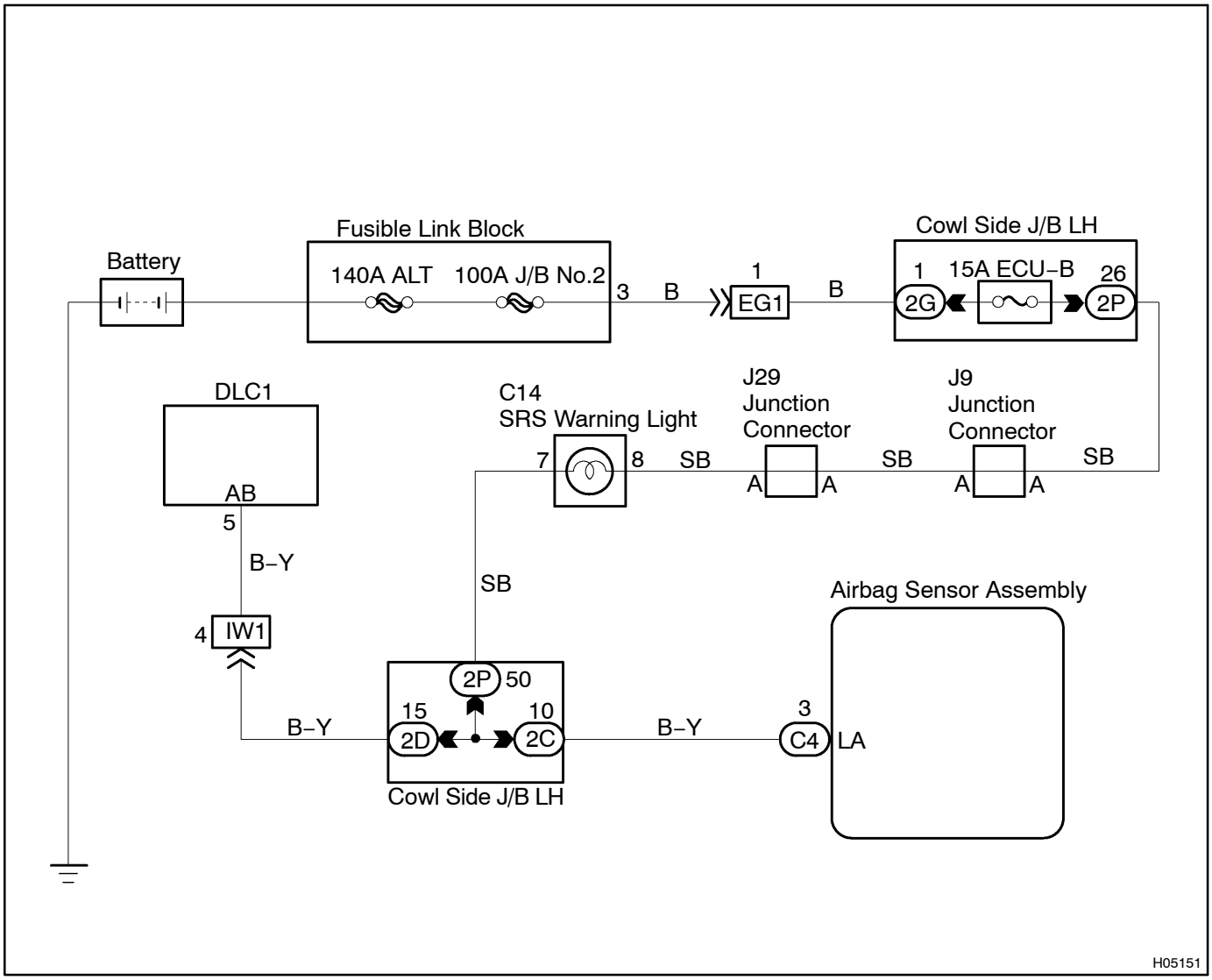
DI2I5–05

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



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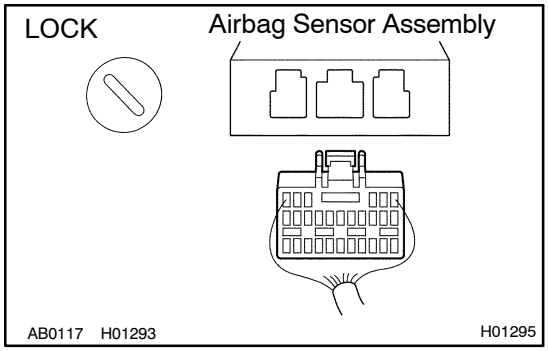
INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–427)**

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.

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DI191–07

SRS Warning Light Circuit Malfunction (Does not light up, when ignition switch is turned to ACC or ON.)

CIRCUIT DESCRIPTION

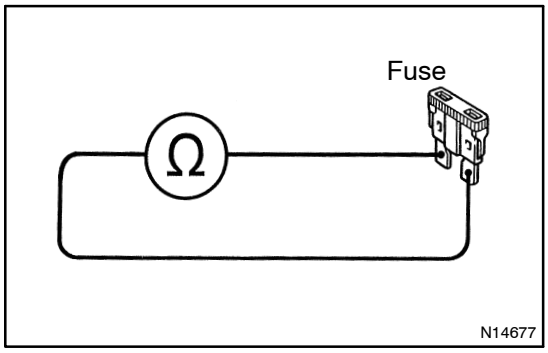
The SRS warning light is located on the combination meter.
When the SRS is normal, the SRS warning light lights up for approx. 6 seconds after the ignition switch is turned from LOCK position to ACC or ON position, and then turns OFF automatically.
If there is a malfunction in the SRS, the SRS warning 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–430.

INSPECTION PROCEDURE

1	**Check SRS–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–427)**

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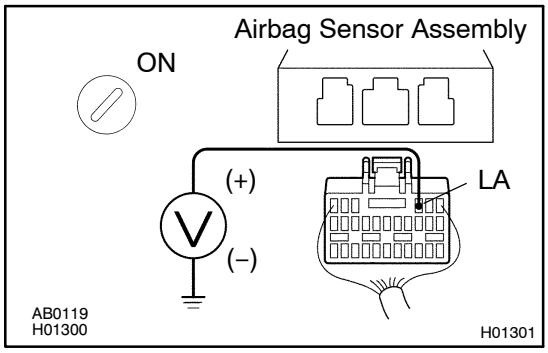
3	Check SRS warning light circuit.



PREPARATION:

(a) Connect negative (–) terminal cable to the battery.

(b) Turn ignition switch to ACC or ON.

CHECK:

Measure the voltage between LA terminal of the harness side connector and body ground.

OK:

Voltage: 10 – 14 V

NG → **Check SRS warning light bulb or repair SRS warning light circuit.**

OK

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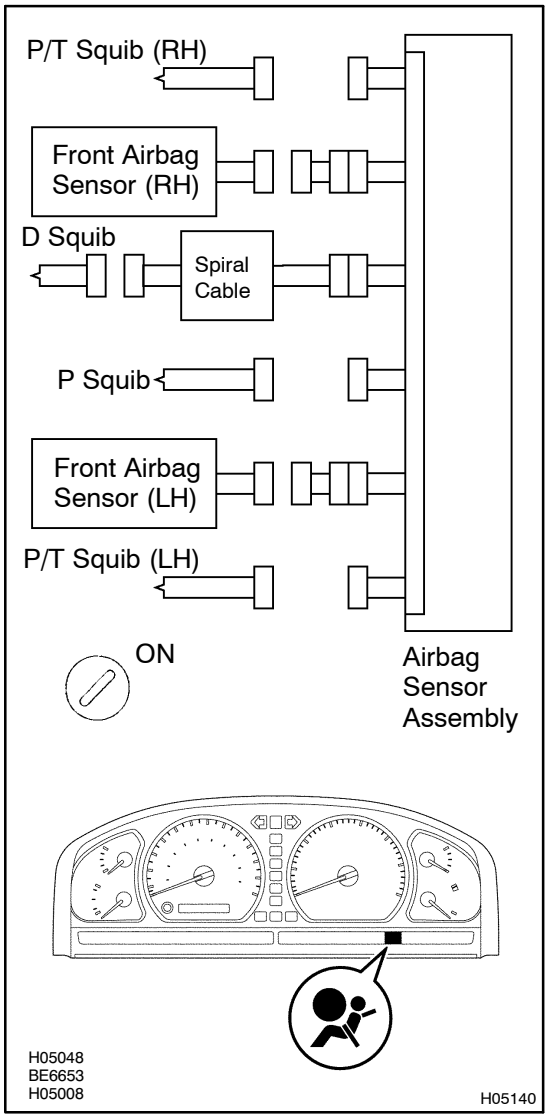
4	Does SRS warning light come on?



PREPARATION:

(a) Disconnect negative (–) terminal cable from the battery.
(b) Connect the airbag sensor assembly connector.
(c) Connect the front airbag sensor connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.
(e) Connect the seat belt pretensioner connector RH and LH.
(f) 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.

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5	Is new ECU–B fuse burnt out again?

NO → Using simulation method, reproduce malfunction symptoms. (See page IN–24)

YES →

Check harness between ECU–B fuse and SRS warning light.

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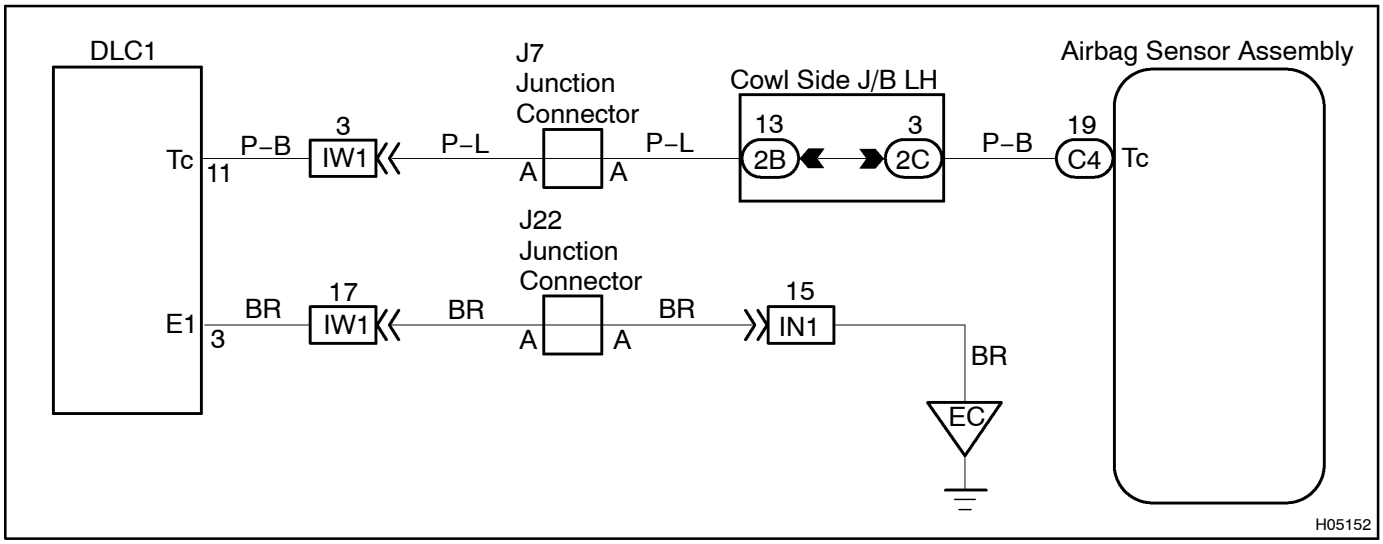
DI192-09

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.

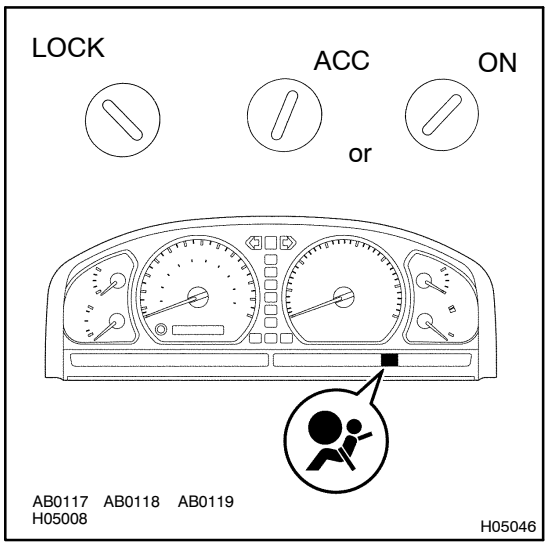
WIRING DIAGRAM



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 is turned from LOCK position to ACC or ON position.

NO → **Check SRS warning light system. (See page DI–342)**

YES

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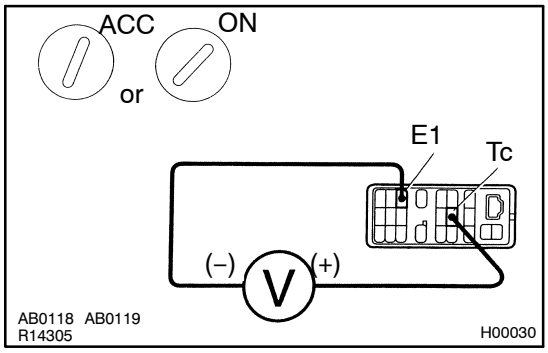
2	Check voltage between terminals Tc and E1 of DLC1.

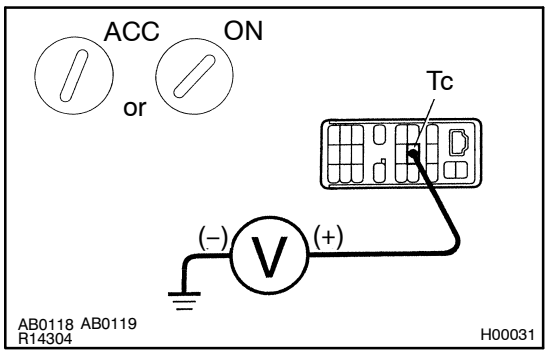


PREPARATION:
Turn ignition switch to ACC or ON.
CHECK:
Measure the voltage between terminals Tc and E1 of check connector.
OK:
Voltage: 10 – 14 V

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

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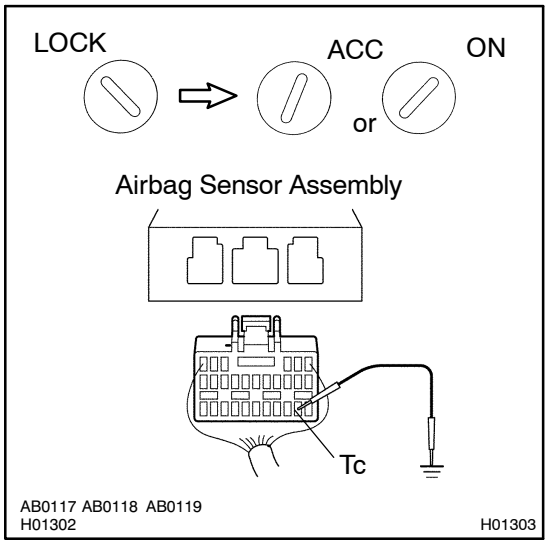
4	Check airbag sensor assembly.



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 service wire into terminal Tc from back side as shown in the illustration.
(e) Connect the airbag sensor assembly connector with service wire.
(f) Connect negative (–) terminal cable to the battery.
(g) Turn ignition switch to ACC or ON and wait at least for 20 seconds.
(h) Connect 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.**

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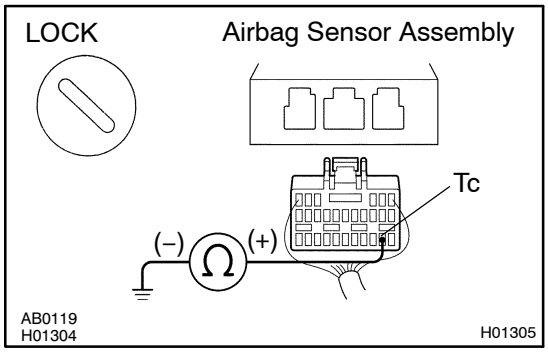
If the DTC is displayed without a DTC check procedure, perform the following troubleshooting.

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 the resistance between terminal Tc of the airbag sensor assembly connector and body ground.

OK:

Resistance: 1 MΩ or Higher

NG → **Replace harness and connector.**

OK

Replace airbag sensor assembly.

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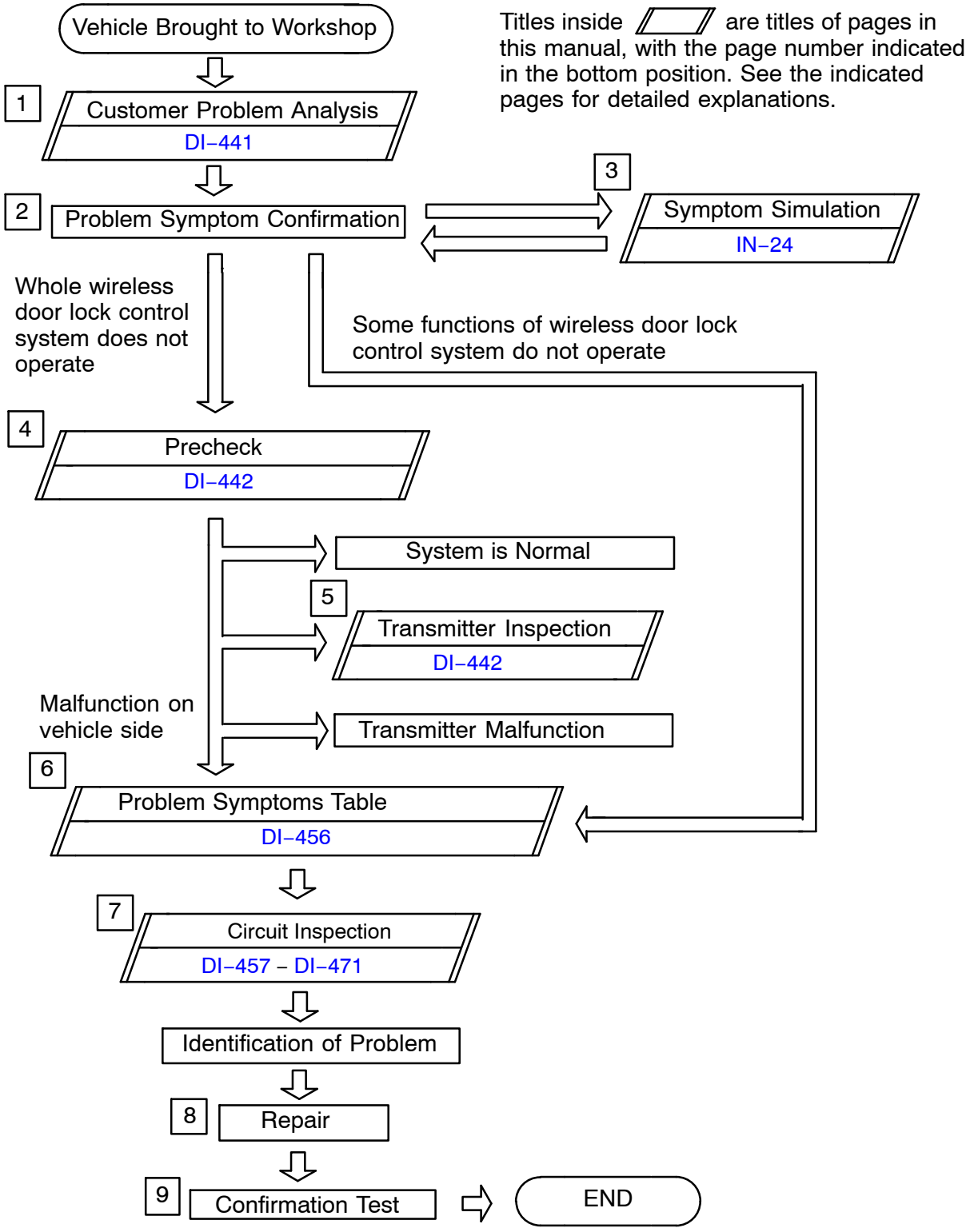
WIRELESS DOOR LOCK CONTROL SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI0DQ–04

HINT:Troubleshooting of the wireless door lock control system is based on the premise that the door lock control system is operating normally. Accordingly, before troubleshooting the wireless door lock control system, first make certain that the door lock control system is operating normally.
Perform troubleshooting in accodnce with procedure on the following page.



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DI0DR–04

CUSTOMER PROBLEM ANALYSIS CHECK

WIRELESS DOOR LOCK CONTROL System Check Sheet

Inspector's Name _____

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	**km Miles**

Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Sometimes (times/per day, month) ☐ Once only
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °F (°C))
	Place	☐ Everywhere ☐ Specific Locality( )
Date Transmitter Battery Last Replaced		/ /

Problem Symptom	☐ Whole wireless door lock control system does not operate.	
	☐ Only door unlock operation is not possible.	
	☐ Only door lock operation is not possible.	
	☐ Only key confinement prevention function is not possible.	
	☐ Wireless door lock function operates even when each door is opened.	
	☐ Wireless door lock functions incorrectly. (Although one door is unlocked, when the transmitter switch is pressed, all doors become unlocked.)	☐ When RH door is unlocked ☐ When LH door is unlocked
	☐ Others	

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DI3CM–01

PRE–CHECK

Wireless function (Remote control) will not operate.

To make the vehicle be in the initialized condition.
Initialized condition is the condition when the following conditions are satisfied.
(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
With a standard operation, when repeating the operations of UNLOCK switch and LOCK switch three times or more alternately, check the operation of UNLOCK – LOCK from 3rd time onward.
● Following procedures are standard operation.
(1) Keep away approx. 1 M to the right direction from the outside handle of a driver's seat.
(2) Point the transmitter toward the vehicle and press either of transmitter switches for about 1 sec.
<Reference>
As of the security function, even the wireless function is normal, there may be the case that only UNLOCK operation will not work.

No

Yes

Normal
<Reference>
● Operative distance may differ depending on the operator, the way of holding or the position.
● Because of the use of weak electric wave, in case of strong wave or noise in the frequency used, there may be the case that operative distance gets shorter.

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No

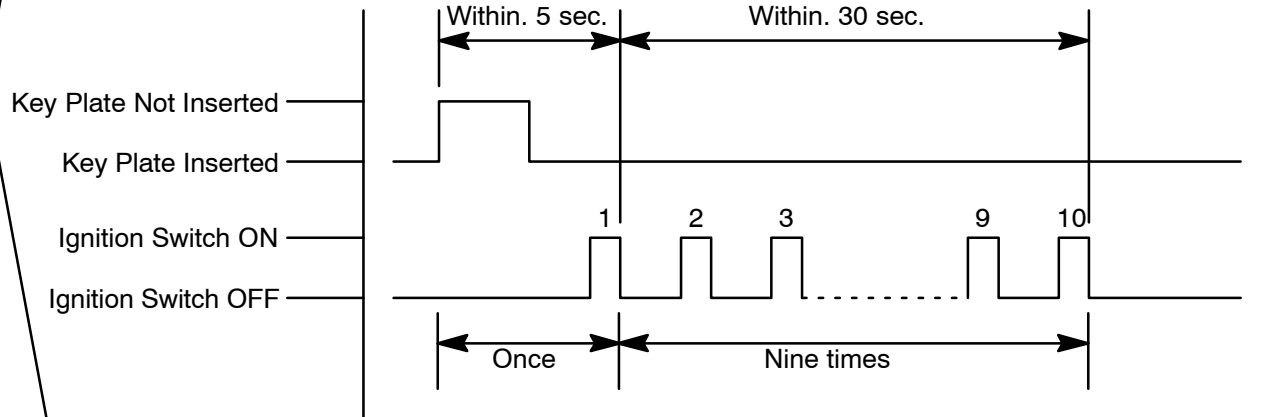
Transmitter battery check:
Charge the transmitter battery to a new or normal one, check UNLOCK operation of the transmitter with the standard operation.
<Reference>
● New or normal battery is necessary.
● Battery quality can be judged by checking the remnant volume of the battery.

Yes → Battery faulty.

No

To make the vehicle be in the initialized condition.

Enter diagnostic mode:
If the operation of the wireless door lock ECU is performed in the order of (1) through (2), the mode turns to diagnostic mode.
(1) Insert the key plate into the ignition key cylinder and pull out, then insert it again and turn the ignition switch OFF → ON → OFF 1 time.
(2) After completing the procedure (1) and within 30 seconds, turn the ignition switch OFF to ON to OFF nine times.
<Reference>
● In the case that either one of (1) and (2) conditions is not satisfied, transfer to normal mode.



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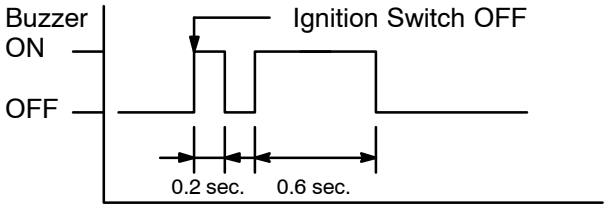
Diagnostic mode operation confirmation:
Check the taillight output soon after the input operation of self diagnostic mode.



No

Is the method to input the diagnostic mode correct?

No

Not enter in diagnostic mode

Yes

Is the function of operation confirmation taillight system normal?

No

Taillight system faulty

Yes

Yes

Key unlock warning switch inspection:
Check that continuity exists between connector terminal 10 of ECU on the vehicle side and ground by inserting the key plate into the ignition key cylinder.

Yes

No

Check key unlock warning switch.

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	Check condition	Standard
1	Continuity	Constant	Continuity
8	Voltage	Constant	10 – 14 V
13	Voltage	Ignition switch OFF → ON	0 V → 10 – 14 V

Yes

No

Wireless door lock ECU faulty.

Vehicle wiring faulty.

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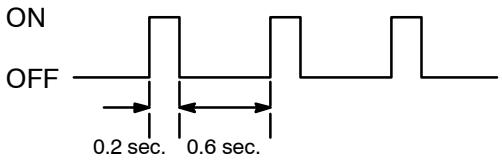
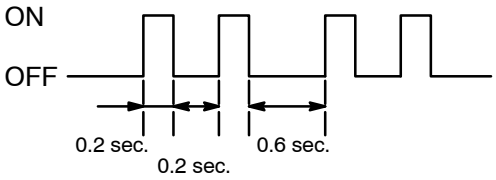
Confirmation of diagnostic mode:
Check taillight output when pressing on each switch of transmitter.

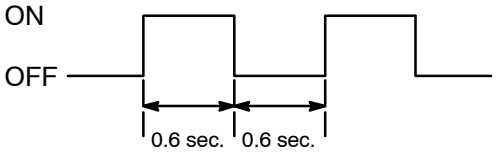
(1) Received normal wave of LOCK switch.



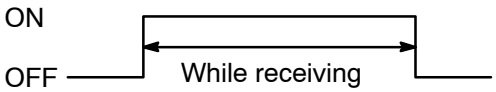
(2) Received normal wave of UNLOCK switch.



(3) Received normal wave of PANIC switch.



(4) Compatibility of the recognition code or out from synchronization of rolling code.*.



No response

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.

In case of taillight outputs from (1) ~ (3)

In case of taillight outputs of (4)

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

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Are the voltage between each terminal of connector connected to the receiver and body ground and locking operation of the electric door normal?

Terminal No.	Item	Check condition	Standard
7	Operation	All door is LOCK → terminal 7 is body ground	All door is UNLOCK operation
11	Voltage	Door control switch OFF → LOCK (manual switch)	0 V → 10 – 14 V → 0 V
		Door control switch OFF → UNLOCK (manual switch)	
13	Voltage	Ignition switch OFF → ON	0 V → 10 – 14 V
14	Voltage	All door is closed → either door is opened	0 V → 10 – 14 V
15	Operation	All door is UNLOCK → terminal 15 is body ground	All door is LOCK operation

Yes → Wireless door lock ECU faulty.

No → Vehicle wiring faulty.

Yes

Is the wave reaching range normal?
Keep away approx. 1 m from the vehicle and press the switch of the transmitter. While pressing on the transmitter switch, the buzzer should not keep working on. (If pressing on about 20 sec. auto power off function will operate.)

No

Transmitter faulty or wireless door lock receiver faulty.
<Reference>
Check the wave reaching range with another transmitter (normal). When the range is normal, transmitter defection is detected, the range is not normal, wireless door lock receiver defection is detected.

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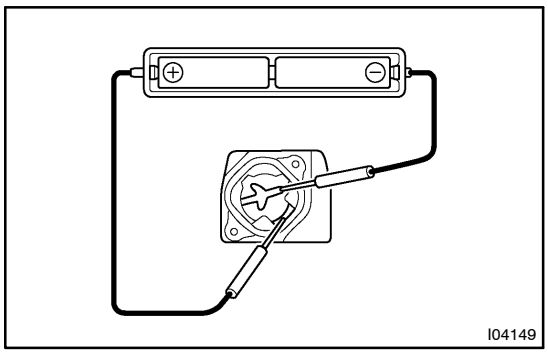
1. INSPECT WIRELESS DOOR LOCK TRANSMITTER OPERATION

HINT:

Refer to ”3. REPLACE TRANSMITTER (LITHIUM) BATTERY”.

(a) Using a screwdriver, remove the 2 screws and cover.

(b) Remove the battery (lithium battery).



(c) Install a new or normal battery (lithium battery).

HINT:

When a new or normal battery can not be obtained, connect 2 new 1.5 V batteries in series, connect the battery (+) to the battery receptacle side terminal and battery (–) to the bottom terminal, then apply 3 V voltage to the transmitter.

(d) In the location where is approx. 1 M away from driver’s outside handle in the right direction, face the key plate of the transmitter to the vehicle, and check the transmitter operation when pressing transmission switch of the transmitter body.

Standard:

- Remote control of vehicle door lock can be operated.
- LED lights up more than once.

HINT:

- The minimum operation distance differs according to operator, the way of holding the transmitter, and location.
- As weak wave is used, operation distance might be shortened when noise is detected in strong wave or used frequency.

(e) Install the battery (lithium battery).

(f) Install a cover so that O–ring is not distorted or slipped off.

(g) Using a screwdriver, tighten the 2 screws.

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).

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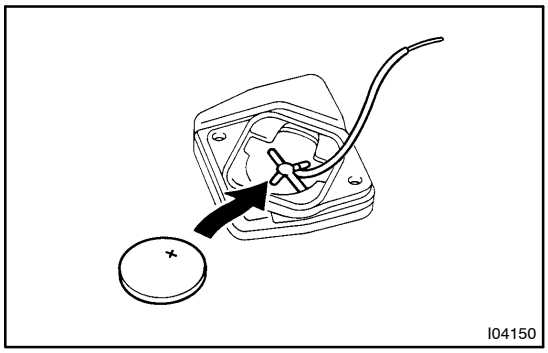
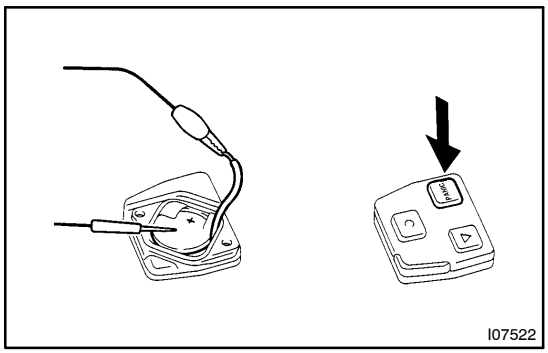


(a) Remove the screws and cover using a (+) driver.
(b) Remove the battery (lithium battery) from the transmitter.
(c) Connect the lead to the (–) terminal of the transmitter and install the battery.



(d) Connect the (+) tester to the (+) battery (lithium battery), and (–) tester to the lead respectively.
(e) Press one of the transmitting switches on the transmitter for approx. 1 second.
(f) Press the transmitting switch on the transmitter again to check the voltage.
Standard: 2.1 V or more

HINT:

- When the temperature of the battery is low, the judge can not be made correctly.
  When the outcome of the test is less than 2.1 V, conduct the test again after leaving the battery in the place at 18 °C for more than 30 minutes.
- By auto power off function, the voltage becomes no load voltage (more than 2.5 V) condition 20 seconds after the switch was pressed.
  Make sure to read the voltage before of it.
- High voltage might be shown 1 to 2 times after leaving the battery, judge should be made with the voltage shown at the 3rd time or later.

(g) Disconnect the lead.
(h) Set the battery (lithium battery) in the transmitter.
(i) Install the cover, so that the O–ring is not distorted or slipped off.
(j) Using a screwdriver, tighten the 2 screws.

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3. 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.

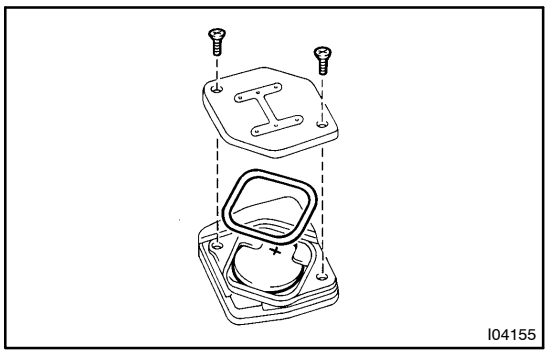
NOTICE:

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.

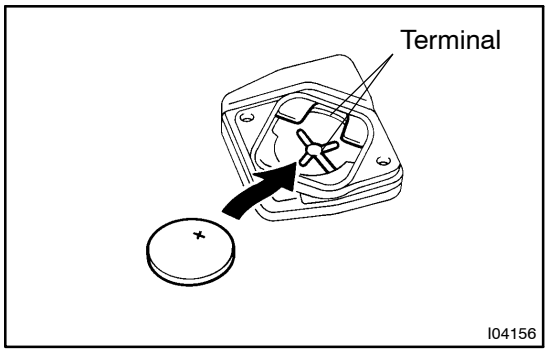


(c) Using a screwdriver, remove the 2 screws and cover.

(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.

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4. 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.

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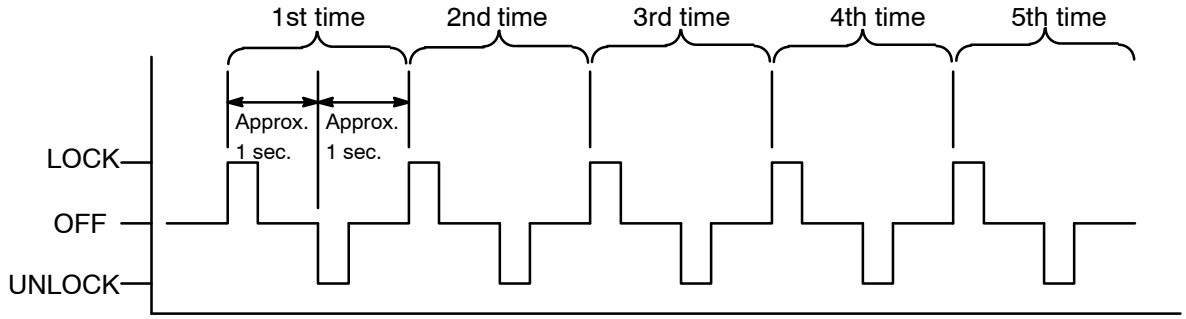
Start registration of recognition code

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 sec

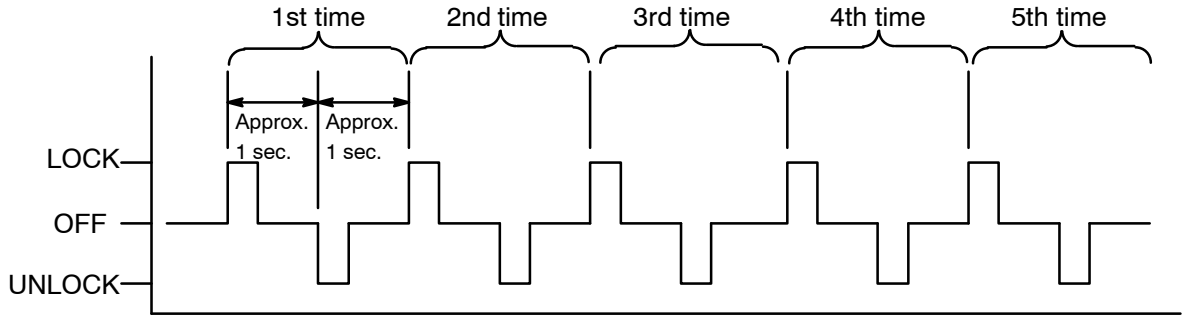
Press the door lock control switch (for manual operation) 5 times to LOCK/UNLOCK at approx. 1 sec. interval.



Close the driver's door, then open it.

Within 40 sec

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.

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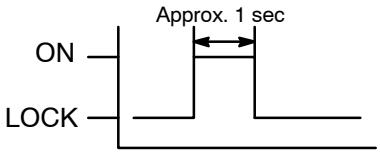
Turn the ignition switch from ON to LOCK at approx. 1 sec interval 1 to 5 times to select the mode.

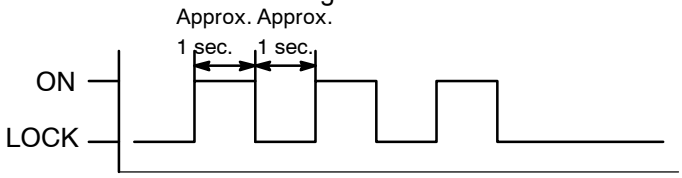
Add mode

ON – LOCK change occurs 1 time



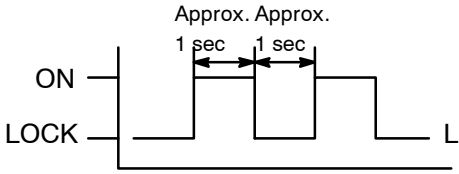
Confirmation mode

ON – LOCK change occurs 3 times



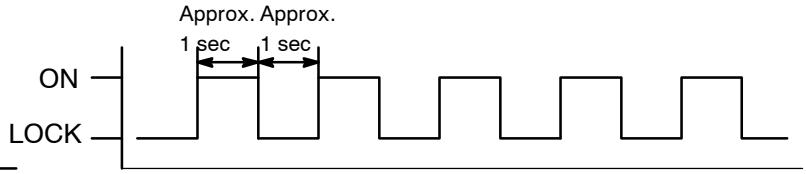
Rewrite mode

ON – LOCK change occurs 2 times



Prohibition mode

ON – LOCK change occurs 5 times



Pull out the key plate from the ignition key cylinder.

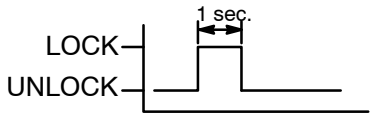
Within 3 sec

When add mode or rewrite mode is selected.

MPX body ECU automatically performs the LOCK–UNLOCK operation once or twice at 1 sec interval to inform the operator that either the add mode or rewrite mode has been selected.

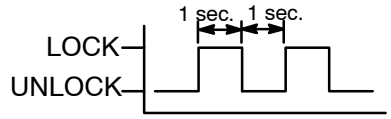
LOCK–UNLOCK occurs once

Indicates that add mode has been selected.



LOCK–UNLOCK occurs twice

Indicates that rewrite mode has been selected.

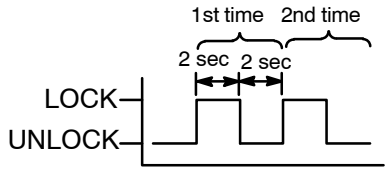


When prohibition mode is selected.

When confirmation mode is selected.

MPX body ECU automatically performs the LOCK–UNLOCK operation 1 to 4 times at 2 sec interval to inform the operator of the number of the registered codes.
HINT:
When the number of the registered code is 0, the operation is automatically performed 5 times.

Example:
When the operation is performed twice, it directs that 2 types of recognition code have been registered.



Registration of recognition code (Confirmation mode and prohibition mode) is completed.

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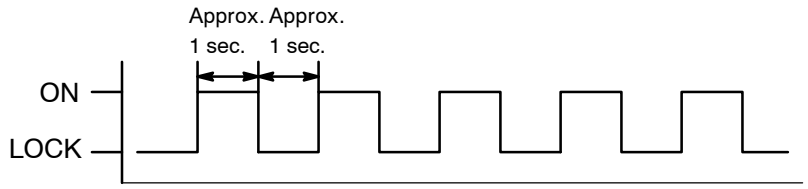
When prohibition mode is selected.

Within 20 sec

MPX body performs LOCK–UNLOCK operation 5 times at a 1 sec. interval to inform the operator that prohibition mode has been selected.



Press the lock and unlock switches on the transmitter switch simultaneously for more than 1 sec.

Press either one of 3 switches on the transmitter for more than 1 sec.

Within 3 sec

MPX body ECU automatically performs LOCK–UNLOCK operation once or twice at a 1 sec interval to inform the operator that the receiver 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 received first time and second time did not match.
- When selecting add mode, a registered recognition code was received.

If LOCK–UNLOCK operation can not be performed at all, the mode returns to the normal mode, then start with ”Start registration of recognition code”.

Proceed to finish registration

Proceed to continue registration

Within 20 sec

If even one of the following conditions is satisfied, registration of recognition codes is completed.

- 20 sec elapses since the MPX body ECU response.
- The driver’s door is closed.
- The key plate is inserted in the ignition key cylinder.
- 4 type recognition codes are registration at one time.

Registration of recognition codes (add mode or rewrite mode) is completed.

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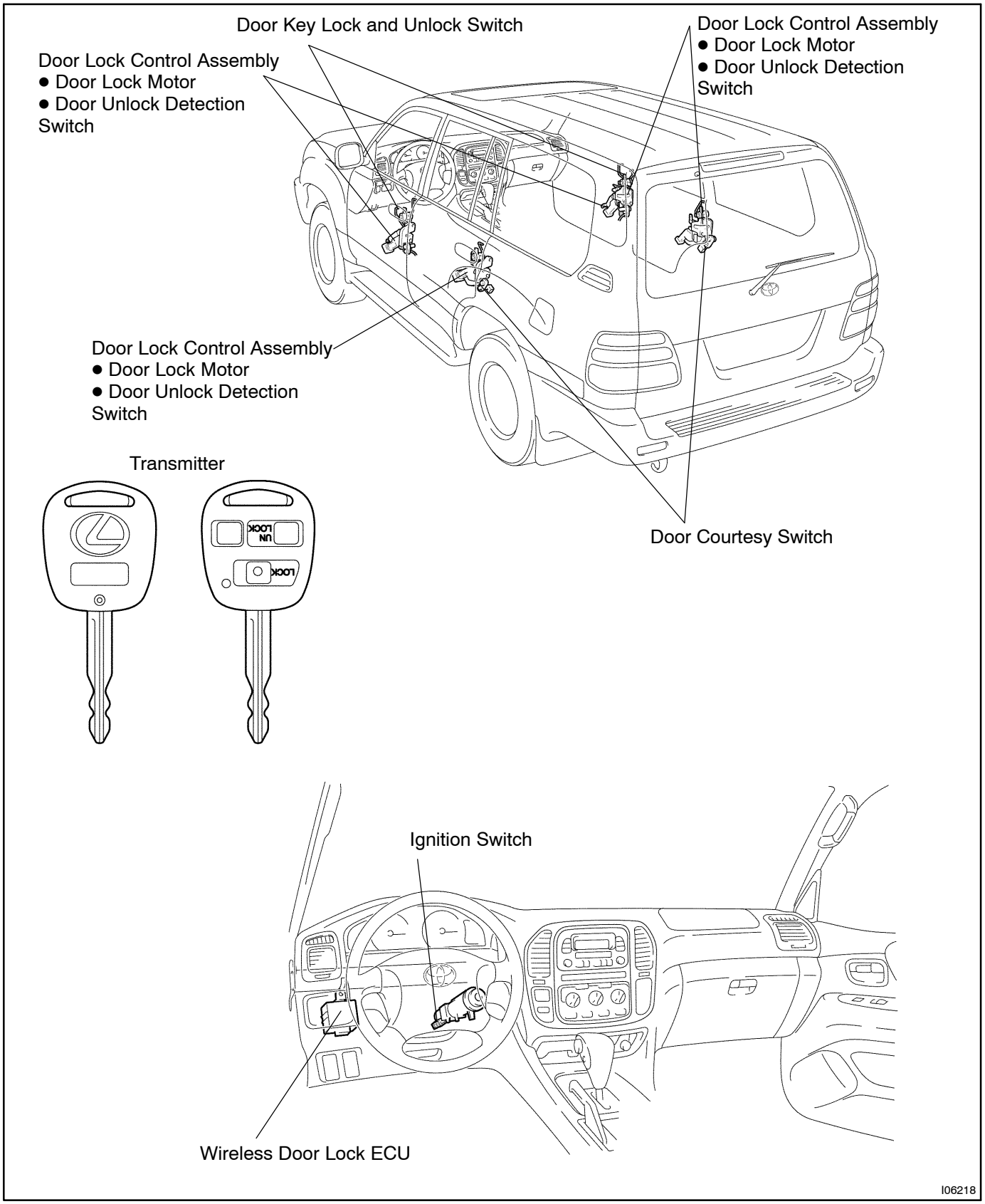
DI3CN–01

PARTS LOCATION



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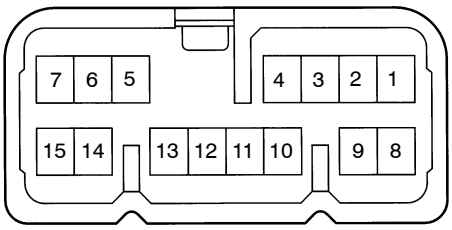
DI1AI–03

TERMINALS OF ECU



I00227

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
1 – Ground (GND – Ground)	W–B	Always.	Below 1 V
4 – Ground (TRLY – Ground)	G ↔ W–B	Taillight lights up.	Below 2 V
		Taillight does not lights up.	10 – 14 V
5 – Ground (T – Ground) (w/ Theft deterrent system)	G–W ↔ W–B	Transmitter PANIC switch ”ON”.	Below 1 Ω
		Transmitter PANIC switch ”OFF”.	1MΩ or higher
6 – Ground (LSWR – Ground) (w/ Theft deterrent system)	GR–L ↔ W–B	Rear door unlock detection switch ”ON”.	Below 1 V
		Rear door unlock detection switch ”OFF”.	10 – 14 V
7 – Ground (UL3 – Ground)	G–B ↔ W–B	Door key lock and unlock switch ”UNLOCK”. (Driver’s Door)	Below 1.5 V
		Door key lock and unlock switch ”LOCK”. (Driver’s Door)	8 – 10 V
8 – Ground (+B – Ground)	L–Y ↔ W–B	Always.	10 – 14 V
10 – Ground (KSW – Ground)	R–B ↔ W–B	Key unlock warning switch ”ON”. (Ignition key is inserted into key cylinder)	Below 1 V
		Key unlock warning switch ”OFF”. (Ignition key pull out key cylinder)	10 – 14 V
11 – Ground (LSWD – Ground)	L–B ↔ W–B	Driver door unlock detection switch ”ON”.	Below 1 V
		Driver door unlock detection switch ”OFF”.	10 – 14 V
12 – Ground (LSWP – Ground) (w/ Theft deterrent system)	L–O ↔ W–B	Passenger door unlock detection switch ”ON”.	Below 1 V
		Passenger door unlock detection switch ”OFF”.	10 – 14 V
13 – Ground (IG – Ground)	R–L ↔ W–B	Turn the ignition switch ”OFF” or ”ACC”.	Below 1 V
		Turn the ignition switch ”ON”.	10 – 14 V
14 – Ground (CTY – Ground)	R–W ↔ W–B	Door courtesy switch ”ON”.	Below 1 V
		Door courtesy switch ”OFF”.	10 – 14 V
15 – Ground (L – Ground)	L–W ↔ W–B	Door key lock and unlock switch ”LOCK”.	Below 1 V
		Door key lock and unlock switch aer not”OFF” or ”UNLOCK”.	8 – 10 V

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DI0DV–04

PROBLEM SYMPTOMS TABLE

Perform troubleshooting of the circuit for the applicable problem symptom in the order given in the chart below. Proceed to the page located for each circuit.

HINT:

- Troubleshooting of the wireless door lock control system is based on the premise that the door lock control system and theft deterrent system are operating normally. Accordingly, before troubleshooting the wireless door lock control system, first make certain that the door lock control system and theft deterrent system are operating normally.
- If the instruction ”Proceed to next circuit inspection shown on matrix chart” is given in the flow chart for each circuit, proceed to the circuit with the next highest number in the table to continue the check.
- If the trouble still reappears even through there are no abnormalities in any of the other circuits, check and replace the Wireless Door Lock ECU as the last step.

Symptom	Suspect Area	See page
All function of wireless door lock control system do no operate.	1. ECU Power Source Circuit 2. Ignition Switch Circuit 3. Door Courtesy Switch Circuit 4. Door Key Lock and Unlock Switch Circuit (Unlock Side) 5. Door Key Lock and Unlock Switch Circuit (Lock Side) 6. Key Unlock Warning Switch Circuit 7. Wireless Door Lock ECU	DI–457 DI–459 DI–469 DI–463 DI–465 DI–467 IN–34
Only door unlock operation is not possible (Lock operation is possible).	1. Door Key Lock and Unlock Switch Circuit (Unlock Side) 2. Door Unlock Detection Switch Circuit 3. Wireless Door Lock ECU	DI–463 DI–461 IN–34
Only door lock operation is not possible (Unlock operation is possible).	1. Door Key Lock and Unlock Switch Circuit (Lock Side) 2. Wireless Door Lock ECU	DI–465 IN–34
Only transmitter misoperation prevention function is not possible.	1. Key Unlock Warning Switch Circuit 2. Wireless Door Lock ECU	DI–467 IN–34
Wireless door lock function operates even when each door is opened.	1. Door Courtesy Switch Circuit 2. Wireless Door Lock ECU	DI–469 IN–34
Wireless door lock functions incorrectly. (Although one door is unlocked, when the transmitter switch is pressed, all doors unlock.)	1. Door Unlock Detection Switch Circuit 2. Wireless Door Lock ECU	DI–461 IN–34
Wireless door lock operates, but the taillight does not respond.	1. Taillight Relay Circuit 2. Wireless Door Lock ECU	DI–471 IN–34

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DI0DW–04

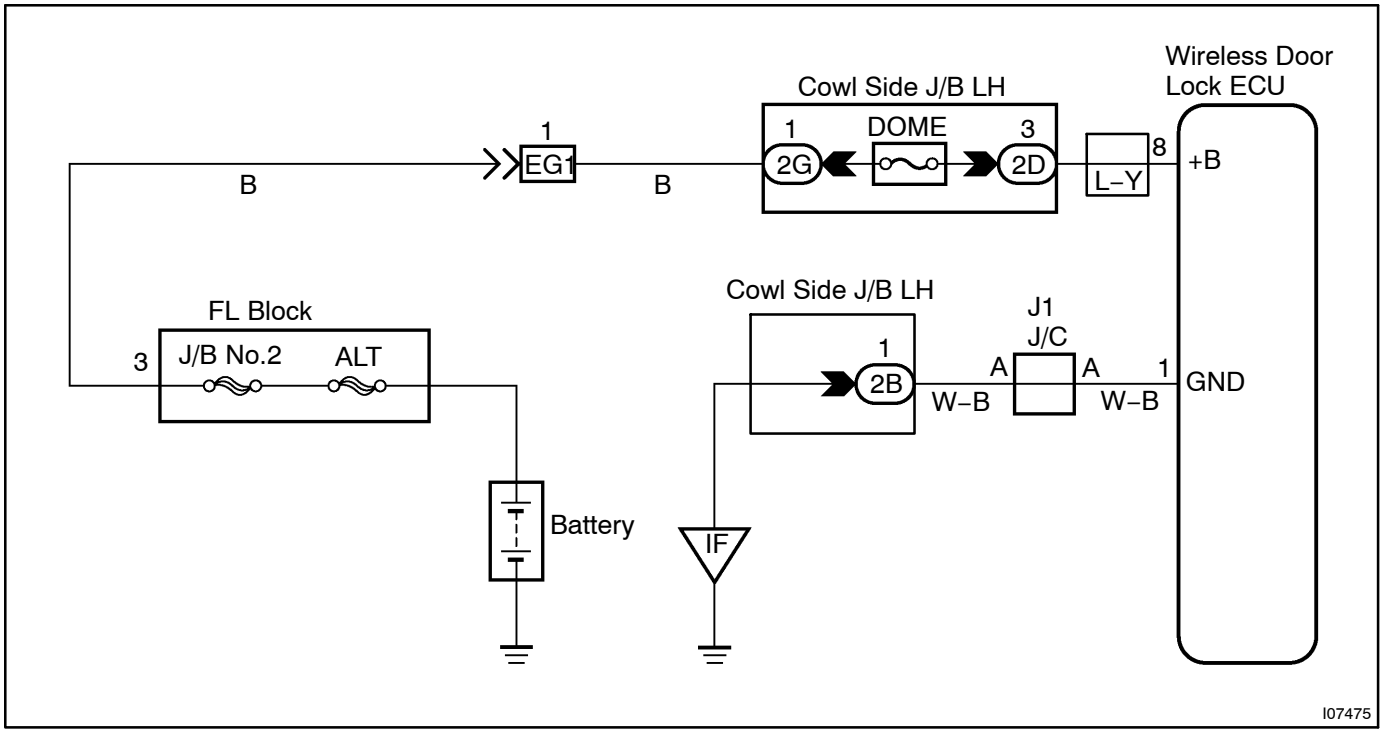
CIRCUIT INSPECTION

ECU Power Source Circuit

CIRCUIT DESCRIPTION

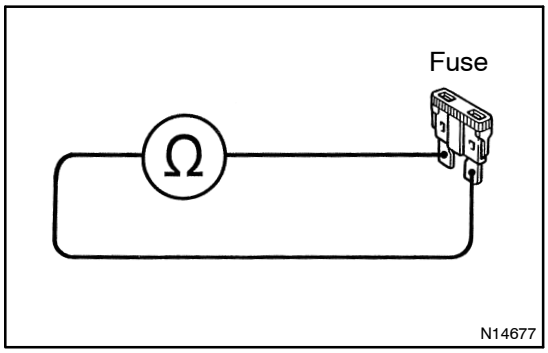
Battery positive voltage is always applied to the terminal +B of the wireless door lock ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check DOME fuse.**



PREPARATION:

Remove DOME fuse from engine room junction block.

CHECK:

Check continuity of DOME fuse.

OK:

Below 1.0 Ω or continuity

NG → **Check for short in all the harness and components connected to DOME fuse. (See attached wiring diagram.)**

OK

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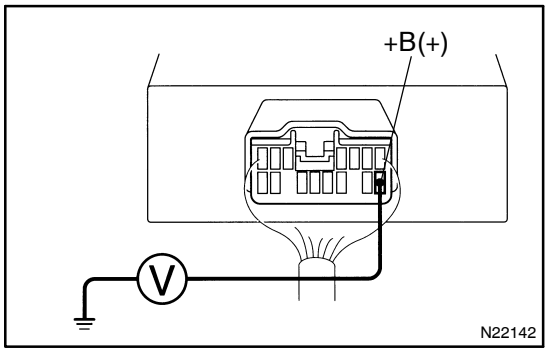
2	**Check voltage between terminal +B of ECU connector and ground.**



PREPARATION:
Remove the wireless door lock ECU from No.1 instrument panel brace.
CHECK:
Measure voltage between terminal +B of ECU connector and ground.
OK:
Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown in matrix chart (See page DI–456).**

NG

3	**Check for open in harness and connector between terminal GND of ECU and body ground (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and repair harness and connector between ECU and battery.

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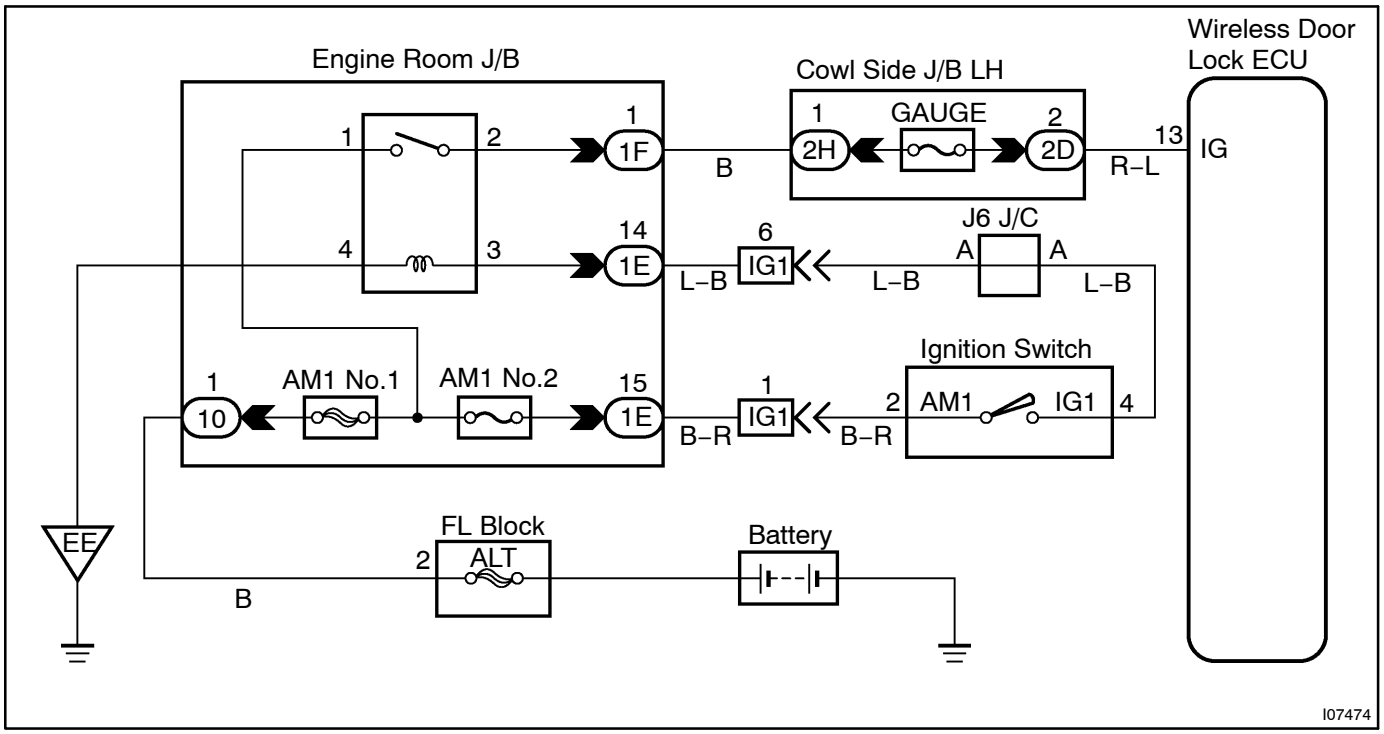
DI0DX–04

Ignition Switch Circuit

CIRCUIT DESCRIPTION

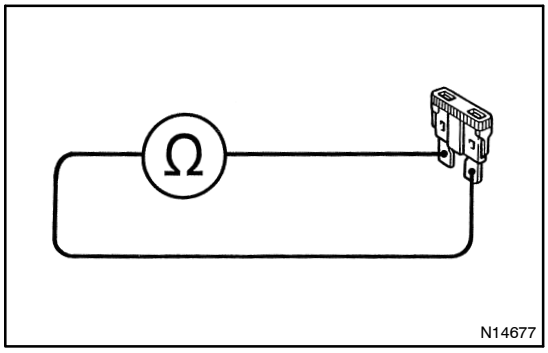
When the ignition switch is turned to the ON position, battery positive voltage is applied to the terminal IG of the ECU. Furthermore, power supplied from the terminal IG of the ECU is used as power for the wireless door lock buzzer.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ECU–IG fuse.**



PREPARATION:

(a) Remove front lower panel.

(b) Remove ECU–IG fuse from instrument panel junction block.

CHECK:

Check continuity of ECU–IG fuse.

OK:

Continuity

NG → **Check for short in all the harness and components connected to ECU–IG fuse. (See attached wiring diagram.)**

OK

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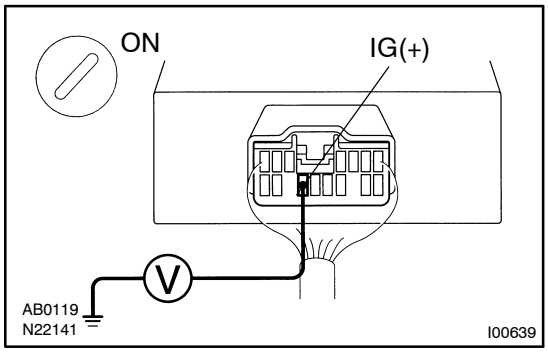
2	**Check voltage between terminal IG of ECU and body ground.**



PREPARATION:

(a) Disconnect the ECU connector.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal IG of ECU connector and body ground.

OK:

Voltage: 10 ~ 14 V

OK → **Check and replace ECU.**

NG

Check and repair harness and connector between ECU and battery (See page IN–34).

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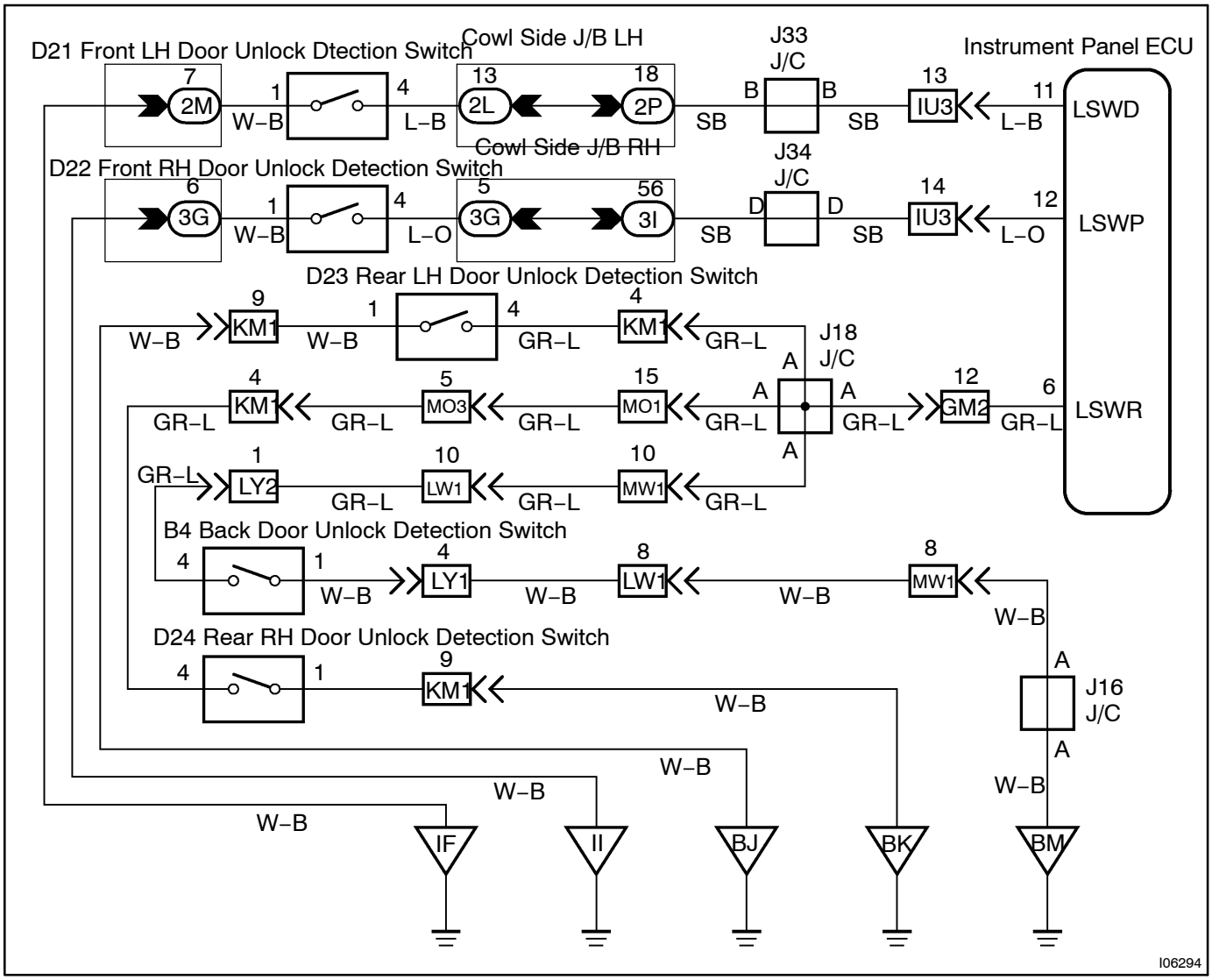
DI0E0–04

Door Unlock Detection Switch Circuit

CIRCUIT DESCRIPTION

The door unlock detection switch is built into the door lock motor assembly. The switch is OFF when the door lock knob is in Lock Position, and is ON When the Knob is in Unlock position.
Furthermore, the door unlock detection switch circuit has terminal +B connected inside the theft deterrent ECU, when the door unlock detection switch is OFF, battery positive voltage is applied to the terminal of the door unlock detection switch circuit of the wireless door lock ECU.

WIRING DIAGRAM



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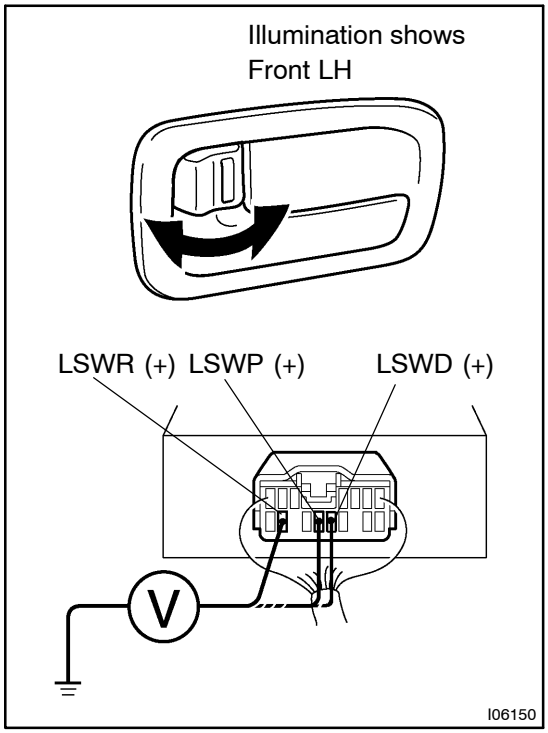
INSPECTION PROCEDURE

1	**Check voltage between terminals LSWD, LSWP and LSWR of wireless door lock ECU connector and body ground.**



PREPARATION:

Remove the wireless door lock ECU from instrument panel brace.

CHECK:

Measure voltage between terminals LSWD, LSWP and LSWR of wireless door lock ECU connector and body ground, when the respective door lock knobs are pushed to the lock side.

OK:

Voltage 10 – 14 V

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–456).**

NG

Check and repair harness and connector between wireless door lock ECU and door unlock detection switch.

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DI0E2–04

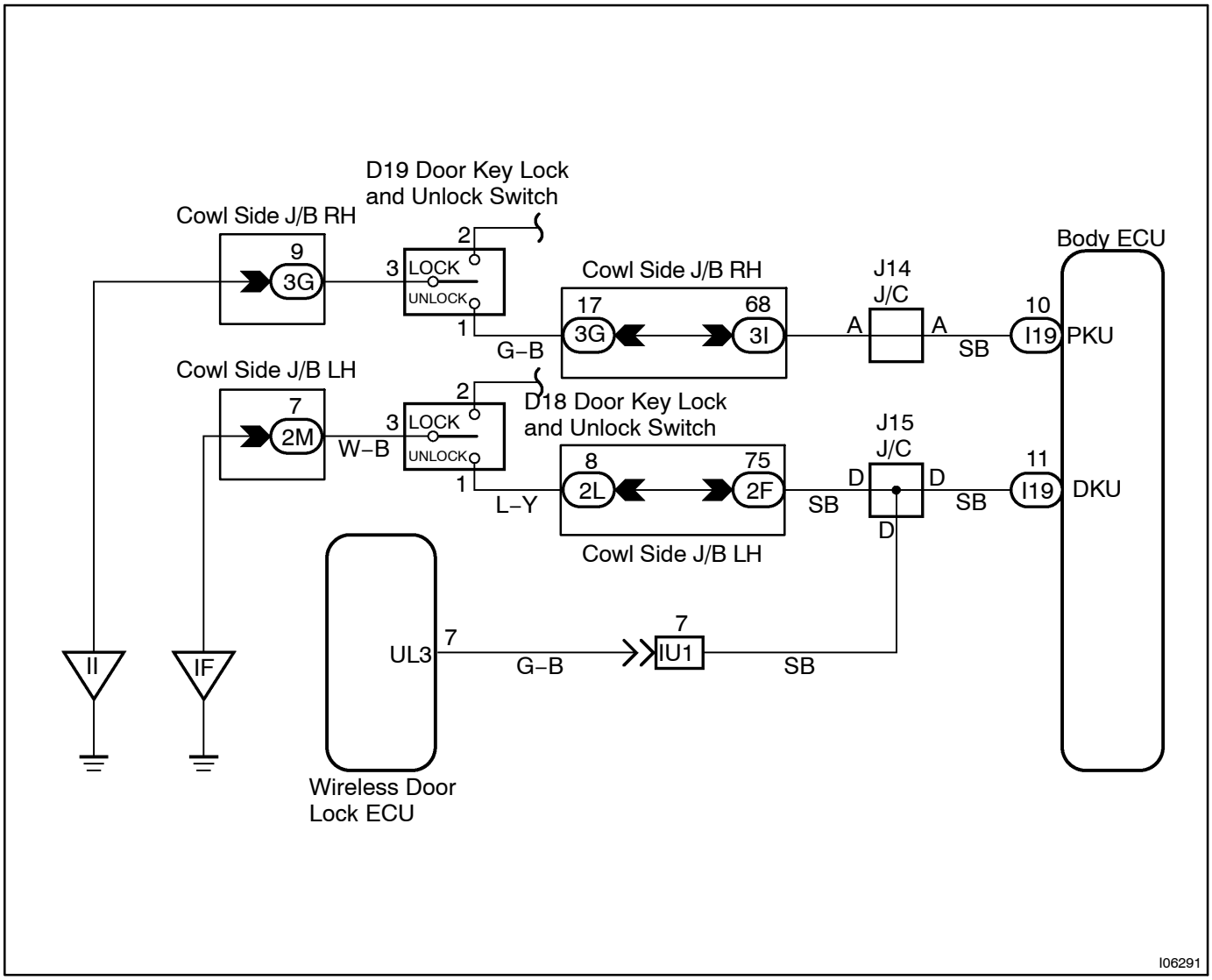
Door Key Lock and Unlock Switch Circuit (Unlock Side)

CIRCUIT DESCRIPTION

The switch that is operated by key built into the door key cylinder. When the key is turned to the lock side, the lock terminal of the switch is grounded, and when the key is turned to the unlock side the unlock terminal is grounded.

Furthermore, the door key lock and unlock switch circuit has terminal +B connected inside the theft deterrent ECU, when either the lock or unlock terminal of the key lock and unlock switch are grounded, battery positive voltage is applied to the door key lock and unlock switch circuit of the wireless door lock ECU.

WIRING DIAGRAM



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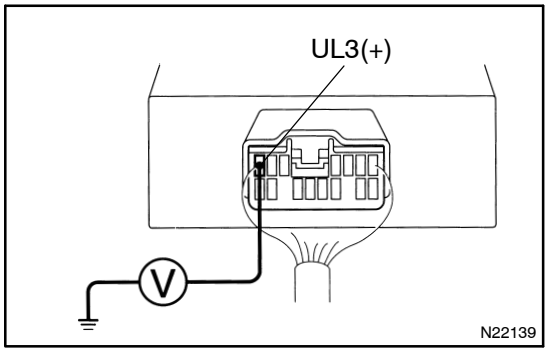
INSPECTION PROCEDURE

1	**Check voltage between terminals UL3 of wireless door lock ECU connector and body ground.**



PREPARATION:
Remove the wireless door lock ECU from No.1 instrument panel brace.

CHECK:
Measure voltage between terminal UL3 of wireless door lock ECU connector and body ground.

OK:

Voltage: 10 – 14V

OK → **Proceed to next circuit inspection shown on problem symptom table (See page DI–456).**

NG

Check and repair harness and connector between wireless door lock ECU and door key lock and unlock switch.

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DI0E5–04

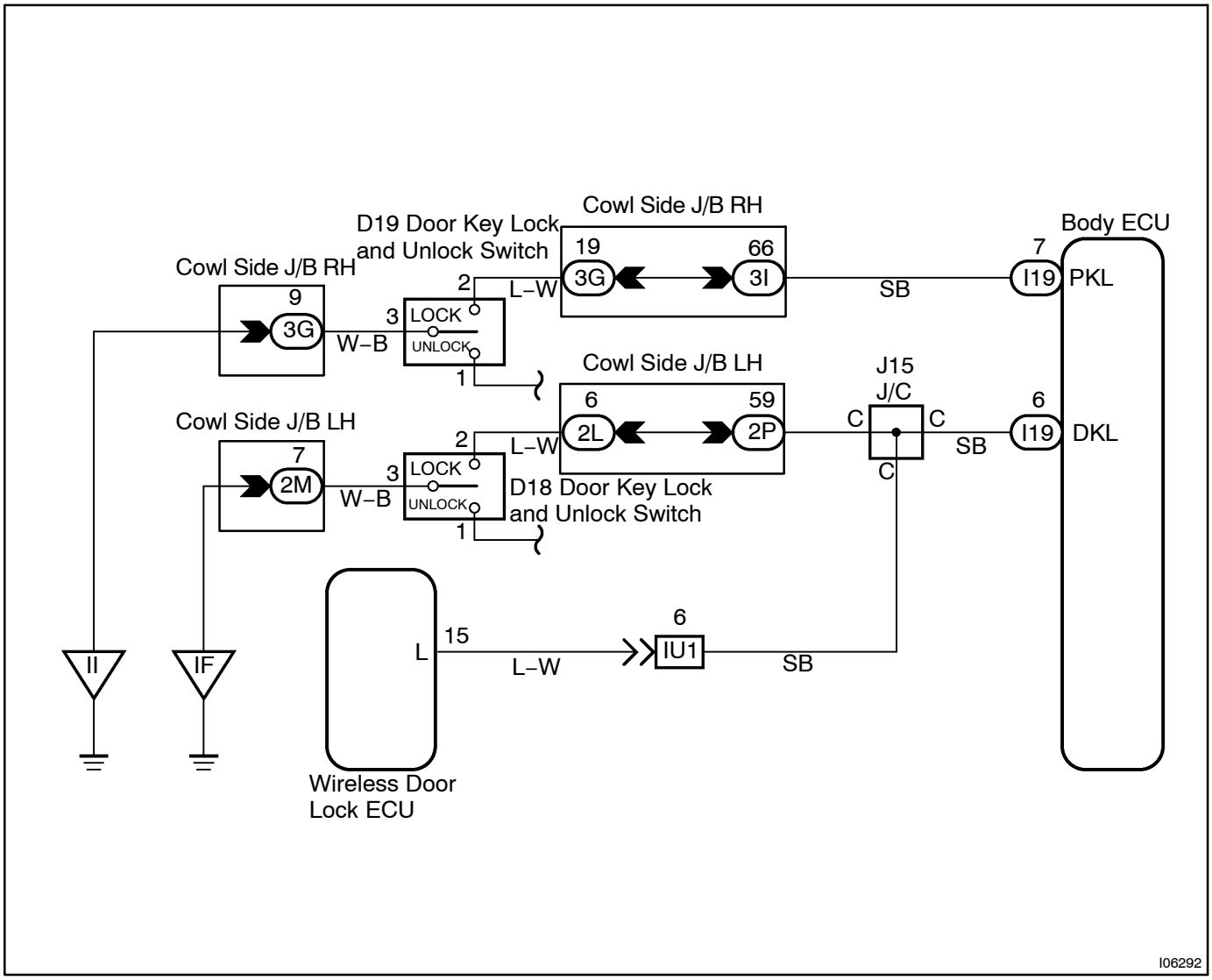
Door Key Lock and Unlock Switch Circuit (Lock Side)

CIRCUIT DESCRIPTION

Refer to page DI–463.

Transistor inside the wireless door lock ECU coming ON causes the theft deterrent ECU to output a signal to lock all the doors.

WIRING DIAGRAM



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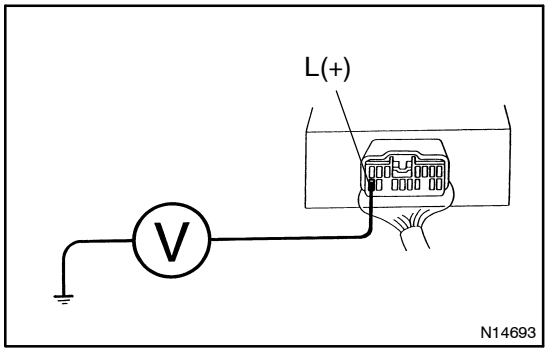
INSPECTION PROCEDURE

1	**Check voltage between terminal L of wireless door lock ECU connector and body ground.**



PREPARATION:

Remove the wireless door lock ECU from No.1 instrument panel brace.

CHECK:

Measure voltage between terminal L of wireless door lock ECU connector and body ground.

OK:

Voltage 10 – 14 V

OK → **Proceed to next circuit inspection shown on problem symptom table (See page DI–456).**

NG

Check and repair harness and connector between wireless door lock ECU and door key lock and unlock switch.

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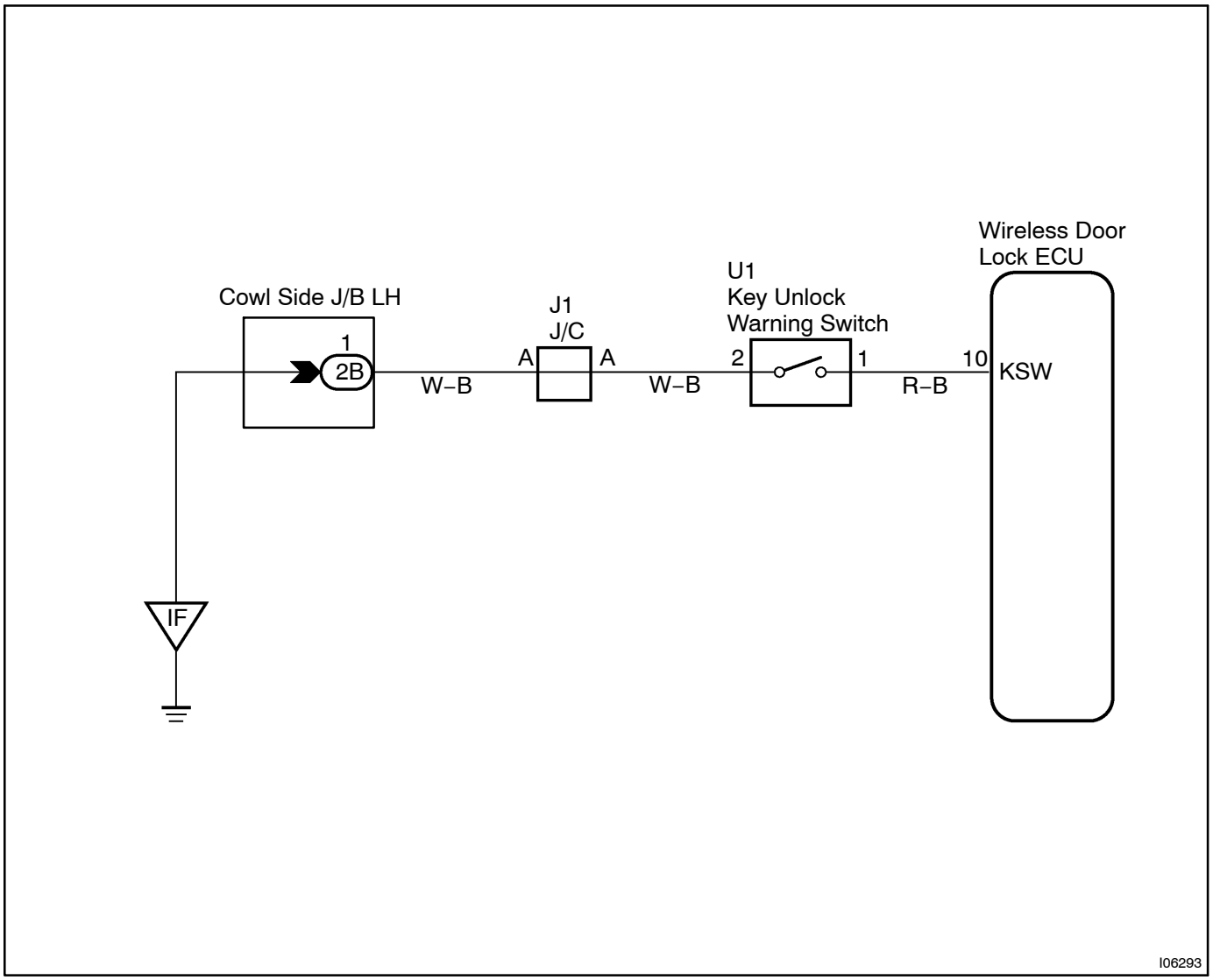
DI0E7–04

Key Unlock Warning Switch Circuit

CIRCUIT DESCRIPTION

When the key is inserted in the ignition key cylinder, the key unlock warning switch comes ON, and when the key is not inserted the switch is OFF.
When the key unlock warning switch is ON, the ECU operates the key confinement prevention function.

WIRING DIAGRAM



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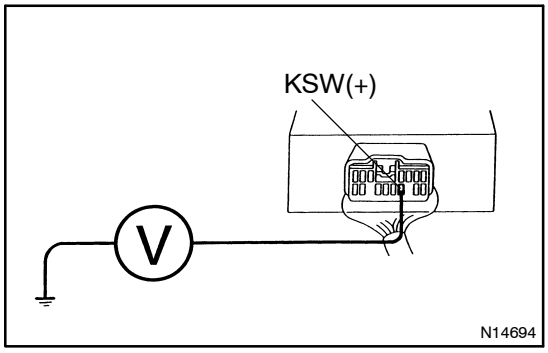
INSPECTION PROCEDURE

1	**Check voltage between terminal KSW of wireless door lock ECU connector and body ground.**



PREPARATION:

Remove the wireless door lock ECU from No.1 instrument panel brace.

CHECK:

Measure voltage between terminal KSW of wireless door lock ECU connector and body ground, when key plate is not inserted in the key cylinder.

OK:

Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–456).**

NG

Check and repair harness and connector between wireless door lock ECU and key unlock warning switch.

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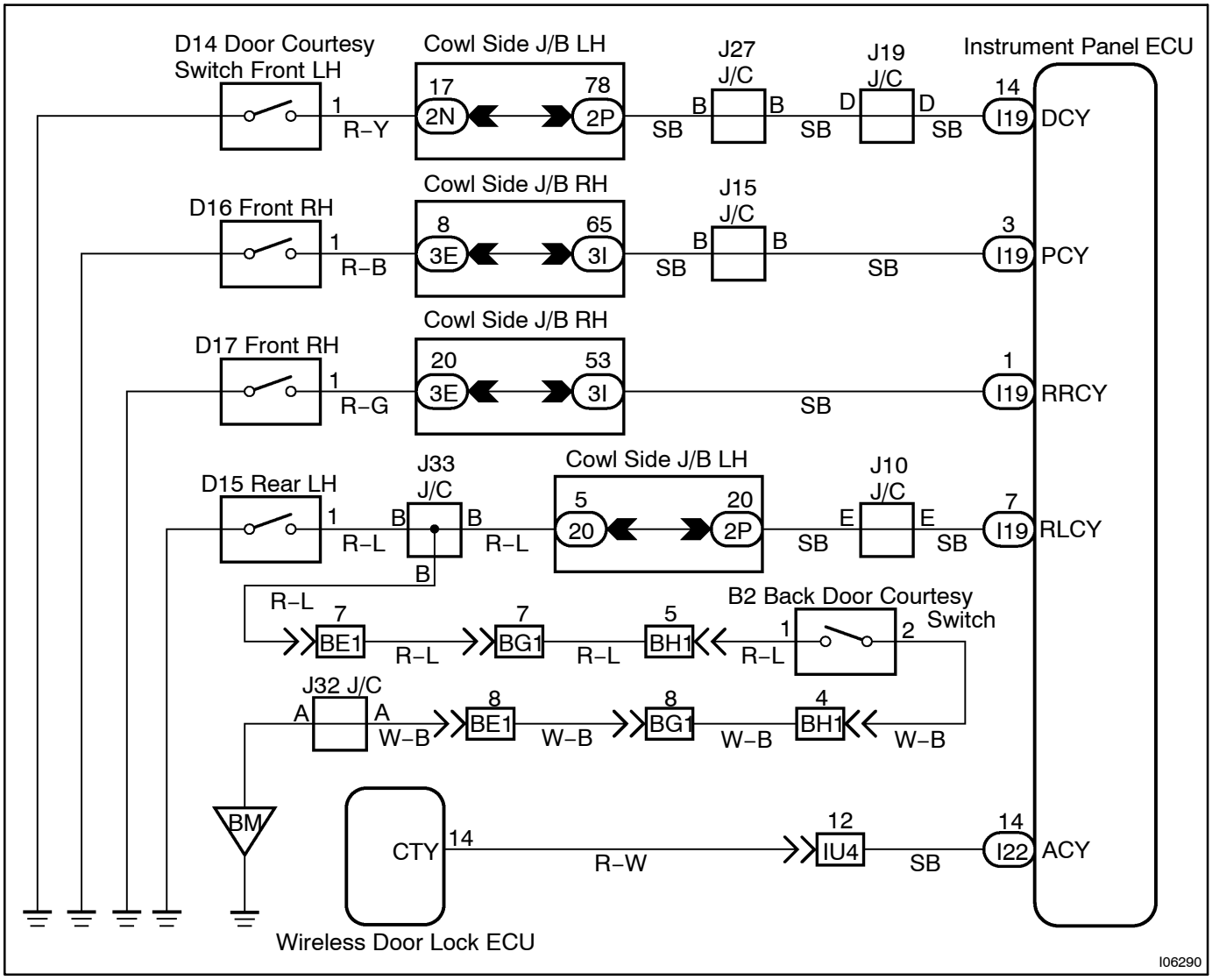
DI0E9–04

Door Courtesy Switch Circuit

CIRCUIT DESCRIPTION

The door courtesy switch comes ON when the door is opened and goes OFF when door is closed. Furthermore. the door courtesy switch circuit has terminal +B connected inside the theft deterrent ECU. Battery positive voltage is applied to terminal DSWD of the theft deterrent ECU when all doors are closed, i.e., when the door courtesy switches of all doors are OFF.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check operation of open door warning light.**

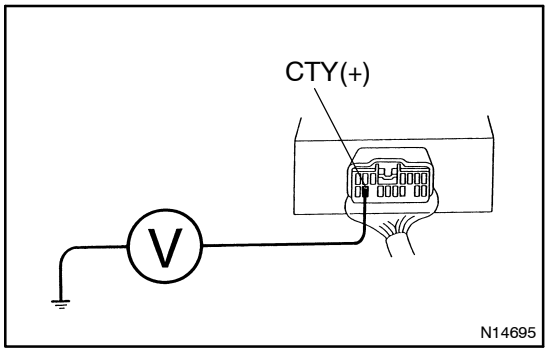
CHECK:

Check that open door warning light comes on when each door is opened, and goes off when all doors are closed.

NG → **Check open door warning light circuit**

OK

2	**Check voltage between terminal CTY of wireless door lock ECU connector and body ground.**



PREPARATION:

Remove the wireless door lock ECU from No.1 instrument panel brace.

CHECK:

Measure voltage between terminal CTY of wireless door lock ECU connector and body ground, when all doors are closed.

OK:

Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–456).**

NG

Check and repair harness and connector between wireless door lock ECU and door courtesy switch.

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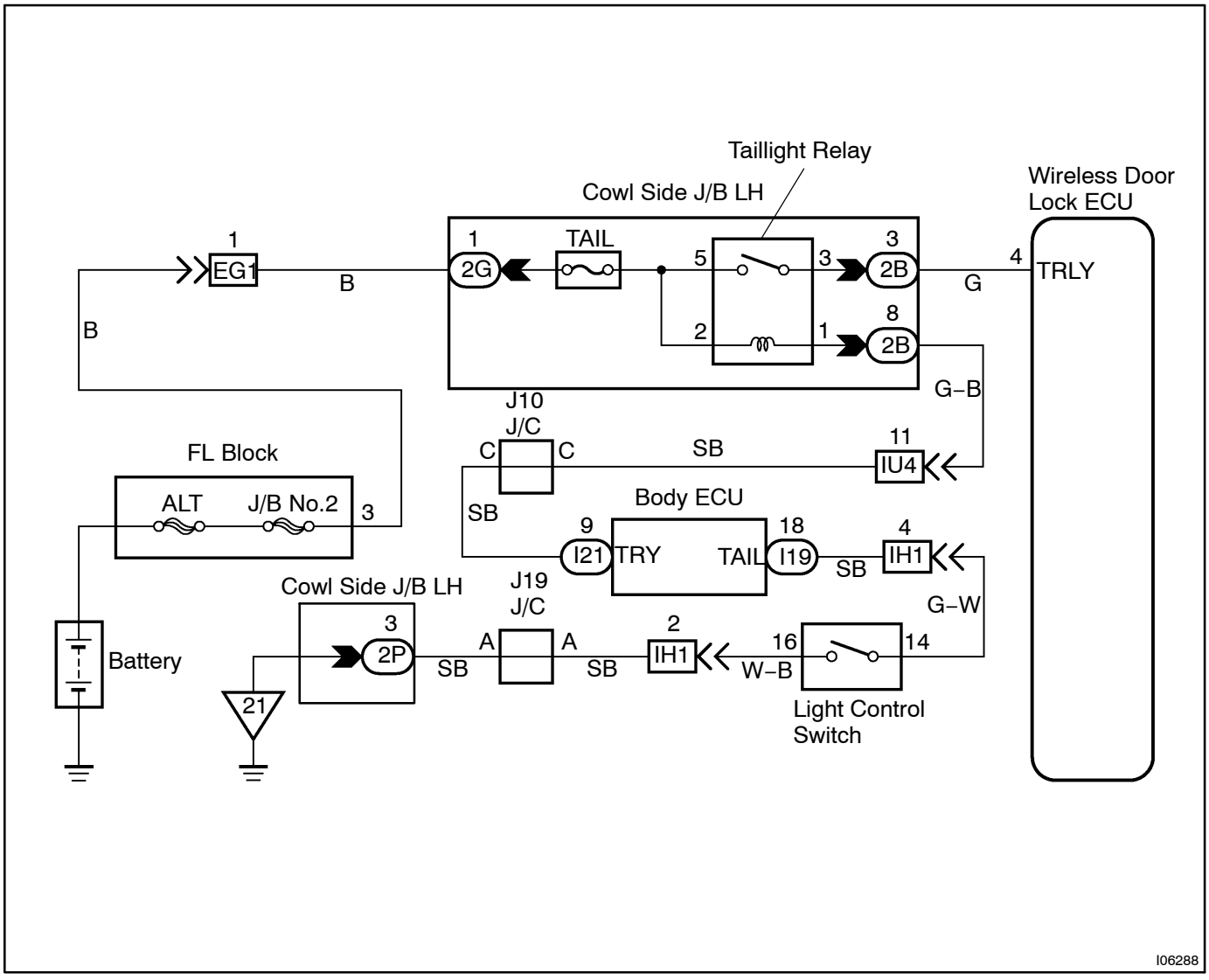
DI0EB–04

Taillight Relay Circuit

CIRCUIT DESCRIPTION

TRLY terminal outputs the signal once when pressing the LOCK switch of the transmitter and twice when pressing the UNLOCK switch and then makes the taillight come to light.

WIRING DIAGRAM



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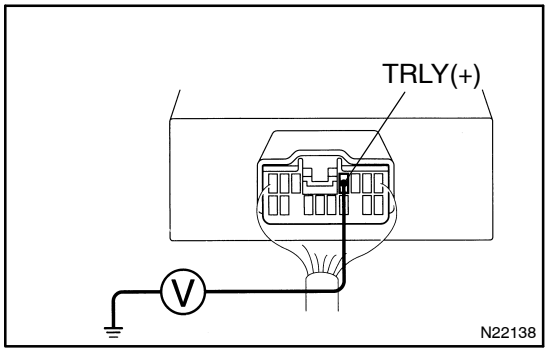
INSPECTION PROCEDURE

1	**Check voltage between terminal TRLY of wireless door lock ECU connector and body ground.**



PREPARATION:

Remove the wireless door lock ECU from No.1 instrument panel brace.

CHECK:

Measure signal between terminal TRLY and body ground, when transmitter is ON and OFF.

OK:

Door Lock position	Lock	Unlock
Signal	0.2 sec. Once signal	0.2 sec. Twice signal, 0.25 sec.

NG → **Replace wireless door lock ECU.**

OK

Check and repair harness and connector between wireless door lock ECU and taillight relay circuit.

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THEFT DETERRENT SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI01P–04

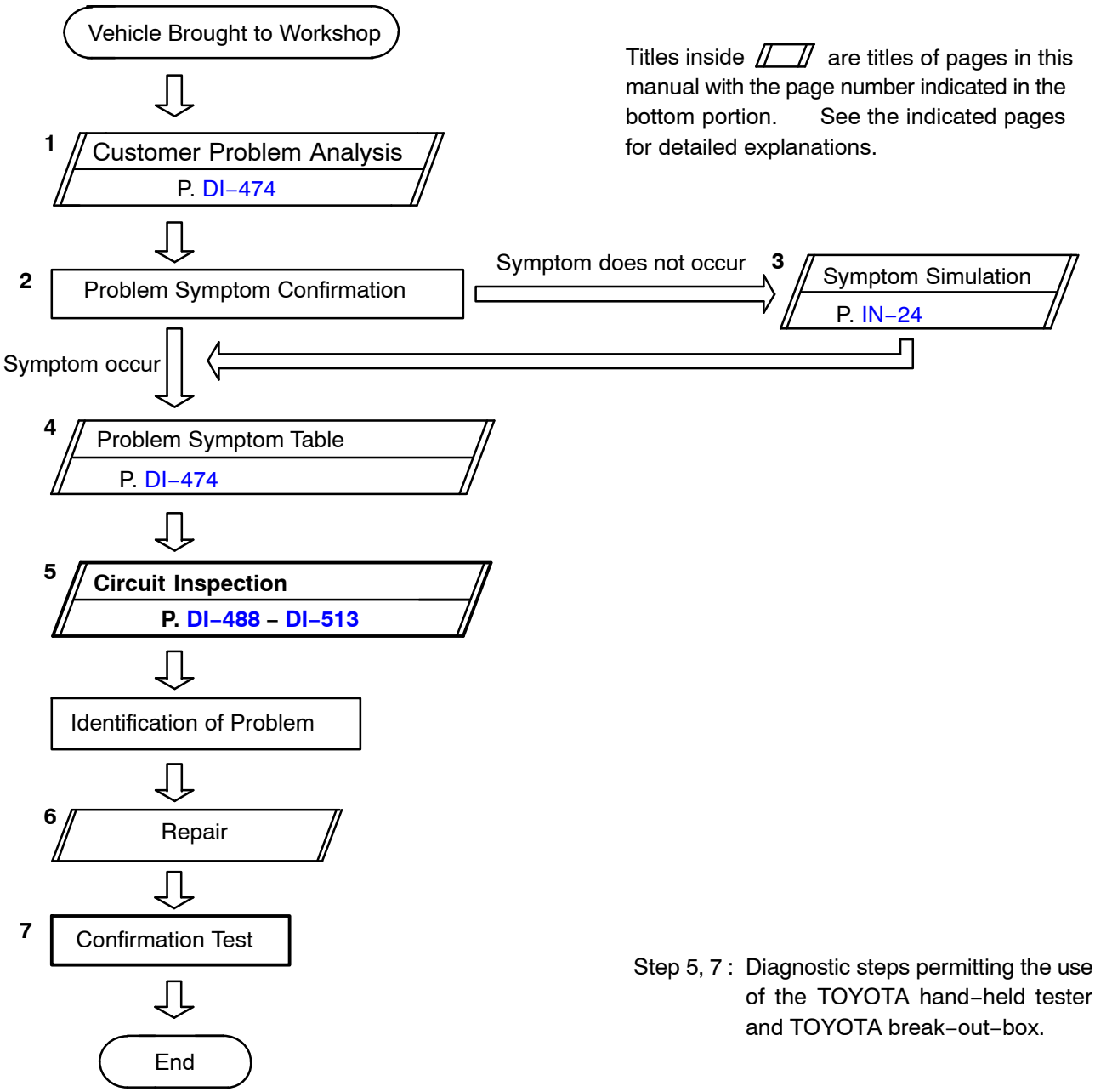
HINT:

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 TOYOTA hand–held tester and TOYOTA break–out–box.

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DI01Q–04

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.		

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DI3CO–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 0.55 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.

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(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 0.25 secs. (ON) 0.25 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.

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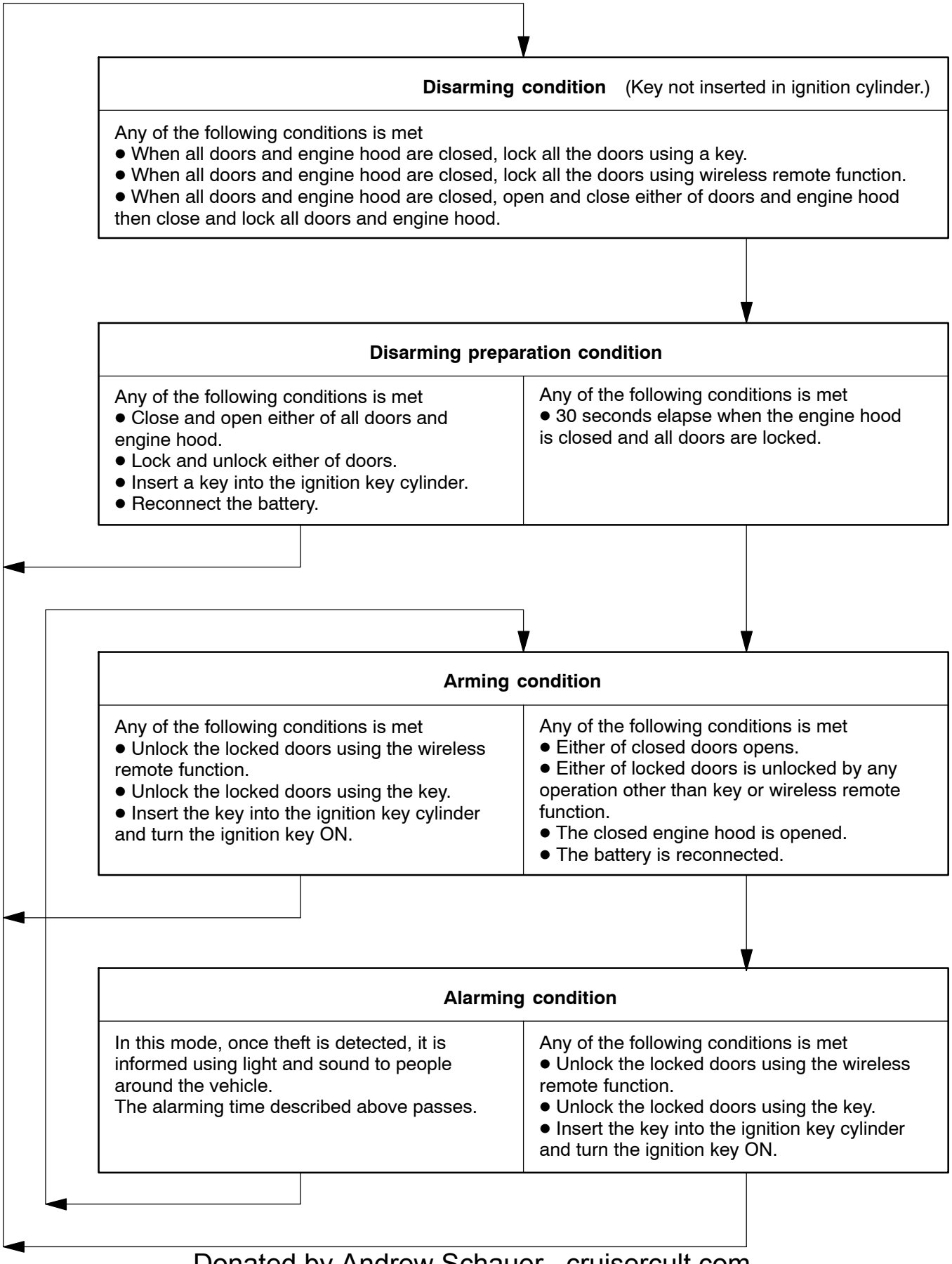
2. ACTIVE ARMING MODE



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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:
0.75 seconds (ON)
1.25 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)

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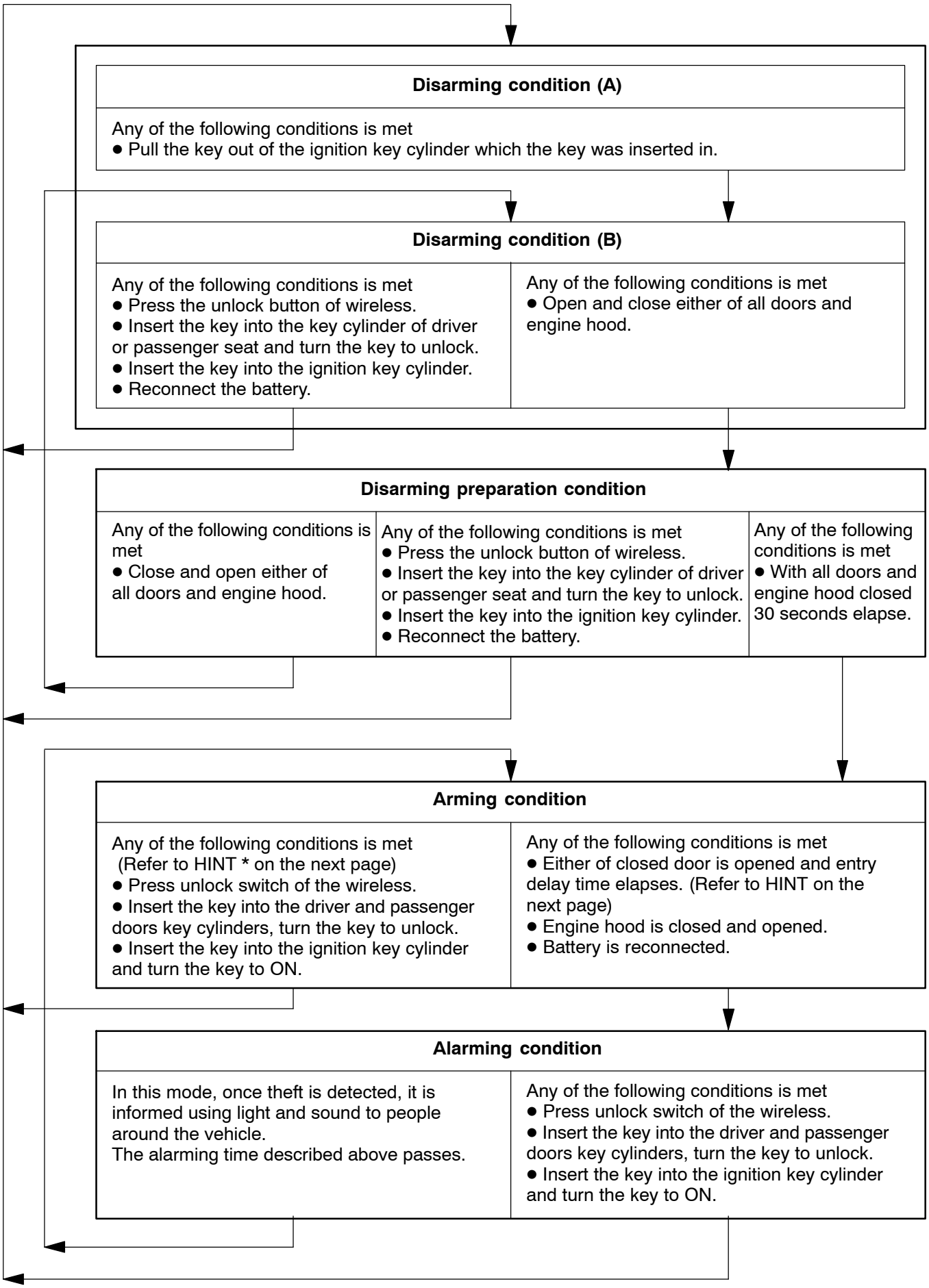

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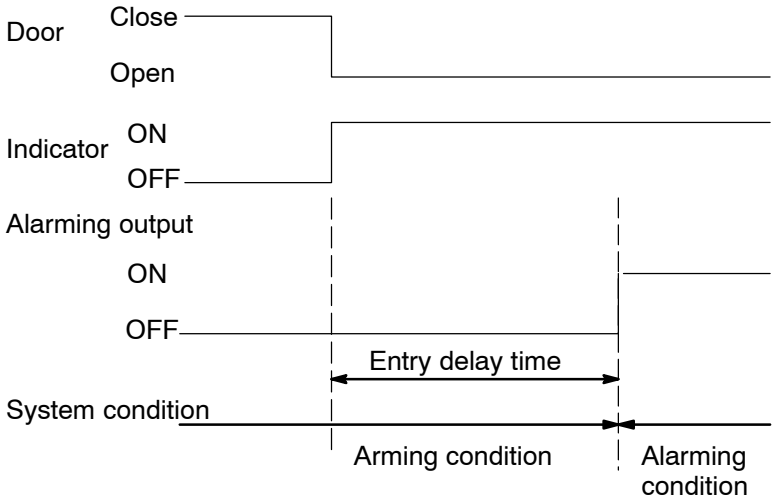
HINT:
In arming condition either closed door is opened, entry delay occurs. (15 secs.)
During this time, the mode transfers to disarming condition when the condition described above * is met.
When the condition is not met, the system judges theft occurs, the mode transfers to alarming condition.



(a) 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:
0.75 seconds (ON)
1.25 seconds (OFF)

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(b) 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

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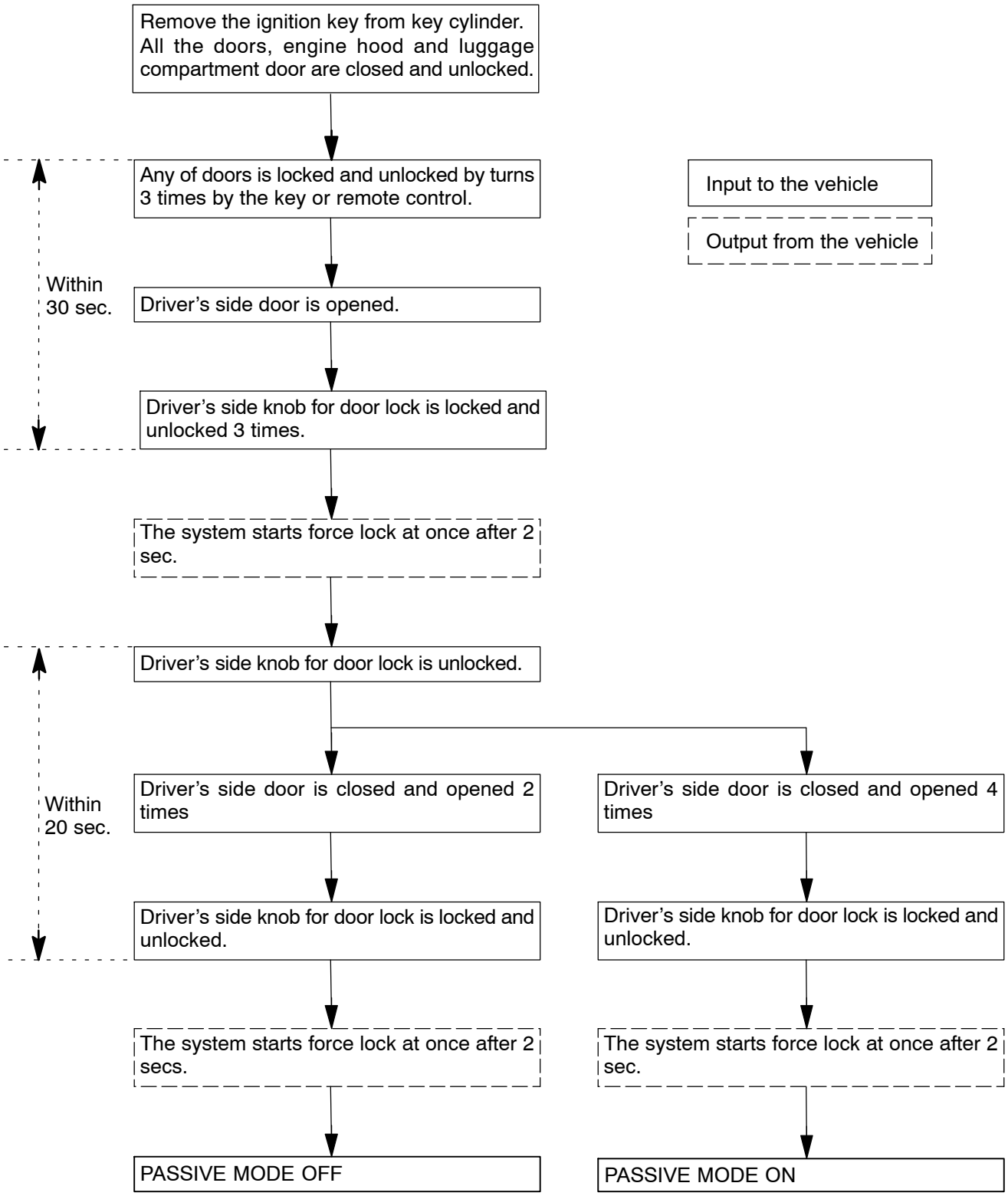
4. CHANGING METHOD OF PASSIVE MODE (ON or OFF)



HINT:
- Initial mode is PASSIVE MODE OFF.
- If there is a different signal in the middle of changing. It is invalid.

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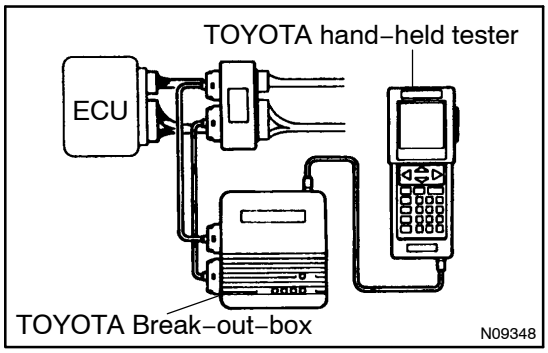

5. ECU TERMINAL VALUES MEASUREMENT BY USING TOYOTA BREAK–OUT–BOX AND TOYOTA HAND–HELD TESTER

(a) Hook up the TOYOTA break–out–box and TOYOTA hand–held tester to the vehicle.

(b) Read the ECU input/ output values by following the prompts on the tester screen.

(c) Please refer to the TOYOTA hand–held tester has a ”Snapshot” function. This records the measured data and is effective in the diagnosis of intermittent problems.

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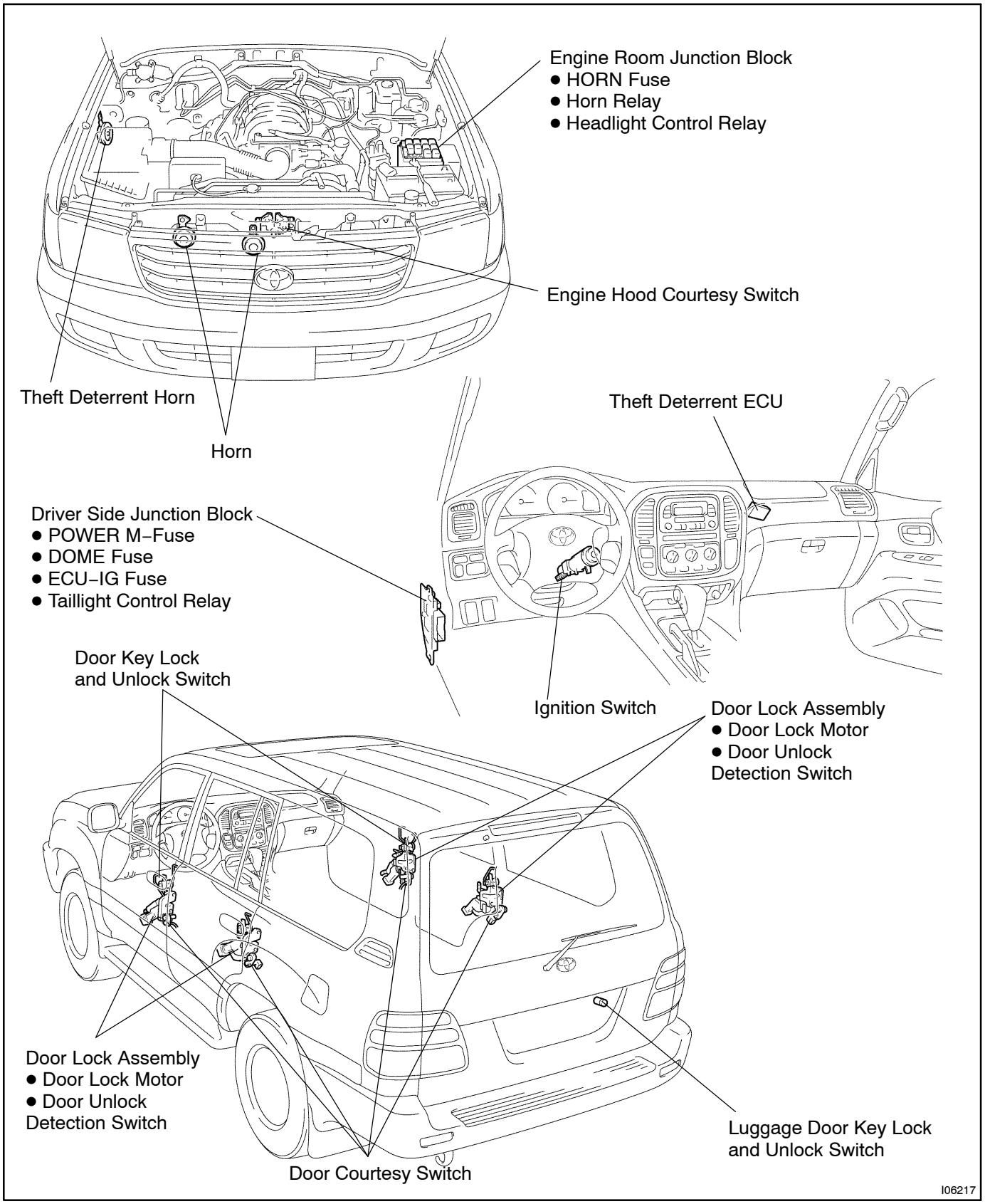
DI3CP–01

PARTS LOCATION



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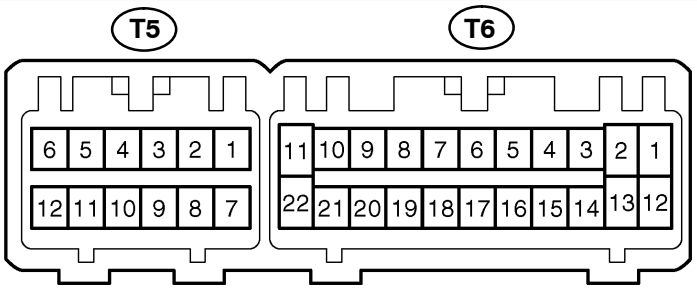
DI1AH–04

TERMINALS OF ECU



I01920

Symbols (Terminals No.)	Wiring Color	Condition	STD Value
CTY ↔ E (T5–1 ↔ T6–7)	R–L ↔ W–B	Door courtesy switch ”ON” (Rear door opened)	Below 1 Ω
		Door courtesy switch ”OFF” (Rear door closed)	1 MΩ or higher
DSWH ↔ E (T5–3 ↔ T6–7)	SB ↔ 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 (T5–4 ↔ T6–7)	R–L ↔ 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 (T5–5 ↔ T6–7)	L ↔ 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 (T5–6 ↔ T6–7)	R–B ↔ W–B	Key unlock warning switch ”ON” (Key inserted)	Below 1 Ω
		Key unlock warning switch ”OFF” (Key removed)	1 MΩ or higher
LUG ↔ E (T5–7 ↔ T6–7)	G–W ↔ W–B	Back door key lock and unlock switch ”ON”	Below 1 Ω
		Back door key lock and unlock switch ”OFF”	1 MΩ or higher
L2 ↔ E (T5–8 ↔ T6–7)	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 (T5–9 ↔ T6–7)	L–Y ↔ 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 (T5–10 ↔ T6–7)	G ↔ W–B	Door key lock and unlock switch ”UNLOCK” (passenger’s door and back door)	Below 1 Ω
		Door key lock and unlock switch ”LOCK” (passenger’s door and back door)	1 MΩ or higher
+B1 ↔ Body ground (T5–11 ↔ Body ground)	V ↔ Body Ground	Always	10 – 14 V
IG ↔ E (T5–13 ↔ T6–7)	B–W ↔ W–B	Ignition switch is turned to ”ON” position	10 – 14 V

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LSWD ↔ E (T5–14 ↔ T6–7)	L–B ↔ 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 (T5–15 ↔ T6–7)	L–O ↔ 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 (T5–16 ↔ T6–7)	GR–L ↔ W–B	Door unlock detection switch ”ON” (Rear door)	Below 1 Ω
		Door unlock detection switch ”OFF” (Rear door)	1 MΩ or higher
+B2 ↔ Body ground (T6–1 ↔ Body ground)	B ↔ Body ground	Always	10 – 14 V
SH ↔ Body Ground (T6–9 ↔ Body Ground)	G–Y ↔ W–B	Always	10 – 14 V
IND ↔ E (T6–6 ↔ T6–7)	G–R ↔ W–B	During set preparation	3 – 5 V
E ↔ Body ground (T6–7 ↔ Body ground)	W–B ↔ Body ground	Always	10 – 14 V
HEAD ↔ E (T6–10 ↔ T6–7)	R–B ↔ W–B	Light control switch ”HEAD”	10 – 14 V
TAIL ↔ E (T6–11 ↔ T6–7)	G–B ↔ W–B	Light control switch ”TAIL” or ”HEAD”	10 – 14 V
HORN ↔ E (T6–12 ↔ T6–7)	G–O ↔ W–B	Horn switch ”OFF”	10 – 14 V

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DI01U–04

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	3. Key unlock warning switch circuit		1. Indicator light circuit	DI–488
			2. ECU power source circuit	DI–490
			3. Key unlock warning switch circuit	DI–503
			4. Door key lock and unlock switch circuit	DI–507
			5. Door courtesy switch circuit	DI–511
			6. Door unlock detection switch circuit	DI–509
			7. Engine hood courtesy switch circuit	DI–513
The indicator light does not blink when system is set			Indicator light circuit	DI–488
When the system is set	When the rear door is unlocked	The system does not operate	Door unlock detection switch circuit	DI–509
	When the engine hood is opened		Engine hood courtesy switch circuit	DI–513
While the system is in warning operation	Horns do not sound		Horn relay circuit	DI–495
	Theft deterrent horn does not sound		Theft deterrent horn circuit	DI–493
	Headlights do not flash		Headlight control relay circuit	DI–497
	Taillights do not flash		Taillight control relay circuit	DI–499
	The door lock is not locked		Door unlock detection switch circuit	DI–509
When the system is set	It is not canceled when the ignition key is turned to ACC or ON position		Ignition switch circuit	DI–501
System is still set even when a rear door is open			Door courtesy switch circuit	DI–511
Even when the system is not set	Horns sound		Horn relay circuit	DI–495
	Theft deterrent horn sounds		Theft deterrent horn circuit	DI–493
	Headlights stay on		Headlight control relay circuit	DI–497
	Taillights stay on		Taillight control relay circuit	DI–499

*1: If numbers are given to the circuit proceed with troubleshooting in the order indicated by those numbers.

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DI01V–04

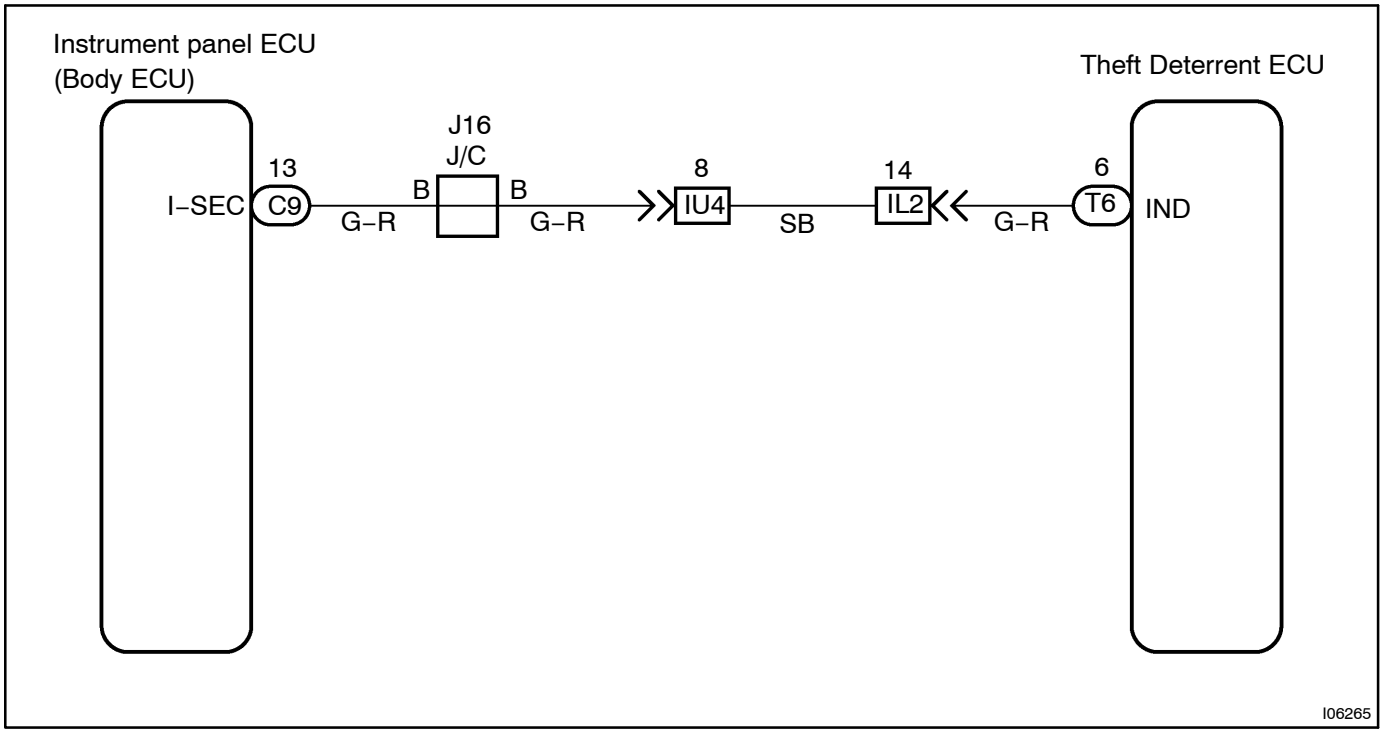
CIRCUIT INSPECTION

Indicator Light Circuit

CIRCUIT DESCRIPTION

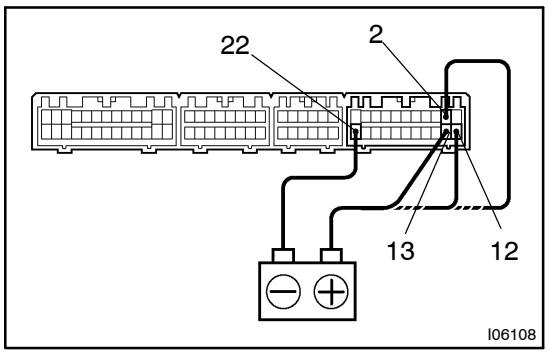
When the theft deterrent system is preparing to set, this circuit lights up the indicator light. When the system has been set, it continually turns the indicator light ON for 1 second and turns it OFF for 1 second, thus blinking the indicator light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check indicator light.**



PREPARATION:

(a) Remove integration control panel.

(b) Disconnect indicator light connector.

CHECK:

Connect the positive (+) lead to terminal D2, D12 and the negative (–) lead to terminal D22 of indicator light connector.

OK:

Indicator light comes on.

NG	**Replace indicator light.**

OK

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2	**Check harness and connector between theft deterrent ECU and indicator light, indicator light and body ground (See page IN–34).**

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 matrix chart (See page DI–487).

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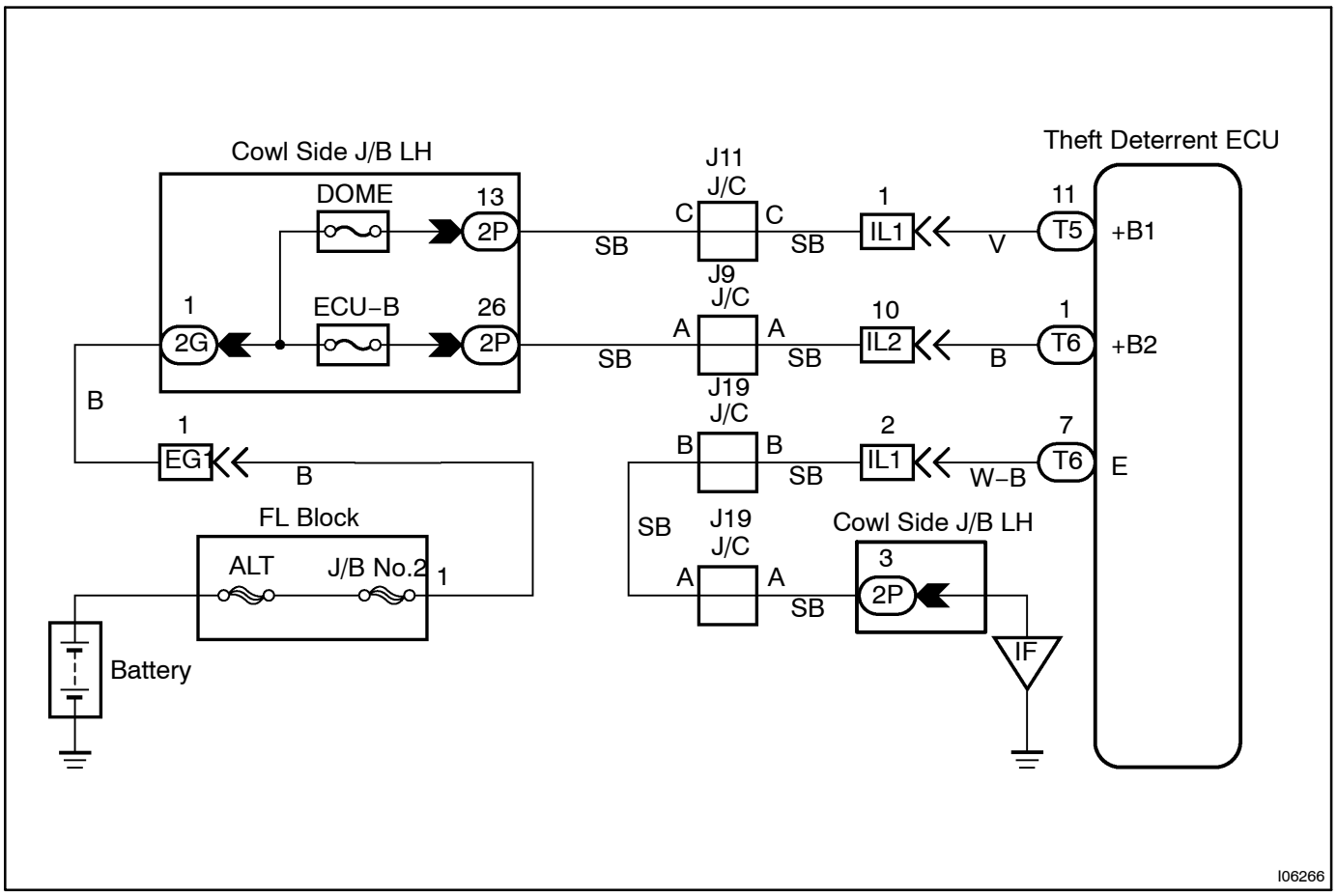
DI01W–04

ECU Power Source Circuit

CIRCUIT DESCRIPTION

This circuit provides power to operate the theft deterrent ECU.

WIRING DIAGRAM



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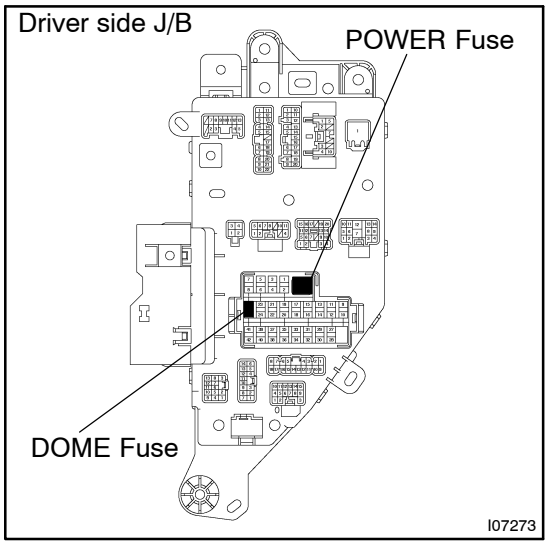
INSPECTION PROCEDURE

1	**Check DOME and POWER fuse.**

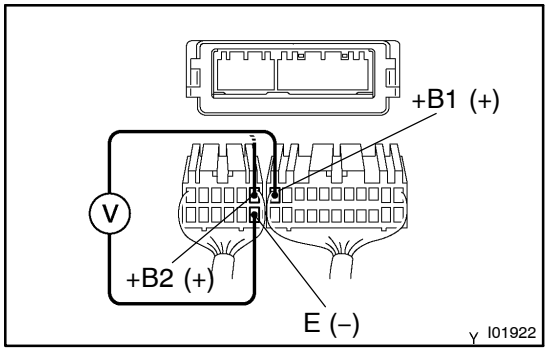


PREPARATION:
Remove DOME and POWER fuse from driver side junction block.
CHECK:
Check continuity of DOME and POWER fuse.
OK:
Continuity

NG → **Check for short in all the harness and components connected to the DOME and POWER 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 matrix chart (See page DI–487).**

NG

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3	**Check for open in harness and connector between ECU and body ground (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and repair harness and connector between ECU and battery.

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DI01Y–04

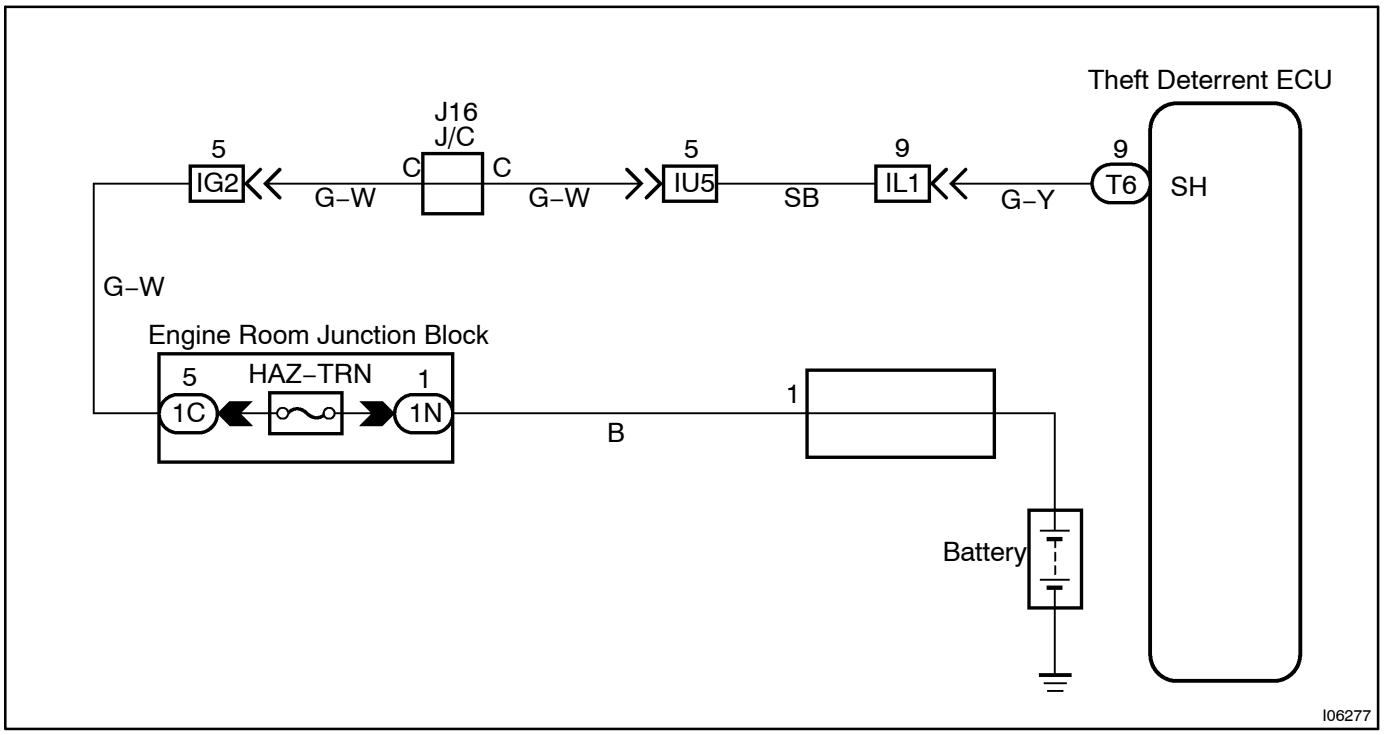
Theft Deterrent Horn Circuit

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:

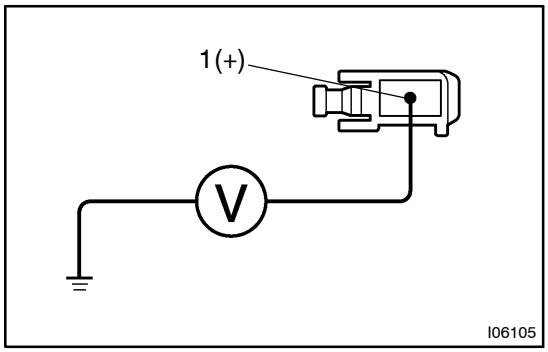
(1) Unlock the front LH or RH door with a key.
(2) Turn the ignition switch to ACC or ON position.
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.

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

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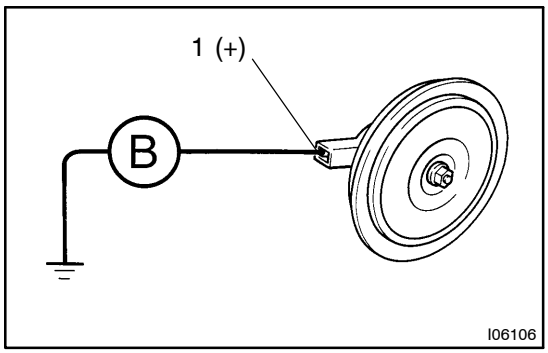
NG → **Check and repair harness and connector between HORN fuse and theft deterrent horn.**

OK

2	**Check theft deterrent horn.**



CHECK:
Connect positive (+) lead from the battery to terminal 1 and negative (–) lead to body ground 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–34).**

NG → **Check and repair harness or connector.**

OK

Check and replace theft deterrent ECU.

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DI01Z–04

Horn Relay Circuit

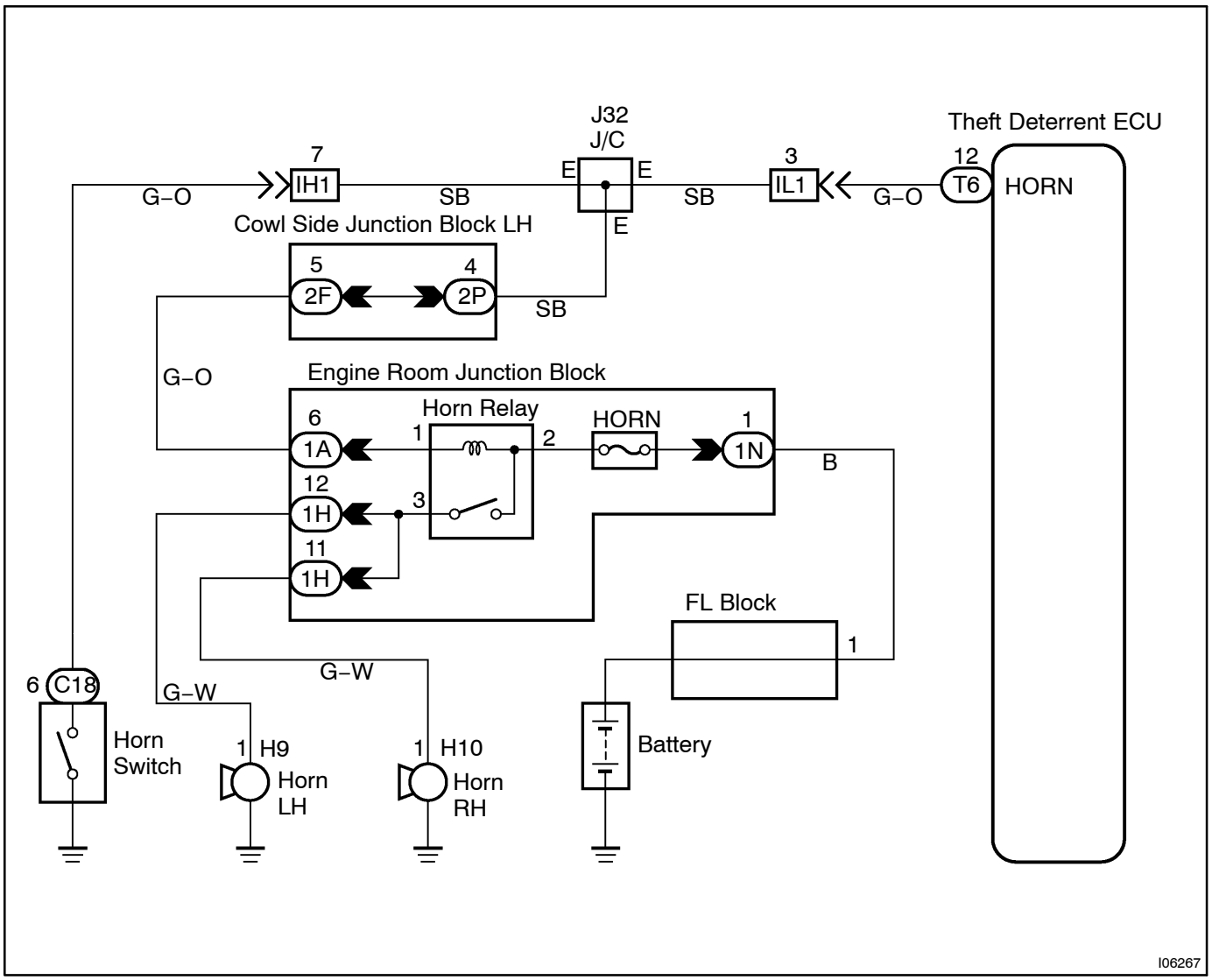
CIRCUIT DESCRIPTION

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



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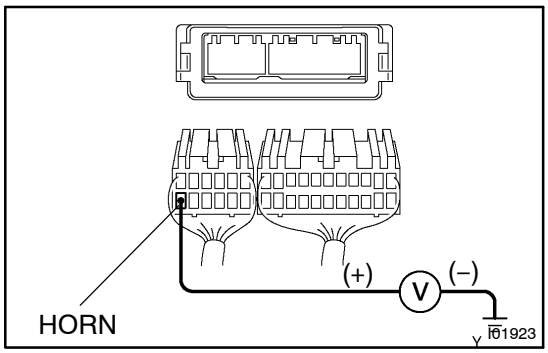
INSPECTION PROCEDURE

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.

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DI020–04

Headlight Control Relay Circuit

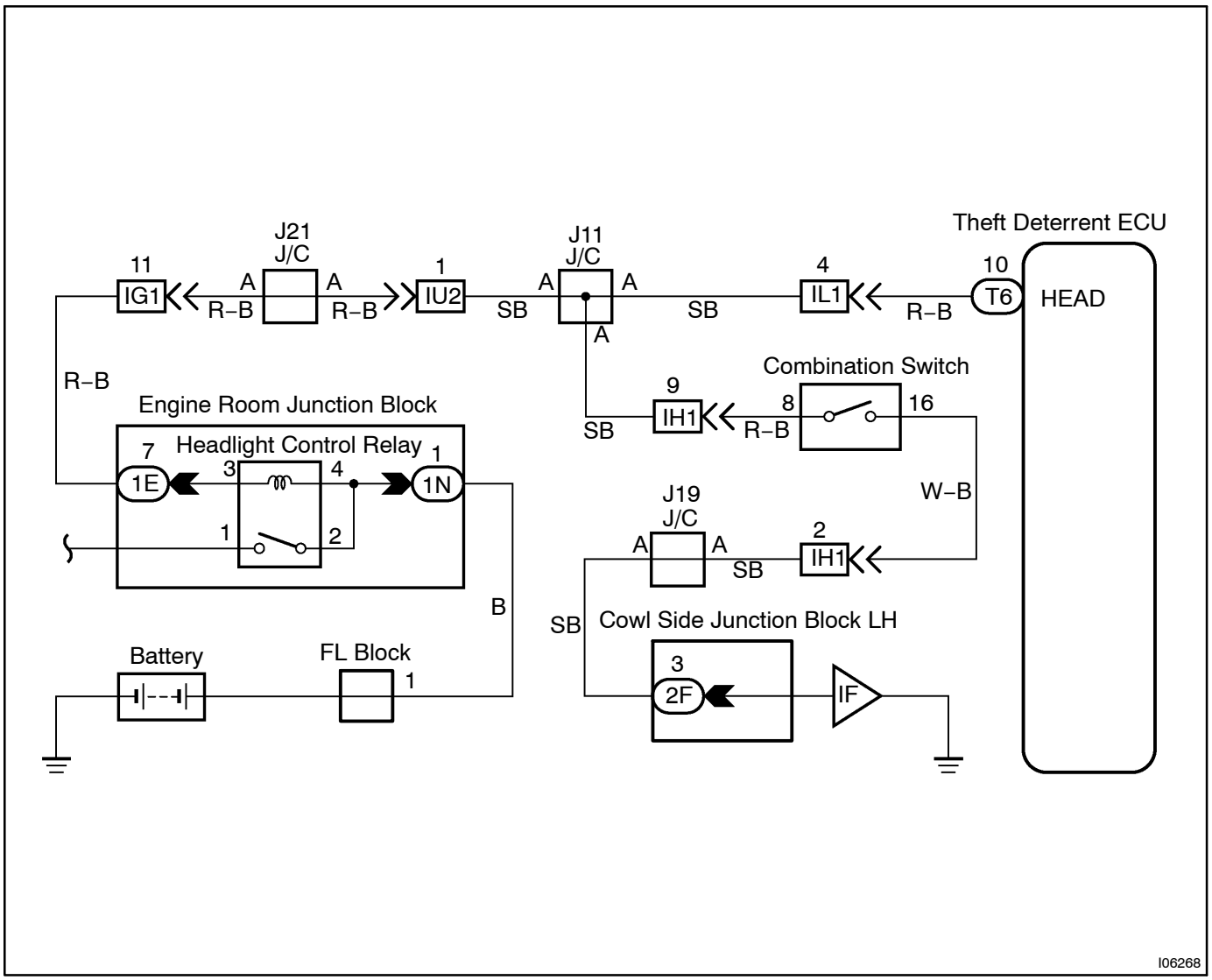
CIRCUIT DESCRIPTION

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



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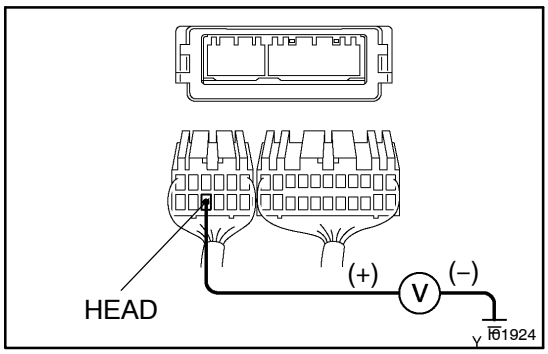
INSPECTION PROCEDURE

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–2.

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–34).**

OK

Check and replace theft deterrent ECU.

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DI021-04

Taillight Control Relay Circuit

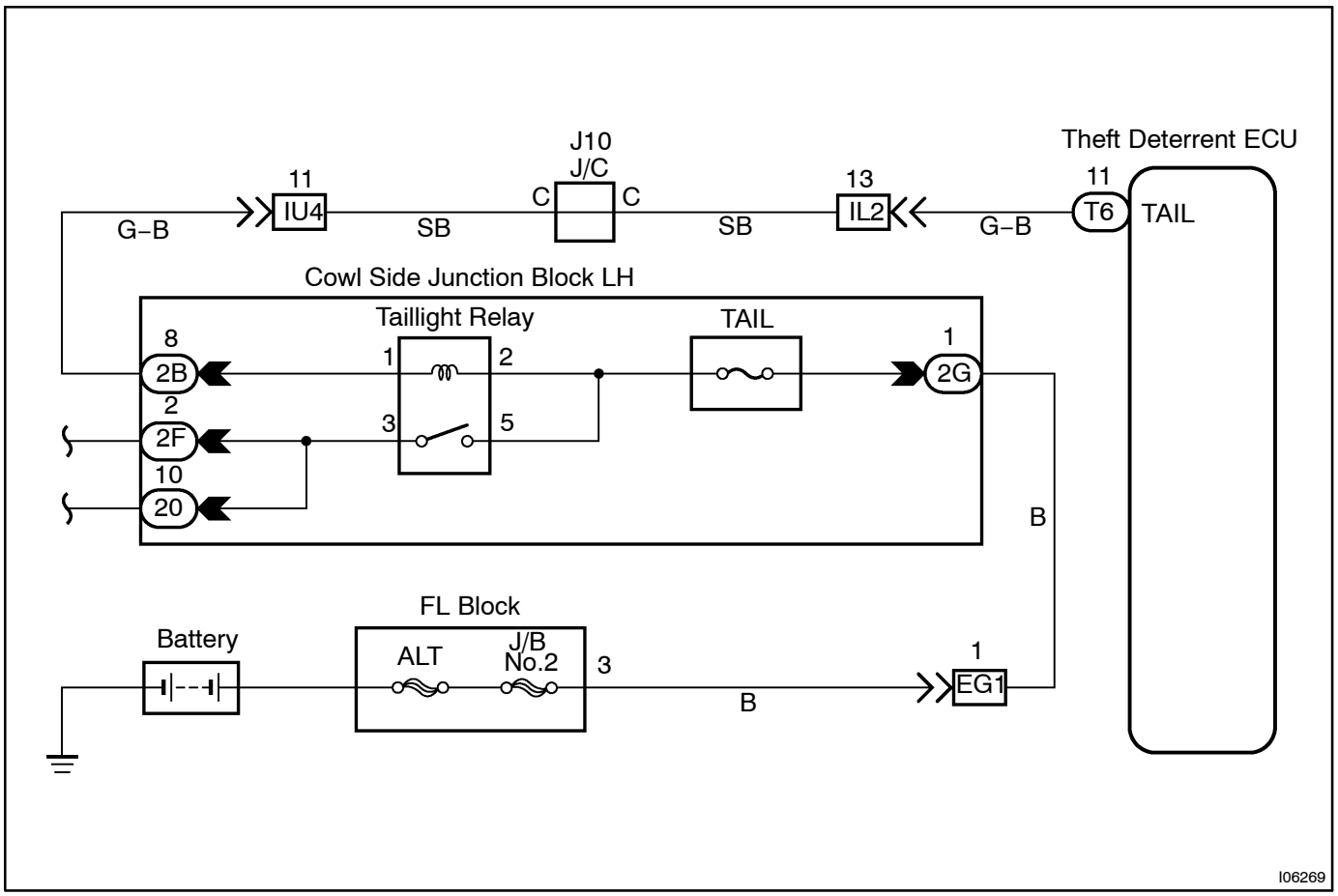
CIRCUIT DESCRIPTION

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



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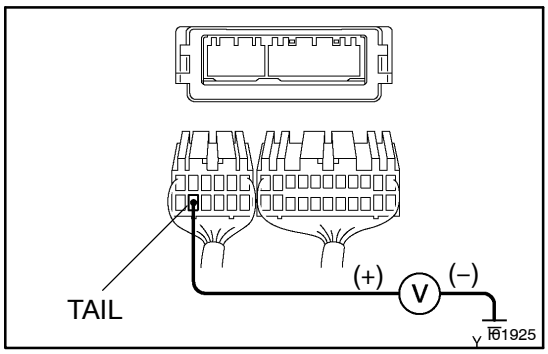
INSPECTION PROCEDURE

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–2.

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–34).**

OK

Check and replace theft deterrent ECU.

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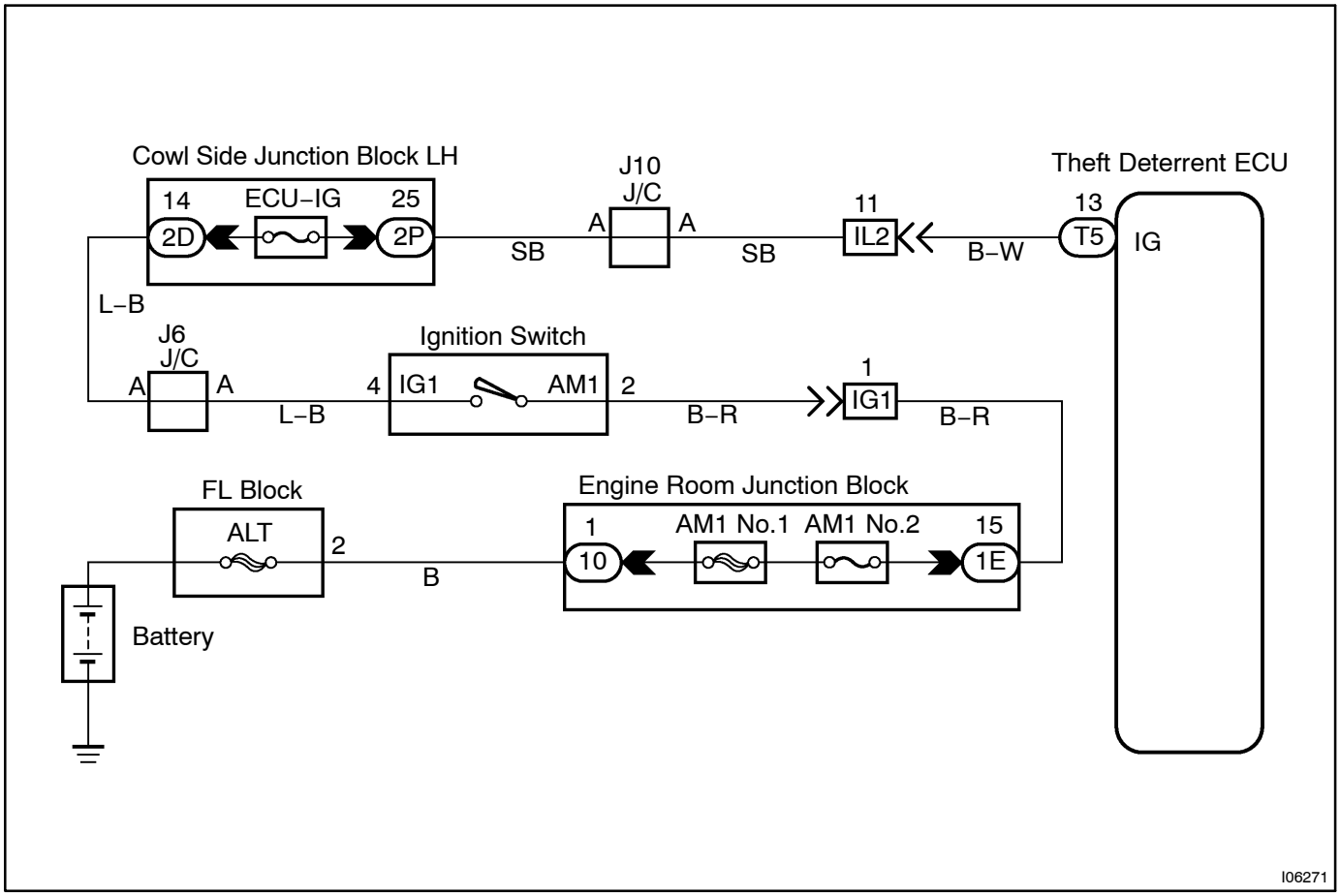
DI022-05

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



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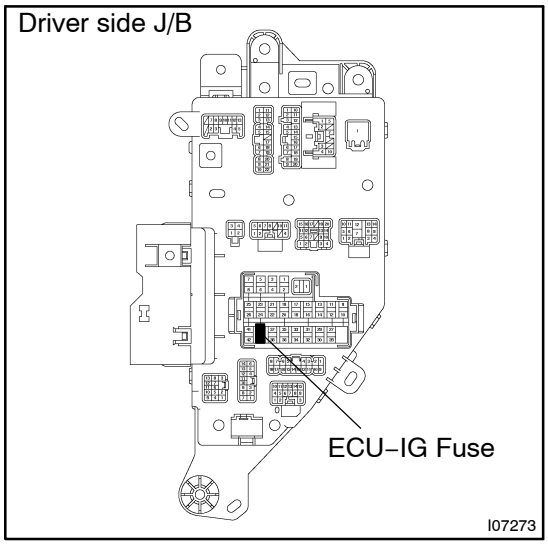
INSPECTION PROCEDURE

1	**Check ECU–IG fuses.**



PREPARATION:

(a) Remove the fuse box opening cover.

(b) Remove ECU–IG fuses from driver side junction block.

CHECK:

Check continuity of and ECU–IG fuses.

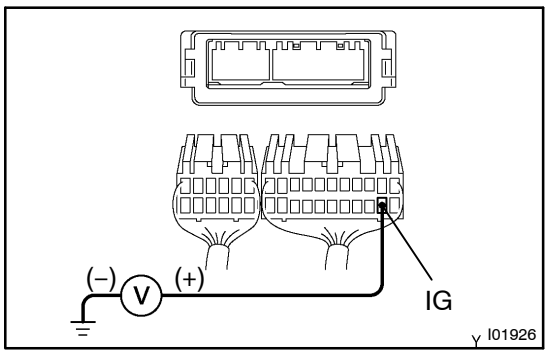
OK:

Continuity

NG → **Check for short in all the harness and components connected to the 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–34).**

OK

Check and replace theft deterrent ECU.

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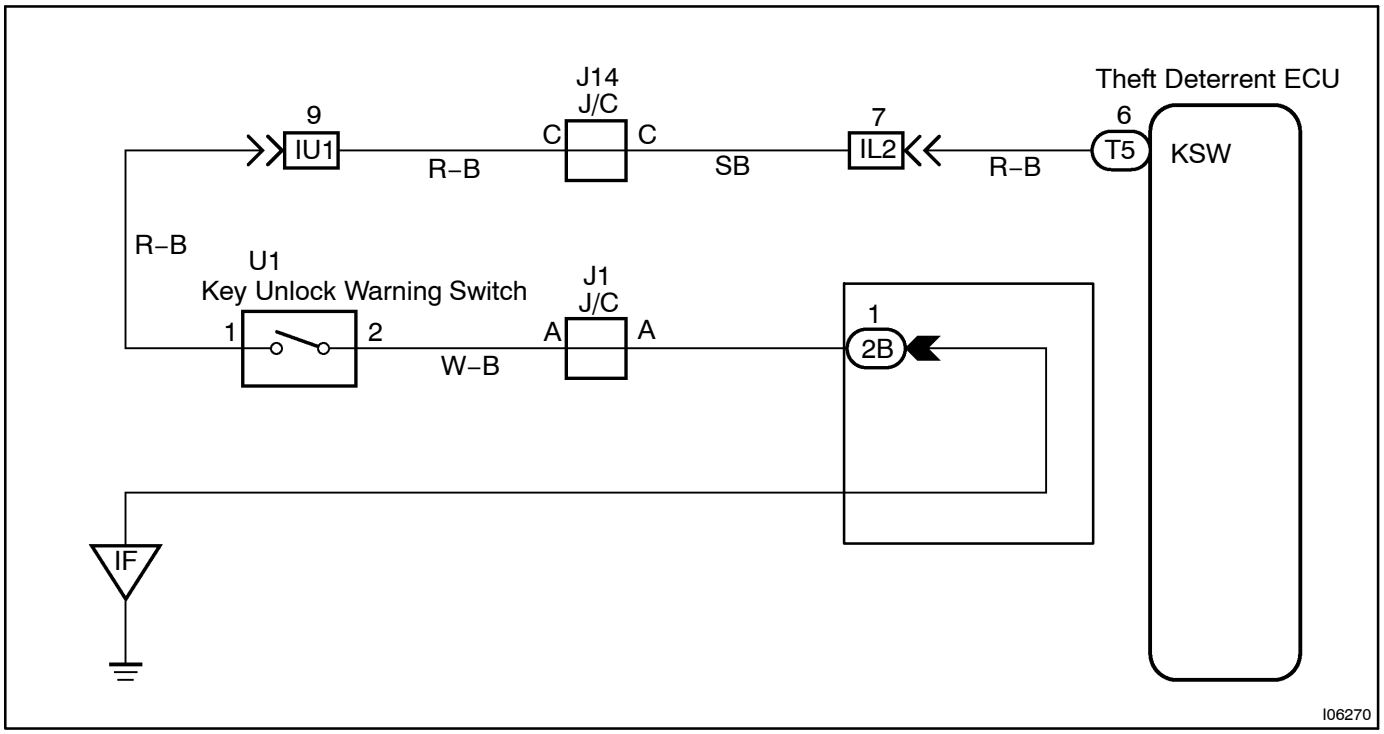
DI023–04

Key Unlock Warning Switch Circuit

CIRCUIT DESCRIPTION

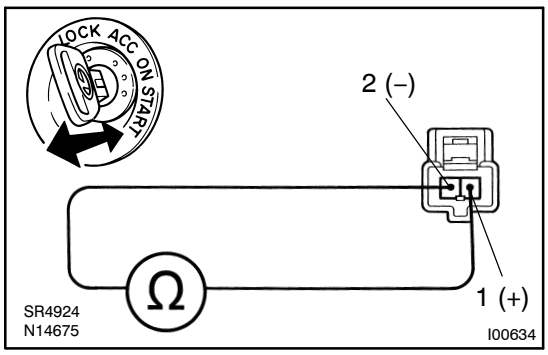
The key unlock warning switch goes ON when the ignition key is inserted in the key cylinder and goes OFF when the ignition key is removed.
The ECU operates the key confinement prevention function while the key unlock warning switch is ON.

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.**

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OK

2	**Check harness and connectors between ECU and key unlock warning switch, key unlock warning switch and body ground (See page IN–34).**

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 matrix chart (See page DI–487).

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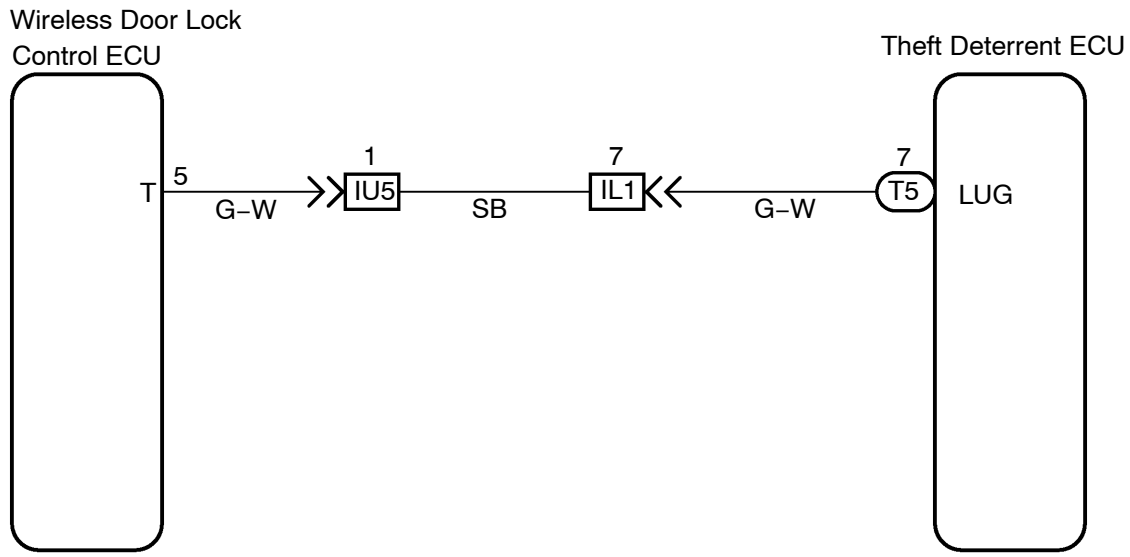
DI024–04

Back Door Key Lock and Unlock Switch Circuit

CIRCUIT DESCRIPTION

The back door key lock and unlock switch goes ON when the back door key cylinder is turned to the unlock side with the key.

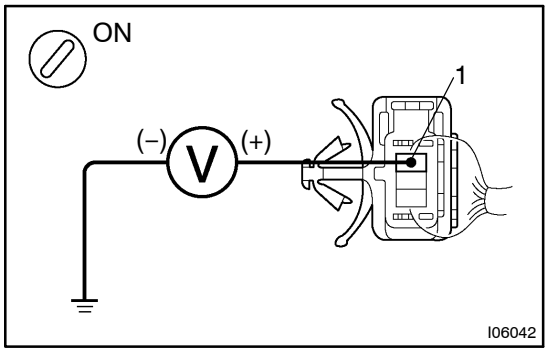
WIRING DIAGRAM



I06272

INSPECTION PROCEDURE

1	**Check voltage between terminal 1 of back door key lock and unlock switch connector and body ground.**



I06042

PREPARATION:

(a) Remove back door trim.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal 1 of back 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**

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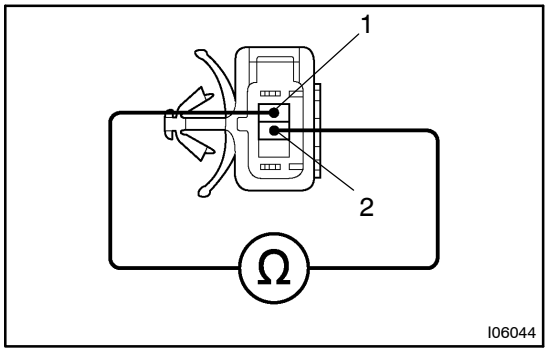
NG

2	**Check back door key lock and unlock switch.**



PREPARATION:
Disconnect back 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 back 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–34).**

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 matrix chart (See page DI–487).

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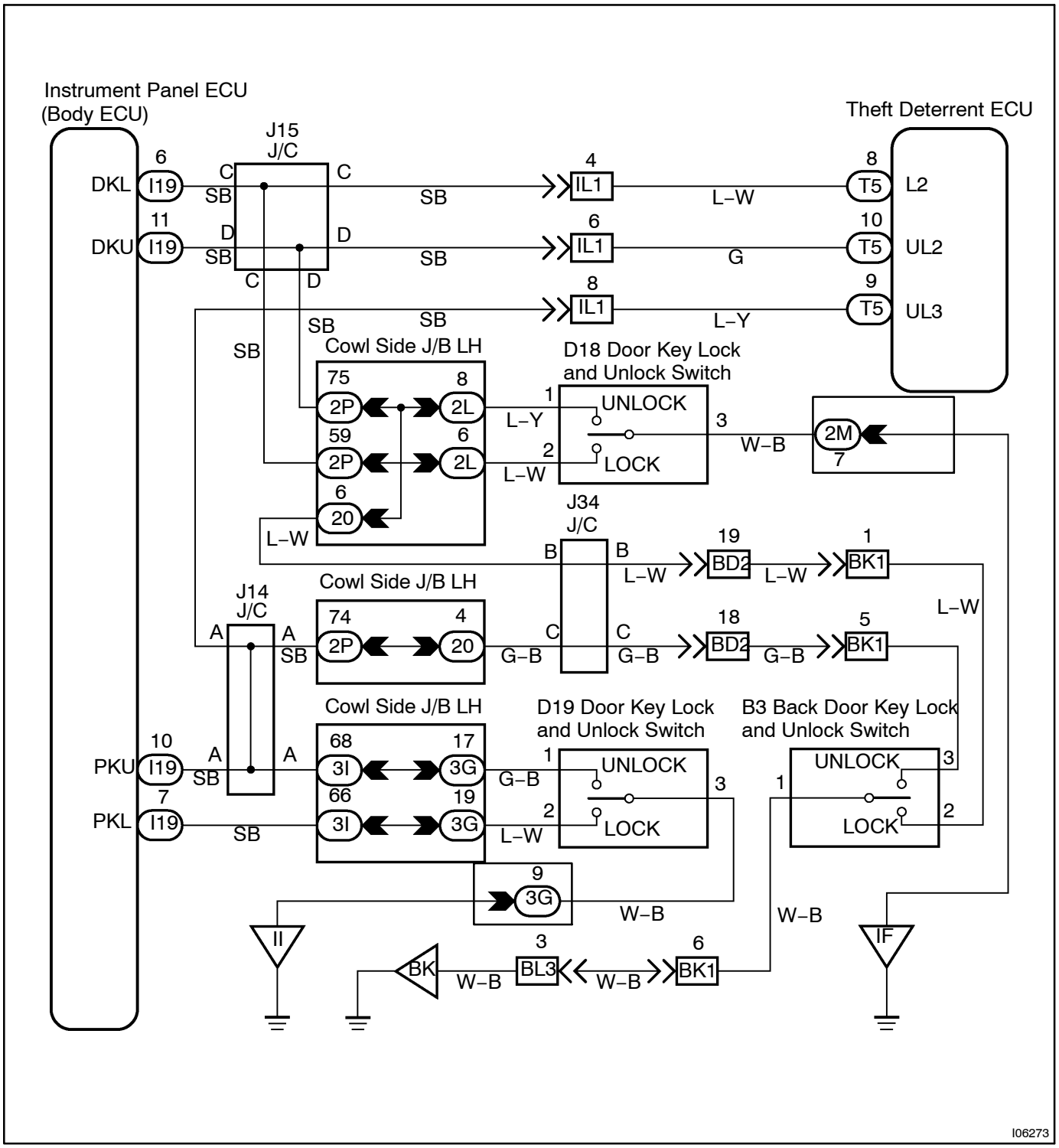
DI028–04

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



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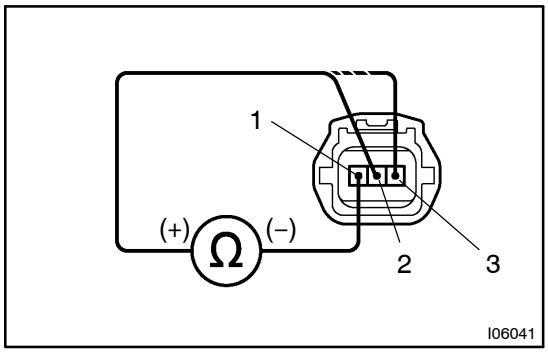
INSPECTION PROCEDURE

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–34).**

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–487).

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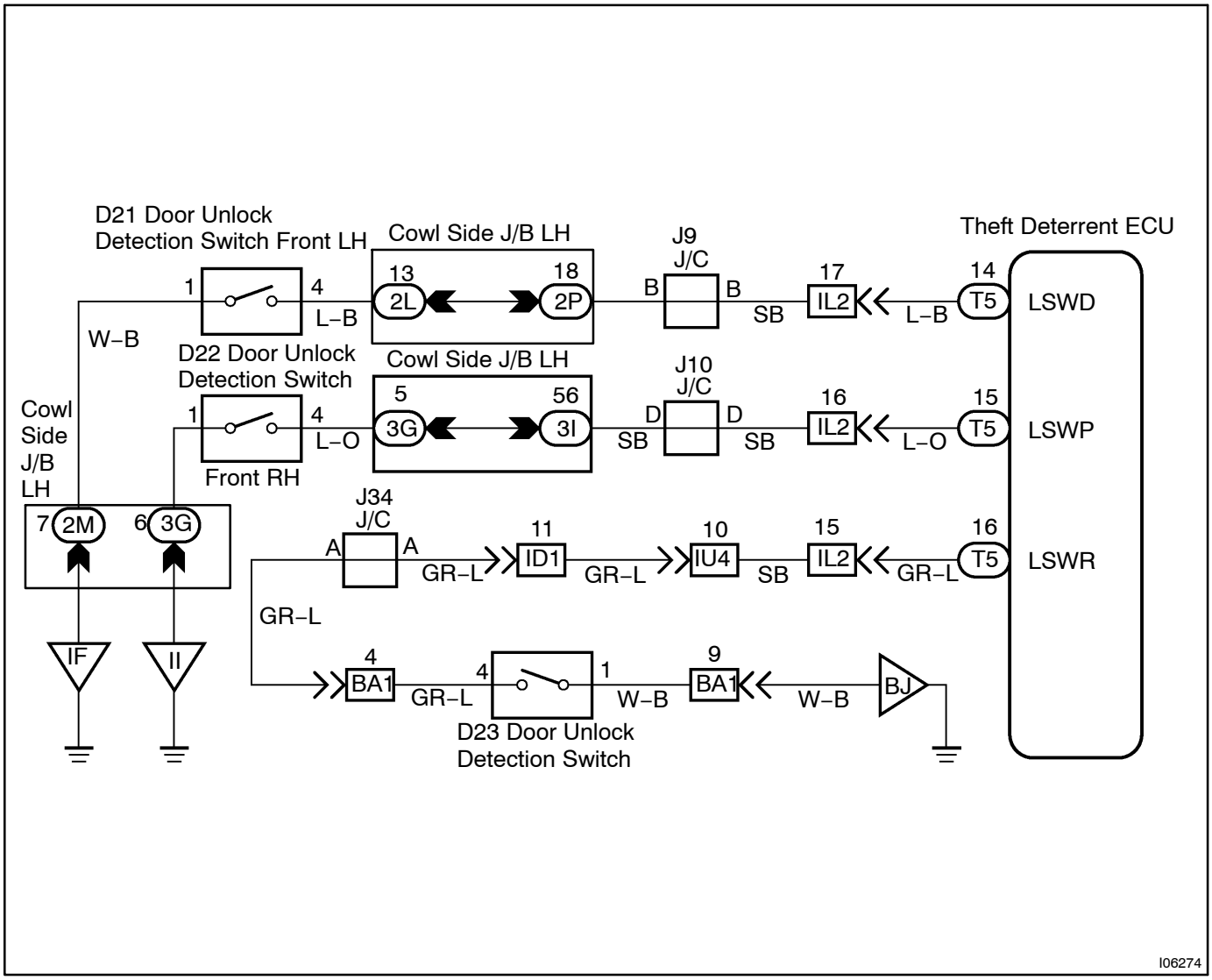
DI029–04

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



I06274

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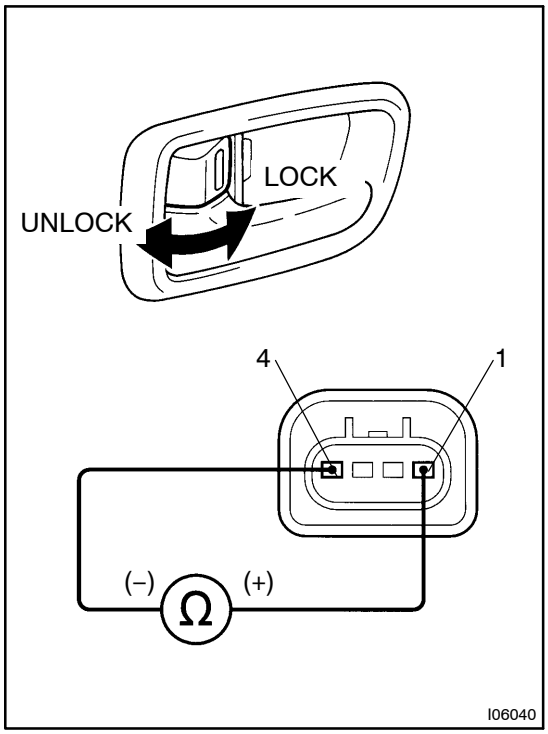
INSPECTION PROCEDURE

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–34).**

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 matrix chart (See page DI–487).

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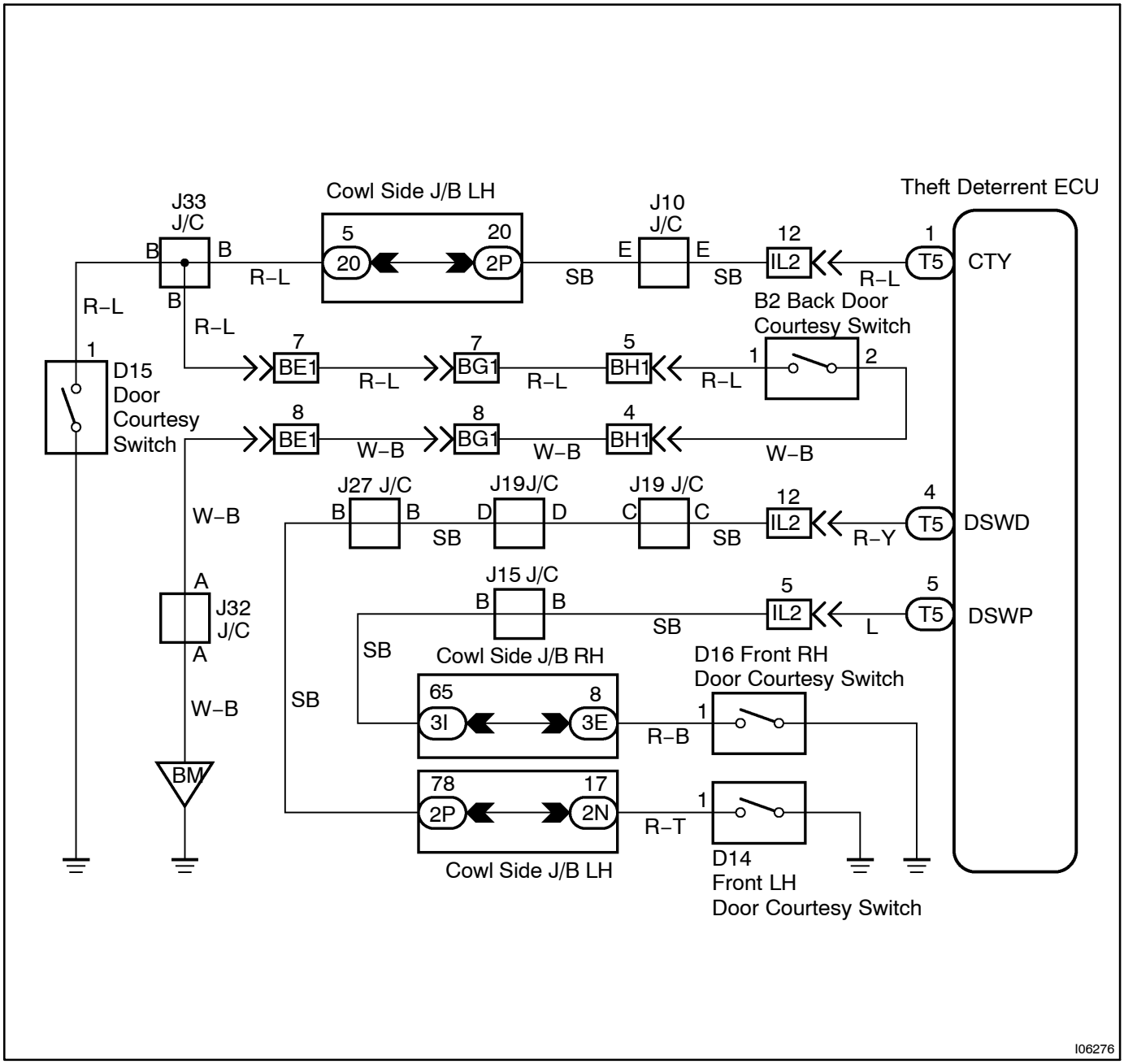
DI02A–04

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



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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–34).**

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 matrix chart (See page DI–487).

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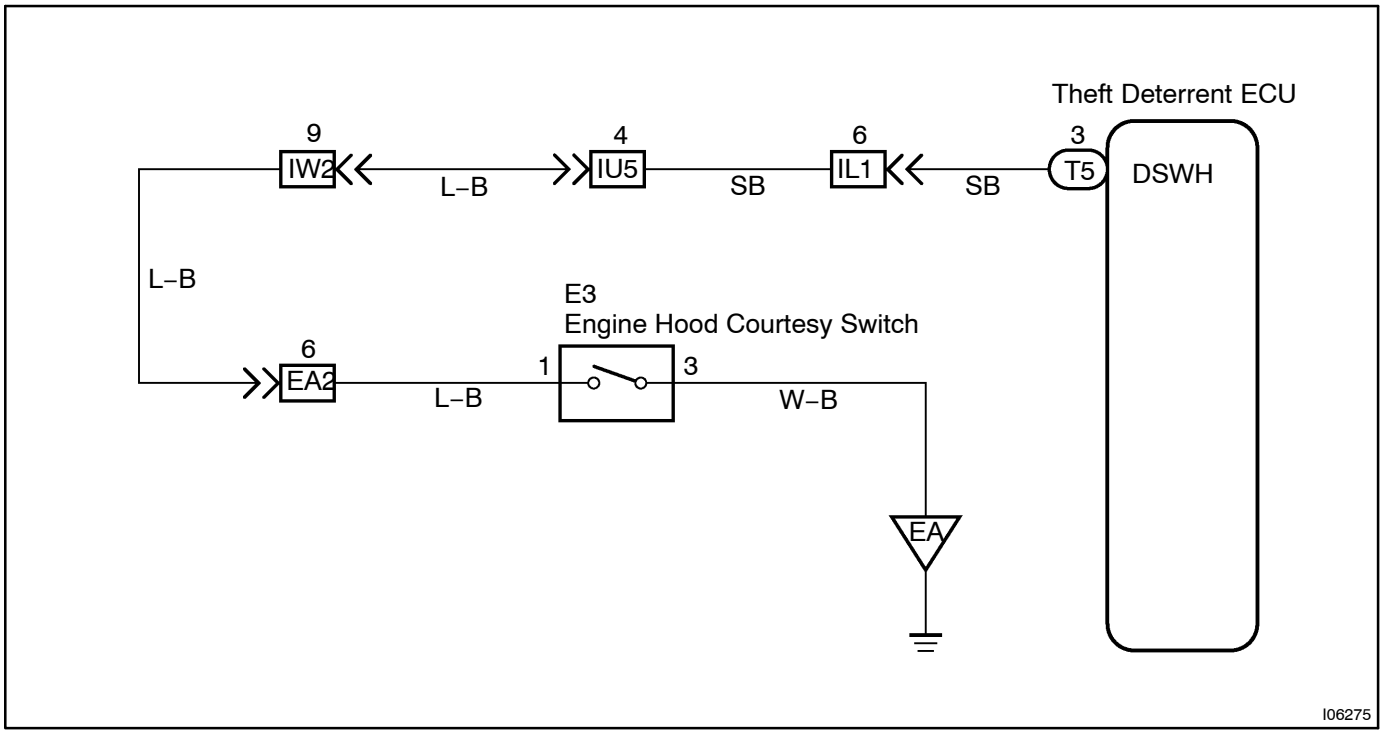
DI02B–04

Engine Hood Courtesy Switch Circuit

CIRCUIT DESCRIPTION

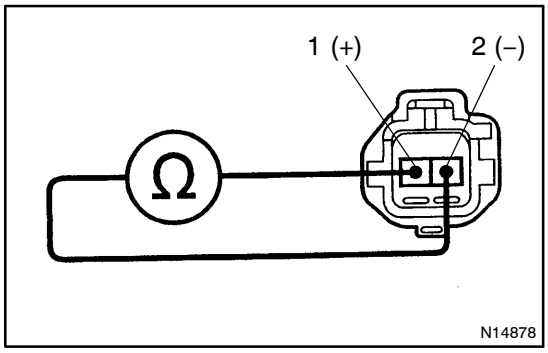
The engine hood courtesy switch is built into the engine hood lock assembly and goes ON when the engine hood is opened and goes OFF when the engine hood is closed.

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

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2	**Check harness and connector between theft deterrent ECU and switch, switch and body ground (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace theft deterrent ECU (See page IN–34).

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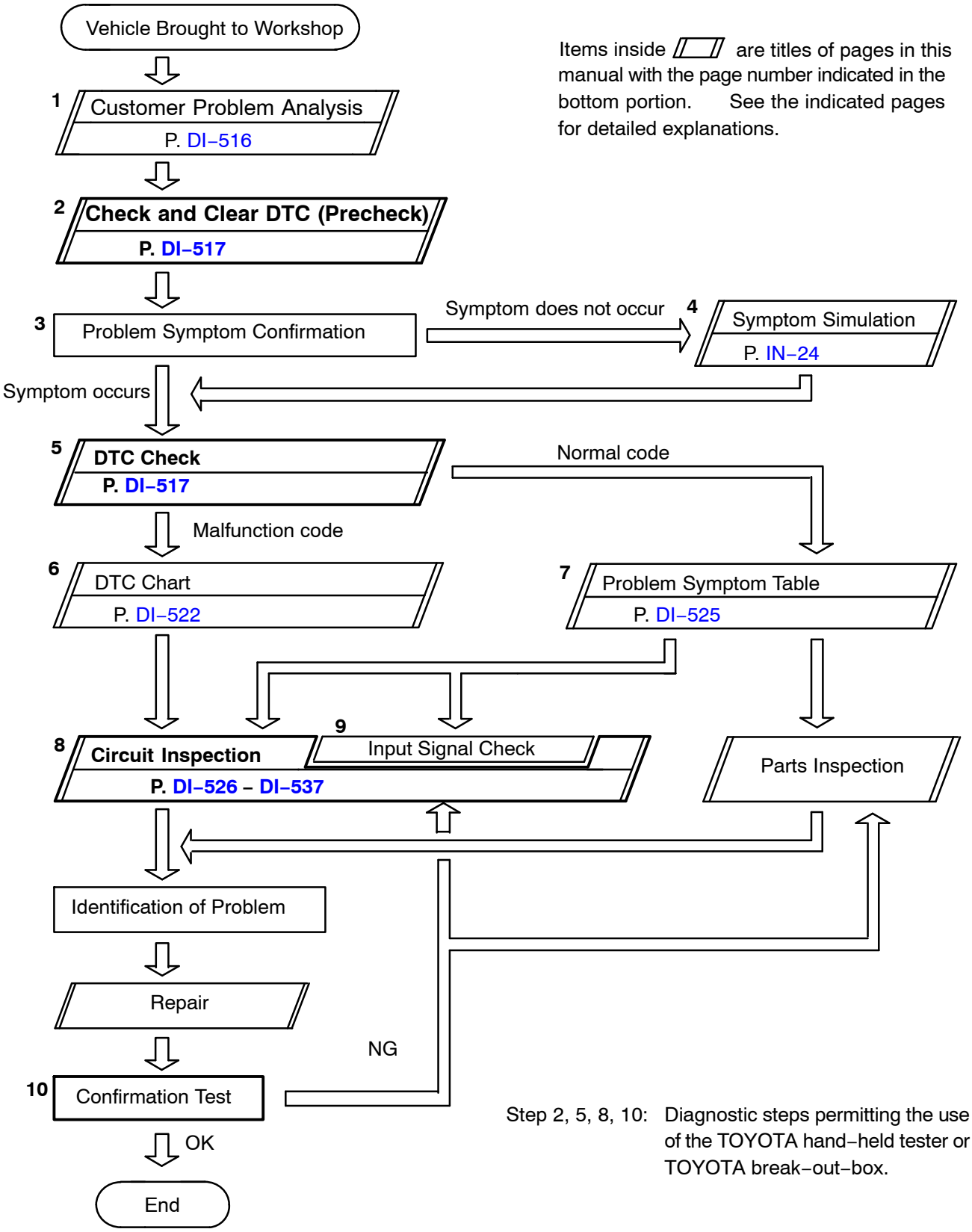
CRUISE CONTROL SYSTEM

DI26R–04

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following page.



Items inside ▱ are titles of pages in this manual with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.

Step 2, 5, 8, 10: Diagnostic steps permitting the use of the TOYOTA hand–held tester or TOYOTA break–out–box.

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DI26S–04

CUSTOMER PROBLEM ANALYSIS CHECK

CRUISE CONTROL SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date of Vehicle Brought in	/ /	**Odometer Reading**	**km** **Mile**

Condition of Problem Occurrence	**Date of Problem Occurrence**	/ /
	Frequency Problem Occurs?	☐ Continuous ☐ Intermittent (Times a day)
	Vehicle Speed when Problem Occurred	**km** **Mile**

Symptoms	☐ Auto cancel occurs	● Driving condition ☐ City driving ☐ Freeway ☐ Up hill ☐ Down hill ● After cancel occurred, did the driver activate cruise control again? ☐ Yes ☐ No
	☐ Cancel does not occur	☐ With brake ON ☐ Except D position shift ☐ When control SW turns to CANCEL position
	☐ Cruise control malfunction	☐ Slip to acceleration side ☐ Slip to deceleration side ☐ Hunting occurs ☐ O/D cut off does not occur ☐ O/D does not return
	☐ Switch malfunction	☐ SET ☐ ACCEL ☐ COAST ☐ RESUME ☐ CANCEL
	☐	☐ Remains ON ☐ Does not light up ☐ Blinks

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

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DI26T–04

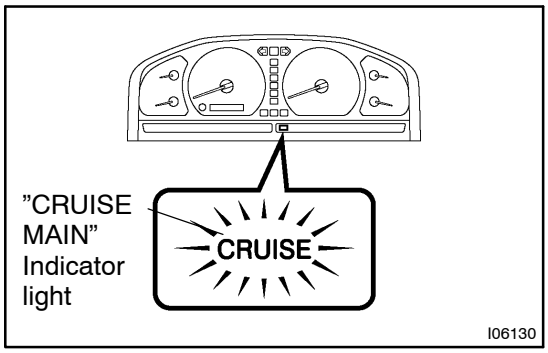
PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) Check the indicator.

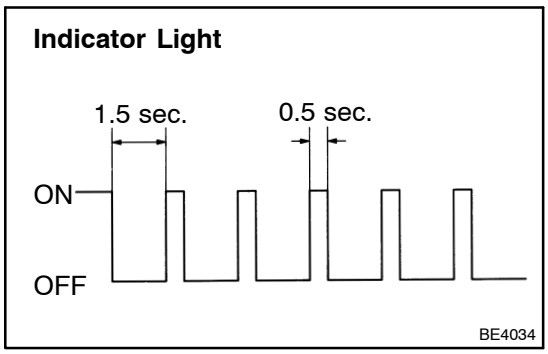
(1) Turn the ignition switch to ON.

(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:

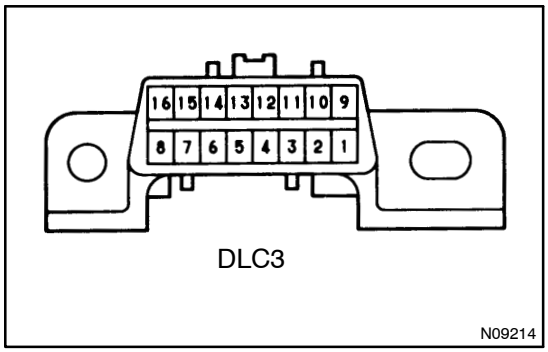
If the indicator check result is not normal, proceed to troubleshooting (See page BE–2) for the combination meter section.



(b) Check the DTC.

HINT:

If a malfunction occurs in the speed sensor 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 DLC3.

SST 09843–18020

(3) Read the DTC on the CRUISE MAIN indicator light.

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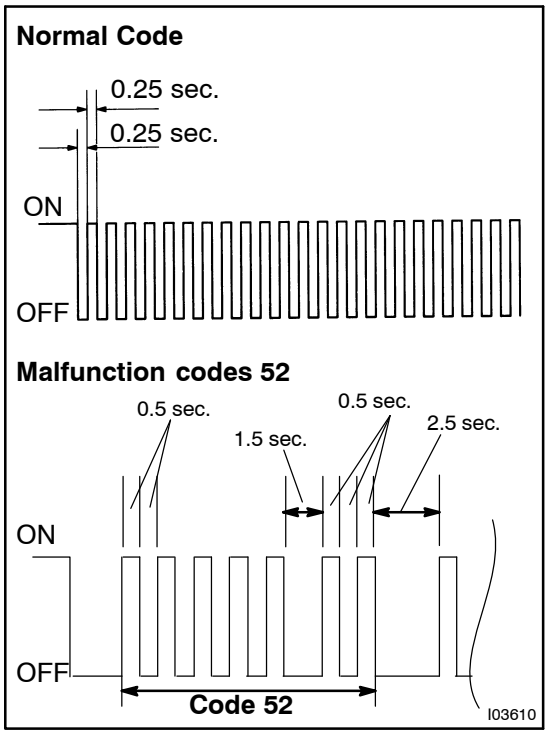
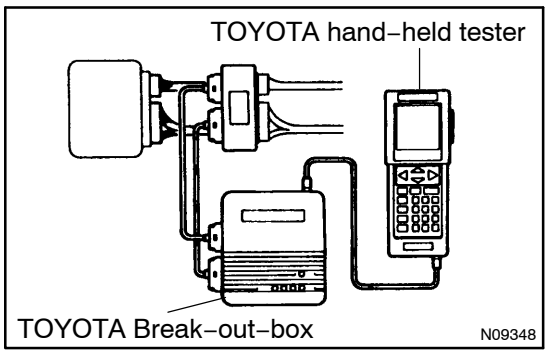
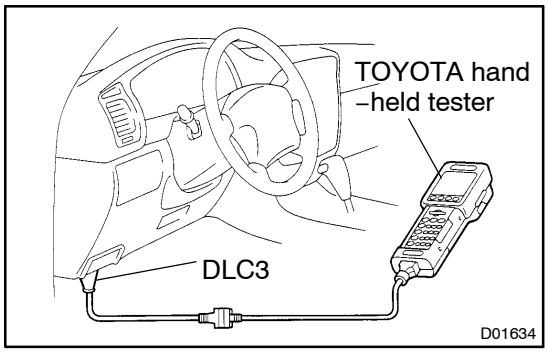


HINT:
If the DTC is not output, inspect the diagnosis circuit.
As an example, the blinking patterns for codes; normal 52 are shown in the illustration.



2. ECU TERMINAL VALUES MEASUREMENT BY USING TOYOTA BREAK–OUT–BOX AND TOYOTA HAND–HELD TESTER

(a) Hook up the TOYOTA break–out–box and TOYOTA hand–held tester to the vehicle.
(b) Read the ECU input/output values by following the prompts on the tester screen.
(c) Please refer to the TOYOTA hand–held tester has a ”Snapshot” function. This records the measured data and is effective in the diagnosis of intermittent problems.



3. USING TOYOTA HAND–HELD TESTER

(a) Hook up the TOYOTA hand–held tester to the DLC3.
(b) Monitor the ECU data by following the prompts on the tester screen.

HINT:
TOYOTA hand–held tester has a ”Snapshot” function which records the monitored data.
Please refer to the TOYOTA hand–held tester operator’s manual for further details.

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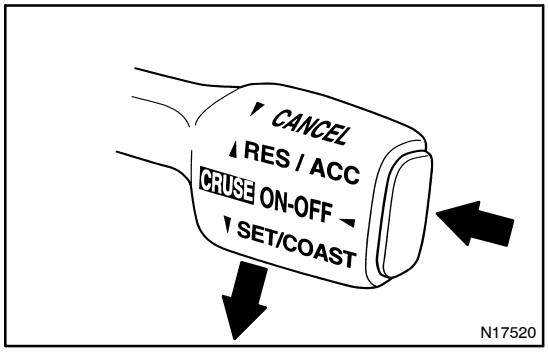
4. DTC CLEARANCE

(a) The following actions will erase the DTCs and freeze frame data.
  (1) Operating the OBD II scan tool (complying with SAEJ1978) or TOYOTA 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.

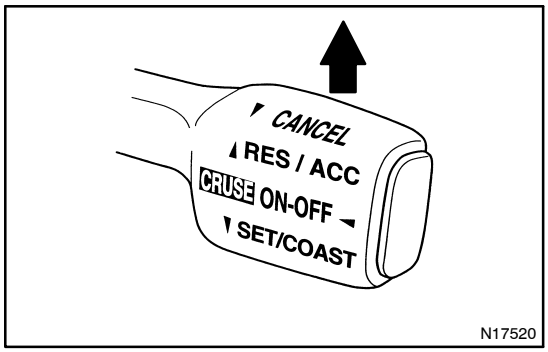
(b) After completing repairs, the DTC retained in memory can be cleared by removing the ECU–B fuse for 10 seconds or more with the ignition switch off.

(c) Check that the normal code is displayed after connecting the fuse.



5. PROBLEM SYMPTOM CONFIRMATION (ROAD TEST)

(a) Inspect the SET switch.
  (1) Push the main switch ON.
  (2) Drive at a desired speed (40 km/h (25 mph) or higher).
  (3) Press the control switch to the SET/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 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).

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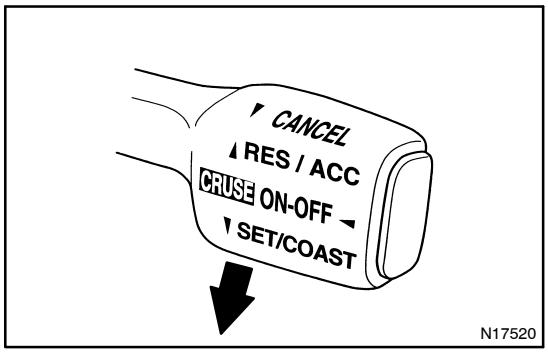
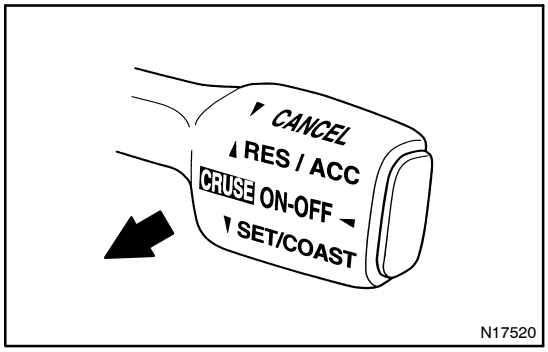


(c) Inspect the COAST switch.
(1) Push the main switch ON.
(2) Drive at a desired speed (40 km/h (25 mph) or higher).
(3) Check that the vehicle speed decreases while the control switch is turned to SET/COAST, and the vehicle cruises at the set speed when the switch is released.
(4) Momentarily press 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 (A/T)
- Push the main switch OFF
- Pull the cruise control switch to CANCEL

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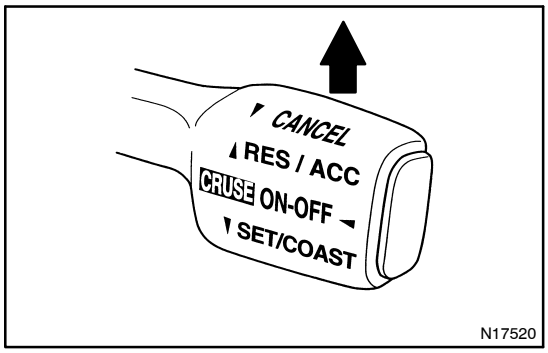
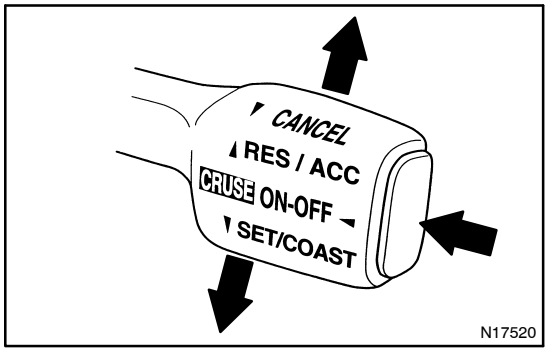


(e) Inspect the RESUME switch.
  (1) Push the main switch ON.
  (2) Drive at a desired speed (40 km/h (25 mph) or higher).
  (3) When operating one of the followings, check that the cruise control system is cancelled and that the normal driving mode is reset.
    • Depress the brake pedal
    • Shift to except D position (A/T)
    • 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.



6. INPUT SIGNAL CHECK
(Using TOYOTA hand–held tester)

(a) Connect the TOYOTA hand–held tester to DLC3
(b) Check the control switch (MAIN, CANCEL, SET/COAST, RES/ACC)

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DI26U–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 and proceed to the appropriate page.

DTC No. (See Page)	Circuit Inspection	Trouble Area
P0500/ 21,23 (DI–526)	Vehicle Speed Signal Abnormal	• Harness or connector between ECM and vehicle speed sensor • Vehicle speed sensor • ECM
P1520/ 52 (DI–527)	Short in Stop Light Switch Circuit	• Stop light switch • Harness or connector between ECM and stop light switch circuit • ECM
P1565/ 32 (DI–531)	Short in Cruise Control Switch Circuit	• Cruise control switch • Harness or connector between ECM and cruise control switch circuit • ECM
P1566/ 54 (DI–534)	Input Signal Circuit	• ECM

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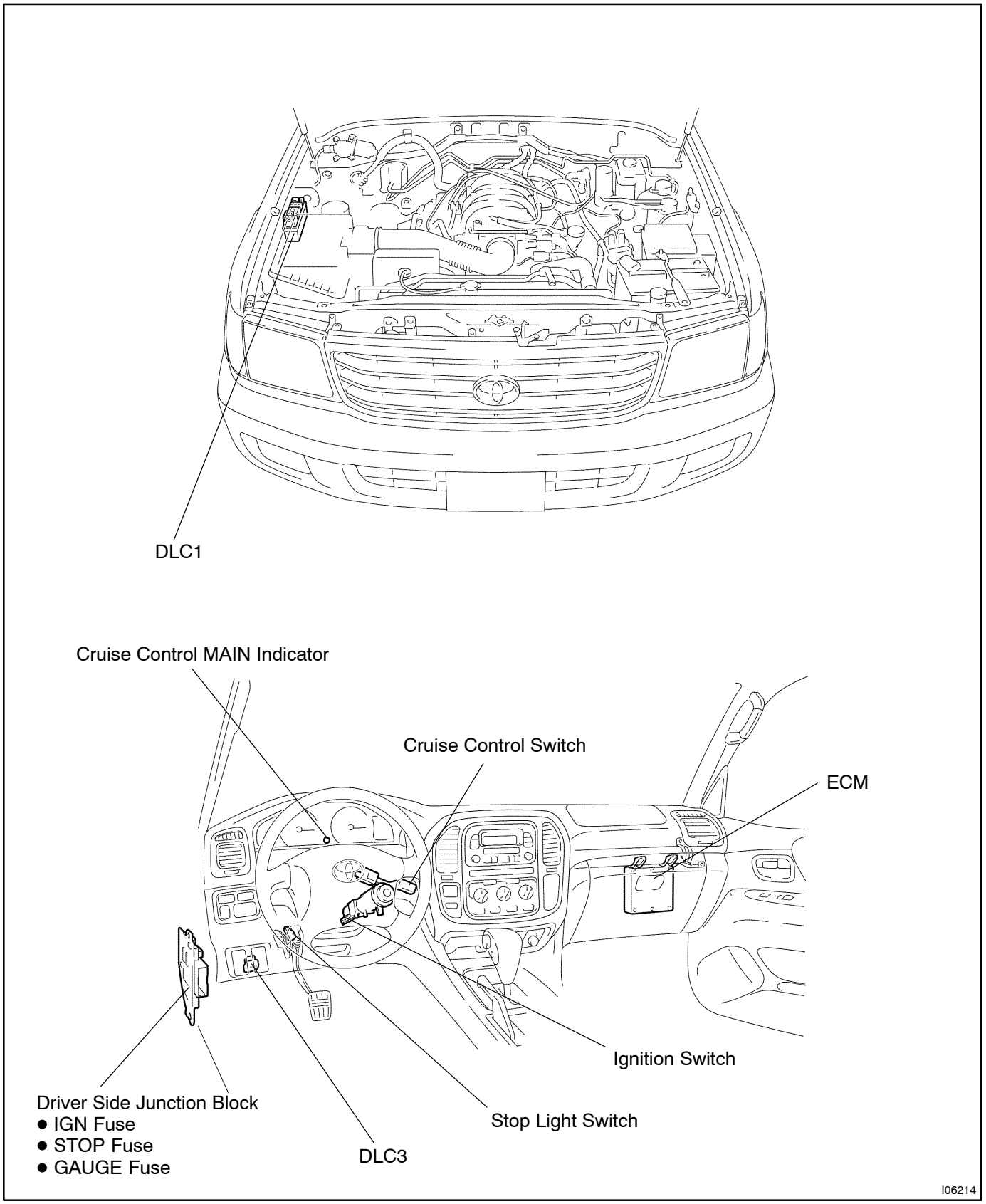
DI3CG–01

PARTS LOCATION



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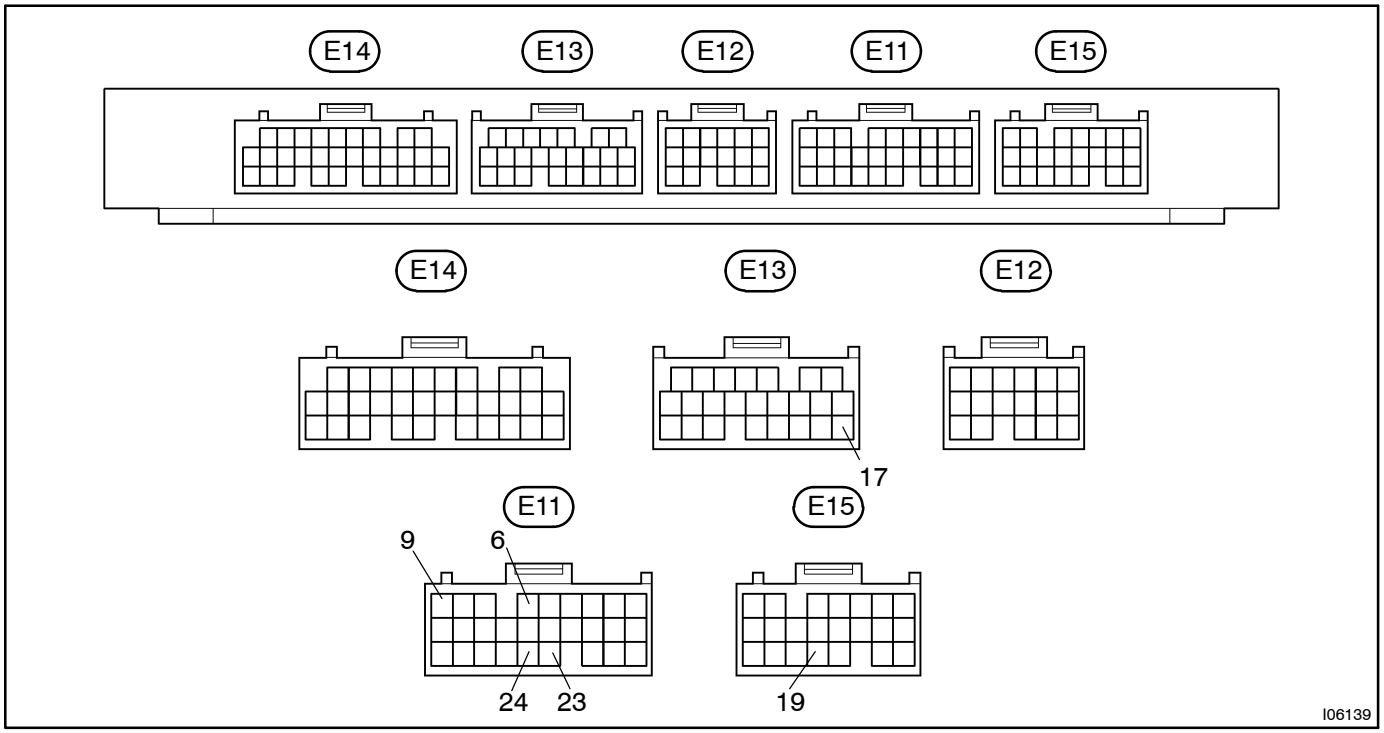
DI3CH–01

TERMINALS OF ECM



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
STP ↔ E1 (E11–6 ↔ E13–17)	G–W ↔ BR	Depress brake pedal	10 – 16 V
		Release brake pedal	Below 1 V
CCS ↔ E1 (E11–23 ↔ E13–17)	L ↔ BR	Ignition switch ON	10 – 16 V
		Ignition switch ON CANCEL switch hold ON	3.6 – 7.2 V
		Ignition switch ON SET/COAST switch hold ON	2.1 – 4.9 V
		Ignition switch ON RES/ACC switch hold ON	0.7 – 2.6 V
CMS ↔ E1 (E11–24 ↔ E13–17)	Y–R ↔ BR	Ignition switch ON Main switch OFF	Below 1 V
		Ignition switch ON Main switch ON	10 – 14 V
PI ↔ E1 (E11–9 ↔ E13–17)	Y–B ↔ BR	Ignition switch ON Cruise control main switch ON	Below 1 V
		Ignition switch ON Cruise control main switch OFF	10 – 14 V
ST1 ↔ E1 (E15–19 ↔ E13–17)	R–G ↔ BR	Depress brake pedal	Below 1 V
		Release brake pedal	10 – 14 V

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DI26X–03

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
SET not occurring or CANCEL occurring. (DTC is Normal)	1. Input Signal Circuit 2. Vehicle Speed Sensor Circuit 3. Stop Light Switch Circuit 4. Park/Neutral Position Switch Circuit 5. ECM	DI–534 DI–526 DI–527 DI–200 IN–34
SET not occurring or CANCEL occurring. (DTC is not output)	1. ECM	IN–34
Actual vehicle speed deviates above or below the set speed.	1. Input Signal Circuit 2. ECM	DI–534 IN–34
Gear shifting occurs frequently between 3rd and O/D when driving on uphill road. (Hurting)	1. ECM	IN–34
Cruise control not cancelled, even when brake pedal is depressed.	1. Stop Light Switch Circuit 2. ECM	DI–527 IN–34
Cruise control not cancelled, even when transmission is shifted to ”N” position.	1. Park/Neutral Position Switch Circuit 2. ECM	DI–200 IN–34
Cruise control not cancelled, even when clutch pedal is depressed.	1. ECM	IN–34
Control switch does not operate. (SET/COAST, ACC/RES, CANCEL not possible)	1. Cruise Control Switch Circuit 2. ECM	DI–531 IN–34
SET possible at 40 km/h (25 mph) or less, or CANCEL does not operate at 40 km/h (25 mph) or less.	1. Input Signal Circuit 2. ECM	DI–534 IN–34
Poor response is ACCEL and RESUME modes.	1. ECM	IN–34
O/D does not resume, even though the road is not uphill.	1. ECM	IN–34
DTC memory is erased.	1. ECM	IN–34
DTC is not output, or is output when should not be.	1. Diagnosis Circuit 2. ECM	IN–34
Cruise MAIN indicator light remains ON or falls to light up.	1. Input Signal Circuit 2. ECM	DI–534 IN–34

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DI3CI–01

CIRCUIT INSPECTION

DTC	P0500/21,23	Vehicle Speed Sensor Circuit

CIRCUIT DESCRIPTION

See page DI–100.

DTC No.	Detection Item	Trouble Area
P0500/21,23	Speed signal is not input to the ECM while cruise control is set.	• Combination meter • Harness or connector between ECM and vehicle speed sensor • Vehicle speed sensor • ECM

WIRING DIAGRAM

See page DI–100.

INSPECTION PROCEDURE

See page DI–100.

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DI3CJ–01

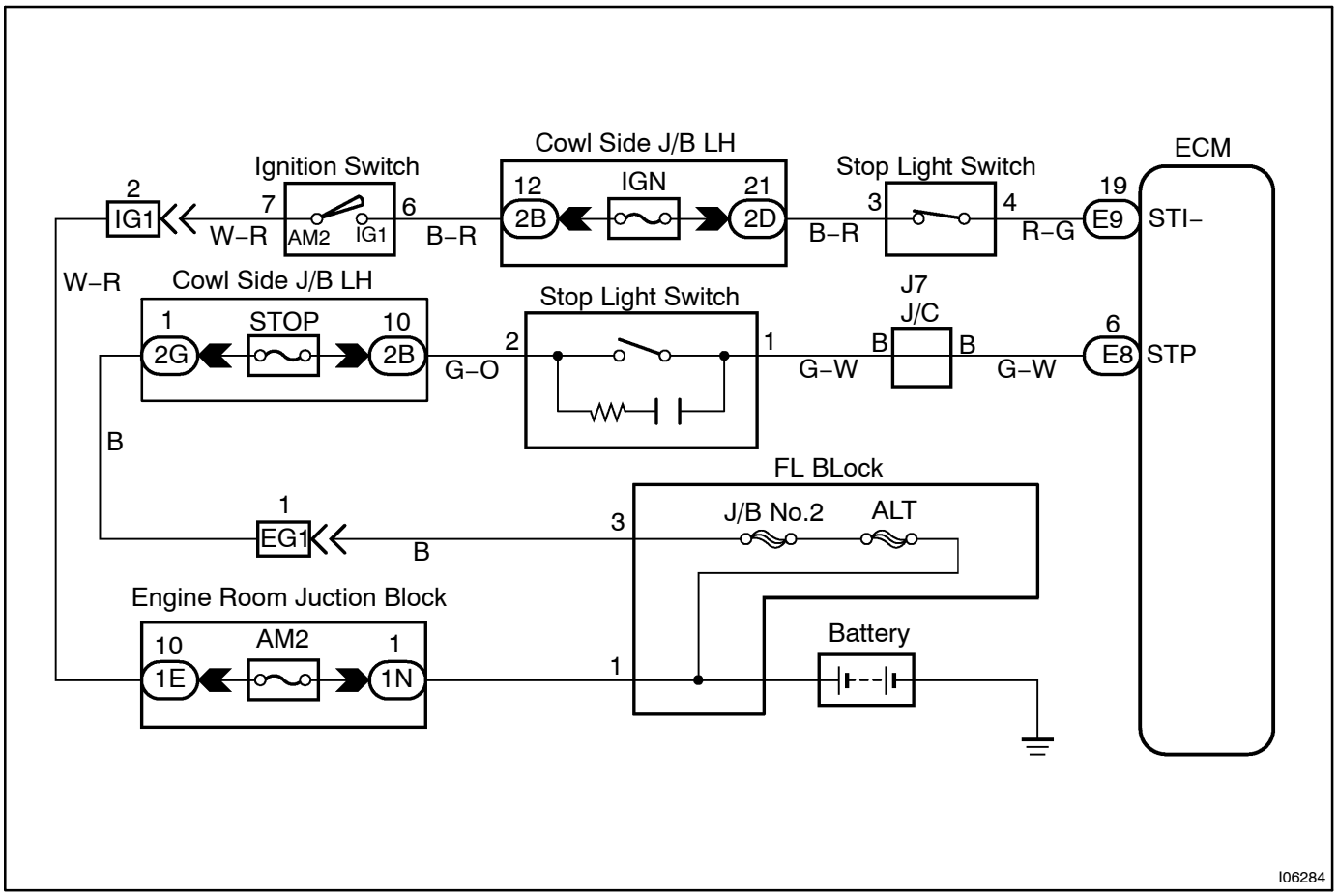
DTC	P1520/52	Stop light switch circuit

CIRCUIT DESCRIPTION

When the brake pedal is depressed, the stop light switch sends a signal to the ECM. When the ECM receives this signal, it cancels the cruise control.
A fail–safe function is provided so that the cancel functions normally, even if there is a malfunction in the stop light signal circuit.
The cancel condition is that battery positive voltage is supplied to terminal STP.
When the brake is on, battery positive voltage is normally applied through the STOP fuse and stop light switch to terminal STP of the ECM, and the ECM turns the cruise control OFF.
If the harness connected to terminal STP has an open circuit, terminal STP will have battery positive voltage and the cruise control will be turned OFF.

DTC No.	Detection Item	Trouble Area
52	Stop light switch circuit.	• Stop light switch • Harness or connector between ECM and stop light switch circuit • ECM

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

In case of using the LEXUS hand–held tester, start the inspection from step 1 and in case of not using the LEXUS hand–held tester, start from step 2.

1	**Check stop light switch using LEXUS hand–held tester.**

PREPARATION:

Connect the LEXUS hand–held tester to the DLC3.

CHECK:

Check the stop light switch using DATALIST.

OK:

Condition	Stop light switch 1 (Sub CPU)	Stop light switch 2 (Sub CPU)	Stop light switch 2 (Main CPU)
Depressed	ON	ON	ON
Released	OFF	OFF	OFF

HINT:

- Stop light SW 1 has a function to disconnect the connection (OFF) when depressing the pedal, however, ECM controls by the logic rivers, so with the LEXUS hand–held tester, it displays ON.
- Stop light SW 1 indicates the input of ST1–terminal and Stop light SW 2 indicates the input of STP terminal.

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–525).**

NG

2	**Check operation of stop light.**

CHECK:

Check that stop light comes on when brake pedal is depressed, and turns off when brake pedal is released.

NG → **Check stop light system (See page BE–44).**

OK

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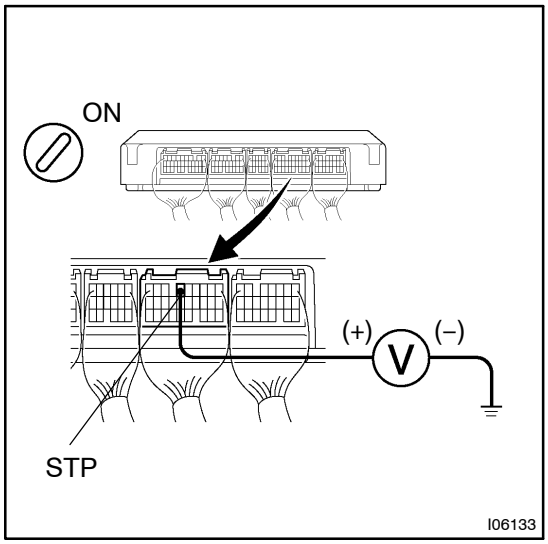
3	Check voltage between terminal STP of ECM connector and body ground.



PREPARATION:

(a) Remove the ECM with connectors still connected.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal STP of ECM connector and body ground, when the brake pedal is depressed and released.

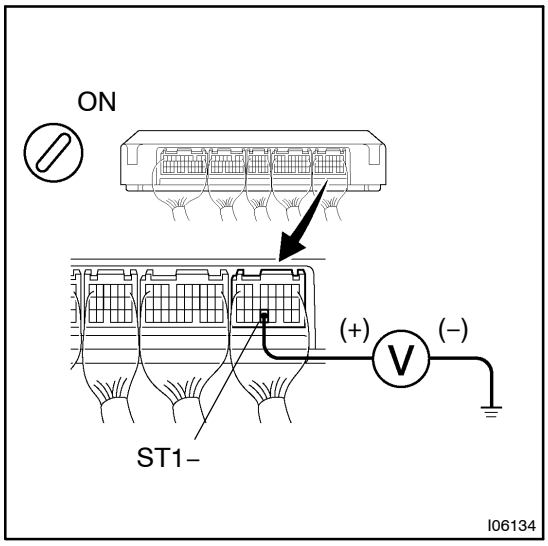
OK:

Depressed	10 – 14 V
Released	Below 1 V

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–525).**

NG

4	Check voltage between terminal ST1– of ECM connector and body ground.



PREPARATION:

(a) Remove the ECM with connectors still connected.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal ST1– of ECM connector and body ground, when the brake pedal is depressed and released.

OK:

Released	Below 1 V
Depressed	10 – 14 V

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OK → Proceed to next circuit inspection shown in problem symptoms table (See page DI–525).

NG

5	Check wire harness and connector between terminal STP of ECM and stop light switch, and terminal ST1– of ECM and stop light switch (See page IN–34).

NG → Repair or replace harness or connector.

OK

Check and replace ECM (See page IN–34).

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DI3CK–01

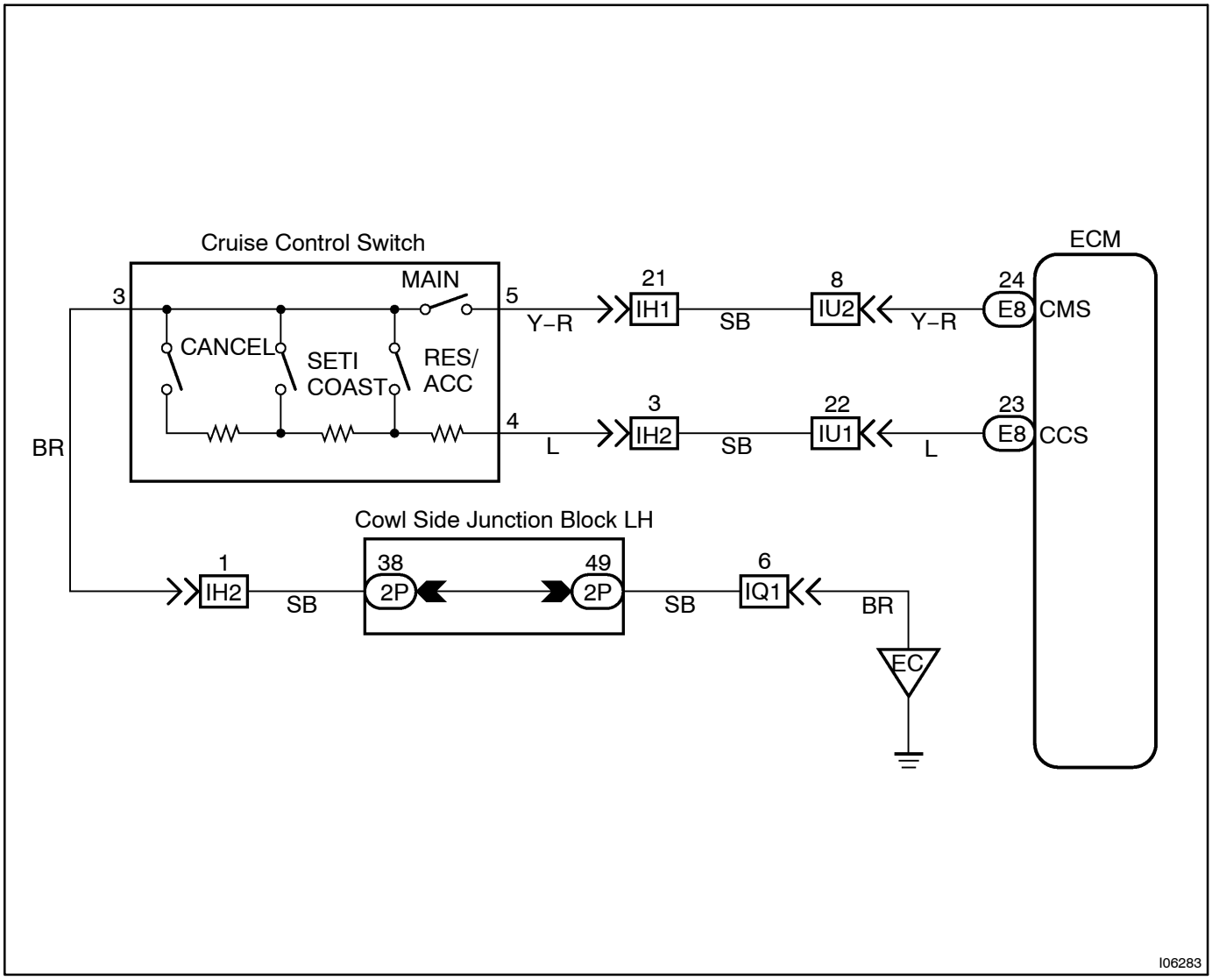
DTC	P1565/32	Control Switch Circuit (Cruise Control Switch)

CIRCUIT DESCRIPTION

This circuit carries the SET/COAST, RESUME/ACCEL and CANCEL signals (each voltage) to the ECM.

DTC No.	Detection Item	Trouble Area
P1565/32	Short in control switch circuit.	• Cruise control switch • Harness or connector between ECM and cruise control switch, cruise control switch and body ground • ECM

WIRING DIAGRAM



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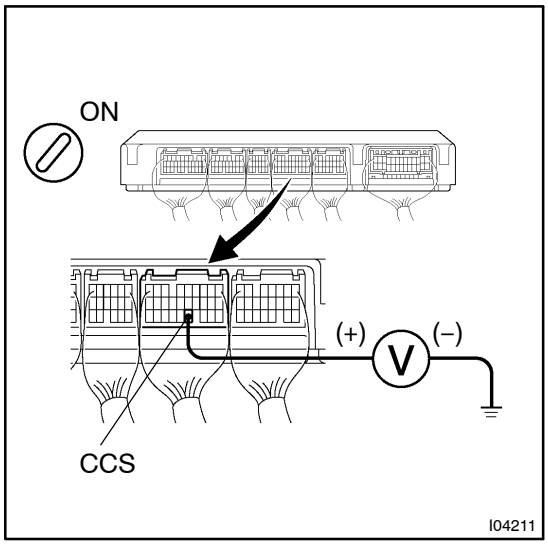
INSPECTION PROCEDURE

1	Check voltage between terminals CCS of ECM connector and body ground.



PREPARATION:

(a) Remove the ECM with connector still connected.

(b) Turn ignition switch ON.

CHECK:

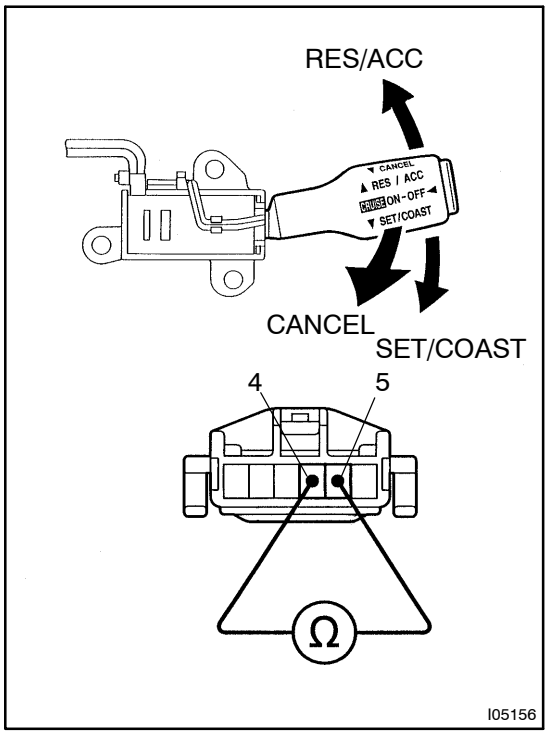
Measure voltage between terminals CCS of ECM connector and body ground, when each of the SET/COAST, RESUME/ACCEL and CANCEL is turned ON.

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 in problem symptoms table (See page DI–525)**

OK

2	Check control switch continuity.



PREPARATION:

(a) Remove steering wheel center pad.

(b) Disconnect the control switch connector.

CHECK:

Measure resistance between terminals 4 and 5 of control switch connector when control switch is operated.

Switch position	Resistance (Ω)
Neutral	∞ (No continuity)
RES/ACC	60 – 70
SET/COAST	180 – 220
CANCEL	380 – 460

NG → **Replace control switch.**

OK

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3	**Check harness and connector between ECM and cruise control switch, cruise control switch and body ground (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

4	**Check cruise control indicator light. (See combination meter)**

NG → **Replace combination meter.**

OK

Check and replace ECM (See page IN–34).

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DI3CL–01

DTC	P1566/54	Input Signal Circuit

CIRCUIT DESCRIPTION

See page DI–527.

DTC No.	Detection Item	Trouble Area
P1566/ 54	• Input signal abnormal.	• ECM

INSPECTION PROCEDURE

Check and replace ECM (See page IN–34).

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DI08Z–08

Main Switch Circuit (Cruise Control Switch)

CIRCUIT DESCRIPTION

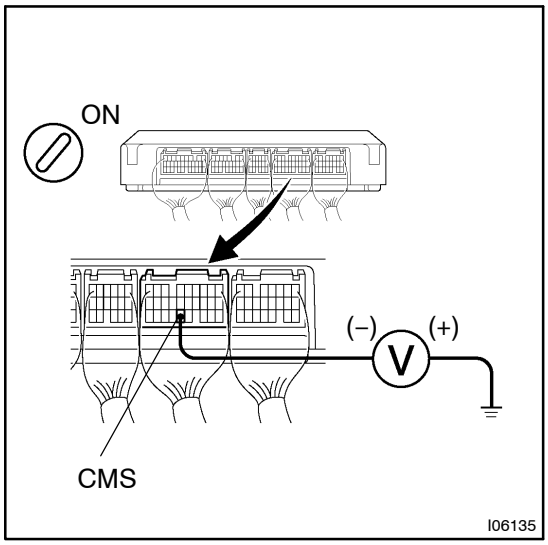
When the cruise control main switch is turned off, the cruise control does not operate.

WIRING DIAGRAM

See page DI–531.

INSPECTION PROCEDURE

1	**Check voltage between terminal CMS of ECM connector and body ground.**



PREPARATION:

(a) Remove the ECM with connector still connected.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal CMS of ECM 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 on problem symptom table (See page DI–525).**

NG

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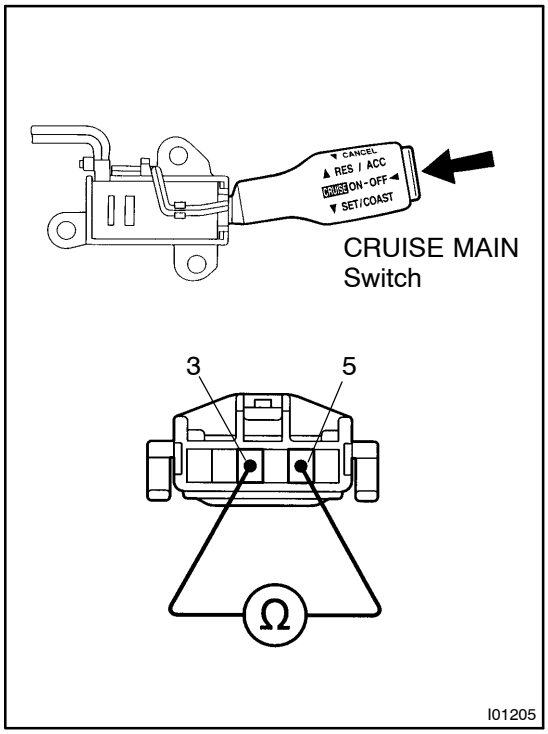
2	Check main switch continuity.



PREPARATION:

(a) Remove steering wheel center pad. (See page SR–9)

(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 ECM and main switch (See page IN–24).

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace ECM (See page IN–34).

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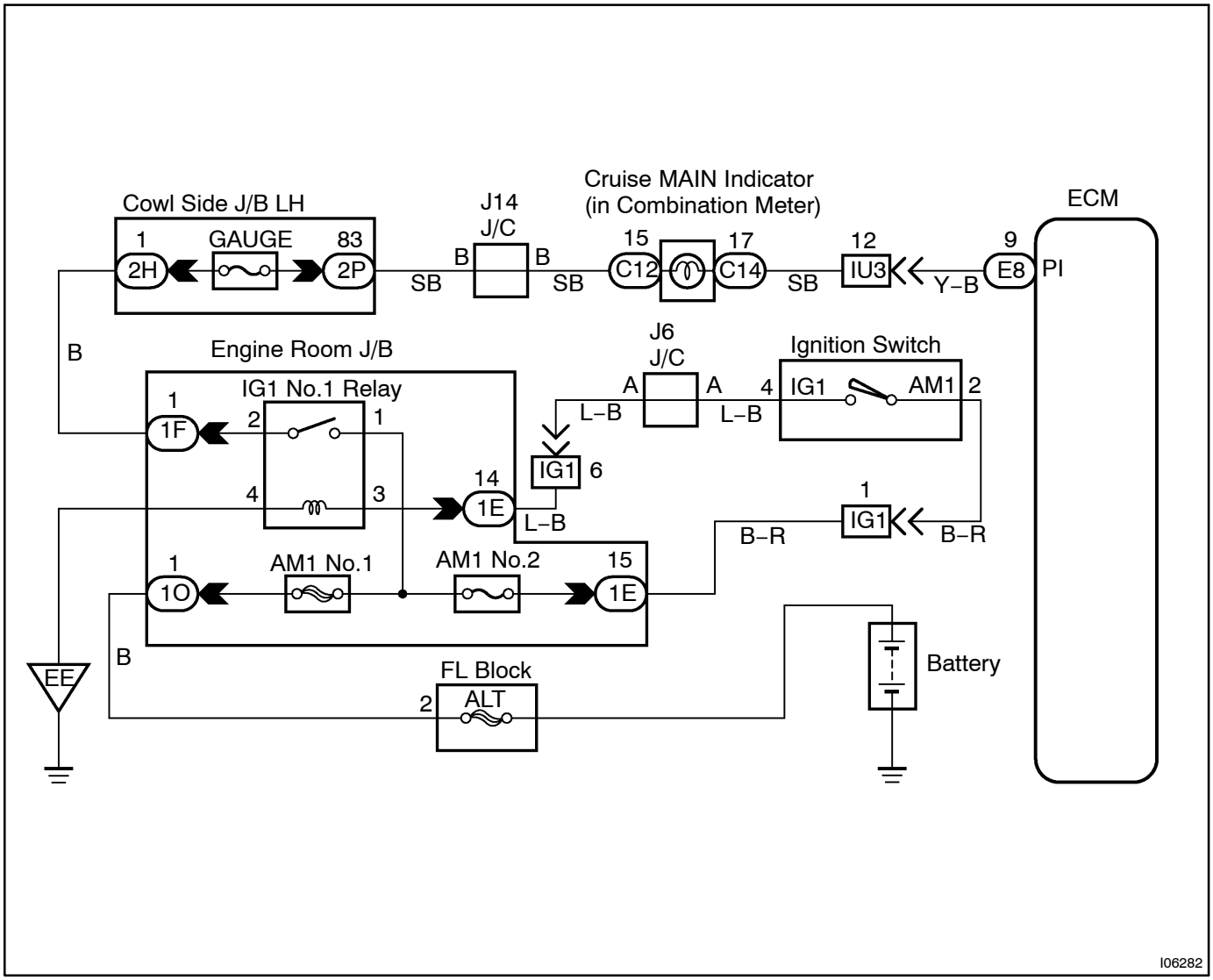
DI090-08

CRUISE MAIN Indicator Light Circuit

CIRCUIT DESCRIPTION

When the cruise control main switch is turned ON, CRUISE MAIN indicator light lights up.

WIRING DIAGRAM



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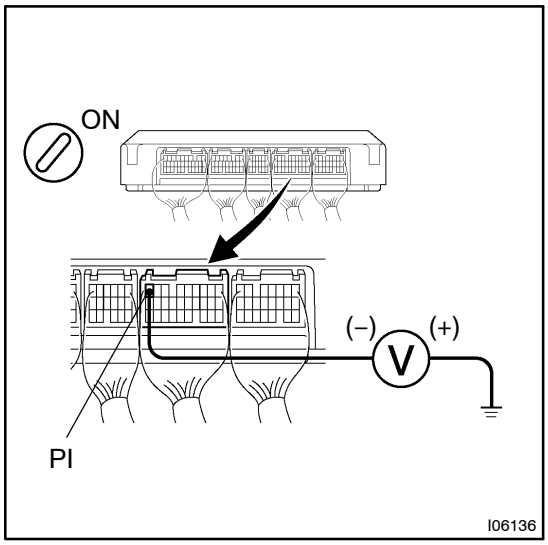
INSPECTION PROCEDURE

1	**Check voltage between terminals PI and GND of ECM connector.**



PREPARATION:
Tun ignition switch ON.
CHECK:
Measure voltage between terminals PI and GND of ECM 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 on problem symptom table (See page DI–525).**

NG

2	**Check combination meter (See page BE–50).**

NG → **Replace combination meter.**

OK

Check and replace ECM (See page IN–34).

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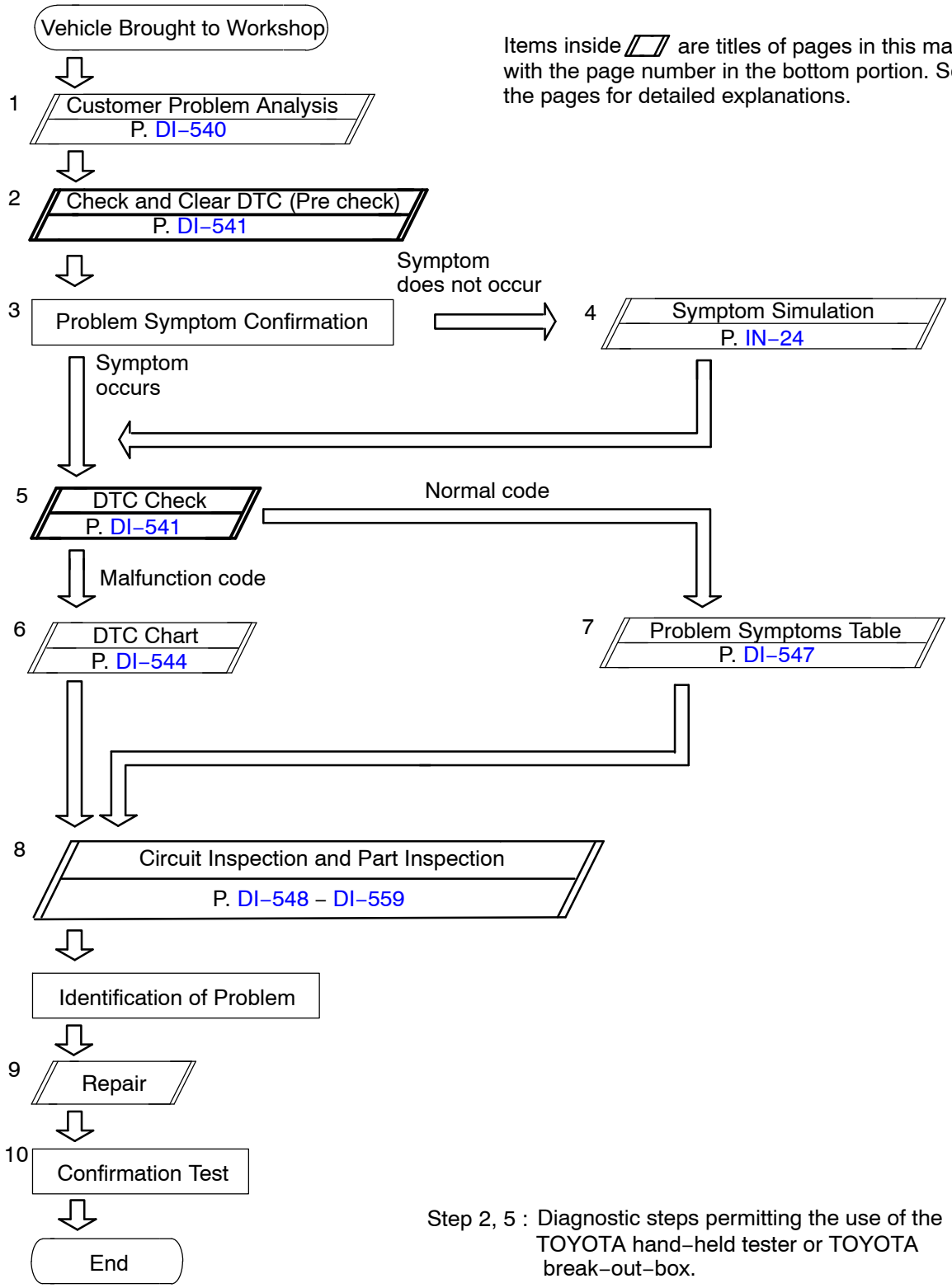
ENGINE IMMOBILISER SYSTEM

DI1AJ–06

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following pages.



Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.

Step 2, 5 : Diagnostic steps permitting the use of the TOYOTA hand–held tester or TOYOTA break–out–box.

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DI1AK–06

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE IMMOBILISER Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Immobiliser is not set. (Engine starts with key codes other than the registered key code.)
	☐ Engine does not start.

Check Item	**Malfunction Indicator Lamp**	☐ Normal ☐ Remains ON ☐ Does not Light Up

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

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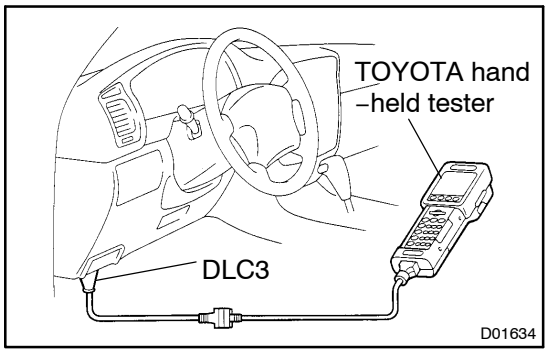
DI1AL–05



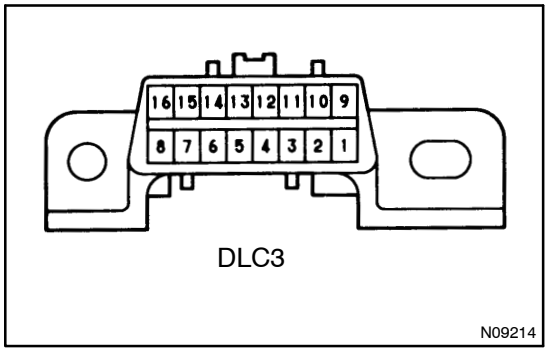
PRE–CHECK

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 up but DTC inspection is performed.

Therefore when there seems to be a trouble on immobiliser, use TOYOTA 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 TOYOTA 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.

(1) If communication is normal when the tool is connected to another vehicle, inspect DLC3 on the original vehicle.

(2) If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

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2. INSPECT DIAGNOSIS

(a) Check the DTC (Using TOYOTA hand–held tester)

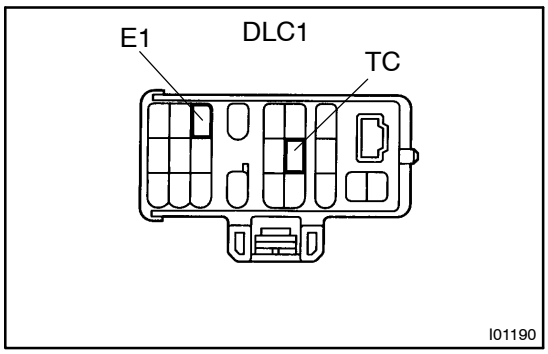
(1) Prepare the OBD II scan tool (complying with SAEJ 1978) or TOYOTA hand–held tester.

(2) Connect the OBD II scan tool or TOYOTA hand–held tester to DLC3 under the instrument panel lower pad.

(3) Turn the ignition switch ON and turn the OBD II scan tool or TOYOTA hand–held tester switch ON.

(4) Use the OBD II scan tool or TOYOTA hand–held tester to check the DTCs and freeze frame data; note them down. (For operating instructions, see the OBD II scan tool's instruction book.)

(5) See page DI–544 to confirm the details of the DTCs.



(b) Check the DTC (Using diagnosis check wire)

(1) Turn ignition switch ON.

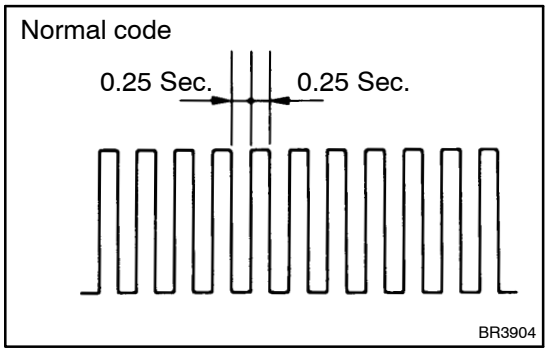
(2) Using SST, connect between terminals 11 (TC) and 3 (E1) of DLC1.

SST 09843–18040

(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 charts.

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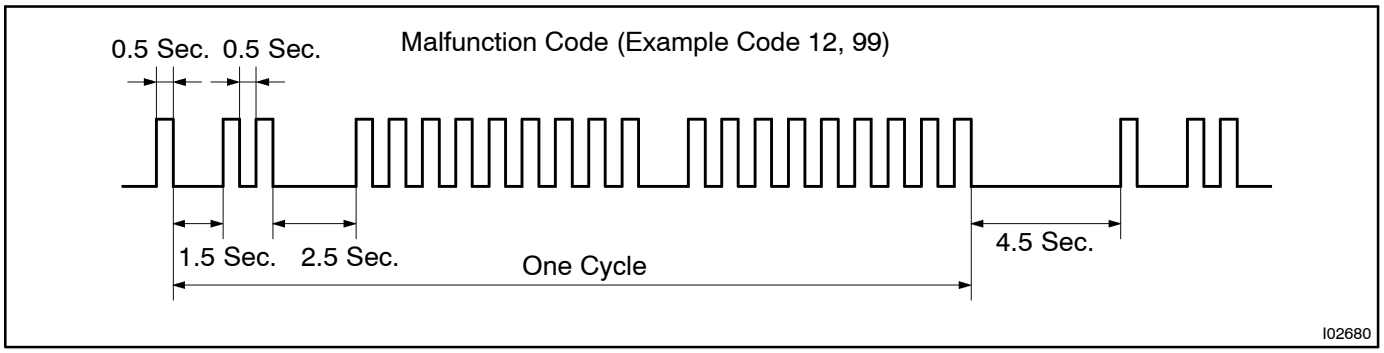

(4) When DTC ”99” is output, there is a trouble of immobiliser. Start troubleshooting referring to PROBLEM SYMPTOMS TABLE.

(5) After completing the check, disconnect terminals 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 operations will erase the DTCs and freeze frame data.

(1) Operating the OBD ll scam tool (complying with SAEJ1978) or TOYOTA 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.

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DI1AM–06

DIAGNOSTIC TROUBLE CODE CHART

DTC No. (See page)	Detection Item	Trouble Area
B2785 (DI–548)	Ignition switch ON malfunction	• Ignition Switch • Main Relay • Wireharness
B2786 (DI–548)	Ignition switch OFF malfunction	
B2791 (DI–552)	Key unlock warning switch OFF malfunction	• Key unlock warning switch • Main Relay • Wireharness
B2795 (DI–554)	Unmatched key code	• Key • Unregistered key inserted before
B2796 (DI–555)	No communication in immobiliser system	• Key • Transponder key coil • Amplifier • Wirehaness • ECM
B2797 (DI–557)	Communication malfunction No.1	• Communication contents • Unregistered key inserted before
B2798 (DI–559)	Communication malfunction No.2	• Key • Transponder key coil • Amplifier • Wire haness • 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.

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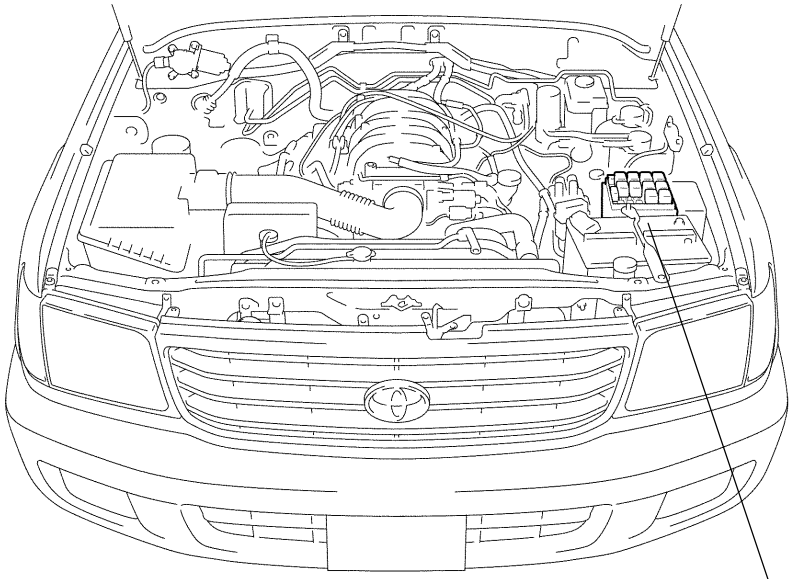
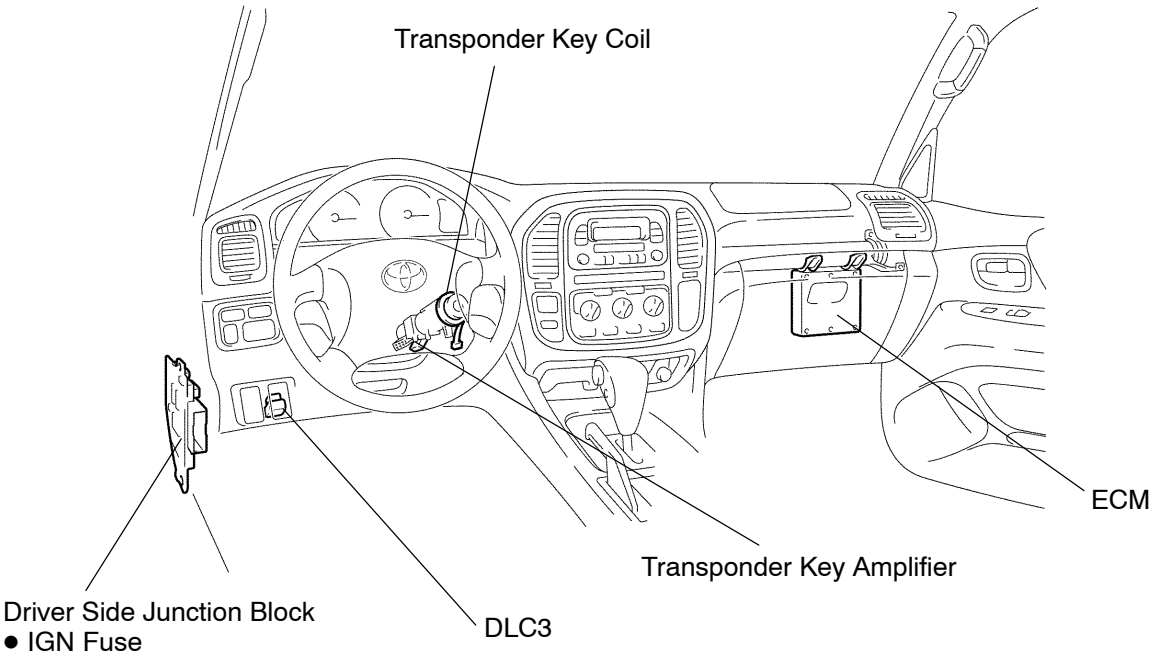
DI3CE–01

PARTS LOCATION



Engine Room Junction Block
- EFI Fuse
- EFI and ECD Relay



I06215

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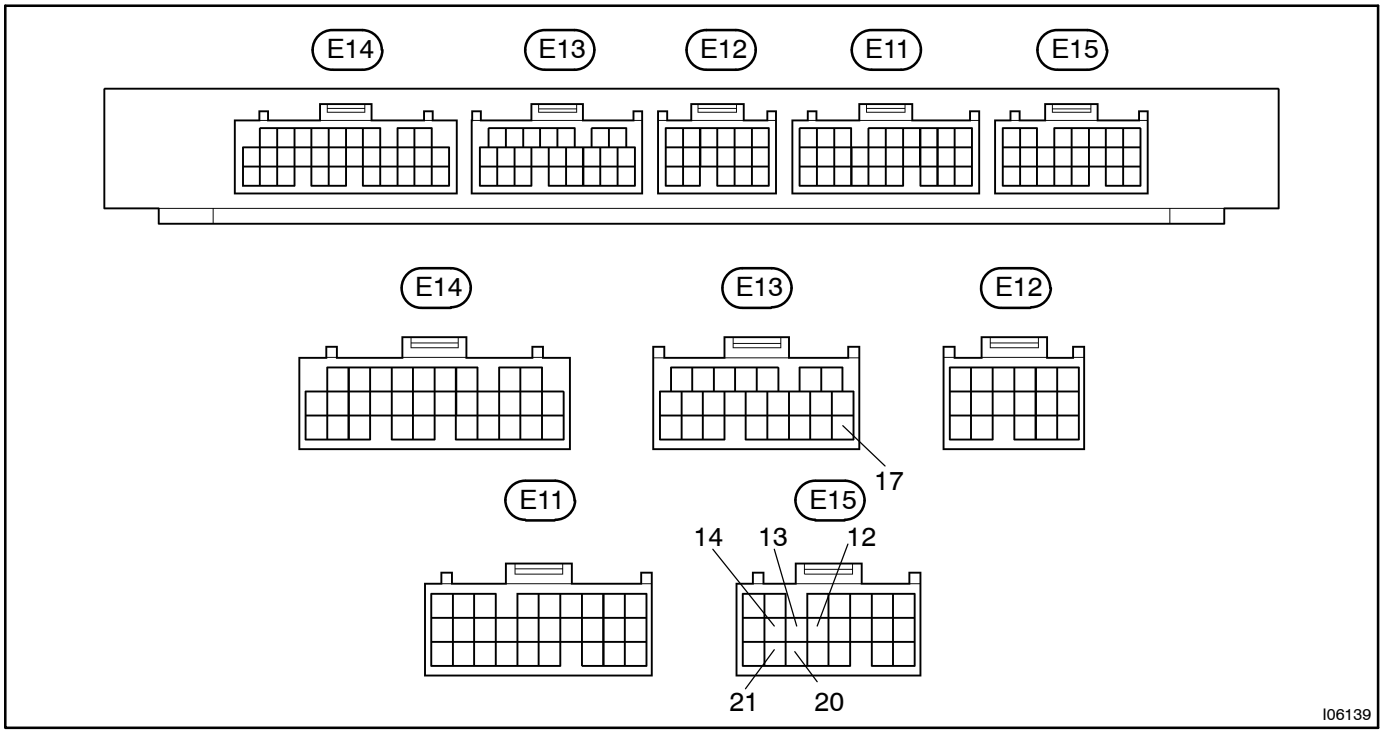
DI3CF–01

TERMINALS OF ECM



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
IMLD – E1 (E15 – 21 ↔ E13 – 17)	G–R ↔ BR	Ignition Switch ON	10 – 14
TXCT – E1 (E15 – 14 ↔ E13 – 17)	R–Y ↔ BR	Ignition Switch ON	10 – 14
CODE – E1 (E15 – 12 ↔ E13 – 17)	L–B ↔ BR	Ignition Switch ON	10 – 14
RXCK – E1 (E15 – 13 ↔ E13 – 17)	V–G ↔ BR	Ignition Switch ON	10 – 14
KSW – E1 (E15 – 20 ↔ E13 – 17)	R–B ↔ BR	Ignition Switch ON	10 – 14

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DI1AP–06

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–34
Engine does not start.	1. Key 2. Wire harness 3. Transponder key coil 4. Amplifier 5. ECM	*1 IN–34 BE–150 IN–34
Security indicator is always ON.	1. Security indicator 2. Wire harness 3. ECM	*2 IN–34 IN–34
Security indicator is always ON. (Although code has been registered in the automatic registration mode, indicator is not OFF.)	1. Wire harness 2 Transponder key coil 3. Amplifier 4. ECM	IN–34 BE–150 IN–34
Security indicator is OFF. (When DTC of immobiliser is output)	1. Wire harness 2 Transponder key coil 3. Amplifier 4. ECM	IN–34 BE–150 IN–34
Security indicator is OFF. (When DTC of immobiliser is not output)	1. Wire harness 2. ECM	IN–34 IN–34
Security indicator is abnormally blinking.	1. Wire harness 2. ECM	IN–34 IN–34

*1 : Check that the key which did not start the engine has been registered and that it is possible to start with other already registered key.

*2 : Finish the automatic registration mode because the mode might still remain.

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DI1AQ–06

CIRCUIT INSPECTION

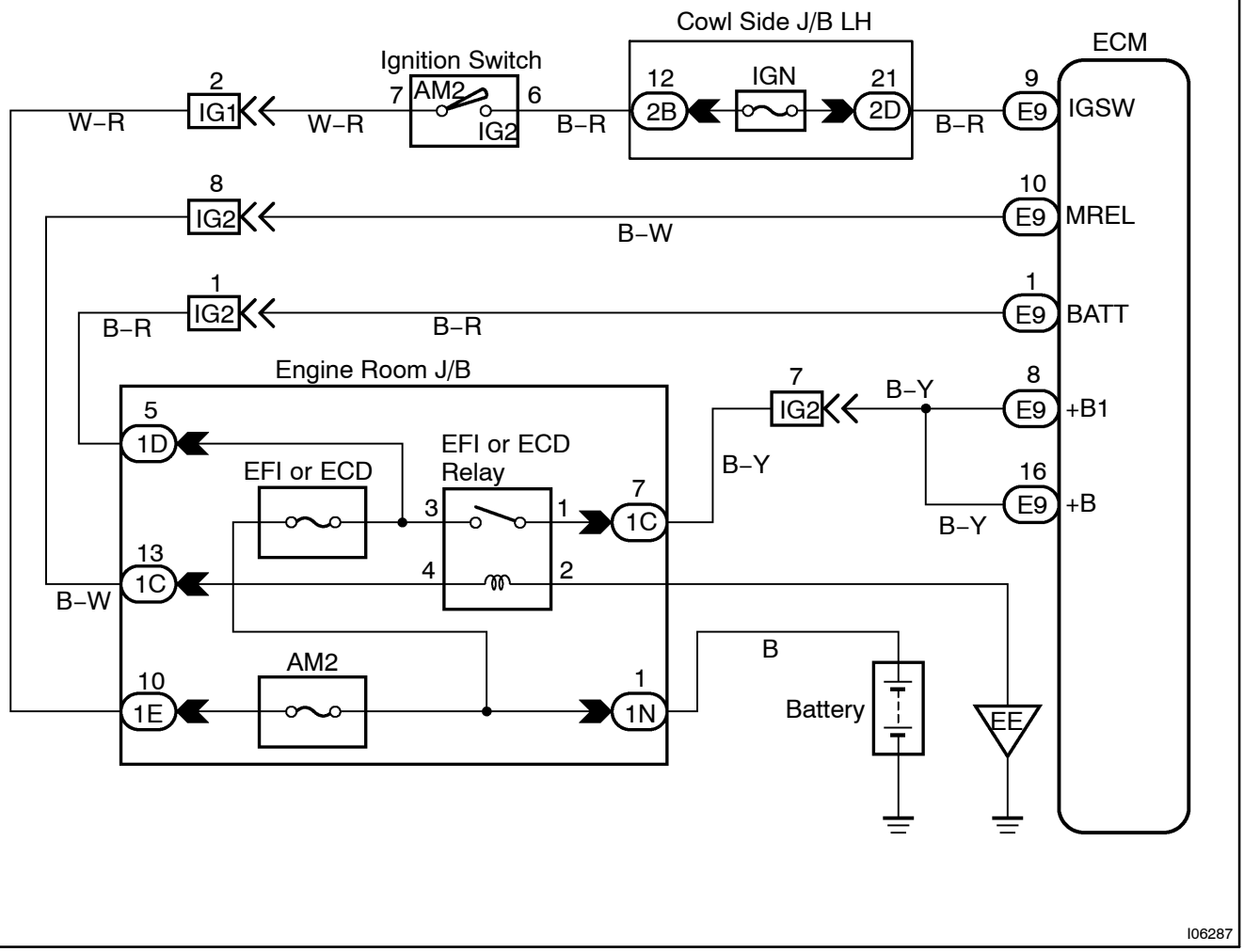
DTC	B2785/99	IG Switch ON Malfunction

DTC	B2786/99	IG Switch OFF Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
B2785/99	• Short circuit in IG switch circuit • IG switch adheres to ON position	• IG switch • EFI Main Relay • Wire harness
B2786/99	• Open circuit in IG switch circuit • IG switch adheres to OFF position	

WIRING DIAGRAM



I06287

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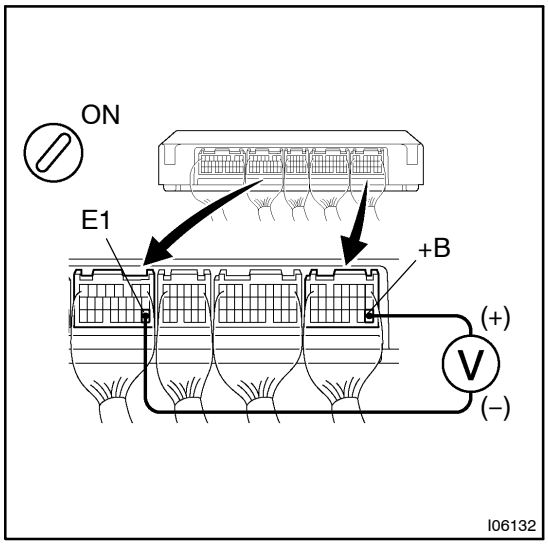
INSPECTION PROCEDURE

1	**Check voltage between terminals + B and E1 of ECM connectors.**



PREPARATION:

(a) Remove the glove compartment.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminals + B and E1 of ECM connectors.

OK:

Voltage: 9 ~ 14 V

OK	**Proceed to next circuit inspection shown in problem symptoms table (See page DI–547).**

NG

2	**Check for open in harness and connector between terminal E1 of ECM and body ground (See page IN–34).**

NG	**Repair or replace harness or connector.**

OK

3	**Check EFI main relay (Marking: EFI). (See page SF–45).**

NG	**Replace EFI main relay.**

OK

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4	**Check EFI fuse.**

NG → **Check for short in all the harness and components connected to EFI fuse.**

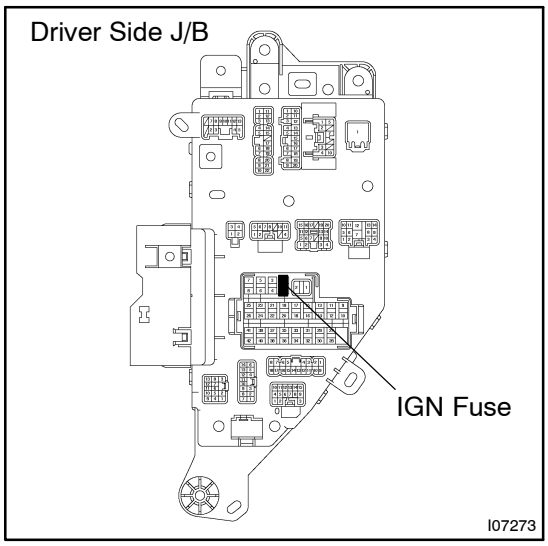
OK

5	**Check for open in harness and connector between EFI main relay (Marking : EFI) and battery, EFI main relay (Marking : EFI) and ECM (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

6	**Check IGN fuse.**



PREPARATION:
Remove the IGN fuse from the driver side J/B.
CHECK:
Check continuity of IGN fuse.
OK:

Continuity

NG → **Check for short in all the harness and components connected to IGN fuse.**

OK

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7	Check ignition switch (See page BE–18).

NG → Replace ignition switch.

OK

8	Check for open circuit in harness and connector between IG switch and EFI main relay, EFI main relay and body ground (See page IN–34).

NG → Repair or replace wire harness and connector.

OK

Replace ECM.

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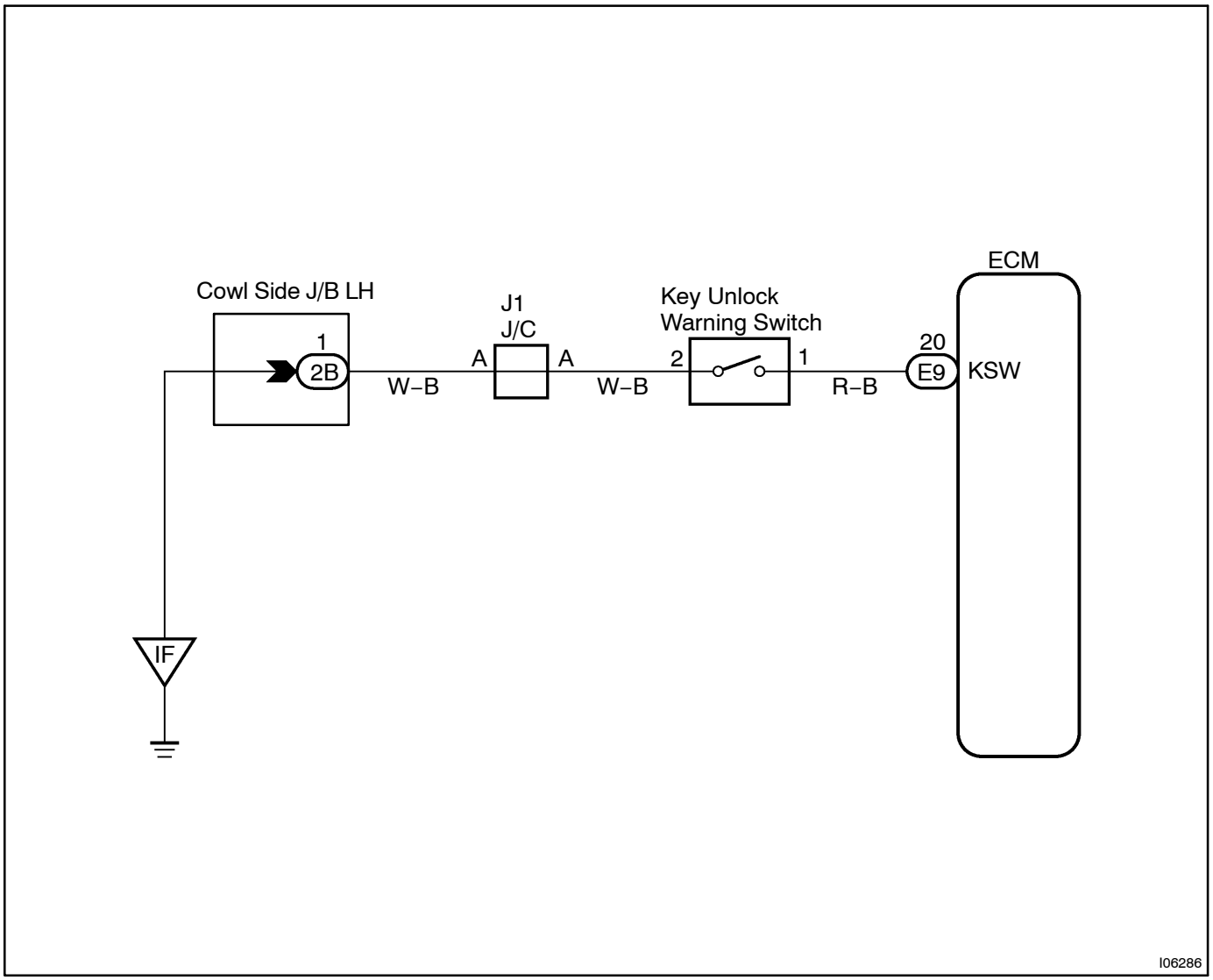
DI1AR–06

DTC	B2791/99	Key Unlock Warning SW OFF Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
B2791/99	• Open circuit in key unlock warning switch circuit. • Key unlock warning switch adheres to OFF position.	• Key unlock warning switch • Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check key unlock warning switch (See page BE–18).

NG → Replace key unlock warning switch.

OK

2	Check harness and connector between key unlock warning switch and ECM.

NG → Repair or replace the harness or connector.

OK

Replace ECM

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DI1AS–06

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..)

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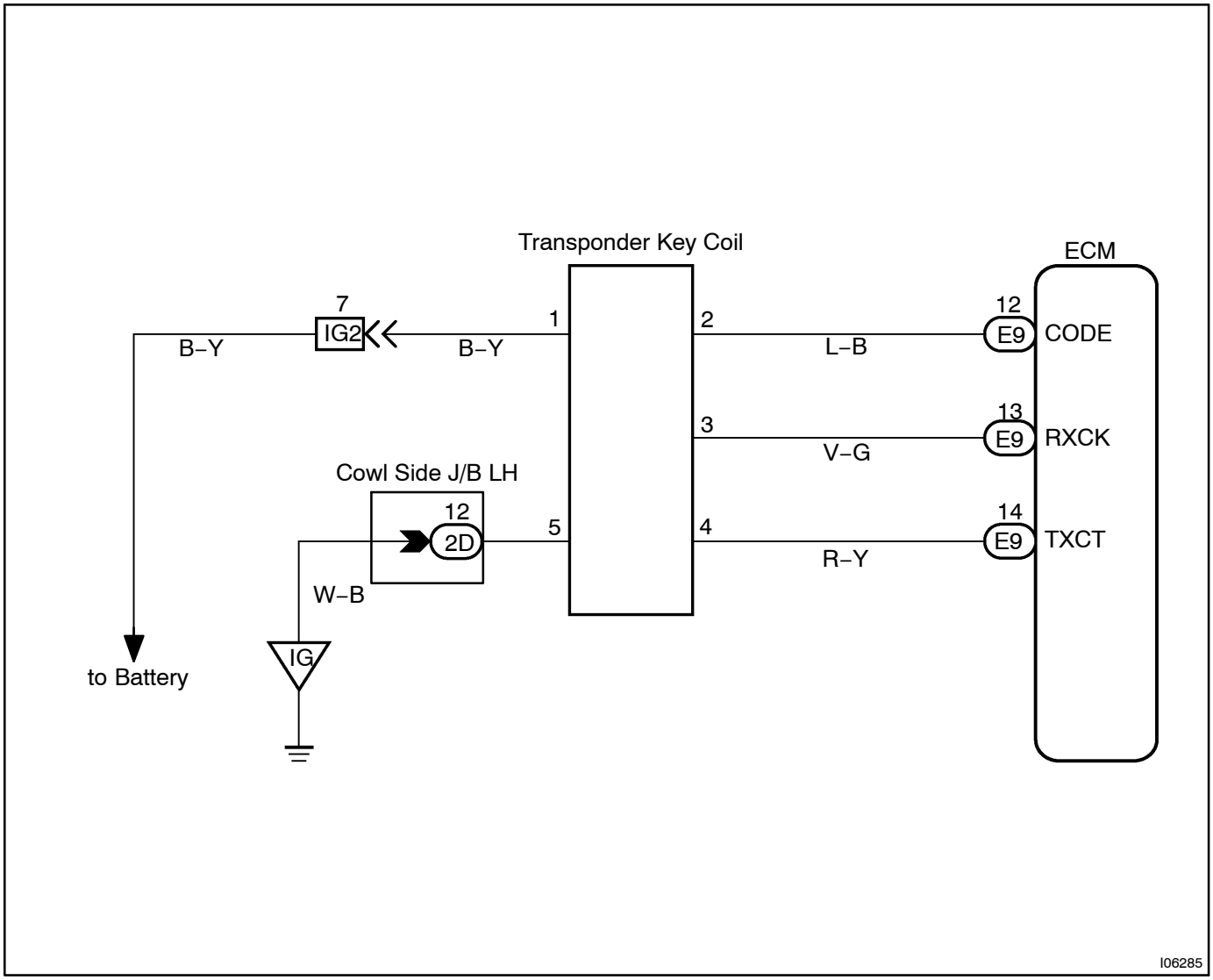
DI1AT–07

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



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INSPECTION PROCEDURE

1	Check transponder key coil (See page BE–150).

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

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DI1AU–05

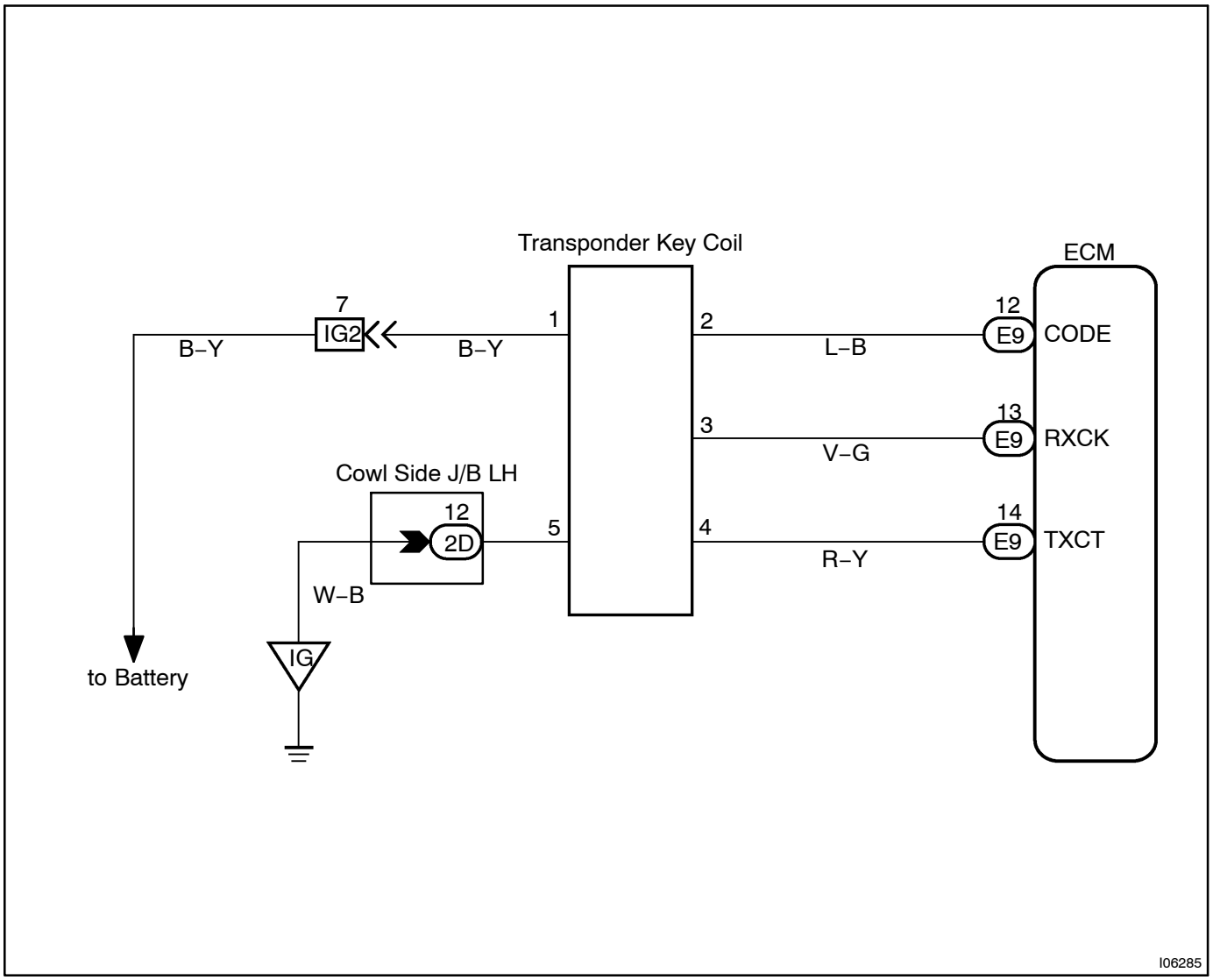
DTC	B2797/99	Communication Malfunction No.1

CIRCUIT DESCRIPTION

This code is detected when although the communication has been performed normally, an error occurs. (Example. Some noise is included in communication line.)

DTC No.	DTC Detecting Condition	Trouble Area
B2797/99	Communication error	• Wire Harness • Transponder Key Amplifier • ECM

WIRING DIAGRAM



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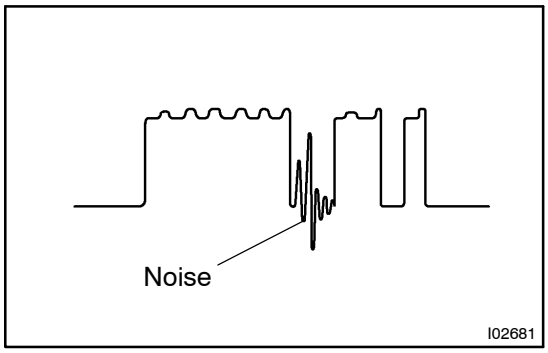
INSPECTION PROCEDURE

1	**Noise check**



PREPARATION:
Insert the already registered master key in the key cylinder.
CHECK:
Using an oscilloscope or TOYOTA hand–held tester, check that noise is included in the signals sent to the CODE terminal of ECM.
OK:
No noise is detected.

NG → **Try to find the cause of the noise and remove it.**

OK

2	**Does the system operate normally after replacement of transponder key amplifier?**

Yes → **Replace transponder key amplifier.**

No

Replace ECM.

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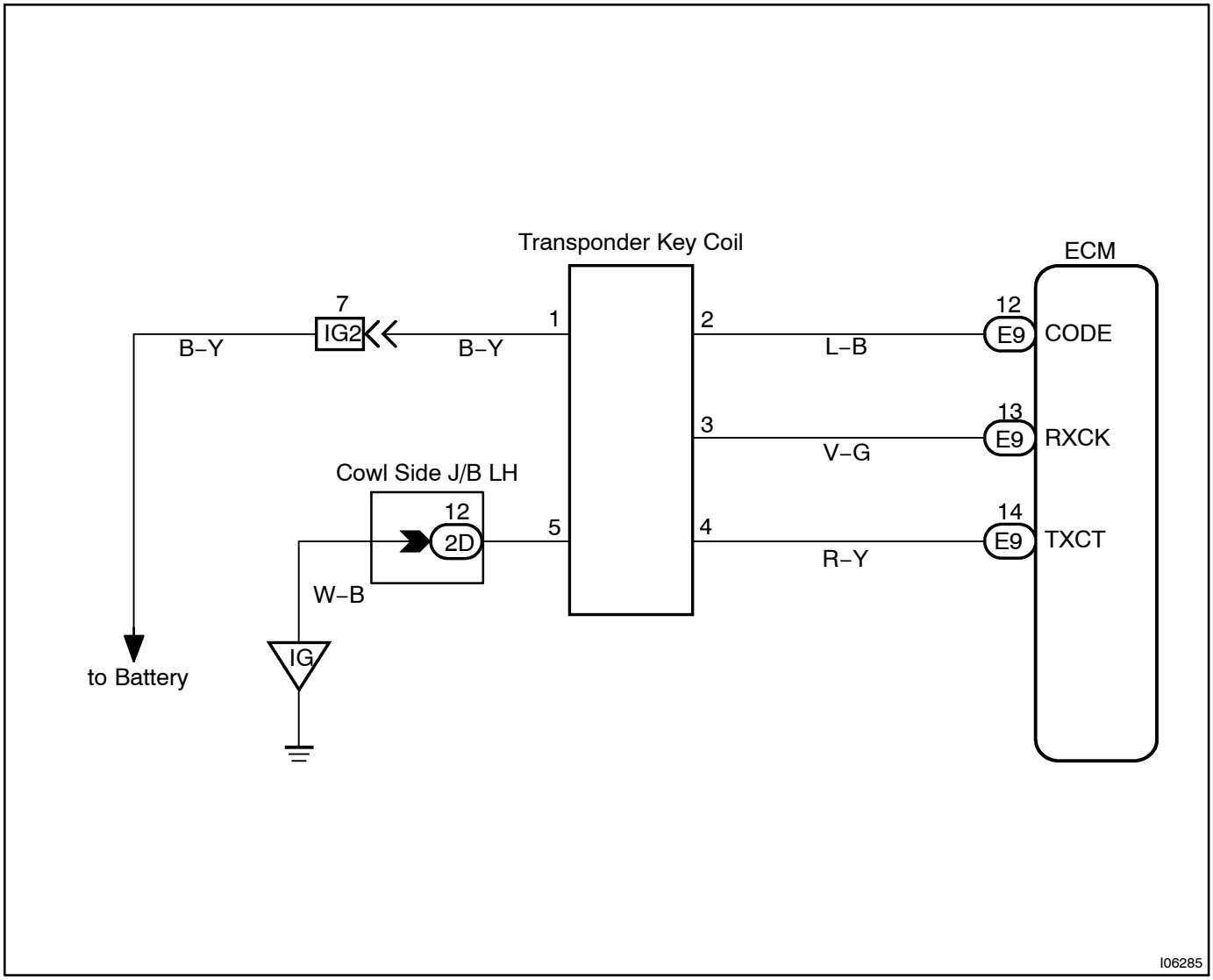
DI1AV–05

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



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INSPECTION PROCEDURE

1	Check transponder key coil (See page BE–150).

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 the system operate normally after replacement of transponder key amplifier?

Yes → Replace transponder key amplifier.

No →

Replace ECM

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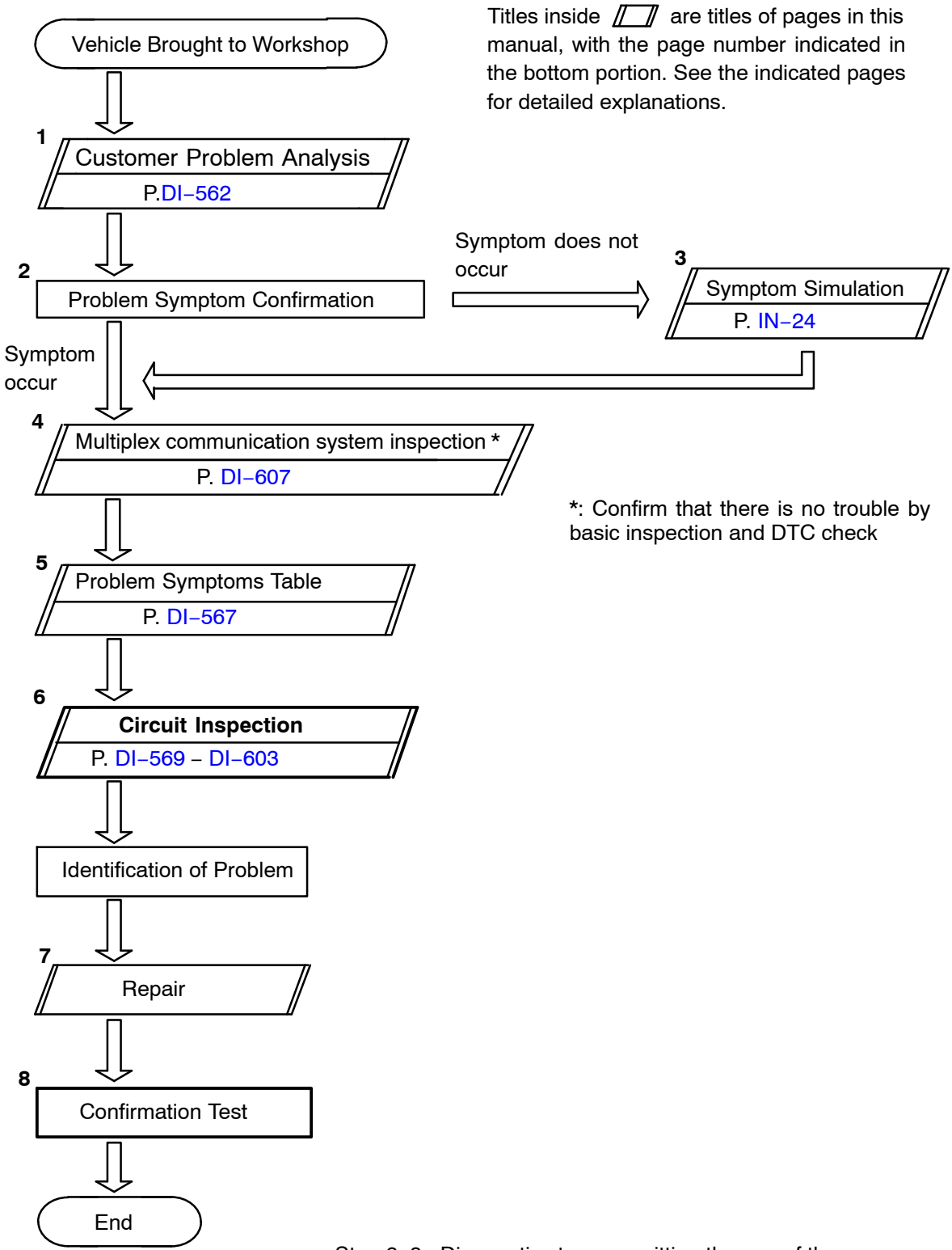
BODY CONTROL SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI1OD–03

HINT:

This ECU is connected to the multiplex communication system. Therefore, be sure to check that there is no troubles in the multiplex communication system before performing the trouble shooting.



Step 6, 8 : Diagnostic steps permitting the use of the TOYOTA hand–held tester .

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DI1OE–03

CUSTOMER PROBLEM ANALYSIS CHECK

BODY CONTROL 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))

Malfunction System	☐ Key Reminder System
	☐ Light Control System
	☐ Illuminated Entry System
	☐ Rear Wiper and Washer System
	☐ Seat Belt Warning
	☐ Power Window Control System
	☐ Power Door Lock Control System
	☐ Theft Deterrent System
	☐ Wireless Door Lock Control System
	☐ Others

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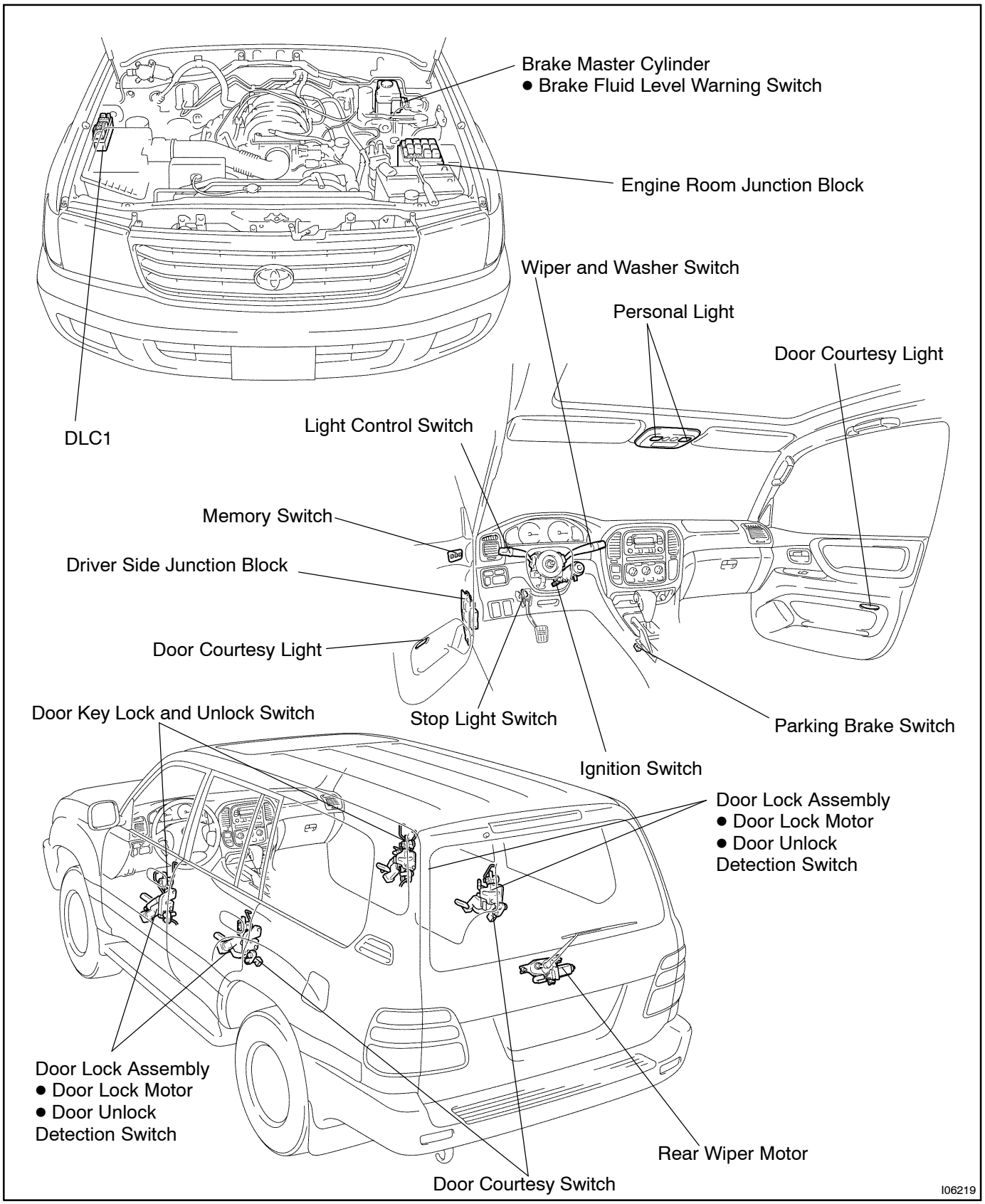
DI3CC–01

PARTS LOCATION



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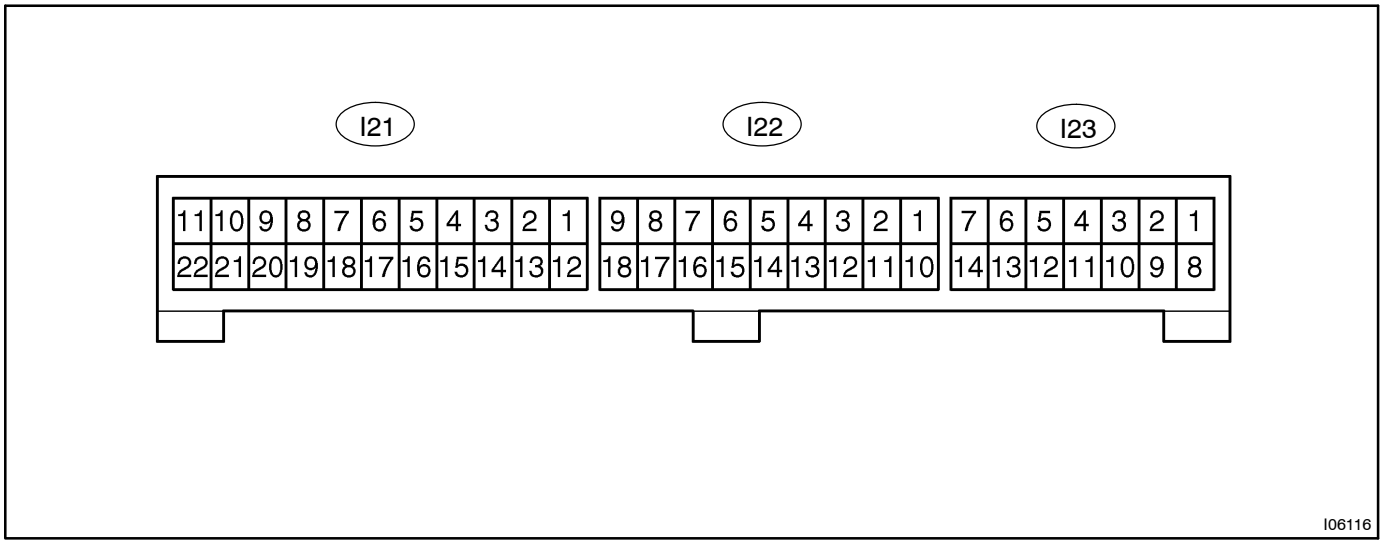
DI1OG–02

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
KYIL ↔ GND (I21–1 ↔ I23–4)	SB ↔ SB	Each door are opened.	Below 1 V
		All doors are closed.	10 – 14 V
FRRM ↔ GND (I21–2 ↔ I23–4)	SB ↔ SB	Each door are opened.	Below 2 V
		All doors are closed.	10 – 14 V
PCY ↔ GND (I21–3 ↔ I23–4)	SB ↔ SB	Passenger door closed.	10 – 14 V
		Passenger door opened.	Below 1 V
DMU ↔ GND (I21–4 ↔ I23–4)	SB ↔ SB	Driver door lock control switch* position OFF.	10 – 14 V
		Driver door lock control switch* position LOCK.	Below 1 V
PMU ↔ GND (I21–5 ↔ I23–4)	SB ↔ SB	Passenger door lock control switch* position OFF.	10 – 14 V
		Passenger door lock control switch* position LOCK.	Below 1 V
DKL ↔ GND (I21–6 ↔ I23–4)	SB ↔ SB	Driver door key lock and unlock switch position is OFF.	Below 1 V
		Driver door key lock and unlock switch position is LOCK.	10 – 14 V
PKL ↔ GND (I21–7 ↔ I23–4)	SB ↔ SB	Passenger door key lock and unlock switch position is OFF.	Below 1 V
		Passenger door key lock and unlock switch position is LOCK.	10 – 14 V
DML ↔ GND (I21–8 ↔ I23–4)	SB ↔ SB	Driver door lock control switch* position LOCK.	Below 1 V
PML ↔ GND (I21–9 ↔ I23–4)	SB ↔ SB	Passenger door lock control switch* position OFF.	10 – 14 V
		Passenger door lock control switch* position LOCK.	Below 1 V
PKU ↔ GND (I21–10 ↔ I23–4)	SB ↔ SB	Passenger door key lock and unlock switch is position OFF.	Below 1 V
		Passenger door key lock and unlock switch is position UN-LOCK.	10 – 14 V
DKU ↔ GND (I21–11 ↔ I23–4)	SB ↔ SB	Driver door key lock and unlock switch position is OFF.	Below 1 V
		Driver door key lock and unlock switch position is UNLOCK.	10 – 14 V
HW ↔ GND (I21–13 ↔ I23–4)	SB ↔ SB	Constant.	10 – 14 V
DCY ↔ GND (I21–14 ↔ I23–4)	SB ↔ SB	Driver door closed.	10 – 14 V
		Driver door opened.	Below 1 V
HRY ↔ GND (I21–15 ↔ I23–4)	SB ↔ SB	Ignition switch position is ON. Light control switch HEAD position.	Below 2 V

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Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
HRY ↔ GND (I21–15 ↔ I23–4)	SB ↔ SB	Ignition switch position is ON. Light control switch OFF position.	10 – 14 V
C1 ↔ GND (I21–16 ↔ I23–4)	SB ↔ SB	Rear wiper S/W position is OFF.	10 – 14 V
		Rear wiper S/W position is INT, AUTO.	Below 1 V
		Rear wiper S/W position is LO.	10 – 14 V
		Rear wiper S/W position is HI.	10 – 14 V
L ↔ GND (I21–17 ↔ I23–4)	SB ↔ SB	Rear wiper S/W position is OFF.	10 – 14 V
		Rear wiper S/W position is INT, AUTO.	10 – 14 V
		Rear wiper S/W position is LO.	10 – 14 V
		Rear wiper S/W position is HI.	Below 1 V
TAIL ↔ GND (I21–18 ↔ I23–4)	SB ↔ SB	Headlight control switch position is TAIL.	Below 1 V
		Headlight control switch position is except TAIL.	10 – 14 V
HEAD ↔ GND (I21–19 ↔ I23–4)	SB ↔ SB	Headlight control switch position is HEAD.	Below 1 V
		Headlight control switch position is except HEAD.	10 – 14 V
KSW ↔ GND (I21–20 ↔ I23–4)	SB ↔ SB	Key is inserted.	Below 1 V
		Key is not inserted.	10 – 14 V
ACC ↔ GND (I21–21 ↔ I23–4)	SB ↔ SB	Ignition switch position is ACC.	10 – 14 V
DISW ↔ GND (I22–1 ↔ I23–4)	SB ↔ SB	Driver door is locked.	10 – 14 V
		Driver door is unlocked.	Below 1 V
RRCY ↔ GND (I22–2 ↔ I23–4)	SB ↔ SB	Rear RH door is opened.	Below 1 V
		Rear RH door is closed.	10 – 14 V
STP ↔ GND (I22–3 ↔ I23–4)	SB ↔ SB	Brake is ON.	10 – 14 V
		Brake is OFF.	Below 1 V
RISW ↔ GND (I22–5 ↔ I23–4)	SB ↔ SB	Rear door is locked.	10 – 14 V
		Rear door is unlocked.	Below 1 V
PISW ↔ GND (I22–6 ↔ I23–4)	SB ↔ SB	Passenger door is locked.	10 – 14 V
		Passenger door is unlocked.	Below 1 V
RLCL ↔ GND (I22–10 ↔ I23–4)	SB ↔ SB	Constant	10 – 14 V
RRCL ↔ GND (I22–11 ↔ I23–4)	SB ↔ SB	Constant	10 – 14 V
DURY ↔ GND (I22–12 ↔ I23–4)	SB ↔ SB	Constant.	10 – 14 V
DDRY ↔ GND (I22–13 ↔ I23–4)	SB ↔ SB	Constant.	10 – 14 V
FRCL ↔ GND (I22–15 ↔ I23–4)	SB ↔ SB	Constant	10 – 14 V
BECU ↔ GND (I23–1 ↔ I23–4)	SB ↔ SB	Constant.	10 – 14 V
SIG ↔ GND (I23–2 ↔ I23–4)	SB ↔ SB	Ignition switch position is ON.	10 – 14 V
WLRY ↔ GND (I23–3 ↔ I23–4)	SB ↔ SB	Ignition switch position is ON.	10 – 14 V
GND ↔ Body Ground (I23–4 ↔ Body Ground)	W–B ↔ Body Ground	Constant.	Below 1 V

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PWRY ↔ Body Ground (I23–6 ↔ Body Ground)	SB ↔ Body Ground	Constant.	Below 1 V
RLCY ↔ GND (I23–7 ↔ I23–4)	SB ↔ SB	Rear LH door and back door is open.	Below 1 V
		Rear LH door and back door is closed.	10 – 14 V
LMRY ↔ GND (I23–8 ↔ I23–4)	SB ↔ SB	Constant.	10 – 14 V
TRY ↔ GND (I23–9 ↔ I23–4)	SB ↔ SB	Ignition switch position is ON. Light control switch OFF position.	10 – 14 V
DLRY ↔ GND (I23–11 ↔ I23–4)	SB ↔ SB	Constant.	10 – 14 V
LS/M ↔ GND (I23–12 ↔ I23–4)	SB ↔ SB	During the rear wiper is in operation.	Below 1 V
		When the rear wipers at a stop.	10 – 14 V
INDP ↔ GND (I23–14 ↔ I23–4)	SB ↔ SB	Shift position is P position.	Below 1 V
		Shift position is except P position.	10 – 14 V

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DI1OH–03

PROBLEM SYMPTOMS TABLE

- LIGHT CONTROL

Symptom	Suspect Area	See page
Auto turn–off does not operate	1. Door courtesy switch circuit (Driver side) 2. Ignition switch 3. Body ECU	DI–593 DI–571 –

- REAR WIPER AND WASHER

Symptom	Suspect Area	See page
Rear wiper does not operate.	1. Rear wiper switch circuit 2. Rear wiper motor circuit 3. Body ECU	DI–576 DI–578 –
Rear washer does not operate.	1. Rear washer switch circuit 2. Rear washer motor 3. Wire harness	DI–576 BE–46 –
Rear wiper does not operate only at Hi speed.	1. Body ECU	–
Rear wiper does not operate when washer switch is ON.	1. Rear wiper switch circuit 2. Body ECU.	DI–576 –

- DOOR LOCK CONTROL

Symptom	Suspect Area	See page
Lock or unlock cannot be operated with door lock control S/W.	1. Door lock control switch circuit 2. Body ECU	DI–591 –
Door key linked function does not operate.	1. Door key lock and unlock switch circuit 2. Body ECU	DI–599 –
Key confinement prevention function does not operate.	1. Key unlock switch circuit 2. Body ECU	DI–587 –

- WIRELESS DOOR LOCK CONTROL

Symptom	Suspect Area	See page
All function of wireless door lock control system do not operate.	1. Transmitter 2. Key unlock warning switch circuit 3. Wireless door lock ECU 4. Body ECU	DI–442 DI–587 DI–440 –
Lock (or unlock) function does not operate.	1. Door key lock and unlock switch circuit 2. Door unlock detection switch circuit 3. Body ECU	DI–599 DI–597 –
Automatic lock function operates even if any door is opened within 30 seconds after all doors are unlocked by wireless door lock control system .	1. Door courtesy switch circuit 2. Body ECU	DI–593 –

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- THEFT DETERRENT SYSTEM

Symptom	Suspect Area	See page
No alerting condition is operated. (The system cannot be set.)	1. Theft deterrent indicator circuit 2. Key unlock warning switch circuit 3. Courtesy switch circuit 4. Door unlock detection switch circuit 5. Engine hood courtesy switch circuit 6. Body ECU	DI–488 DI–587 DI–593 DI–597 DI–513 –
The system operated for more 60 records.	1. Body ECU	–

- OTHERS

Symptom	Suspect Area	See page
Does not operate the illuminated entry	1. Illumination circuit 2. Body ECU	DI–573 –

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DI1OI–03

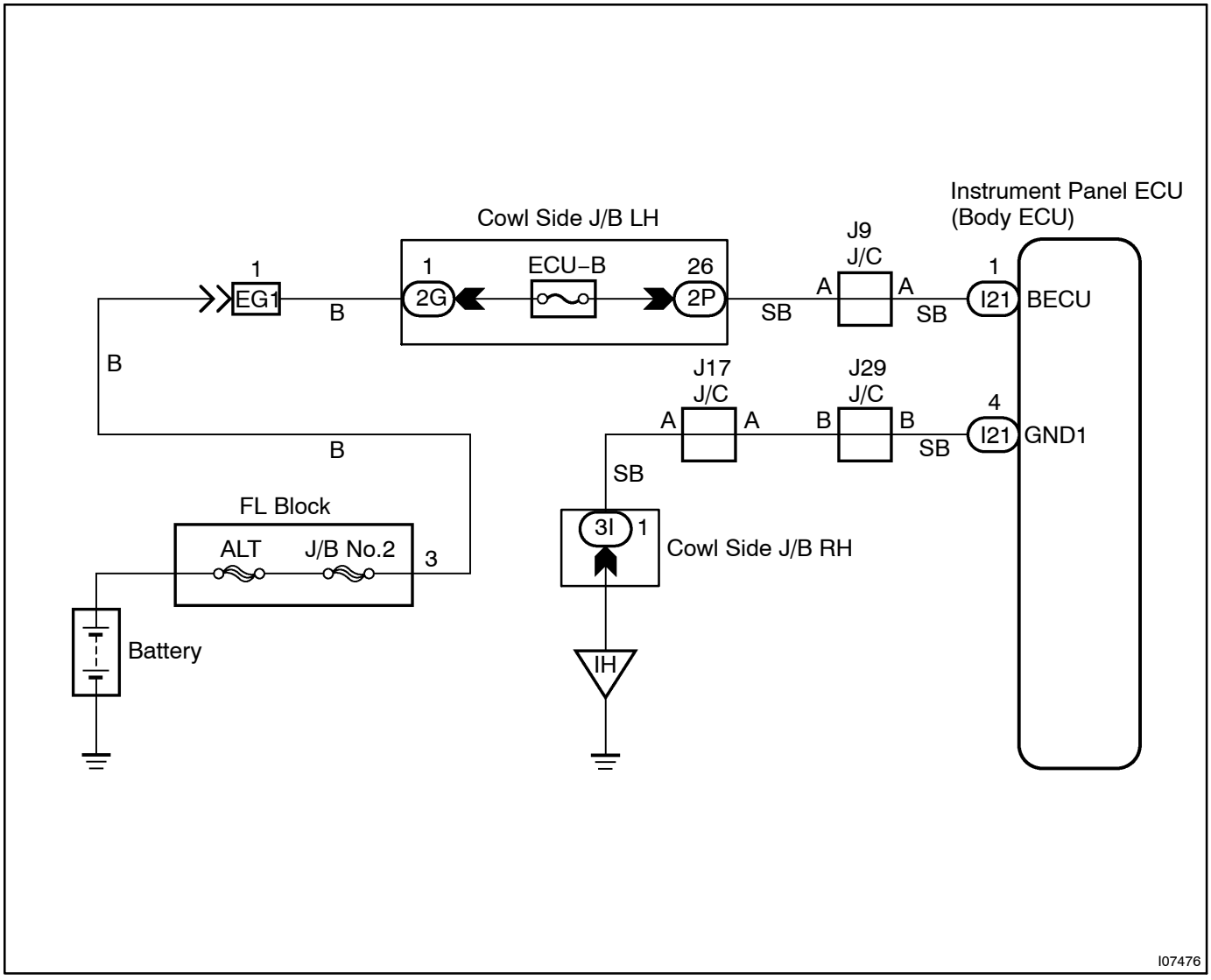
CIRCUIT INSPECTION

Power source circuit

CIRCUIT DESCRIPTION

This circuit provides power to operate the Body ECU.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check ECU–B fuse.**

CHECK:
Check continuity of ECU–B fuse.
OK:
Continuity

NG → **Replace the failure fuse.**

OK ↓

2	**Check voltage between terminals BECU and GND of Body ECU connector.**

PREPARATION:
(a) Turn ignition switch OFF.
(b) Disconnect the Body ECU connector.
CHECK:
Measure voltage between terminals BECU and GND.
OK:
Voltage: 10 – 14V

OK → **Proceed to next circuit inspection shown on problem symptoms table. (See page DI–567)**

NG ↓

3	**Check wireharness and connector between Body ECU and body ground.**

NG → **Repair or replace wireharness or connector.**

OK ↓

Check and repair wireharness and connector between Body ECU and battery.

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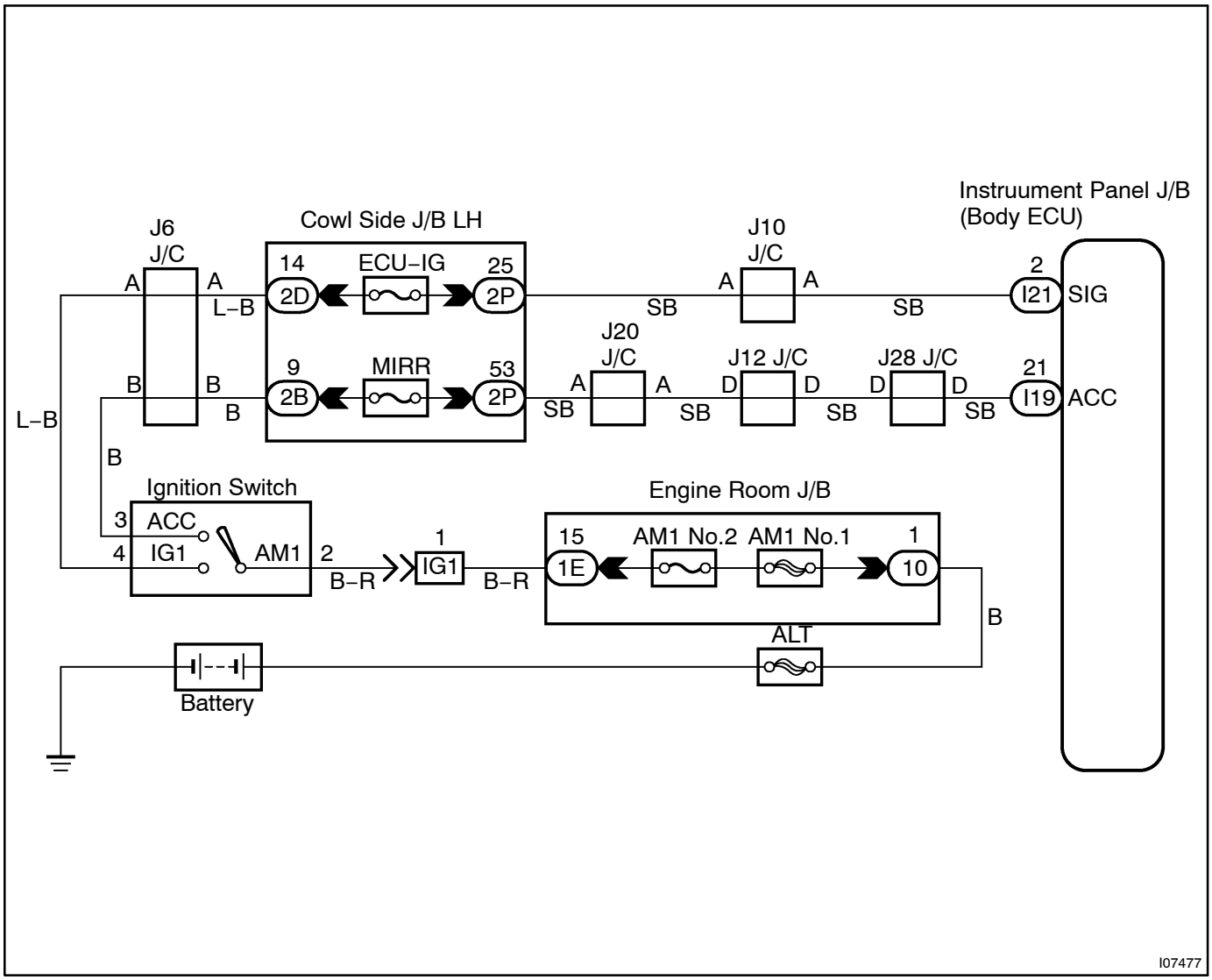
DI1OI–04

Ignition switch power source circuit

CIRCUIT DESCRIPTION

When the ignition switch is turned to the ACC position, battery positive voltage is applied to the terminal ACC of the ECU and when the ignition switch is turned to the ON position, battery positive voltage is applied to the terminal SIG of the ECU.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check ECU–IG and CIGAR fuse.**

CHECK:
Check continuity of ECU–IG and SIGAR fuse.
OK:
Continuity

NG → **Replace the failure fuse.**

OK ↓

2	**Check voltage between terminals ACC, SIG and GND of Body ECU connector.**

PREPARATION:
Turn ignition switch ON.
CHECK:
Measure voltage between terminals ACC, SIG, and GND.
OK:
Voltage: 10 – 14V

OK → **Proceed to next circuit inspection shown on problem symptoms table. (See page DI–567)**

NG ↓

3	**Check wireharness and connector between Body ECU and body ground.**

NG → **Repair or replace wireharness or connector.**

OK ↓

Check and repair wireharness and connector between Body ECU and battery.

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DI1OW–02

Illumination circuit

CIRCUIT DESCRIPTION

Receiving the courtesy signal from the Body ECU will make the interior light, ignition light, and courtesy light come on.

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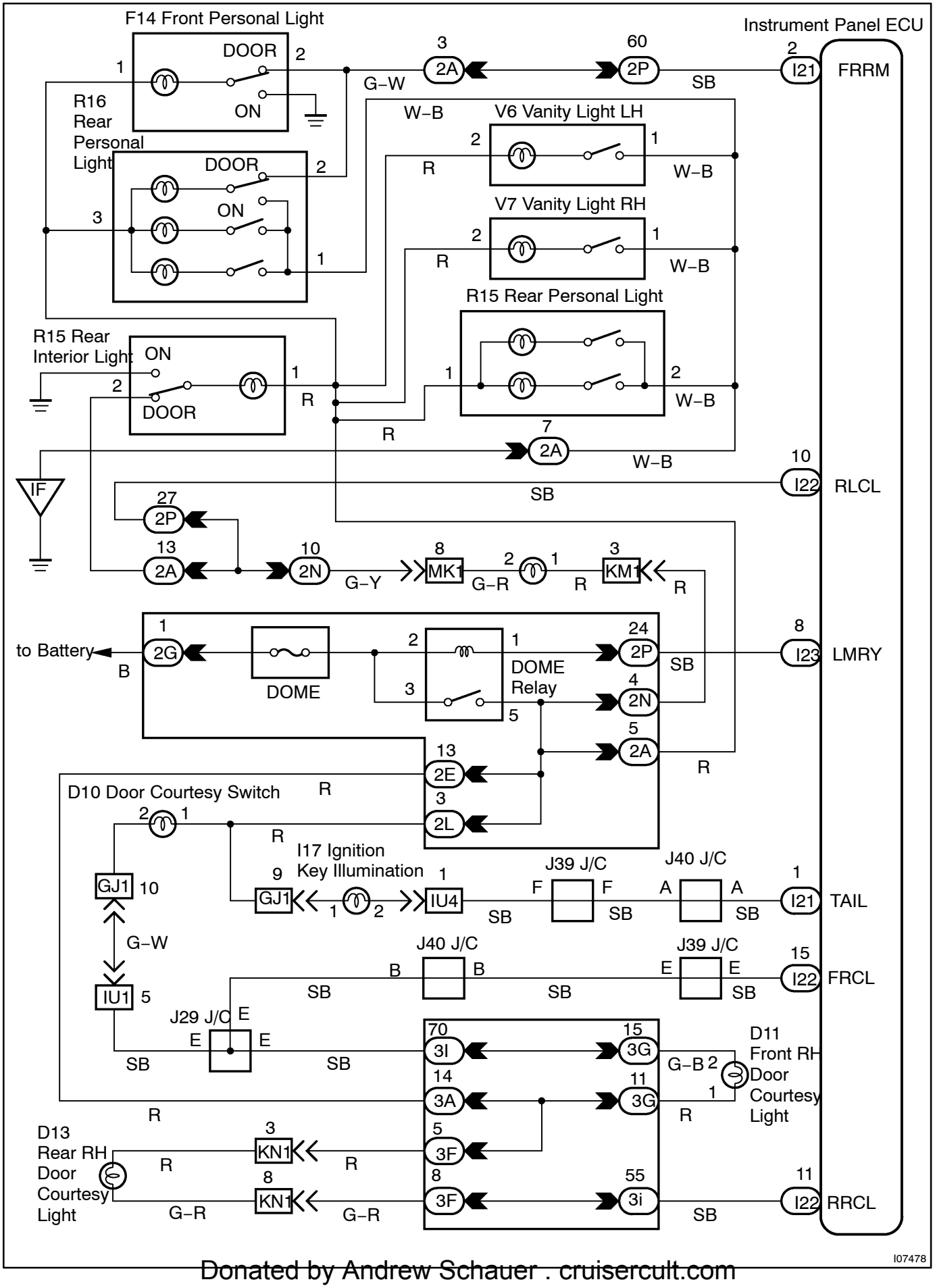
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check DOME fuse.

NG → Replace the fuse.

OK

2	Check illumination light.

NG → Replace the failure light.

OK

3	Check wireharness and connector between each illumination light and Body ECU, battery and each illumination light .

NG → Repair or replace wireharness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table.
(See page DI–567)

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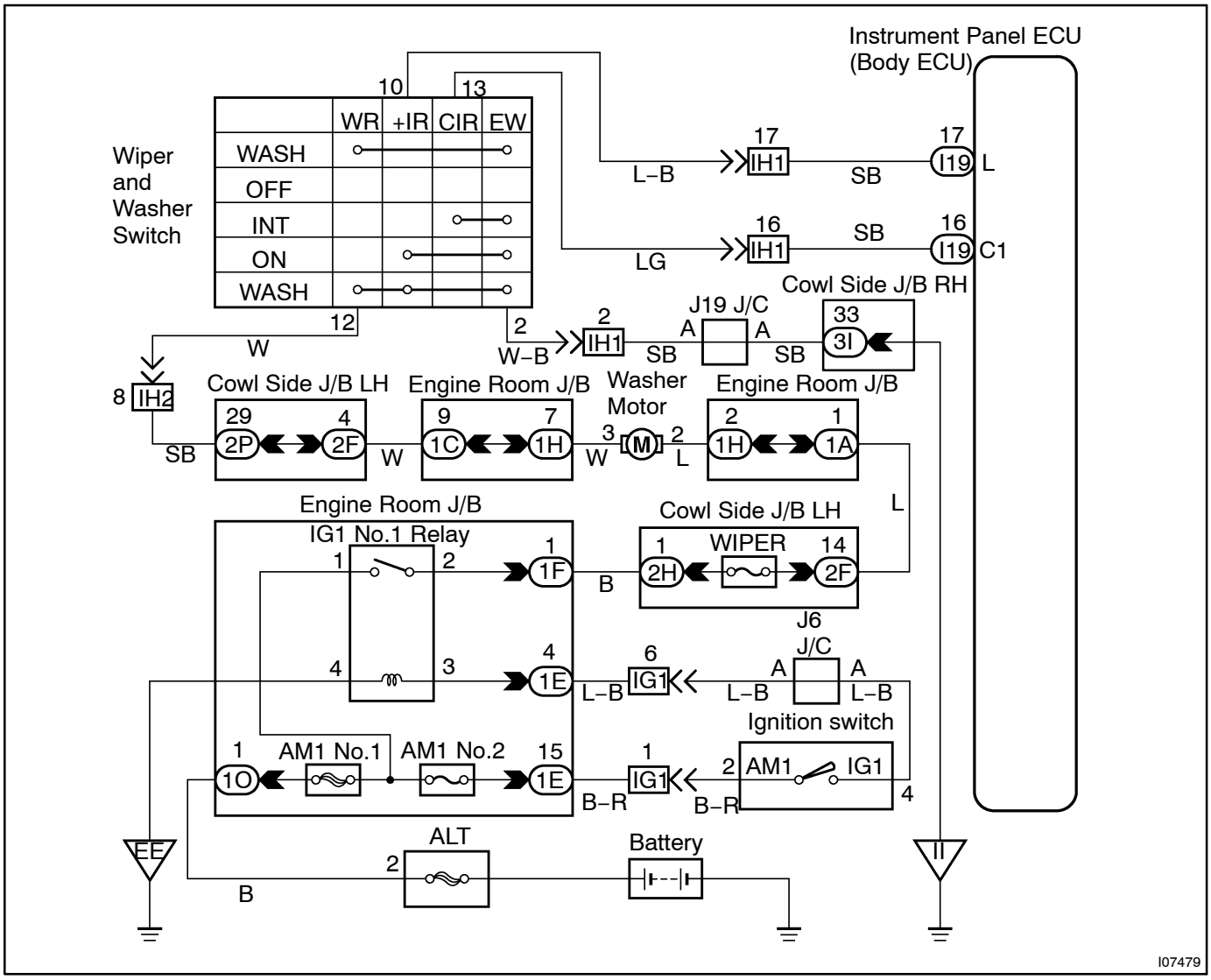
DI1OJ–03

Rear wiper and washer switch circuit

CIRCUIT DESCRIPTION

Body ECU judges the switch position with the terminal voltage of the wiper and washer switch and runs the wiper motor.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check rear wiper and washer switch (See page BE–46)

NG → Replace the rear wiper and washer switch.

OK

2	Check wireharness and connector between rear wiper and washer switch and Body ECU.

NG → Repair or replace wireharness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table.
(See page DI–567)

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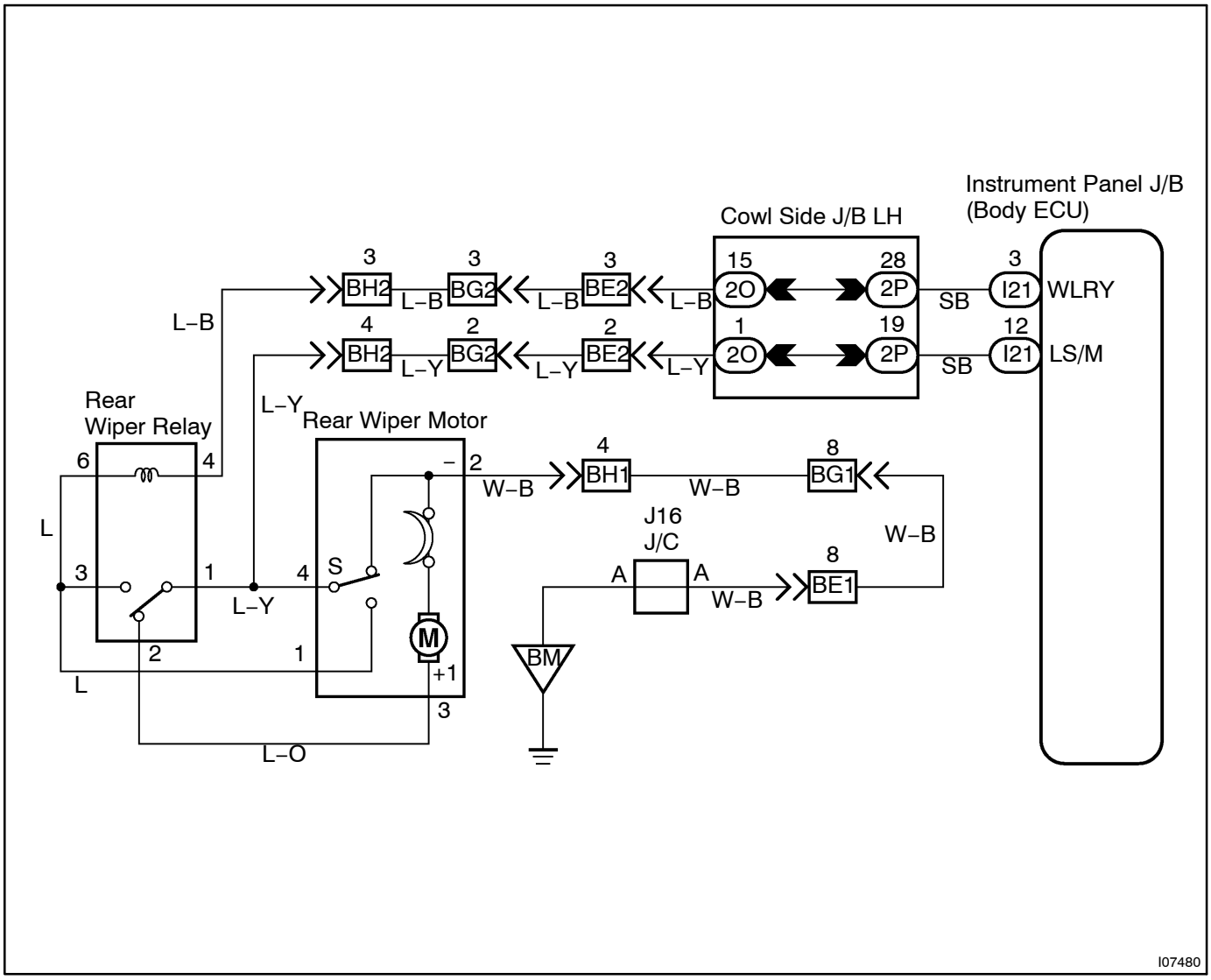
DI1OK–03

Rear wiper motor and relay circuit

CIRCUIT DESCRIPTION

Wiper motor is controlled by the Body ECU. Even CPU is in the failure, its circuit structure enables to operate the wiper with ”High” mode.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check WIPER fuse.**

CHECK:
Check continuity of WIPER fuse.
OK:
Continuity

NG → **Replace the failure fuse.**

OK

2	**Check voltage between terminals WRRY, WLRY and GND of Body ECU connector.**

PREPARATION:
Turn ignition switch ON.
CHECK:
Measure voltage between terminals WRRY, WLRY, and GND.
OK:
Voltage: 10 – 14V

OK → **Proceed to next circuit inspection shown on problem symptoms table. (See page DI–567)**

NG

3	**Check rear wiper relay. (See page BE–46)**

NG → **Replace the rear wiper motor.**

OK

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4	Check rear wiper motor. (See page BE–46)

NG → Replace the rear wiper motor.

OK

5	Check wireharness and connector between rear wiper motor and Body ECU.

NG → Repair or replace wireharness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table.
(See page DI–567)

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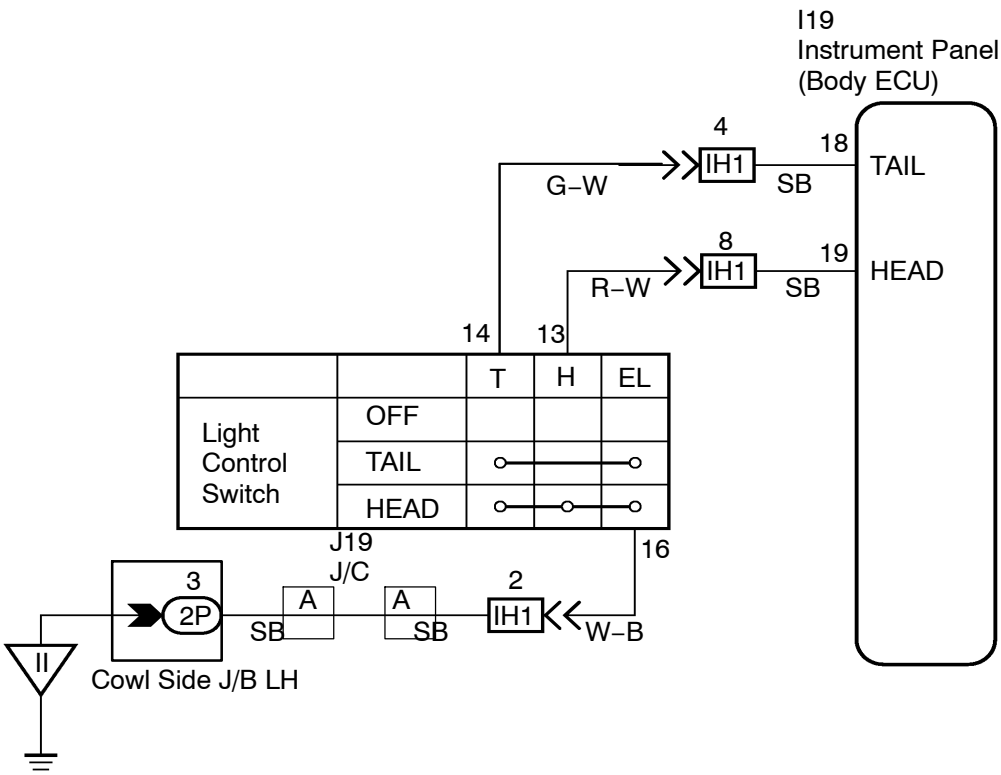
DI1OL–03

Light control switch circuit

WIRING DIAGRAM



I07481

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INSPECTION PROCEDURE

1	Check headlight control switch (See page BE–23)

NG → Replace the headlight control switch.

OK

2	Check wireharness and connector between headlight control switch and Body ECU.

NG → Repair or replace wireharness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table.
(See page DI–567)

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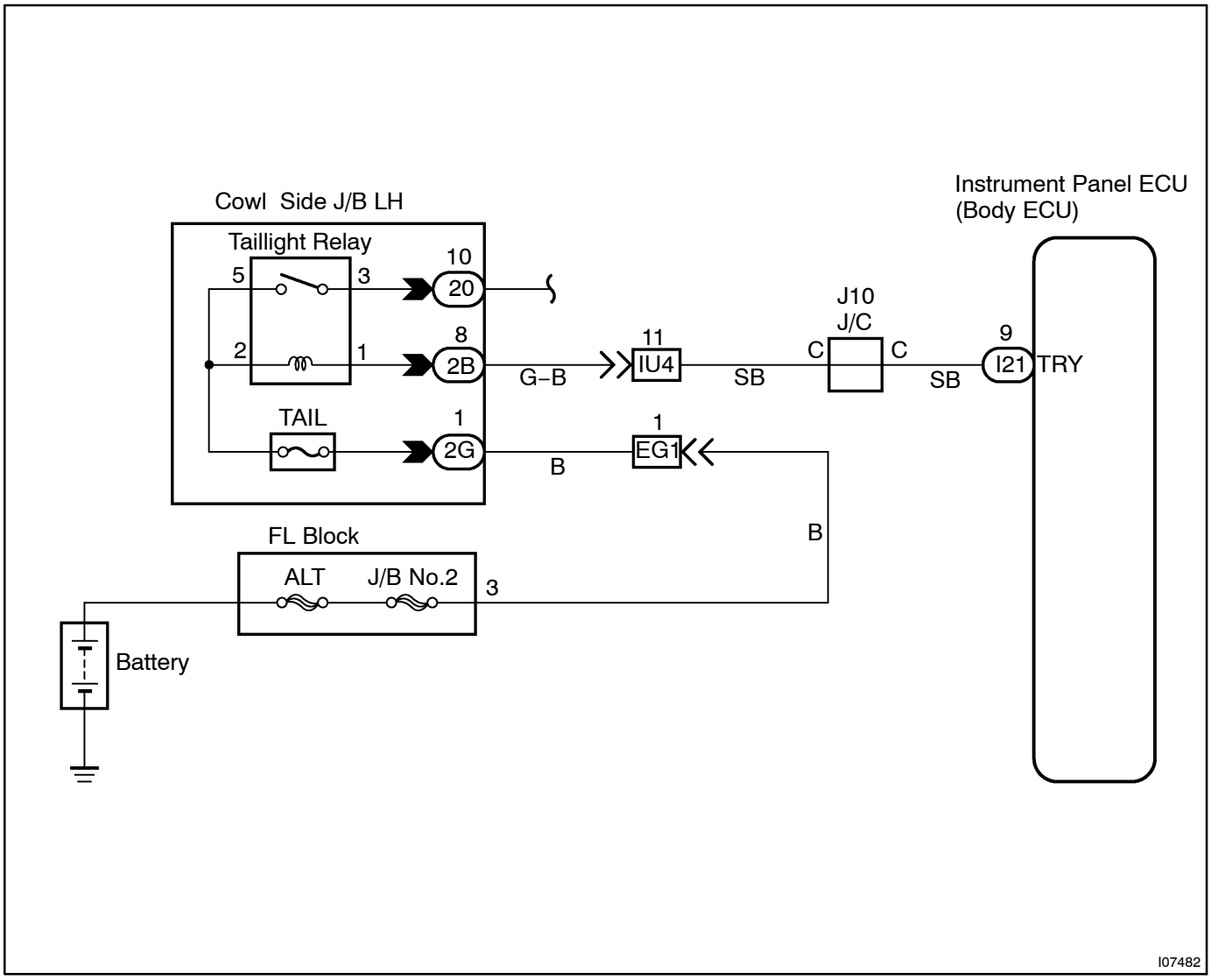
DI1ON–02

Taillight relay circuit

CIRCUIT DESCRIPTION

Taillight relay will be ”ON” by operating the taillight switch. The transistor which activates the tail light relay has two sorts: one activates by the tail light switch for fail safe and the other activates by CPU.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check taillight relay. (See page BE–23)

NG → Replace the taillight relay.

OK

2	Check wireharness and connector between taillight relay and Body ECU, battery and taillight relay.

NG → Repair or replace wireharness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table.
(See page DI–567)

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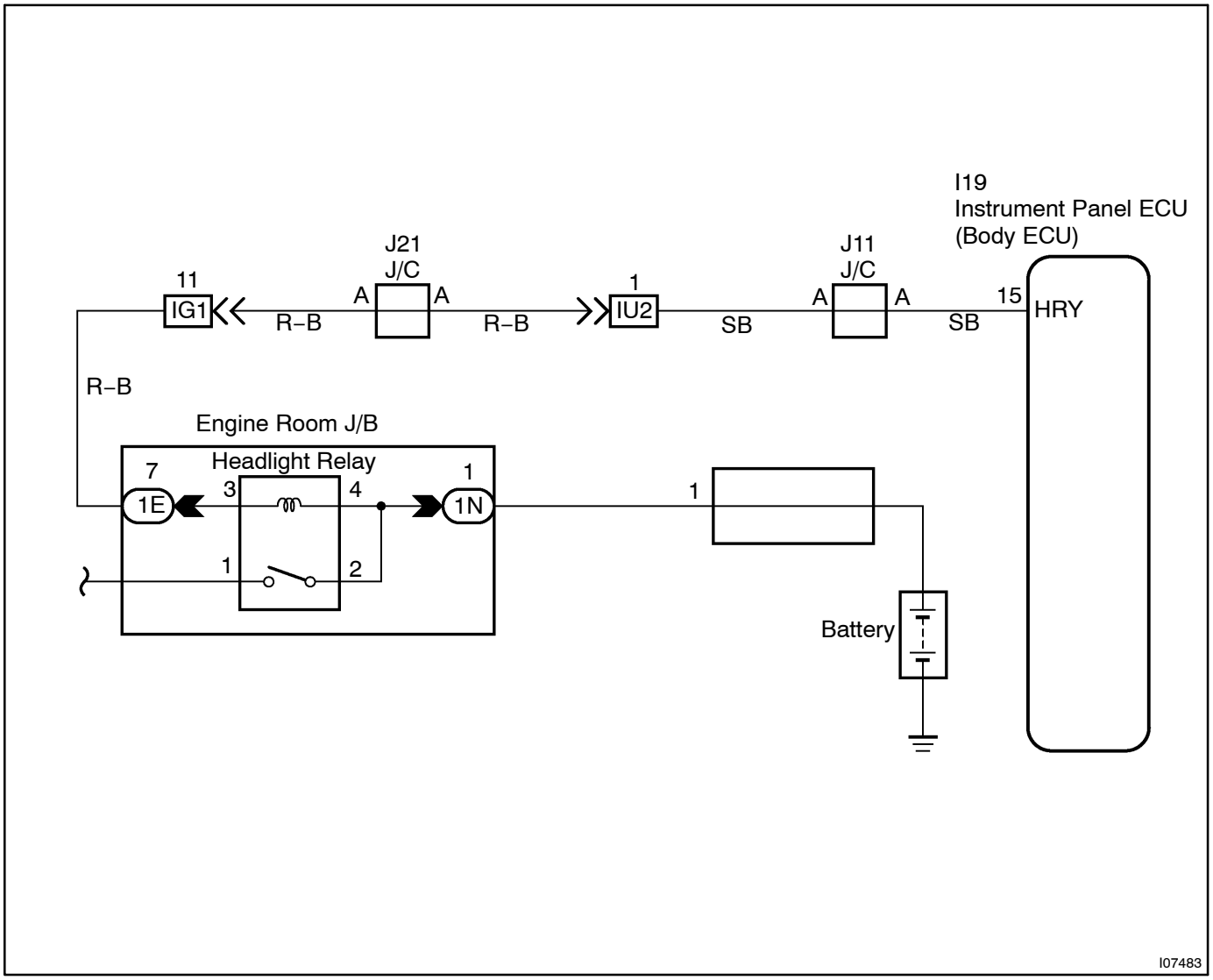
DI1OO–03

Headlight relay circuit

CIRCUIT DESCRIPTION

Head light relay will be ”ON” by operating the headlight switch. The transistor which activates the taillight relay has two sorts: one activates directly by the headlight switch for fail safe and the other activates by CPU. the one that activates by CPU has two systems and prevents the headlight from turning off at the time of one system trouble in the automatic operation circuit.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check headlight relay. (See page BE–23)

NG → Replace the headlight relay.

OK

2	Check wireharness and connector between headlight relay and Body ECU, battery and headlight relay.

NG → Repair or replace wireharness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table.
(See page DI–567)

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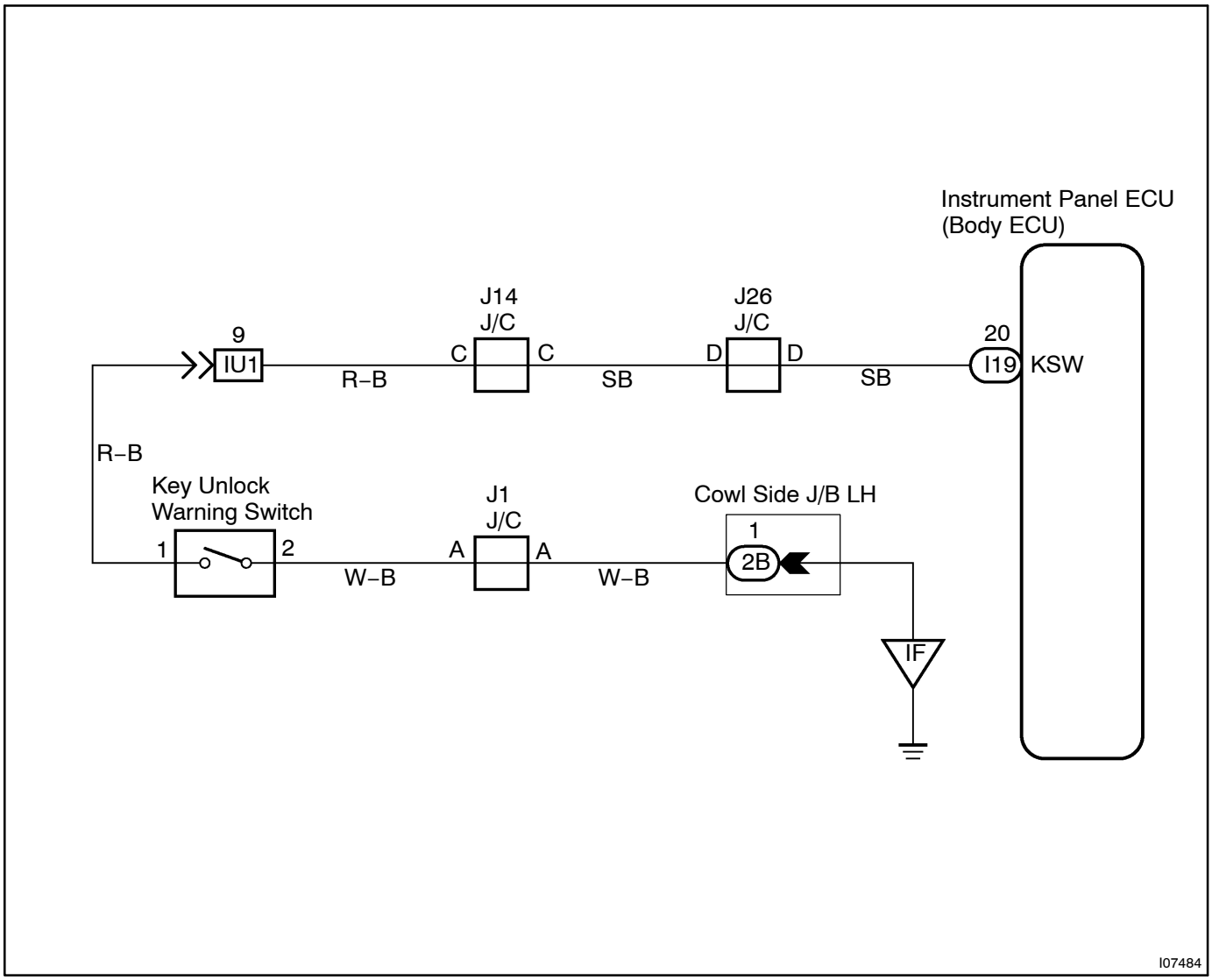
DI1OX–03

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



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INSPECTION PROCEDURE

1	Check key unlock warning switch (See page BE–18)

NG → Replace the key unlock warning switch.

OK

2	Check wireharness and connector between key unlock warning switch and Body ECU.

NG → Repair or replace wireharness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table.
(See page DI–567)

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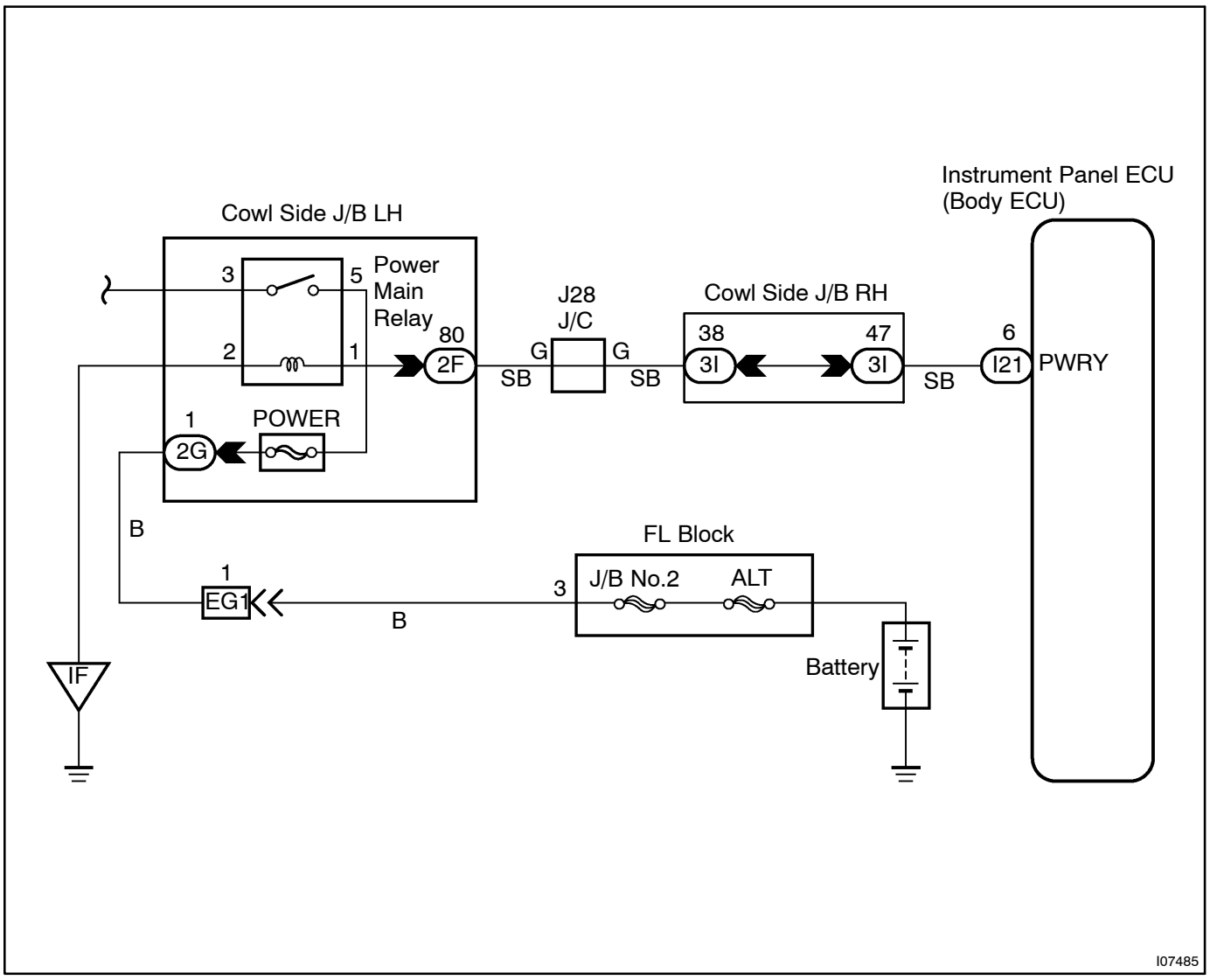
DI1ON–03

Power main relay circuit

CIRCUIT DESCRIPTION

Power main relay will be ”ON” by operating the power window switch.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check power main relay. (See page BE–23)

NG → Replace the power main relay.

OK

2	Check wireharness and connector between power main relay and Body ECU, battery and power main relay.

NG → Repair or replace wireharness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table.
(See page DI–567)

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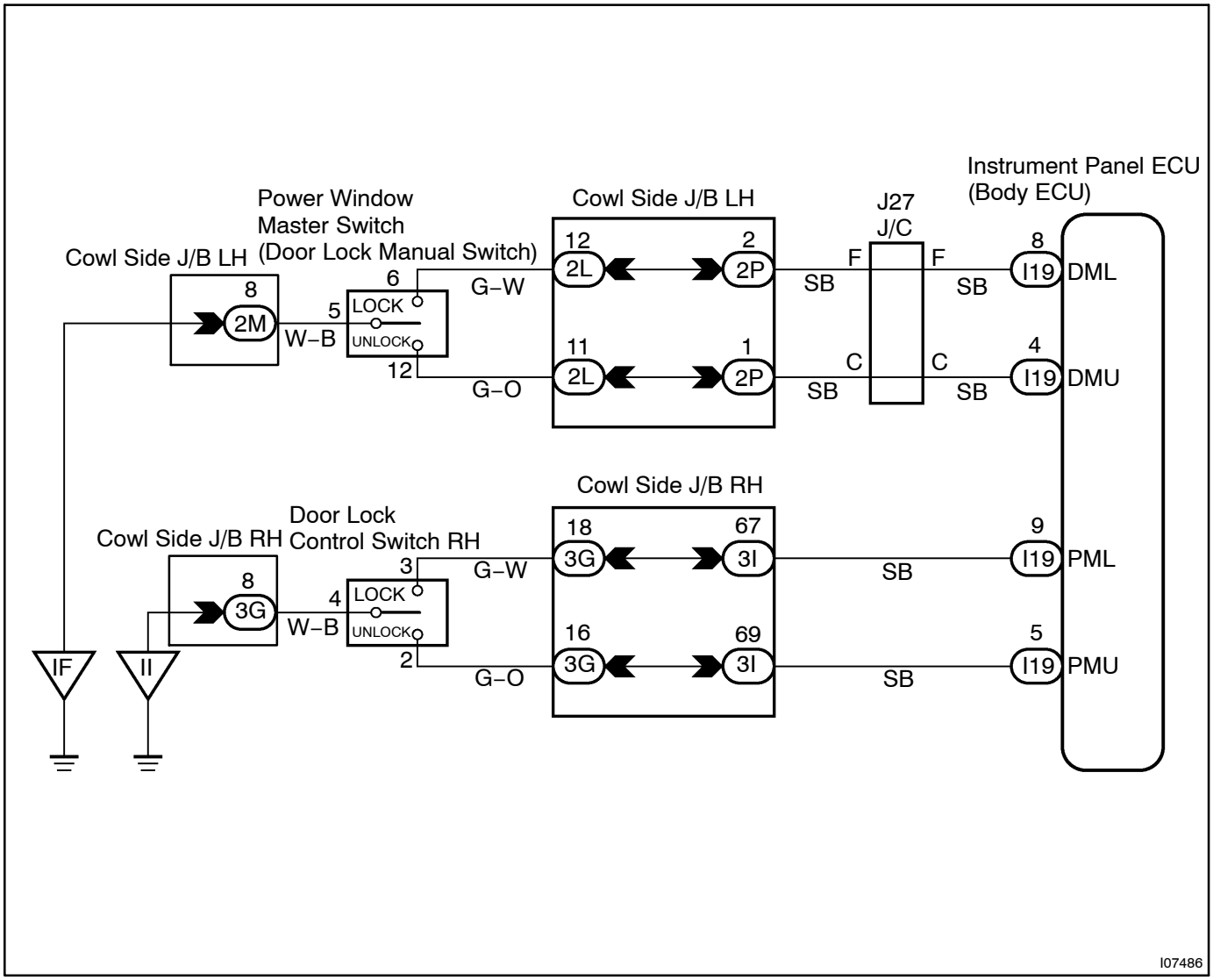
DI1PR–03

Door lock control switch circuit

CIRCUIT DESCRIPTION

Door lock control switch circuit can be checked using DTC check. (Refer to DI–616)

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check the door lock control switch. (See page BE–86)

NG → Replace the door lock control switch.

OK

2	Check wireharness and connector between door lock control switch and Body ECU.

NG → Repair or replace wireharness or connector.

OK

3	Check wireharness and connector between door lock control switch and power window master switch.

NG → Repair or replace wireharness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table.
(See page DI–567)

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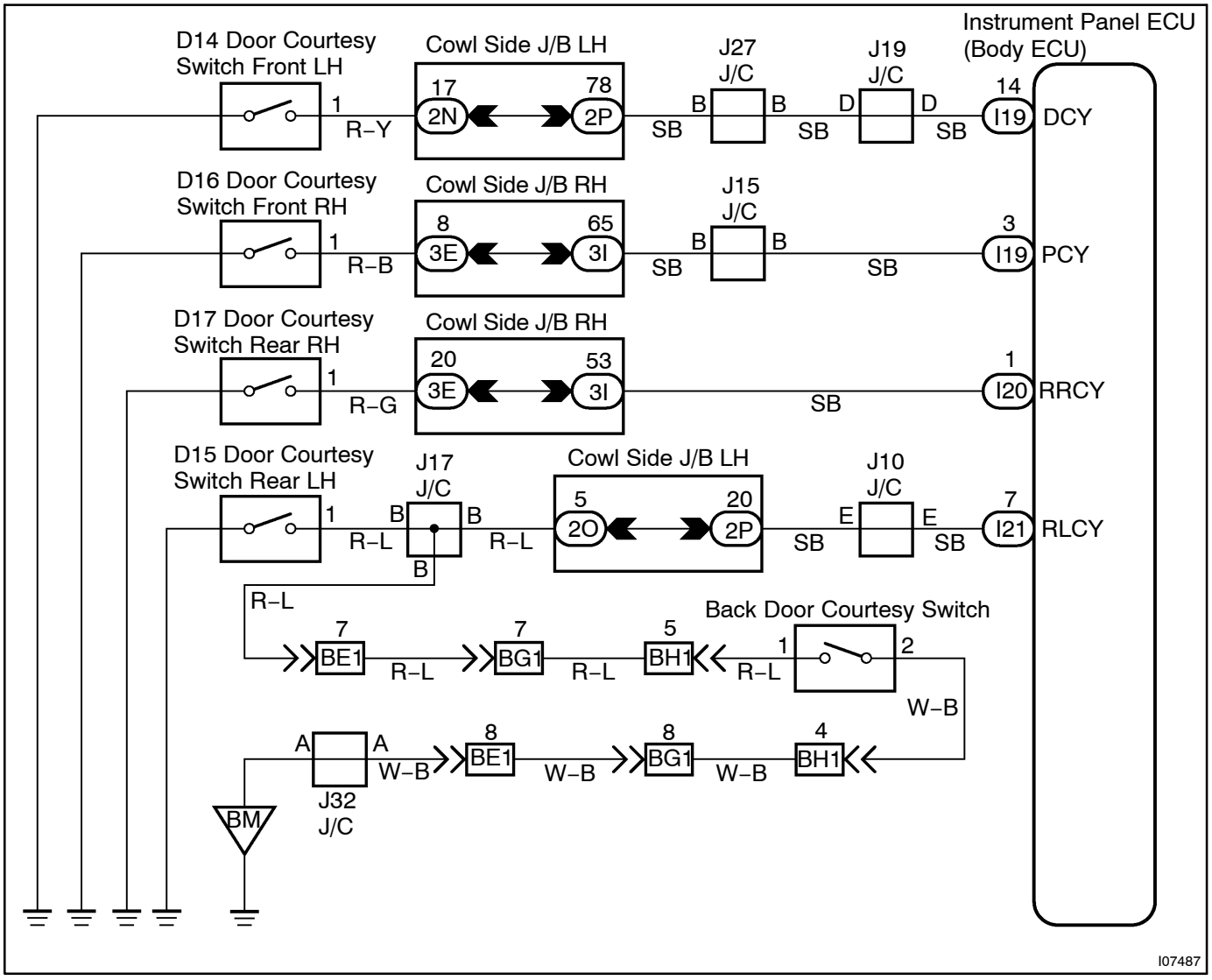
DI1PI–03

Door courtesy switch circuit

CIRCUIT DESCRIPTION

The door courtesy switch goes on when the door is opened and goes off when door is closed.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check courtesy switch. (See page BE–38)

NG → Replace the courtesy switch.

OK

2	Check wireharness and connector between courtesy light and body ECU, courtesy switch and body ECU.

NG → Repair or replace wireharness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table.
(See page DI–567)

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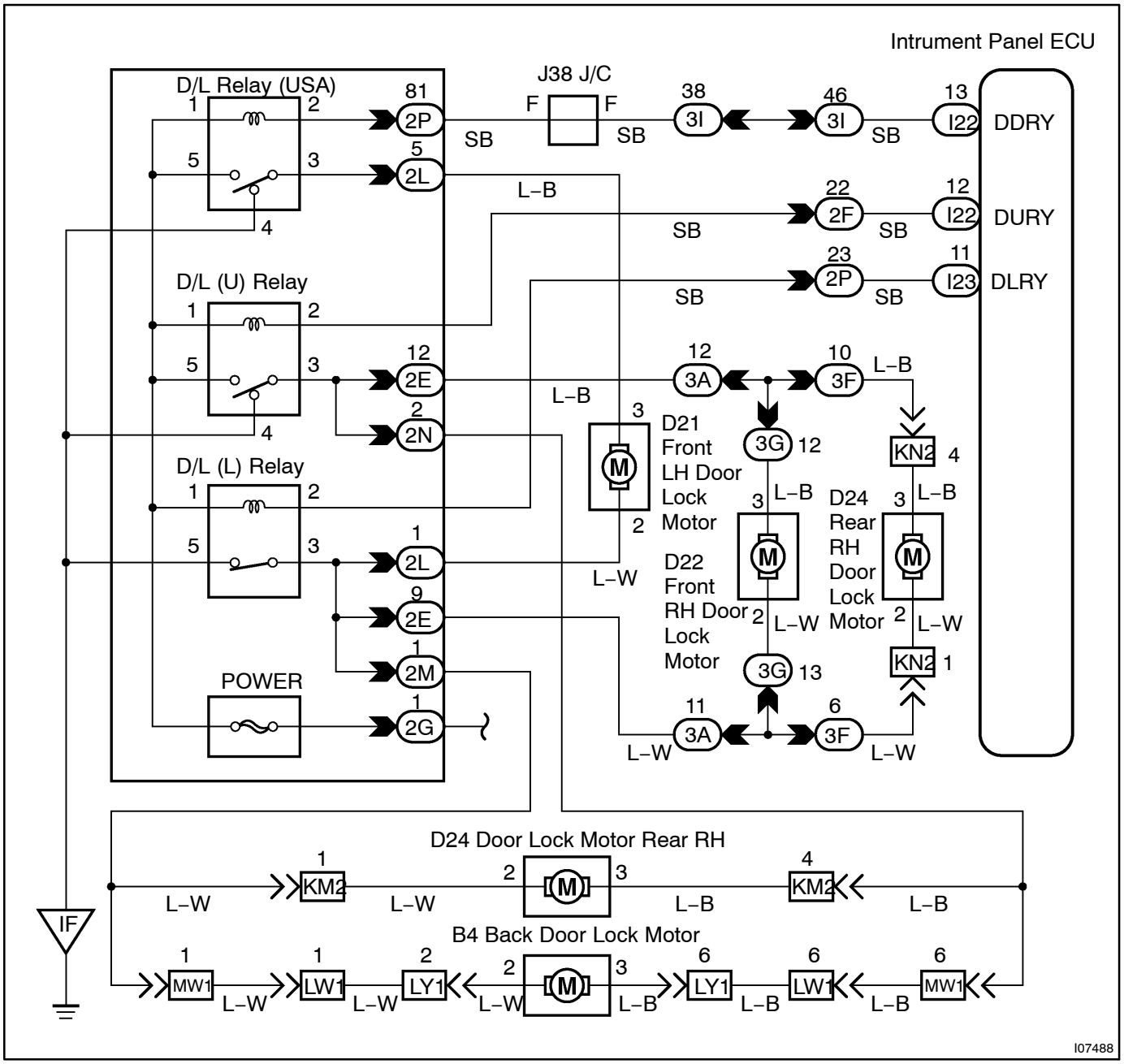
DI1PF–03

Door lock motor and relay circuit

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check door lock relay. (See page BE–86)

NG → Replace the door lock relay.

OK

2	Check door lock motor. (See page BE–86)

NG → Replace the door lock motor.

OK

3	Check wireharness and connector between door lock motor and body ECU.

NG → Repair or replace wireharness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table.
(See page DI–567)

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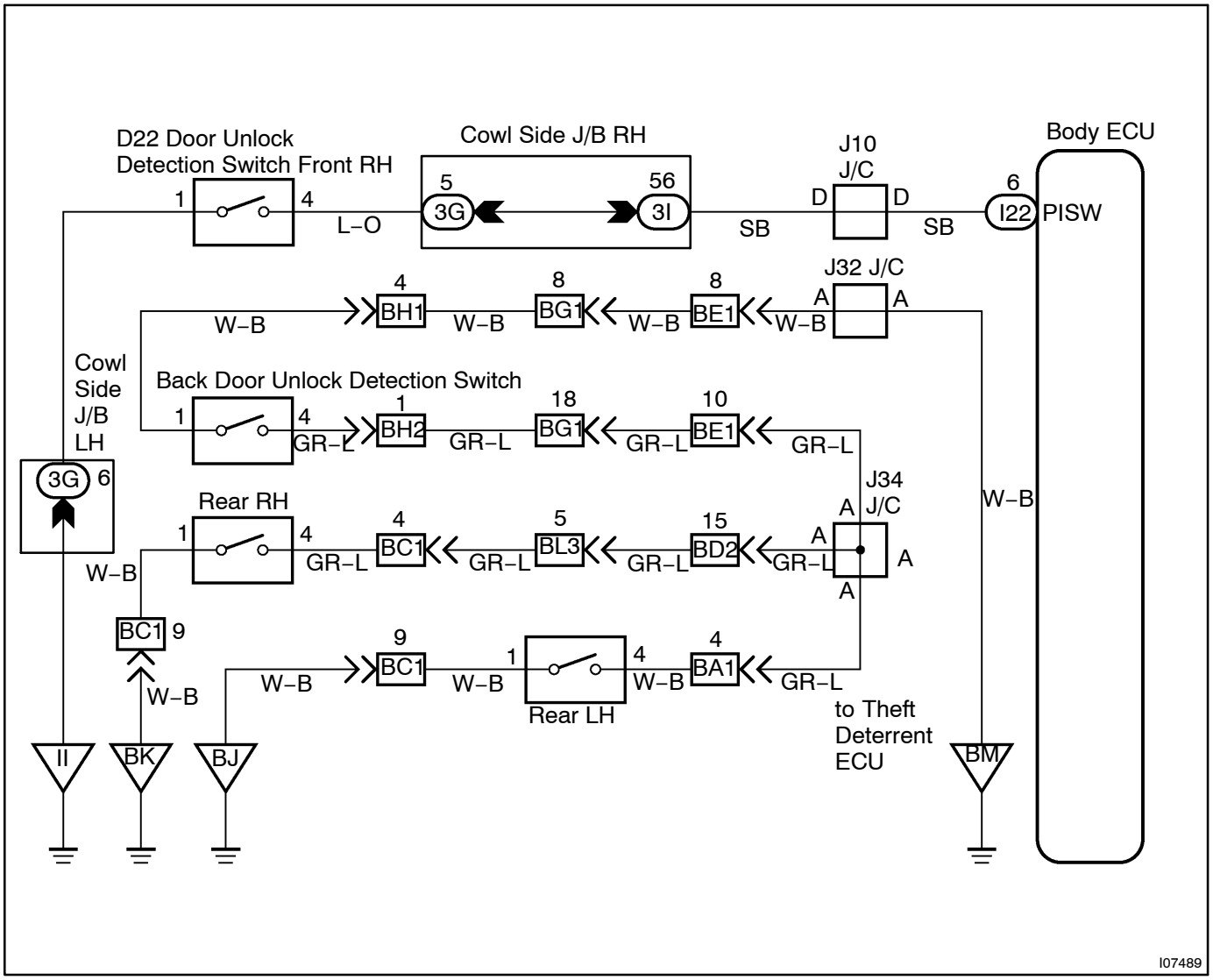
Door unlock detection switch circuit

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 is this circuit. It is used as one of the operating conditions for the key confinement prevention function.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check door unlock detection switch. (See page BE–86)

NG → Replace the door lock motor.

OK

2	Check wireharness and connector between door unlock detection switch and body ECU.

NG → Repair or replace wireharness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table.
(See page DI–567)

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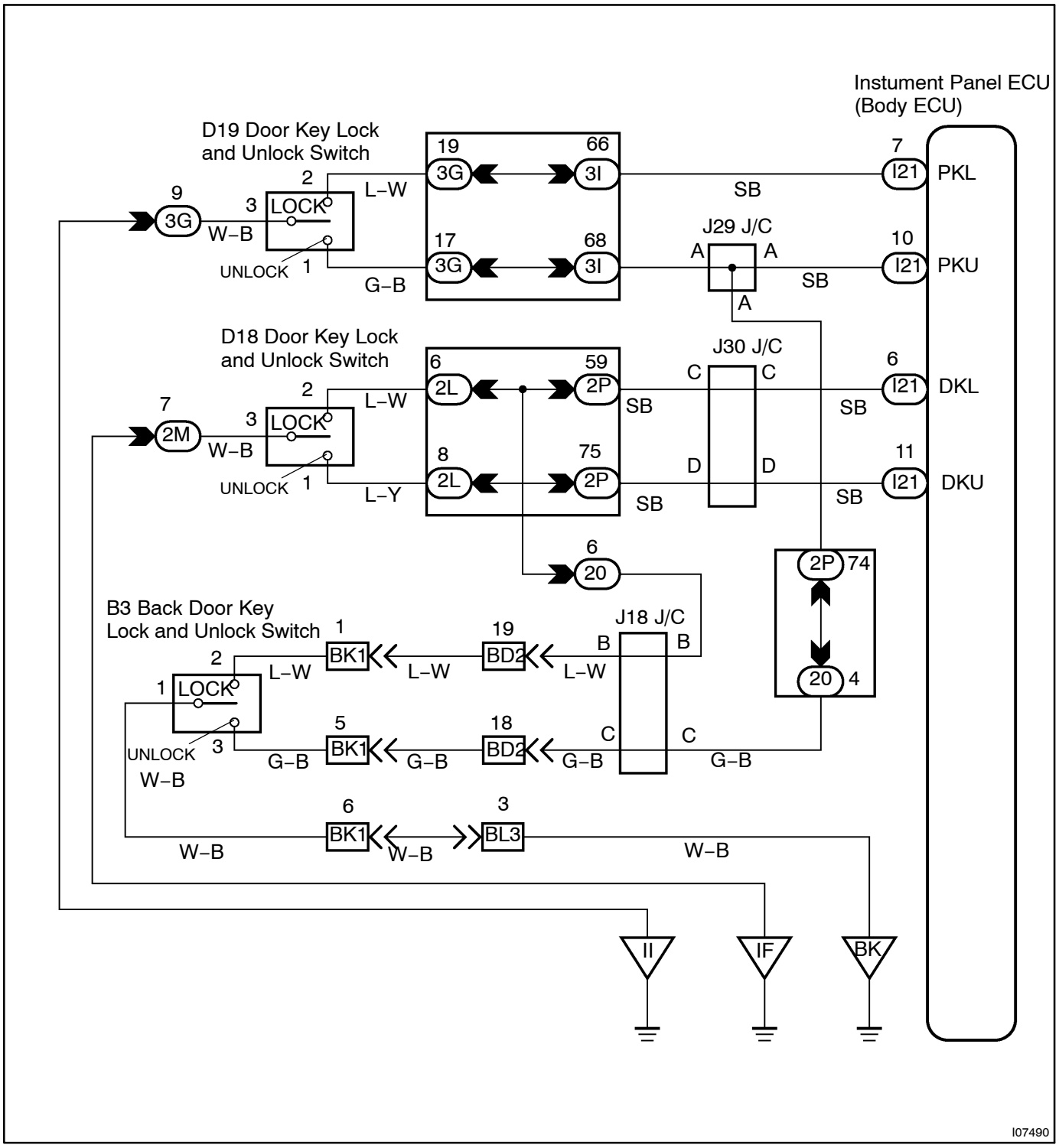
DI1PH–03

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 3 of the switch is grounded and when the key is turned to the unlock side, terminal 2 of the switch is grounded.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check the door key lock and unlock switch. (See page BE–86)

NG → Replace the door key lock and unlock switch.

OK

2	Check wireharness and connector between door key lock and unlock switch and body ECU.

NG → Repair or replace wireharness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table.
(See page DI–567)

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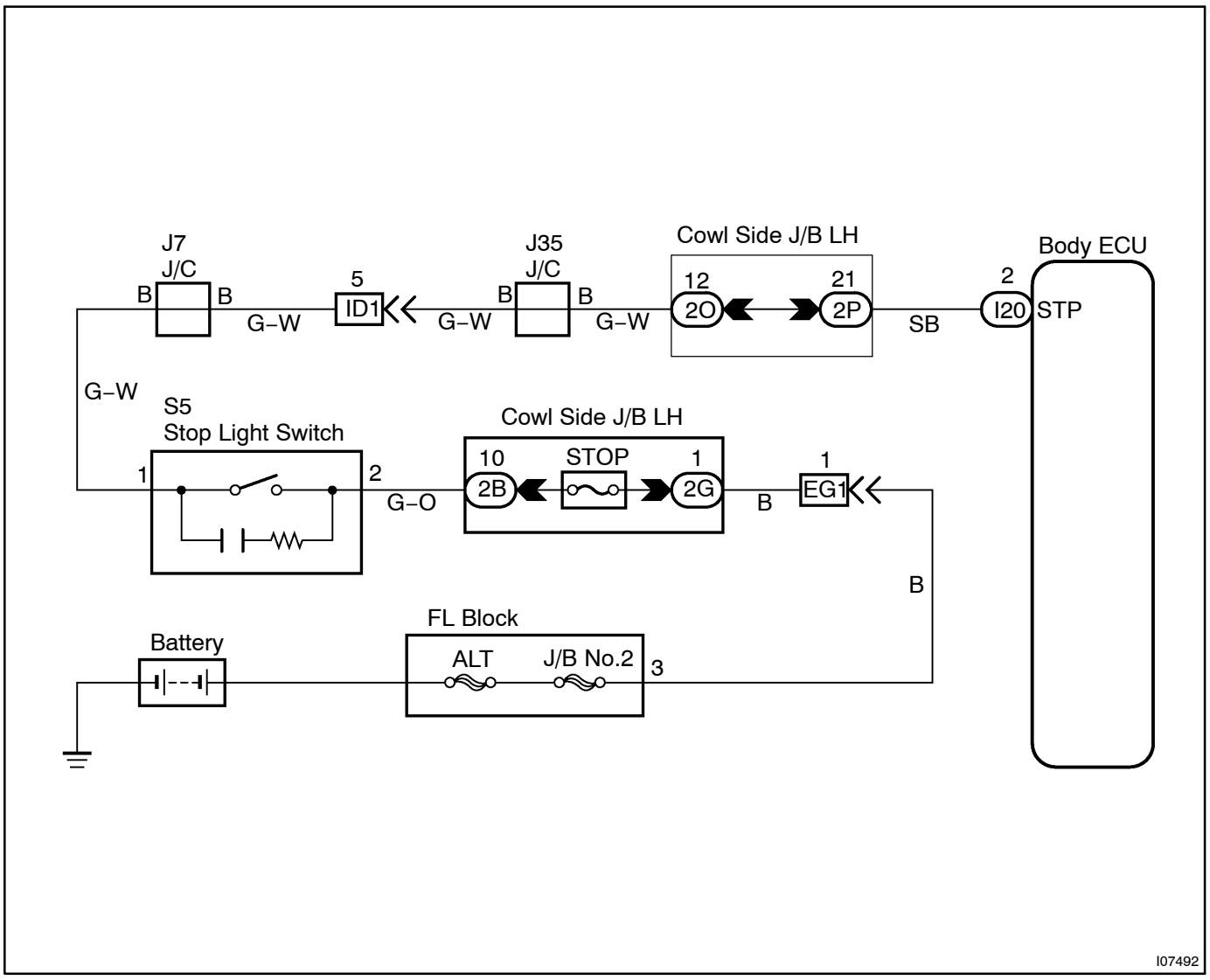
Stop light switch circuit

CIRCUIT DESCRIPTION

The Body ECU is detecting the condition of the stop light switch.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check stop light switch. (See page BE–44)

NG → Replace the stop light switch.

OK

2	Check wireharness and connector between stop light switch and Body ECU, battery and stop light switch.

NG → Repair or replace wireharness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table.
(See page DI–567)

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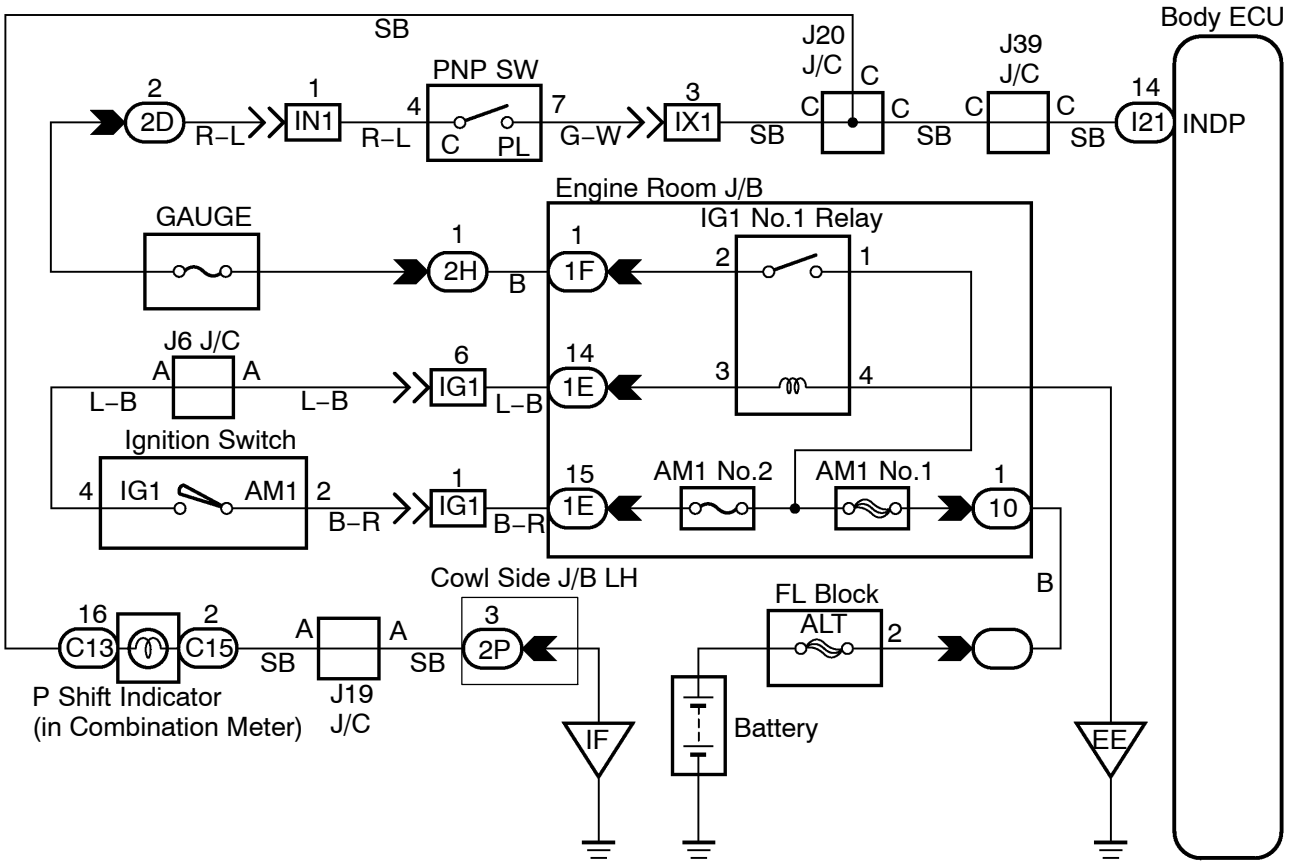
DI3CD–01

Park/Neutral Position Switch Circuit

CIRCUIT DESCRIPTION

The park/neutral position switch detects the shift lever position P and sends signals to the Body ECU.

WIRING DIAGRAM



I07493

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INSPECTION PROCEDURE

1	**Check A/T shift operation.**

CHECK:

Check that the A/T shift operates normally.

NG → **Proceed to AT troubleshooting. (See ST–1).**

OK

2	**Check harness and connector between Body ECU and park/neutral position switch (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace Body ECU (See page IN–34).

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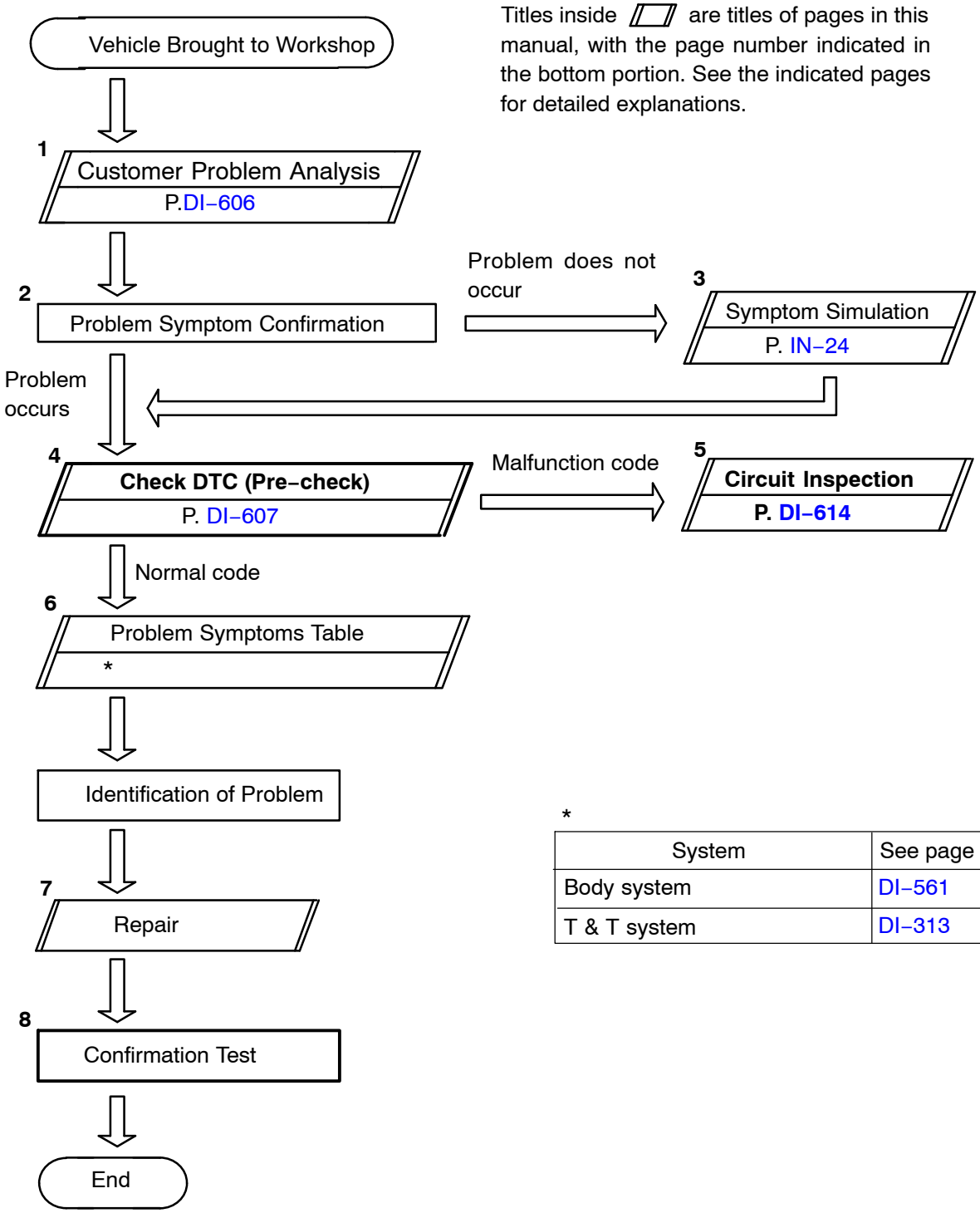
MULTIPLEX COMMUNICATION SYSTEM

DI2AT–03

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.

*

System	See page
Body system	DI–561
T & T system	DI–313

Step 4, 8 : Diagnostic steps permitting the use of the TOYOTA hand–held tester.

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DI2AU–03

CUSTOMER PROBLEM ANALYSIS CHECK

MULTIPLEX COMMUNICATION 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))

Malfunction System	☐ Body Control System
	☐ Tilt and Telescopic System

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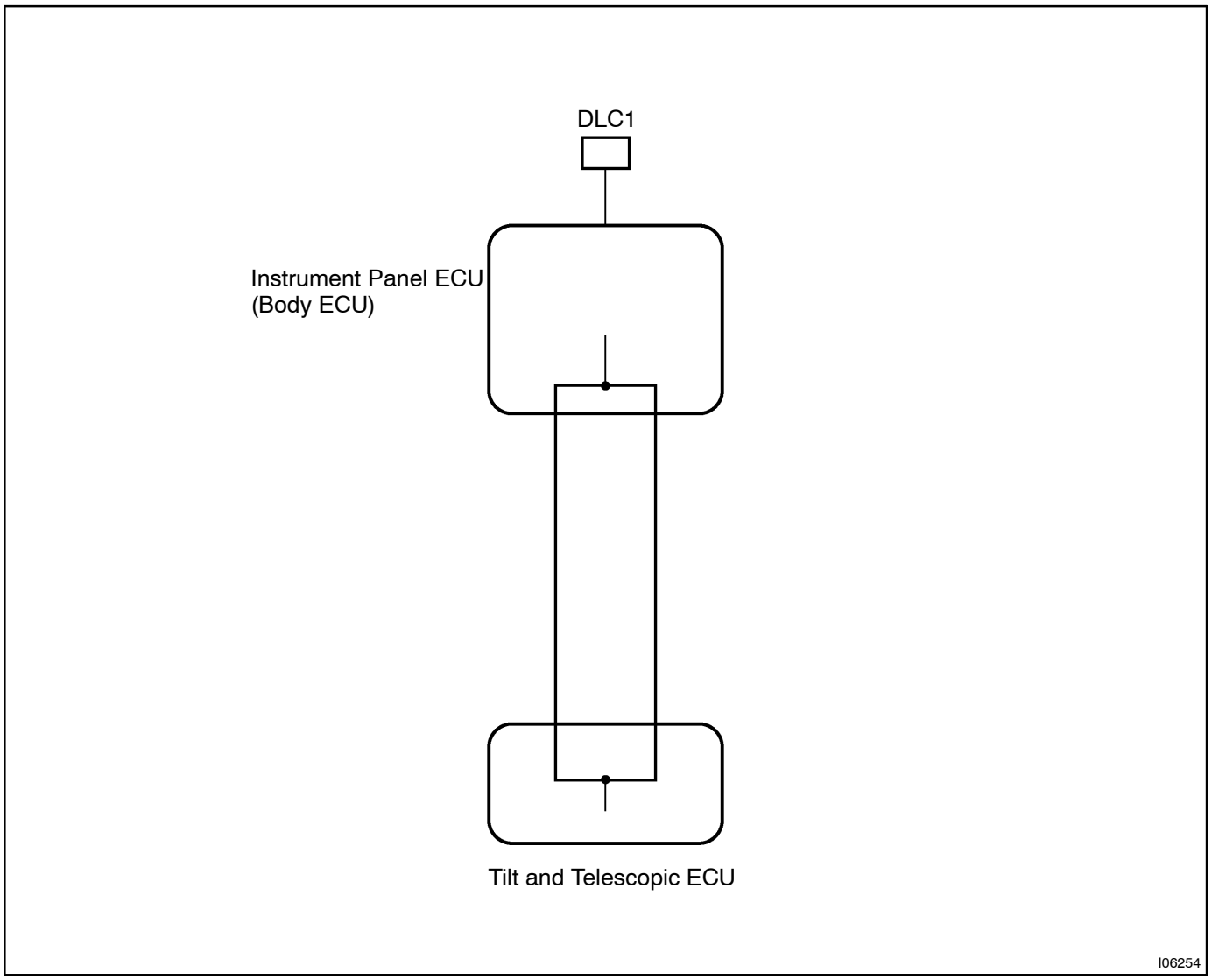
DI3C8–01

PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) As shown in the following illustration, each ECU of this vehicle is connected by communication bus and it transmits each signal by communication. This communication bus is self–diagnosed by Body ECU and it memorizes DTC when it detects communication stop to ECU or communication bus +B short or GND short. There is a possibility that Body ECU cannot self–diagnose accurately unless it doesn't work normal. So, please note that the troubleshooting of Body Electrical System should be done after confirming if Body ECU and Open door indicator works normal by 2 "BASIC INSPECTION" described later.



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2. BASIC INSPECTION

INSPECT BODY ECU	
1	**Check Body ECU operation.**

HINT:
With this inspection Body ECU CPU can be diagnosed if it works normal or not.

CHECK:

Check if the luggage compartment door opener works normal.

OK → **Go to next step"OPEN DOOR INDICATOR LIGHT INSPECTION".**

NG

2	**Check rear wiper system (Except Body ECU). (See page BE–86)**

OK → **Replace the Body ECU.**

NG

Repair of replace malfunction part.

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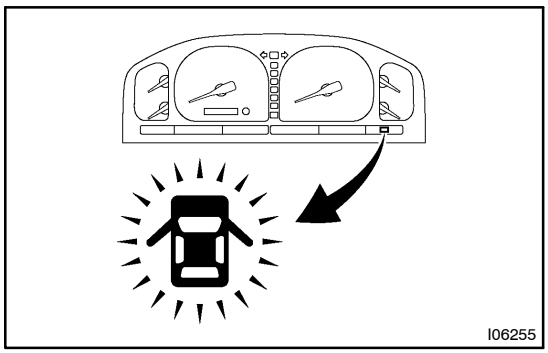
INSPECT OPEN DOOR INDICATOR LIGHT.

1	**Check open door indicator light.**

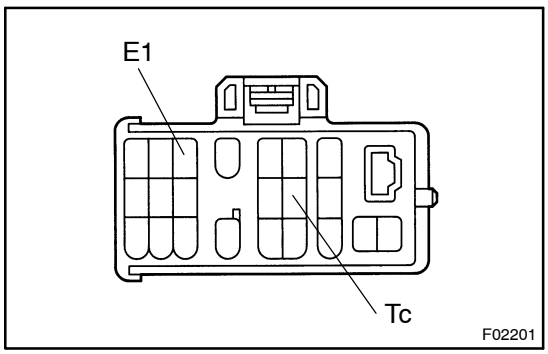


CHECK:
Check if open door Indicator light is turned on when either door open.
HINT:
If open door Indicator light is not turned on, DTC will not be output.

OK → **Go to step 3. "DTC CHECK".**

NG

Repair the open door indicator light.
(See page BE–57)



3. DTC CHECK (Using diagnosis check wire)

(a) Using SST, connect terminals Tc and E1 of DLC1.
SST 09843–18020

(b) Turn the ignition switch ON.

(c) Read the DTC on the open door indicator light.

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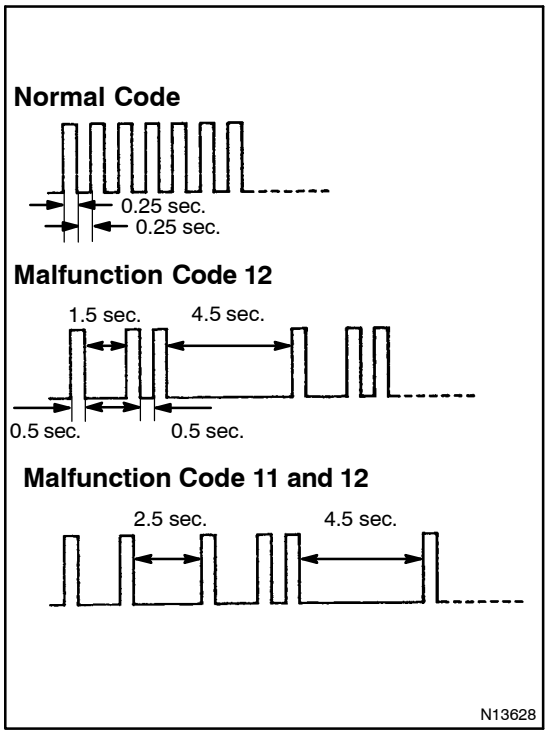
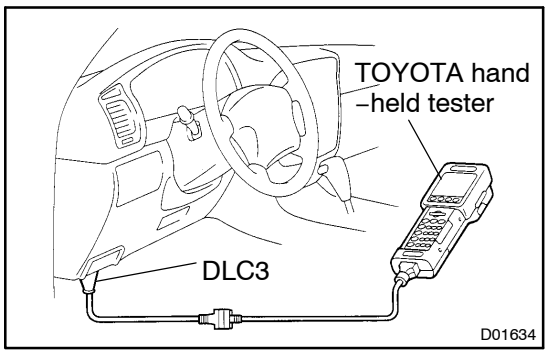


As an example, the blinking patterns for codes; normal, 12, and 11 and 12 are shown in the illustration.

(d) Check for the problem using the DTC table on the next page.

(e) After completing the check, turn the ignition switch off, and disconnect terminals Tc and E1.



4. DTC CHECK (Using TOYOTA hand–held tester)

(a) Prepare the hand–held tester.

(b) Connect the hand–held tester to DLC3.

(c) Turn the ignition switch ON and switch the hand–held tester main switch ON.

(d) Use the hand–held tester to check the DTCs, note them down. (For opening instructions, see the hand–held tester's instruction book.)

(e) See page DI–611 to confirm the details of the DTCs.

5. DTC CLEARANCE

DTC will be cleared when the troble output to DTC is recovered normally.

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DI2AW–03

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
B1213/13 (DI–614)	Tilt and telescopic ECU communication stop	• Wireharness • Tilt and telescopic ECU
B1215/15 (DI–616)	Door system communication bus malfunction (short circuit)	• Wireharness • ECU (Door system bus)

HINT:

When some of the DTC 15 is output, the DTC of other ECU communication stop is also output. In this case, please repair DTC 15 first. The following shows DTCs which are output when +B or GND short occurs on communication bus.

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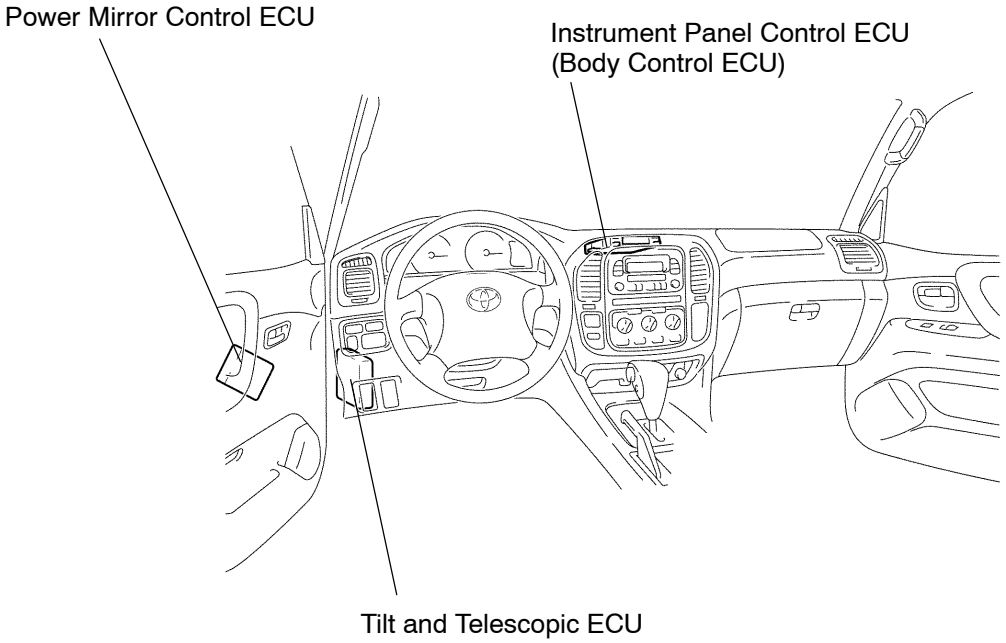
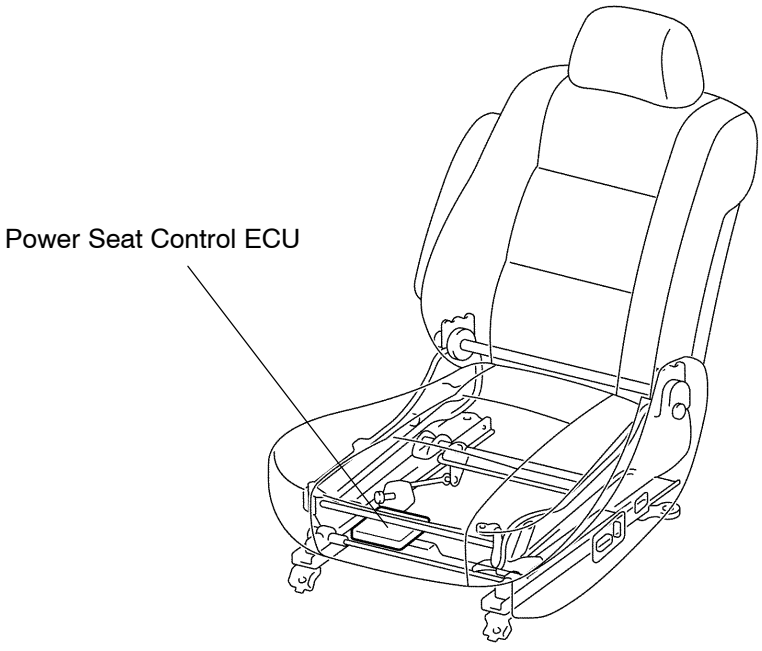
DI3C9–01

PARTS LOCATION





I07576

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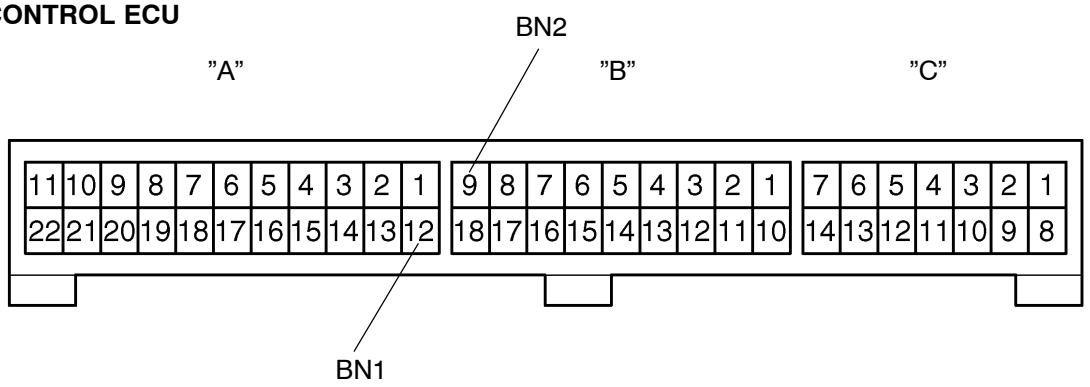
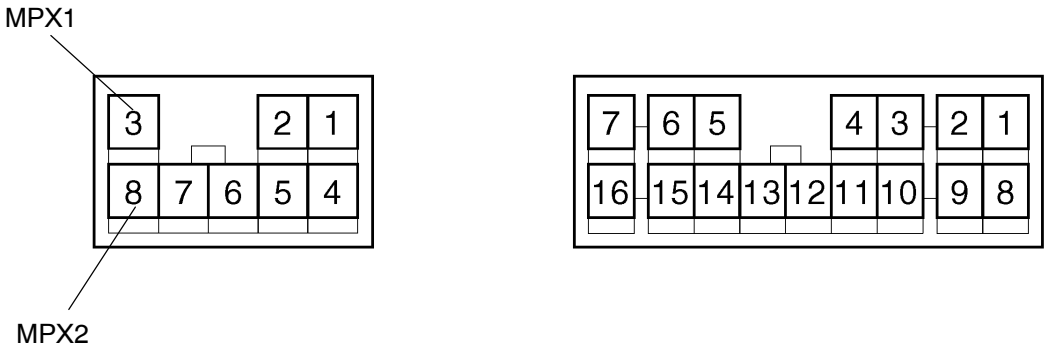
TERMINALS OF ECU

BODY CONTROL ECU



I06116

TILT AND TELESCOPIC ECU



I06256

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DI2B1–03

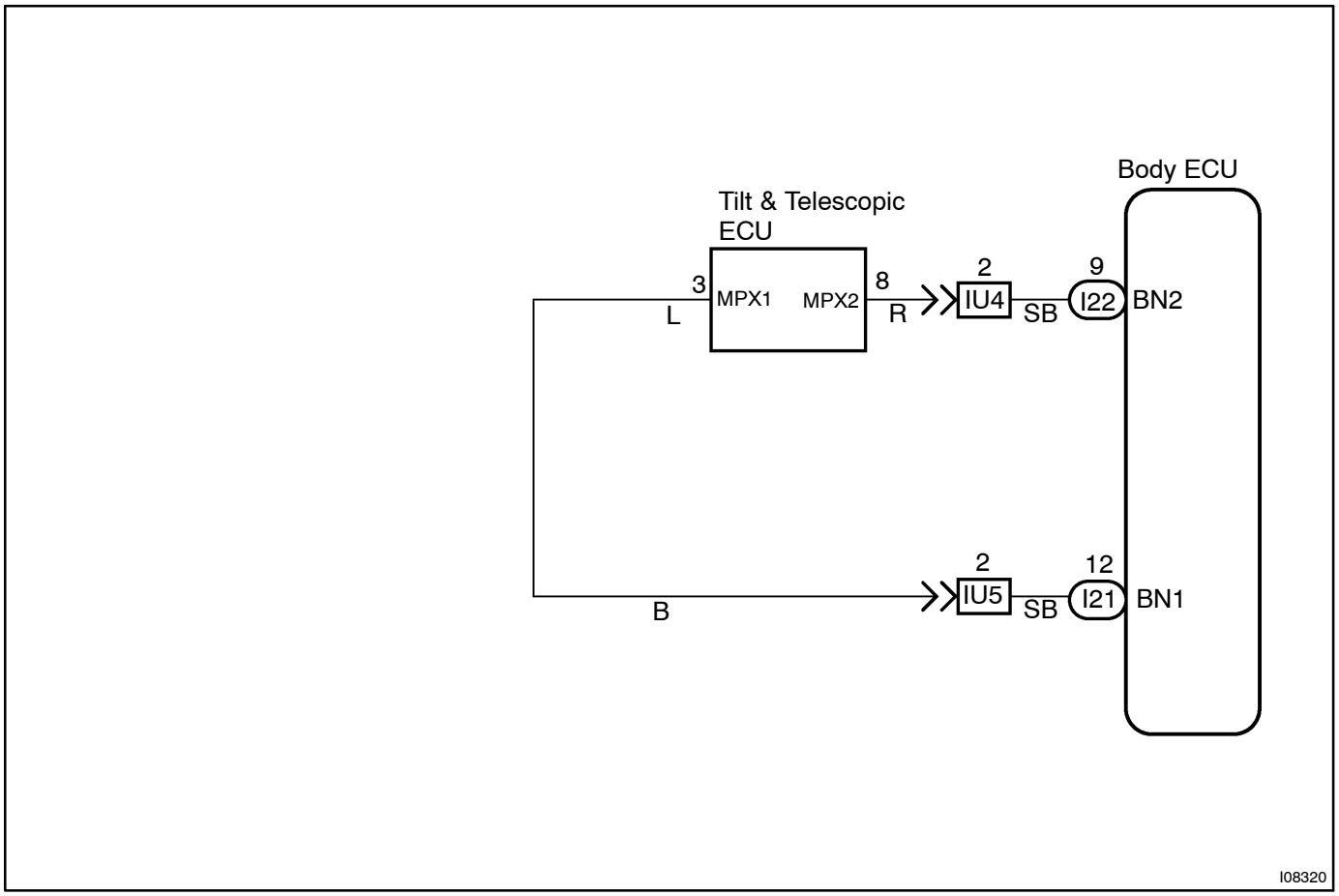
DTC	B1213 / 13	Tilt and telescopic ECU communication stop

CIRCUIT DESCRIPTION

This DTC is output when communication stops between tilt and telescopic ECU and Body ECU.

DTC No.	DTC Detecting Condition	Trouble Area
B1212/12	No communication from tilt and telescopic ECU more than 10 seconds.	• Tilt and telescopic ECU • Wireharness

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check tilt and telescopic ECU.**

CHECK:

Check the operation of the manual tilt and telescopic.

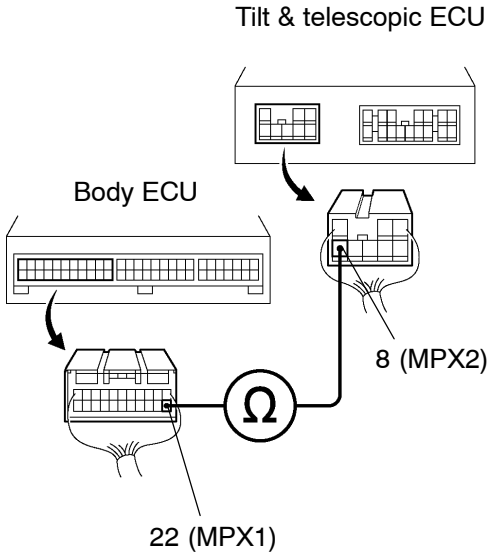
HINT:

With this inspection, the tile and telescopic ECM CPU can be diagnosed if it works normally or not.

NG → **Replace the tilt and telescopic ECU.**

OK

2	**Check wireharness**



PREPARATION:

Disconnect connector body ECU and tilt and telescopic ECU.

CHECK:

(a) Check continuity between terminals MPX1 of body ECU and MPX2 of tilt and telescopic ECU.

(b) Check continuity between terminals MPX1 of tilt and telescopic ECU and MPX2 of body ECU.

OK:

There is a continuity in wireharness.

NG → **Repair or replace wireharness.**

OK

Replace the tilt and telescopic ECU.

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DI3CB–01

DTC	B1215 / 15	Door system communication bus malfunction (GND short)

CIRCUIT DESCRIPTION

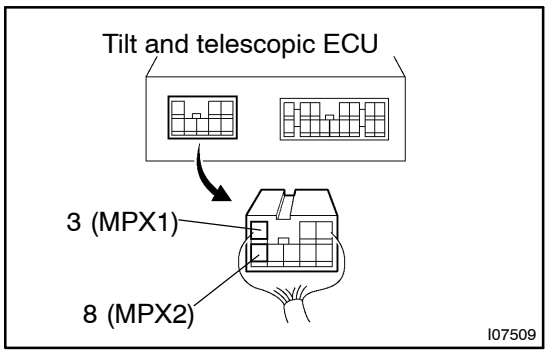
This DTC is output when +B or GND short occurs on door system communication bus. If +B or GND short is detected on door system communication bus, separate it by bus cut relay in body ECU to prevent while communication buses' failure.

WIRING DIAGRAM

See page DI–614.

INSPECTION PROCEDURE

1	**Check the communication circuit inside tilt and telescopic ECU.**



PREPARATION:
Disconnect the connector tilt and telescopic ECU.
CHECK:
Check the DTC.
OK:
Code B1215/15 is not output

OK → **Replace the tilt and telescopic ECU.**

NG

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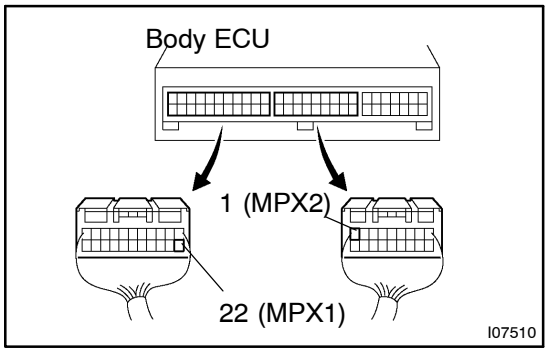
2	Check for short circuit between tilt & telescopic ECU and body ECU.



PREPARATION:
Disconnect the connector body ECU.
CHECK:
Check the DTC.
OK:
Code B1215/15 is not output

OK → **Repair or replace the wireharness between tilt & telescopic ECU and body ECU.**

NG

Replace the body ECU.

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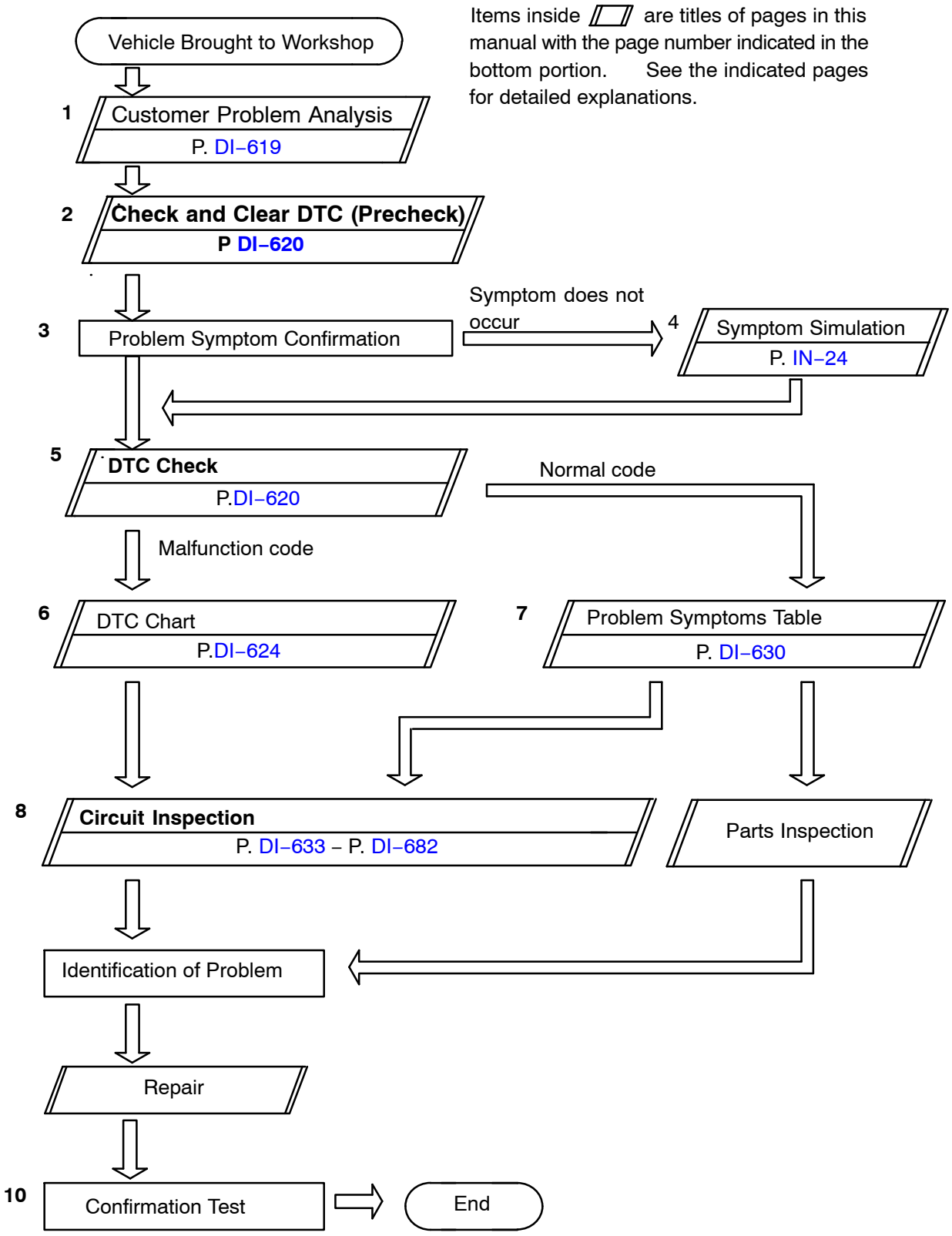
AIR CONDITIONING SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI261–02

Perform troubleshooting in accordance with the procedure on the following page.



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DI262-01

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 chage ☐ Will not enter the desired mode

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

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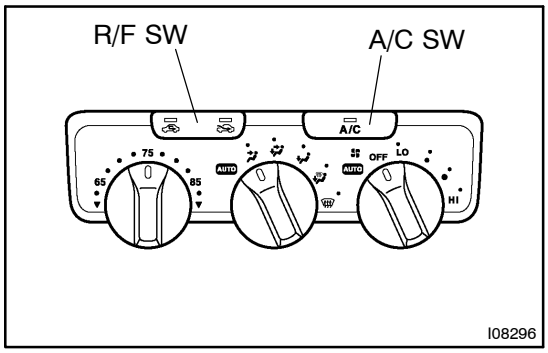
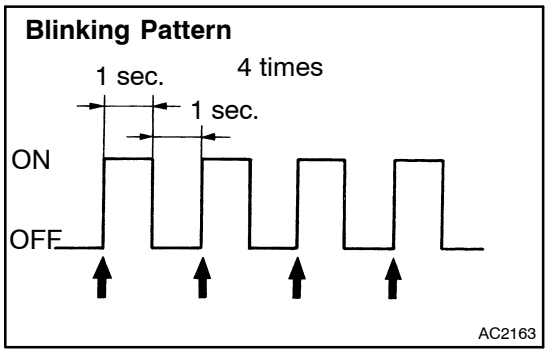
DI3CV–01



PRE–CHECK

1. INDICATOR CHECK

(a) Turn the ignition switch on while pressing the A/C switch and R/F SW simultaneously.



(b) Check that all the indicators light up and go off at 1 second intervals 4 times in succession.

HINT:

- After the indicator check is ended, the diagnostic sensor check begins automatically.
- Press the OFF switch when cancelling the check mode.

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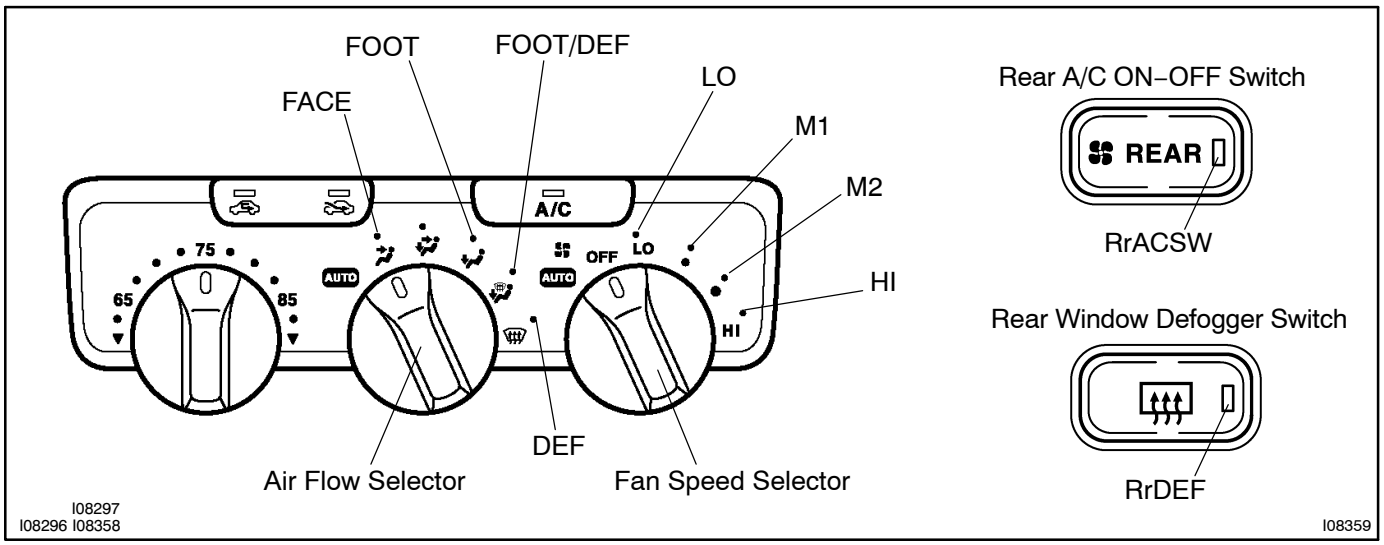
2. PANEL DIAGNOSIS SYSTEM

If a trouble occurs in A/C system, the specified lamp on the control panel starts blinking during the diagnostic sensor check.

During system diagnosis, a trouble is indicated on the panel by the blinking of a specified light instead of a code display (See TROUBLE CODE CHART).

For example, when a trouble occurs in solar sensor circuit, the RrDEF switch indicator and DEF mode switch indicator will be blinking during the diagnostic sensor check.



No.	Indicator name	Symbol
1	Rear window defogger switch indicator light	RrDEF
2	Rear A/C ON–OFF switch indicator light	RrACSW
3	Air flow selector: FACE	FACE
4	Air flow selector: FOOT	FOOT
5	Air flow selector: FOOT and DEFROSTER	F/D
6	Air flow selector: DEFROSTER	DEF
7	Fan Speed Selector: LO	M1
8	Fan Speed Selector: M1	M2
9	Fan Speed Selector: M2	LO
10	Fan Speed Selector: HI	HI

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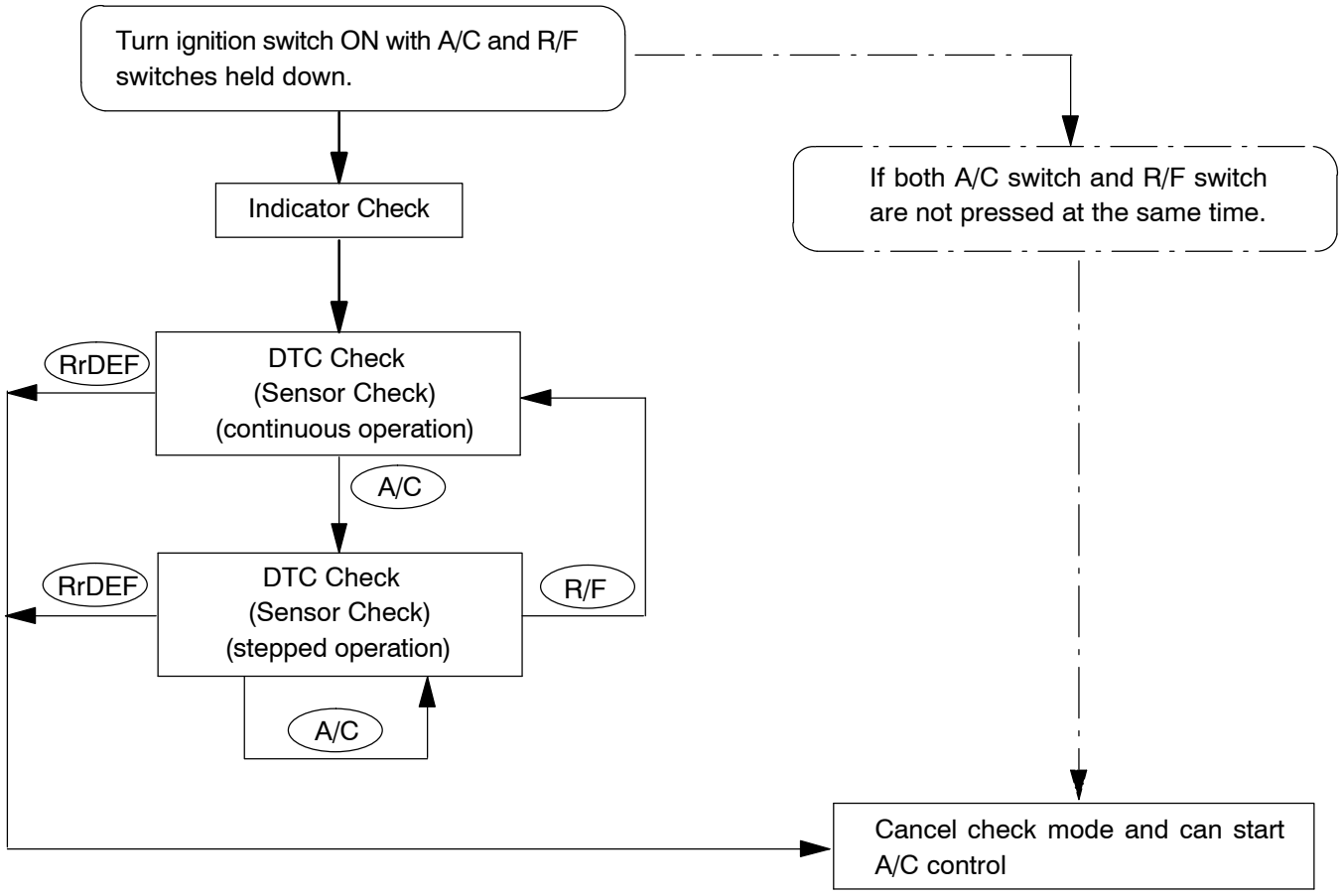
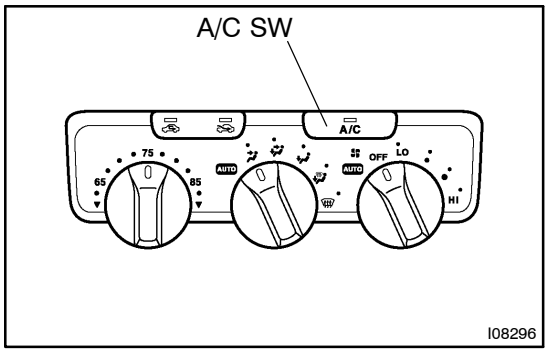
3. LIST OF OPERATION METHODS

By operating each of the A/C control switches as shown in the diagram below, it is possible to enter the diagnosis check mode.





4. DIAGNOSTIC SENSOR CHECK

(a) Perform an indicator check. After the indicator check is completed, the system enters the diagnostic sensor check mode automatically.

(b) Check the LED blinking on the panel. Refer to the list of codes on page DI–624 when translating the trouble code from the LED blinking.
If the slower display is desired, press the A/C switch and change it to step operation. Each time the A/C switch is pressed, the blinking LED changes by 1 step.

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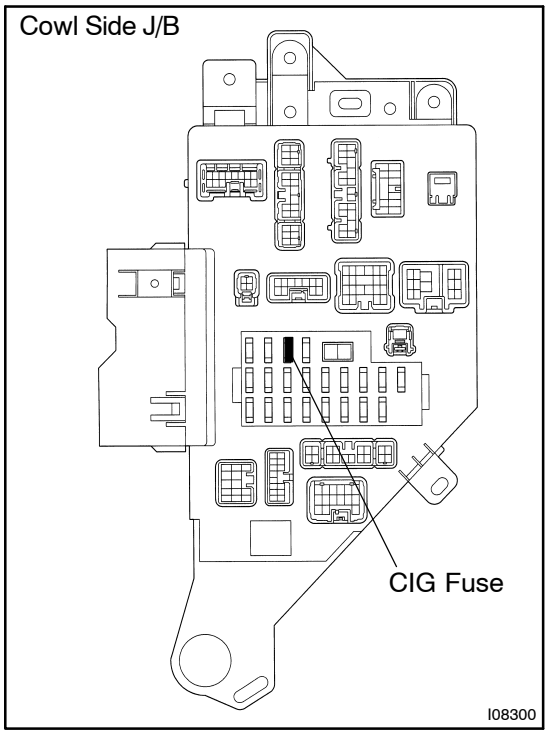

5. CLEARING DTC

(a) Pull out the CIG fuse in Cowl Side J/B for 10 sec. or longer to clear the trouble code's memory.

(b) After reinserting the fuse, check that the normal code is output.

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DI264–03

DIAGNOSTIC TROUBLE CODE CHART

If 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.)

Blinking light	Detection Item	Trouble Area	Memory
RrDEF RrACSW	Normal	–	–
RrDEF FACE *1 (DI–633)	Front room temperature sensor circuit	• Front room temp. sensor • Harness or connector between front room temp. sensor and A/C amplifier • A/C amplifier	○ (8.5 min. or more)
RrDEF B/L *2 (DI–636)	Ambient temperature sensor circuit	• Ambient temp. sensor • Harness or connector between ambient temp. sensor and A/C amplifier • A/C amplifier	○ (8.5 min. or more)
RrDEF FOOT (DI–639)	Front evaporator temperature sensor circuit	• Front evaporator temp. sensor • Harness or connector between front evaporator temp. sensor and A/C amplifier • A/C amplifier	○ (8.5 min. or more)
RrDEF F/D (DI–642)	Engine coolant temperature sensor circuit	• Engine coolant temp. sensor • Harness or connector between engine coolant temp. sensor and A/C amplifier • A/C amplifier	–
RrACSW FOOT (DI–644)	Rear evaporator temperature sensor circuit	• Rear evaporator temp. sensor • Harness or connector between Rear evaporator temp. sensor and A/C amplifier • A/C amplifier	○ (8.5 min. or more)
RrACSW FACE *1 (DI–647)	Rear room temperature sensor circuit	• Rear room temp. sensor • Harness or connector between rear room temp. sensor and A/C amplifier • A/C amplifier	○ (8.5 min. or more)
RrDEF DEF *3 (DI–650)	Solar sensor circuit (Open)	• Solar sensor • Harness or connector between solar sensor and A/C amplifier • A/C amplifier	–
	Solar sensor circuit (Short)		○ (8.5 min. or more)
RrDEF FRS (DI–653)	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 amplifier • Refrigerant pipe line • A/C amplifier	–
RrACSW HI *1 (DI–656)	Rear linlet air temperature sensor circuit	• Rear inlet air temp. sensor • Harness or connector between rear inlet air temp. sensor and A/C amplifier • A/C amplifier	○ (8.5 min. or more)
RrDEF REC (DI–659)	Front air mix damper position sensor circuit	• Front air mix damper position sensor • A/C amplifier • Harness or connector between front air mix damper position sensor and A/C amplifier	○ (1 min. or more)
RrDEF LO (DI–662)	Air inlet damper position sensor circuit	• Air inlet damper position sensor circuit • A/C amplifier • Harness or connector between air inlet damper position sensor and A/C amplifier	○ (1 min. or more)

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RrACSW REC (DI–665)	Rear air mix damper position sensor circuit	• Rear air mix damper position sensor • A/C amplifier • Harness or connector between rear air mix damper position sensor and A/C amplifier	–
RrDEF M1 (DI–659 DI–668)	Front air mix damper position sensor circuit	• Front air mix damper control servomotor • Front air mix damper position sensor • Harness and connector between A/C amplifier front and air mix position sensor • Harness and connector between A/C amplifier and front air mix damper control servomotor • A/C amplifier	○ (15secs. or more)
RrDEF M2 (DI–662 DI–670)	Air inlet damper position sensor circuit	• Air mix damper control servomotor • Air mix damper position sensor • Harness and connector between A/C amplifier and air mix position sensor • Harness and connector between A/C amplifier and mix damper control servomotor • A/C amplifier	○ (15secs. or more)
RrACSW M1 (DI–665 DI–672)	Rear Air mix damper position sensor circuit	• Air mix damper control servomotor • Air mix damper position sensor • Harness and connector between A/C amplifier and air mix position sensor • Harness and connector between A/C amplifier and mix damper control servomotor • A/C amplifier	–

HINT:

- *1 If the room temp. is approx. –20°C (–4°F) or lower, RrDEF and FACE indicator may be light up even though the system is normal.
- *2 If the ambient temperature is approx. –50°C (–58°F) or lower, a DTC may be output even though the system is normal.
- *3 If the check is being performed in a dark place, RrDEF and DEF (solar sensor circuit abnormal) could be light up. In this case, perform DTC check again while shining a light, such as an inspection light, on the solar sensor. If RrDEF and DEF is still light up, there could be trouble in the solar sensor circuit.

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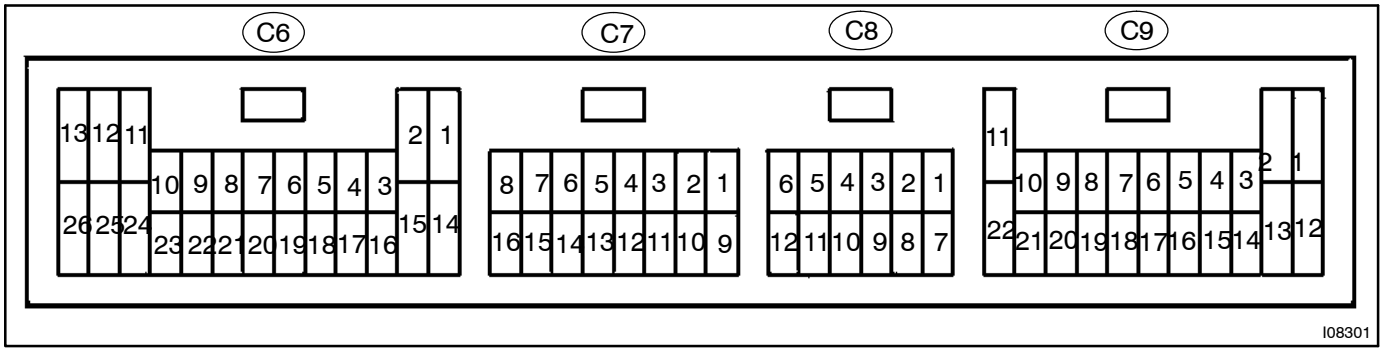
TERMINALS OF ECU

1. A/C AMPLIFIER



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
IG ↔ GND (C9–1 ↔ C9–22)	R–L ↔ W–B	IG switch OFF → ON	10 – 14 V
ACC ↔ GND (C9–2 ↔ C9–22)	GR ↔ W–B	Turn ignition switch ACC	10 – 14 V
AIF ↔ GND (C9–6 ↔ C9–22)	G–W ↔ W–B	IG ON. Push FRS switch	Below 1.0 V
		IG ON. Push REC switch	10 – 14 V
AIR ↔ GND (C9–7 ↔ C9–22)	LG–B ↔ W–B	IG ON. Push FRS switch	10 – 14 V
		IG ON. Push REC switch	Below 1.0 V
FrAMC ↔ GND (C9–8 ↔ C9–22)	P–G ↔ W–B	IG ON. Set temp. : Max Cool	10 – 14 V
		IG ON. Set temp. : Max Hot	Below 1.0 V
FrAMH ↔ GND (C9–9 ↔ C9–22)	P–B ↔ W–B	IG ON. Set temp. : Max Cool	Below 1.0 V
		IG ON. Push REC switch	10 – 14 V
+B ↔ GND (C9–12 ↔ C9–22)	L–W ↔ W–B	Always	10 – 14 V
FrS5 ↔ FrSG (C8–1 ↔ C8–12)	G–R ↔ Y–G	IG ON	4.5 – 5.5 V
FrTR ↔ FrSG (C8–2 ↔ C8–12)	B ↔ Y–G	IG ON. Cabin temp. : 25 °C (77 °F)	1.8 – 2.2 V
		IG ON. Cabin temp. : 40 °C (104 °F)	1.2 – 1.6 V
TAM ↔ FrSG (C8–3 ↔ C8–12)	L–Y ↔ Y–G	IG ON. Ambient temp. : 25 °C (77 °F)	1.3 – 1.8 V
		IG ON. Ambient temp. : 40 °C (104 °F)	0.8 – 1.3 V
FrTE ↔ FrSG (C8–4 ↔ C8–12)	GR–B ↔ Y–G	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
TS ↔ FrSG (C8–6 ↔ C8–12)	B–Y ↔ Y–G	IG ON. Sensor subjected electric light	0.8 – 4.3V
		IG ON. Sensor covered by a cloth	Below 0.8 V
FrTP ↔ FrSG (C8–8 ↔ C8–12)	B–Y ↔ Y–G	IG ON. Set temp. : Max Cool	3.5 – 4.5 V
		IG ON. Set temp. : Max Hot	0.5 – 1.5 V DI3CW–01
TPI ↔ FrSG (C8–9 ↔ C8–12)	L–R ↔ Y–G	IG ON. Push REC switch	3.5 – 4.5 V
		IG ON. Push FRS switch	0.5 – 1.5 V
FACE ↔ GND (C7–3 ↔ C9–22)	GR ↔ W–B	Mode control switch except FACE → FACE	From 10 – 14 V to below 1.0 V
B/L ↔ GND (C7–4 ↔ C9–22)	BR–W ↔ W–B	Mode control switch except BI–LEVEl → BI–LEVEL	From 10 – 14 V to below 1.0 V
FOOT ↔ GND (C7–5 ↔ C9–22)	W ↔ W–B	Mode control switch except FOOT → FOOT	From 10 – 14 V to below 1.0 V

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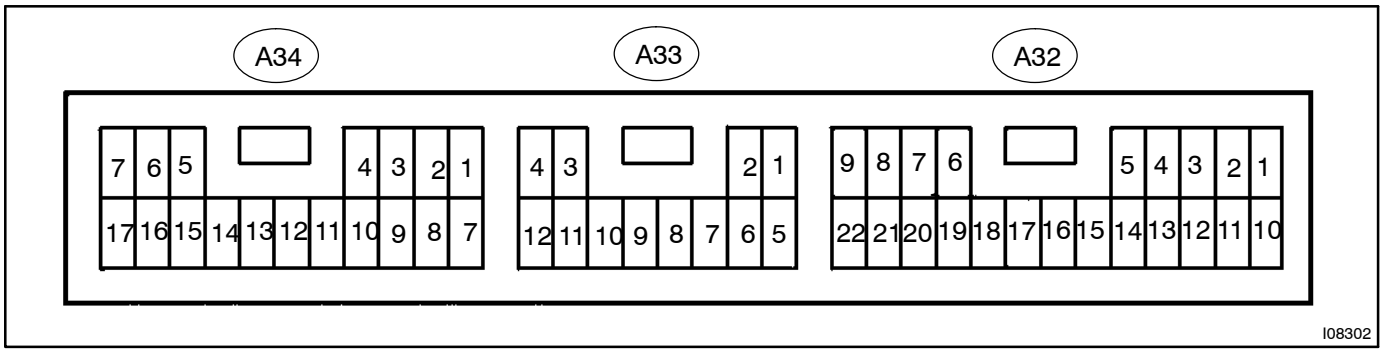
Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
F/D ↔ GND (C7–10 ↔ C9–22)	P–L ↔ W–B	Mode control switch except FOOT/DEF → FOOT/DEF	From 10 – 14 V to below 1.0 V
DEF ↔ GND (C7–11 ↔ C9–22)	B–W ↔ W–B	Mode control switch except DEF → DEF	From 10 – 14 V to below 1.0 V
FrBLW ↔ GND (C7–12 ↔ C9–22)	W–R ↔ W–B	Blower fan OFF → M2 → DEF	ON: Below 1.0 V
			OFF: 10 – 14 V
FrHR ↔ GND (C7–13 ↔ C9–22)	Y–R ↔ W–B	Blower fan OFF → ON	From 10 – 14 V to below 1.0 V
MGC ↔ GND (C7–14 ↔ C9–22)	L ↔ W–B	A/C compressor OFF → ON	From 10 – 14 V to below 1.0 V
LOCK ↔ FrSG (C6–57 ↔ C8–12)	W–L ↔ Y–G	A/C compressor ON	Pulse
TW ↔ GND (C6–59 ↔ C9–22)	Y–B ↔ W–B	IG ON. Engine coolant temp. : 25 °C (77 °F)	1.8 – 2.2 V
		IG ON. Engine Coolant temp. : 40 °C (104 °F)	1.2 – 1.6 V
PSW ↔ GND (C6–10 ↔ C9–22)	L–W ↔ W–B	A/C refrigerant pressure: less than 0.19 MPa (2.0 kgf/cm^2) or more than 3.14 MPa (32 Kgf/cm^2)	From 10 – 14 V to below 1.0 V
IGN ↔ GND (C6–13 ↔ C9–22)	B ↔ W–B	Engine idling	Pulse
SPD ↔ GND (C6–22 ↔ C9–22)	V ↔ W–B	Turn propeller shaft slowly	Pulse
ACT ↔ GND (C6–23 ↔ C9–22)	L–B ↔ W–B	A/C compressor OFF → ON	From 10 – 14 V to below 1.0 V

2. REAR A/C AMPLIFIER



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
+B ↔ GND (A32–1 ↔ A32–22)	B ↔ W–B	Constant	10 –14 V
IG1 ↔ GND (A32–2 ↔ A32–22)	R–L ↔ W–B	IG ON.	10 –14 V
VMrc ↔ GND (A32–3 ↔ A32–22)	W–L ↔ W–B	Rr FACE mode. Rr blower switch: Lo → ME → HI	7.2 → 4.2 → 0.5 V
BLWrc ↔ GND (A32–4 ↔ A32–22)	R ↔ W–B	Rr FACE mode. Fr blower switch: OFF → Lo	Below 1.0 V → 1.5 – 3.0 V
S51 ↔ SG1 (A32–5 ↔ A32–9)	R–Y ↔ Y–G	IG ON.	4.5 – 5.5 V
TRr ↔ SG1 (A32–6 ↔ A32–9)	B ↔ Y–G	Rr temp. control switch: Max. COOL → Max. HOT	4.0 – 1.0 V
TEr ↔ SG1 (A32–7 ↔ A32–9)	Y ↔ Y–G	Rr evaporator temp.: 0 °C (32 °F)	2.0 – 2.4 V
		Rr evaporator temp.: 15 °C (59 °F)	2.0 – 2.4 V

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Tinr ↔ SG1 (A32–8 ↔ A32–9)	GR–G ↔ Y–G	Rr inlet air temp.: 25 °C (77 °F)	1.5 – 1.9 V
		Rr inlet air temp.: 40 °C (104 °F)	1.2 – 1.6 V
SG1 ↔ GND (A32–9 ↔ A32–22)	Y–G ↔ W–B	Constant	Continuity
MCr ↔ GND (A32–11 ↔ A32–22)	W–L ↔ W–B	Rr temp. control switch: Max. HOT → Max. COOL	Below 1.0V → 10 – 14 V for 16 sec.
MHr ↔ GND (A32–12 ↔ A32–22)	Y ↔ W–B	Rr temp. control switch: Max. COOL → Max. HOT	Below 1.0V → 10 – 14 V for 16 sec.
HRrc ↔ GND (A32–13 ↔ A32–22)	R–Y ↔ W–B	Rr FACE mode. Rr blower control switch: OFF → LO	10 – 14 V → Below 1.0 V
HRrh ↔ GND (A32–14 ↔ A32–22)	L–B ↔ W–B	Rr FOOT mode. Rr blower control switch: OFF → LO	10 – 14 V → Below 1.0 V
VMrh ↔ GND (A32–15 ↔ A32–22)	R–W ↔ W–B	Rr FOOT mode. Rr blower control switch: LO → ME → HI	7.2 → 4.2 → 0.5 V
BLWrh ↔ GND (A32–16 ↔ A32–22)	R–G ↔ W–B	Rr FOOT mode. Rr blower control switch: OFF → LO	Below 1.0 V → 1.5 – 3.0 V
CID ↔ GND (A32–18 ↔ A32–22)	L ↔ W–B	IG ON.	Pulse
CSD ↔ GND (A32–19 ↔ A32–22)	R ↔ W–B	IG ON.	Pulse
CLK ↔ GND (A32–20 ↔ A32–22)	G ↔ W–B	IG ON.	Pulse
LAT ↔ GND (A32–21 ↔ A32–22)	W ↔ W–B	IG ON.	Pulse
GND ↔ Body ground (A32–22 ↔ Body ground)	W–B	Constant	Continuity
TRr ↔ SG2 (A33–7 ↔ A33–12)	B ↔ G–Y	IG ON. Rr room temp.: 25 °C (77 °F)	1.8 – 2.2 V
		IG ON. Rr room temp.: 40 °C (104 °F)	1.2 – 1.6 V
TSETr ↔ SG2 (A33–8 ↔ A33–12)	L–O ↔ G–Y	Rr temp. control switch: Max. COOL → Max. HOT	5.0 → 0 V
SG2 ↔ SG1 (A33–12 ↔ A32–9)	G–Y ↔ Y–G	Constant	Continuity
AUTO–S ↔ RG (A34–1 ↔ A34–8)	W–G ↔ G–Y	Rr A/C control panel AUTO switch: OFF → ON	10 – 14 V → Below 1.0 V during pushed switch
OFF–S ↔ RG (A34–2 ↔ A34–8)	Y–B ↔ G–Y	Rr A/C control panel OFF switch: OFF → ON	10 – 14 V → Below 1.0 V during pushed switch
LO–S ↔ RG (A34–3 ↔ A34–8)	GR ↔ G–Y	Rr A/C control panel LO switch: OFF → ON	10 – 14 V → Below 1.0 V during pushed switch
ME–S ↔ RG (A34–4 ↔ A34–8)	L–Y ↔ G–Y	Rr A/C control panel ME switch: OFF → ON	10 – 14 V → Below 1.0 V during pushed switch
AUTO–I ↔ GND (A34–5 ↔ A32–22)	L–R ↔ W–B	Rr A/C control panel switch: except. AUTO → AUTO	10 – 14 V → Below 1.0 V
LO–I ↔ GND (A34–6 ↔ A32–22)	L–W ↔ W–B	Rr A/C control panel switch: except. LO → LO	10 – 14 V → Below 1.0 V
ME–I ↔ GND (A34–7 ↔ A32–22)	L ↔ W–B	Rr A/C control panel switch: except. ME → ME	10 – 14 V → Below 1.0 V

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RG ↔ GND (A34–8 ↔ A32–22)	G–W ↔ W–B	Constant	Continuity
HI–S ↔ GND (A34–9 ↔ A32–22)	GR–R ↔ W–B	Rr A/C control panel HI switch: OFF → ON	10 – 14 V → Below 1.0 V during pushed switch
FACE–S ↔ GND (A34–10 ↔ A32–22)	R–L ↔ W–B	Rr A/C control panel FACE switch: OFF → ON	10 – 14 V → Below 1.0 V during pushed switch
B/L–S ↔ GND (A34–11 ↔ A32–22)	R–Y ↔ W–B	Rr A/C control panel B/L switch: OFF → ON	10 – 14 V → Below 1.0 V during pushed switch
FOOT–S ↔ GND (A34–12 ↔ A32–22))	R–G ↔ W–B	Rr A/C control panel FOOT switch: OFF → ON	10 – 14 V → Below 1.0 V during pushed switch
FACE–I ↔ GND (A34–15 ↔ A32–22)	G ↔ W–B	Rr A/C control panel switch: except. FACE → FACE	10 – 14 V → Below 1.0 V
B/L–I ↔ GND (A34–16 ↔ A32–22)	W–G ↔ W–B	Rr A/C control panel switch: except. B/L → B/L	10 – 14 V → Below 1.0 V
FOOT–I ↔ GND (A34–17 ↔ A32–22)	W–R ↔ W–B	Rr A/C control panel switch: except. FOOT → FOOT	10 – 14 V → Below 1.0 V
HI–I ↔ GND (A34–18 ↔ A34–22)	L ↔ W–B	Rr A/C control panel switch: except. HI → HI	10 – 14 V → Below 1.0 V

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DI29M–03

PROBLEM SYMPTOMS TABLE

1. Front A/C

Symptom	Suspect Area	See page
Whole functions of the A/C system does not operate	1. A/C amplifier 2. ACC power source circuit	IN–34 DI–676
Air Flow Control: No blower operation	1. ACC power source circuit 2. Heater main relay 3. Blower motor circuit 4. A/C amplifier	DI–676 AC–82 DI–679 IN–34
Air Flow Control: No blower control	1. Heater main relay 2. Blower motor circuit 3. A/C amplifier 4.Solar sensor circuit	AC–82 DI–679 IN–34 DI–650
Air Flow Control: Insufficient air flow	Blower motor circuit	DI–679
Temperature Control: No cool air comes out	1. Refrigerant volume 2. Drive belt tension 3. Refrigeration system inspection with manifold gauge set 4. Compressor circuit 5. Pressure switch circuit 6. Front air mix damper position sensor circuit 7. Front air mix damper control servomotor circuit 8. Front room temp. sensor circuit 9. Ambient temp. sensor circuit 10. A/C amplifier	AC–22 AC–15 AC–3 DI–682 DI–653 DI–659 DI–668 DI–633 DI–636 IN–34
Temperature Control: No warm air comes out	1. Front air mix damper position sensor circuit 2. Front air mix damper control servomotor circuit 3. Front room temp. sensor circuit 4. Ambient temp. sensor circuit 5. Front evaporator temp. sensor circuit 6. A/C amplifier	DI–659 DI–668 DI–633 DI–636 DI–639 IN–34
Temperature Control: Output air is warmer or cooler that the set temperature or response is slow	1. Refrigerant volume 2. Drive belt tension 3. Refrigeration system inspection with manifold gauge set 4. Cooling fan system 5. Solar sensor circuit 6. Front room temp. sensor circuit 7. Ambient temp. sensor circuit 8. Front Evaporator temp. sensor circuit 9. Front air mix damper position sensor circuit 10. Front air mix damper control servomotor circuit 11. Front air inlet damper position sensor circuit 12. Front air inlet damper control servomotor circuit 13. Condenser 14. Evaporator 15. Heater radiator 16. Expansion valve 17. A/C amplifier	AC–22 AC–15 AC–3 DI–650 DI–633 DI–636 DI–639 DI–659 DI–668 DI–662 DI–670 AC–59 AC–68 AC–33 AC–23 IN–34

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Symptom	Suspect Area	See page
Temperature Control: No temperature control (only Max. cool or Max. warm)	1. Front room temp. sensor circuit 2. Ambient temp. sensor circuit 3. Front air mix damper position sensor circuit 4. Front air mix damper control servomotor circuit 5. A/C amplifier	DI–633 DI–636 DI–659 DI–668 IN–34
No air inlet control	1. Front air inlet damper position sensor circuit 2. Front air inlet damper control servomotor circuit 3. A/C amplifier	DI–662 DI–670 IN–34
No air flow mode	1. Air outlet damper control servomotor 2. A/C amplifier	 IN–34
Engine idle up does not occur, or is continuous	1. Compressor circuit 2. A/C amplifier	DI–682 IN–34

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2. Rear A/C

Symptom	Suspect Area	See page
Whole functions of the rear A/C system does not operate	1. Rear A/C amplifier 2. ACC power source circuit	IN–34 DI–676
Air Flow Control: No blower operation	1. ACC power source circuit 2. Rear heater main relay 3. Rear blower motor 3. Rear Blower resister 4. Rear A/C amplifier	DI–676 AC–83 AC–36 AC–72 IN–34
Air Flow Control: No blower control	1. Rear heater main relay 2. Rear Blower motor 3. Rear Blower resister 4. Rear A/C amplifier 5.Solar sensor circuit	AC–83 AC–36 AC–72 IN–34 DI–650
Air Flow Control: Insufficient air flow	1. Rear Blower motor 2. Rear Blower resister	DI–679 AC–72
Temperature Control: No cool air comes out	1. Refrigerant volume 2. Drive belt tension 3. Refrigeration system inspection with manifold gauge set 4. Compressor circuit 5. Pressure switch circuit 6. Rear air mix damper position sensor circuit 7. Rear air mix damper control servomotor circuit 8. Rear room temp. sensor circuit 9. Ambient temp. sensor circuit 10. Rear A/C amplifier	AC–22 AC–15 AC–3 DI–682 DI–653 DI–665 DI–672 DI–647 DI–636 IN–34
Temperature Control: No warm air comes out	1. Rear air mix damper position sensor circuit 2. Rear air mix damper control servomotor circuit 3. Rear room temp. sensor circuit 4. Ambient temp. sensor circuit 5. Rear evaporator temp. sensor circuit 6. Rear A/C amplifier	DI–665 DI–672 DI–647 DI–636 DI–644 IN–34
Temperature Control: Output air is warmer or cooler that the set temperature or response is slow	1. Refrigerant volume 2. Drive belt tension 3. Refrigeration system inspection with manifold gauge set 4. Cooling fan system 5. Solar sensor circuit 6. Rear room temp. sensor circuit 7. Ambient temp. sensor circuit 8. Rear Evaporator temp. sensor circuit 9. Rear air mix damper position sensor circuit 10. Rear air mix damper control servomotor circuit 11. Condenser 12. Evaporator 13. Heater radiator 14. Expansion valve 15. Rear A/C amplifier	AC–22 AC–15 AC–3 DI–650 DI–633 DI–636 DI–644 DI–665 DI–672 AC–59 AC–68 AC–36 AC–23 IN–34
Temperature Control: No temperature control (only Max. cool or Max. warm)	1. Rear room temp. sensor circuit 2. Ambient temp. sensor circuit 3. Rear air mix damper position sensor circuit 4. Rear air mix damper control servomotor circuit 5. Rear A/C amplifier	DI–647 DI–636 DI–665 DI–672 IN–34

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DI3CX–01

CIRCUIT INSPECTION

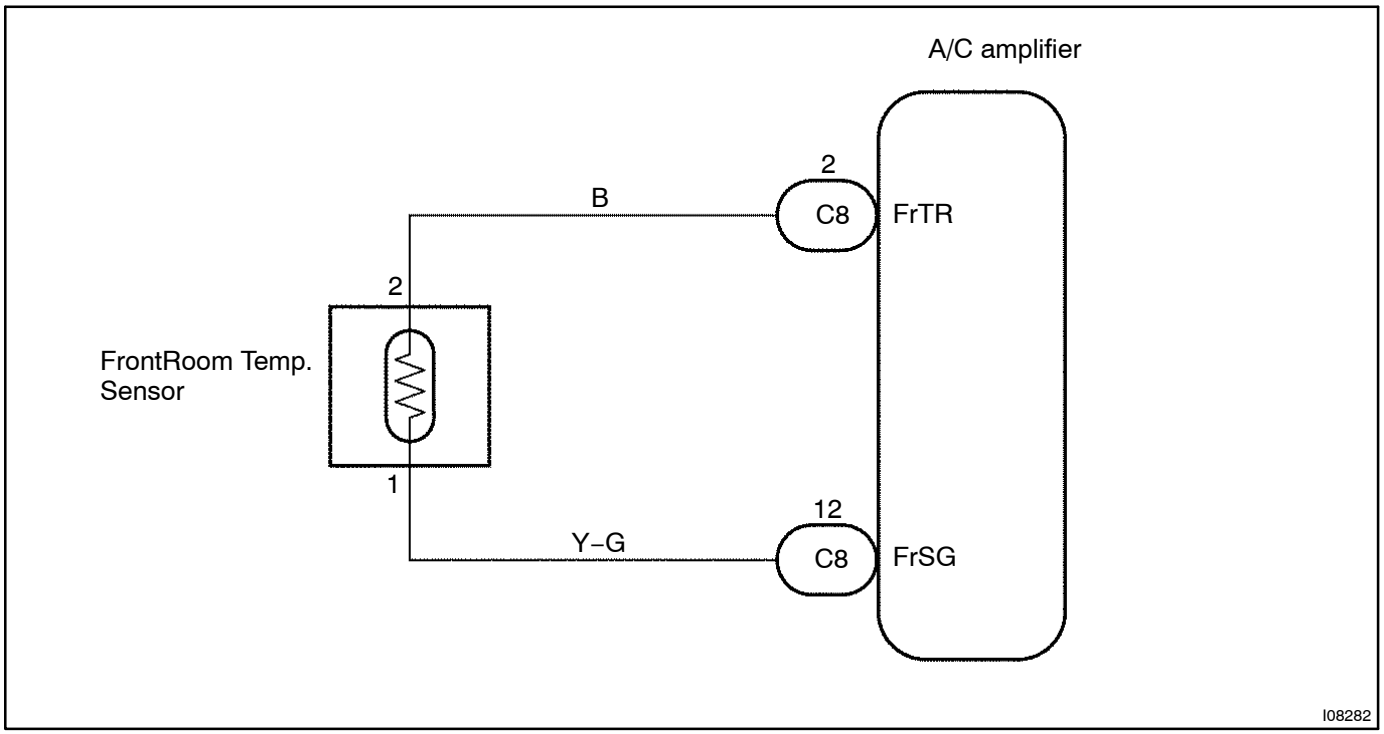
DTC	RrDEF, FACE	Front Room Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the temperature inside the cabin and sends the appropriate signals to the A/C amplifier.

Blinking light	Detection Item	Trouble Area
RrDEF FACE	Open or short in front room temperature sensor circuit.	• Front room temperature sensor. • Harness or connector between front room temperature sensor and A/C amplifier. • A/C amplifier.

WIRING DIAGRAM



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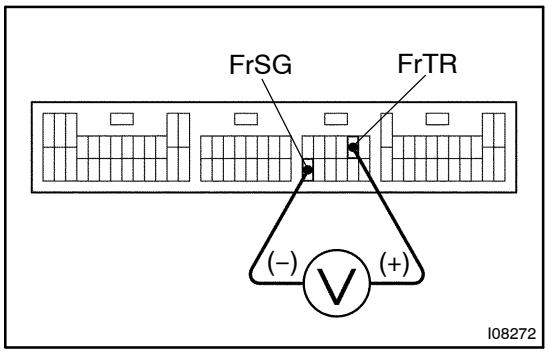
INSPECTION PROCEDURE

1	**Check voltage between terminals FrTR and FrSG of A/C amplifier connector.**



PREPARATION:

Remove A/C amplifier with connectors still connected.

CHECK:

(a) Turn ignition switch ON.

(b) Measure voltage between terminals FrTR and FrSG of A/C amplifier connector at each temperature.

OK:

Voltage :
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 problem symptoms table (See page DI–630). However, if RrDEF and FACE indicator light is light up, check and replace A/C amplifier.

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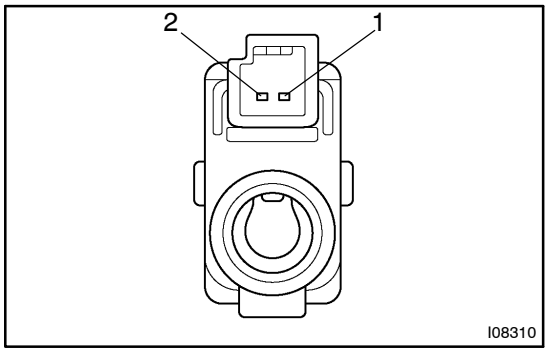
2	Check front room temperature sensor.



PREPARATION:
Disconnect room temperature sensor connector.
CHECK:
Measure resistance between terminals 1 and 2 of room temperature sensor connector at each temperature.
OK:

Resistance :
at 25°C (77°F) : 1.65 – 1.75 kΩ
at 50°C (122°F) : 0.55 – 0.65 kΩ

HINT:
As the temperature increases, the resistance decreases.

NG → **Replace front room temperature sensor.**

OK ↓

3	Check harness and connector between A/C amplifier and front room temperature sensor (See page IN–34).

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace A/C amplifier.

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DI3CY–01

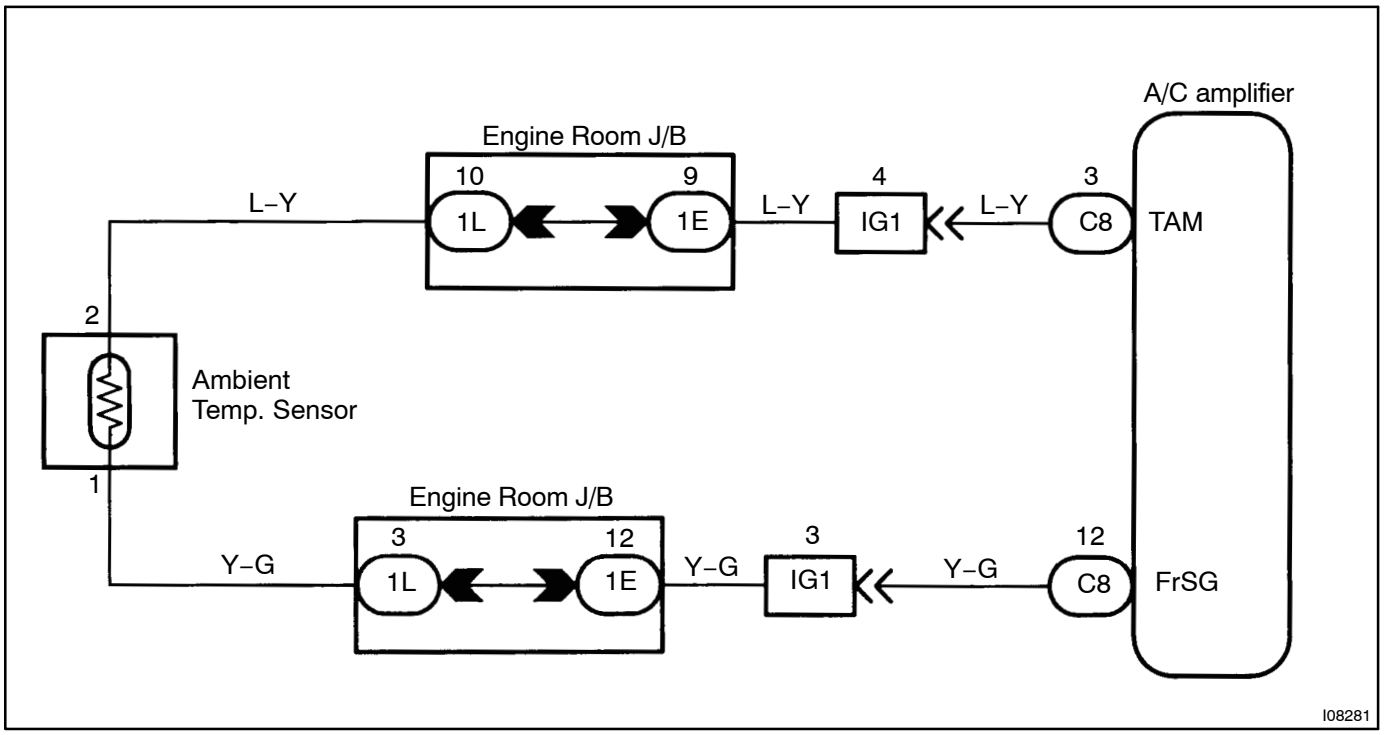
DTC	RrDEF, B/L	Ambient Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the ambient temperature and sends the appropriate signals to the A/C amplifier.

Blinking light	Detection Item	Trouble Area
RrDEF B/L	Open or short in ambient temperature sensor circuit.	• Ambient temperature sensor. • Harness or connector between ambient temperature sensor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



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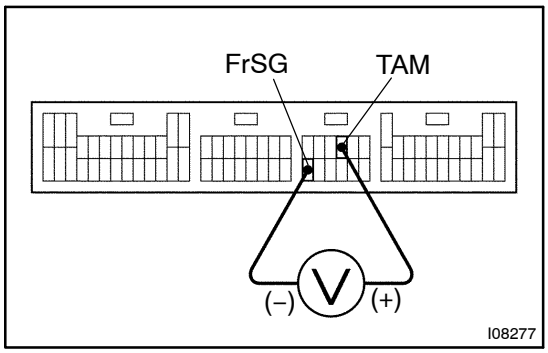
INSPECTION PROCEDURE

1	**Check voltage between terminals TAM and FrSG of A/C amplifier.**



PREPARATION:

Remove A/C amplifier with connectors still connected.

CHECK:

(a) Turn ignition switch ON.

(b) Measure voltage between terminals TAM and FrSG of A/C amplifier 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 2.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–630). However, if RrDEF and B/L indicator light is light up, check and replace A/C amplifier.

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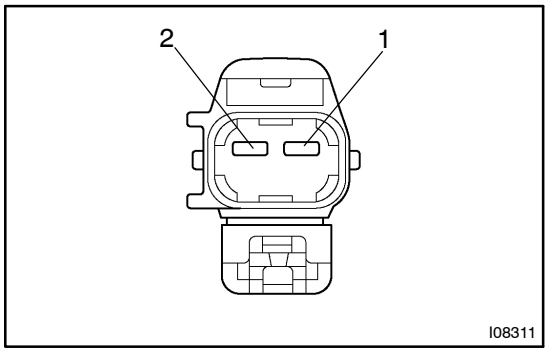
2	Check ambient temperature sensor.



PREPARATION:
Disconnect ambient temperature sensor connector.
CHECK:
Measure 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 50°C (122°F) : 0.5 – 0.7 kΩ

HINT:
As the temperature increases, the resistance decreases.
NOTICE:
When installing the ambient temperature sensor, be sure to connect the sensor connector before connecting the battery.

NG → **Replace ambient temperature sensor.**

OK

3	Check harness and connector between ambient temperature sensor and A/C amplifier (See page IN–34).

NG → **Repair or replace harness or connector.**

OK

Check and replace and A/C amplifier.

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DI3CZ–01

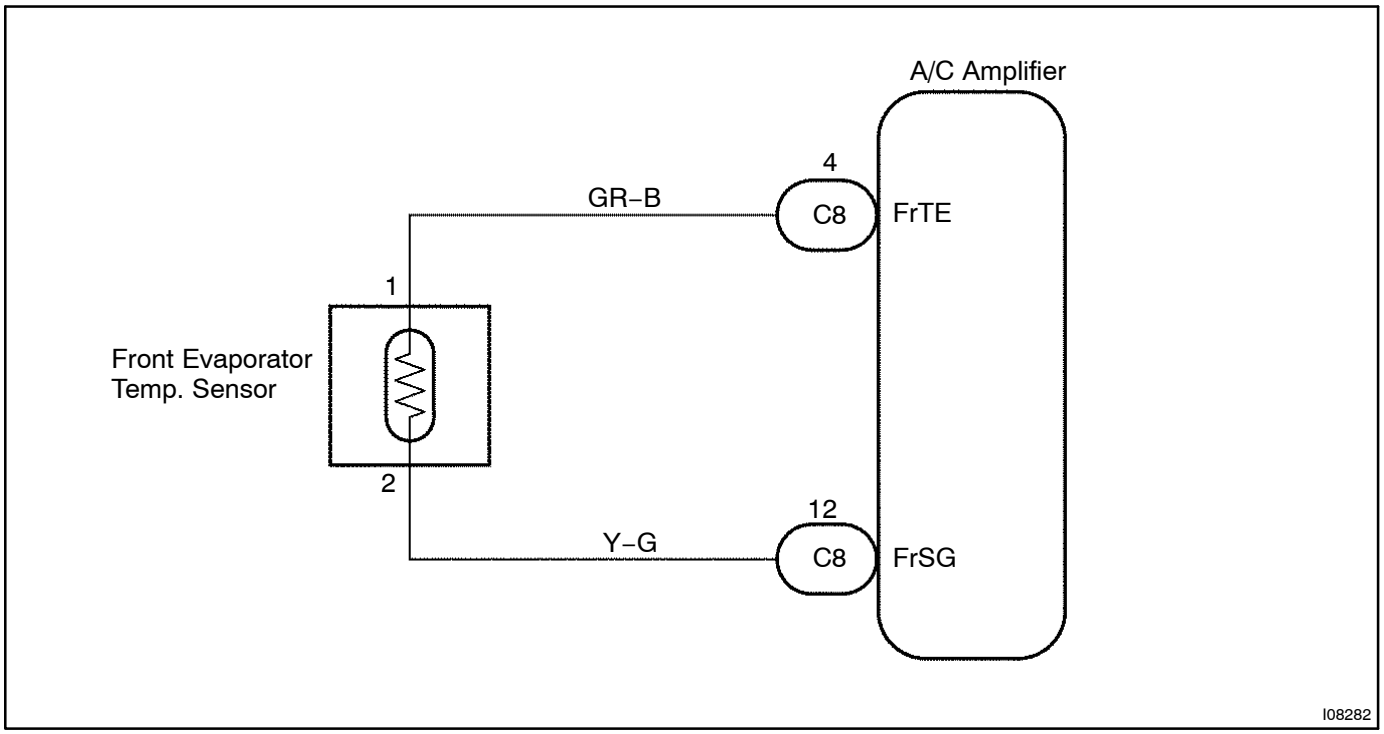
DTC	RrDEF, FOOT	Front Evaporator Temperature Sensor circuit

CIRCUIT DESCRIPTION

This sensor detects the temperature inside the cooling unit and sends the appropriate signals to the A/C amplifier.

Blinking light	Detection Item	Trouble Area
RrDEF FOOT	Open or short in front evaporator temperature sensor circuit.	• Front evaporator temperature sensor. • Harness or connector between front evaporator temperature sensor and A/C amplifier. • A/C amplifier.

WIRING DIAGRAM



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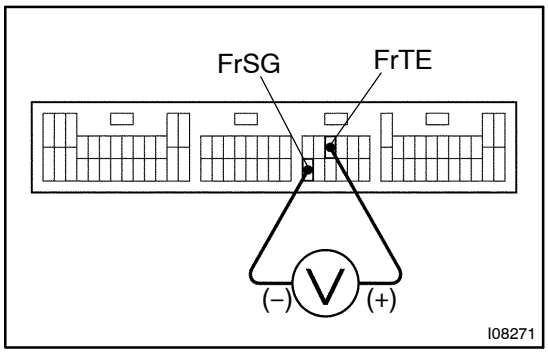
INSPECTION PROCEDURE

1	**Check voltage between terminals FrTE and FrSG of A/C amplifier connector.**



PREPARATION:

Remove A/C amplifier with connectors still connected.

CHECK:

(a) Turn ignition switch ON.

(b) Measure voltage between terminals FrTE and FrSG of A/C amplifier 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 2.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–630). However, if RrDEF and FOOT is light up, check and replace A/C amplifier.

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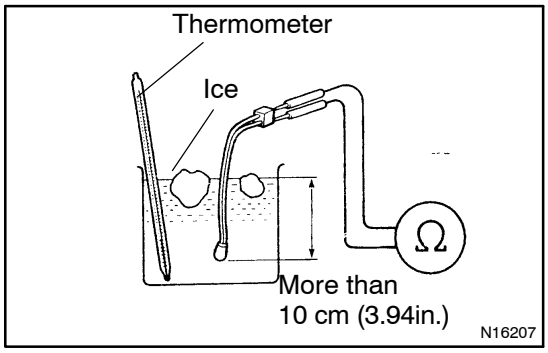
2	Check front evaporator temperature sensor.



PREPARATION:
Remove front evaporator temperature sensor
(See page AC–23).
CHECK:
Measure resistance between terminals 1 and 2 of evaporator temperature sensor connector at each temperature.
OK:

Resistance :
at 0°C (32°F) : 4.5 – 5.2 kΩ
at 15°C (59°F) : 2.0 – 2.7 kΩ

HINT:
As the temperature increases, the resistance decreases.

NG → **Replace front evaporator temperature sensor.**

OK

3	Check harness and connector between A/C amplifier and front evaporator temperature sensor (See page IN–34).

NG → **Repair or replace harness or connector.**

OK

Check and replace A/C amplifier.

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DI3D0–01

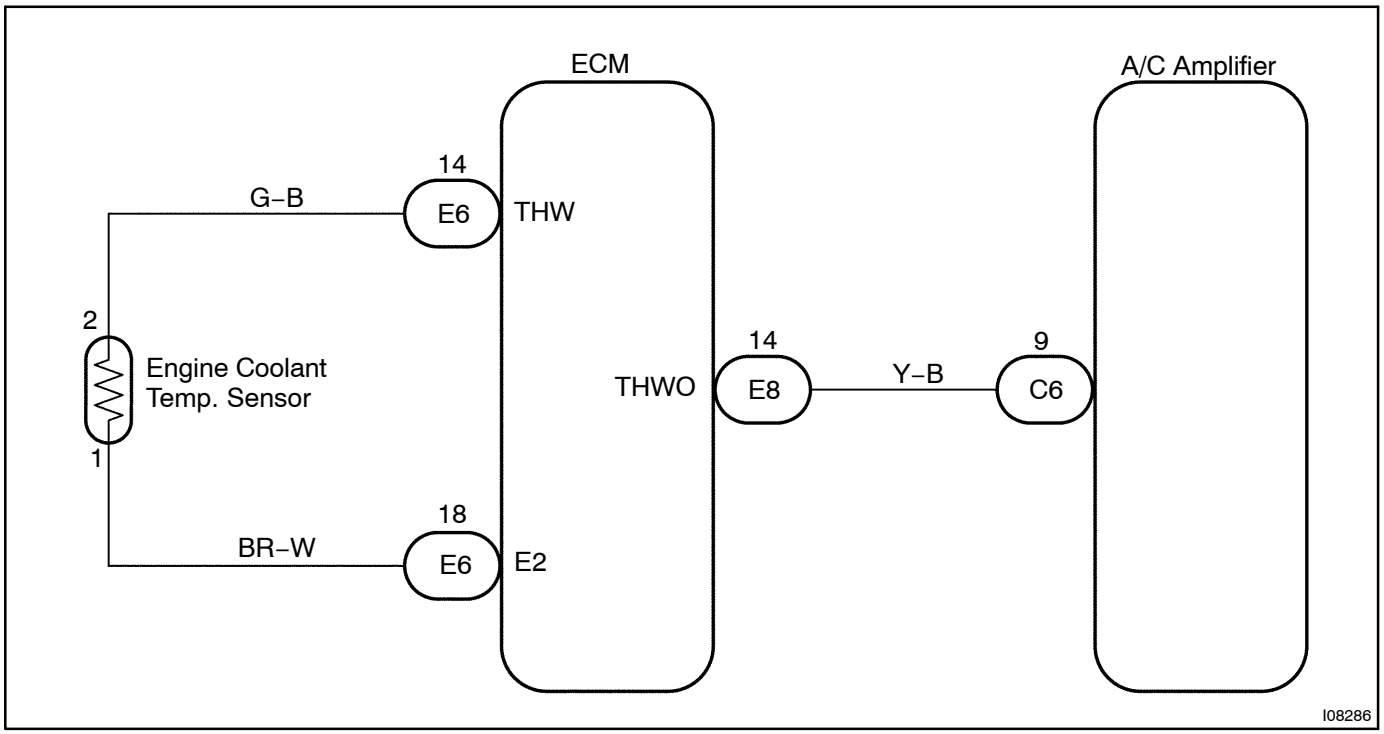
DTC	RrDEF, F/D	Engine Coolant Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the engine coolant temperature and sends the appropriate signals to the A/C amplifier.

Blinking light	Detection Item	Trouble Area
RrDEF F/D	Open or short in engine coolant temperature sensor circuit.	• Engine coolant temperature sensor. • Harness or connector between engine coolant temperature sensor and ECM. • Harness or connector between A/C amplifier and ECM. • A/C amplifier. • ECM

WIRING DIAGRAM



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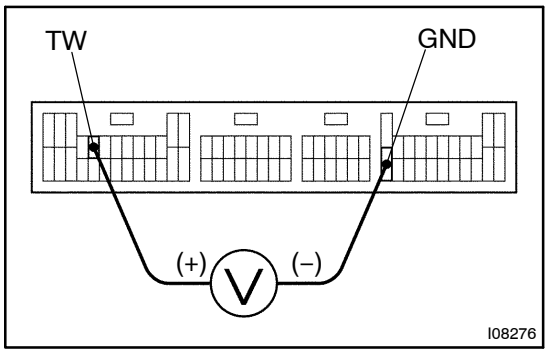
INSPECTION PROCEDURE

1	**Check voltage between terminals TW and GND of A/C amplifier connector.**



PREPARATION:
Remove A/C amplifier with connectors still connected.
CHECK:
(a) Turn ignition switch ON.
(b) Measure voltage between terminals TW and GND of A/C amplifier connector at each temperature.
OK:
Voltage :
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 problem symptoms table (See page DI–630). However, if RrDEF and F/D indicator light is light up, check and replace A/C amplifier.

2	**Check engine coolant temperature sensor circuit (See page DI–33).**

NG → **Replace engine coolant temperature sensor.**

OK

3	**Check harness and connector between A/C amplifier and ECM (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace A/C amplifier.

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DI3D1–01

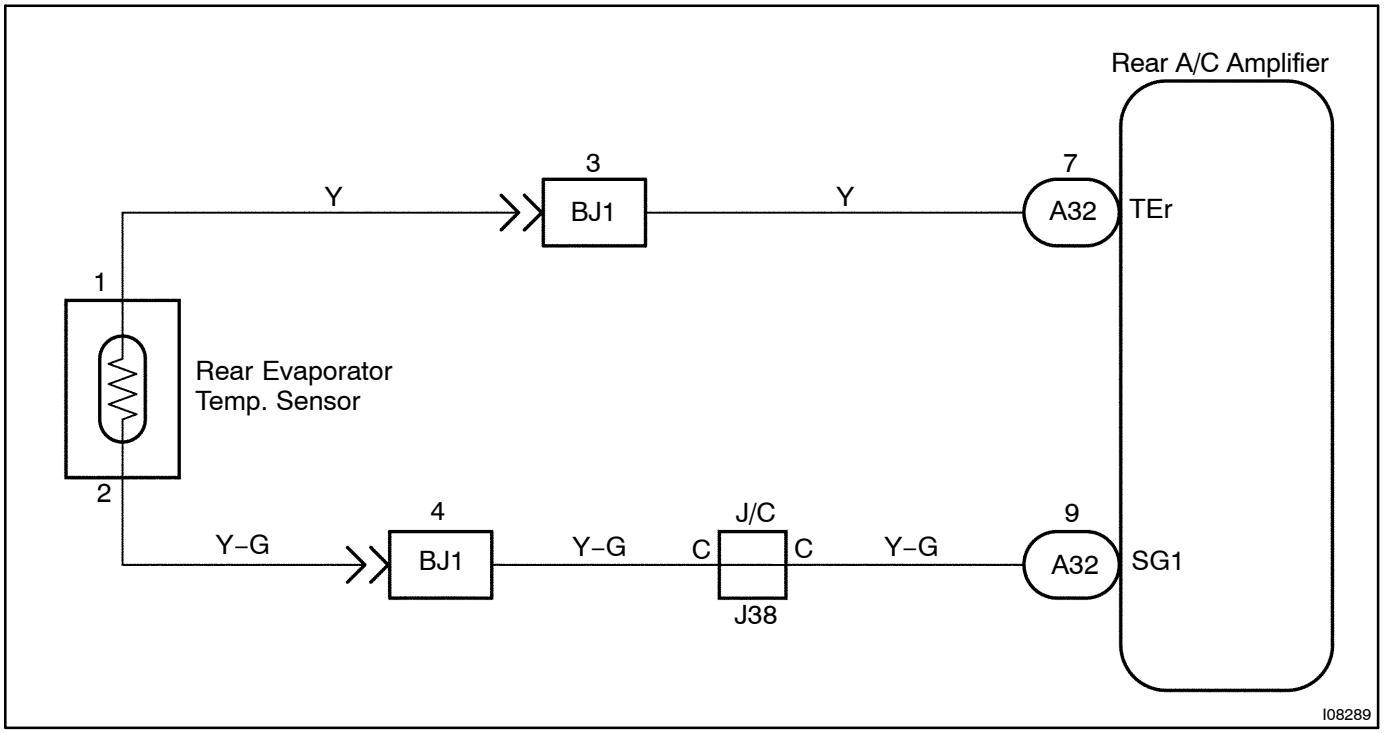
DTC	RrACSW, FOOT	Rear Evaporator Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the rear evaporator temperature and sends the appropriate signals to the A/C amplifier.

Blinking light	Detection Item	Trouble Area
RrACSW FOOT	Open or short in rear evaporator temperature sensor circuit.	• Rear evaporator temperature sensor. • Harness or connector between rear evaporator temperature sensor and A/C amplifier. • Rear A/C amplifier

WIRING DIAGRAM



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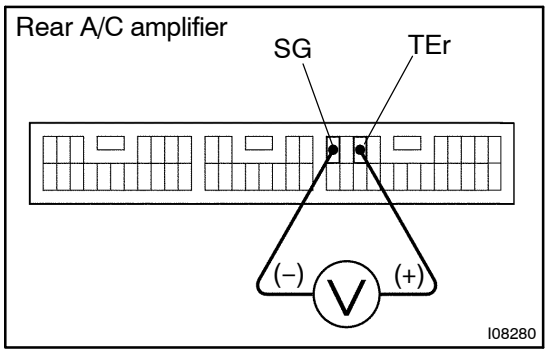
INSPECTION PROCEDURE

1	Check voltage between terminals TEr and SG of rear A/C amplifier connector.



PREPARATION:

Remove rear A/C amplifier with connectors still connected.

CHECK:

(a) Turn ignition switch ON.

(b) Measure voltage between terminals TEr and SG of rear A/C amplifier 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 2.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–630). However, if RrACSW and FOOT is light up, check and replace A/C amplifier.

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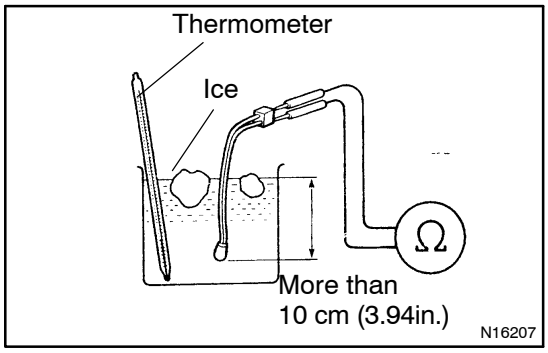
2	Check rear evaporator temperature sensor.



PREPARATION:
Remove rear evaporator temperature sensor.
CHECK:
Measure resistance between terminals 1 and 2 of evaporator temperature sensor connector at each temperature.
OK:

Resistance :
at 0°C (32°F) : 4.5 – 5.2 kΩ
at 15°C (59°F) : 2.0 – 2.7 kΩ

HINT:
As the temperature increases, the resistance decreases.

NG → **Replace rear evaporator temperature sensor.**

OK ↓

3	Check harness and connector between A/C amplifier and rear evaporator temperature sensor (See page IN–34).

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace A/C amplifier.

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DI3D2–01

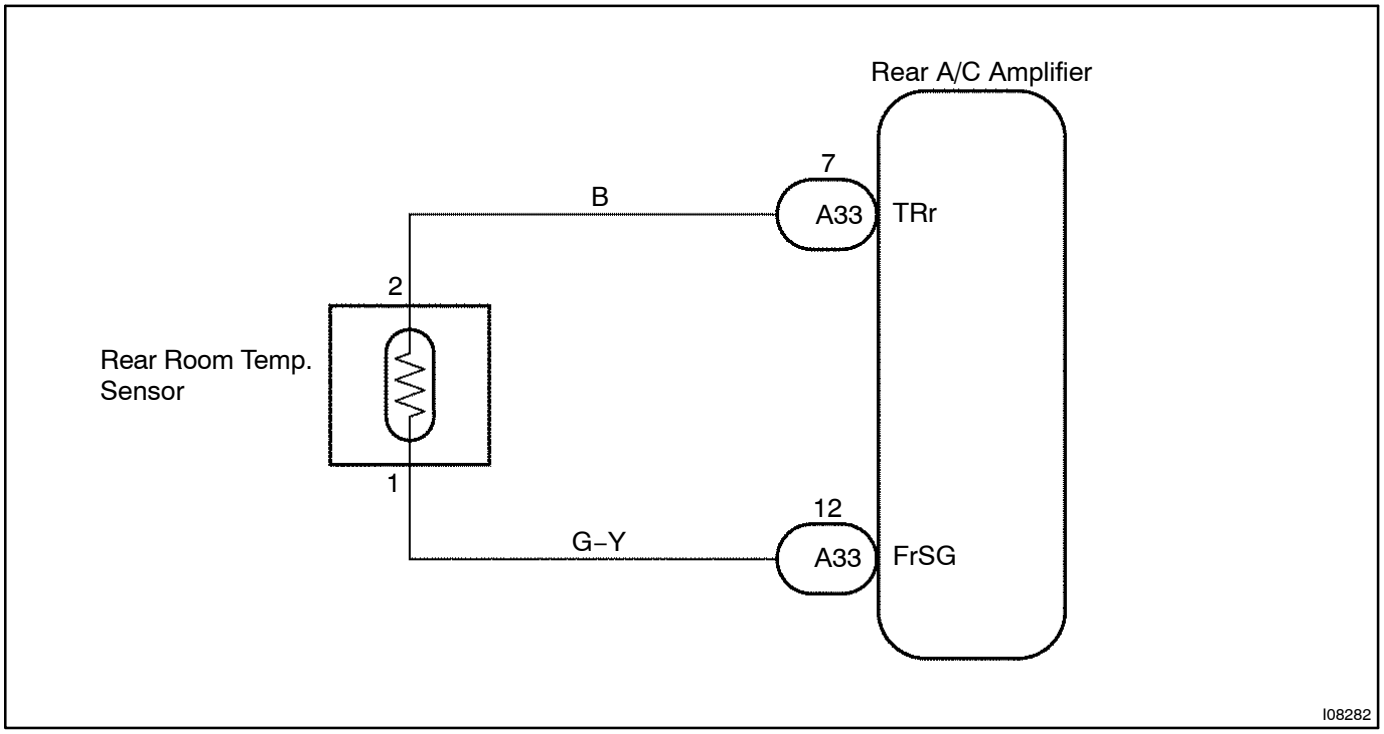
DTC	RrACSW, FACE	Rear Room Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the temperature inside the cabin and sends the appropriate signals to the A/C amplifier.

Blinking light	Detection Item	Trouble Area
RrACSW FACE	Open or short in rear room temperature sensor circuit.	• Rear room temperature sensor. • Harness or connector between rear room temperature sensor and A/C amplifier. • Rear A/C amplifier.

WIRING DIAGRAM



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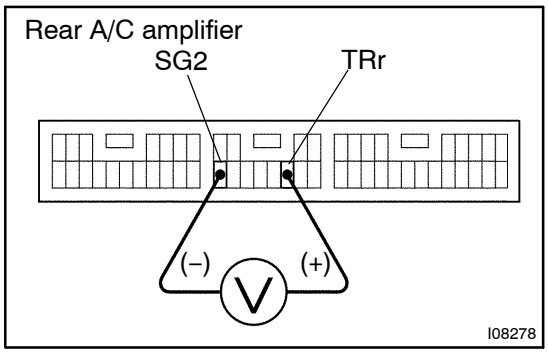
INSPECTION PROCEDURE

1	**Check voltage between terminals TRr and SG2 of A/C amplifier connector.**



PREPARATION:

Remove rear A/C amplifier with connectors still connected.

CHECK:

(a) Turn ignition switch ON.

(b) Measure voltage between terminals TRr and SG2 of rear A/C amplifier connector at each temperature.

OK:

Voltage :
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 problem symptoms table (See page DI–630). However, if RrACSW and FACE indicator light is light up, check and replace A/C amplifier.

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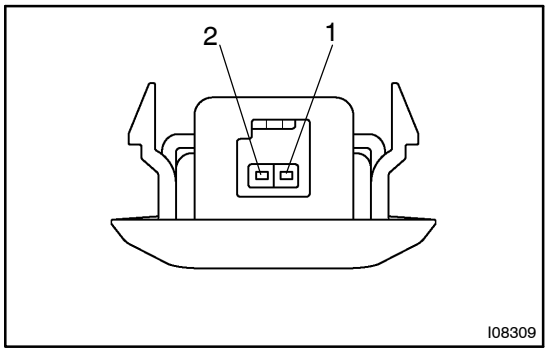
2	Check rear room temperature sensor.



PREPARATION:
Disconnect rear room temperature sensor connector.
CHECK:
Measure resistance between terminals 1 and 2 of room temperature sensor connector at each temperature.
OK:

Resistance :
at 25°C (77°F) : 1.65 – 1.75 kΩ
at 50°C (122°F) : 0.55 – 0.65 kΩ

HINT:
As the temperature increases, the resistance decreases.

NG → **Replace rear room temperature sensor.**

OK

3	Check harness and connector between rear A/C amplifier and rear room temperature sensor (See page IN–34).

NG → **Repair or replace harness or connector.**

OK

Check and replace A/C amplifier.

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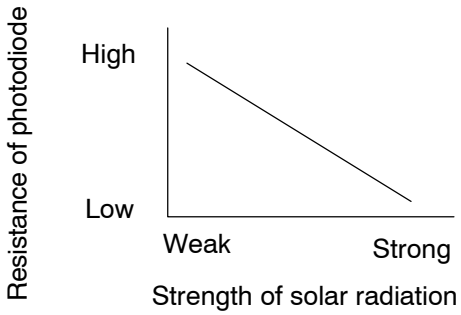
DI3D3–01

DTC	RrDEF, DEF	Solar Sensor Circuit

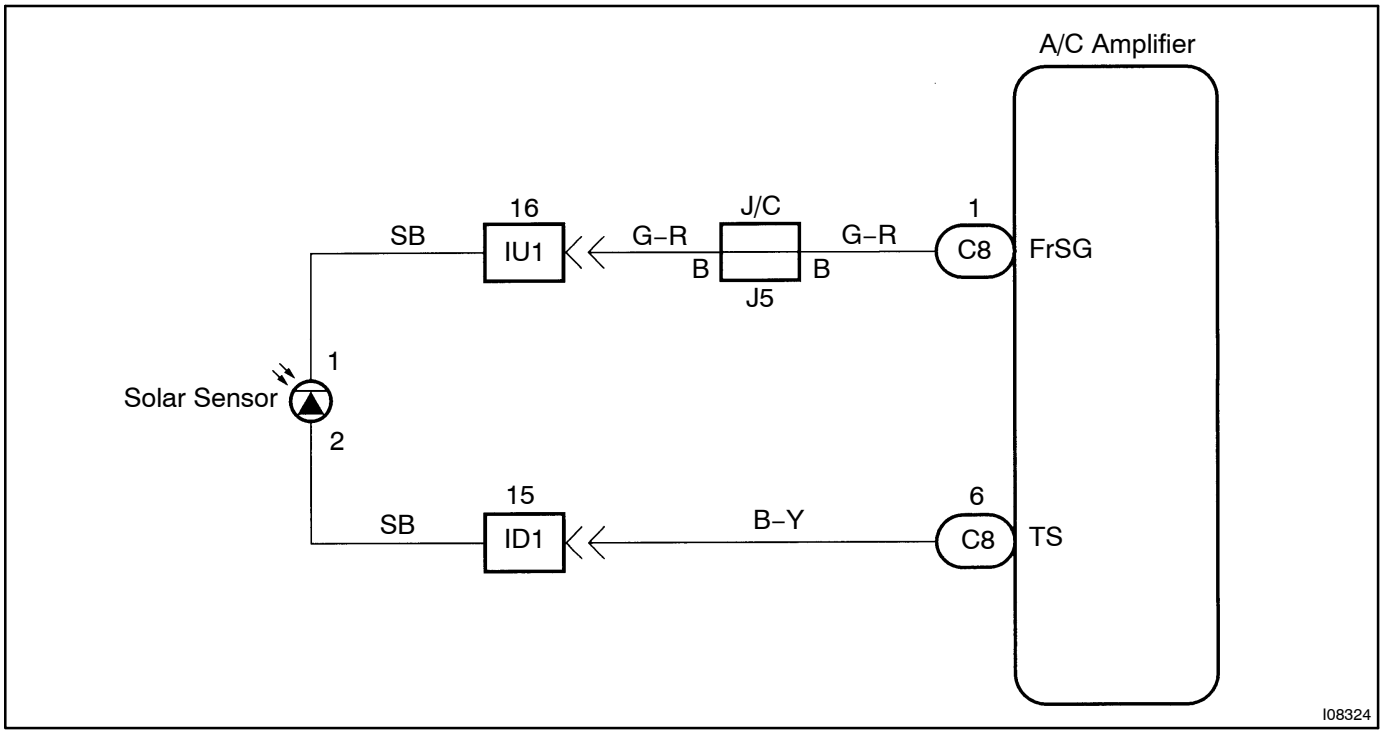
CIRCUIT DESCRIPTION



A photo diode in the solar sensor detects solar radiation and sends signals to the A/C control assembly.

Blinking light	Detection Item	Trouble Area
RrDEF DEF	Open or short in solar sensor circuit. Please note that display of diagnostic trouble code 21 is not abnormal when the sensor is not receiving solar radiation.	• Solar sensor. • Harness or connector between solar sensor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



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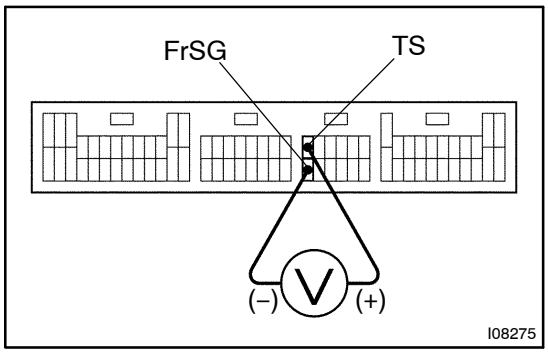
INSPECTION PROCEDURE

1	**Check voltage between terminals TS and FrSG of A/C amplifier connector.**



PREPARATION:

Remove A/C amplifier with connectors still connected.

CHECK:

(a) Turn ignition switch ON.

(b) Measure voltage between terminals TS and FrSG of A/C amplifier connector when the solar sensor is subjected to an electric light, and when the sensor is covered by al cloth.

OK:

Condition	Voltage
Sensor subjected to electric light	0.8 – 4.3 V
Sensor covered by a cloth	Below 0.8 V

HINT:

As the inspection light is moved away from the sensor, the voltage increases.

NG → **Go to step 2.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–630). However, if RrDEF and DEF indicator light is light up, check and replace A/C amplifier.

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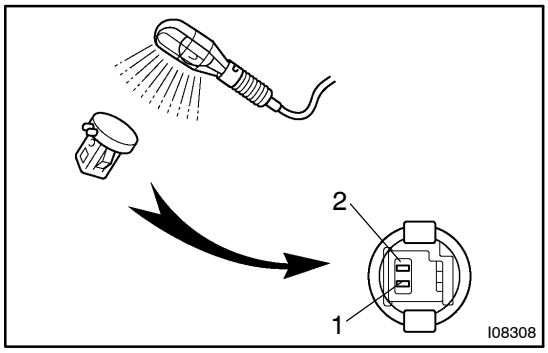
2	Check solar sensor.



PREPARATION:
Remove solar sensor.
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 1 and negative (–) lead to terminal 2 of the solar sensor.
OK:
Resistance : ∞ Ω (no continuity)
PREPARATION:
(a) Remove the cloth from the solar sensor and subject the sensor to electric light.
(b) Measure resistance.
OK:
Resistance : Approx. 4 kΩ (continuity)
HINT:
As the electric light is moved away from the sensor, the resistance increases.

NG → **Replace solar sensor.**

OK ↓

3	Check harness and connector between A/C amplifier and solar sensor (See page IN–34).

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace A/C control assembly.

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DI3D4–01

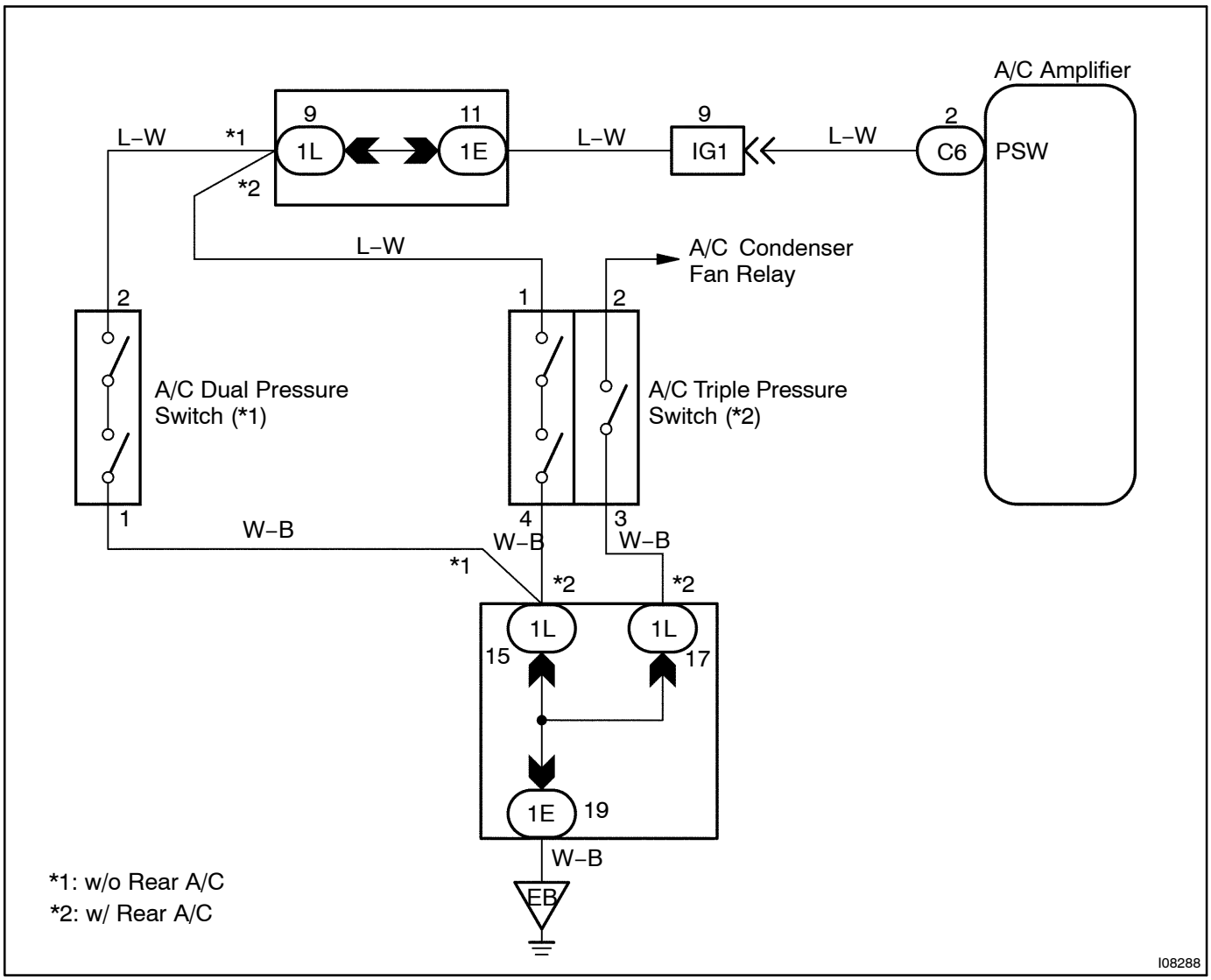
DTC	RrDEF, FRS	Pressure Switch Circuit

CIRCUIT DESCRIPTION

The pressure switch sends the appropriate signals to the A/C amprifier when the A/C refrigerant pressure drops too low or rises too high. When the A/C amplifier receives these signals, it outputs signals via the A/C amplifier to switch OFF the compressor relay and turns the magnetic clutch OFF.

Blinking light	Detection Item	Trouble Area
RrDEF FRS	• Open in pressure sensor circuit. • Abnormal refrigerant pressure. below 196 kPa (2.0 kg/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 amplifier • Refrigerant pipe line. • A/C amplifier

WIRING DIAGRAM



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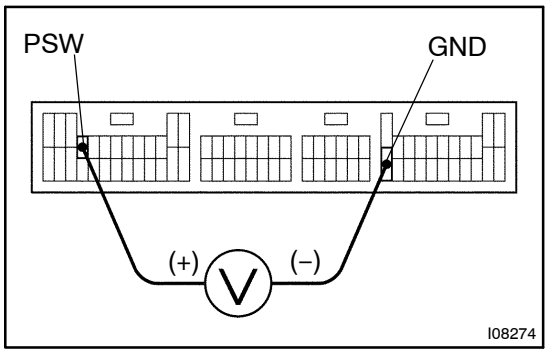
INSPECTION PROCEDURE

1	Check voltage between terminal PSW and GND of A/C amplifier.



PREPARATION:

Install the manifold gauge set.

CHECK:

(a) Turn ignition switch ON.

(b) Check voltage between terminal PRE of ECM 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	Reference : High Pressure Cut Side
ON (0V) 225 kPa 196 kPa OFF (12V)	ON (0V) 2,550 kPa 3,140 kPa OFF (12V)

NG → **Go to step 2.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–630). However, if RrDEF and FRS indicator light is light up, check and replace A/C amplifier.

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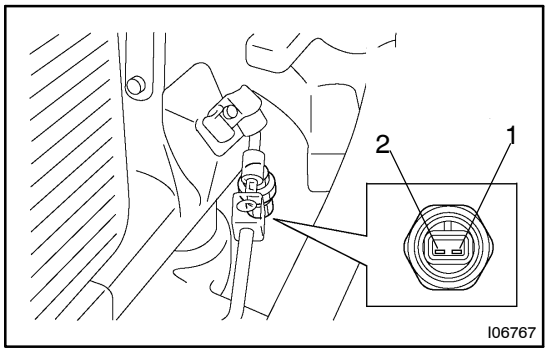
2	Check pressure switch.



PREPARATION:

Disconnect pressure switch connector.

CHECK:

(a) Turn ignition switch ON.

(b) Check continuity between terminals 1 and 2 of pressure switch when A/C gas pressure is changed.

OK:

The continuity changes with gas pressure as shown below.

Low Pressure Cut Side	Reference : High Pressure Cut Side
ON (continuity) 196 kPa ↑ 211 kPa OFF (continuity)	ON (continuity) 2,550 kPa ↓ 3,140 kPa OFF (continuity)

NG → **Replace pressure switch.**

OK ↓

3	Check harness and connector between A/C amplifier and pressure switch (See page IN–34).

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace A/C amplifier.

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DI3D5–01

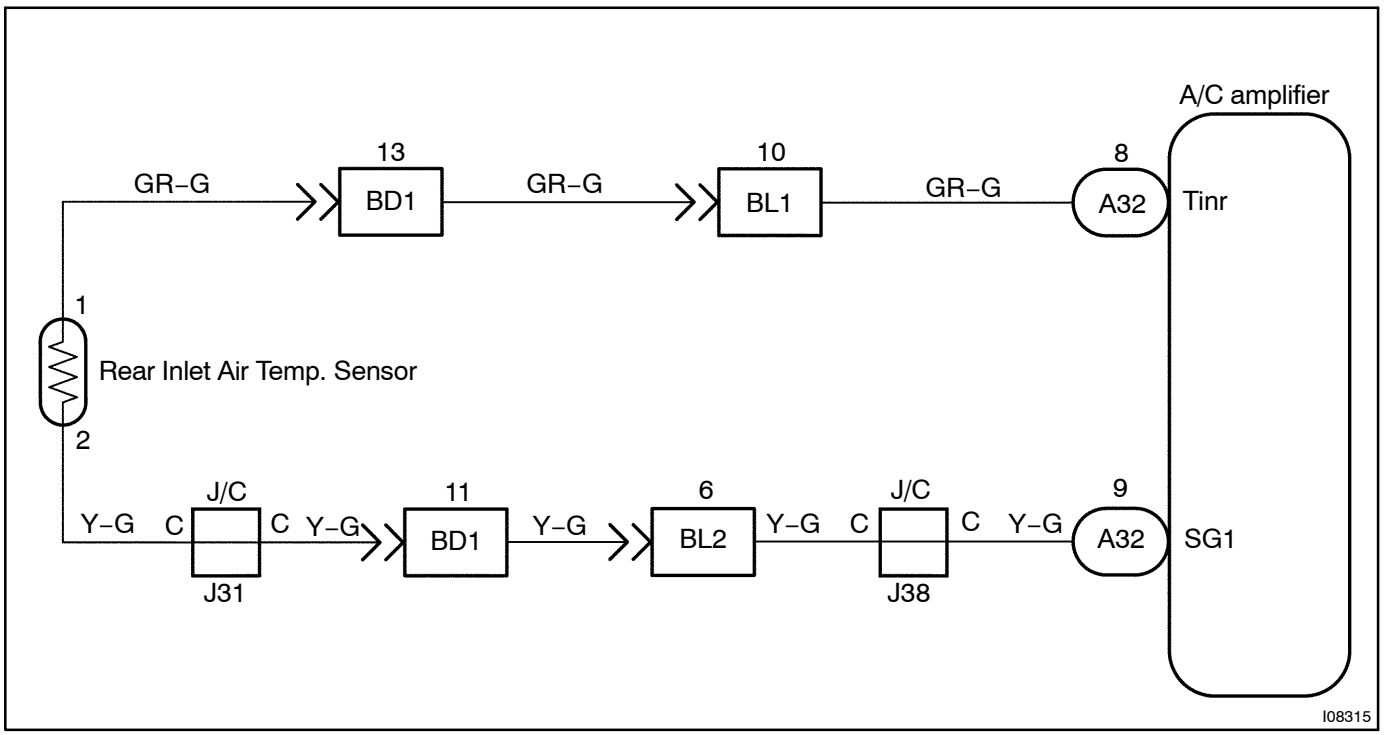
DTC	RrACSW, HI	Rear Inlet Air Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the rear inlet air temperature and sends the appropriate signals to the A/C amplifier.

Blinking light	Detection Item	Trouble Area
RrACSW HI	Open or short in rear inlet air temperature sensor circuit.	• Rear inlet air temperature sensor. • Harness or connector between rear inlet air temperature sensor and rear A/C amplifier. • Rear A/C amplifier.

WIRING DIAGRAM



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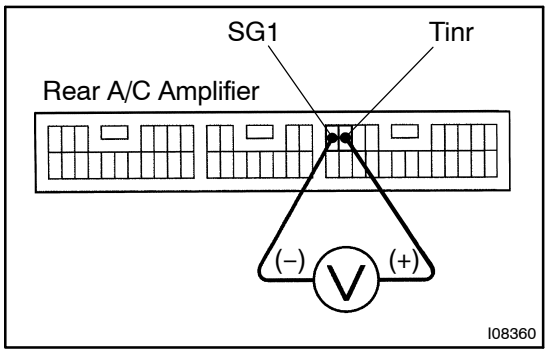
INSPECTION PROCEDURE

1	**Check voltage between terminals Tinr and SG1 of rear A/C amplifier connector.**



PREPARATION:

Remove rear A/C amplifier with connectors still connected.

CHECK:

(a) Turn ignition switch ON.

(b) Measure voltage between terminals Tinr and SG1 of rear A/C amplifier connector at each temperature.

OK:

Voltage :
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 2.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–630). However, if RrACSW and HI indicator light is light up, check and replace rear A/C amplifier.

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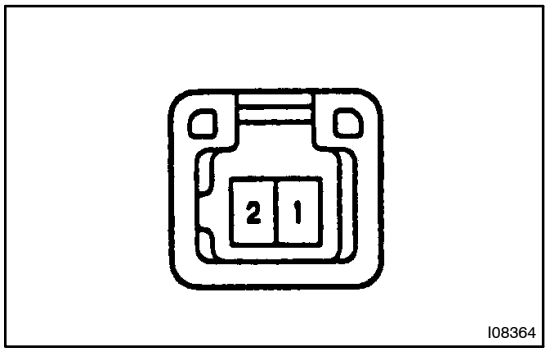
2	Check rear inlet air temperature sensor.



PREPARATION:
Disconnect rear inlet air temperature sensor connector.
CHECK:
Measure resistance between terminals 1 and 2 of rear inlet air temperature sensor connector at each temperature.
OK:

Resistance :
at 25°C (77°F) : 1.65 – 1.75 kΩ
at 50°C (122°F) : 0.55 – 0.65 kΩ

HINT:
As the temperature increases, the resistance decreases.

NG → **Replace rear inlet air temperature sensor.**

OK

3	Check harness and connector between rear A/C amplifier and inlet air temperature sensor (See page IN–34).

NG → **Repair or replace harness or connector.**

OK

Check and replace rear A/C amplifier.

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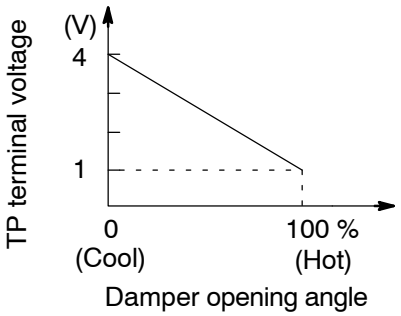
DI3D6–01

DTC	RrDEF, REC	Front Air Mix Damper Position Sensor Circuit

DTC	RrDEF, M1	Front Air Mix Damper Position Sensor Circuit

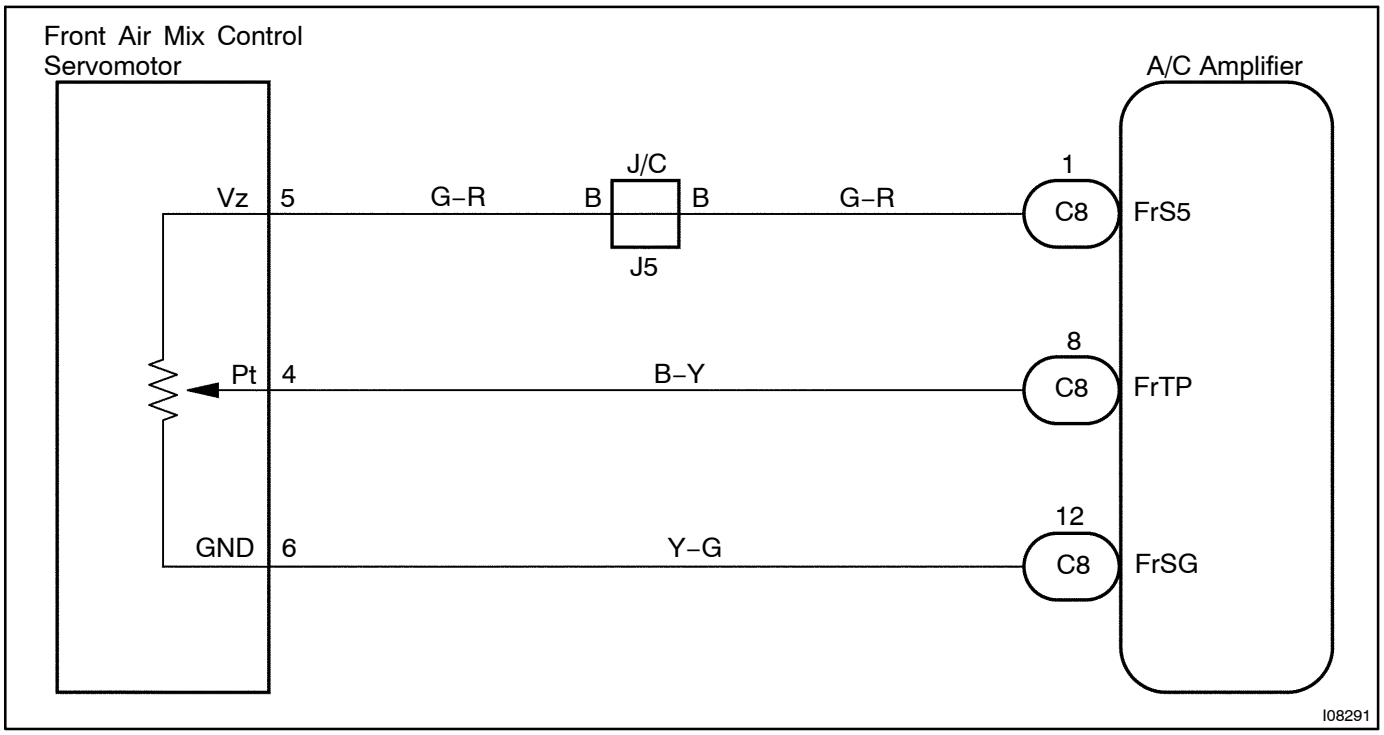
CIRCUIT DESCRIPTION



This sensor detects the position of the air mix damper and sends the appropriate signals to the A/C amplifier.
The position sensor is built into the air mix damper control servomotor assembly.

Blinking light	Detection Item	Trouble Area
RrDEF REC	Short to ground or power source circuit in front air mix damper position sensor circuit.	• Front air mix damper position sensor. • Harness or connector between front air mix damper control servomotor assembly and A/C amplifier. • A/C amplifier.
RrDEF M1	Front air mix damper position sensor value does not change even if A/C amplifier operates front air mix damper control servomotor.	

WIRING DIAGRAM



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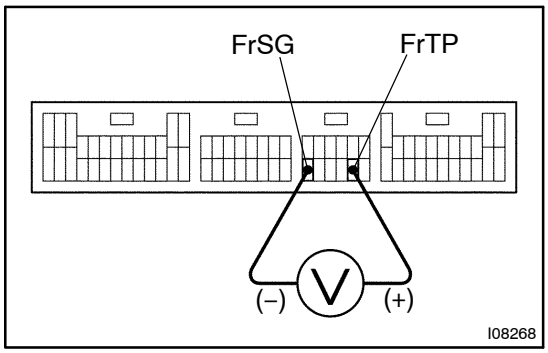
INSPECTION PROCEDURE

1	**Check voltage between terminals FrTP and FrSG of A/C amplifier connector.**



PREPARATION:

Remove A/C amplifier with connectors still connected.

CHECK:

(a) Turn ignition switch ON.

(b) Change the set temperature to activate the front air mix damper control servomotor, and measure the voltage between terminals FrTP and FrSG of A/C amplifier connector each time when the set temperature is changed.

OK:

Set Temperature	Voltage
Max. cool	3.5 – 4.5 V
Max. hot	0.5 – 1.5 V

HINT:

As the set temperature increases, the voltage decreases.

NG → **Go to step 2.**

Ok

Proceed to next circuit inspection shown on problem symptoms table (See page DI–630). However, if RrDEF and REC or RrDEF and M1 is light up, check and replace A/C amplifier.

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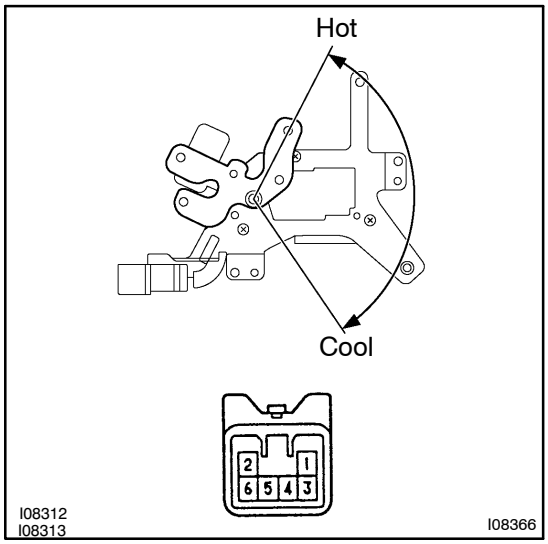
2	Check front air mix damper position sensor.



PREPARATION:

(a) Remove heater unit (See page AC–29)

(b) Disconnect front air mix damper control servomotor assembly connector.

CHECK:

Measure resistance between terminals 4 and 6 of front air mix damper control servomotor assembly connector.

OK:

Resistance : 4.2 – 7.8 kΩ

CHECK:

While operating front air mix damper control servomotor, following the procedure, measure resistance between terminals 4 and 6 of front air mix damper control servomotor assembly connector.

OK:

Position	Resistance
Max. cool	3.6 – 6.8 kΩ
Max. hot	0.5 – 1.1 kΩ

HINT:

As the front air mix damper control servomotor moves from cool side to hot side, the resistance decreases.

NG → **Replace front air mix damper control servomotor assembly.**

OK

3	Check harness and connector between A/C amplifier and front air mix damper control servomotor assembly (See page IN–34).

NG → **Repair or replace harness or connector.**

OK

Check and replace A/C amplifier.

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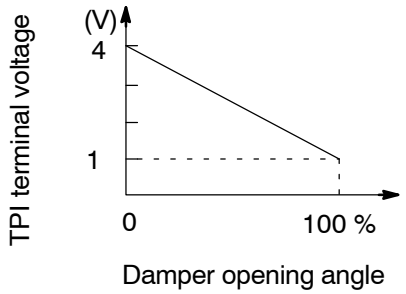
DI3D7–01

DTC	RrDEF, LO	Air Inlet Damper Position Sensor Circuit

DTC	RrDEF, M2	Air Inlet Damper Position Sensor Circuit

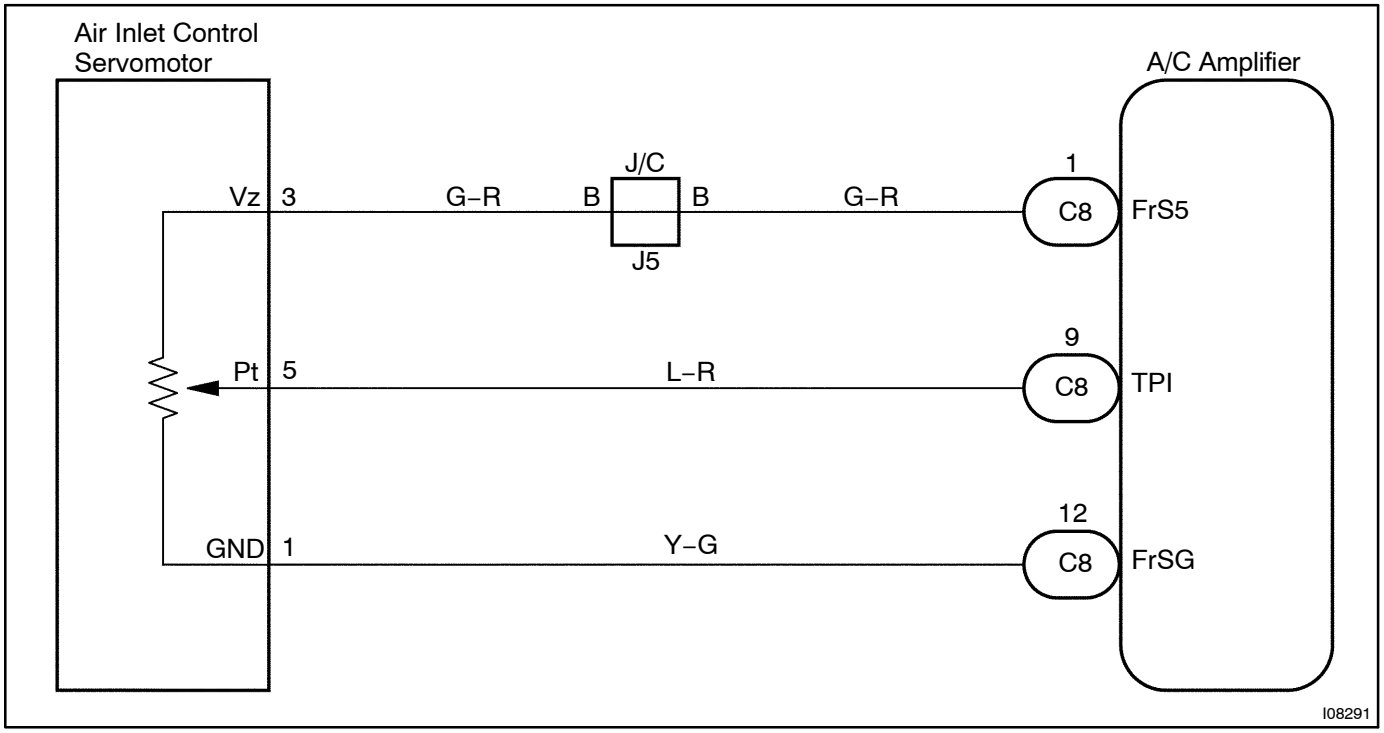
CIRCUIT DESCRIPTION



This sensor detects the position of the air inlet damper and sends the appropriate signals to the A/C amplifier.
The position sensor is built into the air inlet damper control servomotor assembly.

Blinking light	Detection Item	Trouble Area
RrDEF LO	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 damper control servomotor assembly and A/C amplifier. • A/C amplifier.
RrDEF M2	Air inlet damper position sensor value does not change even if A/C amplifier operates air inlet damper control servomotor.	

WIRING DIAGRAM



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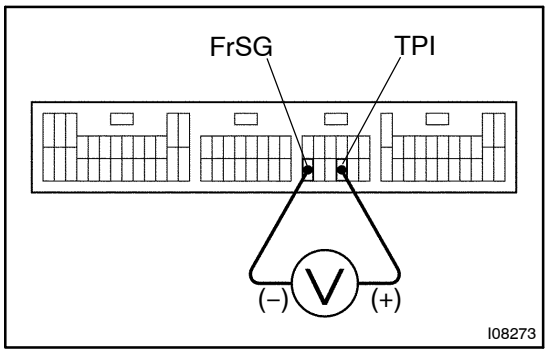
INSPECTION PROCEDURE

1	**Check voltage between terminals TPI and FrSG of A/C amplifier connector.**



PREPARATION:

Remove A/C amplifier with connectors still connected.

CHECK:

(a) Turn ignition switch ON.

(b) Press REC/FRS switch to change air inlet between fresh and recirculation air, and measure voltage between terminals TPI and FrSG of A/C amplifier when the air inlet damper control servomotor operates.

OK:

FRS–REC Switch	Voltage
REC	3.5 – 4.5 V
FRS	0.5 – 1.5 V

HINT:

As the air inlet damper control servomotor is moved form REC side to FRS side, the voltage decreases.

NG → **Go to step 2.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–630). However, if RrDEF and Lo or RrDEF and M2 indicator light is light up, check and replace A/C amplifier.

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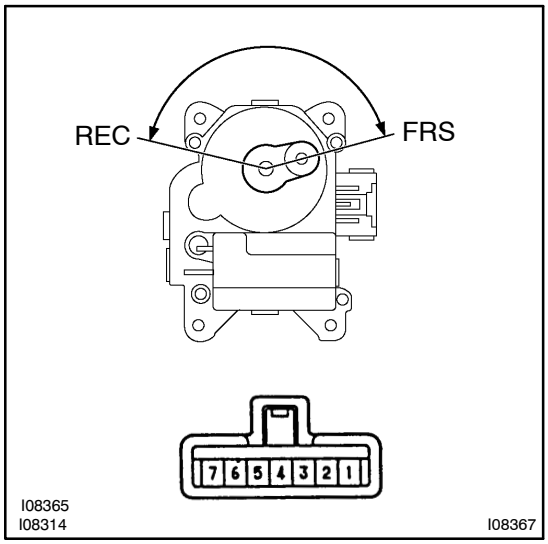
2	Check air inlet damper position sensor.



PREPARATION:

(a) Remove heater unit (See page AC–29).

(b) Disconnect air inlet damper control servomotor assembly connector.

CHECK:

Measure resistance between terminals 1 and 5 of air inlet damper control servomotor assembly connector.

OK:

Resistance : 4.2 – 7.8 kΩ

CHECK:

While operating air inlet damper control servomotor, following the procedure on page DI–670, measure resistance between terminals 1 and 5 of air inlet damper control servomotor assembly connector.

OK:

Resistance

Damper Position	Resistance
REC side	3.1 – 5.8 kΩ
FRS side	0.8 – 1.6 kΩ

HINT:

As the air inlet damper control servomotor moves from REC side to FRS side, the resistance decreases.

NG → **Replace air inlet damper control servomotor assembly.**

OK

3	Check harness and connectors between A/C amplifier and air inlet damper control servomotor assembly (See page IN–34).

NG → **Repair or replace harness or connector.**

OK

Check and replace A/C amplifier.

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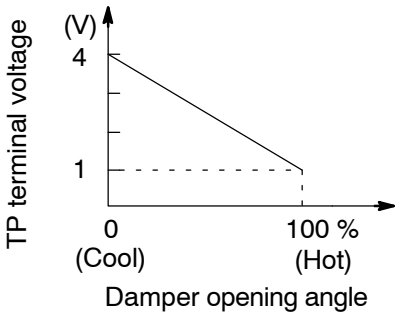
DI3D8–01

DTC	RrACSW, REC	Rear Air Mix Damper Position Sensor Circuit

DTC	RrACSW, M1	Rear Air Mix Damper Position Sensor Circuit

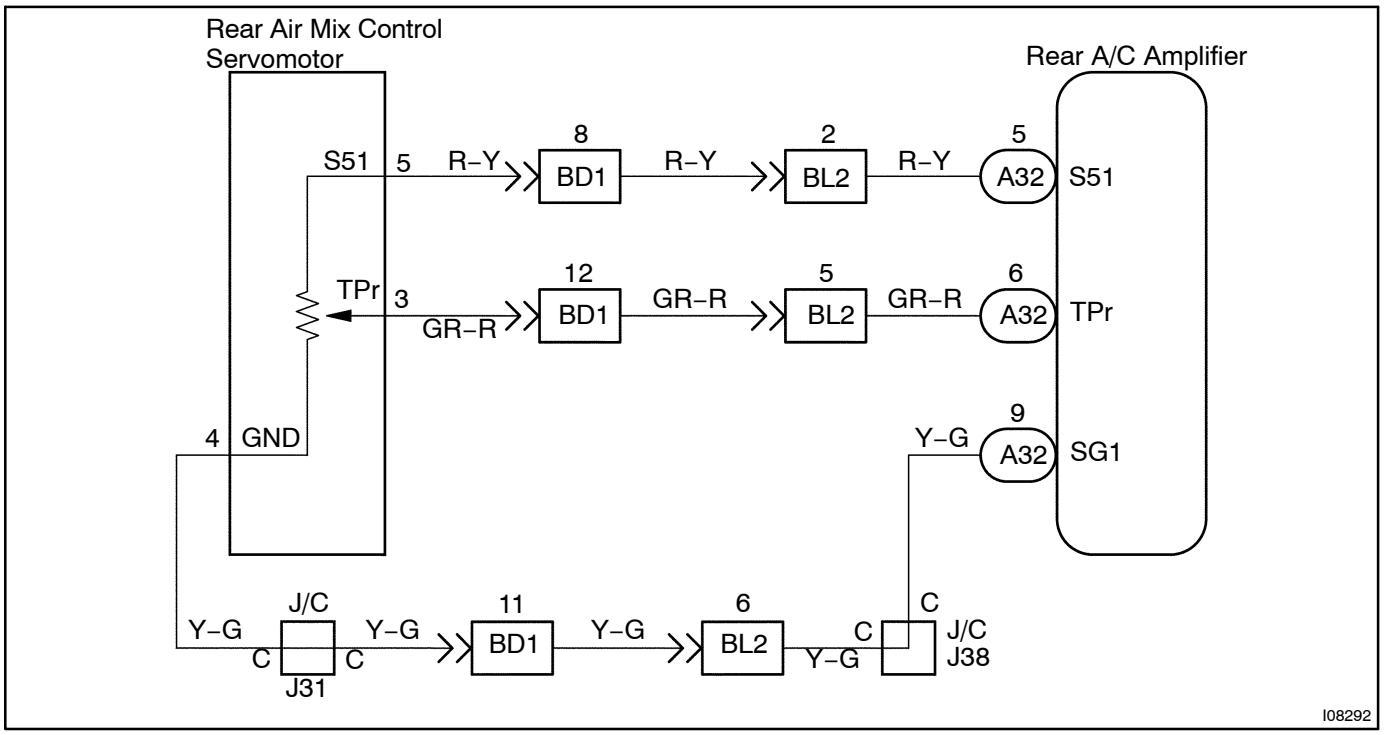
CIRCUIT DESCRIPTION



This sensor detects the position of the air mix damper and sends the appropriate signals to the rear A/C amplifier.
The position sensor is built into the rear air mix damper control servomotor assembly.

Blinking light	Detection Item	Trouble Area
RrACSW REC	Short to ground or power source circuit in rear air mix damper position sensor circuit.	• Rear air mix damper position sensor. • Harness or connector between Rear air mix damper control servomotor assembly and A/C amplifier. • Rear A/C amplifier.
RrACSW M1	Rear air mix damper position sensor value does not change even if A/C amplifier operates rear air mix damper control servomotor.	

WIRING DIAGRAM



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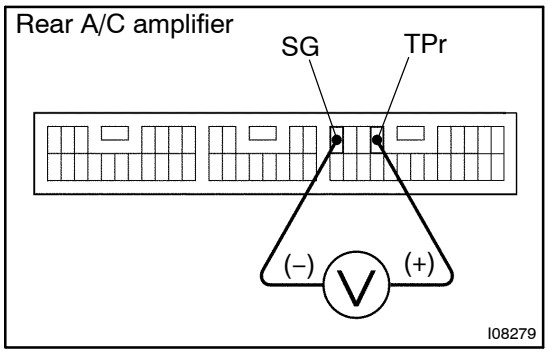
INSPECTION PROCEDURE

1	**Check voltage between terminals TPr and SG of rear A/C amplifier connector.**



PREPARATION:

Remove rear A/C amplifier with connectors still connected.

CHECK:

(a) Turn ignition switch ON.

(b) Change the set temperature to activate the rear air mix damper control servomotor, and measure the voltage between terminals TPr and SG of rear A/C amplifier connector each time when the set temperature is changed.

OK:

Set Temperature	Voltage
Max. cool	3.5 – 4.5 V
Max. hot	0.5 – 1.5 V

HINT:

As the set temperature increases, the voltage decreases.

NG → **Go to step 2.**

Ok

Proceed to next circuit inspection shown on problem symptoms table (See page DI–630). However, if RrACSW and REC or RrACSW and M1 is light up, check and replace rear A/C amplifier.

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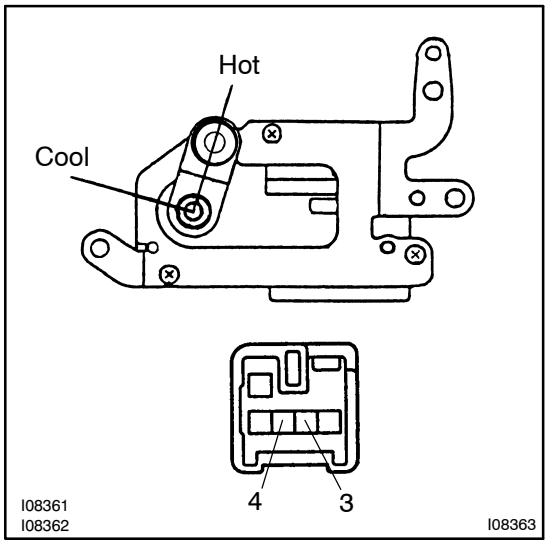
2	Check rear air mix damper position sensor.



PREPARATION:

(a) Remove heater unit (See page AC–36)

(b) Disconnect rear air mix damper control servomotor assembly connector.

CHECK:

Measure resistance between terminals 3 and 4 of rear air mix damper control servomotor assembly connector.

OK:

Resistance : 4.2 – 7.8 kΩ

CHECK:

While operating rear air mix damper control servomotor, following the procedure, measure resistance between terminals 3 and 4 of rear air mix damper control servomotor assembly connector.

OK:

Position	Resistance
Max. cool	3.6 – 6.8 kΩ
Max. hot	0.5 – 1.1 kΩ

HINT:

As the rear air mix damper control servomotor moves from cool side to hot side, the resistance decreases.

NG → **Replace rear air mix damper control servomotor assembly.**

OK

3	Check harness and connector between rear A/C amplifier and rear air mix damper control servomotor assembly (See page IN–34).

NG → **Repair or replace harness or connector.**

OK

Check and replace A/C amplifier.

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DI3D9–01

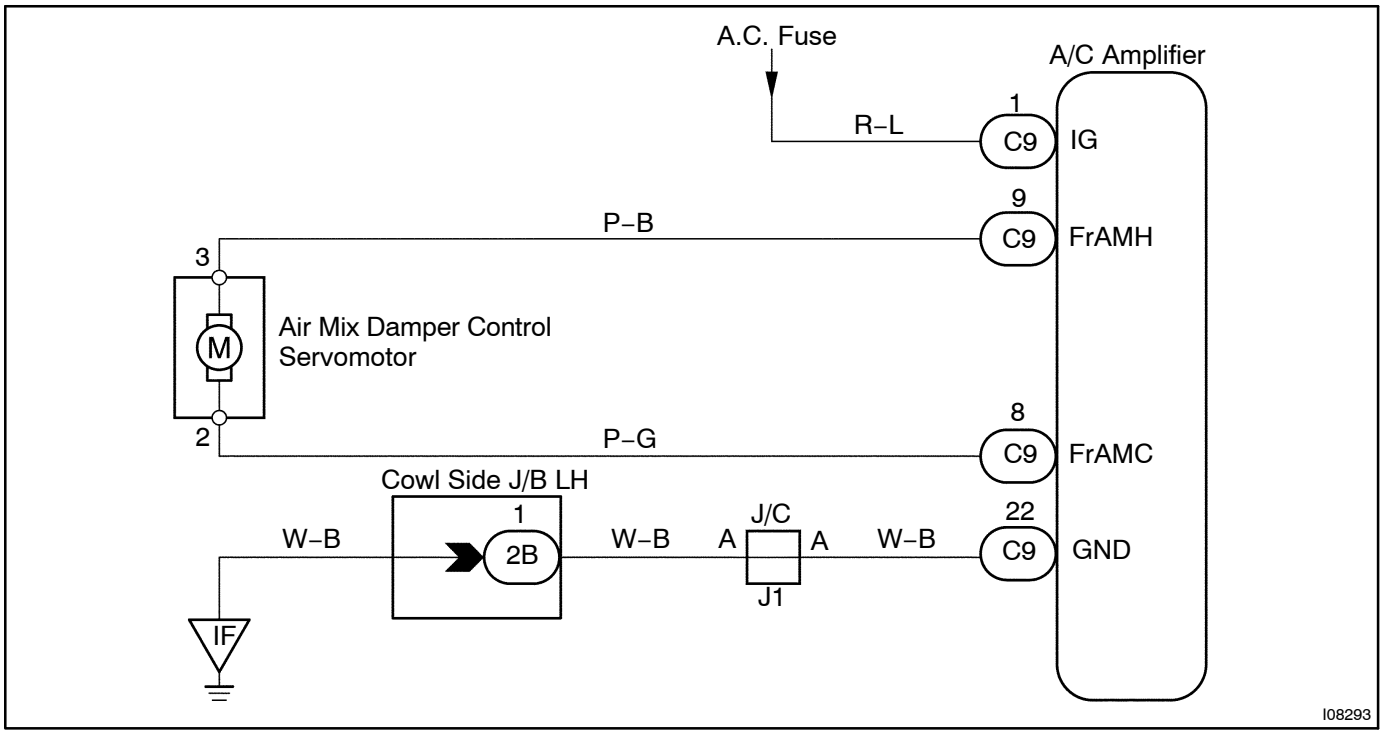
DTC	RrDEF, M1	Front Air Mix Damper Control Servo-motor Circuit

CIRCUIT DESCRIPTION

The front air mix damper control servomotor is controlled by the A/C control assembly and moves the air mix damper to the desired position.

Blinking lilght	Detection Item	Trouble Area
RrDEF M1	Air mix damper position sensor value does not change even if A/C control assembly operates air mix damper control servo-motor.	• Front air mix damper control servomotor. • Front air mix damper position sensor. • Harness or connector between front air mix control servomo-tor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



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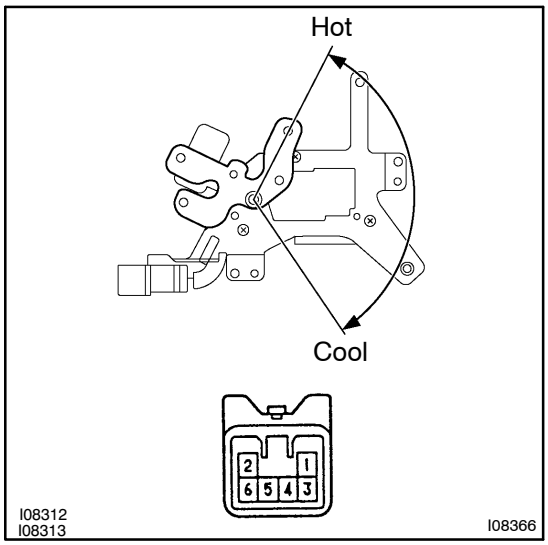
INSPECTION PROCEDURE

1	**Check front air mix damper control servomotor.**



PREPARATION:
Remove heater unit (See page AC–29).
CHECK:
Connect positive (+) lead to terminal 3 and negative (–) lead to terminal 2.
OK:
The lever turns smoothly to Hot side.
CHECK:
Connect positive (+) lead to terminal 2 and negative (–) lead to terminal 3.
OK:
The lever turns smoothly to Cool side.

NG → **Replace front air mix damper control servomotor assembly.**

OK

2	**Check harness and connector between A/C amplifier and front air mix damper control servomotor assembly (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace A/C amplificer.

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DI3DA–01

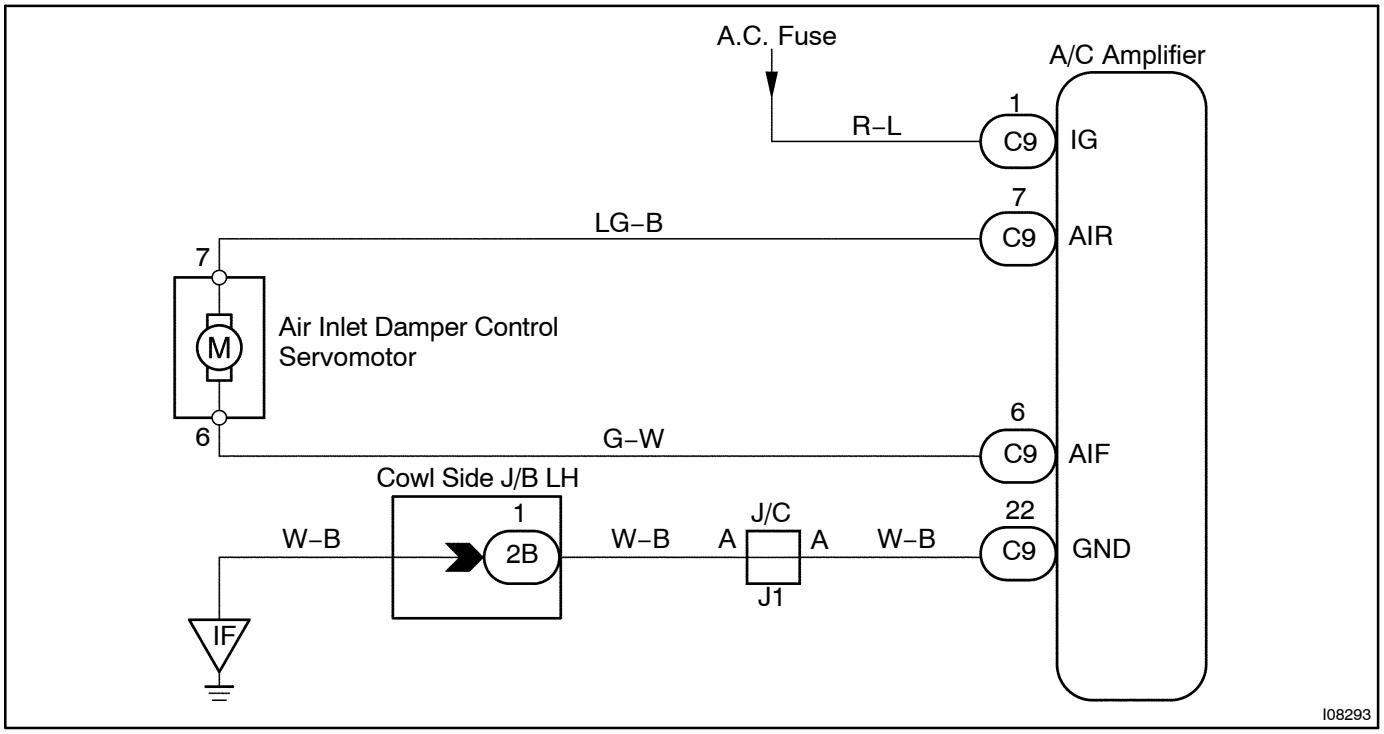
DTC	RrDEF, M2	Air Inlet Damper Control Servomotor Circuit

CIRCUIT DESCRIPTION

The air inlet damper control servomotor is controlled by the A/C amplifier and moves the air inlet damper to the desired position.

Blinking light	Detection item	Trouble Area
RrDEF M2	Air inlet damper position sensor value does not change even if A/C amplifier operated air inlet damper control servomotor.	• Air inlet damper position sensor. • Harness or connector between air inlet damper control servomotor assembly and A/C amplifier. • A/C amplifier.

WIRING DIAGRAM



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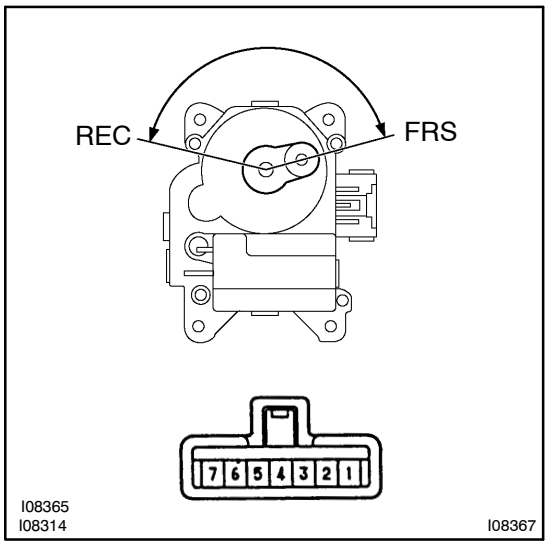
INSPECTION PROCEDURE

1	**Check air inlet damper control servomotor.**



PREPARATION:

(a) Remove cooling unit (See page AC–23).

(b) Disconnect the air inlet damper control servomotor assembly connector.

CHECK:

Connect positive (+) lead to terminal 7 and negative (–) lead to terminal 6.

OK:

The lever moves smoothly to REC position.

CHECK:

Connect positive (+) lead to terminal 6 and negative (–) lead to terminal 7.

OK:

The lever moves smoothly to FRS position.

NG → **Replace air inlet damper control servomotor assembly.**

OK

2	**Check harness and connector between A/C amplifier and air inlet damper control servomotor (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace A/C amplifier.

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DI3DB–01

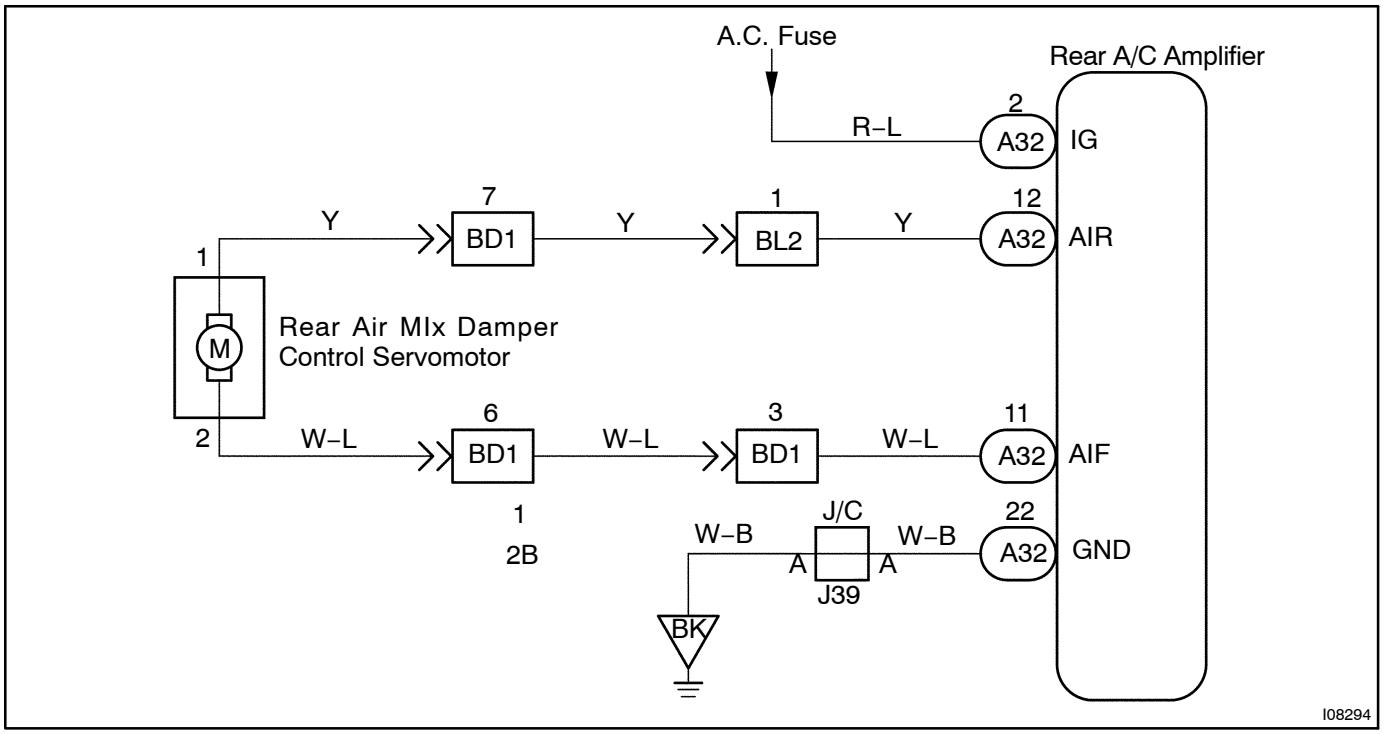
DTC	RrACSW, M1	Rear Air Mix Damper Control Servomotor Circuit

CIRCUIT DESCRIPTION

The rear air mix damper control servomotor is controlled by the A/C control assembly and moves the air mix damper to the desired position.

Blinking light	Detection Item	Trouble Area
RrDEF M1	Air mix damper position sensor value does not change even if A/C control assembly operates air mix damper control servomotor.	• Rear air mix damper control servomotor. • Rear air mix damper position sensor. • Harness or connector between rear air mix control servomotor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



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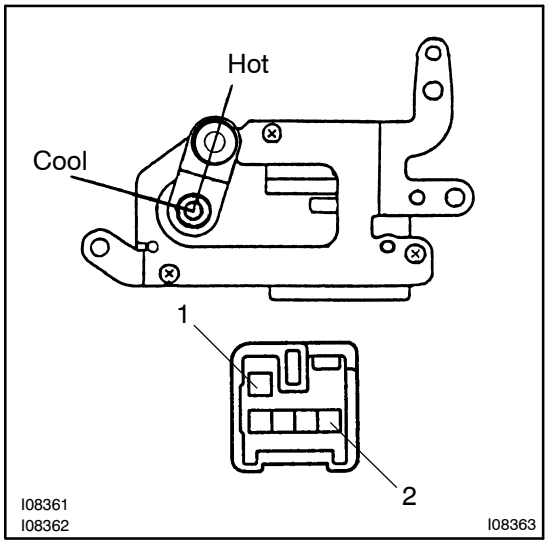
INSPECTION PROCEDURE

1	**Check rear air mix damper control servomotor.**



PREPARATION:
Remove heater unit (See page AC–36).
CHECK:
Connect positive (+) lead to terminal 1 and negative (–) lead to terminal 2.
OK:
The lever turns smoothly to Hot side.
CHECK:
Connect positive (+) lead to terminal 2 and negative (–) lead to terminal 1.
OK:
The lever turns smoothly to Cool side.

NG → **Replace rear air mix damper control servomotor assembly.**

OK

2	**Check harness and connector between A/C amplifier and rear air mix damper control servomotor assembly (See page IN–34).**

NG → **Repair or replace harness or connector.**

OK

Check and replace A/C amplifier.

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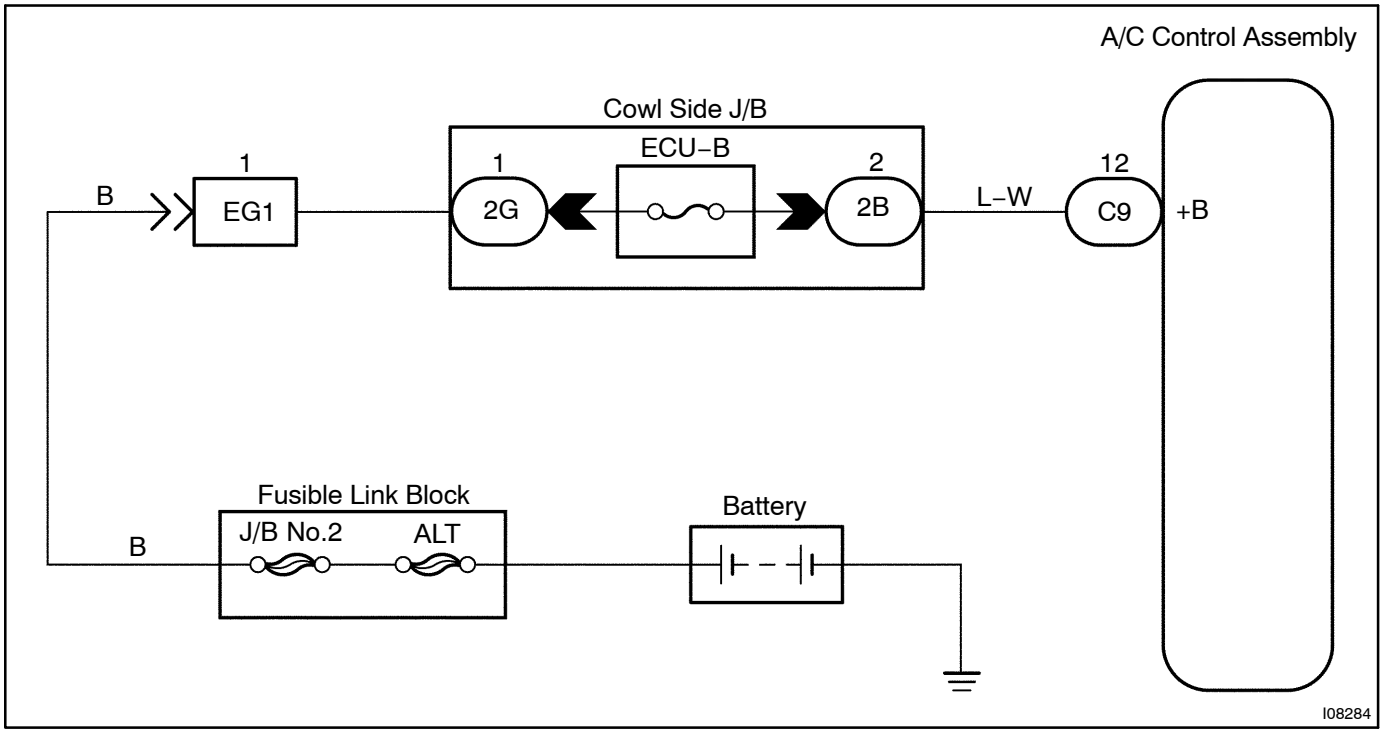
DI3DC–01

Back Up Power Source Circuit

CIRCUIT DESCRIPTION

This is the backup poser source for the A/C control assembly. Power is supplied even when the ignition switch is off and is used for diagnostic trouble code memory, etc.

WIRING DIAGRAM



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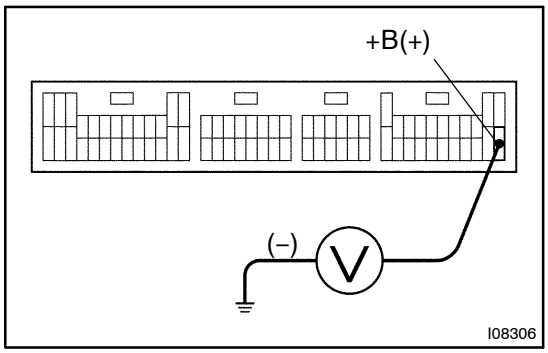
INSPECTION PROCEDURE

1	**Check voltage between terminal +B of A/C ampllifier assembly connector and body ground.**



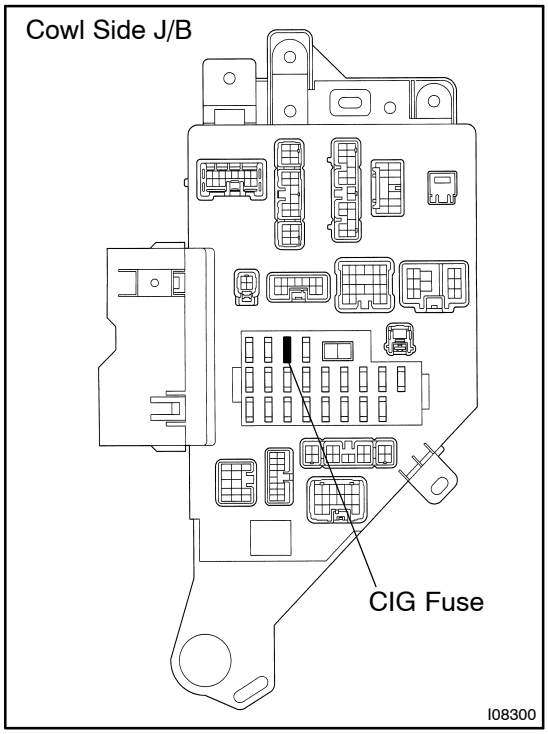
PREPARATION:
Remove the A/C amplifier with connector still connected.
CHECK:
Measure voltage between terminal +B of A/C amplifierconnector and body ground.
OK:

Voltage : Battery positive voltage

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI–630).**

NG

2	**Check CIG fuse.**



PREPARATION:
Remove CIG fuse from cowl side J/B.
CHECK:
Check continuity of CIG fuse.
OK:

Continuity

NG	**Check for short in all the harness and components connected to the CIG fuse (See attached wiring diagram).**

OK

Check and repair harness and connector between A/C amplifier.

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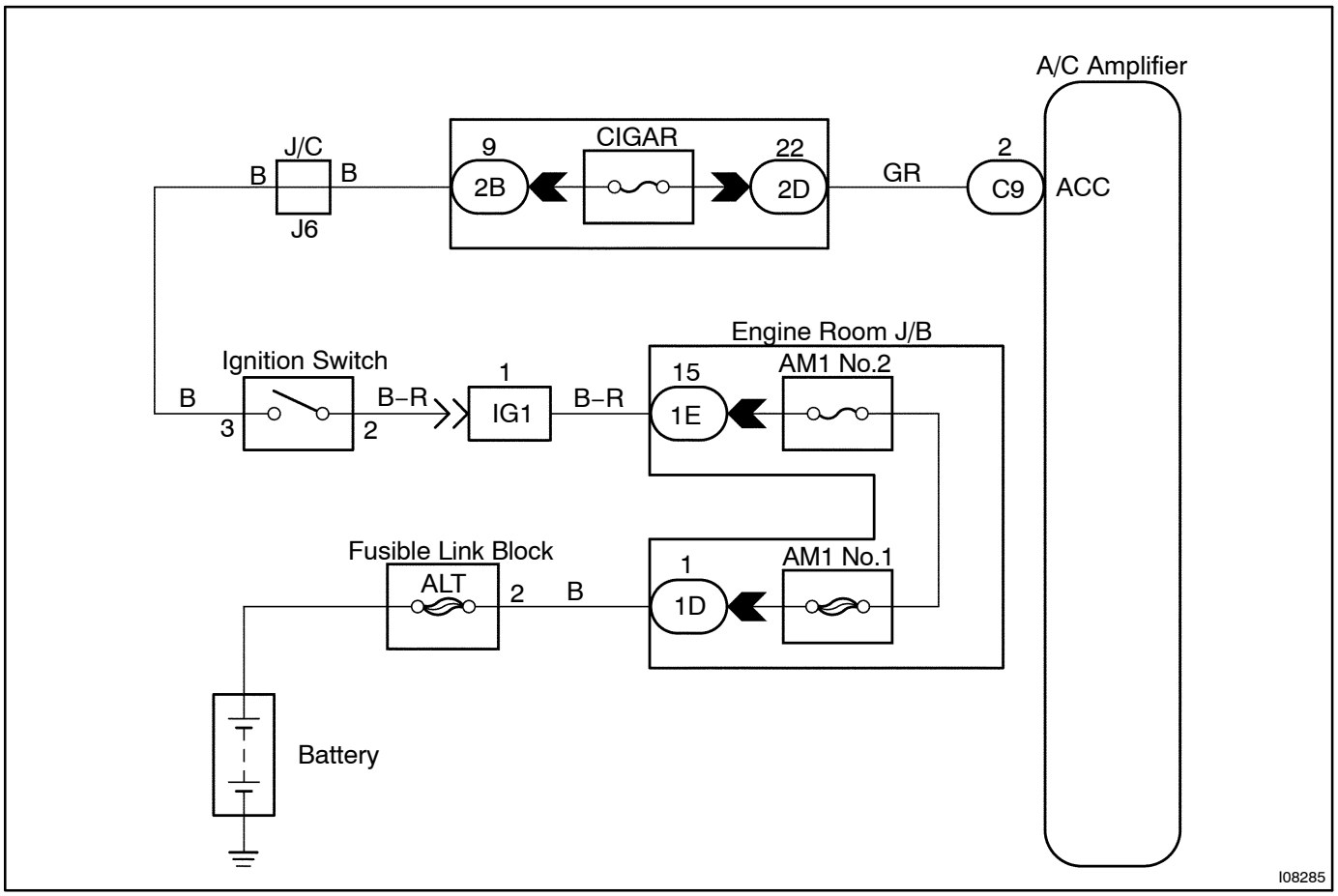
DI3DD–01

ACC Power Source Circuit

CIRCUIT DESCRIPTION

This is the power source for A/C amplifier and servomotors, etc.

WIRING DIAGRAM



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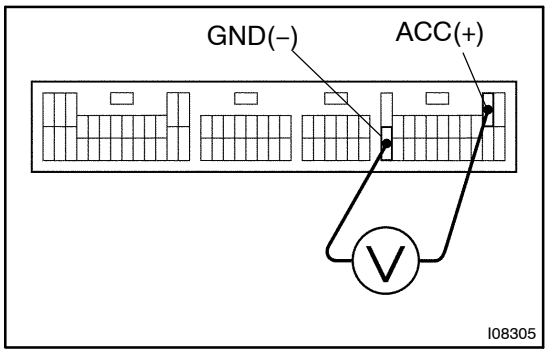
INSPECTION PROCEDURE

1	Check voltage between terminals ACC and GND of A/C amplifier connector.

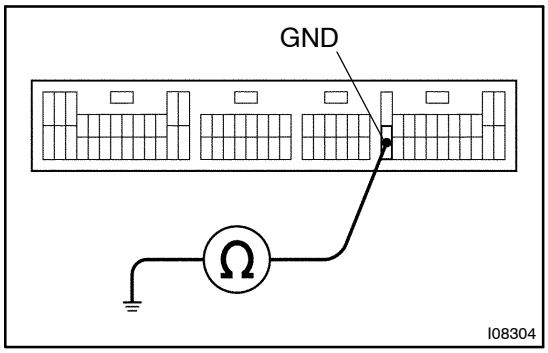


PREPARATION:
Remove A/C amplifier with connectors still connected.
CHECK:
(a) Turn ignition switch ON.
(b) Measure voltage between terminals ACC and GND of A/C amplifier.
OK:
Voltage : Battery positive voltage

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–630).**

NG

2	Check continuity between terminal GND of A/C amplifier and body ground.



CHECK:
Measure resistance between terminal GND of A/C amplifier and body ground.
OK:
Resistance : 0 Ω (continuity)

NG → **Repair or replace harness or connector.**

OK

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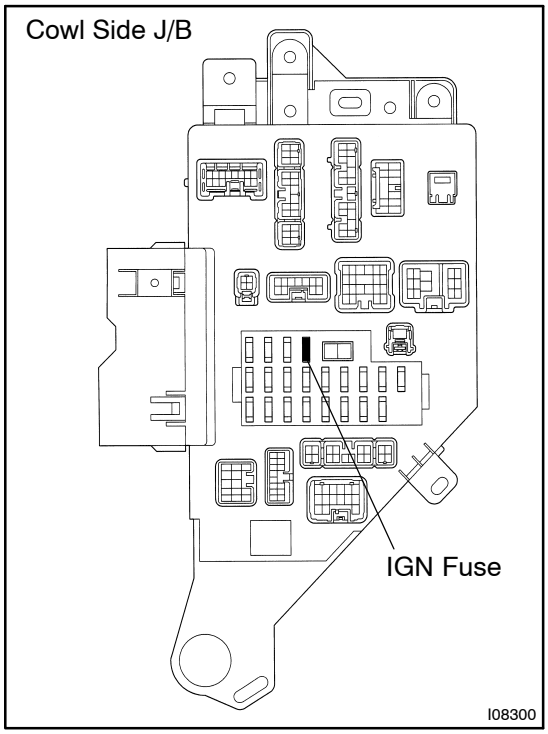
3	**Check IGN fuse.**



PREPARATION:
Remove IGN fuse from cowl side J/B.
CHECK:
Check continuity of IGN fuse.
OK:

Continuity

NG → **Check for short in all the harness and components connected to the IGN fuse (See attached wiring diagram).**

OK

Check and repair harness and connector between A/C amplifier.

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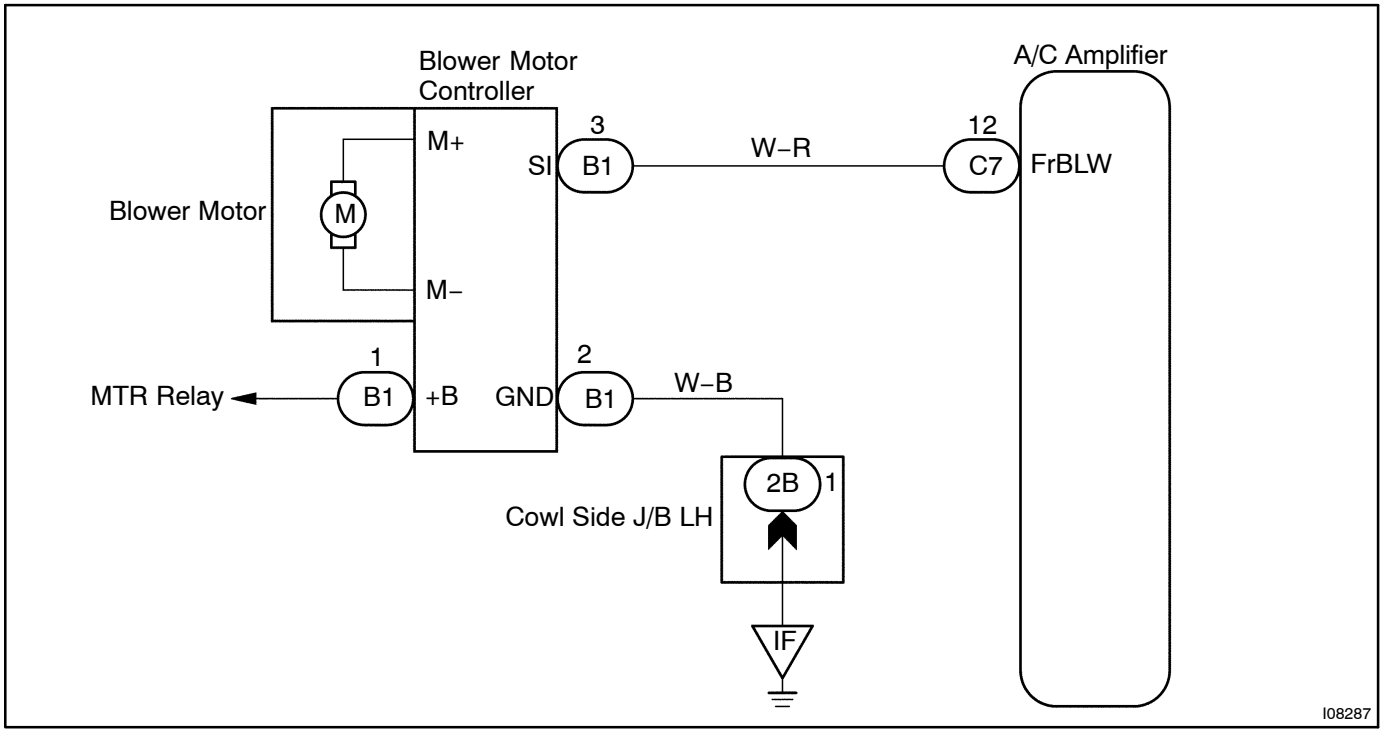
DI3DE–01

Blower Motor Circuit

CIRCUIT DESCRIPTION

This is the power source for the blower motor.

WIRING DIAGRAM



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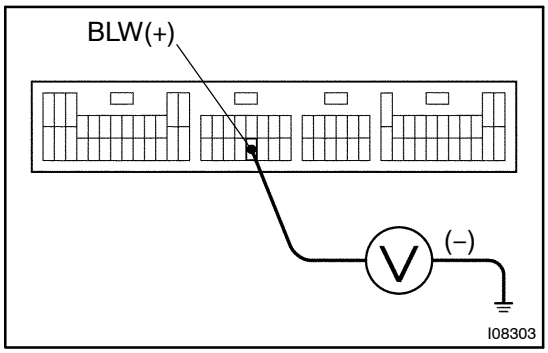
INSPECTION PROCEDURE

1	**Check voltage between terminal BLW of A/C amplifier connector and body ground.**

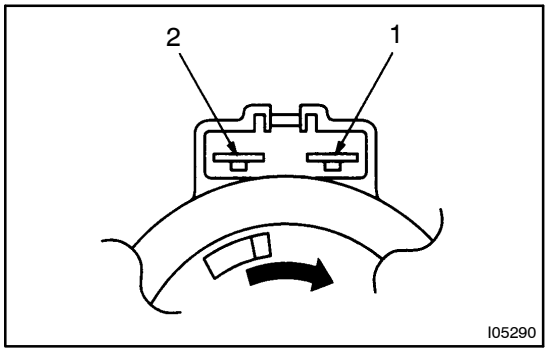


PREPARATION:
Remove the A/C amplifier with connector still connected.
CHECK:
(a) Turn ignition switch ON.
(b) Operate blower motor.
(c) Measure voltage between terminal BLW of A/C amplifier and body ground.
OK:
Voltage : 1 – 3 V

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI–630).**

NG

2	**Check blower motor.**



PREPARATION:
Remove blower motor (See page AC–45)
CHECK:
Connect the positive (+) lead from the battery to terminal 2 of blower motor connector and the negative (–) lead to terminal 1.
OK:
Blower motor operates smoothly.

NG	**Replace blower motor.**

OK

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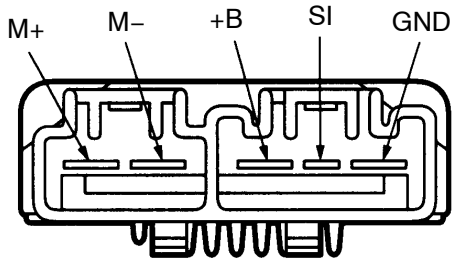
3	Check blower motor control relay.



I05291

PREPARATION:

Remove blower motor control relay with connectors still connected.

CHECK:

(a) Turn ignition switch ON.

(b) Operate blower motor (High blower speed).

OK:

Terminals	Standard Value
GND ↔ Body Ground	Continuity
+B ↔ Body Ground	Battery Positive Voltage
+M ↔ Body Ground	Battery Positive Voltage
M+ ↔ M–	Battery Positive Voltage
SI ↔ Body Ground	1 – 3 V

NG → **Replace blower motor relay.**

OK →

Repair or replace harness or connector.

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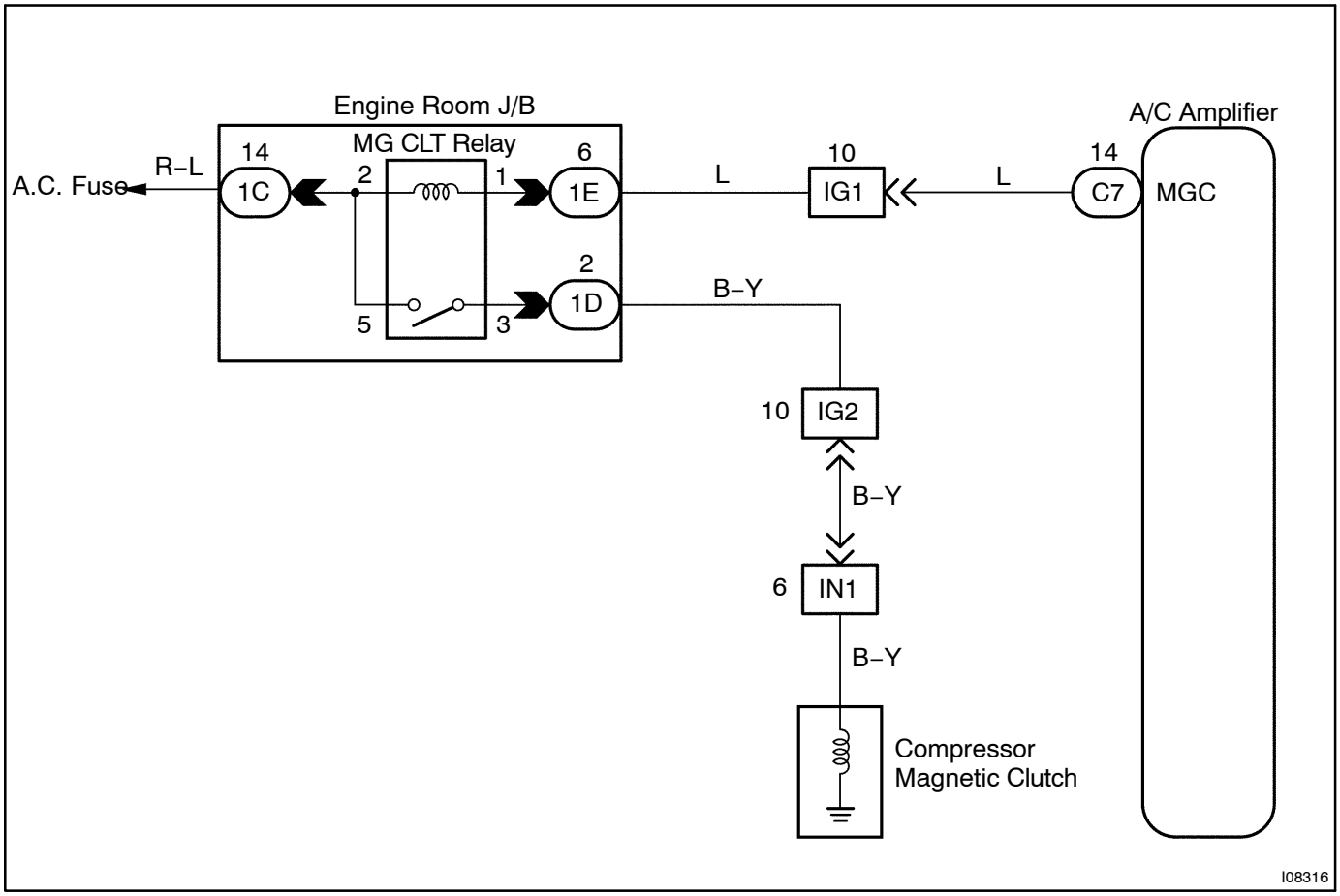
DI3DF–01

Compressor Circuit

CIRCUIT DESCRIPTION

A/C amplifier switches the A/C magnetic clutch relay ON, thus turning the A/C compressor magnetic clutch ON.

WIRING DIAGRAM



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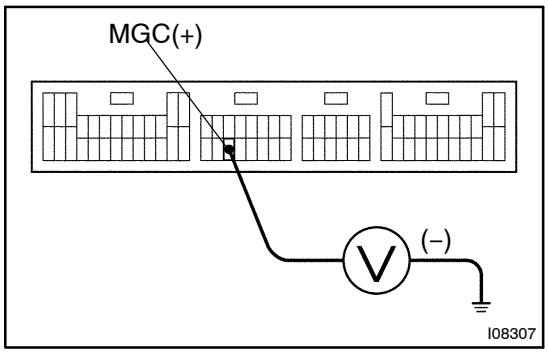
INSPECTION PROCEDURE

1	Check voltage between terminal MGC of A/C amplifier connector.



CHECK:

(a) Start engine.
(b) Push AUTO SW.
(c) Measure voltage between terminal MCG of A/C amplifier connector and body ground when A/C switch is ON and OFF.

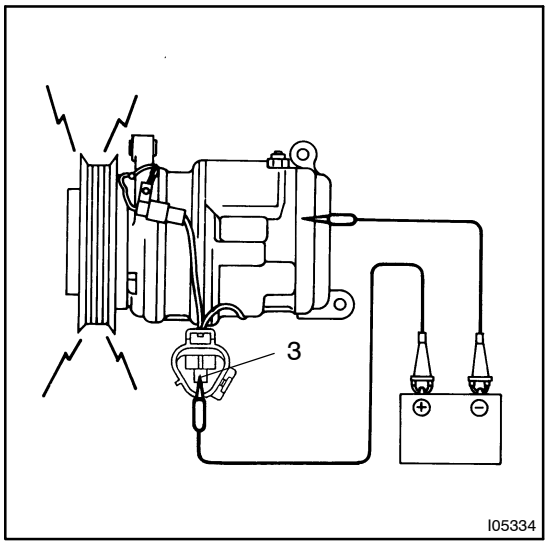
OK:

A/C switch	Voltage
ON	10 – 4 V
OFF	0 V

OK → **Check and replace A/C amplifier.**

NG

2	Check A/C compressor 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 compressor magnetic clutch.**

OK

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3	**Check harness and connector between A/C compressor and MC CLT relay (See page IN–34)**

NG → **Repair or replace harness or connector.**

OK

Check and replace A/C amplifier.

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CO/HC

INSPECTION

EM0KQ–01

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.

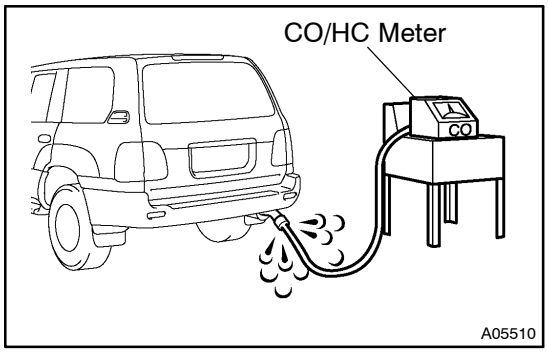
HINT:

All vacuum hoses should be properly connected.

(f) SFI system wiring connectors fully plugged.
(g) Ignition timing set correctly.
(h) Transmission in neutral range.
(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 performing the 2 mode (2,500 rpm and idle) test, follow the measurement order prescribed by the applicable local regulations.

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6. TROUBLESHOOTING

If the CO/HC concentration does not comply with regulations, perform troubleshooting in the order given below.
See the table below for possible causes, and then inspect and correct the applicable causes if necessary.

CO	HC	Problems	Causes
Normal	High	Rough idle	1. Faulty ignitions: • Incorrect timing • Fouled, shorted or improperly gapped plugs 2. Incorrect valve clearance 3. Leaky intake and exhaust valves 4. Leaky cylinders
Low	High	Rough idle (fluctuating HC reading)	1. Vacuum leaks: • PCV hoses • Intake manifold • Throttle body • Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2.Faulty SFI systems: • Faulty pressure regulator • Defective ECT sensor • Faulty ECM • Faulty injectors • Faulty throttle position sensor • Faulty MAF meter

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COMPRESSION

INSPECTION

EM0KR–01

HINT:

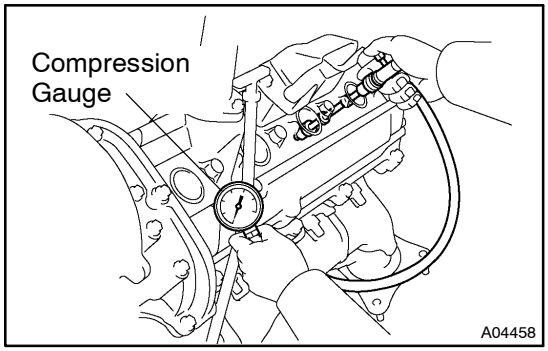
If there is lack of power, excessive oil consumption or poor fuel economy, measure the compression pressure.

1. WARM UP AND STOP ENGINE

Allow the engine to warm up to normal operating temperature.

2. REMOVE SPARK PLUGS

(See page IG–1)



3. CHECK CYLINDER COMPRESSION PRESSURE

(a) Insert a compression gauge into the spark plug hole.

(b) Fully open the throttle.

(c) While cranking the engine, measure the compression pressure.

HINT:

Always use a fully charged battery to obtain 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:
1,324 kPa (13.5 kgf/cm^2, 192 psi) or more
Minimum pressure:
981 kPa (10.0 kgf/cm^2, 142 psi)
Difference between each cylinder:
98 kPa (1.0 kgf/cm^2, 14 psi) or less

(e) If the cylinder compression in one or more cylinders is 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, chances are that the piston rings and/or cylinder bore are worn or damage.
- If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket.

4. REINSTALL SPARK PLUGS

(See page IG–1)

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VALVE CLEARANCE

INSPECTION

EM0KS–01

HINT:

Inspect and adjust the valve clearance when the engine is cold.

1. DRAIN ENGINE COOLANT

2. REMOVE BATTERY CLAMP COVER

3. REMOVE AIR CLEANER INLET

4. REMOVE V–BANK COVER

5. REMOVE AIR CLEANER AND INTAKE AIR CONNECTOR ASSEMBLY

6. REMOVE NO.3 TIMING BELT COVERS
(See page EM–15)

7. REMOVE IGNITION COILS
(See page IG–6)

8. REMOVE RH CYLINDER HEAD COVER

Remove the 9 bolts, 9 seal washers and cylinder head cover.

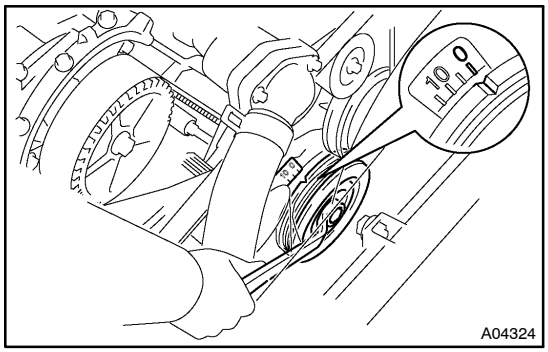
9. REMOVE LH CYLINDER HEAD COVER

(a) Remove the oil dipstick for the transmission.

(b) Disconnect the PCV hose.

(c) Disconnect the engine wire clamp from the wire bracket on the cylinder head cover.

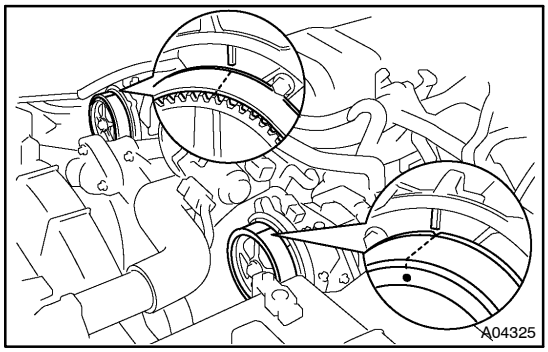
(d) Remove the 9 bolts, 9 seal washers and cylinder head cover.



A04324

10. SET NO.1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley, and align its groove with timing mark ”0” of the No.1 timing belt cover.


A04325

(b) Check that the timing marks of the camshaft timing pulleys and timing belt rear plates are aligned.

If not, turn the crankshaft 1 revolution (360˚) and align the mark as above.

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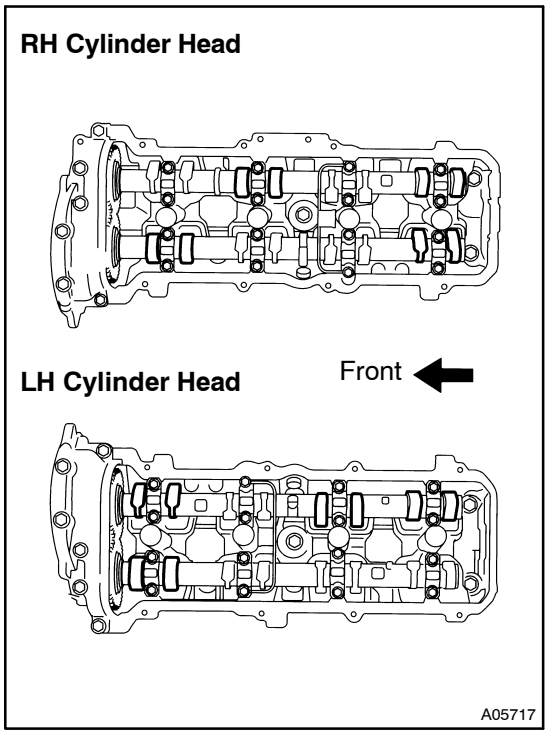


11. INSPECT VALVE CLEARANCE

(a) Check only the valves indicated.

- Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
- Record the out–of–specification valve clearance measurements. They will be used later to determine the required replacement adjusting shim.

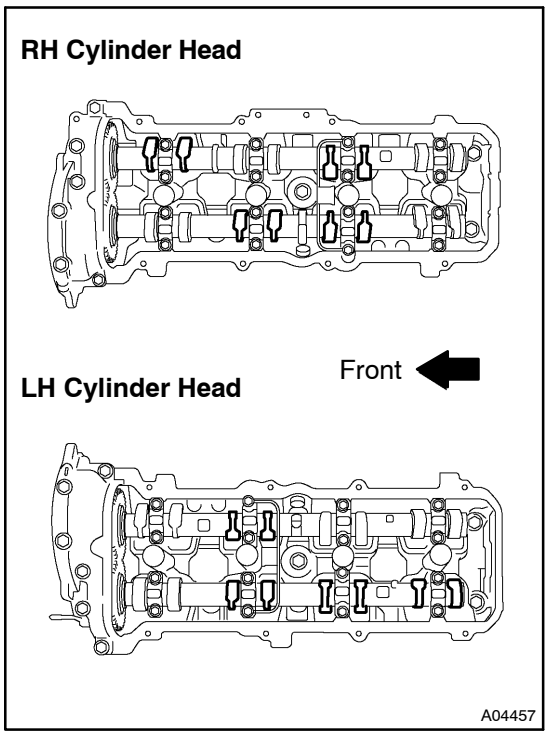
Valve clearance (Cold):

Intake

0.15 – 0.25 mm (0.006 – 0.010 in.)

Exhaust

0.25 – 0.35 mm (0.010 – 0.014 in.)



(b) Turn the crankshaft 1 revolution (360°) and align the mark as above. (See procedure in step 10)

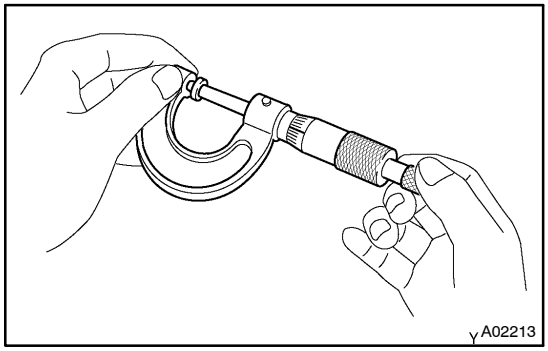
(c) Check only the valves indicated as shown. Measure the valve clearance. (See procedure in step (a))

12. ADJUST VALVE CLEARANCE

(a) Remove the timing belt.
(See page EM–15)

(b) Remove the camshafts.
(See page EM–42)

(c) Remove the valve lifter and adjusting shim.



(d) Determine the replacement adjusting shim size according to these Formula or Charts:

- Using a micrometer, measure the thickness of the removed shim.
- Calculate the thickness of a new shim so that the valve clearance comes within the specified value.

T ..... Thickness of removed shim
A ..... Measured valve clearance
N ..... Thickness of new shim

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Intake:
N = T + (A – 0.20 mm (0.008 in.))
Exhaust:
N = T + (A – 0.30 mm (0.012 in.))

- Select a new shim with a thickness as close as possible to the calculated value.

HINT:
Shims are available in 41 increments of 0.020 mm (0.0008 in.), from 2.00 mm (0.0787 in.) to 2.80 mm (0.1102 in.).

(e) Place a new adjusting shim on the valve.
(f) Place the valve lifter.
(g) Reinstall the camshafts.
(See page EM–55)
(h) Reinstall the timing belt.
(See page EM–22)
(i) Recheck the valve clearance.

13. REINSTALL CYLINDER HEAD COVERS
14. REINSTALL IGNITION COILS
15. REINSTALL NO.3 TIMING BELT COVERS
(See page EM–22)
16. REINSTALL AIR CLEANER AND INTAKE AIR CONNECTOR ASSEMBLY
17. REFILL WITH ENGINE COOLANT
18. START ENGINE AND CHECK FOR LEAKS
19. RECHECK ENGINE COOLANT LEVEL
20. REINSTALL V–BANK COVER
21. REINSTALL AIR CLEANER INLET
22. REINSTALL BATTERY CLAMP COVER

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Adjusting Shim Selection Chart (Intake)

Measured clearance mm (in.) \ Installed shim thickness mm (in.)	2.000 (0.0787)	2.020 (0.0795)	2.040 (0.0803)	2.060 (0.0811)	2.080 (0.0819)	2.100 (0.0827)	2.120 (0.0835)	2.140 (0.0843)	2.160 (0.0850)	2.180 (0.0858)	2.200 (0.0866)	2.210 (0.0870)	2.220 (0.0874)	2.230 (0.0878)	2.240 (0.0882)	2.250 (0.0886)	2.260 (0.0890)	2.270 (0.0894)	2.280 (0.0898)	2.290 (0.0902)	2.300 (0.0906)	2.310 (0.0909)	2.320 (0.0913)	2.330 (0.0917)	2.340 (0.0921)	2.350 (0.0925)	2.360 (0.0929)	2.370 (0.0933)	2.380 (0.0937)	2.390 (0.0941)	2.400 (0.0945)	2.410 (0.0949)	2.420 (0.0953)	2.430 (0.0957)	2.440 (0.0961)	2.450 (0.0965)	2.460 (0.0969)	2.470 (0.0972)	2.480 (0.0976)	2.490 (0.0980)	2.500 (0.0984)	2.510 (0.0988)	2.520 (0.0992)	2.530 (0.0996)	2.540 (0.1000)	2.550 (0.1004)	2.560 (0.1008)	2.570 (0.1012)	2.580 (0.1016)	2.590 (0.1020)	2.600 (0.1024)	2.620 (0.1031)	2.640 (0.1039)	2.660 (0.1047)	2.680 (0.1055)	2.700 (0.1063)	2.720 (0.1071)	2.740 (0.1079)	2.760 (0.1087)	2.780 (0.1094)	2.800 (0.1102)
0.000–0.030 (0.0000–0.0012)							00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	44	46	48	50	52	54	56	58	60	62
0.031–0.050 (0.0012–0.0020)						00	00	00	00	02	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	48	50	52	54	56	58	60	62	64
0.051–0.070 (0.0020–0.0028)					00	00	00	00	02	04	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	50	52	54	56	58	60	62	64	66
0.071–0.090 (0.0028–0.0035)				00	00	00	00	02	04	06	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	52	54	56	58	60	62	64	66	68
0.091–0.110 (0.0036–0.0043)			00	00	00	00	02	04	06	08	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	54	56	58	60	62	64	66	68	70
0.111–0.130 (0.0044–0.0051)		00	00	00	00	02	04	06	08	10	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	56	58	60	62	64	66	68	70	72
0.131–0.149 (0.0052–0.0059)		00	00	00	02	04	06	08	10	12	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	58	60	62	64	66	68	70	72	74
0.150–0.250 (0.0059–0.0098)						

Adjusting Shim Selection Chart (Exhaust)

Measured clearance mm (in.) \ Installed shim thickness mm (in.)	2.000 (0.0787)	2.020 (0.0795)	2.040 (0.0803)	2.060 (0.0811)	2.080 (0.0819)	2.100 (0.0827)	2.120 (0.0835)	2.140 (0.0843)	2.160 (0.0850)	2.180 (0.0858)	2.200 (0.0866)	2.210 (0.0870)	2.220 (0.0874)	2.230 (0.0878)	2.240 (0.0882)	2.250 (0.0886)	2.260 (0.0890)	2.270 (0.0894)	2.280 (0.0898)	2.290 (0.0902)	2.300 (0.0906)	2.310 (0.0909)	2.320 (0.0913)	2.330 (0.0917)	2.340 (0.0921)	2.350 (0.0925)	2.360 (0.0929)	2.370 (0.0933)	2.380 (0.0937)	2.390 (0.0941)	2.400 (0.0945)	2.410 (0.0949)	2.420 (0.0953)	2.430 (0.0957)	2.440 (0.0961)	2.450 (0.0965)	2.460 (0.0969)	2.470 (0.0972)	2.480 (0.0976)	2.490 (0.0980)	2.500 (0.0984)	2.510 (0.0988)	2.520 (0.0992)	2.530 (0.0996)	2.540 (0.1000)	2.550 (0.1004)	2.560 (0.1008)	2.570 (0.1012)	2.580 (0.1016)	2.590 (0.1020)	2.600 (0.1024)	2.620 (0.1031)	2.640 (0.1039)	2.660 (0.1047)	2.680 (0.1055)	2.700 (0.1063)	2.720 (0.1071)	2.740 (0.1079)	2.760 (0.1087)	2.780 (0.1094)	2.800 (0.1102)
0.000–0.030 (0.0000–0.0012)												00	00	00	00	00	00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52
0.031–0.050 (0.0012–0.0020)											00	00	00	00	00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54
0.051–0.070 (0.0020–0.0028)										00	00	00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56
0.071–0.090 (0.0028–0.0035)									00	00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58
0.091–0.110 (0.0036–0.0043)								00	00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60
0.111–0.130 (0.0044–0.0051)							00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62
0.131–0.150 (0.0052–0.0059)						00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64
0.151–0.170 (0.0059–0.0067)					00	00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66
0.171–0.190 (0.0067–0.0075)				00	00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68
0.191–0.210 (0.0075–0.0083)			00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70
0.211–0.230 (0.0083–0.0091)		00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72
0.231–0.249 (0.0091–0.0098)		00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74
0.250–0.350 (0.0098–0.0138)											

IGNITION TIMING

EM0KT–01

INSPECTION

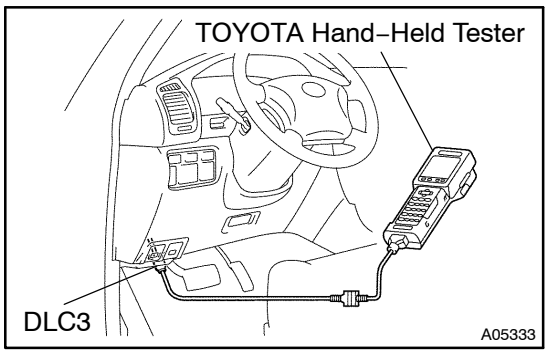
1. REMOVE BATTERY CLAMP COVER

2. REMOVE INTAKE AIR CONNECTOR

3. REMOVE V–BANK COVER

4. WARM UP ENGINE

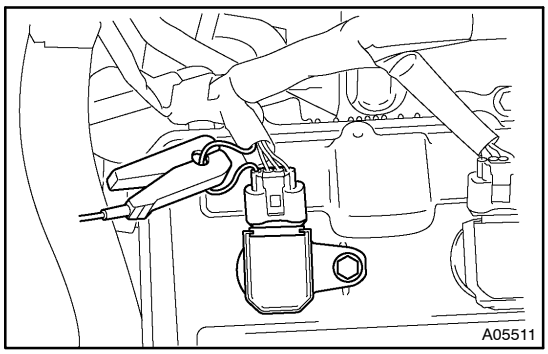
Allow the engine to warm up to normal operating temperature.



5. CONNECT TOYOTA HAND–HELD TESTER OR OBD II SCAN TOOL

(a) Connect the hand–held tester or OBD II scan tool to the DLC3.

(b) Please refer to the hand–held tester or OBD II scan tool operator's manual for further details.



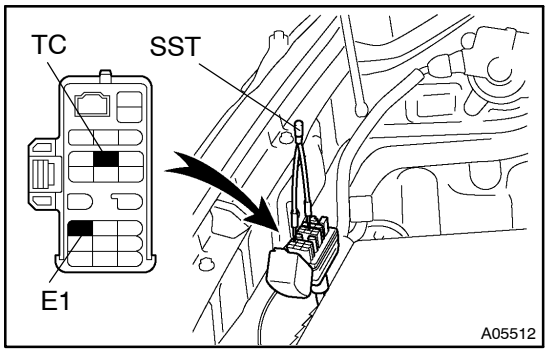
6. CONNECT TIMING LIGHT TO ENGINE

Connect the tester probe of a timing light to the wire of the ignition coil connector for No.1 cylinder.

7. CHECK IDLE SPEED

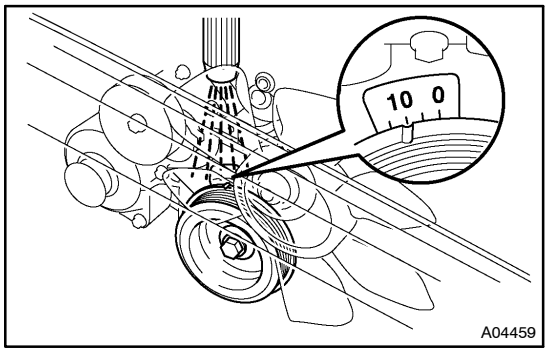
(a) Race the engine speed at 2,500 rpm for approx. 90 seconds.

(b) Check the idle speed.
Idle speed:
700 ± 50 rpm



8. INSPECT IGNITION TIMING

(a) Using SST, connect terminals TC and E1 of the DLC1.
SST 09843–18020



(b) Using a timing light, check the ignition timing.
Ignition timing:
5 – 15° BTDC @ idle
(Transmission in neutral position)

(c) Remove the SST from the DLC1.
SST 09843–18020

9. DISCONNECT TIMING LIGHT FROM ENGINE

10. DISCONNECT TOYOTA HAND–HELD TESTER OR OBD II SCAN TOOL

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11. **REINSTALL V–BANK COVER**
12. **REINSTALL INTAKE AIR CONNECTOR**
13. **REINSTALL BATTERY CLAMP COVER**

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IDLE SPEED

EM0KU–01

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

HINT:

All vacuum hoses should be properly connected.

(f) SFI system wiring connectors fully plugged
(g) Ignition timing set correctly
(h) Transmission in neutral position
(i) Air conditioning switched OFF

2. CONNECT TOYOTA HAND–HELD TESTER OR OBD II SCAN TOOL
(See page EM–9)

3. INSPECT IDLE SPEED

(a) Race the engine speed at 2,500 rpm for approx. 90 seconds.
(b) Check the idle speed.
Idle speed: 750 ± 50 rpm

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

4. DISCONNECT TOYOTA HAND–HELD TESTER OR OBD II SCAN TOOL

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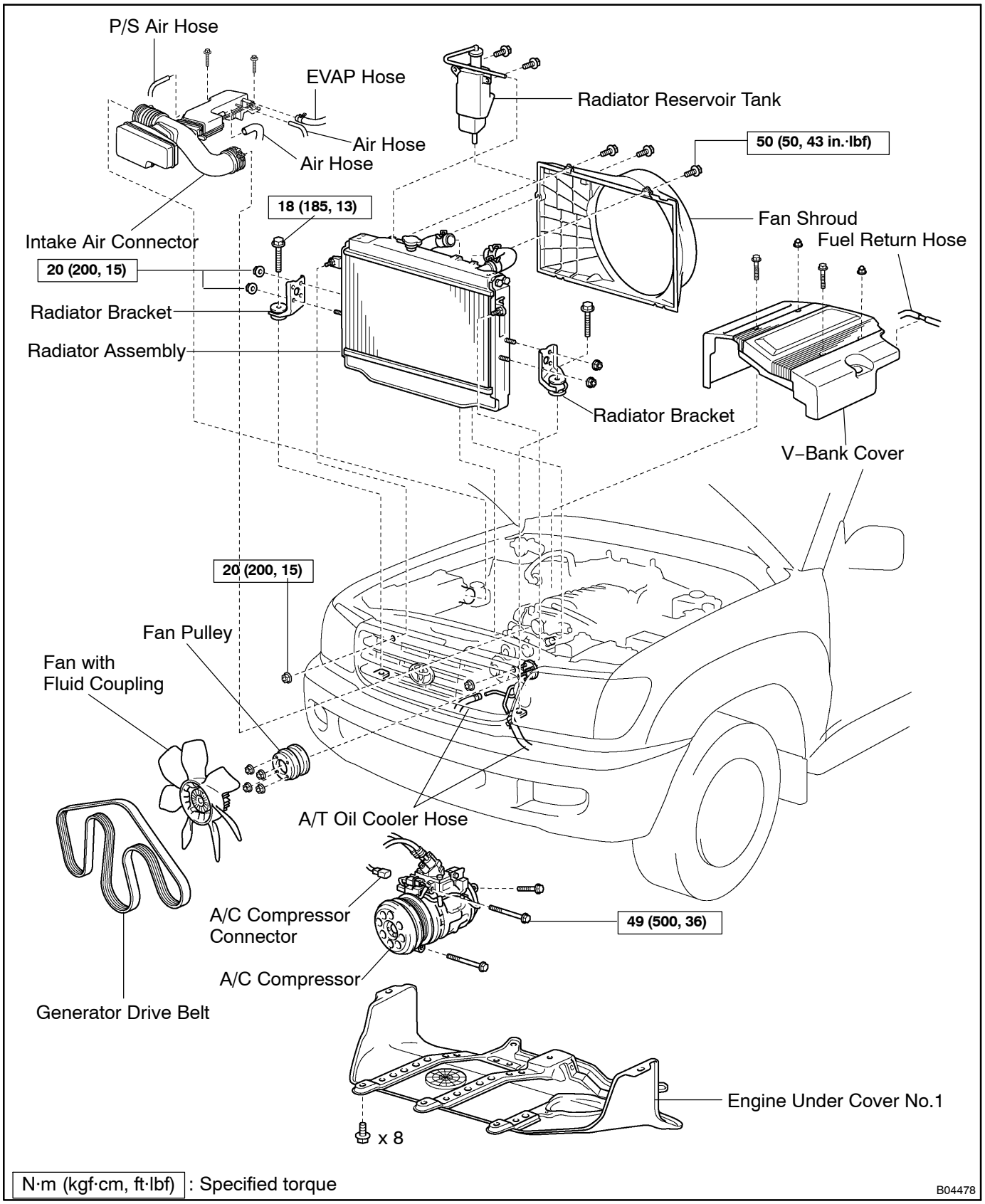
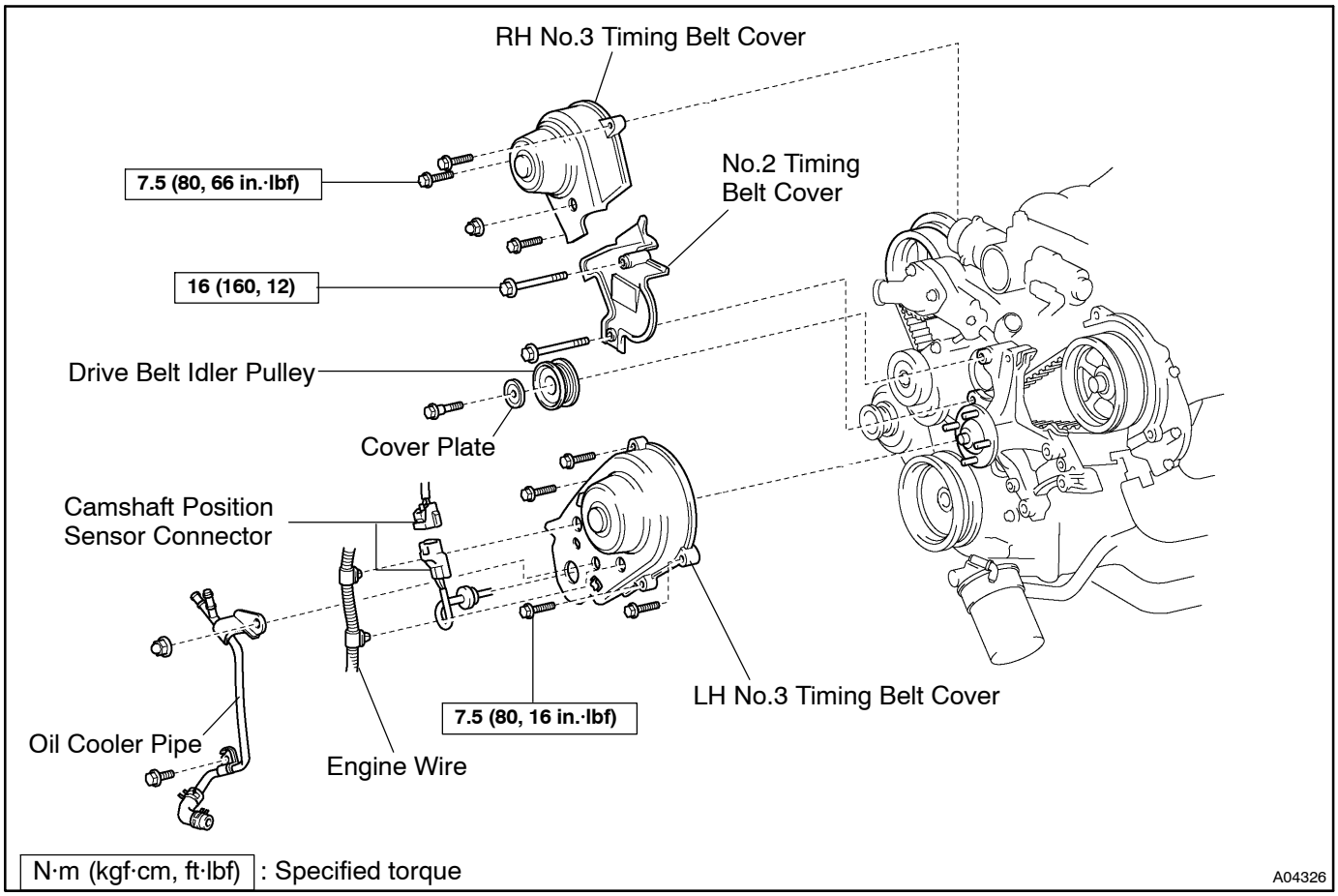
TIMING BELT

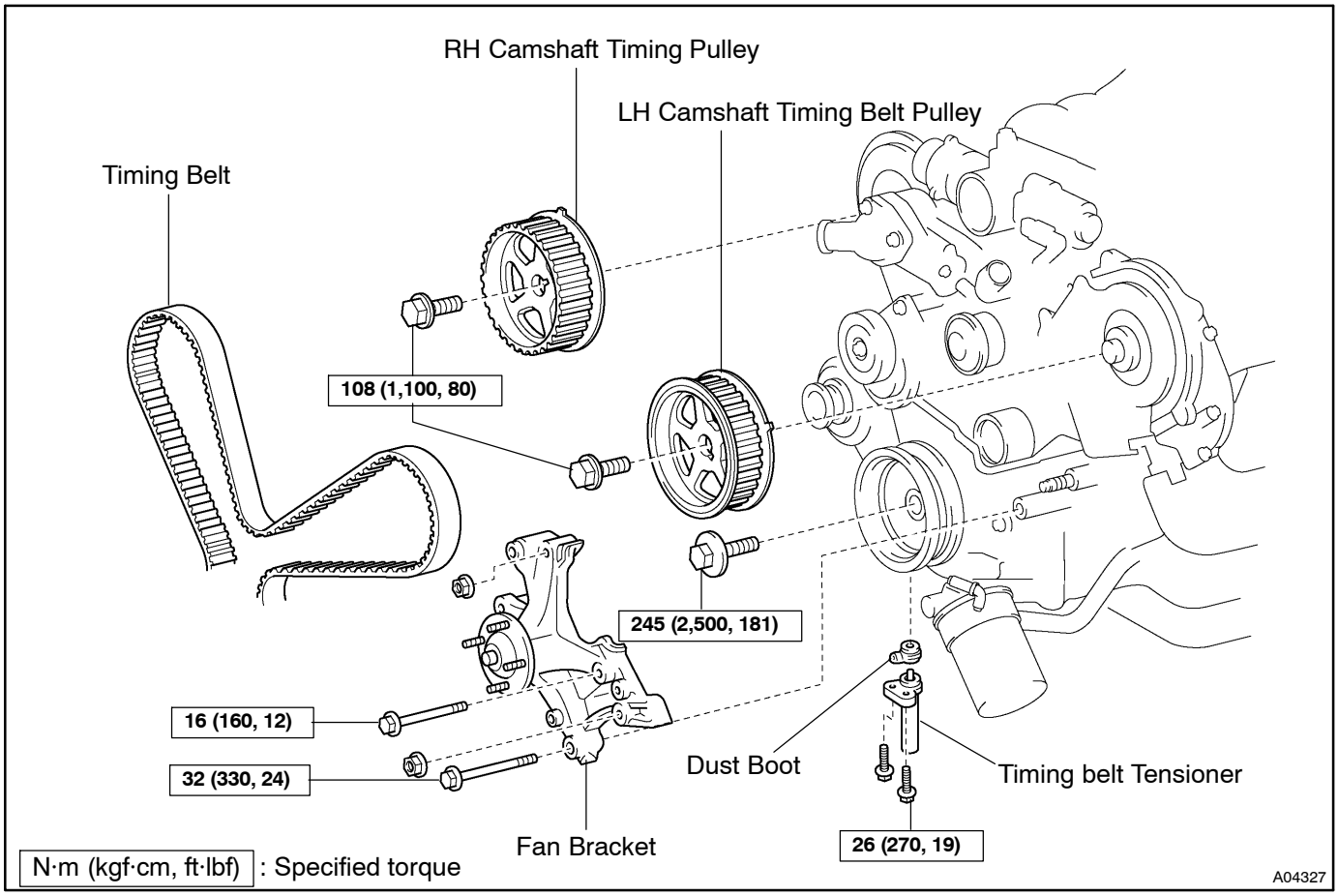
COMPONENTS

EM0KV–01



Donated by Andrew Schauer . cruisercult.com





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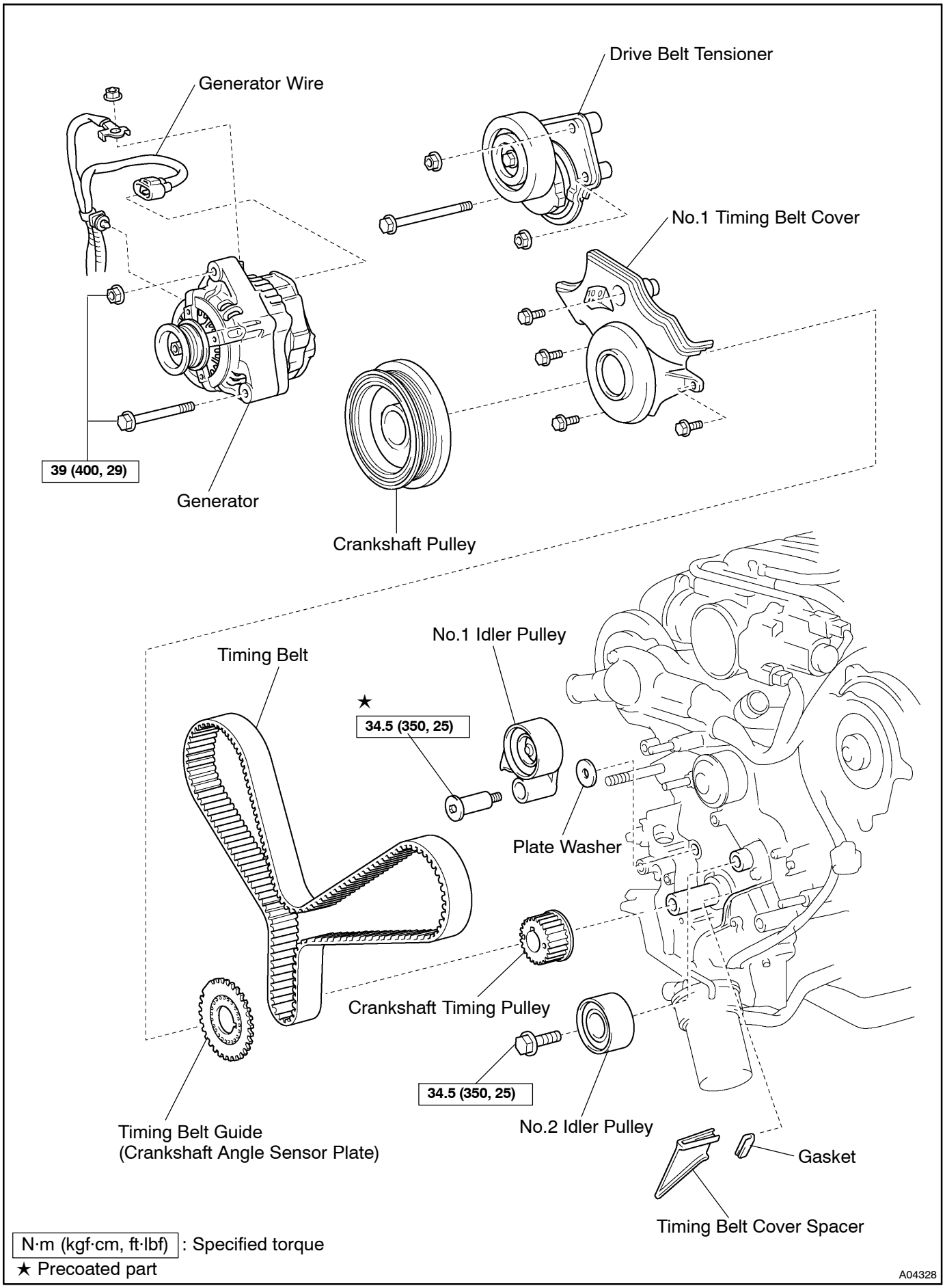

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EM0KW–01

REMOVAL

1. REMOVE OIL PAN PROTECTOR

2. REMOVE ENGINE UNDER COVER

3. DRAIN ENGINE COOLANT

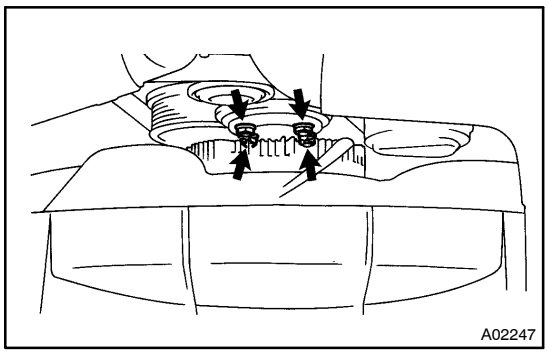
4. REMOVE BATTERY CLAMP COVER

5. REMOVE INTAKE AIR CONNECTOR

6. REMOVE V–BANK COVER

(a) Remove the fuel return hose from the V–bank cover.

(b) Remove the 2 bolt, 2 cap nuts and V–bank cover.



7. REMOVE AIR CLEANER AND INTAKE AIR CONNECTOR ASSEMBLY

8. REMOVE DRIVE BELT, FAN, FLUID COUPLING AND FAN PULLEY

(a) Loosen the 4 nuts holding the fluid coupling to the fan bracket.

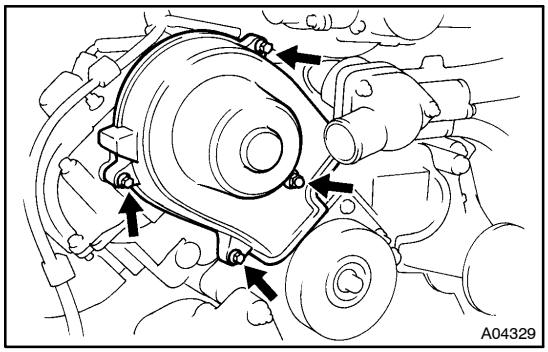
(b) Remove the generator drive belt.
(See page CH–8)

(c) Remove the 4 nuts, the fan, fluid coupling assembly and fan pulley.

9. REMOVE RADIATOR ASSEMBLY
(See page CO–17)

10. REMOVE DRIVE BELT IDLER PULLEY

Remove the pulley bolt, cover plate and idler pulley.



11. REMOVE RH NO.3 TIMING BELT COVER

Remove the 3 bolts,nut RH No.3 timing belt cover.

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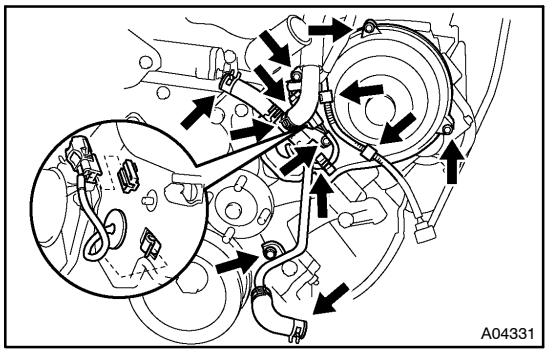
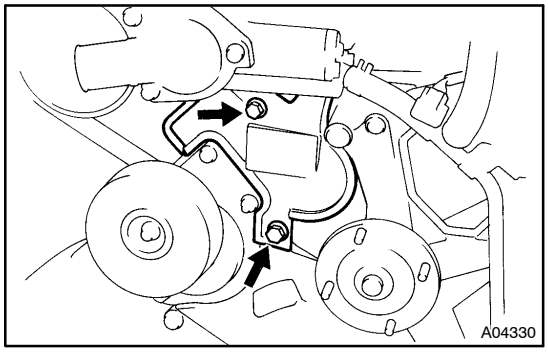


12. REMOVE LH NO.3 TIMING BELT COVER

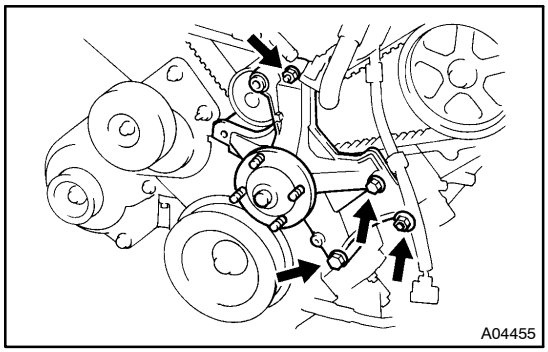
(a) Disconnect the engine wire from the 2 wire clamps.
(b) Remove the 4 bolts and nut.
(c) Disconnect the camshaft position sensor wire from the wire clamp on the LH No.3 timing belt cover.
(d) Disconnect the sensor connector from the connector bracket.
(e) Disconnect the sensor connector.
(f) Remove the wire grommet from the LH No.3 timing belt cover.
(g) Remove the LH No.3 timing belt cover.
(h) Remove the oil cooler pipe and 2 bolts.



13. REMOVE NO.2 TIMING BELT COVER

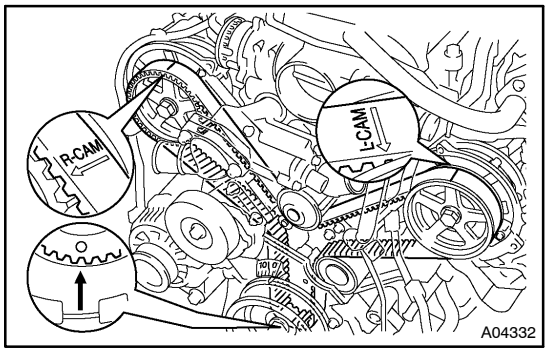
Remove the 2 bolts and No.2 timing belt cover.

14. DISCONNECT A/C COMPRESSOR FROM ENGINE (See page EM–76)



15. REMOVE FAN BRACKET

Remove the 2 bolts, 2 nuts and fan bracket.



16. IF RE–USING TIMING BELT, CHECK INSTALLATION MARKS ON TIMING BELT

Check that there are 3 installation marks on the timing belt by turning the crankshaft pulley as shown in the illustration.

HINT:

If the installation marks have disappeared, place a new installation mark on the timing belt before removing each part.

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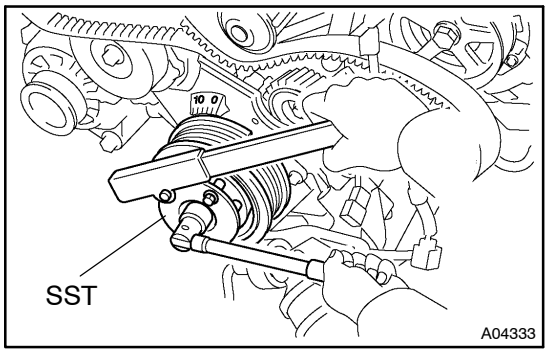
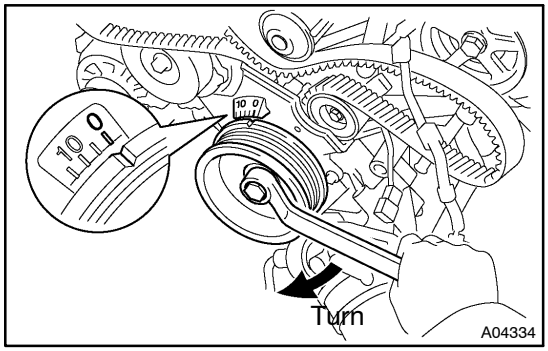


17. LOOSEN CRANKSHAFT PULLEY BOLT

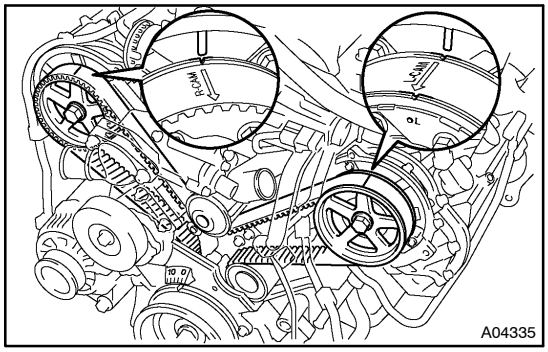
Using SST, loosen the pulley bolt.

SST 09213–70010 (90105–08076), 09330–00021



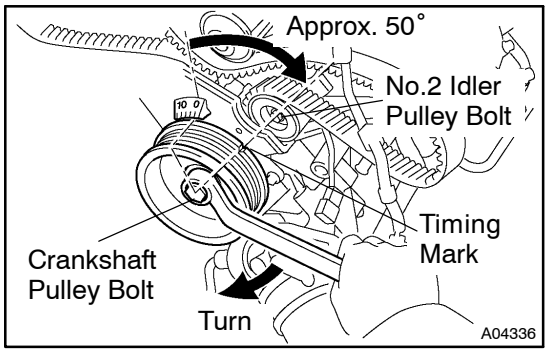
18. SET NO.1 CYLINDER TO APPROX. 50° ATDC/COMPRESSION

(a) Turn the crankshaft pulley and align its groove with timing mark ”0” of the No.1 timing belt cover.



(b) Check that the timing marks of the camshaft timing pulleys and timing belt rear plates aligned.

If not, turn the crankshaft 1 revolution (360°).



(c) Turn the crankshaft pulley approx. 50° clockwise, and put the timing mark of the crankshaft pulley in line with the centers of the crankshaft pulley bolt and the idler pulley bolt.

NOTICE:

If the timing belt is disengaged, having the crankshaft pulley at the wrong angle can cause the piston head and valve head to come into contact with each other when you remove the camshaft timing pulley (step 19), causing damage. So always set the crankshaft pulley at the correct angle.

(d) Remove the crankshaft pulley bolt.

NOTICE:

Do not turn the crankshaft pulley.

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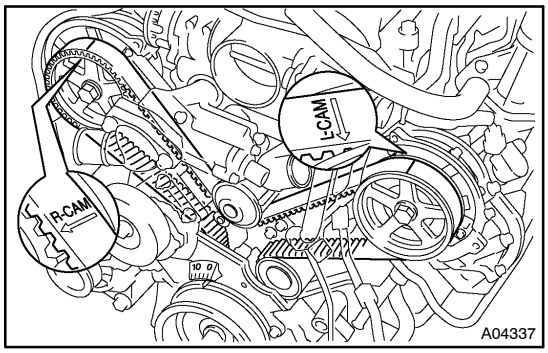
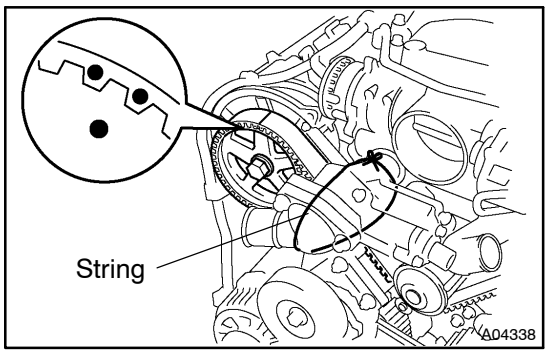


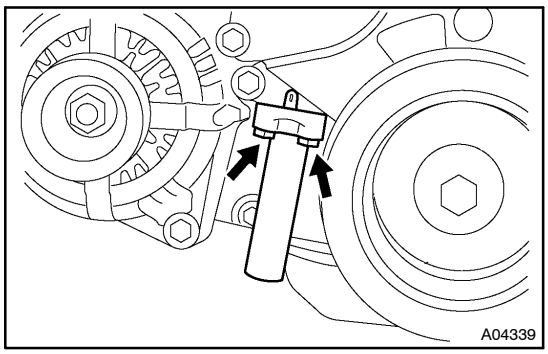
19. REMOVE TIMING BELT TENSIONER

HINT:

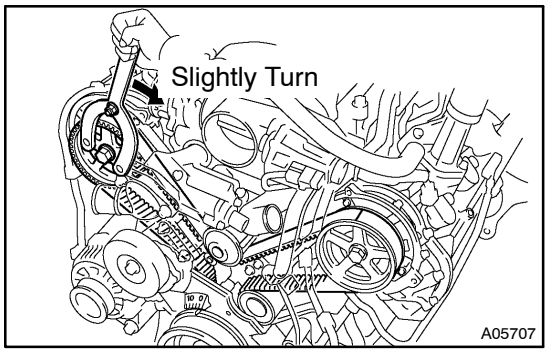
- When re–using timing belt:
  If the installation marks have disappeared, before remove the timing belt, place 2 new installation marks on the timing belt to match the timing marks of the camshaft timing pulleys.



- When replacing timing belt tensioner only:
  To avoid meshing of the timing pulley and timing belt, secure one of them with string. And place matchmarks on the timing belt and RH camshaft timing pulley.



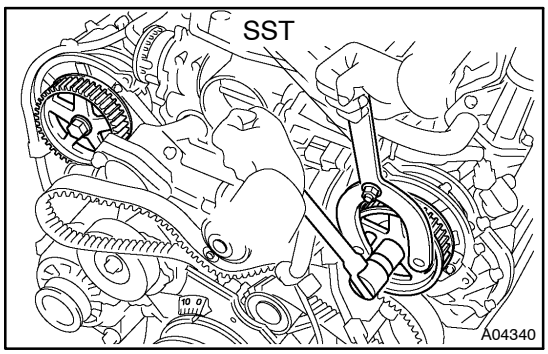
Alternately loosen the 2 bolts, and remove them, the belt tensioner and dust boot.



20. DISCONNECT TIMING BELT FROM CAMSHAFT TIMING PULLEYS

(a) Using SST, loosen the tension spring between the LH and RH camshaft timing pulleys by slightly turning the LH camshaft timing pulley clockwise.
SST 09960–10010 (09962–01000, 09963–01000)

(b) Disconnect the timing belt from the camshaft timing pulleys.



21. REMOVE CAMSHAFT TIMING PULLEYS

Using SST, remove the bolt and timing pulley. Remove the 2 timing pulleys.
SST 09960–10010 (09962–01000, 09963–01000)

22. REMOVE GENERATOR
(See page CH–8)

23. REMOVE DRIVE BELT TENSIONER

Remove the bolt, 2 nuts and belt tensioner.

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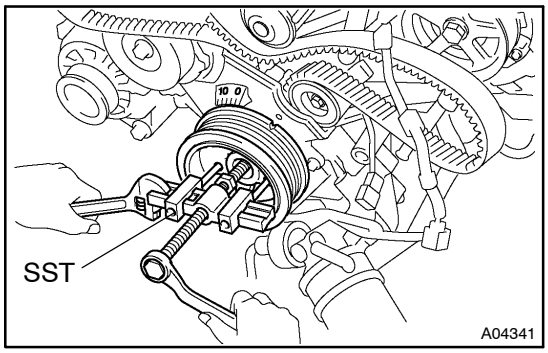


24. REMOVE CRANKSHAFT PULLEY

Using SST, remove the crankshaft pulley.

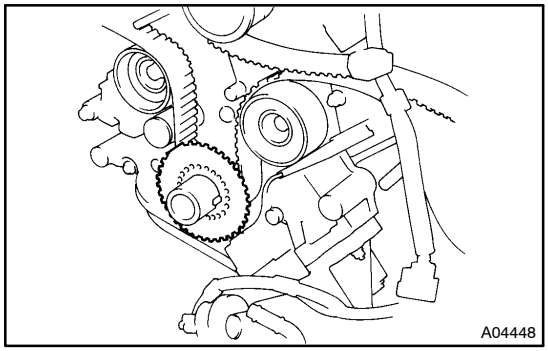
SST 09950–50010 (09951–05010, 09952–05010, 09953–05010, 09953–05020, 09954–05020)

NOTICE:

Do not turn the crankshaft pulley.

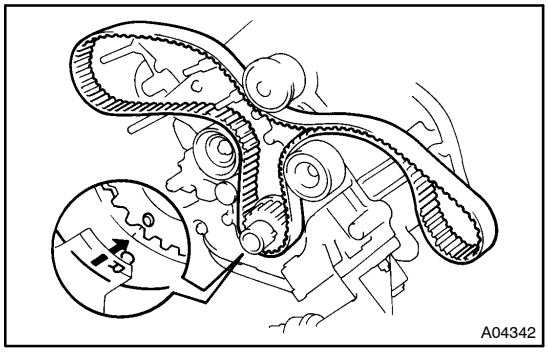
25. REMOVE NO.1 TIMING BELT COVER

Remove the 4 bolts, timing belt cover.



26. REMOVE TIMING BELT GUIDE

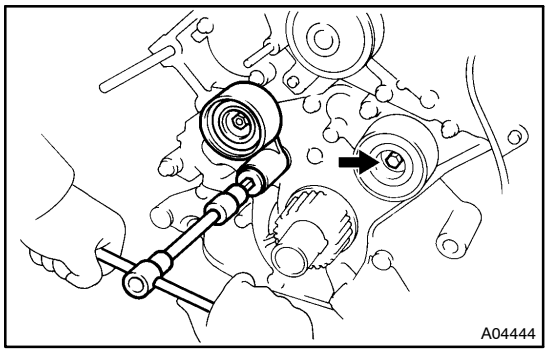
27. REMOVE TIMING BELT COVER SPACER



28. REMOVE TIMING BELT

HINT:

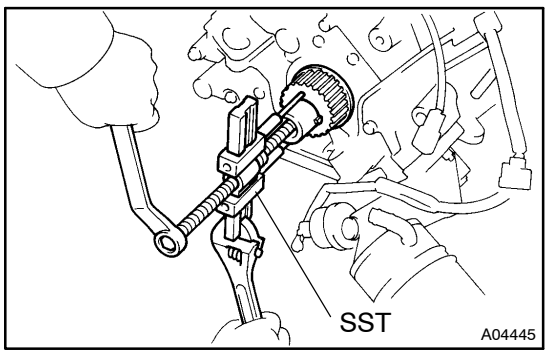
If re–using the belt and the installation mark has disappeared from it, place a new installation mark on the timing belt to the match the dot mark of the crankshaft timing pulley.



29. REMOVE NO.1 IDLER PULLEY AND NO.2 IDLER PULLEY

(a) Using a 10 mm hexagon wrench, remove the bolt, No.1 idler pulley and plate washer.

(b) Remove the bolt and No.2 idler pulley.



30. REMOVE CRANKSHAFT TIMING PULLEY

Using SST, remove the timing pulley.

SST 09950–50010 (09951–05010, 09952–05010, 09953–05010, 09953–05020, 09954–05010)

NOTICE:

Do not turn the timing pulley.

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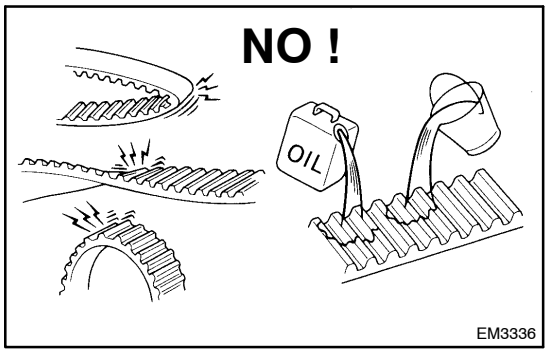
EM0KX–01



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.

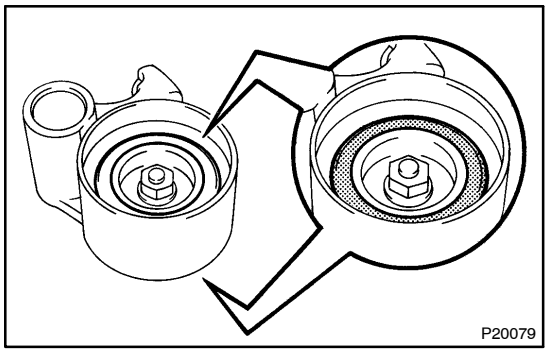
(b) If the belt teeth are cracked or damaged, check to see if either camshaft is locked.

(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 for foreign material on the pulley teeth.

If necessary, replace the timing belt.



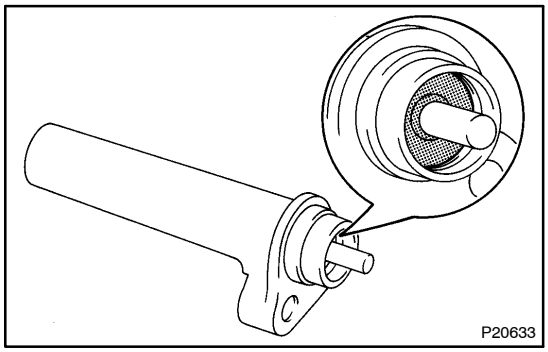
2. INSPECT IDLER PULLEYS

(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.

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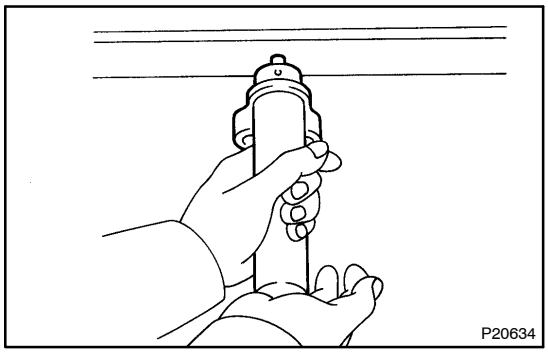
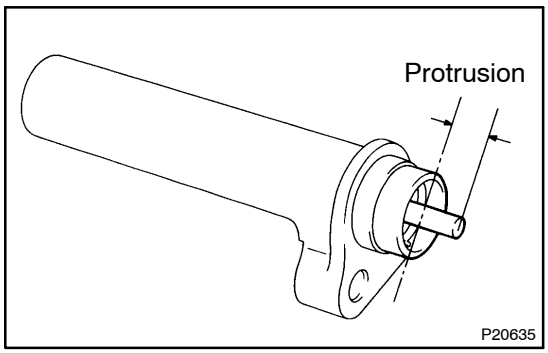


(b) Hold the tensioner with both hands and push the push rod strongly as shown to check that it doesn't move.

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:

10.5 – 11.5 mm (0.413 – 0.453 in.)

If the protrusion is not as specified, replace the tensioner.

4. INSPECT WATER PUMP

(See page CO–7)

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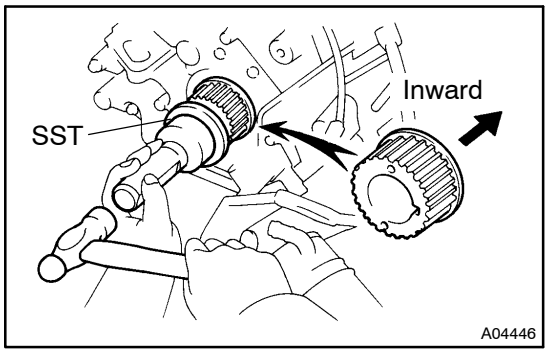
EM0KY–01

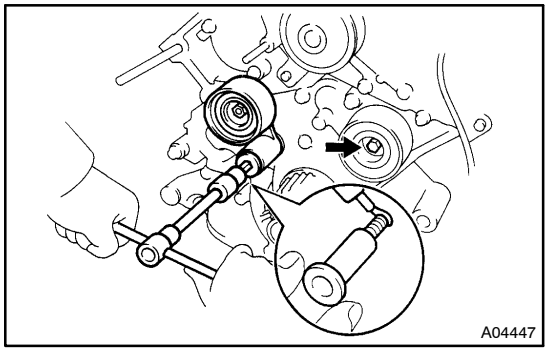
INSTALLATION



1. INSTALL CRANKSHAFT TIMING PULLEY

(a) Align the timing pulley set key with the key groove of the pulley.

(b) Using SST and a hammer, tap in the timing pulley, facing the flange side inward.
SST 09223–46011



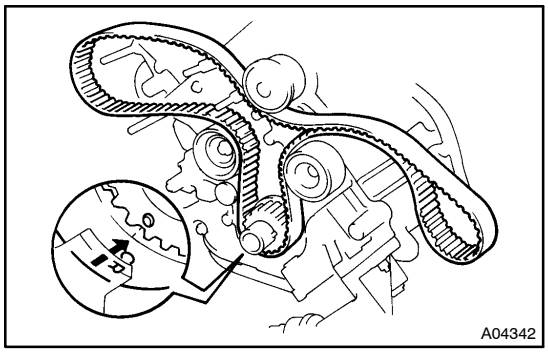
2. INSTALL NO.1 IDLER PULLEY AND NO.2 IDLER PULLEY

(a) Apply adhesive 2 or 3 threads of the pivot bolt.
Adhesive:
Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

(b) Using a 10 mm hexagon wrench, install the plate washer and No.1 idler pulley with the pivot bolt.
Torque: 34.5 N·m (350 kgf·cm, 25 ft·lbf)

(c) Install the No.2 idler pulley with the bolt.
Torque: 34.5 N·m (350 kgf·cm, 25 ft·lbf)

(d) Check that the No.1 and No.2 idler pulley moves smoothly.



3. TEMPORARILY INSTALL TIMING BELT

NOTICE:

The engine should be cold.

(a) Remove any oil or water on the crankshaft pulley, oil pump pulley, water pump pulley, No.1 idler pulley and No.2 idler pulley, and keep them clean.

NOTICE:

Only wipe the pulleys; do not use any cleansing agent.

(b) Align the installation mark on the timing belt with the timing mark of the crankshaft timing pulley.

(c) Install the timing belt on the crankshaft timing pulley, No.1 idler pulley and No.2 idler pulley.

4. INSTALL TIMING BELT COVER SPACER

(a) Install the gasket to the cover spacer.

(b) Install the cover spacer.

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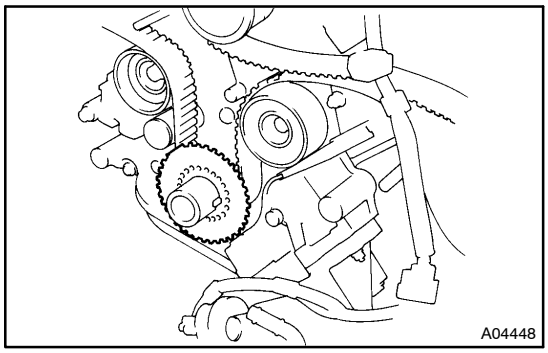
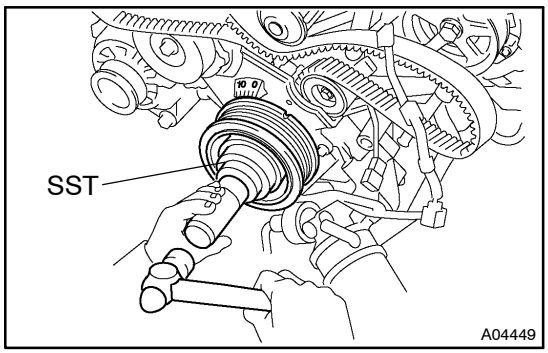


5. INSTALL TIMING BELT GUIDE

Install the belt guide, facing the cup side outward.

6. INSTALL NO.1 TIMING BELT COVER

Install the timing belt cover with the 4 bolts.



7. INSTALL CRANKSHAFT PULLEY

(a) Align the pulley set key with the key groove of the crankshaft pulley.

(b) Using SST and a hammer, tap in the crankshaft pulley.
SST 09223–46011

8. INSTALL DRIVE BELT TENSIONER

Install the belt tensioner with the bolt and 2 nuts.

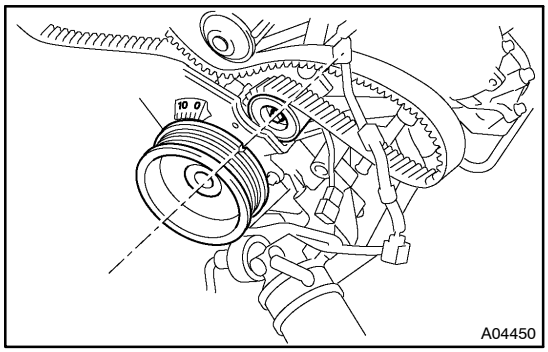
Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)

HINT:

Use a bolt 106 mm (4.18 in.) in length.

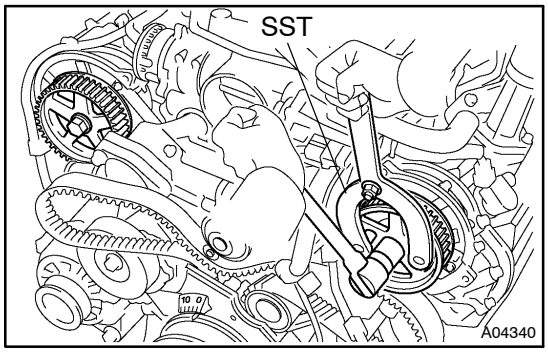
9. INSTALL GENERATOR

(See page CH–20)



10. CHECK CRANKSHAFT PULLEY POSITION

Check that the timing mark of the crankshaft pulley is aligned with the centers of the crankshaft pulley and the idler pulley bolt.



11. INSTALL RH, LH CAMSHAFT TIMING PULLEYS

(a) Align the camshaft knock pin with the knock pin grove of the timing pulley, and slide on the timing pulley.

(b) Using SST, install the pulley bolt.
SST 09960–10010 (09962–01000, 09963–01000)
Torque: 108 N·m (1,100 kgf·cm, 80 ft·lbf)

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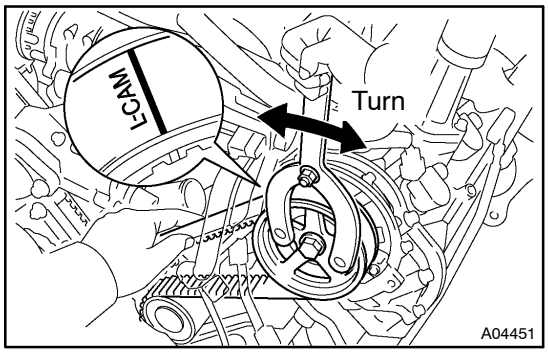


12. CONNECT TIMING BELT TO LH CAMSHAFT TIMING PULLEY

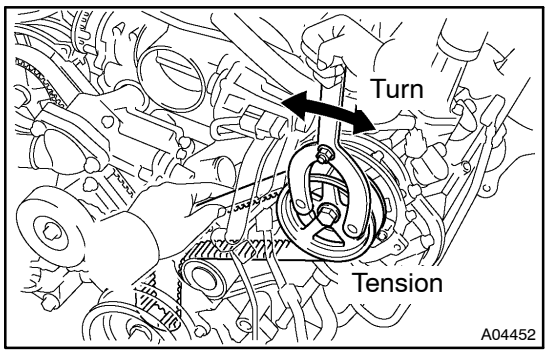
(a) Remove any oil or water on the LH camshaft timing pulley, and keep it clean.

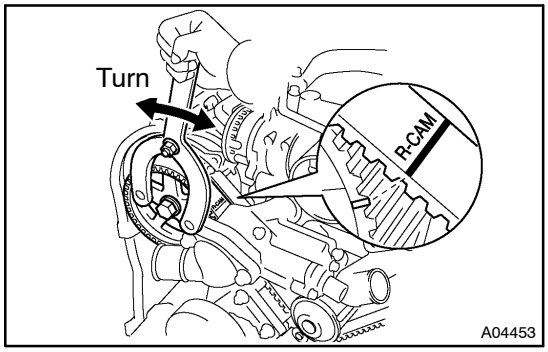
NOTICE:

Only wipe the pulleys; do not use any cleansing agent.

(b) Turn the LH camshaft timing pulley. Align the installation mark on the timing belt with the timing mark of the camshaft timing pulley, and hang the timing belt on the LH camshaft timing pulley.

(c) Turn the LH camshaft timing pulley counterclockwise until there is tension between the crankshaft timing pulley and LH camshaft timing pulley.





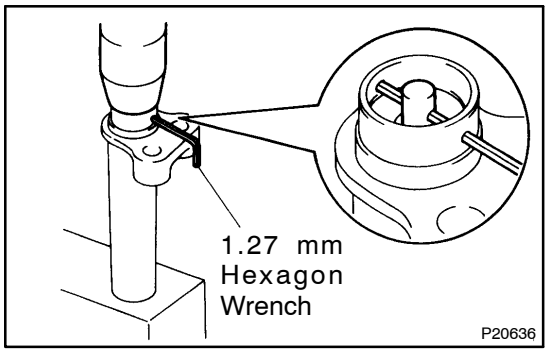
13. CONNECT TIMING BELT TO RH CAMSHAFT TIMING PULLEY

(a) Remove any oil or water on the RH camshaft timing pulley and water pump pulley, and keep them clean.

NOTICE:

Only wipe the pulleys; do not use any cleansing agent.

(b) Turn the RH camshaft timing pulley. Align the installation mark on the timing belt with the timing mark of the camshaft timing pulley, and hang the timing belt on the RH camshaft timing pulley.



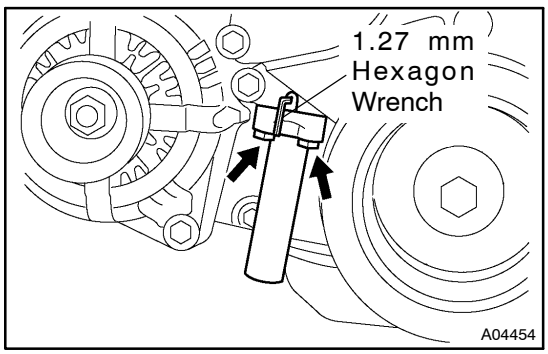
14. SET TIMING BELT TENSIONER

(a) Using a press, slowly press in the push rod using 981 – 9,807 N (100 – 1,000 kgf, 220 – 2,205 lbf) of pressure.

(b) Align the holes of the push rod and 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 belt tensioner.



15. INSTALL TIMING BELT TENSIONER

(a) Temporarily install the belt tensioner with the 2 bolts.

(b) Alternately tighten the 2 bolts.

Torque: 26 N·m (270 kgf·cm, 19 ft·lbf)

(c) Using pliers, remove the 1.27 mm hexagon wrench from the belt tensioner.

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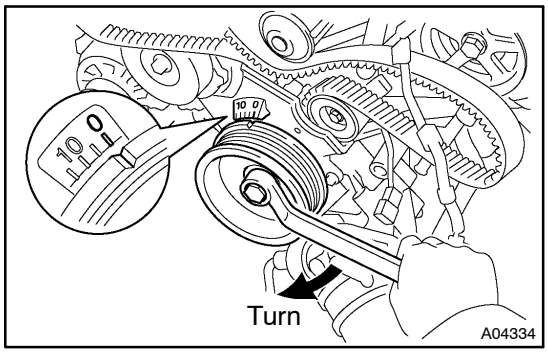


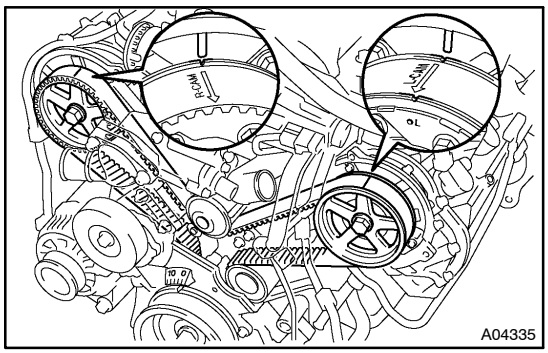
16. CHECK VALVE TIMING

(a) Temporarily install the crankshaft pulley bolt.

(b) Slowly turn the crankshaft pulley 2 revolutions from TDC to TDC.

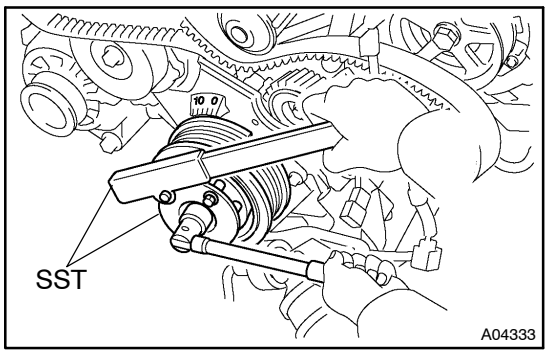
NOTICE:

Always turn the crankshaft pulley clockwise.



(c) Check that each pulley aligns with the timing marks as shown in the illustration.

If the timing marks do not align, remove the timing belt and reinstall it.

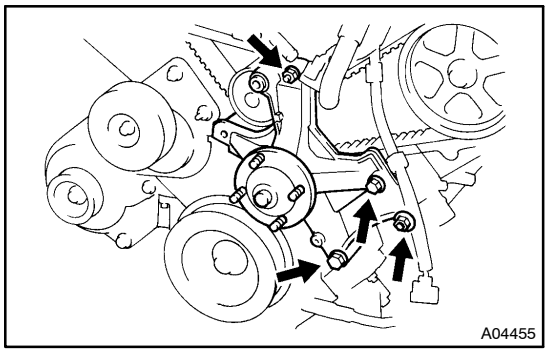


17. TIGHTEN CRANKSHAFT PULLEY BOLT

Using SST, install the pulley bolt.

SST 09213–54015 (90119–08216), 09330–00021

Torque: 245 N·m (2,500 kgf·cm, 181 ft·lbf)



18. INSTALL FAN BRACKET

Install the fan bracket with the 2 bolts and 2 nuts.

Torque:

12 mm head

16 N·m (160 kgf·cm, 12 ft·lbf)

14 mm head

32 N·m (330 kgf·cm, 24 ft·lbf)

HINT:

Each bolt length is indicated in the illustration.

Bolt Length:

106 mm (4.17 in.) for 12 mm head (A)

114 mm (4.49 in.) for 14 mm head (B)

19. INSTALL A/C COMPRESSOR

(See page EM–80)

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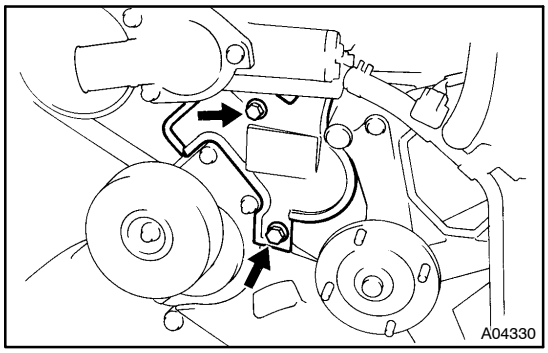
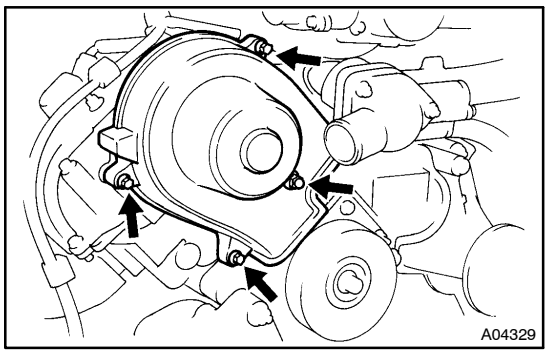


20. INSTALL NO.2 TIMING BELT COVER

Install the No.2 timing belt cover with the 2 bolts.

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

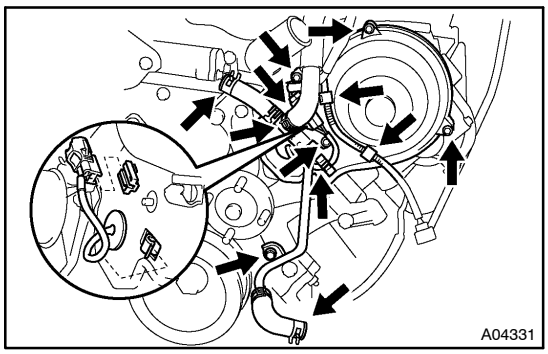


21. INSTALL RH NO.3 TIMING BELT COVER

(a) Fit the RH No.3 timing belt cover, matching it with the fan bracket.

(b) Install the RH No.3 timing belt cover with the 3 bolts and nut.

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)



22. INSTALL LH NO.3 TIMING BELT COVER

(a) Install the oil cooler pipe and bolt.

(b) Run the camshaft position sensor wire through the LH No.3 timing belt cover hole.

(c) Fit the LH No.3 timing belt cover, matching it with the fan bracket.

(d) Install the LH No.3 timing belt cover with the 4 bolts and nut.

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

(e) Install the wire grommet to the LH No.3 timing belt cover.

(f) Install the sensor connector to the connector bracket.

(g) Connect the sensor connector.

(h) Install the sensor wire to the wire clamp on the LH No.3 timing belt cover.

(i) Install the engine wire to the 2 wire clamps on the LH No.3 timing belt cover.

23. INSTALL DRIVE BELT IDLER PULLEY

Install the idler pulley and cover plate with the bolt.

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

24. INSTALL RADIATOR ASSEMBLY

(See page CO–19)

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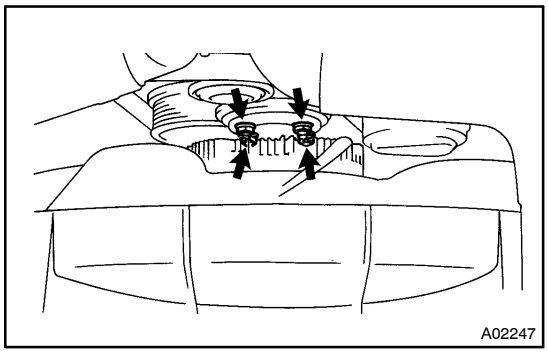

25. INSTALL FAN PULLEY, FAN, FLUID COUPLING AND DRIVE BELT

(a) Temporarily install the fan pulley, the fan, fluid coupling assembly with the 4 nuts.

(b) Install the generator drive belt.
(See page CH–20)

(c) Tighten the 4 nuts holding the fluid coupling to the fan bracket.
Torque: 21 N·m (215 kgf·cm, 16 ft·lbf)

26. INSTALL AIR CLEANER AND INTAKE AIR CONNECTOR ASSEMBLY

27. INSTALL V–BANK COVER

28. FILL WITH ENGINE COOLANT

29. START ENGINE AND CHECK FOR LEAKS

30. RECHECK ENGINE COOLANT LEVEL

31. INSTALL INTAKE AIR CONNECTOR

32. INSTALL BATTERY CLAMP COVER

33. INSTALL ENGINE UNDER COVER

34. INSTALL OIL PAN PROTECTOR

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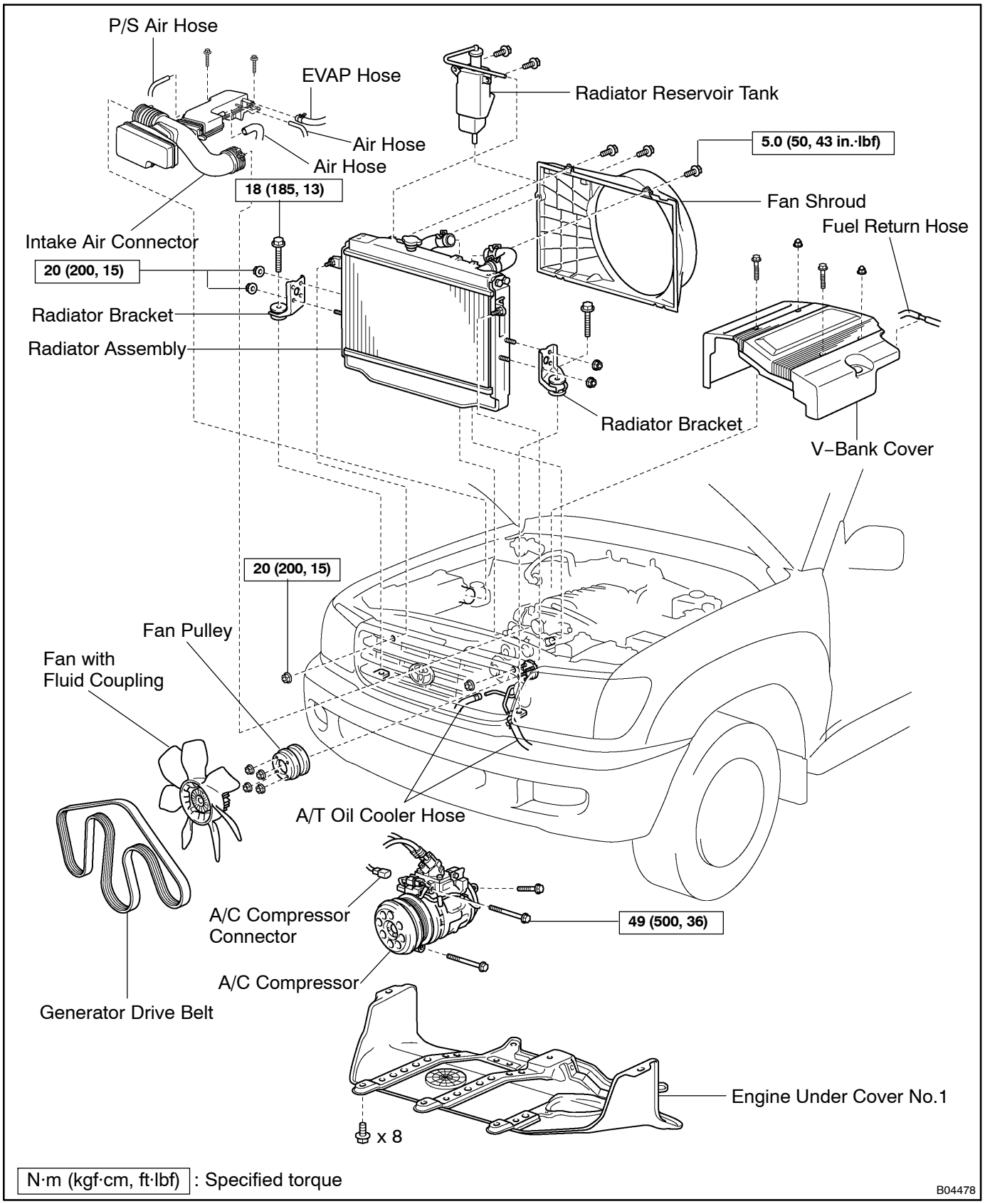
CYLINDER HEAD

COMPONENTS

EM0KZ–01



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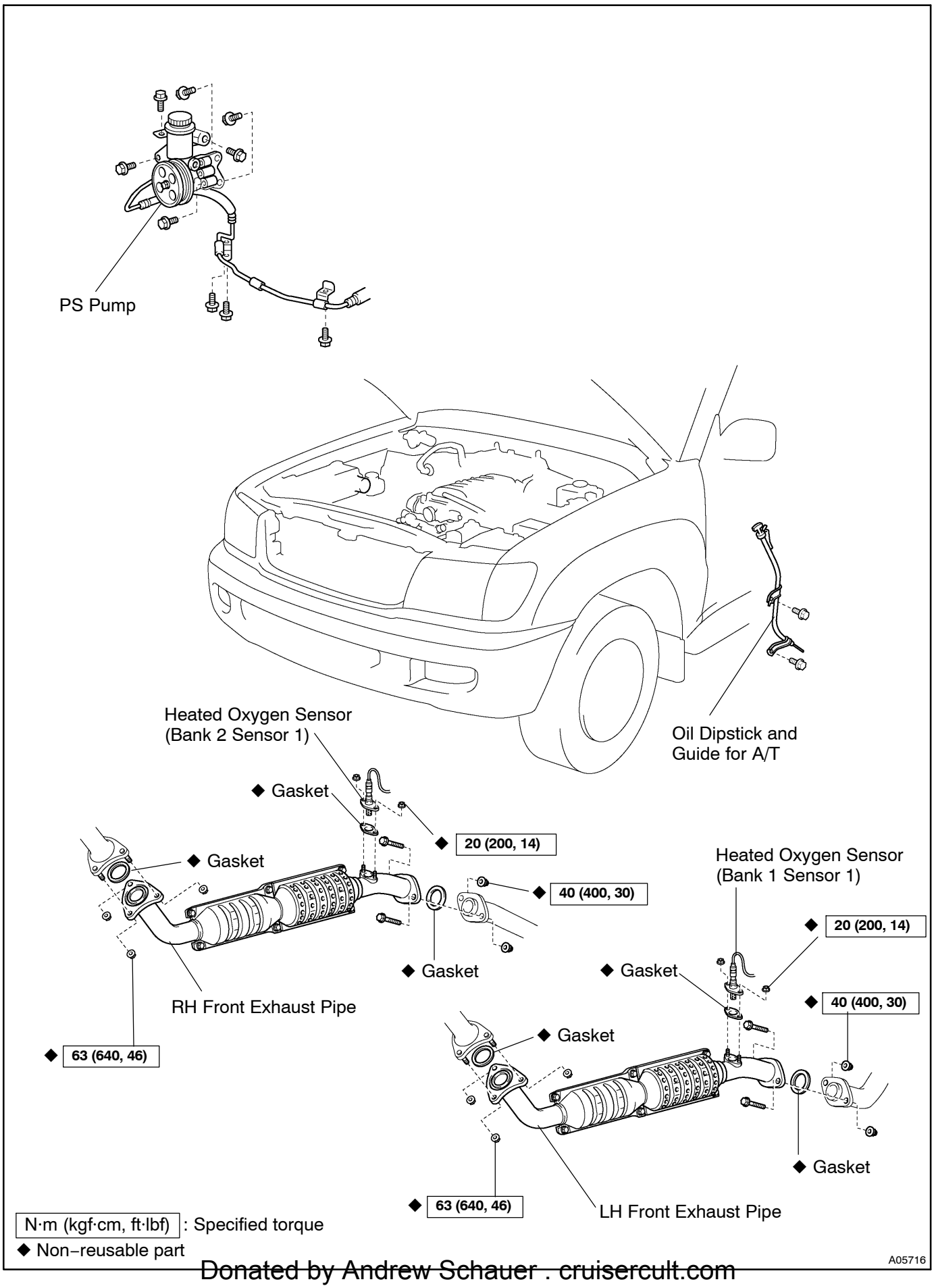

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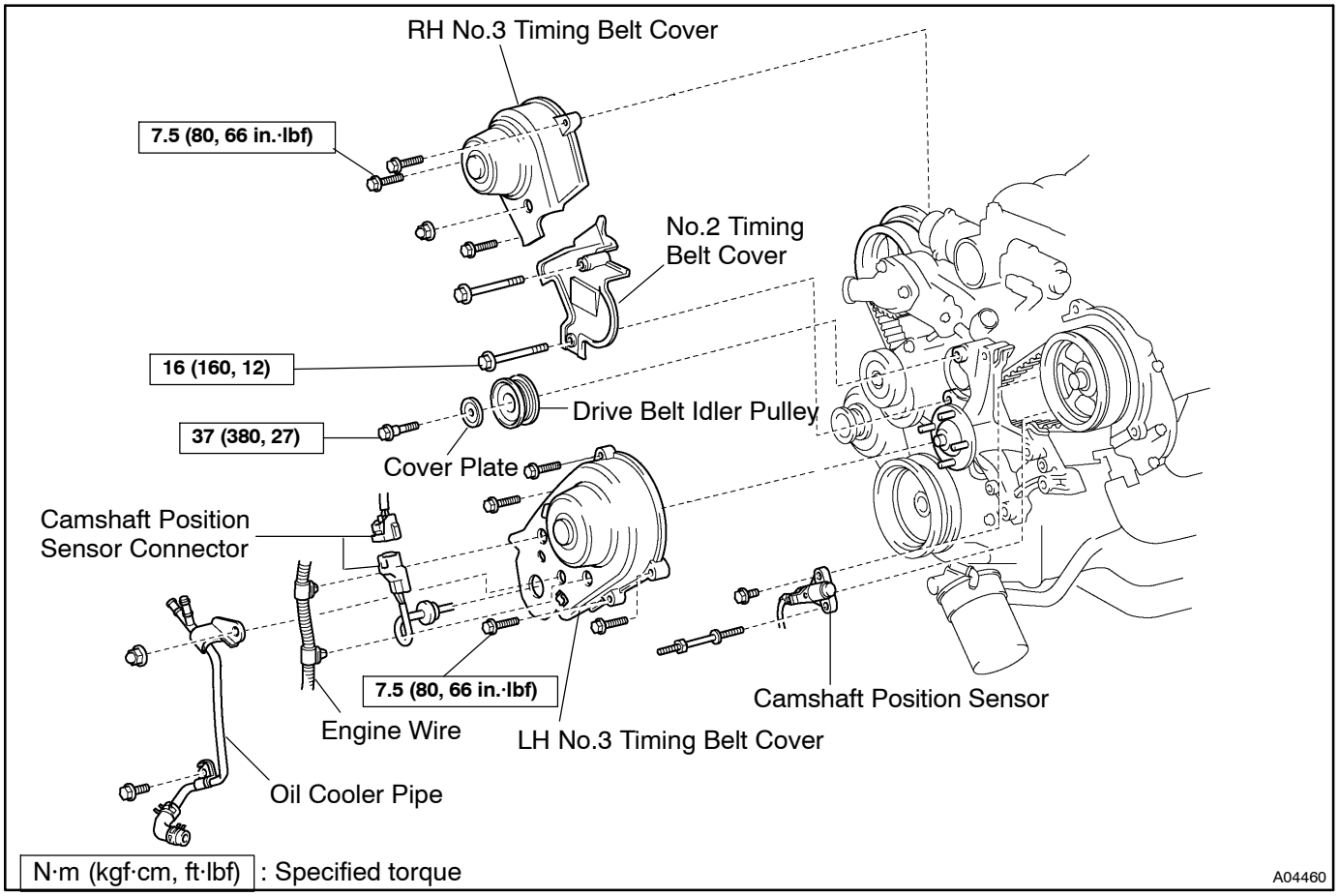

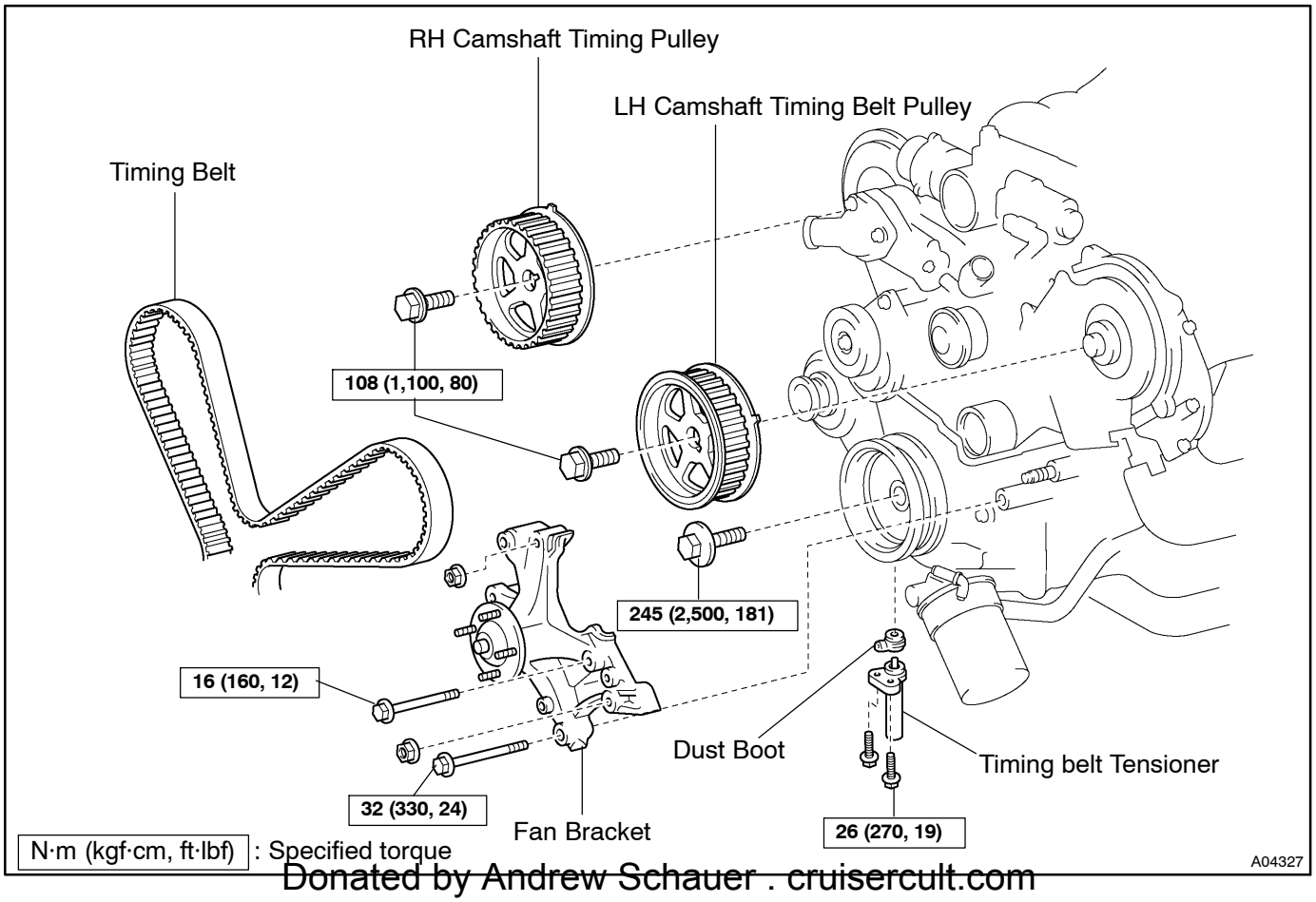

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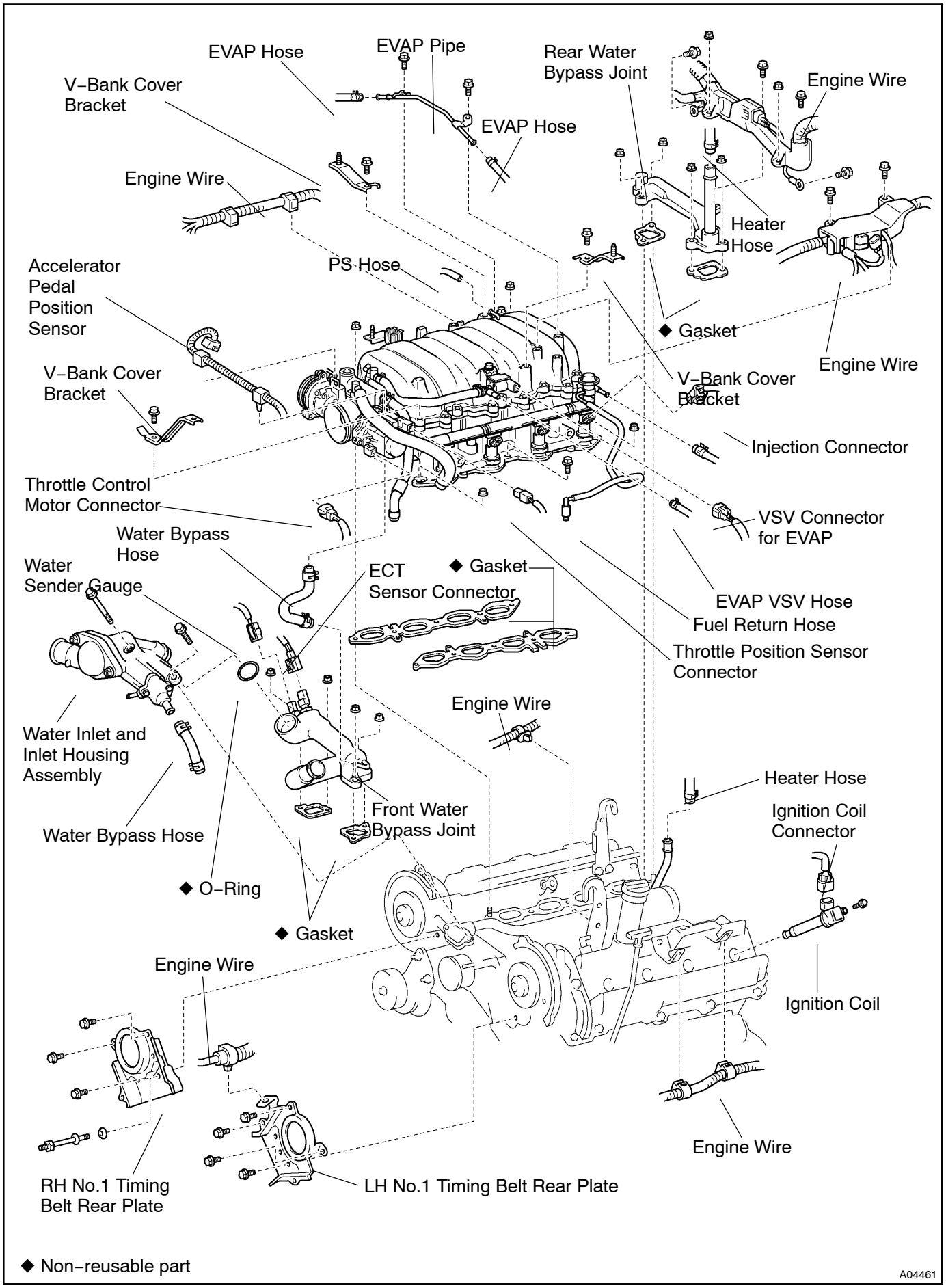

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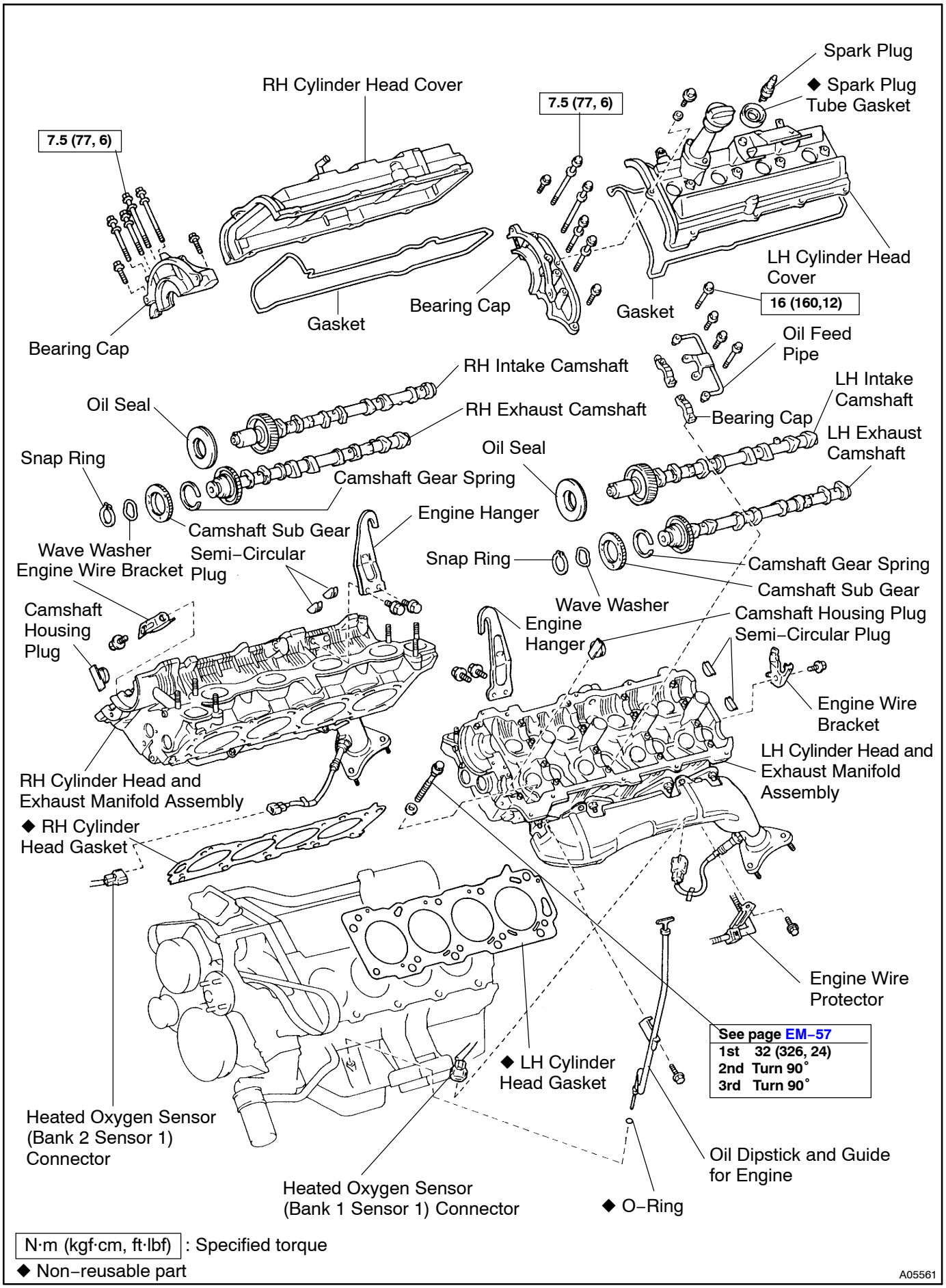

N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part

A05561

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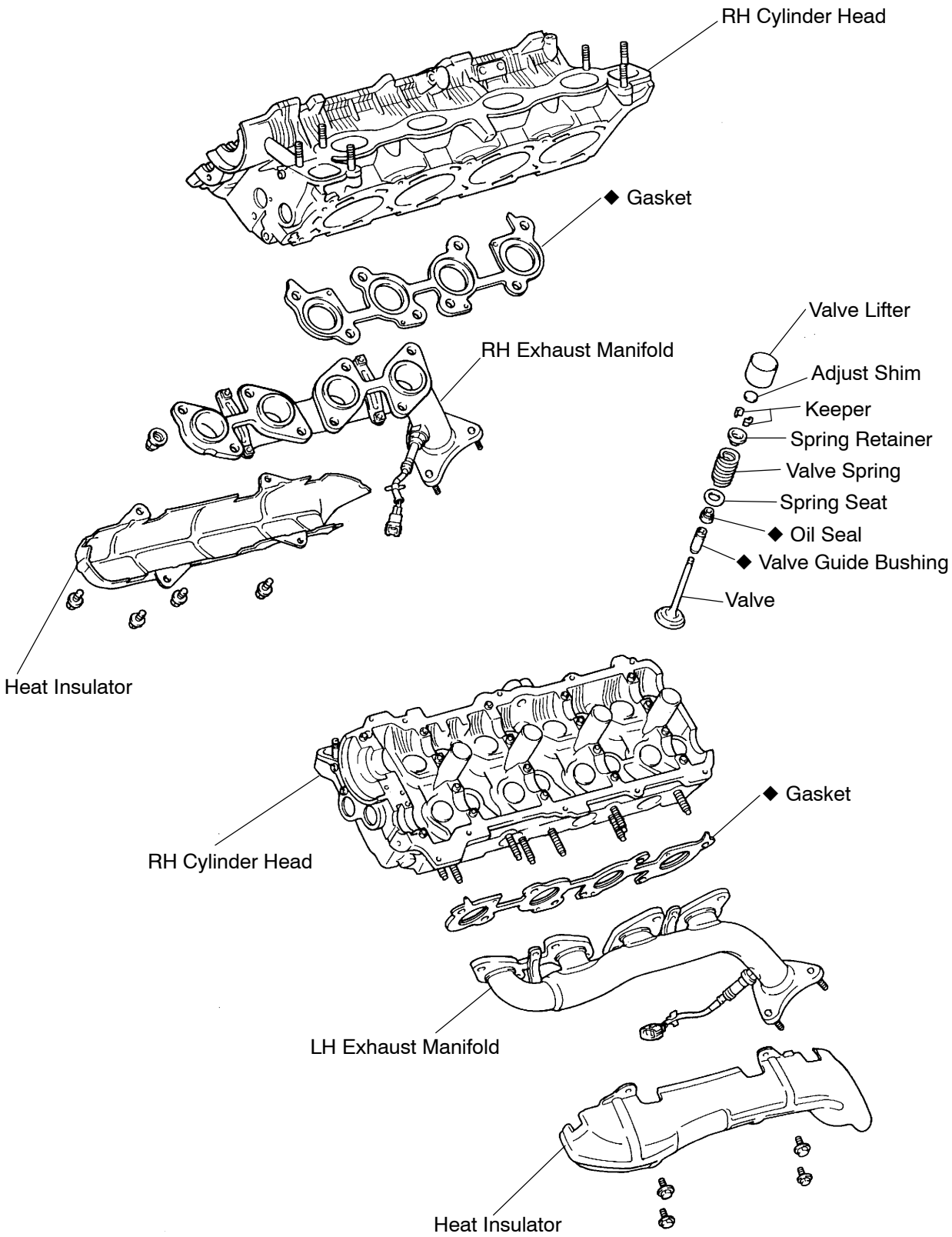

N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part

A05527

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EM0L0–01

REMOVAL

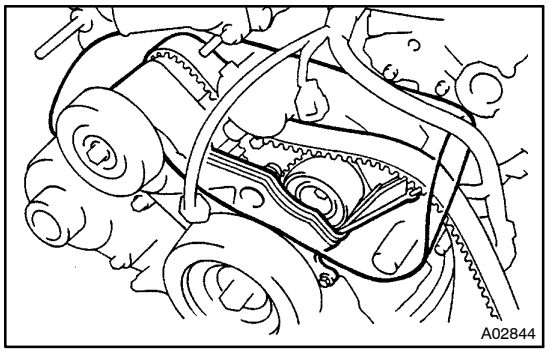
1. **DISCONNECT TIMING BELT FROM CAMSHAFT TIMING PULLEYS**
   (See page EM–15)
2. **REMOVE CAMSHAFT TIMING PULLEYS**
   (See page EM–15)
3. **REMOVE CAMSHAFT POSITION SENSOR**
   (See page IG–9)
4. **DISCONNECT PS PUMP FROM ENGINE**
   (See page EM–76)
5. **REMOVE FRONT EXHAUST PIPE**
   (See page EM–113)
6. **REMOVE OIL DIPSTICK AND GUIDE FOR A/T**
7. **REMOVE IGNITION COILS**
   (See page IG–6)
8. **REMOVE TIMING BELT REAR PLATES**
9. **REMOVE V–BANK COVER**

Remove the V–bank covers.

(a) Remove the 3 bolts, stud bolt, and RH No.1 timing belt rear plates.

(b) Disconnect the wire clamp from the LH timing belt rear plate.

(c) Remove the 3 bolts, stud bolt, LH No.1 and timing belt rear plates.



NOTICE:

- **Be careful not to drop anything inside the timing belt cover.**
- **Do not allow the belt to come into correct with oil, water or dust.**

10. **DISCONNECT FUEL INLET HOSE**
    (See page SF–24)
11. **REMOVE INTAKE MANIFOLD ASSEMBLY**

(a) Disconnect the accelerator cable.

(b) Disconnect these connectors:

- Throttle position sensor connector
- Accelerator pedal position sensor connector
- Throttle motor connector
- VSV connector for EVAP
- 8 injector connectors
- Water temperature senor
- Water sender gauge
- 8 ignition coil connector
- 2 oxygen sensor connector

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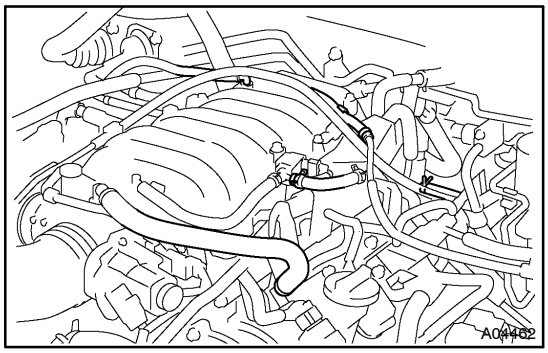
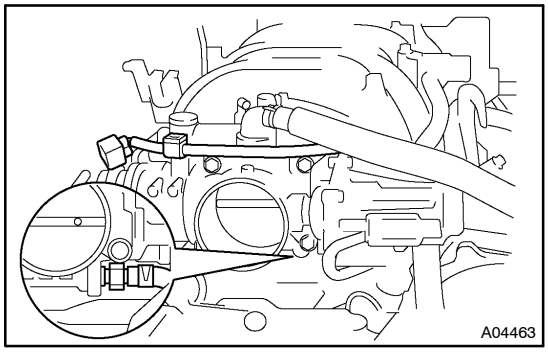
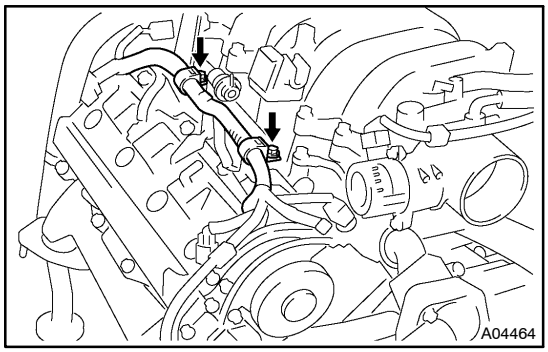


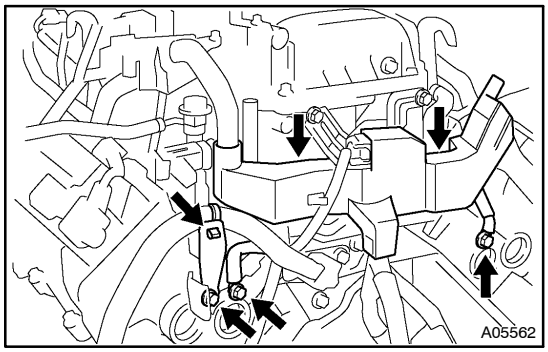
(c) Disconnect these hoses:
- Fuel pressure regulator vacuum hose from fuel pressure regulator pipe.
- PCV hose from PCV valve on LH cylinder head
- EVAP hose (from charcoal canister) from VSV for EVAP
- EVAP hose (from charcoal canister) from EVAP pipe on the intake manifold
- EVAP hose (from intake air connector) from EVAP pipe on the intake manifold
- PS air hose from intake manifold



(d) Disconnect the 2 wire clamp from the throttle body.
(e) No.1 water bypass hose (from the front water by–pass joint).



(f) Disconnect the 2 wire clamps from the wire clamp bracket on the RH delivery pipe.



(g) Remove the 2 bolts and disconnect the engine wire protector from the rear water bypass joint and RH cylinder head.
(h) Remove the guide for A/T bracket from the LH cylinder head.
(i) Remove the 2 ground cables from the RH and LH cylinder head.

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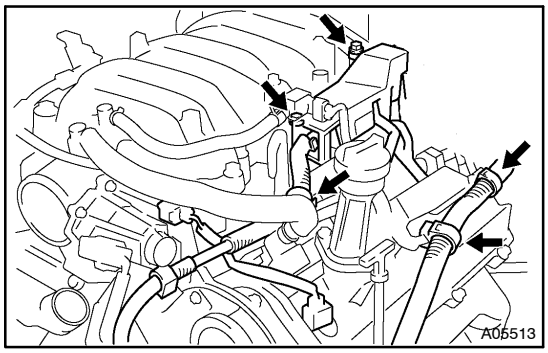
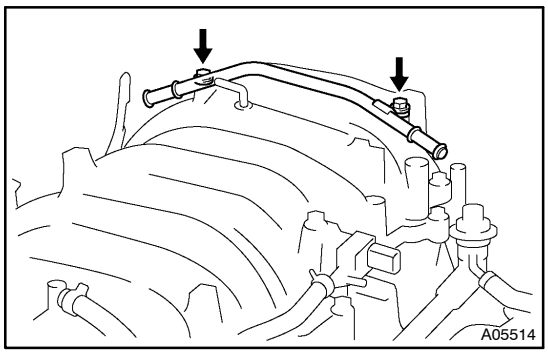
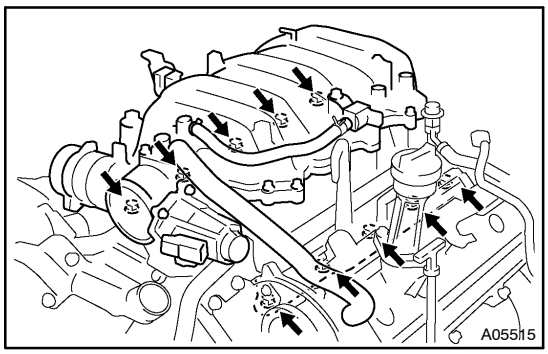


(j) Remove the 2 bolts and disconnect the engine wire protector from the intake manifold.
(k) Remove the engine wire from the engine hanger.
(l) Remove the engine wire from the wire bracket.

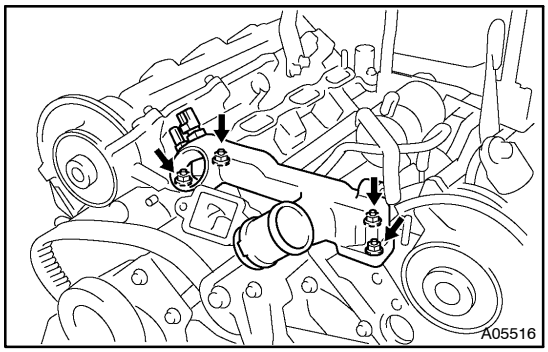


(m) Remove the 2 bolts and EVAP pipe from the intake manifold.
(n) Remove the RH rear and LH front V–bank cover brackets.

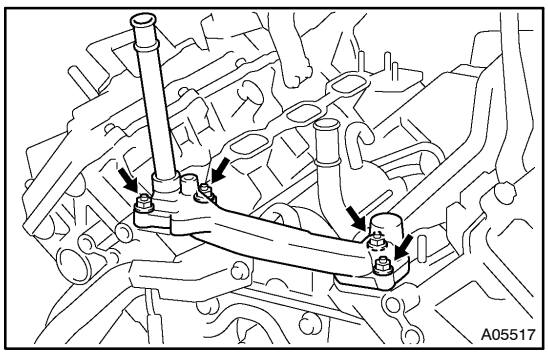


(o) Remove the 6 bolts, 4 nuts, the intake manifold assembly and 2 gaskets.

12. REMOVE WATER INLET AND INLET HOUSING ASSEMBLY
(See page CO–6)



13. REMOVE FRONT WATER BYPASS JOINT
Remove the 4 nuts, water bypass joint and 2 gaskets.



14. REMOVE REAR WATER BYPASS JOINT
Remove the 4 nuts, water bypass joint and 2 gaskets.
15. REMOVE ENGINE HANGERS
16. REMOVE OIL DIPSTICK AND GUIDE FOR A/T

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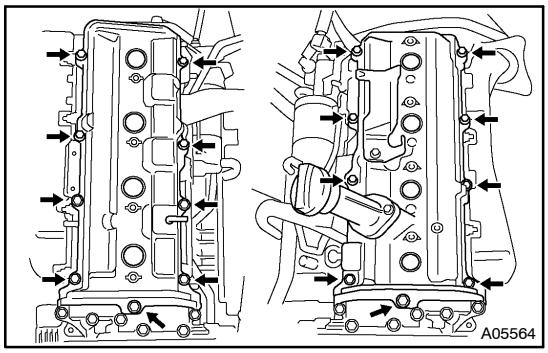
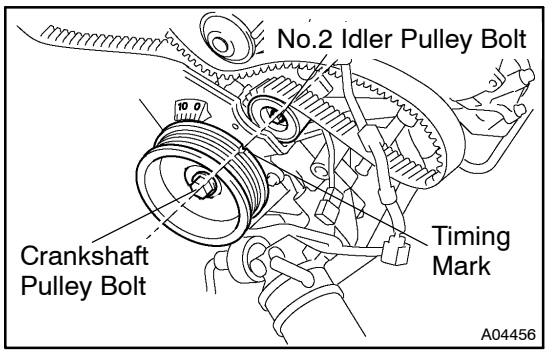


17. REMOVE CYLINDER HEAD COVERS

Remove the 18 bolts, 18 seal washers, cylinder head cover and gasket. Remove the 2 cylinder head covers.

18. IF NECESSARY, REMOVE SEMI–CIRCULAR PLUGS AND CAMSHAFT HOUSING PLUGS



19. REMOVE CAMSHAFTS

NOTICE:

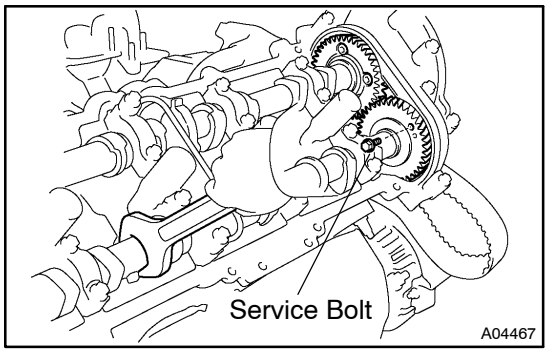
Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being removed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.

(a) Check the crankshaft pulley position.

Check that the timing mark of the crankshaft pulley is in aligned with the centers of the crankshaft pulley bolt and idler pulley bolt.

NOTICE:

Having the crankshaft pulley at the wrong angle can cause the piston head and valve head to come into contact with each other when you remove the camshaft, causing damage. So always set the crankshaft pulley at the correct angle.



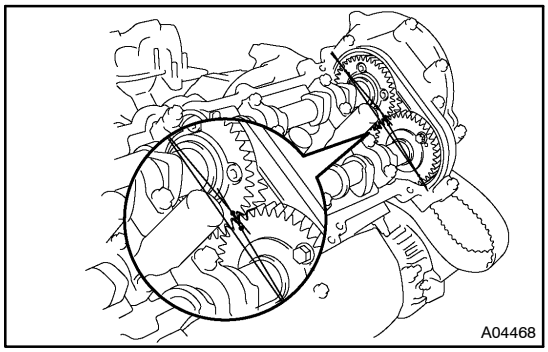
(b) Remove the RH camshafts.

(1) Boring the service bolt hole of the sub–gear upward by turning the hexagon wrench head portion of the exhaust camshaft with a wrench.

(2) Secure the sub–gear to the main gear with a service bolt.

Recommended service bolt:

Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 – 20 mm



HINT:

When removing the camshafts, make sure that the torsional spring force of the sub–gear has been eliminated by the above operation.

(3) Set the timing mark (1 dot mark) of the camshaft main gear at approx. 10° angle by turning the hexagon wrench head portion of the exhaust camshaft with a wrench.

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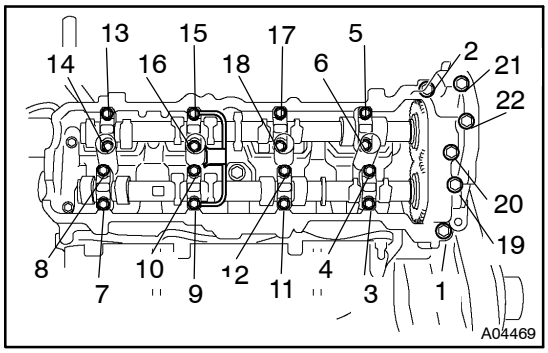
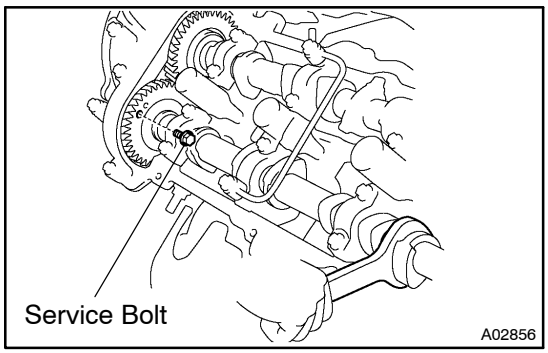


(4) Uniformly loosen and remove the 22 bearing cap bolts in several passes, in the sequence shown.

(5) Remove the oil feed pipe, 9 bearing caps, cam shaft timing oil control valve and camshafts.



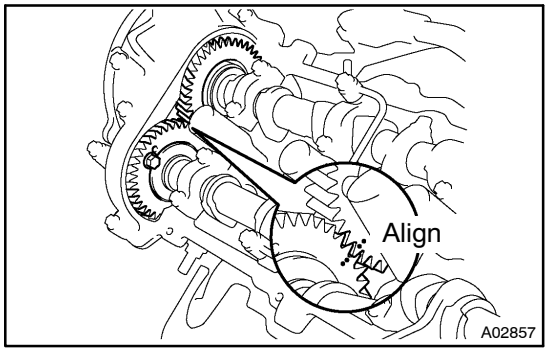
(c) Remove the LH camshafts.

(1) Boring the service bolt hole of the sub–gear upward by turning the hexagon wrench head portion of the exhaust camshaft with a wrench.

(2) Secure the sub–gear to the main gear with a service bolt.

Recommended service bolt:

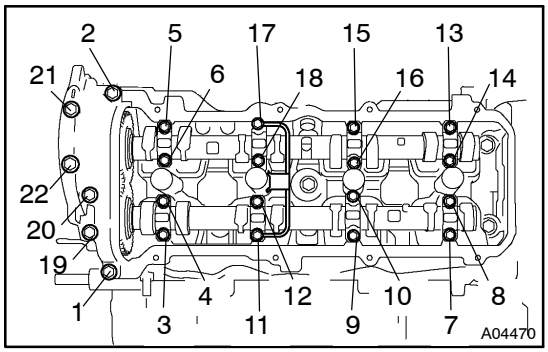
Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 – 20 mm



HINT:

When removing the camshaft, make sure that the torsional spring force of the sub–gear has been eliminated by the above operation.

(3) Align the timing mark (2 dot marks) of the camshaft drive gear by turning the hexagon wrench head portion of the exhaust camshaft with a wrench.

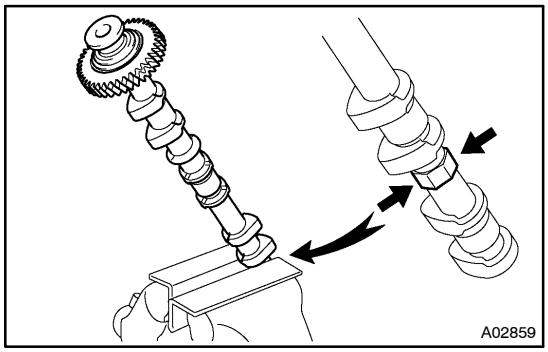


(4) Uniformly loosen and remove the 22 bearing cap bolts in several passes, in the sequence shown.

(5) Remove the oil feed pipe, 9 bearing caps, cam shaft timing oil control valve filter and camshafts.

HINT:

Arrange the bearing caps in correct order.



20. DISASSEMBLE EXHAUST CAMSHAFTS

(a) Mount the hexagon wrench head portion of the camshaft in a vise.

NOTICE:

Be careful not to damage the camshaft.

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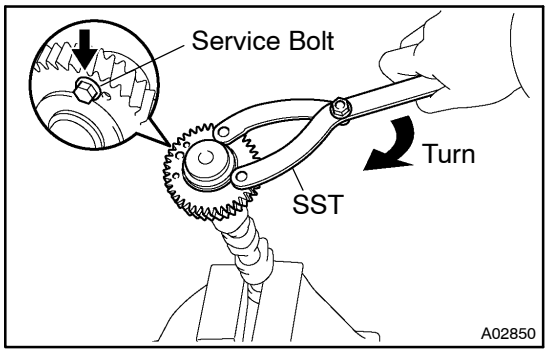
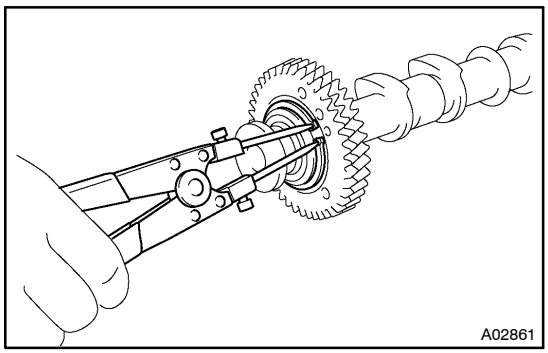
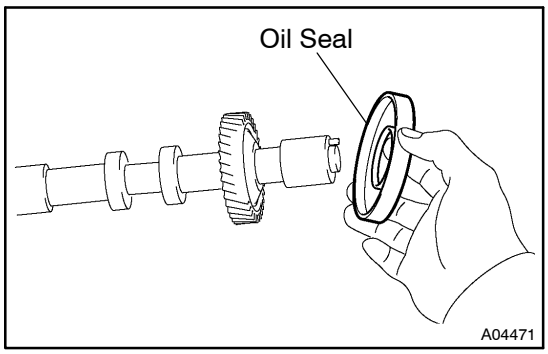


(b) Using SST, turn the sub–gear clockwise, and remove the service bolt.
SST 09960–10010 (09962–01000, 09963–00500)

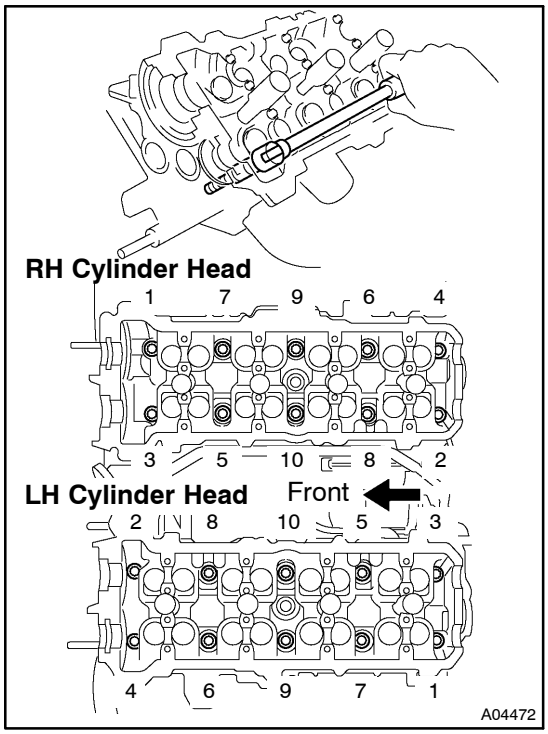


(c) Using snap ring pliers, remove the snap ring.
(d) Remove these parts:
- Wave washer
- Camshaft sub–gear
- Camshaft gear spring

HINT:
Arrange the camshaft sub–gears and gear spring (RH and LH sides).
Be careful not to damage the camshaft timing tube.



21. REMOVE OIL SEAL FROM INTAKE CAMSHAFT
22. REMOVE SPARK PLUGS



23. REMOVE CYLINDER HEAD AND EXHAUST MANIFOLD ASSEMBLIES
(a) Uniformly loosen the 10 cylinder head bolts on one side of each cylinder head in several passes, in the sequence shown, then do the other side as shown. Remove the 20 cylinder head bolts and plate washers.

NOTICE:
- **Cylinder head warpage or cracking could result from removing bolts in incorrect order.**

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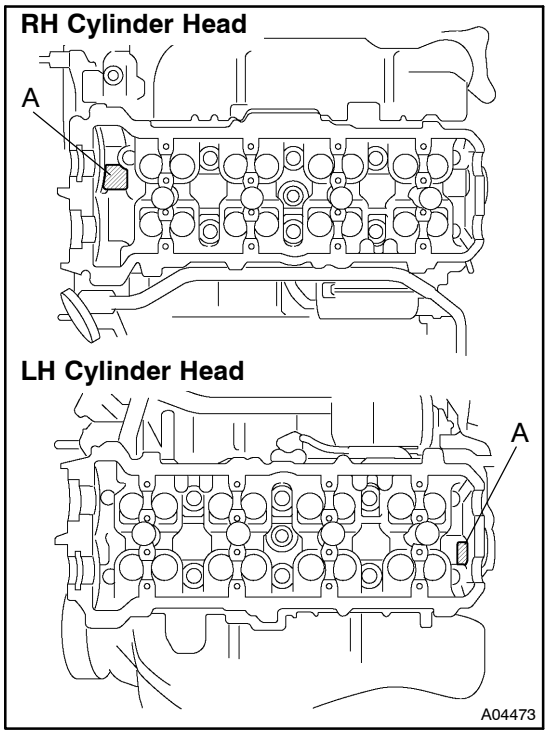
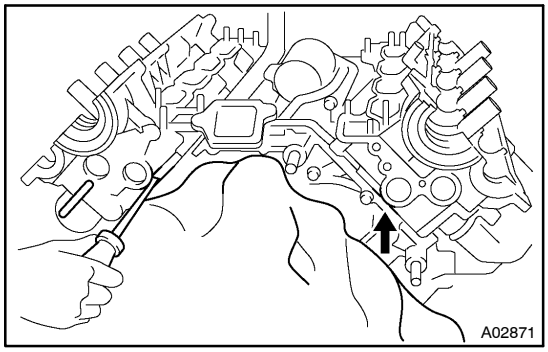


- **Do not drop the plate washer for cylinder head bolt into portion A of the cylinder head. If dropped into portion A, the plate washer will pass through the cylinder head and cylinder block into the oil pan.**



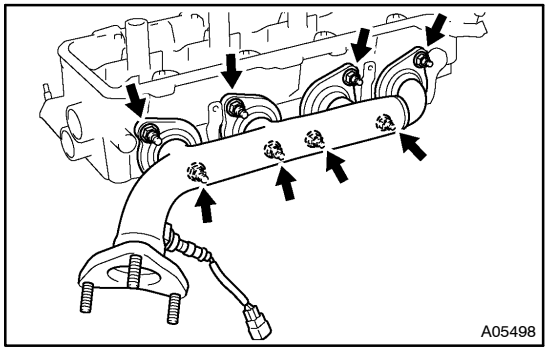
(b) Lift the cylinder head from the dowels on the cylinder block, and place the 2 cylinder heads on wooden blocks on a bench.

HINT:

If the cylinder head is 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.**
- **The cylinder head should not be tilted so as to secure the valve lifter. If the cylinder head is tilted, remove the valve lifter and check that the adjusting shim is set correctly.**



24. REMOVE RH EXHAUST MANIFOLD FROM CYLINDER HEAD

(a) Remove the 4 bolts and heat insulator.

(b) Remove the 8 nuts, exhaust manifold and gasket.

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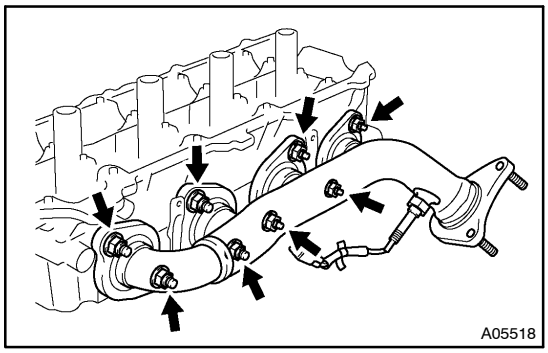

25. REMOVE LH EXHAUST MANIFOLD FROM CYLINDER HEAD

(a) Remove the 4 bolts and heat insulator.

(b) Remove the 8 nuts, exhaust manifold and gasket.

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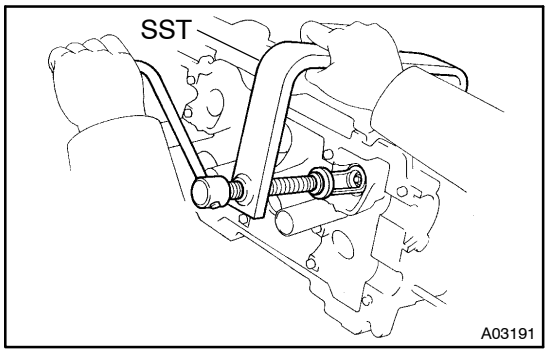
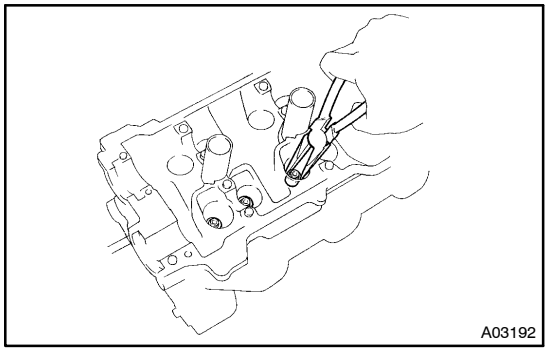
EM0L1–01





DISASSEMBLY

1. REMOVE VALVE LIFTERS AND SHIMS

HINT:

Arrange the valve lifters and shims in correct order.

2. REMOVE VALVES

(a) Using SST, compress the valve spring and remove the 2 keepers.

SST 09202–70020

(b) Remove these parts:

- Spring retainer
- Valve spring
- Valve
- Spring seat

HINT:

Arrange the valves, valve springs, spring seats and spring retainers incorrect order.

(c) Using needle–nose pliers, remove the oil seal.

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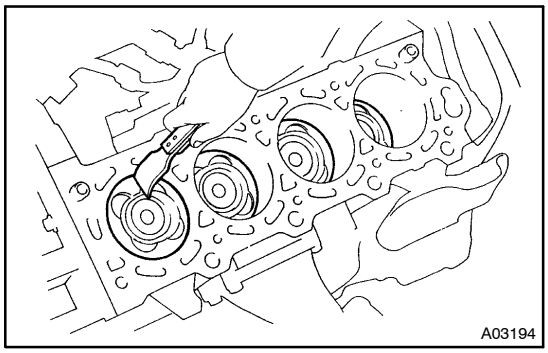
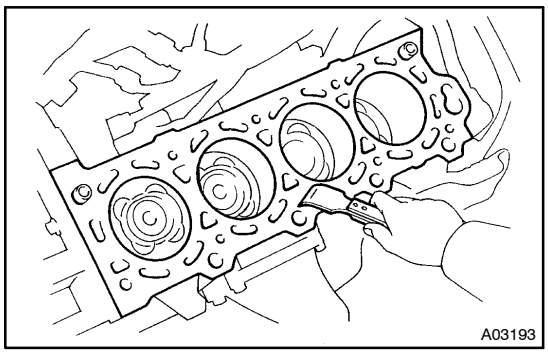
EM0L2–01

INSPECTION



1. CLEAN TOP SURFACES OF PISTONS AND CYLINDER BLOCK

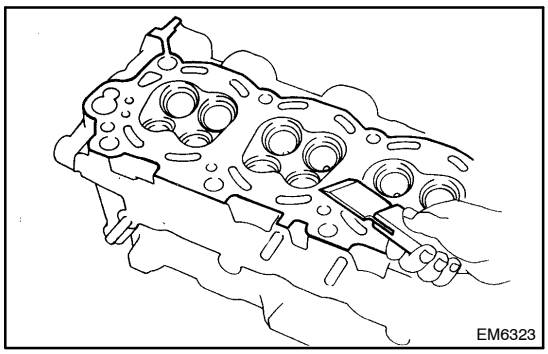
(a) Turn the crankshaft, and bring each piston to top dead center (TDC). Using a gasket scraper, remove all the carbon from the piston top surface.



(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.

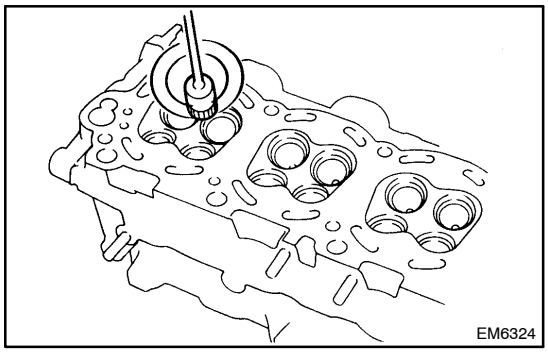
CAUTION:
Protect your eyes when using high pressure compressed air.



2. REMOVE GASKET MATERIAL

Using a gasket scraper, remove all the gasket material from the cylinder block contact surface.

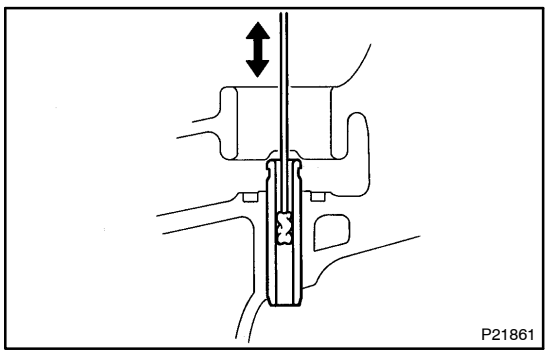
NOTICE:
Be careful not to scratch the cylinder block contact surface.



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 VALVE GUIDE BUSHINGS

Using a valve guide bushing brush and solvent, clean all the guide bushings.

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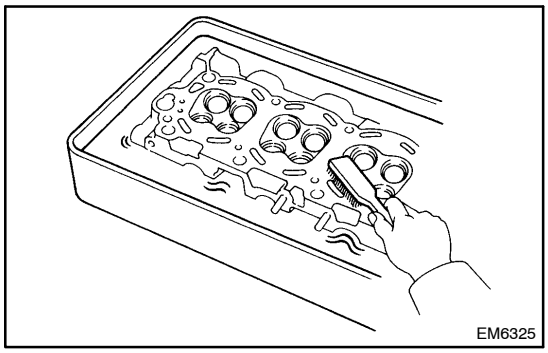
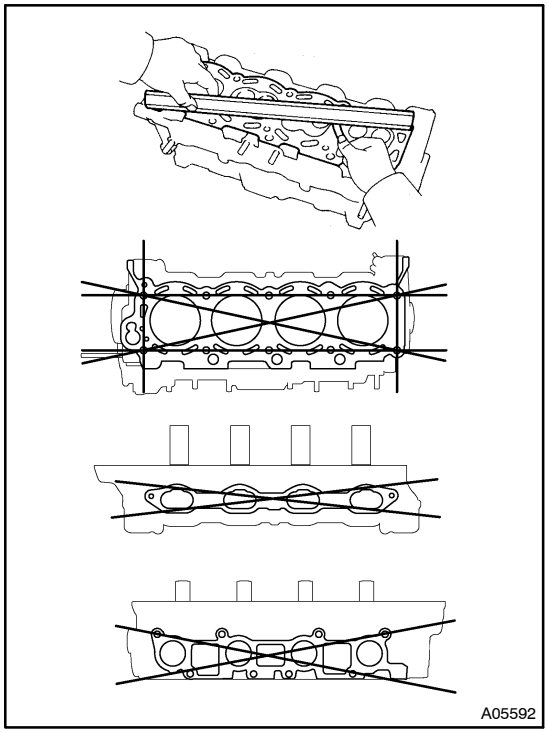


5. CLEAN CYLINDER HEAD

Using a soft brush and solvent, thoroughly clean the cylinder head.

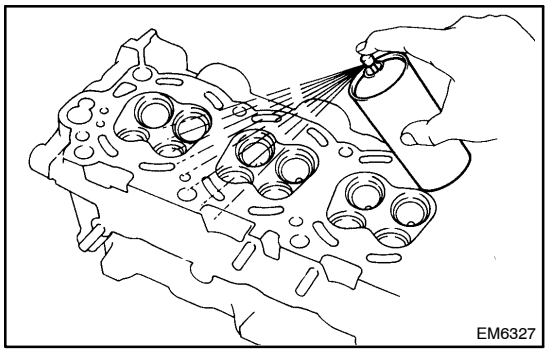


6. INSPECT FOR FLATNESS

Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder block and the manifolds for warpage.

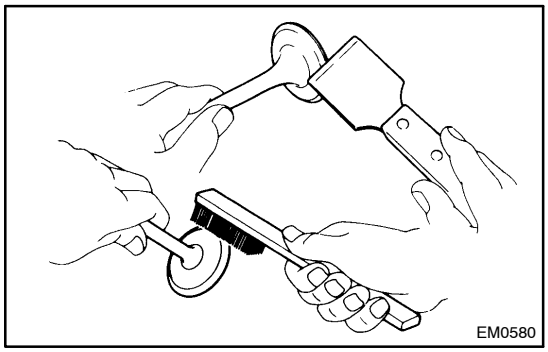
Maximum warpage:
0.10 mm (0.0039 in.)

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.

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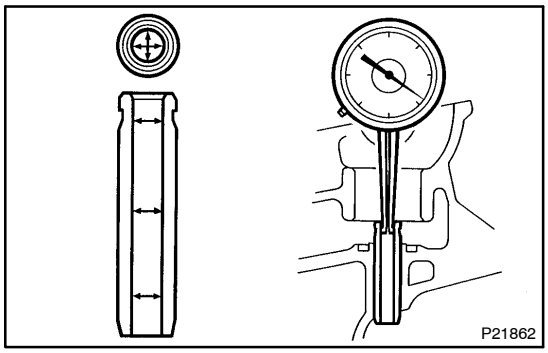
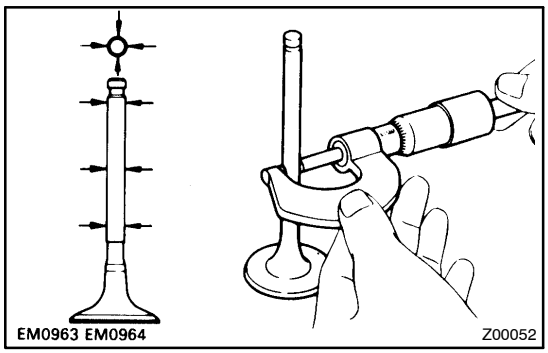


9. INSPECT VALVE STEMS AND GUIDE BUSHINGS

(a) Using a caliper gauge, measure the inside diameter of the guide bushing.

Bushing inside diameter:
5.510 – 5.530 mm (0.2169 – 0.2177 in.)



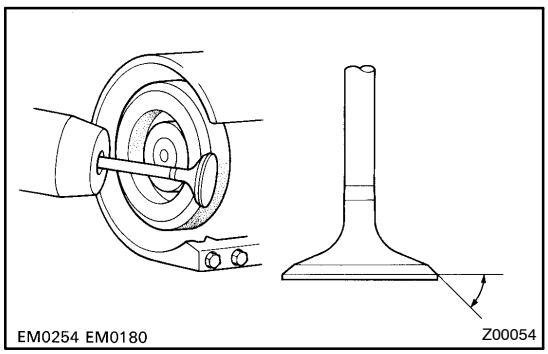
(b) Using a micrometer, measure the diameter of the valve stem.

Valve stem diameter:
Intake
5.470 – 5.485 mm (0.2154 – 0.2159 in.)
Exhaust
5.465 – 5.480 mm (0.2152 – 0.2157 in.)

(c) Subtract the valve stem diameter measurement from the guide bushing inside diameter measurement.

Standard oil clearance:
Intake
0.025 – 0.060 mm (0.0010 – 0.0024 in.)
Exhaust
0.030 – 0.065 mm (0.0012 – 0.0026 in.)
Maximum oil clearance:
Intake
0.08 mm (0.0031 in.)
Exhaust
0.10 mm (0.0039 in.)

If the clearance is greater than maximum, replace the valve and guide bushing. (See Page EM–53)



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°

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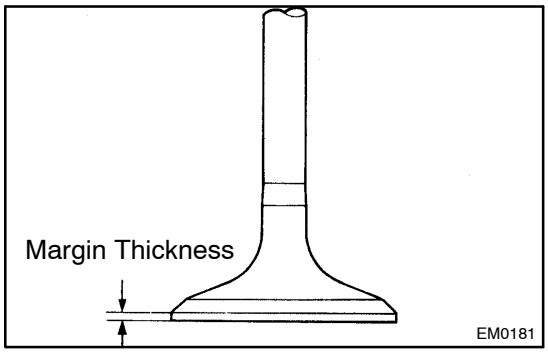
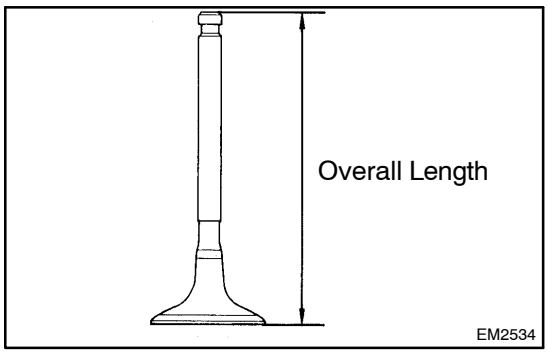
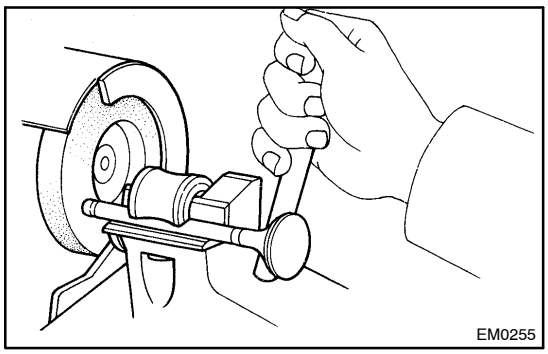


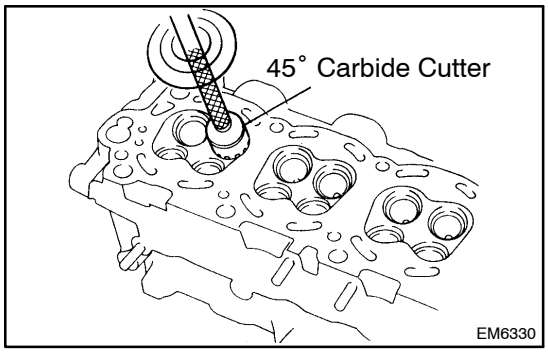
(c) Check the valve head margin thickness.
Standard margin thickness:
IN 1.25 mm (0.049 in.)
EX 1.4 mm (0.055 in.)
Minimum margin thickness:
0.5 mm (0.020 in.)
If the margin thickness is less than minimum, replace the valve.



(d) Check the valve overall length.
Standard overall length:
Intake: 95.05 mm (3.7421 in.)
Exhaust: 95.10 mm (3.7441 in.)
Minimum overall length:
Intake: 94.55 mm (3.7224 in.)
Exhaust: 94.60 mm (3.7244 in.)
If the overall length is less than 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.

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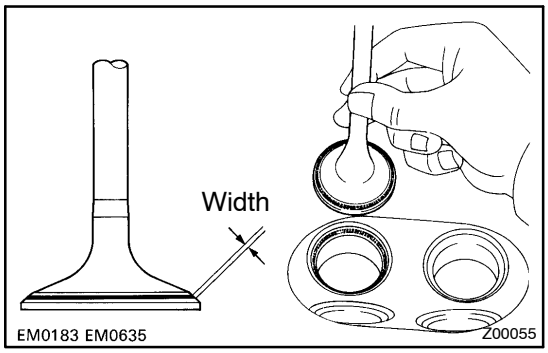
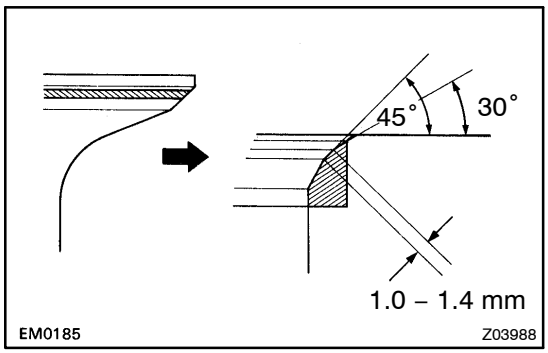


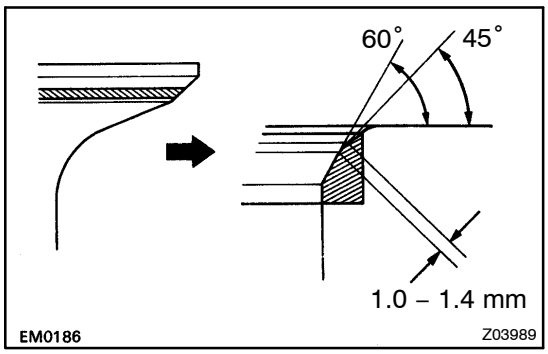
(b) Check the valve seating position.
Apply a light coat of prussian blue (or white lead) to the valve face. Lightly press the valve against the seat. Do not rotate valve.

(c) Check the valve face and seat for the following:
- If blue appears 360° around the face, the valve is concentric. If not, replace the valve.
- If blue appears 360° around the valve seat, the guide and face are concentric. If not, resurface the seat.
- Check that the seat contact is in the middle of the valve face with the following width:

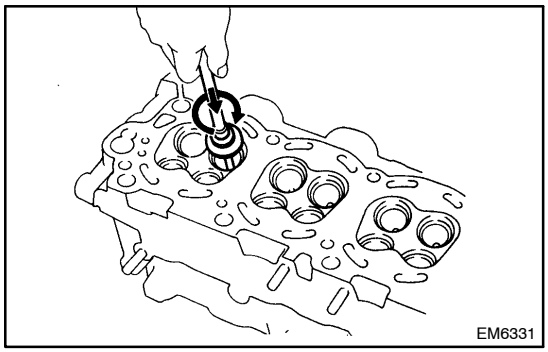
1.0 – 1.4 mm (0.039 – 0.055 in.)



If not, correct the valve seats as follows:
- If the seating is too high on the valve face, use 30° and 45° cutters to correct the seat.

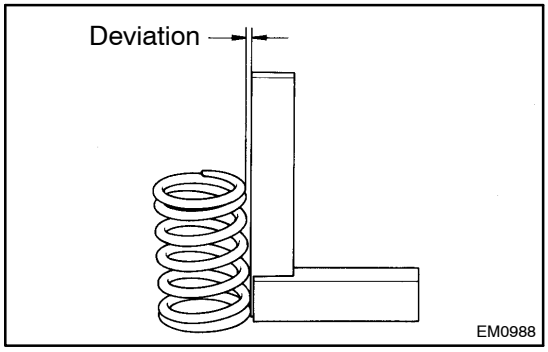


- If the seating is too low on the valve face, use 60° and 45° cutters to correct the seat.



(d) Hand–lap the valve and valve seat with an abrasive compound.

(e) After hand–lapping, clean the valve and valve seat.



12. INSPECT VALVE SPRINGS

(a) Using a steel square, measure the deviation of the valve spring.

Maximum deviation:
2.0 mm (0.079 in.)

If the deviation is greater than maximum, replace the valve spring.

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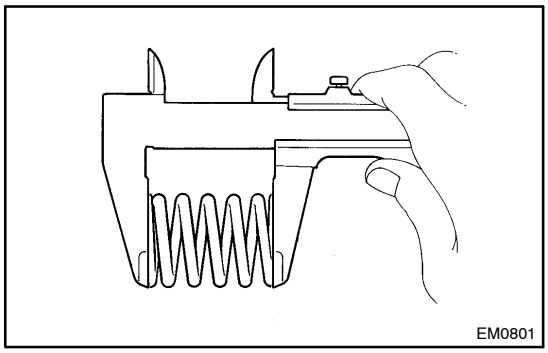
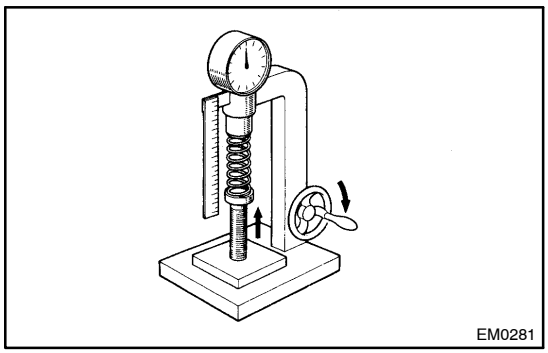


(b) Using vernier calipers, measure the free length of the valve spring.

Free length:

54.1 mm (2.130 in.)

If the free length is not as specified, replace the valve spring.



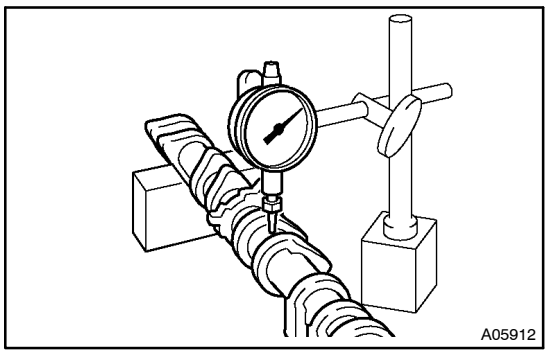
(c) Using a spring tester, measure the tension of the valve spring at the specified installed length.

Installed tension:

204 – 226 N (20.8 – 23.0 kgf, 45.9 – 50.7 lbf)

at 35.0 mm (1.378 in.)

If the installed tension is not as specified, replace the valve spring.



13. INSPECT CAMSHAFT FOR RUNOUT

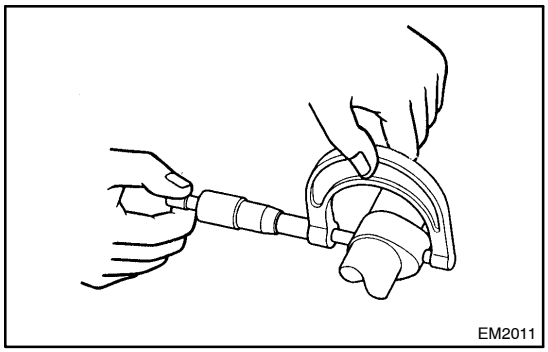
(a) Place the camshaft on V–blocks.

(b) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout:

0.08 mm (0.0031 in.)

If the circle runout is greater than maximum, replace the camshaft.



14. INSPECT CAM LOBES

Using a micrometer, measure the cam lobe height.

Standard cam lobe height:

Intake:

41.94 – 42.04 mm (1.6512 – 1.6551 in.)

Exhaust:

41.96 – 42.06 mm (1.6520 – 1.6559 in.)

Minimum cam lobe height:

Intake:

41.79 mm (1.6453 in.)

Exhaust:

41.81 mm (1.6461 in.)

If the cam lobe height is less than minimum, replace the camshaft.

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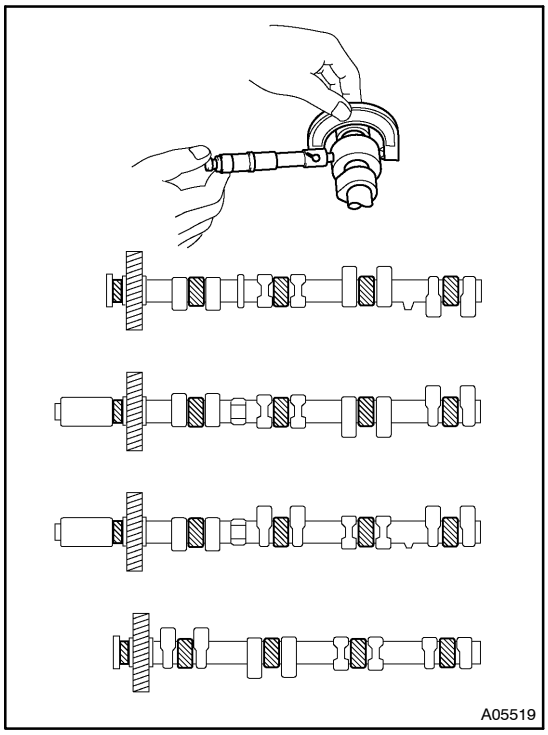


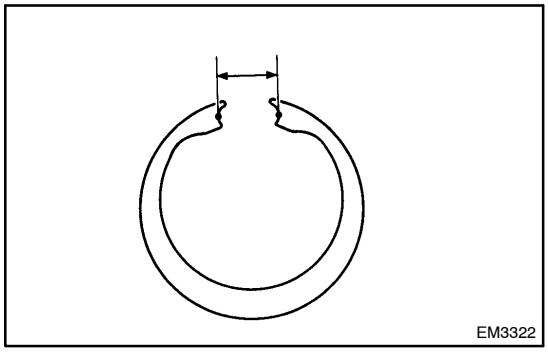
15. INSPECT CAMSHAFT JOURNALS

Using a micrometer, measure the journal diameter.

Journal diameter:

26.954 – 26.970 mm (1.0612 – 1.0618 in.)

If the journal diameter is not as specified, check the oil clearance.



16. INSPECT CAMSHAFT GEAR SPRING

Using vernier calipers, measure the free distance between the spring ends.

Free distance:

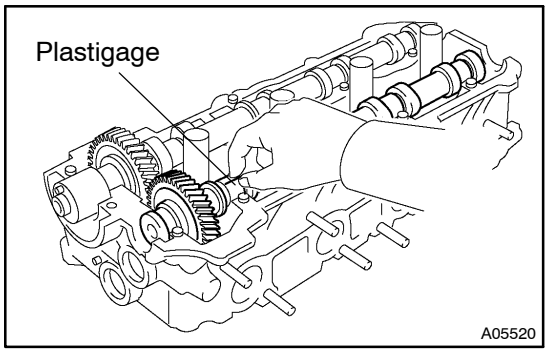
18.2 – 18.8 mm (0.712 – 0.740 in.)

If the free distance is not as specified, replace the gear spring.

17. INSPECT CAMSHAFT BEARINGS

Check that bearings for flaking and scoring.

If the bearings are damaged, replace the bearing caps and cylinder head as a set.

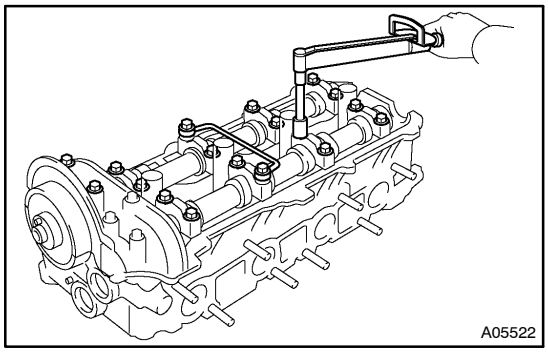


18. INSPECT CAMSHAFT JOURNAL OIL CLEARANCE

(a) Clean the bearing caps and camshaft journals.

(b) Place the camshafts on the cylinder head.

(c) Lay a strip of Plastigage across each of the camshaft journals.



(d) Install the bearing caps.
(See page EM–57)
Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)

NOTICE:

Do not turn the camshaft.

(e) Remove the bearing caps.

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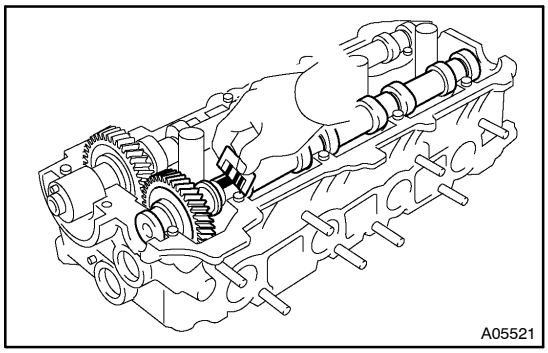
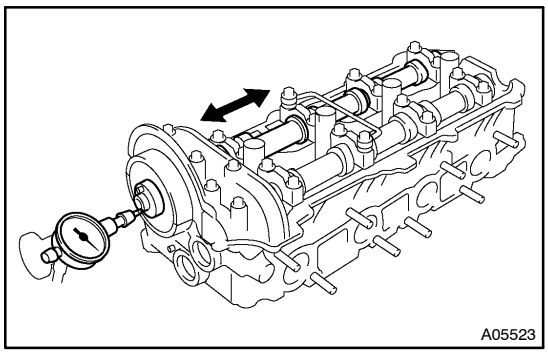


(f) Measure the Plastigage at its widest point.
Maximum oil clearance:
0.10 mm (0.0039 in.)

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.

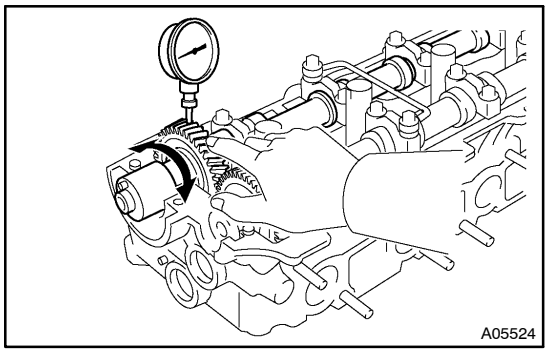


19. INSPECT CAMSHAFT THRUST CLEARANCE

(a) Install the camshaft.
(See page EM–57)
(b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.
Standard thrust clearance:
Intake
0.040 – 0.090 mm (0.0016 – 0.0035 in.)
Exhaust
0.040 – 0.085 mm (0.0016 – 0.0033 in.)
Maximum thrust clearance:
0.12 mm (0.0047 in.)

If the thrust clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.

(c) Remove the camshafts.



20. INSPECT CAMSHAFT GEAR BACKLASH

(a) Install the camshafts without installing the exhaust cam sub–gear and front bearing cap.
(See page EM–57)
(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.

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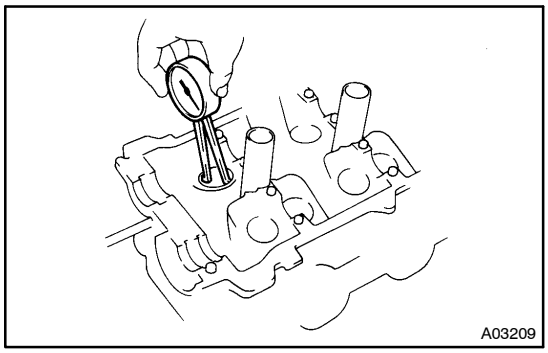


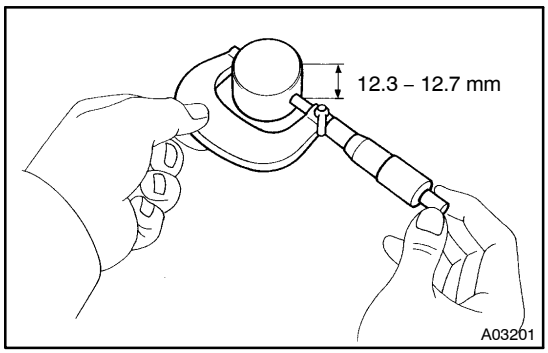
21. INSPECT VALVE LIFTERS AND LIFTER BORES

(a) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.

Lifter bore diameter:
31.000 – 31.016 mm (1.2205 – 1.2211 in.)

(b) Using a micrometer, measure the lifter diameter at the valve lifter center line, 12.3 – 12.7 mm (0.484 – 0.500 in.) from the valve lifter head.

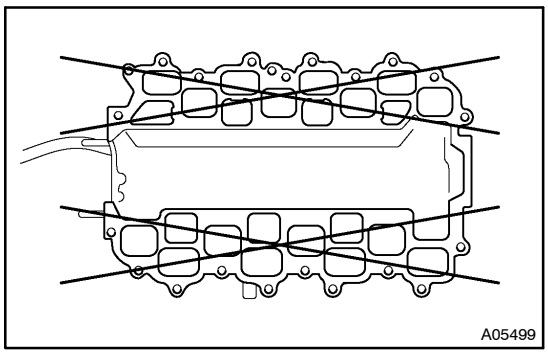
Lifter diameter:
30.966 – 30.976 mm (1.2191 – 1.2195 in.)



(c) Subtract the lifter diameter 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.



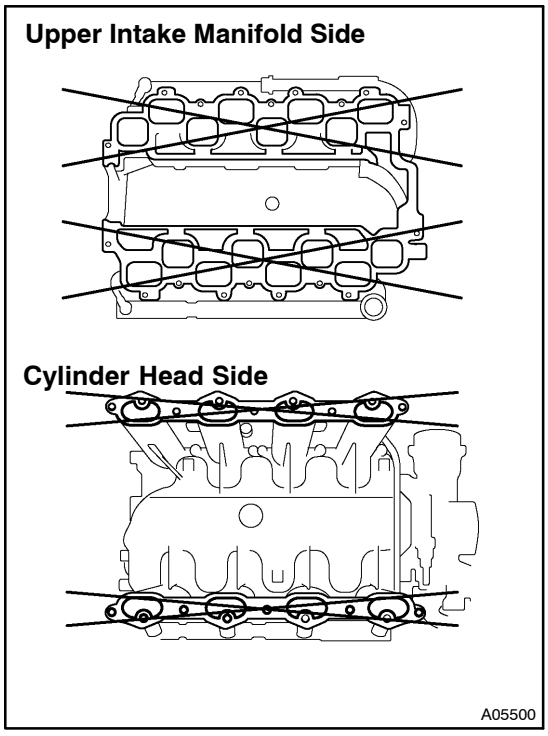
22. INSPECT INTAKE MANIFOLD

(a) Upper intake manifold:

Using a precision straight edge and feeler gauge, measure the surface contacting the lower intake manifold for warpage.

Maximum warpage: 0.15 mm (0.0059 in.)

If warpage is greater than maximum, replace the upper intake manifold.



(b) Lower intake manifold:

Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head and upper intake manifold for warpage.

Maximum warpage:
0.15 mm (0.0059 in.)

If warpage is greater than maximum, replace the lower intake manifold.

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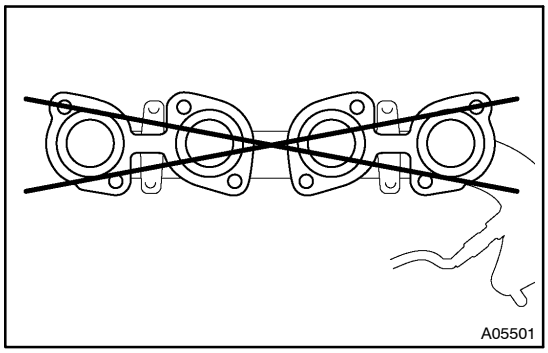
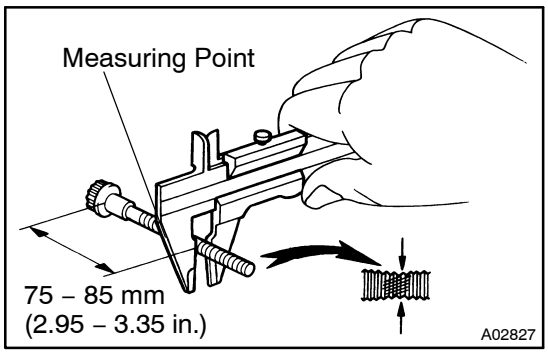


23. INSPECT EXHAUST MANIFOLD

Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head for warpage.

Maximum warpage:
0.50 mm (0.0197 in.)

If warpage is greater than maximum, replace the manifold.



24. INSPECT CYLINDER HEAD BOLTS

Using vernier calipers, measure the thread outside diameter of the bolt.

Standard outside diameter:
9.810 – 9.960 mm (0.3862 – 0.3921 in.)
Minimum outside diameter:
9.700 mm (0.3819 in.)

If the diameter is less than minimum, replace the bolt.

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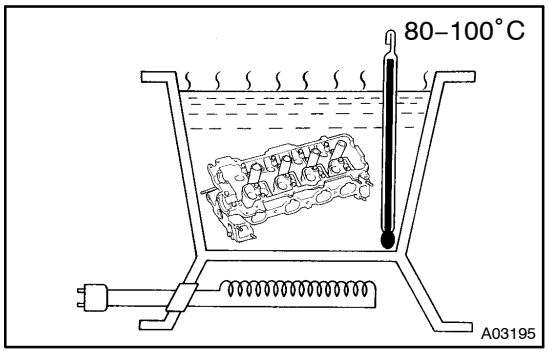
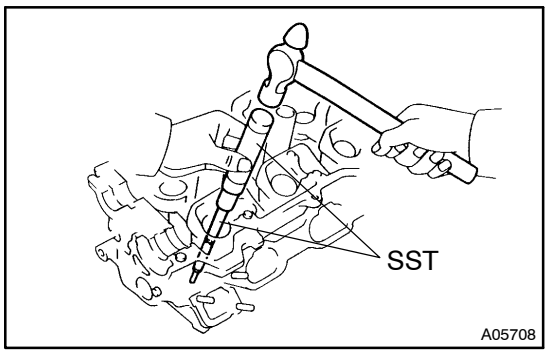
EM0L3–01

REPLACEMENT

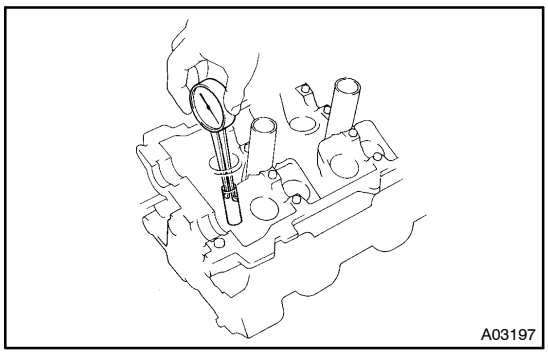
1. REPLACE VALVE GUIDE BUSHINGS



(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 09201–10000 (09201–01060),
09950–70010 (09951–07100)



(c) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.

Both intake and exhaust

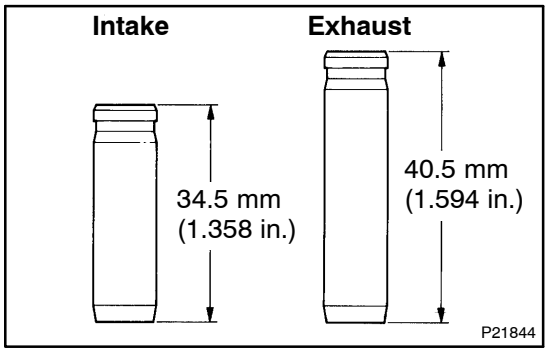
Bushing bore diameter mm (in.)	Bushing size
10.285 – 10.306 (0.4049 – 0.4057)	Use STD
10.335 – 10.356 (0.4069 – 0.4077)	Use O/S STD

(d) Select a new guide bushing (STD or O/S 0.05).

If the bushing bore diameter of the cylinder head is greater than 10.306 mm (0.4057 in.), machine the bushing bore to the following dimension:

10.335 – 10.356 mm (0.4069 – 0.4077 in.)

If the bushing bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.



HINT:

Different the bushings are used for the intake and exhaust.

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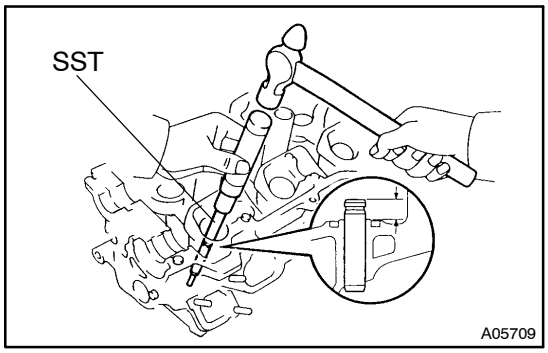


(e) Gradually heat the cylinder head to 80 – 100°C (176 – 212°F).

(f) Using SST and a hammer, tap in a new guide bushing to the specified protrusion height.

Protrusion height:

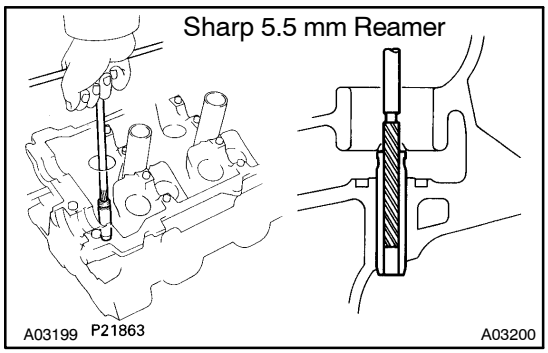
Intake

9.2 – 9.8 mm (0.362 – 0.386 in.)

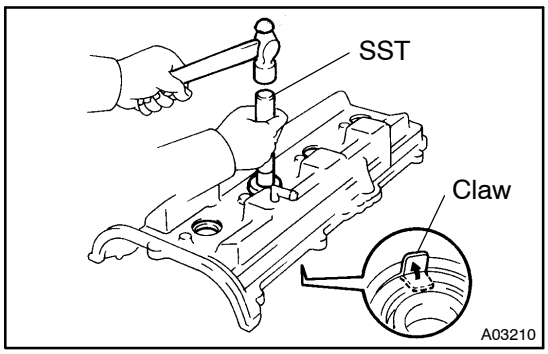
Exhaust

8.2 – 8.8 mm (0.323 – 0.346 in.)

SST 09201–10000 (09201–01060), 09950–70010 (09951–07100)



(g) Using a sharp 5.5 mm reamer, ream the guide bushing to obtain the standard specified clearance (See page EM–43) between the guide bushing and valve stem.

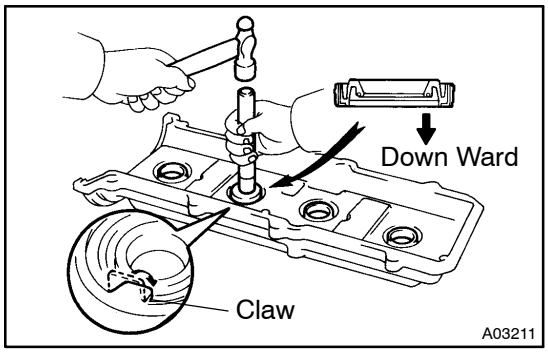


2. REPLACE SPARK PLUG TUBE GASKETS

(a) Bend the ventilation case claw installed on the cylinder head cover to an angle of 90° or more.

(b) Using SST and a hammer, tap out the gasket.

SST 09950–60010 (09551–00240, 09951–00460, 09952–06010, 90155–60003), 09950–70010 (09951–07100)



(c) Using SST and a hammer, tap in a new gasket until its surface is flush with the upper edge of the cylinder head cover.

SST 09950–60010 (09551–00240, 09951–00460, 09952–06010, 90155–60003), 09950–70010 (09951–07100)

NOTICE:

Be careful of the installation direction.

(d) Apply a light coat of MP grease to the gasket lip.

(e) Return the ventilation case claw to its original position.

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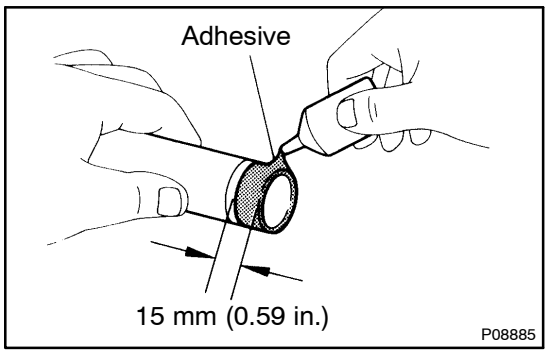
EM0L4–01

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.



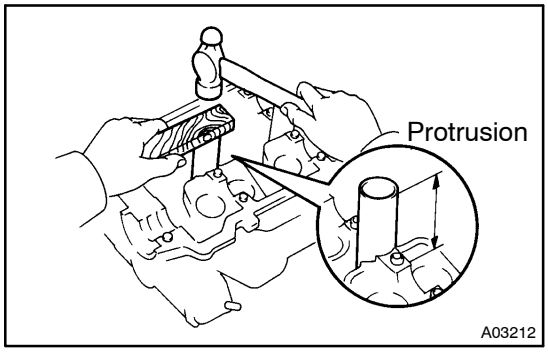
1. INSTALL SPARK PLUG TUBES

HINT:

When using a new cylinder head, spark plug tubes must be installed.

(a) Apply adhesive to the end of the spark plug tube.

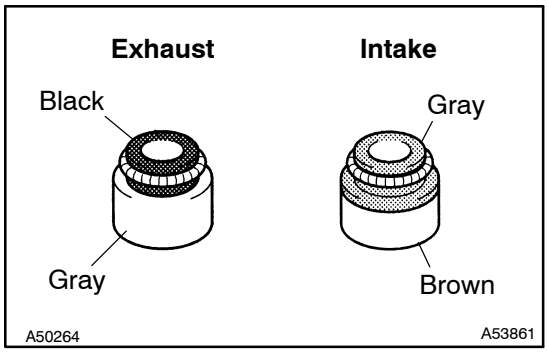
Adhesive:
Part No. 08833–00070, THREE BOND 1324
or equivalent



(b) Using a wooden block and hammer, tap in a new spark tube until there is 48.4 – 49.6 mm (1.906 – 1.953 in.) protruding from the camshaft bearing cap installation surface of the cylinder head.

NOTICE:

Avoid tapping a new spark plug tube in too far by measuring the amount of the protrusion while tapping.



2. INSTALL VALVES

(a) Apply a light coat of engine oil to a new oil seal.

NOTICE:

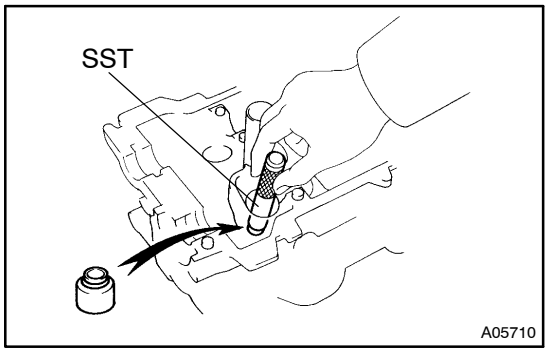
Pay close attention when installing the intake and exhaust oil seal. For example, installing the intake oil seal into the exhaust or installing the exhaust oil seal to the intake can cause installation problems later.

HINT:

The intake valve oil seal is gray/brown and the exhaust valve oil seal is black/gray.

(b) Using SST, push in a new oil seal.

SST 09201–41020



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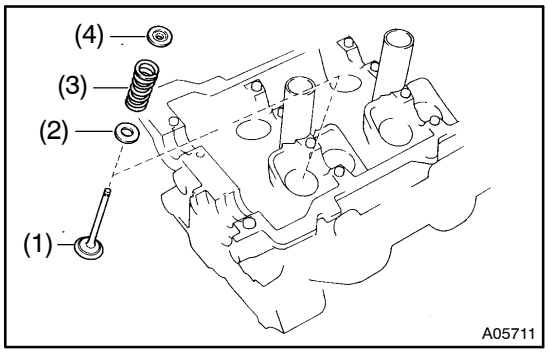
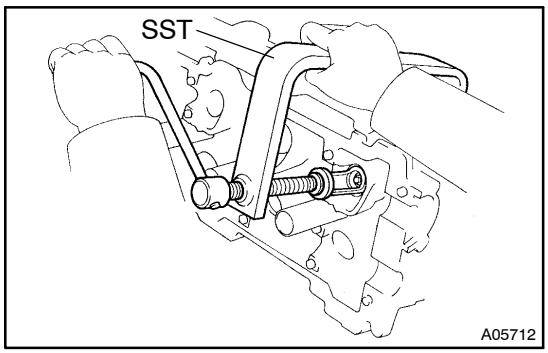
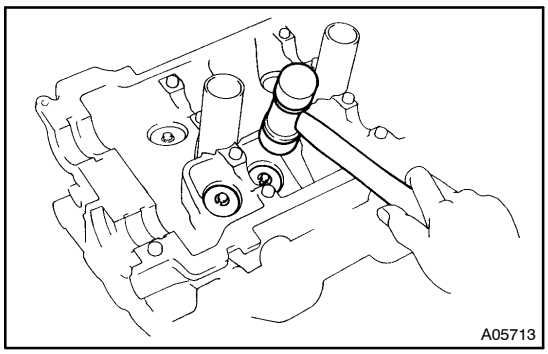


(c) Install these parts:
(1) Valve
(2) Spring seat
(3) Valve spring
(4) Spring retainer



(d) Using SST, compress the valve spring and place the 2 keepers around the valve stem.
SST 09202–70020



(e) 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 to damage the valve stem tip.

3. INSTALL SHIMS AND VALVE LIFTERS

(a) Install the shim and valve lifter.

(b) Check that the valve lifter rotates smoothly by hand.

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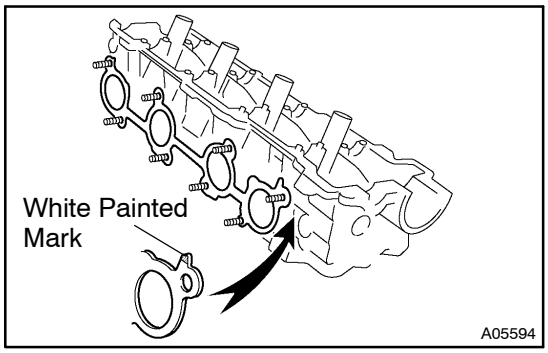
EM0L5–01

INSTALLATION

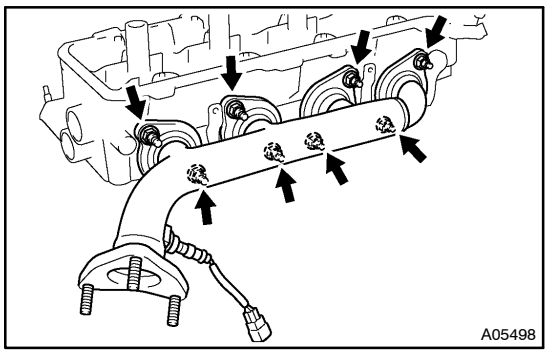


1. INSTALL RH EXHAUST MANIFOLD TO CYLINDER HEAD

(a) Place a new gasket on the cylinder head with the white painted marks facing the manifold side.

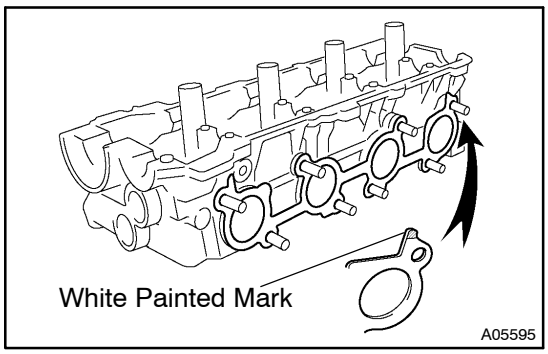
NOTICE:

Be careful of the installation direction.



(b) Install the exhaust manifold with 8 new nuts. Uniformly tighten the nuts in several passes.
Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

(c) Install the heat insulator with the 4 bolts.

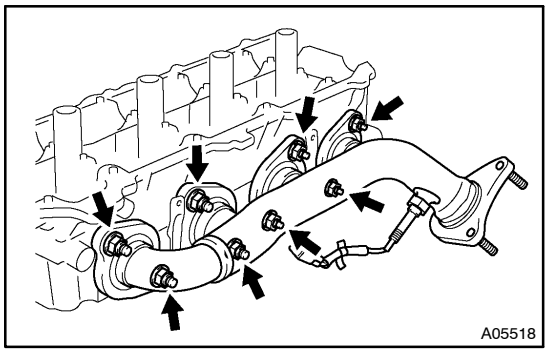


2. INSTALL LH EXHAUST MANIFOLD TO CYLINDER HEAD

(a) Place a new gasket on the cylinder head with the white painted marks facing the manifold side.

NOTICE:

Be careful of the installation direction.



(b) Install the exhaust manifold with 8 new nuts. Uniformly tighten the nuts in several passes.
Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

(c) Install the heat insulator with the 4 bolts.

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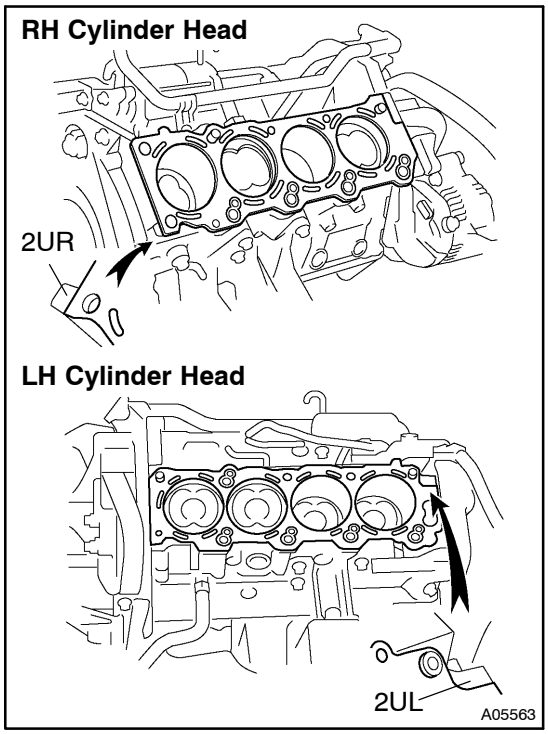


3. PLACE CYLINDER HEAD ON CYLINDER BLOCK

(a) Place 2 new cylinder head gaskets in position on the cylinder block.

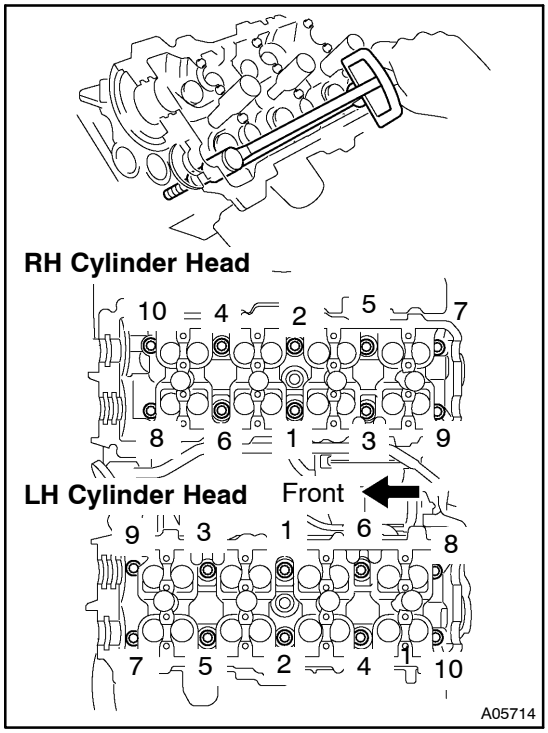
HINT:

On the rear side of the cylinder head gasket are marks to distinguish the LH and RH banks, a ”R” mark for the RH bank and a ”L” mark for the LH bank.

NOTICE:

Be careful of the installation direction.

(b) Place the 2 cylinder heads in position on the cylinder head gaskets.



4. INSTALL CYLINDER HEAD BOLTS

HINT:

- The cylinder head bolts are tightened in 3 progressive steps (steps (c), (e) and (f)).
- If any cylinder head bolt is broken or deformed, replace it.

(a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.

(b) Install the plate washer to the cylinder head bolt.

(c) Install and uniformly tighten the 10 cylinder head bolts on one side of the cylinder head in several passes in the sequence shown, then do the other side as shown.

Torque: 32 N·m (325 kgf·cm, 24 ft·lbf)

If any one of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.

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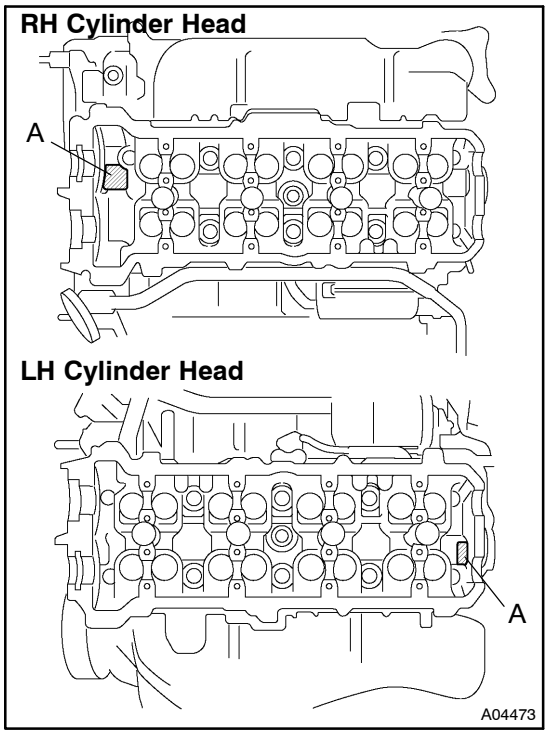
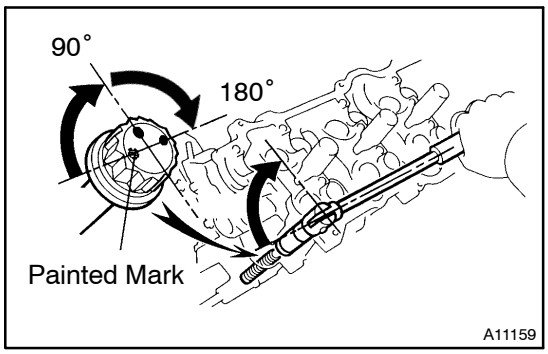
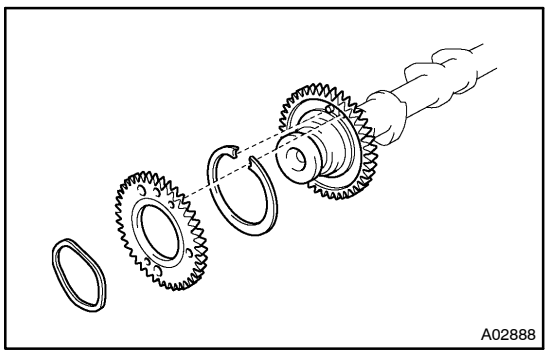


NOTICE:
Do not drop the plate washer for cylinder head bolt into portion A of the cylinder head. If dropped into portion A, the plate washer will pass through the cylinder head and cylinder block into the oil pan.



(d) Mark the front of the cylinder head bolt with paint.
(e) Retighten the cylinder head bolts by 90° in the numerical order shown.
(f) Retighten the cylinder head bolts by an additional 90°.
(g) Check that the painted mark is now at a 180° angle to front.

5. INSTALL SPARK PLUGS

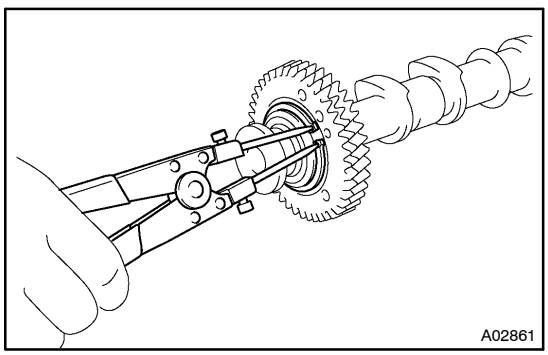


6. ASSEMBLE EXHAUST CAMSHAFT

(a) Install these parts:
(1) Camshaft gear spring
(2) Camshaft sub–gear

HINT:
Attach the pins on the gears to the gear spring ends.

(3) Wave washer



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

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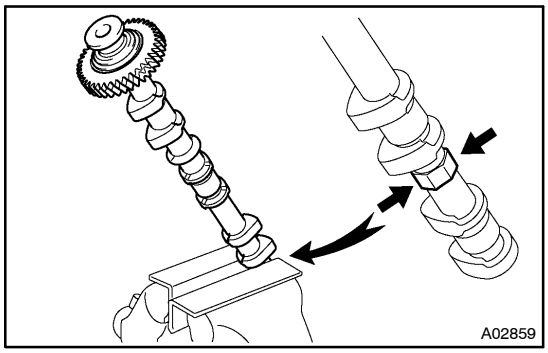
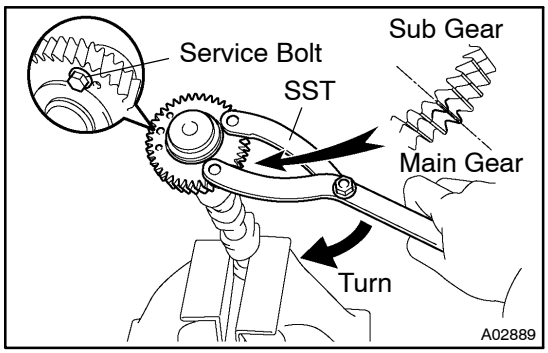


(c) Mount the hexagon wrench head portion of the camshaft in a vise.

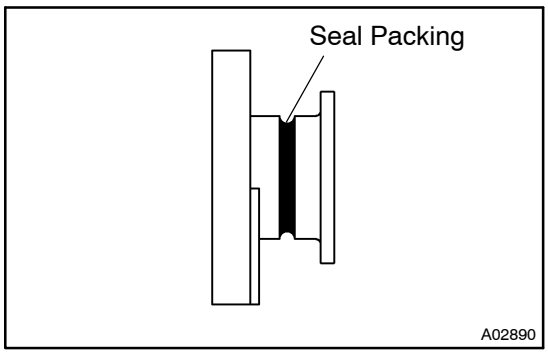
NOTICE:

Be careful not to damage the camshaft.



(d) Using SST, align the holes of the camshaft main gear and sub–gear by turning camshaft sub–gear counterclockwise, and temporarily install a service bolt.
SST 09960–10010 (09962–01000, 09963–00500)

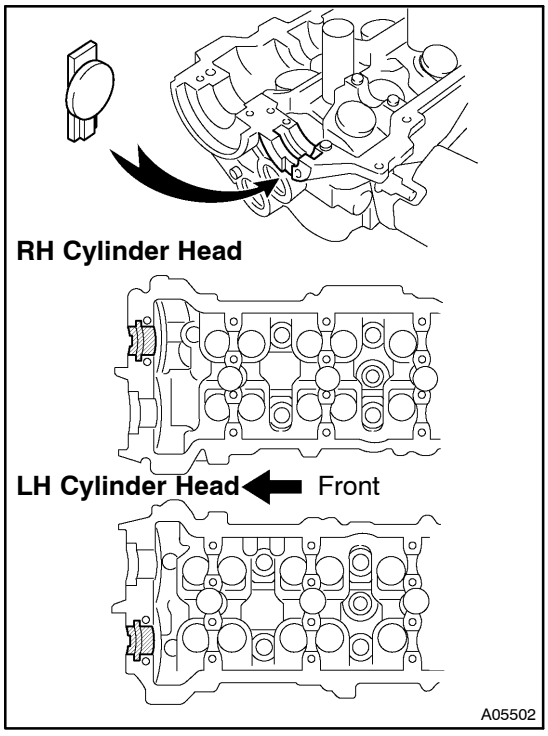
(e) Align the gear teeth of the main gear and sub–gear, and tighten the service bolt.



7. INSTALL CAMSHAFT HOUSING PLUGS

(a) Remove any old packing (FIPG) material.

(b) Apply seal packing to the camshaft housing plug grooves.
Seal packing:
Part No. 08826–00080 or equivalent



(c) Install the 2 camshaft housing plugs to the cylinder heads.

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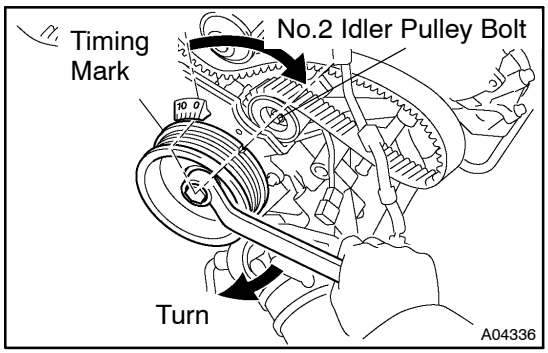
8. INSTALL CAMSHAFTS

NOTICE:

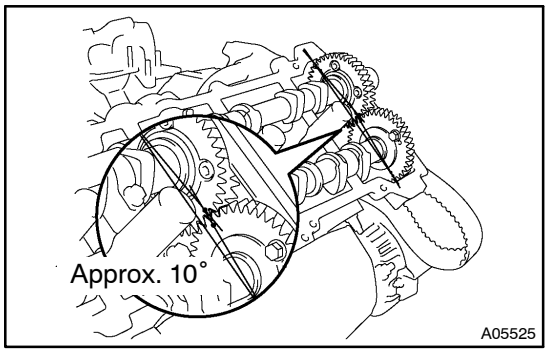
Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



(a) Set the crankshaft pulley position.
Turn the crankshaft pulley clockwise or counterclockwise, and put the timing mark of the crankshaft pulley in line with the centers of the crankshaft pulley bolt and idler pulley bolt.

NOTICE:

Having the crankshaft pulley at the wrong angle can cause the piston head and valve head to come into contact with each other when you install the camshaft, causing damage. So always set the crankshaft pulley at the correct angle.



(b) Install the RH camshafts.
(1) Apply MP grease to the thrust portion of the intake and exhaust camshafts.
(2) Place the intake and exhaust camshafts.
(3) Set the timing mark (1 dot mark) of the camshaft main gear at approx. 10° angle.

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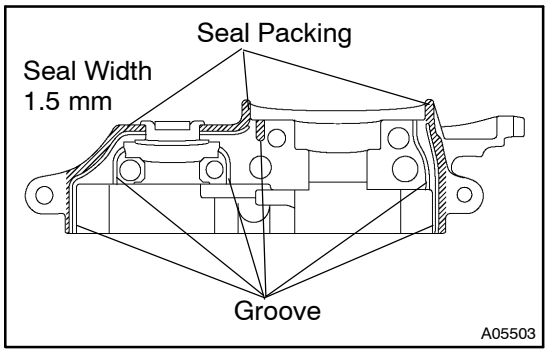


(4) Remove any old packing (FIPG) material from front bearing cap.

(5) Apply seal packing to the front bearing cap as shown in the illustration.

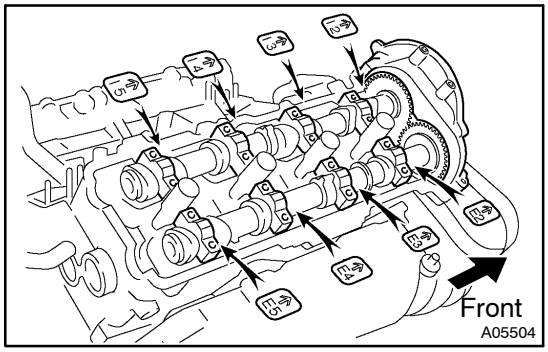
Seal packing:

Part No. 08826–00080 or equivalent

- Install a nozzle that has been cut to a 1.5 mm (0.06 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

NOTICE:

Do not apply seal packing to the front bearing cap grooves.



(6) Install the front bearing cap.

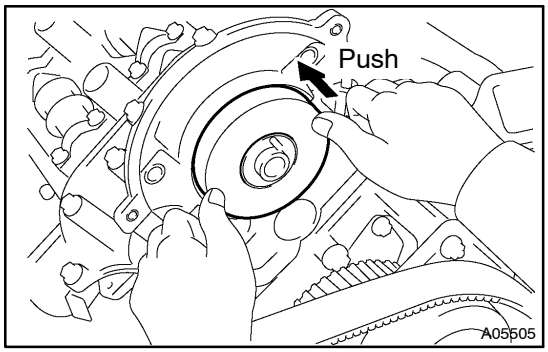
HINT:

Installing the front bearing cap will determine the thrust portion of the camshaft.

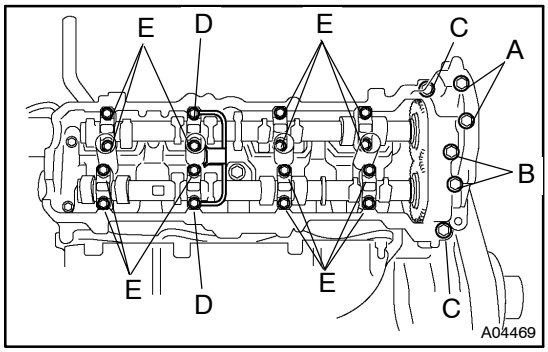
(7) Install the other bearing cap in the sequence shown with the arrow mark facing forward.

HINT:

Align the arrow marks at the front and rear of the cylinder head with the mark on the bearing cap.



(8) Push in the camshaft oil seal.



(9) Apply a light coat of engine oil on the threads and under the heads (D and E) of the bearing cap bolts.

HINT:

Do not apply engine oil under the heads of the bearing cap bolt (A), (B) and (C).

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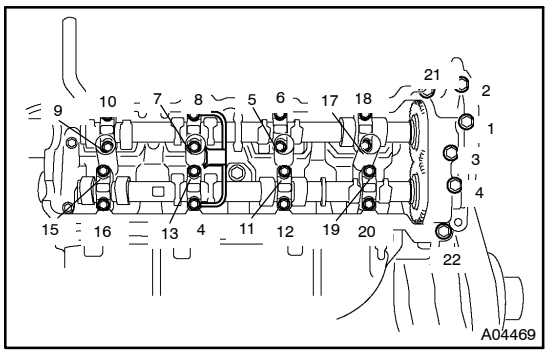
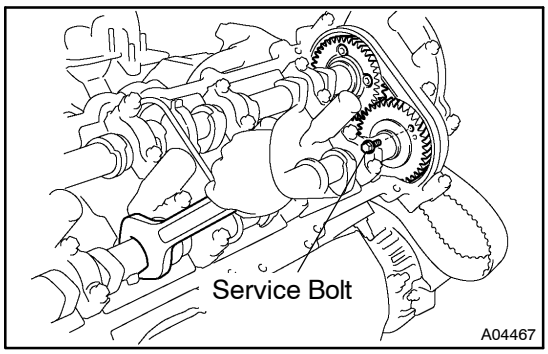
(10) Install the oil feed pipe and the 22 bearing cap bolts as shown.

HINT:
Each bolt length is indicated in the illustration.
Bolt length:
94 mm (3.70 in.) for A
72 mm (2.83 in.) for B
25 mm (0.98 in.) for C
52 mm (2.05 in.) for D
38 mm (1.50 in.) for E

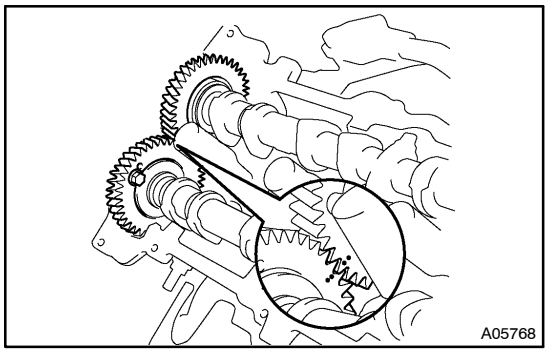


(11) Uniformly tighten the 22 bearing cap bolts in several passes, in the sequence shown.

Torque:
Bolt C:
7.5 N·m (80 kgf·cm, 69 in.·lbf)
Others
16 N·m (160 kgf·cm, 12 ft·lbf)



(12) Boring the service bolt installed in the driven sub–gear upward by turning the hexagon wrench head portion of the camshaft with a wrench.
(13) Remove the service bolt.



(c) Install the LH camshafts.
(1) Apply MP grease to the thrust portion of the intake and exhaust camshafts.
(2) Place the intake and exhaust camshafts.
(3) Engage the intake to the exhaust gear by meeting the timing marks (2 dot marks) on each gear.

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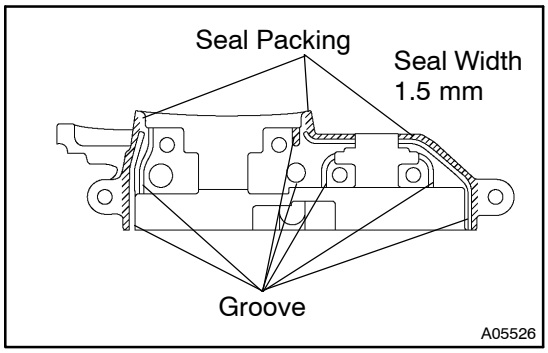


(4) Remove any old packing (FIPG) material.

(5) Apply seal packing to the front bearing cap.

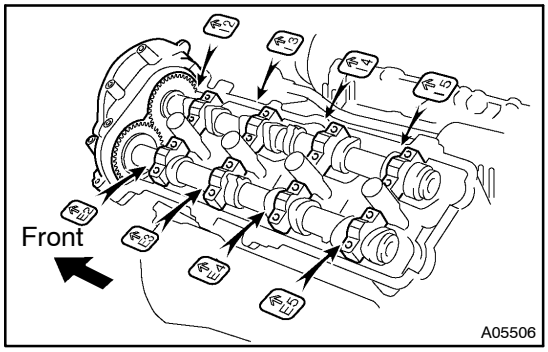
Seal packing:

Part No. 08826–00080 or equivalent

- Install a nozzle that has been cut to a 1.5 mm (0.06 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

NOTICE:

Do not apply seal packing to the front bearing cap grooves.



(6) Install the front bearing cap.

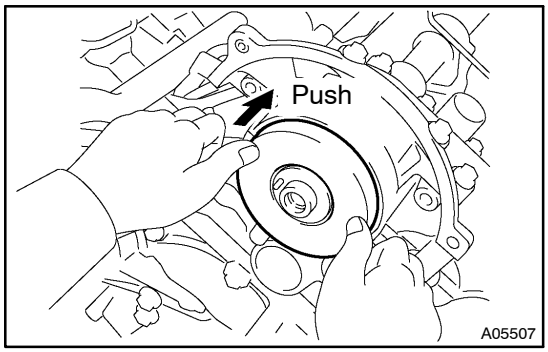
HINT:

Installing the front bearing cap will determine the thrust portion of the camshaft.

(7) Install the other bearing cap in the sequence shown with the arrow mark facing forward.

HINT:

Align the arrow marks at the front and rear of the cylinder head with the mark on the bearing cap.



(8) Push in the camshaft oil seal.

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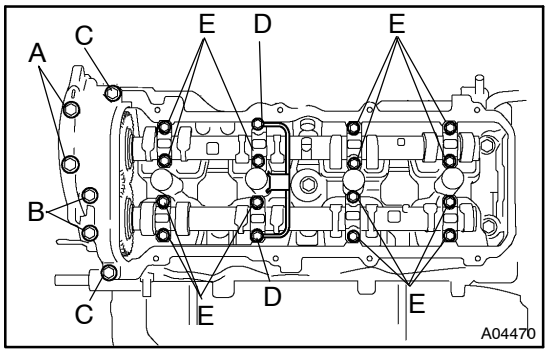


(9) Apply a light coat of engine oil on the threads and under the heads (D and E) of the bearing cap bolts.

HINT:

Do not apply engine oil under the heads of the bearing cap bolt (A), (B) and (C).

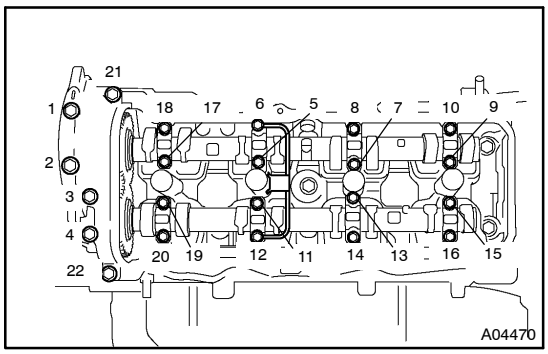
(10) Install the oil feed pipe and the 22 bearing cap bolts as shown.

HINT:

Each bolt length is indicated in the illustration.

Bolt length:

94 mm (3.70 in.) for A
72 mm (2.83 in.) for B
25 mm (0.98 in.) for C
52 mm (2.05 in.) for D
38 mm (1.50 in.) for E



(11) Uniformly tighten the 22 bearing cap bolts in several passes, in the sequence shown.

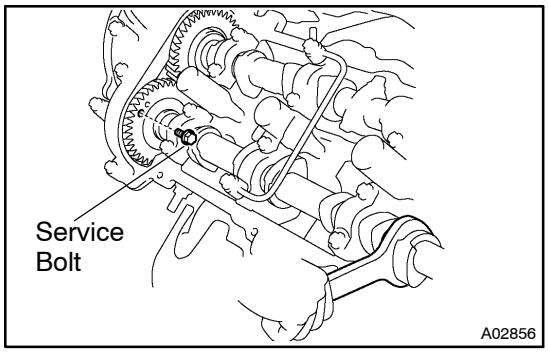
Torque:

Bolt C:

7.5 N·m (80 kgf·cm, 69 in.·lbf)

Others

16 N·m (160 kgf·cm, 12 ft·lbf)



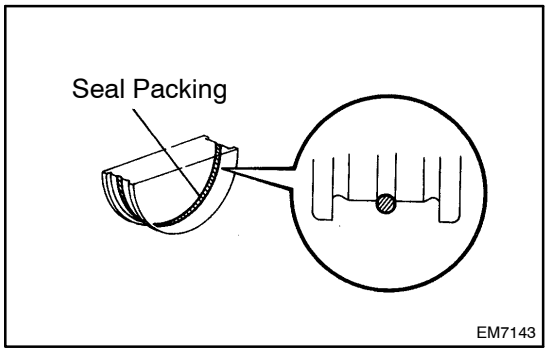
(12) Boring the service bolt installed in the driven sub–gear upward by turning the hexagon wrench head portion of the camshaft with a wrench.

(13) Remove the service bolt.

9. 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.



10. INSTALL SEMI–CIRCULAR PLUGS

(a) Remove any old packing (FIPG) material.

(b) Apply seal packing to the semi–circular plug grooves.

Seal packing:

Part No. 08826–00080 or equivalent

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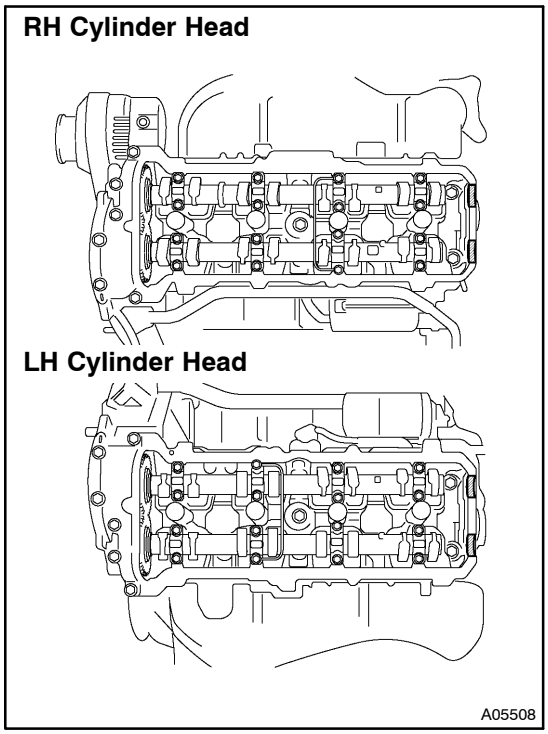
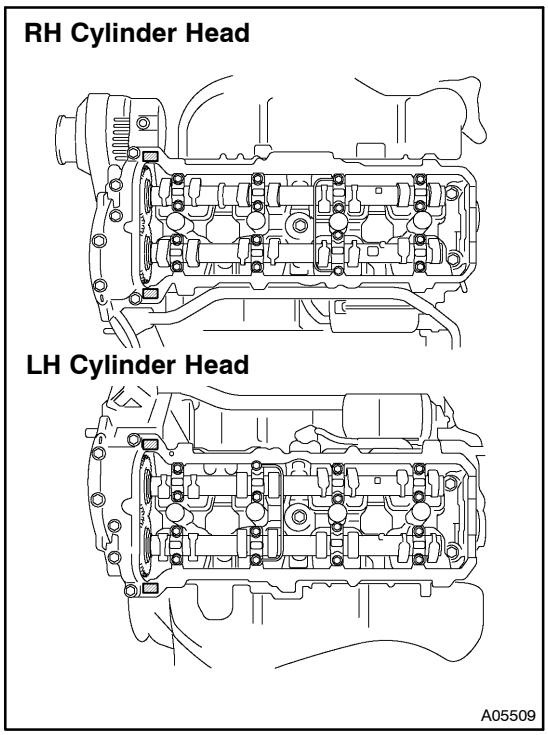


(c) Install the 4 semi–circular plugs to the cylinder heads.



11. INSTALL CYLINDER HEAD COVER

(a) Remove any old packing (FIPG) material.

(b) Apply seal packing to the cylinder heads as shown in the illustration.

Seal packing:
Part No. 08826–00080 or equivalent

(c) Install the gasket to the cylinder head cover.

(d) Install the seal washer to the bolt.

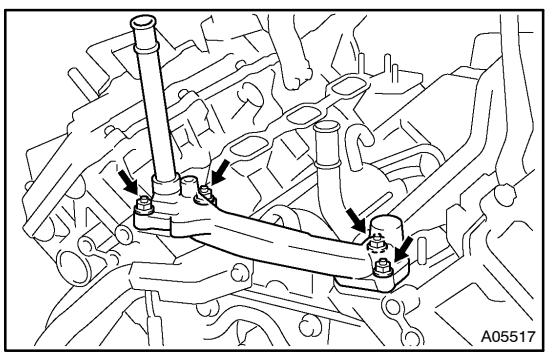
(e) Install the cylinder head cover with the 18 bolts. Uniformly tighten the bolts in several passes. Install the 2 cylinder head covers.

Torque: 6.0 N·m (60 kgf·cm, 53 in.·lbf)

12. INSTALL ENGINE HANGERS

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

13. INSTALL OIL DIPSTICK AND GUIDE FOR ENGINE



14. INSTALL REAR WATER BYPASS JOINT

(a) Install 2 new gaskets to the cylinder head.

(b) Install the 4 nuts holding the water bypass joint to the cylinder heads. Alternately tighten the nuts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

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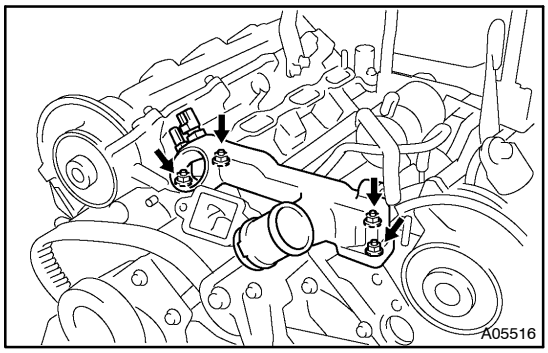
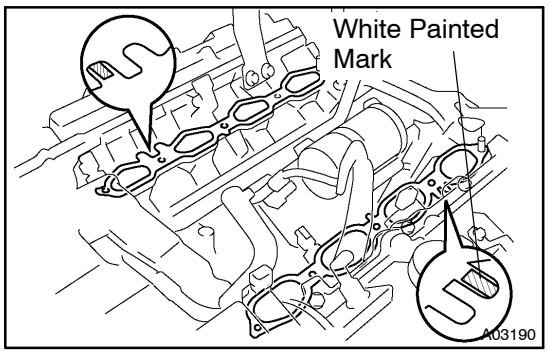


15. INSTALL FRONT WATER BYPASS JOINT

(a) Install 2 new gaskets and the water bypass joint with the 4 nuts. Alternately tighten the nuts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

16. INSTALL WATER INLET AND INLET HOUSING ASSEMBLY (See page CO–8)

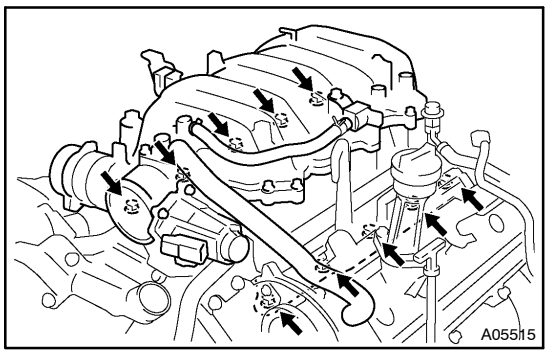


17. INSTALL INTAKE MANIFOLD ASSEMBLY

(a) Place 2 new gaskets on the cylinder heads with white painted mark facing upward.

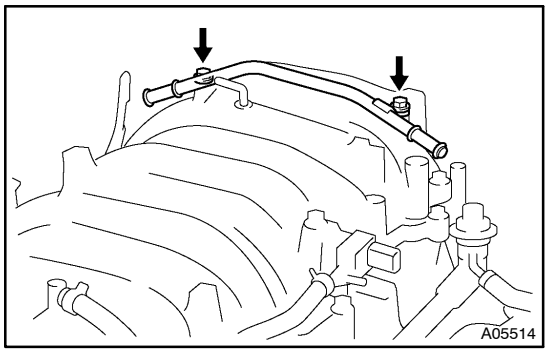
NOTICE:

- **Align the port holes of the gasket and cylinder head.**
- **Be careful of the installation direction.**

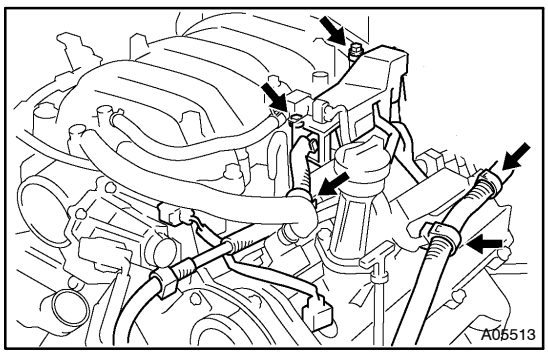


(b) Place the intake manifold assembly on the cylinder heads.

(c) Install and uniformly tighten the 6 bolts and 4 nuts in several passes.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)



(d) Install the EVAP pipe to the intake manifold with the 2 bolts.



(e) Connect the wire protector to the intake manifold with the 2 bolts.

(f) Install the engine wire to the engine hanger.

(g) Install the engine wire to the LH No.1 timing belt rear plate.

(h) Install the engine wire to the bracket.

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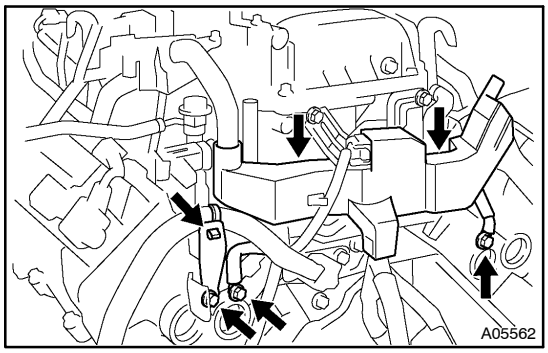
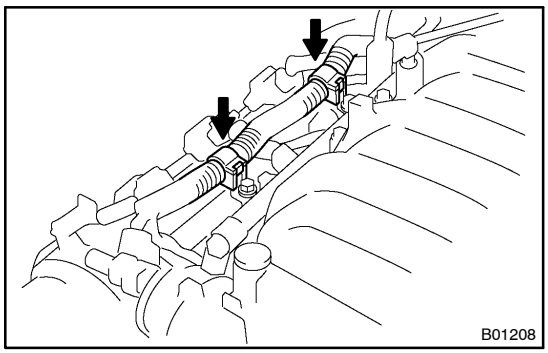


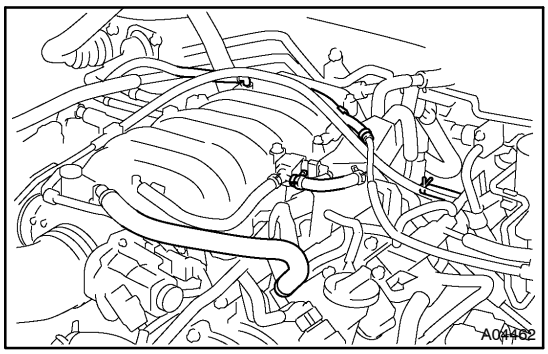
(i) Connect the wire protector to the rear water bypass joint and RH cylinder head with the 2 bolts.

(j) Install the 2 grounds cables to the RH and LH cylinder head.

(k) Install the guide for A/T bracket to the LH cylinder head.



(l) Connect the 2 wire clamp to the wire clamp bracket on the RH delivery pipe.



(m) Connect these hoses:

- Fuel pressure regulator vacuum hose to the fuel pressure regulator pipe.
- PCV hose to PCV valve on LH cylinder head
- EVAP hose (from charcoal canister) to VSV for EVAP
- EVAP hose (from charcoal canister) to EVAP pipe on the intake manifold
- EVAP hose (from intake air connector) to EVAP pipe on the intake manifold
- PS air hose to intake manifold

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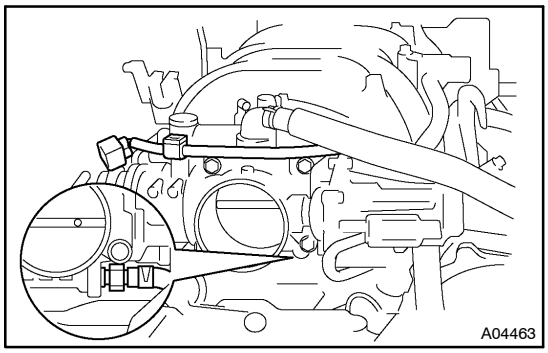

(n) No.1 water bypass hose (from water inlet housing) from throttle body
(o) Connect the 2 wire clamp to the throttle body.
(p) Connect these connectors:
- Throttle position sensor connector
- Accelerator pedal position sensor connector
- Throttle motor connector
- VSV connector for EVAP
- 8 injector connectors
- ECT sensor
- Water sender gauge
- 8 ignition coil connector
- 2 oxygen sensor connector

(q) Connect the accelerator cable.

18. CONNECT FUEL INLET HOSE
(See page SF–24)

19. INSTALL TIMING BELT REAR PLATES

(a) Install the RH timing belt rear plates.
- Install the No.1 timing belt rear plate to the cylinder head with the 3 bolts and stud bolt.

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

(b) Install the LH timing belt rear plates.
(1) Connect the wire clamp to the No.1 timing belt rear plate.
(2) Install the No.1 timing belt rear plate to the cylinder head with the 3 bolts.

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

20. INSTALL V–BANK COVER

Install the 3 V–bank covers.

Torque: 7.5 N·m (80 kgf·cm, 69 in.·lbf)

21. INSTALL IGNITION COILS
(See page IG–6)

22. INSTALL OIL DIPSTICK AND GUIDE FOR A/T

23. INSTALL FRONT EXHAUST PIPE
(See page EM–113)

24. INSTALL PS PUMP
(See page EM–80)

25. INSTALL CAMSHAFT POSITION SENSOR
(See page IG–10)

26. INSTALL CAMSHAFT TIMING PULLEYS
(See page EM–22)

27. CONNECT TIMING BELT TO CAMSHAFT TIMING PULLEYS
(See page EM–22)

28. CHECK ENGINE OIL LEVEL

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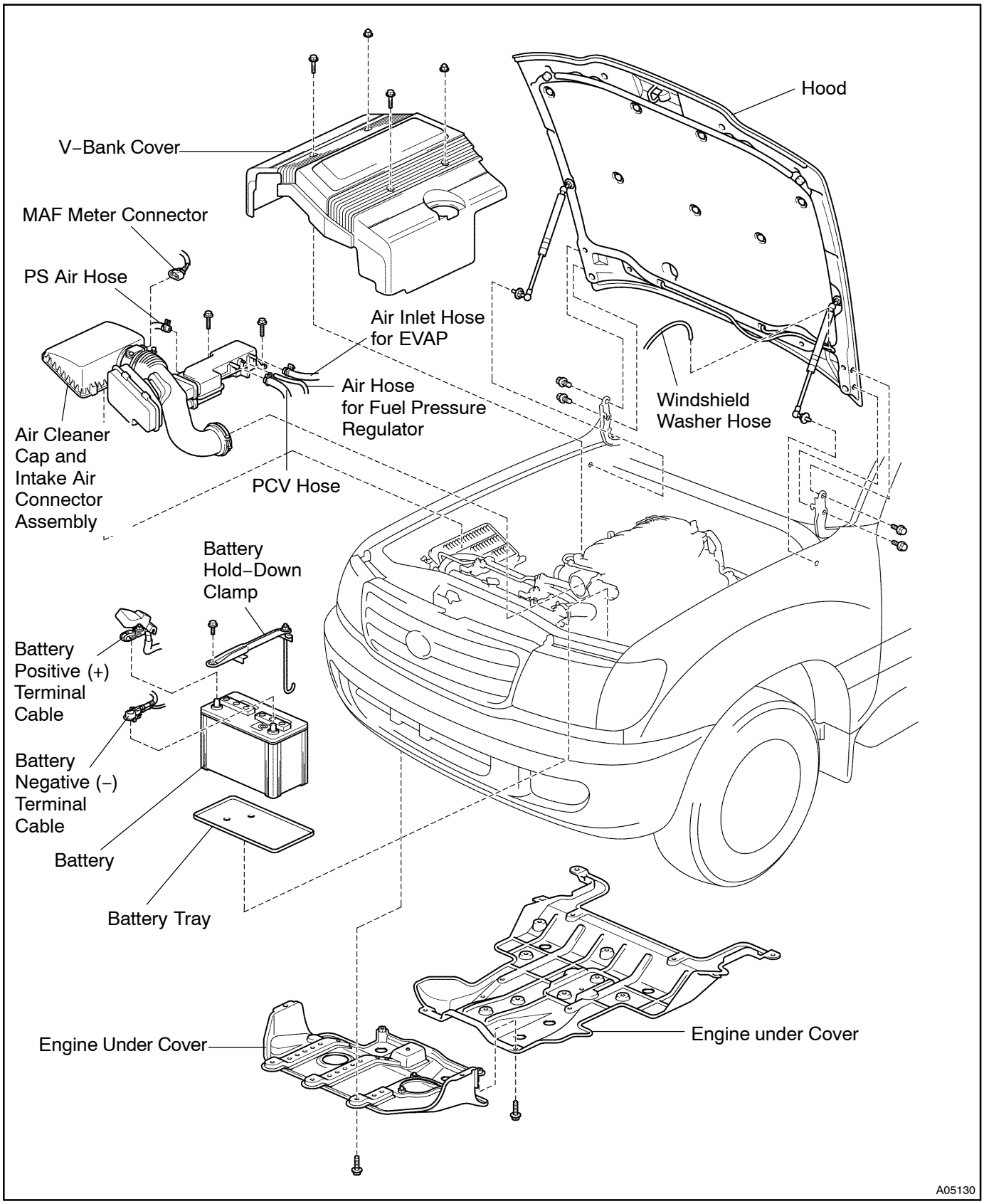
ENGINE UNIT

COMPONENTS

EM0LB–01



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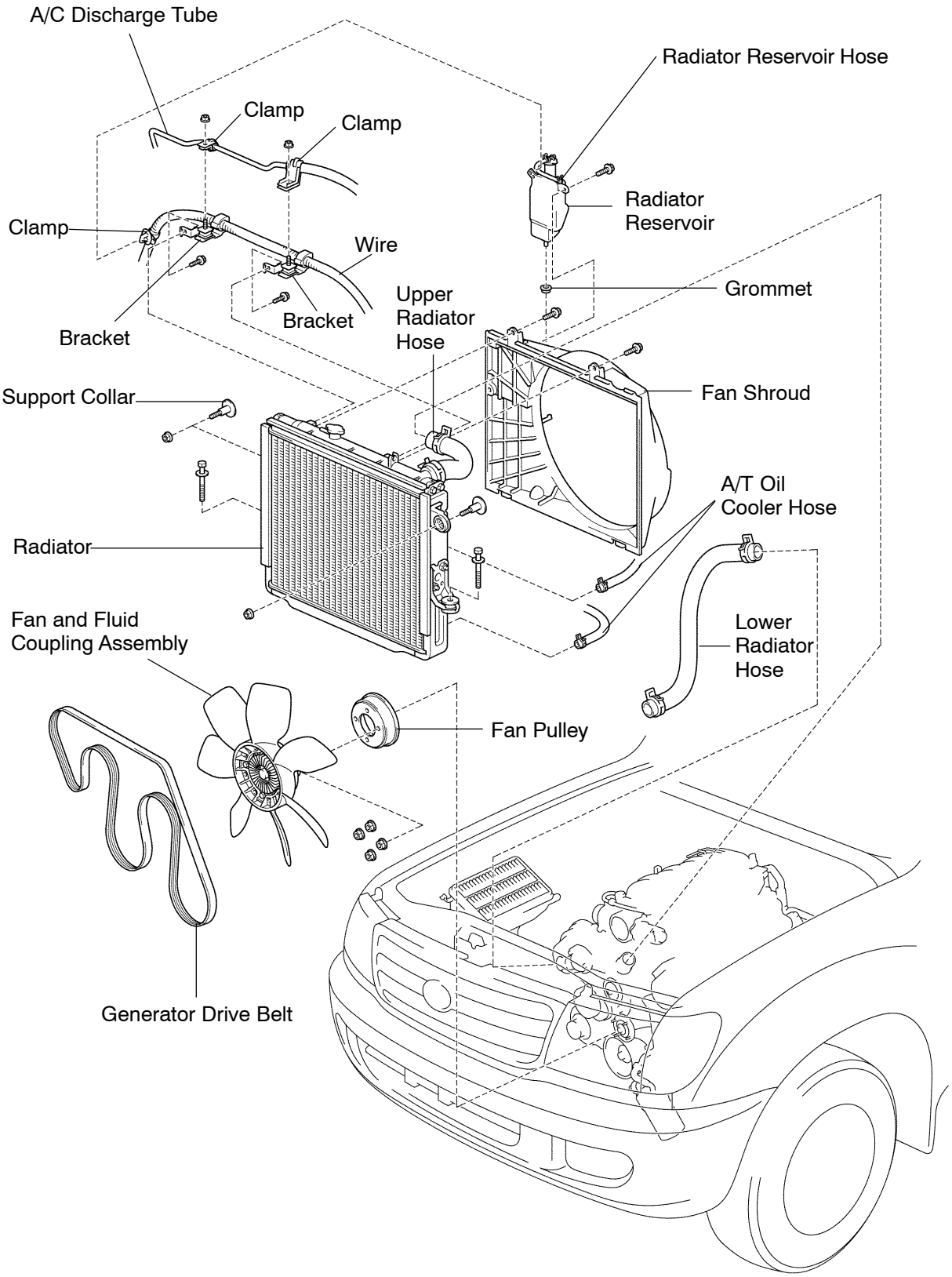

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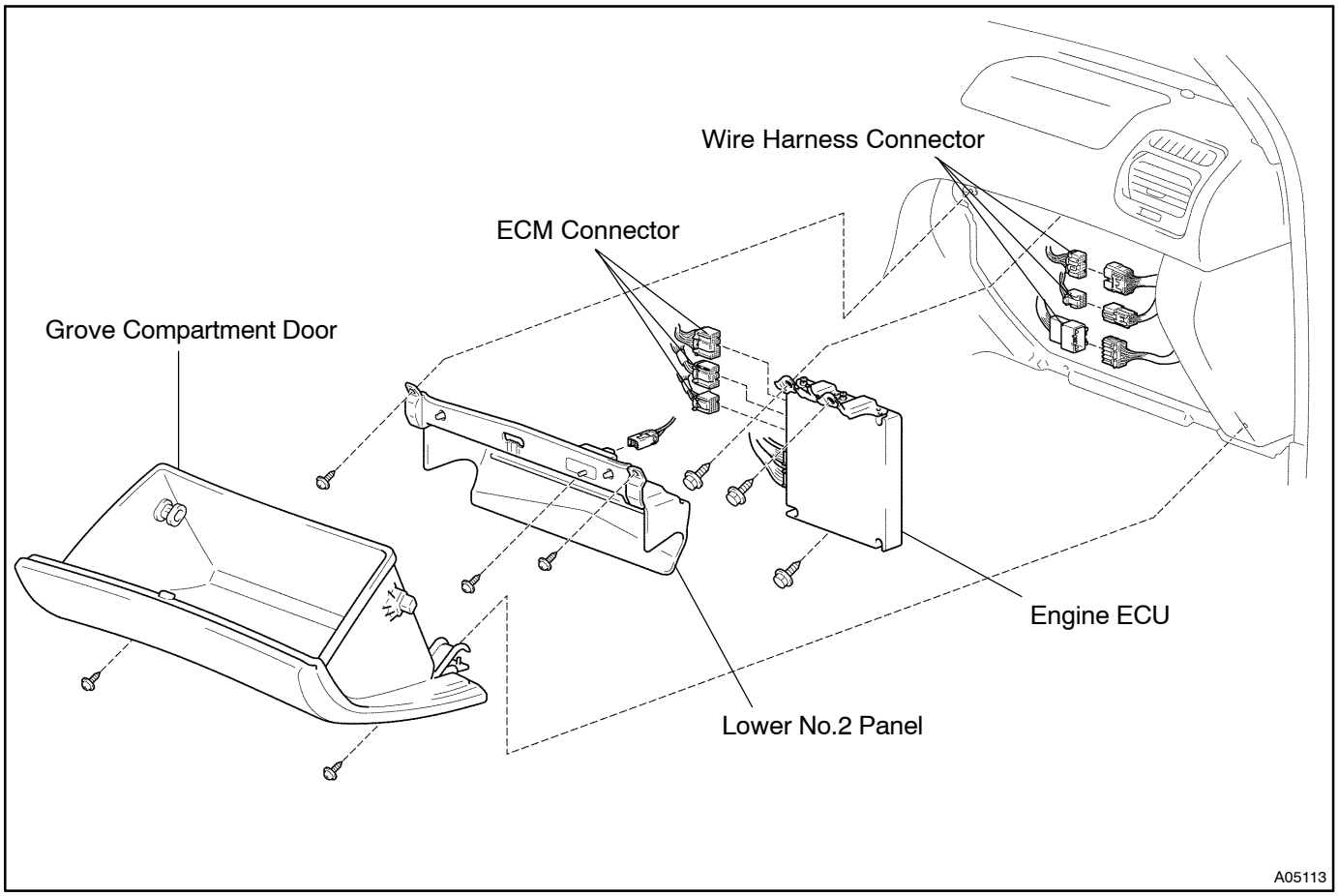

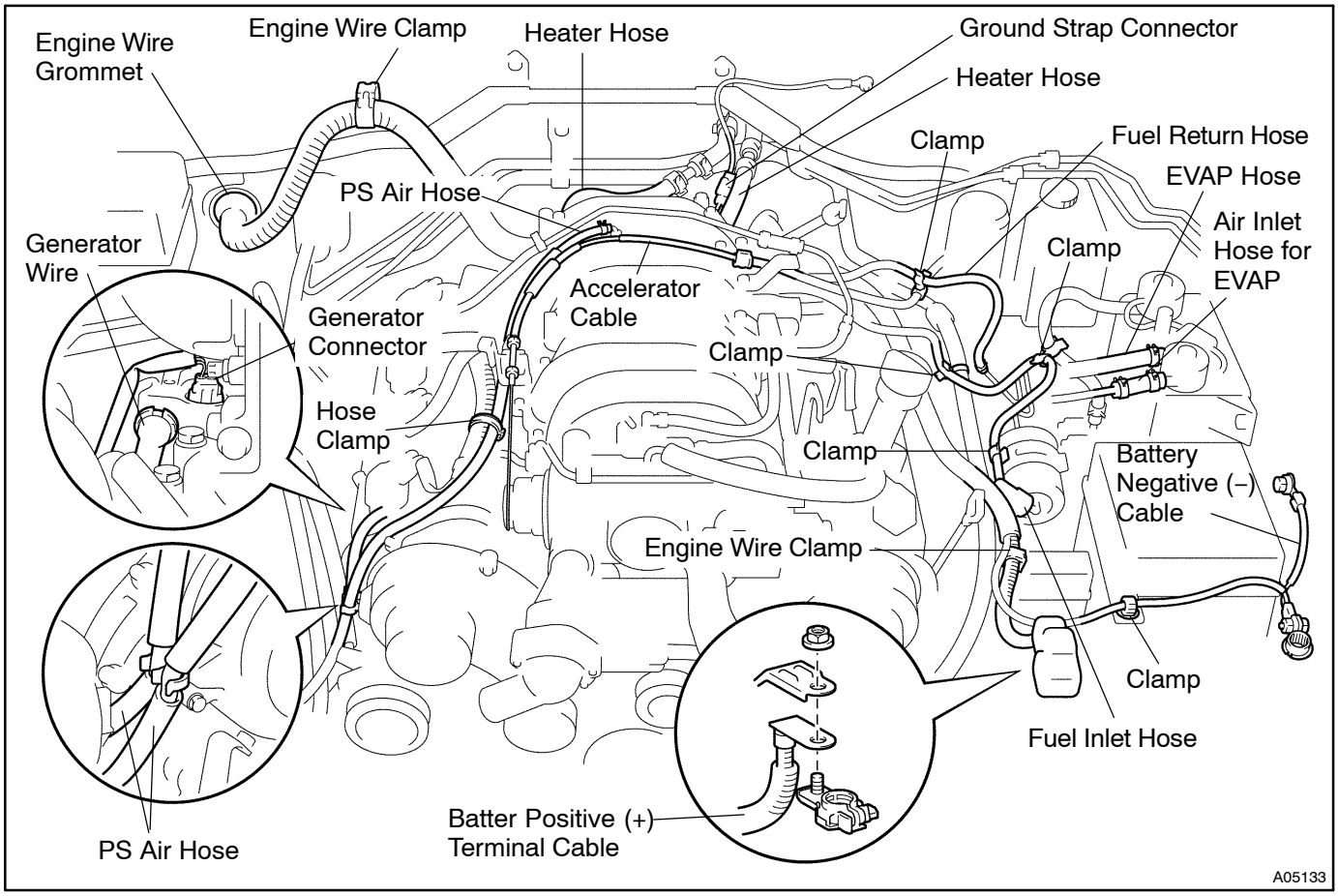

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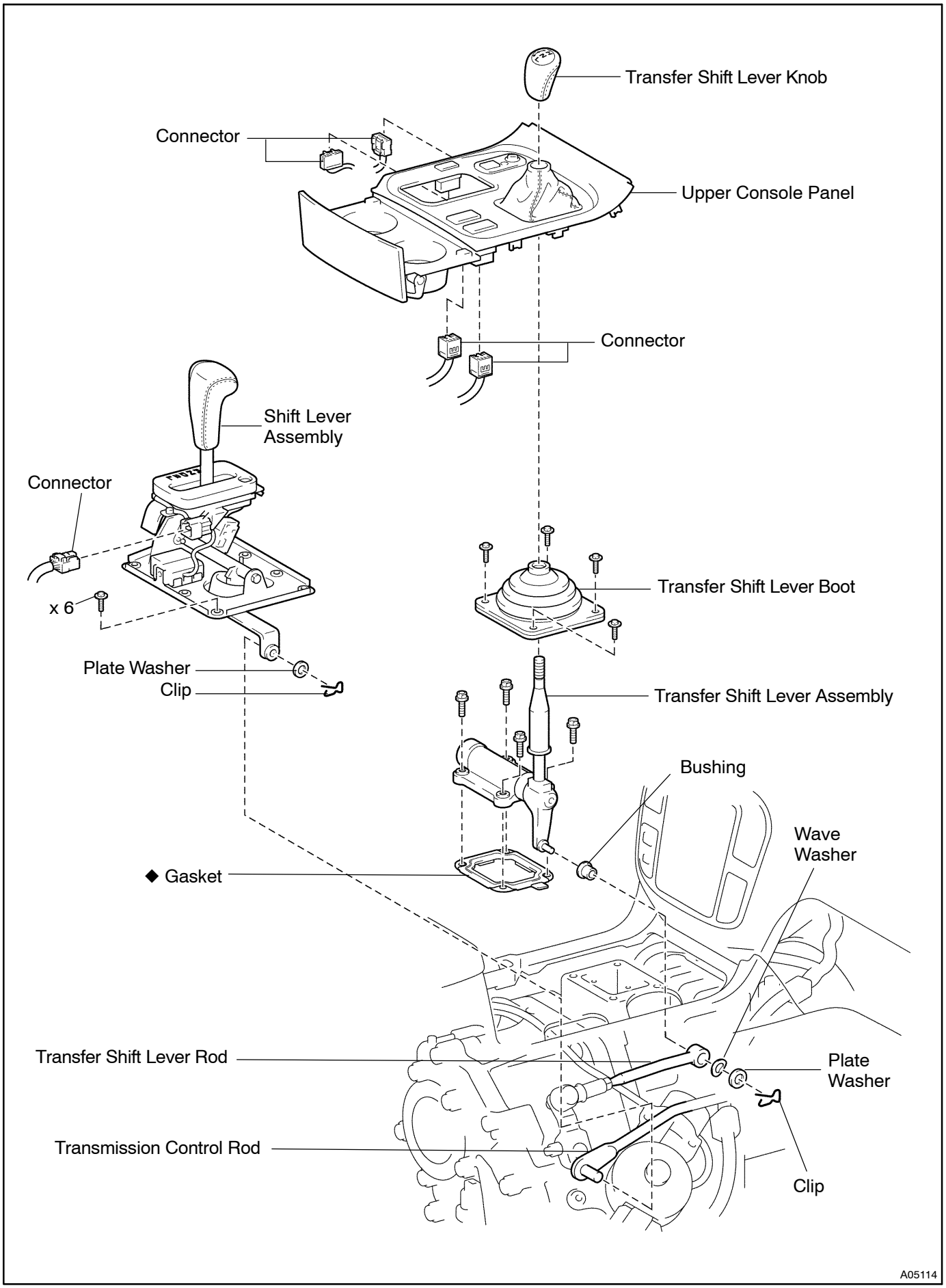

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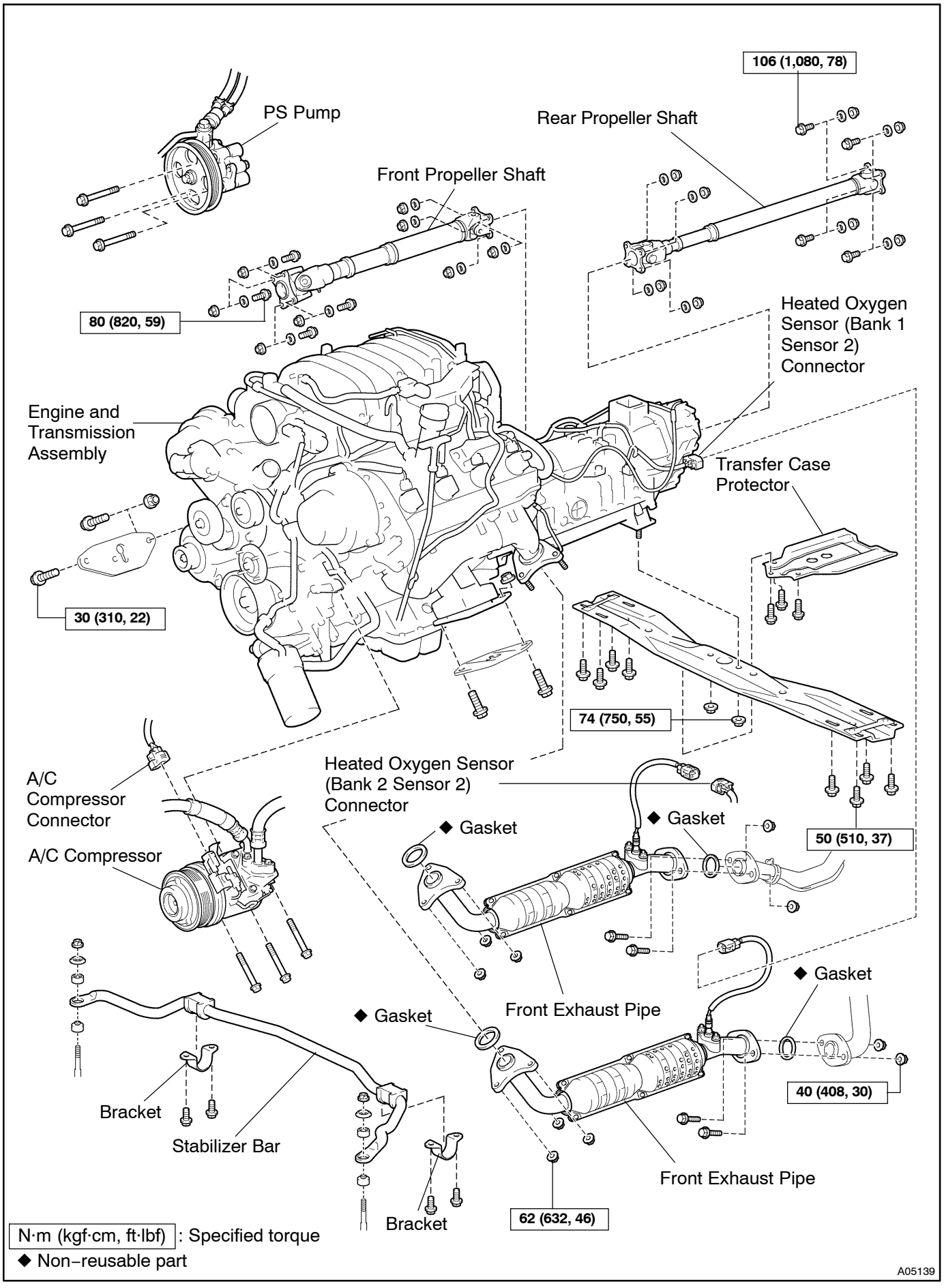

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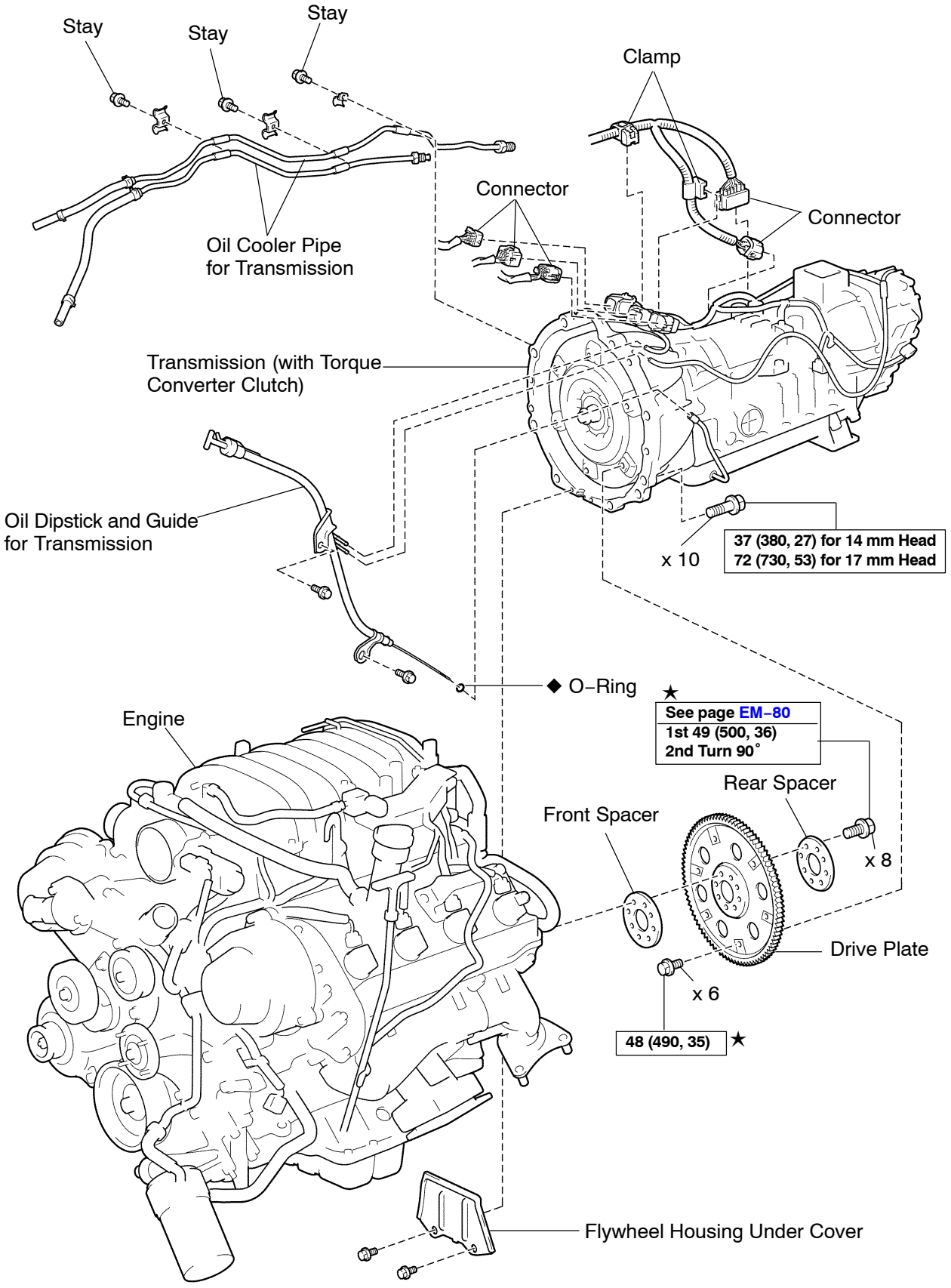

N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
★ Precoated part

A05120

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EM0L9–01

REMOVAL

1. REMOVE HOOD

2. REMOVE ENGINE UNDER COVERS

3. DRAIN ENGINE COOLANT

4. DRAIN ENGINE OIL

5. REMOVE V–BANK COVER

6. REMOVE BATTERY

7. REMOVE AIR CLEANER CAP AND INTAKE AIR CONNECTOR PIPE ASSEMBLY

8. REMOVE RADIATOR RESERVOIR

(a) Disconnect the clamp on the wire from the reservoir.

(b) Disconnect the reservoir hose from the radiator.

(c) Remove the bolt, reservoir and grommet.

9. REMOVE RADIATOR AND FAN SHROUD

(a) Disconnect the upper radiator hose from the front water bypass joint.

(b) Remove the 2 nuts, and disconnect the 2 clamps on the A/C discharge tube from the bracket.

(c) Remove the 2 bolts, and disconnect the 2 brackets on the wire from the radiator.

(d) Remove the 2 bolts, and disconnect the fan shroud from the radiator.

(e) Remove the lower radiator hose.

(f) Disconnect the 2 A/T oil cooler hoses from the radiator.

(g) Remove the 2 bolts, 2 nuts, 2 support collars and radiator.

(h) Remove the fan shroud.

10. REMOVE GENERATOR DRIVE BELT, FAN, FLUID COUPLING AND FAN PULLEY

(a) Loosen the 4 nuts holding the fluid coupling to the fan bracket.

(b) Remove the generator drive belt. (See page CH–8)

(c) Remove the 4 nuts, the fan, fluid coupling assembly and fan pulley.

11. DISCONNECT ENGINE WIRE FROM CABIN

(a) Remove these parts:

(1) Glove compartment door

(2) Lower No.2 panel

(b) Disconnect the 3 connectors from the engine ECU.

(c) Remove the 3 screws, and disconnect the engine ECU from the body bracket.

(d) Disconnect the 3 wire harness connectors.

12. DISCONNECT HOSES, WIRES, CONNECTORS, CLAMPS, GROMMET AND CABLES

- Accelerator cable from engine
- 2 PS air hoses from hose clamp on No.3 RH timing belt cover
- Generator wire
- Generator connector
- Hose clamp for PS air hose

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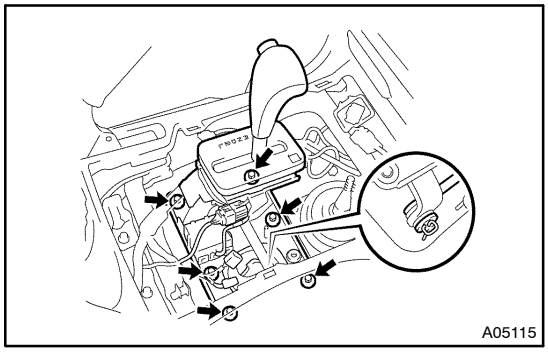
- PS air hose from upper intake manifold
- 2 heater hoses
- Engine wire clamp from bracket on cowl panel
- Engine wire grommet from cowl panel
- Ground strap connector
- Fuel inlet hose and clamps
- Fuel return hose and clamp
- Air inlet hose from charcoal canister
- EVAP hose from charcoal canister
- Engine wire from clamp on right fender apron
- Clamp on battery negative (–) cable from relay box
- Battery negative (–) cable from right fender apron
- Battery positive (+) terminal cable

13. REMOVE SHIFT LEVER ASSEMBLY AND TRANSFER SHIFT LEVER ASSEMBLY

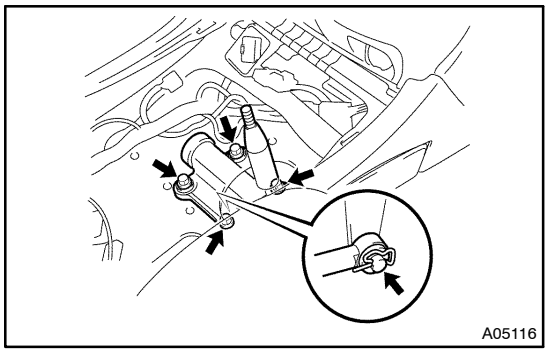
(a) Remove the transfer shift lever knob.

(b) Remove the upper console panel.



(c) Remove the shift lever assembly.
  (1) Disconnect the connector.
  (2) Remove the 6 bolts.
  (3) Remove the clip and plate washer, and disconnect the transmission control rod from the shift lever assembly.
  (4) Remove the shift lever assembly.

(d) Remove the 4 bolts and transfer shift lever boot.

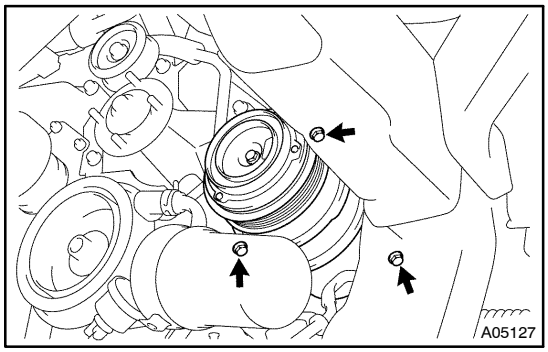


(e) Remove the transfer shift lever assembly.
  (1) Remove the clip, plate washer and wave washer, and disconnect the transfer rod from the shift lever.
  (2) Remove the bushing.
  (3) Remove the 4 bolts, shift lever and gasket.

14. REMOVE FRONT EXHAUST PIPES

15. REMOVE PROPELLER SHAFT (See page PR–4)

16. REMOVE STABILIZER BAR (See page SA–78)



17. DISCONNECT A/C COMPRESSOR FROM ENGINE

(a) Disconnect the A/C compressor connector.

(b) Remove the 3 bolts, and disconnect the A/C compressor from the engine.

HINT:

Suspend the A/C compressor securely.

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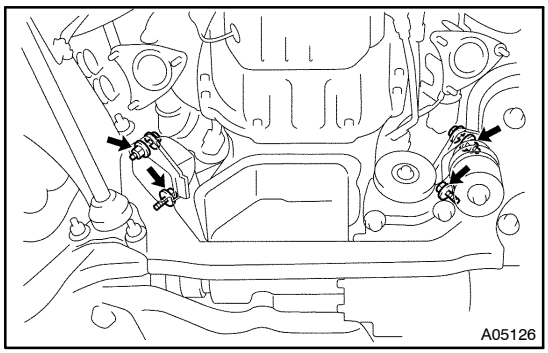
18. DISCONNECT PS PUMP FROM ENGINE

Remove the 3 bolts, and disconnect the PS pump from the engine.

HINT:

Suspend the PS pump securely.

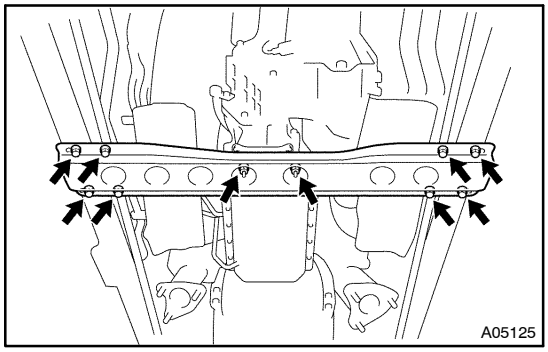


19. REMOVE ENGINE AND TRANSMISSION ASSEMBLY FROM VEHICLE

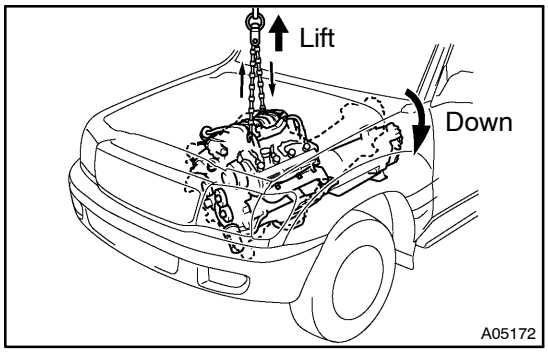
(a) Attach the engine chain hoist to the engine hangers.

(b) Remove the 2 nuts and 4 bolts holding the engine mounting brackets to the frame brackets.

(c) Remove the 3 bolts and transfer case protector.



(d) Remove the 8 bolts, 2 nuts and frame crossmember.



(e) Lift the engine out of the vehicle slowly and carefully.

HINT:

Make sure the engine is clear of all wiring, hoses and cables.

(f) Place the engine and transmission assembly onto the stand.

20. DISCONNECT ENGINE WIRE FROM TRANSMISSION

(a) Disconnect the 5 connectors.

(b) Disconnect the 2 wire clamps.

21. REMOVE OIL DIPSTICK GUIDE AND DIPSTICK FOR TRANSMISSION

(a) Disconnect the 2 breather hoses from the dipstick guide.

(b) Remove the 2 bolts.

(c) Pull out the dipstick guide and dipstick from the dipstick tube of transmission.

(d) Remove the O–ring from the dipstick guide.

22. REMOVE OIL COOLER PIPES FOR TRANSMISSION

(a) Remove the 3 bolts and 3 stays.

(b) Loosen the 2 union nuts, and remove the 2 oil cooler pipes.

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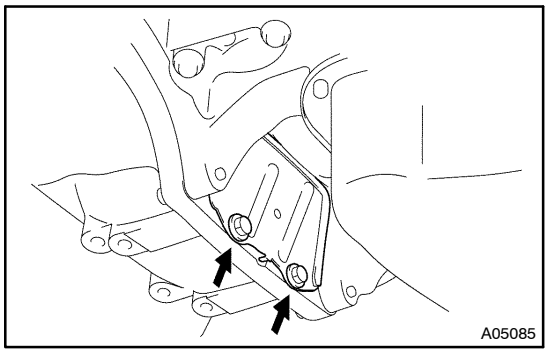
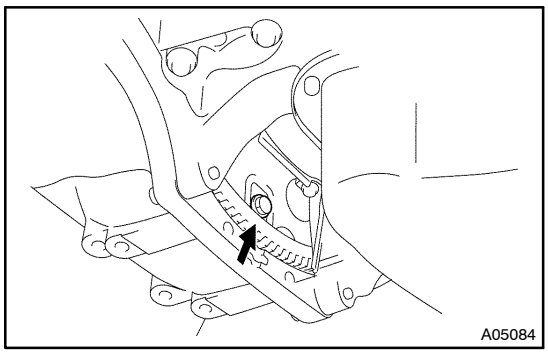


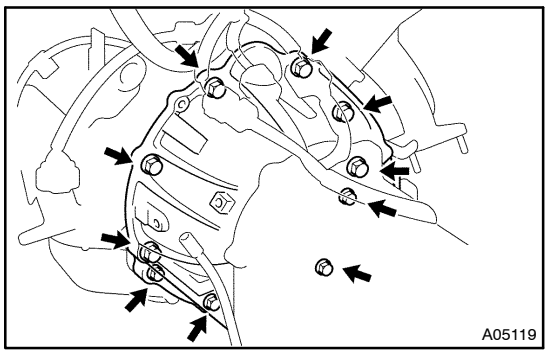
23. REMOVE TORQUE CONVERTER CLUTCH BOLTS

(a) Remove the 2 bolts and flywheel housing under cover.



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

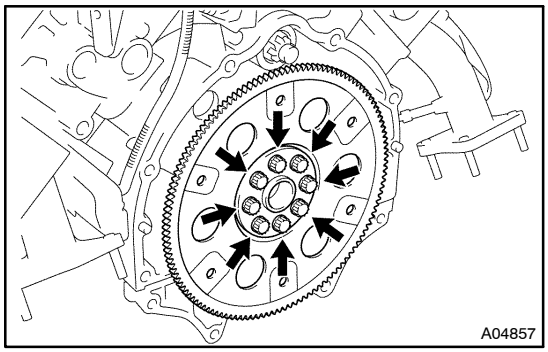
(c) Hold the crankshaft pulley bolt with a wrench, and remove the 6 bolts.



24. REMOVE TRANSMISSION

(a) Remove the 10 bolts.

(b) Remove the transmission together with the torque converter clutch from the engine.



25. REMOVE DRIVE PLATE

Remove the 8 bolts, front spacer, drive plate and rear spacer.

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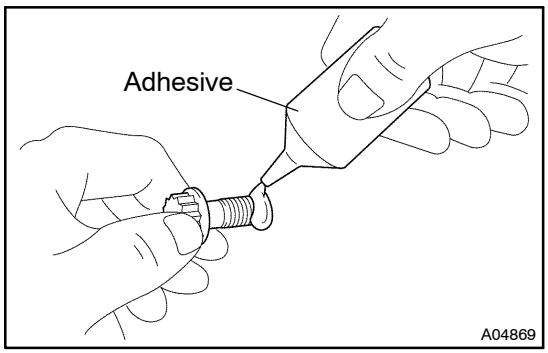
EM0LA–01

INSTALLATION

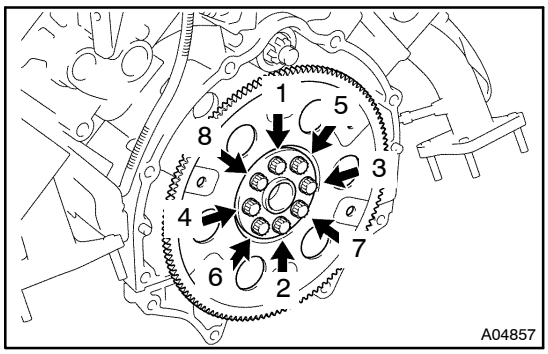
1. INSTALL DRIVE PLATE

HINT:

- The mounting bolts are tightened in 2 progressive steps (steps (c) and (e)).
- If any one of the mounting bolts is broken or deformed, replace it.

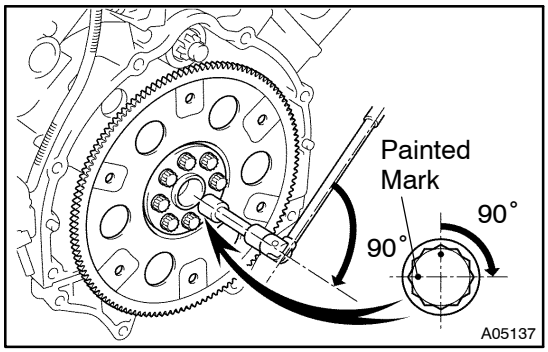


(a) Apply adhesive to 2 or 3 threads of the mounting bolt end.
Adhesive:
Part No. 08833–00070, THREE BOND 1324 or equivalent



(b) Install the front spacer, drive plate and rear spacer on the crankshaft.
(c) Install and uniformly tighten the 8 mounting bolts in several passes, in the sequence shown.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

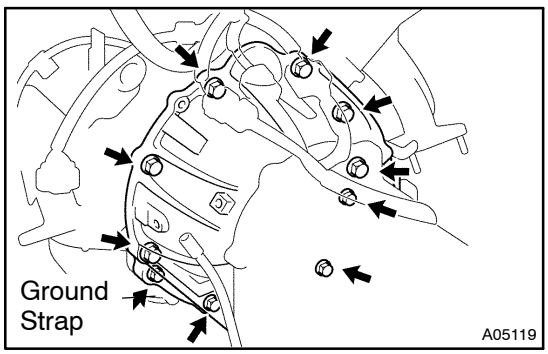
If any one of the mounting bolts does not meet the torque specification, replace the mounting bolt.



(d) Mark the mounting bolt with paint.
(e) Retighten the mounting bolts by 90° in the numerical order shown.
(f) Check that the painted mark is now at a 90° angle to (e).

2. INSTALL TRANSMISSION TO ENGINE

(a) Check the torque converter clutch installation.
(See page AT–31)
(b) Attach the transmission to the engine.
(c) Install the ground strap and 10 bolts.
Torque:
37 N·m (380 kgf·cm, 27 ft·lbf) for 14 mm head
72 N·m (730 kgf·cm, 53 ft·lbf) for 17 mm head



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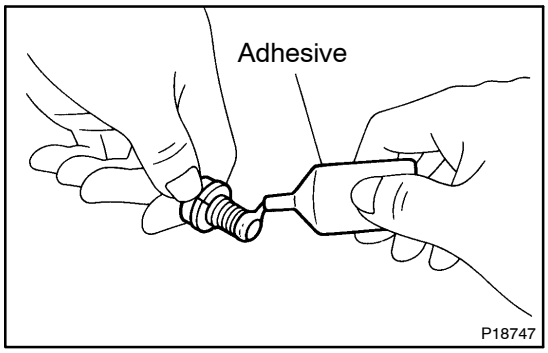
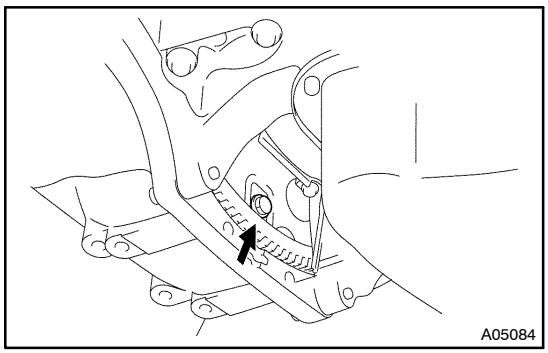


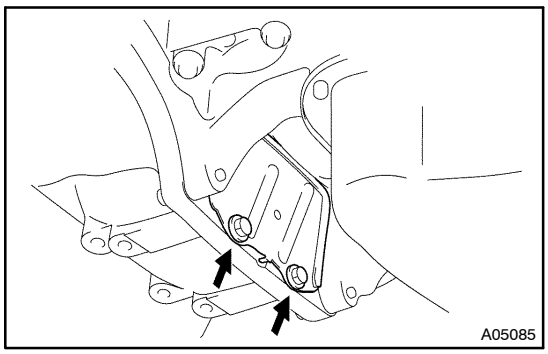
3. INSTALL TORQUE CONVERTER CLUTCH BOLTS

(a) Apply adhesive to 2 or 3 threads of the bolt end.
Adhesive:
Part No. 08833–00070, THREE BOND 1324 or equivalent



(b) Hold the crankshaft pulley bolt with a wrench, and install the 6 bolts evenly.
Torque: 48 N·m (490 kgf·cm, 35 ft·lbf)

HINT:
First install the black colored bolt, install the other bolts.



(c) Install the flywheel housing under cover with the 2 bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

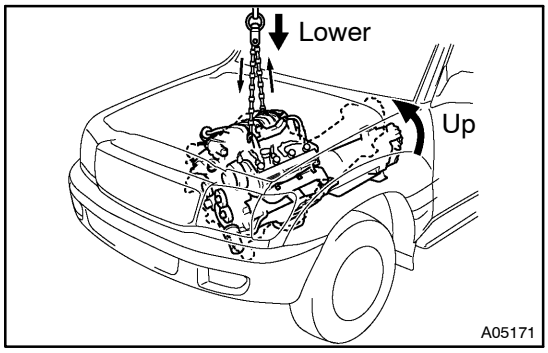
4. INSTALL OIL COOLER PIPE FOR TRANSMISSION

5. INSTALL OIL DIPSTICK GUIDE AND DIPSTICK FOR TRANSMISSION

(a) Install a new O–ring to the dipstick guide.
(b) Apply soapy water to the O–ring.
(c) Connect the dipstick guide end to the dipstick tube of the oil pan.
(d) Install the dipstick guide with the bolt.
(e) Install the dipstick.
(f) Connect the 2 breather hoses to the dipstick guide.

6. CONNECT ENGINE WIRE TO TRANSMISSION

(a) Connect the 5 connectors.
(b) Connect the 2 wire clamps.



7. INSTALL ENGINE AND TRANSMISSION ASSEMBLY IN VEHICLE

(a) Attach the engine chain hoist to the engine hangers.
(b) Slowly lower the engine and transmission assembly into the engine compartment.
(c) Attach the engine mounting brackets to the frame brackets.

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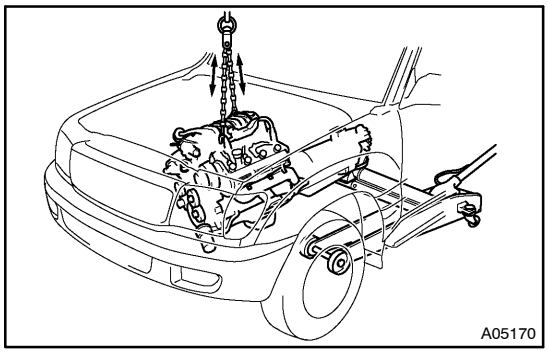
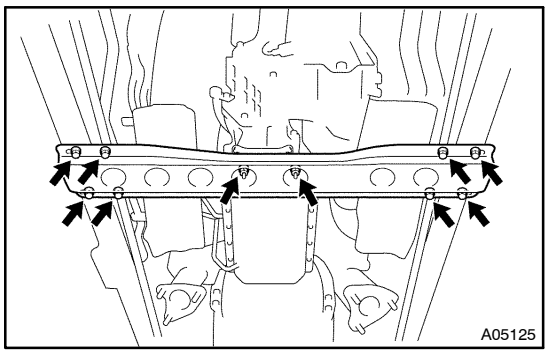
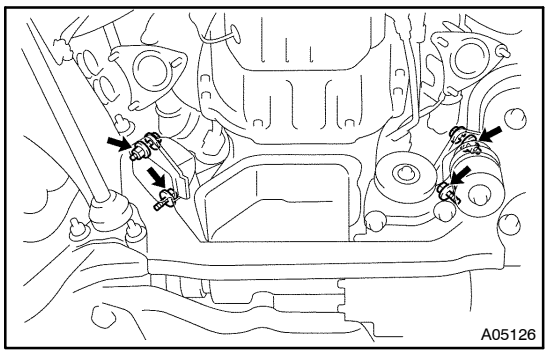


(d) Keep the engine level with a jack.



(e) Install the frame crossmember with the 8 bolts and 4 nuts.
Torque:
50 N·m (510 kgf·cm, 37 ft·lbf) for bolts
74 N·m (750 kgf·cm, 55 ft·lbf) for nuts

(f) Install the transfer case protector with the 3 bolts.

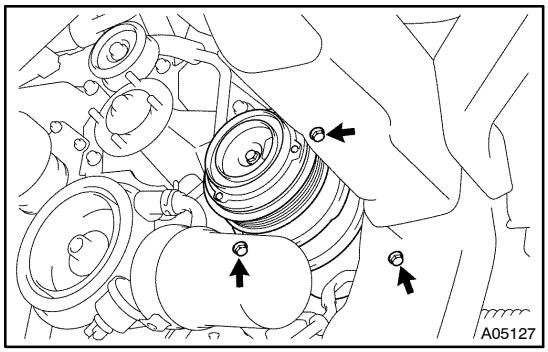


(g) Install the 2 nuts and 4 bolts holding the engine mounting brackets to the frame brackets.
Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)

(h) Remove the engine chain hoist.

8. INSTALL PS PUMP

Install the PS pump with the 3 bolts.
Torque: 17 N·m (175 kgf·cm, 13 ft·lbf)



9. INSTALL A/C COMPRESSOR

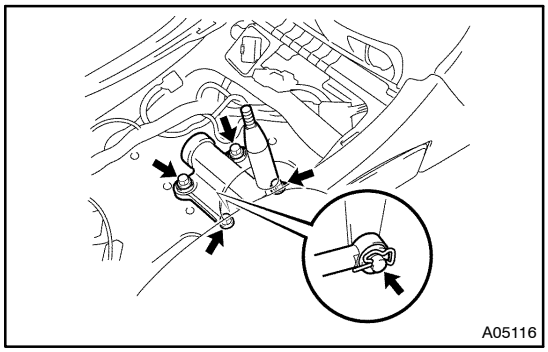
(a) Install the A/C compressor with the 3 bolts.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

(b) Connect the A/C compressor connector.

10. INSTALL STABILIZER BAR (See page SA–79)

11. INSTALL PROPELLER SHAFT (See page PR–7)

12. INSTALL FRONT EXHAUST PIPES



13. INSTALL SHIFT LEVER ASSEMBLY AND TRANSFER SHIFT LEVER ASSEMBLY

(a) Install the transfer shift lever.
(1) Install a new gasket and the shift lever with the 4 bolts.
(2) Connect the transfer shift lever rod to the shift lever with the bushing, wave washer, plate washer and clip.

(b) Install the transfer shift lever boot with the 4 bolts.

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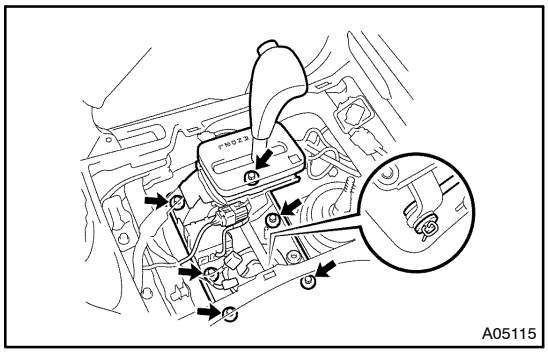

(c) Install the shift lever assembly.
  (1) Connect the transmission control rod to the shift lever assembly with the plate washer and clip.
  (2) Install the shift lever assembly with the 6 bolts.
  (3) Connect the connector.
(d) Install the console upper cover.
(e) Install the transfer shift lever knob.

14. CONNECT HOSES, WIRES, CONNECTORS, CLAMPS, GROMMET AND CABLES

- Accelerator cable to engine
- 2 PS air hoses to hose clamp on No.3 RH timing belt cover
- Generator wire
- Generator connector
- Hose clamp for PS air hose
- PS air hose to upper intake manifold
- 2 heater hoses
- Engine wire clamp to bracket on cowl panel
- Engine wire grommet to cowl panel
- Ground strap connector
- Fuel inlet hose and clamps
- Fuel return hose and clamp
- Air inlet hose to charcoal canister
- EVAP hose to charcoal canister
- Engine wire to clamp on right fender apron
- Clamp on battery negative (–) cable to relay box
- Battery negative (–) cable to right fender apron
- Battery positive (+) terminal cable

15. CONNECT ENGINE WIRE TO CABIN

(a) Connect the 3 wire harness connectors.
(b) Install the engine ECU with the 3 screws.
(c) Connect the 3 connectors to the engine ECU.
(d) Install these parts:
  (1) Glove compartment door
  (2) Lower No.2 panel

16. INSTALL FAN PULLEY, FAN, FLUID COUPLING AND GENERATOR DRIVE BELT

(a) Temporarily install the fan pulley, the fan and fluid coupling assembly with the 4 nuts.
(b) Install the generator drive belt. (See page CH–20)
(c) Tighten the 4 nuts holding the fluid coupling to the fan bracket.

17. INSTALL RADIATOR AND FAN SHROUD

(a) Place the fan shroud in the installation position.
(b) Install the radiator with the 2 support collars, 2 nuts and 2 bolts.
(c) Connect the 2 A/T oil cooler hoses to the radiator.
(d) Install the lower radiator hose.
(e) Attach the lower side of the fan shroud to the brackets of the radiator, and install the fan shroud with the 2 bolts.

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(f) Install the 2 brackets on the wire to the radiator with the 2 bolts.
(g) Install the 2 clamps on the A/C discharge tube to the brackets on the wire with the 2 nuts.
(h) Connect the upper radiator hose to the front water bypass joint.

18. INSTALL RADIATOR RESERVOIR

(a) Install the grommet to the reservoir.
(b) Attach the lower side of the reservoir to the fan shroud.
(c) Install the reservoir with the bolt.
(d) Connect the reservoir hose to the radiator.
(e) Install the clamp on the wire to the reservoir.

19. INSTALL AIR CLEANER CAP AND INTAKE AIR CONNECTOR PIPE ASSEMBLY

20. INSTALL BATTERY

21. FILL WITH ENGINE COOLANT (See page CO–2)

22. FILL WITH ENGINE OIL (See page LU–2)

23. START ENGINE AND CHECK FOR LEAKS

24. INSTALL V–BANK COVER

25. INSTALL ENGINE UNDER COVERS

26. INSTALL HOOD

27. PERFORM ROAD TEST

Check for abnormal noise, shock, slippage, correct shift points and smooth operation.

28. RECHECK ENGINE COOLANT AND OIL LEVELS

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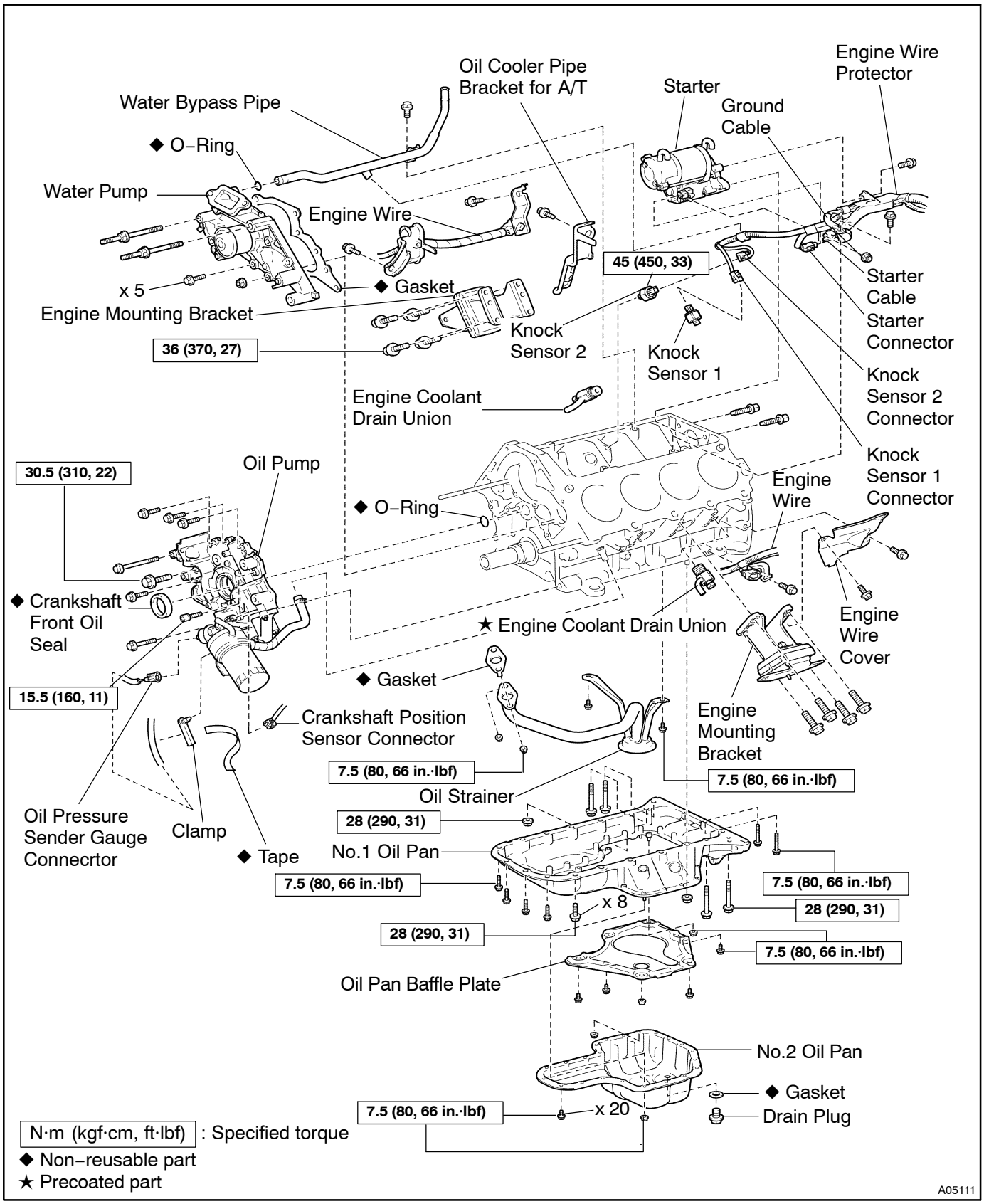
CYLINDER BLOCK

COMPONENTS

EM0E9–02



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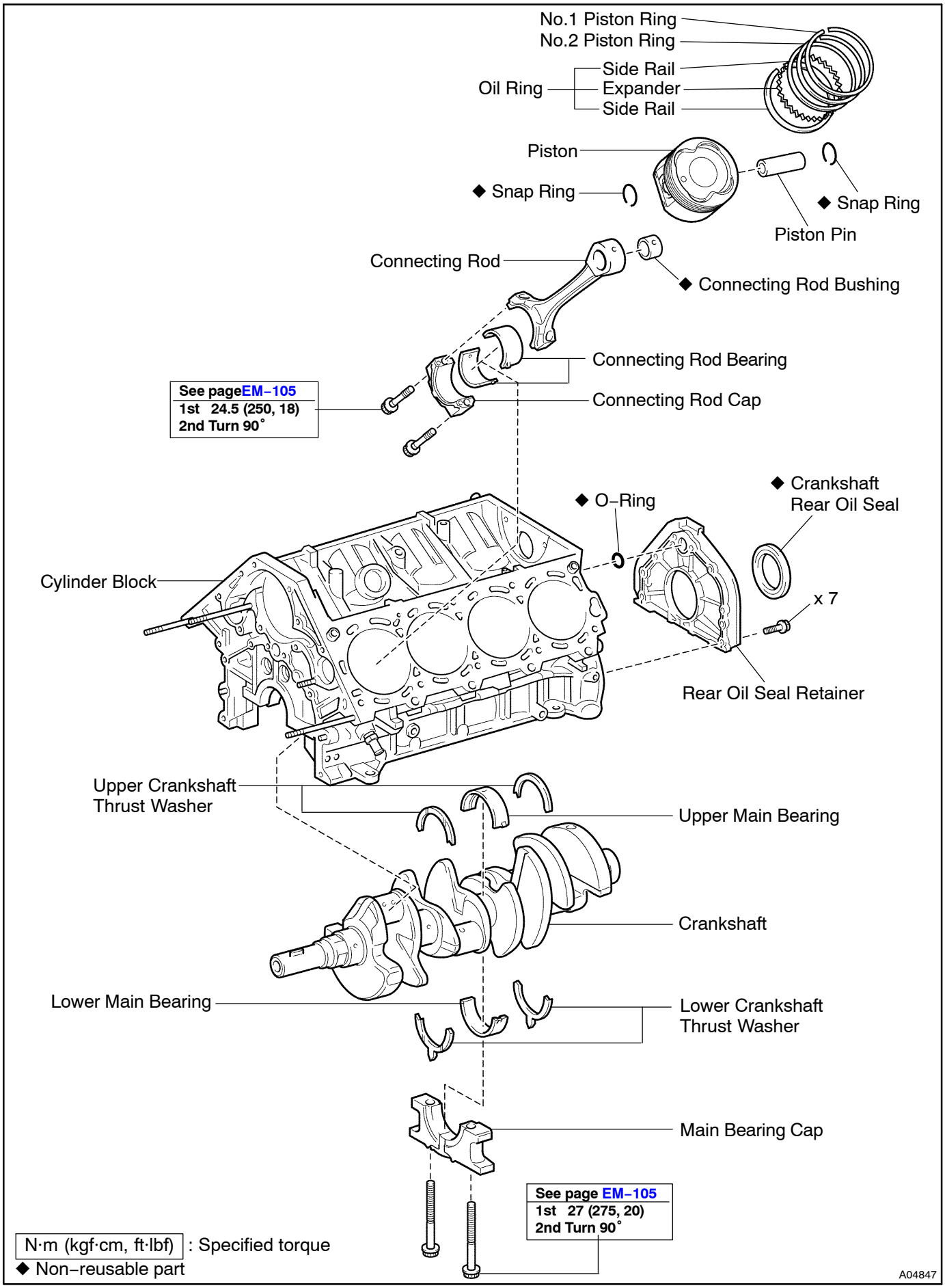

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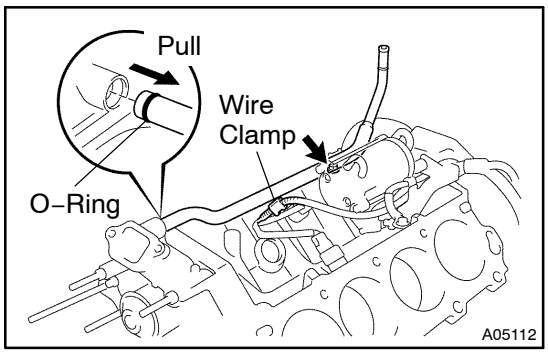
EM0L6–01

DISASSEMBLY

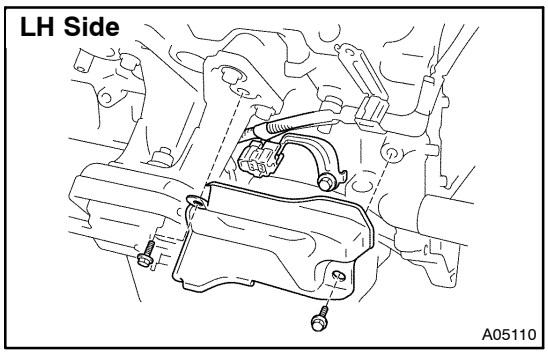
1. INSTALL ENGINE TO ENGINE STAND
2. REMOVE TIMING BELT AND PULLEYS (See page EM–15)
3. REMOVE CYLINDER HEAD (See page EM–34)



4. REMOVE WATER BYPASS PIPE

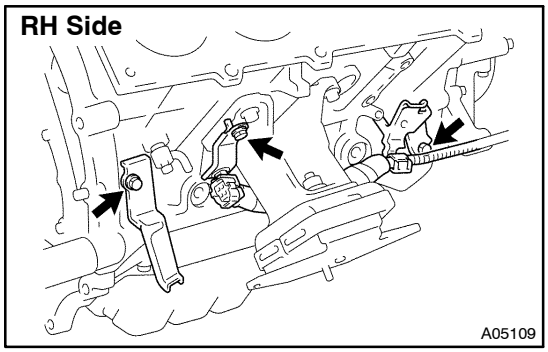
(a) Disconnect the wire clamp (for knock sensor 1, 2) from bracket of the water bypass pipe.
(b) Remove the bolt.
(c) Pull out the water bypass pipe from the water pump.
(d) Remove the O–ring from the water bypass pipe.

5. REMOVE STARTER (See page ST–5)
6. REMOVE KNOCK SENSORS (See page SF–56)



7. DISCONNECT ENGINE WIRE FROM LH SIDE OF CYLINDER BLOCK

(a) Remove the 2 bolts and engine wire cover from the LH side of the cylinder block.
(b) Remove the bolt, disconnect the bracket on the engine wire from the cylinder block.



8. DISCONNECT ENGINE WIRE FROM RH SIDE OF CYLINDER BLOCK

Remove the 2 bolts, and disconnect the 2 brackets on the engine wire from the cylinder block.

9. REMOVE OIL COOLER PIPE BRACKET FOR A/T

Remove the bolt and bracket.

10. REMOVE ENGINE MOUNTING BRACKETS

Remove the 4 bolts and mounting bracket. Remove the 2 mounting brackets

11. REMOVE WATER PUMP (See page CO–6)
12. REMOVE NO.2 OIL PAN (See page LU–8)
13. REMOVE OIL PAN BAFFLE PLATE
14. REMOVE NO.1 OIL PAN (See page LU–8)
15. REMOVE OIL STRAINER
16. REMOVE OIL PUMP (See page LU–8)
17. REMOVE ENGINE COOLANT DRAIN UNIONS

Remove the 2 drain unions.

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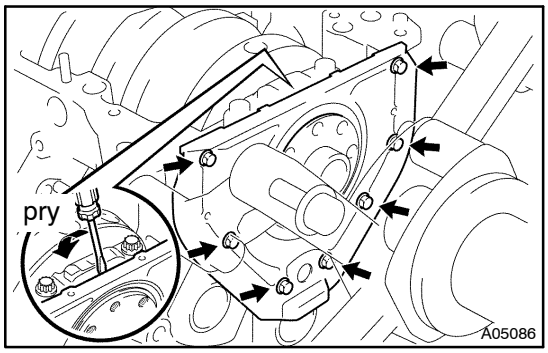
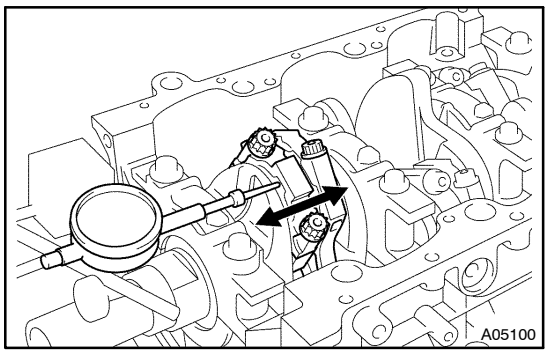


18. REMOVE REAR OIL SEAL RETAINER

(a) Remove the 7 bolts.

(b) Using a screwdriver, remove the oil seal retainer by prying the portions between the oil seal retainer and main bearing cap.

(c) Remove the O–ring.



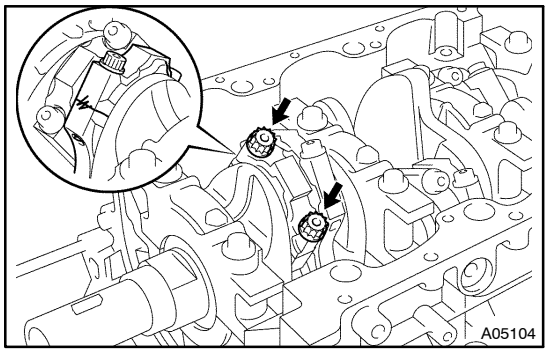
19. CHECK CONNECTING ROD THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while moving the connecting rod back an forth.

Standard thrust clearance:
0.160 – 0.290 mm (0.0063 – 0.0138 in.)
Maximum thrust clearance: 0.35 mm (0.0138 in.)

If the thrust clearance is greater than maximum, replace the connecting rod assembly(s). If necessary, replace the crankshaft.

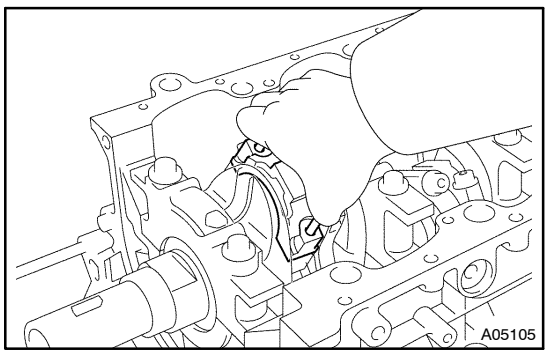
Connecting rod thickness:
22.880 – 22.920 mm (0.9008 – 0.9024 in.)



20. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE

(a) Check the matchmarks on the connecting rod and cap to ensure correct reassembly.

(b) Remove the 2 connecting rod cap bolts.



(c) Using the 2 removed connecting rod cap bolts, remove the connecting rod cap and 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.

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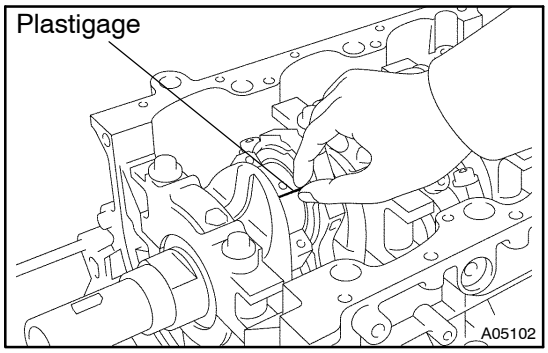
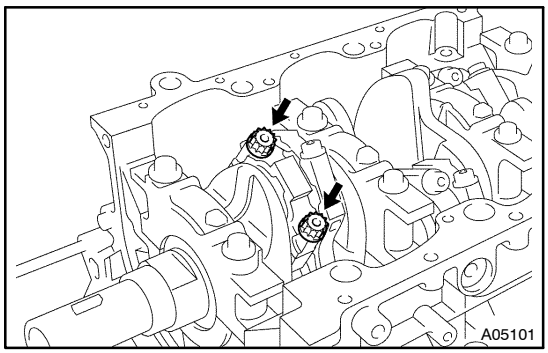


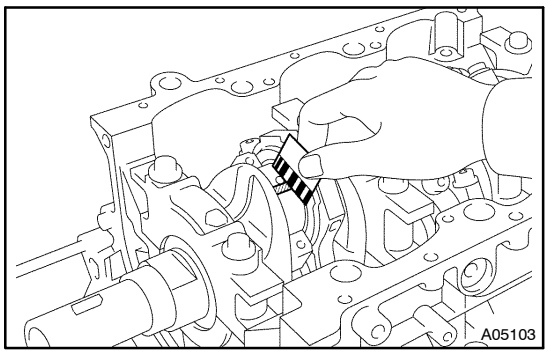
(f) Lay a strip of Plastigage across the crank pin.



(g) Install the connecting rod cap with the 2 bolts.
(See page EM–105)

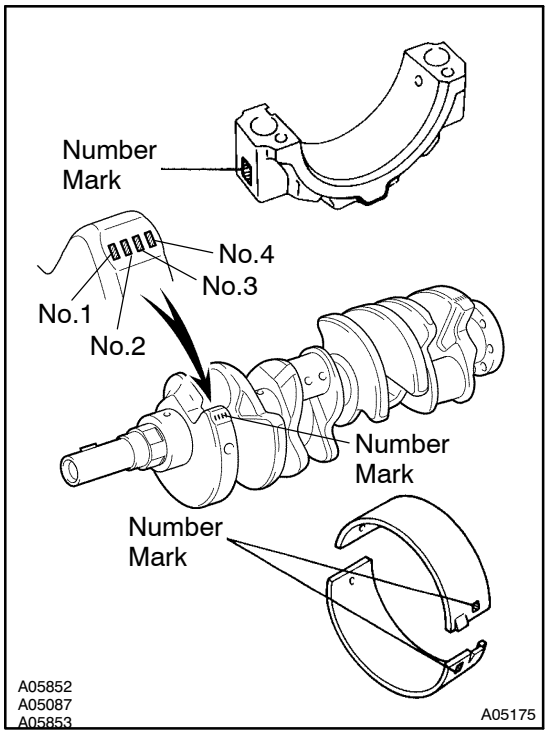
NOTICE:
Do not turn the crankshaft.

(h) Remove the 2 bolts, connecting rod cap and lower bearing. (See procedure (b) and (c) above)



(i) Measure the Plastigage at its widest point.
Standard oil clearance:
0.027 – 0.053 mm (0.0011 – 0.0021 in.)
Maximum oil clearance: 0.065 mm (0.0026 in.)

If the oil clearance is greater than maximum, replace the bearings. If necessary, replace the crankshaft.



HINT:
If using a standard 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 connecting rod cap and crankshaft, then selecting the bearing with the same number as the total. There are 6 sizes of standard bearings, marked ”2”, ”3”, ”4”, ”5”, ”6” and ”7”.

	Number mark											
Connecting rod cap	1	1	2	1	2	3	2	3	4	3	4	4
Crankshaft	1	2	1	3	2	1	3	2	1	3	2	3
Use bearing	2	3		4			5			6		7

EXAMPLE:
Connecting rod cap ”3” + Crankshaft ”1”
= Total number 4 (Use bearing ”4”)

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Reference

Connecting rod big end inside diameter:

Mark "1"	55.000 – 55.006 mm (2.1654 – 2.1656 in.)
Mark "2"	55.006 – 55.012 mm (2.1656 – 2.1658 in.)
Mark "3"	55.012 – 55.018 mm (2.1658 – 2.1661 in.)
Mark "4"	55.018 – 55.024 mm (2.1661 – 2.1663 in.)

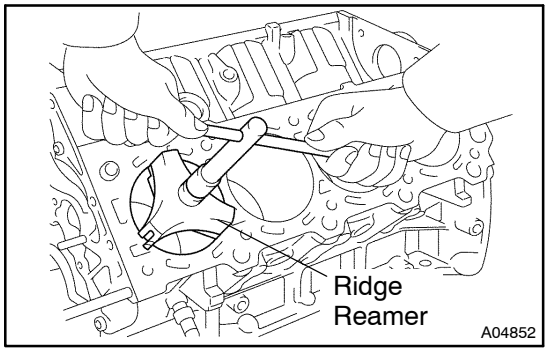
Crankshaft crank pin diameter:

Mark "1"	51.994 – 52.000 mm (2.0470 – 2.0472 in.)
Mark "2"	51.988 – 51.994 mm (2.0468 – 2.0470 in.)
Mark "3"	51.982 – 51.988 mm (2.0465 – 2.0468 in.)

Standard sized bearing center wall thickness:

Mark "2"	1.484 – 1.487 mm (0.0584 – 0.0585 in.)
Mark "3"	1.487 – 1.490 mm (0.0585 – 0.0587 in.)
Mark "4"	1.490 – 1.493 mm (0.0587 – 0.0588 in.)
Mark "5"	1.493 – 1.496 mm (0.0588 – 0.0589 in.)
Mark "6"	1.496 – 1.499 mm (0.0589 – 0.0590 in.)
Mark "7"	1.499 – 1.502 mm (0.0590 – 0.0591 in.)

(a) Completely remove the Plastigage.



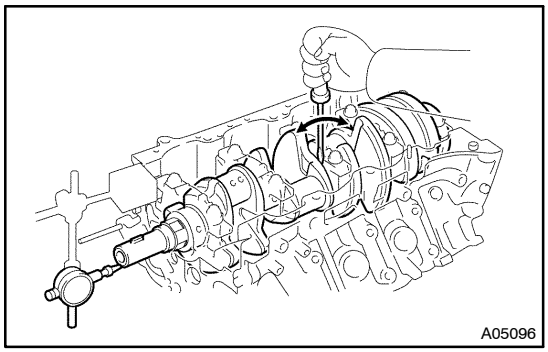
21. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES

(a) Using a ridge reamer, remove all the carbon from the top of the cylinder.

(b) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.

HINT:

- Keep the bearings, connecting rod and cap together.
- Arrange the piston and connecting rod assemblies in correct order.



22. CHECK CRANKSHAFT THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance:

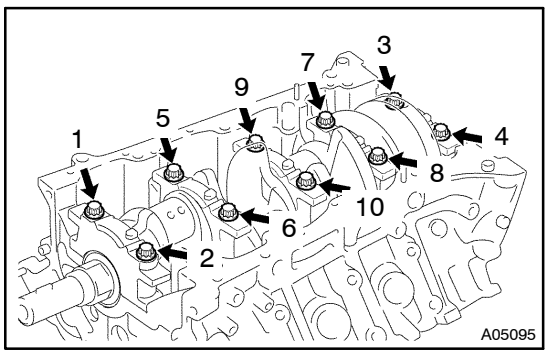
0.020 – 0.220 mm (0.0008 – 0.0087 in.)

Maximum thrust clearance: 0.30 mm (0.0118 in.)

If the thrust clearance is greater than maximum, replace the thrust washers as a set.

Thrust washer thickness:

2.440 – 2.490 mm (0.0961 – 0.0980 in.)



23. REMOVE MAIN BEARING CAPS AND CHECK OIL CLEARANCE

(a) Uniformly loosen and remove the 10 main bearing cap bolts in several passes, in the sequence shown.

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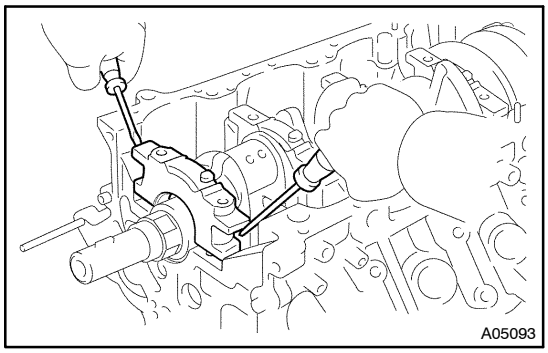


(b) Using 2 screwdrivers, pry out the main bearing cap, and remove the 5 main bearing caps, 5 lower bearings and 2 lower thrust washers (No.3 main bearing cap only).

NOTICE:

Be careful not to damage the cylinder block.

HINT:

- Keep the lower bearing and main bearing cap together.
- Arrange the main bearing caps and lower thrust washers in correct order.

(c) Lift out the crankshaft.

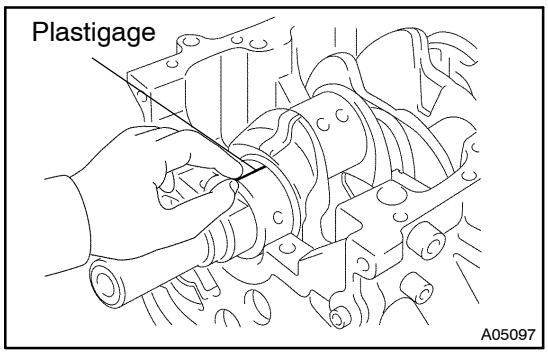
HINT:

Keep the upper bearings and upper thrust washers together with the cylinder block.

(d) Clean each main journal and bearing.

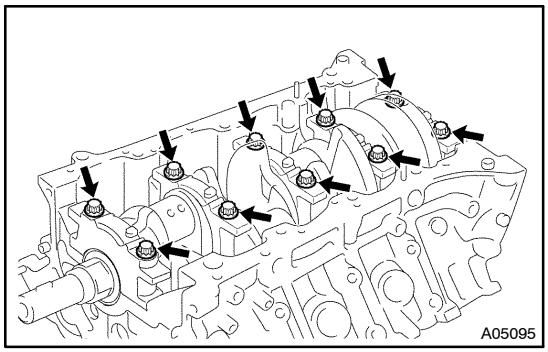
(e) Check each main journal and bearing for pitting and scratches.

If the journal or bearing is damaged, replace the bearings. If necessary, replace the crankshaft.



(f) Place the crankshaft on the cylinder block.

(g) Lay a strip of Plastigage across each journal.

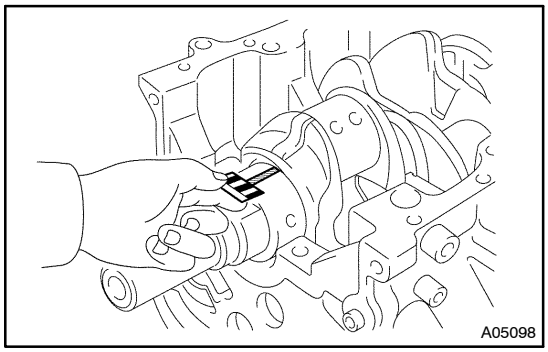


(h) Install the main bearing caps.
(See page EM–105)

NOTICE:

Do not turn the crankshaft.

(i) Remove the main bearing caps.
(See procedure (a) and (b) above)



(j) Measure the Plastigage at its widest point.
Standard clearance:
0.040 – 0.058 mm (0.0016 – 0.0023 in.)
Maximum clearance: 0.070 mm (0.0028 in.)

If the oil clearance is greater than maximum, replace the bearings. If necessary, replace the crankshaft.

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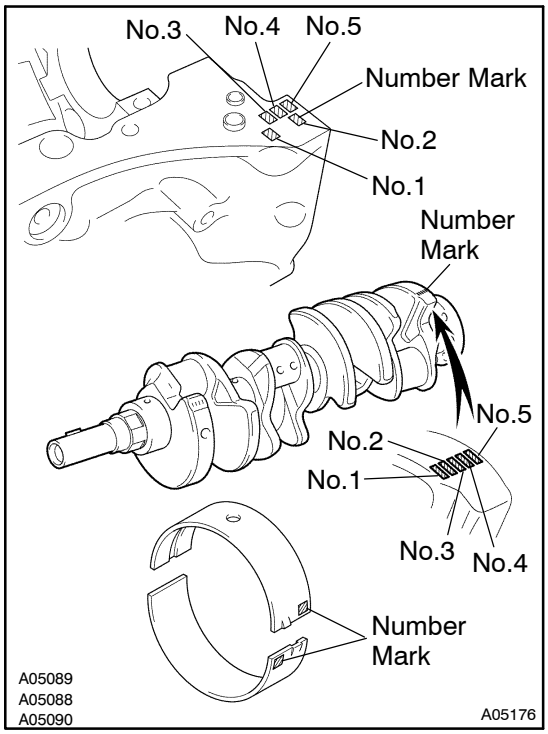

HINT:
If using a standard bearing, replace it with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the cylinder block and crankshaft, then refer to the table below for the appropriate bearing number. There are 5 sizes of the standard bearings. For No.1 and No.5 position bearings, use bearings marked ”3”, ”4”, ”5”, ”6” and ”7”. For others position bearings, use bearings marked ”1”, ”2”, ”3”, ”4” and ”5”.

No.1, No.5:

		Use bearing
Cylinder block (A) + Crankshaft (B)	0 – 5	3
	6 – 11	4
	12 – 17	5
	18 – 23	6
	24 – 28	7

EXAMPLE:
Cylinder block ”08” + Crankshaft ”06”
= Total number 14 (Use bearing ”5”)

Others:

		Use bearing
Cylinder block (A) + Crankshaft (B)	0 – 5	1
	6 – 11	2
	12 – 17	3
	18 – 23	4
	24 – 28	5

EXAMPLE:
Cylinder block ”08” + Crankshaft ”06”
= Total number 14 (Use bearing ”3”)

Reference
Cylinder block main journal bore diameter (A):

Mark ”00”	72.000 mm (2.8346 in.)
Mark ”01”	72.001 mm (2.8347 in.)
Mark ”02”	72.002 mm (2.8347 in.)
Mark ”03”	72.003 mm (2.8348 in.)
Mark ”04”	72.004 mm (2.8348 in.)
Mark ”05”	72.005 mm (2.8348 in.)
Mark ”06”	72.006 mm (2.8349 in.)
Mark ”07”	72.007 mm (2.8349 in.)
Mark ”08”	72.008 mm (2.8350 in.)
Mark ”09”	72.009 mm (2.8350 in.)
Mark ”10”	72.010 mm (2.8350 in.)
Mark ”11”	72.011 mm (2.8351 in.)
Mark ”12”	72.012 mm (2.8351 in.)
Mark ”13”	72.013 mm (2.8352 in.)
Mark ”14”	72.014 mm (2.8352 in.)

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Mark ”15”	72.015 mm (2.8352 in.)
Mark ”16”	72.016 mm (2.8353 in.)

Crankshaft main journal diameter (B):

Mark ”00”	67.000 mm (2.6378 in.)
Mark ”01”	66.999 mm (2.6378 in.)
Mark ”02”	66.998 mm (2.6377 in.)
Mark ”03”	66.997 mm (2.6377 in.)
Mark ”04”	66.996 mm (2.6376 in.)
Mark ”05”	66.995 mm (2.6376 in.)
Mark ”06”	66.994 mm (2.6376 in.)
Mark ”07”	66.993 mm (2.6375 in.)
Mark ”08”	66.992 mm (2.6375 in.)
Mark ”09”	66.991 mm (2.6374 in.)
Mark ”10”	66.990 mm (2.6374 in.)
Mark ”11”	66.989 mm (2.6374 in.)
Mark ”12”	66.988 mm (2.6373 in.)

Standard bearing center wall thickness:
No.1 and No.5

Mark ”3”	2.481 – 2.484 mm (0.0977 – 0.0978 in.)
Mark ”4”	2.484 – 2.487 mm (0.0978 – 0.0979 in.)
Mark ”5”	2.487 – 2.490 mm (0.0979 – 0.0980 in.)
Mark ”6”	2.490 – 2.493 mm (0.0980 – 0.0981 in.)
Mark ”7”	2.493 – 2.496 mm (0.0981 – 0.0983 in.)

Others:

Mark ”1”	2.481 – 2.484 mm (0.0977 – 0.0978 in.)
Mark ”2”	2.484 – 2.487 mm (0.0978 – 0.0979 in.)
Mark ”3”	2.487 – 2.490 mm (0.0979 – 0.0980 in.)
Mark ”4”	2.490 – 2.493 mm (0.0980 – 0.0981 in.)
Mark ”5”	2.493 – 2.496 mm (0.0981 – 0.0983 in.)

(k) Completely remove the Plastigage.

24. REMOVE CRANKSHAFT

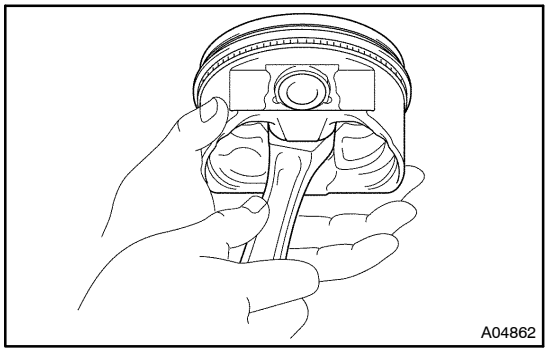
(a) Lift up the crankshaft.

(b) Remove the 5 upper main bearings and 2 upper thrust washers from the cylinder block.

HINT:
Arrange the main bearing caps, bearings and thrust washers in correct order.

25. CHECK FIT BETWEEN PISTON AND PISTON PIN

Try to move the piston back and forth on the piston pin.
If any movement is felt, replace the piston and pin as a set.



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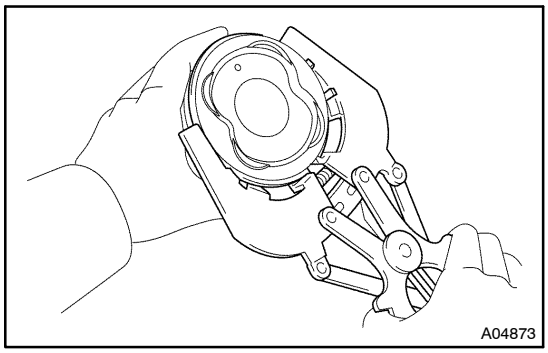


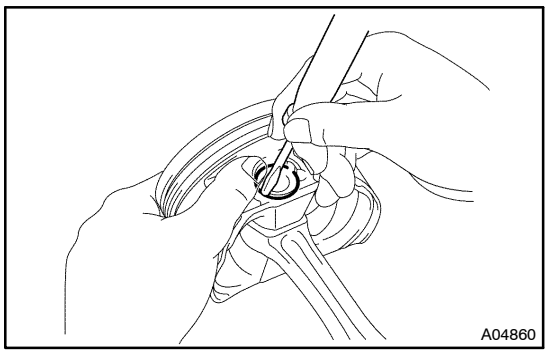
26. REMOVE PISTON RINGS

(a) Using a piston ring expander, remove the 2 compression rings.

(b) Remove the 2 side rails and oil ring by hand.

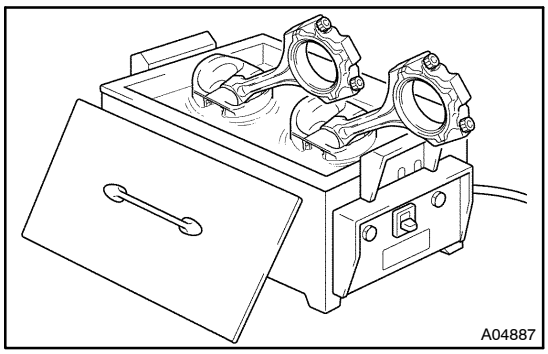
HINT:

Arrange the piston rings in correct order only.

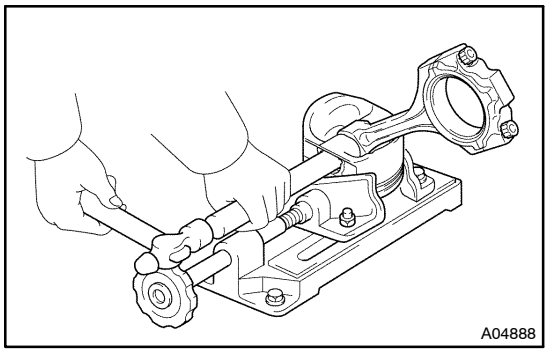


27. DISCONNECT CONNECTING ROD FROM PISTON

(a) Using a small screwdriver, pry out the 2 snap rings.



(b) Gradually heat the piston to approx. 60°C (140°F).



(c) Using a plastic–faced hammer and brass bar, lightly tap out the piston pin and 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 correct order.

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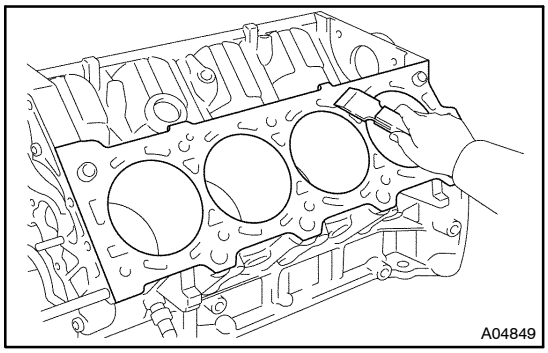
EM0EB–02

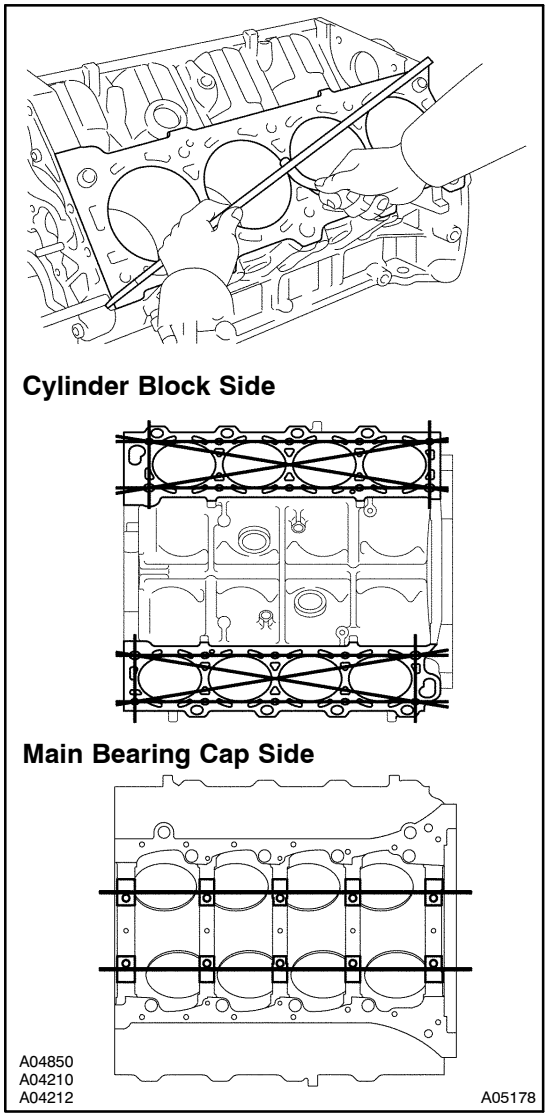
INSPECTION



1. CLEAN CYLINDER BLOCK

(a) Using a gasket scraper, remove all the gasket material from the top surface of the cylinder block.

(b) Using a soft brush and solvent, thoroughly clean the cylinder block.



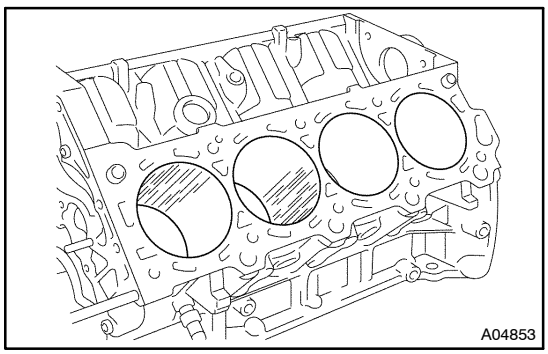
2. INSPECT CYLINDER BLOCK

(a) Inspect for flatness.

Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder head and main bearing cap for warpage.

Maximum warpage: 0.07 mm (0.0028 in.)

If warpage is greater than maximum, replace the cylinder block.



(b) Visually check the cylinder for vertical scratches.

If deep scratches are present, rebore all the 8 cylinders and replace all the 8 pistons. (See page EM–102) If necessary, replace the cylinder block.

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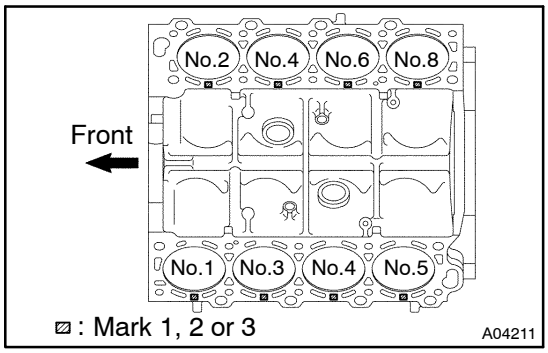
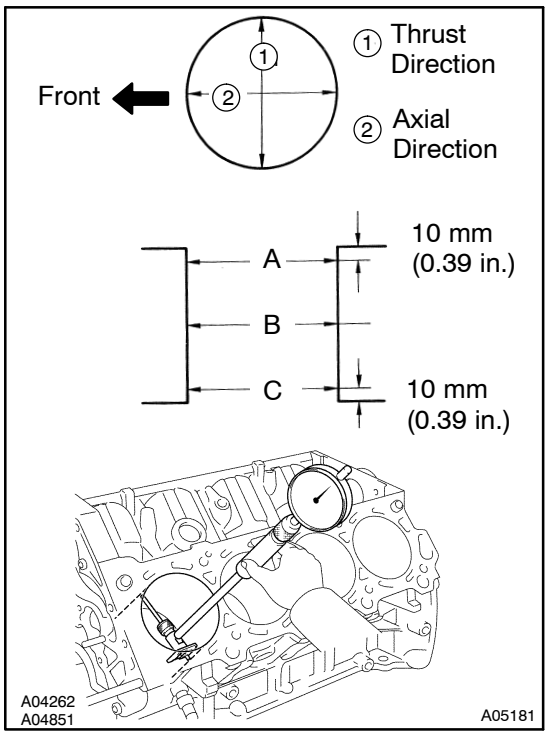


(c) Inspect the cylinder bore diameter.

HINT:

There are 3 sizes of the standard cylinder bore diameter, marked "1", "2" and "3" accordingly. The mark is stamped on the top of the cylinder block.



Using a cylinder gauge, measure the cylinder bore diameter at positions A, B and C in the thrust and axial directions.

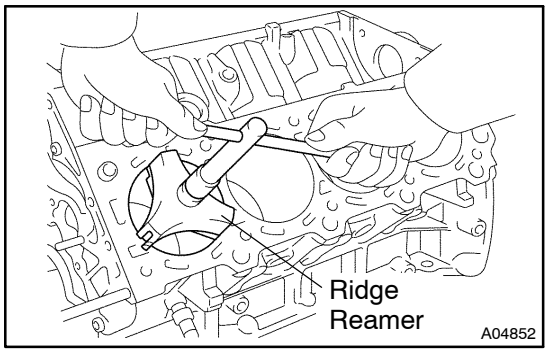
Standard diameter:

STD	Mark "1"	94.002 – 94.010 mm (3.7009 – 3.7012 in.)
	Mark "2"	94.010 – 94.023 mm (3.7012 – 3.7017 in.)
	Mark "3"	94.023 – 94.031 mm (3.7017 – 3.7020 in.)

Maximum diameter: 94.23 mm (3.7098 in.)

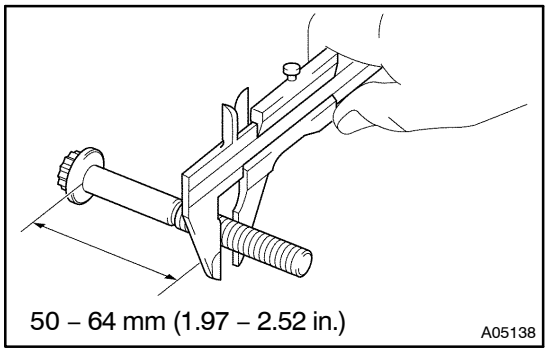
STD	94.231 mm (3.7099 in.)
O/S 0.50	94.731 mm (3.7296 in.)

If the diameter is greater than maximum, rebore all the 8 cylinders and replace all the 8 pistons. (See page EM–102) If necessary, replace the cylinder block.



(d) Remove the cylinder ridge.

If the wear is less than 0.2 mm (0.008 in.), using a ridge reamer, grind the top of the cylinder.



(e) Using vernier calipers, measure the thread outside diameter of the main bearing cap bolt.

Standard diameter:

10.760 – 10.970 mm (0.4236 – 0.4319 in.)

Minimum diameter: 10.40 mm (0.4094 in.)

If the diameter is less than minimum, replace the cap bolt.

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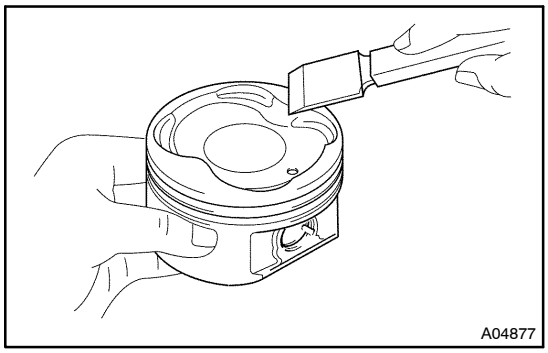
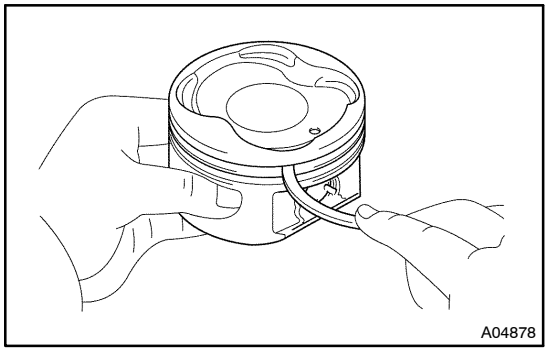
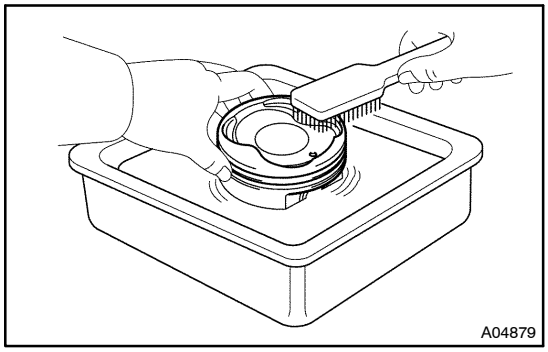


3. CLEAN PISTON

(a) Using a gasket scraper, remove the carbon from the piston top.



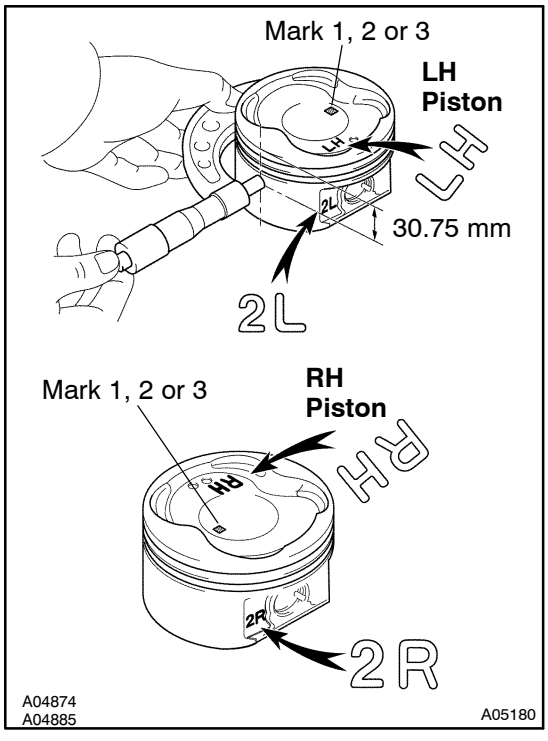
(b) Using a groove cleaning tool or broken ring, clean the piston ring grooves.



(c) Using solvent and a brush, thoroughly clean the piston.

NOTICE:

Do not use a wire brush.



4. INSPECT PISTON AND CONNECTING ROD

(a) Inspect the piston oil clearance.

HINT:

There are 3 sizes of the standard piston diameter, marked "1", "2" and "3" accordingly. The mark is stamped on the piston top.

(1) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 30.75 mm (1.2106 in.) from the piston head.

Piston diameter:

STD	Mark "1"	93.902 – 93.912 mm (3.6969 – 3.6973 in.)
	Mark "2"	93.912 – 93.920 mm (3.6973 – 3.6976 in.)
	Mark "3"	93.920 – 93.930 mm (3.6976 – 3.6980 in.)
O/S 0.50		94.402 – 94.430 mm (3.7166 – 3.7177 in.)

(2) Measure the cylinder bore diameter in the thrust directions. (See step 2 above)

(3) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

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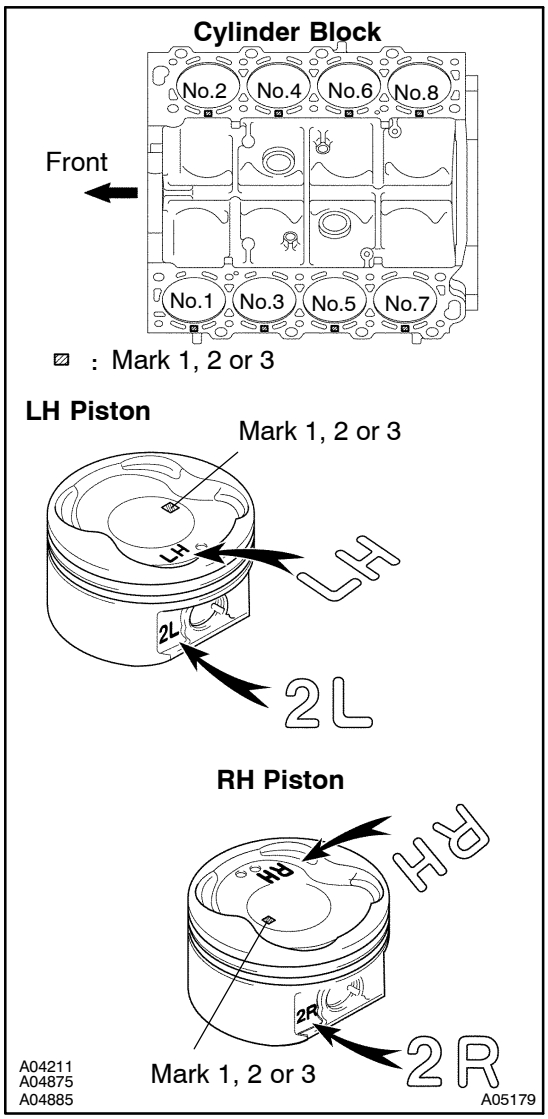
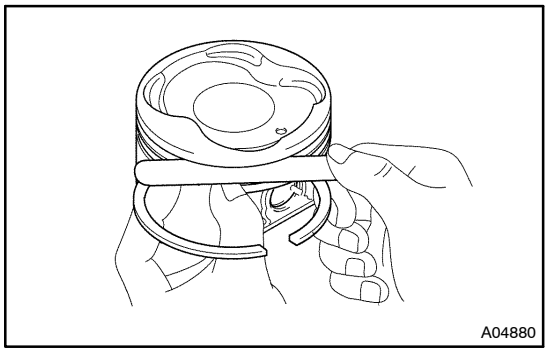
Standard oil clearance:
0.090 – 0.111 mm (0.0035 – 0.0044 in.)
Maximum oil clearance: 0.13 mm (0.0051 in.)

If the oil clearance is greater than maximum, replace all the 8 pistons and rebore all the 8 cylinders. (See page EM–102) If necessary, replace the cylinder block.



HINT
Use new cylinder block:

- Use a piston with the same number mark as the cylinder diameter marked on the cylinder block.
- The shape of the piston varies for the LH and RH banks. The LH piston is marked with ”LH” and ”2L”, the RH piston with ”RH” and ”2R”.



(b) Inspect the piston ring groove clearance.
Using a feeler gauge, measure the clearance between new piston ring and the wall of the ring groove.
Ring groove clearance:

No.1	0.030 – 0.080 mm (0.0012 – 0.0031 in.)
No.2	0.030 – 0.070 mm (0.0012 – 0.0028 in.)

If the clearance is not as specified, replace the piston.

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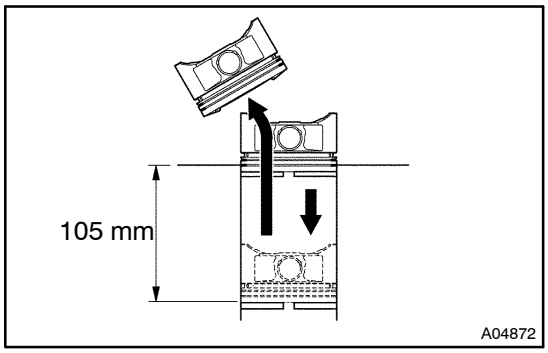
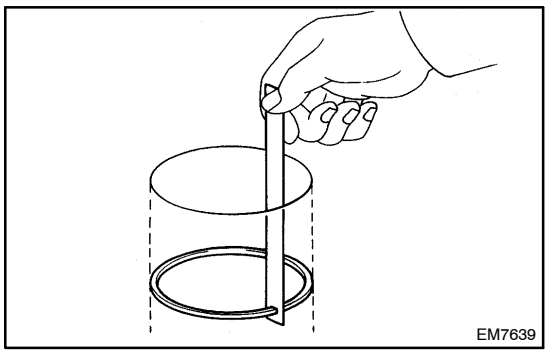


(c) Inspect the piston ring end gap.
(1) Insert the piston ring into the cylinder bore.
(2) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 105 mm (4.13 in.) from the top of the cylinder block.



(3) Using a feeler gauge, measure the end gap.

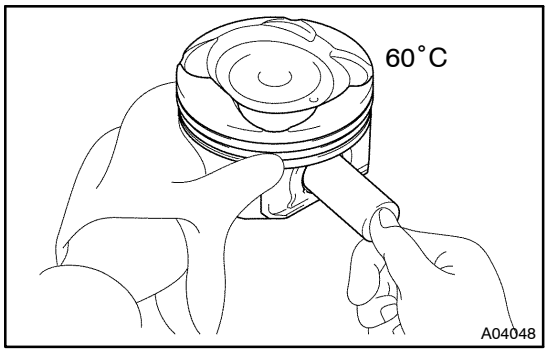
Standard end gap:

No.1	0.300 – 0.500 mm (0.0118 – 0.0197 in.)
No.2	0.400 – 0.650 mm (0.0157 – 0.0256 in.)
Oil (Side rail)	0.130 – 0.480 mm (0.0051 – 0.0189 in.)

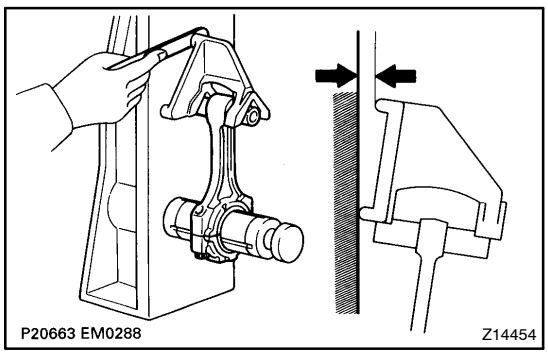
Maximum end gap:

No.1	1.10 mm (0.0433 in.)
No.2	1.20 mm (0.0472 in.)
Oil (Side rail)	1.15 mm (0.0453 in.)

If the end gap is greater than maximum, replace the piston ring.
If the end gap is greater than maximum, even with a new piston ring, rebore all the 8 cylinders (See page EM–102) or replace the cylinder block.



(d) Inspect the piston pin fit.
At 60˚C (140˚F), you should be able to push the piston pin into the piston pin hole with your thumb.



(e) Using a rod aligner and feeler gauge, check the connecting rod alignment.
(1) Check for bend.

Maximum bend:

0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

If bend is greater than maximum, replace the connecting rod assembly.

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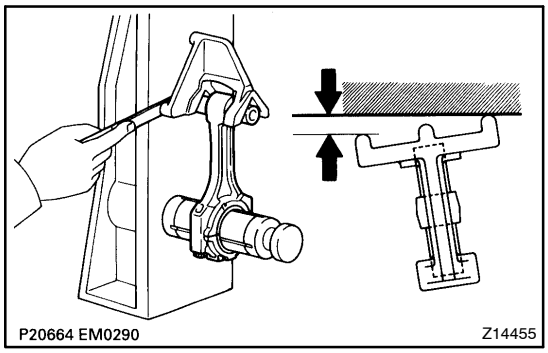
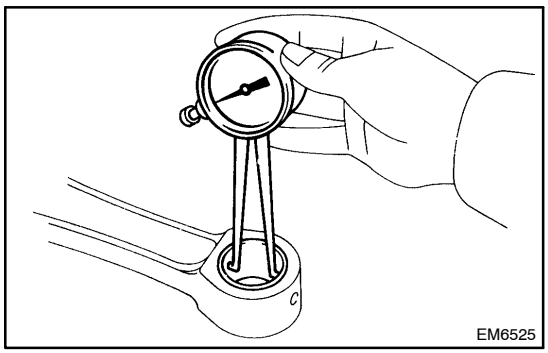


(2) Check for twist

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.

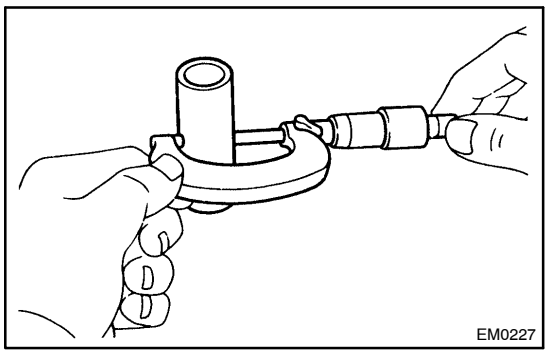


(f) Inspect the piston pin oil clearance.

(1) Using a caliper gauge, measure the inside diameter of the connecting rod bushing.

Bushing inside diameter:

22.005 – 22.014 mm (0.8663 – 0.8667 in.)



(2) Using a micrometer, measure the piston pin diameter.

Piston pin diameter:

21.997 – 22.006 mm (0.8660 – 0.8664 in.)

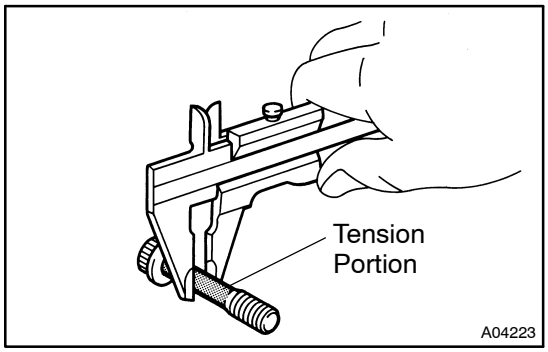
(3) Subtract the piston pin diameter measurement from the bushing inside diameter measurement.

Standard oil clearance:

0.005 – 0.011 mm (0.0002 – 0.0004 in.)

Maximum oil clearance: 0.05 mm (0.0020 in.)

If the oil clearance is greater than maximum, replace the bushing. If necessary, replace the piston and piston pin as a set.



(g) Using vernier calipers, measure the tension portion of the connecting rod bolt.

Standard diameter:

7.200 – 7.300 mm (0.2835 – 0.2874 in.)

Minimum diameter: 7.00 mm (0.2756 in.)

If the diameter is less than minimum, replace the bolt.

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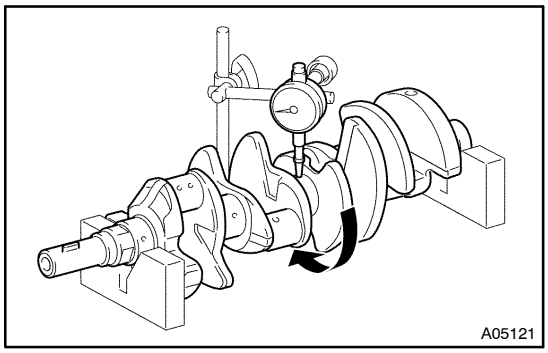


5. INSPECT CRANKSHAFT

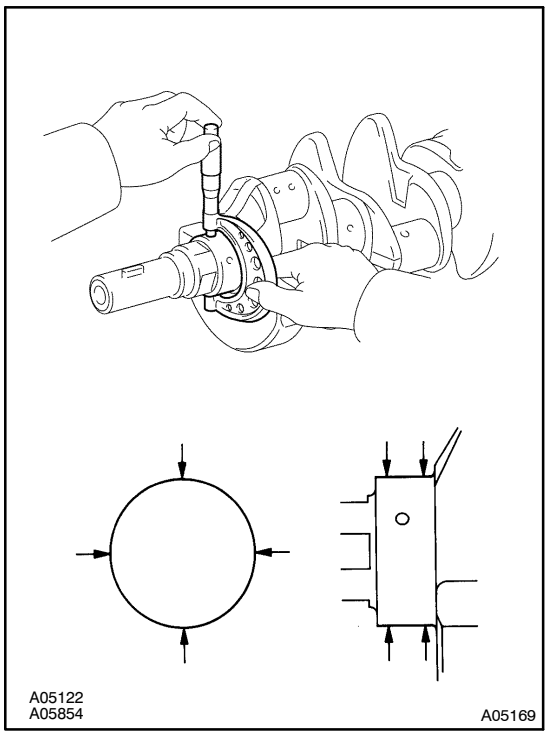
(a) Inspect for circle runout.

(1) Place the crankshaft on V–blocks.

(2) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout: 0.08 mm (0.0031 in.)

If the circle runout is greater than maximum, replace the crankshaft.



(b) Inspect the main journals and crank pins.

(1) Using a micrometer, measure the diameter of each main journal and crank pin.

Main journal diameter:

66.988 – 67.000 mm (2.6373 – 2.6378 in.)

Crank pin diameter:

51.982 – 52.000 mm (2.0465 – 2.0472 in.)

If the diameter is not as specified, check the oil clearance (See page EM–87). If necessary, replace the crankshaft.

(2) Check each main journal and crank pin for taper and out–of–round as shown.

Maximum taper and out–of–round:

0.02 mm (0.0008 in.)

If the taper and out–of–round is greater than maximum, replace the crankshaft.

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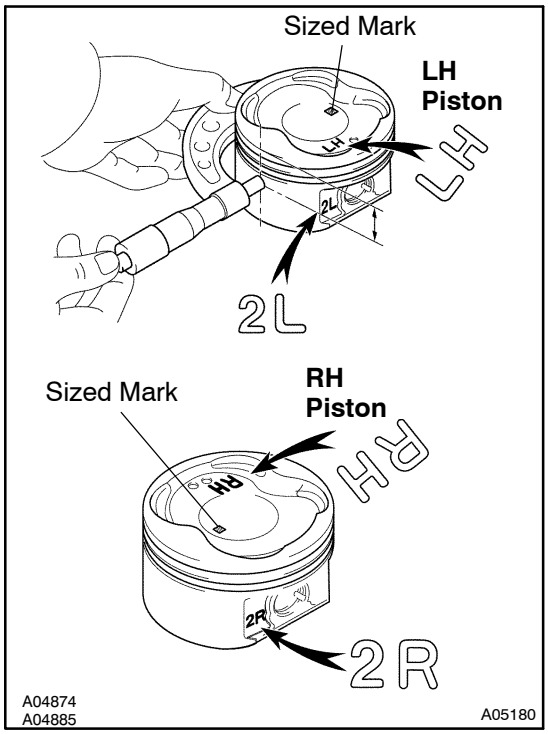
EM0L7–01

REPLACEMENT



1. REPLACE OVERSIZED (O/S) PISTONS FOR CYLINDER BORING

HINT:

- Bore all the 8 cylinders to the oversized piston outside diameter.
- Replace all the piston rings with ones to match the oversized pistons.

(a) Keep 8 new O/S pistons.
O/S 0.50 piston diameter:
94.402 – 94.430 mm (3.7166 – 3.7177 in.)

HINT:

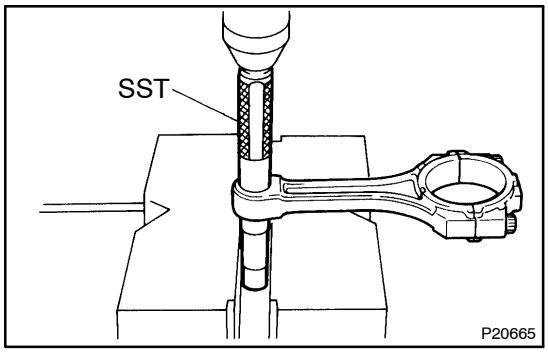
The shape of the piston varies for the LH and RH banks. The LH piston is marked with ”LH” and ”2L”, the RH piston with ”RH” and ”2R”.

(b) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 30.75 mm (1.2106 in.) from the piston head.

(c) Calculate the amount each cylinder is to be rebored as follows:
Size to be rebored = P + C – H
P = Piston diameter
C = Piston clearance:
0.090 – 0.111 mm (0.0035 – 0.0044 in.)
H = Allowance for honing: 0.02 mm (0.0008 in.) or less

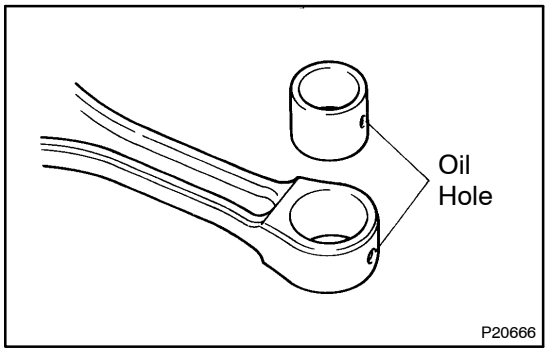
(d) Bore and hone the cylinders to calculated dimensions.
Maximum honing: 0.02 mm (0.0008 in.)

NOTICE:
Excess honing will destroy the finished roundness.



2. REPLACE CONNECTING ROD BUSHINGS

(a) Using SST and a press, press out the bushing.
SST 09222–30010



(b) Align the oil holes of a new bushing and the connecting rod.

(c) Using SST and a press, press in the bushing.
SST 09222–30010

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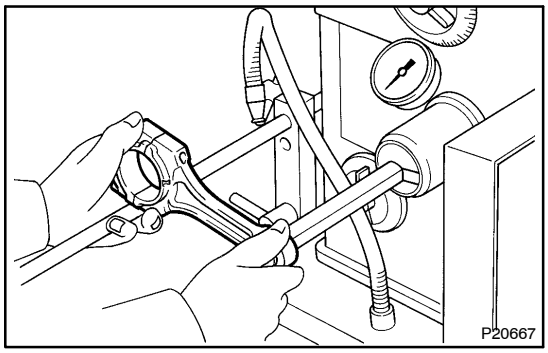
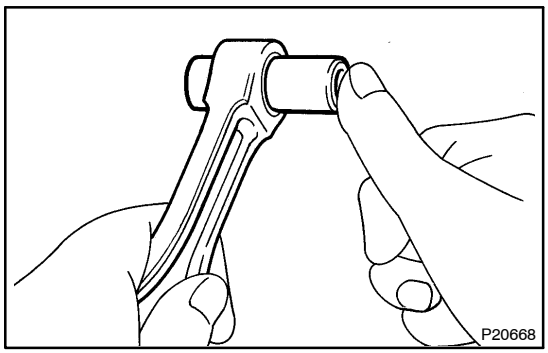
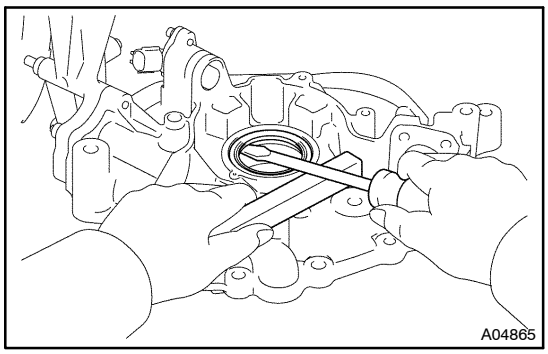


(d) Using a pin hole grinder, hone the bushing to obtain the standard specified clearance (See page EM–95) between the bushing and piston pin.



(e) Check the piston pin fit at normal room temperature. Coat the piston pin with engine oil, and push it into the connecting rod with your thumb.



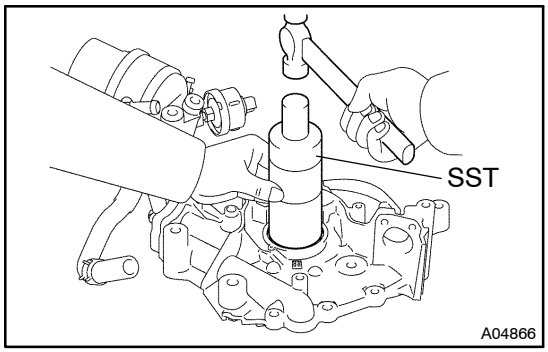
3. REPLACE CRANKSHAFT FRONT OIL SEAL

HINT:

There are 2 methods ((a) and (b)) to replace the oil seal.

(a) If the oil pump is removed from the cylinder block:

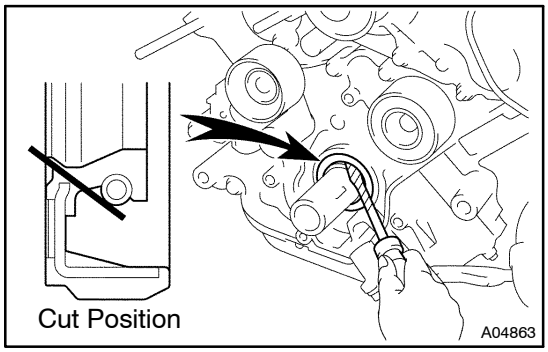
(1) Using a screwdriver, pry out the oil seal.



(2) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump body edge.

SST 09316–60011 (09316–00011)

(3) Apply MP grease to the oil seal lip.



(b) If the oil pump is installed to the cylinder block:

(1) Using a knife, cut off the oil seal lip.

(2) Using a screwdriver, pry out the oil seal.

NOTICE:

Be careful not to damage the crankshaft. Tape the screwdriver tip.

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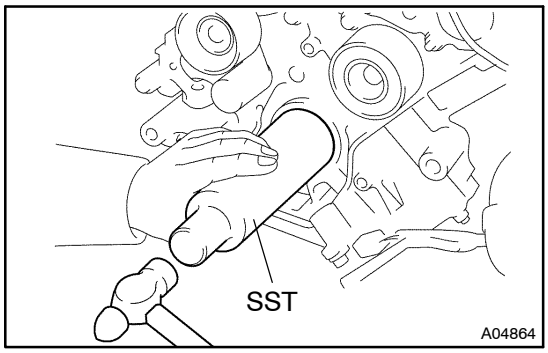
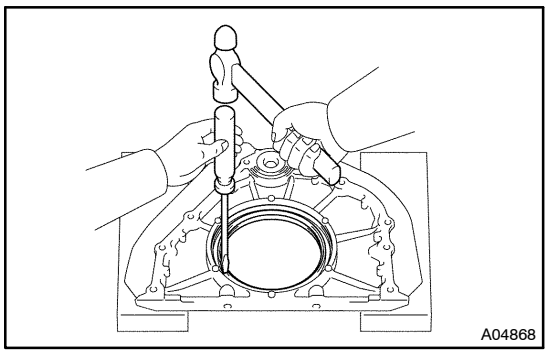


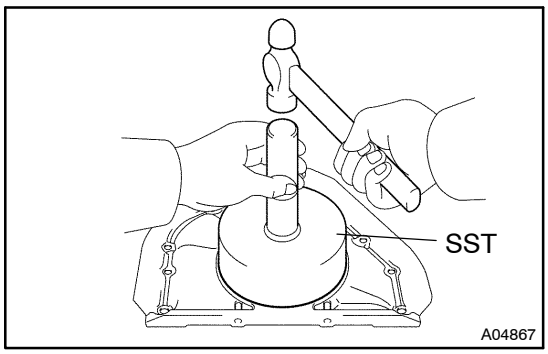
(3) Apply MP grease to a new oil seal lip.
(4) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil pump body edge.
SST 09316–60011 (09316–00011)



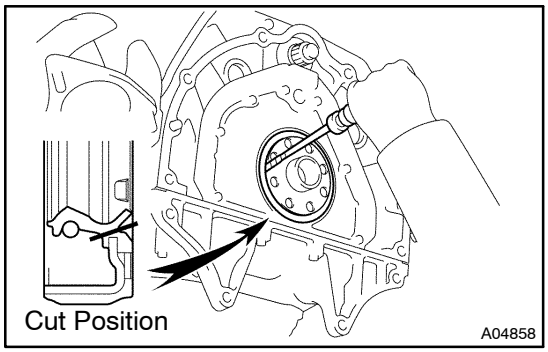
4. REPLACE CRANKSHAFT REAR OIL SEAL

HINT:
There are 2 methods ((a) and (b)) to replace the oil seal.

(a) If the rear oil seal retainer is removed from the cylinder block:
(1) Using a screwdriver and hammer, tap out the oil seal.

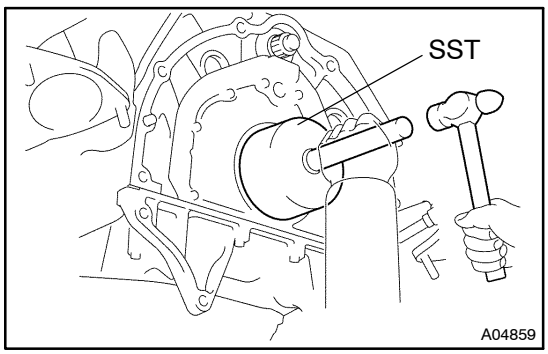


(2) Using SST and a hammer, tap in a new oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223–56010
(3) Apply MP grease to the oil seal lip.



(b) If the rear oil seal retainer is installed to the cylinder block:
(1) Using a knife, cut off the oil seal lip.
(2) Using a screwdriver, pry out the oil seal.

NOTICE:
Be careful not to damage the crankshaft. Tape the screwdriver tip.



(3) Apply MP grease to a new oil seal lip.
(4) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223–56010

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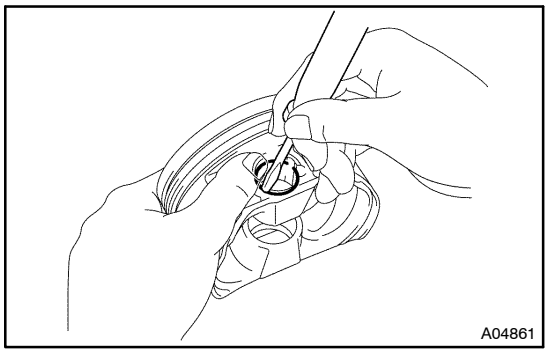
EM0L8–01

REASSEMBLY

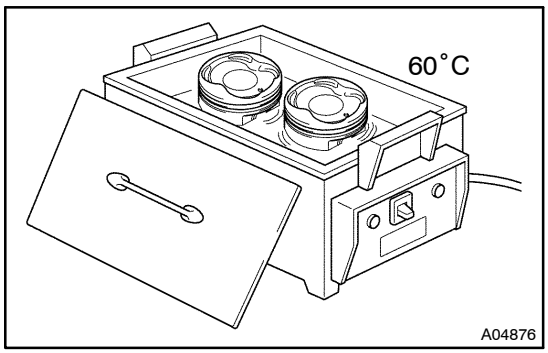


HINT:

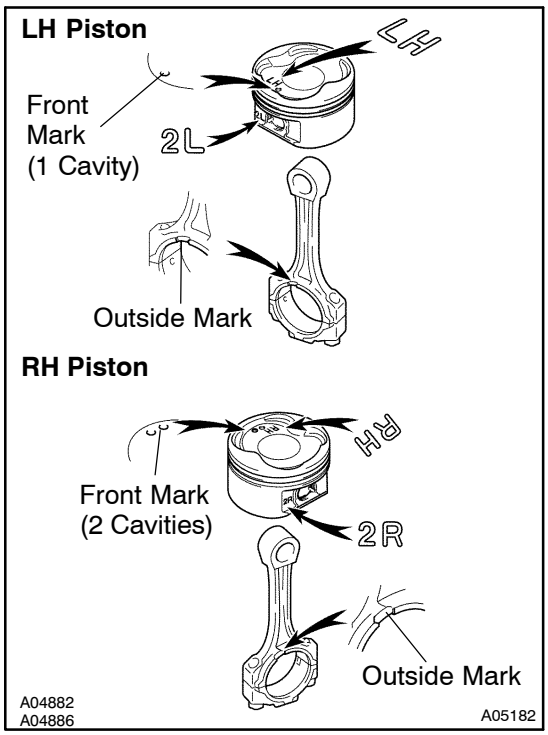
- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- Replace all gaskets, O–rings and oil seals with new parts.

1. ASSEMBLE PISTON AND CONNECTING ROD

(a) Using a small screwdriver, install a new snap ring on one side of the piston pin hole.



(b) Gradually heat the piston to about 60˚C (140˚F).



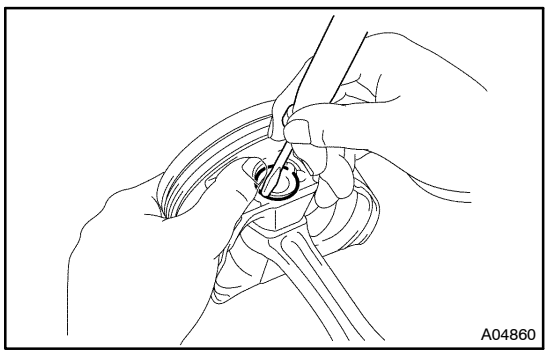
(c) Coat the piston pin with engine oil.

(d) Position the piston front mark with respect to the outside mark on the connecting rod as shown in the diagram.

NOTICE:

The installation directions of the piston and connecting rod are different for the LH and RH banks. The LH piston is marked with ”LH” and ”2L”, the RH piston with ”RH” and ”2R”.

(e) Align the piston pin holes of the piston and connecting rod, and push in the piston pin with your thumb.



(f) Using a small screwdriver, install a new snap ring on the other side of the piston pin hole.

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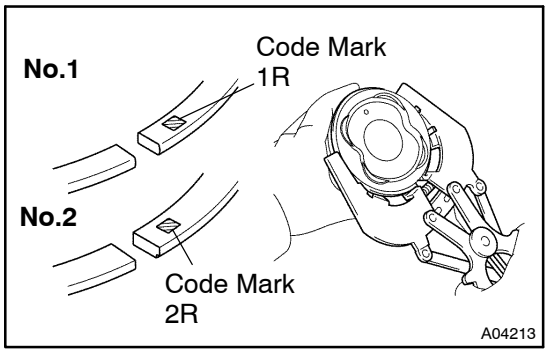


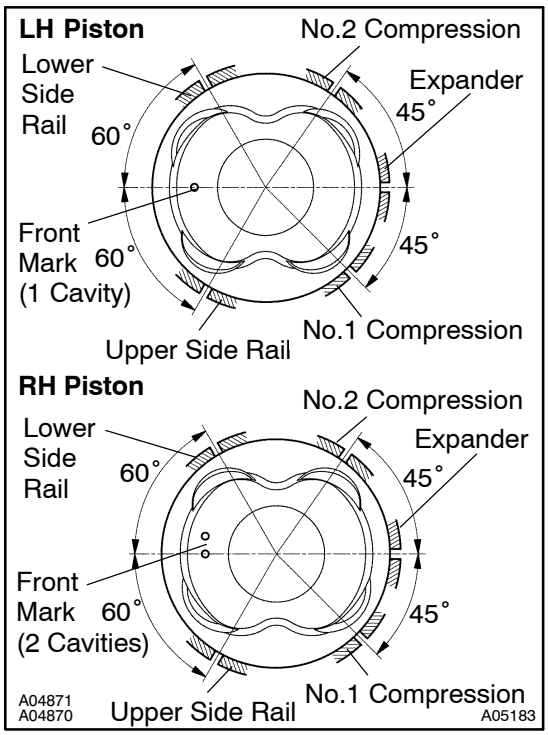
2. INSTALL PISTON RINGS

(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:

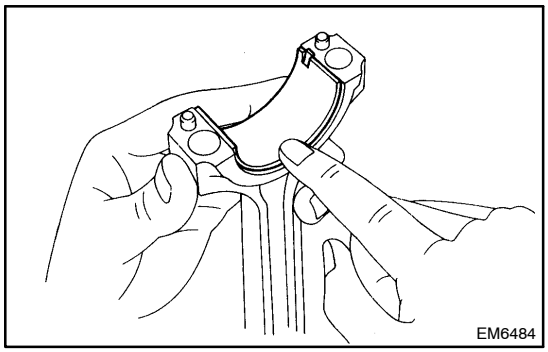
No.1	1R
No.2	2R



(c) Position the piston rings so that the ring ends are as shown.

NOTICE:

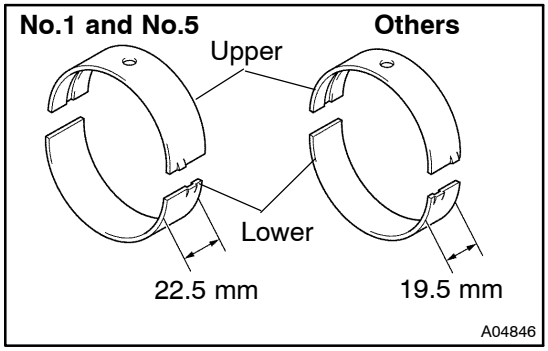
Do not align the ring ends.



3. INSTALL BEARINGS

(a) Align the bearing claw with the groove of the connecting rod or 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 19.5 mm (0.768 in.) and 22.5 mm (0.886 in.). Install the 22.5 mm (0.886 in.) bearings in the No.1 and No.5 cylinder block journal positions with the main bearing cap. Install the 19.5 mm (0.768 in.) bearings in the other positions.
- Upper bearings have an oil groove and oil holes; lower bearings do not.

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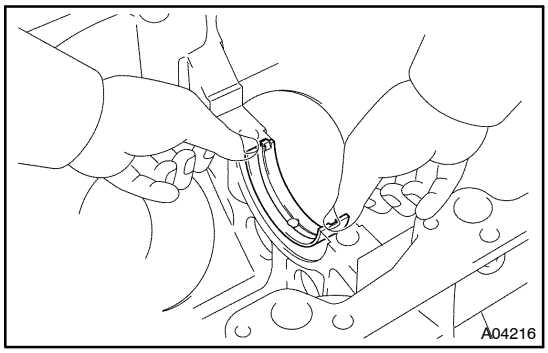
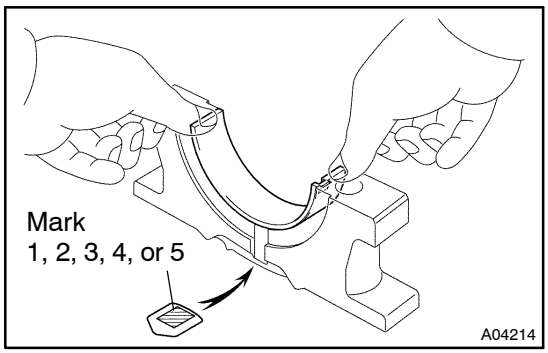
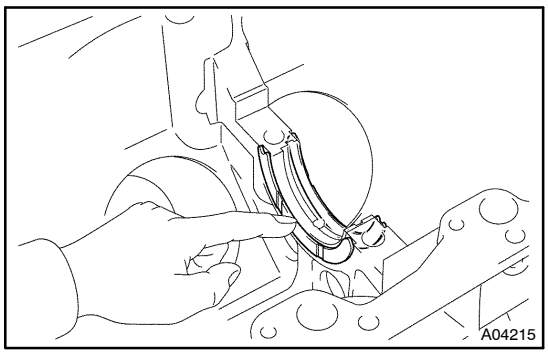


(a) Align the bearing claw with the claw groove of the cylinder block, and push in the 5 upper bearings.



(b) Align the bearing claw with the claw groove of the main bearing cap, and push in the 5 lower bearings.

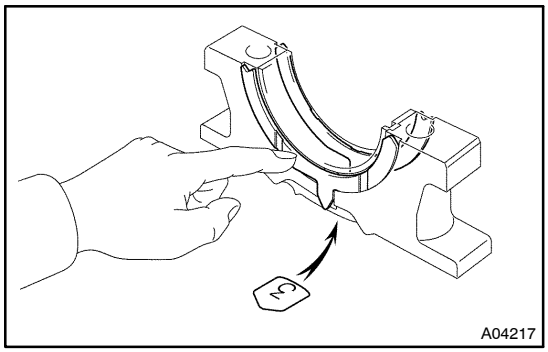
HINT:
A number is marked on each main bearing cap to indicate the installation position.



5. INSTALL UPPER THRUST WASHERS

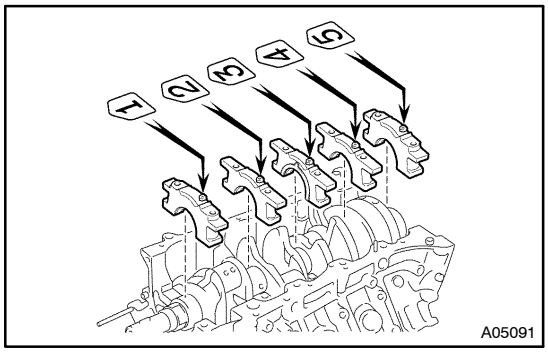
Install the 2 thrust washers under the No.3 journal position of the cylinder block with the oil grooves facing outward.

6. PLACE CRANKSHAFT ON CYLINDER BLOCK



7. PLACE MAIN BEARING CAPS AND LOWER THRUST WASHERS ON CYLINDER BLOCK

(a) Install the 2 thrust washers on the No.3 bearing cap with the grooves facing outward.



(b) Install the 5 main bearing caps in their proper locations.

8. INSTALL MAIN BEARING CAP BOLTS

HINT:

- The main bearing cap bolts are tightened in 2 progressive steps (steps (b) and (d)).
- If any one of the main bearing cap bolts is broken or deformed, replace it.

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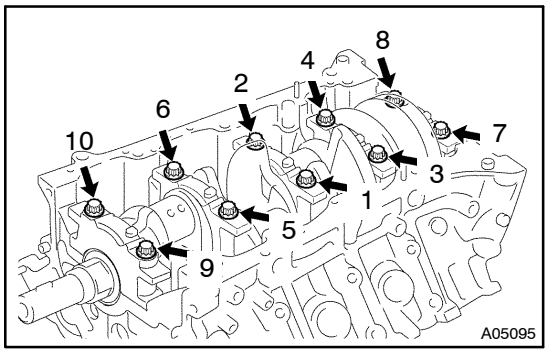
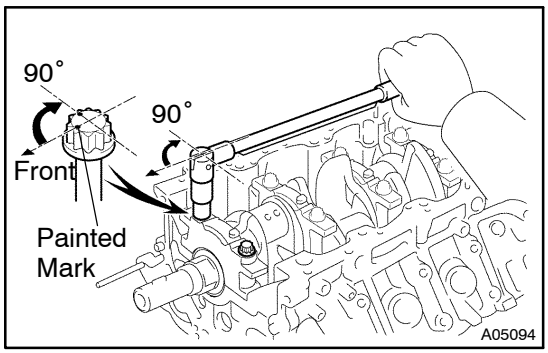


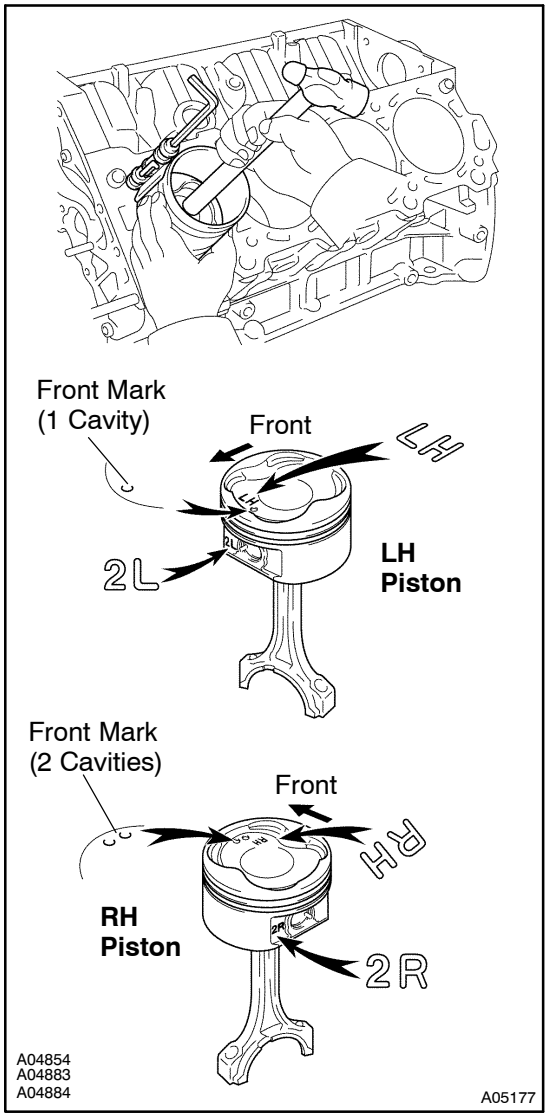
(a) Apply a light coat of engine oil on the threads and under the main bearing cap bolts.
(b) Install and uniformly tighten the 10 main bearing cap bolts in several passes, in the sequence shown.
Torque: 27 N·m (275 kgf·cm, 20 ft·lbf)

If any one of the main bearing cap bolts does not meet the torque specification, replace the main bearing cap bolt.



(c) Mark the front of the main bearing cap bolt with paint.
(d) Retighten the main bearing cap bolts by 90° in the numerical order shown.
(e) Check that the painted mark is now at a 90° angle to the front.
(f) Check that the crankshaft turns smoothly.

9. CHECK CRANKSHAFT THRUST CLEARANCE
(See page EM–87)



10. INSTALL PISTON AND CONNECTING ROD ASSEMBLES

Using a piston ring compressor, push the correctly numbered piston and connecting rod assemblies into each cylinder with the front mark of the piston facing forward.

NOTICE:
The shape of the piston varies for the LH and RH banks. The LH piston is marked with ”LH” and ”2R”, the RH piston with ”RH” and ”2R”.

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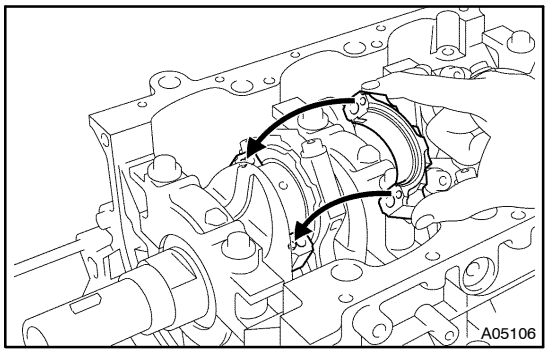
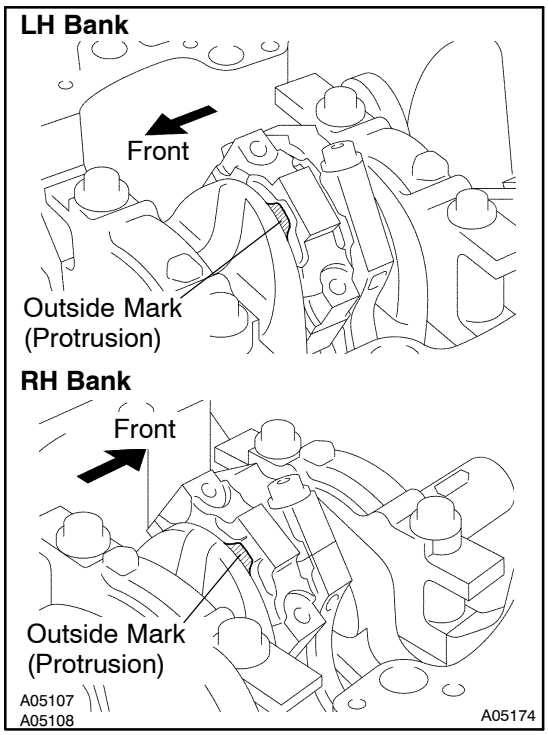


11. PLACE CONNECTING ROD CAP ON CONNECTING ROD

(a) Match the numbered connecting rod cap with the connecting rod.

(b) Align the pin groove of the connecting rod cap with the pins of the connecting rod, and install the connecting rod cap.

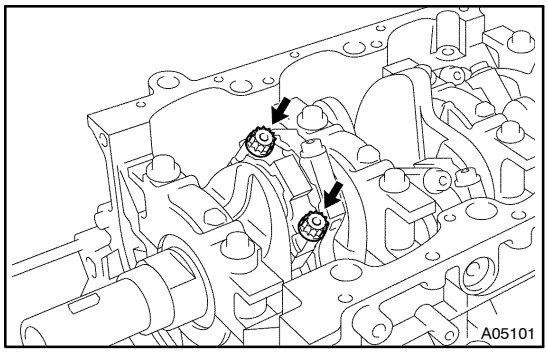


(c) Check that the outside mark of the connecting rod cap is facing in correct direction.

12. INSTALL CONNECTING ROD CAP BOLTS

HINT:

- The connecting rod cap bolts are tightened in 2 progressive steps (steps (b) and (d)).
- If any one of the connecting rod cap bolts is broken or deformed, replace it.

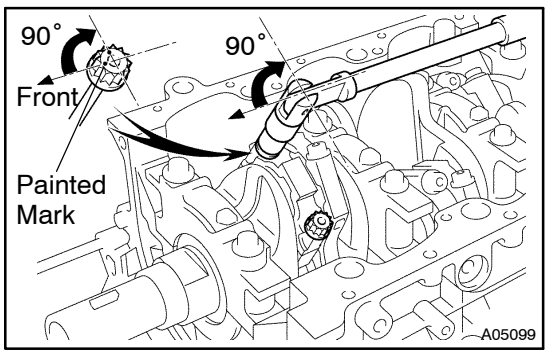


(a) Apply a light coat of engine oil on the threads and under the heads of the connecting rod cap bolts.

(b) Install and alternately tighten the 2 connecting rod cap bolts in several passes.

Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)

If any one of the connecting rod cap bolts does not meet the torque specification, replace the connecting rod cap bolts.



(c) Mark the front of the connecting cap bolt with paint.

(d) Retighten the cap bolts 90° as shown.

(e) Check that the painted mark is now at a 90° angle to the front.

(f) Check that the crankshaft turns smoothly.

13. CHECK CONNECTING ROD THRUST CLEARANCE (See page EM–87)

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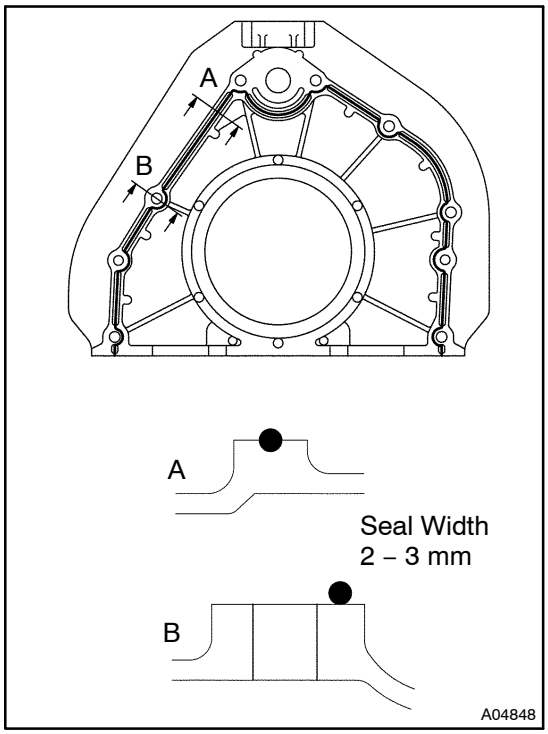
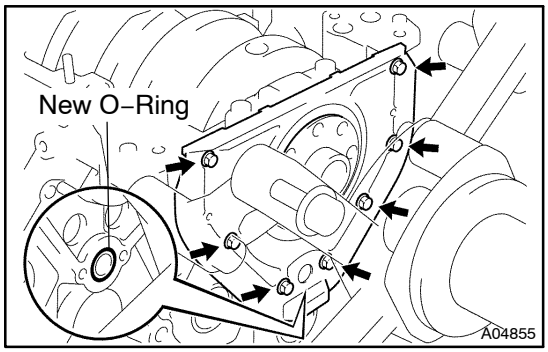


14. INSTALL REAR OIL SEAL RETAINER

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the oil seal retainer and 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.

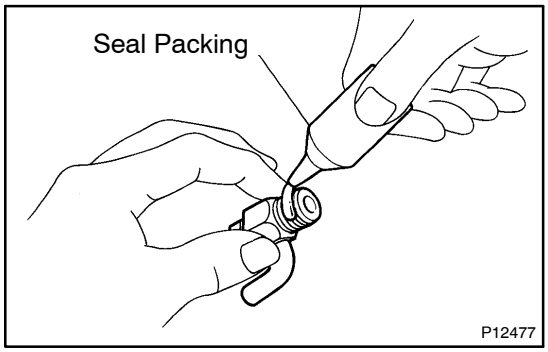
Seal packing: Part No. 08826–00080 or equivalent
- Install a nozzle that has been cut to a 2 – 3 mm (0.08 – 0.12 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.



(c) Install a new O–ring to the cylinder block.

(d) Install the oil seal retainer with the 7 bolts.

Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)



15. INSTALL ENGINE COOLANT DRAIN UNIONS

(a) Apply seal packing to 2 or 3 threads.

Seal packing: Part No. 08826–00100 or equivalent

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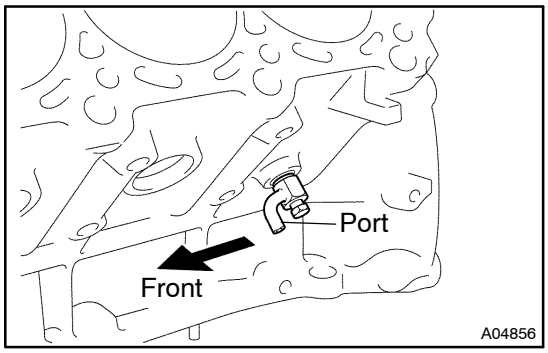
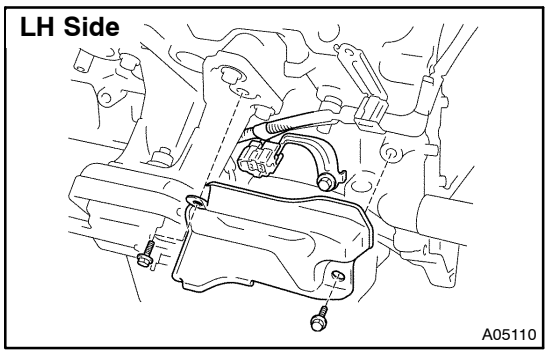


(b) Install the 2 drain unions.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

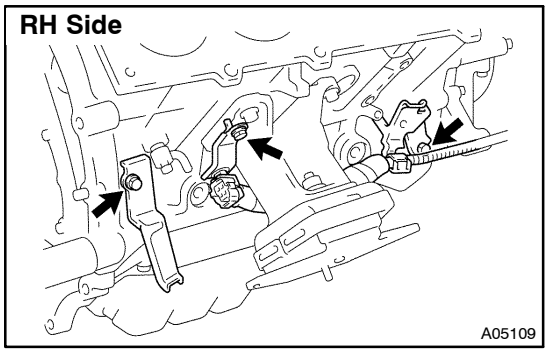
HINT:
After applying the specified torque, rotate the drain union clockwise until its drain port is facing forward.

16. INSTALL OIL PUMP (See page LU–15)
17. INSTALL OIL STRAINER (See page LU–15)
18. INSTALL NO.1 OIL PAN (See page LU–15)
19. INSTALL OIL PAN BAFFLE PLATE (See page LU–15)
20. INSTALL NO.2 OIL PAN (See page LU–15)
21. INSTALL WATER PUMP (See page CO–8)
22. INSTALL ENGINE MOUNTING BRACKETS

Install the mounting bracket with the 4 bolts. Install the 2 mounting brackets.
Torque: 36 N·m (370 kgf·cm, 27 ft·lbf)



23. INSTALL ENGINE WIRE TO LH SIDE OF CYLINDER BLOCK
(a) Install the bracket on the engine wire with the bolt.
(b) Install the engine wire cover with the 2 bolts.



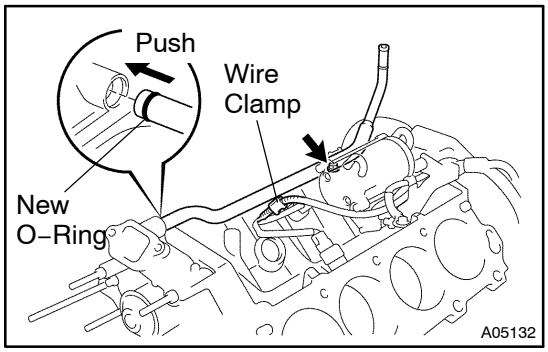
24. INSTALL ENGINE WIRE TO RH SIDE OF CYLINDER BLOCK

Install the 2 brackets on the engine wire with the 2 bolts.

25. INSTALL OIL COOLER PIPE BRACKET FOR A/T

Install the bracket with the bolt.

26. INSTALL KNOCK SENSORS (See page SF–56)
27. INSTALL STARTER (See page ST–17)



28. INSTALL WATER BYPASS PIPE
(a) Install a new O–ring to the water bypass pipe.
(b) Apply soapy water to the O–ring.
(c) Push in the water bypass pipe end into the pipe hole of the water pump.
(d) Install the water bypass pipe with the bolt.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
(e) Install the wire clamp to the bracket of the water bypass pipe.

29. INSTALL CYLINDER HEADS (See page EM–57)

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30. **INSTALL TIMING BELT AND PULLEYS**
(See page EM–22)
31. **DISCONNECT ENGINE FROM ENGINE STAND**

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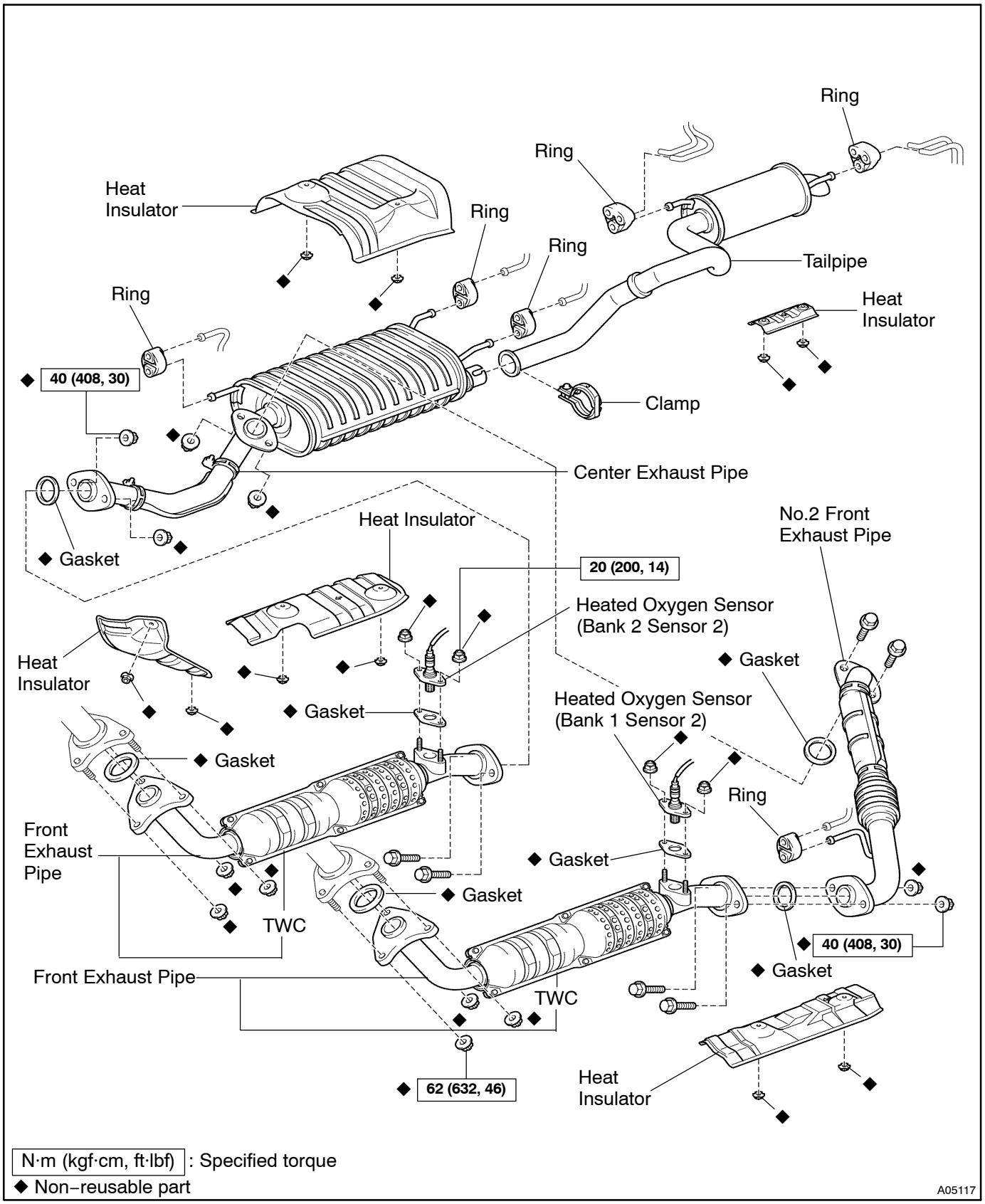
EXHAUST SYSTEM

COMPONENTS

EM0EE–02



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EMISSION CONTROL SYSTEM

EC07H–01

PURPOSE

The emission control systems are installed to reduce the amount of HC, CO and NOx exhausted from the engine ((3) and (4)), to prevent the atmospheric release of blow–by gas–containing HC (1) and evaporated fuel containing HC being released from the fuel tank (2).
The function of each system is shown in the following table:

System	Abbreviation	Function
(1) Positive Crankcase Ventilation	PCV	Reduces HC
(2) Evaporative Emission Control	EVAP	Reduces evaporated HC
(3) Three–Way Catalytic Converter	TWC	Reduces HC, CO and NOx
(4) Sequential Multiport Fuel Injection*	SFI	Injects a precisely timed, optimum amount of fuel for reduced exhaust emissions

Remark: * For inspection and repair of the SFI system, refer to the SF section in this manual.

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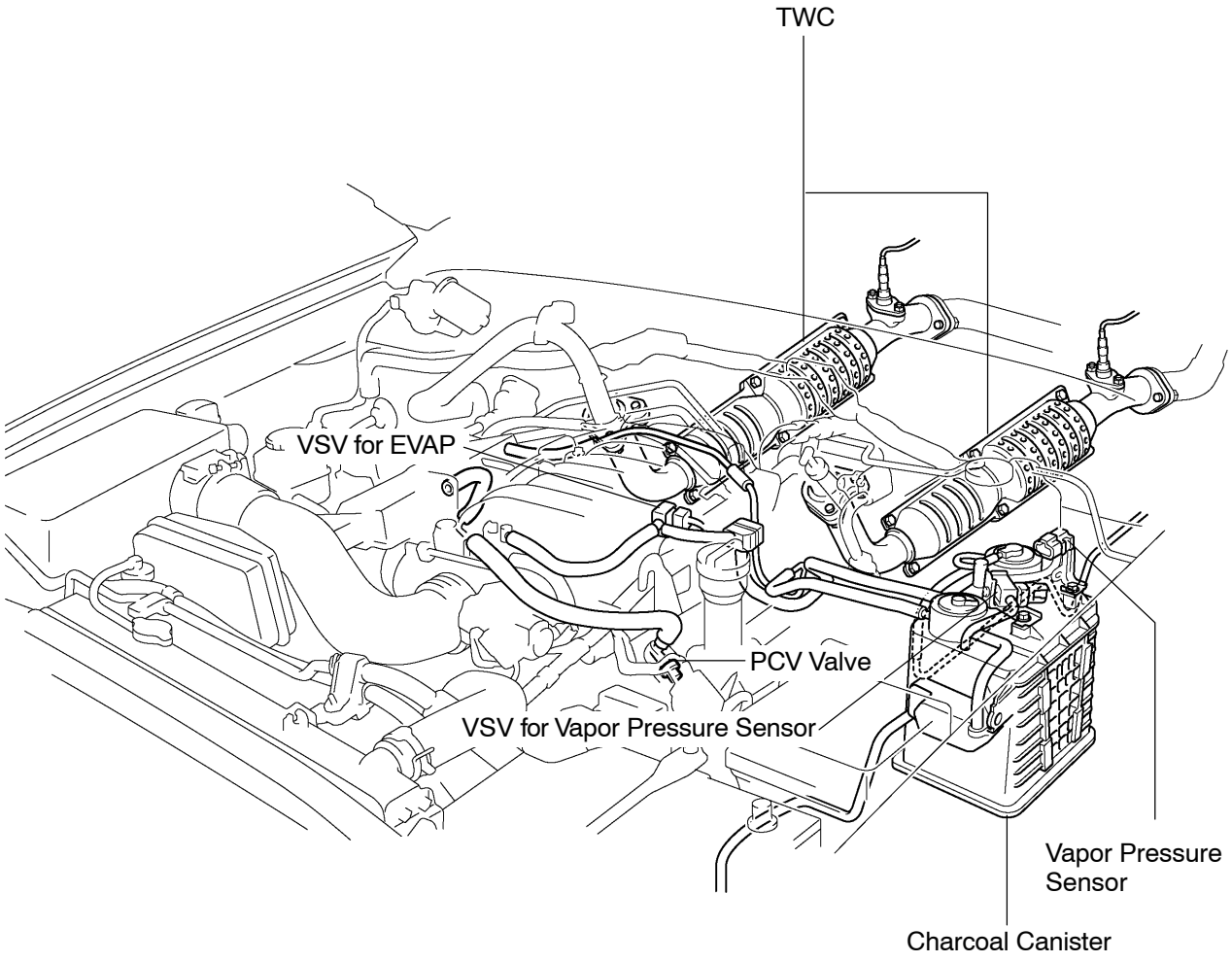
PARTS LAYOUT AND SCHEMATIC DRAWING

LOCATION

EC07I–01



B03195

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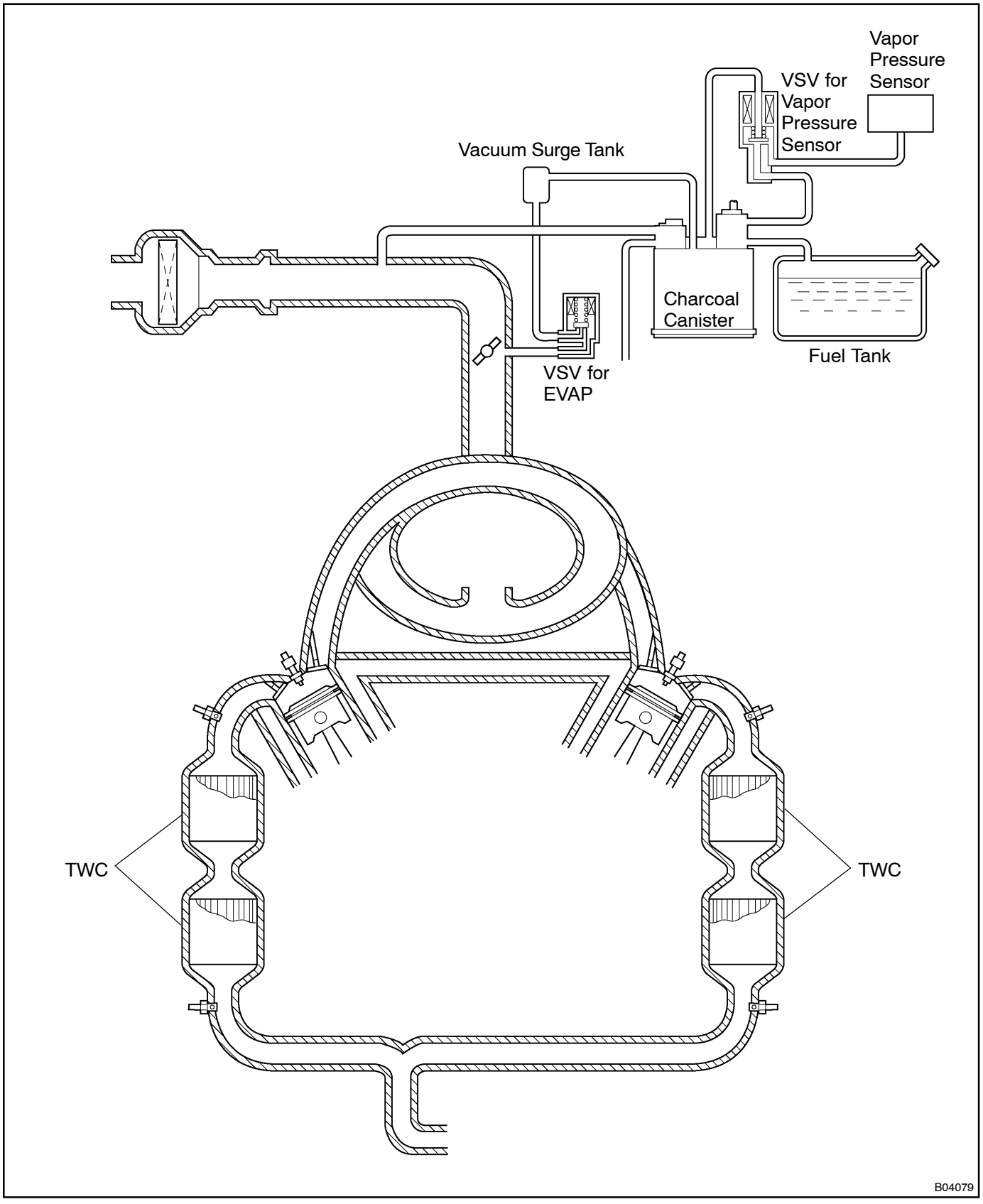
EC07J–01

DRAWING



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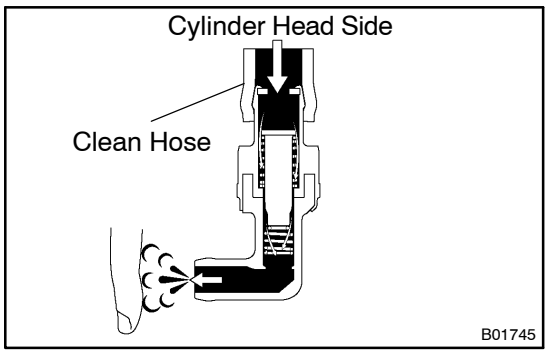
POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

EC07K–01

INSPECTION

1. **REMOVE V–BANK COVER**
2. **REMOVE PCV VALVE**
3. **INSTALL CLEAN HOSE TO PCV VALVE**

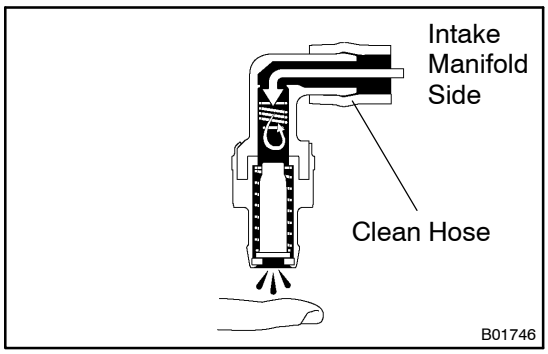


4. **INSPECT PCV VALVE OPERATION**

(a) Blow air into the cylinder head side, and check that air passes through easily.

CAUTION:

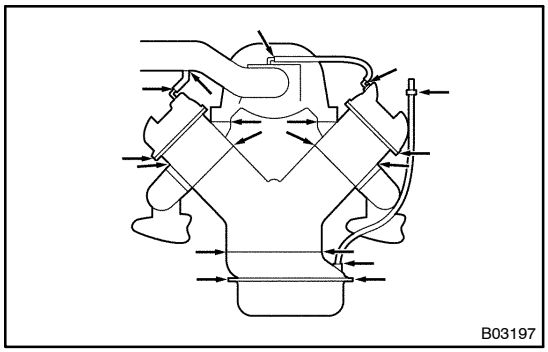
Do not suck air through the valve.
Petroleum substances inside the valve are harmful.



(b) Blow air into the intake manifold side, and check that air passes through with difficulty.

If operation is not as specified, replace the PCV valve.

5. **REMOVE CLEAN HOSE FROM PCV VALVE**
6. **REINSTALL PCV VALVE**



7. **VISUALLY INSPECT HOSE, CONNECTIONS AND GASKETS**

Check for cracks, leaks or damage.

8. **REINSTALL V–BANK COVER**

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EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM

EC07L–01

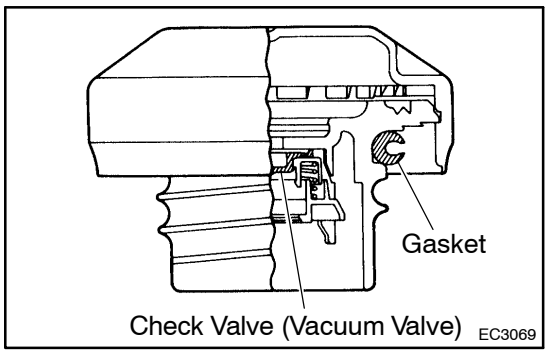
INSPECTION

1. VISUALLY INSPECT LINES AND CONNECTIONS

Look for loose connections, sharp bends or damage.

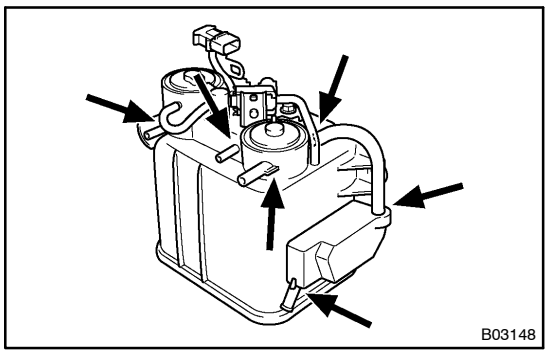
2. VISUALLY INSPECT FUEL TANK

Look for deformation, cracks or fuel leakage.



3. VISUALLY INSPECT FUEL TANK CAP

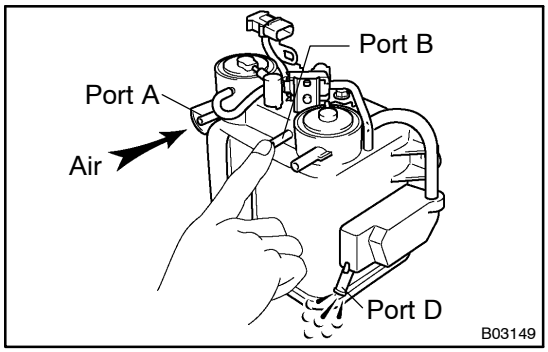
Check if the cap and/or gasket are deformed or damaged.
If necessary, repair or replace the cap.



4. REMOVE CHARCOAL CANISTER

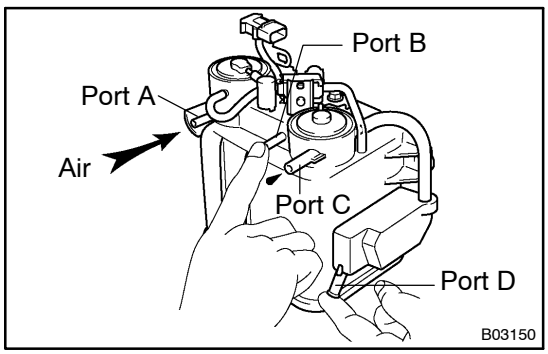
5. VISUALLY INSPECT CHARCOAL CANISTER

Look for cracks or damage.



6. CHECK FOR CLOGGED FILTER, AND STUCK CHECK VALVE AND DIAPHRAGM

(a) While holding port B closed, blow air (1.76 kPa (18 gf/cm^2, 0.26 psi)) into port A and check that air flows from port D.



(b) While holding port B and port D closed, blow air (1.76 kPa (18 gf/cm^2, 0.26 psi)) into port A and check that air does not flow from port C.

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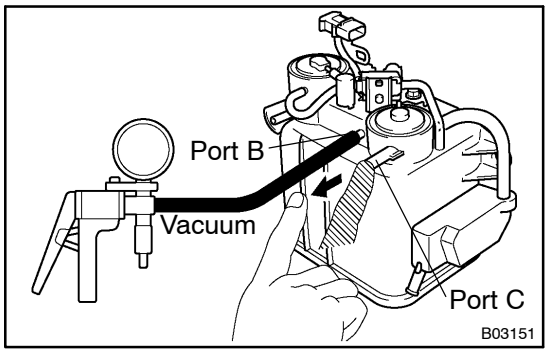
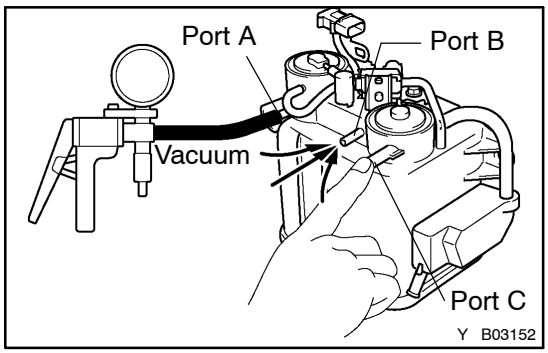


(c) Apply vacuum (3.43 kPa (26 mmHg, 1.01 in.Hg)) to port B, check that the vacuum does not decrease when port C is closed, and check that the vacuum decreases when port C is released.



(d) While holding port C closed, apply vacuum (1.32 kPa (10 mmHg, 0.39 in.Hg)) to port A and check that air flows into port B.

If a problem is found, replace the charcoal canister.

7. REINSTALL CHARCOAL CANISTER
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

8. INSPECT VSV FOR EVAP (See page SF–47)

9. INSPECT VSV FOR VAPOR PRESSURE SENSOR (See page SF–49)

10. INSPECT VAPOR PRESSURE SENSOR (See page SF–53)

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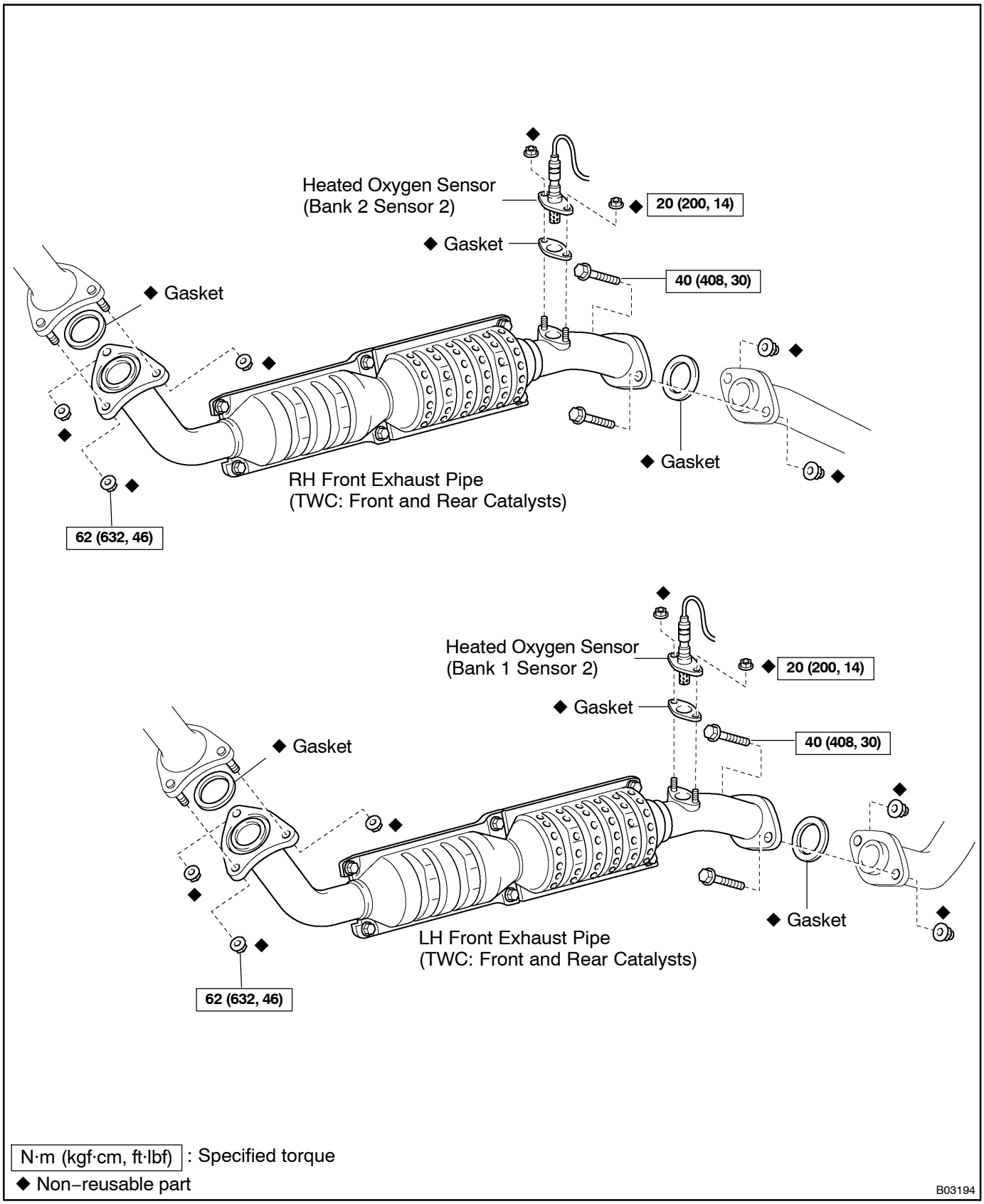
THREE–WAY CATALYTIC CONVERTER (TWC) SYSTEM

EC07M–01

COMPONENTS



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

◆ Non–reusable part

B03194

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EC07N–01

INSPECTION

1. CHECK EXHAUST PIPE ASSEMBLY

(a) Check the connections for looseness or damage.

(b) Check the clamps for weakness, cracks or damage.

2. INSPECT TWC

Check for dents or damage.

If any part of protector is damaged or dented to the extent that it contacts the TWC, repair or replace it.

3. INSPECT HEAT INSULATOR

(a) Check the heat insulator for damage.

(b) Check for adequate clearance between the TWC and heat insulator.

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SFI SYSTEM

PRECAUTION

SF0XU–01

1. BEFORE WORKING ON FUEL SYSTEM, DISCONNECT NEGATIVE (–) TERMINAL CABLE FROM BATTERY

HINT:

Any diagnostic trouble code retained by the computer will be erased when the negative (–) terminal cable is removed from the battery.

Therefore, if necessary, read the diagnosis before removing the negative (–) terminal cable from the battery.

2. DO NOT SMOKE OR WORK NEAR AN OPEN FLAME WHEN WORKING ON THE FUEL SYSTEM

3. KEEP GASOLINE AWAY FROM RUBBER OR LEATHER PARTS

4. MAINTENANCE PRECAUTIONS

(a) 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 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 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 OFF 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.

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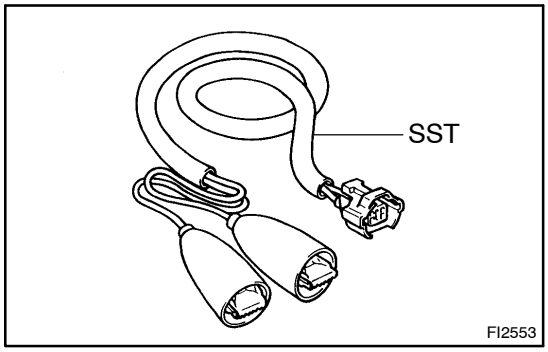
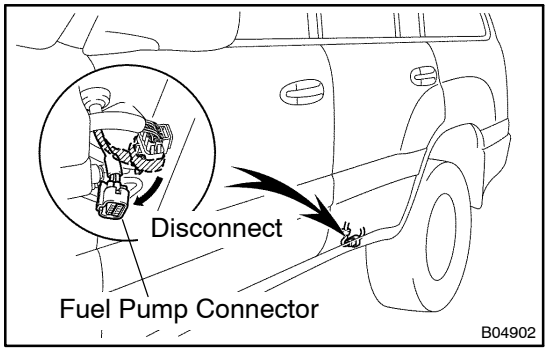
(b) When installing the battery, be especially careful not to incorrectly connect the positive (+) and negative (–) cables.
(c) Do not permit parts to receive a severe impact during removal or installation. Handle all SFI parts carefully, especially the ECM.
(d) Be careful during troubleshooting as there 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 OFF.
  (3) Put a container under the connection.
  (4) Slowly loosen the connection.
  (5) Disconnect the connection.
  (6) Plug the connection with a rubber plug.
  (7) Reconnect the fuel pump connector.

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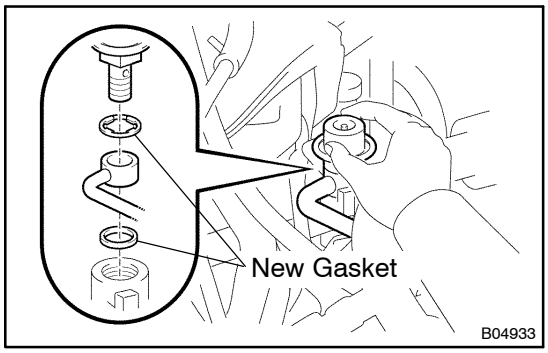
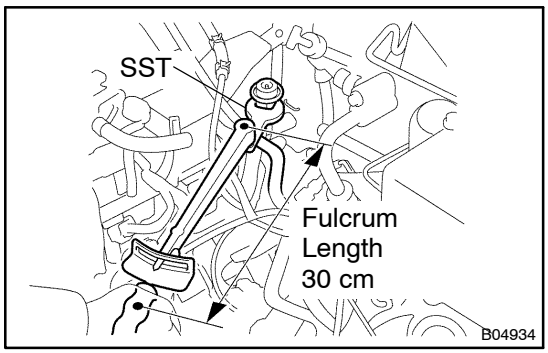
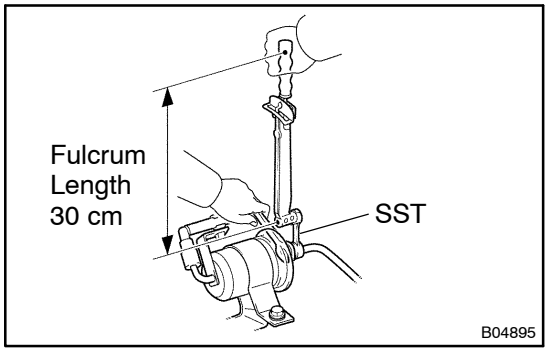


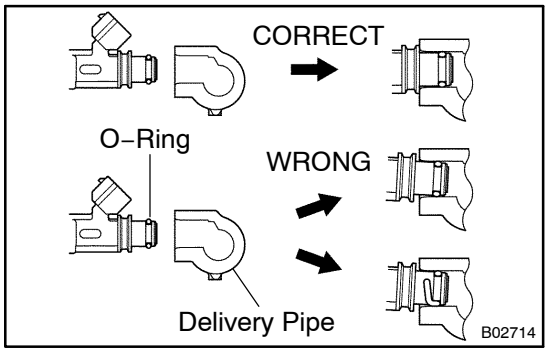
(b) When connecting the union bolt (fuel pressure pulsation damper) on the high pressure pipe union, observe these procedures:
(1) Always use 2 new gaskets.
(2) Tighten the union bolt by hand.



(3) Using SST, tighten the union bolt to the specified torque.
SST 09612–24014 (09617–24011)
Torque:
33 N·m (340 kgf·cm, 24 ft·lbf) for use with SST
39 N·m (400 kgf·cm, 29 ft·lbf)
HINT:
Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).



(c) When connecting the flare nut on the high pressure pipe union, 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 the specified torque.
SST 09631–22020
NOTICE:
Do not rotate the fuel filter outlet, when tightening the flare nut.
Torque:
34 N·m (345 kgf·cm, 25 ft·lbf) for use with SST
38 N·m (380 kgf·cm, 28 ft·lbf)
HINT:
Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).



(d) 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.

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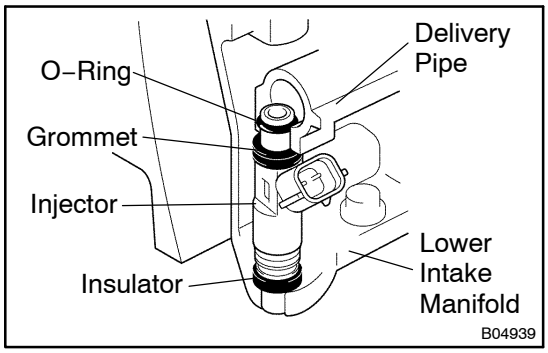
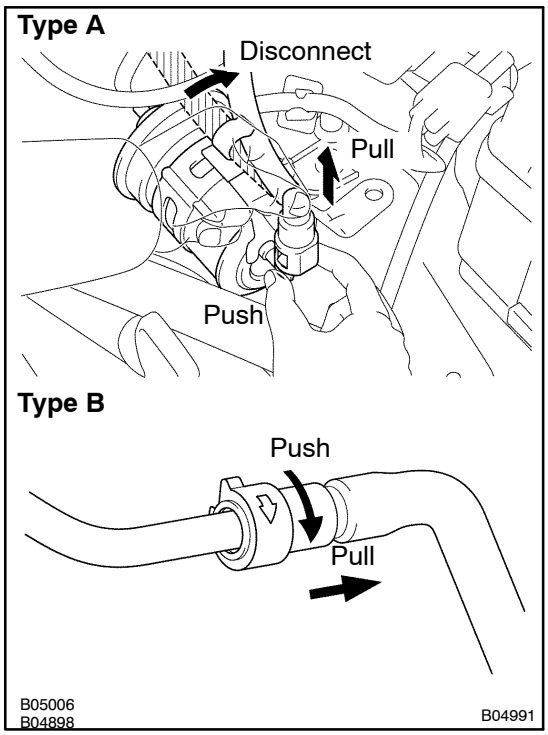
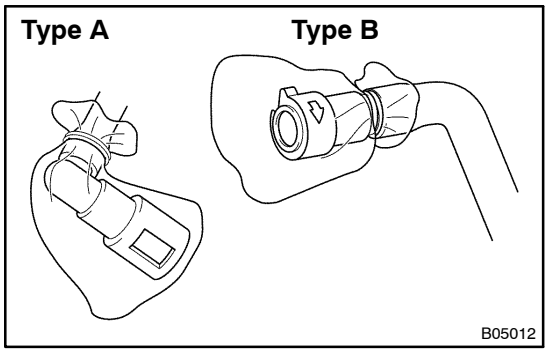


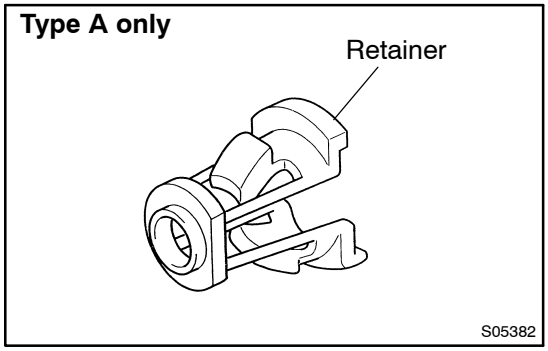
(e) Install the injector to the delivery pipe and lower intake manifold as shown in the illustration.
Before installing the injector, must apply spindle oil or gasoline on the place where a delivery pipe or an intake manifold touches an O–ring of the injector.

(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) Type A:
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.
Type B:
When the connector and the pipe are stuck, 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.

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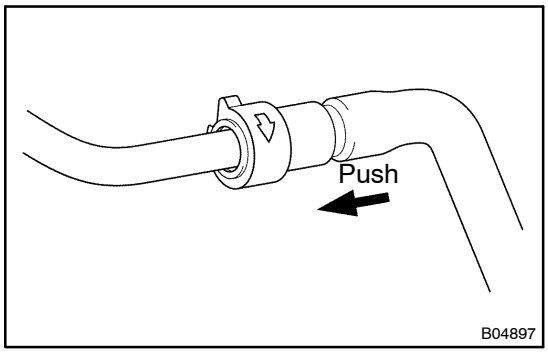
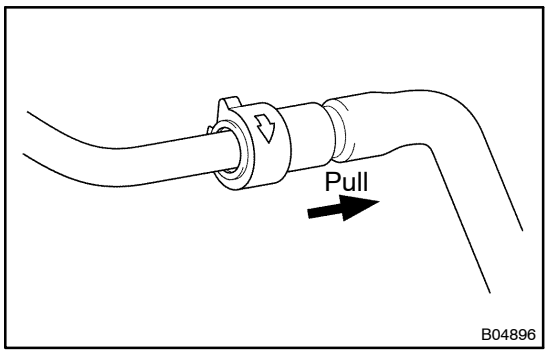
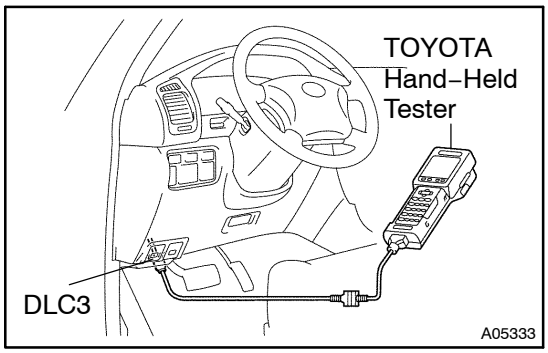


(4) Match the axis of the connector with axis of the pipe, and push in the connector until the connector makes a ”click” sound. In case that the connections is tight, apply little amount of new engine oil on the tip of the pipe.



(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 a TOYOTA hand–held tester to the DLC3.
(2) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.

NOTICE:
Do not start the engine.

(3) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.
(4) Please refer to the TOYOTA hand–held tester operator’s manual for further details.
(5) If you have no TOYOTA hand–held tester, connect the positive (+) and negative (–) leads from the battery to the fuel pump connector.
(See page SF–7)

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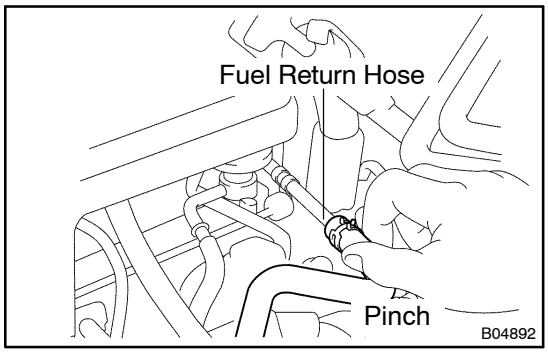

(6) Pinch the fuel return hose.
The pressure in the high pressure line will rise to approx. 392 kPa (4 kgf/cm^2, 57 psi). In this state, check to see that there are no leaks from any part of the fuel system.

NOTICE:
Always pinch the hose. Avoid bending as it may cause the hose to crack.

(7) Turn the ignition switch OFF.
(8) Disconnect the TOYOTA hand–held tester from the DLC3.

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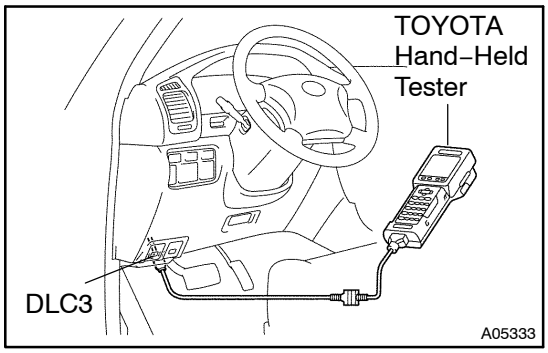


FUEL PUMP

ON–VEHICLE INSPECTION

SF0XV–01

1. CHECK FUEL PUMP OPERATION

(a) Connect a TOYOTA hand–held tester to the DLC3.

(b) Turn the ignition switch ON, and push the TOYOTA hand–held tester main switch ON.

NOTICE:

Do not start the engine.

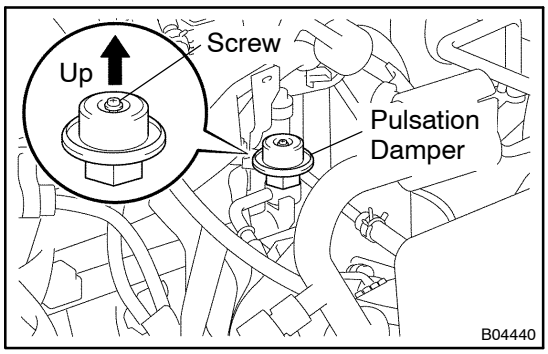
(c) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.

(d) Please refer to the TOYOTA hand–held tester operator's manual for further details.

(e) If you have no TOYOTA hand–held tester, connect the positive (+) and negative (–) leads from the battery to the fuel pump connector. (See step 3)

(f) Disconnect the fuel return hose from the clamp on the V–bank cover.

(g) Remove the 2 bolts, nuts and V–bank cover.



(h) Check that the pulsation damper screw rises up when the fuel pump operates.

If operation is not as specified, check these parts:

- Fusible link
- Fuses
- EFI main relay
- Fuel pump
- ECM
- Wiring connections

(i) Turn the ignition switch OFF.

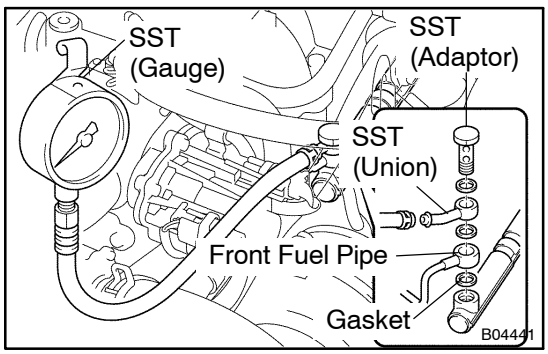
(j) Disconnect the TOYOTA hand–held tester from the DLC3.

2. CHECK FUEL PRESSURE

(a) Check the battery positive voltage is above 12 V.

(b) Disconnect the negative (–) terminal cable from the battery.

(c) Remove the front fuel pipe from the LH delivery pipe. (See page SF–22)



(d) Install the front fuel pipe and SST (pressure gauge) to the delivery pipe with 3 lower gaskets and SST (adaptor).
SST 09268–45012 (09268–41190, 90405–06167)
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(e) Wipe off any splattered gasoline.

(f) Reconnect the negative (–) terminal cable to the battery.

(g) Connect a TOYOTA hand–held tester to the DLC3. (See step 1 in check fuel pump operation (a) to (e))

(h) Measure the fuel pressure.

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Fuel pressure:
265 – 304 kPa (2.7 – 3.1 kgf/cm^2, 38 – 44 psi)

If pressure is high, replace the fuel pressure regulator.

If pressure is low, check these parts:

- Fuel hoses and connections
- Fuel pump
- Fuel filter
- Fuel pressure regulator

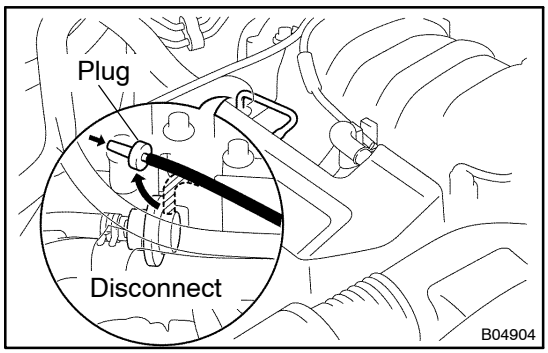
(i) Disconnect the TOYOTA hand–held tester from the DLC3.

(j) Start the engine.

(k) Disconnect the vacuum sensing hose from the fuel pressure regulator, and plug the hose end.

(l) Measure the fuel pressure at idle.

Fuel pressure:
265 – 304 kPa (2.7 – 3.1 kgf/cm^2, 38 – 44 psi)



(m) Reconnect the vacuum sensing hose to the fuel pressure regulator.

(n) Measure the fuel pressure at idle.

Fuel pressure:
196 – 235 kPa (2.0 – 2.4 kgf/cm^2, 28 – 34 psi)

(o) Stop the engine.

(p) 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.

(q) After checking fuel pressure, disconnect the negative (–) terminal cable from the battery and carefully remove the SST to prevent gasoline from splashing.
SST 09268–45012

(r) Reinstall the front fuel pipe to the LH delivery pipe. (See page SF–27)

(s) Reconnect the negative (–) terminal cable to the battery.

(t) Check for fuel leaks. (See page SF–1)

(u) Reinstall the V–bank cover with the 2 bolts and nuts.

(v) Reconnect the fuel return hose to the clamp on the V–bank cover.

3. INSPECT FUEL PUMP

(a) Remove the No.1 rear seats.

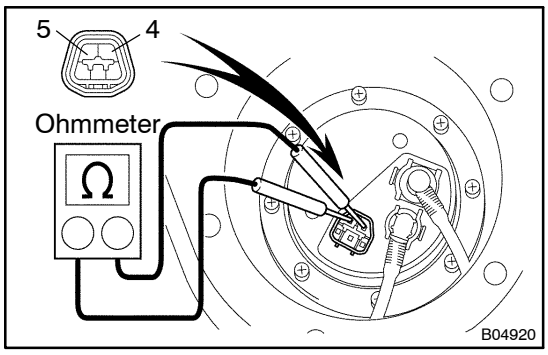
(b) Remove the 2 rear door scuff plates, step plates and rear seat lock covers.

(c) Pull off the front and rear floor carpets.

(d) Remove the 2 screws and rear floor service hole cover.

(e) Disconnect the fuel pump & sender gauge connector.

(f) 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 and/or lead wire.

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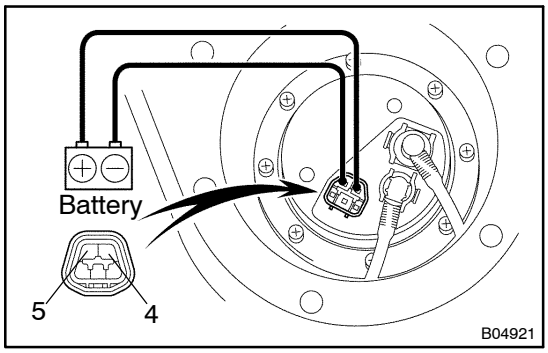

(g) Inspect the fuel pump operation.
Connect the positive (+) lead from the battery to terminal 4 of the connector, and the negative (–) lead to terminal 5. Check that the fuel pump operates.

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 and/or lead wire.

(h) Reconnect the fuel pump & sender gauge connector.
(i) Reinstall the rear floor service hole cover with the 2 screws.
(j) Reinstall the front and rear floor carpets.
(k) Remove the 2 rear door scuff plates, step plates and rear seat lock covers.
(l) Reinstall the No.1 rear seats.

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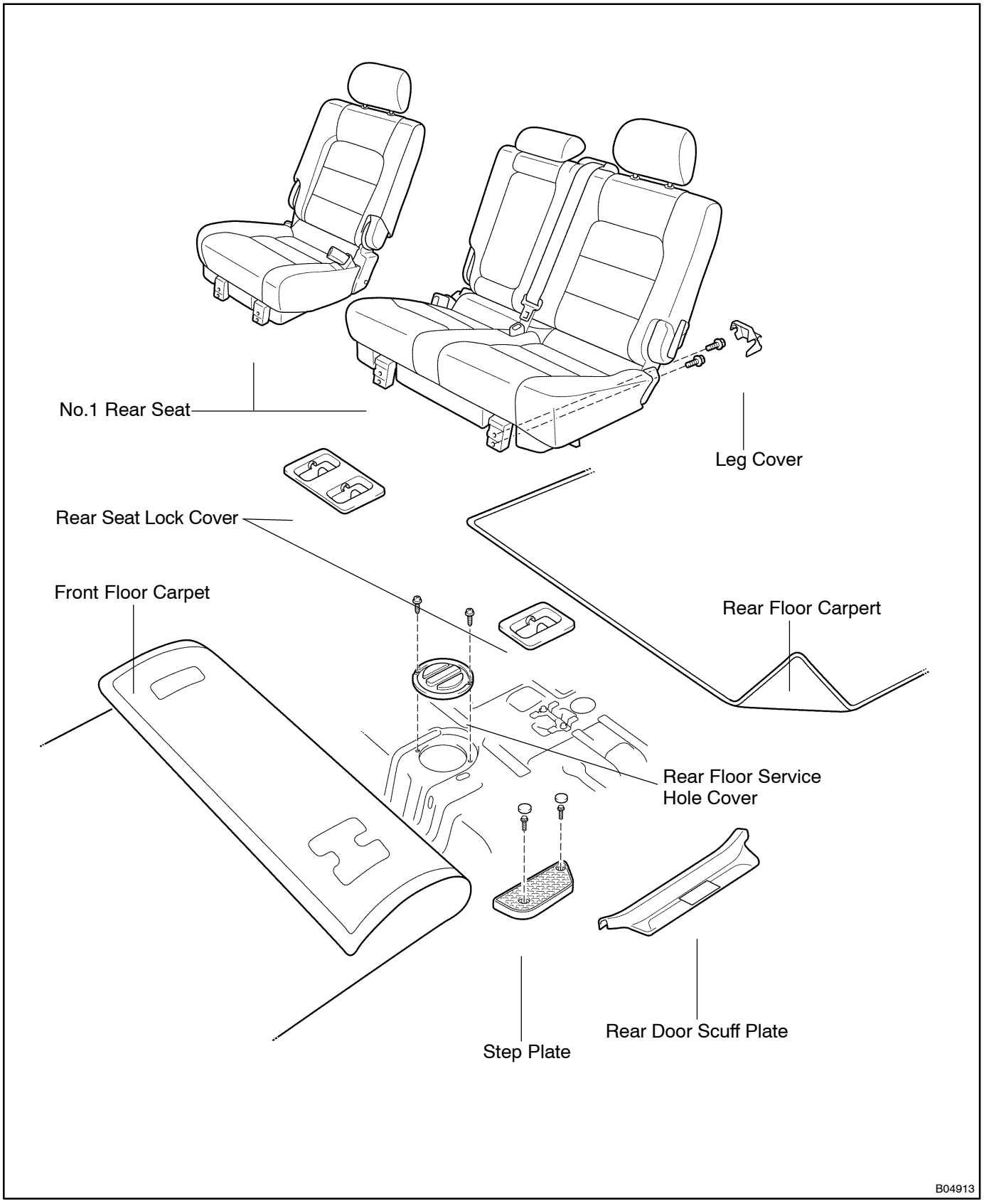
SF0XW–01

COMPONENTS



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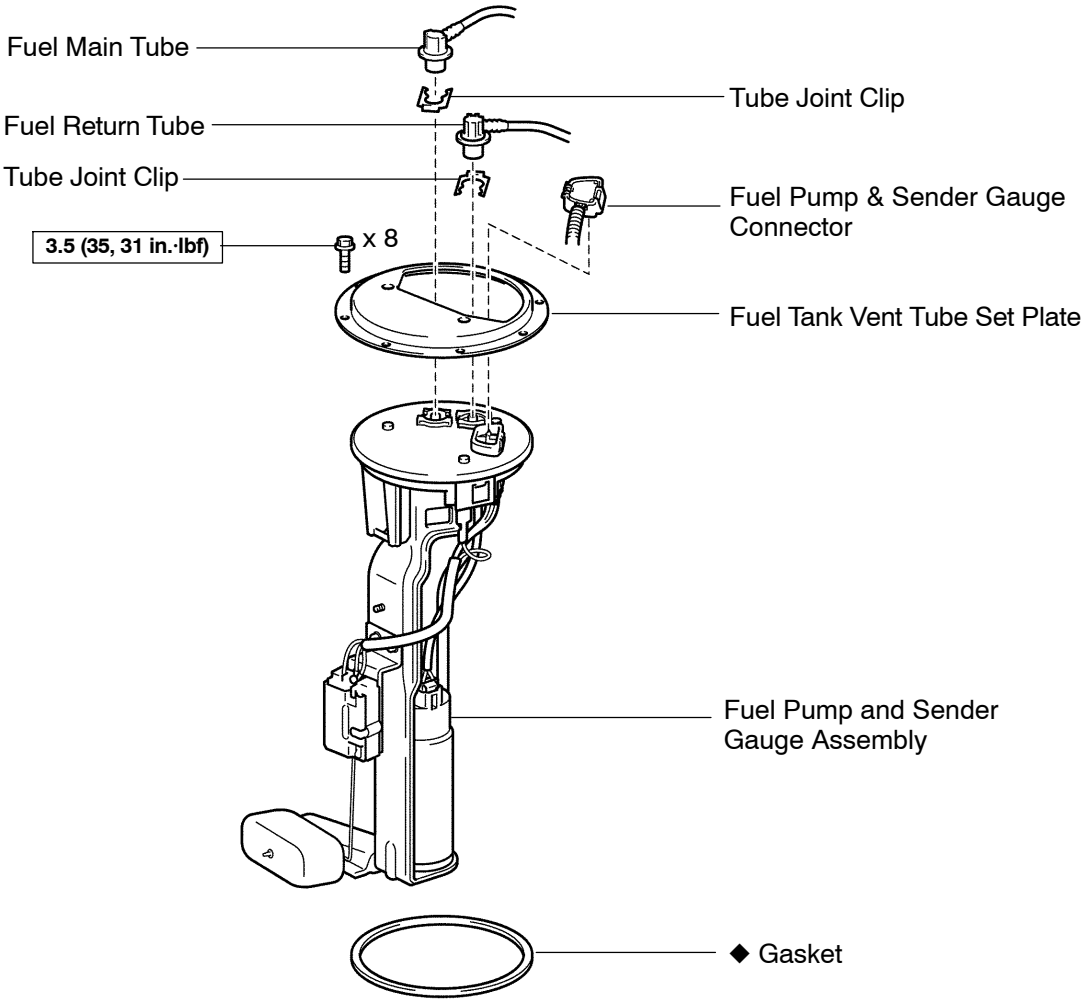

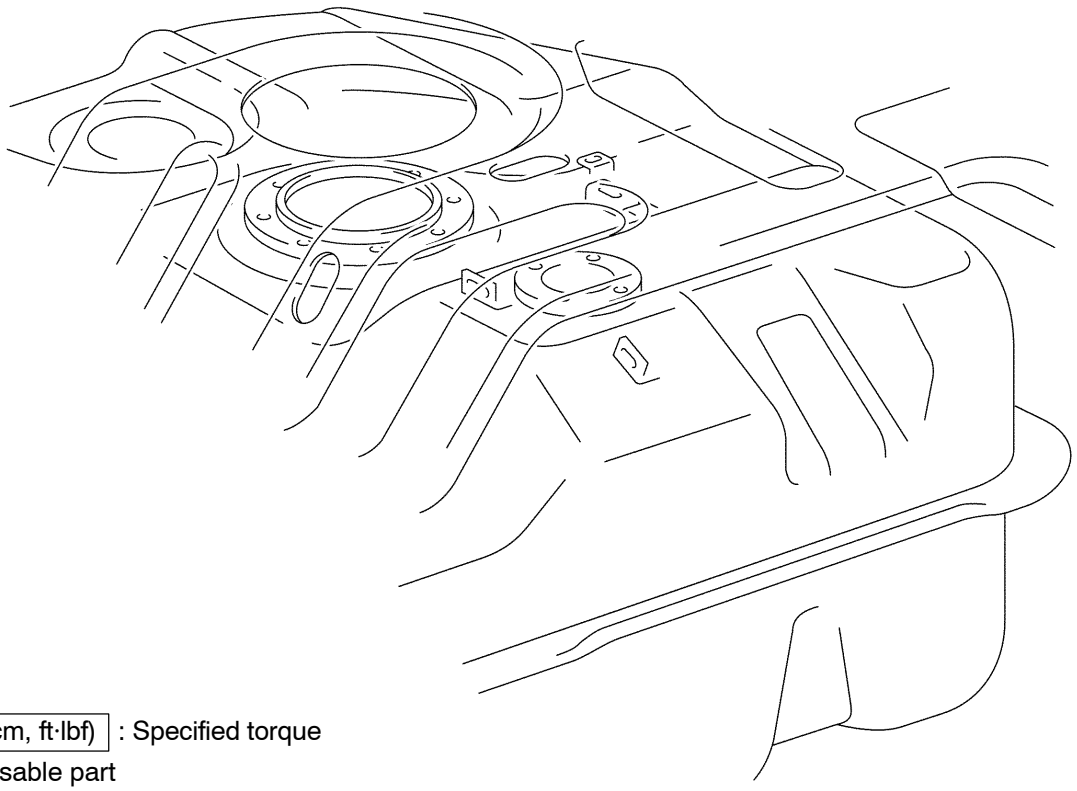

N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part

B04914

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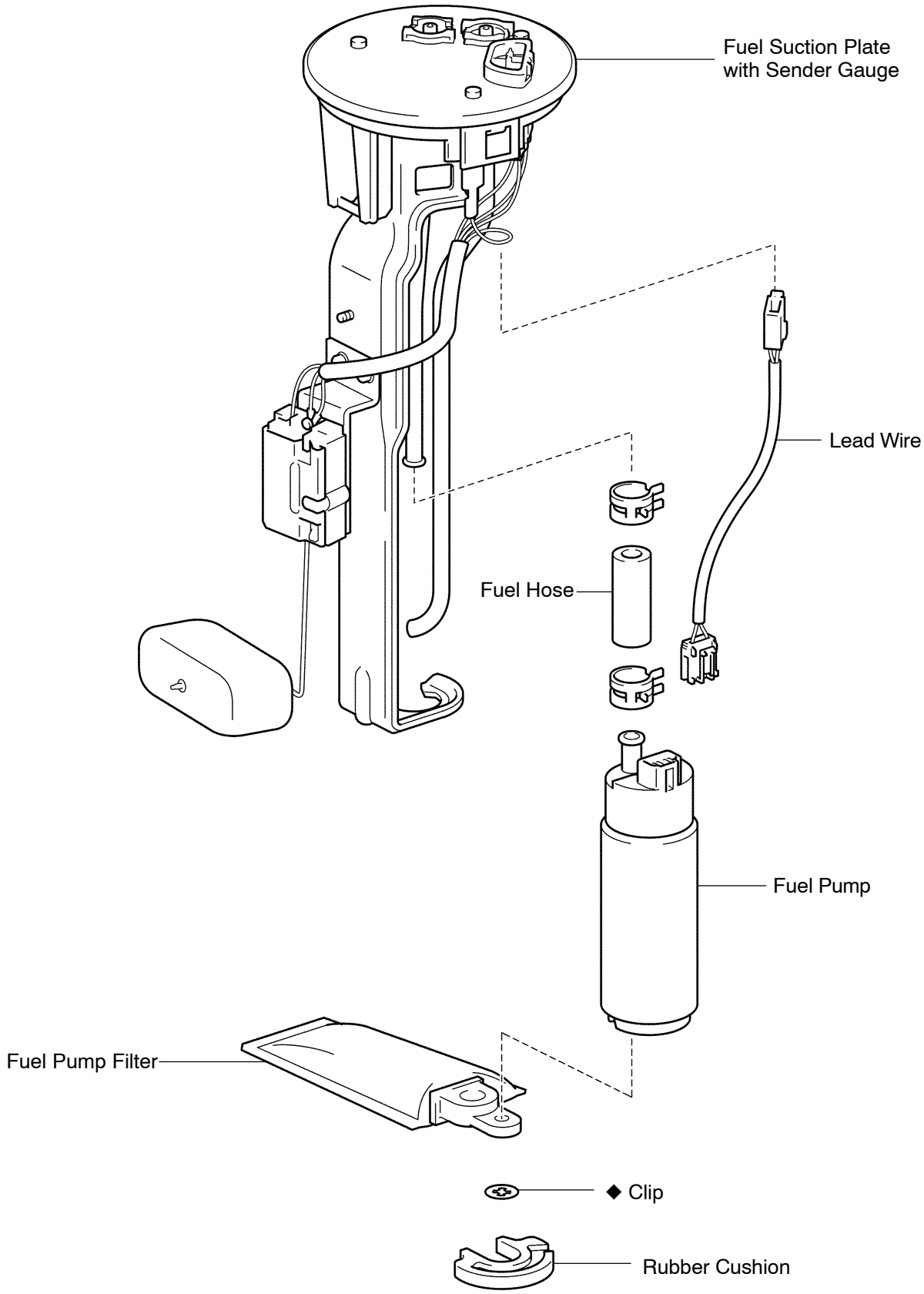

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SF0XX–01

REMOVAL

CAUTION:

Do not smoke or work near an open frame when working the fuel pump.

1. **REMOVE NO.1 REAR SEATS**
2. **REMOVE REAR DOOR SCUFF PLATES, STEP PLATES AND REAR SEAT LOCK COVERS**
3. **REMOVE FLOOR SERVICE HOLE COVER**

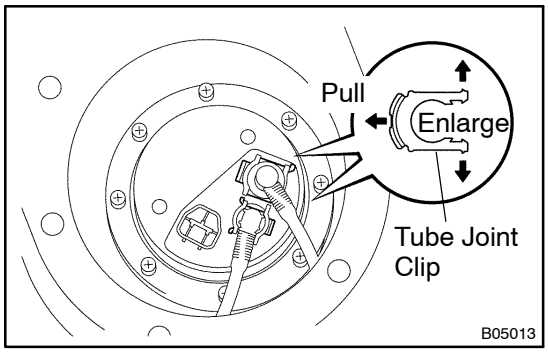
(a) Take off the front and rear floor carpets.

(b) Remove the 2 screws and service hole cover.

4. **DISCONNECT FUEL PUMP & SENDER GAUGE CONNECTOR**
5. **DISCONNECT FUEL MAIN TUBE AND RETURN TUBE (FUEL TUBE CONNECTORS) FROM FUEL SUCTION PLATE**

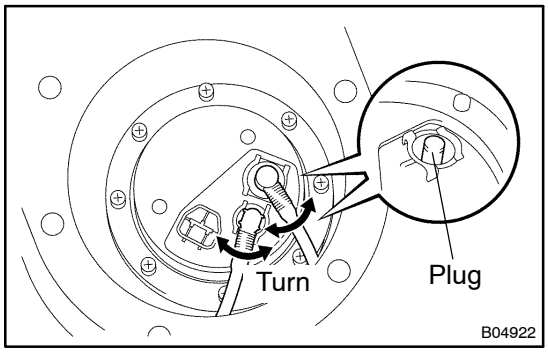
CAUTION:

- **Perform disconnecting operation of the fuel tube connector (quick type) after observing precaution. (See page SF–1)**
- **As there is retained pressure in the fuel line, prevent it from splashing inside the vehicle compartment.**
- **As the quick connector seals tube and suction plate through O–rings, perform the operation while taking sufficient care not to damage the contact surface or let the foreign matter stick on it.**
- **Be sure to perform the disconnection with your hands. Do not use tools.**
- **Do not bend or turn the nylon tube forcefully.**



(a) Before operation, remove the foreign matter or dirt stick to the tube joint clips and clean them.

(b) Enlarge the tip of the clips with your finger and pull them out for disconnection.



(c) Pull out the fuel main tube and return tube.

If the nylon tube and suction plate stick together, ease the connection by turning the nylon tube with your hand and pull it out for disconnection.

NOTICE:

Plug the port of the fuel suction plate with a clean rubber cap.

(d) After disconnection, protect the connector with a vinyl bag.

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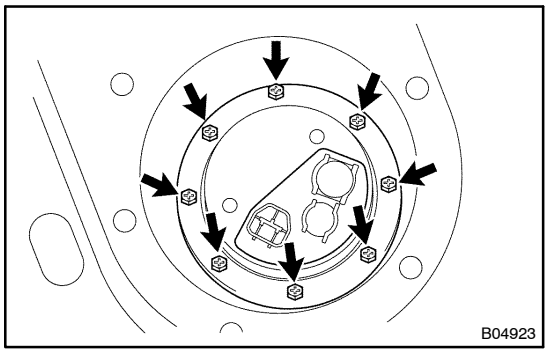


6. REMOVE FUEL PUMP AND SENDER GAUGE ASSEMBLY FROM FUEL TANK

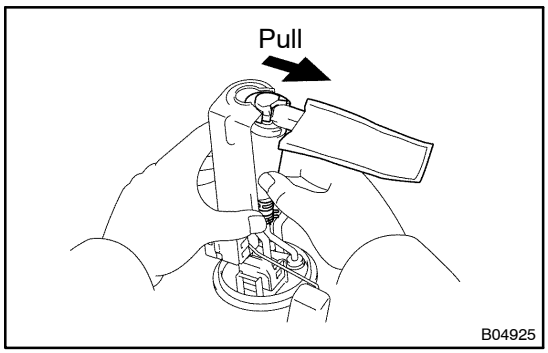
(a) Remove the 8 bolts.

(b) Pull out the fuel pump and sender gauge assembly.

NOTICE:

- **Do not damage the fuel pump filter.**
- **Be careful that the arm of the sender gauge should not bent.**

(c) Remove the gasket from the fuel section plate.



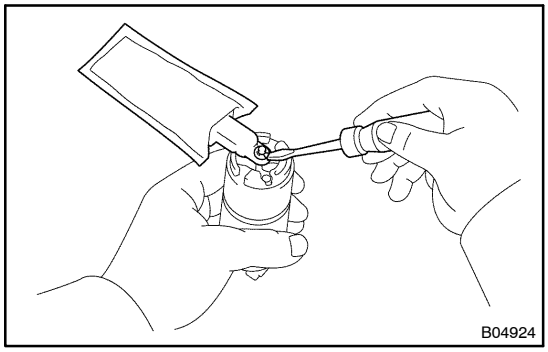
7. REMOVE LEAD WIRE FROM FUEL PUMP

8. REMOVE FUEL PUMP FROM FUEL PUMP BRACKET

(a) Pull out the lower side of the fuel pump from the pump bracket.

(b) Disconnect the fuel hose from the fuel pump, and remove the fuel pump.

(c) Remove the rubber cushion from the fuel pump.



9. REMOVE FUEL PUMP FILTER FROM FUEL PUMP

(a) Using a small screwdriver, remove the clip.

(b) Pull out the pump filter.

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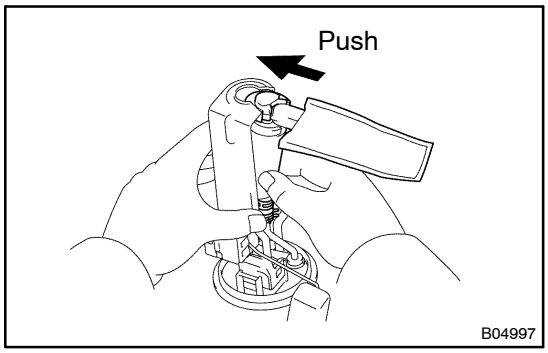
SF0XY–01

INSTALLATION



1. INSTALL FUEL PUMP FILTER TO FUEL PUMP

Install the pump filter with a new clip.

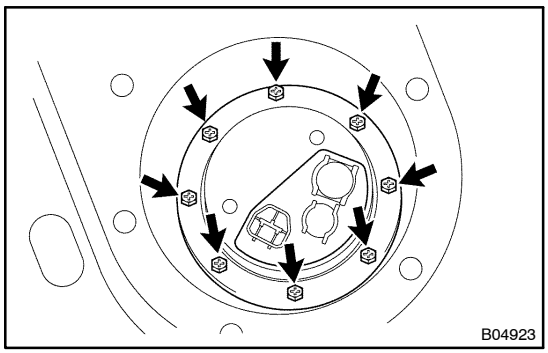
2. INSTALL FUEL PUMP TO FUEL PUMP BRACKET

(a) Install the rubber cushion to the fuel pump.

(b) Connect the fuel hose to the outlet port of the fuel pump.

(c) Install the fuel pump by pushing the lower side of the fuel pump.

3. INSTALL LEAD WIRE TO FUEL PUMP



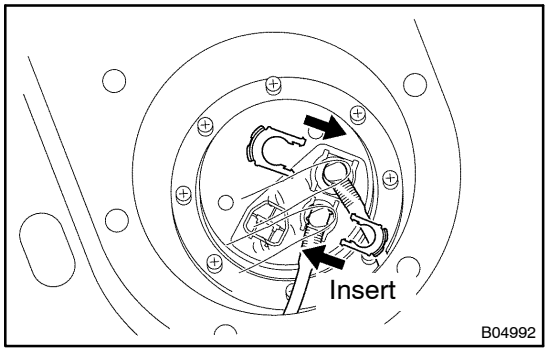
4. INSTALL FUEL PUMP AND SENDER GAUGE ASSEMBLY TO FUEL TANK

(a) Install a new gasket to the fuel suction plate.

(b) Insert the fuel pump and sender gauge assembly into the fuel tank.

(c) Install the fuel tank vent tube set plate with the 8 bolts.

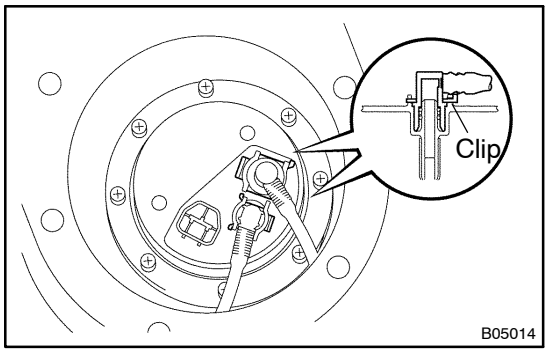
Torque: 3.5 N·m (35 kgf·cm, 31 in.·lbf)



5. CONNECT FUEL MAIN TUBE AND RETURN TUBE (FUEL TUBE CONNECTORS) TO FUEL SUCTION PLATE

(a) Before installing the tube connectors, check to see the connection between the nylon tube and suction plate for the presence of foreign matters.

(b) Attach the fuel tube connectors to the ports of the fuel suction plate and insert the clips until you hear a click.



(c) After connection, pull out the clips to check to see that they are installed securely.

6. CONNECT FUEL PUMP & SENDER GAUGE CONNECTOR

7. CHECK FOR FUEL LEAKS (See page SF–1)

8. INSTALL FLOOR SERVICE HOLE COVER

(a) Install the service hole cover with the 2 screws.

(b) Cover the rear and front floor carpets.

9. INSTALL REAR DOOR SCUFF PLATES, STEP PLATES AND REAR SEAT LOCK COVERS

10. INSTALL NO.1 REAR SEATS

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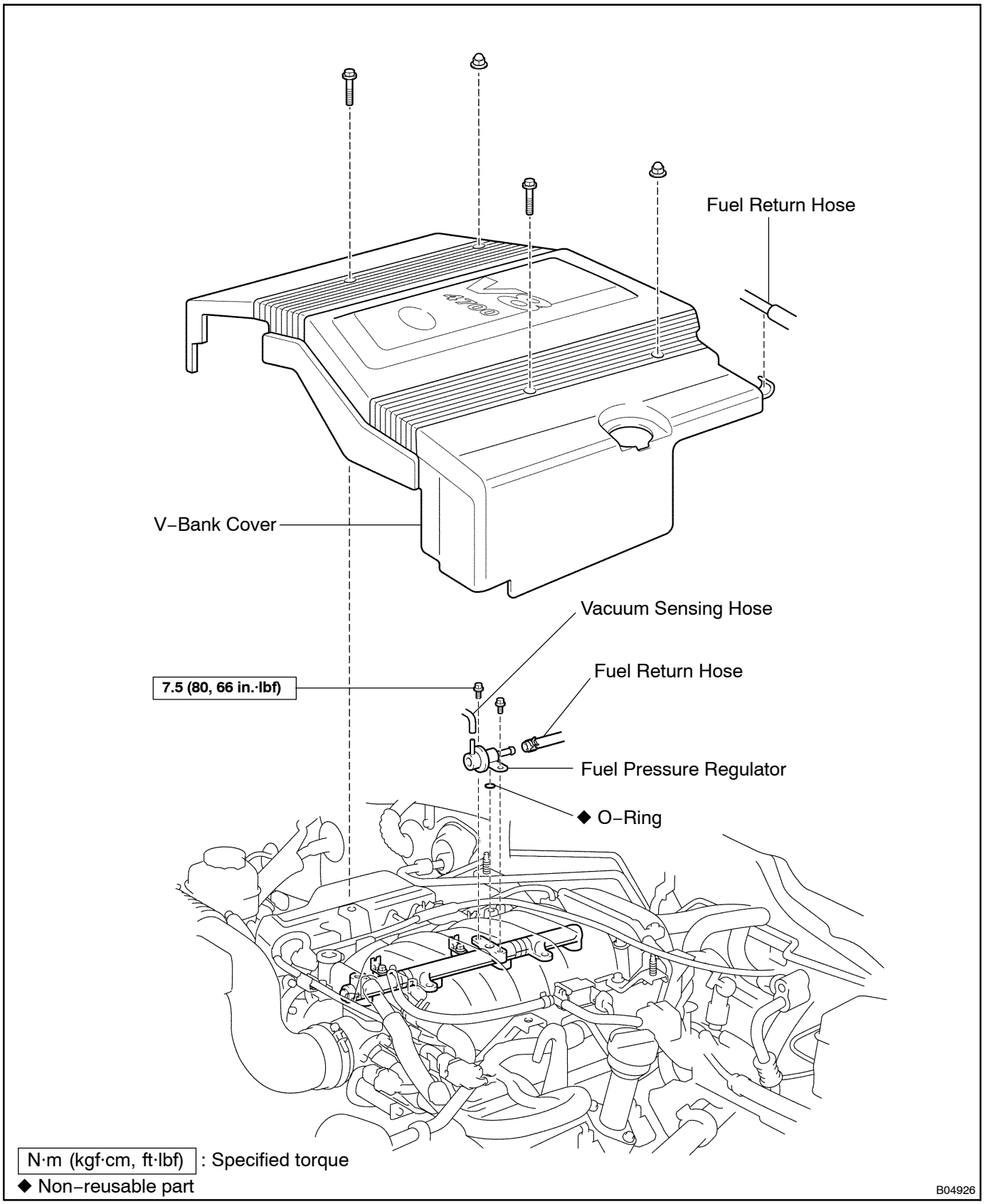
FUEL PRESSURE REGULATOR

COMPONENTS

SF0XZ–01



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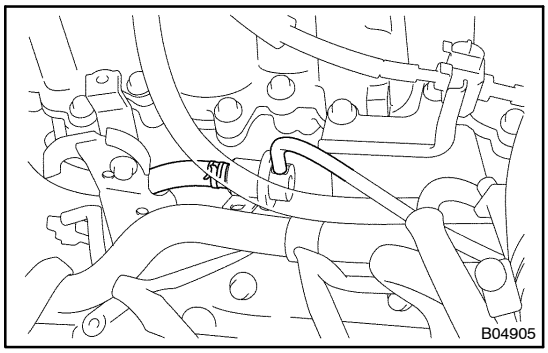
SF0Y0–01



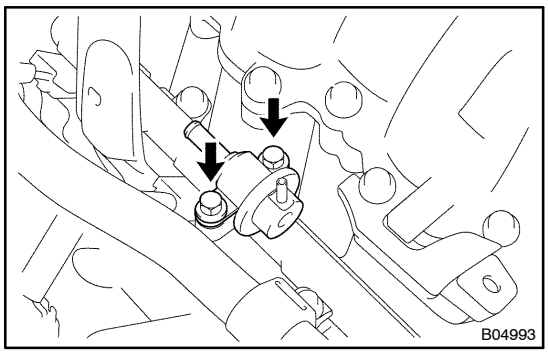
REMOVAL

1. REMOVE V–BANK COVER

2. REMOVE FUEL PRESSURE REGULATOR

(a) Disconnect these hoses from the pressure regulator:
- Vacuum sensing hose from intake air resonator
- Fuel return hose

CAUTION:
Put a shop towel under the pressure regulator.



(b) Remove the 2 bolts, and pull out the pressure regulator.
(c) Remove the O–ring from the pressure regulator.

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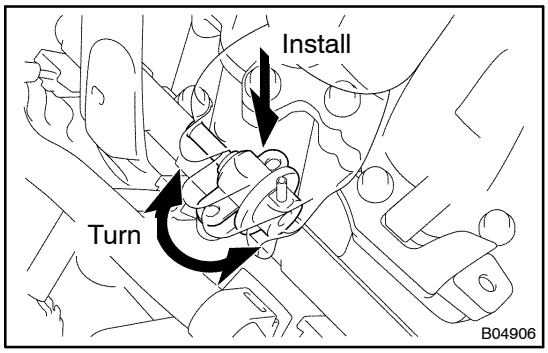
SF0Y1–01

INSTALLATION

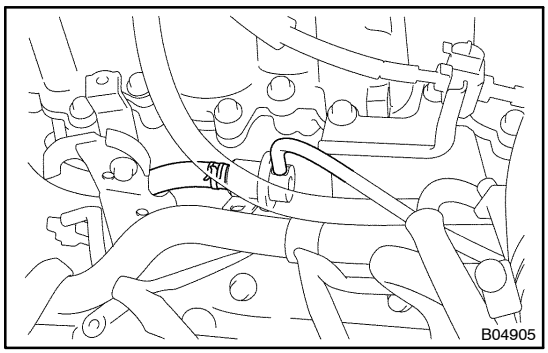


1. INSTALL FUEL PRESSURE REGULATOR

(a) Apply a light coat of gasoline to a new O–ring, and install it to the pressure regulator.

(b) While turning the pressure regulator left and right, install it to the delivery pipe.

(c) Install the pressure regulator with the 2 bolts.
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)



(d) Connect these hoses to the pressure regulator:
- Vacuum sensing hose to intake air resonator
- Fuel return hose

2. CHECK FOR FUEL LEAKS (See page SF–1)

3. INSTALL V–BANK COVER

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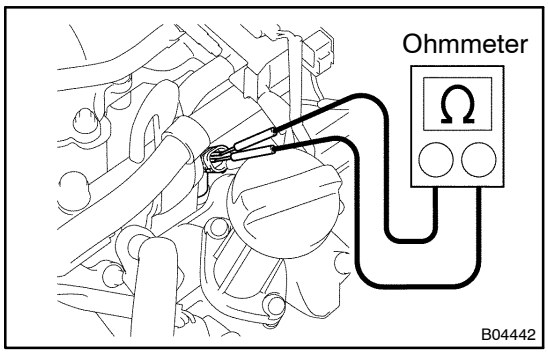
INJECTOR

SF0OR–02

ON–VEHICLE INSPECTION

1. REMOVE V–BANK COVER

2. REMOVE INTAKE AIR CONNECTOR



3. INSPECT INJECTOR RESISTANCE

(a) Disconnect the 8 injector connectors.

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

Resistance: 13.4 – 14.2 Ω at 20°C (68°F)

If the resistance is not as specified, replace the injector.

(c) Reconnect the 8 injector connectors.

4. REINSTALL INTAKE AIR CONNECTOR

5. REINSTALL V–BANK COVER

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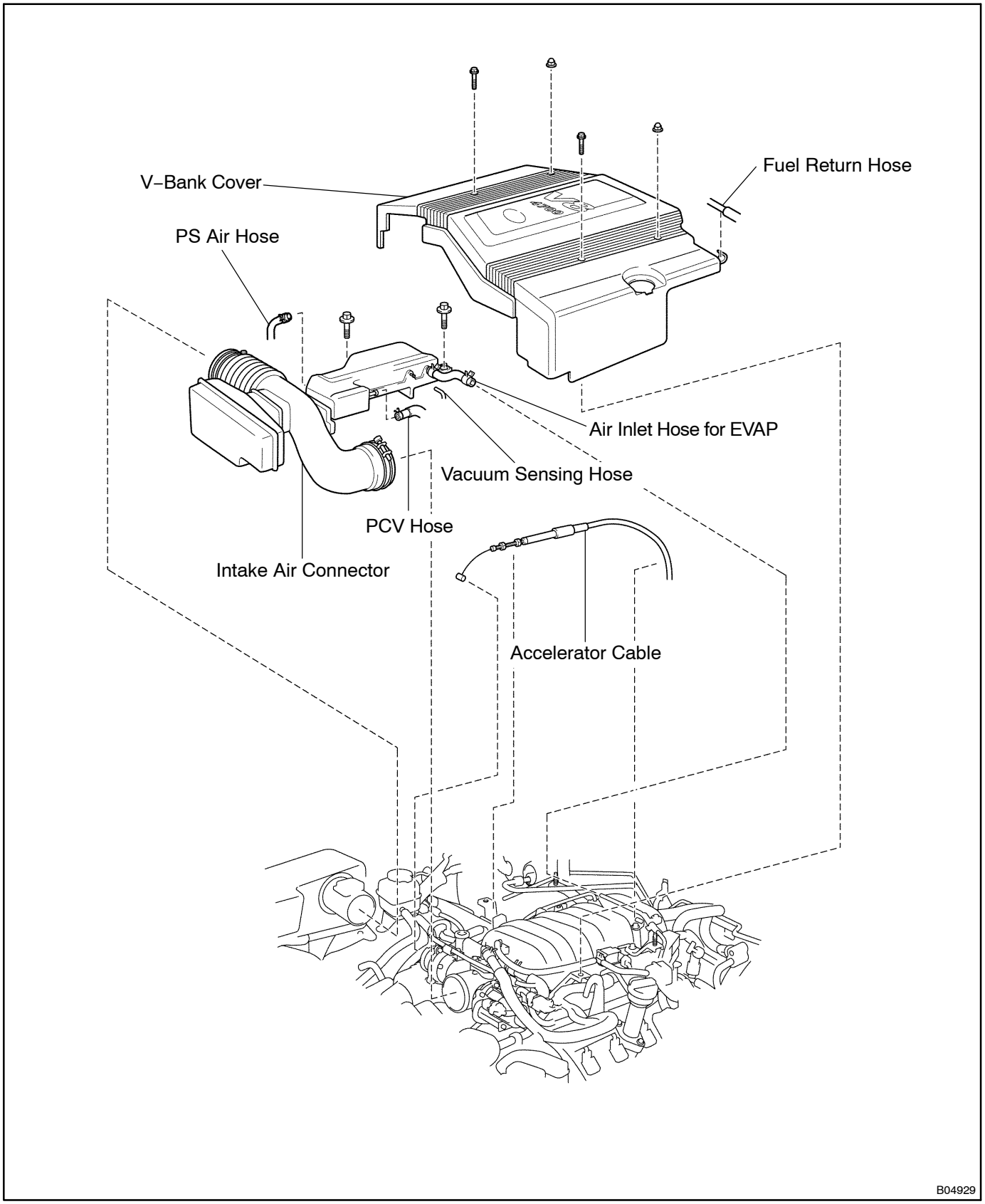
SF0OS–02

COMPONENTS



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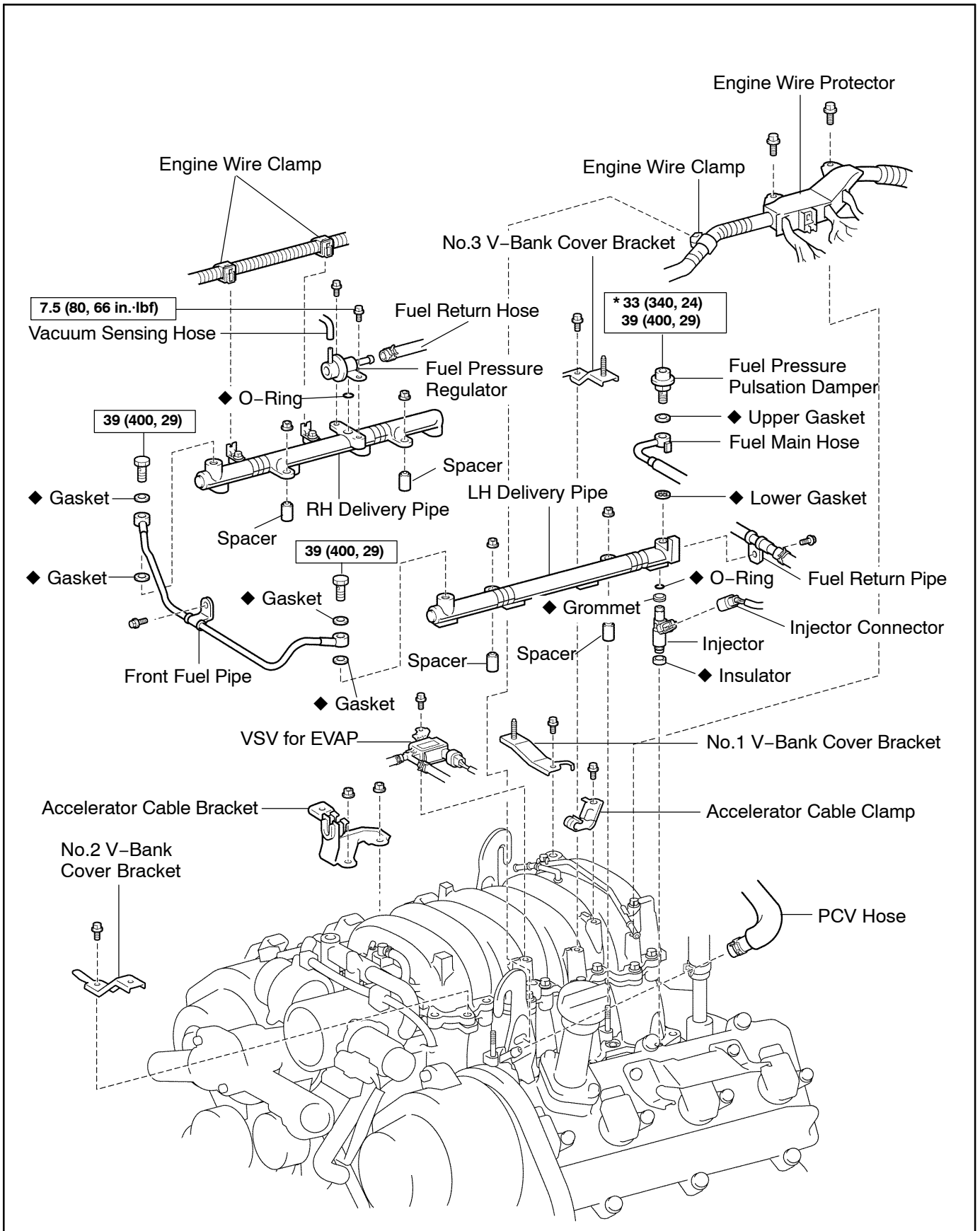

N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
* For use with SST

B04930

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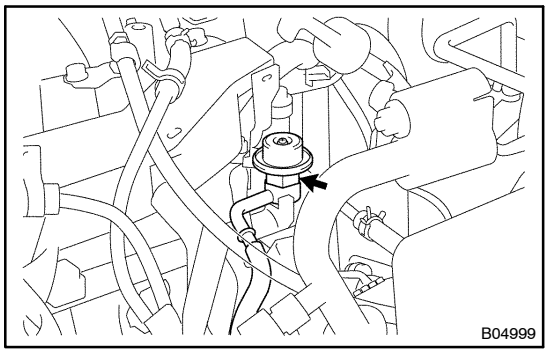
SF0Y2–01



REMOVAL

1. REMOVE V–BANK COVER

2. REMOVE INTAKE AIR CONNECTOR

3. REMOVE FUEL PRESSURE PULSATION DAMPER

Remove the pulsation damper, upper gasket, fuel main hose and lower gasket.

CAUTION:

- **Put a shop towel under the delivery pipe.**
- **Slowly loosen the pulsation damper.**

4. REMOVE ACCELERATOR CABLE BRACKET

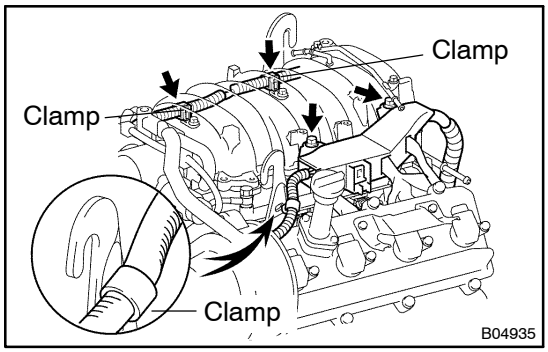
(a) Disconnect the accelerator cable from the engine.

(b) Remove the 2 nuts and accelerator cable bracket.

5. DISCONNECT ENGINE WIRE PROTECTOR FROM UPPER INTAKE MANIFOLD

(a) Remove and disconnect these parts:

- PCV hose from PCV valve
- VSV for EVAP from upper intake manifold
- Accelerator cable clamp from upper intake manifold
- No.1 V–bank cover bracket from upper intake manifold
- No.2 V–bank cover bracket from upper intake manifold
- No.3 V–bank cover bracket from upper intake manifold



(b) Remove the 2 bolts, and disconnect the engine wire protector from the upper intake manifold.

(c) Disconnect the engine wire clamp from the No.1 engine hanger.

6. DISCONNECT ENGINE WIRE FROM RH DELIVERY PIPE

Disconnect the 2 wire clamps on the engine wire from the brackets on the delivery pipe

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.**

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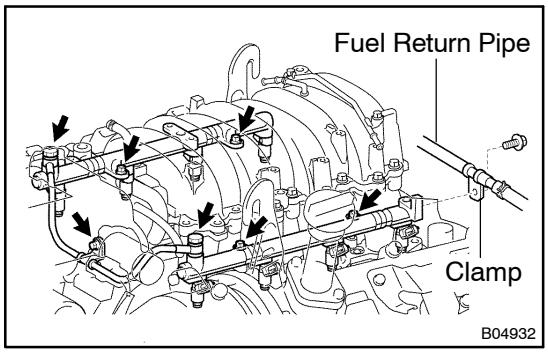

(a) Remove the bolt holding the clamp on the fuel return pipe to the LH delivery pipe.
(b) Remove the bolt, 2 union bolts, 4 gaskets and front fuel pipe.
(c) Disconnect the 8 injector connectors.
(d) Remove the 4 nuts holding the delivery pipes to the lower intake manifold.
(e) Remove the 2 delivery pipes, 8 injectors, 4 spacers and 8 insulators.
(f) Remove the O–ring and grommet from each injector.

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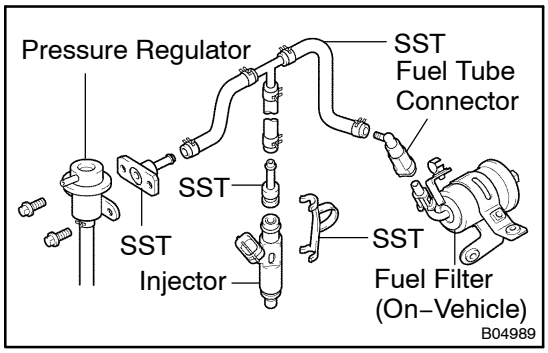
SF0Y3–01

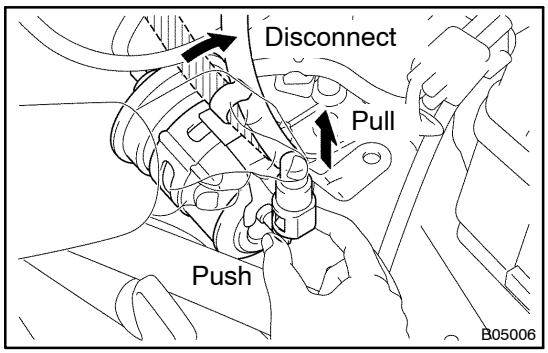


INSPECTION

1. INSPECT INJECTOR INJECTION

CAUTION:

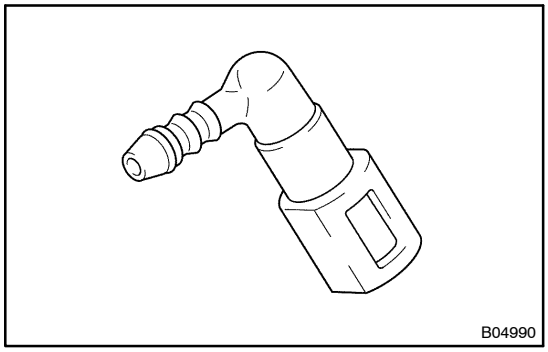
Keep injector clean of sparks during the test.



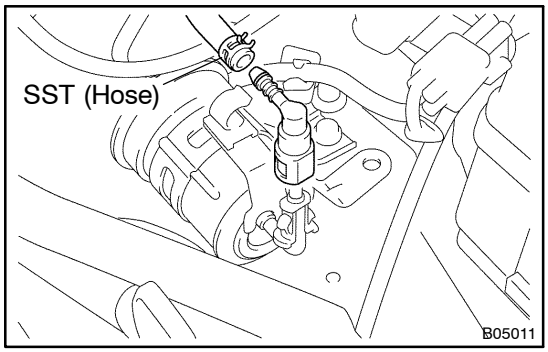
(a) Disconnect the fuel inlet hose (fuel tube connector) from the fuel filter.

CAUTION:

- **Perform disconnecting operations of the fuel tube connector (quick type) after observing the precautions.**
- **As there is retained pressure in the fuel pipe line, prevent it from splashing inside the engine compartment.**



(b) Purchase the new fuel main hose and take out the fuel tube connector from its hose.
Part No. 23271–50150



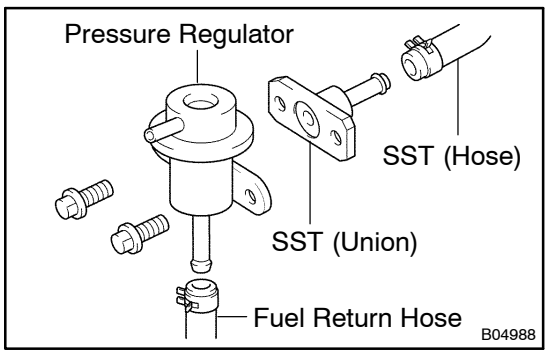
(c) Connect SST (hose) and fuel tube connector to the fuel filter outlet.
SST 09268–41047

CAUTION:

Perform connecting operations of the fuel tube connector (quick type) after observing the precautions.

HINT:

Use the vehicle's fuel filter.



(d) Remove the pressure regulator from the delivery pipe.
(e) Install the O–ring to the fuel inlet of the pressure regulator.
(f) Connect SST (hose) to the fuel inlet of the pressure regulator with SST (union) and the 2 bolts.
SST 09268–41047 (09268–41091)
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)
(g) Connect the fuel return hose to the fuel outlet of the pressure regulator.

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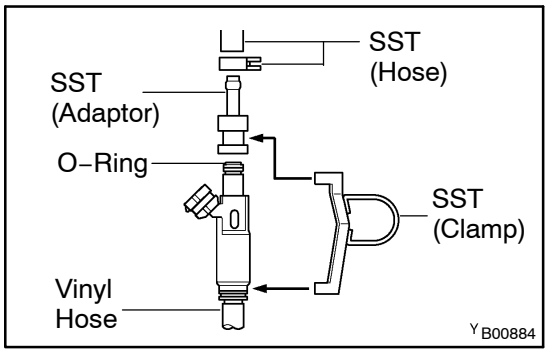
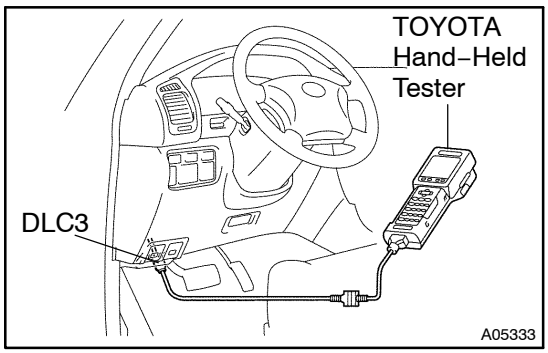


(h) Install the O–ring to the injector.
(i) Connect SST (adaptor and hose) to the injector, and hold the injector and union with SST (clamp).
SST 09268–41047 (09268–41110, 09268–41300)
(j) Put the injector into the graduated cylinder.

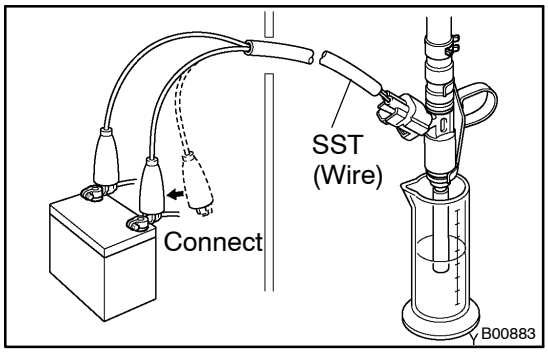
CAUTION:
Install a suitable vinyl hose onto the injector to prevent gasoline from splashing out.



(k) Connect a TOYOTA hand–held tester to the DLC3.
(l) Connect the battery negative (–) cable to the battery.
(m) Turn the ignition switch ON, and push the TOYOTA hand–held tester main switch ON.

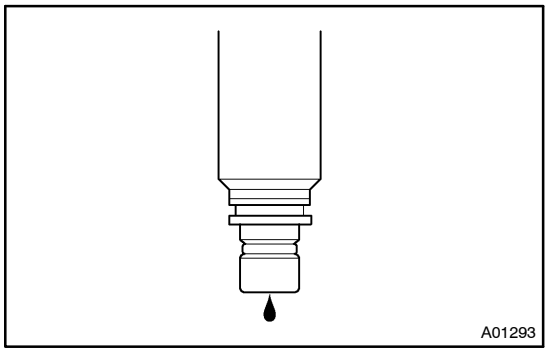
NOTICE:
Do not start the engine.

(n) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.
(o) Please refer to the TOYOTA hand–held tester operator's manual for further details.
(p) If you have no TOYOTA hand–held tester, connect the positive (+) and negative (–) leads from the battery to the fuel pump connector. (See page SF–7)



(q) Connect SST (wire) to the injector and battery for 15 seconds, and measure the injection volume with a graduated cylinder. Test each injector 2 or 3 times.
SST 09842–30070
Volume: 56 – 69 cm^3 (3.4 – 4.2 cu in.) per 15 seconds
Difference between each injector:
13 cm^3 (0.8 cu in.) or less

If the injection volume is not as specified, replace the injector.



2. INSPECT LEAKAGE

(a) In the condition above, disconnect the tester probes of SST (wire) from the battery and check the fuel leakage from the injector.
SST 09842–30070
Fuel drop: 1 drop or less per 12 minutes

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(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
(e) Disconnect the TOYOTA hand–held tester from the DLC3.
(f) Reconnect the fuel inlet pipe (fuel tube connector) to the fuel filter.

CAUTION:
Perform connecting operations of the fuel tube connector (quick type) after observing the precautions.

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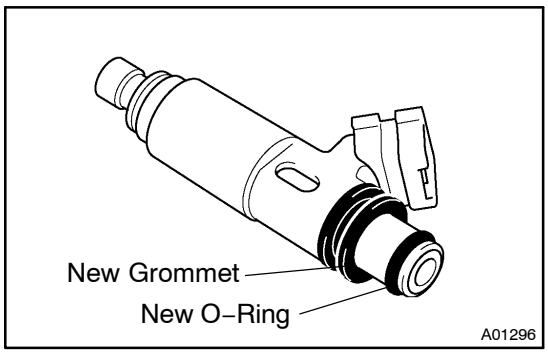
SF0Y4–01

INSTALLATION

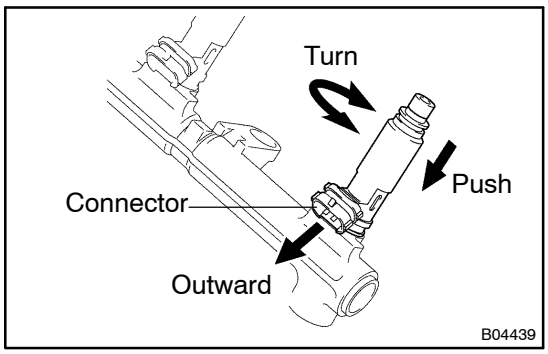
1. INSTALL INJECTORS AND DELIVERY PIPES

NOTICE:

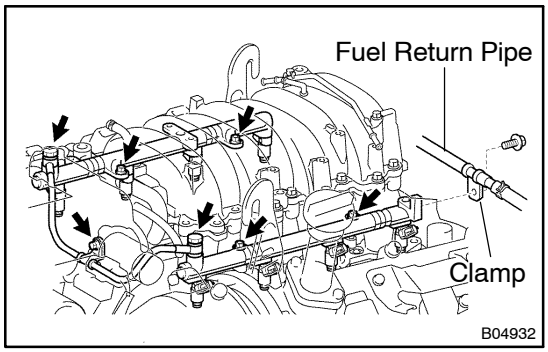
- **Be careful not to drop the injectors when installing the delivery pipes.**
- **Pay attention to put any hung load on the injector to and from the side direction.**



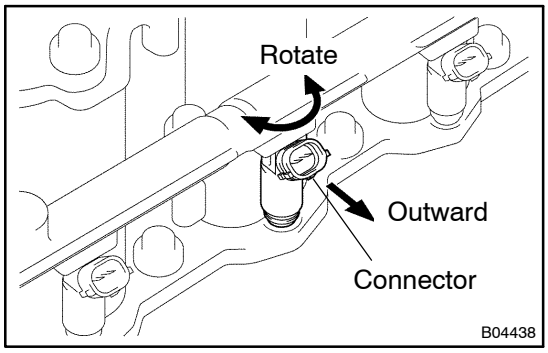
(a) Install a new grommet to each injector.
(b) Apply a light coat of gasoline to a new O–rings and install it to each injector.



(c) While turning the injector clockwise and counterclockwise, push it to the delivery pipes. Install the 8 injectors.
(d) Position injector connector outward.
(e) Place the 4 spacers and 8 new insulators on the intake manifold.
(f) Place the 2 delivery pipes and injectors assemblies on the lower intake manifold.
(g) Temporarily install the 4 nuts.
(h) Install the front fuel pipe with the bolt, 4 new gaskets and 2 union bolts.
Torque:
39 N·m (400 kgf·cm, 29 ft·lbf) for union bolts
7.5 N·m (80 kgf·cm, 66 in.·lbf) for bolt



(i) Install the bolt holding the clamp on the fuel return pipe to the LH delivery pipe.
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)



(j) Check that the injectors rotate smoothly.

HINT:

If injectors do not rotate smoothly, the probable cause is incorrect installation of O–rings. Replace the O–rings.

(k) Position injector connector outward.
(l) Tighten the 4 nuts holding the delivery pipes to the lower
(m) intake manifold.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
(n) Connect the 8 injectors connectors.

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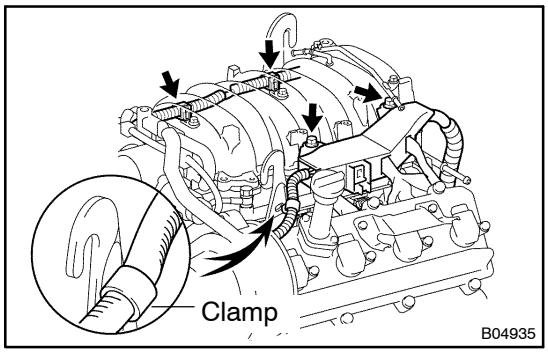

2. INSTALL ENGINE WIRE TO LH DELIVERY PIPE

Install the 2 wire clamps on the engine wire to the brackets on the delivery pipe.

3. INSTALL ENGINE WIRE PROTECTOR

(a) Connect the engine wire clamp to the No.1 engine hanger.

(b) Install the engine wire protector with the 2 bolts.

(c) Install and connect these parts:

- PCV hose to PCV valve
- VSV for EVAP to upper intake manifold
- Accelerator cable clamp to upper intake manifold
- No.1 V–bank cover bracket to upper intake manifold
- No.2 V–bank cover bracket to upper intake manifold
- No.3 V–bank cover bracket to upper intake manifold

4. INSTALL ACCELERATOR CABLE BRACKET

(a) Install the accelerator cable bracket with the 2 nuts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(b) Connect the accelerator cable to the engine.

5. INSTALL FUEL PRESSURE PULSATION DAMPER (See page SF–1)

6. INSTALL INTAKE AIR CONNECTOR

7. INSTALL V–BANK COVER

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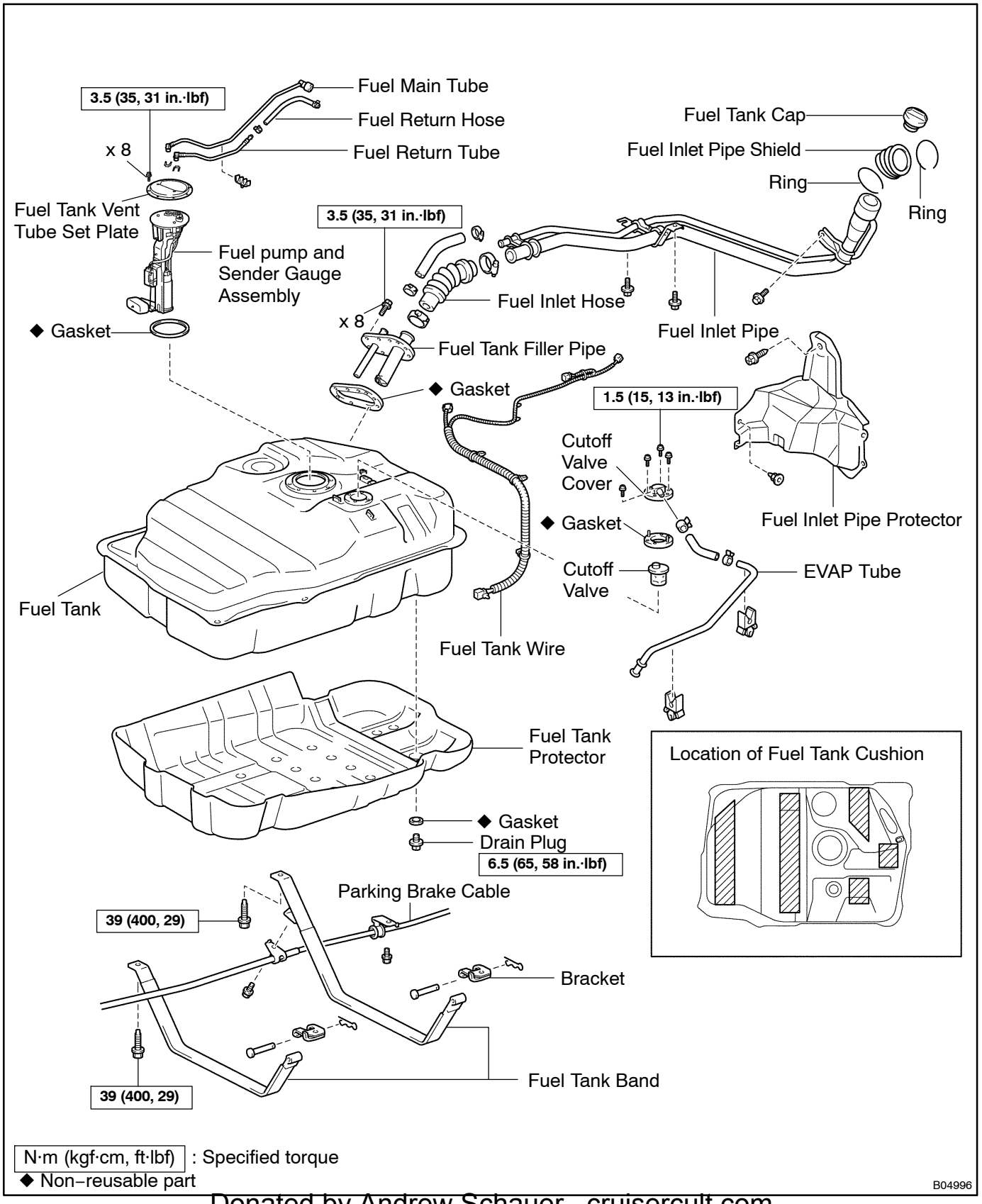
FUEL TANK AND LINE

SF0OZ–02

COMPONENTS

CAUTION:

- **Always use new gaskets when replacing the fuel tank or component parts.**
- **Apply the proper torque to all parts tightened**



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

B04996

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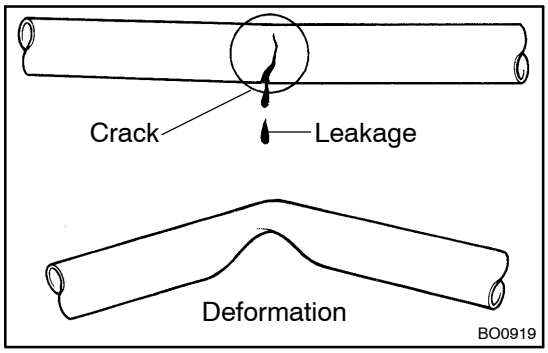
SF0P0–02



INSPECTION

INSPECT FUEL TANK AND LINE

(a) Check the fuel lines for cracks or leakage, and all connections for deformation.

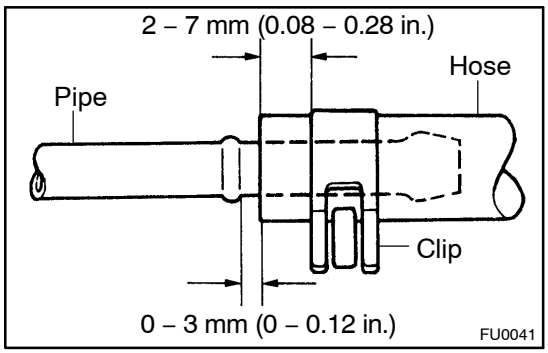
(b) Check the fuel tank vapor vent system hoses and connections for looseness, sharp bends or damage.

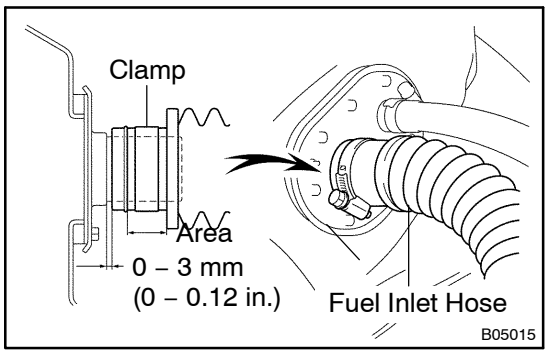
(c) Check the fuel tank for deformation, cracks, fuel leakage or tank band looseness.

(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.





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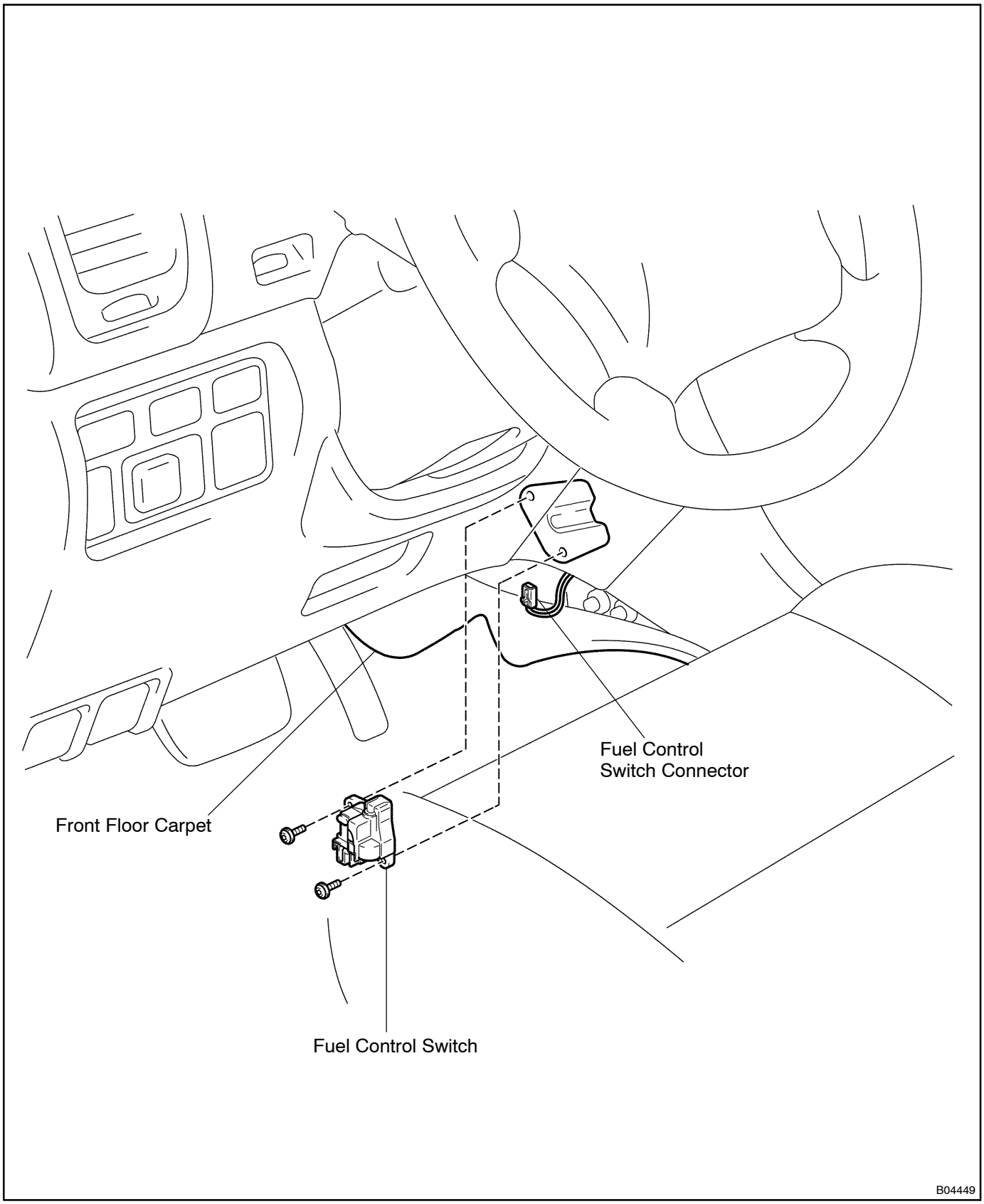
FUEL CONTROL SWITCH

COMPONENTS

SF0Y5–01



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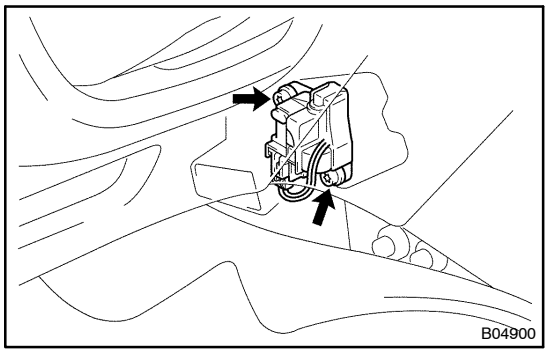
SF0Y6–01



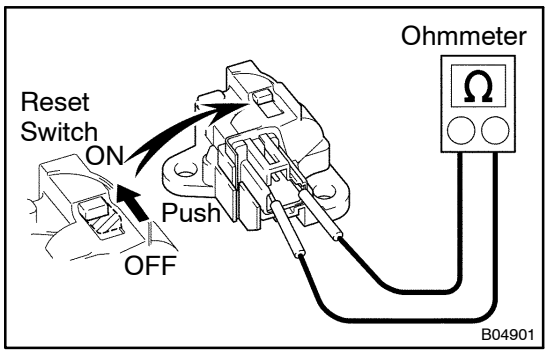
INSPECTION

1. DISCONNECT FUEL CONTROL SWITCH CONNECTOR

Take off the front floor carpet, and disconnect the connector.

2. REMOVE FUEL CONTROL SWITCH

Using a torx driver (T30), remove the 2 bolts and switch.



3. INSPECT FUEL CONTROL SWITCH

(a) Check that there is no continuity between terminals with the reset switch OFF.

(b) Check that there is continuity between terminals with the reset switch ON.

If operation is not as specified, replace the switch.

4. REINSTALL FUEL CONTROL SWITCH

NOTICE:

Check that the reset switch ON position.

5. RECONNECT FUEL CONTROL SWITCH CONNECTOR

6. CHECK THAT START ENGINE

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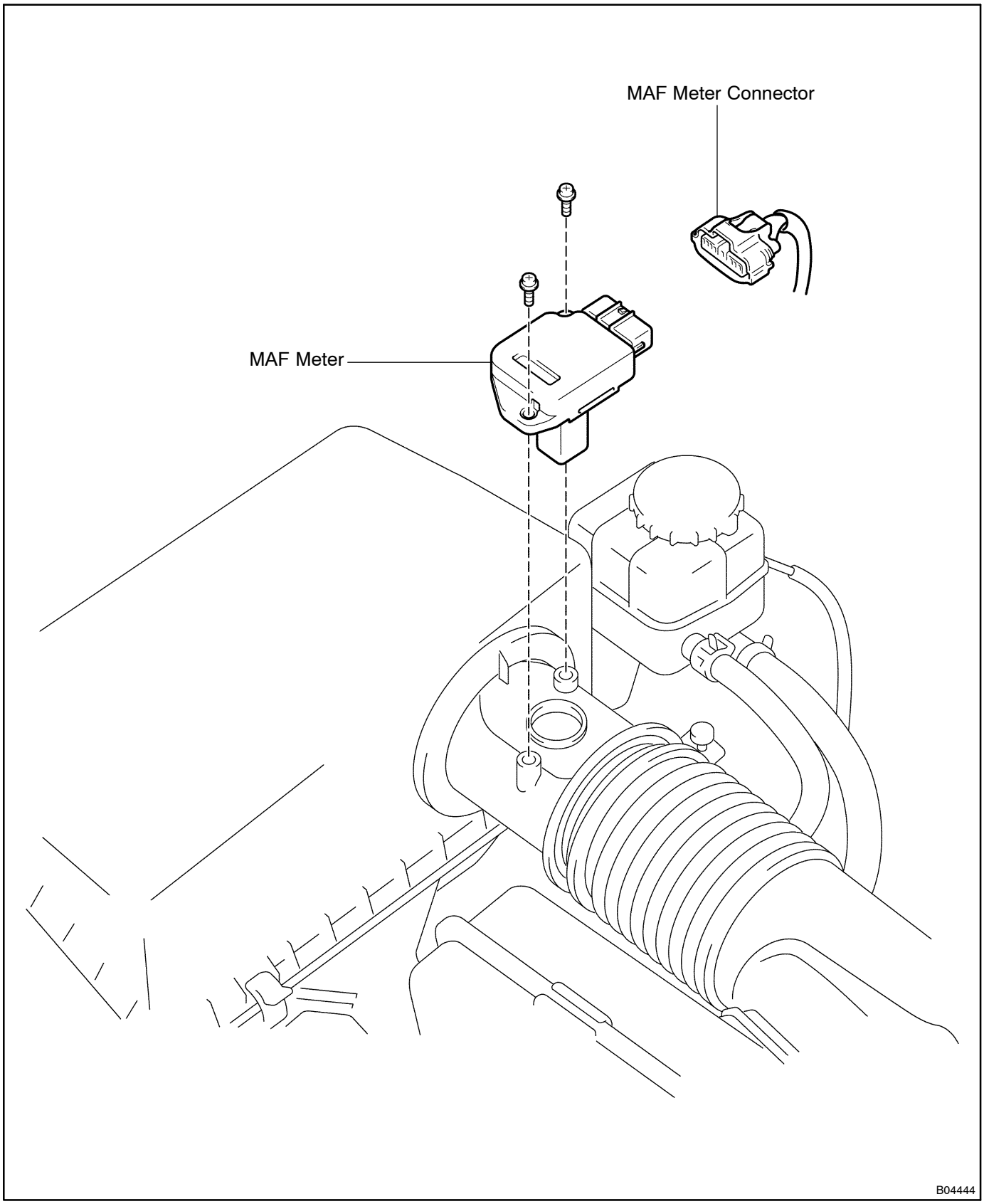
MASS AIR FLOW (MAF) METER

COMPONENTS

SF0P1–02



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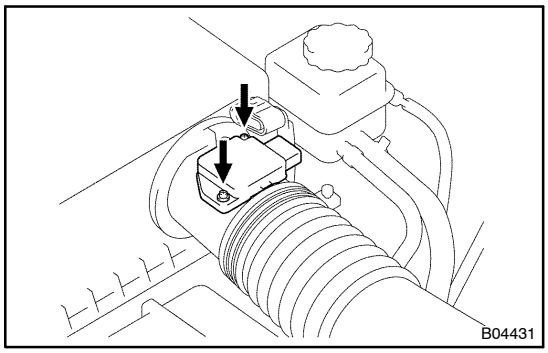
SF0P2–02

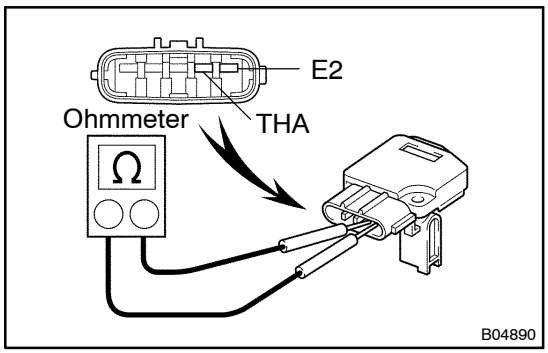


INSPECTION

1. DISCONNECT MAF METER CONNECTOR

2. REMOVE MAF METER

Remove the 2 screws and MAF meter.

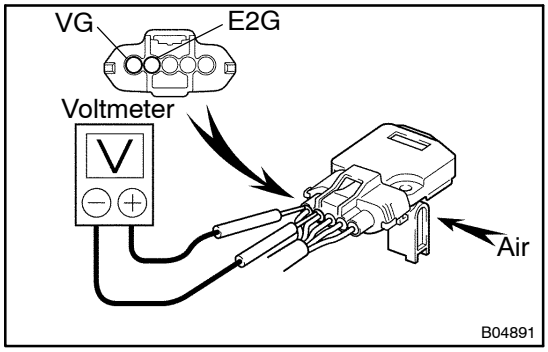


3. INSPECT MAF METER

(a) Using an ohmmeter, measure the resistance between terminals THA and E2.

Terminals	Resistance	Temperature
THA – E2	12.5 – 16.9 kΩ	–20°C (–4°F)
THA – E2	2.19 – 2.67 kΩ	20°C (68°F)
THA – E2	0.50 – 0.68 kΩ	60°C (140°F)

If the resistance is not as specified, replace the MAF meter.



(b) Inspect for operation.

(1) Connect the MAF meter connector.

(2) Connect the negative (–) terminal cable to the battery.

(3) Turn the ignition switch ON.

(4) Using a voltmeter, connect the positive (+) tester probe to terminal VG, and negative (–) tester probe to terminal E2G.

(5) Blow air into the MAF meter, and check that the voltage fluctuates.

If operation is not as specified, replace the MAF meter.

(6) Turn the ignition switch OFF.

(7) Disconnect the negative (–) terminal cable from the battery.

(8) Disconnect the MAF meter connector.

4. REINSTALL MAF METER

Install the MAF meter with the 2 screws.

5. RECONNECT MAF METER CONNECTOR

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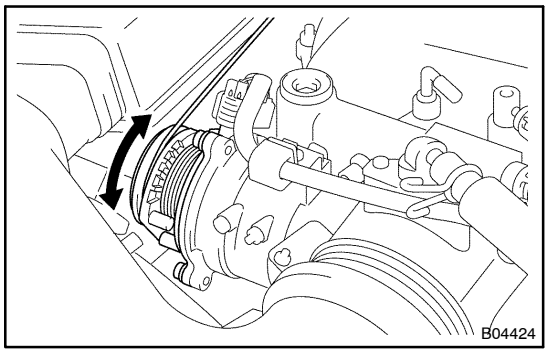


THROTTLE BODY

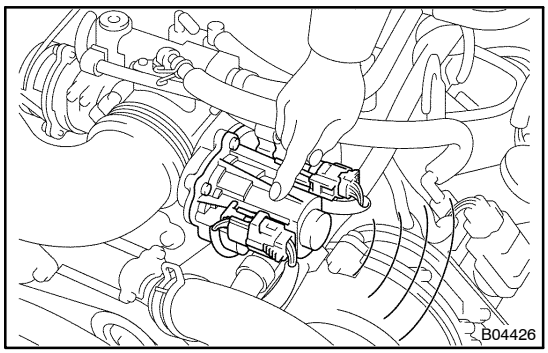
SF0P3–02

ON–VEHICLE INSPECTION

1. REMOVE V–BANK COVER

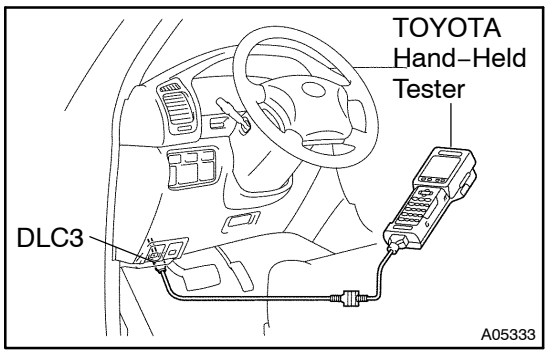
2. INSPECT SYSTEM OPERATION

(a) Check that the throttle linkage moves smoothly.



(b) Inspect the throttle control motor for operating sound.
   (1) Turn the ignition switch ON.
   (2) When turning the accelerator pedal position sensor lever, check the running sound of the motor. Also, check that there is no friction sound.

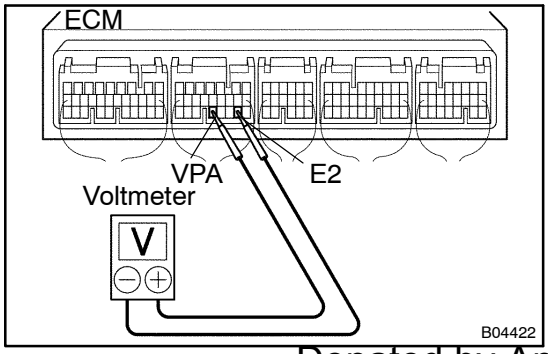
If operation is not as specified, check the throttle control motor (See step 3), wiring and ECM.



(c) Inspect the accelerator pedal position sensor.
   (1) Connect the TOYOTA hand–held tester to the DLC3.
   (2) Check that the MIL does not light up.
   (3) When turning the accelerator pedal position sensor lever to the full–open position, check that the throttle valve opening percentage (THROTTLE POS) of the CURRENT DATA showns the standard value.

   Standard throttle valve opening percentage:
   60 % or more

If operation is not as specified, check that the accelerator pedal position sensor (See step 5), wiring and ECM.



If you have no TOYOTA hand–held tester, measure voltage between terminals VPA and E2 of the ECM connector.

(d) Inspect the air assist system.
   (1) Start the engine and check that the MIL does not light up.
   (2) Allow the engine to warm up to normal operating temperature.
   (3) Turn the A/C compressor ON to OFF, and check the idle speed.

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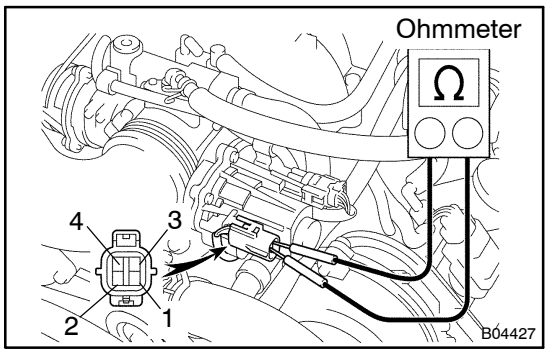
Idle speed (Transmission in neutral): 700 ± 50 rpm

NOTICE:

Perform inspection under condition without electrical load.

(e) After checking the above (b) to (d), perform the driving test and check that there is no sense of incongruity.



3. INSPECT THROTTLE CONTROL MOTOR

(a) Disconnect the throttle control motor connector.

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

Motor resistance: 0.3 – 100 Ω at 20°C (68°F)

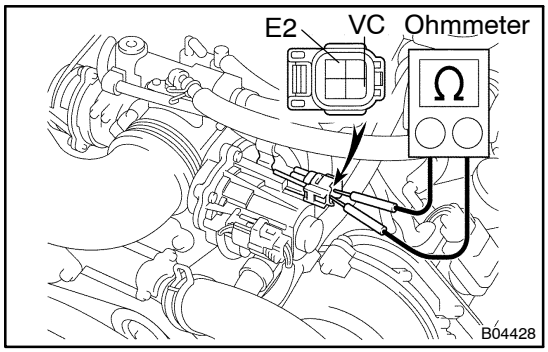
If the resistance is not as specified, replace the throttle control motor. (See page SF–40)

(c) Using an ohmmeter, measure the clutch resistance between terminal 3 (CL–) and 4 (CL+).

Clutch resistance: 4.2 – 5.2 Ω at 20°C (68°F)

If the resistance is not as specified, replace the throttle control motor. (See page SF–40)

(d) Reconnect the throttle control motor connector.



4. INSPECT THROTTLE POSITION SENSOR

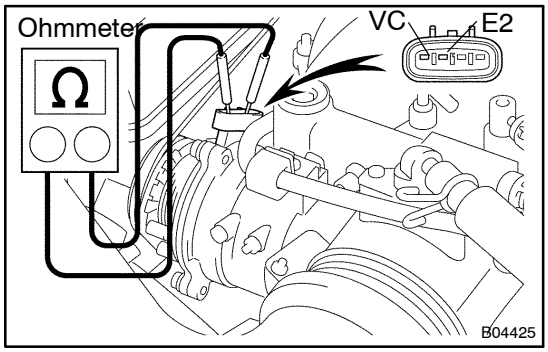
(a) Disconnect the throttle position sensor connector.

(b) Using an ohmmeter, measure the resistance between terminals VC and E2.

Resistance: 1.25 – 2.35 kΩ at 20°C (68°F)

If the resistance is not as specified, replace the throttle position sensor. (See page SF–40)

(c) Reconnect the throttle position sensor connector.



5. INSPECT ACCELERATOR PEDAL POSITION SENSOR

(a) Disconnect the pedal position sensor connector.

(b) Using an ohmmeter, measure the resistance between terminals VC and E2.

Resistance: 1.64 – 3.28 kΩ at 20°C (68°F)

If the resistance is not as specified, replace the accelerator pedal position sensor. (See page SF–40)

(c) Reconnect the pedal position sensor connector.

6. REINSTALL V–BANK COVER

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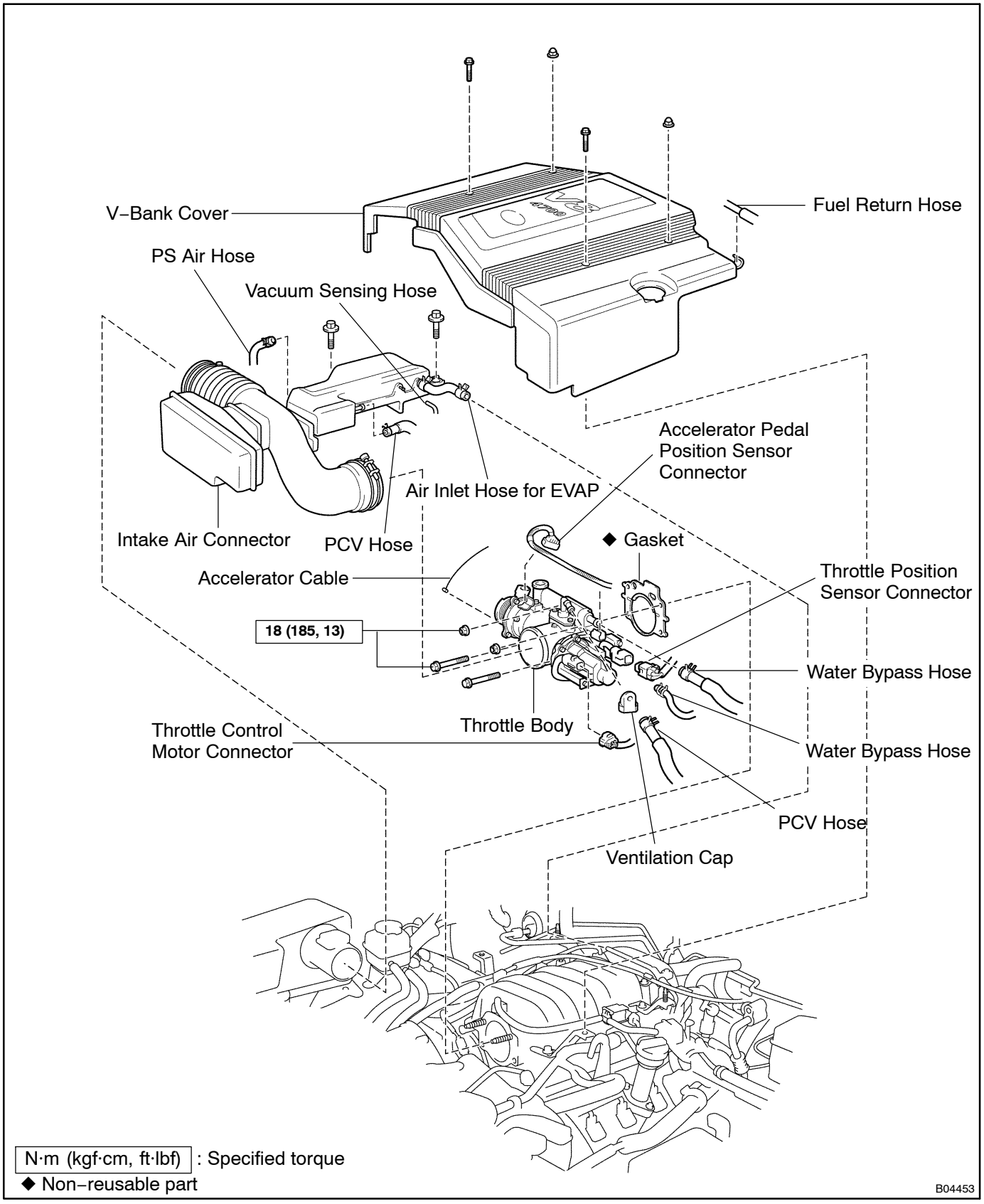
SF0P4–02

COMPONENTS



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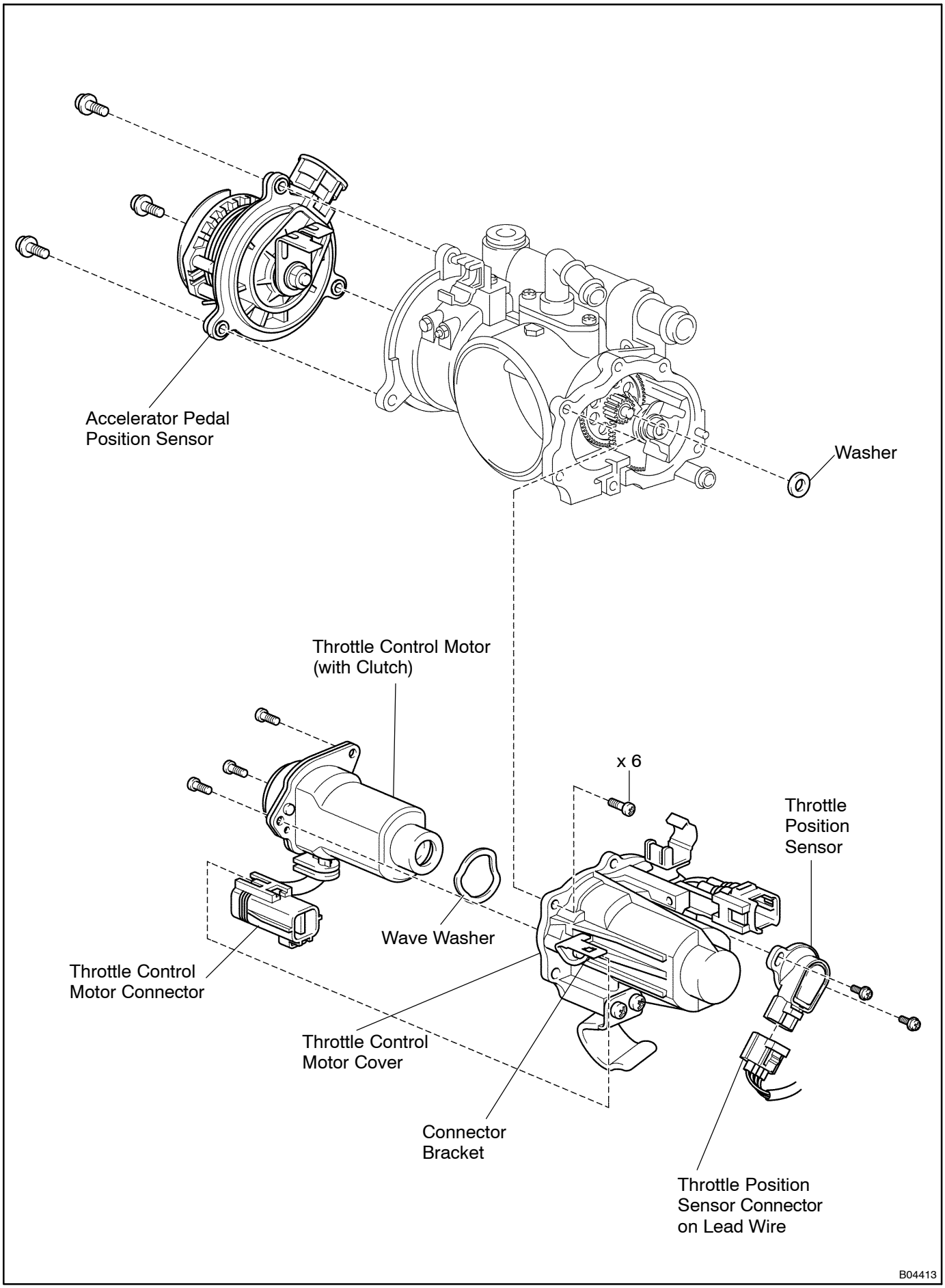

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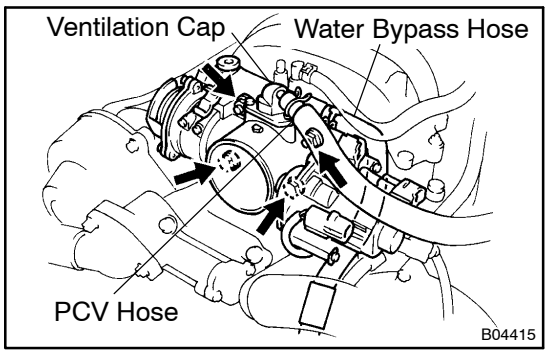
SF0P5–02

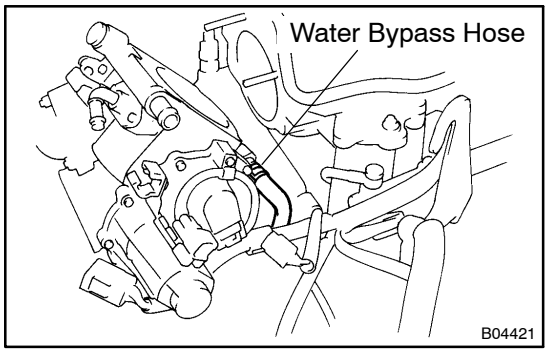
REMOVAL

1. **REMOVE V–BANK COVER**
2. **DRAIN ENGINE COOLANT**
3. **REMOVE INTAKE AIR CONNECTOR**
4. **DISCONNECT ACCELERATOR CABLE FROM THROTTLE BODY**
5. **REMOVE THROTTLE BODY**

(a) Disconnect the connectors and wire:
- Throttle position sensor connector
- Throttle control motor connector
- Accelerator pedal position sensor connector
- Accelerator pedal position sensor wire from 2 clamps on wire brackets



(b) Disconnect the PCV hose and water bypass hose from the throttle body.
(c) Remove the ventilation cap.
(d) Remove the 2 bolts and 2 nuts, and disconnect the throttle body from the intake manifold.



(e) Disconnect the water bypass hose from the manifold thermostat on the throttle body, and remove the throttle body.
(f) Remove the gasket.

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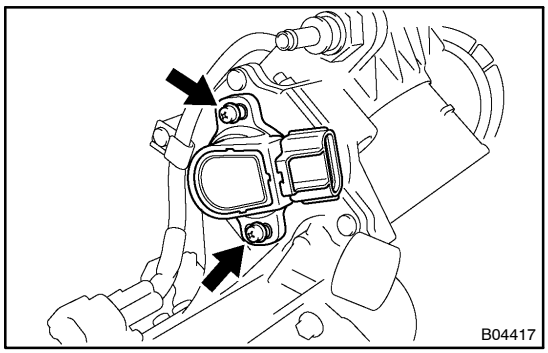
SF0P6–02

REPLACEMENT

NOTICE:

- **To prevent deterioration, do not shock the throttle position sensor and accelerator pedal position sensor.**
- **Mixing of the foreign objects may cause the gear locking, so thoroughly check that there is no stuck of any foreign objects and clean up if any.**



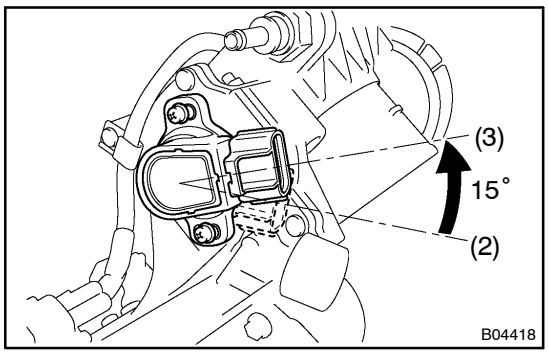
1. REPLACE THROTTLE POSITION SENSOR

(a) Disconnect the throttle position sensor connector on the lead wire.

(b) Remove the 2 set screws and throttle position sensor.

(c) Reinstall a new throttle position sensor.

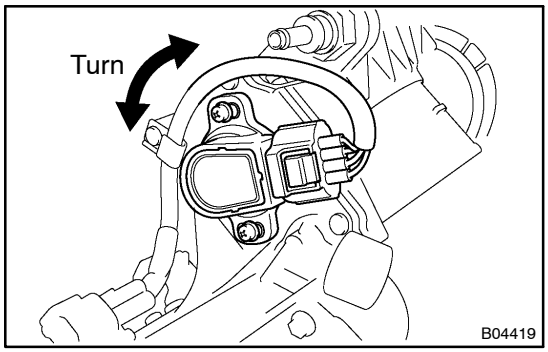
(1) Check that the throttle valve is under the condition of the opener opening angle (about 5.5˚).



(2) Install the sensor to the place where is at 15˚ rotated to the right from the specified installation position.

(3) Gradually turn sensor counterclockwise until it touches the throttle valve shaft, and temporarily tighten the 2 set screws.

(d) Connect the throttle position sensor connector on the lead wire.



(e) Adjust the throttle position sensor.

(1) Connect the throttle position sensor connector.

NOTICE:

Do not connect the accelerator pedal position sensor connector.

(2) Connect the TOYOTA hand–held tester or OBDII scan tool to the DLC3.

(3) Turn the ignition switch ON.

NOTICE:

After turning the ignition switch ON, do not depress the accelerator pedal.

(4) While reading the valve of the throttle valve opening percentage (THROTTLE POS) of the CURRENT DATA, turn the throttle position sensor slowly to left and right and set the sensor at the center value of the standard value, and then tighten the screws.

Standard throttle valve opening percentage:

14.4 – 16 %

Torque: 2.0 N·m (20 kgf·cm, 18 in.·lbf)

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(5) Recheck throttle valve opening percentage.

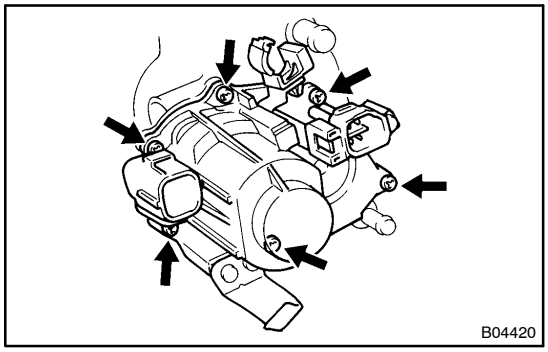
If the throttle valve opening percentage is not as specified, repeat step (4).

(6) Perform fully closed throttle valve by hand and check that the valve of the throttle valve opening percentage (THROTTLE POS) of the CURRENT DATA stays with the standard value.

Standard throttle valve opening percentage:
10 – 14 %

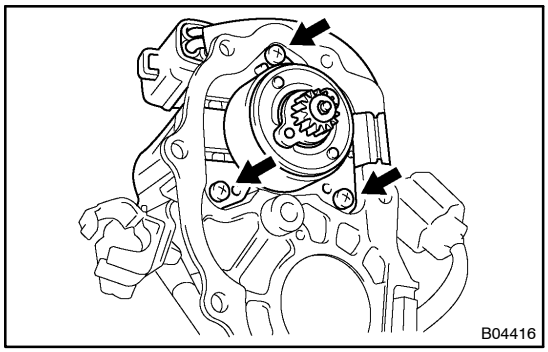
If the throttle valve opening percentage is not as specified, repeat steps (4) to (6).

(7) Paint the 2 set screws.
(8) Turn the ignition switch OFF.
(9) Disconnect the TOYOTA hand–held tester or OBDII scan tool from the DLC3.
(10) Disconnect the throttle position sensor connector.

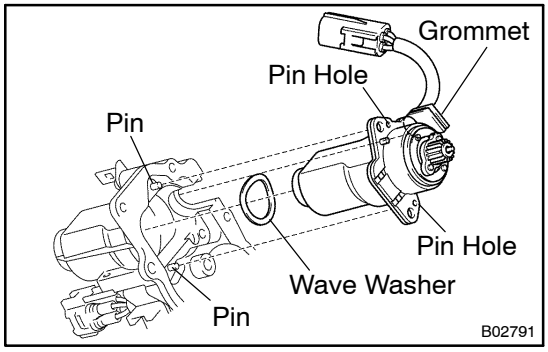


2. REPLACE THROTTLE CONTROL MOTOR

(a) Remove the throttle position sensor. (See step 1)
(b) Remove the throttle control motor.
(1) Disconnect the throttle control motor connector from the connector bracket.
(2) Remove the 6 screws, the throttle control motor cover, motor assembly and washer.



(3) Remove the 3 screws, throttle control motor and wave washer from the throttle control motor cover.



(c) Reinstall a new throttle control motor.
(1) Insert the wave washer into the throttle control motor cover.
(2) Align the pin holes of the throttle control motor with the positioning pins of the throttle control motor cover.
(3) Attach the grommet to the throttle control motor cover.

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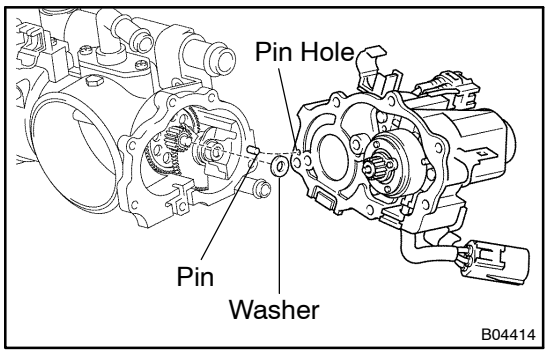
(4) Install the throttle control motor with the 3 screws.
Torque: 3.4 N·m (35 kgf·cm, 30 in.·lbf)
(5) Apply the grease thinly on the whole surface of the gear teeth.

NOTICE:
Do not apply the grease other than specified because grease has been already applied to the component to be replaced.

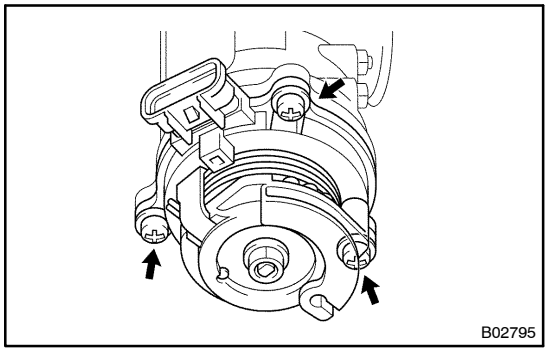


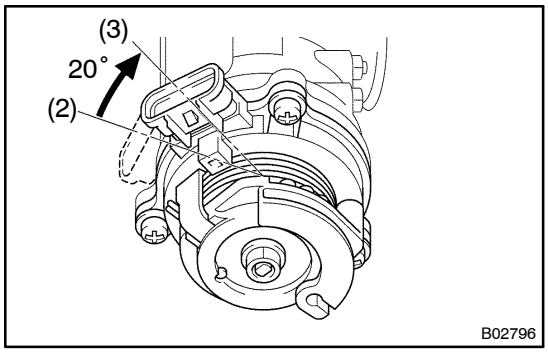
(6) Install the washer as shown in the illustration.
(7) Align the pin hole of the throttle control motor cover with the positioning pin of the throttle body.
(8) Install the throttle control motor cover and motor assembly with the 6 screws.
Torque: 3.4 N·m (35 kgf·cm, 30 in.·lbf)
(9) Connect the throttle control motor connector to the connector bracket.

(d) Reinstall and adjust the throttle position sensor. (See step 1)

3. REPLACE ACCELERATOR PEDAL POSITION SENSOR

(a) Remove the 3 set screws and accelerator pedal position sensor.





(b) Reinstall a new accelerator pedal position sensor.
(1) Check that the throttle valve is under the condition of the opener opening angle (about 4°).
(2) Install the sensor to the place where is at 20° rotated to the left from the specified installation position.
(3) Gradually turn sensor clockwise until it touches the throttle valve shaft, and tighten the 3 set screws.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

(c) Inspect the accelerator pedal position sensor.
(1) Connect the accelerator pedal position sensor connector.
(2) Connect the TOYOTA hand–held tester or OBDII scan tool to the DLC3.
(3) Turn the ignition switch ON.

NOTICE:
After turning the ignition switch ON, do not depress the accelerator pedal.

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(4) Check that the ACCEL POS #1 (VPA) voltage of the CURRENT DATA shows the standard value.

Standard accelerator pedal position voltage:
0.35 – 0.85 V

4. AFTER INSTALL THROTTLE BODY, INSPECT SYSTEM OPERATION (See page SF–35)

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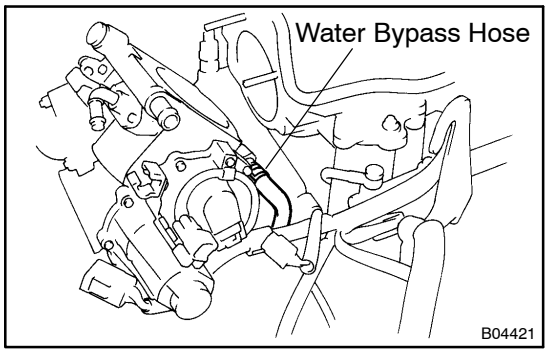
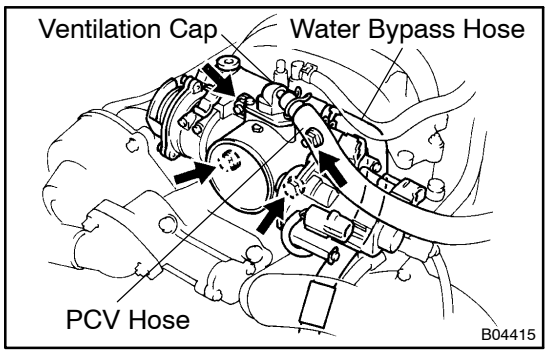
SF0P7–02



INSTALLATION

1. INSTALL THROTTLE BODY

(a) Connect the water bypass hose to the manifold thermostat on the throttle body.



(b) Install a new gasket and the throttle body with the 2 bolts and 2 nuts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(c) Install the ventilation cap.

(d) Connect the water bypass hose and PCV hose to the throttle body.

(e) Connect the connectors and wire:

- Throttle position sensor connector
- Throttle control motor connector
- Accelerator pedal position sensor connector
- Accelerator pedal position sensor wire to 2 clamps on wire brackets

2. CONNECT ACCELERATOR CABLE TO THROTTLE BODY

3. INSTALL INTAKE AIR CONNECTOR

4. FILL WITH ENGINE COOLANT (See page CO–2)

5. START ENGINE AND CHECK FOR ENGINE COOLANT LEAKS

6. INSTALL V–BANK COVER

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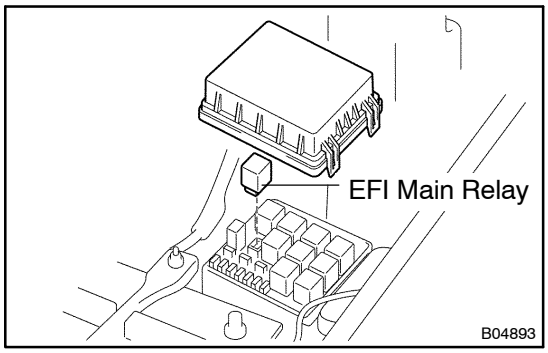
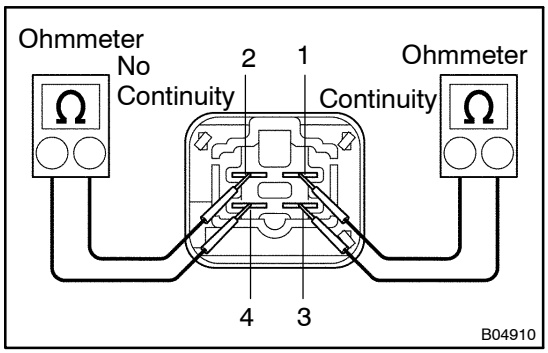


EFI MAIN RELAY

SF06G–03

INSPECTION

1. **REMOVE RELAY BOX COVER**
2. **REMOVE EFI MAIN RELAY (Marking: EFI)**



3. **INSPECT EFI MAIN RELAY**

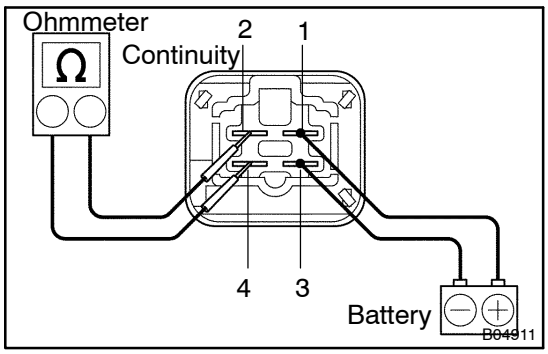
(a) Inspect the relay continuity.

(1) Using an ohmmeter, check that there is continuity between terminals 1 and 3.

If there is no continuity, replace the relay.

(2) Check that there is no continuity between terminals 2 and 4.

If there is continuity, replace the relay.



(b) Inspect the relay operation.

(1) Apply battery positive voltage across terminals 1 and 3.

(2) Using an ohmmeter, check that there is continuity between terminals 2 and 4.

If there is no continuity, replace the relay.

4. **REINSTALL EFI MAIN RELAY**
5. **REINSTALL RELAY BOX COVER**

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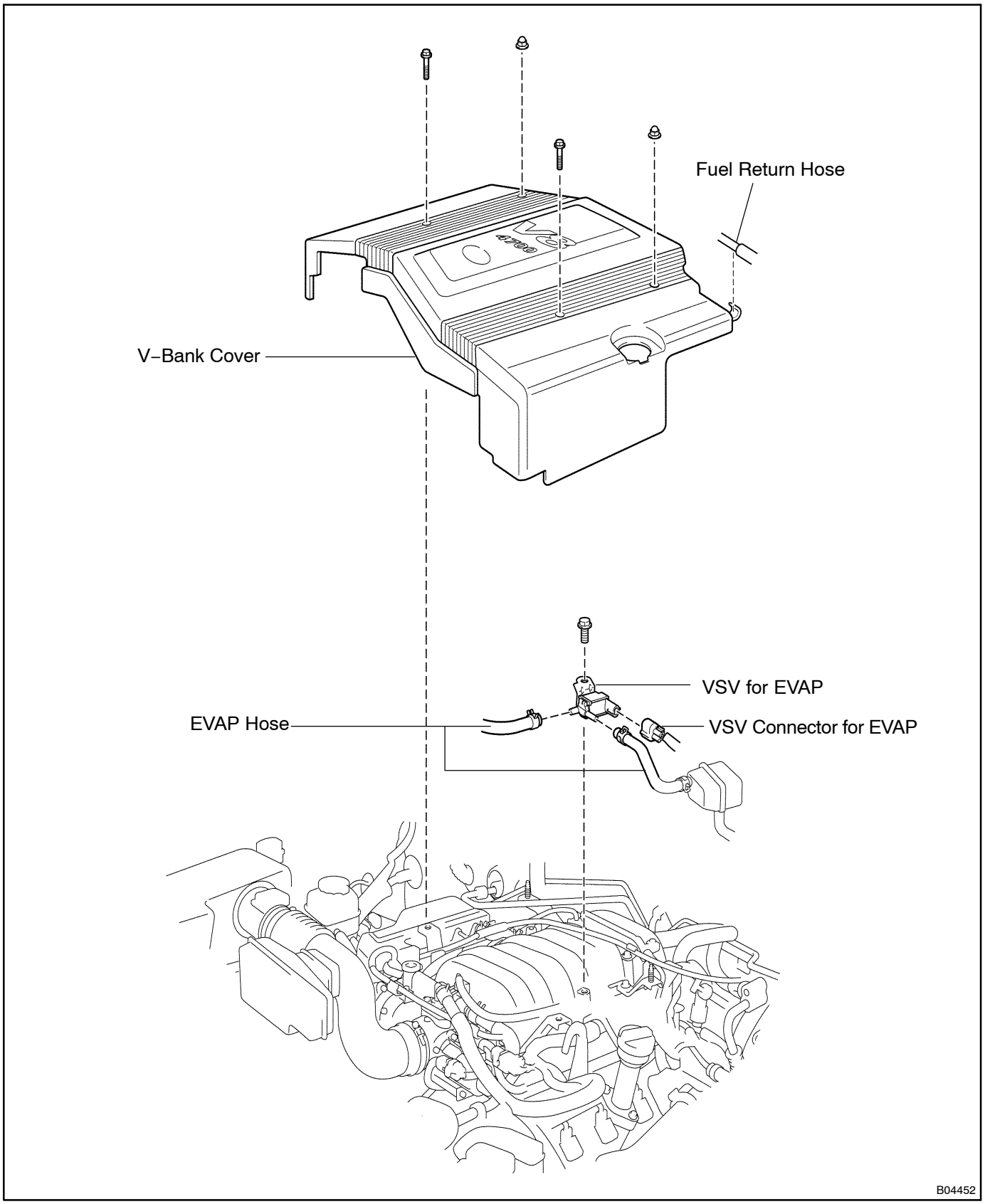
VSV FOR EVAPORATIVE EMISSION (EVAP)

COMPONENTS

SF0Y7–01



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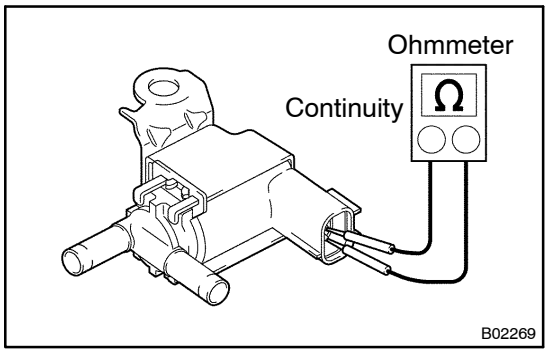
SF0PJ–02



INSPECTION

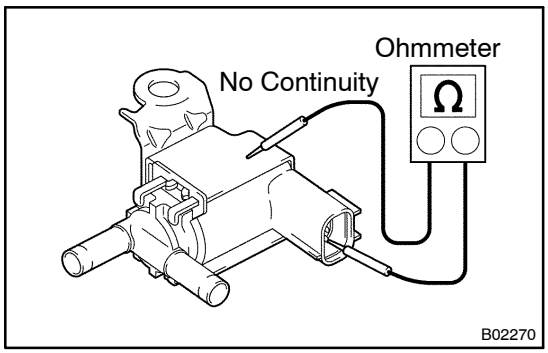
1. REMOVE V–BANK COVER

2. REMOVE VSV

3. INSPECT VSV

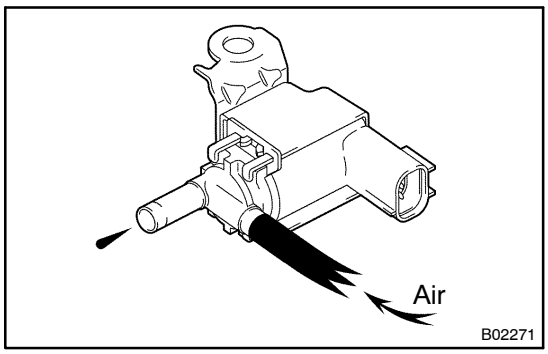
(a) Inspect the VSV for open circuit.
Using an ohmmeter, check that there is continuity between the terminals.
Resistance: 30 – 34 Ω at 20˚C (68˚F)

If there is no continuity, replace the VSV.

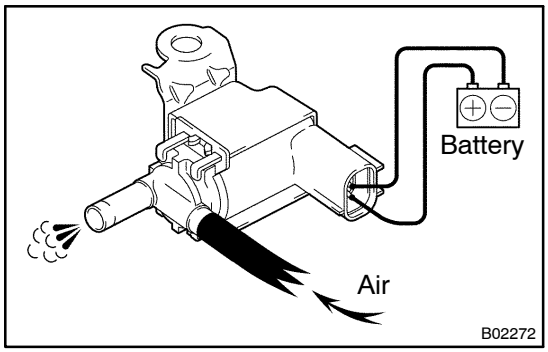


(b) Inspect the VSV for ground.
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



(c) Inspect the VSV operation.
(1) Check that air does not flow from ports.



(2) Apply battery positive voltage across the terminals.
(3) Check that air flows from ports.

If operation is not as specified, replace the VSV.

4. REINSTALL VSV

5. REINSTALL V–BANK COVER

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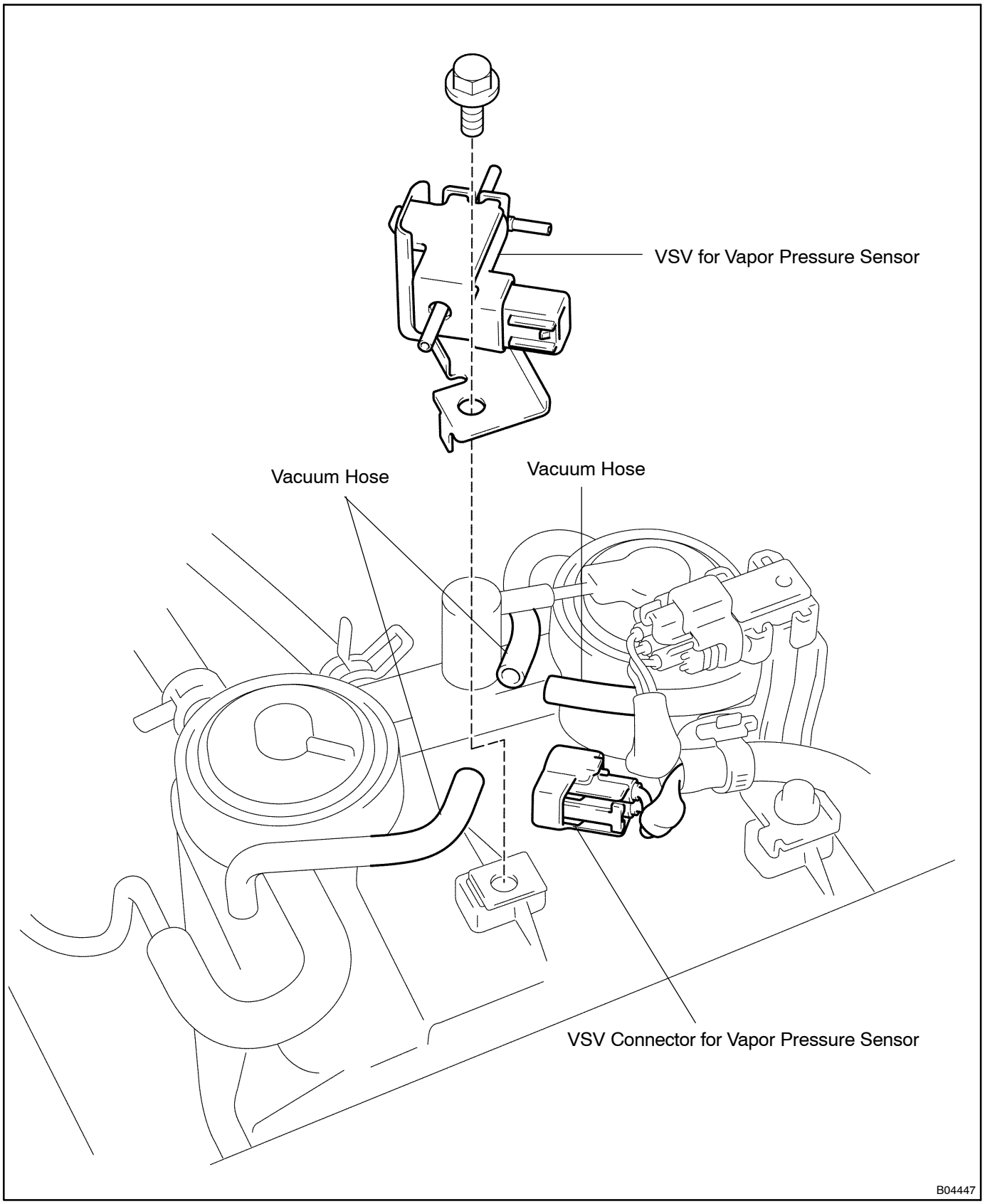
VSV FOR VAPOR PRESSURE SENSOR

COMPONENTS

SF0Y8–01



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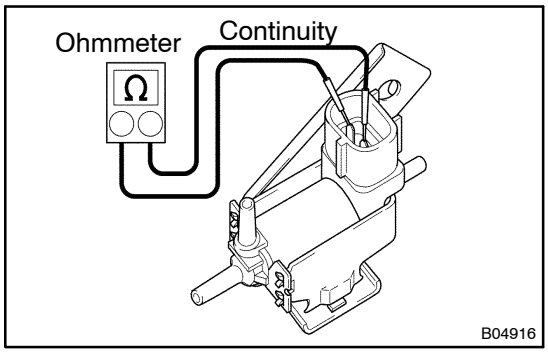
SF0PM–02



INSPECTION

1. REMOVE VSV

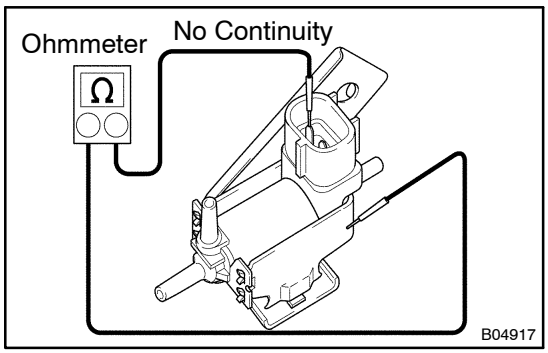
2. INSPECT VSV

(a) Inspect the VSV for open circuit.

Using an ohmmeter, check that there is continuity between the terminals.

Resistance: 37 – 44 Ω at 20˚C (68˚F)

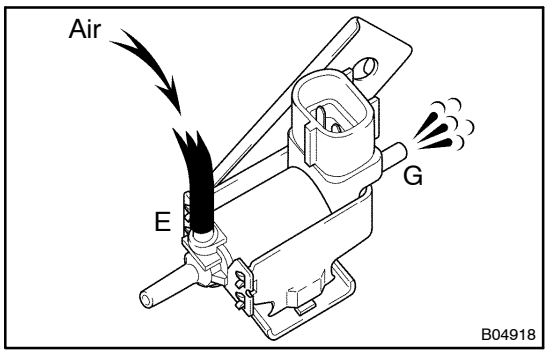
If there is no continuity, replace the VSV.



(b) Inspect the VSV for ground.

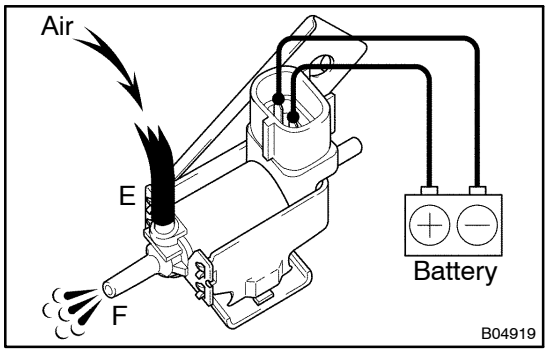
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



(c) Inspect the VSV operation.

(1) Check that air flows from ports E to G.



(2) Apply battery positive voltage across the terminals.

(3) Check that air flows from ports E to F.

If operation is not as specified, replace the VSV.

3. REINSTALL VSV

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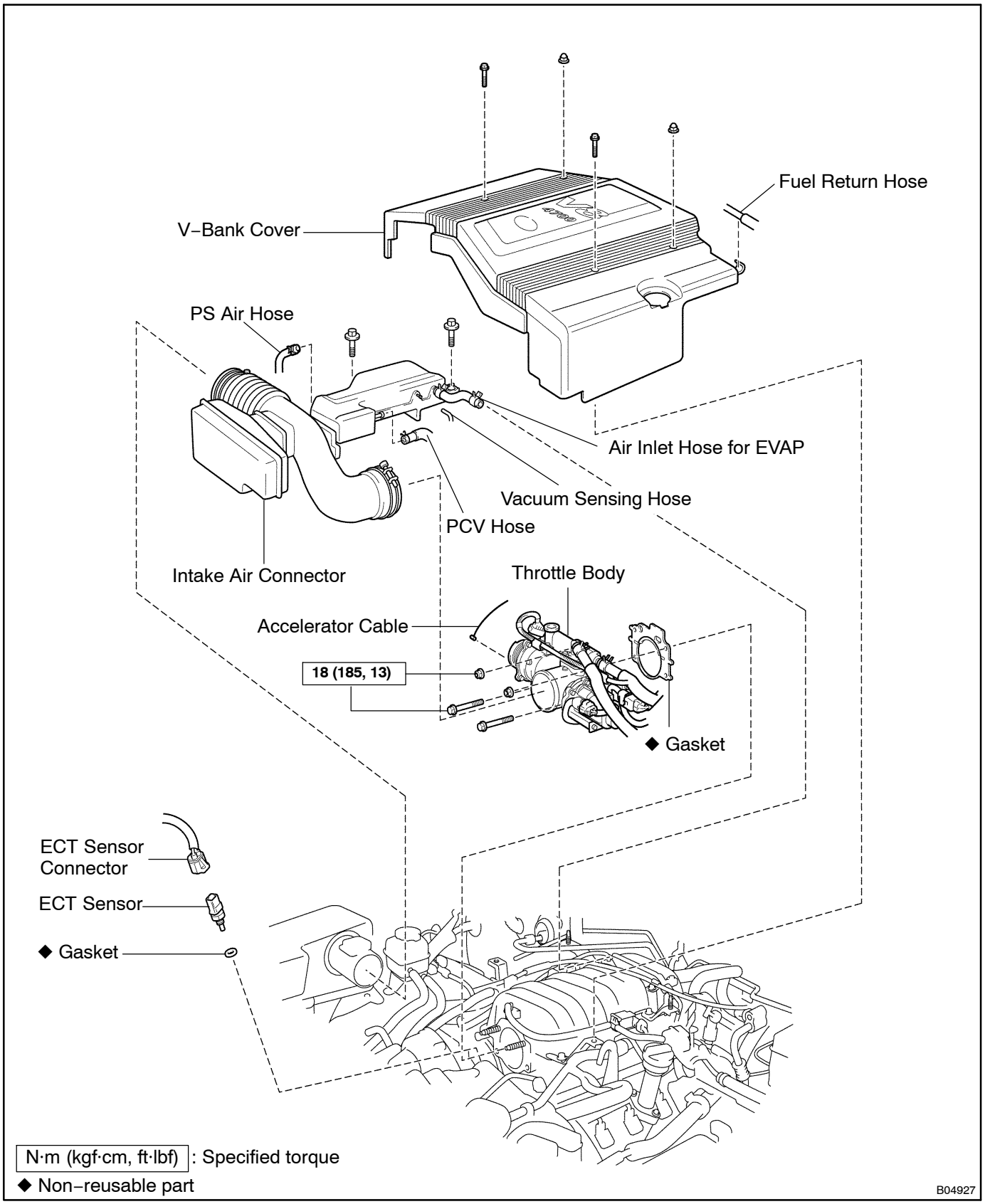
ENGINE COOLANT TEMPERATURE (ECT) SENSOR

COMPONENTS

SF0PN–02



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SF0PO–02

INSPECTION

1. DRAIN ENGINE COOLANT

2. REMOVE V–BANK COVER

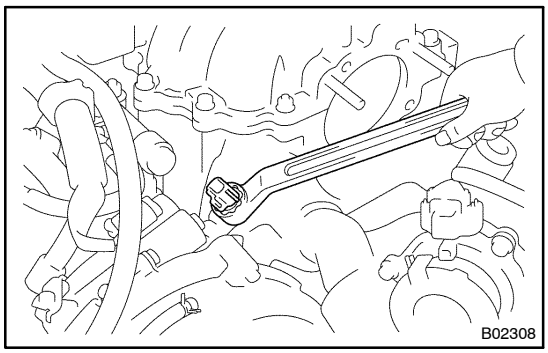
3. REMOVE INTAKE AIR CONNECTOR

4. DISCONNECT THROTTLE BODY FROM INTAKE MANIFOLDS

(a) Disconnect the accelerator cable from the throttle body.

(b) Remove the 2 bolts and 2 nuts, and disconnect the throttle body from the intake manifold.

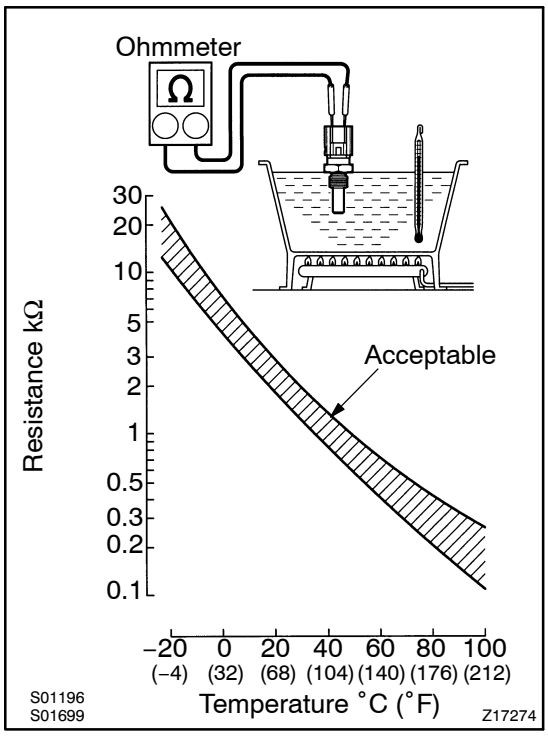
(c) Remove the gasket.



5. REMOVE ECT SENSOR

(a) Disconnect the ECT sensor connector.

(b) Remove the ECT sensor and gasket.



6. INSPECT ECT SENSOR

Using an ohmmeter, measure the resistance between the terminals.

Resistance: Refer to the graph

If the resistance is not as specified, replace the ECT sensor.

7. REINSTALL ECT SENSOR

(a) Install a new gasket and the ECT sensor.

Torque: 19.6 N·m (200 kgf·cm, 14 ft·lbf)

(b) Connect the ECT sensor connector.

8. REINSTALL THROTTLE BODY TO INTAKE MANIFOLDS

(a) Install a new gasket and the throttle body with the 2 bolts and 2 nuts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(b) Connect the accelerator cable to the throttle body.

9. REINSTALL INTAKE AIR CONNECTOR

10. REFILL WITH ENGINE COOLANT (See page CO–2)

11. REINSTALL V–BANK COVER

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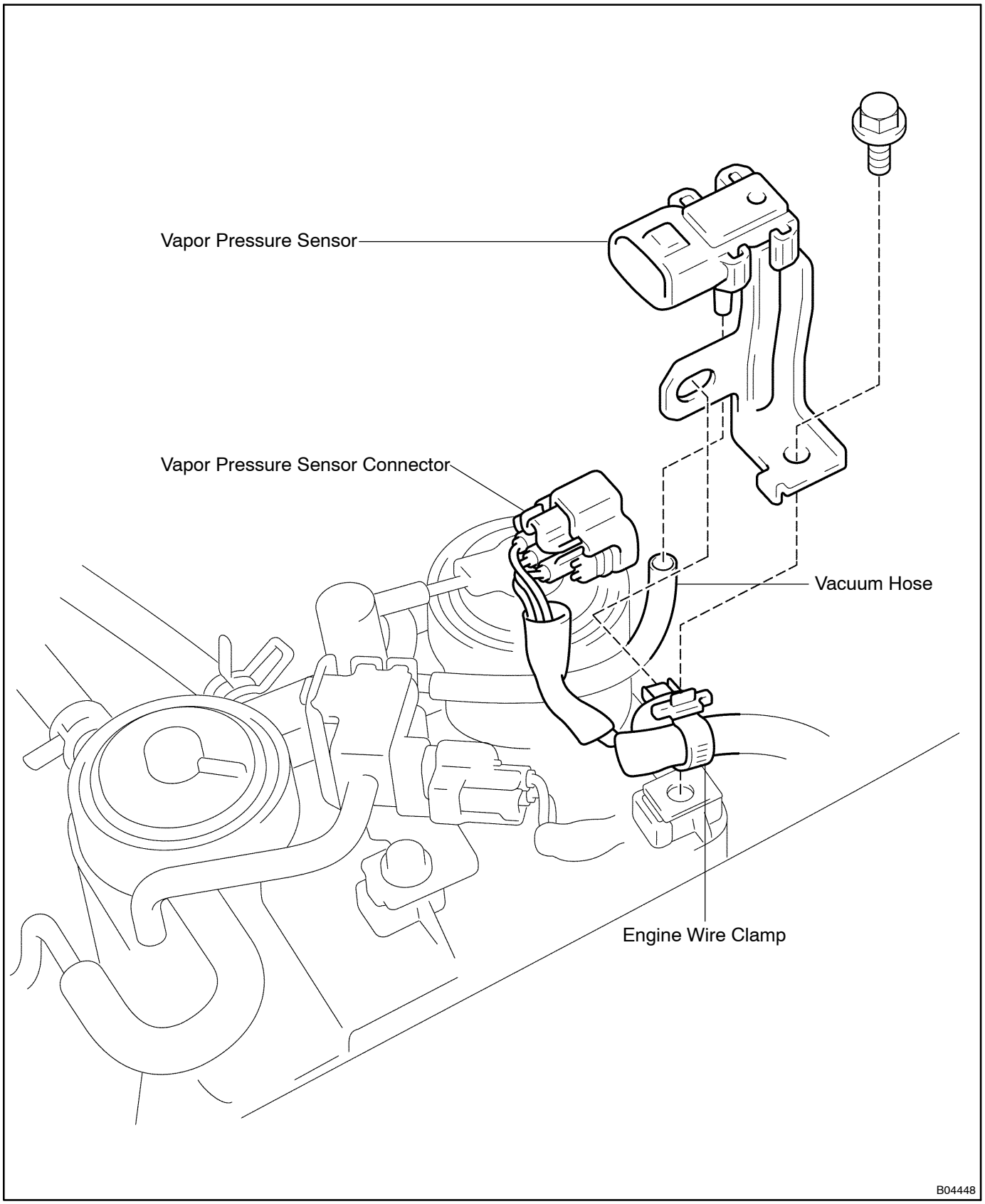
VAPOR PRESSURE SENSOR

COMPONENTS

SF0PP–02



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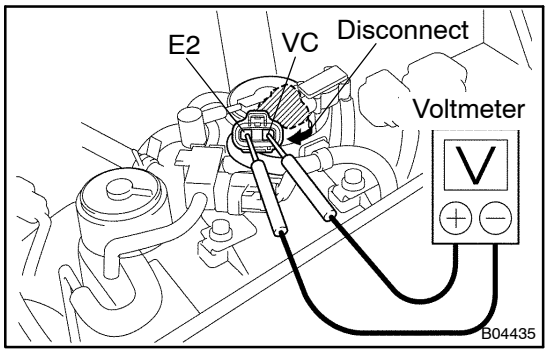
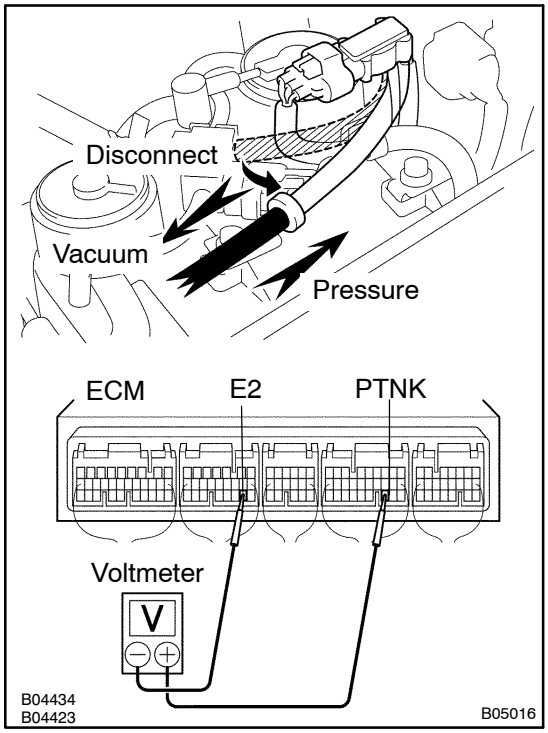
SF0PQ–02



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 vacuum hose from the vapor pressure sensor.
(c) Connect a voltmeter to terminals PTNK and E2 of the ECM, and measure the output voltage under these 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 vacuum hose to the vapor pressure sensor.

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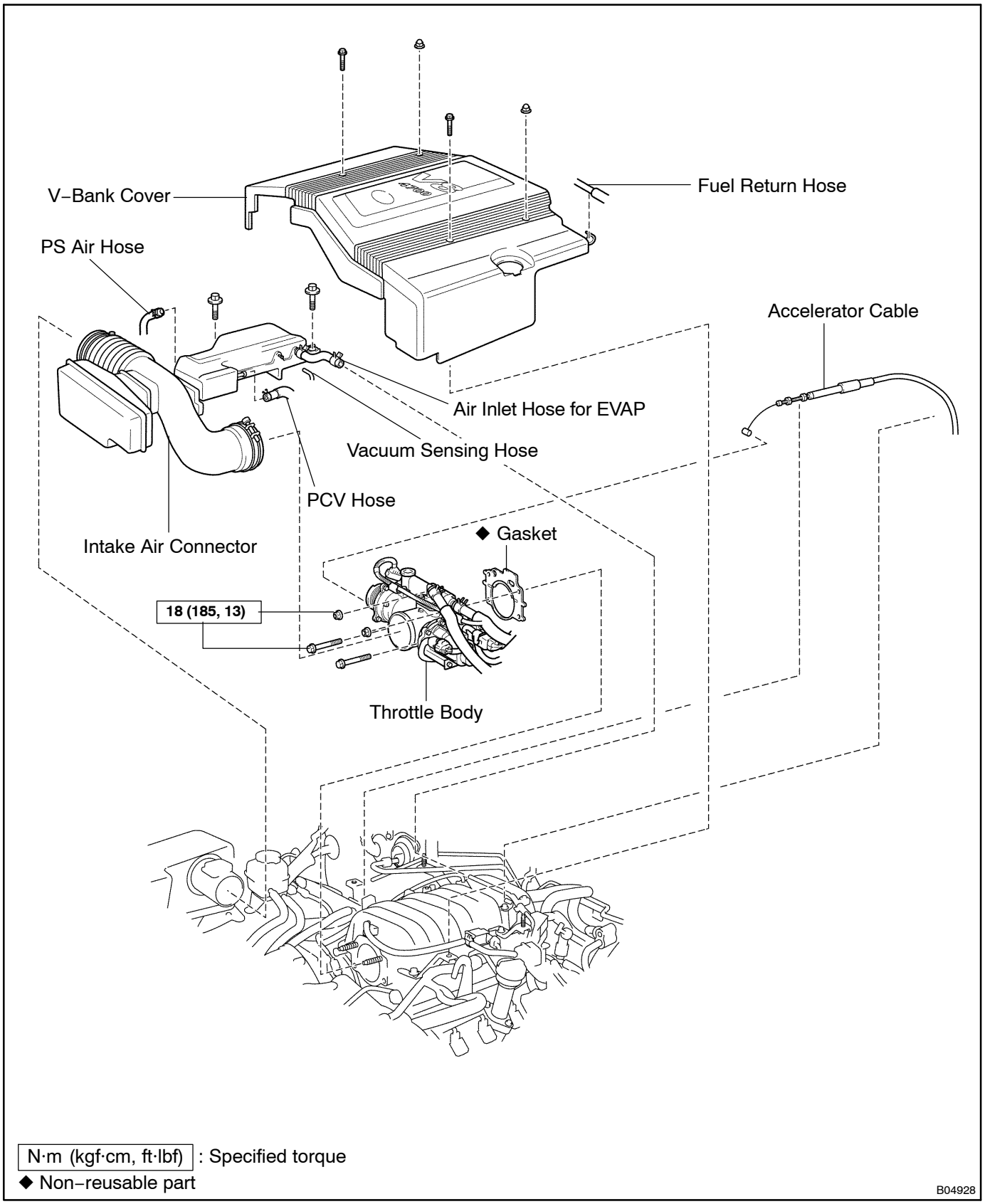
KNOCK SENSOR

COMPONENTS

SF0PR–02



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

◆ Non–reusable part

B04928

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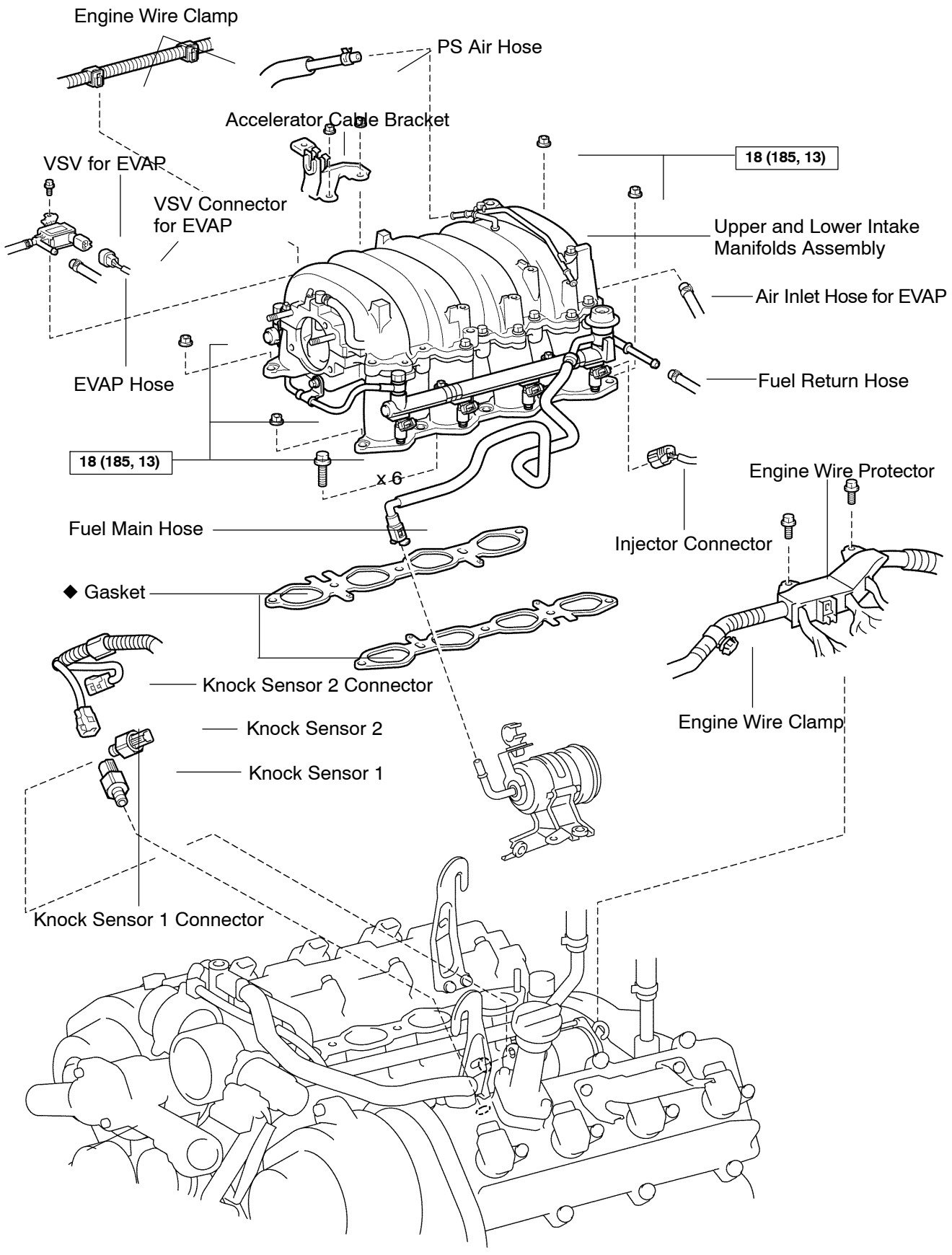

N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part

B04931

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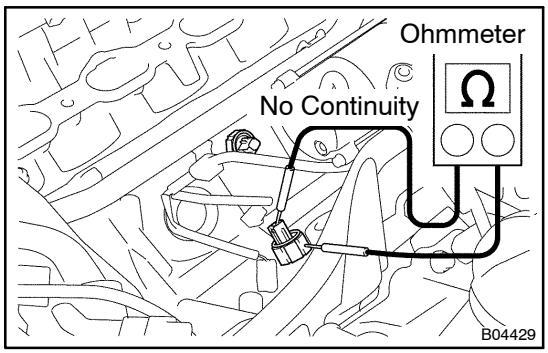
SF0PS–02

INSPECTION

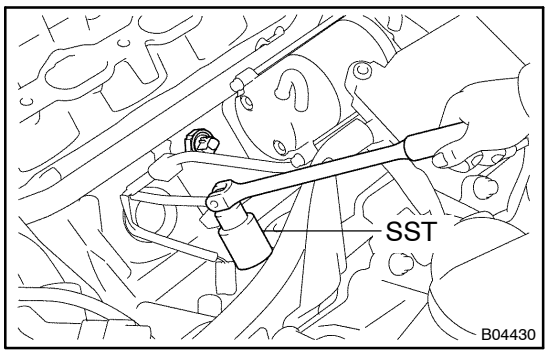
1. **REMOVE V–BANK COVER**
2. **REMOVE INTAKE AIR CONNECTOR**
3. **DISCONNECT THROTTLE BODY FROM INTAKE MANIFOLDS (See page SF–51)**
4. **REMOVE UPPER AND LOWER INTAKE MANIFOLDS ASSEMBLY (See page EM–34)**



5. **INSPECT KNOCK SENSOR 1, 2**

(a) Disconnect the knock sensor connectors.

(b) Using an ohmmeter, check that there is no continuity between the terminal and body.



If there is continuity, replace the sensor with SST.

SST 09816–30010

Torque: 45 N·m (450 kgf·cm, 33 ft·lbf)

(c) Reconnect the knock sensor connectors.

6. **REINSTALL UPPER AND LOWER INTAKE MANIFOLDS ASSEMBLY (See page EM–57)**
7. **REINSTALL THROTTLE BODY TO INTAKE MANIFOLDS (See page SF–51)**
8. **REINSTALL INTAKE AIR CONNECTOR**
9. **REINSTALL V–BANK COVER**

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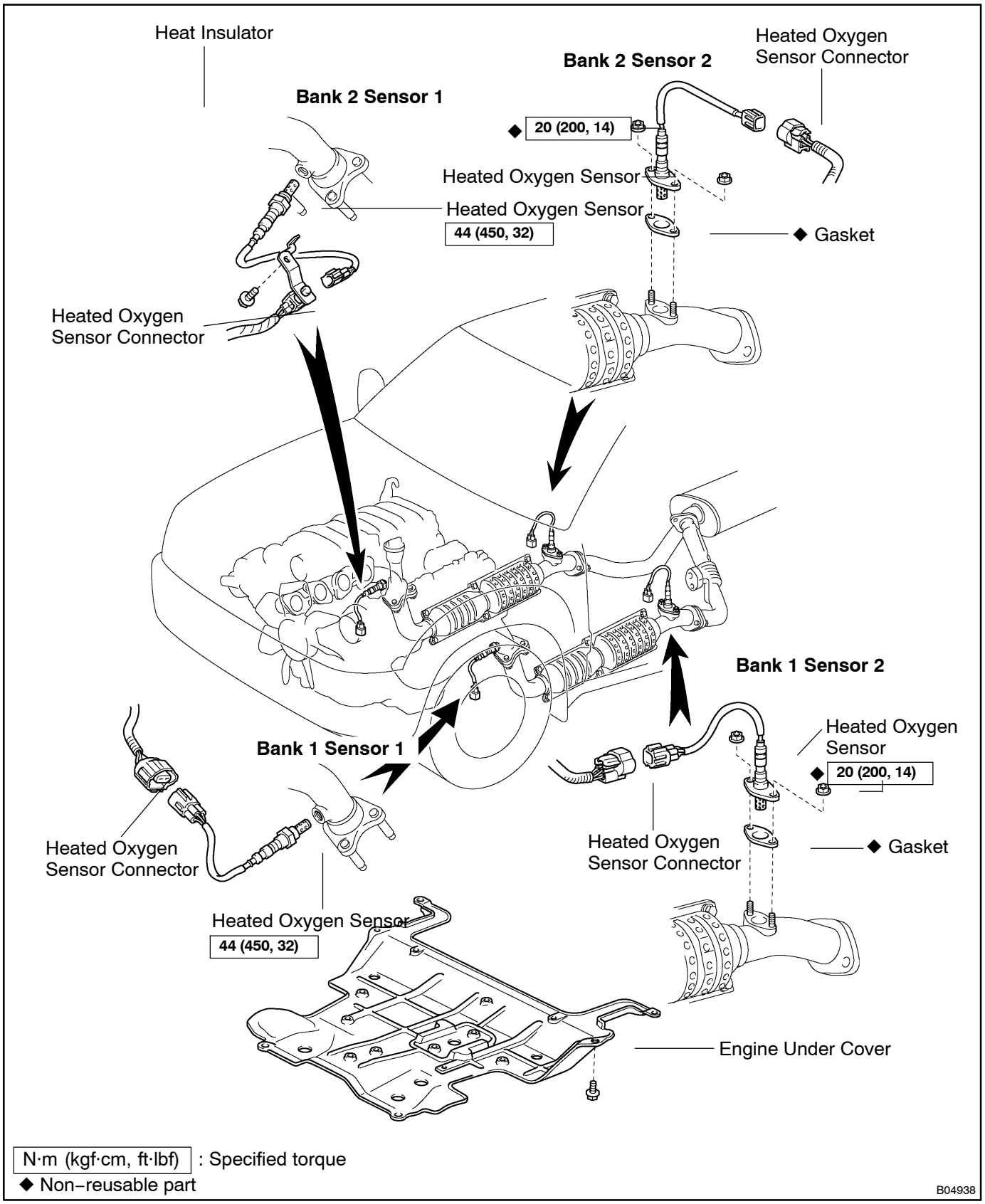
HEATED OXYGEN SENSOR

COMPONENTS

SF0Y9–01



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

B04938

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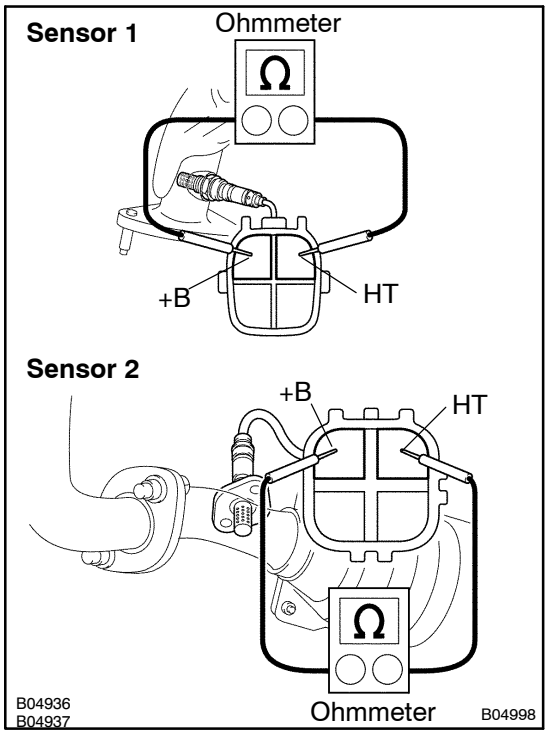
SF0YA–01



INSPECTION

1. INSPECT HEATER RESISTANCE OF HEATED OXYGEN SENSORS

(a) Disconnect the oxygen sensor connector.

(b) Using an ohmmeter, measure the resistance between terminals +B and HT.

Resistance: 11 – 16 Ω at 20°C (68°F)

If the resistance is not as specified, replace the sensor.

Torque:
44 N·m (450 kgf·cm, 32 ft·lbf) for sensor 1
20 N·m (200 kgf·cm, 14 ft·lbf) for sensor 2

(c) Reconnect the oxygen sensor connector.

2. INSPECT OPERATION OF HEATED OXYGEN SENSORS (See page DI–49)

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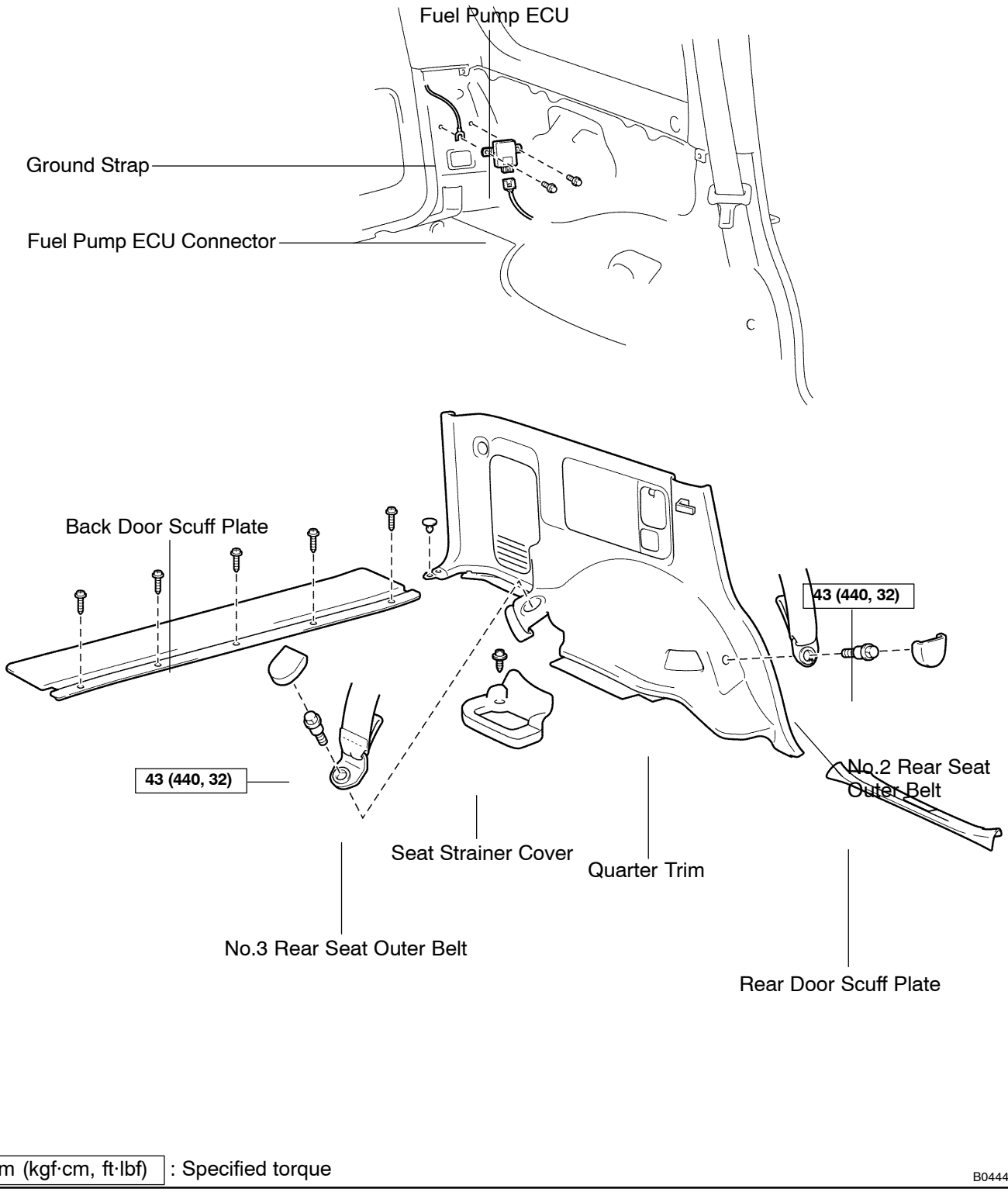
FUEL PUMP ECU

COMPONENTS

SF0PY–03



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

B04443

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SF0PZ–02

INSPECTION

1. REMOVE FUEL PUMP ECU
2. INSPECT FUEL PUMP ECU (See page DI–121)
3. REINSTALL FUEL PUMP ECU

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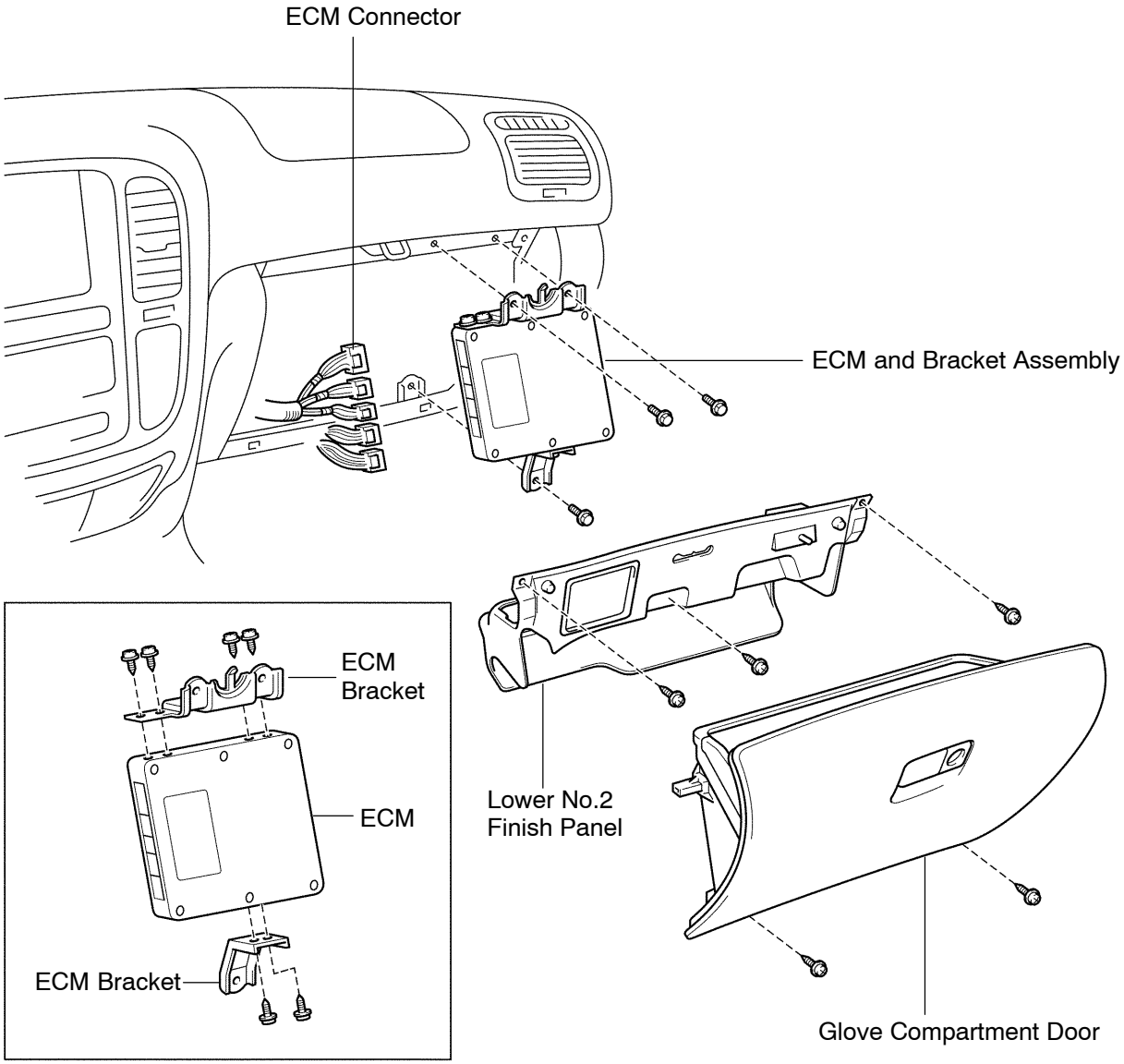
ENGINE CONTROL MODULE (ECM)

COMPONENTS

SF0Q0–02



B04450

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SF0Q1–02

INSPECTION

1. REMOVE ECM
2. INSPECT ECM (See page DI–20)
3. REINSTALL ECM

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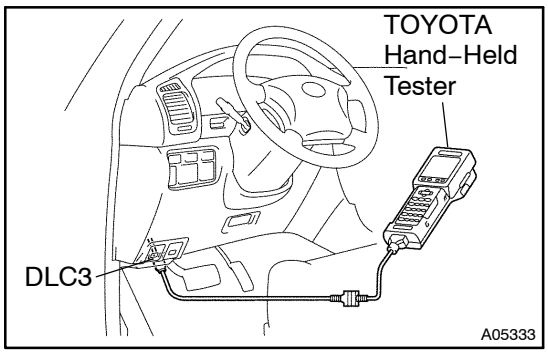
FUEL CUT RPM

SF0Q2–02

INSPECTION

1. WARM UP ENGINE

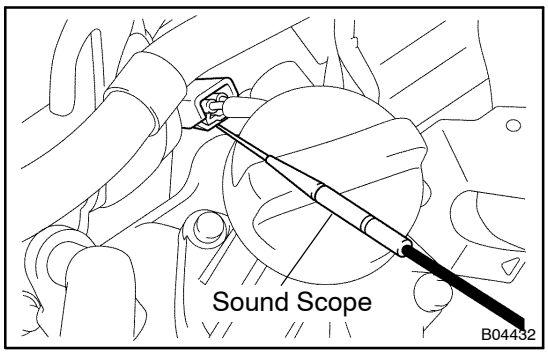
Allow the engine to warm up to normal operating temperature.



2. CONNECT TOYOTA HAND–HELD TESTER OR OBDII SCAN TOOL

(a) Connect a TOYOTA hand–held tester or OBDII scan tool to the DLC3.

(b) Please refer to the TOYOTA hand–held tester or OBDII scan tool operator's manual for further details.



3. INSPECT FUEL CUTOFF RPM OPERATION

(a) Increase the engine speed to at least 2,500 rpm.

(b) Check for injector operating noise.

(c) Check that when the throttle lever is released, injector operation noise stops momentarily and then resumes.

HINT:

- The vehicle should be stopped.
- Measure with the A/C OFF.

Fuel return speed: 1,000 rpm

4. DISCONNECT TOYOTA HAND–HELD TESTER OR OBDII SCAN TOOL

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COOLANT

CO0IO–01

INSPECTION

HINT:

Check the coolant level when the engine is cold.

1. CHECK ENGINE COOLANT LEVEL AT RADIATOR RESERVOIR

The engine coolant level should be between the ”LOW” and ”FULL” lines at normal temperature (20˚C(68˚F)).

If low, check for leaks and add engine coolant up to the ”FULL” line.

2. CHECK ENGINE COOLANT QUALITY

(a) Remove the radiator cap.

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

(b) There should not be any excessive deposits of rust or scale around the radiator cap or radiator filler hole, and the coolant should be free from oil.

If excessively dirty, clean the coolant passages and replace the coolant.

(c) Reinstall the radiator cap.

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CO0IP–01

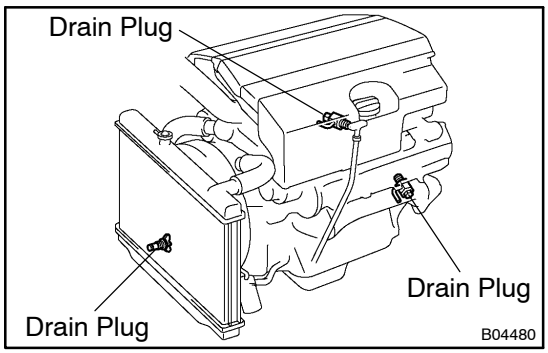
REPLACEMENT

1. DRAIN ENGINE COOLANT

(a) Remove the radiator cap.

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



(b) Loosen the 3 drain plugs on the engine and radiator, and drain the coolant.

(c) Close the 3 drain plugs.

Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf) for engine

2. REFILL WITH ENGINE COOLANT

(a) Slowly fill the system with coolant.

- Use a good brand of ethylene–glycol base coolant and mix it according to the manufacturer's directions.

Grade:

"TOYOTA LONG LIFE Antifreeze coolant" or equivalent

- Using coolant which includes more than 50 % ethylene–glycol (but not more than 70 %) is recommended.

NOTICE:

- **Do not use an alcohol type coolant.**
- **The coolant should be mixed with demineralized water or distilled water.**

Capacity:

w/ Front heater: 14.8 liters (15.6 US qts, 13.0 Imp. qts)

w/ Front heater and rear heater:

15.3 liters (16.2 US qts, 13.4 Imp. qts)

(b) Install the radiator cap.

(c) Bleed the cooling system.

(1) Start the engine, and open the heater water valve.

(2) Maintain the engine speed at 2,000 – 2,500 rpm, and warm up the engine.

(d) Stop the engine, and wait until the engine coolant cools down.

(e) Refill the radiator reservoir with coolant until it reaches the "FULL" line.

3. CHECK FOR ENGINE COOLANT LEAKS

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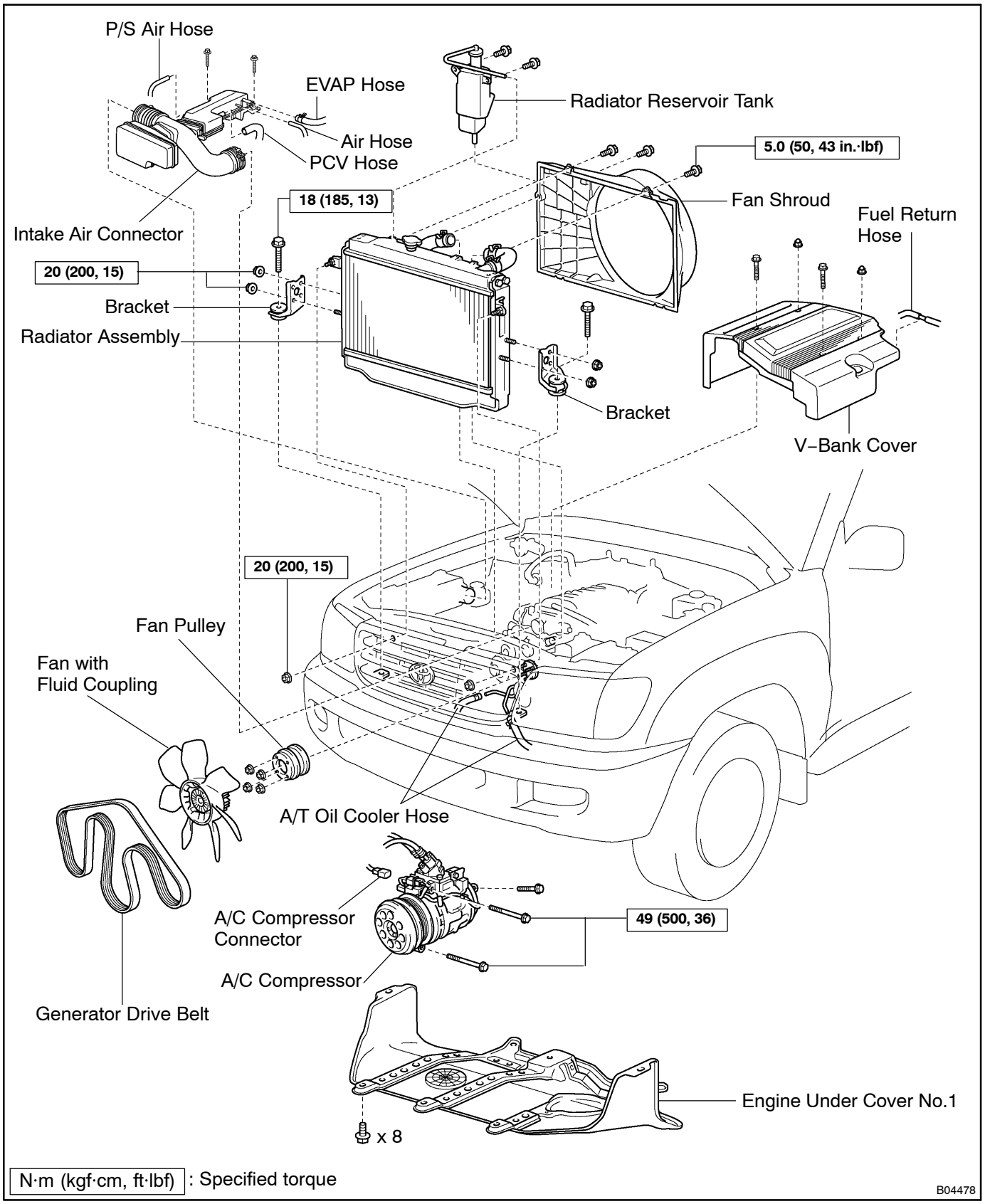
WATER PUMP

COMPONENTS

CO0IQ–02



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

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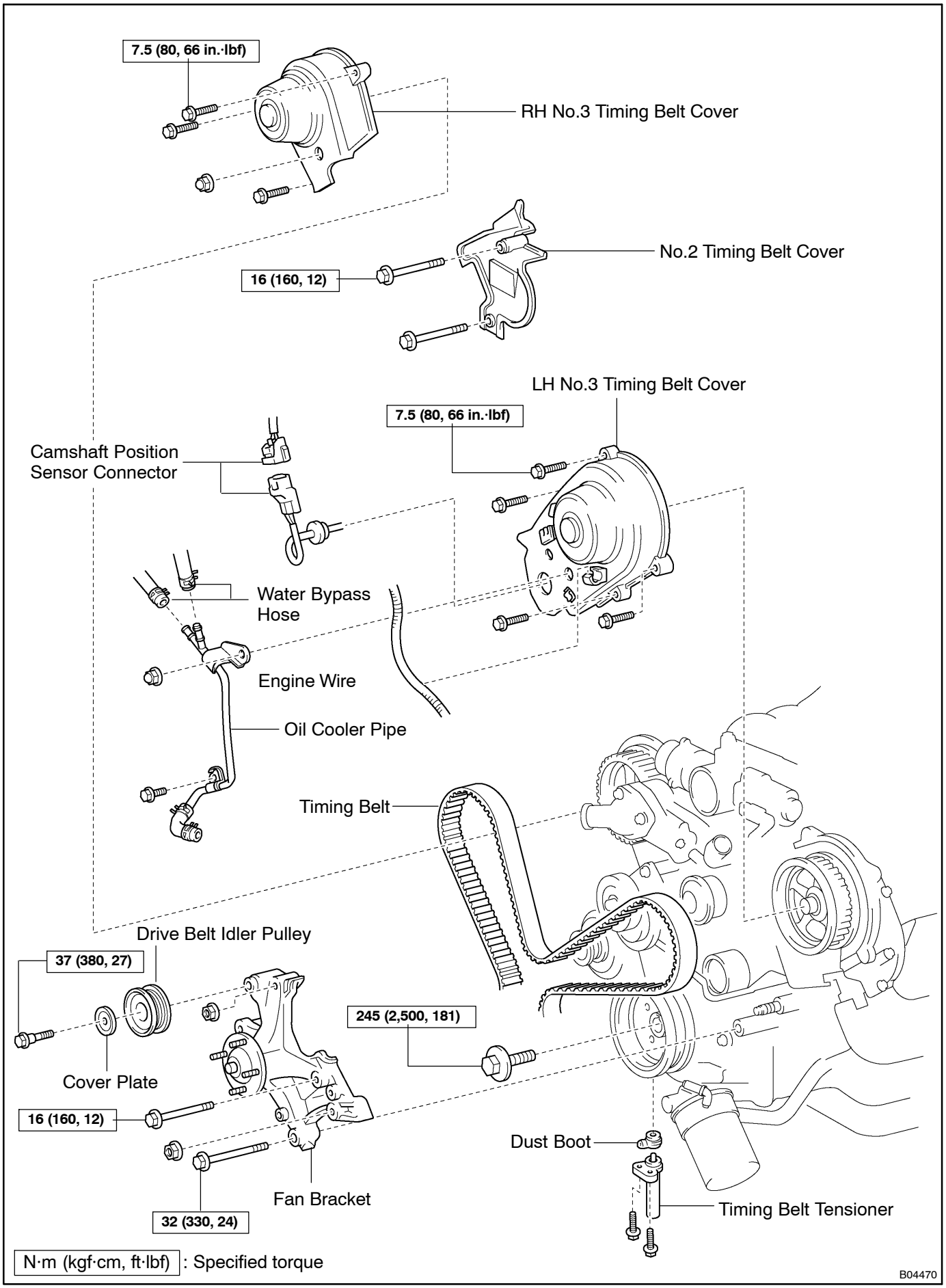

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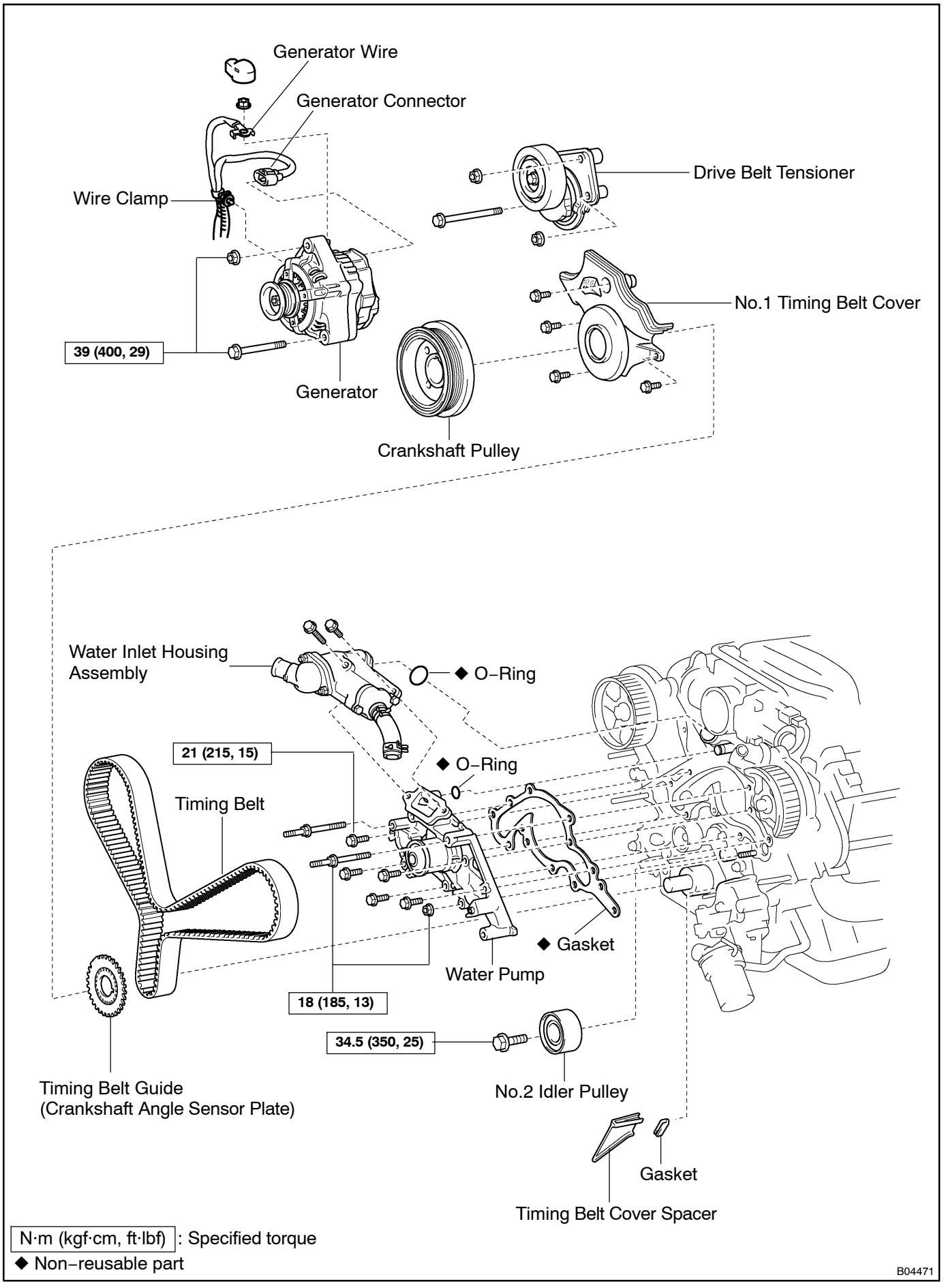

N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part

B04471

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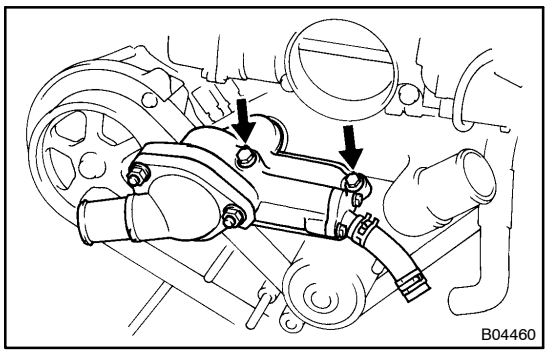
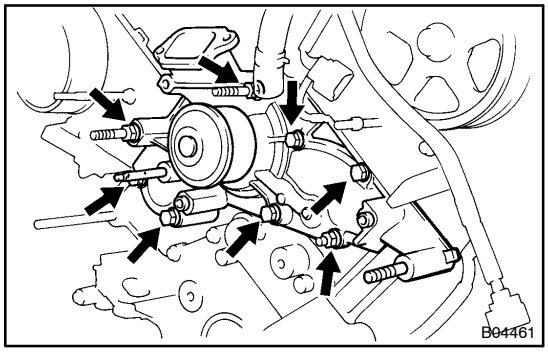
CO0IR–01

REMOVAL

1. **DRAIN ENGINE COOLANT**
2. **REMOVE TIMING BELT (See page EM–15)**
3. **REMOVE NO.2 IDLER PULLEY (See page EM–15)**





4. **REMOVE WATER INLET AND INLET HOUSING ASSEMBLY**

(a) Disconnect the water bypass hose from the water inlet housing.

(b) Remove the 2 bolts holding the water inlet housing to the water pump.

(c) Disconnect the water inlet housing from the front water bypass joint, and remove the water inlet and inlet housing assembly.

(d) Remove the O–ring from the water inlet housing.

5. **REMOVE WATER PUMP**

(a) Remove the 5 bolts, 2 stud bolts, nut, water pump and gasket.

(b) Remove the O–ring from the water bypass pipe.

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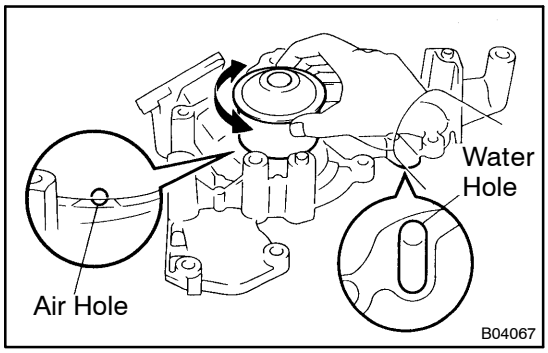
CO0IS–01



INSPECTION

1. INSPECT WATER PUMP

(a) Visually check the air hole and water hole for coolant leakage.

If leakage is found, replace the water pump and timing belt.

(b) Turn the pulley, and check that the water pump bearing moves smoothly and quietly.

If necessary, replace the water pump.

2. INSPECT TIMING BELT COMPONENTS

(See page EM–20)

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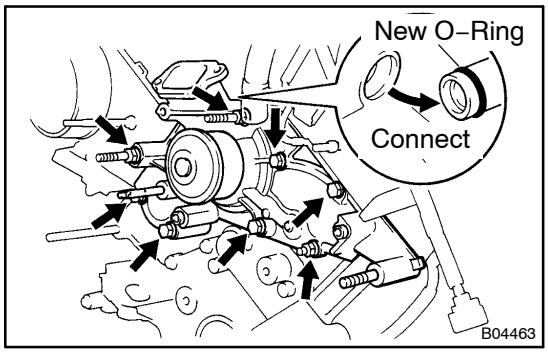
CO0IT–01



INSTALLATION

1. INSTALL WATER PUMP

(a) Install a new O–ring to the water bypass pipe end.

(b) Apply soapy water to the O–ring.

(c) Connect the water pump to the water bypass pipe end.

(d) Install the water pump and new gasket with the 5 bolts, 2 stud bolts and nut. Uniformly tighten the bolts, stud bolts and nut in several passes.

Torque:

Bolt: 21 N·m (215 kgf·cm, 15 ft·lbf)

Stud bolt and nut: 18 N·m (185 kgf·cm, 13 ft·lbf)

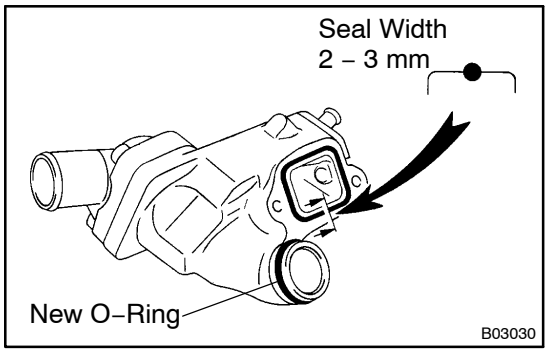
HINT:

Use bolts 35 mm (1.38 in.) in length.

2. INSTALL WATER INLET AND INLET HOUSING ASSEMBLY

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the water inlet housing and water pump.

- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- Thoroughly clean all components to remove all the loose material.
- Using a non–residue solvent, clean both sealing surfaces.



(b) Apply seal packing to the sealing groove of water inlet housing as shown in the illustration.

Seal packing: Part No. 08826–00100 or equivalent

- Install a nozzle that has been cut to a 2 – 3 mm (0.08 – 0.12 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

(c) Install a new O–ring to the water inlet housing.

(d) Apply soapy water on the O–ring.

(e) Attach the water inlet housing end to the front water bypass joint hole.

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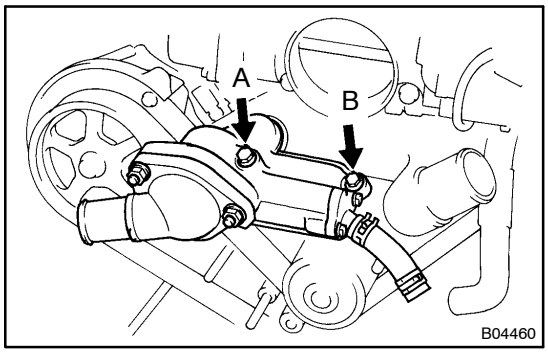

(f) Install the water inlet and housing assembly with the 2 bolts. Alternately tighten the bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

HINT:
Each bolt length is indicated in the illustration.
Bolt length:
76 mm (3.00 in.) for A
22 mm (0.87 in.) for B

3. **INSTALL NO.2 IDLER PULLEY (See page EM–22)**
4. **INSTALL TIMING BELT (See page EM–22)**
5. **FILL WITH ENGINE COOLANT**
6. **START ENGINE AND CHECK FOR ENGINE COOLANT LEAKS**
7. **RECHECK ENGINE COOLANT LEVEL**

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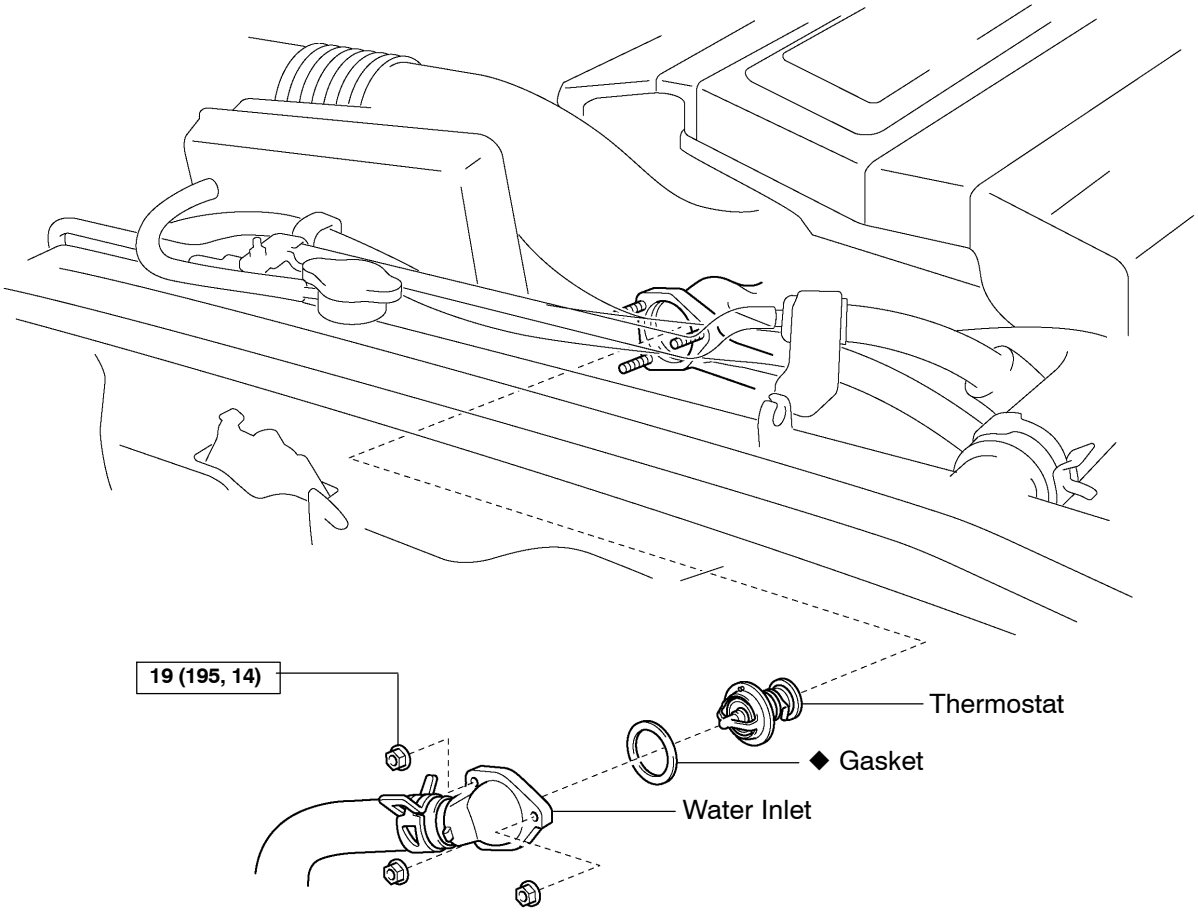
THERMOSTAT

COMPONENTS

CO0IU–01



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

B04464

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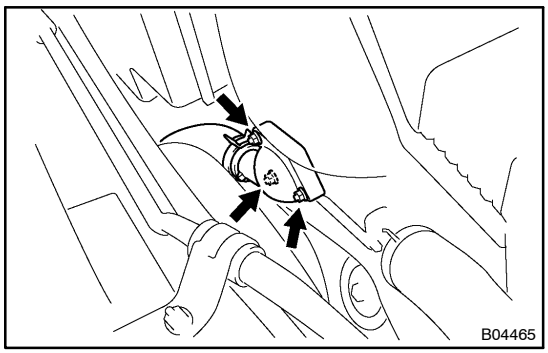
CO0IV–01

REMOVAL

HINT:

Removal of the thermostat would have an adverse effect, causing a lowering of cooling efficiency. Do not remove the thermostat, even if the engine tends to overheat.

1. DRAIN ENGINE COOLANT



2. DISCONNECT WATER INLET FROM WATER INLET HOUSING

Remove the 3 nuts and disconnect the water inlet from the water inlet housing.

3. REMOVE THERMOSTAT

(a) Remove the thermostat.

(b) Remove the gasket from the thermostat.

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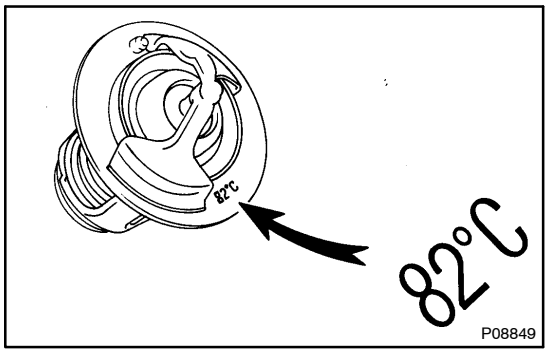
CO0IW–01

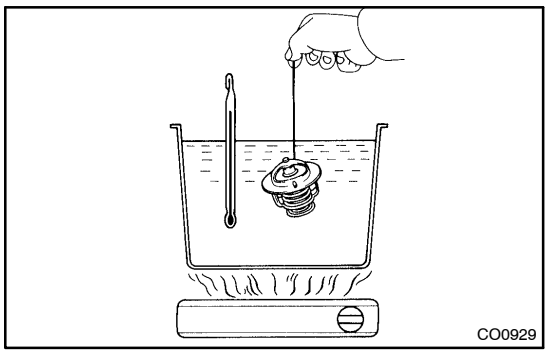


INSPECTION

INSPECT THERMOSTAT

HINT:

The thermostat is numbered with the valve opening temperature.

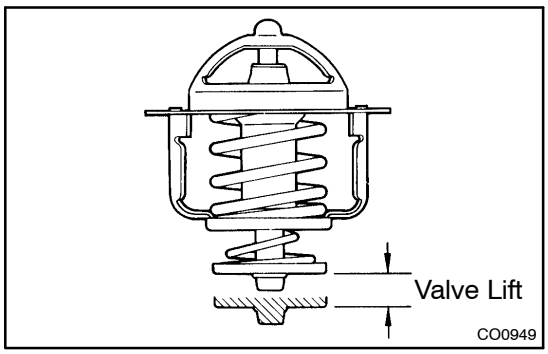


(a) Immerse the thermostat in water and gradually heat the water.

(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 mm (0.39 in.) or more at 95˚C (203˚F)

If the valve lift is not as specified, replace the thermostat.

(d) Check that the valve is fully closed when the thermostat is at low temperatures (below 40˚C (104˚F)).

If not closed, replace the thermostat.

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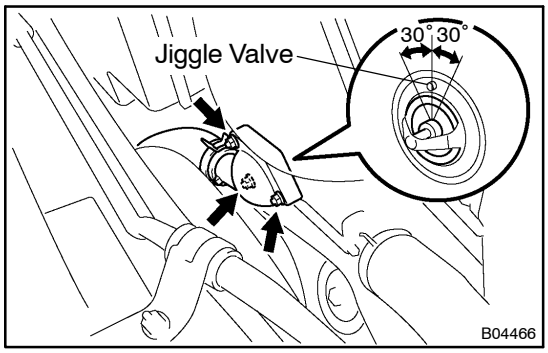
CO0IX–01



INSTALLATION

1. PLACE THERMOSTAT IN WATER INLET HOUSING

(a) Install a new gasket to the thermostat.

(b) Insert the thermostat into the water inlet housing with the jiggle valve facing straight upward.

HINT:

The jiggle valve may be set within 30° of either side of the prescribed position.

2. INSTALL WATER INLET

Install the water inlet with the 3 nuts.

Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)

3. FILL WITH ENGINE COOLANT

4. START ENGINE AND CHECK FOR ENGINE COOLANT LEAKS

5. RECHECK ENGINE COOLANT LEVEL

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RADIATOR

CO0IY–01

ON–VEHICLE CLEANING

CLEAN RADIATOR

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 and radiator core.)

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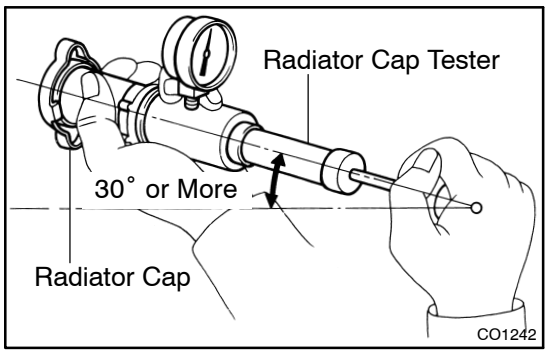
CO0IZ–01

ON–VEHICLE INSPECTION

1. REMOVE RADIATOR CAP

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



2. INSPECT RADIATOR CAP

NOTICE:

- **If the radiator cap has contaminations, always rinse it with water.**
- **Before using a radiator cap tester, wet the relief valve and pressure valve with engine coolant or water.**
- **When performing steps (a) and (b) below, keep the tester at an angle of over 30° above the horizontal.**

(a) Using a radiator cap tester, slowly pump the tester and check that air is coming from the vacuum valve.

Pump speed: 1 push/(3 seconds or more)

NOTICE:

Push the pump at a constant speed.

If air is not coming from the vacuum valve, replace the radiator cap.

(b) Pump the radiator cap tester, and measure the relief valve opening pressure.

Pump speed: 1 push within 1 second

NOTICE:

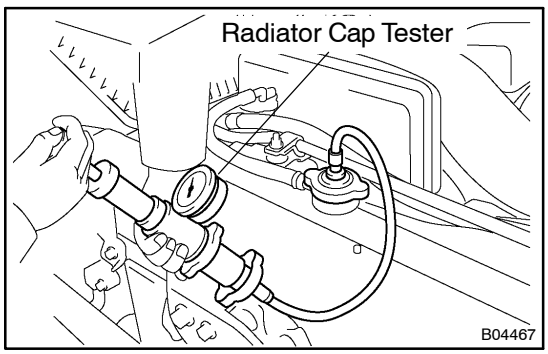
This pump speed is for the first pump only (in order to close the vacuum valve). After this, the pump speed can be reduced.

Standard opening pressure:
93 – 123 kPa (0.95 – 1.25 kgf/cm^2, 13.5 – 17.8 psi)
Minimum opening pressure:
78 kPa (0.8 kgf/cm^2, 11.4 psi)

HINT:

Use the tester's maximum reading as the opening pressure.

If the opening pressure is less than minimum, replace the radiator cap.



3. INSPECT COOLING SYSTEM FOR LEAKS

(a) Fill the radiator with coolant and attach a radiator cap tester.

(b) Warm up the engine.

(c) Pump it to 118 kPa (1.2 kgf/cm^2, 17.1 psi), and check that the pressure does not drop.

If the pressure drops, check the hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and head.

4. REINSTALL RADIATOR CAP

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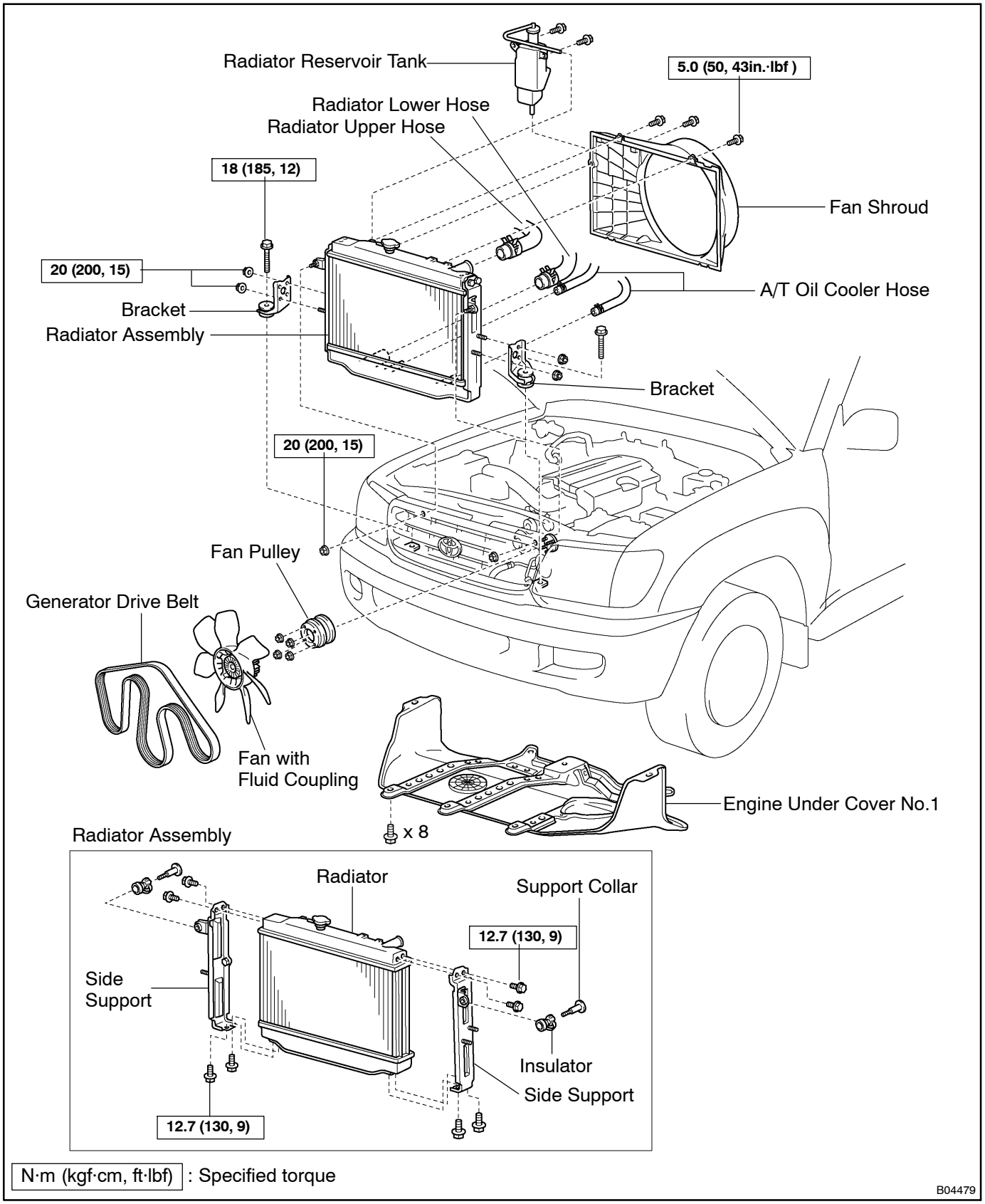
CO0J0–01

COMPONENTS



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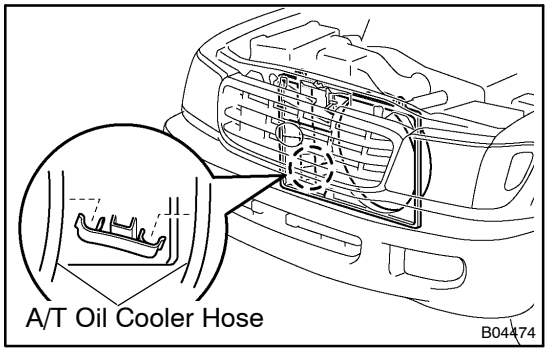
CO0J1–01

REMOVAL

1. REMOVE ENGINE UNDER COVER NO.1
2. DRAIN ENGINE COOLANT
3. DISCONNECT RADIATOR RESERVOIR HOSE FROM RADIATOR
4. DISCONNECT RADIATOR UPPER HOSE FROM RADIATOR
5. DISCONNECT RADIATOR LOWER HOSE FROM RADIATOR
6. DISCONNECT A/T OIL COOLER HOSES FROM RADIATOR
7. REMOVE RADIATOR RESERVOIR TANK



8. REMOVE RADIATOR ASSEMBLY

(a) Disconnect the A/T oil cooler hoses from the clamp on the fan shroud.

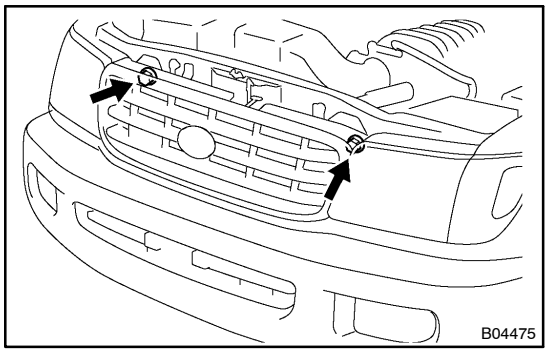
(b) Loosen the fan pulley mounting nuts holding the fluid coupling to the fan bracket.

(c) Remove generator drive belt. (See page CH–8)

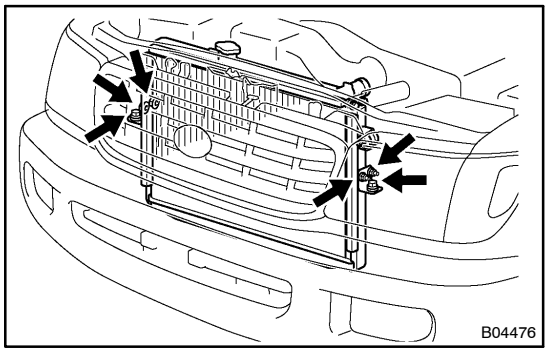
(d) Remove the 3 bolts holding the fan shroud to the radiator.

(e) Remove the 4 fan pulley mounting nuts.

(f) Pull out the fan with fluid coupling, fan pulley and fan shroud.



(g) Remove the 2 nuts.



(h) Remove the 4 nuts, 2 bolts and 2 brackets.

(i) Lift out the radiator assembly.

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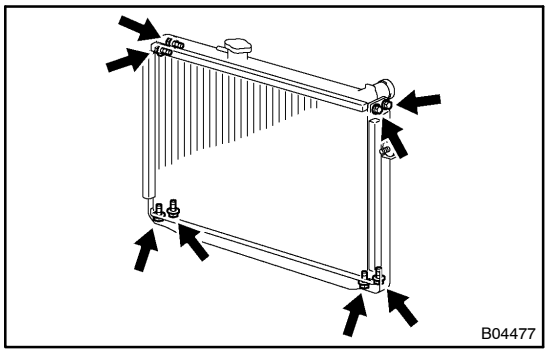

9. REMOVE RADIATOR SIDE SUPPORTS FROM RADIATOR

Remove the 8 nuts and 2 side supports.

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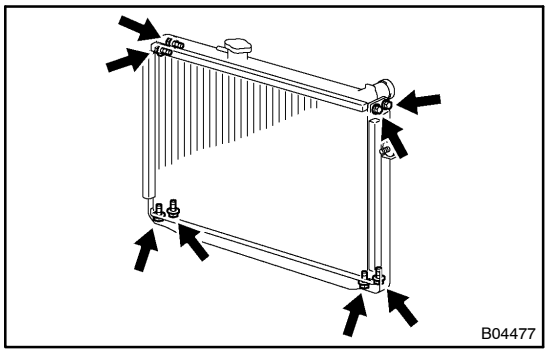
CO0J2–01

INSTALLATION



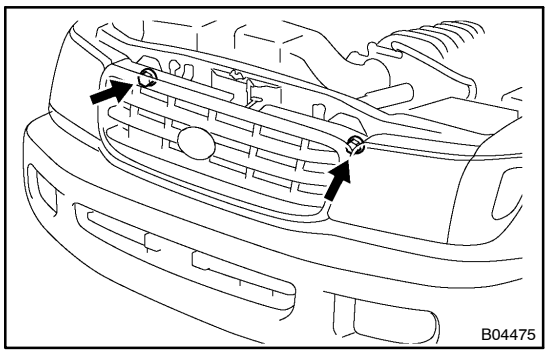
1. INSTALL SIDE SUPPORTS TO RADIATOR

Install the 2 side support with 8 nuts.

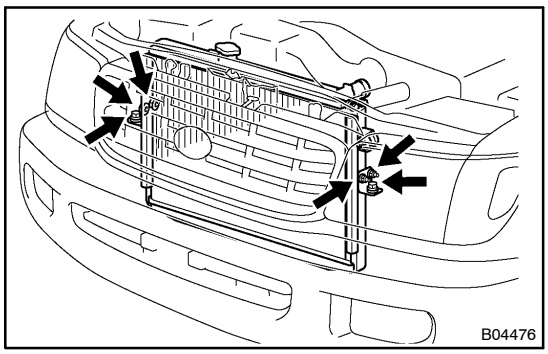
Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf)

2. INSTALL RADIATOR ASSEMBLY

(a) Place the radiator assembly to the body.



(b) Temporarily install the 2 nuts.



(c) Install the 2 brackets to the radiator assembly and body.

Torque:
Bolt: 18 N·m (185 kgf·cm, 13 ft·lbf)
Nut: 20 N·m (200 kgf·cm, 15 ft·lbf)

(d) Tighten the 2 nuts.

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

3. INSTALL FAN PULLEY, FAN SHROUD, FAN WITH FLUID COUPLING AND GENERATOR DRIVE BELT

(a) Place the fan with fluid coupling, fan pulley and fan shroud in position.

(b) Temporarily install the fan pulley mounting nuts.

(c) Install the fan shroud with the 3 bolts.

Torque: 5.0 N·m (50 kgf·cm, 43 in.·lbf)

(d) Connect the A/T oil cooler hoses to the clamp on the fan shroud.

(e) Install the generator drive belt. (See page CH–20)

(f) Tighten the 4 fan pulley mounting nuts.

4. INSTALL RADIATOR RESERVOIR TANK

5. CONNECT A/T OIL COOLER HOSES TO RADIATOR

6. CONNECT RADIATOR UPPER HOSE TO RADIATOR

7. CONNECT RADIATOR LOWER HOSE TO RADIATOR

8. CONNECT RADIATOR RESERVOIR HOSE TO RADIATOR

9. FILL WITH ENGINE COOLANT

10. START ENGINE AND CHECK FOR ENGINE COOLANT LEAKS

11. INSTALL ENGINE UNDER COVER NO.1

12. RECHECK ENGINE COOLANT LEVEL

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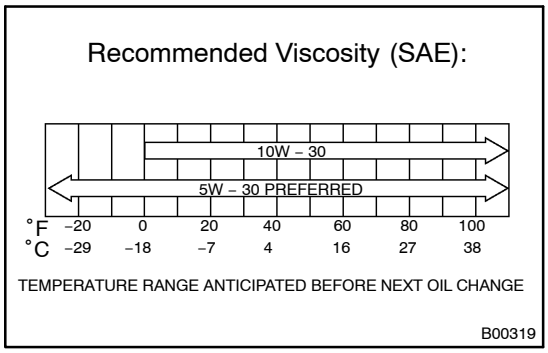


OIL AND FILTER

INSPECTION

LU08N–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:

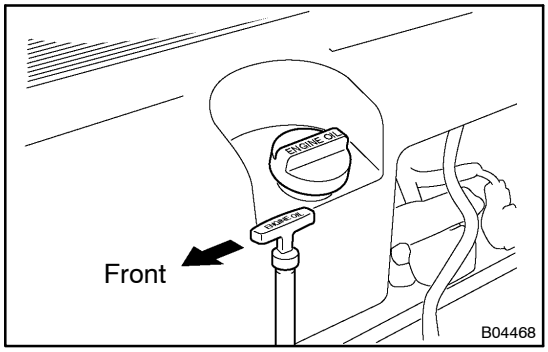
API grade SH Energy–Conserving II or SJ, Energy–Conserving or ILSAC multigrade engine oil. SAE 5W–30 is the best choice for your vehicle, for good fuel economy, and good starting in cold weather.

2. CHECK ENGINE OIL LEVEL

After warming up the engine and then 5 minutes after the engine stop, oil level should be between "L" and "F" of the dipstick. If low, check for leakage and add oil up to "F" mark.

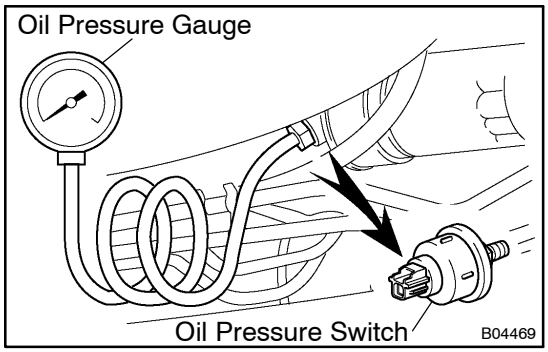
NOTICE:

- **Do not fill with engine oil above the "F" mark.**



- **Install the oil dipstick and oil filler cap facing the direction shown in the illustration.**

3. REMOVE ENGINE UNDER COVER NO.1



4. REMOVE OIL PRESSURE SWITCH

5. INSTALL OIL PRESSURE GAUGE

6. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

7. CHECK OIL PRESSURE

Oil pressure:

At idle: 29 kPa (0.3 kgf/cm^2, 4.3 psi) or more

At 3,000 rpm:

294 – 588 kPa (3.0 – 6.0 kgf/cm^2, 43 – 85 psi)

8. REMOVE OIL PRESSURE GAUGE

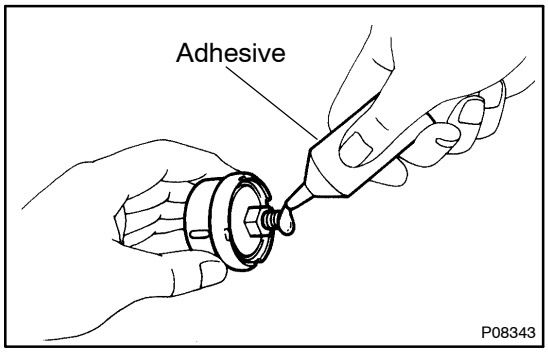
9. REINSTALL OIL PRESSURE SWITCH

(a) Apply adhesive to 2 or 3 threads of the oil pressure switch.

Adhesive:

Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

(b) Reinstall the oil pressure switch.



10. START ENGINE AND CHECK FOR ENGINE OIL LEAKS

11. REINSTALL ENGINE UNDER COVER NO.1

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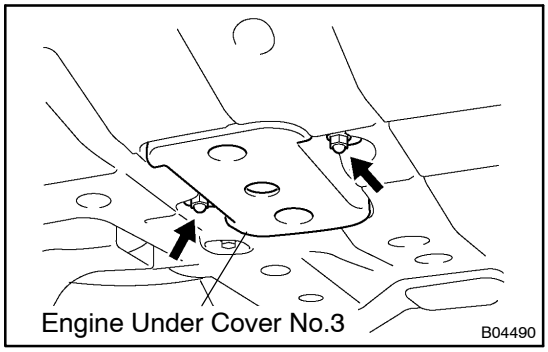
LU08O–01

REPLACEMENT

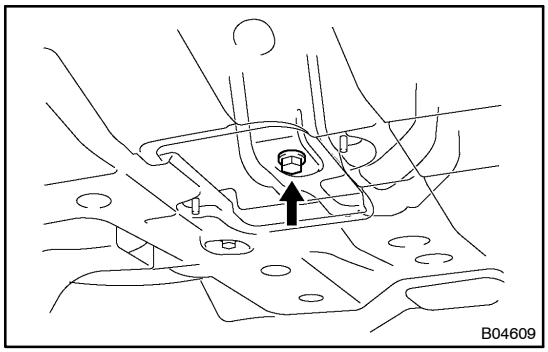
CAUTION:

- **Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.**
- **Care should be taken, therefore, when changing engine oil to minimize the frequency and length of time your skin is exposed to used engine oil. Protective clothing and gloves that cannot be penetrated by oil should be worn. The skin should be thoroughly washed with soap and water, or use water–less hand cleaner, to remove any used engine oil. Do not use gasoline, thinners, or solvents.**
- **In order to preserve the environment, used oil and used oil filters must be disposed of only at designated disposal sites.**



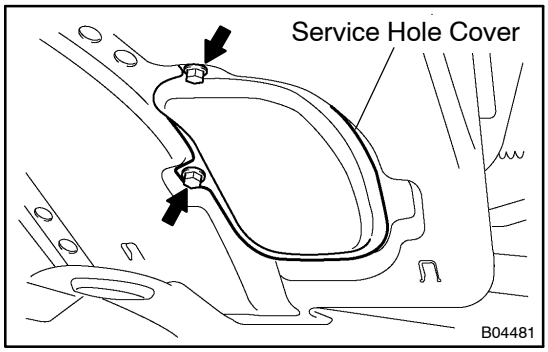
1. DRAIN ENGINE OIL

(a) Remove the 2 nuts and engine under cover No.3.



(b) Remove the oil filler cap.

(c) Remove the oil drain plug, and drain the oil into a container.



2. REPLACE OIL FILTER

(a) Remove the 2 bolts and service hole cover.

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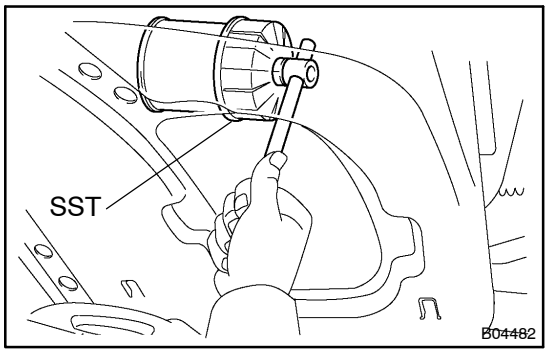
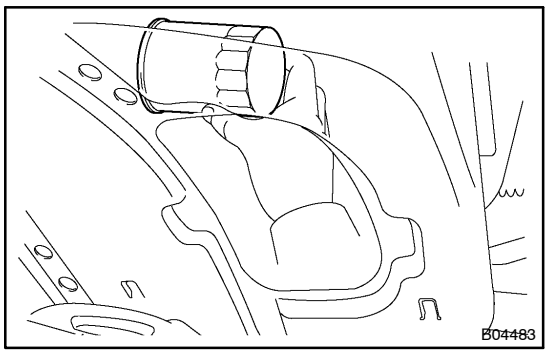


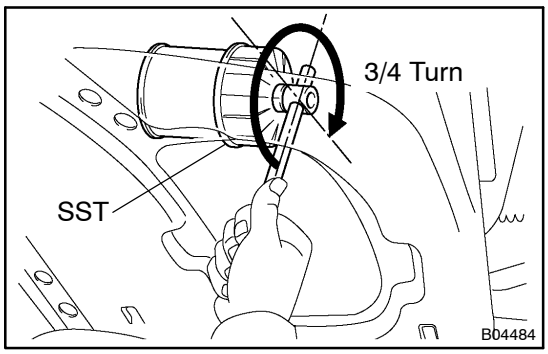
(b) Using SST, remove the oil filter.
SST 09228–07501

(c) Clean the oil filter contact surface on the oil filter mounting.

(d) Lubricate the filter rubber gasket with clean engine oil.



(e) Tighten the oil filter by hand until the rubber gasket contacts the seat of the filter mounting.



(f) Using SST, give it an additional 3/4 turn to seat the filter.
SST 09228–07501

3. REFILL WITH ENGINE OIL

(a) Clean and install the oil drain plug with a new gasket.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(b) Fill with new engine oil.
Capacity:
Drain and refill:
w/ Oil filter change: 6.8 liters (7.2 US qts, 6.0 Imp. qts)
w/o Oil filter change: 6.4 liters (6.8 US qts, 5.6 Imp. qts)
Dry fill: 8.0 liters (8.5 US qts, 7.0 Imp. qts)

(c) Reinstall the oil filler cap.

4. START ENGINE AND CHECK FOR ENGINE OIL LEAKS

5. RECHECK ENGINE OIL LEVEL

6. REINSTALL ENGINE UNDER COVER NO.3 AND SERVICE HOLE COVER

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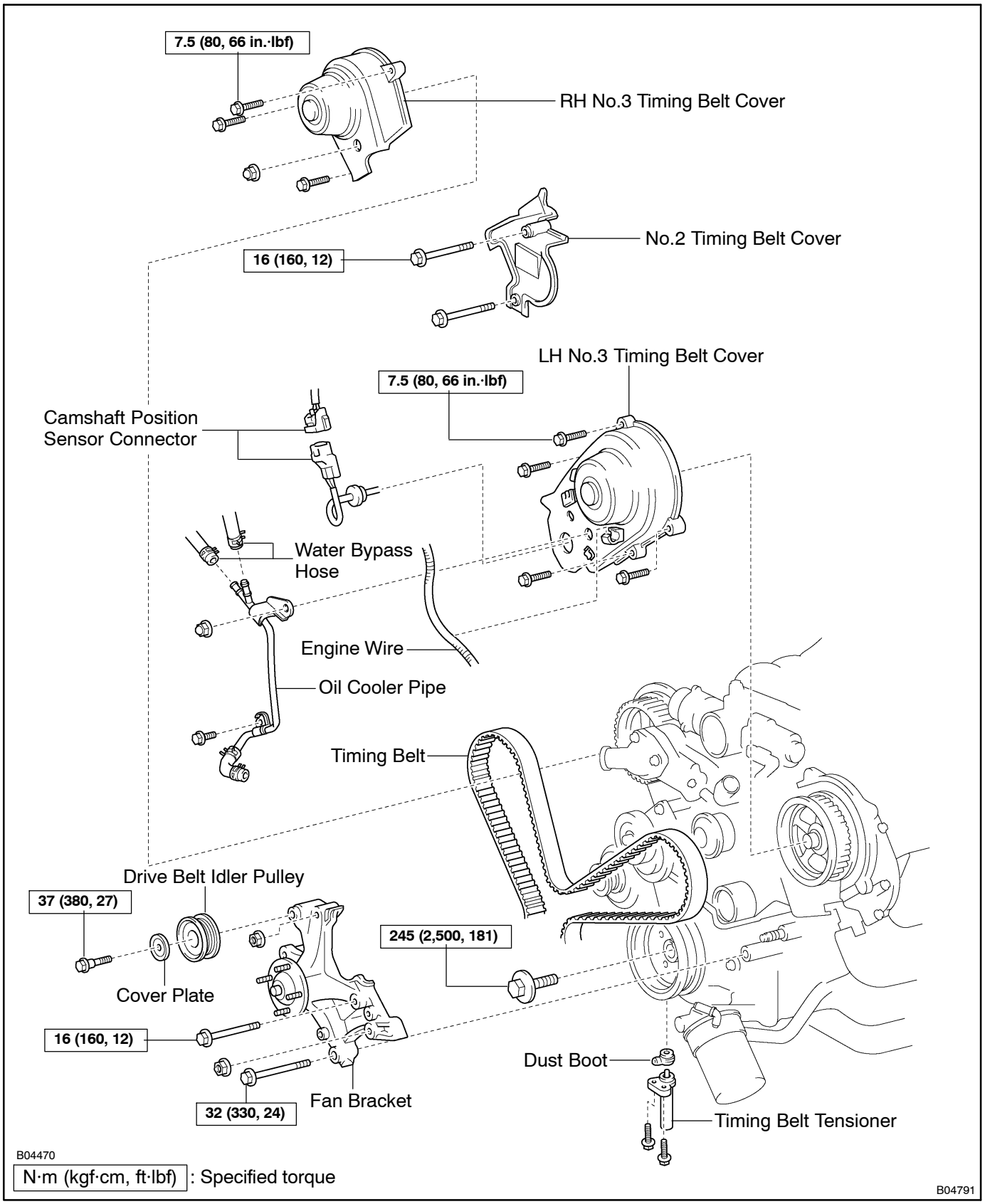
OIL PUMP

COMPONENTS

LU08P–01



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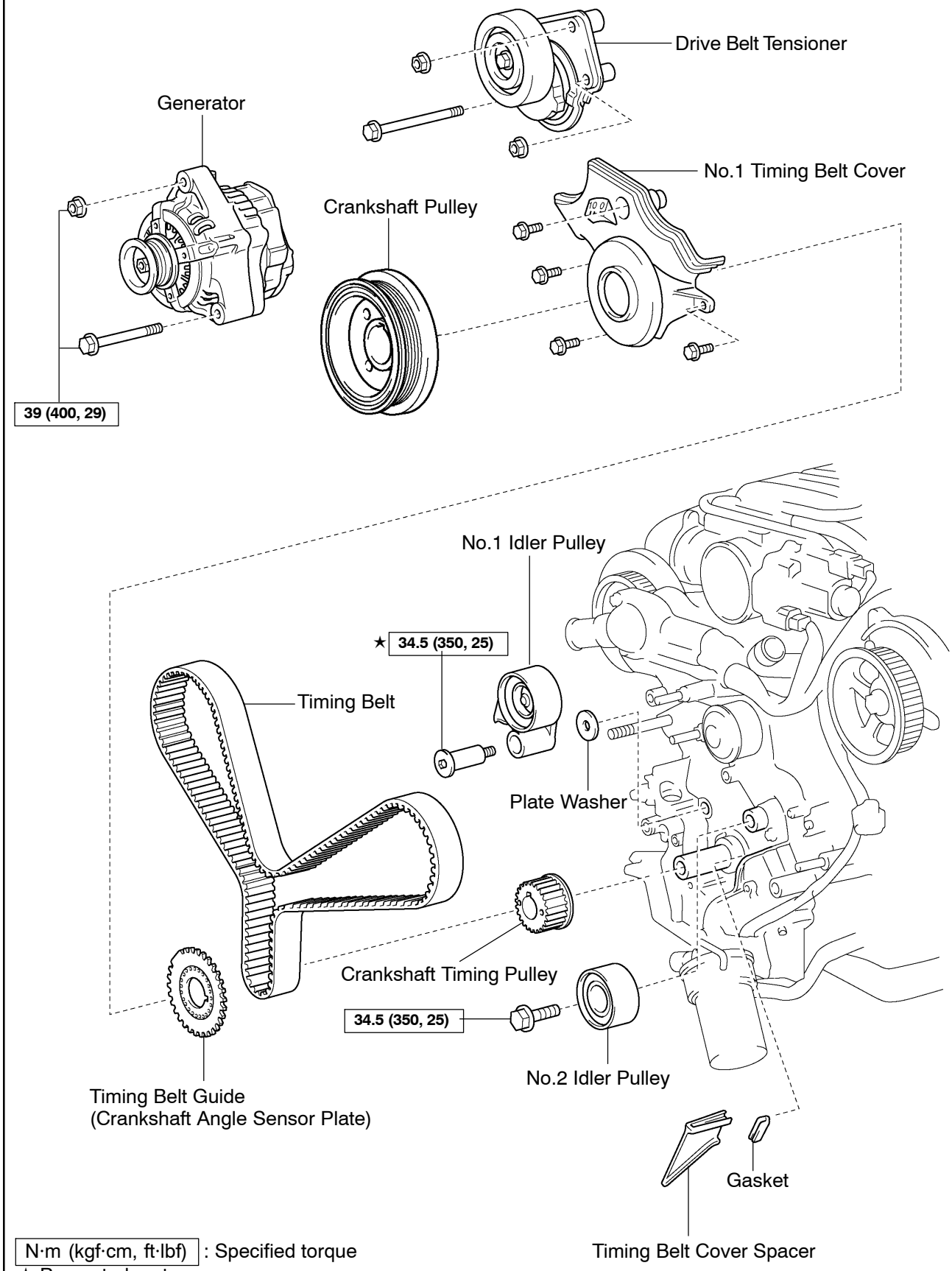

N·m (kgf·cm, ft·lbf) : Specified torque
★ Precoated part

B04472

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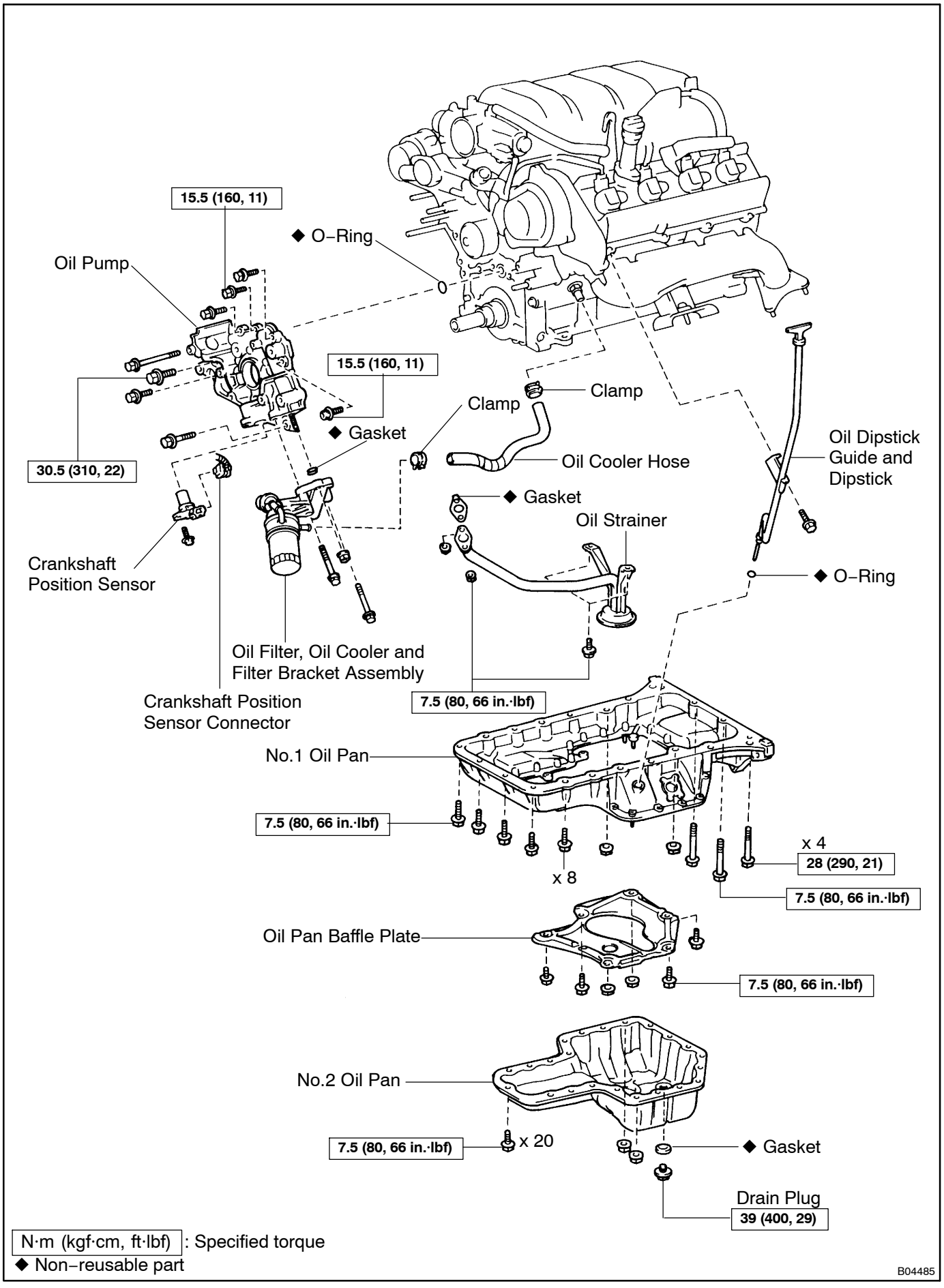

N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part

B04485

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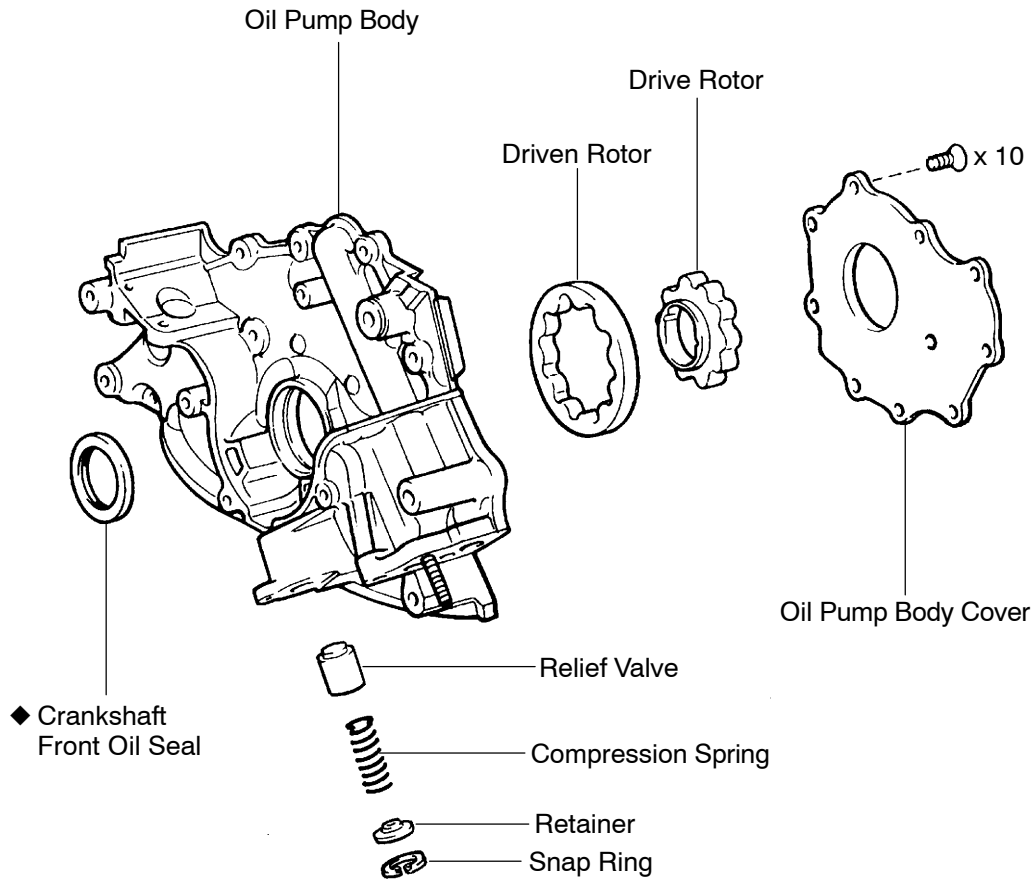

◆ Non–reusable part

B03735

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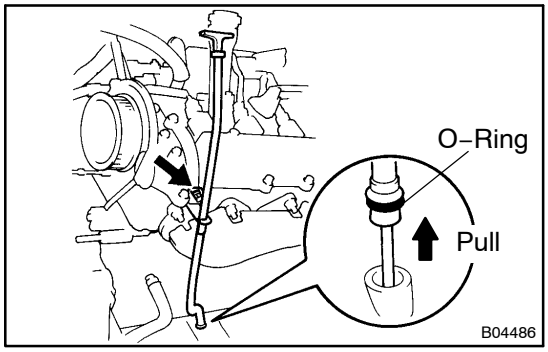
LU08Q–02

REMOVAL

HINT:

When repairing the oil pump, the oil pan and strainer should be removed and cleaned.

1. **REMOVE ENGINE FROM VEHICLE (See page EM–76)**
2. **INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY**
3. **REMOVE TIMING BELT (See page EM–15)**
4. **REMOVE NO.1 IDLER PULLEY (See page EM–15)**
5. **REMOVE NO.2 IDLER PULLEY (See page EM–15)**
6. **REMOVE CRANKSHAFT TIMING PULLEY (See page EM–15)**

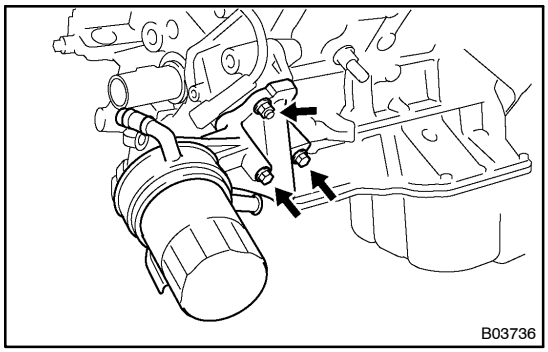


7. **REMOVE OIL DIPSTICK AND GUIDE**

(a) Remove the bolt holding the oil dipstick to the LH cylinder head.

(b) Pull out the dipstick guide together with the dipstick from the No.1 oil pan.

(c) Remove the O–ring from the dipstick guide.



8. **REMOVE OIL FILTER, OIL COOLER AND FILTER BRACKET ASSEMBLY**

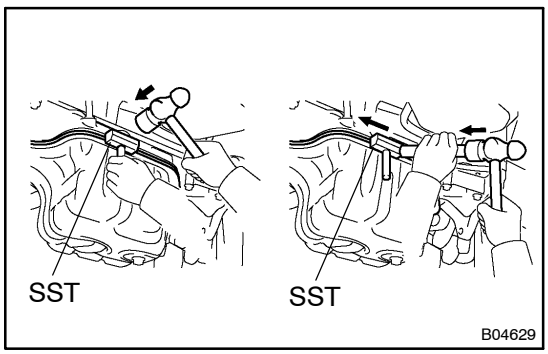
(a) Disconnect the oil cooler hose.

(b) Disconnect the oil pressure switch connector.

(c) Remove the 2 bolts, nut, and oil filter, oil cooler and filter bracket assembly.

(d) Remove the gasket from the filter bracket.

9. **REMOVE CRANKSHAFT POSITION SENSOR (See page IG–12)**



10. **REMOVE NO.2 OIL PAN**

(a) Remove the 20 bolts and 2 nuts.

(b) Insert the blade of SST between the No.1 and No.2 oil pans, cut off applied sealer and remove the No.2 oil pan.
SST 09032–00100

NOTICE:

- **Be careful not to damage the No.2 oil pan contact surface of the No.1 oil pan.**
- **Be careful not to damage the No.2 oil pan flange.**

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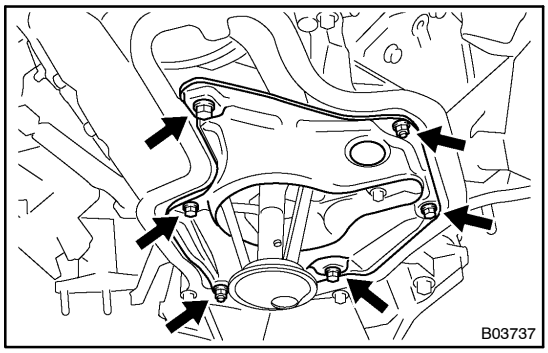
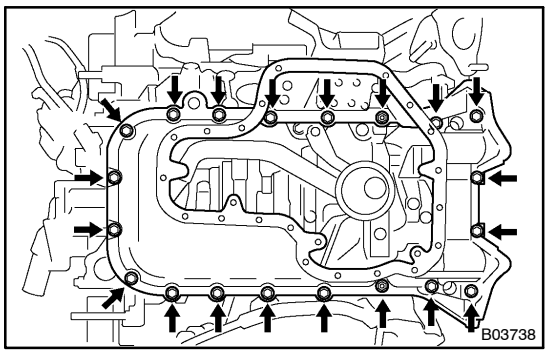


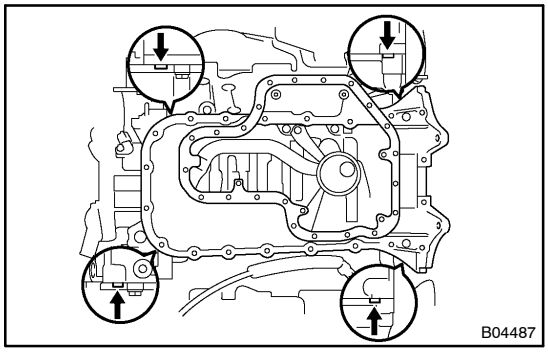
11. REMOVE OIL PAN BAFFLE PLATE

Remove the 4 bolts, 2 nuts and baffle plate.



12. REMOVE NO.1 OIL PAN

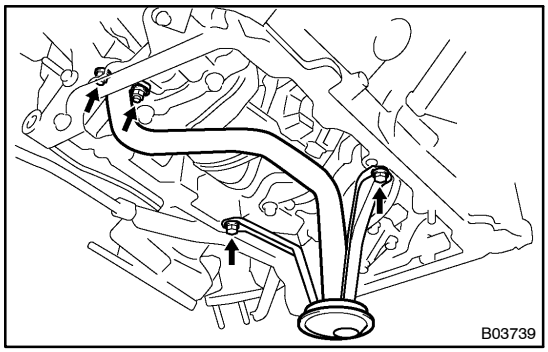
(a) Remove the 18 bolts and 2 nuts.



(b) Using a screwdriver, remove the No.1 oil pan by prying between the oil pan and cylinder block in the sequence shown.

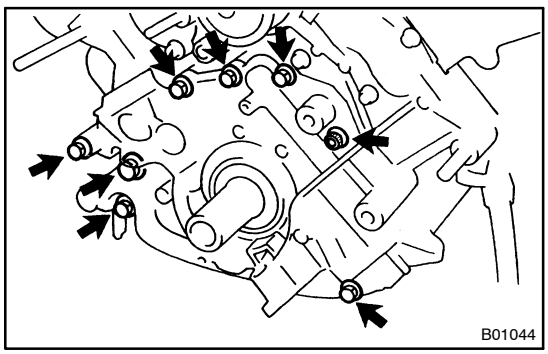
NOTICE:

Be careful not to damage the contact surface of the cylinder block and No.1 oil pan.



13. REMOVE OIL STRAINER

Remove the 2 bolt, 2 nuts, oil strainer and gasket.



14. REMOVE OIL PUMP

(a) Remove the 8 bolts.

HINT:

Use a 6 mm hexagon wrench for the hexagon head bolt.

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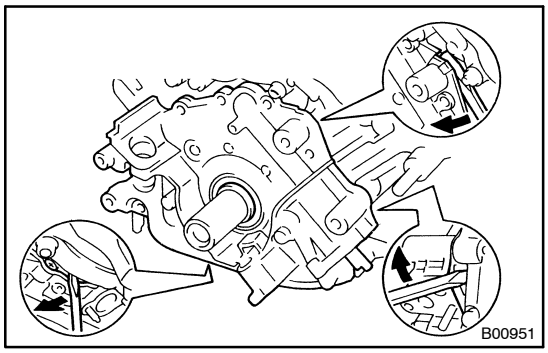

(b) Using a screwdriver, remove the oil pump by prying the portions between the oil pump and cylinder block.

NOTICE:

Be careful not to damage the contact surface of the cylinder block and oil pump.

(c) Remove the O–ring from the cylinder block.

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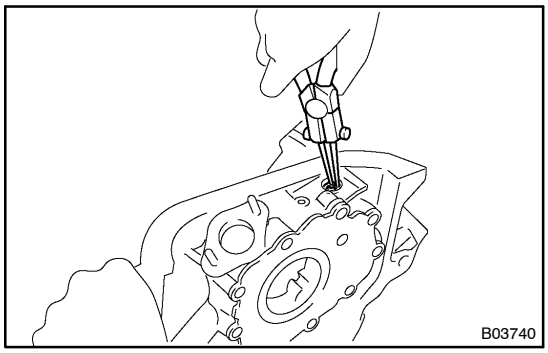
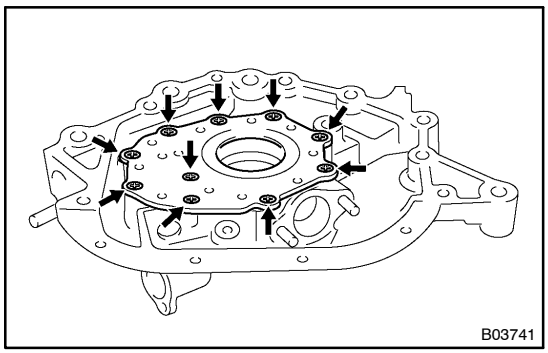
LU08R–01



DISASSEMBLY

1. REMOVE RELIEF VALVE

(a) Using snap ring pliers, remove the snap ring.
(b) Remove the retainer, spring and relief valve.



2. REMOVE DRIVE AND DRIVEN ROTORS

Remove the 10 screws, pump body cover, the drive and driven rotors.

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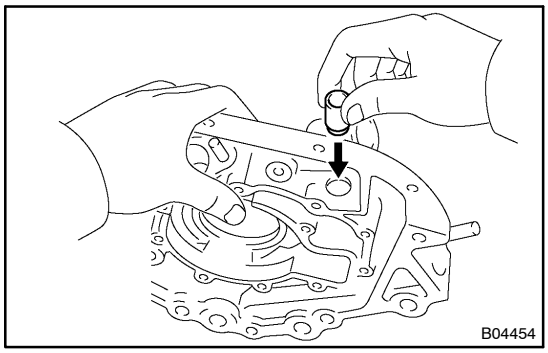
LU08S–01

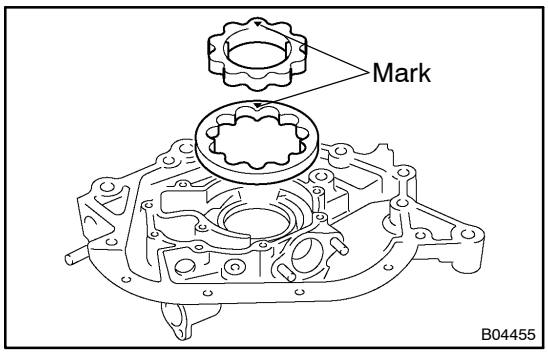
INSPECTION



1. INSPECT RELIEF VALVE

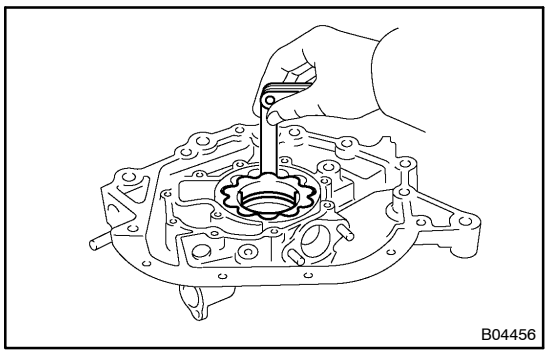
Coat the valve with engine oil and check that it falls smoothly into the valve hole by its own weight.

If it doesn't, replace the relief valve. If necessary, replace the oil pump assembly.



2. INSPECT DRIVE AND DRIVEN ROTORS INTO OIL PUMP BODY

Place the drive and driven rotors into the oil pump body with the mark facing upward.

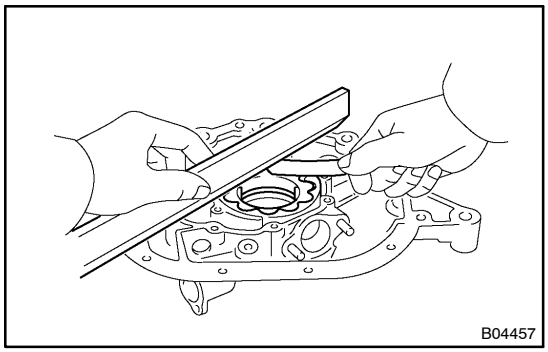


3. INSPECT ROTORS FOR TIP CLEARANCE

Using a feeler gauge, measure the clearance between the drive and driven rotor tips.

Standard tip clearance:
0.110 – 0.240 mm (0.0043 – 0.0094 in.)
Maximum tip clearance: 0.35 mm (0.0138 in.)

If the tip clearance is greater than maximum, replace the rotors as a set.

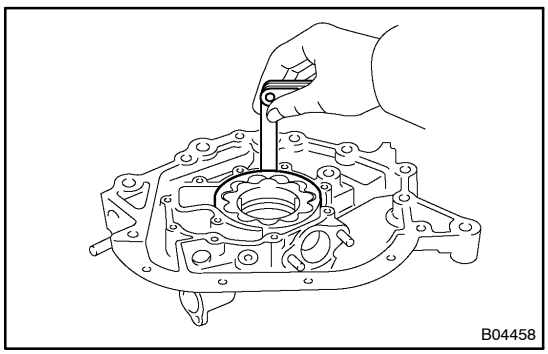


4. INSPECT ROTORS FOR SIDE CLEARANCE

Using a feeler gauge and precision straight edge, measure the clearance between the rotors and precision straight edge.

Standard side clearance:
0.030 – 0.090 mm (0.0012 – 0.0035 in.)
Maximum side clearance: 0.15 mm (0.0059 in.)

If the side clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.



5. INSPECT ROTOR FOR BODY CLEARANCE

Using a feeler gauge, measure the clearance between the driven rotor and body.

Standard body clearance:
0.100 – 0.175 mm (0.0039 – 0.0069 in.)
Maximum body clearance: 0.30 mm (0.0118 in.)

If the body clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.

6. REMOVE DRIVE AND DRIVE ROTORS

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LU08T–02

REPLACEMENT

REPLACE CRANKSHAFT FRONT OIL SEAL (See page EM–102)

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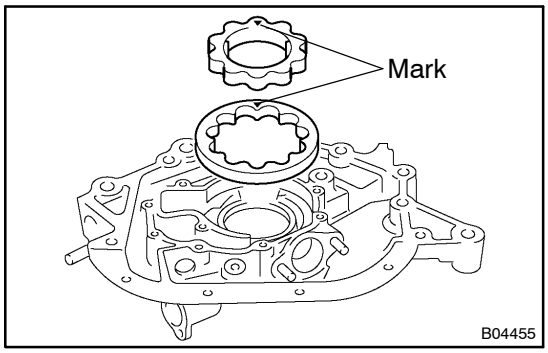
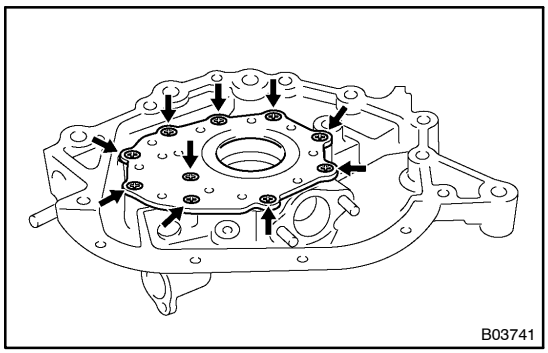
LU08U–01

REASSEMBLY

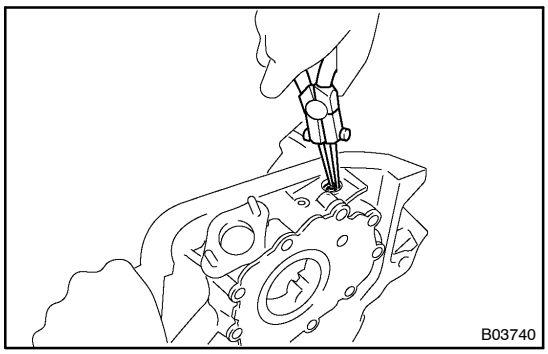


1. INSTALL DRIVE AND DRIVEN ROTORS

(a) Place the drive and driven rotors into pump body with the marks facing the pump body cover side.



(b) Install the pump body cover with the 10 screws.
Torque: 10 N·m (105 kgf·cm, 7 ft·lbf)



2. INSTALL RELIEF VALVE

(a) Insert the relief valve, spring and retainer into the oil pump body hole.

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

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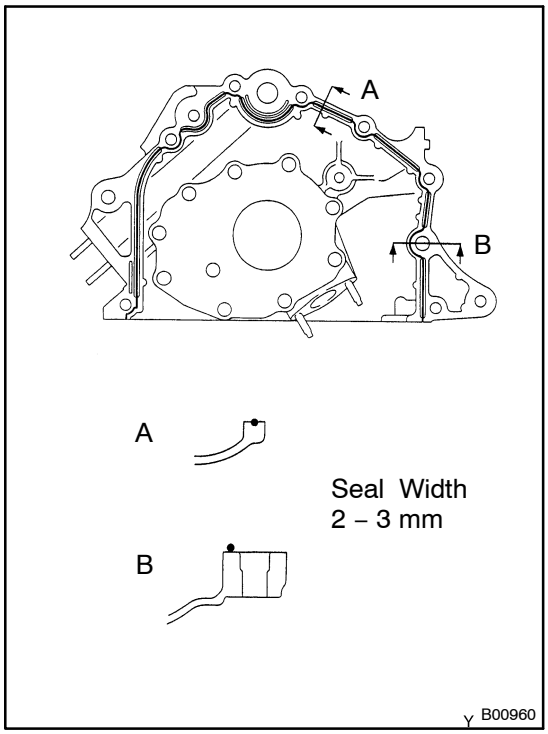
LU08V–01



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 groove.
- Thoroughly clean all components to remove all the loose material.
- Using a non–residue solvent, clean both sealing surfaces.

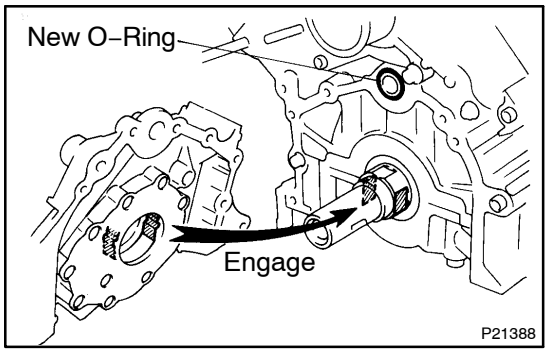
(b) Apply seal packing to the oil pump as shown in the illustration.

Seal packing: Part No. 08826–00080 or equivalent

NOTICE:

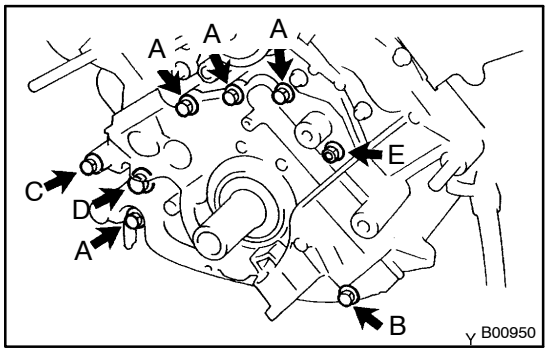
Avoid applying an excessive amount to the surface. Be particularly careful near oil passage.

- Install a nozzle that has been cut to a 2 – 3 mm (0.08 – 0.12 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.



(c) Install a new O–ring to the cylinder block.

(d) Engage the spline teeth of the oil pump drive gear with the large teeth of the crankshaft, and slide the oil pump on the crankshaft.



(e) Install the oil pump with the 8 bolts. Uniformly tighten the bolts in several passes.

Torque:

15.5 N·m (160 kgf·cm, 11 ft·lbf)

for 12 mm head and 6 mm hexagon head

30.5 N·m (310 kgf·cm, 22 ft·lbf) for 14 mm head

HINT:

- Use a 6 mm hexagon wrench for the hexagon head bolt.
- Each bolt length is indicated in the illustration.

Bolt length:

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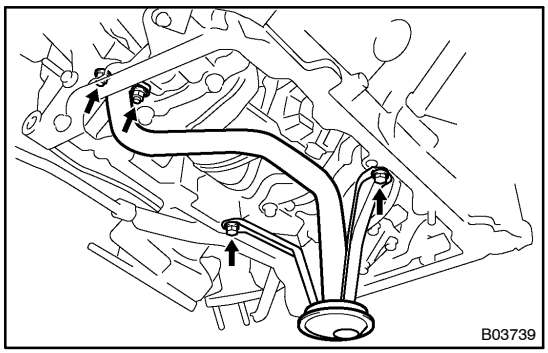
35 mm (1.38 in.) for A of 12 mm head
50 mm (1.97 in.) for B of 12 mm head
106 mm (4.17 in.) for C of 12 mm head
44 mm (1.73 in.) for D of 14 mm head
28 mm (1.10 in.) for E of 6 mm hexagon head

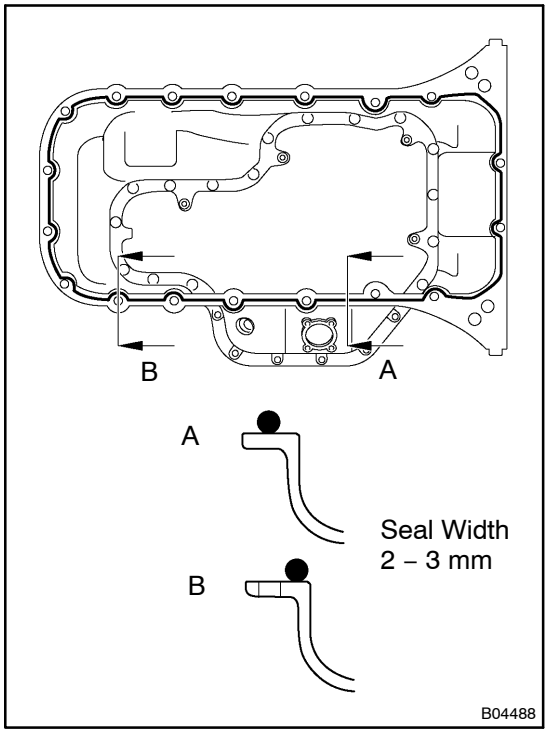


2. INSTALL OIL STRAINER

Install a new gasket and the oil strainer with the 2 bolts and 2 nuts.

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

HINT:
Use bolt 12 mm (0.47 in.) in length.



3. INSTALL NO.1 OIL PAN

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the No.1 oil pan, cylinder block, oil pump and rear oil seal retainer.
- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- Thoroughly clean all components to remove all the loose material.
- Using a non–residue solvent, clean both sealing surfaces.

(b) Apply seal packing to the No.1 oil pan as shown in the illustration.

Seal packing: Part No. 08826–00080 or equivalent
- Install a nozzle that has been cut to a 3 – 5 mm (0.12 – 0.20 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

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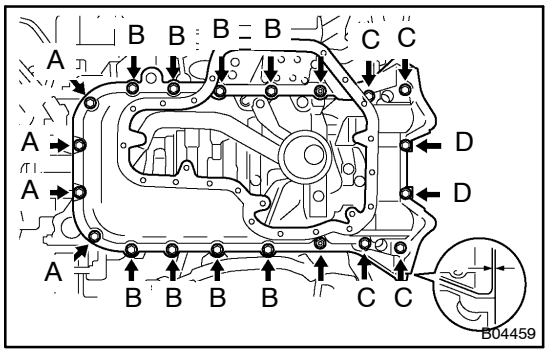


(c) Temporarily install the No.1 oil pan with the 18 bolts, stud bolt and 2 nuts.

HINT:

Each bolt length is indicated in the illustration.

Bolt length:

20 mm (0.79 in.) for A of 10 mm head

25 mm (0.98 in.) for B of 12 mm head

60 mm (2.36 in.) for C of 12 mm head

35 mm (1.38 in.) for D of 10 mm head

(d) Set the No.1 oil pan as shown in the illustration.

NOTICE:

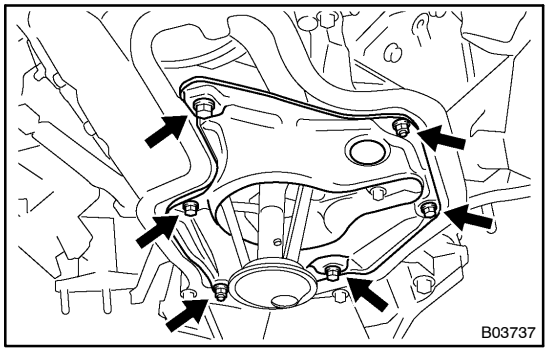
Make sure the clearance between the rear ends of the No.1 oil pan and cylinder block is 0.2 mm (0.008 in.) or less. If the clearance is more than 0.2 mm (0.008 in.), the No.1 oil pan will be stretched.

(e) Uniformly tighten the bolts, stud bolts and nuts in several passes.

Torque:

7.5 N·m (80 kgf·cm, 66 in.·lbf) for 10 mm head

28 N·m (290 kgf·cm, 21 ft·lbf) for 12 mm head



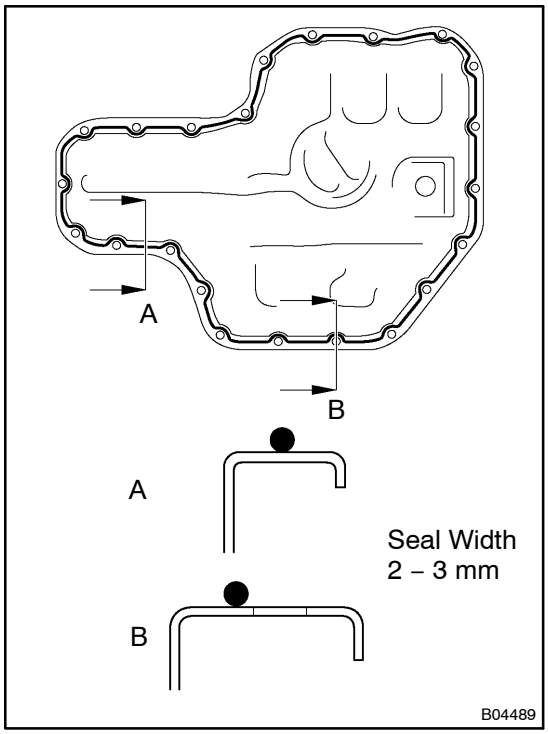
4. INSTALL OIL PAN BAFFLE PLATE

Install the baffle plate with the 4 bolts and 2 nuts.

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

HINT:

Use bolts 12 mm (0.47 in.) in length.



5. INSTALL NO.2 OIL PAN

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the No.1 and No.2 oil pans.

- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- Thoroughly clean all components to remove all the loose material.
- Using a non–residue solvent, clean both sealing surfaces.

NOTICE:

Do not use a solvent which will affect the painted surfaces.

(b) Apply seal packing to the No.2 oil pan as shown in the illustration.

Seal packing: Part No. 08826–00080 or equivalent

- Install a nozzle that has been cut to a 3 – 5 mm (0.12 – 0.20 in.) opening.

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- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

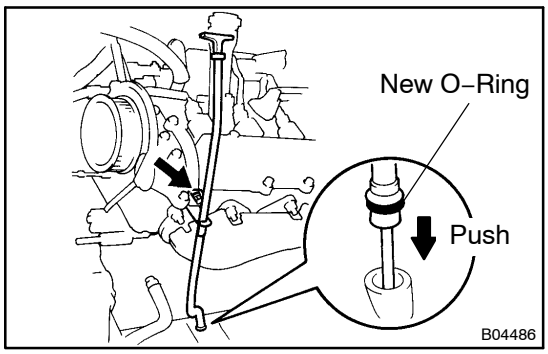
(c) Install the No.2 oil pan with the 20 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

HINT:
Use bolts 14 mm (0.55 in.) in length.

6. INSTALL CRANKSHAFT POSITION SENSOR (See page IG–13)

7. INSTALL OIL FILTER, OIL COOLER AND FILTER BRACKET ASSEMBLY

(a) Install the a new gasket to the oil filter bracket.
(b) Install the oil filter, oil cooler and filter bracket assembly with the 2 bolts and nut.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
(c) Connect the oil pressure switch connector.



8. INSTALL OIL DIPSTICK GUIDE AND DIPSTICK

(a) Install a new O–ring to the dipstick guide.
(b) Apply soapy water to the O–ring.
(c) Push in the dipstick guide end into the guide hole of the No.1 oil pan.
(d) Install the dipstick guide with the bolt.
Torque: 15 N·m, (155 kgf·cm, 11 ft·lbf)
(e) Install the dipstick.

9. INSTALL CRANKSHAFT TIMING PULLEY (See page EM–22)

10. INSTALL NO.1 IDLER PULLEY (See page EM–22)

11. INSTALL NO.2 IDLER PULLEY (See page EM–22)

12. INSTALL TIMING BELT (See page EM–22)

13. DISCONNECT ENGINE FROM ENGINE STAND

14. INSTALL ENGINE TO VEHICLE (See page EM–80)

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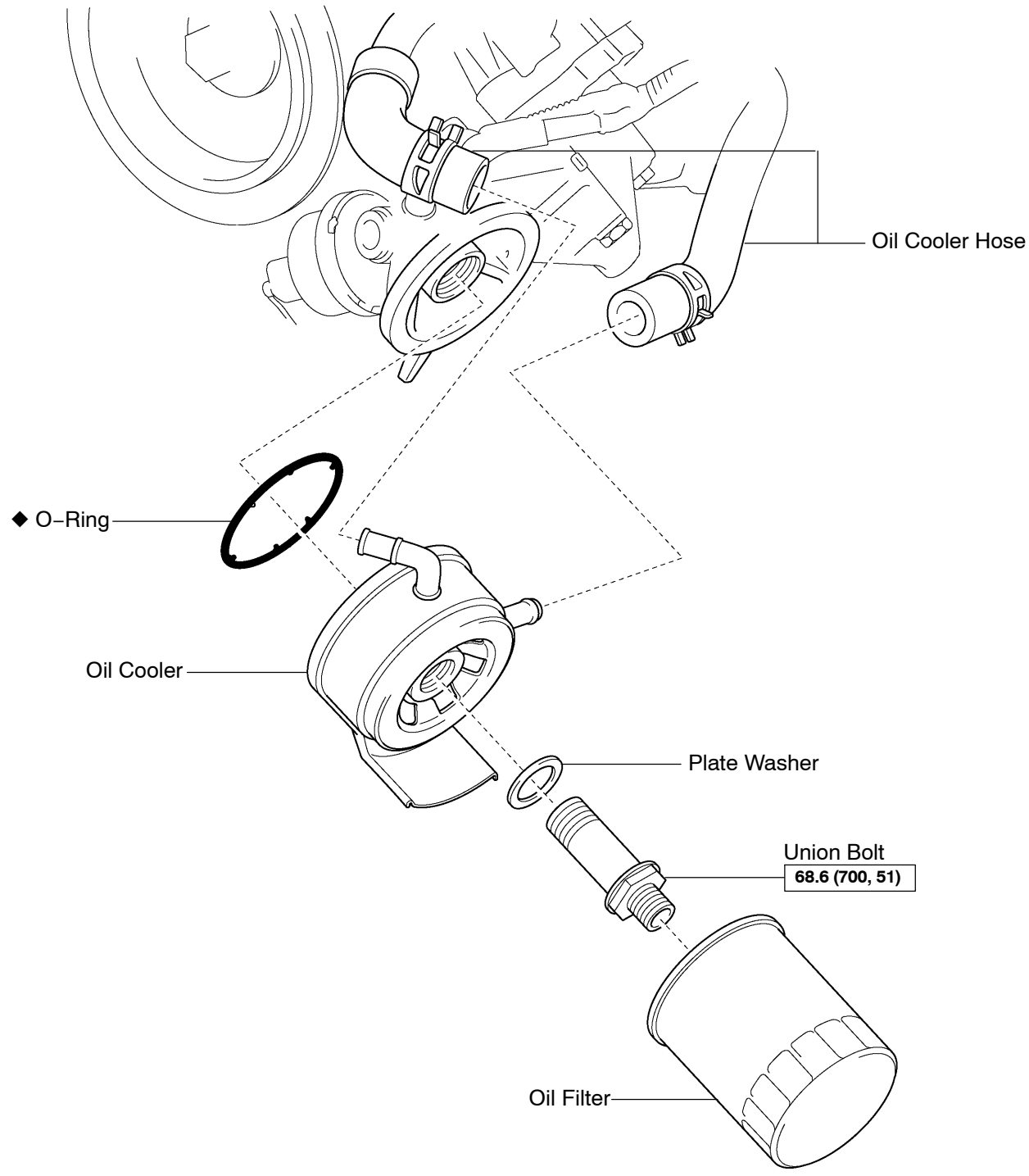
OIL COOLER

COMPONENTS

LU08W–01



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

B04473

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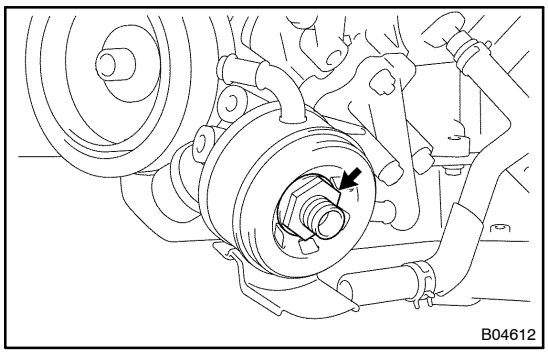
LU08X–01

REMOVAL

1. **DRAIN ENGINE COOLANT**
2. **REMOVE OIL FILTER (See page LU–2)**



3. **REMOVE OIL COOLER**

(a) Disconnect the 2 oil cooler hoses from the oil cooler.
(b) Remove the union bolt, plate washer and the oil cooler.
(c) Remove the O–ring from the oil cooler.

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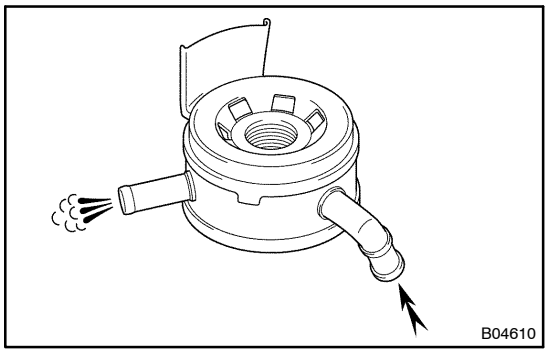
LU08Y–01



INSPECTION

INSPECT OIL COOLER

Check the oil cooler for damage or clogging.
If necessary, replace the oil cooler.

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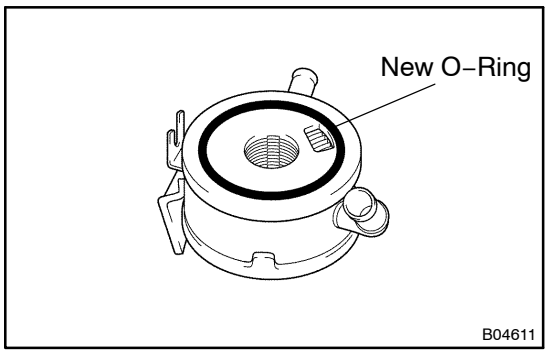
LU08Z–01

INSTALLATION

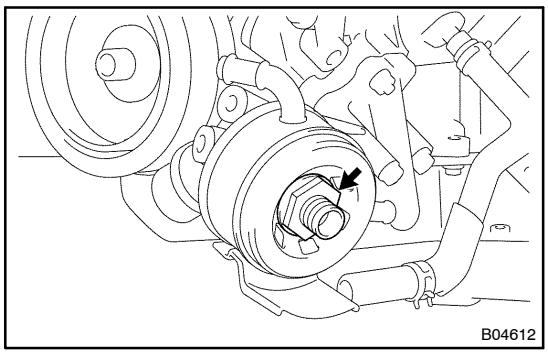
1. INSTALL OIL COOLER

(a) Clean the oil cooler contact surface on the oil cooler mounting.



(b) Install a new O–ring to the oil cooler.

(c) Apply a light coat of engine oil on the threads and under the head of the union bolt.



(d) Install the plate washer and union bolt.
Torque: 68.6 N·m (700 kgf·cm, 51 ft·lbf)

(e) Connect the 2 oil cooler hoses to the oil cooler.

2. INSTALL OIL FILTER (See page LU–2)

3. FILL WITH ENGINE COOLANT

4. START ENGINE AND CHECK FOR ENGINE COOLANT AND ENGINE OIL LEAKS

5. CHECK ENGINE OIL LEVEL

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IGNITION SYSTEM

IG08P–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 IGNITION COIL (WITH IGNITER) AND SPARK TEST

Check that the spark occurs.

(1) Remove the ignition coils (with igniter).
(See page IG–6)
(2) Remove the spark plugs.
(3) Install the spark plugs to each ignition coil (with igniter), and connect the ignition coil (with igniter) connector.
(4) Disconnect the 8 injector connectors.
(5) Ground the spark plug.
(6) Check if spark occurs while engine is being cranked.

NOTICE:

To prevent gasoline from being injected from injectors during this test, crank the engine for no more than 5 – 10 seconds at time.

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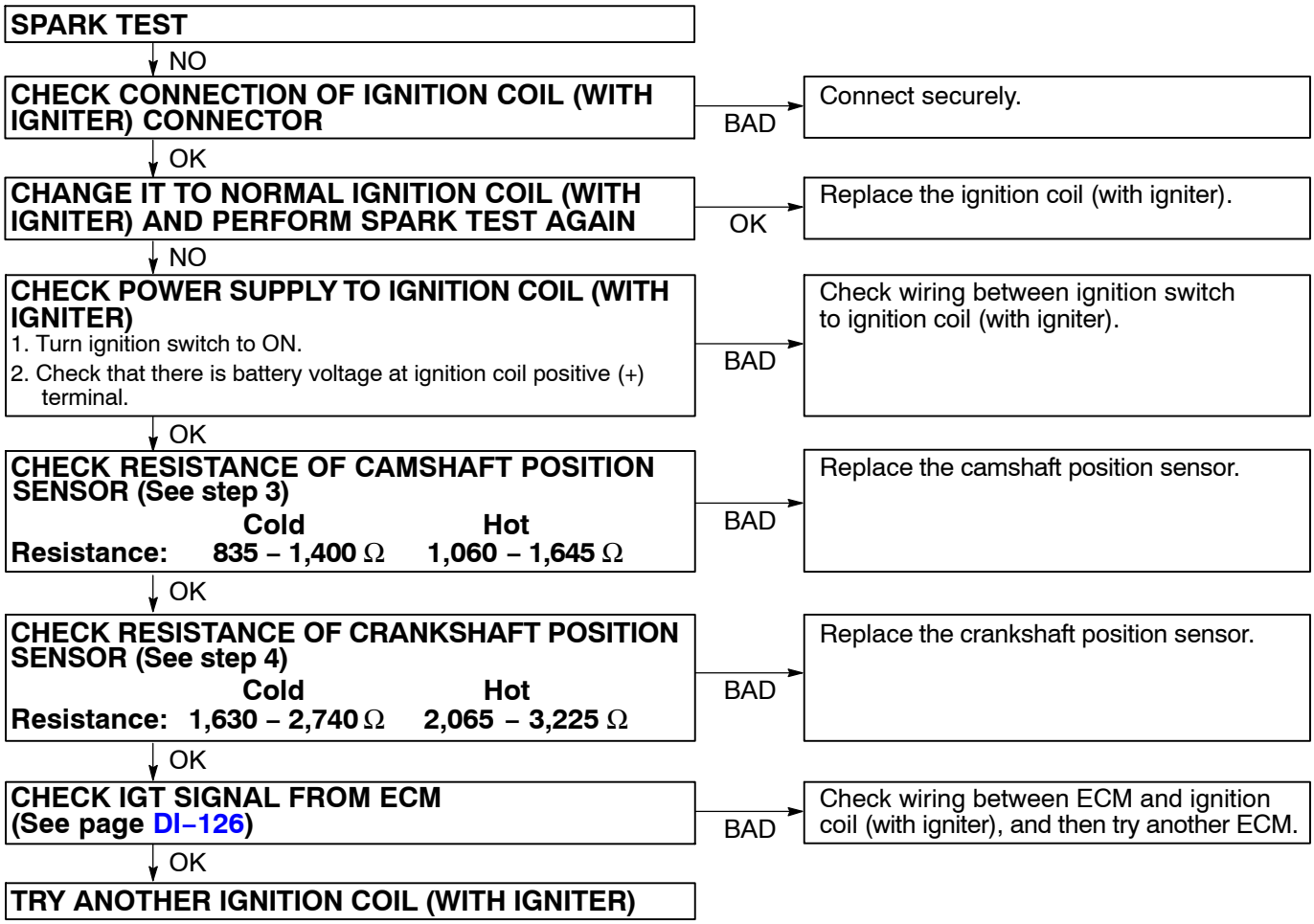
If the spark does not occur, do the test as follows:



(7) Using a 16 mm plug wrench, install the spark plugs.
Torque: 17.5 N·m (180 kgf·cm, 13 ft·lbf)

(8) Reinstall the ignition coils (with igniter).
(See page IG–6)

2. INSPECT SPARK PLUGS

NOTICE:

- **Never use a wire brush for cleaning.**
- **Never attempt to adjust the electrode gap on used spark plug.**
- **Spark plug should be replaced every 100,000 km (60,000 miles).**

(a) Remove the ignition coils (with igniter).
(See page IG–6)

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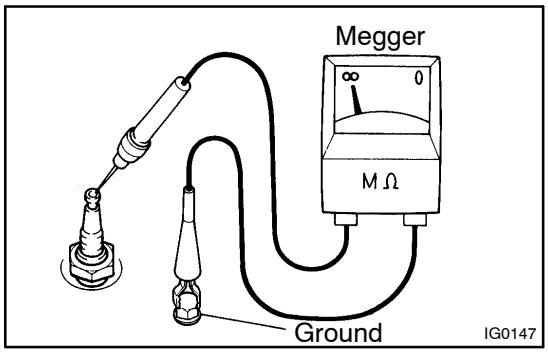


(b) Check the electrode.

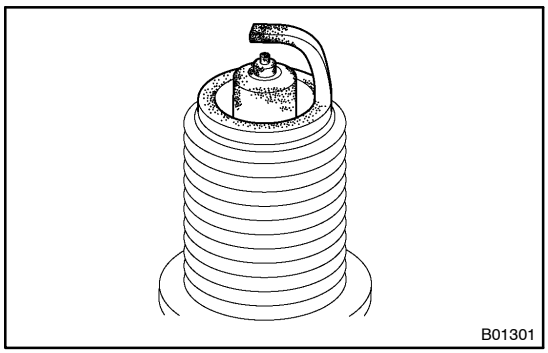
- Using a megger (insulation resistance meter), measure the insulation resistance.

Correct insulation resistance: 10 MΩ or more

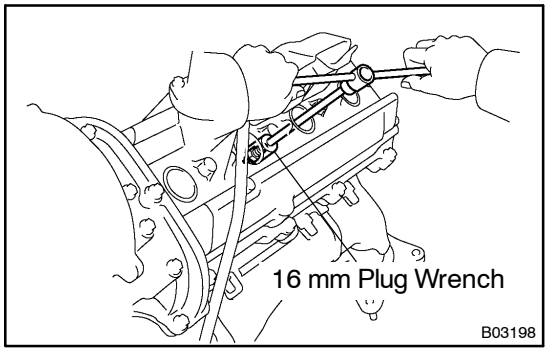
If the resistance is less than specified, proceed to step (d).

HINT:

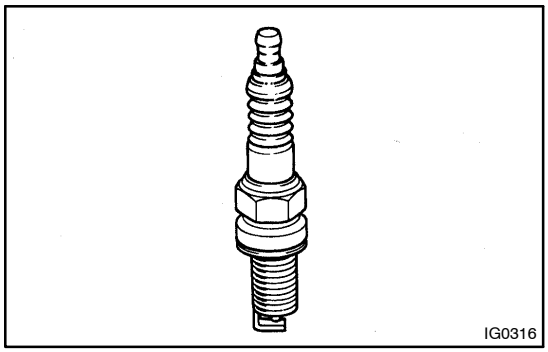
If a megger is not available, the following simple method of inspection provides fairly accurate results.



- Simple Method:
  - Quickly race the engine to 4,000 rpm 5 times.
  - Remove the spark plug. (See step (c))
  - Visually check the spark plug.
    If the electrode is dry ... OK.
    If the electrode is wet ... Proceed to step (d).
  - Reinstall the spark plug. (See step (g))



(c) Using a 16 mm plug wrench, remove the spark plugs.

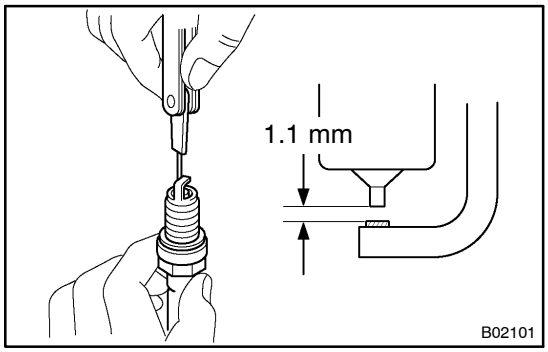


(d) Check the spark plug for thread damage and insulator damage.

If abnormal, replace the spark plug.

Recommended spark plug:

DENSO made	SK20R11
NGK made	IFR6A11



(e) Check the spark plug electrode gap.

Maximum electrode gap for used spark plug:
1.2 mm (0.047 in.)

If the gap is greater than maximum, replace the spark plug.

Correct electrode gap for new spark plug:
1.1 mm (0.043 in.)

NOTICE:

If adjusting the gap of a new spark plug, bend only the base of the ground electrode. Do not touch the tip. Never attempt to adjust the gap on a used plug.

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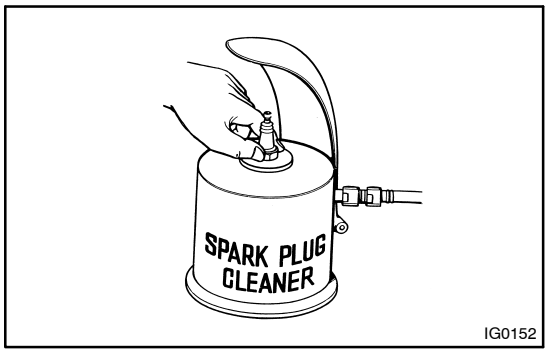


(f) Clean the spark plugs.

If the electrode has traces of wet carbon, allow it to dry and then clean with a spark plug cleaner.

Air pressure: Below 588 kPa (6 kgf/cm^2, 85 psi)
Duration: 20 seconds or less

HINT:

If there are traces of oil, remove it with gasoline before using the spark plug cleaner.

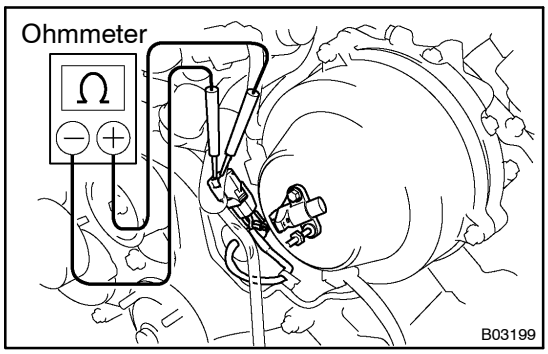
(g) Using a 16 mm plug wrench, install the spark plugs.
Torque: 17.5 N·m (180 kgf·cm, 13 ft·lbf)

(h) Reinstall the ignition coils (with igniter).
(See page IG–6)

3. INSPECT CAMSHAFT POSITION SENSOR

(a) Remove the V–bank cover.

(b) Disconnect the camshaft position sensor connector.



(c) Using an ohmmeter, measure the resistance between terminals.

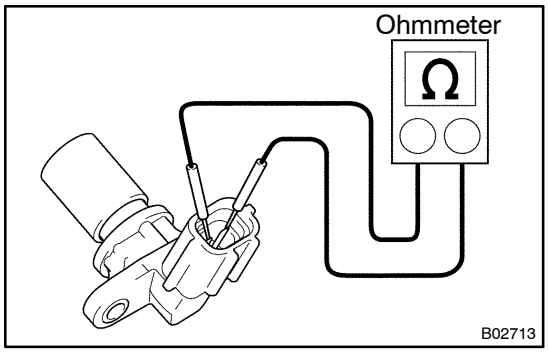
Resistance:

Cold	835 – 1,400 Ω
Hot	1,060 – 1,645 Ω

If the resistance is not as specified, replace the camshaft position sensor.

(d) Reconnect the camshaft position sensor connector.

(e) Reinstall the V–bank cover.



4. INSPECT CRANKSHAFT POSITION SENSOR

(a) Remove the crankshaft position sensor.
(See page IG–12)

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

Resistance:

Cold	1,630 – 2,740 Ω
Hot	2,065 – 3,225 Ω

If the resistance is not as specified, replace the crankshaft position sensor.

(c) Reinstall the crankshaft position sensor.

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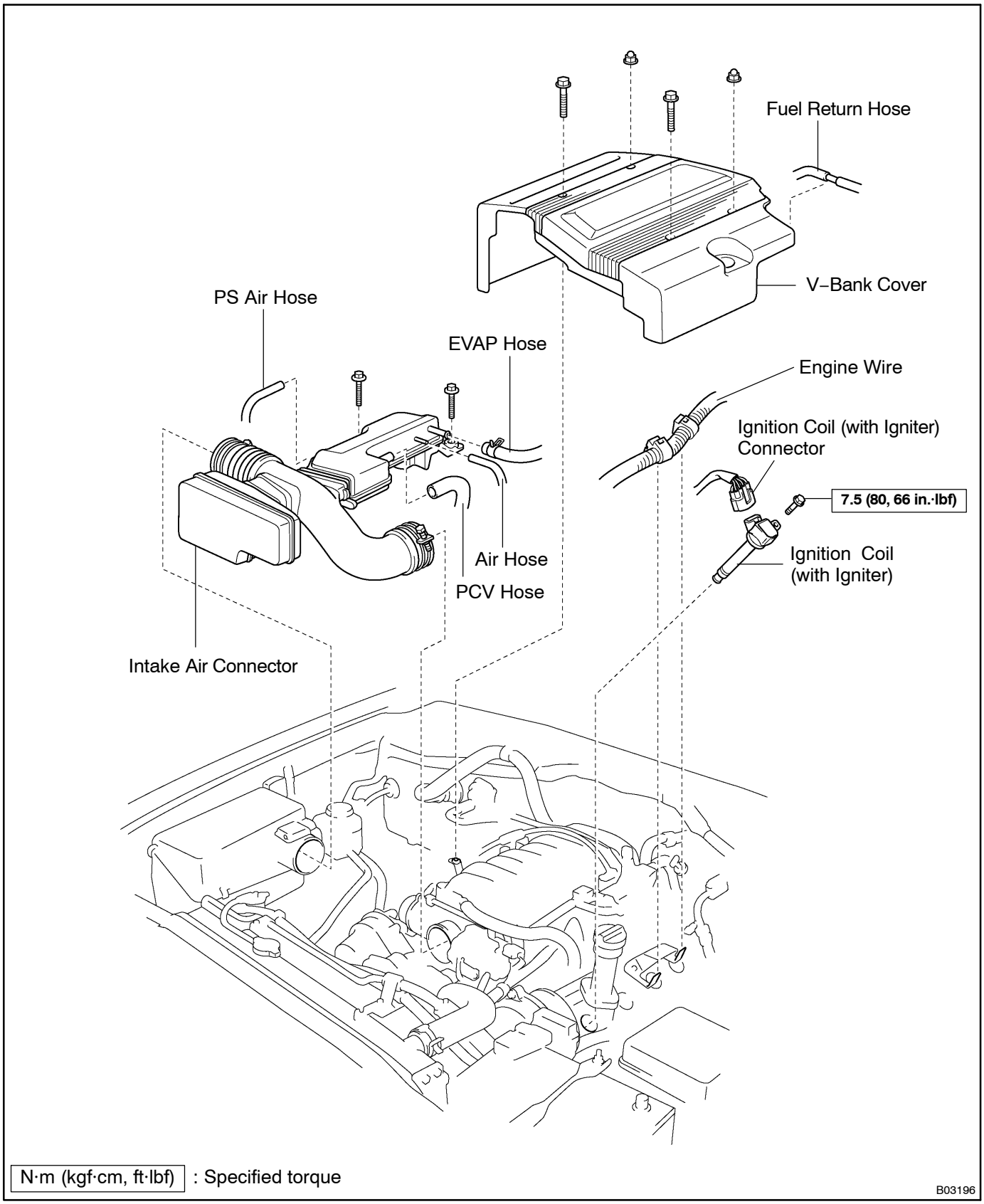
IGNITION COIL

COMPONENTS

IG08Q–01



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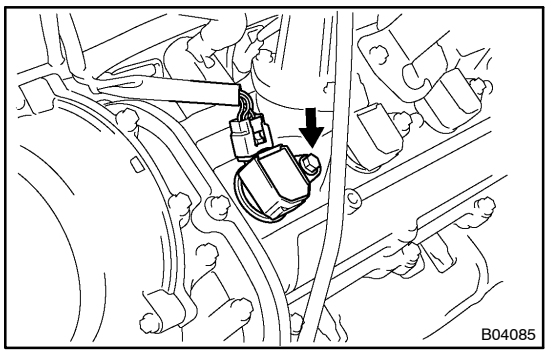
IG08R–01

REMOVAL

1. **REMOVE V–BANK COVER**
2. **REMOVE INTAKE AIR CONNECTOR**
3. **DISCONNECT ENGINE WIRE FROM LH CYLINDER HEAD COVER**

Disconnect the 2 wire clamps and engine wire.



4. **DISCONNECT IGNITION COIL (WITH IGNITER) CONNECTORS**
5. **REMOVE IGNITION COILS (WITH IGNITER) FROM SPARK PLUGS**

Remove the bolt, and pull out the ignition coil (with igniter). Remove the 8 ignition coils (with igniter).

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

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IG08S–01

INSTALLATION

Installation is in the reverse order of removal. (See page IG–6)

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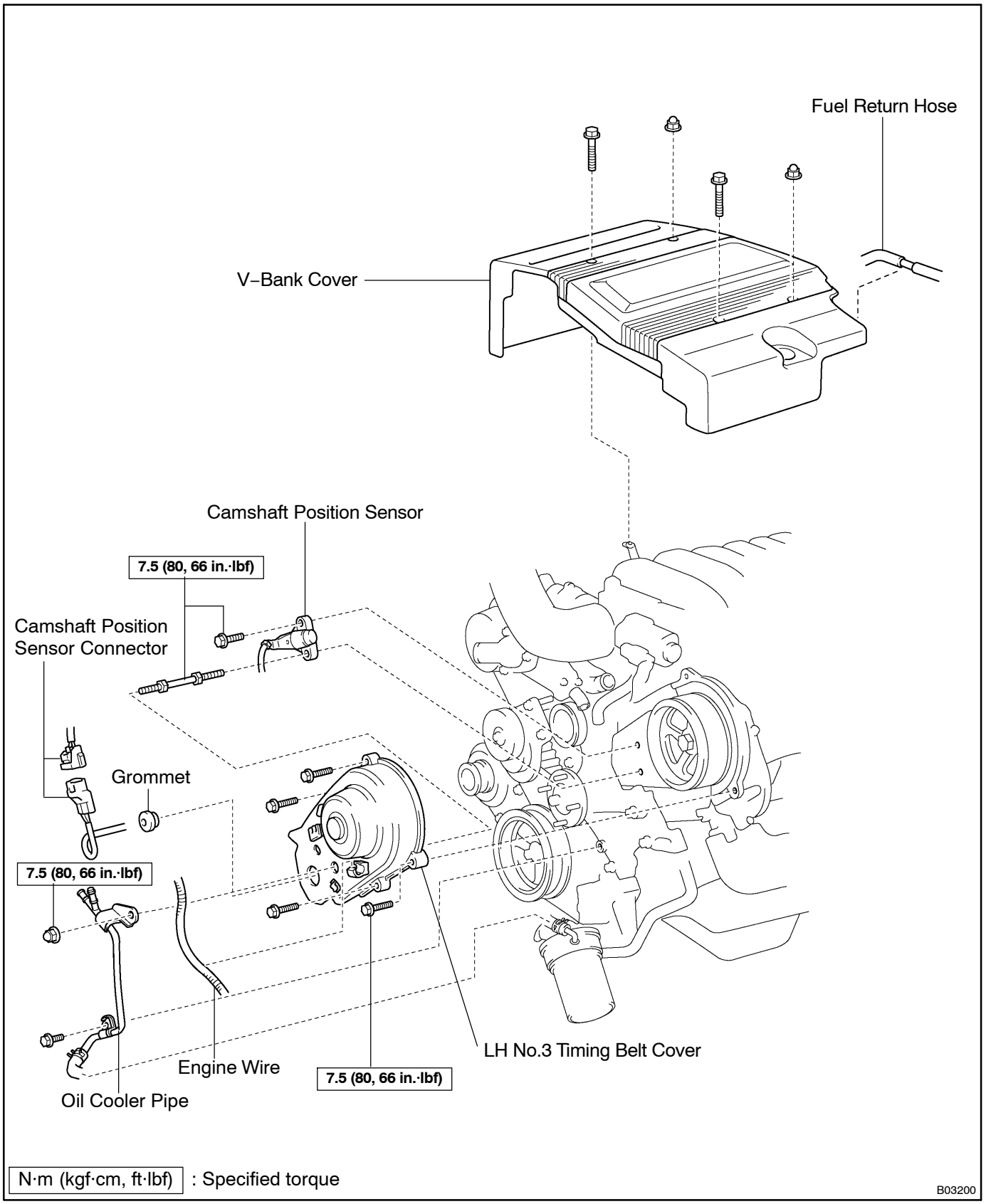
CAMSHAFT POSITION SENSOR

COMPONENTS

IG08T–01



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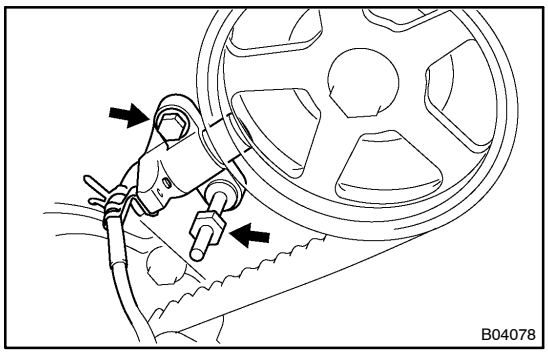
IG08U–01

REMOVAL

1. REMOVE V–BANK COVER
2. DRAIN ENGINE COOLANT
3. DISCONNECT UPPER RADIATOR HOSE
4. REMOVE LH NO.3 TIMING BELT COVER
   (See page EM–15)



5. REMOVE CAMSHAFT POSITION SENSOR

Remove the bolt, stud bolt and camshaft position sensor.

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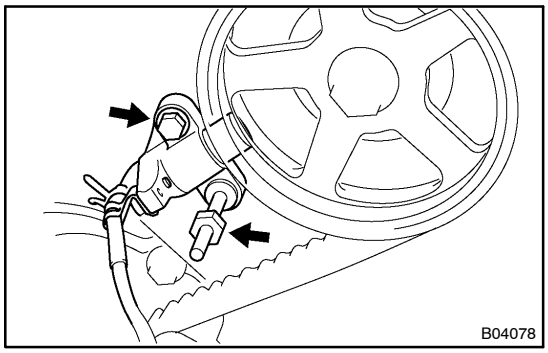
IG08V–01



INSTALLATION

1. **INSTALL CAMSHAFT POSITION SENSOR**

Install the camshaft position sensor with the bolt and stud bolt

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

2. **INSTALL LH NO.3 TIMING BELT COVER (See page EM–22)**
3. **CONNECT RADIATOR HOSE**
4. **INSTALL V–BANK COVER**
5. **FILL ENGINE COOLANT (See page CO–2)**
6. **CHECK ENGINE COOLANT FOR LEAKS**
7. **CHECK IGNITION TIMING (See page EM–9)**

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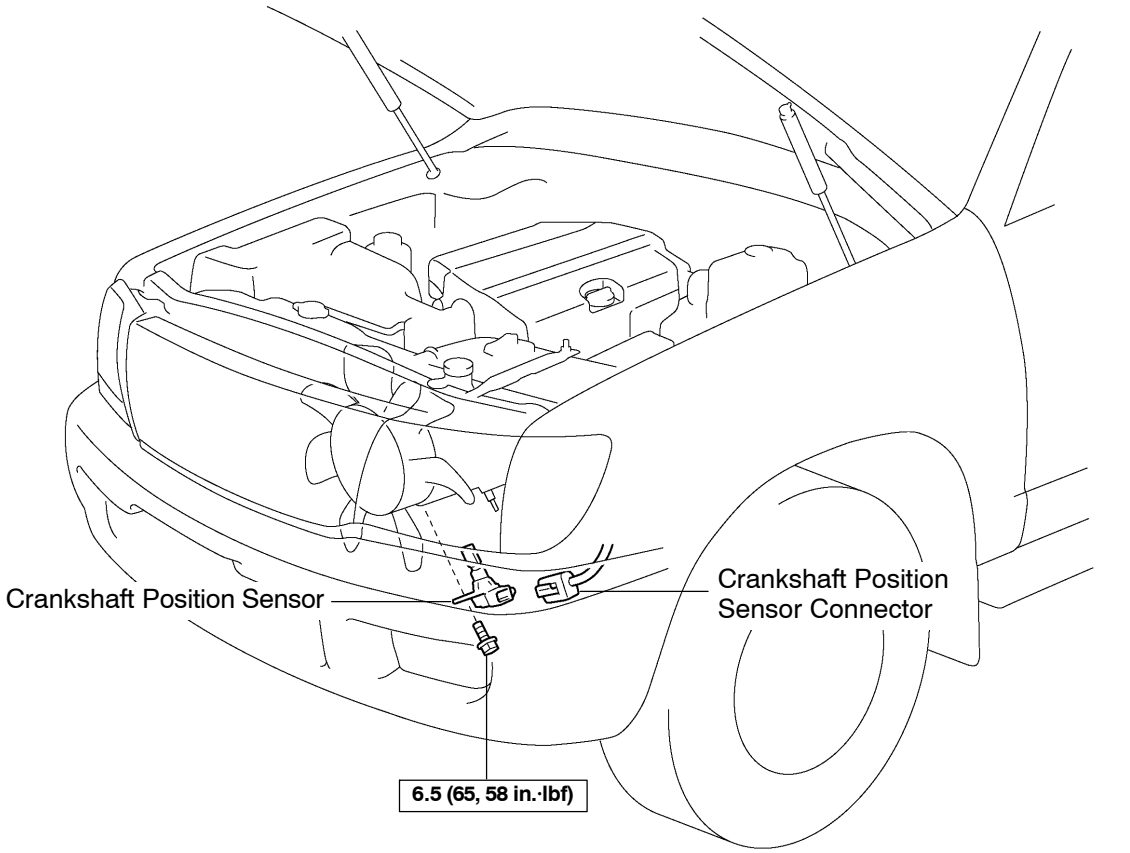
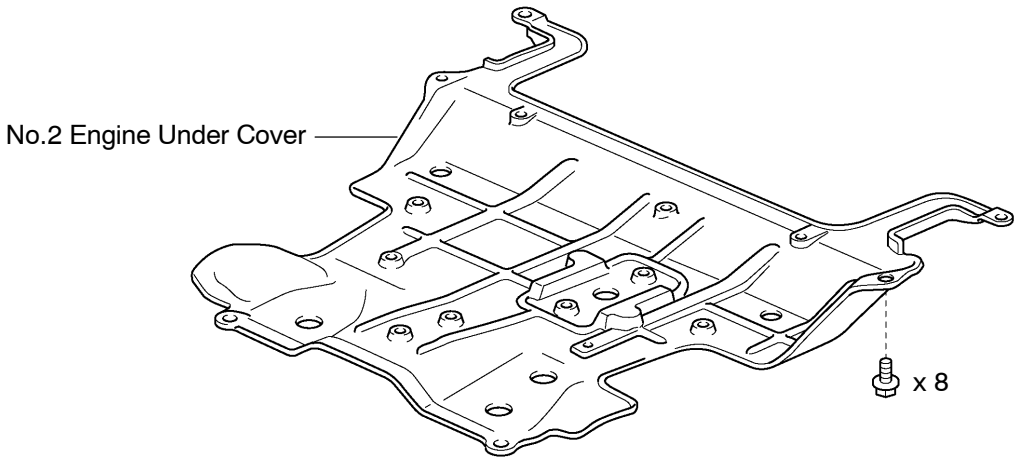
CRANKSHAFT POSITION SENSOR

IG08W–01

COMPONENTS





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

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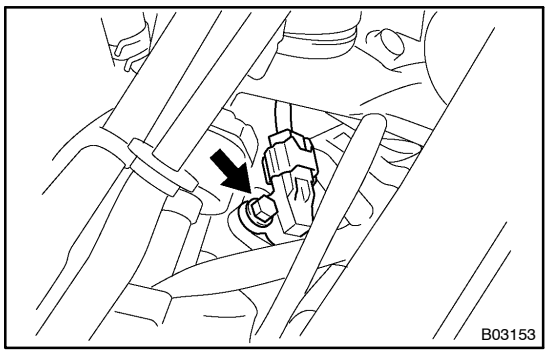
IG08X–01

REMOVAL

1. REMOVE NO.2 ENGINE UNDER COVER



2. REMOVE CRANKSHAFT POSITION SENSOR

(a) Disconnect the crankshaft position sensor connector.

(b) Remove the bolt and crankshaft position sensor.
Torque: 6.5 N·m (65 kgf·cm, 58 in.·lbf)

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IG08Y–01

INSTALLATION

Installation is in the reverse order of removal. (See page IG–12)

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STARTING SYSTEM

ST08A–01

ON–VEHICLE INSPECTION

NOTICE:

Before changing the starter, check these items again:

- **Connector connection**
- **Accessory installation, e.g.: theft deterrent system**

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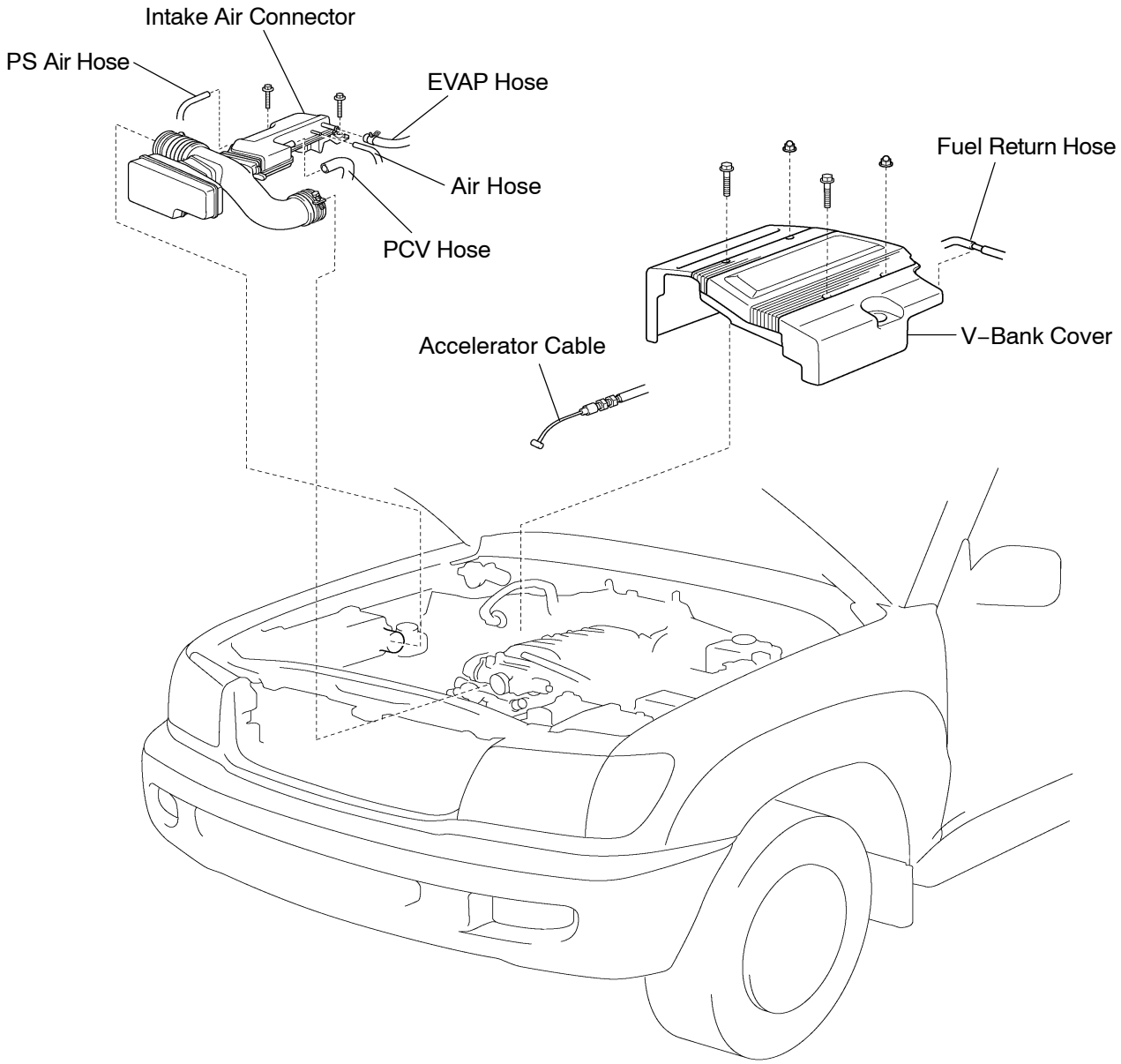
STARTER

COMPONENTS

ST08B–01



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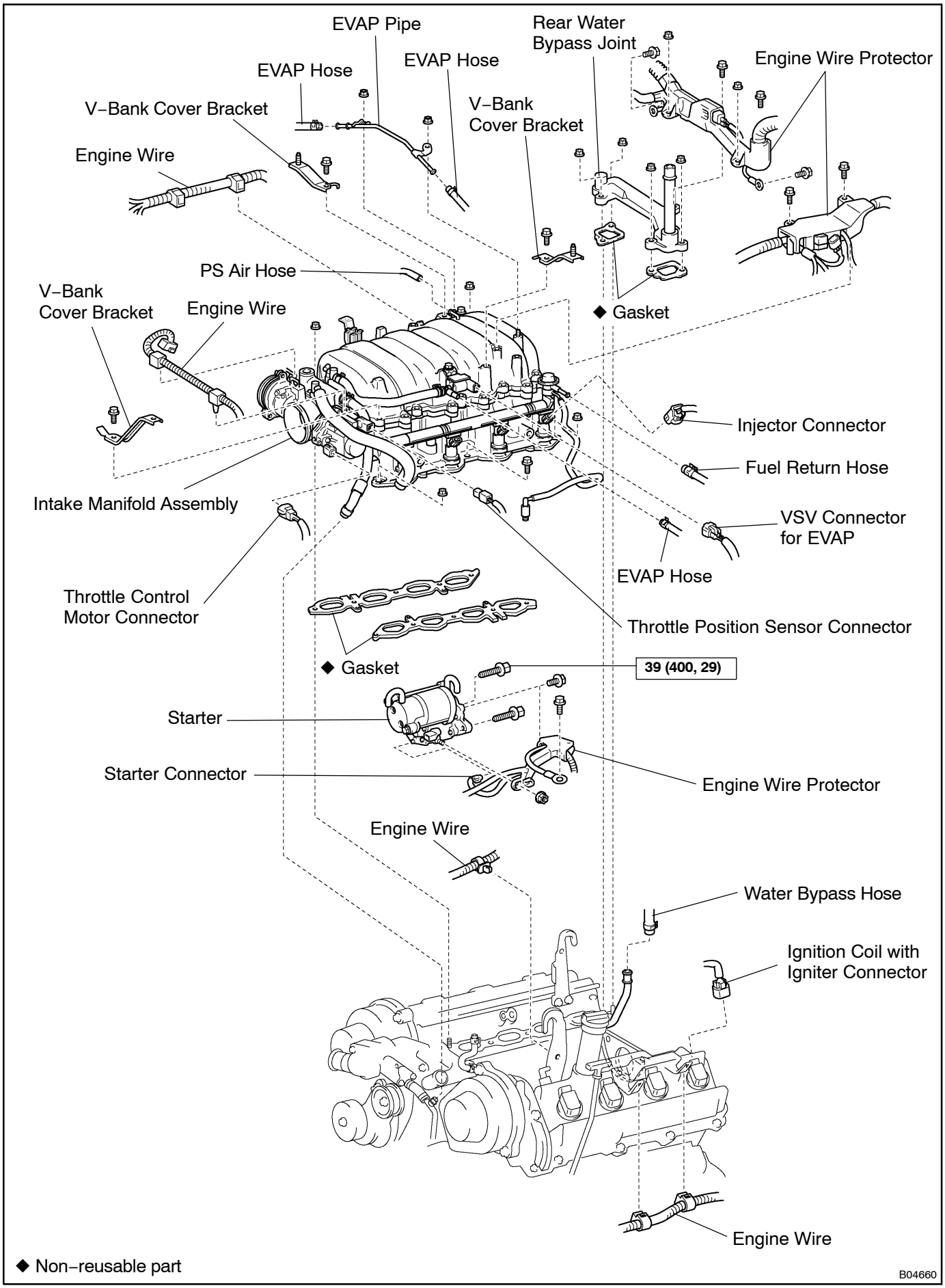

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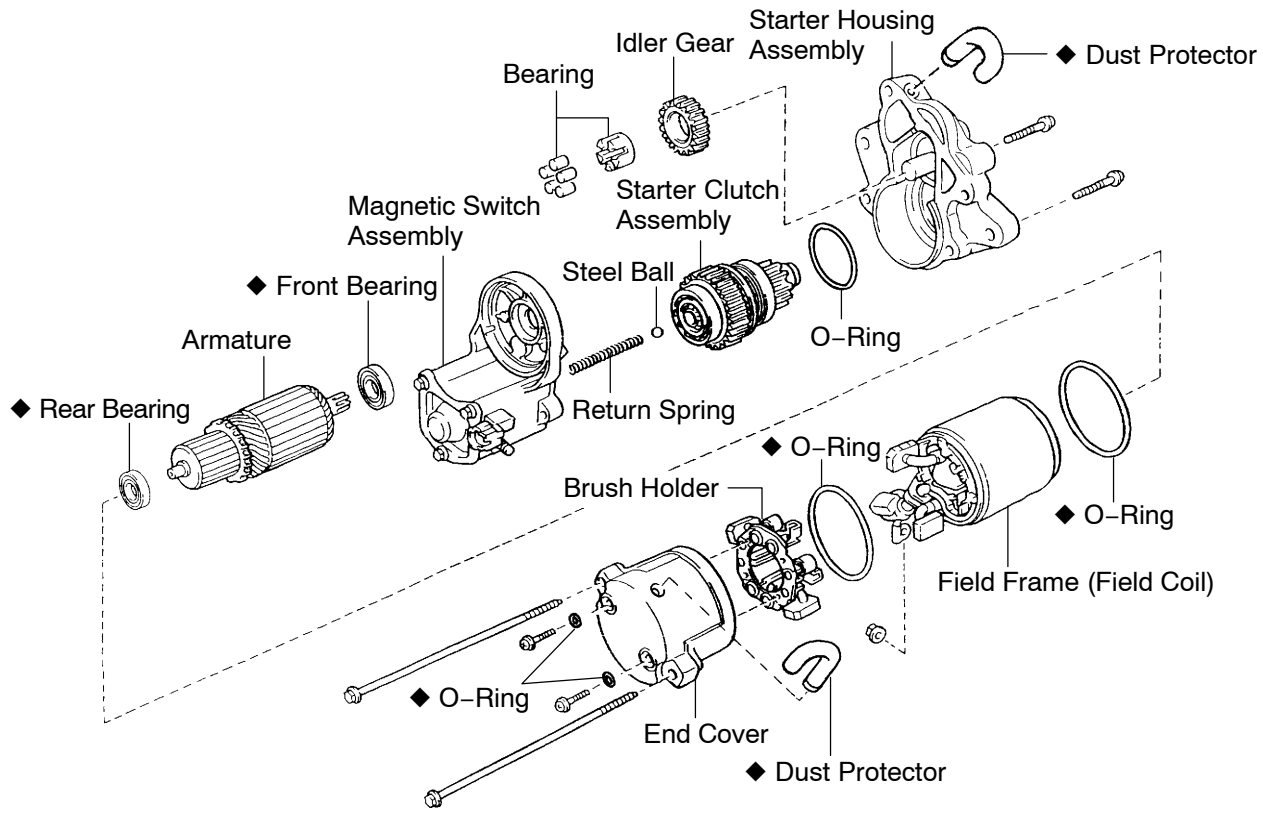
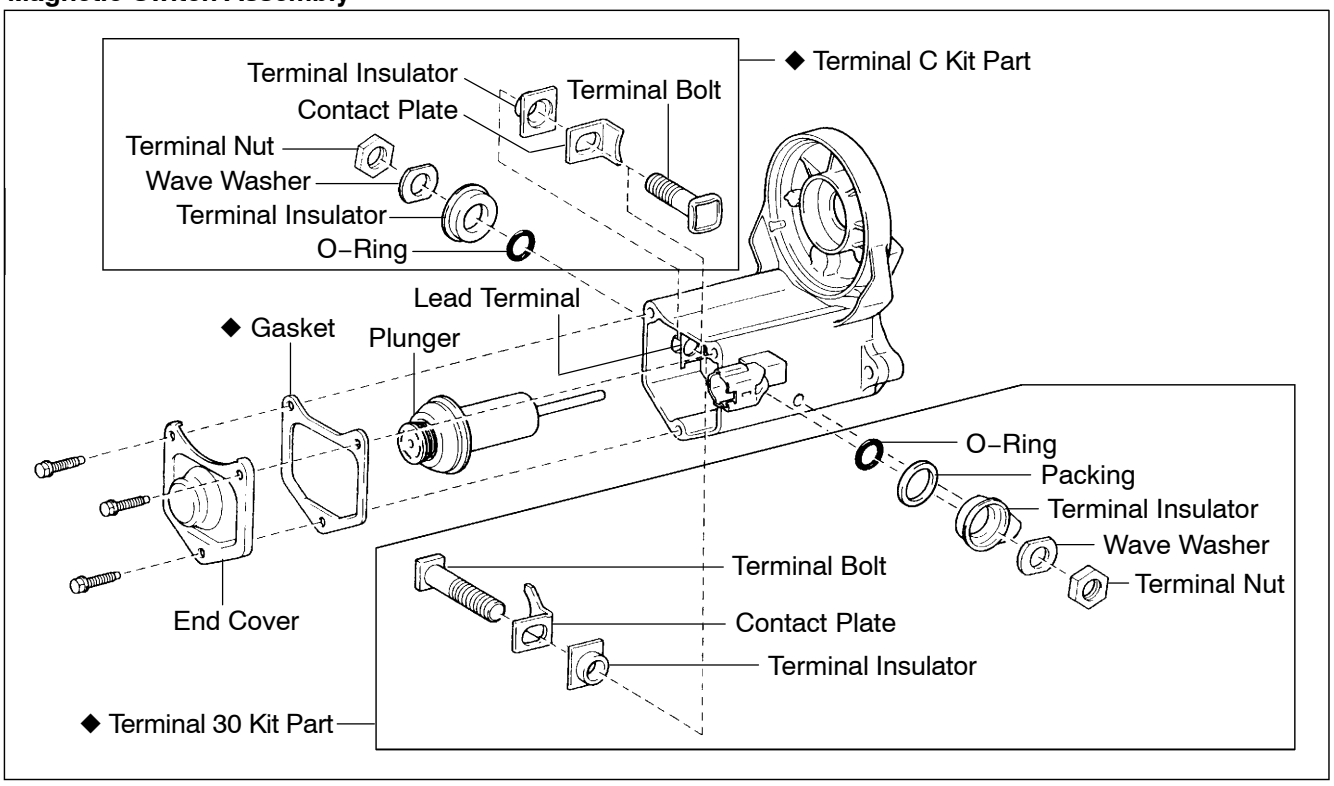


Magnetic Switch Assembly



◆ Non–reusable part

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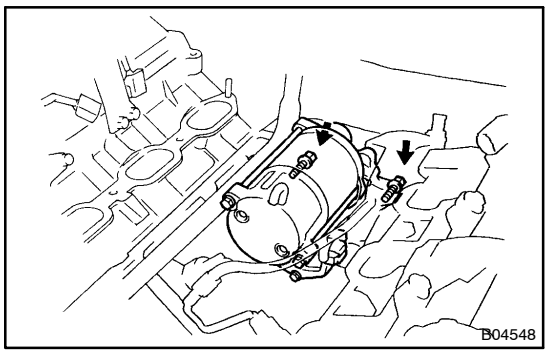
ST08C–01

REMOVAL

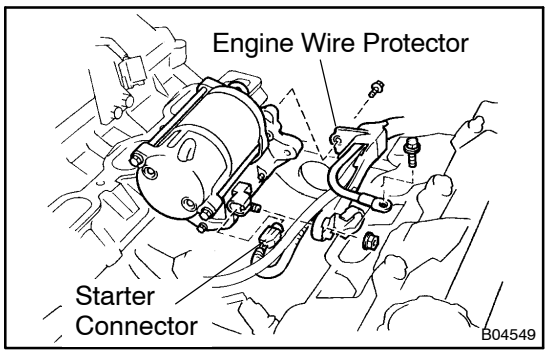
1. **REMOVE V–BANK COVER**
2. **DISCONNECT ACCELERATOR CABLE**
3. **REMOVE INTAKE AIR CONNECTOR**
4. **REMOVE INTAKE MANIFOLD ASSEMBLY**
   (See page EM–34)



5. **REMOVE STARTER**

(a) Remove the 2 bolts holding the starter to the cylinder block.

(b) Disconnect the starter from the cylinder block.



(c) Disconnect the starter connector.

(d) Remove the nut, bolt and disconnect the starter wire.

(e) Remove the bolt, and disconnect the engine wire protector from the starter.

(f) Remove the starter.

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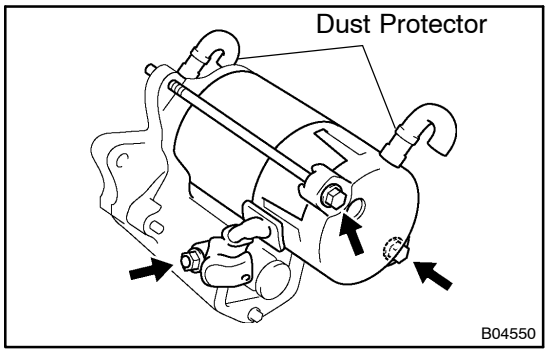
ST08D–01

DISASSEMBLY

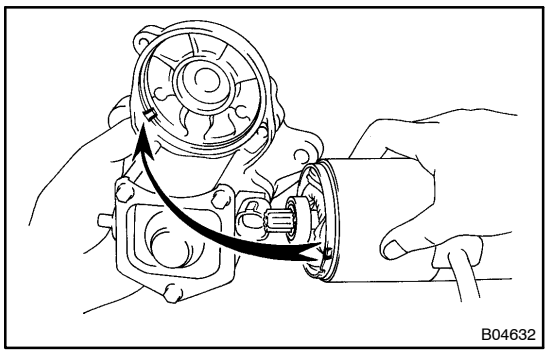


1. REMOVE 2 DUST PROTECTORS

2. REMOVE FIELD FRAME AND ARMATURE

(a) Remove the nut, and disconnect the lead wire from the magnetic switch terminal.
Torque: 5.9 N·m (60 kgf·cm, 52 in.·lbf)

(b) Remove the 2 through bolts.
Torque: 9.3 N·m (95 kgf·cm, 82 in.·lbf)



(c) Pull out the field frame together with the armature from the magnetic switch assembly.

NOTICE:

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

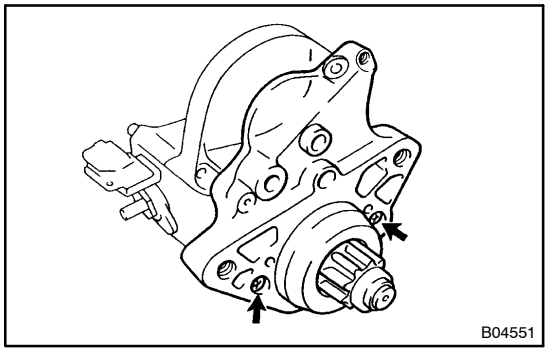
Align the protrusion of the field frame with the groove of the magnetic switch.

(d) Remove the O–ring from the field frame.

HINT:

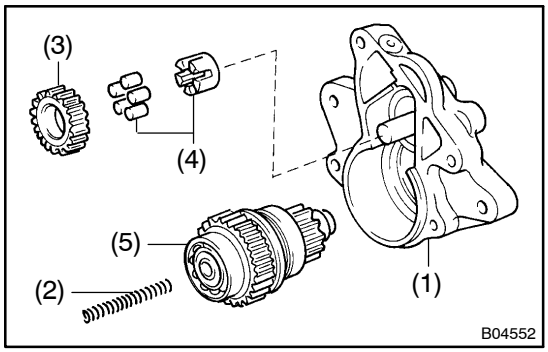
At the time of assembly, please refer to the following items.

Use a new O–ring.



3. REMOVE STARTER HOUSING, CLUTCH ASSEMBLY AND GEAR

(a) Remove the 2 screws.
Torque: 9.3 N·m (95 kgf·cm, 82 in.·lbf)

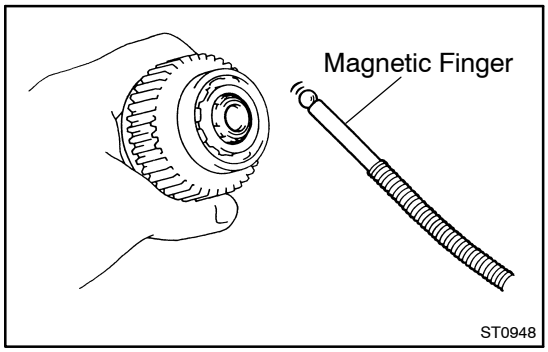


(b) Remove these parts from the magnetic switch assembly:
(1) Starter housing
(2) Return spring
(3) Idler gear
(4) Bearing
(5) Starter clutch assembly

HINT:

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

Apply grease to the return spring and insert the return spring into the clutch shaft hole.



4. REMOVE STEEL BALL

Using a magnetic finger, remove the steel ball from the clutch shaft hole.

HINT:

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

Apply grease to the steel ball and insert the steel ball into the clutch shaft hole.

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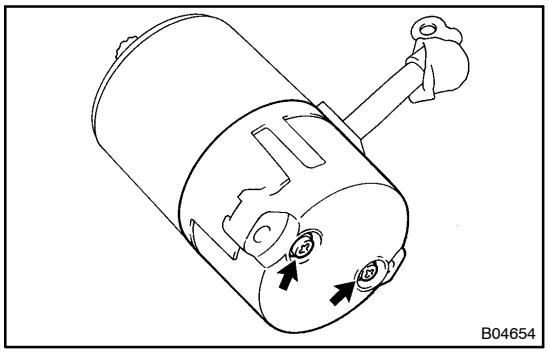


5. REMOVE BRUSH HOLDER

(a) Remove the 2 screws w/ O–ring and end cover from the field frame.

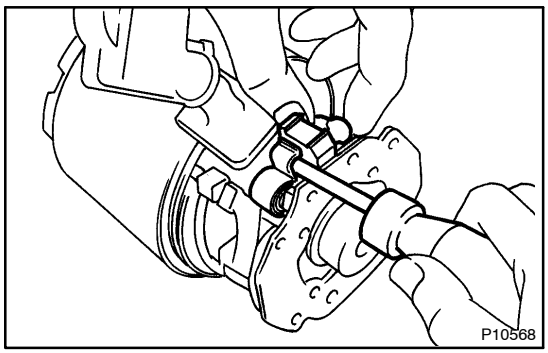
Torque: 3.8 N·m (39 kgf·cm, 34 in.·lbf)

(b) Remove the O–ring from the field frame.

HINT:

At the time of assembly, 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:

Check that the positive (+) lead wires are not grounded.

6. REMOVE ARMATURE FROM FIELD FRAME

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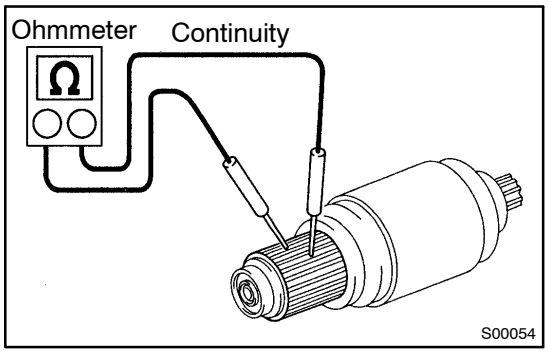
ST08E–01

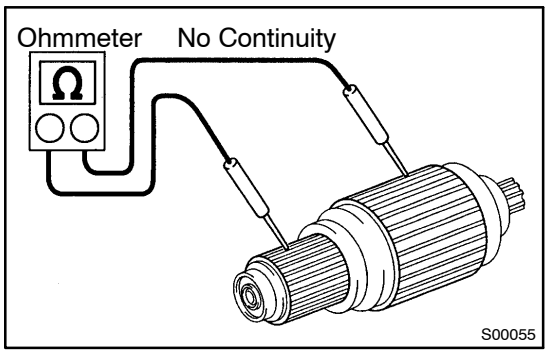


INSPECTION

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.



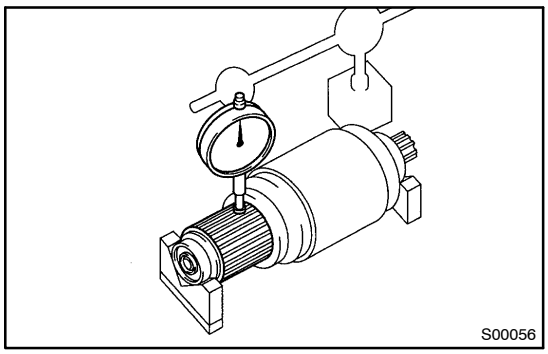
2. INSPECT COMMUTATOR FOR GROUND

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 SURFACE

If the surface is dirty or burnt, correct it with sandpaper (No.400) or on a lathe.



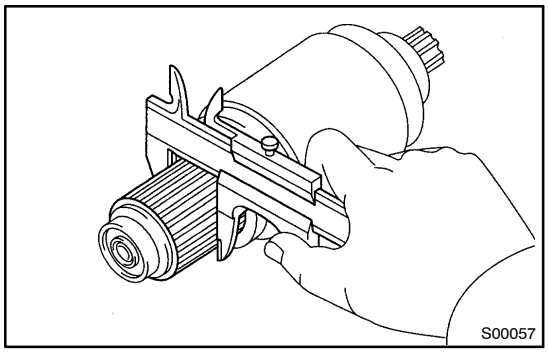
4. INSPECT COMMUTATOR CIRCLE RUNOUT

(a) Place the commutator on V–blocks.

(b) Using a dial indicator the circle runout.

Maximum circle runout:
0.05 mm (0.0020 in.)

If the circle runout is greater than maximum, correct it on a lathe.

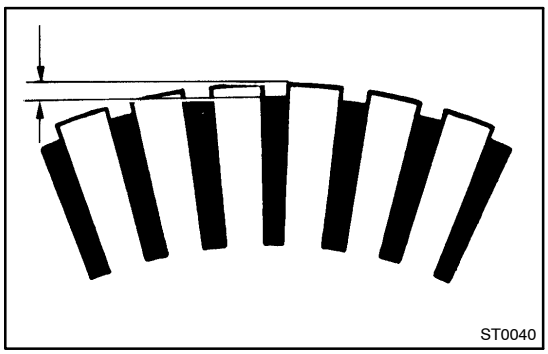


5. INSPECT COMMUTATOR DIAMETER

Using vernier calipers, measure the commutator diameter.

Standard diameter:
35.0 mm (1.378 in.)
Minimum diameter:
34.0 mm (1.339 in.)

If the diameter is less than minimum, replace the armature.



6. INSPECT UNDERCUT DEPTH

Check that the undercut depth is clean and free of foreign materials. Smooth out the edge.

Standard undercut depth:
0.7 mm (0.028 in.)
Minimum undercut depth:
0.2 mm (0.008 in.)

If the undercut depth is less than minimum, correct it with a hacksaw blade.

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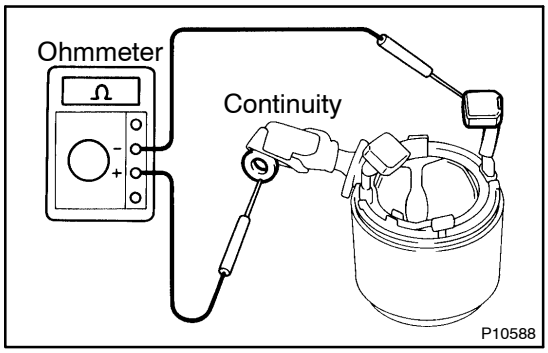
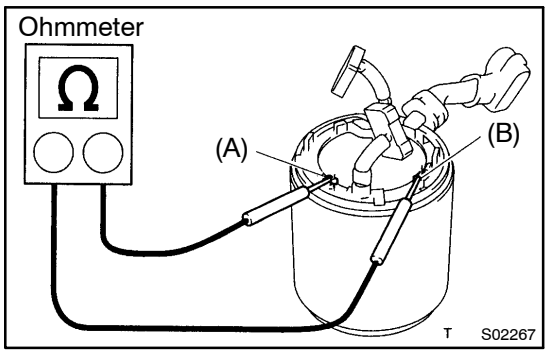


7. INSPECT FIELD COIL FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the lead wire and field coil brush lead.

If there is no continuity, replace the field frame.



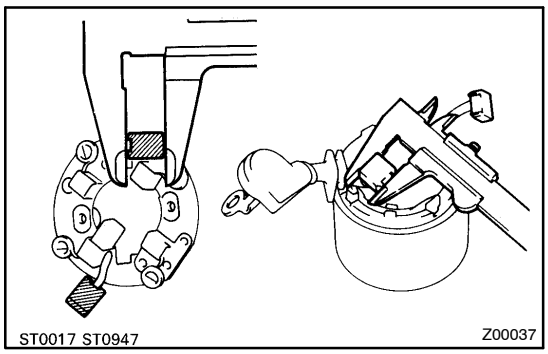
8. INSPECT SHUNT COIL FOR OPEN CIRCUIT

Using an ohmmeter, measure the resistance between shunt coil terminals (A) and (B).

Resistance:

1.5 – 1.9 Ω at 20°C (68°F)

If the resistance is not as specified, replace the field frame.



9. INSPECT BRUSH LENGTH

Using vernier calipers, measure the brush length.

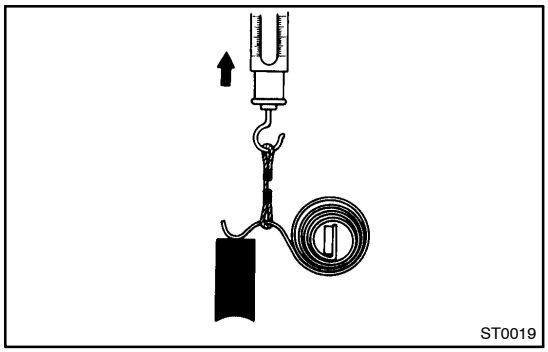
Standard length:

15.0 mm (0.591 in.)

Minimum length:

9.0 mm (0.354 in.)

If the length is less than minimum, replace the brush holder and field frame.



10. INSPECT BRUSH SPRING LOAD

Take the pull scale reading the instant the brush spring separates from the brush.

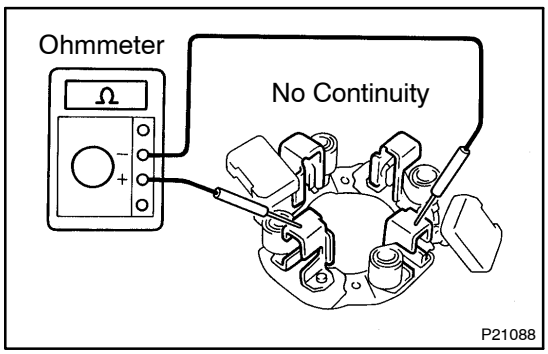
Standard spring installed load:

21.5 – 27.5 N (2.2 – 2.8 kgf, 4.8 – 6.2 lbf)

Minimum spring installed load:

12.7 N (1.3 kgf, 2.9 lbf)

If the installed load is less than minimum, replace the brush springs.



11. INSPECT BRUSH HOLDER INSULATION

Using an ohmmeter, check that there is no continuity between the positive (+) and negative (–) brush holders.

If there is continuity, repair or replace the brush holder.

12. INSPECT GEAR TEETH

Check the gear teeth on the pinion gear, idle gear and the clutch assembly for wear or damage.

If damaged, replace the gear or clutch assembly.

If damaged, also check the drive plate ring gear for wear or damage.

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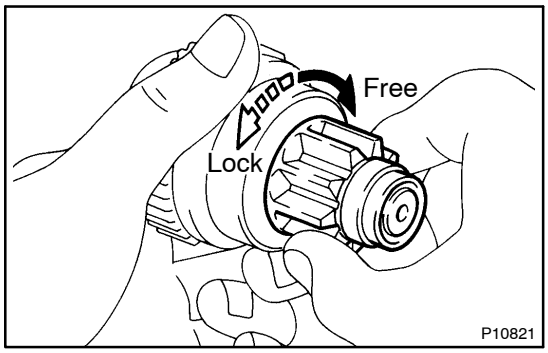
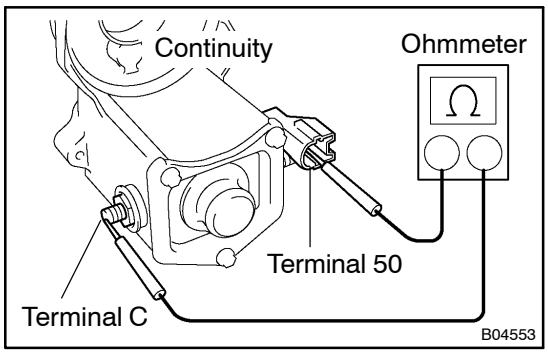


13. INSPECT CLUTCH PINION GEAR

Rotate the pinion gear clockwise, and check that it turns freely.
Try to rotate the pinion gear counterclockwise and check that it locks.
If necessary, replace the clutch assembly.

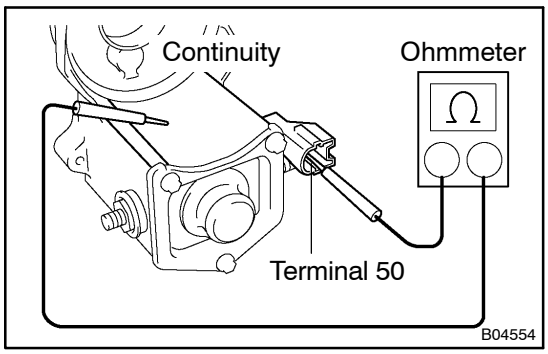
14. INSPECT FRONT AND REAR BEARING

Turn the bearing by hand while applying inward force.
If resistance is felt or the bearing sticks, replace the bearing.



15. DO PULL–IN COIL OPEN CIRCUIT TEST

Using an ohmmeter, check that there is continuity between terminals 50 and C.
If there is no continuity, check and replace the magnetic switch.



16. DO HOLD–IN COIL OPEN CIRCUIT TEST

Using an ohmmeter, check that there is continuity between terminal 50 and the switch body.
If there is no continuity, replace the magnetic switch.

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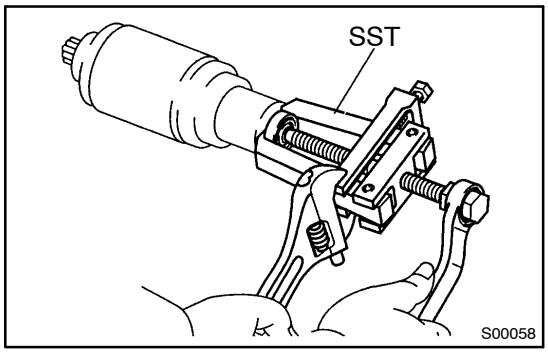
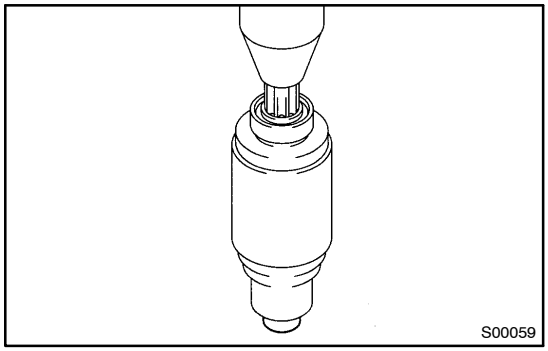
ST08F–01

REPLACEMENT

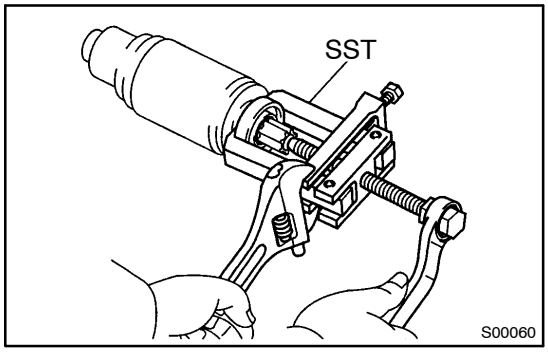


1. REPLACE REAR BEARING

(a) Using SST, remove the bearing.
SST 09286–46011

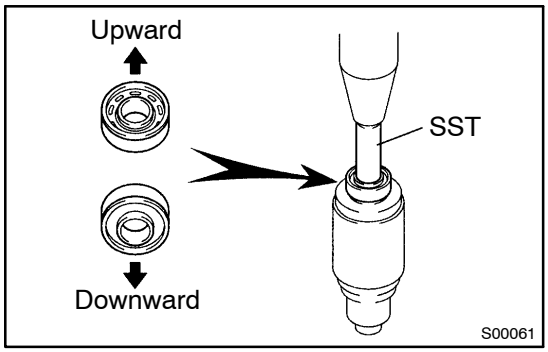


(b) Using a press, press in a new bearing.



2. REPLACE FRONT BEARING

(a) Using SST, remove the bearing.
SST 09286–46011

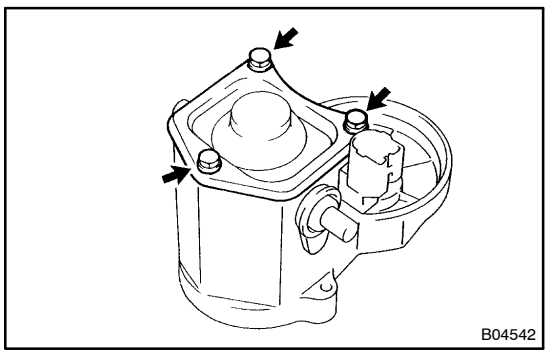


(b) Using SST and a press, press in a new bearing.

NOTICE:

Be careful of the bearing installation direction.

SST 09820–00030



3. REPLACE MAGNETIC SWITCH TERMINAL KIT PARTS

(a) Remove magnetic switch end cover.
Remove the 3 bolts, end cover, gasket and plunger.

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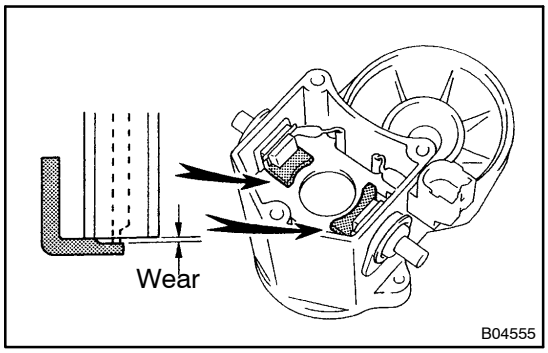
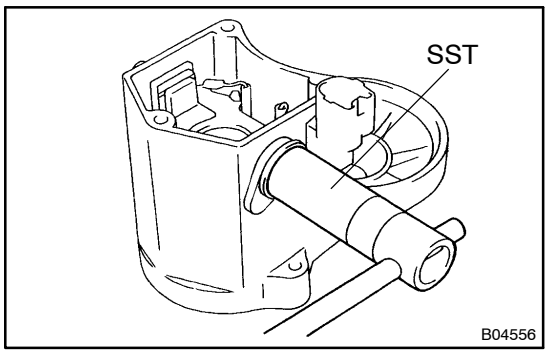
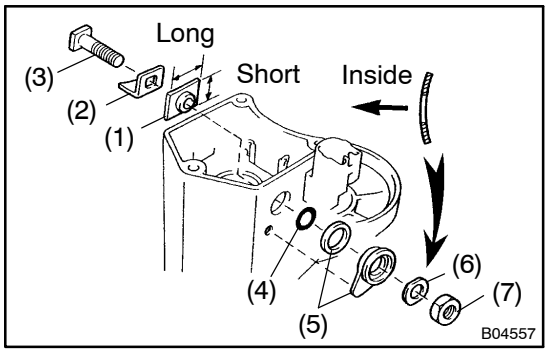


(b) Inspect contact plate for wear.
Using vernier calipers, measure the contact plate for depth of wear.
Maximum wear:
0.9 mm (0.035 in.)

If the depth of wear is greater than the maximum, replace the contact plate.



(c) Remove terminal kit parts.
(1) Using SST, loosen the terminal nuts.
SST 09810–38140
(2) Terminal C:
Remove the terminal nut, wave washer, terminal insulator (outside), O–ring, terminal bolt, contact plate and terminal insulator (inside).
(3) Terminal 30:
Remove the terminal nut, wave washer, terminal insulator (outside), O–ring, terminal bolt, contact plate, terminal insulator (inside) and insulation paper.



(d) Temporarily install these new terminal 30 kit parts:
(1) Terminal insulator (inside)
(2) Contact plate
(3) Terminal bolt
(4) O–ring
(5) Packing and terminal insulator (outside)
Install the packing to the terminal insulator, and install them.

HINT:
Match the protrusion of the insulator with the indentation of the housing.

(6) Wave washer
(7) Terminal nut

NOTICE:
Be careful to install the terminal insulator (inside) and wave washer in the correct direction.

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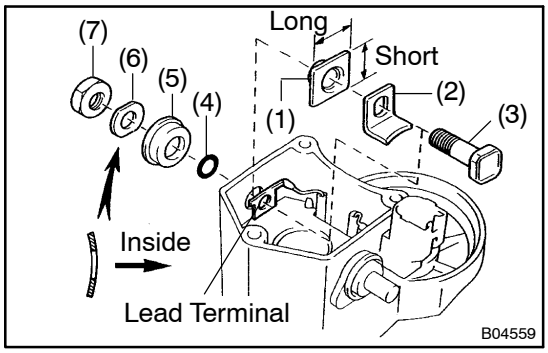
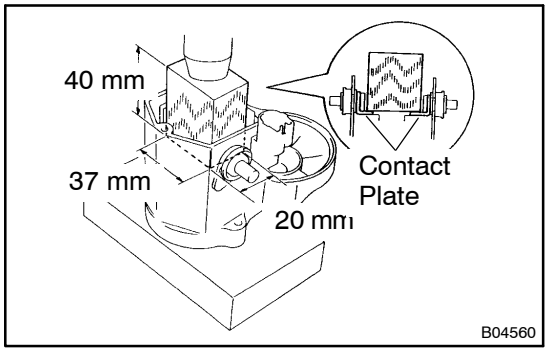


(e) Temporarily install these new terminal C kit parts:
(1) Terminal insulator (inside)
(2) Contact plate
(3) Terminal bolt
(4) O–ring
(5) Terminal insulator (outside)
(6) Wave washer
(7) Terminal nut

NOTICE:

Be careful to install the terminal insulator (inside) and wave washer in the correct direction.

(f) Temporarily tighten the terminal nuts.



(g) Tighten terminal nuts.
(1) Put a wooden block on the contact plate and press it down with a hand press.

Dimensions of wooden block:
20 x 37 x 40 mm (0.79 x 1.46 x 1.57 in.)
Press force:
981 N (100 kgf, 221 lbf)

NOTICE:

- **Check the diameter of the hand press ram. Then calculate the gauge pressure of the press when 981 N (100 kgf, 221 lbf) of force is applied.**
  Gauge pressure:

$$(kgf/cm^2) = \frac{100\ kgf}{\left(\frac{\text{Ram diameter (cm)}}{2}\right)^2 \times 3.14\ (\pi)}$$

$$(psi) = \frac{221 lbf}{\left(\frac{\text{Ram diameter (in.)}}{2}\right)^2 \times 3.14\ (\pi)}$$

$$(kPa) = (kgf/cm^2) \times 98.1$$

$$(kPa) = (psi) \times 6.9$$

- **If the contact plate is not pressed down with the specified pressure, the contact plate may tilt due to coil deformation or the tightening of the nut.**

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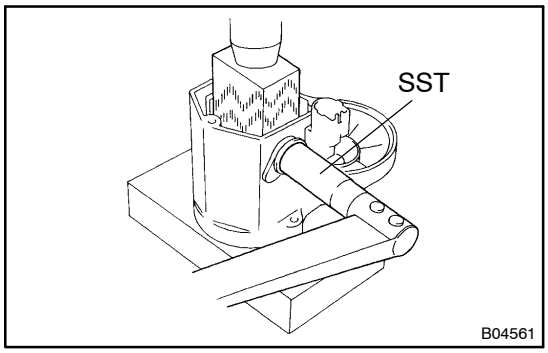
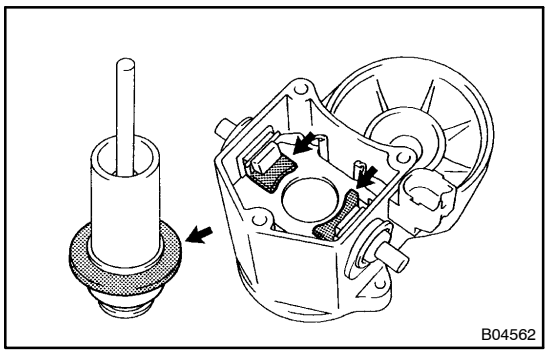


(2) Using SST, tighten the nuts to the specified torque.
SST 09810–38140
Torque: 17 N·m (170 kgf·cm, 13 ft·lbf)

NOTICE:
If the nut is over tightened, it may cause cracks on the inside of the insulator.



(h) Clean contact surfaces of contact plate and plunger.
Clean the contact surfaces of the remaining contact plate and plunger with a dry shop rag.

(i) Reinstall magnetic switch end cover.
Install the plunger, new gasket, end cover and lead clamp with the 3 bolts.
Torque: 3.6 N·m (37 kgf·cm, 32 in.·lbf)

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ST08G–01

REASSEMBLY

Reassembly is in the reverse order of disassembly.

(See page ST–6)

HINT:

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

Use high–temperature grease to lubricate the bearing and gears when assembling the starter.

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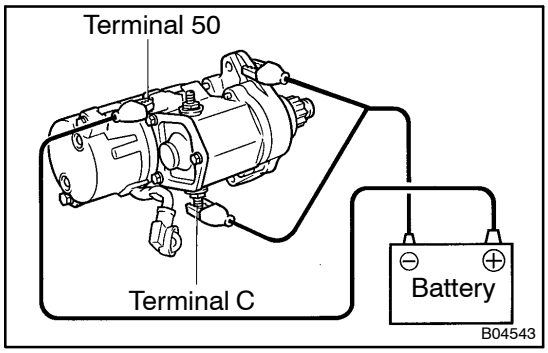
ST08H–01



TEST

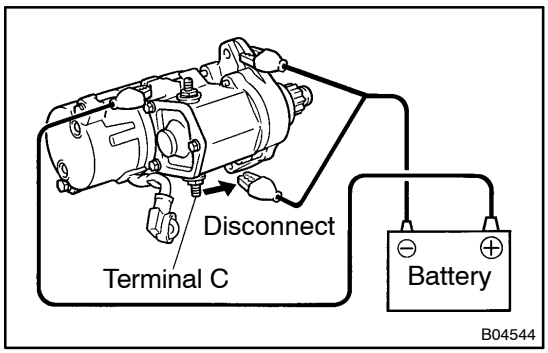
NOTICE:

These tests must be done within 3 to 5 seconds to avoid burning out the coil.

1. DO PULL–IN TEST

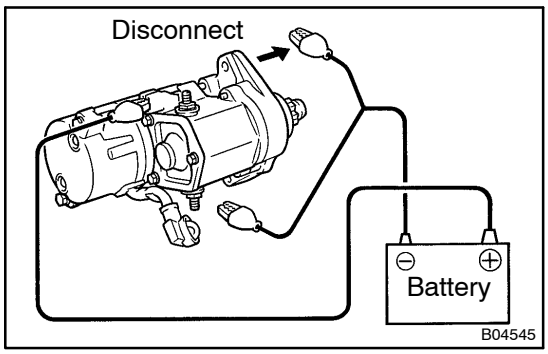
(a) Disconnect the field coil lead wire from terminal C.

(b) Connect the battery to the magnetic switch as shown. Check that the pinion gear moves outward.



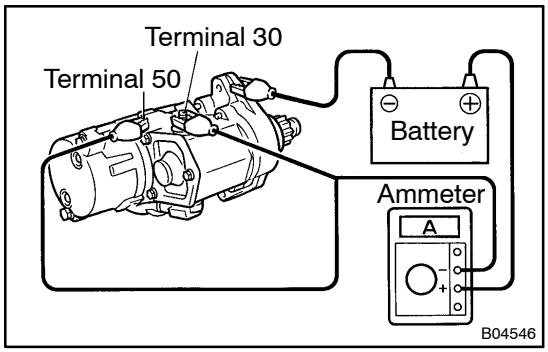
2. DO HOLD–IN TEST

While connected as above with the pinion gear out, disconnect the negative (–) lead from terminal C. Check that the pinion gear remains out.



3. INSPECT CLUTCH PINION GEAR RETURN

Disconnect the negative (–) lead from the starter body. Check that the pinion gear returns inward.



4. DO NO–LOAD PERFORMANCE TEST

(a) Connect the battery and ammeter to the starter as shown.

(b) Check that the starter rotates smoothly and steadily with the pinion gear moving out. Check that the ammeter shows the specified current.

Specified current:

At 11.5 V: 100 A or less

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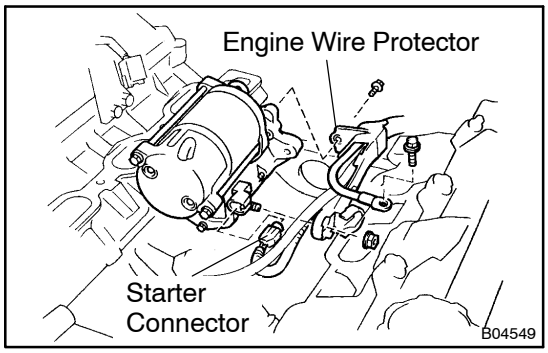
ST08I–01



INSTALLATION

1. INSTALL STARTER

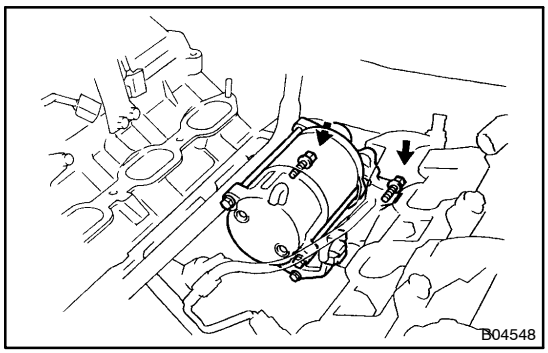
(a) Install the engine wire protector to the starter with the bolt.
Torque: 9.81 N·m (100 kgf·cm, 84 in.·lbf)

(b) Connect the starter wire with the nut.
Torque: 9.81 N·m (100 kgf·cm, 84 in.·lbf)

(c) Connect the starter connector.

(d) Connect the starter to the cylinder block.

(e) Connect the engine wire with the bolt.



(f) Install the starter with the 2 bolts.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

2. INSTALL INTAKE MANIFOLD ASSEMBLY
(See page EM–57)

3. INSTALL INTAKE AIR CONNECTOR

4. CONNECT ACCELERATOR CABLE

5. INSTALL V–BANK COVER

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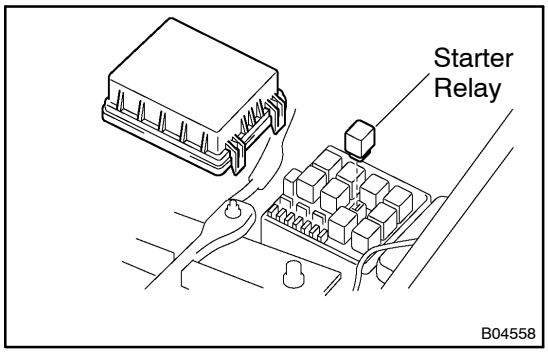


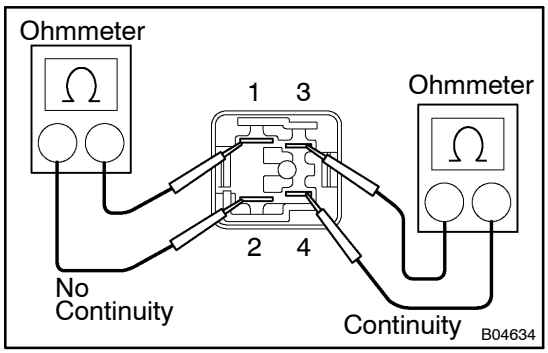
STARTER RELAY

ST08J–01

INSPECTION

1. REMOVE STARTER RELAY (Marking: ”ST”)

Remove the relay box cover and starter relay.



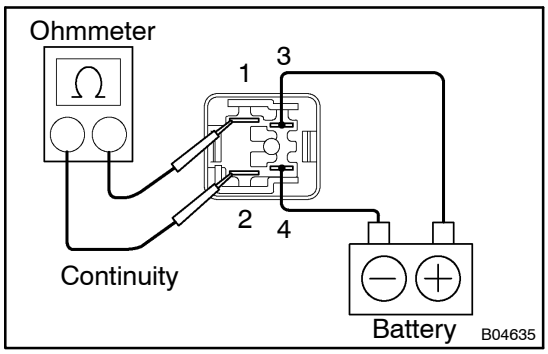
2. INSPECT RELAY CONTINUITY

(a) Using an ohmmeter, check that there is continuity between terminals 3 and 4.

If there is no continuity, replace the relay.

(b) Check that there is no continuity between terminals 1 and 2.

If there is continuity, replace the relay.



3. INSPECT RELAY OPERATION

(a) Apply battery voltage across terminals 3 and 4.

(b) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

If there is no continuity, replace the relay.

4. REINSTALL STARTER RELAY

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CHARGING SYSTEM

CH06F–01

PRECAUTION

1. **Check that the battery cables are connected to the correct terminals.**
2. **Disconnect the battery cables when the battery is given a quick charge.**
3. **Do not perform tests with a high voltage insulation resistance tester.**
4. **Never disconnect the battery while the engine is running.**

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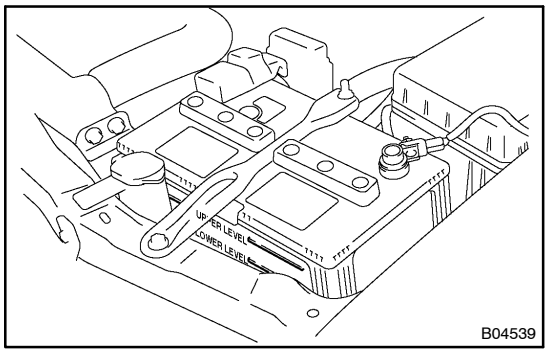
CH06G–01

ON–VEHICLE INSPECTION

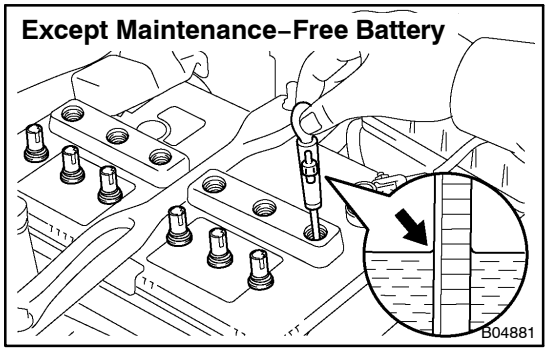


1. CHECK BATTERY ELECTROLYTE LEVEL

Check the electrolyte quantity of each cell.

If under the lower level, replace the battery (or add distilled water if possible). and check the charging system.

Except Maintenance–Free Battery



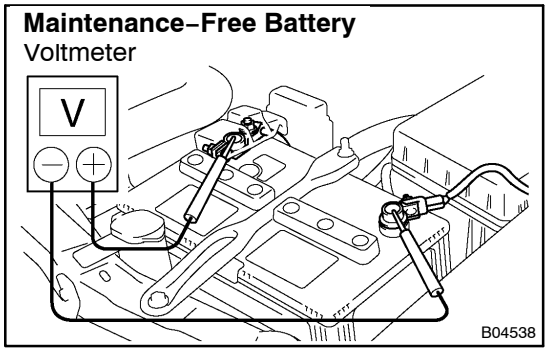
2. Except Maintenance–Free Battery: CHECK BATTERY SPECIFIC GRAVITY

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.

Maintenance–Free Battery
Voltmeter



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.

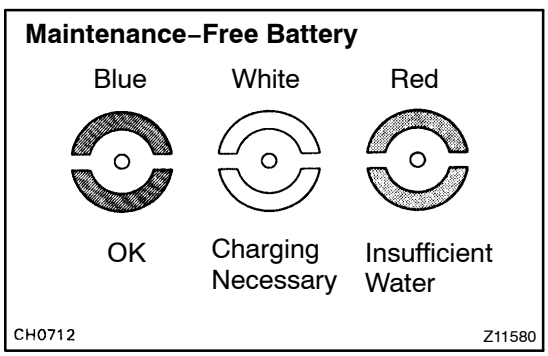
(b) Turn the ignition switch OFF and turn off the electrical systems.

(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.

Maintenance–Free Battery



HINT:

Check the indicator as shown in the illustration.

4. CHECK BATTERY TERMINALS, FUSIBLE LINK AND FUSES

(a) Check that the battery terminals are not loose or corroded.

(b) Check the fusible link and fuses for continuity.

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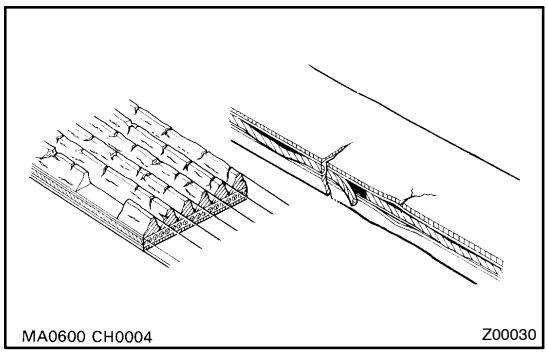
5. INSPECT DRIVE BELT

HINT:

A belt tensioner is used, so checking the belt tension is not necessary.

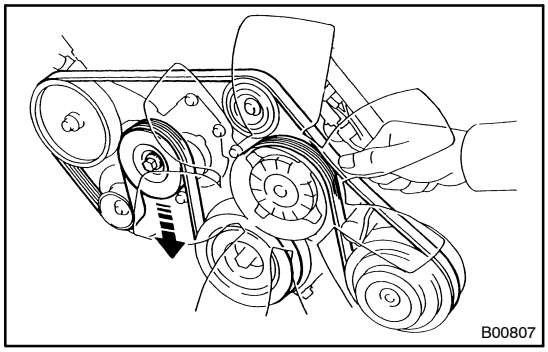


(a) Visually check the drive belt for excessive wear, frayed cords etc.

If necessary, replace the drive belt.

HINT:

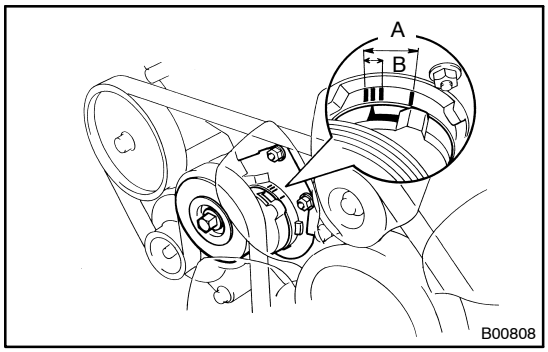
- Cracks on the rib side of a drive belt are considered acceptable. If the drive belt has chunks missing from the ribs, it should be replaced.
- The drive belt tension can be released by turning the belt tensioner counterclockwise. The pulley bolt for the belt tensioner has a left–hand thread.



(b) Check the belt tensioner operation.

- Check that the belt tensioner moves downward when the drive belt is pressed down at the points indicated in the illustration with approx. 98 N (10 kgf, 22.0 lbf) of force.
- Check the alignment of the belt tensioner pulley to make sure the drive belt has not slipped off the pulley.

If necessary, replace the belt tensioner.

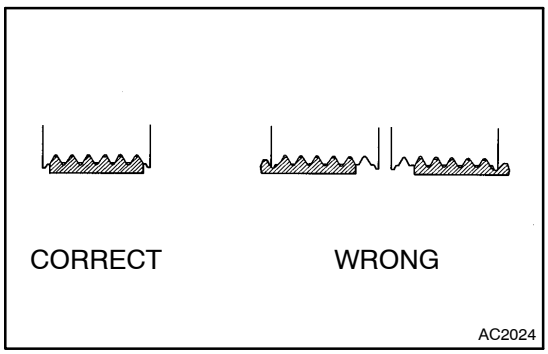


- Check that the arrow mark on the belt tensioner falls within area A of the scale.

If it is outside area A, replace the drive belt.

HINT:

- When a new belt is installed, it should lie within area B. If not, the drive belt is not correct.



- After installing a belt, check that it fits properly in the ribbed grooves.
- Check by hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.

6. REMOVE ENGINE UNDER COVER NO.1

7. VISUALLY CHECK GENERATOR WIRING AND LISTEN FOR ABNORMAL NOISES

(a) Check that the wiring is in good condition.

(b) Check that there is no abnormal noise from the generator while the engine is running.

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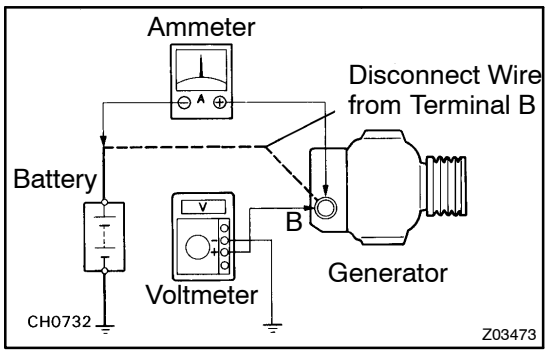
8. CHECK CHARGE WARNING LIGHT CIRCUIT

(a) Warm up the engine and then turn it off.
(b) Switch off all accessories.
(c) Turn the ignition switch ON, and check that the charge warning light is lit.
(d) Start the engine, and check that the light goes off.

If the light does not go off as specified, troubleshoot the charge light circuit.



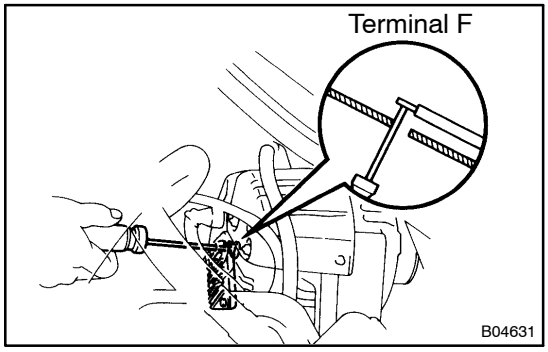
9. INSPECT CHARGING CIRCUIT WITHOUT LOAD

HINT:
If a battery/generator tester is available, connect the tester to the charging circuit as per manufacturer's instructions.

(a) If a tester is not available, connect a voltmeter and ammeter to the charging circuit as follows:
- Disconnect the wire from terminal B of the generator, and connect it to the negative (–) tester probe of the ammeter.
- Connect the positive (+) tester probe of the ammeter to terminal B of the generator.
- Connect the positive (+) tester probe of the voltmeter to terminal B of the generator.
- Ground the negative (–) tester probe of the voltmeter.

(b) Check the charging circuit as follows:
With the engine running from idling to 2,000 rpm, check the reading on the ammeter and voltmeter.
Standard amperage:
10 A or less
Standard voltage:
13.2 – 14.8 V

If the 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:
- Remove the generator rear end cover, and 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.

10. INSPECT CHARGING CIRCUIT WITH LOAD

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(a) With the engine running at 2,000 rpm, turn on the high beam headlights and place the heater blower switch at HI.
(b) Check the reading on the ammeter.
Standard amperage:
30 A or more

If the ammeter reading is less than the standard amperage, repair the generator.
HINT:
If the battery is fully charged, the indication will sometimes be less than standard amperage.

11. REINSTALL ENGINE UNDER COVER NO.1

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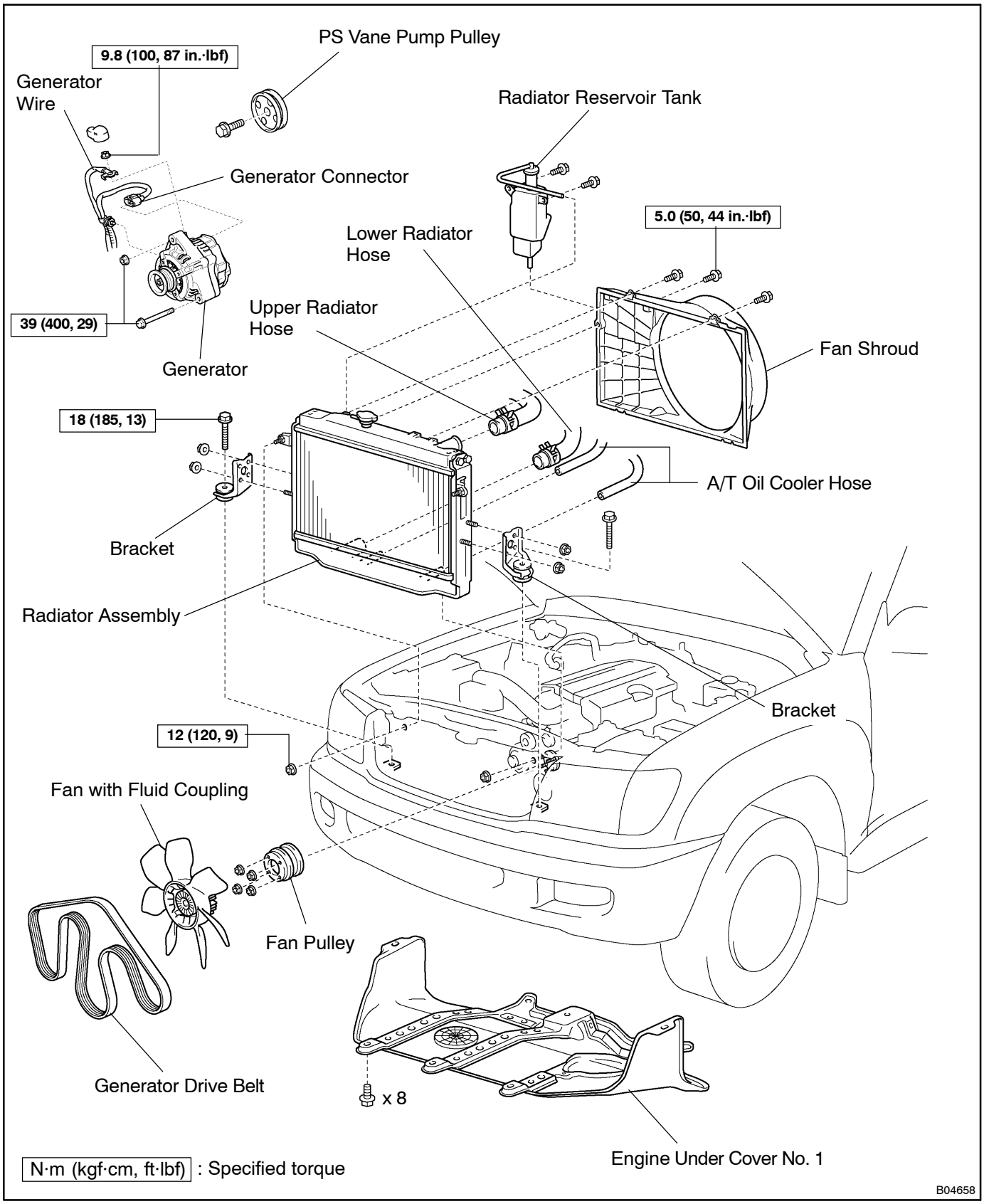
GENERATOR

COMPONENTS

CH06H–01



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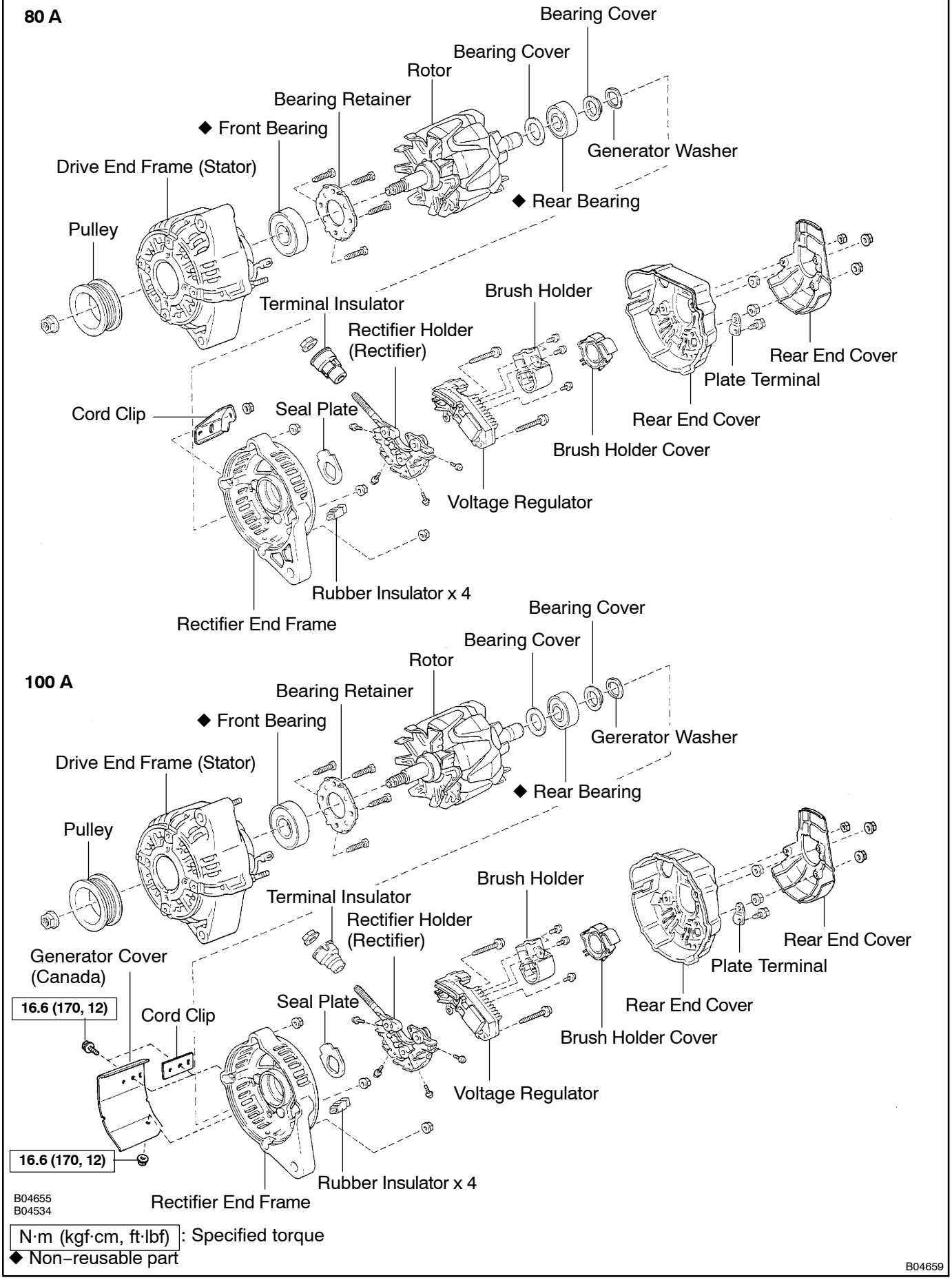

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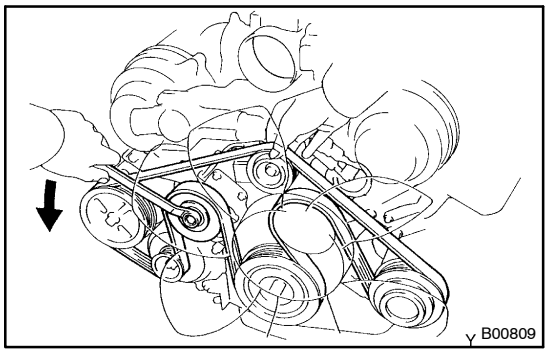
CH06I–01

REMOVAL



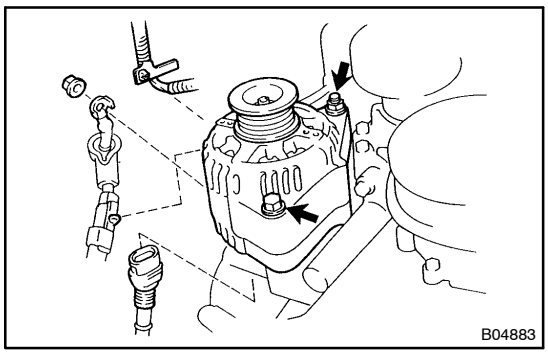
1. **DRAIN ENGINE COOLANT**
   (See page CO–2)
2. **REMOVE GENERATOR DRIVE BELT**

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

HINT:

The pulley bolt for the belt tensioner has a left – hand thread.

3. **REMOVE ENGINE UNDER COVER NO.1**
4. **REMOVE RADIATOR ASSEMBLY**
   (See page CO–17)
5. **REMOVE PS VANE PUMP PULLEY**
   (See page SR–35)



6. **REMOVE GENERATOR**

(a) Disconnect the generator connector.

(b) Remove the rubber cap and nut, and disconnect the generator wire.

(c) Disconnect the generator wire clamp from the cord clip on the generator.

(d) Remove the bolt, nut and generator.

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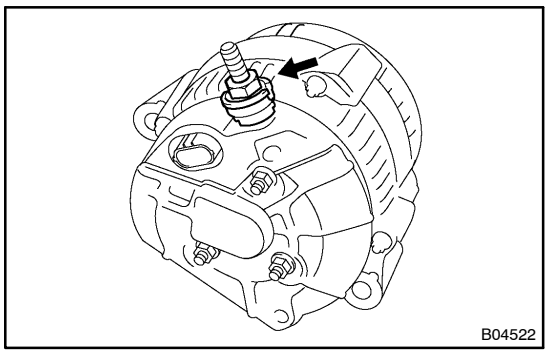
CH06J–01

DISASSEMBLY

1. 100 A:
REMOVE GENERATOR COVER (Canada) AND CORD CLIP

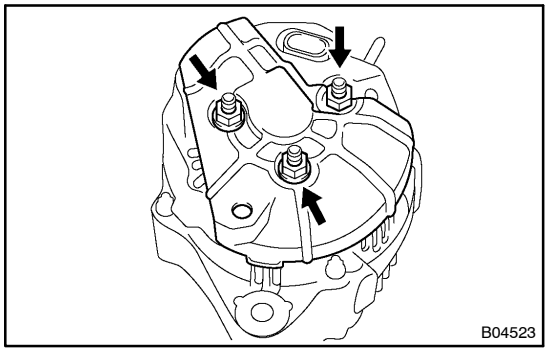
(a) Canada:
Remove the bolt, nut, generator cover and cord clip.

(b) Except Canada:
Remove the bolt and cord clip.

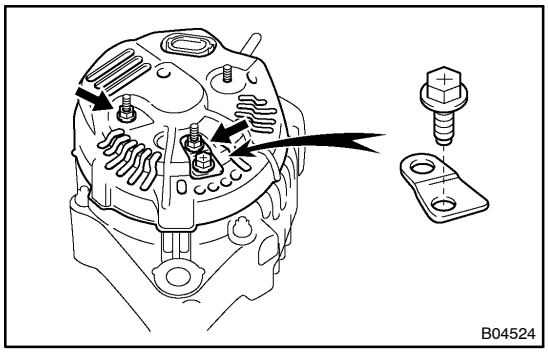


2. REMOVE REAR END COVER

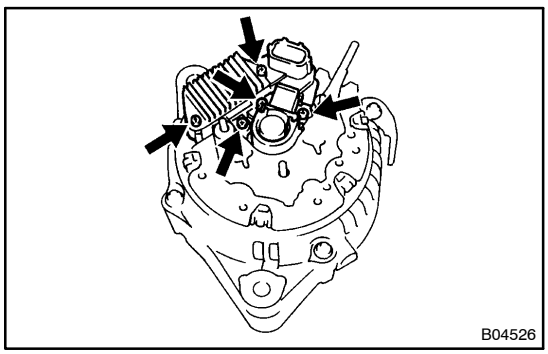
(a) Remove the nut and terminal insulator.



(b) Remove the 3 nuts and rear end cover.



(c) Remove the 2 nuts, bolt, plate terminal and rear end cover.



3. 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.

(c) Remove the seal plate from the rectifier end frame.

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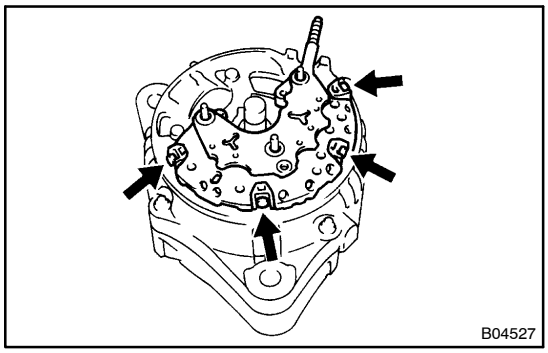
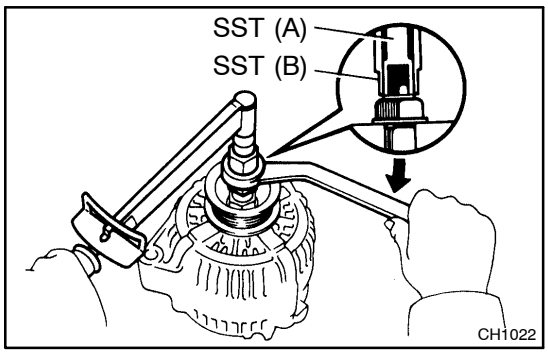


4. REMOVE RECTIFIER HOLDER

(a) Remove the 4 screws and rectifier holder.

(b) Remove the 4 rubber insulators.



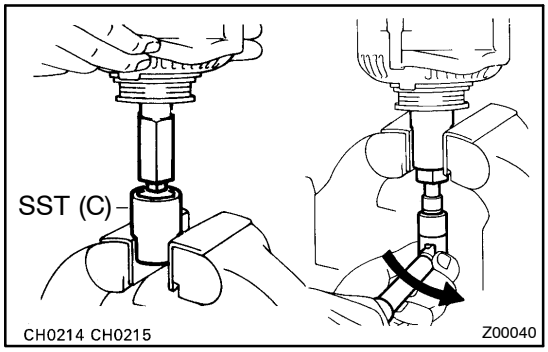
5. REMOVE PULLEY

(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) As shown in the illustration, mount SST (C) in a vise, and install the generator to SST (C).

(d) To loosen the pulley nut, turn SST (A) in the direction shown in the illustration.

NOTICE:

To prevent damage to the rotor shaft, do not loosen the pulley nut more than one–half of a turn.

(e) Remove the generator from SST (C).

(f) Turn SST (B), and remove SST (A and B).

(g) Remove the pulley nut and pulley.

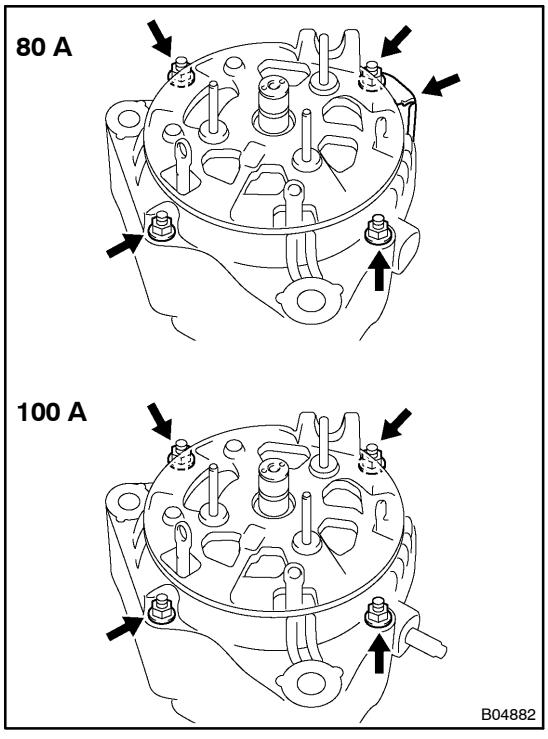
6. REMOVE RECTIFIER END FRAME

(a) 80 A:

Remove the 4 nuts and cord clip.

(b) 100 A:

Remove the 4 nuts.



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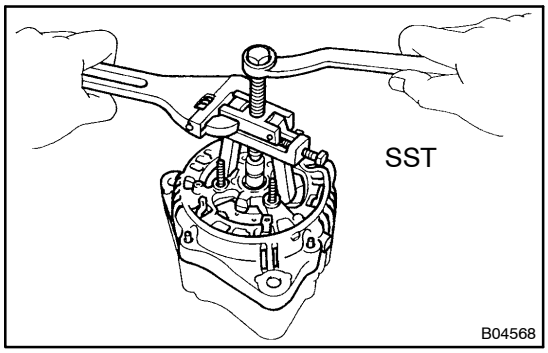

(c) Using SST, remove the rectifier end frame.
SST 09286–46011

(d) Remove the generator washer.

7. REMOVE ROTOR FROM DRIVE END FRAME

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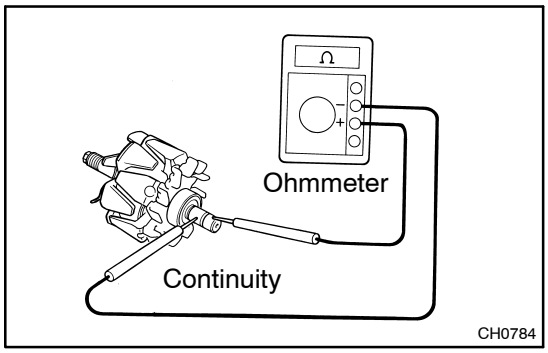
CH06K–01

INSPECTION

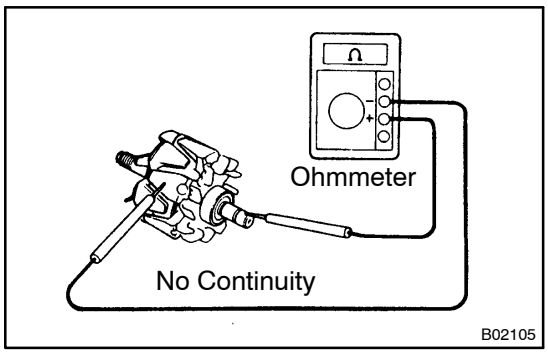


1. INSPECT ROTOR FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the slip rings.

Standard resistance:
2.1 – 2.5 Ω at 20°C (68°F)

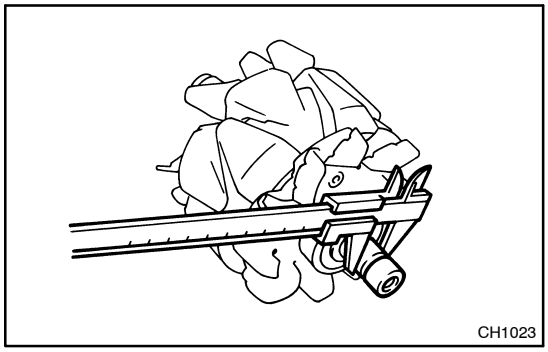
If there is no continuity, replace the rotor.



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

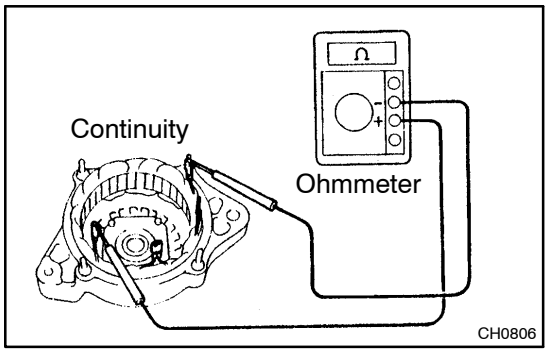
(a) Check that the slip rings are not rough or scored.

If rough or scored, replace the rotor.

(b) Using vernier calipers, 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.)

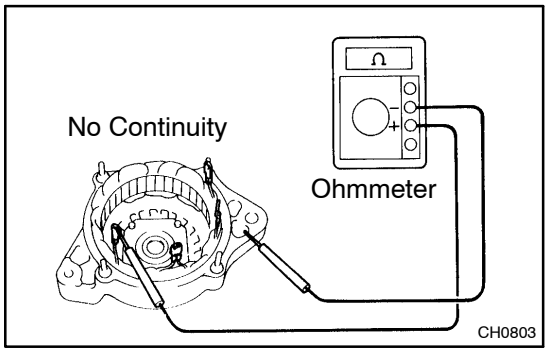
If the diameter is less than minimum, replace the rotor.



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.

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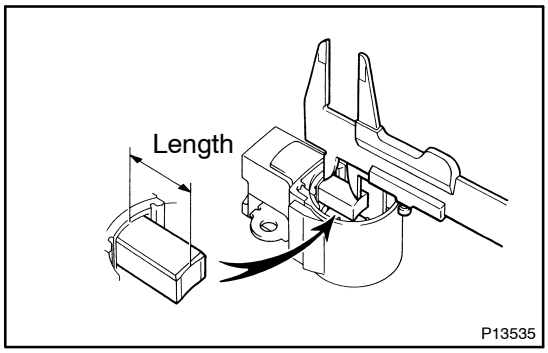
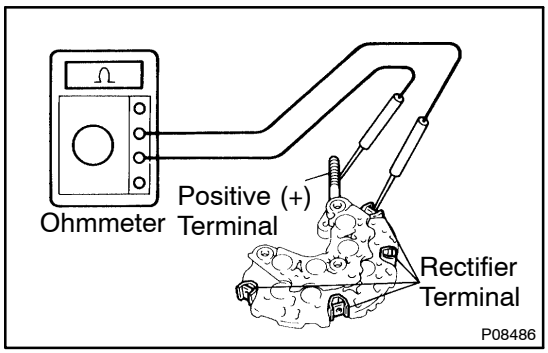


6. INSPECT EXPOSED BRUSH LENGTH

Using vernier calipers, measure the exposed brush length.

Standard exposed length:
10.5 mm (0.413 in.)
Minimum exposed length:
1.5 mm (0.059 in.)

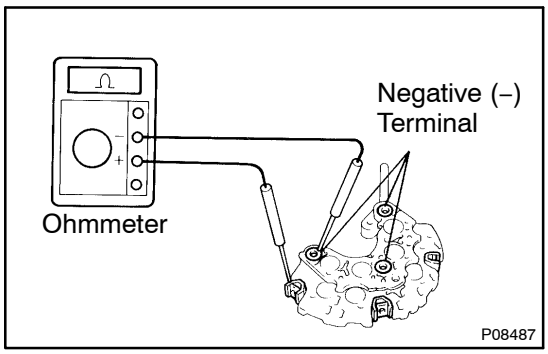
If the exposed length is less than minimum, replace the brush holder.



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 AND REAR BEARING

Check that the bearing is not rough or worn.
If necessary, replace the bearing.

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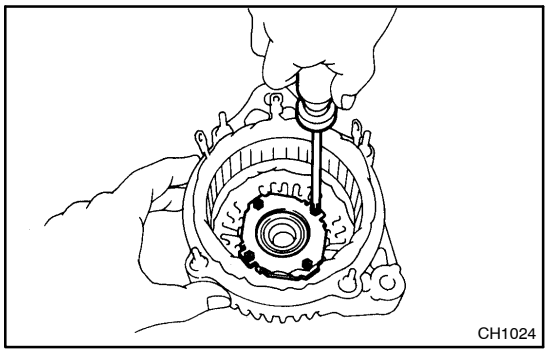
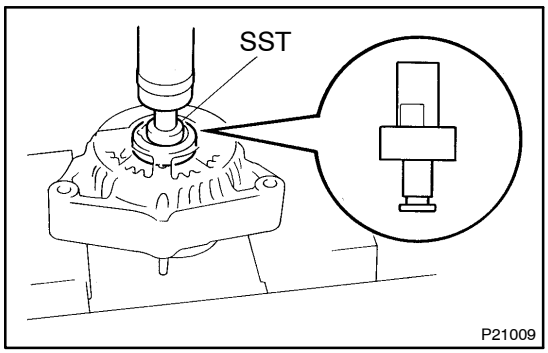
CH06L–01

REPLACEMENT

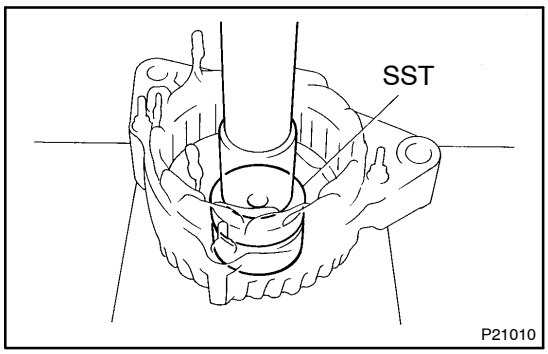


1. REPLACE FRONT BEARING

(a) Remove the 4 screws and bearing retainer.

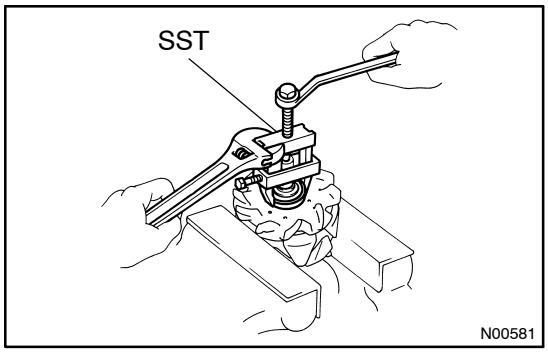


(b) Using SST and a press, press out the bearing.
SST 09950–60010 (09951–00260, 09952–06010)



(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)

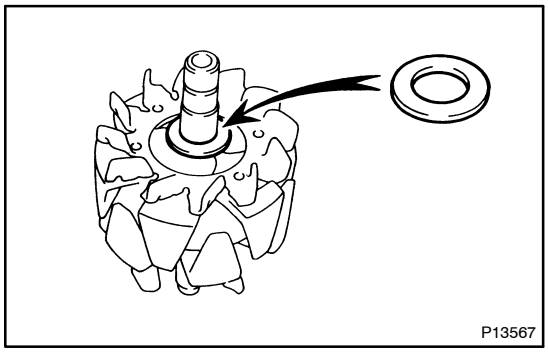


2. REPLACE REAR BEARING

(a) Using SST, remove the bearing cover (outside) and bearing.
SST 09820–00021

NOTICE:
Be careful not to damage the fan.

(b) Remove the bearing cover (inside).



(c) Place the bearing cover (inside) on the rotor.

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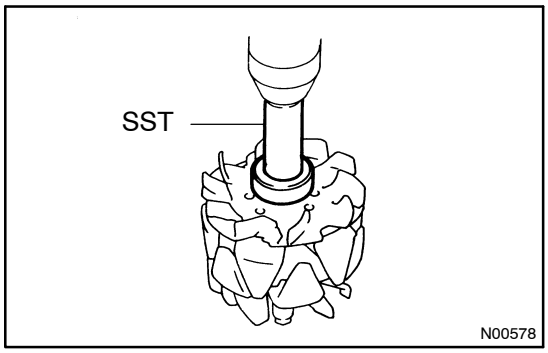
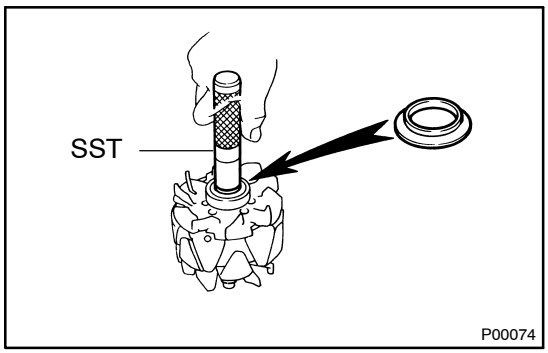


(d) Using SST and a press, press in a new bearing.
SST 09820–00030



(e) Using SST, push in the bearing cover (outside).
SST 09285–76010

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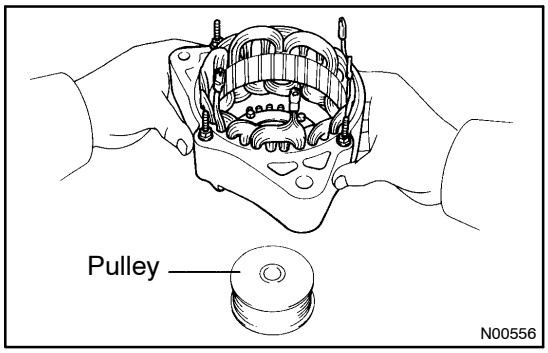
CH06M–01

REASSEMBLY

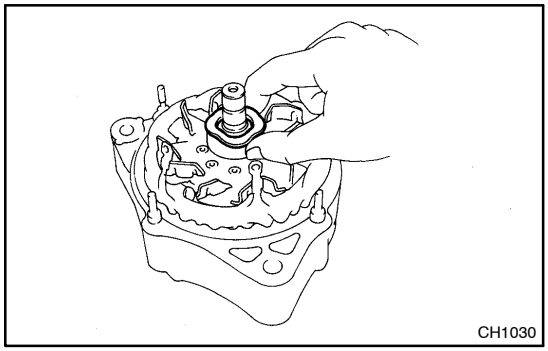
1. PLACE DRIVE END FRAME ON PULLEY

2. INSTALL ROTOR TO DRIVE END FRAME

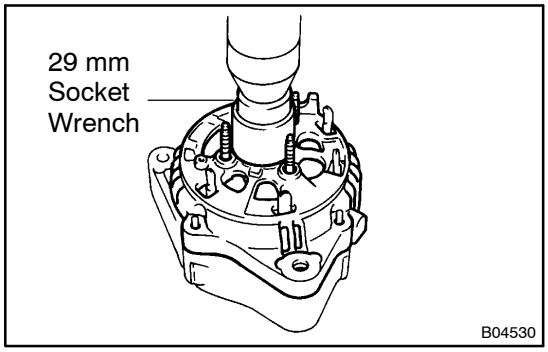


3. INSTALL RECTIFIER END FRAME

(a) Place the generator washer on the rotor.

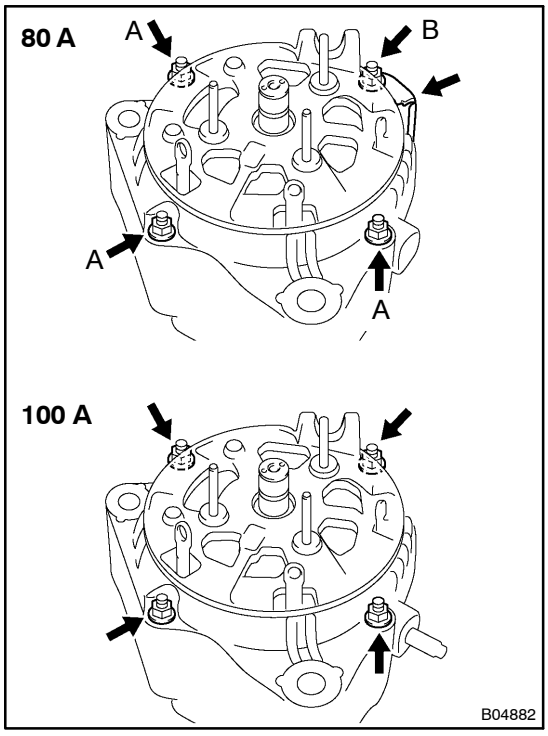


(b) Using a 29 mm socket wrench and press, slowly press in the rectifier end frame.



(c) 80 A:
Install the cord clip and 4 nuts.
Torque:
A: 4.5 N·m (46 kgf·cm, 40 in.·lbf)
B: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

(d) 100 A:
Install the 4 nuts.
Torque: 4.5 N·m (46 kgf·cm, 40 in.·lbf)



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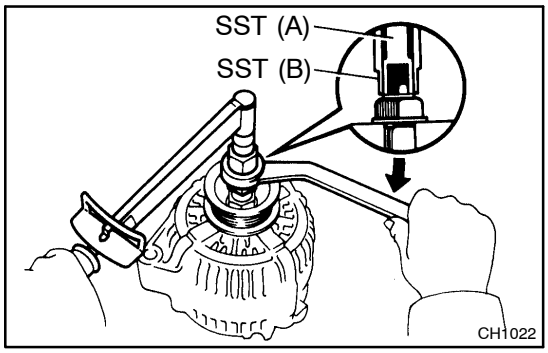
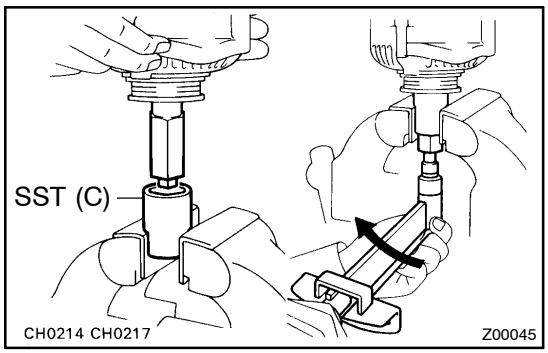


4. INSTALL PULLEY

(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.

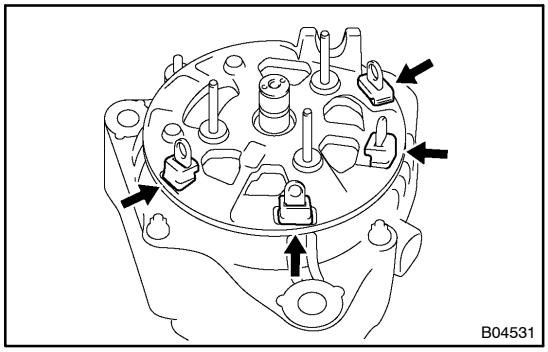


(d) As shown in the illustration, mount SST (C) in a vise, and install the generator to SST (C).

(e) To torque the pulley nut, turn SST (A) in the direction shown in the illustration.
Torque: 110.5 N·m (1,128 kgf·cm, 81 ft·lbf)

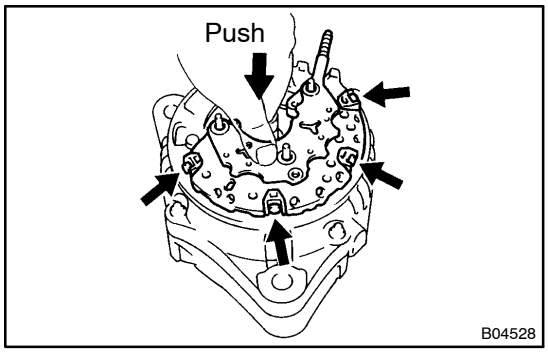
(f) Remove the generator from SST (C).

(g) Turn SST (B), and remove SST (A and B).

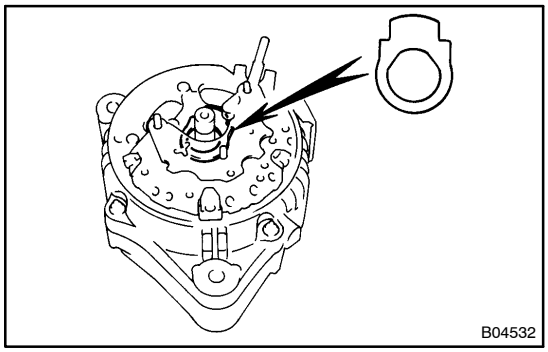


5. INSTALL RECTIFIER HOLDER

(a) Install the 4 rubber insulators on the lead wires.



(b) Install the rectifier holder while pushing it with the 4 screws.
Torque: 2.94 N·m (30 kgf·cm, 26 in.·lbf)



6. INSTALL VOLTAGE REGULATOR AND BRUSH HOLDER

(a) Place the seal plate on the rectifier end frame.

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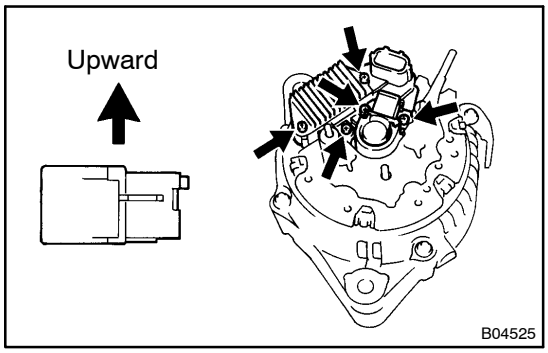
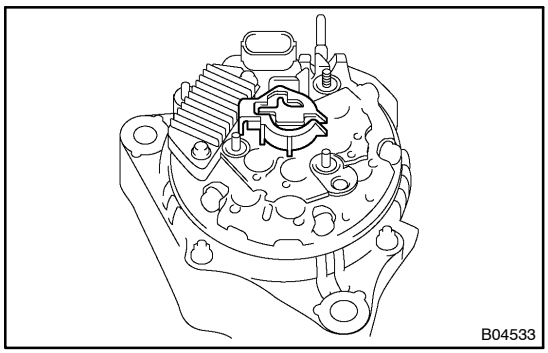


(b) Place the voltage regulator and brush holder on the rectifier end frame.

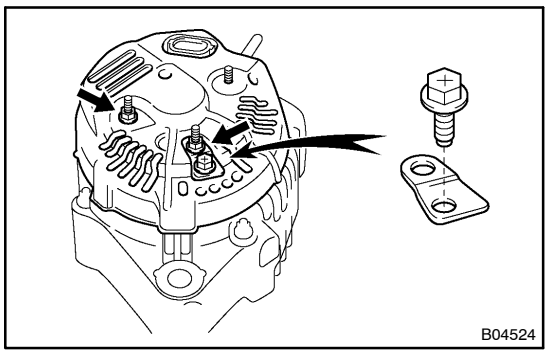
NOTICE:

Be careful of the holder installation direction.

(c) Install the 5 screws.
Torque: 2.0 N·m (20 kgf·cm, 18 in.·lbf)

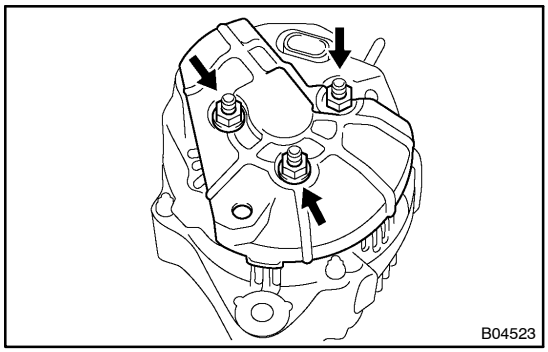


(d) Place the brush holder cover on the brush holder.

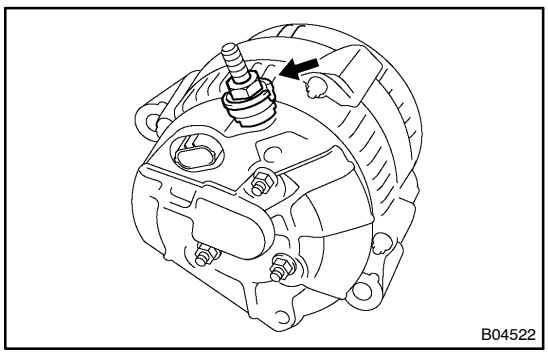


7. INSTALL REAR END COVER

(a) Install the end cover and plate terminal with the 2 nuts and bolt.
Torque:
Bolt: 3.8 N·m (39 kgf·cm, 34 in.·lbf)
Nut: 4.4 N·m (45 kgf·cm, 39 in.·lbf)



(b) Install the rear end cover with the 3 nuts.
Torque: 4.4 N·m (45 kgf·cm, 39 in.·lbf)



(c) Install the terminal insulator with the nut.
Torque: 4.1 N·m (42 kgf·cm, 36 in.·lbf)

8. 100 A:
INSTALL GENERATOR COVER (Canada) AND CORD CLIP

(a) Canada:
Install the cord clip and generator cover with the bolt and nut.
Torque: 16.6 N·m (170 kgf·cm, 12 ft·lbf)

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(b) Except Canada:
Install the cord clip with the bolt.
Torque: 16.6 N·m (170 kgf·cm, 12 ft·lbf)

9. CHECK THAT ROTOR ROTATES SMOOTHLY

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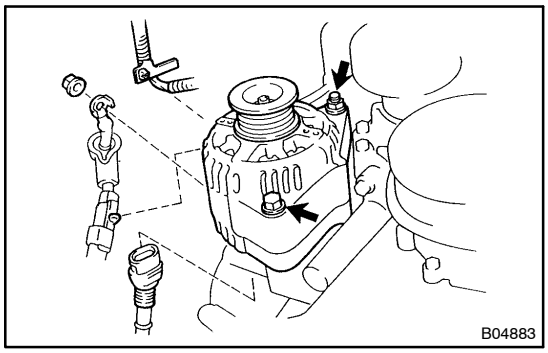
CH06N–01



INSTALLATION

1. **INSTALL GENERATOR**

(a) Install the generator with the bolt and nut.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

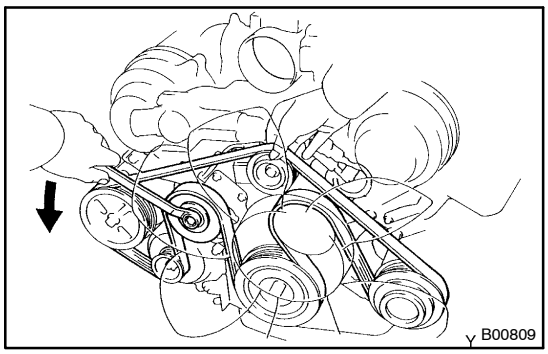
(b) Connect the generator connector.

(c) Connect the generator wire with the nut and rubber cap.

(d) Install the generator wire clamp to the cord clip on the generator.

2. **INSTALL PS VANE PUMP PULLEY**
(See page SR–42)

3. **INSTALL RADIATOR ASSEMBLY**
(See page CO–19)



4. **INSTALL GENERATOR DRIVE BELT**

Install the belt by turning the belt tensioner counterclockwise.

HINT:

The pulley bolt for the belt tensioner has a left – hand thread.

5. **FULL ENGINE COOLANT**
6. **START ENGINE AND CHECK FOR LEAKS**
7. **RECHECK ENGINE COOLANT LEVEL**
8. **PERFORM ON–VEHICLE INSPECTION**
(See page CH–2)
9. **INSTALL ENGINE UNDER COVER NO.1**

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AUTOMATIC TRANSMISSION SYSTEM

AT07L–01

PRECAUTION

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

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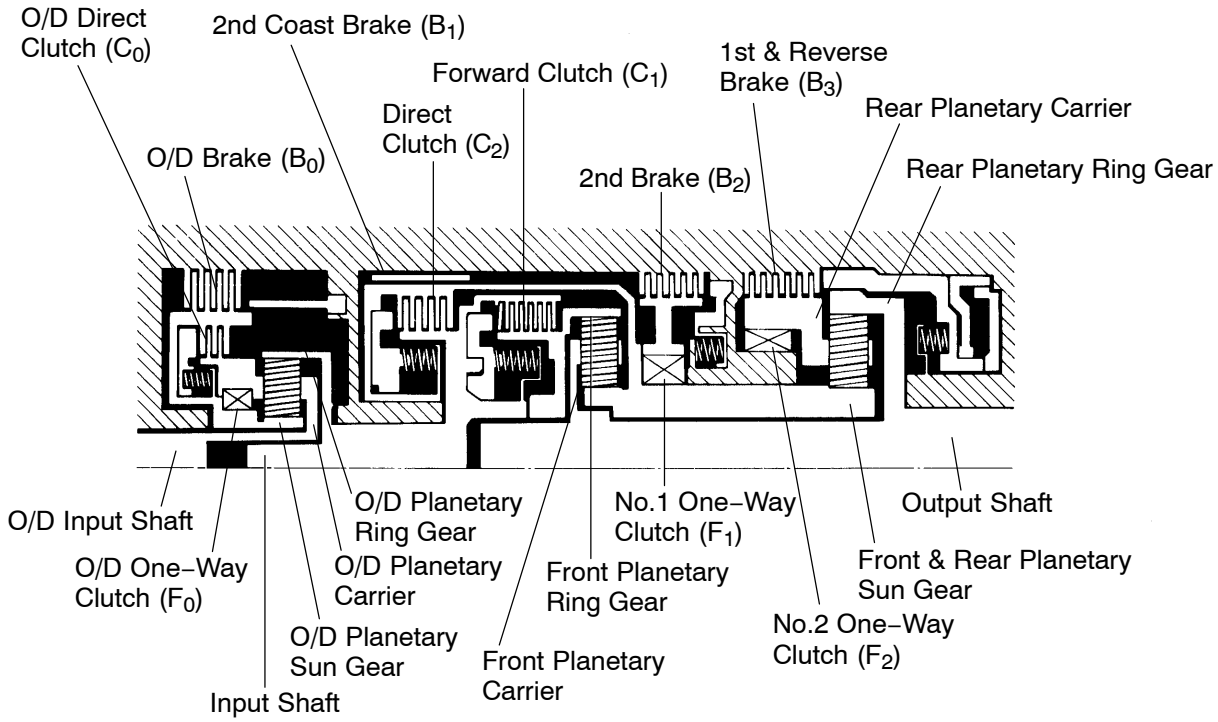
AT07M–01

OPERATION



AT2157

○ - - - - Operating

Shift Lever Position	Gear Position	C_0	C_1	C_2	B_0	B_1	B_2	B_3	F_0	F_1	F_2
P	Parking	○									
R	Reverse	○		○				○	○		
N	Neutral	○									
D	1st	○	○						○		○
	2nd	○	○				○		○	○	
	3rd	○	○	○			○		○		
	O/D		○	○	○		○				
2	1st	○	○						○		○
	2nd	○	○			○	○		○	○	
	*1 3rd	○	○	○			○		○		
L	1st	○	○					○	○		○
	*2 2nd	○	○			○	○		○	○	

*1 Down–shift only in the 2 position and 3rd gear–no up–shift.
*2 Down–shift only in the L position and 2nd gear–no up–shift.

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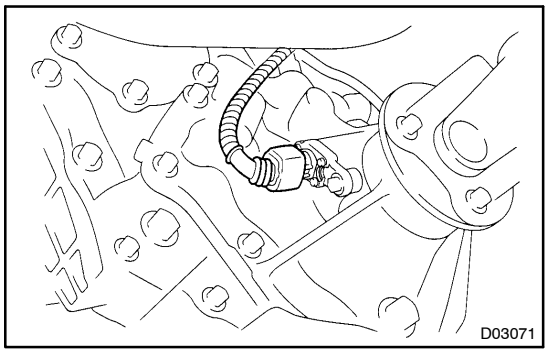
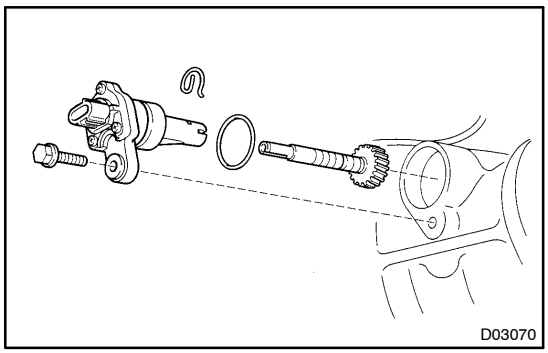


VEHICLE SPEED SENSOR

AT07Y–01

ON–VEHICLE REPAIR

1. DISCONNECT NO.1 VEHICLE SPEED SENSOR CONNECTOR



2. REMOVE NO.1 VEHICLE SPEED SENSOR

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

3. DISASSEMBLE NO.1 VEHICLE SPEED SENSOR

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

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

4. ASSEMBLE NO.1 VEHICLE SPEED SENSOR

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

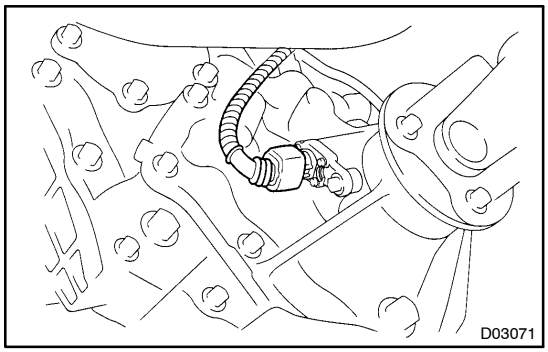
(b) Coat a new O–ring with ATF.

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

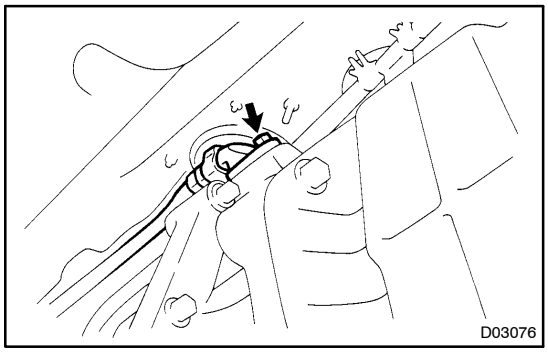
5. INSTALL NO.1 VEHICLE SPEED SENSOR

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

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



6. CONNECT NO.1 VEHICLE SPEED SENSOR CONNECTOR



7. DISCONNECT NO.2 VEHICLE SPEED SENSOR CONNECTOR

8. REMOVE NO.2 VEHICLE SPEED SENSOR

(a) Remove the bolt and No.2 vehicle speed sensor.

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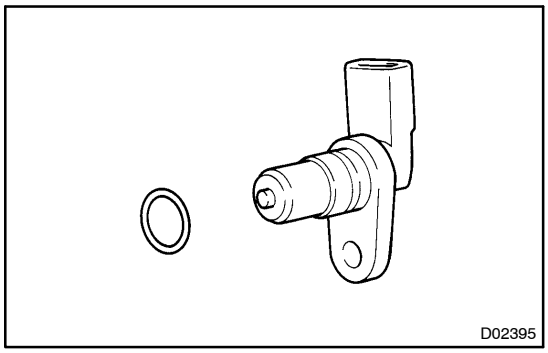
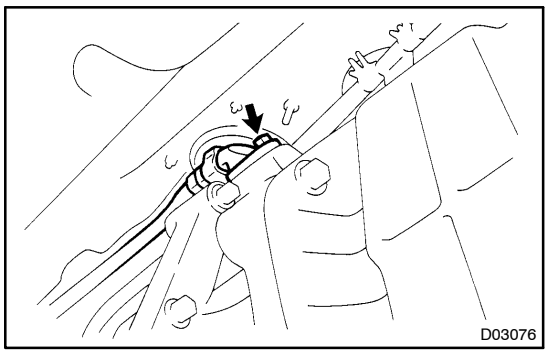


(b) Remove the O–ring from the No.2 vehicle speed sensor.

9. INSTALL NO.2 VEHICLE SPEED SENSOR

(a) Coat a new O–ring with ATF and install it to the No.2 vehicle speed sensor.



(b) Install the No.2 vehicle speed sensor with the bolt.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

10. CONNECT NO.2 VEHICLE SPEED SENSOR CONNECTOR

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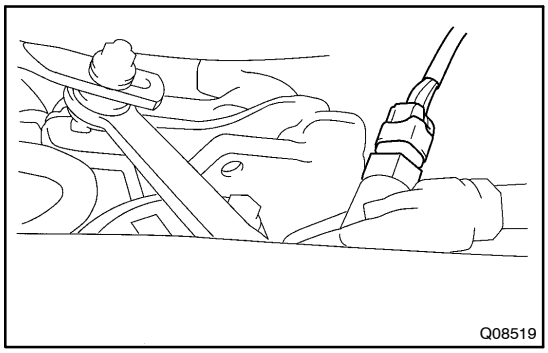

ATF TEMPERATURE SENSOR

AT07N–01

ON–VEHICLE REPAIR

1. REMOVE NO.2 ENGINE UNDER COVER

2. DISCONNECT ATF TEMPERATURE SENSOR CONNECTOR

3. REMOVE ATF TEMPERATURE SENSOR

(a) Remove the ATF temperature sensor.

(b) Remove the O–ring from the ATF temperature sensor.

4. INSTALL ATF TEMPERATURE SENSOR

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

(b) Install the ATF temperature sensor.

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

5. CONNECT ATF TEMPERATURE SENSOR CONNECTOR

6. INSTALL NO.2 ENGINE UNDER COVER

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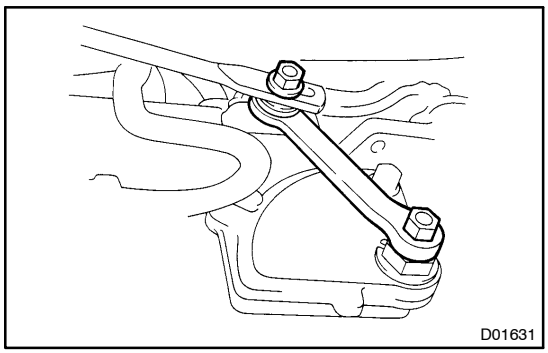
PARK/NEUTRAL POSITION (PNP) SWITCH

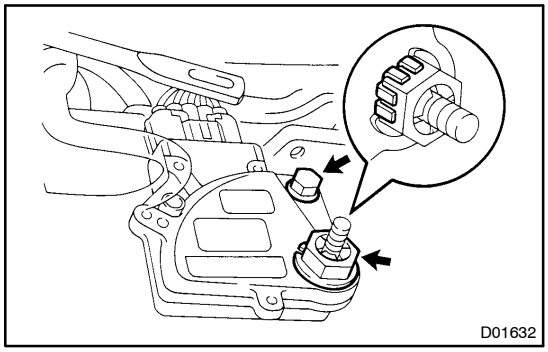
AT07O–01

ON–VEHICLE REPAIR

1. **REMOVE NO.2 ENGINE UNDER COVER**



2. **REMOVE TRANSMISSION CONTROL SHAFT LEVER**
3. **DISCONNECT PARK/NEUTRAL POSITION SWITCH CONNECTOR**



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

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

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

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

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

(b) Install a new lock plate and the nut.
Torque: 3.9 N·m (40 kgf·cm, 35 in.·lbf)

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

(d) Adjust the park/neutral position switch
(See page DI–151).

6. **CONNECT PARK/NEUTRAL POSITION SWITCH CONNECTOR**
7. **INSTALL TRANSMISSION CONTROL SHAFT LEVER**

Adjust the shift lever position (See page DI–151).
Torque:
Park/neutral position switch side:
16 N·m (160 kgf·cm, 12 ft·lbf)
Transmission control rod side:
13 N·m (130 kgf·cm, 9 ft·lbf)

8. **INSTALL NO.2 ENGINE UNDER COVER**

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VALVE BODY ASSEMBLY

AT07Z–01

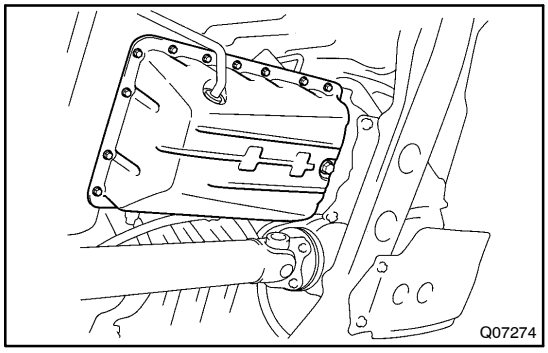
ON–VEHICLE REPAIR

CAUTION:

- **When working with FIPG material, you must observe the followings.**
- **Using a razor blade and a gasket scraper, remove all old FIPG material from the gasket surfaces.**
- **Thoroughly clean all components to remove all loose material. Clean both sealing surfaces with a non–residue solvent.**
- **Apply FIPG in an approx. 1 mm (0.04 in.) wide bead along the sealing surface. Parts must be assembled within 10 minutes of application. Otherwise, the FIPG material must be removed and reapplied.**

1. REMOVE NO.2 ENGINE UNDER COVER

2. DRAIN ATF

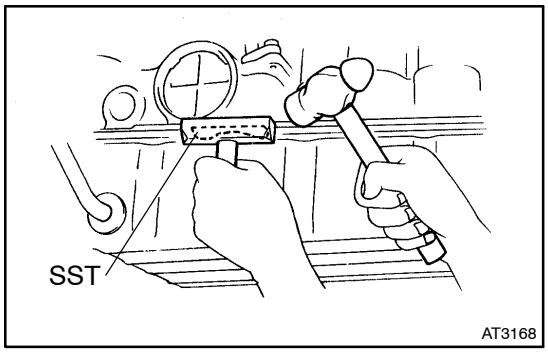


3. REMOVE OIL PAN

NOTICE:

Some fluid will remain in the oil pan.

(a) Remove the 19 bolts.

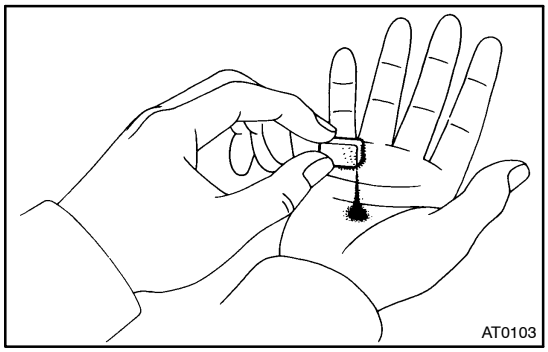


(b) Install the blade of SST between the transmission case and oil pan, cut off applied sealer and then remove the oil pan.

SST 09032–00100

NOTICE:

When removing the oil pan, be careful not to damage the oil pan flange.



4. EXAMINE PARTICLES IN PAN

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

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

Brass (non–magnetic)...bushing wear

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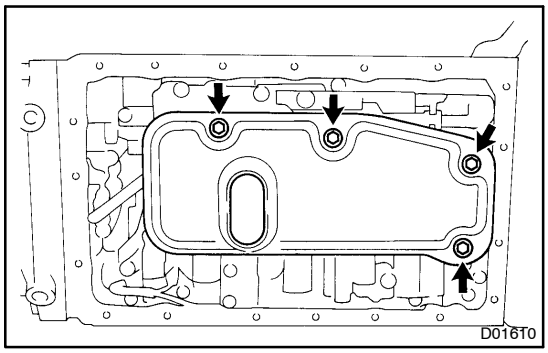
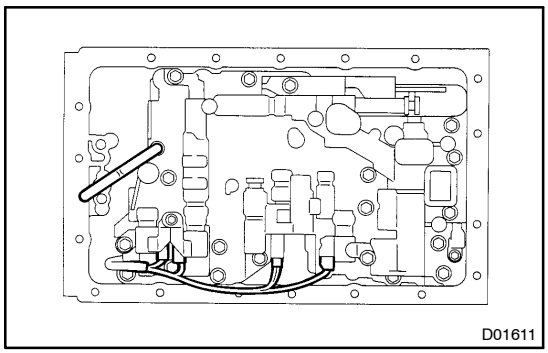


5. REMOVE OIL STRAINER

Remove the 4 bolts, oil strainer and 3 gaskets.

NOTICE:

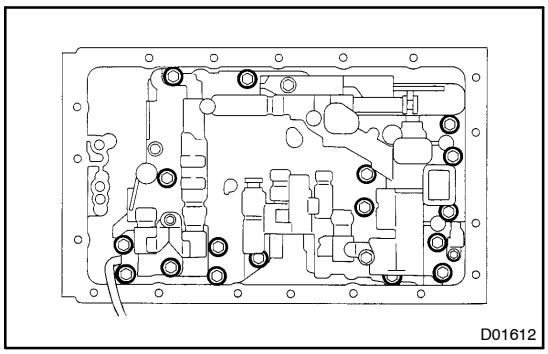
Be careful as some fluid will come out with the oil strainer.



6. REMOVE OIL PIPE

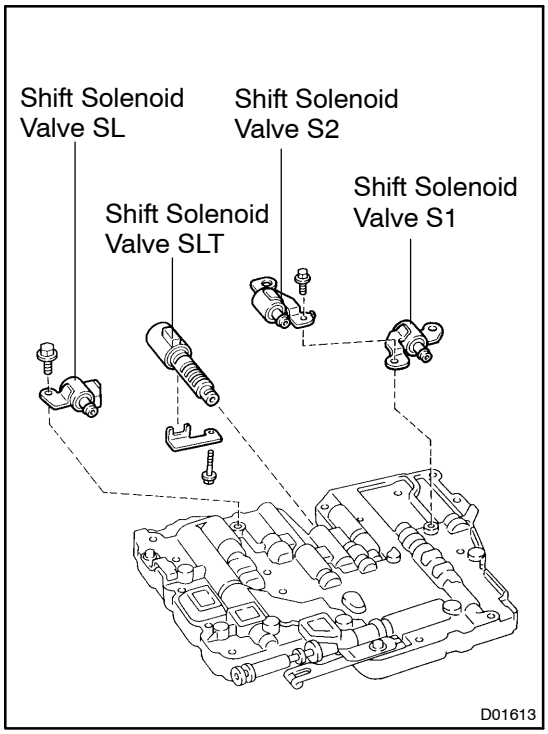
Pry up both pipe ends with a large screwdriver and remove the pipe.

7. DISCONNECT 4 CONNECTORS FROM SHIFT SOLENOID VALVES



8. REMOVE VALVE BODY

Remove the 17 bolts and valve body.



9. REMOVE SOLENOID VALVE

(a) Remove the 2 bolts and 3 solenoid valves.

(b) Turn the valve body, remove the bolt, lock plate and solenoid valve.

(c) Remove the 3 O–rings from the 3 solenoid valves.

10. REMOVE DETENT SPRING

11. REMOVE MANUAL VALVE

12. INSTALL MANUAL VALVE

13. INSTALL DETENT SPRING

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

14. INSTALL SOLENOID VALVE

(a) Install new 3 O–rings to 3 solenoid valves.

(b) Install the solenoid valve and lock plate with bolt.

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

(c) Install the 3 solenoid valves with the 3 bolts.

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

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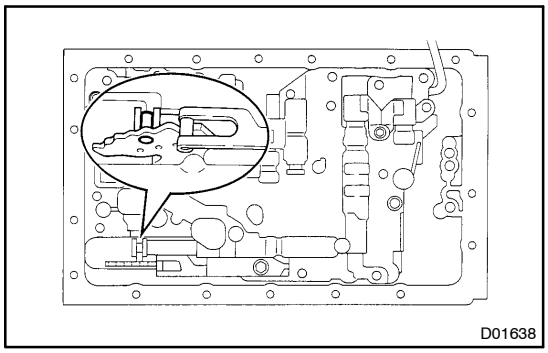
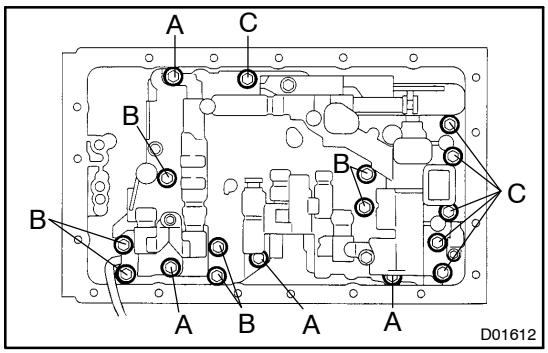


15. INSTALL VALVE BODY

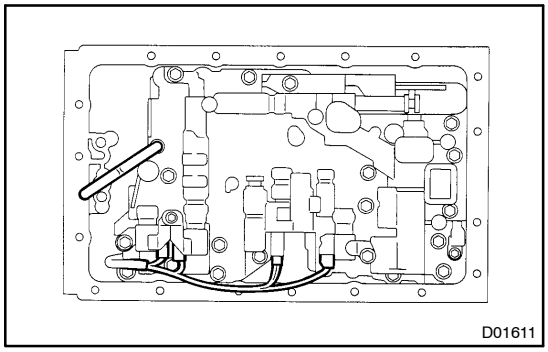
HINT:

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



Install the 17 bolts and valve body.

Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)
Bolt length:
Bolt A: 23 mm (0.91 in.)
Bolt B: 28 mm (1.10 in.)
Bolt C: 36 mm (1.42 in.)

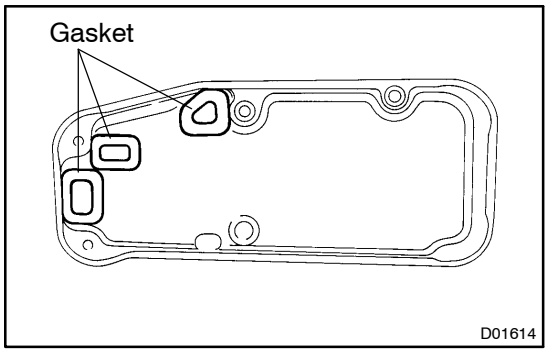


16. INSTALL OIL PIPE

NOTICE:

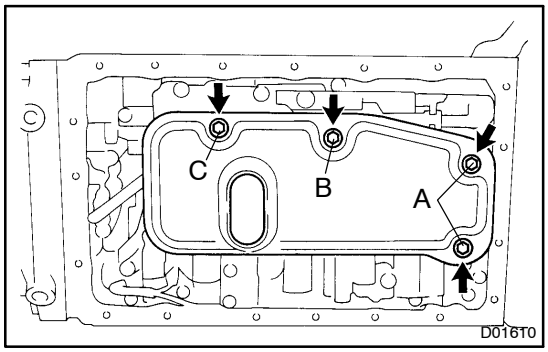
Make sure that the magnets on the oil pan do not interfere with the oil pipe.

17. CONNECT 4 CONNECTORS TO SHIFT SOLENOID VALVES



18. INSTALL OIL STRAINER

(a) Install 3 new gaskets.



(b) Install the oil strainer with the 4 bolts.

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)
Bolt length:
Bolt A: 14 mm (0.55 in.)
Bolt B: 20 mm (0.79 in.)
Bolt C: 23 mm (0.91 in.)

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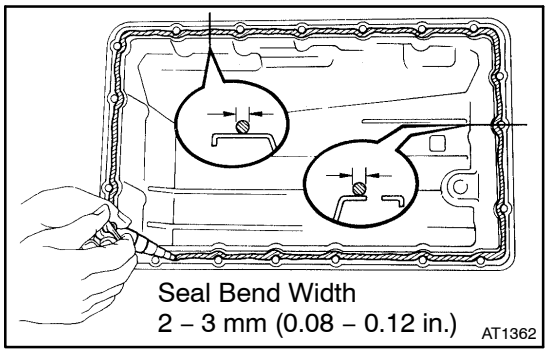

19. INSTALL OIL PAN

HINT:

Remove any packing material and be careful not to drop oil on the contacting surfaces of the transmission case and oil pan.

(a) Apply FIPG to the oil pan, as shown in the illustration.
FIPG: Part No. 08826–00090, THREE BOND 1281 or equivalent

(b) Install the 19 bolts and oil pan.
Torque: 7.4 N·m (75 kgf·cm, 65 in·lbf)

20. FILL ATF AND CHECK ATF

(a) Install a new gasket and drain plug.
Torque: 20 N·m (205 kgf·cm, 15 ft·lbf)

(b) Fill new fluid through the filler pipe (See page DI–151).

21. INSTALL NO.2 ENGINE UNDER COVER

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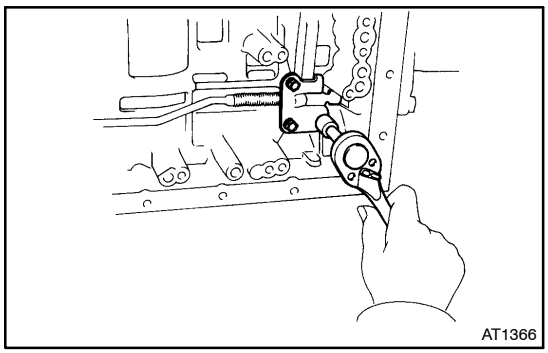
PARKING LOCK PAWL

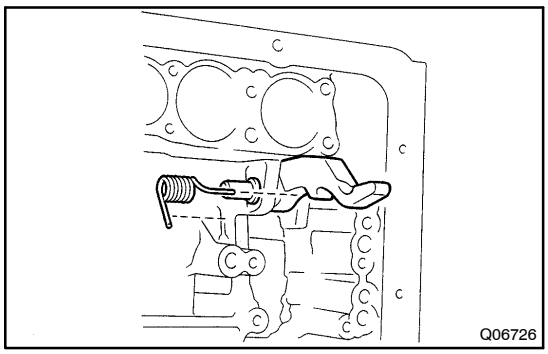
AT07P–01

ON–VEHICLE REPAIR

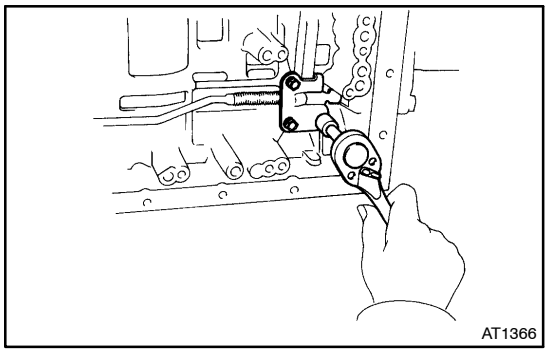
1. **REMOVE VALVE BODY (See page AT–7)**



2. **REMOVE PARKING LOCK PAWL BRACKET**



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



7. **INSTALL PARKING LOCK PAWL BRACKET**

HINT:

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

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

8. **INSTALL VALVE BODY (See page AT–7)**

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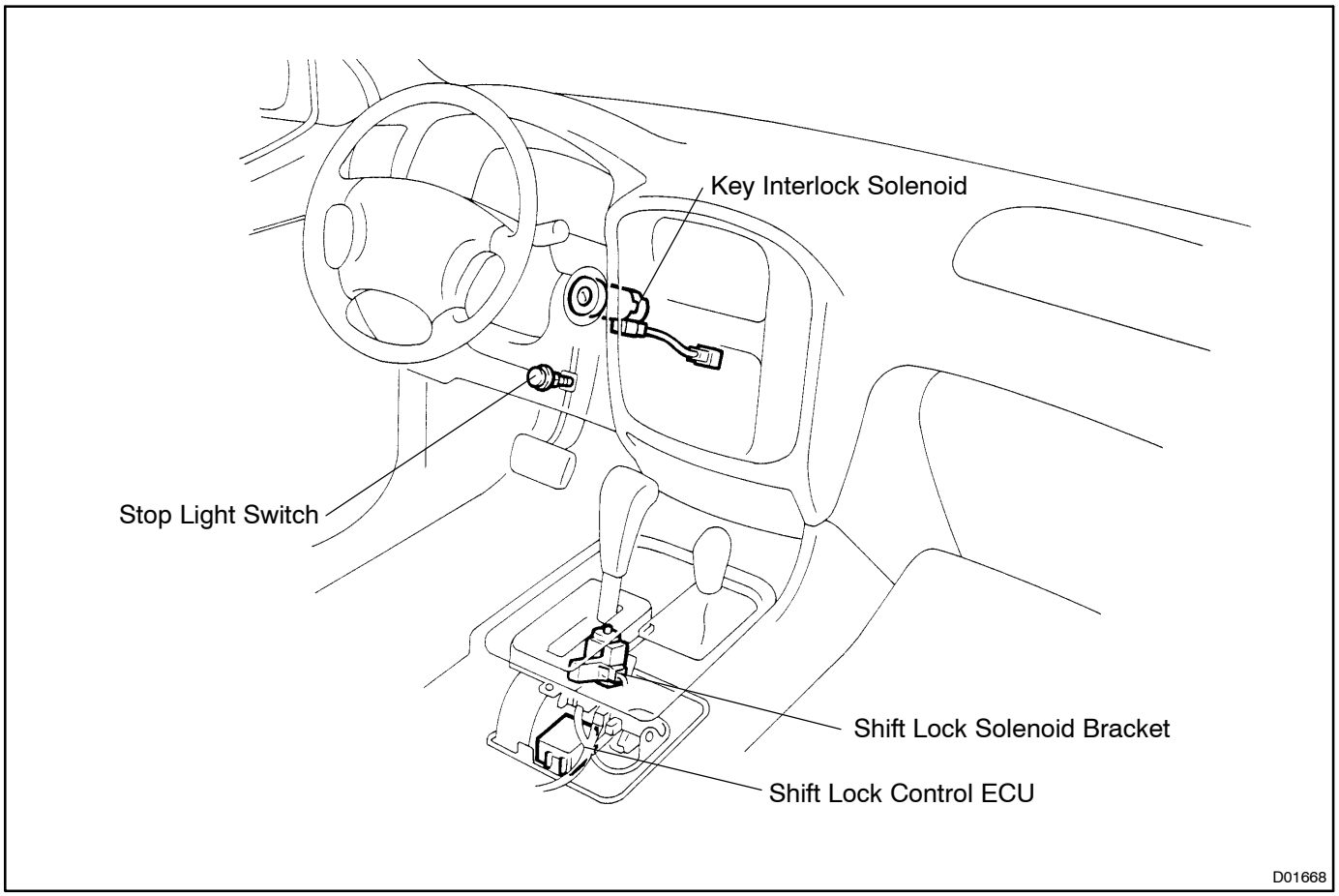
SHIFT LOCK SYSTEM

LOCATION

AT07Q–01



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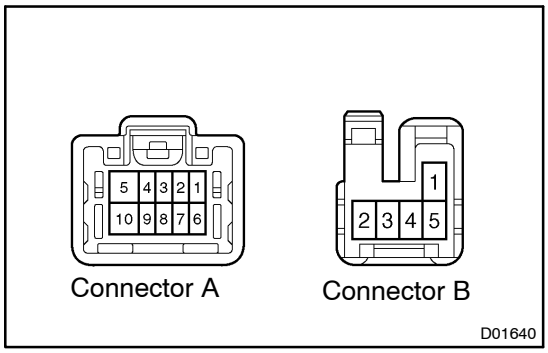
AT07R–01



INSPECTION

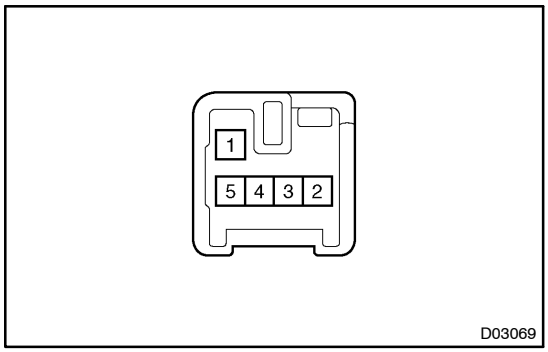
1. INSPECT SHIFT LOCK CONTROL ECU

Using a voltmeter, measure voltage at each terminal.

HINT:

Do not disconnect the ECU connector.

Terminal	Measuring Condition	Voltage (V)
Connector A		
1 – 7 (ACC – E)	Ignition switch ACC	10 – 14
3 – 7 (IG – E)	Ignition switch ON	10 – 14
8 – 7 (STP – E)	Depress brake pedal	10 – 14
6 – 7 (KLS – E)	(1) Ignition switch ACC and P position (2) Ignition switch ACC and except P position (3) (After approx. 1 second)	0 10 – 14 6 – 9
Connector B		
2 – 5 (SLS^+ – SLS^-)	(1) Ignition switch ON and P position (2) Depress brake pedal (3) Shift except P position under conditions above	0 8 – 13.5 0
3 – 1 (P1 – P)	(1) Ignition switch ON, P position and depress brake pedal (2) Shift except P position under condition above	0 9 – 13.5
4 – 1 (P2 – P)	(1) Ignition switch ACC and P position (2) Shift except P position under condition above	9 – 13.5 0



2. INSPECT SHIFT LOCK SOLENOID

(a) Disconnect the solenoid connector.

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

Standard resistance: 20–28 Ω

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

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

If the solenoid does not operate, replace the solenoid.

3. INSPECT SHIFT LOCK CONTROL SWITCH

Inspect that continuity exists between each terminal.

Shift position	Tester connection	Specified value
P position (Release button is not pushed)	1 – 3 (P – P1)	Continuity
P position (Release button is pushed)	1 – 4 (P – P2)	Continuity
R, N, D, 2, L position	1 – 4 (P – P2)	Continuity

If continuity is not as specified, replace the switch.

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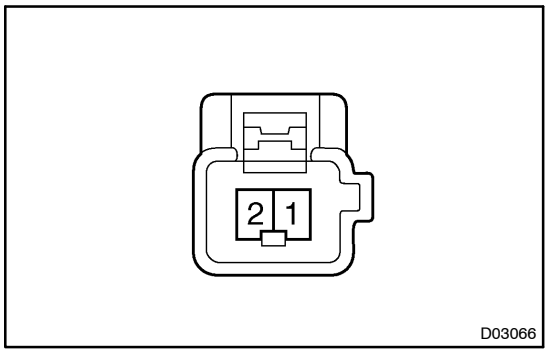

4. INSPECT KEY INTERLOCK SOLENOID

(a) Disconnect the solenoid connector.

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

Standard resistance: 12–17 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 operate, replace the solenoid.

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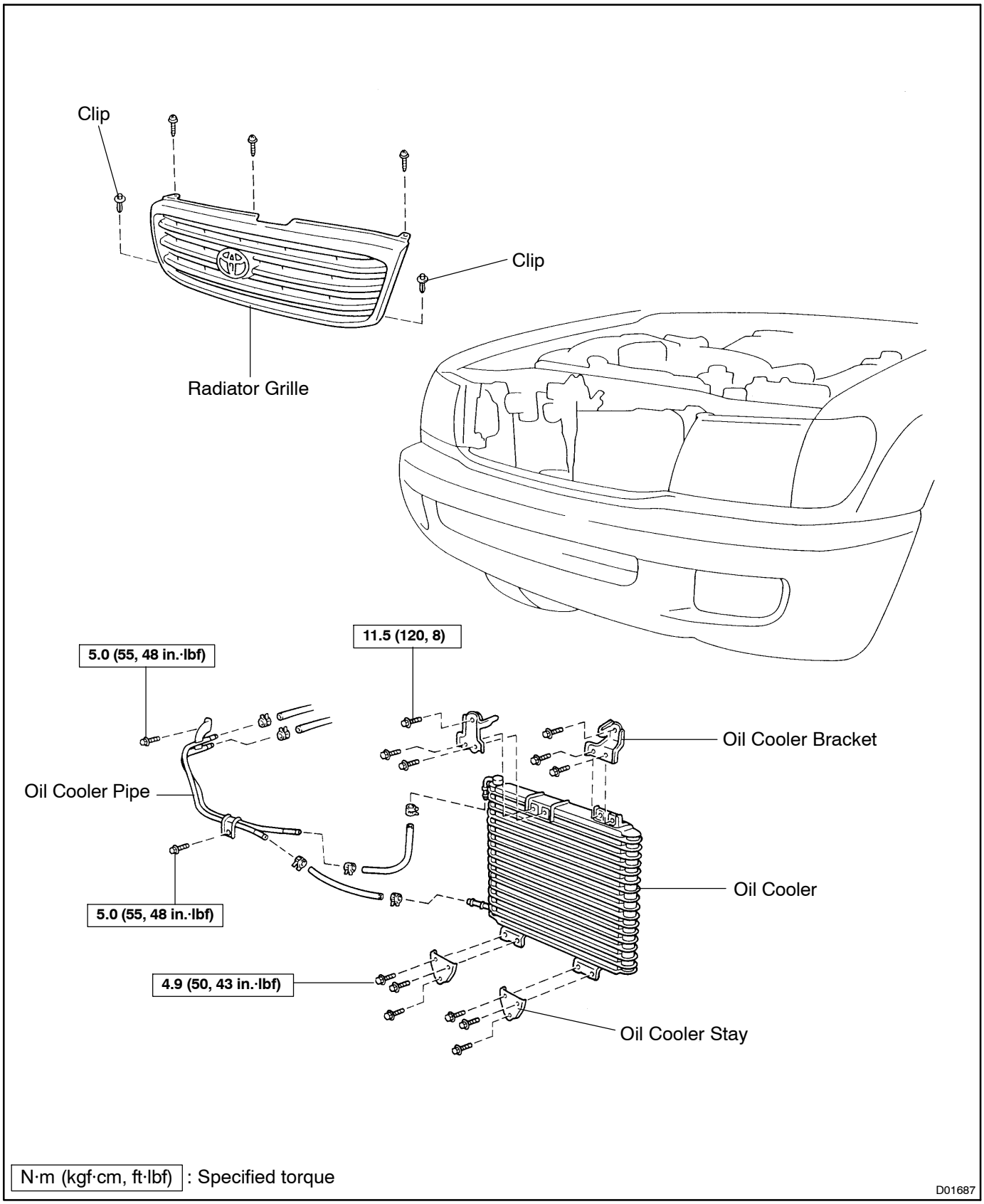
AIR COOLED OIL COOLER

COMPONENTS

AT07I–01



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

D01687

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AT07J–01

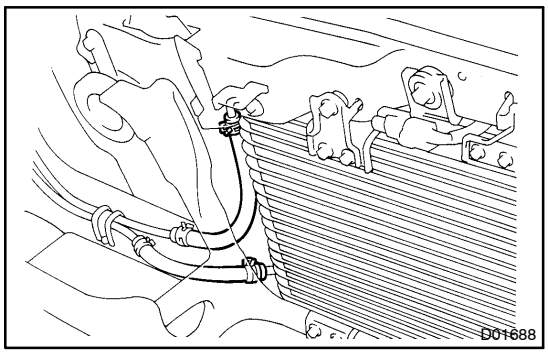
REMOVAL

1. REMOVE RADIATOR GRILLE

(a) Remove the 3 screws.

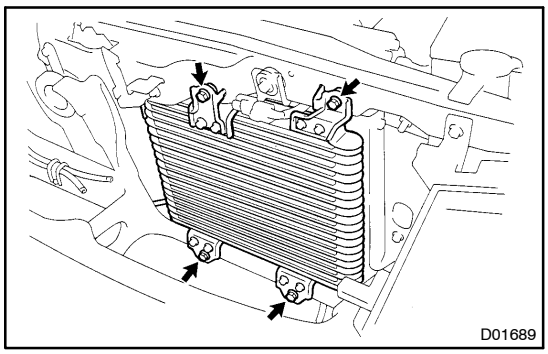
(b) Using a screwdriver, remove the 2 clips.

(c) Remove the radiator grille.

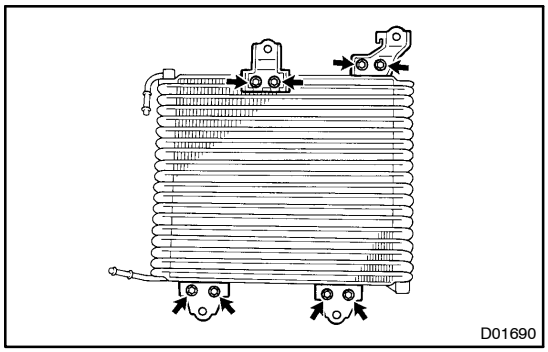


2. REMOVE OIL COOLER

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



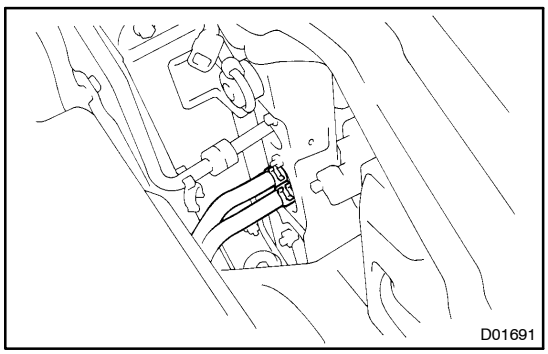
(b) Remove the 4 bolts and oil cooler.
Torque: 11.5 N·m (120 kgf·cm, 8 ft·lbf)



(c) Remove the 8 bolts, oil cooler bracket and stay.
Torque: 4.9 N·m (50 kgf·cm, 43 in.·lbf)

3. REMOVE OIL COOLER PIPE BRACKET

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



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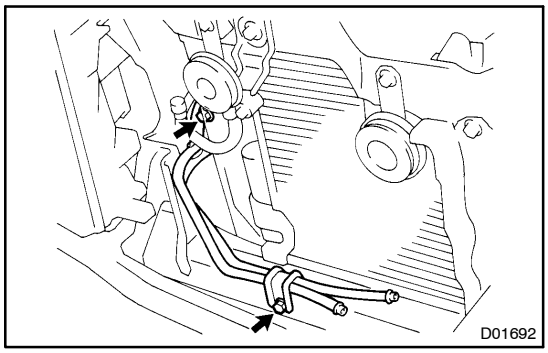

(b) Remove the 2 bolts and oil cooler pipe bracket.
Torque: 5.0 N·m (55 kgf·cm, 48 in.·lbf)

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AT07K–01

INSTALLATION

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

HINT:

After installation, check fluid level (See page DI–151).

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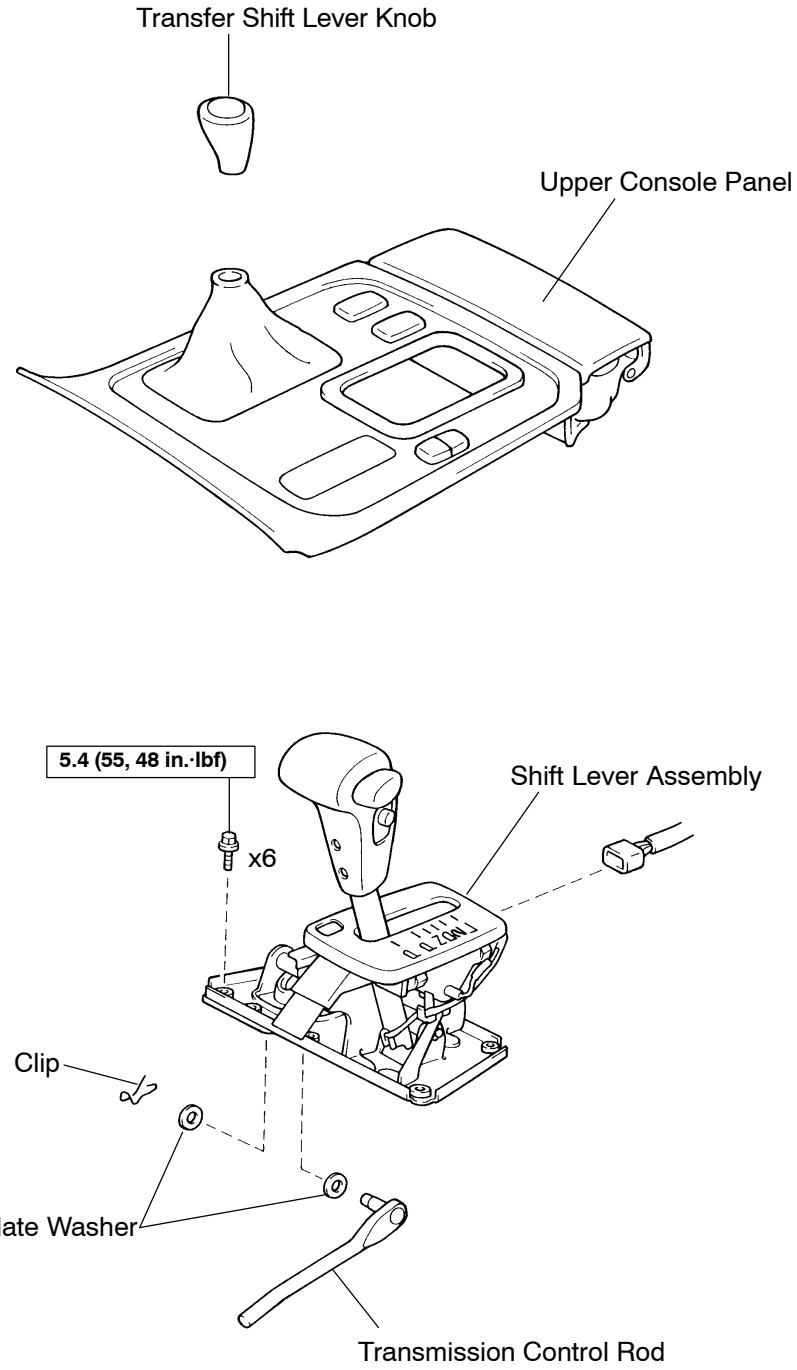
FLOOR SHIFT ASSEMBLY

COMPONENTS

AT07S–01



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

D01700

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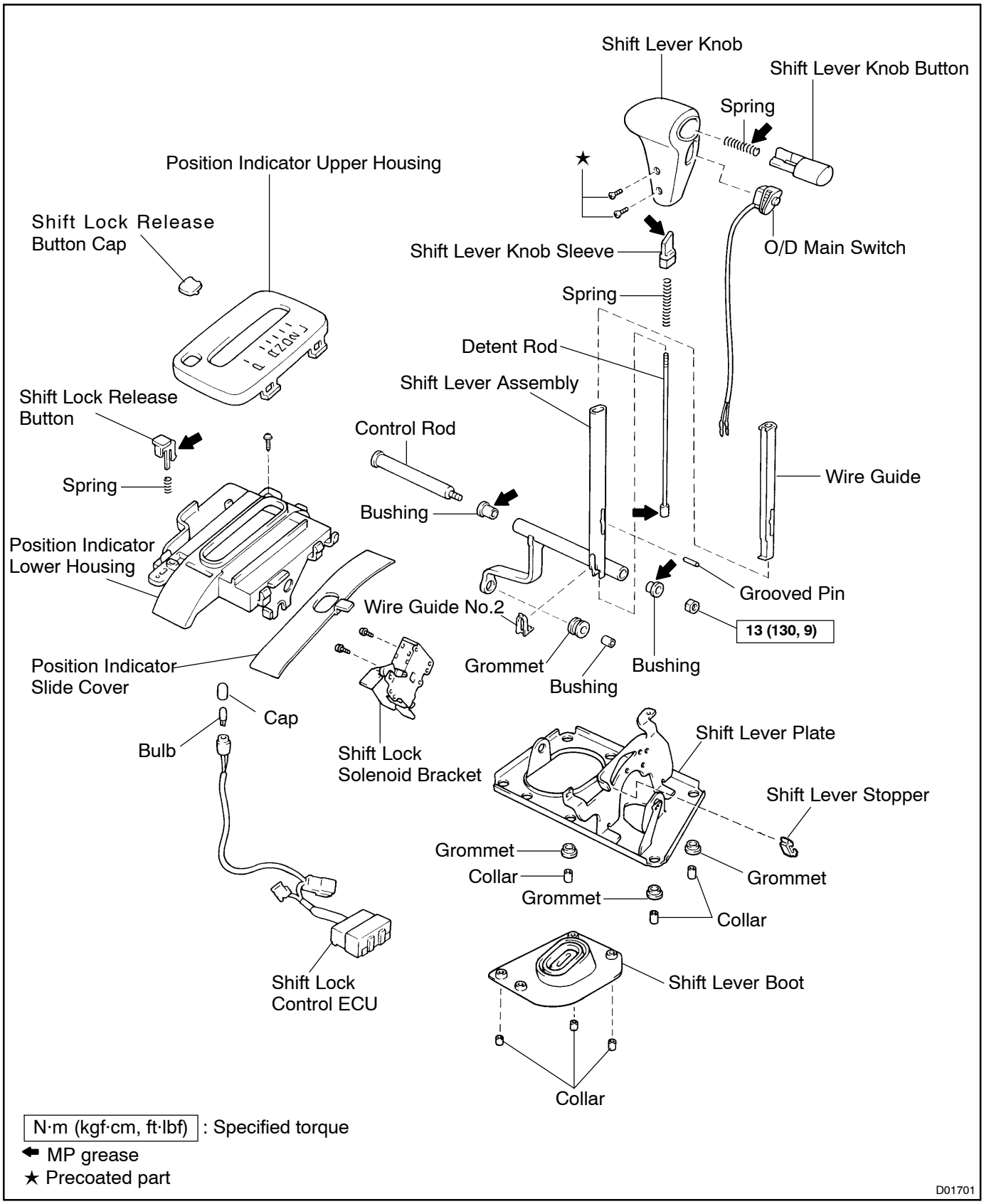

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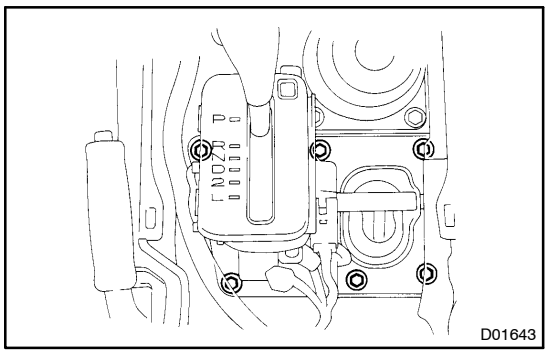
AT07T–01

REMOVAL

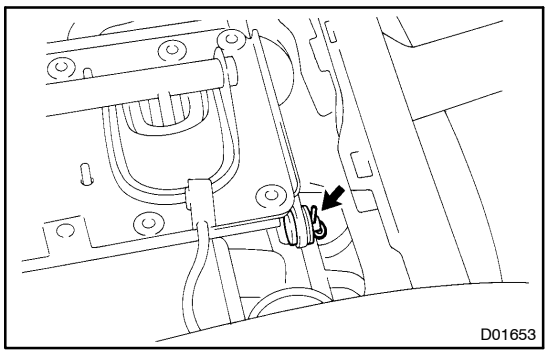
1. **REMOVE TRANSFER SHIFT LEVER KNOB**
2. **REMOVE UPPER CONSOLE PANEL**
   (See page BO–86)



3. **REMOVE SHIFT LEVER ASSEMBLY**

(a) Disconnect the connector.

(b) Remove the 6 bolts.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)



(c) Lift the shift lever assembly up, using a needle nose pliers, remove the clip and plate washer.

(d) Remove the transmission control rod and washer from the shift lever assembly and remove the remove.

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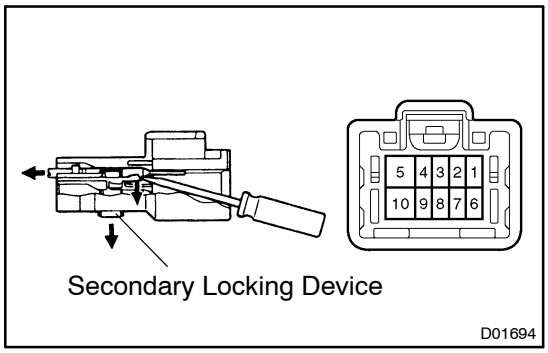
AT07U–01

DISASSEMBLY



1. REMOVE O/D MAIN SWITCH TERMINAL

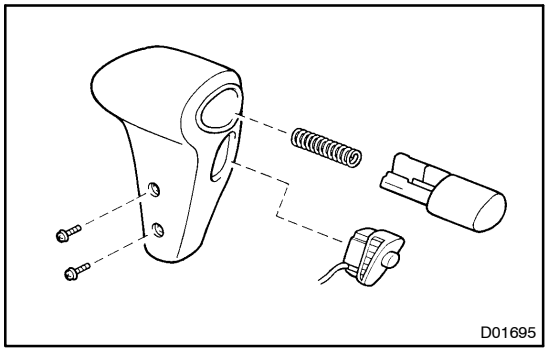
(a) Remove the connector from the shift lever plate.
(b) Disengage the secondary locking device.
(c) Release the locking lug of the terminals 5 and 10, and pull the terminals out from the rear.

2. REMOVE SHIFT LEVER KNOB SUB–ASSEMBLY

(a) Remove the 2 screws and shift lever knob sub–assembly.

NOTICE:

Pay attention not to apply unnatural load onto O/D main switch wire harness.



3. DISASSEMBLE SHIFT LEVER KNOB SUB–ASSEMBLY

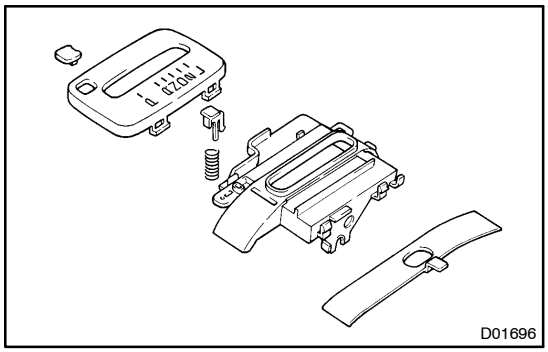
(a) Remove the shift lever knob and spring.
(b) Remove the O/D main switch.

4. DISCONNECT INDICATOR LIGHT

(a) Remove the indicator light from indicator housing.
(b) Remove the cap and bulb from indicator light wire.

5. REMOVE INDICATOR HOUSING

Remove the screw and indicator housing.



6. DISASSEMBLE INDICATOR HOUSING

(a) Remove the position indicator lower housing, position indicator slide cover and shift lock release button cap from the position indicator upper housing.
(b) Remove the shift lock release button and spring from the position indicator lower housing.

7. REMOVE SHIFT LOCK UNIT

(a) Disconnect the shift lock solenoid bracket connector.
(b) Remove the 2 screws and shift lock solenoid bracket.
(c) Remove the shift lock control ECU.

8. REMOVE SHIFT LEVER SUB–ASSEMBLY

(a) Remove the grommet and No.1 bushing from the shift lever sub–assembly.
(b) Remove the 4 collars and shift lever boot.

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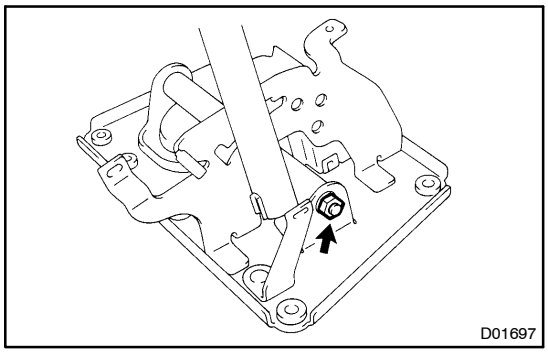
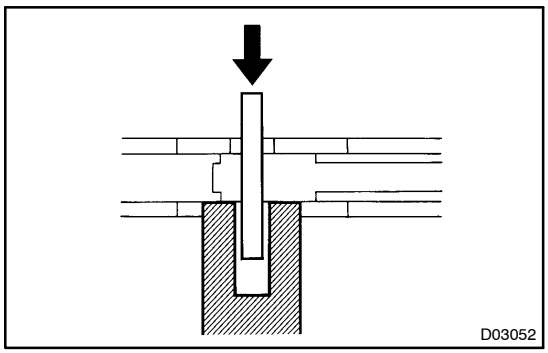


(c) Remove the nut and control rod.
(d) Remove the shift lever sub–assembly.

9. DISASSEMBLE SHIFT LEVER SUB–ASSEMBLY

(a) Remove the 2 bushings from shift lever sub–assembly.
(b) Remove the shift lever knob sleeve and spring from the detent rod.
(c) Align the grooved pin with the notch of the guide hole.



(d) Using a hammer, remove the grooved pin.

NOTICE:

When pressing in the grooved pin, if doing it at the place other than the notch, there may be fear of damaging the shift lever sub–assembly.

(e) Remove the wire guide, wire guide No.2 and detent rod from the shift lever sub–assembly.

10. REMOVE 3 COLLARS AND 3 BUSHINGS FROM SHIFT LEVER PLATE

11. REMOVE SHIFT LEVER STOPPER

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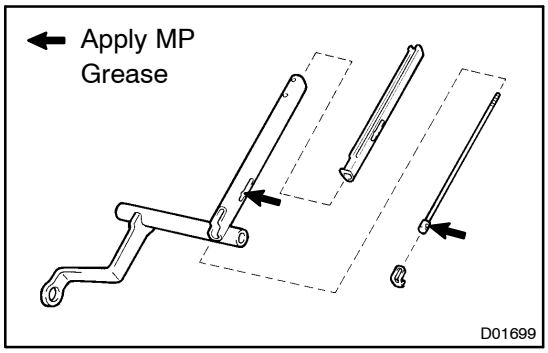
AT07V–01

REASSEMBLY



1. INSTALL COLLARS AND BUSHINGS

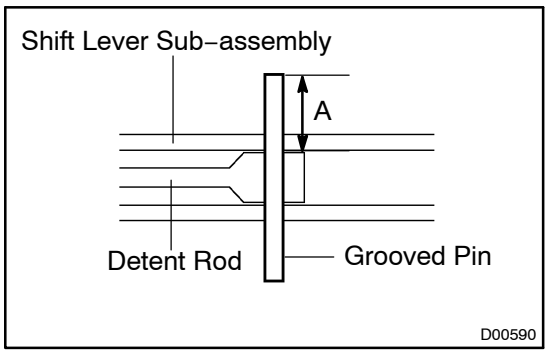
2. ASSEMBLE SHIFT LEVER SUB–ASSEMBLY

(a) Apply MP grease on the detent rod and shift lever sub–assembly.

(b) Install the wire guide, wire guide No.2 and detent rod.

(c) Insert the grooved pin in the detent rod pin hole.

(d) Aligning the grooved pin with the notch of the guide hole.



(e) Using a hammer, install the grooved pin.

A: 13.5 ± 0.3 mm (0.531 ± 0.012 in.)

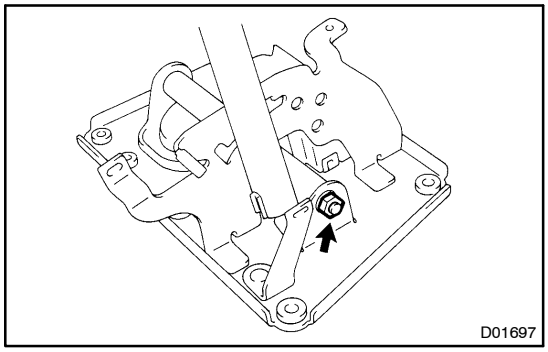
NOTICE:

When pressing in the grooved pin at the place other than the notch, there may be fear of damaging the shift lever sub–assembly.

(f) Check the detent rod operation.

(g) Install the spring and shift lever sleeve.

(h) Apply MP grease on 2 bushings and install 2 bushings to shift lever sub–assembly.



3. INSTALL SHIFT LEVER SUB–ASSEMBLY

(a) Install the shift lever sub–assembly to shift lever plate with the control rod and nut.

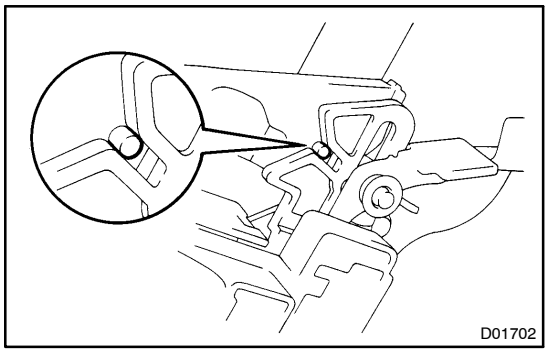
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(b) Install the shift lever boot and 3 collars

4. INSTALL SHIFT LEVER STOPPER

5. INSTALL SHIFT LOCK UNIT

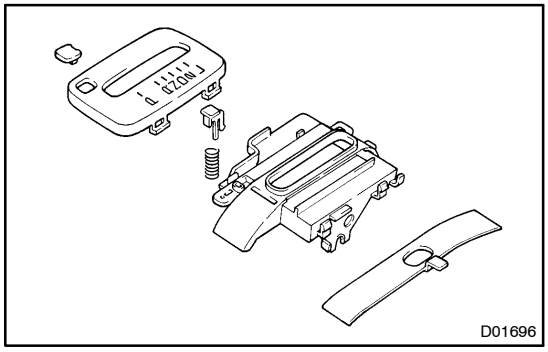
(a) Install the shift lock solenoid bracket with the 2 screws.



(b) Install the shift lock control ECU.

NOTICE:

Install the grooved pin into the groove of the shift lock unit as shown in the illustration.



6. ASSEMBLE INDICATOR HOUSING

(a) Install the shift lock release button and spring to the position indicator lower housing.

(b) Install the position indicator slider cover to the position indicator upper housing.

(c) Install the position indicator lower housing to the position indicator upper housing.

(d) Install the shift lock release button cap to the indicator housing.

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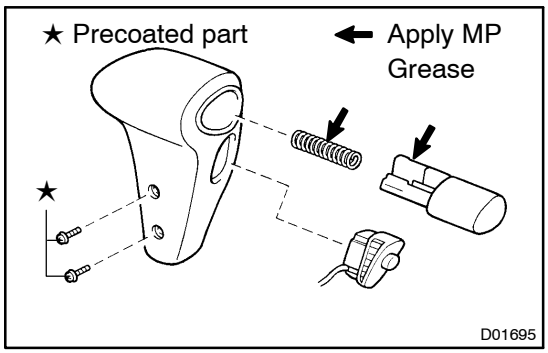
7. INSTALL INDICATOR HOUSING

Install the indicator housing with the screw.

8. INSTALL INDICATOR LIGHT

(a) Install the bulb and cap to the indicator light wire.

(b) Install the indicator light to the indicator housing.



9. INSTALL SHIFT LEVER KNOB

(a) Apply MP grease to shift lever knob button.

(b) Install the spring and shift lever knob button to shift lever knob.

(c) Install the shift lever knob to shift lever sub–assembly.

(d) Install the O/D main switch to shift lever knob.

(e) Coat the threads of the 2 screws with sealant.

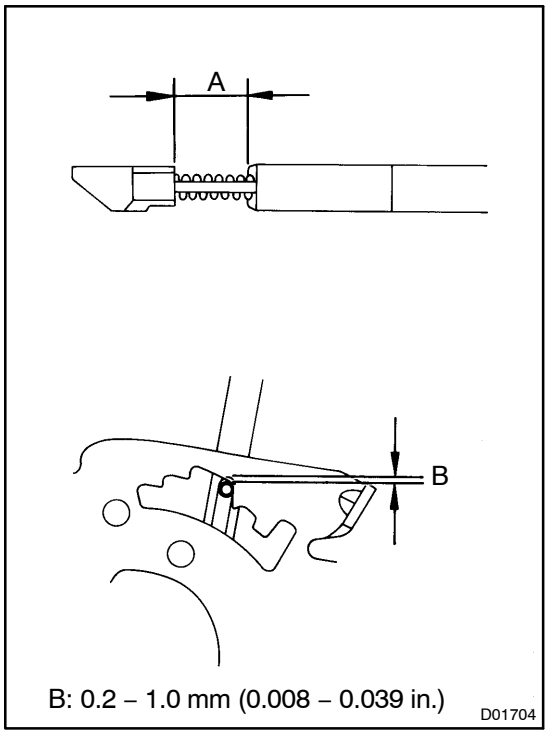
Sealant:

Part No. 08833–00080, THREE BOND 1344, LOCATE 242 or equivalent

(f) Install the shift lever knob and 2 screws to shift lever sub–assembly.

NOTICE:

Make sure not to catch O/D main switch wire harness.



(g) After assembling the shift lever knob, adjust the distance A by moving the shift lever knob sleeve so that the clearance B between the detent plate and grooved pin is within the standard with the shift lever in N position.

10. INSTALL SHIFT LEVER KNOB

11. INSTALL O/D MAIN SWITCH TERMINAL

(a) Connect the 2 O/D main switch terminals to the connector.

(b) Connect the connector to the shift lever plate.

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AT07W–01

INSTALLATION

Installation is in the reverse order of removal (See page AT–21).

HINT:

After installation, inspect shift lever operatoin.

- When shifting it to each position, make sure that the shifting lever moves smoothly, can be moderately operated and the position indicator displays correctly.

  Positions which can be operated without pressing the shift lever knob button

  R → N → D, L → 2 → D → N

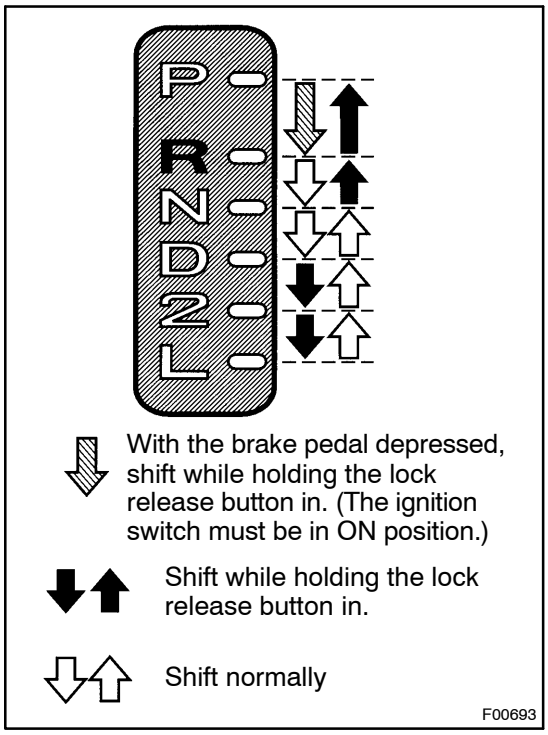
  Positions which can be operated only with pressing the shift lever knob button

  D → 2 → L, N → R → P

  Positions which can be operated only with pressing the shift lever knob button, ignition switch ON and brake pedal depressed

  P → R

- When starting the engine, make sure that the vehicle moves forward when shifting from N to D position, and moves rearward when shifting to R position.



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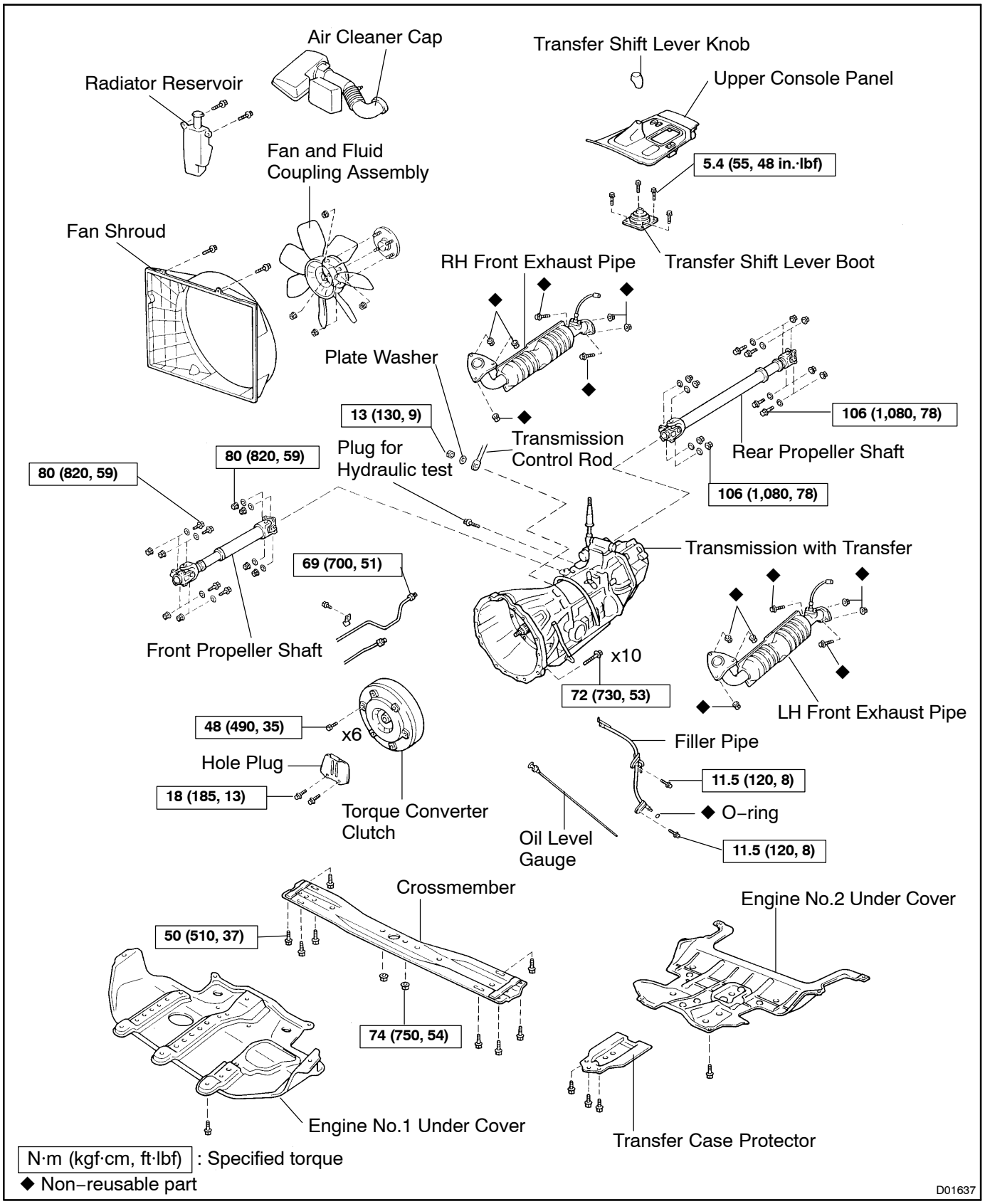
AUTOMATIC TRANSMISSION UNIT

COMPONENTS

AT080–01



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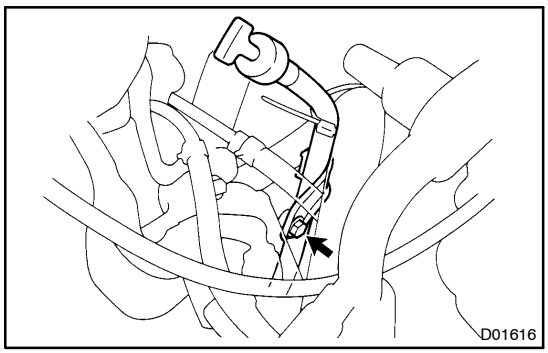
AT081–01

REMOVAL

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



3. **REMOVE OIL FILLER PIPE UPPER SIDE MOUNTING BOLT**

(a) Remove the level gauge.

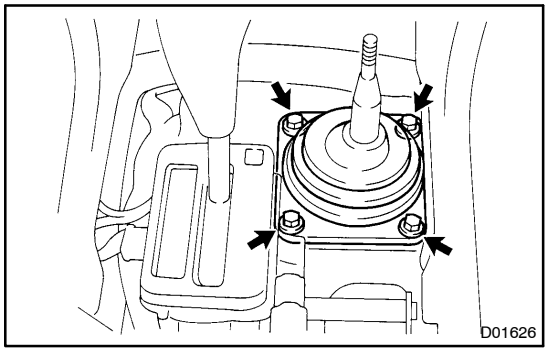
(b) Remove the upper side mounting bolt.
Torque: 11.5 N·m (120 kgf·cm, 8 ft·lbf)

(c) Disconnect the 2 bleeder hoses.

4. **REMOVE TRANSFER SHIFT LEVER BOOT**

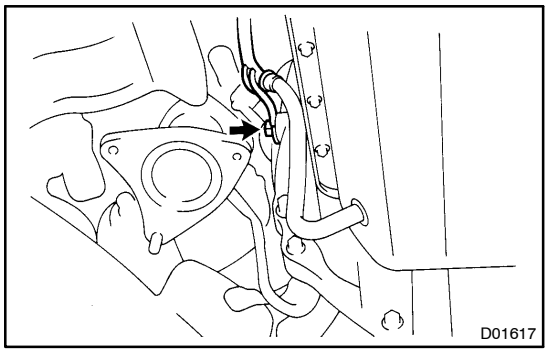
(a) Remove the transfer shift lever knob.

(b) Remove upper console panel (See page BO–86).



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

5. **REMOVE ENGINE NO.1 AND NO.2 UNDER COVERS**
6. **REMOVE LH AND RH FRONT EXHAUST PIPES**
   (See page EM–113)
7. **REMOVE FRONT AND REAR PROPELLER SHAFTS**
   (See page PR–4)



8. **REMOVE OIL FILLER PIPE**

(a) Remove the bolt and filler pipe.
Torque: 11.5 N·m (120 kgf·cm, 8 ft·lbf)

(b) Remove the O–ring from the filler pipe.

HINT:
At the time of installation, please refer to the following item.
Replace the used O–ring with a new one.

9. **REMOVE TRANSMISSION SHIFT CONTROL ROD**

Remove the nut, plate washer and disconnect the transmission control rod.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

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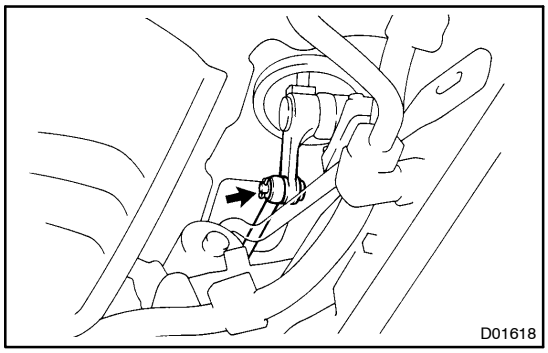
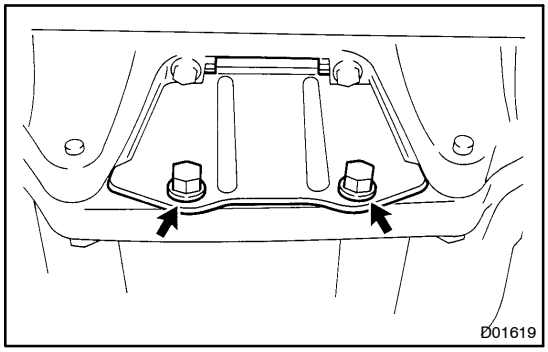


10. DISCONNECT TRANSFER SHIFT LEVER

Remove the clip, plate washer and collar, and disconnect the transfer shift lever rod assembly.

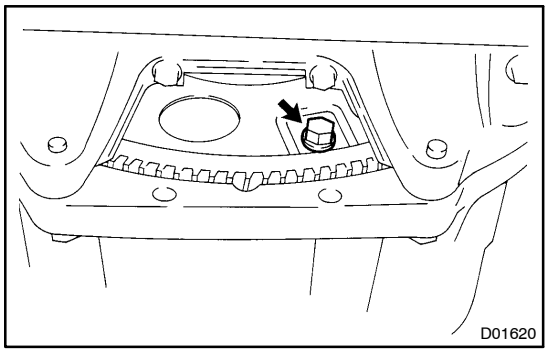
11. DISCONNECT CONNECTORS

(a) Disconnect the No.1 vehicle speed sensor connector.
(b) Disconnect the No.2 vehicle speed sensor connector.
(c) Disconnect the O/D direct clutch speed sensor connector.
(d) Disconnect the solenoid connector.
(e) Disconnect the ATF temperature sensor connector.
(f) Disconnect the park/neutral position switch connector.
(g) Disconnect the center diff. lock indicator switch connector.
(h) Disconnect the motor actuator connector
(i) Disconnect the L4 position switch connector.
(j) Disconnect the neutral position switch connector.
(k) Disconnect 5 clamps.



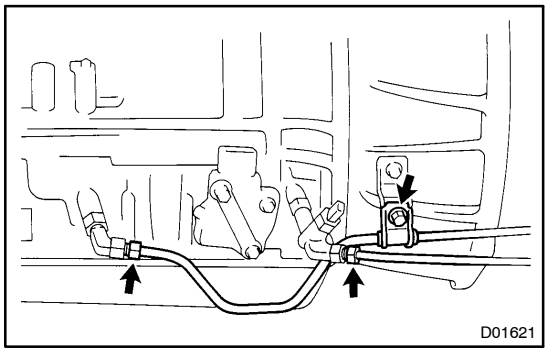
12. REMOVE TORQUE CONVERTER CLUTCH MOUNTING BOLT

(a) Remove the 2 bolts and hole plug.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)



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

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



13. REMOVE OIL COOLER PIPE UNION NUT

(a) Loosen the 2 oil cooler pipe union nuts.
(b) Remove the oil cooler pipe mounting bolt.
Torque: 11.5 N·m (120 kgf·cm, 8 ft·lbf)
(c) Remove the 2 oil cooler pipe union nuts.
Torque: 69 N·m (700 kgf·cm, 51 ft·lbf)

14. REMOVE CROSSMEMBER

(a) Support the transmission with a jack.

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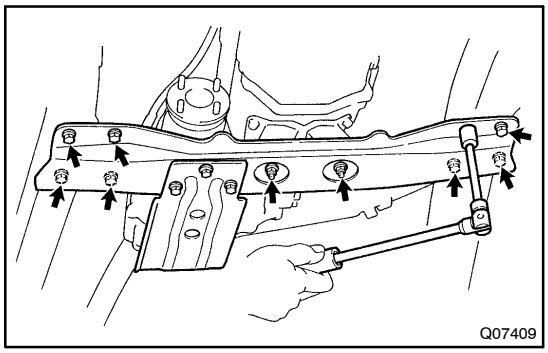
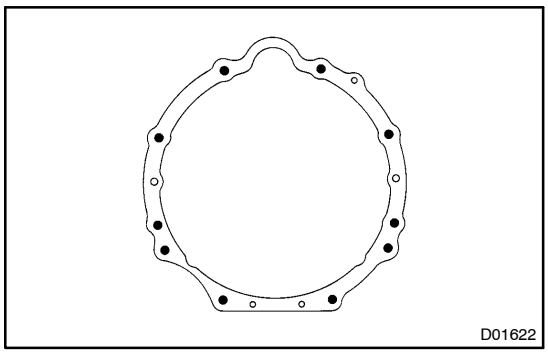


(b) Remove the 8 bolts and 2 nuts, and then remove the crossmember.
Torque:
Bolt: 50 N·m (510 kgf·cm, 37 ft·lbf)
Nut: 74 N·m (750 kgf·cm, 54 ft·lbf)

15. REMOVE TRANSMISSION

(a) Lower the rear end of the transmission.

(b) Remove the transmission wire clamp bolt.



(c) Remove the 10 bolts and transmission.
Torque: 72 N·m (730 kgf·cm, 53 ft·lbf)

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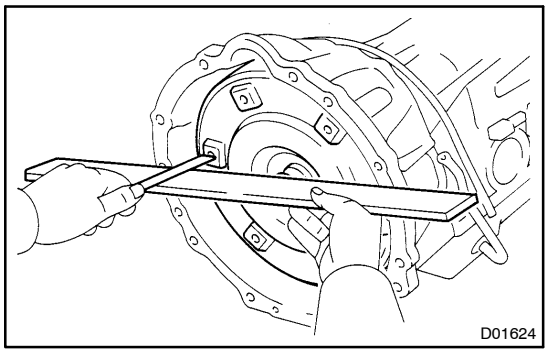
AT082–01



INSTALLATION

1. CHECK TORQUE CONVERTER CLUTCH INSTALLATION

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

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

2. TRANSMISSION INSTALLATION

Installation is in the reverse order of removal (See page AT–28).

HINT:

- Transmission control rod and park/neutral position switch (See page DI–151)
- ATF level (See page DI–151)
- Conduct the road test of the vehicle (See page DI–151)

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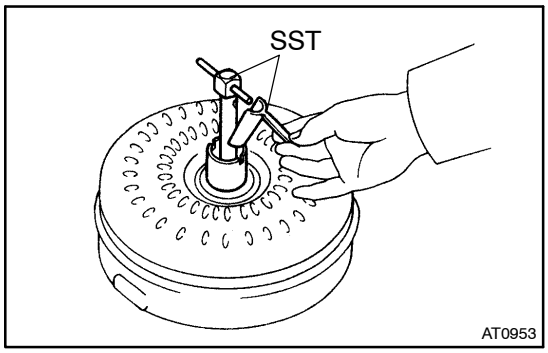


TORQUE CONVERTER CLUTCH AND DRIVE PLATE

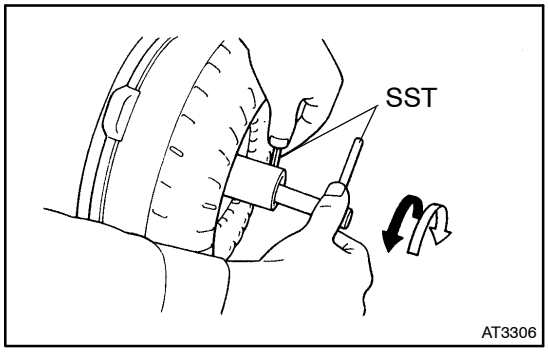
AT07X–01

INSPECTION

1. INSPECT ONE–WAY CLUTCH

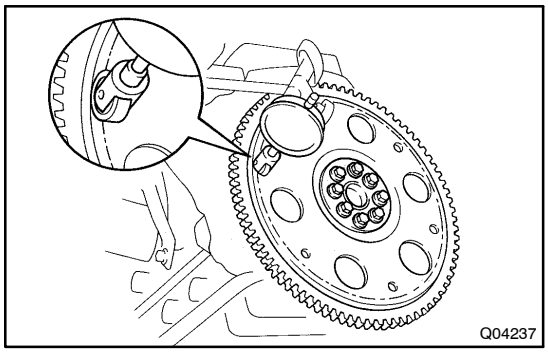
(a) Install SST in the inner race of one–way clutch.
SST 09350–30020 (09351–32010)

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



(c) With the torque converter clutch standing on its side, the clutch locks when turned counterclockwise, and rotates freely and smoothly clockwise.

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



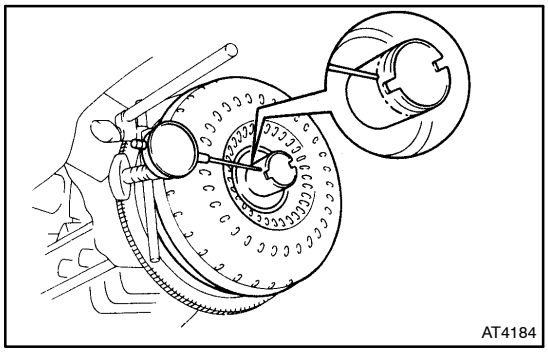
2. MEASURE DRIVE PLATE RUNOUT AND INSPECT RING GEAR

Set up a dial indicator and measure drive plate runout.

Maximum runout: 0.20 mm (0.0079 in.)

If runout is not within the specification or if the ring gear is damaged, replace the drive plate. If installing a new drive plate, note the orientation of spacers and tighten the bolts.

Torque:
1st: 49 N·m (500 kgf·cm, 36 ft·lbf)
2nd: Turn extra 90°



3. MEASURE TORQUE CONVERTER CLUTCH SLEEVE RUNOUT

(a) Temporarily mount the torque converter clutch to the drive plate.
Set up a dial indicator and measure the torque converter clutch sleeve runout.

Maximum runout: 0.30 mm (0.0118 in.)

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

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

(b) Remove the torque converter cluch.

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TRANSFER SYSTEM

TR03N–01

PRECAUTION

When working with FIPG material, you must observe the following.

- **Using a razor blade and gasket scraper, remove all the old FIPG material from the gasket surfaces.**
- **Thoroughly clean all components to remove all the loose material.**
- **Clean both sealing surfaces with a non–residue solvent.**
- **Apply FIPG in an approx. 1.2 mm (0.047 in.) wide bead along the sealing surface.**
- **Parts must be assembled within 10 minutes of application. Otherwise, the FIPG material must be removed and reapplied.**

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TROUBLESHOOTING

TR03O–01

PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

Symptom	Suspect Area	See page
Noise	1. Oil (Level low) 2. Oil (Wrong) 3. Transfer faulty	TR–4 TR–4 TR–7
Oil leakage	1. Oil (Level too high) 2. Gasket (Damaged) 3. Oil seal (Worn or damaged) 4. O–ring (Worn or damaged)	TR–4 TR–7 TR–7 –
Transfer corner braking	Center differential or transfer faulty	TR–7

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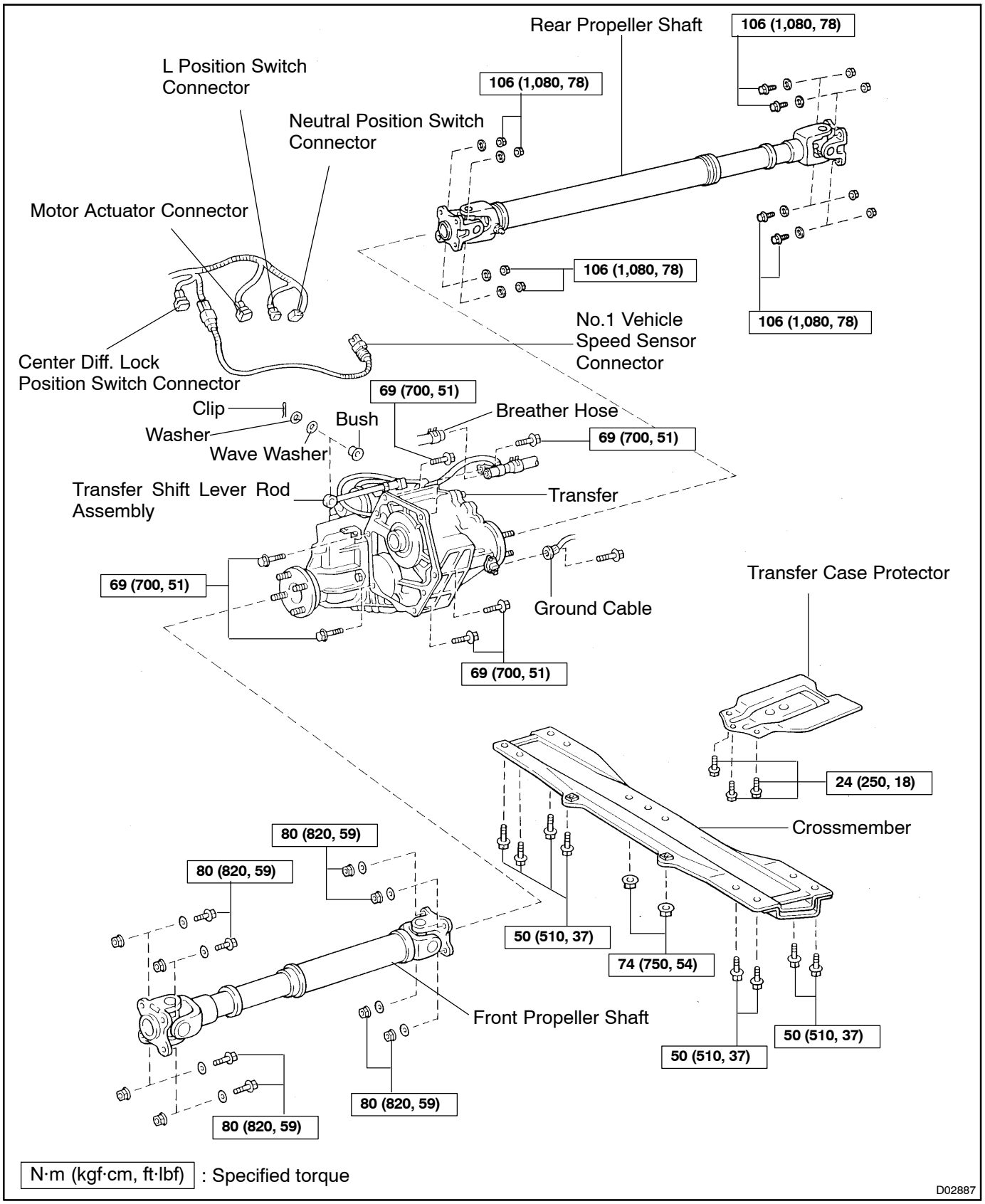
TRANSFER UNIT

COMPONENTS

TR03P–01



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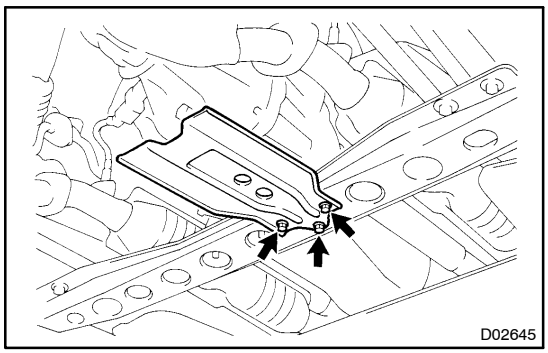
TR03Q–01

REMOVAL

1. RAISE VEHICLE

NOTICE:

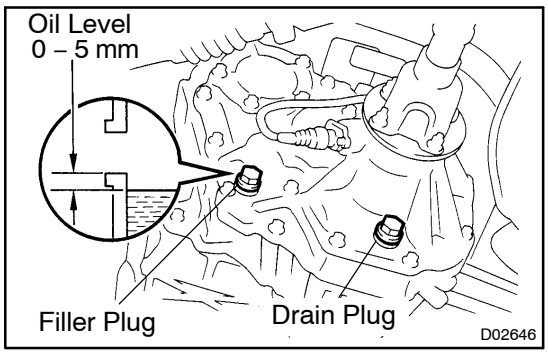
Make sure that the vehicle is securely supported.



2. REMOVE TRANSFER CASE PROTECTOR

Remove the 3 bolts and transfer case protector.

Torque: 24 N·m (250 kgf·cm, 18 ft·lbf)

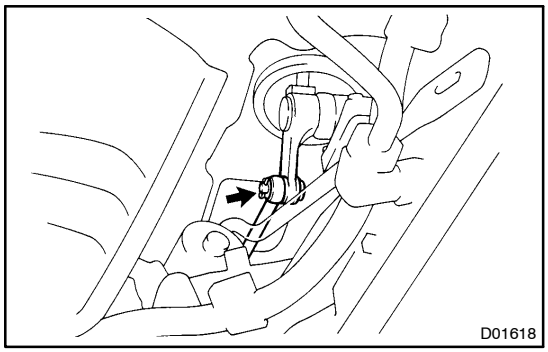


3. DRAIN TRANSFER OIL

Oil grade: API GL–4 or GL–5
Viscosity: SAE 75 W–90
Capacity : 1.3 liters (1.4 US qts, 1.1 Imp. qts)
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

4. REMOVE FRONT AND REAR PROPELLER SHAFTS

(See page PR–4)

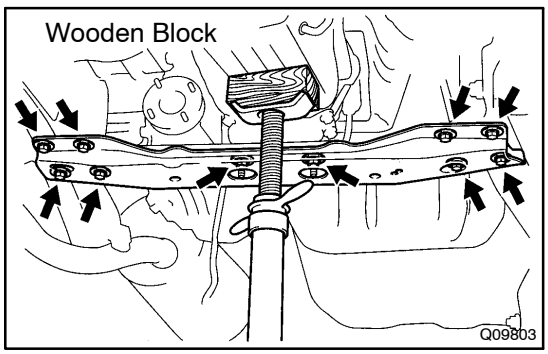


5. DISCONNECT TRANSFER SHIFT LEVER ROD ASSEMBLY

Remove the clip, washer, wave washer and bush, and disconnect the transfer shift lever rod assembly.

6. DISCONNECT GROUND CABLE

Remove the bolt and disconnect the ground cable from the transfer.



7. REMOVE CROSSMEMBER

(a) Support the transmission, as shown.

NOTICE:

Use a wooden block so not to damage the transmission oil pan.

(b) Remove the 8 bolts, 2 nuts and crossmember.

Torque:
Bolt: 50 N·m (510 kgf·cm, 37 ft·lbf)
Nut: 74 N·m (750 kgf·cm, 54 ft·lbf)

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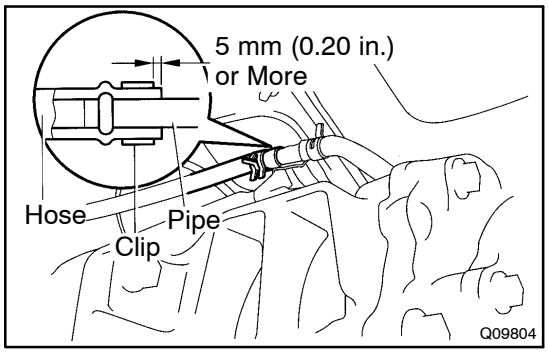

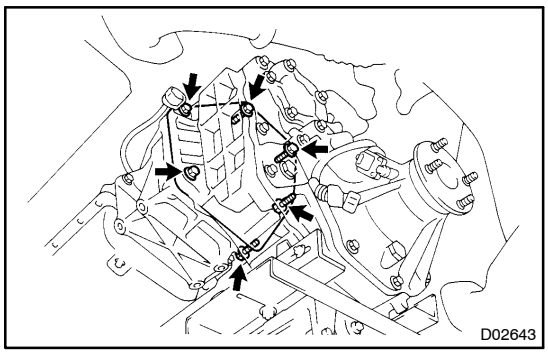

8. DISCONNECT BREATHER HOSE

HINT:

At the time of installation, assemble the clip to the position shown in the illustration.

9. DISCONNECT NO.1 VEHICLE SPEED SENSOR, CENTER DIFF. LOCK POSITION SWITCH, NEUTRAL POSITION SWITCH, L POSITION SWITCH AND MOTOR ACTUATOR CONNECTORS

10. JACK UP TRANSFER SLIGHTLY

Using a transmission jack, support the transfer.

11. REMOVE TRANSFER FROM TRANSMISSION

(a) Disconnect the wire harness from the transfer.

(b) Remove the 6 transfer adaptor rear mounting bolts.
Torque: 69 N·m (700 kgf·cm, 51 ft·lbf)

(c) Pull out the transfer down and toward the rear.

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TR03R–01

INSTALLATION

Installation is in the reverse order of removal (See page TR–4).

1. **APPLY MP GREASE TO TRANSFER ADAPTOR OIL SEAL**
2. **AFTER INSTALLATION, DO ROAD TEST**

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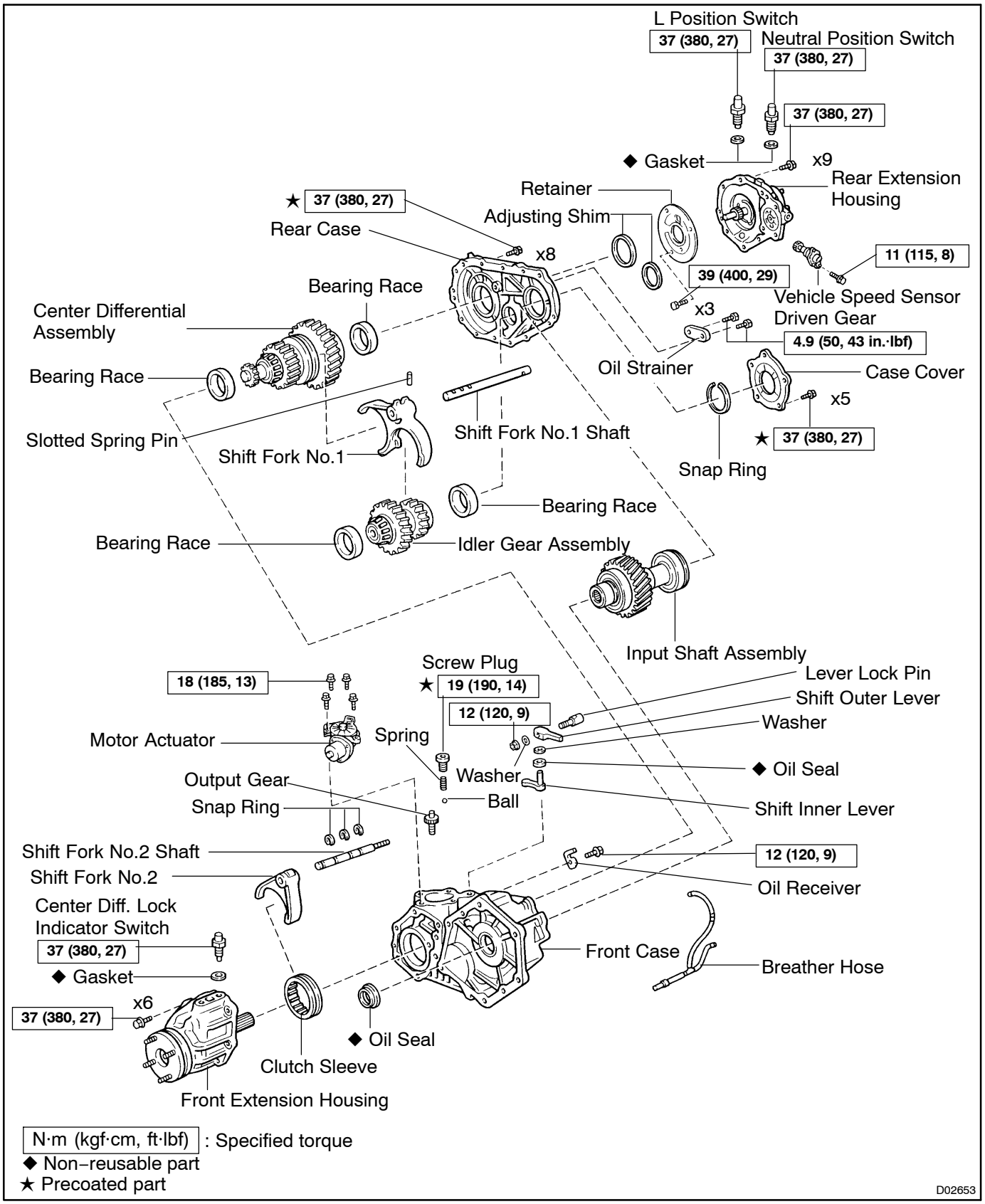
TRANSFER ASSEMBLY

COMPONENTS

TR03S–01



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TR03T–01

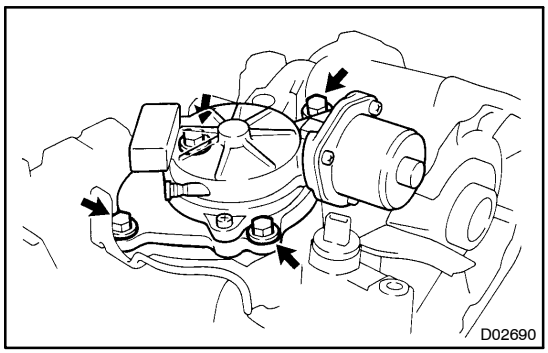
DISASSEMBLY

1. REMOVE BREATHER HOSE

2. REMOVE VEHICLE SPEED SENSOR DRIVEN GEAR

Remove the bolt, and driven gear.

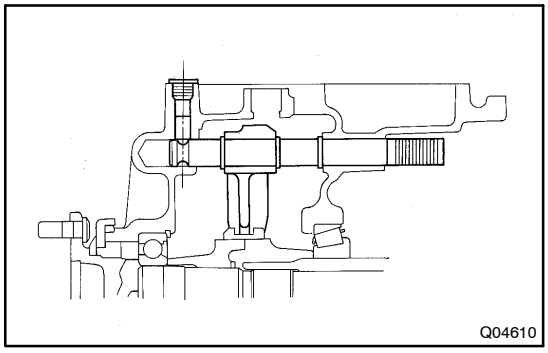
Torque: 11 N·m (115 kgf·cm, 8 ft·lbf)



3. REMOVE MOTOR ACTUATOR

Remove the 4 bolts and motor actuator.

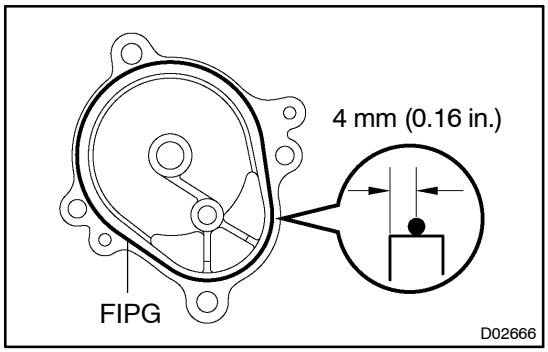
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)



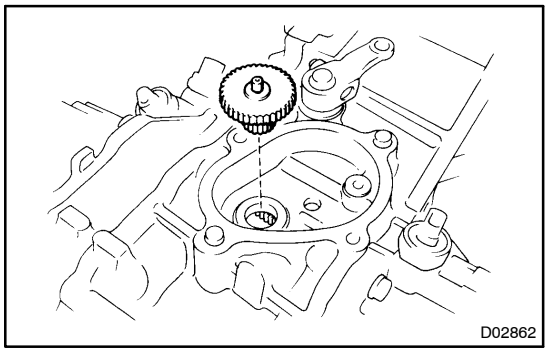
HINT:

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

- Set the motor actuator in differential lock condition.



- Apply FIPG to the motor actuator.
  FIPG:
  Part No. 08826–00090, THREE BOND 1281 or equivalent



4. REMOVE OUTPUT GEAR FROM FRONT CASE

HINT:

At the time of reassembly, apply gear oil to the output gear.

NOTICE:

At the time of reassembly, do not turn the output gear.

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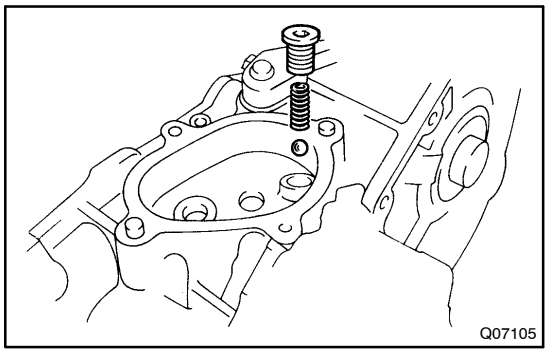


5. REMOVE SCREW PLUG, SPRING AND BALL

(a) Using a torx socket wrench (T40), remove the screw plug.

HINT:

At the time of reassembly, apply liquid sealer to the screw plug threads.

Sealant:

Part No.08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

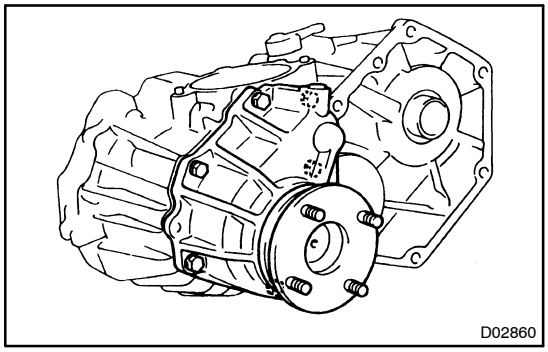
Torque: 19 N·m (190 kgf·cm, 14 ft·lbf)

(b) Using a magnetic finger, remove the spring and ball.

6. REMOVE TRANSFER INDICATOR SWITCH

Remove the center diff. lock indicator switch, L position switch, neutral position switch and 3 gaskets.

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)



7. REMOVE FRONT EXTENSION HOUSING

Remove the 6 bolts and front extension housing.

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

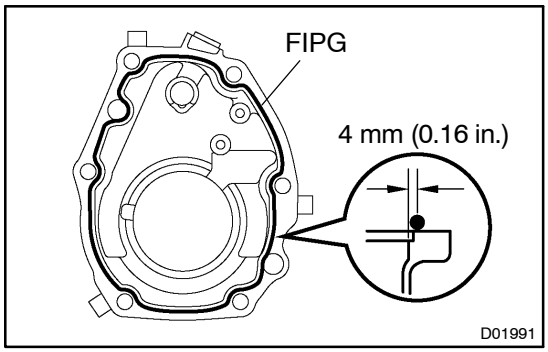
HINT:

If necessary, tap the front extension housing lightly with a plastic hammer.

HINT:

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

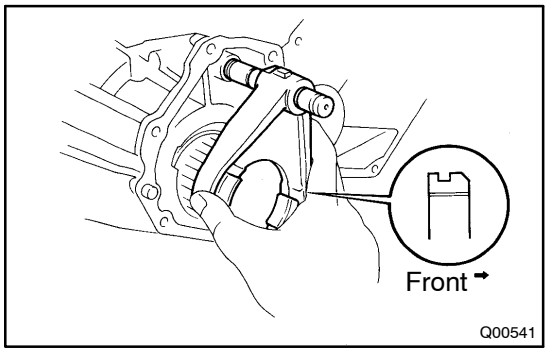
- Set the clutch sleeve in differential lock condition.



- Apply FIPG to the front extension housing.

  FIPG:

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



8. REMOVE CLUTCH SLEEVE WITH SHIFT FORK NO.2 SHAFT AND SHIFT FORK NO.2

HINT:

At the time of reassembly, make sure to install the clutch sleeve in the correct direction.

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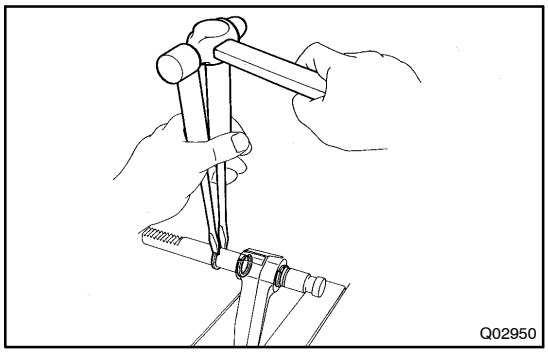
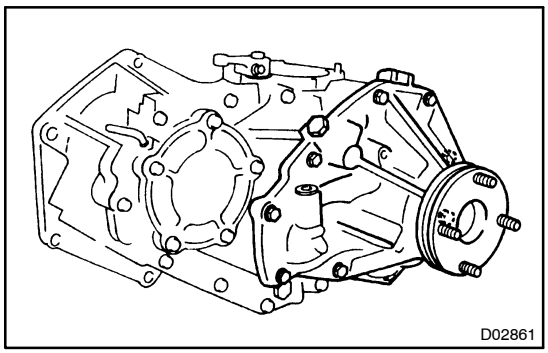


9. SEPARATE SHIFT FORK NO.2 SHAFT AND SHIFT FORK NO.2

(a) Using 2 screwdrivers and a hammer, tap out the 3 snap rings from the shift fork No.2 shaft.

(b) Separate the shift fork No.2 shaft and shift fork No.2.



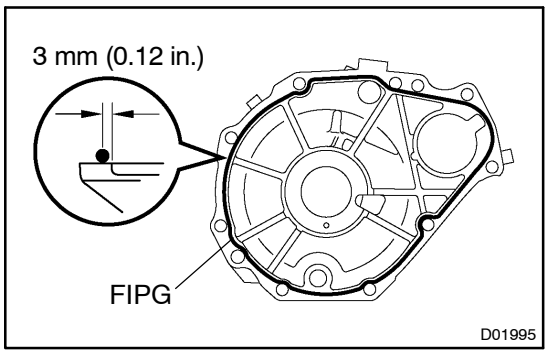
10. REMOVE REAR EXTENSION HOUSING

Remove the 9 bolts and rear extension housing.

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

HINT:

If necessary, tap the rear extension housing lightly with a plastic hammer.



HINT:

At the time of reassembly, apply FIPG to the rear extension housing.

FIPG:

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

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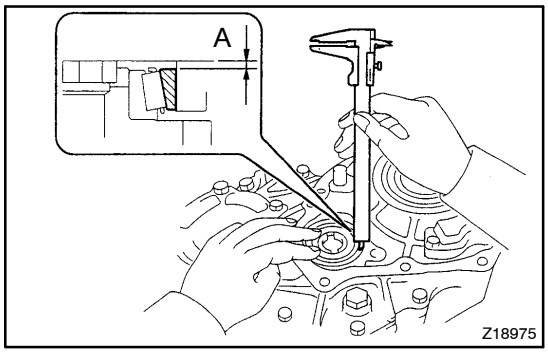

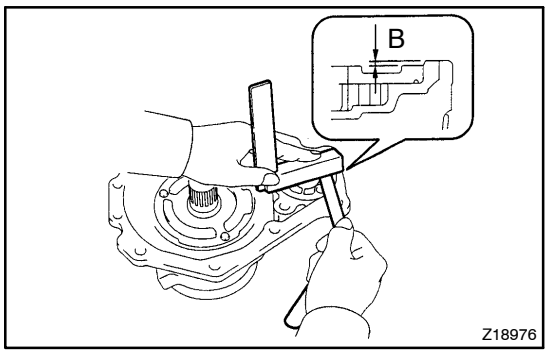

11. REMOVE ADJUSTING SHIM

HINT:

At the time of installation, select adjusting shims for the idler gear rear taper roller bearing.

(a) Using vernier calipers, measure dimension ”A”.

(b) Lightly hold down the bearing outer race in the thrust direction to eliminate any looseness before making the measurement.

(c) Using a steel straight edge and feeler gauge, measure the clearance of dimension ”B”.

(d) Calculate the required thickness of the adjusting shim.
Thickness: Dimension ”A” + Dimension ”B” + [0.022 – 0.049 mm, (0.0009 – 0.0019 in.)]

(e) From the following table, select a shim so that its thickness is within the range of the calculation.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
2	0.30 (0.0118)	8	3.20 (0.1260)
3	0.45 (0.0177)	9	3.40 (0.1339)
4	2.40 (0.0945)	10	3.60 (0.1417)
5	2.60 (0.1024)	11	3.80 (0.1496)
6	2.80 (0.1102)	12	4.00 (0.1575)
7	3.00 (0.1181)	13	0.55 (0.0216)

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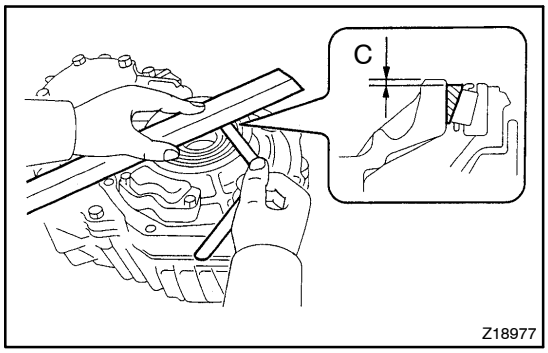


HINT:
At the time of installation, select adjusting shims for the output shaft taper roller bearing.

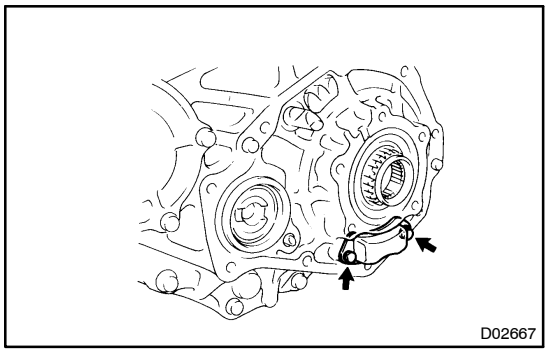
(f) Using a steel straight edge and feeler gauge, measure the clearance of dimension "C".

(g) Lightly hold down the bearing outer race in the thrust direction to eliminate any looseness before making the measurement.

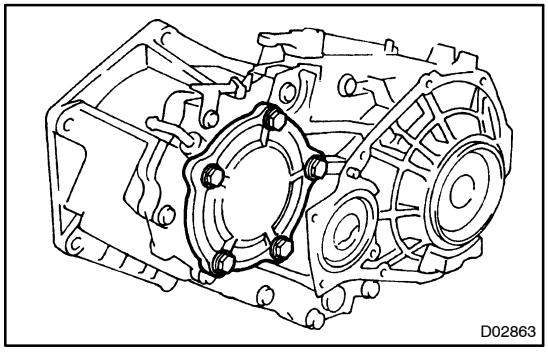
(h) Calculate the required thickness of the adjusting shim.
Thickness: Dimension "C" + [0.014 – 0.039 mm, (0.0006 ~ 0.0015 in.)]

(i) From the following table, select a shim so that its thickness is within the range of the calculation.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
B	0.30 (0.0118)	H	1.80 (0.0709)
C	0.45 (0.0177)	J	2.00 (0.0787)
D	1.00 (0.0394)	K	2.20 (0.0866)
E	1.20 (0.0472)	L	2.40 (0.0945)
F	1.40 (0.0551)	M	2.60 (0.1024)
G	1.60 (0.0630)	N	0.55 (0.0216)



12. REMOVE OIL STRAINER FROM REAR CASE
Remove the 2 bolts and oil strainer.
Torque: 4.9 N·m (50 kgf·cm, 43 in.·lbf)



13. REMOVE CASE COVER
(a) Remove the 5 bolts.
HINT:
At the time of reassembly, apply liquid sealer to the bolt threads.
Sealant:
Part No.08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

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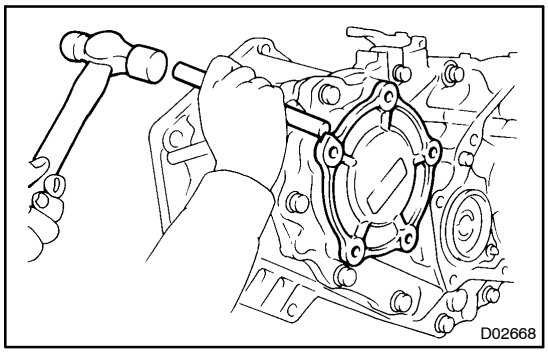
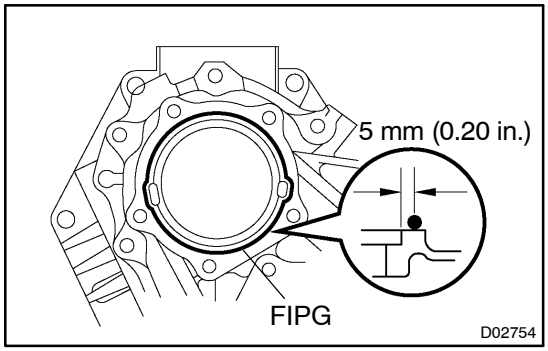
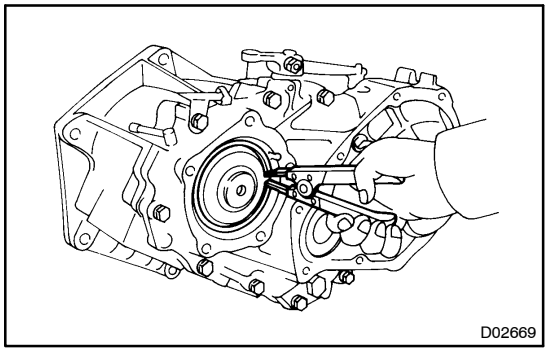


(b) Using a brass bar and hammer, tap the case cover and remove it.



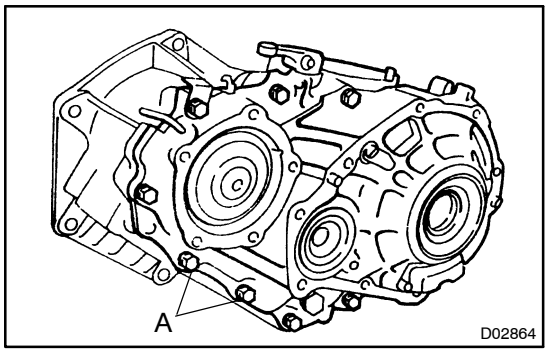
HINT:
At the time of reassembly, apply FIPG to the rear case.

FIPG:
Part No. 08826–00090, THREE BOND 1281 or equivalent



14. SEPARATE FRONT CASE AND REAR CASE

(a) Using a snap ring expander, remove the snap ring from the rear case.

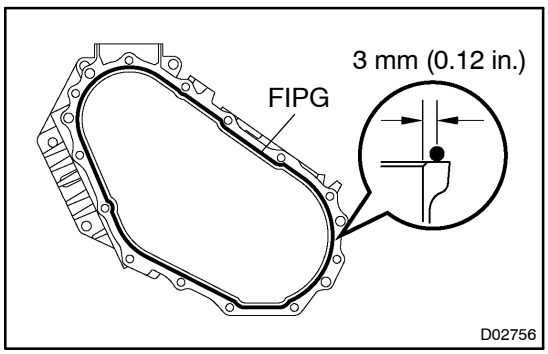


(b) Remove the 8 bolts.

HINT:
At the time of reassembly, apply liquid sealer to the "A" bolt threads.

Sealant:
Part No.08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

(c) Using a brass bar and hammer, tap the rear case and separate it.



HINT:
At the time of reassembly, apply FIPG to the front case.

FIPG:
Part No. 08826–00090, THREE BOND 1281 or equivalent

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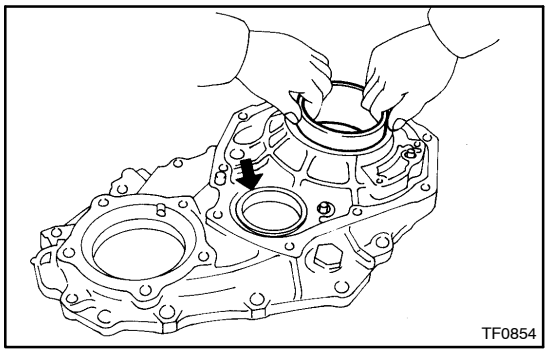
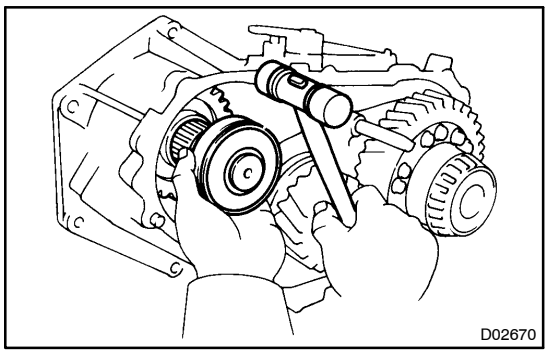
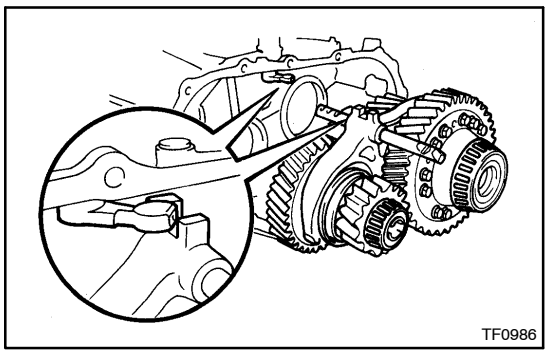


15. REMOVE 2 BEARING RACES FROM REAR CASE



16. REMOVE INPUT SHAFT ASSEMBLY

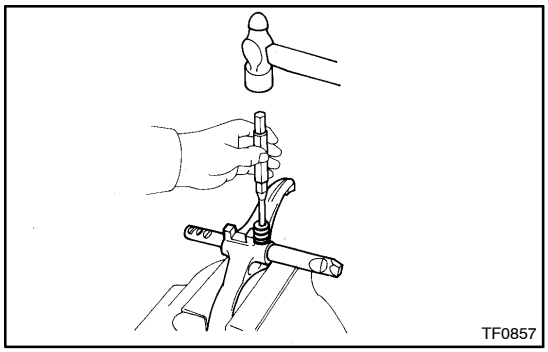
Using a plastic hammer, remove the input shaft assembly from the front case.



17. REMOVE IDLER GEAR ASSEMBLY WITH CENTER DIFFERENTIAL ASSEMBLY, SHIFT FORK NO.1 AND SHIFT FORK NO.1 SHAFT FROM FRONT CASE

NOTICE:

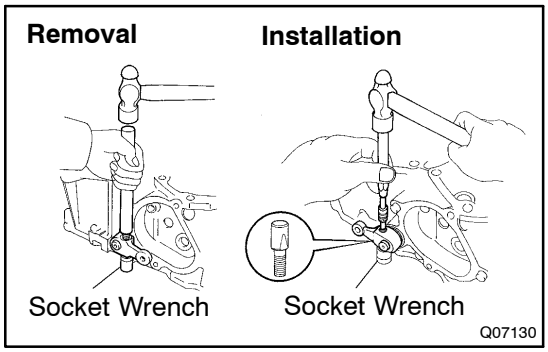
At the time of reassembly, set the shift inner lever into the fork head part of the shift fork No.1 securely.



18. SEPARATE SHIFT FORK NO.1 AND SHIFT FORK NO.1 SHAFT

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

(b) Separate the shift fork No.1 and shift fork No.1 shaft.



19. REMOVE SHIFT OUTER LEVER AND INNER LEVER

(a) Remove the nut and washer from the shift outer lever.
Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

(b) Using a brass bar, hammer and socket wrench, tap out the lever lock pin.

(c) Remove the shift outer lever, washer and inner lever from the front case.

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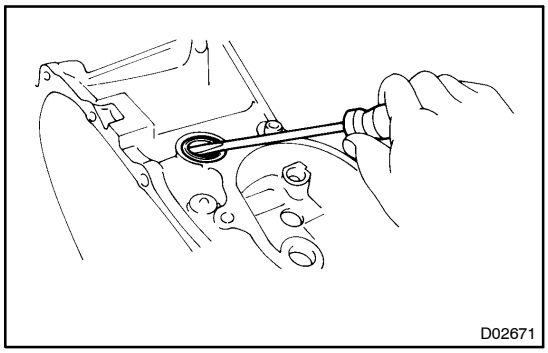
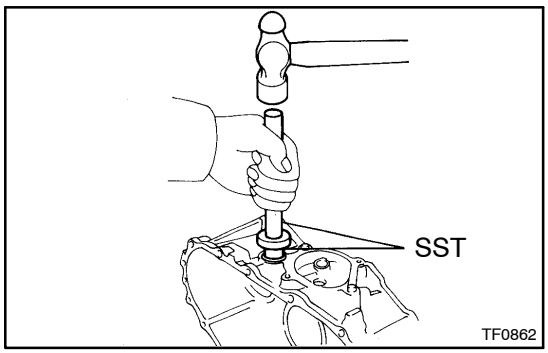


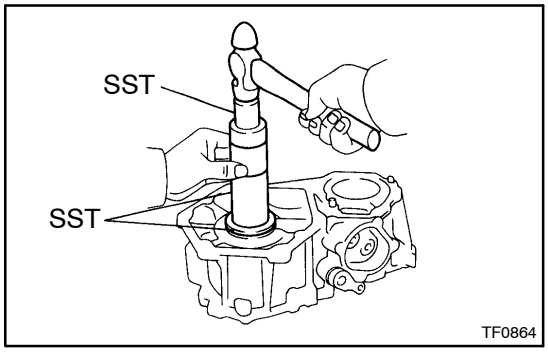
20. IF NECESSARY, REPLACE INNER SHIFT LEVER OIL SEAL

(a) Using a screwdriver, pry out the oil seal from the front case.



(b) Apply MP grease to the lip of a new oil seal.

(c) Using SST and a hammer, drive in a new oil seal.
SST 09950–60010 (09951–00270), 09950–70010 (09951–07150)

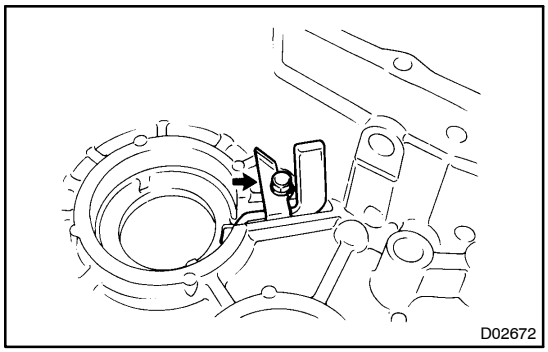


21. IF NECESSARY, REPLACE INPUT SHAFT OIL SEAL

(a) Using SST and a hammer, drive out the oil seal.
SST 09316–60011 (09316–00011)

(b) Apply MP grease to the lip of a new oil seal.

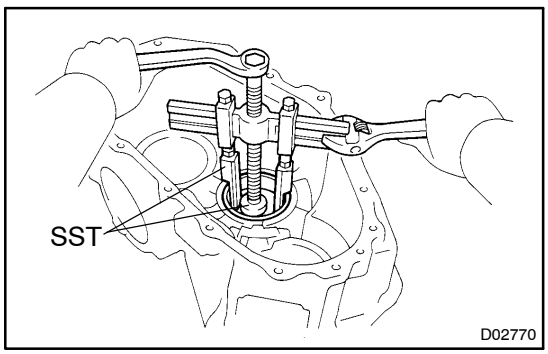
(c) Using SST and a hammer, drive in a new oil seal.
SST 09316–60011 (09316–00011, 09316–00031)



22. REMOVE OIL RECEIVER FROM FRONT CASE

Remove the bolt and oil receiver.

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)



23. REMOVE 2 BEARING RACES FROM FRONT CASE

(a) Using SST, remove the bearing race (for the idler gear).
SST 09950–40011 (09951–04020, 09952–04010 09953–04030, 09954–04010, 09955–04060, 09957–04010), 09950–60010 (09951–00320)

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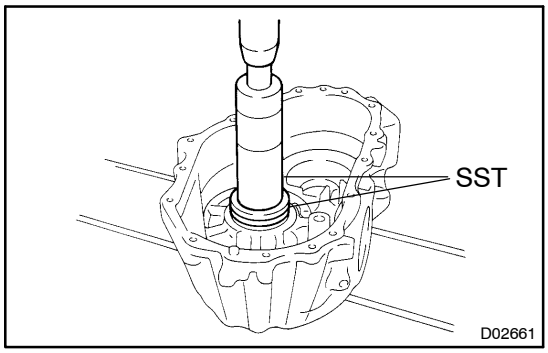
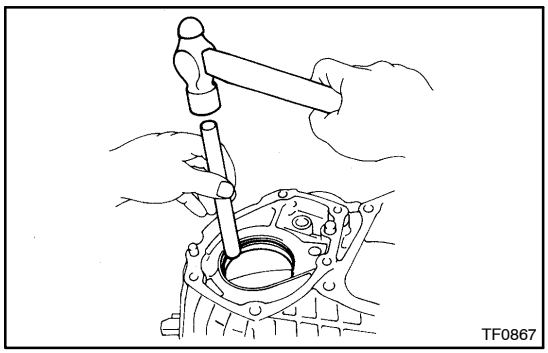
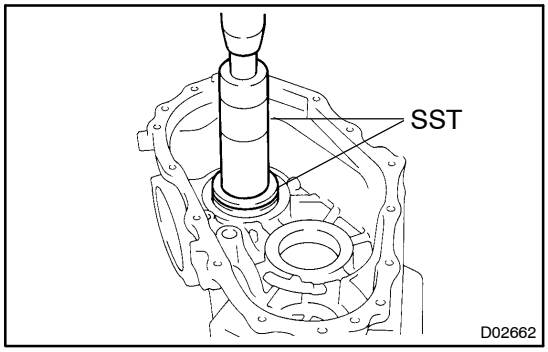


HINT:
At the time of reassembly, please refer to the following item.
Using SST and a press, install the bearing race (for the idler gear).

SST 09316–60011 (09316–00011, 09316–00031), 09950–60020 (09951–00790)

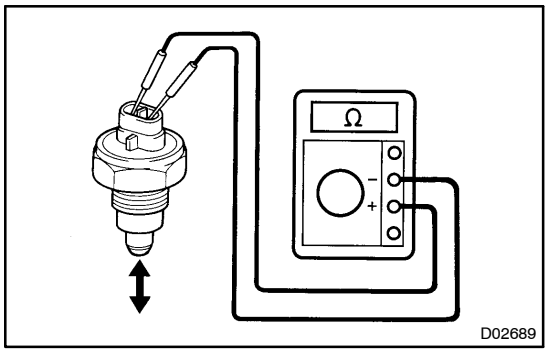


(b) Using a brass bar and hammer, remove the bearing race (for the output shaft).



HINT:
At the time of reassembly, please refer to the following item.
Using SST and a press, install the bearing race (for the output shaft).

SST 09316–60011 (09316–00011, 09316–00031), 09950–60020 (09951–00890)

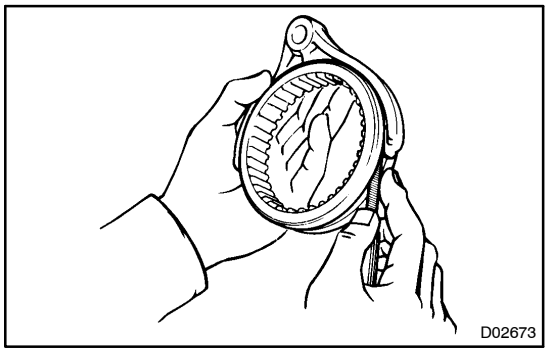


24. INSPECT TRANSFER INDICATOR SWITCH

Check that continuity exists between the terminals, as shown.

Switch Position	Specified Condition
Push	Continuity
Free	No continuity

If continuity is not as specified, replace the switch.



25. INSPECT SHIFT FORK NO.2 AND CLUTCH SLEEVE CLEARANCE

Using a feeler gauge, measure the clearance between the shift fork No.2 and clutch sleeve.

Standard clearance: 0.1 – 0.4 mm (0.0039 – 0.0157 in.)
Maximum clearance: 0.4 mm (0.0157 in.)

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TR03U–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page TR–8).

HINT:

Coat all of the sliding and rotating surfaces with gear oil before reassembly.

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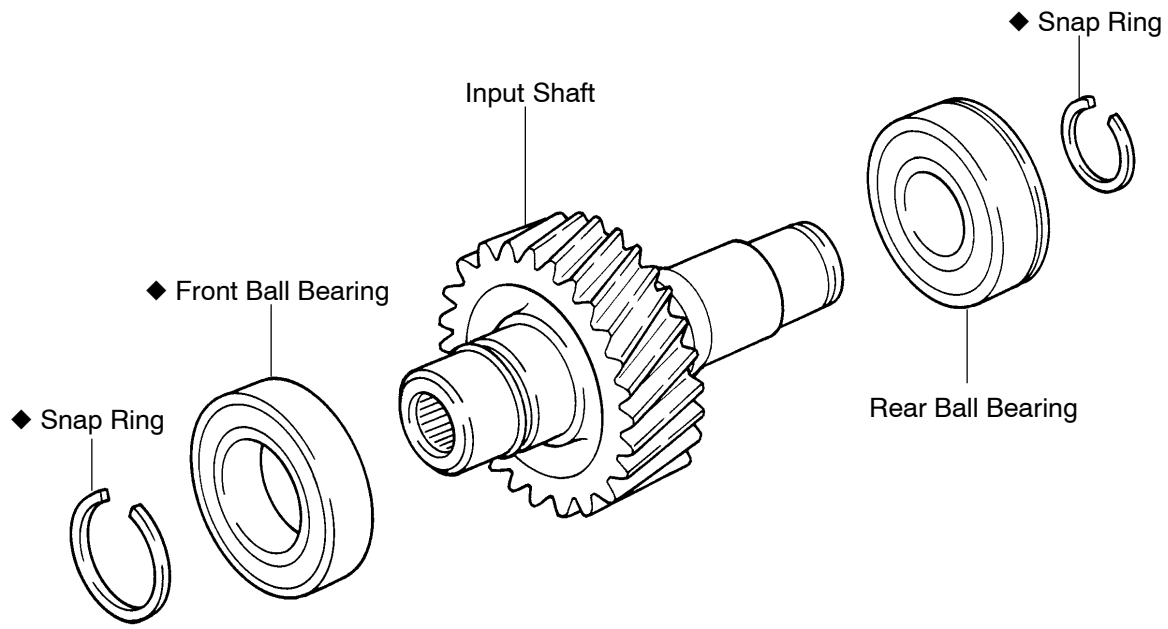
INPUT SHAFT

COMPONENTS

TR03V–01



◆ Non–reusable part

D02654

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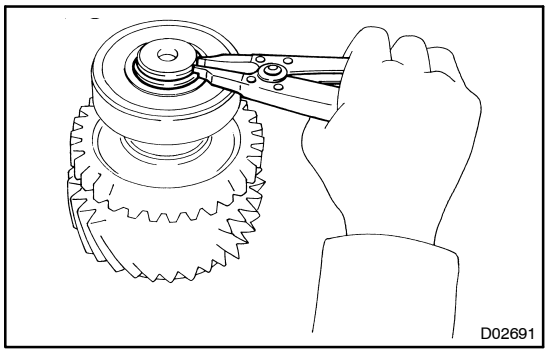
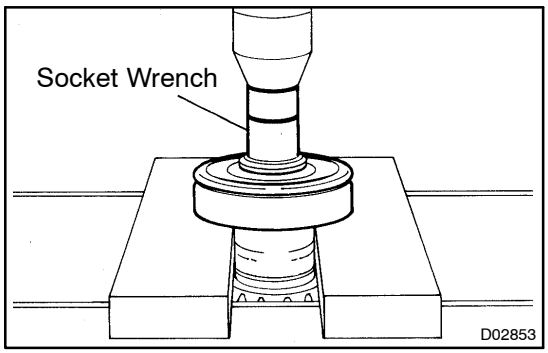
TR03W–01

DISASSEMBLY

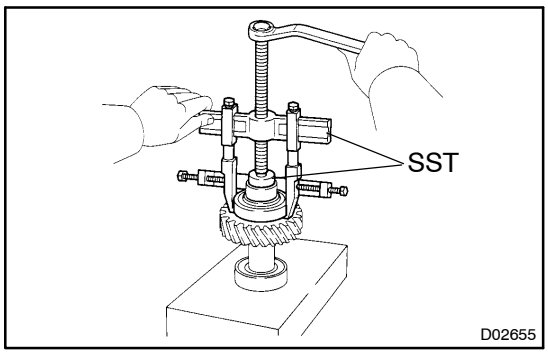


1. REMOVE REAR BALL BEARING

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



(b) Using a socket wrench and press, remove the rear ball bearing.



2. REMOVE FRONT BALL BEARING

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

(b) Using SST, remove the front ball bearing.

SST 09950–40011 (09951–04020, 09952–04010, 09953–04030, 09954–04010, 09955–04010, 09957–04010, 09958–04010), 09950–60010 (09951–00400)

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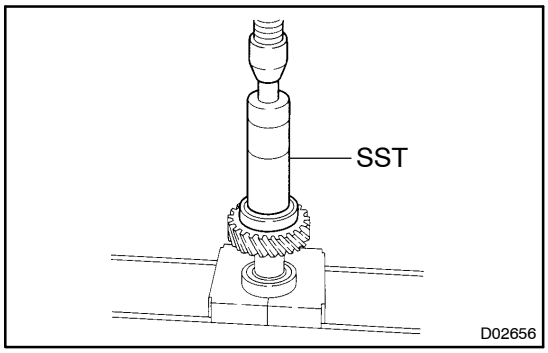
TR03X–01

REASSEMBLY

HINT:
Coat all of the sliding and rotating surfaces with gear oil before reassembly.

1. INSTALL FRONT BALL BEARING

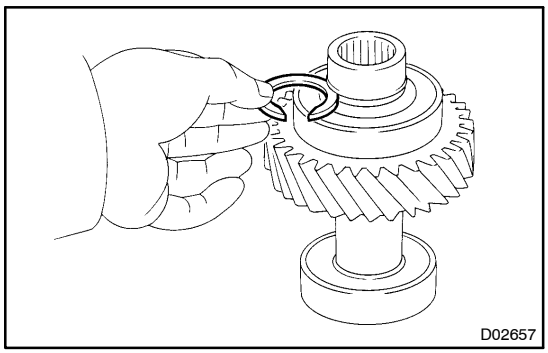
(a) Using SST and a press, install a new front ball bearing.
SST 09527–30010



(b) Select a snap ring that will allow the minimum axial play.

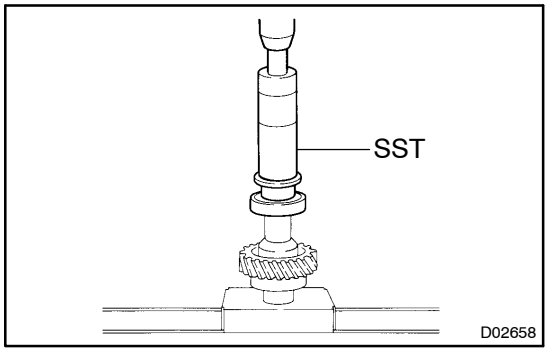
Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
A	2.90 (0.1141)	D	3.05 (0.1201)
B	2.95 (0.1161)	E	3.10 (0.1220)
C	3.00 (0.1181)	F	3.15 (0.1240)

(c) Using a snap ring expander, install a new snap ring.



2. INSTALL REAR BALL BEARING

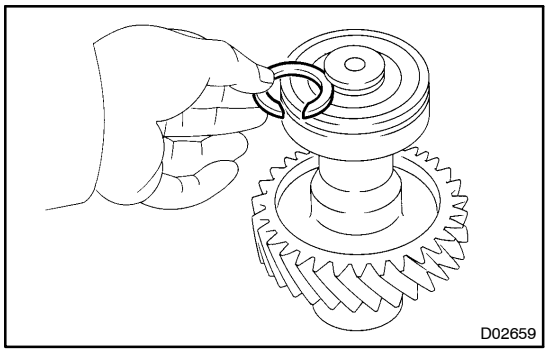
(a) Using SST and a press, install the rear ball bearing.
SST 09316–60011 (09316–00031)



(b) Select a snap ring that will allow the minimum axial play.

Mark	Thickness mm (in.)
A	2.00 (0.0787)
B	2.10 (0.0827)
C	2.20 (0.0866)
D	2.30 (0.0906)
E	2.40 (0.0945)

(c) Using a snap ring expander, install a new snap ring.



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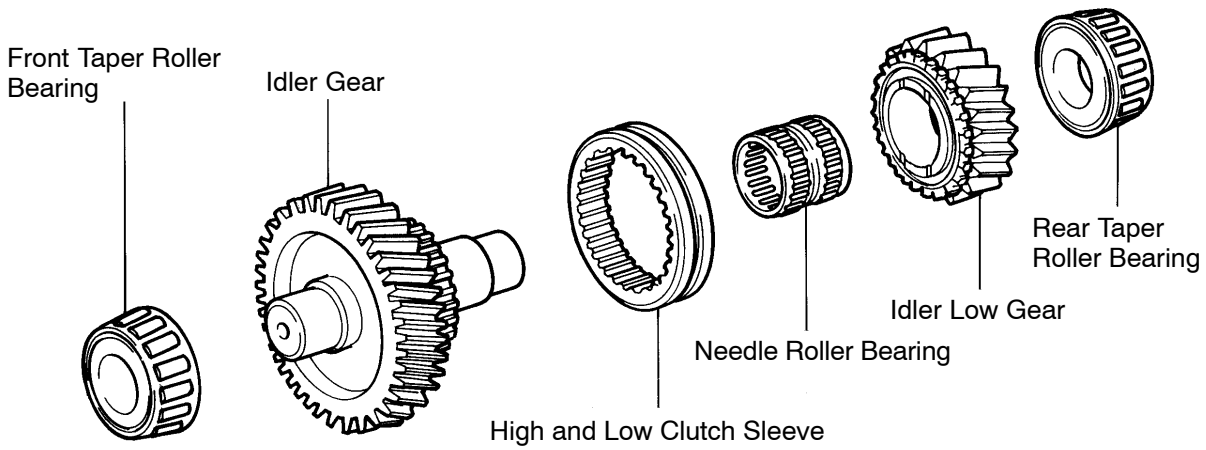
IDLER GEAR

COMPONENTS

TR03Y–01



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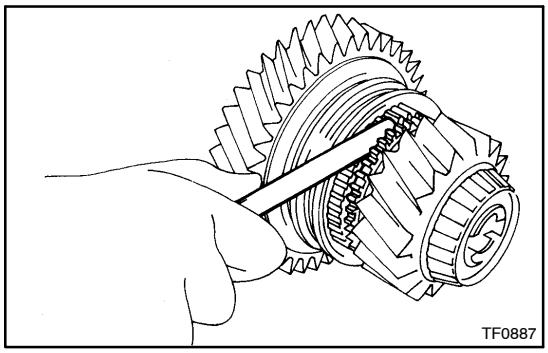
TR03Z–01

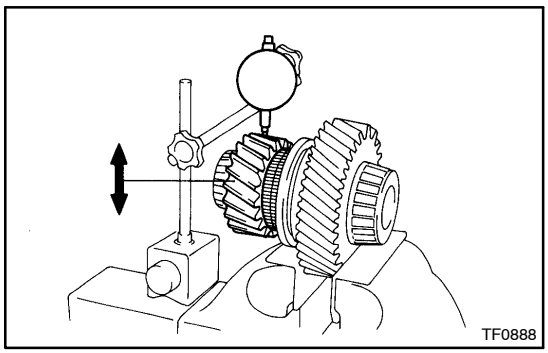
DISASSEMBLY



1. INSPECT IDLER LOW GEAR RADIAL AND THRUST CLEARANCE

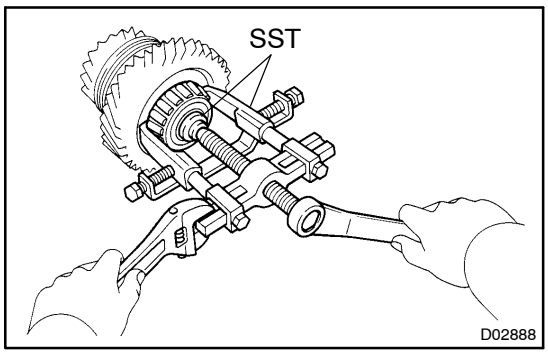
(a) Using a feeler gauge, measure the idler low gear thrust clearance.

Standard clearance:
0.125 – 0.275 mm (0.0049 – 0.0108 in.)
Maximum clearance:
0.275 mm (0.0108 in.)



(b) Using a dial indicator, measure the idler low gear radial clearance.

Standard clearance:
0.015 – 0.068 mm (0.0006 – 0.0027 in.)
Maximum clearance:
0.068 mm (0.0027 in.)

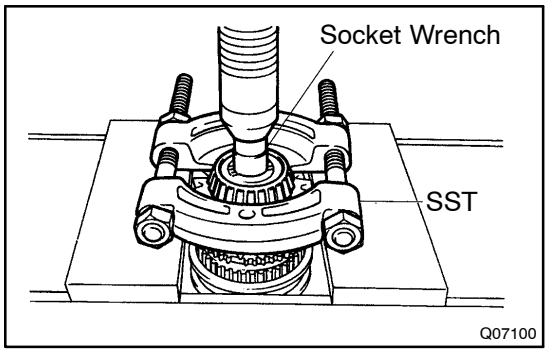


2. REMOVE FRONT TAPER ROLLER BEARING

Using SST, remove the front taper roller bearing.

SST 09950–40011 (09951–04010, 09952–04010, 09953–04030, 09954–04010, 09955–04060, 09957–04010, 09958–04010), 09950–60010 (09951–00330)

NOTICE:
Set the claw of SST to the bearing inner race securely.

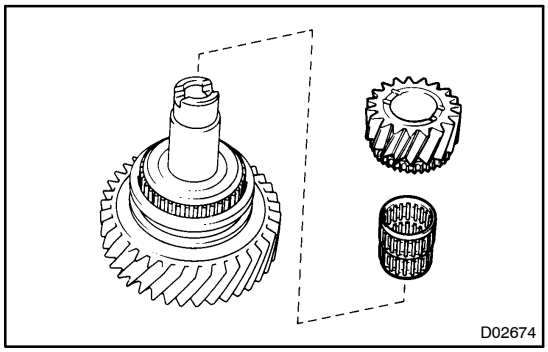


3. REMOVE REAR TAPER ROLLER BEARING

Using SST, a press and socket wrench, remove the rear taper roller bearing.

SST 09950–00020

NOTICE:
Set the claw of SST to the bearing inner race securely.



4. REMOVE IDLER LOW GEAR AND NEEDLE ROLLER BEARING FROM IDLER GEAR

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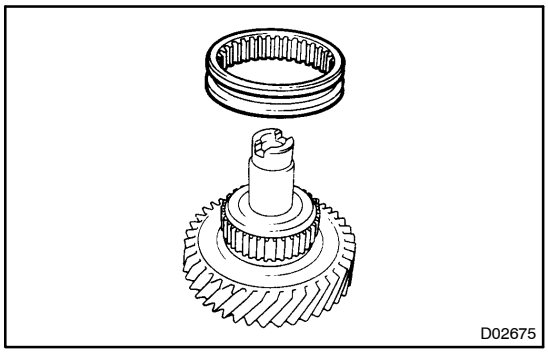

5. REMOVE HIGH AND LOW CLUTCH SLEEVE FROM IDLER GEAR

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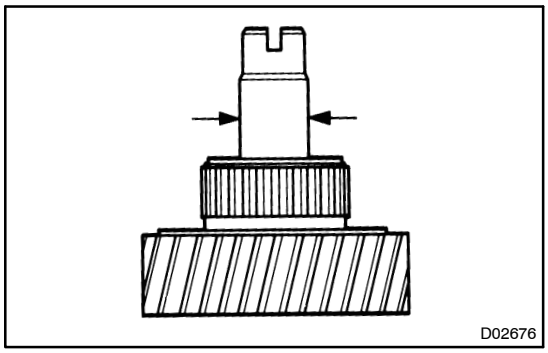
TR040–01

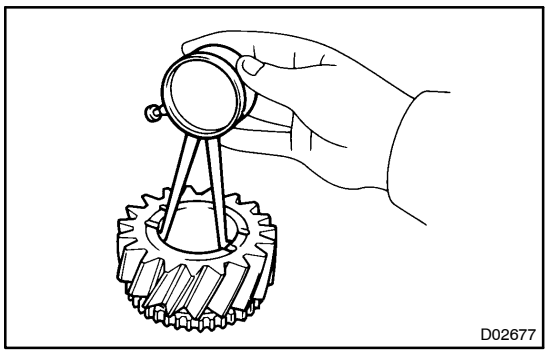


INSPECTION

1. INSPECT IDLER GEAR

Using a micrometer, measure the idler gear diameter.

Standard diameter:
38.48 – 38.50 mm (1.5149 – 1.5157 in.)
Maximum diameter:
38.50 mm (1.5157 in.)



2. INSPECT IDLER LOW GEAR

Using a cylinder gauge, measure the idler low gear diameter.

Standard diameter:
45.52 – 45.54 mm (1.7922 – 1.7930 in.)
Maximum diameter:
45.54 mm (1.7930 in.)

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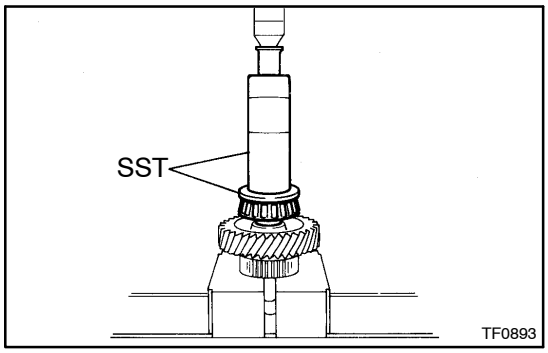
TR041–01

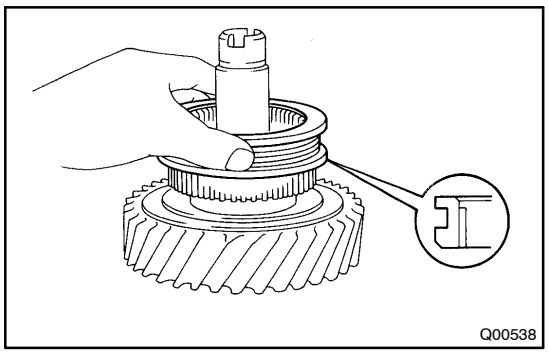
REASSEMBLY



HINT:
Coat all of the sliding and rotating surfaces with gear oil before reassembly.

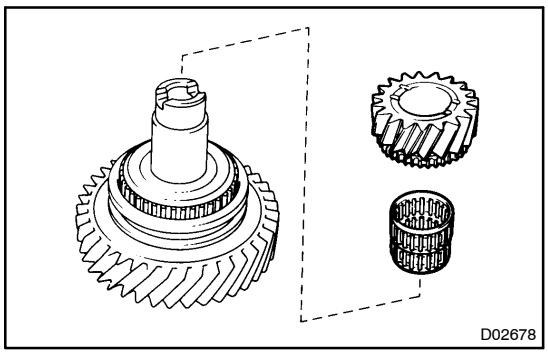
1. INSTALL FRONT TAPER ROLLER BEARING

Using SST and a press, install the front taper roller bearing.
SST 09316–60011 (09316–00011, 09316–00031)



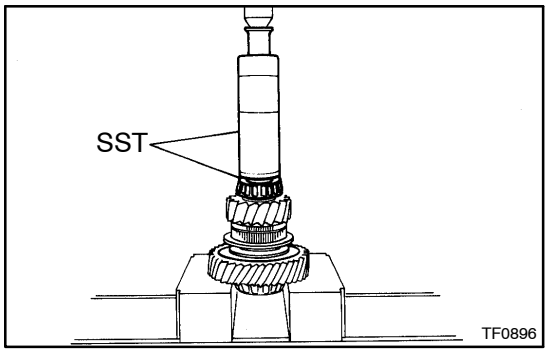
2. INSTALL HIGH AND LOW CLUTCH SLEEVE

HINT:
Make sure to install the high and low clutch sleeve in the correct direction.



3. INSTALL NEEDLE ROLLER BEARING AND IDLER LOW GEAR TO IDLER GEAR

(a) Apply gear oil to the needle roller bearing.
(b) Install the needle roller bearing and idler low gear.



4. INSTALL REAR TAPER ROLLER BEARING

Using SST and a press, install the rear taper roller bearing.
SST 09316–60011 (09316–00011, 09316–00071)

5. INSPECT IDLER LOW GEAR RADIAL AND THRUST CLEARANCE (See page TR–24)

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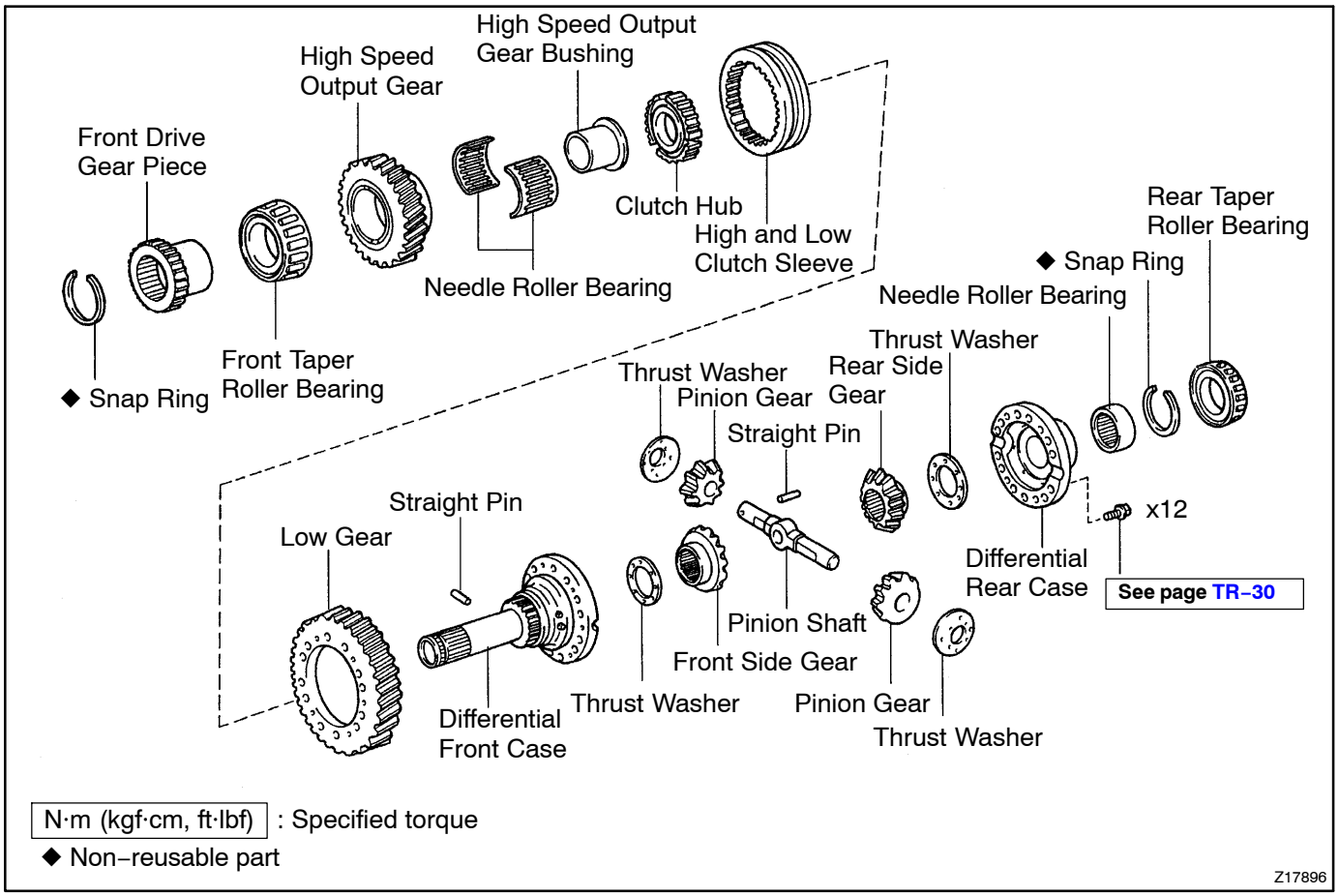
CENTER DIFFERENTIAL

COMPONENTS

TR042–01



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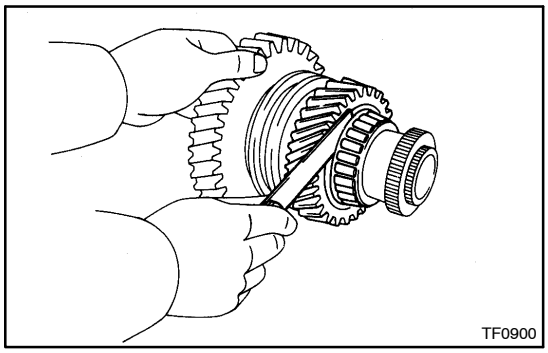
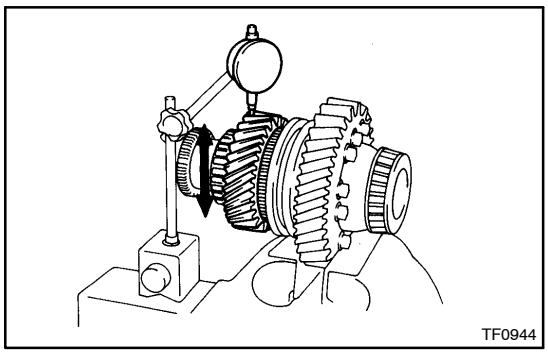
TR043–01

DISASSEMBLY

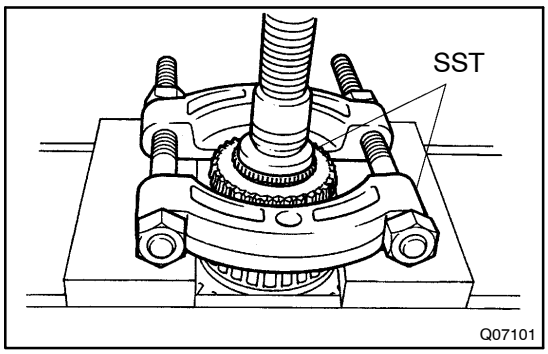


1. INSPECT HIGH SPEED OUTPUT GEAR RADIAL AND THRUST CLEARANCE

(a) Using a feeler gauge, measure the high speed output gear thrust clearance.
Standard clearance:
0.10 – 0.25 mm (0.0039 – 0.0098 in.)
Maximum clearance:
0.25 mm (0.0098 in.)



(b) Using a dial indicator, measure the high speed output gear radial clearance.
Standard clearance:
0.035 – 0.091 mm (0.0014 – 0.0036 in.)
Maximum clearance:
0.091 mm (0.0036 in.)

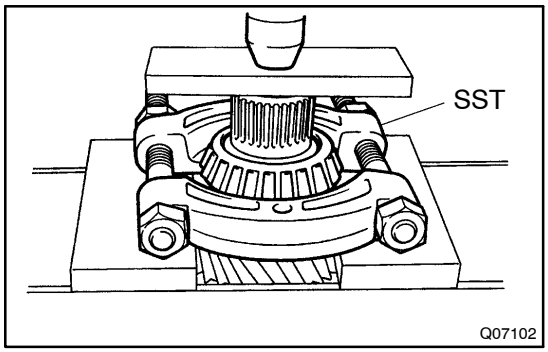


2. REMOVE FRONT DRIVE GEAR PIECE

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

(b) Using SST and a press, remove the front drive gear piece.
SST 09950–00020, 09950–60010 (09951–00320)

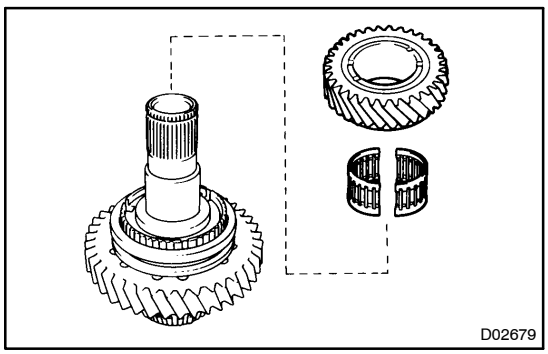
NOTICE:
Be careful not to drop the center differential assembly.



3. REMOVE FRONT TAPER ROLLER BEARING

Using SST and a press, remove the front taper roller bearing.
SST 09950–00020

NOTICE:
Set the claw of SST to the bearing inner race securely.



4. REMOVE HIGH SPEED OUTPUT GEAR

5. REMOVE NEEDLE ROLLER BEARING

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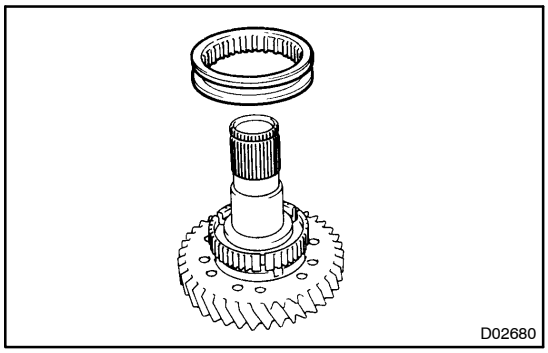
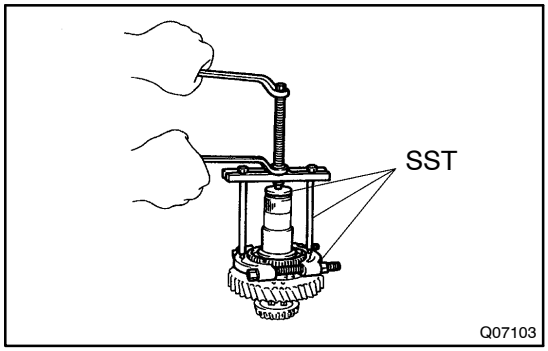


6. REMOVE HIGH AND LOW CLUTCH SLEEVE

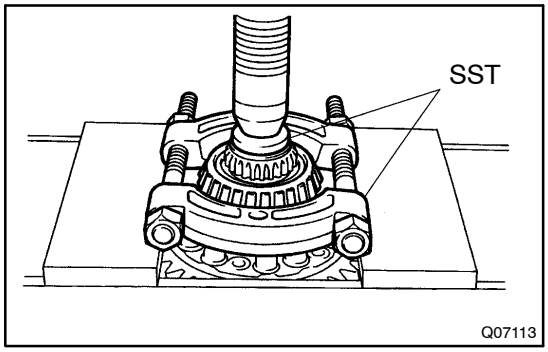


7. REMOVE HIGH SPEED OUTPUT GEAR BUSHING AND CLUTCH HUB

(a) Using SST, remove the high speed output gear bushing and clutch hub.

SST 09550–00020, 09950–00030, 09950–60010 (09951–00320)

(b) Using a magnetic finger, remove the straight pin from the differential front case.



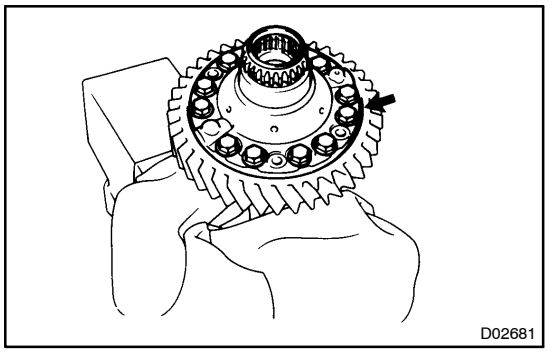
8. REMOVE REAR TAPER ROLLER BEARING

Using SST and a press, remove the rear taper roller bearing.

SST 09950–00020, 09950–60010 (09951–00320)

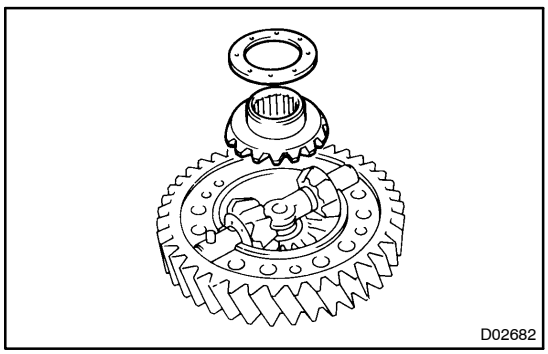
NOTICE:

Set the claw of SST to the bearing inner race securely.



9. REMOVE DIFFERENTIAL REAR CASE

Remove the 12 bolts and differential rear case.



10. REMOVE REAR SIDE GEAR AND THRUST WASHER

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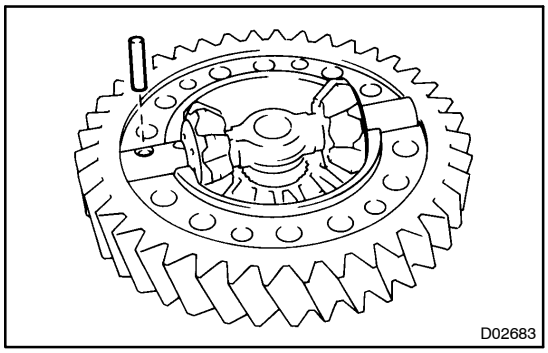
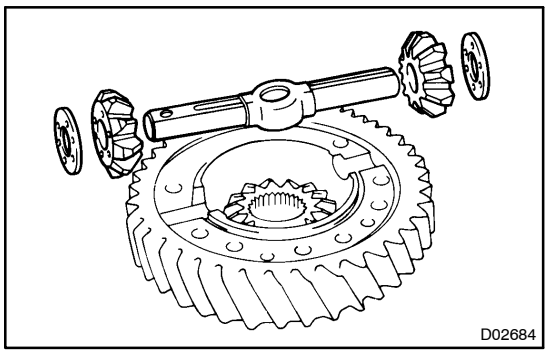
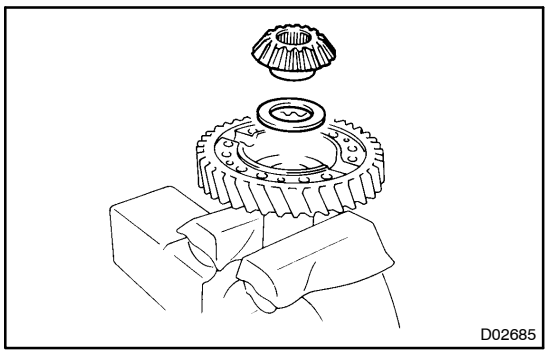


11. REMOVE PINION SHAFT, PINION GEAR AND THRUST WASHER

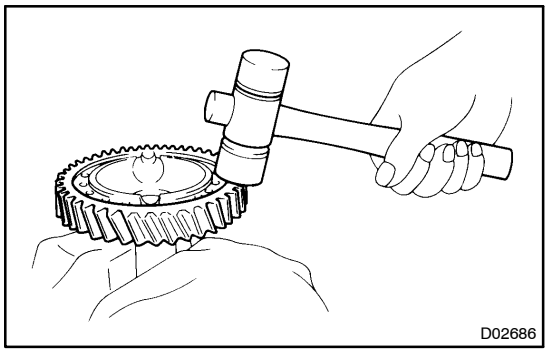
(a) Remove the straight pin from the pinion shaft.



(b) Remove the pinion shaft, 2 pinion gears and thrust washers.



(c) Remove the front side gear and thrust washer.

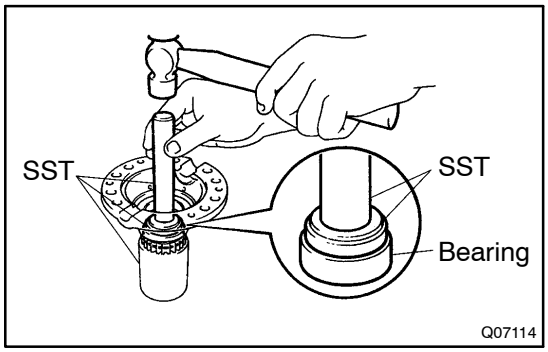


12. REMOVE LOW GEAR

Using a plastic hammer, tap and remove the low gear.

NOTICE:

Be careful not to damage the low gear.



13. REMOVE NEEDLE ROLLER BEARING

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

(b) Using SST and a hammer, remove the needle roller bearing from the differential rear case.

SST 09223–00010, 09950–60010 (09951–00400), 09950–70010 (09951–07150)

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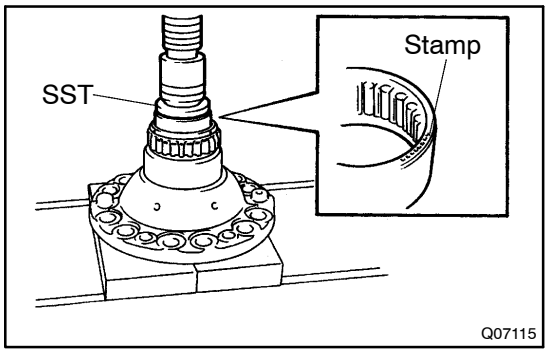
TR044–01

REASSEMBLY



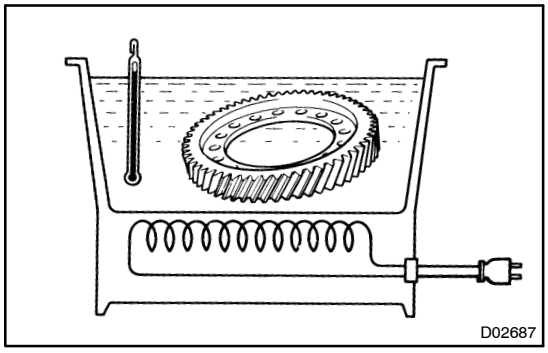
HINT:
Coat all of the sliding and rotating surfaces with gear oil before reassembly.

1. INSTALL NEEDLE ROLLER BEARING

(a) Using SST and a press, install the needle roller bearing to the differential rear case.
SST 09612–24014 (09612–10050)

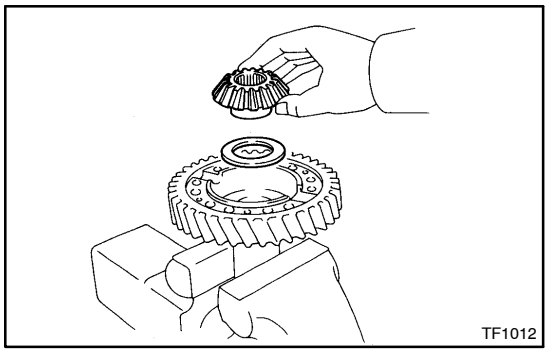
HINT:
Install the bearing to the differential rear case, taking care that its stamped side comes in contact with SST.

(b) Install the snap ring.



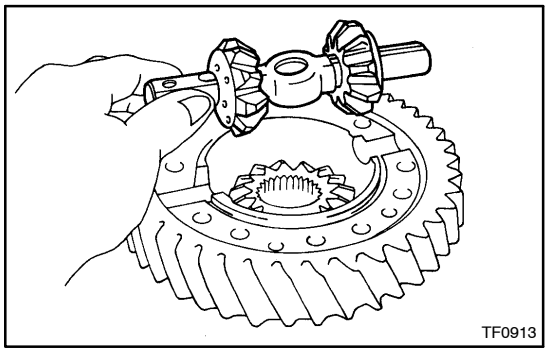
2. INSTALL LOW GEAR

(a) Clean the contact surface of the differential case.
(b) Heat the low gear in boiling water.
(c) Carefully remove the low gear from the water.
(d) After the moisture on the low gear has completely evaporated, quickly install the low gear to the differential case.



3. INSTALL PINION SHAFT, PINION GEAR AND THRUST WASHER

(a) Install the front side gear and thrust washer to the differential front case.



(b) Install the pinion shaft, 2 pinion gears and thrust washers to the differential front case.

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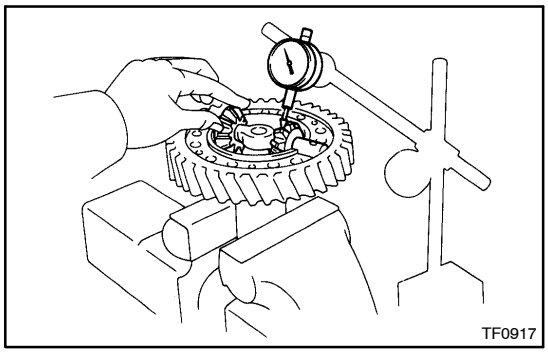

TF0917

(c) Using a dial indicator, measure the front case backlash.
HINT:
Push the pinion shaft.

Minimum backlash: 0.05 mm (0.0020 in.)

If the backlash is not within the specification, replace the thrust washer with one of the correct size and reinstall the thrust washer.

Thickness mm (in.)	Thickness mm (in.)
1.70 (0.0669)	2.45 (0.0965)
1.85 (0.0728)	2.60 (0.1024)
2.00 (0.0787)	2.75 (0.1083)
2.15 (0.0846)	2.90 (0.1142)
2.30 (0.0906)	3.05 (0.1201)

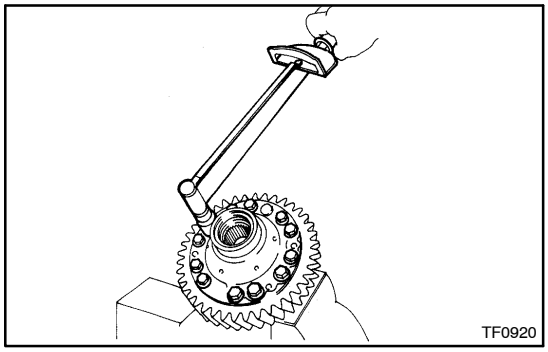
(d) In the same way, measure the rear case backlash.

4. INSTALL STRAIGHT PIN TO PINION SHAFT

5. INSTALL REAR SIDE GEAR AND THRUST WASHER

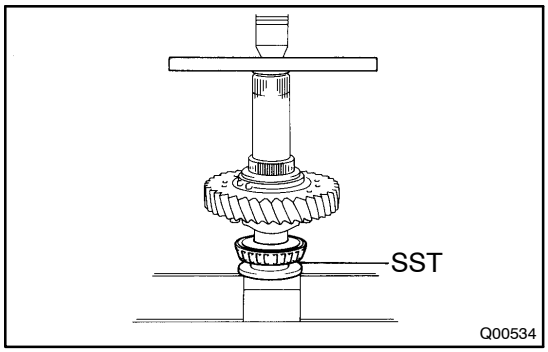
6. INSTALL DIFFERENTIAL REAR CASE

Install the differential rear case and 12 set bolts.


TF0920

7. TORQUE REAR CASE SET BOLT

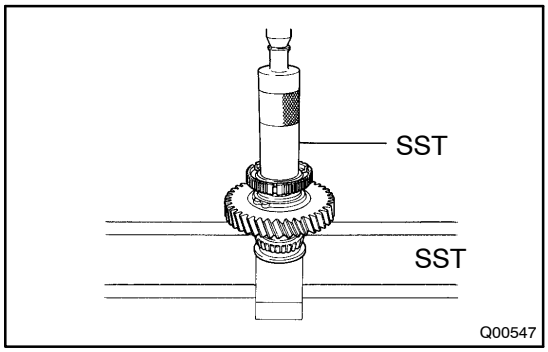
(a) Torque the 12 rear case set bolts.
Torque: 88 N·m (900 kgf·cm, 65 ft·lbf)
(b) Turn the pinion gear.
(c) Loosen the 12 rear case set bolts.
(d) Torque the 12 rear case set bolts.
Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)



Q00534

8. INSTALL REAR TAPER ROLLER BEARING

Using SST and a press, install the rear taper roller bearing.
SST 09316–12010



Q00547

9. INSTALL CLUTCH HUB

Using SST and a press, install the clutch hub.
SST 09316–12010, 09316–60011 (09316–00011)

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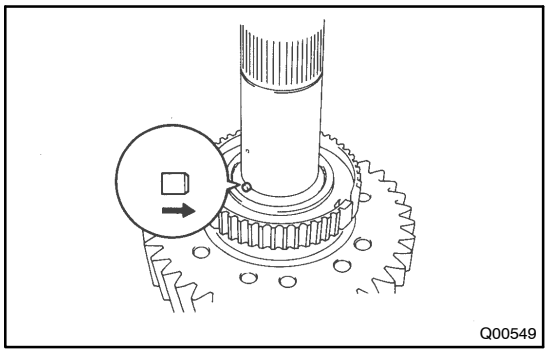
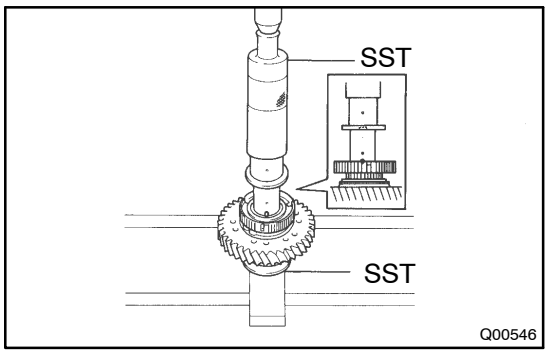


10. INSTALL HIGH SPEED OUTPUT GEAR BUSHING

(a) Apply MP grease to the straight pin.

(b) Install the straight pin, as shown.

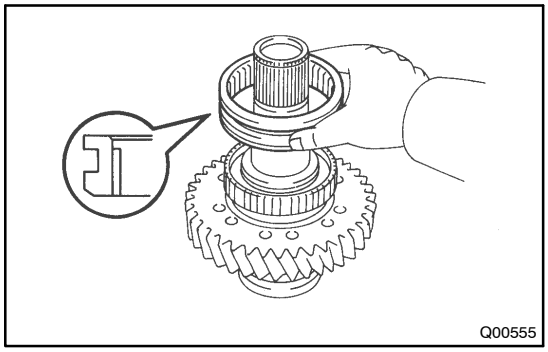


(c) Using SST and a press, install the high speed output gear bushing.

SST 09316–12010, 09316–60011 (09316–00011)

NOTICE:

Before pressing, align the holes on the bushing and shaft so that the pin on the shaft is aligned with the cut–out of the bushing.



11. INSTALL HIGH AND LOW CLUTCH SLEEVE

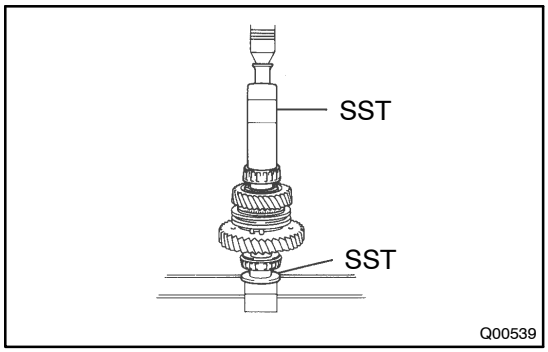
HINT:

Make sure to install the high and low clutch sleeve in the correct direction.

12. INSTALL HIGH SPEED OUTPUT GEAR AND NEEDLE ROLLER BEARING

(a) Apply gear oil to the needle roller bearing.

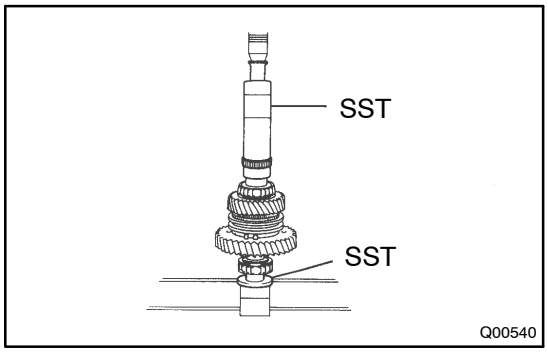
(b) Install the high speed output gear and needle roller bearing.



13. INSTALL FRONT TAPER ROLLER BEARING

Using SST and a press, install the front taper roller bearing.

SST 09316–12010, 09316–60011 (09316–00011)



14. INSTALL FRONT DRIVE GEAR PIECE

Using SST and a press, install the front drive gear piece.

SST 09316–12010, 09316–60011 (09316–00011)

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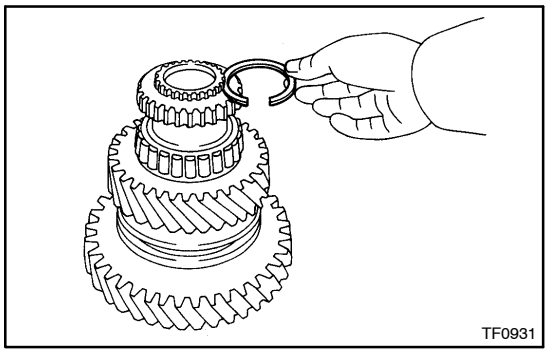

15. INSTALL SNAP RING

(a) Select a snap ring that will allow the minimum axial play.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
A	2.00 (0.0787)	G	2.60 (0.1024)
B	2.10 (0.0827)	H	2.70 (0.1063)
C	2.20 (0.0866)	J	2.80 (0.1102)
D	2.30 (0.0906)	K	1.80 (0.0709)
E	2.40 (0.0945)	L	1.90 (0.0748)
F	2.50 (0.0984)	–	–

(b) Using a snap ring expander, install a new snap ring.

16. INSPECT HIGH SPEED OUTPUT GEAR RADIAL AND THRUST CLEARANCE (See page TR–27)

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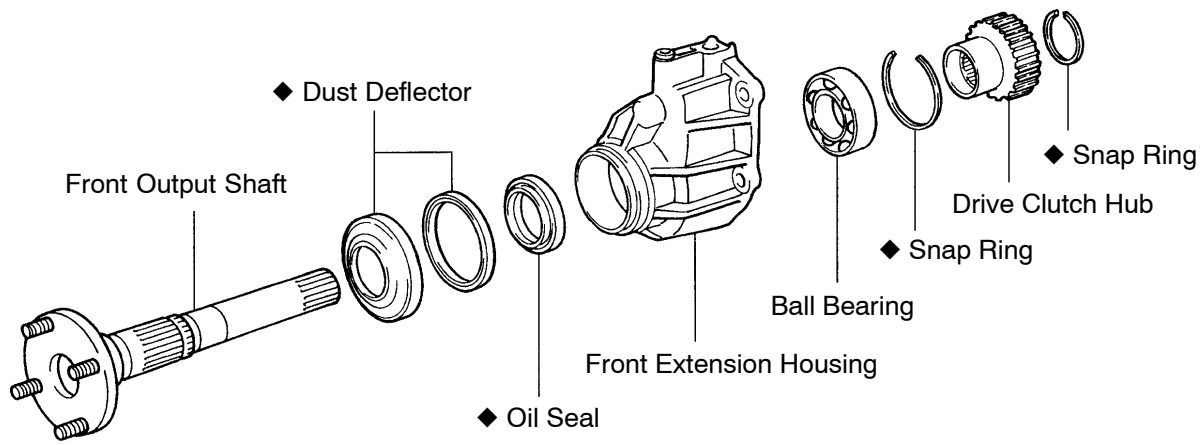
FRONT EXTENSION HOUSING

COMPONENTS

TR045–01



◆ Non–reusable part

Z18836

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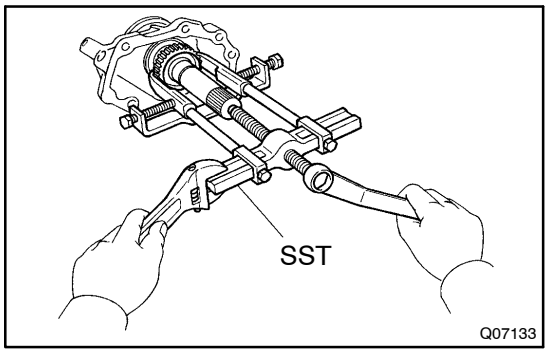
TR046–01

DISASSEMBLY

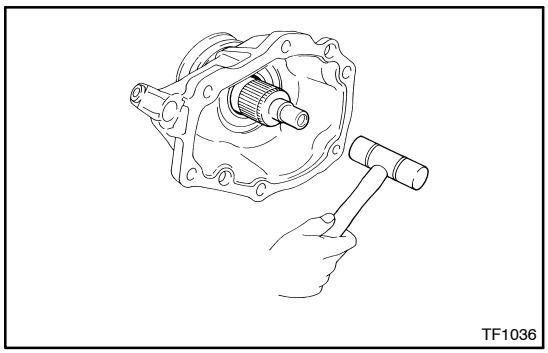


1. REMOVE DRIVE CLUTCH HUB

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

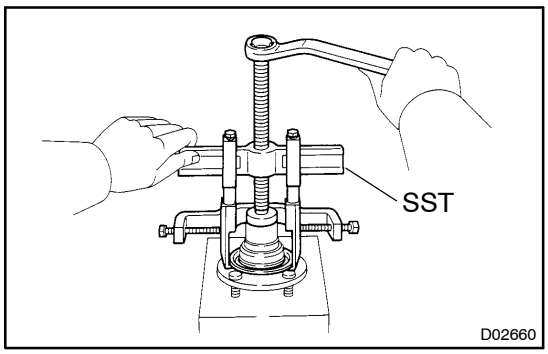
(b) Using SST, remove the drive clutch hub.

SST 09950–40011 (09951–04020, 09952–04010, 09953–04030, 09954–04020, 09955–04020, 09957–04010, 09958–04010)



2. REMOVE FRONT OUTPUT SHAFT

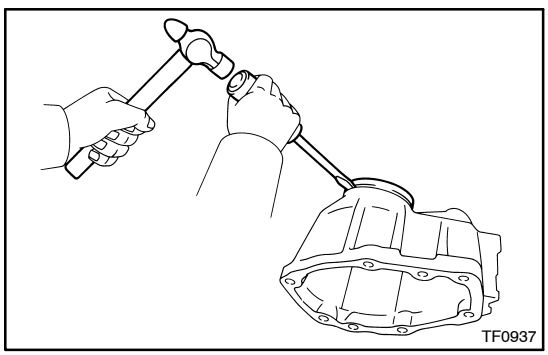
Using a plastic hammer, drive out the front output shaft.



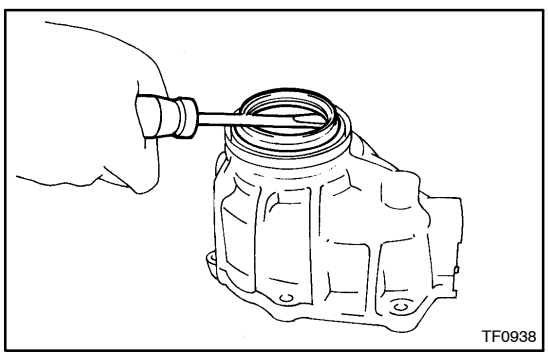
3. REMOVE DUST DEFLECTOR

(a) Using SST, remove the dust deflector.

SST 09950–40011 (09951–04020, 09952–04010, 09953–04030, 09954–04010, 09955–04050, 09957–04010, 09958–04010)



(b) Using a screwdriver and hammer, tap the dust deflector and remove it from the extension housing.



4. REMOVE OIL SEAL

Using a screwdriver, pry out the oil seal from the front extension housing.

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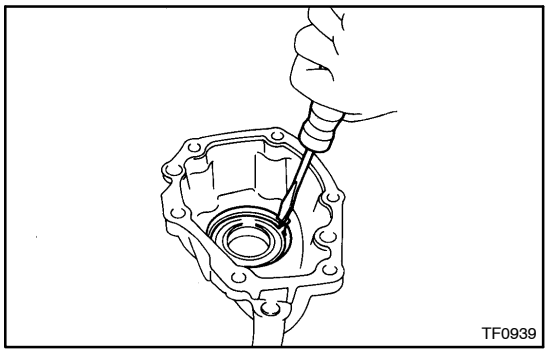
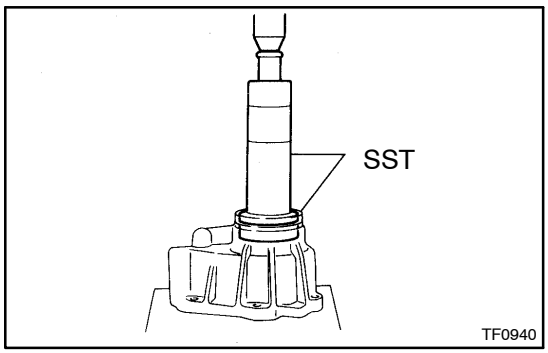


5. REMOVE BALL BEARING

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



(b) Using SST and a press, remove the ball bearing.
SST 09316–60011 (09316–00011, 09316–00071)

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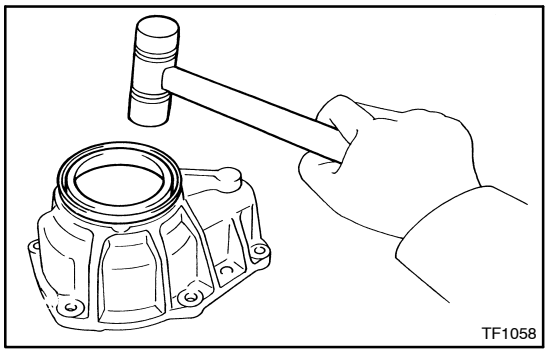
TR047–01

REASSEMBLY

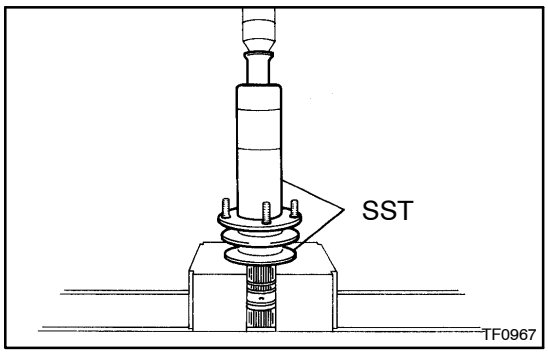
HINT:
Coat all of the sliding and rotating surfaces with gear oil before reassembly.

1. INSTALL DUST DEFLECTOR

(a) Using a plastic hammer, install the dust deflector to the front extension housing.

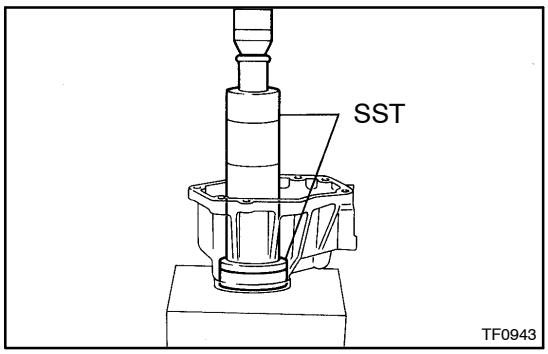


(b) Using SST and a press, install a new dust deflector to the front output shaft.
SST 09316–20011, 09316–60011 (09316–00011)



2. INSTALL BALL BEARING

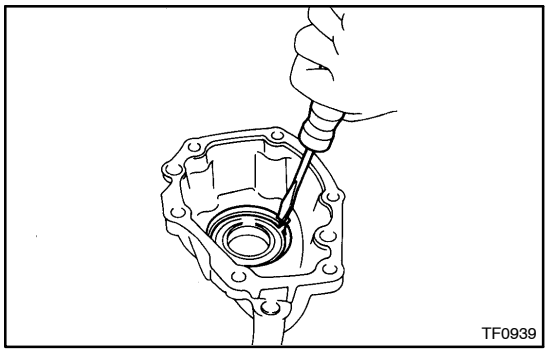
(a) Using SST and a press, install the ball bearing to the front extension housing.
SST 09316–60011 (09316–00011, 09316–00031)



(b) Select a snap ring that will allow the minimum axial play.

Mark	Thickness mm (in.)
A	1.7 (0.0669)
B	1.8 (0.0709)

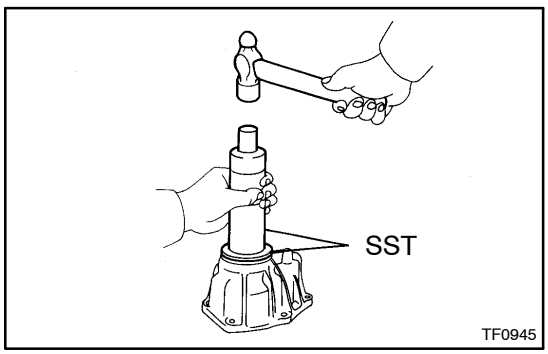
(c) Using a screwdriver, install a new snap ring.



3. INSTALL OIL SEAL

(a) Apply MP grease to the lip of a new oil seal.

(b) Using SST and a hammer, drive in a new oil seal to the front extension housing.
SST 09316–60011 (09316–00011, 09316–00061)



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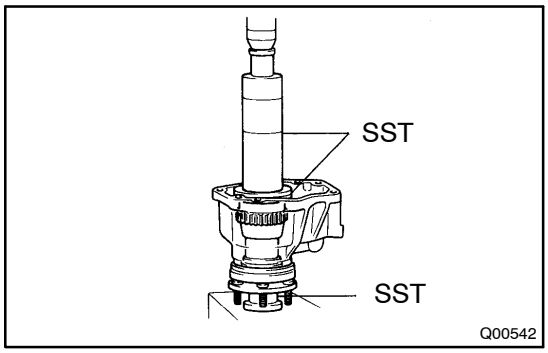
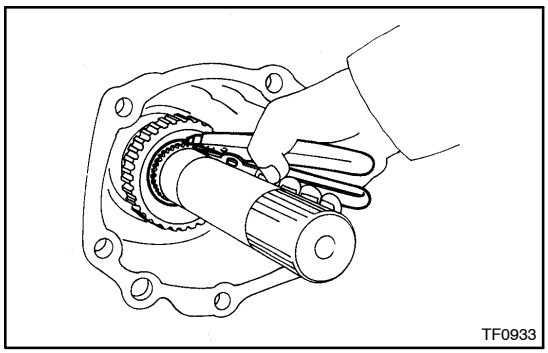


4. INSTALL FRONT OUTPUT SHAFT AND DRIVE CLUTCH HUB

(a) Using SST and a press, install the front output shaft and drive clutch hub.

SST 09316–20011, 09316–60011 (09316–00011, 09316–00041, 09316–00071)



(b) Select a snap ring that will allow the minimum axial play.

Mark	Thickness mm (in.)
A	1.80 (0.0709)
B	1.90 (0.0748)
C	2.00 (0.0787)
D	2.10 (0.0827)
E	2.20 (0.0866)

(c) Using a snap ring expander, install a new snap ring.

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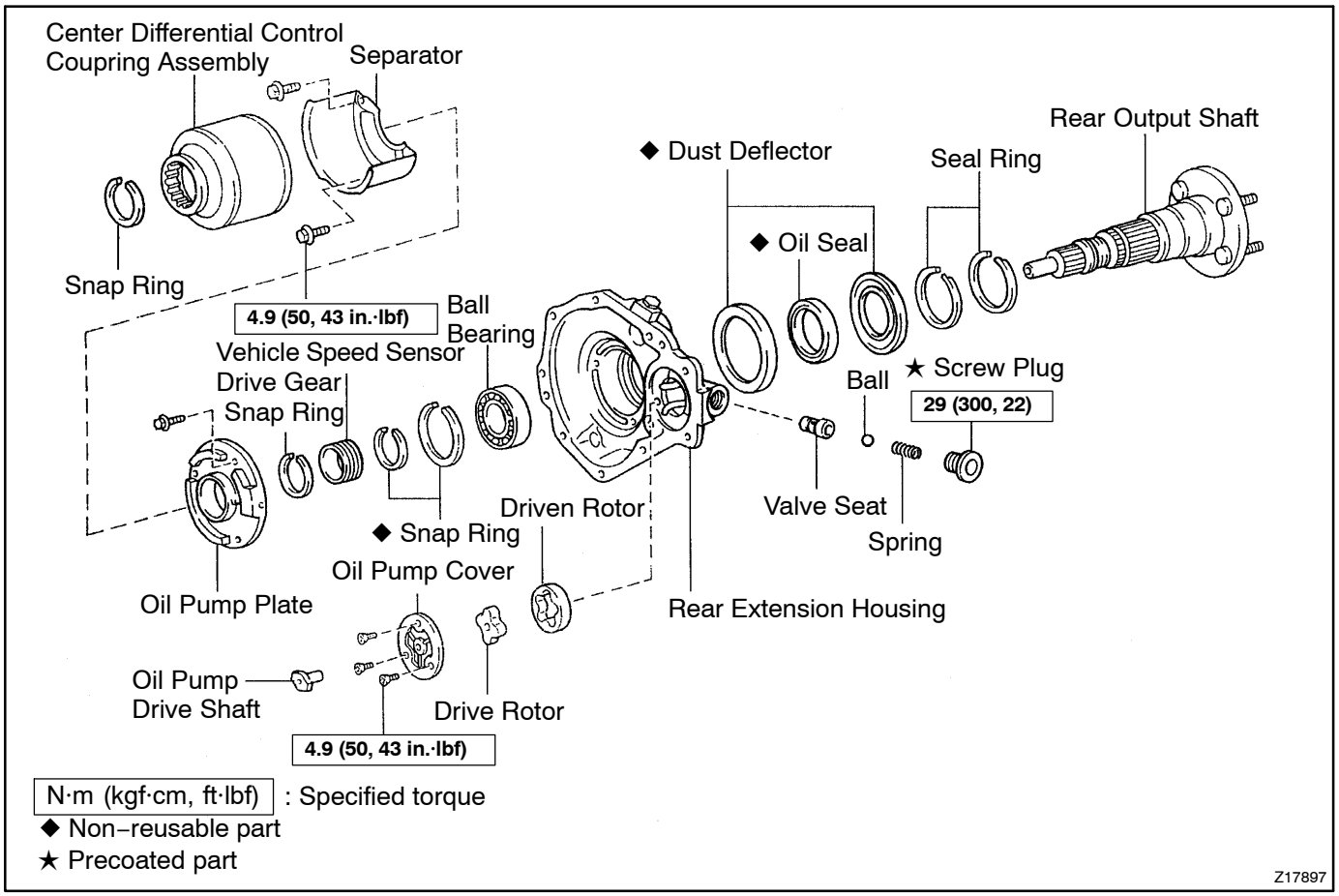
REAR EXTENSION HOUSING

COMPONENTS

TR048–01



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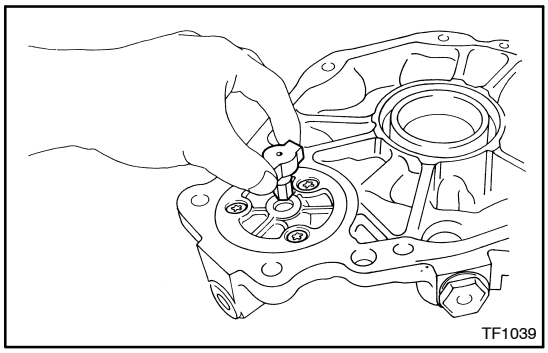
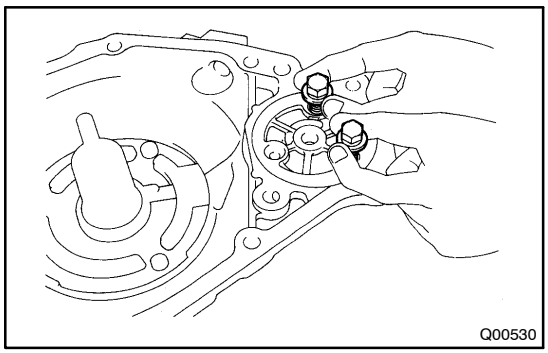
TR049–01

DISASSEMBLY

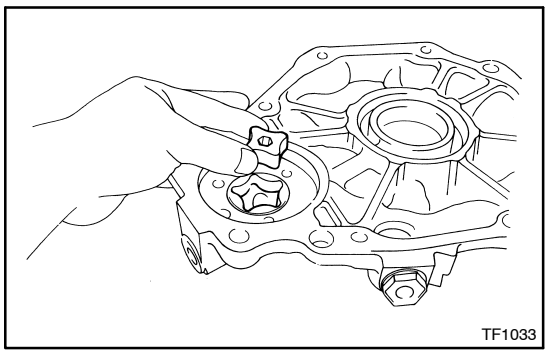


1. REMOVE OIL PUMP DRIVE SHAFT

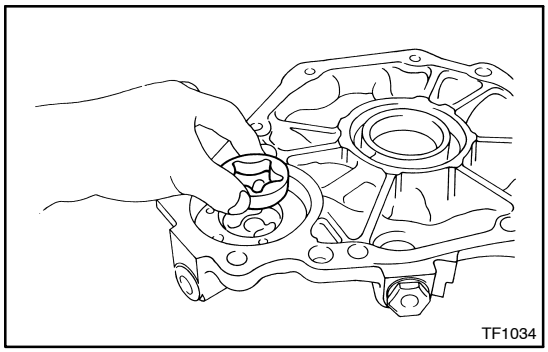


2. REMOVE OIL PUMP COVER

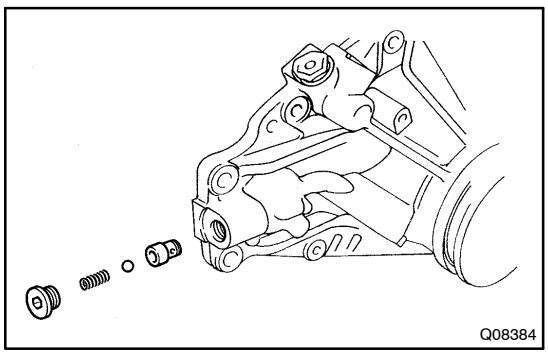
(a) Using a torx socket wrench (T30), remove the 3 screws.
(b) Install the 2 suitable bolts to the pump cover.
(c) Remove the pump cover from the rear extension housing.



3. REMOVE DRIVE ROTOR FROM DRIVEN ROTOR



4. REMOVE DRIVEN ROTOR FROM REAR EXTENSION HOUSING



5. REMOVE SCREW PLUG, SPRING, BALL AND VALVE SEAT

(a) Using a hexagon wrench, remove the screw plug.
(b) Using a magnetic finger, remove the spring, ball and valve seat from the rear extension housing.

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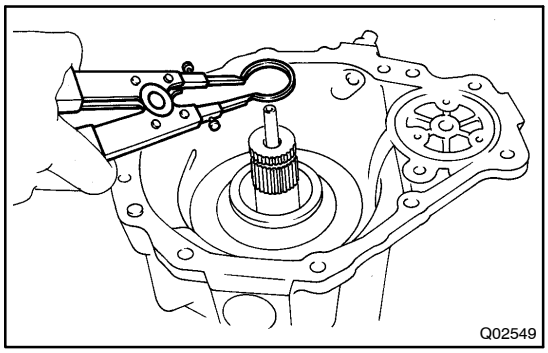
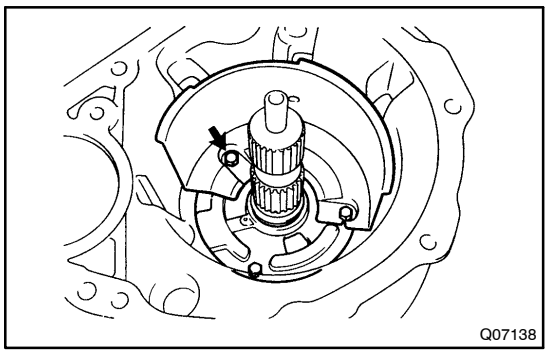


6. REMOVE CENTER DIFFERENTIAL CONTROL COUPLING ASSEMBLY

(a) Using a snap ring expander, remove the snap ring.
(b) Remove the coupling assembly from the rear extension housing.

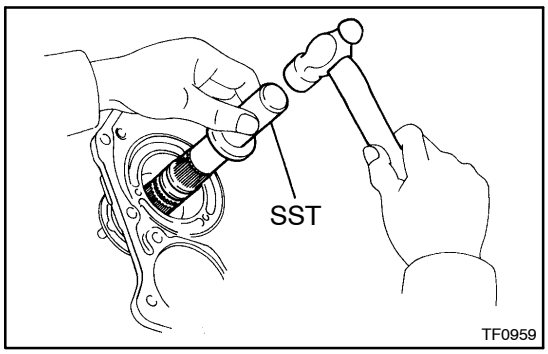


7. REMOVE SEPARATOR AND OIL PUMP PLATE

Remove the 3 bolts, separator and oil pump plate.

8. REMOVE VEHICLE SPEED SENSOR DRIVE GEAR

(a) Using a snap ring expander, remove the snap ring.
(b) Remove the vehicle speed sensor drive gear.

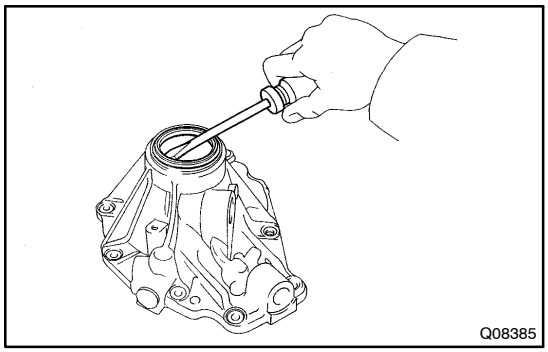


9. REMOVE REAR OUTPUT SHAFT

(a) Using a snap ring expander, remove the snap ring.
(b) Using SST and a hammer, remove the rear output shaft.
SST 09325–12010
(c) Remove the 2 seal rings from the rear output shaft.

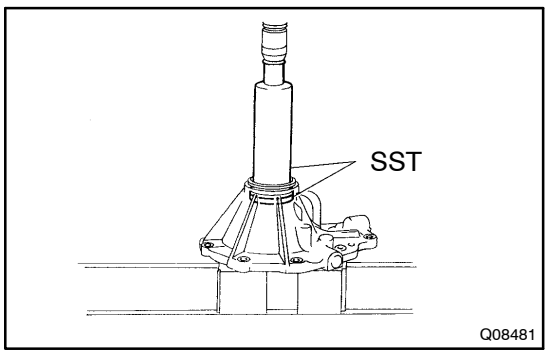
10. REMOVE DUST DEFLECTOR

(a) Using a screwdriver and hammer, remove the rear extension housing dust deflector.
(b) Using a screwdriver and hammer, remove the rear output shaft dust deflector.



11. REMOVE OIL SEAL

Using a screwdriver, pry out the oil seal from the rear extension housing.



12. REMOVE BALL BEARING

(a) Using a screwdriver, remove the snap ring.
(b) Using SST and a press, remove the ball bearing from the rear extension housing.
SST 09316–60011 (09316–00011, 09316–00021)

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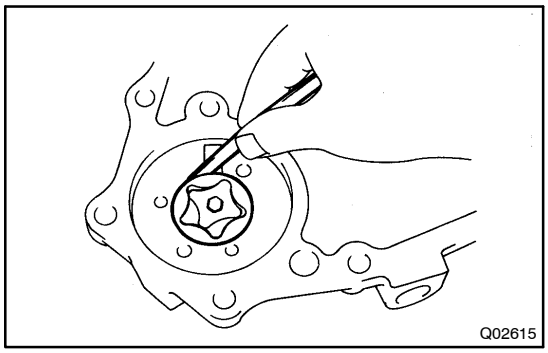
TR04A–01

INSPECTION



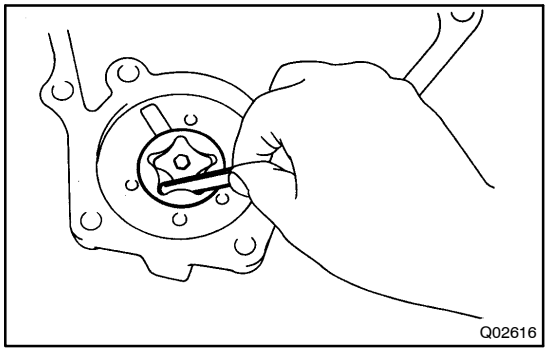
1. INSPECT DRIVEN ROTOR BODY CLEARANCE

(a) Install the drive rotor to the driven rotor.

(b) Using a feeler gauge, measure the body clearance between the drive rotor and extension housing.

Standard clearance:
0.08 – 0.17 mm (0.0031 – 0.0067 in.)
Maximum clearance:
0.17 mm (0.0067 in.)

If the body clearance exceeds the maximum, replace the drive rotor and driven rotor.

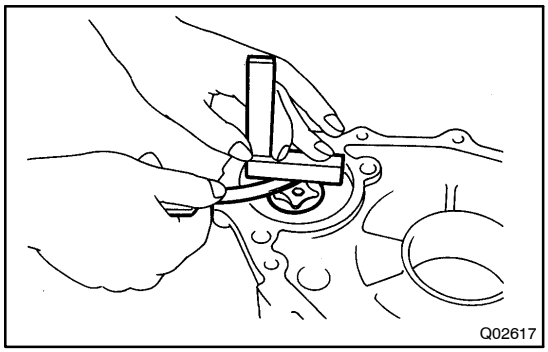


2. INSPECT DRIVEN ROTOR TIP CLEARANCE

Using a feeler gauge, measure the tip clearance between the drive rotor and driven rotor.

Standard clearance:
0.05 – 0.15 mm (0.0020 – 0.0059 in.)
Maximum clearance:
0.15 mm (0.0059 in.)

If the tip clearance exceeds the maximum, replace the drive rotor and driven rotor.



3. INSPECT OIL PUMP SIDE CLEARANCE

Using a steel straight edge and feeler gauge, measure the side clearance of oil pump.

Standard clearance:
0.03 – 0.10 mm (0.0012 – 0.0039 in.)
Maximum clearance:
0.10 mm (0.0039 in.)

If the side clearance exceeds the maximum, replace the drive rotor and driven rotor.

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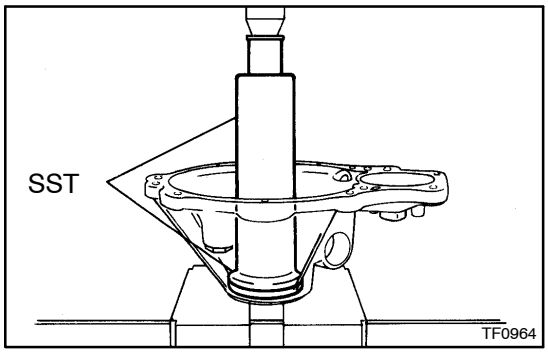
TR04B–01

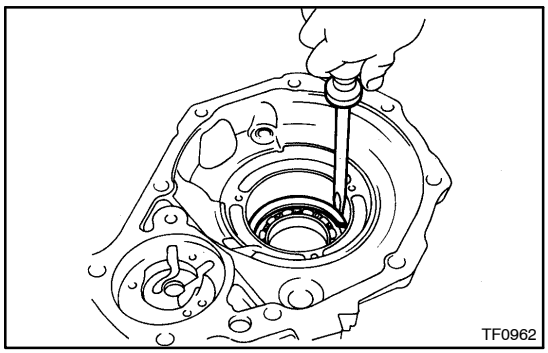
REASSEMBLY



HINT:
Coat all of the sliding and rotating surfaces with gear oil before reassembly.

1. INSTALL BALL BEARING

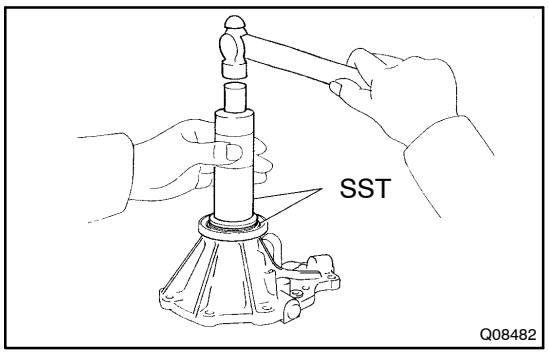
(a) Using SST and a press, install the ball bearing.
SST 09316–60011 (09316–00011, 09316–00031)



(b) Select a snap ring that will allow the minimum axial play.

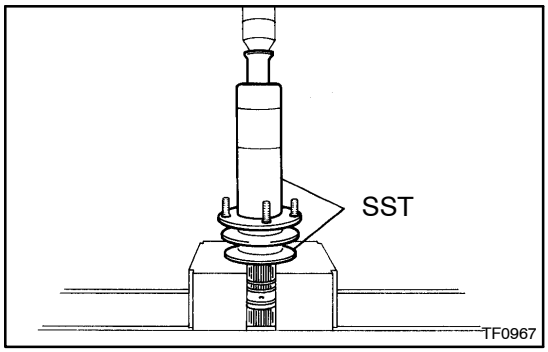
Mark	Thickness mm (in.)
A	1.70 (0.0669)
B	1.80 (0.0709)

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

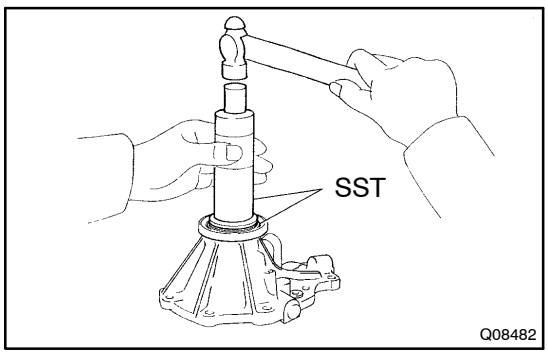


2. INSTALL DUST DEFLECTOR

(a) Using SST and a hammer, install a new rear extension housing dust deflector.
SST 09316–60011 (09316–00011, 09316–00041)



(b) Using SST and a press, install a new rear output shaft dust deflector.
SST 09316–20011, 09316–60011 (09316–00011)



3. INSTALL OIL SEAL

(a) Apply MP grease to the lip of a new oil seal.
(b) Using SST and a hammer, drive in a new oil seal.
SST 09316–60011 (09316–00011, 09316–00031)

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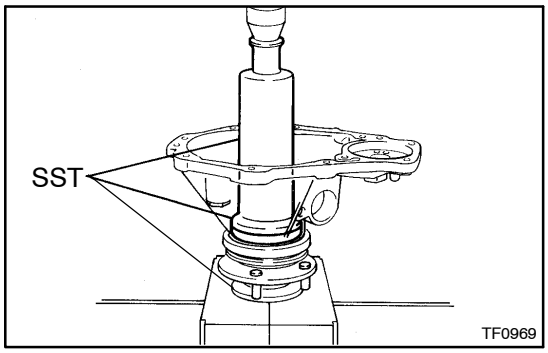
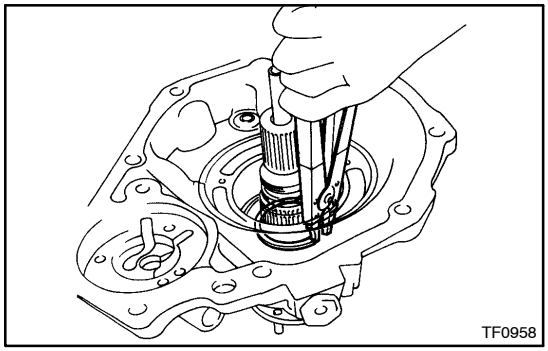


4. INSTALL REAR OUTPUT SHAFT

(a) Using SST and a press, install the rear output shaft.
SST 09316–20011, 09316–60011 (09316–00011, 09316–00031)

(b) Install the 2 seal rings to the rear output shaft.



(c) Select a snap ring that will allow the minimum axial play.

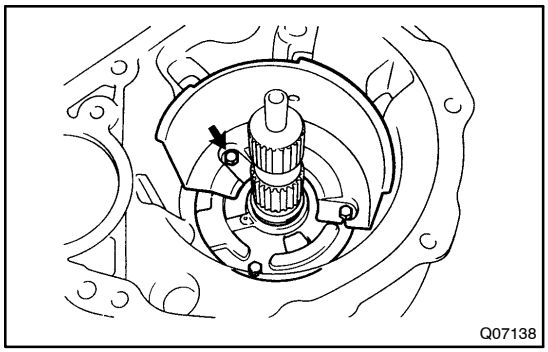
Mark	Thickness mm (in.)
1	1.95 (0.0768)
2	2.05 (0.0807)
3	2.15 (0.0847)
4	2.25 (0.0886)

(d) Using a snap ring expander, install a new snap ring.

5. INSTALL VEHICLE SPEED SENSOR DRIVE GEAR

(a) Install the vehicle speed sensor drive gear.

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



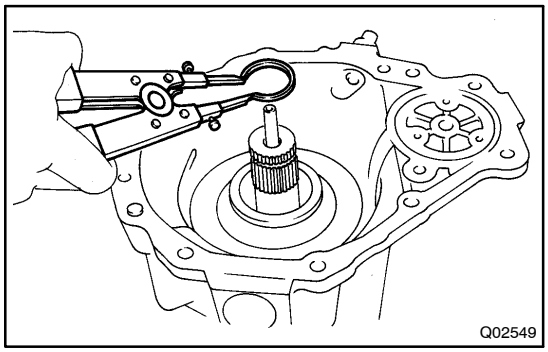
6. INSTALL OIL PUMP PLATE AND SEPARATOR

(a) Install the oil pump plate.

(b) Install the separator.

(c) Install and torque the 3 bolts.

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



7. INSTALL CENTER DIFFERENTIAL CONTROL COUPLING ASSEMBLY

(a) Install the coupling assembly to the output shaft.

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

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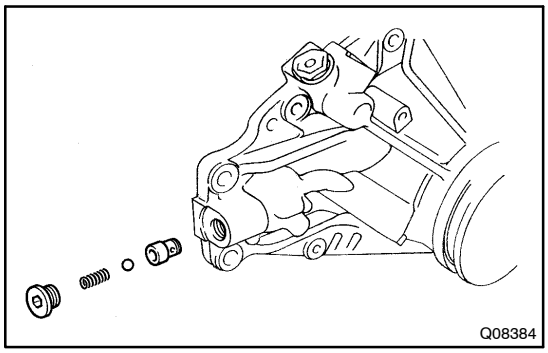


8. INSTALL VALVE SEAT, BALL, SPRING AND SCREW PLUG

(a) Apply gear oil to the ball.

(b) Install the valve seat, ball and spring.

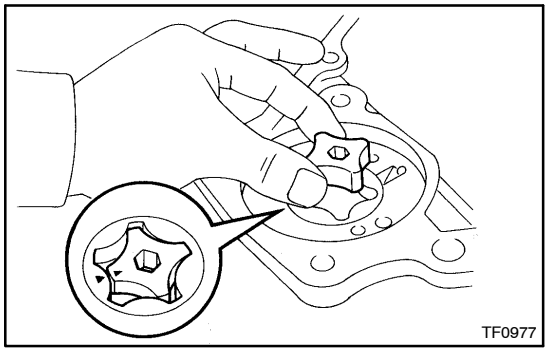
(c) Apply liquid sealer to the screw plug threads.

Sealant:

Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

(d) Using a hexagon wrench, install and torque the screw plug.

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)



9. INSTALL DRIVEN ROTOR

(a) Apply gear oil to the driven rotor.

(b) Install the driven rotor.

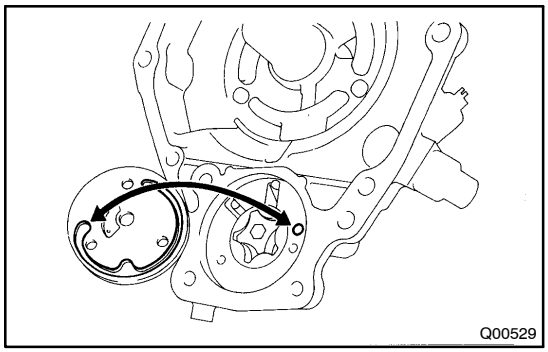
10. INSTALL DRIVE ROTOR

(a) Apply gear oil to the drive rotor.

(b) Install the drive rotor.

HINT:

Align the alignment marks.



11. INSTALL OIL PUMP COVER

(a) Install the oil pump cover.

(b) Using a torx socket wrench (T30), install and torque the 3 screws.

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

NOTICE:

Align the oil hole of the rear extension housing and oil groove end of the oil pump cover.

12. INSTALL OIL PUMP DRIVE SHAFT

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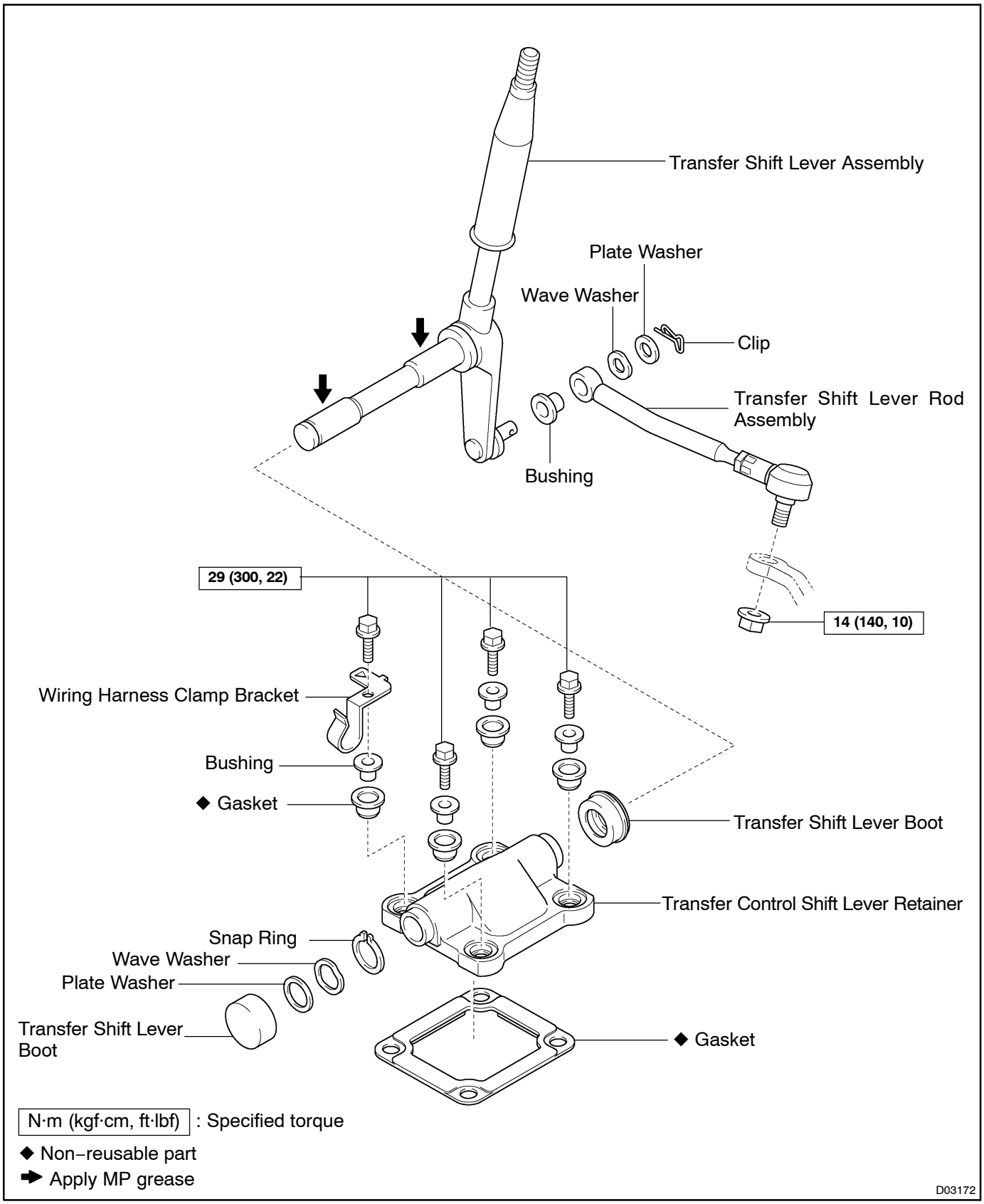
TRANSFER SHIFT LEVER ASSEMBLY

TR04E–01

COMPONENTS



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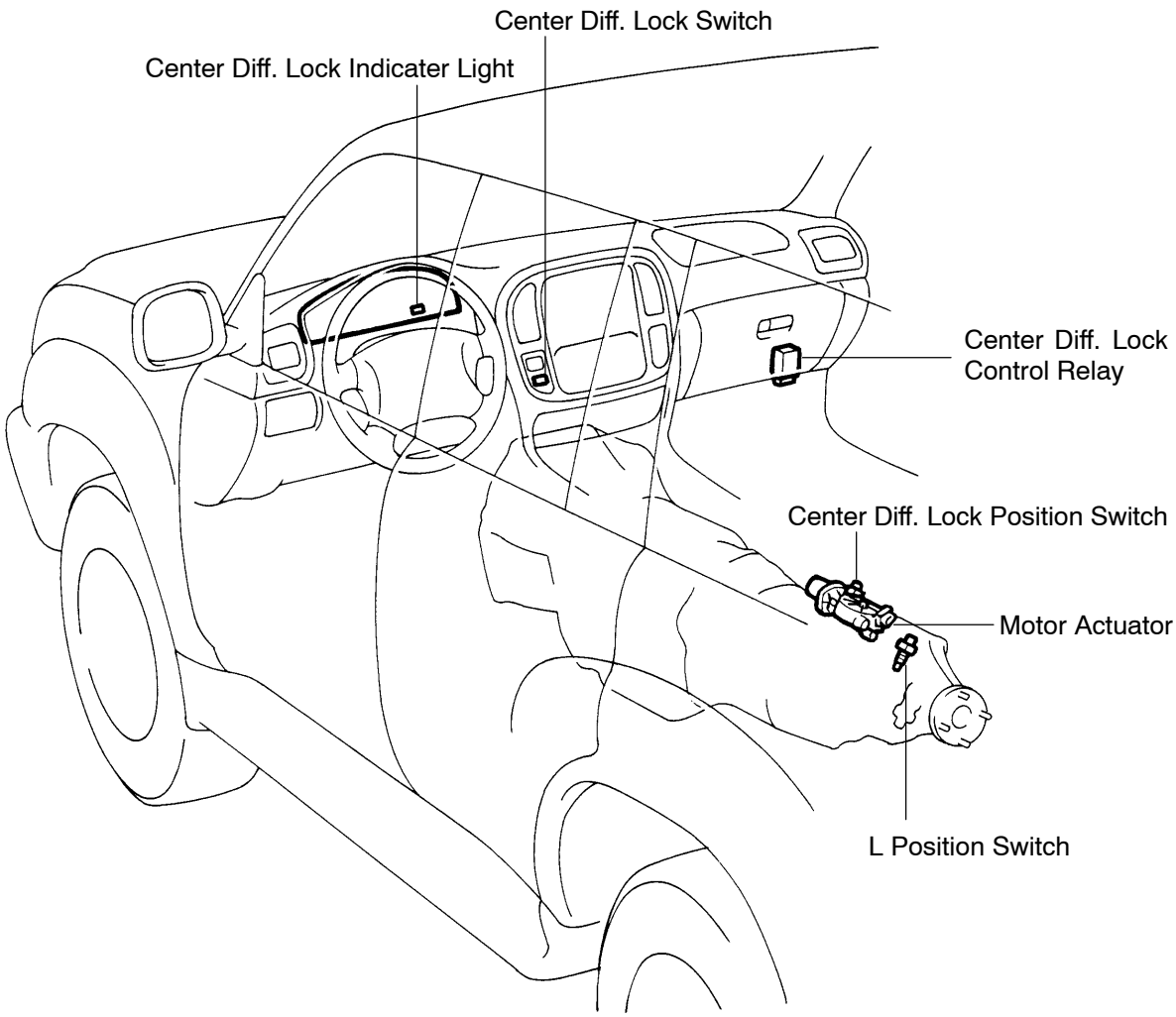
MOTOR SHIFT CONTROL SYSTEM

TR04C–01

LOCATION



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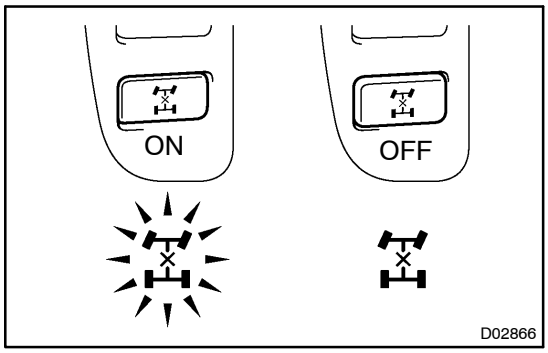
TR04D–01

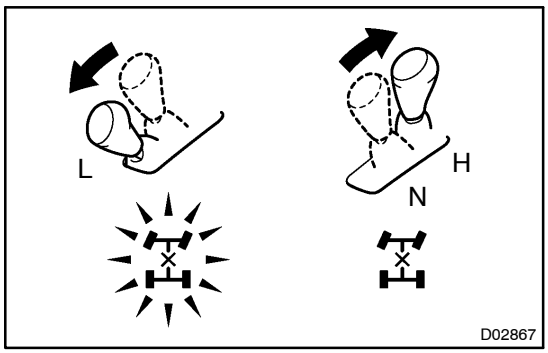
INSPECTION



1. INSPECT SWITCH POSITION

(a) Start the engine, and shift the transfer shift lever to the "H" position.

(b) Check that the center diff. indicator light comes on when the the switch is in "ON" position. Check that the light goes off when the switch is in "OFF" position.

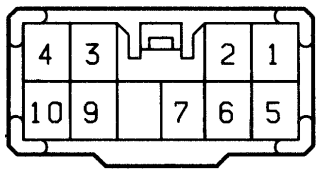


2. INSPECT SHIFT LEVER POSITION

(a) Start the engine, and turn the center diff. lock switch to OFF.

(b) Check that the center diff. indicator light comes on when the transfer shift lever is shifted to the "L" position. Check that the light goes off when the lever is shifted to the "N" or "H" position.

Relay Side:



3. INSPECT CENTER DIFF. LOCK CONTROL RELAY

(a) Check that continuity exists between each terminal, as shown in the chart.

Tester connected terminal number	Specified condition
1 – 2	Continuity
2 – 4	Continuity
6 – 7	*

*: There is a diode between the terminals 6 and 7. If no continuity exists, check that continuity exists when changing the position of ⊕ probe for the position of negative ⊖ prove of tester.

(b) Apply battery positive voltage between each terminal and check that continuity exists between each terminal, as shown in the chart.

Battery voltage applied terminal	Tester connected terminal number	Specified condition
6 (+) – 5 (–)	1 – 3 1 – 2	Continuity No continuity
7 (+) – 2 (–)	9 – 10	No continuity
9 (+) – 10 (–)	3 – 4 2 – 4	Continuity No continuity

If continuity is not as specified, replace the relay.

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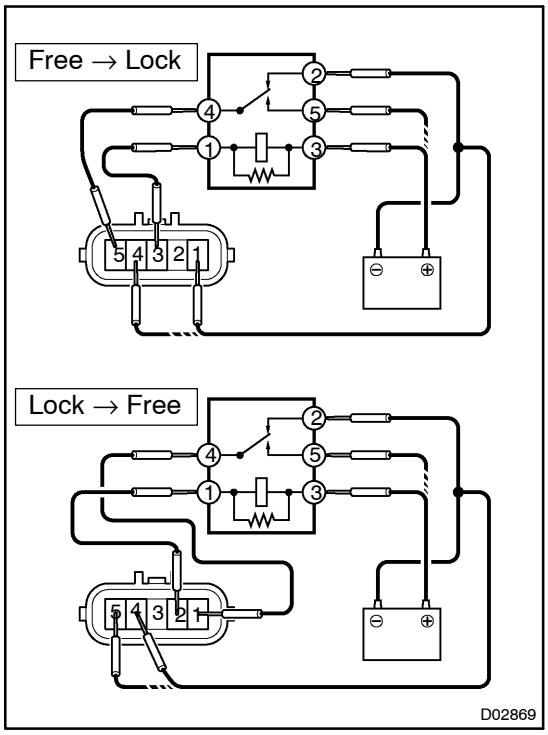


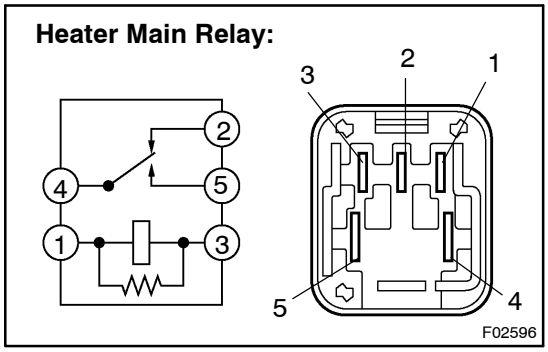
4. INSPECT ACTUATOR OPERATION

(a) Raise up the front wheels, place the stopper under the rear wheels to block them, and pull up the parking brake.

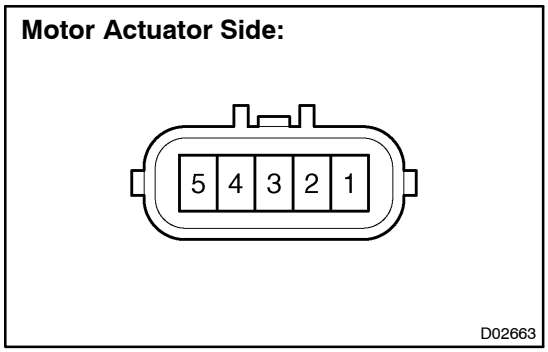
(b) Disconnect the connector of the actuator and connect it to the relay using wire.

(c) Check that the front propeller shaft can be rotated by hand.

Inspection Item	Standard
Center Diff. Free → Lock	Front propeller shaft cannot be rotated
Center Diff. Lock → Free	Front propeller shaft can be rotated.



HINT:
When inspecting the operation described above, use a heater main relay.



5. INSPECT MOTOR ACTUATOR (MOTOR)

(a) Remove the motor actuator (See page TR–8).

(b) Measure the resistance between the terminals 1 and 5.
Standard resistance: 0.3 – 100 Ω

(c) Measure the resistance between the terminals 1 or 5 and body ground.
Standard resistance: More than 0.5 MΩ

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

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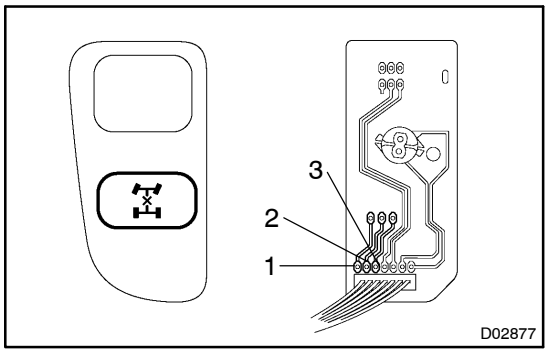
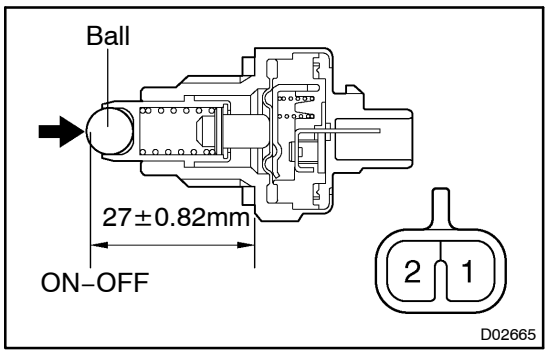


6. INSPECT CENTER DIFF. LOCK SWITCH CONTINUITY

(a) Remove the center diff. lock switch (See page AC–88).

(b) Inspect the continuity between each terminal.

Center diff. lock switch condition	Tester connected terminal number	Specified condition
ON	1 – 2 1 – 3 2 – 3	No continuity No continuity Continuity
OFF	1 – 2 1 – 3 2 – 3	Continuity No continuity No continuity



7. INSPECT L AND CENTER DIFF. LOCK POSITION SWITCH CONTINUITY

(a) Remove the L and center diff. lock position switch (See page TR–8).

(b) Check that continuity exists between terminals 1 and 2 when pushing the ball at the tip of the switch.

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TROUBLESHOOTING

PR03H–01

PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

Symptoms	Suspect Area	See page
Noise	1. Sleeve yoke spline worn	PR–5
	2. Spider bearing worn or stuck	PR–5
Vibration	1. Sleeve yoke spline stuck	PR–5
	2. Propeller shaft runout.	PR–5
	3. Propeller shaft imbalance.	–

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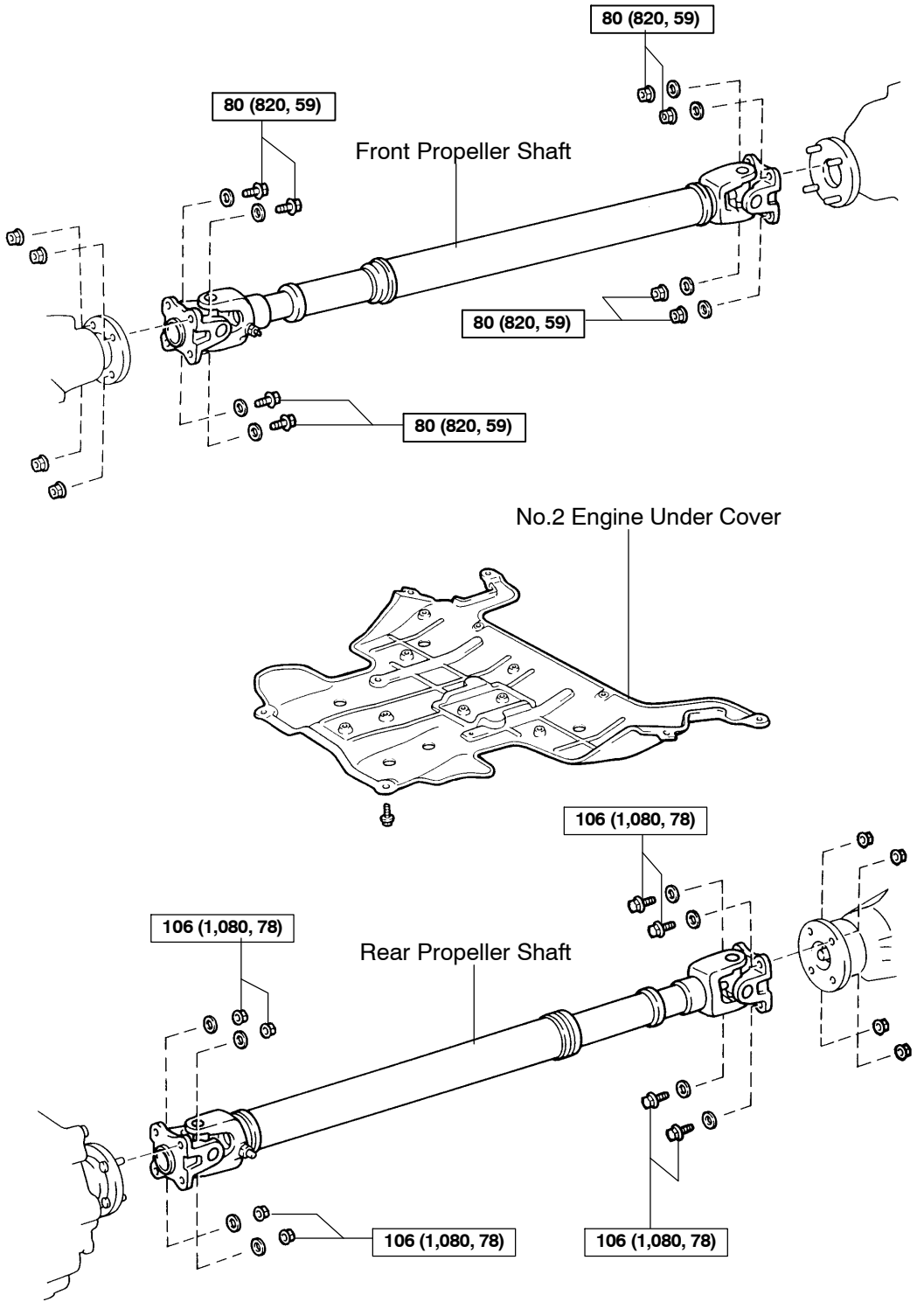
PROPELLER SHAFT ASSEMBLY

COMPONENTS

PR03I–01



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

D03040

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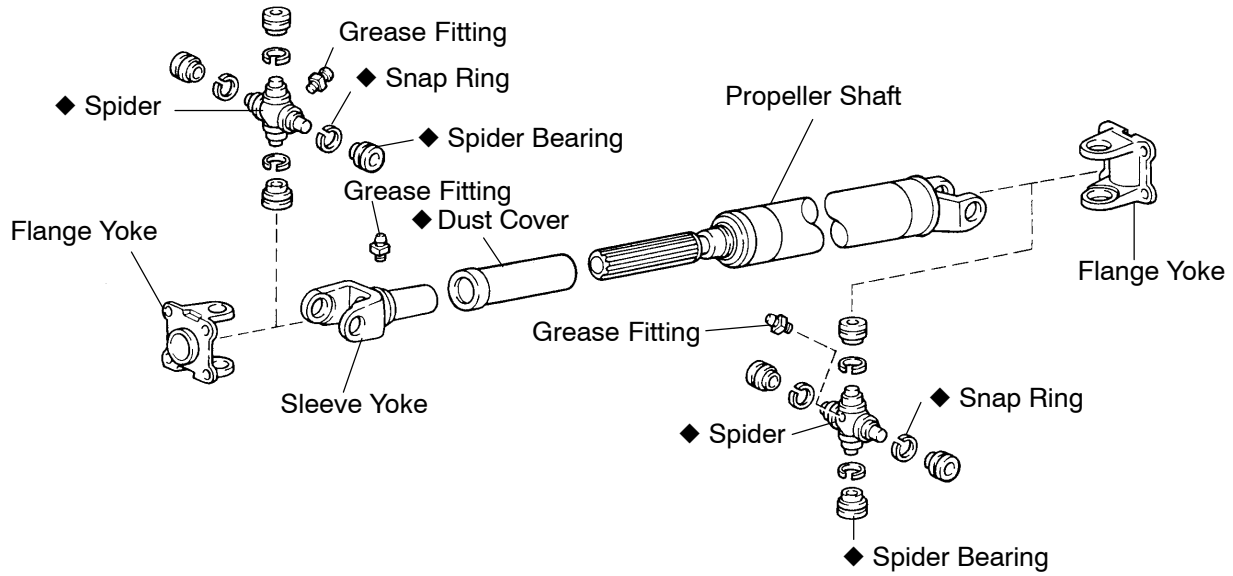
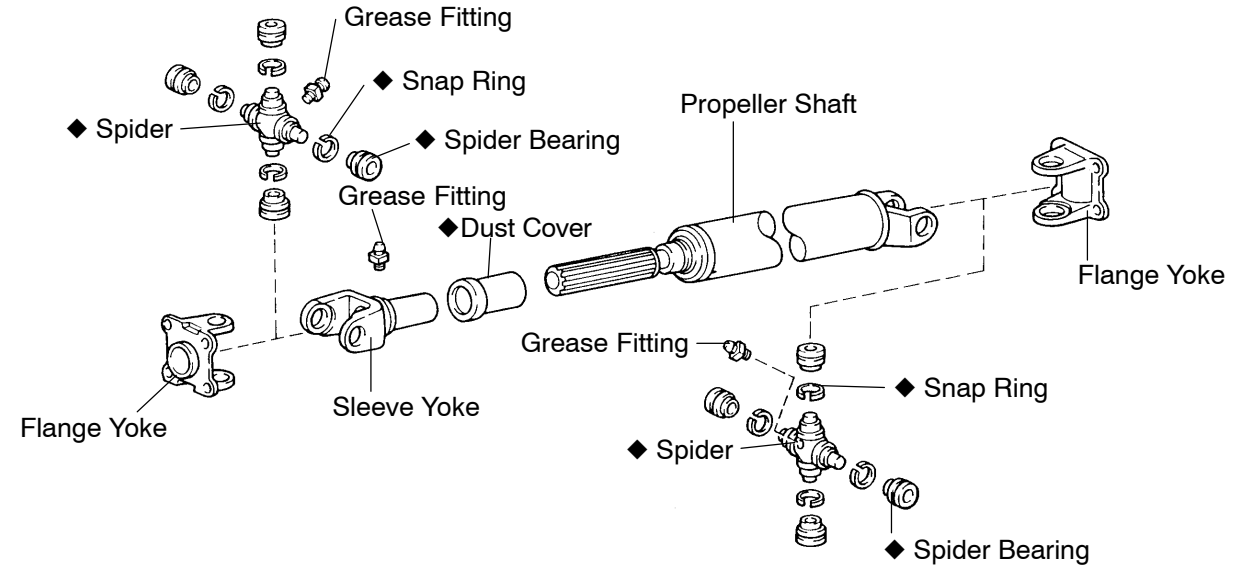
Front Propeller Shaft



Rear Propeller Shaft



◆ Non–reusable part

D03041

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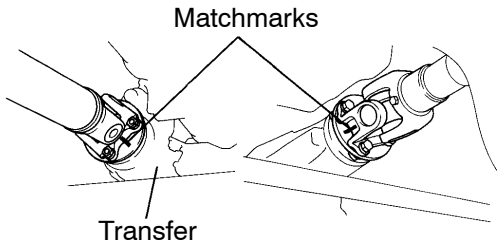
PR03J–01

REMOVAL

Front Propeller Shaft



1. REMOVE ENGINE NO.2 UNDER COVER

2. REMOVE FRONT PROPELLER SHAFT

(a) Place matchmarks on the propeller shaft flange and transfer.

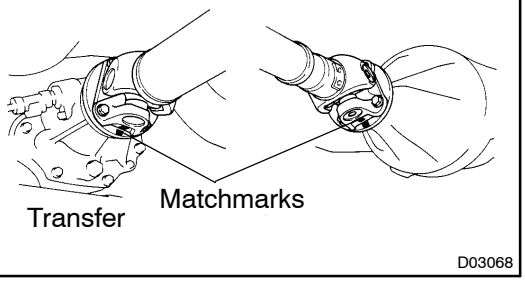
(b) Remove the 4 nuts and washers.
Torque: 80 N·m (820 kgf·cm, 59 ft·lbf)

(c) Place matchmarks on the propeller shaft flange and differential.

(d) Remove the 4 nuts, bolts and washers.
Torque: 80 N·m (820 kgf·cm, 59 ft·lbf)

(e) Remove the front propeller shaft.

Rear Propeller Shaft



3. REMOVE REAR PROPELLER SHAFT

(a) Place matchmarks on the propeller shaft flange and transfer.

(b) Remove the 4 nuts and washers.
Torque: 106 N·m (1,080 kgf·cm, 78 ft·lbf)

(c) Place matchmarks on the propeller shaft flange and differential.

(d) Remove the 4 nuts, bolts and washers.
Torque: 106 N·m (1,080 kgf·cm, 78 ft·lbf)

(e) Remove the rear propeller shaft.

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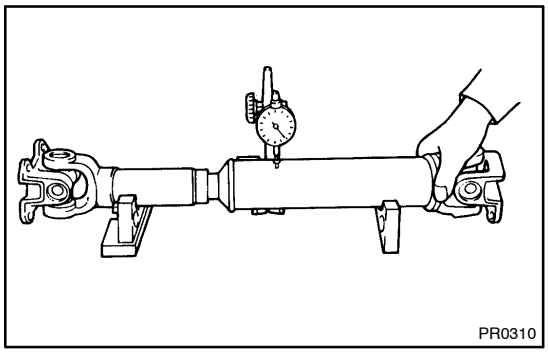
PR03K–01


PR0310

INSPECTION

NOTICE:

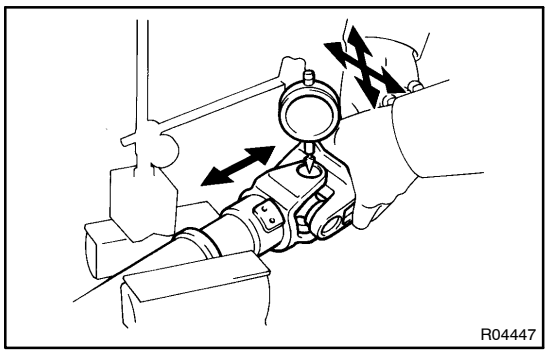
Be careful not to grip the propeller shaft tube too tightly in a vise as this will cause deformation.

1. INSPECT FRONT AND REAR PROPELLER SHAFTS FOR DAMAGE OR RUNOUT

Using a dial indicator, check the runout of shafts.

Maximum runout: 0.8 mm (0.031 in.)

If shaft runout is greater than maximum, replace the shaft.


R04447

2. INSPECT SPIDER BEARING

(a) Check the spider bearings for wear or damage.

(b) Check the spider bearing axial play by turning the yoke with holding the shaft tightly.

Maximum bearing axial play: 0 mm (0 in.)

If necessary, replace the spider bearing.

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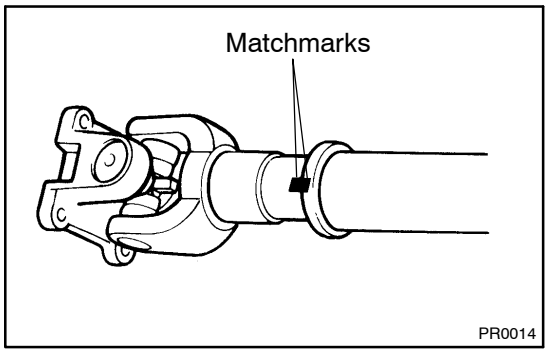
PR03L–01

REPLACEMENT

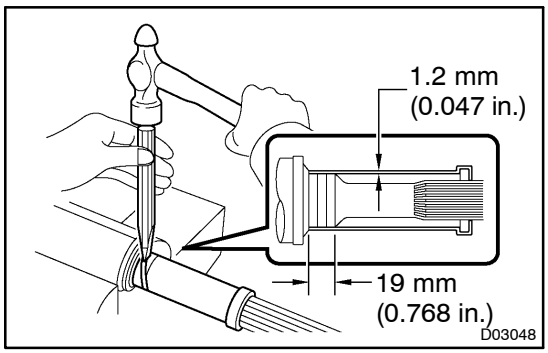


NOTICE:

Be careful not to grip the propeller shaft tube too tightly in a vise as this will cause deformation.

REPLACE DUST COVER

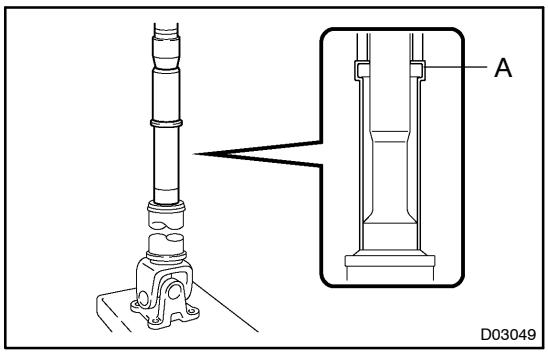
(a) Remove the sleeve yoke from the propeller shaft.
  (1) Place matchmarks on the sleeve yoke and shaft.
  (2) Pull out the sleeve yoke from the shaft.



(b) Remove the dust cover.
  Cut the dust cover spirally at the pressing–in part with a saw and pry it off with a chisel.

NOTICE:

Do not damage the propeller shaft. If damage, replace the shaft with a new one.



(c) Install a new dust cover.
  Using SST and press, press in a new dust cover.
  SST 09636–20010

NOTICE:

Place the universal joint straight when pressing in the dust cover. Apply MP grease to the "A" part.

(d) Insert the sleeve yoke into the propeller shaft.
  (1) Apply MP grease to the propeller shaft spline and sleeve yoke sliding surface.
  (2) Align the matchmarks on the sleeve yoke propeller shaft.
  (3) Install the propeller shaft into the sleeve yoke.

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PR03M–01

INSTALLATION

Installation is in the reverse order of removal (See page PR–4).

HINT:

After installation, pump MP grease into each fitting with a grease gun until the grease begins to flow around the oil seal.

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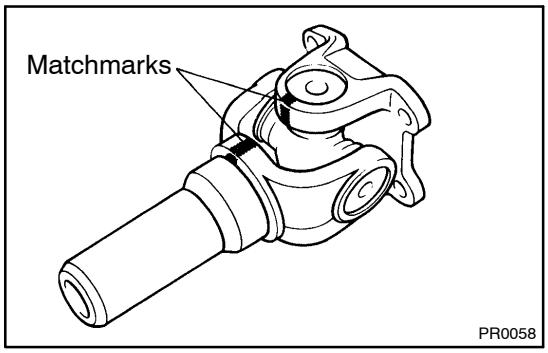


SPIDER BEARING

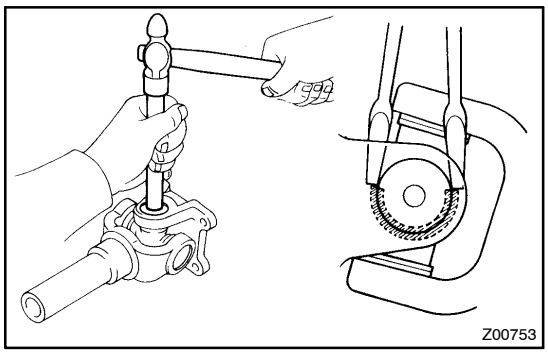
PR03N–01

REPLACEMENT

NOTICE:

Be careful not to grip the propeller shaft rube too tightly in a vise as this will cause deformation.

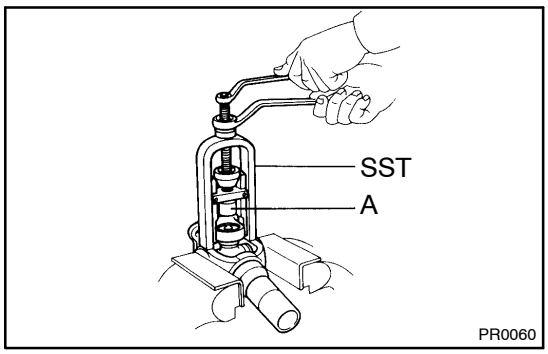
1. **REMOVE PROPELLER SHAFT**
   (See page PR–4)
2. **PLACE MATCHMARKS ON SHAFT AND YOKE**



3. **REMOVE SNAP RINGS**

(a) Using a brass bar and hammer, slightly tap in the bearing outer races.

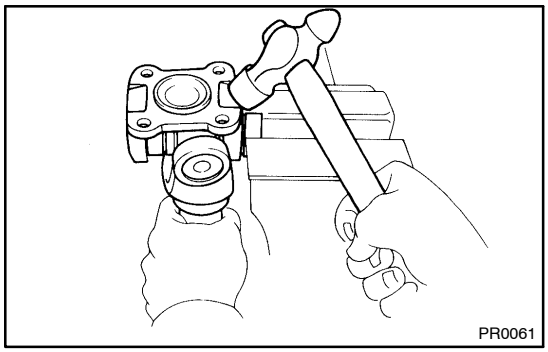
(b) Using 2 screwdrivers, remove the 4 snap rings from the grooves.



4. **REMOVE SPIDER BEARINGS**

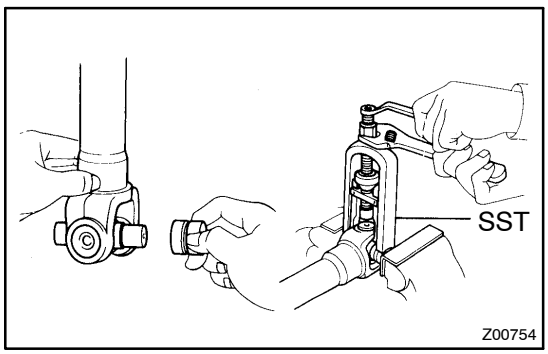
(a) Using SST, push out the bearing from the flange.
SST 09332–25010

HINT:
Sufficiently raise the part indicated by ”A” so that it does not come into contact with the bearing.



(b) Clamp the bearing outer race in a vise and tap off the flange with a hammer.

HINT:
Remove the bearing on the opposite side in the same procedure.



(c) Install the 2 removed bearing outer races to the spider.

(d) Using SST, push out the bearing from the yoke.
SST 09332–25010

(e) Clamp the outer bearing race in a vise and tap off the yoke with a hammer.

HINT:
Remove the bearing on the opposite side in the same procedure.

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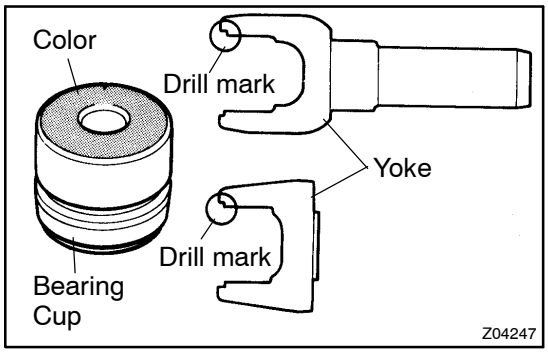
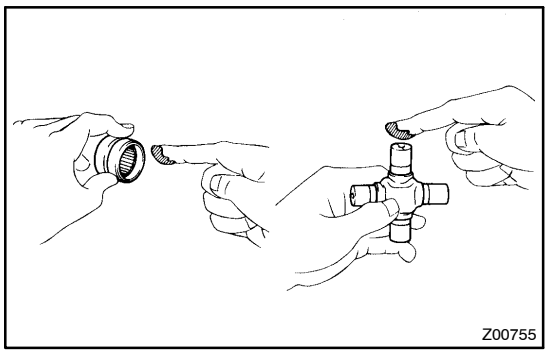


5. SELECT SPIDER BEARING

Select the bearing according to whether or not there is a drill mark on the yoke section.

Yoke	Bearing
w/ drill mark	w/ color mark (Red)
No drill mark	No color mark



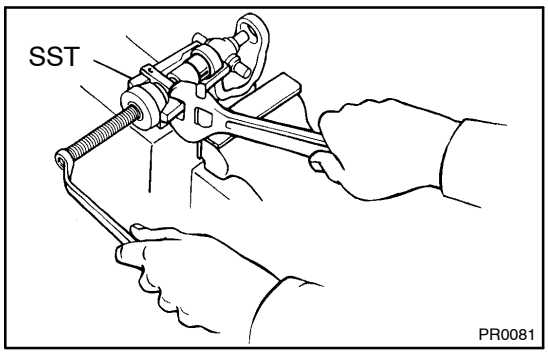
6. INSTALL SPIDER BEARING

(a) Apply MP grease to a new spider and bearings.

NOTICE:

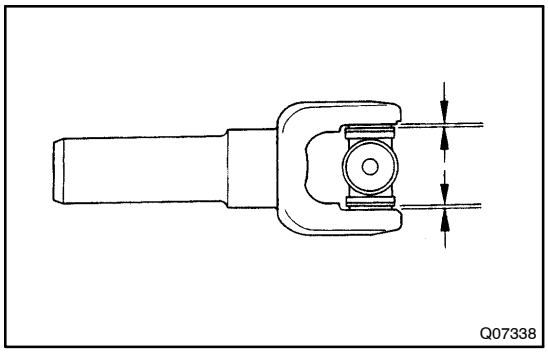
Be careful not to apply too much grease.

(b) Align the matchmark on the yoke with the one on the flange.



(c) Fit the spider into the yoke.

(d) Using SST, install the bearings on the spider.
SST 09332–25010



(e) Using SST, adjust both bearings so that the snap ring grooves are at maximum and equal in width.

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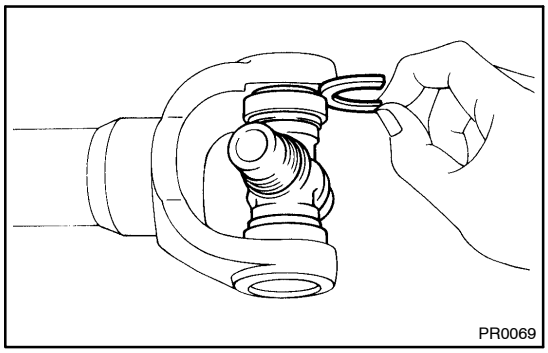

PR0069

7. INSTALL SNAP RINGS

(a) Install 2 new snap rings of equal thickness which will allow no axial play.

HINT:

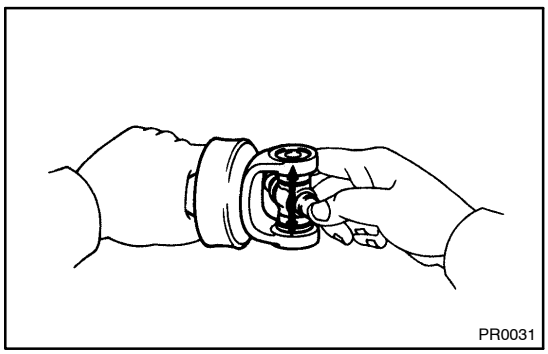
Do not reuse the snap rings.

Thickness of snap ring:

Mark	Color	Thickness mm (in.)
–	1	2.28 – 2.30 mm (0.0898 – 0.0906 in.)
–	2	2.30 – 2.32 mm (0.0906 – 0.0913 in.)
–	–	2.32 – 2.34 mm (0.0913 – 0.0921 in.)
Brown	–	2.34 – 2.36 mm (0.0921 – 0.0929 in.)
Blue	–	2.36 – 2.38 mm (0.0929 – 0.0937 in.)
–	6	2.38 – 2.40 mm (0.0937 – 0.0945 in.)
–	7	2.40 – 2.42 mm (0.0945 – 0.0953 in.)
–	8	2.42 – 2.44 mm (0.0953 – 0.0961 in.)
–	九	2.44 – 2.46 mm (0.0961 – 0.0969 in.)
–	10	2.46 – 2.48 mm (0.0969 – 0.0976 in.)

M00056

(b) Using a hammer, tap the yoke until there is no clearance between the bearing outer race and snap ring.


PR0031

8. CHECK SPIDER BEARING

(See page PR–5)

(a) Check that the spider bearing moves smoothly.

(b) Check the spider bearing axial play.

Maximum bearing axial play: 0 mm (0 in.)

HINT:

- Install a new spider bearing on the flange side in the procedure described above.

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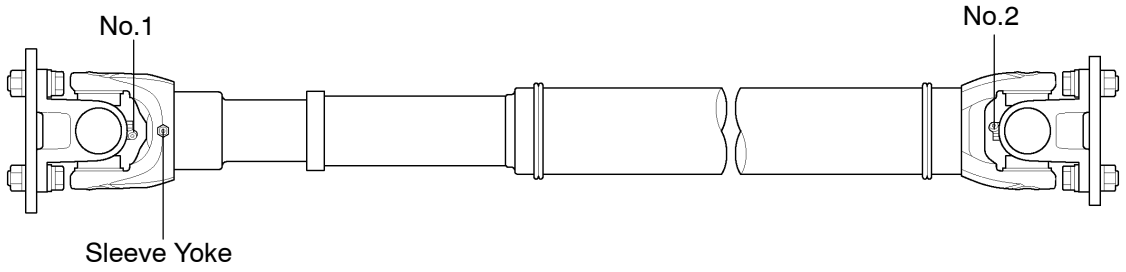
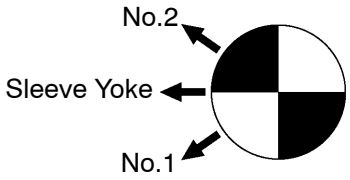
- When replacing the spider bearing, be sure that the grease fitting assembly hole is facing to the direction shown in the illustration.

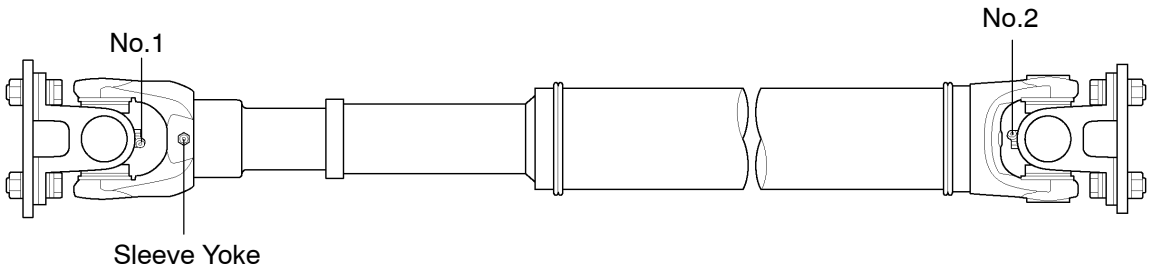
SPIDER GREASE FITTING ASSEMBLY DIRECTION
Front Propeller Shaft





The figure at left shows the locations of the grease fittings as seen from the rear.

SPIDER GREASE FITTING ASSEMBLY DIRECTION
Rear Propeller Shaft



D01633

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TROUBLESHOOTING

PROBLEM SYMPTOMS TABLE

SA140–01

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

(w/ Differential locking system):

- **Check that center differential lock mode is set.**
- **When switching differential Free ↔ Lock, the indicator light will blink if the gears of the differential lock sleeve are not meshed. If this occurs, when the tires are rotated to apply differential power to the differential, the differential locks and the indicator light lights up.**

Symptom	Suspect Area	See page
Wanders/pulls	1. Tire (Worn or improperly inflated)	SA–3
	2. Wheel alignment (Incorrect)	SA–5
	3. Steering linkage (Loosen or worn)	–
	4. Hub bearing (Loosen or worn)	SA–9
	5. Suspension parts (Worn out)	–
	6. Steering gear (Out of adjustment or broken)	–
Bottoming	1. Vehicle (Overloaded)	–
	2. Spring (Weak)	SA–62 SA–168
	3. Shock absorber (Worn out)	SA–59 SA–171
Sways/pitches	1. Tire (Worn or improperly inflated)	SA–3
	2. Stabilizer bar (Bent or broken)	SA–77 SA–181
	3. Shock absorber (Worn out)	SA–59 SA–171
Front wheel shimmy	1. Tire (Worn or improperly inflated)	SA–3
	2. Wheel (Out of balance)	SA–3
	3. Shock absorber (Worn out)	SA–59
	4. Wheel alignment (Incorrect)	SA–5
	5. Ball joint (Worn)	SA–68 SA–73
	6. Hub bearing (Loosen or worn)	SA–9
	7. Steering linkage (Loosen or worn)	–
	8. Steering gear (Out of adjustment or broken)	–
Abnormal tire wear	1. Tire (Improperly inflated)	SA–3
	2. Wheel alignment (Incorrect)	SA–5
	3. Suspension parts (Worn out)	–
	4. Shock absorber (Worn out)	SA–59 SA–171
Noise in front differential	1. Oil level (Low or wrong grade)	SA–32
	2. Excessive backlash between pinion and ring gear	SA–37
	3. Ring, pinion or side gears (Worn or chipped)	SA–37
	4. Pinion shaft bearing (Worn)	SA–37
	5. Side bearing (Worn)	SA–37
Oil leak from front differential	1. Oil level (Too high or wrong grade)	SA–32
	2. Front differential rear oil seal (Worn or damaged)	SA–37
	3. Side gear oil seal (Worn or damaged)	SA–37
	4. Companion flange (Loose or damaged)	SA–37
	5. Side gear shaft (Damaged)	SA–37

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Noise in rear axle	1. Oil level (Low or wrong grade) 2. Excessive backlash between pinion and ring gear 3. Ring, pinion or side gears (Worn or chipped) 4. Pinion shaft bearing (Worn) 5. Axle shaft bearing (Worn)	SA–92 SA–99 SA–118 SA–140 SA–99 SA–118 SA–140 SA–99 SA–118 SA–140 SA–80
Oil leak from rear axle	1. Oil seal (Worn or damaged) 2. Rear axle housing (Cracked)	SA–80 –
Oil leak from rear differential	1. Oil level (Too high or wrong grade) 2. Oil seal (Worn or damaged) 3. Companion flange (Loosen or damaged)	SA–92 SA–92 SA–99 SA–118 SA–140
Diff. lock Indicator lights do not light up	1. Fusible link (Blown) 2. GAUGE fuse (Blown) 3. Bulb (Burned out) 4. Wiring or ground (Faulty)	– – – –
Diff. lock Indicator lights do not light up (Diff. lock control switch RR position)	1. Diff. fuse (Blown) 2. Diff. lock control switch (Faulty) 3. Diff. lock ECU (Faulty) 4. Wiring or ground (Faulty)	– SA–160 SA–160 –
Differential lock does not operate	1. Diff. lock control switch (Faulty) 2. Diff. lock actuator (Faulty) 3. Diff. lock ECU (Faulty) 4. Differential carrier (Faulty) 5. Wiring or ground (Faulty)	SA–160 SA–160 SA–160 – –
After differential lock, lock is not released When vehicle speed is higher than approx. 8 km/h (5 mph)	1. Speed sensor (Faulty) 2. Diff lock ECU (Faulty) 3. Wiring or ground (Faulty)	SA–160 SA–160 –

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TIRE AND WHEEL

SA141–01

INSPECTION

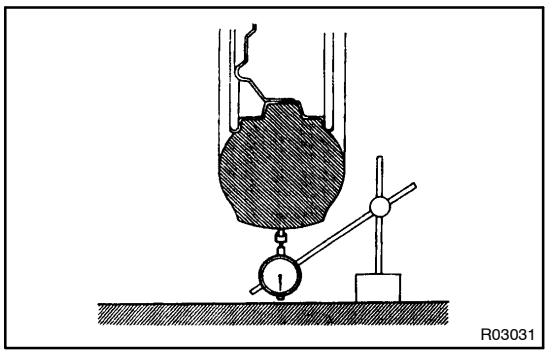
1. INSPECT TIRE

(a) Check the tires for wear and for the proper inflation pressure.

Cold tire inflation pressure

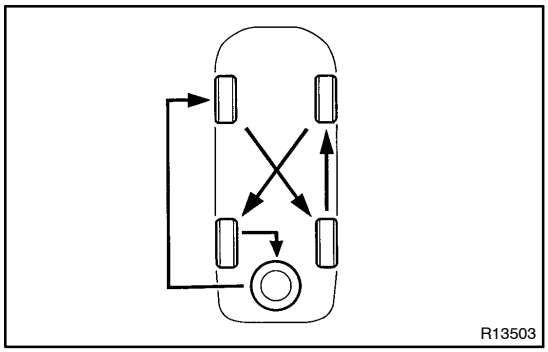
Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P275/70R16	220 (2.2, 32) *220 (2.2, 32)	220 (2.2, 32) *240 (2.4, 35)

*: Trailer towing



(b) Check the tire runout.

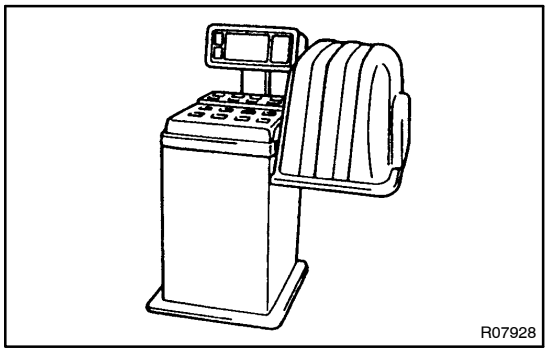
Tire runout: 3.0 mm (0.118 in.) or less



2. ROTATE TIRE

HINT:

See the illustration for where to rotate each tire when you include the spare tire in rotation.



3. INSPECT WHEEL BALANCE

(a) Check and adjust the Off–the car balance.

(b) If necessary, check and adjust the On–the car balance.

Imbalance after adjustment: 14.0 g (0.031 lb) or less

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4. CHECK FRONT SUSPENSION FOR LOOSENESS

5. CHECK STEERING LINKAGE FOR LOOSENESS

6. CHECK BALL JOINT FOR LOOSENESS

7. CHECK SHOCK ABSORBER WORKS PROPERLY

- Check for oil leak
- Check the mounting bushings for wear
- Bounce front and rear of the vehicle

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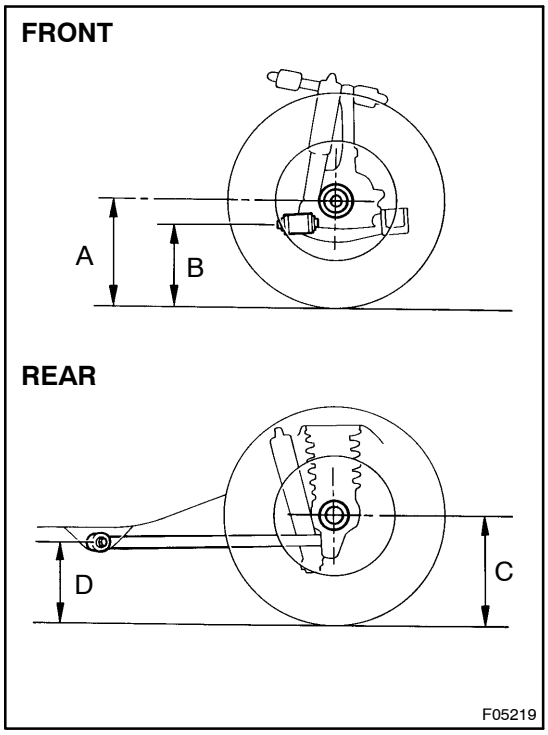


FRONT WHEEL ALIGNMENT

SA142–01

INSPECTION

1. MEASURE VEHICLE HEIGHT

Vehicle height:

Front	A – B: 71 mm (2.795 in.)
Rear	C – D: 51 mm (2.008 in.)

Measure points:

A: Ground clearance of spindle center

B: Ground clearance of lower suspension arm front bolt center

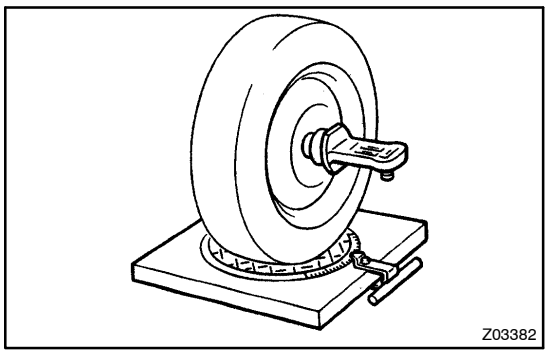
C: Ground clearance of rear axle shaft center

D: Ground clearance of lower control arm front bolt center

NOTICE:

Before inspecting the wheel alignment, adjust the vehicle height to the specification.

If the vehicle height is not within the specification, try to adjust it by pushing down on or lifting the body.



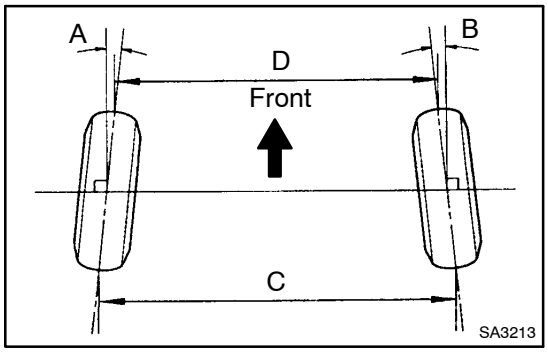
2. INSTALL CAMBER–CASTER–KINGPIN GAUGE OR POSITION VEHICLE ON WHEEL ALIGNMENT TESTER

Follow the specific instructions of the equipment manufacturer.

3. INSPECT CAMBER, CASTER AND STEERING AXIS INCLINATION

Camber	0°05' ± 45' (0.08° ± 0.75°)
Left–right error	30' (0.5°) or less
Caster	2°30' ± 45' (2.5° ± 0.75°)
Left –right error	30' (0.5°) or less
Steering axis inclination	12°10' ± 45' (12.17° ± 0.75°)
Left–right error	30' (0.5°) or less

If the steering axis inclination is not within the specification, after the camber and caster have been correctly adjusted, recheck the steering knuckle front wheel for bearing or looseness.



4. INSPECT TOE–IN

Toe–in (total)	A + B: 0°06' ± 12' (0.1° ± 0.2°)
	C – D: 1 ± 2 mm (0.04 ± 0.08 in.)

If the toe–in is not within the specification, adjust the rack ends.

5. ADJUST CAMBER AND CASTER

NOTICE:

After the camber has been adjusted, inspect the toe–in.

(a) Loosen the front and/or rear adjusting cam nuts.

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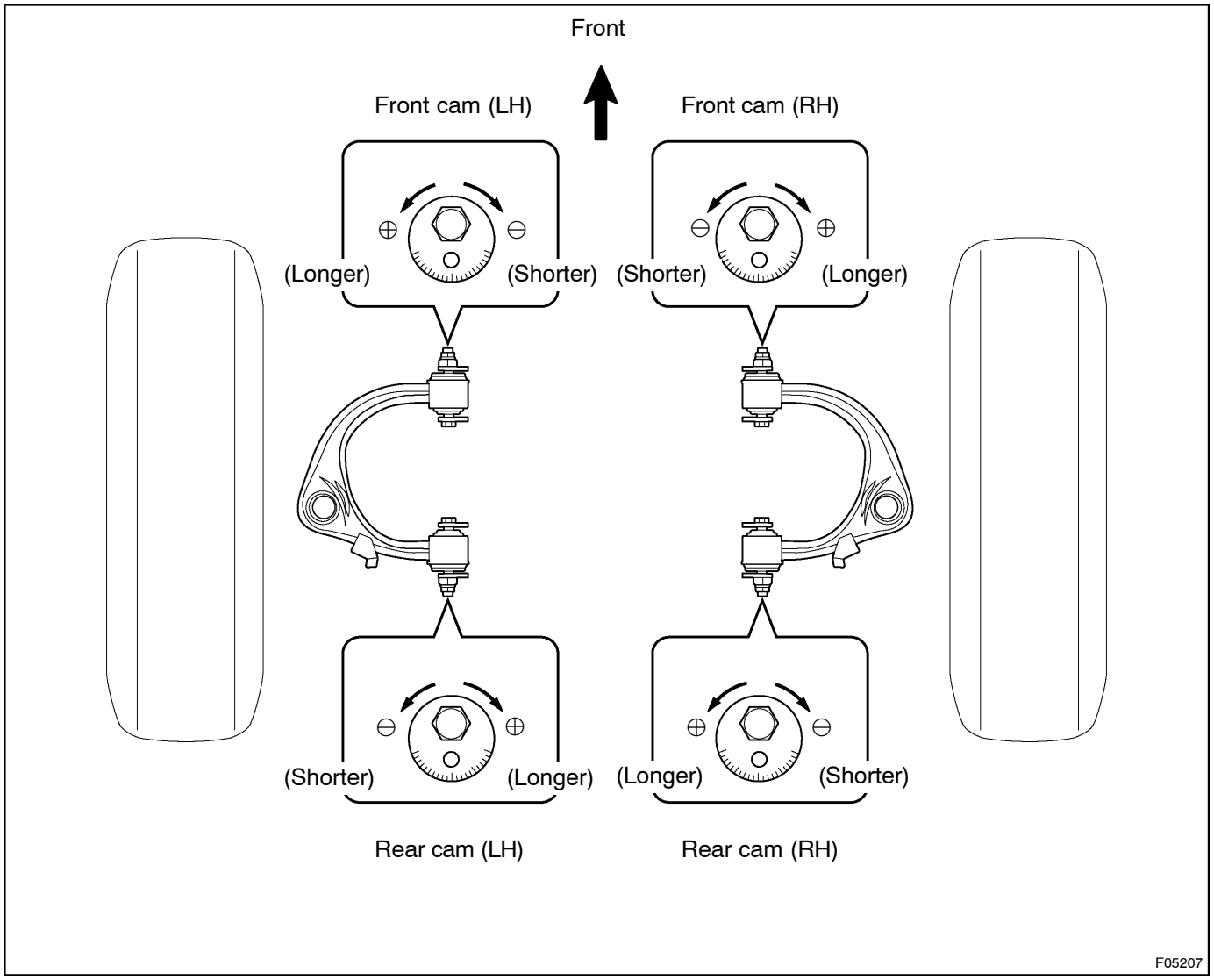
(b) Adjust the camber and caster by front and/or rear adjusting cams.

HINT:

Try to adjust the camber and caster to the center value.



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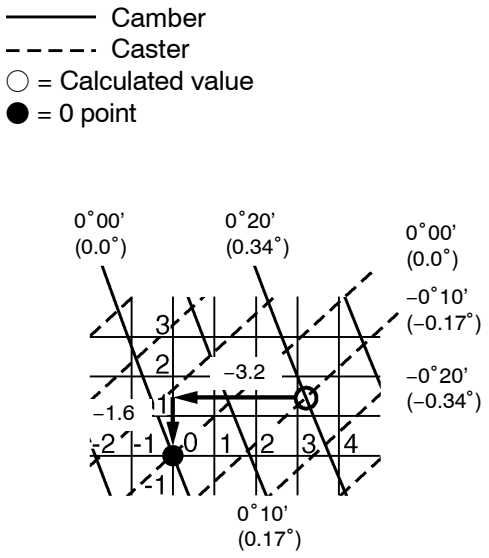
(Example)



(c) How to read adjustment chart (using examples).

(1) Measure the present alignment.

Camber: –0°15' (–0.25°)

Caster: 2°40' (2.67°)

(2) Mark the difference between the standard value (A) and the measured value (B) on the adjustment chart.

Standard value:

Camber: 0°05' (0.08°)

Caster: 2°30' (2.5°)

Formula: A – B = C

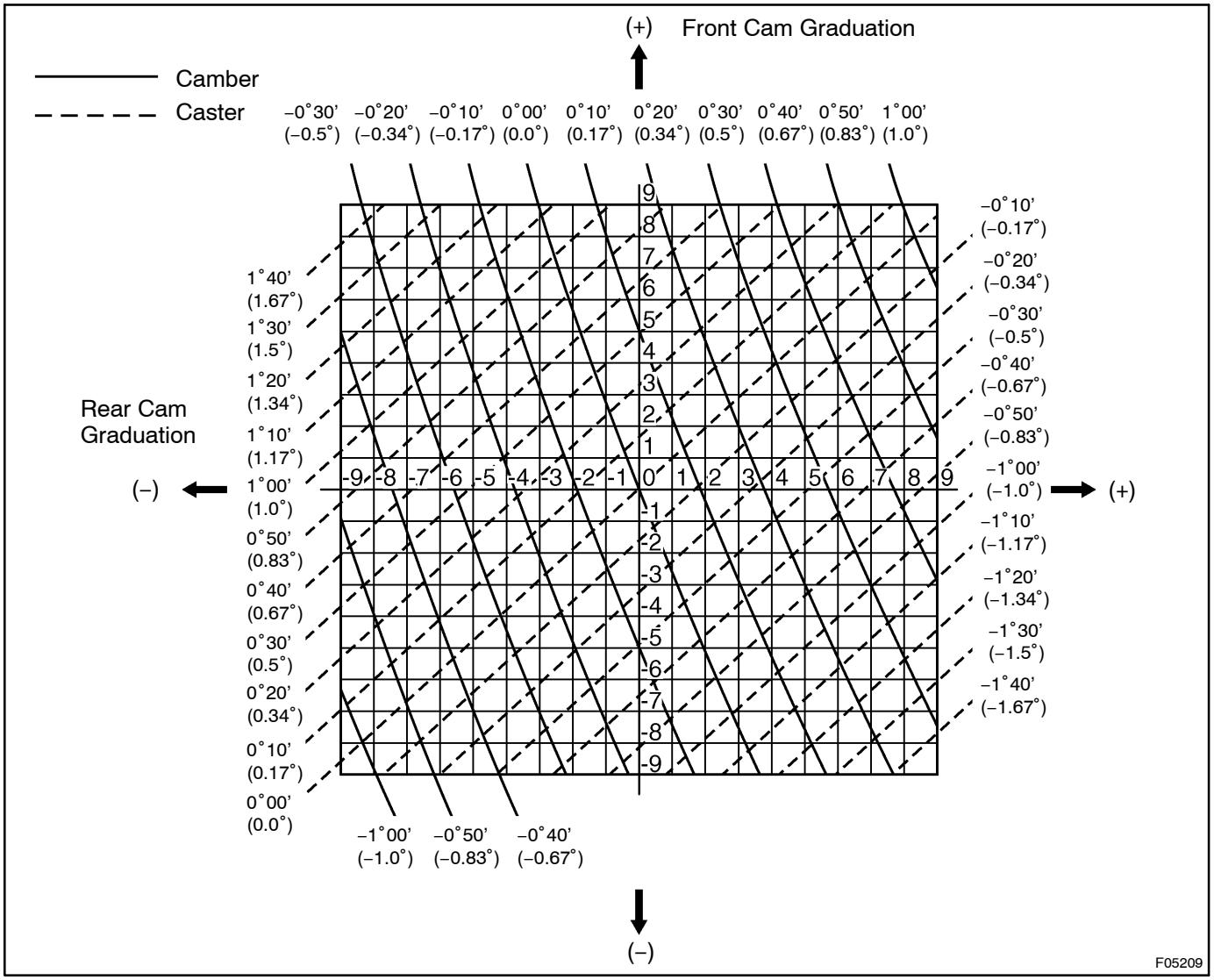
Camber: 0°05' – (–0°15') = 0°20'

Caster: 2°30' – 2°40' = –0°10'

(3) As shown in the chart, read the distance from the marked point to 0 point, and adjust the front and/or rear adjusting cams accordingly.

Front cam: – (Shorter) 1.6

Rear cam: – (Shorter) 3.2



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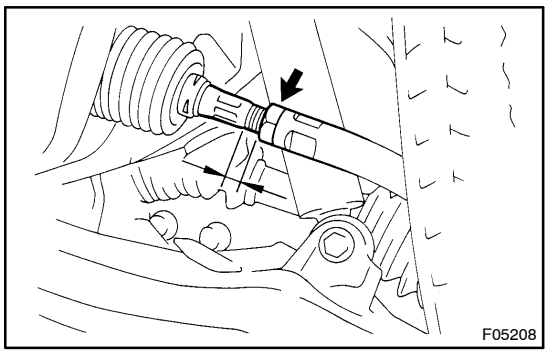
(d) Torque the front and/or rear adjusting cam nuts.
Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)



6. ADJUST TOE–IN

(a) Check or adjust the lengths of the rack ends, then adjust the toe–in.
Rack end length difference: 3.0 mm (0.118 in.) or less

(b) Remove the boot clamps.

(c) Loosen the tie rod lock nuts.

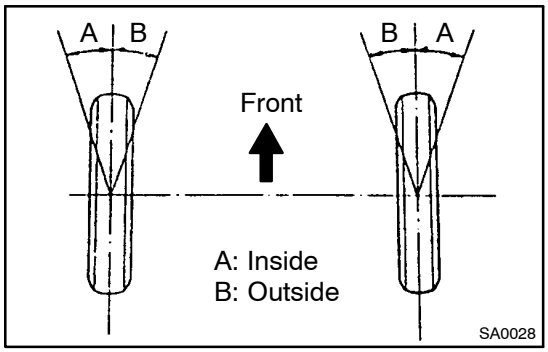
(d) Turn the left and right rack ends an equal amount to adjust the toe–in.

HINT:
Try to adjust the toe–in to the center value.

(e) Tighten the tie rod lock nuts.

(f) Place the boot on the seat and clamp it.

HINT:
Make sure that the boots are not twisted.

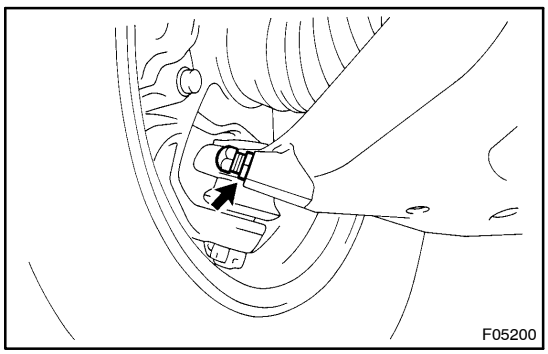


7. INSPECT AND ADJUST WHEEL ANGLE

(a) Turn the steering wheel fully, and measure the turning angle.

Inside wheel	36°42' (33°42' – 36°42') 36.7° (33.7° – 36.7°)
Outside wheel (Reference)	32°36' 32.6°

If the wheel angles differ from the standard of the specification, inspect the toe–in.



(b) When toe–in is normal after inspection, adjust wheel angle with the knuckle stopper bolt of the lower suspension arm.
Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

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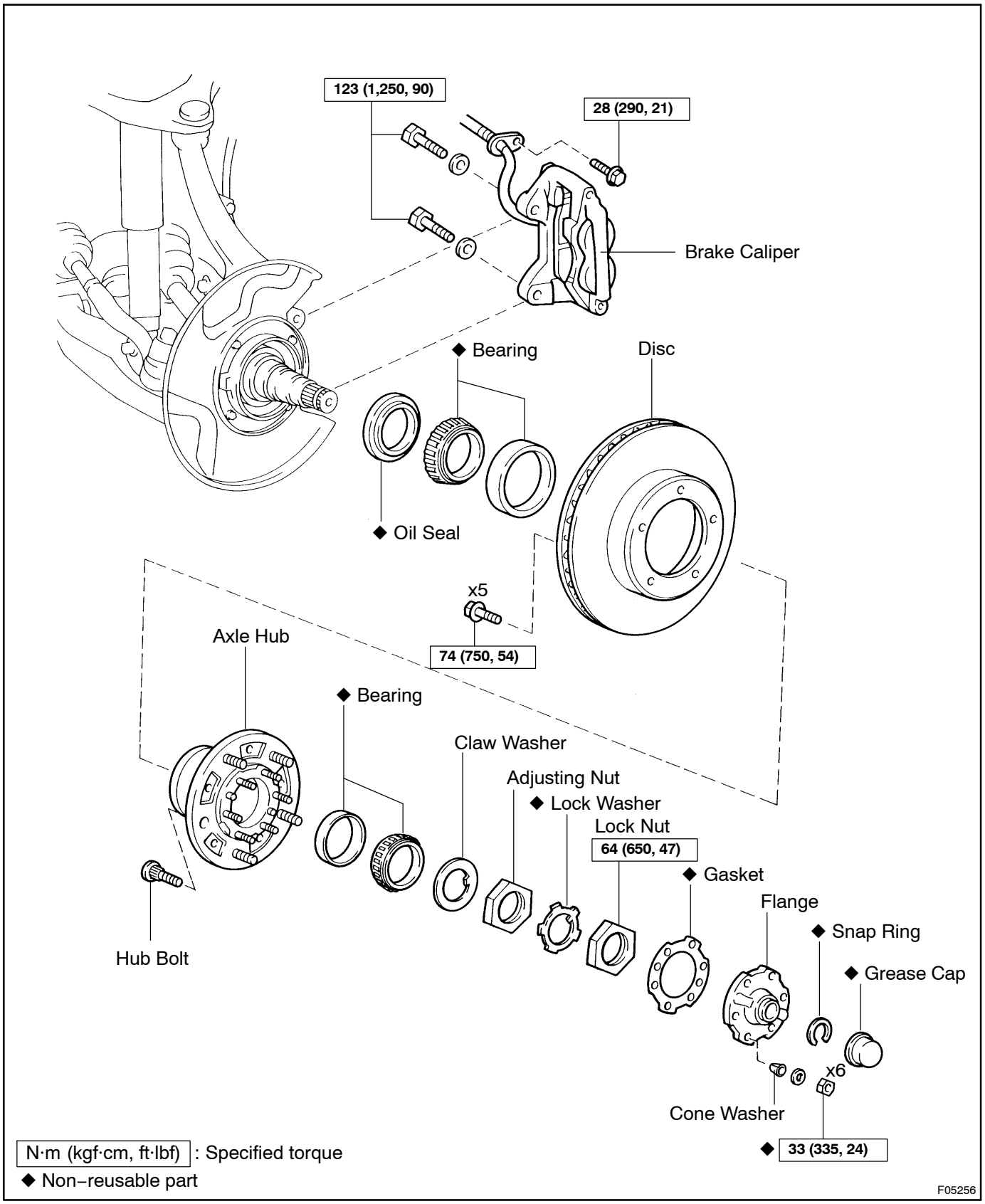
FRONT AXLE HUB

COMPONENTS

SA143–01



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

◆ Non–reusable part

F05256

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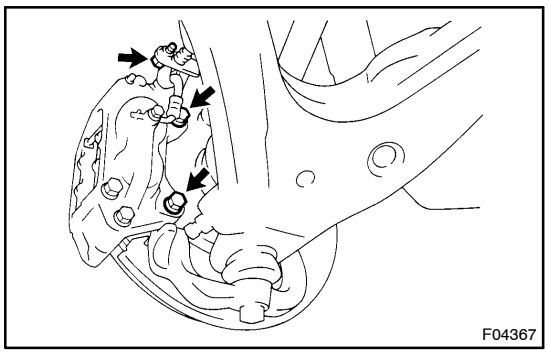
SA144–01

REMOVAL

1. REMOVE FRONT WHEEL

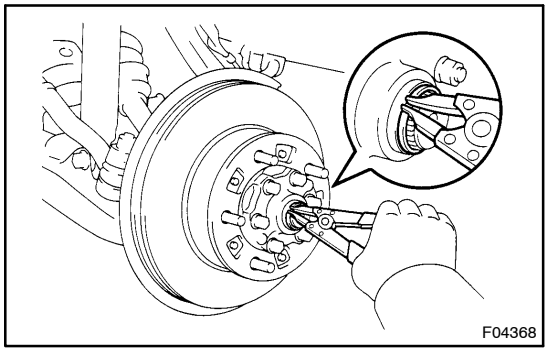


2. REMOVE BRAKE CALIPER

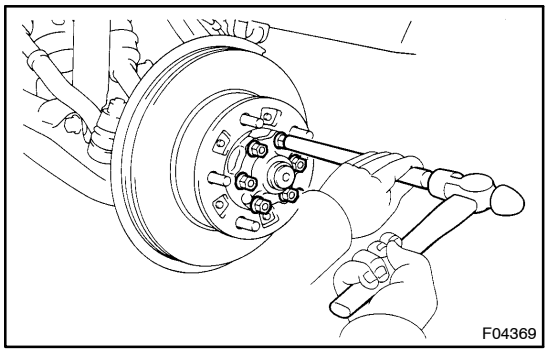
(a) Remove the bolt and disconnect the flexible hose from the steering knuckle.
(b) Remove the 2 bolts, washers and brake caliper.
(c) Support the brake caliper securely.

3. REMOVE FLANGE

(a) Using a screwdriver and hammer, remove the grease cap from the flange.



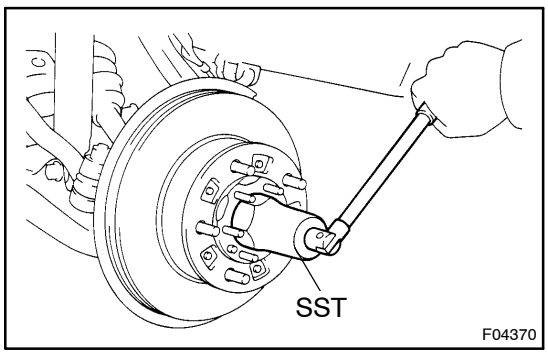
(b) Using a snap ring expander, remove the snap ring.
(c) Remove the 6 nuts and washers.
(d) Install the nuts temporarily to protect the threads of the stud bolts.



(e) Using a brass bar and hammer, tap on the bolt heads and remove the 6 nuts and cone washers.
(f) Remove the flange and gasket.

4. REMOVE AXLE HUB WITH DISC

(a) Using a screwdriver, release the lock washer.



(b) Using SST, remove the lock nut.
SST 09607–60020
(c) Remove the lock washer.
(d) Using SST, remove the adjusting nut.
SST 09607–60020
(e) Remove the axle hub with disc.

NOTICE:

Be careful not to damage the ABS speed sensor rotor and oil seal.

(f) Remove the claw washer and bearing from the axle hub.

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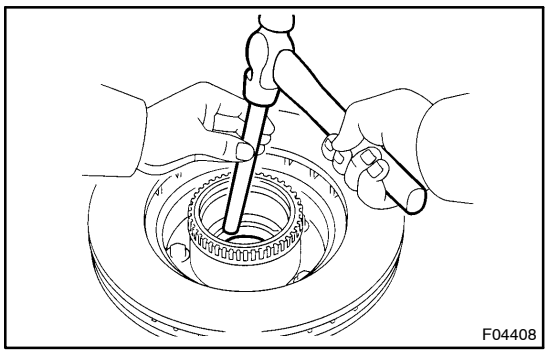
SA145–01

DISASSEMBLY

1. REMOVE OIL SEAL AND BEARING

(a) Using a screwdriver, pry out the oil seal.

(b) Remove the bearing from the axle hub.

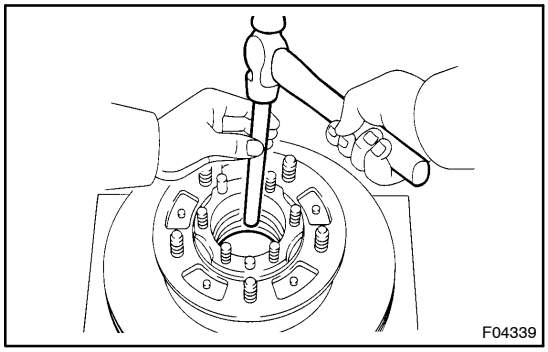


2. REMOVE BEARING OUTER RACES

(a) Using a brass bar and hammer, remove the outside bearing outer race.

NOTICE:

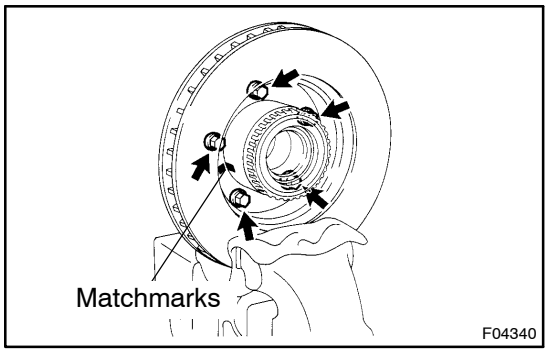
Be careful not to damage the ABS speed sensor rotor.



(b) Using a brass bar and hammer, remove the inside bearing outer race.

3. INSPECT BEARINGS

Clean the bearings and outer races and inspect them for wear or damage.



4. REMOVE DISC

(a) Mount the axle hub with the disc in a soft jaw vice.

NOTICE:

Close vice until it holds disc, do not tighten further.

(b) Place matchmarks on the axle hub and disc.

(c) Remove the 5 bolts and separate the axle hub and disc.

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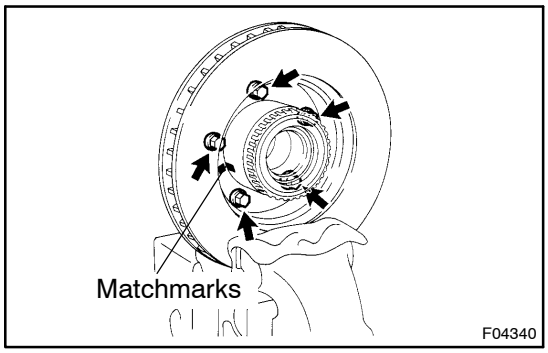
SA146–01

REASSEMBLY



1. INSTALL DISC

(a) Mount the disc in a soft jaw vice.

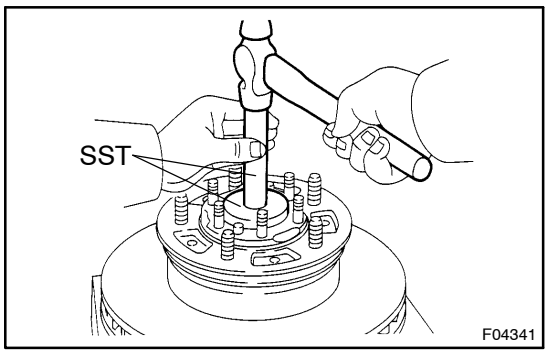
NOTICE:

Close vice until it holds disc, do not tighten further.

(b) Align the matchmarks on the axle hub and disc.

(c) Install the 5 bolts to the axle hub.

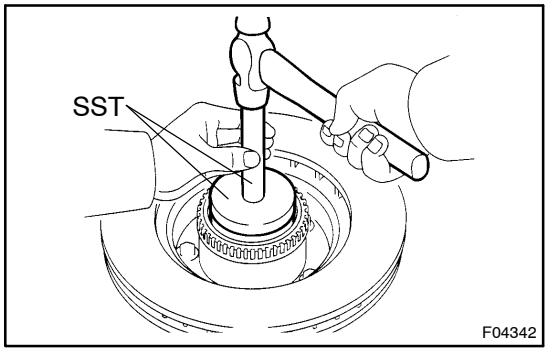
Torque: 74 N·m (750 kgf·cm, 54 ft·lbf)



2. INSTALL BEARING OUTER RACES

(a) Using SST and a hammer, carefully install a new outside bearing outer race.

SST 09950–60020 (09951–00730),
09950–70010 (09951–07100)

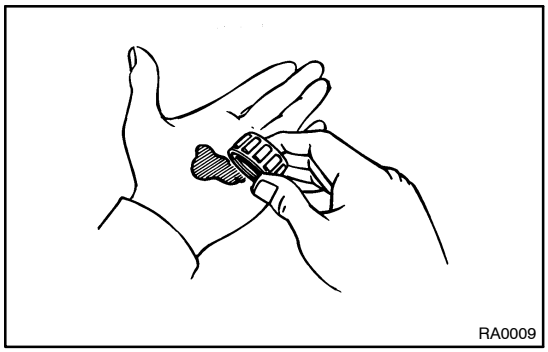


(b) Using SST and a hammer, carefully install a new inside bearing outer race.

SST 09950–60020 (09951–00890),
09950–70010 (09951–07100)

NOTICE:

Be careful not to damage the ABS speed sensor rotor.

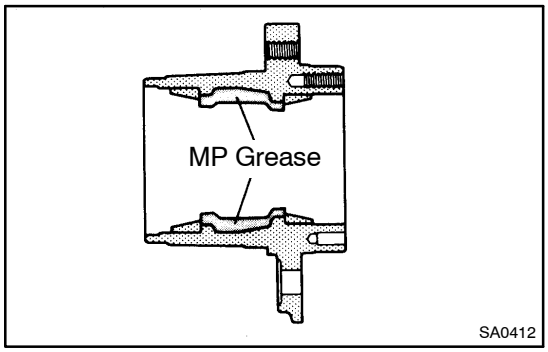


3. PACK BEARING WITH MP GREASE

(a) Place MP grease in the palm.

(b) Pack grease into the bearing, continuing until the grease oozes out from the other side.

(c) Employ the same manner around the bearing circumference.



4. COAT INSIDE OF AXLE HUB WITH MP GREASE

5. INSTALL INNER BEARING AND OIL SEAL

(a) Place the inner bearing into the axle hub.

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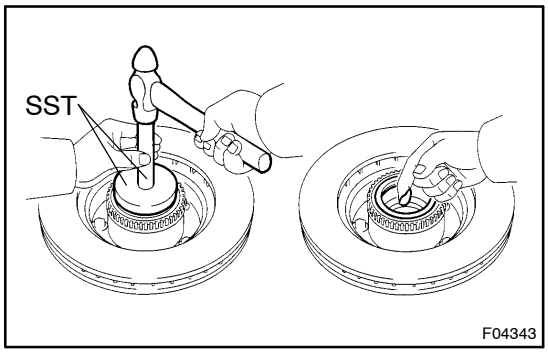

(b) Using SST and a hammer, install a new oil seal into the axle hub.
SST 09950–60020 (09951–01030),
09950–70010 (09951–07100)

NOTICE:
Be careful not to damage the ABS speed sensor rotor.

(c) Coat the lip of the oil seal with MP grease.

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SA147–01

INSTALLATION

1. INSTALL AXLE HUB TO STEERING KNUCKLE

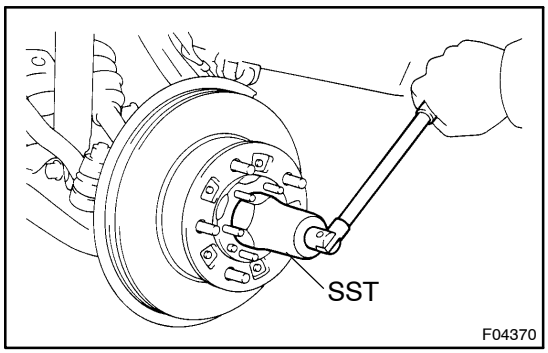
(a) Place the axle hub to the steering knuckle.

NOTICE:

Be careful not to damage the ABS speed sensor rotor and oil seal.

(b) Install the outer bearing.

(c) Install the claw washer.



2. ADJUST PRELOAD

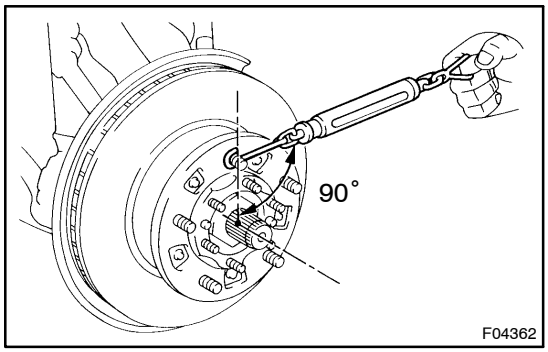
(a) Install the adjusting nut and tighten it using SST.
SST 09607–60020
Torque: 59 N·m (600 kgf·cm, 43 ft·lbf)

(b) Turn the axle hub several times to settle down the bearing.

(c) Using SST, retighten the adjusting nut to then loosen it until it can rotate by hand.
SST 09607–60020
Torque: 59 N·m (600 kgf·cm, 43 ft·lbf)

(d) Using SST, retighten the adjusting nut.
SST 09607–60020
Torque: 4.3 – 6.5 N·m (44 – 66 kgf·cm, 38 – 57 in.·lbf)

HINT:
Check that there is no looseness on the bearing.

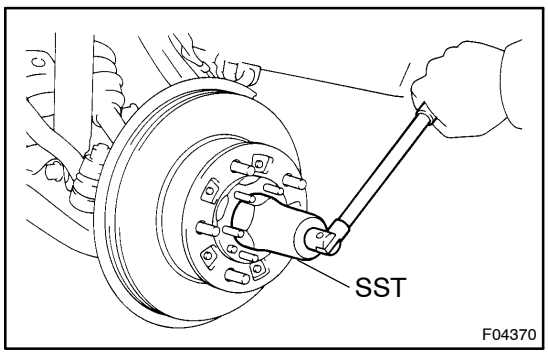


(e) Using a spring tension gauge, measure the preload.
Preload (at starting):
3.1 – 5.0 N·m (32 – 51 kgf·cm, 27.8 – 44.2 in.·lbf)

HINT:
Make sure to check preload in the direction of rotation.
If the preload is not within the specification, adjust it again with the adjusting nut.

3. INSTALL LOCK WASHER AND LOCK NUT

(a) Install a new lock washer and the lock nut.



(b) Using SST, torque the lock nut.
SST 09607–60020
Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)

(c) Check that the axle hub rotates smoothly and there is no looseness on the bearing.

(d) Secure the lock nut by bending one of the lock washer teeth inward and the other lock washer teeth outward.

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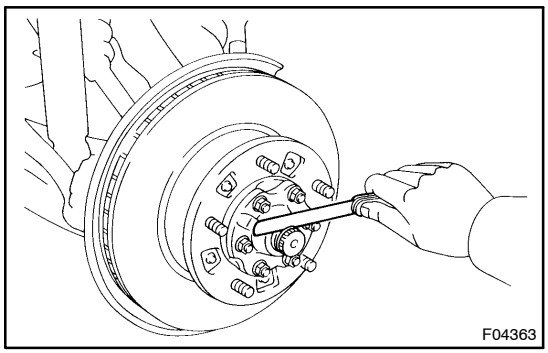
4. INSTALL FLANGE

(a) Place a new gasket in position on the axle hub.

(b) Install the flange to the axle hub.

(c) Install the 6 cone washers, washers and new nuts.

Torque: 33 N·m (335 kgf·cm, 24 ft·lbf)



(d) Pull out the drive shaft outside the vehicle and select the snap ring which ensures the clearance between the tip of the flange and the snap ring is less than 0.2 mm (0.008 in.).

Snap ring thickness

1.8 mm (0.0709 in.)	2.4 mm (0.0945 in.)
2.0 mm (0.0787 in.)	2.6 mm (0.1024 in.)
2.2 mm (0.0866 in.)	2.8 mm (0.1102 in.)

(e) Using a snap ring expander, install a new snap ring to the drive shaft.

(f) Install a new grease cap to the flange.

5. INSTALL BRAKE CALIPER

(a) Install the brake caliper with 2 bolts.

Torque: 123 N·m (1,250 kgf·cm, 90 ft·lbf)

(b) Install the flexible hose and bolt to the steering knuckle.

Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)

6. INSTALL FRONT WHEEL

Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

7. CHECK ABS SPEED SENSOR SIGNAL

(See page DI–219)

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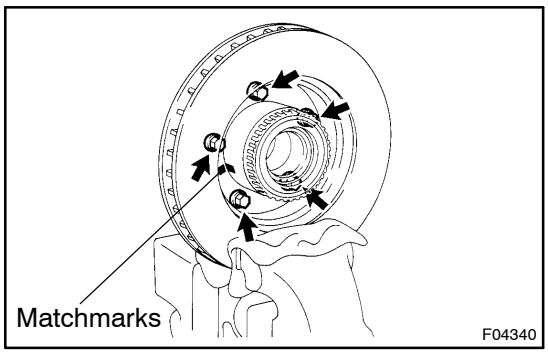
FRONT WHEEL HUB BOLT

SA148–01

REPLACEMENT

1. **REMOVE FRONT AXLE HUB (See page SA–10)**



2. **REMOVE HUB BOLT**

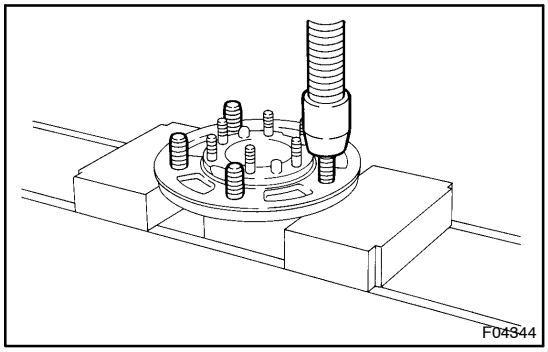
(a) Mount the axle hub with the disc in a soft jaw vice.

NOTICE:

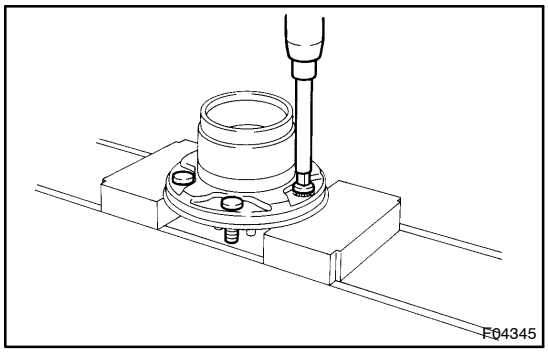
Close vice until it holds disc, do not tighten further.

(b) Place matchmarks on the axle hub and disc.

(c) Remove the 5 bolts and separate the axle hub from the disc.

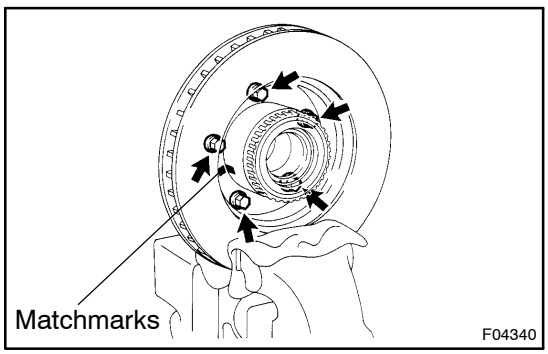


(d) Using a press, remove the hub bolt.



3. **INSTALL HUB BOLT**

(a) Using an extension bar and press, install a new hub bolt.



(b) Align the matchmarks and install the axle hub to the disc, and install the 5 bolts.

Torque: 74 N·m (750 kgf·cm, 54 ft·lbf)

4. **INSTALL FRONT AXLE HUB (See page SA–14)**

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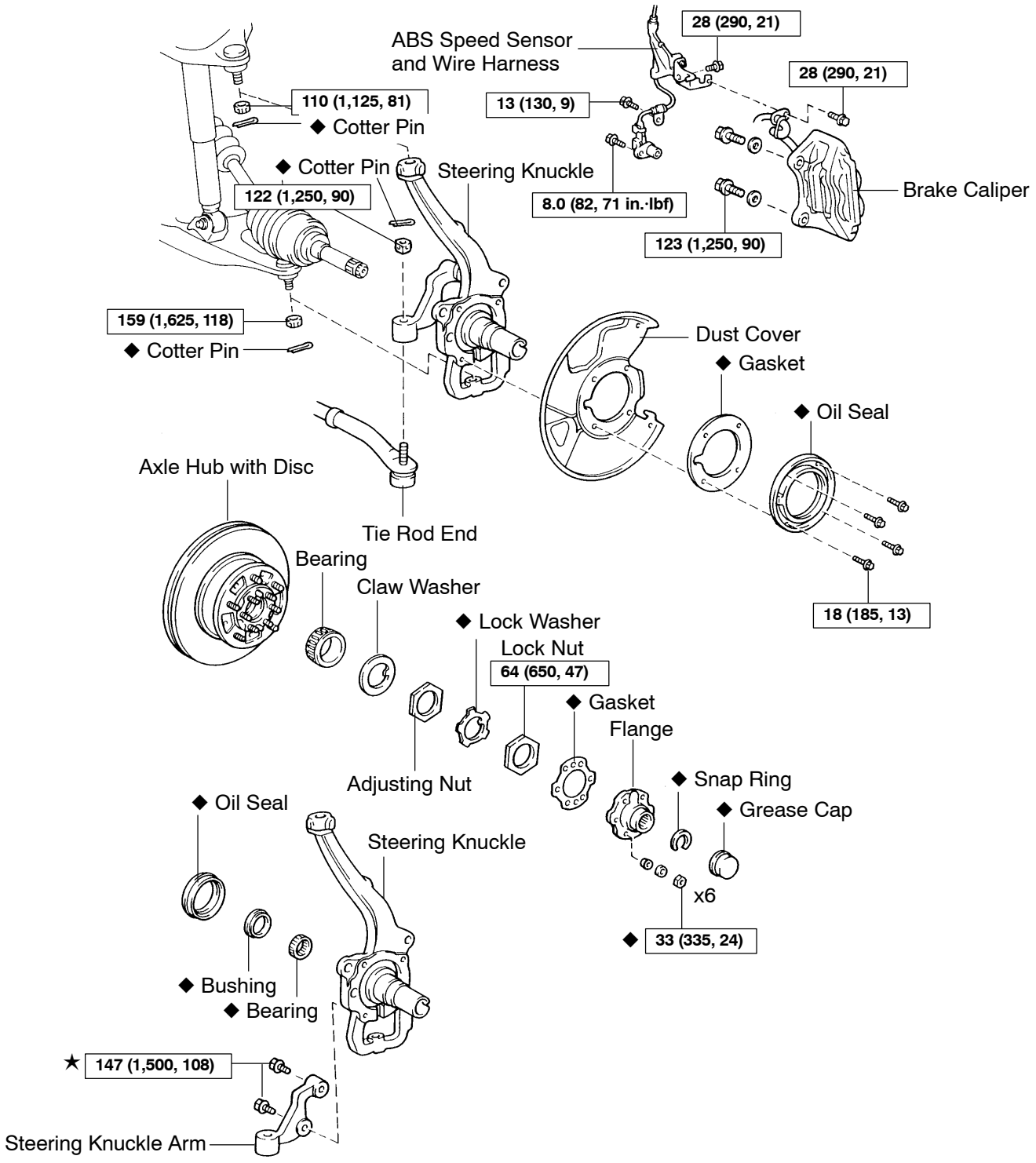
STEERING KNUCKLE

COMPONENTS

SA149–01



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

F05160

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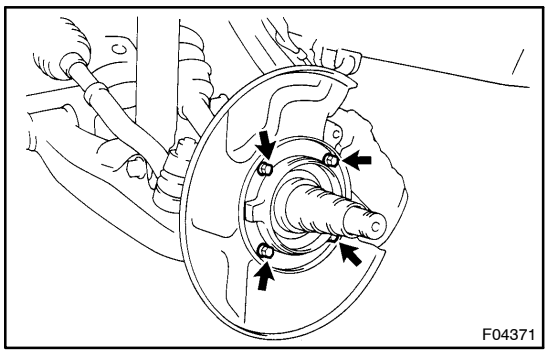
SA14A–01

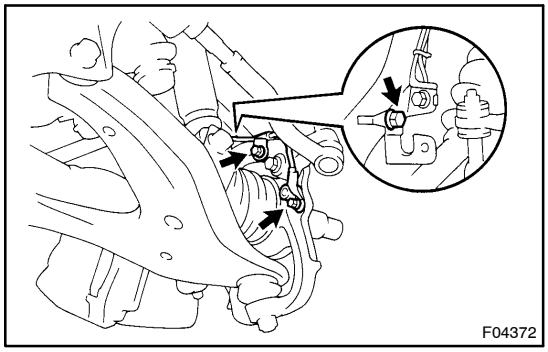
REMOVAL

1. REMOVE FRONT AXLE HUB (See page SA–10)



2. REMOVE OIL SEAL, GASKET AND DUST COVER

Remove the 4 bolts, oil seal, gasket and dust cover.

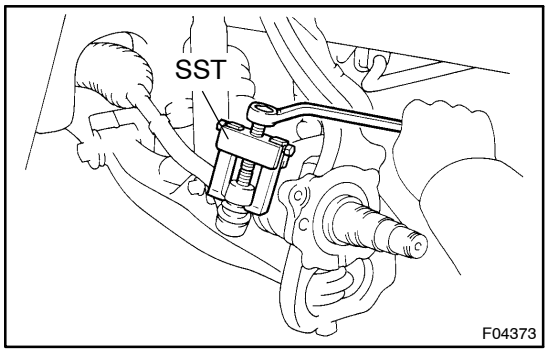


3. DISCONNECT ABS SPEED SENSOR AND WIRE HARNESS

Remove the 3 bolts and disconnect the ABS speed sensor and wire harness.

4. DISCONNECT TIE ROD END FROM STEERING KNUCKLE ARM

(a) Remove the cotter pin and nut.

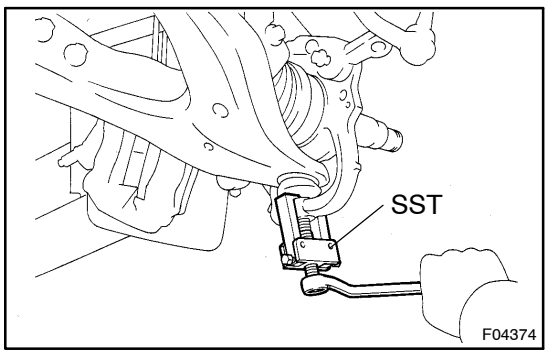


(b) Using SST, disconnect the tie rod end from the steering knuckle arm.

SST 09628–62011

5. DISCONNECT LOWER SUSPENSION ARM FROM STEERING KNUCKLE

(a) Remove the cotter pin and nut.



(b) Using SST, disconnect the lower suspension arm from the steering knuckle.

SST 09628–62011

6. REMOVE STEERING KNUCKLE

(a) Remove the cotter pin and nut.

(b) Temporarily install the nut to the lower suspension arm.

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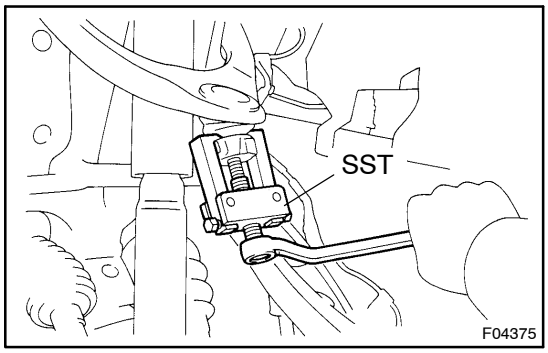

(c) Using SST, disconnect the steering knuckle from the upper suspension arm.
SST 09628–62011

(d) Remove the nut and steering knuckle from the lower suspension arm.

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SA14B–01

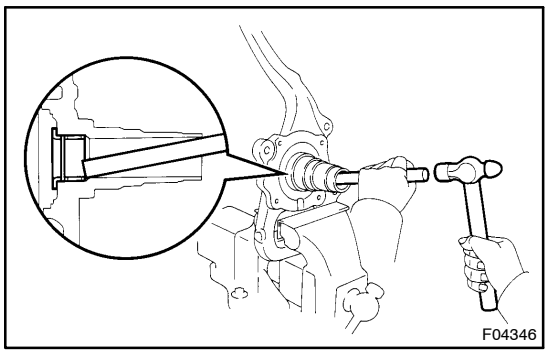
DISASSEMBLY

1. REMOVE STEERING KNUCKLE ARM

Remove the 2 bolts and steering knuckle arm.

2. REMOVE OIL SEAL

Using a screwdriver and hammer, remove the oil seal.



3. REMOVE BEARING AND BUSHING

Using a brass and hammer, remove the bearing and bushing.

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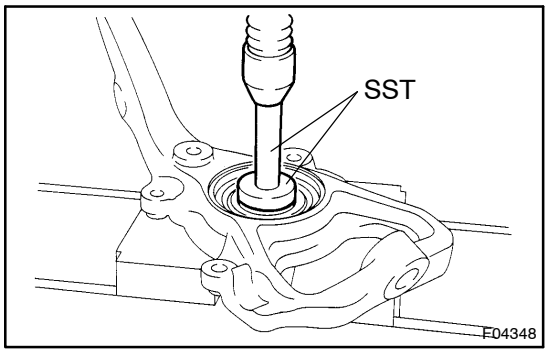
SA14C–01

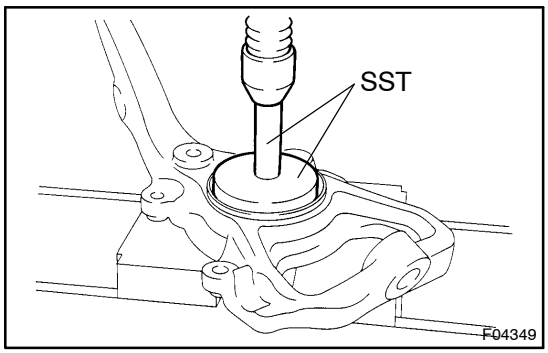
REASSEMBLY



1. INSTALL BEARING AND BUSHING

(a) Using SST and a press, install a new bearing and bushing.
SST 09950–60010 (09951–00540),
09950–70010 (09951–07100)

(b) Apply synthetic oil and lithium soap base chassis grease, NLGI No.1 to the steering knuckle inner side of bushing.



2. INSTALL OIL SEAL

(a) Using SST and a press, install a new oil seal.
SST 09950–60020 (09951–00910),
09950–70010 (09951–07100)

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

3. INSTALL STEERING KNUCKLE ARM

(a) Clean the threads of the 2 bolts and steering knuckle with toluene or trichloroethylene.

(b) Apply sealant to the bolt threads.
Sealant:
Part No. 08833–00070, THREE BOND 1324 or equivalent

(c) Install the steering knuckle arm with 2 bolts.
Torque: 147 N·m (1,500 kgf·cm, 108 ft·lbf)

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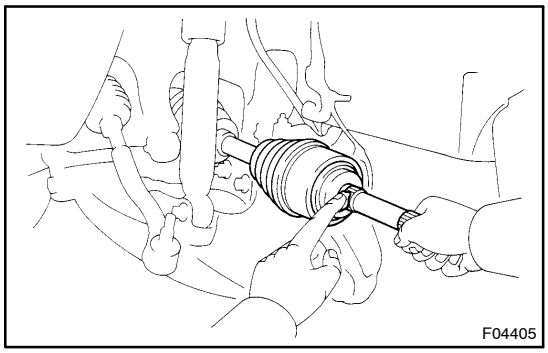
SA14D–01



INSTALLATION

1. INSTALL STEERING KNUCKLE

(a) Apply synthetic oil and lithium soap base chassis grease, NLGI No.1 to the drive shaft.

(b) Support the lower suspension arm with jack and connect the steering knuckle to the lower suspension arm.

NOTICE:

Be careful not to damage the oil seal.

(c) Temporarily install the nut to lower suspension arm.

(d) Raise up the lower suspension arm using a jack and install the steering knuckle to the upper suspension arm with a nut.

Torque: 110 N·m (1,125 kgf·cm, 81 ft·lbf)

(e) Install a new cotter pin.

(f) Torque the nut of the lower suspension arm.

Torque: 159 N·m (1,625 kgf·cm, 118 ft·lbf)

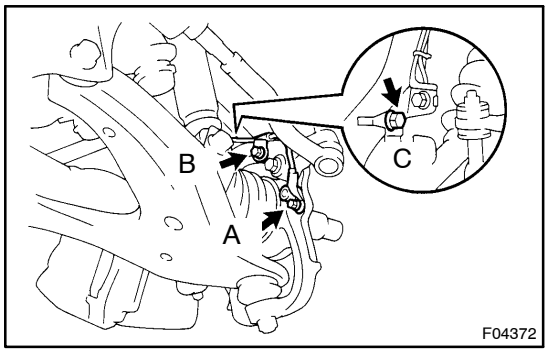
(g) Install a new cotter pin.

2. CONNECT TIE ROD END

(a) Connect the tie rod end to steering knuckle with nut.

Torque: 122 N·m (1,250 kgf·cm, 90 ft·lbf)

(b) Install a new cotter pin.



3. CONNECT ABS SPEED SENSOR AND WIRE HARNESS

Install the 3 bolts.

Torque:

A: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

B: 13 N·m (130 kgf·cm, 9 ft·lbf)

C: 28 N·m (290 kgf·cm, 21 ft·lbf)

4. INSTALL DUST COVER, GASKET AND OIL SEAL

Install the dust cover, gasket and oil seal with 4 bolts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

5. INSTALL FRONT AXLE HUB (See page SA–14)

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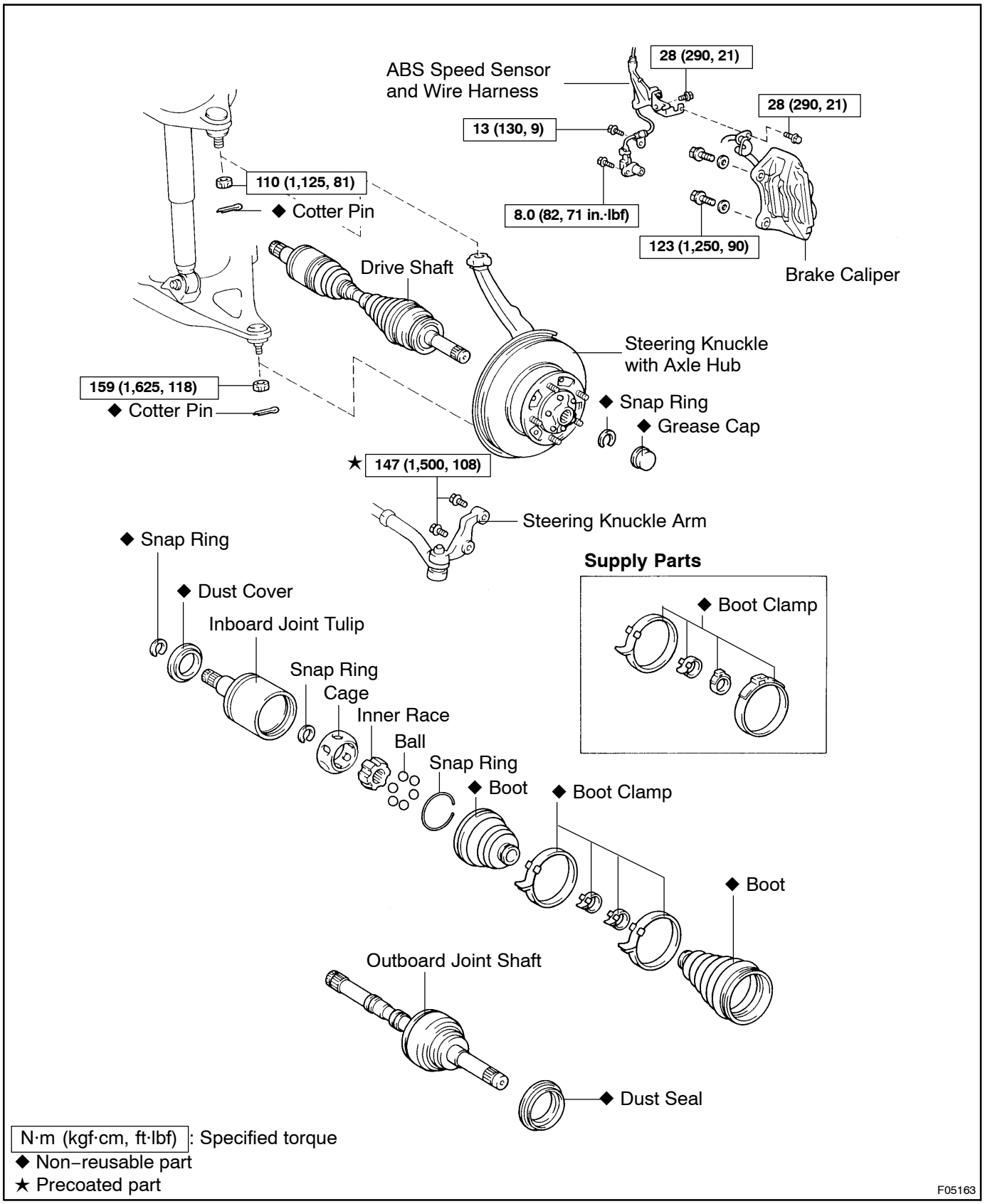
FRONT DRIVE SHAFT

COMPONENTS

SA14E–01



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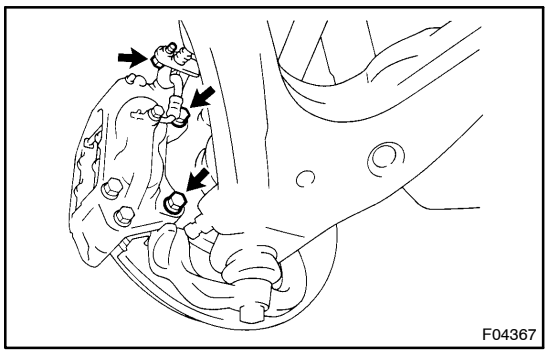
SA14F–01

REMOVAL

1. REMOVE FRONT WHEEL

Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)



2. REMOVE BRAKE CALIPER

(a) Remove the bolt and flexible hose from the steering knuckle.

Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)

(b) Remove the 2 bolts, washers and brake caliper.

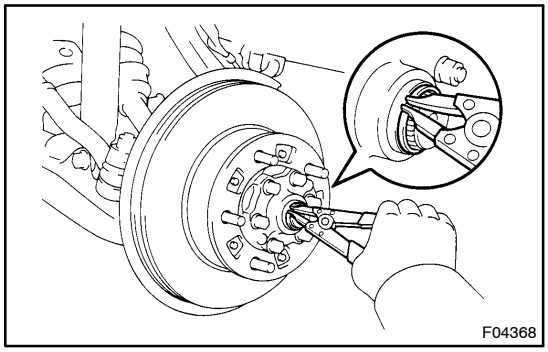
Torque: 123 N·m (1,250 kgf·cm, 90 ft·lbf)

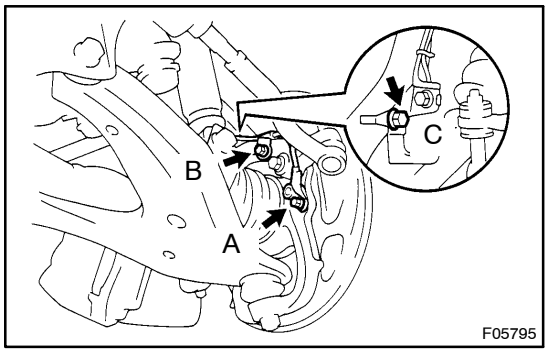
(c) Support the brake caliper securely.

3. REMOVE SNAP RING

(a) Using a screwdriver and hammer, remove the grease cap from the flange.

(b) Using snap ring pliers, remove the snap ring.





4. DISCONNECT ABS SPEED SENSOR AND WIRE HARNESS

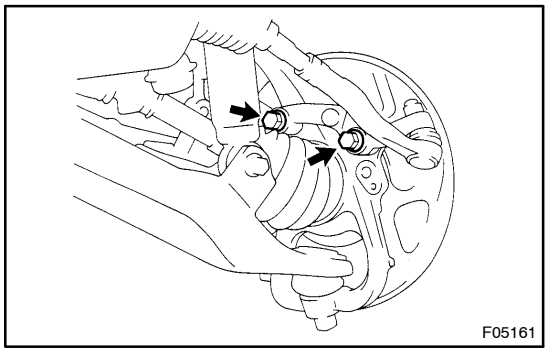
Remove the 3 bolts and disconnect the ABS speed sensor and wire harness.

Torque:

A: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

B: 13 N·m (130 kgf·cm, 9 ft·lbf)

C: 28 N·m (290 kgf·cm, 21 ft·lbf)



5. DISCONNECT STEERING KNUCKLE ARM

Remove the 2 bolts and disconnect the steering knuckle arm.

Torque: 147 N·m (1,500 kgf·cm, 108 ft·lbf)

HINT:

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

- Clean the threads of the 2 bolts and steering knuckle with toluene or trichloroethylene.

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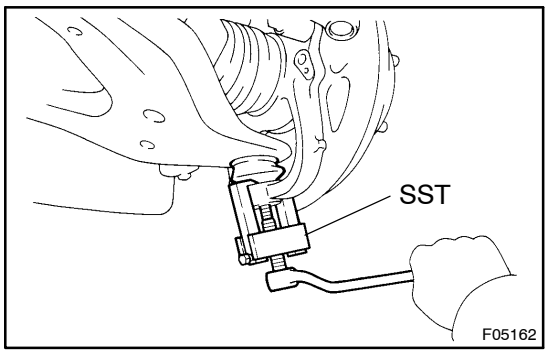
- Apply sealant to the bolt threads.
  Sealant:
  Part No. 08833–00070, THREE BOND 1324
  or equivalent

6. DISCONNECT STEERING KNUCKLE FROM LOWER SUSPENSION ARM

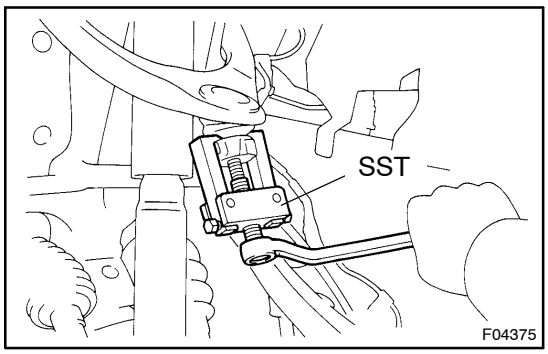
(a) Remove the cotter pin and nut.
Torque: 159 N·m (1,625 kgf·cm, 118 ft·lbf)



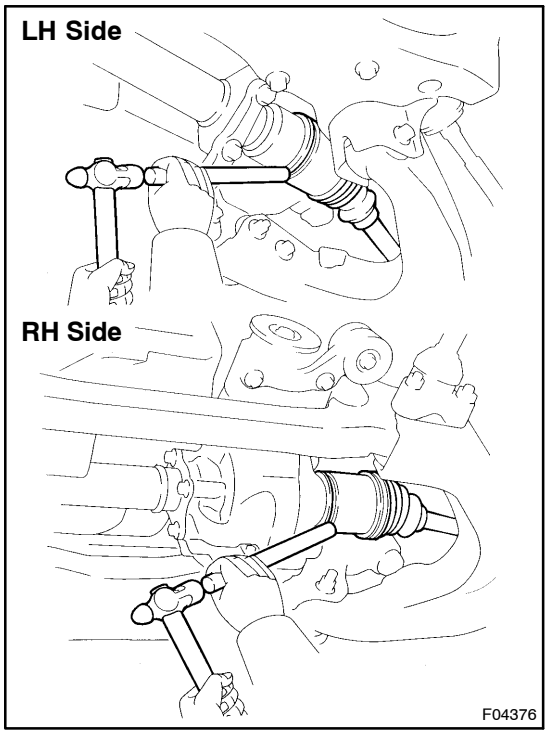
(b) Using SST, disconnect the steering knuckle from the lower suspension arm.
SST 09628–62011

7. REMOVE STEERING KNUCKLE WITH AXLE HUB

(a) Support the lower suspension arm with a jack.
(b) Remove the cotter pin and nut.
Torque: 110 N·m (1,125 kgf·cm, 81 ft·lbf)
(c) Temporarily install the nut to the lower suspension arm.



(d) Using SST, disconnect the steering knuckle from the upper suspension arm.
SST 09628–62011
(e) Remove the nut and steering knuckle with axle hub.



8. REMOVE DRIVE SHAFT

(a) Using a brass bar and hammer, remove the drive shaft.

NOTICE:

Be careful not to damage the boot, dust cover and oil seal.

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

HINT:

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

- Coat the oil seal lip with MP grease.
- Before installation, set a new snap ring with opening side facing downward.
- After installation, check that the drive shaft cannot be pulled out by hand.

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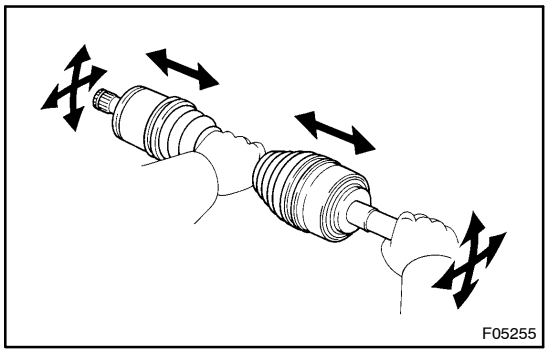
SA14G–01

DISASSEMBLY



1. CHECK DRIVE SHAFT

(a) Check to see that there is no remarkable play in the outboard joint.

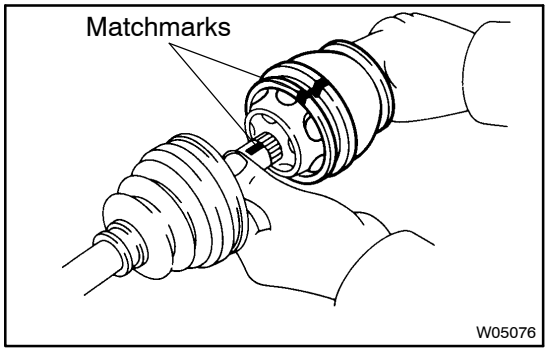
(b) Check to see that inboard joint slides smoothly in the thrust direction.

(c) Check to see that there is no remarkable play in the radial direction of the inboard joint.

(d) Check for damage to boots.

2. UNSTAKE INBOARD JOINT BOOT CLAMPS

Using a screwdriver, unstake the 2 inboard joint boot clamps.



3. REMOVE INBOARD JOINT TULIP

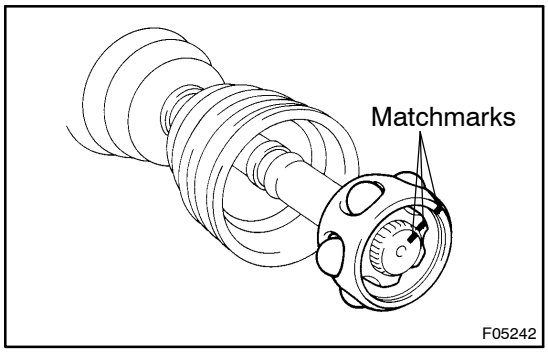
(a) Place matchmarks on the inboard joint tulip and outboard joint shaft.

NOTICE:

Do not punch the marks.

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

(c) Remove the inboard joint tulip from the outboard joint shaft.



4. DISASSEMBLE INBOARD JOINT

(a) Place matchmarks on the outboard joint shaft, inner race and cage.

NOTICE:

Do not punch the marks.

(b) Remove the 6 balls.

(c) Slide the cage to the outboard joint side.

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

(e) Using a brass bar and hammer, remove the inner race.

NOTICE:

Be careful not to damage the inner race.

(f) Remove the cage.

5. REMOVE INBOARD JOINT BOOT AND CLAMPS

6. REMOVE OUTBOARD JOINT BOOT CLAMPS

(a) Using a screwdriver, unstake the 2 outboard joint boot clamps.

HINT:

When the supplied part is used, using a side cutter, cut the 2 outboard joint boot clamps and remove them.

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(b) Remove the 2 outboard joint boot clamps and outboard joint boot.

NOTICE:

Do not disassemble the outboard joint.

7. REMOVE DUST COVER

Using a screwdriver and hammer, remove the dust cover from the inboard joint tulip.

8. REMOVE DUST SEAL

Using a screwdriver and hammer, remove the dust seal from the outboard joint shaft assembly.

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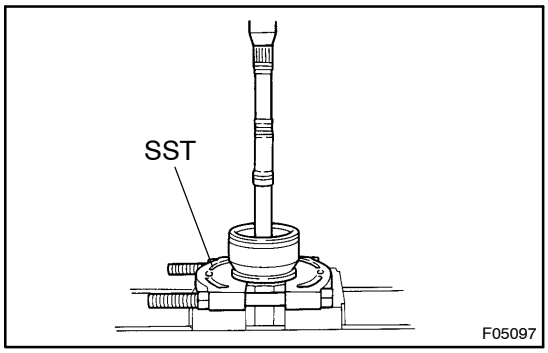
SA14H–01

REASSEMBLY



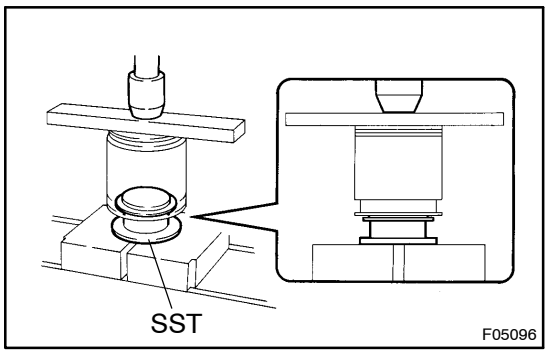
1. INSTALL DUST SEAL

Using SST and a press, install a new dust seal to the outboard joint shaft assembly.

SST 09950–00020

NOTICE:

Be careful not to damage the dust seal.



2. INSTALL DUST COVER

Using SST a steel plate and press, install a new dust cover.

SST 09316–20011

NOTICE:

Be careful not to damage the dust cover.

3. INSTALL OUTBOARD JOINT BOOT AND CLAMPS

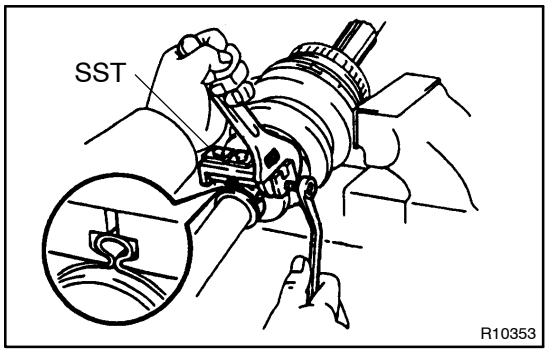
(a) Place 2 new boot clamps to boot.

HINT:

Before installing the boot, wrap vinyl tape around the spline of the shaft to prevent damaging the boot.

(b) Temporarily install a new boot to the outboard joint shaft assembly.

(c) Position the inside clamp onto the boot.



(d) Using SST, pinch the inside clamp.

SST 09521–24010

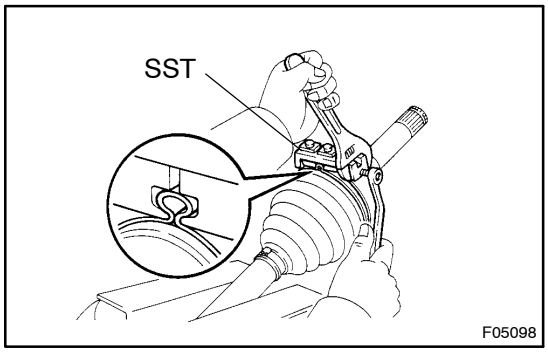
NOTICE:

Do not overtighten SST.

(e) Coat the outboard joint and boot with grease in the boot kit.

Grease capacity: 368 – 378 g (13 – 13.3 oz.)

(f) Position the outside clamp onto the boot.



(g) Using SST, pinch the outside clamp.

SST 09521–24010

NOTICE:

Do not overtighten SST.

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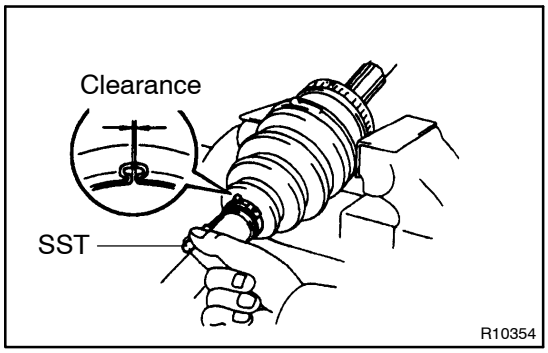
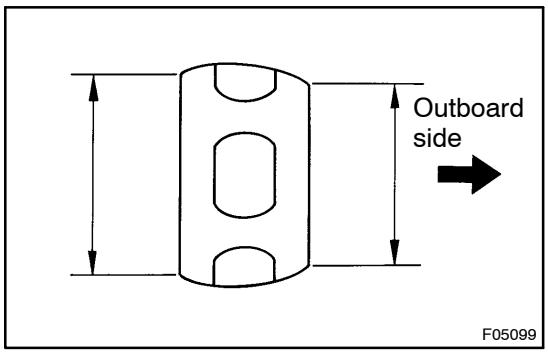


(h) Using SST, adjust the clearance of the clamp.
SST 09240–00020
Clearance: 0.8 mm (0.031 in.)

4. TEMPORARILY INSTALL INBOARD JOINT BOOT AND CLAMPS

Temporarily install 2 new boot clamps and boot to the outboard joint shaft assembly.



5. ASSEMBLE INBOARD JOINT

(a) Install the cage to the outboard joint shaft assembly.

NOTICE:

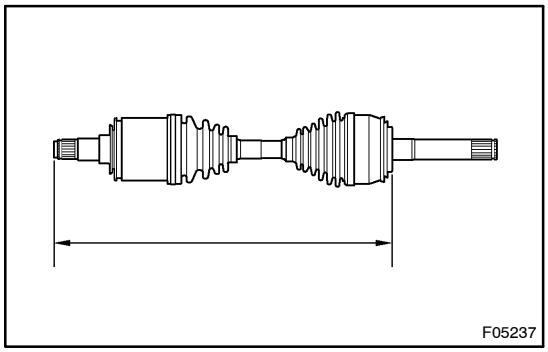
Insert the cage with its smaller inner diameter side facing to the outboard joint.

(b) Align matchmarks placed before removal.
(c) Install the inner race.
(d) Using a snap ring expander, install a new snap ring.
(e) Align matchmarks placed before removal, and install the cage to the inner race.
(f) Install the 6 balls.

HINT:

Apply grease onto the balls to keep them from falling.

(g) Coat the inboard joint tulip and boot with grease in the boot kit.
Grease capacity: 293 – 303 g (10.3 – 10.7 oz.)
(h) Align matchmarks placed before removal, and install the inboard joint tulip to the outboard joint shaft assembly.
(i) Install a new snap ring.
(j) Temporarily install the boot to the inboard joint tulip.
(k) Make sure that the boot is on the shaft groove.



(l) Make sure that the 2 boots are not stretched or contracted when the drive shaft is at standard length.
Drive shaft standard length:
573.9 ± 5 mm (22.594 ± 0.197 in.)
(m) Using a screwdriver, bend the clamp and lock it.

6. CHECK DRIVE SHAFT (See page SA–26)

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SA14I–01

INSTALLATION

Installation is in the reverse order of removal (See page SA–24).

HINT:

After installation, check the ABS speed sensor signal. (See page DI–219)

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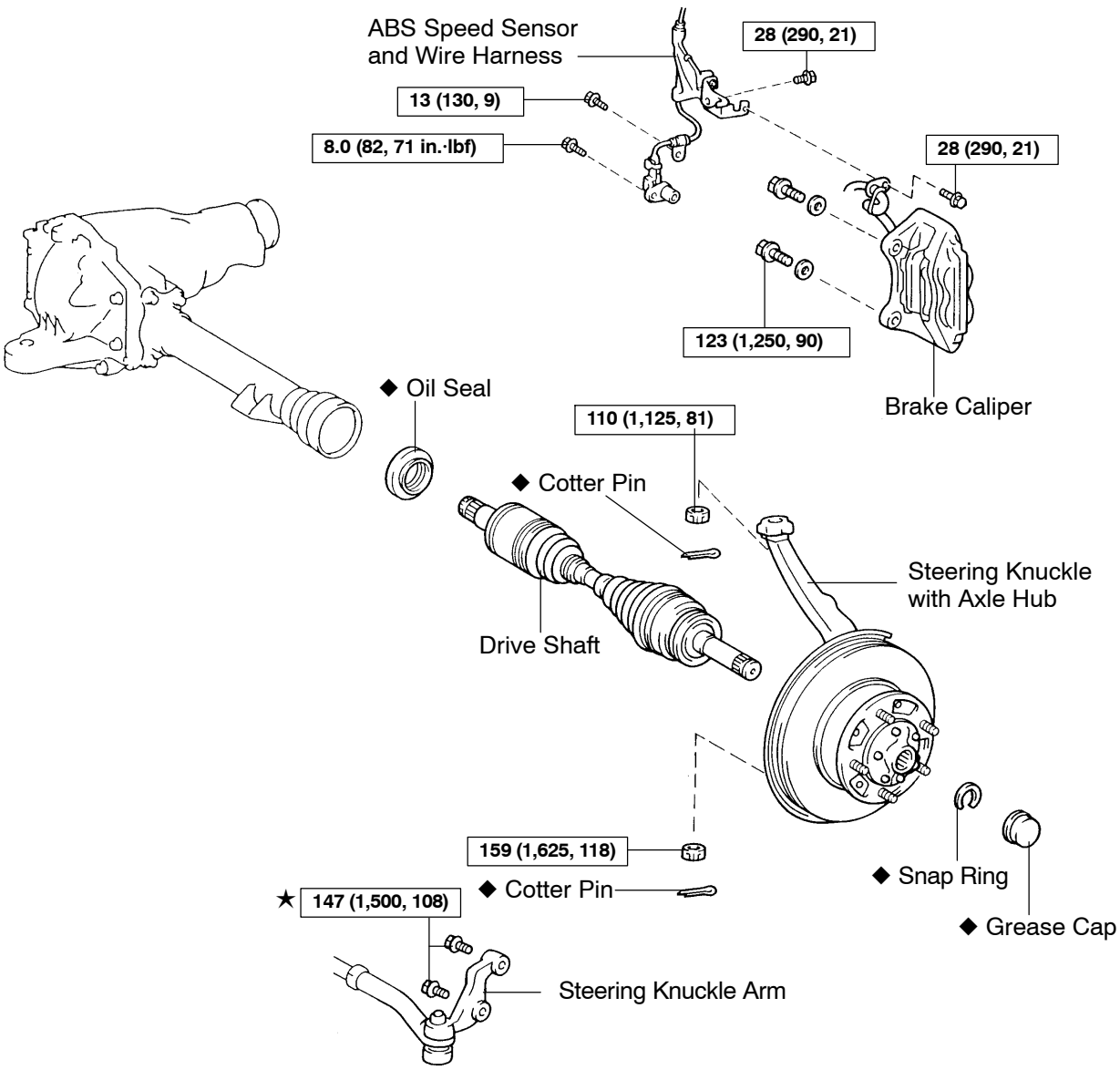
FRONT DIFFERENTIAL SIDE GEAR SHAFT OIL SEAL

SA14J–01

COMPONENTS



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

F05165

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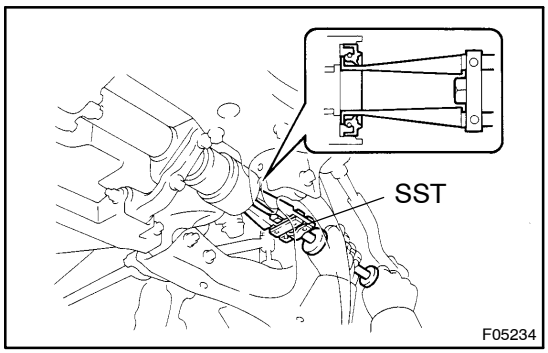
SA14K–01

REPLACEMENT

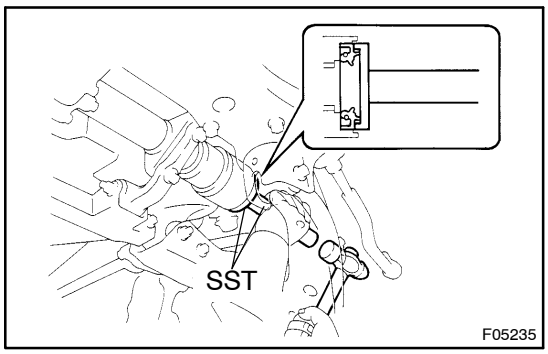
1. REMOVE FRONT DRIVE SHAFT
(See page SA–24)



2. REPLACE OIL SEAL

(a) Using SST, remove the oil seal.
SST 09308–00010

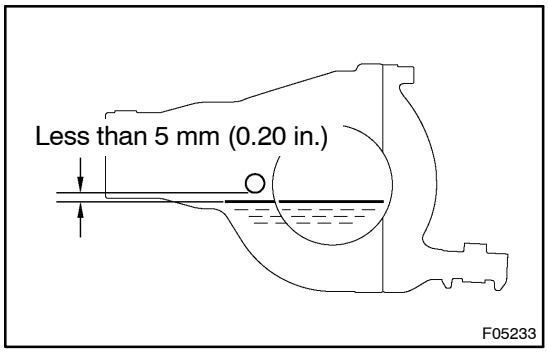
(b) Coat the hypoid gear oil to a new oil seal periphery.



(c) Using SST and a hammer, install a new oil seal.
SST 09550–00032, 09950–70010 (09951–07100)

(d) Coat the MP grease to the oil seal lip.

3. INSTALL FRONT DRIVE SHAFT
(See page SA–30)



4. FILL DIFFERENTIAL WITH HYPOID GEAR OIL
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)
Oil type: Hypoid gear oil API GL–5
Recommended oil viscosity:
Above –18˚C (0˚F) SAE 90
Below –18˚C (0˚F) SAE 80W–90 or 80W
Capacity: 1.70 liters (1.80 US qts, 1.50 Imp.qts)

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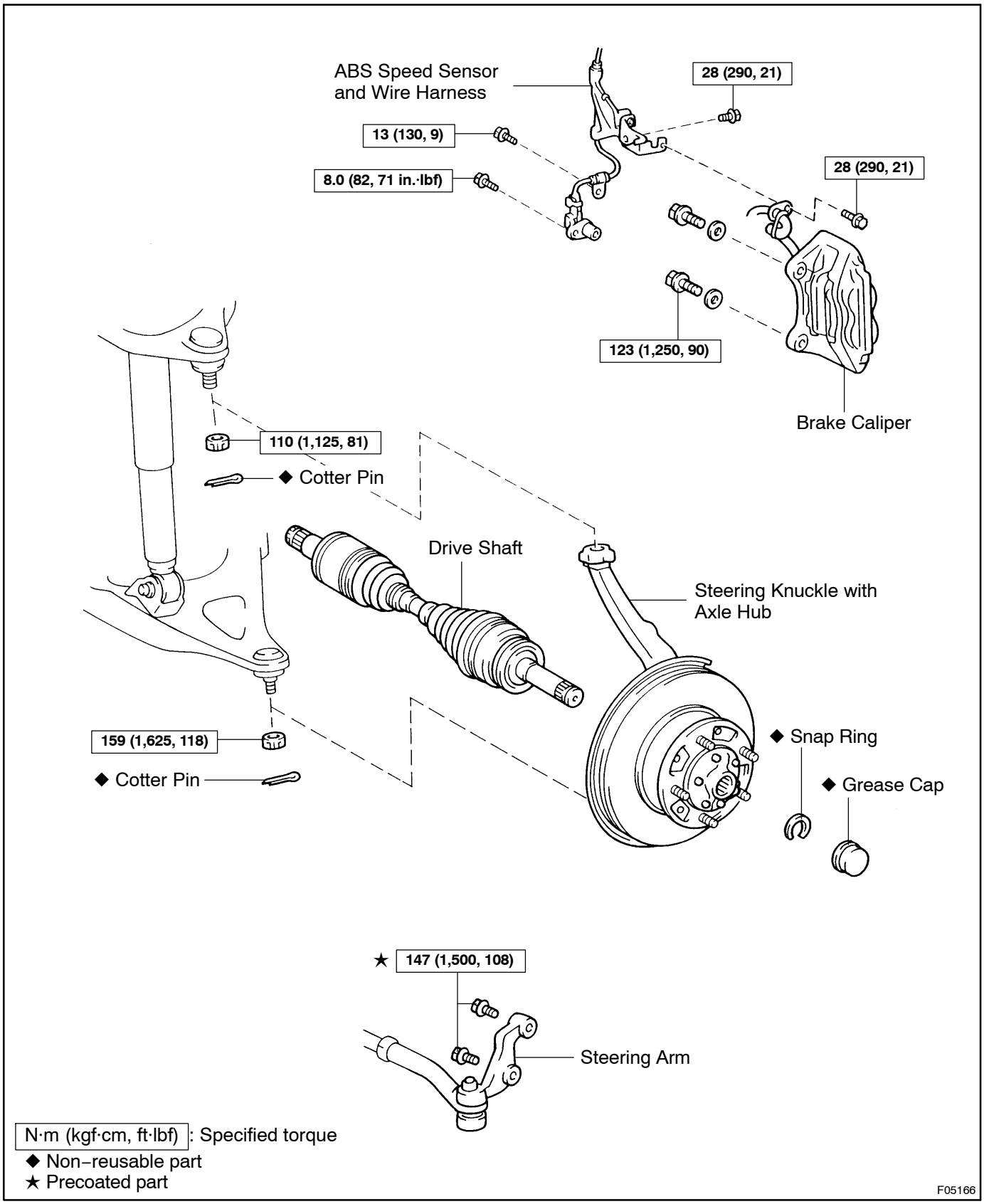
FRONT DIFFERENTIAL CARRIER

COMPONENTS

SA14L–01



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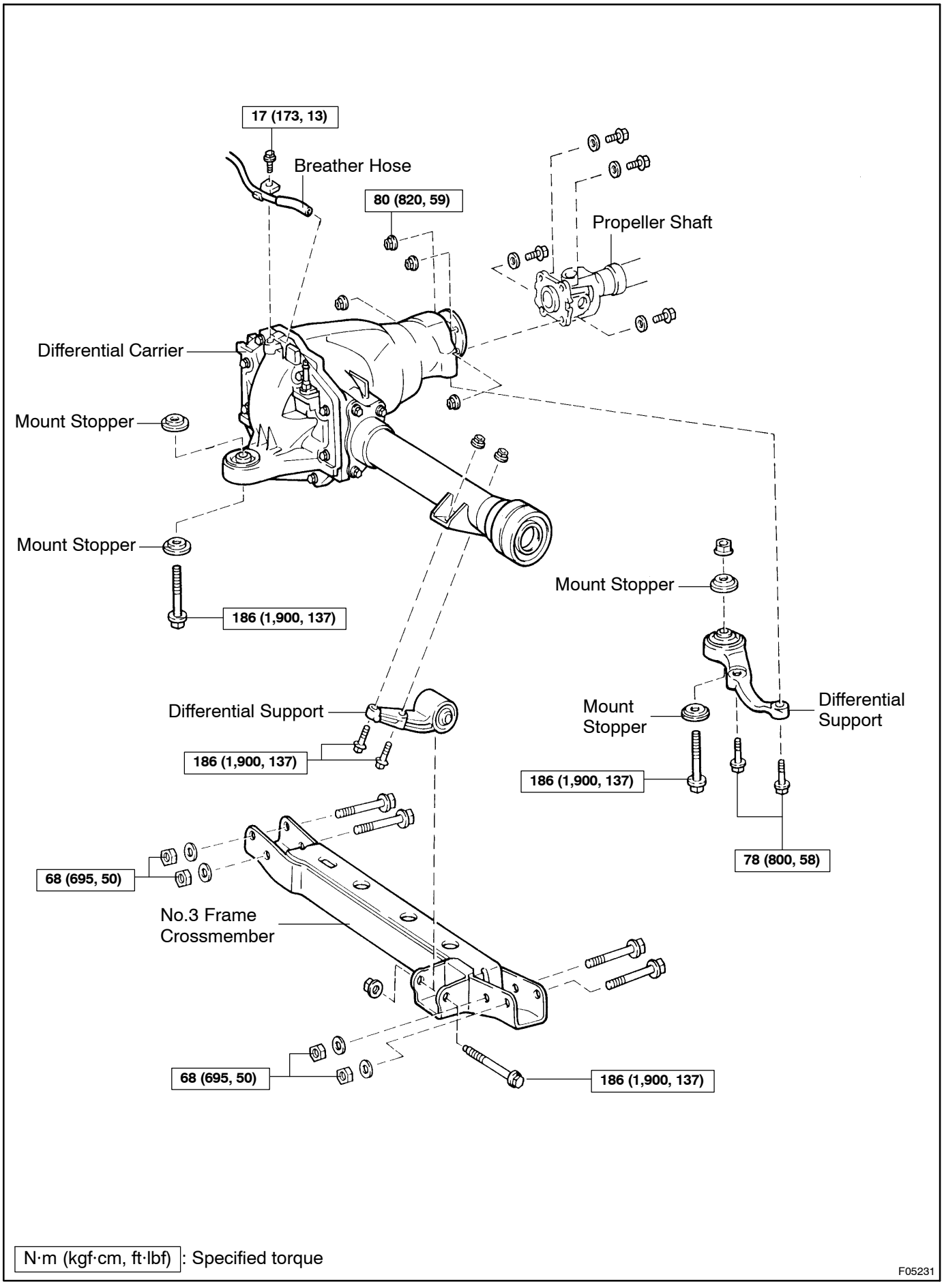

N·m (kgf·cm, ft·lbf) : Specified torque

F05231

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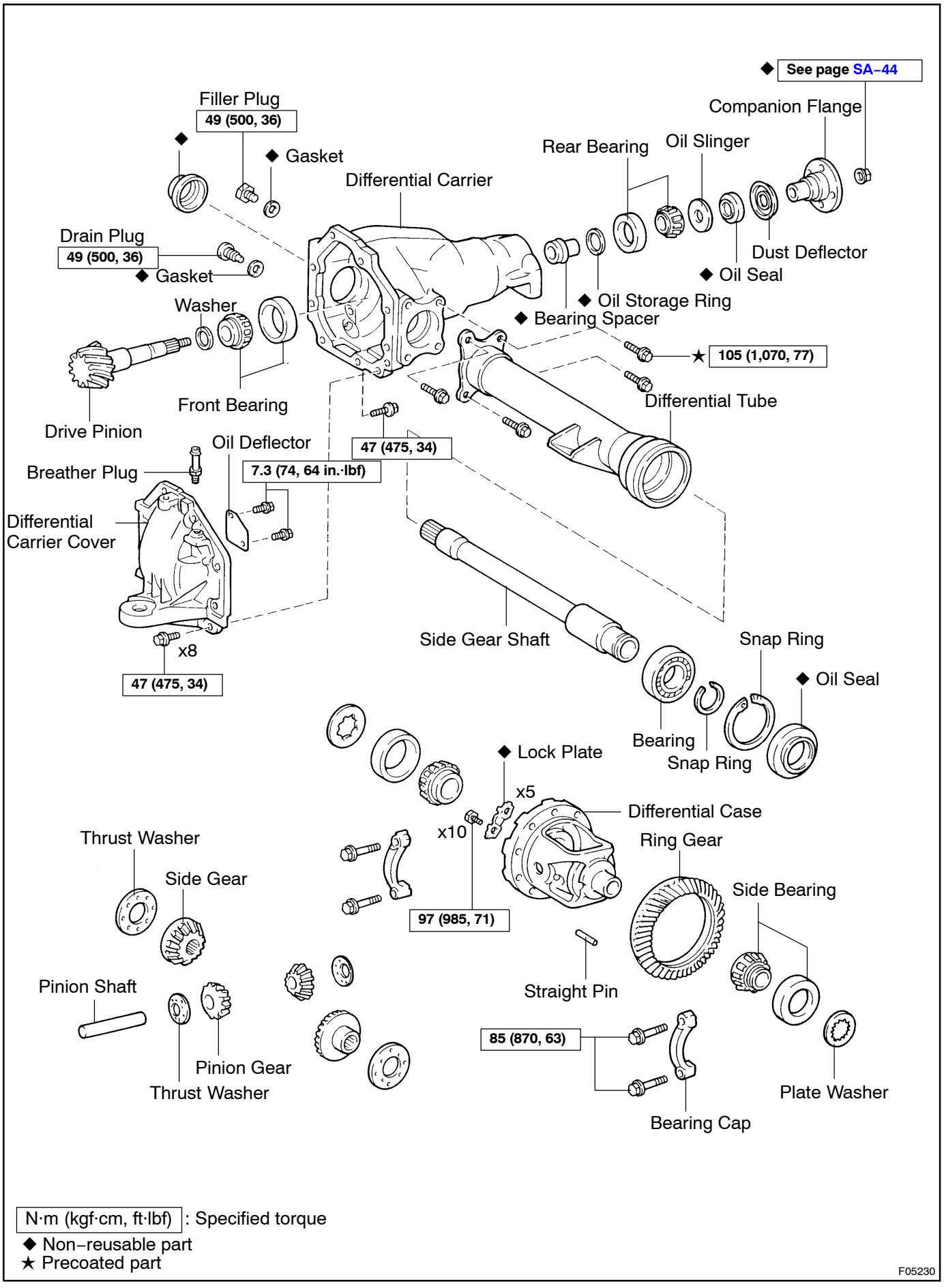

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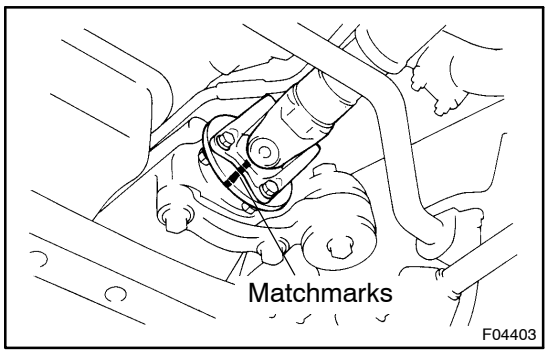
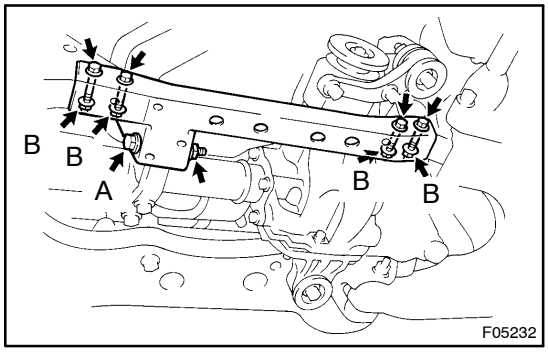
SA14M–01

REMOVAL

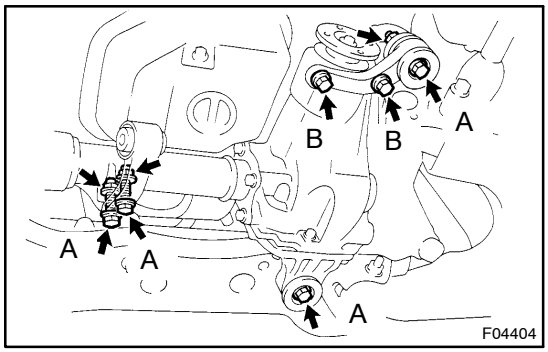
1. **REMOVE FRONT WHEELS**
   Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)
2. **REMOVE DRIVE SHAFTS (See page SA–24)**



3. **DISCONNECT FRONT PROPELLER SHAFT**
(a) Place matchmarks on the propeller shaft and companion flange.
(b) Remove the 4 nuts, washers, bolts and disconnect the propeller shaft.
Torque: 80 N·m (820 kgf·cm, 59 ft·lbf)
(c) Support the propeller shaft securely.
4. **DRAIN HYPOID GEAR OIL**
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



5. **REMOVE NO.3 FRAME CROSSMEMBER**
Remove the 5 bolts, nuts and No.3 frame crossmember.
Torque:
A: 186 N·m (1,900 kgf·cm, 137 ft·lbf)
B: 68 N·m (695 kgf·cm, 50 ft·lbf)
6. **REMOVE FRONT DIFFERENTIAL CARRIER ASSEMBLY**
(a) Support the front differential carrier assembly with a jack.
(b) Remove the bolt and disconnect the breather hose.
Torque: 17 N·m (173 kgf·cm, 13 ft·lbf)
(c) Remove the 4 nuts, mount stoppers, 7 bolts, 2 differential supports and front differential carrier.
Torque:
A: 186 N·m (1,900 kgf·cm, 137 ft·lbf)
B: 78 N·m (800 kgf·cm, 58 ft·lbf)



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SA14N–01

DISASSEMBLY

1. REMOVE DIFFERENTIAL CARRIER COVER

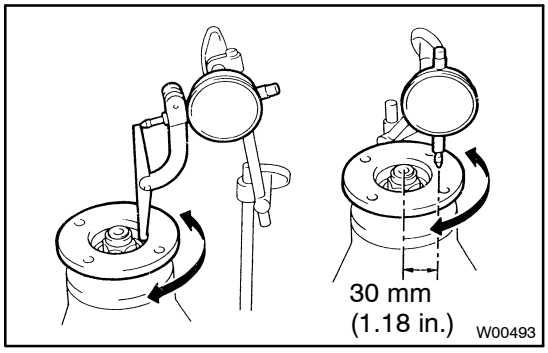
(a) Remove the 9 bolts from the carrier cover.

(b) Using a brass bar and hammer, separate the cover from carrier.

(c) Remove the breather plug from the differential carrier cover.

(d) Remove the 2 bolts and oil deflector from the differential carrier cover.

2. SET DIFFERENTIAL CARRIER TO OVERHAUL STAND ETC.

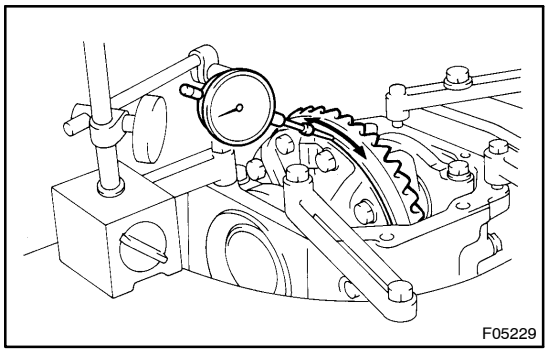


3. CHECK RUNOUT OF COMPANION FLANGE

Using a dial indicator, measure the vertical and lateral runout of the companion flange.

Maximum: 0.09 mm (0.0035 in.)

If the runout is greater than the maximum, replace the companion flange.

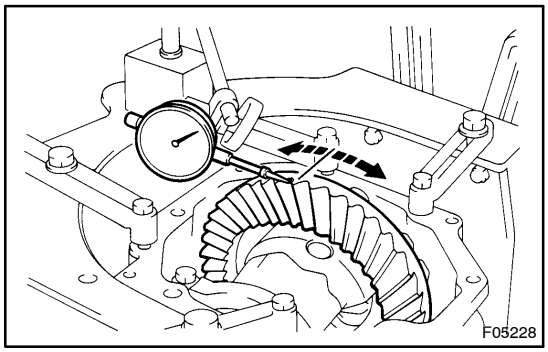


4. CHECK RING GEAR RUNOUT

Using a dial indicator, measure the ring gear runout.

Maximum runout: 0.07 mm (0.0028 in.)

If the runout is greater than the maximum, replace the ring gear and drive pinion as a set.



5. CHECK RING GEAR BACKLASH

Using a dial indicator, while holding the drive pinion flange measure the ring gear backlash.

Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)

HINT:

Measure at 3 or more places on the circumference of the ring gear.

If the backlash is not within the specification, adjust the backlash.

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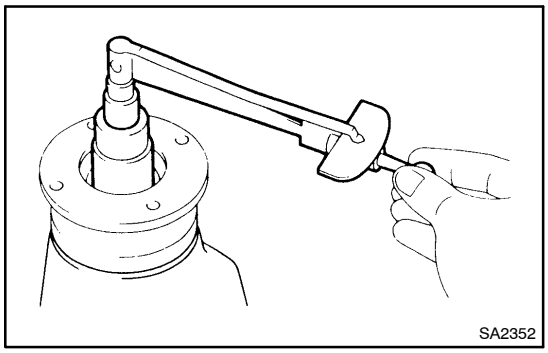


6. MEASURE DRIVE PINION PRELOAD

Using a torque wrench, measure the drive pinion preload using the backlash of the drive pinion and ring gear.

Preload (at starting):
0.5 – 0.8 N·m (5 – 8 kgf·cm, 4.3 – 6.9 in.·lbf)

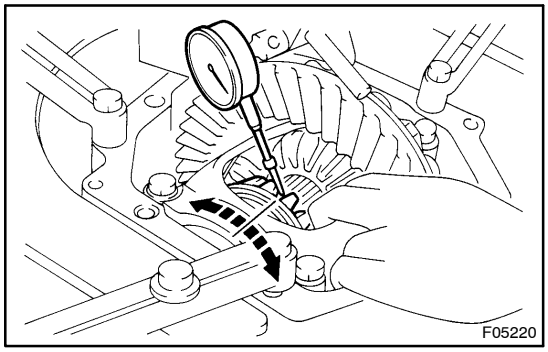
7. CHECK TOTAL PRELOAD

Using a torque wrench, measure the total preload.

Total preload (at starting):
Drive pinion preload plus
0.4 – 0.6 N·m (4 – 6 kgf·cm, 3.5 – 5.2 in.·lbf)

If necessary, disassemble and inspect the differential.

8. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page SA–44)

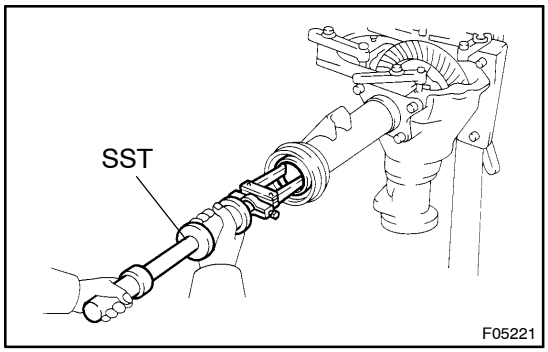


9. CHECK SIDE GEAR BACKLASH

Using a dial indicator, measure the side gear backlash while holding one pinion gear toward the differential case.

Maximum backlash: 0.15 mm (0.0059 in.)

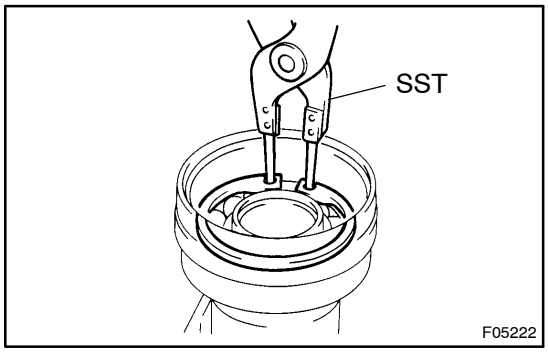
If the backlash is out of the specification, install the correct thrust washers (See page SA–44).



10. REMOVE SIDE GEAR SHAFT OIL SEALS

Using SST, remove the 2 side gear shaft oil seals.

SST 09308–00010



11. REMOVE DIFFERENTIAL TUBE ASSEMBLY

(a) Using SST, remove the snap ring.
SST 09350–30020 (09350–07060)

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

(c) Remove the 4 bolts and differential tube with side gear shaft from the differential carrier.

(d) Remove the side gear shaft from the differential tube.

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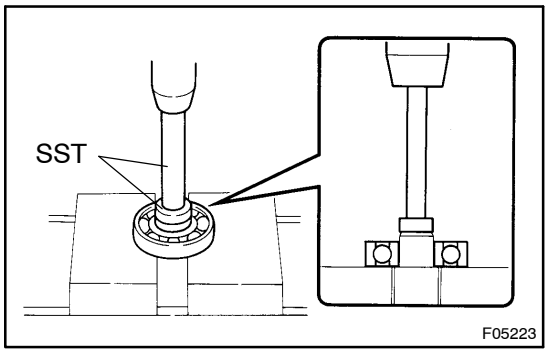


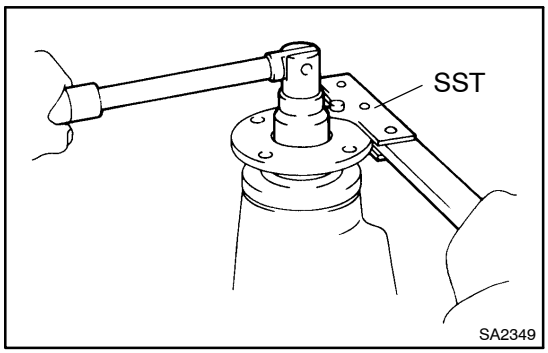
12. REMOVE SIDE GEAR BEARING

Using SST and a press, remove the bearing from side gear shaft.

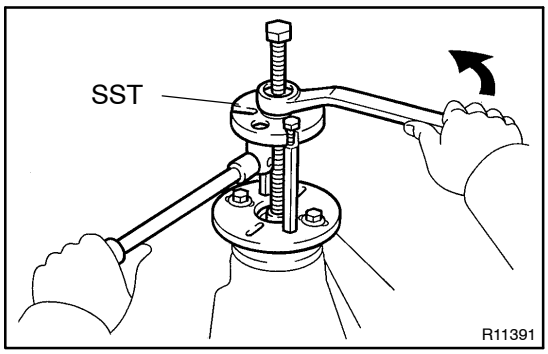
SST 09950–60010 (09951–00410), 09950–70010 (09951–07100)

13. REMOVE COMPANION FLANGE

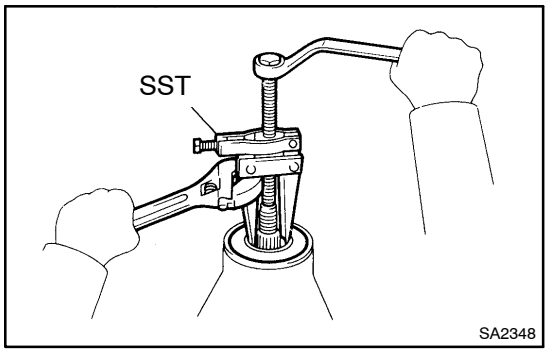
(a) Using a chisel and hammer, unstake the nut.



(b) Using SST to hold the flange, remove the nut.
SST 09330–00021



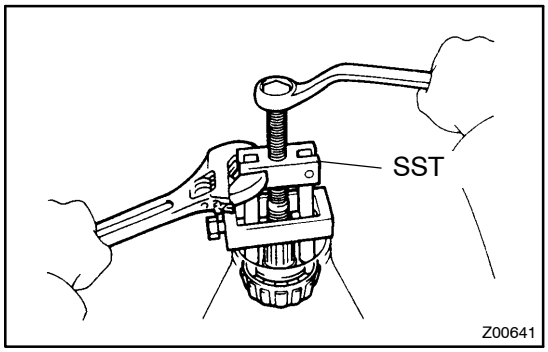
(c) Using SST, remove the companion flange.
SST 09950–30010 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03020)



14. REMOVE OIL SEAL AND OIL SLINGER

(a) Using SST, remove the oil seal from the differential carrier.
SST 09308–10010

(b) Remove the oil slinger.



15. REMOVE REAR BEARING AND BEARING SPACER

Using SST, remove the rear bearing from the drive pinion.
SST 09556–22010

If the rear bearing is damaged or worn, replace the rear bearing.

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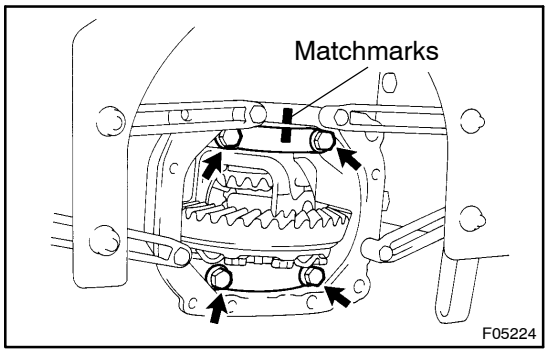
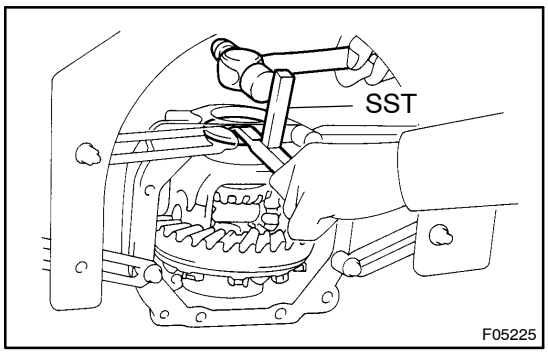


16. REMOVE DIFFERENTIAL CASE ASSEMBLY

(a) Place matchmarks on the bearing cap and differential carrier.

(b) Remove the 4 bolts and 2 bearing caps.



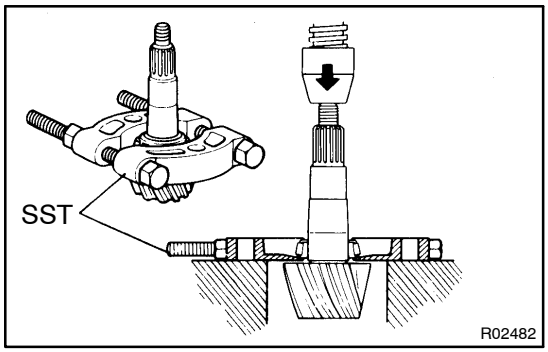
(c) Using SST and a hammer, remove the 2 side bearing plate washers.
SST 09504–22011

HINT:
Measure the plate washer and note down the thickness.

(d) Remove the differential case with the bearing outer races from the differential carrier.

HINT:
Tag the bearing outer races to show the location for reassembling.

17. REMOVE DRIVE PINION AND BEARING SPACER FROM DIFFERENTIAL CARRIER

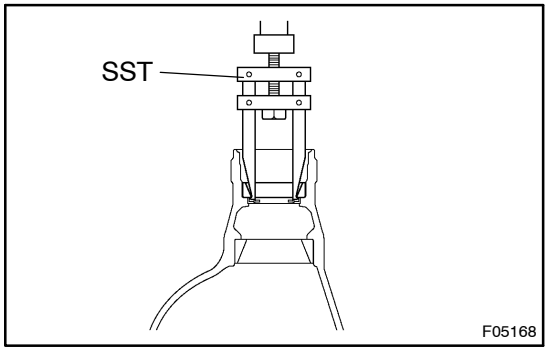


18. REMOVE DRIVE PINION FRONT BEARING

(a) Using SST and a press, remove the front bearing from the drive pinion.
SST 09950–00020

HINT:
If the drive pinion or ring gear is damaged, replace them as a set.

(b) Remove the washer.



19. REMOVE DRIVE PINION FRONT AND REAR BEARING OUTER RACES AND OIL STORAGE RING

(a) Using SST, remove the rear bearing outer race.
SST 09308–00010

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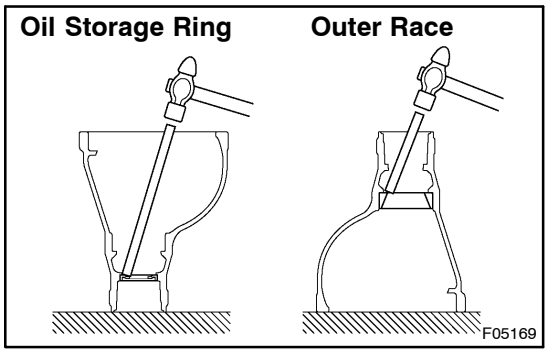
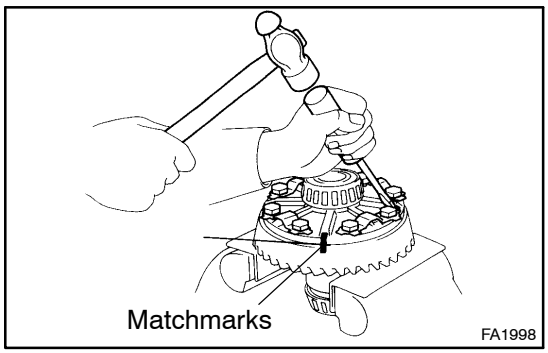


(b) Using a brass bar and hammer, remove the oil storage ring and front bearing outer race.



20. REMOVE RING GEAR

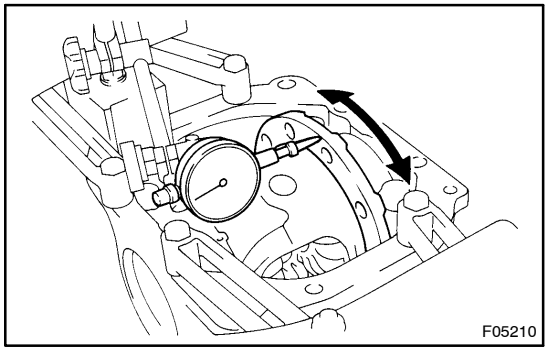
(a) Place matchmarks on the ring gear and differential case.
(b) Using a screwdriver and hammer, unstake the 5 lock plates.
(c) Remove the 10 bolts and 5 lock plates.
(d) Using a plastic hammer, tap on the ring gear to separate it from the differential case.

21. CHECK DIFFERENTIAL CASE RUNOUT

(a) Place the bearing outer races on their respective bearings. Check that the left and right outer races are not interchanged.
(b) Install the assembled plate washers onto the side bearing.
(c) Install the differential case in the differential carrier.

HINT:
If it is difficult to install the differential case into the carrier, replace the plate washer with a thinner one.
However, select a plate washer that allows no clearance between it and the carrier.

(d) Align matchmarks on the bearing cap and differential carrier.
(e) Install and uniformly tighten the 4 bolts a little at a time.



(f) Using a dial indicator, measure the differential case runout.
Maximum case runout: 0.07 mm (0.0028 in.)
(g) Remove the differential case.

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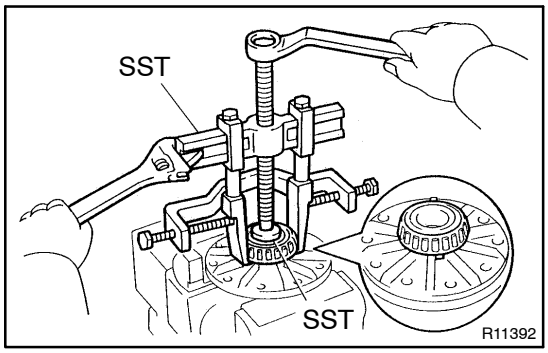

22. REMOVE SIDE BEARINGS

Using SST, remove the 2 side bearings from the differential case.

SST 09950–40011 (09951–04020, 09952–04010, 09953–04030, 09954–04010, 09955–04060, 09957–04010, 09958–04010), 09950–60010 (09951–00480)

HINT:

Fix the claws of SST to the notches in the differential case.

23. DISASSEMBLE DIFFERENTIAL CASE ASSEMBLY

(a) Using a pin punch and hammer, remove the straight pin.

(b) Remove the pinion shaft, 2 pinion gears, pinion gear thrust washers, side gears and side gear thrust washers from the differential case.

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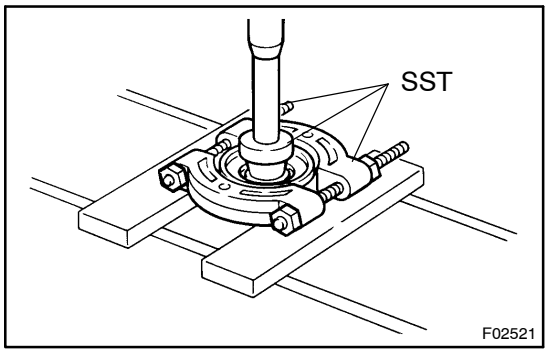
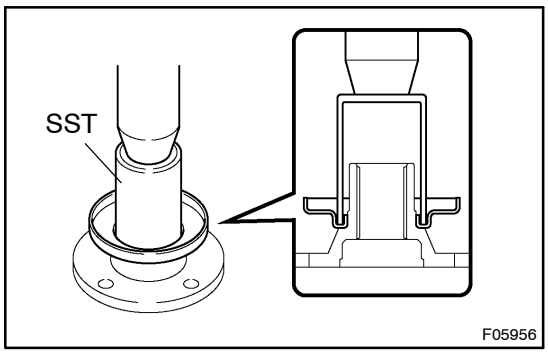
SA14O–01

REPLACEMENT

REPLACE COMPANION FLANGE DUST DEFLECTOR



(a) Using SST and a press, remove the dust deflector.
SST 09950–00020, 09950–60010 (09951–00400), 09950–70010 (09951–07100)



(b) Using SST and a press, install a new dust deflector.
SST 09223–00010

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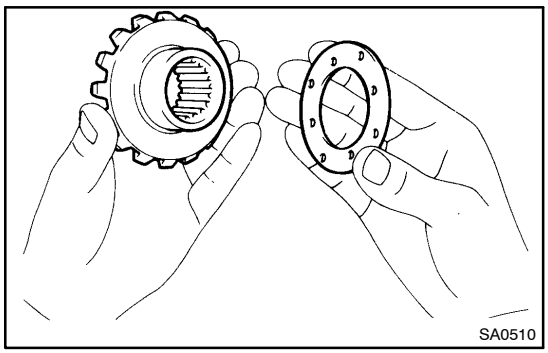
SA14P–01

REASSEMBLY

HINT:

- Using a shop rag, clean off any foreign object from the parts.
- Apply all of the sliding and rotating surfaces with hypoid gear oil.



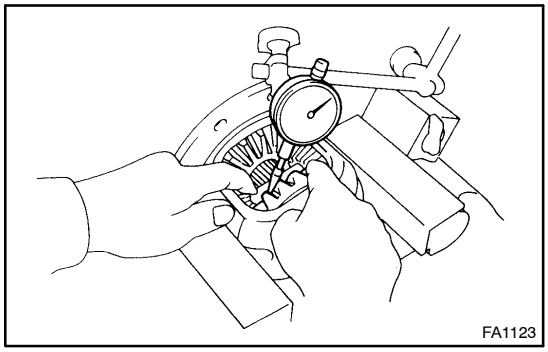
1. MEASURE SIDE GEAR BACKLASH AND ASSEMBLE DIFFERENTIAL CASE

(a) Install the 2 thrust washers to the 2 side gears.

(b) Install the 2 side gears, pinion gears, pinion gear thrust washers and pinion shaft in the differential case.

HINT:

Align the holes of the differential case and pinion shaft.



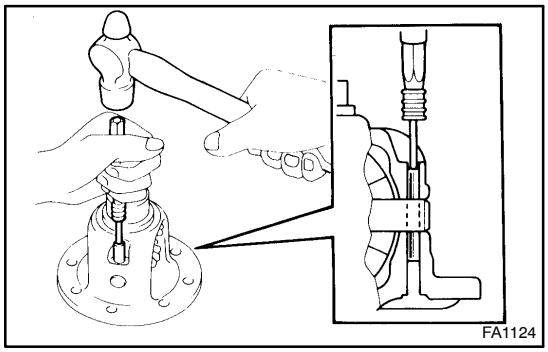
(c) Using a dial indicator, measure the side gear backlash while holding one pinion gear toward the differential case.

Maximum backlash: 0.15 mm (0.0059 in.)

If the backlash is not within the specification, install side gear thrust washers with different thicknesses.

Thrust washer thickness

Thickness mm (in.)	Thickness mm (in.)
1.50 (0.059)	1.75 (0.069)
1.55 (0.061)	1.80 (0.071)
1.60 (0.063)	1.85 (0.073)
1.65 (0.065)	1.90 (0.075)
1.70 (0.067)	–



2. INSTALL STRAIGHT PIN AND STAKE DIFFERENTIAL CASE

(a) Using a pin punch and hammer, install the straight pin through the differential case and hole of the pinion shaft.

(b) Using a chisel and hammer, stake the outside of the differential case pin hole.

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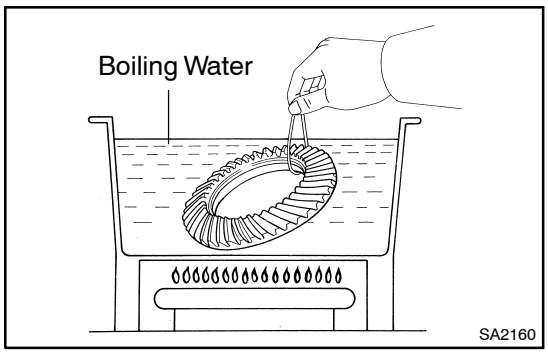
3. INSTALL RING GEAR ON DIFFERENTIAL CASE

(a) Clean the contact surfaces of the differential case and ring gear.



(b) Heat the ring gear to approx. 100°C (212°F) in boiling water.

(c) Carefully take the ring gear out of the boiling water.

(d) After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.

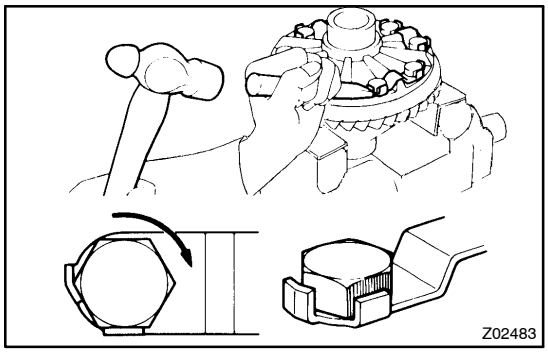
HINT:

Align the matchmarks on the ring gear and differential case.

(e) Temporarily install 5 new lock plates and 10 bolts so that the bolt holes in the ring gear and differential case are not misaligned.

(f) After the ring gear has cooled sufficiently, torque the 10 ring gear set bolts.

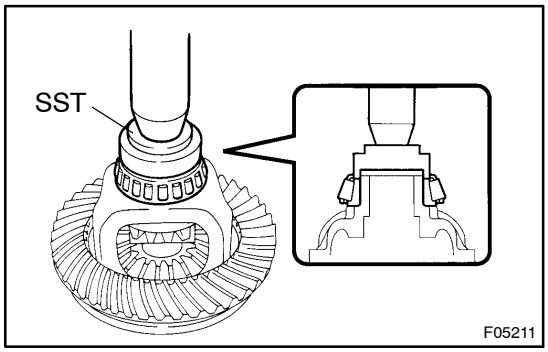
Torque: 97 N·m (985 kgf·cm, 71 ft·lbf)



(g) Using a chisel and hammer, stake the 5 lock plates.

HINT:

Stake the claws of the lock plates to fix the bolts. For the claw contacting the protruding portion of the bolt, stake only the half of it along the tightening direction.



4. INSTALL SIDE BEARINGS

Using SST and a press, install the 2 bearings to the differential case.

SST 09315–00022

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5. CHECK RING GEAR RUNOUT

(a) Place the bearing outer races on their respective bearings. Check that the left and right outer races are not interchanged.

(b) Install the assembled plate washers onto the side bearing.

(c) Install the differential case in the differential carrier.

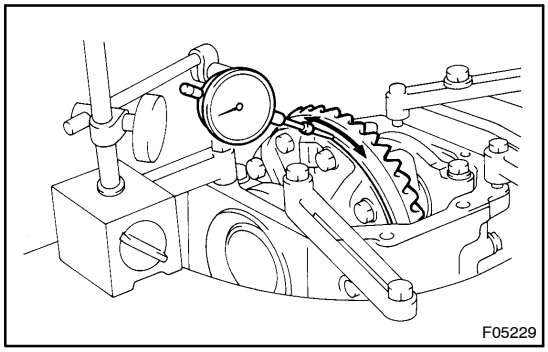
HINT:

If it is difficult to install the differential case into the carrier, replace the plate washer with a thinner one.

However, select a plate washer that allows no clearance between it and the carrier.

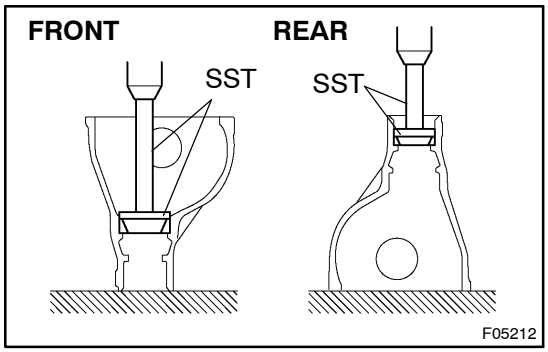
(d) Align matchmarks on the bearing cap and differential carrier.

(e) Install and uniformly tighten the 4 bolts a little at a time.



(f) Using a dial indicator, measure the ring gear runout.
Maximum runout: 0.07 mm (0.0028 in.)

(g) Remove the differential carrier.



6. INSTALL DRIVE PINION FRONT AND REAR BEARING OUTER RACES

(a) Using SST and a press, install the front bearing outer race.
SST 09950–60020 (09951–00780),
09950–70010 (09951–07150)

(b) Using SST and a press, install the rear bearing outer race.
SST 09950–60020 (09951–00710),
09950–70010 (09951–07150)

7. INSTALL DRIVE PINION FRONT BEARING

(a) Install the washer on the drive pinion.

HINT:

First fit a washer with the same thickness as the washer which was removed, then after checking the tooth contact pattern, replace the washer with one of a different thickness if necessary.

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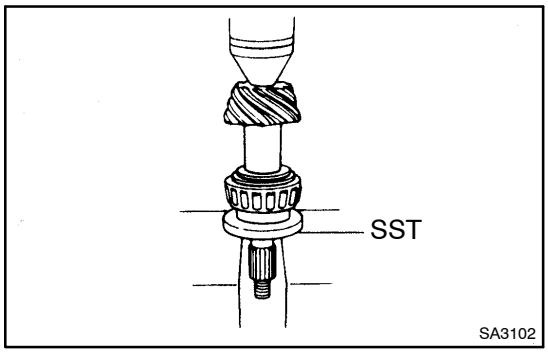


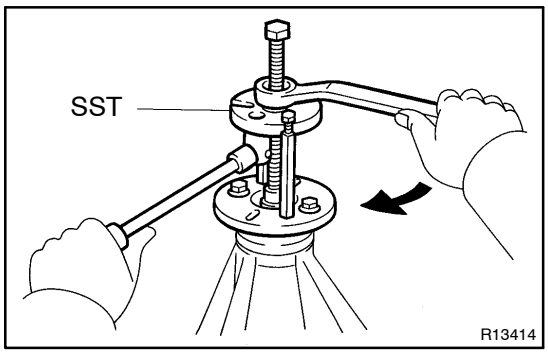
(b) Using SST and a press, install the front bearing onto the drive pinion.
SST 09506–30012

8. TEMPORARILY ADJUST DRIVE PINION PRELOAD

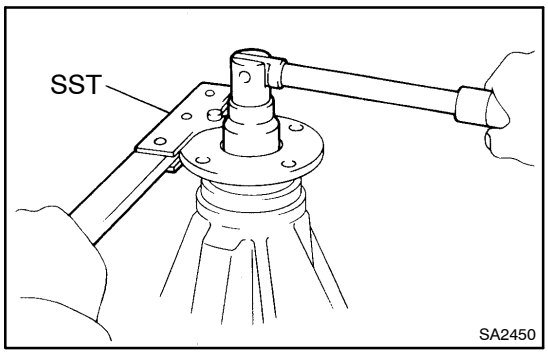
(a) Install the drive pinion and rear bearing.

HINT:
Assemble the spacer and oil seal after adjusting the gear contact pattern.

(b) Install the oil slinger.



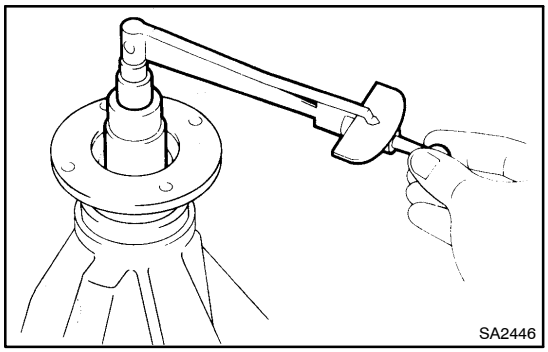
(c) Install the companion flange with SST.
SST 09950–30010, (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03020)



(d) Using SST to hold the flange and adjust the drive pinion preload by tightening the companion flange nut.

NOTICE:

- **Coat the nut and screw of the drive pinion with gear oil.**
- **As there is no spacer, tighten the nut a little at a time, being careful not to overtighten.**



(e) Using a torque wrench, measure the preload.
Preload (at starting):
New bearing
1.0 – 1.6 N·m (10 – 16 kgf·cm, 8.7 – 13.9 in.·lbf)
Reused bearing
0.5 – 0.8 N·m (5 – 8 kgf·cm, 4.3 – 6.9 in.·lbf)

HINT:
Measure the total preload after turning the bearing clockwise and counterclockwise several times to make the bearing smooth.

9. INSTALL DIFFERENTIAL CASE IN DIFFERENTIAL CARRIER

(a) Place the bearing outer races on their respective bearings. Check that the left and right outer races are not interchanged.

(b) Install the differential case in the differential carrier.

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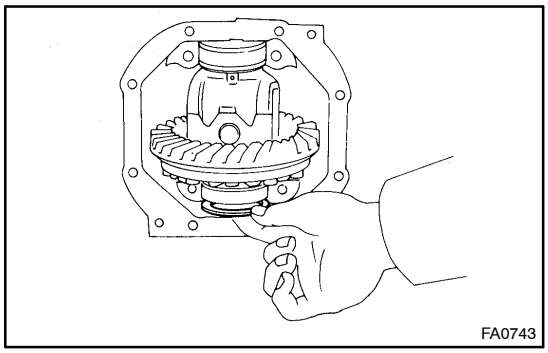
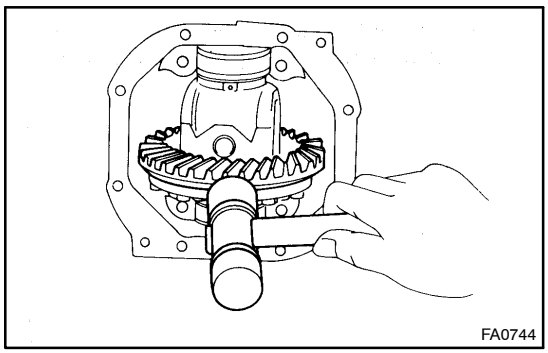


10. ADJUST RING GEAR BACKLASH

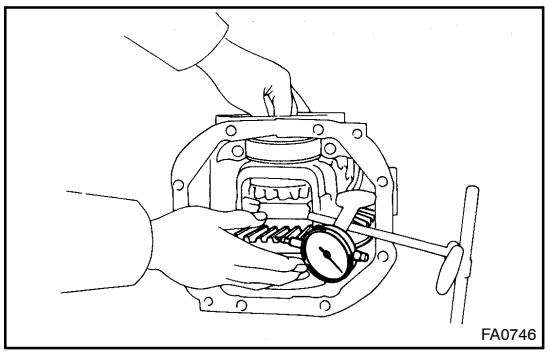
(a) Install the plate washer on the ring gear back side.

HINT:

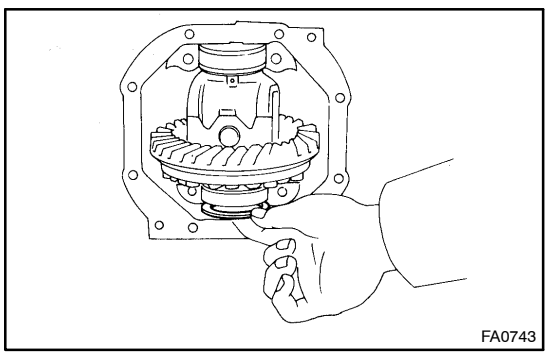
Make sure that the ring gear has backlash.



(b) Tap on the ring gear with a plastic hammer so that the washer fits to the bearing.



(c) Using a dial indicator, measure the side gear backlash while holding one pinion gear toward the differential case.
Backlash (Reference): 0.13 mm (0.0051 in.)



(d) Select a plate washer for back side ring gear, using the backlash as reference.

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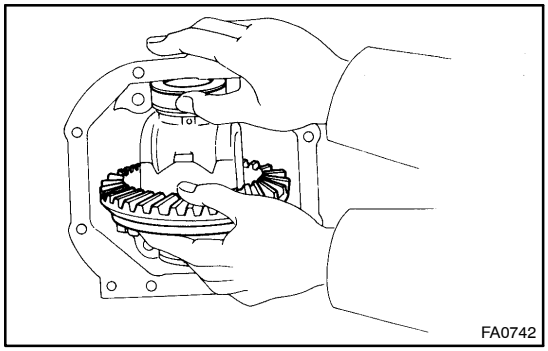
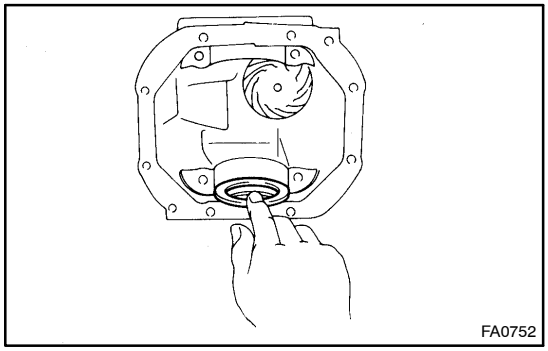
Side plate washer thickness

Thickness mm (in.)	Thickness mm (in.)
2.58 (0.1016)	3.04 (0.1197)
2.60 (0.1024)	3.06 (0.1205)
2.62 (0.1031)	3.08 (0.1213)
2.64 (0.1039)	3.10 (0.1220)
2.66 (0.1047)	3.12 (0.1228)
2.68 (0.1055)	3.14 (0.1236)
2.70 (0.1063)	3.16 (0.1244)
2.72 (0.1071)	3.18 (0.1252)
2.74 (0.1079)	3.20 (0.1260)
2.76 (0.1087)	3.22 (0.1268)
2.78 (0.1094)	3.24 (0.1276)
2.80 (0.1102)	3.26 (0.1283)
2.82 (0.1110)	3.28 (0.1291)
2.84 (0.1118)	3.30 (0.1299)
2.86 (0.1126)	3.32 (0.1307)
2.88 (0.1134)	3.34 (0.1315)
2.90 (0.1142)	3.36 (0.1323)
2.92 (0.1150)	3.38 (0.1331)
2.94 (0.1157)	3.40 (0.1339)
2.96 (0.1165)	3.42 (0.1346)
2.98 (0.1173)	3.44 (0.1354)
3.00 (0.1181)	3.46 (0.1362)
3.02 (0.1189)	3.48 (0.1370)


FA0742

(e) Select a ring gear teeth side plate washer so that is no clearance between the outer race and case.


FA0752

(f) Remove the plate washers and differential case.
(g) Install the plate washer into the ring gear back side of the carrier.

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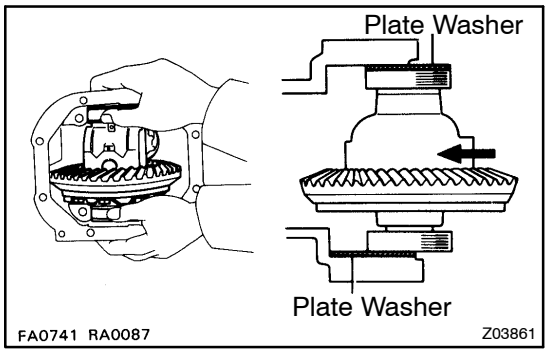
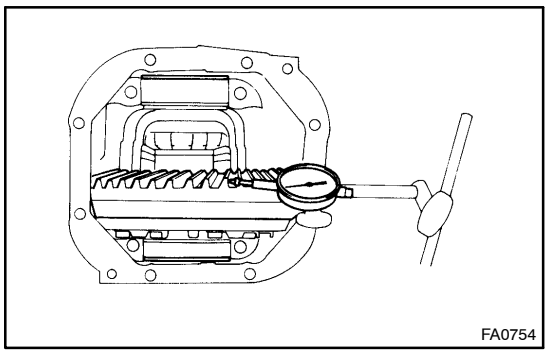


(h) Place the other plate washer onto the differential case together with the outer race, and install the differential case with the outer race into the carrier.

(i) Tap on the ring gear with a plastic hammer so that the washers fit to the bearing.



(j) Using a dial indicator, measure the ring gear backlash.
Backlash: 0.13 – 0.18 mm (0.0051 – 0.0070 in.)

If the backlash is not within the specification, adjust by either increasing or decreasing the thickness of washers on both sides by an equal amount.

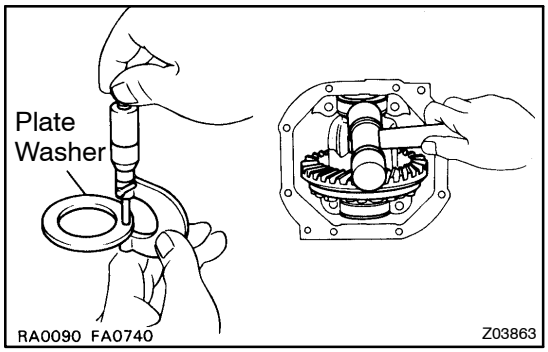
HINT:

There should be no clearance between the plate washer and case.

Make sure that there is ring gear backlash.

11. ADJUST SIDE BEARING PRELOAD

(a) Remove the ring gear teeth side plate washer and measure the thickness.



(b) Using the backlash as a reference, install a new washer of 0.06 – 0.09 mm (0.0024 – 0.0035 in.) thicker than the washer removed.

HINT:

Select a washer which can be pressed in 2/3 of the way with your finger.

(c) Using a plastic hammer, install the plate washer.

(d) Align matchmarks on the bearing cap and differential carrier.

(e) Tighten the 4 bolts.
Torque: 85 N·m (870 kgf·cm, 63 ft·lbf)

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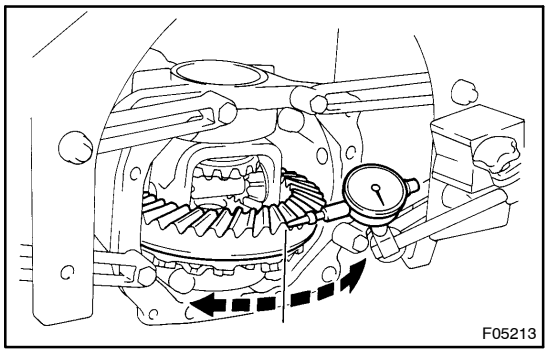


(f) Using a dial indicator, adjust the ring gear backlash until it is within the specification.

Backlash: 0.13 – 0.18 mm (0.0051 – 0.0070 in.)

If the backlash is not within the specification, adjust by either increasing or decreasing the thickness of washers on both sides by an equal amount.

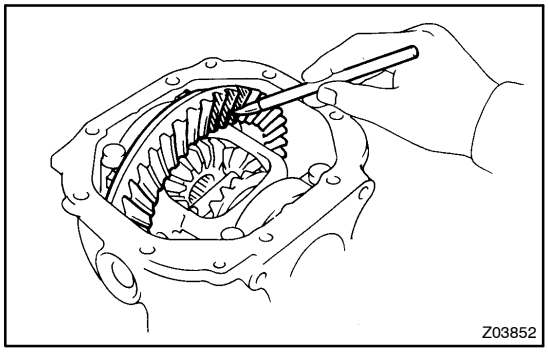
HINT:

The backlash will change by about 0.02 mm (0.0008 in.) corresponding to 0.03 mm (0.0012 in.) change in the plate washer.

12. MEASURE TOTAL PRELOAD

Using a torque wrench, measure the total preload.

Total preload (at starting):
Drive pinion preload plus
0.4 – 0.6 N·m (4 – 6 kgf·cm, 3.5 – 5.2 in.·lbf)

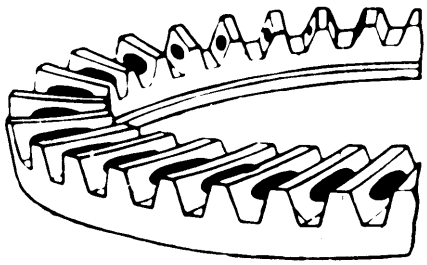


13. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

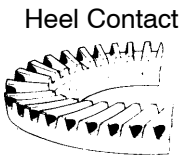
(a) Coat 3 or 4 teeth at three different positions on the ring gear with red lead primer.

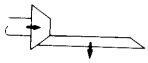
(b) Hold the companion flange firmly and rotate the ring gear in both directions.

(c) Inspect the tooth contact pattern.

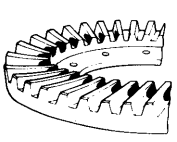


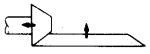
Proper Contact





Select an adjusting shim that will bring the drive pinion closer to the gear.





Select an adjusting shim that will shift the drive pinion gear away from the ring gear.

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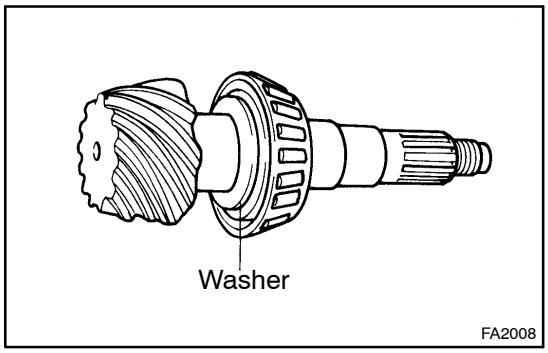


If the teeth are not contacting properly, use the following table to select a proper washer for correction.

Washer thickness

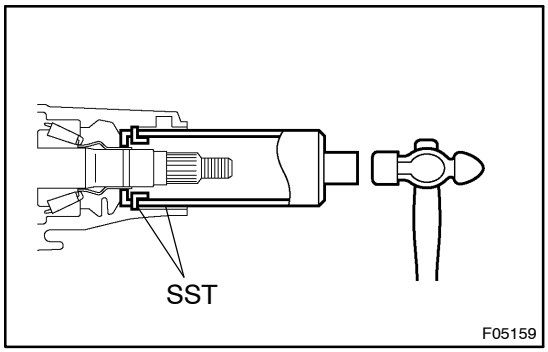
Thickness mm (in.)	Thickness mm (in.)
1.70 (0.067)	2.03 (0.080)
1.73 (0.068)	2.06 (0.081)
1.76 (0.069)	2.09 (0.082)
1.79 (0.070)	2.12 (0.083)
1.82 (0.072)	2.15 (0.085)
1.85 (0.073)	2.18 (0.086)
1.88 (0.074)	2.21 (0.087)
1.91 (0.075)	2.24 (0.088)
1.94 (0.076)	2.27 (0.089)
1.97 (0.078)	2.30 (0.091)
2.00 (0.079)	2.33 (0.092)

14. REMOVE COMPANION FLANGE (See page SA–37)

15. REMOVE OIL SLINGER

16. REMOVE REAR BEARING (See page SA–37)

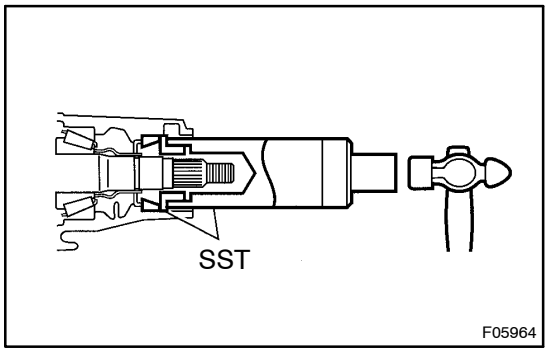
17. REMOVE REAR BEARING OUTER RACE (See page SA–37)



18. INSTALL BEARING SPACER AND OIL STORAGE RING

(a) Install a new bearing spacer.

(b) Using SST and a hammer, install a new oil storage ring.
SST 09316–60011 (09316–00011), 09506–35010



19. INSTALL REAR BEARING OUTER RACE

Using SST and a hammer, install the bearing outer race.
SST 09316–60011 (09316–00011), 09506–35010

20. INSTALL REAR BEARING AND OIL SLINGER

21. INSTALL OIL SEAL

(a) Coat the hypoid gear oil to a new oil seal periphery.

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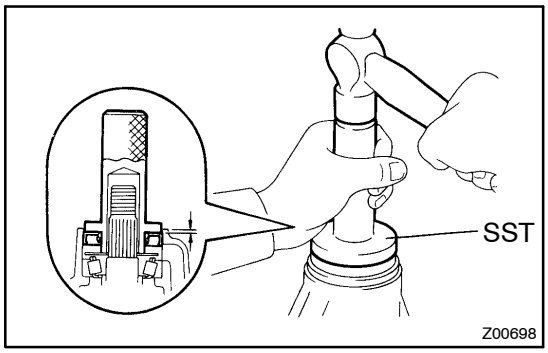
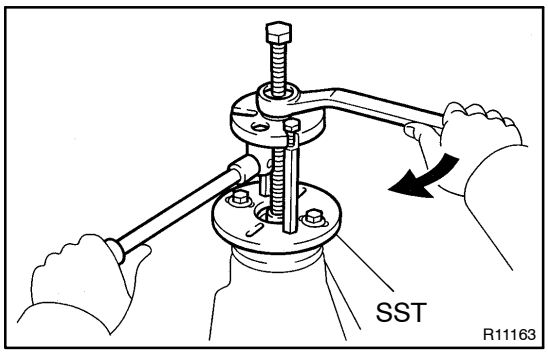
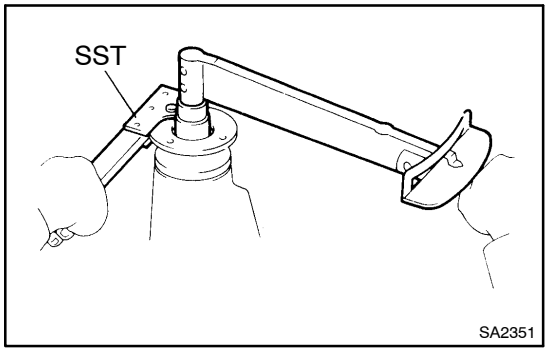


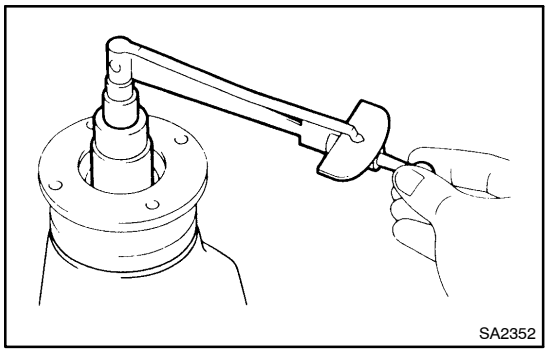
(b) Using SST and a hammer, install a new oil seal.
SST 09554–30011
Oil seal drive in depth: 1.5 mm (0.059 in.)
(c) Coat MP grease to the oil seal lip.



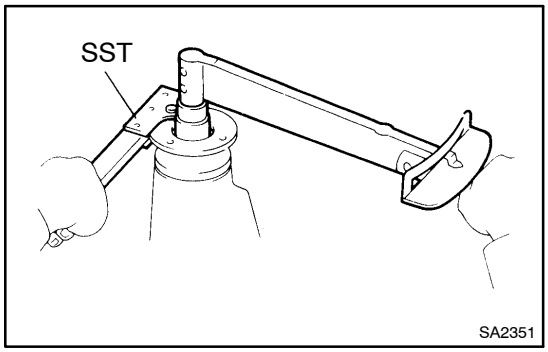
22. INSTALL COMPANION FLANGE
(a) Using SST, install the companion flange.
SST 09950–30010 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03020)
(b) Coat the thread of a new nut with hypoid gear oil LSD.



(c) Using SST to hold the flange, tighten the nut.
SST 09330–00021
Torque: 108 N·m (1,100 kgf·cm, 80 ft·lbf)



23. ADJUST DRIVE PINION PRELOAD
Using a torque wrench, measure the drive pinion preload using the backlash of the drive pinion and ring gear.
Preload (at starting):
New bearing
1.0 – 1.6 N·m (10 – 16 kgf·cm, 8.7 – 13.9 in.·lbf)
Reused bearing
0.5 – 0.8 N·m (5 – 8 kgf·cm, 4.3 – 6.9 in.·lbf)
If the preload is greater than the specification, replace the bearing spacer.
If the preload is less than the specification, retighten the nut a force of 13 N·m (130 kgf·cm, 9 ft·lbf) at a time until the specified preload is reached.
SST 09330–00021
Torque: 338 N·m (3,447 kgf·cm, 249 ft·lbf) or less
If the maximum torque is exceeded while retightening the nut, replace the bearing spacer and repeat the preload procedure. Do not loosen the pinion nut to reduce the preload.



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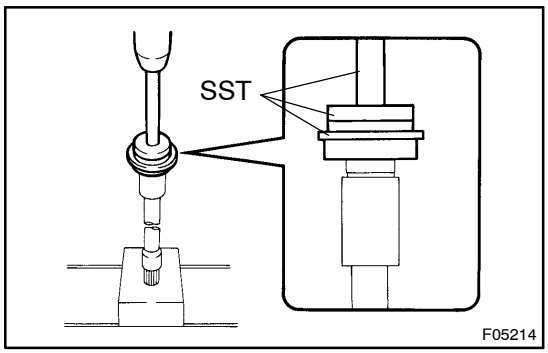
24. RECHECK TOTAL PRELOAD (See page SA–37)

25. RECHECK RING GEAR BACKLASH (See page SA–37)

26. RECHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page SA–44)

27. CHECK RUNOUT OF COMPANION FLANGE (See page SA–37)

28. STAKE DRIVE PINION NUT



29. INSTALL SIDE GEAR BEARING

Using SST and a press, install the bearing to side gear shaft.

SST 09502–12010, 09950–60020 (09951–00730), 09950–70010 (09951–07100)

30. INSTALL DIFFERENTIAL TUBE ASSEMBLY

(a) Clean surfaces with FIPG material attached to using gasoline or alcohol.

(b) Apply FIPG to the differential tube.

FIPG:
Part No. 08826 – 00090, THREE BOND 1281 or equivalent.

HINT:

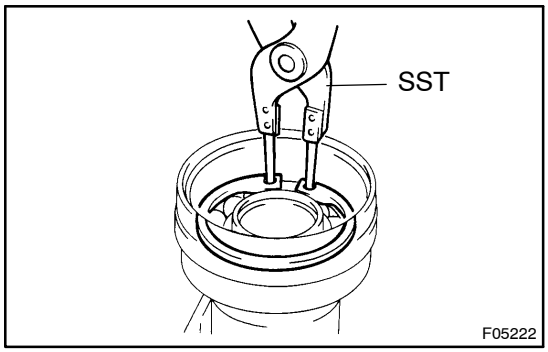
Install the differential tube within 10 minutes after applying FIPG.

(c) Install the differential tube with 4 bolts to the differential tube.

Torque: 105 N·m (1,070 kgf·cm, 77 ft·lbf)

(d) Install the side gear shaft.

(e) Using a snap ring expander, install the snap ring.

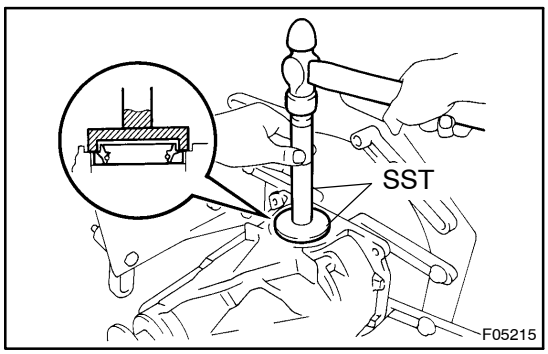


(f) Using SST, install the snap ring.

SST 09350–30020 (09350–07060)

31. INSTALL SIDE GEAR SHAFT OIL SEALS

(a) Coat the hypoid gear oil to a new oil seal periphery.



(b) Using SST and a hammer, install 2 new oil seals.

SST 09550–00032, 09950–70010 (09951–07150)

(c) Coat MP grease to the oil seal lip.

32. REMOVE DIFFERENTIAL CARRIER FROM OVERHAUL STAND ETC.

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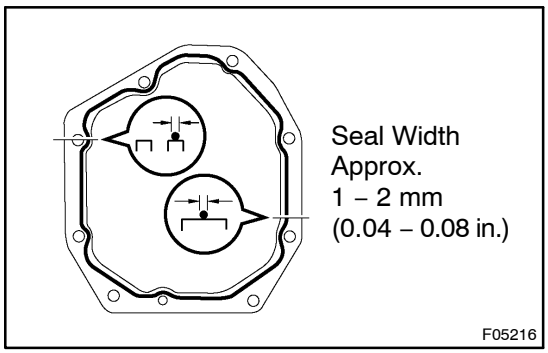
33. INSTALL DIFFERENTIAL CARRIER COVER

(a) Install the oil deflector with 2 bolts to the carrier cover.
Torque: 7.3 N·m (74 kgf·cm, 64 in.·lbf)

(b) Install the breather plug to the carrier cover.

(c) Remove any old FIPG material and be careful not to drop oil on the contact surfaces of the differential carrier and carrier cover.

(d) Clean surfaces with FIPG with material attached to using gasoline or alcohol.



(e) Apply FIPG to the carrier cover, as shown.
FIPG:
Part No. 08826–00090, THREE BOND 1281 or equivalent.

HINT:
Install the carrier cover within 10 minutes after applying FIPG.

(f) Install the differential carrier cover with the 9 bolts.
Torque: 47 N·m (475 kgf·cm, 34 ft·lbf)

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SA14Q–01

INSTALLATION

Installation is in the reverse order of removal (See page SA–36).
AFTER INSTALLATION, FILL DIFFERENTIAL WITH HYPOID GEAR OIL (See page SA–32)

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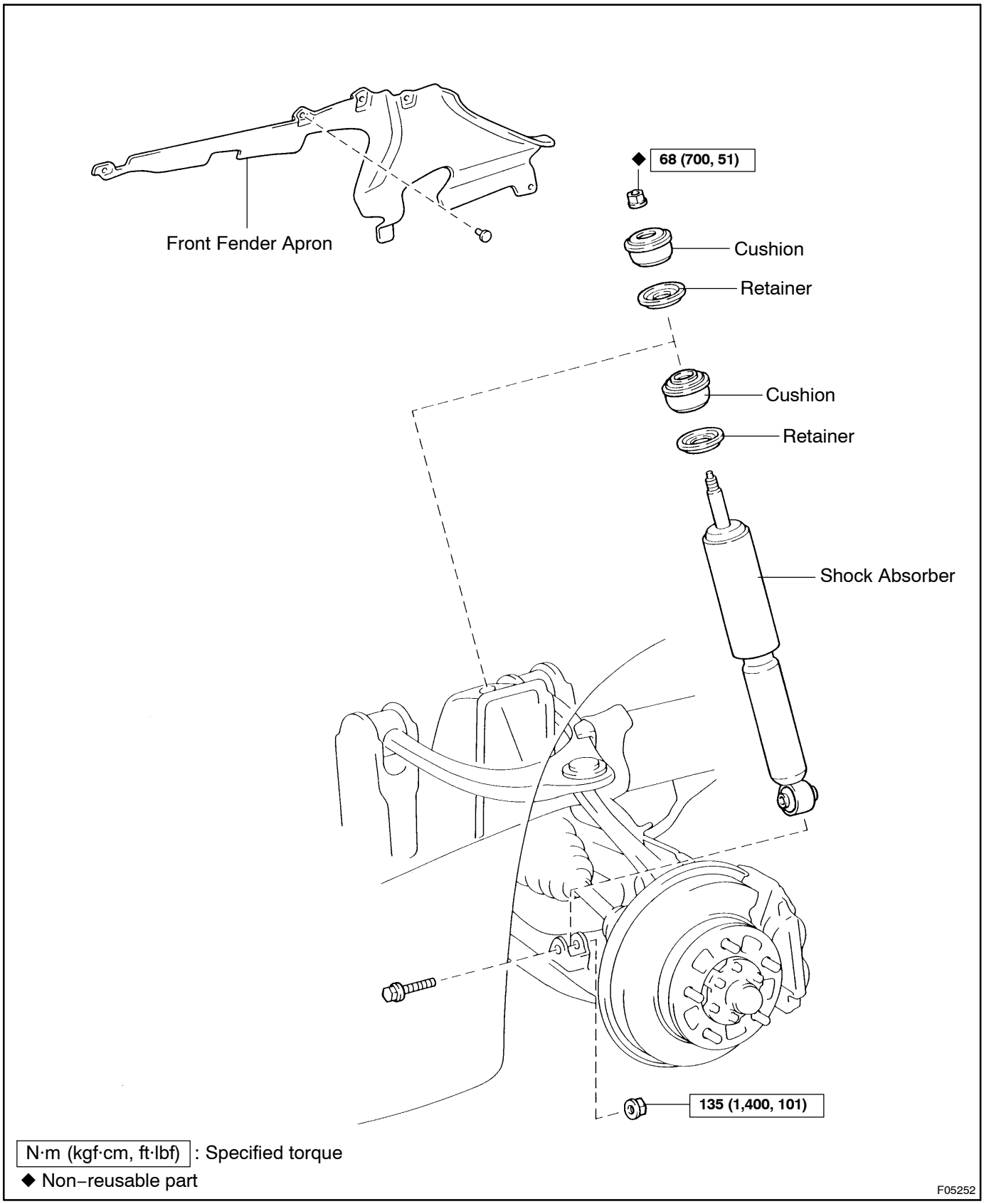
FRONT SHOCK ABSORBER

SA14R–01

COMPONENTS



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

F05252

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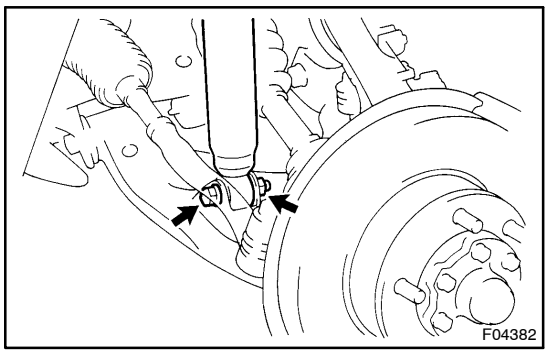
SA14S–01

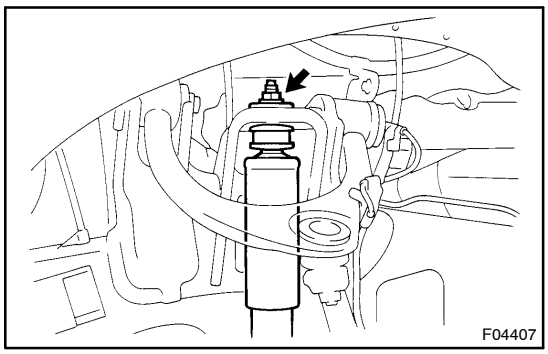
REMOVAL

1. **REMOVE FRONT WHEEL**
   Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)
2. **REMOVE FRONT FENDER APRON**



3. **REMOVE SHOCK ABSORBER**

(a) Remove the bolt, nut and disconnect the shock absorber from the lower suspension arm.
Torque: 135 N·m (1,400 kgf·cm, 101 ft·lbf)



(b) While holding the piston rod, remove the nut, retainer, cushion and shock absorber.
Torque: 68 N·m (700 kgf·cm, 51 ft·lbf)

(c) Remove the retainer and cushion from the shock absorber.

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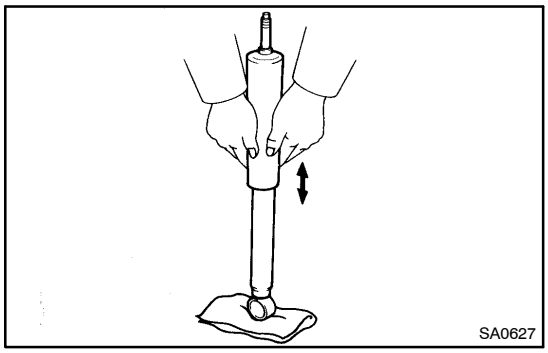
SA14T–01



INSPECTION

INSPECT SHOCK ABSORBER

Compress and extend the shock absorber rod and check that there is no abnormal resistance or unusual operation sounds. If there is any abnormality, replace the shock absorber with a new one.

NOTICE:

When disposing the shock absorber, see DISPOSAL on page SA–60.

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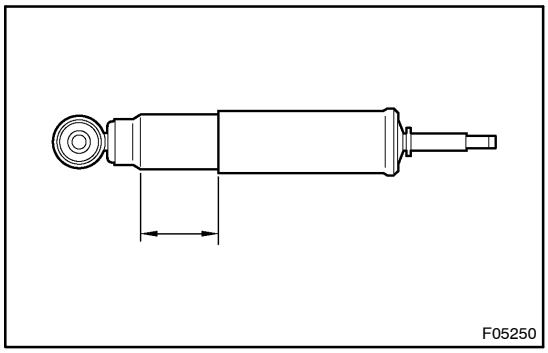
SA14U–01



DISPOSAL

DISCARD SHOCK ABSORBER

Before discarding the shock absorber, drill a hole of 2 – 3 mm (0.079 – 0.118 in.) in diameter at the location shown in the illustration to discharge the gas inside.

NOTICE:

- **When drilling, chips may fly out, work carefully.**
- **The gas is colorless, odorless and non–poisonous.**

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SA14V–01

INSTALLATION

Installation is in the reverse order of removal (See page SA–58).

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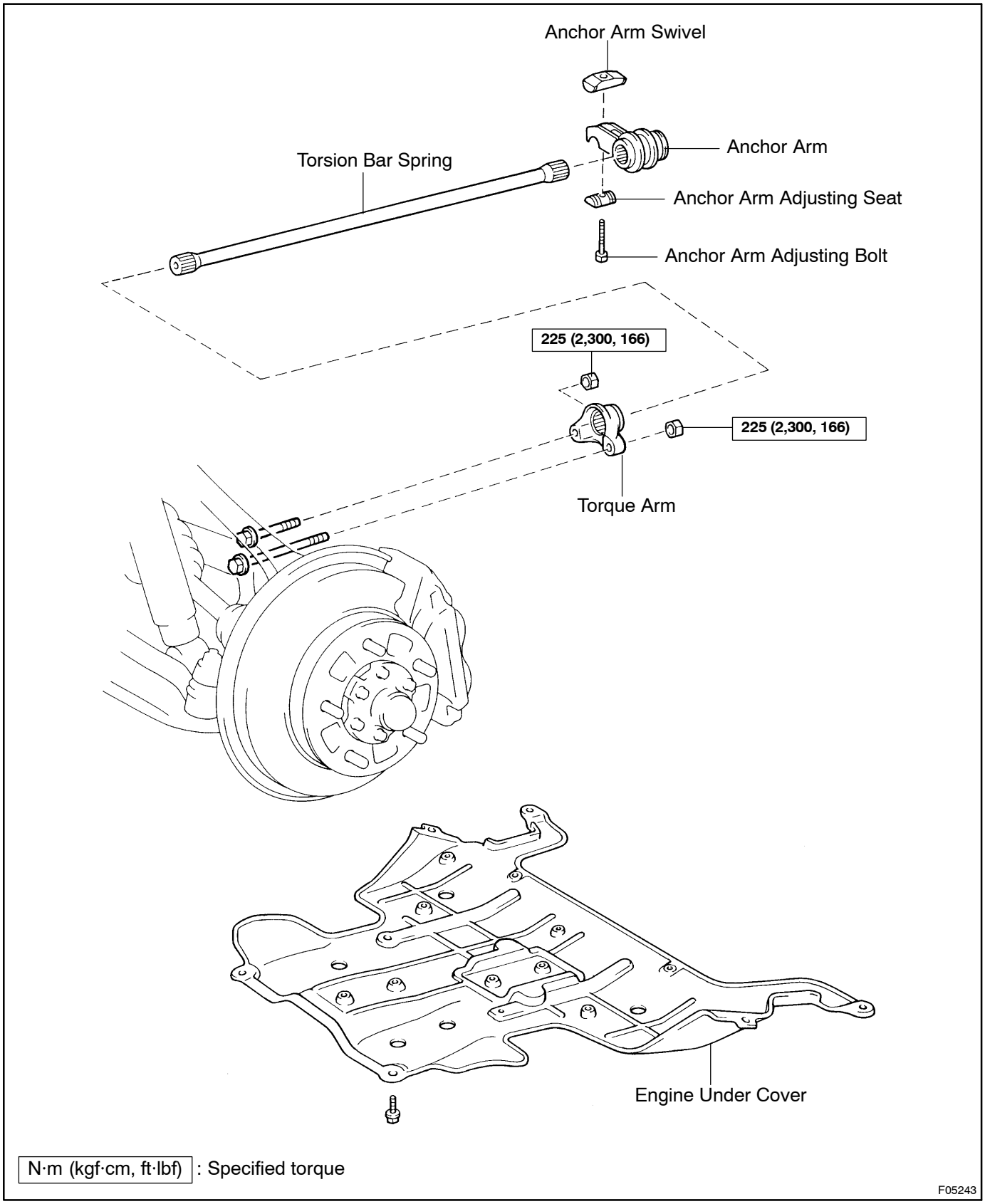
FRONT TORSION BAR SPRING

SA14W–01

COMPONENTS



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

F05243

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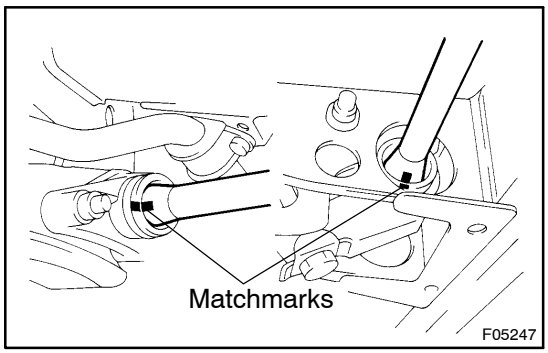
SA14X–01

REMOVAL

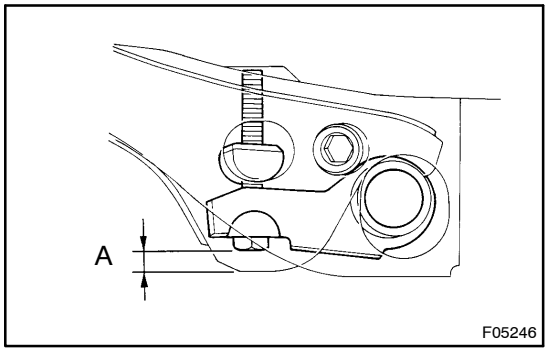
1. REMOVE FRONT WHEEL

2. REMOVE ENGINE UNDER COVER



3. REMOVE TORSION BAR SPRING WITH ANCHOR ARM

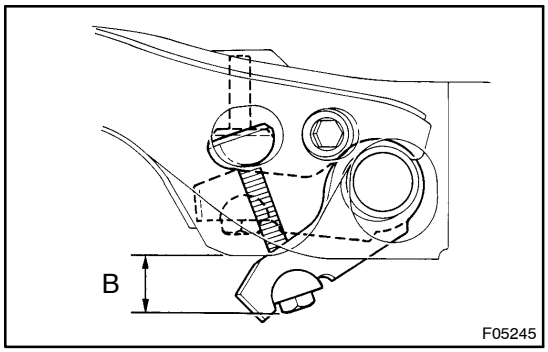
(a) Place matchmarks on the torsion bar spring, anchor arm and torque arm.



(b) Measure the dimension ”A” between the anchor arm bolt end and the frame as shown.

HINT:

Use the measurement for a reference when installing the anchor arm.



(c) Loosen the anchor arm bolt until the spring tension is free and measure the anchor arm bolt ”B”.

HINT:

Use the measurement for a reference when installing the anchor arm.

(d) Remove the anchor arm bolt, anchor arm swivel and anchor arm adjusting seat.

(e) Remove the torsion bar spring with anchor arm.

(f) Remove the anchor arm from the torsion bar spring.

4. REMOVE TORQUE ARM

Remove the bolt, 2 nuts and torque arm.

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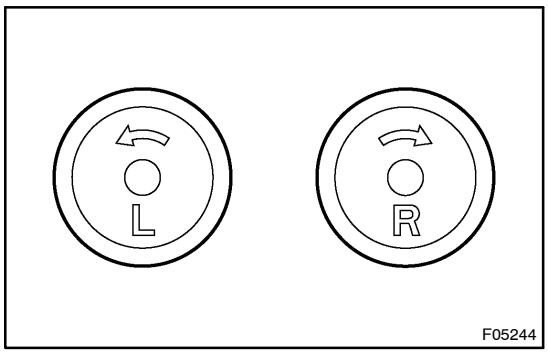
SA14Y–01

INSTALLATION

1. INSTALL TORQUE ARM

Install the torque arm with 2 nuts.

Torque: 225 N·m (2,300 kgf·cm, 166 ft·lbf)



2. INSTALL TORSION BAR SPRING WITH ANCHOR ARM

HINT:

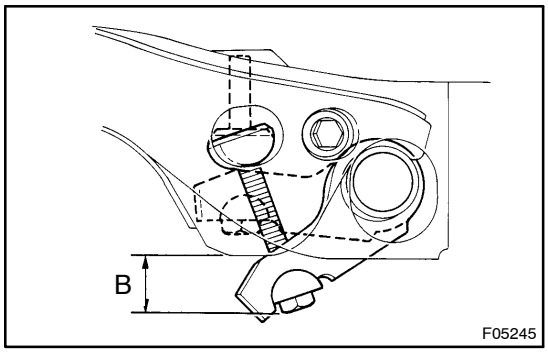
- There are left and right matchmarks on the rear end of the torsion bar springs.
- Apply a light coat of MP grease to the spline of the torsion bar springs.

(a) New torsion bar spring:

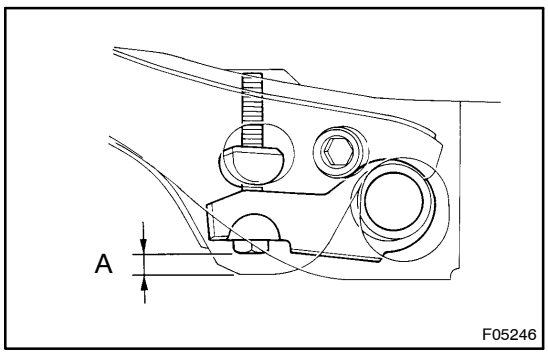
(1) Install the anchor arm to the torsion bar spring.

(2) Install the torsion bar spring with the anchor arm to the torque arm.

(3) Install the anchor arm adjusting seat, anchor arm swivel and anchor arm bolt.



(4) Check that the length of anchor arm bolt end is almost same as dimension ”B” measured when the torsion bar was removed.



(5) Tighten the anchor arm bolt so that the dimension ”A” is within the specifications in the table below.

(Reference)

LH	8 – 25 mm (0.315 – 0.984 in.)
RH	2 – 18 mm (0.079 – 0.709 in.)

(b) Reused torsion bar spring:

(1) Align matchmarks on the torsion bar spring and anchor arm and install them.

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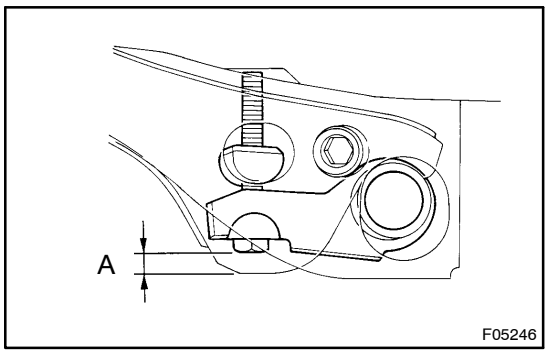
(2) Align matchmarks on the torsion bar spring and torque arm and install them.



(3) Tighten the anchor arm bolt so that the dimension "A" is almost same as the dimension measured when the torsion bar spring was removed.

3. INSTALL ENGINE UNDER COVER

4. INSTALL FRONT WHEEL

Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

5. CHECK VEHICLE HEIGHT (See page SA–5)

HINT:

After stabilizing the suspension, adjust the vehicle height by turning the anchor arm bolt.

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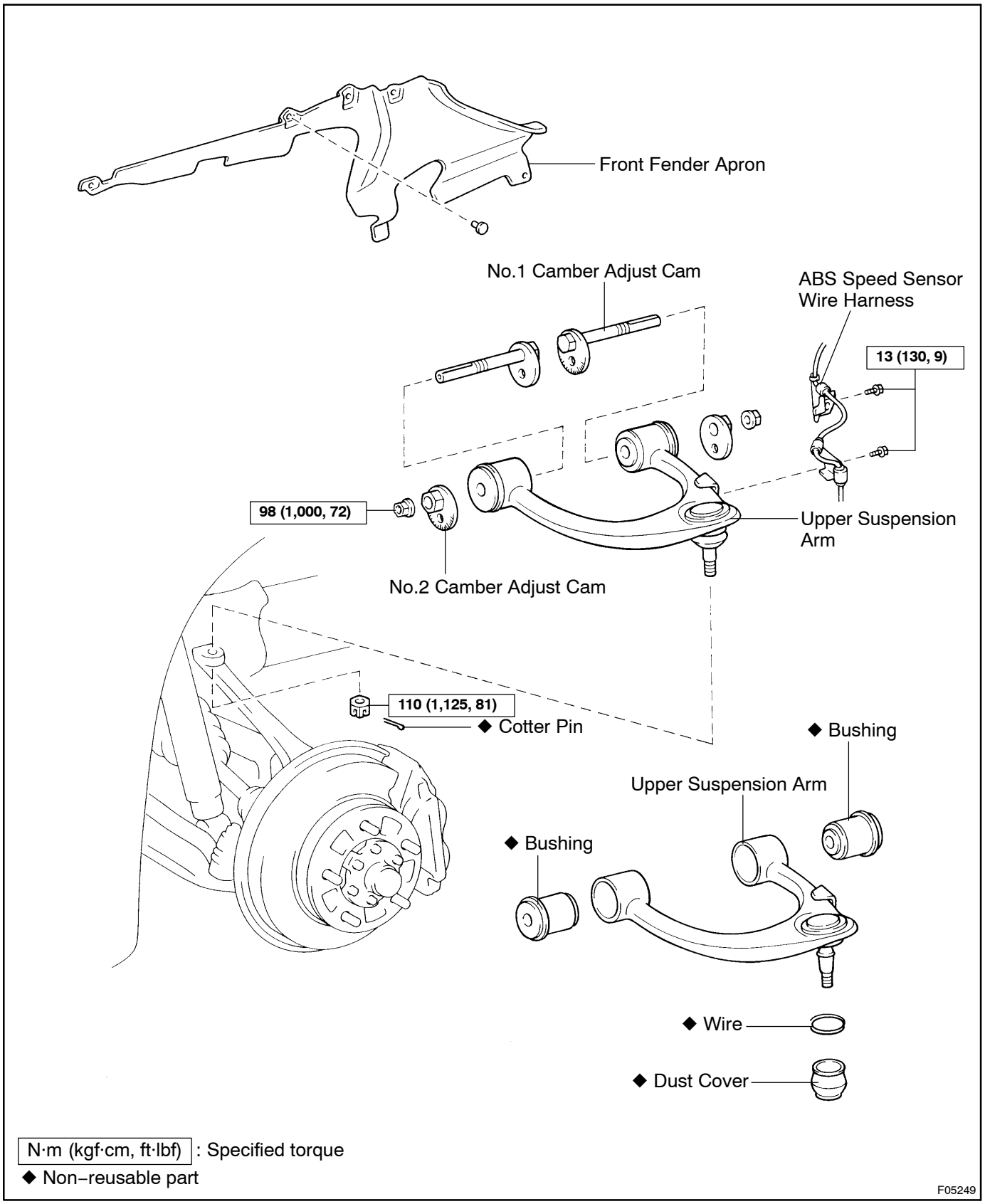
FRONT UPPER SUSPENSION ARM

SA14Z–01

COMPONENTS



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

◆ Non–reusable part

F05249

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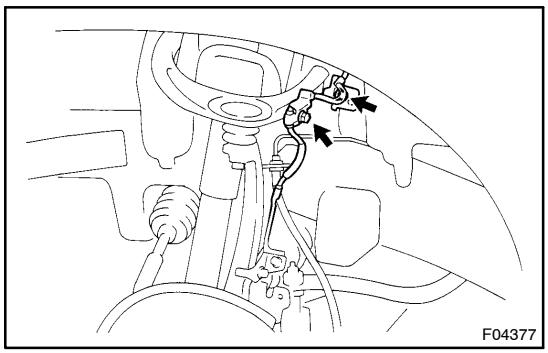
SA150–01

REMOVAL

1. **REMOVE FRONT WHEEL**
   Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)
2. **REMOVE FRONT FENDER APRON**

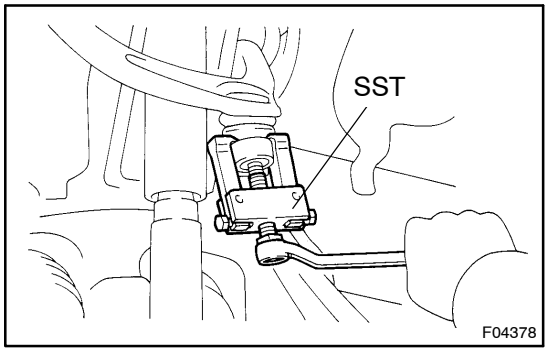


3. **DISCONNECT ABS SPEED SENSOR WIRE HARNESS**
   Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

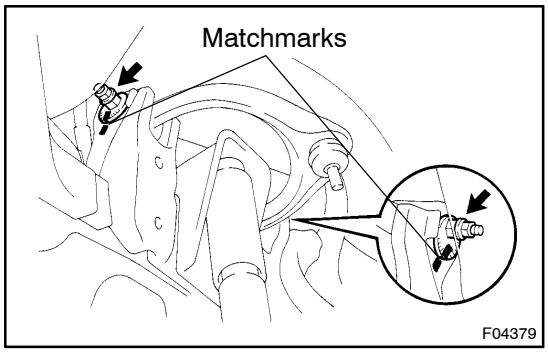
Remove the 2 bolts and disconnect the ABS speed sensor wire harness.

4. **DISCONNECT STEERING KNUCKLE FROM UPPER SUSPENSION ARM**

(a) Support the lower suspension arm with a jack.
(b) Remove the cotter pin and nut.
Torque: 110 N·m (1,125 kgf·cm, 81 ft·lbf)



(c) Using SST, disconnect the steering knuckle from the upper suspension arm.
SST 09628–62011



5. **REMOVE UPPER SUSPENSION ARM**

(a) Place matchmarks on the front and rear No.2 adjust cams and body.
(b) Remove the 2 nuts, No.1 and No.2 camber adjust cams and upper suspension arm.
Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)

HINT:
At the time of installation, after stabilizing the suspension, torque the nuts.

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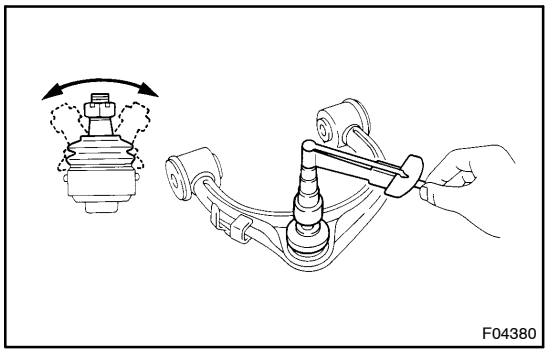
SA151–01



INSPECTION

INSPECT UPPER SUSPENSION ARM BALL JOINT FOR ROTATION CONDITION

(a) As shown in the illustration, flip the ball joint stud back and forth 5 times, before installing the nut.

(b) Using a torque wrench, turn the nut continuously one turn per 3 – 5 seconds and take the torque reading on the 5th turn.

Turning torque:
1.0 – 4.4 N·m (10 – 45 kgf·cm, 8.7 – 39 in.·lbf)

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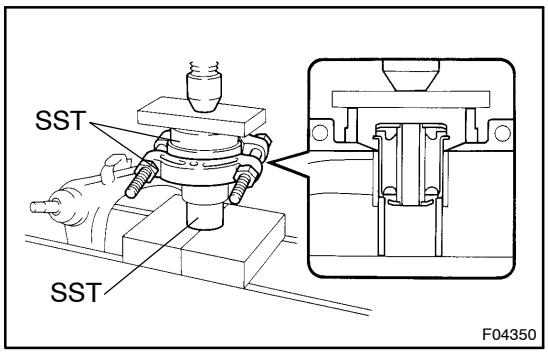
SA152–01

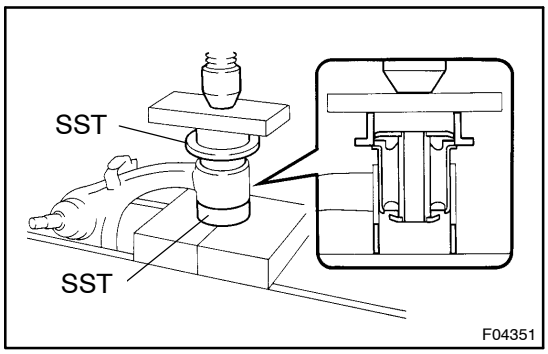
REPLACEMENT

1. REPLACE BUSHING

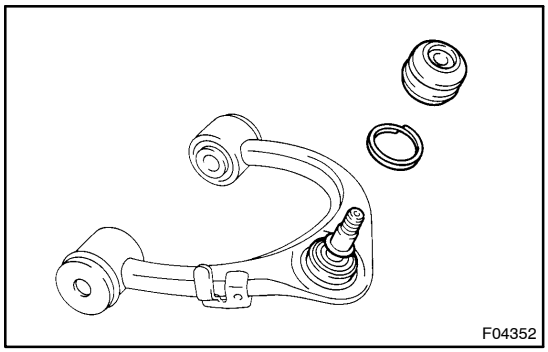
(a) Using a chisel and hammer, pry up the flange of the bushing.



(b) Using SST, a steel plage and press, remove the bushing.
SST 09527–17011, 09710–28021 (09710–08031), 09950–00020



(c) Using SST, a steel plate and press, install a new bushing.
SST 09316–20011, 09710–28012 (09710–07062)



2. REPLACE DUST COVER

(a) Remove the wire and dust cover.
(b) Coat the ball joint with grease in the boot kit.
(c) Install a new dust cover and wire.

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SA153–01

INSTALLATION

Installation is in the reverse order of removal (See page SA–67).
AFTER INSTALLATION, CHECK FRONT WHEEL ALIGNMENT (See page SA–5)

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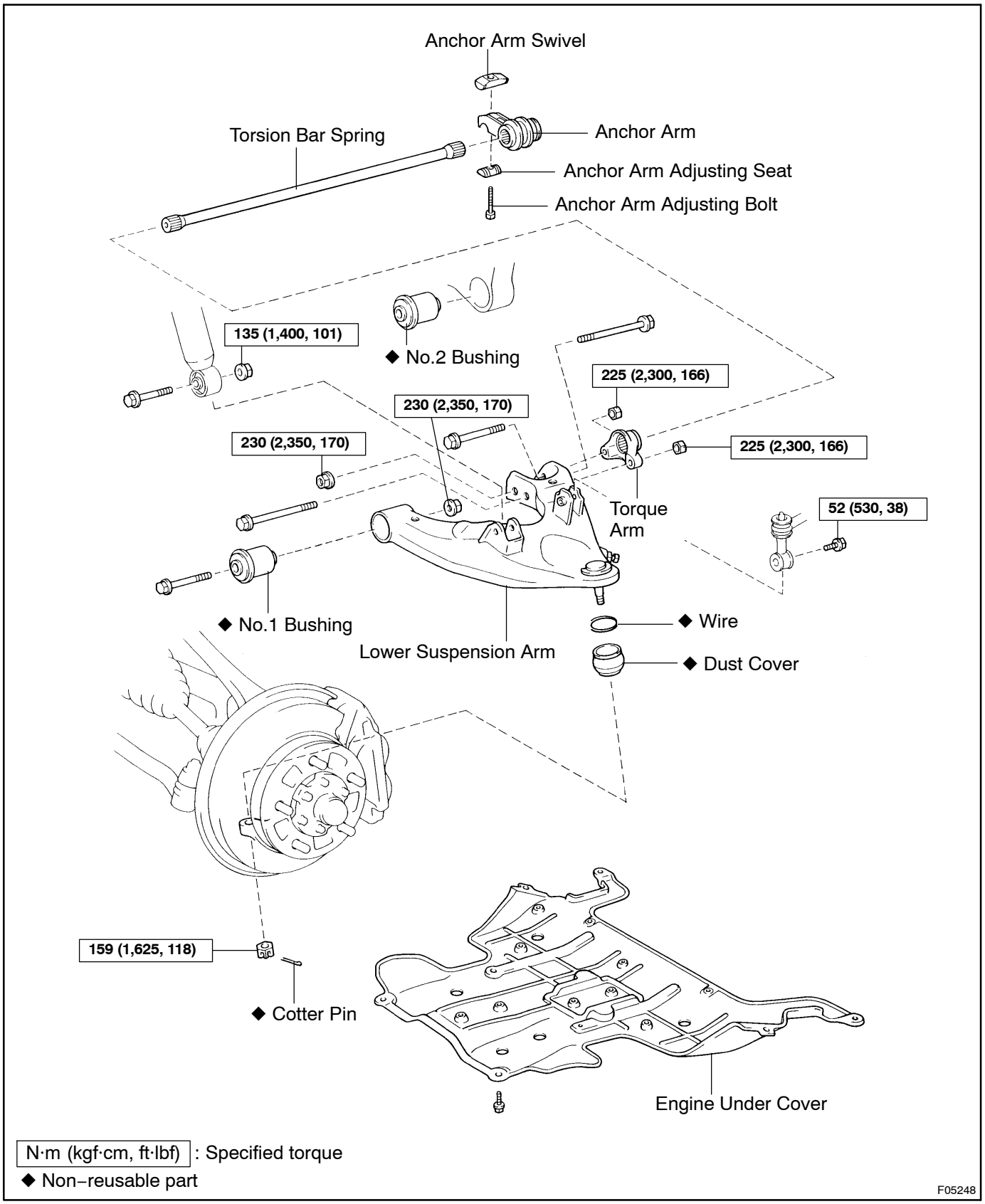
FRONT LOWER SUSPENSION ARM

SA154–01

COMPONENTS



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

◆ Non–reusable part

F05248

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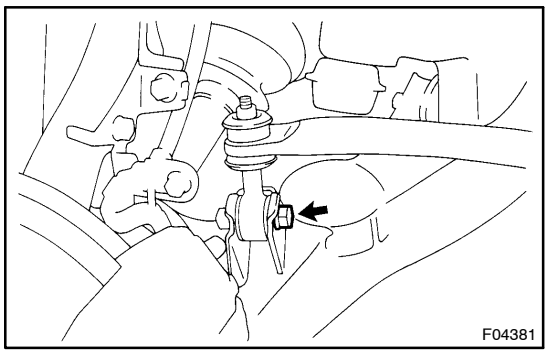
SA155–01

REMOVAL

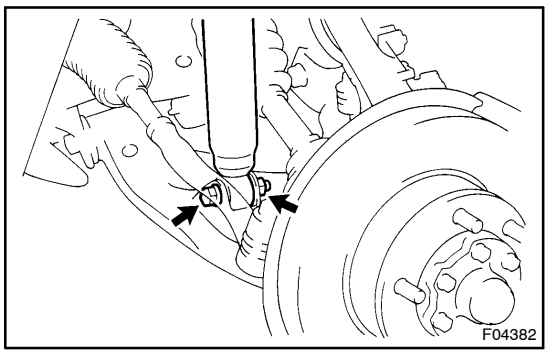
1. **REMOVE FRONT WHEEL**
   Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)
2. **REMOVE ENGINE UNDER COVERS**
3. **REMOVE FRONT TORSION BAR SPRING**
   (See page SA–63)



4. **DISCONNECT STABILIZER BAR LINK FROM LOWER SUSPENSION ARM**

Remove the bolt and disconnect the stabilizer bar link from the lower suspension arm.

Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)



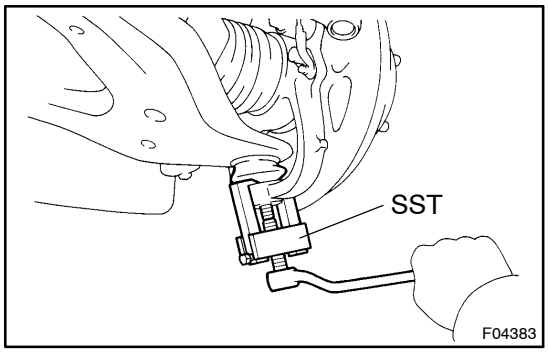
5. **DISCONNECT SHOCK ABSORBER FROM LOWER SUSPENSION ARM**

Remove the bolt, nut and disconnect the shock absorber from the lower suspension arm.

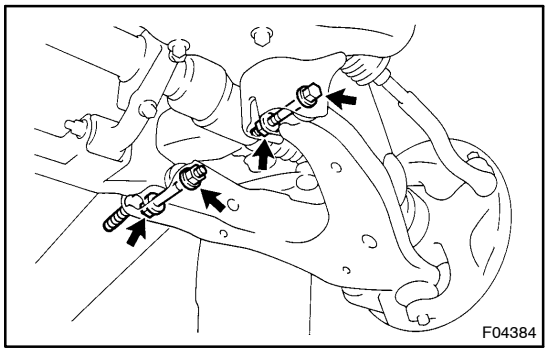
Torque: 135 N·m (1,400 kgf·cm, 101 ft·lbf)

6. **DISCONNECT STEERING KNUCKLE FROM LOWER SUSPENSION ARM**

(a) Remove the cotter pin and nut.
Torque: 159 N·m (1,625 kgf·cm, 118 ft·lbf)



(b) Using SST, disconnect the steering knuckle from the lower suspension arm.
SST 09628–62011



7. **REMOVE LOWER SUSPENSION ARM**

Remove the 2 nuts, 3 bolts and lower suspension arm.

Torque: 230 N·m (2,350 kgf·cm, 170 ft·lbf)

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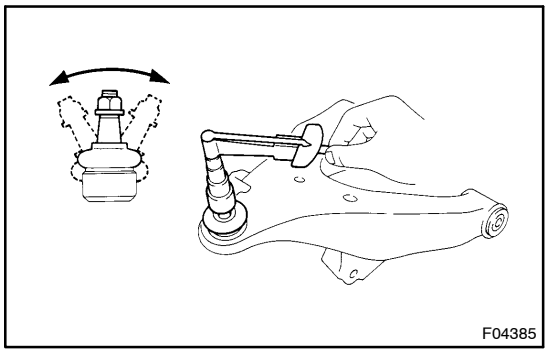
SA156–01



INSPECTION

INSPECT LOWER SUSPENSION ARM BALL JOINT FOR ROTATION CONDITION

(a) As shown in the illustration, flip the ball joint stud back and forth 5 times, before installing the nut.

(b) Using a torque wrench, turn the nut continuously one turn per 3 – 5 seconds and take the torque reading on the 5th turn.

Turning torque:
0.29 – 2.94 N·m (3 – 30 kgf·cm, 2.6 – 26 in.·lbf)

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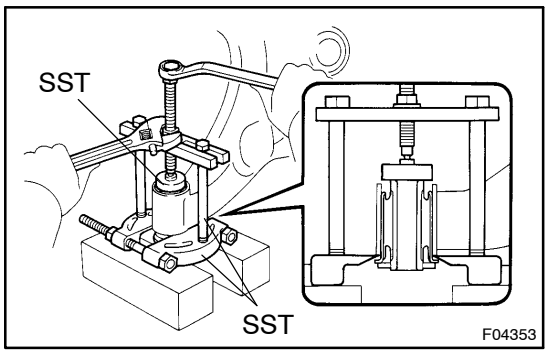
SA157–01

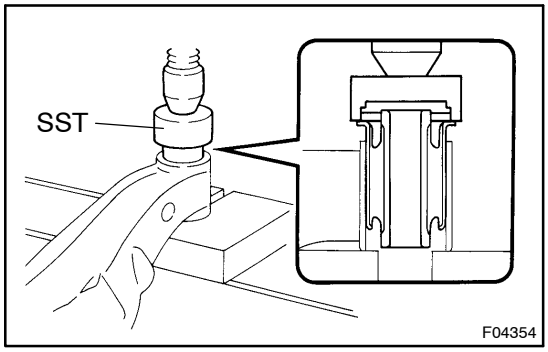
REPLACEMENT

1. REPLACE NO.1 BUSHING

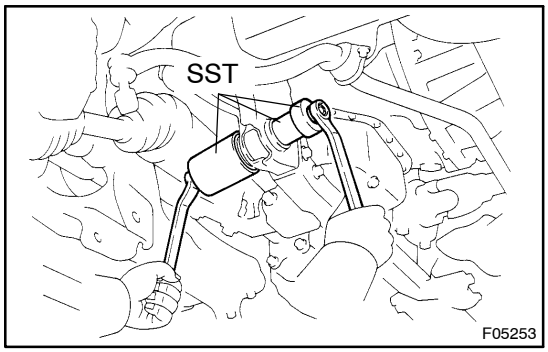
(a) Using a chisel and hammer, pry up the flange of the No.1 bushing.



(b) Using SST, remove the No.1 bushing.
SST 09710–30021 (09710–03101), 09950–00020, 09950–00030, 09950–40011 (09957–04010)

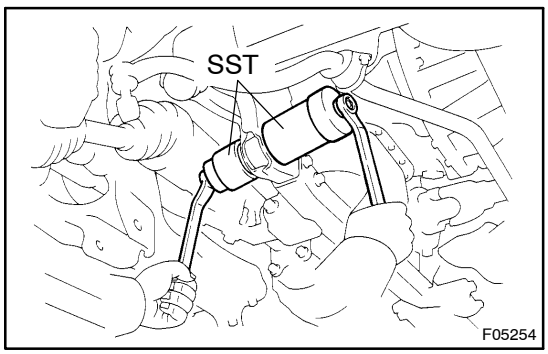


(c) Using SST and a press, install a new bushing.
SST 09726–36010



2. REPLACE NO.2 BUSHING

(a) Using SST, remove the No.2 bushing.
SST 09710–22021 (09710–01071), 09726–35011 (09726–05021), 09830–36010



(b) Using SST, install a new bushing.
SST 09631–32020, 09830–36010

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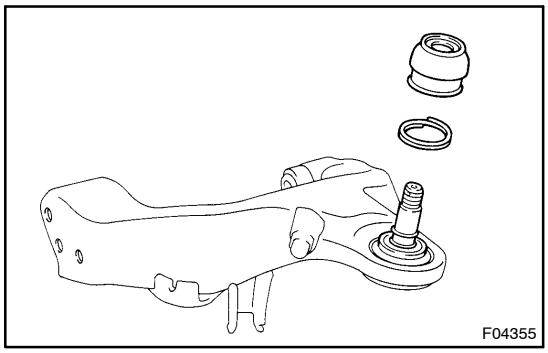

3. REPLACE DUST COVER

(a) Remove the wire and dust cover.

(b) Coat the ball joint with grease in the boot kit.

(c) Install a new dust cover and wire.

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SA158–01

INSTALLATION

Installation is in the reverse order of removal (See page SA–72).
AFTER INSTALLATION, CHECK FRONT WHEEL ALIGNMENT (See page SA–5)

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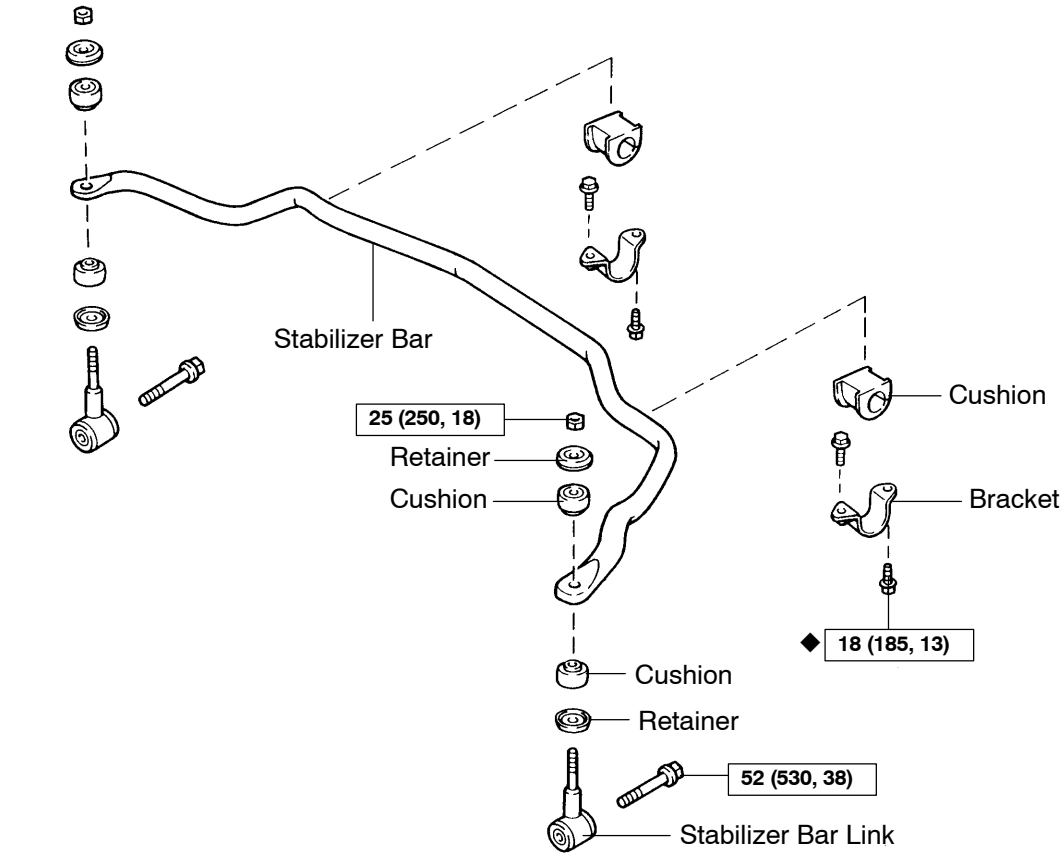
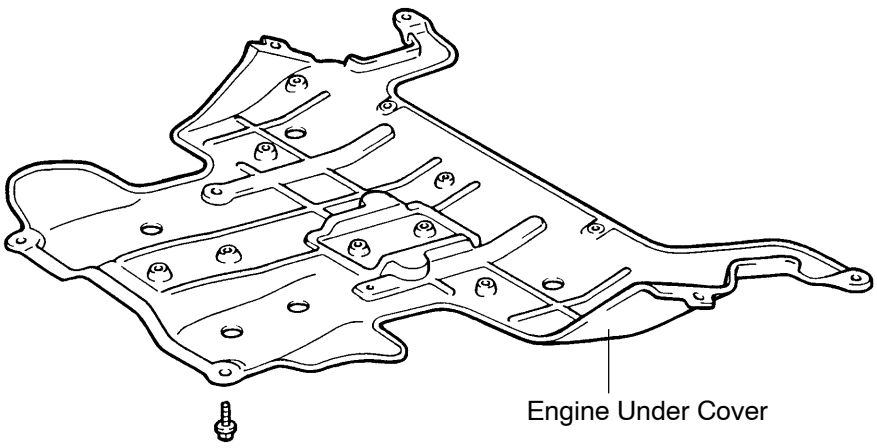
FRONT STABILIZER BAR

COMPONENTS

SA159–01





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

◆ Non–reusable part

F05236

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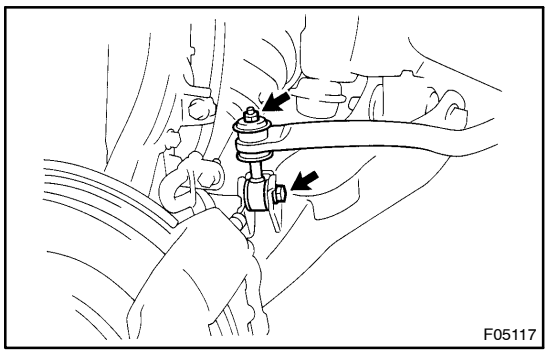
SA15A–01

REMOVAL

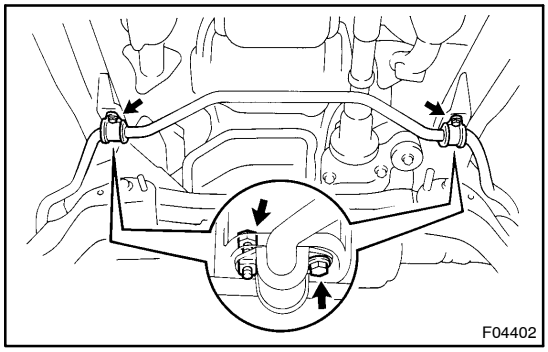
1. REMOVE ENGINE UNDER COVER



2. REMOVE LH AND RH STABILIZER BAR LINKS

Remove the 2 nuts, bolts, 4 retainers, 4 cushions and 2 stabilizer bar links.

Torque:
Bolt: 52 N·m (530 kgf·cm, 38 ft·lbf)
Nut: 25 N·m (250 kgf·cm, 18 ft·lbf)



3. REMOVE STABILIZER BAR

(a) Remove the 4 bolts, 2 brackets and 2 cushions.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(b) Remove the stabilizer bar.

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SA15B–01

INSTALLATION

Installation is in the reverse order of removal (See page SA–78).

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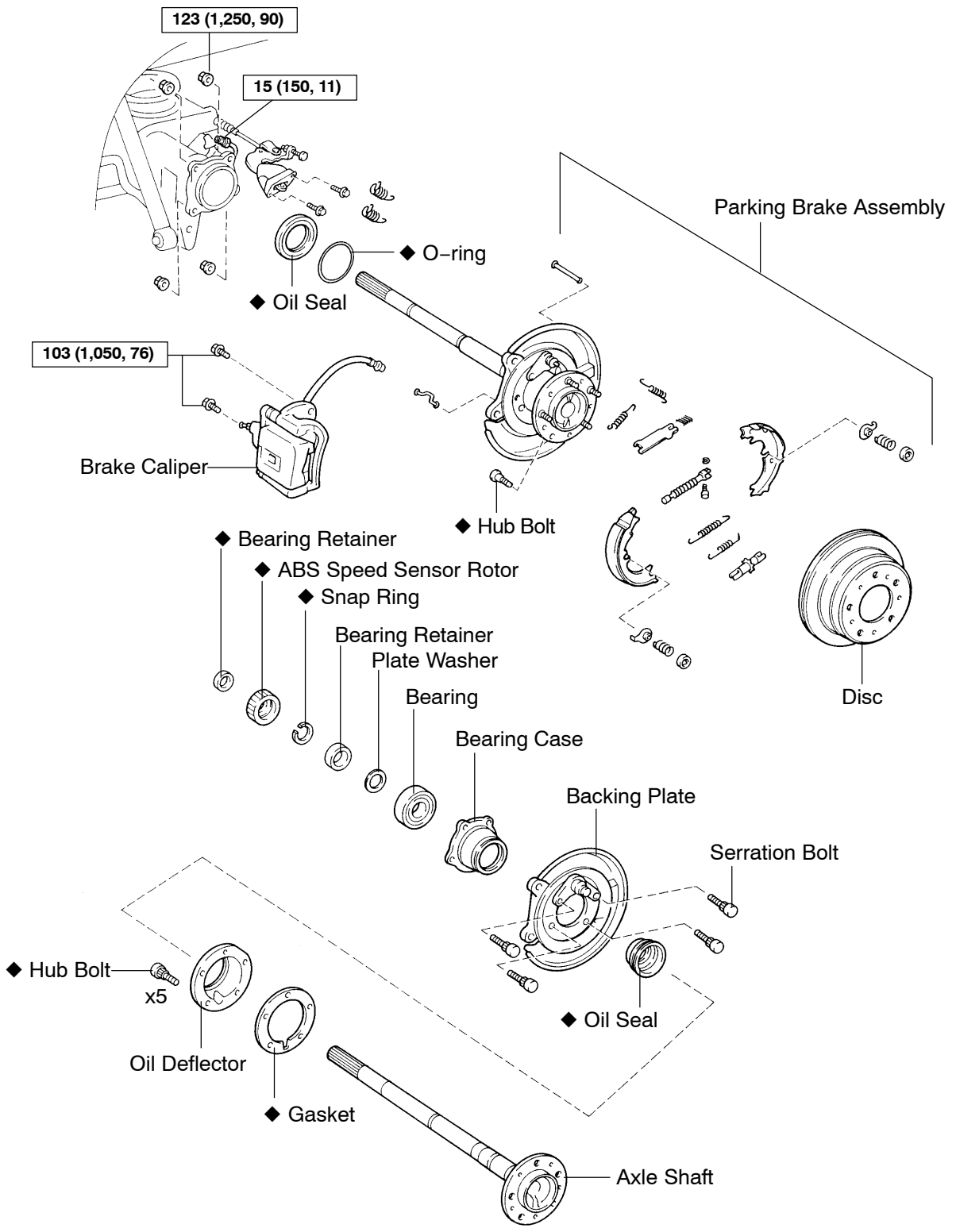
REAR AXLE SHAFT

COMPONENTS

SA15C–01



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

F05177

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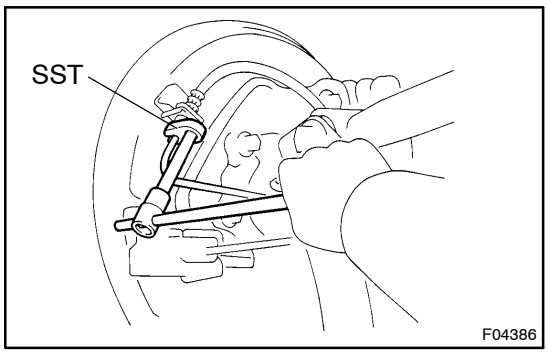
SA15D–01

REMOVAL

1. REMOVE REAR WHEEL

Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

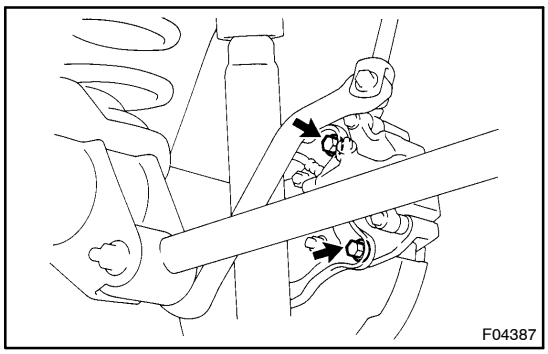


2. DISCONNECT BRAKE LINE

Using SST, disconnect the brake line and remove the clip.

SST 09023–00100

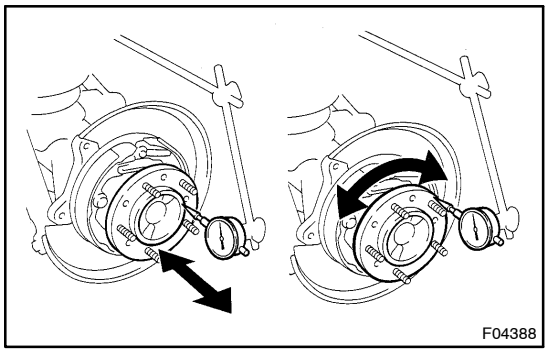
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)



3. REMOVE BRAKE CALIPER AND DISC

Remove the 2 bolts, brake caliper and disc.

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)



4. CHECK BEARING BACKLASH AND AXLE SHAFT DEVIATION

(a) Using a dial indicator, check the backlash in the bearing shaft direction.

Maximum: 0.6 mm (0.024 in.)

If the backlash exceeds the maximum, replace the bearing.

(b) Using a dial indicator, check the deviation at the surface of the axle shaft outside the hub bolt.

Maximum: 0.05 mm (0.0020 in.)

If the deviation exceeds the maximum, replace the axle shaft.

5. REMOVE PARKING BRAKE ASSEMBLY

(See page BR–29)

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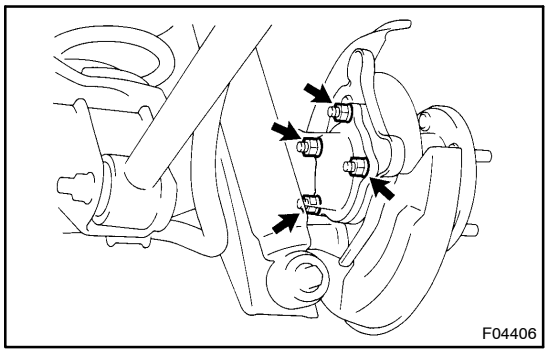

6. REMOVE AXLE SHAFT ASSEMBLY

(a) Remove the 4 nuts.

Torque: 123 N·m (1,250 kgf·cm, 90 ft·lbf)

(b) Pull out the axle shaft assembly.

NOTICE:

Be careful not to damage the oil seal.

(c) Remove the O–ring from the bearing case.

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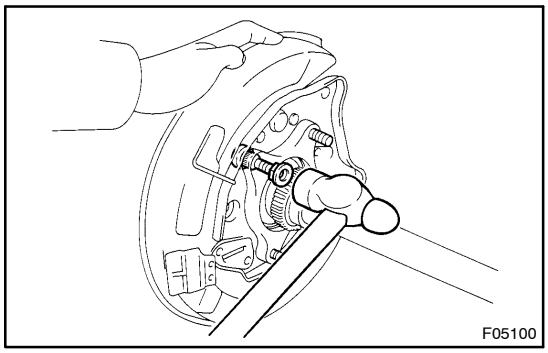
SA15E–01

DISASSEMBLY

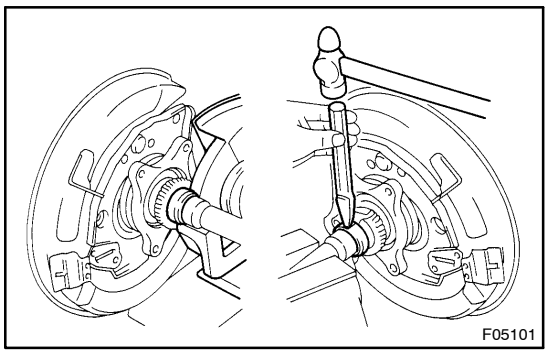


1. REMOVE BEARING RETAINER (DIFFERENTIAL SIDE) AND ABS SPEED SENSOR ROTOR

(a) Attach 4 nuts to the serration bolts and remove the serration bolts from the backing plate using a hammer.

NOTICE:

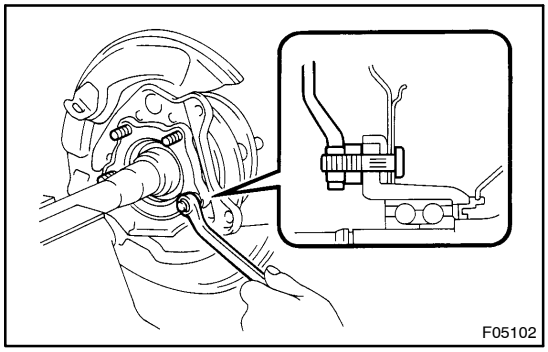
Do not reuse the nuts previously removed from the vehicle.



(b) Grind the retainer and sensor rotor surfaces using a grinder, then pry them out with a chisel and hammer.

2. REMOVE SNAP RING FROM AXLE SHAFT

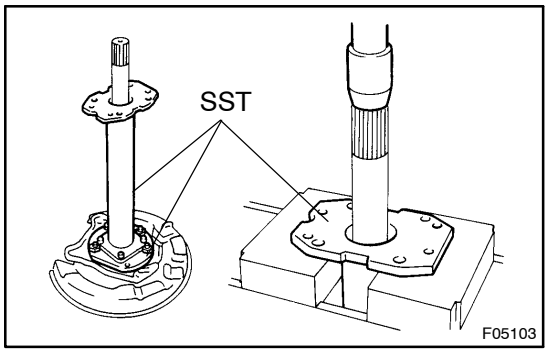
Using a snap ring expander, remove the snap ring.



3. REMOVE REAR AXLE SHAFT FROM BACKING PLATE

(a) Attach washers and nut to the serration bolts, then torque the nuts to install the serration bolts to the backing plate.

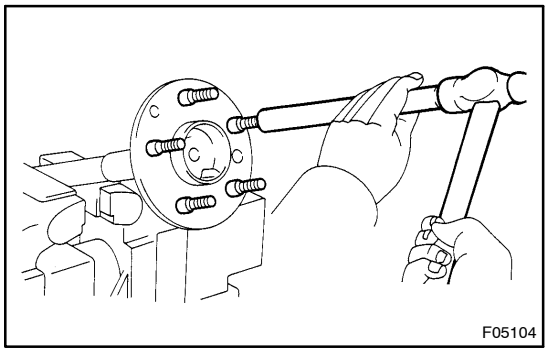
(b) Remove the 4 nuts from the serration bolts.



(c) Position SST on the backing plate with 4 nuts.
SST 09521–25011, 09521–25021

(d) Using a press, remove the rear axle shaft, plate washer and bearing retainer from the backing plate.

(e) Remove the SST.
SST 09521–25011, 09521–25021



4. REMOVE OIL DEFLECTOR

Using a brass bar and hammer, remove the 5 hub bolts, oil deflector and gasket.

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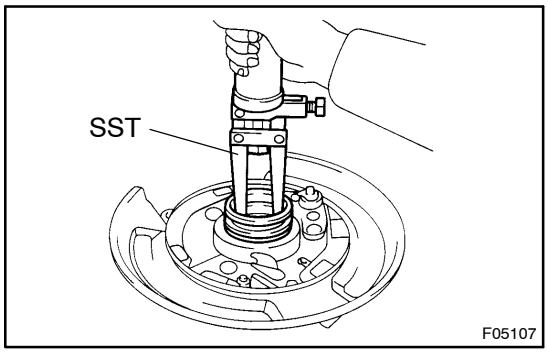
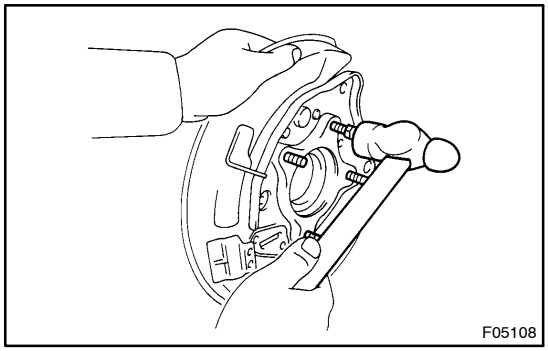


5. REMOVE OUTER OIL SEAL

Using SST, remove the oil seal.

SST 09308–00010

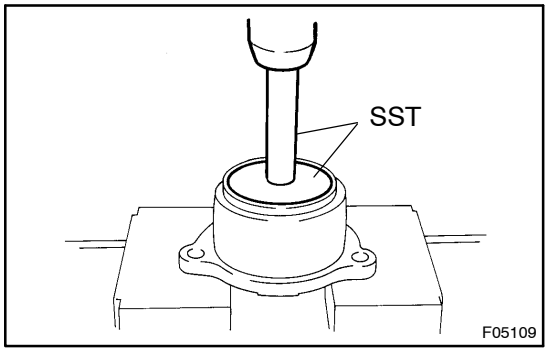


6. REMOVE BEARING CASE

Attach 4 nuts to the serration bolts and remove the serration bolts from the backing plate using a hammer.

NOTICE:

Do not reuse the nuts previously removed from the vehicle.



7. REMOVE REAR AXLE BEARING

Using SST and a press, remove the bearing.

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

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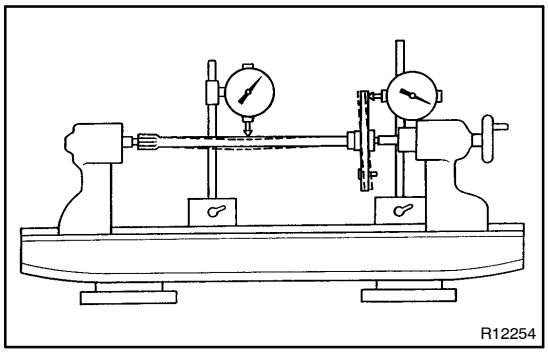
SA15F–01



INSPECTION

INSPECT AXLE SHAFT

Using a dial indicator, measure the runout of the shaft and flange.

Maximum shaft runout: 2.0 mm (0.079 in.)

Maximum flange runout: 0.05 mm (0.0020 in.)

If the rear axle shaft or flange are damaged or worn, or if runout is greater than the maximum, replace the rear axle shaft.

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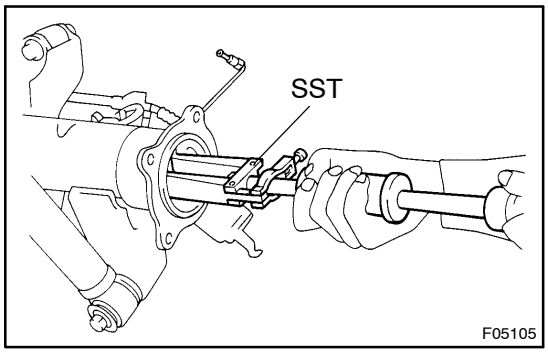
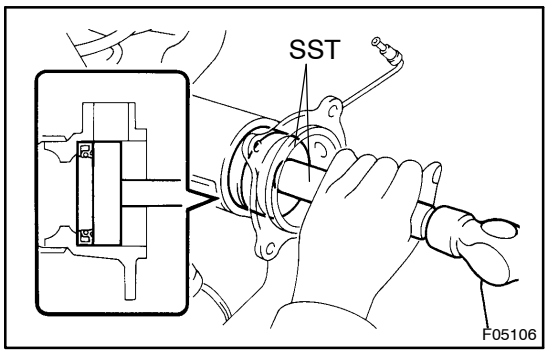
SA15G–01

REPLACEMENT

REPLACE OIL SEAL (INNER SIDE)



(a) Using SST, remove the oil seal.
SST 09308–00010



(b) Using SST and a hammer, install a new oil seal.
SST 09950–60020 (09951–00710),
09950–70010 (09951–07150)

(c) Coat MP grease to the oil seal lip.

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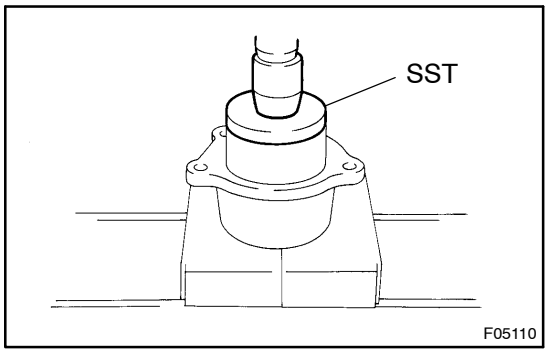
SA15H–01

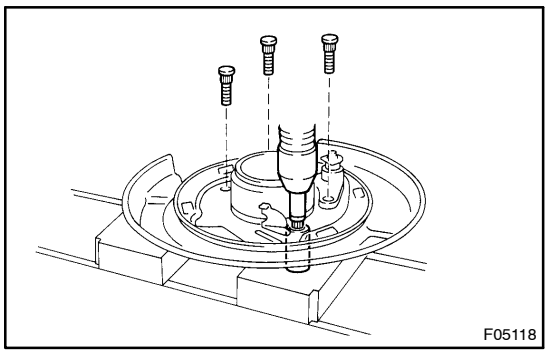
REASSEMBLY



1. INSTALL REAR AXLE BEARING

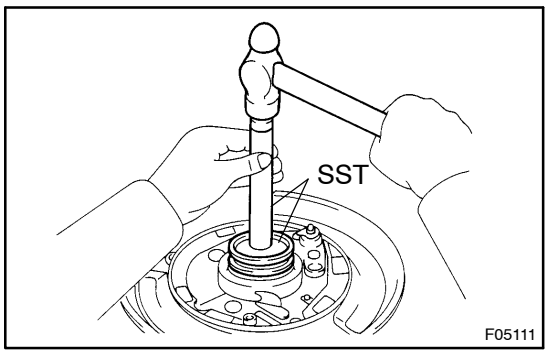
Using SST and a press, install the bearing.

SST 09950–60020 (09951–00890)



2. INSTALL BEARING CASE

Position the backing plate on the bearing case and using a press and 2 socket wrenches, install the serration bolts.

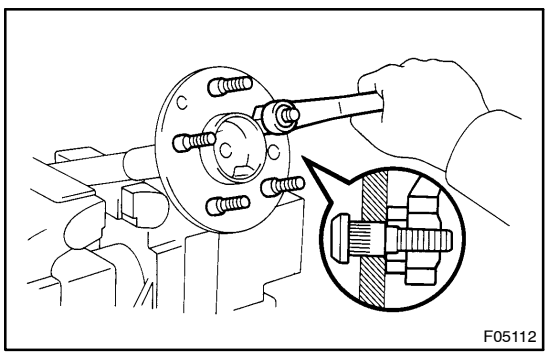


3. INSTALL OUTER OIL SEAL

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

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

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

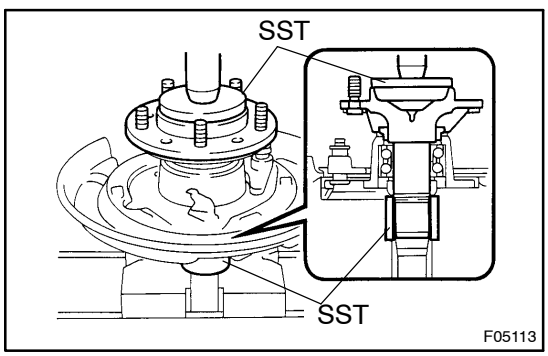


4. INSTALL OIL DEFLECTOR

Position a new gasket on the axle shaft a new gasket and install a washer and nut to a new hub bolt, as shown in the illustration, and install the hub bolt by torquing the nut.

5. INSTALL REAR AXLE SHAFT TO BACKING PLATE

(a) Install the backing plate, plate washer and bearing retainer on the rear axle shaft.



(b) Using SST and a press, install the rear axle shaft into the backing plate.

SST 09631–12090, 09950–60020 (09951–01030)

6. INSTALL SNAP RING TO AXLE SHAFT

Using a snap ring expander, install a new snap ring.

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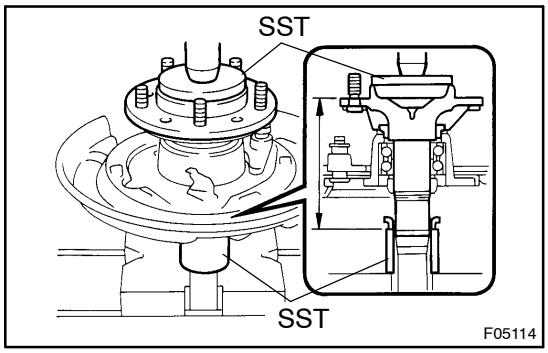

7. INSTALL ABS SPEED SENSOR ROTOR AND BEARING RETAINER

Using SST and a press, install a new ABS speed sensor rotor and bearing retainer.

SST 09631–12090, 09950–60020 (09951–01030)

Standard length: 170.7 ± 1.0 mm (6.720 ± 0.039 in.)

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SA15I–01

INSTALLATION

Installation is in the reverse order of removal (See page SA–81).
AFTER INSTALLATION, FILL BRAKE RESERVOIR WITH BRAKE FLUID, BLEED BRAKE SYSTEM (See page BR–4), CHECK FOR LEAKS AND ABS SPEED SENSOR SIGNAL (See page DI–219)

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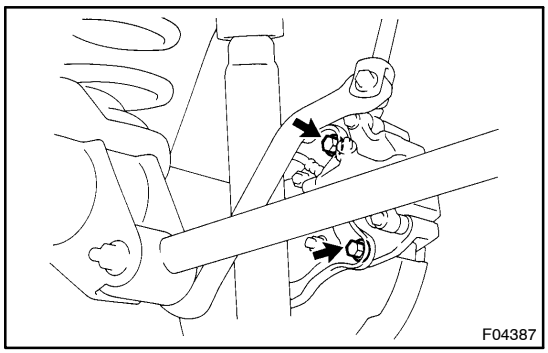
REAR WHEEL HUB BOLT

SA15J–01

REPLACEMENT

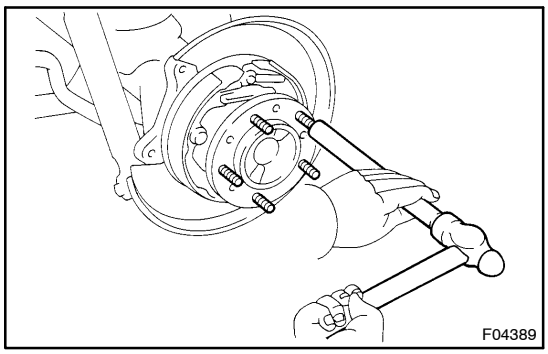
1. REMOVE REAR WHEEL



2. REMOVE BRAKE CALIPER AND DISC

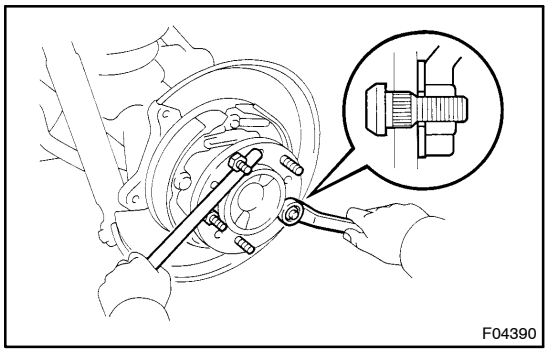
(a) Remove the 2 bolts, brake caliper and disc.

(b) Support the brake caliper securely.



3. REMOVE HUB BOLT

Using a brass bar and hammer, remove the hub bolt.



4. INSTALL HUB BOLT

Install a washer and nut to a new hub bolt, as shown in the illustration, and install the hub bolt by torquing the nut.

5. INSTALL DISC AND BRAKE CALIPER

Install the disc and brake caliper with the 2 bolts.

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

6. INSTALL REAR WHEEL

Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

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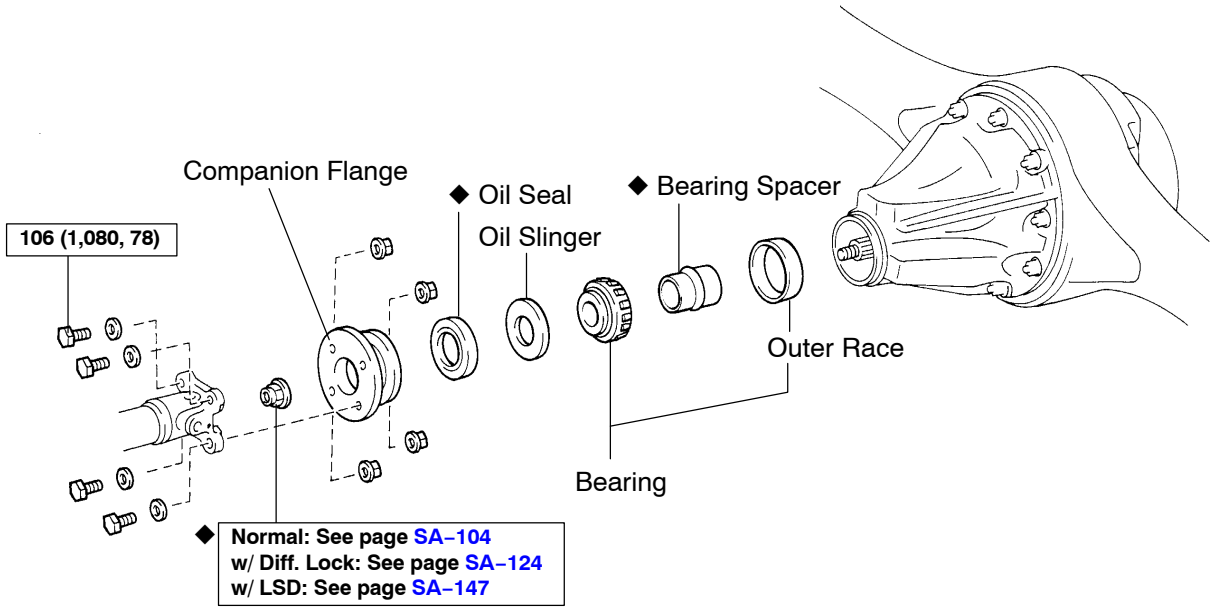
REAR DIFFERENTIAL FRONT OIL SEAL

COMPONENTS

SA15K–01



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

F05115

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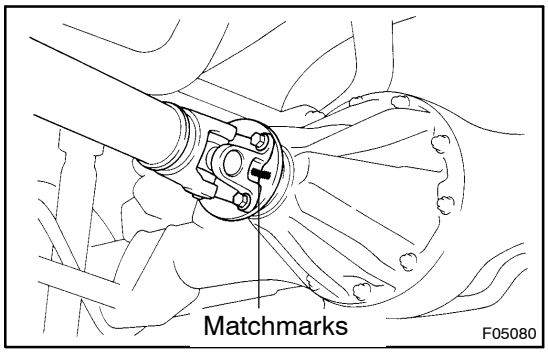
SA15L–01

REPLACEMENT

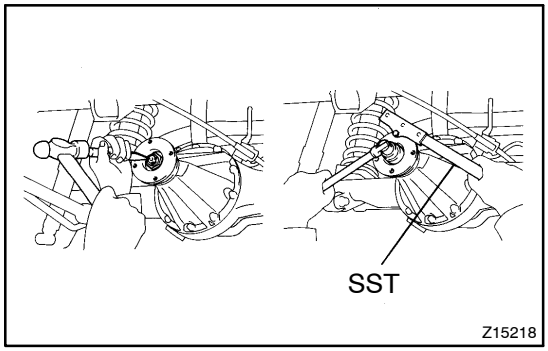


1. DISCONNECT REAR PROPELLER SHAFT

(a) Place matchmarks on the propeller shaft and companion flange.

(b) Remove the 4 nuts, washers, bolts and disconnect the propeller shaft.

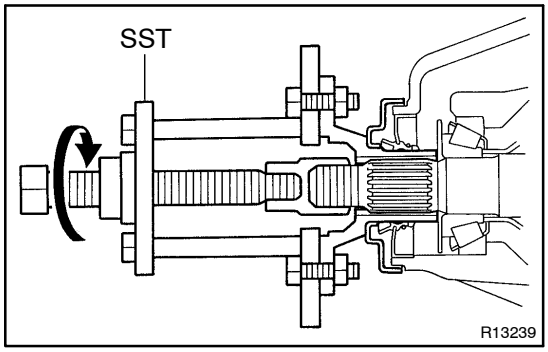
(c) Support the propeller shaft securely.



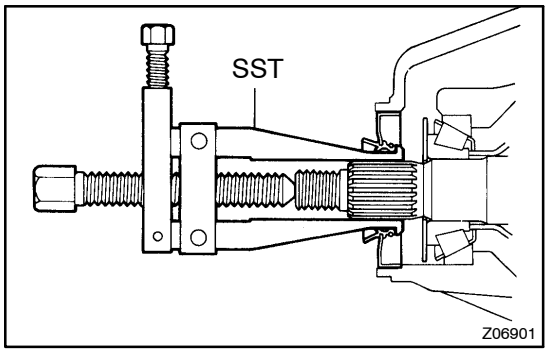
2. REMOVE COMPANION FLANGE

(a) Using a chisel and hammer, unstake the nut.

(b) Using SST to hold the flange, remove the nut.
SST 09330–00021



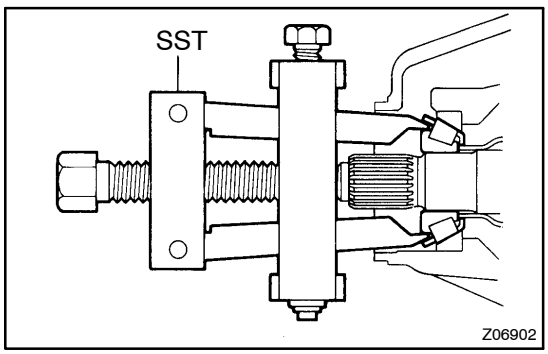
(c) Using SST, remove the companion flange.
SST 09950–30010 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03040)



3. REMOVE OIL SEAL AND OIL SLINGER

(a) Using SST, remove the oil seal.
SST 09308–10010

(b) Remove the oil slinger.



4. REMOVE FRONT BEARING

Using SST, remove the front bearing from the drive pinion.
SST 09556–22010

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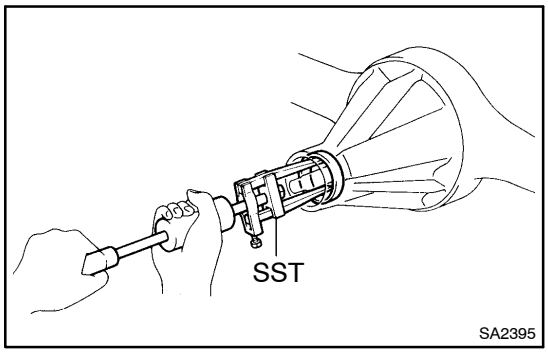


5. REMOVE BEARING OUTER RACE

Using SST, remove the bearing outer race.

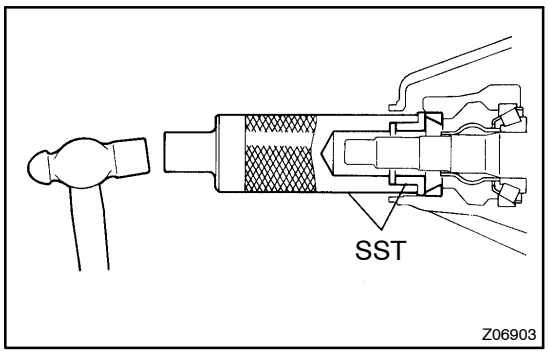
SST 09308–00010

NOTICE:

Do not scratch the taper surface of the outer race.

6. REMOVE BEARING SPACER

7. INSTALL NEW BEARING SPACER



8. INSTALL BEARING OUTER RACE

Using SST and a hammer, install the bearing outer race.

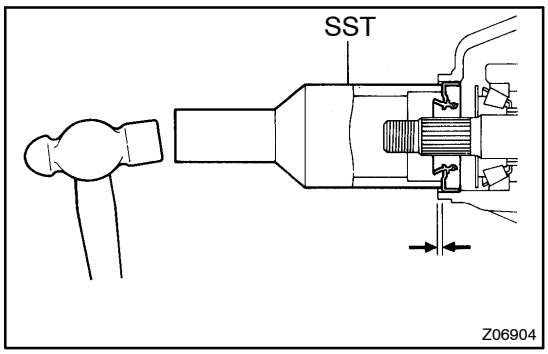
SST 09316–60011 (09316–00011, 09316–00021)

9. INSTALL FRONT BEARING

10. INSTALL OIL SLINGER AND OIL SEAL

(a) Install the oil slinger.

(b) Coat the hypoid gear oil to a new oil seal periphery.

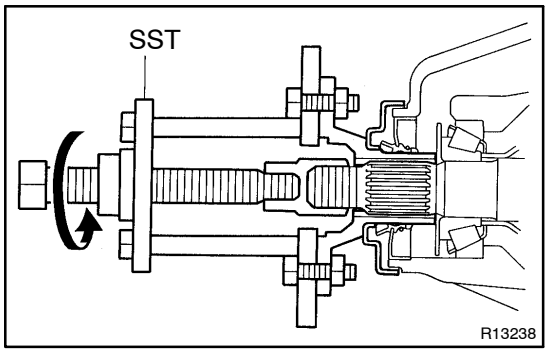


(c) Using SST and a hammer, install a new oil seal.

SST 09214–76011

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

(d) Coat MP grease to the oil seal lip.

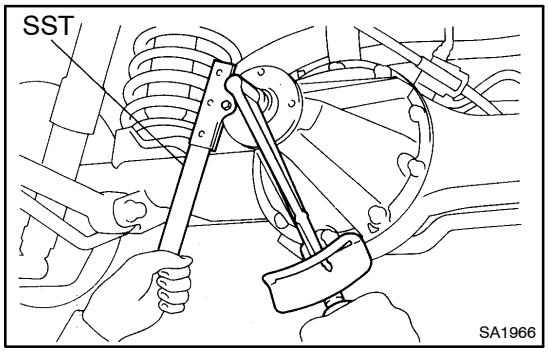


11. INSTALL COMPANION FLANGE

(a) Using SST, install the companion flange on the drive pinion.

SST 09950–30010 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03040)

(b) Coat of gear oil on threads of a new companion flange nut.



(c) Using SST to hold the flange, install the nut.

SST 09330–00021

Torque: 245 N·m (2,500 kgf·cm, 181 ft·lbf)

12. ADJUST DRIVE PINION PRELOAD

(See page SA–104, SA–124 or SA–147)

13. STAKE DRIVE PINION NUT

14. CONNECT REAR PROPELLER SHAFT

(a) Align the matchmarks on the propeller shaft and flange.

(b) Install the 4 bolts, washers and nuts.

Torque: 106 N·m (1,080 kgf·cm, 78 ft·lbf)

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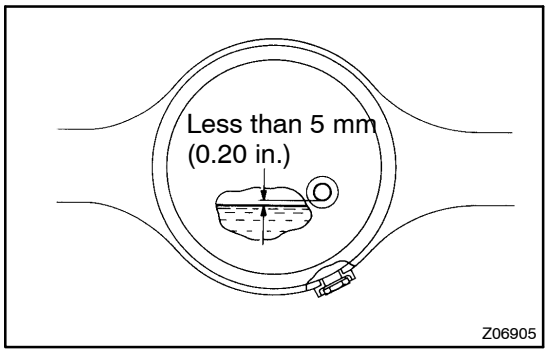


15. FILL DIFFERENTIAL WITH HYPOID GEAR OIL

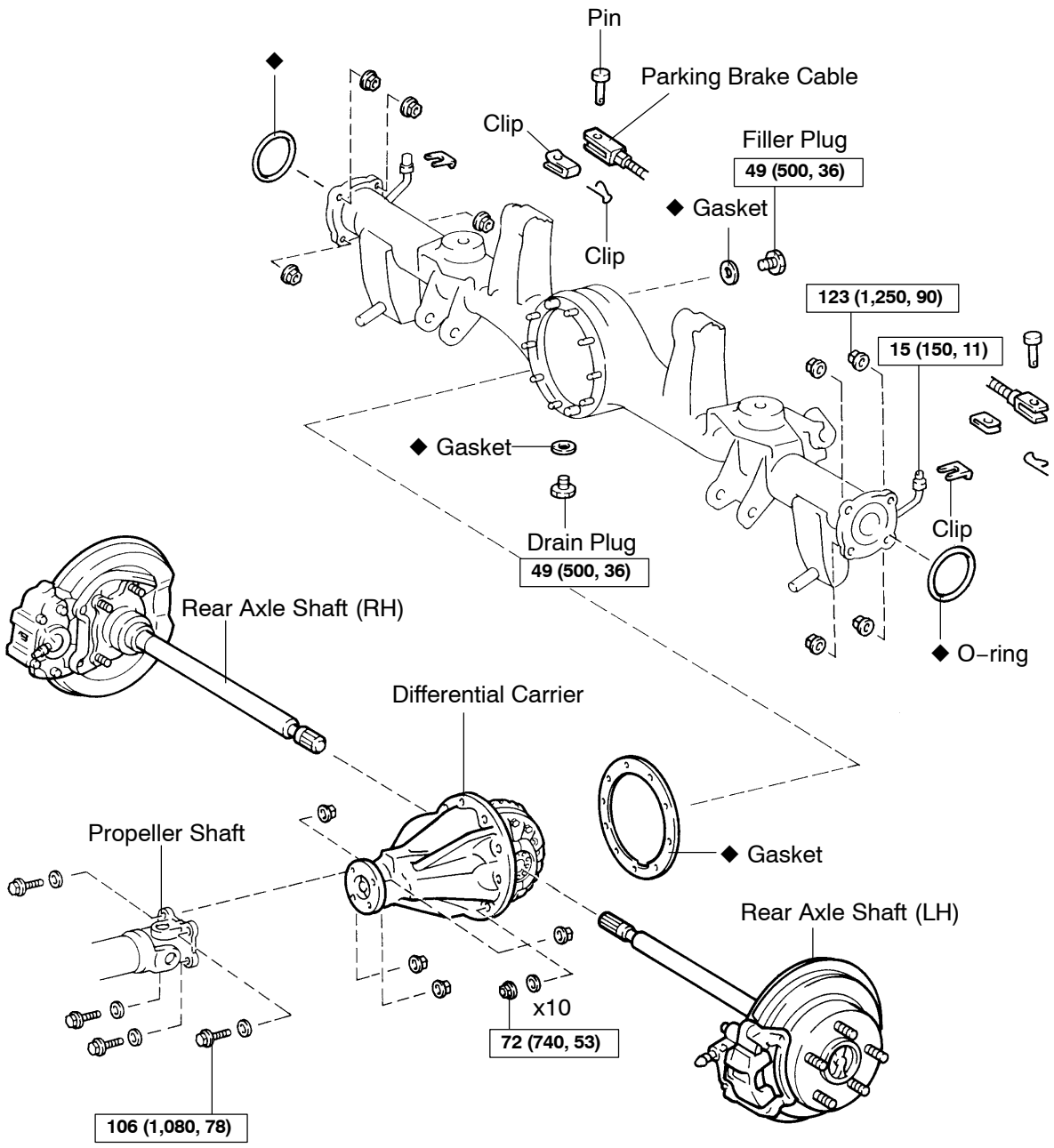
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)
Oil type:
w/o LSD: Hypoid gear oil API GL–5
w/ LSD: Hypoid gear oil LSD API GL–5
Recommended oil viscosity:
Above –18˚C (0˚F) SAE 90
Below –18˚C (0˚F) SAE 80W–90 or 80W
Capacity:
w/ Diff. Lock: 3.20 liters (3.38 US qts, 2.82 Imp.qts)
Others: 3.30 liters (3.49 US qts, 2.90 Imp.qts)

Donated by Andrew Schauer . cruisercult.com

REAR DIFFERENTIAL CARRIER

COMPONENTS

SA15M–01



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

F05218

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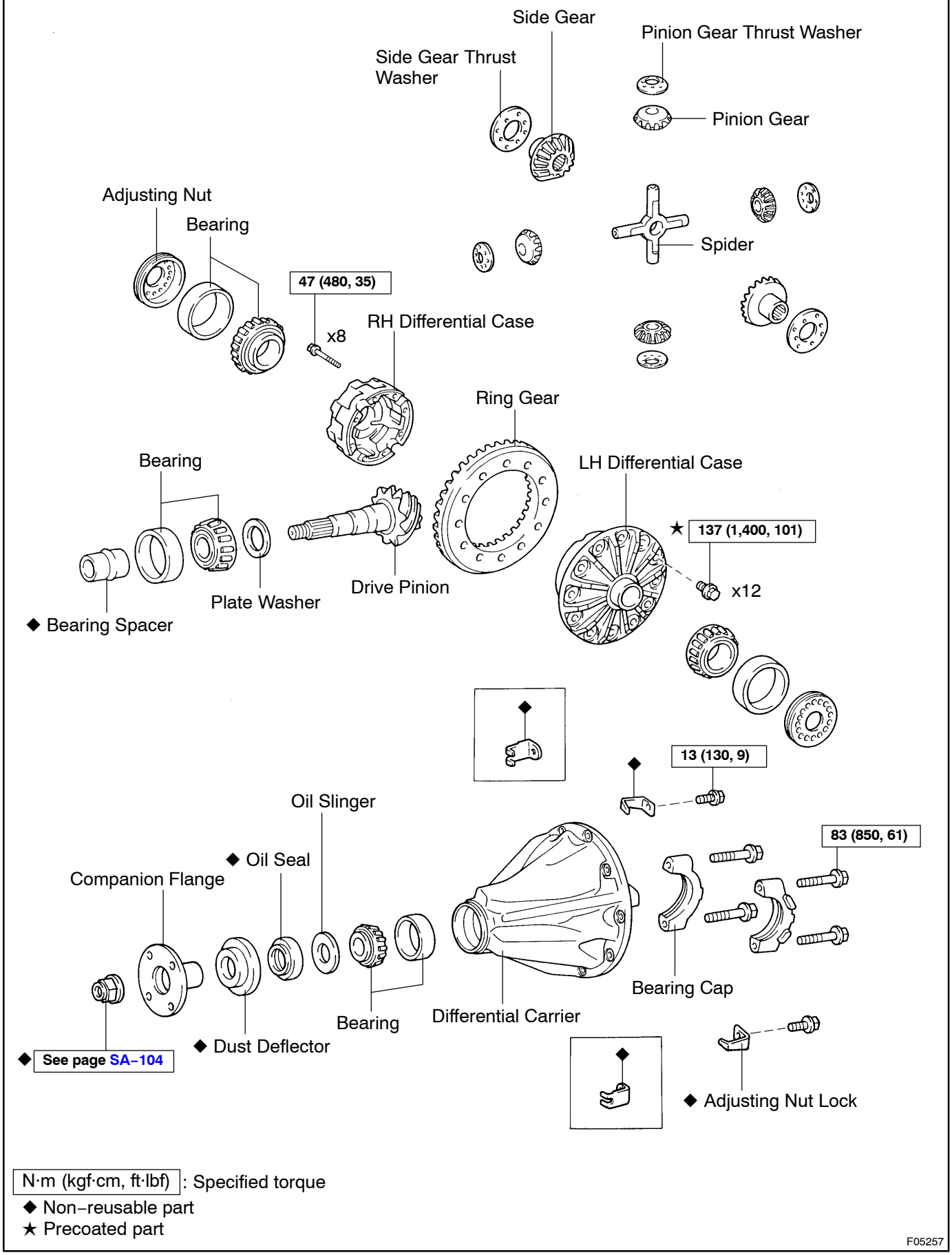

N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
★ Precoated part

F05257

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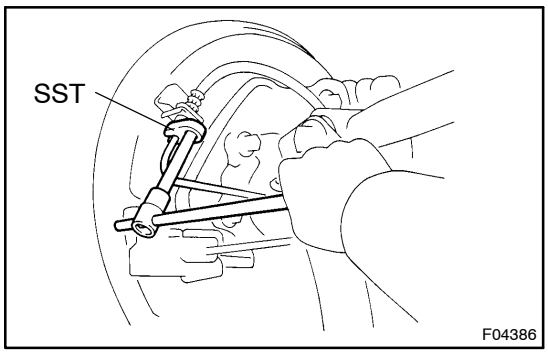
SA15N–01

REMOVAL

1. **REMOVE REAR WHEELS**
   Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)
2. **DRAIN HYPOID GEAR OIL**
   Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



3. **DISCONNECT BRAKE LINES**

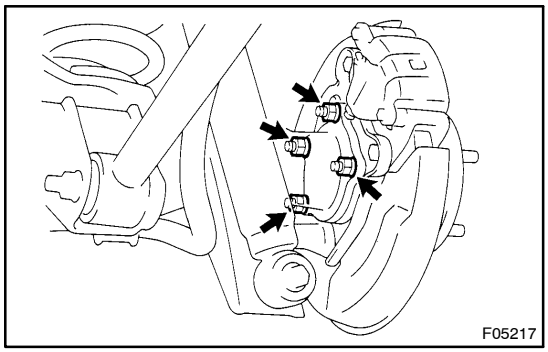
(a) Using SST, disconnect the brake line and remove the clip.
SST 09023–00100
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

(b) Employ the same manner described above to the other side.

4. **DISCONNECT PARKING BRAKE CABLES**

(a) Remove the 2 clips, pin and disconnect the parking brake cable from the bellcrank.

(b) Employ the same manner described above to the other side.



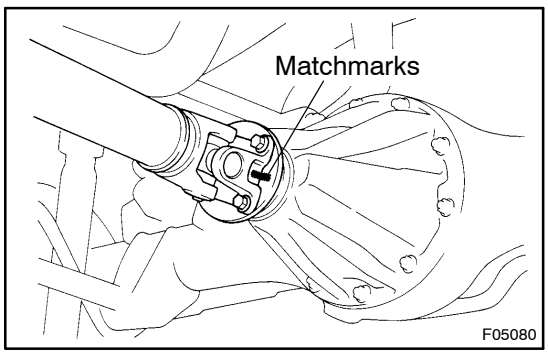
5. **REMOVE REAR AXLE SHAFTS**

(a) Remove the 4 nuts.
Torque: 123 N·m (1,250 kgf·cm, 90 ft·lbf)

(b) Pull out the axle shaft assembly.

NOTICE:
Be careful not to damage the oil seal.

(c) Employ the same manner described above to the other side.



6. **DISCONNECT REAR PROPELLER SHAFT**

(a) Place matchmarks on the propeller shaft and differential flange.

(b) Remove the 4 nuts, washers, bolts and disconnect the propeller shaft.
Torque: 106 N·m (1,080 kgf·cm, 78 ft·lbf)

(c) Support the propeller shaft securely.

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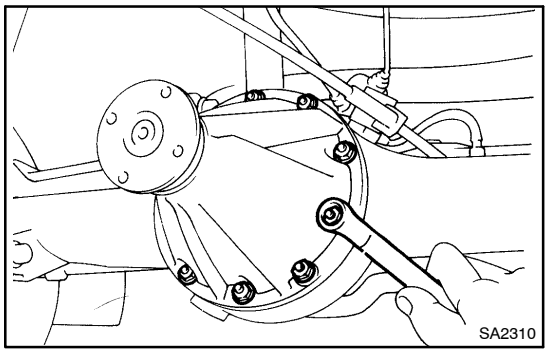

7. REMOVE DIFFERENTIAL CARRIER ASSEMBLY

(a) Remove the 10 nuts, washers and differential carrier assembly.

NOTICE:

Be careful not to damage the installation surface.

Torque: 72 N·m (740 kgf·cm, 53 ft·lbf)

(b) Remove the gasket.

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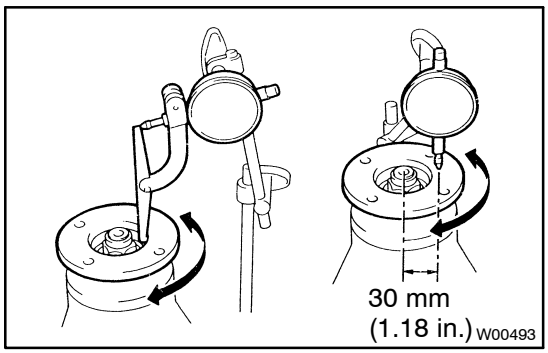
SA15O–01

DISASSEMBLY

1. SET DIFFERENTIAL CARRIER TO OVERHAUL STAND ETC.

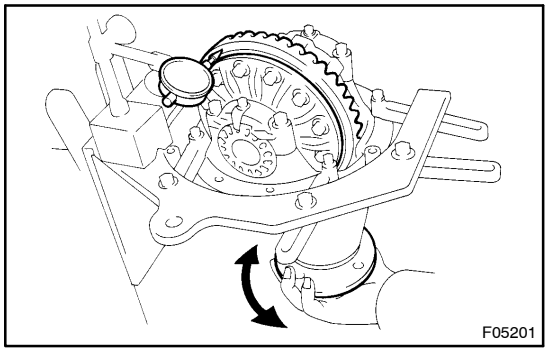


2. CHECK RUNOUT OF COMPANION FLANGE

Using a dial indicator, measure the vertical and lateral runout of the companion flange.

Maximum runout: 0.10 mm (0.0039 in.)

If the runout is not within the specification, replace the companion flange.

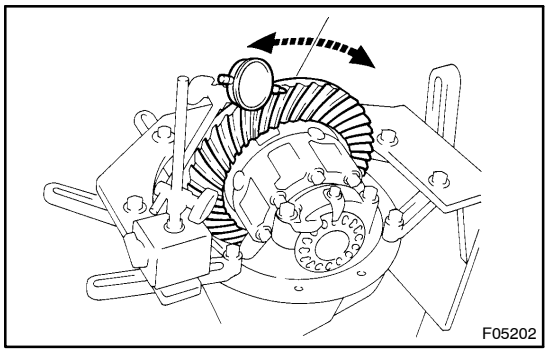


3. CHECK RING GEAR RUNOUT

Using a dial indicator, measure the ring gear runout.

Maximum runout: 0.05 mm (0.0020 in.)

If the runout is greater than the maximum, replace the ring gear.



4. CHECK RING GEAR BACKLASH

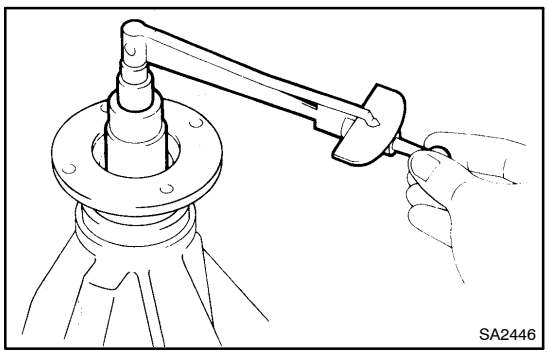
Using a dial indicator, measure the ring gear backlash.

Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)

HINT:

Perform the measurements at 3 or more positions around the circumference of the ring gear.

If the backlash is not within the specification, adjust the side bearing preload or repair as necessary.



5. MEASURE DRIVE PINION PRELOAD

Using a torque wrench, measure the preload of backlash between the drive pinion and ring gear.

Preload (at starting):

0.64 – 0.92 N·m (6.5 – 9.4 kgf·cm, 5.6 – 8.2 in.·lbf)

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6. CHECK TOTAL PRELOAD

Using a torque wrench, measure the preload with the teeth of the drive pinion and ring gear in contact.

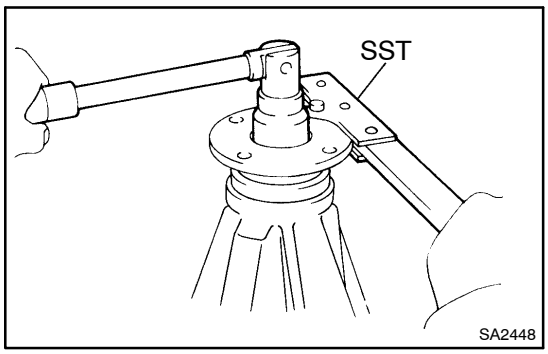
Total preload (at starting):
Drive pinion preload plus
0.38 – 0.63 N·m (3.9 – 6.5 kgf·cm, 3.4 – 5.6 in.·lbf)

If necessary, disassemble and inspect the differential.

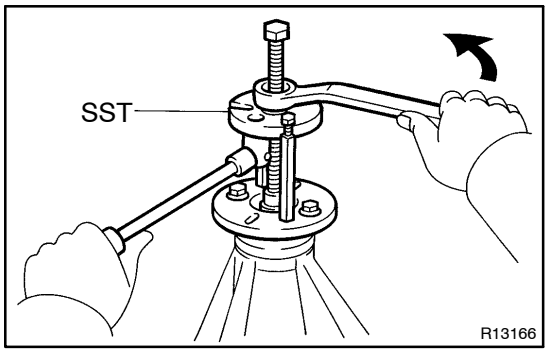
7. CHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page SA–104)

8. REMOVE COMPANION FLANGE

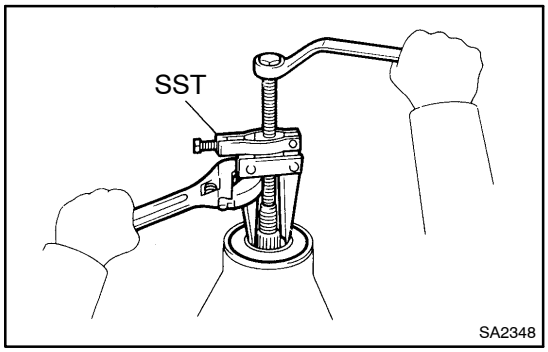
(a) Using a chisel and hammer, unstake the nut.



(b) Using SST to hold the flange, remove the nut.
SST 09330–00021



(c) Using SST, remove the companion flange.
SST 09950–30010 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03040)



9. REMOVE OIL SEAL AND OIL SLINGER

(a) Using SST, remove the oil seal from the differential carrier.
SST 09308–10010

(b) Remove the oil slinger.

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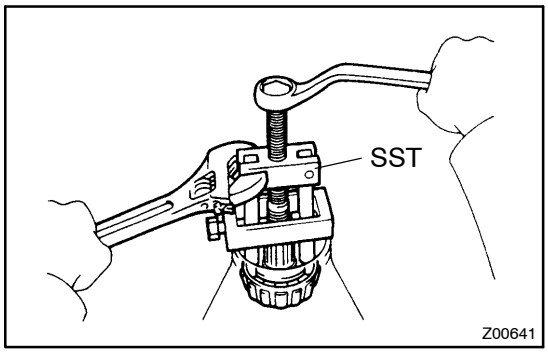
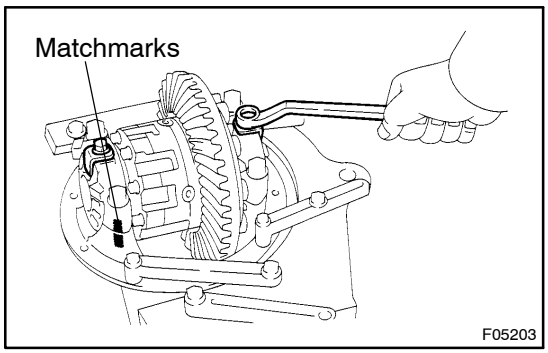


10. REMOVE FRONT BEARING

Using SST, remove the front bearing from the drive pinion.

SST 09556–22010

If the front bearing is damaged or worn, replace the bearing.



11. REMOVE DIFFERENTIAL CASE ASSEMBLY

(a) Place matchmarks on the bearing cap and differential carrier.

(b) Remove the 2 adjusting nut locks.

(c) Remove the 4 bolts, 2 bearing caps and adjusting nuts.

HINT:

Tag the disassembled parts to show the location for reassembly.

(d) Remove the differential case with the bearing outer races from the carrier.

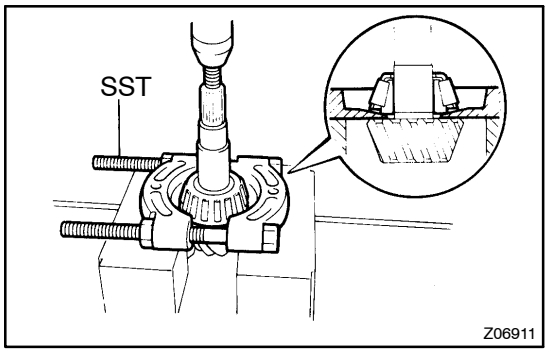
HINT:

Tag the disassembled parts to show the location for reassembly.

12. REMOVE DRIVE PINION AND BEARING SPACER FROM DIFFERENTIAL CARRIER

(a) Remove the drive pinion with the rear bearing.

(b) Remove the bearing spacer.



13. REMOVE DRIVE PINION REAR BEARING

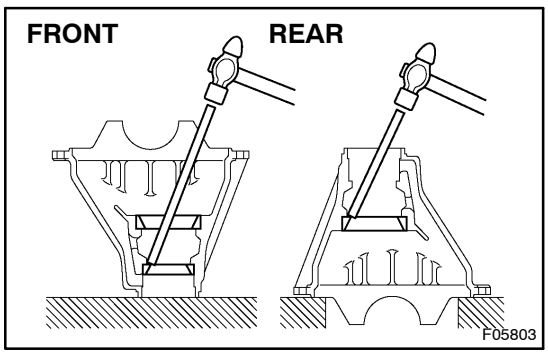
(a) Using SST and a press, remove the rear bearing from the drive pinion.

SST 09950–00020

HINT:

If the drive pinion or ring gear is damaged, replace them as a set.

(b) Remove the plate washer from the drive pinion.



14. REMOVE FRONT AND REAR BEARING OUTER RACES

Using a brass bar and hammer, remove the outer races.

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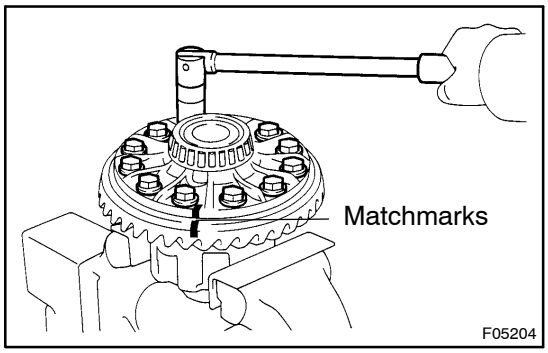
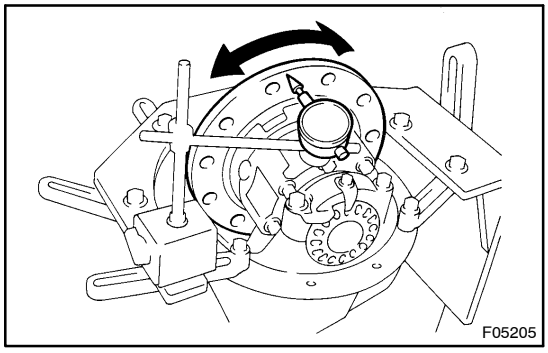


15. REMOVE RING GEAR

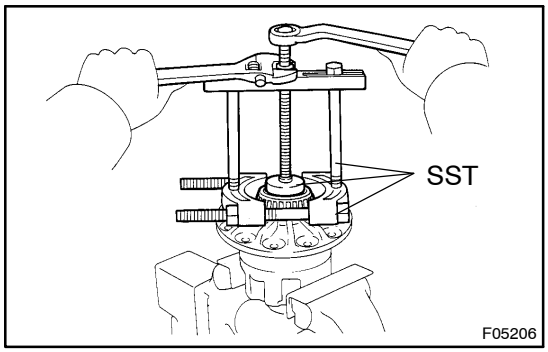
(a) Place matchmarks on the ring gear and differential case.
(b) Remove the 12 ring gear set bolts.
(c) Using a plastic hammer, tap on the ring gear to remove it from the differential case.

16. CHECK DIFFERENTIAL CASE RUNOUT

(a) Place the bearing outer races on their respective bearings. Check that the left and right outer races are not interchanged.
(b) Install the differential case in the differenital carrier.
(c) Tighten the adjusting nut just to where there is no play in the bearing.
(d) Align matchmarks on the bearing cap and differential carrier.
(e) Install and uniformly tighten the 4 bearing cap bolts a little at a time.



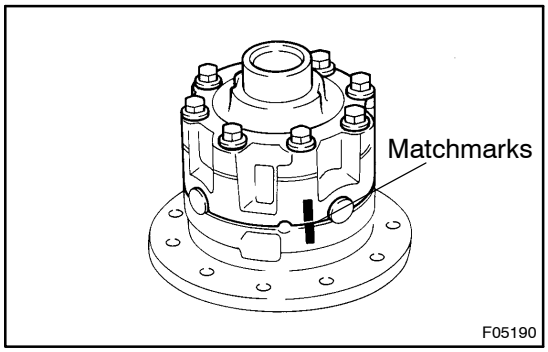
(f) Using a dial indicator, measure the differential case runout.
Maximum case runout: 0.04 mm (0.0016 in.)
(g) Remove the differential case.



17. REMOVE SIDE BEARINGS FROM DIFFERENTIAL CASE

Using SST, remove the 2 side bearings from the differential case.

SST 09950–00020, 09950–00030, 09950–40011 (09957–04010), 09950–60010 (09951–00480)



18. DISASSEMBLE DIFFERENTIAL CASE

(a) Place matchmarks on the LH and RH differential cases.
(b) Remove the 8 bolts uniformly, a little at a time.
(c) Using a plastic hammer, separate the LH and RH differenital cases.
(d) Remove the 2 side gear thrust washers, 2 side gears, spider, 4 pinion gears and pinion gear thrust washers.

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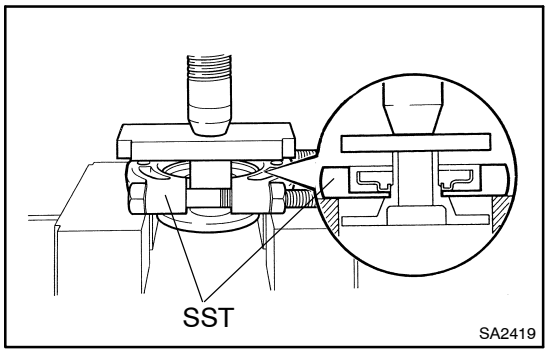
SA15P–01

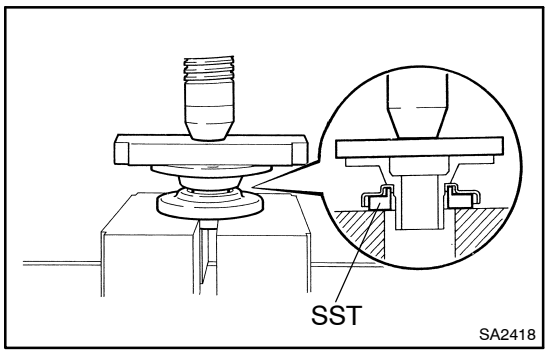
REPLACEMENT



1. REMOVE COMPANION FLANGE DUST DEFLECTOR

Using SST a steel plate and press, remove the dust deflector.

SST 09950–00020



2. INSTALL DUST DEFLECTOR

Using SST a steel plate and press, install a new dust deflector.

SST 09726–40010

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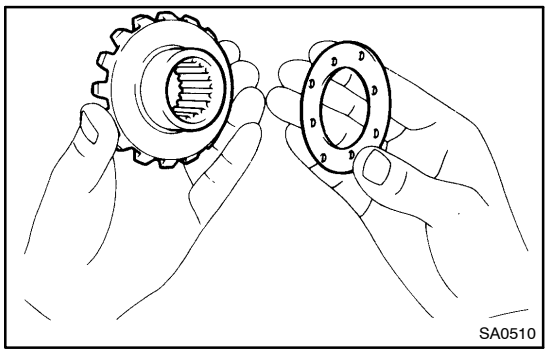
SA15Q–01

REASSEMBLY

HINT:

- Using a shop rag, clean off any foreign object from the parts.
- Apply all of the sliding and rotating surfaces with hypoid gear oil.

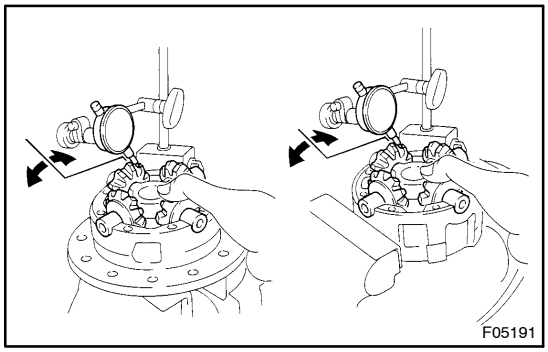


1. MEASURE SIDE GEAR BACKLASH

(a) Install the 2 thrust washers to the side gears.
(b) Install the side gear assembly to the differential case.
(c) Install the 4 pinion gears and thrust washers to the spider.
(d) Install the spider assembly to the differential case.

HINT:

Install the spider to the differential case tightly.



(e) Using a dial indicator, measure the side gear backlash with the side gear and spider.

Backlash: 0.02 – 0.15 mm (0.0008 – 0.0059 in.)

HINT:

- Measure at all 4 locations.
- Measure the backlash at the LH and RH differential cases.

If the backlash is not within the specification, install a thrust washer of a different thickness.

Thrust washer thickness

Thickness mm (in.)	Thickness mm (in.)
1.55 (0.061)	1.85 (0.073)
1.60 (0.063)	1.90 (0.075)
1.65 (0.065)	1.95 (0.077)
1.70 (0.067)	2.00 (0.079)
1.75 (0.069)	2.05 (0.081)
1.80 (0.071)	2.10 (0.083)

2. ASSEMBLE DIFFERENTIAL CASE

(a) Reinstall the spider assembly to the differential case.

HINT:

Install the spider to the differential case tightly.

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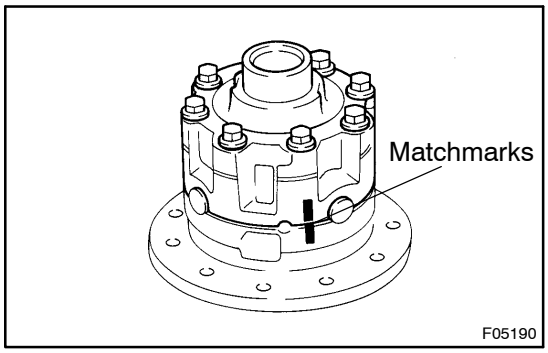
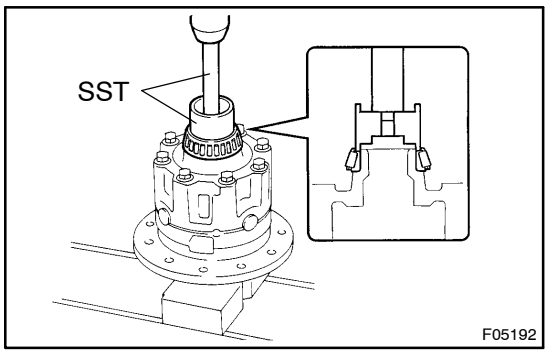
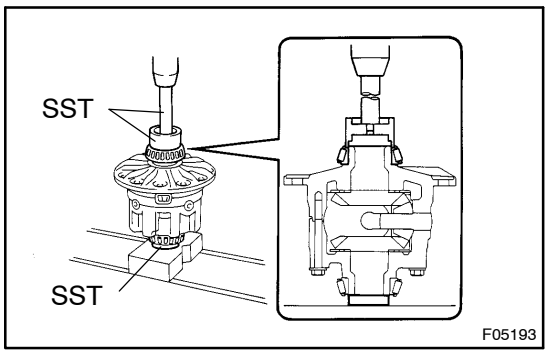


(b) Align the matchmarks and assemble the LH and RH differential cases.
(c) Tighten the 8 bolts uniformly, a little at a time.
Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)

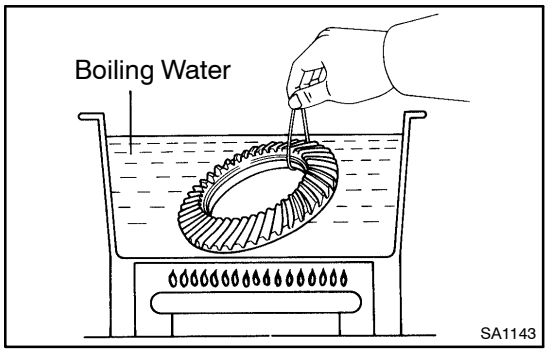


3. INSTALL SIDE BEARING
(a) Using SST and a press, install the RH side bearing on the differential case.
SST 09710–30050, 09950–70010 (09951–07100)

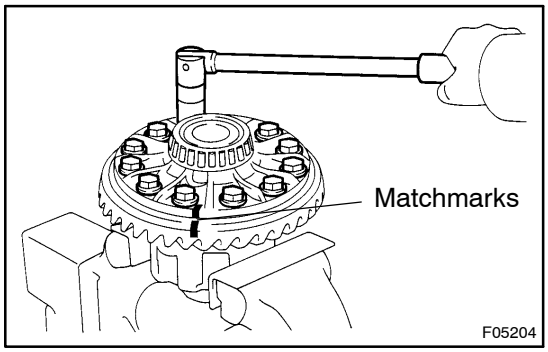


(b) Using SST and a press, install the LH side bearing on the differential case.
SST 09710–30050, 09950–60010 (09951–00480), 09950–70010 (09951–07100)

4. INSTALL RING GEAR ON DIFFERENTIAL CASE
(a) Clean the threads of the bolts and differential case with the white gasoline.
(b) Clean the contact surfaces of the differential case and ring gear.



(c) Heart the ring gear to about 100 °C (212 °F) in boiling water.
(d) Carefully take the ring gear out of the boiling water.
(e) After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.



(f) Align the matchmarks on the ring gear and differential case.
(g) Temporarily install the 12 set bolts.
(h) After the ring gear cools down enough, torque the 12 set bolts to which thread lock has been applied.
Thread lock:
Part No. 08833–00100, THREE BOND 1360 K or equivalent
Torque: 137 N·m (1,400 kgf·cm, 101 ft·lbf)

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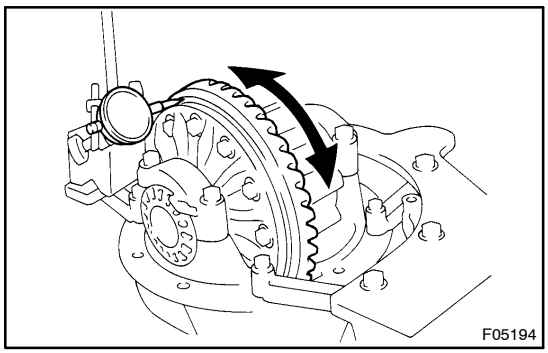
5. CHECK RING GEAR RUNOUT

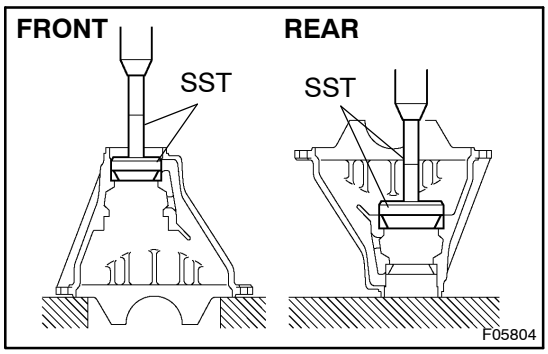
(a) Place the bearing outer races on their respective bearings. Check that the left and right outer races are not interchanged.

(b) Install the differential case onto the carrier and tighten the adjusting nut just to where there is no play in the bearings.



(c) Using a dial indicator, check the ring gear runout.
Maximum runout: 0.05 mm (0.0020 in.)

(d) Remove the differential case.



6. INSTALL FRONT AND REAR BEARING OUTER RACES

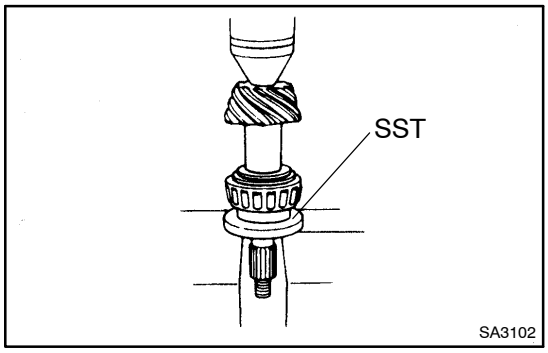
(a) Using SST and a press, install the front bearing outer race.
SST 09950–60020 (09951–00710),
09950–70010 (09951–07150)

(b) Using SST and a press, install the rear bearing outer race.
SST 09950–60020 (09951–00890),
09950–70010 (09951–07150)

7. INSTALL DRIVE PINION REAR BEARING

(a) Install the washer on the drive pinion.

HINT:
First fit a washer with the same thickness as the washer which was removed, then after checking the tooth contact pattern, replace the washer with one of a different thickness if necessary.



(b) Using SST and a press, install the rear bearing onto the drive pinion.
SST 09506–35010

8. TEMPORARILY ADJUST DRIVE PINION PRELOAD

(a) Install the drive pinion and front bearing.

HINT:
Assemble the spacer and oil seal after adjusting the gear contact pattern.

(b) Install the oil slinger.

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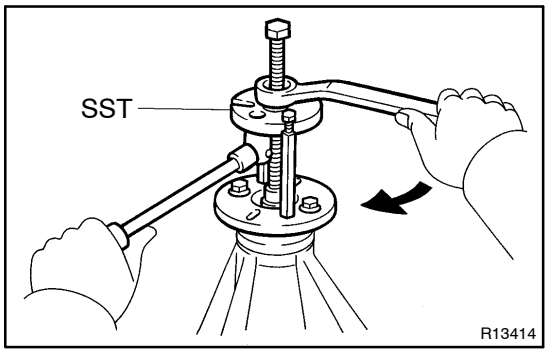
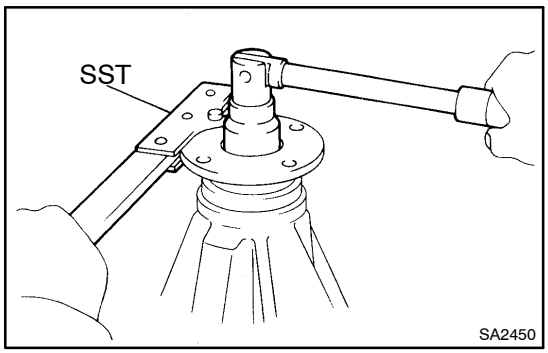


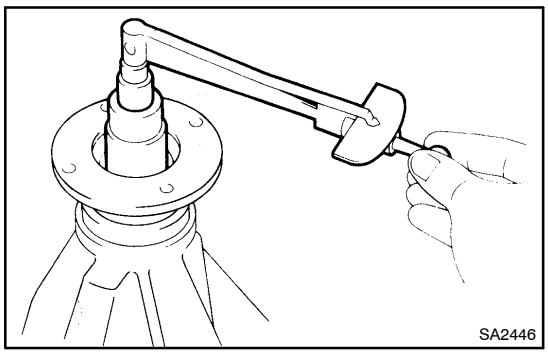
(c) Install the companion flange with SST.
SST 09950–30010, (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03040)



(d) Using SST to hold the flange and adjust the drive pinion preload by tightening the companion flange nut.
SST 09330–00021

NOTICE:

- **Coat the nut and screw of the drive pinion with gear oil.**
- **As there is no spacer, tighten the nut a little at a time, being careful not to overtighten.**



(e) Using a torque wrench, measure the preload.
Preload (at starting):
New bearing
1.3 – 1.8 N·m (13 – 19 kgf·cm, 11.3 – 16.4 in.·lbf)
Reused bearing
0.64 – 0.92 N·m (6.5 – 9.4 kgf·cm, 5.6 – 8.2 in.·lbf)

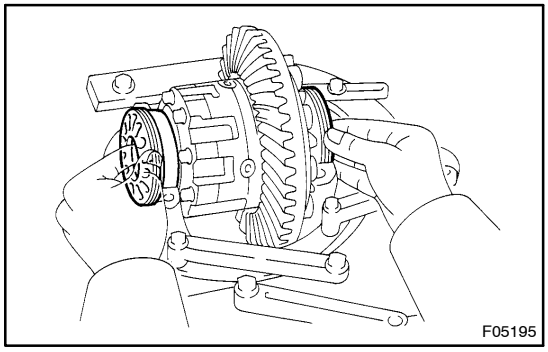
HINT:
Measure the total preload after turning the bearing clockwise and counterclockwise several times to make the bearing smooth.

9. INSTALL DIFFERENTIAL CASE IN CARRIER

(a) Place the 2 bearing outer races on their respective bearings. Make sure that the left and right outer races are not interchanged.

(b) Install the differential case in the carrier.

HINT:
Make sure that there is backlash between the ring gear and drive pinion.



10. INSTALL ADJUSTING NUTS

Install the 2 adjusting nuts on the carrier, making sure the nuts are engaged properly.

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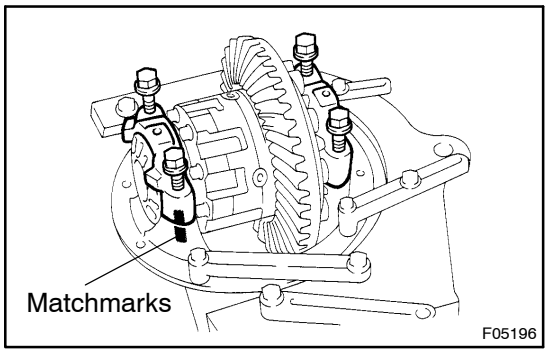


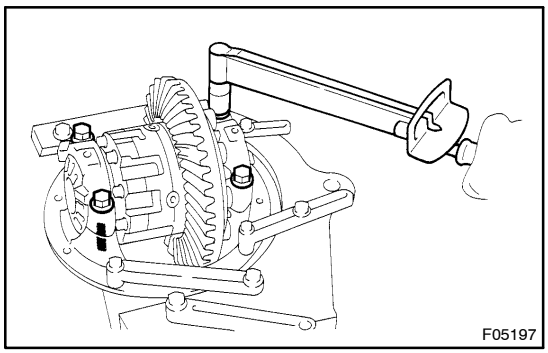
11. INSTALL BEARING CAPS

Align the matchmarks on the bearing cap and carrier. Screw in the 2 bearing cap bolts 2 or 3 turns and press down the bearing cap by hand.

HINT:

If the bearing cap does not fit tightly on the carrier, the adjust nuts are not engaged properly.

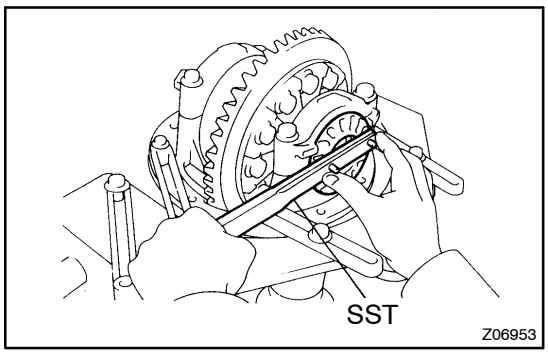
Reinstall the adjusting nuts if necessary.



12. ADJUST SIDE BEARING PRELOAD

(a) Torque the 4 bolts.

Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)

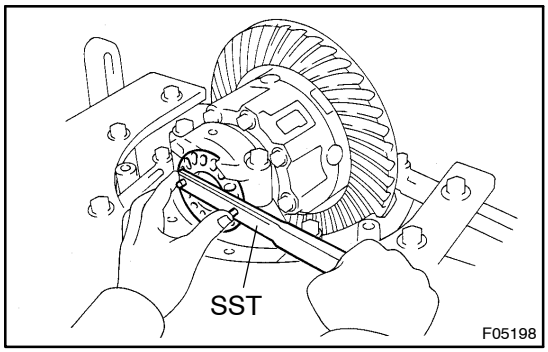


(b) Then loosen them to the point where the adjusting nuts can be turned by SST.

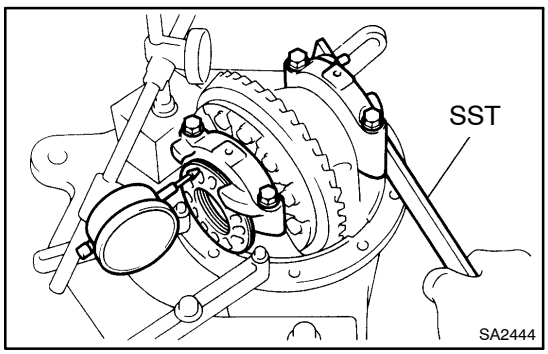
SST 09504–00011

(c) Fully tighten the 4 bolts by hand.

(d) Using SST, torque the adjusting nut on the ring gear side until the ring gear has a backlash of about 0.2 mm (0.008 in.).



(e) While turning the ring gear, use the SST to fully tighten the adjusting nut on the drive pinion side. After the bearings are settled, loosen the adjusting nut on the drive pinion side.



(f) Place a dial indicator on the top of the adjusting nut on the ring gear side.

(g) Adjust the side bearing to zero preload by tightening the other adjusting nut until the pointer on the indicator begins to move.

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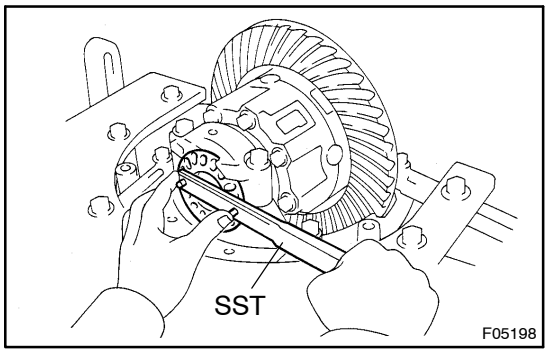
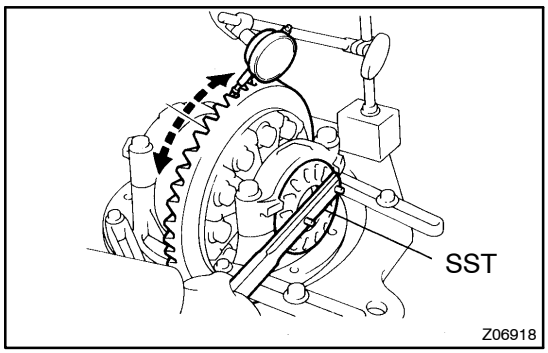
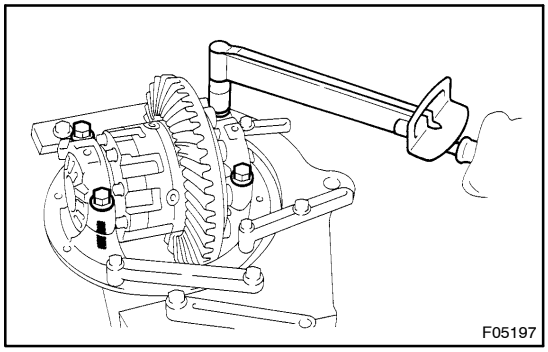


(h) Using SST, torque the adjusting nut 1 – 1.5 notches from the zero preload position.



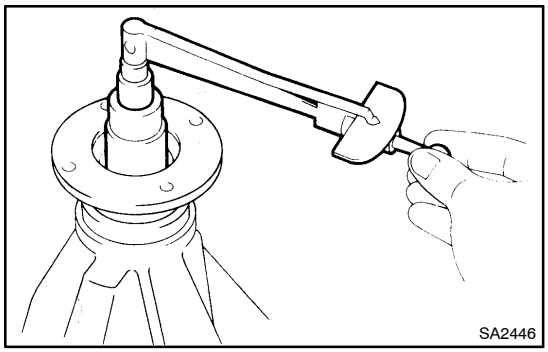
(i) Using a dial indicator, adjust the ring gear backlash until it is within the specification.
Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)

HINT:
The backlash is adjusted by turning the left and right adjusting nuts by equal amount. For example, loosen the nut on the left side 1 notch and torque the nut on the right side 1 notch.



(j) Torque the 4 bearing cap bolts.
Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)

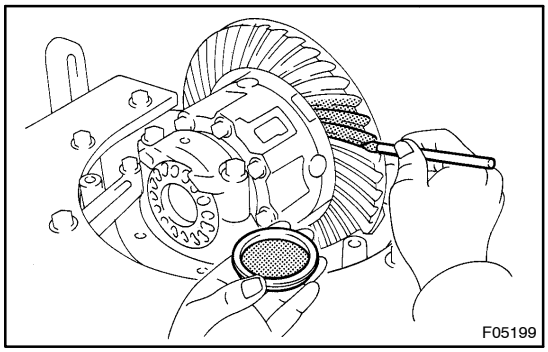
(k) After rotating the ring gear 5 turns or more, recheck the ring gear backlash.
Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)



13. MEASURE TOTAL PRELOAD

Using a torque wrench, measure the preload with the teeth of the drive pinion and ring gear in contact.

Preload (at starting):
Drive pinion preload plus
0.38 – 0.63 N·m (3.9 – 6.5 kgf·cm, 3.4 – 5.6 in.·lbf)



14. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

(a) Coat 3 or 4 teeth at 3 different positions on the ring gear with red lead primer.

(b) Turn the companion flange, in both directions to inspect the ring gear for proper tooth contact.

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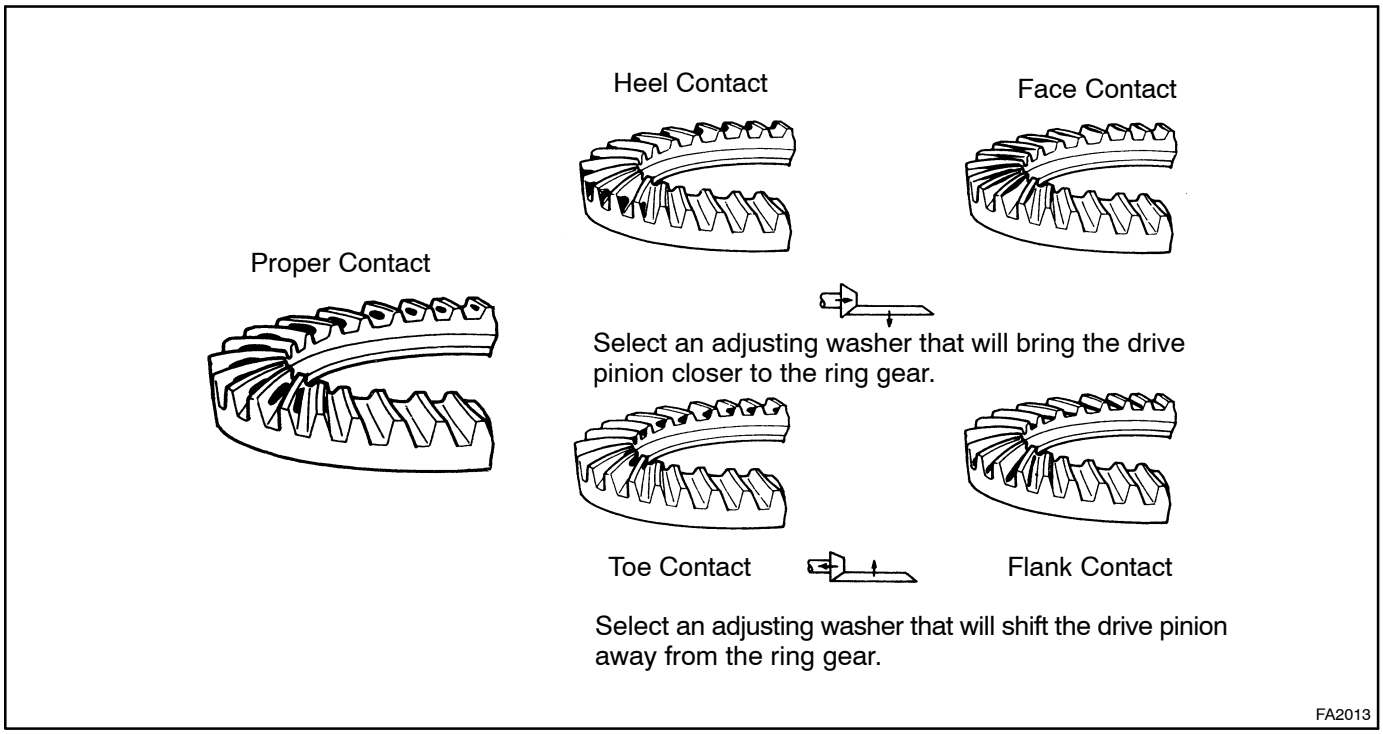
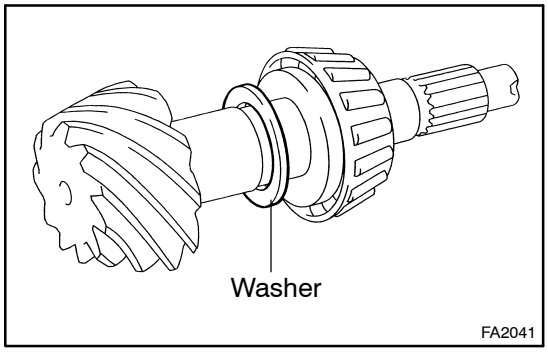


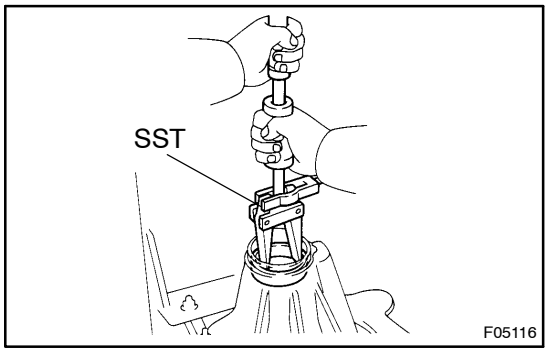


If the teeth are not contacting properly, use the following chart to select a proper washer for correction.

Thickness mm (in.)	Thickness mm (in.)
1.050 (0.04134)	1.325 (0.05217)
1.075 (0.04232)	1.350 (0.05315)
1.100 (0.04331)	1.375 (0.05413)
1.125 (0.04429)	1.400 (0.05512)
1.150 (0.04528)	1.425 (0.05610)
1.175 (0.04626)	1.450 (0.05709)
1.200 (0.04724)	1.475 (0.05807)
1.225 (0.04823)	1.500 (0.05906)
1.250 (0.04921)	1.525 (0.06004)
1.275 (0.05020)	1.550 (0.06102)
1.300 (0.05118)	–

15. REMOVE COMPANION FLANGE (See page SA–99)

16. REMOVE OIL SLINGER AND FRONT BEARING (See page SA–99)



17. REMOVE BEARING OUTER RACE

Using SST, remove the bearing outer race.

SST 09308–00010

18. INSTALL NEW BEARING SPACER

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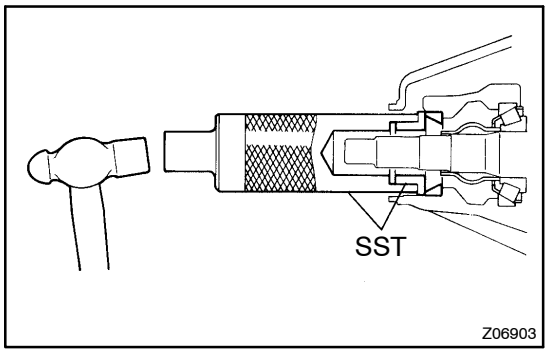


19. INSTALL BEARING OUTER RACE

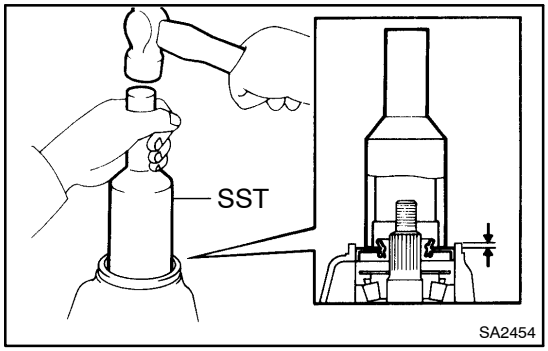
Using SST and a hammer, install the bearing outer race.

SST 09316–60011 (09316–00011, 09316–00021)

20. INSTALL FRONT BEARING AND OIL SLINGER

21. INSTALL OIL SEAL

(a) Coat the hypoid gear oil to a new oil seal periphery.

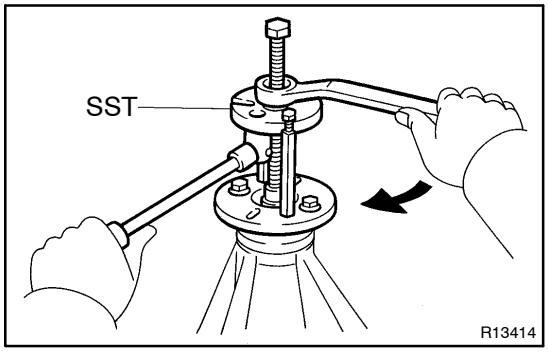


(b) Using SST and a hammer, install a new oil seal.

SST 09214–76011

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

(c) Coat MP grease to the oil seal lip.



22. INSTALL COMPANION FLANGE

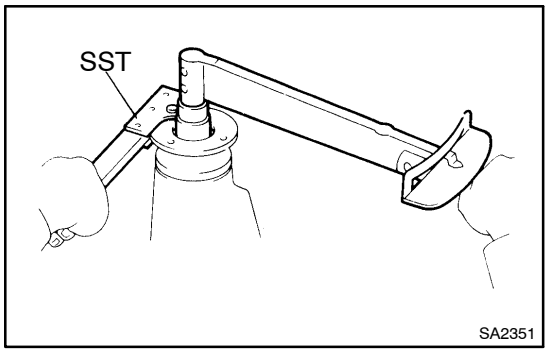
(a) Install the companion flange with SST.

SST 09950–30010 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03040)

(b) Install a new nut.

HINT:

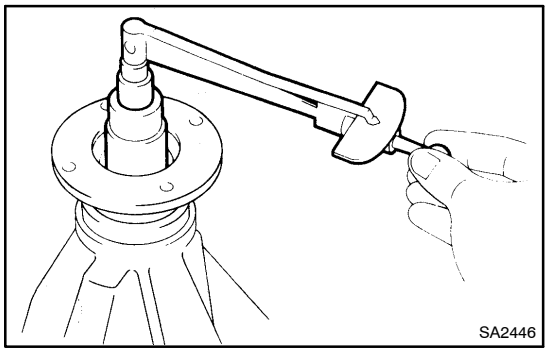
Coat the threads of a new nut with gear oil.



(c) Using SST to hold the flange, tighten the nut.

SST 09330–00021

Torque: 245 N·m (2,500 kgf·cm, 181 ft·lbf)



23. ADJUST DRIVE PINION PRELOAD

Using a torque wrench, measure the preload of the backlash between the drive pinion and ring gear.

Preload (at starting):

New bearing

1.3 – 1.8 N·m (13 – 19 kgf·cm, 11.3 – 16.4 in.·lbf)

Reused bearing

0.64 – 0.92 N·m (6.5 – 9.4 kgf·cm, 5.6 – 8.2 in.·lbf)

If the preload is greater than the specification, replace the bearing spacer.

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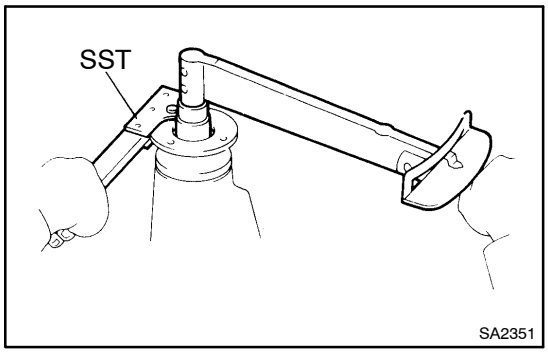


If the preload is less than the specification, retighten the nut with a force of 13 N·m (130 kgf·cm, 9 ft·lbf) at a time until the specified preload is reached.

SST 09330–00021

Torque: 441 N·m (4,500 kgf·cm, 326 ft·lbf) or less

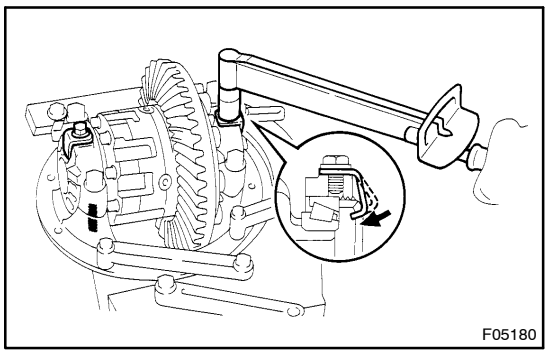
If the maximum torque is exceeded while retightening the nut, replace the bearing spacer and repeat the preload procedure. Do not loosen the pinion nut to reduce the preload.

24. RECHECK RING GEAR BACKLASH
(See page SA–104)

25. RECHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page SA–104)

26. CHECK RUNOUT OF COMPANION FLANGE
(See page SA–104)

27. STAKE DRIVE PINION NUT



28. INSTALL ADJUSTING NUT LOCKS

(a) Install 2 new nut locks on the bearing caps.

(b) Tightening 2 bolts, bend the nut locks.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

29. REMOVE DIFFERENTIAL CARRIER FROM OVERHAUL STAND ETC.

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SA15R–01

INSTALLATION

Installation is in the reverse order of removal (See page SA–97).
AFTER INSTALLATION, FILL DIFFERENTIAL HYPOID GEAR OIL (See page SA–92)

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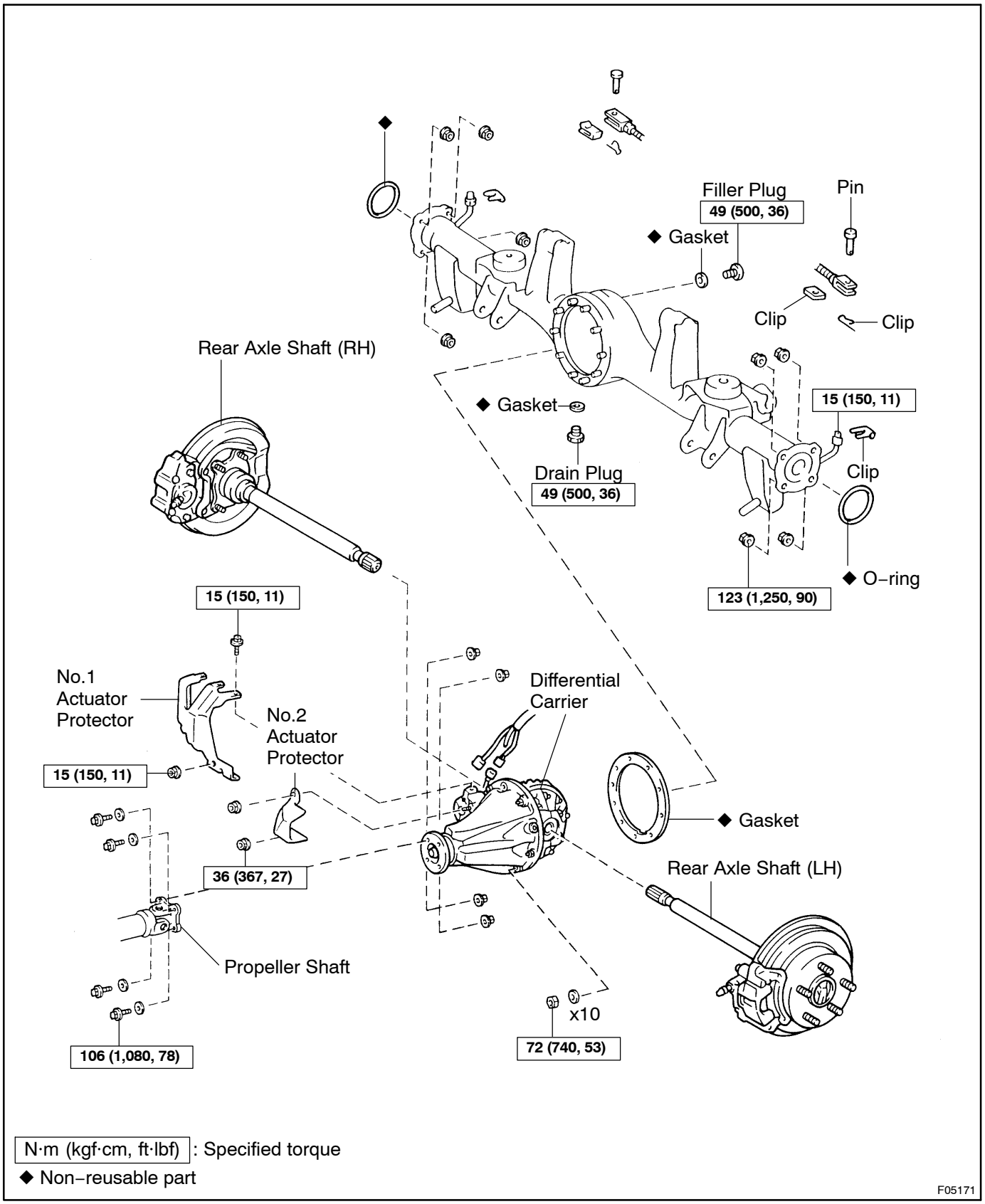
REAR DIFFERENTIAL CARRIER (w/ Diff. Lock)

SA15S–01

COMPONENTS



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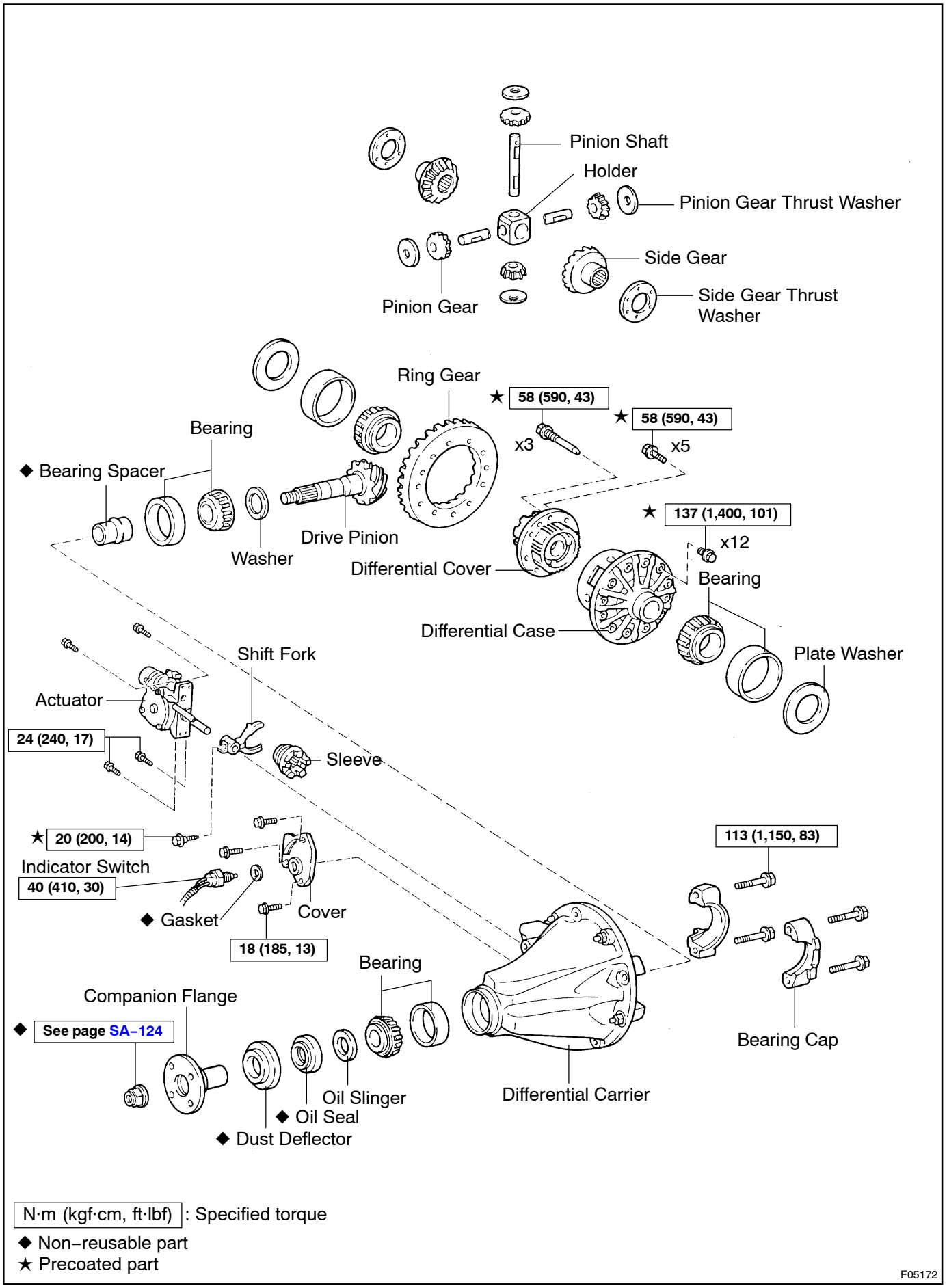

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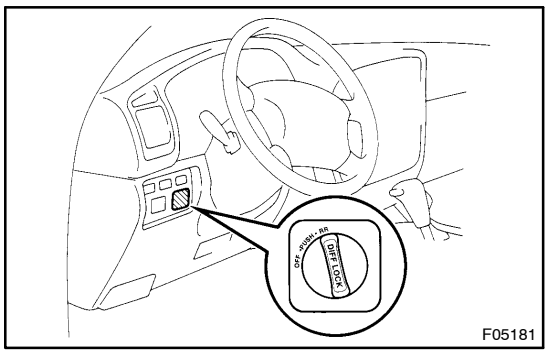
SA15T–01

REMOVAL

1. SHIFTING REAR DIFF. LOCK

(a) Turn the ignition switch to the ON position.

(b) Keep the center differential lock condition.



(c) Turn the differential lock control switch to the RR position and lock the rear differential.

HINT:

While rotating the tires, check they are in the differential lock condition.

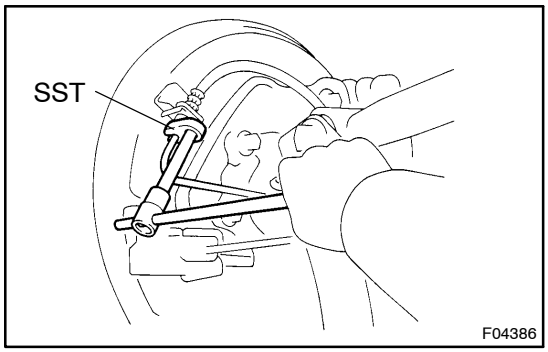
(d) Disconnect the cable from the negative terminal of the battery.

2. REMOVE REAR WHEELS

Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

3. DRAIN HYPOID GEAR OIL

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



4. DISCONNECT BRAKE LINES

(a) Using SST, disconnect the brake line and remove the clip.

SST 09023–00100

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

(b) Employ the same manner described above to the other side.

5. DISCONNECT PARKING BRAKE CABLES

(a) Remove the 2 clips, pin and disconnect the parking brake cable from the bellcrank.

(b) Employ the same manner described above to the other side.

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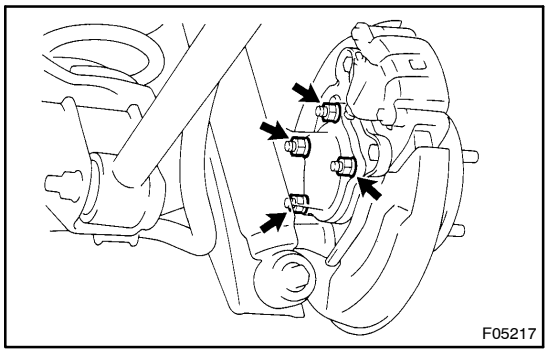


6. REMOVE REAR AXLE SHAFTS

(a) Remove the 4 nuts.

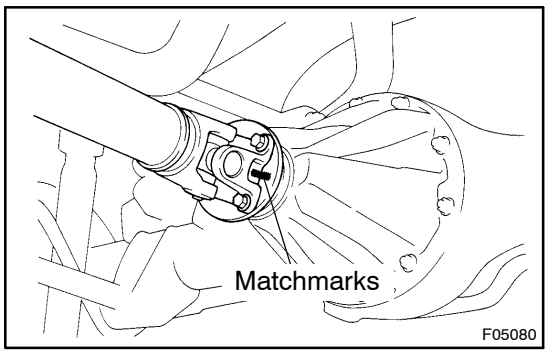
Torque: 123 N·m (1,250 kgf·cm, 90 ft·lbf)

(b) Pull out the axle shaft assembly.

NOTICE:

Be careful not to damage the oil seal.

(c) Employ the same manner described above to the other side.



7. DISCONNECT REAR PROPELLER SHAFT

(a) Place matchmarks on the propeller shaft and differential flange.

(b) Remove the 4 nuts, washers, bolts and disconnect the propeller shaft.

Torque: 106 N·m (1,080 kgf·cm, 78 ft·lbf)

(c) Support the propeller shaft securely.

8. REMOVE NO.1 AND NO.2 ACTUATOR PROTECTORS

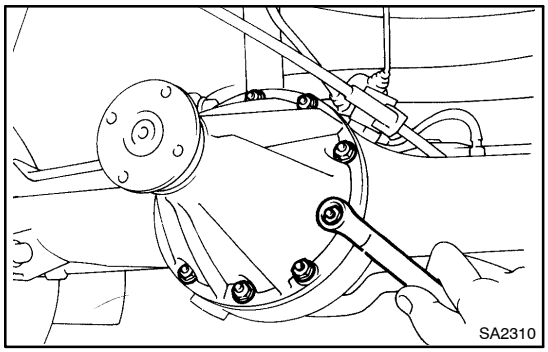
(a) Remove the nut, bolt and No.1 actuator protector.

Torque: 15 N·m (150 kgf·cm, 11 kgf·cm)

(b) Remove the 2 nuts and No.2 actuator protector.

Torque: 36 N·m (367 kgf·cm, 27 kgf·cm)

9. DISCONNECT CONNECTORS AND HOSE



10. REMOVE DIFFERENTIAL CARRIER ASSEMBLY

(a) Remove the 10 nuts, washers and differential carrier assembly.

NOTICE:

Be careful not to damage the installation surface.

Torque: 72 N·m (740 kgf·cm, 53 ft·lbf)

(b) Remove the gasket.

HINT:

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

- Before installation, connect the connectors of the actuator to the connector on the vehicle side, check the differential lock is in operation.
- Before installation, check that the sleeves are in operation while switching over the differential lock control switch.
- After installation, check that the rear differential lock is in operation.

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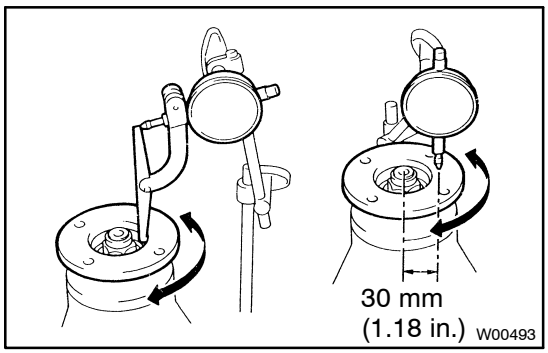
SA15U–01

DISASSEMBLY

1. SET DIFFERENTIAL CARRIER TO OVERHAUL STAND ETC.

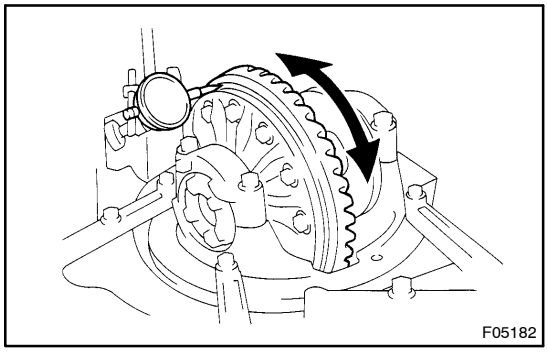


2. CHECK RUNOUT OF COMPANION FLANGE

Using a dial indicator, measure the vertical and lateral runout of the companion flange.

Maximum runout: 0.10 mm (0.0039 in.)

If the runout is not within the specification, replace the companion flange.

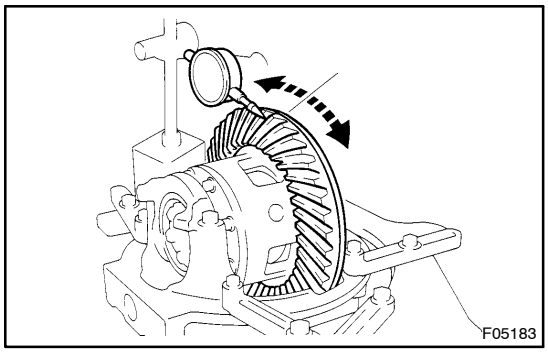


3. CHECK RING GEAR RUNOUT

Using a dial indicator, measure the ring gear runout.

Maximum runout: 0.05 mm (0.0020 in.)

If the runout is greater than the maximum, replace the ring gear.



4. CHECK RING GEAR BACKLASH

Using a dial indicator, measure the ring gear backlash.

Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)

HINT:

Perform the measurements at 3 or more positions around the circumference of the ring gear.

If the backlash is not within the specification, adjust the side bearing preload or repair as necessary.

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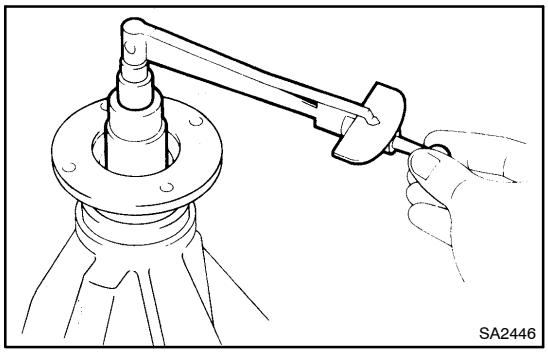

SA2446

5. MEASURE DRIVE PINION PRELOAD

Using a torque wrench, measure the preload of backlash between the drive pinion and ring gear.

Preload (at starting):
0.64 – 0.92 N·m (6.5 – 9.4 kgf·cm, 5.6 – 8.2 in.·lbf)

6. CHECK TOTAL PRELOAD

Using a torque wrench, measure the preload with the teeth of the drive pinion and ring gear in contact.

Total preload (at starting):
Drive pinion preload plus
0.3 – 0.5 N·m (3 – 5 kgf·cm, 2.6 – 4.3 in.·lbf)

If necessary, disassemble and inspect the differential.

7. CHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page SA–124)

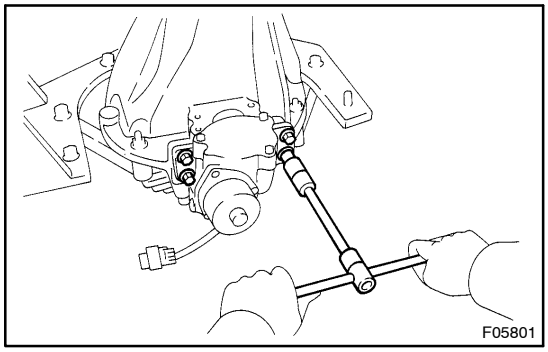
8. REMOVE INDICATOR SWITCH

Remove the indicator switch and gasket.

9. REMOVE COVER

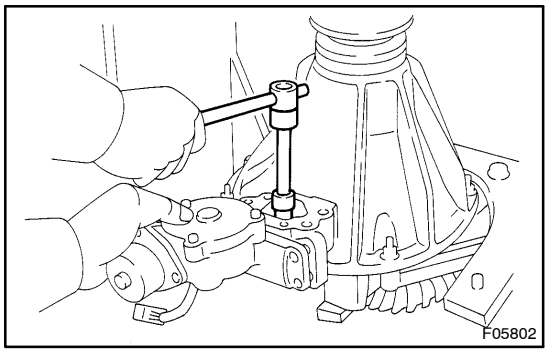
(a) Remove the 3 bolts.

(b) Using a brass bar and hammer, tap on the cover to remove it.


F05801

10. REMOVE ACTUATOR, SHIFT FORK AND SLEEVE

(a) Remove the 4 bolts.

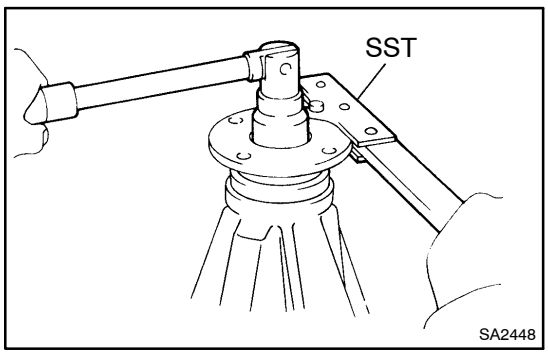

F05802

(b) Remove the shift fork shaft bolt.

(c) Using a screwdriver, pull out the actuator and remove the sleeve and shift fork.

11. REMOVE COMPANION FLANGE

(a) Using a chisel and hammer, unstake the nut.



SA2448

(b) Using SST to hold the flange, remove the nut.
SST 09330–00021

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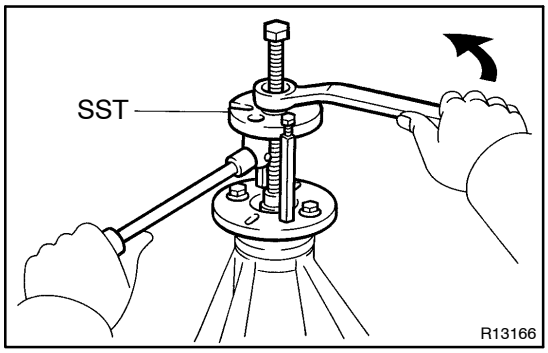
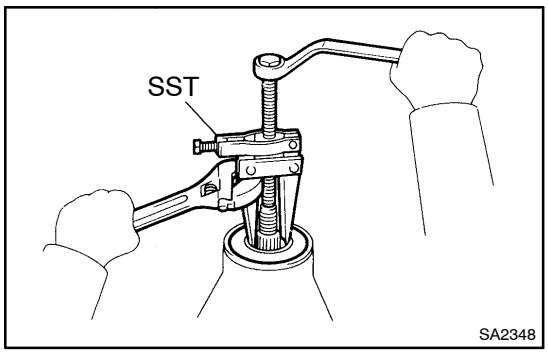


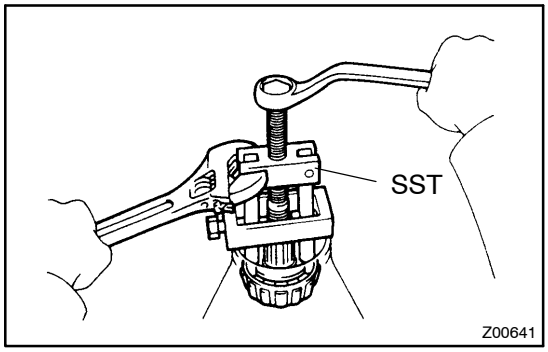
(c) Using SST, remove the companion flange.
SST 09950–30010 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03040)



12. REMOVE OIL SEAL AND OIL SLINGER

(a) Using SST, remove the oil seal from the differential carrier.
SST 09308–10010

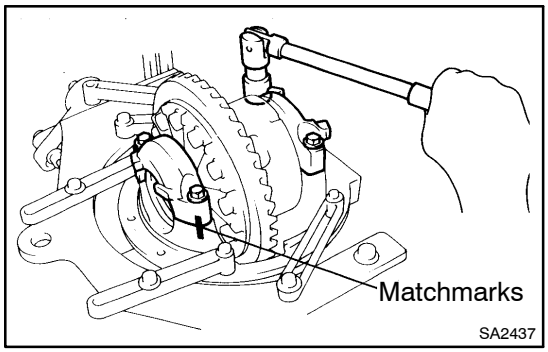
(b) Remove the oil slinger.



13. REMOVE FRONT BEARING

Using SST, remove the front bearing from the drive pinion.
SST 09556–22010

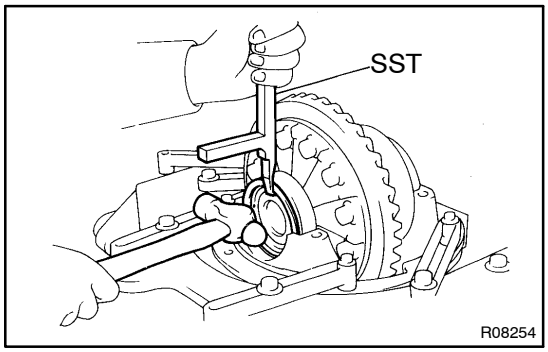
If the front bearing is damaged or worn, replace the bearing.



14. REMOVE DIFFERENTIAL CASE ASSEMBLY

(a) Place matchmarks on the bearing cap and differential carrier.

(b) Remove the 4 bolts and 2 bearing caps.



(c) Using SST and a hammer, remove the plate washers.
SST 09504–22011

HINT:
Measure the plate thickness and note down it.

(d) Remove the differential case with the side bearing outer races from the differential carrier.

HINT:
Tag the bearing outer races to show the location for reassembly.

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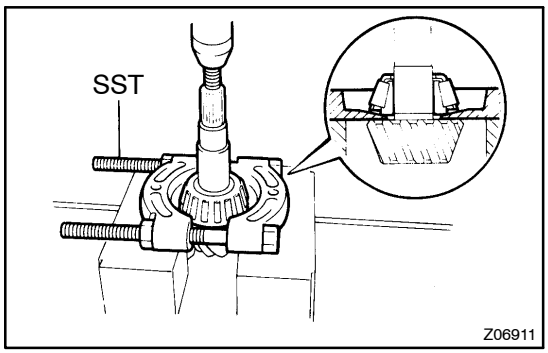
15. REMOVE DRIVE PINION AND BEARING SPACER FROM DIFFERENTIAL CARRIER

(a) Remove the drive pinion with the rear bearing.

(b) Remove the bearing spacer.



16. REMOVE DRIVE PINION REAR BEARING

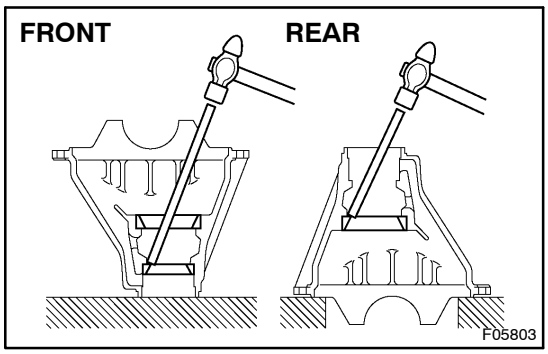
(a) Using SST and a press, remove the rear bearing from the drive pinion.

SST 09950–00020

HINT:

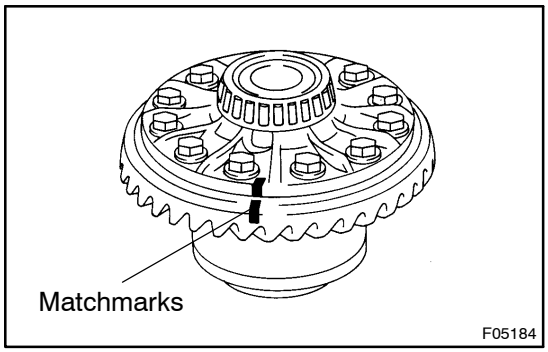
If the drive pinion or ring gear is damaged, replace them as a set.

(b) Remove the plate washer from the drive pinion.



17. REMOVE FRONT AND REAR BEARING OUTER RACES

Using a brass bar and hammer, remove the outer races.



18. REMOVE RING GEAR

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

(b) Remove the 12 ring gear set bolts.

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

19. CHECK DIFFERENTIAL CASE RUNOUT

(a) Place the bearing outer races on their respective bearings. Check that the left and right outer races are not interchanged.

(b) Install the assembled plate washers onto the side bearing.

(c) Install the differential case in the differential carrier.

HINT:

If it is difficult to install the differential case into the carrier, replace the plate washer with a thinner one.

However, select a plate washer that allows no clearance between it and the carrier.

(d) Align matchmarks on the bearing cap and differential carrier.

(e) Install and uniformly tighten the 4 bolts a little at a time.

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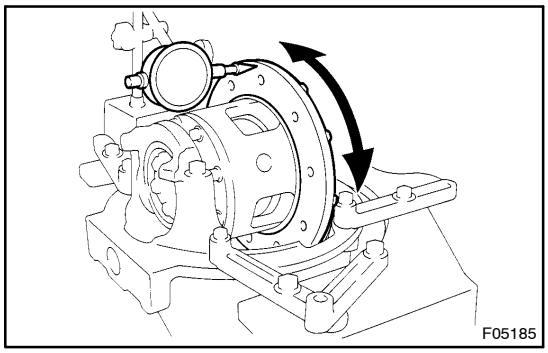
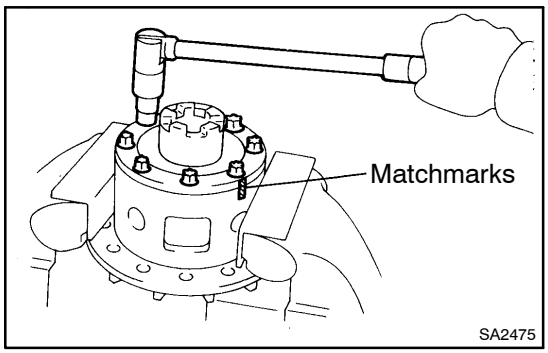
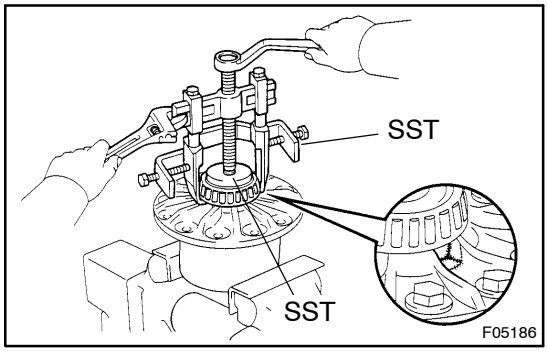


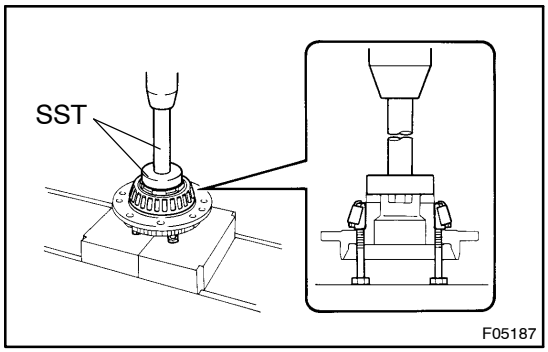
(f) Using a dial indicator, measure the differential case runout.
Maximum case runout: 0.04 mm (0.0016 in.)
(g) Remove the differential case.



20. DISASSEMBLE DIFFERENTIAL CASE
(a) Place matchmarks on the case and cover.
(b) Using a torx socket (E10), remove the 5 set bolts and 3 pinion shaft pins.
(c) Separate the cover and case.
(d) Remove the 2 side gears, side gear thrust washers, 4 pinion gears, pinion gear thrust washers, 3 pinion shafts and pinion shaft holder from the differential case.



21. REMOVE SIDE BEARING FROM DIFFERENTIAL CASE
Using SST, remove the side bearing.
SST 09950–40011 (09951–04010, 09952–04010, 09953–04020, 09955–04060, 09957–04010, 09958–04010), 09950–60010 (09951–00580)
HINT:
Fix the claws of SST to the notches in the differential case.



22. REMOVE SIDE BEARING FROM DIFFERENTIAL COVER
Using SST, 4 bolts and a press, remove the side bearing.
SST 09950–60010 (09951–00580), 09950–70010 (09951–07100)

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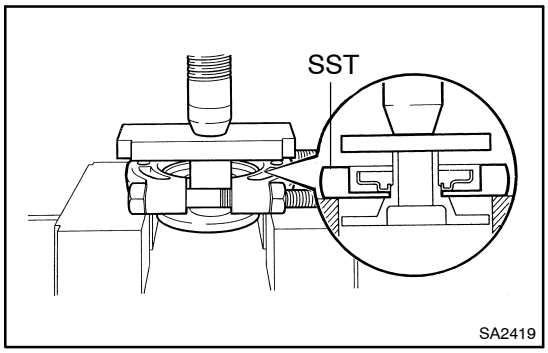
SA15V–01

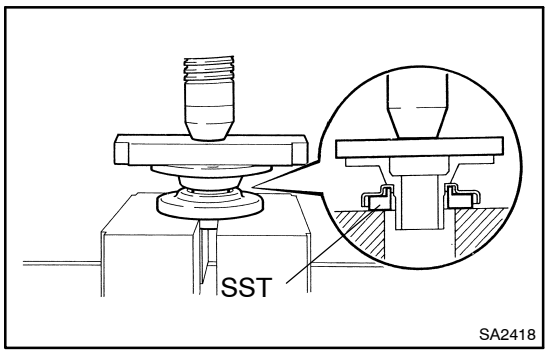
REPLACEMENT



1. REMOVE COMPANION FLANGE DUST DEFLECTOR

Using SST a steel plate and press, remove the dust deflector.

SST 09950–00020



2. INSTALL DUST DEFLECTOR

Using SST a steel plate and press, install a new dust deflector.

SST 09726–40010

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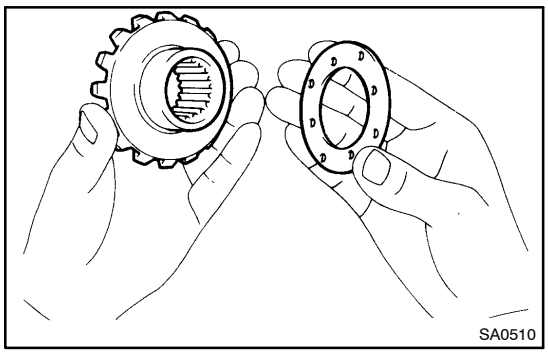
SA15W–01

REASSEMBLY

HINT:

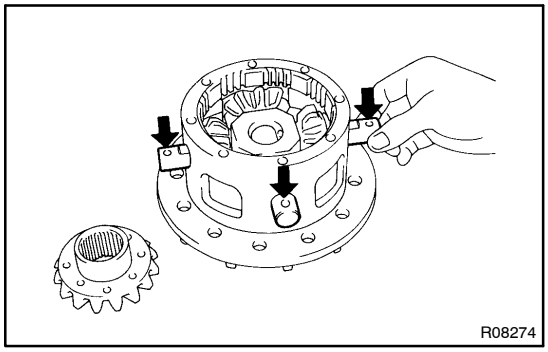
- Using a shop rag, clean off any foreign object from the parts.
- Apply all of the sliding and rotating surfaces with hypoid gear oil.



1. MEASURE SIDE GEAR BACKLASH

(a) Install the 2 thrust washers to the 2 side gears.

(b) Install the 4 thrust washers to the 4 pinion gears.



(c) Install the 2 side gears into the case.

(d) Install the holder into the case.

(e) Install the 4 pinion gears with the thrust washers.

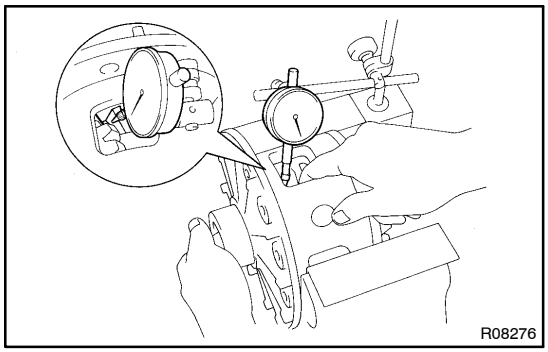
(f) Align the holes of the differential case and pinion shaft, and install the pinion shaft.

(g) Install the side gear to the cover.

(h) Align the matchmarks and install the case and cover.

(i) Using a torx socket (E10), install the 5 bolts and 3 pinion shaft pins.

Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)



(j) Using a dial indicator, while holding the side gear measure the backlash.

Backlash: 0.02 – 0.15 mm (0.0008 – 0.0059 in.)

If the backlash is not within the specification, install the thrust washer of a different thickness.

HINT:

- Try to select washers of the same size for both sides.
- Measure at all 4 locations.

Thrust washer thickness

Thickness mm (in.)	Thickness mm (in.)
1.55 (0.061)	1.85 (0.073)
1.60 (0.063)	1.90 (0.075)
1.65 (0.065)	1.95 (0.077)
1.70 (0.067)	2.00 (0.079)
1.75 (0.069)	2.05 (0.081)
1.80 (0.071)	2.10 (0.083)

(k) After measuring backlash, remove the 5 set bolts and 3 pinion shaft pins.

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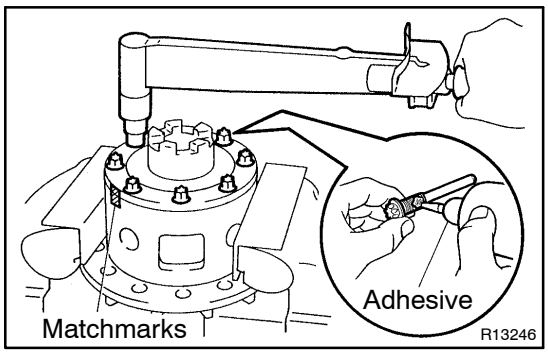
2. ASSEMBLE DIFFERENTIAL CASE

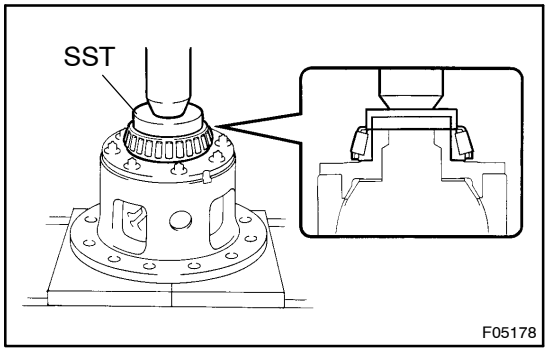
(a) Clean the threads of the bolts, pinion shaft pins, case and cover with the white gasoline.



(b) Coat the threads of the bolts and pinion shaft with adhesive.
Adhesive:
Part No. 08833–00070, THREE BOND 1324
or equivalent

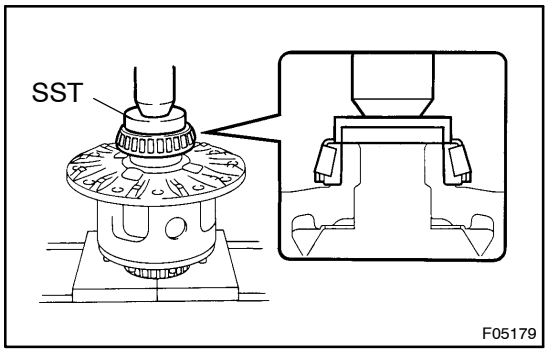
(c) Align the matchmarks, install the case and cover.

(d) Using a torx socket (E10), install the 5 bolts and 3 pinion shaft pins.
Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)



3. INSTALL SIDE BEARINGS

(a) Cover side:
Using SST and a press, install the side bearing on the differential cover.
SST 09550–60010

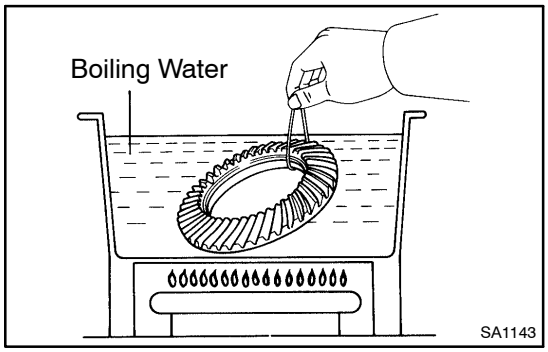


(b) Ring gear side:
Using SST and a press, install the side bearing on the differential case.
SST 09550–60010

4. INSTALL RING GEAR ON DIFFERENTIAL CASE

(a) Clean the threads of the bolts and differential case with the white gasoline.

(b) Clean the contact surfaces of the differential case and ring gear.



(c) Heat the ring gear to about 100 °C (212 °F) in boiling water.

(d) Carefully take the ring gear out of the boiling water.

(e) After the moisture on the ring gear has completely evaporated, quickly install the ring gear on the differential case.

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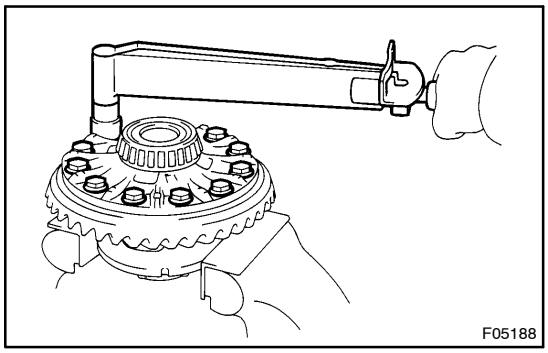

F05188

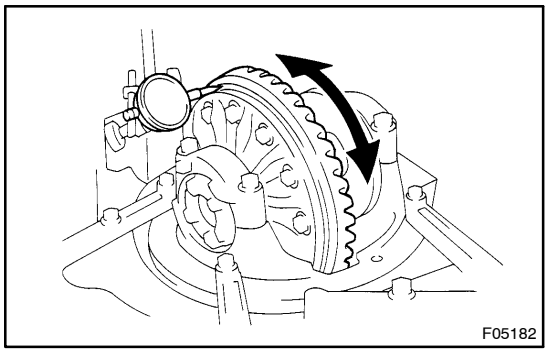
(f) Align the matchmarks on the ring gear and differential case.
(g) Temporarily install the 12 set bolts.
(h) After the ring gear has cooled down enough, torque the 12 set bolts to which thread lock has been applied.
Thread lock:
Part No.08833–00100, THREE BOND 1360K or equivalent
Torque: 137 N·m (1,400 kgf·cm, 101 ft·lbf)

5. CHECK RING GEAR RUNOUT

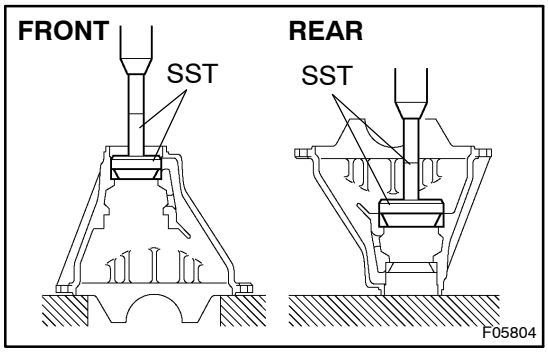
(a) Place the bearing outer races on their respective bearings. Check that the left and right outer races are not interchanged.
(b) Install the assembled plate washers onto the side bearing.
(c) Install the differential case in the differential carrier.

HINT:
If it is difficult to install the differential case into the carrier, replace the plate washer with a thinner one.
However, select a plate washer that allows no clearance between it and the carrier.

(d) Align matchmarks on the bearing cap and differential carrier.
(e) Install and uniformly tighten the 4 bolts a little at a time.


F05182

(f) Using a dial indicator, check the ring gear runout.
Maximum runout: 0.05 mm (0.0020 in.)
(g) Remove the differential case.



F05804

6. INSTALL DRIVE PINION FRONT AND REAR BEARING OUTER RACES

(a) Using SST and a press, install the front bearing outer race.
SST 09950–60020 (09951–00710), 09950–70010 (09951–07150)
(b) Using SST and a press, install the rear bearing outer race.
SST 09950–60020 (09951–00890), 09950–70010 (09951–07150)

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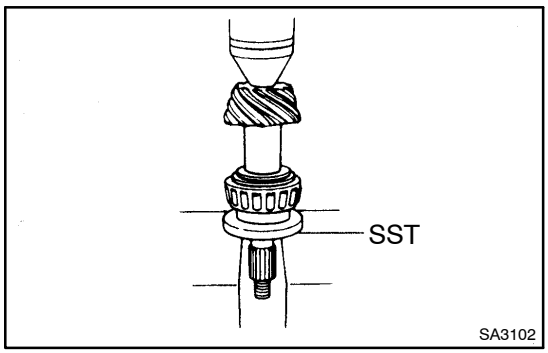
7. INSTALL DRIVE PINION REAR BEARING

(a) Install the washer on the drive pinion.

HINT:

First fit a washer with the same thickness as the washer which was removed, then after checking the tooth contact pattern, replace the washer with one of a different thickness if necessary.



(b) Using SST and a press, install the rear bearing onto the drive pinion.
SST 09506–35010

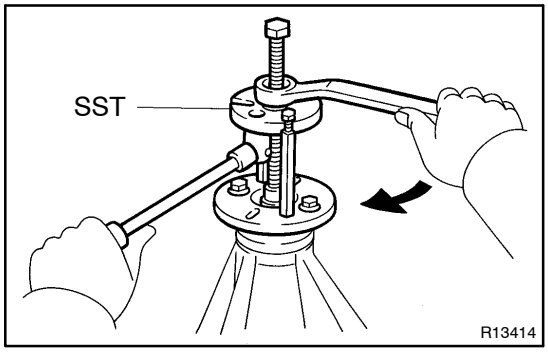
8. TEMPORARILY ADJUST DRIVE PINION PRELOAD

(a) Install the drive pinion and front bearing.

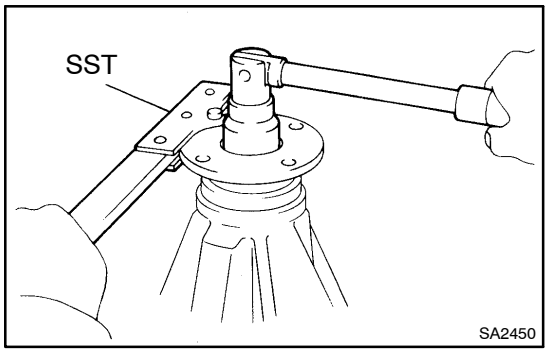
HINT:

Assemble the spacer and oil seal after adjusting the gear contact pattern.

(b) Install the oil slinger.



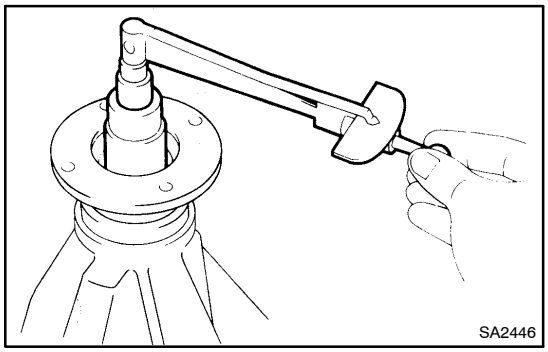
(c) Install the companion flange with SST.
SST 09950–30010, (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03040)



(d) Using SST to hold the flange and adjust the drive pinion preload by tightening the companion flange nut.
SST 09330–00021

NOTICE:

- **Coat the nut and screw of the drive pinion with gear oil.**
- **As there is no spacer, tighten the nut a little at a time, being careful not to overtighten.**



(e) Using a torque wrench, measure the preload.
Preload (at starting):
New bearing
1.3 – 1.8 N·m (13 – 19 kgf·cm, 11.3 – 16.4 in.·lbf)
Reused bearing
0.64 – 0.92 N·m (6.5 – 9.4 kgf·cm, 5.6 – 8.2 in.·lbf)

HINT:

Measure the total preload after turning the bearing clockwise and counterclockwise several times to make the bearing smooth.

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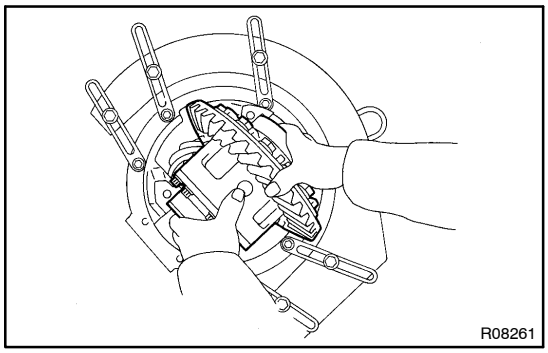
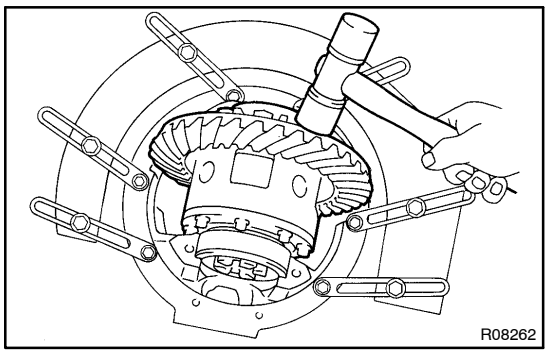


9. INSTALL DIFFERENTIAL CASE IN CARRIER

(a) Place the 2 bearing outer races on their respective bearings. Make sure that the left and right races are not interchanged.

(b) Install the assembled plate washer onto the side bearing.

(c) Install the differential case in the carrier.

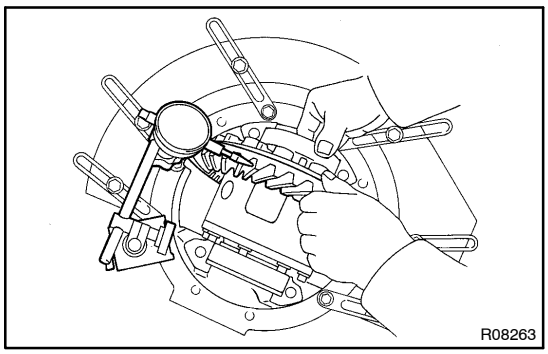


(d) Settle down the plate washer and bearing snugly by tapping on the ring gear with a plastic hammer.

HINT:

If it is difficult to install the differential case into the carrier, replace the plate washer with a thinner one.

However, select a plate washer that allows no clearance between it and the carrier.



10. ADJUST RING GEAR BACKLASH

(a) Using a dial indicator, while holding the side bearing of the ring gear side measure the backlash.

Backlash (Reference): 0.15 mm (0.0059 in.)

(b) Select a case cover side plate washer using the backlash as a reference.

Side plate washer thickness

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
1	2.67 (0.1051)	13	3.03 (0.1193)
2	2.70 (0.1063)	14	3.06 (0.1205)
3	2.73 (0.1075)	15	3.09 (0.1217)
4	2.76 (0.1087)	16	3.12 (0.1228)
5	2.79 (0.1098)	17	3.15 (0.1240)
6	2.82 (0.1110)	18	3.18 (0.1252)
7	2.85 (0.1122)	19	3.21 (0.1264)
8	2.88 (0.1134)	20	3.24 (0.1276)
9	2.91 (0.1146)	21	3.27 (0.1287)
10	2.94 (0.1157)	22	3.30 (0.1299)
11	2.97 (0.1169)	23	3.33 (0.1311)
12	3.00 (0.1181)	–	–

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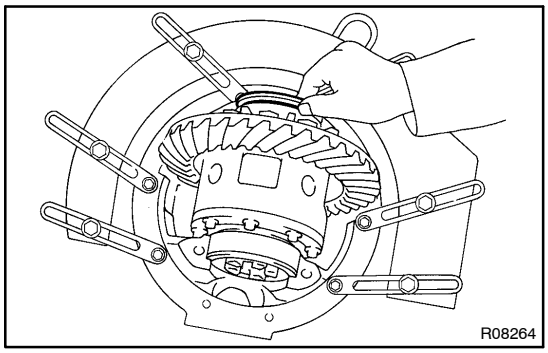
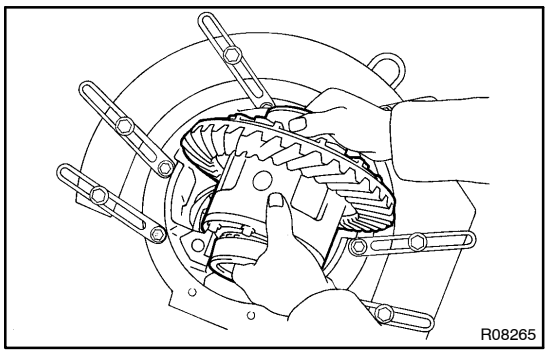
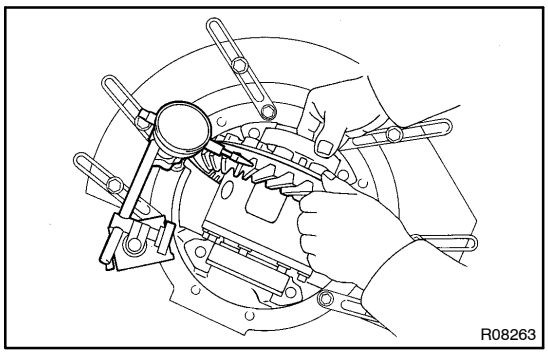


(c) Select a ring gear teeth side plate washer so that there is no clearance between the outer race and case.



(d) Remove the 2 plate washers and differential carrier.
(e) Install the plate washer into the lower part of the carrier.
(f) Place the plate washer onto the differential case together with the outer races, and install the differential case with the outer race into the carrier.
(g) Settle down the plate washer and bearing snugly by tapping on the ring gear with a plastic hammer.



(h) Using a dial indicator, measure the ring gear backlash.
Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)

If it is not within the specification, adjust it by either increasing or decreasing the thickness of washers on both sides by an equal amount.

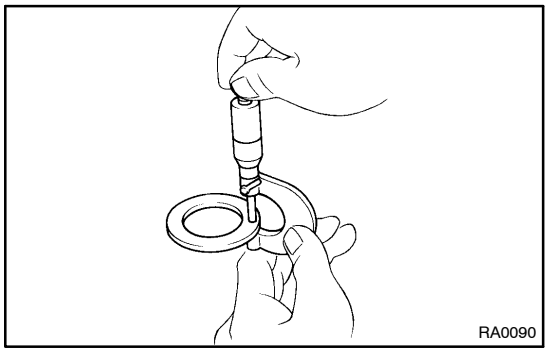
HINT:

There should be no clearance between the plate washer and case.

Ensure that there is ring gear backlash.

11. ADJUST SIDE BEARING PRELOAD

(a) After adjustment using the backlash as reference, remove the ring gear side plate washer.



(b) Using a micrometer, measure the thickness of the removed plate washer.
(c) Install a new washer 0.06 – 0.09 mm (0.0024 – 0.0035 in.) thicker than the removed washer.

HINT:

Select a washer which can be pressed in 2/3 of the way with finger.

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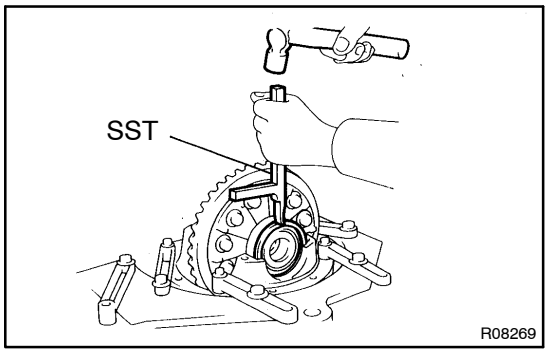
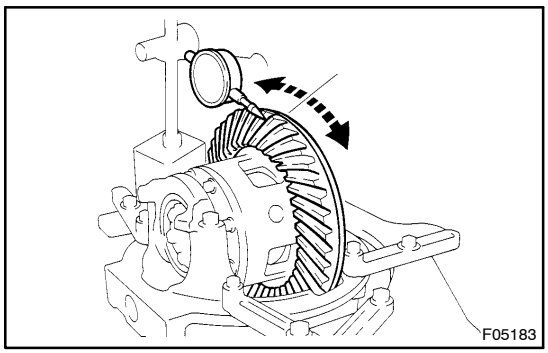


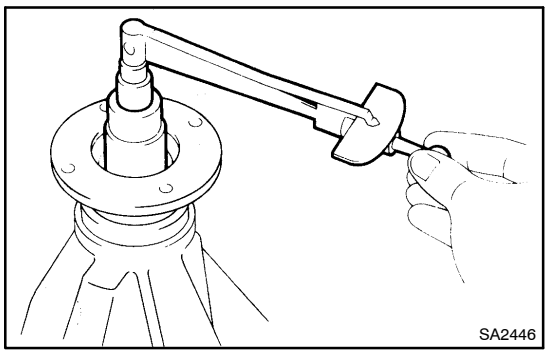
(d) Using SST, tap in the plate washer.
SST 09504–22010
(e) Align the matchmarks on the cap and carrier.
(f) Tighten the 4 bearing cap bolts to the specified torque.
Torque: 113 N·m (1,150 kgf·cm, 83 ft·lbf)



(g) Using a dial indicator, adjust the ring gear backlash until it is within the specification.
Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)

If the backlash is not within the specification, adjust by either increasing or decreasing the thickness of washers on both sides by an equal amount.

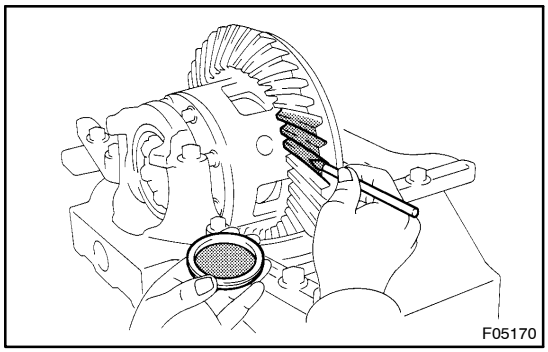
(h) After rotating the ring gear 5 turns or more, recheck the ring gear backlash.



12. MEASURE TOTAL PRELOAD

Using a torque wrench, measure the preload with the teeth of the drive pinion and ring gear in contact.

Preload (at starting):
Drive pinion preload plus
0.3 – 0.5 N·m (3 – 5 kgf·cm, 2.6 – 4.3 in.·lbf)



13. INSPECT TOOTH CONTACT BETWEEN RING GEAR

(a) Coat 3 or 4 teeth at 3 different positions on the ring gear with red lead primer.
(b) Turn the companion flange, in both directions to inspect the ring gear for proper tooth contact.

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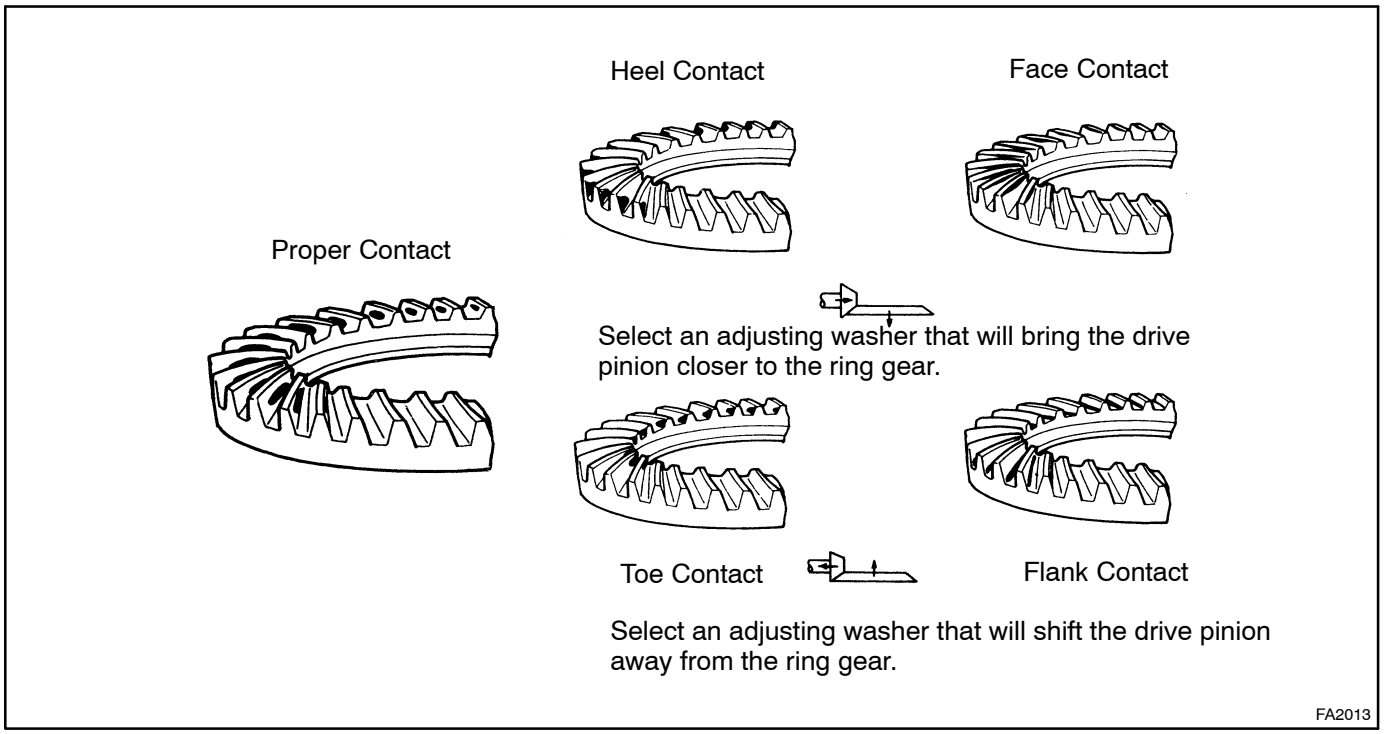
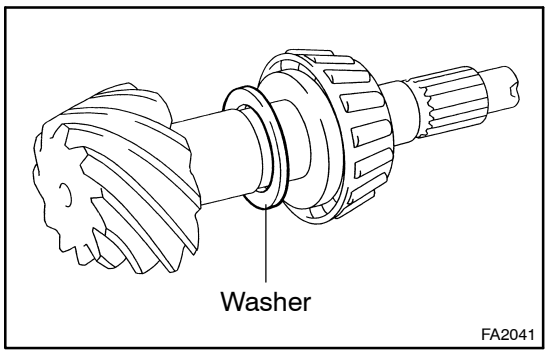


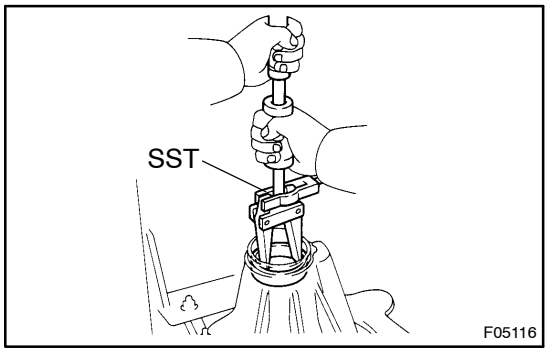


If the teeth are not contacting properly, use the following chart to select a proper washer for correction.

Thickness mm (in.)	Thickness mm (in.)
1.050 (0.04134)	1.325 (0.05217)
1.075 (0.04232)	1.350 (0.05315)
1.100 (0.04331)	1.375 (0.05413)
1.125 (0.04429)	1.400 (0.05512)
1.150 (0.04528)	1.425 (0.05610)
1.175 (0.04626)	1.450 (0.05709)
1.200 (0.04724)	1.475 (0.05807)
1.225 (0.04823)	1.500 (0.05906)
1.250 (0.04921)	1.525 (0.06004)
1.275 (0.05020)	1.550 (0.06102)
1.300 (0.05118)	–

14. REMOVE COMPANION FLANGE (See page SA–118)

15. REMOVE OIL SLINGER AND FRONT BEARING (See page SA–118)



16. REMOVE BEARING OUTER RACE

Using SST, remove the bearing outer race.

SST 09308–00010

17. INSTALL NEW BEARING SPACER

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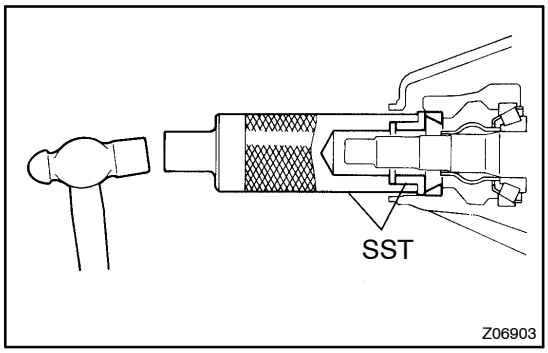


18. INSTALL BEARING OUTER RACE

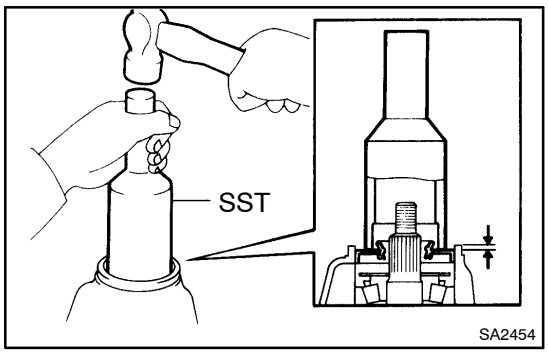
Using SST and a hammer, install the bearing outer race.

SST 09316–60011 (09316–00011, 09316–00021)

19. INSTALL FRONT BEARING AND OIL SLINGER

20. INSTALL OIL SEAL

(a) Coat the hypoid gear oil to a new oil seal periphery.

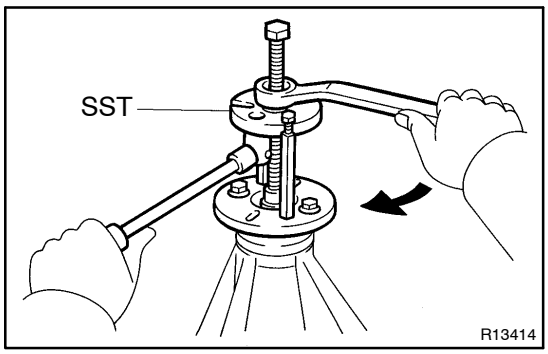


(b) Using SST and a hammer, install a new oil seal, as shown.

SST 09214–76011

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

(c) Coat MP grease to the oil seal lip.



21. INSTALL COMPANION FLANGE

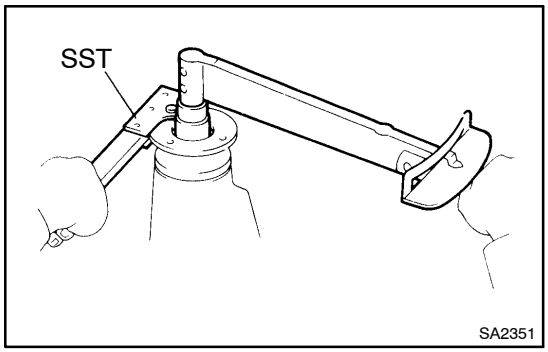
(a) Install the companion flange with SST.

SST 09950–30010 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03040)

(b) Install a new nut.

HINT:

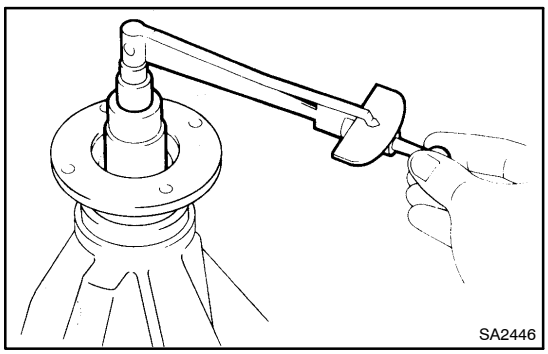
Coat the threads of a new nut with gear oil.



(c) Using SST to hold the flange, tighten the nut.

SST 09330–00021

Torque: 245 N·m (2,500 kgf·cm, 181 ft·lbf)



22. ADJUST DRIVE PINION PRELOAD

Using a torque wrench, measure the preload of the backlash between the drive pinion and ring gear.

Preload (at starting):

New bearing

1.3 – 1.8 N·m (13 – 19 kgf·cm, 11.3 – 16.4 in.·lbf)

Reused bearing

0.64 – 0.92 N·m (6.5 – 9.4 kgf·cm, 5.6 – 8.2 in.·lbf)

If the preload is greater than the specification, replace the bearing spacer.

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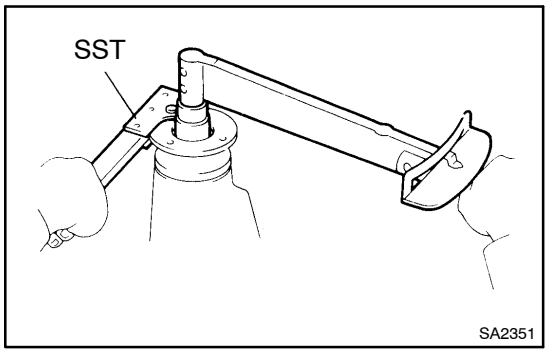


If the preload is less than the specification, retighten the nut with a force of 13 N·m (130 kgf·cm, 9 ft·lbf) at a time until the specified preload is reached.

SST 09330–00021

Torque: 441 N·m (4,500 kgf·cm, 326 ft·lbf) or less

If the maximum torque is exceeded while retightening the nut, replace the bearing spacer and repeat the preload procedure. Do not loosen the pinion nut to reduce the preload.

23. RECHECK RING GEAR BACKLASH
(See page SA–118)

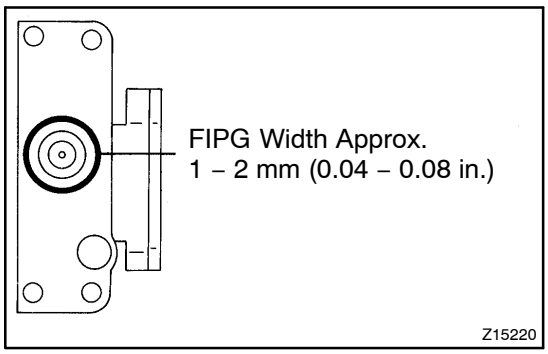
24. RECHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page SA–124)

25. CHECK RUNOUT OF COMPANION FLANGE
(See page SA–118)

26. STAKE DRIVE PINION NUT

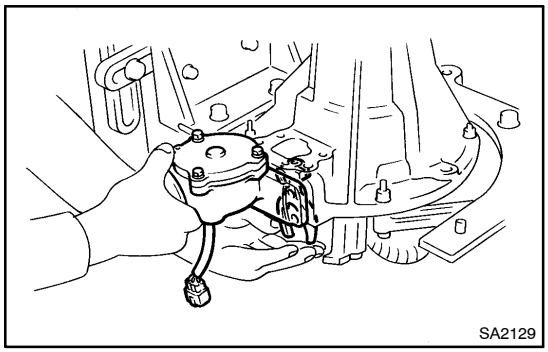
27. INSTALL ACTUATOR, SHIFT FORK AND SLEEVE

(a) Clean contacting surfaces of any FIPG material using gasoline or alcohol.



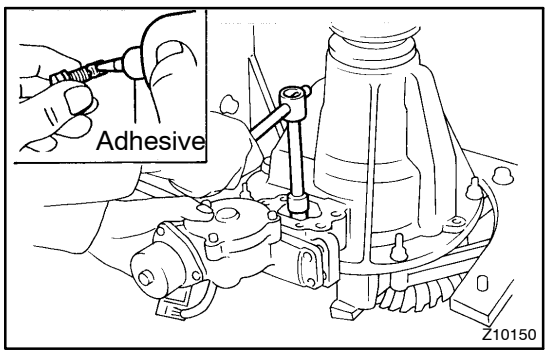
(b) Apply FIPG to the actuator.
FIPG:
Part No. 08826–00090, THREE BOND 1281
or equivalent

HINT:
Install the actuator within 10 minutes after applying FIPG.



(c) Install the shift fork and actuator to the differential and match the shift fork hole with the shift fork.

(d) Clean the threads of the set bolt and fork shaft with the white gasoline.



(e) Coat the threads of the set bolt with adhesive.
Adhesive:
Part No. 08833–00070, THREE BOND 1324
or equivalent

(f) Tighten the shift fork shaft set bolt.
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

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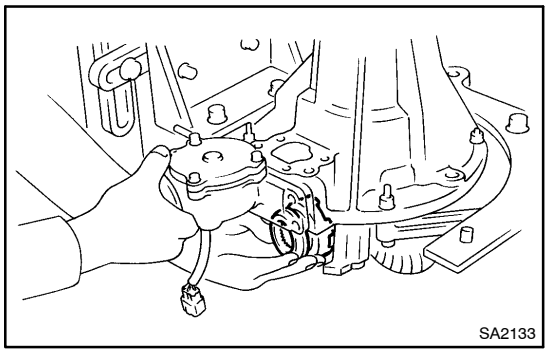
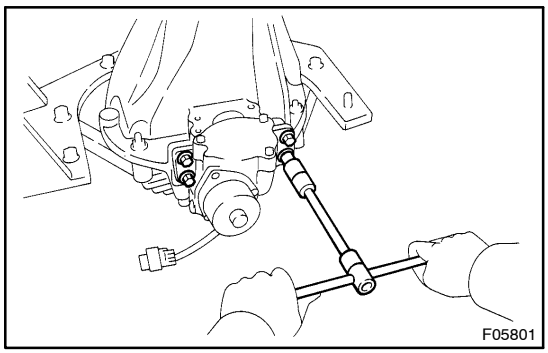

SA2133

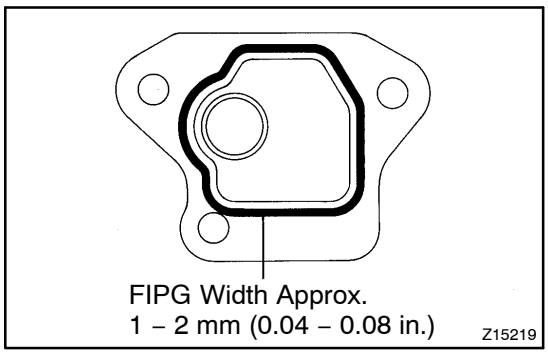
(g) Engage the sleeve with the dog clutch of the differential case.


F05801

(h) Tighten the 4 bolts.
Torque: 24 N·m (240 kgf·cm, 17 ft·lbf)

28. INSTALL COVER

(a) Clean contacting surfaces of any FIPG material using gasoline or alcohol.



(b) Apply FIPG to the cover.
FIPG:
Part No. 08826–00090, THREE BOND 1281
or equivalent

HINT:
Install the actuator within 10 minutes after applying FIPG.

(c) Tighten the 3 bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

29. INSTALL INDICATOR SWITCH

Install the indicator switch with a new gasket.
Torque: 40 N·m (410 kgf·cm, 30 ft·lbf)

30. REMOVE DIFFERENTIAL CARRIER FROM OVERHAUL STAND ETC.

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SA15X–01

INSTALLATION

Installation is in the reverse order of removal (See page SA–97).
AFTER INSTALLATION, FILL DIFFERENTIAL WITH HYPOID GEAR OIL (See page SA–92)

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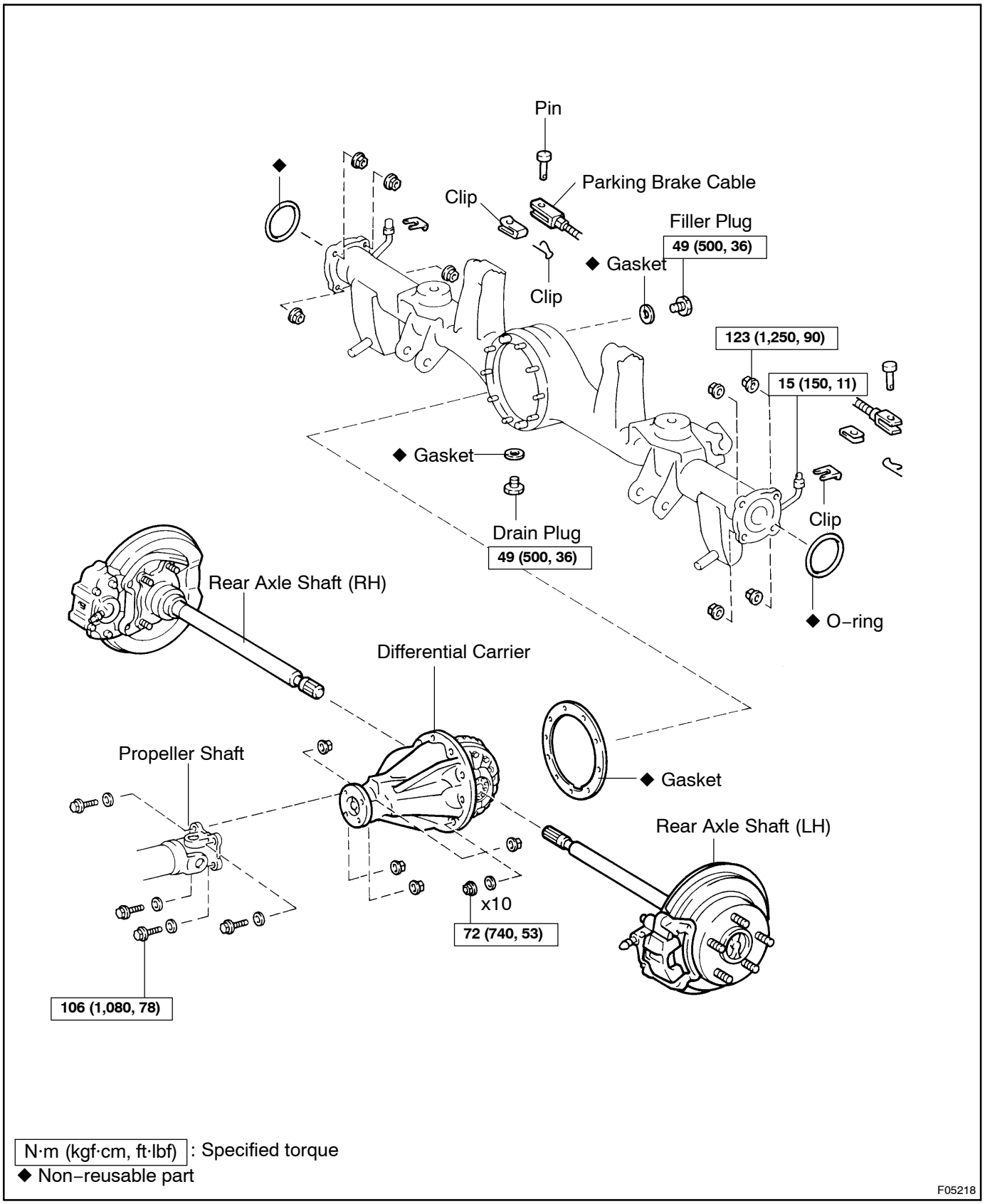
REAR DIFFERENTIAL CARRIER (w/ LSD)

COMPONENTS

SA15Y–01



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

F05218

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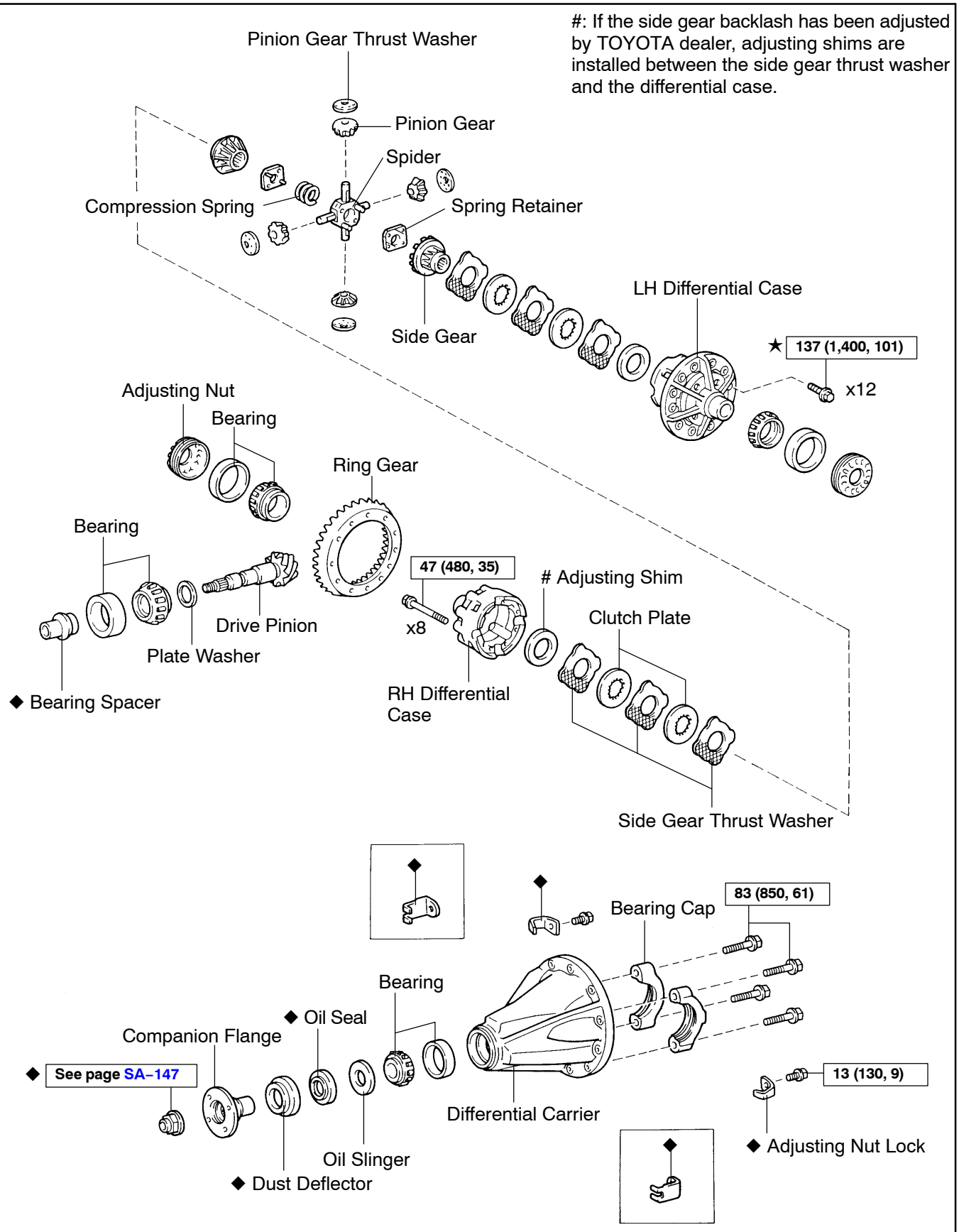

N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
★ Precoated part

F05173

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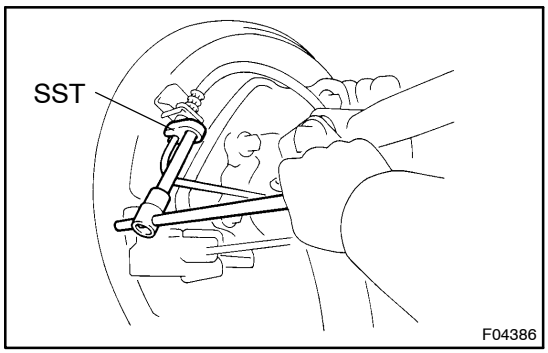
SA15Z–01

REMOVAL

1. **REMOVE REAR WHEELS**
   Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)
2. **DRAIN HYPOID GEAR OIL**
   Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



3. **DISCONNECT BRAKE LINES**

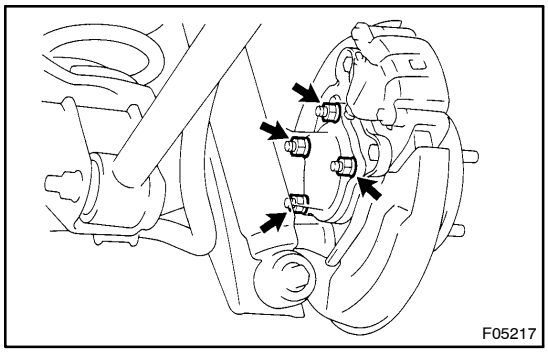
(a) Using SST, disconnect the brake line and remove the clip.
SST 09023–00100
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

(b) Employ the same manner described above to the other side.

4. **DISCONNECT PARKING BRAKE CABLES**

(a) Remove the 2 clips, pin and disconnect the parking brake cable from the bellcrank.

(b) Employ the same manner described above to the other side.



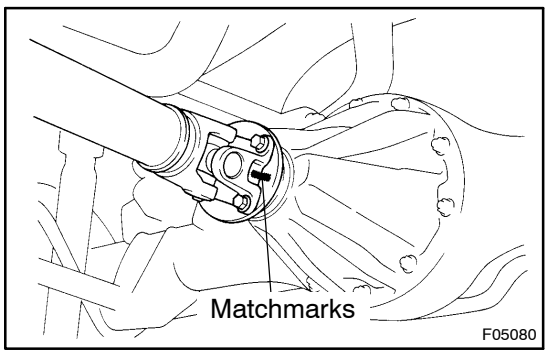
5. **REMOVE REAR AXLE SHAFTS**

(a) Remove the 4 nuts.
Torque: 123 N·m (1,250 kgf·cm, 90 ft·lbf)

(b) Pull out the axle shaft assembly.

NOTICE:
Be careful not to damage the oil seal.

(c) Employ the same manner described above to the other side.



6. **DISCONNECT REAR PROPELLER SHAFT**

(a) Place matchmarks on the propeller shaft and differential flange.

(b) Remove the 4 nuts, washers, bolts and disconnect the propeller shaft.
Torque: 106 N·m (1,080 kgf·cm, 78 ft·lbf)

(c) Support the propeller shaft securely.

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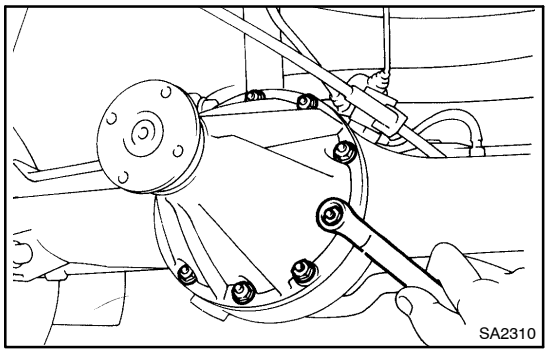

7. REMOVE DIFFERENTIAL CARRIER ASSEMBLY

(a) Remove the 10 nuts, washers and differential carrier assembly.

NOTICE:

Be careful not to damage the installation surface.

Torque: 72 N·m (740 kgf·cm, 53 ft·lbf)

(b) Remove the gasket.

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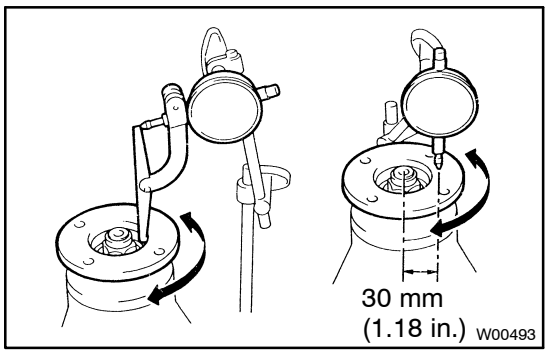
SA160–01

DISASSEMBLY

1. SET DIFFERENTIAL CARRIER TO OVERHAUL STAND ETC.

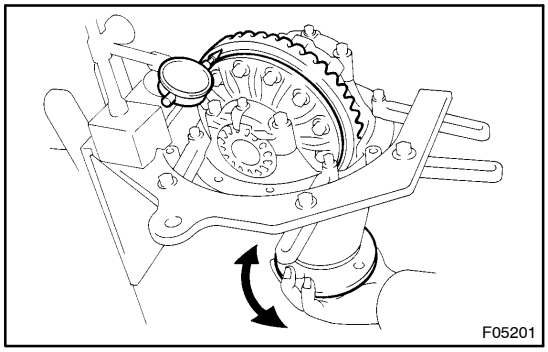


2. CHECK RUNOUT OF COMPANION FLANGE

Using a dial indicator, measure the vertical and lateral runout of the companion flange.

Maximum runout: 0.10 mm (0.0039 in.)

If the runout is not within the specification, replace the companion flange.

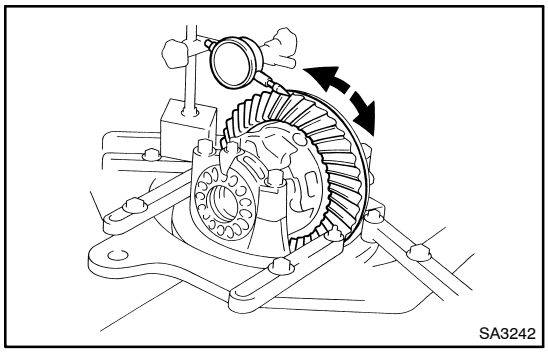


3. CHECK RING GEAR RUNOUT

Using a dial indicator, measure the ring gear runout.

Maximum runout: 0.05 mm (0.0020 in.)

If the runout is greater than the maximum, replace the ring gear.



4. CHECK RING GEAR BACKLASH

Using a dial indicator, measure the ring gear backlash.

Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)

HINT:

Perform the measurements at 3 or more positions around the circumference of the ring gear.

If the backlash is not within the specification, adjust the side bearing preload or repair as necessary.

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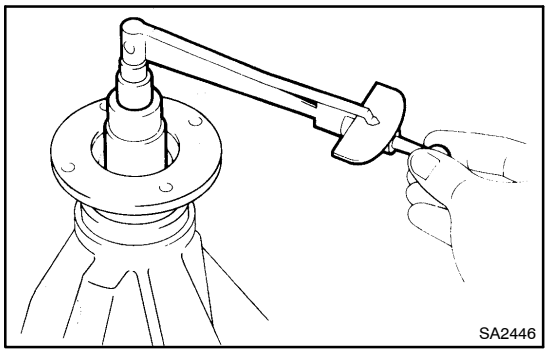


5. MEASURE DRIVE PINION PRELOAD

Using a torque wrench, measure the preload of backlash between the drive pinion and ring gear.

Preload (at starting):
0.64 – 0.92 N·m (6.5 – 9.4 kgf·cm, 5.6 – 8.2 in.·lbf)

6. CHECK TOTAL PRELOAD

Using a torque wrench, measure the preload with the teeth of the drive pinion and ring gear in contact.

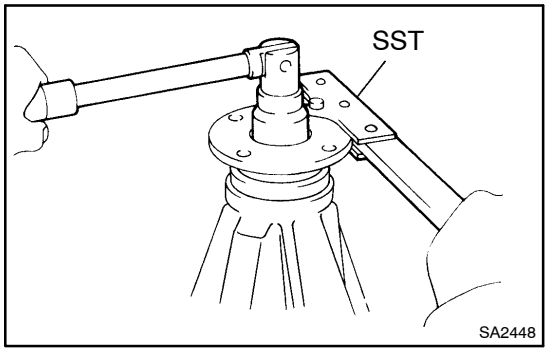
Total preload (at starting):
Drive pinion preload plus
0.38 – 0.63 N·m (3.9 – 6.5 kgf·cm, 3.4 – 5.6 in.·lbf)

If necessary, disassemble and inspect the differential.

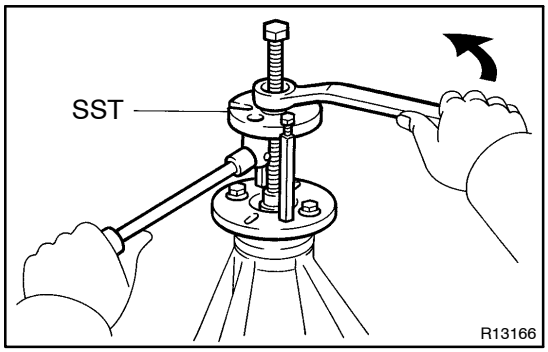
7. CHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page SA–147)

8. REMOVE COMPANION FLANGE

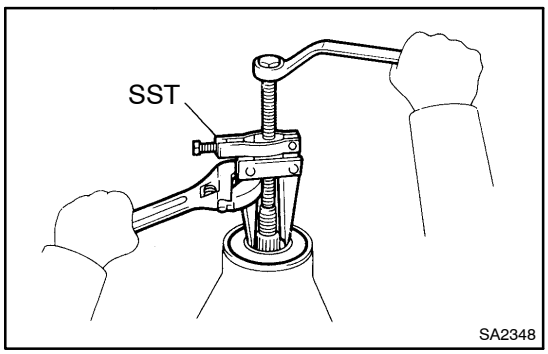
(a) Using a chisel and hammer, unstake the nut.



(b) Using SST to hold the flange, remove the nut.
SST 09330–00021



(c) Using SST, remove the companion flange.
SST 09950–30010 (09951–03010, 09953–03010 09954–03010, 09955–03030, 09956–03040)



9. REMOVE OIL SEAL AND OIL SLINGER

(a) Using SST, remove the oil seal from the differential carrier.
SST 09308–10010

(b) Remove the oil slinger.

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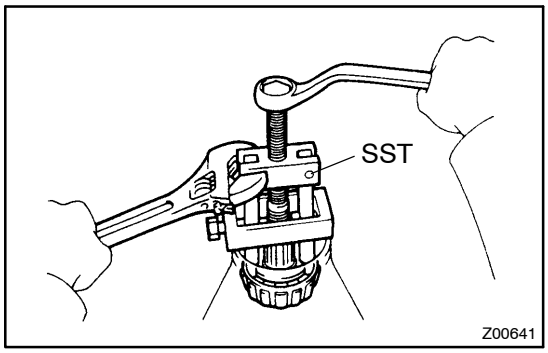
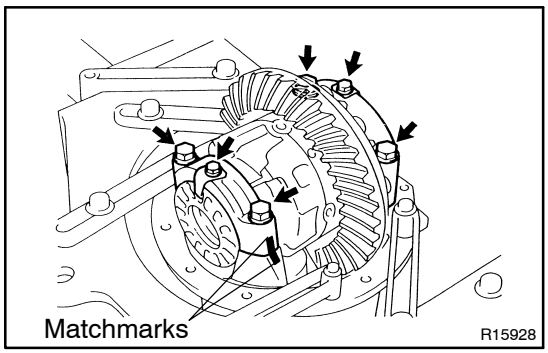


10. REMOVE FRONT BEARING

Using SST, remove the front bearing from the drive pinion.

SST 09556–22010

If the front bearing is damaged or worn, replace the bearing.



11. REMOVE DIFFERENTIAL CASE

(a) Place matchmarks on the bearing cap and differential carrier.

(b) Remove the 2 adjusting nut locks.

(c) Remove the 4 bolts, 2 bearing caps and adjusting nuts.

HINT:

Tag the disassembled parts to show the location for reassembly.

(d) Remove the differential case with the bearing outer races.

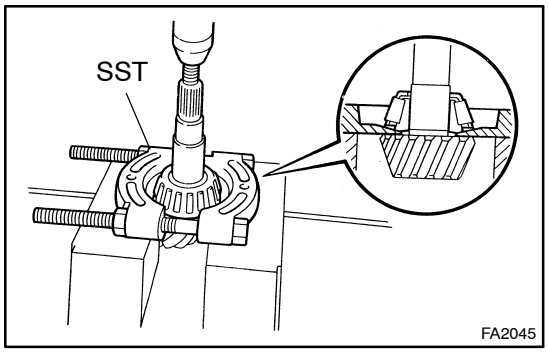
HINT:

Tag the disassembled parts to show the location for reassembly.

12. REMOVE DRIVE PINION AND BEARING SPACER

(a) Remove the drive pinion with the rear bearing.

(b) Remove the bearing spacer.



13. REMOVE DRIVE PINION REAR BEARING

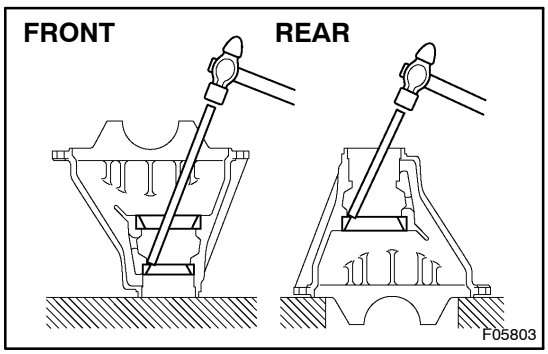
(a) Using SST and a press, remove the rear bearing from the drive pinion.

SST 09950–00020

HINT:

If the drive pinion or ring gear is damaged, replace them as a set.

(b) Remove the plate washer from the drive pinion.



14. REMOVE FRONT AND REAR BEARING OUTER RACES

Using a brass bar and hammer, remove the outer races.

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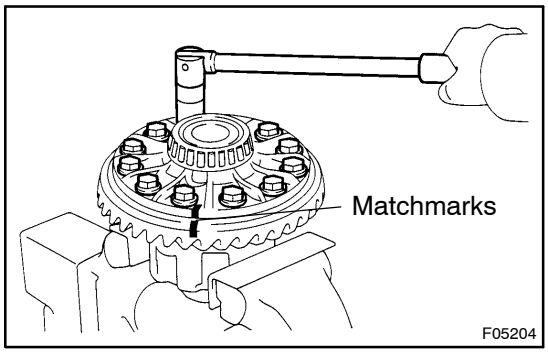
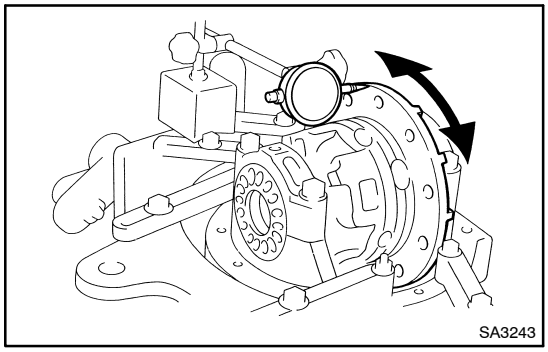


15. REMOVE RING GEAR

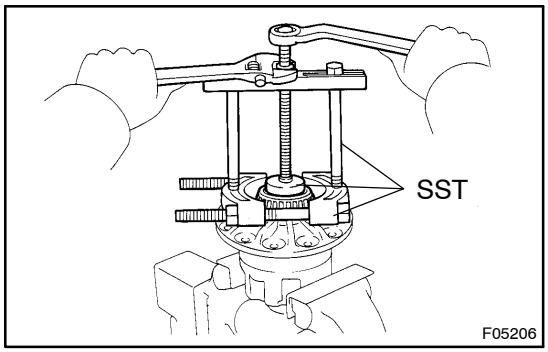
(a) Place matchmarks on the ring gear and differential case.
(b) Remove the 12 ring gear set bolts.
(c) Using a plastic hammer, tap on the ring gear to remove it from the differential case.

16. CHECK DIFFERENTIAL CASE RUNOUT

(a) Place the bearing outer races on their respective bearings. Check that the left and right outer races are not interchanged.
(b) Install the differential case in the differential carrier.
(c) Tighten the adjusting nut just to where there is no play in the bearing.
(d) Align the matchmarks on the bearing cap and differential carrier.
(e) Install and uniformly tighten the bearing cap bolts a little at a time.



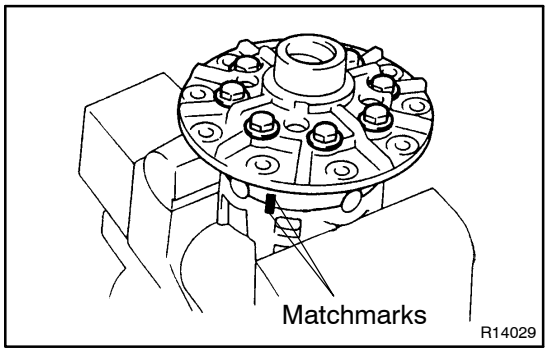
(f) Using a dial indicator, measure the differential case runout.
Maximum runout: 0.04 mm (0.0016 in.)
(g) Remove the differential case.



17. REMOVE SIDE BEARINGS FROM DIFFERENTIAL CASE

Using SST, remove the 2 side bearings from the differential case.

SST 09950–00020, 09950–00030, 09950–40011 (09957–04010), 09950–60010 (09951–00480)



18. DISASSEMBLE DIFFERENTIAL CASE

(a) Place matchmarks on the LH and RH cases.
(b) Remove the 8 bolts uniformly, a little at a time.
(c) Using a plastic hammer, separate the LH and RH cases.

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(d) Remove the 2 side gears, 6 side gear thrust washers, 4 clutch plates, 2 spring retainers, compression spring, 4 pinion gears, 4 pinion gear thrust washers and spider from the differential case.

HINT:

- Keep the disassembled parts in order.
- If the side gear backlash has been adjusted by TOYOTA dealer, adjusting shims are installed between the side gear thrust washer and the differential case.

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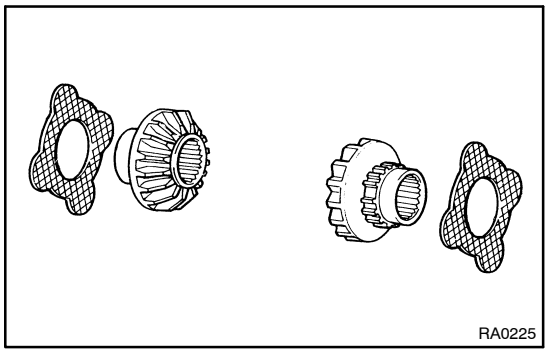
SA161–01

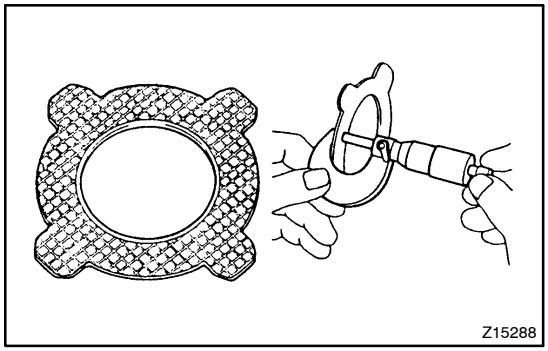
INSPECTION


RA0225

1. REPLACE PARTS THAT ARE DAMAGED OR WORN

HINT:

If replacing the side gear, also replace the thrust washer that contact with it.


Z15288

2. INSPECT SIDE GEAR THRUST WASHERS FOR WEAR OR DAMAGE

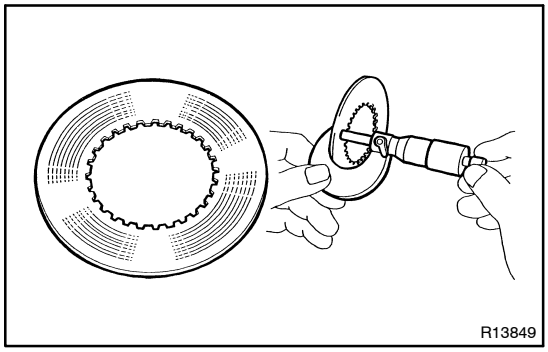
Using a micrometer, measure that the contact surface of the thrust washer is even and check that no bare metal is showing.

Thickness (Reference):
1.97 – 2.06 mm (0.0776 – 0.0811 in.)

If necessary, replace the thrust washers.

HINT:

If replacing the thrust washer, also replace the clutch plate that contacts with it.

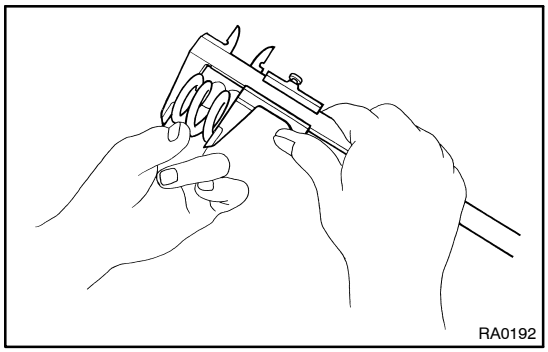

R13849

3. INSPECT CLUTCH PLATE FOR WEAR OR DAMAGE

Using a micrometer, measure the contact surface of the clutch plate and check that there is no abnormal wear.

Thickness (Reference):
1.97 – 2.03 mm (0.0776 – 0.0799 in.)

If necessary, replace the clutch plate.


RA0192

4. INSPECT COMPRESSION SPRING FREE LENGTH

Using vernier calipers, measure the free length of the spring.

Length (Reference): 32.8 mm (1.291 in.)

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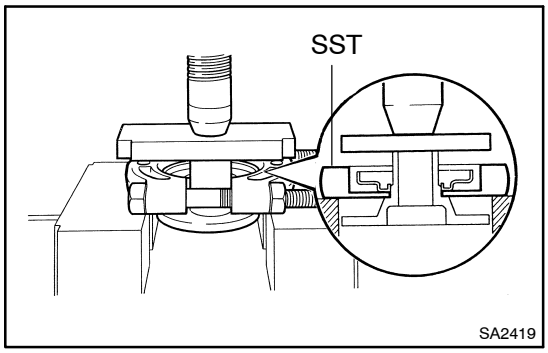
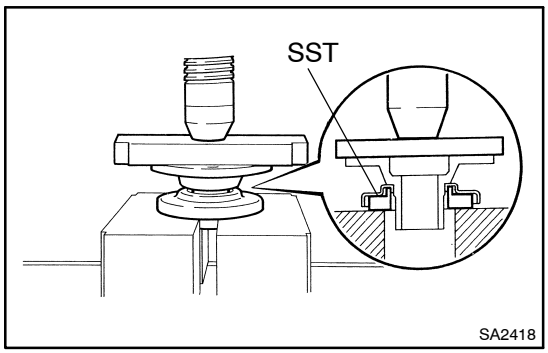
SA162–01

REPLACEMENT

REPLACE COMPANION FLANGE DUST DEFLECTOR



(a) Using SST a steel plate and press, remove the dust deflector.
SST 09950–00020



(b) Using SST a steel plate and press, install a new dust deflector.
SST 09726–40010

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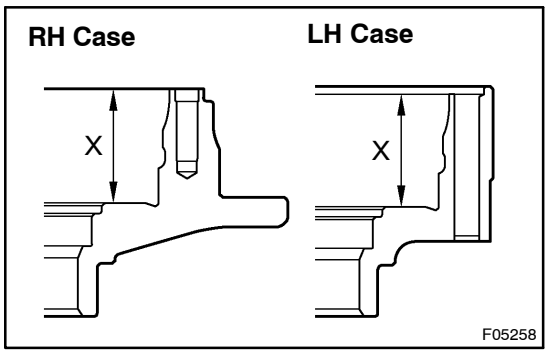
SA163–01

REASSEMBLY

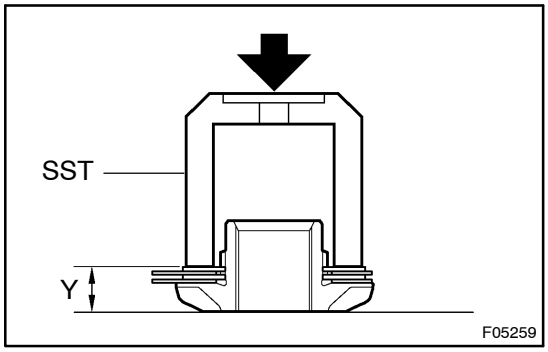
HINT:

- When reusing the side gear, thrust washers and clutch plates, skip the STEP 1.
- Using a shop rag, clean off any foreign object from the parts.
- Apply all of the sliding and rotating surfaces with LSD oil.



1. SELECT ADJUSTING SHIM

(a) Measure the LH and RH differential case dimensions "X", as shown in the illustration.



(b) Install the thrust washers and clutch plates on the side gear.

(c) Using SST to press down the thrust washers and clutch plates with about pressure of 10 kgf (22 lbf), measure dimension "Y", as shown in the illustration.
SST 09649–17010

(d) Referring to the following selection table on the next page, select the proper adjusting shim.
Adjust shim thickness =
X – Y – 19.08 mm (0.7511 in.)

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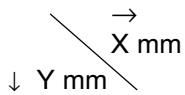

	46.05	46.06	46.07	46.08	46.09	46.10	46.11	46.12	46.13	46.14	46.15	46.16	46.17	46.18	46.19	46.20	46.21	46.22
26.45																		
26.46																		
26.47																C + D		
26.48																		
26.49																		
26.50																		
26.51													C + C					
26.52																		
26.53																		
26.54												B + C						
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26.56																		
26.57																		
26.58										B + B								
26.59																		
26.60																		
26.61																		
26.62										A + B								
26.63																		
26.64																		
26.65																		
26.66									A + A									
26.67																		
26.68																		
26.69																		
26.70																		
26.71									D									
26.72																		
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26.76																		
26.77																		
26.78																		
26.79							B											
26.80																		
26.81																		
26.82																		
26.83						A												
26.84																		
26.85																		
26.86				#														
26.87																		
26.88																		

#: Reassemble another type shim or check the backlash after assembling A shim.

F05260

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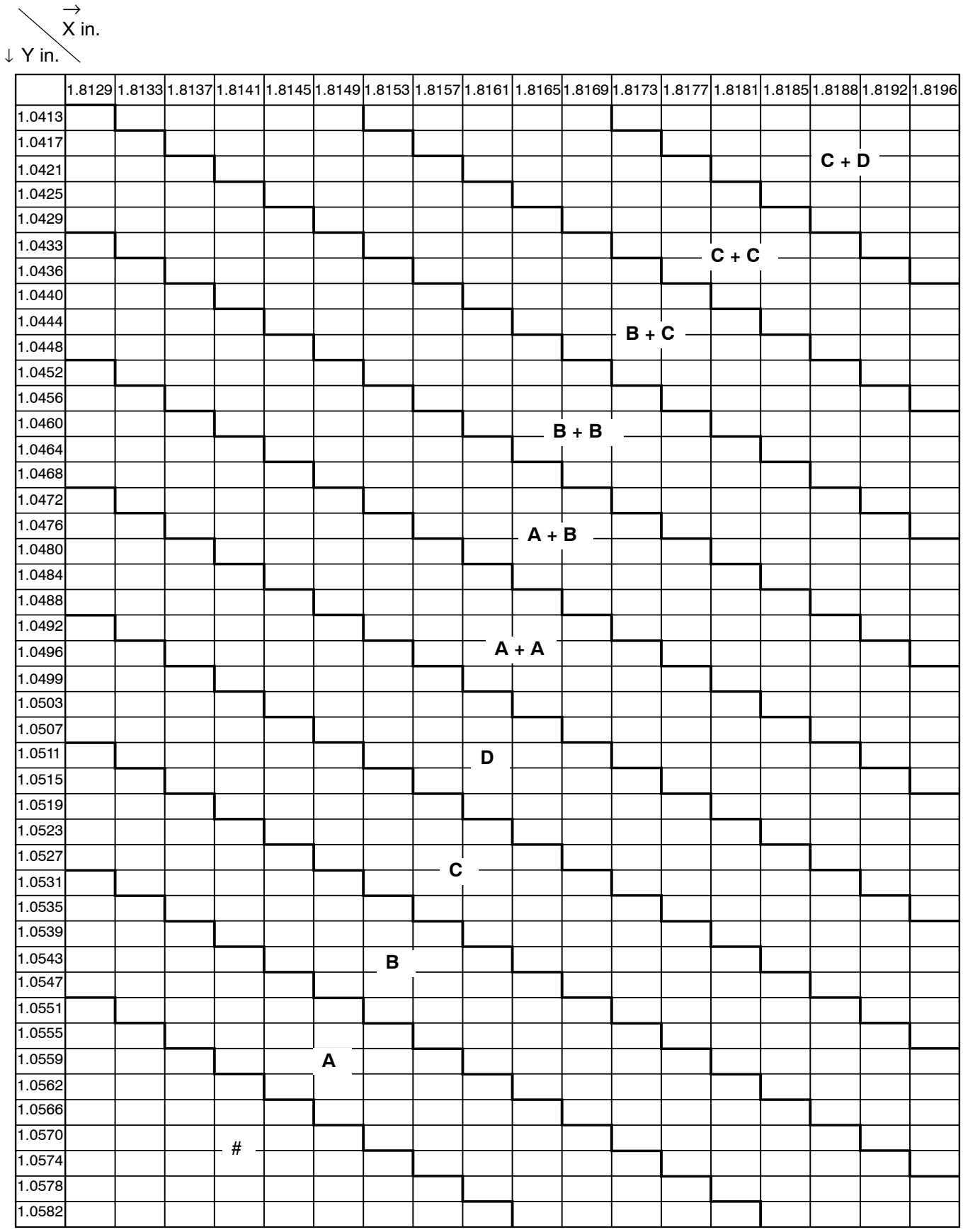

#: Reassemble another type shim or check the backlash after assembling A shim.

F05260

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Adjust shim thickness

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
A	0.20 (0.0079)	C	0.30 (0.0118)
B	0.25 (0.0098)	D	0.35 (0.0138)

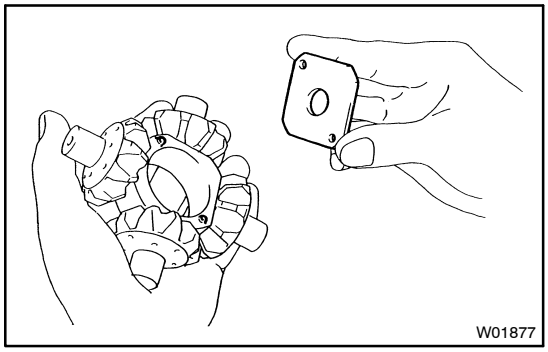
2. CHECK SIDE GEAR BACKLASH

(a) Install the thrust washers, clutch plates and adjusting shim to side gear.

HINT:

Install the adjusting shim with its surface having no oil groove facing to the differential case side.

(b) Install the side gear assembly to the differential case.



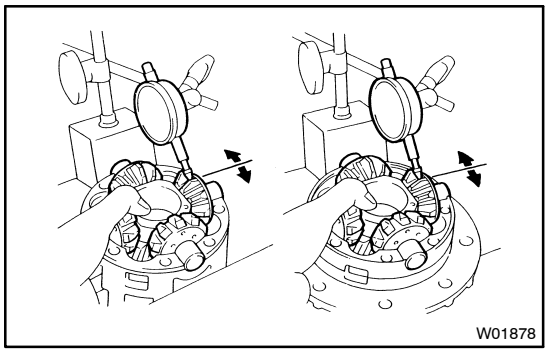
(c) Install the 4 pinion gears and thrust washers to the spider.

(d) Align the spring retainer holes with the straight pins and install the retainer.

(e) Install the spider assembly to the differential case.

HINT:

Install the spider to the differential case tightly and do not move the spring retainer.



(f) Using a dial indicator, measure the side gear backlash while holding the side gear and spider.

Backlash: 0.02 – 0.15 mm (0.0008 – 0.0059 in.)

HINT:

- Measure at all 4 locations.
- Measure the backlash at the LH and RH differential cases.

If the backlash is not within the specification, select the adjusting shim.

3. ASSEMBLE DIFFERENTIAL CASE

(a) Reinstall the spider assembly to the LH differential case.

HINT:

Install the spider to the LH differential case tightly and do not move the spring retainer.

(b) Install the compression spring and RH spring retainer.

(c) Install the RH side gear assembly.

(d) Align the matchmarks and assemble the LH and RH differential cases.

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HINT:

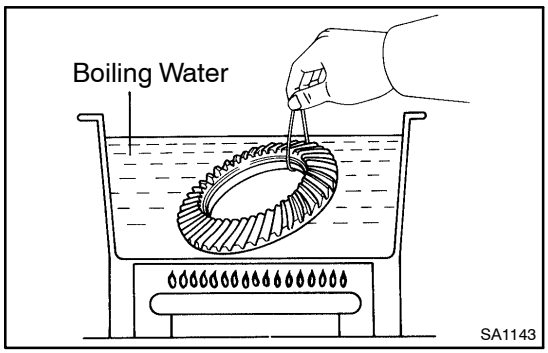
- Be careful not to drop the side gear.
- Check the pinion and side gear alignment.

(e) Tighten the 8 bolts uniformly, a little at a time.
Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)

4. INSTALL RING GEAR ON DIFFERENTIAL CASE

(a) Clean the threads of the bolts and differential case with the white gasoline.

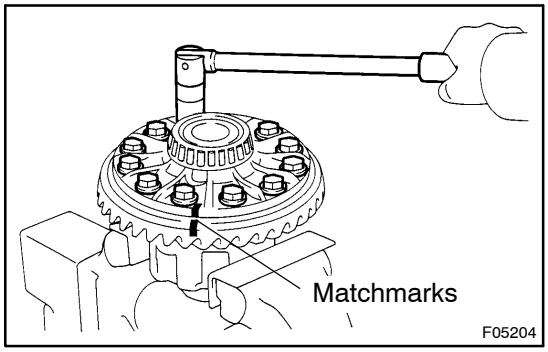
(b) Clean the contact surfaces of the differential case and ring gear.



(c) Heat the ring gear to about 100 °C (212 °F) in boiling water.

(d) Carefully take the ring gear out of the boiling water.

(e) After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.



(f) Align the matchmarks on the ring gear and differential case.

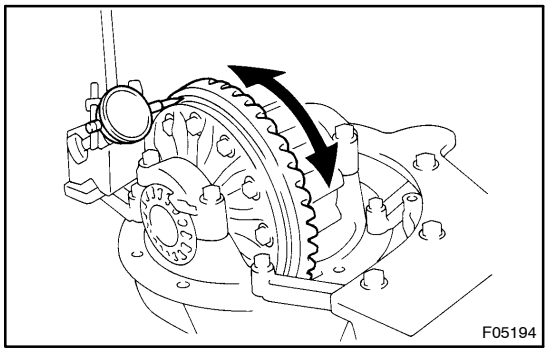
(g) Temporarily install the 12 set bolts.

(h) After the ring gear has cooled down enough, torque the 12 set bolts to which thread lock has been applied.
Thread lock:
Part No. 08833–00100, THREE BOND 1360K or equivalent
Torque: 137 N·m (1,400 kgf·cm, 101 ft·lbf)

5. CHECK RING GEAR RUNOUT

(a) Place the bearing outer races on their respective bearings. Check that the left and right outer races are not interchanged.

(b) Install the differential case onto the carrier and tighten the adjusting nut just to where there is no play in the bearings.



(c) Using a dial indicator, measure the ring gear runout.
Maximum runout: 0.04 mm (0.0016 in.)

(d) Remove the differential case.

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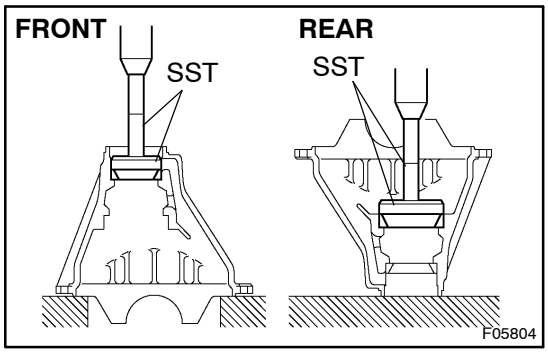


6. INSTALL DRIVE PINION FRONT AND REAR BEARING OUTER RACE

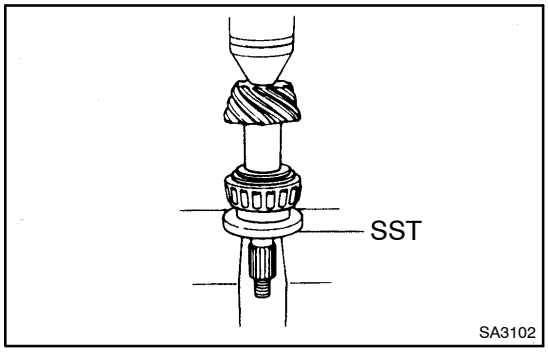
(a) Using SST and a press, install the front bearing outer race.
SST 09950–60020 (09951–00710)
09950–70010 (09951–07150)

(b) Using SST and a press, install the rear bearing outer race.
SST 09950–60020 (09951–00890),
09950–70010 (09951–07150)

7. INSTALL DRIVE PINION REAR BEARING

(a) Install the washer on the drive pinion.

HINT:
First fit a washer with the same thickness as the washer which was removed, then after checking the tooth contact pattern, replace the washer with one of a different thickness if necessary.



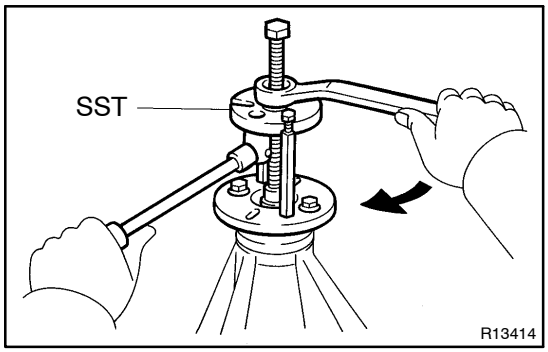
(b) Using SST and a press, install the rear bearing onto the drive pinion.
SST 09506–35010

8. TEMPORARILY ADJUST DRIVE PINION PRELOAD

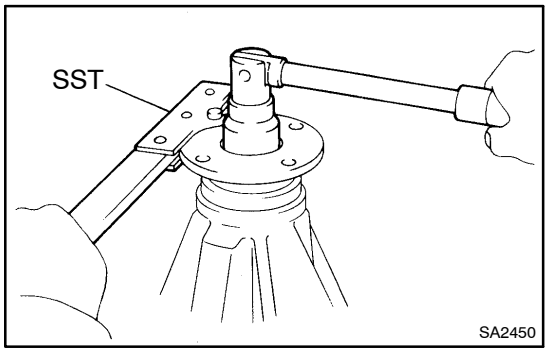
(a) Install the drive pinion and front bearing.

HINT:
Assemble the spacer and oil seal after adjusting the gear contact pattern.

(b) Install the oil slinger.



(c) Install the companion flange with SST.
SST 09950–30010, (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03040)



(d) Using SST to hold the flange and adjust the drive pinion preload by tightening the companion flange nut.
SST 09330–00021

NOTICE:

- **Coat the nut and screw of the drive pinon with gear oil.**
- **As there is no spacer, tighten the nut a little at a time, being careful not to overtighten.**

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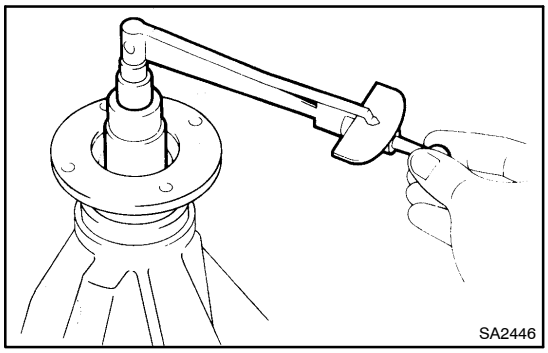


(e) Using a torque wrench, measure the preload.
Preload (at starting):
New bearing
1.3 – 1.8 N·m (13 – 19 kgf·cm, 11.3 – 16.4 in.·lbf)
Reused bearing
0.64 – 0.92 N·m (6.5 – 9.4 kgf·cm, 5.6 – 8.2 in.·lbf)

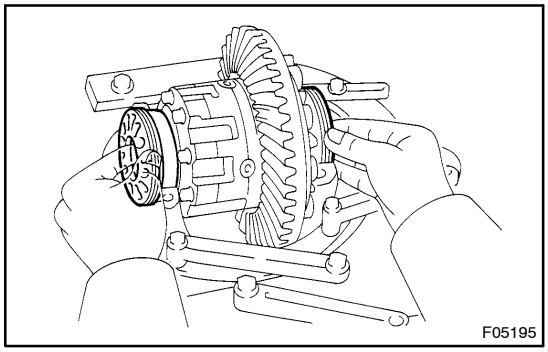
HINT:
Measure the total preload after turning the bearing clockwise and counterclockwise several times to make the bearing smooth.

9. INSTALL DIFFERENTIAL CASE IN CARRIER

(a) Place the 2 bearing races on their respective bearings. Make sure that the left and right outer races are not interchanged.

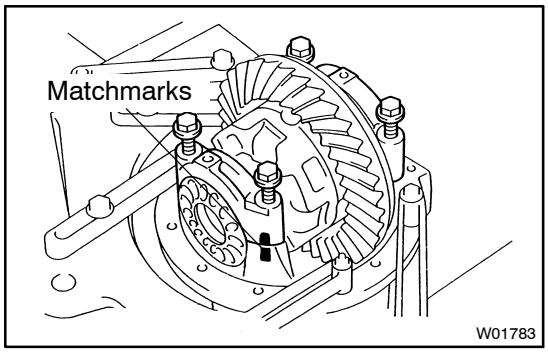
(b) Install the differential in the carrier.

HINT:
Make sure that there is backlash between the ring gear and drive pinion.



10. INSTALL ADJUSTING NUTS

Install the 2 adjusting nuts on the carrier, making sure the nuts are engaged properly.



11. INSTALL BEARING CAPS

Align the matchmarks on the bearing cap and carrier. Screw in the 2 bearing cap bolts 2 or 3 turns and press down the bearing cap by hand.

HINT:
If the bearing cap does not fit tightly on the carrier, the adjusting nuts are not engaged properly. Reinstall the adjusting nuts if necessary.

12. ADJUST SIDE BEARING PRELOAD

(a) Torque the 4 bolts.
Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)

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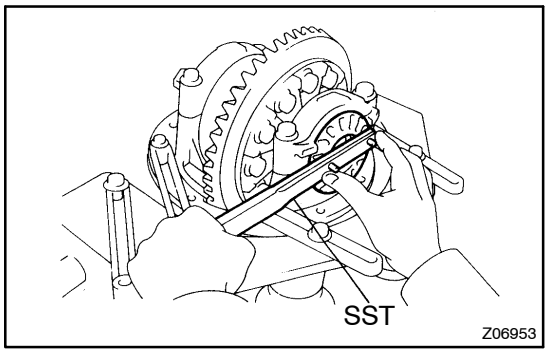
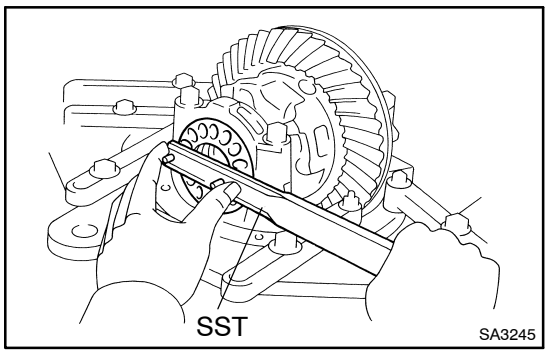
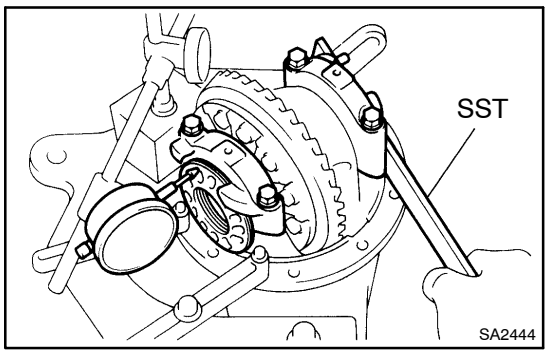


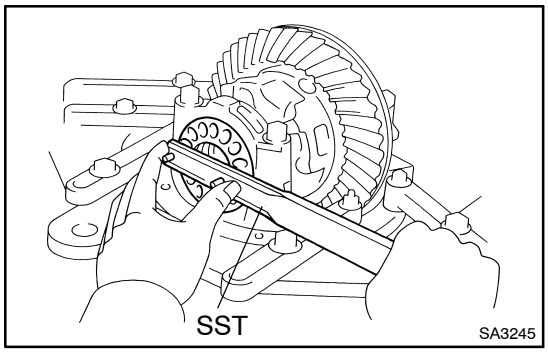
(b) Then loosen them to the point where the adjusting nuts can be turned by SST.
SST 09504–00011
(c) Fully tighten the 4 bolts by hand.
(d) Using SST, torque the adjusting nut on the ring gear side until the ring gear has a backlash of about 0.2 mm (0.008 in.).



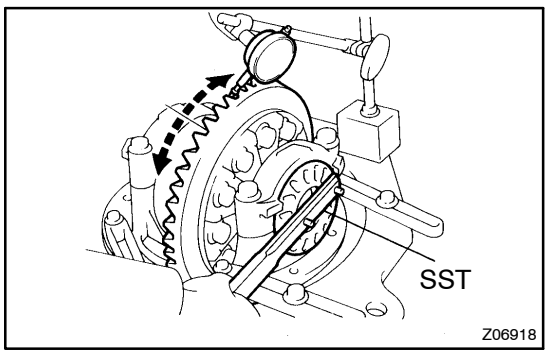
(e) While turning the ring gear, use the SST to fully tighten the adjusting nut on the drive pinion side. After the bearings are settled, loosen the adjusting nut on the drive pinion side.



(f) Place a dial indicator on the top of the adjusting nut on the ring gear side.
(g) Adjust the side bearing to zero preload by tightening the other adjusting nut until the pointer on the indicator begins to move.



(h) Using SST, torque the adjusting nut 1 – 1.5 notches from the zero preload position.



(i) Using a dial indicator, adjust the ring gear backlash until it is within the specification.
Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)

HINT:
The backlash is adjusted by turning the left and right adjusting nuts equal amounts. For example, loosen the nut on the left side 1 notch and torque the nut on the right side 1 notch.

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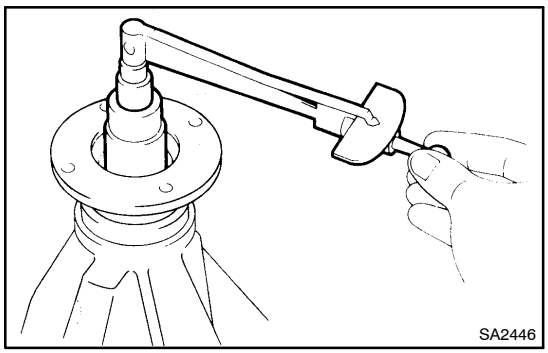
(j) Torque the 4 bolts.
Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)

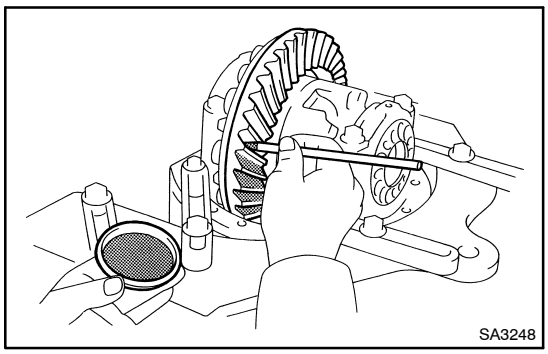
(k) After rotating the ring gear 5 turns or more, recheck the ring gear backlash.
Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)



13. MEASURE TOTAL PRELOAD

Using a torque wrench, measure the preload with the teeth of the drive pinion and ring gear in contact.

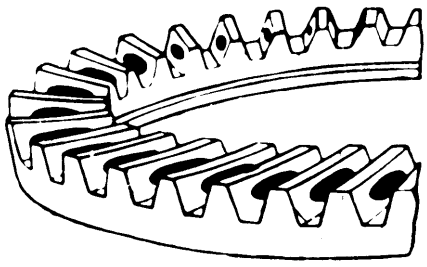
Preload (at starting):
Drive pinion preload plus
0.38 – 0.63 N·m (3.9 – 6.5 kgf·cm, 3.4 – 5.6 in.·lbf)



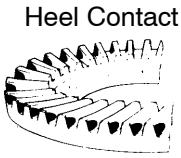
14. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

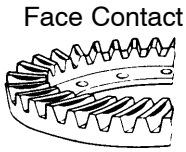
(a) Coat 3 or 4 teeth at 3 different positions on the ring gear with red lead primer.

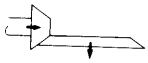
(b) Turn the companion flange, and pin to both directions to inspect the ring gear for proper tooth contact.



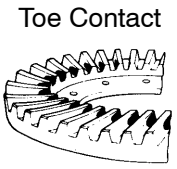
Proper Contact

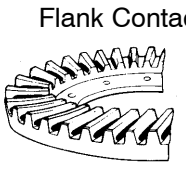


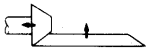




Select an adjusting shim that will bring the drive pinion closer to the gear.







Select an adjusting shim that will shift the drive pinion gear away from the ring gear.

R02495

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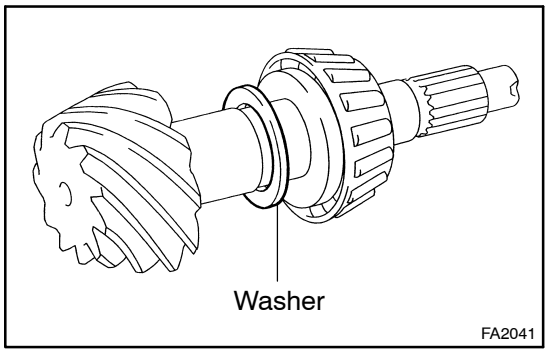
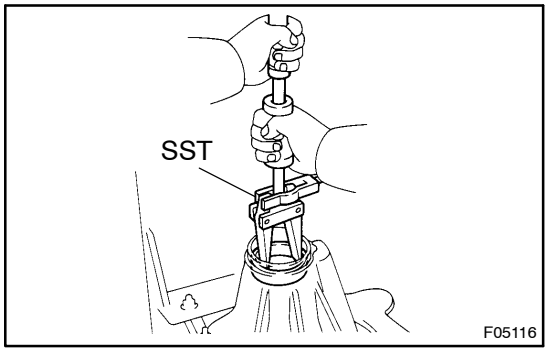


If the teeth are not contacting properly, use the following chart to select a proper washer for correction.

Thickness mm (in.)	Thickness mm (in.)
1.050 (0.04134)	1.325 (0.05217)
1.075 (0.04232)	1.350 (0.05315)
1.100 (0.04331)	1.375 (0.05413)
1.125 (0.04429)	1.400 (0.05512)
1.150 (0.04528)	1.425 (0.05610)
1.175 (0.04626)	1.450 (0.05709)
1.200 (0.04724)	1.475 (0.05807)
1.225 (0.04823)	1.500 (0.05906)
1.250 (0.04921)	1.525 (0.06004)
1.275 (0.05020)	1.550 (0.06102)
1.300 (0.05118)	–

15. REMOVE COMPANION FLANGE (See page SA–140)

16. REMOVE OIL SLINGER AND FRONT BEARING (See page SA–140)

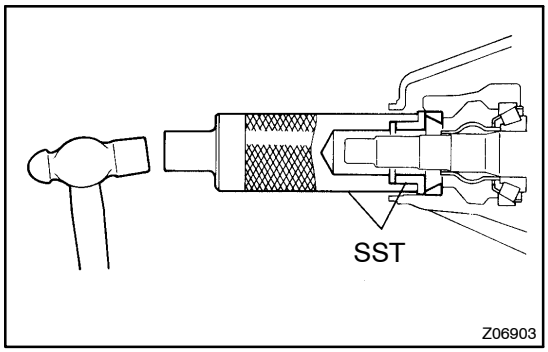


17. REMOVE BEARING OUTER RACE

Using SST, remove the bearing outer race.

SST 09308–00010

18. INSTALL NEW BEARING SPACER



19. INSTALL BEARING OUTER RACE

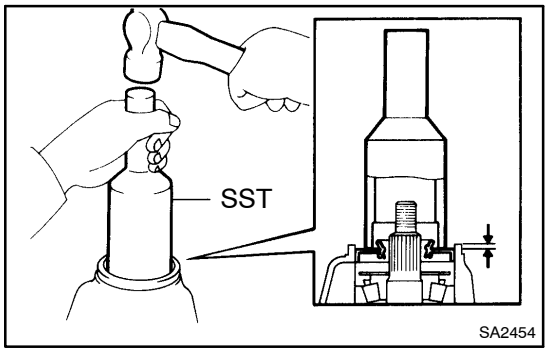
Using SST and a hammer, install the bearing outer race.

SST 09316–60011 (09316–00011, 09316–00021)

20. INSTALL FRONT BEARING AND OIL SLINGER

21. INSTALL OIL SEAL

(a) Coat the hypoid gear oil to a new oil seal periphery.



(b) Using SST and a hammer, install a new oil seal, as shown.

SST 09214–76011

Oil seal driven in depth: 0.5 mm (0.020 in.)

(c) Coat MP grease to the oil seal lip.

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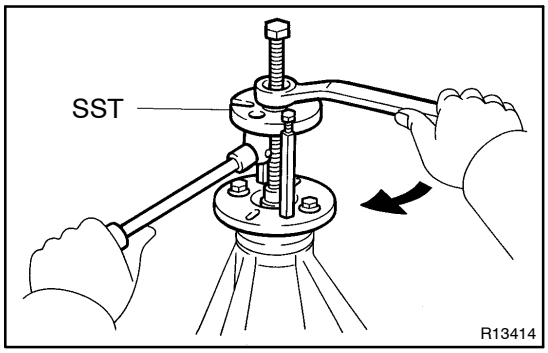


22. INSTALL COMPANION FLANGE

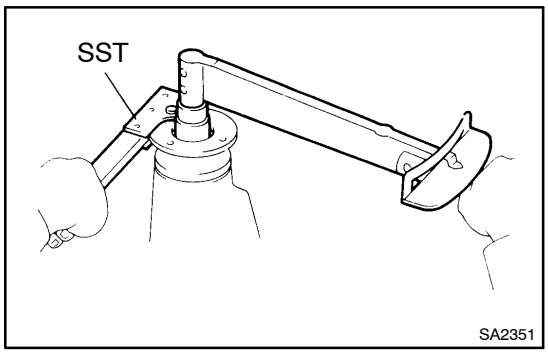
(a) Install the companion flange with SST.

SST 09950–30010 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03040)

(b) Install a new nut.

HINT:

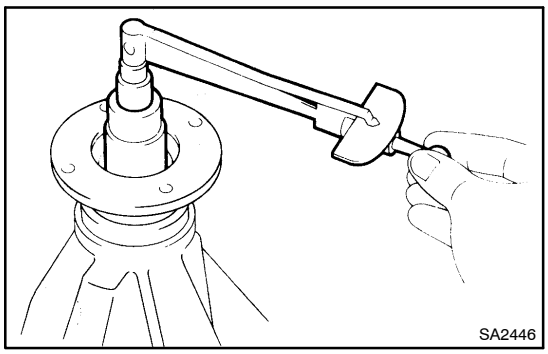
Coat the threads of a new nut with gear oil.



(c) Using SST to hold the flange, tighten the nut.

SST 09330–00021

Torque: 245 N·m (2,500 kgf·cm, 181 ft·lbf)



23. ADJUST DRIVE PINION PRELOAD

Using a torque wrench, measure the preload of the backlash between the drive pinion and ring gear.

Preload (at starting):

New bearing

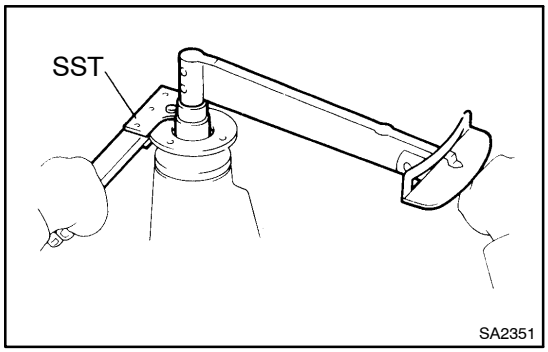
1.3 – 1.8 N·m (13 – 19 kgf·cm, 11.3 – 16.4 in.·lbf)

Reused bearing

0.64 – 0.92 N·m (6.5 – 9.4 kgf·cm, 5.6 – 8.2 in.·lbf)

If the preload is greater than the specification, replace the bearing spacer.

If the preload is less than the specification, retighten the nut with a force of 13 N·m (130 kgf·cm, 9 ft·lbf) at a time until the specified preload is reached.



SST 09330–00021

Torque: 441 N·m (4,500 kgf·cm, 326 ft·lbf) or less

If the maximum torque is exceeded while retightening the nut, replace the bearing spacer and repeat the preload procedure. Do not loosen the pinion nut to reduce the preload.

24. RECHECK RING GEAR BACKLASH
(See page SA–140)

25. RECHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page SA–147)

26. CHECK RUNOUT OF COMPANION FLANGE
(See page SA–140)

27. STAKE DRIVE PINION NUT

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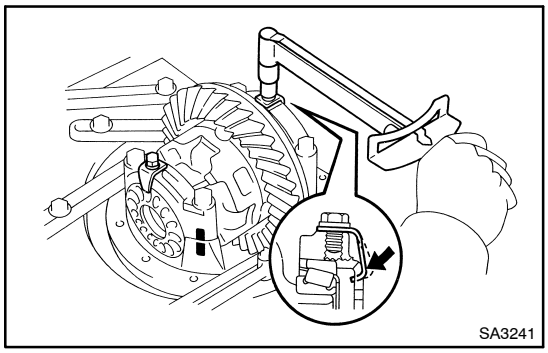

28. INSTALL ADJUSTING NUT LOCKS

(a) Install 2 new nut locks on the bearing caps.

(b) After tightening 2 bolts, bend the nut locks.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

29. REMOVE DIFFERENTIAL CARRIER FROM OVERHAUL STAND ETC.

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SA164–01

INSTALLATION

Installation is in the reverse order of removal (See page SA–138).
AFTER INSTALLATION, FILL DIFFERENTIAL WITH HYPOID GEAR OIL FOR LSD (See page SA–92)

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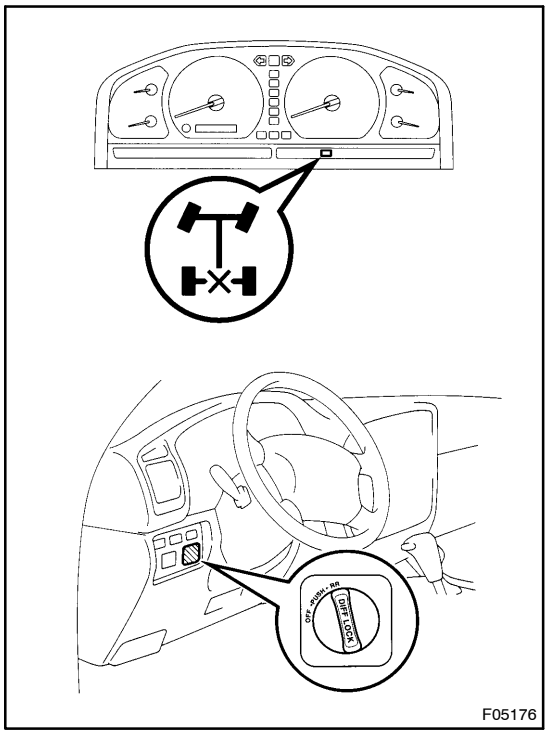


DIFFERENTIAL LOCKING SYSTEM

SA165–01

ON–VEHICLE INSPECTION

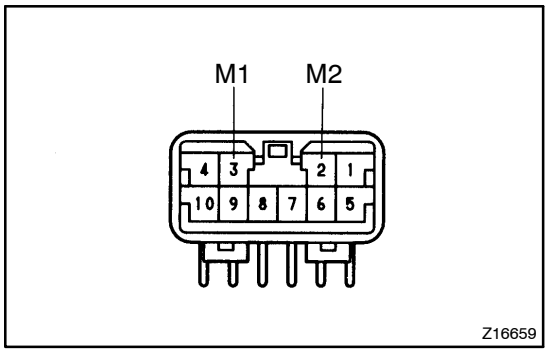
1. INSPECT DIFFERENTIAL LOCK SYSTEM

(a) Inspect the indicator light.
Check that the indicator light lights up for approx. 1 second when the ignition switch is turned ON.

(b) Inspect the differential lock operation.
(1) Jack up the vehicle then start the engine.
(2) Push the center differential lock switch.
(3) When the Diff. lock control switch is set to the RR position, the indicator light is turned on.
Differential lock is applied to the rear wheel at this time.

HINT:
If the gears of the differential lock system are not meshed, the indicator light remains blinking, so rotate the tires to mesh the gear.

(4) When the Diff. lock control switch is at the OFF position, the indicator light goes off.
Differential lock is released for the rear wheel at this time.



(5) Check the voltage between the terminals of the 4WD control ECU when switching the Diff. lock control switch with the speedometer, registering approx. 8 km/h (5 mph) or more.

Swith position	Terminal	Specified value
ON	M1 – M2	0.5 V or less (No change)

(6) Check that the indicator lights blink when 2WD mode is set.
Diff. lock is released for both the rear wheels at this time.
(7) Return the Diff. lock control switch to OFF.
(8) Stop the engine and lower the vehicle.

2. INSPECT DIFF. LOCK SYSTEM CIRCUIT

(a) Inspect the battery positive voltage.
Battery positive voltage: 10 – 14 V

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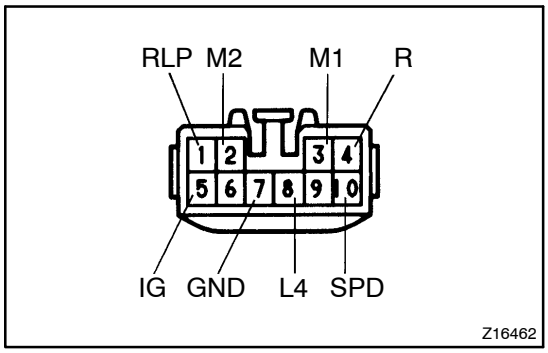

(b) Inspect the system circuit with the connector disconnected.
Disconnect the connector from the 4WD control ECU and inspect the connector on the wire harness side, as shown in the chart.

Symbols (Terminals No.)	Trouble part	Condition	Specified value
M1 – M2	RR Differntial Lock Actuator	–	Less than 100 Ω
GND – Body ground	Body ground	–	Continuity
SPD – Body ground	Speed sensor	Vehicle moves slowly	1 pulse each 40 cm (15.75 in.)
IG – Body ground	DIFF Fuse	Ignition switch ON	10 – 14 V
RLP – Body ground	Rear Differential Lock Indicator Switch	Ignition switch ON with indicator light ON	About 0 V
		Ignition switch ON with indicator light OFF	10 – 14 V
L4 – Body ground	L4 position Switch	Ignition switch ON with T/F lever except L4	About 0 V
		Ignition switch ON with T/F lever L4	10 – 14 V
R – Body ground	Differential Lock Control Switch	Ignition switch ON with differential lock control switch ON	10 – 14 V
		Ignition switch ON with differential lock control switch OFF	About 0 V

HINT:
If the circuit is not as specified, check and repair or replace the trouble part shown in the table above.

(c) Inspect the system circuit with the connector connected.
(1) Turn the ignition switch to the ON position.
(2) Keep the center Diff. lock condition.
(3) Remove the Diff. lock ECU.

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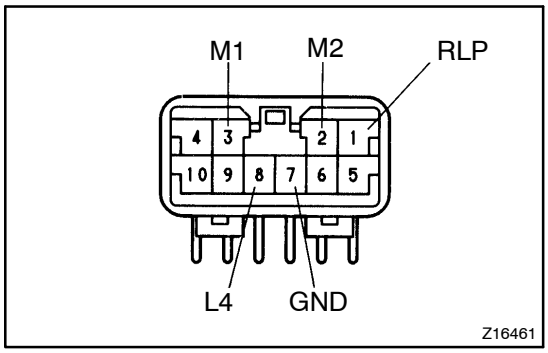
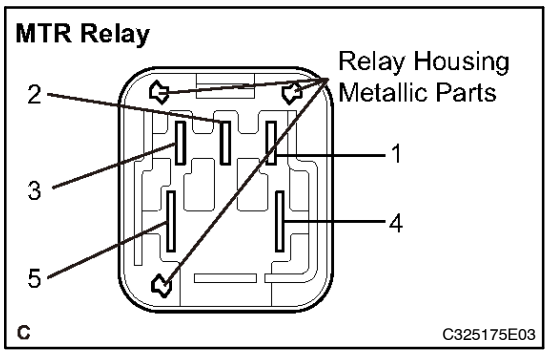


(4) Using a voltmeter, measure the voltage when the differential lock control switch is in the position, as shown below.

Tester Connection ⊕ – ⊖	Switch position	Specified valve
L4 – GND	T/F lever L4	10 – 14 V
RLP – GND	ON	0.5 V or less → 10 – 14 V (Approx. 1 sec.) → 0.5 V or less
M1 – M2	OFF → RR	
M2 – M1	RR → OFF	

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

(5) Install the ECU in place.



3. INSPECT DIFF. LOCK COMPONENTS

(a) Inspect the relay operation.

(1) Jack up the vehicle.

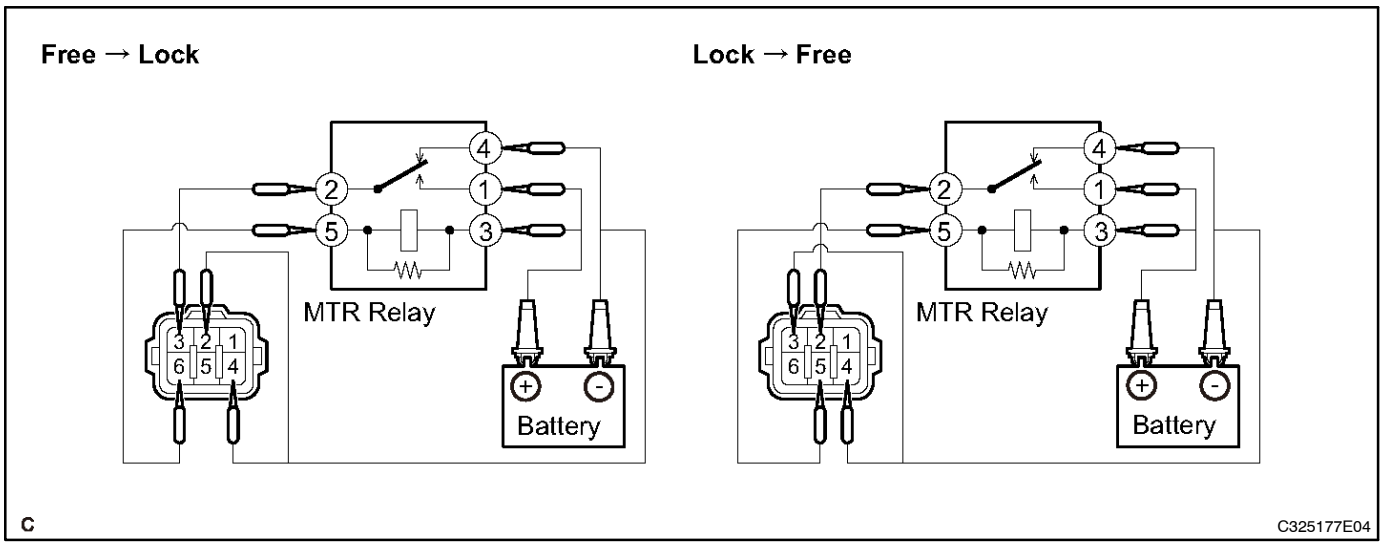
(2) Use a MTR relay and connect it, as shown below.

NOTICE:

Connect the terminals being careful not to touch the neighboring terminals or metallic parts of the relay housing.

(3) Rotate the tire and check that differential lock has occurred.

If operation is not as specified, replace the actuator.



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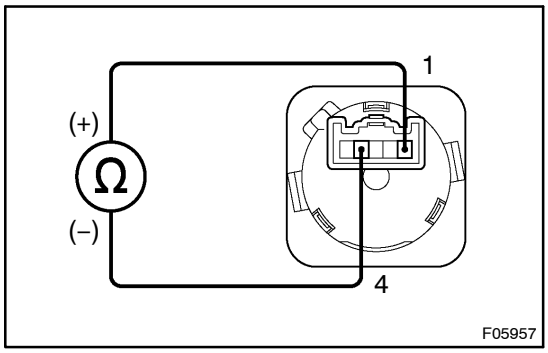
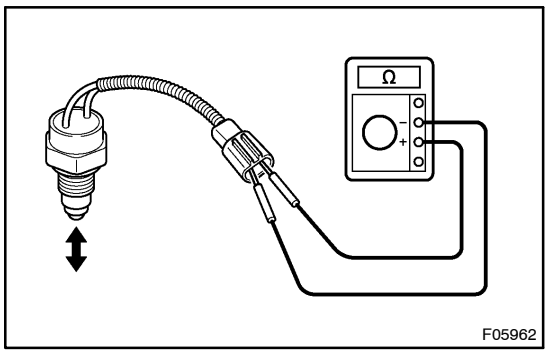


(b) Inspect the Diff. lock control switch continuity.
Inspect the switch continuity between terminal 1 to terminal 4.

HINT:
If continuity does not exist, replace the switch.



(c) Inspect the Diff. lock indicator switch.
(1) Check that continuity between exists terminals when the switch is pushed (differential connected position).
(2) Check that no continuity exists when the switch is free (differential disconnected position).

HINT:
If operation is not as specified, replace the switch.

(d) Inspect the center diff. lock position switch (See page TR–48).

(e) Inspect the vehicle speed sensor (See page BE–57).

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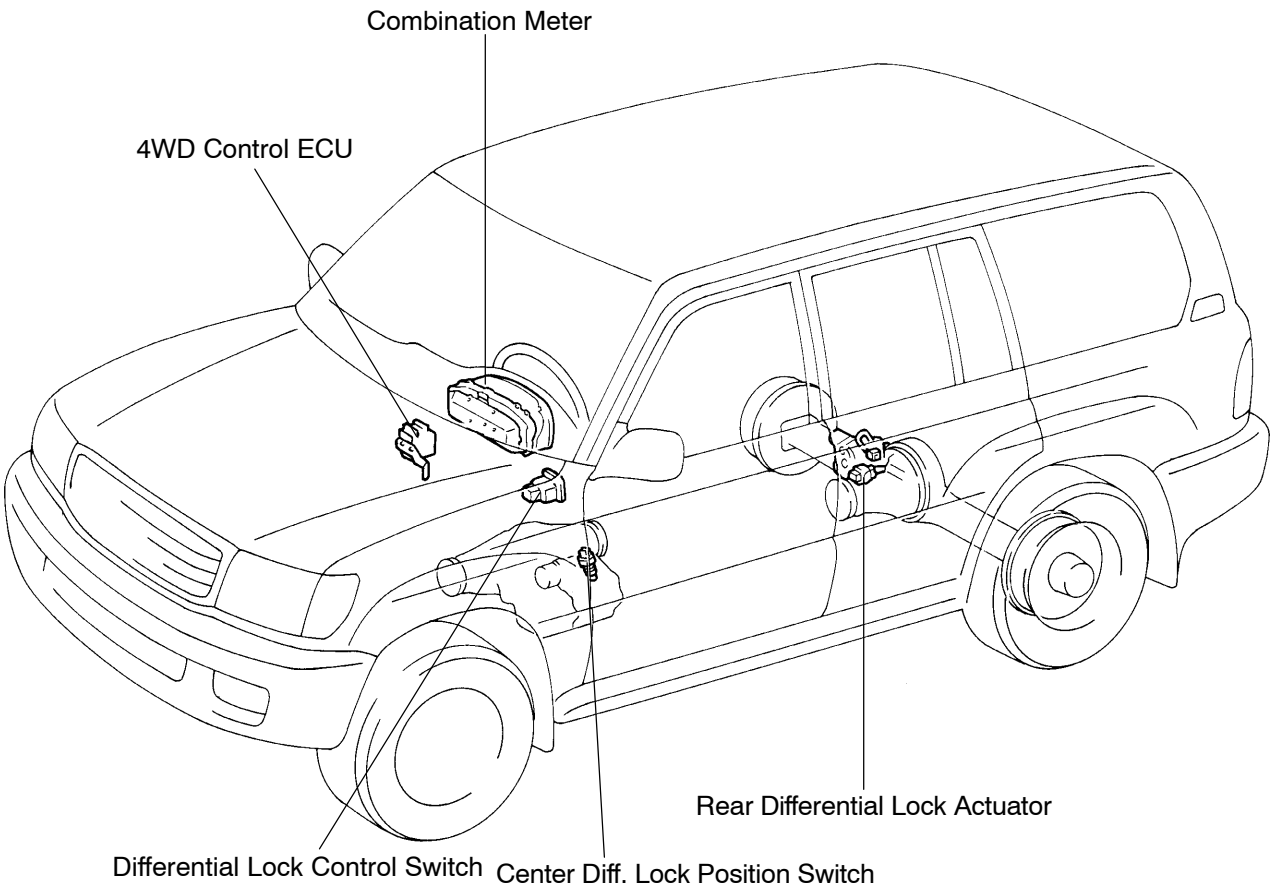
SA166–01

LOCATION



F05174

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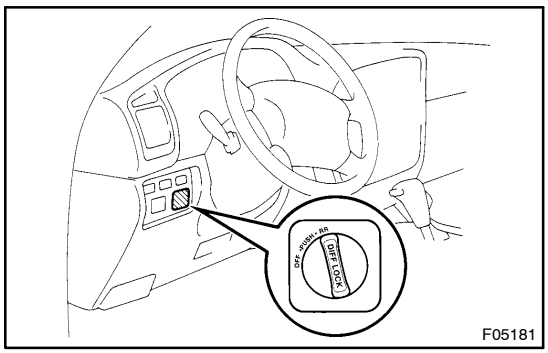
SA167–01

REMOVAL

1. SHIFTING REAR DIFF. LOCK

(a) Turn the ignition switch to the ON position.

(b) Keep the center differential lock condition.



F05181

(c) Turn the differential lock control switch to the RR position and lock the rear differential.

HINT:

While rotating the tires, check they are in the differential lock condition.

(d) Disconnect the cable from the negative terminal of the battery.

2. REMOVE NO.1 ACTUATOR PROTECTOR

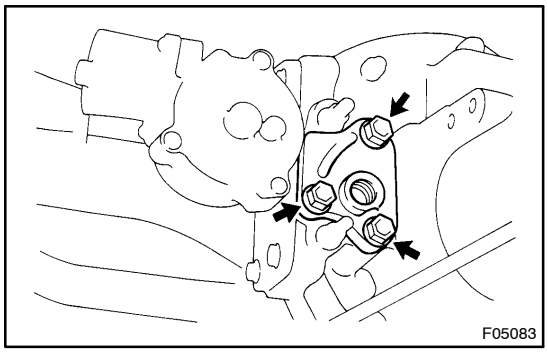
Remove the nut, bolt and No.1 actuator protector.

3. REMOVE NO.2 ACTUATOR PROTECTOR

Remove the 2 nuts and No.2 actuator protector.

4. DISCONNECT CONNECTORS AND TUBE

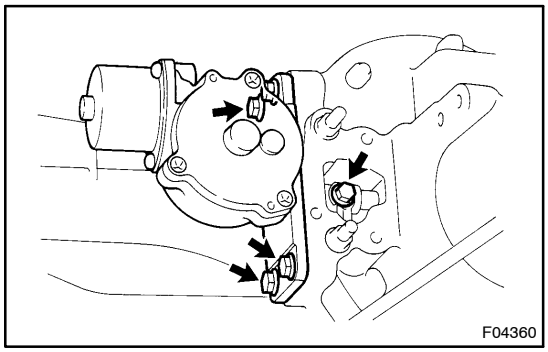
5. REMOVE REAR DIFF. LOCK POSITION SWITCH


F05083

6. REMOVE COVER

(a) Remove the 3 bolts.

(b) Using a brass bar and hammer, remove the cover.


F04360

7. REMOVE ACTUATOR

(a) Remove the shift fork set bolt.

(b) Remove the 4 bolts.

(c) Using a screwdriver, pry out the actuator.

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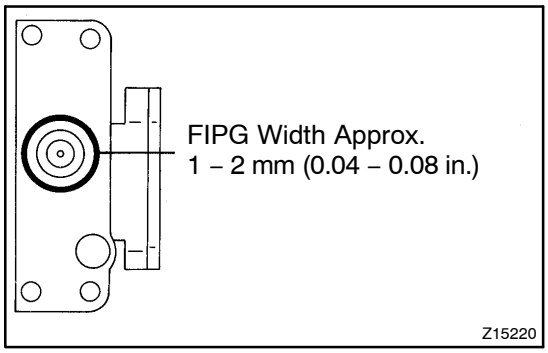
SA168–01



INSTALLATION

1. INSTALL ACTUATOR

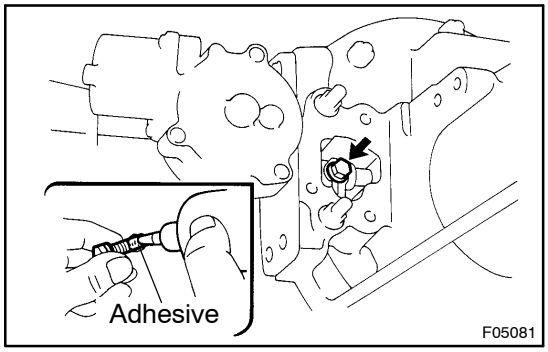
(a) Clean contacting surfaces of any FIPG material using gasoline or alcohol.

(b) Apply FIPG to the actuator.
FIPG:
Part No. 08826–00090, THREE BOND 1281
or equivalent

HINT:
Install the actuator within 10 minutes after applying FIPG.

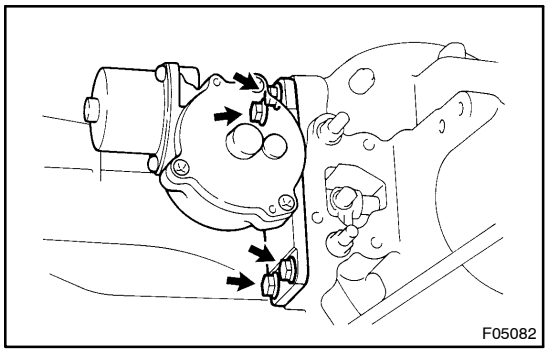
(c) Install the actuator to the differential and match the shaft with the shaft fork hole.

(d) Clean the threads of the set bolt and shaft fork with the white gasoline.

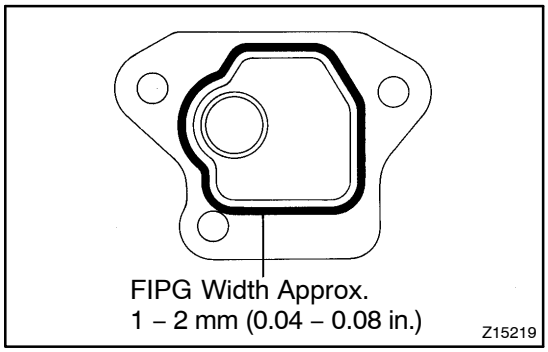


(e) Coat the threads of the set bolt with adhesive.
Adhesive:
Part No. 08833–00070, THREE BOND 1324
or equivalent

(f) Tighten the shift fork set bolt.
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)



(g) Tighten the 4 bolts uniformly, a little at time.
Torque: 24 N·m (240 kgf·cm, 17 ft·lbf)



2. INSTALL COVER

(a) Clean the contacting surfaces of any FIPG material using gasoline or alcohol.

(b) Apply FIPG to the cover.
FIPG:
Part No. 08826–00090, THREE BOND 1281
or equivalent

HINT:
Install the actuator within 10 minutes after applying FIPG.

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(c) Tighten the 3 bolts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

3. INSTALL REAR DIFF. LOCK POSITION SWITCH

Install the position switch with a new gasket.

Torque: 40 N·m (410 kgf·cm, 30 ft·lbf)

4. CONNECT CONNECTORS AND TUBE

HINT:

- The depth of the insertion of the bleeder tube into the hose is approx. 15 mm (0.59 in.).
- Take care that the water or the equivalent will not adhere to the connectors and hose.

5. INSTALL NO.2 ACTUATOR PROTECTOR

Install the No.2 actuator protector with 2 nuts.

Torque: 36 N·m (367 kgf·cm, 27 ft·lbf)

6. INSTALL NO.1 ACTUATOR PROTECTOR

Install the No.1 actuator protector with the nut and bolt.

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

7. CANCEL REAR DIFFERENTIAL LOCK

With the ignition switch ON, turn the differential lock control switch OFF to cancel the differential lock.

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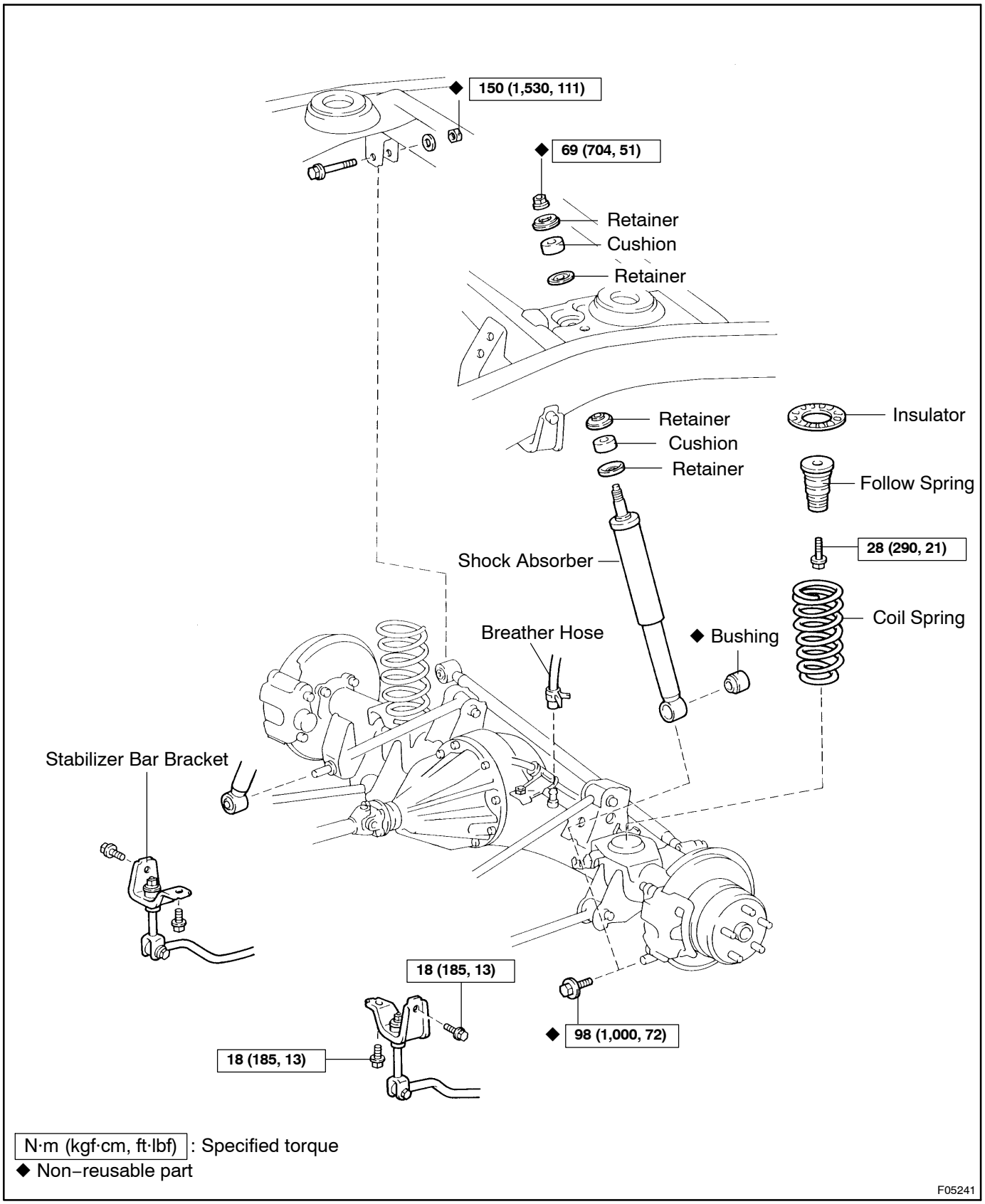
COIL SPRING AND REAR SHOCK ABSORBER

COMPONENTS

SA169–01



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

F05241

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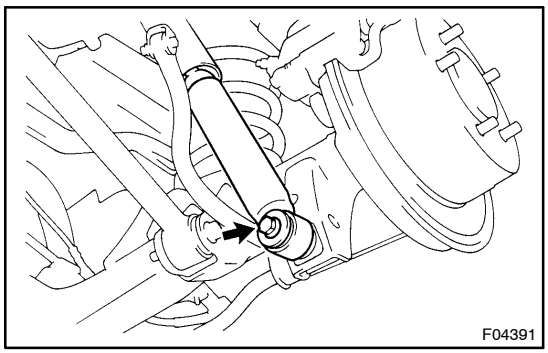
SA16A–01

REMOVAL

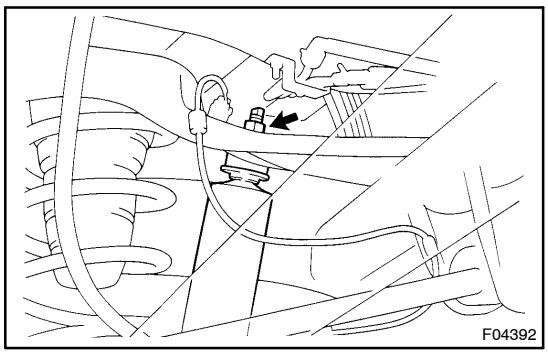
1. REMOVE REAR WHEELS
Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

2. SUPPORT REAR AXLE HOUSING WITH JACK



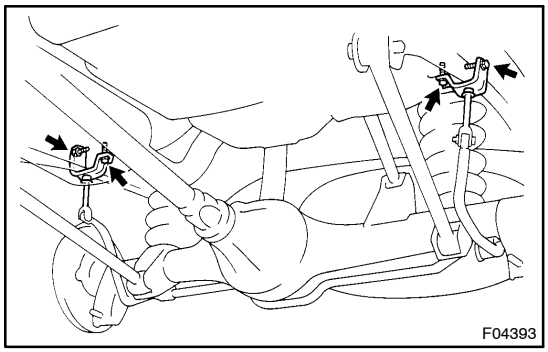
3. REMOVE SHOCK ABSORBER

(a) Remove the bolt and disconnect the shock absorber from the axle housing.
Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)



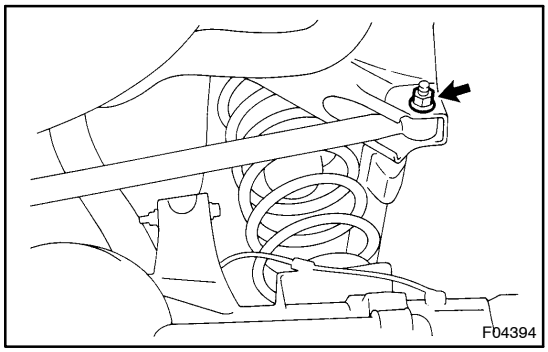
(b) While holding the piston rod, remove the nut, 2 retainers cushion and shock absorber.
Torque: 69 N·m (704 kgf·cm, 51 ft·lbf)

(c) Remove the 2 retainers and cushion from the shock absorber.



4. DISCONNECT LH AND RH STABILIZER BAR BRACKETS

Remove the 4 bolts and disconnect the LH and RH stabilizer bar brackets.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)



5. DISCONNECT LATERAL CONTROL ROD

Remove the nut, washer, bolt and disconnect the lateral control rod.
Torque: 150 N·m (1,530 kgf·cm, 111 ft·lbf)

HINT:
At the time of installation, after stabilizing the suspension, torque the nut and bolt.

6. DISCONNECT BREATHER HOSE

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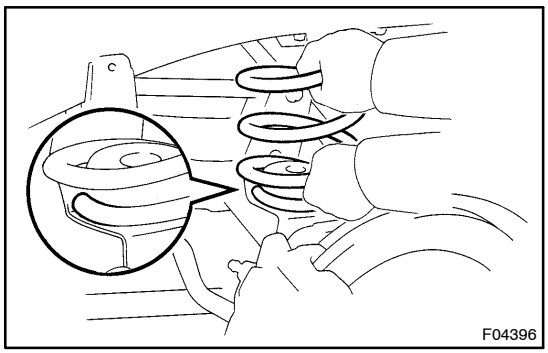
7. REMOVE COIL SPRING

(a) Begin to lower the axle housing.

NOTICE:

Be careful not to snap the brake line and parking brake cable.

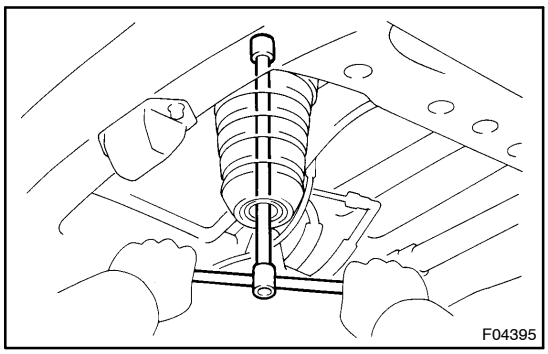


(b) While lowering the axle housing, remove the coil spring and insulator.

HINT:

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

- Check that the coil spring end is installed correctly.
- If the coil spring end is not in the correct position, reinstall the coil spring.



(c) Remove the bolt and follow spring from the frame.
Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)

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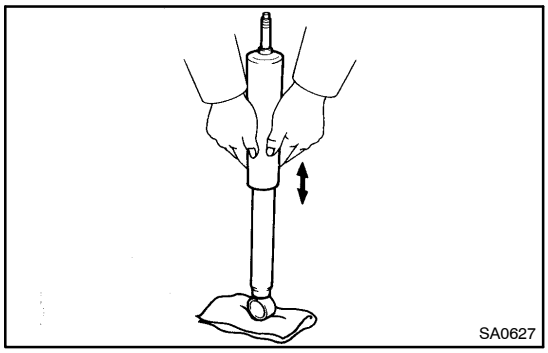
SA16B–01



INSPECTION

INSPECT SHOCK ABSORBER

Compress and extend the shock absorber rod and check that there is no abnormal resistance or unusual operation sounds. If there is any abnormality, replace the shock absorber with a new one.

NOTICE:

When disposing the shock absorber, see DISPOSAL on page SA–172.

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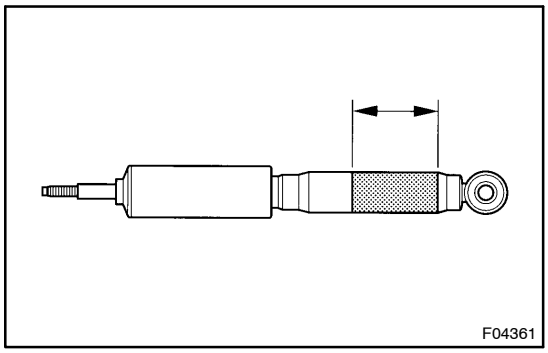
SA16C–01



DISPOSAL

DISCARD SHOCK ABSORBER

Before discarding the shock absorber, drill a hole of 2 – 3 mm (0.079 – 0.118 in.) in diameter at the location shown in the illustration to discharge the gas inside.

NOTICE:

- **When drilling, chips may fly out, work carefully.**
- **The gas is colorless, odorless and non–poisonous.**

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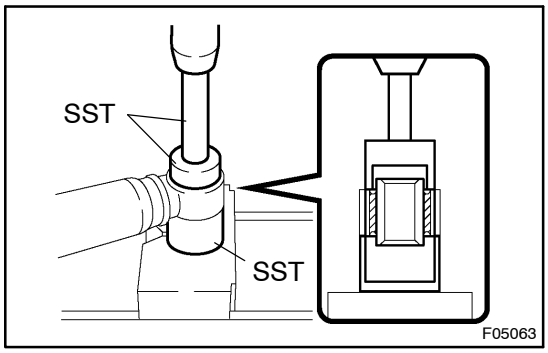
SA16D–01

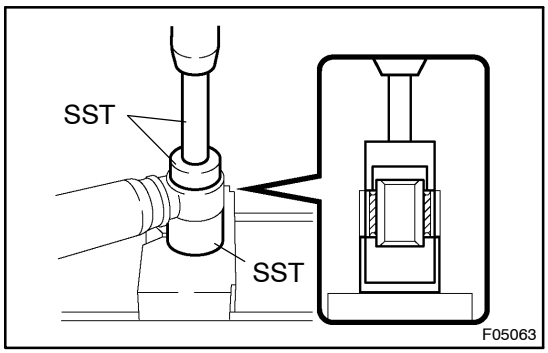


REPLACEMENT

1. REMOVE BUSHING

Using SST and a press, remove the bushing.

SST 09710–14013 (09710–00061),
09710–28012 (09710–07031),
09950–70010 (09951–07100)



2. INSTALL BUSHING

Using SST and a press, install a new bushing.

SST 09710–14013 (09710–00061),
09710–28012 (09710–07031),
09950–70010 (09951–07100)

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SA16E–01

INSTALLATION

Installation is in the reverse order of removal (See page SA–169).

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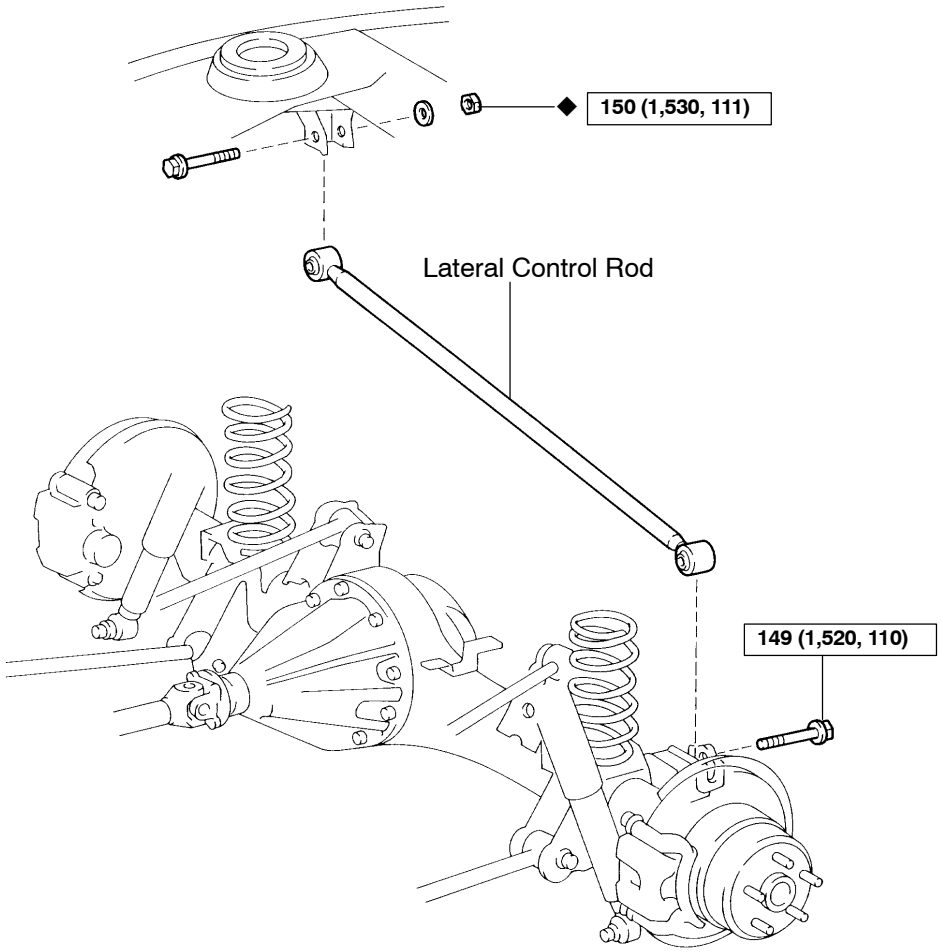
REAR LATERAL CONTROL ROD

COMPONENTS

SA16F–01



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

F05238

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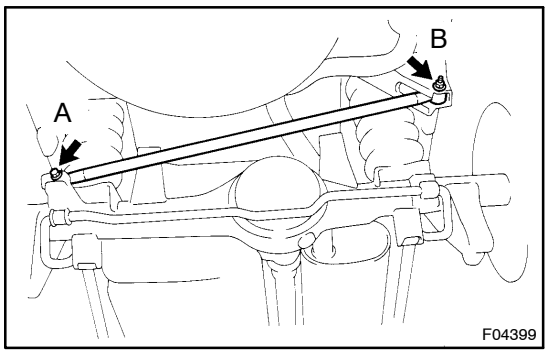
SA16G–01

REMOVAL

1. SUPPORT REAR AXLE HOUSING WITH JACK



2. REMOVE LATERAL CONTROL ROD

Remove the 2 bolts, nut, washer and lateral control rod.

Torque:

A: 149 N·m (1,520 kgf·cm, 110 ft·lbf)

B: 150 N·m (1,530 kgf·cm, 111 ft·lbf)

HINT:

At the time of installation, after stabilizing the suspension, torque the nut and bolt.

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SA16H–01

INSTALLATION

Installation is in the reverse order of removal (See page SA–176).

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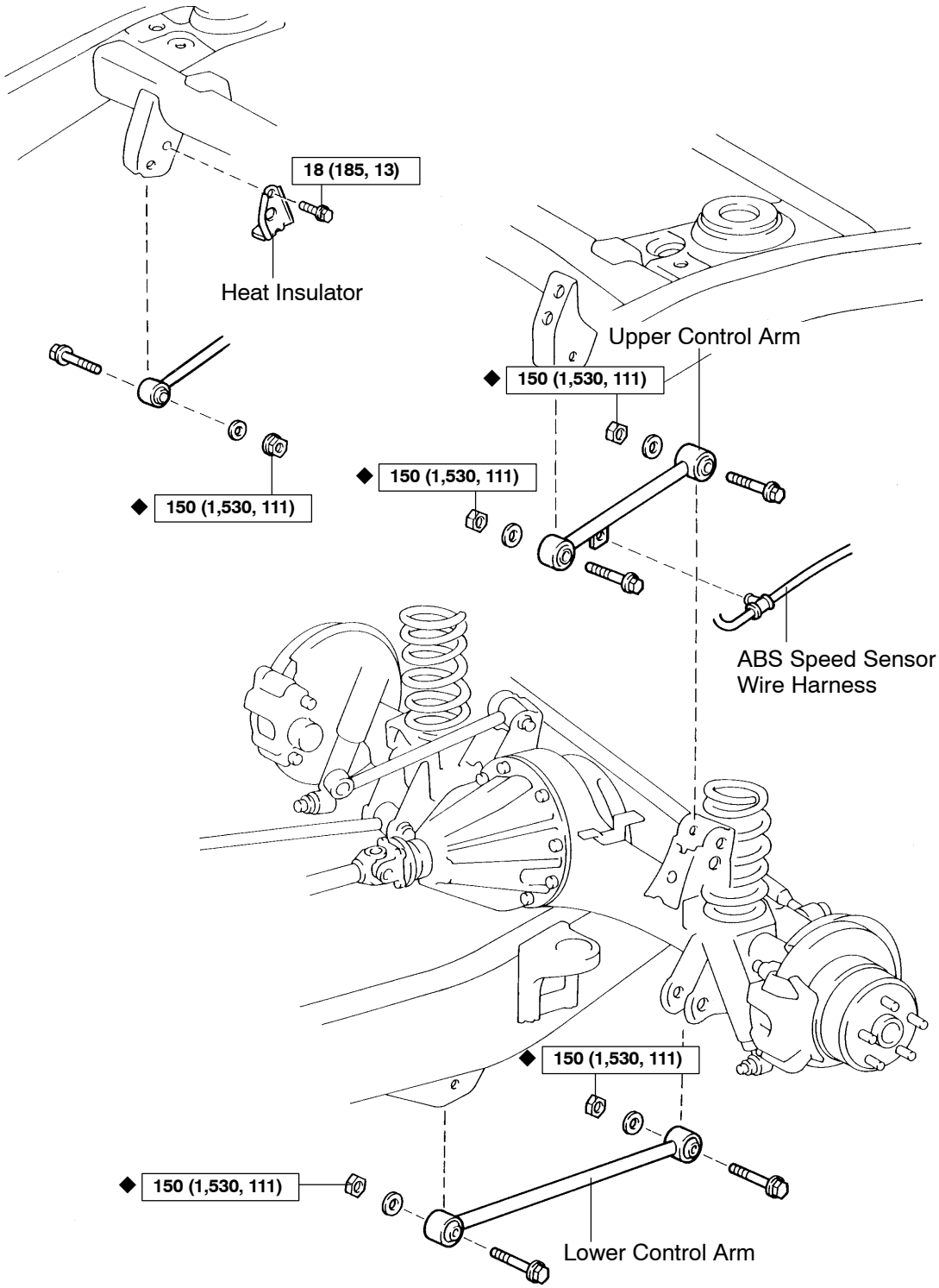
REAR UPPER AND LOWER CONTROL ARM

COMPONENTS

SA16I–01



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

◆ Non–reusable part

F05240

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SA16J–01

REMOVAL

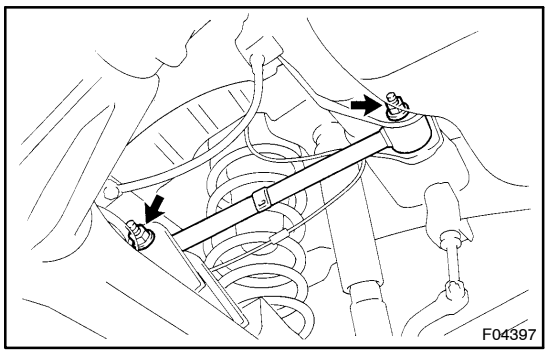
1. REMOVE REAR WHEEL
Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

2. SUPPORT REAR AXLE HOUSING WITH JACK

3. REMOVE UPPER CONTROL ARM

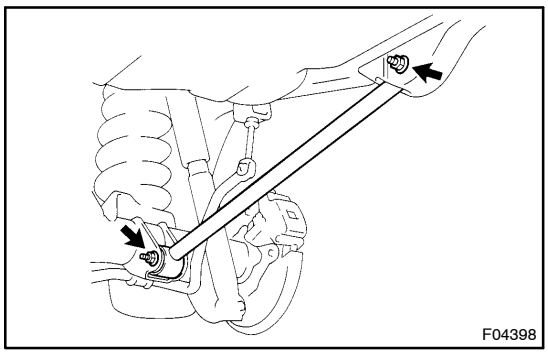
(a) Disconnect the ABS speed sensor wire harness.

(b) RH side:
Remove the bolt and heat insulator.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)



(c) Remove the 2 nuts, washers, bolts, heat insulator (RH side) and upper control arm.
Torque: 150 N·m (1,530 kgf·cm, 111 ft·lbf)

HINT:
At the time of installation, after stabilizing the suspension, torque the nuts.



4. REMOVE LOWER CONTROL ARM

Remove the 2 nuts, washers, bolts and lower control arm.
Torque: 150 N·m (1,530 kgf·cm, 111 ft·lbf)

HINT:
At the time of installation, after stabilizing the suspension, torque the nuts.

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SA16K–01

INSTALLATION

Installation is in the reverse order of removal (See page SA–179).

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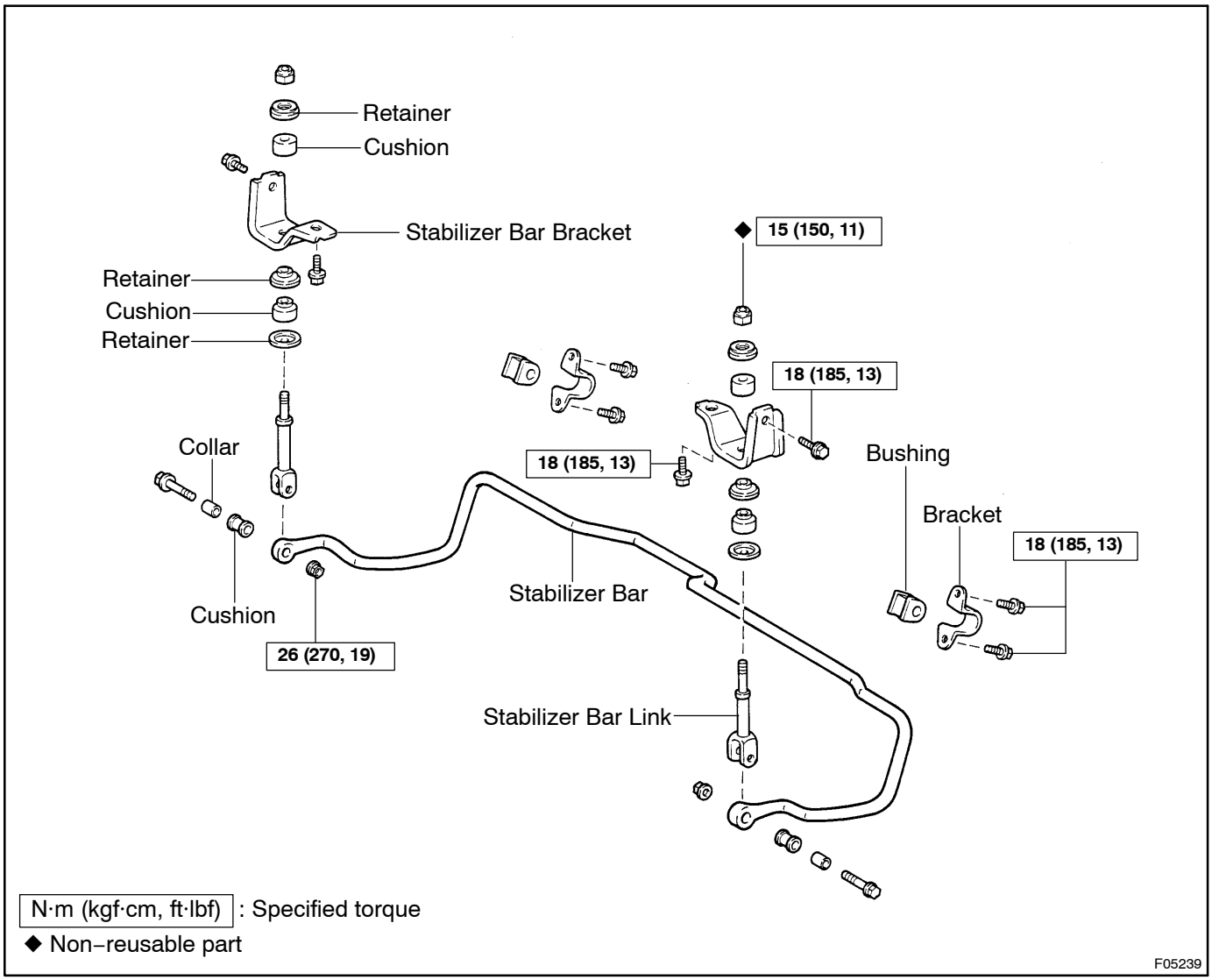
REAR STABILIZER BAR

COMPONENTS

SA16L–01



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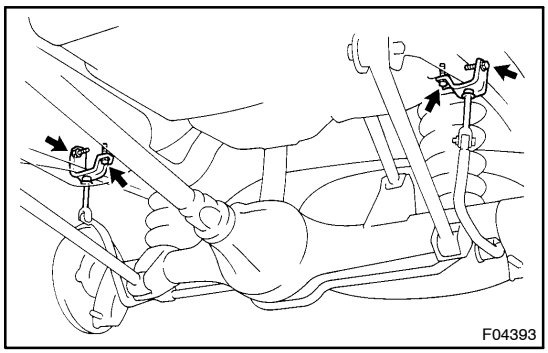
SA16M–01

REMOVAL

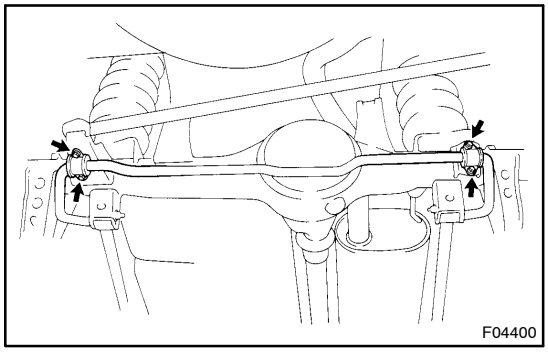
1. **REMOVE REAR WHEELS**
   Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)
2. **SUPPORT REAR AXLE HOUSING WITH JACK**



3. **DISCONNECT LH AND RH STABILIZER BAR BRACKETS**

Remove the 4 bolts and disconnect the LH and RH stabilizer bar brackets.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)



4. **REMOVE STABILIZER BAR**

(a) Remove the 4 bolts and stabilizer bar with bushings and brackets.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(b) Remove the 2 brackets and 2 bushings from the stabilizer bar.

5. **REMOVE BOTH STABILIZER BAR LINKS FROM STABILIZER BAR**

(a) Remove the 2 nuts, 6 retainers, 4 cushions and disconnect the stabilizer bar link from the bracket.
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

(b) Remove the 2 nuts, bolts and stabilizer bar links.
Torque: 26 N·m (270 kgf·cm, 19 ft·lbf)

(c) Remove the 2 collars and cushions.

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SA16N–01

INSTALLATION

Installation is in the reverse order of removal (See page SA–182).

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BRAKE SYSTEM

BR0J9–01

GENERAL DESCRIPTION

1. **Care must be taken to replace each part properly as it could affect the performance of the brake system and result in a driving hazard. Replace the parts with parts of the same part number or equivalent.**
2. **It is very important to keep parts and the area clean when repairing the brake system.**
3. **If the vehicle is equipped with a mobile communication system, refer to the precautions in the IN section.**

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TROUBLESHOOTING

PROBLEM SYMPTOMS TABLE

BR0JA–03

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

Symptom	Suspect Area	See page
Low pedal or spongy pedal	1. Fluid leaks for brake system	DI–305
	2. Air in brake system	BR–4
	3. Piston seals (Worn or damaged)	BR–15
		BR–23
	4. Hydraulic brake booster (Faulty)	BR–36
Brake drags	1. Brake pedal freeplay (Minimum)	BR–9
	2. Parking brake lever travel (Out of adjustment)	BR–11
	3. Parking brake wire (Sticking)	–
	4. Parking brake (Shoe clearance out of adjustment)	BR–34
	5. Pad (Cracked or distorted)	BR–12
		BR–21
	6. Piston (Stuck)	BR–15
		BR–23
	7. Piston (Frozen)	BR–15
		BR–23
	8. Tension or return spring (Faulty)	BR–29
	9. Hydraulic brake booster (Faulty)	BR–36
Brake pulls	1. Piston (Stuck)	BR–15
		BR–23
	2. Pad (Cracked or distorted)	BR–12
		BR–21
	3. Piston (Frozen)	BR–15
		BR–23
	4. Disc (Scored)	BR–15
		BR–23
	5. Pad (Cracked or distorted)	BR–12
		BR–21
	6. Hydraulic brake booster (Faulty)	BR–36
Hard pedal but brake inefficient	1. Fluid leaks for brake system	DI–305
	2. Air in brake system	BR–4
	3. Pad (Worn)	BR–12
		BR–21
	4. Pad (Cracked or distorted)	BR–12
		BR–21
	5. Pad (Oily)	BR–12
		BR–21
	6. Pad (Glazed)	BR–12
		BR–21
	7. Disc (Scored)	BR–15
		BR–23
	8. Hydraulic brake booster (Faulty)	BR–36

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Noise from brakes	1. Pad (Cracked or distorted) 2. Installation bolt (Loose) 3. Disc (Scored) 4. Pad support plate (Loose) 5. Sliding pin (Worn) 6. Pad (Dirty) 7. Pad (Glazed) 8. Tension or return spring (Faulty) 9. Anti–squeal shim (Damaged) 10. Shoe hold–down spring (Damaged)	BR–12 BR–21 BR–12 BR–21 BR–15 BR–23 BR–15 BR–15 BR–12 BR–21 BR–12 BR–21 BR–29 BR–15 BR–23 BR–29
Noise from hydraulic brake booster (Abnormal pump motor operation noise)	1. Accumulator bracket clearance (Out of adjustment)	BR–51
Brake warning light lights up*1 (Parking brake pedal released)	1. Brake fluid level 2. Hydraulic brake booster power supply system (Faulty)	 BR–36
Brake warning light lights up and brake warning buzzer sounds*2	1. Hydraulic brake booster power supply system (Faulty)	BR–36
ABS warning light lights up*3	1. Anti – lock brake system (Faulty) 2. Hydraulic brake booster power supply system (Faulty)	 BR–36

*1, *3: The light may stay on for about 60 seconds after the engine is started. It is normal if it gose out after a while.

*2, *3: Depressing the brake pedal repeatedly may turn on the warning light and buzzer. It is normal if the light goes out and the buzzer stops sounding after a few seconds.

*3: While ABS warning light is ON.

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BRAKE FLUID

BLEEDING

BR0T8–01

HINT:

- If any work is done on the brake system or if air in the brake lines is suspected, bleed the air fro the system.
- When bleeding, keep the amount of the fluid within the line of reservoir between Min. and Max.

NOTICE:

- **Do not let brake fluid remain on painted surfaces. Wash it off immediately.**
- **With the reservoir cap removed, when depressing the brake pedal, the fluid will spray.**

1. FILL RESERVOIR WITH BRAKE FLUID
Fluid: SAE J1703 or FMVSS NO.116 DOT3

2. IN CASE OF USING TOYOTA HAND–HELD TESTER: BLEED HYDRAULIC BRAKE BOOSTER

HINT:

If the hydraulic brake booster has been disassembled, disconnect the brake line from the hydraulic brake booster or if the reservoir becomes empty, bleed the hydraulic brake booster.

(a) Turn the ignition switch OFF, depress the brake pedal more than 40 times.

HINT:

When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

(b) Turn the ignition switch ON, check that the pump stops after 30 to 40 seconds.

NOTICE:

When the pump does not stop, repeat step (a) and (b) again.

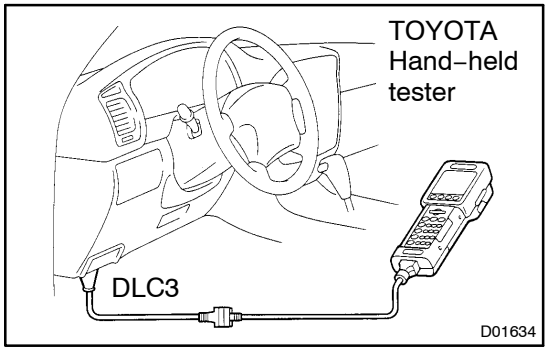
(c) With the ignition switch remained ON, depress the brake pedal more than 20 times.

(d) Observe the procedure in step 4 and bleed the right and left front brake caliper.

(e) Holding the brake pedal depressed, bleed the right and left rear brake caliper.

HINT:

It is not necessary to depress the pedal continuously, as brake fluid flows out by first depressing.



(f) Connect TOYOTA hand–held tester.

(1) Turn the ignition switch OFF, connect the TOYOTA hand–held tester to DLC3.

(2) Turn the ignition switch ON and select ”AIR BLEEDING” on the TOYOTA hand–held tester.

HINT:

Please refer to the TOYOTA hand–held tester operator’s manual for further details.

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(g) Bleed right front brake line.
  (1) Select ”FR LINE” on the TOYOTA hand–held tester.
  (2) With ”FR LINE” turned ON with the TOYOTA hand–held tester, depress the brake pedal and hold it to bleed the right front brake caliper.
  (3) Repeat step (2) until there are no more air bubbles in the fluid.

(h) Bleed left front brake line.
  (1) Select ”FL LINE” on the TOYOTA hand–held tester.
  (2) With ”FL LINE” turned ON with the TOYOTA hand–held tester, depress the brake pedal and hold it to bleed the left front brake caliper.
  (3) Repeat step (2) until there are no more air bubbles in the fluid.

(i) Disconnect the TOYOTA hand–held tester from DLC3.

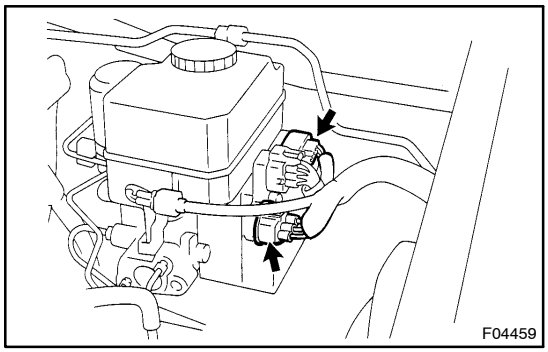
(j) Clear the DTC (See page DI–219).

3. IN CASE OF USING ABS ACTUATOR CHECKER (SST):

BLEED HYDRAULIC BRAKE BOOSTER

HINT:

If the hydraulic brake booster has been disassembled, disconnect the brake line from the hydraulic brake booster or if the reservoir becomes empty, bleed the hydraulic brake booster.



(a) Disconnect the 2 connectors from the hydraulic brake booster.

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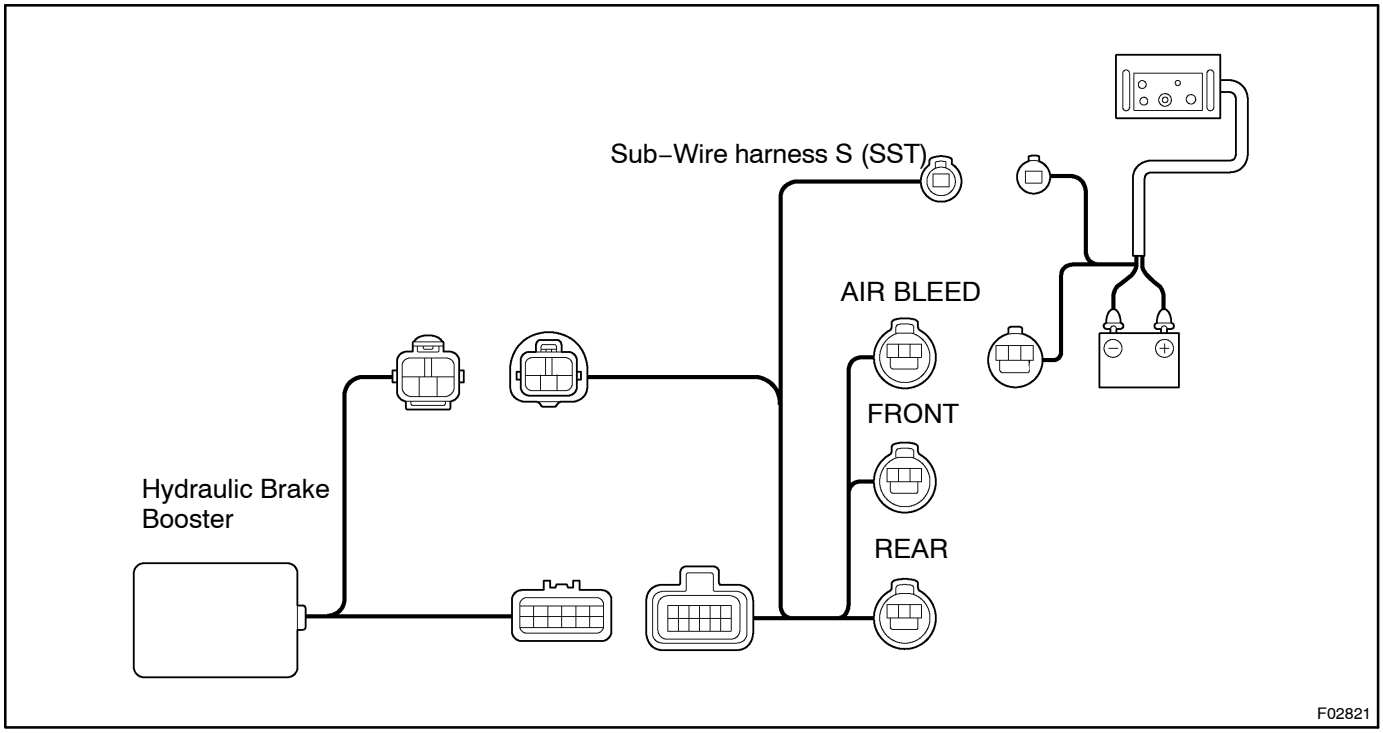
(b) Connect the actuator checker (SST) to the hydraulic brake booster side wire harness via the sub–wire harness (SST), as shown in the chart below.
SST 09990–00150, 09990–00480

HINT:
Connect the connector with the label of "AIR BLEED" attached to the connector of actuator checker.

(c) Connect the red cable of the checker to the battery positive (+) terminal and the black cable to the negative (–) terminal.



(d) Turn the ignition switch OFF, depress the brake pedal more than 40 times.

HINT:
When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

(e) Turn the ignition switch ON, check that the pump stops after 30 to 40 seconds.

NOTICE:
When the pump does not stop, repeat step (d) and (e) again.

(f) With the ignition switch remained ON, depress the brake pedal more than 20 times.

(g) Observe the procedure in step 4 and bleed the right and left front wheel caliper.

(h) Holding the brake pedal depressed, bleed the right and left rear wheel caliper.

HINT:
It is not necessary to depress the pedal continuously, as brake fluid flows out by first depressing.

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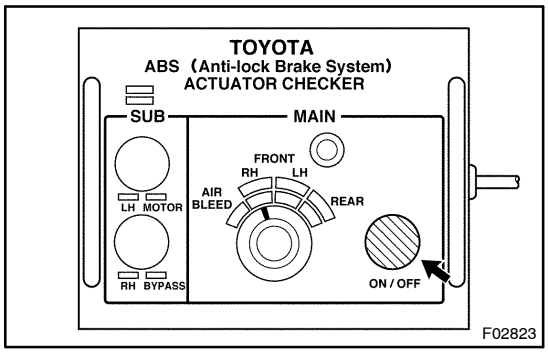
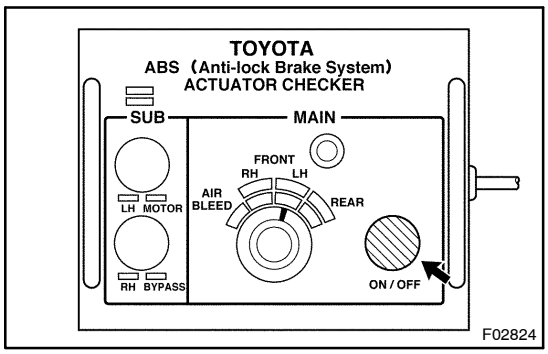


(i) Bleed right front brake line.
  (1) Turn the selector switch of the actuator checker to the "FRONT RH" position.
  (2) Push and hold in MAIN push switch, depress the brake pedal and hold it to bleed the right front brake caliper.

NOTICE:
Do not keep the MAIN switch pushed in for more than 10 seconds. When operating it continuously, set the interval of more than 20 seconds.

  (3) Repeat step (2) until there are no more air bubbles in the fluid.

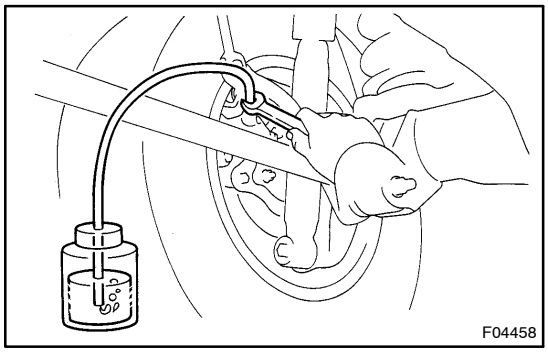


(j) Bleed left front brake line.
  (1) Turn the selector switch of the actuator checker to the "FRONT LH" position.
  (2) Push and hold in the MAIN push switch, depress the brake pedal and hold it to bleed the left front brake caliper.

NOTICE:
Do not keep the MAIN switch pushed in for more than 10 seconds. When operating it continuously, set the interval of more than 20 seconds.

  (3) Repeat step (2) until there are no more air bubbles in the fluid.

(k) Disconnect the actuator checker (SST) and sub–wire harness (SST) from the actuator.
  SST 09990–00150, 09990–00480
(l) Connect the 2 connectors to the hydraulic brake booster.
(m) Clear the DTC (See page DI–219).



4. BLEED BRAKE LINE

(a) Connect the vinyl tube to the brake caliper.
(b) Depress the brake pedal several times, then loosen the bleeder plug with the pedal held down.
(c) At the point when fluid stops coming out, tighten the bleeder plug, then release the brake pedal.
(d) Repeat (b) and (c) until all the air in the fluid has been bled out.

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(e) Repeat the above procedure to bleed the brake line for each wheel.

Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)

5. CHECK FLUID LEVEL IN RESERVOIR

(a) With the ignition switch OFF, depress the brake pedal more than 40 times.

HINT:

When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

(b) Remove the reservoir cap. Add brake fluid up to the "MAX" line.

Fluid: SAE J1703 or FMVSS NO.116 DOT3

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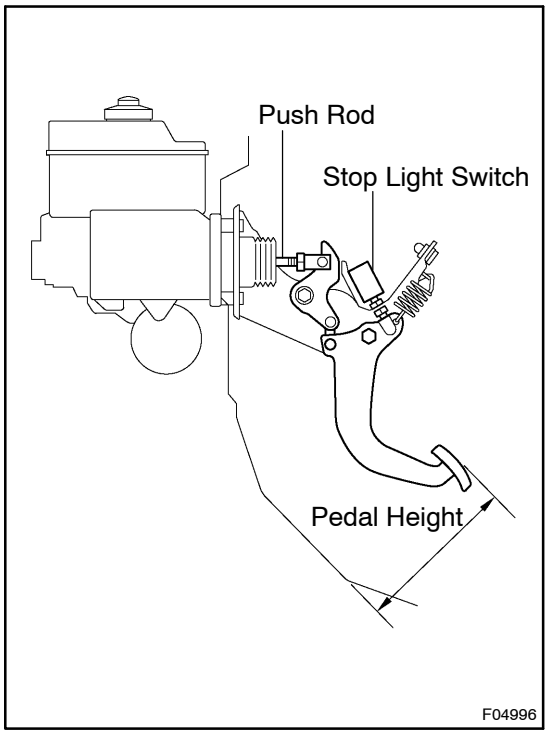


BRAKE PEDAL

BR0JB–03

ON–VEHICLE INSPECTION

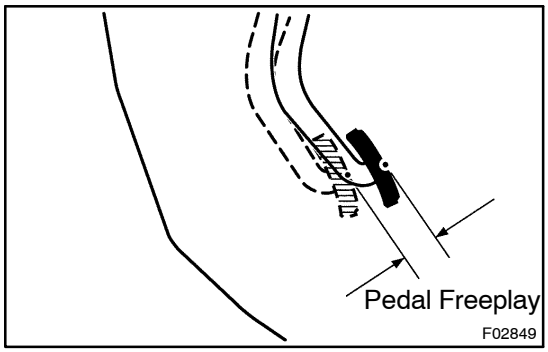
1. CHECK PEDAL HEIGHT

Pedal height from asphalt sheet:
183.7 – 193.7 mm (7.232 – 7.626 in.)

If the pedal height is incorrect, adjust it.

2. IF NECESSARY, ADJUST PEDAL HEIGHT

(a) Remove the No.1 under panel, No.1 safety pad, finish panel, and No.2 heater to register duct.
(b) Disconnect the connector from the stop light switch.
(c) Loosen the stop light switch lock nut and remove the stop light switch.
(d) Loosen the push rod lock nut.
(e) Adjust the pedal height by turning the pedal push rod.
(f) Tighten the push rod lock nut.
Torque: 25 N·m (260 kgf·cm, 19 ft·lbf)
(g) Install the stop light switch.
(h) Push in the brake pedal 5 – 15 mm (0.20 – 0.59 in.), turn the stop light switch to lock the nut in the position where the stop light goes off.
(i) Connect the connector to the stop light switch.
(j) After installation, push in the brake pedal 5 – 15 mm (0.20 – 0.59 in.), check that stop light lights up.
(k) After adjusting the pedal height, check the pedal freeplay.
(l) Install the No.1 under panel, No.1 safety pad, finish panel, and No.2 heater to register duct.



3. CHECK PEDAL FREEPLAY

(a) Stop the engine and depress the brake pedal more than 40 times until there is no more pressure left in the booster.
(b) Push in the pedal by hand until the second point of resistance begins to be felt, then measure the distance, as shown.
Pedal freeplay: 1.0 – 6.0 mm (0.039 – 0.236 in.)

If incorrect, check the stop light switch clearance. If the clearance is OK, then troubleshoot the brake system.

Stop light switch clearance: 1.0 mm (0.039 in.)

HINT:

The freeplay to the 1st point of resistance is due to the play between the clevis, pedal rink and pin. It is 1.0 – 6.0 mm (0.039 – 0.236 in.) on the pedal.

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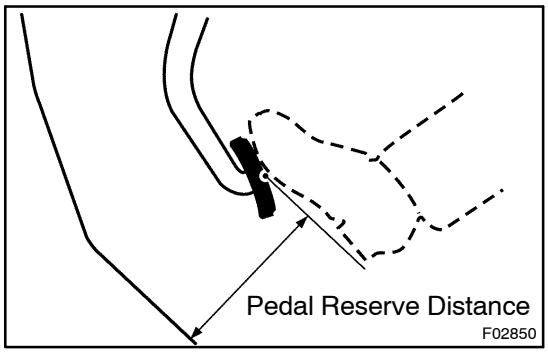

4. CHECK PEDAL RESERVE DISTANCE

(a) Remove the floor carpet.

(b) Release the parking brake.

With the engine running, depress the pedal and measure the pedal reserve distance, as shown.

Pedal reserve distance at 490 N (50 kgf, 110.1 lbf): More than 116 mm (4.57 in.)

If the reserve distance is incorrect, troubleshoot the brake system.

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PARKING BRAKE LEVER

BR0T9–01

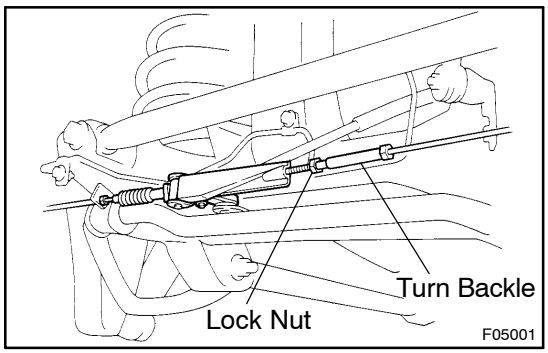
ON–VEHICLE INSPECTION

1. CHECK PARKING BRAKE LEVER TRAVEL

Pull the parking brake lever all the way up, and count the number of clicks.

Parking brake lever travel at 196 N (20 kgf, 44 lbf):
4 – 6 clicks

If incorrect, adjust the parking brake.



2. IF NECESSARY, ADJUST PARKING BRAKE

HINT:

Before adjusting the parking brake, make sure that the rear brake shoe clearance has been adjusted. For shoe clearance adjustment see page BR–34.

(a) Loosen the lock nut and turn the turn backle until the lever travel is correct.

(b) Tighten the lock nut.

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

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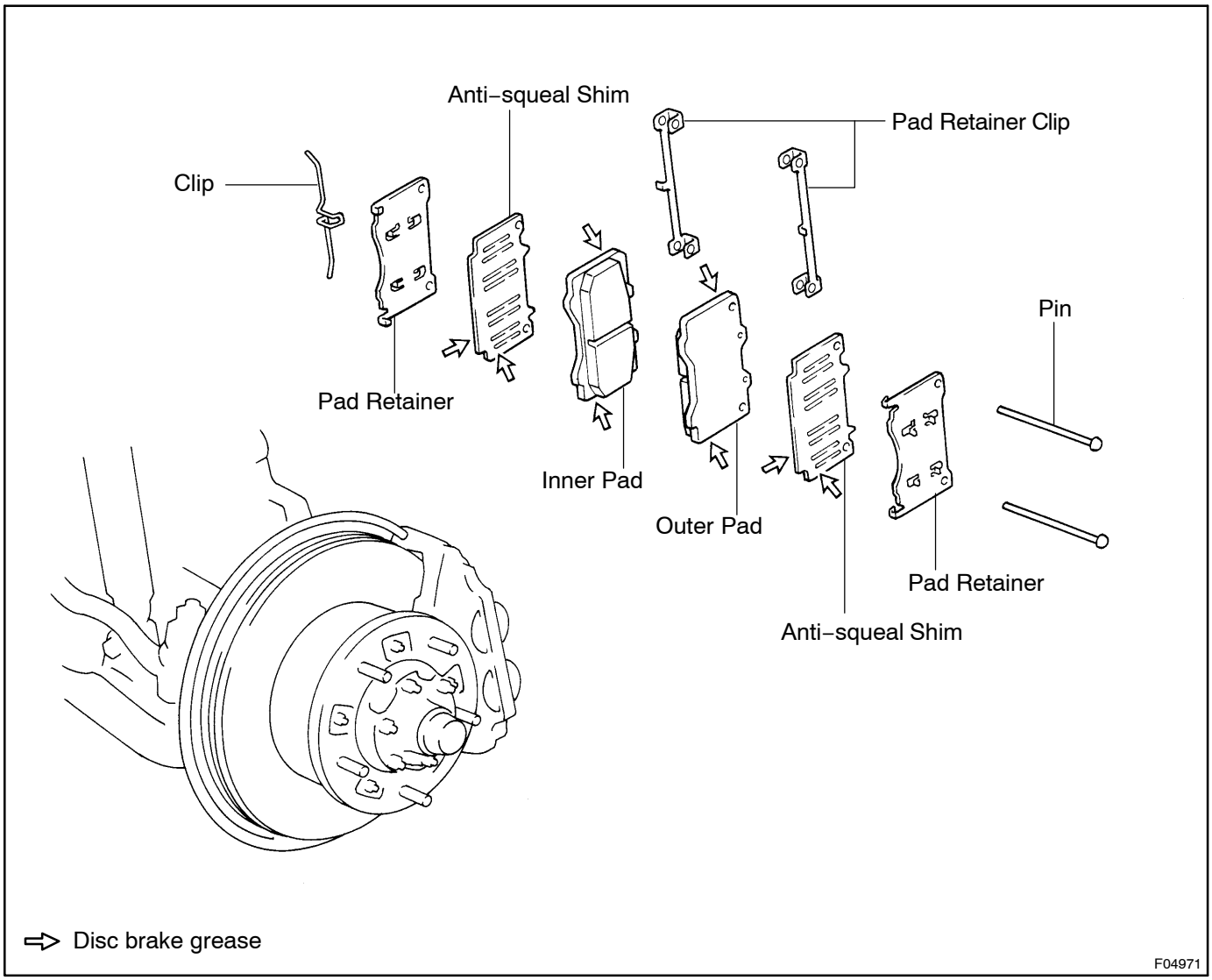
FRONT BRAKE PAD

COMPONENTS

BR0JH–03



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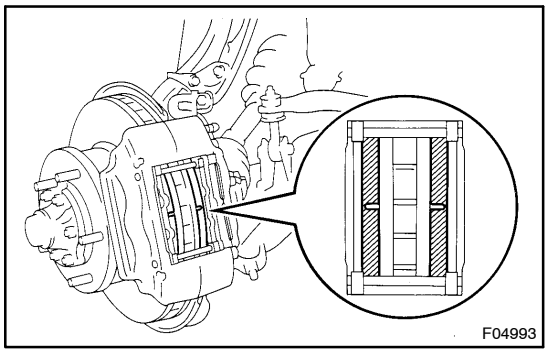
BR0JI–03

REPLACEMENT

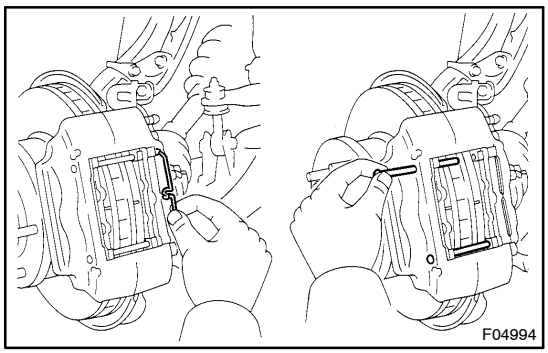


1. REMOVE FRONT WHEEL

2. INSPECT PAD LINING THICKNESS

Check the pad thickness through the caliper inspection hole and replace the pads if they are not within the specification.

Minimum thickness: 1.0 mm (0.039 in.)



3. REMOVE CLIP AND 2 PINS

4. REMOVE 2 PAD RETAINER CLIPS

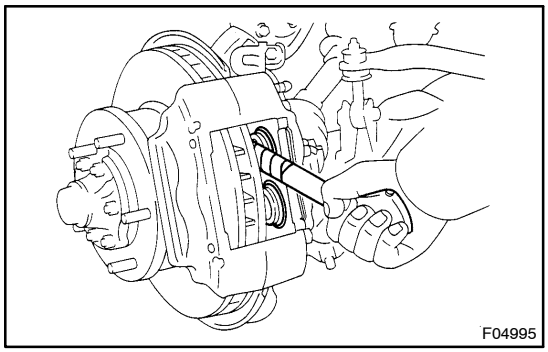
5. REMOVE 2 PADS, ANTI–SQUEAL SHIMS AND PAD RETAINERS

NOTICE:

The pad retainer clip and clip can be used again provided that they have sufficient rebound, no deformation, cracks or wear, and have had all rust, dirt and foreign particles cleaned off.

6. CHECK DISC THICKNESS AND DISC RUNOUT

(See page BR–18)



7. INSTALL NEW PADS

NOTICE:

When replacing worn pads, the anti–squeal shims must be replaced together with the pad.

(a) Draw out a small amount of brake fluid from the reservoir.

(b) Press in the piston with a hammer handle or an equivalent.

HINT:

- Always change the pads on one wheel at a time as there is a possibility of opposite piston fling out.
- If the piston is difficult to push in, loosen the bleeder plug and push in the piston while letting some brake fluid escape.

(c) Install the 2 pad retainers to each caliper piston.

(d) Install the anti–squeal shim to each pad.

HINT:

Apply disc brake grease to both sides of the anti–squeal shims (See page BR–12).

(e) Install the 2 pads.

HINT:

Apply disc brake grease to the pads indicated by the arrows (See page BR–12).

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NOTICE:
There should be no oil or grease adhering to the friction surfaces of the pads or the disc.

8. INSTALL 2 PAD RETAINER CLIPS AND 2 PINS
9. INSTALL CLIP
10. INSTALL FRONT WHEEL
11. CHECK THAT FLUID LEVEL IS AT MAX LINE

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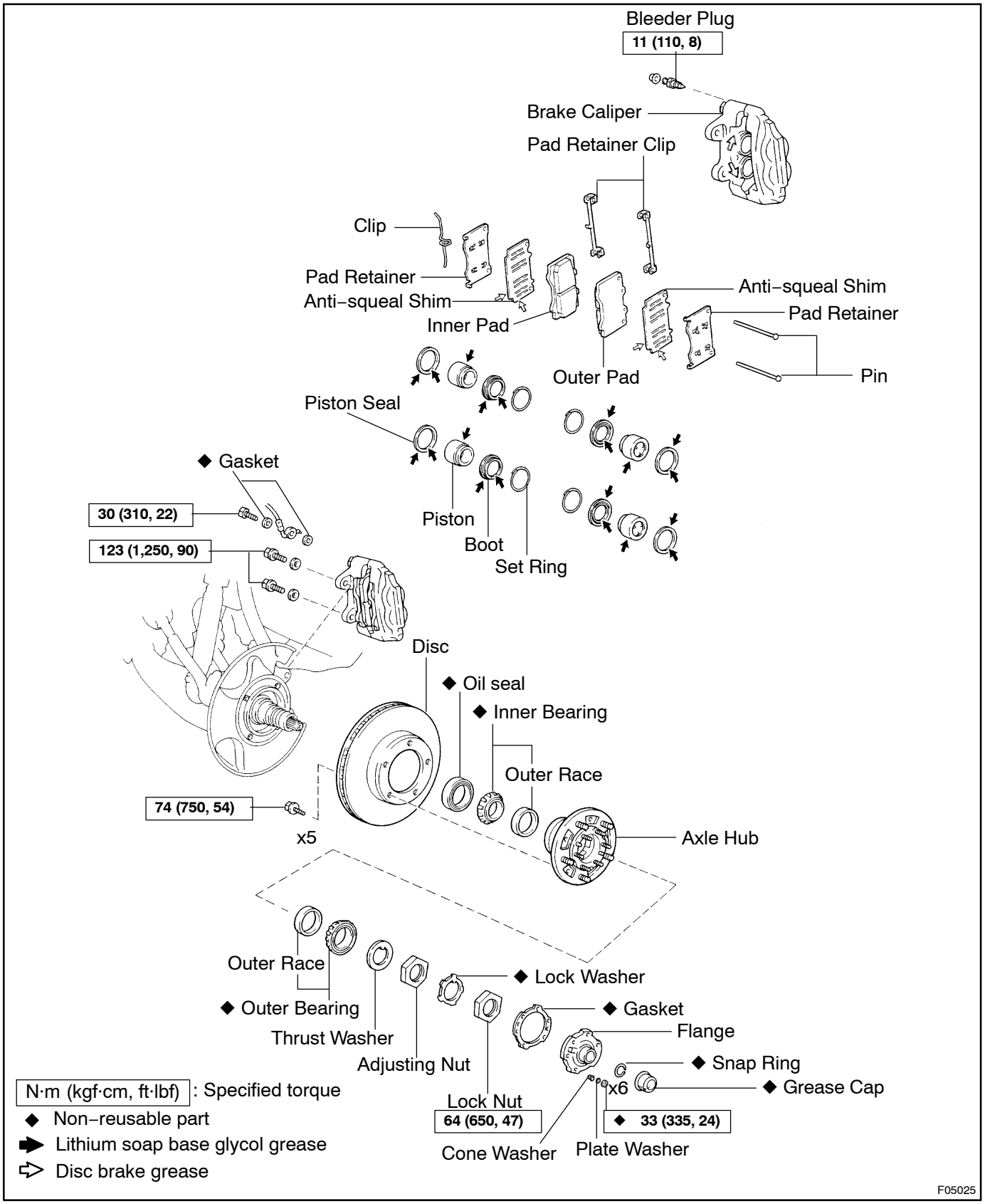
FRONT BRAKE CALIPER

COMPONENTS

BR0JJ–03



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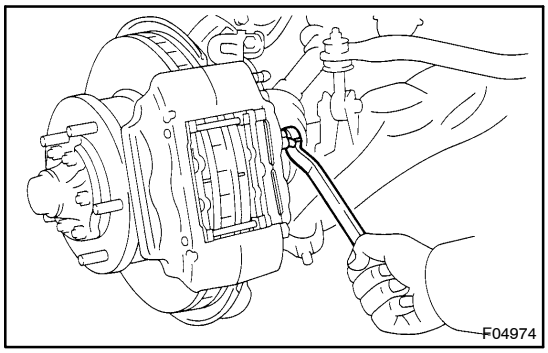
BR0TA–01

REMOVAL

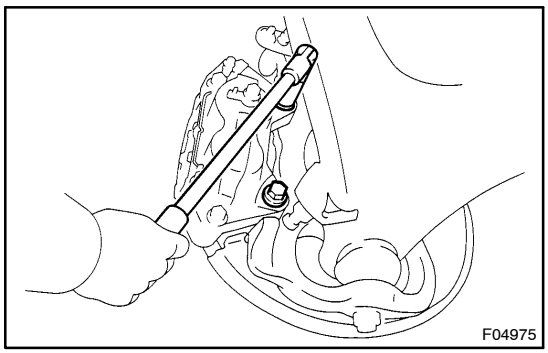


1. REMOVE FRONT WHEEL

2. DISCONNECT BRAKE LINE

(a) Remove the union bolt and 2 gaskets from the caliper, then disconnect the flexible hose from the caliper.
Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)

(b) Use a container to catch the brake fluid as it drains out.



3. REMOVE CALIPER

Remove the 2 mounting bolts and remove the caliper.
Torque: 123 N·m (1,250 kgf·cm, 90 ft·lbf)

4. REMOVE CLIP AND 2 PINS

5. REMOVE 2 PAD RETAINER CLIPS

6. REMOVE 2 PADS, ANTI–SQUEAL SHIMS AND PAD RETAINERS

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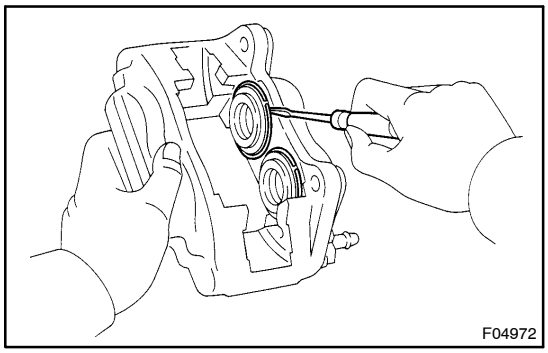
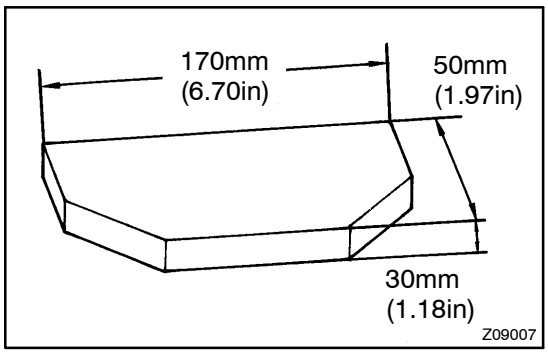
BR0JL–03

DISASSEMBLY



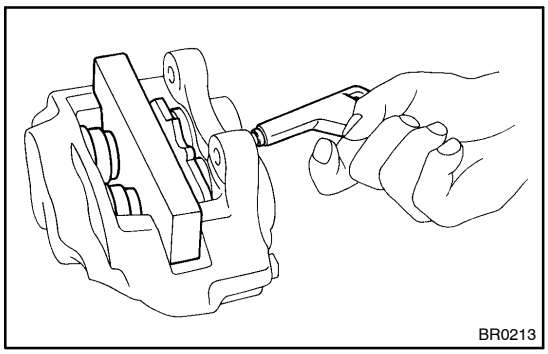
1. REMOVE CYLINDER BOOT SET RINGS AND CYLINDER BOOTS

Using a screwdriver, remove the 4 cylinder boot set rings and 4 cylinder boots from the caliper.



2. REMOVE PISTONS FROM CYLINDER

(a) Prepare the wooden plate to hold the pistons.

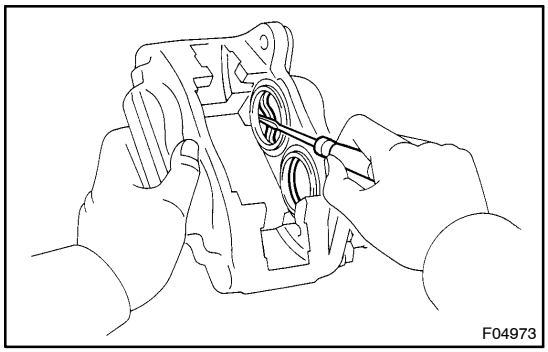


(b) Place the plate between the pistons and insert a pad at one side.

(c) Use compressed air to remove the pistons alternately from the cylinder.

CAUTION:

Do not place your fingers in front of the piston when using compressed air.



3. REMOVE PISTON SEALS FROM BRAKE CYLINDER

Using a screwdriver, remove the 4 piston seals from the cylinder.

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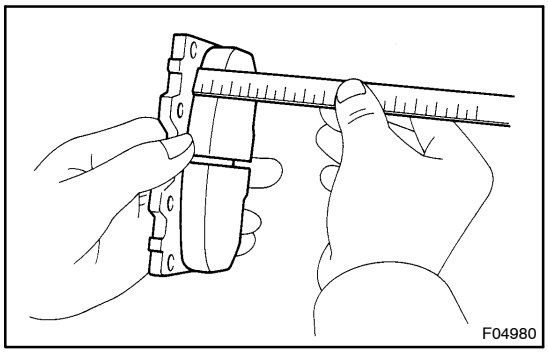
BR0JM–03

INSPECTION



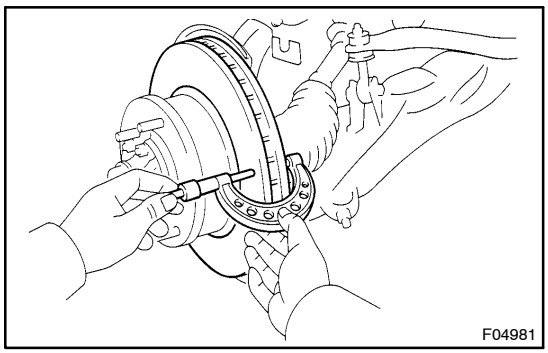
1. MEASURE PAD LINING THICKNESS

Using a ruler, measure the pad lining thickness.

Standard thickness: 11.5 mm (0.453 in.)

Minimum thickness: 1.0 mm (0.039 in.)

Replace the pad if the pad's thickness is at the minimum or if it shows signs of uneven wear.



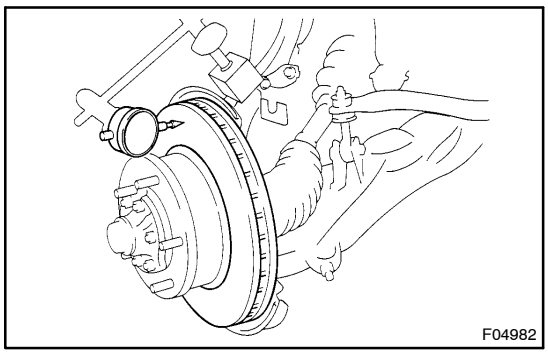
2. MEASURE DISC THICKNESS

Using a micrometer, measure the disc thickness.

Standard thickness: 32.0 mm (1.260 in.)

Minimum thickness: 30.0 mm (1.181 in.)

Replace the disc if the thickness of the disc is at the minimum thickness or less. Replace the disc or grind it on a lathe if it is scored or is worn unevenly.



3. MEASURE DISC RUNOUT

Using a dial indicator, measure the disc runout at a position 10 mm (0.39 in.) from the out side edge.

Maximum disc runout: 0.07 mm (0.0028 in.)

If the bearing play and axle hub runout are not abnormal, replace the disc or grind it on an "On–Car brake lathe".

HINT:

Before measuring the runout, confirm that the front bearing preload is within the specification (See page SA–10).

4. IF NECESSARY, REPLACE DISC

(a) Remove the front axle hub (See page SA–10).

(b) Remove the disc from the axle hub (See pageSA–11).

(c) Install a new disc and torque the 5 bolts.

Torque: 74 N·m (750 kgf·cm, 54 ft·lbf)

(d) Install the axle hub and adjust the front bearing preload (See page SA–14).

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BR0JN–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR–17).

NOTICE:

Apply lithium soap base glycol grease to the parts indicated by the arrows (See page BR–15).

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BR0JO–03

INSTALLATION

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

1. **AFTER INSTALLATION, FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM (See page BR–4)**
2. **CHECK FOR LEAKS (See page DI–305)**

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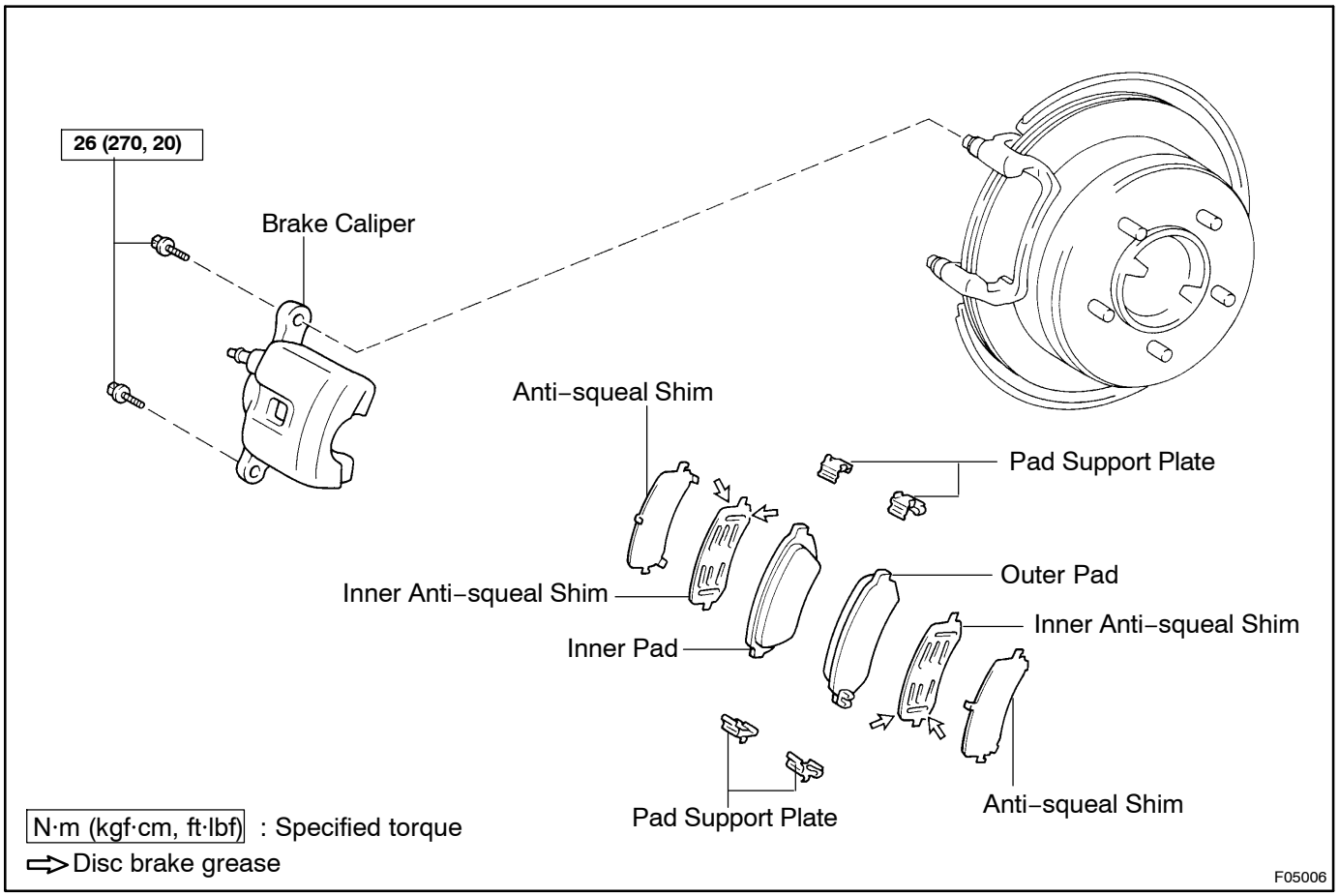
REAR BRAKE PAD

COMPONENTS

BR0JP–03



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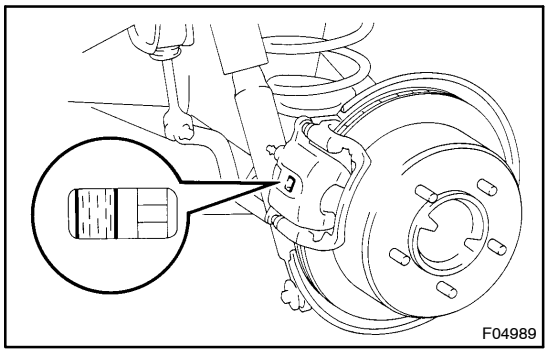
BR0TB–01

REPLACEMENT

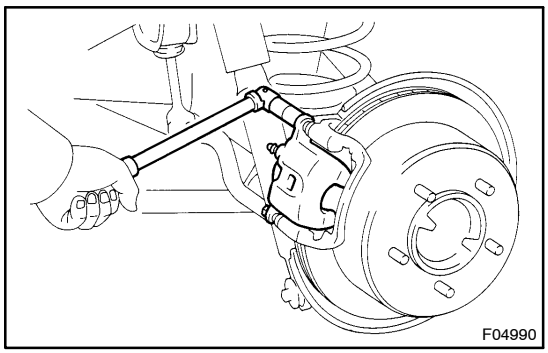


1. REMOVE REAR WHEEL

2. INSPECT PAD LINING THICKNESS

Check the pad thickness through the caliper inspection hole and replace pads if not within the specification.

Minimum thickness: 1.0 mm (0.039 in.)



3. REMOVE BRAKE CALIPER

(a) Remove the 2 mounting bolts.

(b) Remove the caliper and suspend it so the hose is not stretched.

HINT:

Do not disconnect the flexible hose.

4. REMOVE 2 PADS AND 4 ANTI–SQUEAL SHIMS

5. REMOVE 4 PAD SUPPORT PLATES

NOTICE:

The pad support plates can be used again provided that they have sufficient rebound, no deformation, cracks or wear, and have had all rust, dirt and foreign particles cleaned off.

6. CHECK DISK THICKNESS AND RUNOUT

(See page BR–26)

7. INSTALL PAD SUPPORT PLATES

8. INSTALL NEW PADS

NOTICE:

When replacing worn pads, the anti–squeal shims must be replaced together with the pads.

Install the 4 anti–squeal shims to the pads.

HINT:

Apply disc brake grease to both sides of the inner anti–squeal shims (See page BR–21).

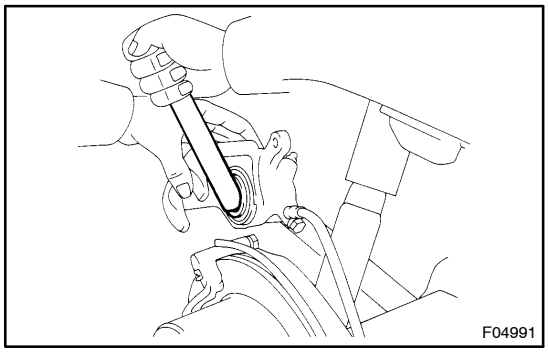
NOTICE:

Do not allow oil or grease to get on the rubbing face.

9. INSTALL CALIPER

(a) Draw out a small amount of brake fluid from the reservoir.

(b) Press in the pistons with a hammer handle or an equivalent.



HINT:

- Always change the pads on one wheel at a time as there is a possibility of the opposite piston flying out.
- If the piston is difficult to push in, loosen the bleeder plug and push in the piston while letting some fluid escape.

(c) Install the caliper carefully so the boot is not wedged.

(d) Install 2 mounting bolts.

Torque: 26 N·m (270 kgf·cm, 20 ft·lbf)

10. INSTALL REAR WHEEL

11. CHECK THAT FLUID LEVEL IS AT MAX LINE

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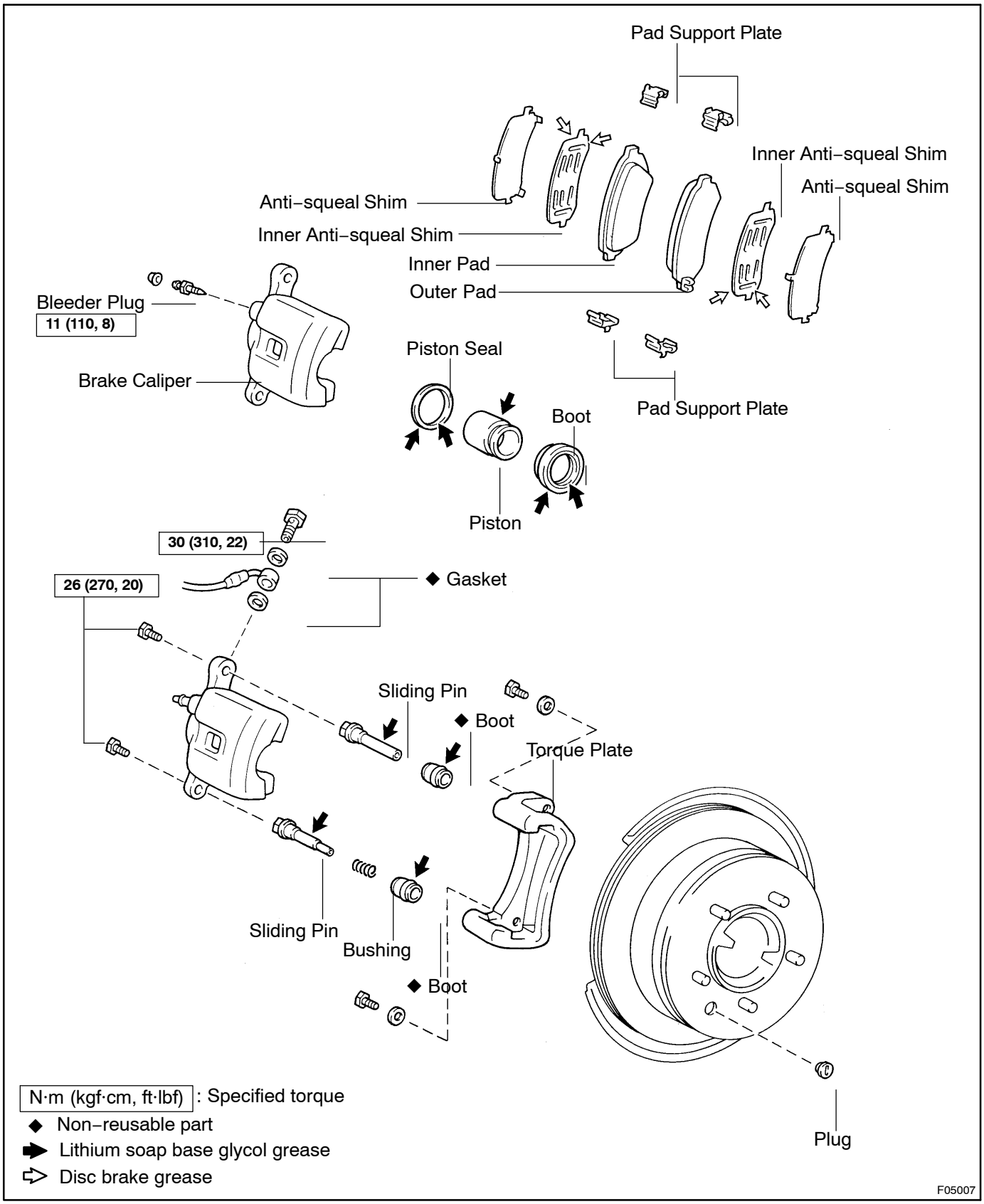
REAR BRAKE CALIPER

COMPONENTS

BR0JR–03



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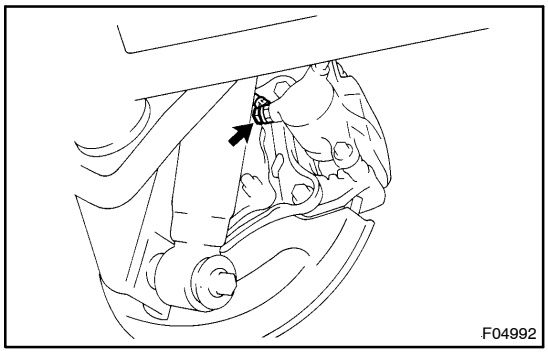
BR0JS–03



REMOVAL

1. DISCONNECT FLEXIBLE HOSE

Remove the union bolt and gasket from the caliper, then disconnect the flexible hose from the caliper. Use a container to catch brake fluid as it drains out.

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

HINT:

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

Install the flexible hose lock securely in the lock hole in the caliper.

2. REMOVE CALIPER

(a) Hold the sliding pin and loosen the 2 installation bolts.
Torque: 26 N·m (270 kgf·cm, 20 ft·lbf)

(b) Remove the 2 installation bolts.

(c) Remove the caliper from the torque plate.

3. REMOVE 2 BRAKE PADS WITH ANTI–SQUEAL SHIMS

4. REMOVE 4 PAD SUPPORT PLATES

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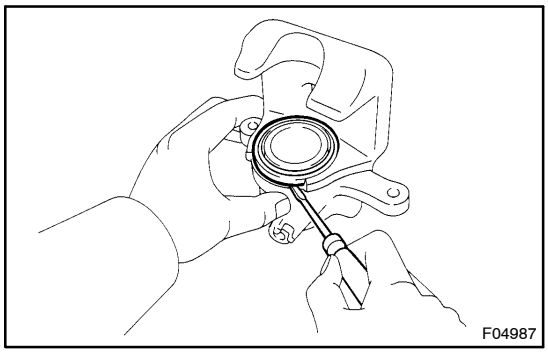
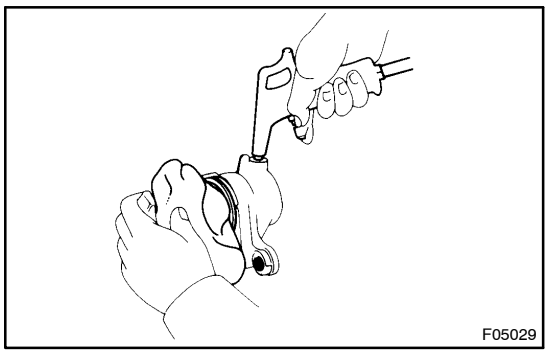
BR0TC–01

DISASSEMBLY



1. REMOVE CYLINDER BOOTS

Using a screwdriver, remove the cylinder boot from the caliper.



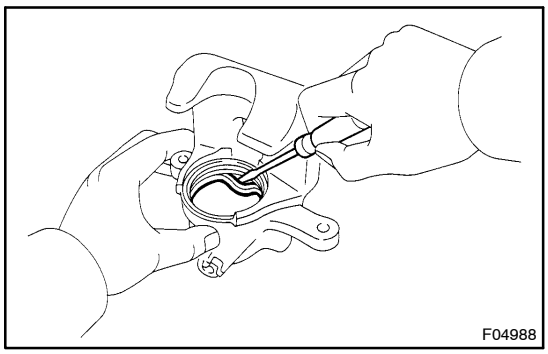
2. REMOVE PISTON

(a) Place a piece of cloth or a similar object between the piston and caliper.

(b) Use compressed air to remove the piston from the cylinder.

CAUTION:

Do not place your fingers in front of the piston when using compressed air.



3. REMOVE PISTON SEALS FROM BRAKE CYLINDER

Using a screwdriver, remove the piston seals from the caliper.

4. REMOVE PIN BOOT AND SLIDING BUSHING

Using a screwdriver and hammer, tap out pin boot and sliding bushing.

HINT:

Tape the screwdriver tip before use.

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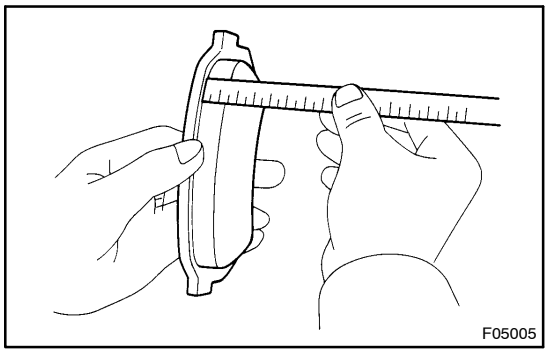
BR0JU–03

INSPECTION


F05005

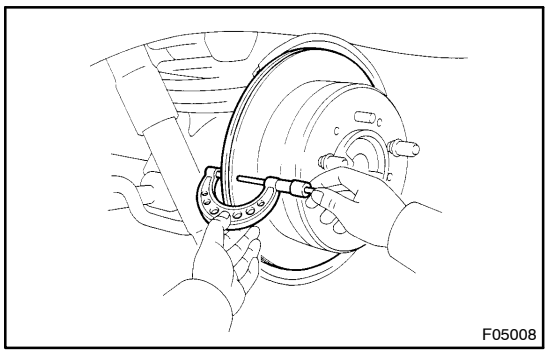
1. MEASURE PAD LINING THICKNESS

Using a ruler, measure the pad lining thickness.

Standard thickness: 12.0 mm (0.472 in.)

Minimum thickness: 1.0 mm (0.039 in.)

Replace the pad if the pad's thickness is at the minimum or if it shows signs of uneven wear.


F05008

2. MEASURE DISC THICKNESS

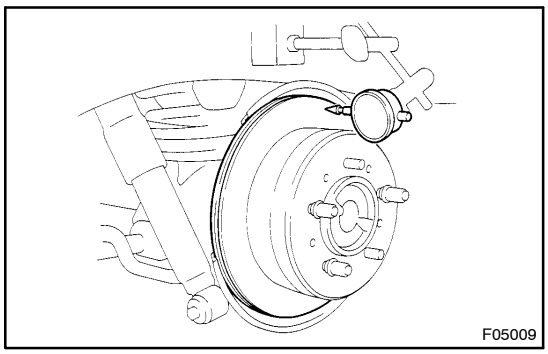
(a) Temporarily fasten the disc with the 3 hub nuts.

(b) Using a micrometer, measure the disc thickness.

Standard thickness: 18.0 mm (0.709 in.)

Minimum thickness: 16.0 mm (0.611 in.)

Replace the disc if the thickness of the disc is at the minimum thickness or less. Replace the disc or grind it on a lathe if it is scored or is worn unevenly.


F05009

3. MEASURE DISC RUNOUT

Using a dial indicator, measure the disc runout at a position 10 mm (0.39 in.) from the outside edge.

Maximum disc runout: 0.1 mm (0.0040 in.)

If the disc's runout is at the maximum value or greater, check the bearing play is in the axial direction and check the axle hub runout (See page SA–81). If the bearing play and axle hub runout are not abnormal, adjust the disc runout or grind it on an "On–Car" brake lathe.

4. IF NECESSARY, ADJUST DISC RUNOUT

(a) Remove the torque plate from the backing plate.

(b) Remove the hub nuts and the disc. Reinstall the disc rotating 1/5 of a turn from its original position on the hub. Install and torque the hub nuts.

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

Remeasure the disc runout. Make a note of the runout and the disc's position on the hub.

(c) Repeat (b) until the disc has been installed on the 3 remaining hub positions.

(d) If the minimum runout recorded in (b) and (c) is less than 0.1 mm (0.0040 in.), install the disc in that position.

(e) If the minimum runout recorded in (b) and (c) is greater than 0.1 mm (0.0040 in.), replace the disc and repeat step 3.

(f) Install the torque plate and tighten the 2 bolts.

Torque: 103 N·m(1,050 kgf·cm, 76 ft·lbf)

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BR0JV–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR–25).

NOTICE:

Apply lithium soap base glycol grease to the parts indicated by the arrows (See page BR–23).

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BR0JW–01

INSTALLATION

Installation is in the reverse order of removal (See page BR–24).

1. **AFTER INSTALLATION, FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM (See page BR–4)**
2. **CHECK FOR LEAKS**

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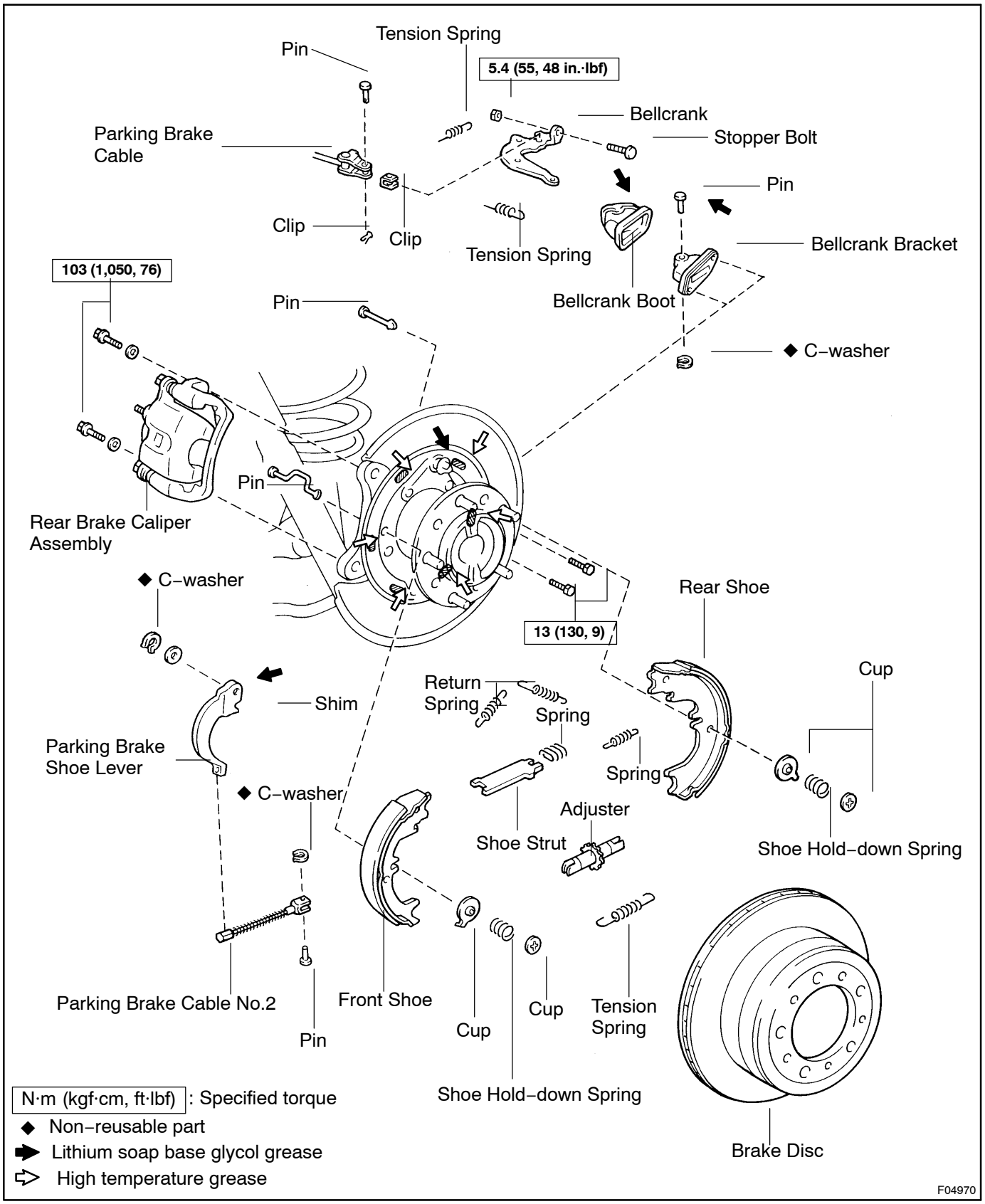
PARKING BRAKE

COMPONENTS

BR0JX–02



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BR0TD–01

DISASSEMBLY

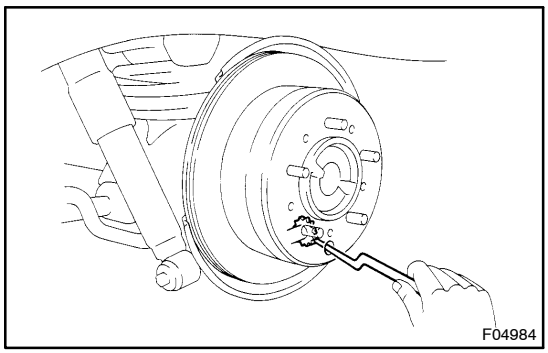
1. REMOVE REAR WHEEL

2. REMOVE REAR DISC BRAKE ASSEMBLY

(a) Remove the 2 mounting bolts and remove the disc brake assembly.

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

(b) Suspend the disc brake securely. Ensure that the hose is not stretched.



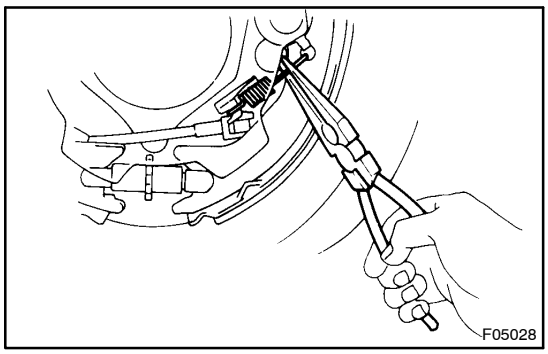
3. REMOVE DISC

(a) Place matchmarks on the disc and rear hub.

(b) Remove the disc.

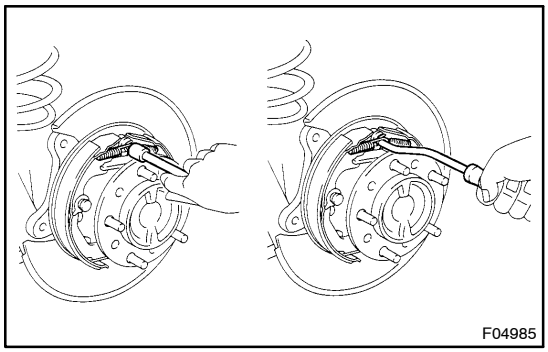
HINT:

If the disc cannot be removed easily, turn the shoe adjuster until the wheel turns freely.



4. REMOVE TENSION SPRING

Using needle–nose pliers, remove the spring, and tension spring.



5. REMOVE SHOE RETURN SPRINGS

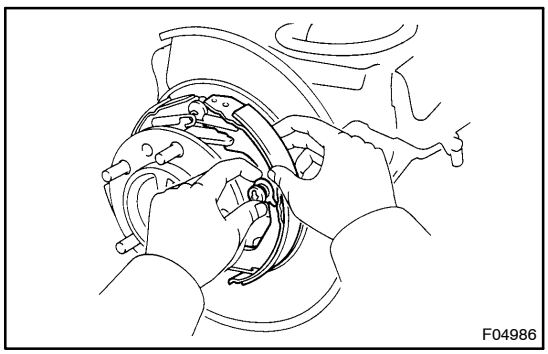
Using SST, remove the 2 shoe return springs.

SST 09717–20010

HINT:

At the time of installation, using SST, install the front shoe return spring and then install the rear return spring.

SST 09718–20010



6. REMOVE SHOE STRUT WITH SPRING

7. REMOVE REAR SHOE, ADJUSTER AND TENSION SPRING

(a) Slide out the rear shoe and remove the adjuster.

(b) Remove the lower side tension spring.

(c) Remove the 2 shoe hold–down spring cups, spring and pin.

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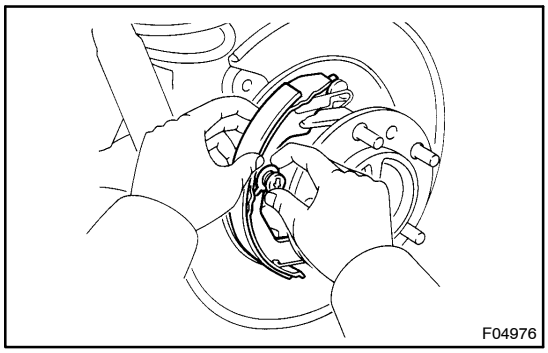
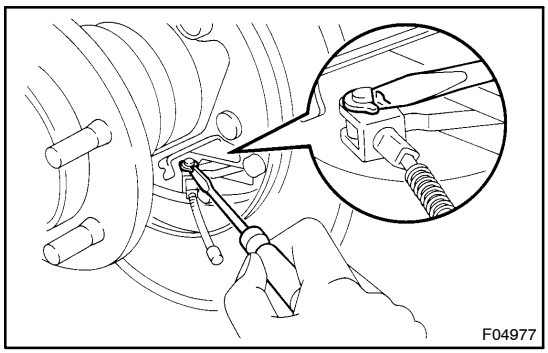


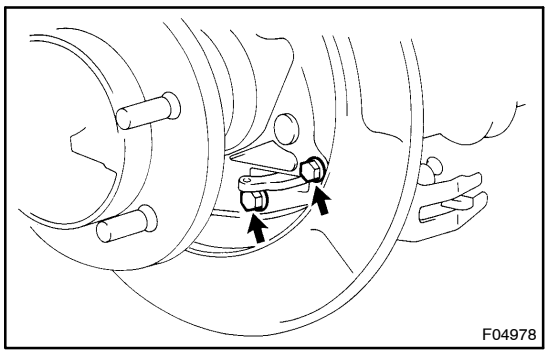
8. REMOVE FRONT SHOE

(a) Slide out the front shoe.
(b) Disconnect the parking brake cable No.2 from the parking brake shoe lever.
(c) Remove the 2 shoe hold–down spring cups, spring and pin.

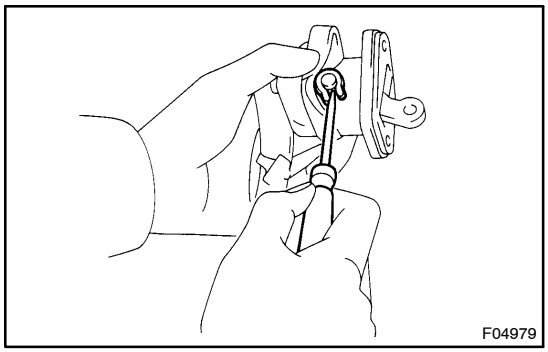


9. IF NECESSARY, REMOVE AND DISASSEMBLE PARKING BRAKE BELLCRANK ASSEMBLY

(a) Using a screwdriver, remove the C–washer.
(b) Remove the pin and disconnect the parking brake cable No.2 from the bellcrank.
(c) Remove the clip and pin.
(d) Disconnect the parking brake cable and remove the clip.
(e) Remove the 2 tension springs.



(f) Remove the 2 bolts and parking brake bellcrank assembly.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)



(g) Turn the boot over from parking brake bellcrank bracket.
(h) Using a screwdriver, remove the C–washer and pin.
(i) Remove the parking brake bellcrank from the bellcrank bracket.

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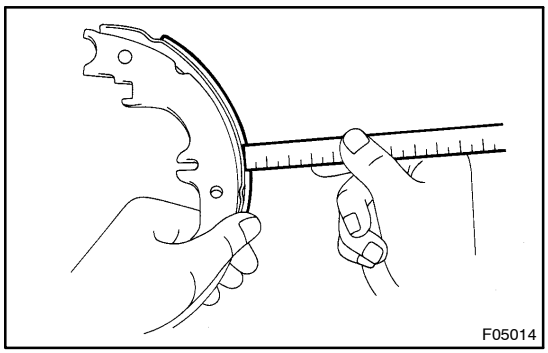
BR0HM–02

INSPECTION

1. INSPECT DISASSEMBLED PARTS

Inspect the disassembled parts for wear, rust or damage.



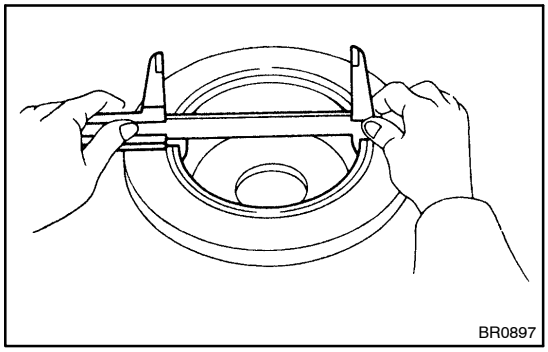
2. MEASURE BRAKE SHOE LINING THICKNESS

Using a ruler, measure the thickness of the shoe lining.

Standard thickness: 4.0 mm (0.157 in.)

Minimum thickness: 1.0 mm (0.039 in.)

If the lining thickness is at the minimum thickness or less, or if there is severe and uneven wear, replace the brake shoe.



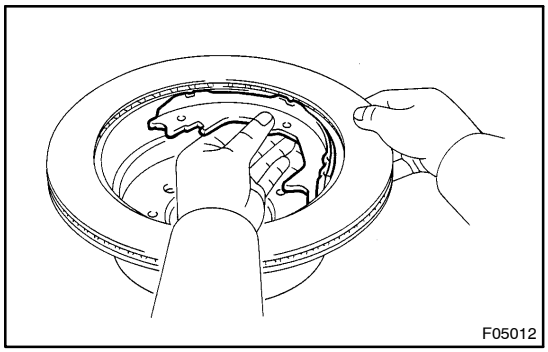
3. MEASURE BRAKE DISC INSIDE DIAMETER

Using vernier calipers, measure the inside diameter of the disc.

Standard inside diameter: 230 mm (9.06 in.)

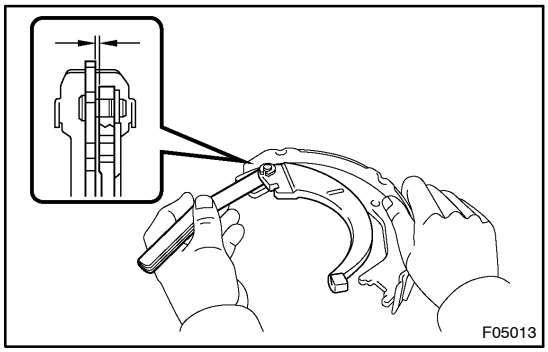
Maximum inside diameter: 231 mm (9.09 in.)

Replace the disc if the inside diameter is at the maximum value or more. Replace the disc or grind it with a lathe if the disc is scored or is worn unevenly.



4. INSPECT PARKING BRAKE LINING AND DISC FOR PROPER CONTACT

Apply chalk to the inside surface of the disc, then grind down the brake shoe lining to fit. If the contact between the disc and the brake shoe lining is improper, repair it using a brake shoe grinder or replace the brake shoe assembly.



5. MEASURE CLEARANCE BETWEEN PARKING BRAKE SHOE AND LEVER

Using a feeler gauge, measure the clearance.

Standard clearance: Less than 0.35 mm (0.0138 in.)

If the clearance is not within the specification, replace the shim with one of the correct size.

Thickness mm (in.)	Thickness mm (in.)
0.3 (0.012)	0.9 (0.035)
0.6 (0.024)	

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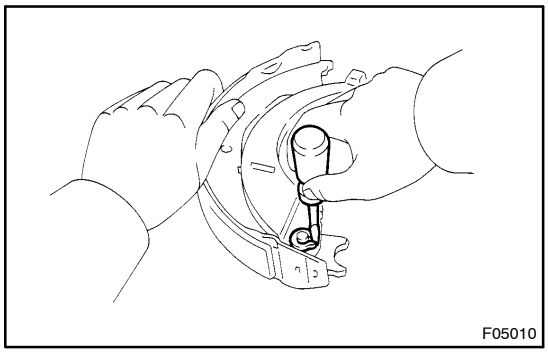
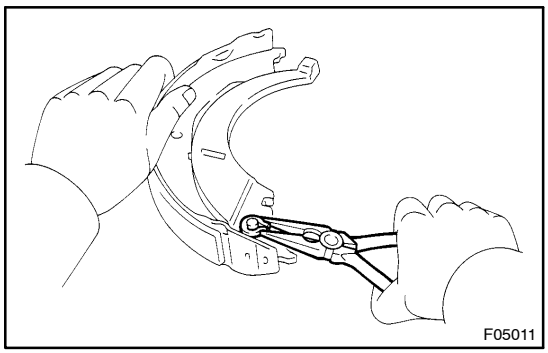


6. IF NECESSARY, REPLACE SHIM

(a) Using a screwdriver, remove the C–washer.

(b) Remove the parking brake shoe lever and shim, and install the correct sized shim.



(c) Install the parking brake shoe lever with a new C–washer.

(d) Remeasure the clearance.

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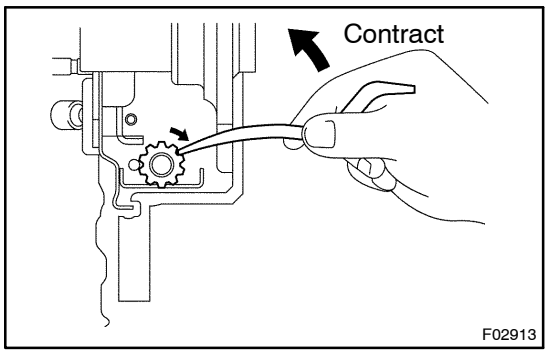
BR0TE–01

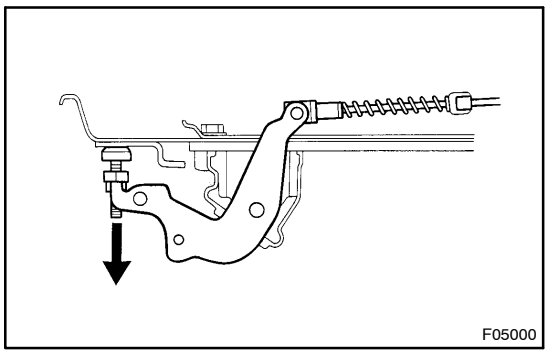
REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR–30).

NOTICE:

Apply high temperature grease and lithium soap base glycol grease to the parts indicated by the arrows (See page BR–29).





1. ADJUST PARKING BRAKE SHOE CLEARANCE

(a) Disconnect the parking brake cable from the bellcrank.
(b) Remove the bellcrank spring.
(c) Loosen the bellcrank adjusting bolt.
(d) Temporarily install the 3 hub nuts.
(e) Remove the hole plug.
(f) Turn the adjuster and expand the shoes until the disc locks.
(g) Return the adjuster 8 notches.
(h) Install the hole plug.

2. ADJUST BELLCRANK

(a) Pull the bellcrank until all play in the interior linkage is taken up.
(b) Screw in the bellcrank adjusting bolt to where it contacts on the dust seal.
(c) Loosen it one turn, and lock it at that position with the lock nut.

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

(d) Install the bellcrank spring.
(e) Connect the parking brake cable.
(f) Remove the 3 hub nuts.

3. SETTLING PARKING BRAKE SHOES AND DISC

(a) Drive the vehicle at about 50 km/h (31 mph) on a safe, level and dry road.
(b) With the parking brake release button pushed in, pull on the lever with 88 N (9 kgf, 19.8 lbf) of force.
(c) Drive the vehicle for about 400 meters (0.25 mile) in this condition.
(d) Repeat this procedure 2 or 3 times.

4. RECHECK AND ADJUST PARKING BRAKE LEVER TRAVEL

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PROPORTIONING AND BY–PASS VALVE (P & B VALVE)

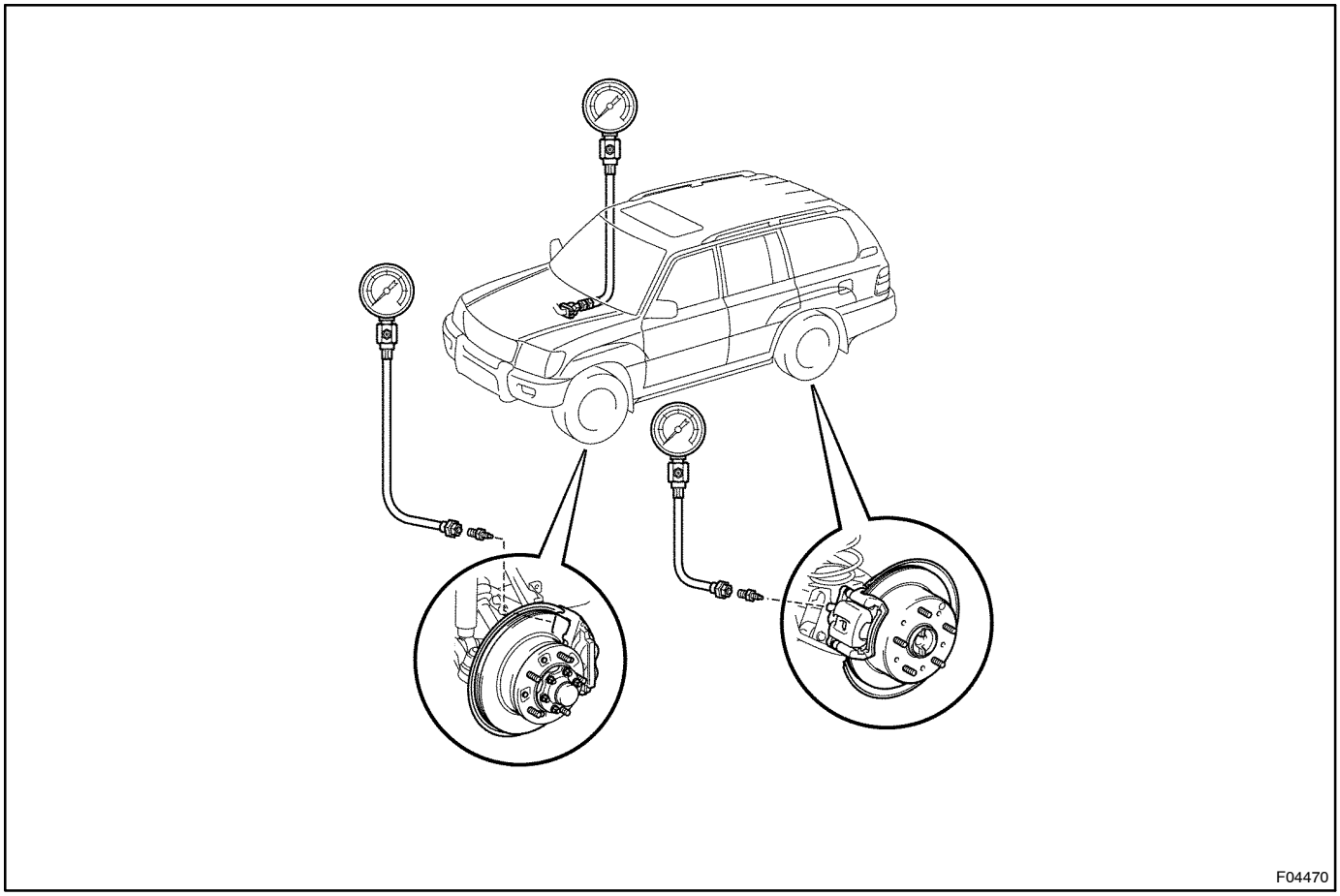
BR0NC–02

ON–VEHICLE INSPECTION

1. INSTALL LSPV GAUGE (SST) AND BLEED AIR

(a) Turn the ignition switch OFF, depress the brake pedal more than 40 times.

(b) Install the LSPV gauge (SST) and bleed air.
SST 09709–29018



(c) Turn the ignition switch ON, and wait until the pump motor has stopped.

2. RAISE FRONT BRAKE CALIPER PRESSURE AND CHECK REAR BRAKE CALIPER PRESSURE

(a) Depress the brake pedal and check fluid pressure.

Front brake caliper pressure	Rear brake caliper pressure
2,256 kPa (23 kgf·cm^2, 327 psi)	2,452 kPa (25 kgf·cm^2, 356 psi)
7,845 kPa (45 kgf·cm^2, 1,138 psi)	3,334 – 3,727 kPa (34 – 38 kgf·cm^2, 484 – 540 psi)
7,845 kPa (80 kgf·cm^2, 1,138 psi)	5,197 kPa (53 kgf·cm^2, 754 psi)

If the rear brake caliper pressure is incorrect, replace the hydraulic brake booster.

3. BLEED BRAKE SYSTEM (See page BR–4)

4. CHECK FOR FLUID LEAKAGE

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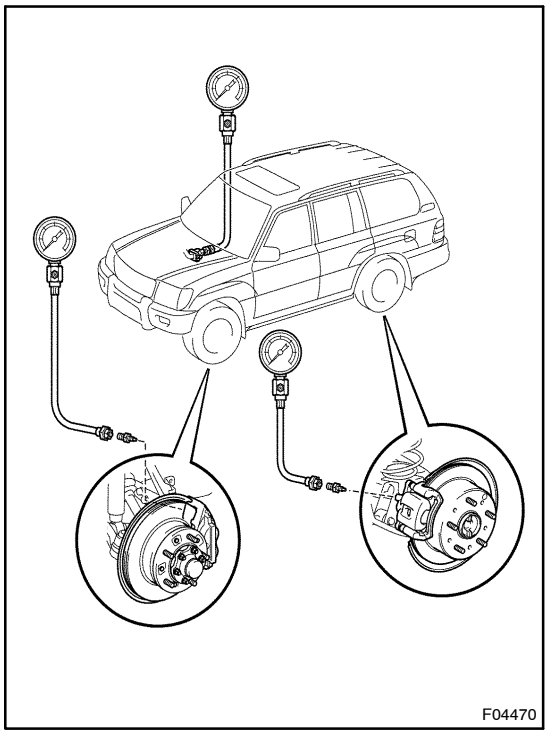

HYDRAULIC BRAKE BOOSTER

BR0TF–01

ON–VEHICLE INSPECTION

1. CHECK HYDRAULIC BRAKE BOOSTER FLUID PRESSURE CHANGE

(a) Inspect the battery positive voltage.

Battery positive voltage: 10 – 14 V

(b) Turn the ignition switch OFF, depress the brake pedal more than 40 times.

HINT:

When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

(c) Install LSPV gauge (SST) and brake pedal effort gauge, bleed air.

SST 09709–29018

(d) When booster does not operate

Depress the brake pedal and check fluid pressure.

At 245 N (25 kgf, 55 lbf):

Front brake pressure	Rear brake pressure
2,700 kPa (27.5 kgf/cm^2, 391 psi) or more	0 kPa (0 kgf/cm^2, 0 psi)

At 343 N (35 kgf, 77 lbf):

Front brake pressure	Rear brake pressure
3,950 kPa (40 kgf/cm^2, 568 psi) or more	0 kPa (0 kgf/cm^2, 0 psi)

(e) When booster operate

(1) Turn the ignition switch ON and wait until the pump motor has stopped.

(2) Depress the brake pedal and check fluid pressure.

At 49 N (5 kgf, 11 lbf):

Front brake pressure	Rear brake pressure
1,821 – 3,146 kPa (16.5 – 28.5 kgf/cm^2, 234 – 405 psi)	1,931 – 3,256 kPa (17.5 – 29.5 kgf/cm^2, 249 – 419 psi)

At 98 N (10 kgf, 22 lbf):

Front brake pressure	Rear brake pressure
4,967 – 6,291 kPa (45 – 57 kgf/cm^2, 639 – 809 psi)	3,587 – 4,911 kPa (32.5 – 44.5 kgf/cm^2, 462 – 632 psi)

At 147 N (15 kgf, 33 lbf):

Front brake pressure	Rear brake pressure
8,112 – 9,437 kPa (73.5 – 85.5 kgf/cm^2, 1,043 – 1,214 psi)	5,187 – 6,511 kPa (47 – 59 kgf/cm^2, 667 – 838 psi)

At 196 N (20 kgf, 44 lbf):

Front brake pressure	Rear brake pressure
11,147 – 12,471 kPa (101 – 113 kgf/cm^2, 1,434– 1,604 psi)	6,789 – 8,112 kPa (61.5 – 73.5 kgf/cm^2, 873 – 1,044 psi)

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2. IN CASE OF USING TOYOTA HAND–HELD TESTER: INSPECT HYDRAULIC BRAKE BOOSTER OPERATION

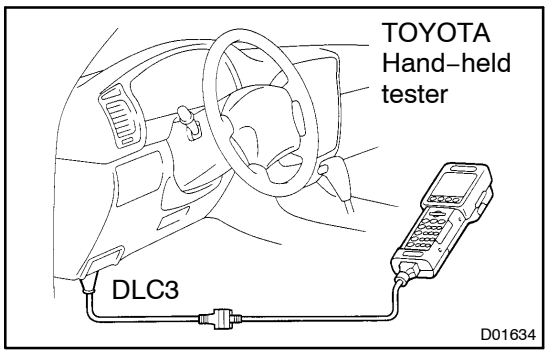
(a) Inspect the battery positive voltage.
Battery positive voltage: 10–14 V

(b) Turn the ignition switch OFF, depress the brake pedal more than 40 times.

HINT:
When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

(c) Turn the ignition switch ON, check the pump motor operation noise.

If the pump motor does not operate, check and replace the wire harness and pump motor.



(d) Connect the TOYOTA hand–held tester.
(1) Connect the TOYOTA hand–held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Select the ”ACTIVE TEST” mode on the TOYOTA hand–held tester.

HINT:
- Please refer to the TOYOTA hand–held tester operator’s manual for further details.
- To protect the solenoids, hand–held tester turns OFF automatically for 2 secs. after every solenoid has been turned ON.

(e) Inspect the front ABS switching solenoid operation.
(1) Select ”SA1” and ”SA2” on the TOYOTA hand–held tester.
(2) With ”SA1” and ”SA2” turned ON simultaneously with the TOYOTA hand–held tester, depress the brake pedal with stable force and check that the pedal cannot be depressed.

HINT:
To protect the solenoids, TOYOTA hand–held tester turns OFF automatically for 2 secs. after every solenoid has been turned ON.

If the pedal can be depressed, replace the hydraulic brake booster.

NOTICE:
When operating it continuously, set the interval of more than 20 seconds.

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(3) Once, release the brake pedal.
(4) When the solenoids are OFF, after depressing the brake pedal again and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(f) Inspect the front ABS solenoid operation.
(1) Select ”SFRH” and ”SFLH” on the TOYOTA hand–held tester.
(2) With ”SFRH” and ”SFLH” turned ON simultaneously with the TOYOTA hand–held tester, depress the brake pedal with stable force and check that the brake pedal cannot be depressed.

HINT:
To protect the solenoids, TOYOTA hand–held tester turns OFF automatically for 2 secs. after every solenoid has been turned ON.

If the pedal can be depressed, replace the hydraulic brake booster.

(3) Once, release the brake pedal when the solenoids are OFF, check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(4) Once, release the brake pedal. After depressing and holding the brake pedal with stable force, turn the SFRH and SFRR solenoids ON simultaneously.

HINT:
To protect the solenoids, TOYOTA hand–held tester turns OFF automatically for 2 secs. after every solenoid has been turned ON.

(5) When the solenoids are OFF, check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(6) Once, release the brake pedal. After depressing and holding the brake pedal with stable force, turn the SFLH and SFLR solenoids ON simultaneously.

HINT:
To protect the solenoids, TOYOTA hand–held tester turns OFF automatically for 2 secs. after every solenoid has been turned ON.

(7) Once release the brake pedal when the solenoids are OFF, check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(g) Jack up and support the vehicle.
(h) Release the parking brake pedal.
(i) Inspect the rear ABS solenoid.

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(1) Select the ”SRH” on the TOYOTA hand–held tester.
(2) Turn the ”SRH” ON with the TOYOTA hand–held tester, and check that the right rear wheel by rotating it by hand.

HINT:

- To protect the solenoids, TOYOTA hand–held tester turns OFF automatically for 2 secs. after every solenoid has been turned ON.
- When rotating the wheel fast, the fail–safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.
- When solenoid is OFF, the wheel might stop temporarily. However if the wheel rotates again, the function works normally.

If the rear wheels stop, replace the hydraulic brake booster.

(3) Once, release the brake pedal turn the ”SRH” OFF, after depressing the brake pedal and check that the rear wheels by stopping it by hand.

HINT:

- To protect the solenoids, TOYOTA hand–held tester turns OFF automatically for 2 secs. after every solenoid has been turned ON.
- When rotating the wheel fast, the fail–safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.

If the rear wheels rotate, replace the hydraulic brake booster.

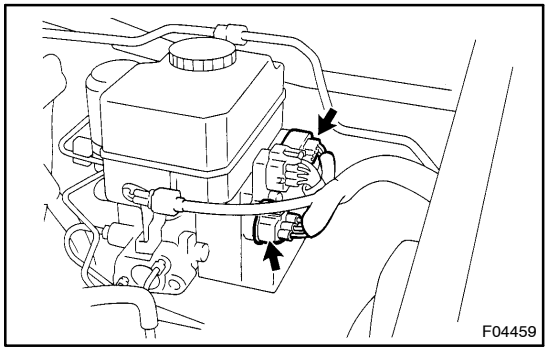
(4) Depress the pedal with stable force, then turn the ”SRH” and ”SRR” ON simultaneously.
(5) When the solenoids are ON, check that the right rear wheel by rotating it by hand.

(j) Lower the vehicle.
(k) Disconnect the TOYOTA hand–held tester.

3. IN CASE OF USING ABS ACTUATOR CHECKER (SST):

INSPECT HYDRAULIC BRAKE BOOSTER OPERATION

(a) Inspect the battery positive voltage.
Battery positive voltage: 10 – 14 V



(b) Disconnect the 2 connectors from hydraulic brake booster.
(c) Connect the actuator checker (SST) to the hydraulic brake booster side wire harness via the sub–wire harness (SST), as shown in the chart on the next page.
SST 09990–00150, 09990–00480

HINT:

Connect the connector with the label of ”FRONT” attached to the connector of actuator checker.

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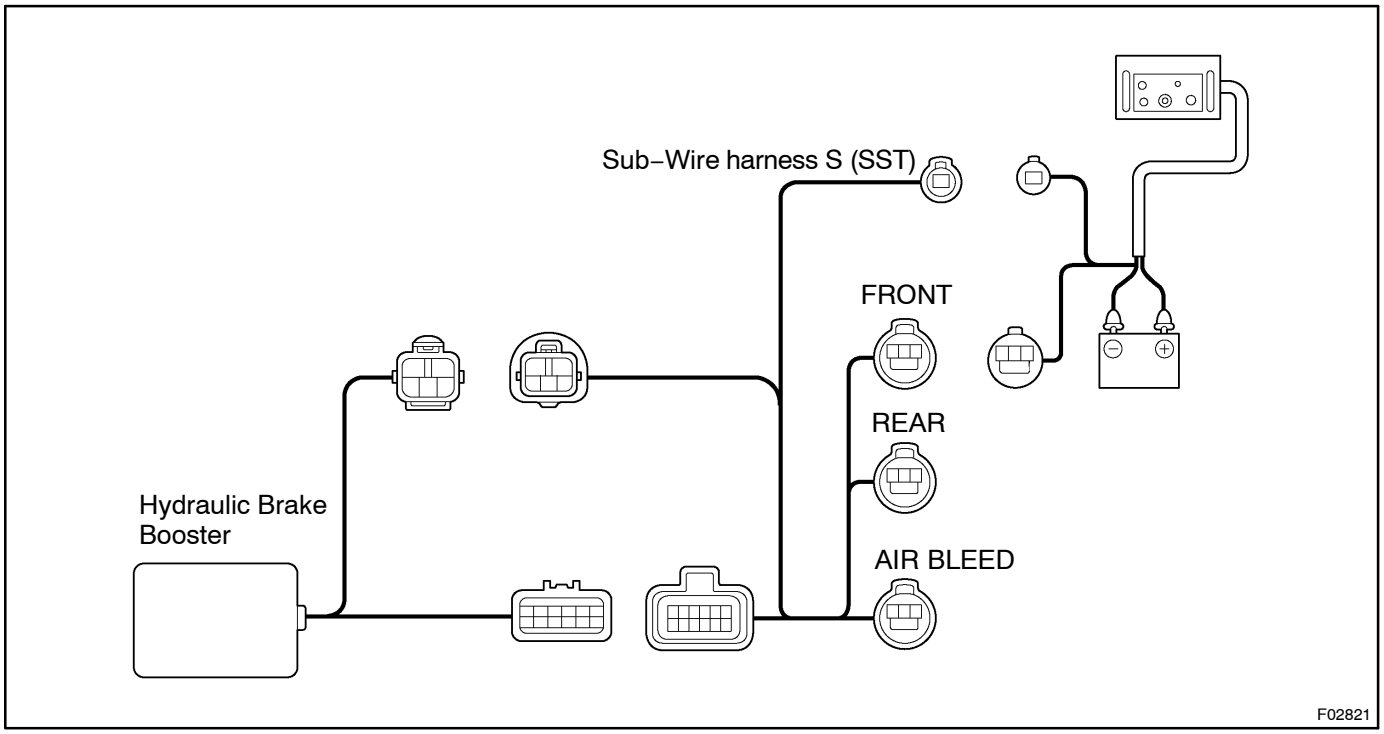
(d) Connect the red cable of the checker to the battery positive (+) terminal and the black cable to the negative (–) terminal.



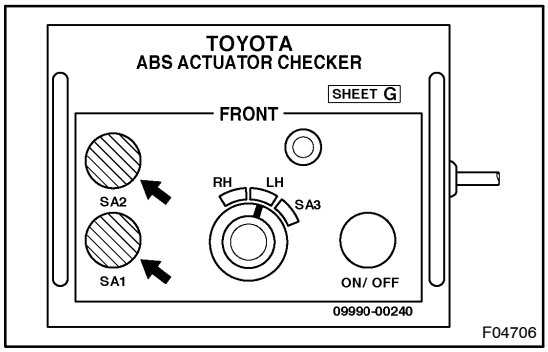
(e) Place "SHEET G" (SST) of "FRONT" on actuator checker.
SST 09990–00240

(f) Turn the ignition switch OFF, depress the brake pedal more than 40 times.

HINT:
When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

(g) Turn the ignition switch ON, check the pump motor operation noise.

If the pump motor does not operate, check and replace the wire harness and pump motor.



(h) Inspect the front ABS switching solenoid operation.
(1) Push in and hold the "SA1" and "SA2" switches simultaneously, depress strongly and hold the brake pedal with stable force.

NOTICE:
Do not keep the "SA1" and "SA2" pushed down for more than 10 seconds. When operating it continuously, set the interval of more than 20 seconds.

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(2) Check that the brake pedal cannot be depressed.

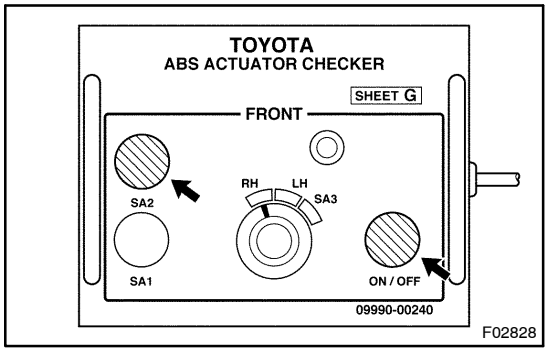
If the pedal can be depressed, replace the hydraulic brake booster.

(3) Release the ”SA1” switch and check that the brake pedal can be depressed.

If the pedal can be depressed, replace the hydraulic brake booster.

(4) Release the ”SA2” switch and check that the brake pedal can be depressed.

If the pedal can be depressed, replace the hydraulic brake booster.



(i) Inspect the right front ABS solenoid operation.

(1) Turn the selector switch to ”RH” position.

(2) Push and hold in the MAIN push switch and ”SA2” switch simultaneously depress and hold the brake pedal with stable force.

NOTICE:

Do not keep the MAIN push switch and ”SA2” switch pushed down for more than 10 seconds. When operating it continuously, set the interval of more than 20 seconds.

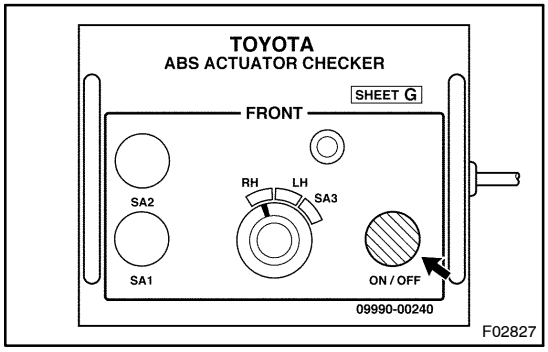
(3) Check that the brake pedal cannot be depressed.

If the pedal can be depressed, replace the hydraulic brake booster.

(4) Release the MAIN push switch and ”SA2” switch simultaneously and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(5) Release the brake pedal.



(6) Depress and hold the brake pedal with stable force, push and hold in MAIN push switch.

NOTICE:

Do not keep the MAIN push switch pushed down for more than 10 seconds. When operating it continuously, set the interval of more than 20 seconds.

(7) Check that the brake pedal cannot be depressed.

If the pedal can be depressed, replace the hydraulic brake booster.

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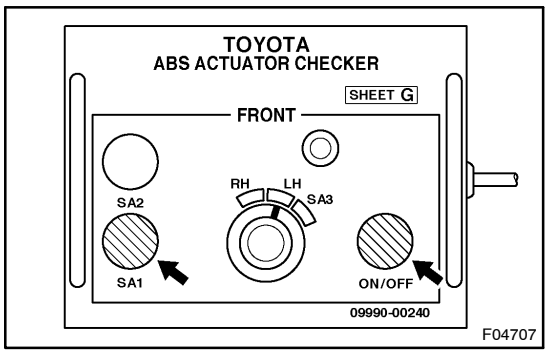
(8) Release the MAIN push switch, and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(9) Release the brake pedal.



(j) Inspect the left front ABS solenoid operation.

(1) Turn the selector switch to ”LH” position.

(2) Push and hold in the MAIN push switch and ”SA1” switch simultaneously, depress and hold the brake pedal with stable force.

NOTICE:

Do not keep the MAIN push switch and ”SA1” switch pushed down for more than 10 seconds. When operating it continuously, set the interval of more than 20 seconds.

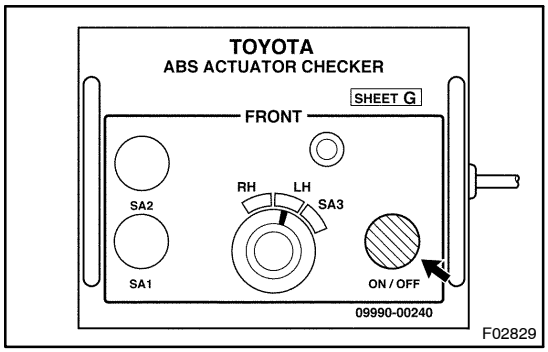
(3) Check that the brake pedal cannot be depressed.

If the pedal can be depressed, replace the hydraulic brake booster.

(4) Release the MAIN push switch and ”SA1” switch simultaneously, and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(5) Release the brake pedal.



(6) Depress and hold the brake pedal with stable force, push and hold in MAIN push switch.

NOTICE:

Do not keep the MAIN push switch pushed down for more than 10 seconds. When operating it continuously, set the interval of more than 20 seconds.

(7) Check that the brake pedal cannot be depressed.

If the pedal can be depressed, replace the hydraulic brake booster.

(8) Release the MAIN push switch, and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(9) Release the brake pedal.

(k) Turn the ignition switch OFF, then reconnect the connector of sub–wire harness from the one with label of ”FRONT” to ”REAR”.

(l) Place ”SHEET G” of ”REAR” on the actuator checker.

(m) Jack up and support the vehicle.

(n) Start the engine and run it at idle.

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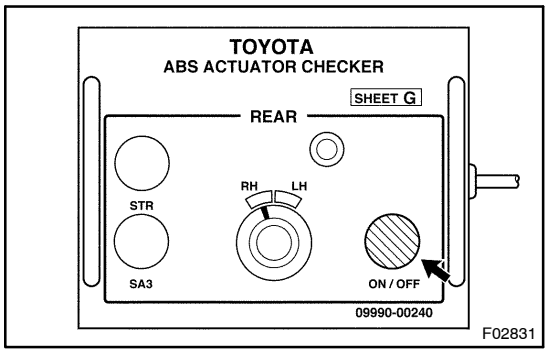

(o) Inspect the rear ABS position.
  (1) Turn the selector switch to ”RH” position.
  (2) Depress the brake pedal several times and release the pedal when the pump begins rotating. Wait until the pump stops.
  (3) Turn the ignition switch OFF.
  (4) With the brake pedal with a force of 343 N (35 kgf, 77 lbf) check the fluid surface in the reservoir tank of the hydro booster.
  (5) Press the MAIN push switch for 10 secs., and check that the fluid surface in the reservoir tank of the hydro booster does not rise up at this time.

NOTICE:
Do not press MAIN push switch for more than 10 secs. When operating the switch continuously, do it an interval of more than 20 secs
If the fluid surface level rises up, replace the hydro booster.

  (6) Check that brake pedal is not hard to depress.

If pedal is hard to depress, replace the hydraulic brake booster.

  (7) Start the engine and run it at idle.
  (8) Depress the brake pedal.
  (9) Release the parking brake pedal and shift the shift lever to ”L” position.
  (10) Once, release the brake pedal. After depressing the brake pedal with stable force, then push and hold MAIN push switch.
  (11) Check that the right rear wheel rotates.

If the right rear wheels stops, replace the hydraulic brake booster.

(p) Stop the engine and lower the vehicle.
(q) Remove the ”SHEET G” (SST) and disconnect the actuator checker (SST) and sub–wire harness (SST) from the hydraulic brake booster.
(r) Connect the 2 connectors to the actuator.
(s) Clear the DTC (See page DI–219).

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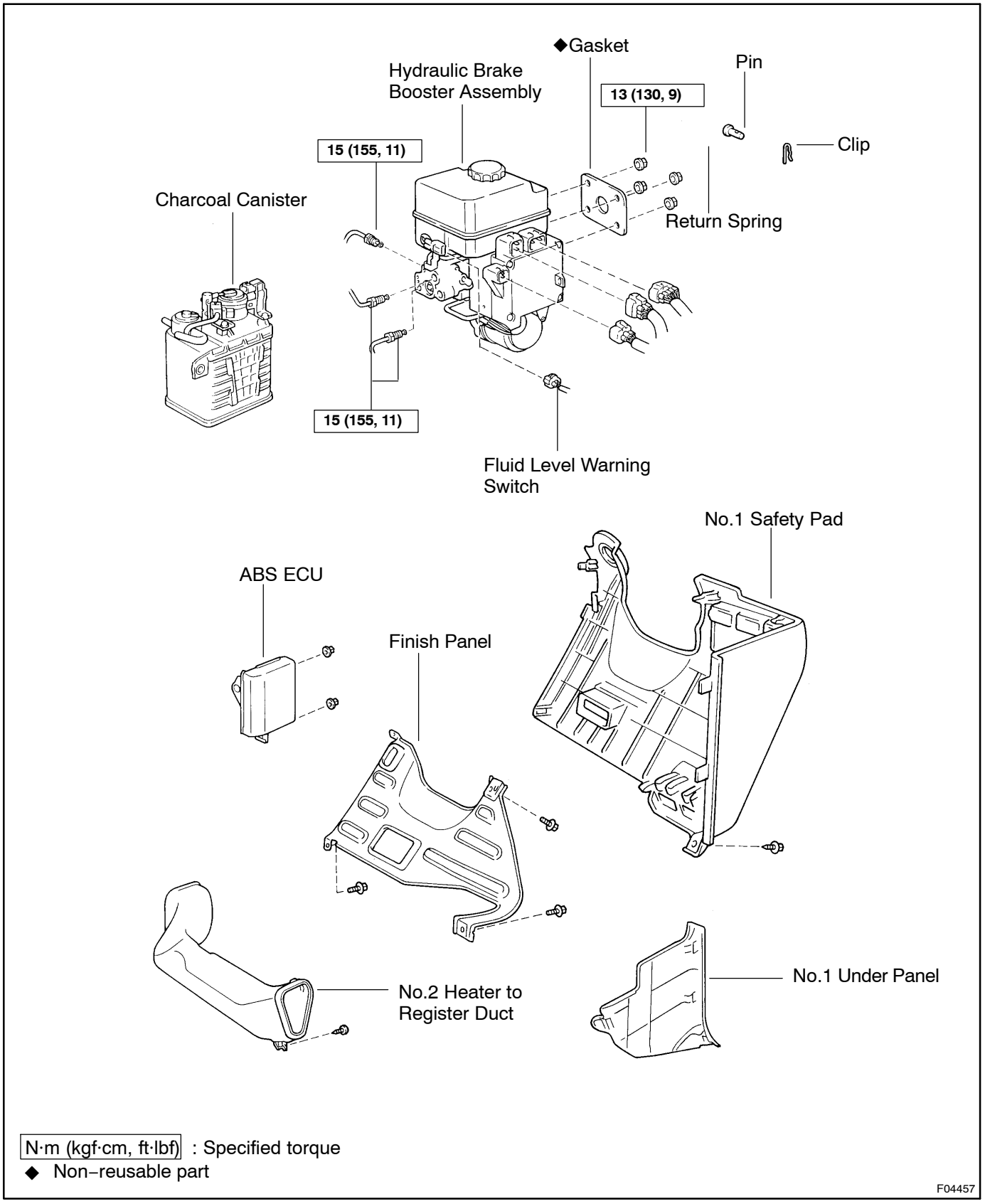
BR0K8–03

COMPONENTS



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

◆ Non–reusable part

F04457

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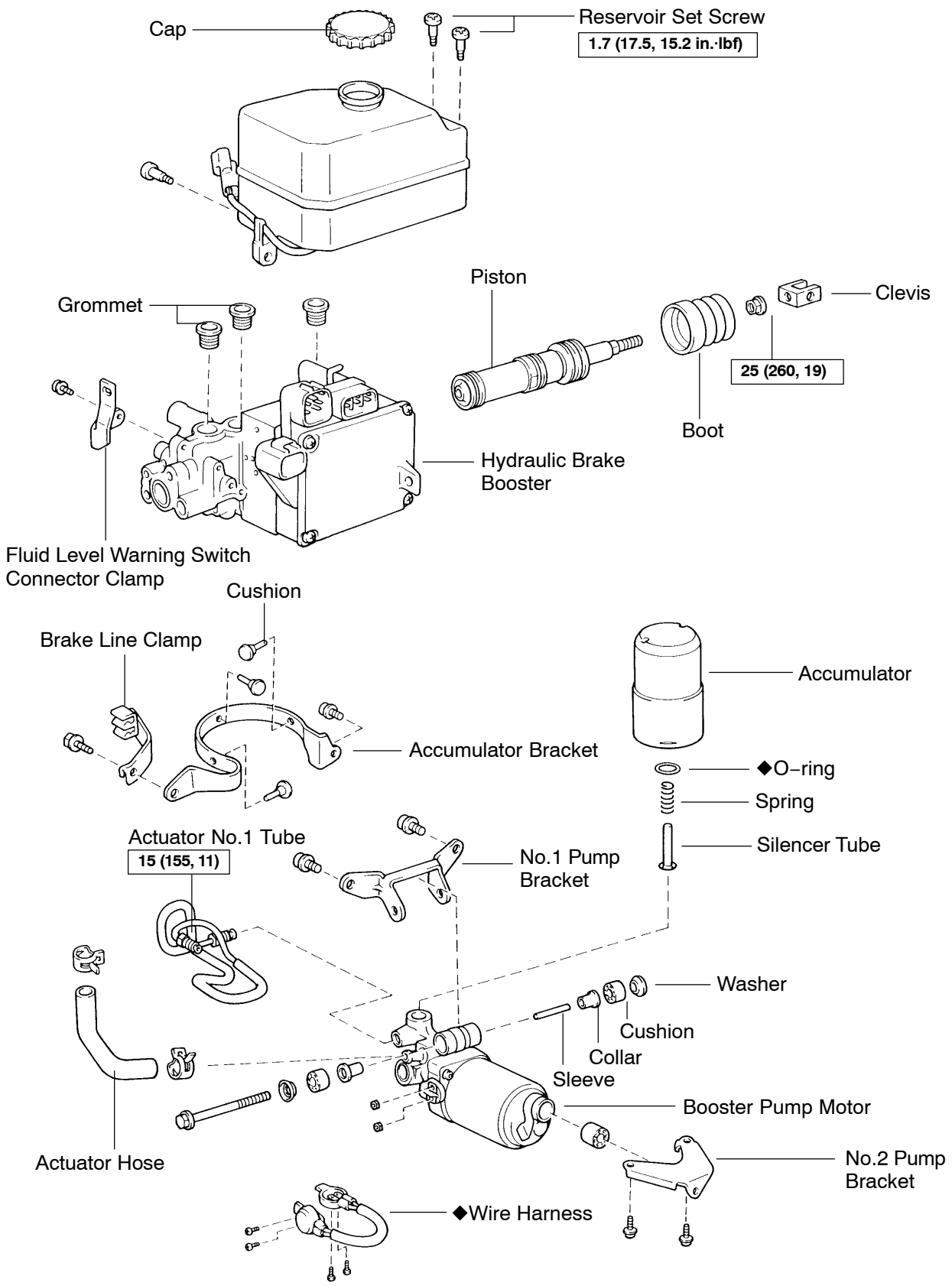

N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part

F04474

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BR0TG–01

REMOVAL

NOTICE:

- **Before starting the work, make sure that the ignition switch is OFF and depress the brake pedal more than 40 times.**

HINT:

When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

- **As high pressure is applied to the brake actuator tube No.1, never deform it.**
- **Until the work is over, do not turn the ignition switch ON.**

1. DRAW OUT FLUID WITH SYRINGE

NOTICE:

Do not let brake fluid remain on a painted surface. Wash it off immediately.

2. REMOVE No.1 UNDER PANEL (See page BO–86)

3. REMOVE No.1 SAFETY PAD (See page BO–86)

4. REMOVE FINISH PANEL (See page BO–86)

5. REMOVE No.2 HEATER TO REGISTER DUCT (See page BO–86)

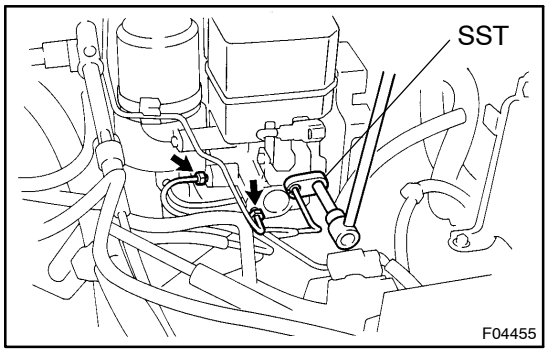
6. REMOVE ABS ECU

Remove the 2 nuts and ABS ECU.

Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

7. REMOVE CHARCOAL CANISTER

8. DISCONNECT LEVEL WARNING SWITCH CONNECTOR

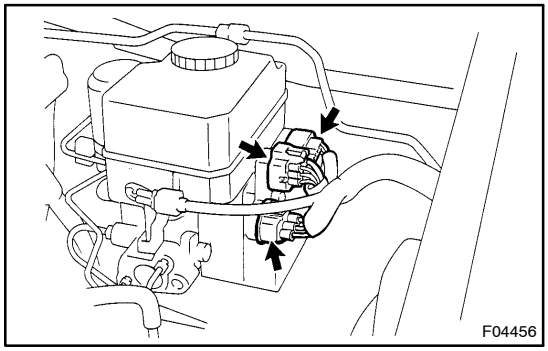


9. DISCONNECT BRAKE LINES

Using SST, disconnect the 3 brake lines.

SST 09023–00100

Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)



10. DISCONNECT 3 CONNECTORS

11. REMOVE PEDAL RETURN SPRING, CLIP AND CLEVIS PIN

12. REMOVE HYDRAULIC BRAKE BOOSTER ASSEMBLY

(a) Remove the 4 booster installation nuts.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(b) Remove the booster assembly and gasket.

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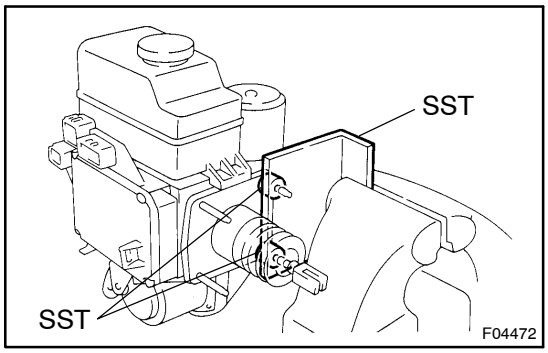
BR0KA–03

DISASSEMBLY



1. PLACE HYDRAULIC BRAKE BOOSTER IN VISE

Using SST, set the hydraulic brake booster in vise.

SST 09630–00014 (09631–00142),
09950–60010 (09951–00180, 09951–00190)

2. REMOVE RESERVOIR AND GROMMETS

(a) Remove reservoir cap.

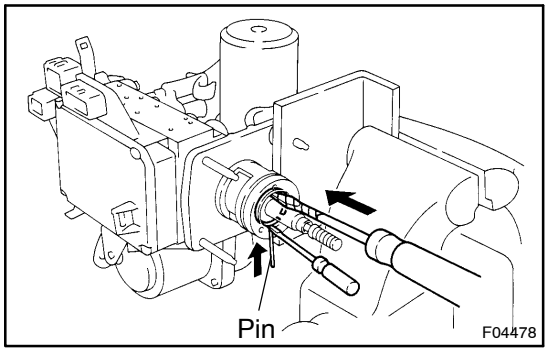
(b) Remove the 3 set screws and pull out the reservoir.
Torque: 1.7 N·m (17.5 kgf·cm, 15.2 in.·lbf)

(c) Remove the 3 grommets.

3. REMOVE CLEVIS AND CYLINDER BOOT

(a) Loosen the lock nut, then remove the clevis and lock nut.
Torque: 25 N·m (260 kgf·cm, 19 ft·lbf)

(b) Remove the cylinder boot.



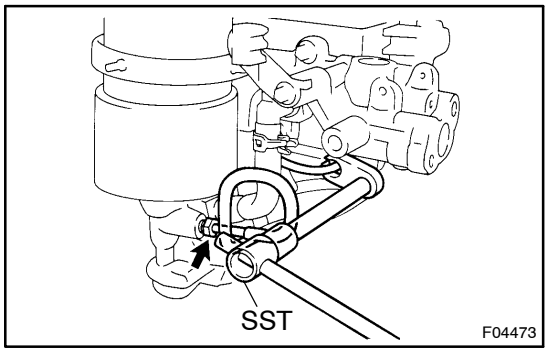
4. REMOVE PISTON

(a) Pressing the piston in with a screwdriver, use a pin or an equivalent to push the snap ring from the hole in the body then remove it with another screwdriver.

(b) Remove the piston, pulling straight out, not at an angle.

NOTICE:

- **If pulled out and installed at an angle, there is a possibility that the cylinder bore could be damaged.**
- **At the time of reassembly, be careful not to damage the rubber lips on the pistons.**



5. REMOVE BRAKE ACTUATOR TUBE NO.1

Using SST, remove the brake actuator tube No.1.

SST 09023–00100
Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)

6. REMOVE BOOSTER PUMP AND ASSEMBLY

(a) Remove the actuator hose.

(b) Remove the 4 screws and wire harness from the booster and pump.

(c) Remove the 2 bolts, accumulator bracket and brake line clamp.

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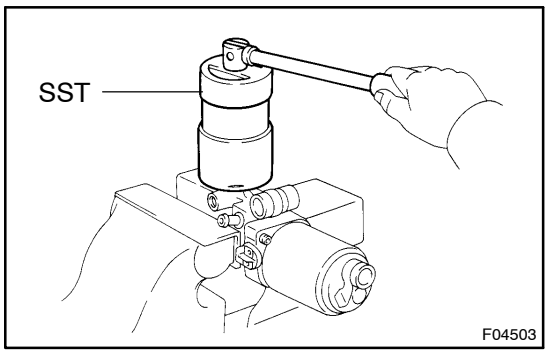
(d) Remove the 2 bolts and booster pump assembly.
(e) Remove the bolt and No.1 pump bracket.
(f) Remove the 2 washers, 2 cushions, 2 collars and sleeve.
(g) Remove the 2 bolts and No.2 pump bracket.
(h) Remove the cushion from No.2 pump bracket.



7. REMOVE ACCUMULATOR FROM BOOSTER PUMP

(a) Using SST, remove the accumulator.
SST 09318–12010
Torque: 54 N·m (550 kgf·cm, 36 ft·lbf)
(b) Remove the silencer tube, spring and O–ring.

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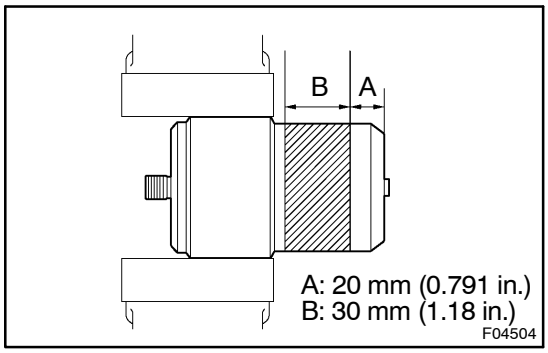
BR0TH–01



DISPOSAL

DISPOSAL METHOD OF ACCUMULATOR

(a) Follow the procedures described below and drain the high pressure fluid from the accumulator.

(b) Place the accumulator in a vise, cover it with a cloth over a saw then cut the accumulator body slowly.

CAUTION:

Never cut at a stretch.

(c) When the outer body of the accumulator is cut, gas discharges.

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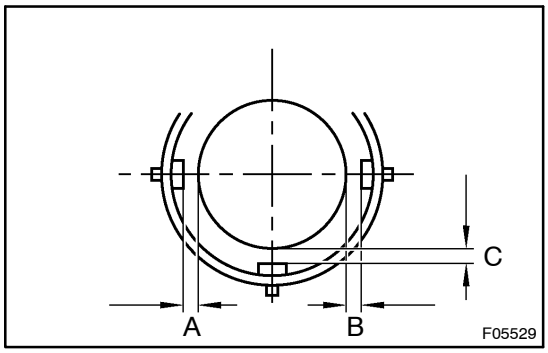
BR0TI–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR–47).



INSTALL ACCUMULATOR BRACKET

When installing the accumulator bracket, adjust to secure the clearance shown in the illustration on the left.

Standard clearance:

A + B: 4.1 mm (0.161 in.) or less

C: 0.3 mm (0.012 – 0.150 in.)

HINT:

Secure more than 0.3 mm (0.012 in.) clearance for A and B each.

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BR0KD–01

INSTALLATION

Installation is in the reverse order of removal (See page BR–46).

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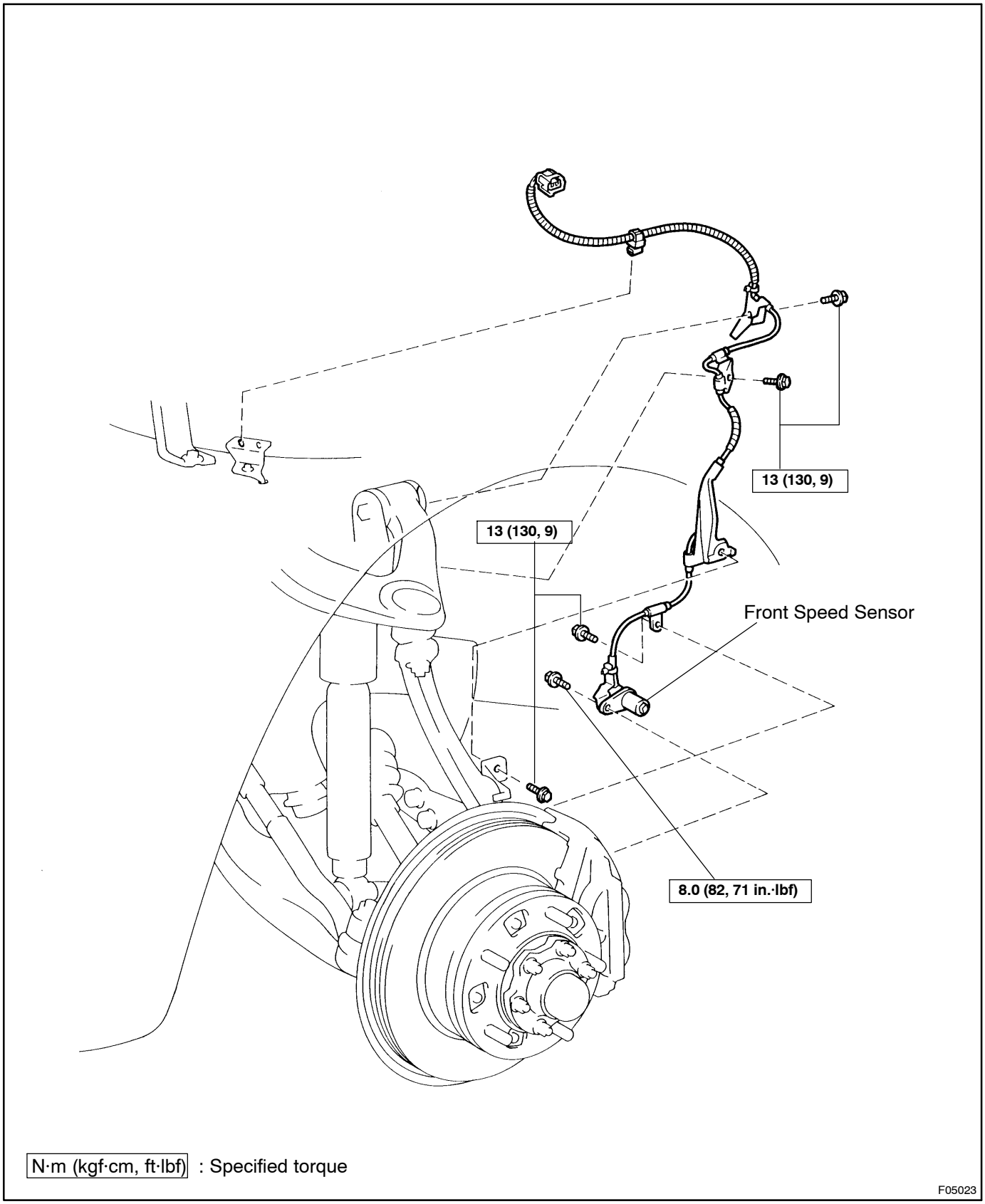
FRONT SPEED SENSOR

COMPONENTS

BR0K1–03



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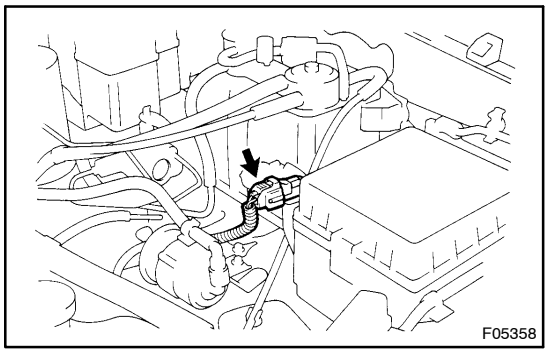
BR0K2–03

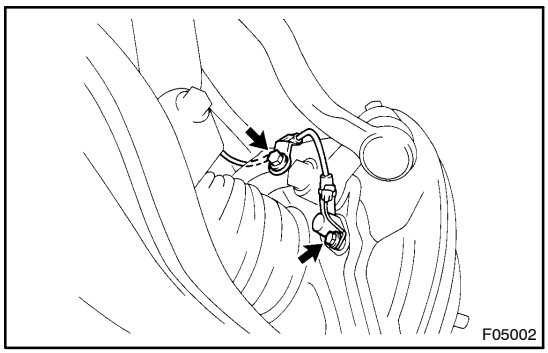


REMOVAL

REMOVE SPEED SENSOR

(a) Disconnect the speed sensor connector.

(b) Remove the resin clip and 4 clamp bolts holding the sensor harness from the steering knuckle and upper arm.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)



(c) Remove the speed sensor installation bolt and speed sensor from the steering knuckle.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

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BR0K3–01

INSTALLATION

Installation is in the reverse order of removal (See page BR–53).
AFTER INSTALLATION, CHECK SPEED SENSOR SIGNAL (See page DI–219)

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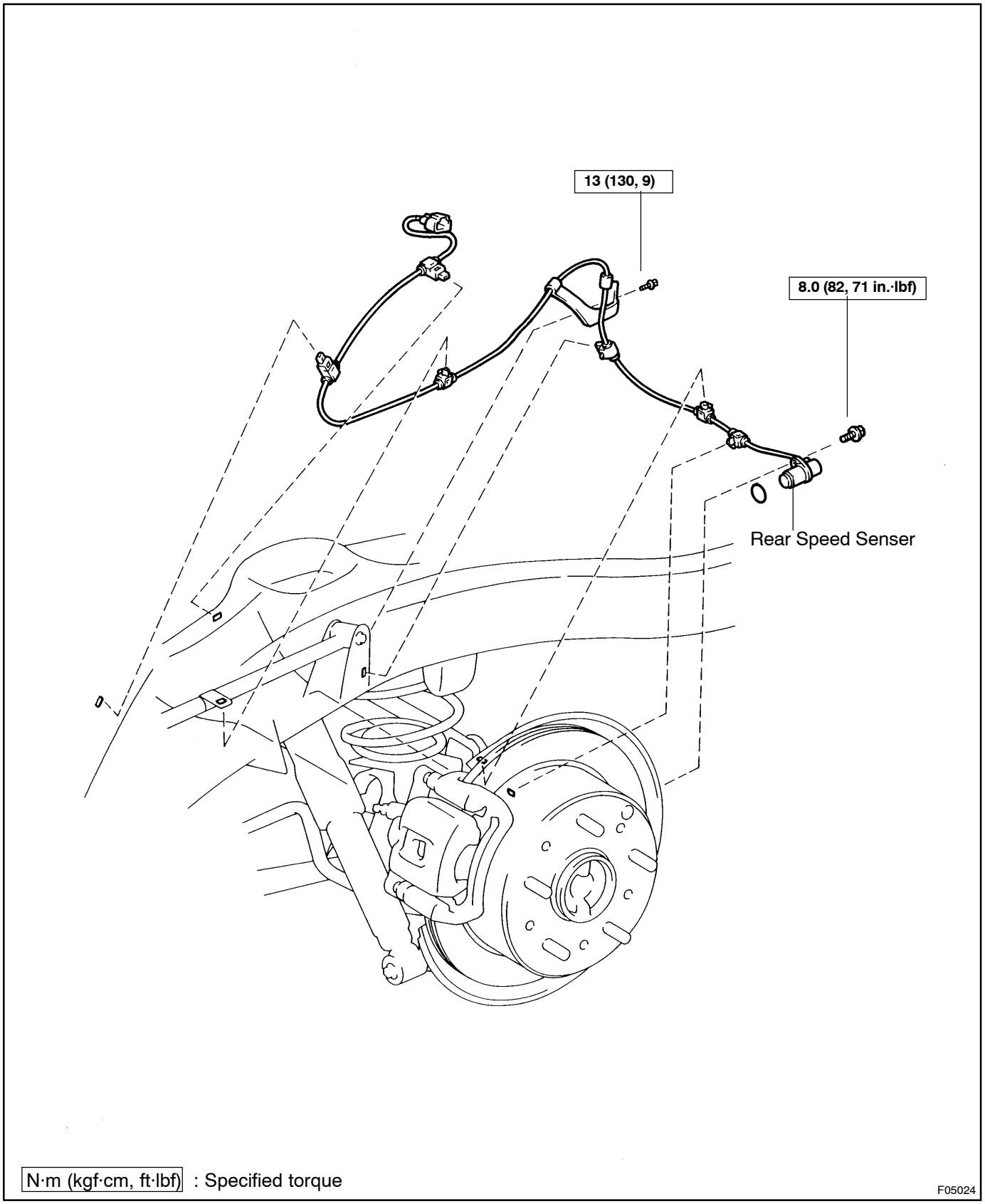
REAR SPEED SENSOR

COMPONENTS

BR0K4–03



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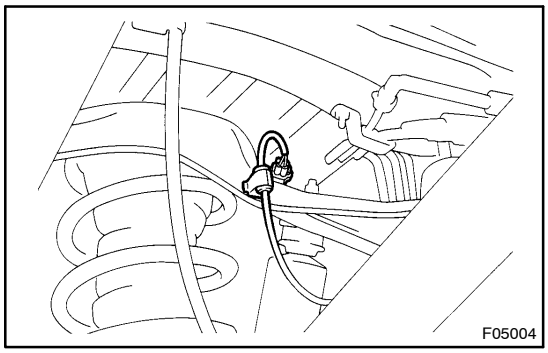
BR0K5–03



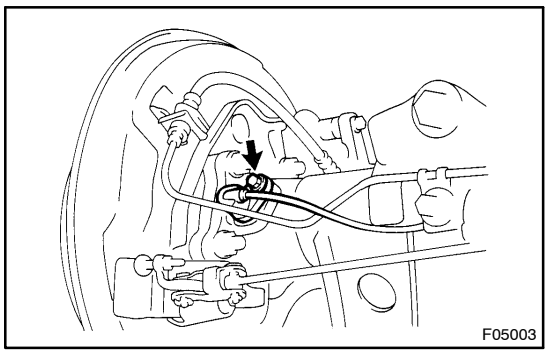
REMOVAL

REMOVE SPEED SENSOR

(a) Disconnect the speed sensor connector.

(b) Remove the clamp bolt from the upper control bracket.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(c) Remove the 5 resin clips, holding the sensor wire harness from the frame, upper control arm and axle housing.



(d) Remove the mounting bolt and speed sensor.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

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BR0K6–01

INSTALLATION

Installation is in the reverse order of removal (See page BR–56).
AFTER INSTALLATION, CHECK SPEED SENSOR SIGNAL (See page DI–219).

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STEERING SYSTEM

SR0LU–01

PRECAUTION

- **Care must be taken to replace parts properly because they could affect the performance of the steering system and result in a driving hazard.**
- **The LAND CRUISER is equipped with SRS (Supplemental Restraint System) such as the driver airbag and front passenger airbag. Failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deployed 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.**

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TROUBLESHOOTING

PROBLEM SYMPTOMS TABLE

SR0LV–01

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in the order shown. If necessary, repair or replace these parts.

Symptom	Suspect Area	See page
Hard steering	1. Tires (Improperly inflated)	SA–3
	2. Power steering fluid level (Low)	SR–5
	3. Drive belt (Loose)	–
	4. Front wheel alignment (Incorrect)	SA–5
	5. Steering system joints (Worn)	–
	6. Suspension arm ball joints (Worn)	SA–68 SA–73
	7. Steering column (Binding)	–
	8. Power steering gear	SR–43
Poor return	1. Tires (Improperly inflated)	SA–3
	2. Front wheel alignment (Incorrect)	SA–5
	3. Steering column (Binding)	–
	4. Power steering gear	SR–43
Excessive play	1. Steering system joints (Worn)	–
	2. Suspension arm ball joints (Worn)	SA–68 SA–73
	3. Intermediate shaft, Universal joint, Sliding yoke (Worn)	–
	4. Front wheel bearing (Worn)	SA–9
	5. Power steering gear	SR–43
Abnormal noise	1. Power steering fluid level (Low)	SR–5
	2. Steering system joints (Worn)	–
	3. Power steering gear	SR–43

HINT:

When the problem occurs on the power tilt and telescopic steering system, refer to the DI section. (See page DI–306)

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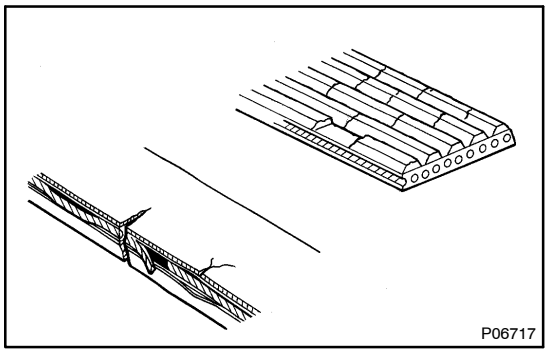

DRIVE BELT

SR0LW–01

INSPECTION

INSPECT DRIVE BELT

(a) Visually check the belt for excessive wear, frayed cords etc.

If any defect has been found, replace the drive belt.

HINT:

Cracks on the rib side of a belt are considered acceptable. If the belt has chunks missing from the ribs, it should be replaced.

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POWER STEERING FLUID

SR0LX–01

BLEEDING

1. **CHECK FLUID LEVEL**
   (See page SR–5)
2. **JACK UP FRONT OF VEHICLE AND SUPPORT IT WITH STANDS**
3. **TURN STEERING WHEEL**

With the engine stopped, turn the wheel slowly from lock to lock several times.

4. **LOWER VEHICLE**
5. **START ENGINE**

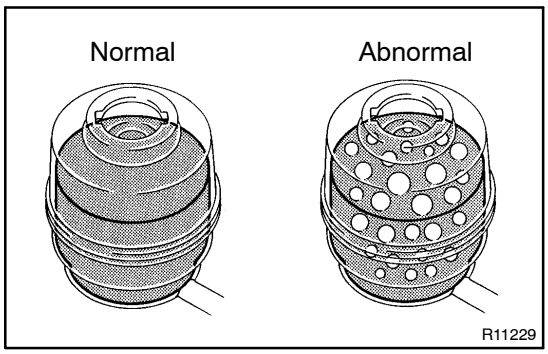
Run the engine at idle for a few minutes.

6. **TURN STEERING WHEEL**

(a) With the engine idling, turn the wheel to left or right full lock position and keep it there for 2–3 seconds, then turn the wheel to the opposite full lock position and keep it there for 2–3 seconds.

(b) Repeat (a) several times.

7. **STOP ENGINE**



8. **CHECK FOR FOAMING OR EMULSIFICATION**

If the system has to be bled twice specifically because of foaming or emulsification, check for fluid leaks in the system.

9. **CHECK FLUID LEVEL**
   (See page SR–5)

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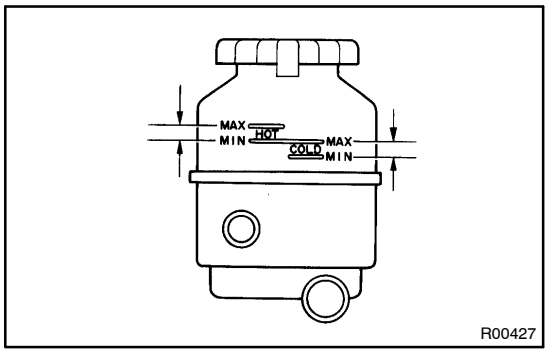
SR0LY–01



INSPECTION

1. CHECK FLUID LEVEL

(a) Keep the vehicle level.

(b) With the engine stopped, check the fluid level in the oil reservoir.

If necessary, add fluid.

Fluid: ATF DEXRON® II or III

HINT:

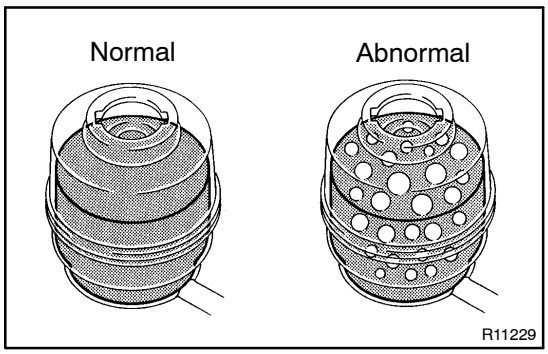
Check that the fluid level is within the HOT LEVEL range on the reservoir.

If the fluid is cold, check that it is within the COLD LEVEL range.

(c) Start the engine and run it at idle.

(d) Turn the steering wheel from lock to lock several times to boost fluid temperature.

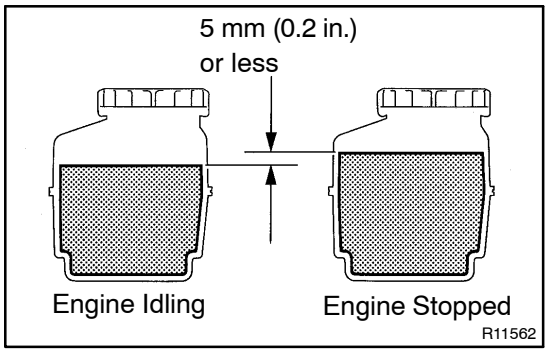
Fluid temperature: 80˚C (176˚F)



(e) Check for foaming or emulsification.

If there is foaming or emulsification, bleed power steering system.

(See page SR–4)



(f) With the engine idling, measure the fluid level in the oil reservoir.

(g) Stop the engine.

(h) Wait a few minutes and remeasure the fluid level in the oil reservoir.

Maximum fluid level rise: 5 mm (0.20 in.)

If a problem is found, bleed power steering system.

(See page SR–4)

(i) Check the fluid level.

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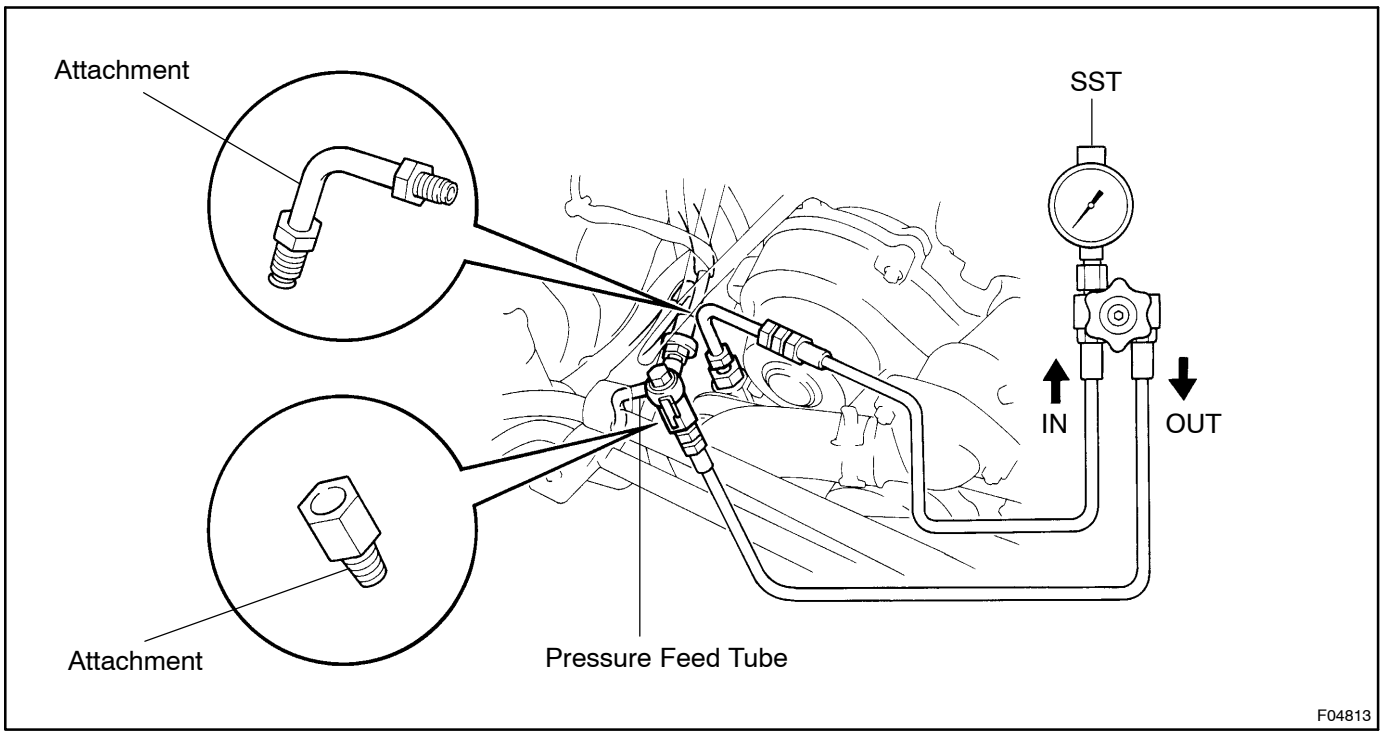
2. CHECK STEERING FLUID PRESSURE

(a) Remove the air cleaner assembly with air cleaner hose.
(See page SR–35)

(b) Disconnect the pressure feed tube from the PS vane pump.
(See page SR–35)

(c) Connect SST, as shown below.
SST 09640–10010 (09641–01010, 09641–01030, 09641–01060)

NOTICE:
Check that the valve of the SST is in the open position.



(d) Bleed the power steering system.
(See page SR–4)

(e) Start the engine and run it at idle.

(f) Turn the steering wheel from lock to lock several times to boost fluid temperature.
Fluid temperature: 80 °C (176 °F)

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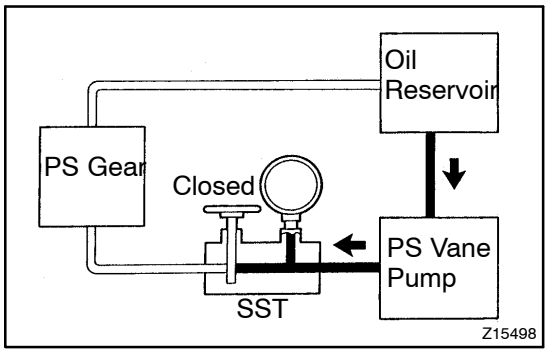
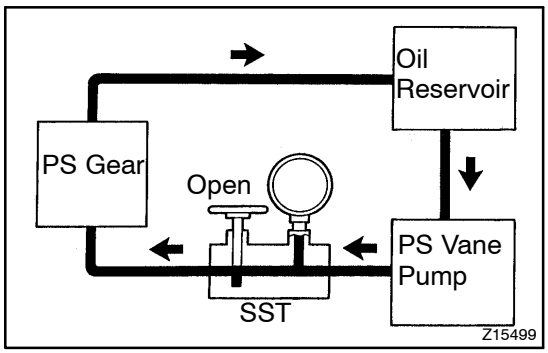


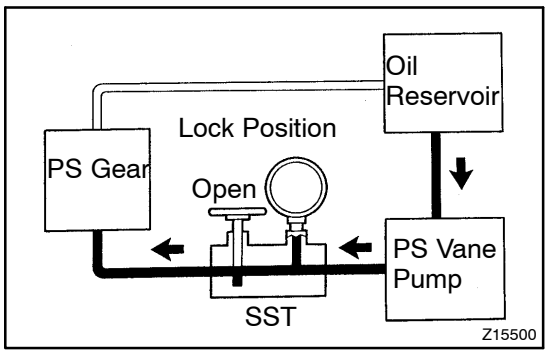
(g) With the engine idling, close the valve of the SST and observe the reading on the SST.
Minimum fluid pressure:
8,336 kPa (85 kgf/cm^2, 1,209 psi)

NOTICE:
- **Do not keep the valve closed for more than 10 seconds.**
- **Do not let the fluid temperature become too high.**



(h) With the engine idling, open the valve fully.
(i) Measure the fluid pressure at engine speeds of 1,000 rpm and 3,000 rpm.
Difference fluid pressure:
490 kPa (5 kgf/cm^2, 71 psi) or less

NOTICE:
Do not turn the steering wheel.



(j) With the engine idling and valve fully opened, turn the steering wheel to full lock.
Minimum fluid pressure:
8,336 kPa (85 kgf/cm^2, 1,209 psi)

NOTICE:
- **Do not maintain lock position for more than 10 seconds.**
- **Do not let the fluid temperature become too high.**

(k) Disconnect the SST.
(l) Connect the pressure feed tube.
(See page SR–42)
(m) Install the air cleaner assembly with air cleaner hose.
(See page SR–42)
(n) Bleed the power steering system.
(See page SR–4)

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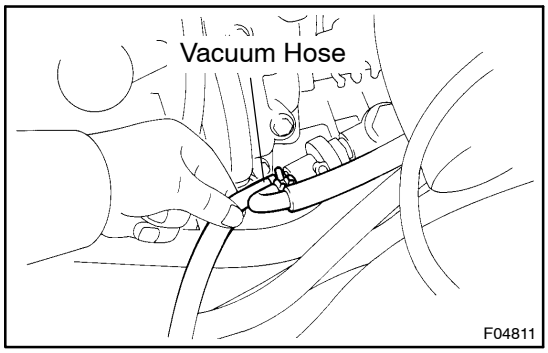

AIR CONTROL VALVE

SR0LZ–01

INSPECTION

1. TURN AIR CONDITIONING SWITCH OFF

2. CHECK IDLE–UP

(a) Start the engine and run it at idle.

(b) Fully turn the steering wheel.

(c) Check that the engine rpm decreases when the vacuum hose of the air control valve is pinched.

(d) Check that the engine rpm increases when the hose is released.

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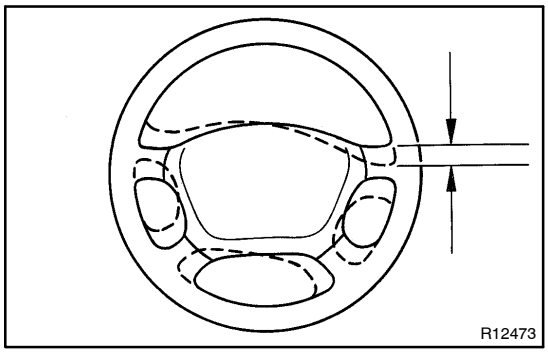


STEERING WHEEL

SR0M0–01

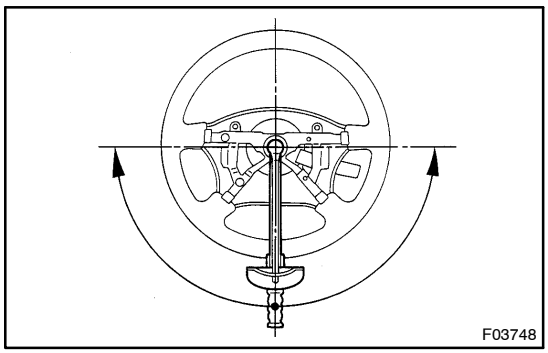
INSPECTION

1. CHECK STEERING WHEEL FREEPLAY

With the vehicle stopped and tires pointed straight ahead, rock the steering wheel gently back and forth with light finger pressure.

Freeplay should not exceed the maximum.

Maximum freeplay: 40 mm (1.58 in.)



2. CHECK STEERING EFFORT

(a) Center the steering wheel.

(b) Remove the steering wheel pad.
(See page SR–12)

(c) Start the engine and run it at idle.

(d) Measure the steering effort in both directions.

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

HINT:

Be sure to consider the tire type, pressure and contact surface before making your diagnosis.

(e) Torque the steering wheel set nut.

Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

(f) Install the steering wheel pad.
(See page SR–21)

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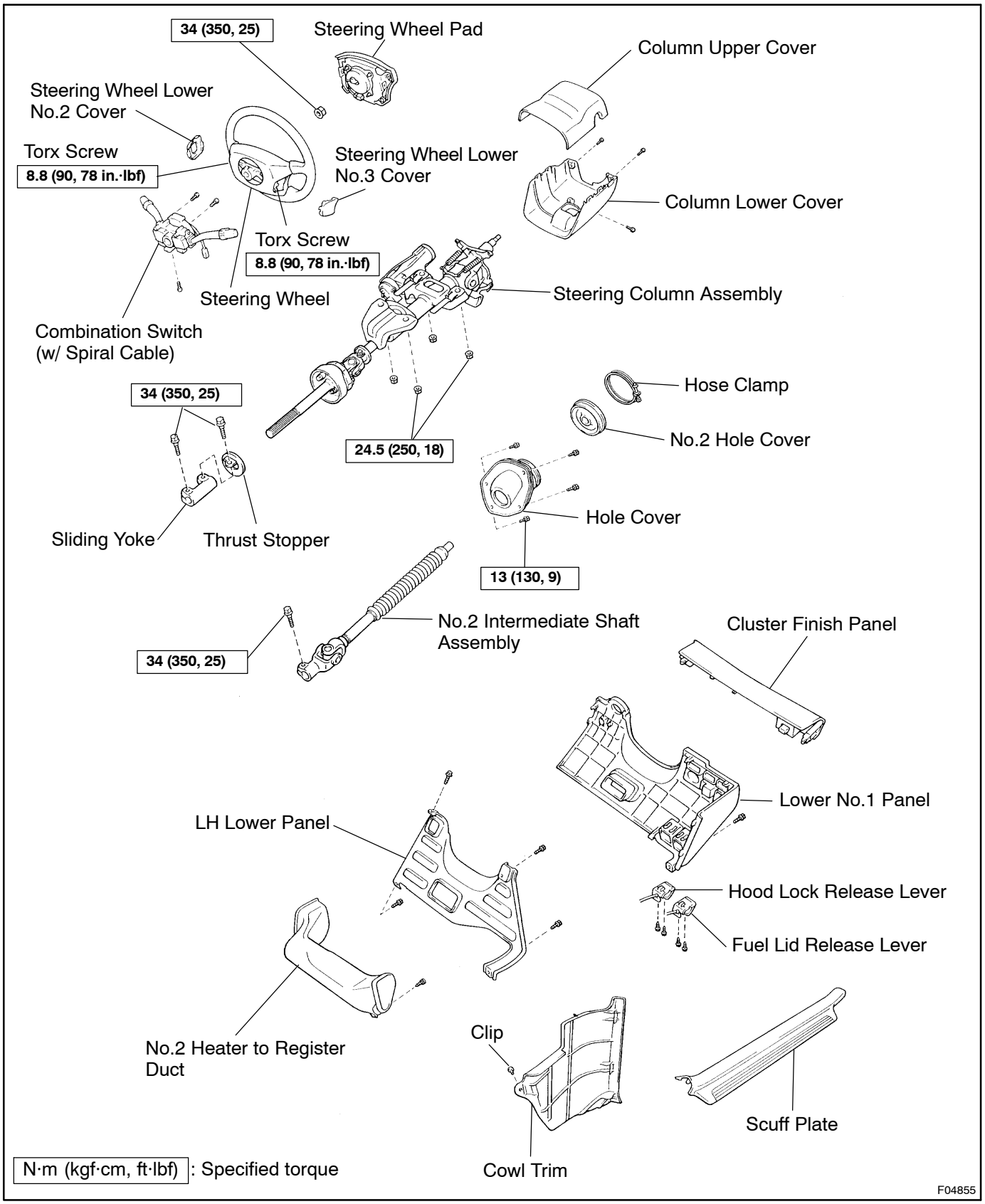
TILT STEERING COLUMN

COMPONENTS

SR0M1–01



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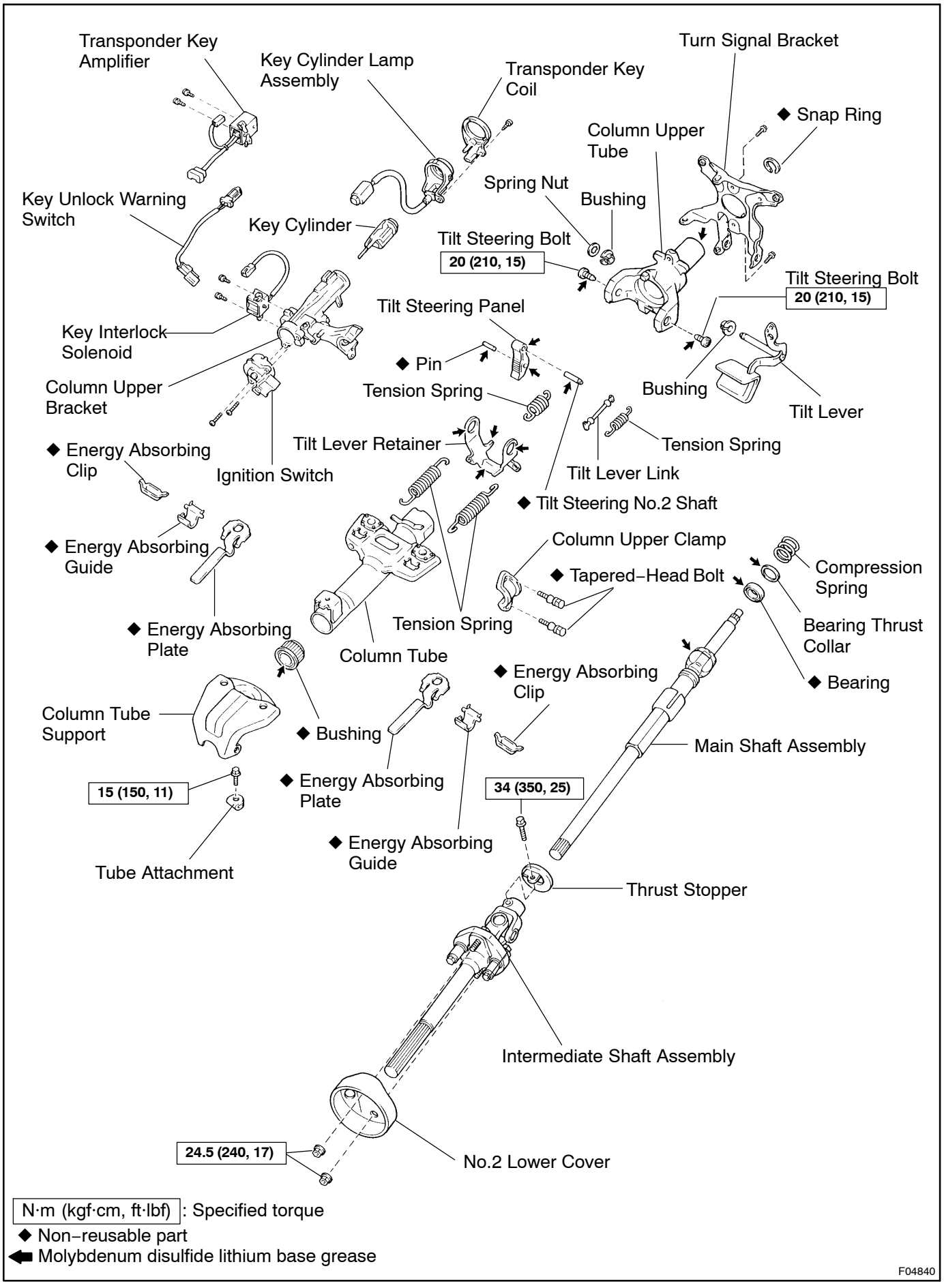

N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
⬅ Molybdenum disulfide lithium base grease

F04840

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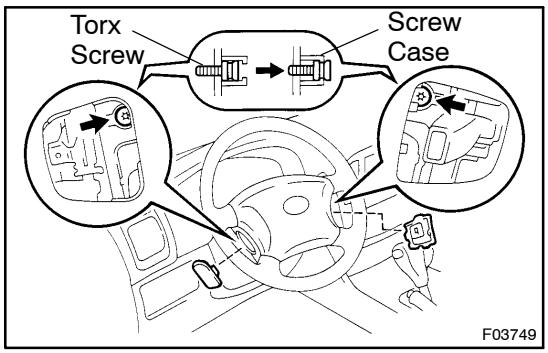
SR0M2–01

REMOVAL

1. REMOVE STEERING WHEEL PAD

NOTICE:

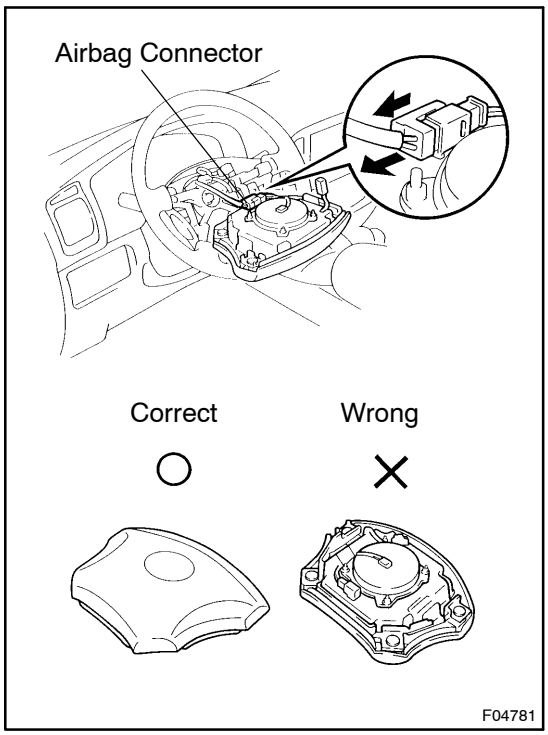
- **If the airbag connector is disconnected with the ignition switch at ON or ACC, DTCs will be recorded.**
- **Never use airbag parts from another vehicle. When replacing parts, replace with new ones.**



(a) Place the front wheels facing straight ahead.
(b) Remove the steering wheel lower No.2 and No.3 covers.
(c) Using a torx socket wrench, loosen the 2 torx screws.

HINT:

Loosen the 2 screws until the groove along the screw circumference catches on the screw case.



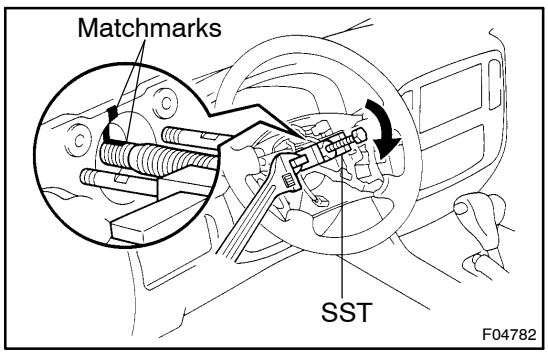
(d) Pull the pad out from the steering wheel and disconnect the airbag connector.
(e) Disconnect the connector.

CAUTION:

- **When storing the wheel pad, keep the upper surface of the pad facing upward.**
- **Never disassemble the wheel pad.**

NOTICE:

When removing the wheel pad, take care not to pull the airbag wire harness.



2. REMOVE STEERING WHEEL

(a) Disconnect the connector.
(b) Remove the steering wheel set nut.
(c) Place matchmarks on the steering wheel and main shaft assembly.
(d) Using SST, remove the wheel.
SST 09950–50010 (09951–05010, 09952–05010, 09953–05020, 09954–05020)

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3. REMOVE UPPER AND LOWER COLUMN COVERS

Remove the 3 screws.

4. REMOVE COMBINATION SWITCH WITH SPIRAL CABLE

(a) Disconnect the 3 connectors.

(b) w/ Power tilt and power telescopic steering column: Disconnect the 5 connectors.

(c) Disconnect the airbag connector.

(d) Remove the 3 screws.

5. REMOVE SPIRAL CABLE

(See page BE–20)

NOTICE:

Do not disassembly the cable or apply oil to it.

6. REMOVE SCUFF PLATE

7. REMOVE COWL TRIM

Remove the clip.

8. REMOVE CLUSTER FINISH PANEL

Remove the connector.

9. REMOVE LOWER NO.1 PANEL

(a) Remove the 2 screws and disconnect the hood lock release lever from the panel.

(b) Remove the 2 screws and disconnect the fuel lid release lever from the panel.

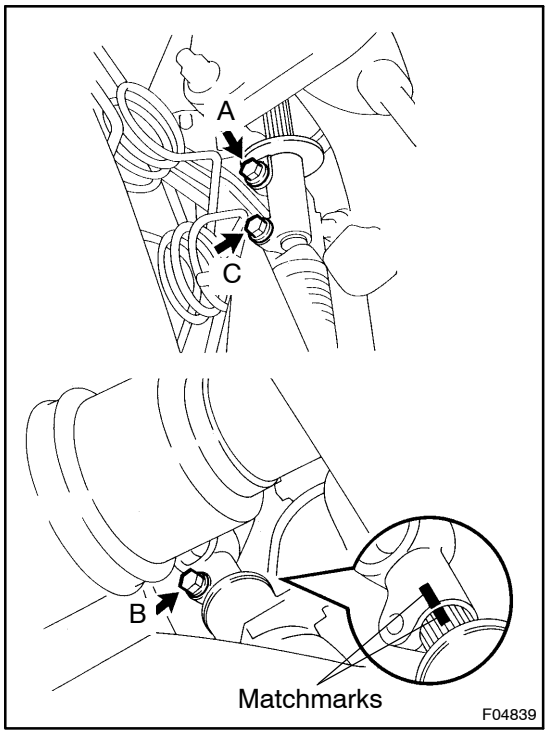
(c) Remove pad set screw.

10. REMOVE LH LOWER PANEL

Remove the 4 bolts.

11. REMOVE NO.2 HEATER TO REGISTER DUCT

Remove the screw.



12. DISCONNECT NO.2 INTERMEDIATE SHAFT ASSEMBLY

(a) Place matchmarks on the intermediate shaft and control valve shaft.

(b) Loosen the bolt A.

(c) Remove the bolt B and the bolt C.

13. REMOVE NO.2 INTERMEDIATE SHAFT ASSEMBLY

14. REMOVE HOLE COVER

Remove the 4 bolts.

15. REMOVE STEERING COLUMN ASSEMBLY

(a) Disconnect the connectors.

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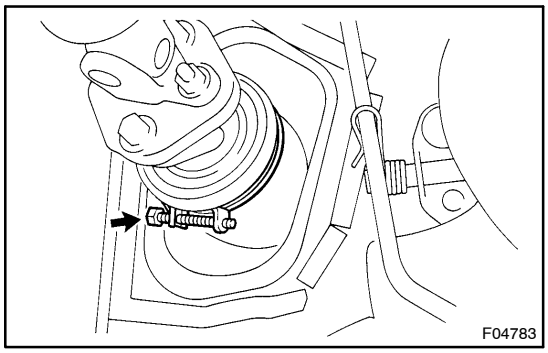

(b) Loosen the hose clamp.
(c) Remove the 4 column assembly set nuts.

16. REMOVE SLIDING YOKE

(a) Remove the bolt A.
(b) Remove the thrust stopper.

17. REMOVE HOSE CLAMP

18. REMOVE NO.2 HOLE COVER

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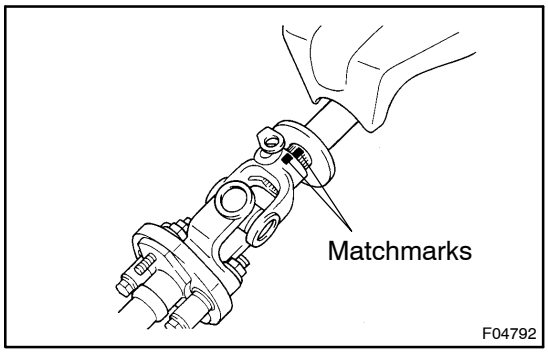
SR0M3–01



DISASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. REMOVE NO.2 LOWER COVER

Remove the 2 nuts.

2. REMOVE INTERMEDIATE SHAFT ASSEMBLY

(a) Place matchmarks on the shaft assembly and main shaft assembly.

(b) Remove the bolt.

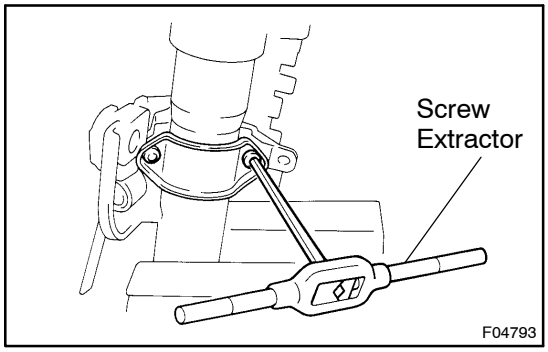
(c) Remove the thrust stopper.

3. REMOVE TRANSPONDER KEY COIL WITH KEY CYLINDER LAMP ASSEMBLY

Remove the screw.

4. REMOVE KEY CYLINDER LAMP ASSEMBLY

Remove the lamp assembly from the key coil.



5. REMOVE COLUMN UPPER BRACKET AND COLUMN UPPER CLAMP

(a) Using a centering punch, mark the center of the 2 tapered–head bolts.

(b) Using a 3–4 mm (0.12–0.16 in.) drill, drill into the 2 bolts.

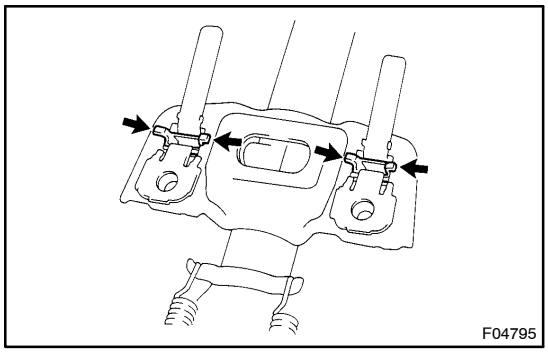
(c) Using a screw extractor, remove the 2 bolts.

6. REMOVE COLUMN TUBE SUPPORT

(a) Remove the bolt.

(b) Remove the tube support with lower tube attachment.

(c) Remove the tube attachment from the tube support.



7. REMOVE 2 ENERGY ABSORBING PLATES

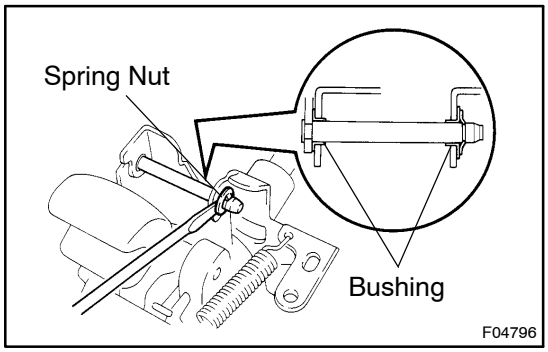
(a) Using pliers, remove the energy absorbing clip.

(b) Remove the energy absorbing plate and energy absorbing guide.

8. REMOVE 4 TENSION SPRINGS

HINT:

Remove the springs with the tilt function at maximum tilt up.



9. REMOVE TILT LEVER

(a) Using a screwdriver, remove the spring nut.

(b) Remove the lever.

(c) Remove the 2 bushings from the column upper tube.

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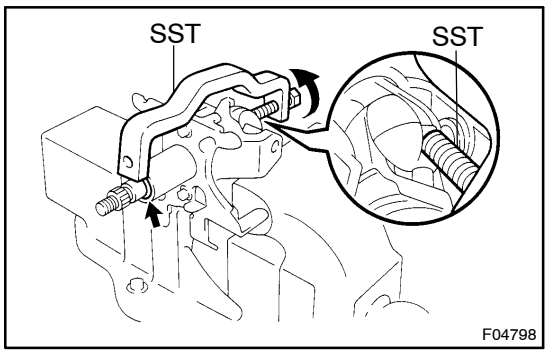
10. REMOVE TILT LEVER LINK

11. REMOVE COLUMN UPPER TUBE WITH MAIN SHAFT ASSEMBLY

(a) Using a hexagon wrench, remove the 2 tilt steering bolts.

(b) Remove the upper tube with the shaft from the column tube.

12. REMOVE TILT LEVER RETAINER



13. REMOVE MAIN SHAFT ASSEMBLY

(a) Using SST, compress the compression spring.
SST 09950–40011 (09958–04010)

NOTICE:

Do not bend the universal joint of the shaft more than 20°.

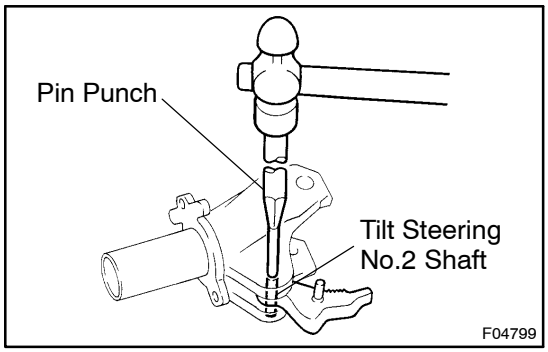
(b) Using a snap ring expander, remove the snap ring from the shaft.

(c) Remove the shaft assembly from the column upper tube.

(d) Remove the compression spring and bearing thrust collar from the shaft.

14. REMOVE TURN SIGNAL BRACKET

Remove the 2 bolts.



15. REMOVE TILT STEERING PAWL

(a) Using a pin punch and hammer, tap out the tilt steering No.2 shaft.

(b) Remove the pin from the pawl.

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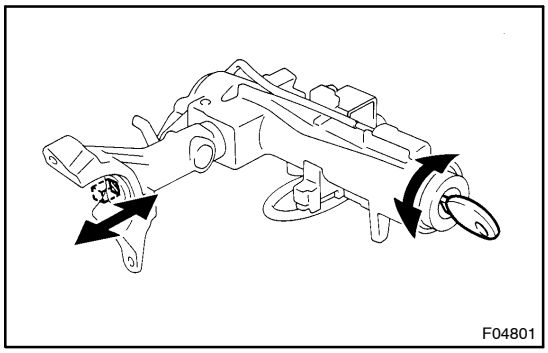
SR0M4–01


F04801

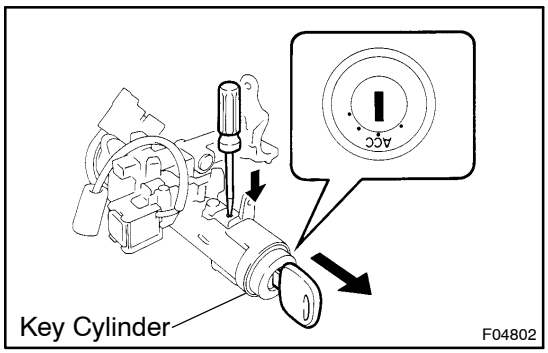
INSPECTION

NOTICE:

When using a vise, do not overtighten it.

1. INSPECT STEERING LOCK OPERATION

Check that the steering lock mechanism operates properly.



F04802

2. IF NECESSARY, REPLACE KEY CYLINDER

(a) Place the ignition key at the ACC position.

(b) Using a screwdriver, push down the stop pin of the cylinder, and pull out the key cylinder.

(c) Install a new cylinder.

HINT:

Make sure the key is at the ACC position.

3. INSPECT IGNITION SWITCH
(See page BE–18)

4. IF NECESSARY, REPLACE IGNITION SWITCH

(a) Remove the 2 screws.

(b) Install a new switch with the 2 screws.

5. INSPECT KEY UNLOCK WARNING SWITCH
(See page BE–18)

6. IF NECESSARY, REPLACE KEY UNLOCK WARNING SWITCH

(a) Slide out the switch.

(b) Slide in a new switch.

7. INSPECT KEY INTERLOCK SOLENOID
(See page AT–13)

8. IF NECESSARY, REPLACE KEY INTERLOCK SOLENOID

(a) Remove the 2 screws.

(b) Install a new solenoid with the 2 screws.

9. INSPECT TRANSPONDER KEY COIL
(See page BE–150)

10. IF NECESSARY, REPLACE TRANSPONDER KEY COIL

11. IF NECESSARY, REPLACE TRANSPONDER KEY AMPLIFIER

(a) Remove the 2 screws.

(b) Install a new key amplifier with the 2 screws.

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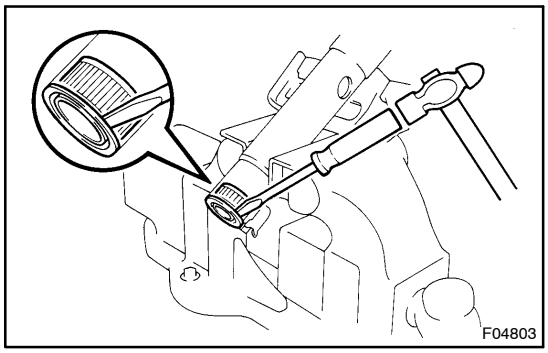
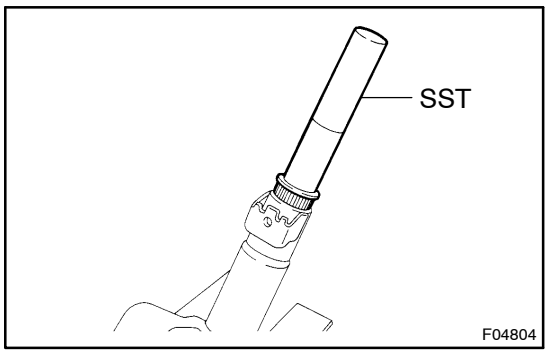


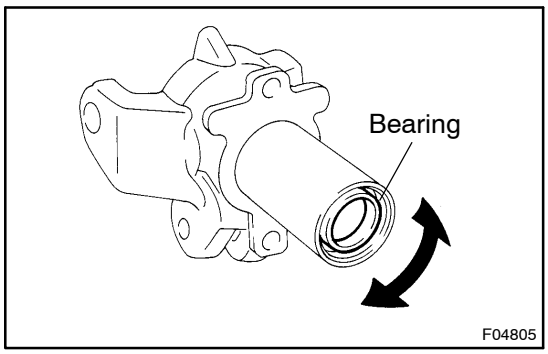
12. TILT STEERING COLUMN: IF NECESSARY, REPLACE BUSHING

(a) Using a screwdriver, tap out the bushing.



(b) Coat a new bushing with molybdenum disulfide lithium base grease.

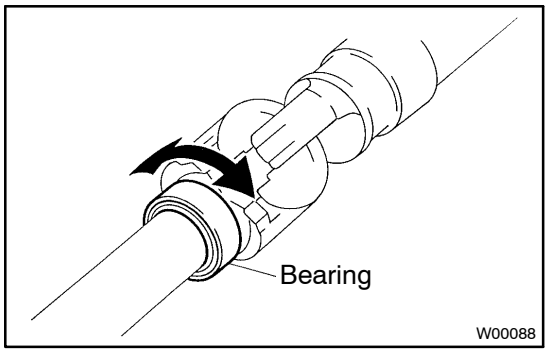
(c) Using SST and a hammer, tap in the bushing.
SST 09612–22011



13. INSPECT BEARING

(a) Check the bearing rotation condition and check for abnormal noise.
If the bearing is worn or damaged, replace the column upper tube.

(b) Coat the bearing with molybdenum disulfide lithium base grease.



14. INSPECT BEARING

(a) Check the bearing rotation condition of the main shaft assembly and check for abnormal noise.

If necessary, replace bearing.

(b) Coat the bearing with molybdenum disulfide lithium base grease.

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SR0M5–01

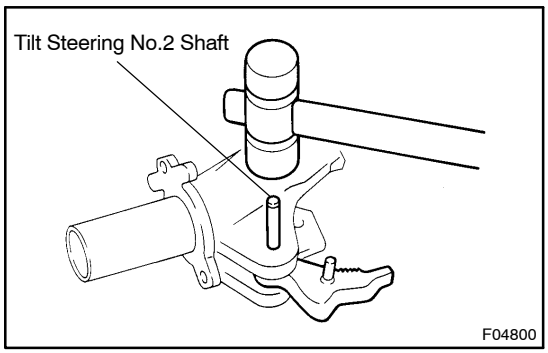
REASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. COAT WITH MOLYBDENUM DISULFIDE LITHIUM BASE GREASE

(See page SR–10)



2. INSTALL TILT STEERING PAWL

(a) Install a new pin to the pawl.

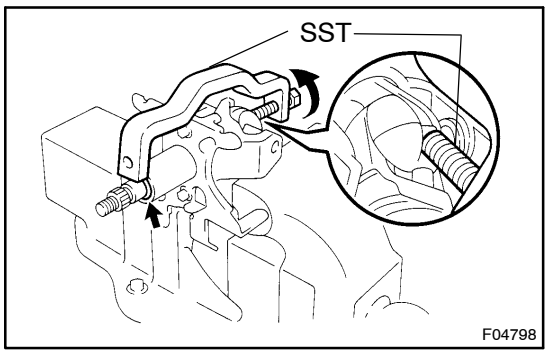
(b) Using a plastic hammer, tap in a new tilt steering No.2 shaft and install the pawl.

NOTICE:

Tap the shaft completely into the steering column upper tube.

3. INSTALL TURN SIGNAL BRACKET

Tighten the 2 bolts.



4. INSTALL MAIN SHAFT ASSEMBLY

(a) Install the bearing thrust collar and compression spring to the shaft.

(b) Install the shaft assembly to the column upper tube.

(c) Using SST, compress the compression spring.

SST 09950–40011 (09958–04010)

NOTICE:

Do not bend the universal joint of the shaft more than 20°.

(d) Using a snap ring expander, install a new snap ring to the shaft.

5. INSTALL TILT LEVER RETAINER

6. INSTALL COLUMN UPPER TUBE WITH MAIN SHAFT ASSEMBLY

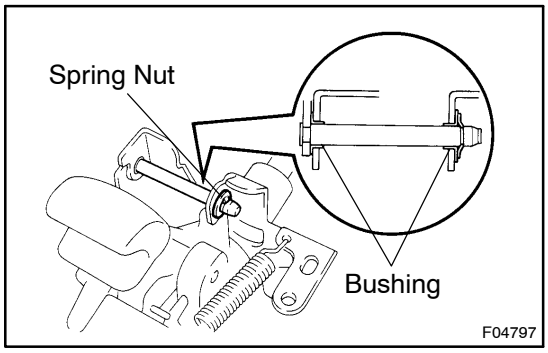
(a) Install the upper tube with the shaft to the column tube.

(b) Using a hexagon wrench, torque the 2 tilt steering bolts.

Torque: 20 N·m (210 kgf·cm, 15 ft·lbf)

(c) Check that the upper tube turns smoothly.

7. INSTALL TILT LEVER LINK



8. INSTALL TILT LEVER

(a) Install the 2 bushings to the column upper tube, as shown in the illustration.

(b) Install the lever, as shown in the illustration.

(c) Install a new spring nut to the lever.

9. INSTALL 4 TENSION SPRINGS

HINT:

Install the springs with the tilt function at maximum tilt up.

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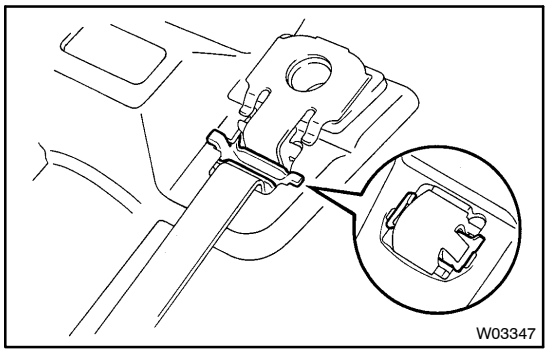


10. INSTALL 2 ENERGY ABSORBING PLATES

(a) Install the new energy absorbing guide and new absorbing plate.

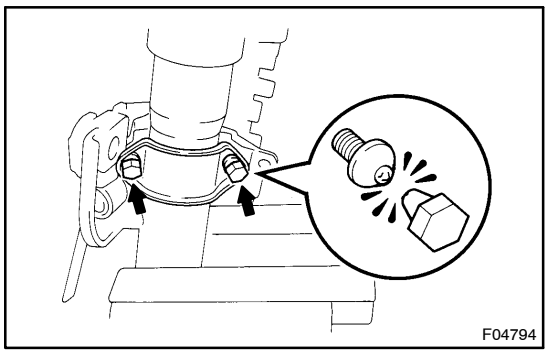
(b) Install the new energy absorbing clip.

11. INSTALL COLUMN TUBE SUPPORT

(a) Install the attachment to the tube support.

(b) Torque the bolt.

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)



12. INSTALL COLUMN UPPER BRACKET AND COLUMN UPPER CLAMP

Tighten the 2 new tapered–head bolts until the bolt heads break off.

13. INSTALL KEY CYLINDER LAMP ASSEMBLY

Install the lamp assembly to the key coil.

14. INSTALL TRANSPONDER KEY COIL WITH KEY CYLINDER LAMP ASSEMBLY

Tighten the screw.

15. INSTALL INTERMEDIATE SHAFT ASSEMBLY

(a) Install the thrust stopper.

(b) Align the matchmarks on the shaft assembly and main shaft assembly.

Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

16. INSTALL NO.2 LOWER COVER

Torque the 2 nuts.

Torque: 24.5 N·m (240 kgf·cm, 17 ft·lbf)

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SR0M6–01

INSTALLATION

1. INSTALL NO.2 HOLE COVER

2. INSTALL HOSE CLAMP

3. INSTALL SLIDING YOKE

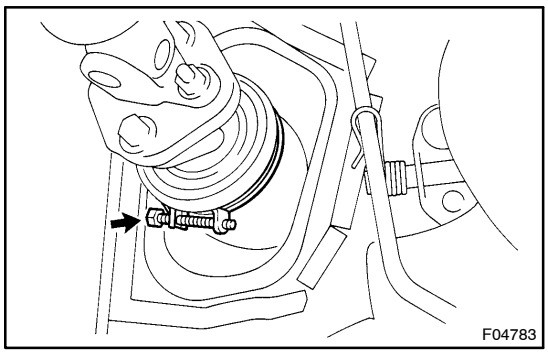
(a) Install the thrust stopper.

(b) Temporarily tighten the bolt A.

4. INSTALL STEERING COLUMN ASSEMBLY

(a) Torque the 4 column assembly set nuts.

Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)



(b) Tighten the hose clamp.

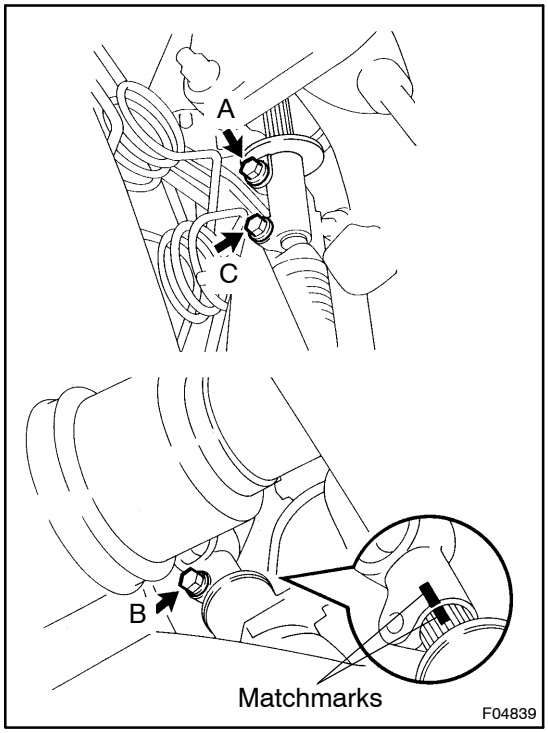
(c) Connect the connectors.

5. INSTALL HOLE COVER

Torque the 4 bolts.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

6. INSTALL NO.2 INTERMEDIATE SHAFT ASSEMBLY



7. CONNECT NO.2 INTERMEDIATE SHAFT ASSEMBLY

(a) Align the matchmarks on the intermediate shaft and control valve shaft.

(b) Torque the bolt C.

Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

(c) Torque the bolt B.

Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

(d) Torque the bolt A.

Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

8. INSTALL NO.2 HEATER TO REGISTER DUCT

Tighten the screw.

9. INSTALL LH LOWER PANEL

Tighten the 4 bolts.

10. INSTALL LOWER NO.1 PANEL

(a) Tighten the pad set screw.

(b) Connect the hood lock release lever and fuel lid release lever with the 4 screws.

11. INSTALL CLUSTER FINISH PANEL

Install the connector.

12. INSTALL COWL TRIM

Install the clip.

13. INSTALL SCUFF PLATE

14. INSTALL SPIRAL CABLE

(See page BE–20)

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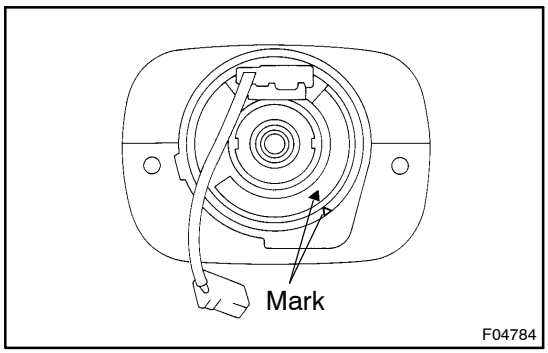
15. INSTALL COMBINATION SWITCH WITH SPIRAL CABLE

(a) Tighten the 3 screws.
(b) Connect the airbag connector.
(c) Connect the 3 connectors.
(d) w/ Power tilt and power telescopic steering column: Connect the 5 connectors.

16. INSTALL UPPER AND LOWER COLUMN COVERS

Tighten the screws.



17. CENTER SPIRAL CABLE

(a) Check that the front wheels are facing straight ahead.
(b) Turn the cable counterclockwise by hand until it becomes harder to turn the cable.
(c) Then rotate the cable clockwise about 2.5 turns to align the mark.

HINT:
The cable will rotate about 2.5 turns to either left or right of the center.

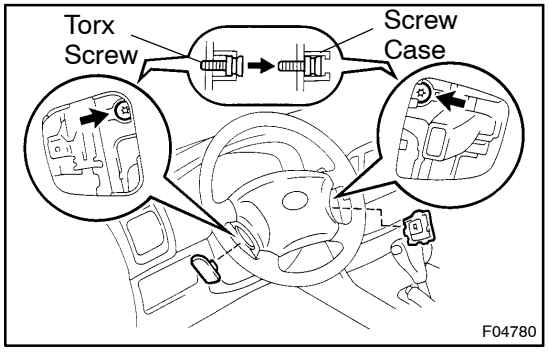
18. INSTALL STEERING WHEEL

(a) Align the matchmarks on the wheel and main shaft.
(b) Torque the wheel set nut.
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)
(c) Connect the connector.

19. INSTALL STEERING WHEEL PAD

NOTICE:

- **Make sure the wheel pad is installed to the specified torque.**
- **If the wheel pad has been dropped, or there are cracks, dents or other defects in the case or connector, replace the wheel pad with a new one.**
- **When installing the wheel pad, take care that the wirings do not interfere with other parts and are not pinched between other pars.**



(a) Connect the connector.
(b) Connect the airbag connector.
(c) Install the pad after confirming that the circumference groove of the torx screw is caught on the screws case.
(d) Using a torx socket wrench, torque the 2 screws.
Torque: 8.8 N·m (90 kgf·cm, 78 in.·lbf)
(e) Install the steering wheel lower No.2 and No.3 covers.

20. CHECK STEERING WHEEL CENTER POINT

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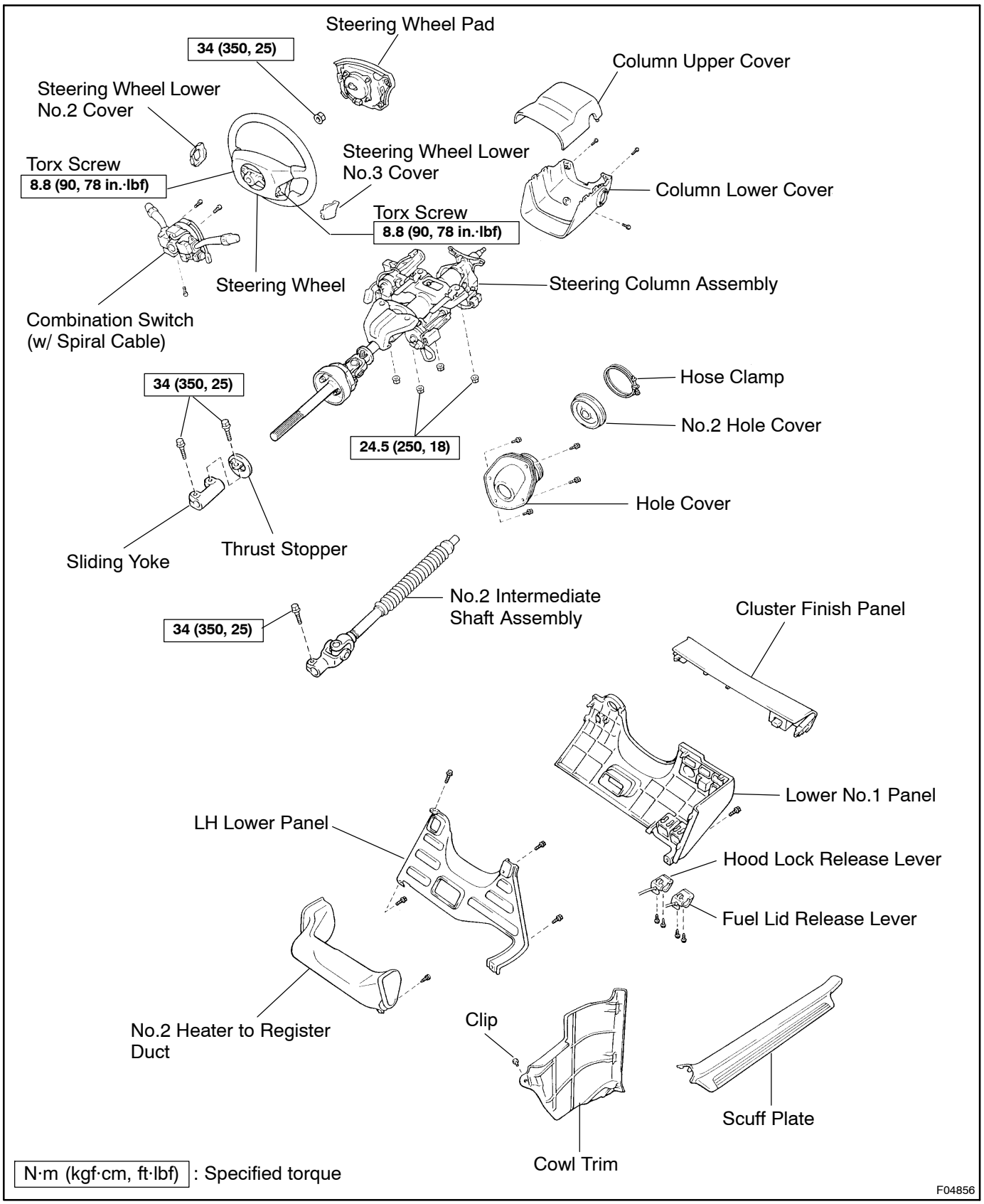
POWER TILT AND POWER TELESCOPIC STEERING COLUMN

COMPONENTS

SR0M7–01



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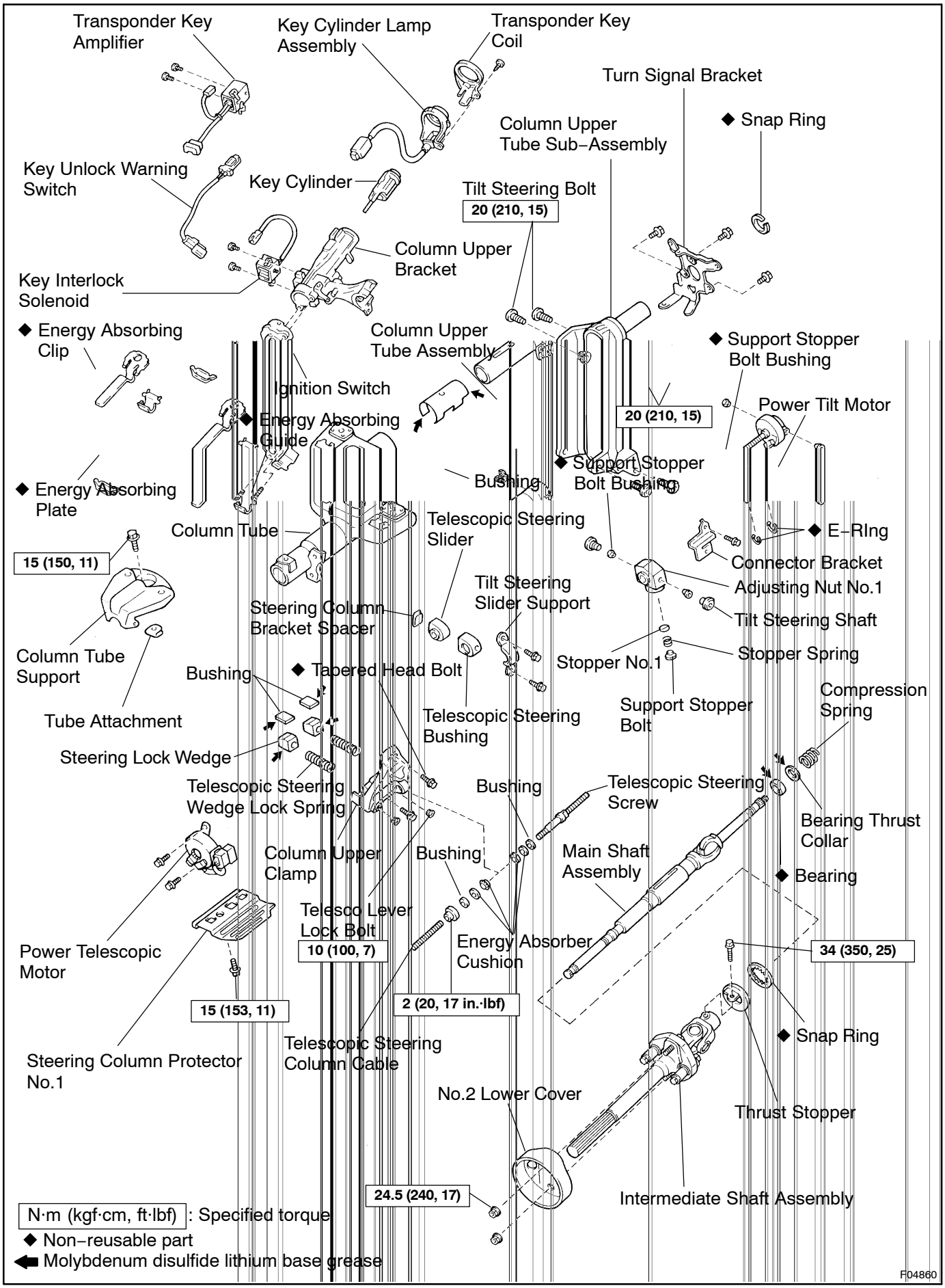

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SR0M8–01

REMOVAL

(See page SR–12)

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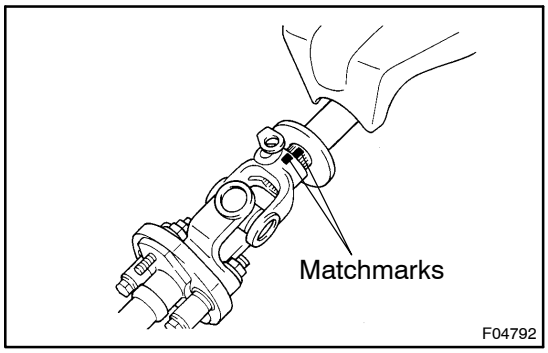
SR0M9–01



DISASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. REMOVE NO.2 LOWER COVER

Remove the 2 nuts.

2. REMOVE INTERMEDIATE SHAFT ASSEMBLY

(a) Place matchmarks on the shaft assembly and main shaft assembly.

(b) Remove the bolt.

(c) Remove the thrust stopper.

3. REMOVE TRANSPONDER KEY COIL WITH KEY CYLINDER LAMP ASSEMBLY

Remove the screw.

4. REMOVE KEY CYLINDER LAMP ASSEMBLY

Remove the lamp assembly from the key coil.

5. REMOVE CONNECTOR BRACKET

Remove the bolt.

6. REMOVE STEERING COLUMN PROTECTOR NO.1

Remove the bolt.

7. REMOVE TURN SIGNAL BRACKET

Remove the 3 bolts.

8. REMOVE POWER TILT MOTOR

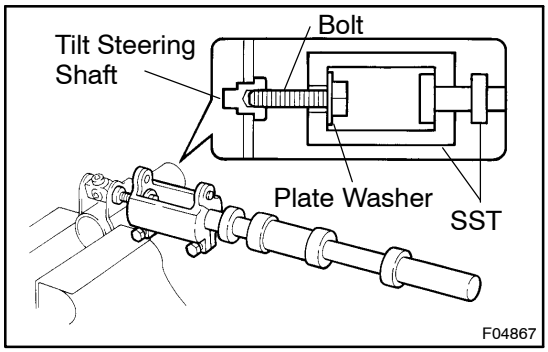
(a) Using a hexagon wrench, remove the support stopper bolt.

(b) Remove the stopper spring and stopper No.1.

(c) Using a hexagon wrench, remove the 2 tilt steering bolts.

(d) Using a screwdriver, remove the 2 E–rings.

(e) Remove the 2 support stopper bolt bushings from the motor.



9. REMOVE ADJUSTING NUT NO.1

(a) Set SST, a plate washer (36 mm outer diameter) and bolt (10 mm normal diameter, 1.25 mm pitch, 50 mm length), as shown.

SST 09910–00015 (09911–00011, 09912–00010)

Reference:

Plate washer	90201–10201
Bolt	91111–51050

(b) Remove the 2 tilt steering shafts by using the sliding hammer on SST.

(c) Remove the 2 support stopper bolt bushings from the adjusting nut No.1.

10. REMOVE POWER TELESCOPIC MOTOR

(a) Remove the 2 bolts.

(b) Remove the telescopic steering column cable.

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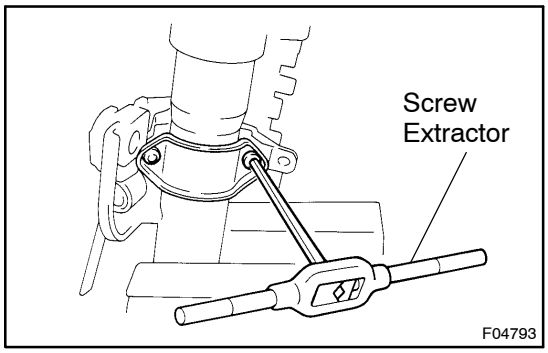
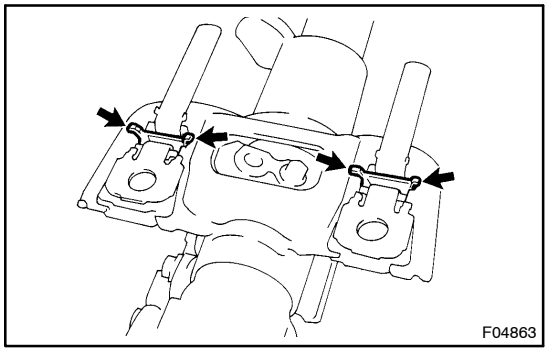


11. REMOVE COLUMN UPPER BRACKET AND COLUMN UPPER CLAMP

(a) Using a centering punch, mark the center of the 2 tapered–head bolts.
(b) Using a 3 – 4 mm (0.12 – 0.16 in.) drill, drill into the 2 bolts.
(c) Using a screw extractor, remove the 2 bolts.
(d) Using a hexagon wrench, remove the 2 telesco lever lock bolts.
(e) Remove the 2 telescopic steering wedge lock springs and 2 steering lock wedges.

12. REMOVE COLUMN TUBE SUPPORT

(a) Remove the bolt.
(b) Remove the tube support with lower tube attachment.
(c) Remove the tube attachment from the tube support.



13. REMOVE 2 ENERGY ABSORBING PLATES

(a) Using pliers, remove the energy absorbing clip.
(b) Remove the energy absorbing plate and energy absorbing guide.

14. REMOVE TELESCOPIC STEERING SLIDER SUPPORT

Remove the 2 bolts.

15. REMOVE TELESCOPIC STEERING BUSHING

16. REMOVE TELESCOPIC STEERING SLIDER

17. REMOVE TELESCOPIC STEERING SCREW

Remove the nut, 4 energy absorber cushions, 2 bearings and steering screw.

18. REMOVE COLUMN UPPER TUBE SUB–ASSEMBLY WITH MAIN SHAFT ASSEMBLY

(a) Using a screwdriver, remove the snap ring.
(b) Using a hexagon wrench, remove the 2 tilt steering bolts.
(c) Remove the column upper tube assembly from the column tube.
(d) Remove the 2 support stopper bolt bushing from the column upper tube assembly.
(e) Remove the 3 bushings from the column tube.

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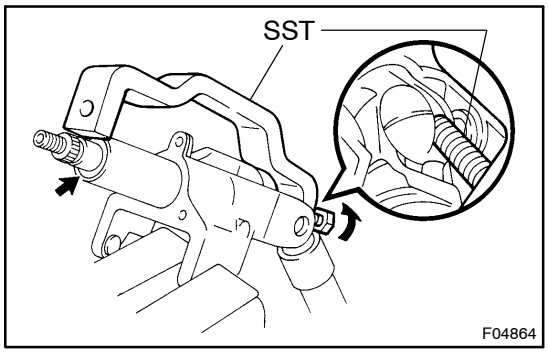

19. REMOVE MAIN SHAFT ASSEMBLY

(a) Using SST, compress the compression spring.
SST 09950–40011 (09958–04010)

NOTICE:

Do not bend the universal joint of the shaft assembly more than 20°.

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

(c) Remove the shaft assembly from the column upper tube.

(d) Remove the compression spring and bearing thrust collar from the shaft assembly.

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SR0MA–01

INSPECTION

(See page SR–17)

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SR0MB–01

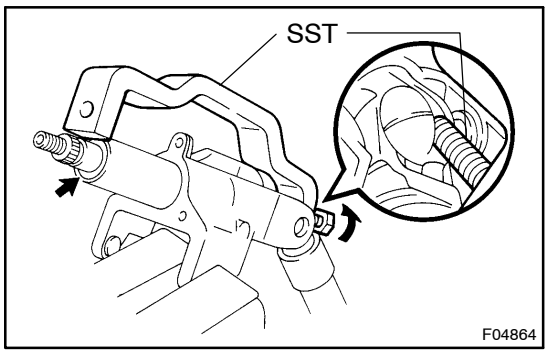
REASSEMBLY

NOTICE:

When using a vise, do not over tighten it.

1. COAT WITH MOLYBDENUM DISULFIDE LITHIUM BASE GREASE

(See page SR–23)



2. INSTALL MAIN SHAFT ASSEMBLY

(a) Install the bearing thrust collar and compression spring to the shaft.

(b) Install the shaft assembly to the column upper tube.

(c) Using SST, compress the compression spring.
SST 09950–40011 (09958–04010)

NOTICE:

Do not bend the universal joint of the shaft more than 20°.

(d) Using a snap ring expander, install a new snap ring to the shaft.

3. INSTALL COLUMN UPPER TUBE SUB–ASSEMBLY WITH MAIN SHAFT ASSEMBLY

(a) Install the 3 bushings to the column tube.

(b) Install 2 new support stopper bolt bushings to the column tube assembly.

(c) Install the column upper tube assembly to the column tube.

(d) Using a hexagon wrench, install the 2 tilt steering bolts.
Torque: 20 N·m (210 kgf·cm, 15 ft·lbf)

(e) Install a new snap ring.

4. INSTALL TELESCOPIC STEERING SCREW

(a) Install the 4 energy absorber cushions, 2 bearings and steering screw.

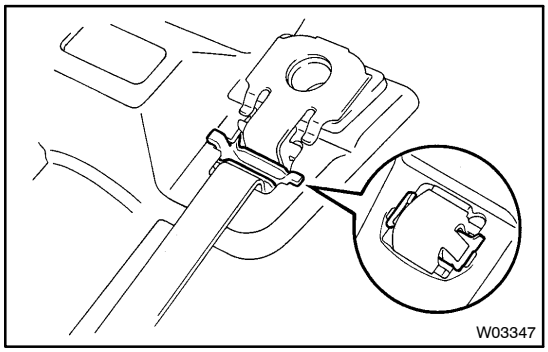
(b) Torque the nut.
Torque: 2 N·m (20 kgf·cm, 17 in.·lbf)

5. INSTALL TELESCOPIC STEERING SLIDER

6. INSTALL TELESCOPIC STEERING BUSHING

7. INSTALL TELESCOPIC STEERING SLIDER SUPPORT

Tighten the 2 bolts.



8. INSTALL 2 ENERGY ABSORBING PLATES

(a) Install the new energy absorbing guide and new absorbing plate.

(b) Install the new energy absorbing clip.

9. INSTALL COLUMN TUBE SUPPORT

(a) Install the attachment to the tube support.

(b) Torque the bolt.
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

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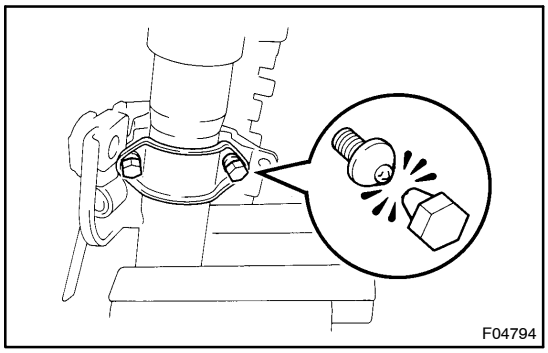

10. INSTALL COLUMN UPPER BRACKET AND COLUMN UPPER CLAMP

(a) Install the 2 telescopic steering wedge lock springs and 2 steering lock wedges.

(b) Using a hexagon wrench, install the 2 telesco lever lock bolts.

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

(c) Tighten the 2 new tapered–head bolts until the bolt heads break off.

11. INSTALL POWER TELESCOPIC MOTOR

(a) Install the telescopic steering column cable.

(b) Tighten the 2 bolts.

12. INSTALL ADJUSTING NUT NO.1

(a) Install 2 new support stopper bolt bushings.

(b) Install the 2 tilt steering shafts.

13. INSTALL POWER TILT MOTOR

(a) Install 2 new support stopper bolt bushings to the motor.

(b) Install 2 new E–rings.

(c) Using a hexagon wrench, install the 2 tilt steering bolts.

Torque: 20 N·m (210 kgf·cm, 15 ft·lbf)

(d) Install the support No.1 and support spring.

(e) Using a hexagon wrench, install the support stopper bolt.

14. INSTALL TURN SIGNAL BRACKET

Tighten the 3 bolts.

15. INSTALL STEERING COLUMN PROTECTOR NO.1

Torque the bolt.

Torque: 15 N·m (153 kgf·cm, 11 ft·lbf)

16. INSTALL CONNECTOR BRACKET

Tighten the bolt.

17. INSTALL KEY CYLINDER LAMP ASSEMBLY

install the lamp assembly to the key coil.

18. INSTALL TRANSPONDER KEY COIL WITH KEY CYLINDER LAMP ASSEMBLY

Tighten the screw.

19. INSTALL INTERMEDIATE SHAFT ASSEMBLY

(a) Install the thrust stopper.

(b) Align the matchmarks on the shaft assembly and main shaft assembly.

Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

20. INSTALL NO.2 LOWER COVER

Torque the 2 nuts.

Torque: 24.5 N·m (240 kgf·cm, 17 ft·lbf)

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SR0MC–01

INSTALLATION

(See page SR–21)

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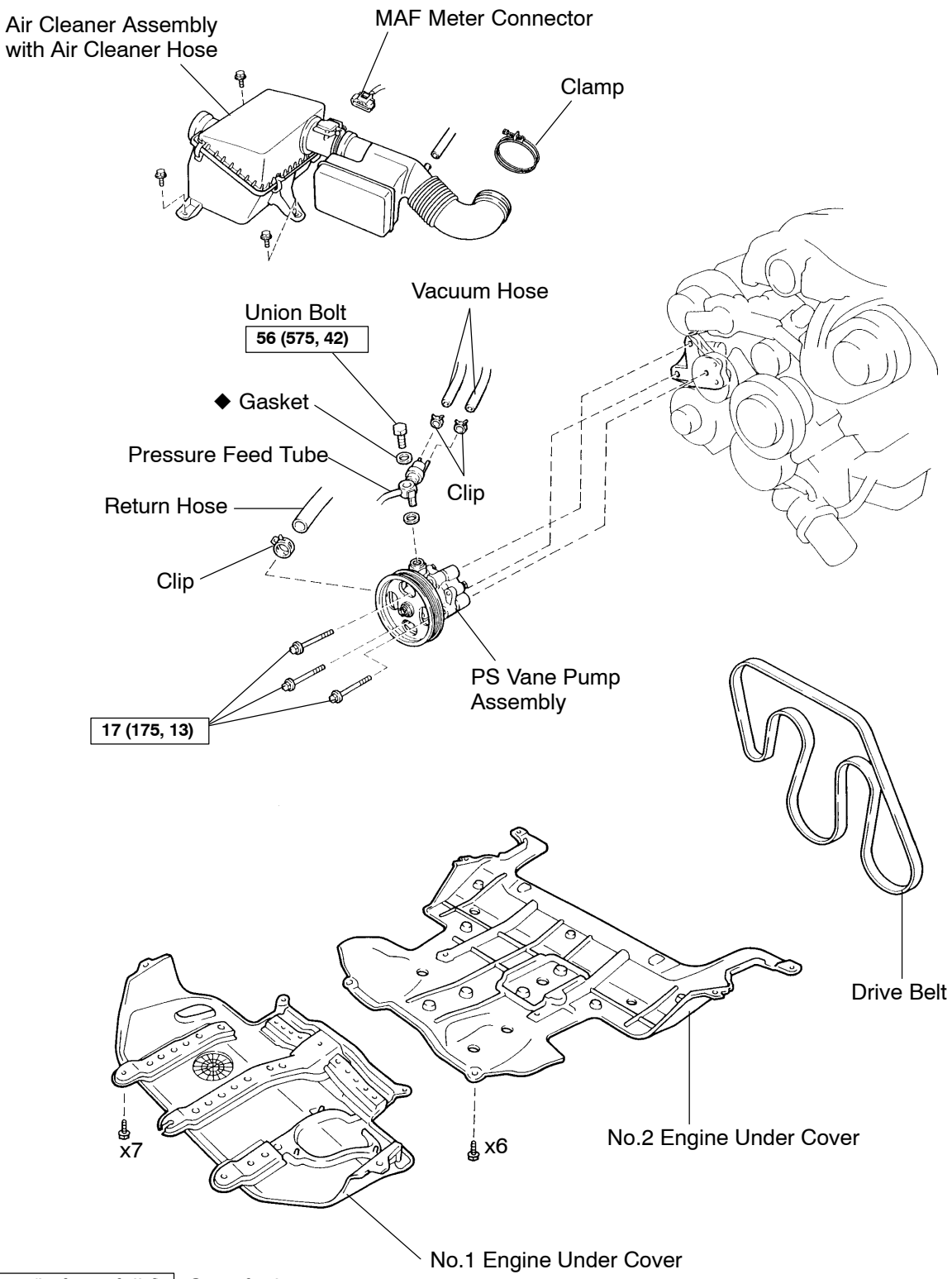
POWER STEERING VANE PUMP

COMPONENTS

SR0MD–01



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

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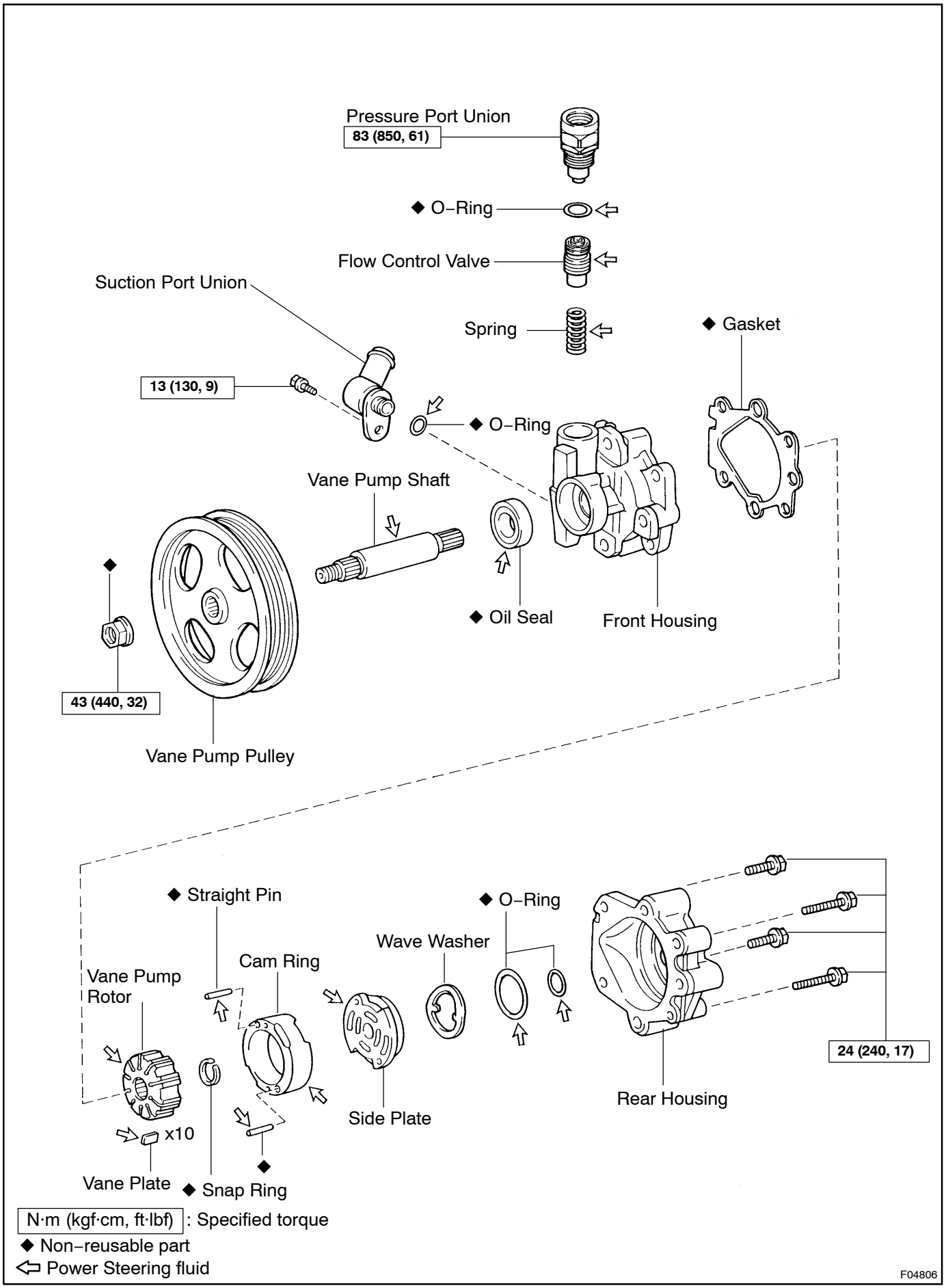

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SR0ME–01

REMOVAL

1. REMOVE NO.1 ENGINE UNDER COVER

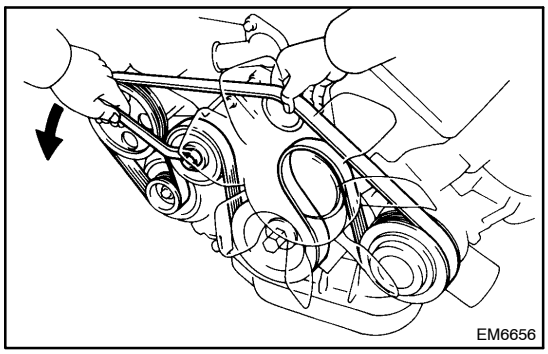
Remove the 7 bolts.

2. REMOVE NO.2 ENGINE UNDER COVER

Remove the 6 bolts.

3. REMOVE AIR CLEANER ASSEMBLY WITH AIR CLEANER HOSE

(a) Disconnect the MAF meter connector.
(b) Disconnect the hose.
(c) Remove the clamp.
(d) Remove the 3 bolts.


EM6656

4. REMOVE DRIVE BELT

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

5. DISCONNECT 2 VACUUM HOSES

Remove the 2 clips.

6. DISCONNECT RETURN HOSE

Remove the clip and disconnect the hose.

7. REMOVE PRESSURE FEED TUBE

Remove the union bolt and 2 gaskets.

8. REMOVE PS VANE PUMP ASSEMBLY

Remove the 3 bolts.

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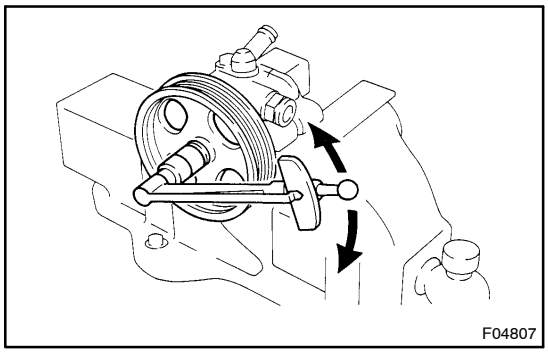
SR0MF–01



DISASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. MEASURE PS VANE PUMP ROTATING TORQUE

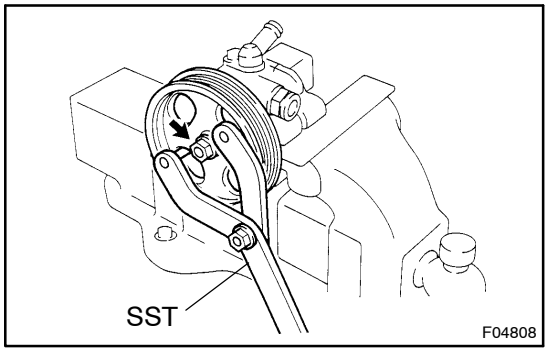
(a) Check that the pump rotates smoothly without abnormal noise.

(b) Temporarily install the vane pump pulley set nut.

(c) Using a torque wrench, check the pump rotating torque.

Rotating torque:

0.28 N·m (2.8 kgf·cm, 2.4 in.·lbf) or less



2. REMOVE VANE PUMP PULLEY

Using SST to stop the pulley rotating, remove the pulley set nut.

SST 09960–10010 (09962–01000, 09963–01000)

3. REMOVE SUCTION PORT UNION

(a) Remove the bolt.

(b) Remove the O–ring from the union.

4. REMOVE PRESSURE PORT UNION, FLOW CONTROL VALVE AND SPRING

Remove the O–ring from the union.

5. REMOVE REAR HOUSING

(a) Remove the 4 bolts.

HINT:

If the wave washer and side plate are stuck to the rear housing, lightly tap the rear housing with a plastic hammer, and remove the wave washer and side plate.

(b) Remove the 2 O–rings from the housing.

6. REMOVE WAVE WASHER

7. REMOVE SIDE PLATE

8. REMOVE GASKET

9. REMOVE CAM RING, 10 VANE PLATES AND VANE PUMP ROTOR

Using a screwdriver, remove the snap ring from the vane pump shaft.

NOTICE:

Be careful not to drop the plate.

10. REMOVE VANE PUMP SHAFT

11. REMOVE STRAIGHT PINS

Remove the 2 pins from the front housing.

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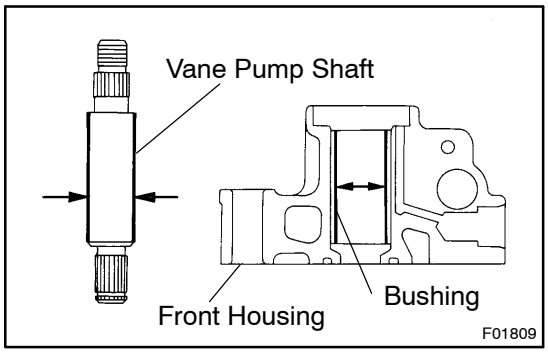
SR0MG–01



INSPECTION

NOTICE:

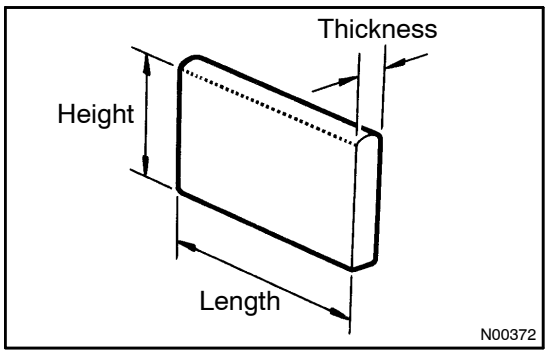
When using a vise, do not overtighten it.

1. CHECK OIL CLEARANCE BETWEEN VANE PUMP SHAFT AND BUSHING

Using a micrometer and caliper gauge, measure the oil clearance.

Standard clearance:
0.03 – 0.05 mm (0.0012 – 0.0020 in.)
Maximum clearance: 0.07 mm (0.0028 in.)

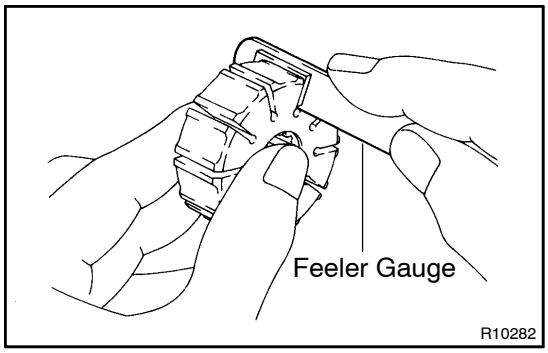
If it is more than the maximum, replace the shaft and front housing.



2. INSPECT VANE PUMP ROTOR AND VANE PLATES

(a) Using a micrometer, measure the height, thickness and length of the 10 plates.

Minimum height: 8.6 mm (0.339 in.)
Minimum thickness: 1.397 mm (0.0550 in.)
Minimum length: 14.991 mm (0.5902 in.)



(b) Using a feeler gauge, measure the clearance between the rotor groove and plate.

Maximum clearance: 0.033 mm (0.0013 in.)

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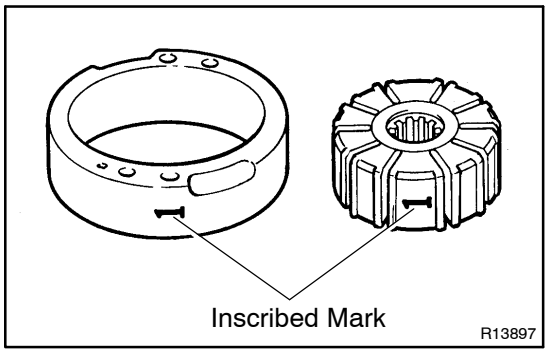


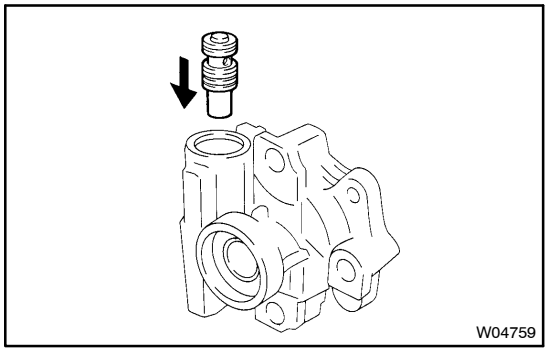
If it is more than the maximum, replace the plate and/or rotor with one having the same mark stamped on the cam ring.

Inscribed mark: 1, 2, 3, 4 or None

HINT:

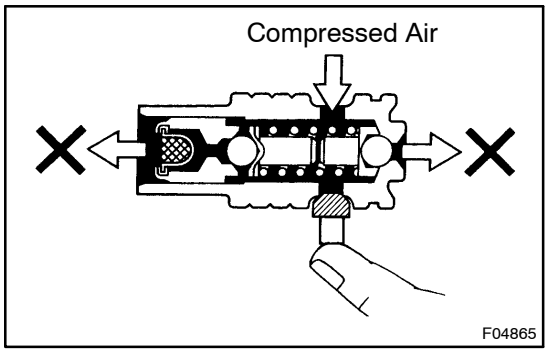
There are 5 vane plate lengths with the following rotor and cam ring marks:

Rotor and cam ring mark	Vane plate part number	Vane plate length mm (in.)
None	44345–26010	14.999–15.001 (0.59051–0.59059)
1	44345–26020	14.997–14.999 (0.59043–0.59051)
2	44345–26030	14.995–14.997 (0.59035–0.59043)
3	44345–26040	14.993–14.995 (0.59027–0.59035)
4	44345–26050	14.991–14.993 (0.59020–0.59027)

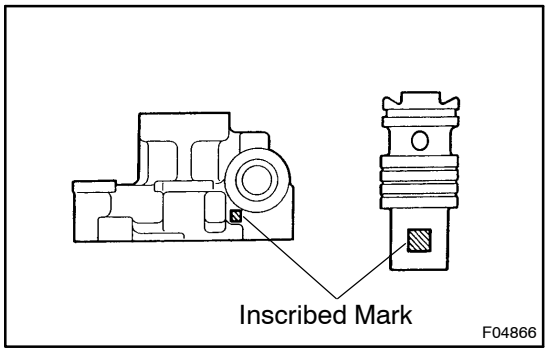


3. INSPECT FLOW CONTROL VALVE

(a) Coat the valve with power steering fluid and check that it falls smoothly into the valve hole by its own weight.



(b) Check the flow control valve for leakage.
Close one of the holes and apply compressed air 392–490 kPa (4–5 kgf/cm^2, 57–71 psi) into the opposite side, and confirm that air does not come out from the end holes.



If necessary, replace the valve with one having the same letter as inscribed on the front housing.

Inscribed mark: A, B, C, D, E or F

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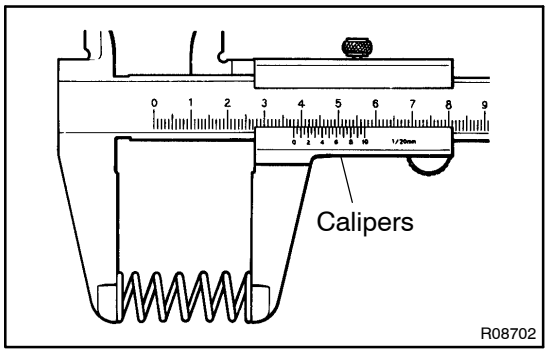
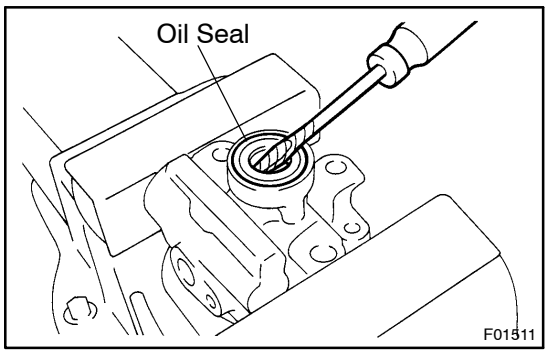


4. INSPECT SPRING

Using calipers, measure the free length of the spring.

Minimum free length: 33.2 mm (1.307 in.)

If it is not within the specification, replace the spring.

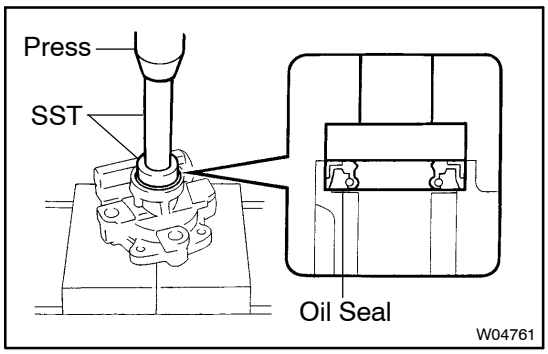


5. IF NECESSARY, REPLACE OIL SEAL

(a) Using a screwdriver with vinyl tape wound around its tip, remove the oil seal.

NOTICE:

Be careful not to damage the front housing.



(b) Coat a new oil seal lip with power steering fluid.

(c) Using SST, press in the oil seal.

SST 09950–60010 (09951–00330),
09950–70010 (09951–07100)

NOTICE:

Make sure to install the oil seal facing the correct direction.

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SR0MH–01

REASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. COAT WITH POWER STEERING FLUID
(See page SR–33)

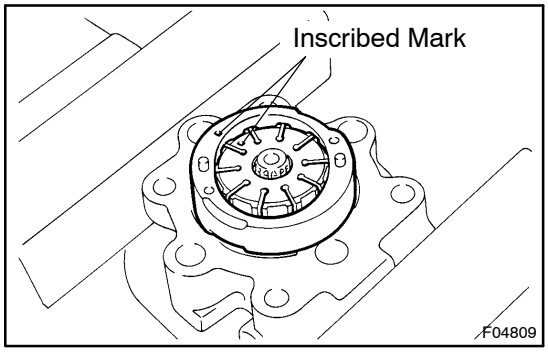
2. INSTALL VANE PUMP SHAFT

3. INSTALL STRAIGHT PINS

Using a plastic hammer, tap in 2 new pins to the front housing.

NOTICE:

Be careful not to damage the pins.



4. INSTALL CAM RING

Install the ring with the inscribed mark facing outward.

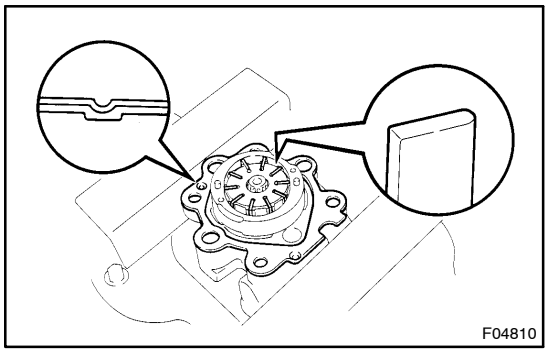
HINT:

Align the holes of the cam ring with the straight pins.

5. INSTALL VANE PUMP ROTOR

(a) Install the rotor with the inscribed mark facing outward.

(b) Install a new snap ring to the vane pump shaft.



6. INSTALL VANE PLATES AND GASKET

(a) Install the 10 plates with the round end facing outward.

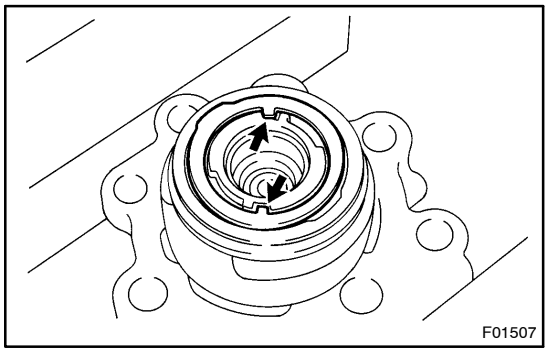
(b) Install a new gasket on the front housing.

NOTICE:

Be careful the direction of the gasket.

7. INSTALL SIDE PLATE

Align the holes of the plate and 2 straight pins.



8. INSTALL WAVE WASHER

Install the washer so that its protrusions fit into the slots in the side plate.

9. INSTALL REAR HOUSING

(a) Coat 2 new O–rings with power steering fluid and install them to the housing.

(b) Torque the 4 bolts.

Torque: 24 N·m (240 kgf·cm, 17 ft·lbf)

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10. INSTALL SPRING, FLOW CONTROL VALVE AND PRESSURE PORT UNION

(a) Install the valve facing the correct direction.
(See page SR–33)

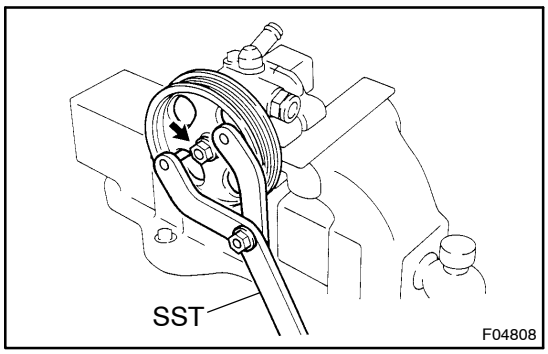
(b) Coat a new O–ring with power steering fluid and install it to the union.

(c) Torque the union.
Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)

11. INSTALL SUCTION PORT UNION

(a) Coat a new O–ring with power steering fluid and install it to the union.

(b) Torque the bolt.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)



12. INSTALL VANE PUMP PULLEY

Using SST to stop the pulley rotating, torque a new pulley set nut.

SST 09960–10010 (09962–01000, 09963–01000)
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

13. MEASURE PS VANE PUMP ROTATING TORQUE
(See page SR–36)

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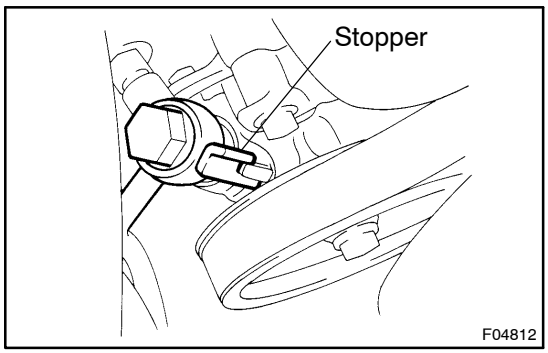
SR0MI–01

INSTALLATION

1. INSTALL PS VANE PUMP ASSEMBLY

Torque the 3 bolts.

Torque: 17 N·m (175 kgf·cm, 13 ft·lbf)



2. INSTALL PRESSURE FEED TUBE

Torque the union bolt with a new gasket on each side of the tube.

HINT:

Make sure the stopper of the pressure feed tube touches the PS vane pump body as shown in the illustration, then torque the bolt.

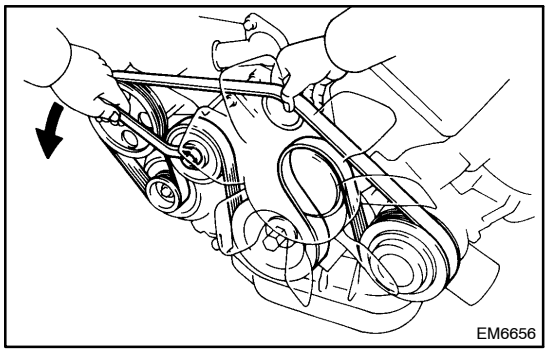
Torque: 56 N·m (575 kgf·cm, 42 ft·lbf)

3. CONNECT RETURN HOSE

Connect the hose with the clip.

4. CONNECT 2 VACUUM HOSES

Install the 2 clips.



5. INSTALL DRIVE BELT

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

6. INSTALL AIR CLEANER ASSEMBLY WITH AIR CLEANER HOSE

(a) Tighten the 3 bolts.
(b) Install the clamp.
(c) Connect the connector.
(d) Connect the MAF meter connector.

7. INSTALL NO.2 ENGINE UNDER COVER

Tighten the 6 bolts.

8. INSTALL NO.1 ENGINE UNDER COVER

Tighten the 7 bolts.

9. BLEED POWER STEERING SYSTEM

(See page SR–4)

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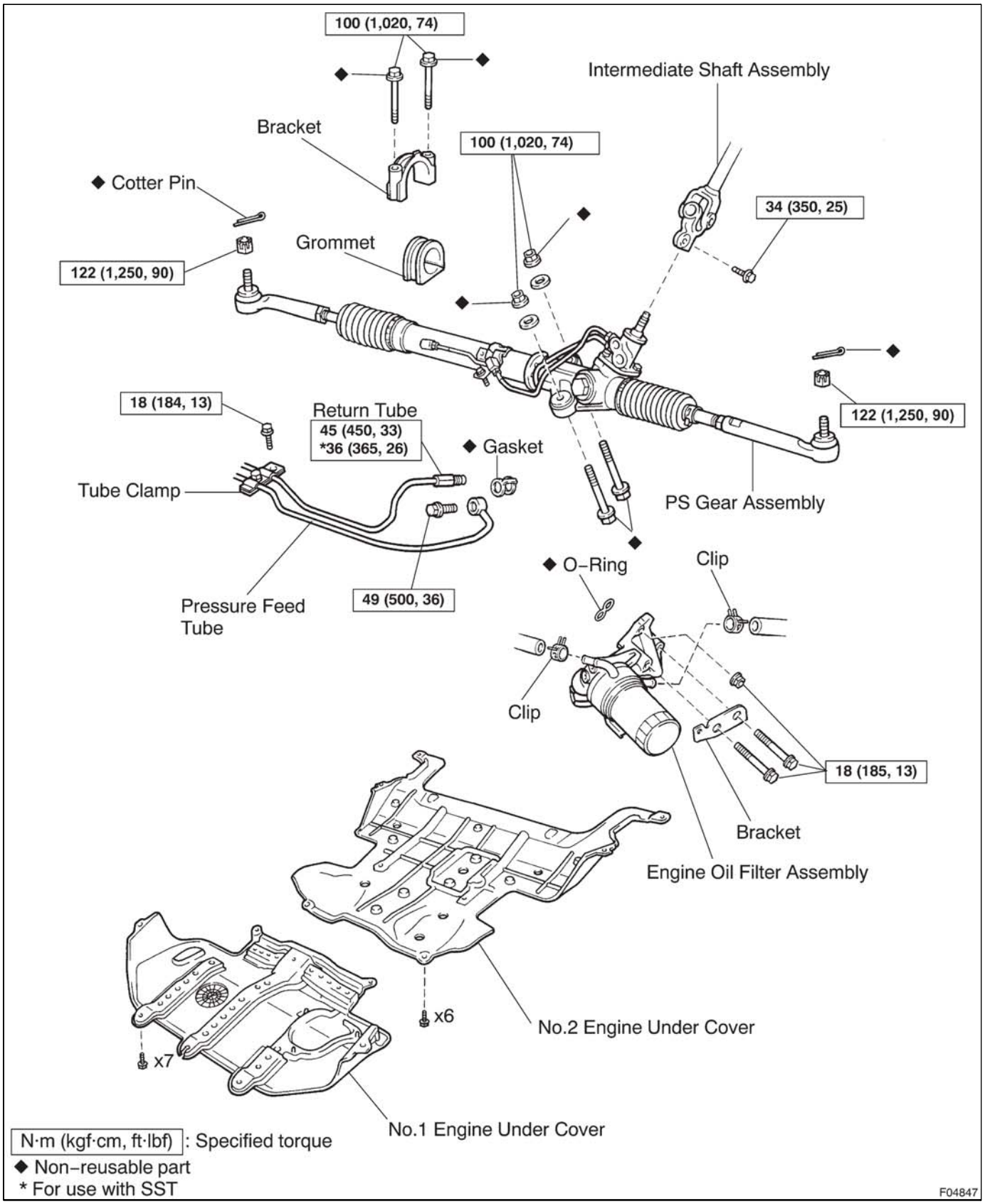
POWER STEERING GEAR

COMPONENTS

SR0MJ–01



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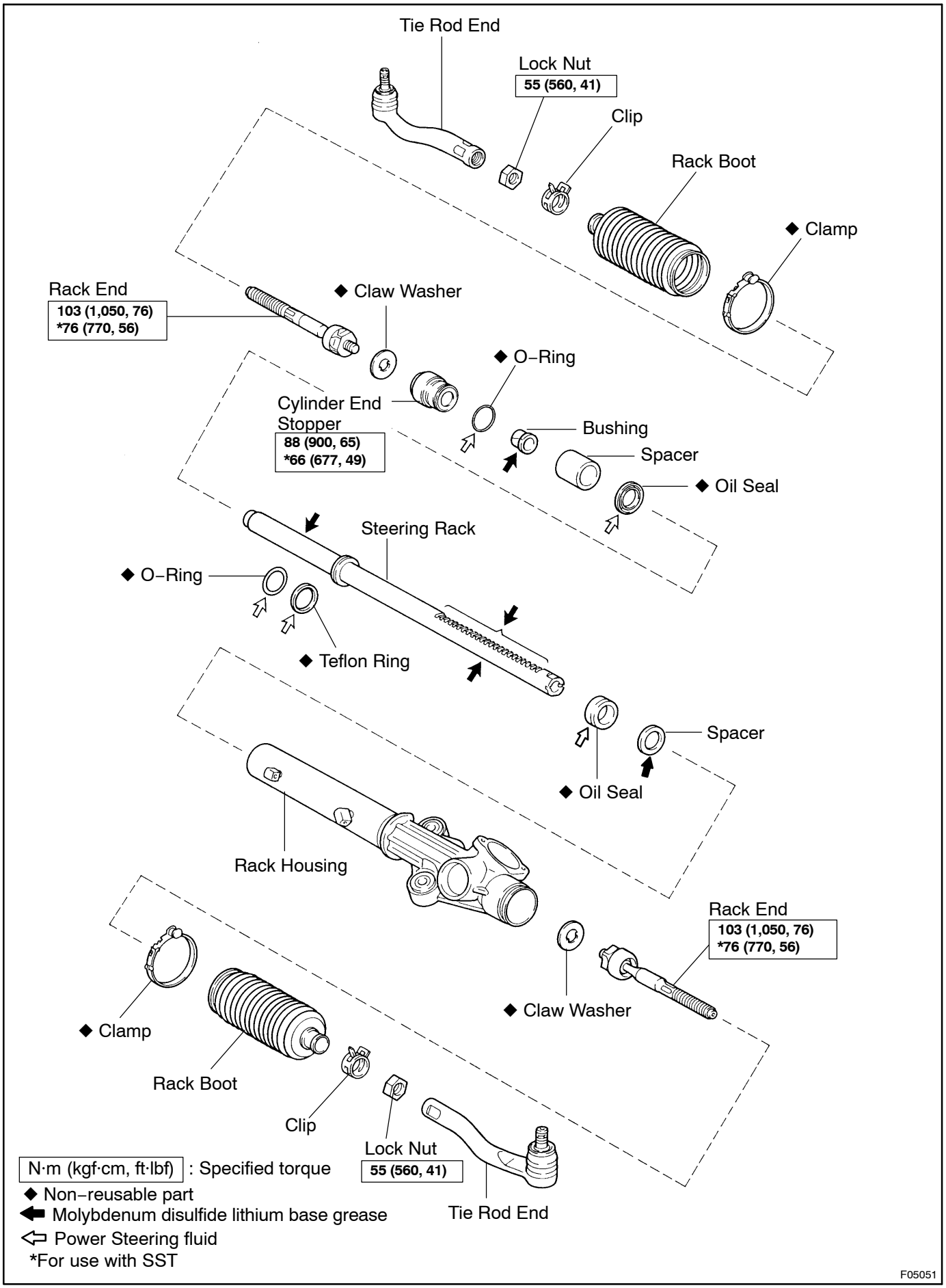

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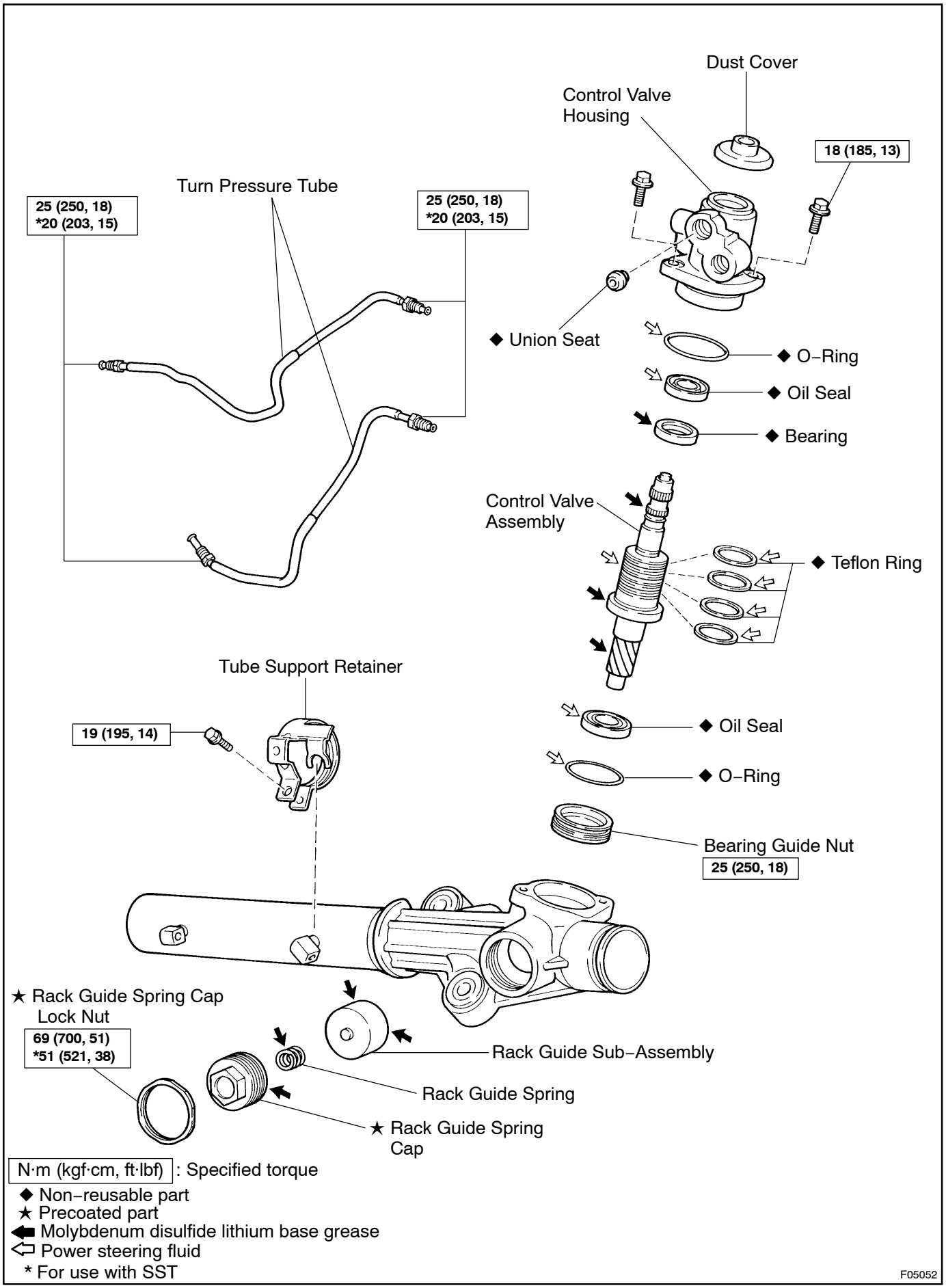

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SR0MK–01

REMOVAL

1. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

2. REMOVE STEERING WHEEL PAD
(See page SR–12)

3. REMOVE STEERING WHEEL
(See page SR–12)

4. REMOVE NO.1 ENGINE UNDER COVER

Remove the 7 bolts.

5. REMOVE NO.2 ENGINE UNDER COVER

Remove the 6 bolts.

6. DISCONNECT RH AND LH TIE ROD ENDS
(See page SA–18)

7. REMOVE ENGINE OIL FILTER ASSEMBLY

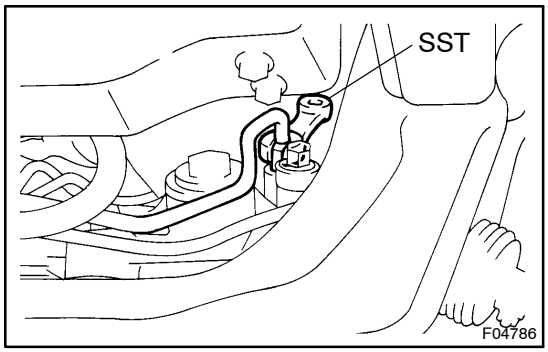
(a) Disconnect the 2 clips and hoses.
(b) Remove the 2 bolts and nut with the bracket.
(c) Remove the O–ring.

8. DISCONNECT NO.2 INTERMEDIATE SHAFT ASSEMBLY
(See page SR–12)

HINT:
Turn the steering wheel fully to the right side.

9. REMOVE PRESSURE FEED TUBE

Remove the union bolt and gasket.



10. DISCONNECT RETURN TUBE

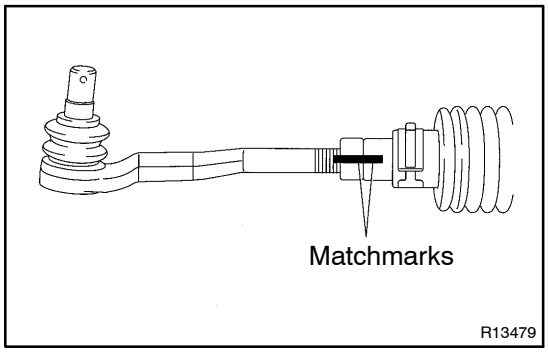
Using SST, disconnect the tube.
SST 09631–22020

11. REMOVE BRACKET AND GROMMET

Remove the 2 bolts.

12. DISCONNECT TUBE CLAMP

Remove the bolt.



13. REMOVE RH AND LH TIE ROD ENDS AND LOCK NUTS

Place matchmarks on the tie rod end and rack end.

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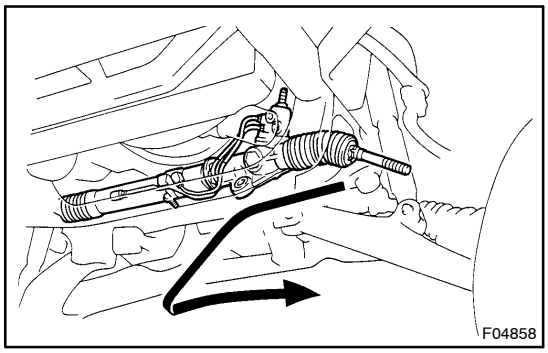

14. REMOVE PS GEAR ASSEMBLY

Remove the 2 gear assembly set bolts, nut and washers.

HINT:

Slide the gear assembly to the right side, pull out the left side of the gear assembly from the member.

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SR0ML–01

DISASSEMBLY

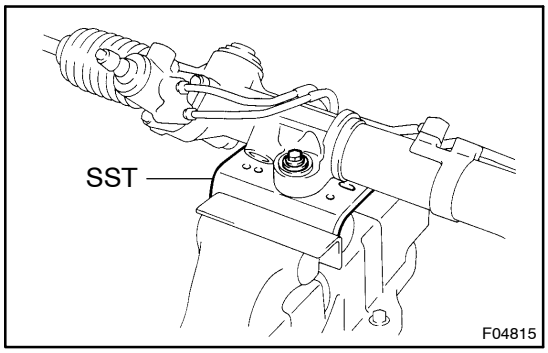
NOTICE:

When using a vise, do not overtighten it.

1. SECURE PS GEAR ASSEMBLY IN VISE

Using SST, secure the gear assembly in a vise, as shown in the illustration.

SST 09630–00014 (09631–00142)



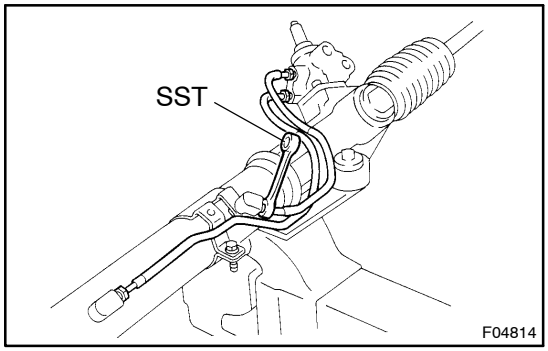
2. REMOVE 2 TURN PRESSURE TUBES

Using SST, remove the tube.

SST 09633–00020

3. REMOVE TUBE SUPPORT RETAINER

Remove the bolt.

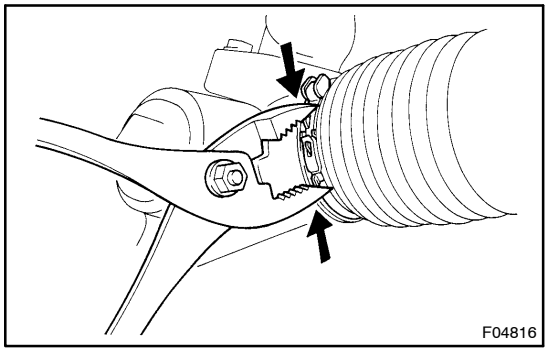


4. REMOVE RH AND LH CLIPS, RACK BOOTS AND CLAMPS

Using pliers, loosen the clamp, as shown in the illustration.

NOTICE:

- **Be careful not to damage the boot.**
- **Mark the RH and LH boots.**

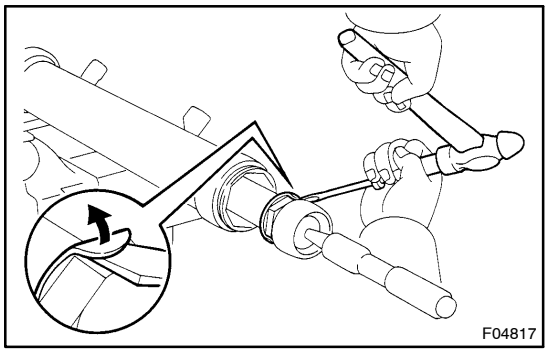


5. REMOVE RH AND LH RACK ENDS AND CLAW WASHERS

(a) Using a screwdriver and hammer, stake back the washer.

NOTICE:

Avoid and impact to the steering rack.

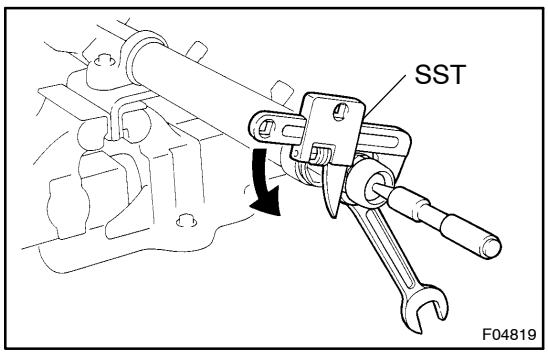


(b) Using a spanner to hold the steering rack steady, and using SST, remove the rack end.

SST 09922–10010

NOTICE:

- **Use SST 09922–10010 in the direction shown in the illustration.**
- **Mark the RH and LH rack ends.**



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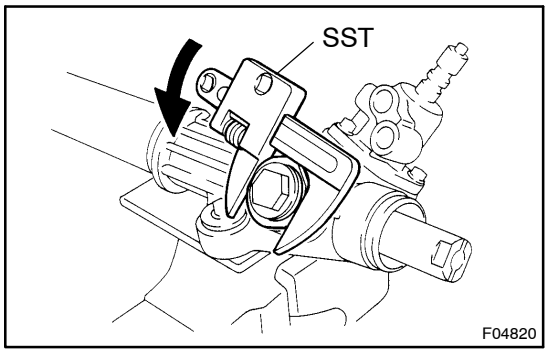


6. REMOVE RACK GUIDE SPRING CAP LOCK NUT

Using SST, remove the nut.

SST 09922–10010

NOTICE:

Use SST 09922–10010 in the direction shown in the illustration.

7. REMOVE RACK GUIDE SPRING CAP

8. REMOVE RACK GUIDE SPRING AND RACK GUIDE SUB–ASSEMBLY

9. REMOVE DUST COVER

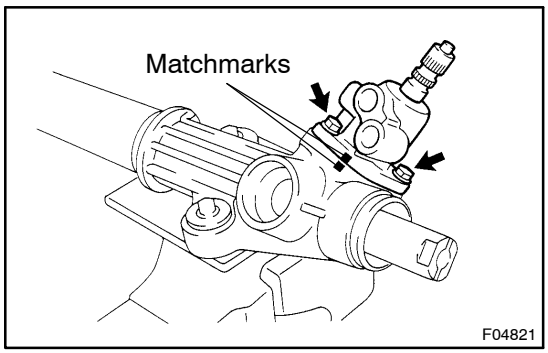
10. REMOVE CONTROL VALVE HOSING WITH CONTROL VALVE ASSEMBLY

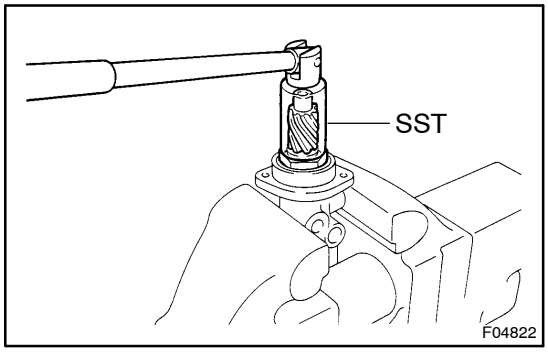
(a) Place matchmarks on the valve housing and rack housing.

(b) Remove the 2 bolts.

(c) Pull out the control valve assembly with the valve housing.

(d) Remove the O–ring from the valve housing.

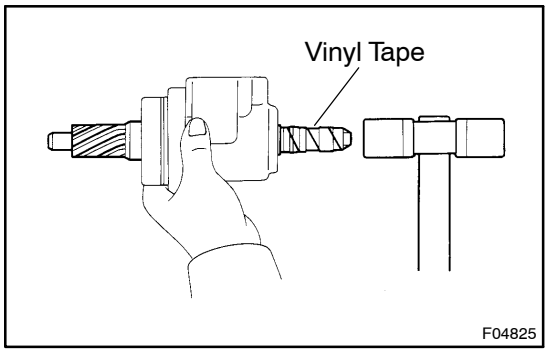




11. REMOVE CONTROL VALVE ASSEMBLY

(a) Using SST, loosen the bearing guide nut.

SST 09631–20060



(b) Wind vinyl tape to the control valve shaft.

(c) Using a plastic hammer, tap out the valve assembly with the nut from the control valve housing.

NOTICE:

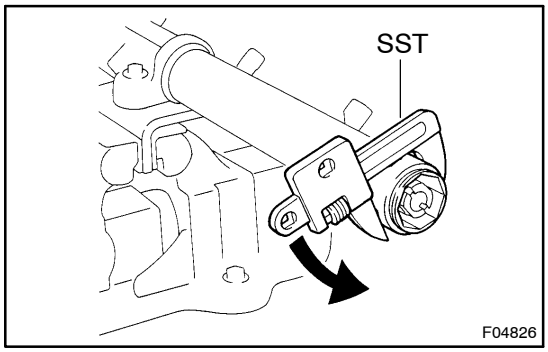
Be careful not to damage the oil seal lip.

(d) Remove the nut from the valve assembly.

NOTICE:

Be careful not the damage the oil seal lip.

(e) Remove the O–ring from the nut.



12. REMOVE CYLINDER END STOPPER AND SPACER

(a) Using SST, remove the stopper.

SST 09922–10010

NOTICE:

Use SST 09922–10010 in the direction shown in the illustration.

(b) Remove the O–ring from the stopper.

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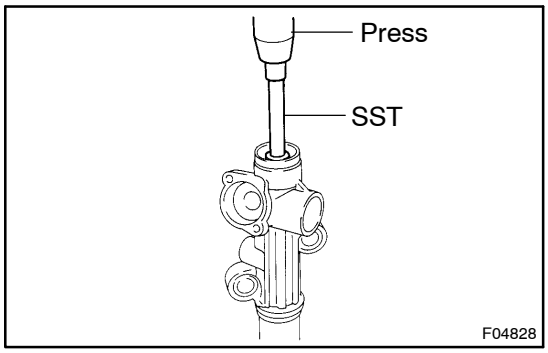


13. REMOVE STEERING RACK AND OIL SEAL

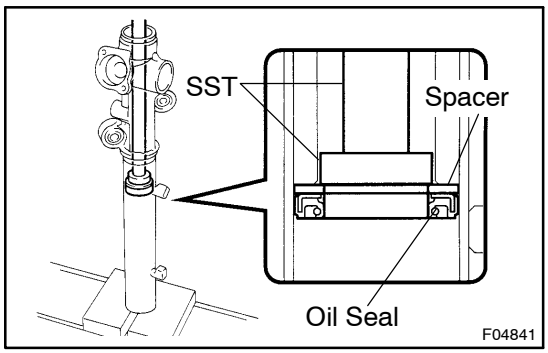
(a) Using SST, press out the rack and oil seal.

NOTICE:

Take care not to drop the rack.

SST 09950–70010 (09951–07200)

(b) Remove the oil seal from the rack.



14. REMOVE OIL SEAL AND SPACER

Using SST, press out the oil seal and spacer.

SST 09950–60010 (09951–00360),
09950–70010 (09951–07360)

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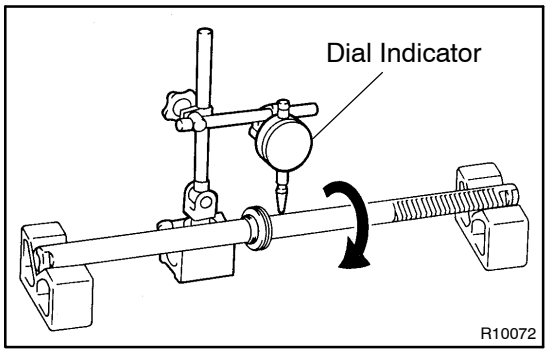
SR0MM–01

INSPECTION

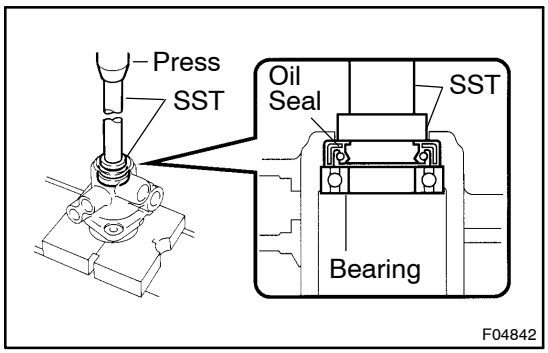


1. INSPECT STEERING RACK

(a) Using a dial indicator, check the rack for runout and for teeth wear and damage.

Maximum runout: 0.3 mm (0.012 in.)

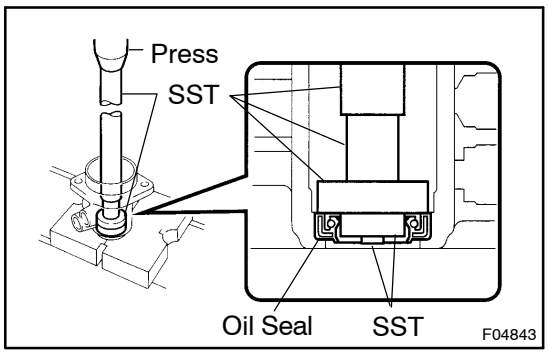
(b) Check the back surface for wear and damage.



2. IF NECESSARY, REPLACE OIL SEAL AND BEARING

(a) Using SST, press out the oil seal and bearing from the control valve housing.

SST 09950–60010 (09951–00260), 09950–70010 (09951–07150)



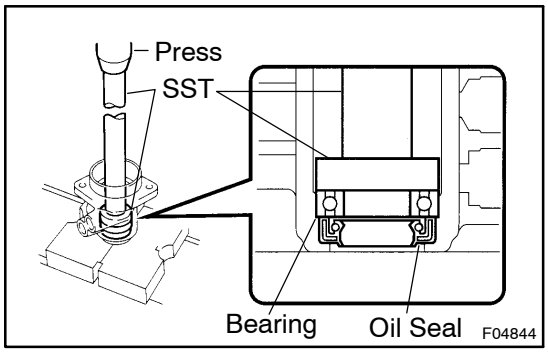
(b) Coat a new oil seal lip with power steering fluid.

(c) Using SST, press in the oil seal.

SST 09950–60010 (09951–00180, 09951–00330, 09952–06010), 09950–70010 (09951–07150)

NOTICE:

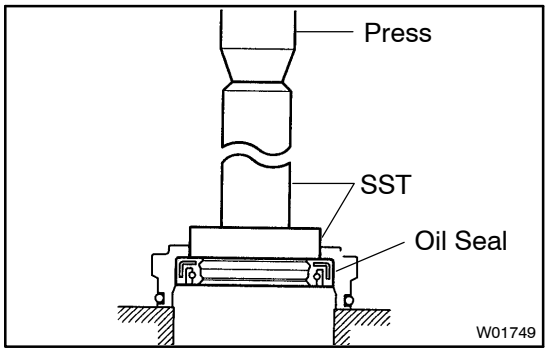
Make sure to install the oil seal facing the correct direction.



(d) Coat a new bearing with molybdenum disulfide lithium base grease.

(e) Using SST, press in the bearing.

SST 09950–60010 (09951–00330), 09950–70010 (09951–07150)



3. IF NECESSARY, REPLACE OIL SEAL

(a) Using SST, press out the oil seal from the bearing guide nut.

SST 09950–60010 (09951–00320), 09950–70010 (09951–07100)

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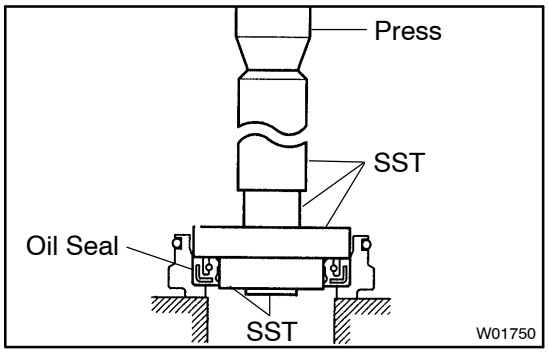
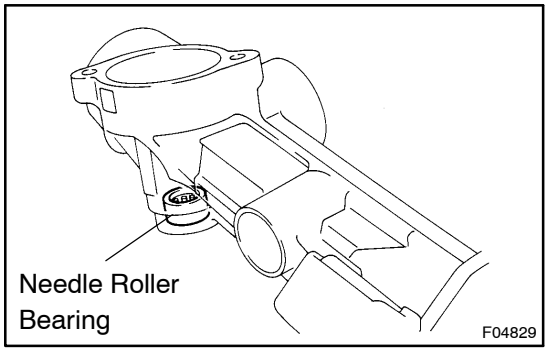


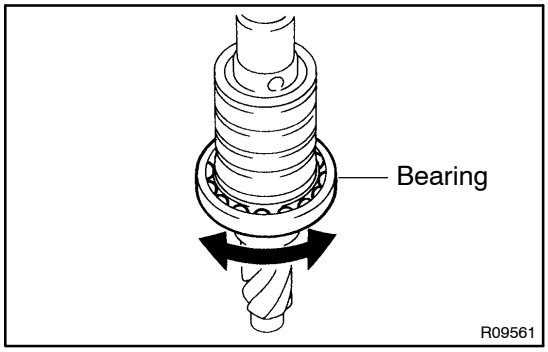
(b) Coat a new oil seat lip with power steering fluid.
(c) Using SST, press in the oil seal.
SST 09950–60010 (09951–00280, 09951–00360, 09952–06010), 09950–70010 (09951–07100)

NOTICE:
Make sure to install the oil seal facing the correct direction.



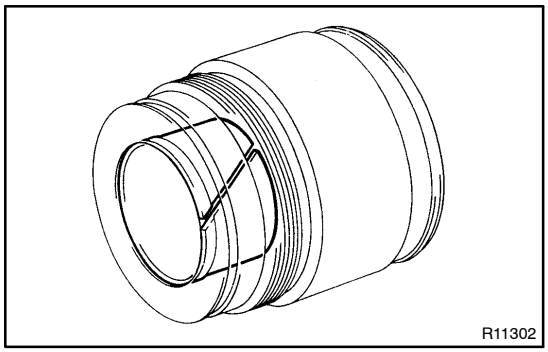
4. INSPECT BEARING
(a) Check the needle roller bearing of the rack housing for pitmarks or damage.

If faulty, replace the rack housing,
(b) Coat the inside of the bearing with molybdenum disulfide lithium base grease.

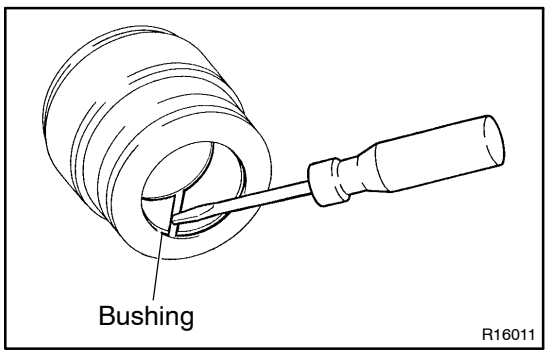


5. INSPECT BEARING
(a) Check the bearing rotation condition and check for abnormal noise.

If the bearing is worn or damaged, replace the control valve assembly.
(b) Coat the bearing with molybdenum disulfide lithium base grease.



6. INSPECT BUSHING
(a) Check the inside of the bushing of the cylinder end stopper for cracks. If faulty, replace the bushing.
(b) Apply molybdenum disulfide lithium base grease to the inside of the bushing.



7. IF NECESSARY, REPLACE BUSHING
(a) Using a screwdriver, remove the bushing from the cylinder end stopper.

NOTICE:
Be careful not to damage the cylinder end stopper.
(b) Coat the inside of a new bushing with molybdenum disulfide lithium base grease.
(c) Install the bushing.

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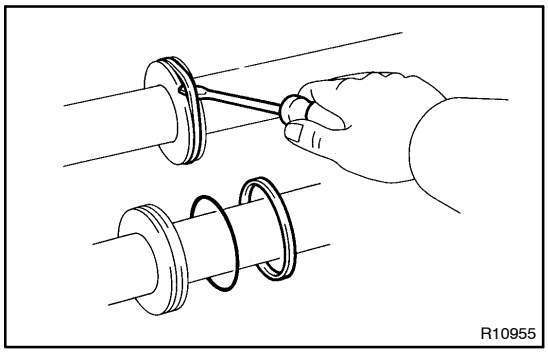


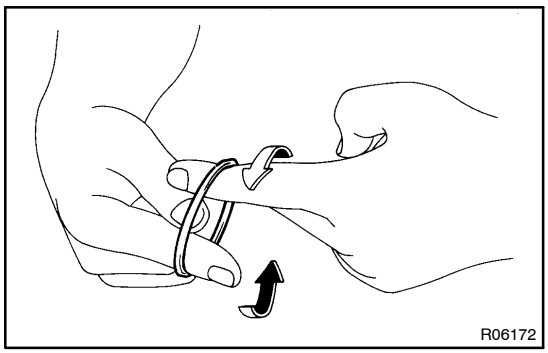
8. IF NECESSARY, REPLACE TEFLON RING AND O–RING

(a) Using a screwdriver, remove the teflon ring and O–ring from the steering rack.

NOTICE:

Be careful not to damage the groove for the ring.

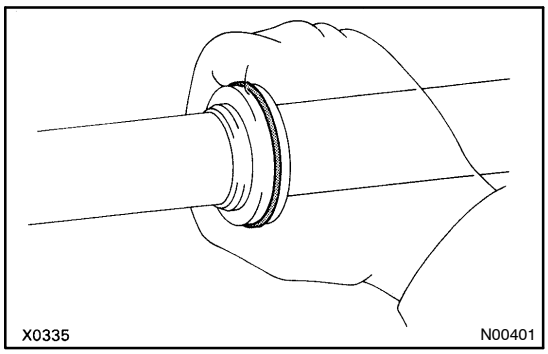
(b) Coat a new O–ring with power steering fluid and install it.



(c) Expand a new teflon ring with your fingers.

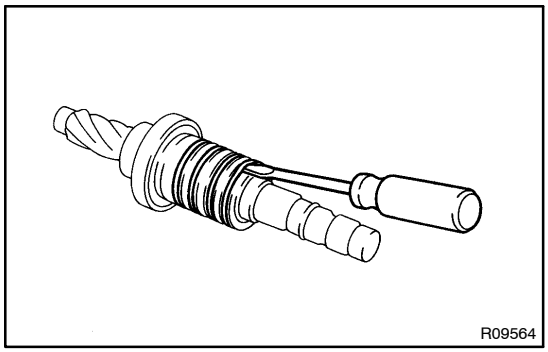
NOTICE:

Be careful not to overexpand the ring.



(d) Coat the ring with power steering fluid.

(e) Install the ring to the rack, and settle it down with your fingers.



9. IF NECESSARY, REPLACE TEFLON RINGS

(a) Using a screwdriver, remove the 4 rings from the control valve assembly.

NOTICE:

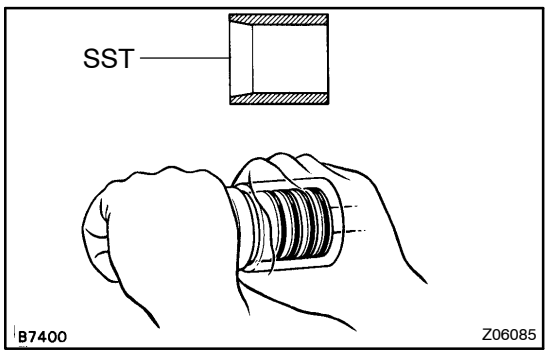
Be careful not to damage the grooves for the ring.

(b) Expand 4 new rings with your fingers.

NOTICE:

Be careful not to overexpand the ring.

(c) Coat the rings with power steering fluid.



(d) Install the rings to the control valve assembly, and settle them down with your fingers.

(e) Carefully slide the tapered end of SST over the rings until the ring fits to the steering rack.

SST 09631–20081

NOTICE:

Be careful not to damage the rings.

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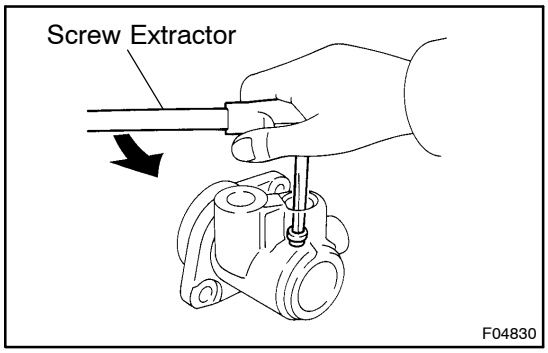
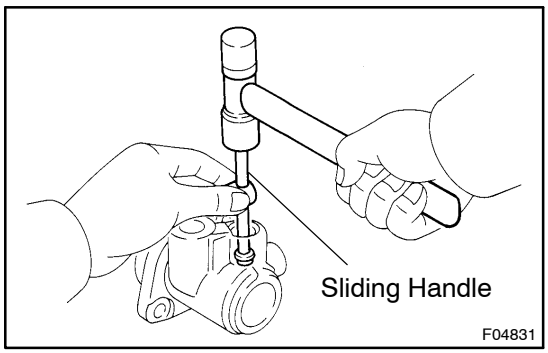


10. IF NECESSARY, REPLACE UNION SEAT

(a) Using a screw extractor, remove the seat from the control valve housing.



(b) Using plastic hammer and sliding handle, lightly tap in a new seat.

NOTICE:

Before installing the union seat, remove dust sticking to the control valve housing.

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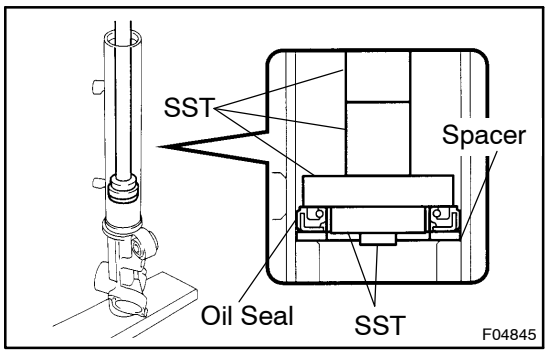
SR0MN–01

REASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. COAT WITH POWER STEERING FLUID OR MOLYBDENUM DISULFIDE LITHIUM BASE GREASE
(See page SR–43)



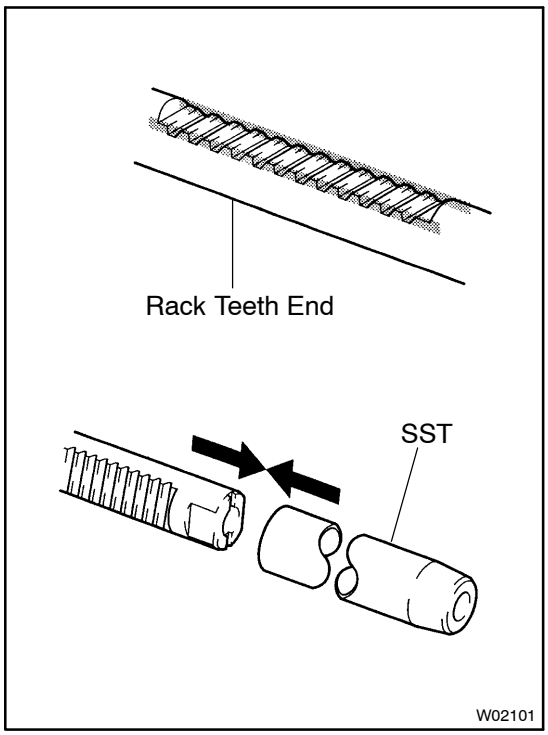
2. INSTALL SPACER AND OIL SEAL

(a) Coat a new oil seal lip with power steering fluid.

(b) Using SST, press in the oil seal and spacer.
SST 09951–60010 (09951–00350, 09951–00550, 09952–06010), 09950–70010 (09951–07360)

NOTICE:

- **Make sure to install the oil seal facing the correct direction.**
- **Take care that the oil seal does not get reversed as you install it.**



3. INSTALL STEERING RACK

(a) Install SST to the rack.
SST 09631–00350

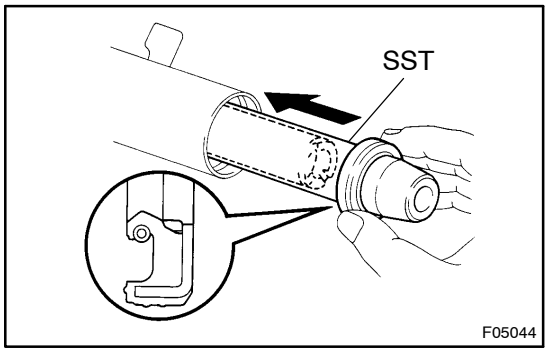
HINT:

If necessary, scrape the burrs off the rack teeth end and burnish.

(b) Coat SST with power steering fluid.

(c) Install the rack into the rack housing.

(d) Remove the SST.



4. INSTALL OIL SEAL

(a) Install SST to the steering rack opposite end.
SST 09631–00350

(b) Coat SST with power steering fluid.

(c) Coat a new oil seal lip with power steering fluid.

(d) Install the oil seal by pushing it onto the SST without tilting.

NOTICE:

Make sure to install the oil seal facing the correct direction.

(e) Remove the SST.

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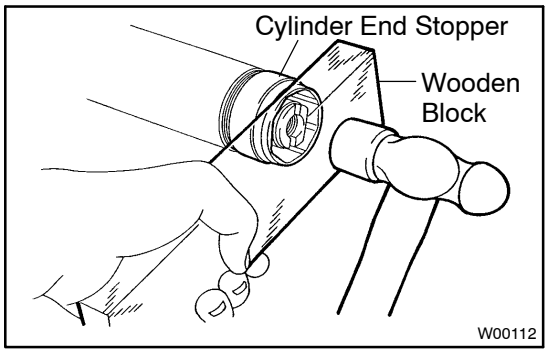


5. INSTALL SPACER AND CYLINDER END STOPPER

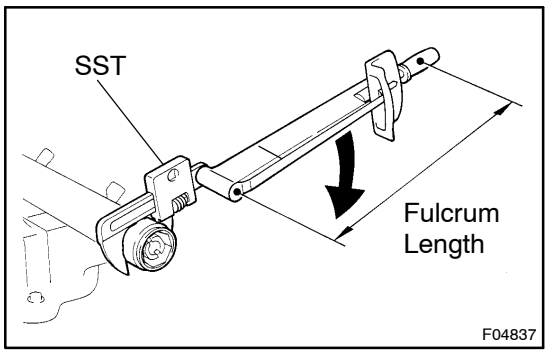
(a) Install the spacer.

(b) Coat a new O–ring with power steering fluid, and install it to the stopper.

(c) Using a wooden block and hammer, drive in the stopper until it is tightly installed.

NOTICE:

Be careful not to damage the O–ring.



(d) Using SST, torque the stopper.

SST 09922–10010

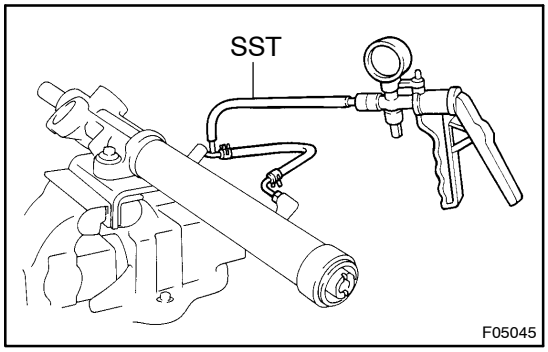
Torque: 66 N·m (677 kgf·cm, 49 ft·lbf)

NOTICE:

Use SST 09922–10010 in the direction shown in the illustration.

HINT:

Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).



6. AIR TIGHTNESS TEST

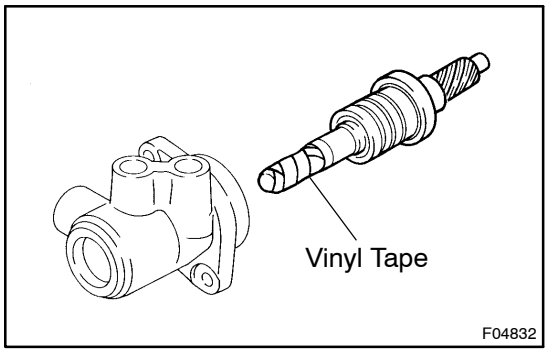
(a) Install SST to the unions of the rack housing.

SST 09631–12071

(b) Apply 53 kPa (400 mmHg,15.75 in.Hg) of vacuum for about 30 seconds.

(c) Check that there is no change in the vacuum.

If there is change in the vacuum, check the installation of the oil seals.



7. INSTALL CONTROL VALVE ASSEMBLY

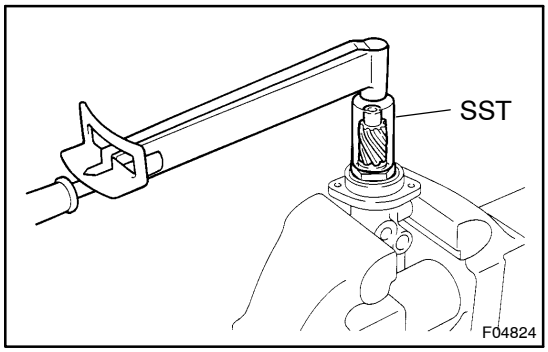
(a) Coat the teflon rings with power steering fluid.

(b) To prevent oil seal lip damage, wind vinyl tape on the serrated part of the control valve shaft.

(c) Push the valve assembly into the control valve housing.

NOTICE:

Be careful not to damage the teflon rings and oil seal lip.



(d) Coat a new O–ring with power steering fluid, and install it to the bearing guide nut.

(e) Using SST, torque the nut.

SST 09631–20060

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

NOTICE:

Be careful not to damage the oil seal lip.

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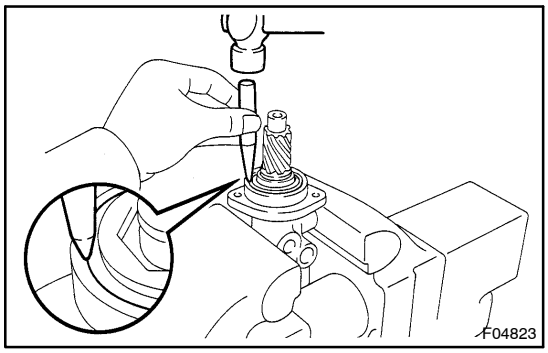


(f) Using a punch, stake the nut.

8. INSTALL CONTROL VALVE HOUSING WITH CONTROL VALVE ASSEMBLY

(a) Coat a new O–ring with power steering fluid, and install it to the valve housing.

(b) Align the matchmarks on the valve housing and rack housing, and install the valve housing with the valve assembly to the rack housing.

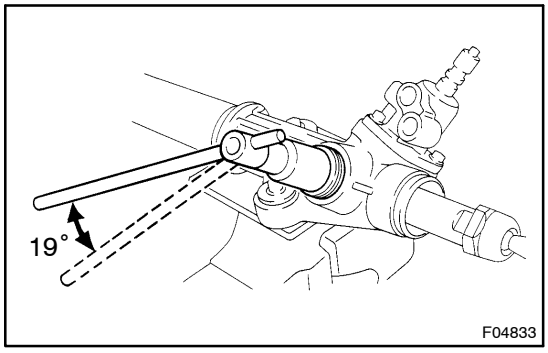
(c) Torque the 2 bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

9. INSTALL DUST COVER

10. INSTALL RACK GUIDE SUB–ASSEMBLY, RACK GUIDE SPRING AND RACK GUIDE SPRING CAP

(a) Apply sealant to 2 or 3 threads of the cap.
Sealant:
Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

(b) Temporarily install the cap.

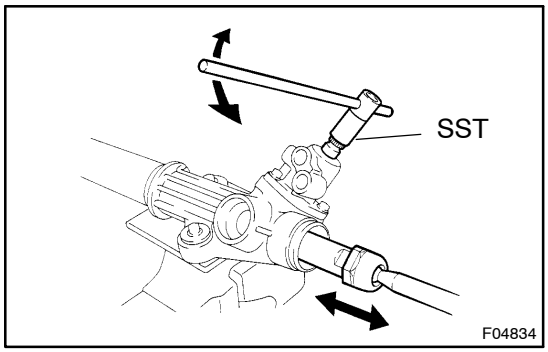


11. ADJUST TOTAL PRELOAD

(a) To prevent the steering rack teeth from damaging the oil seal lip, temporarily install the RH and LH rack ends.

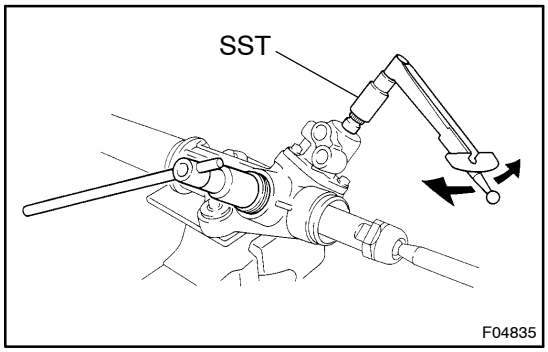
(b) Torque the rack guide spring cap.
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

(c) Return the cap 19°.



(d) Using SST, turn the control valve shaft right and left 1 or 2 times.
SST 09616–00010

(e) Loosen the cap until the rack guide spring is not functioning.



(f) Using SST and a torque wrench, tighten the cap until the preload is within specification.
SST 09616–00010
Preload (turning):
1.3 –1.8 N·m (13.3–18.4 kgf·cm, 11.5–16.0 in.·lbf)

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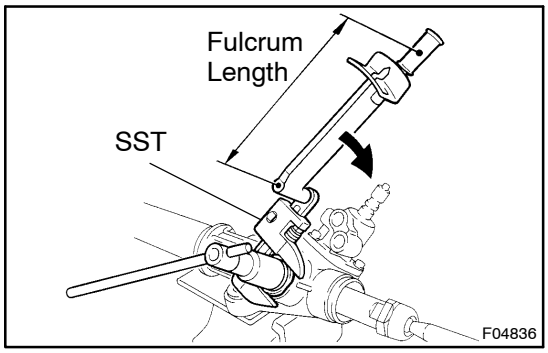


12. INSTALL RACK GUIDE SPRING CAP LOCK NUT

(a) Apply sealant to 2 or 3 threads of the nut.
Sealant:
Part No.08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

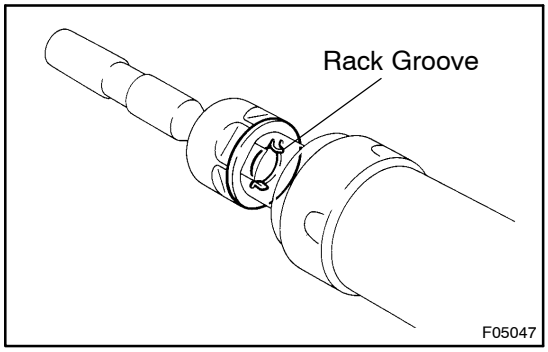
(b) Holding the rack guide spring cap rotating, and using SST, torque the nut.
SST 09922–10010
Torque: 51 N·m (521 kgf·cm, 38 ft·lbf)

NOTICE:
Use SST 09922–10010 in the direction shown in the illustration.

HINT:
Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).

(c) Recheck the total preload.
Preload (turning):
1.3 –1.8 N·m (13.3–18.4 kgf·cm, 11.5–16.0 in.·lbf)

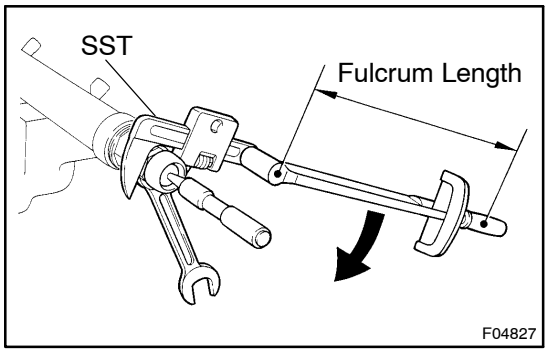
(d) Remove the RH and LH rack ends.



13. INSTALL RH AND LH CLAW WASHERS AND RACK ENDS

(a) Install a new washer, and temporarily tighten the rack end.

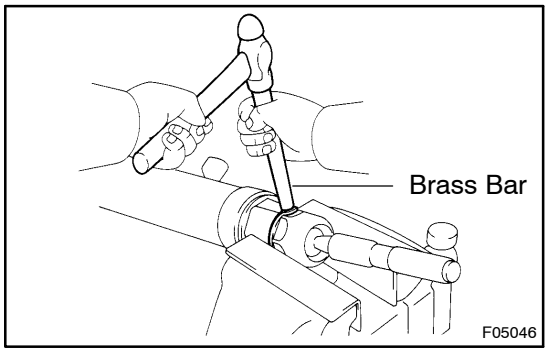
HINT:
Align the claws of the washer with the steering rack grooves.



(b) Using a spanner to hold the steering rack steady, and using SST, torque the rack end.
SST 09922–10010
Torque: 76 N·m (770 kgf·cm, 56 ft·lbf)

NOTICE:
Use SST 09922–10010 in the direction shown in the illustration.

HINT:
Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).



(c) Using a brass bar and hammer, stake the washer.

NOTICE:
Avoid any impact to the rack.

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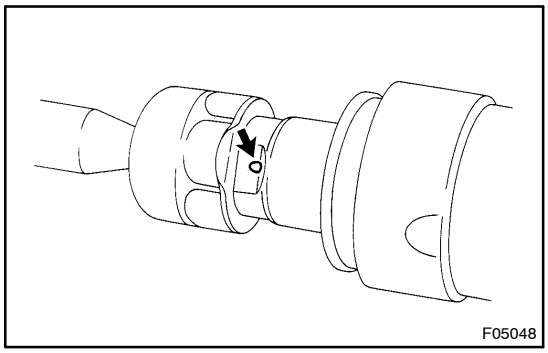
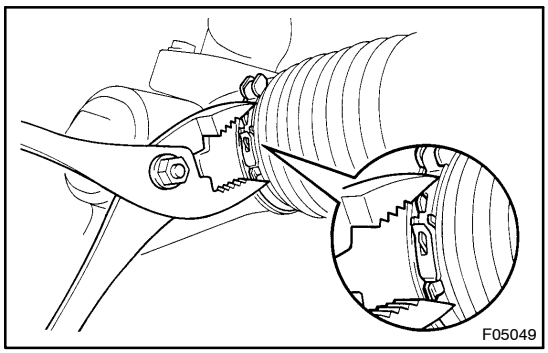


14. INSTALL RH AND LH RACK BOOTS, CLAMPS AND CLIPS

(a) Ensure that the tube hole is not clogged with grease.

HINT:

If the tube hole is clogged, the pressure inside the boot will change after it is assembled and the steering wheel is turned.



(b) Install the boot.

NOTICE:

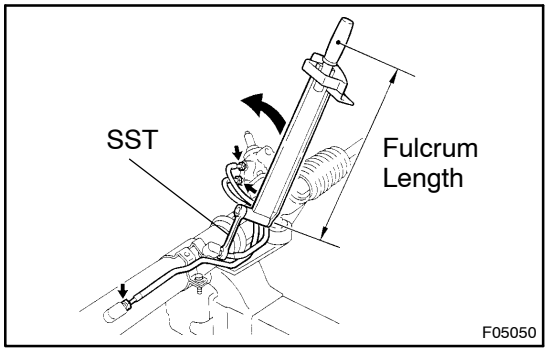
Be careful not to damage or twist the boot.

(c) Using pliers tighten a new clamp, as shown in the illustration.

15. INSTALL TUBE SUPPORT RETAINER

Torque the bolt.

Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)



16. INSTALL 2 TURN PRESSURE TUBES

Using SST, install the tube.

SST 09633–00020

Torque: 20 N·m (203 kgf·cm, 15 ft·lbf)

HINT:

- Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).
- This torque value is effective in case that SST is parallel to a torque wrench.

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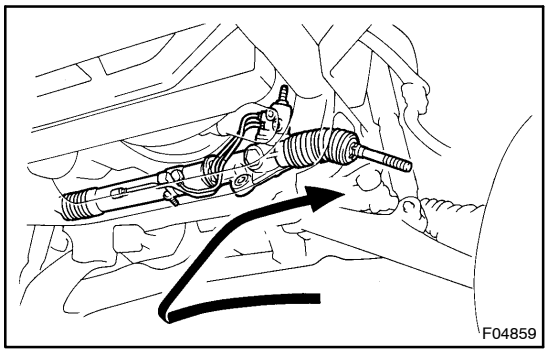
SR0MO–01



INSTALLATION

1. INSTALL PS GEAR ASSEMBLY

Torque the 2 new gear assembly set bolts, nuts and washers.

Torque: 100 N·m (1,020 kgf·cm, 74 ft·lbf)

HINT:

Slide the gear assembly to the right side, slide the gear assembly to the left side and position it.

2. INSTALL RH AND LH TIE ROD ENDS AND LOCK NUTS

(a) Screw the lock nut and tie rod end onto the rack end until the matchmarks are aligned.

(b) After adjusting toe–in, torque the nut.
(See page SA–5)

Torque: 55 N·m (560 kgf·cm, 41 ft·lbf)

3. CONNECT TUBE CLAMP

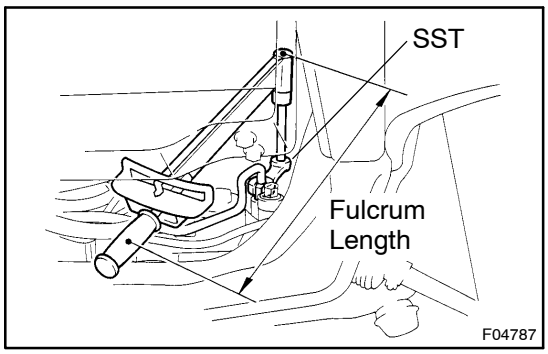
Torque the bolt.

Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)

4. INSTALL BRACKET AND GROMMET

Torque 2 new bolts.

Torque: 100 N·m (1,020 kgf·cm, 74 ft·lbf)



5. CONNECT RETURN TUBE

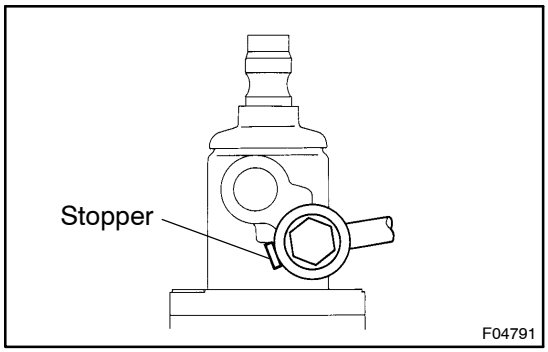
Using SST, connect the tube.

SST 09631–22020

Torque: 36 N·m (365 kgf·cm, 26 ft·lbf)

HINT:

- Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).
- This torque value is effective in case that SST is parallel to a torque wrench.



6. INSTALL PRESSURE FEED TUBE

Torque the union bolt with a new gasket.

HINT:

Make sure the stopper of the pressure feed tube touches the PS gear assembly as shown in the illustration, then torque the bolt.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

7. CONNECT NO.2 INTERMEDIATE SHAFT ASSEMBLY
(See page SR–21)

8. INSTALL ENGINE OIL FILTER ASSEMBLY

(a) Install a new O–ring.

(b) Torque the 2 bolts and nut with the bracket.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(c) Connect the 2 clips and hoses.

9. CONNECT RH AND LH TIE ROD ENDS
(See page SA–18)

10. INSTALL NO.2 ENGINE UNDER COVER

Tighten the 6 bolts.

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11. INSTALL NO.1 ENGINE UNDER COVER

Tighten the 7 bolts.

12. POSITION FRONT WHEELS FACING STRAIGHT AHEAD

HINT:

Do it with the front of the vehicle jacked up.

13. CENTER SPIRAL CABLE

(See page BE–20)

14. INSTALL STEERING WHEEL

(a) Align the matchmarks on the wheel and steering column main shaft.

(b) Temporarily tighten the wheel set nut.

(c) Connect the connector.

15. BLEED POWER STEERING SYSTEM

(See page SR–4)

16. CHECK STEERING WHEEL CENTER POINT

17. TORQUE STEERING WHEEL SET NUT

Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

18. INSTALL STEERING WHEEL PAD

(See page SR–21)

19. CHECK FRONT WHEEL ALIGNMENT

(See page SA–5)

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SRS AIRBAG

RS02V–06

PRECAUTION

NOTICE:

- **The LAND CRUISER is equipped with an SRS, which comprises a driver airbag and front passenger airbag. Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Further, if a mistake is made in servicing the SRS, it is possible the SRS may fail to operate when required. Before performing servicing (including removal or installation of parts, inspection or replacement), be sure to read the following items carefully, then follow the correct procedure described in the repair manual.**
- **Malfunction symptoms of the SRS are difficult to confirm, so the DTCs become the most important source of information when troubleshooting the SRS, always inspect the DTCs before disconnecting the battery.**
- **Even in cases of a minor collision where the SRS does not deploy, the steering wheel pad, front passenger airbag assembly, airbag sensor assembly and front airbag sensor should be inspected. (See page RS–12, RS–26, RS–39 and RS–45)**
- **Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.**
- **Never disassemble and repair the steering wheel pad, front passenger airbag assembly or airbag sensor assembly in order to reuse it.**
- **If the steering wheel pad, front passenger airbag assembly, airbag sensor assembly or front airbag sensor has been dropped, or if there are cracks, dents or other defects in the case, bracket or connector, replace it with new one.**
- **Use a volt/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting the system's electrical circuits.**
- **Information labels are attached to the periphery of the SRS components. Follow the instruction on the notices.**
- **After work on the SRS is completed, check the SRS warning light. (See page DI–342)**
- **If the vehicle is equipped with a mobile communication system, refer to the precaution in the IN section.**

CAUTION:

- **Work must be started 90 seconds after the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery. (The SRS is equipped with a back–up power source so that if work is started within 90 seconds of disconnecting the negative (–) terminal cable of the battery, the SRS may be deployed.)**
- **When the negative (–) terminal cable is disconnected from the battery, the memory of the clock and audio system will be canceled. So before starting work, make a record of the contents memorized in the audio memory system. When work is finished, reset the audio systems as before and adjust the clock. To avoid erasing the memory of each memory system, never use a back–up power supply from outside the vehicle.**
- **Before repairs, remove the airbag sensor if shocks are likely to be applied to the sensor during repairs.**
- **Do not expose the steering wheel pad, front passenger airbag assembly, airbag sensor assembly or front airbag sensor directly to hot air or flames.**

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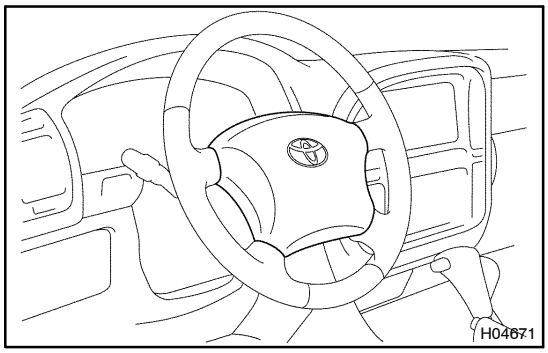
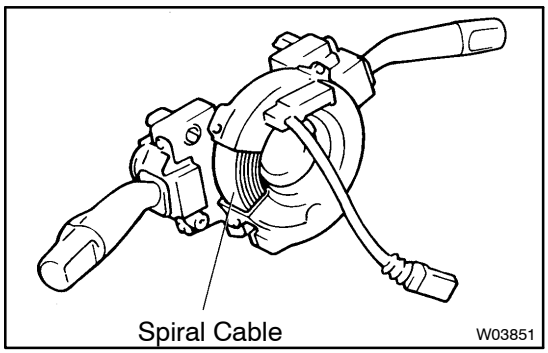
RS0B3–01

OPERATION



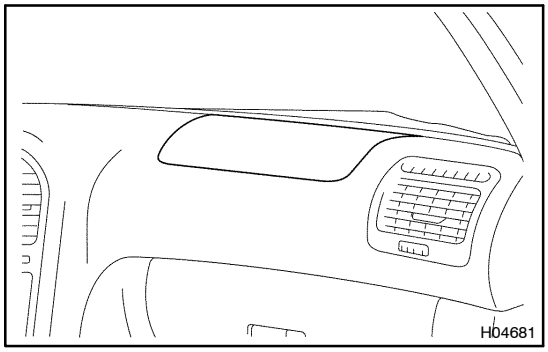
1. STEERING WHEEL PAD (with AIRBAG)

The inflater and bag of the SRS are stored in the steering wheel pad and cannot be disassembled. The inflater contains a squib, igniter charge, gas generant, etc., and inflates the bag when instructed by the airbag sensor assembly.



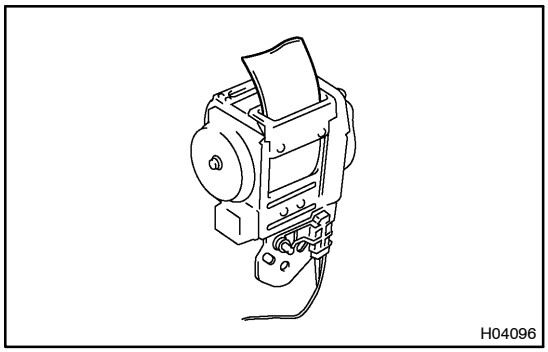
2. SPIRAL CABLE (in COMBINATION SWITCH)

A spiral cable is used as an electrical joint from the vehicle body side to the steering wheel.



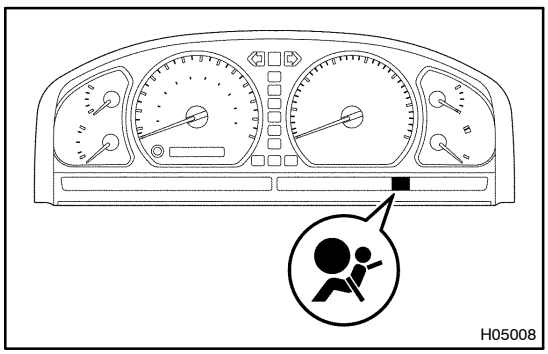
3. FRONT PASSENGER AIRBAG ASSEMBLY

The inflater and bag of the SRS are stored in the front passenger airbag assembly and cannot be disassembled. The inflater contains a squib, igniter charge and gas generant, etc., and inflates the bag when instructed by the airbag sensor assembly.



4. SEAT BELT PRETENSIONER

The seat belt pretensioner system is a component of the front seat outer belt. The pretensioner contains a squib, gas generant, strip, etc., and operates in the event of a frontal collision.



5. SRS WARNING LIGHT

The SRS warning light is located on the combination meter. It goes on to alert the driver of trouble in the system when a malfunction is detected in the airbag sensor assembly self–diagnosis. In normal operating conditions when the ignition switch is turned to the ACC or ON position, the light goes on for about 6 seconds and then goes off.

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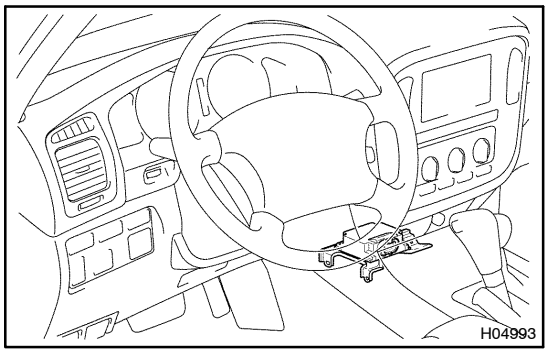
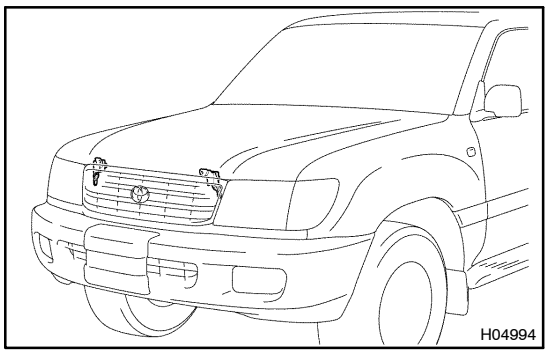


6. AIRBAG SENSOR ASSEMBLY

The airbag sensor assembly is mounted on the floor inside the center cluster. The airbag sensor assembly consists of airbag sensor, safing sensor, diagnosis circuit, ignition control and drive circuit, etc.

It receives signals from the airbag sensor assembly and judges whether the SRS must be activated or not.



7. FRONT AIRBAG SENSOR

The front airbag sensor is mounted inside each of the side members. The sensor unit is a mechanical type. When the sensor detects deceleration force above a predetermined limit, contact is made in the sensor, sending a signal to the airbag sensor assembly. The sensor cannot be disassembled.

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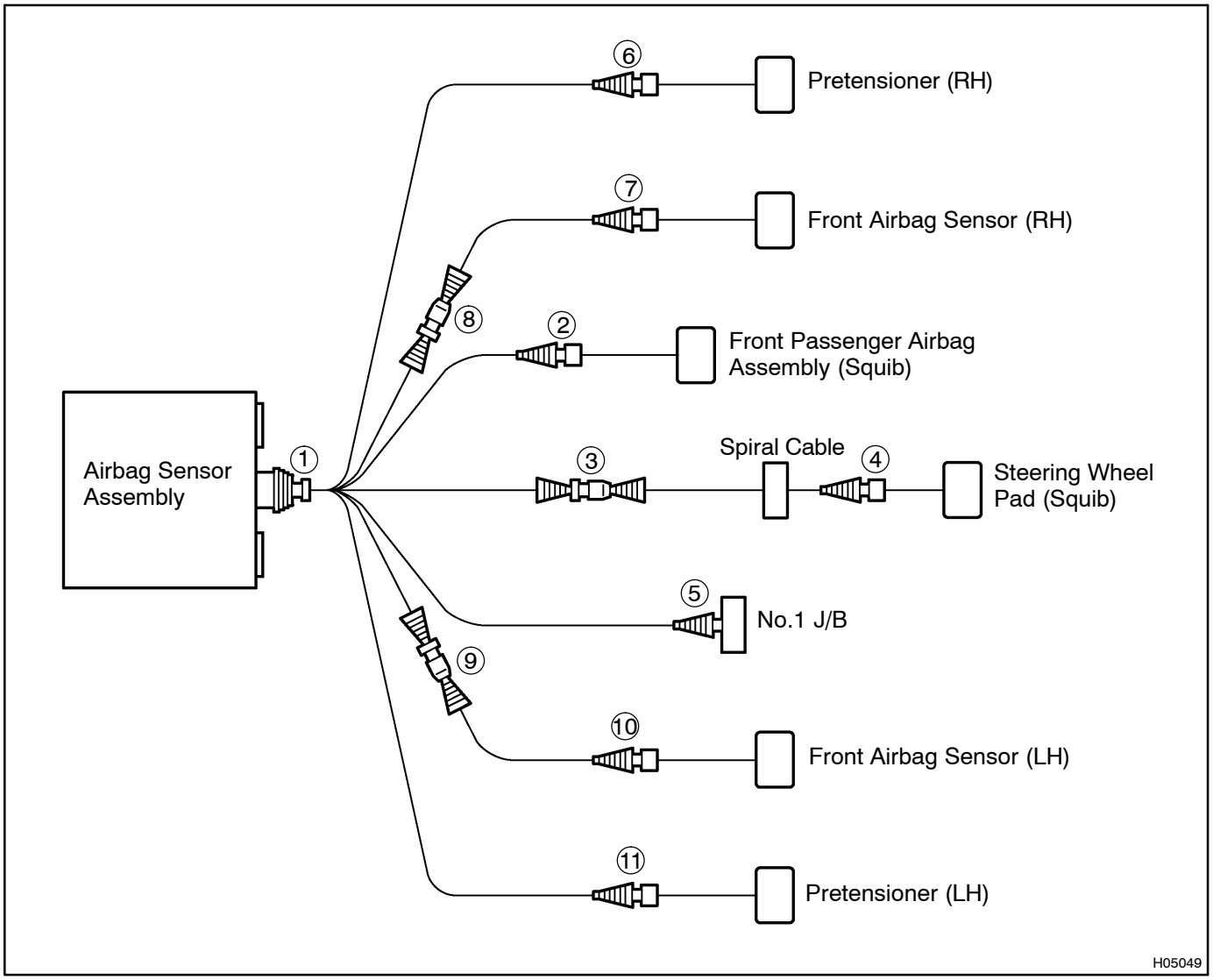
8. SRS CONNECTORS



No.	Item	Application
(1)	Terminal Twin–Lock Mechanism	Connectors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
(2)	Airbag Activation Prevention Mechanism	Connectors 1, 2, 3, 4, 5, 6, 11
(3)	Electrical Connection Check Mechanism	Connectors 1
(4)	Connector Twin–Lock Mechanism	Connectors 3, 5

(a) All connectors in the SRS are colored in yellow to distinguish them from other connectors. Connectors having special functions and specifically designed for SRS are used in the locations shown above to ensure high reliability. These connectors use durable gold–plated terminals.

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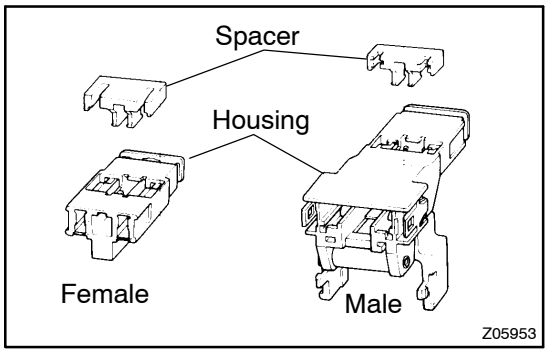
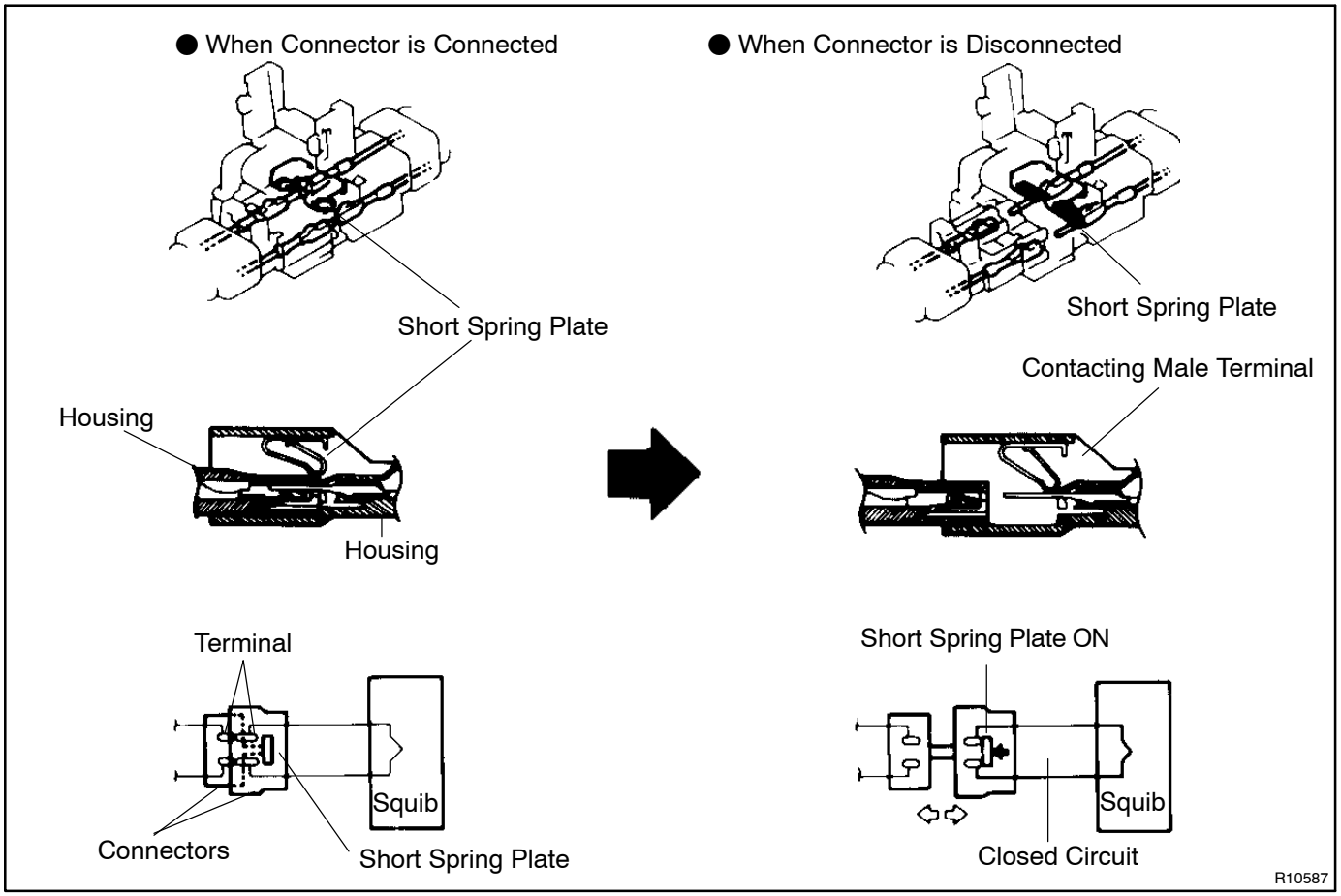


(1) Terminal Twin–Lock Mechanism
Each connector has a two–piece construction consisting of a housing and a spacer. This design enables the terminal to be locked securely by two locking devices (the spacer and the lance) to prevent terminals from coming out.

(2) Airbag Activation Prevention Mechanism
Each connector contains a short spring plate. When the connector is disconnected, positive (+) terminal and negative (–) terminal of the squib are attached.



HINT:
The type of connector shown above is used for the connectors "1", "2", "3", "4", "6" and "11" in the diagram on the previous page, but the operating principle is the same.

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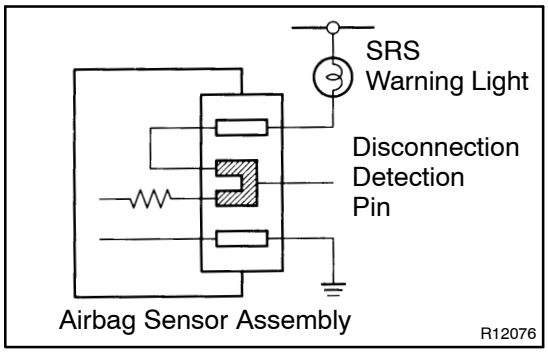
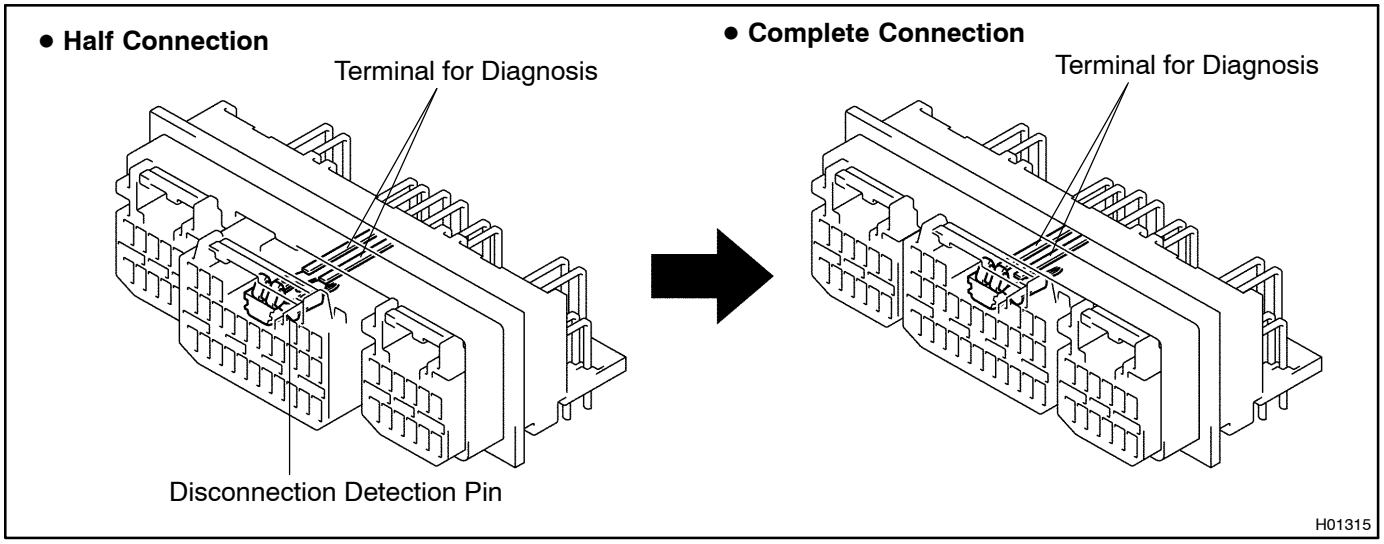
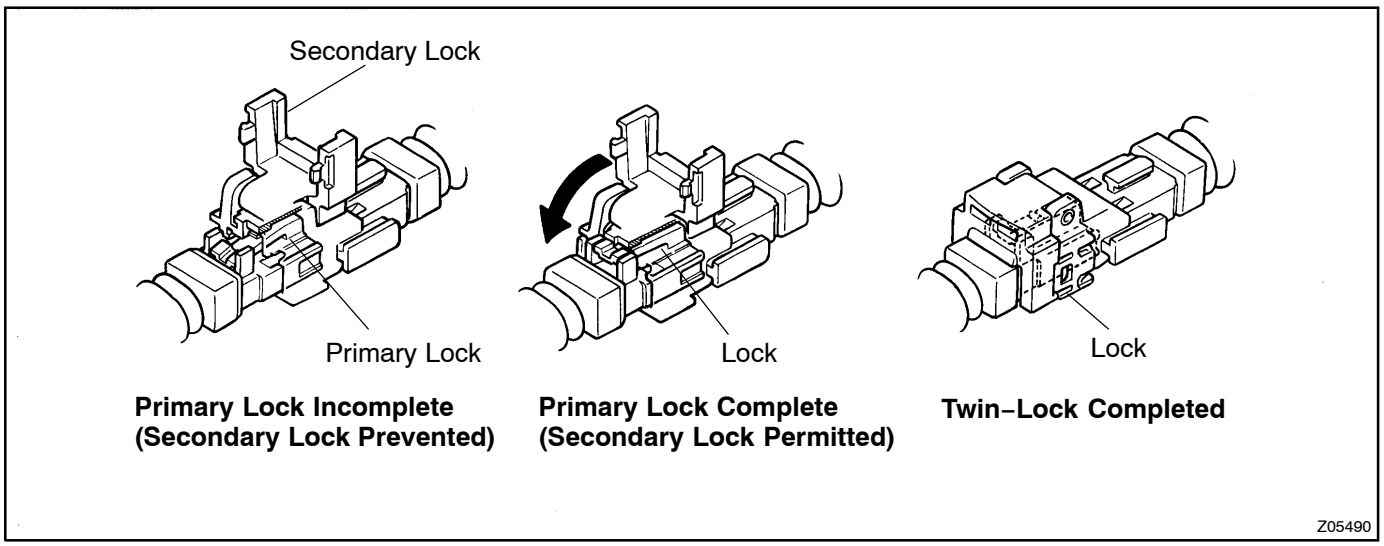


(3) Electrical Connection Check Mechanism
This mechanism is designed to electrically check if connectors are connected correctly and completely. The electrical connection check mechanism is designed so that the connection detection pin connects with the diagnosis terminals when the connector housing lock is in the locked condition.



(4) Connector Twin–Lock Mechanism
With this mechanism connectors (male and female connectors) are locked by two locking devices to increase connection reliability.

If the primary lock is incomplete, ribs interfere and prevent the secondary lock.



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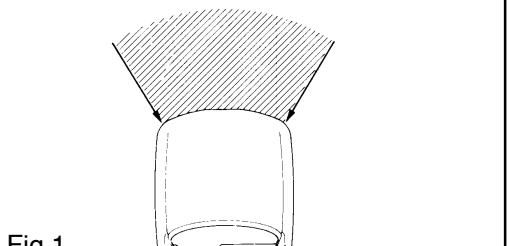


Fig.1

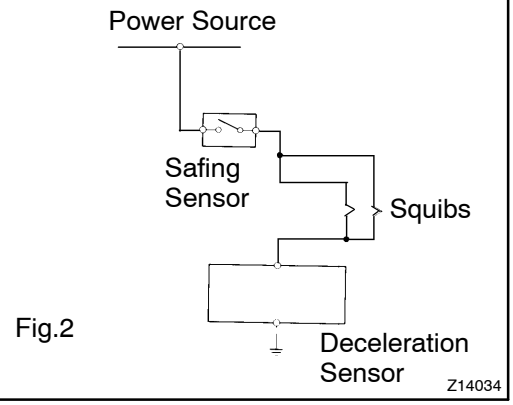
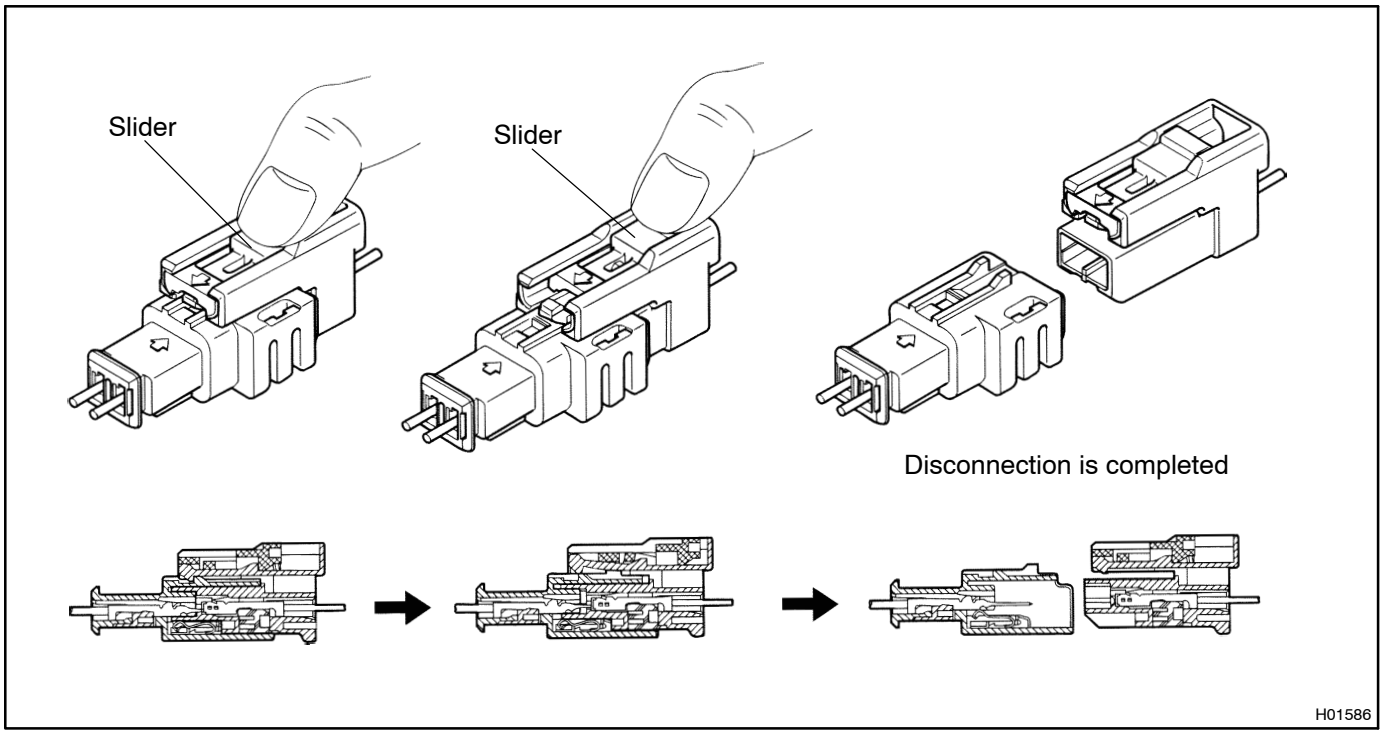


Fig.2

(b) When the vehicle is involved in a frontal collision in the hatched area (Fig. 1) and the shock is larger than a predetermined level, the SRS is activated automatically. A safing sensor is designed to go on at a smaller deceleration rate than the airbag sensors. As illustrated in Fig. 2, ignition is caused when a safing sensor and the deceleration sensor go on simultaneously. When a deceleration force acts on the sensors, two squibs in the driver airbag and front passenger airbag ignite and generate gas. The gas discharging into the driver and front passenger airbags rapidly increases the pressure inside the bags breaking open the steering wheel pad and instrument panel door. Bag inflation then ends, and the bags deflate as the gas is discharged through discharge holes at the bag's rear or side.

9. DISCONNECTION OF CONNECTORS FOR STEERING WHEEL PAD (with AIRBAG) AND FRONT PASSENGER AIRBAG ASSEMBLY

(a) Place a finger on the slider.
(b) Slide the slider to release lock.
(c) Disconnect the connector.



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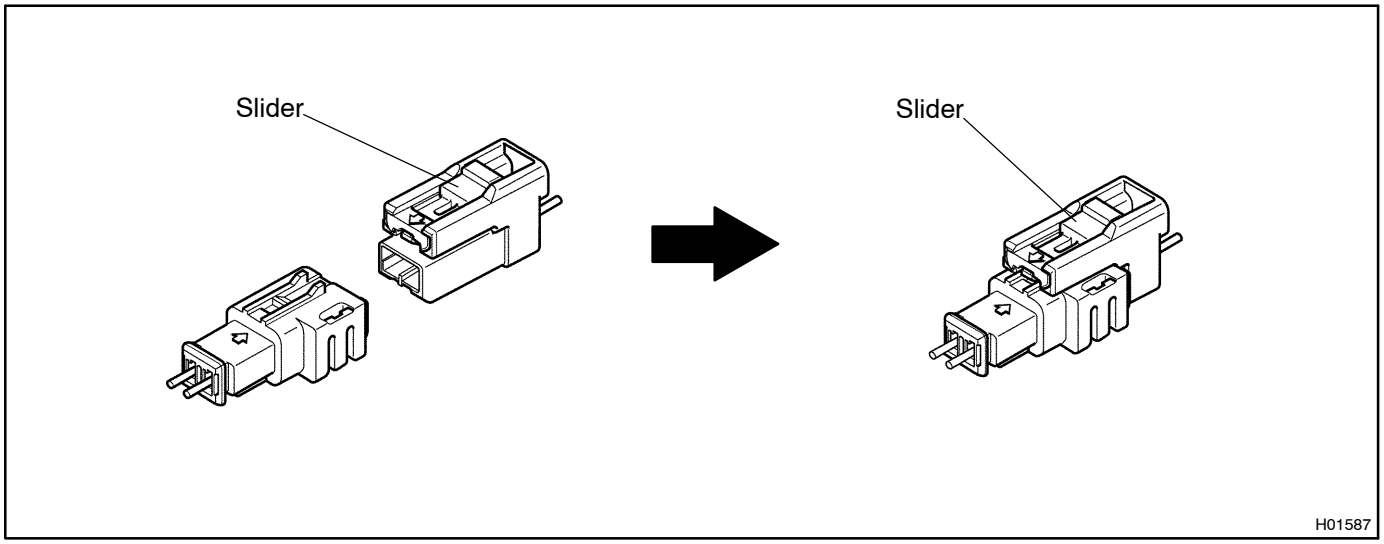
10. CONNECTION OF CONNECTORS FOR STEERING WHEEL PAD (with AIRBAG) AND FRONT PASSENGER AIRBAG ASSEMBLY

(a) Align a lock part of male connector and a slider of female connector in the same direction as shown in the illustration, fit in them without rubbing.

(b) Make sure to insert until they are locked. After fitting in pull them lightly to check that they are locked. (When locked, make sure that the outer returns to its original position and sound at the time of fitting in can be heard.)

HINT:

- As the slider slides, do not touch it.
- Be careful not to deform the release board. If the release board is deformed, replace it with a new one.



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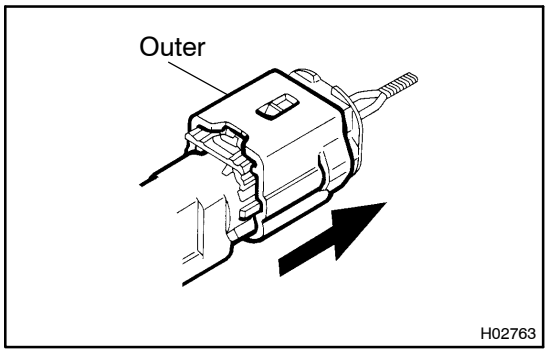


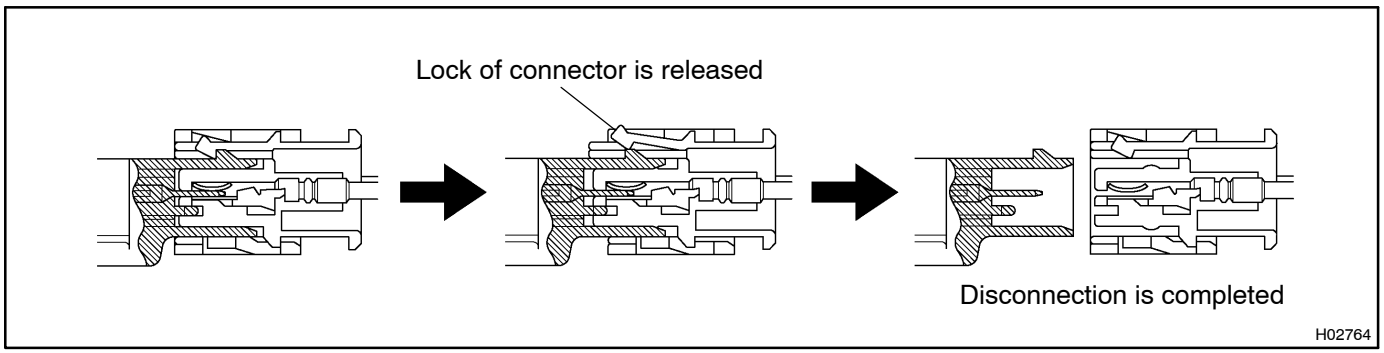
11. DISCONNECTION OF FRONT AIRBAG SENSOR CONNECTOR

(a) While holding both flank sides of the outer, slide the outer to the direction shown by an arrow.

(b) When lock of the connectors is released, disconnect the connectors.

HINT:

Make sure to hold both flank sides of the outer. If holding the top and bottom sides, it will obstruct disconnection.



12. CONNECTION OF FRONT AIRBAG SENSOR CONNECTOR

(a) Align the male connector (on the side of sensor) and female connector in the same direction as shown in the illustration and fit in them without rubbing.

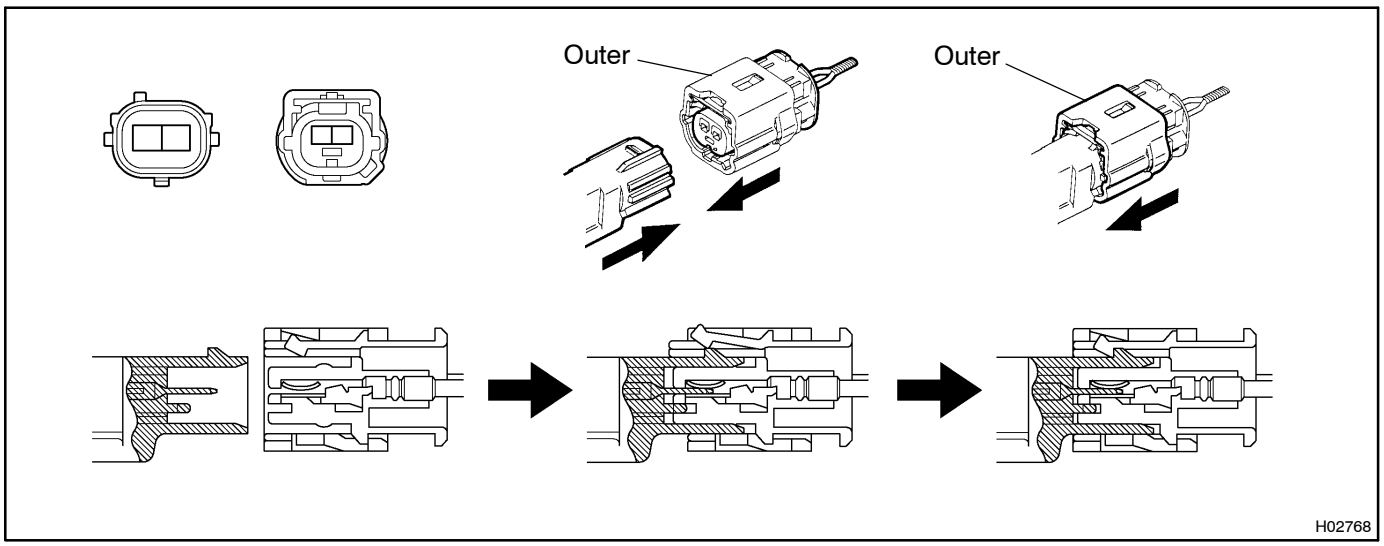
(b) As they are fitted in, the outer slides rearward. Press it until the outer returns to its original position again.

If fitting stops half way, connectors will separate.

(c) Make sure to insert until they are locked. After fitting in, pull them slightly to check that they are locked. (When locked, make sure that the outer returns to its original position and sound at the time of fitting in can be heard.)

HINT:

- Do not fit in while holding the outer.
- When fitting in, the outer slides. Do not touch it.



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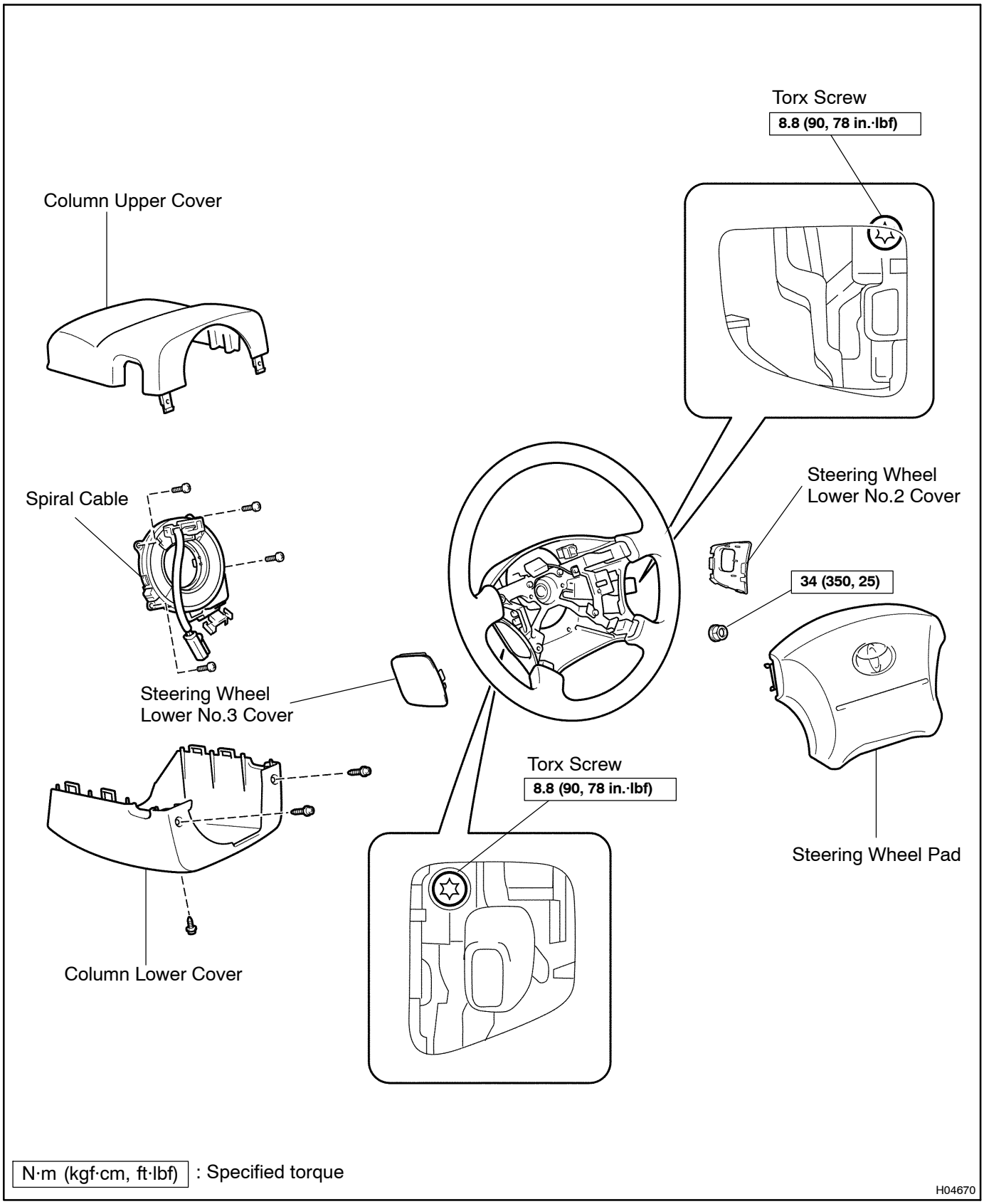
STEERING WHEEL PAD AND SPIRAL CABLE

COMPONENTS

RS00Y–12



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RS00Z–10

REMOVAL

(See page SR–12)

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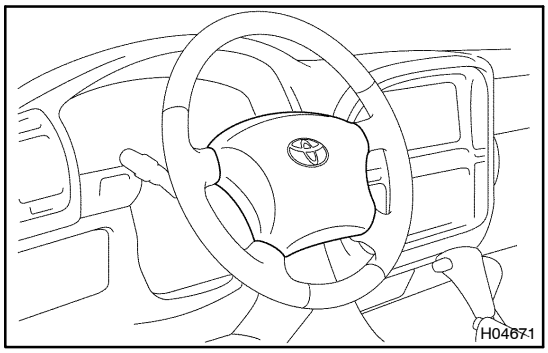
RS010–12

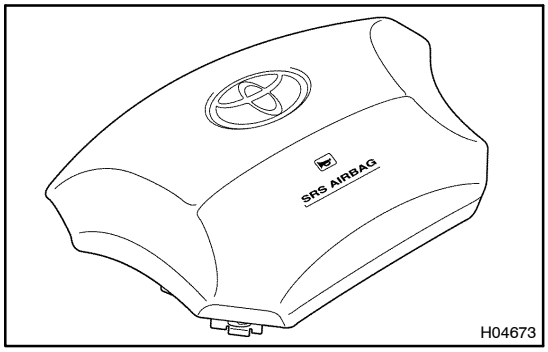


INSPECTION

1. VEHICLES NOT INVOLVED IN COLLISION

(a) Do a diagnostic system check.
(See page DI–342)

(b) Do a visual check which includes the following item with the steering wheel pad (with airbag) installed in the vehicle.
Check cuts, minute cracks or marked discoloration on the steering wheel pad top surface and in the grooved portion.

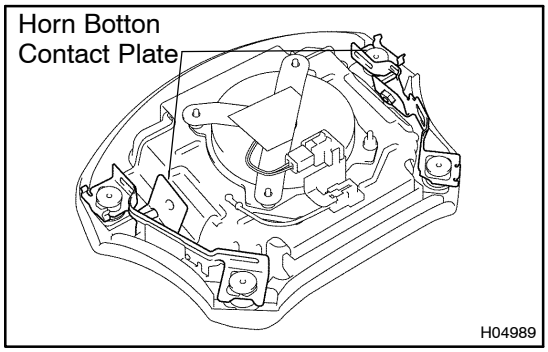


2. VEHICLE INVOLVED IN COLLISION AND AIRBAG IS NOT DEPLOYED

(a) Do a diagnostic system check.
(See page DI–342)

(b) Do a visual check which includes the following items with the steering wheel pad (with airbag) removed from the vehicle.

- Check cuts, minute cracks or marked discoloration on the steering wheel pad top surface and in the grooved portion.
- Check cuts and cracks in wire harnesses, and chipping in connectors.
- Check the deformation on the horn button contact plate of the steering wheel pad.
- Check the deformation on the steering wheel.



HINT:

- If the horn button contact plate of the steering wheel pad is deformed, never repair it. Always replace the steering wheel pad with a new one.

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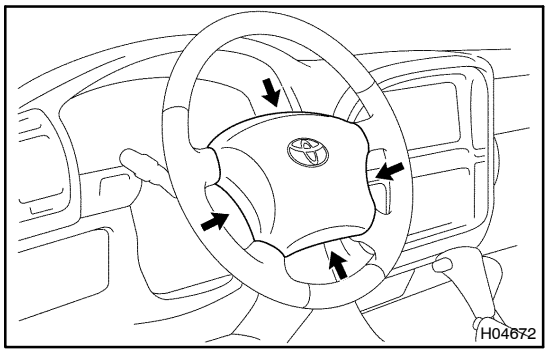

- There should be no interference between the steering wheel pad and steering wheel, and the clearance should be uniform all the way around when the new steering wheel pad is installed on the steering wheel.

CAUTION:
For removal and installation of the steering wheel pad, see page SR–12 and SR–21, and be sure to follow the correct procedure.

3. VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED

(a) Do a diagnostic system check.
(See page DI–342)

(b) Do a visual check which includes the following items with the steering wheel pad (with airbag) removed from the vehicle.
- Check the deformation on the horn button contact plate of the steering wheel.
- Check the damage on the spiral cable connector and wire harness.

HINT:
- If the horn button contact plate of the steering wheel is deformed, never repair it. Always replace the steering wheel assembly with a new one.
- There should be no interference between the steering wheel pad and steering wheel, and the clearance should be uniform all the way around when the new steering wheel pad is installed on the steering wheel.

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RS011–12

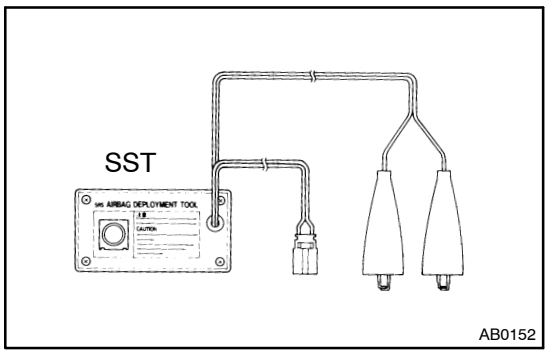
DISPOSAL

HINT:

When scrapping vehicle equipped with an SRS or disposing of a steering wheel pad (with airbag), always first deploy the airbag in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of the TOYOTA MOTOR SALES, U.S.A., INC. When disposing of a steering wheel pad with an airbag deployed in a collision, follow the same procedure given in step 1–(d) in "DISPOSAL".

CAUTION:

- **Never dispose of a steering wheel pad which has an undeployed airbag.**
- **The airbag produces a sizeable exploding sound when it deploys, so perform the operation out of doors and where it will not create a nuisance to nearby residents.**



- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
  SST 09082–00700
- **When deploying an airbag, perform the operation at least 10 m (33 ft) away from the steering wheel pad.**
- **The steering wheel pad is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a steering wheel pad with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a steering wheel pad with the deployed airbag.**

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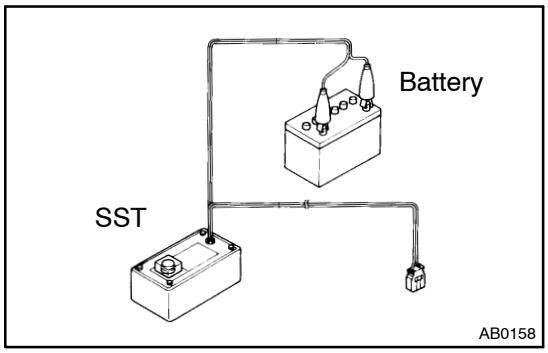
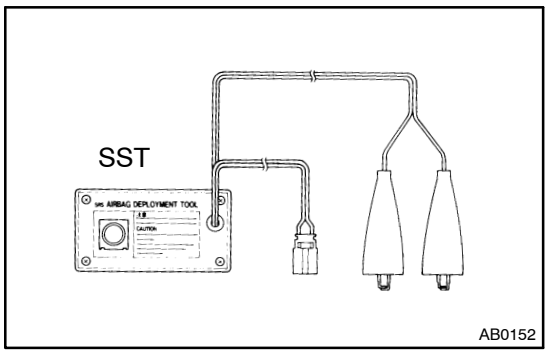


1. AIRBAG DEPLOYMENT WHEN SCRAPPING VEHICLE

HINT:

Have a battery ready as the power source to deploy the airbag.

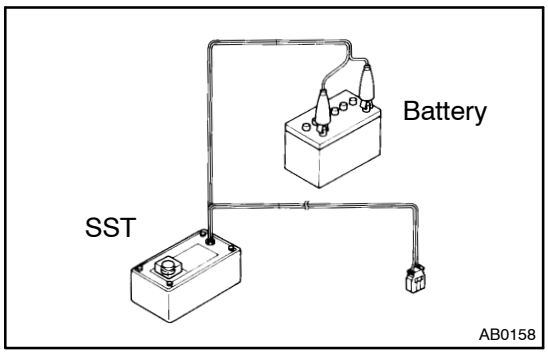


(a) Check functioning of the SST.

CAUTION:

When deploying the airbag, always use the specified SST: SRS Airbag Deployment Tool.

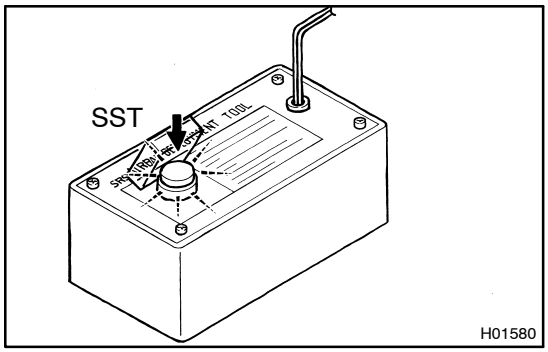
SST 09082–00700



(1) Connect the SST to the battery.
Connect the red clip of the SST to the battery positive (+) terminal and the black clip to the battery negative (–) terminal.

HINT:

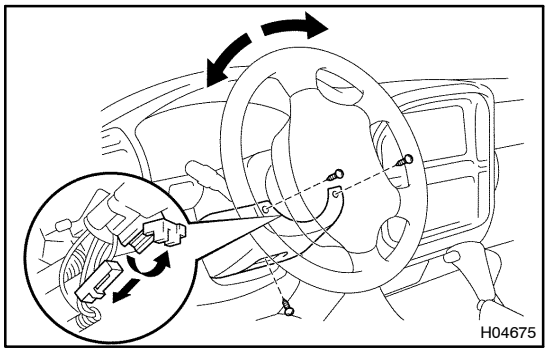
Do not connect the yellow connector which will be connected with the supplemental restraint system.



(2) Check functioning of the SST.
Press the SST activation switch, and check that the LED of the SST activation switch lights up.

CAUTION:

If the LED lights up when the activation switch is not being pressed, SST malfunction is probable, so definitely do not use the SST.



(b) Install the SST.

CAUTION:

Check that there is no looseness in the steering wheel and steering wheel pad.

(1) Remove the steering column lower cover.
Remove the 3 screws and steering column lower cover as shown in the illustration.

(2) Disconnect the airbag connector of the spiral cable.

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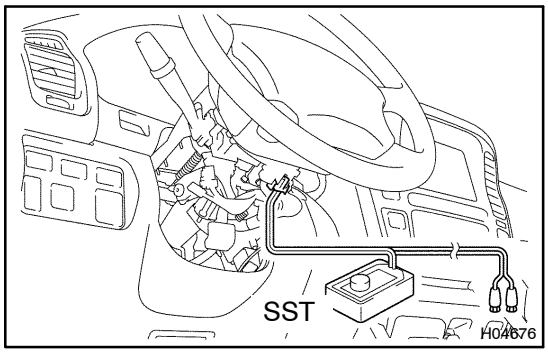
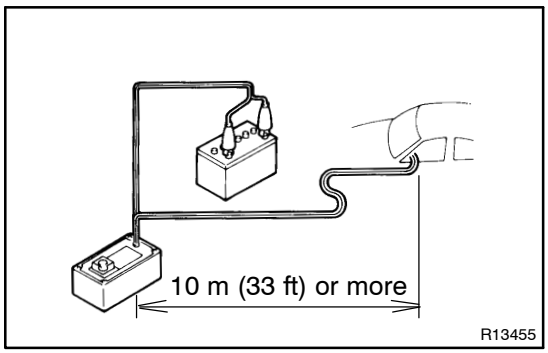


(3) Connect the SST connector to the airbag connector of the spiral cable.

SST 09082–00700



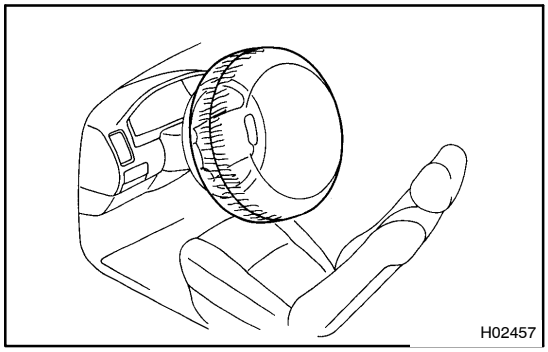
(4) Move the SST at least 10 m (33 ft) away from the front of the vehicle.

(5) Close all the doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(6) Connect the SST red clip to the battery positive (+) terminal and the black clip to the negative (–) terminal.



(c) Deploy the airbag.

(1) Confirm that no one is inside the vehicle or within 10 m (33 ft) area around the vehicle.

(2) Press the SST activation switch and deploy the airbag.

HINT:

The airbag deploys simultaneously as the LED of the SST activation switch lights up.

(d) Dispose of steering wheel pad (with airbag).

CAUTION:

- **The steering wheel pad is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a steering wheel pad with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a steering wheel pad with the deployed airbag.**

(1) When scrapping a vehicle, deploy the airbag and scrap the vehicle with the steering wheel pad still installed.

(2) When moving a vehicle for scrapping which has a steering wheel pad with deployed airbag, use gloves and safety glasses.

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2. DEPLOYMENT WHEN DISPOSING OF STEERING WHEEL PAD ONLY

NOTICE:

- **When disposing of the steering wheel pad (with airbag) only, never use the customers vehicle to deploy the airbag.**
- **Be sure to follow the procedure given below when deploying the airbag.**

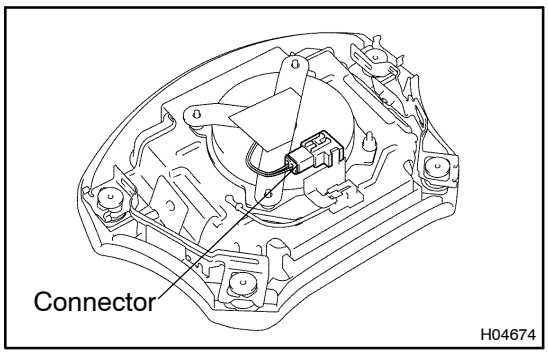
HINT:

Have a battery ready as the power source to deploy the airbag.

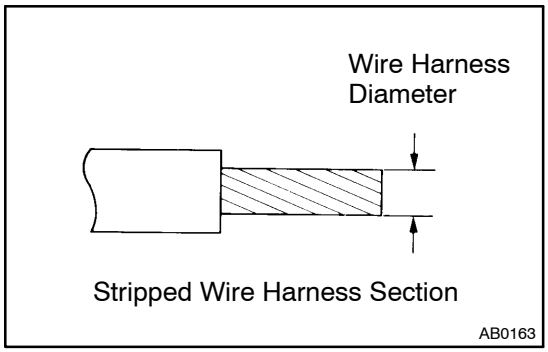
(a) Remove the steering wheel pad.
(See page SR–12)

CAUTION:

When storing the steering wheel pad, keep the upper surface of the pad facing upward.



(b) Remove the connector on the rear surface of the steering wheel pad from the bracket.



(c) Using a service–purpose wire harness, tie down the steering wheel pad to the disc wheel.
Wire harness: Stripped wire harness section 1.25 mm^2 or more (0.0019 in^2 or more).

HINT:

To calculate the square of the stripped wire harness section:
Square = 3.14 x (Diameter)^2 divided by 4

CAUTION:

If a wire harness which is too thin or some other thing is used to tie down the steering wheel pad, it may be snapped by the shock when the airbag is deployed. This is highly dangerous. Always use a wire harness for vehicle use which is at least 1.25 mm^2 (0.0019 in^2).

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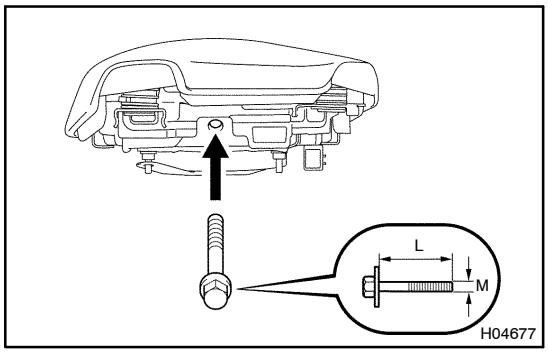


(1) Install the 2 bolts with washers in the 2 bolt holes in the steering wheel pad.

Bolt:
L: 35. mm (1.387 in.)
M: 6.0 mm (0.236 in.)
Pitch: 1.0 mm (0.039 in.)

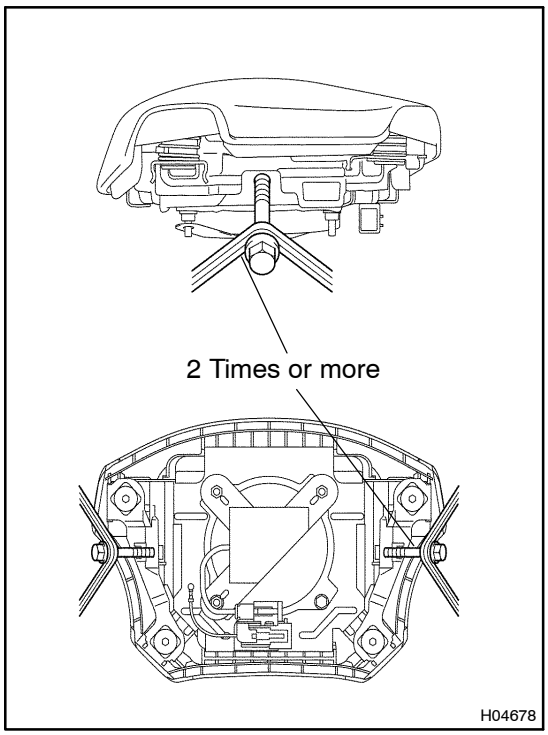
NOTICE:

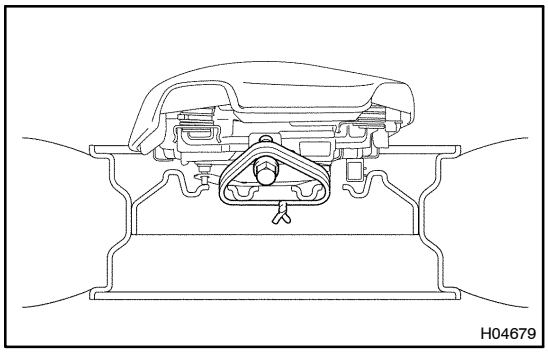
- **Tighten the bolts by hand until the bolts become difficult to turn.**
- **Do not tighten the bolts too much.**

(2) Using 3 wire harnesses, wind the wire harness at least 2 times each around the bolts installed on the left and right sides of the steering wheel pad.

CAUTION:

- **Tightly wind the wire harness around the bolts so that there is no slack.**
- **If there is slack in the wire harness, the steering wheel pad may come loose due to the shock when the airbag is deployed. This is highly dangerous.**





(3) Face the upper surface of the steering wheel pad upward. Separately tie the left and right sides of the steering wheel pad to the disc wheel through the hub nut holes. Position the steering wheel pad connector so that it hangs downward through a hub hole in the disc wheel.

CAUTION:

- **Make sure that the wire harness is tight. It is very dangerous when looseness in the wire harness results in the steering wheel pad coming free through the shock from the airbag deploying.**
- **Always tie down the steering wheel pad with the pad side facing upward. It is very dangerous if the steering wheel pad is tied down with the metal surface facing upward as the wire harness will be cut by the shock from the airbag deploying and the steering wheel pad will be thrown into the air.**

NOTICE:

The disc wheel will be marked by airbag deployment, so when disposing of the airbag use a redundant disc wheel.

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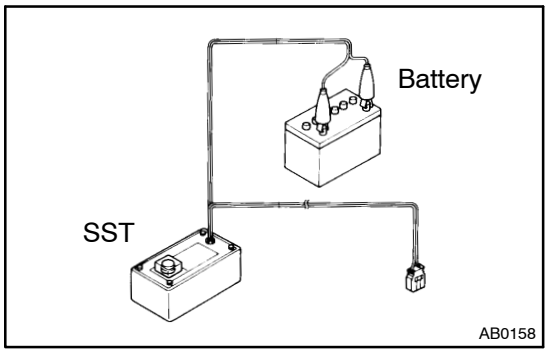
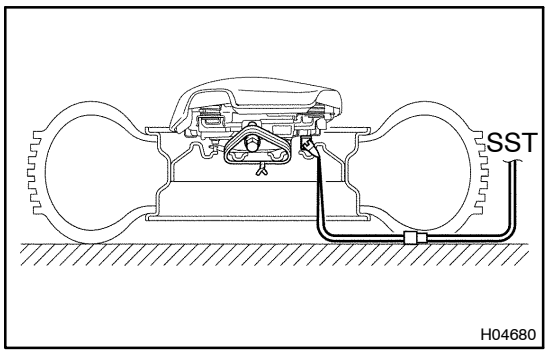


(d) Check functioning of the SST.
SST 09082–00700



(e) Install the SST.

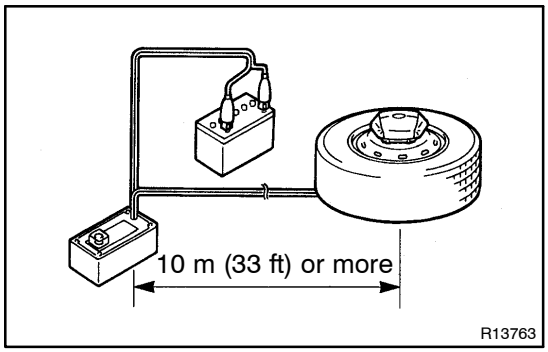
CAUTION:

Place the disc wheel on the level ground.

(1) Connect the connector of 2 SST to the steering wheel pad connector.
SST 09082–00700, 09082–00760

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the disc wheel.



(2) Move the SST to at least 10 m (33 ft) away from the steering wheel pad tied down on the disc wheel.

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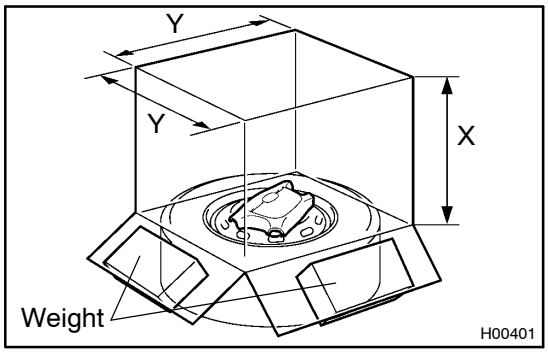
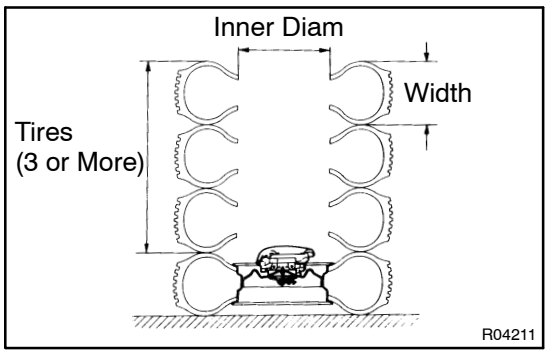


(f) Cover the steering wheel pad with a cardboard box or tires.

- Covering method using a cardboard box:
  Cover the steering wheel pad with the cardboard box and weight the cardboard box down in 4 places with at least 190 N (20 kg, 44 lb).

Size of cardboard box:
Must exceed the following dimensions:
x=460 mm (18.11 in.)
When dimension of the cardboard box exceeds the diameter of the disc wheel with tire to which the steering wheel pad is tied
x=460 mm (18.11 in.) + width of tire
y= 650 mm (25.59 in.)

NOTICE:
If a cardboard box smaller than the specified size is used, the cardboard box will be broken by the shock from the airbag deployment.



- Covering method using tires:
  Place at least 3 tires without disc wheel on top of the disc wheel with tire to which the steering wheel pad is tied.

Tire size: Must exceed the following dimensions–
Width: 185 mm (7.87 in.)
Inner diameter: 360 mm (14.17 in.)

CAUTION:
Do not use tires with disc wheels.

NOTICE:
The tires may be marked by the airbag deployment, so use the redundant tires.

(g) Deploy the airbag.

(1) Connect the SST red clip to the battery positive (+) terminal and the black clip to the battery negative (–) terminal.

(2) Check that no one is within 10 m (33 ft) area around the disc wheel which the steering wheel pad is tied to.

(3) Press the SST activation switch and deploy the airbag.

HINT:
The airbag deploys simultaneously as the LED of the SST activation switch lights up.

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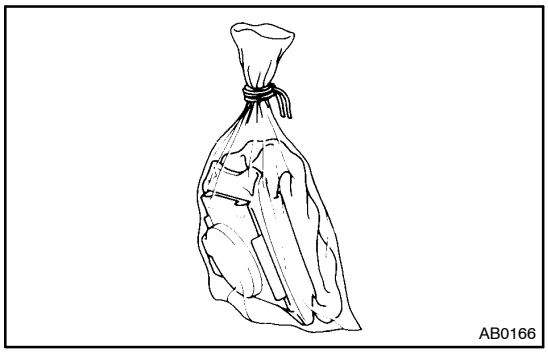

(h) Dispose of the steering wheel pad (with airbag).

CAUTION:

- **The steering wheel pad is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a steering wheel pad with deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a steering wheel pad with deployed airbag.**

(1) Remove the steering wheel pad from the disc wheel.

(2) Place the steering wheel pad in a vinyl bag, tie the end tightly and dispose of it in the same way as other general parts disposal.

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RS012–12

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the steering wheel pad, steering wheel or spiral cable.

Case	Replacing part
If the airbag has been deployed.	Steering wheel pad
If the steering wheel pad has been found to be faulty in troubleshooting.	Steering wheel pad
If the spiral cable has been found to be faulty in troubleshooting.	Spiral cable
If the steering wheel pad has been found to be faulty during checking items. (See page RS–12)	Steering wheel pad
If the steering wheel has been found to be faulty during checking items. (See page RS–12)	Steering wheel
If the spiral cable has been found to be faulty during checking items. (See page RS–12)	Spiral cable
If the steering wheel pad has been dropped.	Steering wheel pad

CAUTION:

For removal and installation of the steering wheel pad, see page SR–12 and SR–21, and be sure to follow the correct procedure.

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RS013–11

INSTALLATION

(See page SR–21)

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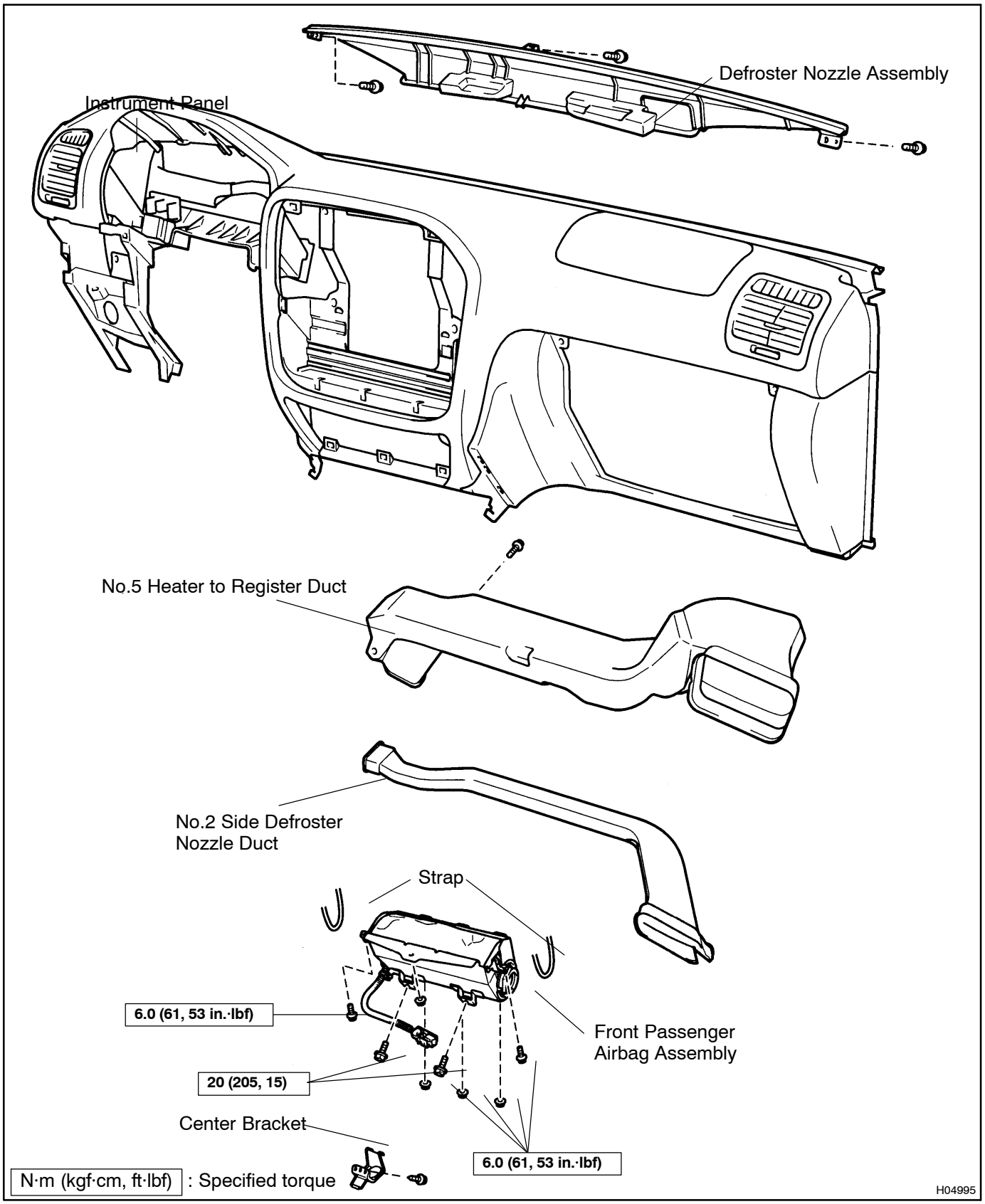
FRONT PASSENGER AIRBAG ASSEMBLY

COMPONENTS

RS014–13



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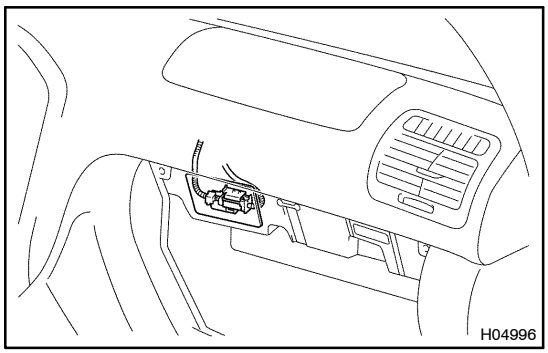
RS015–04

REMOVAL

NOTICE:

- **If the wiring connector of the SRS is disconnected and the ignition switch is in ON or ACC position, DTCs will be recorded.**
- **Never use the airbag parts from another vehicle. When replacing parts, replace them with new parts.**



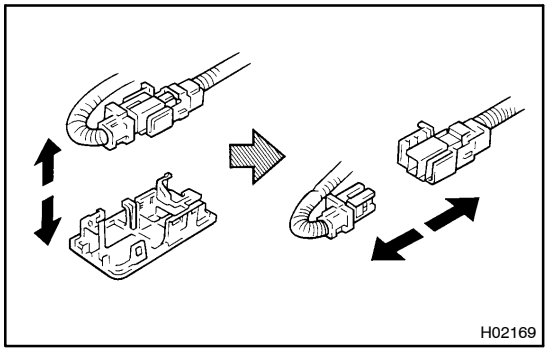
1. DISCONNECT AIRBAG CONNECTOR

(a) Remove the glove compartment door.

(b) Remove the No.1 under cover from the lower No.2 finish panel.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.



(c) Pull up the connector.

(d) Disconnect the front passenger airbag connector.

2. REMOVE INSTRUMENT PANEL

(See page BO–86)

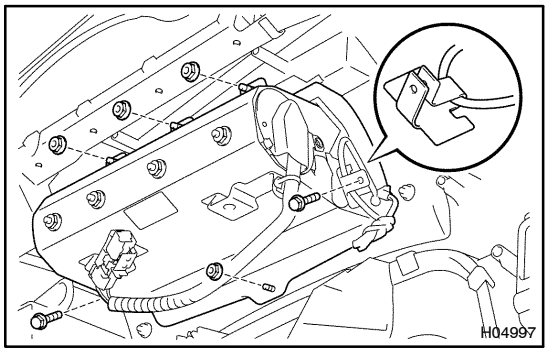
3. REMOVE THESE PARTS:

(a) Center bracket

(b) Defroster nozzle assembly

(c) No.5 heater to register duct

(d) No.2 side defroster nozzle duct



4. REMOVE FRONT PASSENGER AIRBAG ASSEMBLY

(a) Remove the 2 bolts and airbag door straps.

(b) Remove the 4 nuts, then remove the front passenger airbag assembly.

CAUTION:

- **Do not store the front passenger airbag assembly with the airbag deployment side facing downward.**
- **Never disassemble the front passenger airbag assembly.**

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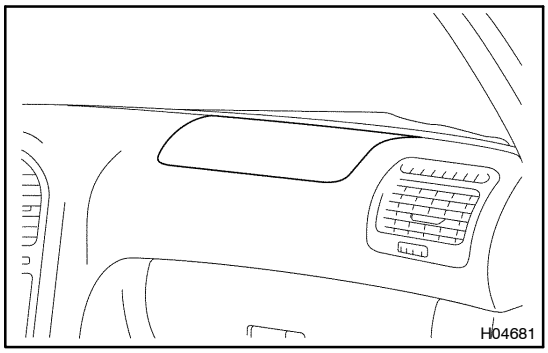
RS0B4–01

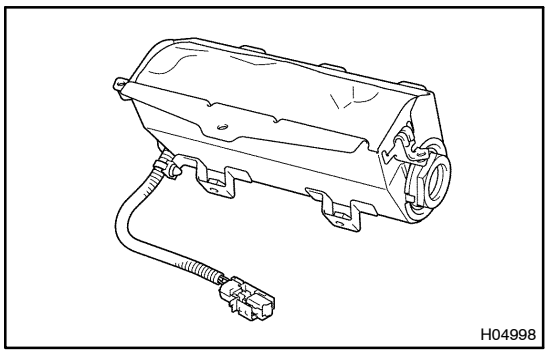
INSPECTION



1. VEHICLES NOT INVOLVED IN COLLISION

(a) Do a diagnostic system check.
(See page DI–342)

(b) Do a visual check which includes the following items with the front passenger airbag assembly installed in the vehicle.
Check cuts, minute cracks or marked discoloration on the front passenger airbag assembly and instrument panel.

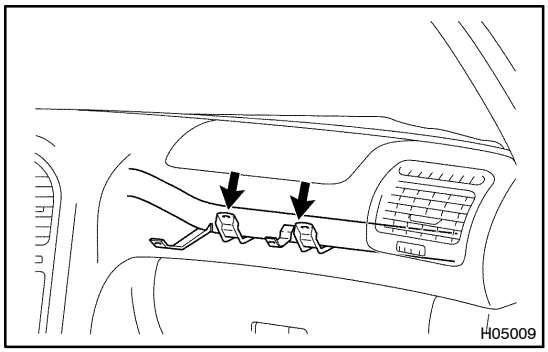


2. VEHICLE INVOLVED IN COLLISION AND AIRBAG IS NOT DEPLOYED

(a) Do a diagnostic system check.
(See page DI–342)

(b) Do a visual check which includes the following items with the front passenger airbag assembly removed from the vehicle.

- Check cuts, minute cracks or marked discoloration on the front passenger airbag assembly.
- Check cuts and cracks in wire harnesses, and for chipping in connectors.
- Check the deformation or cracks on the instrument panel and instrument panel reinforcement.



HINT:

- If the instrument panel or instrument panel reinforcement is deformed or cracked, never repair it. Always replace it with a new one.

CAUTION:
For removal and installation of the front passenger airbag assembly, see page RS–25 and RS–35 and be sure to follow the correct procedure.

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3. VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED

(a) Do a diagnostic system check.
(See page DI–342)

(b) Do a visual check which includes the following items with the front passenger airbag assembly removed from the vehicle.

- Check the deformation or cracks on the instrument panel and instrument panel reinforcement.
- Check the damage on the connector and wire harness.

HINT:
If the instrument panel or instrument panel reinforcement is deformed or cracked, never repair it. Always replace it with a new one.

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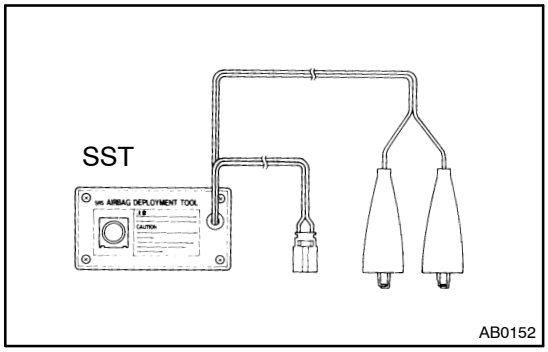
RS017–04

DISPOSAL

HINT:

When scrapping vehicle equipped with an SRS or disposing of a front passenger airbag assembly, always first deploy the airbag in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

When disposing of a front passenger airbag assembly with an airbag deployed in a collision, follow the same procedure given in step 1–(e) in "DISPOSAL".



CAUTION:

- **Never dispose of a front passenger airbag assembly which has an undeployed airbag.**
- **The airbag produces a sizeable exploding sound when it deploys, so perform the operation out of doors and where it will not create a nuisance to nearby residents.**
- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
  SST 09082–00700
- **When deploying an airbag, perform the operation at least 10 m (33 ft) away from the front passenger airbag assembly.**
- **The front passenger airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front passenger airbag assembly with deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front passenger airbag assembly with deployed airbag.**

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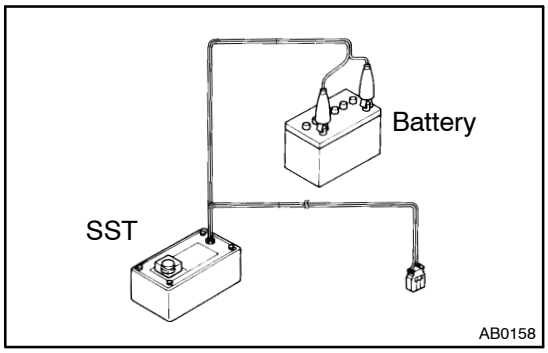
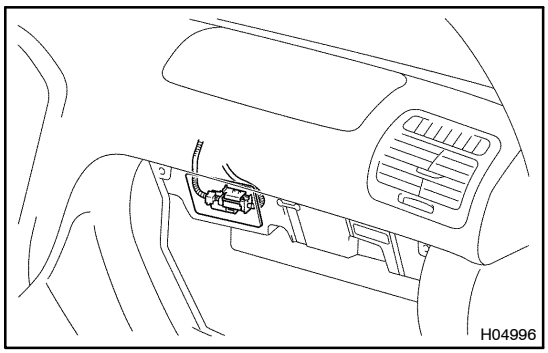


1. AIRBAG DEPLOYMENT WHEN SCRAPPING VEHICLE

HINT:

Have a battery ready as the power source to deploy the airbag.

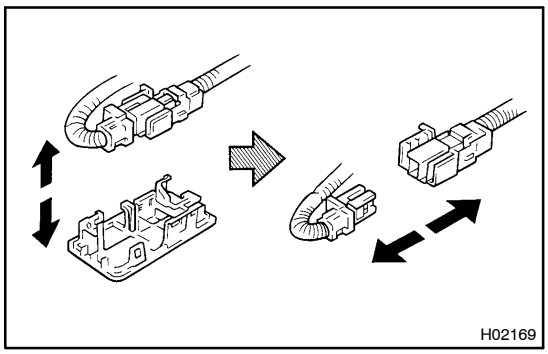
(a) Check functioning of the SST.
(See page RS–14)



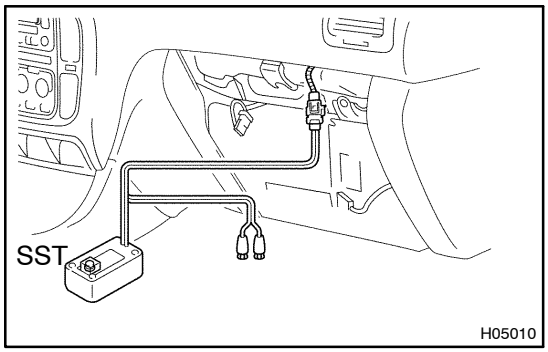
(b) Disconnect the airbag connector.
(1) Remove the glove compartment door.
(2) Remove the No.1 under cover.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.



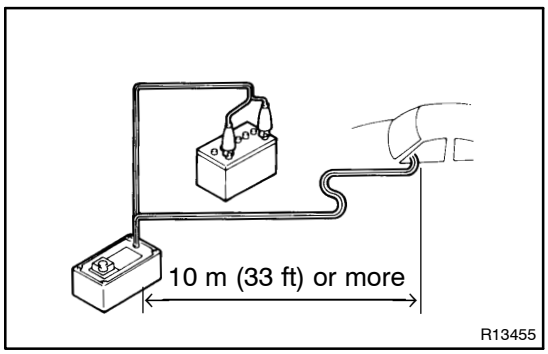
(3) Pull up the connector.
(4) Disconnect the airbag connector.



(c) Install the SST.
(1) Connect the SST connector to the front passenger airbag assembly connector.
SST 09082–00700

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



(2) Move the SST to at least 10 m (33 ft) away from the front of the vehicle.
(3) Close all the doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(4) Connect the SST red clip to the battery positive (+) terminal and the black clip to the negative (+) terminal.

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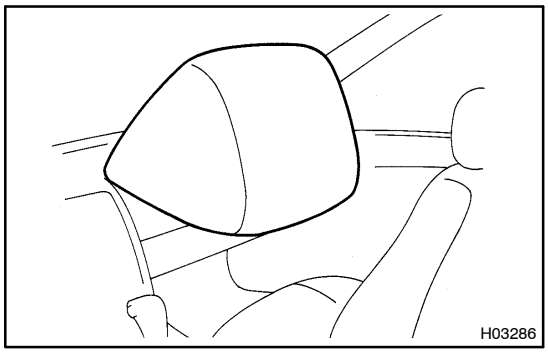


(d) Deploy the airbag.
(1) Confirm that no one is inside the vehicle or within 10 m (33 ft) area around the vehicle.
(2) Press the SST activation switch and deploy the airbag.

HINT:
The airbag deploys simultaneously as the LED of the SST activation switch lights up.

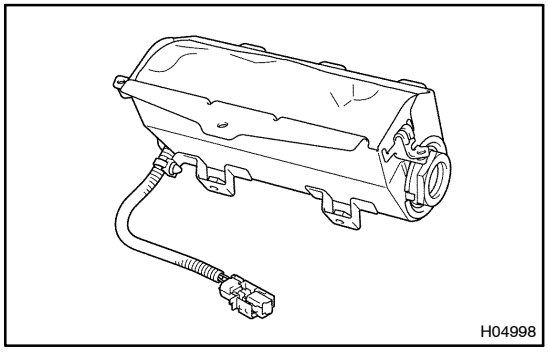
(e) Dispose of the front passenger airbag assembly.

CAUTION:
- **The front passenger airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front passenger airbag assembly with deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front passenger airbag assembly with deployed airbag.**
  (1) When scrapping a vehicle, deploy the airbag and scrap the vehicle with the front passenger airbag assembly still installed.
  (2) When moving a vehicle for scrapping which has a front passenger airbag assembly with deployed airbag, use gloves and safety glasses.

2. DEPLOYMENT WHEN DISPOSING OF FRONT PASSENGER AIRBAG ASSEMBLY ONLY

NOTICE:
- **When disposing of the front passenger airbag assembly only, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure given below when deploying the airbag.**

HINT:
Have a battery ready as the power source to deploy the airbag.



(a) Remove the front passenger airbag assembly.
(See page RS–25)

CAUTION:
- **When removing the front passenger airbag assembly, work must be started 90 seconds after the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery.**
- **Store the front passenger airbag assembly with the airbag deployment side facing upward.**

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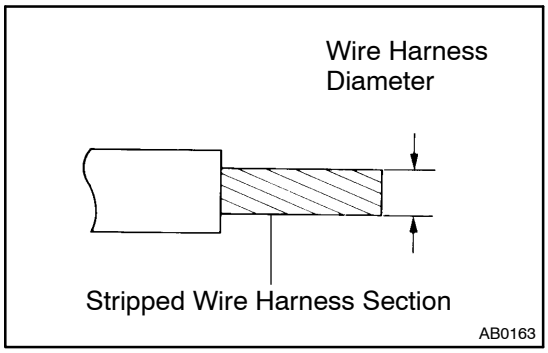
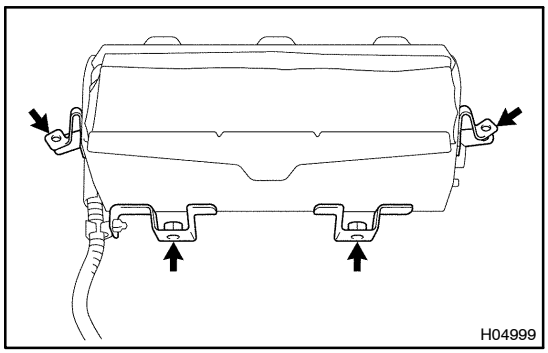


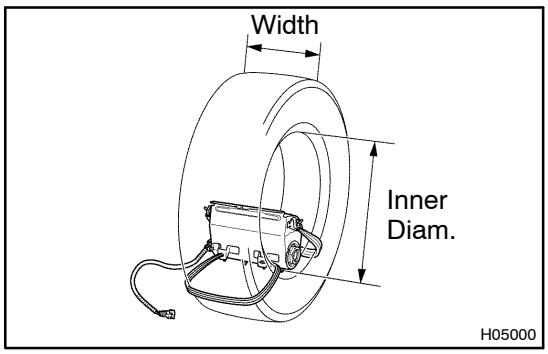
(b) Using a service–purpose wire harness for the vehicle, tie down the front passenger airbag assembly to the tire.
Wire harness: Stripped wire harness section 1.25 mm^2 or more (0.0019 in.^{2} or more)

HINT:
To calculate the square of the stripped wire harness section:
Square = 3.14 X (Diameter)^2 divided by 4



CAUTION:
If the front passenger airbag assembly is tied down with too thin wire harness, it may snap. This is highly dangerous. Always use a wire harness which is at least 1.25 mm^2 (0.0019 in.^{2})

(1) Wind the wire harness around the tire, passing the wire harness through the installation holes indicated by arrows in the illustration.

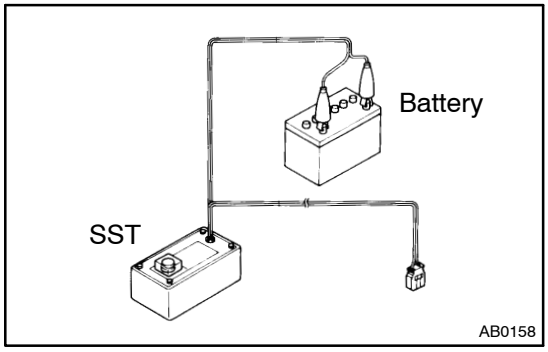


(2) Position the front passenger airbag assembly inside the tire with the airbag deployment side facing inside.

Tire size: Must exceed the following dimensions–
Width: 185 mm (7.28 in.)
Inner diameter: 360 mm (14.17 in.)

CAUTION:
- **Make sure that the wire harness is tight. It is very dangerous if looseness in the wire harness results in the front passenger airbag assembly coming free due to the shock from the airbag deploying.**
- **Always tie down the front passenger airbag assembly with the airbag deployment side facing inside.**

NOTICE:
The tire will be marked by the airbag deployment, so use a redundant tire.



(c) Check functioning of the SST.
SST 09082–00700

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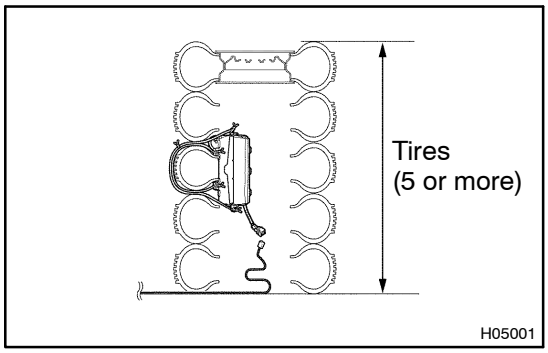
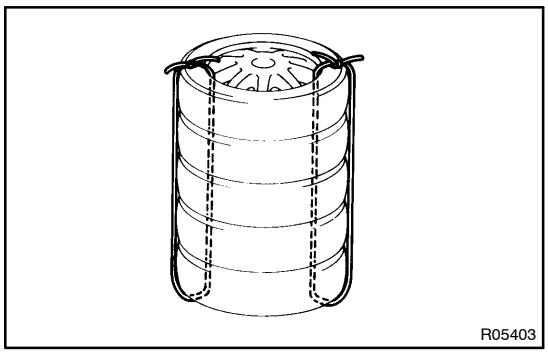


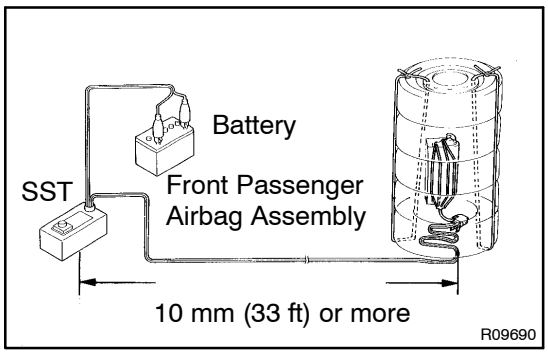
(d) Place tires.
(1) Place at least 2 tires under the tire to which the front passenger airbag assembly is tied.
(2) Place at least 2 tires over the tire to which the front passenger airbag assembly is tied. The top tire should have the wheel installed.



(3) Tie the tires together with 2 wire harnesses.

CAUTION:
Make sure that the wire harnesses are tight. It is very dangerous if loose wire harnesses result in the tires coming free due to the shock from the airbag deploying.

HINT:
Place the SST connector and wire harness inside tires. Provide at least 1 m (3 ft) of slack for the wire harness.

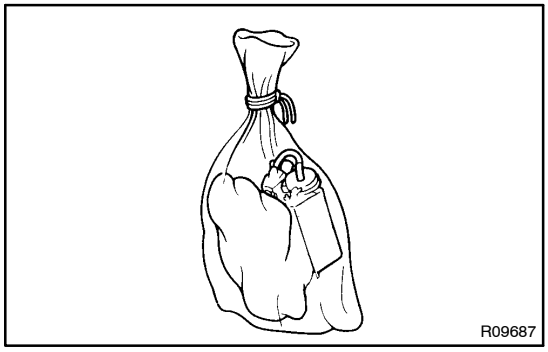


(e) Install the SST.
Connect the SST connector to the front passenger airbag assembly connector.
SST 09082–00700

NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.

(f) Deploy the airbag
(1) Connect the SST red clip to the battery positive (+) terminal and the black clip to the battery negative (–) terminal.
(2) Confirm that no one is within 10 m (33 ft) area around the tire which the front passenger airbag assembly is tied to.
(3) Press the SST activation switch and deploy the airbag.

HINT:
The airbag deploys simultaneously as the LED of the SST activation switch lights up.



(g) Dispose of the front passenger airbag assembly.

CAUTION:
- **The front passenger airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front passenger airbag assembly with deployed airbag.**
- **Always wash your hands with water after completing the operation.**

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- **Do not apply water, etc. to a front passenger airbag assembly with deployed airbag.**
  (1) Remove the front passenger airbag assembly from the tire.
  (2) Place the front passenger airbag assembly in a vinyl bag, tie the end tightly and dispose of it in the same way as other general parts disposal.

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RS018–11

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the front passenger airbag assembly, instrument panel or instrument panel reinforcement.

Case	Replacing part
If the airbag has been deployed.	Front passenger airbag assembly
If the front passenger airbag assembly has been found to be faulty in trouble-shooting.	Front passenger airbag assembly
If the front passenger airbag assembly has been found to be faulty during checking items. (See page RS–26)	Front passenger airbag assembly
If the instrument panel has been found to be faulty during checking items. (See page RS–26)	Instrument panel
If the instrument panel reinforcement has been found to be faulty during checking items. (See page RS–26)	Instrument panel reinforcement
If the front passenger airbag assembly has been dropped.	Front passenger airbag assembly

CAUTION:

For replacement of the front passenger airbag assembly, see page RS–25 and RS–35.

Be sure to follow the correct procedure.

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RS060–03

INSTALLATION

NOTICE:

Never use airbag parts from another vehicle. When replacing parts, replace them with new parts.

1. INSTALL FRONT PASSENGER AIRBAG ASSEMBLY

(a) Install the front passenger airbag assembly to the instrument panel with the 4 nuts.

Torque: 6.0 N·m (61 kgf·cm, 53 in.·lbf)

(b) Install the 2 airbag straps and bolts to front passenger airbag assembly.

Torque: 6.0 N·m (61 kgf·cm, 53 in.·lbf)

CAUTION:

- **Make sure that no foreign objects are trapped between the airbag bag and the module.**
- **Do not damage the strap when installing the module.**

NOTICE:

If the front passenger airbag assembly has been dropped, or there are cracks, dents or other defects in the case or connector, replace the front passenger airbag assembly with a new one.

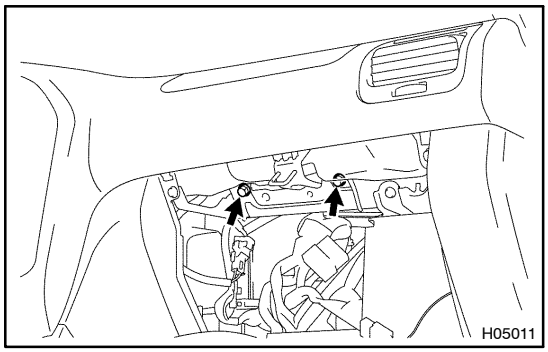
2. INSTALL THESE PARTS:

(a) Center bracket

(b) No.2 side defroster nozzle duct

(c) No.5 heater to register duct

(d) Defroster nozzle assembly



3. INSTALL INSTRUMENT PANEL

(See page BO–92)

Install the 2 bolts to instrument panel reinforcement.

Torque: 20 N·m (205 kgf·cm, 15 ft·lbf)

NOTICE:

- **Make sure the front passenger airbag assembly is installed with the specified torque.**
- **When installing the instrument panel, take care that the airbag wire harness does not interfere with other parts and is not pinched between other parts.**
- **When installing the instrument panel box, carefully pull out the airbag wire harness from the glove compartment upper hole.**

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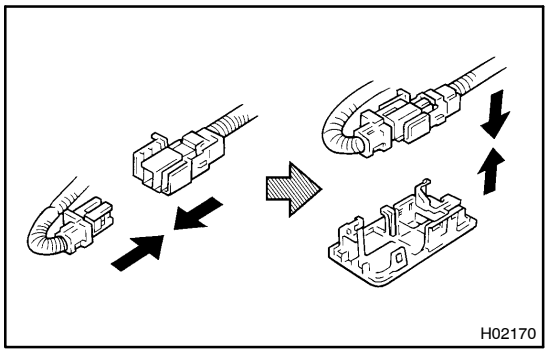
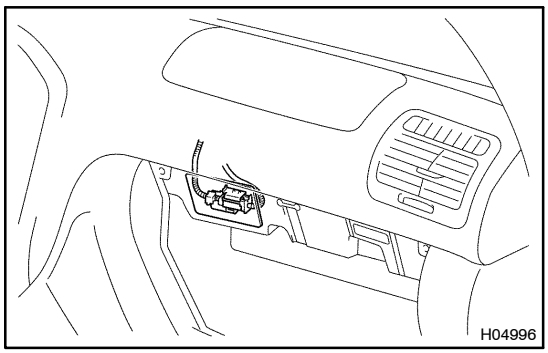


4. CONNECT AIRBAG CONNECTOR

(a) Connect the airbag connector.



(b) Set the connector on the No.1 under cover.
(c) Install the No.1 under cover to the lower No.2 finish panel.
(d) Install the glove compartment door.

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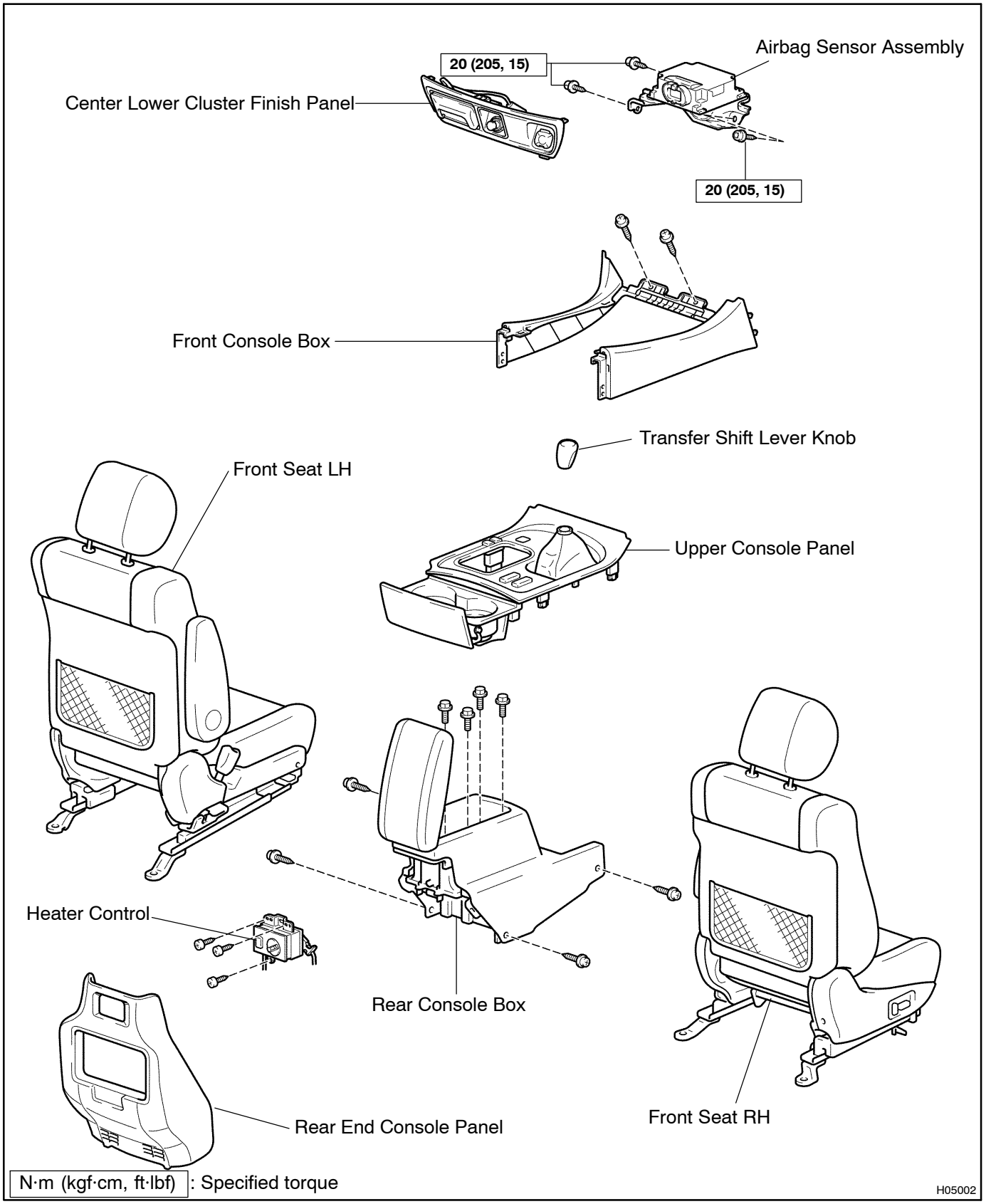
AIRBAG SENSOR ASSEMBLY

COMPONENTS

RS067–04



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RS068–04

REMOVAL

NOTICE:

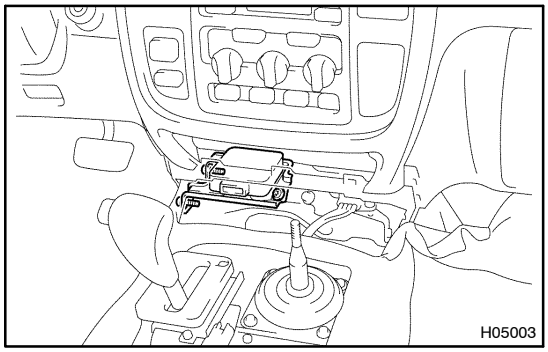
Do not open the cover or the case of the ECU and various electrical devices unless absolutely necessary.

(If the IC terminals are touched, the IC may be destroyed by static electricity.)

1. REMOVE THESE PARTS:

(See page BO–83)

(a) Front seat
(b) Upper console panel
(c) Rear end console panel
(d) Heater control
(e) Rear console box
(f) Front console box
(g) Center lower cluster finish panel assembly



2. REMOVE AIRBAG SENSOR ASSEMBLY

(a) Disconnect the airbag sensor connector.

NOTICE:

Remove the connector with the airbag sensor assembly installed.

(b) Using a torx wrench, remove the 3 screws and airbag sensor assembly.

Torx wrench: T40 (Part No.09042–00020 or locally manufactured tool)

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RS069–03

INSPECTION

1. VEHICLE NOT INVOLVED IN COLLISION

Do a diagnostic system check. (See page DI–342)

2. VEHICLE INVOLVED IN COLLISION AND AIRBAG IS NOT DEPLOYED

Do a diagnostic system check. (See page DI–342)

3. VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED

Replace the airbag sensor assembly. (See page RS–37)

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RS06A–04

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the airbag sensor assembly.

- If the SRS has been deployed in a collision.
- If the airbag sensor assembly has been found to be faulty in troubleshooting.
- If the airbag sensor assembly has been dropped.

CAUTION:

For removal and installation of the airbag sensor assembly, see page RS–38 and RS–41. Be sure to follow the correct procedure.

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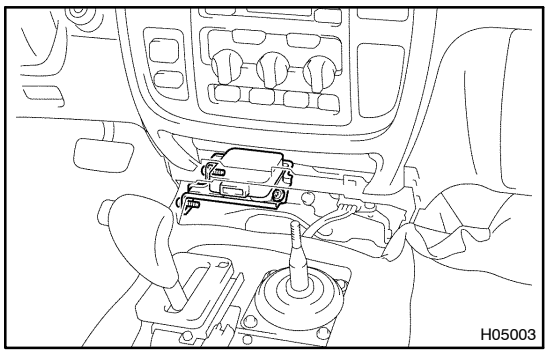
RS06B–04

INSTALLATION

NOTICE:

- **Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.**
- **Never reuse the airbag sensor assembly involved in a collision when the airbag has deployed.**
- **Never repair a sensor in order to reuse it.**



1. INSTALL AIRBAG SENSOR ASSEMBLY

(a) Using a torx wrench, install the airbag sensor assembly with 3 screws.

Torx wrench: T40 (Part No.09042–00020 or locally manufactured tool)

Torque: 20 N·m (205 kgf·cm, 15 ft·lbf)

(b) Connect the airbag sensor connector.

NOTICE:

- **Installation of the connector is done after the sensor assembly has been installed.**
- **Make sure the sensor assembly is installed with the specified torque.**
- **If the sensor assembly has been dropped, or there are cracks, dents or other defects in the case, bracket or connector, replace the sensor assembly with a new one.**
- **When installing the senor assembly, take care that the SRS wiring does not interfere with other parts and is not pinched between other parts.**
- **After installing , shake the sensor assembly to check that there is no looseness.**

2. INSTALL REMOVED PARTS

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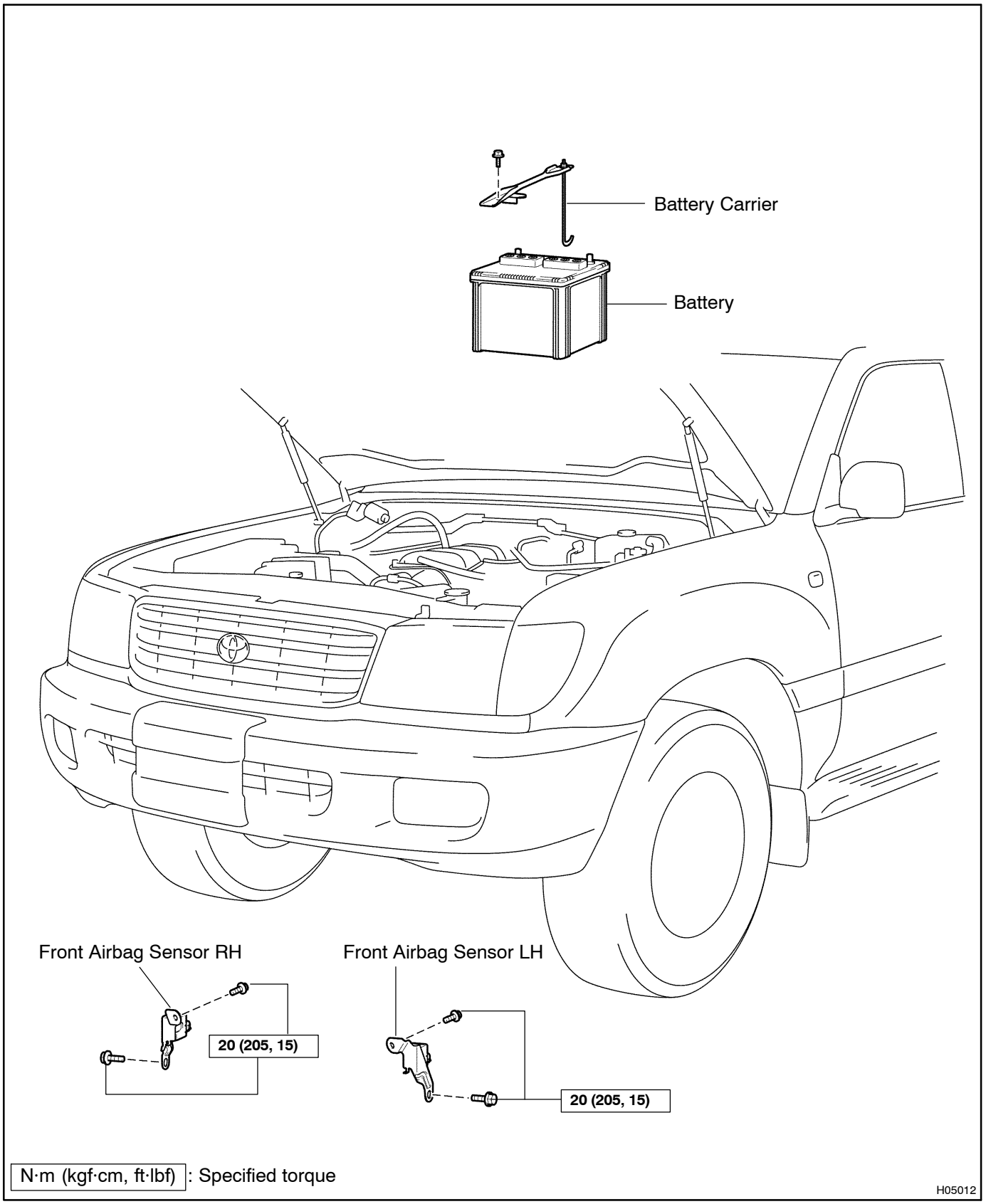
FRONT AIRBAG SENSOR

COMPONENTS

RS01L–08



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

H05012

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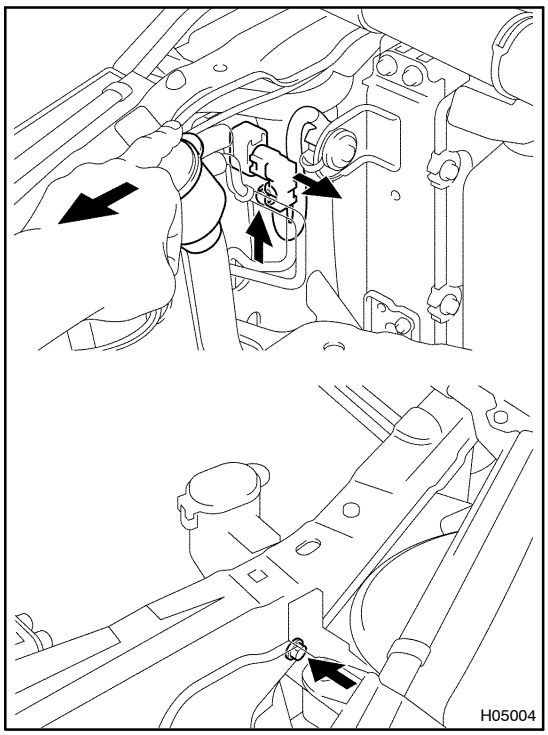
RS01M–08

REMOVAL

NOTICE:

- **If the wiring connector of the SRS is disconnected with the ignition switch at ON or ACC position, DTCs will be recorded.**
- **Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.**
- **Never reuse the sensor involved in a collision when the SRS has deployed.**
- **Never repair a sensor in order to reuse it.**



1. LH:

REMOVE FRONT AIRBAG SENSOR

(a) Remove the battery carrier and battery.

(b) Disconnect the front airbag sensor connector.

NOTICE:

Disconnect the connector with sensor assembly installed.

(c) Pull the windshield washer tank opening as shown in the illustration.

(d) Remove the 2 bolts and front airbag sensor.

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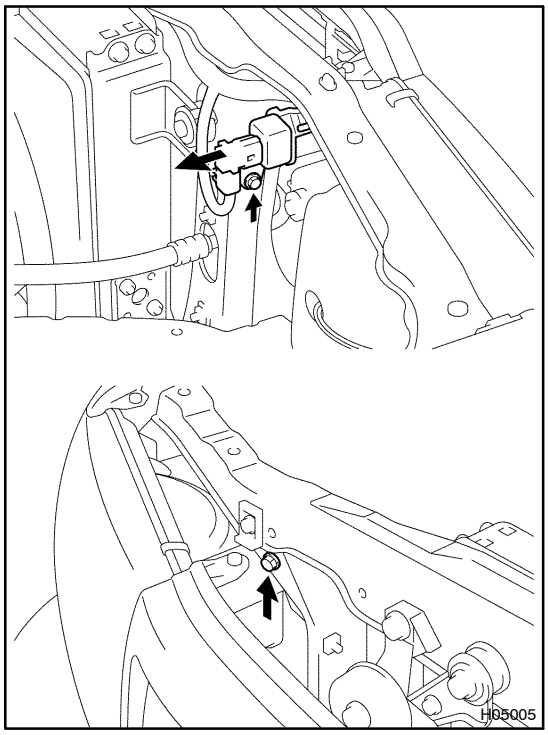

2. RH:

REMOVE FRONT AIRBAG SENSOR

(a) Disconnect the front airbag sensor connector.

NOTICE:

Disconnect the connector with sensor assembly installed.

(b) Remove the 2 nuts and remove the front airbag sensor.

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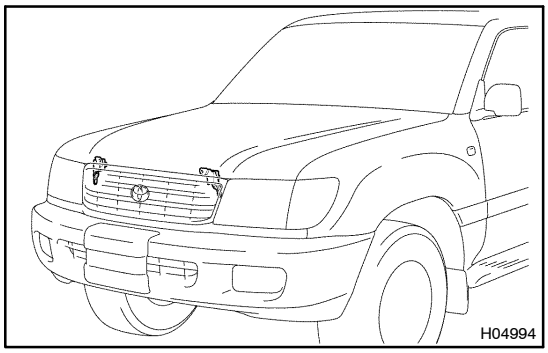
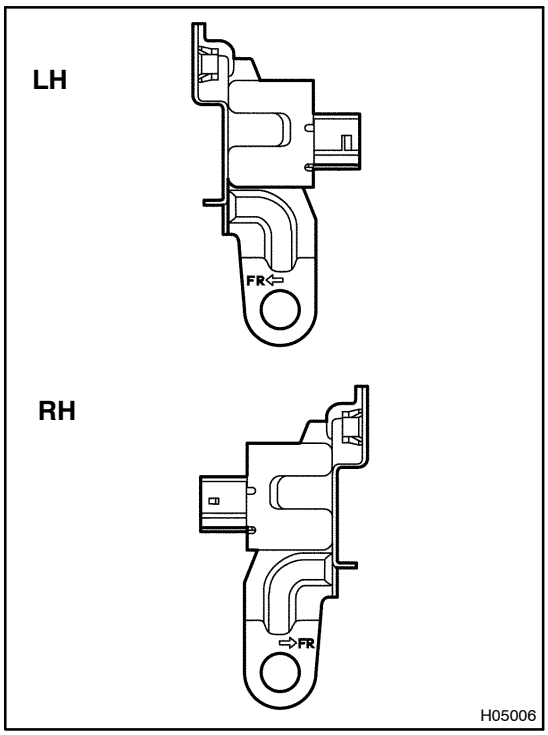
RS01N–09





INSPECTION

1. VEHICLES NOT INVOLVED IN COLLISION

Do a diagnostic system check.
(See page DI–342)

2. VEHICLES INVOLVED IN COLLISION

(a) Do a diagnostic system check.
(See page DI–342)

(b) If the front fender of the car or its periphery is damaged, do a visual check for damage to the front airbag sensor, which includes the following items even if the airbag was not deployed:

- Bracket deformation
- Paint peeling off the bracket
- Cracks, dents or chips in the case
- Cracks, dents, chipping and scratches in the connector
- Peeling off of the label or damage to the serial number

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RS01O–07

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the front airbag sensor.

- If the SRS has been deployed in a collision. (Replace both the left and right airbag sensors.)
- If the front airbag sensor has been found to be faulty in troubleshooting.
- If the front airbag sensor has been found to be faulty during checking items.
  (See page RS–45)
- If the front airbag sensor has been dropped.

CAUTION:

For removal and installation of the front airbag sensor, see page RS–43 and RS–47.

Be sure to follow the correct procedure.

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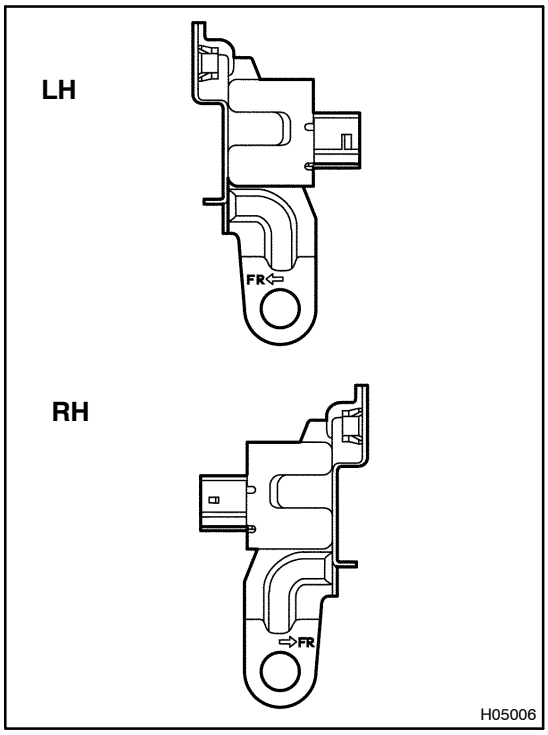
RS01P–08



INSTALLATION

1. INSTALL FRONT AIRBAG SENSOR

(a) Install the front airbag sensor with the arrow on the sensor facing toward the front of the vehicle.

Torque: 20 N·m (205 kgf·cm, 15 ft·lbf)

NOTICE:

- **Make sure the sensor is installed with the specified torque.**
- **If the sensor has been dropped, or there are cracks, dents or other defects in the case, brackets or connector, replace the removed sensor with a new one.**
- **The front sensor is equipped with an electrical connection check mechanism. Be sure to lock this mechanism securely when connecting the connector. If the connector is not securely locked, a malfunction code will be detected by the diagnostic system.**

(b) Connect the front airbag sensor connector.

2. INSTALL REMOVED PARTS

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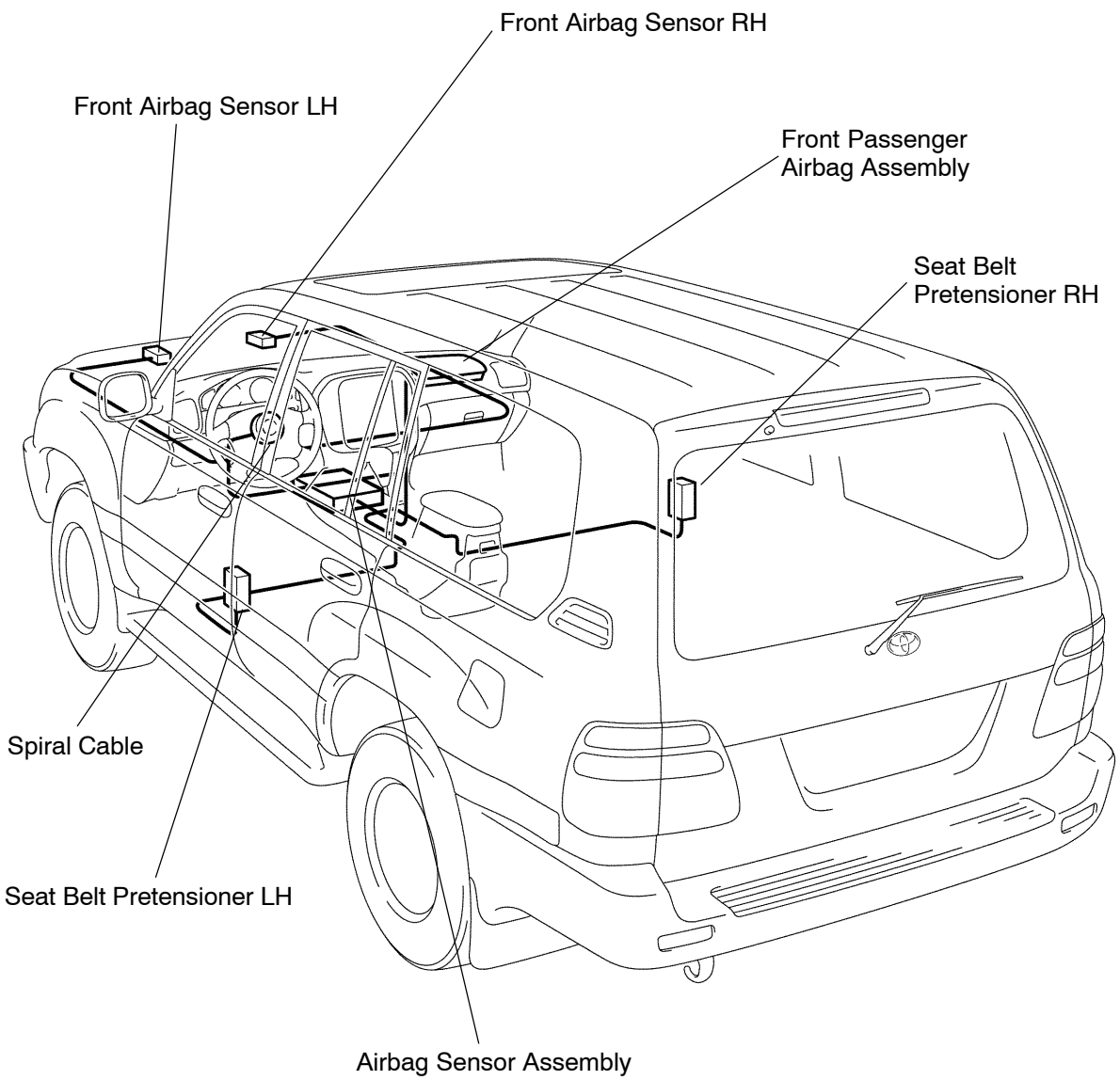
WIRE HARNESS AND CONNECTOR

RS03D–06

LOCATION



H05153

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RS03E–03

INSPECTION

HINT:

The SRS wire harness is integrated with the cowl wire harness assembly. The wires for the SRS wire harness are encased in a yellow corrugated tube and all the connectors in the system are a standard yellow color.

1. VEHICLES NOT INVOLVED IN COLLISION

Do a diagnostic system check. (See page DI–342)

2. VEHICLES INVOLVED IN COLLISION

(a) Do a diagnostic system check. (See page DI–342)

(b) Check for breaks in all wires of the SRS wire harness, and for exposed conductors.

(c) Check to see if the SRS wire harness connectors are cracked or chipped.

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RS03F–04

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the wire harness or connector.

- If any part of the SRS wire harness or any connector has been found to be faulty in troubleshooting.
- If any part of the SRS wire harness or any connector has been found to be faulty during checking items 2–(b) or (c). (See page RS–49)

NOTICE:

If the wire harness used in the SRS is damaged, replace the whole wire harness assembly.

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BODY ELECTRICAL SYSTEM

BE01I–05

PRECAUTION

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

1. HEADLIGHT SYSTEM

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

2. SRS (SUPPLEMENTAL RESTRAINT SYSTEM)

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

3. AUDIO SYSTEM

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

4. MOBILE COMMUNICATION SYSTEM

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

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BE01J–07

PROBLEM SYMPTOMS TABLE

1. IGNITION SWITCH AND KEY UNLOCK WARNING SWITCH

This system uses the body control system, so check the body control system before you proceed with troubleshooting(See page DI–561).

Ignition Switch:

Symptom	Suspect Area	See page
Ignition switch is not set to each position.	1. Ignition switch 2. Power source circuit	BE–18 –

Ignition Key Illumination:

Symptom	Suspect Area	See page
Ignition key illumination does not lights up.	1. Bulb 2. Instrument Panel ECU 3. Wire Hauness	– DI–561 –

Key Unlock Warning Switch:

Symptom	Suspect Area	See page
Key unlock warning system does not operate. (The buzzer does not sound when the driver's door is opened with the ignition OFF and key inserted)	1. Key Unlock Warning Switch 2. Door Courtesy Switch 3. Wire Harness	BE–18 BE–38 –
Key unlock warning system does not operate. (The buzzer sounds when the ignition key is ACC or ON)	1. Ignition Switch 2. Wire Harness	BE–18 –

2. HEADLIGHT AND TAILLIGHT SYSTEM:

This system uses the body control system, so check the body control system before you proceed with troubleshooting(See page DI–561).

Symptom	Suspect Area	See page
"Automatic light control system" does not operate.	1. Automatic Light Control Sensor 2. Light Control Switch 3. Door Courtesy Switch 4. Wire Harness	BE–23 BE–23 BE–38 –
Auto turn–off system does not operate when the driver's door is opened.	1. Drivers Door Courtesy Switch	BE–38
Auto turn–off system: Headlight and taillight do not come on.	1. Instrument Panel ECU 2. Wire Harness	DI–561 –
Auto turn–off system: Headlight and taillight stay on.	1. Instrument Panel ECU 2. Wire Harness	DI–561 –
Only one headlight comes on.	1. Daytime Running Light No.2, 3, 4 Relay 2. Daytime Running Light Main Relay 3. Bulb 4. Wire Harness	BE–23 BE–23 – –
"LO–Beam" does not light (All).	1. Headlight Control Relay 2.Wire Harness	BE–23 –
"LO–Beam" does not light (One side).	1. Bulb 2. H–LP L–LWR Fuse 3. H–LP R–LWR Fuse 4. Wire Harness	– – – –
"HI–Beam" does not light (All).	1. Headlight Dimmer Switch 2. Daytime Running Light Main Relay 3. Wire Harness	BE–23 BE–23 –

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”HI–Beam” does not light (One side).	1. Bulb 2. H–LP L–UPR Fuse 3. H–LP R–UPR Fuse 4. Daytime Running Light No.3 Relay 5. Wire Harness	– – – BE–23 –
”Flash” does not light.	1. Headlight Dimmer Switch 2. Daytime Running Light Main Relay 3. Wire Harness	BE–23 BE–23 –
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. Bulb	BE–23 BE–23 BE–23 BE–23 BE–23 – –
Headlight does not come on with light control switch in HEAD.	1. Light Control Switch 2. Wire Harness	BE–23 –
Headlight does not go out with light control switch in OFF.	1. Headlight Control Relay 2. Wire Harness	BE–23 –
Headlight flickers.	1. Bulb 2. Wire Harness	– –
Headlight is dark.	1. Bulb 2. Wire Harness	– –
Taillight does not come on with light control switch in TAIL.	1. Taillight Control Relay 2. Light Control Switch 3. Wire Harness	BE–23 BE–23 –
Taillight does not go out with light control switch in OFF.	1. Taillight Control Relay 2. Light Control Switch 3. Wire Harness	BE–23 BE–23 –
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–23 BE–23 CH–12 BE–57 –

3. FOG LIGHT SYSTEM

Symptom	Suspect Area	See page
Fog light does not light up with light control SW HEAD (Headlight is normal.)	1. FOG Fuse 2. Fog Light Relay 3. Fog Light Switch 4. Wire Harness	– BE–31 BE–31 –
Fog light does not light up with light control SW HEAD (Headlight does not light).	1. *1 Other Parts 2. Wire Harness	– –
Only one light does not light up.	1. Bulb 2. Wire Harness	– –

*1: Inspect Headlight System

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4. TURN SIGNAL AND HAZARD WARNING SYSTEM

Symptom	Suspect Area	See page
”Hazard” and ”Turn” do not light up.	1. GAUGE Fuse 2. TURN HAZ Fuse 3. Ignitioin Switch 4. Turn Signal Flasher Relay 5. Wire Harness	– – BE–18 BE–34 –
Hazard warning light does not light up. (Turn is normal)	1. Hazard Warning Switch 2. Wire Harness	BE–34 –
Turn signal does not light up. (Hazard is normal)	1. Turn Signal Switch 2. Wire Harness	BE–34 –
Turn signal does not light up in one direction.	1. Turn Signal Switch 2. Wire Harness	BE–34 –
Only one bulb does not light up.	1. Bulb 2. Wire Harness	– –

5. INTERIOR LIGHT SYSTEM

This system uses the body control system, so check the body control system before you proceed with troubleshooting(See page DI–561).

Symptom	Suspect Area	See page
All the lights do not come ON.	1. DOME Fuse 2. Instrument Panel ECU 3. DOME Relay(Driver Side J/B)	– DI–561 BE–12
The light does not come ON when the driver’s door is opened.	1. Driver’s Door Courtesy Switch 2. Wire Harness	BE–38 –
The light does not come ON when the passenger’s door is opened.	1. Passenger’s Door Courtesy Switch 2. Wire Harness	BE–38 –
The light does not come on when the rear–right door is opened.	1. Rear–Right Door Courtesy Switch 2. Wire Harness	BE–38 –
The light does not come on when the rear–left door is opened.	1. Rear–Left Door Courtesy Switch 2. Wire Harness	BE–38 –
Only one of the bulbs comes ON.	1. Bulb	–
The illumination does not fade out when all the doors are closed.	1. Courtesy Switch 2. Wire Harness 3. Instrument Panel ECU	BE–38 – DI–561
The illumination does not fade out immediately when the ignition switch is turned to ACC or ON within 15 seconds after all the doors are closed.	1. Ignition Switch 2. RADIO NO.2 Fuse 3. GAUGE Fuse 4. Instrument Panel ECU 5. Wire Harness	BE–18 – – DI–561 –
The illumination does not fade out immediately when all the doors are locked within 15 seconds after they are closed.	1. Door Unlock Detection Switch 2. Wire Harness	BE–86 –
Room light does not light up. (w/o Sliding Roof)	1. Bulb 2. Room Light 3.Rear Parsonl Light 4. Wire Harness	– BE–38 BE–38 –
Room light does not light up. (w/ Sliding Roof)	1. Bulb 2. Room Light 3.Rear Parsonl Light 4. Wire Harness	– BE–38 BE–38 –

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Front personal light does not light up. (w/o Sliding Roof)	1. Bulb 2. Front Personal Light 3.Room Light 3. Wire Harness	– BE–38 BE–38 –
Front personal light does not light up. (w/ Sliding Roof)	1. Bulb 2. Front Personal Light 3.Room Light 3. Wire Harness	– BE–38 BE–38 –
Rear Room light does not light up.	1. Bulb 2. Rear Room Light 3. Wire Harness	– BE–38 –
Vanity light does not light up.	1. Bulb 2. Vanity Light 3. Wire Harness	– BE–38 –
Glove compartment light does not light up.	1. Bulb 2. Glove Compartment Courtesy Switch 3. Wire Harness	– BE–38 –
Courtesy light does not light up.	1. Bulb 2. Door Courtesy Switch 3. Wire Harness	– BE–38 –

6. BACK–UP LIGHT SYSTEM

Symptom	Suspect Area	See page
Back–Up Light does not light up.	1. GAUGE Fuse 2. Ignition Switch 3. Wire Harness 4. Bulb	– BE–18 – –
Back–Up Light remains always on.	1. Park/ Neutral Position Switch 2. Wire Harness	DI–200 –
Only one light does not light up.	1. Bulb 2. Wire Harness	– –

7. STOP LIGHT SYSTEM

Symptom	Suspect Area	See page
Stop light does not light up.	1. STOP Fuse 2. Stop Light Switch 3. Wire Harness	 BE–44 –
Stop light always lights up.	1. Stop Light Switch 2. Wire Harness	BE–44 –
Only one light always lights up.	1. Wire Harness	–
Only one light does not light up.	1. Bulb 2. Wire Harness	– –

8. WIPER AND WASHER SYSTEM

Symptom	Suspect Area	See page
Front wiper and washer do not operate.	1. WIPER Fuse 2. Wiper Switch 3. Wiper Motor 4. Wire Harness	– BE–46 BE–46 –
Front wiper does not operate in LO, HI or MIST.	1. Wiper Switch 2. Wiper Motor 3. Wire Harness	BE–46 BE–46 –

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Front wiper does not operate in INT.	1. Wiper Switch 2. Wiper Motor 3. Wire Harness	BE–46 BE–46 –
Front washer motor does not operate.	1. WASHER Fuse 2. Washer Switch 3. Washer Motor 4. Wire Harness	– BE–46 BE–46 –
Front wiper does not operate when washer switch ON.	1. WASHER Fuse 2. Washer Switch 3. Wiper Motor 4. Wire Harness	– BE–46 BE–46 –
Rear wiper does not operate.	1. WIPER Fuse 2. Rear Wiper Motor 3. Rear Wiper Switch 4. Rear Wiper Relay 5. Instrument Panel ECU 6. Wire Harness	– BE–46 BE–46 BE–46 DI–561 –
Rear wiper does not operate in INT or ON position.	1.Rear Wiper Switch 2. Instrument Panel ECU 3. Wire Harness	BE–46 DI–561 –
Rear wiper does not return to OFF position.	1.Rear Wiper Motor 2.Wire Harness	BE–46 –
Rear Washer Motor does not operate.	1.Rear Washer Motor 2. Rear Washer Switch 3.Wire Harness	BE–46 BE–46 –
Washer fluid does not operate.	1. Washer Hose and Nozzle	–

*1: Inspect wiper arm and blade set positions.

9. Meter Gauges and Illumination: COMBINATION METER

Symptom	Suspect Area	See page
Tachometer, Fuel Gauge and Engine Coolant Temperature Gauge do not operate.	1. GAUGE Fuse 2. Meter Circuit Plate 3. Wire Harness	– BE–52 –
Speedometer does not operate.	1. Speed Sensor 2. Meter Circuit Plate 3. Wire Harness	BE–57 BE–52 –
Tachometer does not operate.	1. Igniter 2. Meter Circuit Plate 3. Wire Harness	IG–1 BE–52 –
Fuel Gauge does not operate or abnormal operation.	1. Fuel Receiver Gauge 2. Fuel Sender Gauge 3. Meter Circuit Plate 4. Wire Harness	BE–57 BE–57 BE–52 –
Oil Pressure Gauge does not operate.	1. Oil Pressure Receiver Gauge 2. Oil Pressure Sender Gauge 3. Meter Circuit Plate 4. Wire Harness	BE–57 BE–57 BE–52 –
Voltmeter does not operate.	1. Voltmeter 2. Meter Circuit Plate 3. Wire Harness	BE–57 BE–52 –

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Engine Coolant Temperature Gauge does not operate or abnormal operation	1. Engine Coolant Temperature Receiver Gauge 2. Engine Coolant Temperature Sender Gauge 3. Meter Circuit Plate 4. Wire Harness	BE–57 BE–57 BE–52 –
All illumination lights do not light up.	1. Light Control Rheostat 2. Wire Harness	BE–57 –
Brightness does not change even when rheostat turned.	1. Bulb 2. Wire Harness	– –
Only one illumination light does not light up.	1. Bulb 2. Wire Harness	– –

10. Warning Light: COMBINATION METER

Symptom	Suspect Area	See page
Warning lights do not light up. (Except Discharge, Open Door and SRS)	1. GAUGE Fuse 2. Meter Circuit Plate 3. Wire Harness	– BE–52 –
Fuel Level warning light does not light up.	1. Bulb 2. Meter Circuit Plate 3. Fuel Sender Gauge 4. Wire Harness	– BE–52 BE–57 –
ABS warning light does not light up.	1. Bulb 2. ABS ECU 3. Wire Harness	– DI–217 –
Seat Belt warning light does not light up.	1. Bulb 2. Seat Belt Buckle Switch 3. Wire Harness 4. Body ECU	– BE–57 BE–57 DI–561
Discharge warning light does not light up.	1. IGN Fuse 2. Bulb 3. Wire Harness 4. Generator	– – – CH–2
Brake warning light does not light up.	1. Bulb 2. Parking Brake Switch 3. Brake Fluid Level Warning Switch 4. Bulb Check Relay 5. Meter Circuit Plate 6. Wire Harness	– BE–57 BE–57 BE–57 BE–52 –
SRS Warning light does not light up.	1. ECU–B Fuse 2. Bulb 3. Airbag Sensor Assembly 4. Meter Circuit Plate 5. Wire Harness	– – DI–340 BE–52 –
Open Door warning light does not light up.	1. DOME Fuse 2. Bulb 3. Door Courtesy Switch 4. Meter Circuit Plate 5. Wire Harness	– – BE–38 BE–52 –
A/T Oil Temperature warning light does not light up.	1. Bulb 2. Meter Circuit Plate 3. Wire Harness 4. ECM	– BE–57 BE–52 DI–1

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11. Indicator Light: COMBINATION METER

Symptom	Suspect Area	See page
O/D OFF indicator light does not light up.	1. Bulb 2. O/D OFF Switch 3. Meter Circuit Plate 4. Wire Harness	– DI–204 BE–52 –
Cruise Control indicator light does not light up.	1. Bulb 2. Meter Circuit Plate 3. Wire Harness 4. ECM	– BE–52 DI–1
High beam indicator light does not light up.	1. Bulb 2. Meter Circuit Plate 3. Wire Harness 4. Headlight System	– BE–52 – BE–19
Turn indicator light does not light up.	1. Bulb 2. Meter Circuit Plate 3. Wire Harness 4. Turn Signal and Hazard Warning System	– BE–52 – BE–33
Shift indicator lights do not light up.	1. Bulb 2. Meter Circuit Plate 3. Park/Neutral Position Switch 4. Wire Harness	– BE–52 DI–200 –
Only one shift indicator does not light up.	1. Bulb 2. Meter Circuit Plate	– BE–52
Malfunction indicator light does not light up.	1. Bulb 2. Meter Circuit Plate 3. Wire Harness 4. ECM	– BE–52 – DI–1
ECT PWR indicator light does not light up.	1. Bulb 2. ECT Pattern Select Switch 3. Meter Circuit Plate 4. Wire Harness 5. ECT System	– – BE–52 – DI–149
2nd Start ETCS indicator light does not light up.	1. Bulb 2. Meter Circuit Plate 3. Wire Harness 4. ECM	– BE–52 – DI–1
Rear Diff. Lock indicator light does not light up.	1. Bulb 2. Meter Circuit Plate 3. Rear Diff. Lock Detection Switch 4. Wire Harness	– BE–52 SA–160 –
Center Diff. Lock indicator light does not light up.	1. Bulb 2. Meter Circuit Plate 3. Transfer 4WD Position Detection Switch 4. Wire Harness	– BE–52 TR–48 –
Indicator lights do not light up. (Except Turn, Hi–beam and security)	1. GAUGE Fuse 2. Wire Harness	– –

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12. DEFOGGER SYSTEM

Symptom	Suspect Area	See page
All defogger systems do not operate.	1. DEFOG M–Fuse 2. Defogger Relay 3. Defogger Switch (Integration Control Panel Assembly) 4. Wire Harness	– BE–68 BE–68 –
Rear window defogger does not operate.	1. Defogger Wire 2. Choke Coil 3. Wire Harness	BE–68 – –
Mirror defogger does not operate.	1. MIR/HTR Fuse 2. Mirror Heater Relay 3. Mirror Defogger 4. Wire Harness	– BE–68 BE–68 –

13. POWER WINDOW CONTROL SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
All the power windows do not operate. (Power Door Lock System is normal.)	1. POWER M–Fuse 2. Power Window Master Switch 3. Wire Harness	– BE–76 –
Only the driver's window does not operate.	1. Power Window Master Switch 2. Power WIndow Switch 3. Power Window Motor 4. Wire Harness	BE–76 BE–76 BE–76 –
"Window lock function" does not operate.	1. Power Window Master Switch	BE–76
One touch power window does not move up and down. (Prepare normal master switch).	TROUBLESHOOTING NO.1	BE–71
During AUTO UP operation, the power window moves down.	TROUBLESHOOTING NO.2	BE–71
The DOWN function does not work though some other objects are caught in the power window glass.	TROUBLESHOOTING NO.3	BE–71

14. POWER DOOR LOCK CONTROL SYSTEM

This system uses the body control system, so check diagnosis system of the body control system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
All the doors cannot be locked or unlocked. (Power Window Control System is normal.)	1. POWER Fuse 2. Door Lock Control Switch 3. Door Relay (L), (U) 4. Wire Harness 5. Body ECU	– BE–86 BE–86 – DI–561
Only one side door lock control does not operate.	1. Door Lock Motor 2. Wire Harness	BE–86 –
Door key related function does not operate.	1. Door Key Lock and Unlock Switch 2. Wire Harness 3. Body ECU	BE–86 – DI–561
Key confinement prevention function does not operate.	1. Key Unlock Warning Switch 2. Door Courtesy Switch 3. Wire Harness	BE–18 BE–38 –

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15. POWER SEAT CONTROL SYSTEM

Symptom	Suspect Area	See page
Both Driver and Passenger Power seats do not operate. (Door lock does not operate.)	1. ALT M–Fuse 2. Wire Harness	– –
Driver's seat does not operate.	1. POWER Fuse 2. Power Seat Switch (D) 3. Wire Harness	– BE–96 –
Passenger's seat does not operate.	1. POWER Fuse 2. Power Seat Switch (P) 3. Wire Harness	– BE–96 –
"Slide operation" does not operate.	1. Power Seat Switch (D, P) 2. Wire Harness 3. Slide Motor (D, P)	BE–96 – BE–96
"Front Vertical Operation" does not operate.	1. Power Seat Switch (D, P) 2. Wire Harness 3. Front Vertical Motor (D, P)	BE–96 – BE–96
"Lifter Operation" does not operate.	1. Power Seat Switch (D, P) 2. Wire Harness 3. Lifter Motor (D, P)	BE–96 – BE–96
"Reclining Operation" does not operate.	1. Power Seat Switch (D, P) 2. Wire Harness 3. Reclining Motor (D, P)	BE–96 – BE–96
"Lumbar Support Operation" does not operate.	1. Power Seat Switch (D) 2. Wire Harness 3. Lumbar Support Motor (D)	BE–96 – BE–96

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

16. POWER MIRROR CONTROL SYSTEM

Symptom	Suspect Area	See page
Mirror does not operate.	1. MIRR Fuse 2. CIGAR Fuse 3. ECU–IG Fuse 4. Mirror Switch 5. Wire Harness	– – – BE–103 –
Mirror operates abnormally.	1. Mirror Switch 2. Mirror Motor 3. Wire Harness	BE–103 BE–103 –

17. SEAT HEATER SYSTEM

Symptom	Suspect Area	See page
Seat heaters do not operate. (Driver's and Passenger's)	1. SEAT HTR Fuse 2. Seat Heater Switch (D, P) 3. Wire Harness 4. Seat Heater	– BE–106 – BE–106
Driver's seat heater does not operate.	1. Seat Heater Switch (D, P) 2. Wire Harness	BE–106 –
Passenger's seat heater does not operate.	1. Seat Heater Switch (D, P) 2. Wire Harness	BE–106 –
Seat heater temperature is too hot.	1. Seat Heater	BE–106

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18. AUDIO SYSTEM

Symptom	Suspect Area	See page
Audio system abnormal operation.	TROUBLESHOOTINGS	BE–111

19. CLOCK SYSTEM

Symptom	Suspect Area	See page
Passenger seat belt warning system does not light up.	TROUBLESHOOTING NO.1	BE–137
Clock will not operate.	TROUBLESHOOTING NO.1	BE–137
Clock loses or gains time.	TROUBLESHOOTING NO.2	BE–137

20. ENGINE IMMOBILIZER SYSTEM

Symptom	Suspect Area	See page
Engine immobilizer system does not operate.	See DIAGNOSIS SYSTEM	DI–539

21. HORN SYSTEM

Symptom	Suspect Area	See page
Horn system does not operate.	1. HORN Fuse 2. Horn Relay 3. Horn Switch 4. Horn 5. Wire Harness	– BE–152 BE–152 BE–152 –
Horns blow all the time.	1. Horn Relay 2. Horn Switch 3. Wire Harness	BE–152 BE–152 –
One horn operates but the other horn does not operate.	1. Horn 2. Wire Harness	BE–152 –
Horns operate abnormally.	1. Horn Relay 2. Horn 3. Wire Harness	BE–152 BE–152 –

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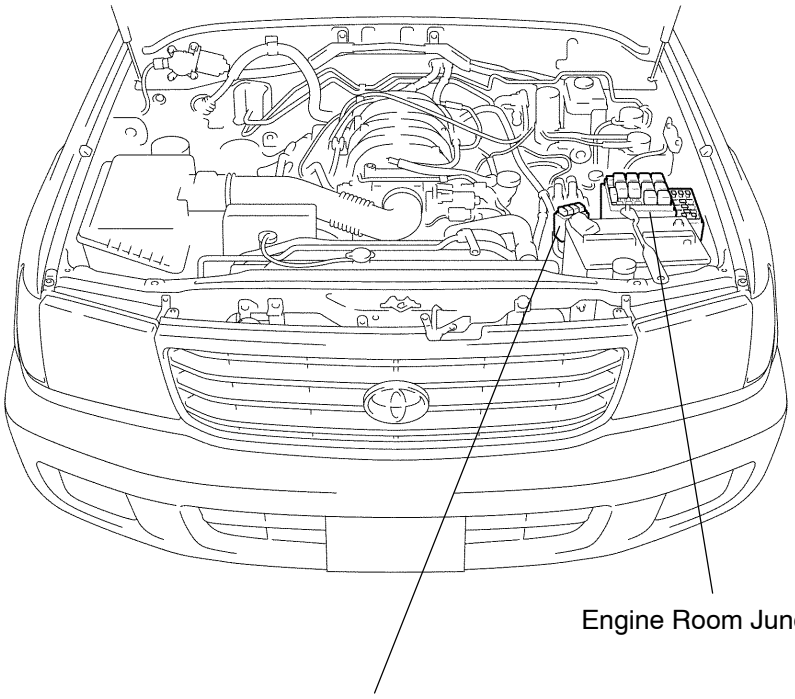
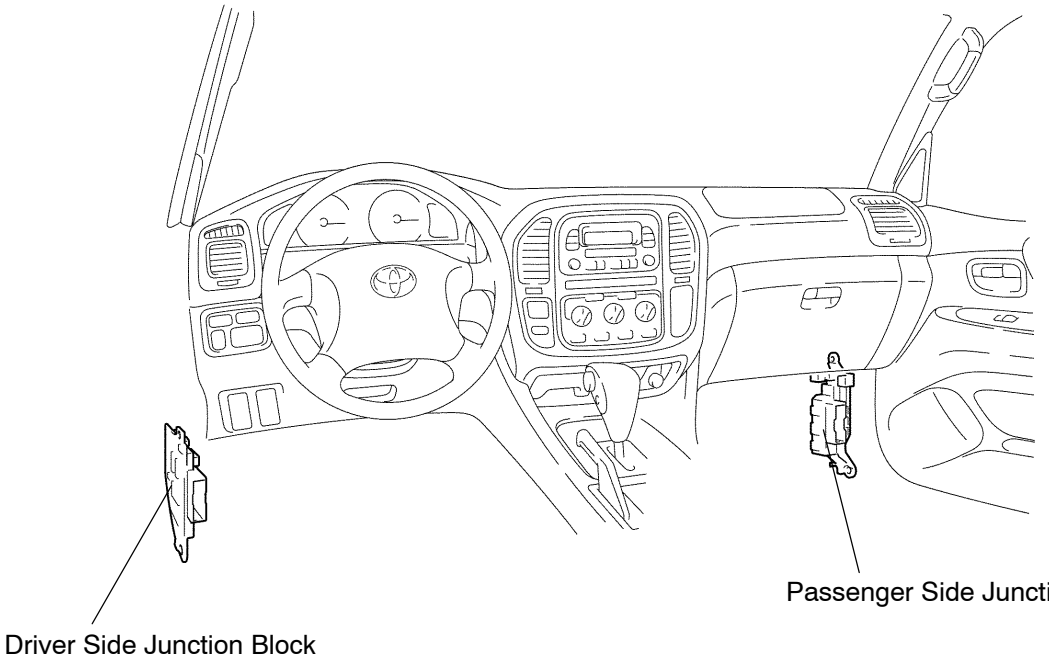
POWER SOURCE

LOCATION

BE0H5–03





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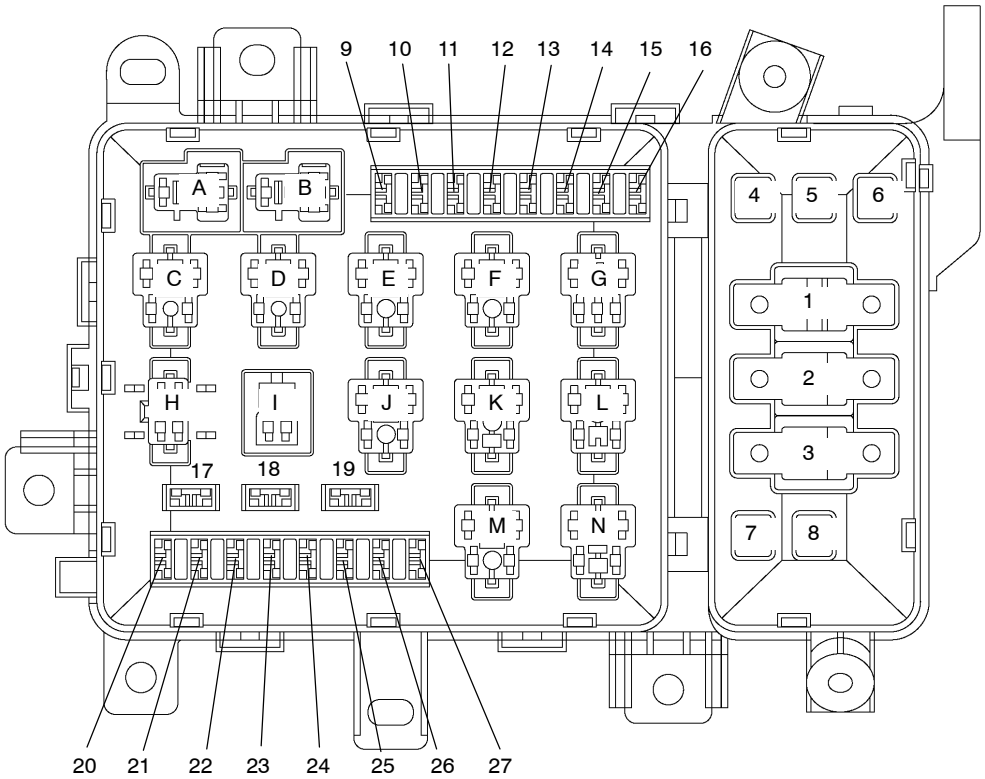
Engine Room Junction Block



Fuses

1. FL AM1 NO. 1	80 A
2. FL HTR	60 A
3. –	50 A
4. ABS NO.1 M–Fuse	40 A
5. –	–
6. ACC M–Fuse	50 A
7. ABS NO.2 M–Fuse	40 A
8. STARTER M–Fuse	30 A
9. AM1 NO.2 Fuse	20 A
10. A/C Fuse	20 A
11. POWER HTR Fuse	10 A
12. SEAT HTR Fuse	15 A
13. FUEL HTR Fuse	20 A
14. MIR HTR Fuse	15 A
15. –	–
16. CDS FAN Fuse	20 A
17. EFI Fuse	20 A
18. HORN Fuse	10 A
19. THROTTLE Fuse	15 A
20. RADIO Fuse	20 A
21. HAZ–TRN Fuse	15 A
22. AM2 Fuse	30 A
23. TEL Fuse	10 A
24. HEAD LH–UPR Fuse	20 A
25. HEAD RH–UPR Fuse	20 A
26. HEAD LH–LWR Fuse	10 A
27. HEAD RH–LWR Fuse	10 A

Relays

A. Magnetic Clutch Relay
B. Mirror Heater Relay
C. ACC Relay
D. –
E. IG1 No.1 Relay
F. IG1 No.2 Relay
G. ABS SOL Relay
H. EFI and ECD Relay
I. Horn Relay
J. Headlight Dimmer Relay
K. Starter Relay
L. ABS MTR2 Relay
M. Headlight Control Relay
N. ABS MTR1 Relay

I06118

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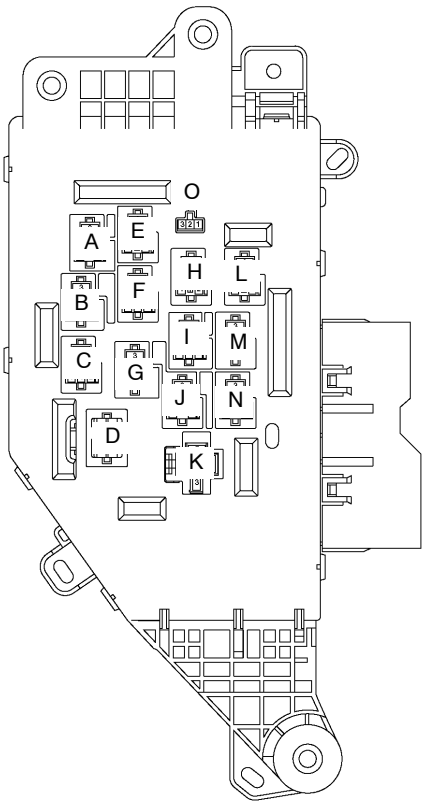
Driver Side Junction Block

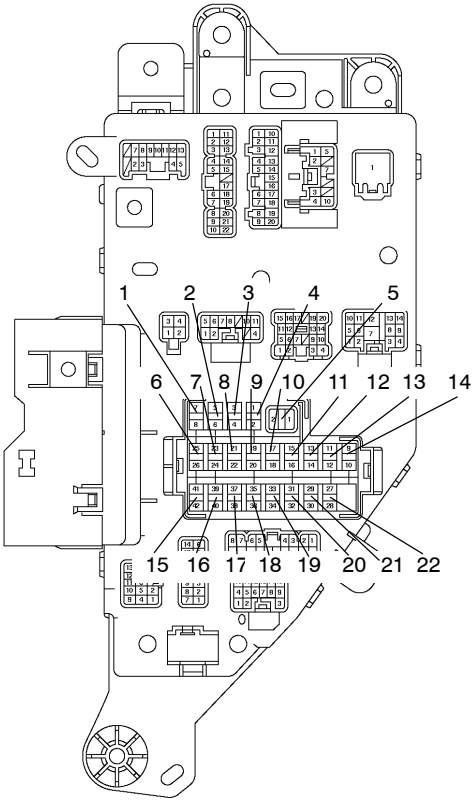


Relays

A. Circuit Opening Relay
B. Fuel/ Pump Relay
C. Door Lock Relay
D. Turn Signal Flasher Relay
E. SPIL/ Level Relay
F. Starter Cut Relay
G. Door Lock Relay
H. Front Fog Relay
I. Door Lock Relay
J. Defogger Relay
K. Power Main Relay
L. Rear Heater Relay
M. Dome Relay
N. Taillight Control Relay

Others

O. DIODE



Fuses

1. MIRR Fuse	10 A
2. SRS Fuse	15 A
3. CIGAR Fuse	15 A
4. IGN Fuse	10 A
5. POWER M–Fuse	30 A
6. DOME Fuse	10 A
7. –	–
8. DIFF Fuse	20 A
9. GAUGE Fuse	15 A
10. WIPER Fuse	20 A
11. I/UP Fuse	7.5 A
12. FR FOG Fuse	15 A
13. STOP Fuse	15 A
14. RR A/C Fuse	30 A
15. DEFOG M–Fuse	20 A
16. ECU–B Fuse	15 A
17. TAIL Fuse	15 A
18. –	–
19. OBD Fuse	10 A
20. RR HTR Fuse	10 A
21. ECU–IG Fuse	15 A
22. PWR OUTLET Fuse	15 A

I06120

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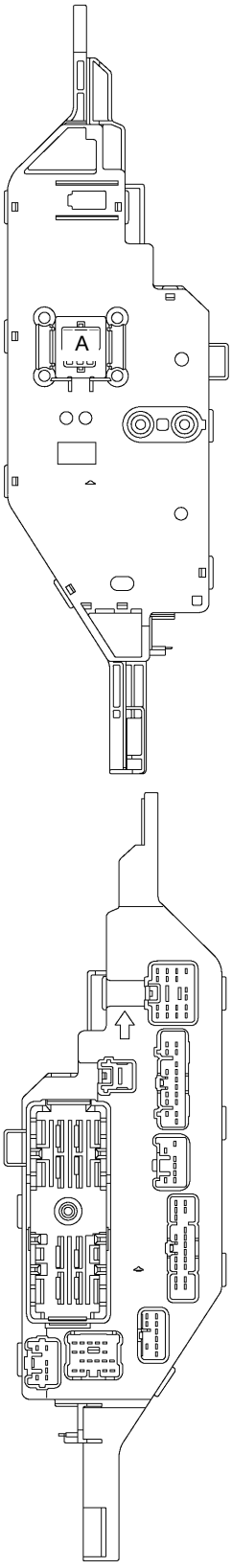
Passenger Side Junction Block



Relay

A. Heater Relay

I06119

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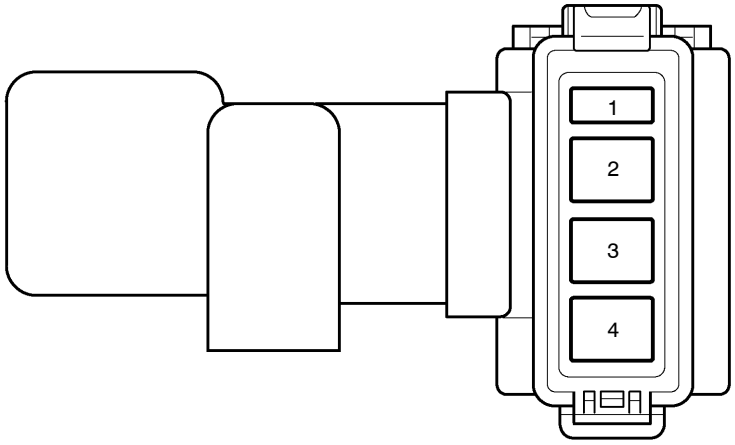
Fusible Link Block



Fuses

1. ALT–S Fuse	7.5 A
2. FL MAIN	100 A
3. FL ALT	140 A
4. FL J/B NO.2	100 A

I06117

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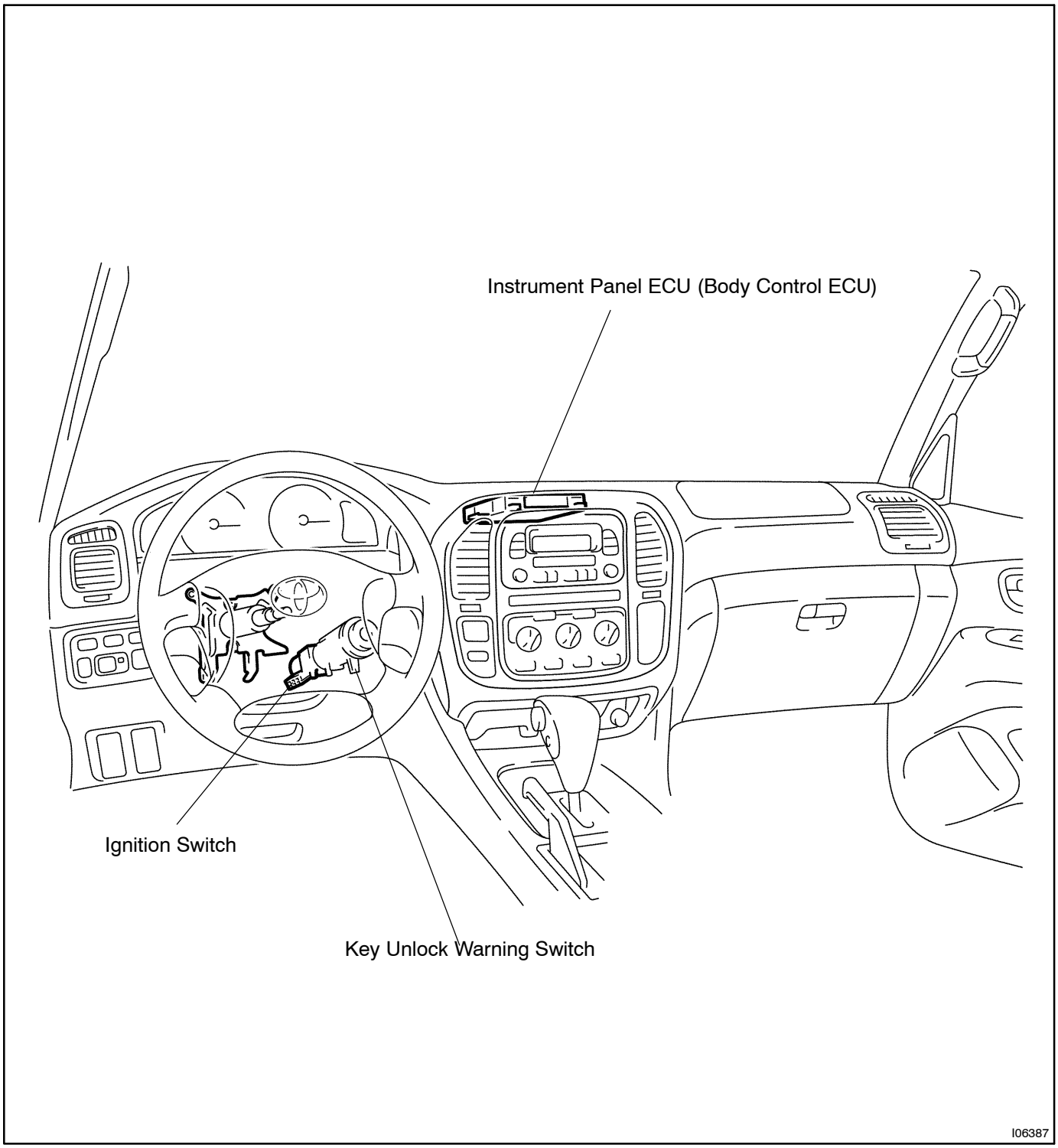
IGNITION SWITCH AND KEY UNLOCK WARNING SWITCH

BE01L–05

LOCATION



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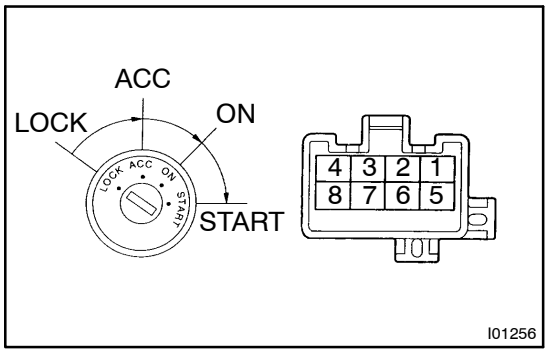
BE0RO–01

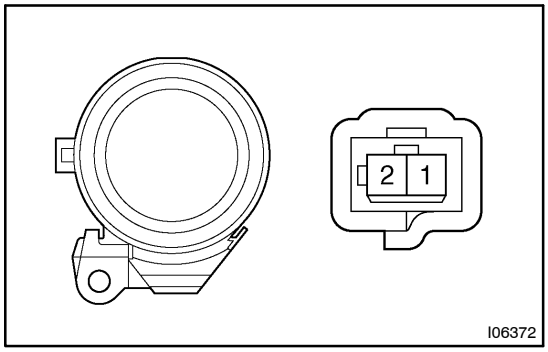


INSPECTION

1. INSPECT IGNITION SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
LOCK	–	No continuity
ACC	2 – 3	Continuity
ON	2 – 3 – 4 6 – 7	Continuity
START	1 – 2 – 4 6 – 7 – 8	Continuity

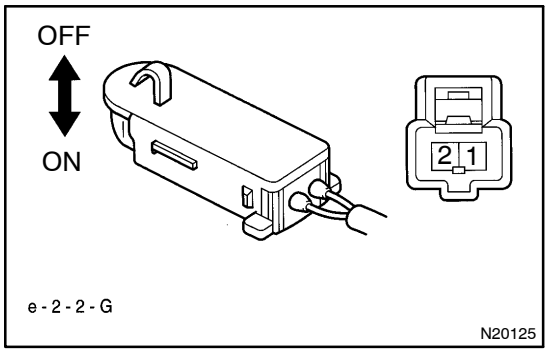
If continuity is not as specified, replace the switch.



2. INSPECT IGNITION KEY ILLUMINATION OPERATION

Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, and check that the indicator light lights up.

If operation is not as specified, replace the switch.



3. INSPECT KEY UNLOCK WARNING SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (Key removed)	–	No continuity
ON (Key set)	1 – 2	Continuity

If continuity is not as specified, replace the switch.

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

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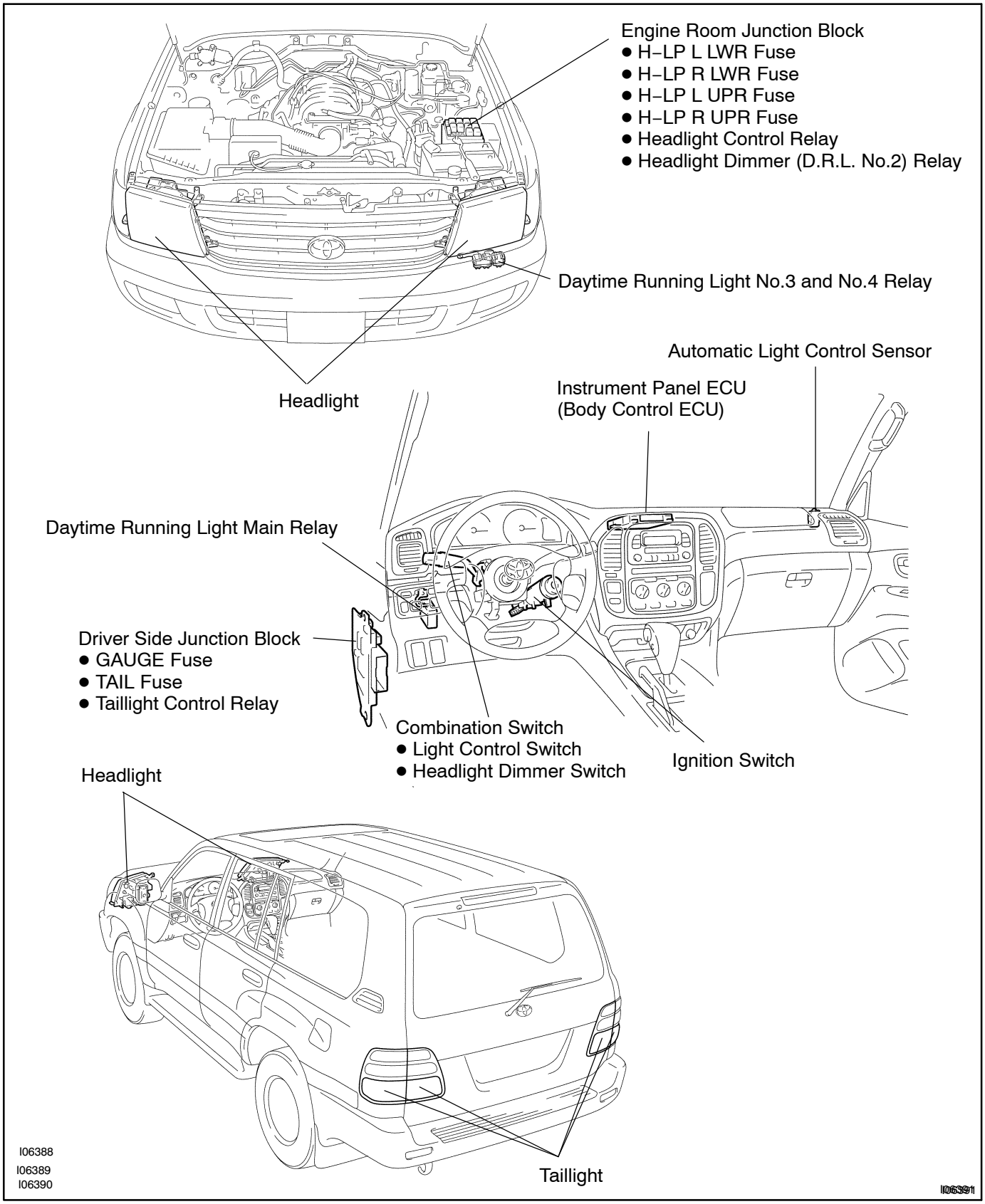
HEADLIGHT AND TAILLIGHT SYSTEM

BE0H8–02

LOCATION



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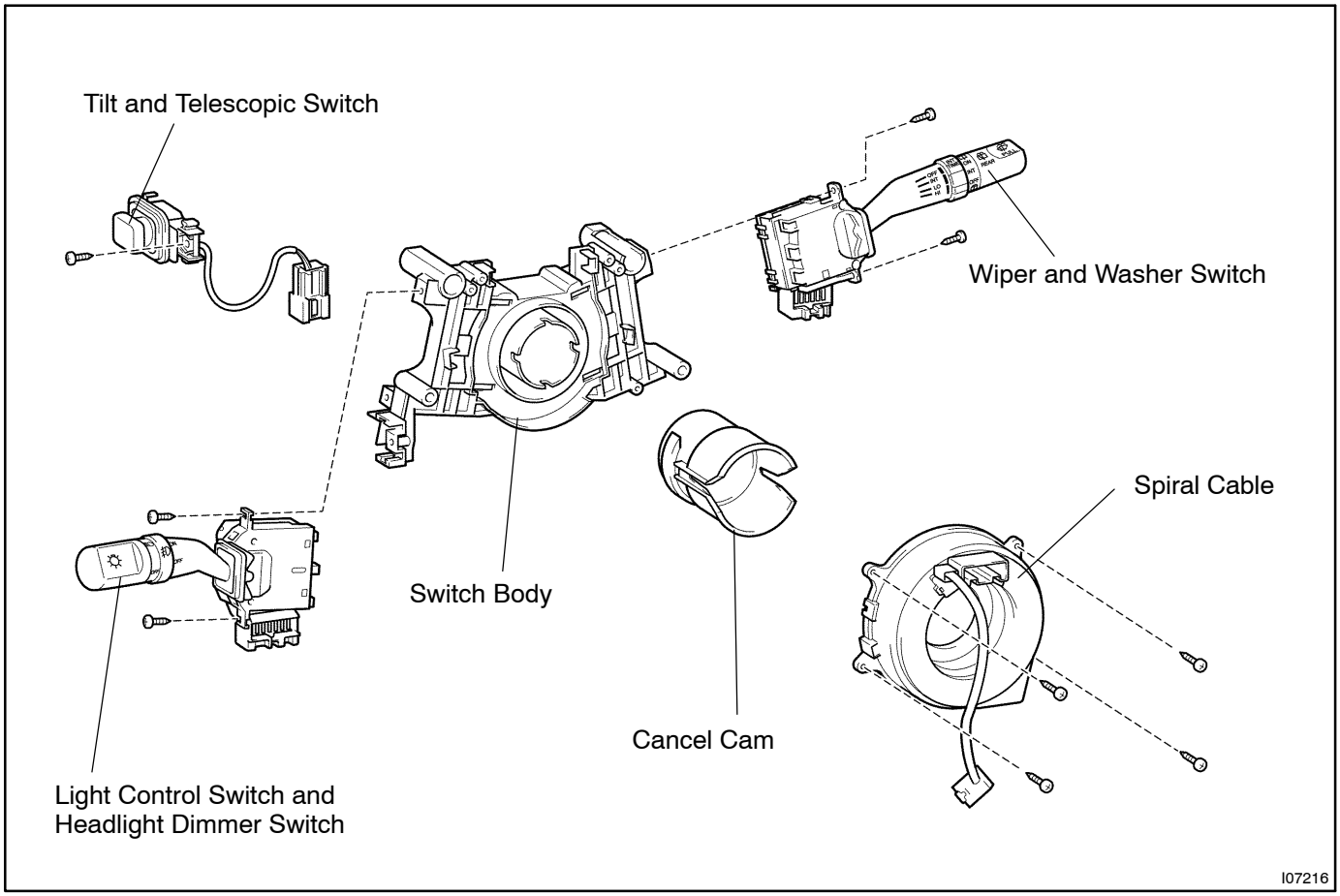
BE0H9–02

COMPONENTS



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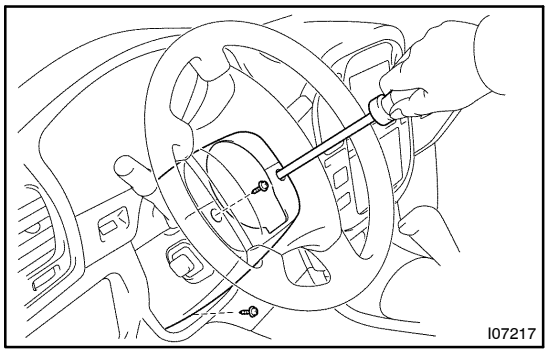
BE0RP–01

REMOVAL

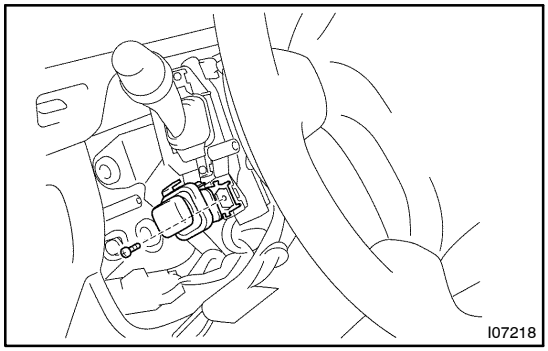
Installation is in the reverse order of removal.



1. REMOVE COLUMN COVER

(a) Remove the 3 screws.

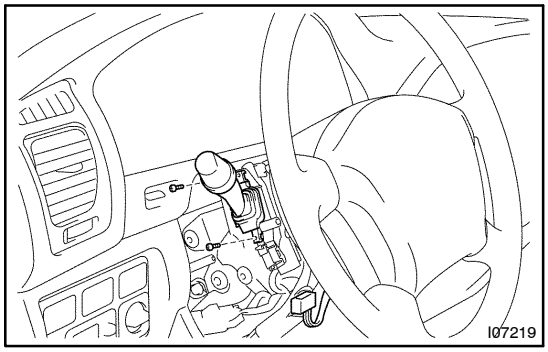
(b) Remove the column cover.



2. REMOVE POWER TILT AND TELESCOPIC SWITCH

(a) Remove the screw.

(b) Remove the power tilt and telescopic switch.

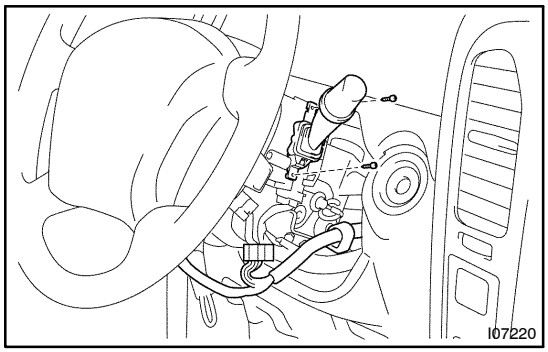


3. REMOVE LIGHT CONTROL SWITCH

(a) Disconnect the light control switch connector.

(b) Remove the 2 screws.

(c) Remove the switch.



4. REMOVE WIPER AND WASHER SWITCH

(a) Disconnect the wiper and washer switch connector.

(b) Remove the 2 screws.

(c) Remove the switch.

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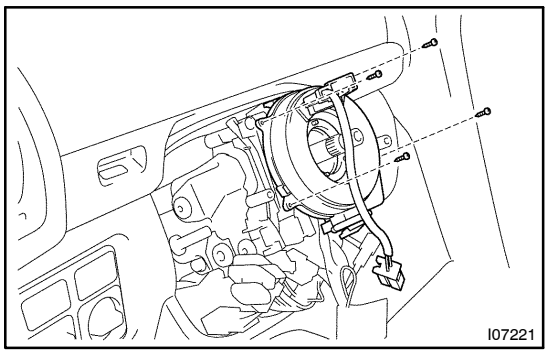
BE0RQ–01

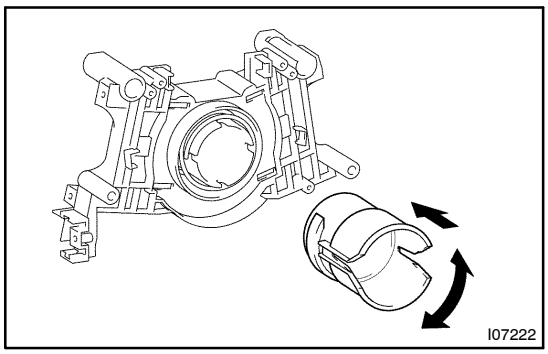
DISASSEMBLY

1. REMOVE STEERING WHEEL(See page SR–25)



2. REMOVE SPIRAL CABLE

Remove the 4 screws and the spiral cable.



3. REMOVE CANCEL CAM

Turn the cancel cam with pressing it and pull it out.

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BE0RR–01

INSPECTION

1. INSPECT LIGHT CONTROL SWITCH CONTINUITY

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

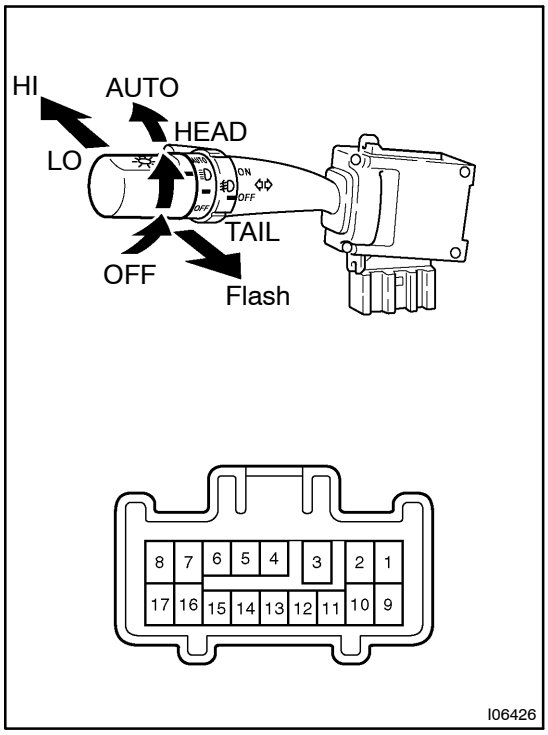
If continuity is not as specified, replace the switch.

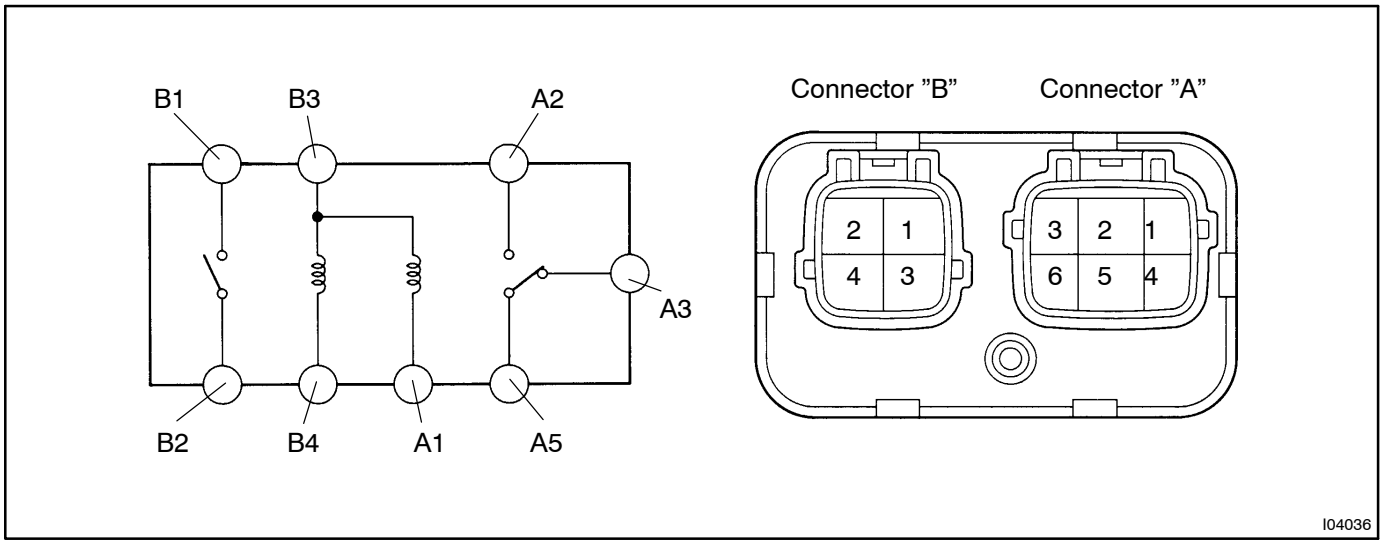
2. INSPECT HEADLIGHT DIMMER SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Low beam	16 – 17	Continuity
High beam	7 – 16	Continuity
Flash	7 – 8 – 16	Continuity

If continuity is not as specified, replace the switch.

3. INSPECT DAYTIME RUNNING LIGHT NO.3 AND NO.4 RELAY CONTINUITY





Tester connection	Condition	Specified condition
A1 – B3	Constant	Continuity
A3 – A5	Constant	Continuity
B3 – B4	Constant	Continuity
A2 – A5	Apply battery positive voltage between terminals A1 and B3.	Continuity
B1 – B2	Apply battery positive voltage between terminals B3 and B4.	Continuity

If continuity is not as specified, replace the relay.

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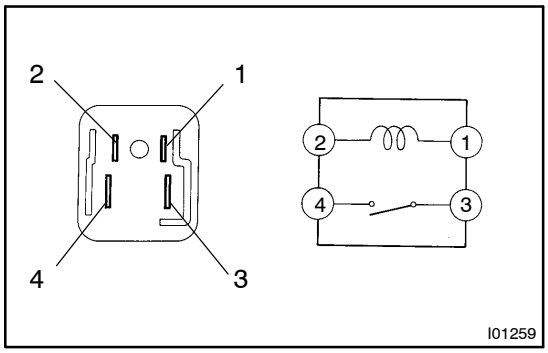
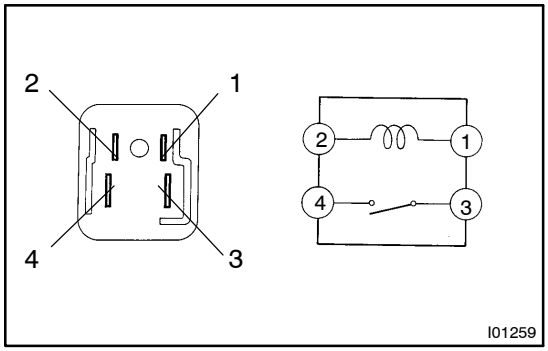


4. INSPECT HEADLIGHT CONTROL RELAY CONTINUITY

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

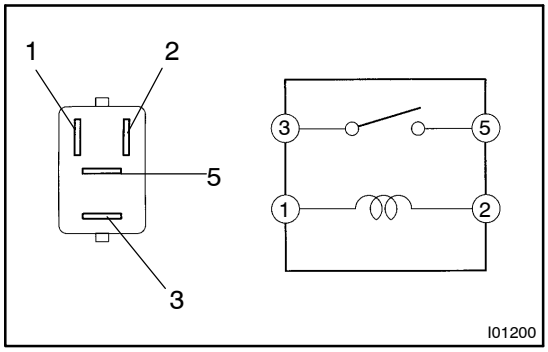
If continuity is not as specified, replace the relay.



5. INSPECT HEADLIGHT DIMMER (DAYTIME RUNNING LIGHT NO.2) RELAY CONTINUITY

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

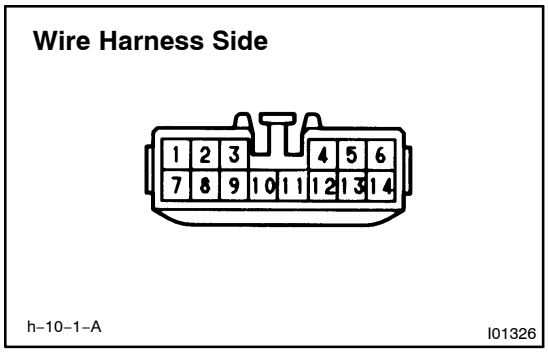
If continuity is not as specified, replace the relay.



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 DAYTIME RUNNING LIGHT MAIN RELAY CIRCUIT

Disconnect the connector from the relay and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
2 – Ground	Light control switch OFF	No continuity
2 – Ground	Light control switch TAIL or HEAD	Continuity
4 – Ground	Light control switch OFF	No continuity
4 – Ground	Light control switch TAIL or HEAD	Continuity
6 – Ground	Headlight dimmer switch FLASH	Continuity
7 – Ground	Light control switch OFF	No continuity
7 – Ground	Light control switch TAIL	Continuity
10 – Ground	Constant	Continuity

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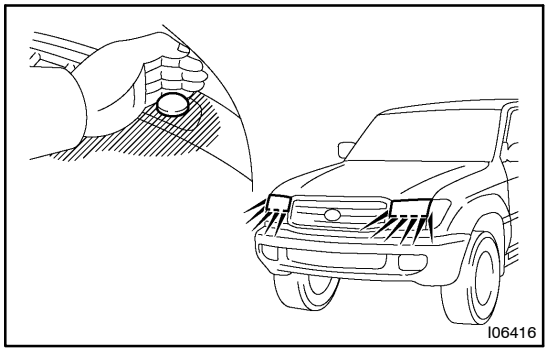
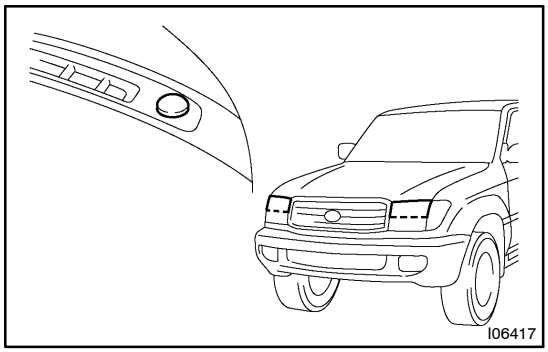
13 – Ground	Headlight dimmer switch FLASH or HI	Continuity
3 – Ground	Constant	Battery positive voltage
8 – Ground	Ignition switch OFF	No voltage
8 – Ground	Ignition switch ON	Battery positive voltage
9 – Ground	Terminal 3 ground	Battery positive voltage
11 – Ground	Rear fog light switch ON, terminal 3 ground	Battery positive voltage
12 – Ground	Constant	Battery positive voltage
14 – Ground	Terminal 5 ground	Battery positive voltage

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



8. INSPECT AUTOMATIC LIGHT CONTROL AUTO ON:

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



9. INSPECT AUTOMATIC LIGHT CONTROL AUTO OFF:

(a) Gradually expose the sensor.
(b) Check the headlights and the accessory lights should turn OFF.

10. INSPECT LIGHT–OFF CONDITION

(a) Turn the ignition switch ON.
(b) Gradually cover the top of the sensor.
Lights auto ON:
(c) Check that the lights go off under the following conditions.
(1) Light control switch is OFF.
(2) The area surrounding the sensor gets bright.
(3) The driver's door is opened with the ignition switch OFF.

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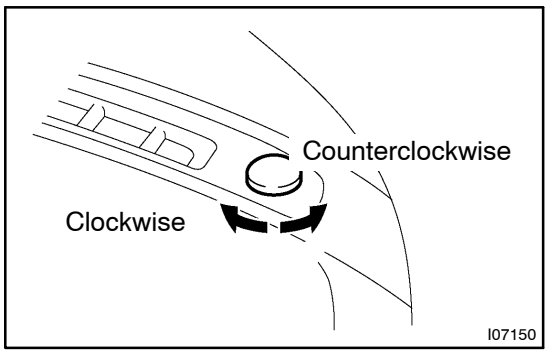
11. INSPECT LIGHTS–ON CONDITION

(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.



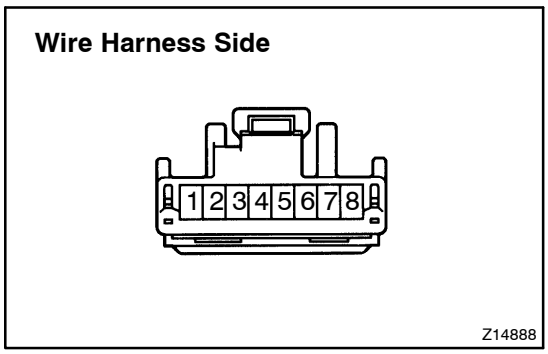
12. ADJUST AUTOMATIC LIGHT CONTROL SENSOR

(a) Adjustment of the light control is performed by turning the sensitivity knob on the sensor.

(b) This will be determined at what light condition the automatic control will take place.

If response is too quick, turn the knob clockwise.

If response is too slow, turn the knob counterclockwise.



13. INSPECT AUTOMATIC LIGHT CONTROL SENSOR CIRCUIT

Connector disconnected:

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

Tester connection	Condition	Specified condition
3 – Ground	Driver's door courtesy switch OFF	No continuity
3 – Ground	Driver's door courtesy switch ON	Continuity
5 – Ground	Headlight control switch HEAD	Continuity
6 – Ground	Headlight control switch AUTO	Continuity
7 – Ground	Headlight control switch TAIL	Continuity
1 – Ground	Ignition switch ON	Battery positive voltage
1 – Ground	Ignition switch LOCK or ACC	No voltage
2 – Ground	Constant	Battery positive voltage

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.

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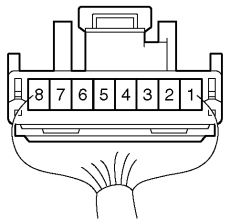
From Back Side



I06428

14. INSPECT AUTOMATIC LIGHT CONTROL SENSOR CIRCUIT

Connector connected

Connect the wire harness side connector to the sensor and inspect wire harness side connector from the back side, as shown.

HINT:

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

Tester connection	Condition	Specified condition
1 – Ground	Ignition switch ON	10 V or more
1 – Ground	Ignition switch OFF	1 V or less
3 – Ground	Door courtesy switch OFF	9 V or more
3 – Ground	Door courtesy switch ON	1 V or less
5 – Ground	Headlight dimmer switch FLASH	0.3 V or less
5 – Ground	Vehicle is under the direct sun light (Sensor is not covered.)	1.8 V or less
7 – Ground	Vehicle is under the direct sun light (Sensor is not covered.)	1.5 V or less

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.

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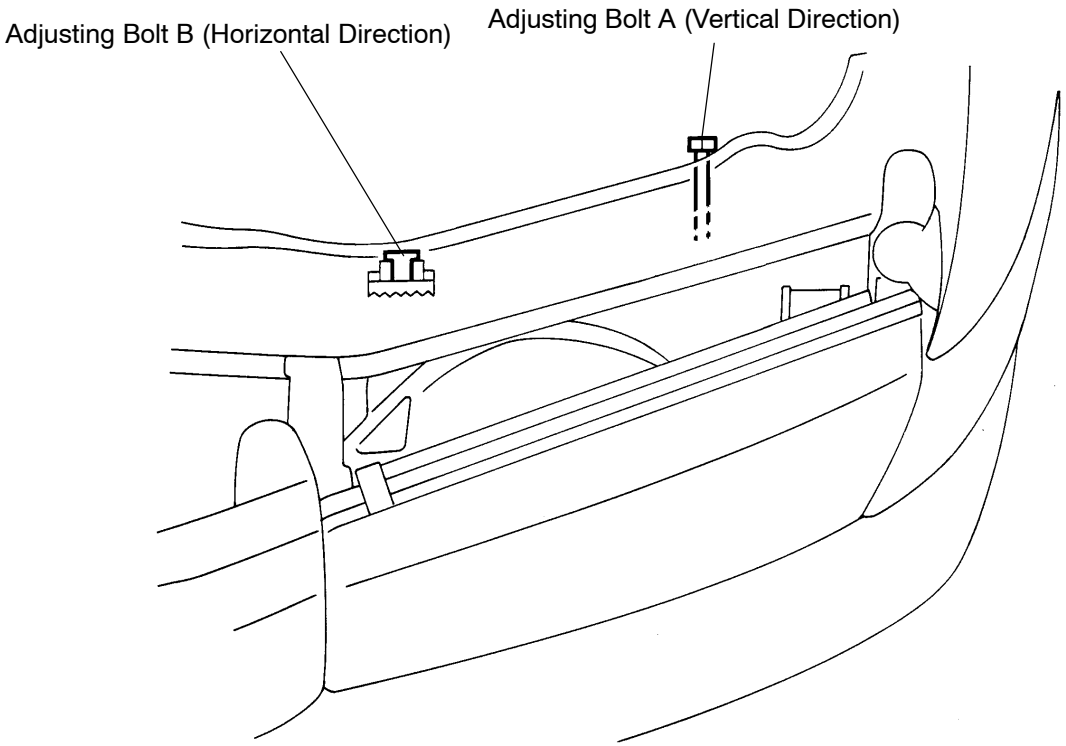
BE0RS–01

ADJUSTMENT



I06379

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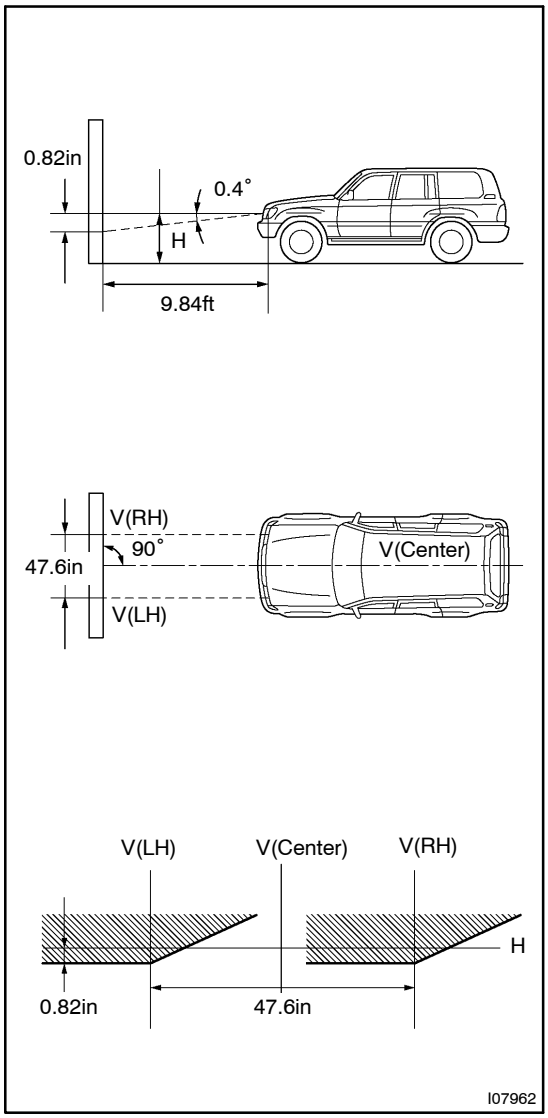

1. ADJUSTING HEADLIGHT AIM

(a) Put the vehicle in below conditions.
- Make sure the body around the headlight is not deformed.
- Park the vehicle on a level spot.
- Tire inflation pressure is the specified value.
- Height control operation completes.
- Tire inflation pressure is the specified value.
- The driver gets into the driver's seat and puts the vehicle in a state ready for driving (with a full tank).
- Bounce the vehicle several times.

(b) Check the headlight aimming.
(1) Prepare the thick white colored paper.
(2) Stand the paper perpendicularly and ensure the distance from it to the head lights is 9.84 ft.
(3) Ensure that the center line of vehicle and the paper are at a 90 degree angle as shown in the illustration.
(4) Engine running.
(5) Draw a horizontal line on the paper where the head lights of the vehicle are to be.
(6) Draw a vertical line on the paper where the center line of the vehicle is to be. (V line)
(7) Draw the vertical lines on the paper where the headlights (low–beam and high–beam center marks) of the vehicle are to be(V RH and V LH lines).
(8) Draw the vertical lines on the paper where the headlights(low beam center marks)of the vehicle are to be.(V RH and LH lines)
(9) Turn the head lights ON.
(10) Check that the head lights light up the paper as shown in the illustration.
(11) When the paper is not lighted up properly, adjust the lights in the vertical or horizontal direction.

HINT:
As shown in the illustration, adjust aiming of the LH and RH lights respectively.

(c) Adjust the headlight in vertical direction.
(1) Using adjusting bolt A, adjust the headlight aim to within the specifications.

(d) Adjust the headlight in horizontal direction.
(1) Using adjusting bolt B, adjust the headlight aim to within the specifications.

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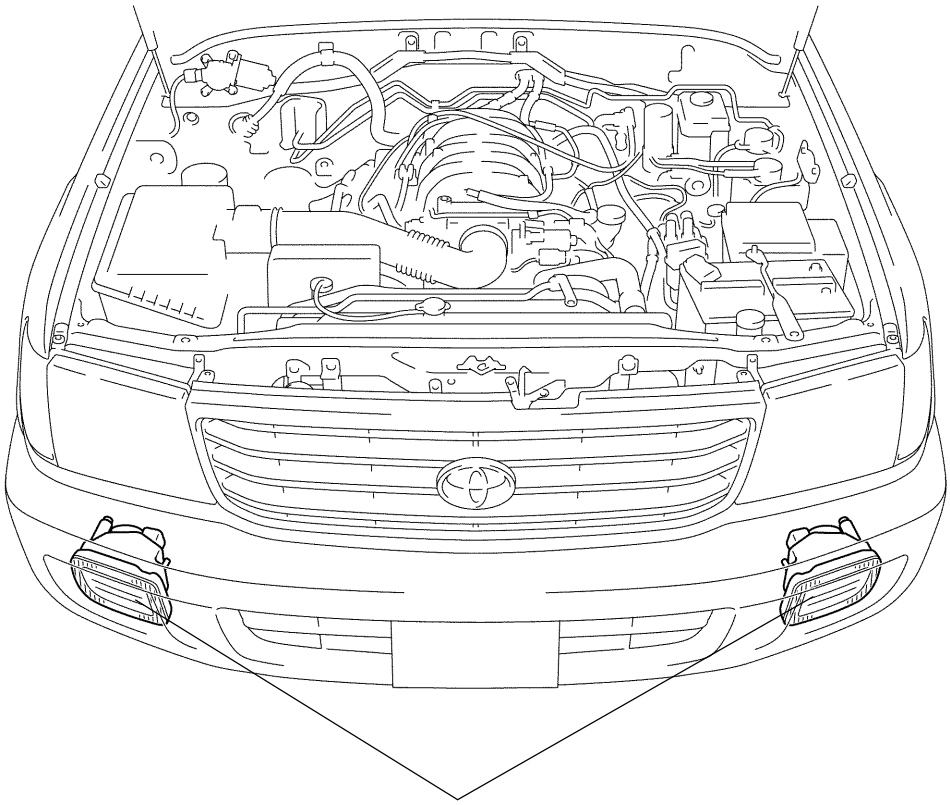
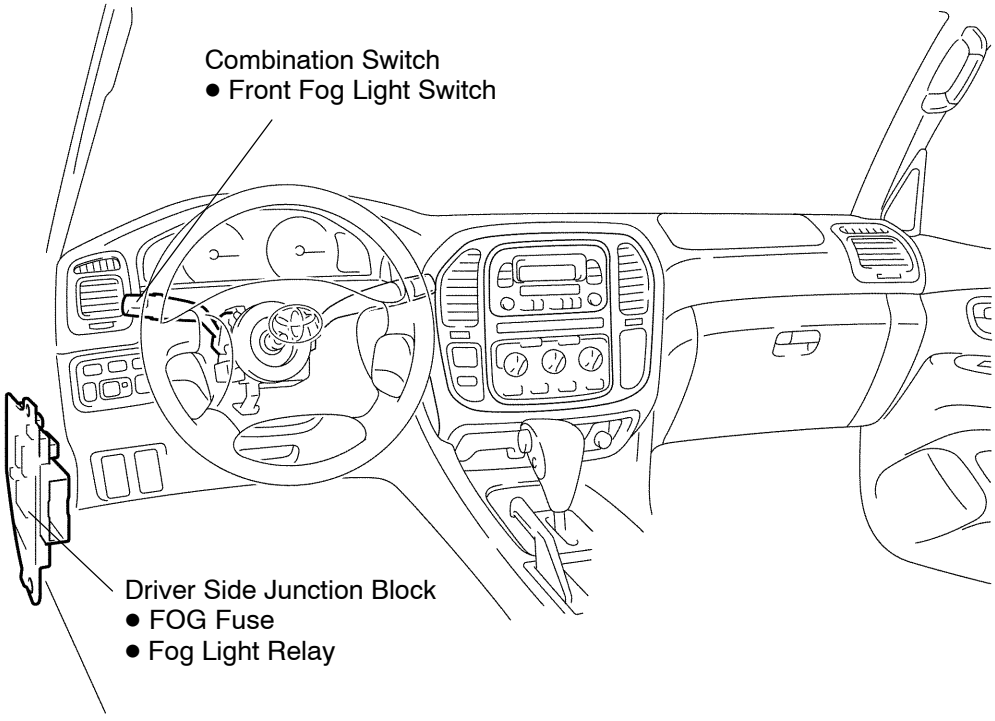
FOG LIGHT SYSTEM

LOCATION

BE0H2–03



Front Fog Light



I06392
I06393

I06394

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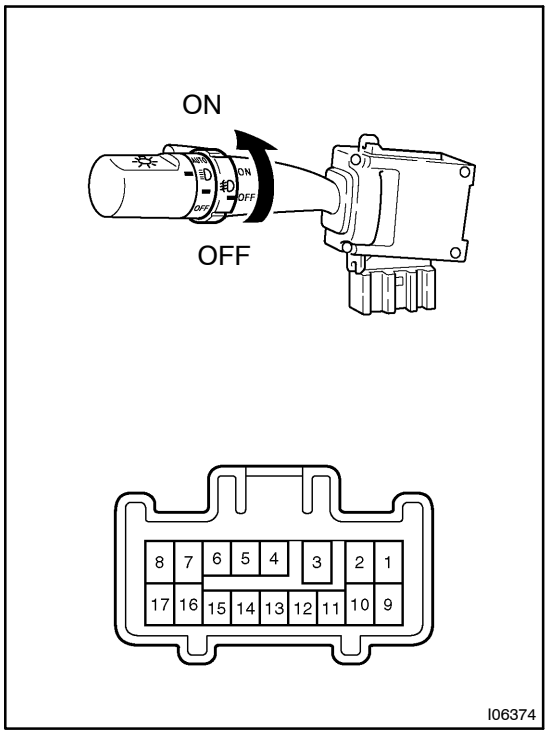
BE0RT–01

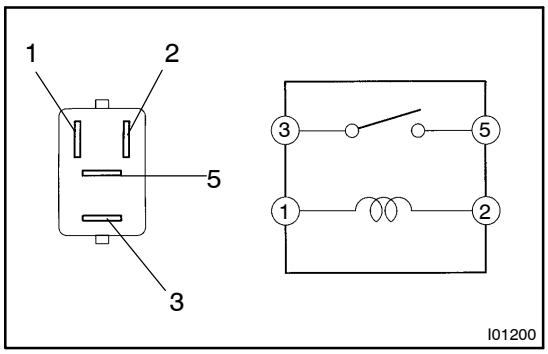
INSPECTION

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 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.

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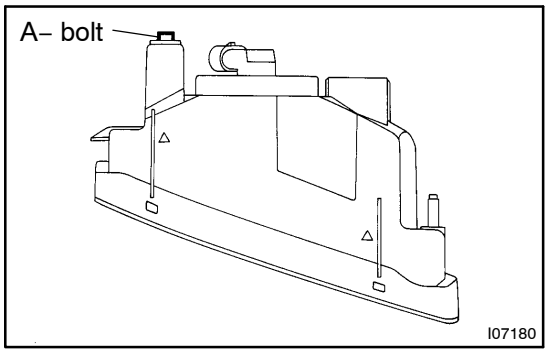
BE0RU–01



ADJUSTMENT

ADJUST FOGLIGHT AIM

A–bolt : Vertical Direction

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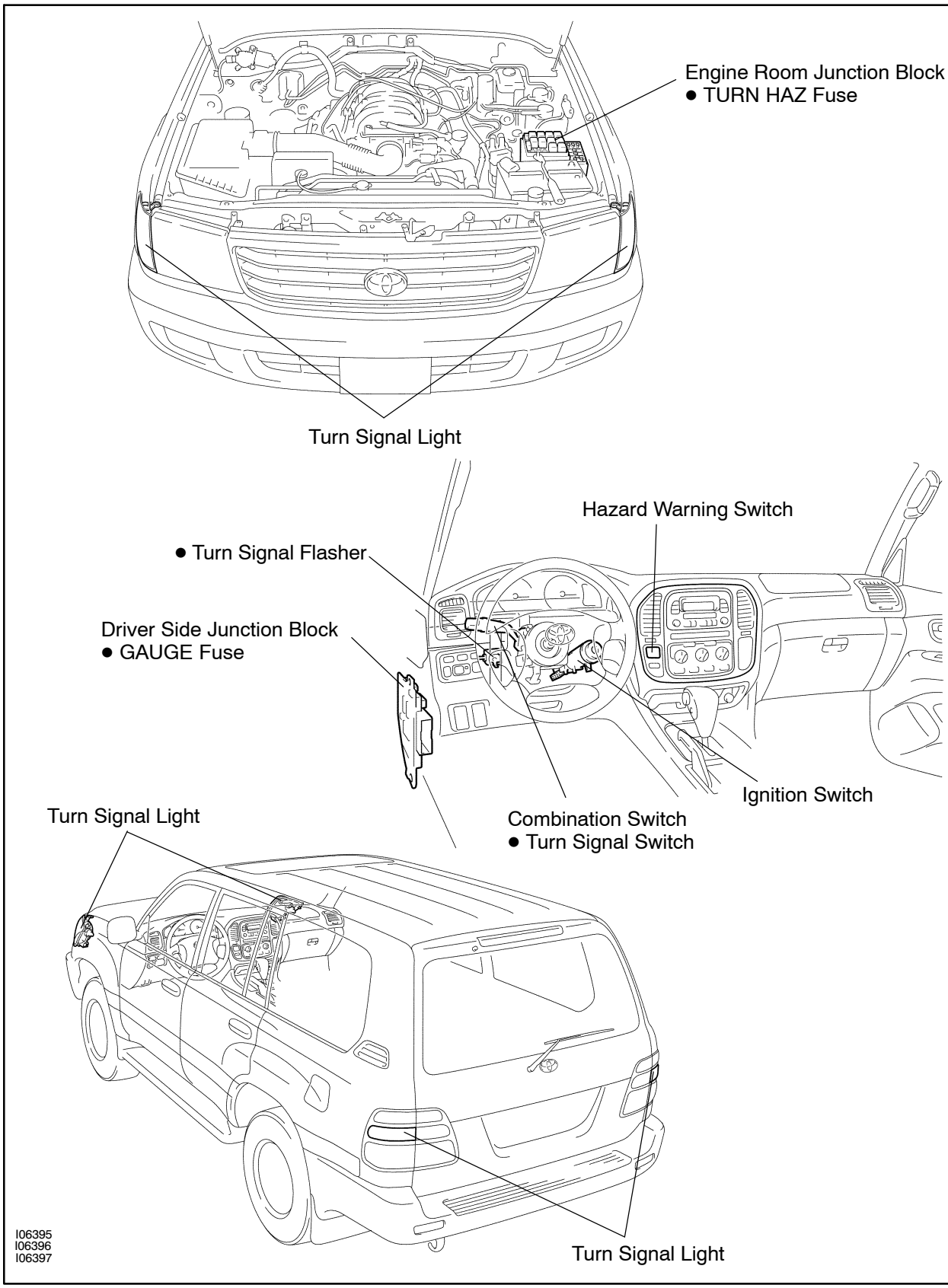
TURN SIGNAL AND HAZARD WARNING SYSTEM

BE0H0–02

LOCATION



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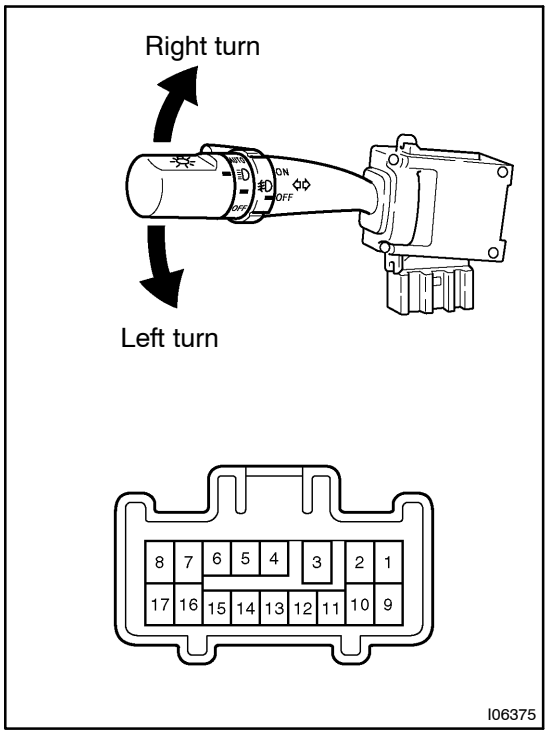
BE0RV–01

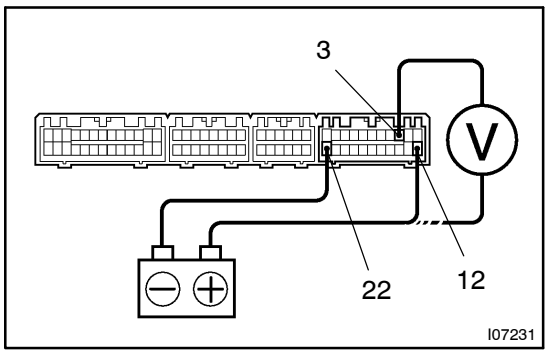
INSPECTION

1. INSPECT TURN SIGNAL SWITCH CONTINUITY



Switch position	Tester connection	Specified condition
Left turn	7 – 8	Continuity
Neutral	–	No continuity
Right turn	6 – 7	Continuity

If continuity is not as specified, replace the switch.

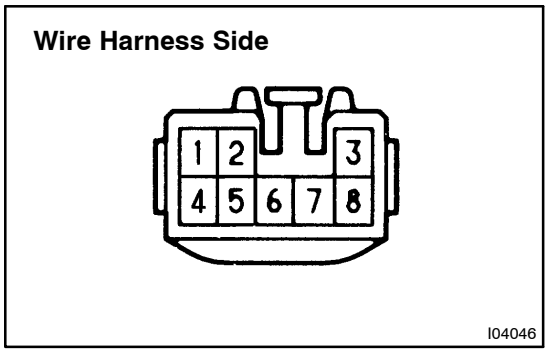


2. INSPECT HAZARD WARNING SWITCH OPERATION

(a) Connect the positive (+) lead from the battery to terminal 12 and 3 of panel switch connector and negative (–) lead to terminal 22.

(b) Push the hazard warning switch and check that the voltage is battery positive voltage.

If operation is not as specified, see page AC–88.



3. INSPECT TURN SIGNAL FLASHER CIRCUIT

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

Tester connection	Condition	Specified condition
2 – Ground	Constant	Continuity
3 – Ground	Constant	Continuity
5 – Ground	Turn signal switch RIGHT or OFF	No continuity
5 – Ground	Turn signal switch LEFT	Continuity
6 – Ground	Turn signal switch LEFT or OFF	No continuity
6 – Ground	Turn signal switch RIGHT	Continuity
7 – Ground	Constant	Continuity
8 – Ground	Hazard warning switch OFF	No continuity

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8 – Ground	Hazard warning switch ON	Continuity
1 – Ground	Ignition switch LOCK or ACC	No voltage
1 – Ground	Ignition switch ON	Battery positive voltage
4 – Ground	Constant	Battery positive voltage

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

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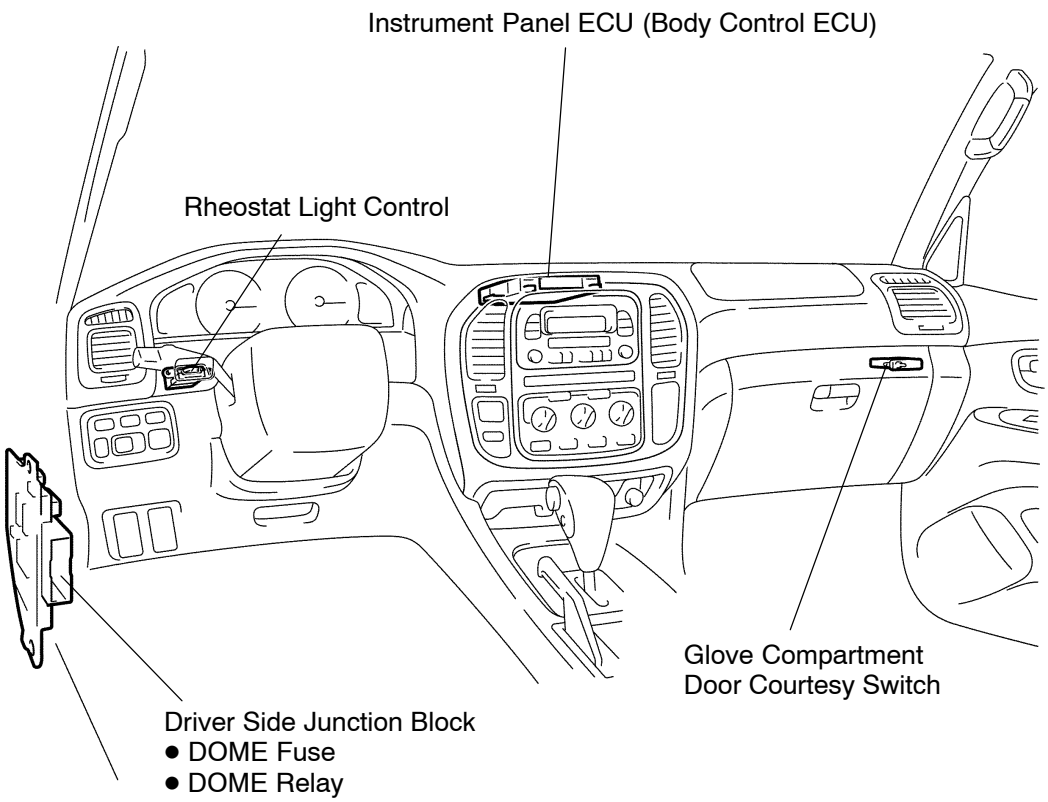
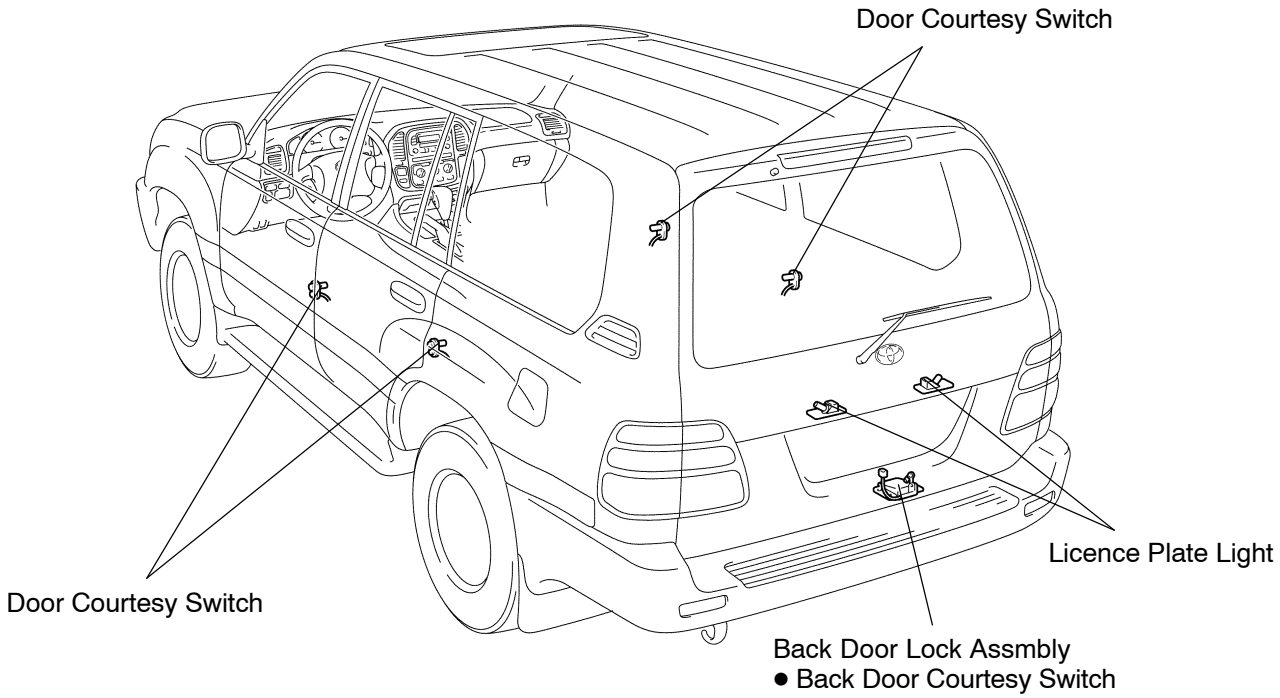
INTERIOR LIGHT SYSTEM

BE0RW–01

LOCATION



I06399



I06400

I06401

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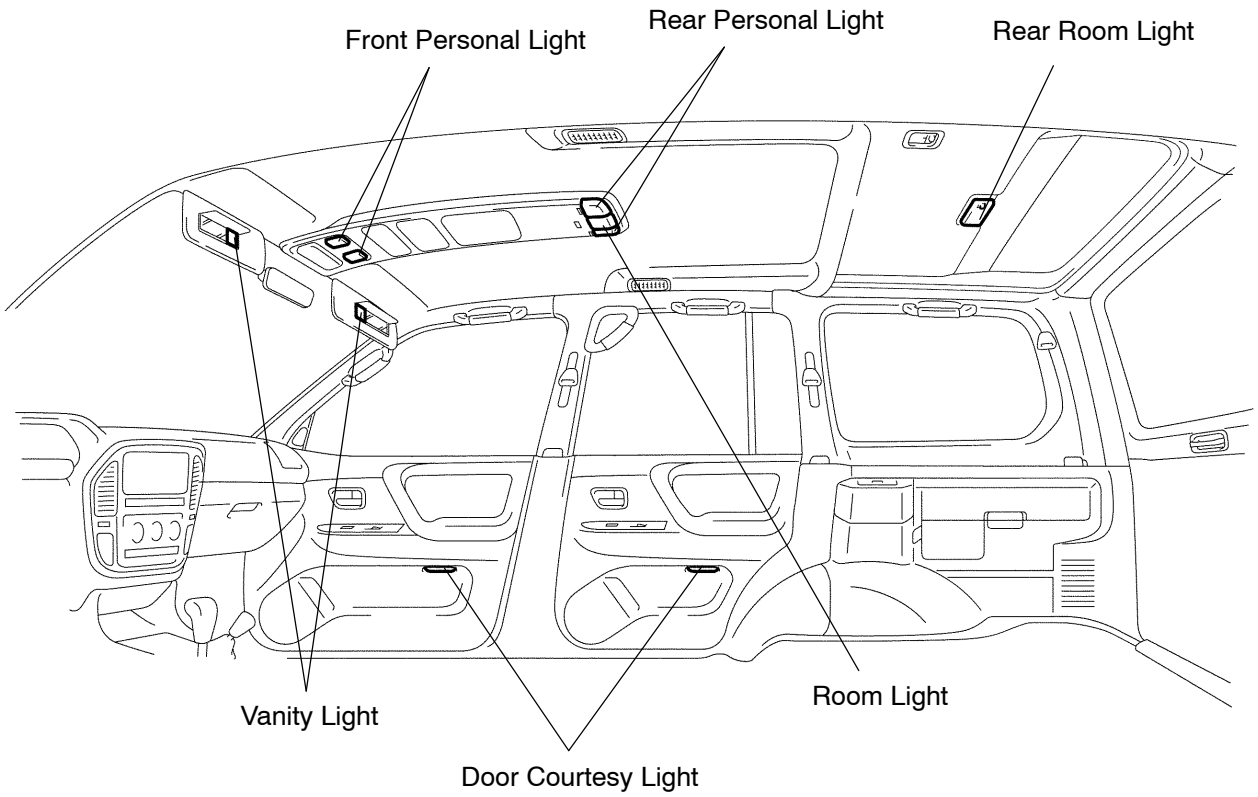
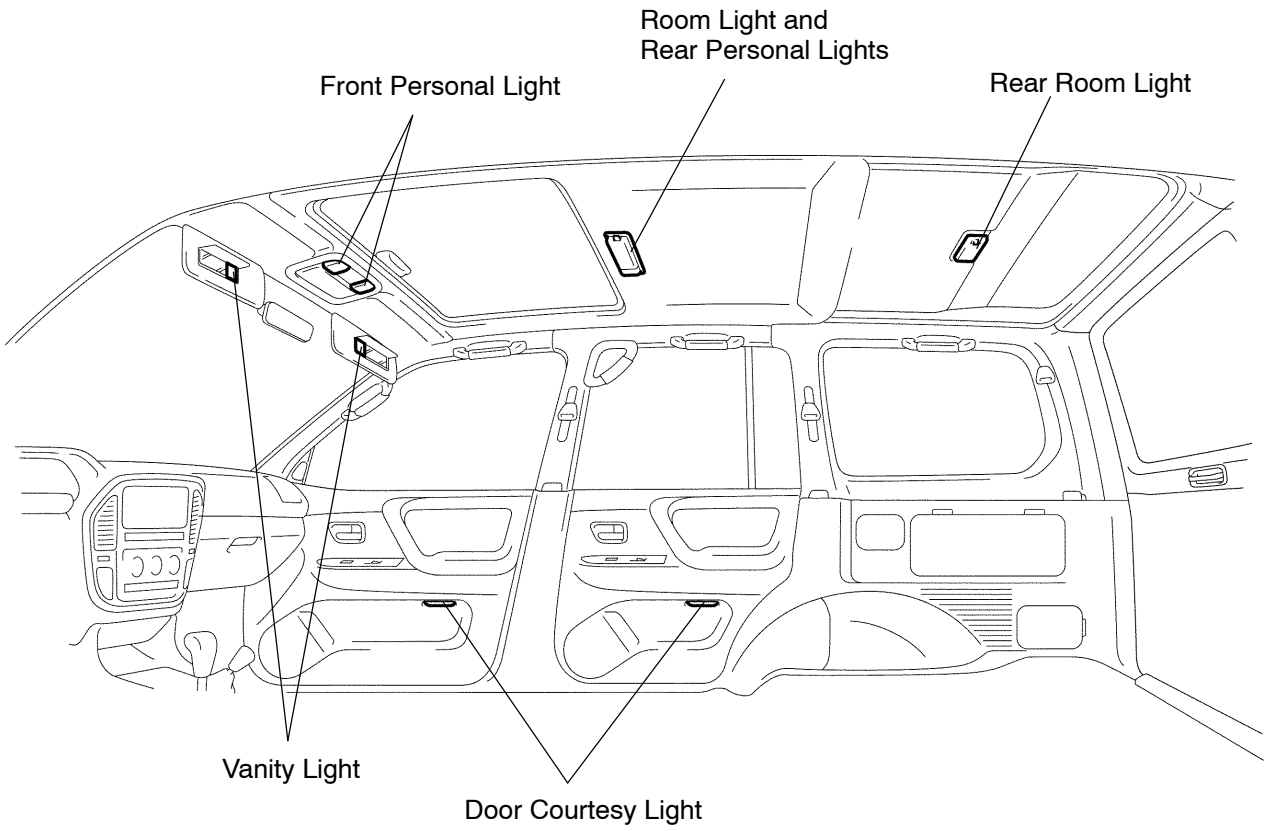
w/o Siding Roof



w/ Sliding Roof



I06402

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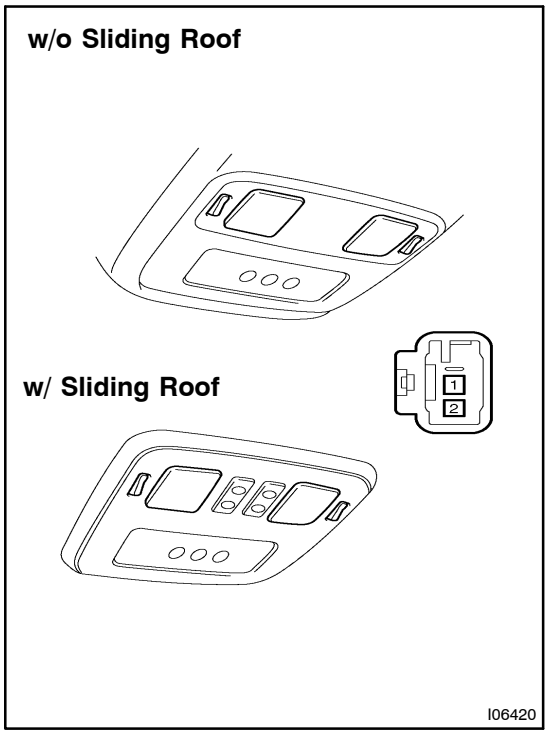
BE0RX–01

INSPECTION

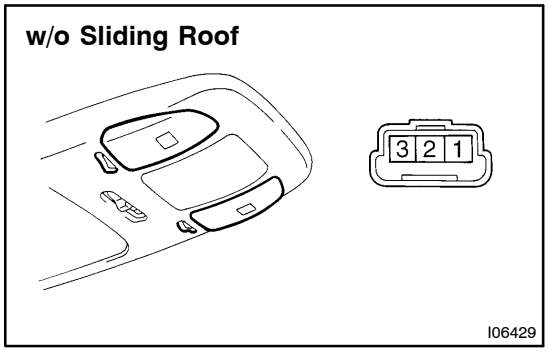
1. INSPECT FRONT PERSONAL LIGHT SWITCH CONTINUITY



Switch position	Tester connection	Specified condition
OFF	–	No continuity
ON	1 – 2	Continuity

If continuity is not as specified, replace the light assembly or bulb.

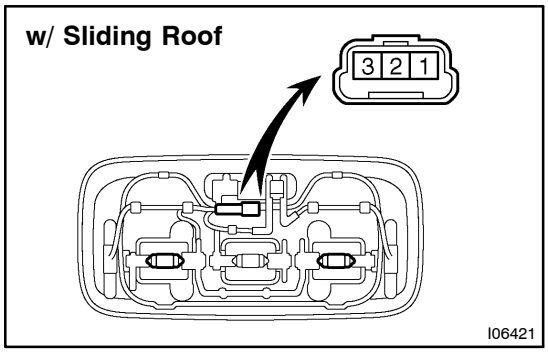
2. INSPECT REAR PERSONAL LIGHT SWITCH CONTINUITY w/o SLIDING ROOF



Switch position	Tester connection	Specified condition
OFF	–	No continuity
ON	1 – 3	Continuity

If continuity is not as specified, replace the light assembly or bulb.

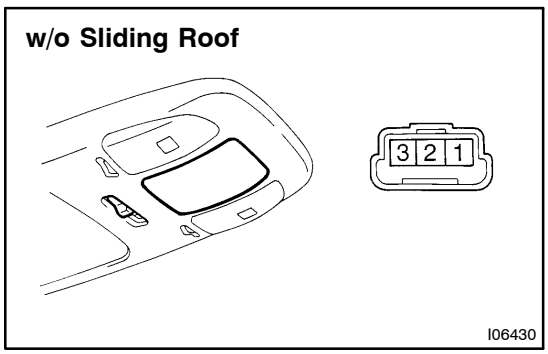
3. INSPECT REAR PERSONAL LIGHT SWITCH CONTINUITY w/ SLIDING ROOF



Switch position	Tester connection	Specified condition
OFF	–	No continuity
ON	1 – 3	Continuity

If continuity is not as specified, replace the light assembly or bulb.

4. INSPECT ROOM LIGHT SWITCH CONTINUITY w/o SLIDING ROOF



Switch position	Tester connection	Specified condition
Room Light Switch OFF	–	No continuity
Room Light Switch DOOR	2 – 3	Continuity
Room Light Switch ON	1 – 3	Continuity

If continuity is not as specified, replace the light assembly or bulb.

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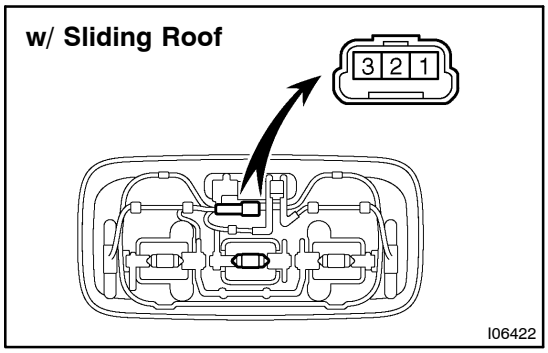
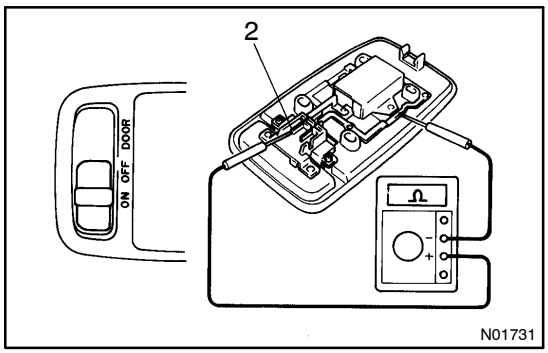


5. INSPECT ROOM LIGHT SWITCH CONTINUITY w/ SLIDING ROOF

Switch position	Tester connection	Specified condition
Room Light Switch OFF	–	No continuity
Room Light Switch DOOR	2 – 3	Continuity
Room Light Switch ON	1 – 3	Continuity

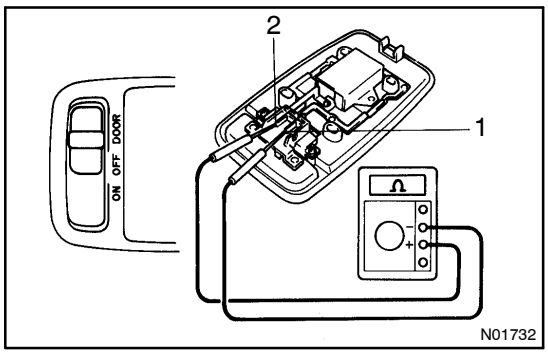
If continuity is not as specified, replace the light assembly or bulb.



6. INSPECT REAR ROOM LIGHT SWITCH CONTINUITY

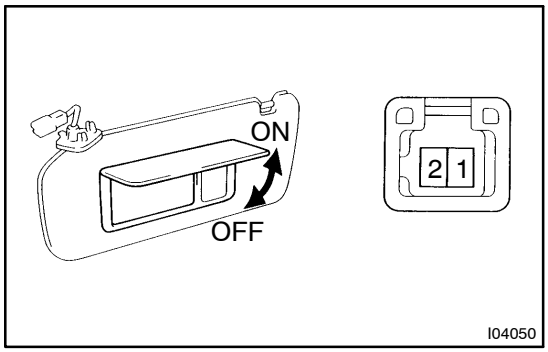
(a) Disconnect the connector from room light assembly.

(b) Turn the room light switch ON, check that continuity exists between terminal 2 and body ground.



(c) Turn the room light switch DOOR, check that continuity exists between terminal 1 and 2.

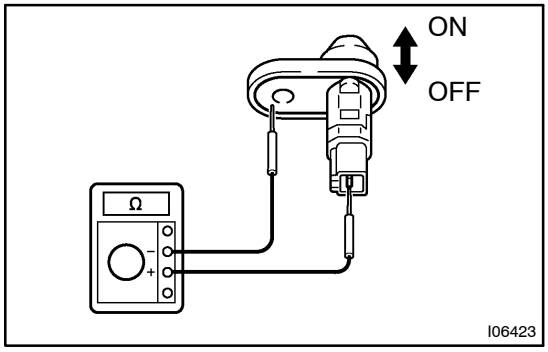
If operation is not as specified, replace the light assembly or bulb.



7. INSPECT VANITY LIGHT CONTINUITY

Switch position	Tester connection	Specified condition
OFF (closed)	–	No continuity
ON (opened)	1 – 2	Continuity

If continuity is not as specified, replace the vanity light assembly or bulb.



8. INSPECT DOOR COURTESY SWITCH CONTINUITY

(a) Check that continuity exists between terminal and switch body with the switch ON (switch pin released).

(b) Check that no continuity exists between terminals and switch body with the switch OFF (switch pin pushed).

If continuity is not as specified, replace the switch.

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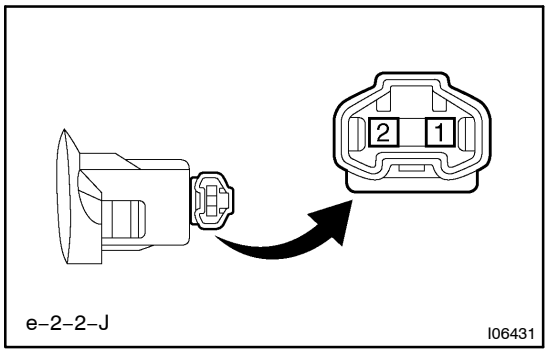
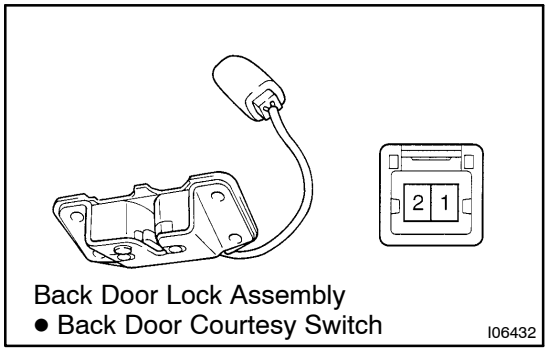


9. INSPECT DOOR COURTESY LIGHT CONTINUITY

Using an ohmmeter, check that continuity exists between terminals.

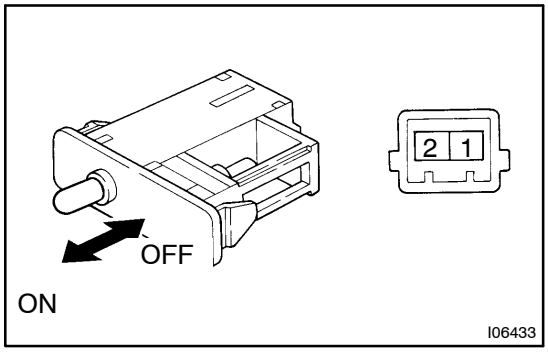
If continuity is not as specified, replace the light assembly or bulb.



10. INSPECT BACK DOOR COURTESY SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (closed)	–	No continuity
ON (opened)	1 – 2	Continuity

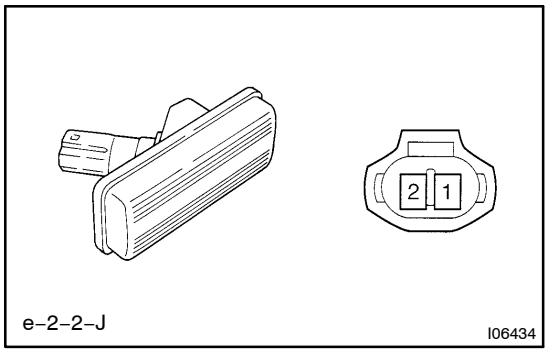
If continuity is not as specified, replace the back door lock assembly.



11. INSPECT GLOVE COMPARTMENT DOOR COURTESY SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (closed)	–	No continuity
ON (opened)	1 – 2	Continuity

If continuity is not as specified, replace the switch.



12. INSPECT LICENCE PLATE LIGHT CONTINUITY

Using an ohmmeter, check that continuity exists between terminals.

If continuity is not as specified, replace the light assembly or bulb.

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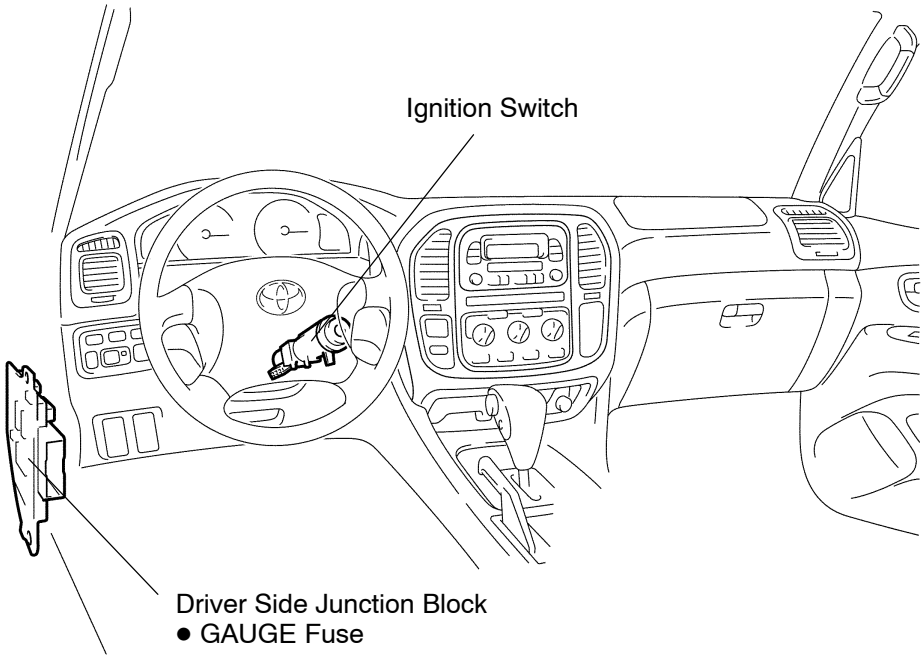
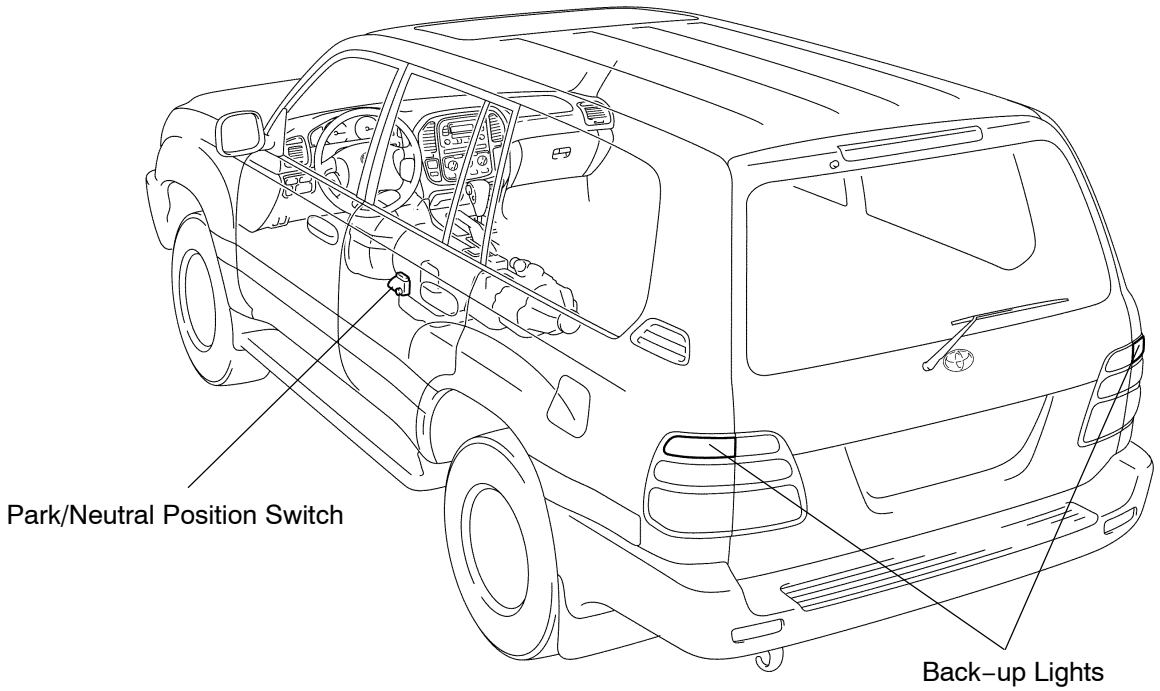
BACK–UP LIGHT SYSTEM

BE0GW–03

LOCATION





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BE0GX–03

INSPECTION

INSPECT PARK/ NEUTRAL POSITION SWITCH CONTINUITY (See page DI–200)

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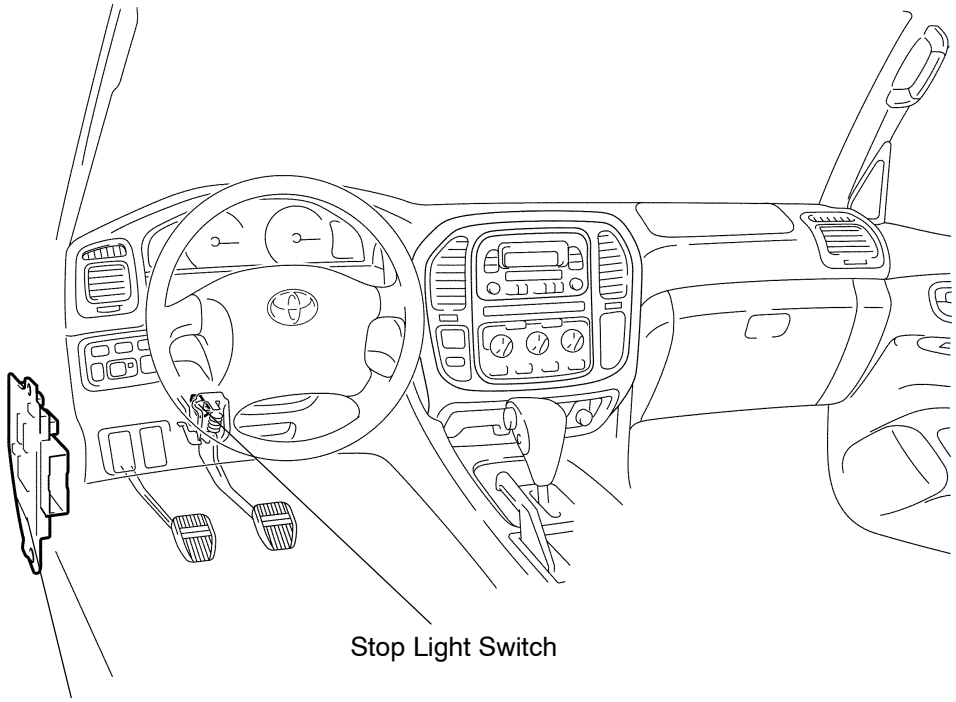
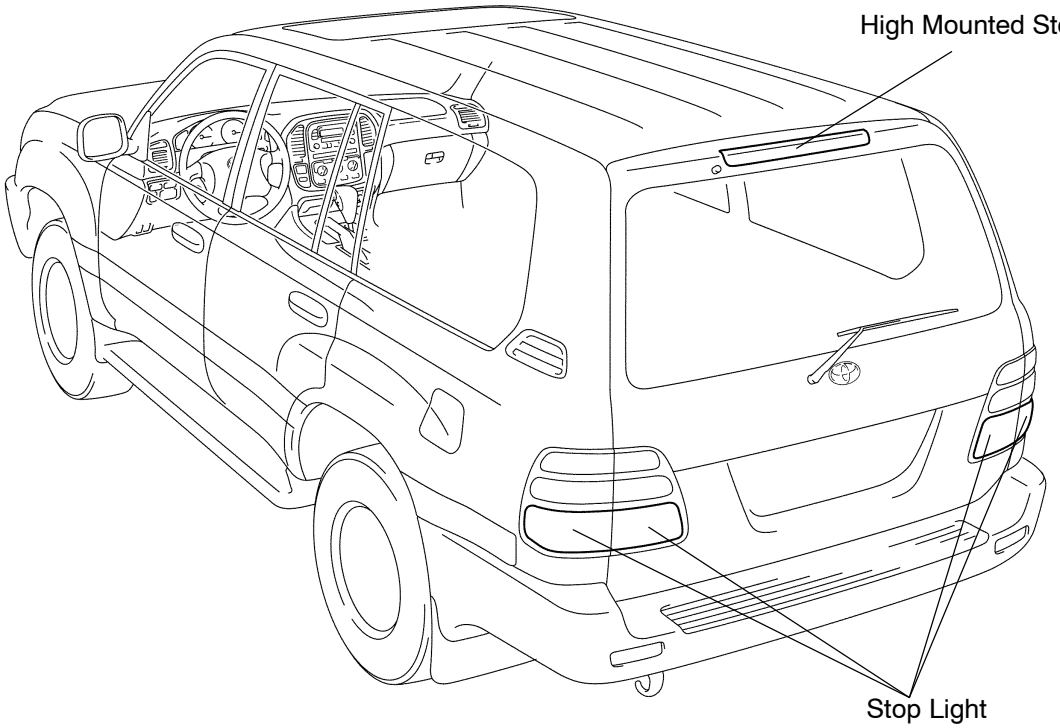
STOP LIGHT SYSTEM

LOCATION

BE0H6–03





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I06404

I06405

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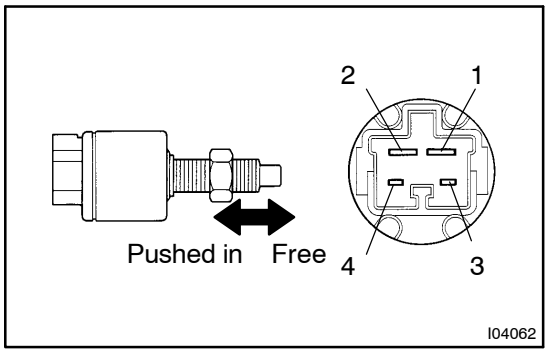
BE0RY–01

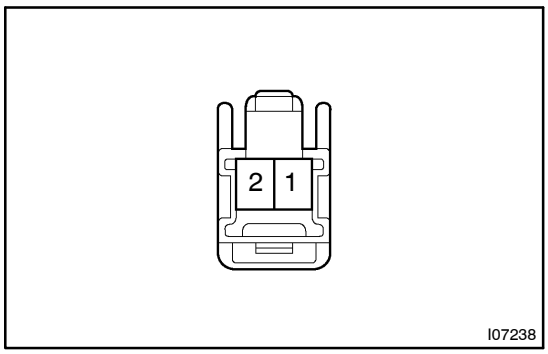


INSPECTION

1. INSPECT STOP LIGHT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Switch pin free (Pedal depressed)	1 – 2	Continuity
Switch pin pushed in (Pedal released)	–	No continuity
Switch pin free (Pedal depressed)	–	No continuity
Switch pin pushed in (Pedal released)	3 – 4	Continuity

If continuity is not as specified, replace the switch.



2. INSPECT HI–MOUNTED STOP LIGHT CONTINUITY

Using an ohmmeter, check that continuity exists between terminals.

If continuity is not as specified, replace the light assembly.

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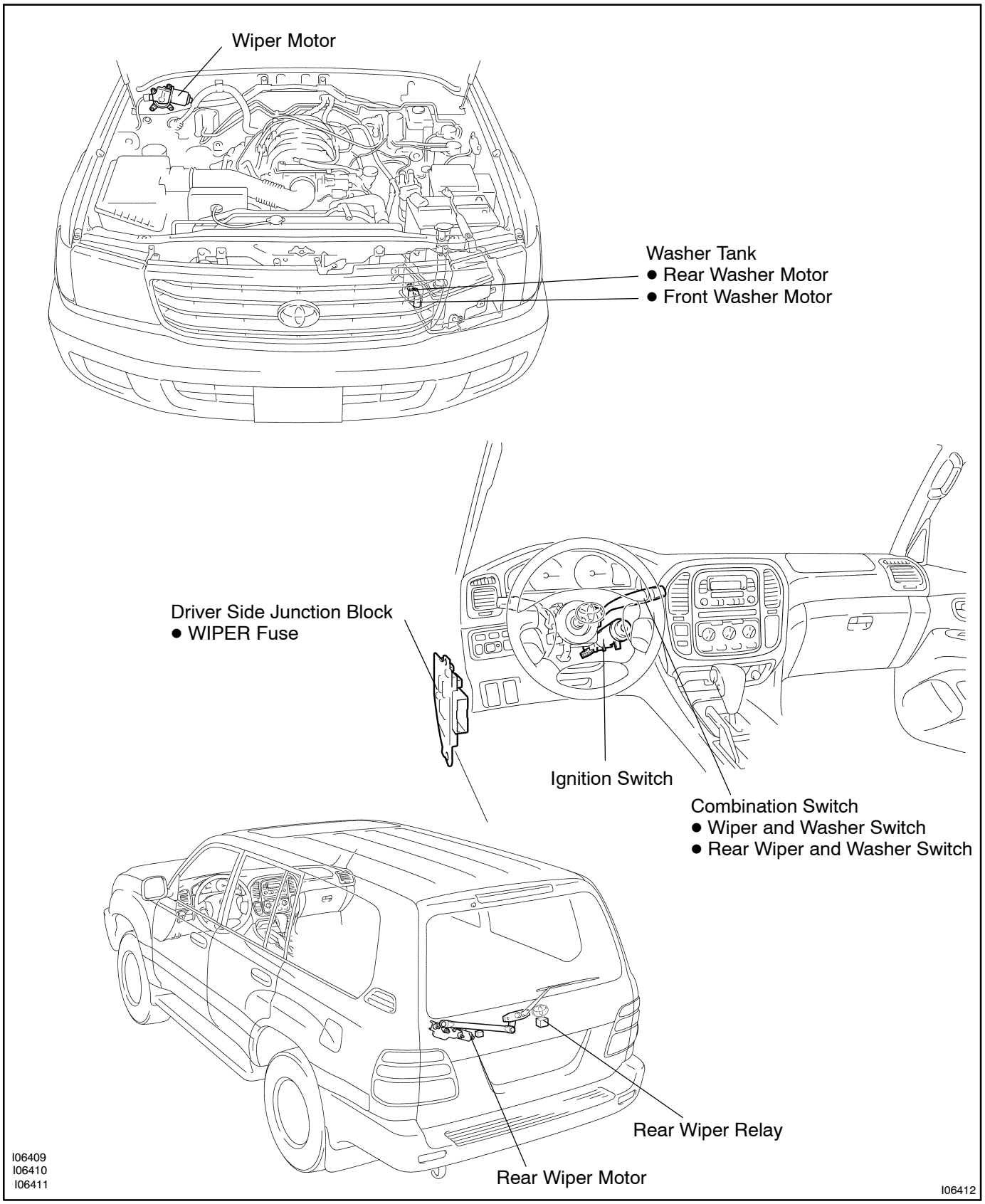
WIPER AND WASHER SYSTEM

LOCATION

BE0HN–03



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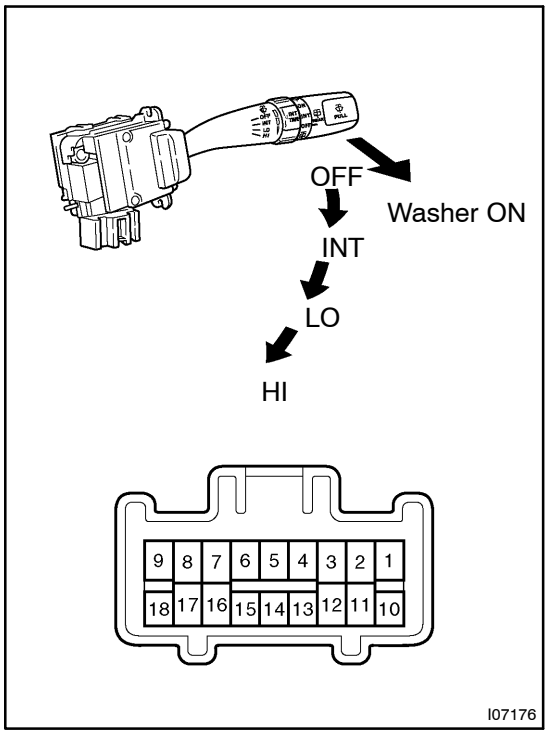
BE0RZ–01

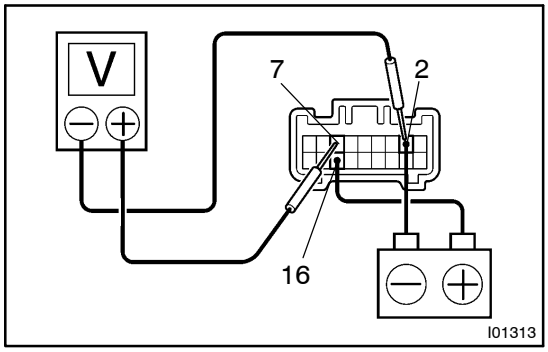
INSPECTION

1. INSPECT FRONT WIPER AND WASHER SWITCH CONTINUITY



Switch position	Tester connection	Specified condition
OFF	7 – 16	Continuity
INT	7 – 16	Continuity
LO	7 – 17	Continuity
HI	8 – 17	Continuity
Washer OFF	–	No continuity
Washer ON	2 – 11	Continuity

If continuity is not as specified, replace the switch.



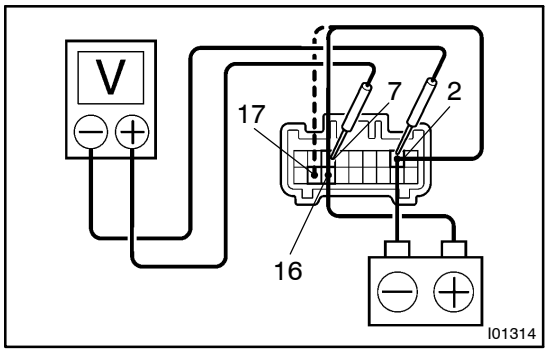
2. INSPECT FRONT WIPER INTERMITTENT OPERATION

(a) Turn the wiper switch to INT position.

(b) Turn the intermittent time control switch to FAST position.

(c) Connect the positive (+) lead from the battery to terminal 16 and the negative (–) lead to terminal 2.

(d) Connect the positive (+) lead from the voltmeter to terminal 7 and the negative (–) lead to terminal 2, check that the meter needle indicates battery voltage.



(e) After connecting terminal 16 to terminal 17, connect to terminal 2 to terminal 17, check the voltage rises from 0 volts to battery voltage with in the times, as shown in the table.

INT time control switch position	Voltage
FAST	0.6 – 2.6 sec. Battery Positive voltage 0 Volt
SLOW	5.7 – 15.7 secs. Battery Positive voltage 0 Volt

If operation is not as specified, replace the wiper and washer switch.

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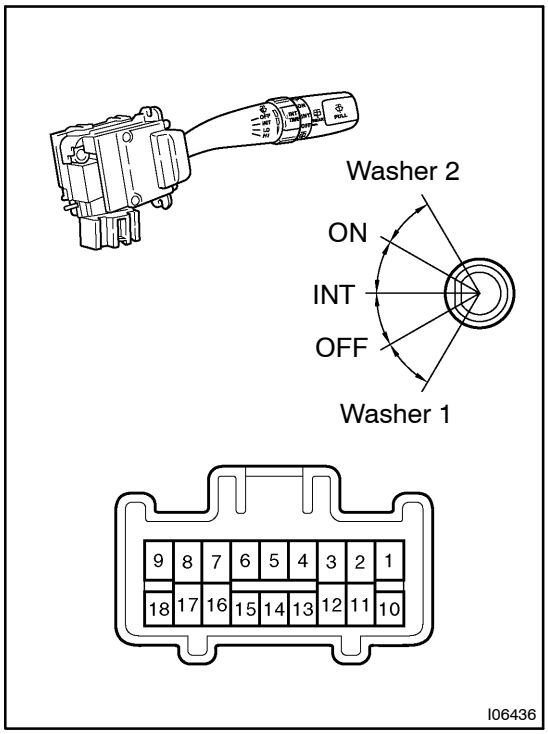
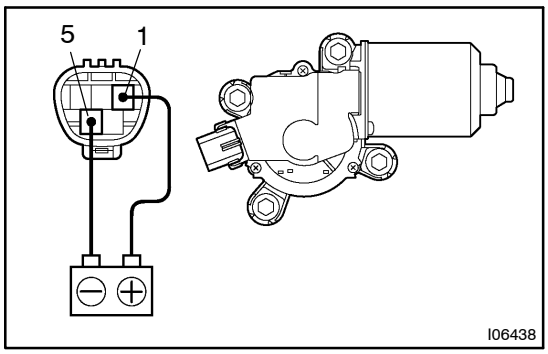


3. INSPECT REAR WIPER AND WASHER SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Washer 1	2 – 12	Continuity
OFF	–	No Continuity
INT	2 – 13	Continuity
ON	2 – 10	Continuity
Washer 2	2 – 10 – 12	Continuity

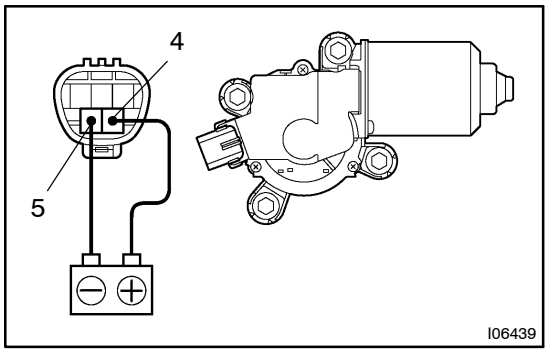
If continuity is not as specified, replace the switch.



4. INSPECT FRONT WIPER MOTOR OPERATION Low Speed:

Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 5, check that the motor operates at low speed.

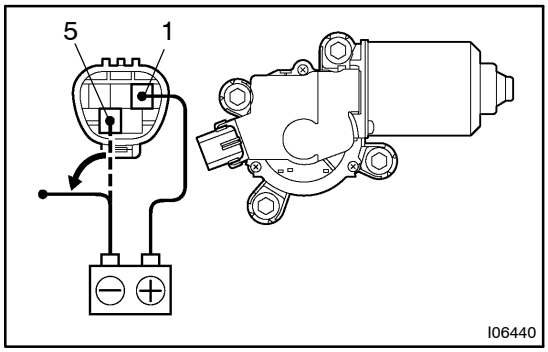
If operation is not as specified, replace the motor.



5. INSPECT FRONT WIPER MOTOR OPERATION High Speed:

Connect the positive (+) lead from the battery to terminal 4 and the negative (–) lead to terminal 5, check that the motor operates at high speed.

If operation is not as specified, replace the motor.



6. INSPECT FRONT WIPER MOTOR OPERATION Stopping at Stop Position:

(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.

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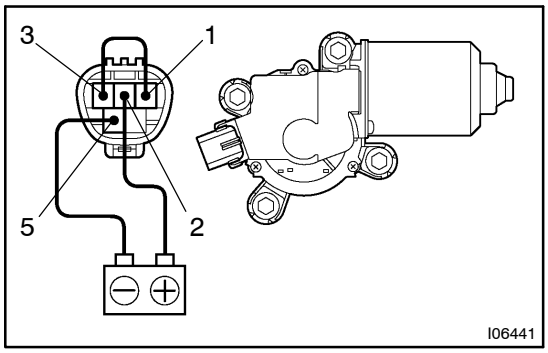
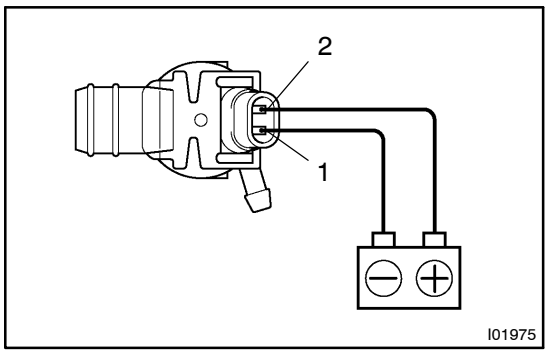


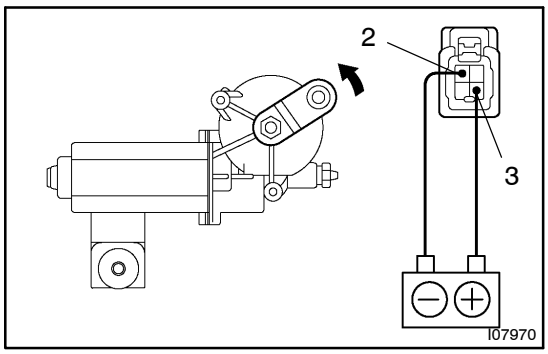
(b) Connect terminals 1 and 3.
(c) Connect the positive (+) lead from the battery to terminal 2 and negative (–) lead to terminal 5, check that the motor stops running at the stop position after the motor operates again.

If operation is not as specified, replace the motor.



7. INSPECT FRONT WASHER MOTOR OPERATION

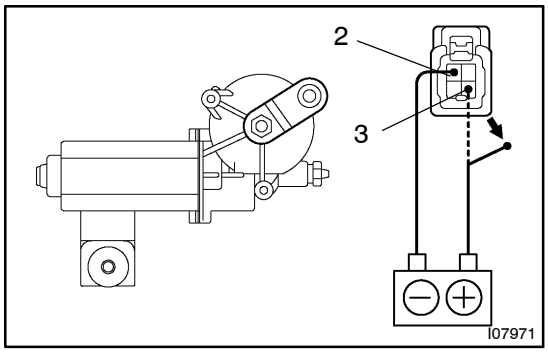
Connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 1, check that the motor operates.



8. INSPECT REAR WIPER MOTOR OPERATION
Low Speed:

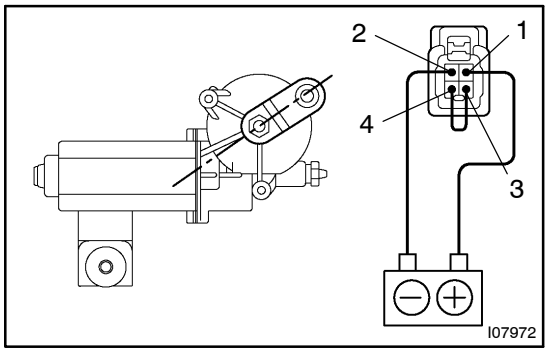
Connect the positive (+) lead from the battery to terminal 3 and negative (–) lead to terminal 2, check that the motor operates at low speed.

If operation is not as specified, replace the motor.



9. INSPECT REAR WIPER MOTOR OPERATION
Stopping at Stop Position:

(a) Operate the motor at low speed and stop the motor operation anywhere except at the stop position by disconnecting positive (+) lead from terminal 3.



(b) Connect terminals 3 and 4.
(c) Connect the positive (+) lead from the battery to terminal 1 and negative (–) lead to terminal 2, check that the motor stops running at the stop position after the motor operates again.

If operation is not as specified, replace the motor.

NOTICE:

These tests must be performed quickly (within 20 seconds) to prevent the coil from burning out.

If operation is not as specified, replace the motor.

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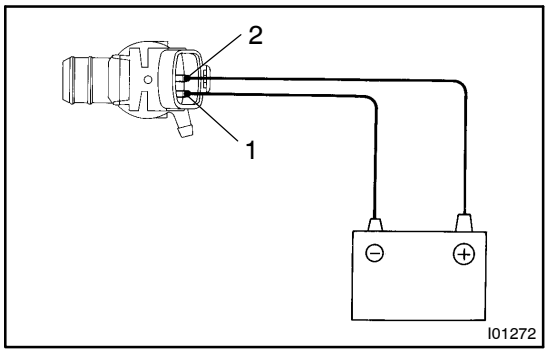


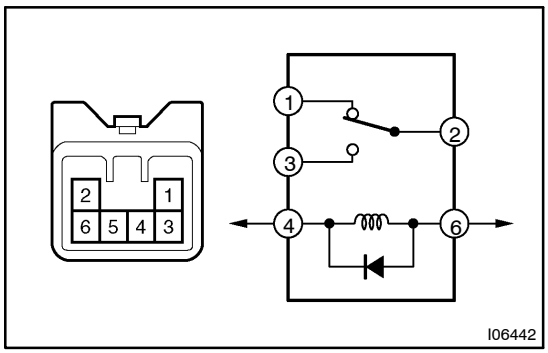
10. INSPECT REAR WASHER MOTOR OPERATION

Connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 1, check that the motor operates.

NOTICE:

These tests must be performed quickly (within 20 seconds) to prevent the coil from burning out.

If operation is not as specified, replace the motor.



11. INSPECT REAR WIPER RELAY CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 – 2 4 – 6	Continuity
Apply B+ between terminals 4 and 6.	2 – 3	Continuity

12. INSPECT REAR WIPER RELAY OPERATION (See page DI–567)

13. INSPECT REAR WIPER RELAY INTERMITTENT OPERATION (See page DI–567)

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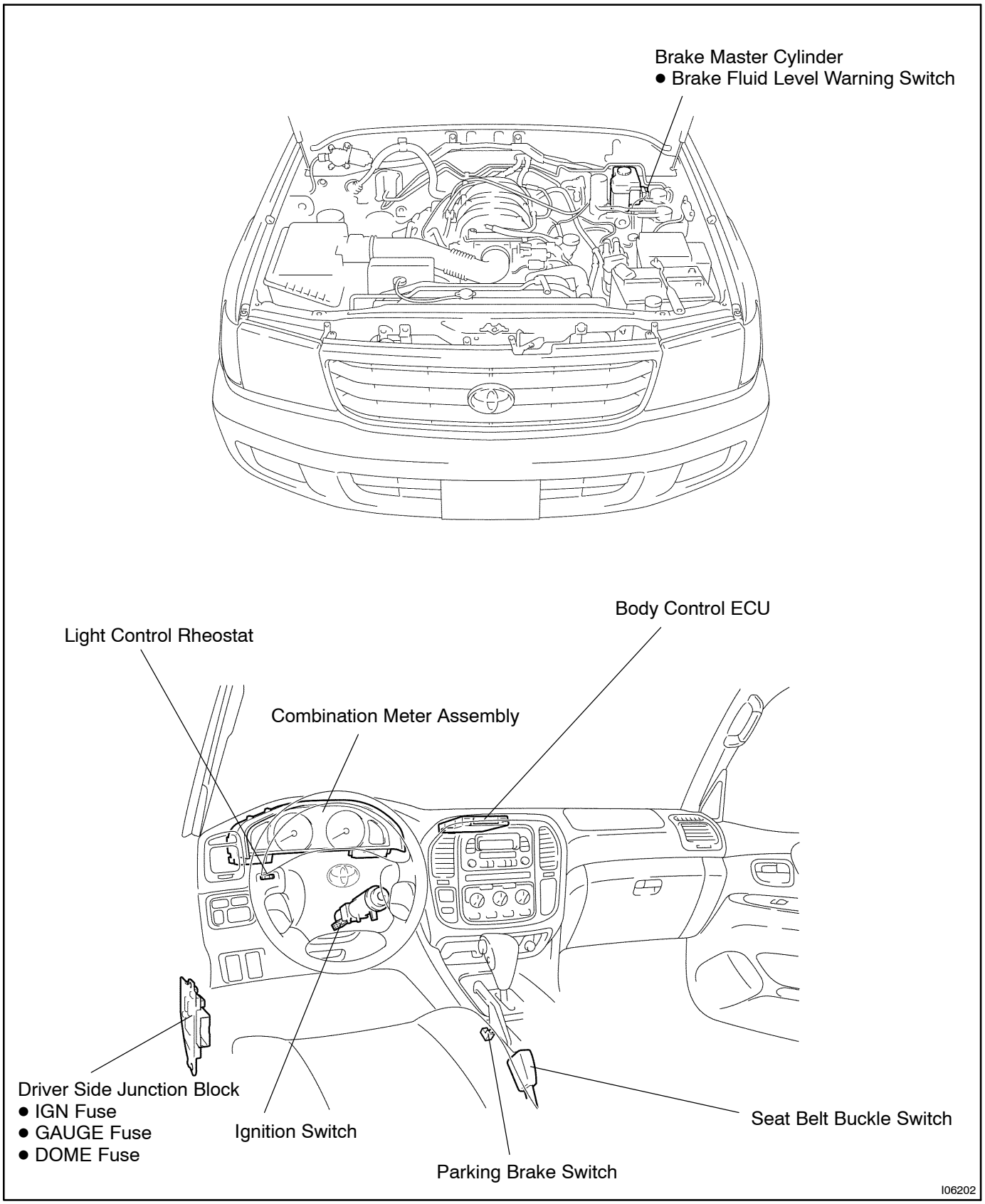
COMBINATION METER

LOCATION

BE0HH–04



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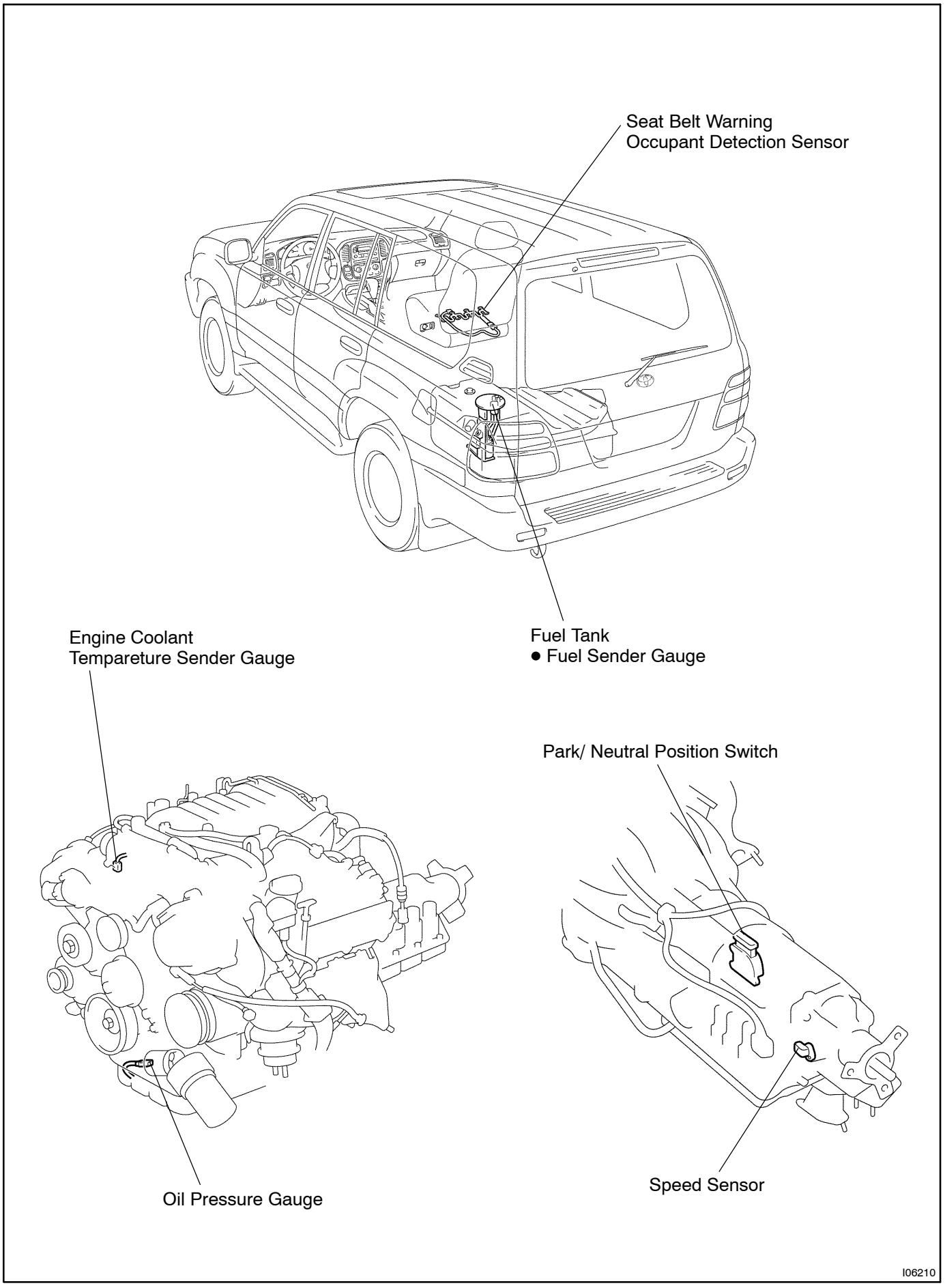

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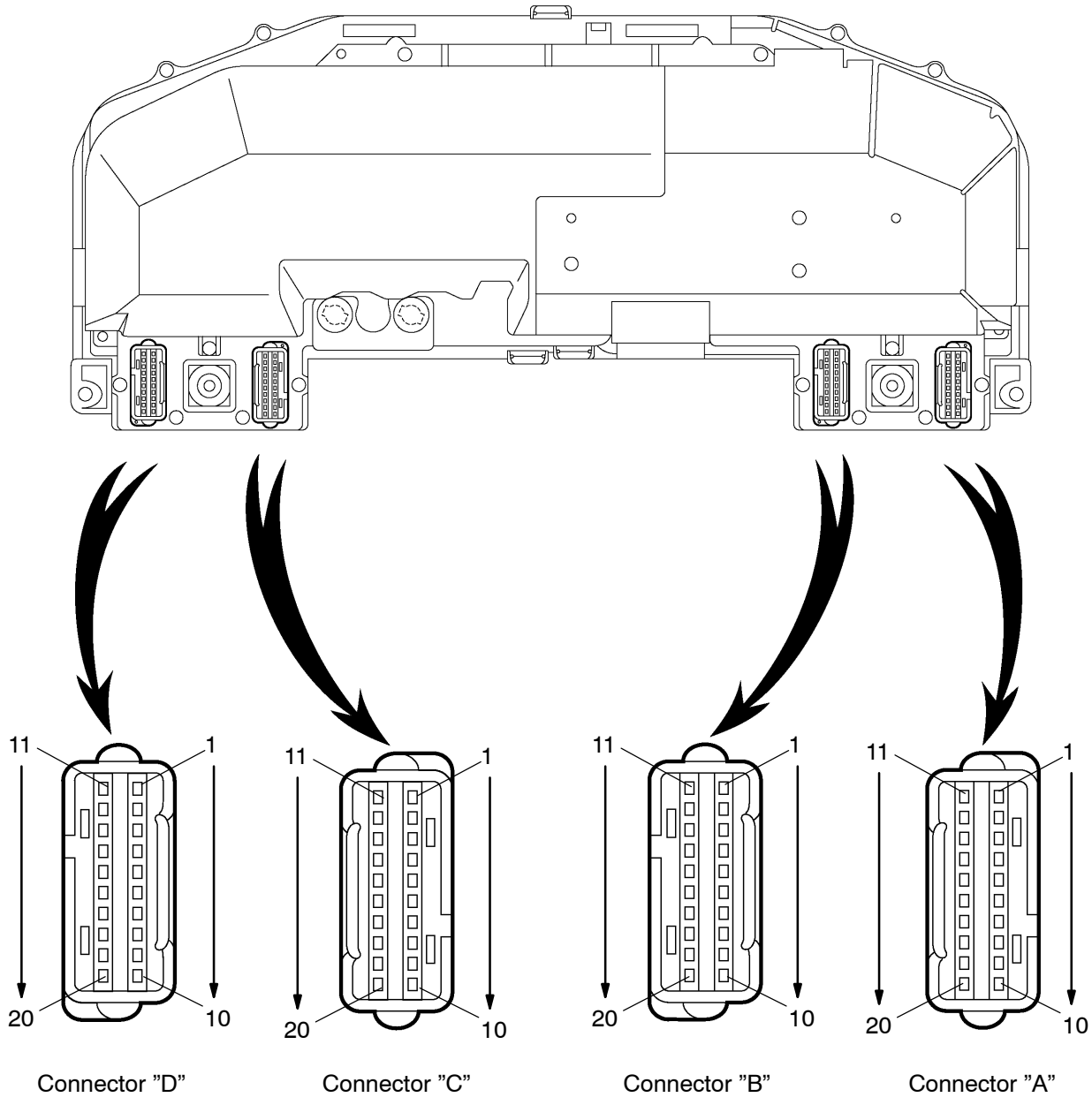
BE0S0–01

CIRCUIT



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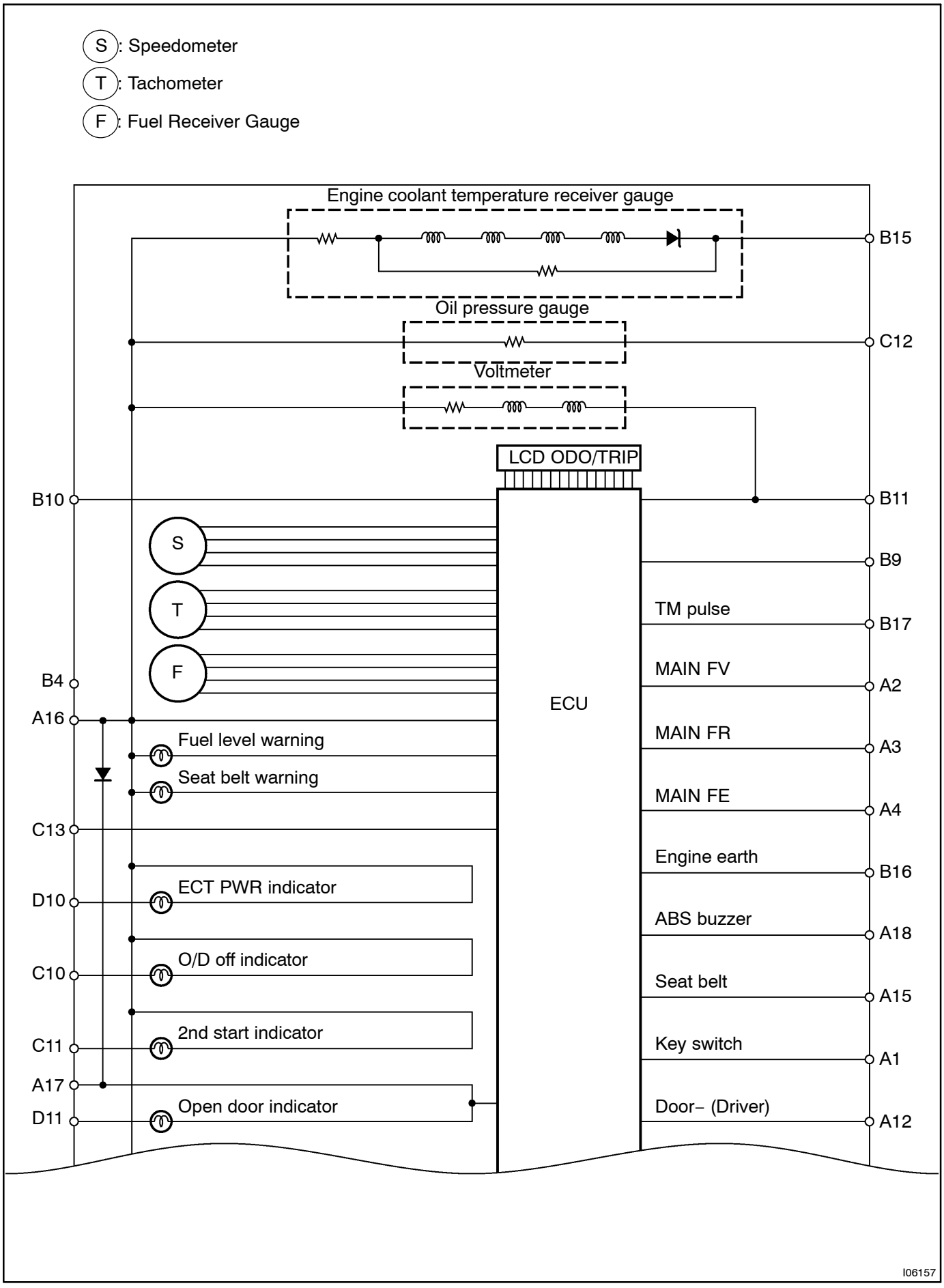

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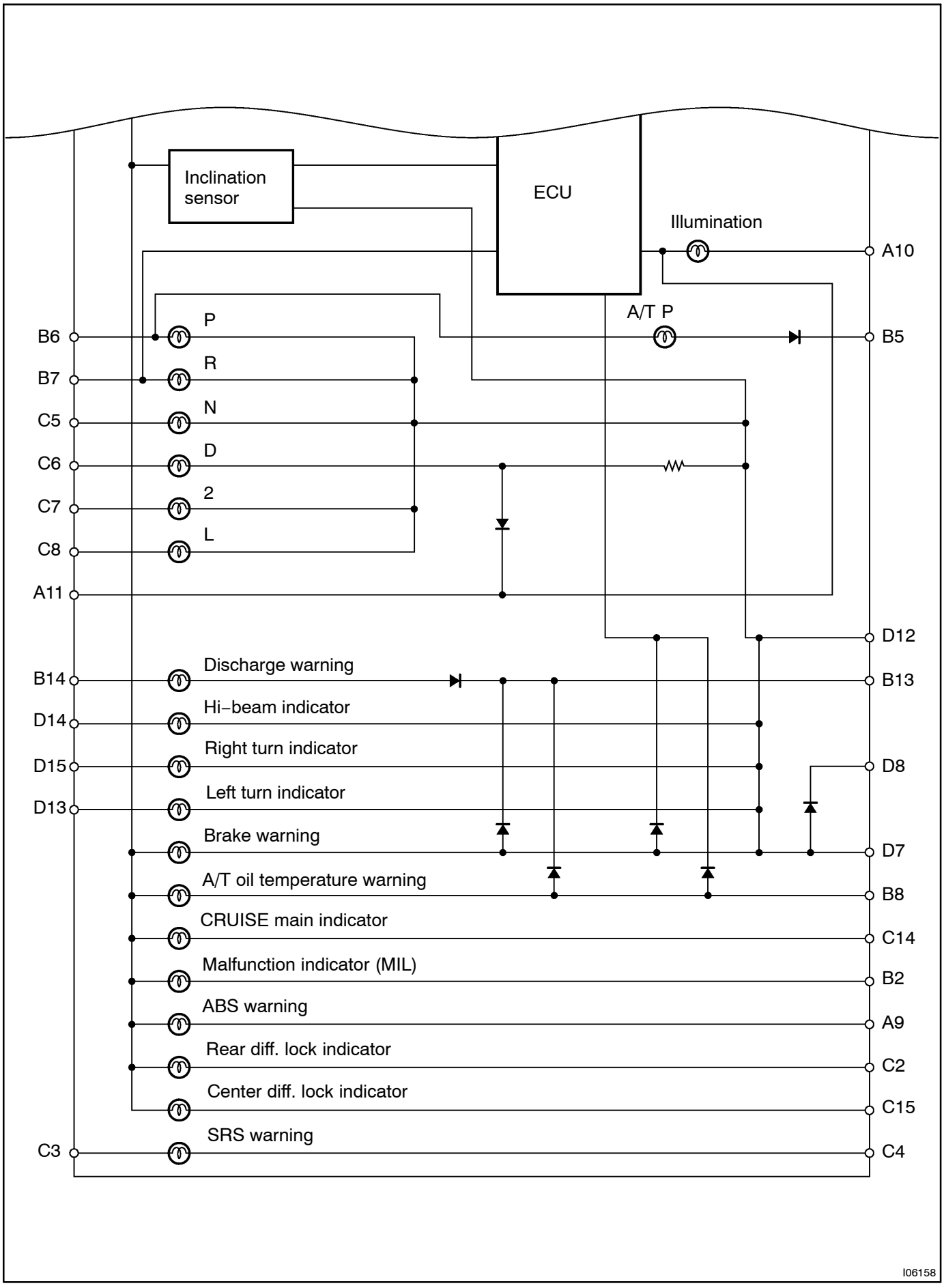

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No.		Wiring connector side
A	1	Key Unlock Warning Switch
	2	Fuel Sender Gauge
	3	Fuel Sender Gauge
	4	Fuel Sender Gauge
	9	ABS ECU
	10	Light Control Rheostat
	11	TAIL Fuse
	12	Driver Door Courtesy Switch
	15	Seat Belt Buckle Switch
	16	GAUGE Fuse
	17	DOME Fuse
	18	ABS ECU
B	2	ECM
	4	MIRR Fuse
	5	Park/ Neutral Position Switch (P position)
	6	Park/ Neutral Position Switch (P position)
	7	Park/ Neutral Position Switch (R position)
	8	ECM
	9	Speed Control Unit
	10	Speed Sensor
	11	Ground
	12	Light control rheostat
	13	Generator
	14	IGN Fuse
	15	Engine Coolant Temperature Sender Gauge
	16	Ground
	17	ECM
C	2	Rear Diff. Lock Detection Switch
	3	ECU–B Fuse
	4	Center Airbag Sensor Assembly
	5	Park/ Neutral Position Switch (N position)
	6	Park/ Neutral Position Switch (2 position)
	7	Park/ Neutral Position Switch (D position)
	8	Park/ Neutral Position Switch (L position)
	10	O/D Main Switch
	11	ECM
	12	Low Oil Pressure Waning Switch
	13	Starter Relay
	14	ECM
	15	Transfer 4WD Position Detection Switch
D	7	Rear Diff. Lock Detection Switch
	8	Parking Brake Switch
	10	ECT Pattern Select Switch
	11	Body Control ECU (Instrument Panel ECU)
	12	Ground
	13	Turn Signal Switch (Left)
	14	Headlight Dimmer Switch
	15	Turn Signal Switch (Right)

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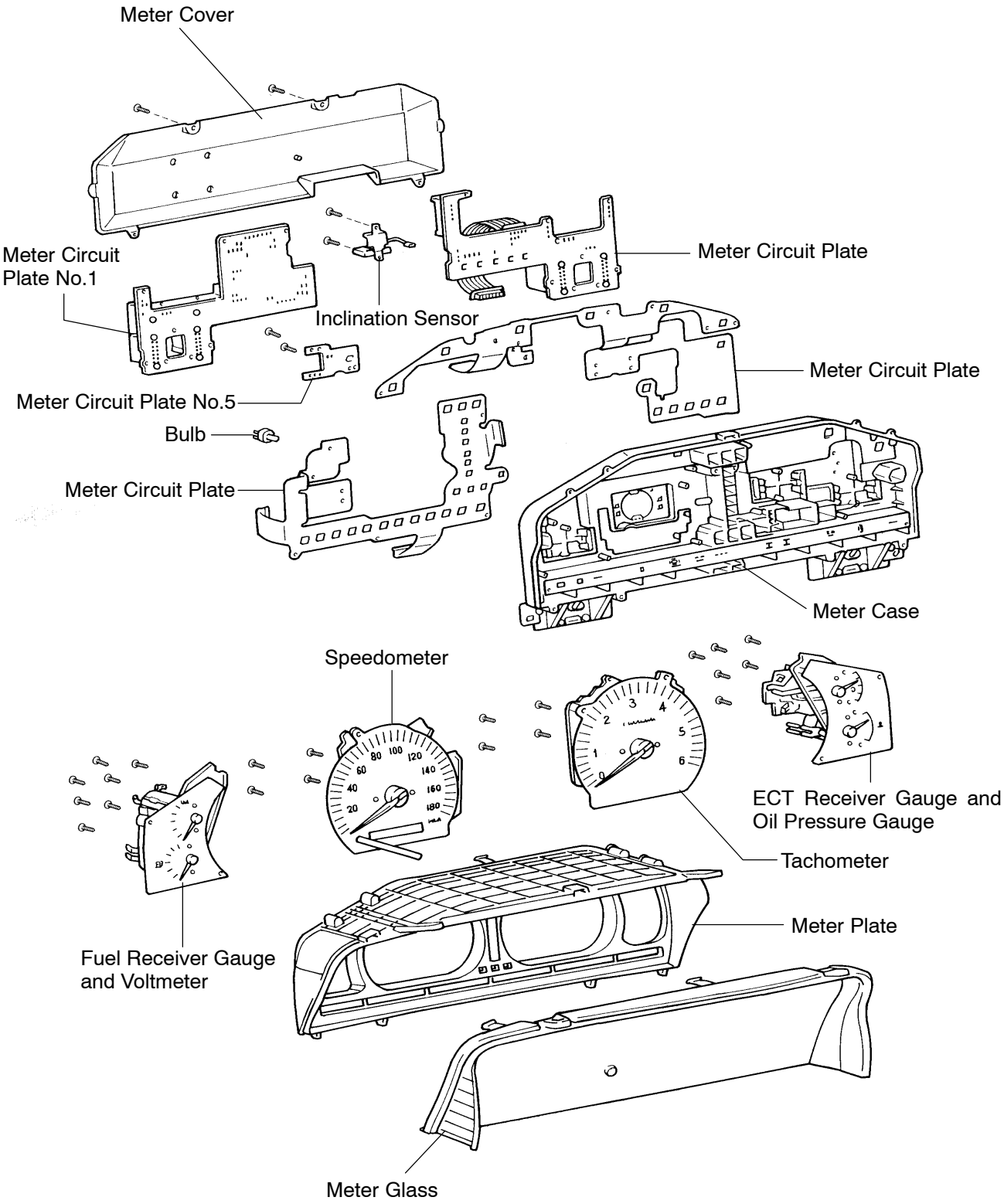
BE0HJ–04

COMPONENTS



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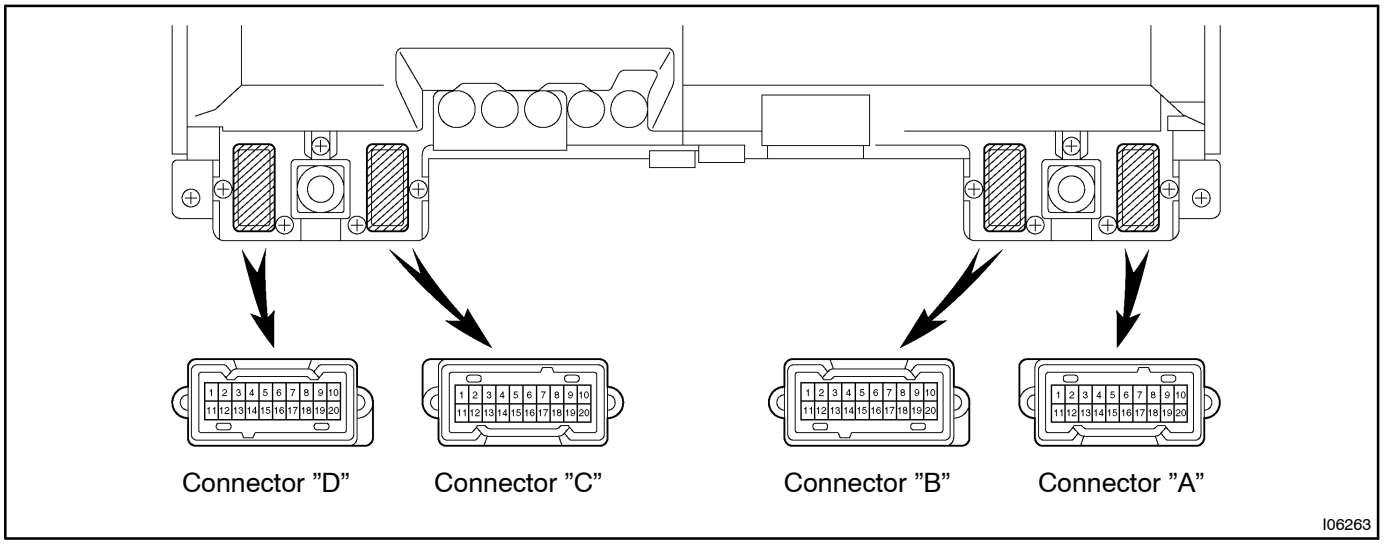
BE0S1–01

INSPECTION

1. INSPECT COMBINATION METER CIRCUIT

Connector disconnected:

Connect the connector ”A” , ”B”, ”C” and ”D” to the combination meter and inspect the wire harness side connectors from the back side as shown in the table.



Tester connection	Condition	Specified condition
A1 – Ground	Key unlock warning switch ON (Key is inserted)	No voltage
A1 – Ground	Key unlock warning switch OFF (Key is removed)	Battery positive voltage
A2 – Ground	Ignition switch ON	4.5 – 5.5 V
A3 – Ground	Ignition switch ON and fuel sender gauge float UP	Approx. 0.5 V
A3 – Ground	Ignition switch ON and fuel sender gauge float DOWN	Approx. 5.5 V
A4 – Ground	Constant	Continuity
A9 – Ground	Ignition switch ON and ABS warning light light up	No voltage
A9 – Ground	Ignition switch ON and ABS warning light does not light up	Battery positive voltage
A10 – Ground	Ignition switch ON and light control rheostat volume minimum	No voltage
A10 – Ground	Ignition switch ON and light control rheostat volume maximum	4.5 – 5.5 V
A11 – Ground	Light control switch OFF	No voltage
A11 – Ground	Light control switch TAIL or HEAD	Battery positive voltage
A12 – Ground	Ignition switch ON and driver door is opened	No voltage
A12 – Ground	Ignition switch ON and driver door is closed	Battery positive voltage
A15 – Ground	Ignition switch ON and seat belt is unfasted	No voltage
A15 – Ground	Ignition switch ON and seat belt is fasted	Battery positive voltage
A16 – Ground	Ignition switch OFF	No voltage
A16 – Ground	Ignition switch ON	Battery positive voltage

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A17 – Ground	Constant	Battery positive voltage
A18 – Ground	Ignition switch ON and ABS is error	No voltage
A18 – Ground	Ignition switch ON and ABS is normal	Battery positive voltage
B2 – Ground	Ignition switch ON and engine is stopped	No voltage
B2 – Ground	Ignition switch ON and engine is running	Battery positive voltage
B4 – Ground	Ignition switch OFF	No voltage
B4 – Ground	Ignition switch ACC or ON	Battery positive voltage
B5 – Ground	Ignition switch ON and A/T shift P indicator light up	No voltage
B5 – Ground	Ignition switch ON and A/T shift P indicator does not light up	Battery positive voltage
B6 – Ground	Ignition switch ON and except A/T shift P postion	No voltage
B6 – Ground	Ignition switch ON and A/T shift P postion	Battery positive voltage
B7 – Ground	Ignition switch ON and except A/T shift R postion	No voltage
B7 – Ground	Ignition switch ON and A/T shift R postion	Battery positive voltage
B8 – Ground	Ignition switch ON and A/T oil temperature indicator light up	No voltage
B8 – Ground	Ignition switch ON and A/T oil temperature indicator does not light up	Battery positive voltage
B9 – Ground	Ignition switch ON and slowly move the wheel	Pulse signal is output below 1.5 V ↔ aprox. 5 V or below 1.5 V ↔ battery positive voltage
B10 – Ground	Ignition switch ON and slowly move the wheel	Pulse signal is output below 1.5 V ↔ battery positive voltage
B11 – Ground	Constant	Continuity
B12 – Ground	Ignition switch ON and rheostat light control volume CANCEL position	No voltage
B12 – Ground	Ignition switch ON and rheostat light control volume maximum	Battery positive voltage
B13 – Ground	Ignition switch ON and engine is stopping	No voltage
B13 – Ground	Ignition switch ON and engine is running	Battery positive voltage
B14 – Ground	Ignition switch OFF	No voltage
B14 – Ground	Ignition switch ON	Battery positive voltage
B15 – Ground	Ignition switch ON and engine coolant temperature 90 ˚C	Battery positive voltage
B16 – Ground	Constant	Continuity
B17 – Ground	Engine is running	Pulse generation
C2 – Ground	Ignition switch ON and rear diff. lock switch OFF	No voltage
C2 – Ground	Ignition switch ON and rear diff. lock switch ON	Battery positive voltage
C3 – Ground	Constant	Battery positive voltage
C4 – Ground	Ignition switch ON and ABS indicator light light up	No voltage
C4 – Ground	Ignition switch ON and ABS indicator does not light up	Battery positive voltage
C5 – Ground	Ignition switch ON and except A/T shift N postion	No voltage
C5 – Ground	Ignition switch ON and A/T shift N postion	Battery positive voltage

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C6 – Ground	Ignition switch ON and except A/T shift D postion	No voltage
C6 – Ground	Ignition switch ON and A/T shift D postion	Battery positive voltage
C7 – Ground	Ignition switch ON and except A/T shift 2nd postion	No voltage
C7 – Ground	Ignition switch ON and A/T shift 2nd postion	Battery positive voltage
C8 – Ground	Ignition switch ON and except A/T shift L postion	No voltage
C8 – Ground	Ignition switch ON and A/T shift L postion	Battery positive voltage
C10 – Ground	Ignition switch ON and O/D off switch ON	No voltage
C10 – Ground	Ignition switch ON and O/D off switch OFF	Battery positive voltage
C12 – Ground	Ignition switch ON and engine oil level waning light up	No voltage
C12 – Ground	Ignition switch ON and engine oil level warning does not light up	Battery positive voltage
C14 – Ground	Ignition switch ON and cruise control switch OFF	No voltage
C14 – Ground	Ignition switch ON and cruise control switch ON	Battery positive voltage
C15 – Ground	Ignition switch ON and center diff. lock switch OFF	No voltage
C15 – Ground	Ignition switch ON and center diff. lock switch ON	Battery positive voltage
D7 – Ground	Ignition switch ON and brake fluid level warning switch float DOWN	No voltage
D7 – Ground	Ignition switch ON and brake fluid level warning switch float UP	Battery positive voltage
D8 – Ground	Ignition switch ON and parking brake lever is pulled	No voltage
D8 – Ground	Ignition switch ON and parking brake lever is released	Battery positive voltage
D10 – Ground	Ignition switch ON and pattern select switch NORM	No voltage
D10 – Ground	Ignition switch ON and pattern select switch PWR	Battery positive voltage
D11 – Ground	Either door is opened	No voltage
D11 – Ground	Either door is closed	Battery positive voltage
D12 – Ground	Constant	Continuity
D13 – Ground	Ignition switch ON and turn signal switch OFF or RIGHT	No voltage
D13 – Ground	Ignition switch ON and turn signal switch LEFT	Battery positive voltage
D14 – Ground	Light control switch OFF	No voltage
D14 – Ground	Light control switch HI	Battery positive voltage
D15 – Ground	Ignition switch ON and turn signal switch OFF or LEFT	No voltage
D15 – Ground	Ignition switch ON and turn signal switch RIGHT	Battery positive voltage

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

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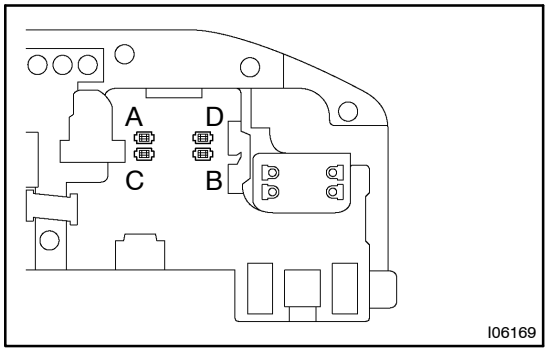
2. INSPECT SPEEDOMETER/ ON–VEHICLE

Using a speedometer tester, inspect the speedometer for allowable indication error and check the operation of the odometer.
HINT:
Tire wear and tire over or under inflation will increase the indication error.

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

If error is excessive, replace the speedometer.



3. INSPECT SPEEDOMETER RESISTANCE

Measure the resistance between terminals with fixing pointer to the stopper.

Tester connection	Resistance (Ω)
A – B	160
C – D	160

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

4. 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 indications.

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

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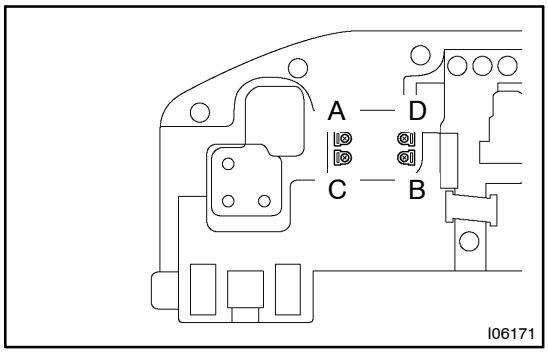
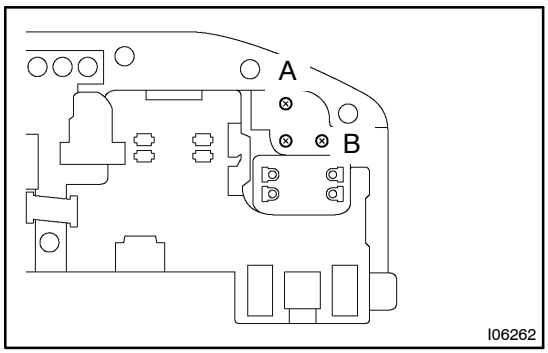


5. INSPECT TACHOMETER RESISTANCE

Measure the resistance between terminals with fixing pointer to the stopper.

Tester connection	Resistance (Ω)
A – B	160
C – D	160

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

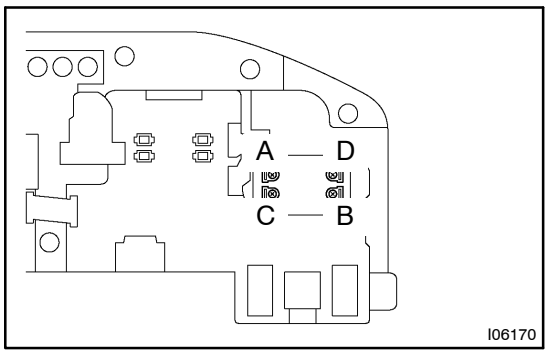


6. INSPECT VOLTMETER RESISTANCE

Measure the resistance between terminals with fixing pointer to the stopper.

Tester connection	Resistance (Ω)
A – B	347

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

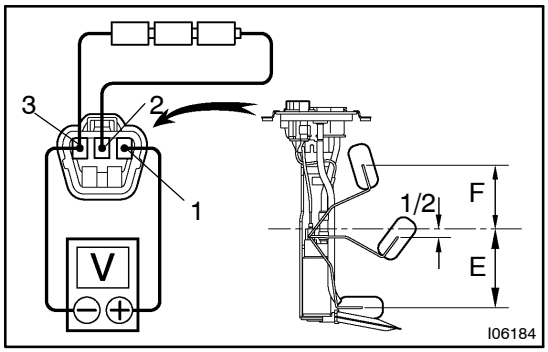


7. INSPECT FUEL RECEIVER GAUGE RESISTANCE

Measure the resistance between terminals with fixing pointer to the stopper.

Tester connection	Resistance (Ω)
A – B	160
C – D	160

If resistance value is not as specified, replace the receiver gauge.



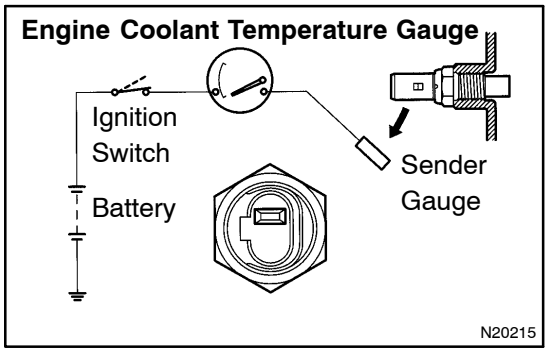
8. INSPECT FUEL SENDER GAUGE RESISTANCE

(a) Apply voltage between terminals 2 and 3.

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

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

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



9. 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.

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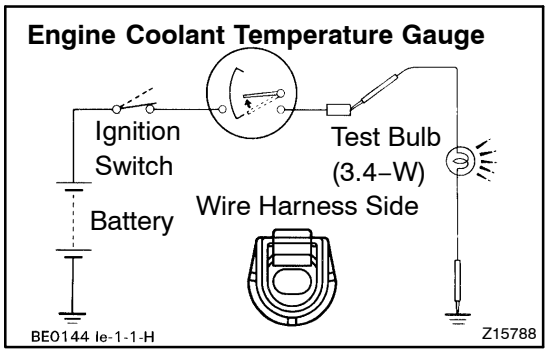
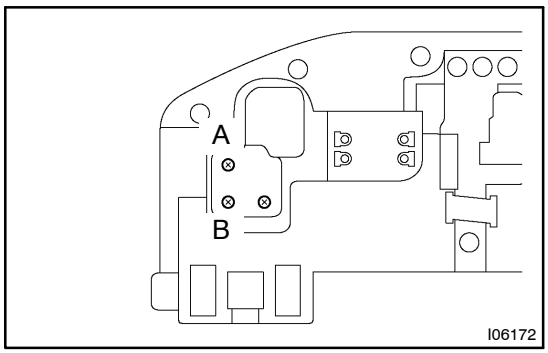


(c) Ground terminal on the wire harness side connector through a 3.4–W test bulb.
(d) Turn the ignition switch ON, and check that the bulb lights up and the receiver gauge needle moves to the hot side.

If operation is as specified, replace the sender gauge.
Then recheck the system.
If operation is not as specified, measure the receiver gauge resistance.

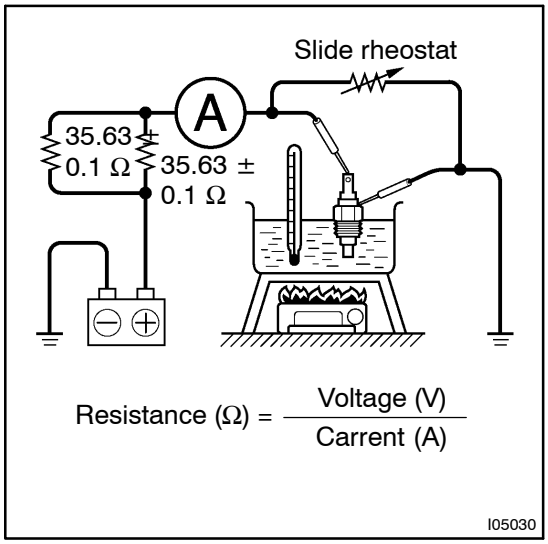


10. INSPECT ENGINE COOLANT TEMPERATURE RECEIVER GAUGE RESISTANCE

Measure the resistance between terminals with fixing pointer to the stopper.

Tester connection	Resistance (Ω)
A – B	226.8

If resistance value is not as specified, replace the receiver gauge.
HINT:
This circuit includes the diode.
If resistance value is not as specified, replace the receiver gauge.

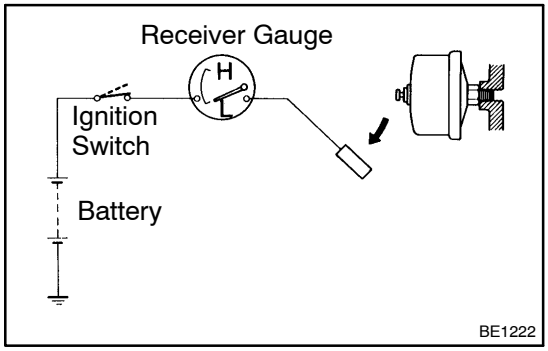


11. INSPECT ENGINE COOLANT TEMPERATURE SENDER GAUGE RESISTANCE

Connect the wire harness as shown in the illustration, and enter the value in the left formula. Check the resistance comforms to the values in the table below.

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.



12. INSPECT OIL PRESSURE 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 LOW.

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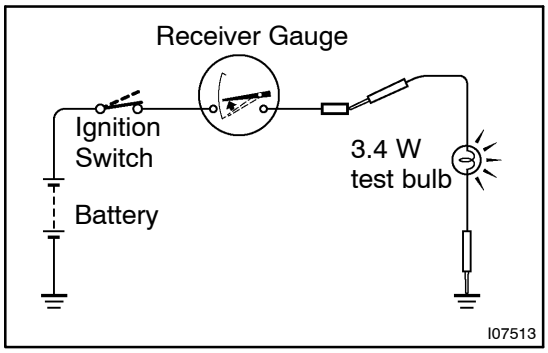
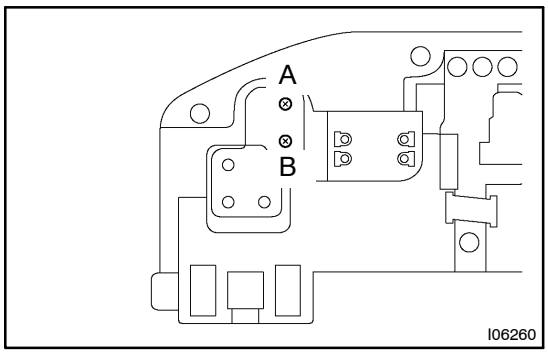


(c) Ground terminal on the wire harness side through a 3.4 W test bulb.
(d) Turn the ignition switch ON and check that the bulb lights up and that the receiver gauge needle moves to the high side.

If operation is not as specified, measure the receiver gauge resistance.

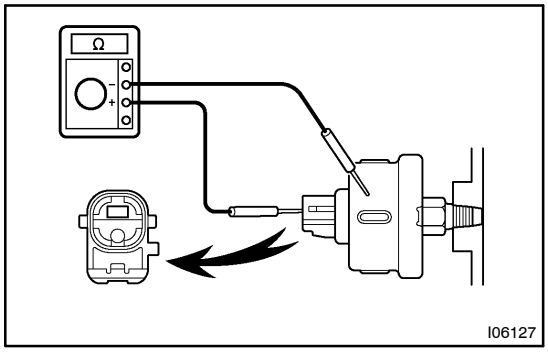


13. INSPECT OIL PRESSURE RECEIVER GAUGE RESISTANCE

Measure the resistance between terminals with fixing pointer to the stopper.

Tester connection	Resistance (Ω)
A – B	44

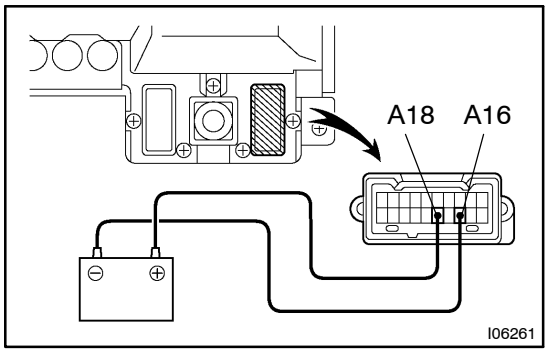
If resistance value is not as the specified, replace the meter.



14. INSPECT OIL PRESSURE SENDER GAUGE OPERATION

(a) Disconnect the connector from the sender gauge.
(b) Apply battery positive voltage to the sender gauge terminal through a test LED.
(c) Check that the bulb does not light when the engine is stopped.
(d) Check that the LED flashes when the engine is running. The number of flashed should vary with engine speed.

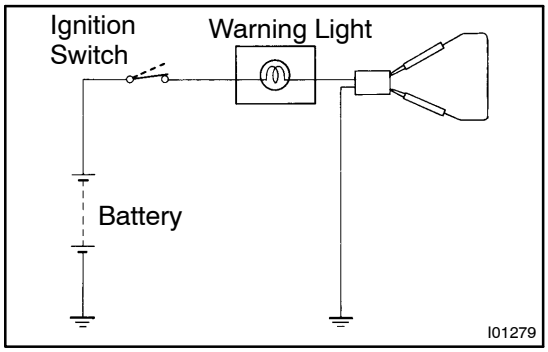
If operation is not as specified, replace the sender gauge.



15. INSPECT ABS WARNING BUZZER OPERATION

(a) Disconnect the connector from the meter connectors.
(b) Apply battery positive voltage to the terminal A16 and A18.

If operation is not as specified, replace the meter.



16. INSPECT BRAKE 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.

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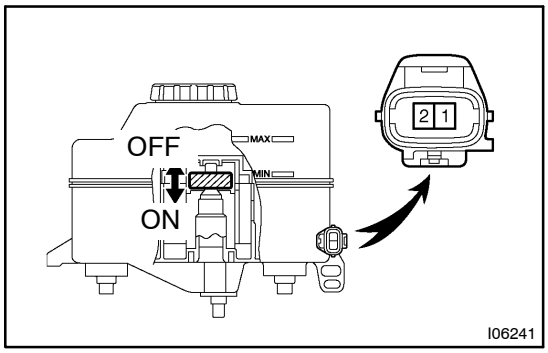
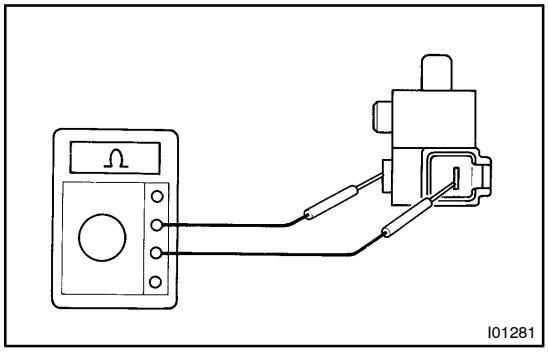


17. INSPECT BRAKE FLUID LEVEL WARNING SWITCH CONTINUITY

(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 siphon, 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.

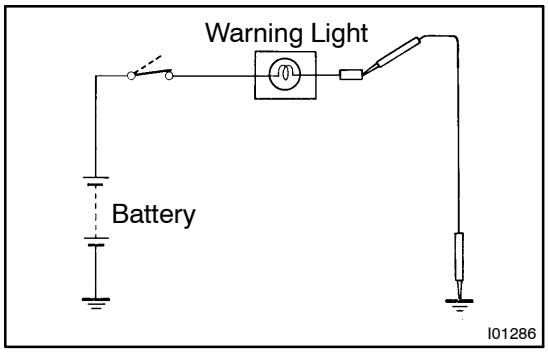
If operation is not as specified, replace the switch.



18. INSPECT PARKING BRAKE SWITCH CONTINUITY

(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).

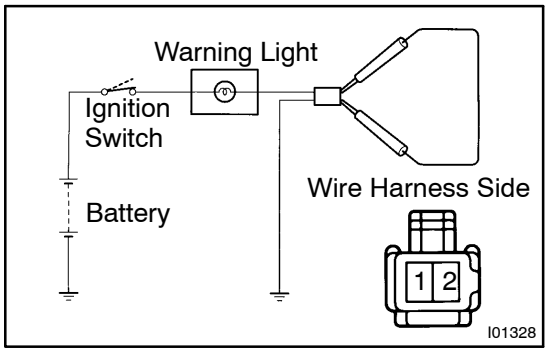
If operation is not as specified, replace the switch or inspect ground point.



19. INSPECT 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.



20. INSPECT SEAT BELT WARNING LIGHT

(a) Disconnect the connector from the retractor 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, inspect the bulb or wire harness.

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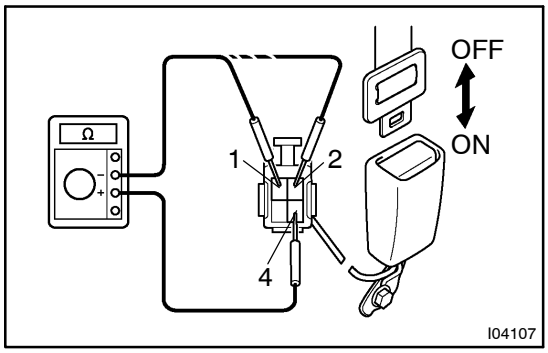
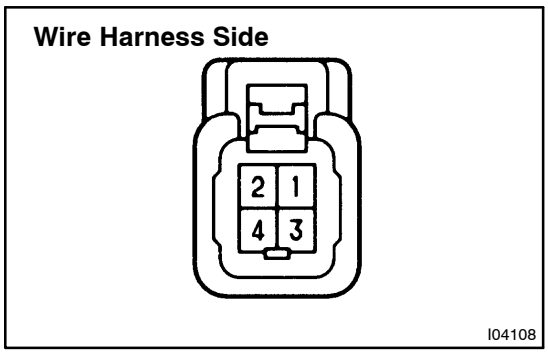


21. INSPECT SEAT BELT BUCKLE SWITCH CONTINUITY

(a) Check that continuity exists between the terminals 1 and 4 on the switch side connector with the switch ON (belt fastened).

(b) Check that continuity exists between the terminals 2 and 4 on the switch side connector with the switch OFF (belt unfastened).

If operation is not as specified, replace the switch.

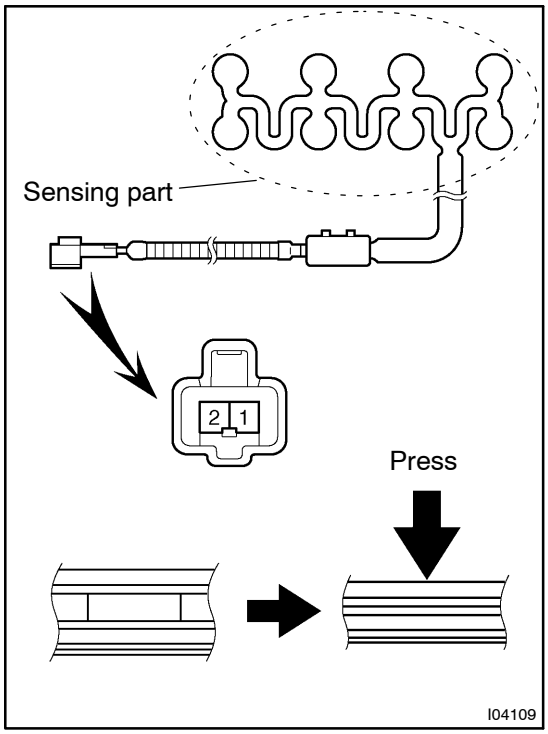


22. INSPECT SEAT BELT BUCKLE SWITCH CIRCUIT

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

Tester connection	Condition	Specified condition
4 – Ground	Constant	Continuity

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



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

Check that continuity exists between the terminals 1 and 2 when pressing the sensing part.

If operation is not as specified, replace the sensor.

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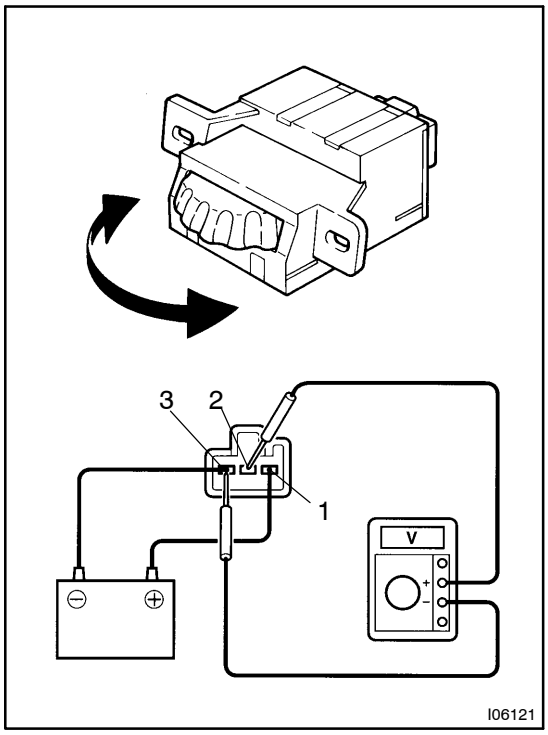

24. INSPECT LIGHT CONTROL RHEOSTAT

(a) Connect the positive (+) lead from the battery to terminal 1 and negative lead (–) to terminal 3.

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

(c) Turn the rheostat knob and check that the voltage changes.

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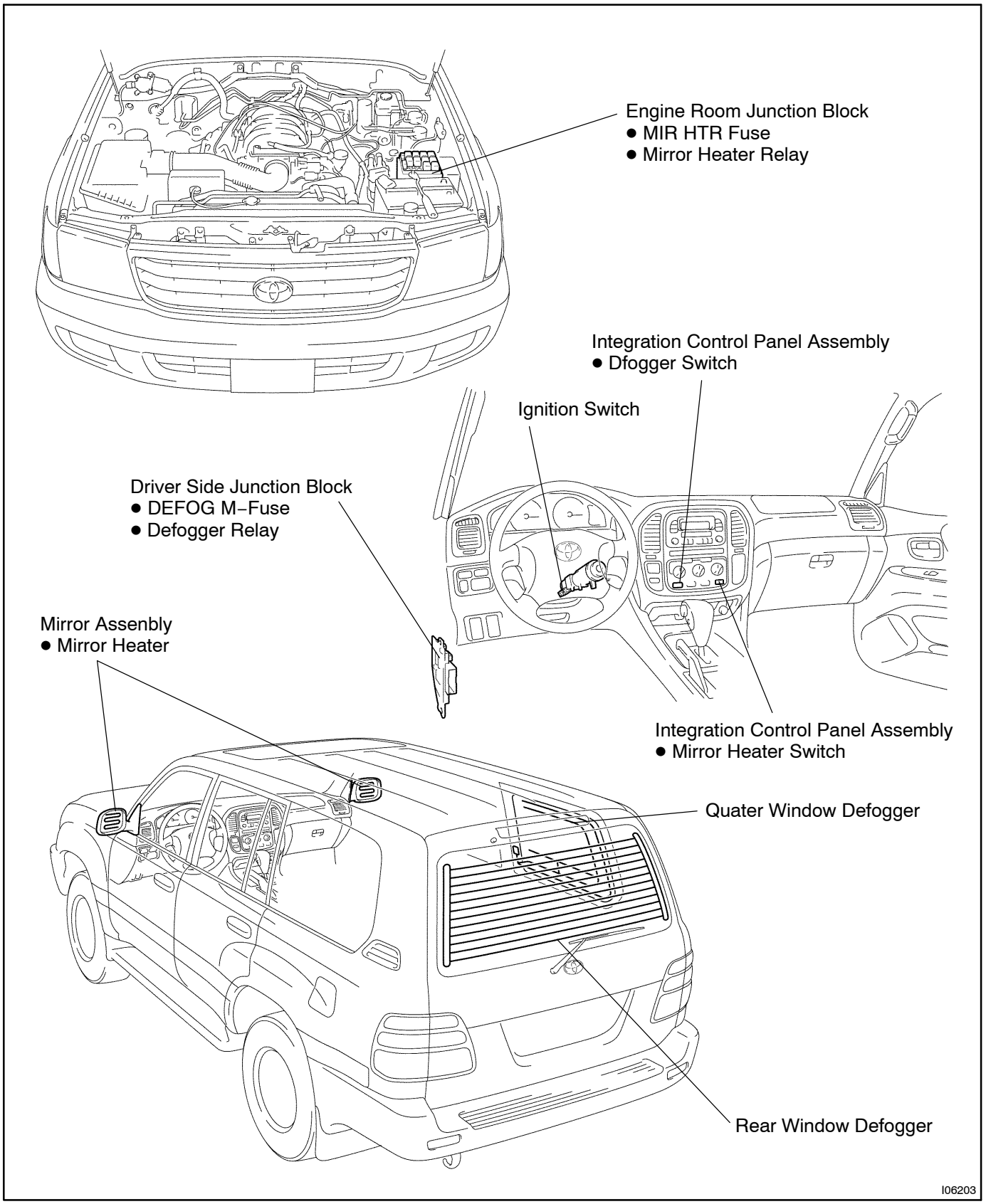
DEFOGGER SYSTEM

LOCATION

BE0GS–03



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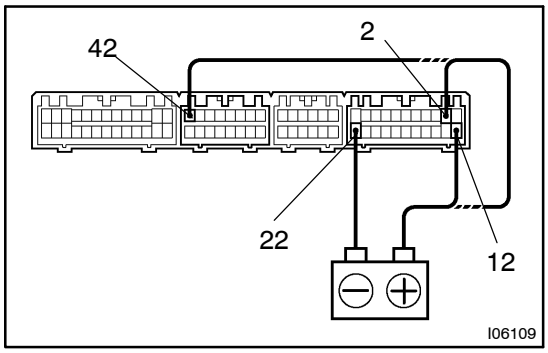
BE0S2–01

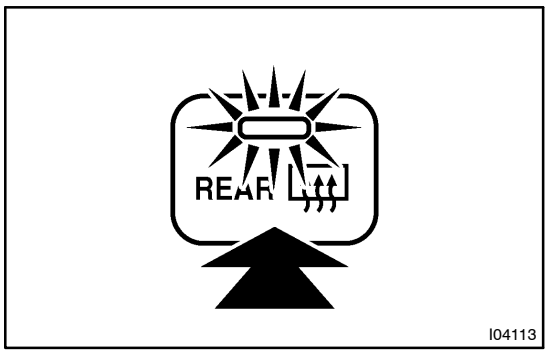
INSPECTION



1. INSPECT DEFOGGER TIMER OPERATION

(a) Connect the positive (+) lead from the voltmeter to terminal 2, 12 and 42 of defogger switch connector and negative (–) lead to terminal 22.

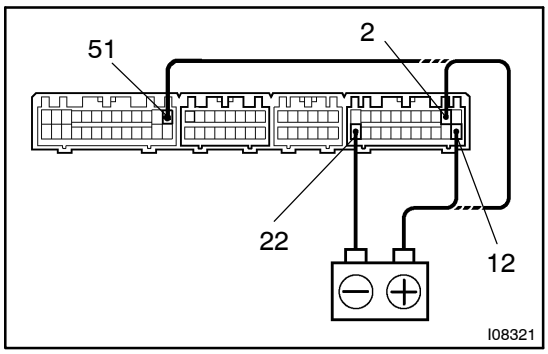
(b) When the switch is OFF, the voltage should be approx. 12V.



(c) Turn the defogger switch ON and check that the indicator lights up and that the voltage is less than 1 V.

(d) After 15 minutes, check that the switch is OFF and the voltage is approx. 12 V.

If operation is not as specified, replace the switch.



2. INSPECT MIRROR HEAER TIMER OPERATION

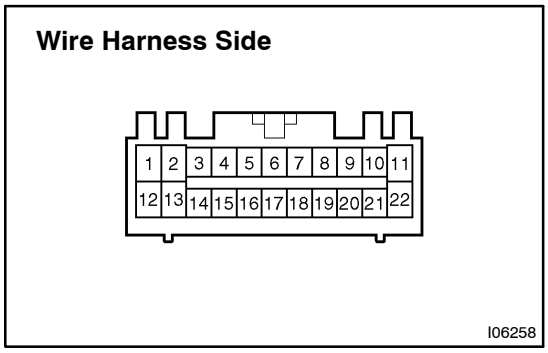
(a) Connect the positive (+) lead from the voltmeter to terminal 2, 12 and 51 of mirror heater switch connector and negative (–) lead to terminal 22.

(b) When the switch is OFF, the voltage should be approx. 12V.

(c) Turn the mirror defogger switch ON and check that the indicator lights up and that the voltage is less than 1 V.

(d) After 15 minutes, check that the switch is OFF and the voltage is approx. 12 V.

If operation is not as specified, replace the switch.



3. INSPECT INTEGRATION CONTROL PANEL SWITCH CIRCUIT

Connector disconnected:

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

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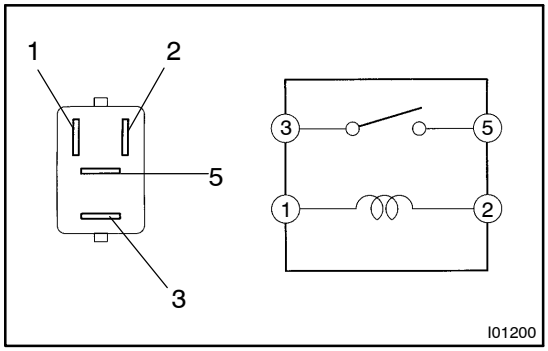
Tester connection	Condition	Specified condition
22 – Ground	Constant	Continuity
12 – Ground	Constant	Battery voltage
1 – Ground	Ignition switch LOCK or ACC	No voltage
1 – Ground	Ignition switch ON	Battery voltage
2 – Ground	Ignition switch LOCK	No voltage
2 – Ground	Ignition switch ACC or ON	Battery voltage

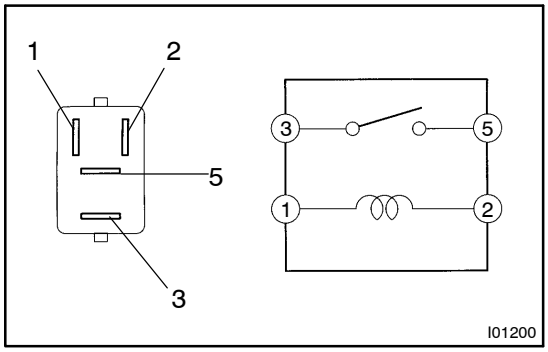
If the circuit is not as specified, replace the switch.



4. INSPECT DEFOGGER RELAY CONTINUITY

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

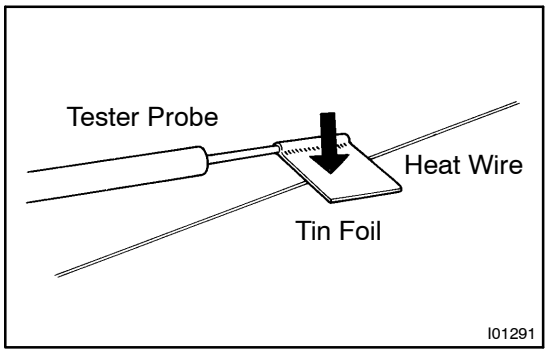
If continuity is not as specified, replace the relay.



5. INSPECT MIRROR HEATER 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.

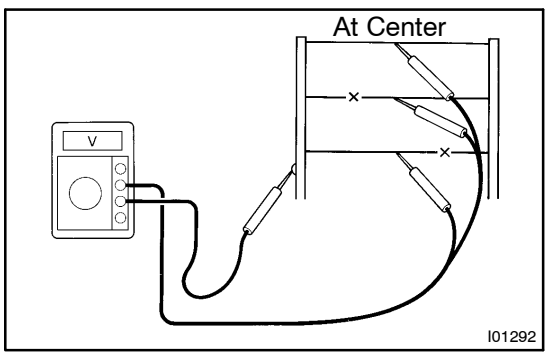


6. INSPECT DEFOGGER WIRE

NOTICE:

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

(a) Turn the ignition switch ON.
(b) Turn the defogger switch ON.
(c) Inspect the voltage at the center of each heat wire, as shown.



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

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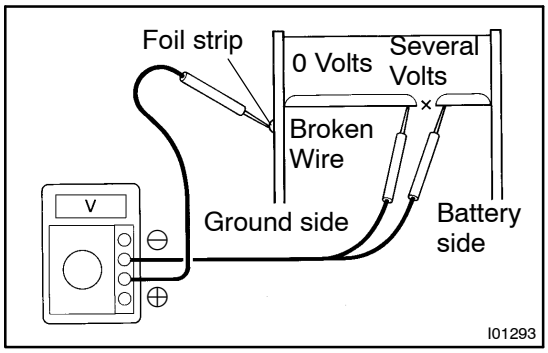
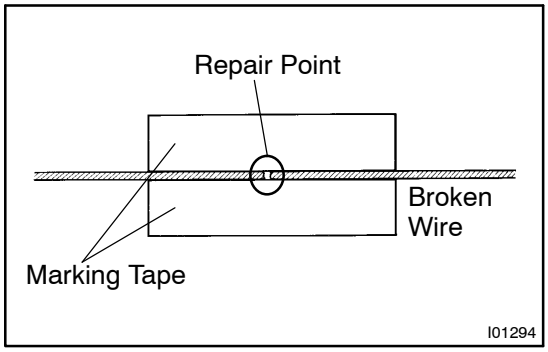


HINT:
If there is approximately 10 V, the wire is broken between the center of the wire and the positive (+) end. If there is no voltage, the wire is broken between the center of the wire and ground.

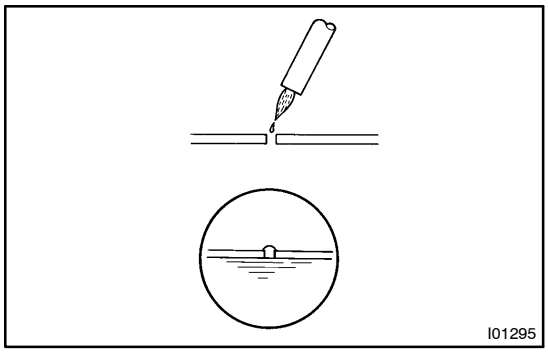
(d) Place the voltmeter positive (+) lead against the defogger wire on the battery side.
(e) Place the voltmeter negative (–) lead with the foil strip against the wire on the ground side.
(f) Slide the positive (+) lead from battery to ground side.
(g) The point where the voltmeter deflects from several V to zero V is the place where the defogger wire is broken.

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

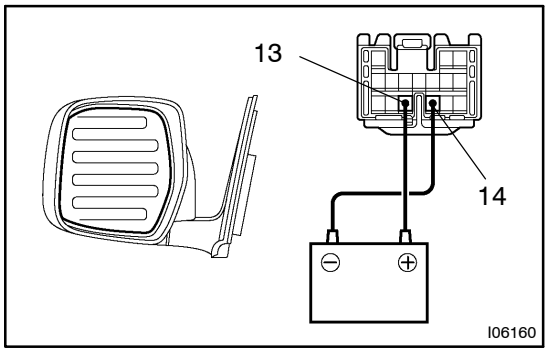


7. IF NECESSARY, REPAIR DEFOGGER WIRE

(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.



8. w/ Mirror Heater
INSPECT MIRROR HEATER OPERATION

(a) Connect the positive (+) lead from the battery to terminal 14 and the negative (–) lead to terminal 13.
(b) Check that the mirror becomes warm.

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

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POWER WINDOW CONTROL SYSTEM

TROUBLESHOOTING

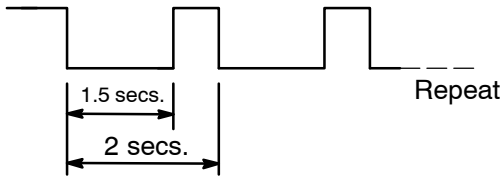
BE02C–06

1	**One touch power window does not move up and down. (Prepare normal master switch.)**

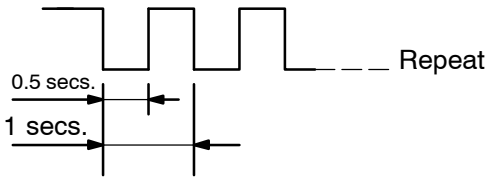
After turning the ignition switch ON and power window master switch UP or DOWN on the drivers side, check that the master switch AUTO light blinks.

• Error is classified into the following 3 types according to the way of blinking.

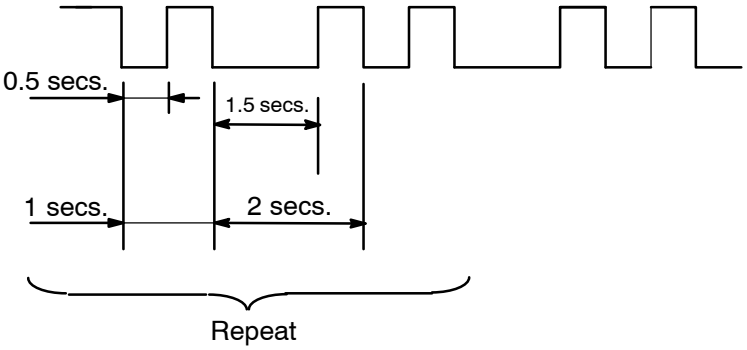
① Limit switch error



② Pulse sensor error



③ Limit switch/Pulse sensor synchronize error



< Reference > • When 30 seconds elapsed since blinking started, blinking finishes. (AUTO light remains ON)
• When turning the ignition key OFF, blinking finishes.

blinks in the ① way

Remove the master switch.
(Connector connection condition)

When the fully closed driver's door is opened, does the voltage between 19 terminal and 20 terminal of master switch change from 0 V to 10 ~ 14 V?

Yes

CONTINUED ON NEXT PAGE

No

Master switch defective

blinks in the ② or ③ way

No

Disconnect the connecters of master switch and driver's power window motor.

CONTINUED ON NEXT PAGE

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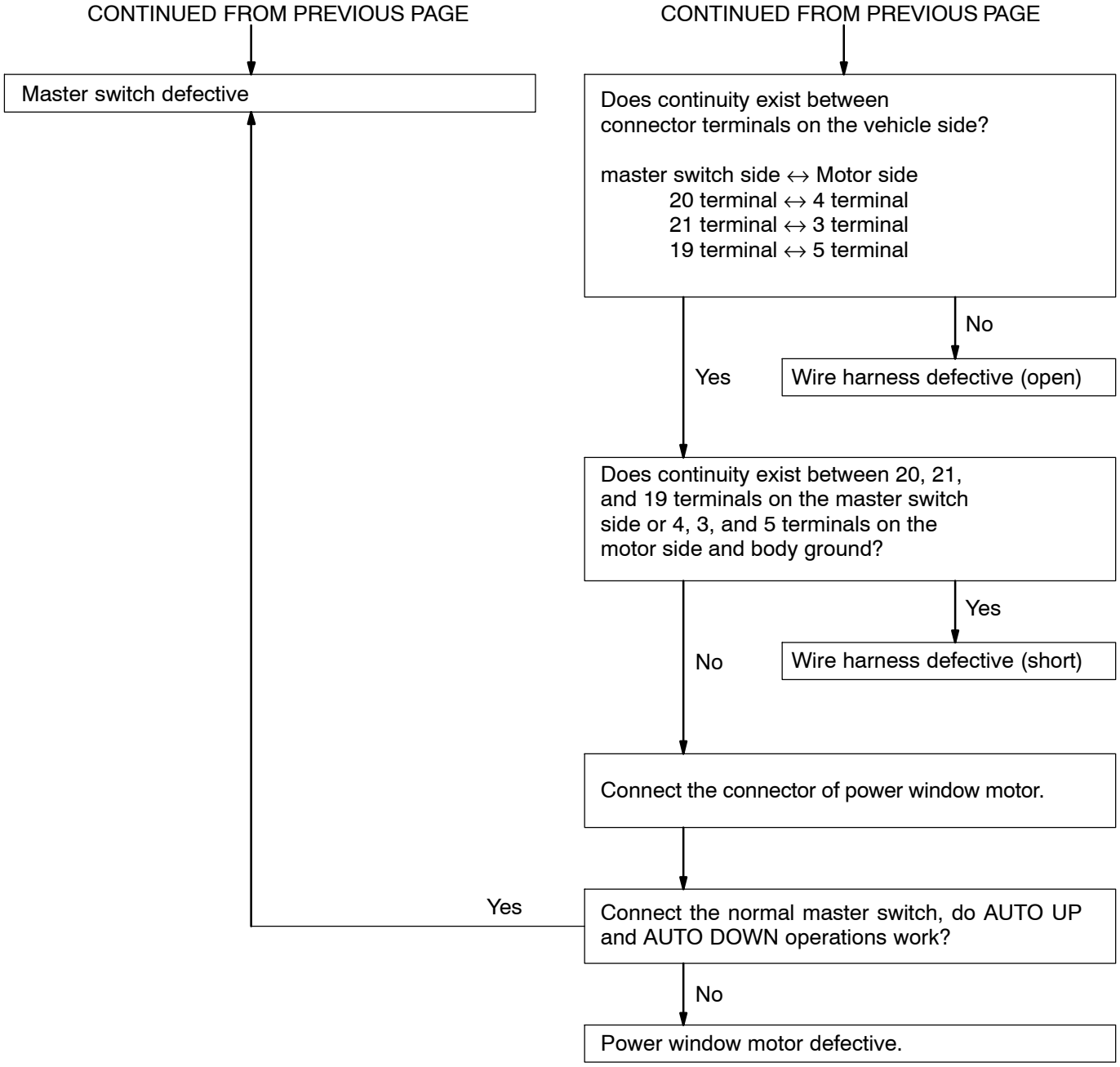

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2 During AUTO UP operation, the power window moves down.

When operating AUTO UP with the ignition switch ON, is there a cause of increasing friction resistance at the inverse position?
- Yes → Disassemble the door and repair or replace the applicable part.
- No ↓

Remove the power window regulator assembly.

Does the window operate smoothly when moving the window up manually after assembling?
- No → Check and replace door glass run.
- Yes ↓

Remove the power window motor from the power window regulator assembly.

When operating the power window regulator manually, does the regulator move smoothly?
Are gears not damaged?
- No → Power window regulator defective.
- Yes ↓

Does window motor rotate smoothly?
- No → Power window motor defective.
- Yes ↓

Reset the limit switch.*1

Does the window move normally?
- Yes → Normal (Check the function.)
- No ↓

Master switch defective.

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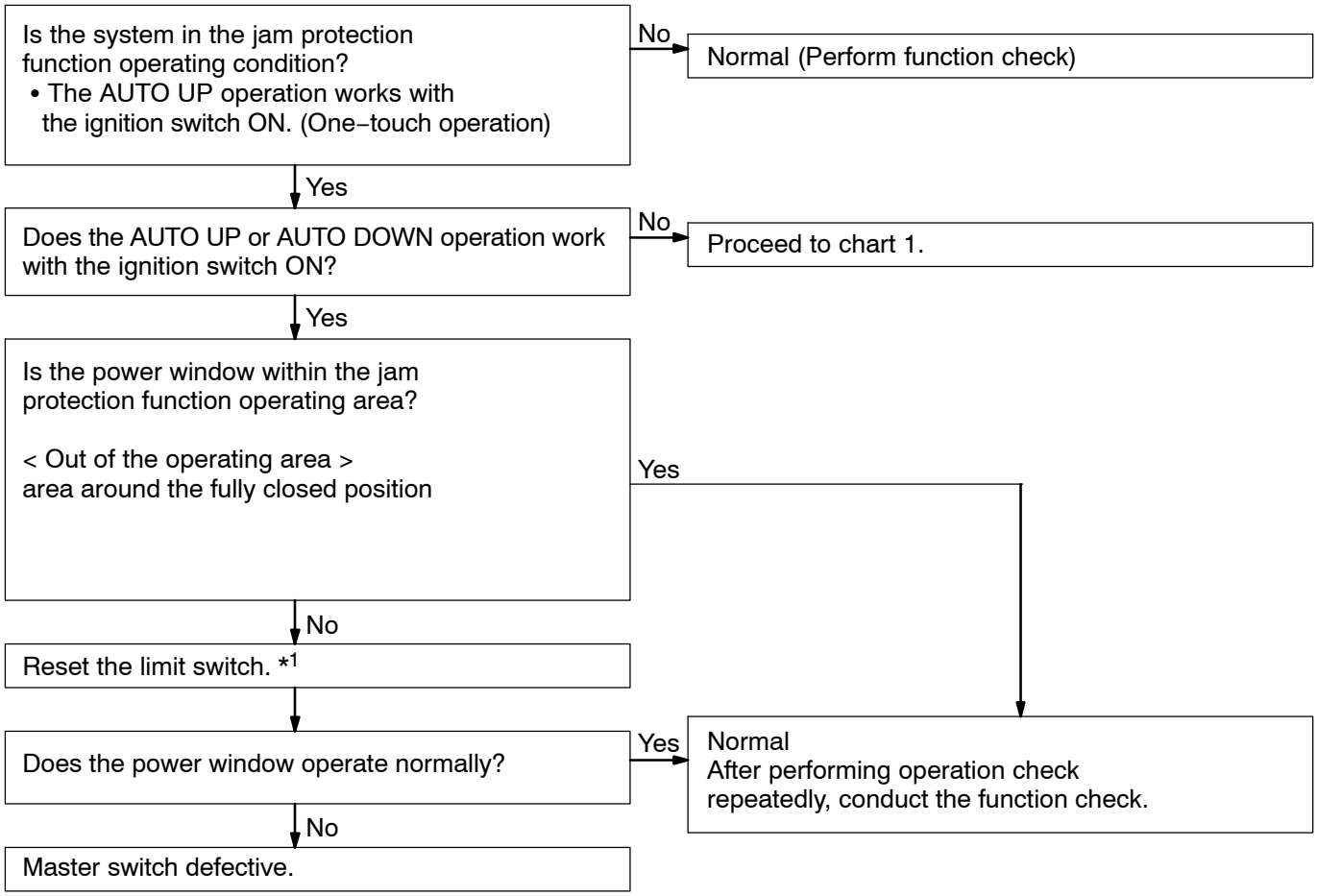
3	The DOWN function does not work though some other objects are caught in the power window glass.



*1Reset procedure of the power window motor.

HINT:

If either of the following is met, it is necessary to reset the position sensor of the power window motor.

- The power window motor is separated from the window regulator.
- The window regulator is operated with the door glass removed.

(1) Remove the power window motor from the regulator.
(2) Connect the power window motor and master switch to the vehicle wire harness.
(3) Turn the ignition switch ON.
(4) Operate the switch up to rotate the motor more than 6 and less than 10 times (4seconds).
(5) Install the power window motor to the regulator.

NOTICE:

Install the motor when the regulator arm is not in the area around the fully closed position.

(6) Install the power window regulator and door glass.
(7) Connect the power window master switch to the wire harness, and turn the ignition switch ON.
(8) Operate the switch up and down several times.
(9) Check that the AUTO UP and AUTO DOWN functions work by one–touch switch operation.

NOTICE:

The jam protection function does not operate immediately after reset procedure.

HINT:

If the jam protection function operates while the window is closing by one–touch switch operation, perform step (1) again.

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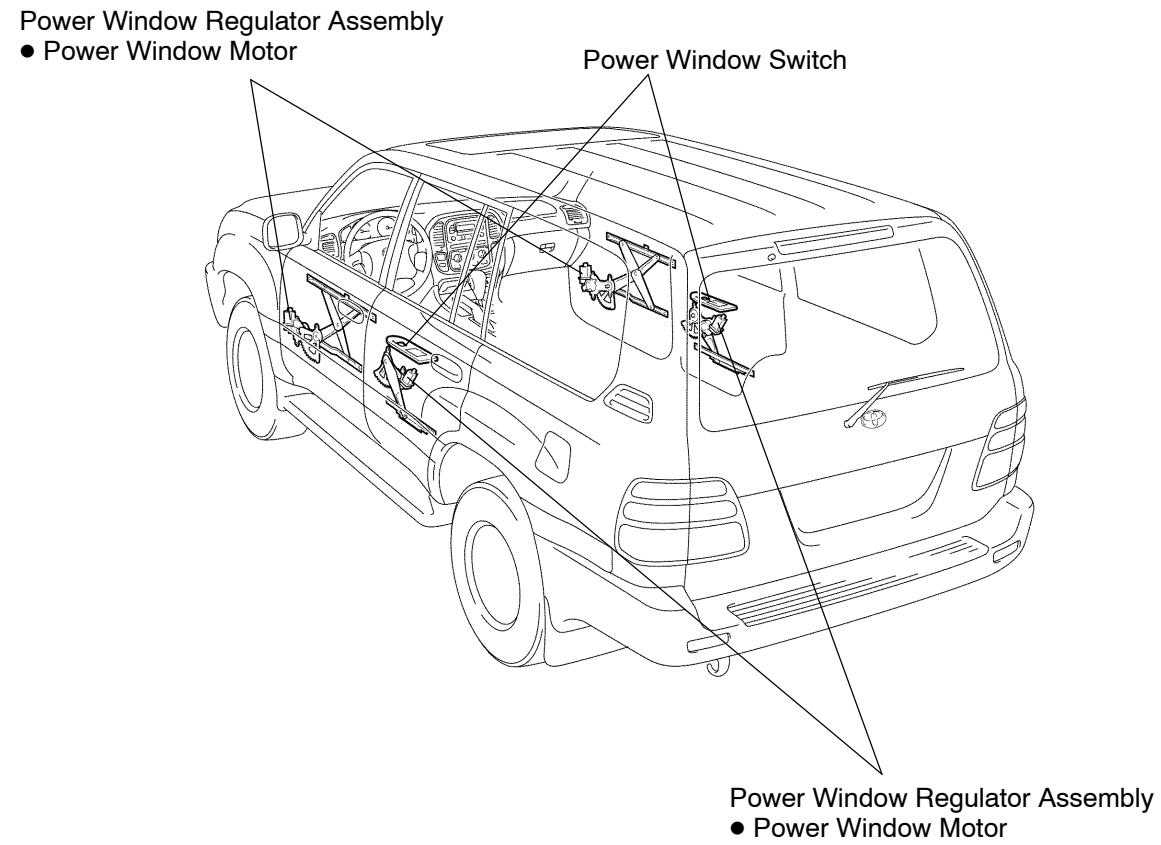
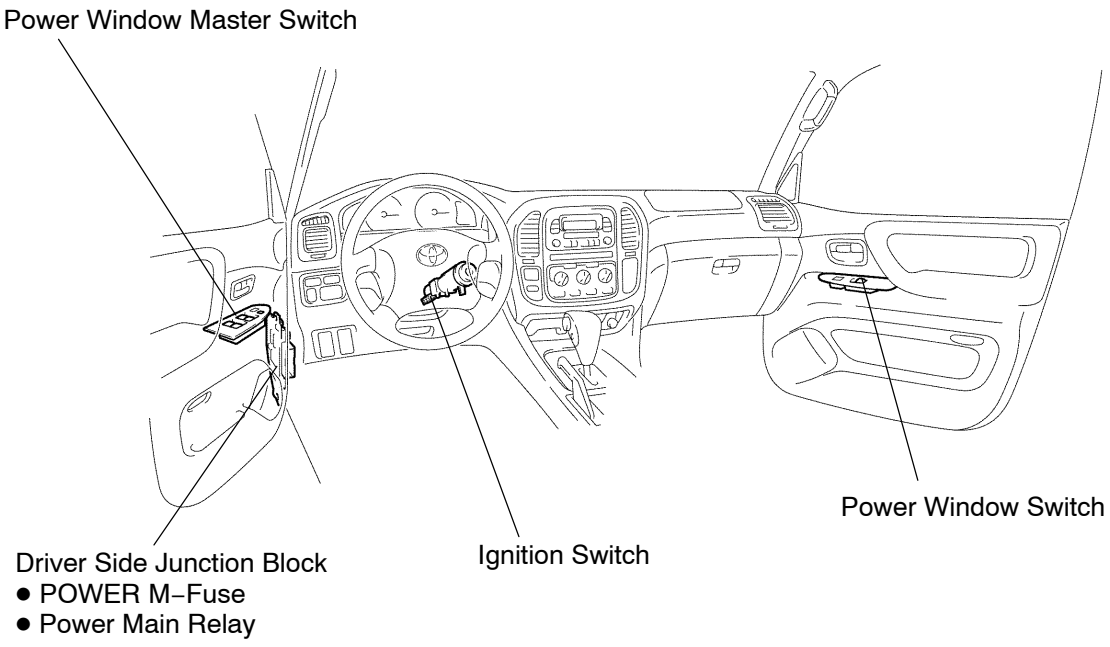
BE0HE–03

LOCATION





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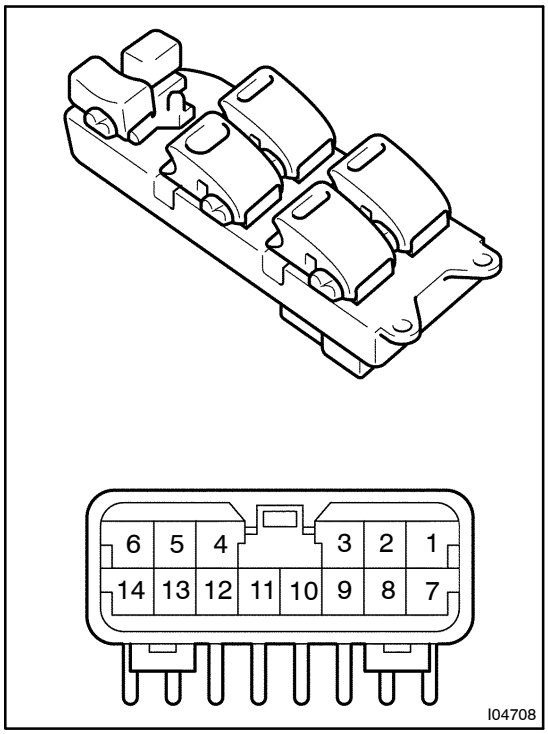
BE0S3–01



INSPECTION

1. INSPECT POWER WINDOW MASTER SWITCH CONTINUITY

Connect the battery positive (+) lead to terminal 3 and 10, and battery negative (–) lead to terminal 4 and 5.

Front Driver's Switch (Window unlock and lock):

Switch position	Tester connection	Specified condition
UP	1 – 2	Battery positive voltage
UP	1 – 3 2 – 4 – 5	Continuity
OFF	1 – 2 – 4 – 5	Continuity
DOWN	1 – 2	Battery positive voltage
DOWN	1 – 4 – 5 2 – 3	Continuity

Front Passenger's Switch (Window unlock):

Switch position	Tester connection	Specified condition
UP	7 – 8	Battery positive voltage
UP	4 – 5 – 8 7 – 10	Continuity
OFF	4 – 5 – 7 – 8	Continuity
DOWN	7 – 8	Battery positive voltage
DOWN	4 – 5 – 7 8 – 10	Continuity

Front Passenger's Switch (Window lock):

Switch position	Tester connection	Specified condition
UP	7 – 8	Battery positive voltage
UP	7 – 10	Continuity
OFF	7 – 8	Continuity
DOWN	7 – 8	Battery positive voltage
DOWN	8 – 10	Continuity

Rear Left Switch (Window unlock):

Switch position	Tester connection	Specified condition
UP	9 – 11	Battery positive voltage
UP	4 – 5 – 11 9 – 10	Continuity
OFF	4 – 5 – 9 – 11	Continuity
DOWN	9 – 11	Battery positive voltage
DOWN	4 – 5 – 9 10 – 11	Continuity

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Rear Left Switch (Window lock):

Switch position	Tester connection	Specified condition
UP	9 – 11	Battery positive voltage
UP	9 – 10	Continuity
OFF	9 – 11	Continuity
DOWN	9 – 11	Battery positive voltage
DOWN	10 – 11	Continuity

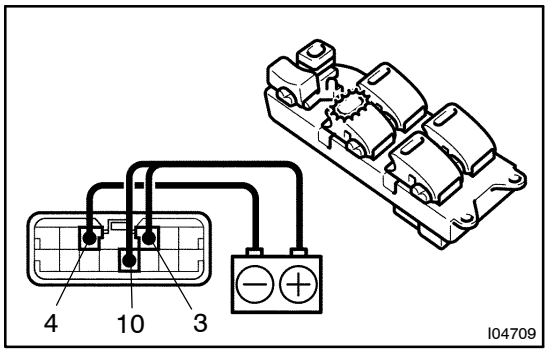
Rear Right Switch (Window unlock):

Switch position	Tester connection	Specified condition
UP	13 – 14	Battery positive voltage
UP	4 – 5 – 14 10 – 13	Continuity
OFF	4 – 5 – 13 – 14	Continuity
DOWN	13 – 14	Battery positive voltage
DOWN	4 – 5 – 13 10 – 14	Continuity

Rear Right Switch (Window lock):

Switch position	Tester connection	Specified condition
UP	13 – 14	Battery positive voltage
UP	10 – 13	Continuity
OFF	13 – 14	Continuity
DOWN	13 – 14	Battery positive voltage
DOWN	10 – 14	Continuity

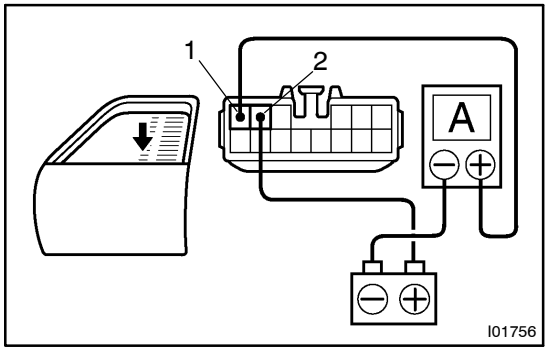
If continuity and voltage is not as specified, replace the master switch.



2. INSPECT POWER WINDOW MASTER SWITCH ILLUMINATION

Connect the positive (+) lead from the battery to terminal 3 and 10, and the negative (–) lead to terminal 4, and check that all the illuminations light up.

If operation is not as specified, replace the master switch.



3. INSPECT ONE TOUCH POWER WINDOW SYSTEM/ CURRENT OF CIRCUIT

Using an ammeter:

(a) Disconnect the connector from the master switch.

(b) Connect the positive (+) lead from the ammeter to terminal 1 on the wire harness side connector and the negative (–) lead to negative (–) terminal of the battery.

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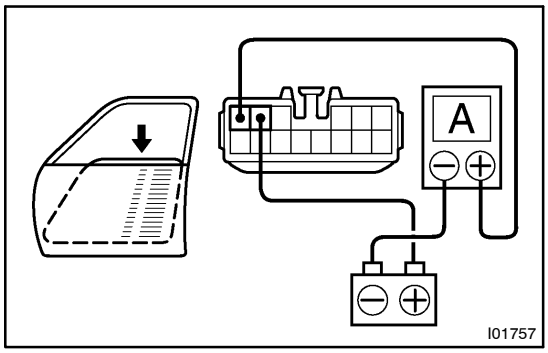
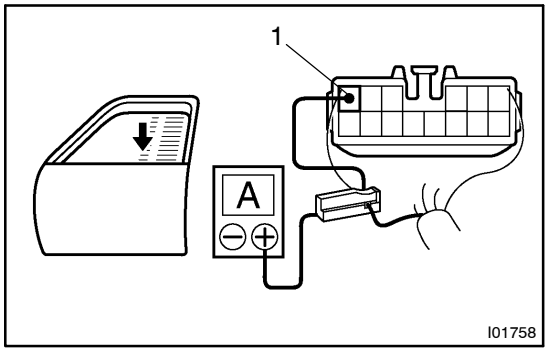


(c) Connect the positive (+) lead from the battery to terminal 2 on the wire harness side connector.
(d) As the window goes down, check that the current flow is approximately 7 A.
(e) Check that the current increases up to approximately 14.5 A or more when the window stops going down.

HINT:
The circuit breaker opens some 4 – 40 seconds after the window stops going down, so that check must be made before the circuit breaker operates.
If the operation is not as specified, replace the master switch.

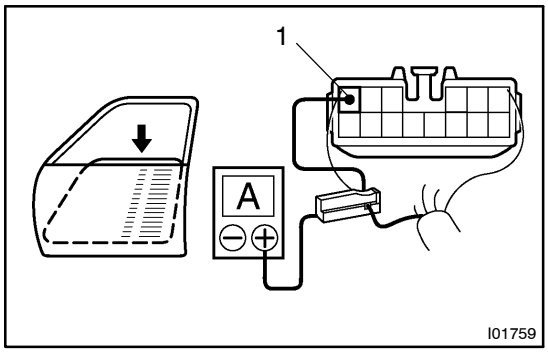


4. INSPECT ONE TOUCH POWER WINDOW SYSTEM/ CURRENT OF CIRCUIT

Using an ammeter with a current–measuring probe:

(a) Remove the master switch with connector connected.
(b) Attach a current–measuring probe to terminal 1 of the wire harness.
(c) Turn the ignition switch ON and set the power window switch in the down position.
(d) As the window goes down, check that the current flow is approximately 7 A.
(e) Check that the current increases up to approximately 14.5 A or more when the window stops going down.

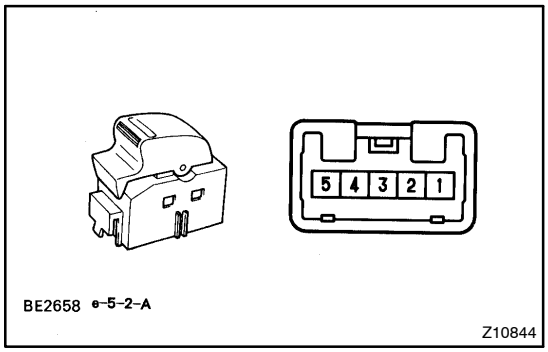
HINT:
The circuit breaker opens some 4 – 40 seconds after the window stops going down, so that check must be made before the circuit breaker operates.
If operation is not as specified, replace the master switch.



5. INSPECT POWER WINDOW SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
UP	1 – 2, 3 – 4	Continuity
OFF	1 – 2, 3 – 5	Continuity
DOWN	1 – 4, 3 – 5	Continuity

If continuity is not as specified, replace the switch.



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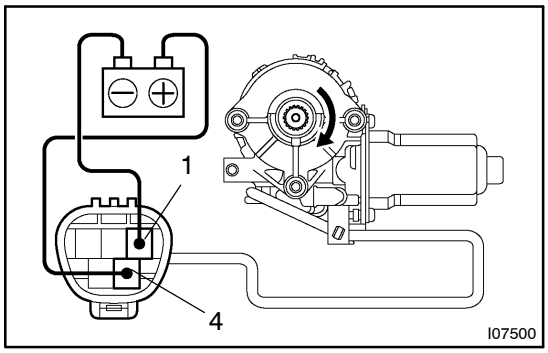
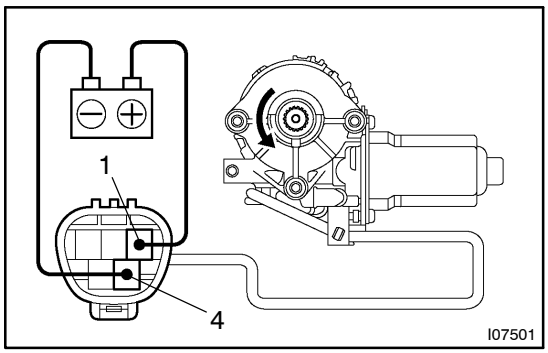


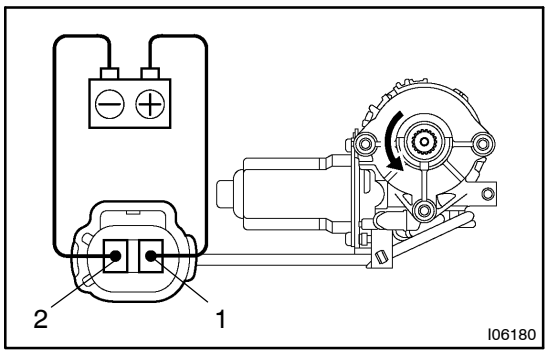
6. Driver's Door:
INSPECT POWER WINDOW MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 4, check that the motor turns clockwise.



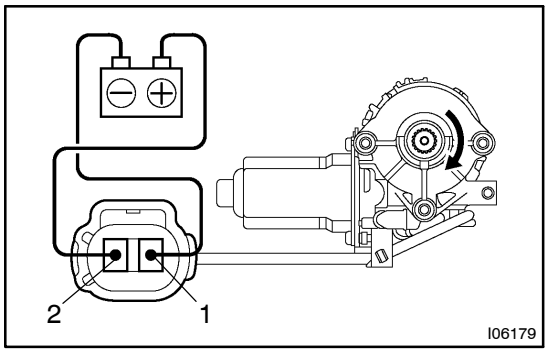
(b) Reverse the polarity, check that the motor turns counterclockwise.

If operation is not as specified, replace the motor.



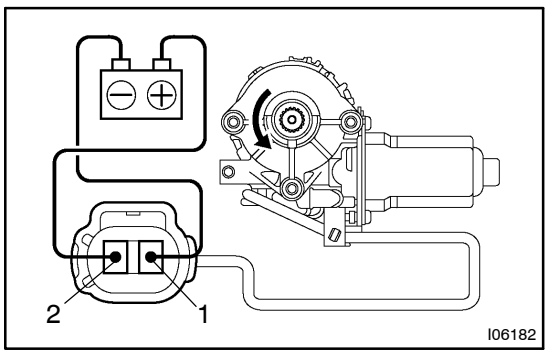
7. Passenger's Door and rear left side:
INSPECT POWER WINDOW MOTOR OPERATION

(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 motor.



8. Rear right side:
INSPECT POWER WINDOW MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 1, check that the motor turns counterclockwise.

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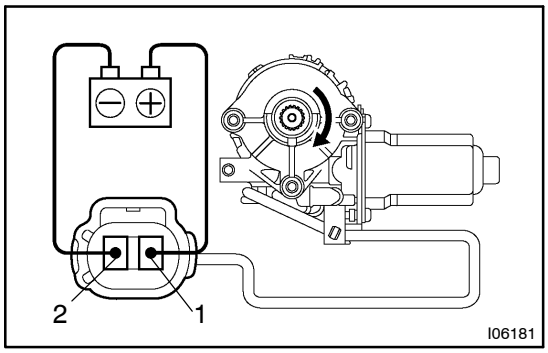
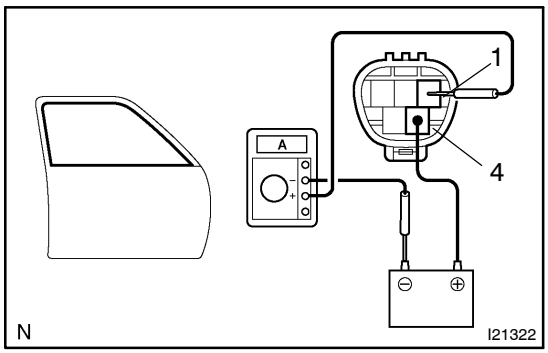


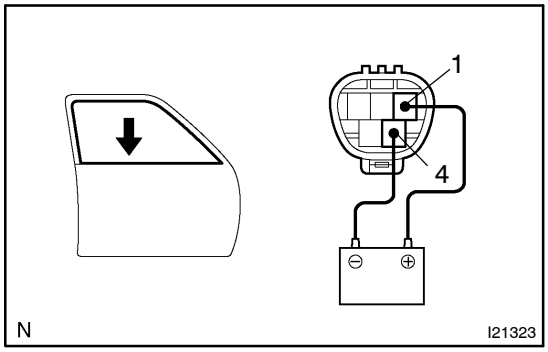
(b) Reverse the polarity, check that the motor turns clockwise.

If operation is not as specified, replace the motor.



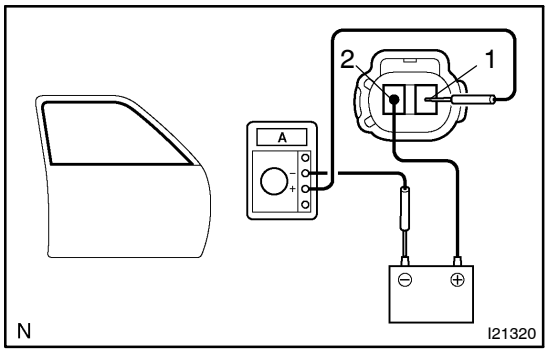
9. Driver's door:
INSPECT POWER WINDOW MOTOR PTC THERMISTOR OPERATION

(a) Disconnect the connector from the power window motor.
(b) Connect the positive (+) lead from the ammeter to terminal 1 on the wire harness side connector and the negative (–) lead to negative terminal of the battery.
(c) Connect the positive (+) lead from the battery to terminal 4 on the wire harness side connector, and raise the window to the fully position.



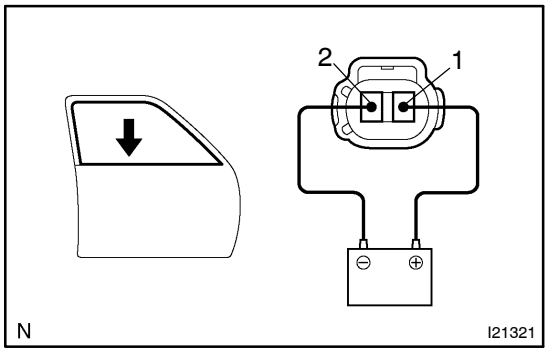
(d) Continue to apply voltage, and check that the current changes to less than 1 A with 4 to 90 seconds.
(e) Disconnect the leads from terminals.
(f) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 1 and negative (–) lead to terminal 4, and check that the window begins to descended.

If operation is not as specified, replace the motor.



10. Passenger's door and rear door:
INSPECT POWER WINDOW MOTOR PTC THERMISTOR OPERATION

(a) Disconnect the connector from the power window motor.
(b) Connect the positive (+) lead from the ammeter to terminal 2 on the wire harness side connector and the negative (–) lead to negative terminal of the battery.
(c) Connect the positive (+) lead from the battery to terminal 1 on the wire harness side connector, and raise the window to the fully position.



(d) Continue to apply voltage and check that the current changes to less than 1 A within 4 to 90 seconds.
(e) Disconnect the leads from the terminals.
(f) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 1, and check that the window begins to descend.

If operation is not as specified, replace the motor.

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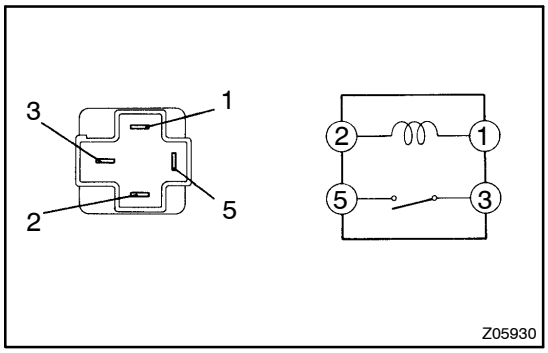

11. INSPECT POWER MAIN RELAY CONTINUITY

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.

12. CHECKING OF THE JAM PROTECTION FUNCTION

NOTICE:

Never, ever be caught any part of your body when checking.

HINT:

In case of performing resetting of the limit switch, do checking after repeating up and down of the glass with automatic operation.

(a) Confirmation of AUTO up operation:
Confirm that the window will be fully close with AUTO up operation.

(b) Checking of the operation of the jam protection function:
(1) Move up the window with AUTO up operation and check that the window will go down when it touches the handle of the hammer stetted.
(2) Confirm that the window will then stop going down about 200 mm.

HINT:

In case of removing the glass, glass guide, regulator and etc. be sure to perform checking of the jam protection function.

If the jam protection is not function properly, adjust power window motor reset switch and pulse switch.

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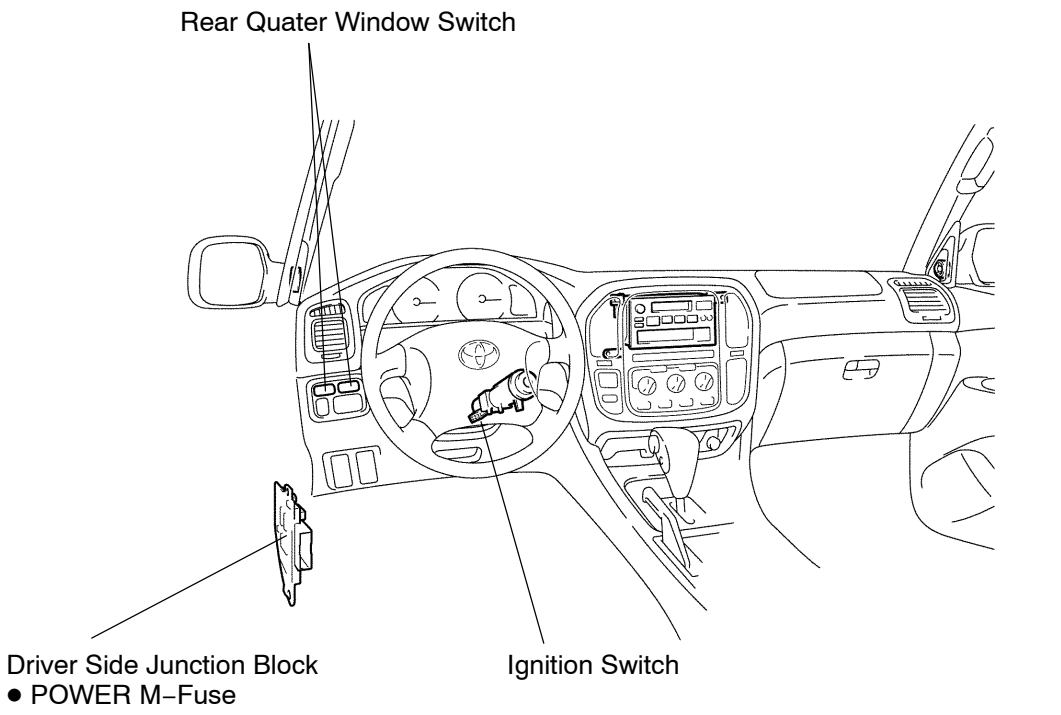
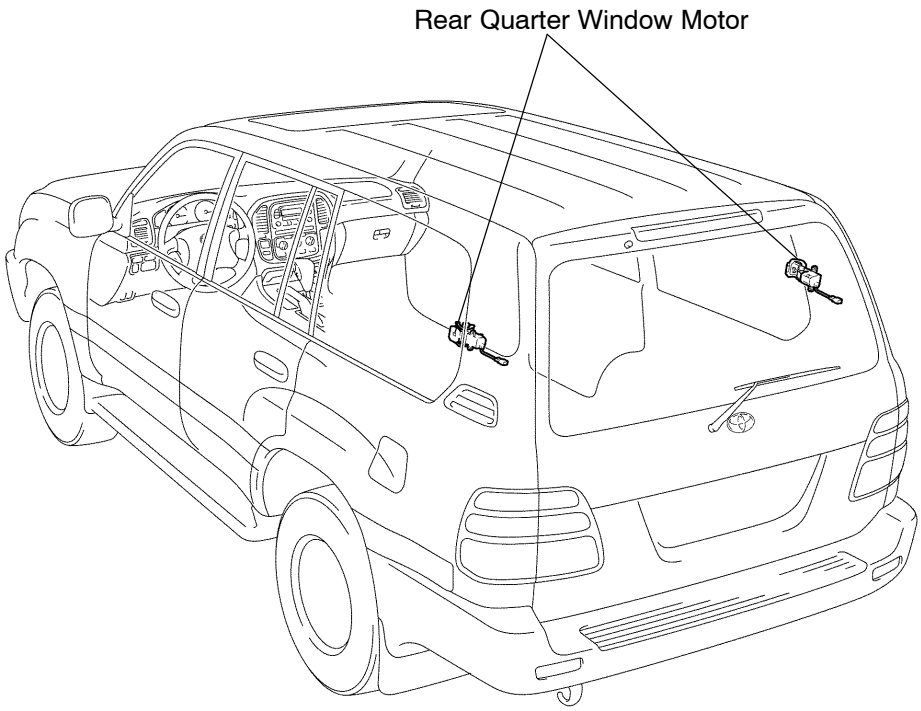
POWER REAR QUARTER WINDOW SYSTEM

LOCATION

BE0S4–01





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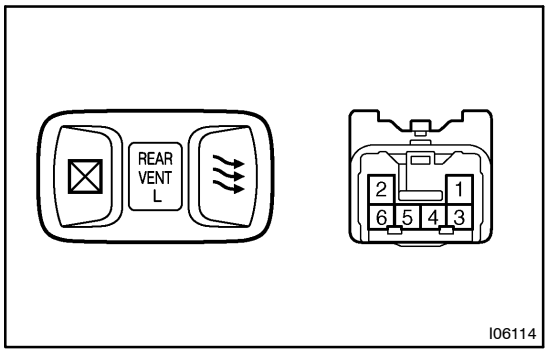
BE0S5–01

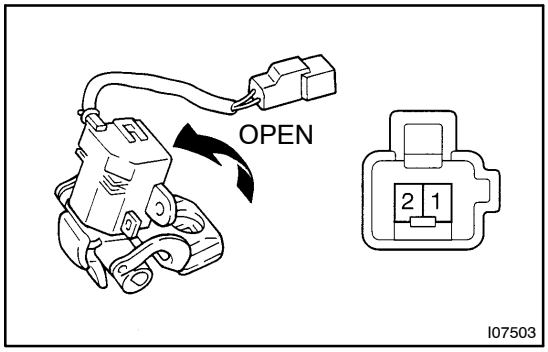
INSPECTION



1. INSPECT POWER QUARTER WINDOW SWITCH CONTINUITY

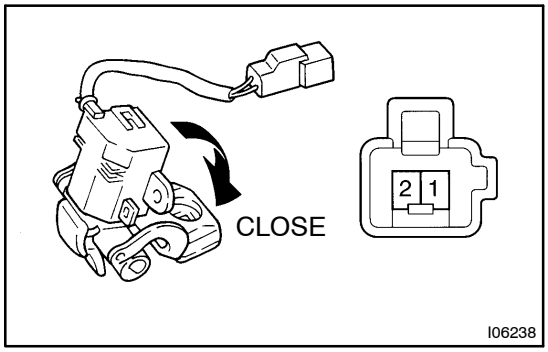
Switch position	Tester connection	Specified condition
CLOSE	3 – 6 4 – 5	Continuity
OFF	–	Continuity
OPEN	3 – 4 5 – 6	Continuity
Illumination Circuit	1 – 2	Continuity

If continuity is not as specified, replace the switch.



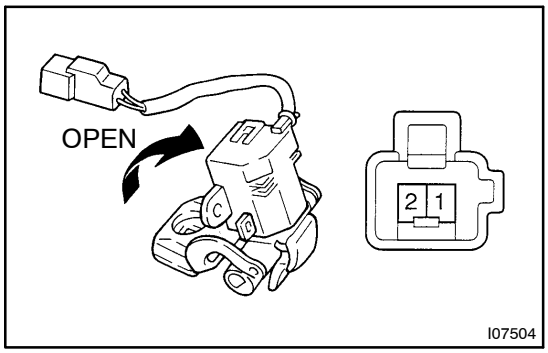
2. Left side:
INSPECT POWER VENT WINDOW MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, and check that the window link moves to OPEN position.



(b) Remove the polarity and check that the window link moves to CLOSE position.

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



3. Right side:
INSPECT POWER VENT WINDOW MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 1, and check that the window link moves to OPEN position.

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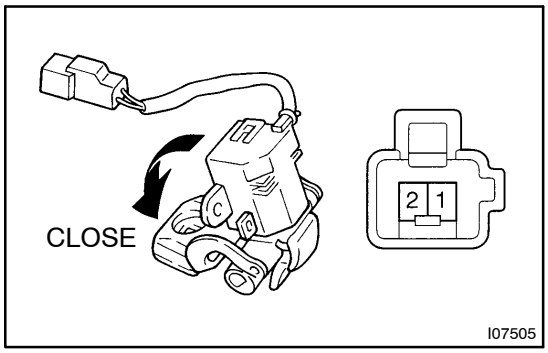

(b) Remove the polarity and check that the window link moves to CLOSE position.

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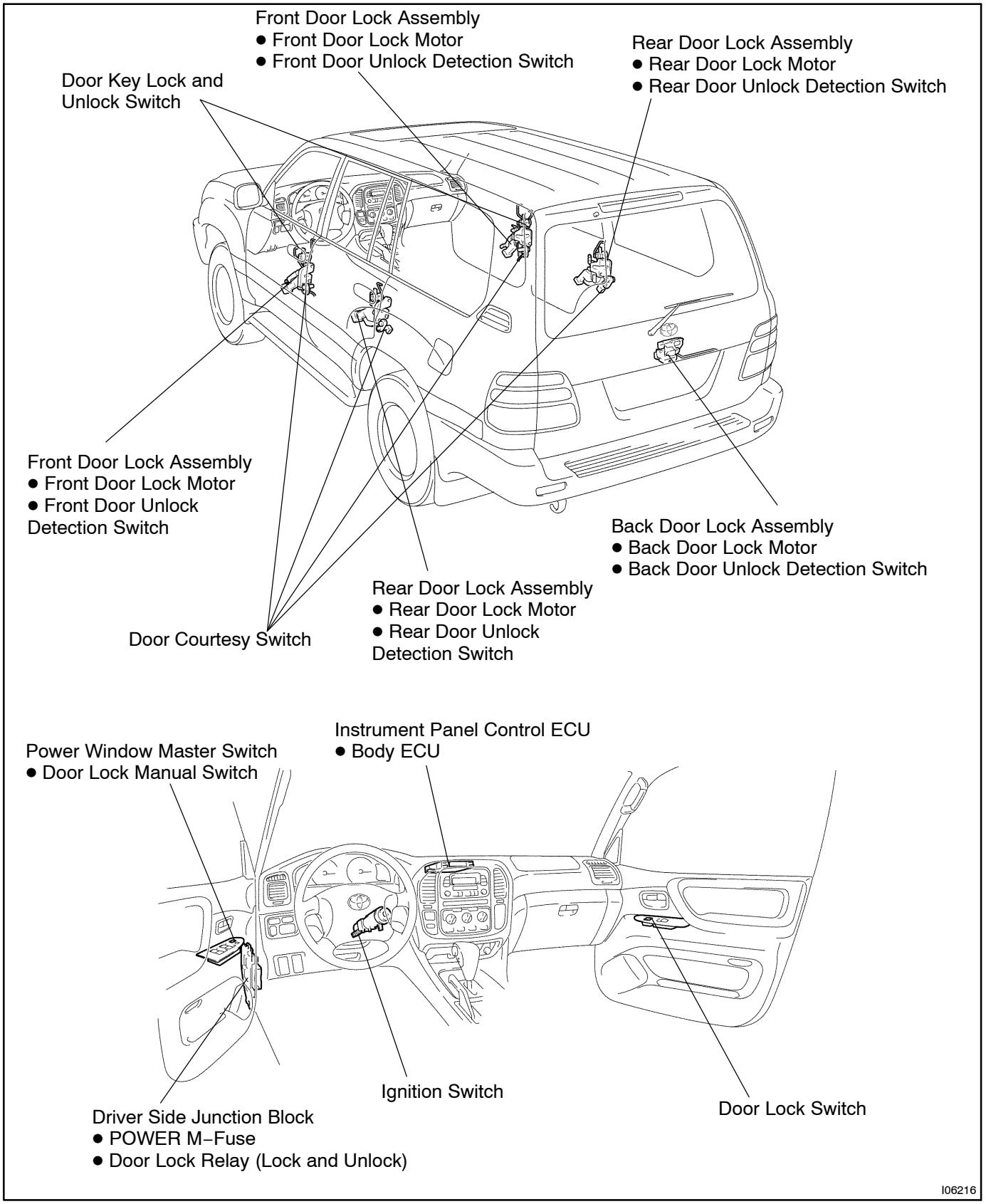
POWER DOOR LOCK CONTROL SYSTEM

LOCATION

BE0HQ–03



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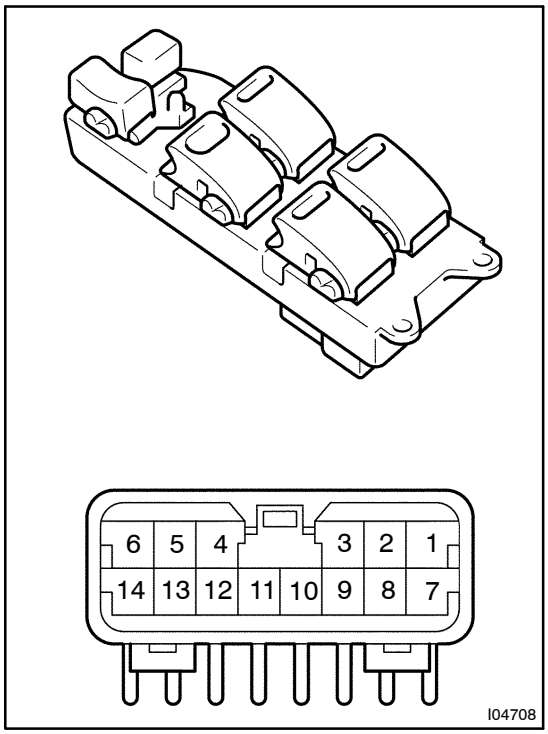
BE0S6–01

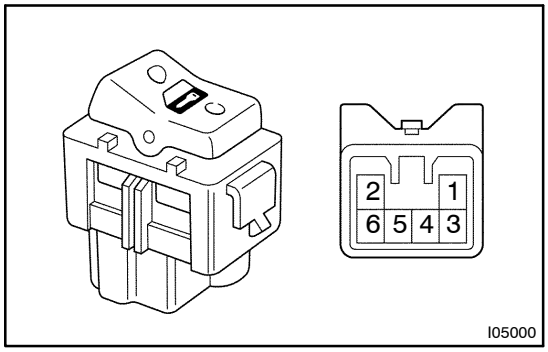
INSPECTION



1. Master Switch:
INSPECT DRIVER'S DOOR LOCK CONTROL SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
LOCK	4 – 6 5 – 6	Continuity
OFF	–	No continuity
UNLOCK	4 – 12 5 – 12	Continuity

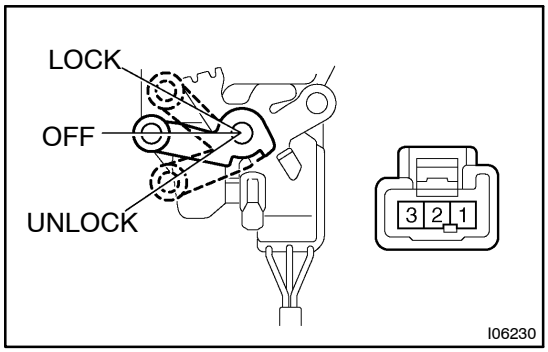
If continuity is not as specified, replace the switch.



2. INSPECT PASSENGER'S DOOR LOCK CONTROL SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
LOCK	3 – 6	Continuity
OFF	–	No continuity
UNLOCK	5 – 6	Continuity

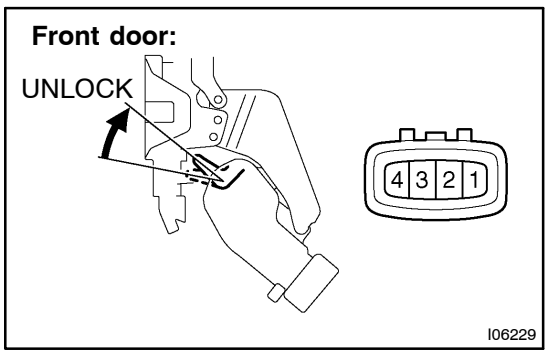
If continuity is not as specified, replace the switch.



3. 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.



4. Front door:
INSPECT DOOR UNLOCK DETECTION SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (Door Lock set to LOCK)	–	No continuity
ON (Door Lock set to UNLOCK)	1 – 4	Continuity

If continuity is not as specified, replace the switch.

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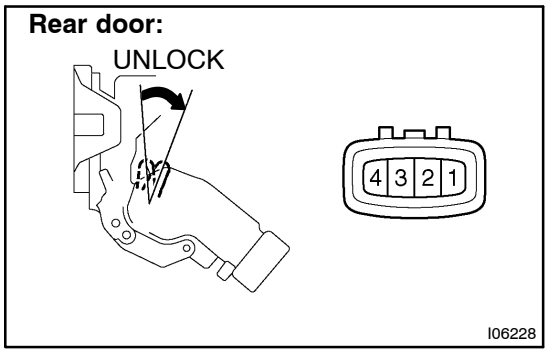
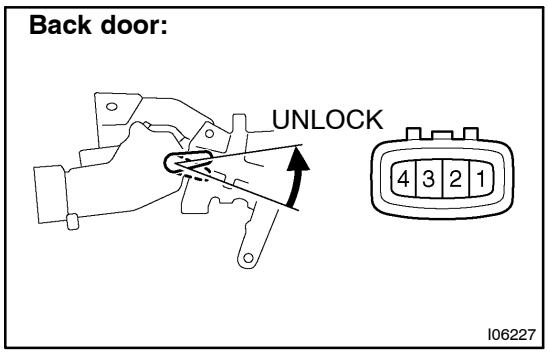


5. Rear door:
INSPECT DOOR UNLOCK DETECTION SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (Door Lock set to LOCK)	–	No continuity
ON (Door Lock set to UNLOCK)	1 – 4	Continuity

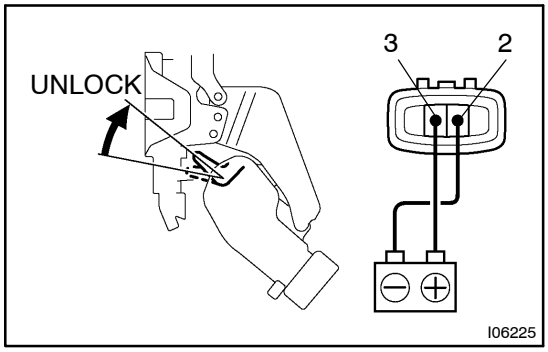
If continuity is not as specified, replace the switch.



6. Back door:
INSPECT DOOR UNLOCK DETECTION SWITCH CONTINUITY

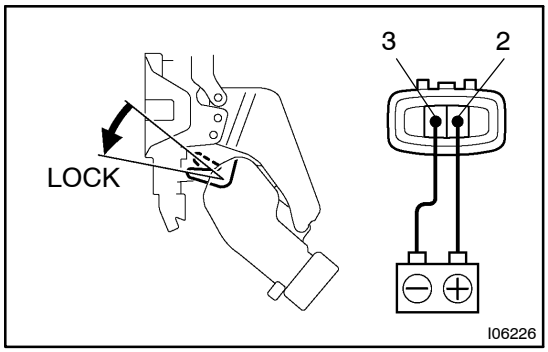
Switch position	Tester connection	Specified condition
OFF (Door Lock set to LOCK)	–	No continuity
ON (Door Lock set to UNLOCK)	1 – 4	Continuity

If continuity is not as specified, replace the switch.



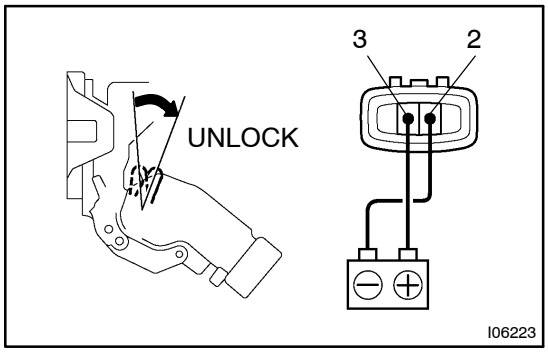
7. Front door:
INSPECT DOOR LOCK MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (–) lead to terminal 2, and check that the door lock link moves to UNLOCK position.



(b) Reverse the polarity and check that the door lock link moves to LOCK position.

If operation is not as specified, replace the door lock assembly.



8. Rear door:
INSPECT DOOR LOCK MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (–) lead to terminal 2, and check that the door lock link moves to UNLOCK position.

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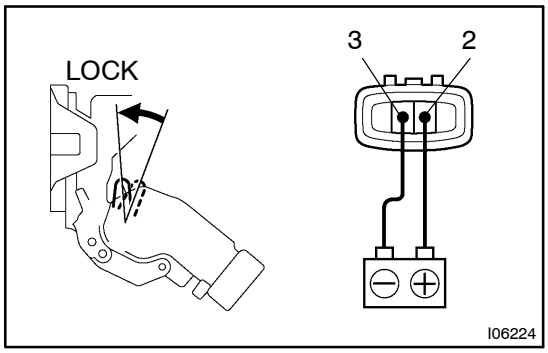
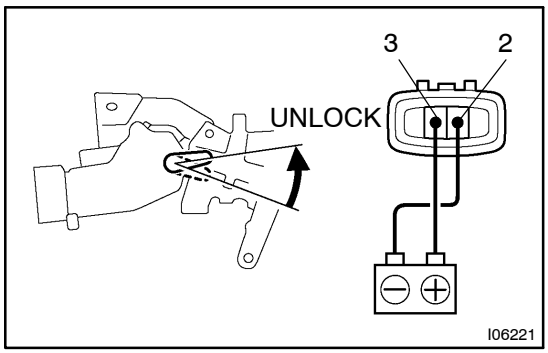


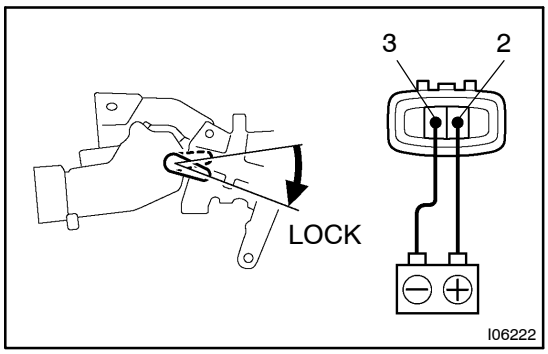
(b) Reverse the polarity and check that the door lock link moves to LOCK position.

If operation is not as specified, replace the door lock assembly.



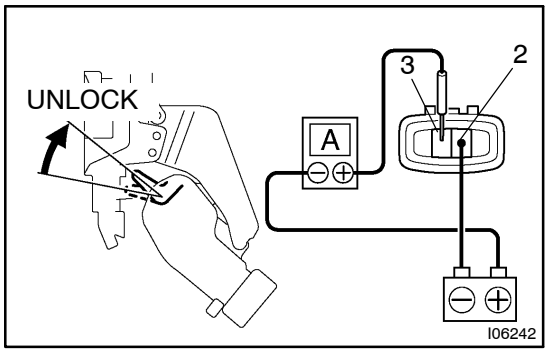
9. Back door:
INSPECT DOOR LOCK MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (–) lead to terminal 2, and check that the door lock link moves to UNLOCK position.



(b) Reverse the polarity and check that the door lock link moves to LOCK position.

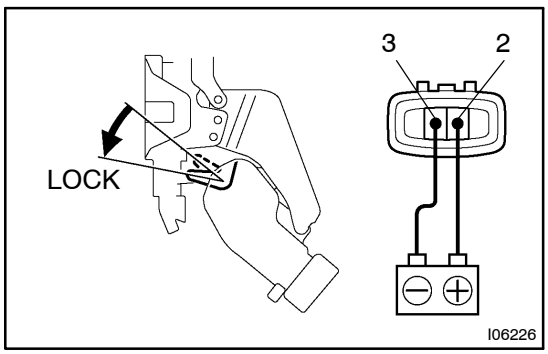
If operation is not as specified, replace the door lock assembly.



10. Front door:
INSPECT PTC THERMISTOR OPERATION (Using an ammeter)

(a) Connect the negative (–) lead from the battery to terminal 2.

(b) Connect the positive (+) lead from the ammeter to terminal 3 and the negative (–) lead to battery negative (–) terminal, and check that the current changes from approximately 3.2 A to less than 0.5 A within 20 to 70 seconds.



(c) Disconnect the leads from terminals.

(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 3, and check that the door lock moves to the LOCK position.

If operation is not as specified, replace the door lock assembly.

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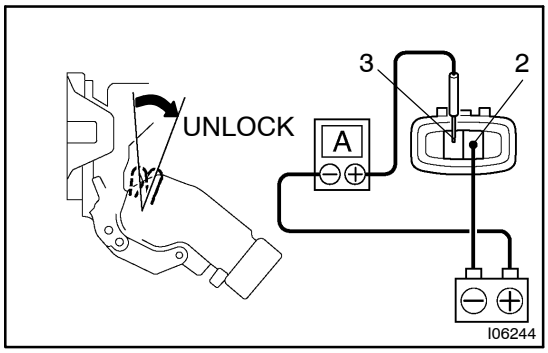
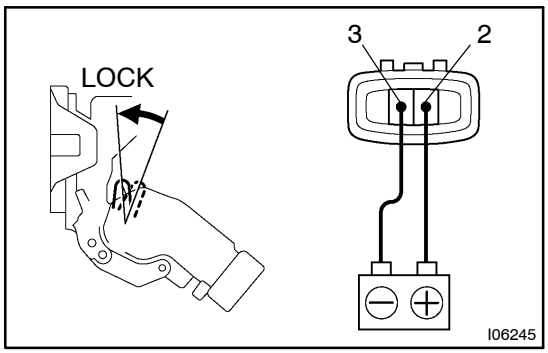


11. Rear door:
INSPECT PTC THERMISTOR OPERATION (Using an ammeter)

(a) Connect the negative (–) lead from the battery to terminal 2.

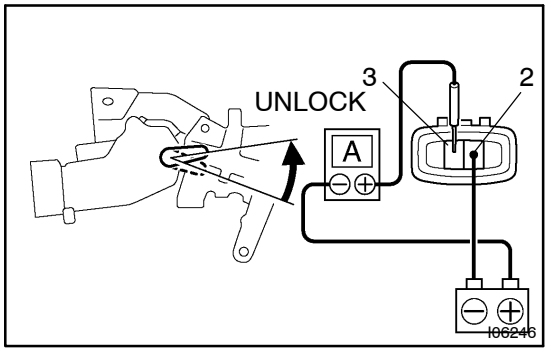
(b) Connect the positive (+) lead from the ammeter to terminal 3 and the negative (–) lead to battery negative (–) terminal, and check that the current changes from approximately 3.2 A to less than 0.5 A within 20 to 70 seconds.



(c) Disconnect the leads from terminals.

(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 3, and check that the door lock moves to the LOCK position.

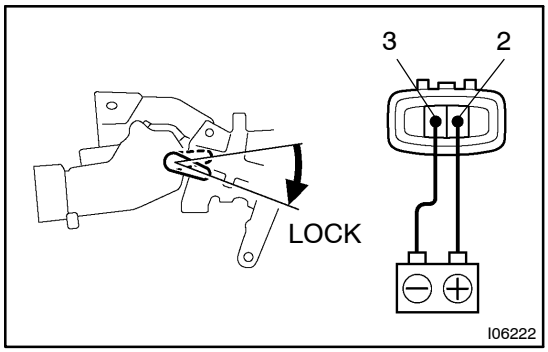
If operation is not as specified, replace the door lock assembly.



12. Back door:
INSPECT PTC THERMISTOR OPERATION (Using an ammeter)

(a) Connect the negative (–) lead from the battery to terminal 2.

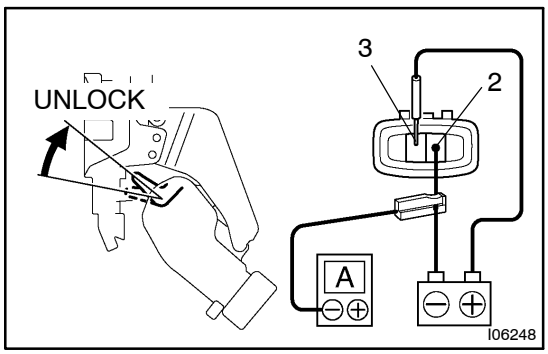
(b) Connect the positive (+) lead from the ammeter to terminal 3 and the negative (–) lead to battery negative (–) terminal, and check that the current changes from approximately 3.2 A to less than 0.5 A within 20 to 70 seconds.



(c) Disconnect the leads from terminals.

(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 3, and check that the door lock moves to the LOCK position.

If operation is not as specified, replace the door lock assembly.



13. Front door:
INSPECT PTC THERMISTOR OPERATION (Using an ammeter with a current–measuring probe)

(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (–) lead to terminal 2.

(b) Attach a current–measuring probe to either the positive (+) lead or the negative (–) lead, and check that the current changes from approximately 3.2 A to less than 0.5 A within 20 to 70 seconds.

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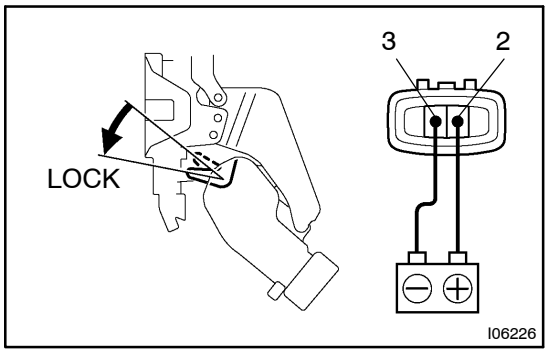
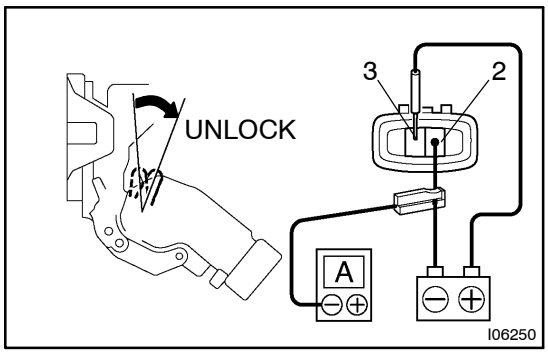


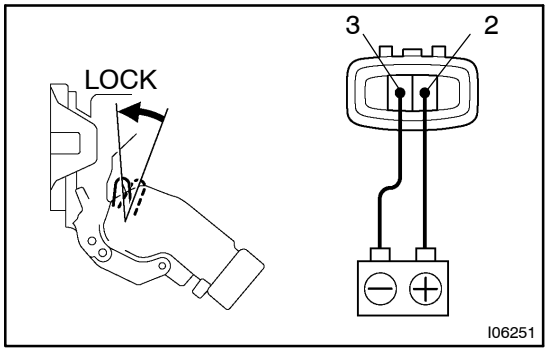
(c) Disconnect the leads from terminals.
(d) Approximately 60 seconds later, reverse the polarity, and check that the door lock moves to the LOCK position.

If operation is not as specified, replace the door lock assembly.



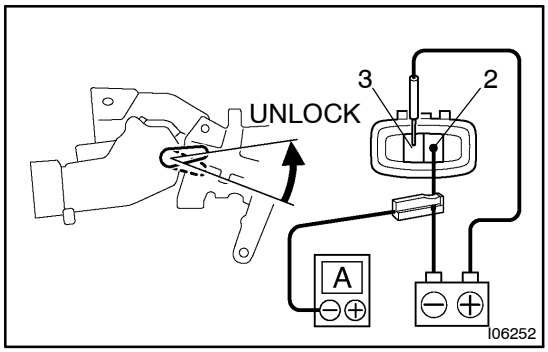
14. Rear door:
INSPECT PTC THERMISTOR OPERATION (Using an ammeter with a current–measuring probe)

(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (–) lead to terminal 2.
(b) Attach a current–measuring probe to either the positive (+) lead or the negative (–) lead, and check that the current changes from approximately 3.2 A to less than 0.5 A within 20 to 70 seconds.



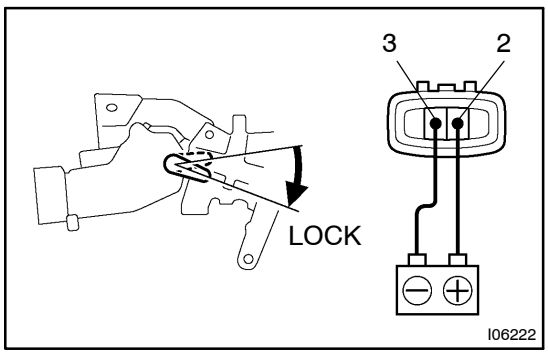
(c) Disconnect the leads from terminals.
(d) Approximately 60 seconds later, reverse the polarity, and check that the door lock moves to the LOCK position.

If operation is not as specified, replace the door lock assembly.



15. Back door:
INSPECT PTC THERMISTOR OPERATION (Using an ammeter with a current–measuring probe)

(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (–) lead to terminal 2.
(b) Attach a current–measuring probe to either the positive (+) lead or the negative (–) lead, and check that the current changes from approximately 3.2 A to less than 0.5 A within 20 to 70 seconds.



(c) Disconnect the leads from terminals.
(d) Approximately 60 seconds later, reverse the polarity, and check that the door lock moves to the LOCK position.

If operation is not as specified, replace the door lock assembly.

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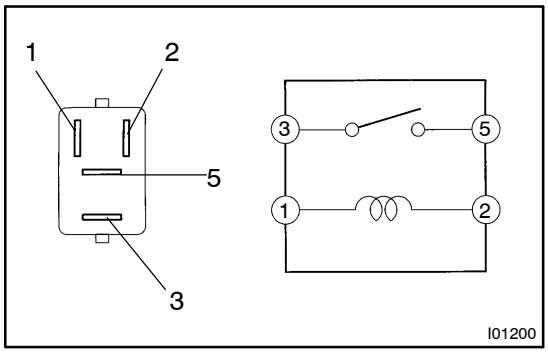

16. INSPECT DOOR LOCK RELAY (LOCK and UNLOCK) CONTINUITY

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.

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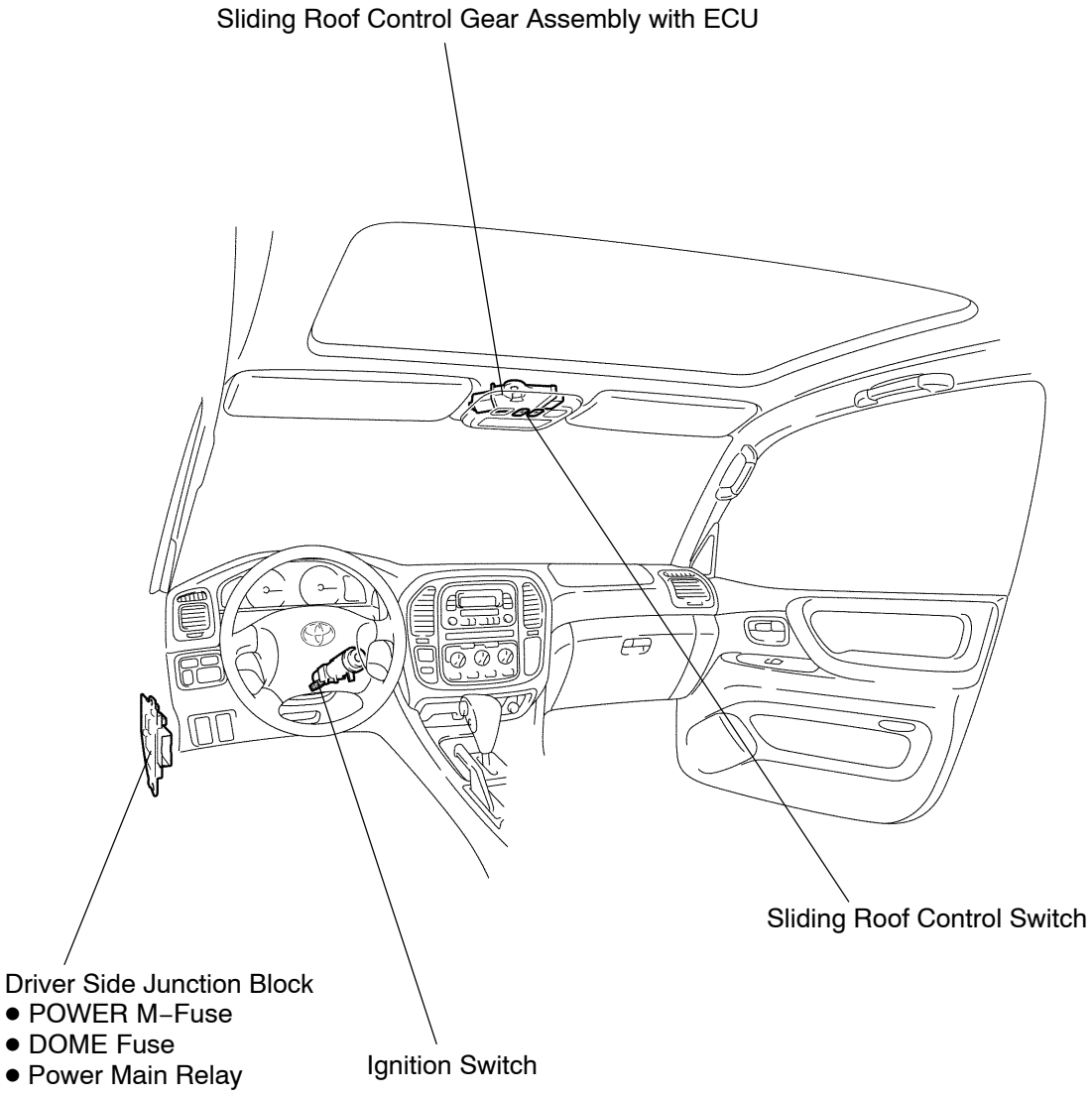
SLIDING ROOF SYSTEM

LOCATION

BE0S8–01



I06205

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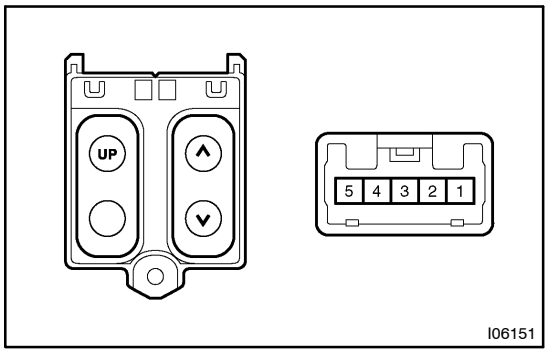
BE0S9–01

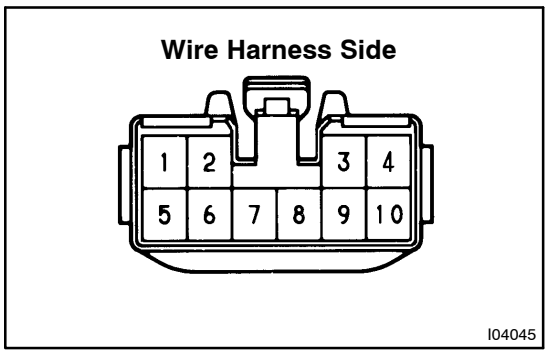
INSPECTION



1. INSPECT SLIDING ROOF SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
SLIDE OPEN	3 – 5	Continuity
SLIDE OFF	–	No continuity
SLIDE CLOSE	3 – 4	Continuity
TILT DOWN	2 – 3	Continuity
TILT OFF	–	No continuity
TILT UP	1 – 3	Continuity

If continuity is not as specified, replace the switch.



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
3 – Ground	Sliding roof control switch (TILT) OFF or CLOSE	No continuity
3 – Ground	Sliding roof control switch (TILT) UP	Continuity
4 – Ground	Sliding roof tilted up or open approx. 200 mm (7.87in.)	No continuity
4 – Ground	Except for conditions mentioned above	Continuity
5 – Ground	Constant	Battery positive voltage
7 – Ground	Constant	Continuity
7 – Ground	Sliding roof control switch (TILT) OFF or UP	No continuity
7 – Ground	Sliding roof control switch (TILT) DOWN	Continuity
8 – Ground	Ignition switch LOCK or ACC	* No voltage
8 – Ground	Ignition switch ON	Battery positive voltage
9 – Ground	Sliding roof control switch (SLIDE) OFF or CLOSE	No continuity
9 – Ground	Sliding roof control switch (SLIDE) OPEN	Continuity
10 – Ground	Sliding roof control switch (SLIDE) OFF or OPEN	No continuity
10 – Ground	Sliding roof control switch (SLIDE) CLOSE	Continuity

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*: 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.

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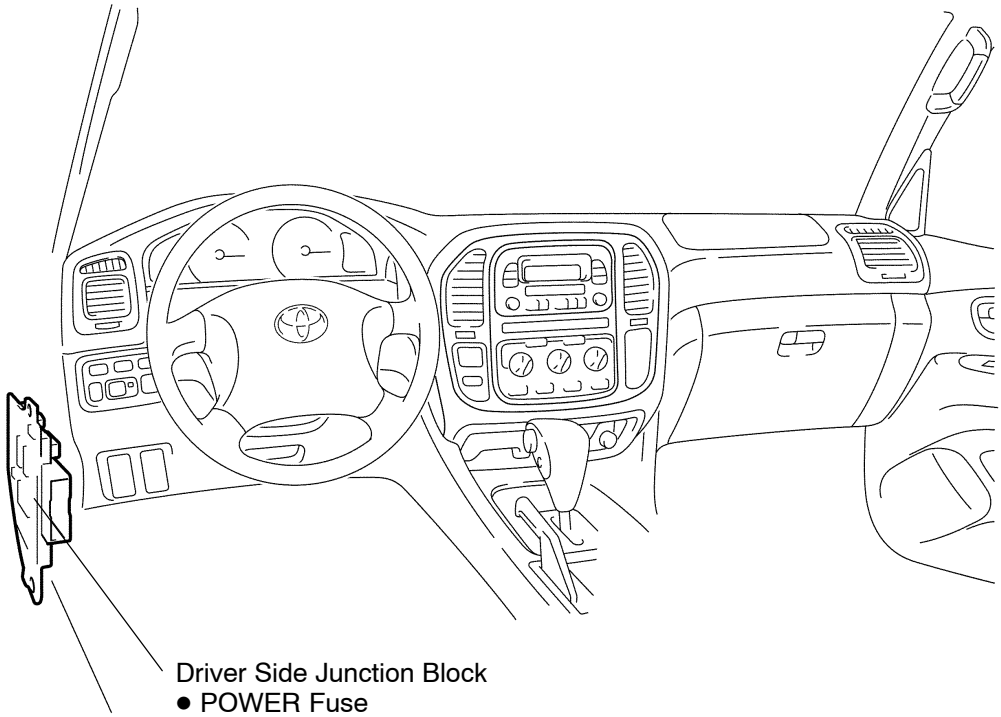
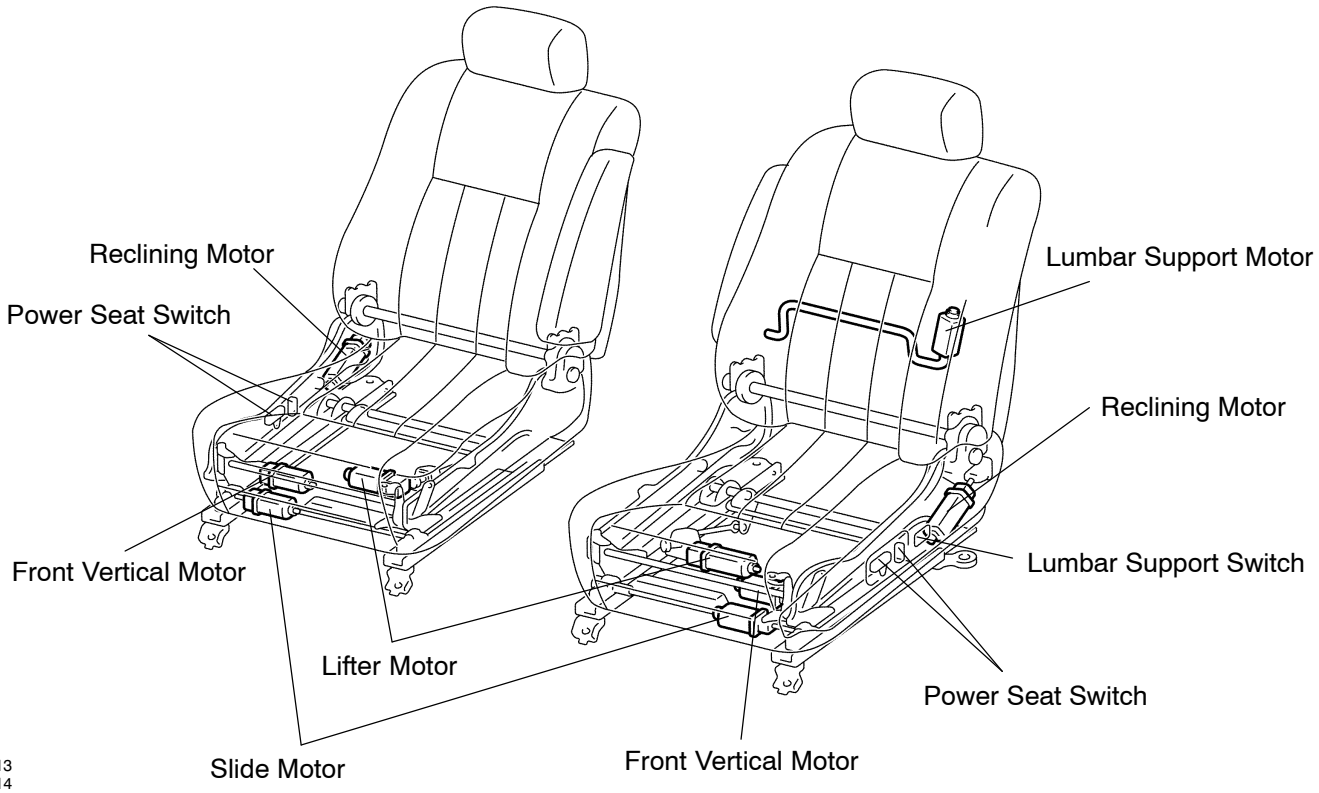
POWER SEAT CONTROL SYSTEM

LOCATION

BE05S–02





I06413
I06414

I06415

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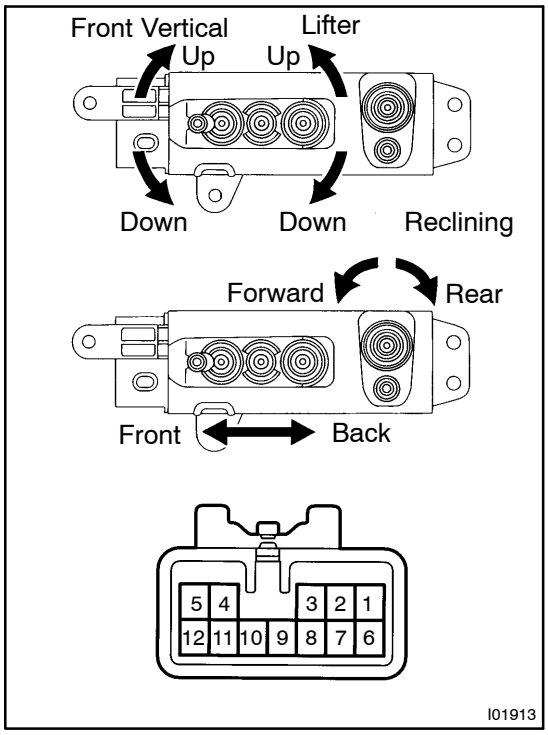
BE0S7–01



INSPECTION

1. INSPECT DRIVER'S POWER SEAT SWITCH CONTINUITY

Slide Switch:

Switch position	Tester connection	Specified condition
FRONT	4 – 7 8 – 11	Continuity
OFF	4 – 7 – 8	Continuity
BACK	4 – 11 7 – 8	Continuity

Front vertical switch:

Switch position	Tester connection	Specified condition
UP	7 – 9 10 – 11	Continuity
OFF	7 – 9 – 10	Continuity
DOWN	7 – 10 9 – 11	Continuity

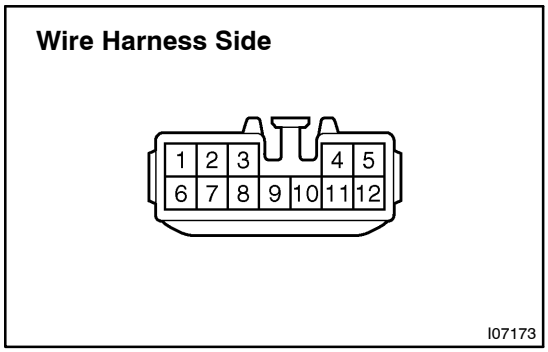
Lifter switch:

Switch position	Tester connection	Specified condition
UP	2 – 11 3 – 7	Continuity
OFF	2 – 3 – 7	Continuity
DOWN	2 – 7 3 – 11	Continuity

Reclining switch:

Switch position	Tester connection	Specified condition
FORWARD	1 – 11 5 – 7	Continuity
OFF	1 – 5 – 7	Continuity
REAR	1 – 7 5 – 11	Continuity

If continuity is not as specified, replace the switch.



2. INSPECT DRIVER'S POWER SEAT SWITCH CIRCUIT

(a) Disconnect the switch connector and connect the seat wire harness to the floor wire harness.

(b) Inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
7 – Ground	Constant	Continuity
11 – Ground	Constant	Battery positive voltage

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

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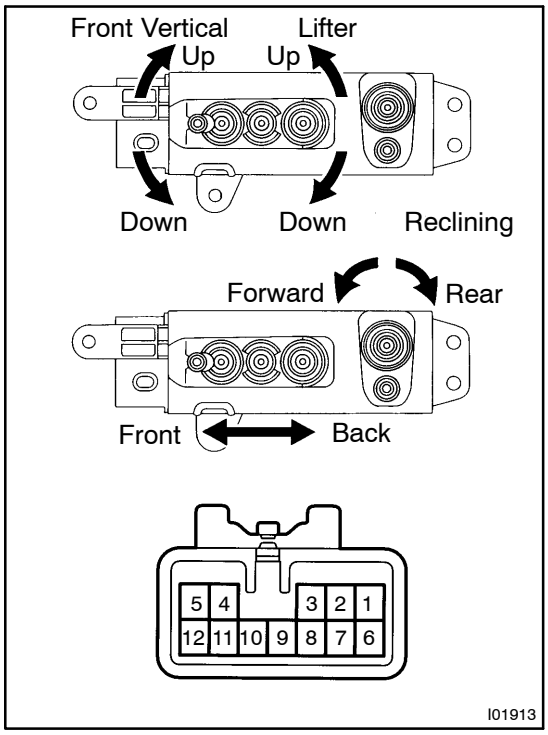


3. INSPECT PASSENGER'S POWER SEAT SWITCH CONTINUITY

Slide switch:

Switch position	Tester connection	Specified condition
FRONT	4 – 7 8 – 11	Continuity
OFF	4 – 7 – 8	Continuity
BACK	4 – 11 7 – 8	Continuity

Front vertical switch:

Switch position	Tester connection	Specified condition
UP	7 – 10 9 – 11	Continuity
OFF	7 – 9 – 10	Continuity
DOWN	6 – 9 10– 11	Continuity

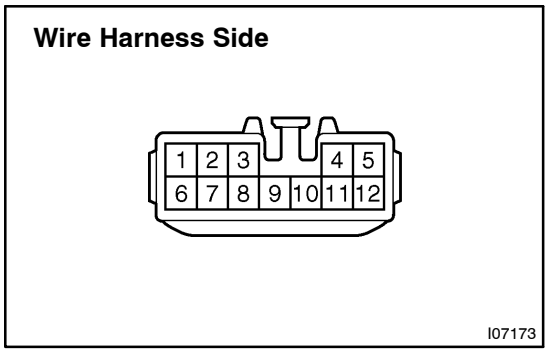
Lifter switch:

Switch position	Tester connection	Specified condition
UP	2 – 7 3 – 11	Continuity
OFF	2 – 3 – 7	Continuity
DOWN	2 – 11 3 – 7	Continuity

Reclining switch:

Switch position	Tester connection	Specified condition
FORWARD	1 – 11 5 – 7	Continuity
OFF	1 – 5 – 7	Continuity
REAR	1 – 7 5 – 11	Continuity

If continuity is not as specified, replace the switch.



4. INSPECT PASSENGER'S POWER SEAT SWITCH CIRCUIT

(a) Disconnect the switch connector and connect the seat wire harness to the floor wire harness.

(b) Inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
7 – Ground	Constant	Continuity
11 – Ground	Constant	Battery positive voltage

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

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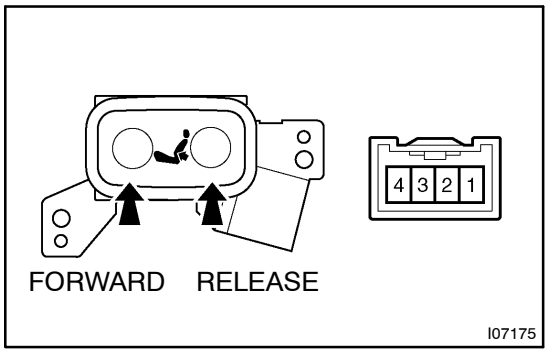
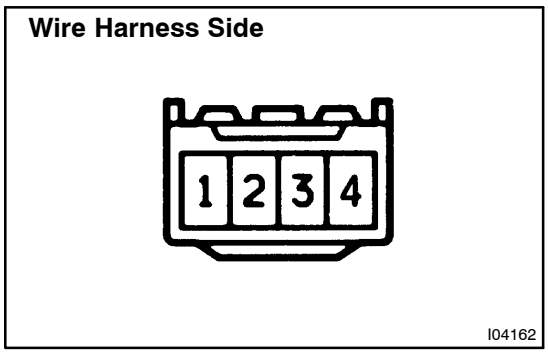


5. INSPECT DRIVER'S LUMBAR SUPPORT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
FORWARD	1 – 4 2 – 3	Continuity
OFF	1 – 2 – 3	Continuity
RELEASE	1 – 3 2 – 4	Continuity

If continuity is not as specified, replace the switch.



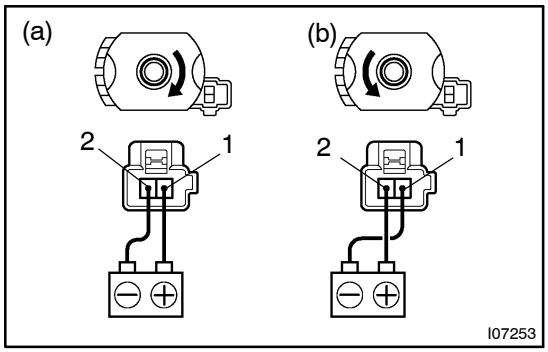
6. INSPECT DRIVER'S LUMBAR SUPPORT SWITCH CIRCUIT

(a) Disconnect the switch connector and connect the seat wire harness to the floor wire harness.

(b) Inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
3 – Ground	Constant	Continuity
4 – Ground	Constant	Battery positive voltage

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

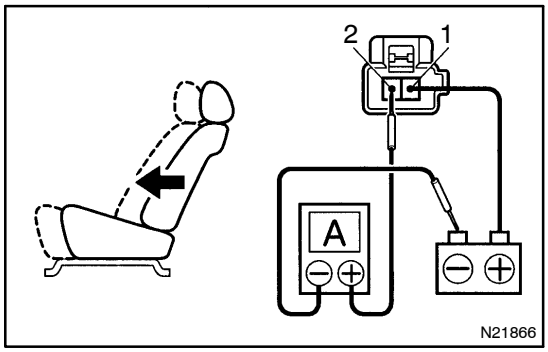


7. INSPECT SLIDE MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, check that the motor turns clockwise.

(b) Reverse the polarity, check that the motor turns counterclockwise.

If operation is not as specified, replace the seat adjuster.



8. INSPECT SLIDE MOTOR PTC THERMISTOR OPERATION

( ): Passenger side

(a) Connect the positive (+) lead from the battery to terminal 2 (1), the positive (+) lead from the ammeter to terminal 1 (2) and the negative (–) lead to the battery negative (–) terminal, then move the seat cushion to the front position.

(b) Continue to apply voltage, check that current changes to less than 1 ampere within 4 to 90 seconds.

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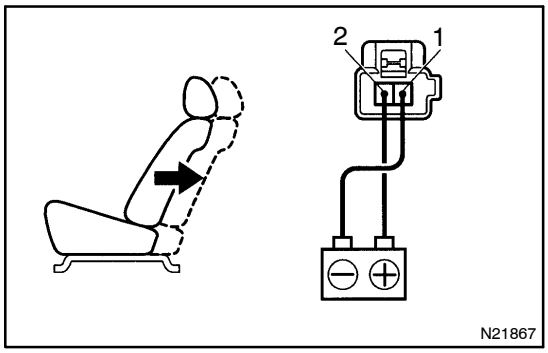
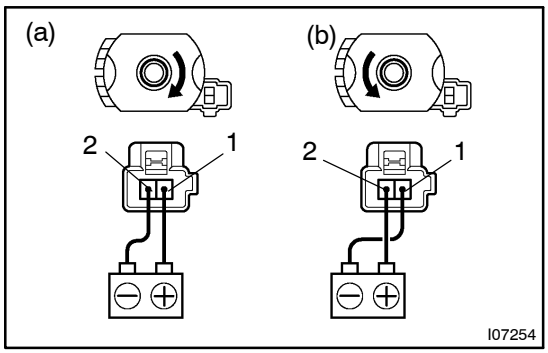


(c) Disconnect the leads from terminals.
(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 1 (2) and the negative (–) lead to terminal 2 (1), check that the seat cushion begins to move backwards.

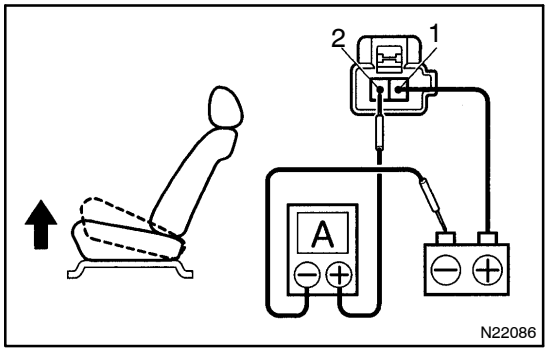
If operation is not as specified, replace the seat adjuster.



9. INSPECT FRONT VERTICAL MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, check that the motor turns clockwise.
(b) Reverse the polarity, check that the motor turns counter-clockwise.

If operation is not as specified, replace the seat adjuster.

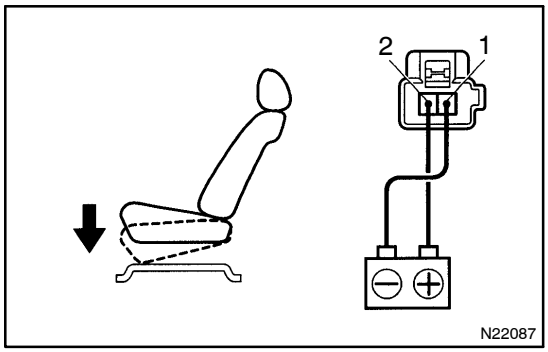


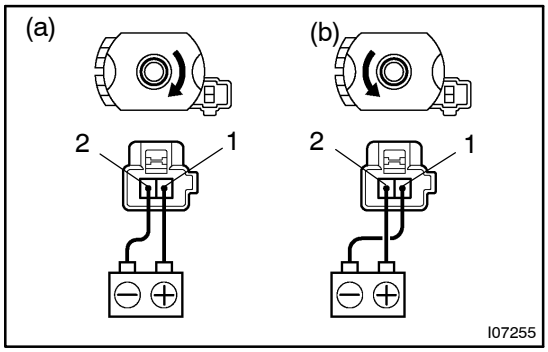
10. INSPECT FRONT VERTICAL MOTOR PTC THERMISTOR OPERATION

( ): Passenger side

(a) Connect the positive (+) lead from the battery to terminal 1 (2), the positive (+) lead from the ammeter to terminal 2 (1) and the negative (–) lead to the battery negative (–) terminal, then move the seat cushion to the highest position.
(b) Continue to apply voltage, check that the current changes to less than 1 ampere within 4 to 90 seconds.
(c) Disconnect the leads from the terminals.
(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 2 (1) and the negative (–) lead to terminal 1 (2), check that the seat cushion begins to descend.

If operation is not as specified, replace the seat adjuster.





11. INSPECT LIFTER MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, check that the motor turns clockwise.
(b) Reverse the polarity, check that the motor turns counter-clockwise.

If operation is not as specified, replace the seat adjuster.

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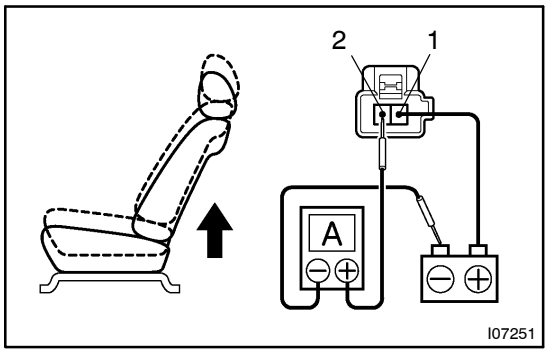
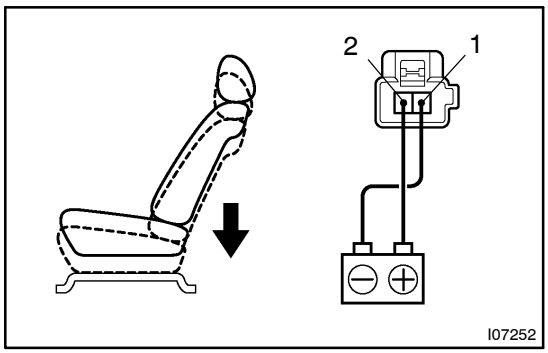


12. INSPECT LIFTER MOTOR PTC THERMISTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 2 (1), the positive (+) lead from the ammeter to terminal 1 (2) and the negative (–) lead to the battery negative (–) terminal, then move the seat cushion to the highest position.

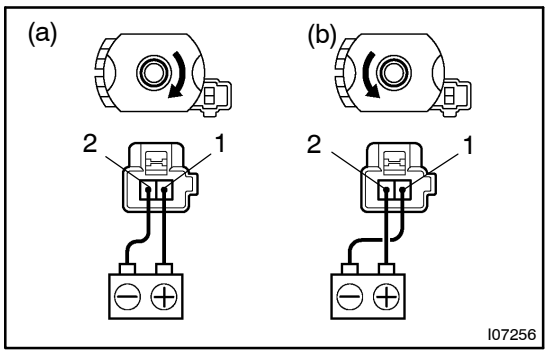
(b) Continue to apply voltage, check that the current changes to less than 1 ampere within 4 to 90 seconds.



(c) Disconnect the leads from the terminals.

(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 1 (2) and the negative (–) lead to terminal 2 (1), check that the seat cushion begins to descend.

If operation is not as specified, replace the seat adjuster.

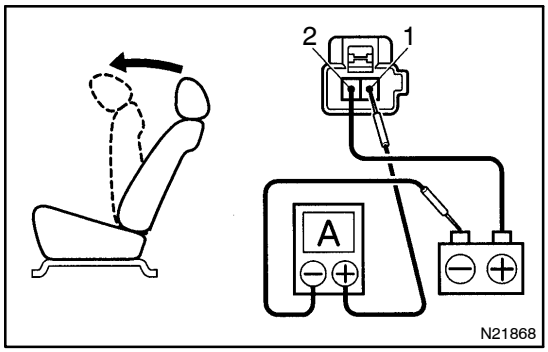


13. INSPECT RECLINING MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, check that the motor turns clockwise.

(b) Reverse the polarity, check that the motor turns counterclockwise.

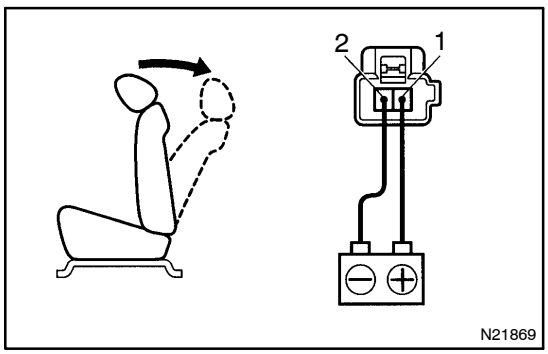
If operation is not as specified, replace the seat adjuster.



14. INSPECT RECLINING MOTOR PTC THERMISTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 2, the positive (+) lead from the ammeter to terminal 1 and the negative (–) lead to the battery negative (–) terminal, then recline the seat back to the most forward position.

(b) Continue to apply voltage, check that the current changes to less than 1 ampere within 4 to 90 seconds.



(c) Disconnect the leads from the terminals.

(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, check that the seat back begins to fall backward.

If operation is not as specified, replace the seat adjuster.

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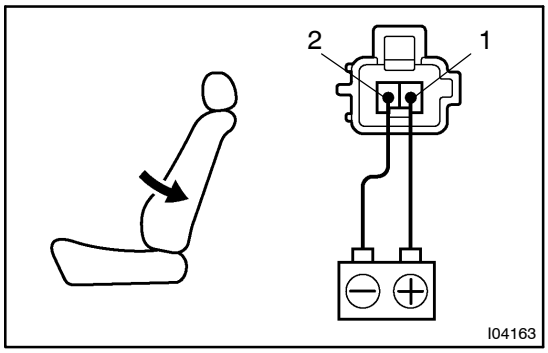
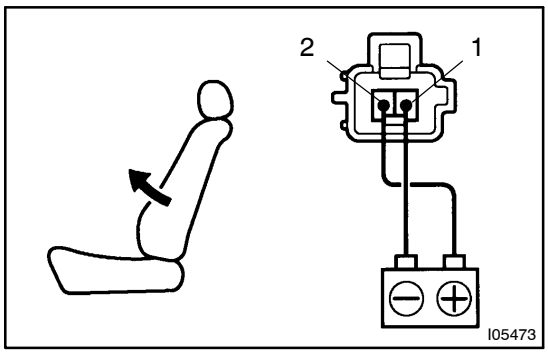


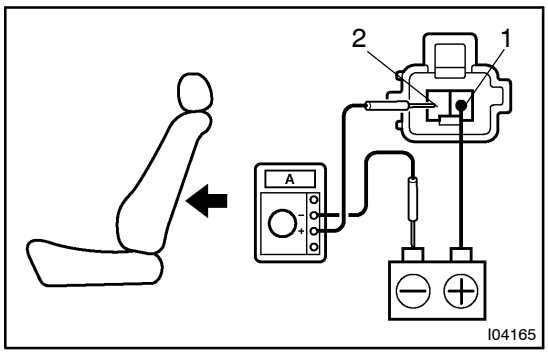
15. INSPECT LUMBAR SUPPORT MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, check that the lumbar support moves to release side.



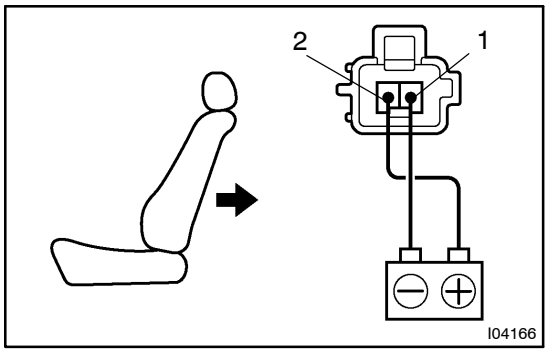
(b) Reverse the polarity, check that the lumbar support moves forward.

If operation is not as specified, replace the seat adjuster.



16. INSPECT LUMBAR SUPPORT MOTOR CIRCUIT BREAKER OPERATION

(a) Connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 1 on the lumbar support motor connector and move the lumbar support to front end position.



(b) Continue to apply voltage, check that a circuit breaker operation noise can be heard within 4 to 60 seconds.

(c) Reverse the polarity, check that the lumbar support begins to move release side with in spproximately 60 seconds.

If operation is not as specified, replace the motor.

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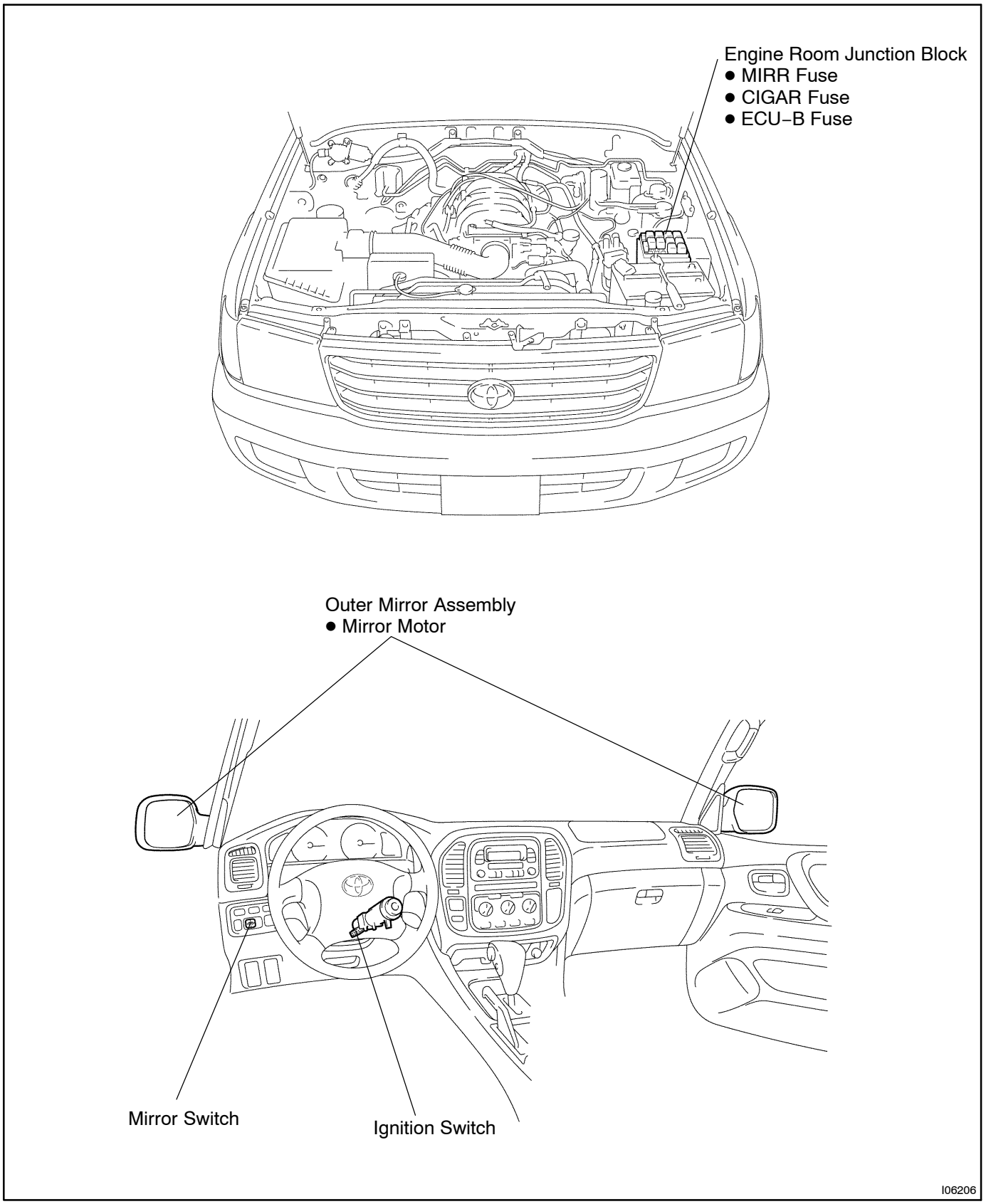
POWER MIRROR CONTROL SYSTEM

LOCATION

BE02J–05



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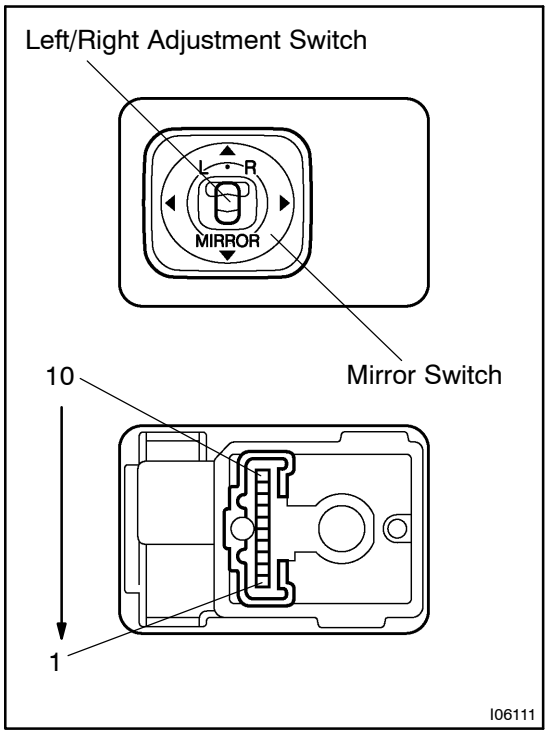
BE0GJ–02



INSPECTION

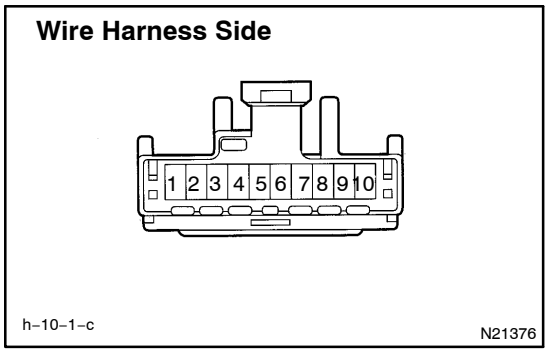
1. INSPECT LEFT SIDE MIRROR SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	–	No continuity
UP	3 – 4 7 – 8	Continuity
DOWN	3 – 8 4 – 7	Continuity
LEFT	4 – 9 7 – 8	Continuity
RIGHT	4 – 7 8 – 9	Continuity

2. INSPECT RIGHT SIDE MIRROR SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	–	No continuity
UP	2 – 4 1 – 7 – 8	Continuity
DOWN	4 – 7 1 – 2 – 8	Continuity
LEFT	4 – 10 1 – 7 – 8	Continuity
RIGHT	4 – 7 1 – 8 – 10	Continuity

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.

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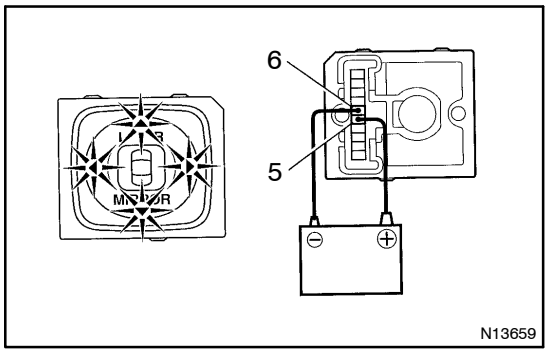
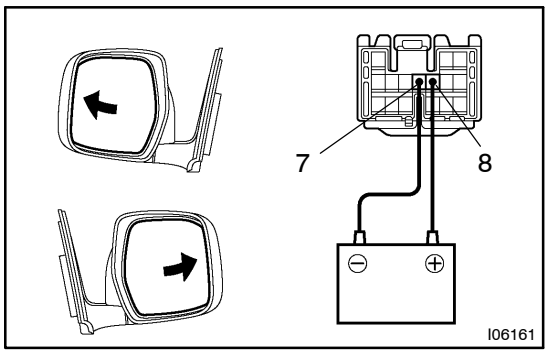


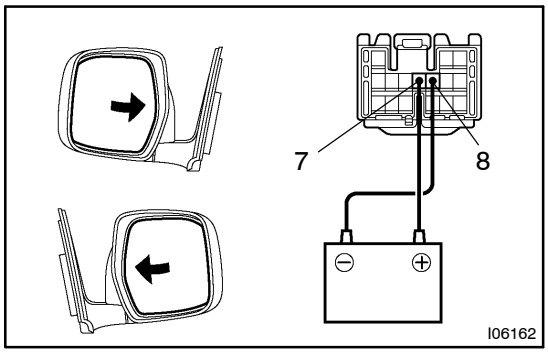
4. INSPECT INDICATOR LIGHT OPERATION

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.

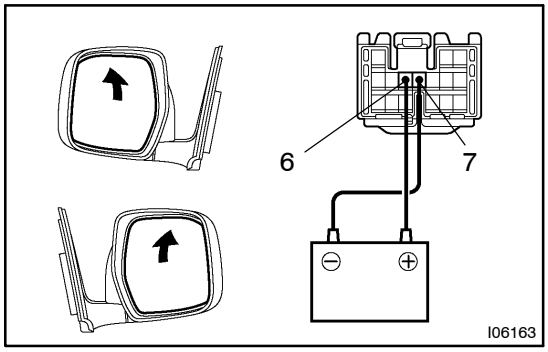


5. INSPECT MIRROR MOTOR OPERATION

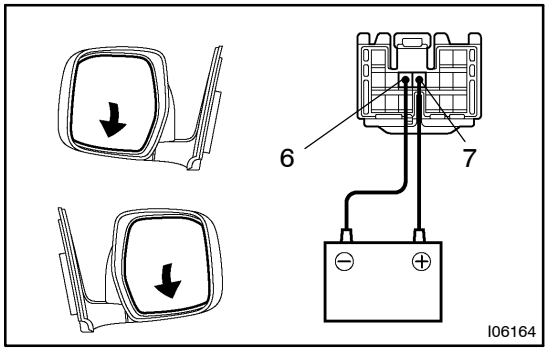
(a) Connect the positive (+) lead from the battery to terminal 8 and the negative (–) lead to terminal 7, and check that the mirror turns to the left side.



(b) Reverse the polarity, and check that the mirror turns to the right side.



(c) Connect the positive (+) lead from the battery to terminal 6 and the negative (–) lead to terminal 7, and check that the mirror turns upward.



(d) Reverse the polarity, and check that the mirror turns downward.

If operation is not as specified, replace the mirror assembly.

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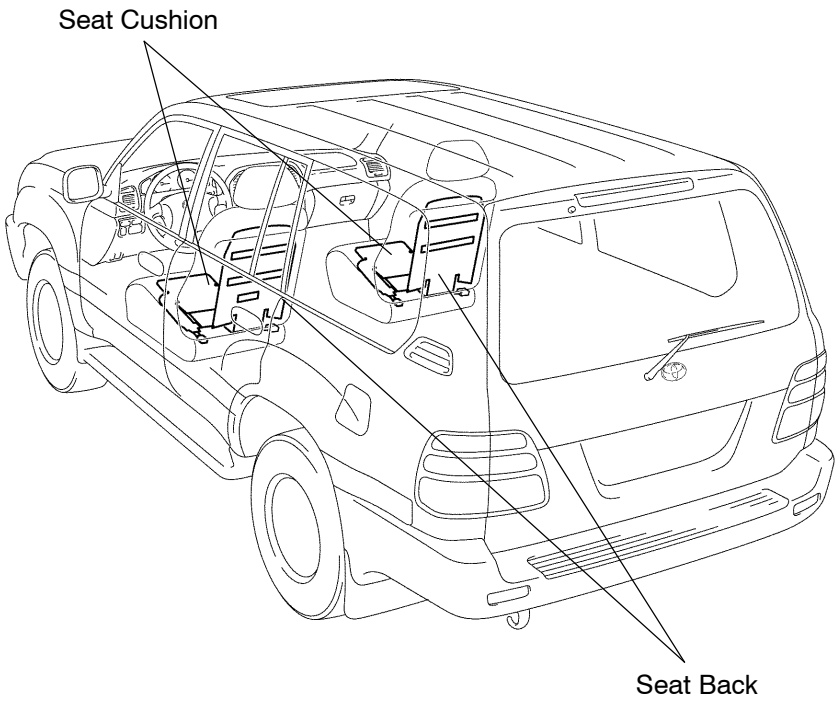
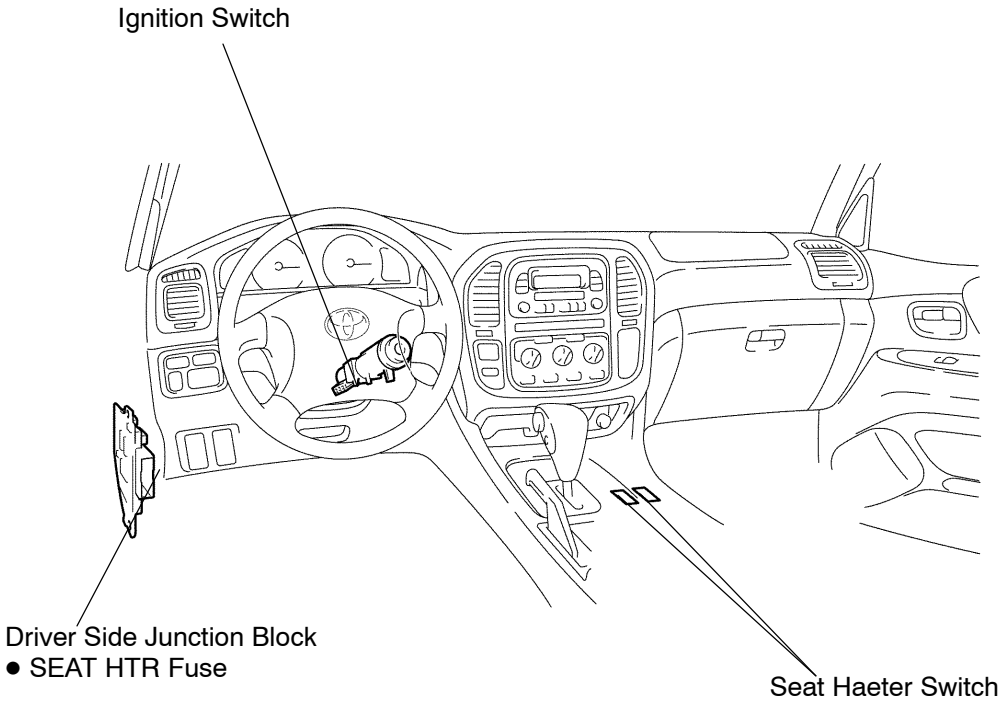
SEAT HEATER SYSTEM

LOCATION

BE0GH–03





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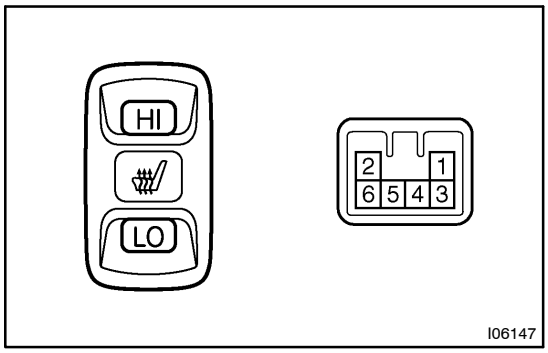
BE0GI–03

INSPECTION

1. INSPECT SEAT HEATER SWITCH CONTINUITY



Switch position	Tester connection	Specified condition
HI	3 – 4 5 – 6	Continuity
OFF	–	No continuity
LO	4 – 5	Continuity
Illumination circuit	1 – 2	Continuity

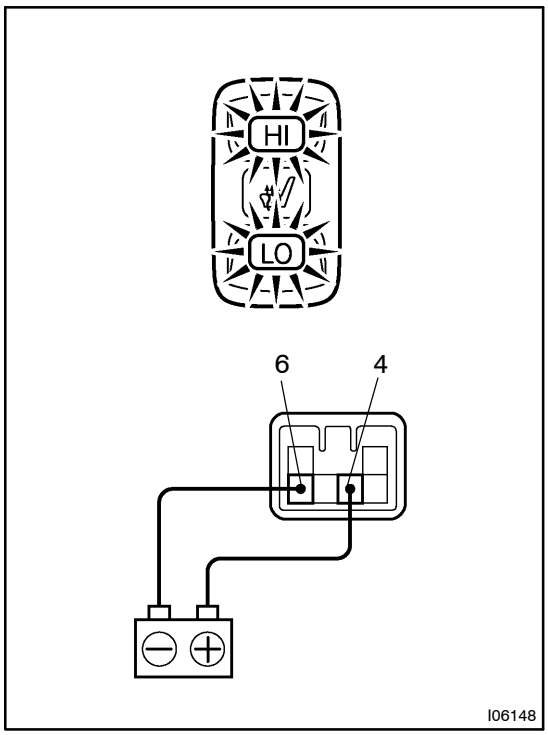
If continuity is not as specified, replace the switch.

2. INSPECT SEAT HEATER INDICATOR LIGHT OPERATION

(a) Connect the positive (+) lead from the battery to terminal 6 and the negative (–) lead to terminal 4.

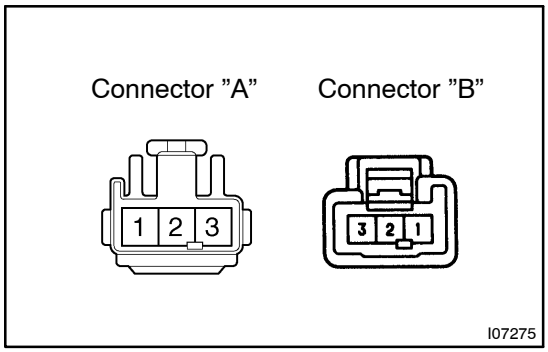
(b) Push the seat heater switch Right or Left side and check that the indicator light lights up.

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



3. INSPECT SEAT HEATER CUSHION CONTINUITY

Inspect the seat cushion between terminals, as shown.



Tester connection	Condition	Specified condition
A1 – B3	Constant	Continuity
A2 – B2	Constant	Continuity
A3 – B1	Constant	Continuity

If continuity is not as specified, replace the seat cushion pad.

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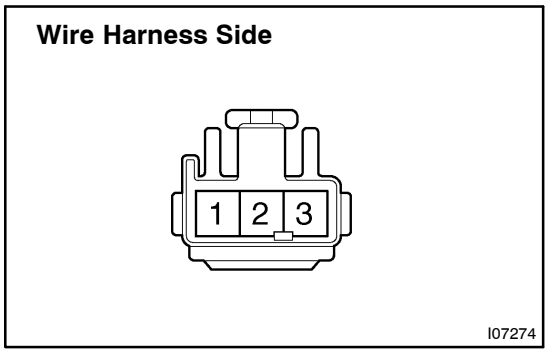
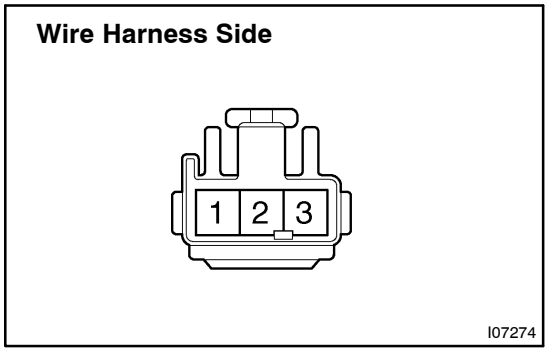


4. INSPECT SEAT BACK CONTINUITY

Inspect the seat heater back and front cushion continuity between terminals, as shown.

Tester connection	Condition	Specified condition
1 – 2 – 3	Constant	Continuity

If continuity is not as specified, replace the seat back pad.



5. INSPECT SEAT CUSHION AND SEAT BACK OPERATION

(a) Heat the thermostat with a light.
(b) Connect the seat cushion and seat back connetor.
(c) Inspect the seat heater cushion and seat back continuity between terminals, as shown.

Tester connection	Condition	Specified condition
1 – 2 – 3	25 – 35 °C	Continuity
1 – 3	35 – 45 °C	Continuity

If continuity is not as specified, replace the seat back pad.

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AUDIO SYSTEM

BE0SA–01

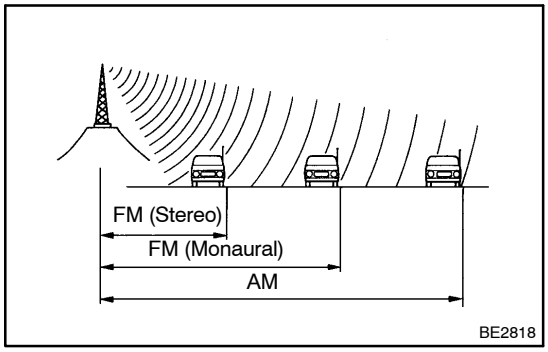
DESCRIPTION

1. RADIO WAVE BAND

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

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

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

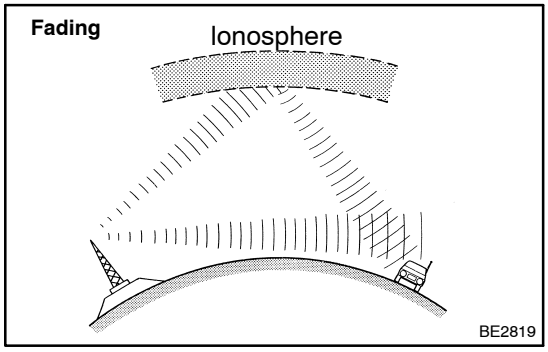


2. SERVICE AREA

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.



(a) 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”.

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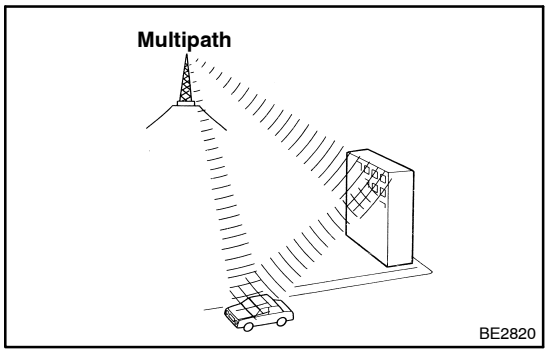
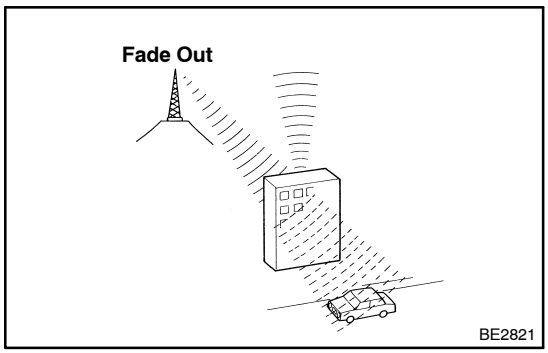


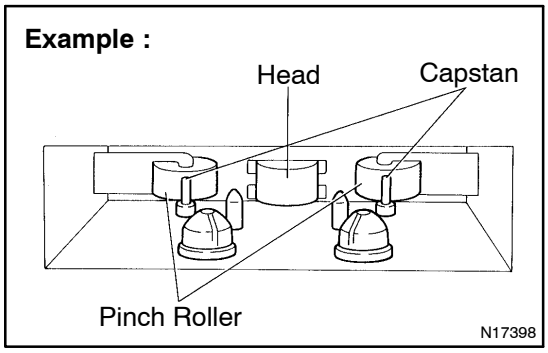
(b) Multipath
One type of interference caused by the bounce of radio waves off of obstructions is called ”multipath”. Multipath occurs when a signal from the broadcast transmitter antenna bounces off buildings and mountains and interferes with the signal that is received directly.



(c) 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. 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.



5. 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.

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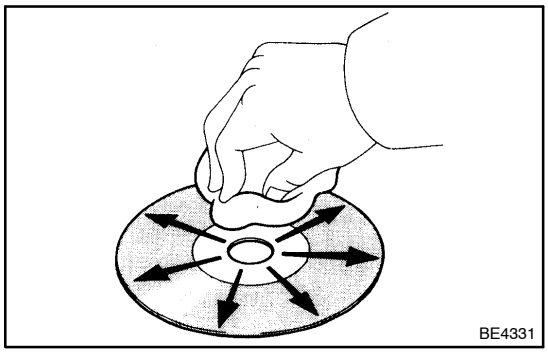

6. CD Player/Disc Cleaning:
MAINTENANCE

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.

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BE0SB–01

TROUBLESHOOTING

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
	Any AM or FM does not work.	5
	Few preset turning bands.	5
	Reception poor.	6
	Sound quality poor.	7
	Preset memory disappears.	8
Tape Player	Cassette tape cannot be inserted.	9
	Cassette tape inserted, but no power.	10
	Power coming in, but tape player not operating.	11
	Any speaker does not work.	12
	Sound quality poor.	13
	Tape jammed, malfunction with tape speed or auto–reverse.	14
	Cassette tape will not eject.	15
CD Player	CD cannot be inserted.	16
	CD inserted, but no power.	17
	Power coming in, but CD player not operating.	18
	Sound jumps.	19
	Sound quality poor (Volume faint).	20
	Any speaker does not work.	21
	CD will not be ejected.	22
Power Amplifier	No power coming in.	23
	Power coming in, but power amplifier not operating.	24
	Any speaker does not work.	25
Noise	Noise occurs	26
	Noise produced by vibration or shock while driving.	27
	Noise produced when engine starts.	28

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

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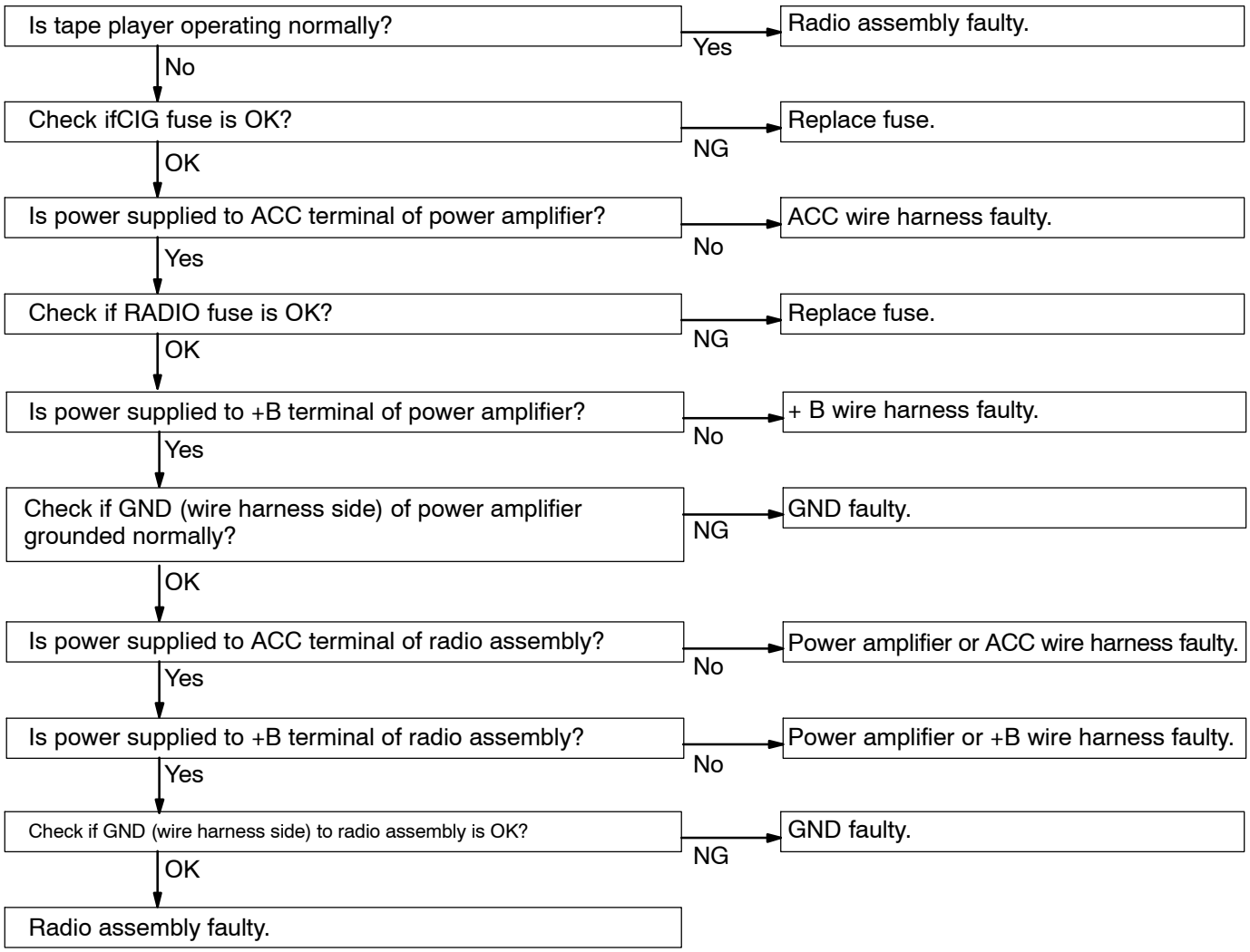
1	Radio	RADIO NOT OPERATING WHEN POWER SWITCH TURNED TO ”ON”



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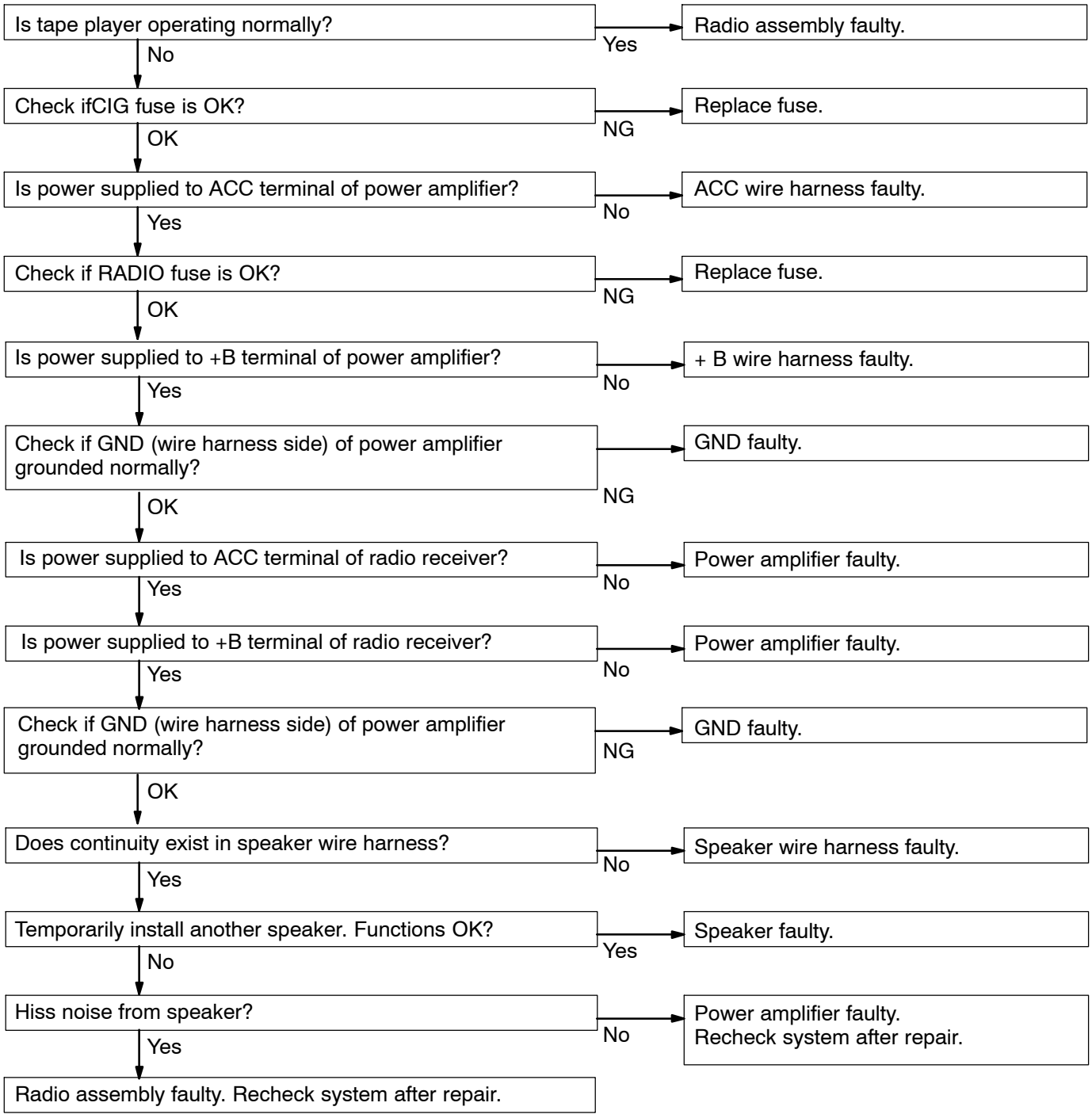
2	Radio	DISPLAY INDICATES WHEN POWER SWITCH TURNED TO ”ON”, BUT NO SOUND (INCLUDING ”NOISE”) IS PRODUCED



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3	Radio	NOISE PRESENT, BUT AM–FM NOT OPERATING

Go to No.25

If radio side faulty. → Radio faulty.

4	Radio	ANY SPEAKER DOES 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 ↓

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

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

Power amplifier faulty. Recheck system after repair.

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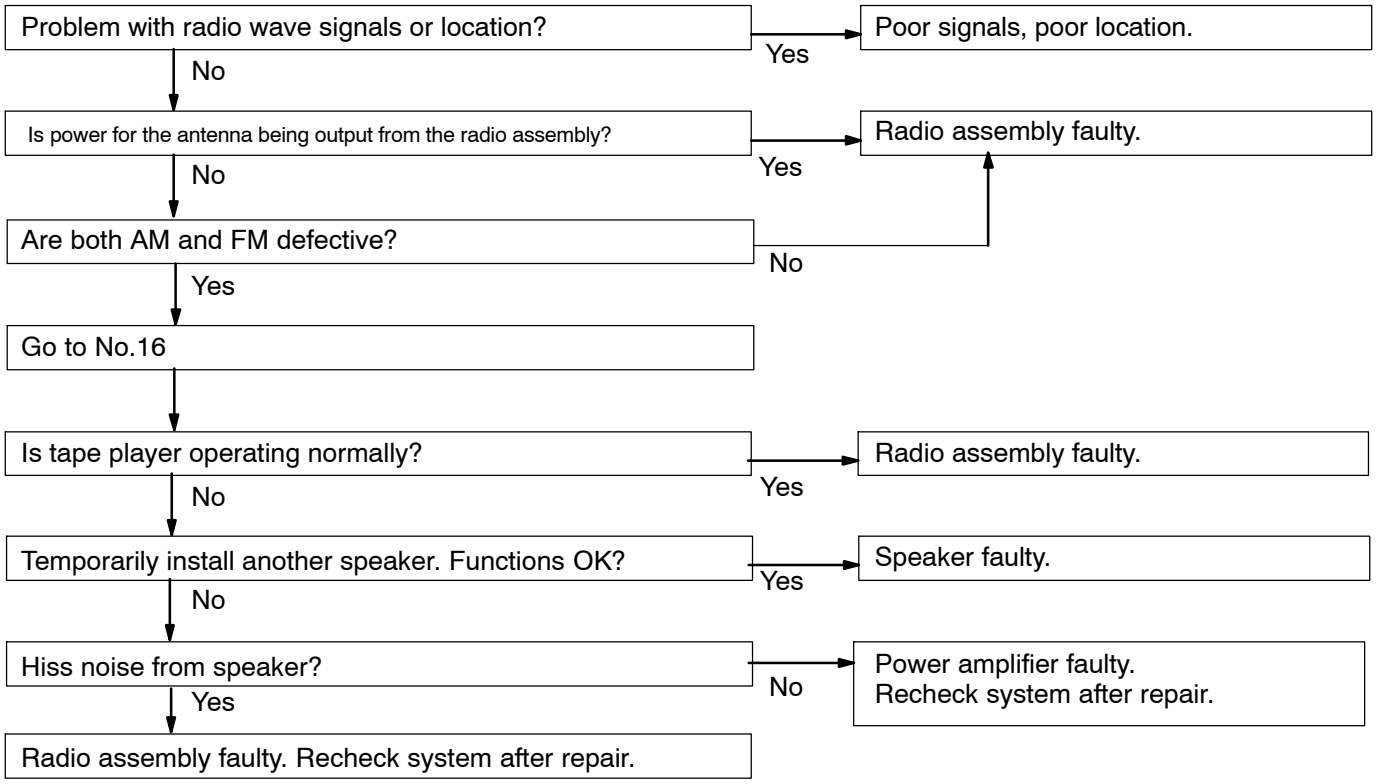
5	Radio	ANY AM OR FM DOES NOR WORK FEW PRESET TUNING BANDS



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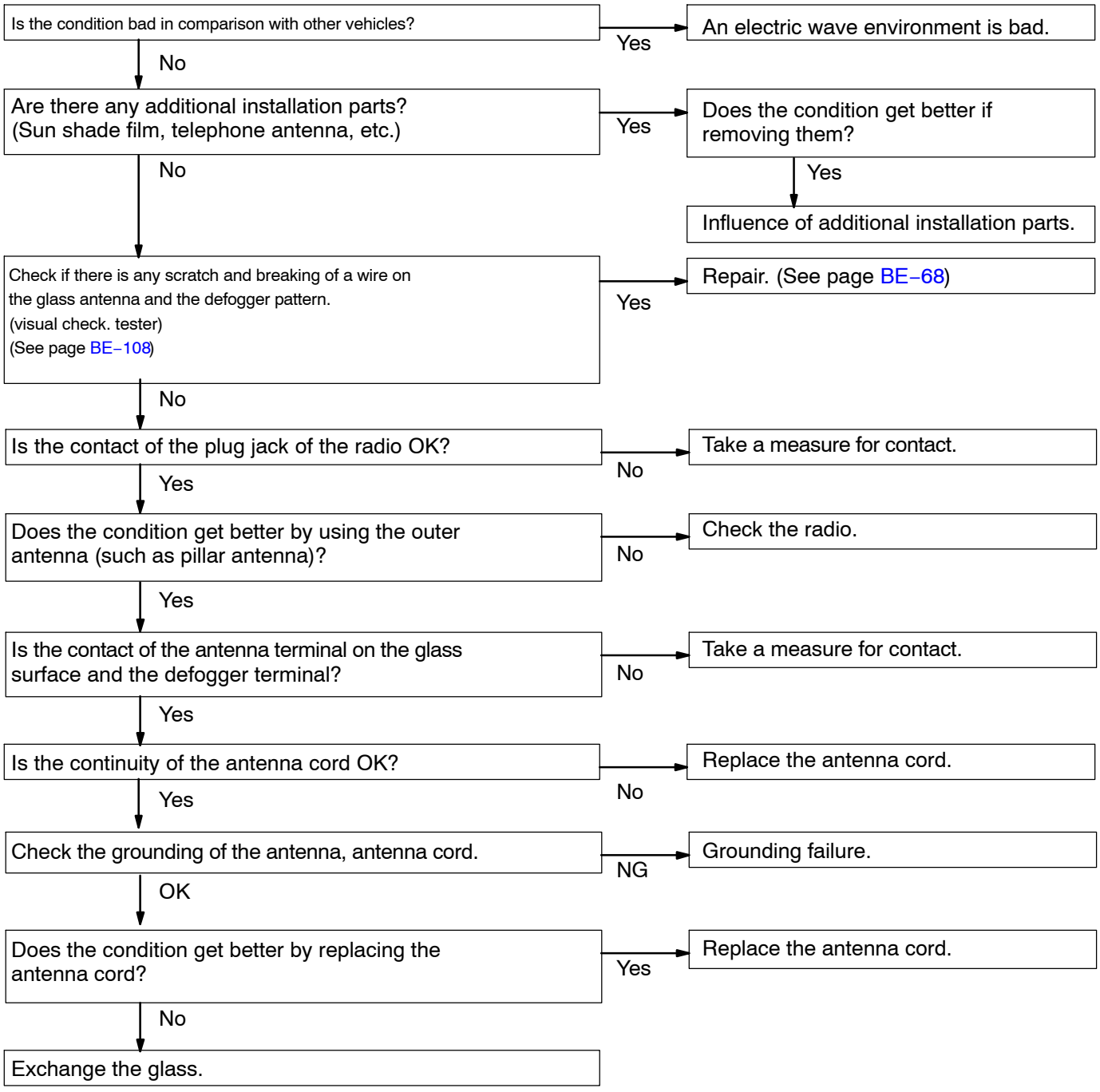
6	Radio	POOR RECEPTION



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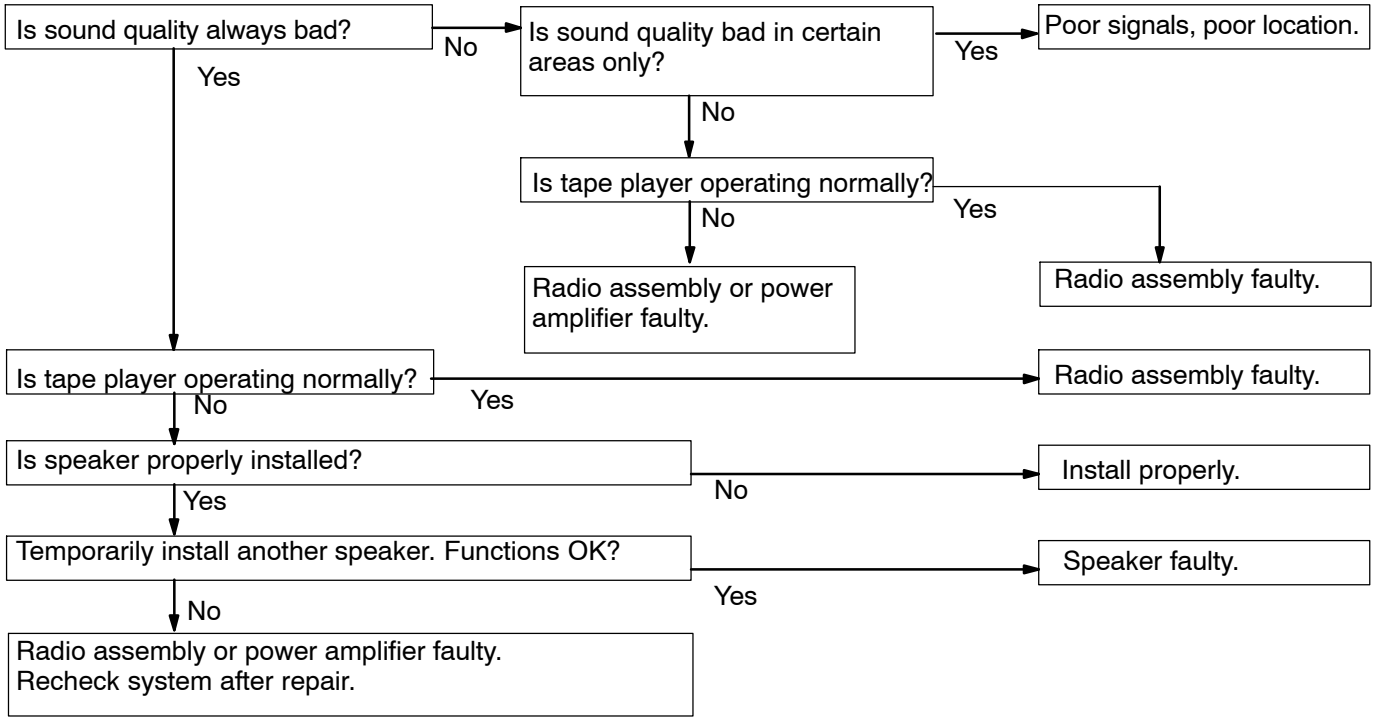
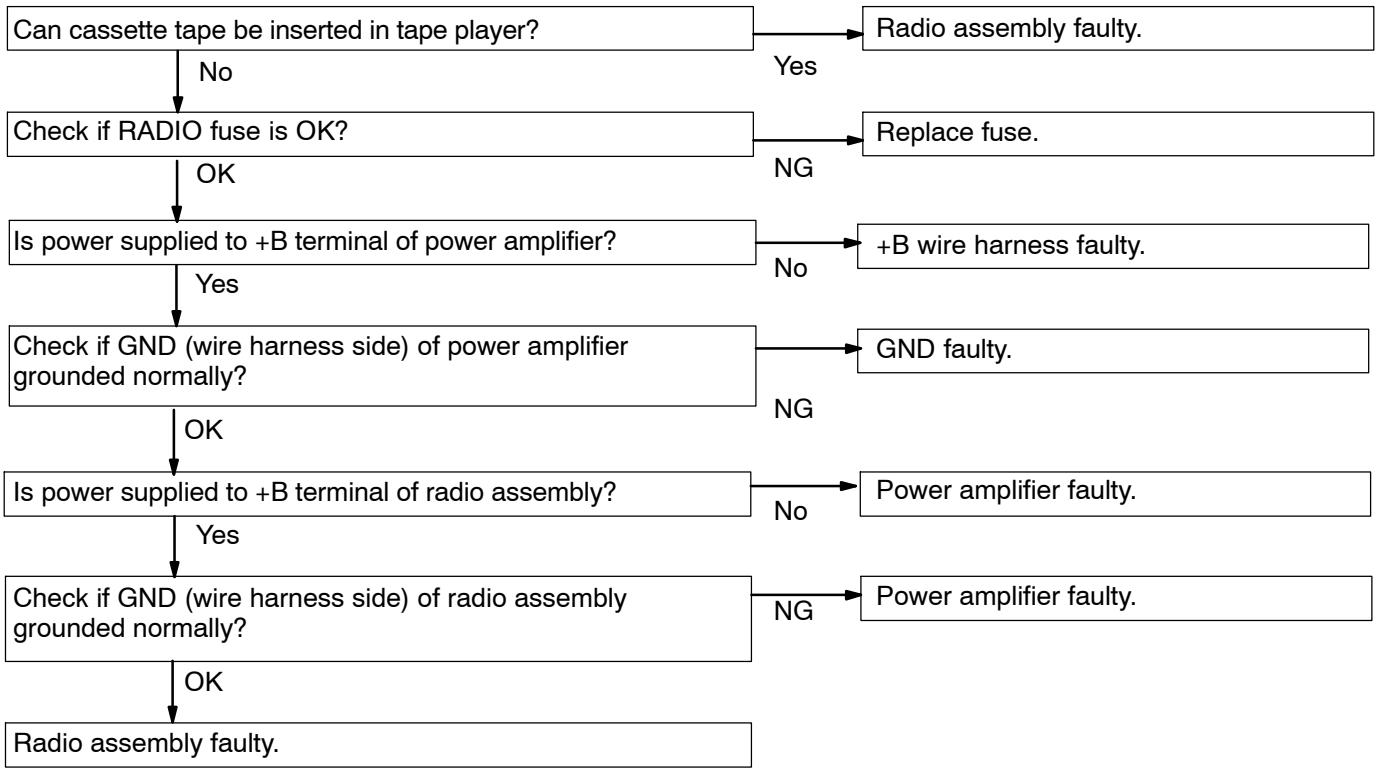
7	Radio	SOUND QUALITY POOR



8	Radio	PRESET MEMORY DISAPPEARS



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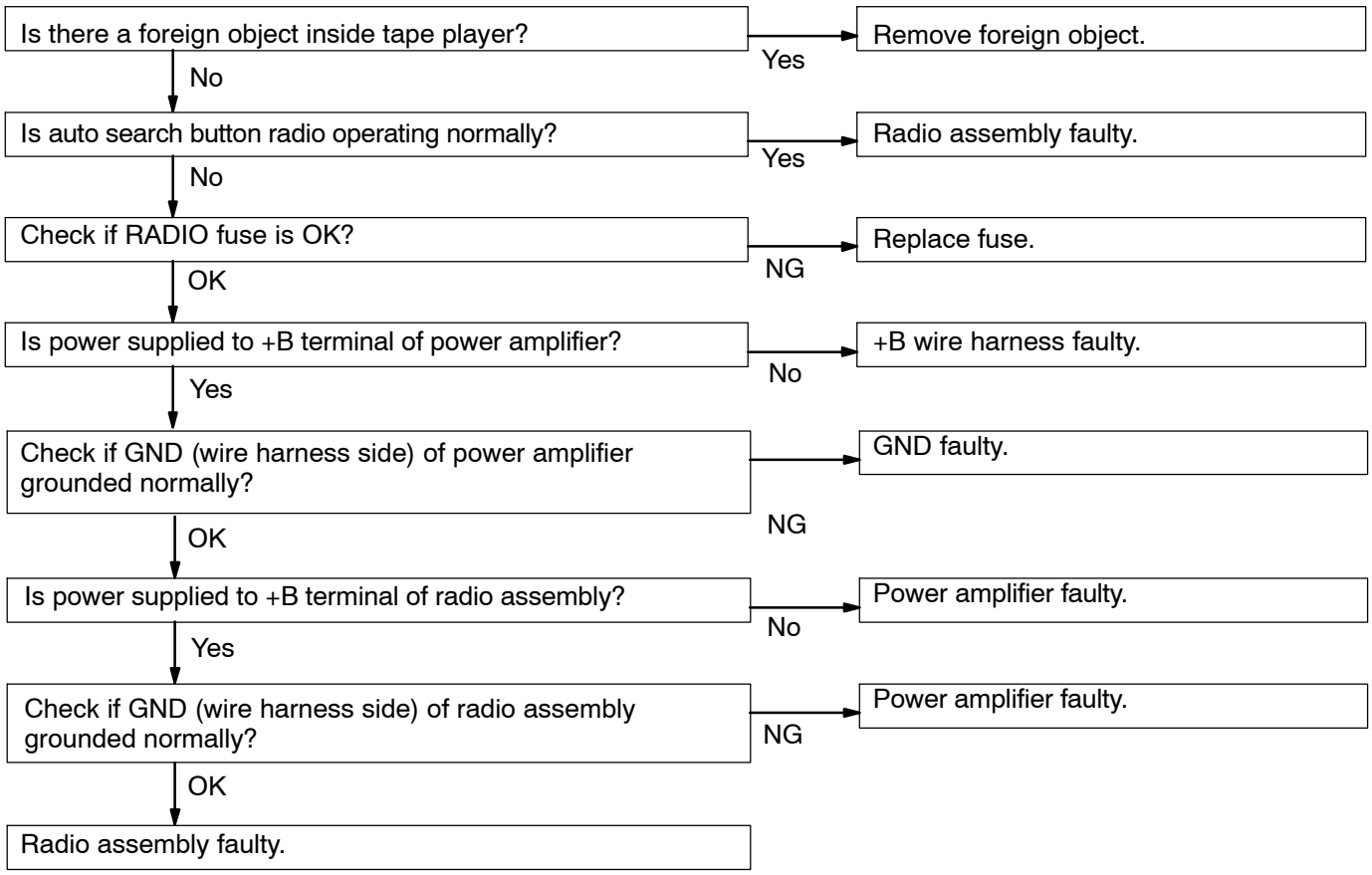
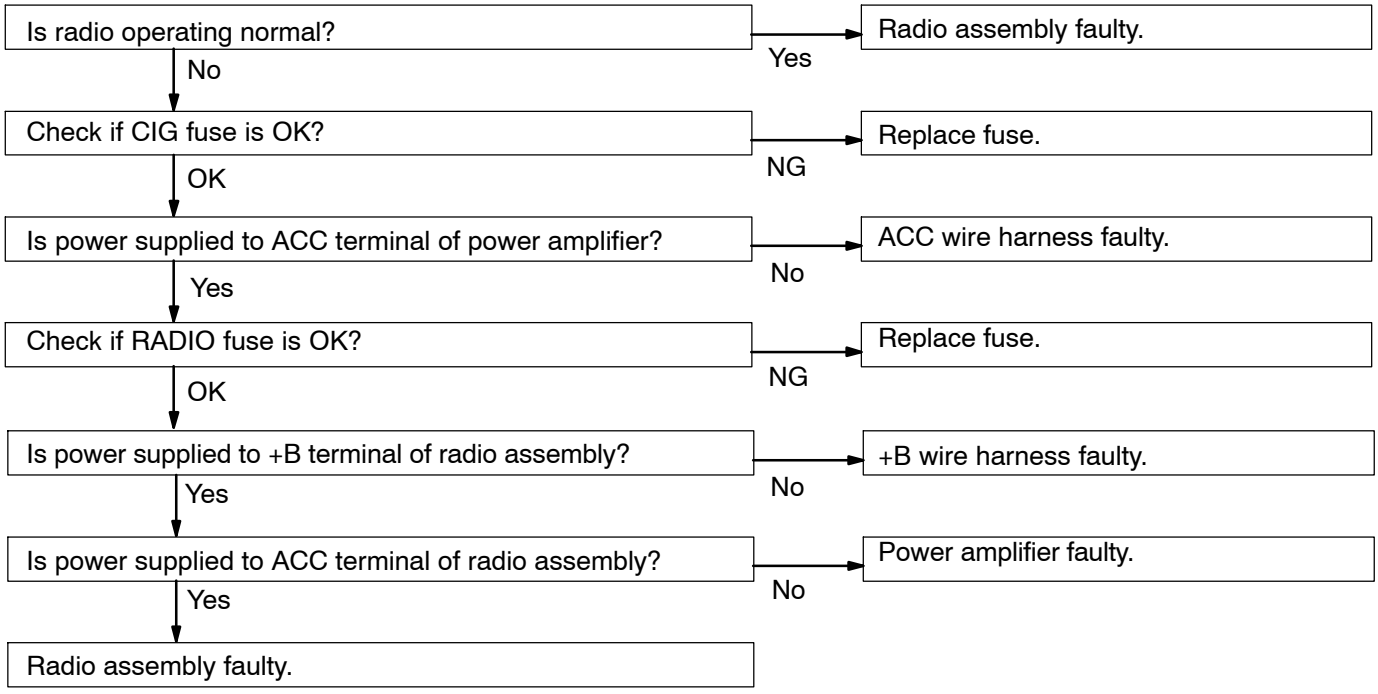
9	Tape Player	CASSETTE TAPE CANNOT BE INSERTED



10	Tape Player	CASSETTE TAPE INSERTED, BUT NO POWER



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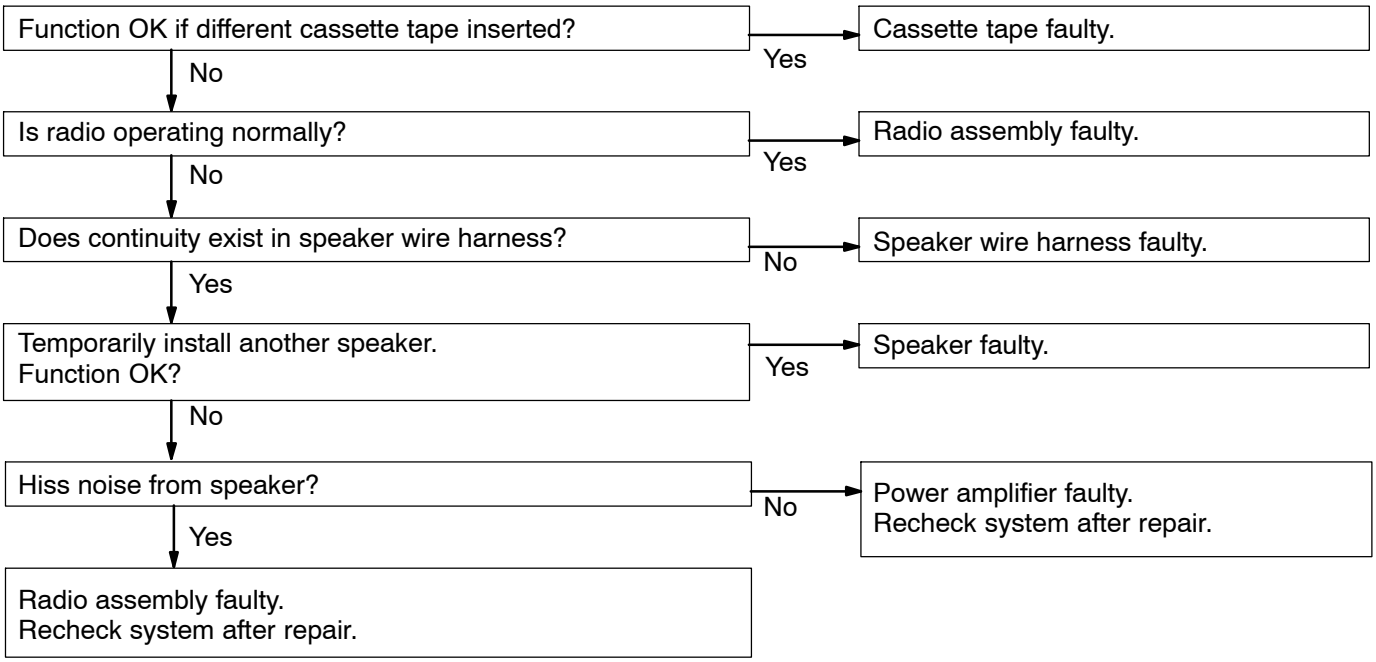
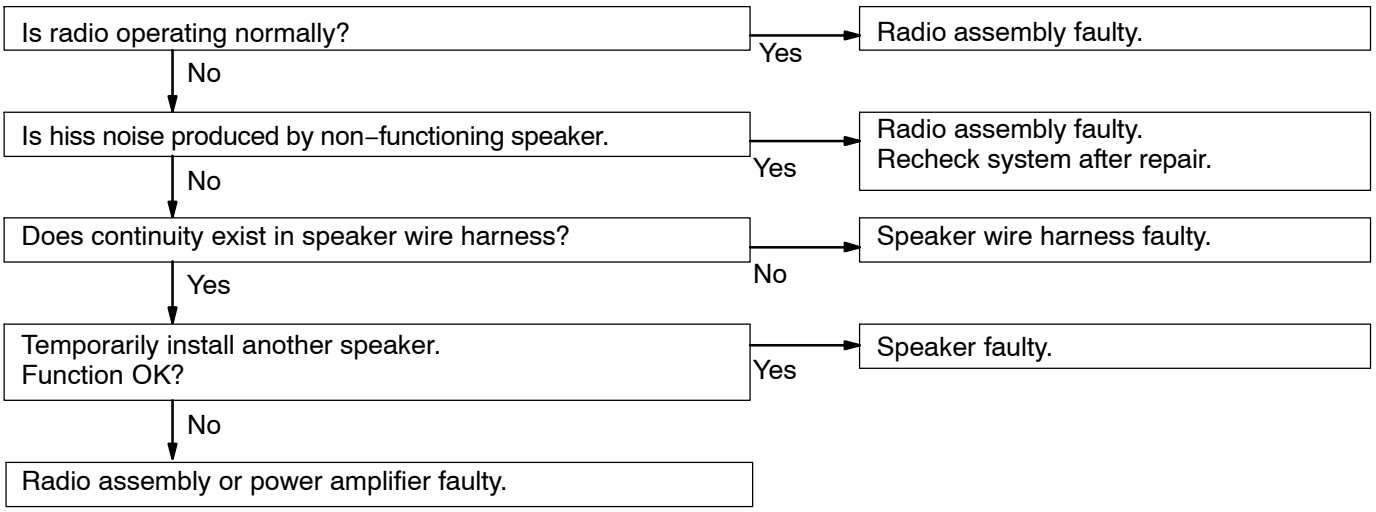
11	Tape Player	POWER COMING IN, BUT TAPE PLAYER NOT OPERATING



12	Tape Player	ANY SPEAKER DOES NOT WORK



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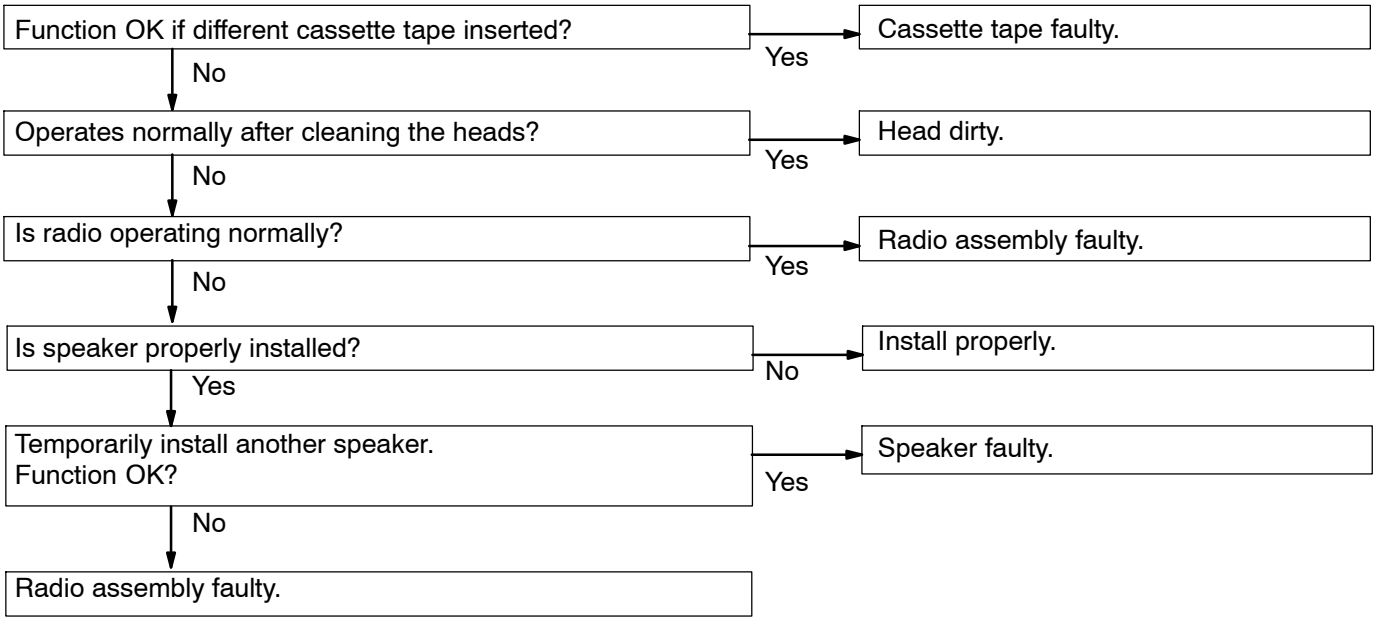
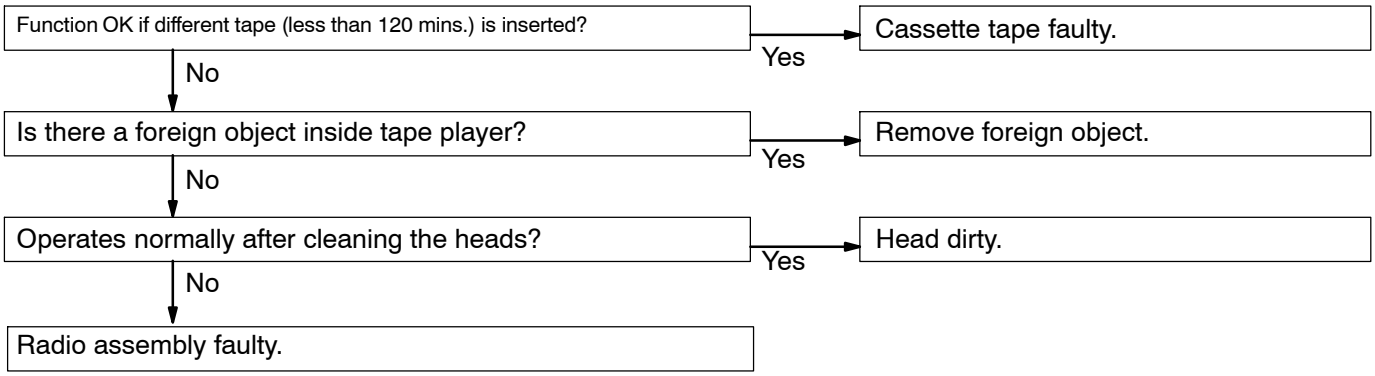
13	Tape Player	SOUND QUALITY POOR (VOLUME FAINT)



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



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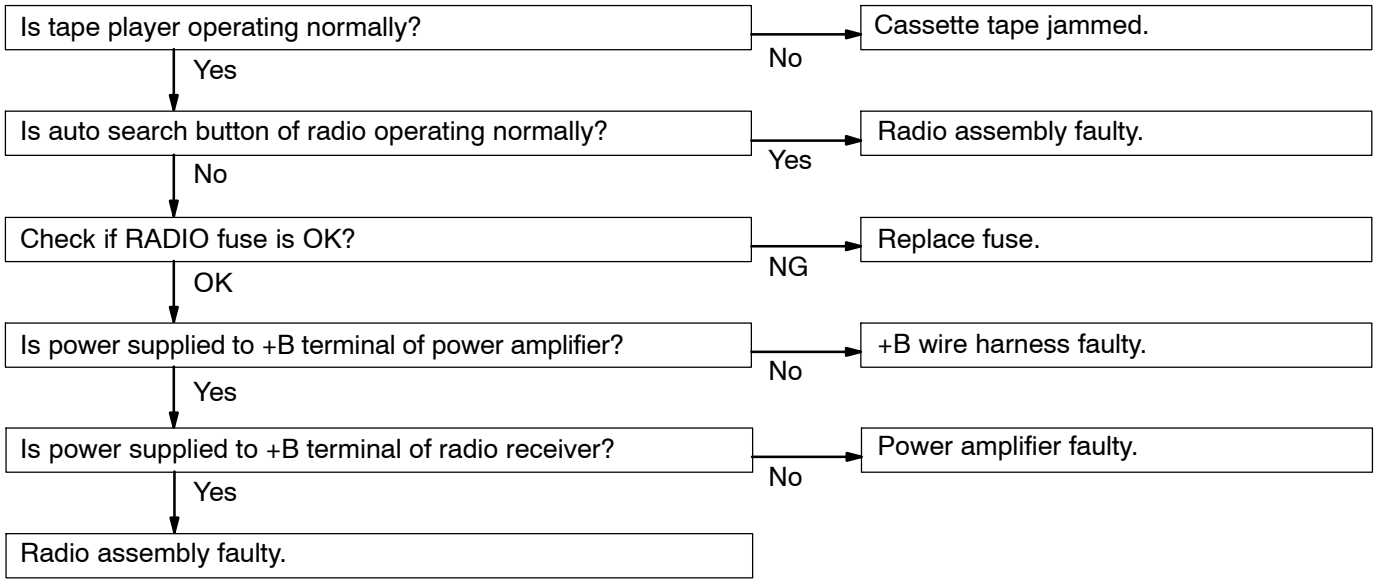
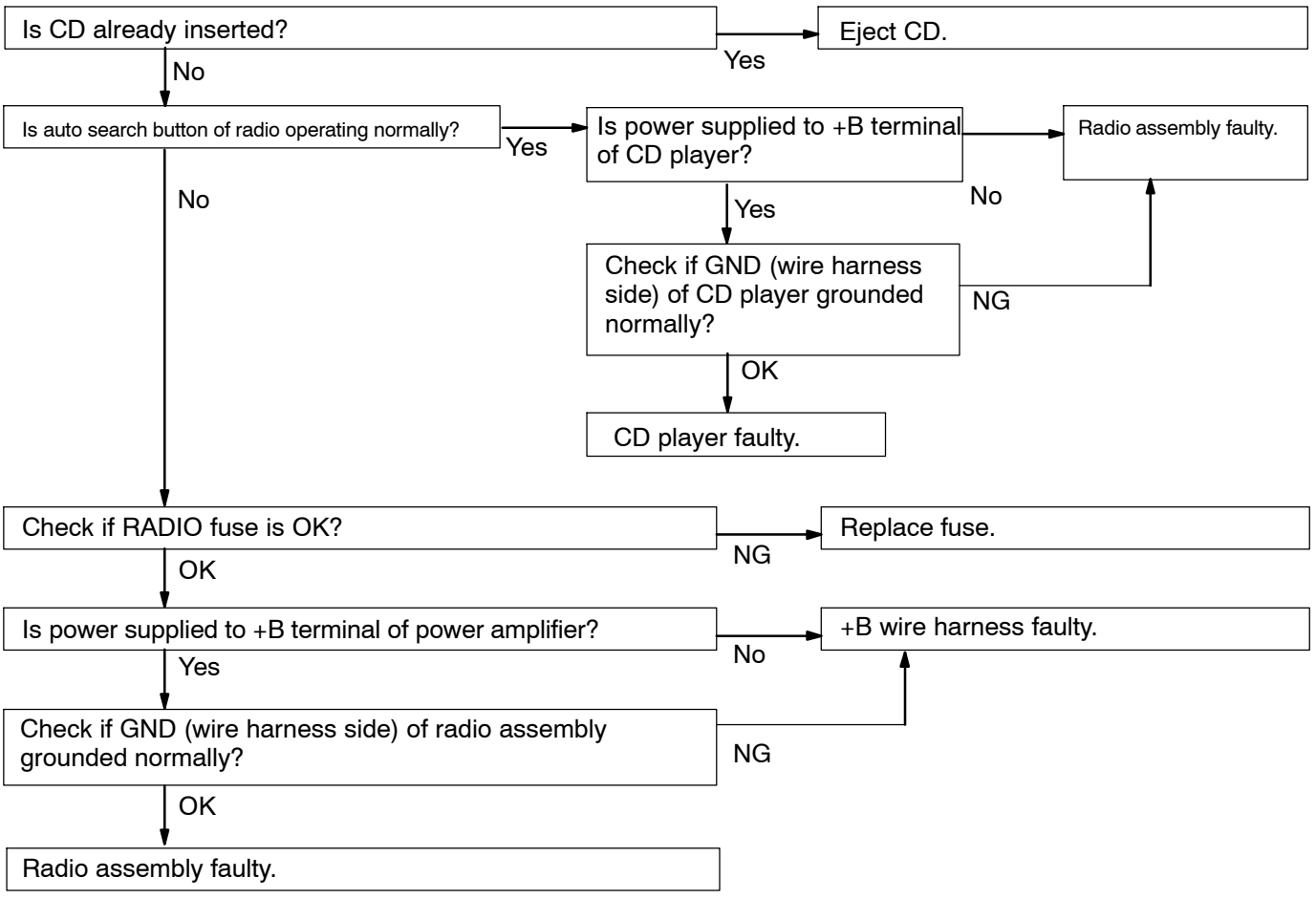
15	Tape Player	CASSETTE TAPE WILL NOT BE EJECTED



16	CD Player	CD CANNOT BE INSERTED



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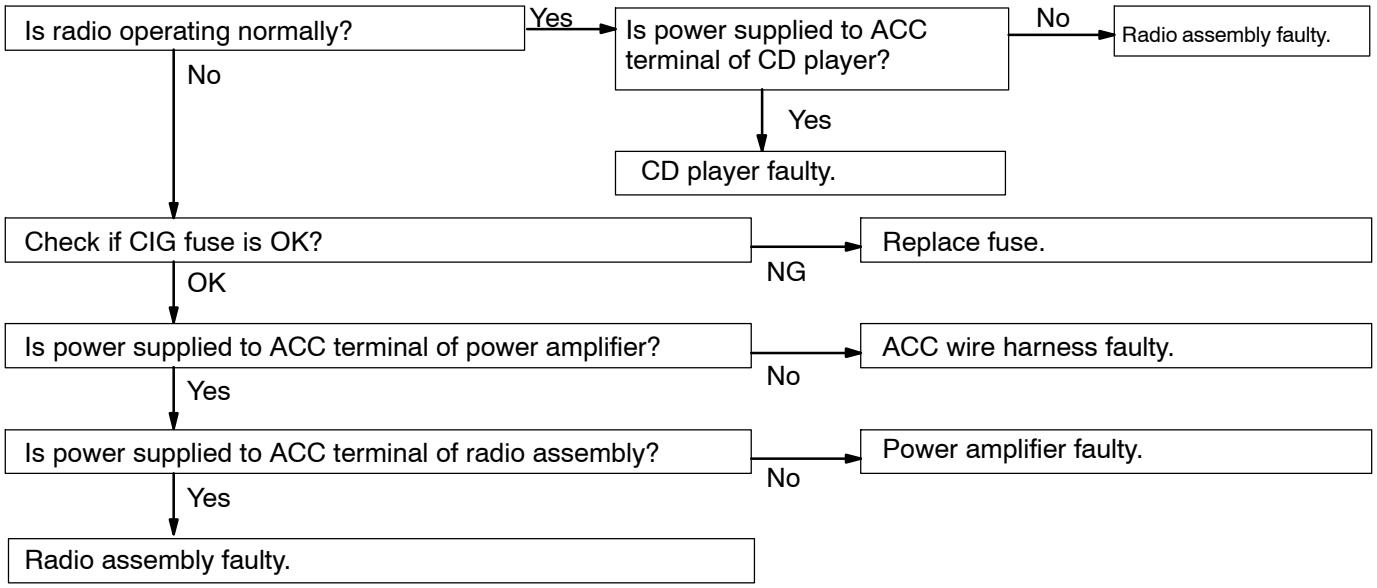
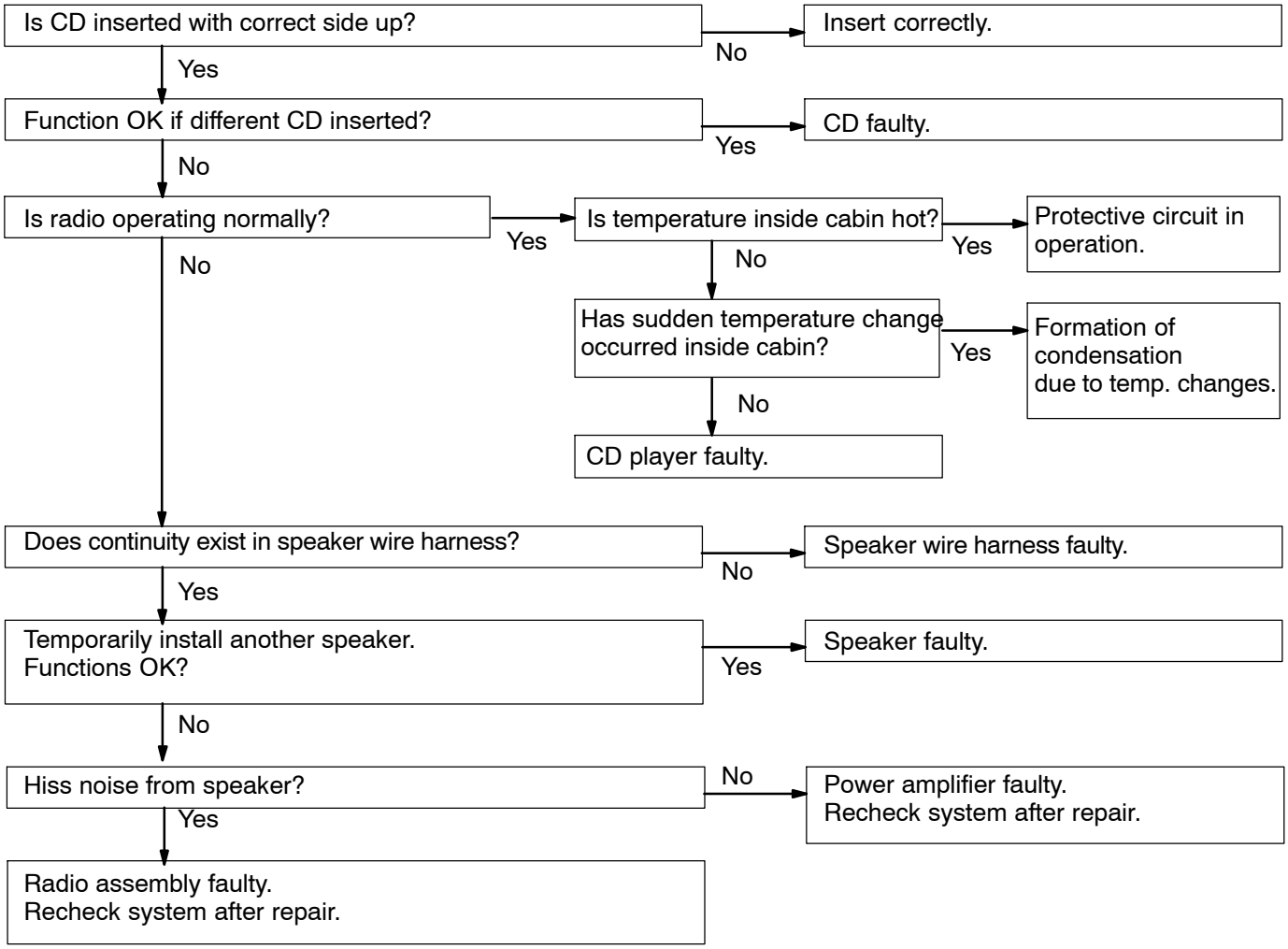
17	CD Player	CD INSERTED, BUT NO POWER



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



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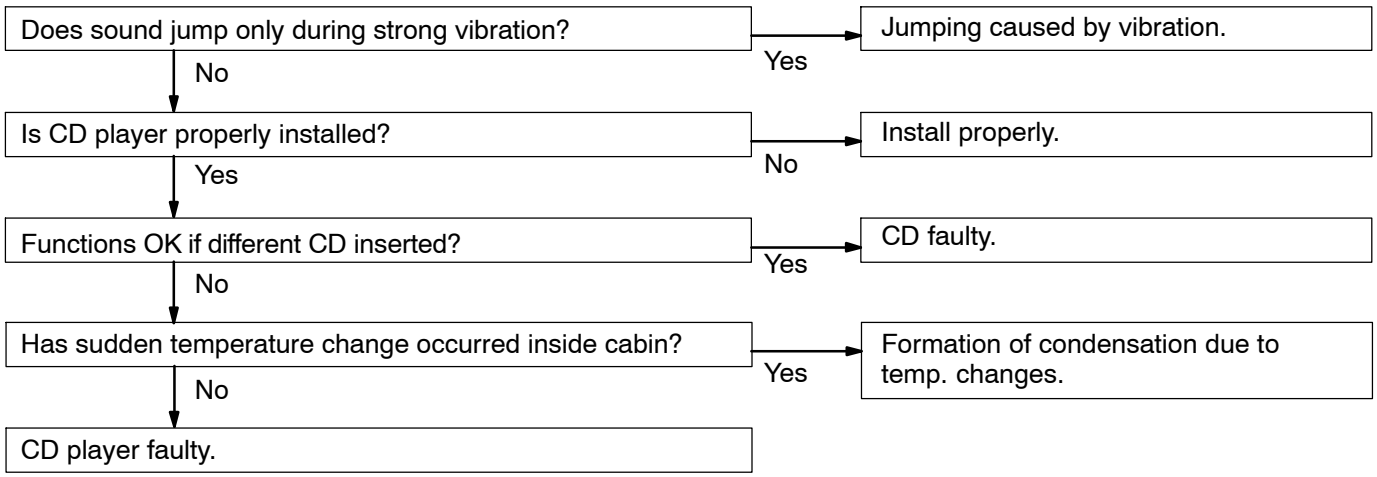
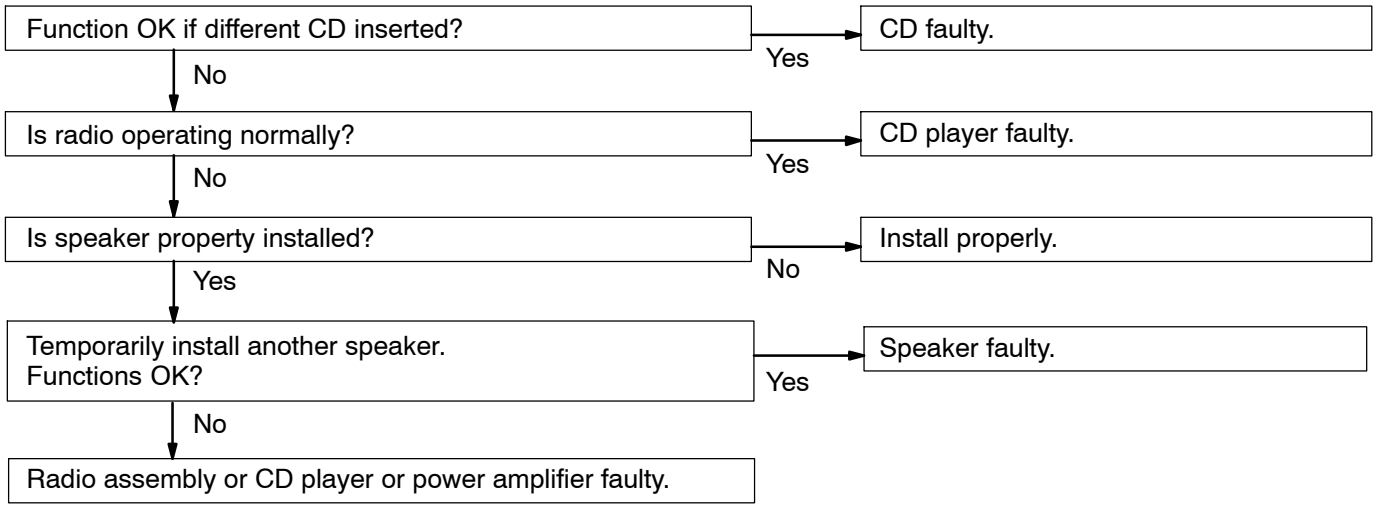
19	CD Player	SOUND JUMPS



20	CD Player	SOUND QUALITY POOR (VOLUME FAINT)



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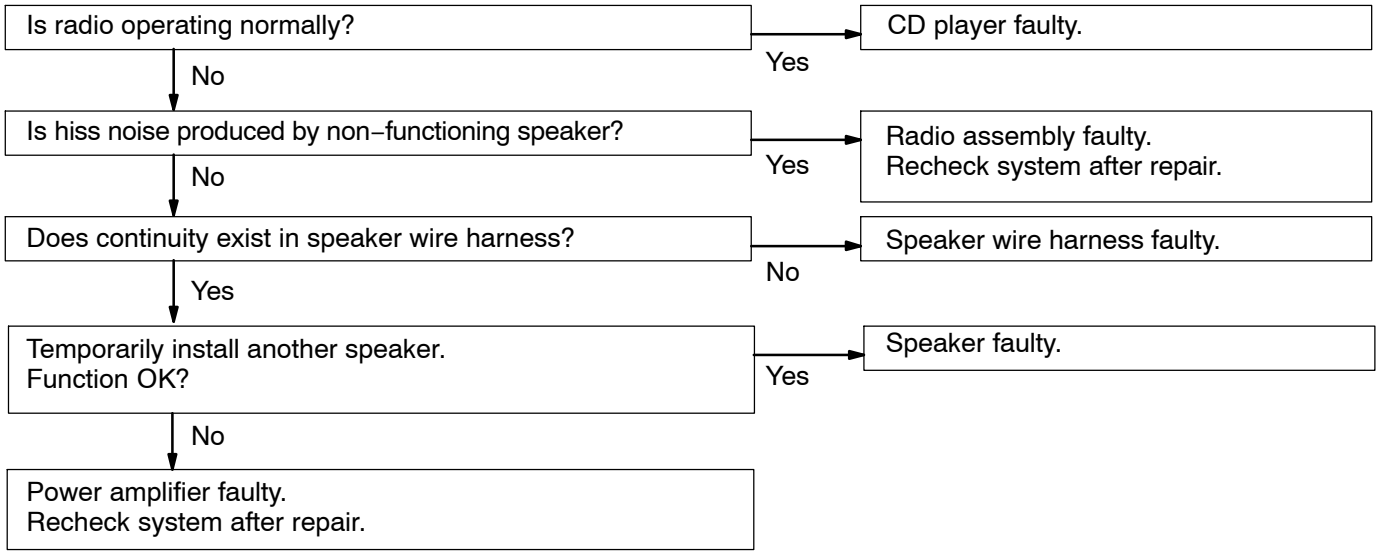
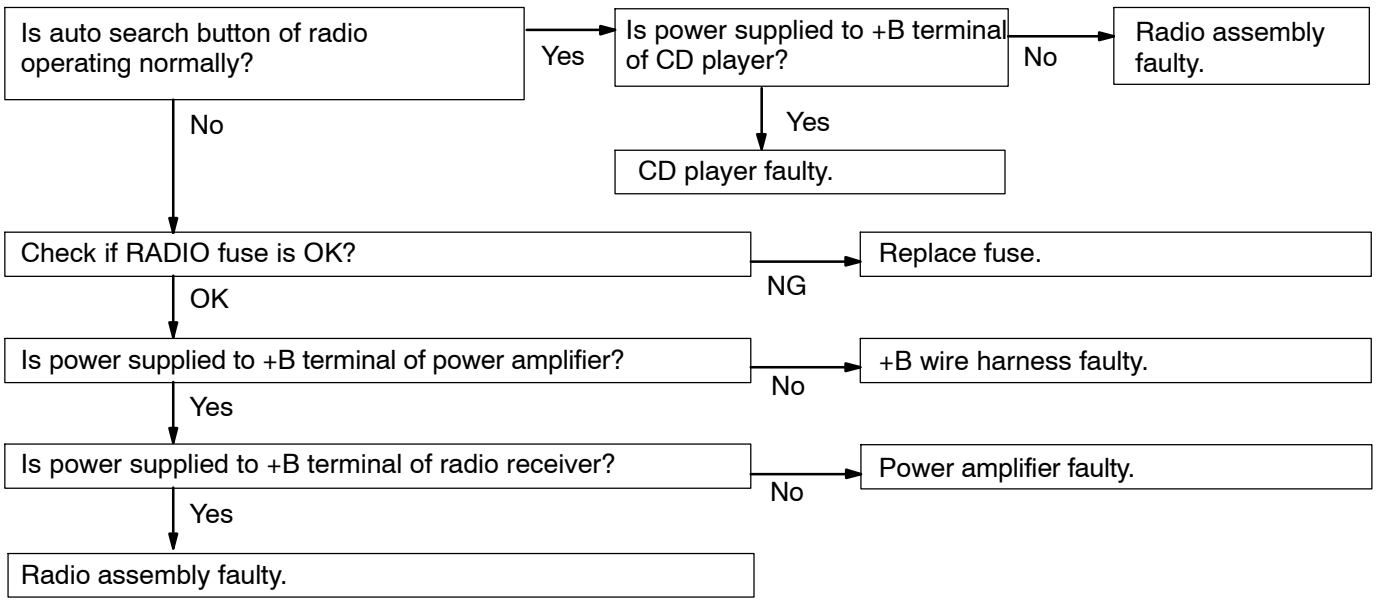
21	CD Player	ANY SPEAKER DOES NOT WORK



22	CD Player	CD WILL NOT BE EJECTED



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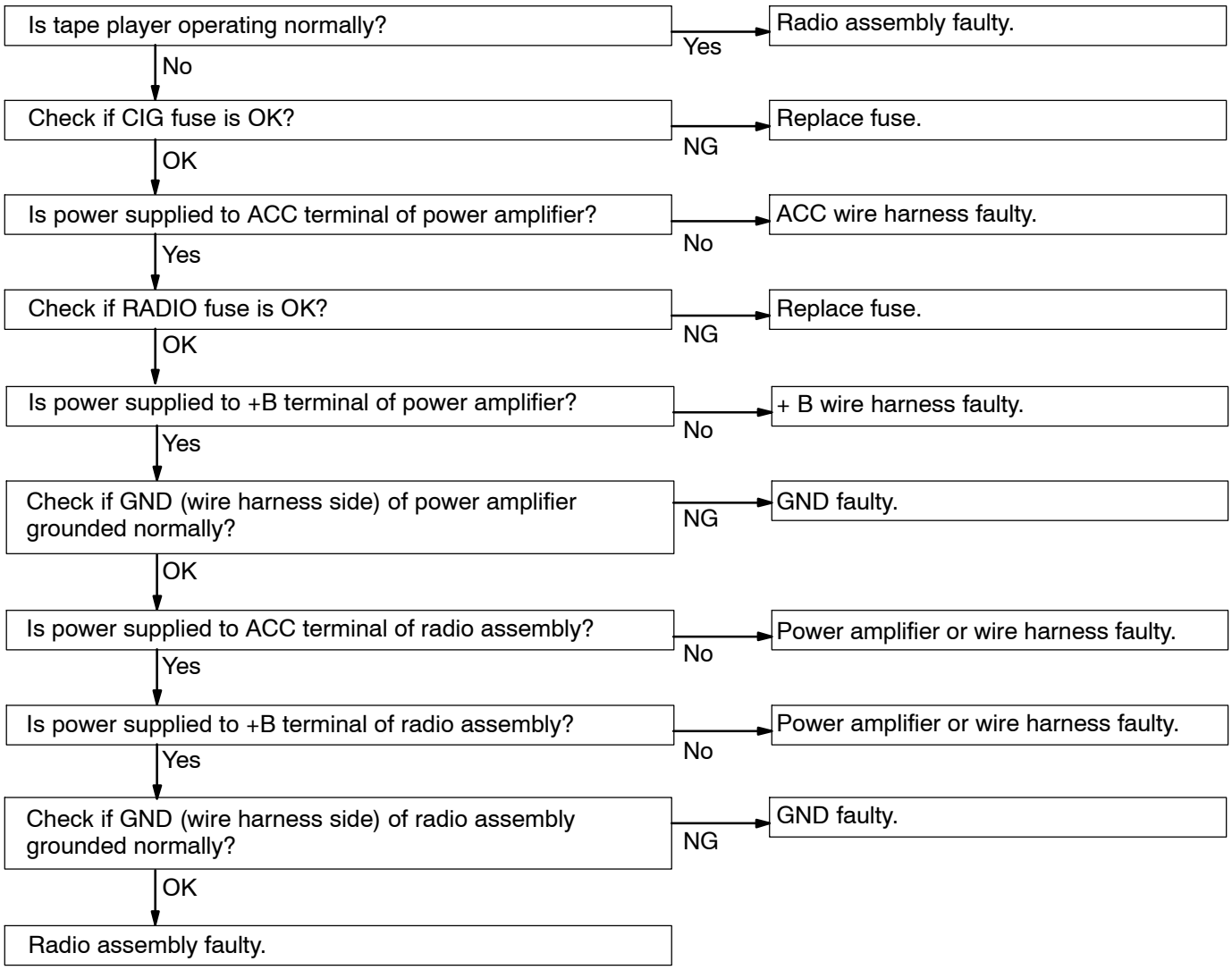
23	Power Amplifier	NO POWER COMING IN



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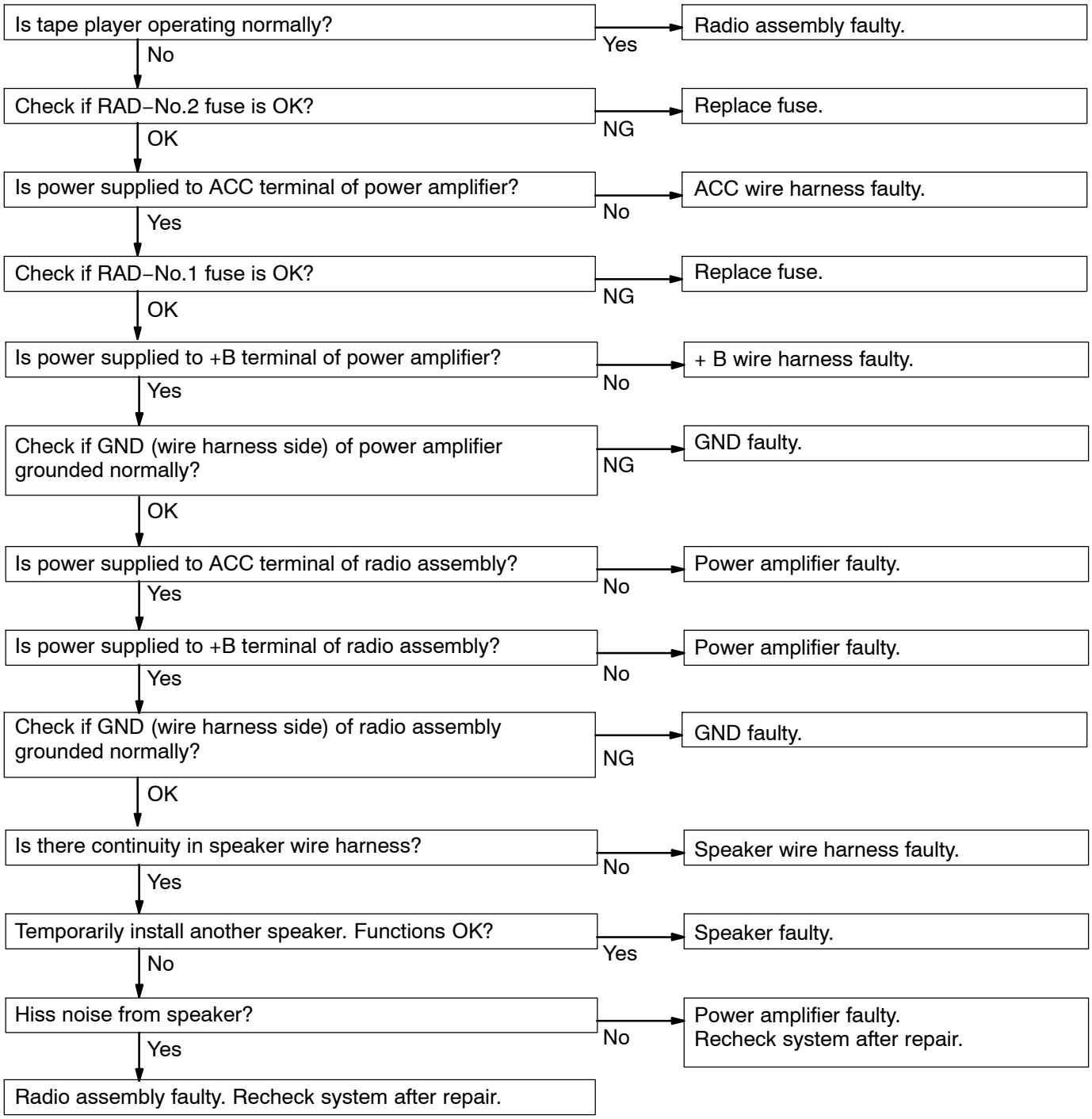
24	Power Amplifier	POWER COMIMG IN, BUT WOOFER (POWER) AMPLIFIER NOT OPERATING



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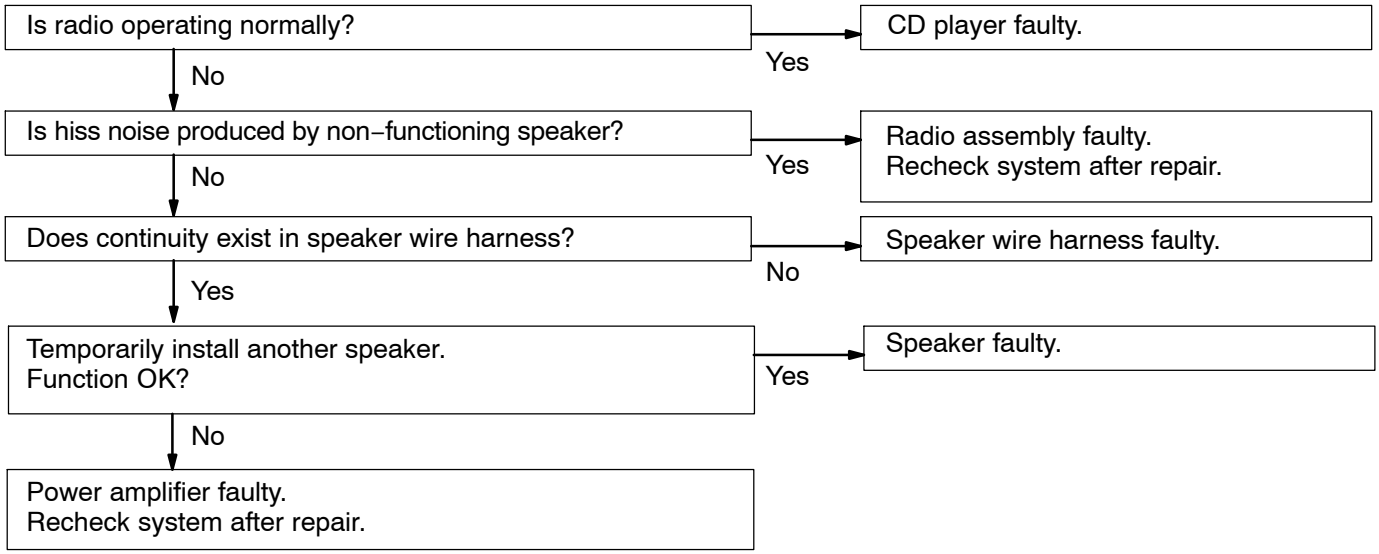
25	Power Amplifier	ANY SPEAKER DOES NOT WORK



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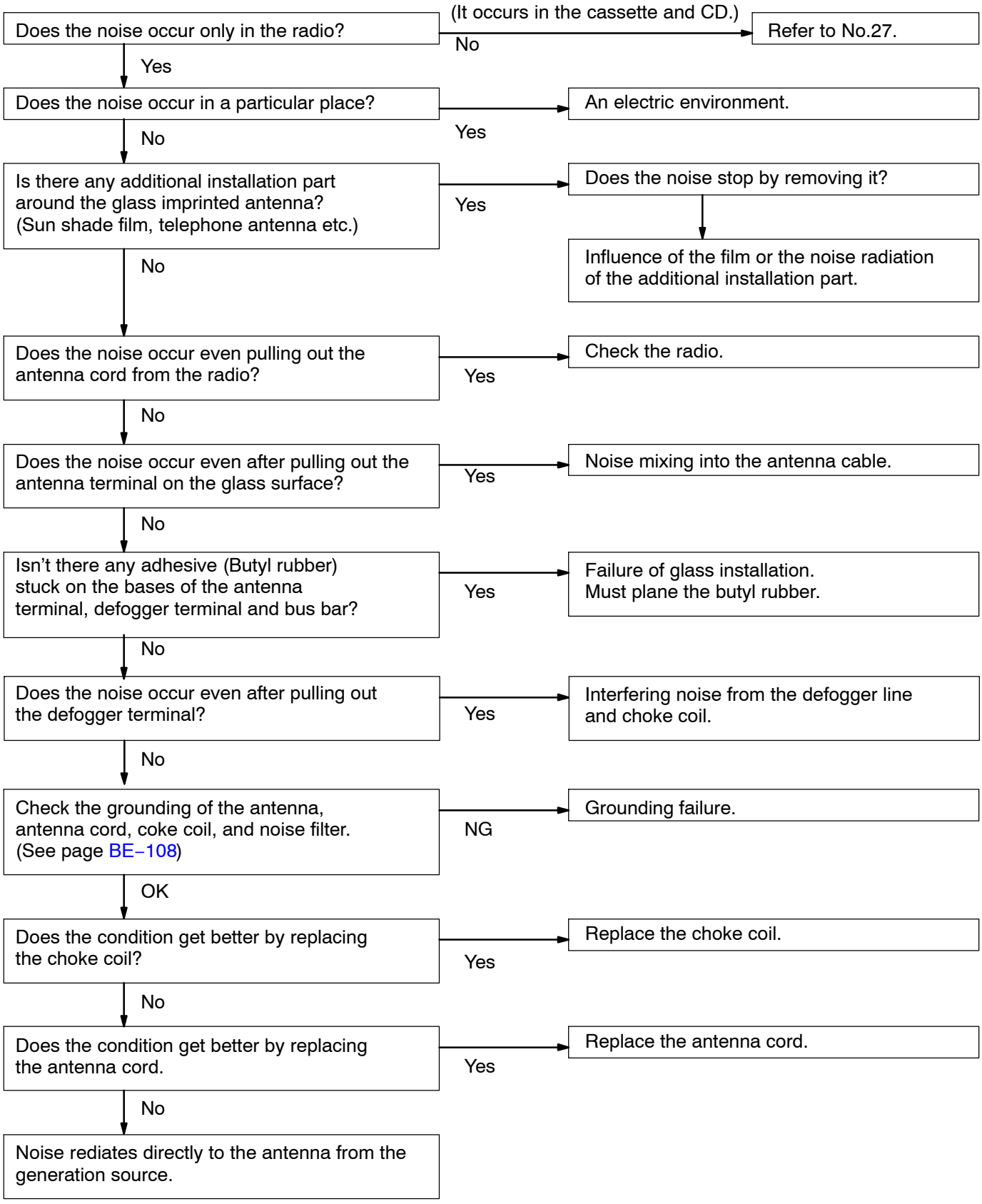
26	Noise	NOISE OCCURS



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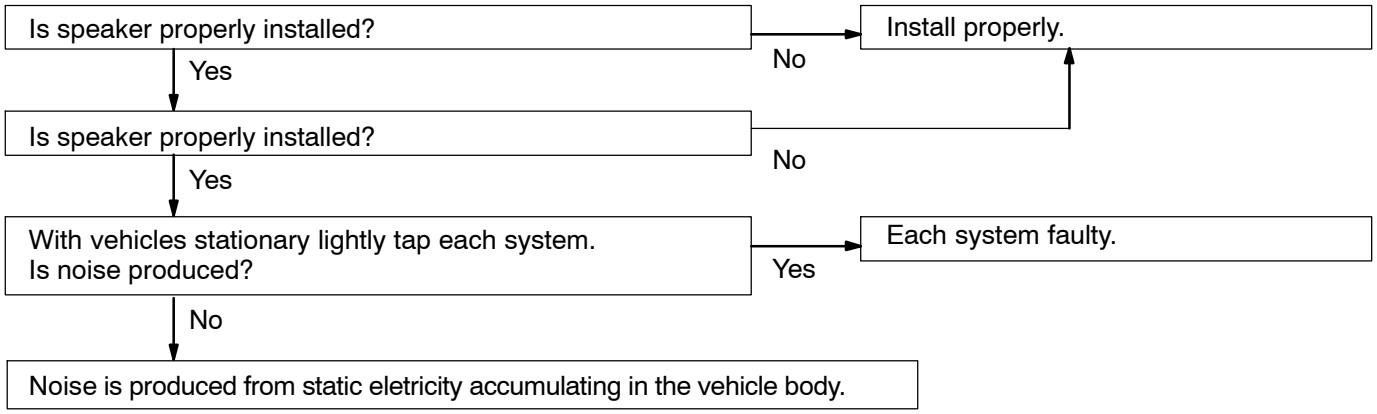
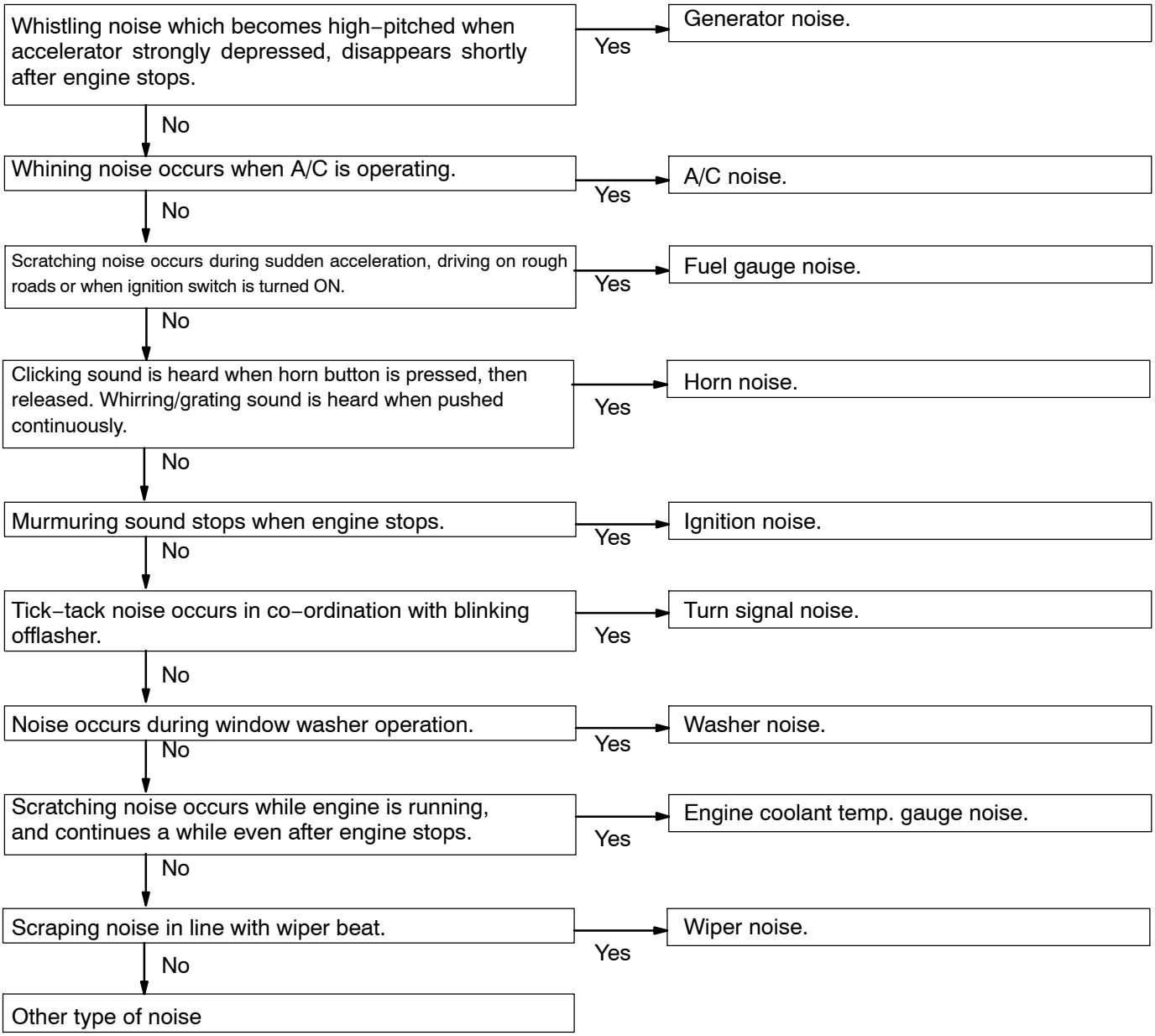
27	Noise	NOISE PRODUCED BY VIBRATION OR SHOCK WHILE DRIVING



28	Noise	NOISE PRODUCED WHEN ENGINE STARTS



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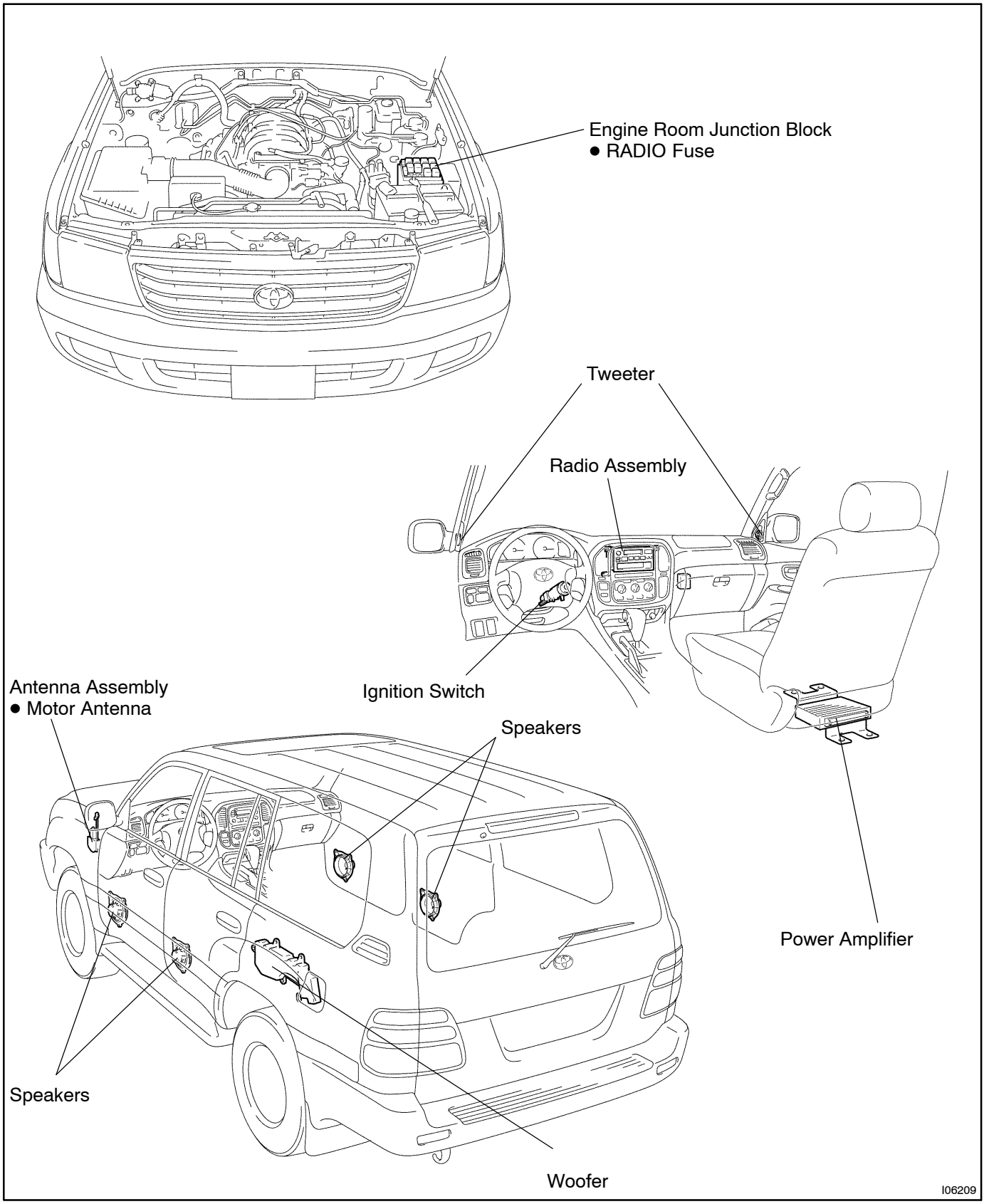
BE0GD–02

LOCATION



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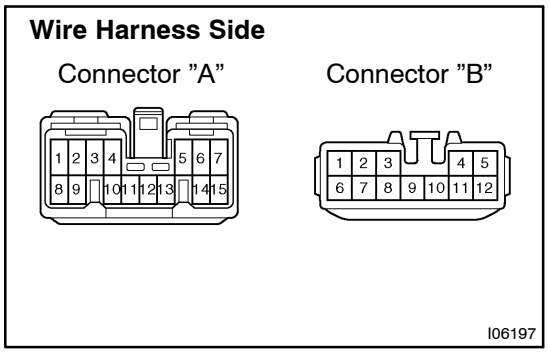
BE0SC–01



INSPECTION

1. 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
A11 – Ground	Constant	Continuity
B8 – Ground	Constant	Continuity
A4 – Ground	Constant	Battery positive voltage
B5 – Ground	Constant	Battery positive voltage
A3 – Ground	Ignition switch LOCK	No voltage
A3 – Ground	Ignition switch ACC or ON	Battery positive voltage
B12 – Ground	Ignition switch LOCK	No voltage
B12 – 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.

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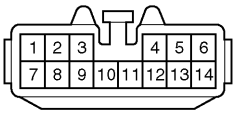
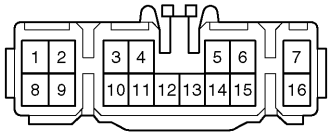
Wire Harness Side

Connector ”A”



Connector ”B”



I06196

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
A2 – Ground	Ignition switch LOCK and radio switch ON	No voltage
A3 – Ground	Constant	Battery positive voltage
A9 – Ground	Ignition switch LOCK and radio switch ON	No voltage
A9 – Ground	Ignition switch ACC or ON and radio switch ON	Battery positive voltage
A10 – Ground B12 – Ground B13 – Ground	Constant	Continuity
B7 – Ground	Constant	Battery positive voltage
B16 – Ground	Constant	Battery positive voltage

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

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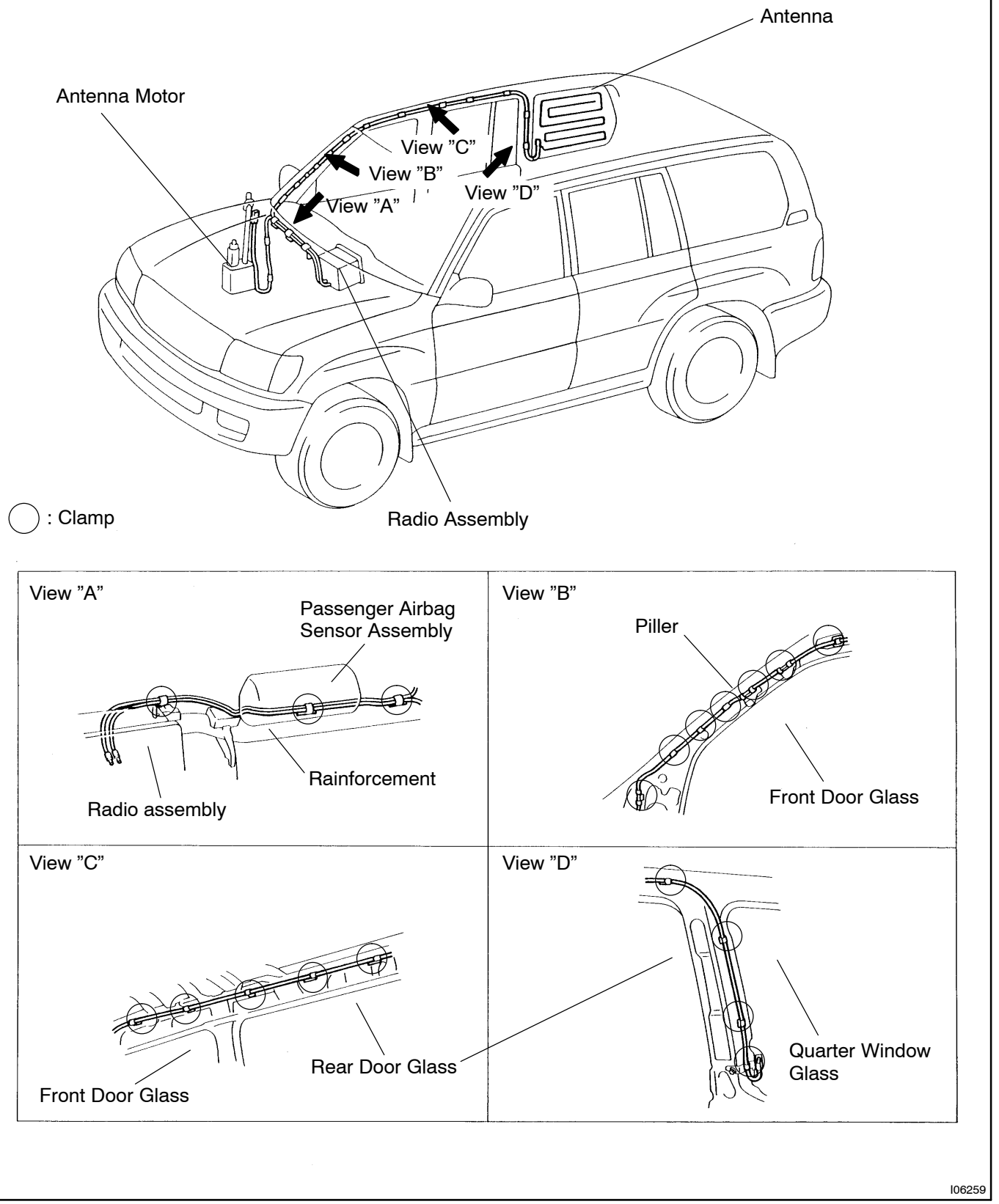
ANTENNA

LOCATION

BE0G9–03



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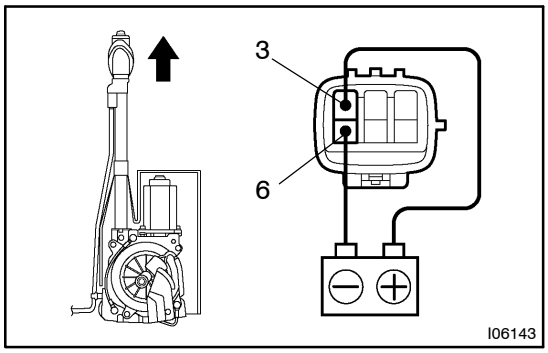
BE0SD–01

INSPECTION



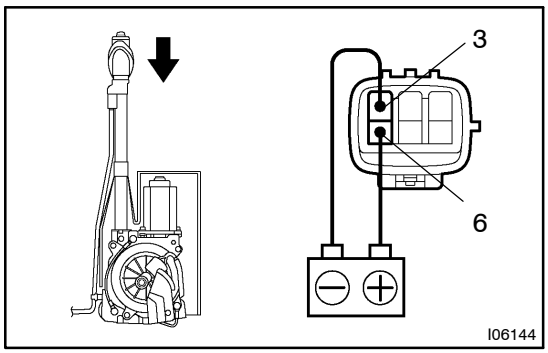
1. Auto Antenna Models:
INSPECT ANTENNA MOTOR

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

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

NOTICE:

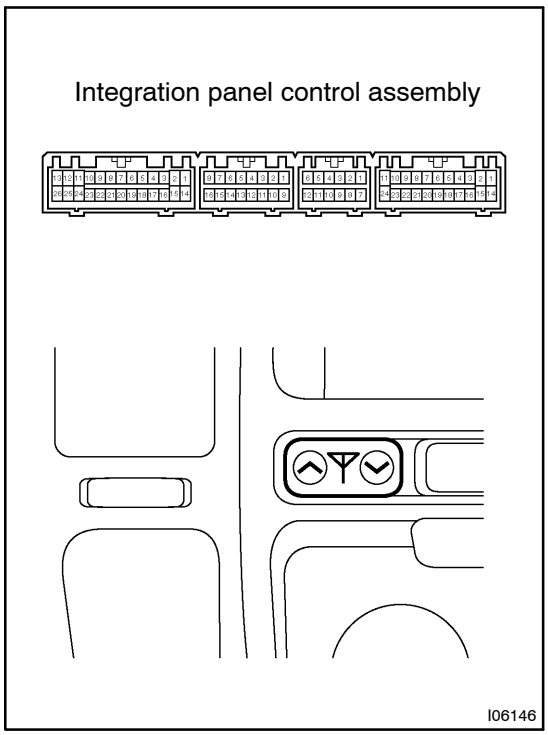
These tests must be done quickly (within 3 – 5 seconds) to prevent the coil from burning out.



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

NOTICE:

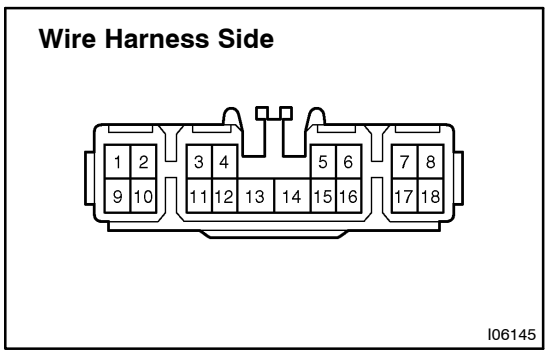
These tests must be done quickly (within 3 – 5 seconds) to prevent the coil from burning out.



2. INSPECT ANTENNA SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
UP button FREE	18 – 22	No continuity
UP button Pushed in	18 – 22	Continuity
DOWN button FREE	17 – 22	No continuity
DOWN button Pushed in	17 – 22	Continuity

If continuity is not as specified, replace the switch.



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

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

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

If circuit is as specified, replace the relay.

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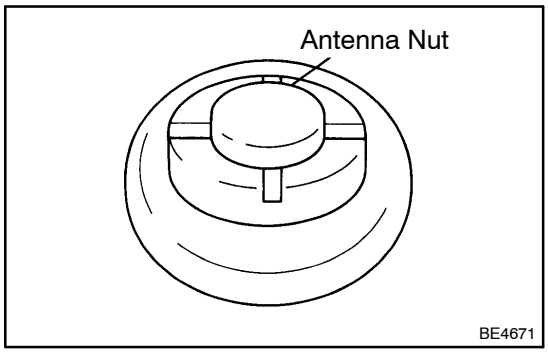
BE0N7–02

REPLACEMENT

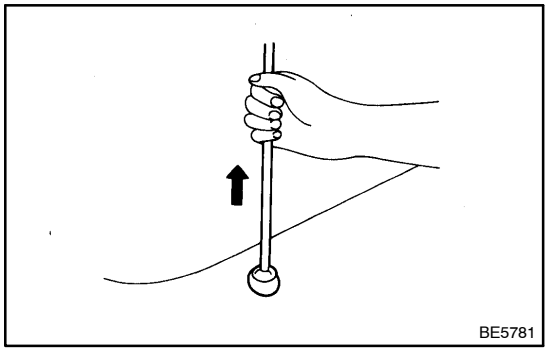


1. Auto Antenna Models:
REMOVE ANTENNA ROD

HINT:

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

(a) Remove the antenna nut.
(b) Radio switch to ”ON” position.
(c) Antenna switch to ”UP”. (1/2 or more for antenna rod)



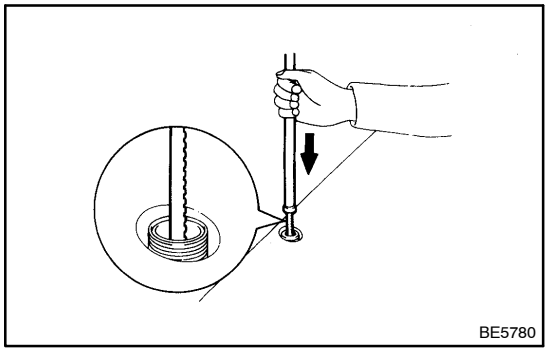
(d) Antenna rod catch to hand and radio switch ”OFF”.
(e) Try again radio switch ”ON” and antenna switch ”UP”.
(f) Remove antenna rod.

HINT:

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

NOTICE:

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



2. Auto Antenna Models:
INSTALL ANTENNA ROD

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

HINT:

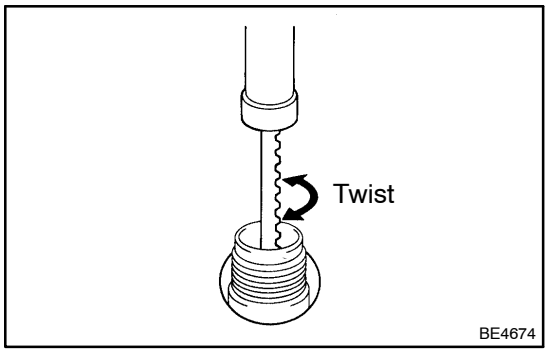
- When inserting the cable, the teeth on the cable must face toward the rear of the vehicle.
- Insert the antenna approx. 350 mm.

(b) Radio switch to ”OFF”.

HINT:

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

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



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CLOCK

TROUBLESHOOTING

BE0SE–01

HINT:

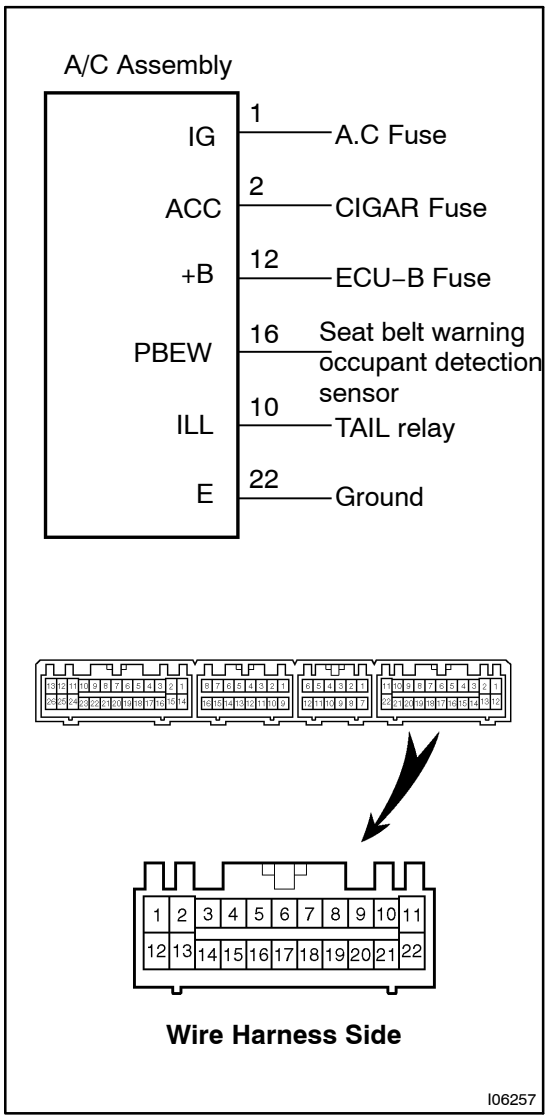
Troubleshoot the clock according to the table below.

Troubleshooting	No.
Passenger seat belt warning light does not light up.	1
Clock will not operate	1
Clock loses or gains time	2

± 1.5 seconds / day

TROUBLESHOOTING NO.1

1	**PASSENGER SEAT BELT WARNING LIGHT DOES NOT OPERATE**
	CLOCK WILL NOT OPERATE



(a) Check that the battery positive voltage is 10 – 16 V.

If voltage is not as specified, replace the battery.

(b) Check that the A.C, ECU–B and CIGAR fuses are not blown.

If the fuse is blown, replace the fuse and check for short.

(c) Troubleshoot the clock as follows.

HINT:

Inspect the connector on the wire harness side.

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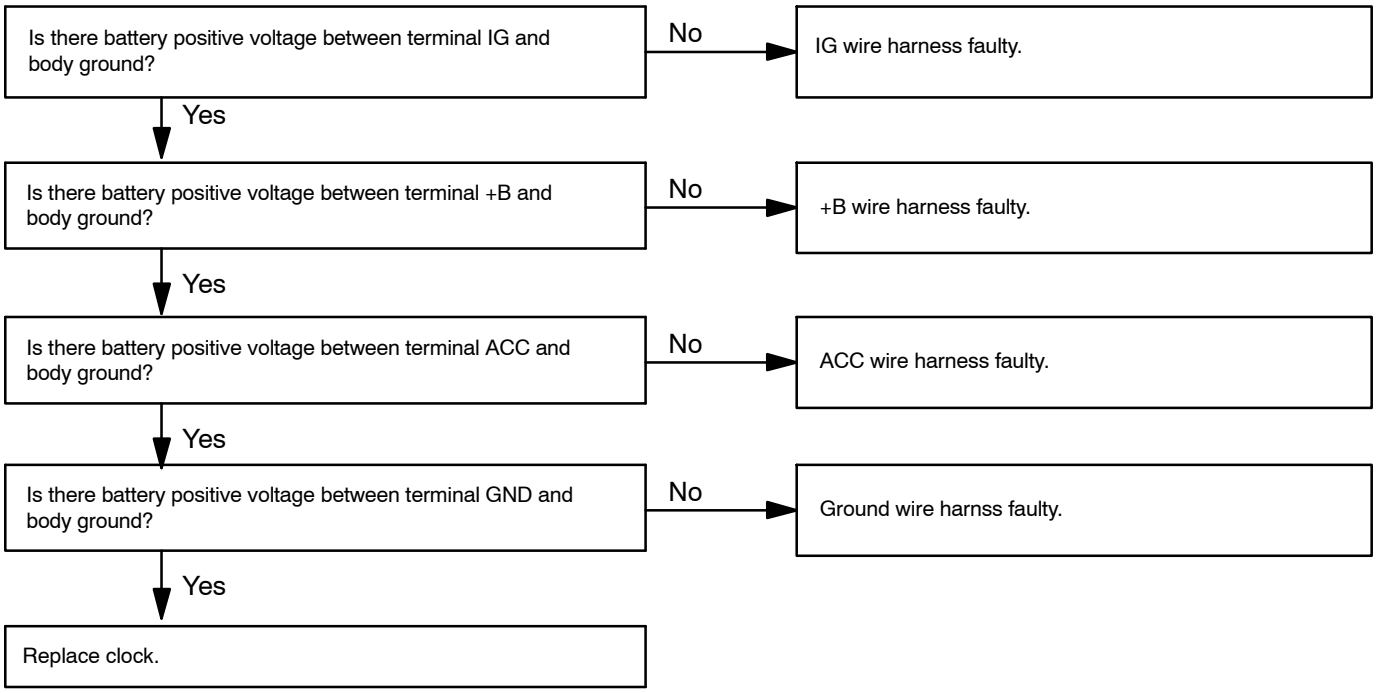


TROUBLESHOOTING NO.2

2	**CLOCK LOSES OR GAINS TIME**

(a) Check that the battery positive voltage is 10 – 16 V.

If voltage is not as specified, replace the battery.

(b) Inspect the error of the clock.

Allowable error (per day): ± 1.5 seconds

If the error exceeds the allowable error, replace the clock.

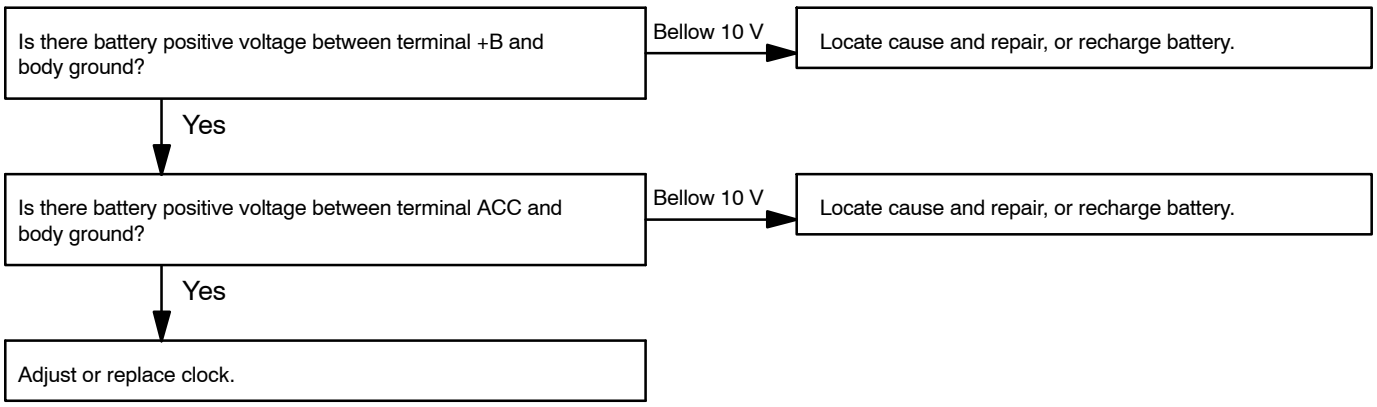
(c) Check that the clock adjusting button is sticking in position and has failed to return.

If the error exceeds the allowable error, replace the clock.

(d) Troubleshoot the clock as follows.

HINT:

Inspect the connector on the wire harness side.



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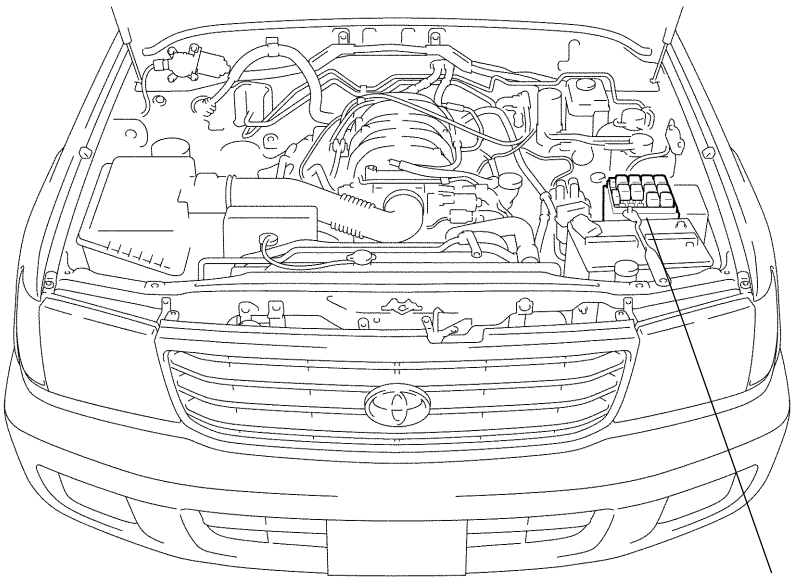
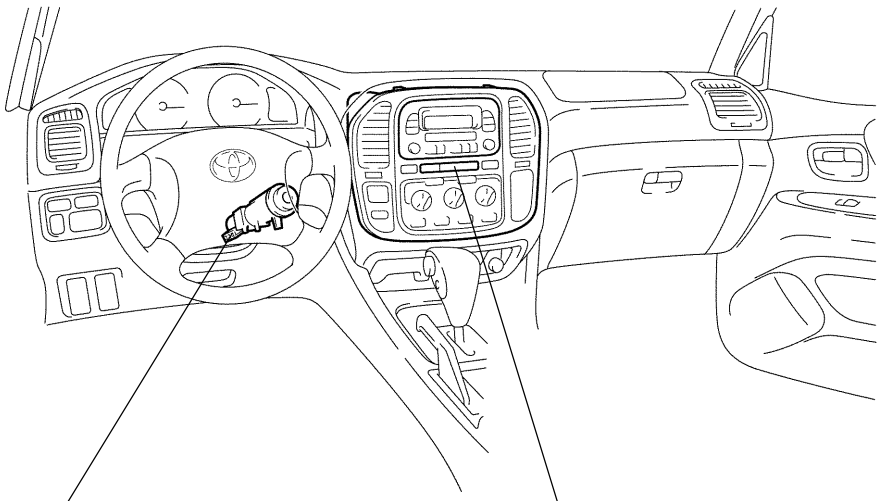
BE0G1–03

LOCATION



Engine Room Junction Block
- CIGAR Fuse
- ECU–B Fuse



Ignition Switch

Integration Control Panel Assembly
- Clock

I06211

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ENGINE IMMOBILISER SYSTEM

BE0G7–03

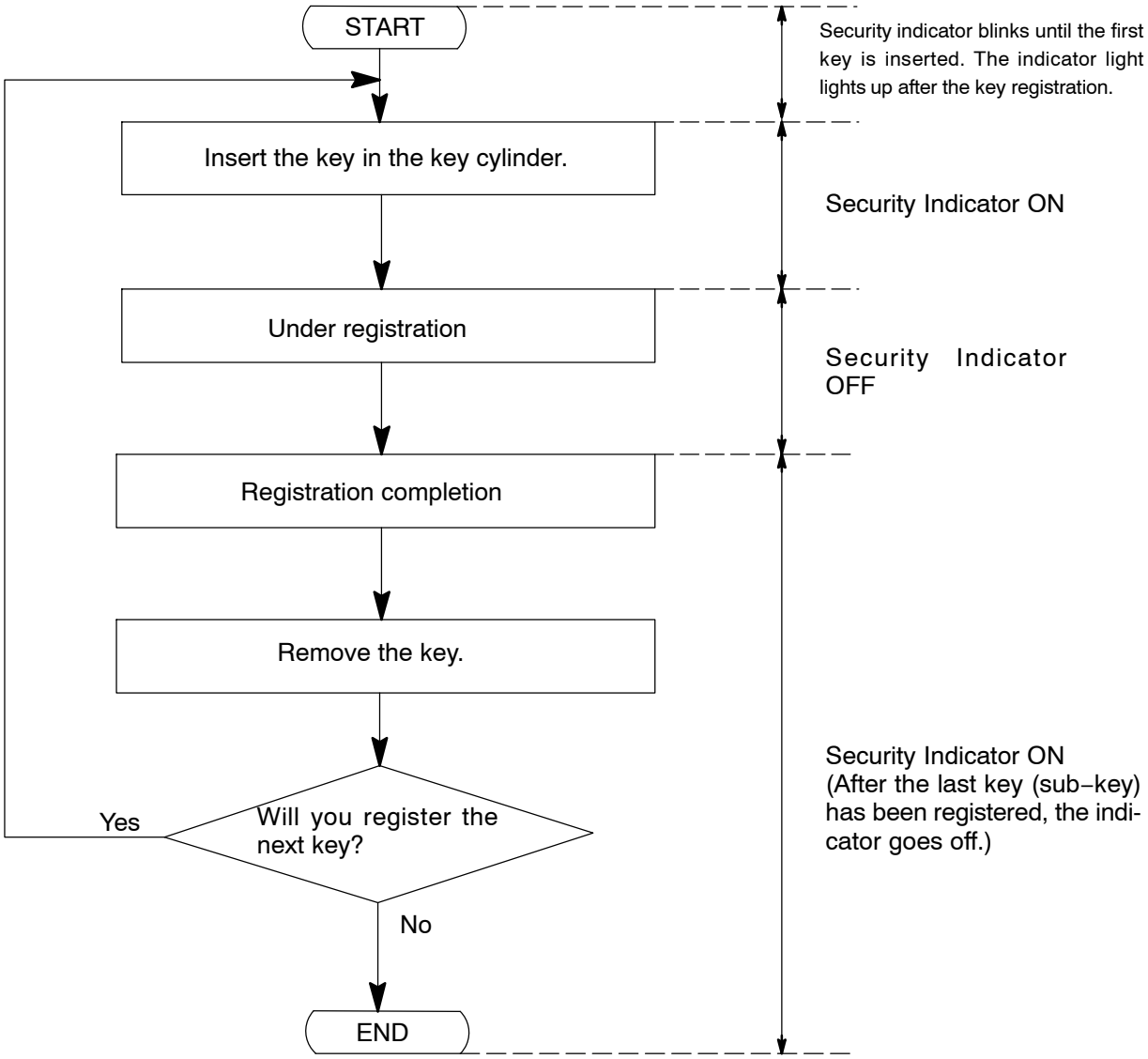
REGISTRATION PROCEDURE

1. KEY REGISTRATION IN AUTOMATIC REGISTRATION MODE

(a) Registration of a new transponder key.

HINT:

- This must be done when you install a new ECM.
- The new ECM is in 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 4 key codes can be registered.
- In the automatic registration mode, the key registered last becomes the sub–key.



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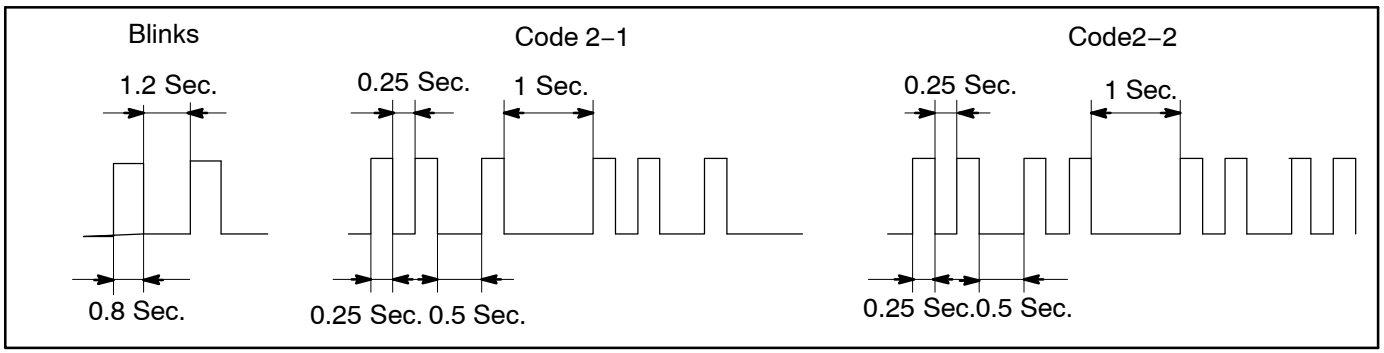
HINT:

- When a key is not inserted in the key cylinder in the automatic registration mode, the security indicator always lights on.
- When the immobiliser system operates normally and the key is pulled out, the security indicator blinks.
- When key code registration could not be performed in 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 in 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 TOYOTA hand–held tester, require automatic registration mode completion.

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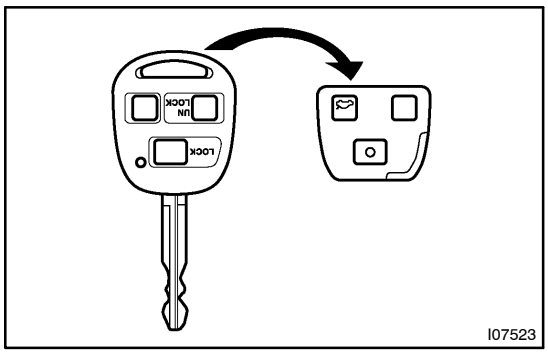
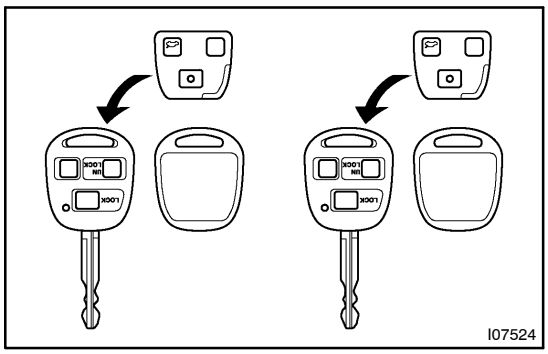
2. KEY REGISTRATION PROCEDURE WHEN KEY OR KEY CYLINDER HAS BEEN REPLACED.

HINT:

Key registration procedure of new master key and new sub–key on this vehicle when new ignition cylinder and key set, and new lock cylinder set including ignition key cylinder are installed is described below.



(a) Removing wire–less and immobiliser module from original master key.



(b) Making new master key.
After replacing and installing new ignition cylinder, install the removed original modules into new 2 key housings as supply parts.

(c) Registration of supplied new sub–key and /or master key
Register supplied new sub–key and /or master key by using new master key.
(See step 3 and 4)

NOTICE:

In case of replacing ignition cylinder and key set, door locks cannot be opened with new ignition keys. Therefore, to avoid any trouble caused by empty battery of transmitter of new ignition key, please bring the original key while driving.

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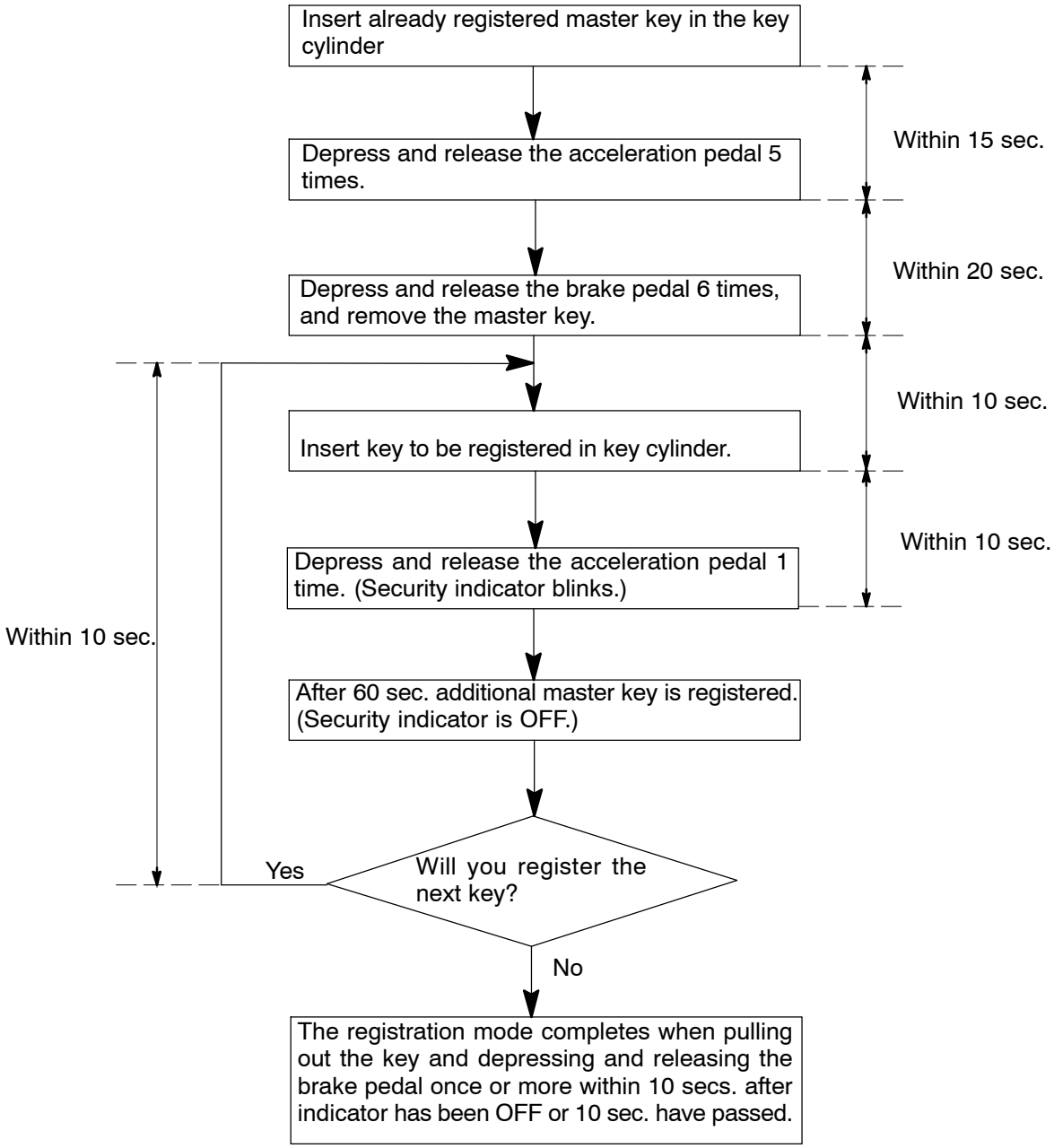
(d) There are 2 ways for registration of additional master key, one way is depressing brake pedal and acceleration pedal and the other way is using TOYOTA hand–held tester.

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" 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 are not necessary any more, erase registered of those key codes.

(1) Depressing brake pedal and acceleration pedal:



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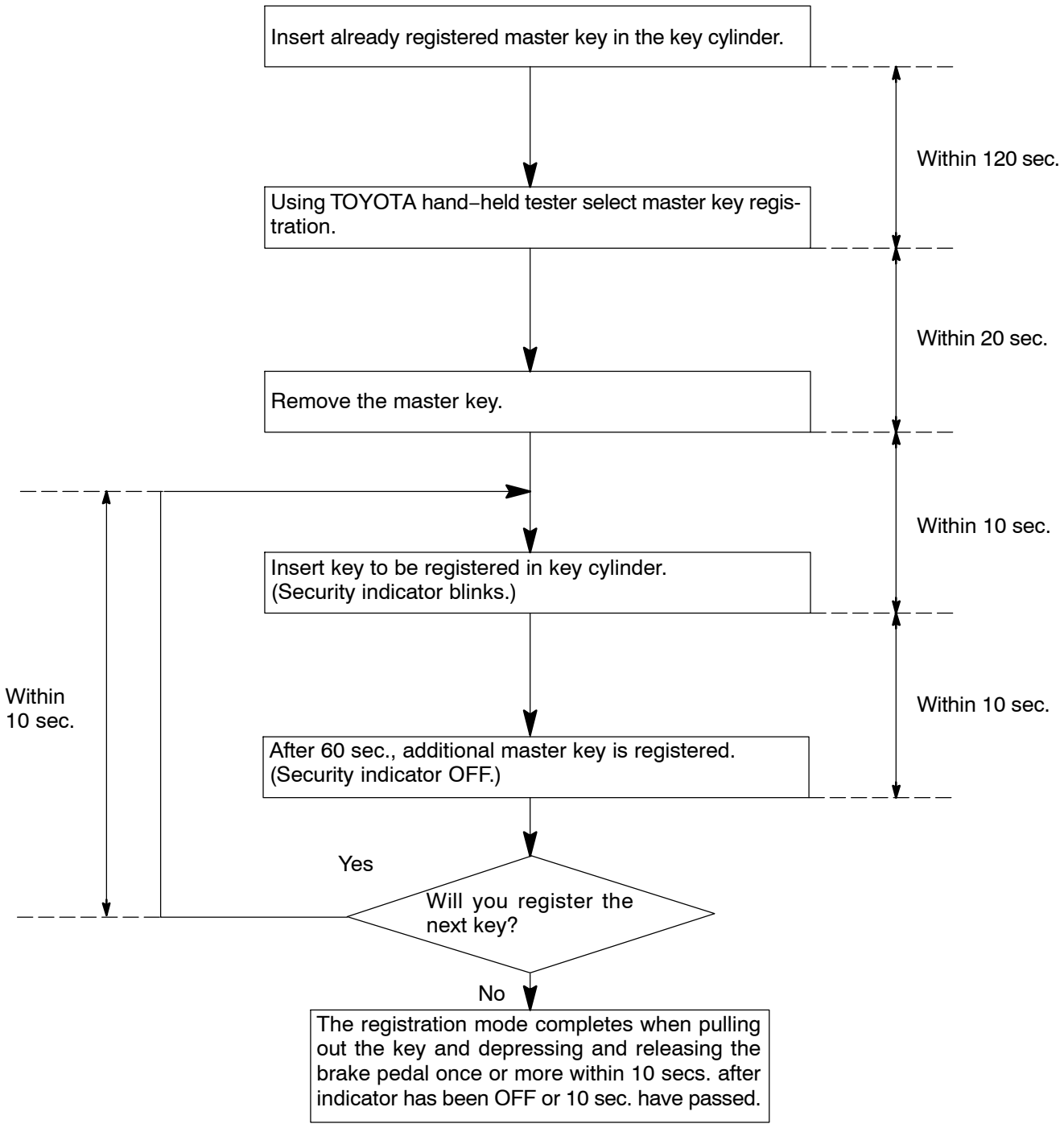
(2) Using TOYOTA hand–held tester:



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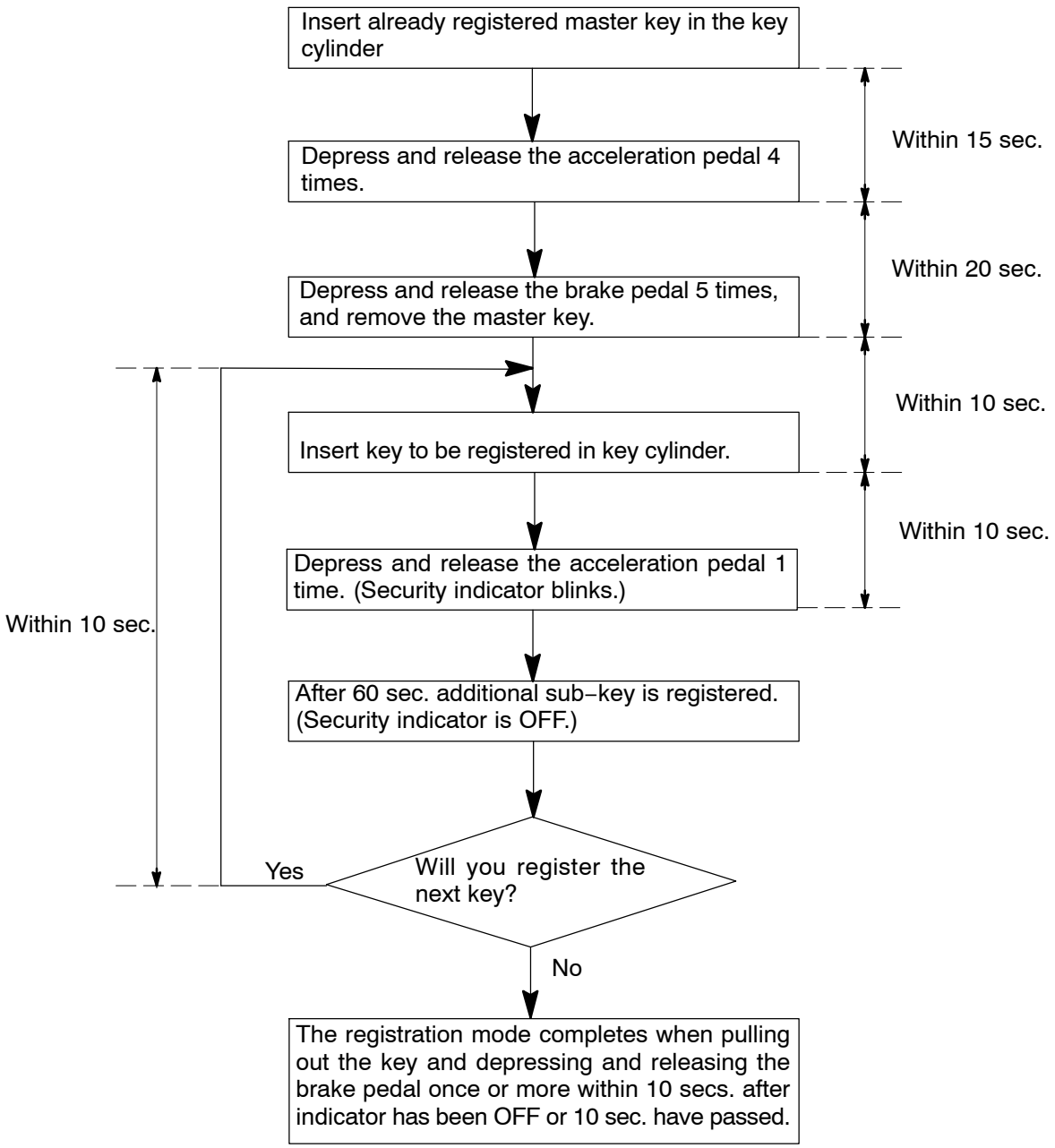
3. REGISTRATION ADDITIONAL OF SUB–KEY

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 TOYOTA 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:



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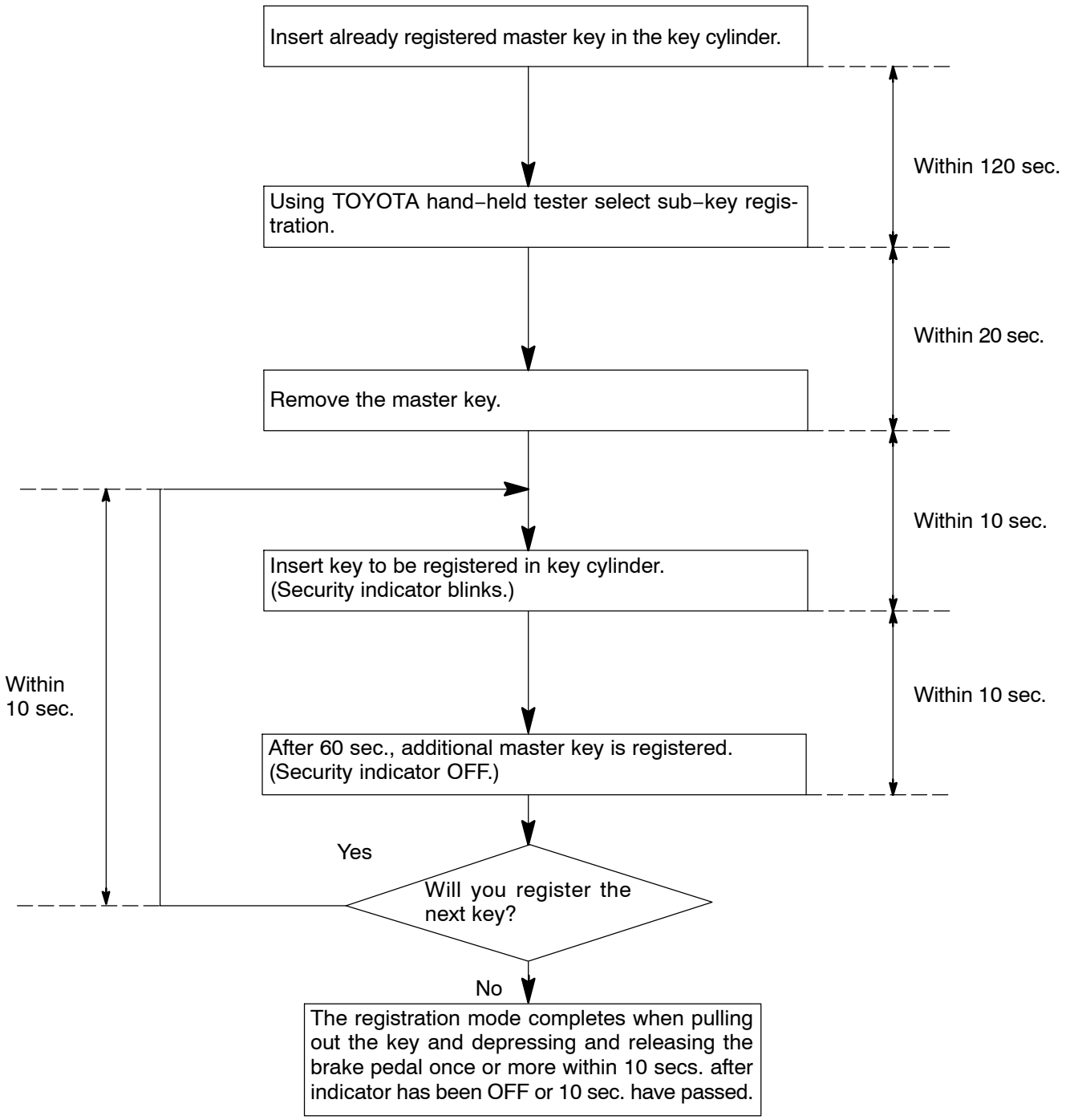
(2) Using TOYOTA hand–held tester:



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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 TOYOTA hand–held tester.

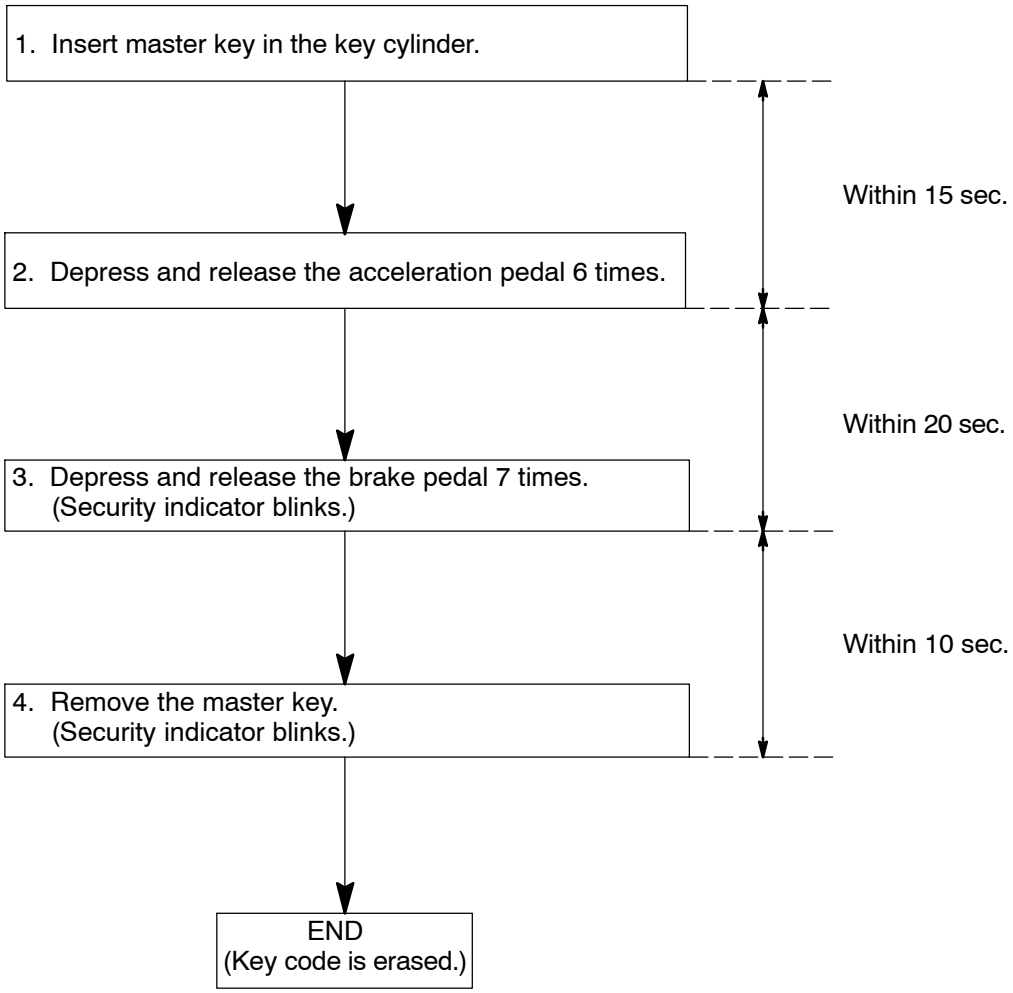
NOTICE:

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.

HINT:

- 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.
(Security indicator is OFF.)

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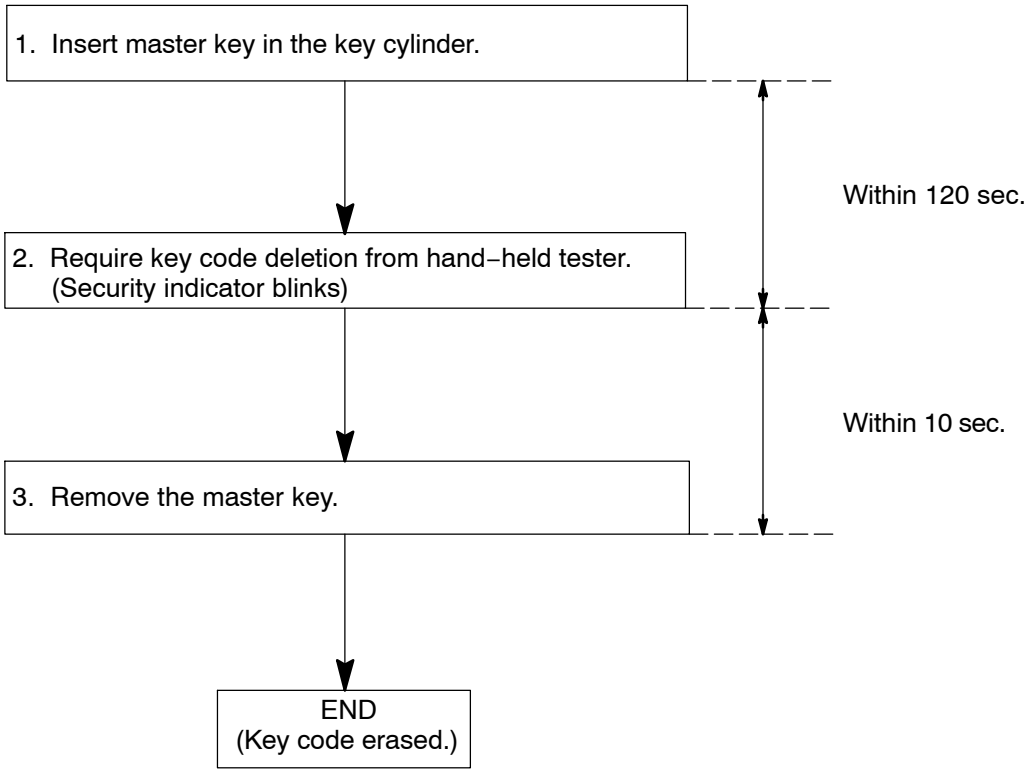
(2) Using TOYOTA hand–held tester:



HINT:

When the key cannot be pulled out in the step 3, key code deletion is canceled.
(Security indicator is OFF.)

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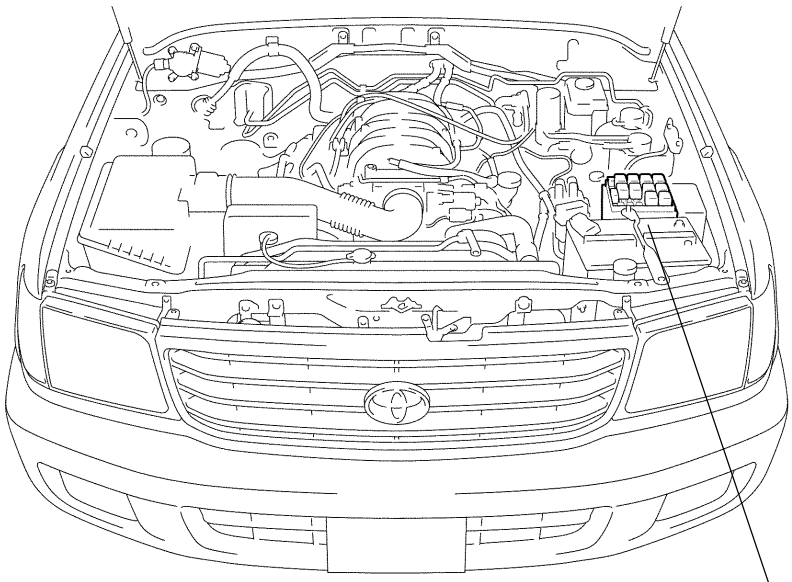
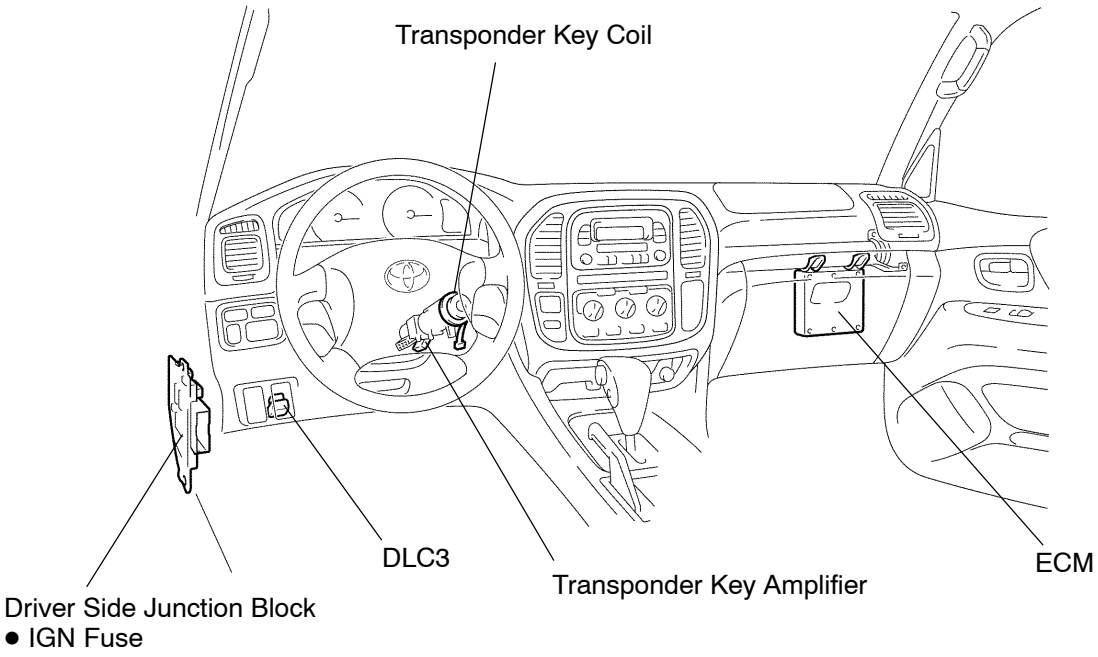
BE02Q–05

LOCATION





I06215

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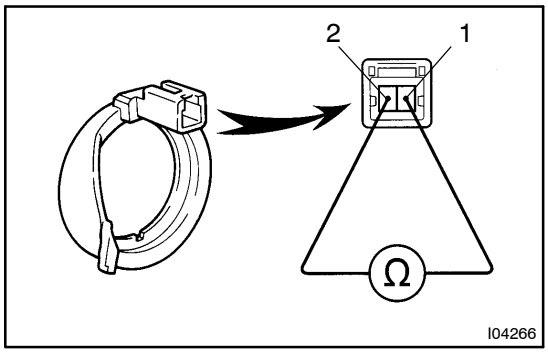
BE0G8–03



INSPECTION

INSPECTION TRANSPONDER KEY COIL CONTINUITY

Check that continuity exists between terminals 1 and 2.
If continuity is not as specified, replace the coil.

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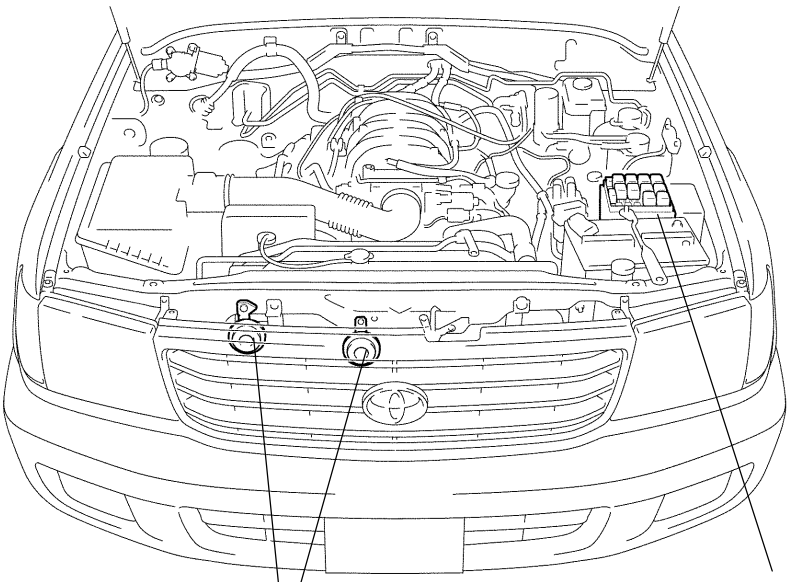
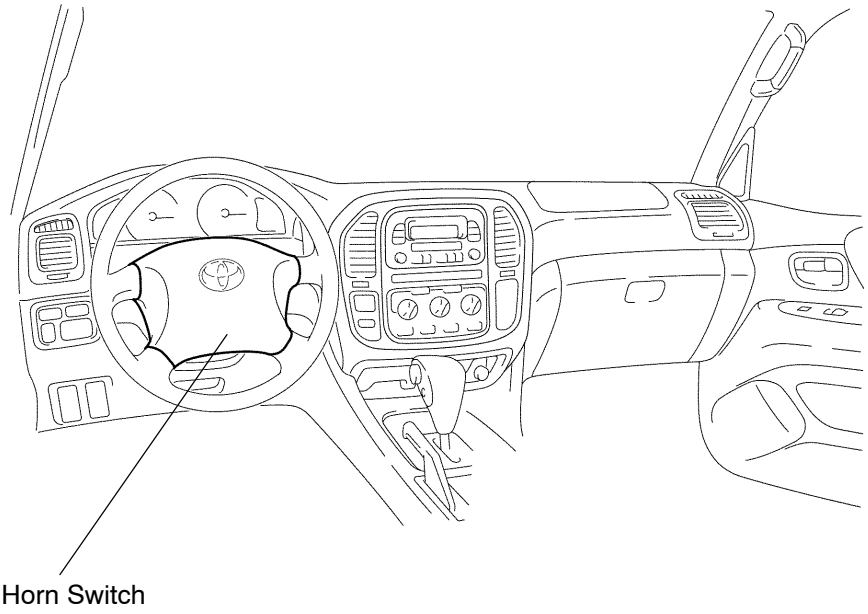
HORN SYSTEM

LOCATION

BE0FY–03





I06213

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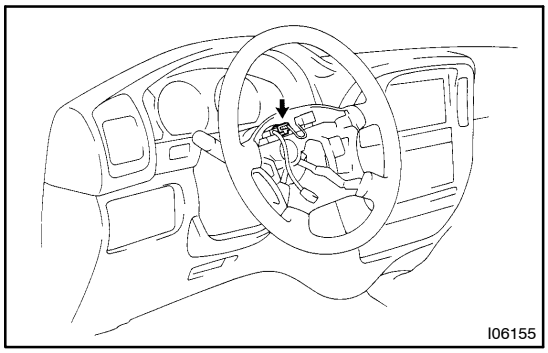
BE0FZ–03



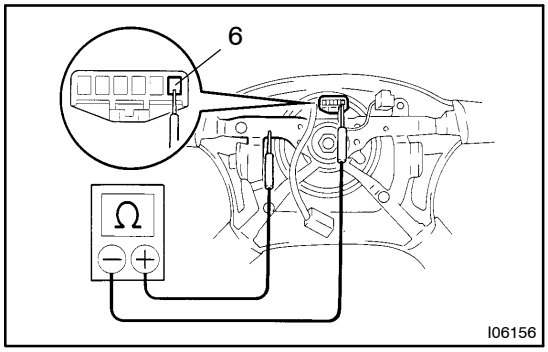
INSPECTION

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.

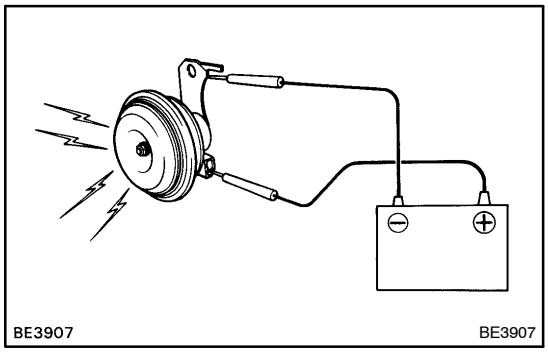
(e) Disconnect the connector from the slip ring.



(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.

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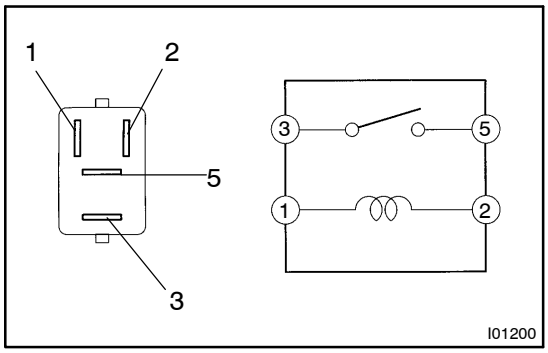

3. INSPECT HORN RELAY CONTINUITY

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.

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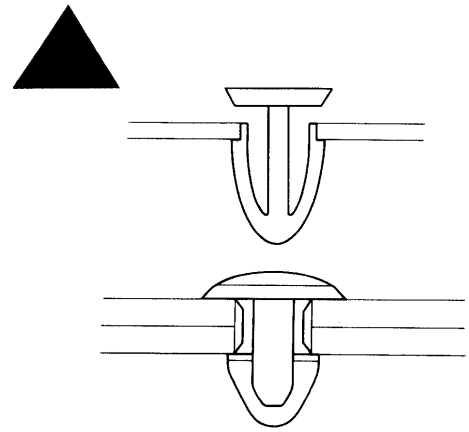
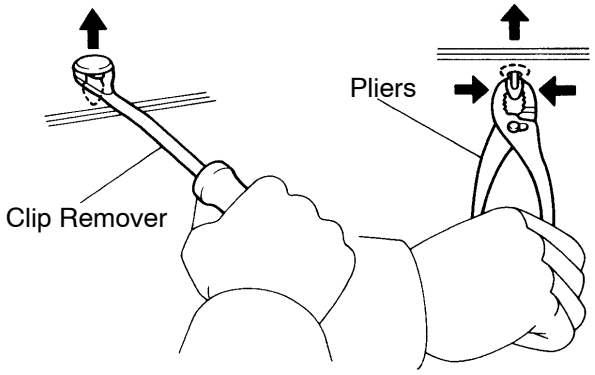
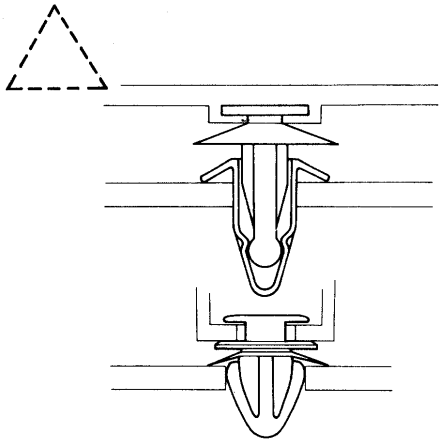
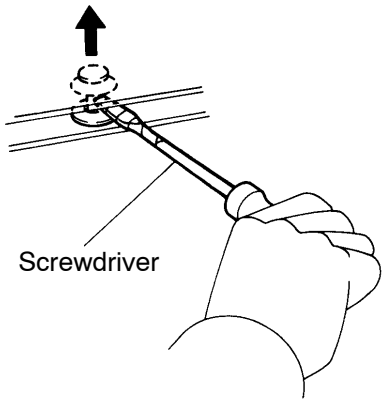
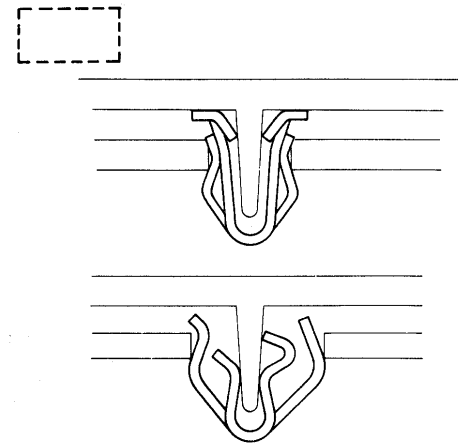
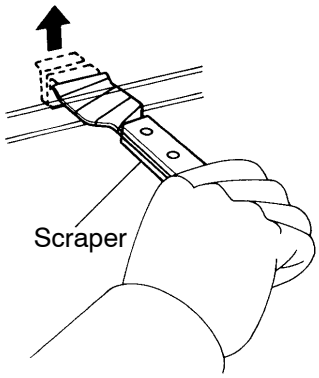
CLIP

BO023–03

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

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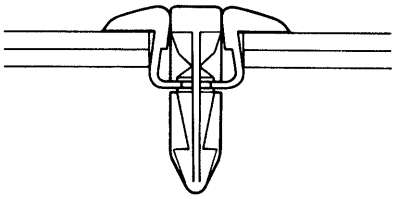
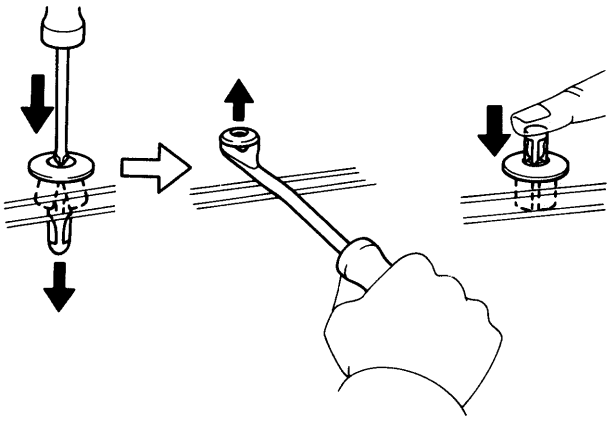
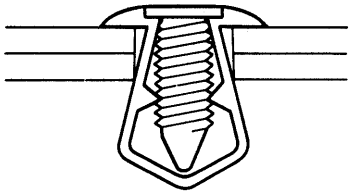
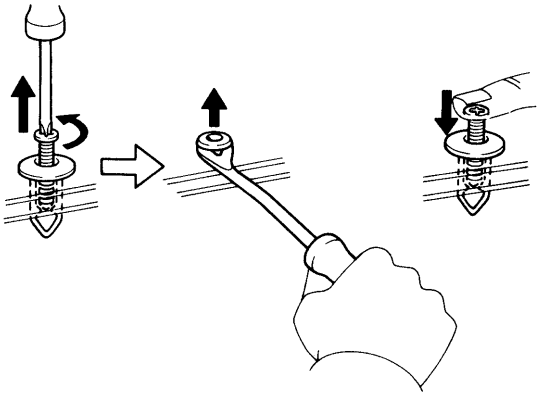
Shape (Example)	Removal/Installation
	Removal Installation 
	Removal Installation 

V00012

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SRS AIRBAG

BO0RW–02

PRECAUTION

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

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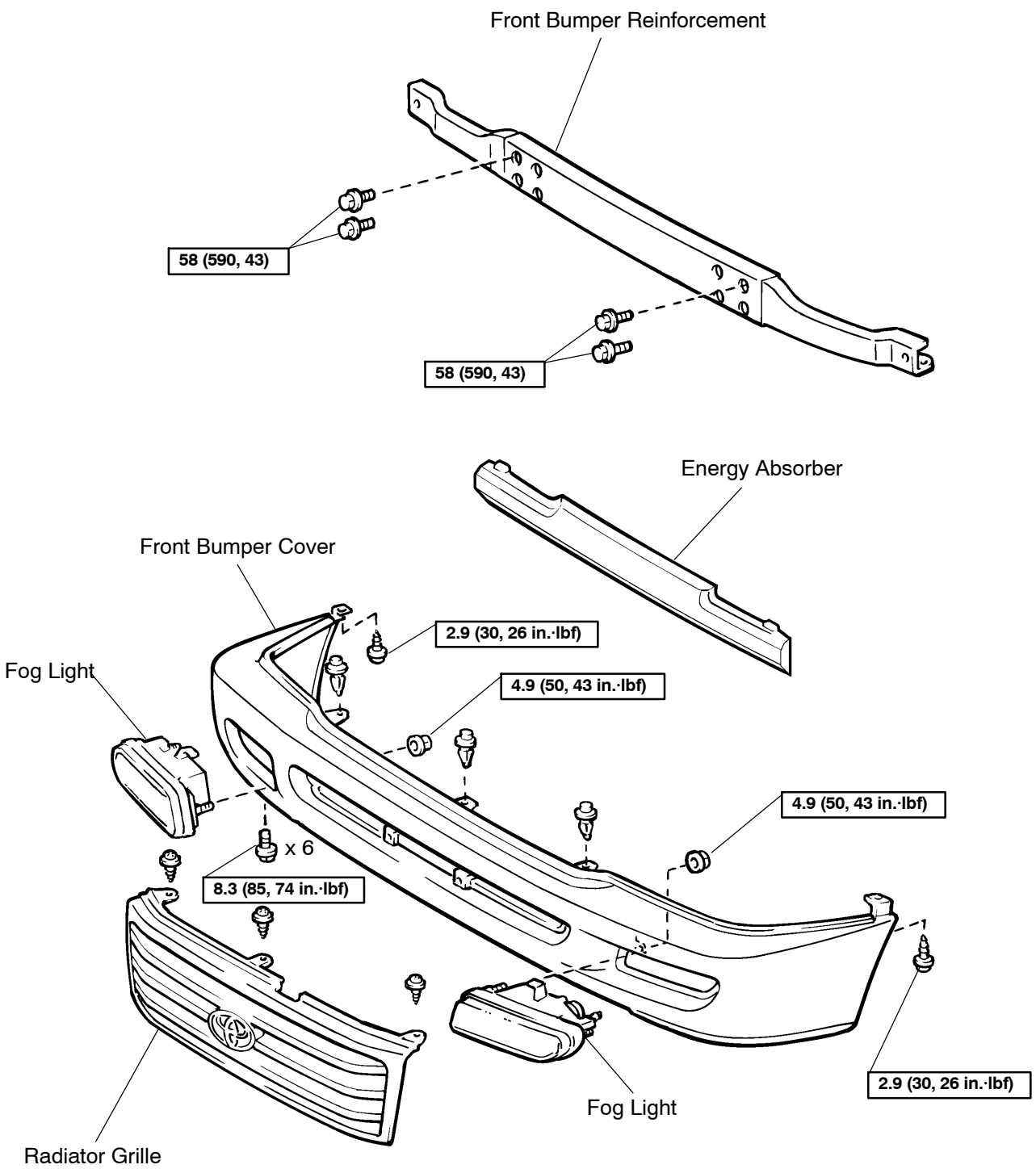
FRONT BUMPER

COMPONENTS

BO1J6–01



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

H04834

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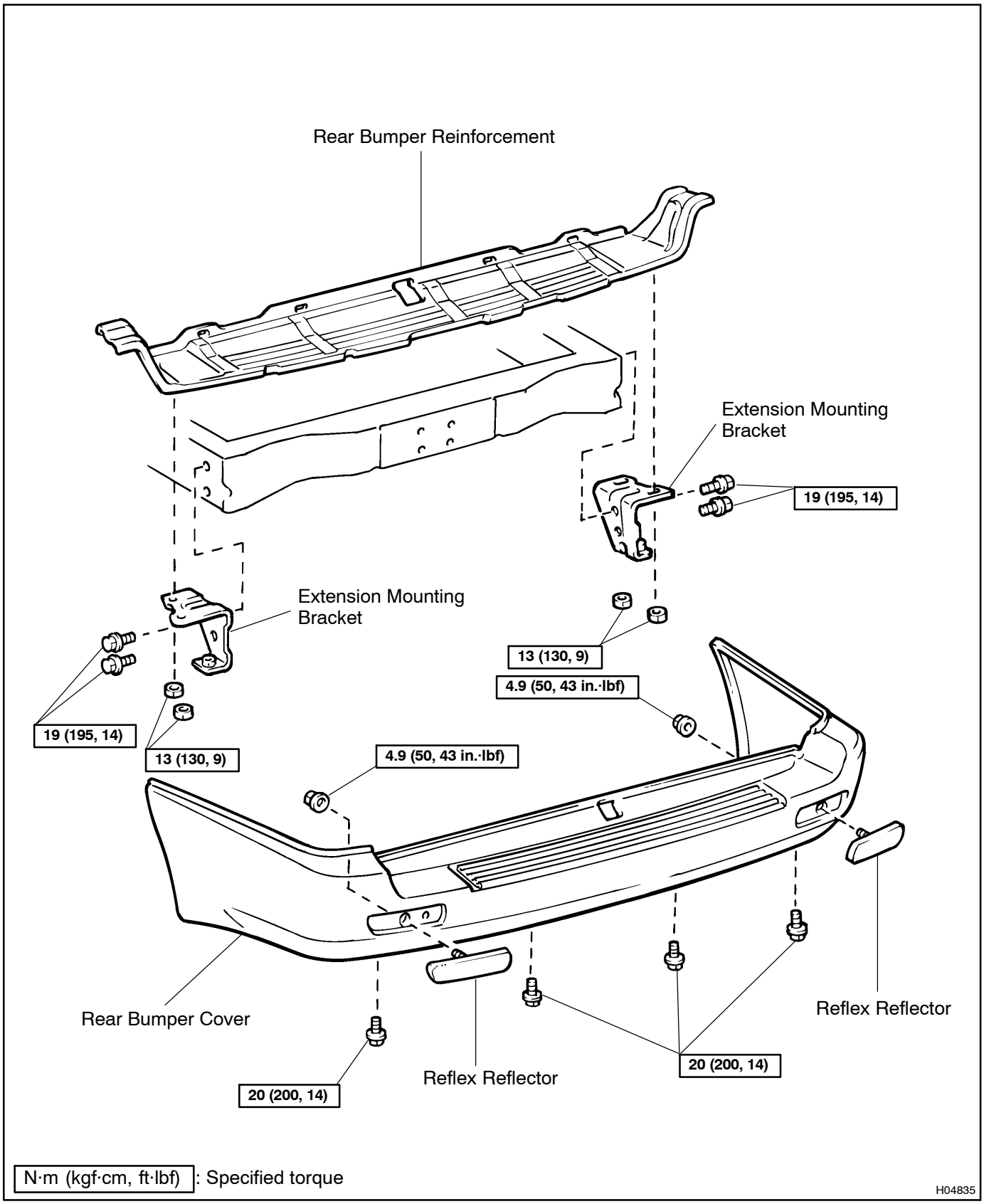
REAR BUMPER

COMPONENTS

BO1J7–01



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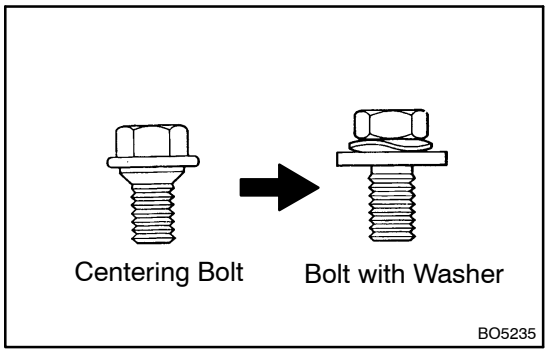


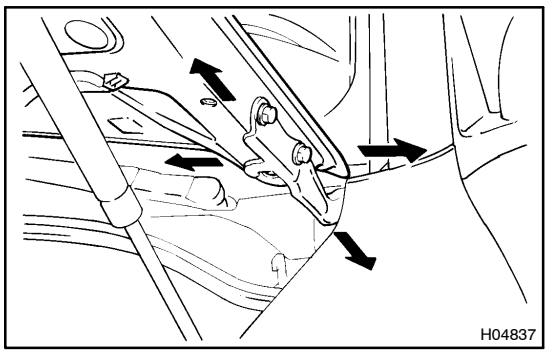
HOOD

ADJUSTMENT

BO1J8–01

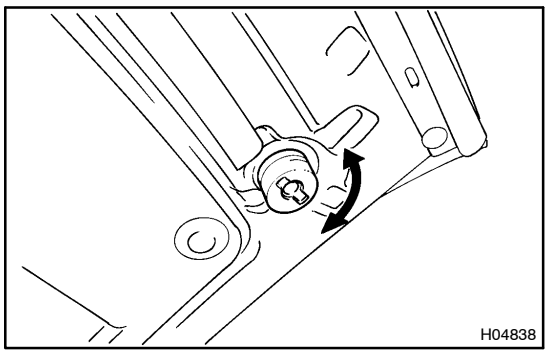
HINT:

Since the centering bolt is used as a hood hinge set bolt, the hood cannot be adjusted with it on. Substitute the bolt with washer for the centering bolt.



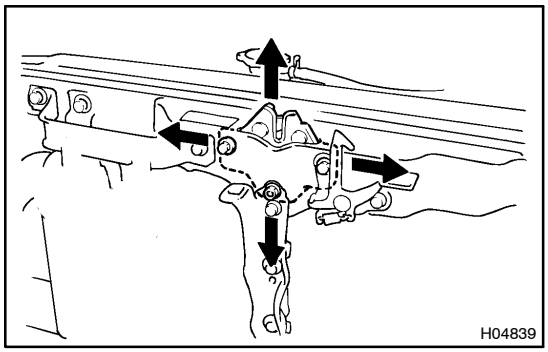
1. ADJUST HOOD IN FORWARD/REARWARD AND LEFT/RIGHT DIRECTIONS

Adjust the hood by loosening the hood side hinge bolts.



2. ADJUST FRONT EDGE OF HOOD IN VERTICAL DIRECTION

Adjust the hood by turning the cushions.



3. ADJUST HOOD LOCK

Adjust the lock by loosening the bolts.

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HOOD SUPPORT

BO1J9–01

REPLACEMENT

1. REMOVE SUPPORT FROM HOOD

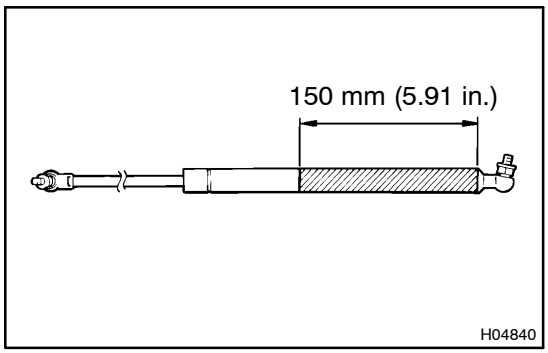
Remove the bolt and support from the hood.

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 support

- **Do not disassemble the support as 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.

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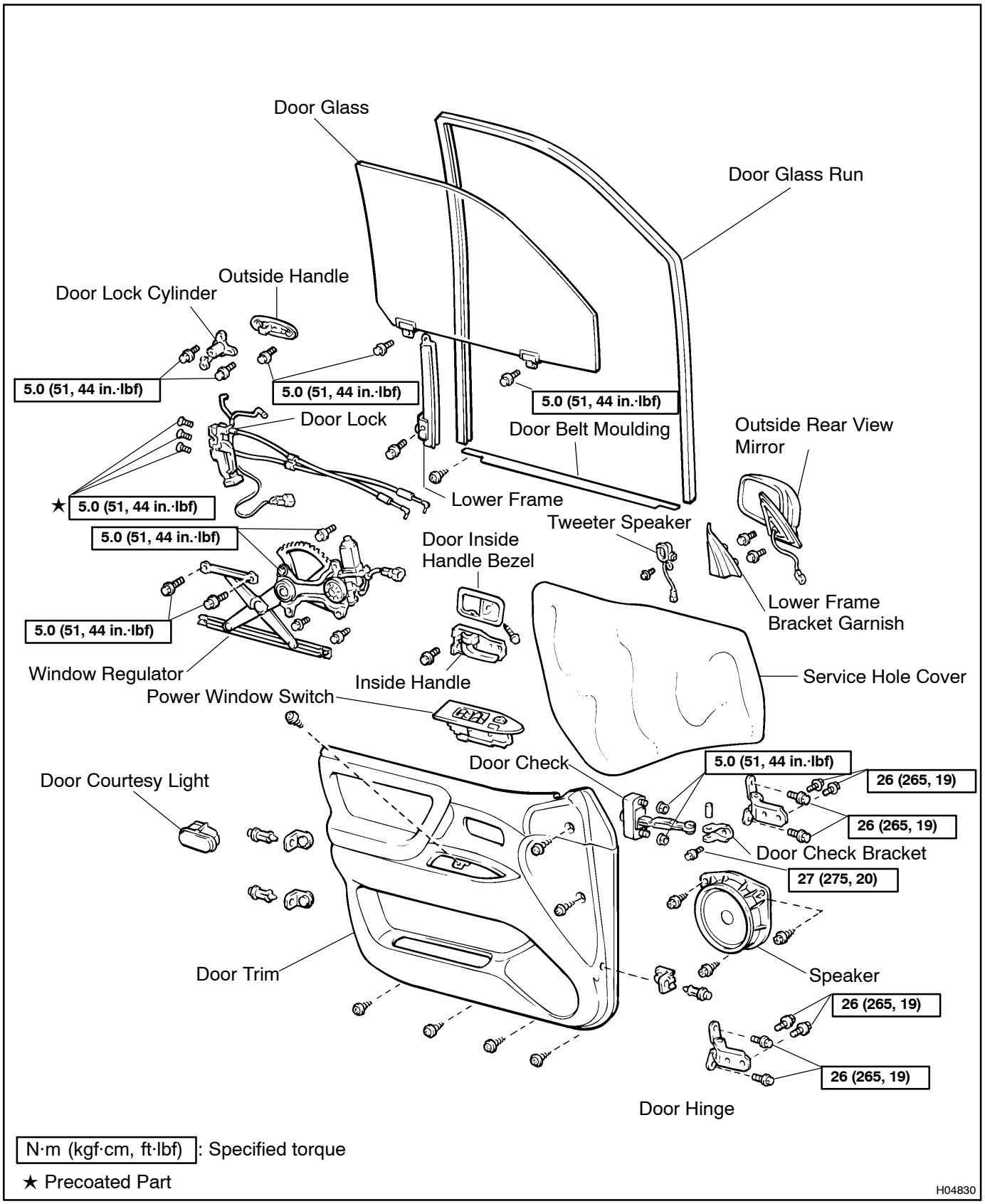
FRONT DOOR

COMPONENTS

BO1JA–01



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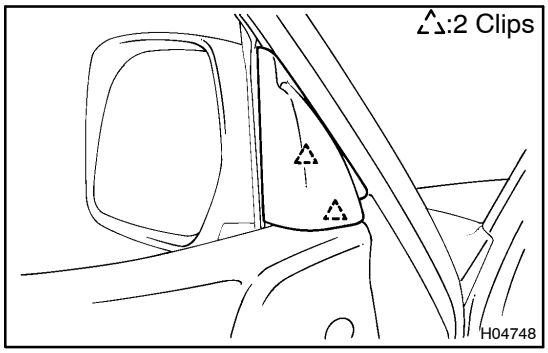
BO1JB–01

DISASSEMBLY

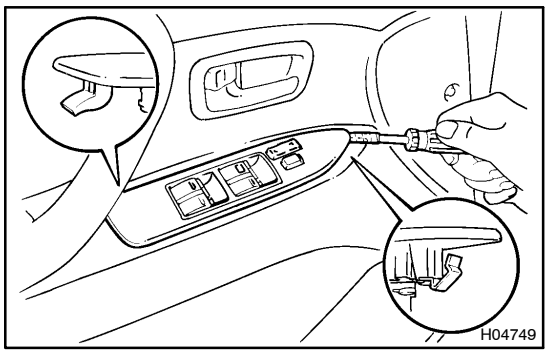


1. REMOVE LOWER FRAME BRACKET GARNISH

Using a screwdriver, remove the lower frame bracket garnish.

HINT:

Tape the screwdriver tip before use.



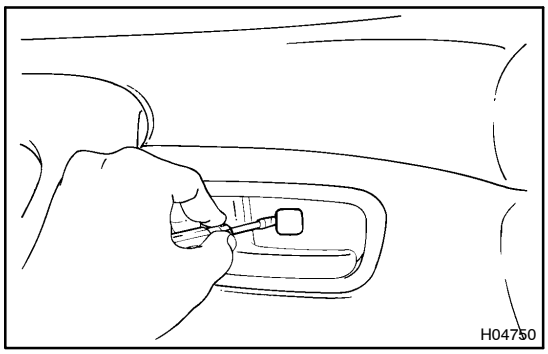
2. REMOVE POWER WINDOW SWITCH

(a) Using a screwdriver, remove the power window switch as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

(b) Disconnect the connector.

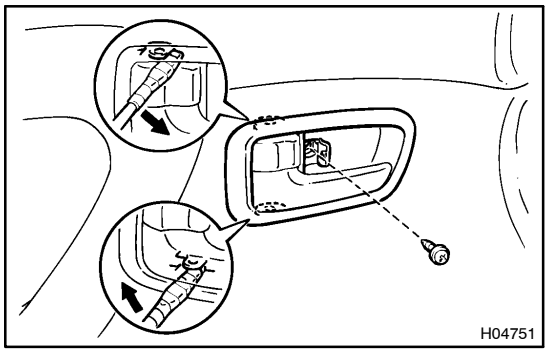


3. REMOVE DOOR INSIDE HANDLE BEZEL

(a) Using a screwdriver, open the cover as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

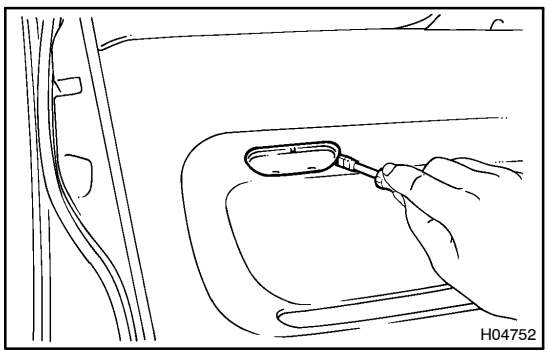


(b) Remove the screw.

(c) Using a screwdriver, remove the inside handle bezel as shown in the illustration.

HINT:

Tape the screwdriver tip before use.



4. REMOVE DOOR COURTESY LIGHT

Using a screwdriver, remove the courtesy light, then disconnect the connector.

HINT:

Tape the screwdriver tip before use.

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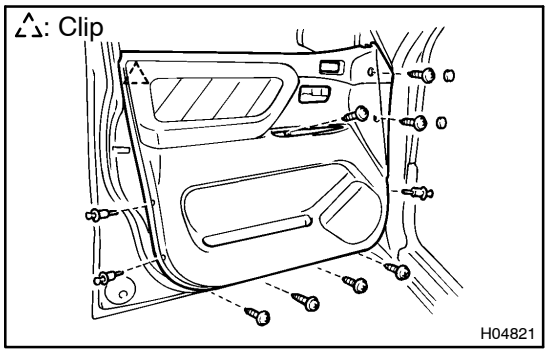


5. REMOVE DOOR TRIM

(a) Remove the 2 caps and 7 screws.

(b) Remove the 3 clips.

(c) Insert a screwdriver between the door and door trim to pry the trim out.

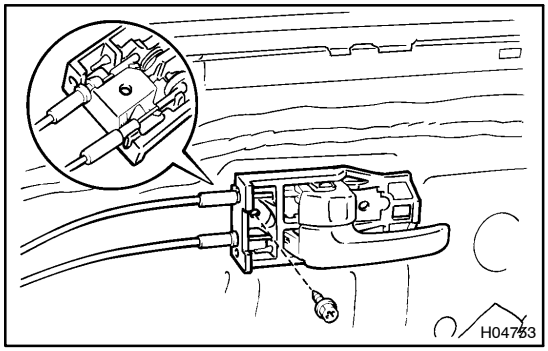
NOTICE:

Be careful not to damage the door and door trim.

HINT:

Tape the screwdriver tip before use.

(d) Pull the trim upward to remove it.



6. REMOVE INSIDE HANDLE

(a) Remove the screw.

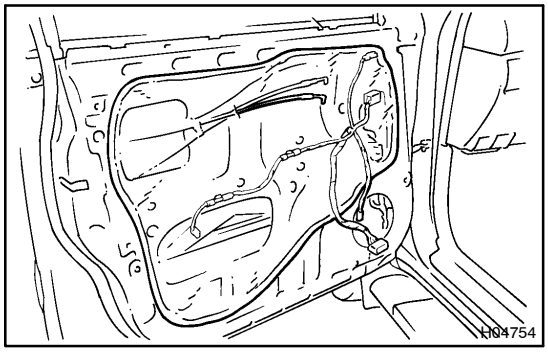
(b) Disconnect the 2 control cables from the inside handle as shown in the illustration.

7. REMOVE TWEETER SPEAKER

Disconnect the connector, then remove the bolt and tweeter speaker.

8. REMOVE OUTSIDE REAR VIEW MIRROR

Disconnect the connector, then remove the 2 bolts and outside rear view mirror.



9. REMOVE SERVICE HOLE COVER

(a) Remove the clamps and wire harness.

(b) Remove the service hole cover.

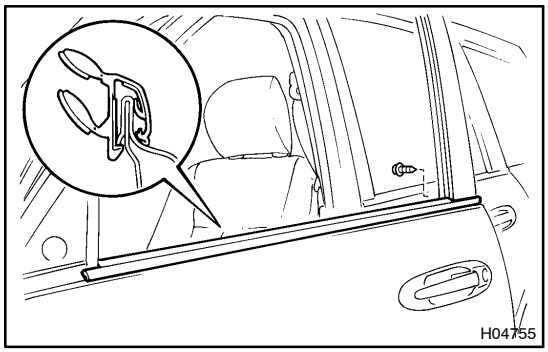
NOTICE:

Do not tear the cover.

HINT:

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

Bring out the 2 control cables and wire harness through the service hole cover.



10. REMOVE DOOR BELT MOULDING

(a) Remove the screw.

(b) Using a scraper, remove the door belt moulding.

HINT:

Tape the scraper tip before use.

11. REMOVE THESE PARTS:

(a) Door glass

Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

(b) Speaker

(c) Door glass run

(d) Lower frame

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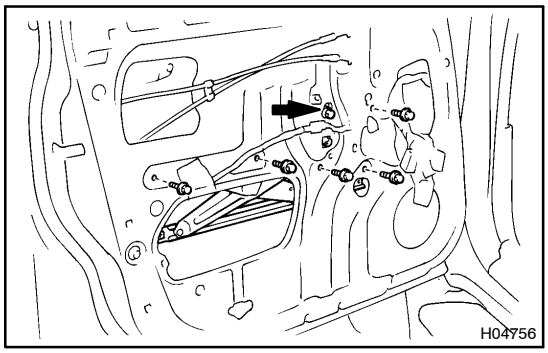
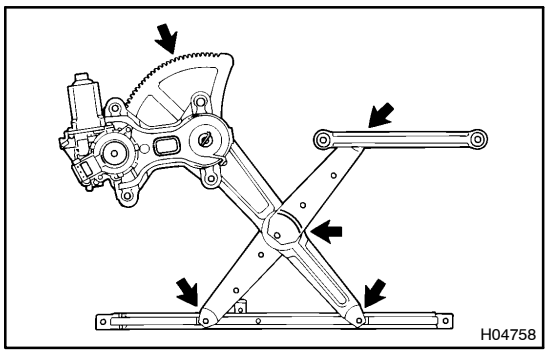


12. REMOVE WINDOW REGULATOR

(a) Disconnect the connector, then remove the 5 bolts.
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

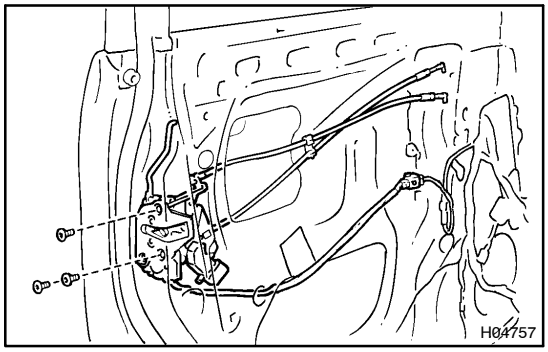
(b) Loosen the bolt and window regulator.
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

HINT:
Remove the regulator through the service hole.



HINT:
At the time of assembly, please refer to the following item.
Apply MP grease to the window regulator.

NOTICE:
At the time of assembly, please refer to the following item.
Do not apply grease to the spring of the window regulator.



13. REMOVE DOOR LOCK

(a) Disconnect the connector.

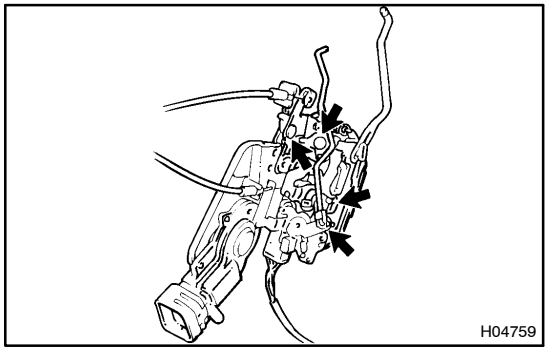
(b) Disconnect the 2 links from outside handle and door lock cylinder.

(c) Using a torx wrench, remove the 3 screws and door lock.
Torx wrench: T30 (Part No. 09042–00010 or locally manufactured tool)
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

HINT:
Remove the door lock through the service hole.

HINT:

- At the time of assembly, please refer to the following items.
- Apply adhesive to 3 screws.
Part No. 08833–00070, THREE BOND 1324 or equivalent.



- Apply MP grease to the sliding and rotating parts of the door lock.

14. REMOVE OUTSIDE HANDLE WITH DOOR LOCK CYLINDER

(a) Remove the 2 bolts and outside handle with door lock cylinder.
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

(b) Remove the bolt and door lock cylinder from the outside handle.
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

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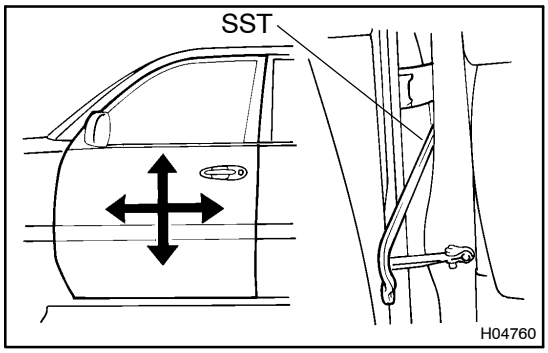
BO1JC–01

ADJUSTMENT

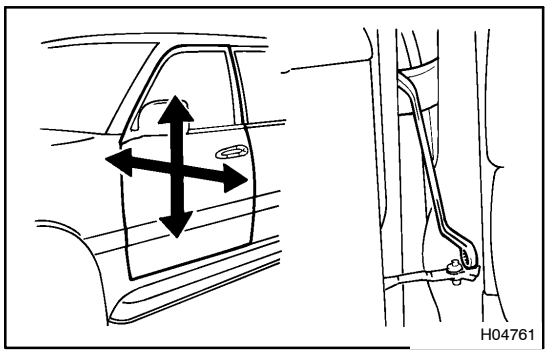


1. ADJUST DOOR IN FORWARD/REARWARD AND VERTICAL DIRECTIONS

Using SST, loosen the body side hinge bolts to adjust.

SST 09812–00010

Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)



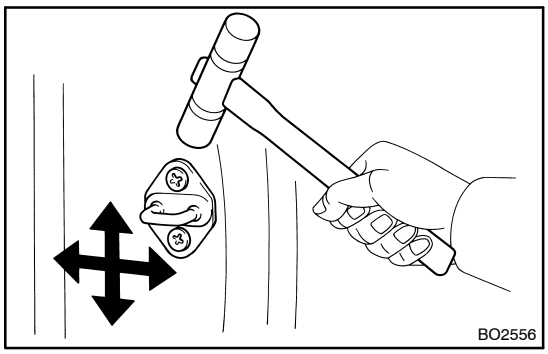
2. ADJUST DOOR IN LEFT/RIGHT AND VERTICAL DIRECTIONS

Loosen the door side hinge bolts to adjust.

HINT:

Substitute the bolt with washer for the centering bolt.

Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)



3. ADJUST DOOR LOCK STRIKER

(a) Check that the door fit and door lock linkages are adjusted correctly.

(b) Loosen the striker mounting screws.

Torque: 11 N·m (115 kgf·cm, 8 ft·lbf)

(c) Using a plastic hammer, tap the striker to adjust it.

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BO1JD–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–9).

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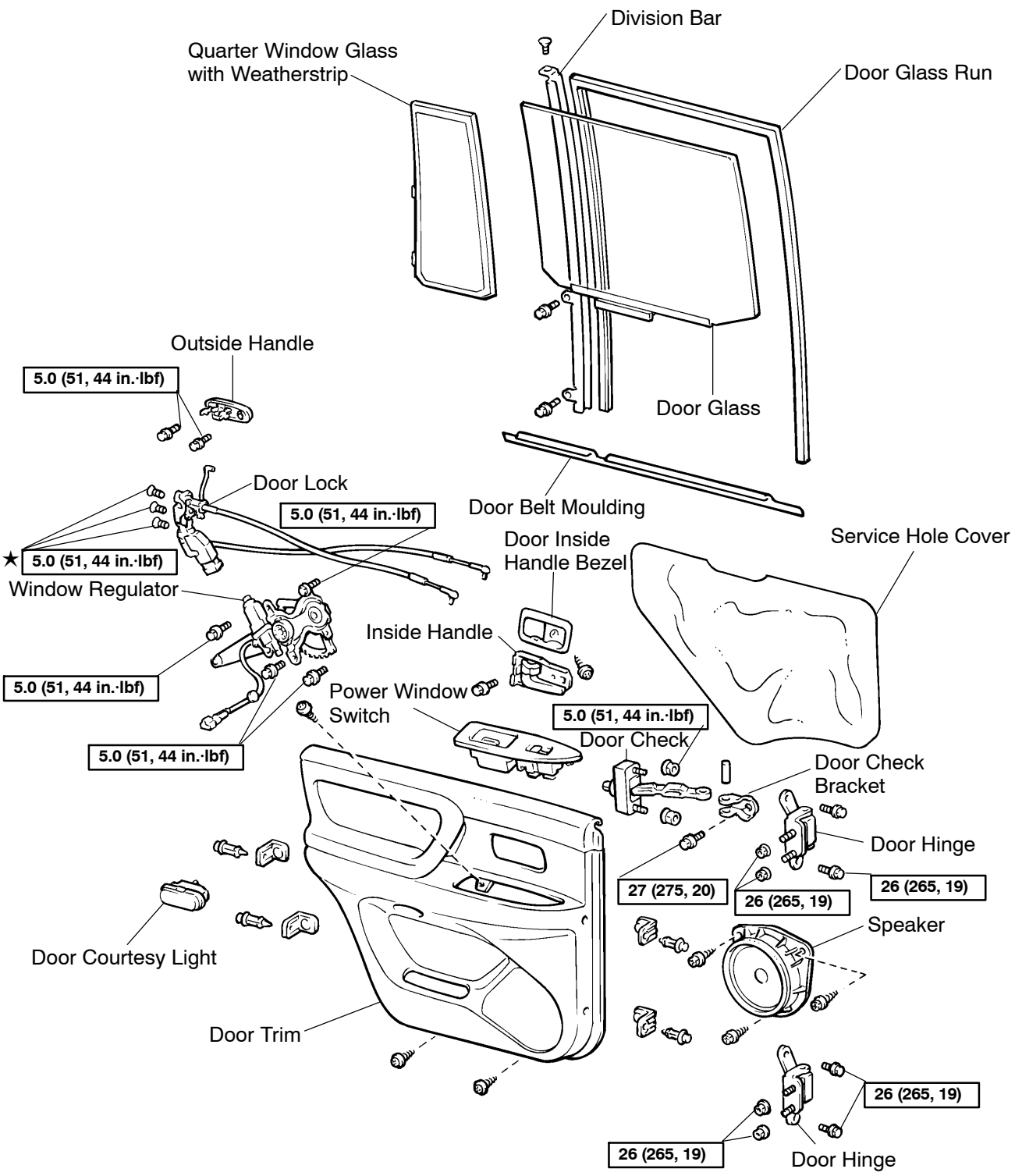
REAR DOOR

COMPONENTS

BO1JE–01



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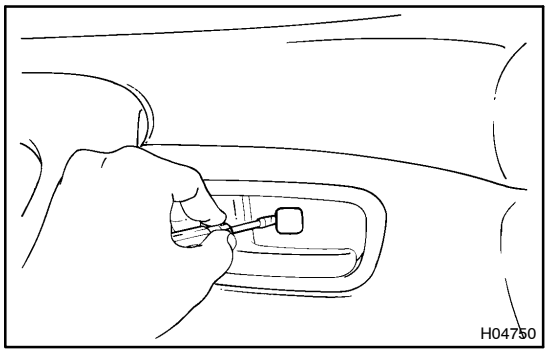
BO1JF–01

DISASSEMBLY

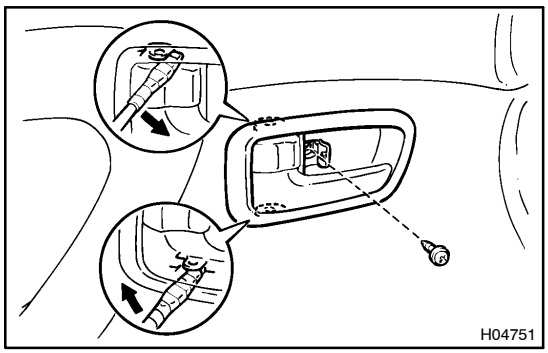


1. REMOVE DOOR INSIDE HANDLE BEZEL

(a) Using a screwdriver, open the cover as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

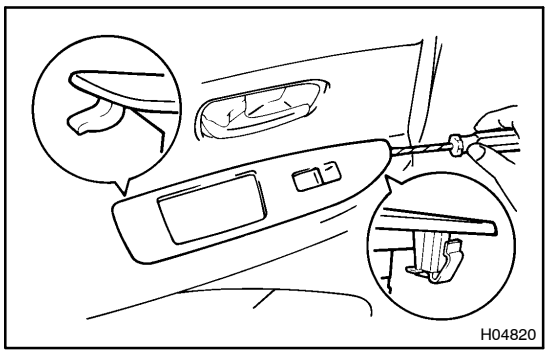


(b) Remove the screw.

(c) Using a screwdriver, remove the inside handle bezel as shown in the illustration.

HINT:

Tape the screwdriver tip before use.



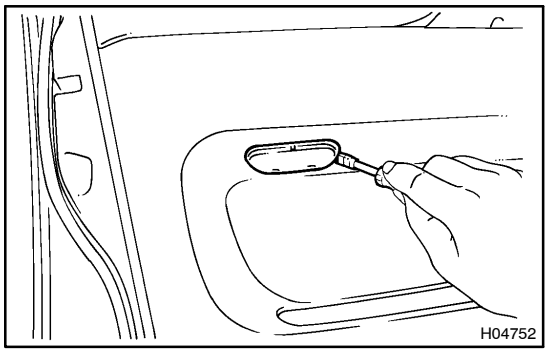
2. REMOVE POWER WINDOW SWITCH

(a) Using a screwdriver, remove the power window switch as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

(b) Disconnect the connector.

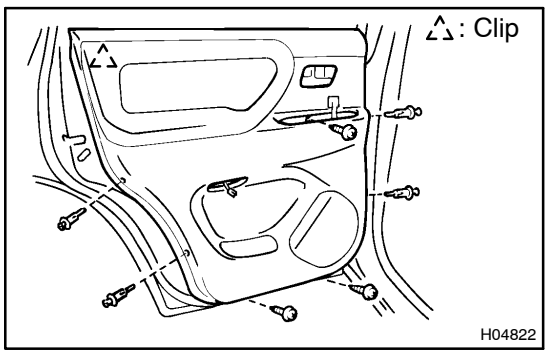


3. REMOVE DOOR COURTESY LIGHT

Using a screwdriver, remove the courtesy light, then disconnect the connector.

HINT:

Tape the screwdriver tip before use.



4. REMOVE DOOR TRIM

(a) Remove the 3 screws and 4 clips.

(b) Pull the trim upward to remove it.

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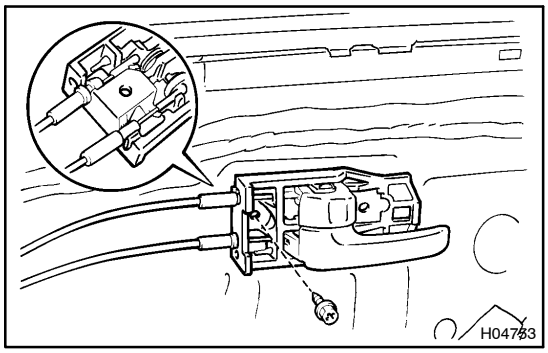
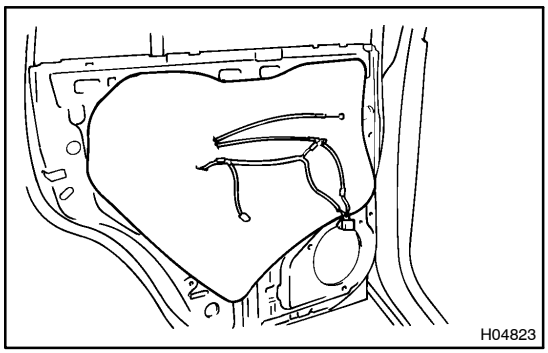


5. REMOVE INSIDE HANDLE

(a) Remove the screw.

(b) Disconnect the 2 control cables from the inside handle as shown in the illustration.

6. REMOVE SPEAKER



7. REMOVE SERVICE HOLE COVER

(a) Remove the clamps and wire harness.

(b) Remove the service hole cover.

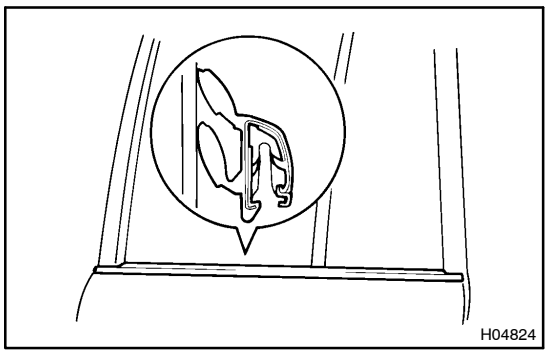
NOTICE:

Do not tear the cover.

HINT:

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

Bring out the 2 control cables and wire harness through the service hole cover.



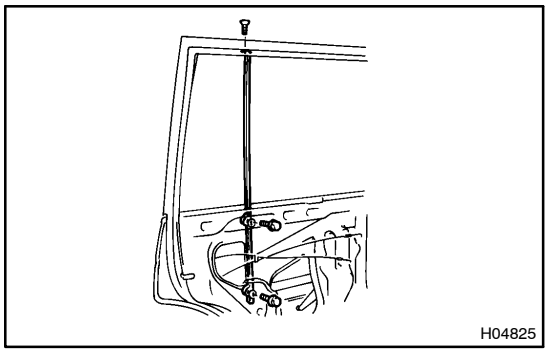
8. REMOVE DOOR BELT MOULDING

Using a scraper, remove the door belt moulding.

HINT:

Tape the scraper tip before use.

9. REMOVE DOOR GLASS RUN



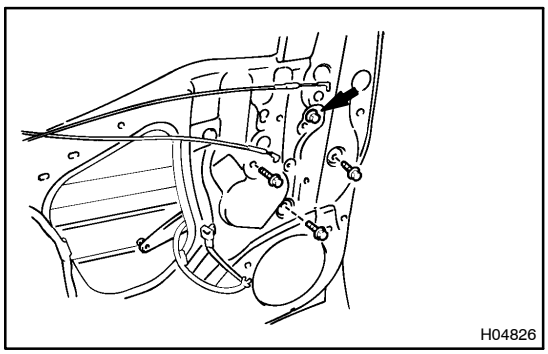
10. REMOVE DIVISION BAR

Remove the 2 bolts, screw and division bar.

11. REMOVE THESE PARTS:

(a) Door glass

(b) Quarter window glass with weatherstrip



12. REMOVE WINDOW REGULATOR

(a) Disconnect the connector, then remove the 3 bolts.
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

(b) Loosen the bolts and window regulator.
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

HINT:

Remove the regulator through the service hole.

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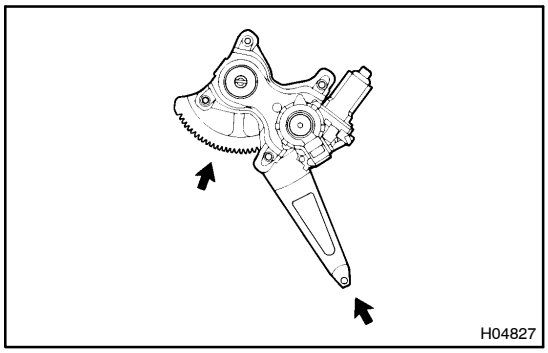
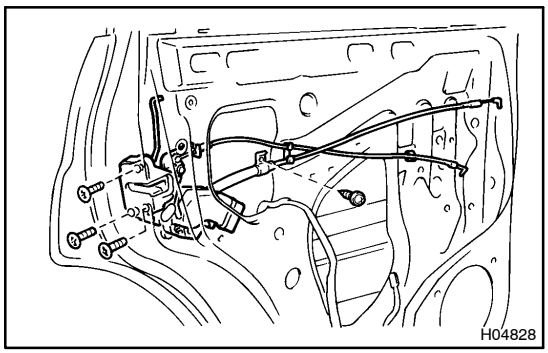
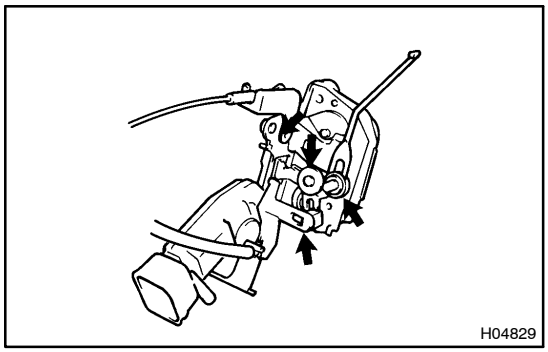


HINT:
At the time of assembly, please refer to the following item.
Apply MP grease to the window regulator.
NOTICE:
At the time of assembly, please refer to the following item.
Do not apply grease to the spring of the window regulator.



13. REMOVE DOOR LOCK
(a) Disconnect the connector.
(b) Disconnect the link from outside handle.
(c) Using a torx wrench, remove the 3 screws and door lock.
Torx wrench: T30 (Part No. 09042–00010 or locally manufactured tool)
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

HINT:
Remove the door lock through the service hole.
HINT:
- At the time of assembly, please refer to the following items.
- Apply adhesive to 3 screws.
Part No. 08833–00070, THREE BOND 1324 or equivalent.



- Apply MP grease to the sliding and rotating parts of the door lock.

14. REMOVE OUTSIDE HANDLE
Remove the 2 bolts and outside handle.
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

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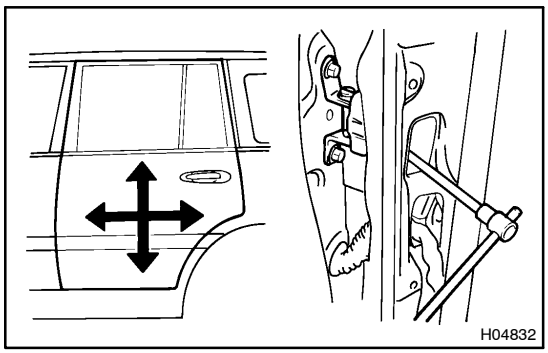
BO1JG–01

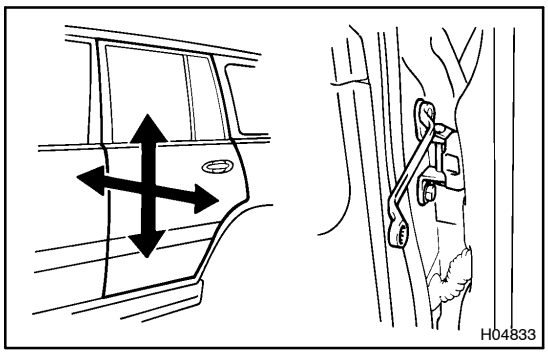
ADJUSTMENT

1. ADJUST DOOR IN FORWARD/REARWARD AND VERTICAL DIRECTIONS

(a) Remove the front door scuff plate.
(b) Remove the rear door scuff plate.
(c) Remove the front door opening trim.
(d) Remove the rear door opening trim.
(e) Remove the center pillar lower garnish.

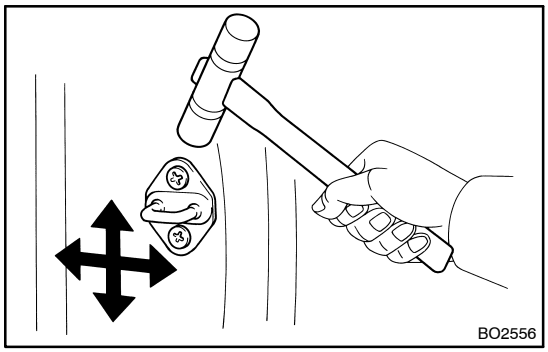


(f) Loosen the body side hinge nuts to adjust.
Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)
(g) Install the removed parts.



2. ADJUST DOOR IN LEFT/RIGHT AND VERTICAL DIRECTIONS

Loosen the door side hinge bolts to adjust.
Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)



3. ADJUST DOOR LOCK STRIKER

(a) Check that the door fit and door lock linkages are adjusted correctly.
(b) Loosen the striker mounting screws to adjust.
Torque: 11 N·m (115 kgf·cm, 8 ft·lbf)
(c) Using a plastic hammer, tap the striker to adjust it.

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BO1JH–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–15).

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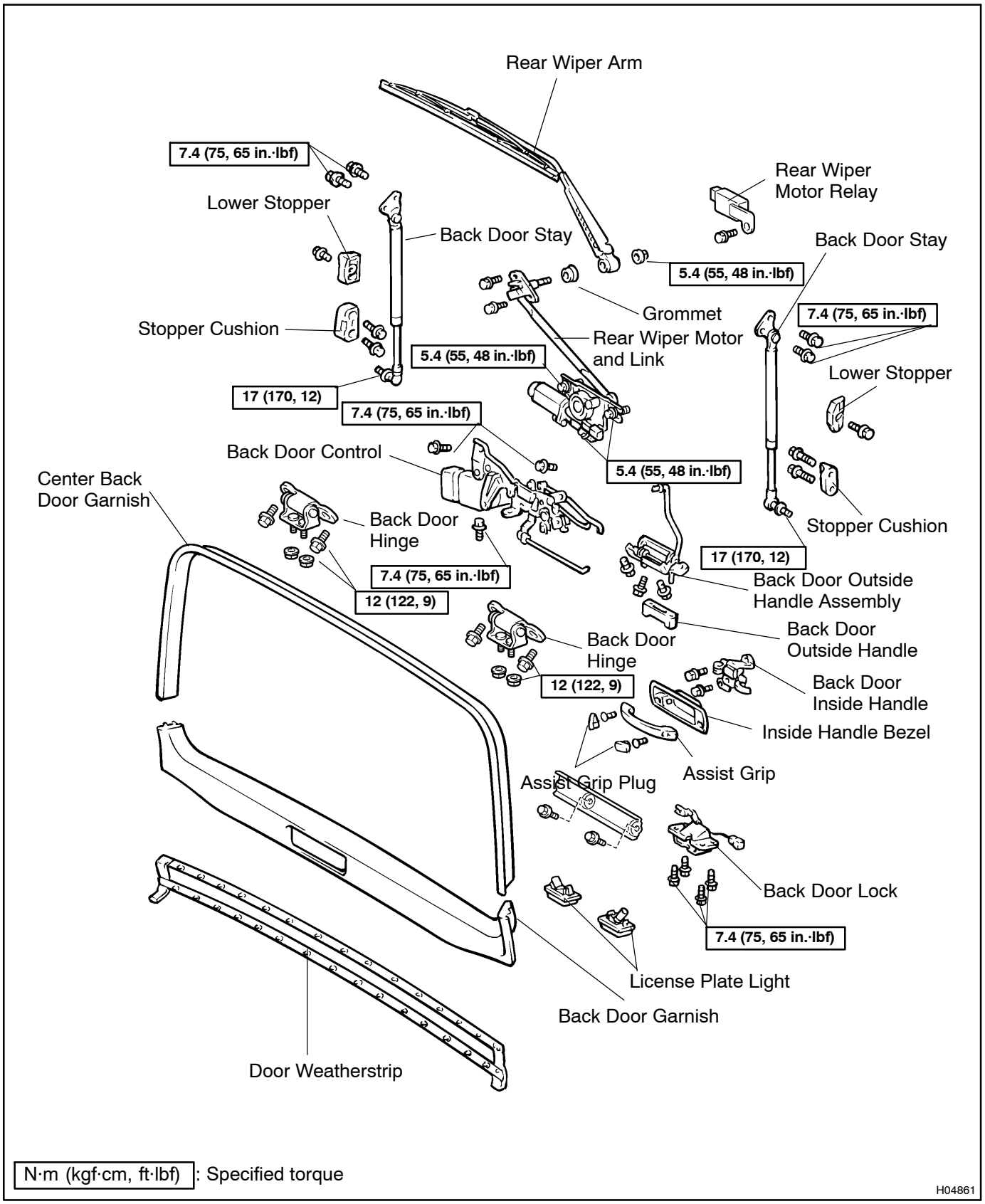
UPPER BACK DOOR

COMPONENTS

BO1JI–01



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

H04861

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BO1JJ–01

DISASSEMBLY

1. REMOVE ASSIST GRIP

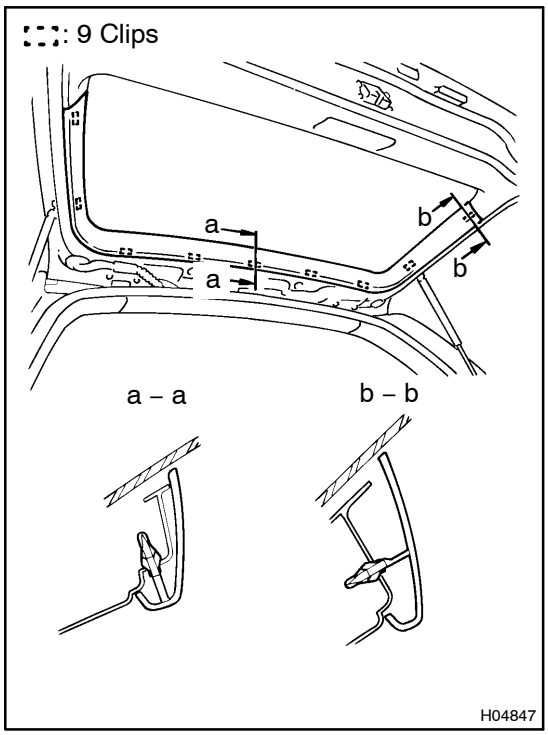
(a) Using a screwdriver, remove the 2 assist grip plugs.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 2 screws and assist grip.

2. REMOVE INSIDE HANDLE BEZEL

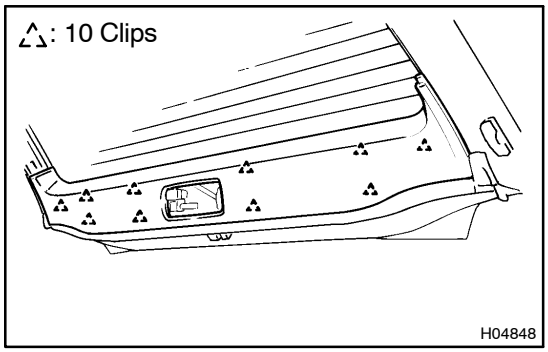


3. REMOVE CENTER BACK DOOR GARNISH

Using a screwdriver, remove the center back door garnish.

HINT:

Tape the screwdriver tip before use.

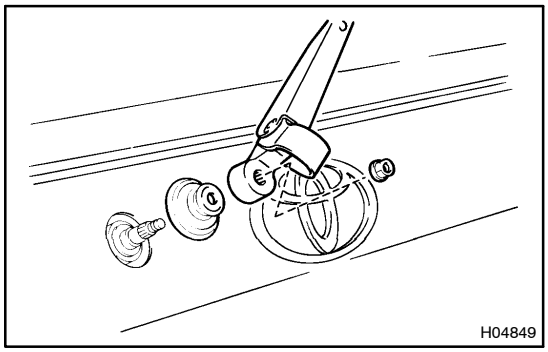


4. REMOVE BACK DOOR GARNISH

Using a screwdriver, remove the back door garnish.

HINT:

Tape the screwdriver tip before use.



5. REMOVE REAR WIPER ARM

(See page BO–37)

(a) Open the cover.

(b) Remove the nut and rear wiper arm.

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

(c) Remove the grommet.

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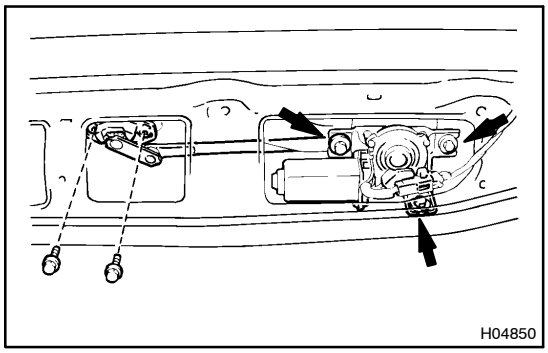
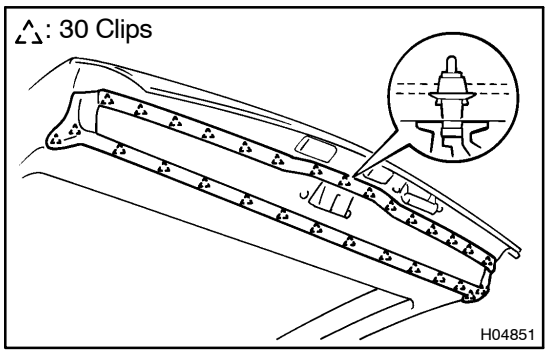


6. REMOVE REAR WIPER MOTOR AND LINK ASSEMBLY

(a) Disconnect the connector.
(b) Remove the 2 bolts.
(c) Unfasten the 3 bolts and remove the rear wiper motor and link assembly.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

7. REMOVE REAR WIPER RELAY

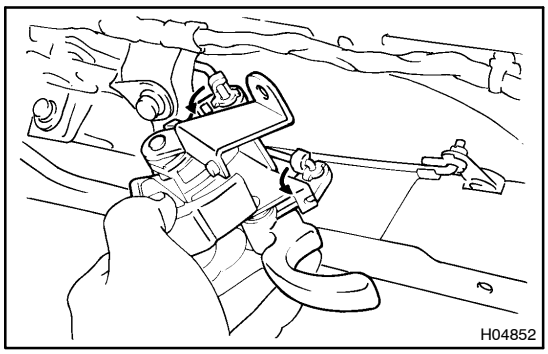


8. REMOVE DOOR WEATHERSTRIP

Remove the door weatherstrip.

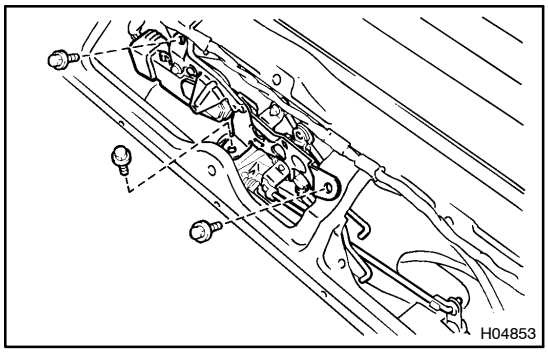
NOTICE:

Do not pull strongly on the weatherstrip as it may tear.



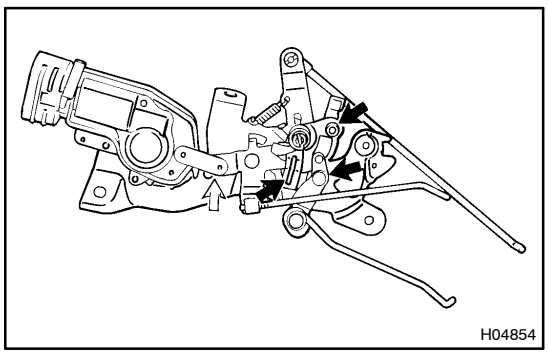
9. REMOVE BACK DOOR INSIDE HANDLE

(a) Remove the 2 bolts.
(b) Disconnect the back door lock locking rod and back door lock inside opening link, then remove the back door inside handle.



10. REMOVE BACK DOOR CONTROL

(a) Disconnect the links.
(b) Remove the 3 bolts.
Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)
(c) Disconnect the connector, then remove the back door control.



HINT:

At the time of assembly, please refer to the following item.
Apply MP grease to the sliding surface of the back door control.

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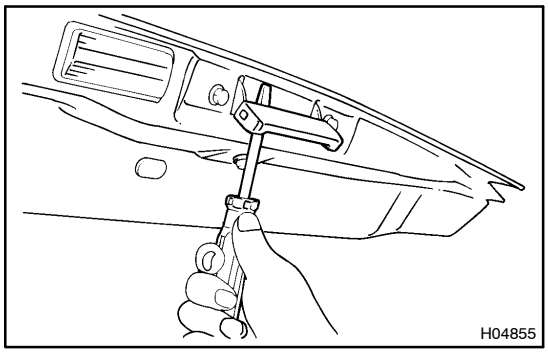
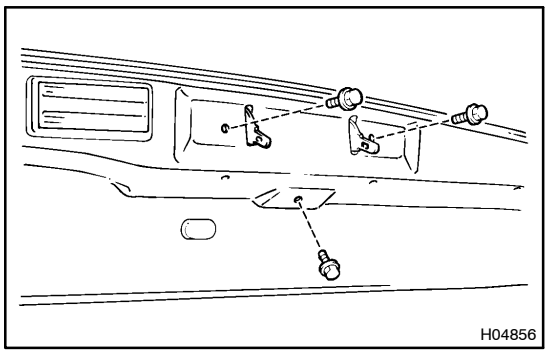


11. REMOVE BACK DOOR OUTSIDE HANDLE ASSEMBLY

(a) Using a screwdriver, remove the back door outside handle.

HINT:

Tape the screwdriver tip before use.



(b) Remove the 3 bolts and back door outside handle assembly.

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

12. REMOVE THESE PARTS:

(a) License plate lights

(b) Back door lock

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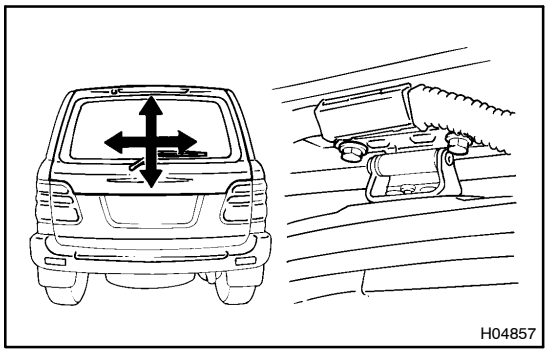
BO1JK–01

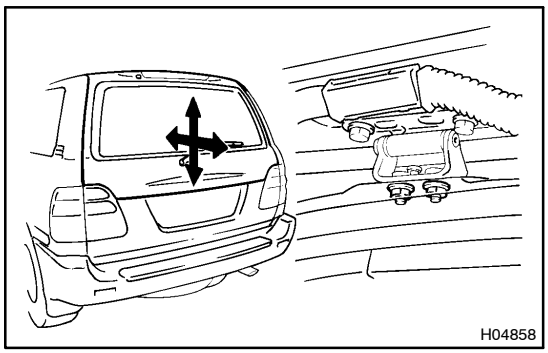
ADJUSTMENT



1. ADJUST DOOR IN LEFT/RIGHT AND VERTICAL DIRECTIONS

Loosen the door side hinge bolts to adjust.

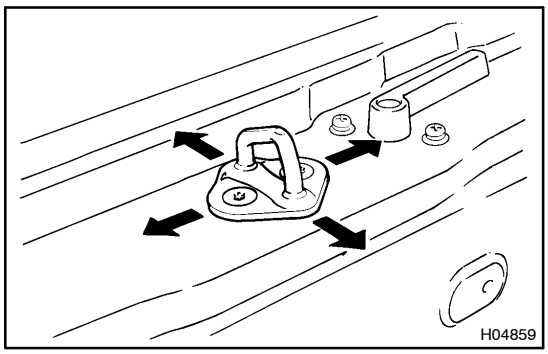
Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)



2. ADJUST DOOR IN FORWARD/REARWARD AND VERTICAL DIRECTIONS

Loosen the body side hinge nuts to adjust.

Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)



3. ADJUST DOOR LOCK STRIKER

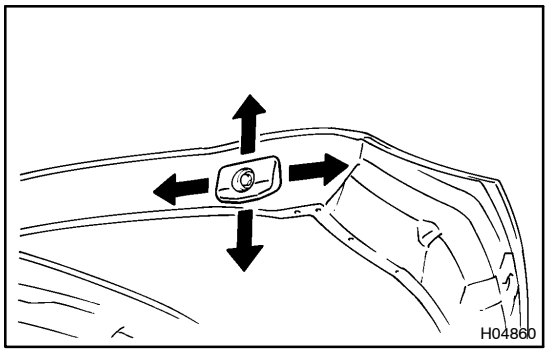
(a) Check tat the door fit and door linkages are adjusted correctly.

(b) Using a torx wrench, loosen the door lock striker mounting screws.

Torx wrench: T40 (Part No. 09042–00020 or locally manufactured tool)

Torque: 11 N·m (115 kgf·cm, 8 ft·lbf)

(c) Using a plastic hammer, tap the door lock striker to adjust.



4. ADJUST LOWER STOPPER

Loosen the stopper mounting bolt to adjust.

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BO1JL–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–21).

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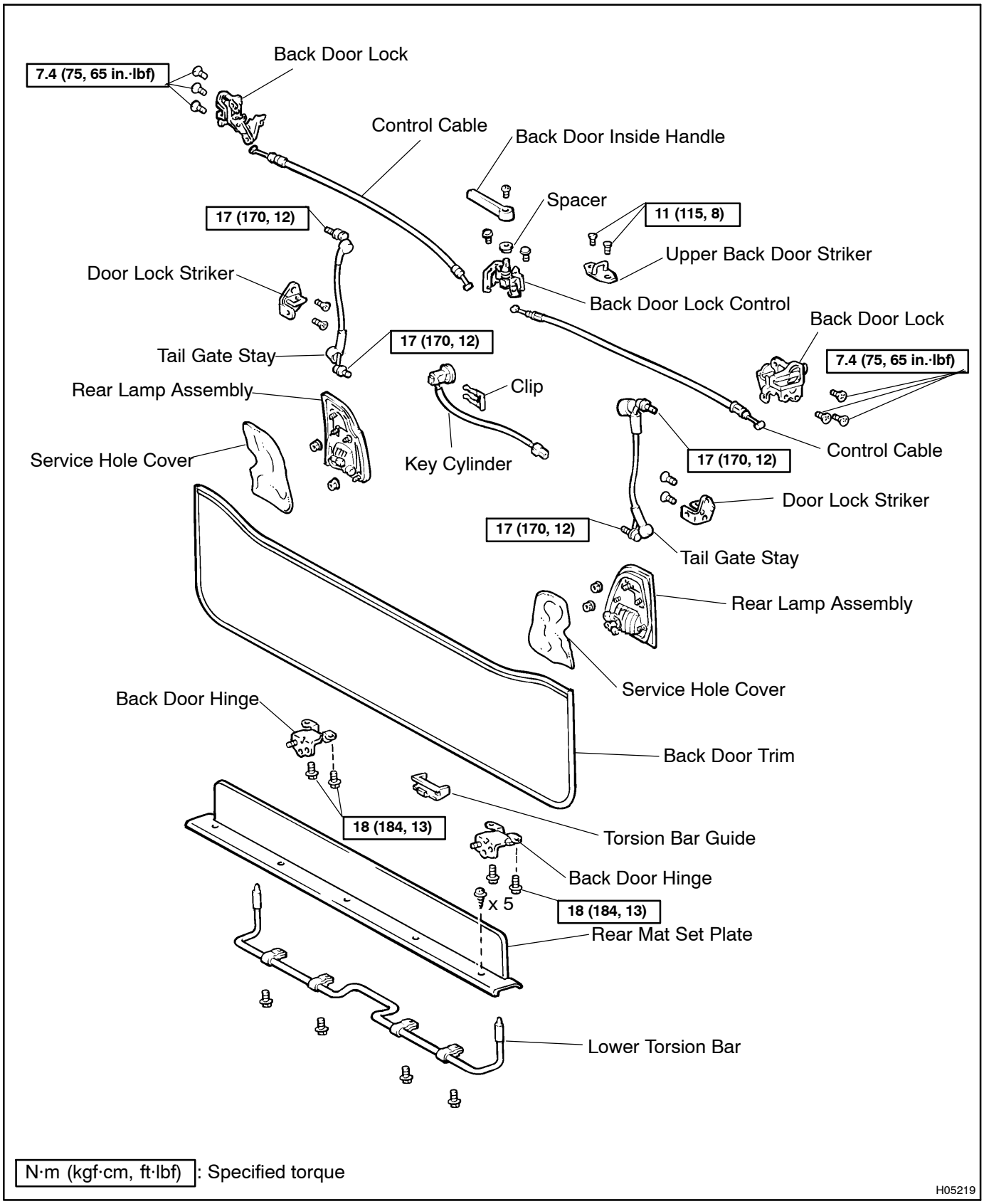
LOWER BACK DOOR

COMPONENTS

BO1JM–01



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

H05219

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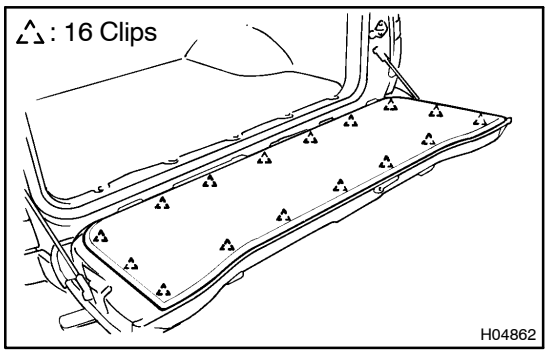
BO1JN–01

DISASSEMBLY

1. REMOVE REAR MAT SET PLATE

Remove the 5 screws and rear mat set plate.



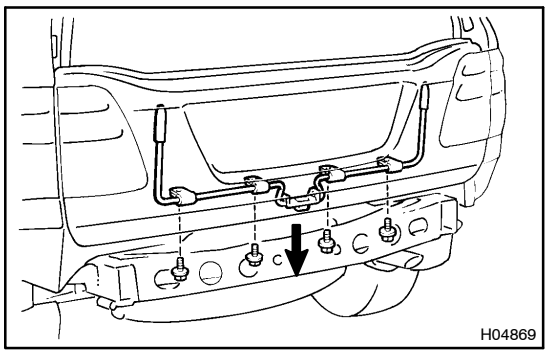
2. REMOVE BACK DOOR TRIM

(a) Insert a screwdriver between the door and door trim to pry out.

HINT:

Tape the screwdriver tip before use.

(b) Remove the door trim.

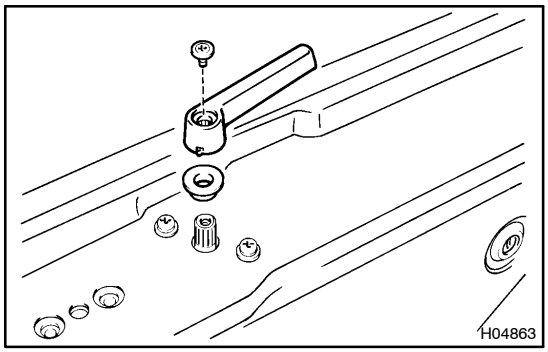


3. REMOVE LOWER TORSION BAR

(a) Remove the rear bumper.
(See page BO–5)

(b) Remove the 4 bolts and lower torsion bar as shown in the illustration.

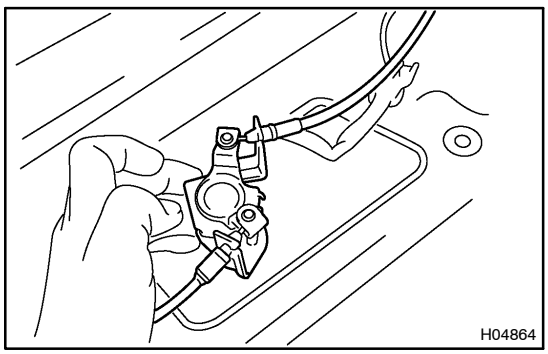
(c) Remove the torsion bar guide.



4. REMOVE BACK DOOR INSIDE HANDLE

(a) Remove the screw and back door inside handle.

(b) Remove the spacer.



5. REMOVE BACK DOOR LOCK CONTROL

(a) Remove the 2 screws.

(b) Disconnect the door lock control cables, then remove the back door control.

6. REMOVE SERVICE HOLE COVER

NOTICE:

Do not tear the service hole cover.

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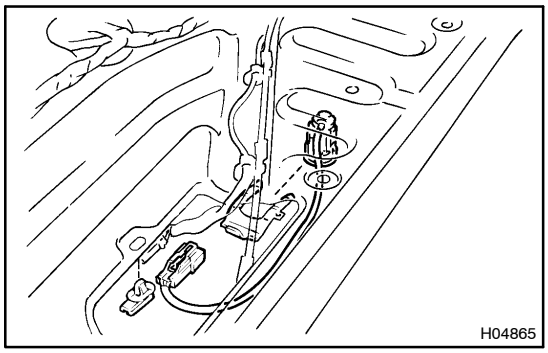
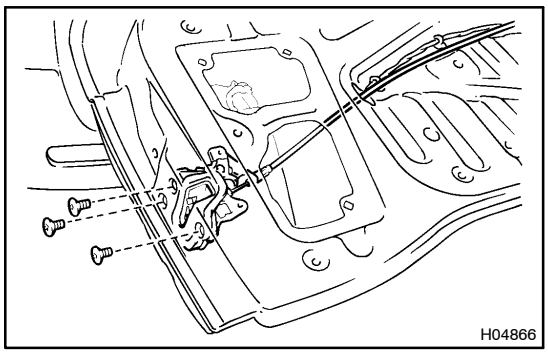


7. REMOVE KEY CYLINDER

(a) Disconnect the connector.

(b) Remove the clip and key cylinder.



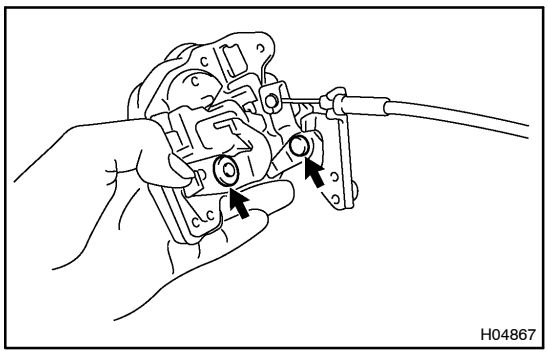
8. REMOVE BACK DOOR LOCK

(a) Disconnect the control cables from the clamps.

(b) Using a torx wrench, remove the 6 screws and back door locks.

Torx wrench: T30 (Part No. 09042–00010 or locally manufactured tool)

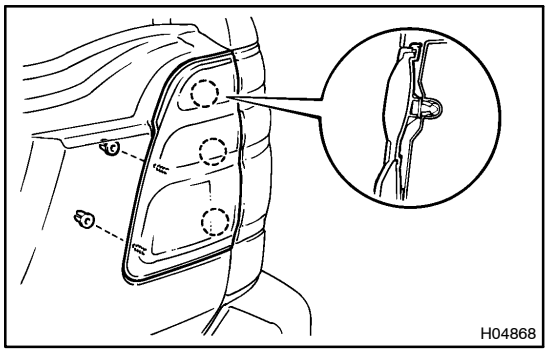
Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)



HINT:

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

Apply MP grease to the rotating parts of the door lock.



9. REMOVE REAR LAMP ASSEMBLY

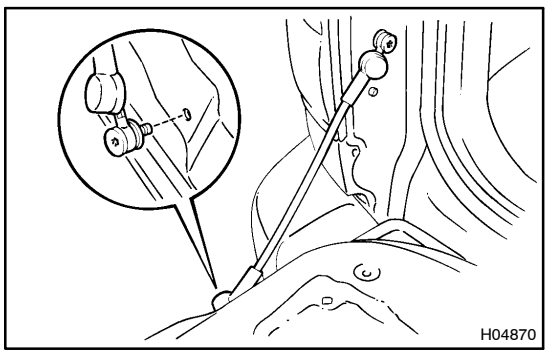
(a) Disconnect the connector.

(b) Remove the 4 nuts.

(c) Using a screwdriver remove the rear lamp assemblies.

HINT:

Tape the screwdriver tip before use.



10. REMOVE TAIL GATE STAY

Using a torx wrench, remove the 4 screws and 2 tail gate stays.

Torx wretch: T30 (Part No. 09042–00010 or locally manufactured tool)

Torque: 17 N·m (170 kgf·cm, 12 ft·lbf)

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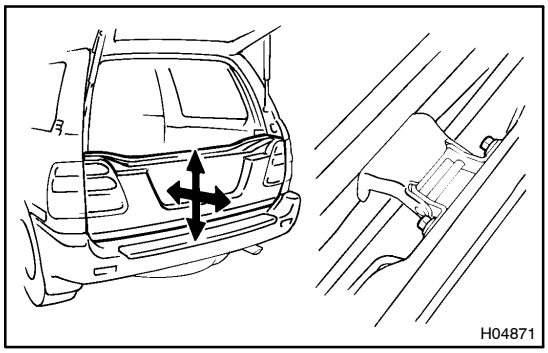
BO1JO–01

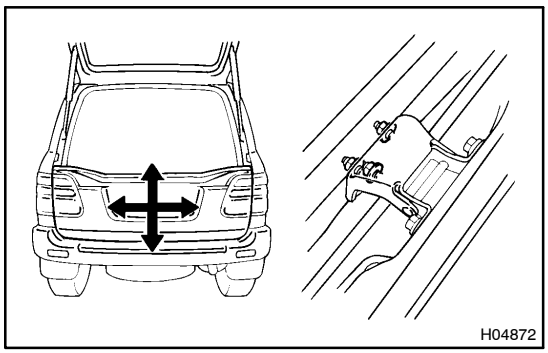
ADJUSTMENT



1. ADJUST DOOR IN FORWARD/REARWARD AND VERTICAL DIRECTIONS

Loosen the door side hinge bolts to adjust.

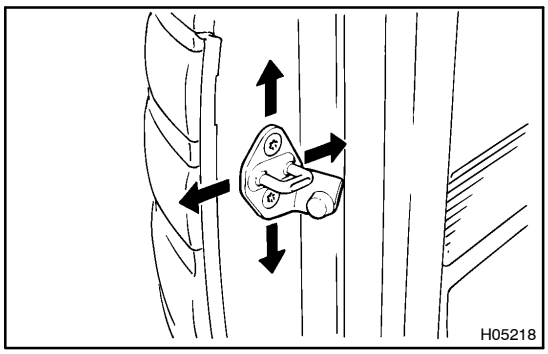
Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)



2. ADJUST DOOR IN LEFT/RIGHT AND VERTICAL DIRECTIONS

Loosen the body side hinge bolts and nut to adjust.

Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)



3. ADJUST DOOR LOCK STRIKER

(a) Check that the door fit and door linkages are adjusted correctly.

(b) Using a torx wrench, loosen the door lock striker mounting screws.

Torx wrench: T40 (Part No. 09042–00020 or locally manufactured tool)

Torque: 11 N·m (115 kgf·cm, 8 ft·lbf)

(c) Using a plastic hammer, tap the striker to adjust.

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BO1JP–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–27).

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BACK DOOR STAY

BO1JQ–01

REPLACEMENT

1. REMOVE BACK DOOR STAY

(a) Remove the bolts and back door stay from the back door.

HINT:

While supporting the back door with your hand, remove the back door stay.

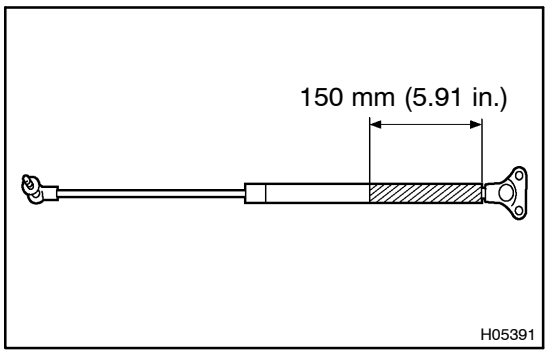
(b) Remove the bolt and back door stay from the body.

2. IF NECESSARY, REPLACE BACK DOOR STAY

NOTICE:

When handling the back door stay.

- **Do not disassemble the back door stay because the cylinder is filled with pressurized gas.**



- **If the back door stay is to be replaced, drill a 2.0 – 3.0 mm (0.079 – 0.118 in.) hole in the bottom of the back door stay as shown in the illustration to completely release the high–pressure gas before disposing of it.**
- **When drilling, chips may fly out so work carefully.**
- **The gas is colorless, odorless and non–toxic.**
- **When working, handle the back door stay carefully. Never score or scratch the exposed part of the piston rod, and never allow paint or oil to get on it.**
- **Do not turn the piston rod and cylinder with the back door stay fully extended.**

3. INSTALL BACK DOOR STAY

(a) Install the bolt and back door stay to the body.
Torque: 17 N·m (170 kgf·cm, 12 ft·lbf)

(b) Install the bolts and back door stay to the back door.
Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)

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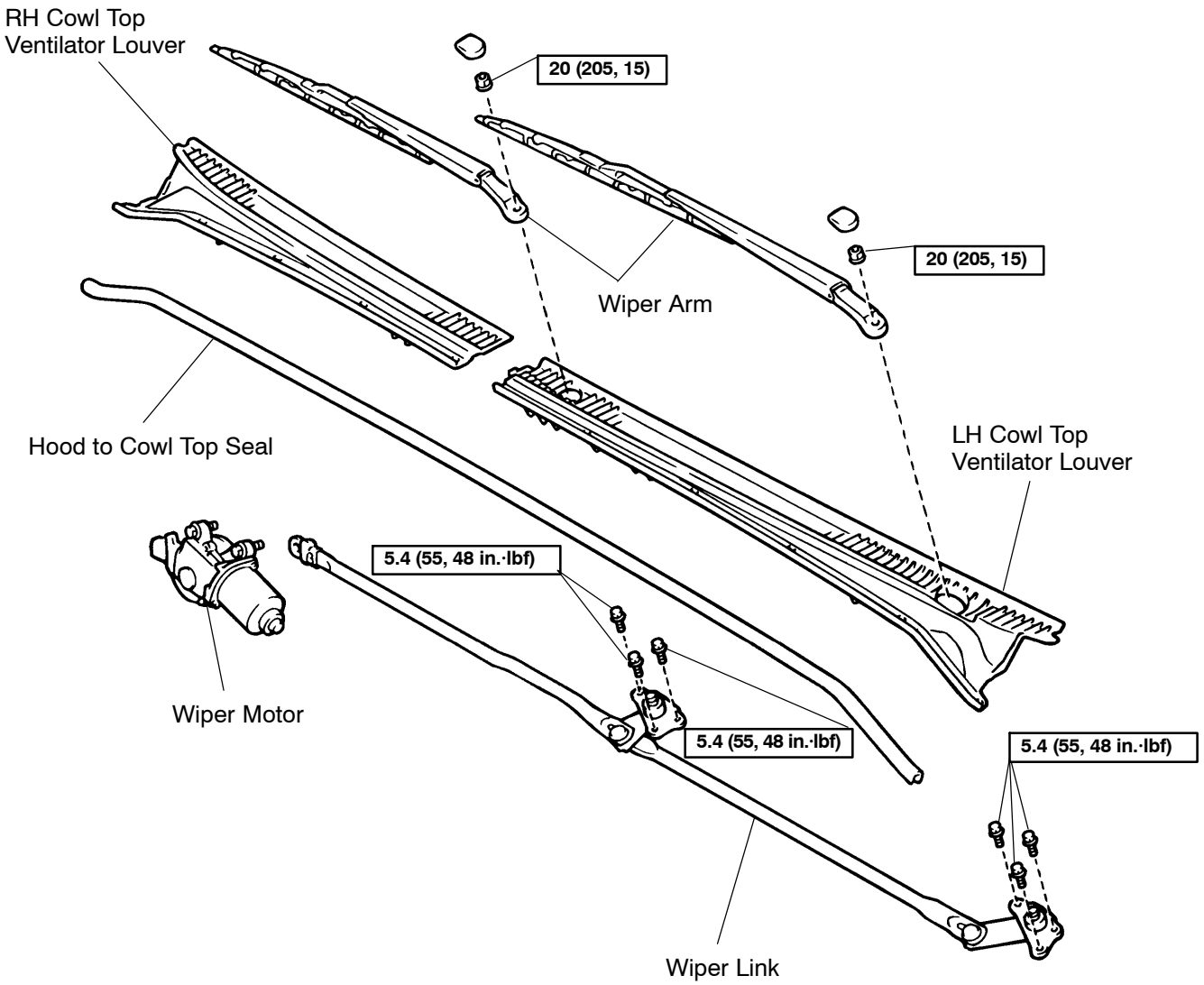
FRONT WIPER AND WASHER

COMPONENTS

BO1JR–01



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

H04846

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BO1JS–01

REMOVAL

1. REMOVE THESE PARTS:

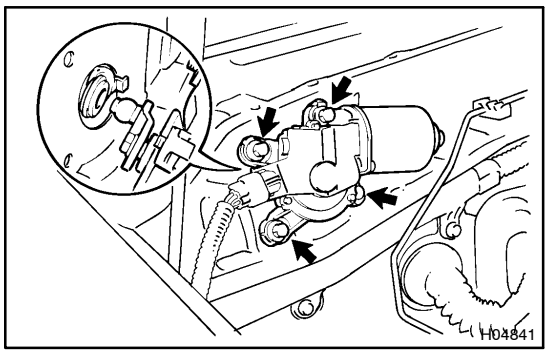
(a) Wiper arms

(b) Hood to cowl top seal

2. REMOVE COWL TOP VENTILATOR LOUVER

(a) Remove the RH cowl top ventilator louver.

(b) Remove the LH cowl top ventilator louver.



3. REMOVE WIPER MOTOR

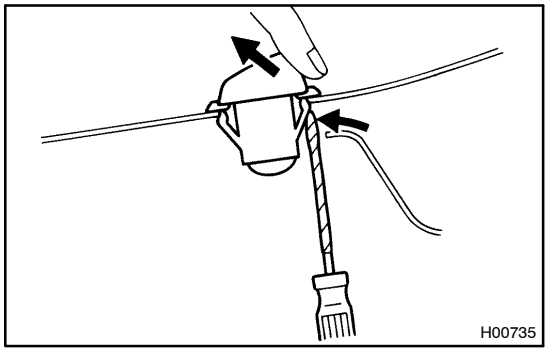
(a) Disconnect the connector, unfasten the 4 bolts.

(b) Disconnect the wiper motor from the wiper link, then remove the wiper motor.

4. REMOVE WIPER LINK

(a) Remove the 6 bolts.

(b) Remove the wiper link through the service hole.



5. REMOVE WASHER NOZZLE

(a) Disconnect the washer hoses.

(b) Using a screwdriver, remove the washer nozzles.

HINT:

Tape the screwdriver tip before use.

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BO1JT–01

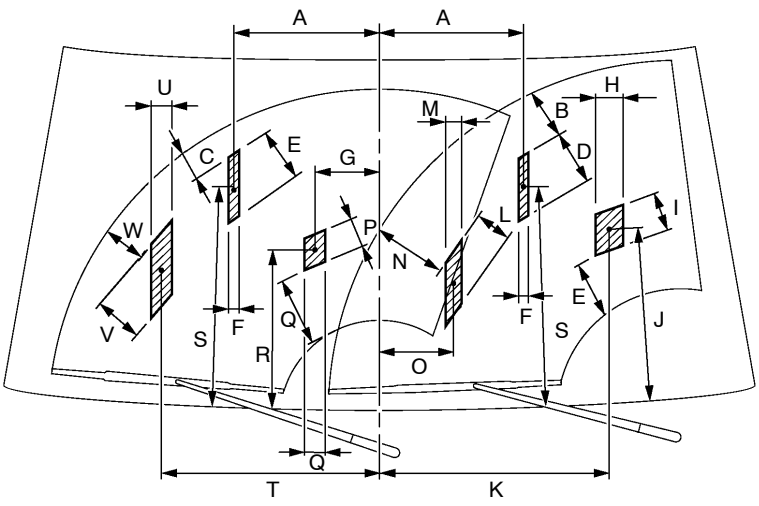
INSPECTION

INSPECT WASHER NOZZLE

(a) While operating the washer, check if the point where the washer fluid hits the windshield is within the range indicated by the hatched line.

A: Approx. 311 mm (12.24 in.)
B: Approx. 110 mm (4.33 in.)
C: Approx. 61 mm (2.40 in.)
D: Approx. 116 mm (4.57 in.)
E: Approx. 117 mm (4.61 in.)
F: Approx. 22 mm (0.87 in.)
G: Approx. 138 mm (5.43 in.)
H: Approx. 60 mm (2.36 in.)
I: Approx. 85 mm (3.35 in.)
J: Approx. 364 mm (14.33 in.)
K: Approx. 496 mm (19.53 in.)
L: Approx. 81 mm (3.19 in.)
M: Approx. 35 mm (1.38 in.)
N: Approx. 157 mm (6.18 in.)
O: Approx. 159 mm (6.26 in.)
P: Approx. 63 mm (2.48 in.)
Q: Approx. 144 mm (5.67 in.)
R: Approx. 331 mm (13.03 in.)
S: Approx. 465 mm (18.31 in.)
T: Approx. 468 mm (18.43 in.)
U: Approx. 45 mm (1.77 in.)
V: Approx. 104 mm (4.09 in.)
W: Approx. 94 mm (3.70 in.)

(b) Check that the lower point where the washer fluid hits the windshield is within the range of the wiping pattern (the area of the glass which is wiped by the blades).



H04842

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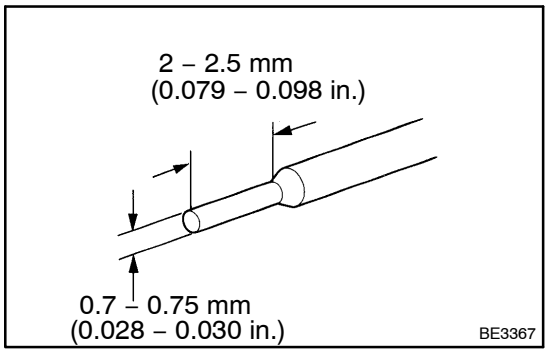
BO1JU–01



ADJUSTMENT

ADJUST WASHER NOZZLE

Using a tool like the one shown in the illustration, change the direction of the nozzle hole to adjust the point where washer fluid hits the windshield.

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BO1JV–01

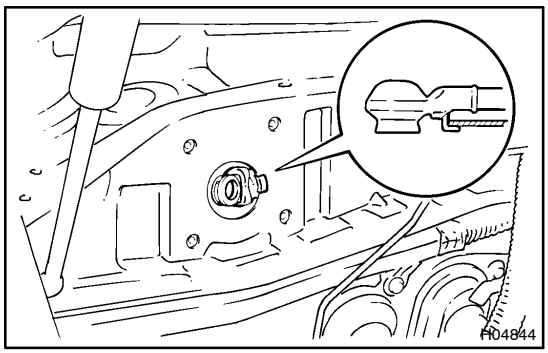
INSTALLATION

1. INSTALL WASHER NOZZLE

2. INSTALL WIPER LINK

Instal the wiper link through the service hole, then torque the 6 bolts.

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



HINT:

When installing the wiper link, connect the claw of wiper link to the panel.

3. INSTALL WIPER MOTOR

(a) Connect the wiper motor to wiper link.

(b) Install the wiper motor with 4 bolts.

(c) Connect the connector.

4. INSTALL COWL TOP VENTILATOR LOUVER

(a) Install the LH cowl top ventilator louver.

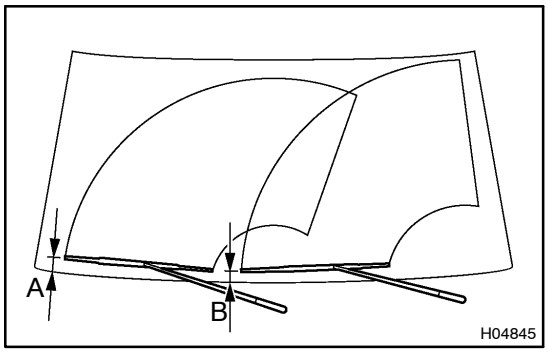
(b) Install the RH cowl top ventilator louver.

5. INSTALL HOOD TO COWL TOP SEAL

6. INSTALL WIPER ARM

(a) Operate the wipers once and turn the wiper switch OFF.

(b) Install the wiper arms and tighten nuts by hand.



(c) Adjust the installation position of the wiper arms to the positions shown in the illustration.

A: Approx. 40 mm (1.57 in.)

B: Approx. 26 mm (1.02 in.)

(d) Torque the nuts.

Torque: 20 N·m (205 kgf·cm, 15 ft·lbf)

(e) Install the wiper arm caps.

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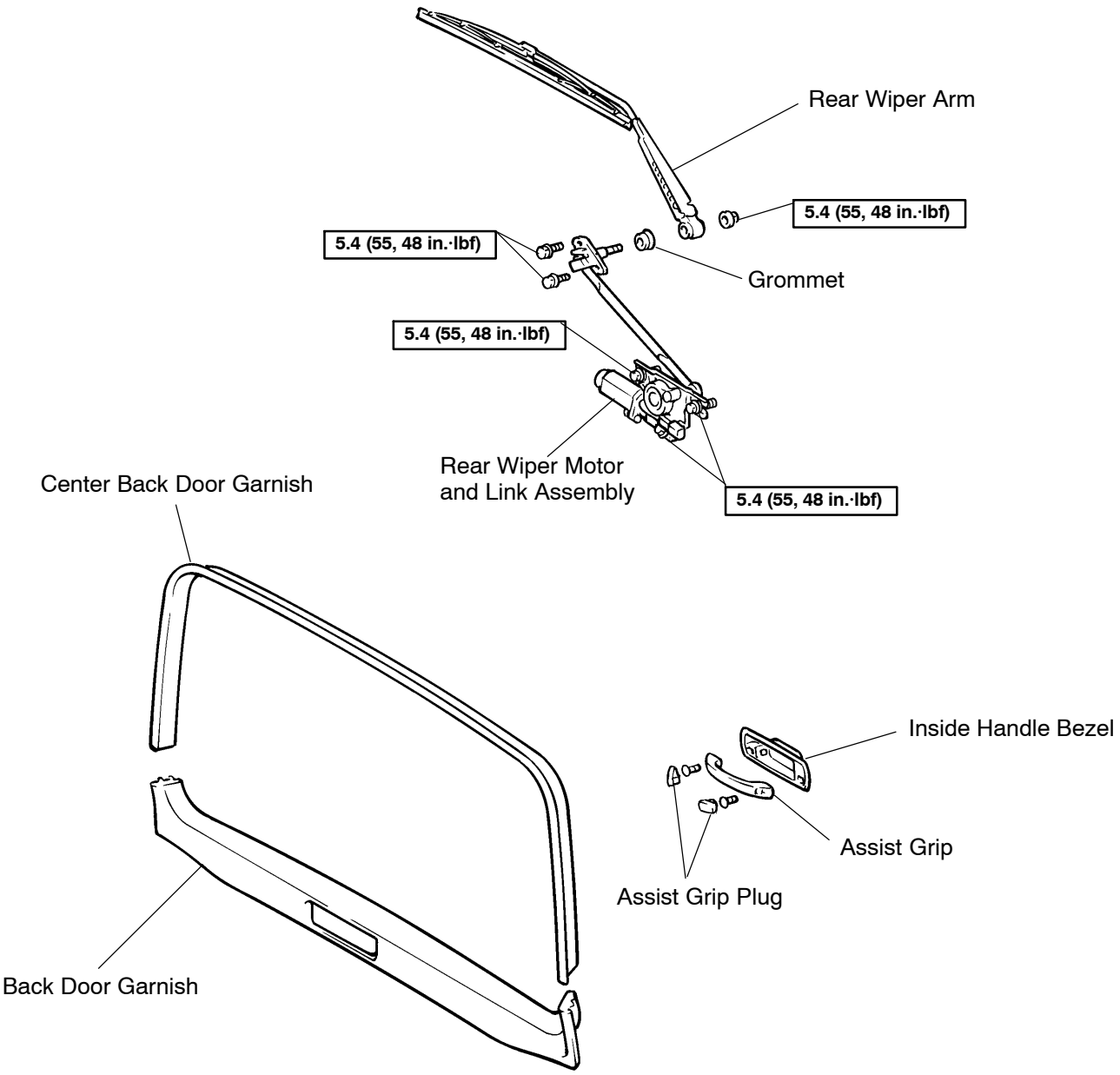
REAR WIPER AND WASHER

COMPONENTS

BO1JW–01



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

H05991

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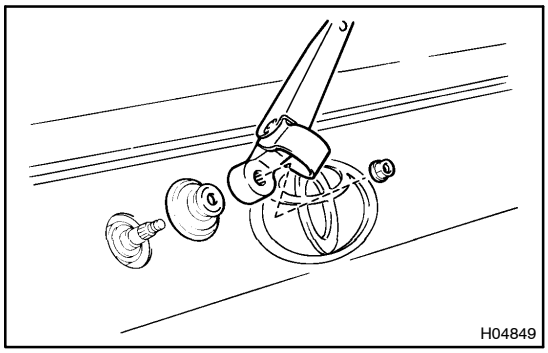
BO1JX–01

REMOVAL

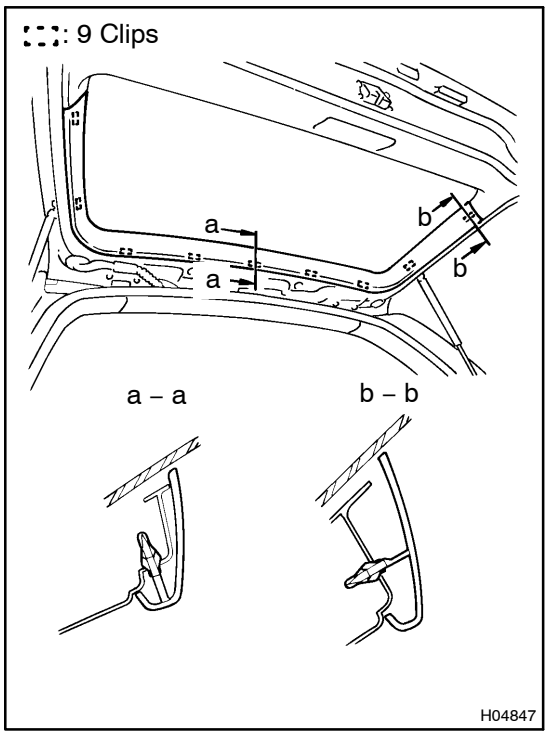


1. REMOVE REAR WIPER ARM

(a) Open the cover.
(b) Remove the nut and rear wiper arm.
(c) Remove the grommet.

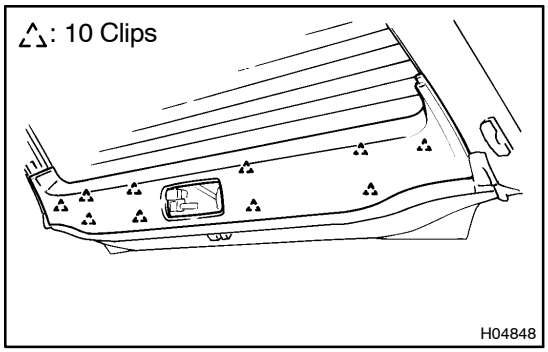
2. REMOVE THESE PARTS:

(a) Assist grip
(b) Inside handle bezel



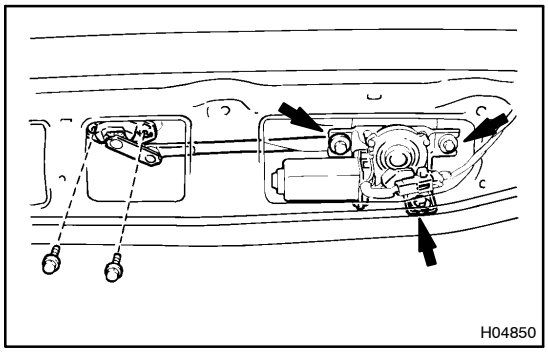
3. REMOVE CENTER BACK DOOR GARNISH

Using a screwdriver, remove the center back door garnish.
HINT:
Tape the screwdriver tip before use.



4. REMOVE BACK DOOR GARNISH

Using a screwdriver, remove the back door garnish.
HINT:
Tape the screwdriver tip before use.



5. REMOVE REAR WIPER MOTOR AND LINK ASSEMBLY

(a) Disconnect the connector
(b) Remove the 3 bolts.
(c) Unfasten the 2 bolts and remove the rear wiper motor with link assembly.

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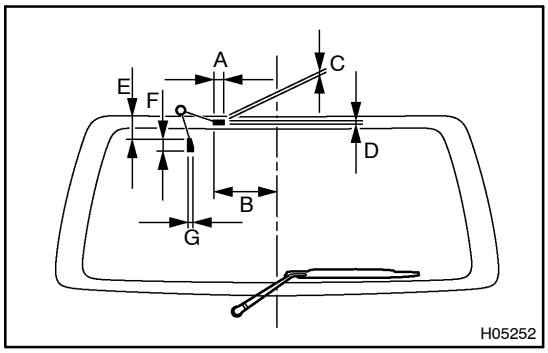
BO1JY–01



INSPECTION

INSPECT WASHER NOZZLE

(a) While operating the washer, check if the point where the washer fluid hits the back door glass is within the range indicated in the illustration.

A: Approx. 30 mm (1.18 in.)
B: Approx. 179 mm (7.05 in.)
C: Approx. 15 mm (0.59 in.)
D: Approx. 10 mm (0.39 in.)
E: Approx. 70 mm (2.76 in.)
F: Approx. 23 mm (0.91 in.)
G: Approx. 7 mm (0.28 in.)

(b) Check that the lower point where the washer fluid hits the back door glass is within the range of the wiping pattern (the area of the glass which is wiped by the blades).

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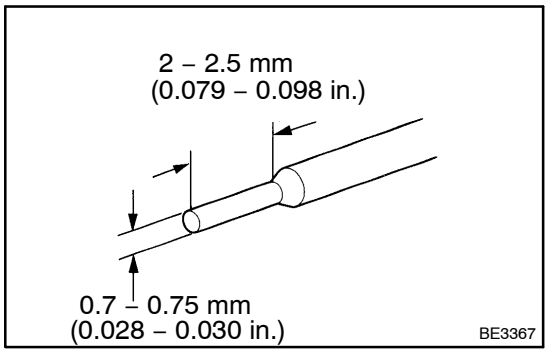
BO1JZ–01



ADJUSTMENT

ADJUST WASHER NOZZLE

Using a tool like the one shown in the illustration, change the direction of the nozzle hole to adjust the point where washer fluid hits the back door glass.

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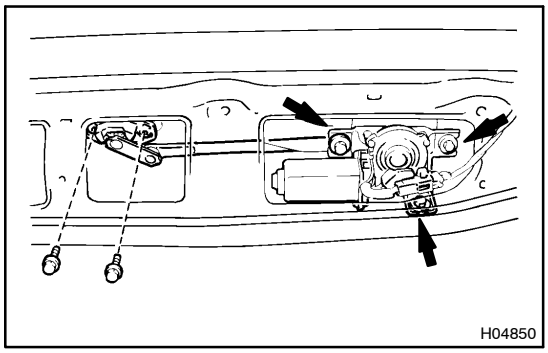
BO1K0–01



INSTALLATION

1. INSTALL REAR WIPER MOTOR AND LINK ASSEMBLY

(a) Install the wiper motor and link assembly with 5 bolts.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

(b) Connect the connector.

2. INSTALL THESE PARTS:

(a) Back door garnish

(b) Center back door garnish

(c) Inside handle bezel

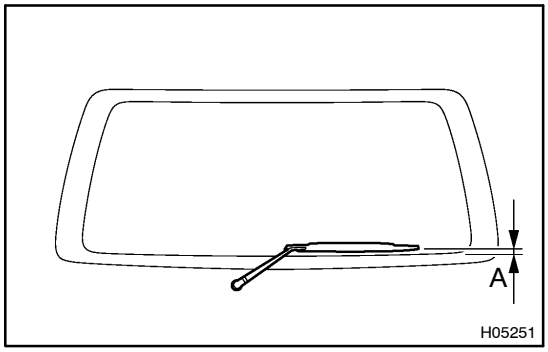
(d) Assist grip

3. INSTALL REAR WIPER ARM

(a) Install the grommet.

(b) Operate the wiper once and turn the wiper switch OFF.

(c) Install the wiper arm and tighten nut by hand.



(d) Adjust the installation position of the wiper arms to the position shown in the illustration.
A: Approx. 38 ± 10 mm (1.50 ± 0.39 in.)

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

(f) Close the cover.

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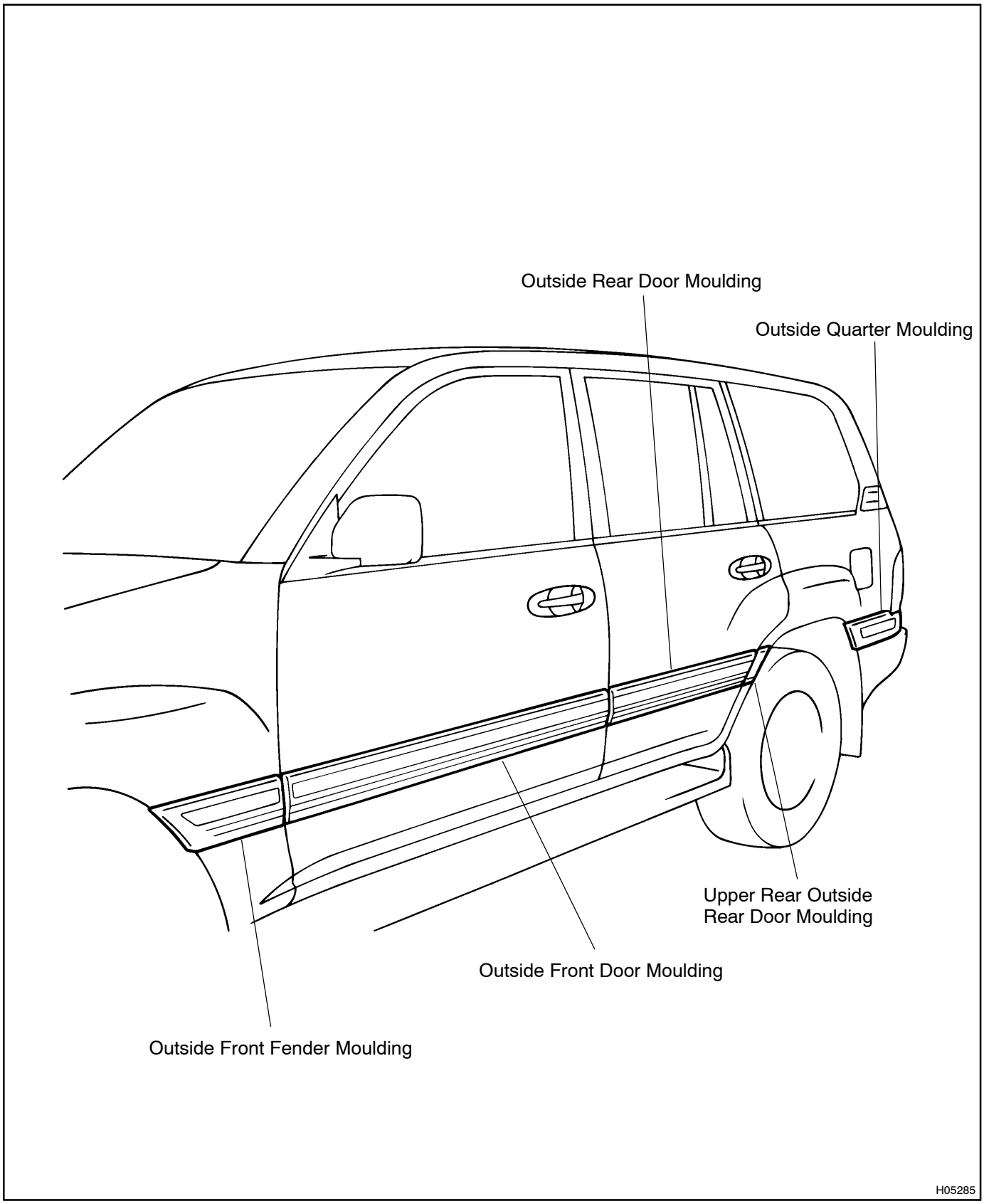
BODY OUTSIDE MOULDING

COMPONENTS

BO1K1–01



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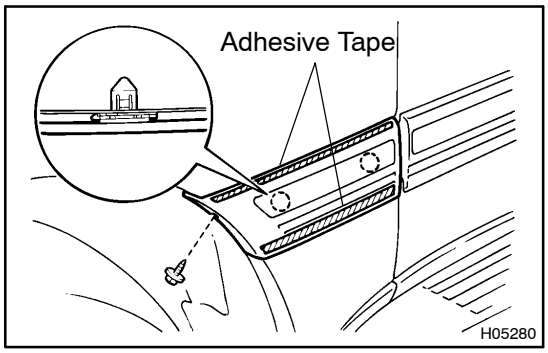
BO1K2–01

REMOVAL



1. REMOVE OUTSIDE FRONT FENDER MOULDING

(a) Remove the screw.

(b) Using a heat light, heat the moulding to 40 – 60 °C (104 – 140 °F).

NOTICE:

Do not heat the moulding excessively.

(c) Cut the adhesive tape with a knife.

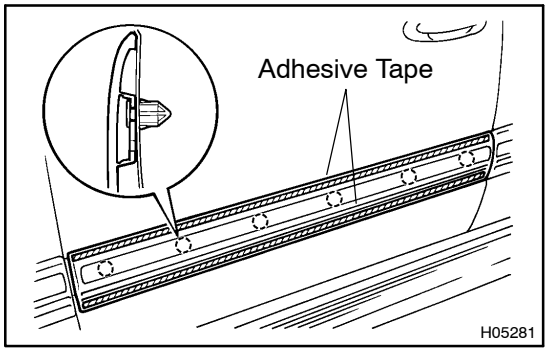
NOTICE:

- **If reusing the moulding, take care not to damage the moulding.**
- **Do not damage the body.**

(d) Using a screwdriver, remove the moulding.

HINT:

Tape the screwdriver tip before use.



2. REMOVE OUTSIDE FRONT DOOR MOULDING

(a) Using a heat light, heat the moulding to 40 – 60 °C (104 – 140 °F).

NOTICE:

Do not heat the moulding excessively.

(b) Cut the adhesive tape with a knife.

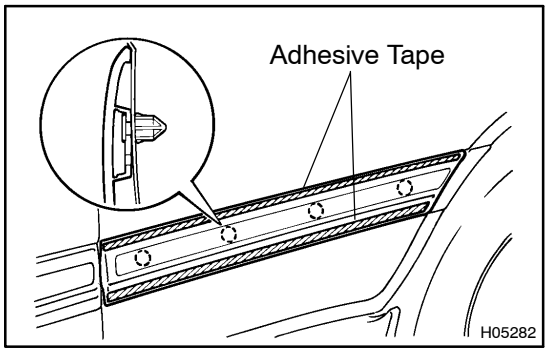
NOTICE:

- **If reusing the moulding, take care not to damage the moulding.**
- **Do not damage the body.**

(c) Using a screwdriver, remove the moulding.

HINT:

Tape the screwdriver tip before use.



3. REMOVE OUTSIDE REAR DOOR MOULDING

(a) Using a heat light, heat the moulding to 40 – 60 °C (104 – 140 °F).

NOTICE:

Do not heat the moulding excessively.

(b) Cut the adhesive tape with a knife.

NOTICE:

- **If reusing the moulding, take care not to damage the moulding.**
- **Do not damage the body.**

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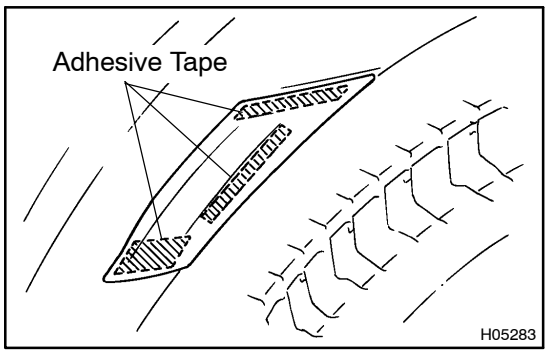
(c) Using a screwdriver, remove the moulding.

HINT:

Tape the screwdriver tip before use.



4. REMOVE UPPER REAR OUTSIDE REAR DOOR MOULDING

(a) Using a heat light, heat the moulding to 40 – 60 °C (104 – 140 °F).

NOTICE:

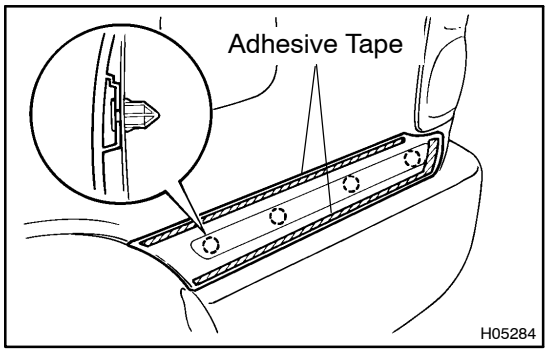
Do not heat the moulding excessively.

(b) Cut the adhesive tape with a knife.

NOTICE:

- **If reusing the moulding, take care not to damage the moulding.**
- **Do not damage the body.**

(c) Remove the moulding.



5. REMOVE OUTSIDE QUARTER MOULDING

(a) Using a heat light, heat the moulding to 40 – 60 °C (104 – 140 °F).

NOTICE:

Do not heat the moulding excessively.

(b) Cut the adhesive tape with a knife.

NOTICE:

- **If reusing the moulding, take care not to damage the moulding.**
- **Do not damage the body.**

(c) Using a screwdriver, remove the moulding.

HINT:

Tape the screwdriver tip before use.

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BO1K3–01

INSTALLATION

1. CLEAN BODY MOUNTING SURFACE

(a) Using a heat light, heat the body mounting surface to 40 – 60 °C (104 – 140 °F).

NOTICE:

Do not the heat body excessively.

(b) Wipe off stains with cleaner.

2. CLEAN MOULDING

If reusing the moulding.

(a) Using a heat light, heat the moulding surface to 20 – 30 °C (68 – 86 °F).

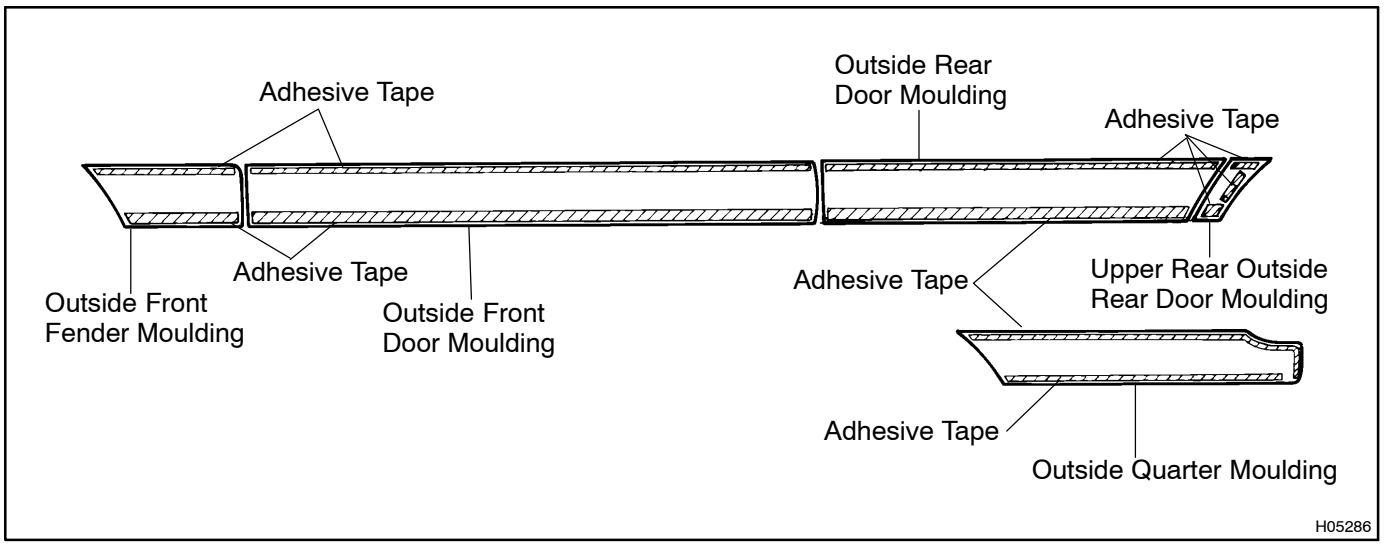
NOTICE:

Do not the heat moulding excessively.

(b) Remove the adhesive tape from the moulding.

(c) Wipe off stains with cleaner.

(d) Apply a new adhesive tape to moulding as shown in the illustration.



3. INSTALL MOULDING

(a) Using a heat light, heat the body and moulding.

Body: 40 – 60 °C (104 – 104 °F)

Moulding: 20 – 30 °C (68 – 86 °F)

NOTICE:

Do not heat the body and moulding excessively.

(b) Lift moulding release sheet from the face of moulding.

NOTICE:

When the moulding release sheet is removed, make sure that no dirt of dust can get onto the uncoated area.

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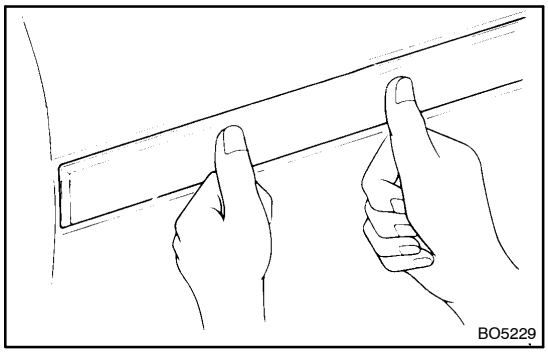

(c) Press firmly on the moulding. Refer to the illustration for the moulding application procedures.

NOTICE:

Do not apply excessive force onto the moulding, but steady pressure with your thumbs.

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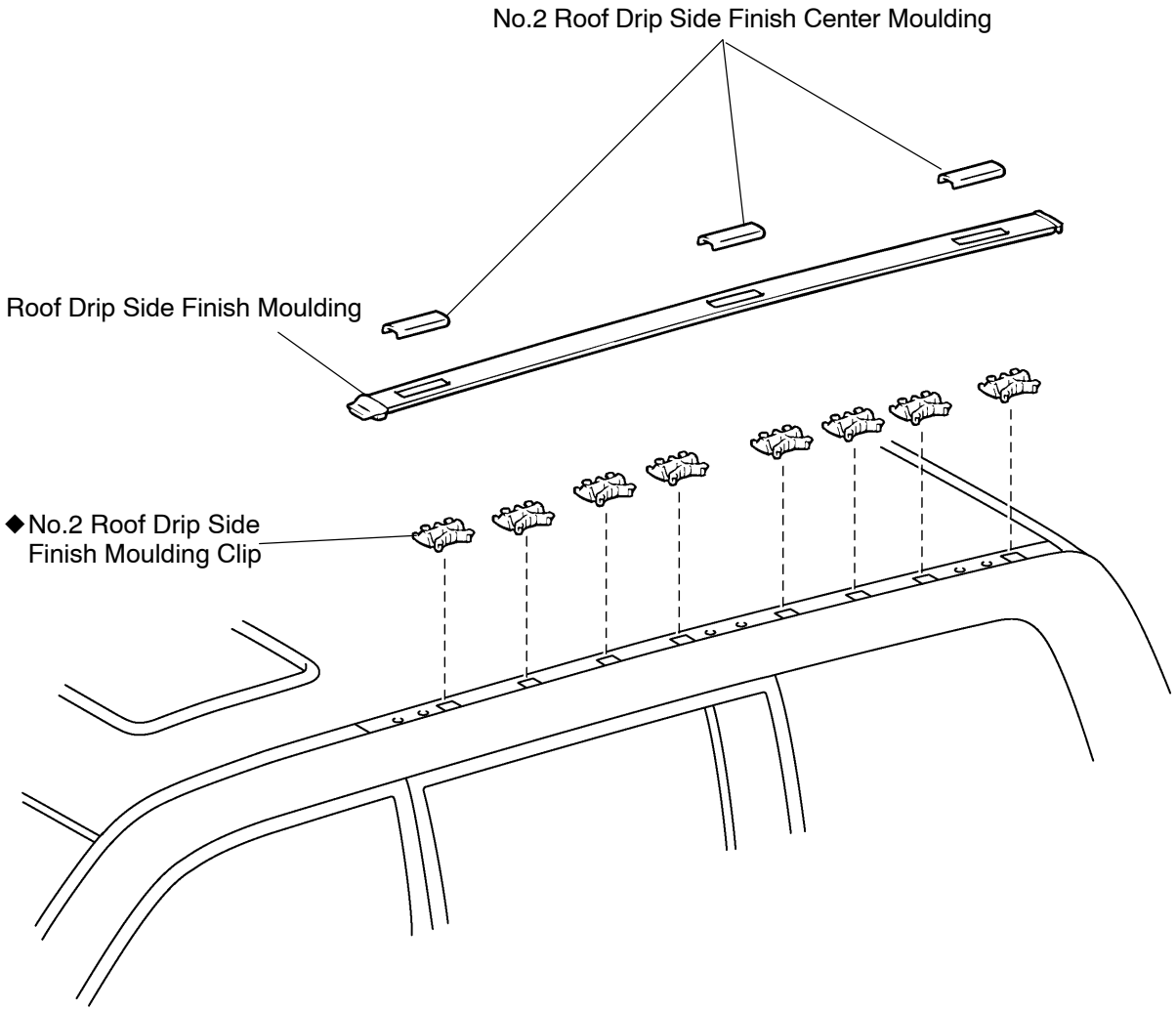
ROOF DRIP SIDE FINISH MOULDING

COMPONENTS

BO1K4–01



◆ Non–reusable part

H05401

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BO1K5–01

REMOVAL

1. REMOVE NO.2 ROOF DRIP SIDE FINISH CENTER MOULDING

2. REMOVE ROOF DRIP SIDE FINISH MOULDING

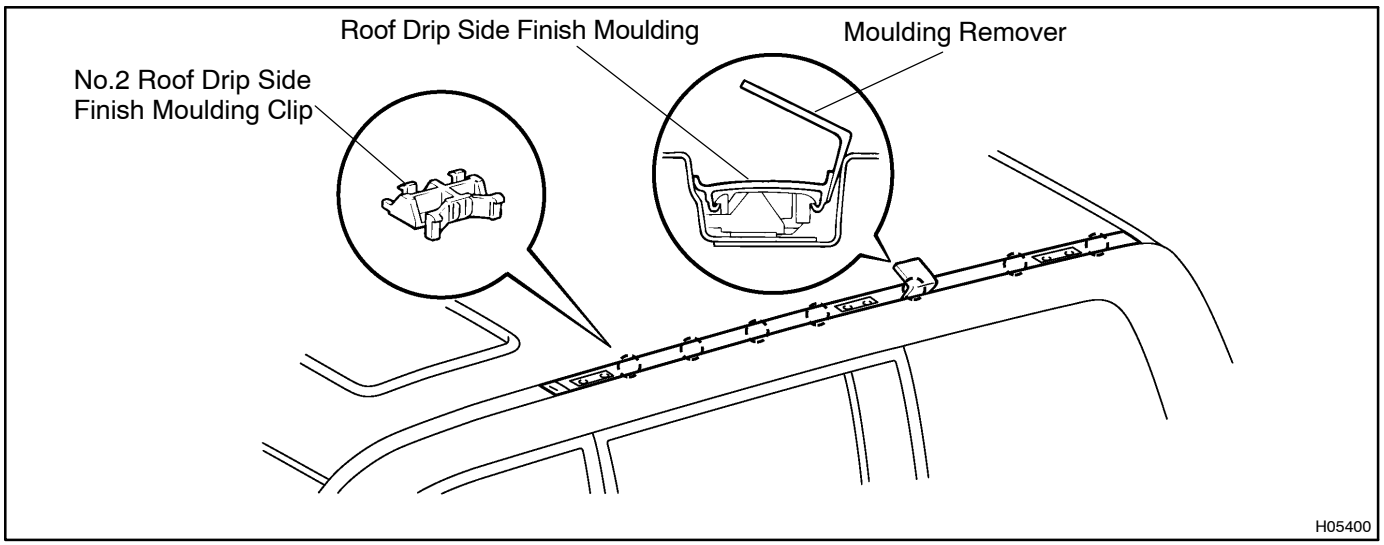
Using a moulding remover, remove the roof drip side finish moulding.

NOTICE:

- **Do not damage the body.**
- **Do not remove the No.2 roof drip side finish moulding clip.**
- **When the clip comes off, replace it with a new one.**

HINT:

Tape the moulding remover tip before use.



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BO1K6–01

INSTALLATION

1. INSTALL NO.2 ROOF DRIP SIDE FINISH MOULDING CLIP

If the No.2 roof drip side finish moulding clip comes off.

(a) Using a heat light, heat the body mounting surface to 40 – 60 °C (104 – 140 °F).

NOTICE:

Do not heat the body excessively.

(b) Remove the adhesive tape and adhesive from the body.

(c) Wipe off stains with cleaner.

(d) Using a heat light, heat the body and clip.

Body: 40 – 60 °C (104 – 140 °F)

Clip: 20 – 30 °C (68 – 86 °F)

NOTICE:

Do not heat body and moulding excessively.

(e) Install the clip.

2. INSTALL NO.2 ROOF DRIP SIDE FINISH CENTER MOULDING

Install the No.2 roof drip side finish center moulding to the roof drip side finish moulding.

3. INSTALL ROOF DRIP SIDE FINISH MOULDING

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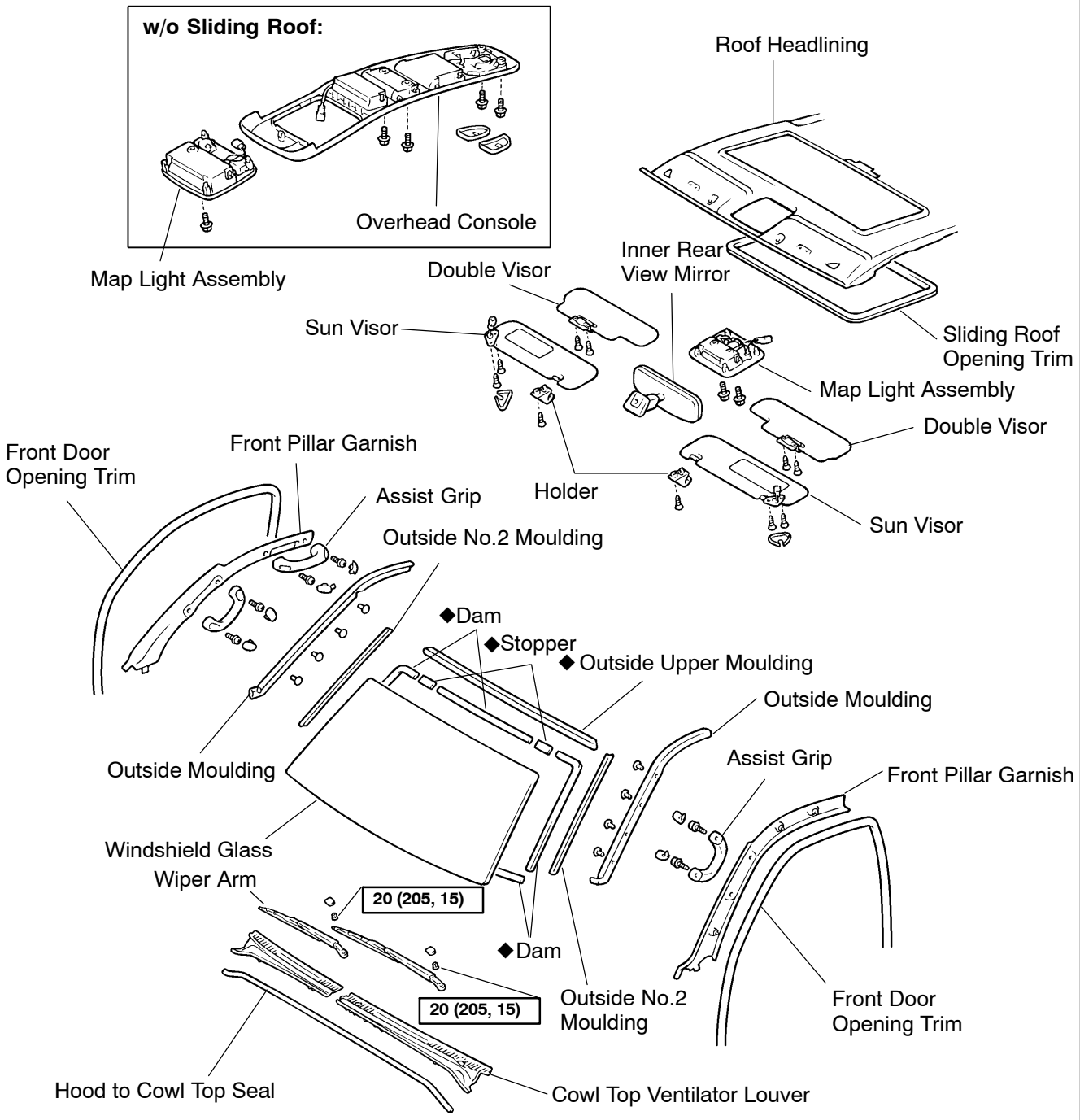
WINDSHIELD

COMPONENTS

BO1K7–01



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

◆ Non–reusable part

H05467

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BO1K8–01

REMOVAL

1. REMOVE THESE PARTS:
(See page BO–96)

(a) Front door opening trims
(b) Front pillar garnishes
(c) Sun visors
(d) Double visors
(e) Holder
(f) Overhead console box
(g) Inner rear view mirror

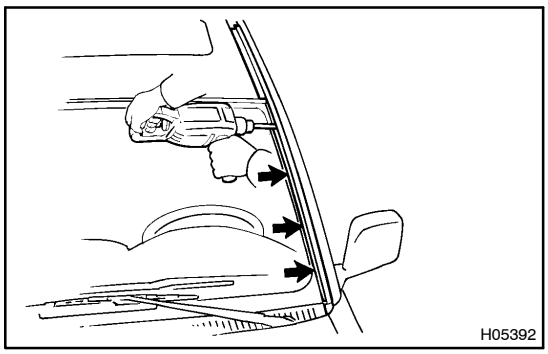
2. REMOVE WIPER ARM AND COWL TIP VENTILATOR LOUVER
(See page BO–33)

3. REMOVE OUTSIDE MOULDING

(a) Using a screwdriver, remove the outside No.2 moulding.

HINT:
Tape the screwdriver tip before use.

(b) Using a drill of less then ø 4 mm (0.16 in.).



(c) Gently and vertically put the drill to the rivet, and cut the rivet flanges.

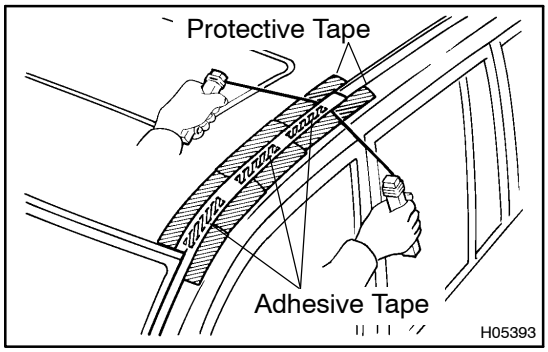
NOTICE:
- **Prizing the hole with a drill can lead to damage to the rivet hole or breaking the drill.**
- **Take cafe as the cut rivet is hot.**

(d) Even if flange is taken off, continue drilling and push out remaining fragments with the drill.

(e) Using a heat light, heat the moulding to 40 – 60 °C (104 – 140 °F).

NOTICE:
Do not heat the moulding excessively.

(f) Tie both piano wire ends to a wooden block or a similar object.



(g) Cut the adhesive tape by pulling the piano wire as shown.

NOTICE:
- **If reusing the moulding, take care not to damage the moulding.**
- **Do not damage the body.**

HINT:
Apply protective tape to the outer surface to keep the surface from being scratched.

(h) Remove the moulding.

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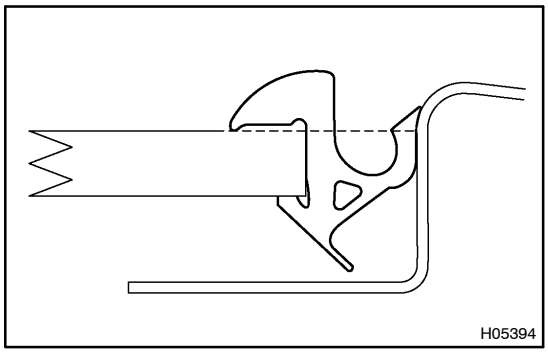
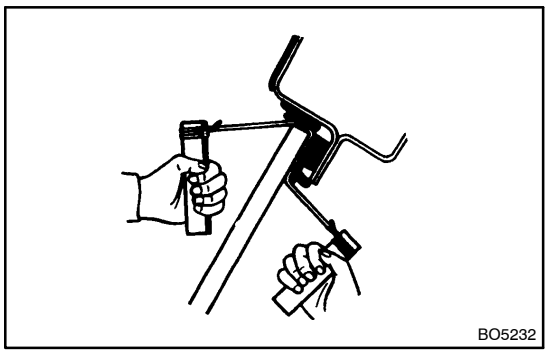


4. REMOVE OUTSIDE UPPER MOULDING

Using a knife, cut off the moulding as shown.

NOTICE:

Do not damage the body with the knife.



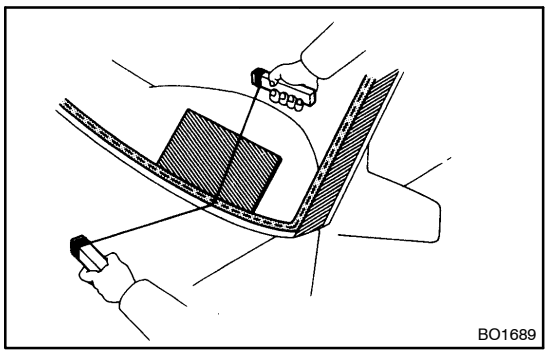
5. REMOVE WINDSHIELD GLASS

(a) Push piano wire through between the body and glass from the interior.

(b) Tie both wire ends to a wooden block or a similar object.

HINT:

Apply protective tape to the outer surface to keep the surface from being scratched.



NOTICE:

When separating the glass, take care not to damage the paint and interior and exterior ornaments. To prevent scratching the safety pad when removing the windshield, place a plastic sheet between the piano wire and safety pad.

(c) Cut the adhesive by pulling the piano wire around it.

(d) Remove the glass.

NOTICE:

Leave as much of the adhesive on the body as possible when cutting the glass.

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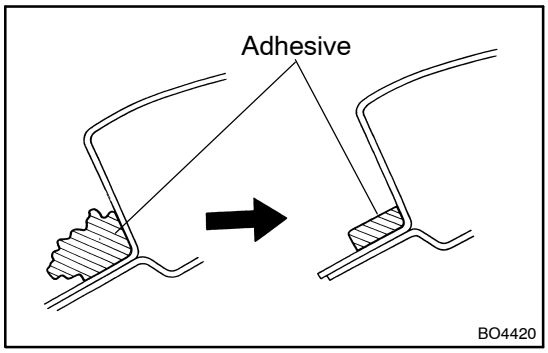
BO1K9–01

INSTALLATION



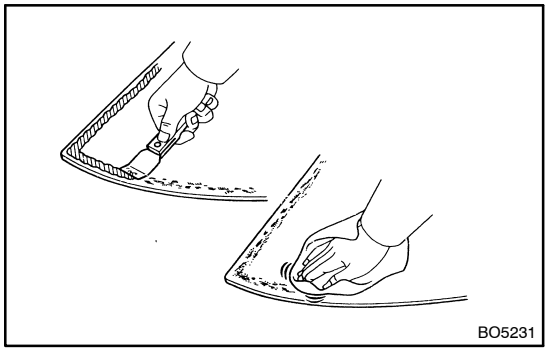
1. CLEAN AND SHAPE CONTACT SURFACE OF BODY

(a) Using a knife, cut away any rough areas on the body.

HINT:

Leave as much of the adhesive on the body as possible.

(b) Clean the cutting surface of the adhesive with a piece of shop rag saturated in cleaner.



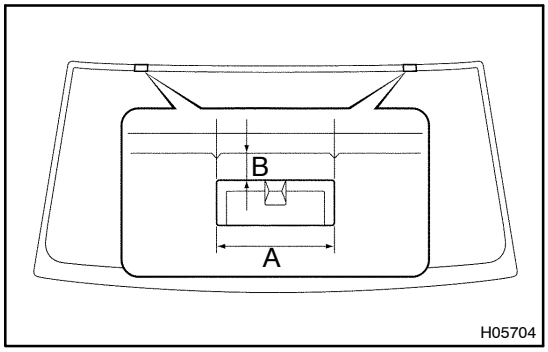
2. CLEAN REMOVED GLASS

(a) Using a scraper, remove the adhesive sticking to the glass.

(b) Clean the glass with cleaner.

NOTICE:

Do not touch the glass surface after cleaning it.



3. REPLACE STOPPER

(a) Remove the damaged stopper.

(b) Cut off the old adhesive around the stopper installation area.

NOTICE:

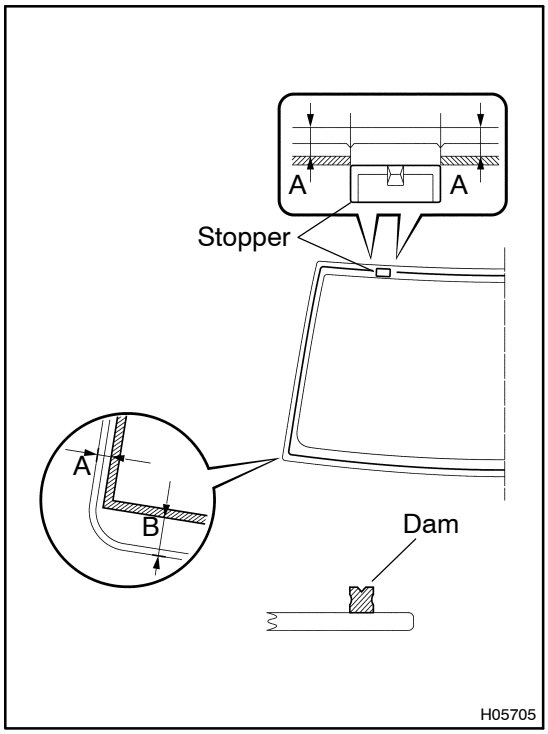
Be careful not to damage the glass.

(c) Clean the installation area.

(d) Install a new stopper onto the glass.

A: 9 mm (0.35 in.)

B: 25 mm (0.98 in.)



4. INSTALL DAM

Install new dams with adhesive tape as shown in the illustration.

NOTICE:

Do not touch the glass surface after cleaning it.

A: 7 mm (0.28 in.)

B: 20 mm (0.79 in.)

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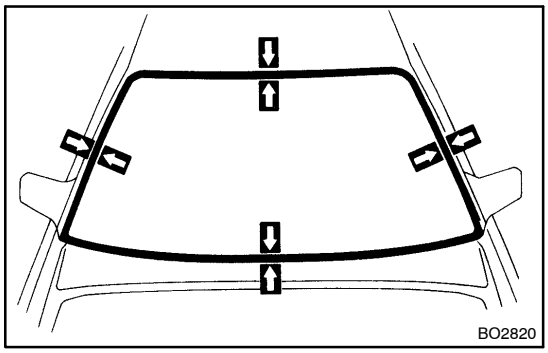
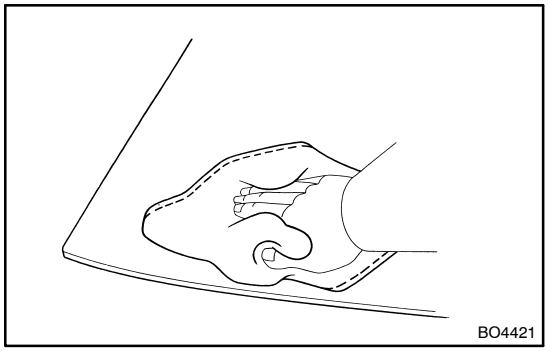


5. POSITION GLASS

(a) Place glass in the correct position.
(b) Check that all contacting parts of the glass rim are perfectly even and do not make contact with the fasteners.
(c) Place reference marks between the glass and body.
(d) Remove the glass.

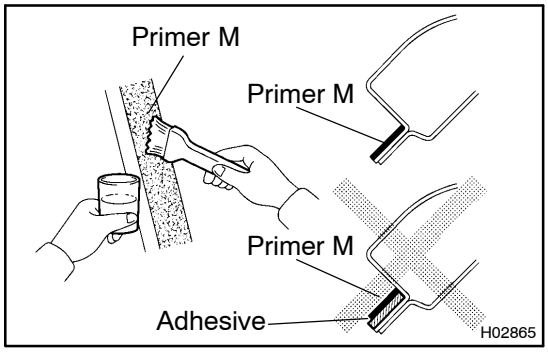


6. CLEAN CONTACT SURFACE OF GLASS

Using a cleaner, clean the contact surface which is black–colored area around the entire glass rim.

NOTICE:

Do not touch the glass face after cleaning it.

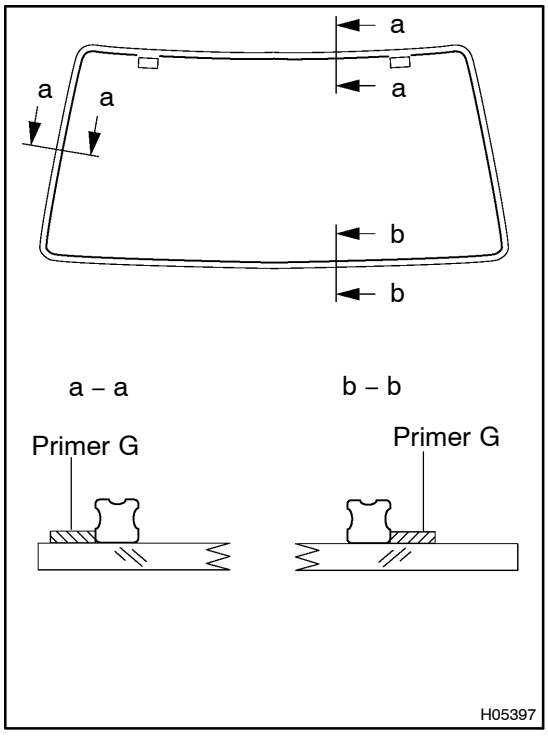


7. COAT CONTACT SURFACE OF BODY WITH PRIMER "M"

Using a brush, coat the contact surface on the body with primer M

NOTICE:

- **Let the primer coating dry for 3 minutes or more.**
- **Do not coat primer M to the adhesive.**
- **Do not keep any of the opened primer M for later use.**



8. COAT CONTACT SURFACE OF GLASS WITH PRIMER "G"

(a) Using a brush or a sponge, coat the edge of the glass and the contact surface with primer G.
(b) When the primer is coated wrongly to the area other than the specified, wipe it off with a clean shop rag before the primer dries.

NOTICE:

- **Let the primer coating dry for 3 minutes or more.**
- **Do not keep any of the opened primer G for later use.**

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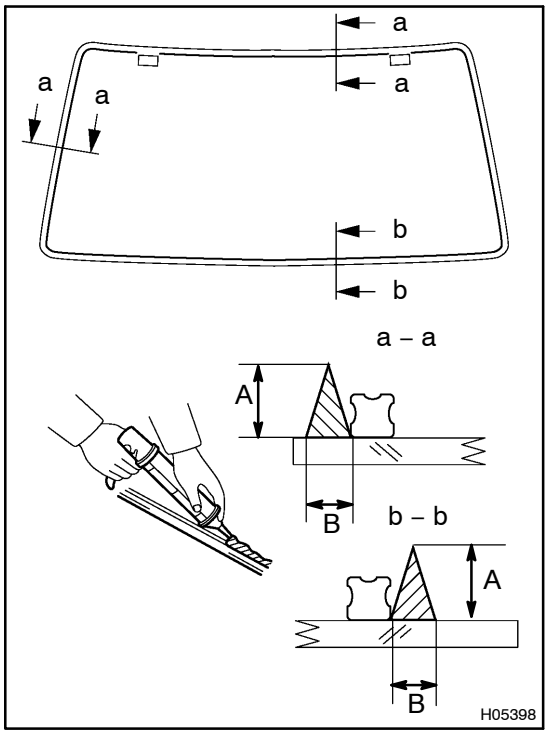


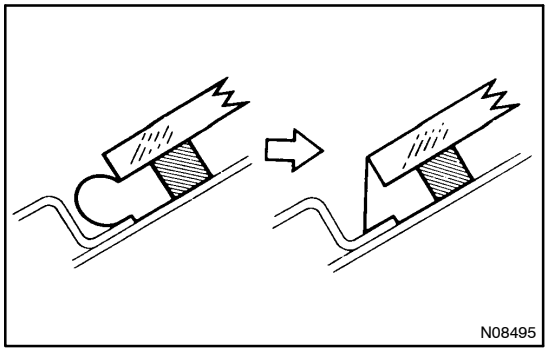
9. APPLY ADHESIVE

(a) Cut off the tip of the cartridge nozzle.
Part No.08850–00801 or equivalent

HINT:
After cutting off the tip, use all adhesive within the time described in the table below.

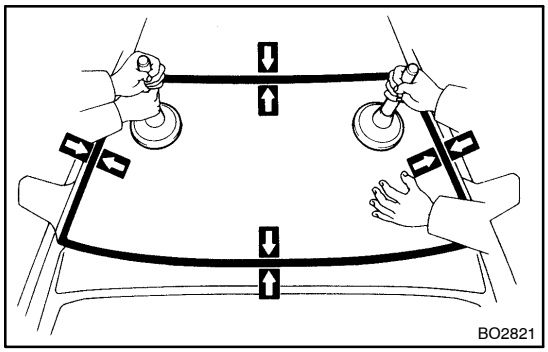
Temperature	Tackfree time
35 °C (95 °F)	15 minutes
20 °C (68 °F)	100 minutes
5 °C (41 °F)	8 hours

(b) Load the cartridge into the sealer gun.
(c) Coat the glass with adhesive as shown.
A: 12.0 mm (0.472 in.)
B: 8.0 mm (0.315 in.)

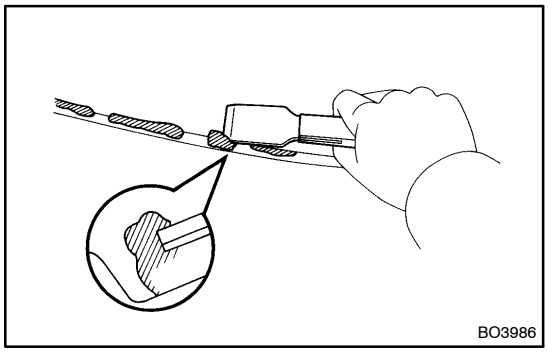


10. INSTALL GLASS

HINT:
Check that the dam is attached to the body panel as shown in the illustration.



(a) Position the glass so that the reference marks are lined up, and press in gently along the rim.
(b) Using a spatula, apply adhesive on the glass rim.



(c) Using a scraper, remove any excessive or protruding adhesive.

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(d) Hold the glass in place securely with a protective tape or equivalent until the adhesive hardens.

NOTICE:

Take care not to drive the vehicle during the time described in the table below.

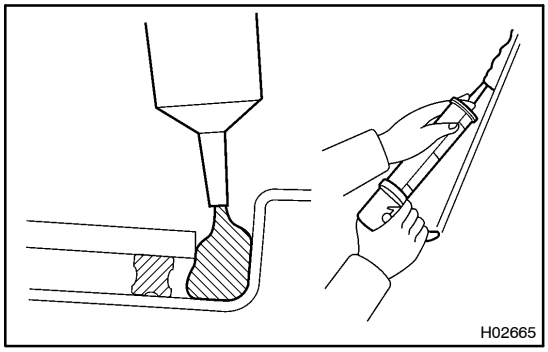
Temperature	Minimum time prior to driving the vehicle
35 °C (95 °F)	1.5 hours
20 °C (68 °F)	5 hours
5 °C (41 °F)	24 hours

11. INSPECT FOR LEAK AND REPAIR

(a) Conduct a leak test after the hardening time has elapsed.

(b) Seal any leak with sealant.

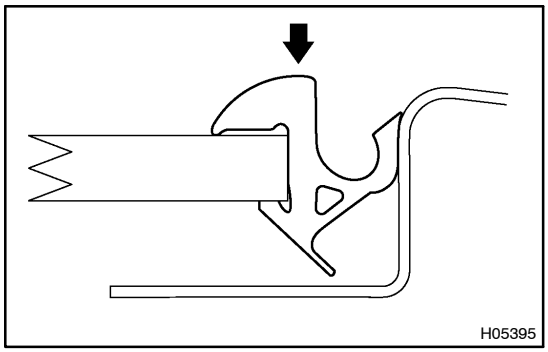
Part No. 08833–00030 or equivalent



12. APPLY ADHESIVE TO MOULDING INSTALLATION AREA

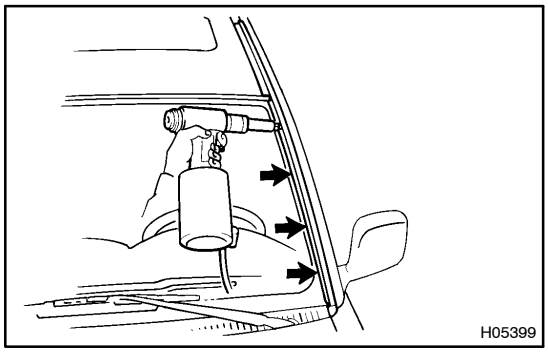
Apply adhesive to the moulding installation area between the glass and the body.

Part No. 08833–00030 or equivalent



13. INSTALL UPPER OUTSIDE MOULDING

Place a new moulding onto the body and tap it by hand.



14. INSTALL OUTSIDE MOULDING

Using an air riveter or hand riveter, install the 3 rivets and outside moulding.

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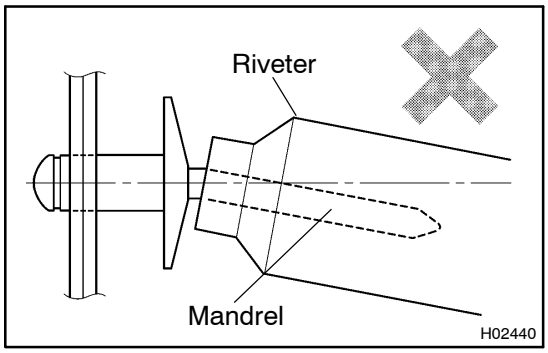
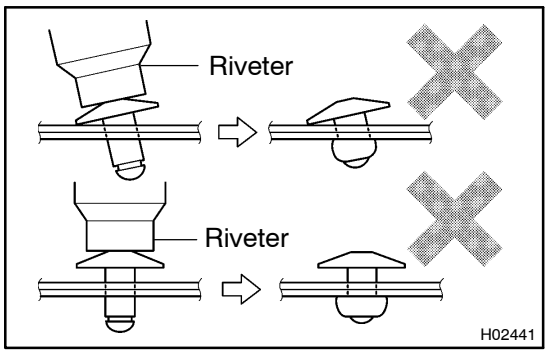
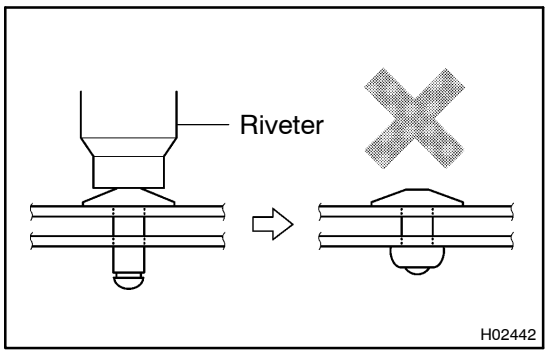


NOTICE:

- **At the time of assembly, please refer to the following items.**
- **Prizing a riveter leads to damage to the riveter, loose tightening and bending the mandrel.**



- **Loose tightening may result from either tilting the riveter while handling or the riveter not connecting to the material.**



- **Loose tightening also occurs when a rivet is applied between materials without touching.**

15. INSTALL WIPER ARM AND COWL TOP VENTILATOR LOUVER
(See page BO–36)

16. INSTALL THESE PARTS:
(See page BO–101)

(a) Inner rear view mirror
(b) Overhead console box
(c) Holder
(d) Double visors
(e) Sun visors
(f) Front pillar garnishes
(g) Front door opening trims

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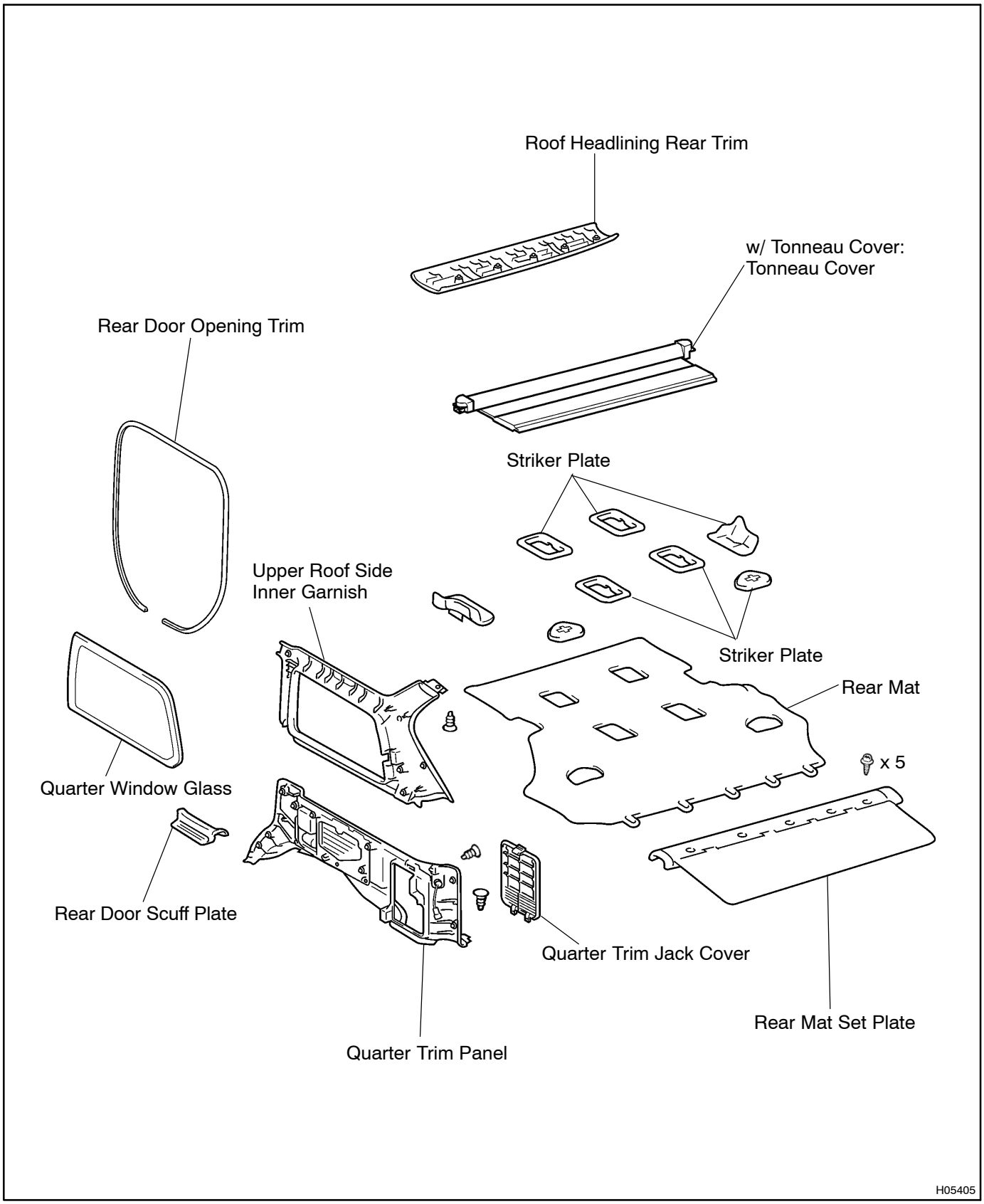
QUARTER WINDOW GLASS (Fixed Type)

COMPONENTS

BO1LA–01



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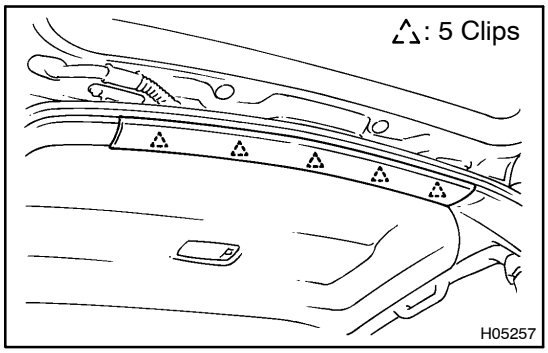
BO1LB–01



REMOVAL

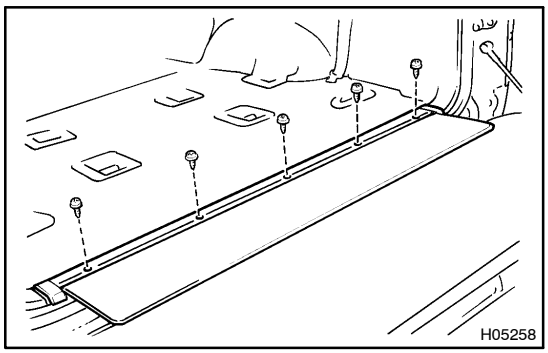
1. REMOVE ROOF HEADLINING REAR TRIM

Using a screwdriver, remove the roof headlining rear trim.

HINT:

Tape the screwdriver tip before use.

2. w/ Rear No.2 Seat:
REMOVE REAR NO.2 SEAT



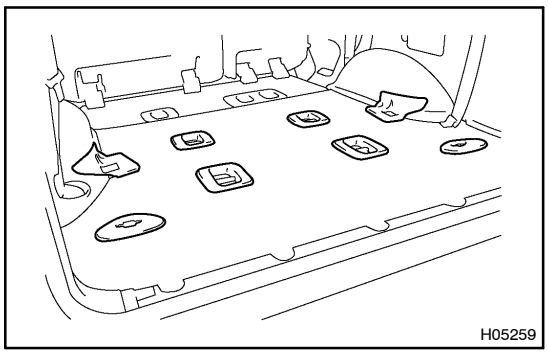
3. REMOVE REAR MAT SET PLATE

(a) Remove the 5 screws.

(b) Using a screwdriver, remove the rear mat set plate.

HINT:

Tape the screwdriver tip before use.



4. w/ Rear No.2 Seat:
REMOVE STRIKER PLATE

Using a screwdriver, remove the striker plates.

5. REMOVE THESE PARTS:

(a) w/ Tonneau cover:
Tonneau cover

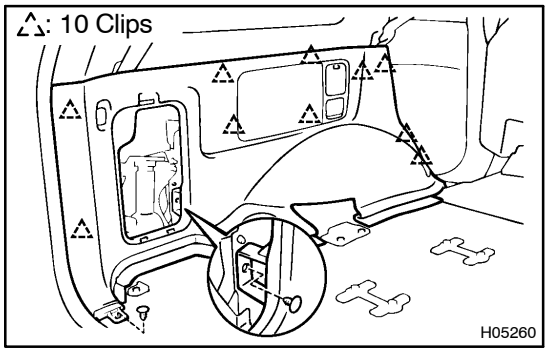
(b) Rear mat

(c) w/ Rear No.2 Seat:
Rear No.2 seat outer belt floor anchor
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

(d) Rear No.1 seat outer belt floor anchor
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

(e) Rear door scuff plate

(f) Rear door opening trim



6. REMOVE QUARTER TRIM PANEL

(a) Remove the quarter trim jack cover.

(b) Using a clip remover, remove the 2 clips.

(c) Remove the quarter trim panel, then disconnect the connector.

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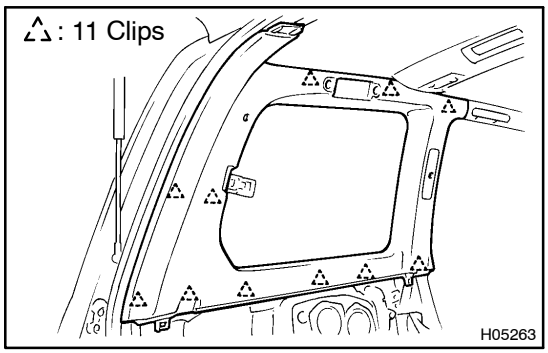
7. REMOVE THESE PARTS:

(a) w/ Rear No.2 Seat:
Rear No.2 seat outer belt shoulder anchor
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

(b) Rear No.1 seat outer belt shoulder anchor
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)



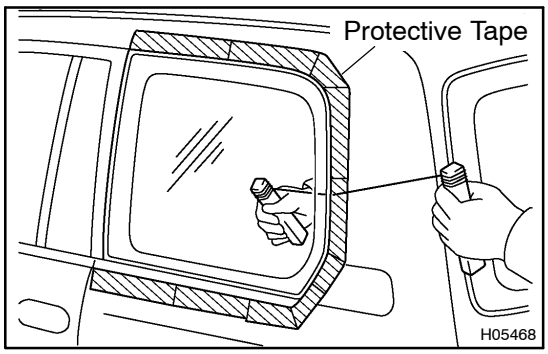
8. REMOVE UPPER ROOF SIDE INNER GARNISH

(a) w/ Rear No.2 Seat:
Using a screwdriver, remove the assist grip plugs, then remove the 4 screws and assist grips.

HINT:
Tape the screwdriver tip before use.

(b) Using a screwdriver, remove the upper roof side inner garnishes.

HINT:
Tape the screwdriver tip before use.



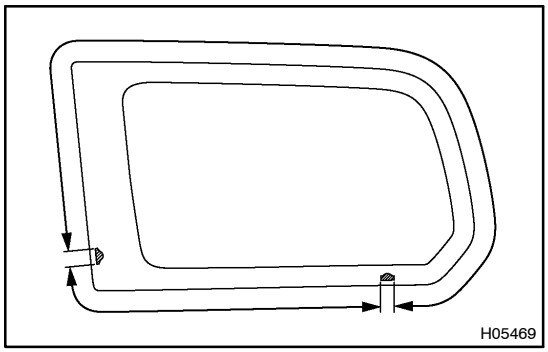
9. REMOVE QUARTER WINDOW GLASS

(a) Push a piano wire through from the interior.

(b) Tie both wire ends to wooden blocks or similar object.

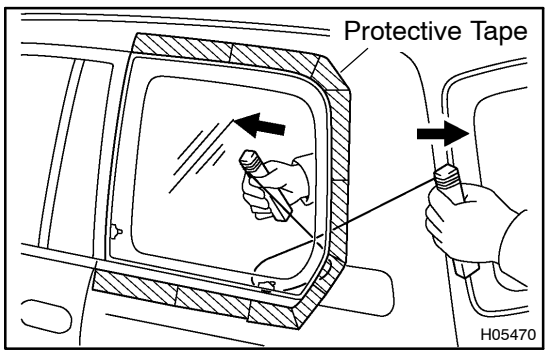
HINT:
Apply protective tape to the outer surface to keep the surface from being scratched.

NOTICE:
When separating the glass, take care not to damage the paint and interior.



(c) Cut the adhesive by pulling the piano wire around it.

HINT:
Cut the adhesive areas as shown in the illustration, leaving the adhesive where the clips are.



(d) Push the piano wire through as shown in the illustration, cut off the adhered part to the clips.

(e) Remove the glass.

NOTICE:
Leave as much of the adhesive on the body as possible when cutting off the glass.

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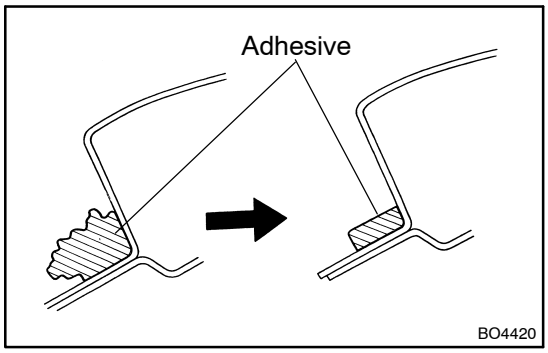
BO1LC–01



INSTALLATION

1. CLEAN AND SHAPE CONTACT SURFACE OF DOOR PANEL

(a) Using a knife, cut away any rough areas on the door panel.

HINT:

Leave as much of the adhesive on the door panel as possible.

(b) Clean the cutting surface of the adhesive with a piece of shop rag saturated in cleaner.

HINT:

Even if all the adhesive has been removed, clean the door panel.

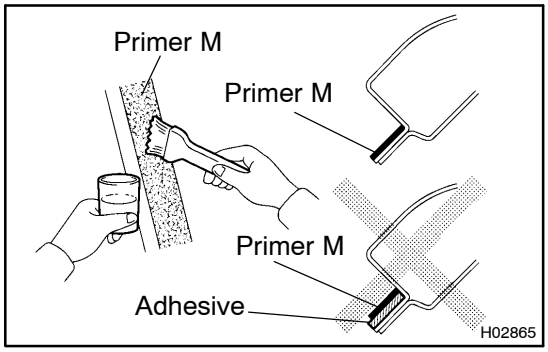
2. CLEAN REMOVED GLASS

(a) Using a scraper, remove the adhesive sticking to the glass.

(b) Clean the glass with cleaner.

NOTICE:

Do not touch the glass surface after cleaning it.

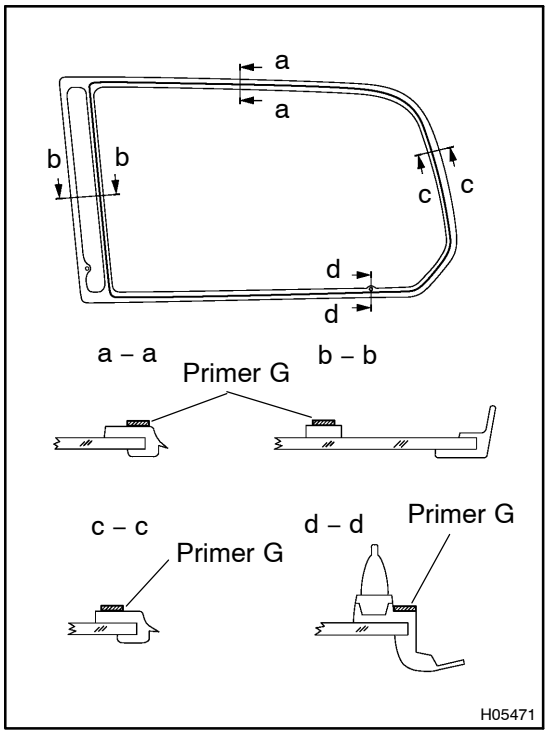


3. COAT CONTACT SURFACE OF DOOR PANEL WITH PRIMER "M"

Using a brush, coat the contact surface on the door panel with primer M.

NOTICE:

- **Let the primer coating dry for 3 minutes or more.**
- **Do not coat primer M to the adhesive.**
- **Do not keep any of the opened primer M for later use.**



4. COAT CONTACT SURFACE OF GLASS WITH PRIMER "G"

(a) Using a brush or sponge, coat the edge of the glass and the contact surface with primer G.

(b) When the rimer is coated wrongly to the area other than the specified, wipe it off with a clean shop rag before the primer dries.

NOTICE:

- **Let the primer coating dry for 3 minutes or more.**
- **Do not keep any of the opened primer G for later use.**

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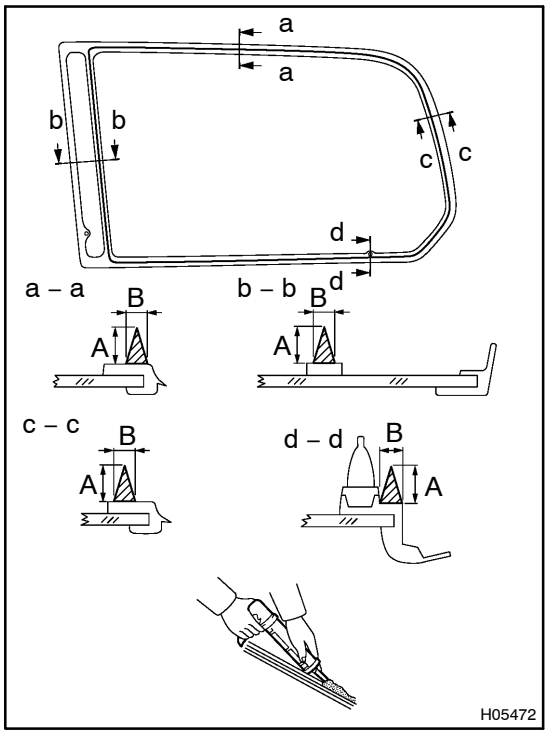

5. APPLY ADHESIVE

(a) Cut off the tip of the cartridge nozzle.
Part No.08850–00801 or equivalent

HINT:
After cutting off the tip, use all adhesive within the time described in the table below.

Temperature	Tackfree time
35 °C (95 °F)	15 minutes
20 °C (68 °F)	100 minutes
5 °C (41 °F)	8 hours

(b) Load the cartridge into the sealer gun.
(c) Coat the glass with adhesive, as shown.
A: 12.0 mm (0.472 in.)
B: 8.0 mm (0.315 in.)

6. INSTALL GLASS

(a) Install the glass to the door.
(b) Hold the glass in place securely with a protective tape or equivalent until the adhesive hardens.

NOTICE:
Take care not to drive the vehicle during the time described in the table below.

Temperature	Minimum time prior to driving the vehicle
35 °C (95 °F)	1.5 hours
20 °C (68 °F)	5 hours
5 °C (41 °F)	24 hours

7. INSPECT FOR LEAK AND REPAIR

(a) Conduct a leak test after the hardening time has elapsed.
(b) Seal any leak with sealant.
Part No. 08833–00030 or equivalent

8. INSTALL THESE PARTS:

(a) Upper roof side inner garnish
(b) Rear No.1 seat outer belt shoulder anchor
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)
(c) w/ Rear No.2 Seat:
Rear No.2 seat outer belt shoulder anchor
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)
(d) Quarter trim panel
(e) Rear door opening trim
(f) Rear door scuff plate
(g) Rear No.1 seat outer belt floor anchor
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)
(h) w/ Rear No.2 Seat:
Rear No.2 seat outer belt floor anchor
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)
(i) Rear mat
(j) w/ Tonneau Cover:
Tonneau cover

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(k) w/ Rear No.2 Seat:
Striker plate
(l) Rear mat set plate
(m) Roof headlining rear trim
(n) w/ Rear No.2 Seat:
Rear No.2 seat

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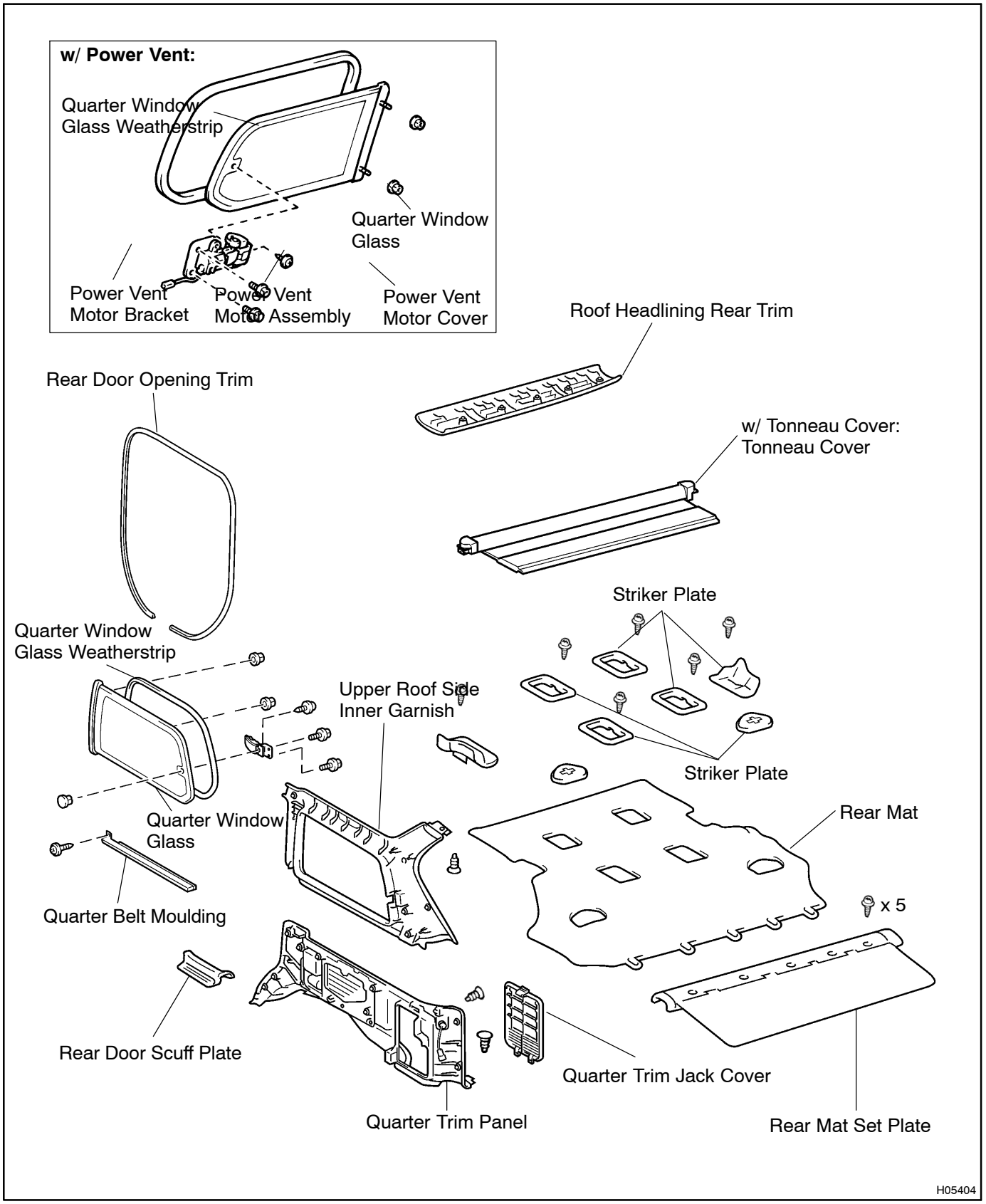
QUARTER WINDOW GLASS (Swing Type)

COMPONENTS

BO1LD–01



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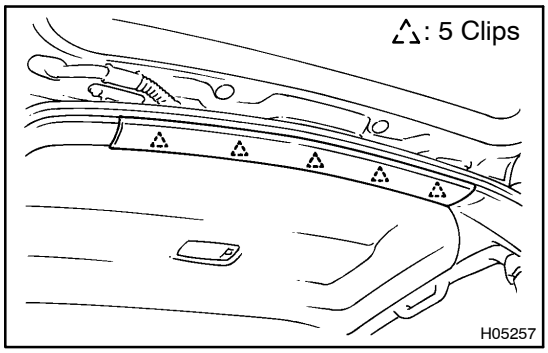
BO1LE–01



REMOVAL

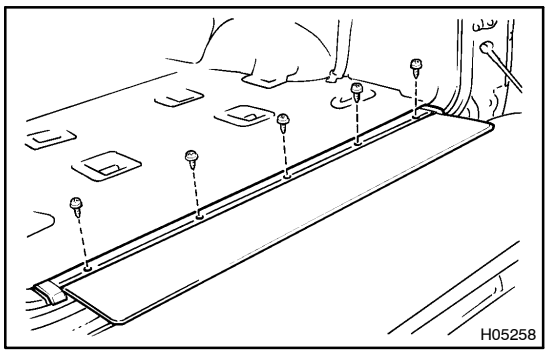
1. REMOVE ROOF HEADLINING REAR TRIM

Using a screwdriver, remove the roof headlining rear trim.

HINT:

Tape the screwdriver tip before use.

2. w/ Rear No.2 Seat:
REMOVE REAR NO.2 SEAT



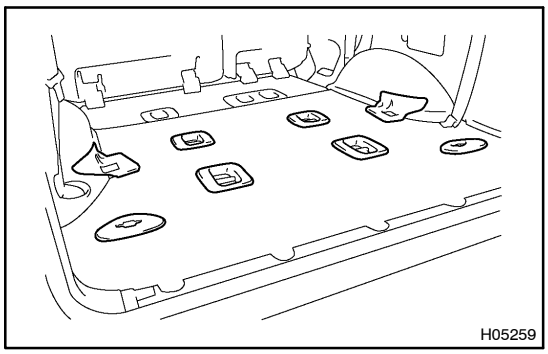
3. REMOVE REAR MAT SET PLATE

(a) Remove the 5 screws.

(b) Using a screwdriver, remove the rear mat set plate.

HINT:

Tape the screwdriver tip before use.



4. w/ Rear No.2 Seat:
REMOVE STRIKER PLATE

Using a screwdriver, remove the striker plates.

5. REMOVE THESE PARTS:

(a) w/ Tonneau cover:
Tonneau cover

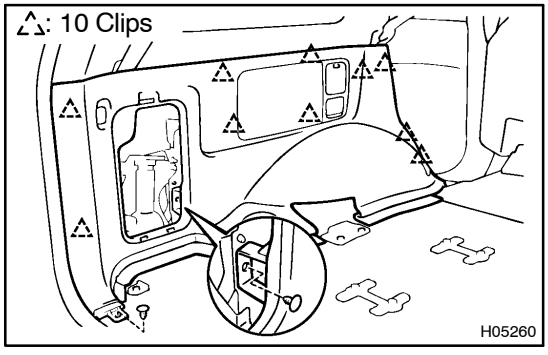
(b) Rear mat

(c) w/ Rear No.2 Seat:
Rear No.2 seat outer belt floor anchor
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

(d) Rear No.1 seat outer belt floor anchor
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

(e) Rear door scuff plate

(f) Rear door opening trim



6. REMOVE QUARTER TRIM PANEL

(a) Remove the quarter trim jack cover.

(b) Using a clip remover, remove the 2 clips.

(c) Remove the quarter trim panel, then disconnect the connector.

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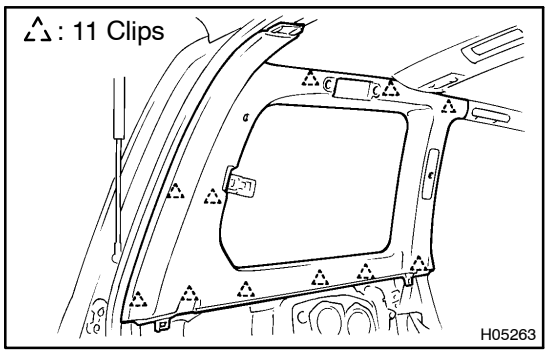
7. REMOVE THESE PARTS:

(a) w/ Rear No.2 Seat:
Rear No.2 seat outer belt shoulder anchors
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

(b) Rear No.1 seat outer belt shoulder anchors
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)



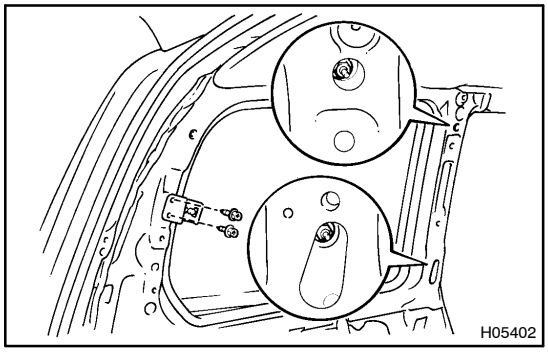
8. REMOVE UPPER ROOF SIDE INNER GARNISH

(a) w/ Rear No.2 Seat:
Using a screwdriver, remove the assist grip plugs, then remove the 2 screws and assist grip.

HINT:
Tape the screwdriver tip before use.

(b) Using a screwdriver, remove the upper roof side inner garnishes.

HINT:
Tape the screwdriver tip before use.



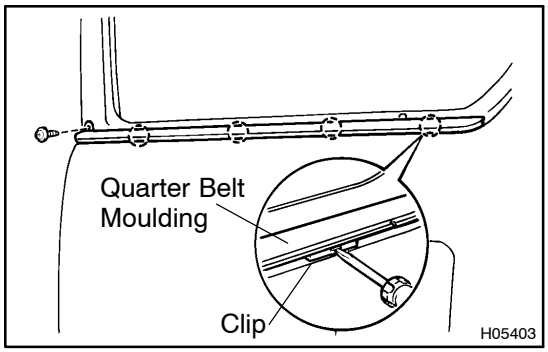
9. REMOVE QUARTER WINDOW GLASS

(a) w/ Power Vent:
Disconnect the connector.

(b) w/ Antenna:
Disconnect the connector.

(c) Remove the 2 bolts, 2 nuts and quarter window glass.

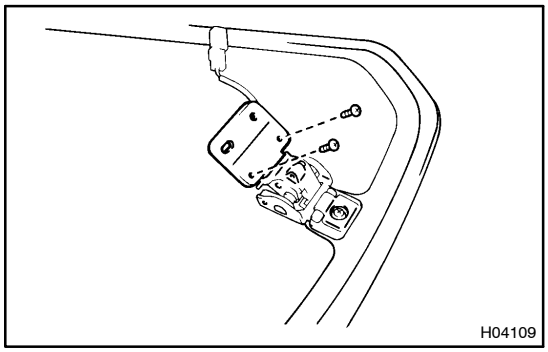
10. REMOVE QUARTER WINDOW GLASS WEATHERSTRIP



11. REMOVE QUARTER BELT MOULDING

(a) Remove the screw.

(b) Using a screwdriver, remove the quarter belt moulding.



12. w/ Power Vent:
REMOVE REAR VENT WINDOW MOTOR

(a) Remove the 2 screws and bracket.

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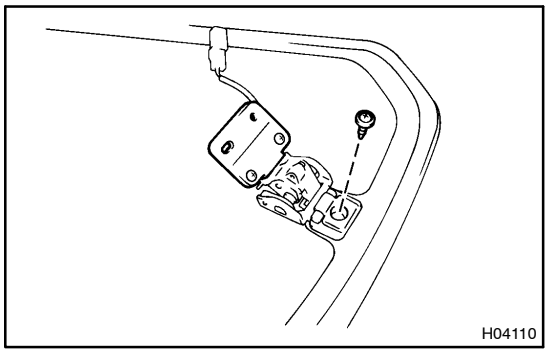

(b) Remove the screw and power vent motor assembly.

13. w/o Power Vent:

REMOVE QUARTER WINDOW LOCK

Remove the screw and quarter window lock.

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INSTALLATION

Installation is in the reverse order of removal (See page BO–65).

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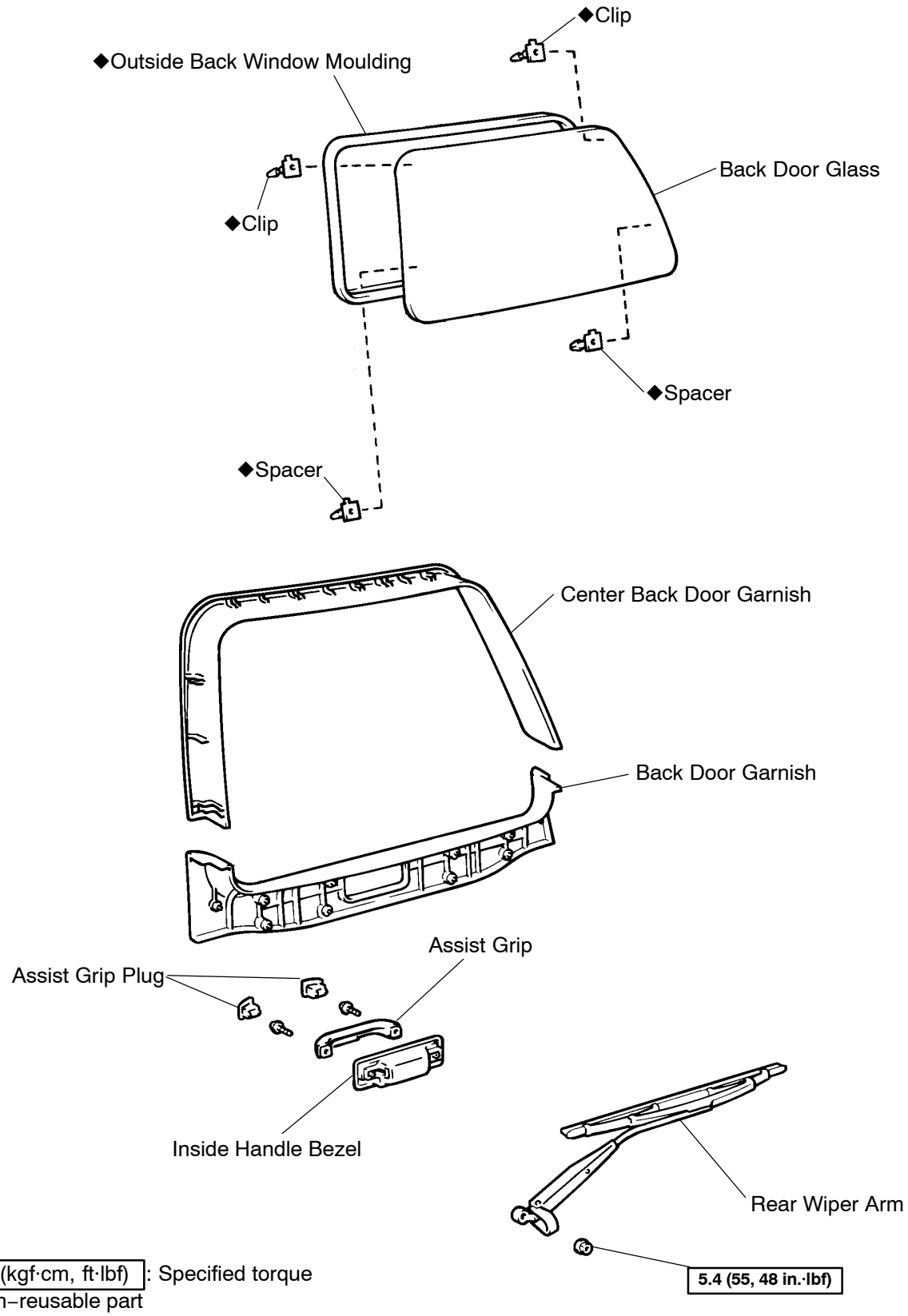
BACK DOOR GLASS

COMPONENTS

BO1KA–01



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

H06468

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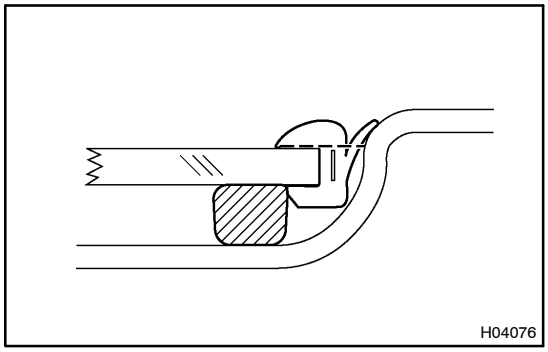
BO1KB–01

REMOVAL

1. REMOVE THESE PARTS:
(See page BO–21)

(a) Assist grip plug
(b) Assist grip
(c) Inside handle bezel
(d) Center back door garnish
(e) Back door garnish

2. REMOVE REAR WIPER ARM
(See page BO–38)

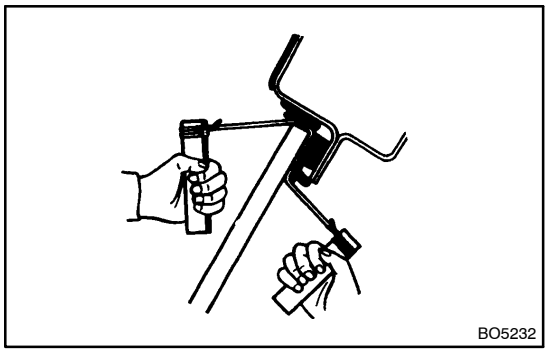


3. REMOVE OUTSIDE BACK WINDOW MOULDING

Using a knife, cut off the moulding as shown.

NOTICE:

Do not damage the body with the knife.

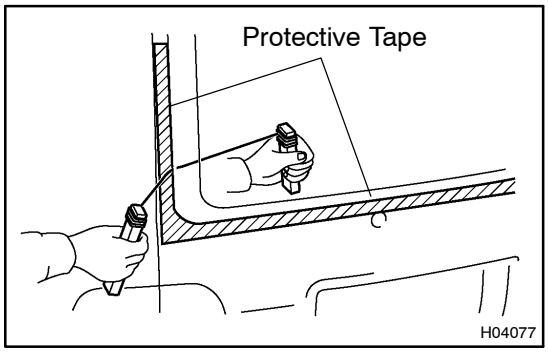


4. REMOVE BACK DOOR GLASS

(a) Disconnect the connector.
(b) Push piano wire through between the body and glass from the interior.
(c) Tie both wire ends to the outer surface to keep the surface from being scratched.

HINT:

Apply protective tape to the outer surface to keep the surface from being scratched.



NOTICE:

When separating the glass, take care not to damage the paint and exterior ornaments.

(d) Cut the adhesive by pulling the piano wire around it.
(e) Remove the glass.

NOTICE:

Leave as much of the adhesive on the body as possible when cutting off the glass.

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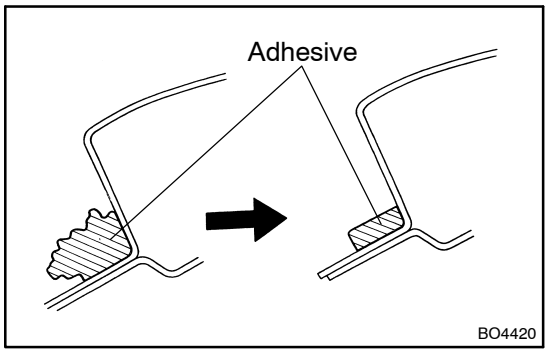
BO1KC–01

INSTALLATION



1. CLEAN AND SHAPE CONTACT SURFACE OF BODY

(a) Using a knife, cut away any rough areas on the body.

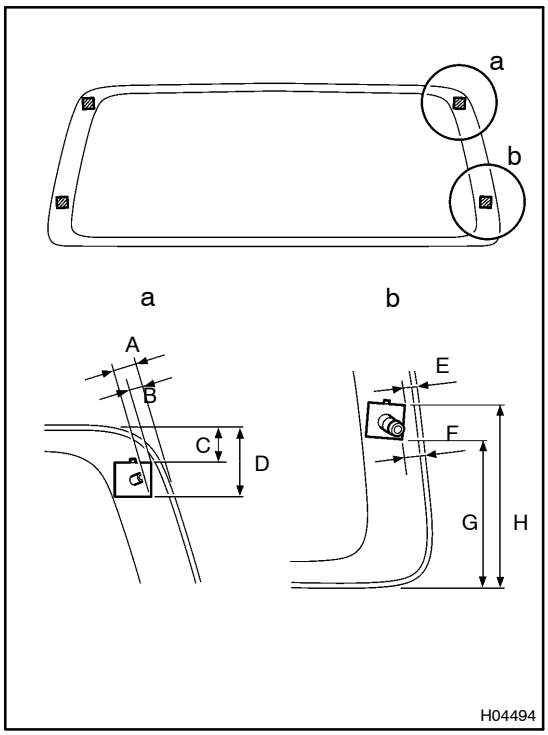
HINT:

Leave as much of the adhesive on the body as possible.

(b) Clean the cutting surface of the adhesive with a piece of shop rag saturated in cleaner.

HINT:

Even if all the adhesive has been removed, clean the body.



2. REPLACE CLIP AND SPACER

(a) Remove the damaged clip and spacer.

(b) Cut off the old adhesive around the clip and spacer installation area.

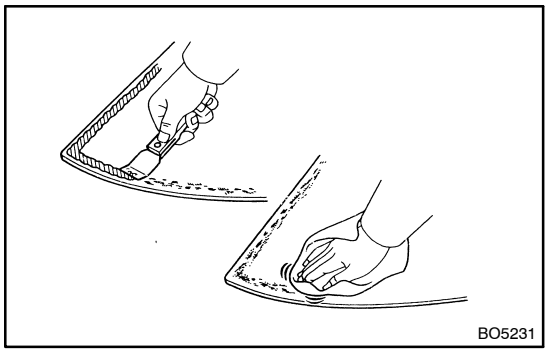
NOTICE:

Be careful not to damage the back door glass.

(c) Clean the installation area.

(d) Install a new clip and spacer onto the glass as shown in the illustration.

A: 24.3 mm (0.957 in.)
B: 18.6 mm (0.732 in.)
C: 33.1 mm (1.303 in.)
D: 52.8 mm (2.079 in.)
E: 14.4 mm (0.567 in.)
F: 18 mm (0.709 in.)
G: 156.6 mm (6.165 in.)
H: 176.8 mm (6.961 in.)



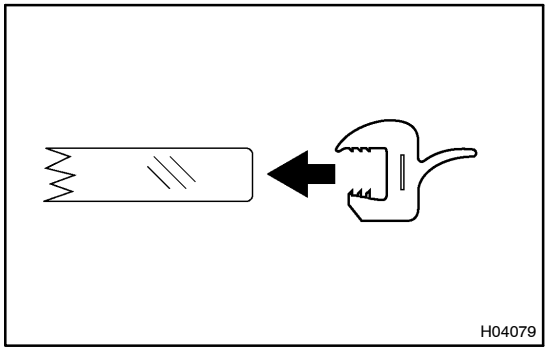
3. CLEAN REMOVED GLASS

(a) Using a scraper, remove the adhesive sticking to the glass.

(b) Clean the glass with cleaner.

NOTICE:

Do not touch the glass after cleaning it.



4. INSTALL BACK WINDOW MOULDING

Install a new back window moulding as shown in the illustration.

NOTICE:

Do not touch the glass face after cleaning it.

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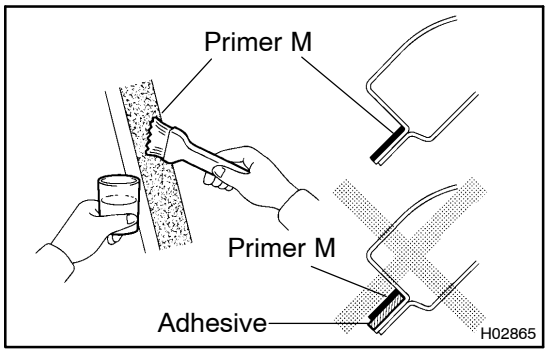
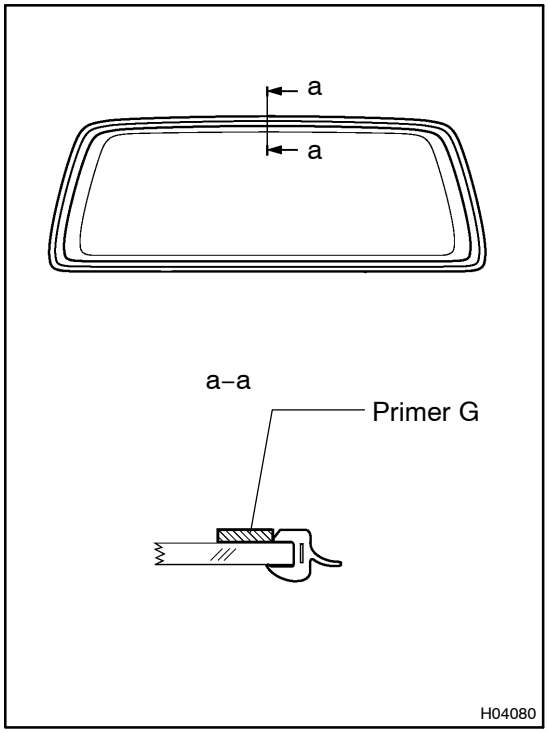


5. COAT CONTACT SURFACE OF BODY WITH PRIMER "M"

Using a brush, coat the contact surface on the body with Primer M.

NOTICE:

- **Let the primer coating dry for 3 minutes or more.**
- **Do not coat primer M to the adhesive.**
- **Do not keep any of the opened primer M for later use.**



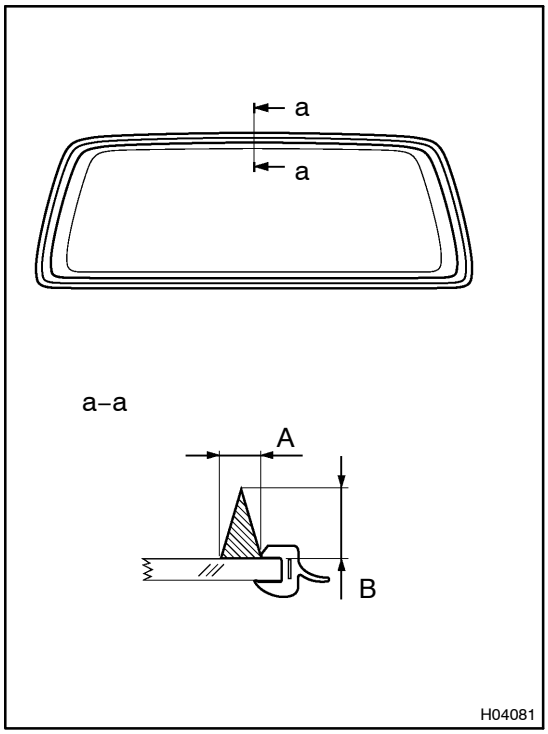
6. COAT CONTACT SURFACE OF GLASS WITH PRIMER "G"

(a) Using a brush or sponge, coat the edge of the glass and contact surface with Primer G.

(b) When the primers coated wrongly to the area other than the specified, wipe it off with a clean shop rag before the primer dries.

NOTICE:

- **Let the primer coating dry for 3 minutes or more.**
- **Do not keep any of the opened primer G for later use.**



7. APPLY ADHESIVE

(a) Cut off the tip of the cartridge nozzle.

HINT:

After cutting off the tip, use all adhesive within the time described in the table below.

Temperature	Tackfree time
35 °C (95 °F)	15 minutes
20 °C (68 °F)	100 minutes
5 °C (41 °F)	8 hours

(b) Load the cartridge into the sealer gun.

(c) Coat the glass with adhesive, as shown in the illustration.

A: 8.0 mm (0.315 in.)

B: 12.0 mm (0.472 in.)

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8. INSTALL BACK DOOR GLASS

(a) Install the glass to the body.

(b) Hold back window glass in place securely with protective tape or equivalent until the adhesive hardens.

NOTICE:

Take care not to drive the vehicle during the time described in the table below.

Temperature	Minimum time prior to moving a car
35 °C (95 °F)	1.5 hours
20 °C (68 °F)	5 hours
5 °C (41 °F)	24 hours

9. INSPECT FOR LEAKS AND REPAIR

(a) Conduct a leak test after the hardening time has elapsed.

(b) Seal any leak with sealant.

Part No. 08833–00030 or equivalent

10. INSTALL REAR WIPER ARM (See page BO–41)

11. INSTALL THESE PARTS:

(See page BO–25)

(a) Back door garnish

(b) Center back door garnish

(c) Inside handle bezel

(d) Assist grip

(e) Assist grip plug

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SLIDING ROOF

BO1KD–01

ON–VEHICLE INSPECTION

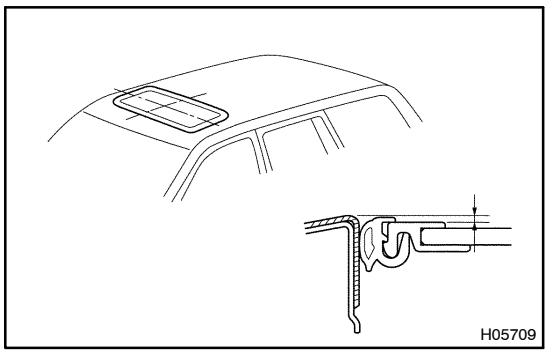
1. INSPECT SLIDING ROOF GLASS

(a) Start the engine and check the operation time of the sliding roof.

Operation time:
Approx. 6 secs.

(b) Check for abnormal noise or binding during operation.

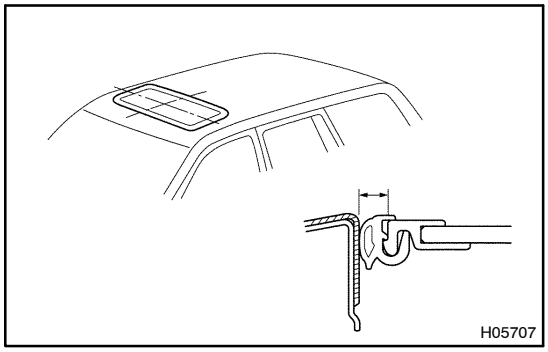
(c) With the sliding roof fully closed, check for water leakage.



2. INSPECT DIFFERENCE IN LEVEL

Inspect the difference in level between the roof panel and sliding roof glass (weatherstrip part) when the sliding roof glass is fully closed.

Except rear end:
0 + 1.5 mm (0 ± 0.059 in.)
0 – 1.0 mm (0 – 0.039 in.)
Rear end:
0 ± 1.5 mm (0 ± 0.059 in.)



3. INSPECT SLIDING ROOF GLASS CLEARANCE

Inspect the clearance between the roof panel and sliding roof glass when the sliding roof is fully closed.

Clearance: Uniform all around

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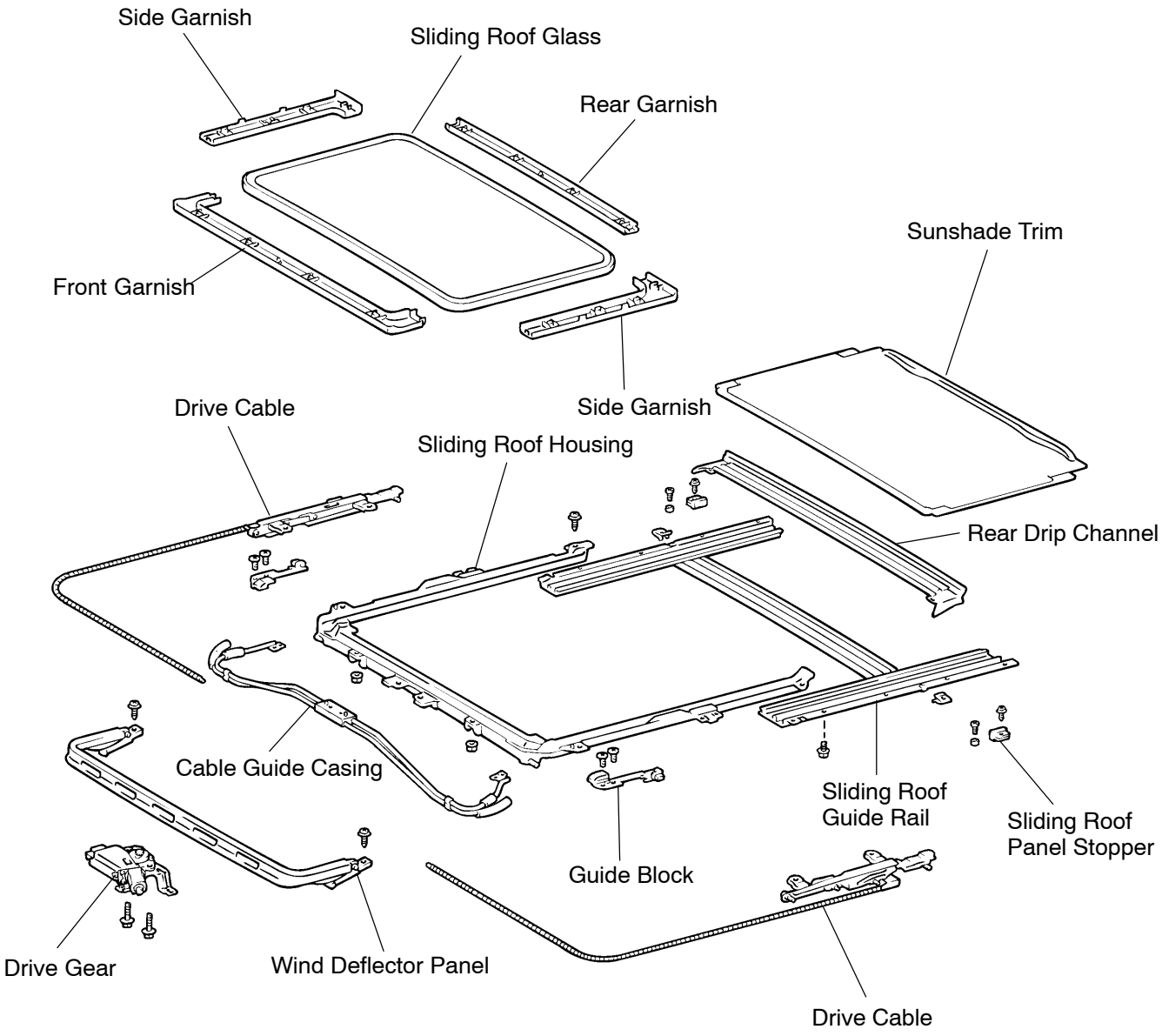
BO1KE–01

COMPONENTS



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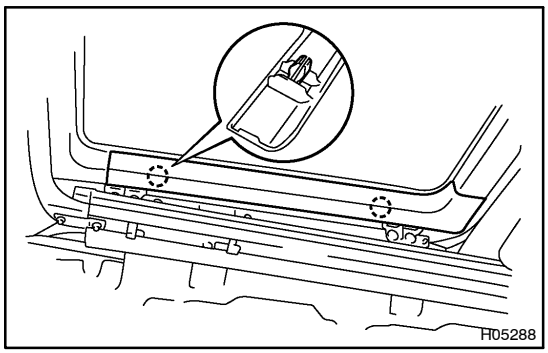
BO1KF–01

REMOVAL

1. REMOVE ROOF HEADLINING
(See page BO–96)



2. REMOVE GARNISH

Using a screwdriver, remove the garnishes.

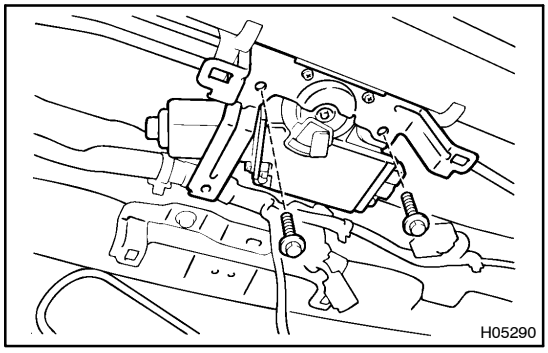
HINT:

Tape the screwdriver tip before use.

3. REMOVE SLIDING ROOF GLASS

(a) Remove the 4 nuts.

(b) Pull the glass upward to remove it.



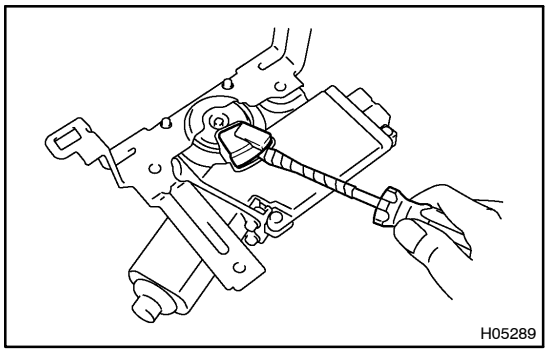
4. REMOVE DRIVE GEAR

NOTICE:

Remove the drive gear with the sliding roof fully closed.

(a) Disconnect the connector.

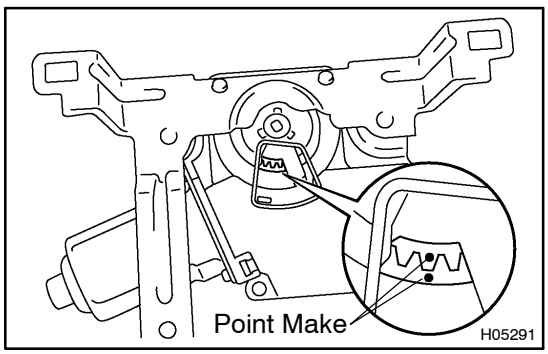
(b) Remove the 2 bolts and drive gear.



(c) Using a screwdriver, remove the cam plate cover.

HINT:

Tape the screwdriver tip before use.



(d) Turn the drive gear to align the point marks as shown in the illustration.

(e) Install the cam plate cover.

NOTICE:

At the time of installation, please refer to the following item. If the sliding roof position and drive gear fully closed position are not matched, the sliding roof does not operate normally.

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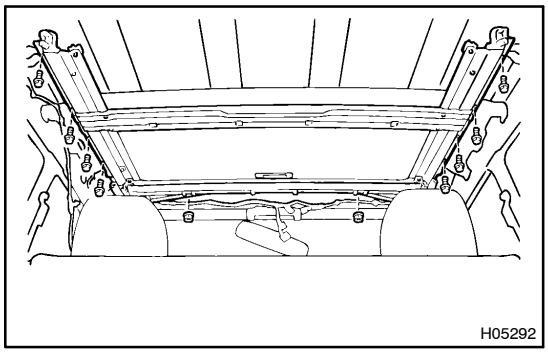

5. REMOVE SLIDING ROOF HOUSING

(a) Remove the 4 drain hoses from the housing.

(b) Remove the room light wire harness.

(c) Remove the 8 bolts, 2 nuts and sliding roof housing.

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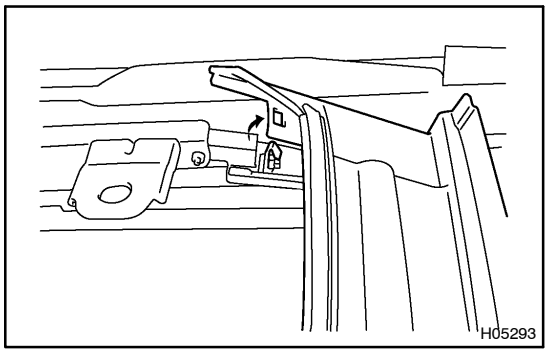
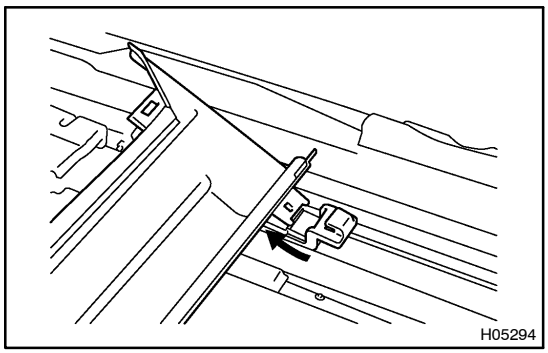
BO1KG–01

DISASSEMBLY



1. REMOVE REAR DRIP CHANNEL

(a) Using a screwdriver, remove the front side of rear drip channel.

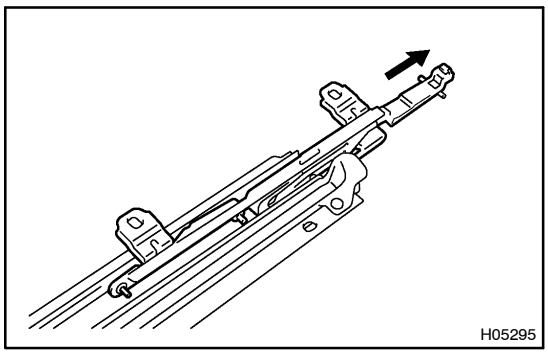


(b) Remove the rear drip channel as shown in the illustration.

2. REMOVE SLIDING ROOF PANEL STOPPER

Remove the 2 screws and 2 stoppers.

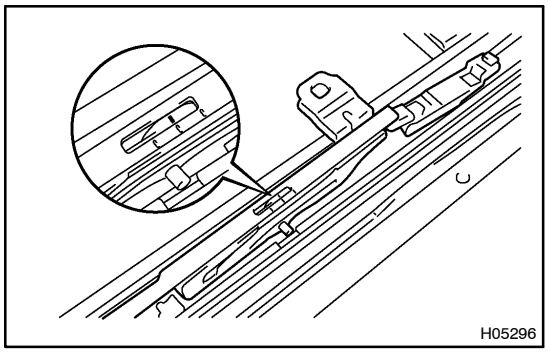
3. REMOVE SUNSHADE TRIM



4. REMOVE DRIVE CABLE

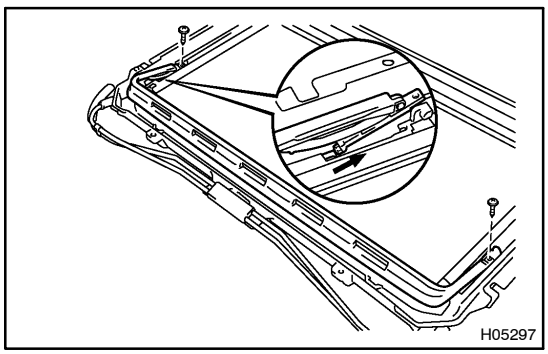
(a) Remove the screw and guide rail stopper.

(b) Slide the drive cable rearward, then remove it.



HINT:

- At the time of assembly, please refer to the following items.
- Adjust the drive cable to a closed and tilted down position.
- Slide the cable forward or backward to align the 2 marks as shown.
- Slide the cable to the forefront with your hand.



5. REMOVE WIND DEFLECTOR PANEL

Remove the 2 screws and wind deflector as shown in the illustration.

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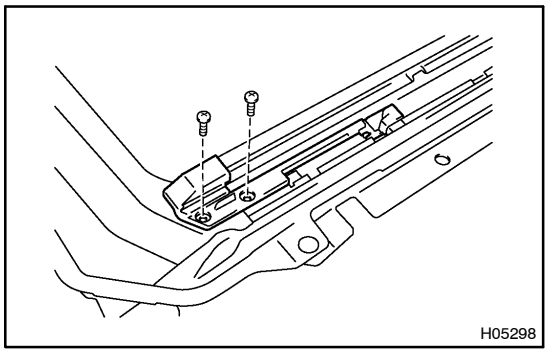
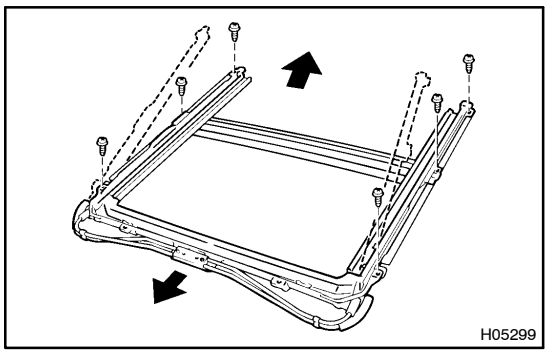


6. REMOVE GUIDE BLOCK

Remove the 2 screws and guide block.



7. REMOVE SLIDING ROOF HOUSING

Remove the 6 screws and sliding roof housing.

8. REMOVE CABLE GUIDE CASING

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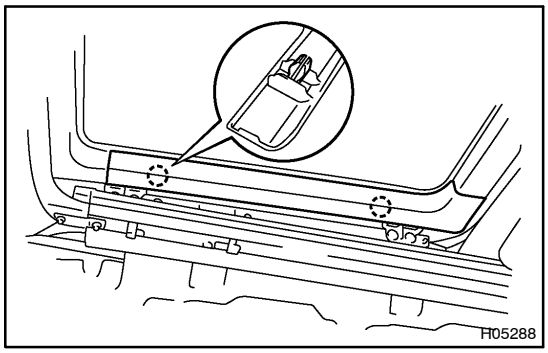
BO1KH–01

ADJUSTMENT

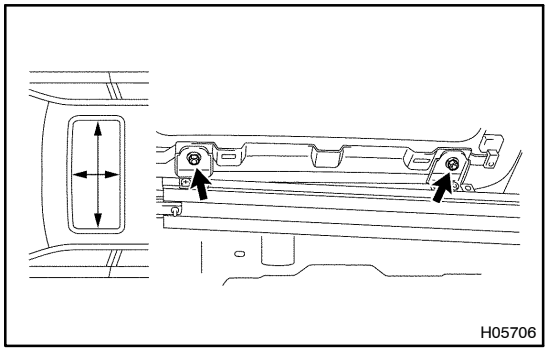


1. REMOVE SIDE GARNISH

Before making adjustment, using a screwdriver, remove the side garnishes.

HINT:

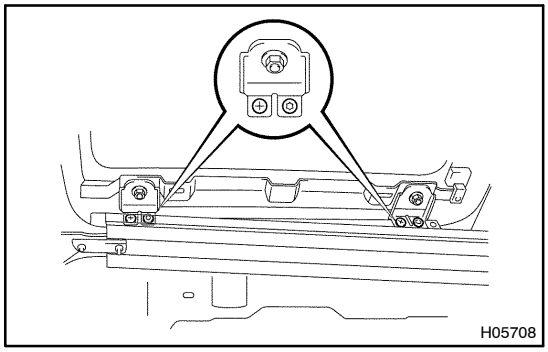
- Tape the screwdriver tip before use.
- After adjustment, reinstall the side garnishes.



2. ADJUST SLIDING ROOF GLASS FORWARD/REARWARD AND LEFT/RIGHT DIRECTIONS

(a) Loosen the sliding roof glass installation nuts.

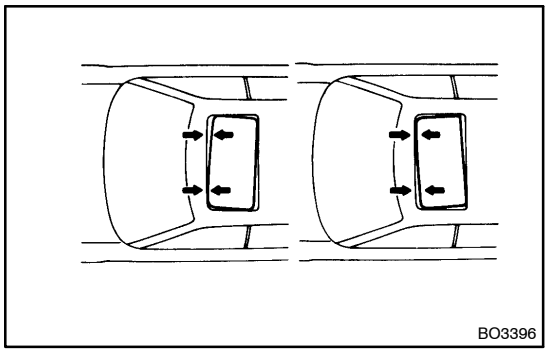
(b) Adjust the sliding roof glass forward/rearward or left/ right.



3. ADJUST SLIDING ROOF GLASS IN UPWARD OR DOWNWARD DIRECTIONS

(a) Loosen the screws shown in the illustration.

(b) Adjust the sliding roof glass upward or downward.

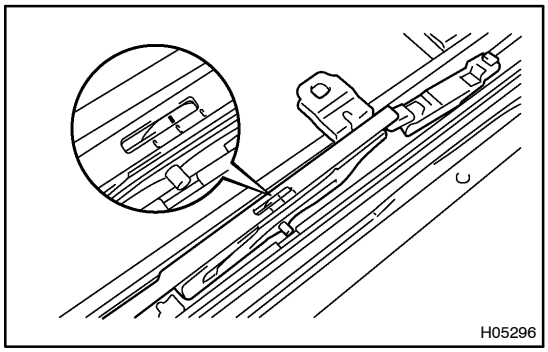


4. ADJUST SLIDING ROOF GLASS IN CLEARANCE (Difference in left and right clearance)

(a) When the front or rear alignment is not correct, remove the drive gear and sliding roof glass, then adjust the drive cable.

NOTICE:

Remove the drive gear with the sliding roof fully closed.



(b) Adjust by sliding the cable forward or rearward to align the 2 marks as shown.

(c) Install the drive gear and sliding roof glass.

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BO1KI–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–78).

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BO1KJ–01

INSTALLATION

Installation is in the reverse order of removal (See page BO–82).

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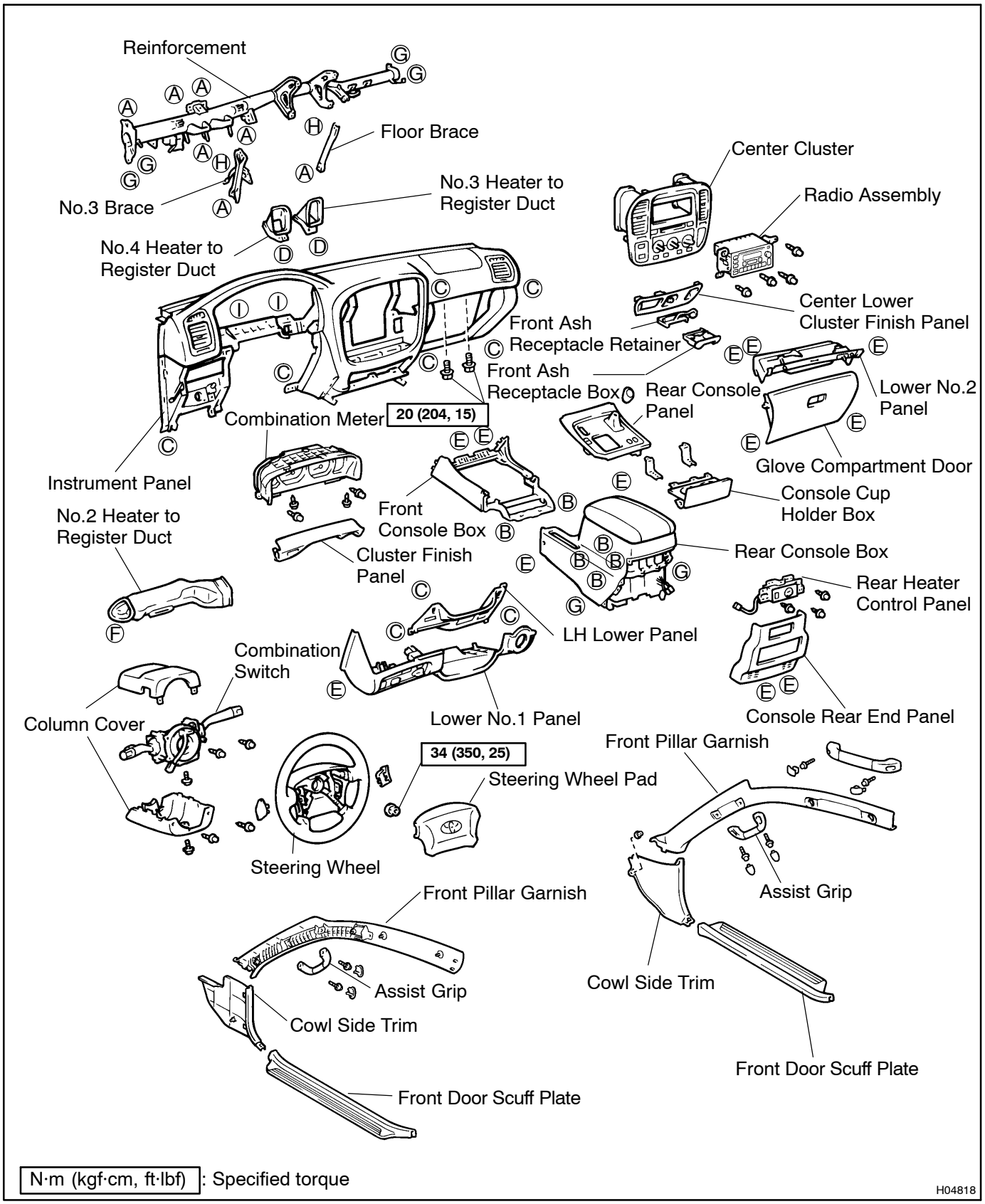
INSTRUMENT PANEL

COMPONENTS

BO1KK–01



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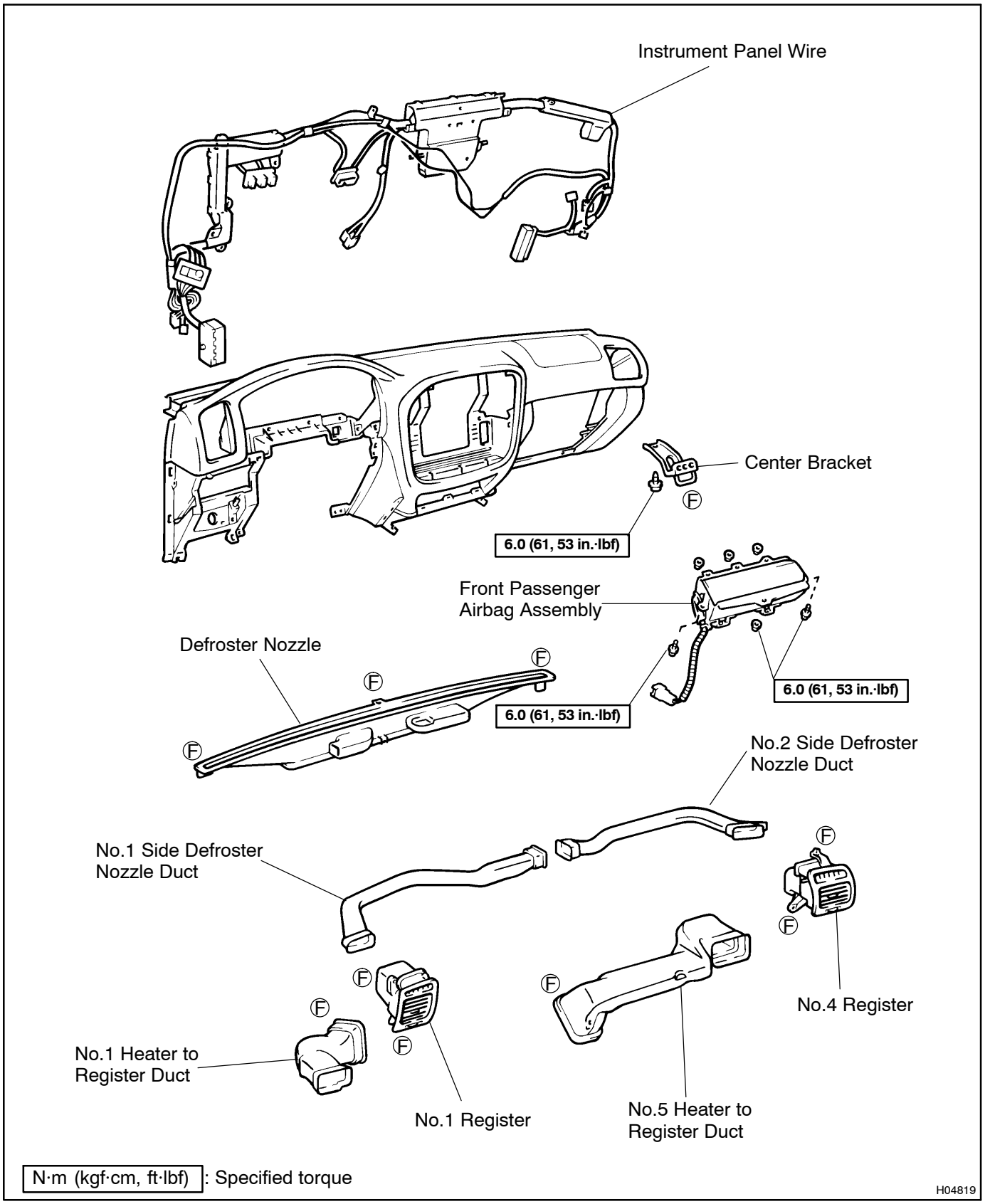

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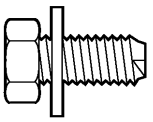
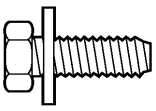
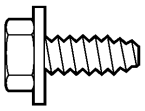
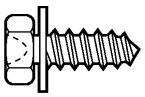
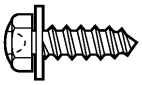
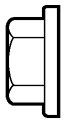
HINT:
Screw shapes and sizes are indicated in the table below. The codes (A – I) correspond to those indicated on the previous page.

mm (in.)

	Shape	Size		Shape	Size		Shape	Size
Ⓐ		ø = 8 (0.31) L =16 (0.63)	Ⓑ		ø = 6 (0.24) L =18 (0.71)	Ⓒ		ø = 6 (0.24) L =16 (0.63)
Ⓓ		ø = 6 (0.24) L =16 (0.63)	Ⓔ		ø = 5 (0.20) L =16 (0.63)	Ⓕ		ø = 5 (0.20) L =14 (0.55)
Ⓖ		ø = 5 (0.20) L =14 (0.55)	Ⓗ		ø = 8 (0.31)	Ⓘ		ø = 6 (0.24)

H04082

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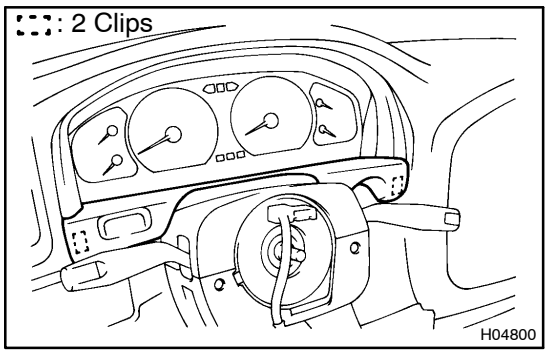
BO1KL–01

REMOVAL

1. REMOVE THESE PARTS:

(a) Front door scuff plates
(b) Cowl side trims
(c) Front door opening trims
(d) Assist grips
(e) Front pillar garnishes

2. REMOVE STEERING WHEEL
(See page SR–12 or SR–25)



3. REMOVE CLUSTER FINISH PANEL

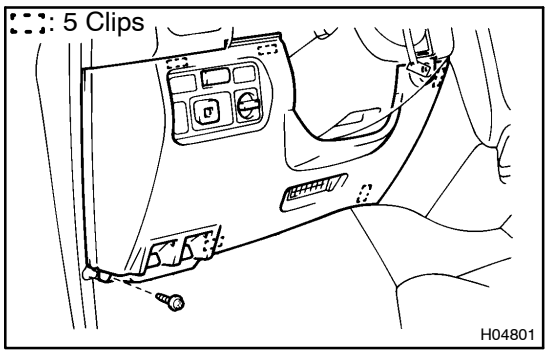
Using a screwdriver, remove the cluster finish panel.

HINT:

Tape the screwdriver tip before use.

4. REMOVE HOOD LOCK AND FUEL LID CONTROL CABLE LEVER

(a) Remove the 2 screws and hood lock control cable.
(b) Remove the 2 screws and fuel lid control cable lever.



5. REMOVE LOWER NO.1 PANEL

(a) Remove the screw.
(b) Using a screwdriver, remove the lower No.1 panel, then disconnect the connectors.

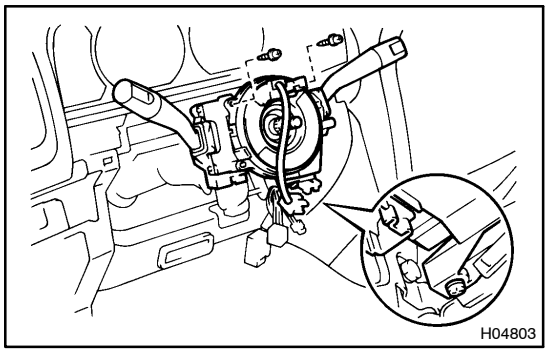
HINT:

Tape the screwdriver tip before use.

6. REMOVE LH LOWER PANEL

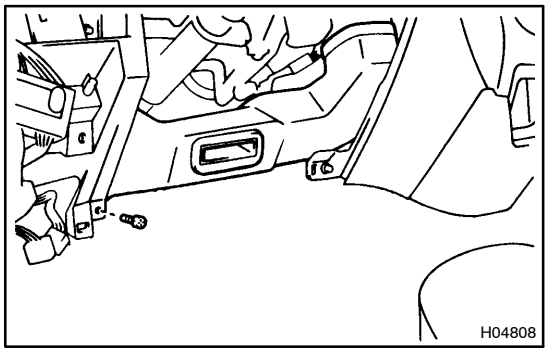
7. REMOVE COLUMN COVER

Remove the 3 screws and column cover.



8. REMOVE COMBINATION SWITCH

(a) Disconnect the connectors.
(b) Remove the clamp.
(c) Remove the 3 screws and combination switch.



9. REMOVE NO.2 HEATER TO REGISTER DUCT

Remove the screw and No.2 heater to register duct as shown in the illustration.

10. REMOVE STEERING COLUMN
(See page SR–12 or SR–25)

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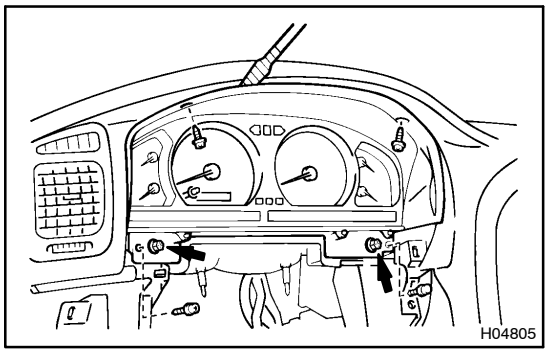


11. REMOVE COMBINATION METER

(a) Disconnect the connectors.

HINT:

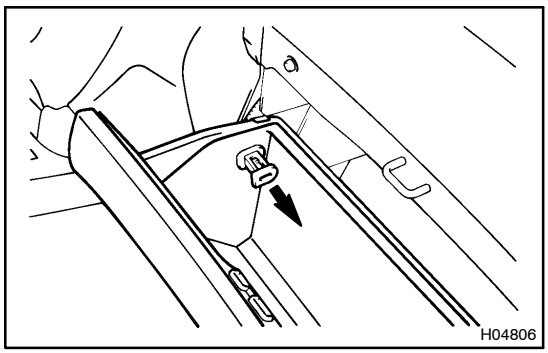
The connectors can be disconnected by loosening the bolts.

(b) Remove the 2 screws.

(c) Using a screwdriver, remove the combination meter.

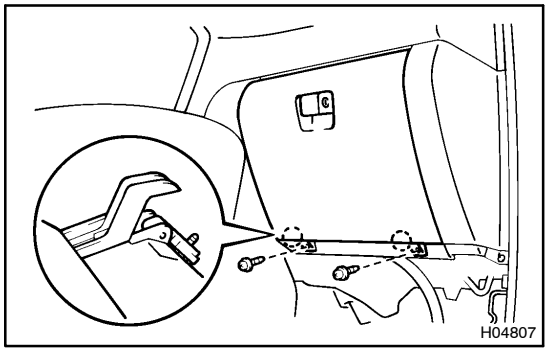
HINT:

Tape the screwdriver tip before use.

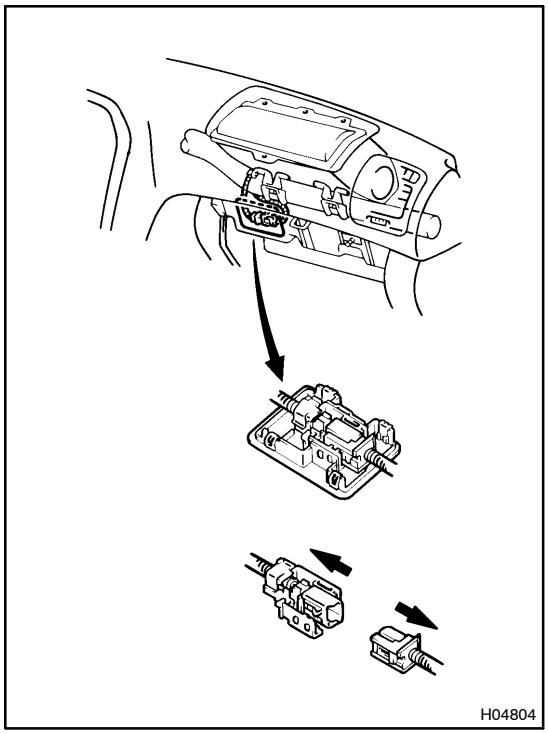


12. REMOVE GLOVE COMPARTMENT DOOR

(a) Remove the glove compartment door stoppers.



(b) Remove the 2 screws and glove compartment door as shown in the illustration.



13. DISCONNECT AIRBAG CONNECTOR

(See page RS–25)

(a) Using a screwdriver, remove the No.1 under cover.

HINT:

Tape the screwdriver tip before use.

(b) Pull up the airbag connector from the No.1 under cover.

(c) Disconnect the airbag connector.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.

14. REMOVE LOWER NO.2 PANEL

Remove the 3 screws and lower No.2 panel.

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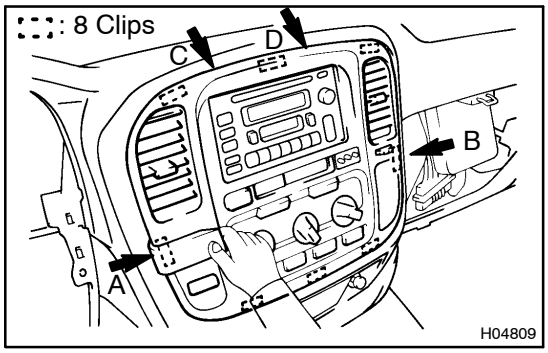
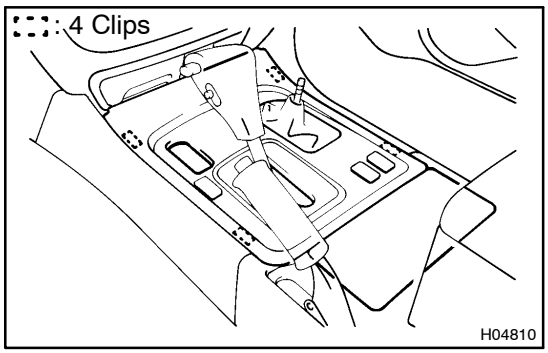


15. REMOVE CENTER CLUSTER

(a) Using a moulding remover, remove the center cluster in order ”A”, ”B”, ”C”, ”D” as shown in the illustration.

(b) Disconnect the connectors.

16. REMOVE RADIO ASSEMBLY



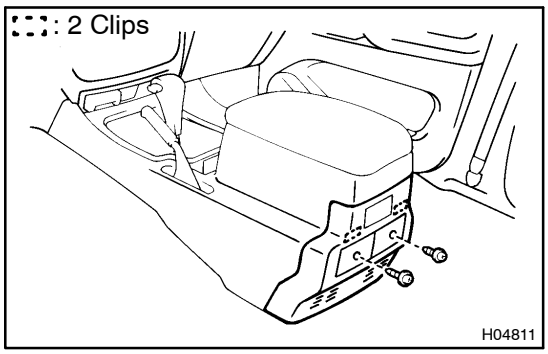
17. REMOVE REAR CONSOLE PANEL

(a) Remove the transfer shift lever knob.

(b) Using a screwdriver, remove the rear console panel.

HINT:

Tape the screwdriver tip before use.



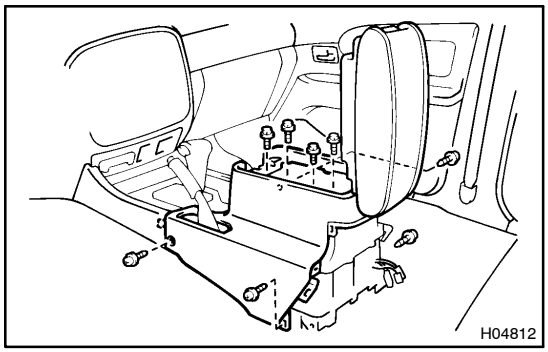
18. REMOVE CONSOLE REAR END PANEL

(a) Remove the 2 screws.

(b) Using a screwdriver, remove the console rear end panel.

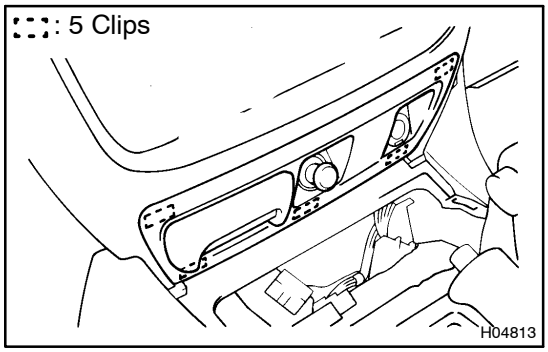
19. w/o Rear Cooler:
REMOVE REAR HEATER CONTROL PANEL

Disconnect the connector and control cable, then remove the 3 screws and rear heater control panel.



20. REMOVE REAR CONSOLE BOX

Remove the 4 bolts, 4 screws and rear console box.



21. REMOVE CENTER LOWER CLUSTER FINISH PANEL

Using a screwdriver, remove the center lower cluster finish panel, then disconnect the connector.

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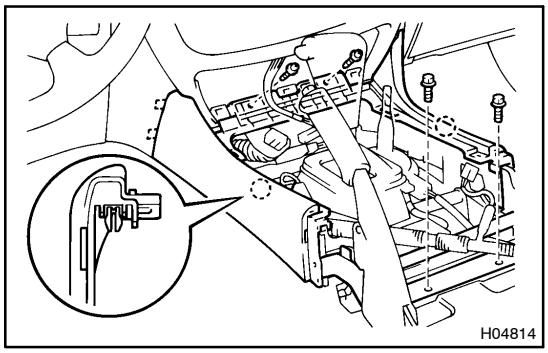


22. REMOVE FRONT CONSOLE BOX

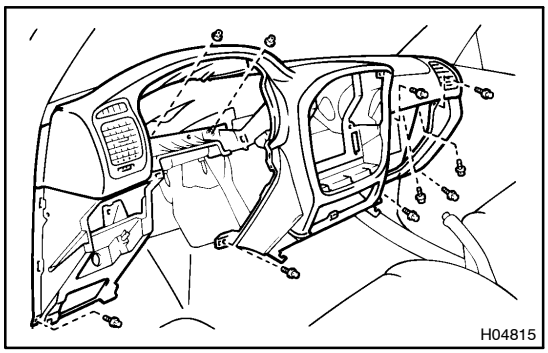
Remove the 2 bolts, 2 screws and front console box.

23. REMOVE INSTRUMENT PANEL

(a) Disconnect the junction connectors.

HINT:

The connectors can be disconnected by loosening the bolts.



(b) Disconnect the connector, then remove the 8 bolts, 2 nuts and instrument panel

24. REMOVE THESE PARTS:

(a) Engine control ECU
(b) No.3 heater to register duct
(c) No.4 heater to register duct
(d) Floor brace
(e) No.1 brace
(f) Reinforcement

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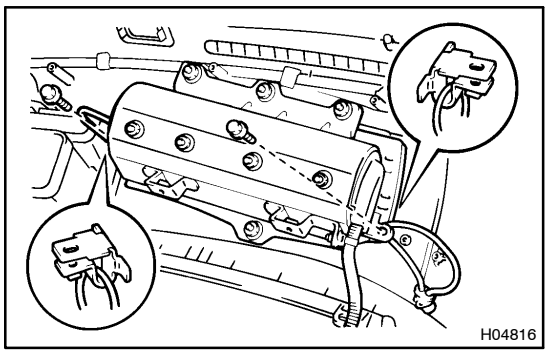
BO1KM–01

DISASSEMBLY

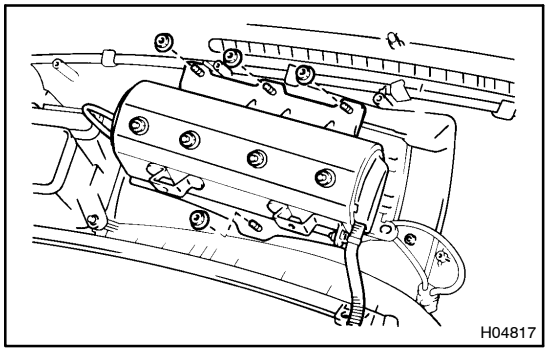
1. REMOVE THESE PARTS:

(a) No.2 side defroster nozzle duct
(b) No.1 side defroster nozzle duct
(c) Defroster nozzle
(d) Center bracket
(e) No.1 heater to register duct
(f) Instrument panel wire harness
(g) No.5 heater to register duct



2. REMOVE FRONT PASSENGER AIRBAG ASSEMBLY

(a) Remove the 2 bolts and straps.
Torque: 6.0 N·m (61 kgf·cm, 53 in.·lbf)



(b) Remove the 4 nuts and front passenger airbag assembly.
Torque: 6.0 N·m (61 kgf·cm, 53 in.·lbf)

CAUTION:

- **Do not store the front passenger airbag assembly with the airbag deployment side facing down.**
- **Never disassemble the front passenger airbag assembly.**

NOTICE:

- **At the time of assembly, please refer to the following items.**
- **Pass the straps of the front passenger airbag door through the brackets on the right and left sides securely.**
- **Install the straps so that they are not pinched between the airbag and instrument panel.**
- **When installing the front passenger airbag assembly, make sure that the straps are not distorted and installed to the brackets securely.**
- **Make sure that the front passenger airbag assembly is installed to the specified torque.**
- **If the front passenger airbag assembly has been dropped, or there are cracks, dents or other defects in the case or connector, replace the front passenger airbag assembly with a new one.**
- **When installing the front passenger airbag assembly, take care that the wiring does not interfere with other parts and is not pinched between other parts.**

3. REMOVE THESE PARTS:

(a) No.1 register
(b) No.4 register

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BO1KN–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–90).

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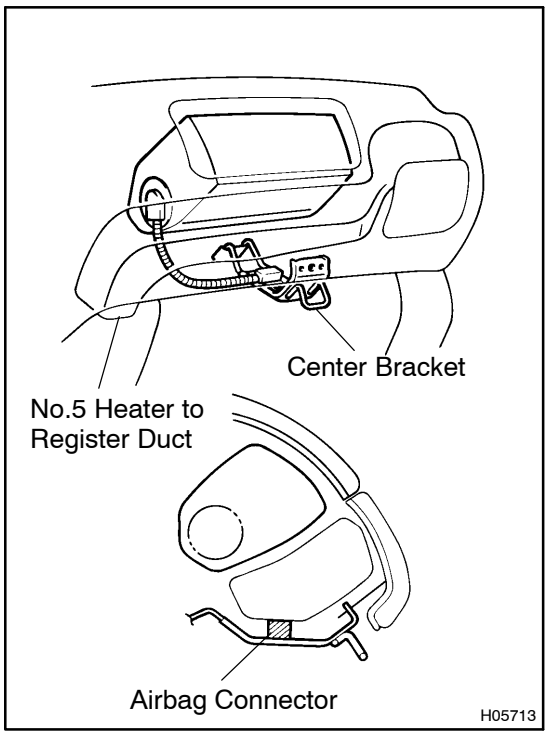
BO1KO–01

INSTALLATION

1. INSTALL THESE PARTS:

(a) Reinforcement
(b) No.1 brace
(c) Floor brace
(d) No.4 heater to register duct
(e) No.3 heater to register duct



2. INSTALL INSTRUMENT PANEL

HINT:

- Install the airbag connector between the No.5 heater to register duct and center bracket temporarily, then install the instrument panel.
- Remove the airbag connector before installing the lower No.2 panel.

(a) Install the 6 bolts, 2 nuts and instrument panel, then connect the connectors.
(b) Install the 2 bolts to the front passenger airbag assembly.
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)
(c) Connect the junction connectors.

HINT:

The connectors can be connected by tightening the bolts.

3. INSTALL THESE PARTS:

(a) Front console box
(b) Center lower cluster finish panel
(c) Rear console box
(d) Rear heater control panel
(e) Console rear end panel
(f) Rear console panel
(g) Radio assembly
(h) Center cluster
(i) Lower No.2 panel

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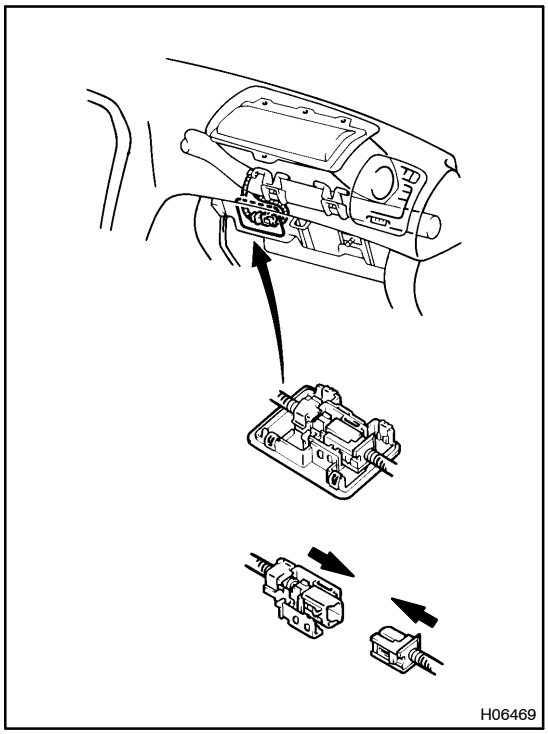
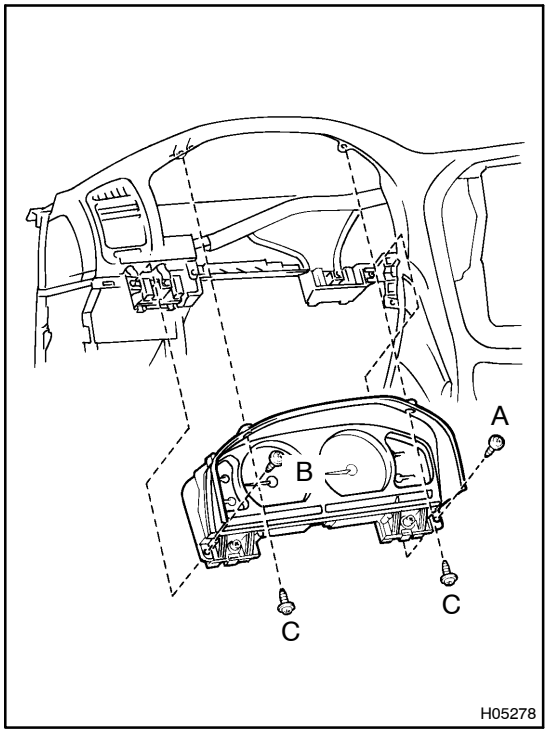


4. **CONNECT AIRBAG CONNECTOR**
(See page RS–35)
5. **INSTALL GLOVE COMPARTMENT DOOR**



6. **INSTALL COMBINATION METER**
(a) Check that the set–in connectors are connected in the installation holes on the instrument panel securely.
(b) Place the combination meter on the instrument panel.
(c) Install the combination meter by tightening the screws, A, B and C in the order.

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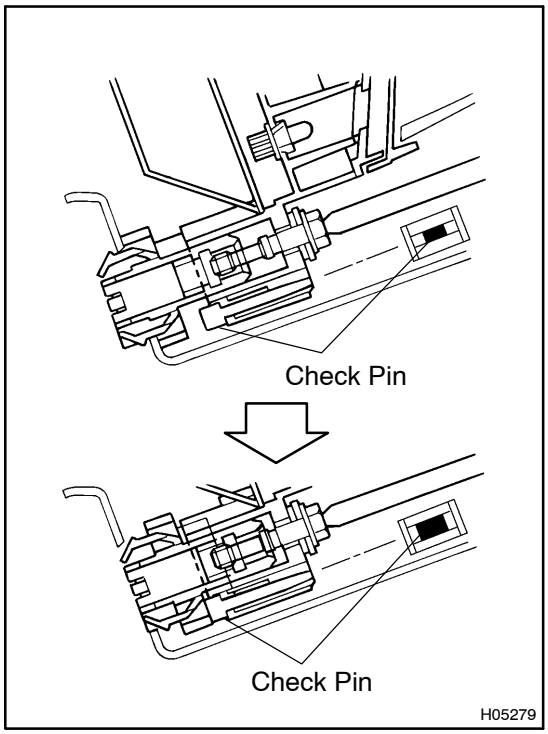

(d) Tighten the connection bolts.

HINT:

- When connection completes, the bolts turns vainly, causing turning noise.
- Check this noise and that the connection check pins protrude from the lower side of the connection bolts.

NOTICE:

Follow the procedures in order of (c) and (d). Otherwise, set–in connectors on the wire harness side and connectors on the meter side might not be connected properly.

7. INSTALL THESE PARTS:

(a) Steering column
(See page SR–21 or SR–32)
(b) No.2 heater to register duct
(c) Combination switch
(d) Column cover
(e) LH lower panel
(f) Lower No.1 panel
(g) Hood lock and fuel lid control cable lever
(h) Cluster finish panel
(i) Steering wheel
(See page SR–21 or SR–32)
(j) Front pillar garnishes
(k) Assist grips
(l) Front door opening trims
(m) Cowl side trims
(n) Front door scuff plates

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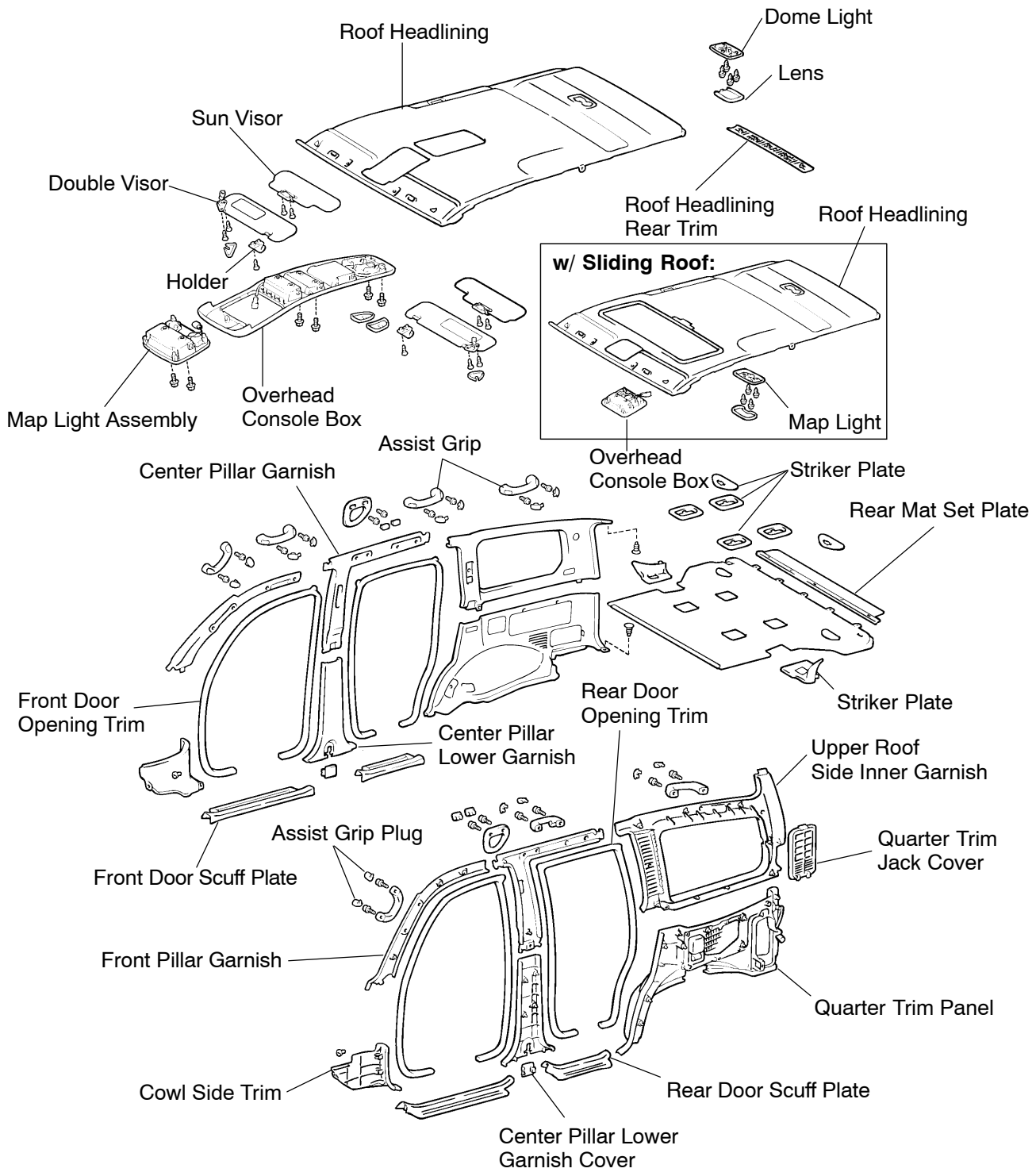
ROOF HEADLINING

COMPONENTS

BO1KP–01



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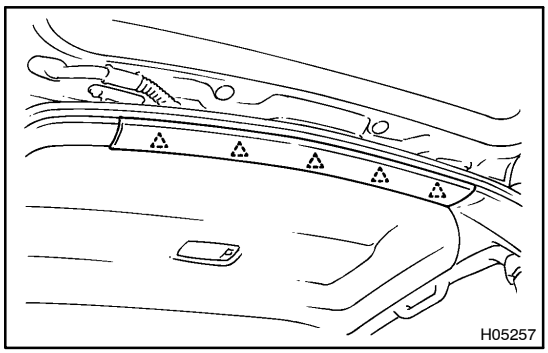
BO1KQ–01

REMOVAL

1. w/ Rear No.2 Seat:
REMOVE REAR NO.2 SEAT

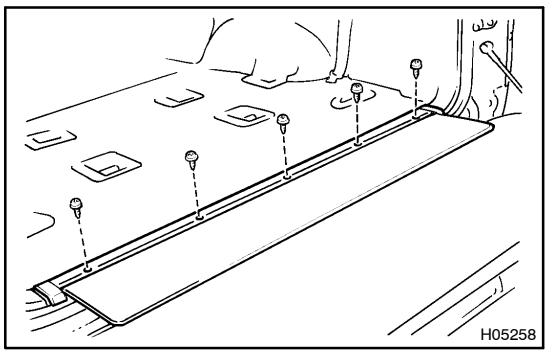


2. REMOVE ROOF HEADLINING REAR TRIM

Using a screwdriver, remove the roof headlining rear trim.

HINT:

Tape the screwdriver tip before use.



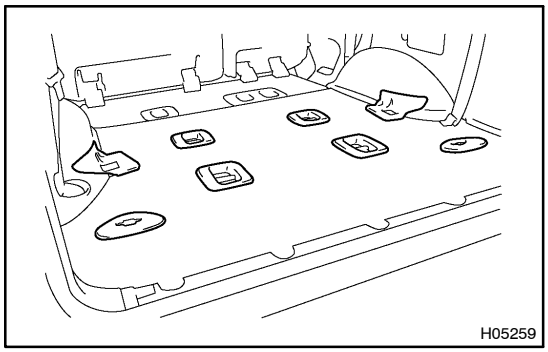
3. REMOVE REAR MAT SET PLATE

(a) Remove the 5 screws.

(b) Using a screwdriver, remove the rear mat set plate.

HINT:

Tape the screwdriver tip before use.



4. w/ Rear No.2 Seat:
REMOVE STRIKER PLATE

Using a screwdriver, remove the striker plates.

5. REMOVE THESE PARTS:

(a) w/ Tonneau cover:
Tonneau cover

(b) Rear mat

(c) w/ Rear No.2 Seat:
Rear No.2 seat outer belt floor anchors
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

(d) Rear No.1 seat outer belt floor anchors
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

(e) Rear door scuff plates

(f) Rear door opening trims

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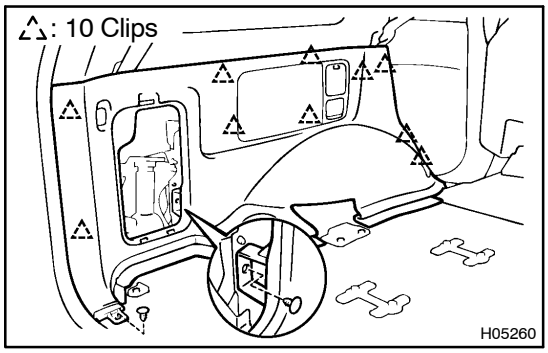
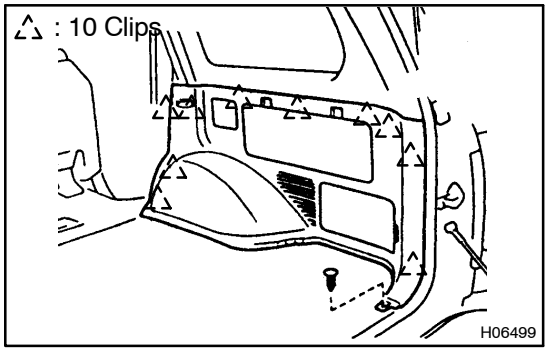


6. REMOVE LH QUARTER TRIM PANEL

(a) Remove the quarter trim jack cover.

(b) Using a clip remover, remove the 2 clips.

(c) Remove the LH quarter trim panel, then disconnect the connector.



7. REMOVE RH QUARTER TRIM PANEL

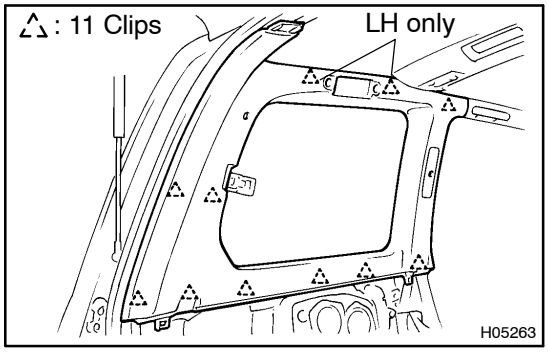
(a) Using a clip remover, remove the clip.

(b) Remove the RH quarter trim panel.

8. REMOVE THESE PARTS:

(a) w/ Rear No.2 Seat:
Rear No.2 seat outer belt shoulder anchors
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

(b) Rear No.1 seat outer belt shoulder anchors
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)



9. REMOVE UPPER ROOF SIDE INNER GARNISH

(a) w/ Rear No.2 Seat:
Using a screwdriver, remove the assist grip plugs, then remove the 4 screws and assist grips.

HINT:

Tape the screwdriver tip before use.

(b) Using a clip remover, remove the clip.

(c) Using a screwdriver, remove the upper roof side inner garnishes.

HINT:

Tape the screwdriver tip before use.

10. REMOVE THESE PARTS:

(a) Front door scuff plates

(b) Cowl side trims

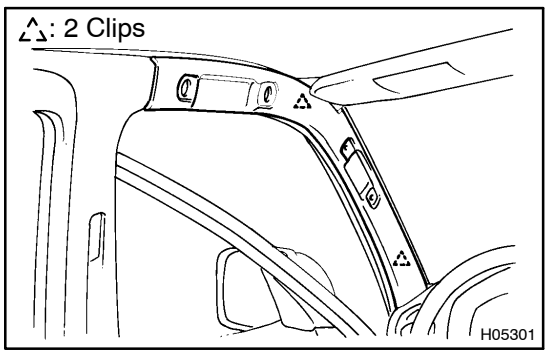
(c) Front door opening trims

11. REMOVE FRONT PILLAR GARNISH

(a) Using a screwdriver, remove the assist grip plugs, then remove the 6 screws and 3 assist grips.

HINT:

Tape the screwdriver tip before use.



(b) Using a screwdriver , remove the front pillar garnishes.

HINT:

Tape the screwdriver tip before use.

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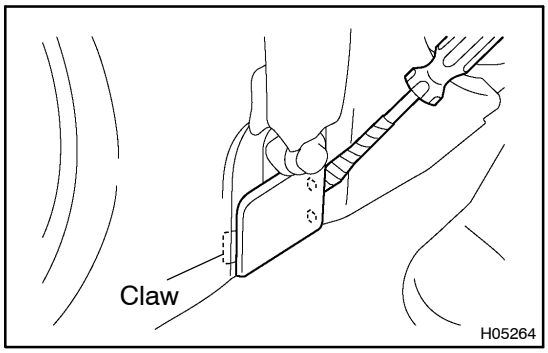
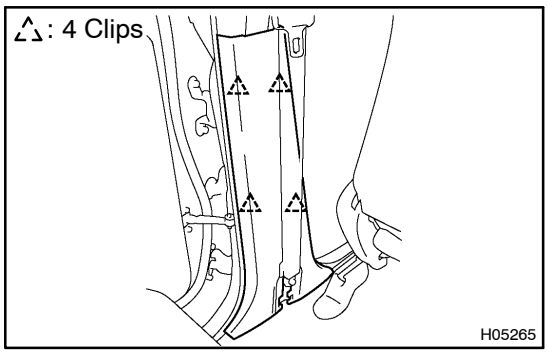


12. REMOVE CENTER PILLAR LOWER GARNISH

(a) Using a screwdriver, remove the center pillar garnish covers.

HINT:

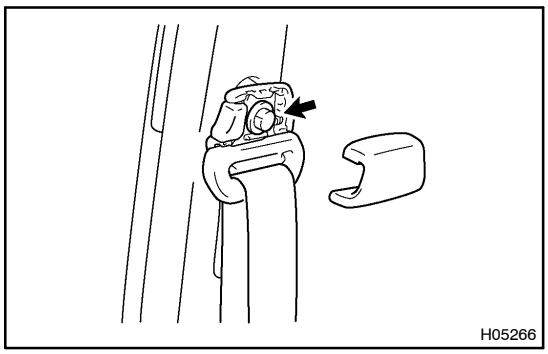
Tape the screwdriver tip before use.



(b) Using a screwdriver, remove the center pillar lower garnishes as shown in the illustration.

HINT:

Tape the screwdriver tip before use.



13. REMOVE CENTER PILLAR GARNISH

(a) Using a screwdriver, remove the seat belt anchor cover caps.

HINT:

Tape the screwdriver tip before use.

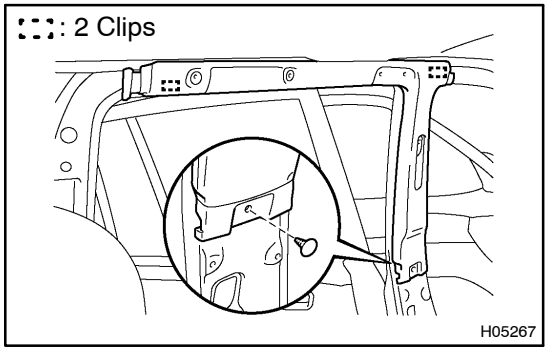
(b) Remove the bolts and front seat outer belt shoulder anchors.

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

(c) Using a screwdriver, remove the 8 assist grip plugs, then remove the 8 screws and 4 assist grips.

HINT:

Tape the screwdriver tip before use.



(d) Using a clip remover, remove the clips.

(e) Using a screwdriver, remove the center pillar garnishes.

14. REMOVE THESE PARTS:

(a) Sun visors

(b) Double visors

(c) Holders

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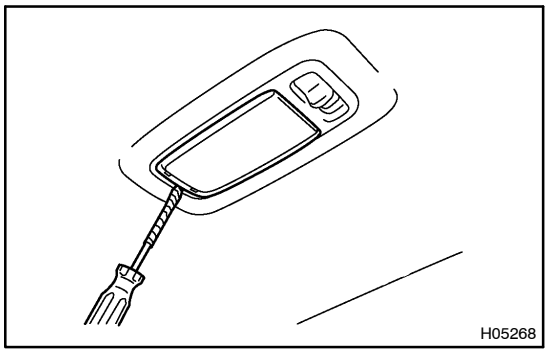


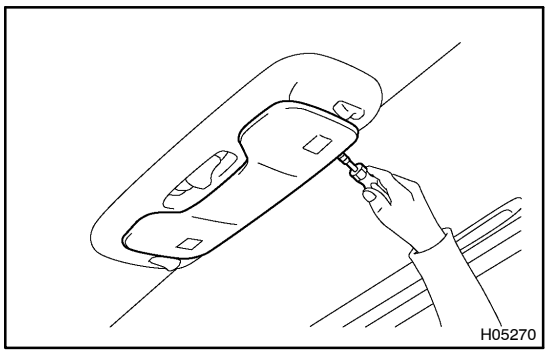
15. REMOVE DOME LIGHT

(a) Using a screwdriver, remove the lens as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 4 screws and dome light, then disconnect the connector.



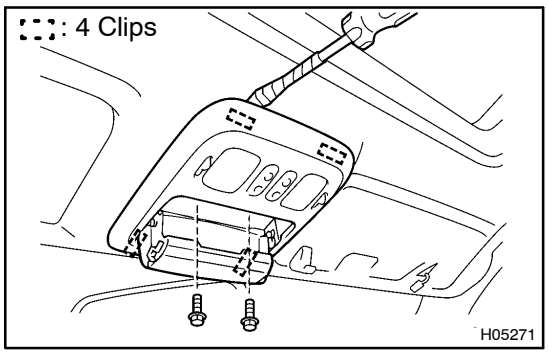
16. w/ sliding Roof:
REMOVE MAP LIGHT

(a) Using a screwdriver, remove the lens as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 4 screws and map light, then disconnect the connector.



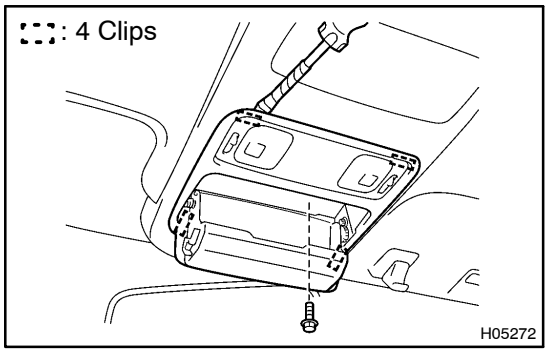
17. w/ Sliding Roof:
REMOVE OVERHEAD CONSOLE BOX

(a) Remove the 2 bolts.

(b) Using a screwdriver, remove the overhead console box, then disconnect the connector.

HINT:

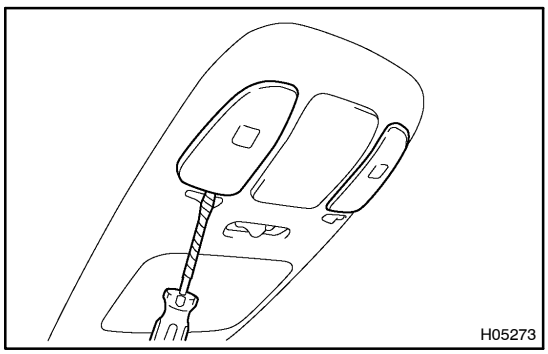
Tape the screwdriver tip before use.



18. w/o Sliding Roof:
REMOVE OVERHEAD CONSOLE BOX

(a) Remove the bolt.

(b) Using a screwdriver, remove the map light assembly, then disconnect the connector.



(c) Using a screwdriver, remove the 2 lenses.

HINT:

Tape the screwdriver tip before use.

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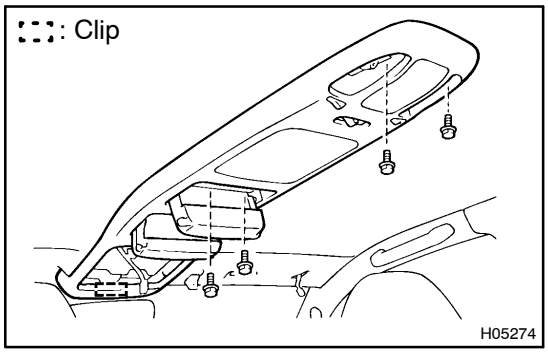
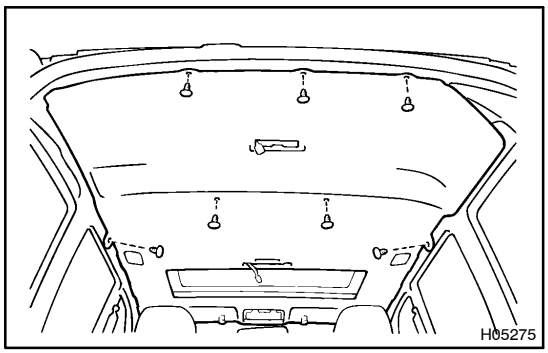


(d) Remove the 4 bolts.
(e) Using a screwdriver, remove the overhead console box, then disconnect the connector.

HINT:
Tape the screwdriver tip before use.

19. w/ Sliding Roof:
REMOVE SLIDING ROOF OPENING TRIM



20. REMOVE ROOF HEADLINING

Using a clip remover, remove the 7 clips and roof headlining.

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BO1KR–01

INSTALLATION

Installation is in the reverse order of removal (See page BO–96).

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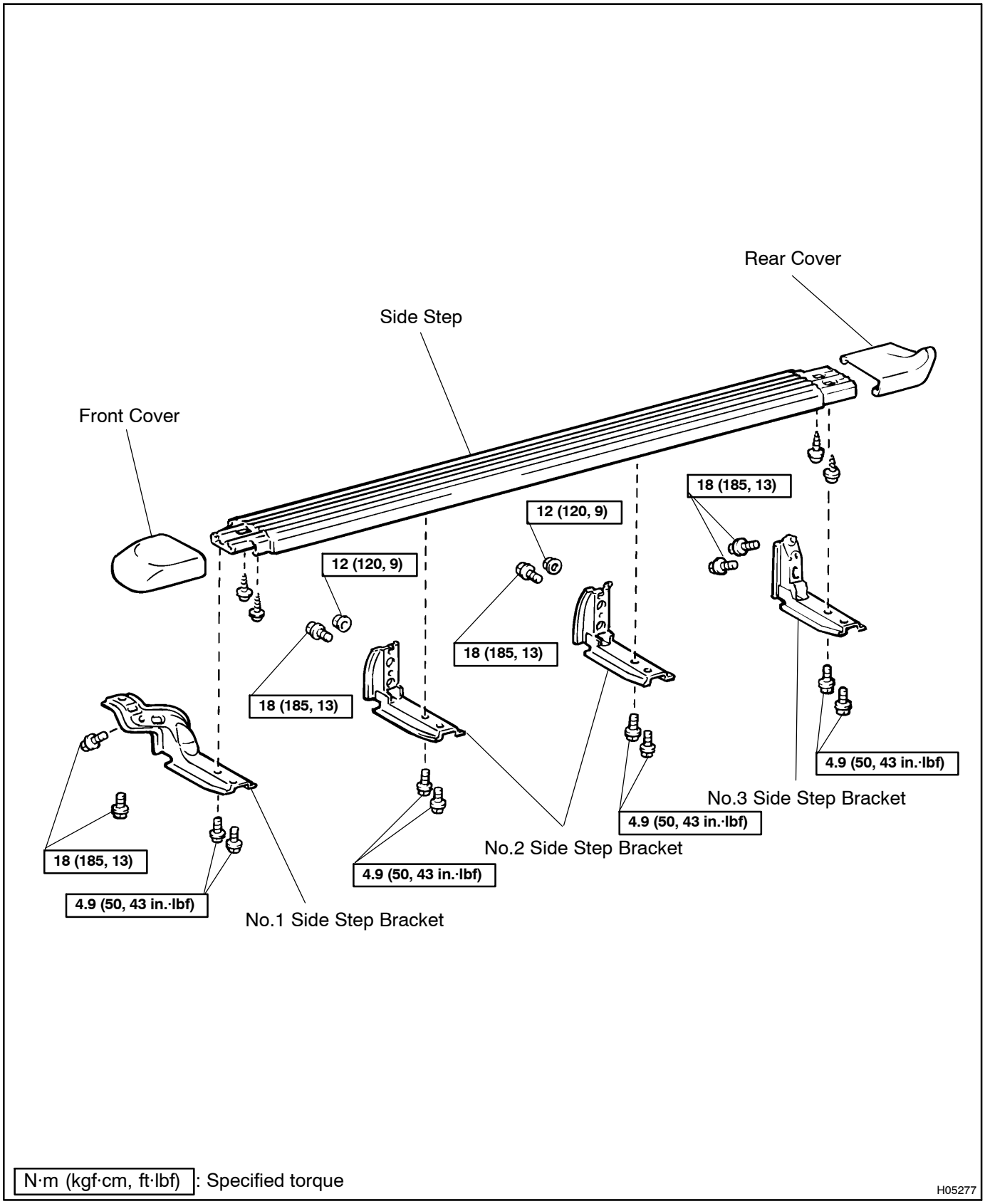
SIDE STEP

COMPONENTS

BO1KS–01



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

H05277

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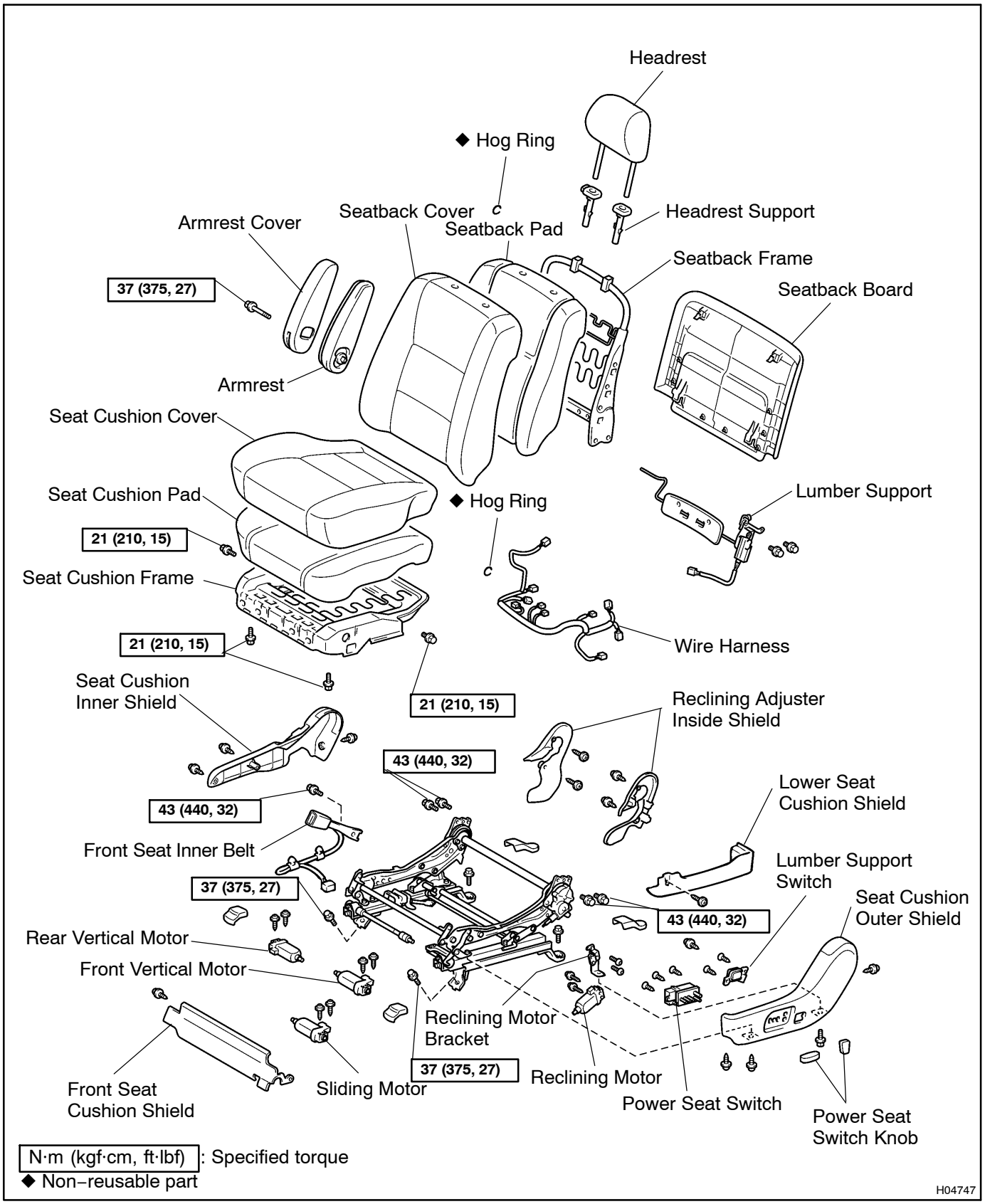
FRONT SEAT

COMPONENTS

BO1KT–01



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BO1KU–01

REMOVAL

1. REMOVE SEAT TRACK OUTER COVER

Using a screwdriver, remove the 4 seat track outer covers.

HINT:

Tape the screwdriver tip before use.

2. REMOVE FRONT SEAT

(a) Remove the 4 bolts.

Torque: 37 N·m (375 kgf·cm, 27 ft·lbf)

(b) Disconnect the connector, then remove the front seat.

NOTICE:

Be careful not to damage the body.

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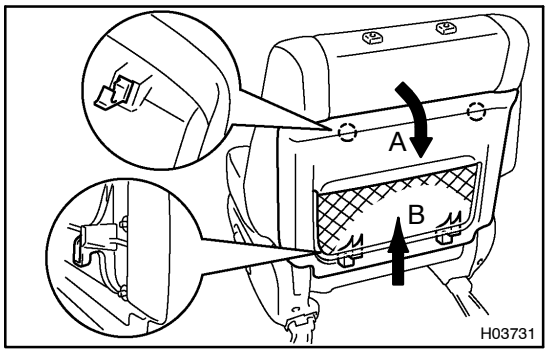
BO1KV–01



DISASSEMBLY

1. REMOVE SEATBACK BOARD

Remove the seatback board as shown in the illustration.

HINT:

Remove the seatback board in order ”A”, ”B” as shown in the illustration.

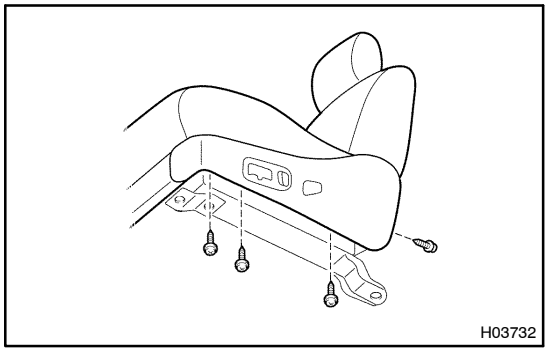
2. REMOVE HEADREST

3. REMOVE SEAT CUSHION OUTER SHIELD

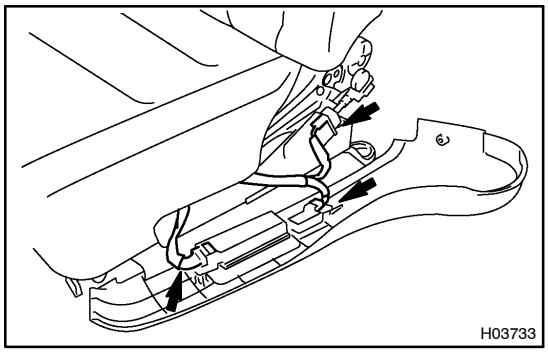
(a) Using a screwdriver, remove the power seat switch knobs.

HINT:

Tape the screwdriver tip before use.

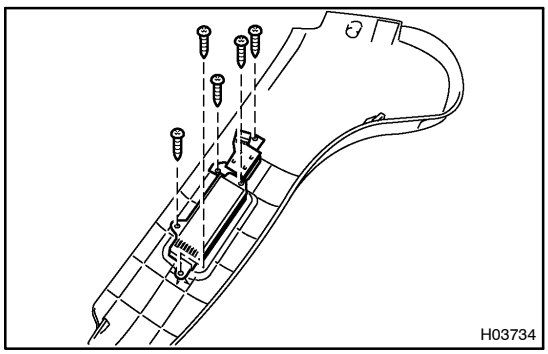


(b) Remove the 4 screws.



(c) Disconnect the connectors shown in the illustration.

(d) Remove the seat cushion outer shield.



(e) Remove the 3 screws and power seat switch from the seat cushion outer shield.

(f) Remove the 2 screws and lumber support switch from the seat cushion outer shield.

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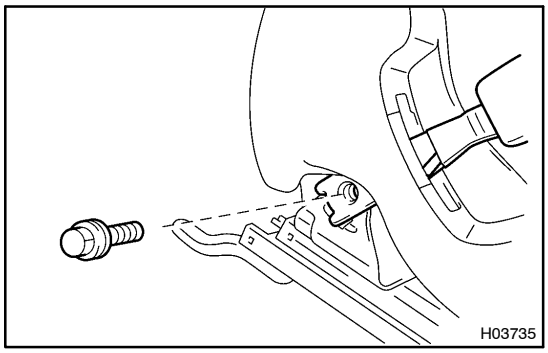
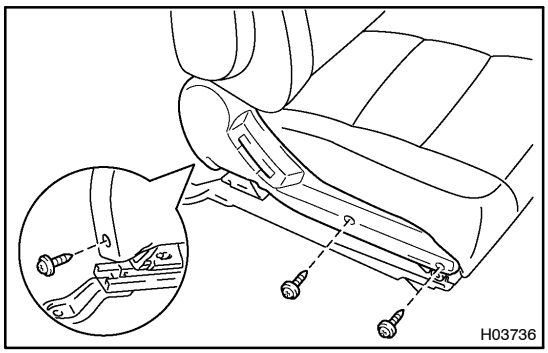


4. REMOVE FRONT SEAT INNER BELT

(a) Remove the clamp, then disconnect the connector.

(b) Remove the bolt and inner belt.

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

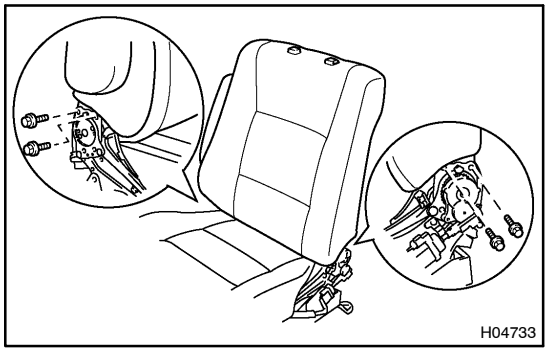


5. REMOVE SEAT CUSHION INNER SHIELD

Remove the 3 screws and seat cushion inner shield.

6. REMOVE SEATBACK ASSEMBLY

(a) Disconnect the seat reclining motor connector and seat heater connector.

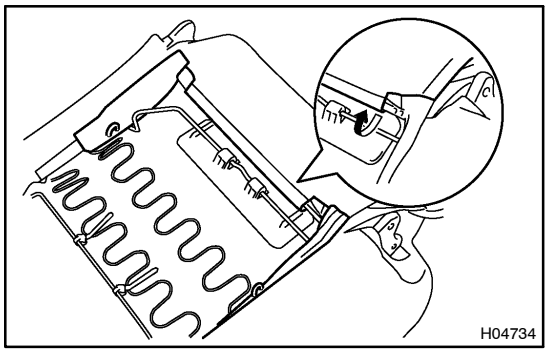


(b) Remove the 4 bolts and seatback assembly.

Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

7. REMOVE ARMREST

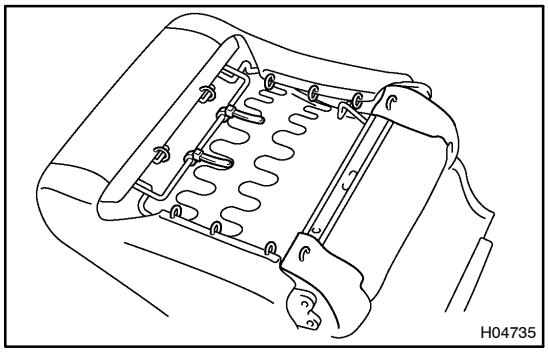
Torque: 37 N·m (375 kgf·cm, 27 ft·lbf)



8. REMOVE SEATBACK FRAME

(a) Remove the 2 hog rings.

(b) Disengage the hook as shown in the illustration.



(c) Remove the 10 hog rings and 2 clamps.

(d) Remove the 2 headrest supports.

(e) Remove the seatback frame from the seatback cover with pad.

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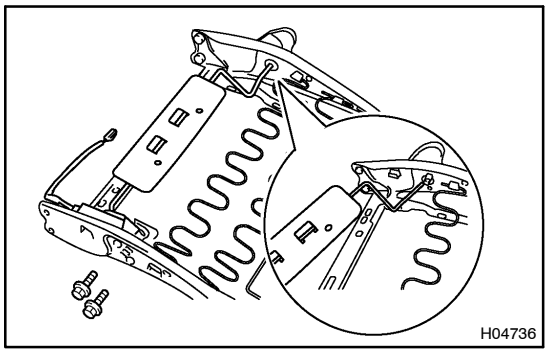
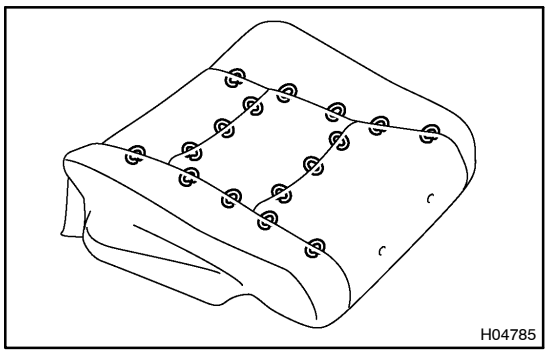


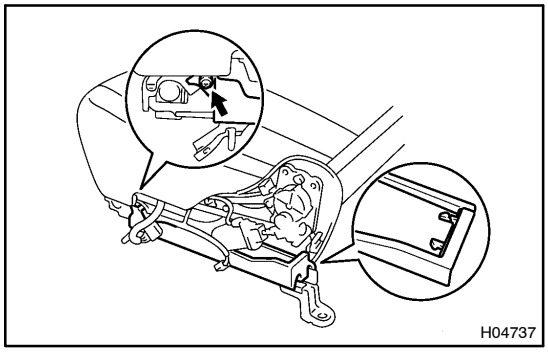
9. REMOVE LUMBER SUPPORT

Remove the 2 bolts and lumber support.



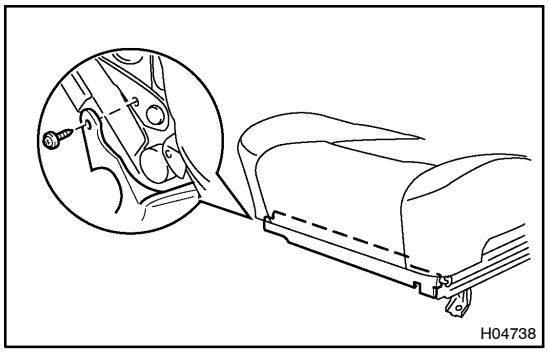
10. REMOVE SEATBACK COVER

Remove the 16 hog rings and seatback cover from the seatback pad.



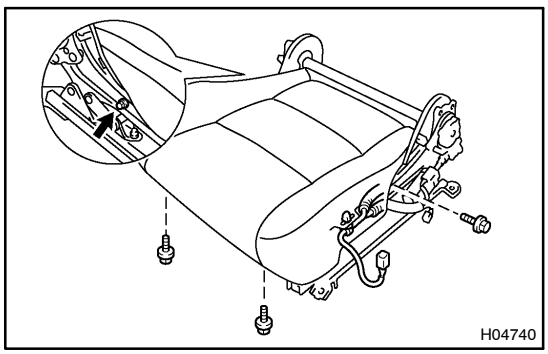
11. REMOVE LOWER SEAT CUSHION SHIELD

Remove the screw and lower seat cushion shield as shown in the illustration.



12. REMOVE FRONT SEAT CUSHION SHIELD

Remove the screw and front seat cushion shield.



13. REMOVE SEAT CUSHION ASSEMBLY

(a) Remove the 4 bolts.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

(b) Remove the wire harness clamp from the seat cushion assembly.

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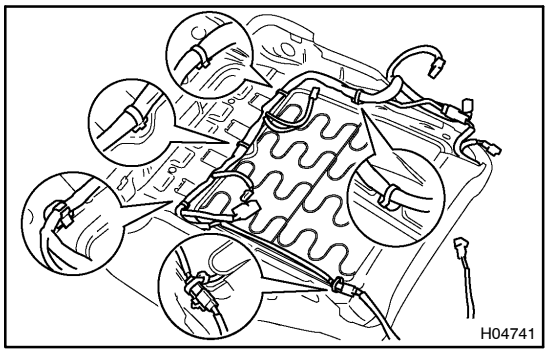
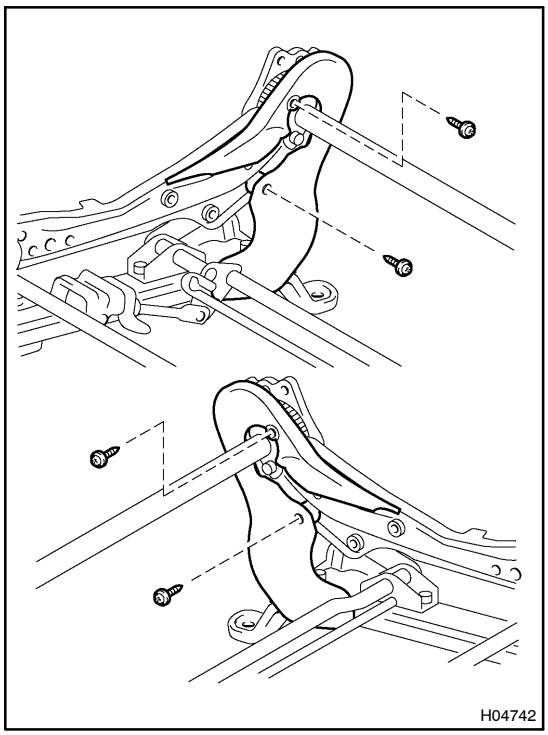


14. REMOVE SEAT CUSHION FRAME

(a) Remove the wire harness.
(b) Disengage the hook.
(c) Remove the 5 hog rings and seat cushion frame.

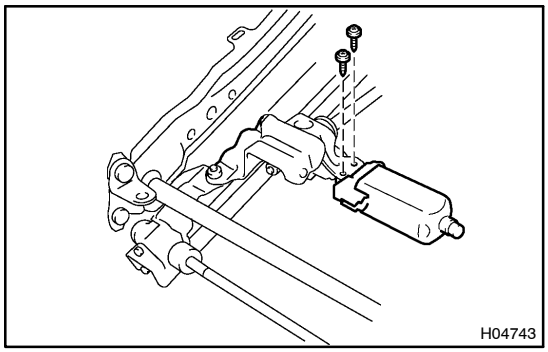
15. REMOVE SEAT CUSHION COVER

Remove the 14 hog rings and seat cushion cover from the seat cushion pad.



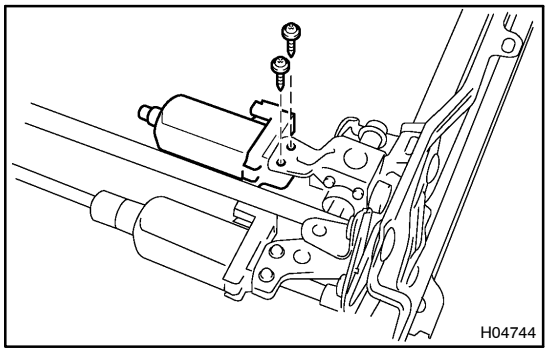
16. REMOVE RECLINING ADJUSTER INSIDE SHIELD

(a) Remove the 2 screws and LH reclining adjuster inside shield.
(b) Remove the 2 screws and RH reclining adjuster inside shield.



17. REMOVE REAR VERTICAL MOTOR

Remove the 2 screws and rear vertical motor.



18. REMOVE FRONT VERTICAL MOTOR

Remove the 2 screws and front vertical motor.

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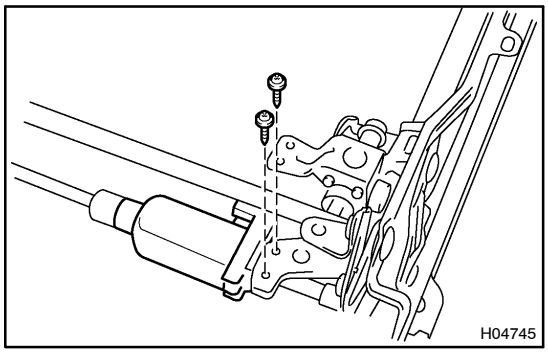
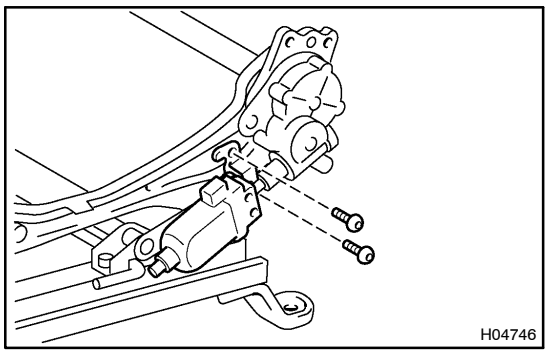


19. REMOVE SLIDING MOTOR

Remove the 2 screws and sliding motor.



20. REMOVE RECLINING MOTOR

(a) Using a torx wrench, remove the reclining motor.

(b) Remove the 2 screws and sliding motor mounting bracket from the sliding motor.

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REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–105).

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BO1KX–01

INSTALLATION

Installation is in the reverse order of removal (See page BO–104).

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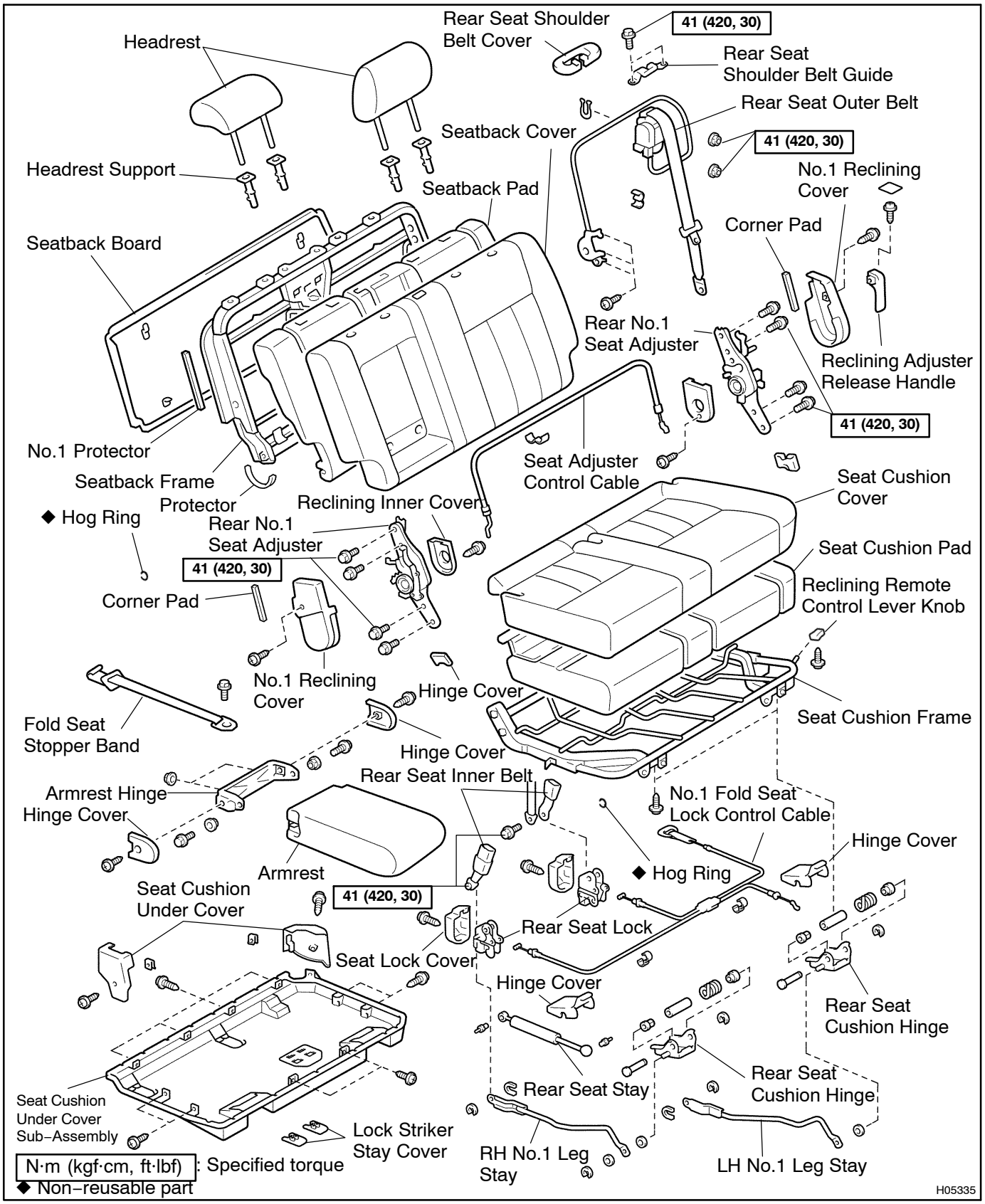
REAR NO.1 SEAT (LH)

COMPONENTS

BO1L0–01



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BO1L1–01

REMOVAL

REMOVE REAR NO.1 SEAT

(a) Fold the seatback down.

(b) Unlock the seat lock, and swing the whole seat up and forward.

(c) Using a screwdriver, remove the seat leg covers.

HINT:

Tape the screwdriver tip before use.

(d) Remove the 4 bolts and rear No.1 seat.

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

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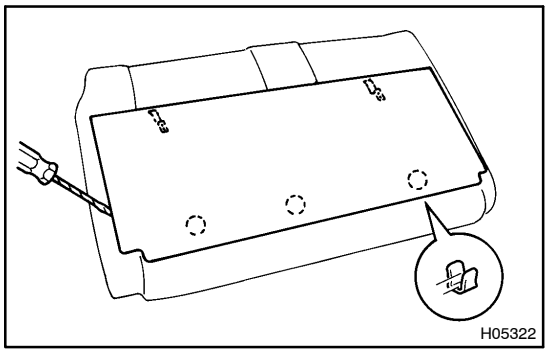
BO1L2–01


H05322

DISASSEMBLY

1. REMOVE HEADREST

2. REMOVE SEATBACK BOARD

Using a screwdriver, remove the seatback board as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

3. REMOVE RECLINING ADJUSTER RELEASE HANDLE

(a) Using a screwdriver, remove the cover.

HINT:

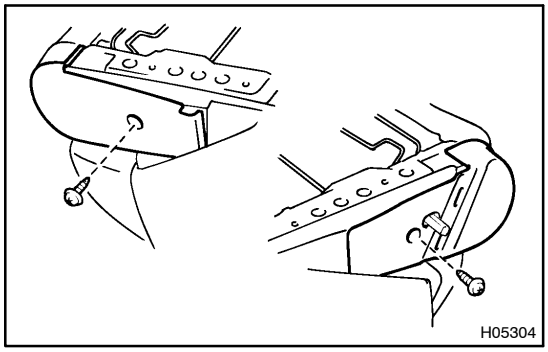
Tape the screwdriver tip before use.

(b) Remove the screw and reclining adjuster release handle.

4. REMOVE NO.1 RECLINING COVER

(a) Remove the 4 hog rings and open the seatback cover.

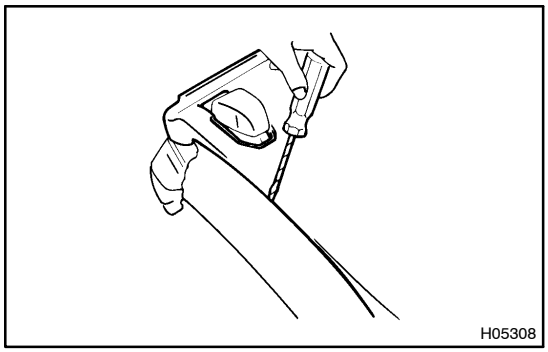
(b) Remove the 2 corner pad.


H05304

(c) Remove the 2 screws and 2 No.1 reclining covers as shown in the illustration.

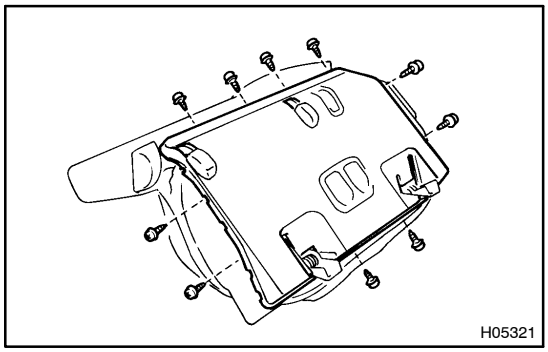
5. REMOVE SEAT CUSHION UNDER COVER

Remove the 2 screws and 2 seat cushion under covers.


H05308

6. REMOVE SEAT CUSHION UNDER COVER SUB–ASSEMBLY

(a) Using a screwdriver, disengage the hooks as shown in the illustration.


H05321

(b) Remove 10 screws and seat cushion under cover sub–assembly.

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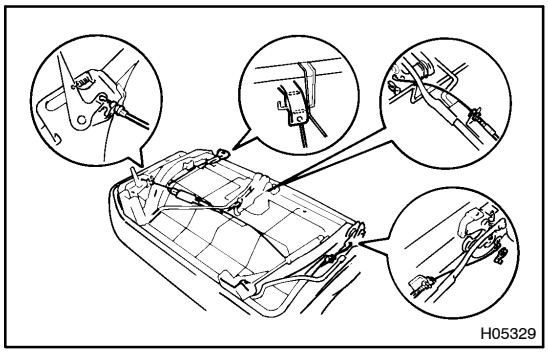
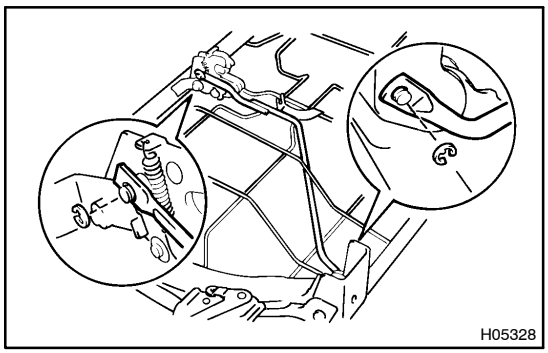


7. REMOVE NO.1 FOLD SEAT LOCK CONTROL CABLE

Remove the 2 clamps and No.1 fold seat lock control cable as shown in the illustration.

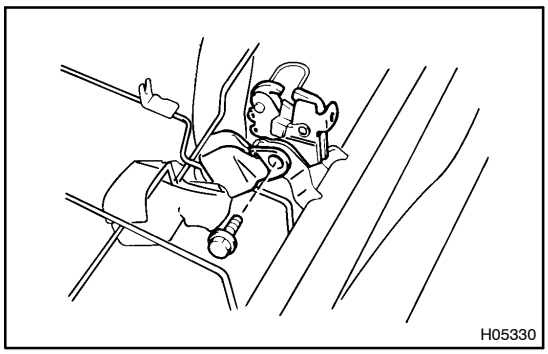


8. REMOVE RH NO.1 SEAT LEG STAY

Using a screwdriver, remove the 2 E–rings and No.1 seat leg stay.

HINT:

Tape the screwdriver tip before use.

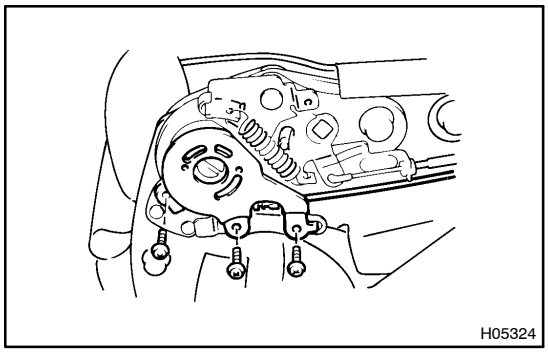


9. REMOVE RH REAR SEAT LOCK

(a) Remove the screw and rear seat lock cover.

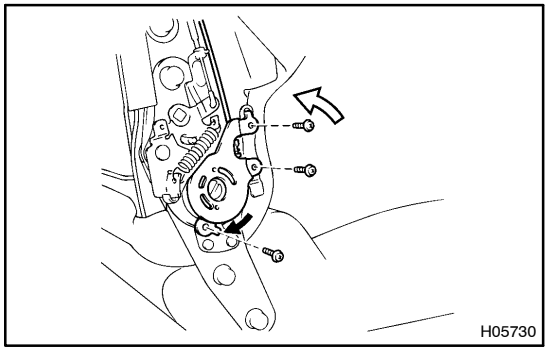
(b) Remove the bolt, seat belt anchor and inner belt.
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

(c) Remove the RH rear seat lock.



10. REMOVE SEATBACK ASSEMBLY

(a) Remove the 3 screws and seat belt reclining detecting part.
Torque: 3.9 N·m (40 kgf·cm, 35 in.·lbf)



HINT:

- At the time of assembly, please refer to the following items.
- Tighten the 2 screws on the seatback side.
- Fold down the seatback forward and raise it up to the first lock position.
- Push the installation part of seat belt reclining detecting part on the cushion side to the rear side of the seat cushion for initial positioning.
- Check visually that the reference holes are penetrated.

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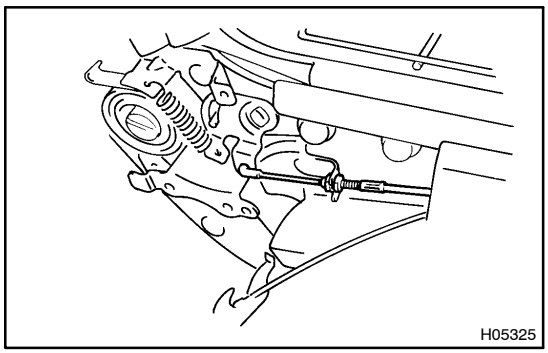
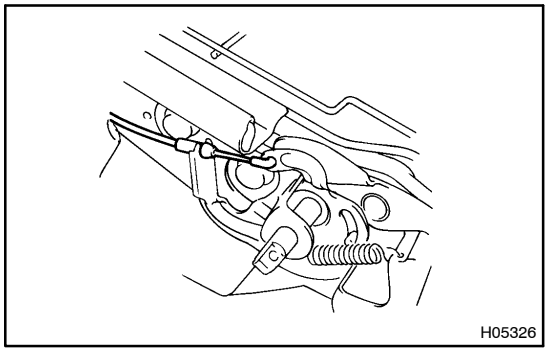
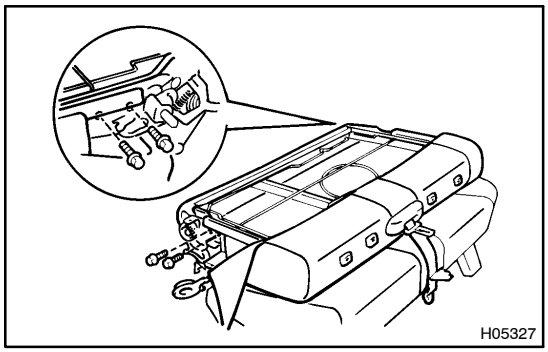
- Tighten the screws on the cushion side of seat belt reclining detecting part.



(b) Loosen the nut, remove the reclining connecting wire of LH side edge.



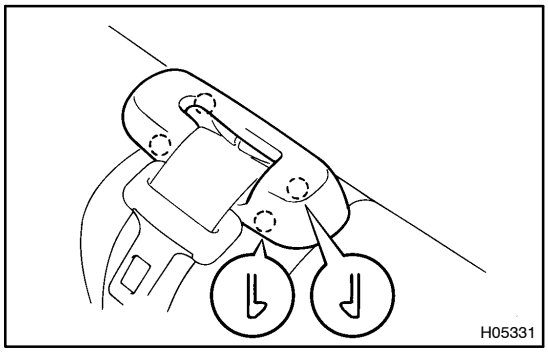
(c) Remove the reclining connecting wire of RH side edge.



(d) Remove the 4 bolts and seatback assembly.
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

11. w/ Armrest:
REMOVE ARMREST

(a) Remove the 2 nuts and armrest.
(b) Remove the 2 screws and 2 hinge covers.
(c) Remove the 2 bolts and hinges.



12. REMOVE SEATBACK FRAME

(a) Using a screwdriver, remove the rear seat shoulder belt cover.

HINT:
Tape the screwdriver tip before use.

(b) Remove the 4 headrest supports
(c) Disengage the hooks, remove the seatback frame.

13. REMOVE SEAT ADJUSTER CONTROL CABLE

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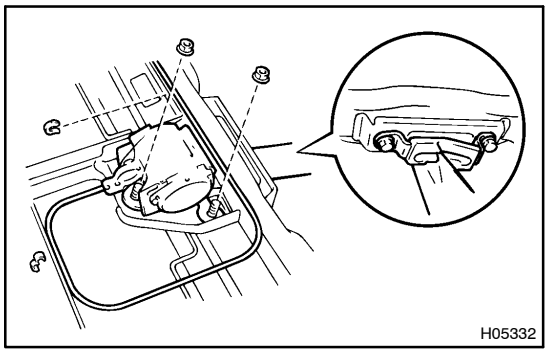


14. REMOVE REAR SEAT OUTER BELT

(a) Remove the 2 bolts and rear seat shoulder belt guide.
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

HINT:

- At the time of assembly, please refer to the following item.
- Install the shoulder belt guide to the seatback frame with a slit in the guide facing to the rear side of the vehicle.

(b) Remove the 2 nuts and rear seat outer belt.
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

15. REMOVE NO.1 PROTECTOR

16. REMOVE SEATBACK COVER

Remove the hog rings and seatback cover.

17. REMOVE SEAT CUSHION FRAME

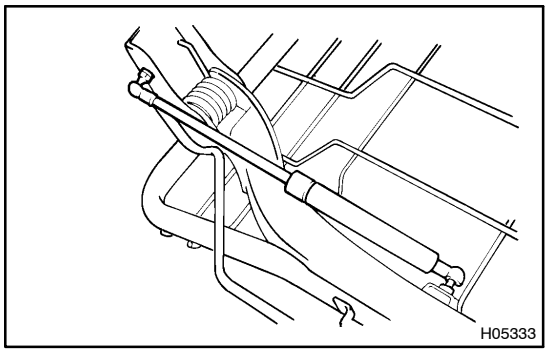
Remove the hog rings and seat cushion frame.

18. REMOVE REAR NO.1 SEAT ADJUSTER

(a) Remove the 2 bolts and rear No.1 seat outer adjuster.
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

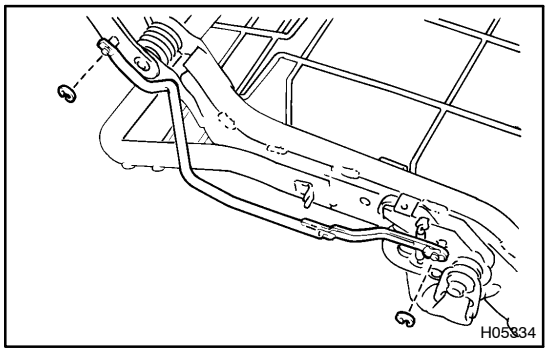
(b) Remove the 2 bolts and rear No.1 seat inner adjuster.
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

(c) Remove the 2 hinge covers form the outer and inner adjuster.



19. REMOVE REAR SEAT STAY

Remove the 2 bolts and rear seat stay.



20. REMOVE LH NO.1 SEAT LEG STAY

Using a screwdriver, remove the 2 E–rings and LH No.1 seat leg stay.

21. REMOVE REAR SEAT CUSHION HINGE

(a) Using a screwdriver, remove the 2 E–rings.

(b) Remove the 2 hinge pins, 2 cushion spacers, 2 cushion support springs and 2 rear seat cushion hinges.

22. REMOVE LH REAR SEAT LOCK

Unfasten the bolt, then remove the inner belt and LH rear seat lock.

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BO1L3–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–114).

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BO1L4–01

INSTALLATION

Installation is in the reverse ordre of removal (See page BO–113).

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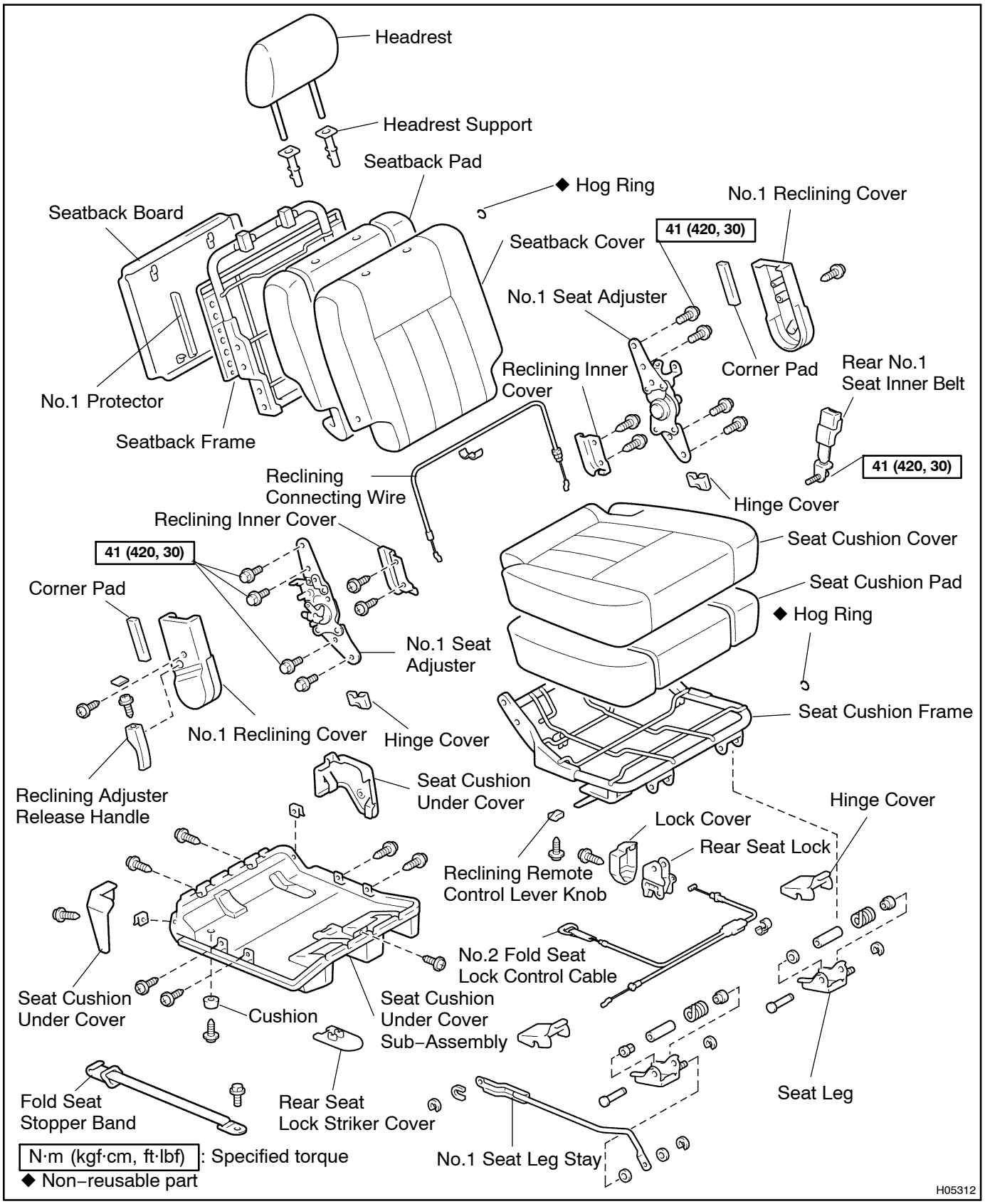
REAR NO.1 SEAT (RH)

COMPONENTS

BO1L5–01



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BO1L6–01

REMOVAL

REMOVE REAR NO.1 SEAT

(a) Fold the seatback down.

(b) Unlock the seat lock, and swing the whole seat up and forward.

(c) Using a screwdriver, remove the seat leg covers.

HINT:

Tape the screwdriver tip before use.

(d) Remove the 4 bolts and rear No.1 seat.

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

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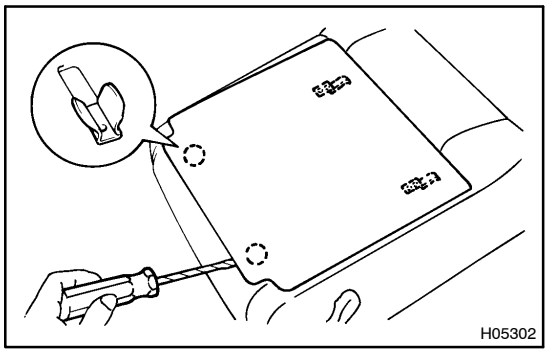
BO1L7–01


H05302

DISASSEMBLY

1. REMOVE HEADREST

2. REMOVE SEATBACK BOARD

Using a screwdriver, remove the seatback board as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

3. REMOVE RECLINING ADJUSTER RELEASE HANDLE

(a) Using a screwdriver, remove the cover.

HINT:

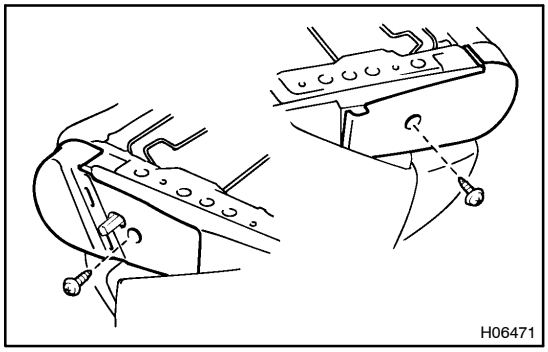
Tape the screwdriver tip before use.

(b) Remove the screw and reclining adjuster release handle.

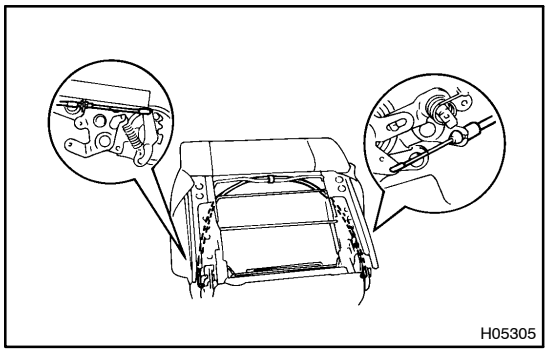
4. REMOVE NO.1 RECLINING COVER

(a) Remove the 4 hog rings and open the seatback cover.

(b) Remove the 2 corner pads.


H06471

(c) Remove the 2 screws and 2 No.1 reclining covers as shown in the illustration.

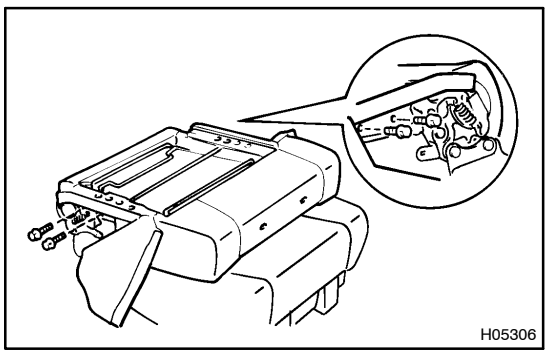

H05305

5. REMOVE RECLINING CONNECTING WIRE

(a) Loosen the nuts, then remove the reclining connecting wire of RH side edge.

(b) Remove the reclining connecting wire of LH side edge.

(c) Remove the clamp and reclining connecting wire.


H05306

6. REMOVE SEATBACK ASSEMBLY

Remove the 4 bolts and seatback assembly.

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

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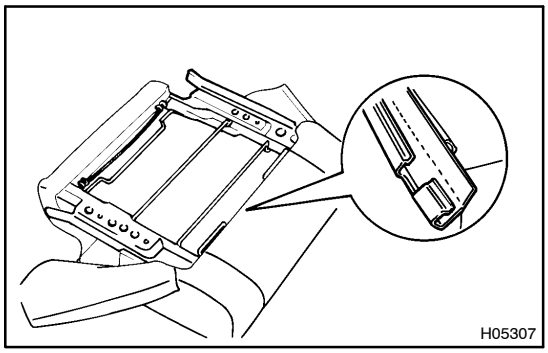


7. REMOVE SEATBACK FRAME

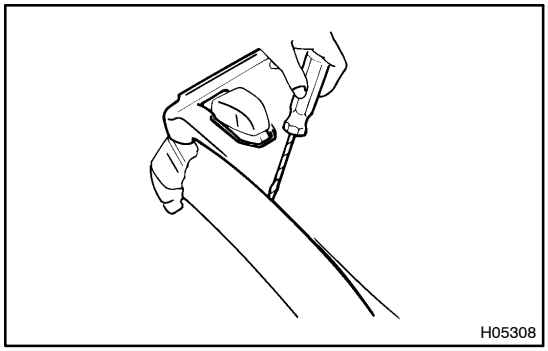
(a) Remove the 4 screws and reclining inner cover.
(b) Remove the 2 hog rings.
(c) Disengage the hook, then remove the headrest supports.
(d) Remove the seatback frame.
(e) Remove the 2 No.1 protectors from the seatback frame.

8. REMOVE SEATBACK COVER

Remove the hog rings and seatback cover.

9. REMOVE SEAT CUSHION UNDER COVER

Remove the 2 screws and 2 seat cushion under covers.



10. REMOVE SEAT CUSHION COVER WITH PAD

(a) Using a screwdriver, disengage the hooks as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

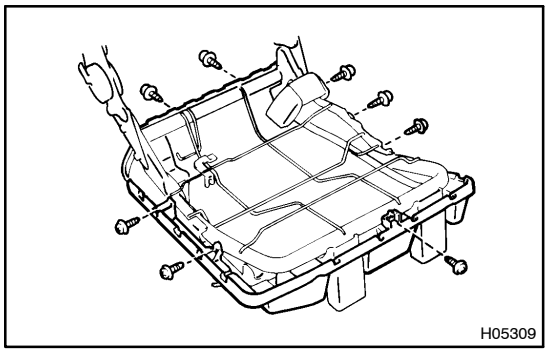
(b) Remove the seat cushion cover with pad.

11. REMOVE SEAT CUSHION COVER

Remove the hog rings and seatback cover.

12. REMOVE THESE PARTS:

(a) Cushion
(b) Lock cover
(c) Reclining remote control lever knob
(d) Fold seat stopper band.
(e) Rear seat cushion under covers



13. REMOVE REAR SEAT CUSHION UNDER COVER SUB–ASSEMBLY

Remove the 8 screws and rear seat cushion under cover.

14. REMOVE REAR NO.1 SEAT ADJUSTER

(a) Remove the 2 bolts and rear No.1 seat outer adjuster.
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)
(b) Remove the 2 bolts and rear No.1 seat inner adjuster.
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)
(c) Remove the 2 hinge covers from the outer and inner adjusters.

15. REMOVE REAR NO.1 SEAT INNER BELT

Unfasten the bolt, then remove the rear No.1 seat inner belt.
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

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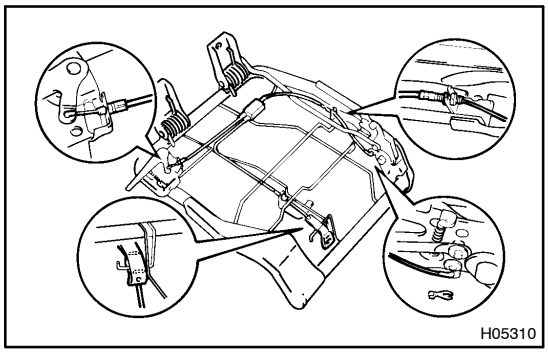
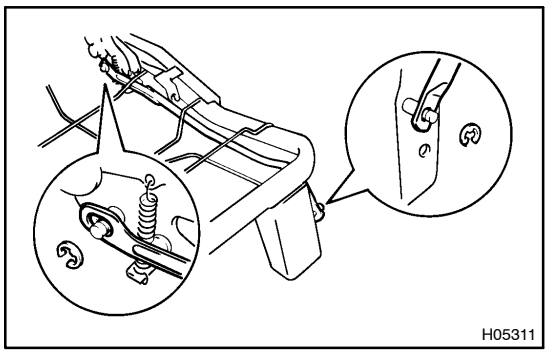


16. REMOVE NO.2 FOLD SEAT LOCK CONTROL CABLE

Remove the clamp and No.2 fold seat lock control cable as shown in the illustration.



17. REMOVE NO.1 SEAT LEG STAY

(a) Using a screwdriver, remove the 2 E–rings.

(b) Remove the No.1 seat leg stay.

18. REMOVE REAR SEAT CUSHION HINGE

(a) Using a screwdriver, remove the 2 E–rings.

(b) Remove the 2 hinge pins, 2 cushion spacers, 2 cushion support springs and 2 rear seat cushion hinges.

19. REMOVE REAR SEAT LOCK

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BO1L8–01

REASSEMBLY

Reassembly is in the reverse order of disassrmbly (See page BO–122).

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BO1L9–01

INSTALLATION

Installation is in the reverse order of removal (See page BO–121).

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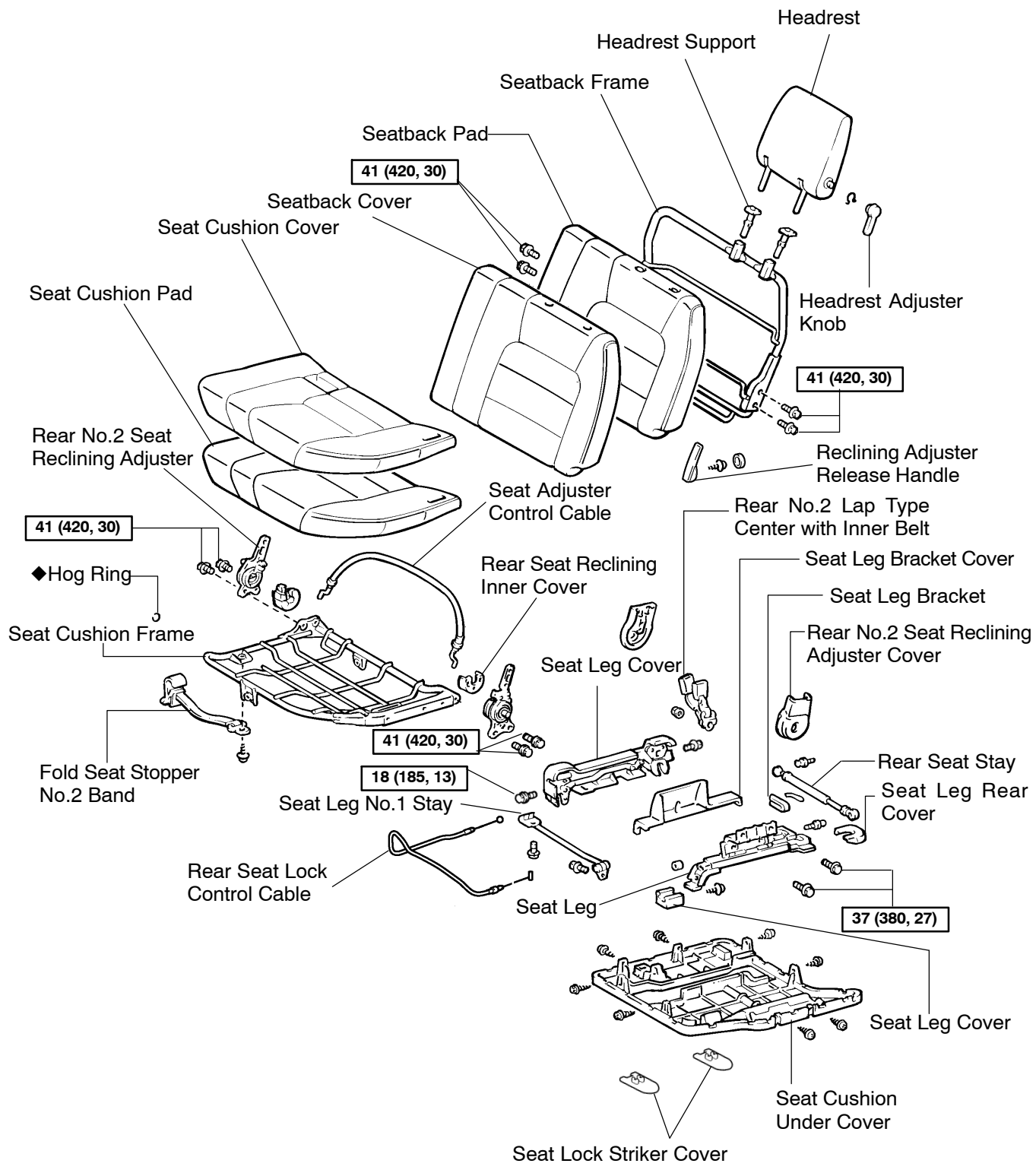
REAR NO.2 SEAT

COMPONENTS

BO1LG–01



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

◆Non–reusable part

H05738

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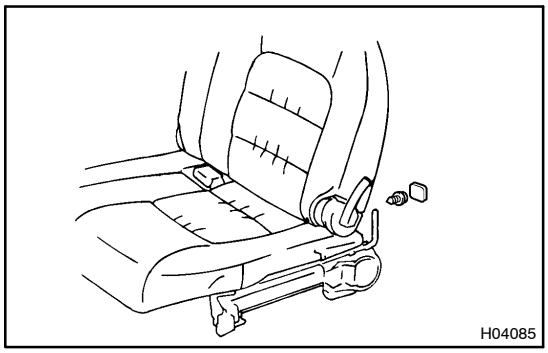
BO1LH–01

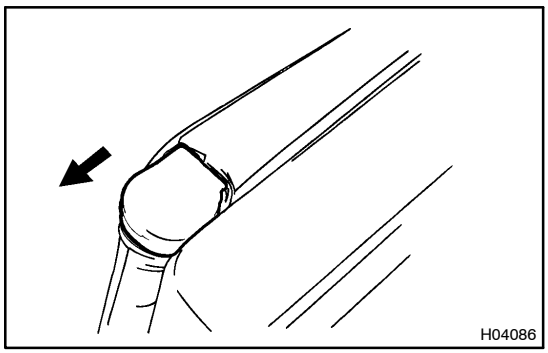
DISASSEMBLY



1. REMOVE RECLINING ADJUSTER RELEASE HANDLE

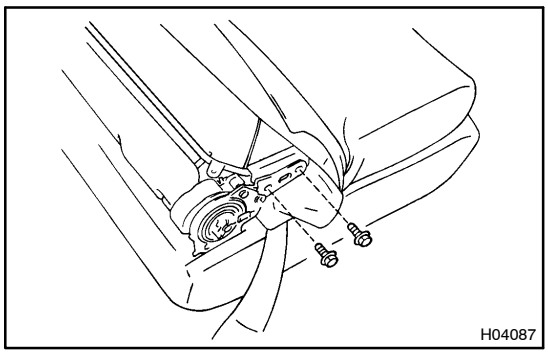
(a) Using a screwdriver, remove the cover.

(b) Remove the screw and reclining adjuster release handle.



2. REMOVE REAR NO.2 SEAT RECLINING ADJUSTER COVERS

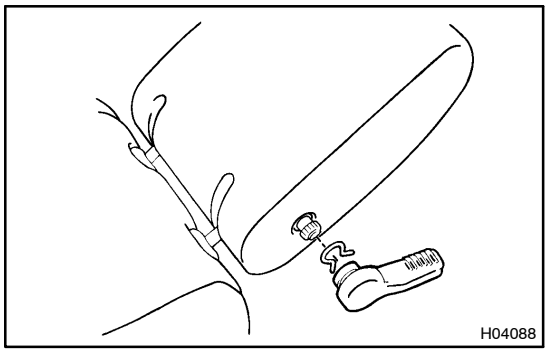
Remove the No.2 rear seat reclining covers.



3. REMOVE SEATBACK ASSEMBLY

(a) disengage the hook.

(b) Remove the 4 bolts and seatback assembly.
Torque: 41 N·m(420 kgf·cm, 30 ft·lbf)



4. REMOVE HEADREST

(a) Remove the headrest adjuster knob.

(b) Remove the headrest.

5. REMOVE SEATBACK COVER

(a) Remove the headrest supports.

(b) Remove the seatback cover with pad from the seatback frame.

(c) Remove the seatback cover from the seatback pad.

6. REMOVE THESE PARTS:

(a) Rear No.2 lap type center with inner belt

(b) Rear seat lock control cable

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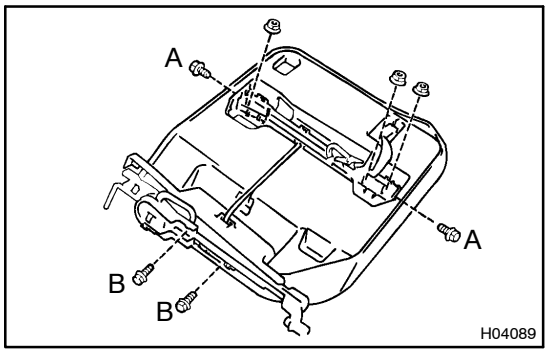


7. REMOVE ADJUSTER

(a) Remove the 3 nuts.

(b) Remove the 4 bolts.

Torque:
A bolt: 18 N·m (185 kgf·cm, 13 ft·lbf)
B bolt: 37 N·m (380 kgf·cm, 27 ft·lbf)

(c) Remove the adjuster.

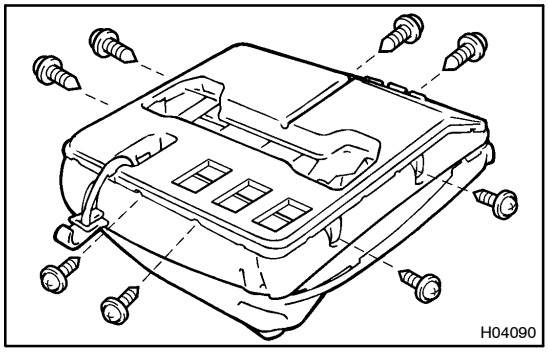
(d) Remove the 2 screws and seat leg No.1 stay.

8. REMOVE THESE PARTS:

(a) Seat leg bracket

(b) Seat leg rear cover

(c) Seat leg cover



9. REMOVE SEAT CUSHION UNDER COVER

(a) Using a screwdriver, disengage the hooks.

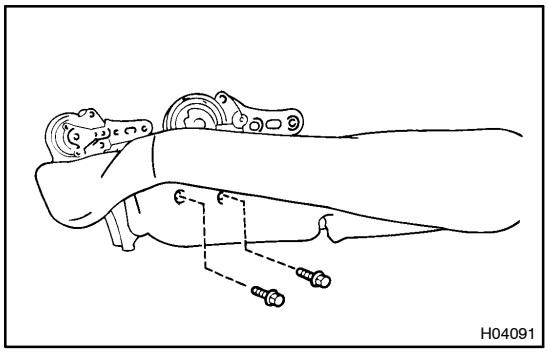
(b) Remove the 8 screws.

(c) Remove the seat cushion under cover.

10. REMOVE THESE PARTS:

(a) Seat adjuster control cable

(b) Rear seat reclining inner covers



11. REMOVE REAR NO.2 SEAT RECLINING ADJUSTERS

(a) Remove the 4 bolts.

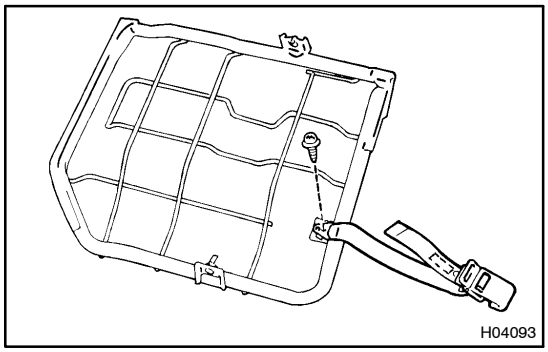
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

(b) Remove the rear No.2 seat reclining adjusters.

12. REMOVE SEAT CUSHION COVER

(a) Remove hog rings and seat cushion frame.

(b) Remove the seat cushion cover from the seat cushion pad.



13. REMOVE HOLD SEAT STOPPER NO.2 BAND

(a) Remove the screw.

(b) Remove the hold seat stopper No.2 band.

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BO1LP–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–128).

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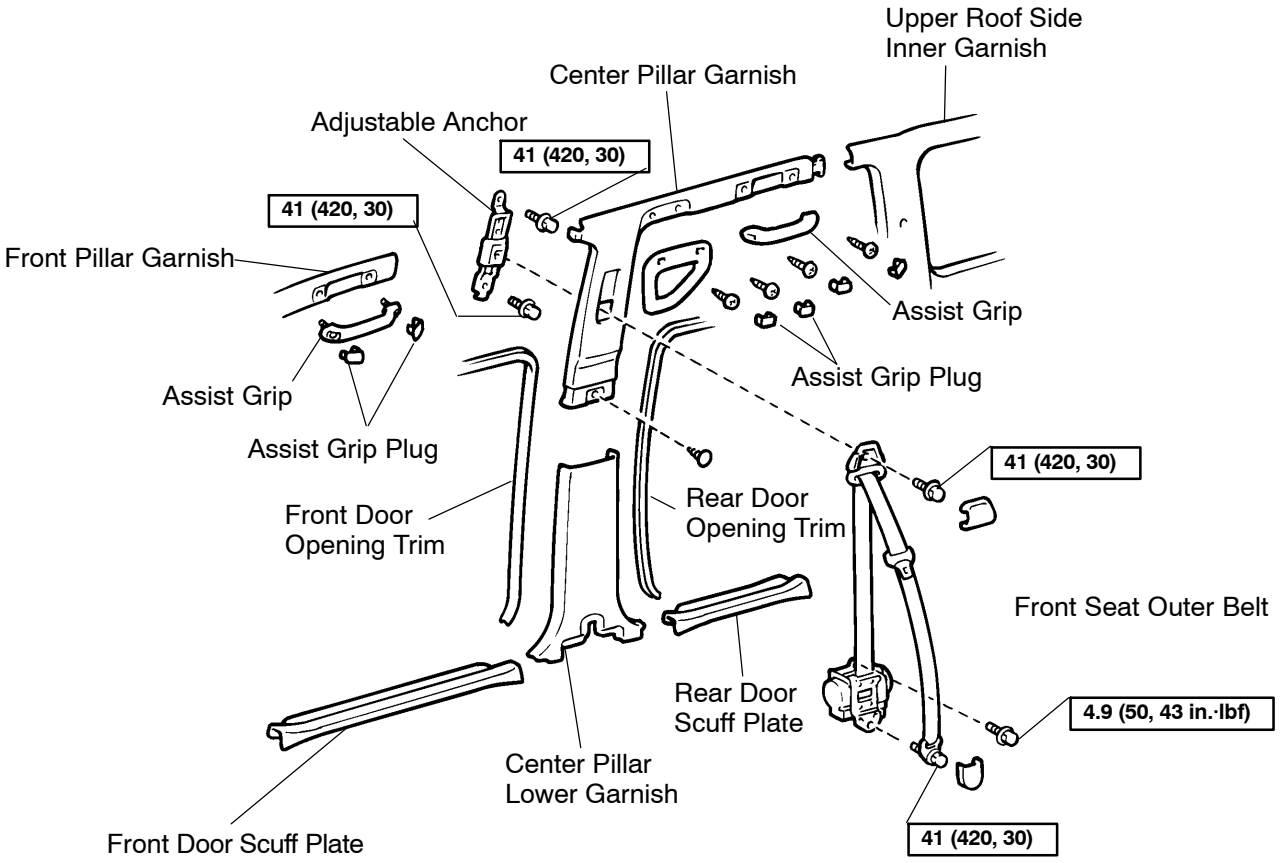
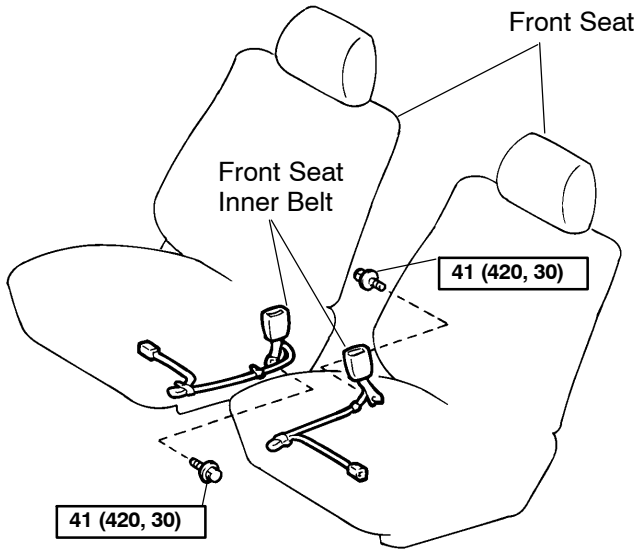
SEAT BELT

COMPONENTS

BO1KY–01





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

H05476

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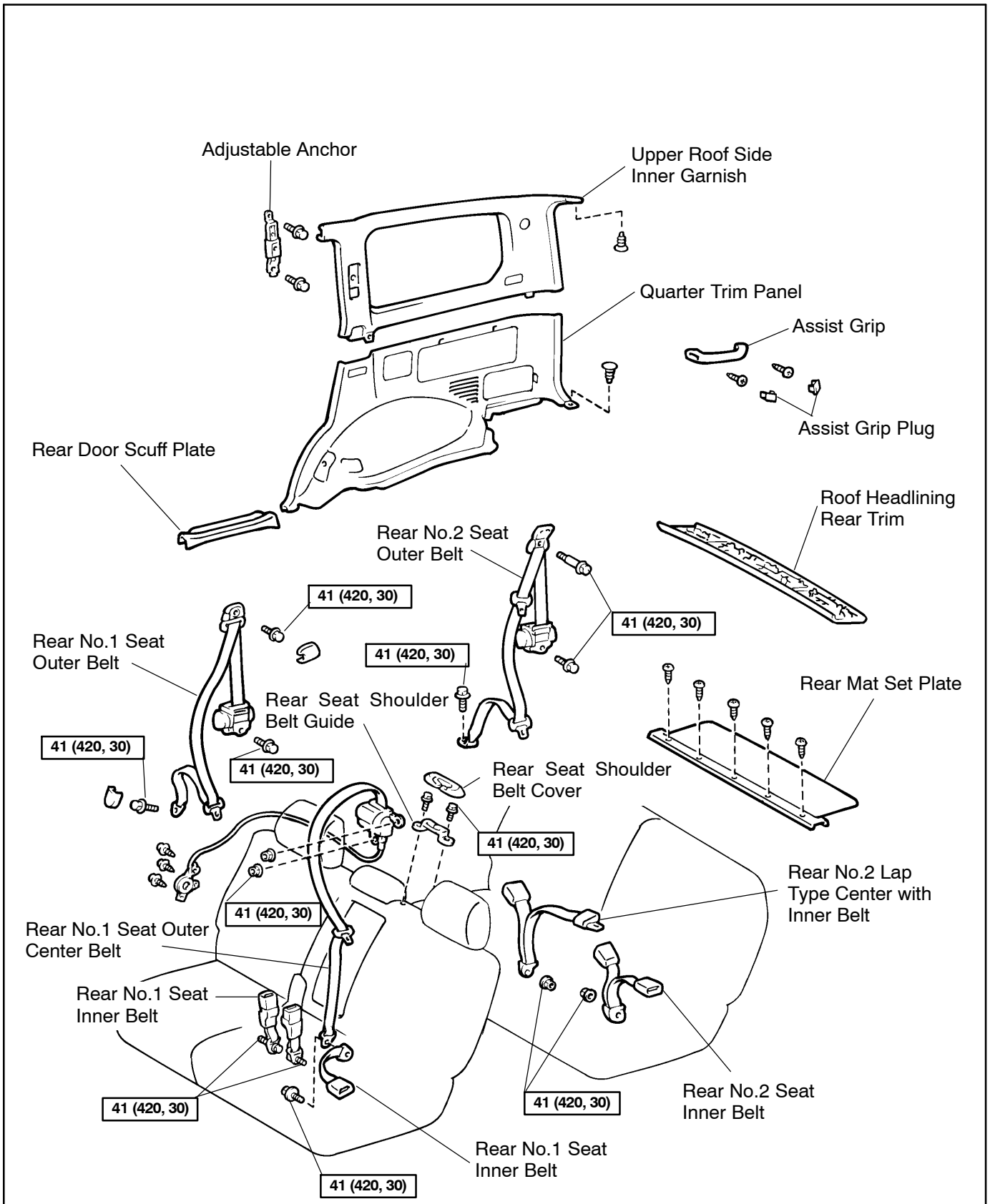

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BO1KZ–01

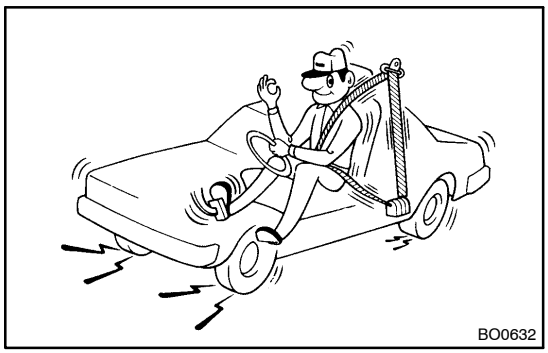
INSPECTION

CAUTION:

Replace the seat belt assembly (outer belt, inner belt, bolts, nuts or sill–bar) if it has been used in a severe impact. The entire assembly should be replaced even if damage is not obvious.

1. Except Manual Type:
RUNNING TEST (IN SAFE AREA)

(a) Fasten the front seat belts.


BO0632

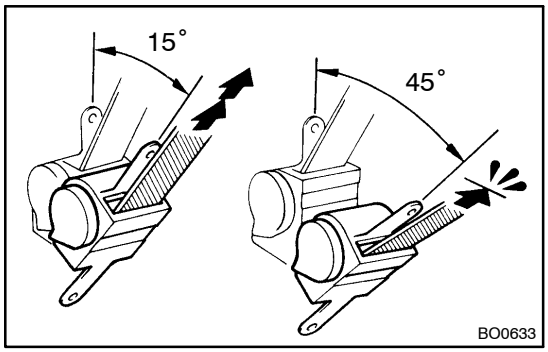
(b) Drive the car at 10 mph (16 km/h) and slam on the brakes. Check that the belt locks and cannot be extended at this time.

HINT:

Conduct this test in a safe area. If the belt does not lock, remove the belt mechanism assembly and conduct the following static check. Also, whenever installing a new belt assembly, verify the proper operation before installation.

2. Driver's Seat Belt (ELR):
STATIC TEST

(a) Make sure that the belt locks when pulled out quickly.
(b) Remove the locking retractor assembly.
(c) Tilt the retractor slowly.



BO0633

(d) Make sure that the belt can be pulled out at a tilt of 15 degrees or less, and cannot be pulled out over 45 degrees of tilt.

If a problem is found, replace the assembly.

3. Except Driver's Seat Belt (ELR/ALR):
STATIC TEST

(a) Make sure that the belt locks when pulled out quickly.
(b) Pull out the whole belt and measure the length of the whole belt.
Then retract the belt slightly and pull it out again
(c) Make sure that the belt cannot be extended further.

If a problem is found, replace the assembly.

(d) Remove the locking retractor assembly.

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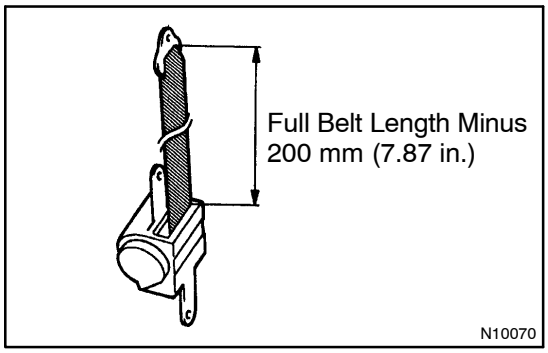
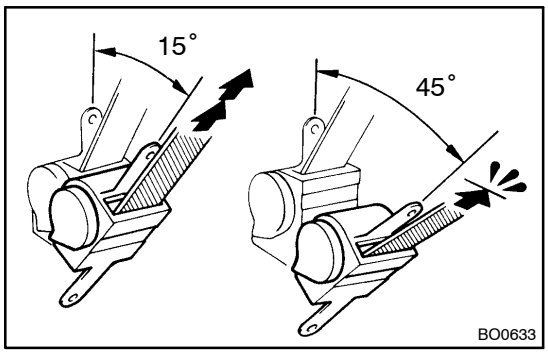
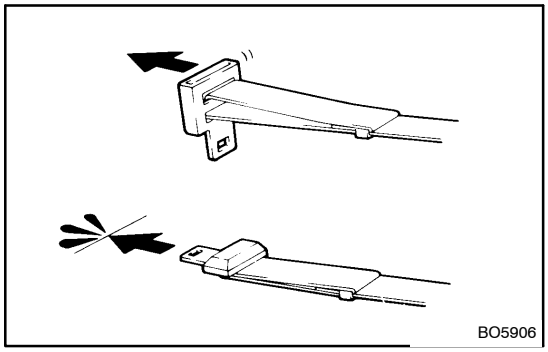


(e) Retract the whole belt, then pull out the belt until 200 mm (7.87 in.)of belt remains retracted.
(f) Tilt the retractor slowly.



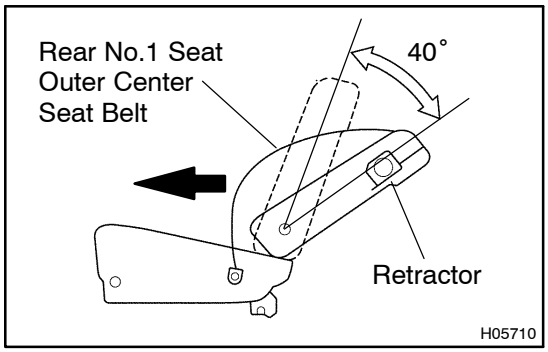
(g) Make sure that the belt can be pulled out at a tilt of 15 degrees or less, and cannot be pulled out at over 45 degrees of tilt.

If a problem is found, replace the assembly.



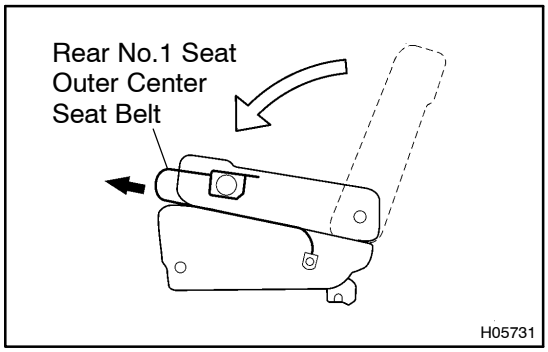
4. Manual Type:
TESTING

(a) Adjust the belt to the proper length.
(b) Apply a firm load to the belt.
(c) Make sure that the belt does not extend.



5. INSPECT REAR NO.1 SEAT CENTER BELT

(a) After retracting 300 mm (11.81 in.) of the seat belt, check that the belt is locked when suddenly extracted.
(b) Check that the belt can be extracted 300 mm (11.81 in.) without being locked when the seat is reclined as shown in the illustration.
(c) Check that the belt is locked when the belt is extracted by a certain amount under (a) condition.



(d) When folding down the seat beck forward and extracting the seat belt slowly, check that the belt is locked after a certain length (approx. 500 mm (19.69 in.)) of the belt has been extracted.

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SEAT BELT PRETENSIONER

BO1LJ–01

REMOVAL

NOTICE:

- **If the wiring connector of the seat belt pretensioner is disconnected with the ignition switch at ON or ACC, diagnostic trouble codes will be recorded.**
- **Never use seat belt pretensioner from another vehicle. When replacing seat belt pretensioner, replace it with new.**

1. REMOVE THESE PARTS:

(a) Front door scuff plate
(b) Front door opening trim
(c) Rear door scuff plate
(d) Rear door opening trim
(e) Center pillar lower garnish

2. REMOVE FRONT SEAT OUTER BELT

CAUTION:

Never disassemble the front seat outer belt.

NOTICE:

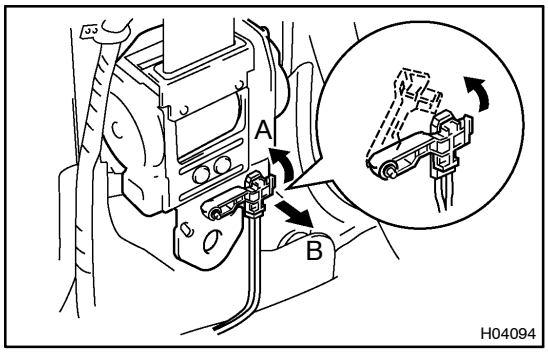
When removing the front outer seat belt, take care not to pull the seat belt pretensioner wire harness.

(a) Using a screwdriver, remove the anchor caps.

HINT:

Tape the screwdriver tip before use.

(b) Remove the bolt and shoulder anchor.



(c) Disconnect the pretensioner connector in the order A and B as shown in the illustration.
(d) Remove the 2 bolts and front seat outer belt.

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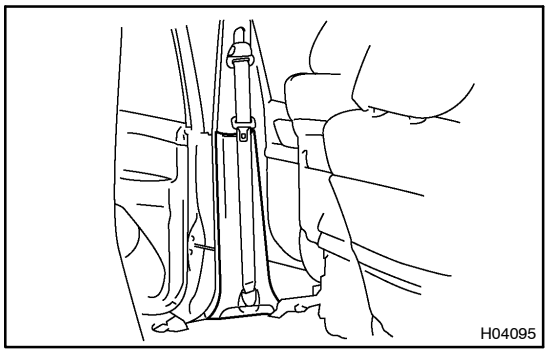
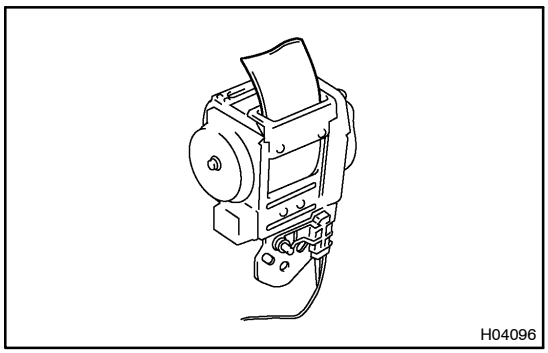
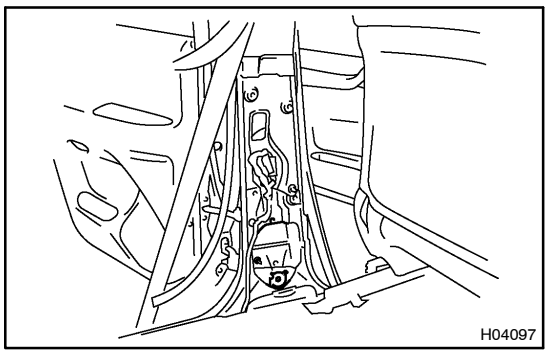
BO1LK–01


H04095


H04096


H04097

INSPECTION

1. PRETENSIONER IS NOT ACTIVATED

(a) Perform a diagnostic system check.
(See page DI–342)

(b) Perform a visual check which includes the following items with the front seat outer belt removed from the vehicle.
- Check for cuts and cracks in, or marked discoloration of the center pillar lower garnish.
- Check for cuts and cracks in wire harness, and for chipping in connectors.
- Check for deformation of the center pillar.

CAUTION:
For removal and installation of the front seat outer belt, see page BO–135 and BO–143.
Be sure to follow the correct procedure.

2. PRETENSIONER IS ACTIVATED

(a) Perform a diagnostic system check.
(See page DI–342)

(b) Perform a visual check which includes the following items with the front seat outer belt removed from the vehicle.
- Check for deformation of the center pillar.
- Check for damage on the connector and wire harness.

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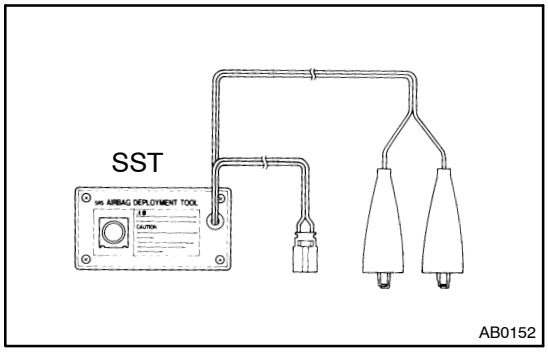
BO1LL–01

DISPOSAL

HINT:

When scrapping vehicle equipped with an SRS or disposing of a front seat outer belt (with seat belt pretensioner), always first deploy the airbag in accordance with the procedure given in RS section or activate the seat belt pretensioner. If any abnormality occurs with the airbag deployment or seat belt pretensioner activation, contact the SERVICE DEPT. of TOYOTA MOTORS SALES, U.S.A., INC.. When disposing of a front seat outer belt (with seat belt pretensioner) activated in a collision, follow the same procedure given in step 1–(d) in "DISPOSAL".



CAUTION:

- **Never dispose of front seat outer belt which has inactivated pretensioner.**
- **The seat belt pretensioner produces a sizeable exploding sound when it activates, so perform the operation out–of–door and where it will not create a nuisance to nearby residents.**
- **When activating the seat belt pretensioner, always use the specified SST. (SRS Airbag Deployment Tool) Perform the operation in a place away from electrical noise.**

  SST 09082–00700, 09082–00740
- **When activating a front seat outer belt (with seat belt pretensioner), perform the operation at least 10 m (33 ft) away from the front seat outer belt.**
- **Use gloves and safety glasses when handling a front seat outer belt with activated pretensioner.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front seat outer belt with activated pretensioner.**

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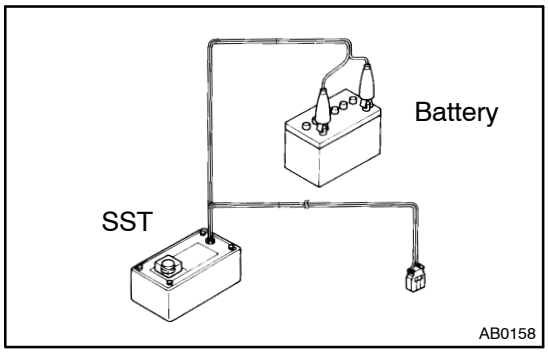
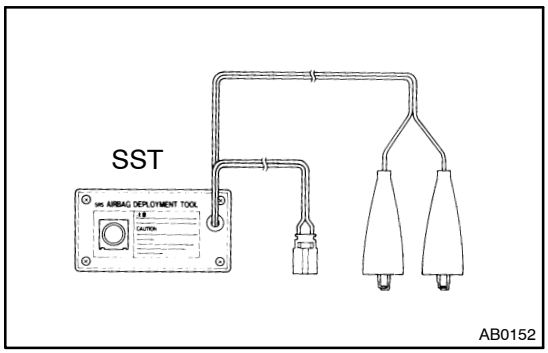


1. SEAT BELT PRETENSIONER ACTIVATION WHEN SCRAPPING VEHICLE

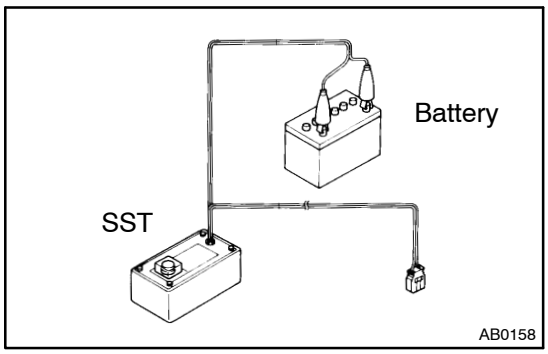
HINT:
Have a battery ready as the power source to activate the seat belt pretensioner.



(a) Check functioning of SST

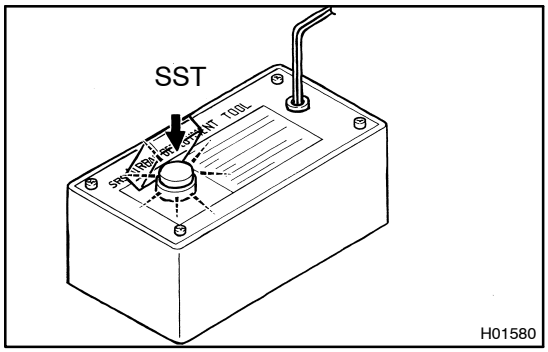
CAUTION:
When activating the seat belt pretensioner, always use the specified SST: SRS Airbag Deployment Tool.

SST 09082–00700, 09082–00740



(1) Connect the SST to battery.
Connect the red clip of the SST to the battery positive (+) terminal and the black clip to the battery negative (–) terminal.

HINT:
Do not connect the yellow connector which will be connected with the seat belt pretensioner.



(2) Check functioning of SST
Press the SST activation switch, and check the LED of the SST activation switch lights up.

CAUTION:
If the LED lights up when the activation switch is not being pressed, SST malfunction is probable, so definitely do not use the SST.

(b) Install the SST.
(1) Remove the front door scuff plate.
(2) Remove the front door opening trim.
(3) Remove the rear door scuff plate.
(4) Remove the rear door opening trim.
(5) Remove the center pillar lower garnish.

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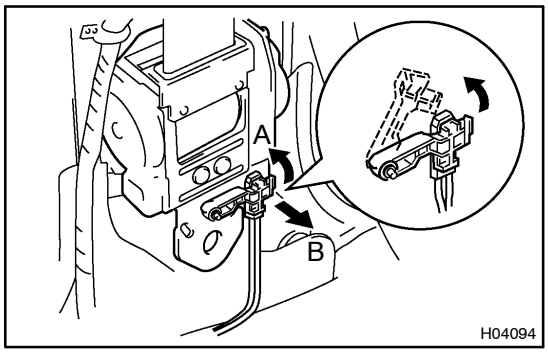
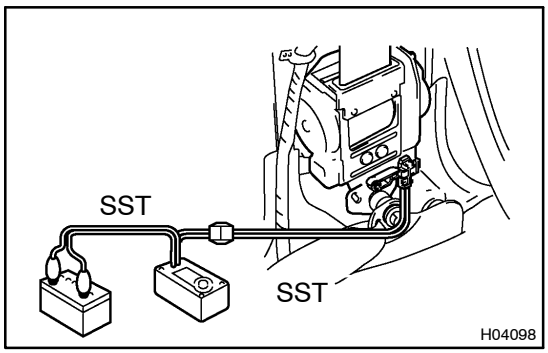


(6) Disconnect the pretensioner connector in the order A and B as shown in the illustration.

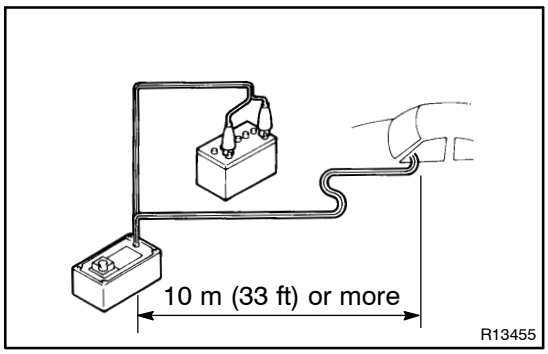


(7) Connect the 2 SST each other, then connect them to the seat belt pretensioner.

SST 09082–00700, 09082–00740

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock secondary lock of the twin lock.



(8) Move the SST to at least 10 m (33 ft) away from the front of the vehicle.

(9) Close all the doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(10) Connect the SST red clip to the battery positive (–) terminal and the black clip to the negative (+) terminal.

(c) Activate seat belt pretensioner.

(1) Confirm that no one is inside the vehicle or within 10 m (33 ft) area around the vehicle.

(2) Press the SST activation switch and activate the seat belt pretensioner.

HINT:

The seat belt pretensioner operates simultaneously as the LED of the SST activation switch lights up.

(d) Dispose of the front seat outer belt (with seat belt pretensioner).

CAUTION:

- **The front seat outer belt is very hot when the seat belt pretensioner is activated, so leave it alone for at least 30 minutes after activation.**
- **Use gloves and safety glasses when handling a front seat outer belt with activated seat belt pretensioner.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front seat outer belt with activated seat belt pretensioner.**

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When scrapping a vehicle, activate the seat belt pretensioner and scrap the vehicle with activated front seat outer belt still installed.

2. ACTIVATION WHEN DISPOSING OF FRONT SEAT OUTER BELT ONLY

NOTICE:

- **When disposing of the front seat outer belt (with seat belt pretensioner) only, never use the customer's vehicle to activate the seat belt pretensioner.**
- **Be sure to follow the procedure given below when activating the seat belt pretensioner.**

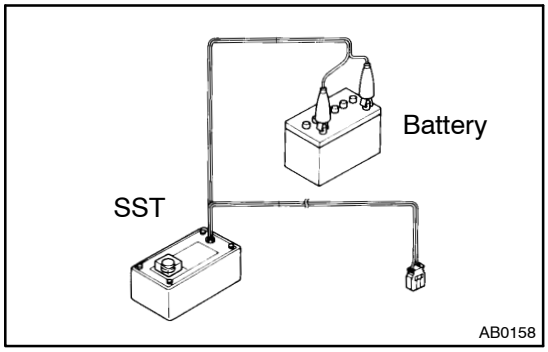
HINT:

Have a battery ready as the power source to activate the seat belt pretensioner.

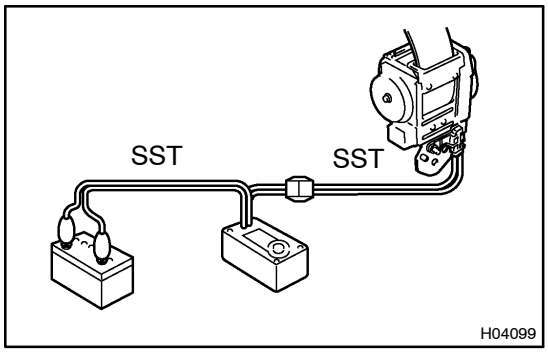
(a) Remove the front seat outer belt.
(See page BO–131)

HINT:

Cut the belt near the seat belt retractor.



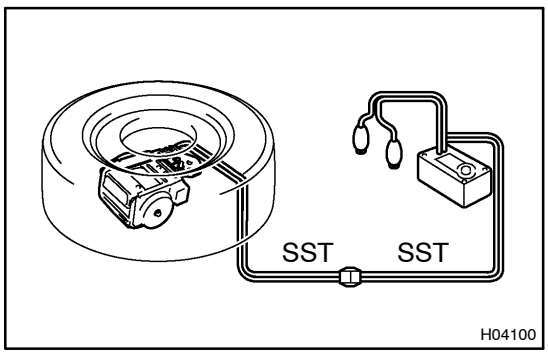
(b) Check functioning of SST.
(See step 1–(a))
SST 09082–00700, 09082–00740



(c) Install the SST.
(1) Connect the 2 SST each other, then connect them to the seat belt pretensioner.
SST 09082–00700, 09082–00740

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



(2) Place the front seat outer belt on the ground and cover it with the disc wheel with tire.

NOTICE:

Place the front seat outer belt as shown in the illustration.

(3) Move the SST to at least 10 m (33 ft) away from the disc wheel.

NOTICE:

Take care not to damage the SST wire harness.

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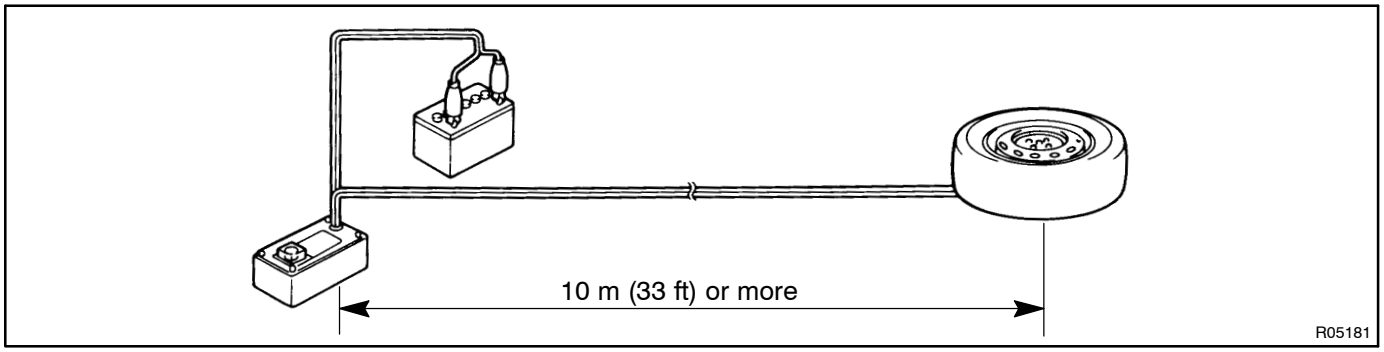
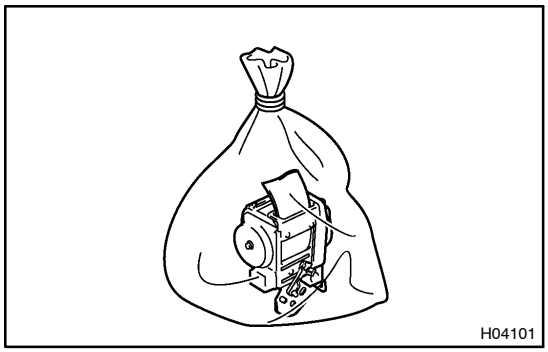
(d) Activate the seat belt pretensioner.
  (1) Connect the SST red clip to the battery positive (+) terminal and black clip to the battery negative (–) terminal.
  (2) Check that no one is within 10 m (33 ft) area around the disc wheel.
  (3) Press the SST activation switch and activate the seat belt pretensioner.

HINT:
The seat belt pretensioner operates simultaneously as the LED of the SST activation switch lights up.





(e) Dispose of the front seat outer belt (with seat belt pretensioner).

CAUTION:
- **The front seat outer belt is very hot when the seat belt pretensioner is activated, so leave it alone for at least 30 minutes after activation.**
- **Use gloves and safety glasses when handling a front seat outer belt with activated seat belt pretensioner.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front seat outer belt with activated seat belt pretensioner.**
  (1) Remove the disc wheel and SST.
  (2) Place the front seat outer belt in a vinyl bag, tie the end tightly and dispose of it in the same way as other general parts disposal.

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BO1LM–01

REPLACEMENT

REPLACE REQUIREMENTS

In the following cases, replace the seat belt pretensioner.

- If the seat belt pretensioner has been activated.
- If the seat belt pretensioner has been found to be faulty in troubleshooting.
- If the front seat outer belt has been found to be faulty during the check in items 1–(b) or 2–(b).
- If the front seat outer belt has been dropped.

CAUTION:

For removal and installation of the seat belt pretensioner, see page BO–135 and BO–143.
Be sure to follow the correct procedure.

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BO1LN–01

INSTALLATION

NOTICE:

Never use seat belt pretensioner from another vehicle. When replacing parts, replace them with new parts.

1. INSTALL FRONT SEAT OUTER BELT

(a) Install the front seat belt parts by following the reverse order of removal and torque the following bolts.

(1) Front seat outer belt retractor

Torque:

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

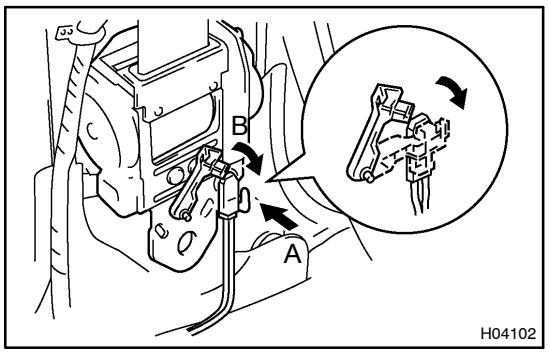
Lower bolt: 41 N·m (420 kgf·cm, 30 ft·lbf)

(2) Seat belt shoulder anchor

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

NOTICE:

- **Make sure that the front seat outer belt is installed to the specified torque.**
- **If the front seat outer belt has been dropped, or there are cracks, dents or other defects in the case or connector, replace the front seat outer belt with a new one.**
- **When installing the front seat outer belt, take care that the wiring does not interfere with other parts and is not pinched between other parts.**



(b) Connect the pretensioner connector in the order A and B as shown in the illustration.

2. INSTALL THESE PARTS:

(a) Anchor caps
(b) Center pillar lower garnish
(c) Rear door scuff plate
(d) Rear door opening trim
(e) Front door scuff plate
(f) Front door opening trim

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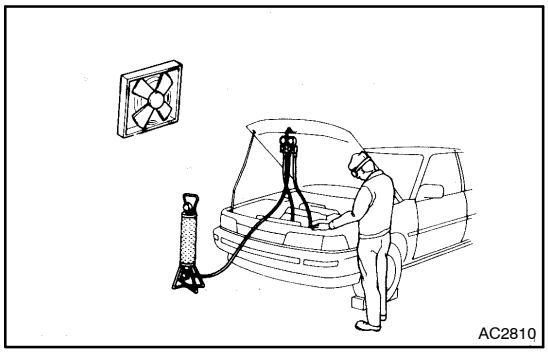


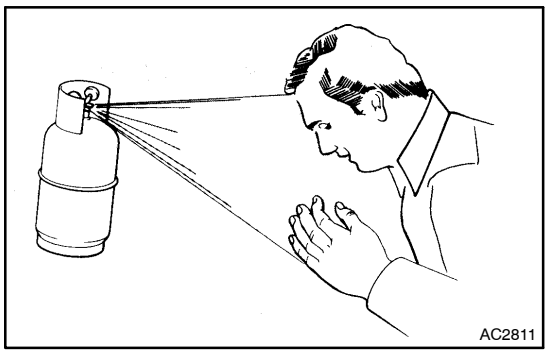
AIR CONDITIONING SYSTEM

AC1HK–01

PRECAUTION

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

2. ALWAYS WEAR EYE PROTECTION



3. BE CAREFUL NOT TO GET LIQUID REFRIGERANT IN YOUR EYES OR ON YOUR SKIN

If liquid refrigerant gets in your eyes or on your skin.

(a) Wash the area with lots of cool water.

CAUTION:

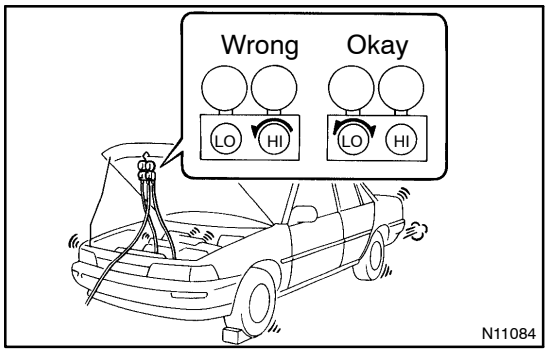
Do not rub your eyes or skin.

(b) Apply clean petroleum jelly to the skin.

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

4. NEVER HEAT CONTAINER OR EXPOSE IT TO NAKED FLAME

5. BE CAREFUL NOT TO DROP CONTAINER AND NOT TO APPLY PHYSICAL SHOCKS TO IT



6. DO NOT OPERATE COMPRESSOR WITHOUT ENOUGH REFRIGERANT IN REFRIGERANT SYSTEM

If there is not enough refrigerant in the refrigerant system oil lubrication will be insufficient and compressor burnout may occur, so take care to avoid this, necessary care should be taken.

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

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

8. BE CAREFUL NOT TO OVERCHARGE SYSTEM WITH REFRIGERANT

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

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9. SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

The LAND CRUISER is equipped with an SRS (Supplemental Restraint System) such as the driver and front passenger air-bag. 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.

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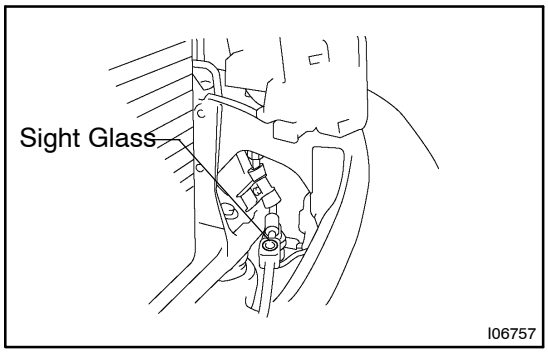
AC1HL–01



ON–VEHICLE INSPECTION

1. INSPECT REFRIGERANT VOLUME

Observe the sight glass on the liquid tube.

Test conditions:

- Running engine at 1,500 rpm
- Blower speed control switch at ”HI” position
- A/C switch ON
- Temperature control dial at ”COOL” position
- Fully open the doors

Item	Symptom	Amount of refrigerant	Remedy
1	Bubbles present in sight glass	Insufficient*	(1) Check for gas leakage with gas leak detector and repair if necessary (2) Add refrigerant until bubbles disappear
2	No bubbles present in sight glass	None, sufficient or too much	Refer item 3 and 4
3	No temperature difference between compressor inlet and outlet	Empty or nearly empty	(1) Check for gas leakage with gas leak detector and repair if necessary (2) Add refrigerant until bubbles disappear
4	Temperature between compressor inlet and outlet is noticeably different	Correct or too much	Refer to items 5 and 6
5	Immediately after air conditioning is turned off, refrigerant in sight glass stays clear	Too much	(1) Discharge refrigerant (2) Evacuate air and charge proper amount of purified refrigerant
6	When air conditioning is turned off, refrigerant foams and then stays clear	Correct	–

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

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2. INSPECT REFRIGERANT PRESSURE WITH MANIFOLD GAUGE SET

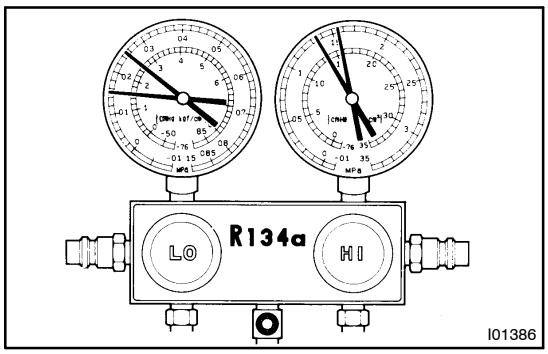
This is a method in which the trouble is located by using a manifold gauge set. Read the manifold gauge pressure when these conditions are established.

Test conditions:

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

HINT:

It should be noted that the gauge indications may vary slightly due to ambient temperature conditions.



(1) Normally functioning refrigeration system.

Gauge reading:

Low pressure side:

0.15 – 0.25 MPa (1.5 – 2.5 kgf/cm^2)

High pressure side:

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

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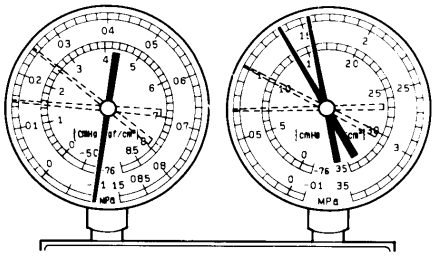
(2) Moisture present in refrigeration system.

Condition: Periodically cools and then fails to cool

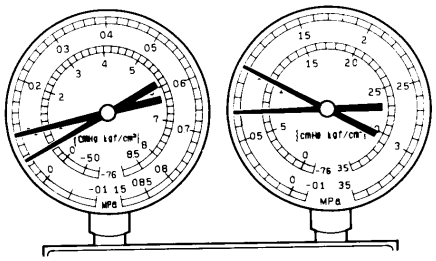


I01387

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

(3) Insufficient cooling

Condition: Insufficient cooling



I01388

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

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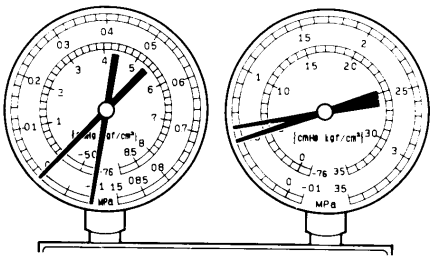
(4) Poor circulation of refrigerant

Condition: Insufficient cooling

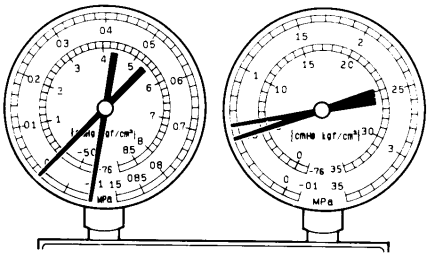


I01389

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

(5) Refrigerant does not circulate

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



I01449

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
• Vacuum indicated on low pressure side, very low pressure indicated on high pressure side • Frost or dew seen on piping before and after condenser/ drier or expansion valve	• Refrigerant flow obstructed by moisture or dirt in refrigeration system • Refrigerant flow obstructed by gas leakage from expansion valve	Refrigerant does not circulate	(1) Check expansion valve (2) Clean out dirt in expansion valve by blowing with air (3) Replace condenser (4) Evacuate air and charge new refrigerant to proper amount (5) For gas leakage from expansion valve, replace expansion valve

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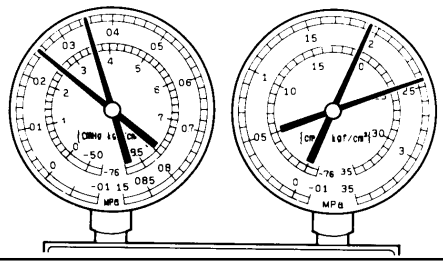
(6) Refrigerant overcharged or insufficient cooling of condenser

Condition: Insufficient cooling

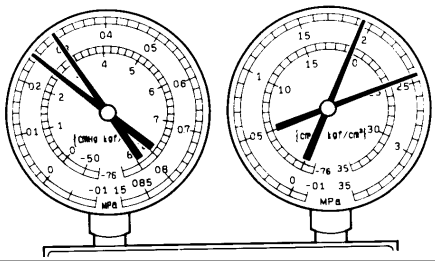


I01390

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

(7) Air present in refrigeration system

Condition: Insufficient cooling



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

I01392

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

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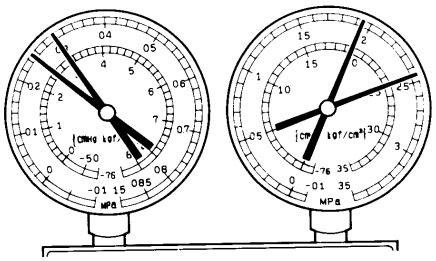
(8) Expansion valve improperly

Condition: Insufficient cooling

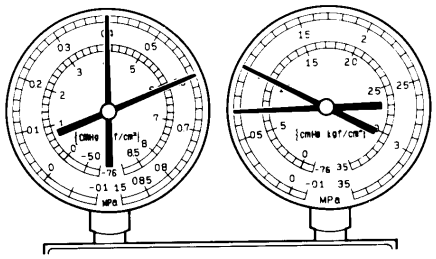


I01450

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

(9) Defective compression compressor

Condition : Does not cool



I01393

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

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3. INSPECT IDLE–UP SPEED

(a) Warm up engine

(b) Inspect idle–up speed when the these conditions are established.

Test conditions:

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

Magnetic clutch condition	Idle–up speed
Magnetic clutch not engaged	750 ± 50 rpm
Magnetic clutch engaged	800 ± 50 rpm

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

4. INSPECT FOR LEAKAGE OF REFRIGERANT

(a) Perform in these conditions.

- Stop engine
- Secure good ventilation (If the gas leak detector may not react volatile gases which are not refrigerant, such as evaporated gasoline and exhaust gas)
- Repeat the test 2 or 3 times
- Make sure that there is some refrigerant remaining in the refrigeration system.
  When compressor is OFF: approx. 392 – 588 kPa (4 – 6 kgf·cm^2, 57 – 85 psi)

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

HINT:

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

If such reaction is unavoidable, the vehicle must be lifted up.

(c) If gas leak is not detected on the drain hose, remove the blower resistor from the cooling unit. Then insert the gas leak detector sensor into the unit and perform the test.

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

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

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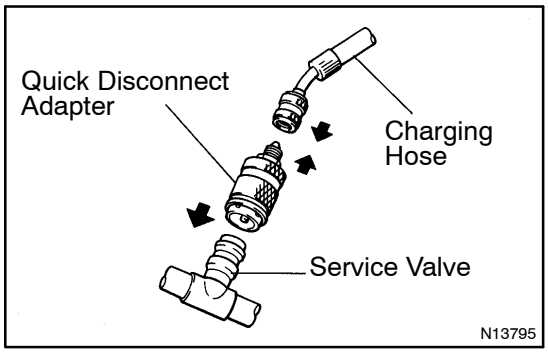
AC1HM–01

EVACUATING



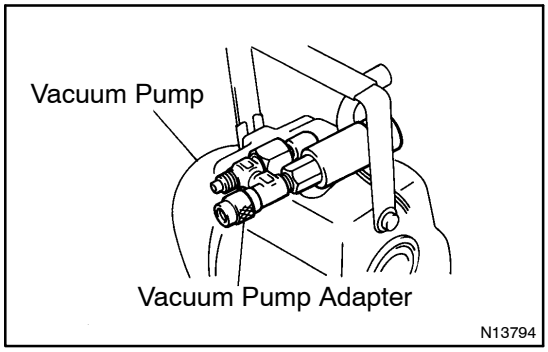
1. CONNECT QUICK DISCONNECT ADAPTER TO CHARGING HOSES

2. REMOVE CAPS FROM SERVICE VALVES ON REFRIGERANT LINES

3. SET ON MANIFOLD GAUGE SET

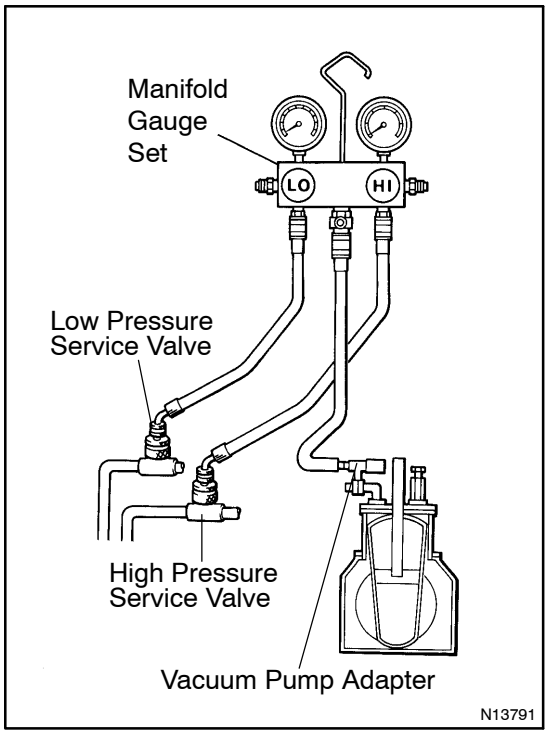
(a) Close both hand valves of manifold gauge set.

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



4. EVACUATE AIR FROM REFRIGERATION SYSTEM

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



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

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

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

HINT:

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

Check the system for leaks and repair if necessary.

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

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

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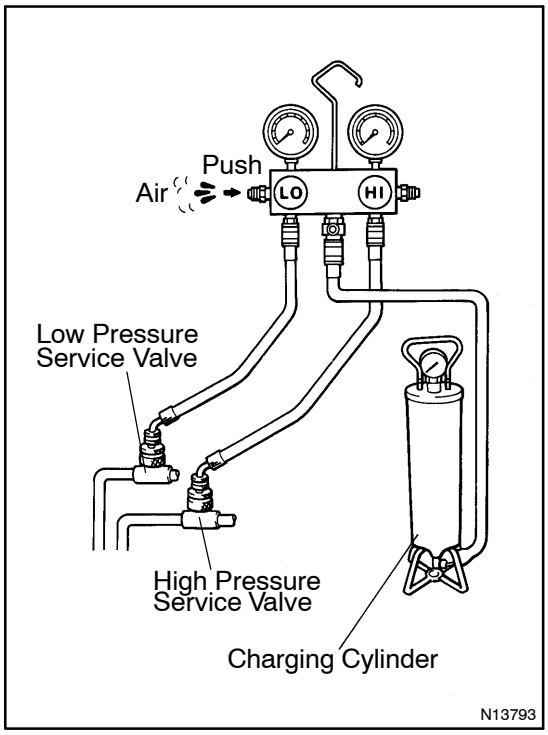
AC1HN–01

CHARGING



1. INSTALL CHARGING CYLINDER

HINT:

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

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

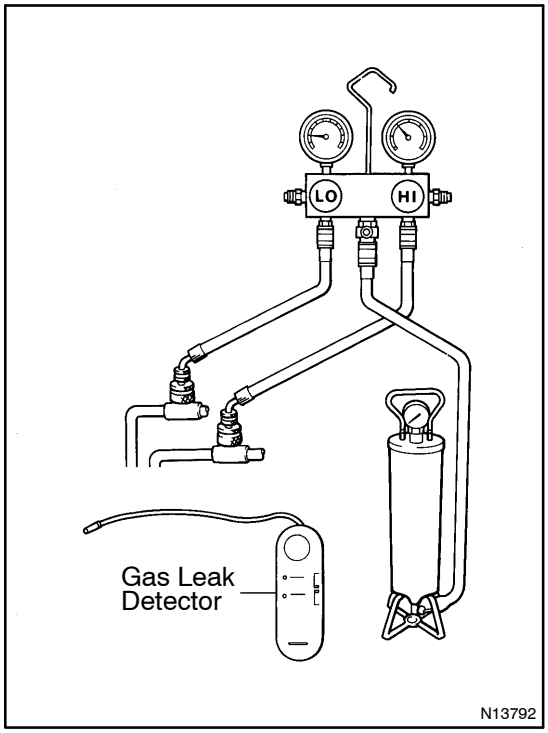
(b) Connect the center hose to the charging cylinder.

CAUTION:

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

(c) Open the valve of charging cylinder.

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



2. INSPECT REFRIGERATION SYSTEM FOR LEAKS

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

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

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

If leak is found, repair the faulty component or connection.

CAUTION:

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

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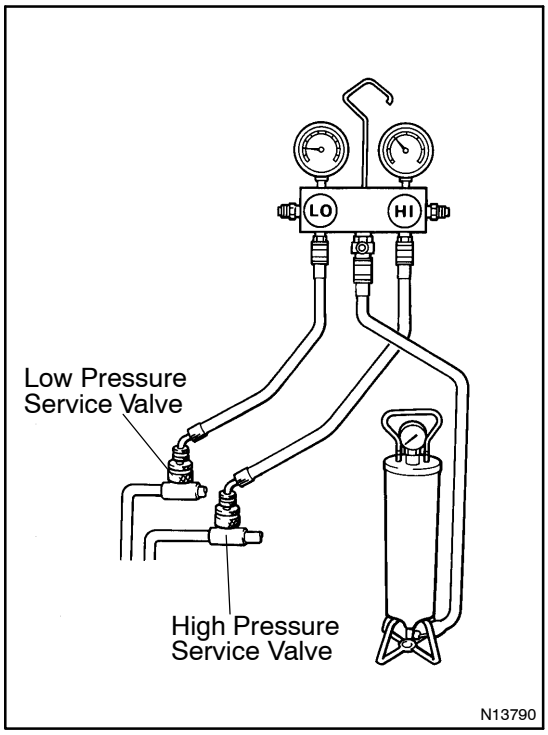


3. CHARGE REFRIGERANT INTO REFRIGERATION SYSTEM

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

CAUTION:

- **Never run the engine when charging the system through the high pressure side.**
- **Do not open the low pressure hand valve when the system is being charged with liquid refrigerant.**

(a) Open he high pressure hand valve fully.

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

HINT:

A fully charged system is indicated by the sight glass being free of any bubbles.

(c) Charge partially refrigeration system with refrigerant.

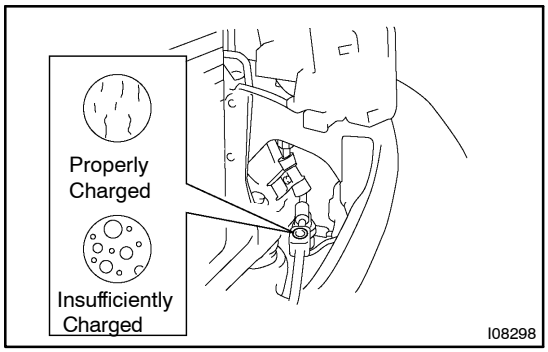
(1) Set vehicle in these conditions:

- Running engine at 1,500 rpm
- Blower speed control set at ”HI”
- Temperature control set at ”MAX. COOL”
- Air inlet control set at ”RECIRC”
- Fully open doors (Sliding roof : closed)

(2) Open the low pressure hand valve.

CAUTION:

Do not open the high pressure hand valve.



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

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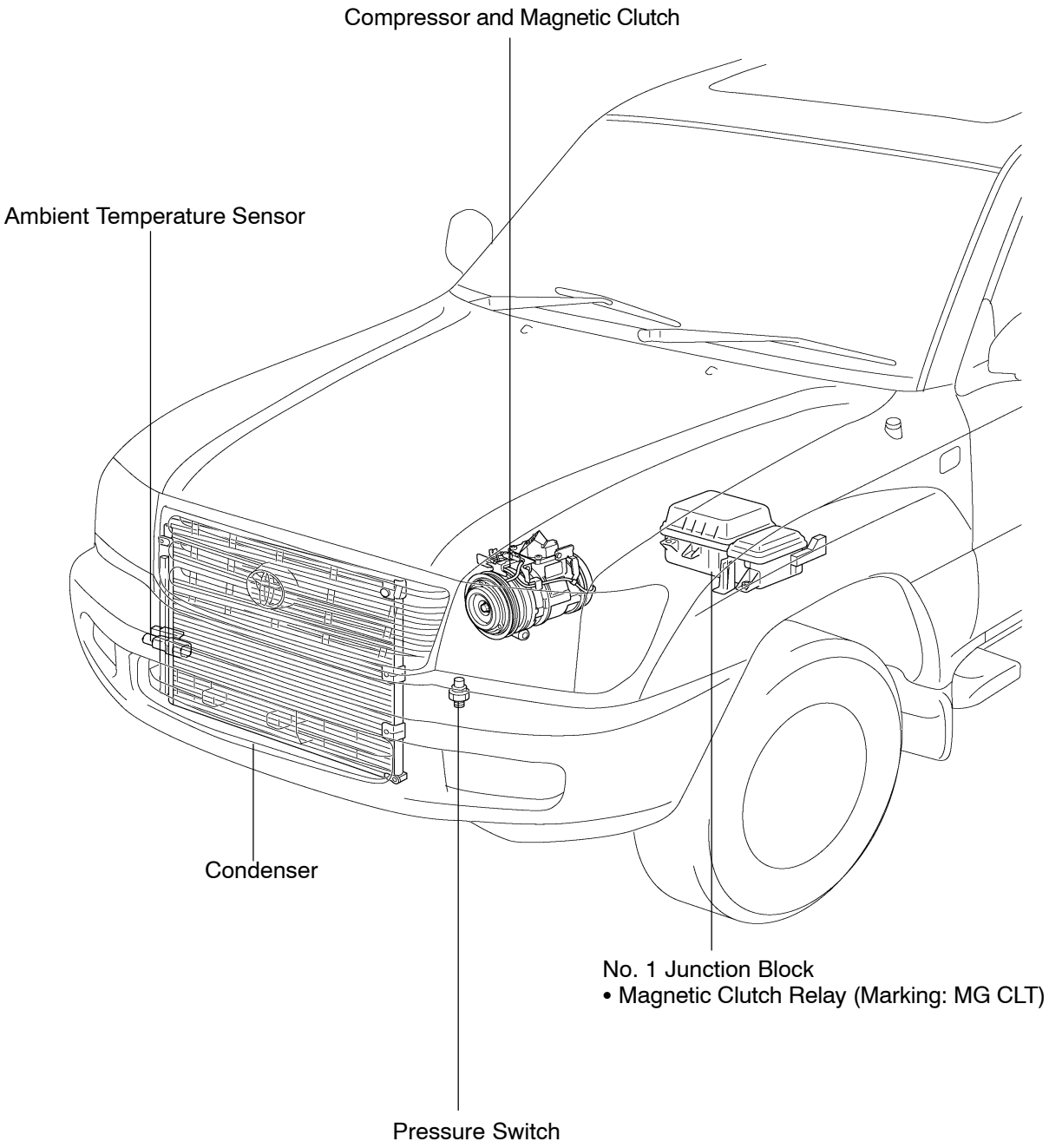
AC1HO–01

LOCATION



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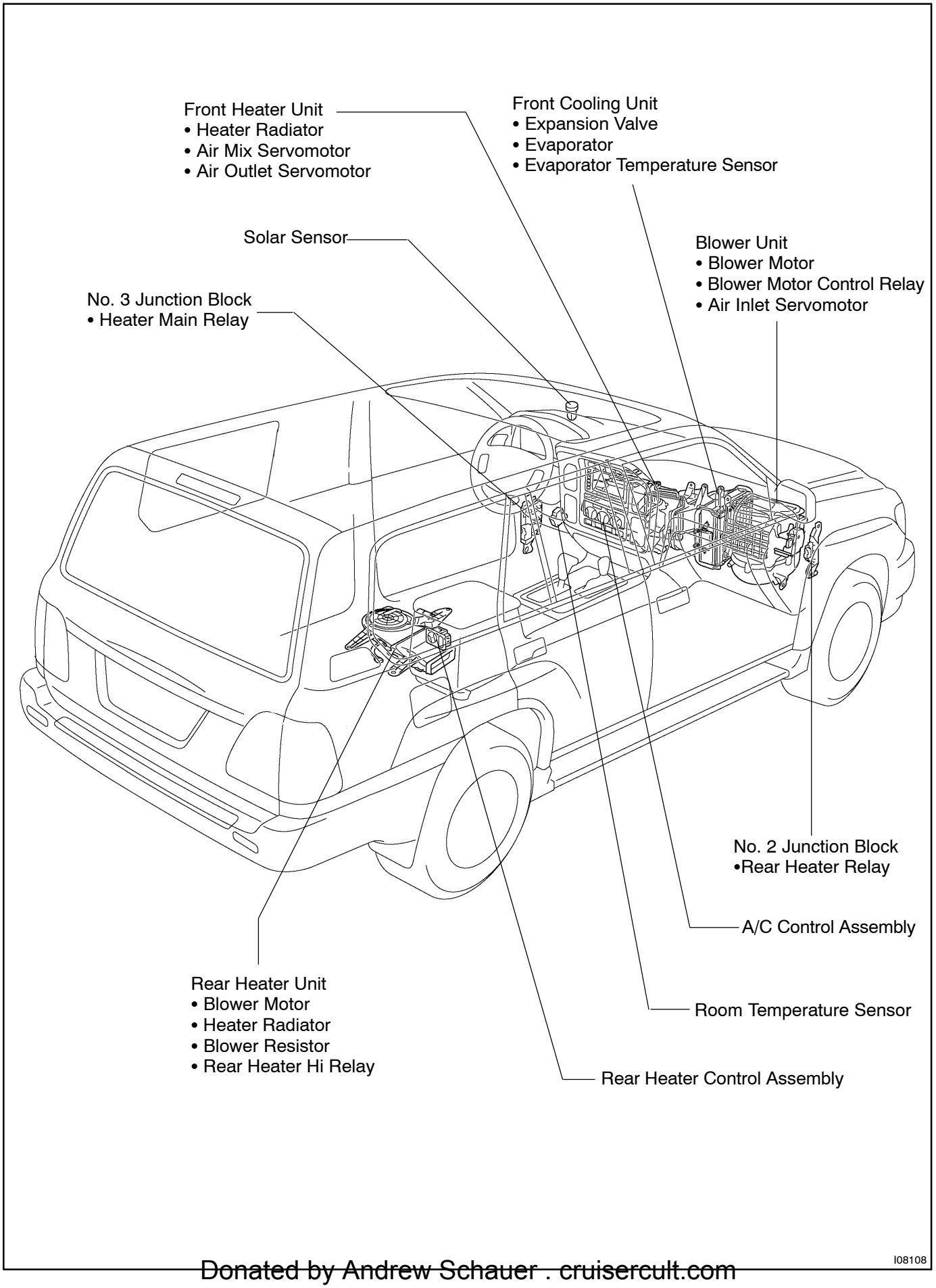

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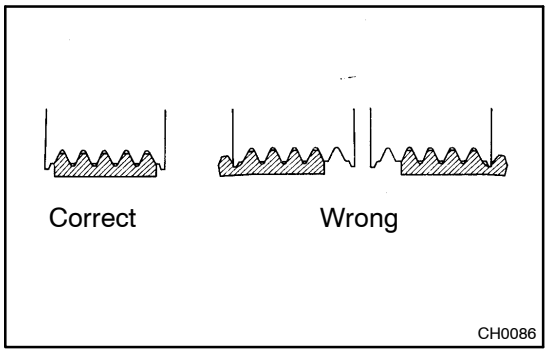


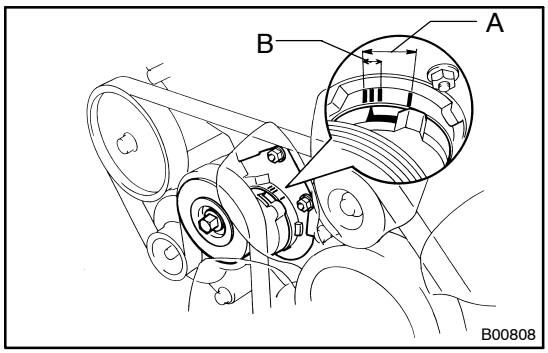
DRIVE BELT

AC1HP–01

ON–VEHICLE INSPECTION

1. INSPECT DRIVE BELT'S INSTALLATION CONDITION

Check that drive belt fits properly in the ribbed grooves.



2. INSPECT DRIVE BELT TENSION

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

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

HINT:

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

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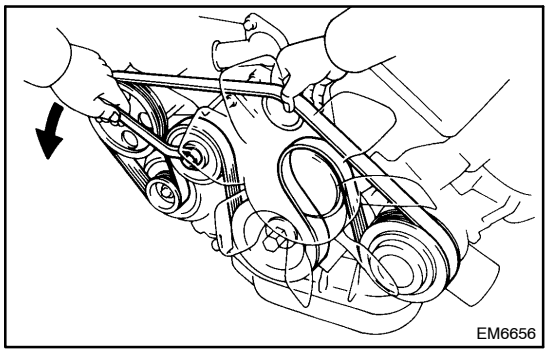
AC1HQ–01



REMOVAL

REMOVE DRIVE BELT

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

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AC1HR–01

INSTALLATION

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

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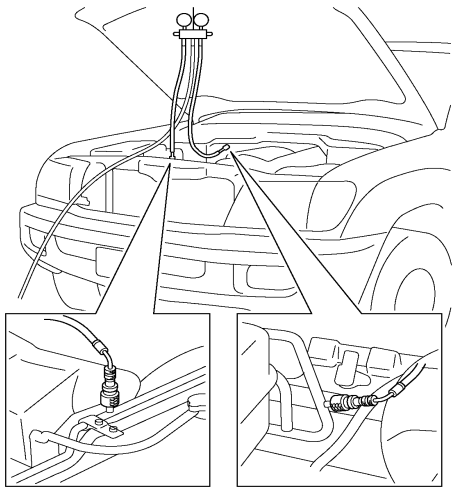


MANIFOLD GAUGE SET

AC1HS–01

SET ON

1. CONNECT CHARGING HOSE TO MANIFOLD GAUGE SET

Tighten the nuts by hand.

CAUTION:

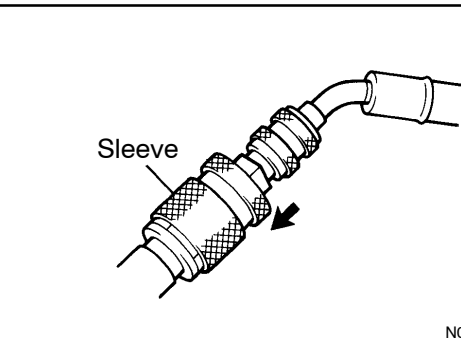
Do not connect the wrong hoses.

2. CONNECT QUICK DISCONNECT ADAPTERS TO CHARGING HOSES

Tighten the nuts by hand.

3. CLOSE BOTH HAND VALVES OF MANIFOLD GAUGE SET

4. REMOVE CAPS FROM SERVICE VALVES ON REFRIGERANT LINES



5. CONNECT QUICK DISCONNECT ADAPTERS TO SERVICE VALVES

HINT:

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

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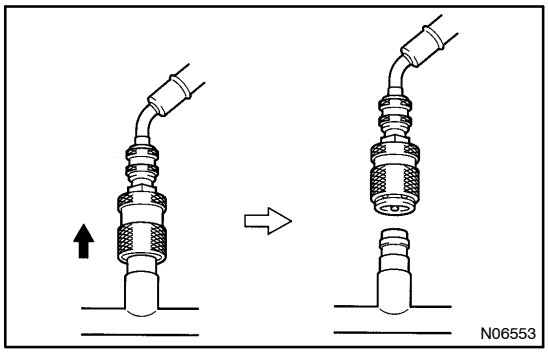
AC1HT–01



SET OFF

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

HINT:

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

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

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REFRIGERANT LINE

AC1HU–01

ON–VEHICLE INSPECTION

1. INSPECTION HOSE AND TUBE CONNECTIONS FOR LOOSENESS

2. INSPECT HOSES AND TUBES FOR LEAKAGE

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

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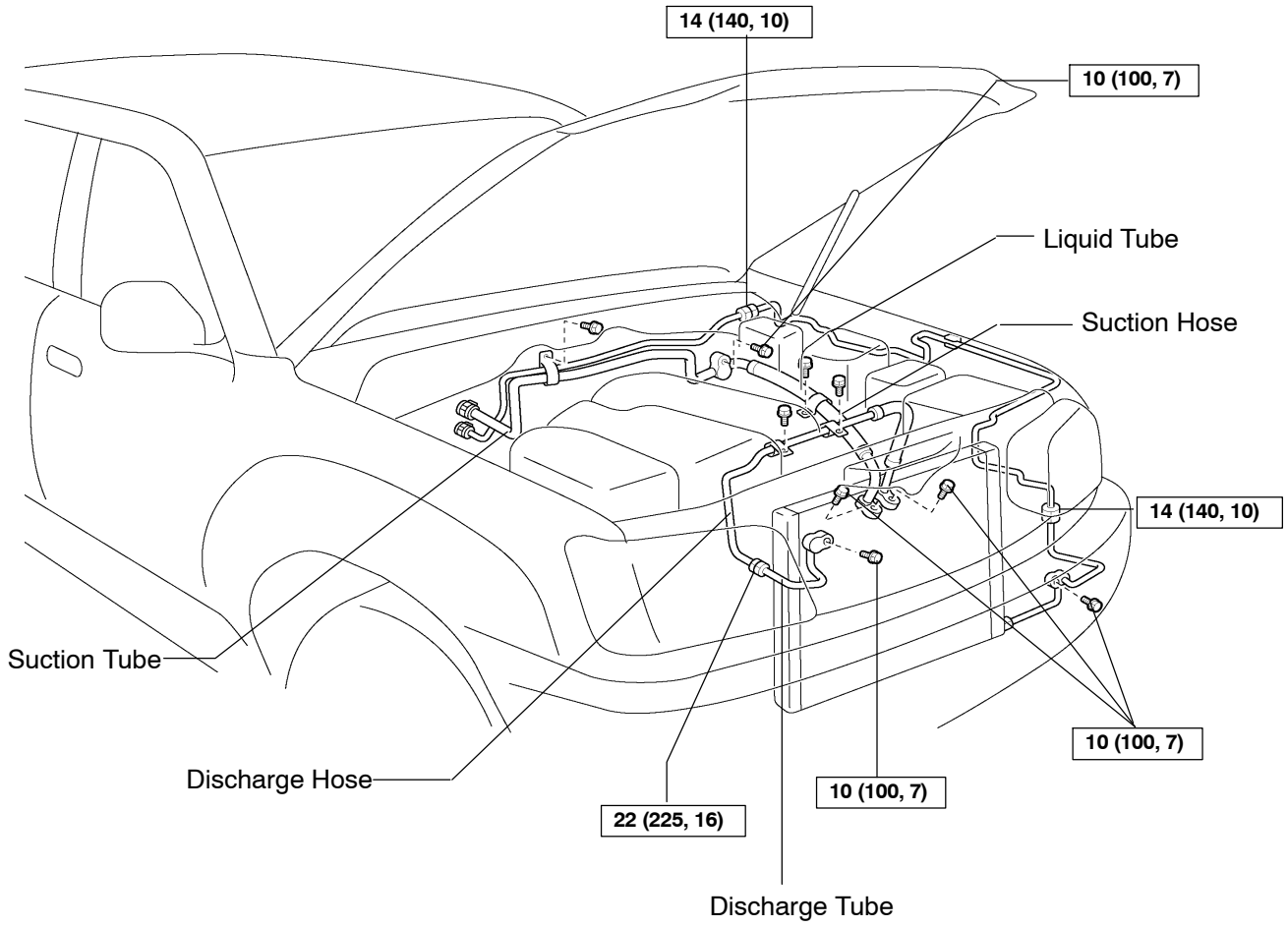
AC1HV–01

COMPONENTS



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

I06806

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AC1HW–01

REPLACEMENT

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

2. REPLACE FAULTY TUBE OR HOSE

NOTICE:

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

3. TIGHTEN JOINT OF BOLT OR NUT TO SPECIFIED TORQUE

NOTICE:

Connections should not be torqued tighter than the specified torqued.

Part tightened		N·m	kgf·cm	ft·lbf
Compressor x Discharge hose		10	100	7
Compressor x Suction hose		10	100	7
Condenser x Discharge hose		10	10	7
Condenser x Liquid tube		10	100	7
Liquid line	Nut	14	140	10
	Bolt	10	100	7
Discharge line	Nut	22	225	16
Suction line	Nut	32	330	24
	Bolt	10	100	7

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

Specified amount: 600 ± 50 g (21.16 ± 1.76 oz.)

5. INSPECT FOR LEAKAGE OF REFRIGERANT

Using a gas leak detector, check for leakage of refrigerant

6. INSPECT AIR CONDITIONING OPERATION

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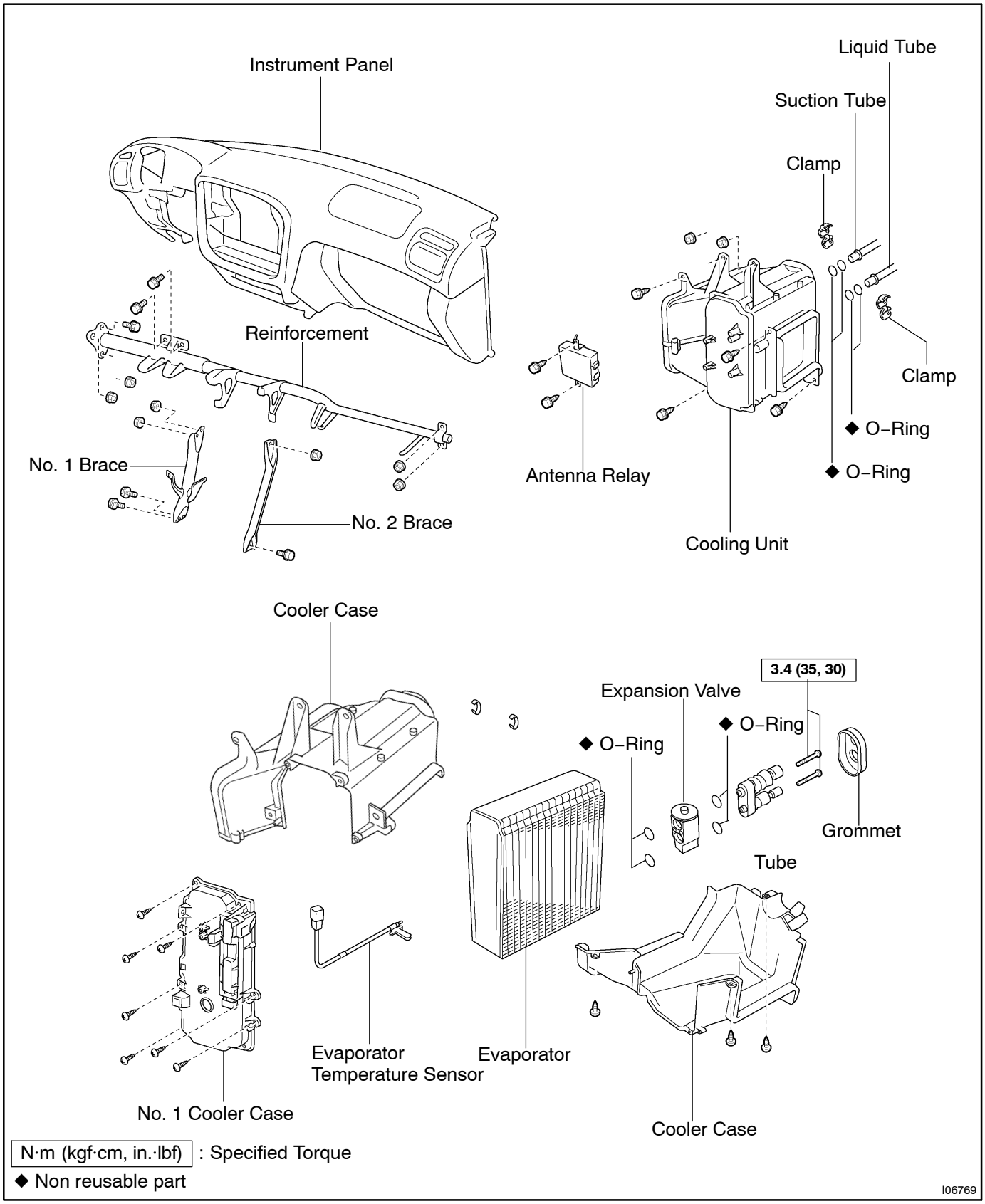
COOLING UNIT

COMPONENTS

AC1HX–01



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AC1HY–01

REMOVAL

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

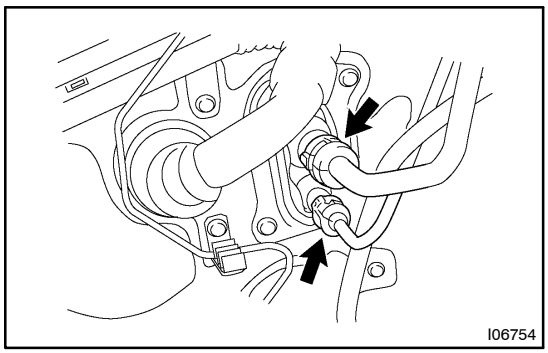
HINT:

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

Evacuate air from refrigeration system.

Charge system with refrigerant and inspect for leakage of refrigerant.

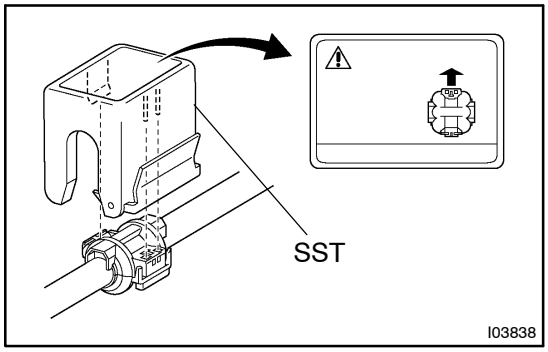
Specified amount: 600 ± 50g (21.16 ± 1.76 oz.)



2. DISCONNECT LIQUID AND SUCTION TUBES

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

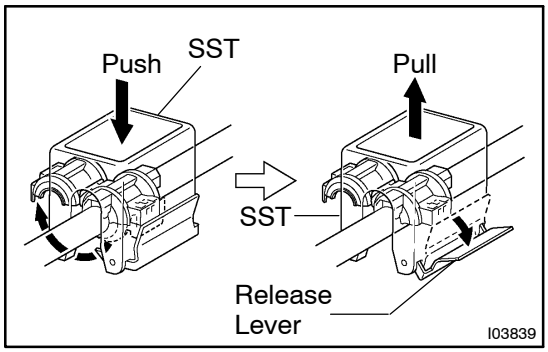
SST 09870–00025 (Liquid tube)
09870–00015 (Suction tube)



(1) Insert SST to piping clamp.

HINT:

Confirm the direction of the piping clamp claw and SST using the illustration showing on the caution label.



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

NOTICE:

Be careful not to deform the tubes, when pushing SST.

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

(4) Remove the piping clamp from SST.

(b) Disconnect the both tubes.

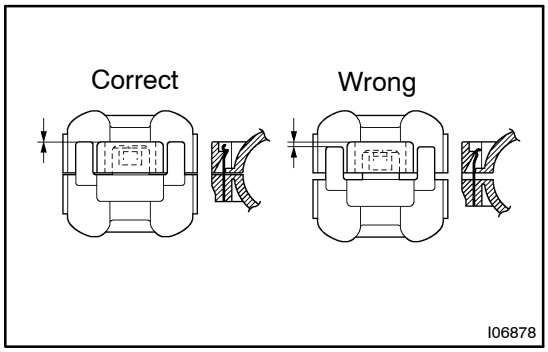
NOTICE:

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

HINT:

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

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



3. REMOVE INSTRUMENT PANEL AND REINFORCEMENT

(See page BO–86)

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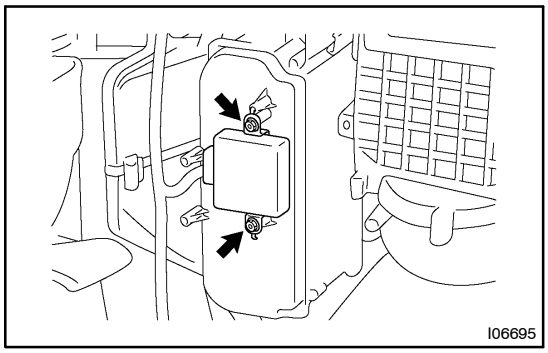
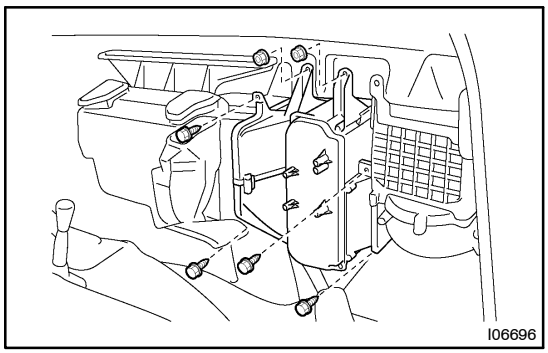


4. REMOVE ANTENNA RELAY

(a) Disconnect the connector.

(b) Remove the 2 screws and relay.



5. REMOVE COOLING UNIT

(a) Disconnect the connector.

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

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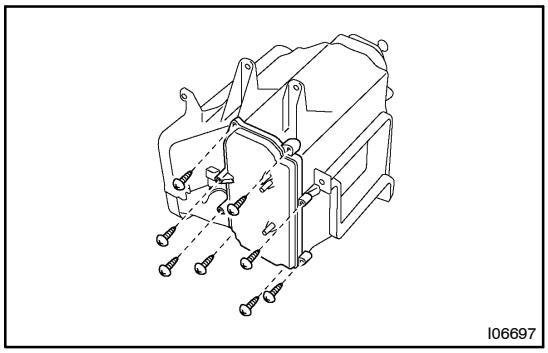
AC1HZ–01



DISASSEMBLY

1. REMOVE EVAPORATOR

(a) Disconnect the connector clamp.

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

(c) Pull out the evaporator

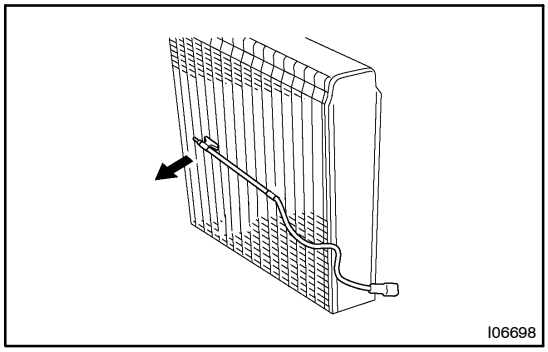
HINT:

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

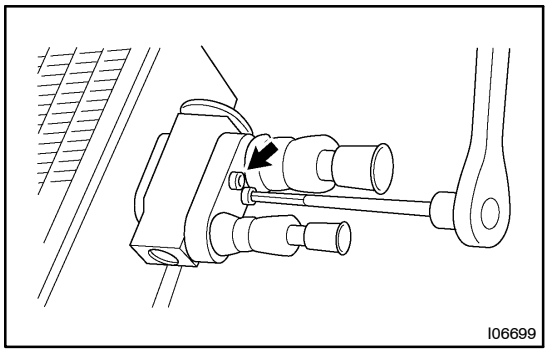
If evaporator is replaced, add compressor oil to the evaporator.

Add: 40 cc (1.4 fl.oz.)

Compressor oil: ND–OIL 8 or equivalent



2. PULL OUT EVAPORATOR TEMPERATURE SENSOR FROM EVAPORATOR



3. REMOVE EXPANSION VALVE

(a) Remove the grommet.

(b) Pry out the packing.

HINT:

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

Do not reuse the packing.

(c) Using a hexagon wrench (50 mm, 0.20 in.), remove the 2 bolts and separate the expansion valve, tube and evaporator.

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

NOTICE:

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

HINT:

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

Lubricate 4 new O–rings with compressor oil and install them to the tube.

4. REMOVE DRAIN HOSE

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AC1I0–01

REASSEMBLY

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

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AC1I1–01

INSTALLATION

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

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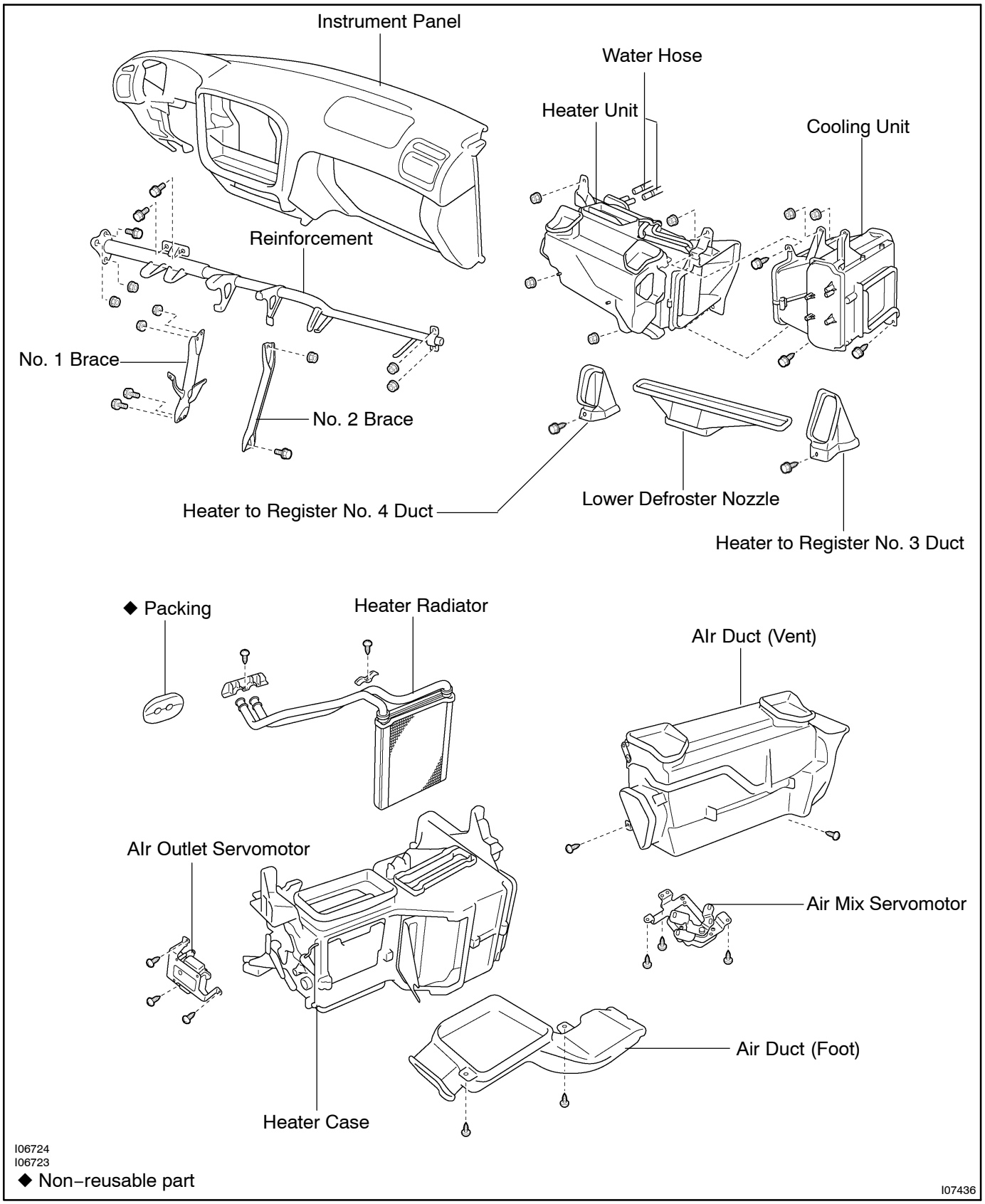
FRONT HEATER UNIT

COMPONENTS

AC1I2–01



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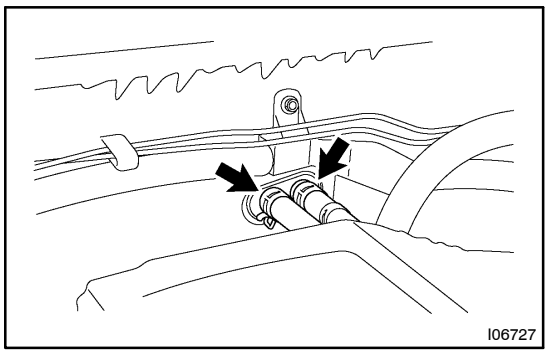
AC1I3–01

REMOVAL

1. DRAIN ENGINE COOLANT FROM RADIATOR

HINT:

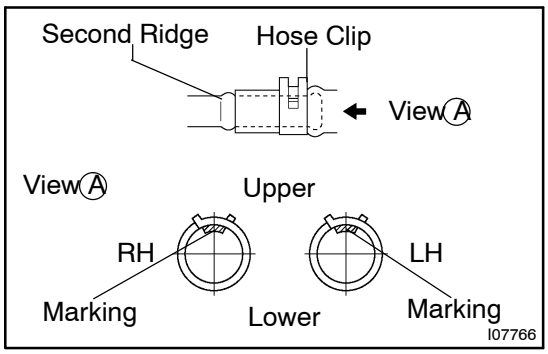
It is not necessary to drain out all coolant.



2. DISCONNECT WATER HOSES FROM HEATER RADIATOR PIPES

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

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



HINT:

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

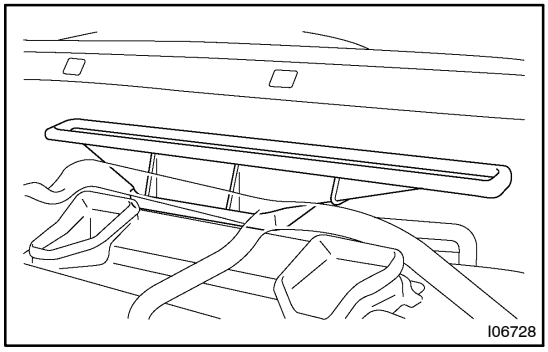
- Push the water hose onto the heater radiator pipe as far as second ridge on the pipe.
- Install a hose clip in the position as shown in the illustration.

3. REMOVE INSTRUMENT PANEL AND REINFORCEMENT

(See page BO–86)

4. REMOVE COOLING UNIT

(See page AC–24)



5. REMOVE HEATER UNIT

(a) Remove the defroster nozzle.

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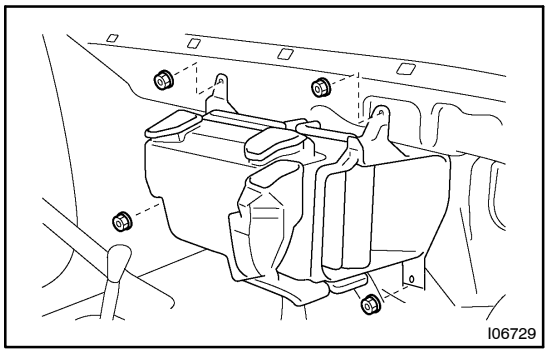

(b) Disconnect the connector.
(c) Remove the 4 nuts and heater unit.

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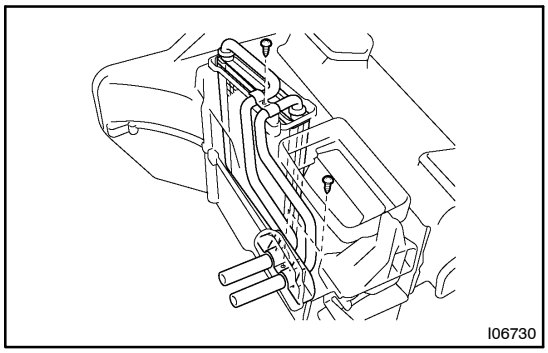
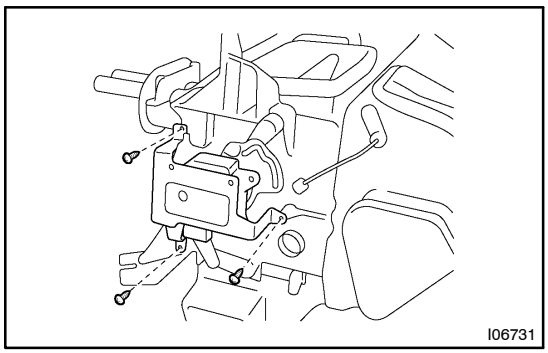
AC1I4–01

DISASSEMBLY



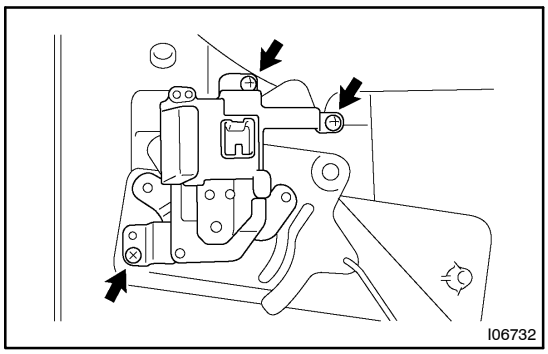
1. REMOVE HEATER RADIATOR

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



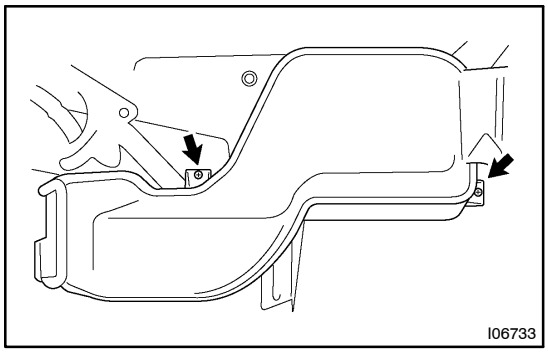
2. REMOVE AIR OUTLET SERVOMOTOR

Remove the 3 screws and servomotor.



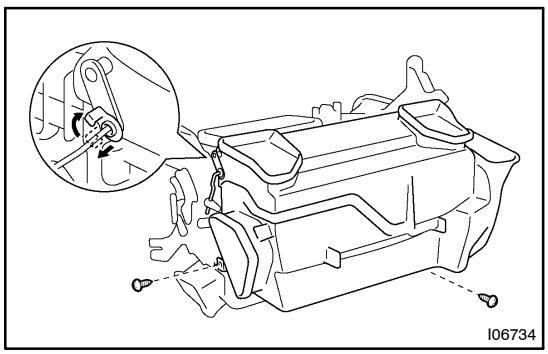
3. REMOVE AIR MIX SERVOMOTOR

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



4. REMOVE AIR DUCT (Foot Duct)

Remove the 2 screws and duct.



5. REMOVE AIR DUCT (Vent Duct)

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

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AC1I5–01

INSPECTION

1. CHECK HEATER RADIATOR FINS FOR BLOCKAGE

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

2. CHECK FITTING FRO CRACKS OR SCRATCHES

If necessary repair or replace.

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AC1I6-01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC–32).

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AC1I7–01

INSTALLATION

Installation is in the reverse order of removal (See page AC–30).

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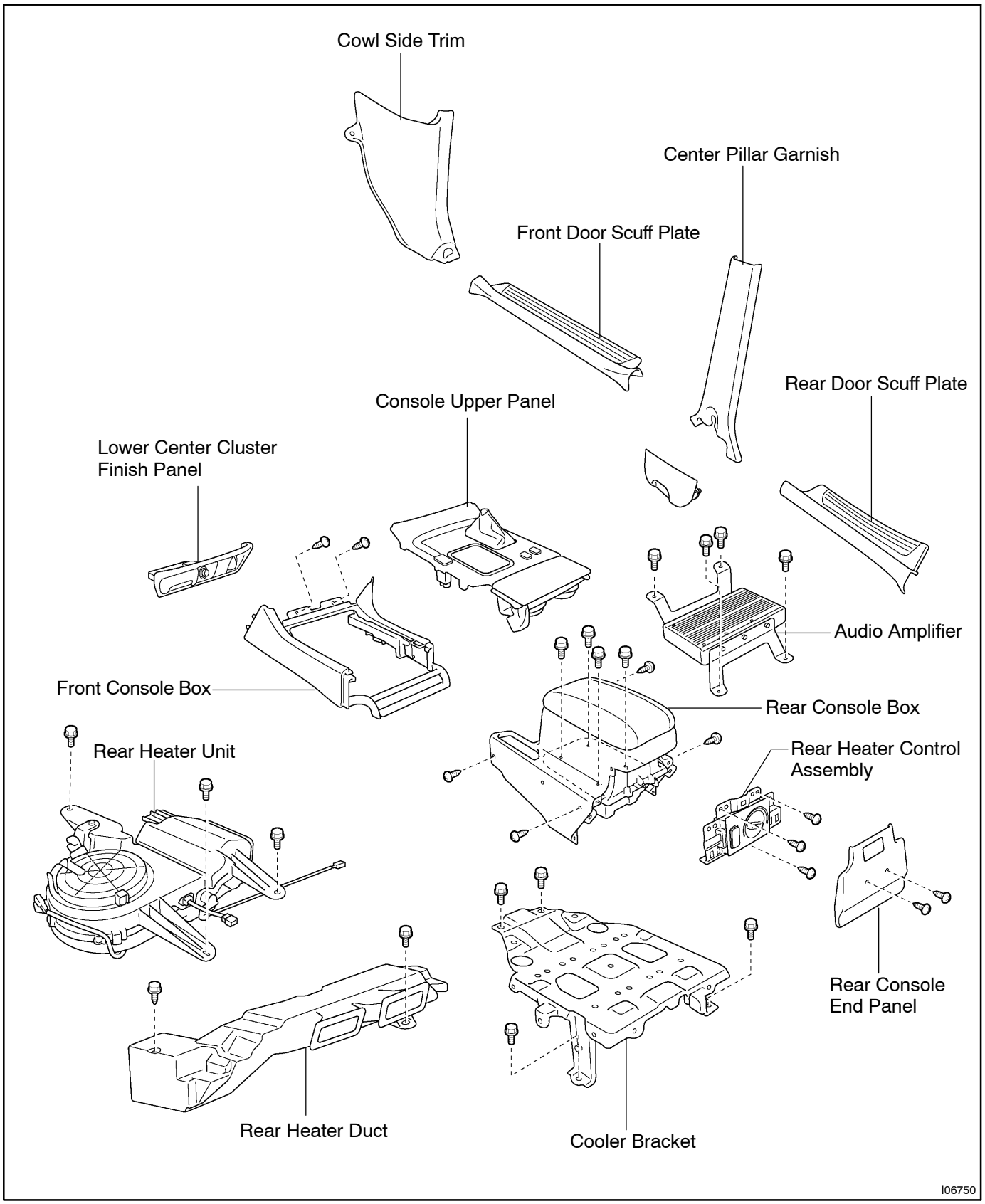
REAR HEATER UNIT

COMPONENTS

AC1I8–01



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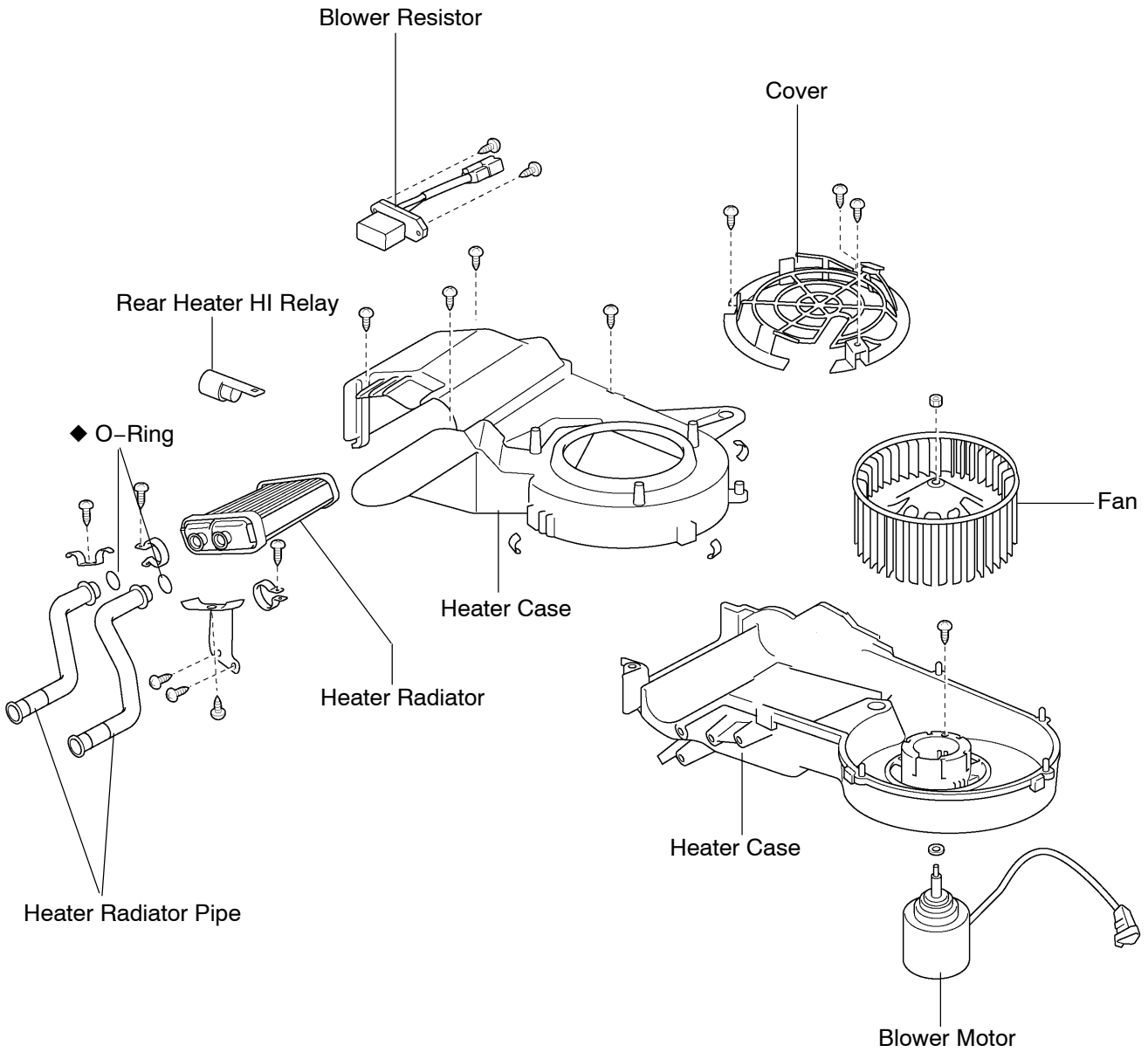

◆ Non–reusable part

I08109

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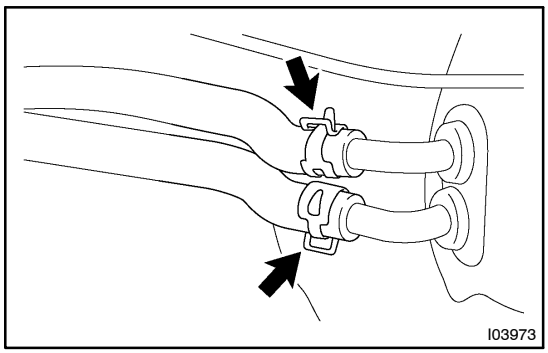
AC1I9-01

REMOVAL

1. DRAIN ENGINE COOLANT FROM RADIATOR

HINT:

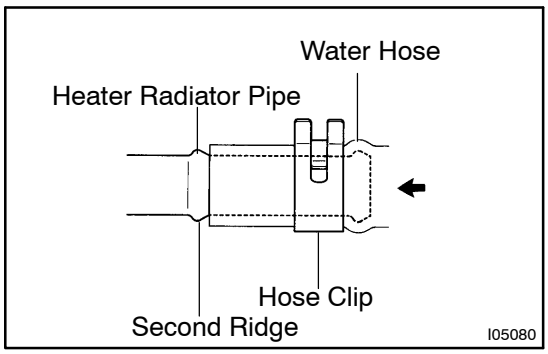
It is not necessary to drain out all the coolant.



2. DISCONNECT WATER HOSES FROM HEATER RADIATOR PIPES

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

(b) Disconnect the water hoses



HINT:

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

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

3. REMOVE THESE PARTS:

(a) Front seats

(b) w/o Rear Cooler:
Rear heater control assembly
(See page AC–95)

(c) Rear console box

(d) Front console box cover

(e) Lower center cluster finish panel

(f) Front door scuff plate

(g) Cowl side trims

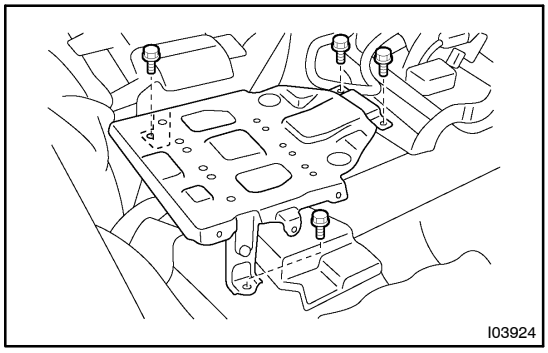
(h) Rear door scuff plates

(i) Center pillar garnishes

4. SLIDE FLOOR CARPET BACKWARD

5. REMOVE COOLER BRACKET

Remove the 4 bolts and bracket.



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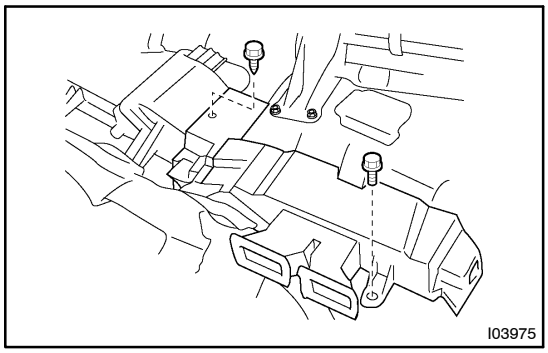
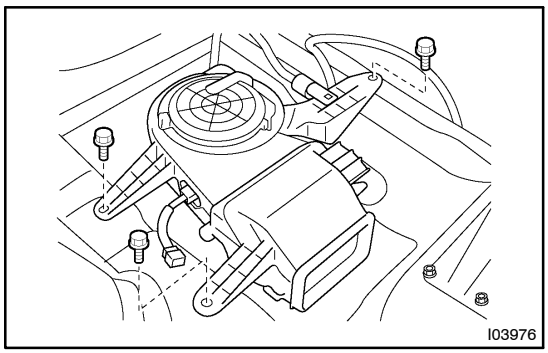


6. REMOVE REAR HEATER DUCT

Remove the bolt, screw and duct.



7. REMOVE REAR HEATER UNIT

(a) Disconnect the connector.

(b) Remove the 3 bolts and heater unit.

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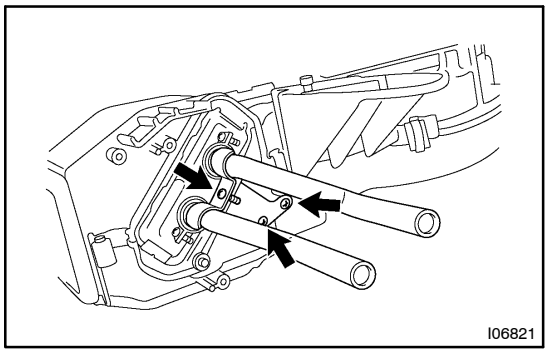
AC1IA–01

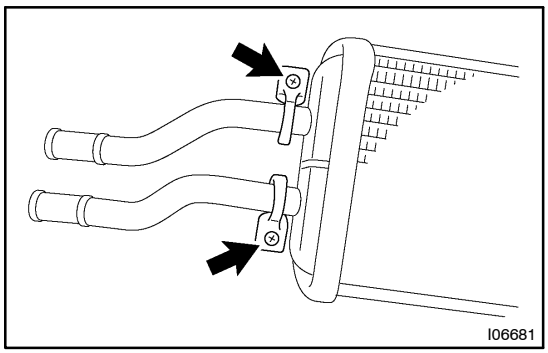
DISASSEMBLY



1. REMOVE HEATER RADIATOR

(a) Remove the 3 screws and 2 clamps

(b) Pull out the heater radiator.



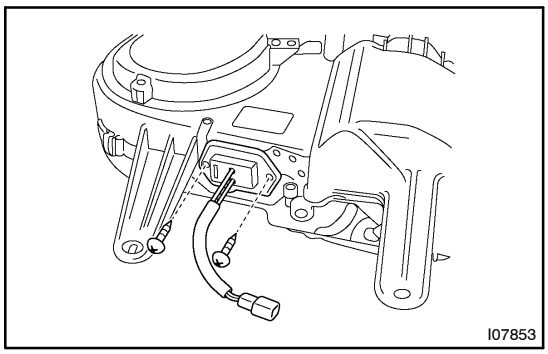
(c) Remove the 2 screws, 2clamps and heater radiator pipes.

(d) Remove the 2 O–rings.

HINT:

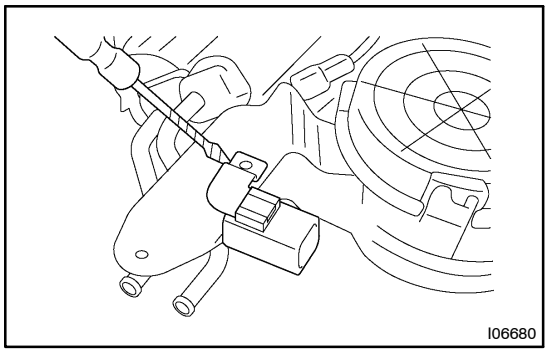
At the time of reassembly, please refer to the following item.

Do not reuse the O–rings



2. REMOVE BLOWER RESISTOR

Remove the 2 screws and blower resistor.

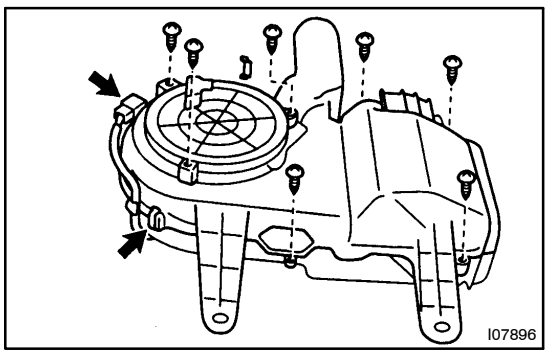


3. REMOVE REAR HEATER HI RELAY

Using a screw driver, release the claw and remove the relay.

HINT:

Tape the screwdriver tip before use.



4. REMOVE BLOWER MOTOR

(a) Remove the 3 screws and cover.

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

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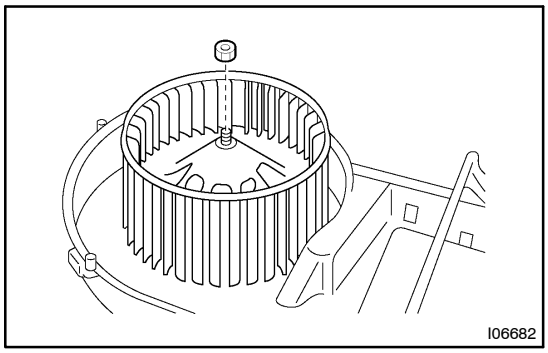
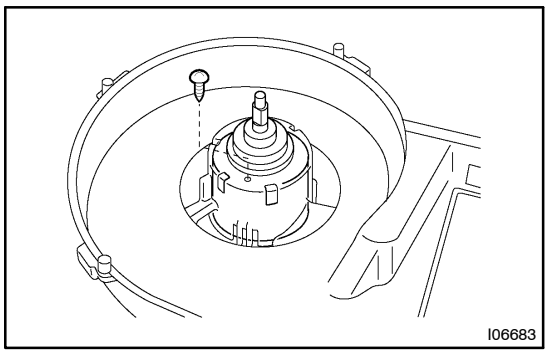


(c) Remove the nut and fan.



(d) Remove the screws and blower motor.

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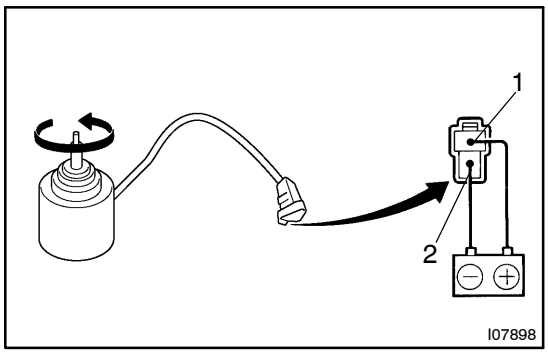
AC1IB–01

INSPECTION

1. INSPECT HEATER RADIATOR

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



2. INSPECT BLOWER MOTOR OPERATION

Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, then check that the motor rotates smoothly.
If operation is not as specified, replace the blower motor.

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AC1IC–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC–40).

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AC1ID–01

INSTALLATION

Installation is in the reverse order of removal (See page AC–38).

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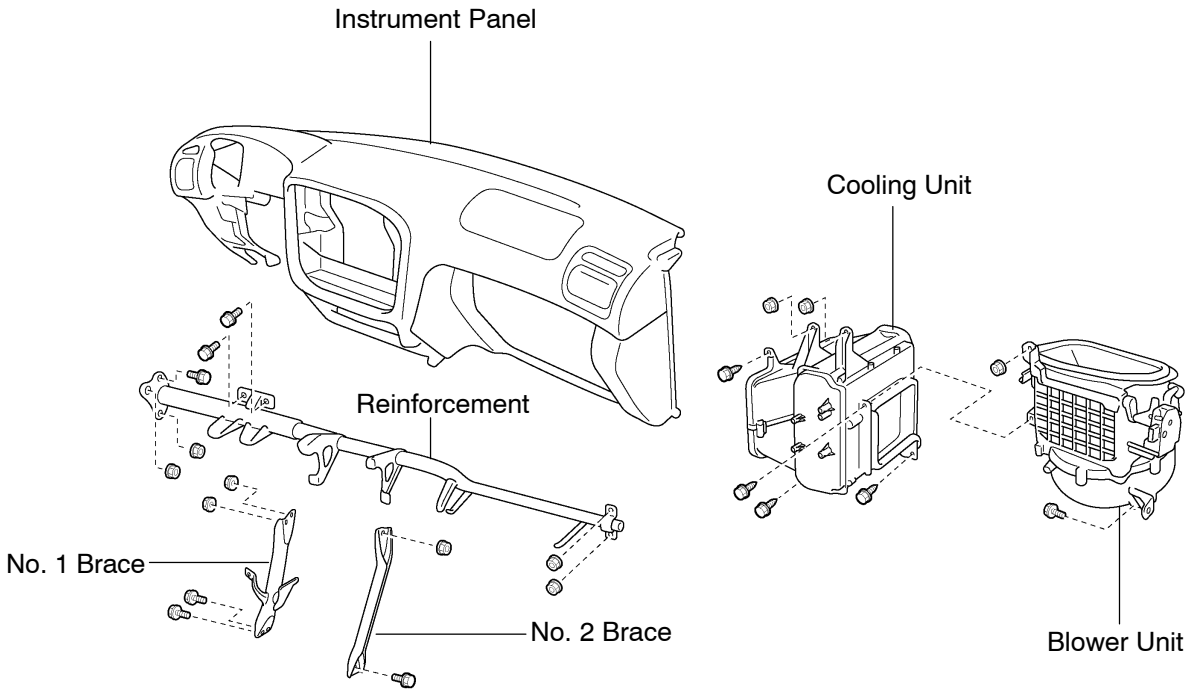
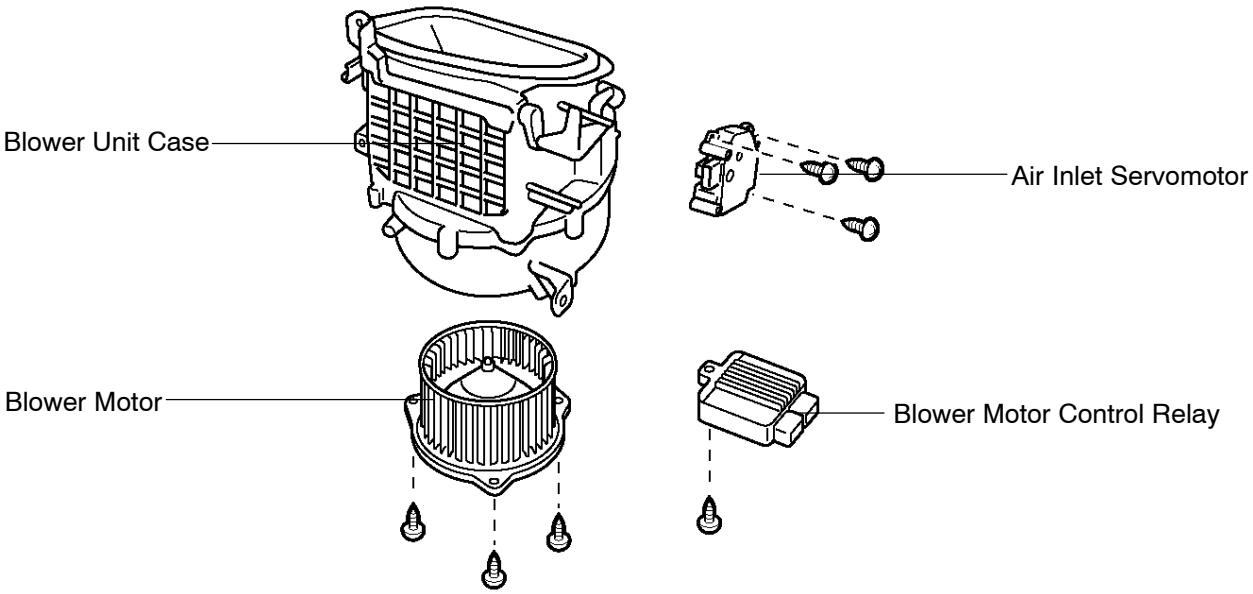
BLOWER UNIT

COMPONENTS

AC1IE–01





I07437

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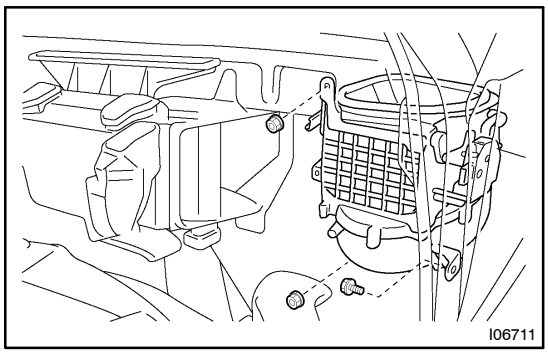
AC1IF–01

REMOVAL

1. REMOVE COOLING UNIT
(See page AC–24)



2. REMOVE BLOWER UNIT

(a) Disconnect the connectors.

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

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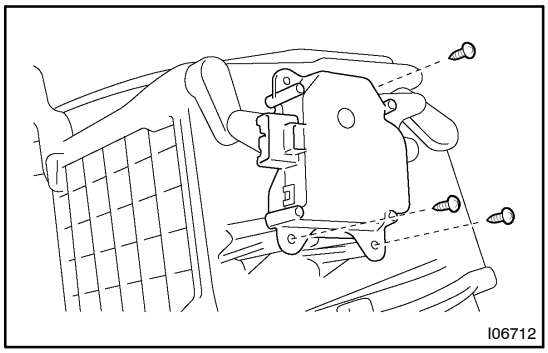
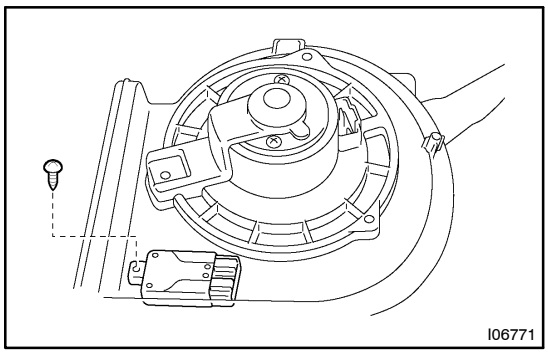
AC1IG–01

DISASSEMBLY



1. REMOVE AIR INLET SERVOMOTOR

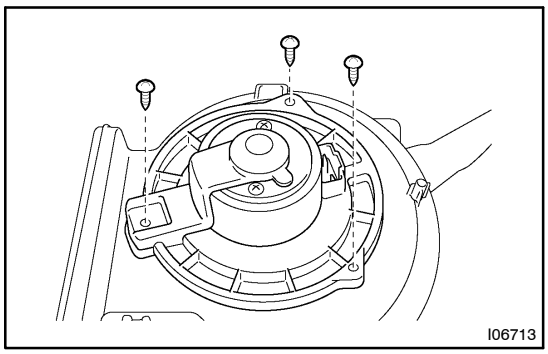
Remove the 3 screws and servomotor.



2. REMOVE BLOWER MOTOR CONTROL RELAY

(a) Disconnect the connector.

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



3. REMOVE BLOWER MOTOR

(a) Disconnect the connector.

(b) Remove the 3 screws and blower motor.

4. REMOVE WIRE HARNESS

Remove the screw and wire harness.

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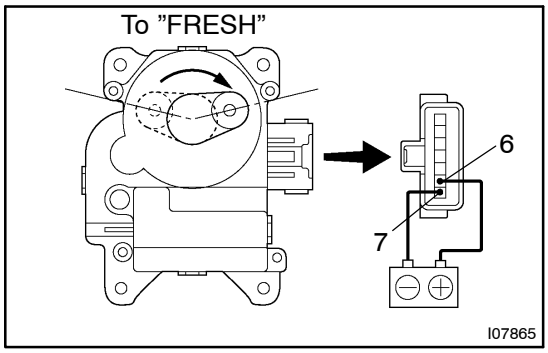
AC1IH–01

INSPECTION

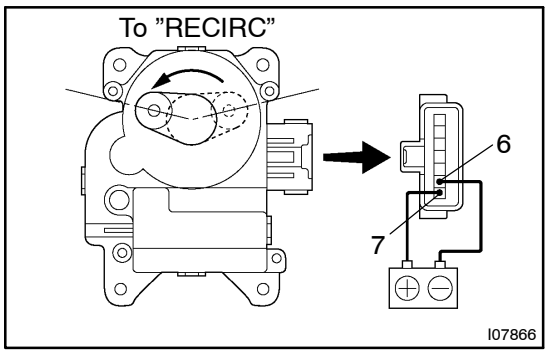
INSPECT AIR INLET SERVOMOTOR

(a) Inspect the servomotor operation.

(1) Connect the positive (+) lead from the battery to terminal 6 and negative (–) lead to terminal 7, then check that the arm turns to ”FRESH” side smoothly.



(2) Connect the positive (+) lead from the battery to terminal 7 and negative (–) lead to terminal 6, then check that the arm turns to ”RECIRC” side smoothly.



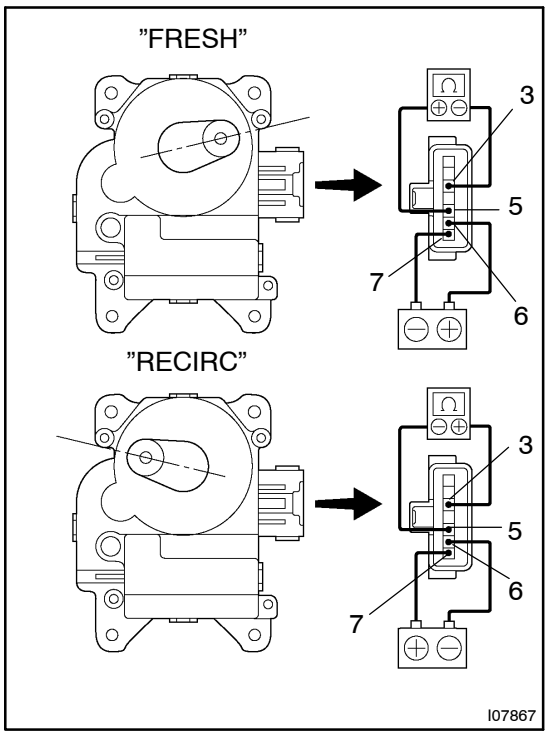
If operations are not as specified, replace the servomotor.

(b) Inspect position sensor resistance.

Measure resistance between terminals at servomotor arm each position as shown in the chart.

Tester connection	Condition	Specified condition
1 – 3	Constant	4.2 – 7.8 kΩ
3 – 5	Arm position at ”FRESH”	0..84 – 1.56 kΩ
3 – 5	Arm position at ”RECIRC”	3.85 – 6.24 kΩ

If resistance is not as specified , replace the servomotor.



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AC1II–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC–47).

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AC1IJ–01

INSTALLATION

Installation is in the reverse order of removal (See page AC–46).

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COMPRESSOR AND MAGNETIC CLUTCH

AC1IK–01

ON–VEHICLE INSPECTION

1. INSPECT COMPRESSOR FOR METALLIC SOUND

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

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

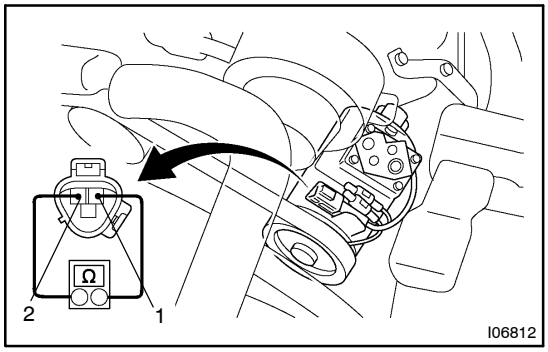
2. INSPECT REFRIGERANT PRESSURE

(See page AC–3)

3. INSPECT VISUALLY FOR LEAKAGE OF REFRIGERANT

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

If there is any leakage, replace the compressor assembly.



4. INSPECT COMPRESSOR LOCK SENSOR RESISTANCE

(a) Disconnect the connector.

(b) Measure resistance between terminals 1 and 2.

Standard resistance:

570 – 1,050 Ω at 20°C (68 °F)

If resistance is not as specified, replace the compressor.

5. MAKE THESE VISUAL CHECKS:

(a) Leakage of grease from the clutch bearing.

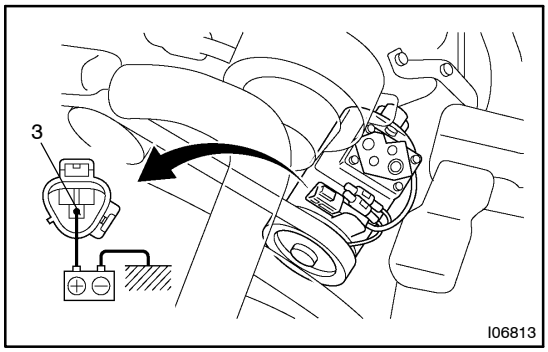
(b) Signs of oil on the pressure plate or rotor.

6. INSPECT MAGNETIC CLUTCH BEARING FOR NOISE

(a) Start engine.

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

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



7. INSPECT MAGNETIC CLUTCH OPERATION

(a) Disconnect the connector.

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

(c) Check that the magnetic clutch is energized.

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

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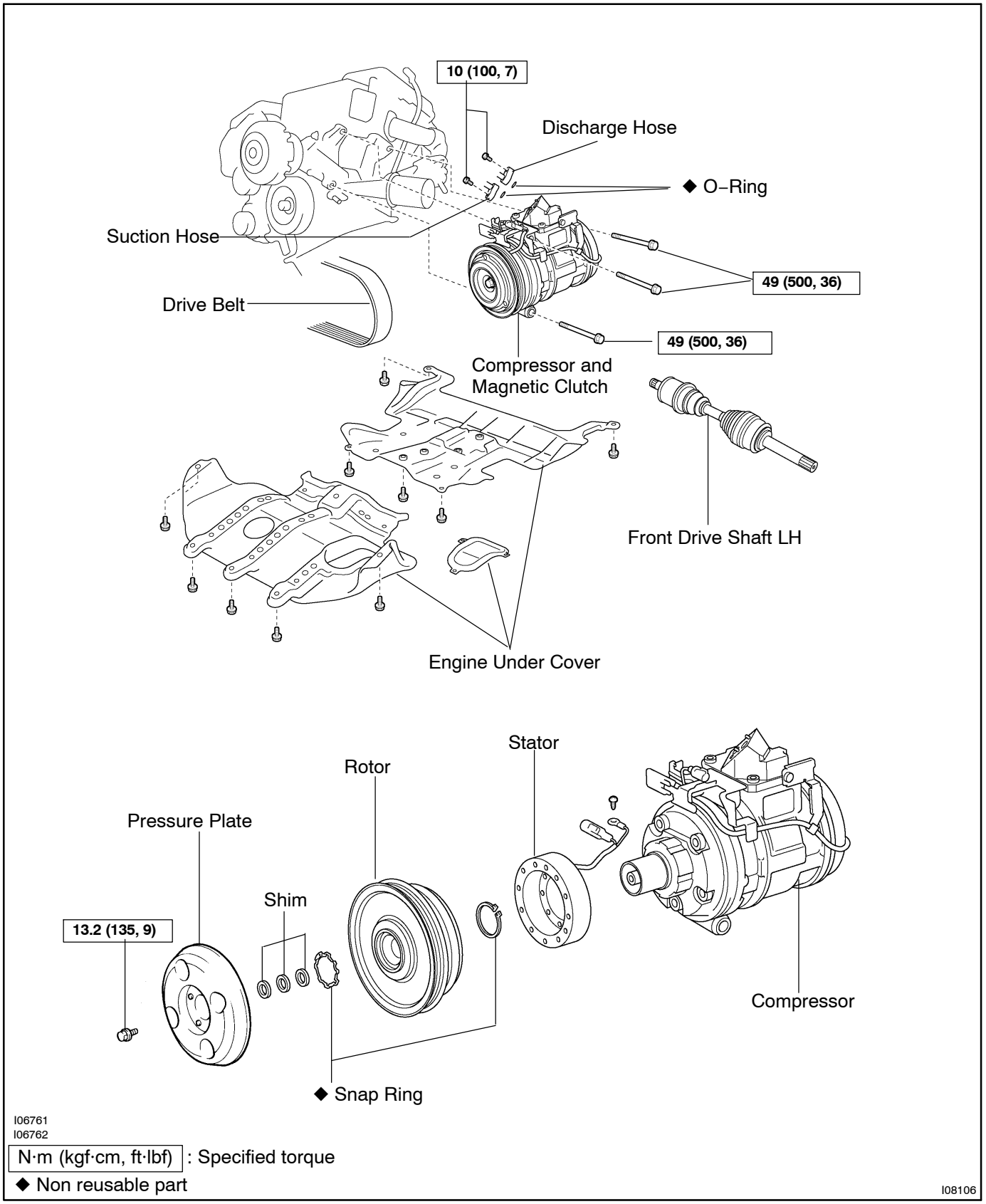
AC1IL–01

COMPONENTS



I06761
I06762

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

◆ Non reusable part

I08106

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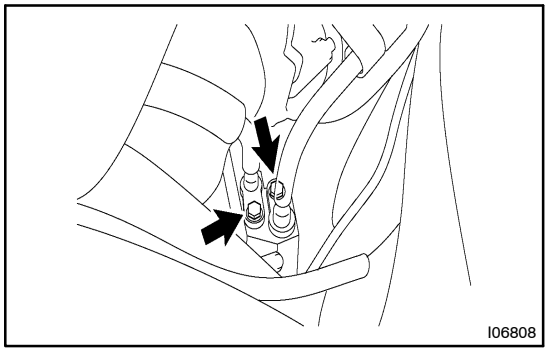
AC1IM–01

REMOVAL

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



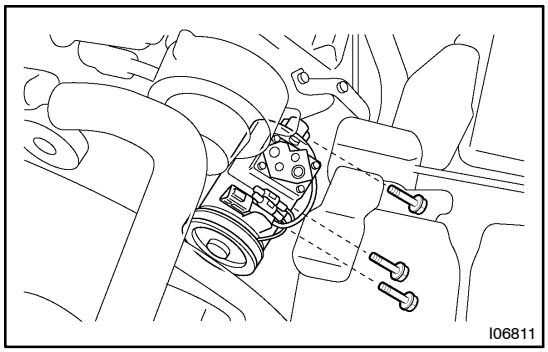
7. **DISCONNECT DISCHARGE AND SUCTION HOSES**

Remove the 2 bolts and disconnect the both hoses.

NOTICE:

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

8. **REMOVE FRONT DRIVE SHAFT LH**
   (See page SA–24)



9. **REMOVE COMPRESSOR**

(a) Disconnect the connector.

(b) Remove the 3 bolts and compressor.

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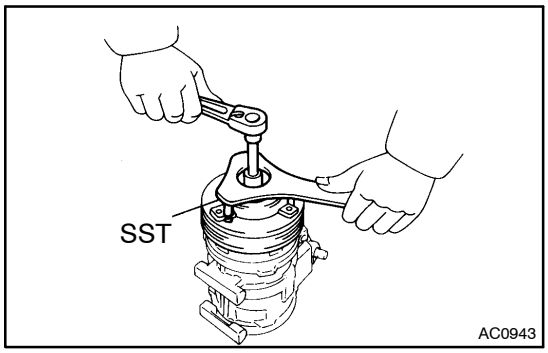
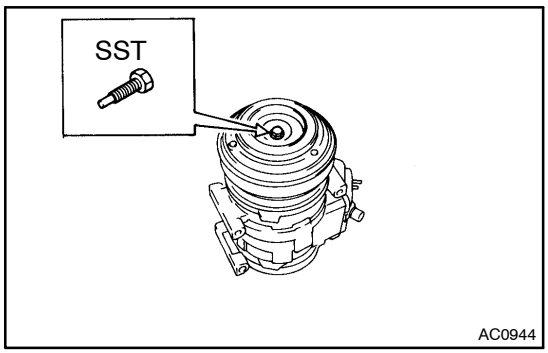
AC1IN–01

DISASSEMBLY

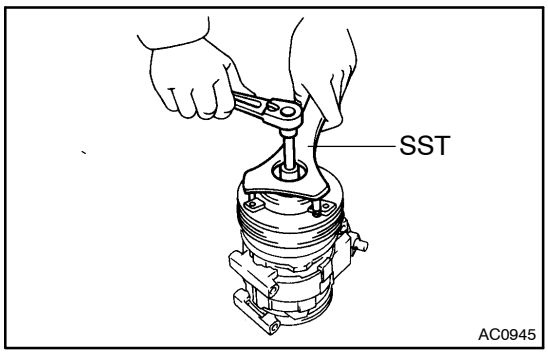


1. REMOVE PRESSURE PLATE

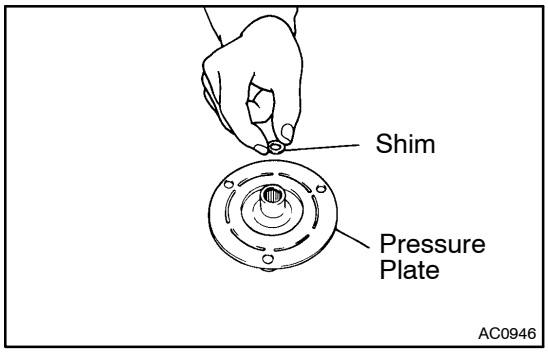
(a) Using SST and a socket wrench, remove the shaft bolt.
Torque: 13.2 N·m (135 kgf·cm, 9 ft·lbf)
SST 07112–76060



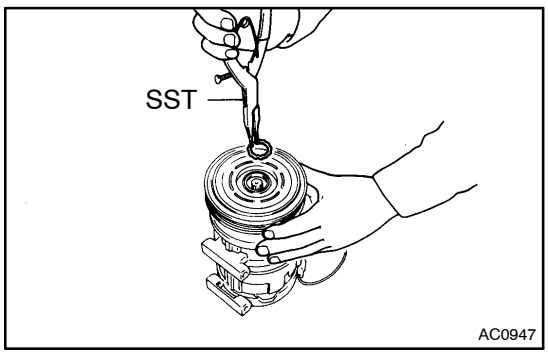
(b) Install SST on the pressure plate.
SST 07112–66040



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



(d) Remove the shims from the pressure plate.



2. REMOVE ROTOR

(a) Using SST, remove the snap ring.
SST 07114–84020

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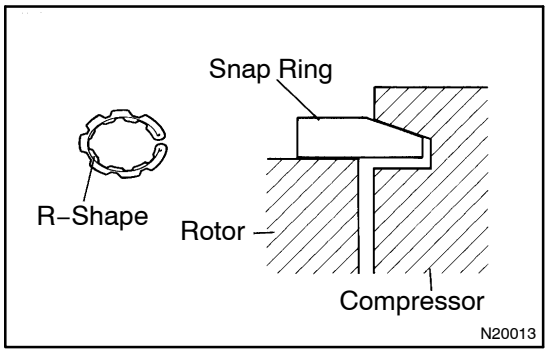
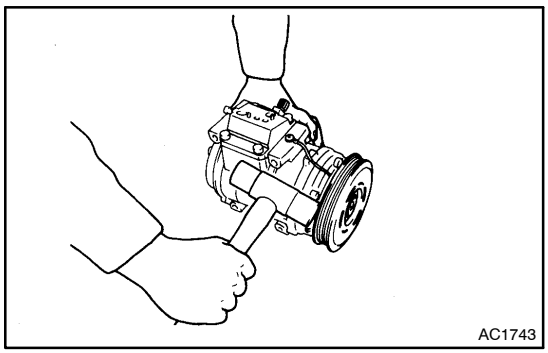
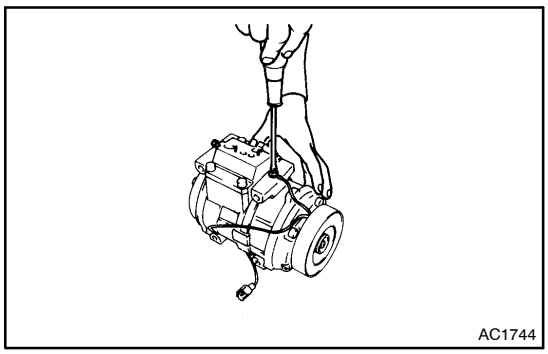


NOTICE:
At the time of reassembly, please refer to the following item.
The snap ring should be installed so that beveled side faces up.



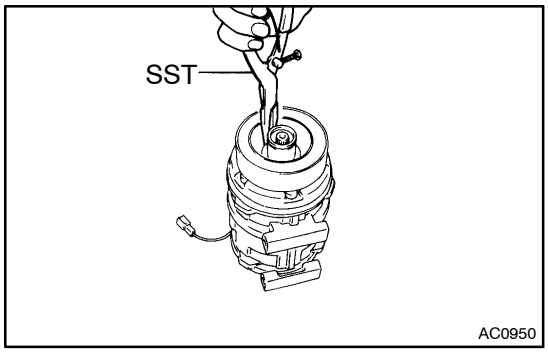
(b) Using a plastic hammer, tap the rotor off the shaft.

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

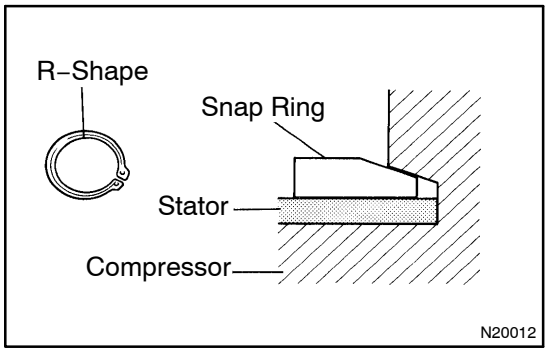


3. REMOVE STATOR

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



(b) Using SST, remove the snap ring.
SST 07114–84020



NOTICE:
At the time of reassembly, please refer to the following item.
The snap ring should be installed so that its beveled side faces up.

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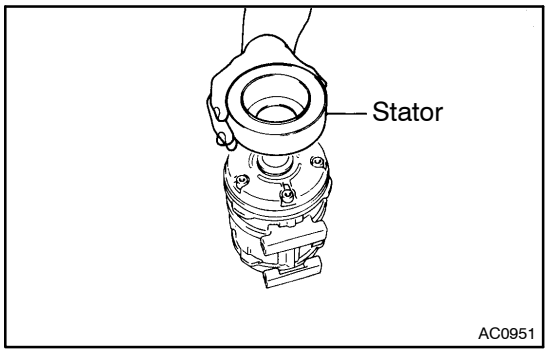

(c) Remove the stator.

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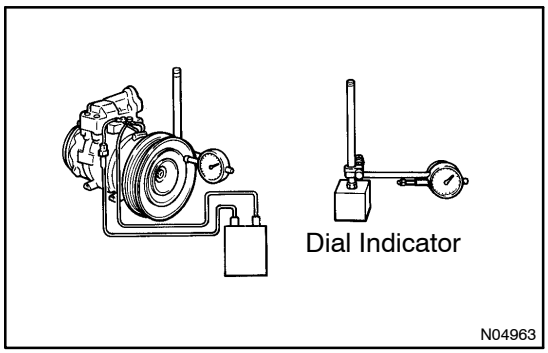
AC1IO–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC–54).



AFTER REASSEMBLY, CHECK MAGNETIC CLUTCH CLEARANCE

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

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

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

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

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

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

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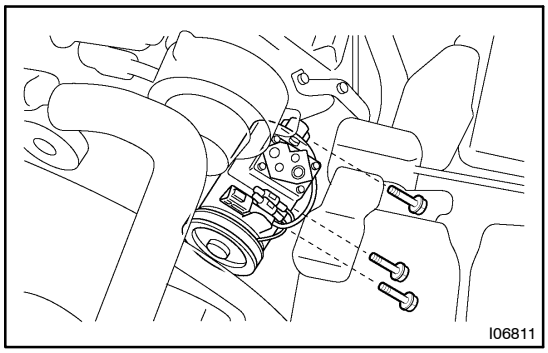
AC1IP–01

INSTALLATION

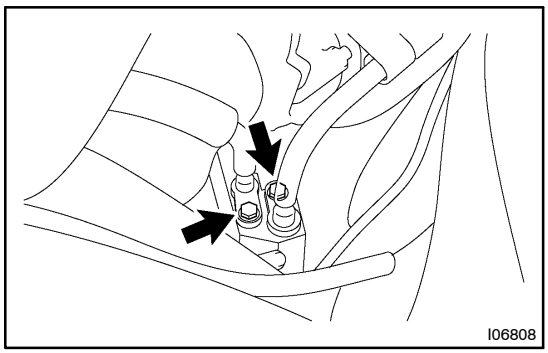


1. INSTALL COMPRESSOR

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

(b) Connect the connector.

2. INSTALL FRONT DRIVE SHAFT LH
(See page SA–30)



3. CONNECT DISCHARGE AND SUCTION HOSES

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

NOTICE:

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

HINT:

Lubricate 2 new O–rings with compressor oil and install them to the hoses.

4. INSTALL AND CHECK DRIVE BELT
(See page AC–17, AC–15)

5. CONNECT NEGATIVE (–) TERMINAL CABLE TO BATTERY

6. EVACUATE AIR FROM REFRIGERATION SYSTEM AND CHARGE SYSTEM WITH REFRIGERANT
Specified amount: 600 ± 50 g (21.16 ± 1.76 oz.)

7. INSPECT FOR LEAKAGE OF REFRIGERANT

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

8. INSPECT A/C OPERATION

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CONDENSER

AC1IQ–01

ON–VEHICLE INSPECTION

1. INSPECT CONDENSER FINS FOR BLOCKAGE OR DAMAGE

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

NOTICE:

Be careful not to damage the fins.

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

2. INSPECT CONDENSER AND FITTINGS FOR LEAKAGE

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

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

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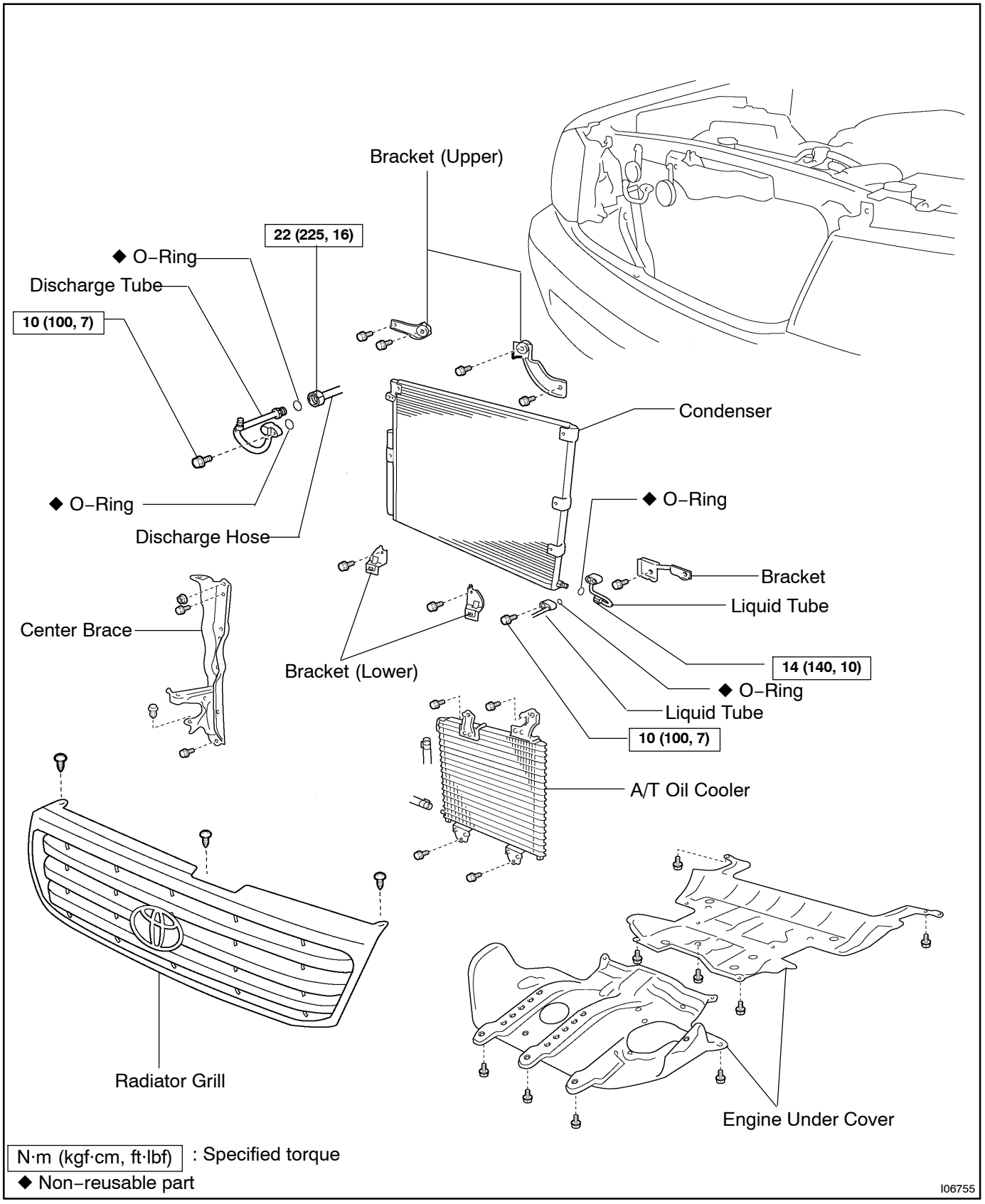
AC1IR–01

COMPONENTS



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

I06755

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AC1IS–01

REMOVAL

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

HINT:

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

Evacuate air from refrigeration system.

Charge system with refrigerant and inspect for leakage of refrigerant.

Specified amount: 600 ± 50 g (21.16 ± 1.76 oz.)

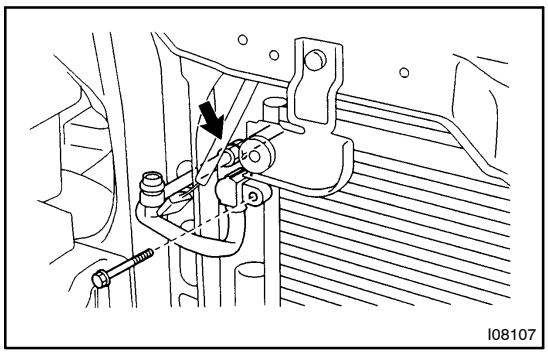
2. REMOVE THESE PARTS:

(a) Radiator grill

(b) Center brace

(c) A/T oil cooler

(d) Engine under cover


I08107

3. REMOVE DISCHARGE TUBE

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

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

(b) Loosen the nut and remove the tube.

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

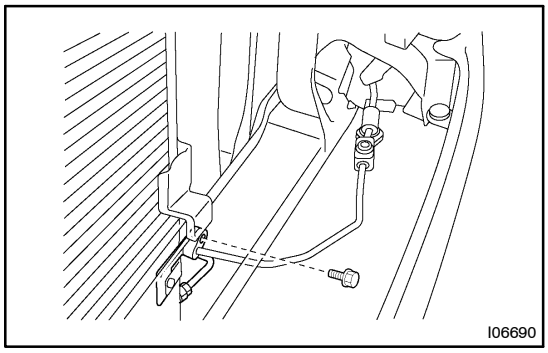
NOTICE:

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

HINT:

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

Lubricate 2 new O–rings with compressor oil and install them to the tube.


I06690

4. DISCONNECT LIQUID TUBE

Remove the bolt and disconnect the tube

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

NOTICE:

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

HINT:

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

Lubricate a new O–ring with compressor oil and install them to the tube.

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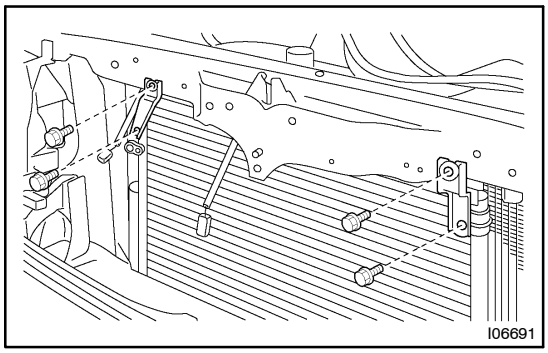
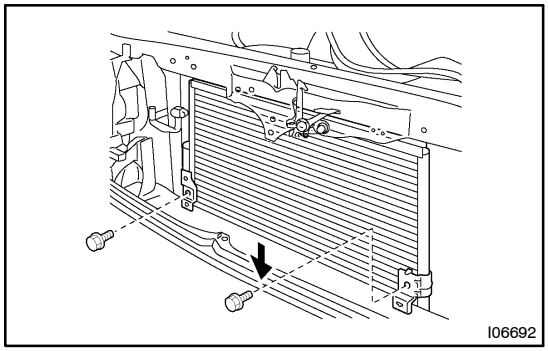


5. REMOVE CONDENSER

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



(b) Remove the 2 bolts and remove the 2 lower bracket.

(c) Remove the condenser.

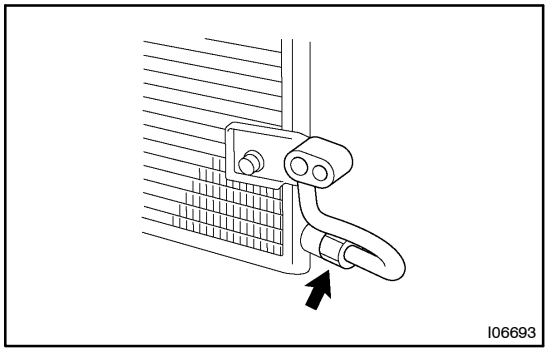
HINT:

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

If condenser is replaced, add compressor oil to condenser.

Add: 40 – 50 cc (1.4 – 1.7 fl.oz.)

Compressor oil: ND–OIL 8 or equivalent



(d) Loosen the nut and remove the liquid tube from condenser.

Torque: 14 N·m (140 kgf·cm, 10 ft·lbf)

NOTICE:

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

HINT:

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

Lubricate a new O–ring with compressor oil and install them to the tube.

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AC1IT–01

INSTALLATION

Installation is in the reverse order of removal (See page AC–61).

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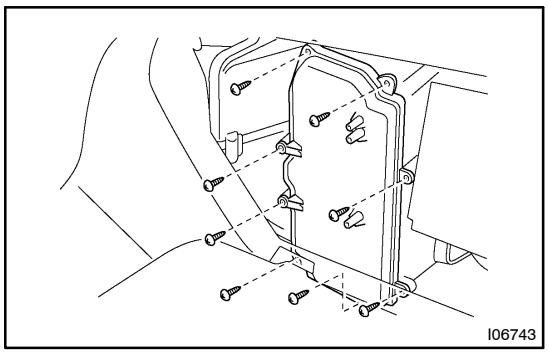
EVAPORATOR

AC1IU–01

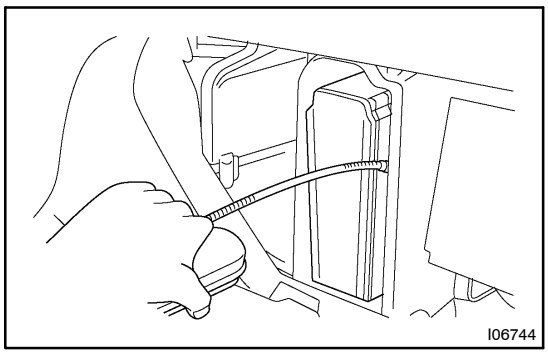
ON–VEHICLE INSPECTION

1. INSPECT FOR LEAKAGE OF REFRIGERANT

(a) Remove these parts:
  (1) Glove compartment door
  (2) Lower No. 2 finish panel
  (See page BO–86)


I06743

(b) Remove the No. 1 cooler cover.
  (1) Disconnect the connector clamp.
  (2) Remove the 8 screws and cover.


I06744

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

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

(d) Install the No. 1 cooler cover.

2. INSPECT EXPANSION VALVE

(a) Check quantity of gas during refrigeration cycle.
(b) Set on manifold gauge set.
(c) Operate A/C system at ”MAX. COOL” for approx. 5 minutes.
(d) Check expansion valve.
  Check the low pressure reading will drop to 0 kPa (0 kgf/cm^2, 0 psi).

If the low pressure reading is as specified, replace the expansion valve with the tubes.

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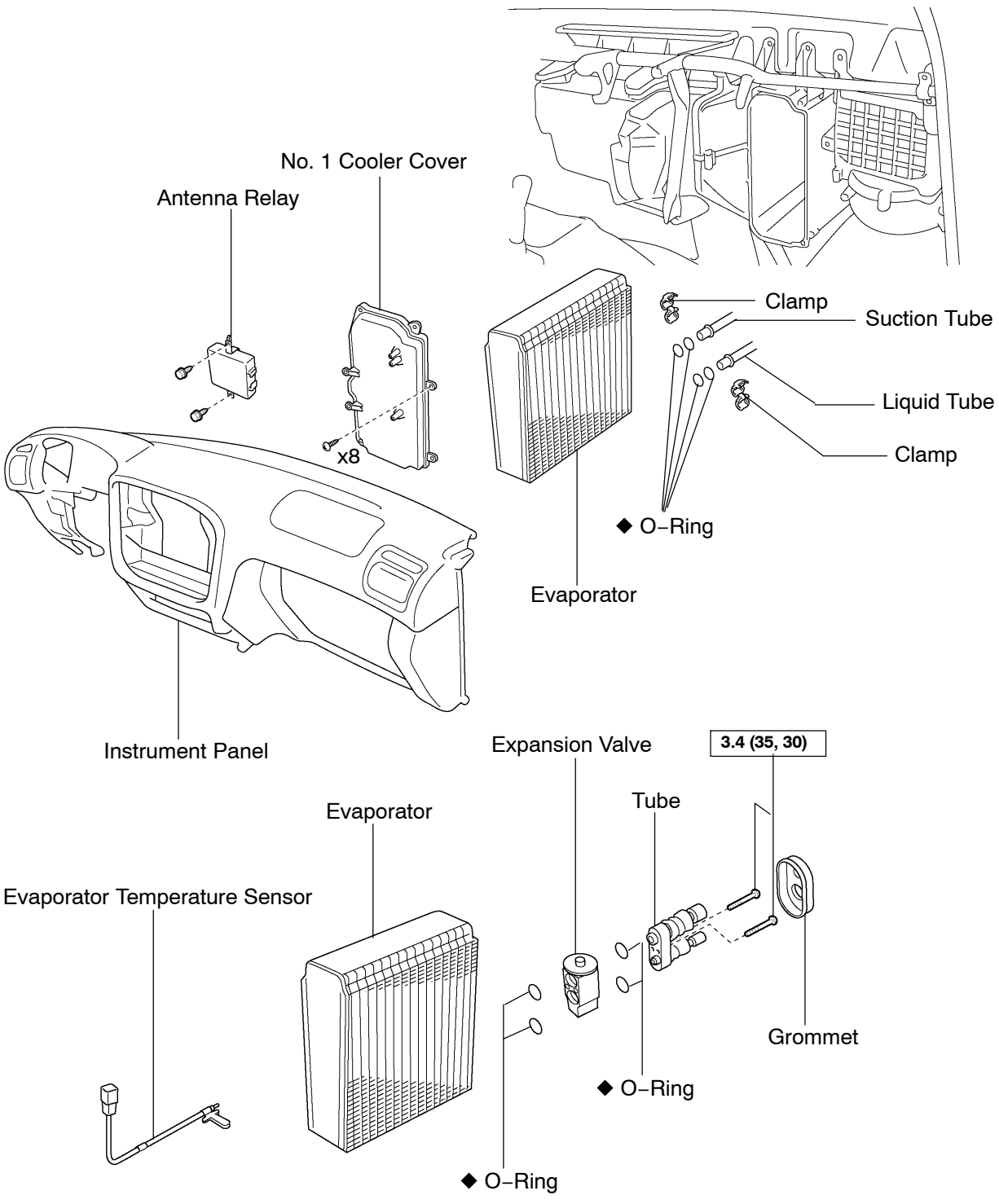
AC1IV–01

COMPONENTS



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

◆ Non–reusable part

I07272

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AC1IW–01

REMOVAL

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

HINT:

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

Evacuate air from refrigeration system.

Charge system with refrigerant and inspect for leakage of refrigerant.

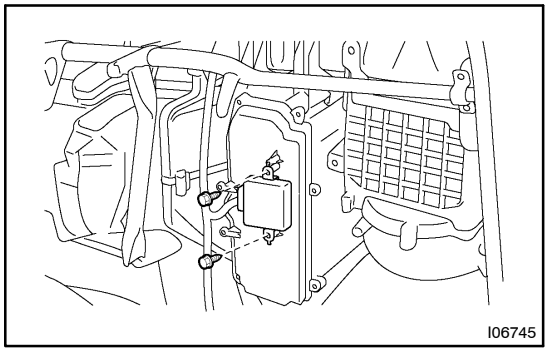
Specified amount:600 ± 50g (21.16 ± 1.76 oz.)

2. DISCONNECT LIQUID AND SUCTION TUBES FROM COOLING UNIT

(See page AC–24)

3. REMOVE INSTRUMENT PANEL

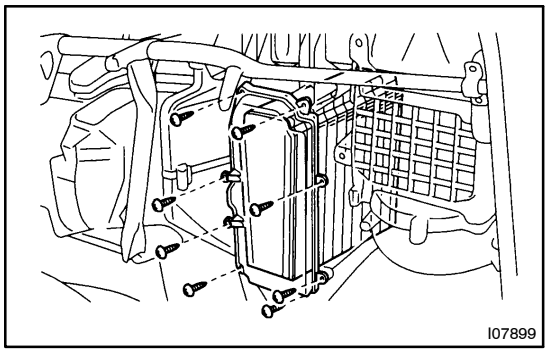
(See page BO–86)



4. REMOVE ANTENNA RELAY

(a) Disconnect the connector.

(b) Remove the 2 screws and relay.



5. REMOVE EVAPORATOR

(a) Disconnect the connector.

(b) Disconnect the connector clamp.

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

(d) Pull out the evaporator.

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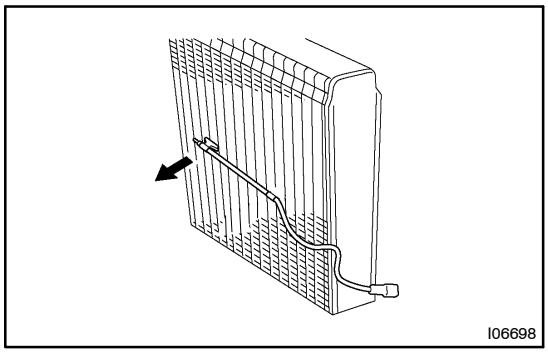
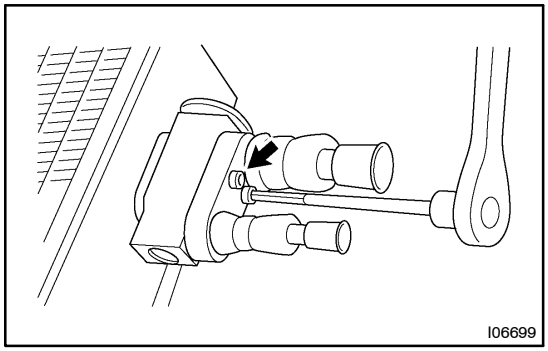
AC1IX–01

DISASSEMBLY



1. PULL OUT EVAPORATOR TEMPERATURE SENSOR



2. REMOVE EXPANSION VALVE

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

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

NOTICE:

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

HINT:

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

- Lubricate 4 new O–rings with compressor oil and install them to the valve.
- If evaporator is replaced, add compressor oil to the evaporator.

  Add: 40 cc (1.4 fl.oz.)

  Compressor oil: ND–OIL8 or equivalent

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AC1IY–01

INSPECTION

1. CHECK EVAPORATOR FINS FOR BLOCKAGE

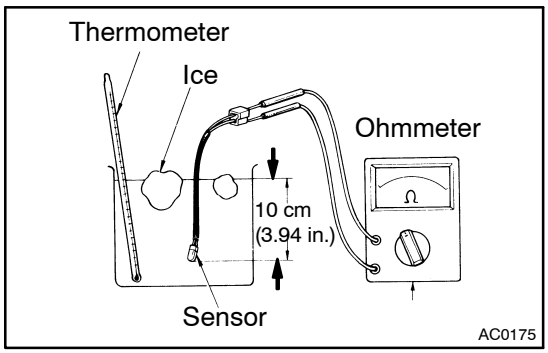
If the fins are clogged, clean them with compressed air.

NOTICE:

Never use water to clean the evaporator.

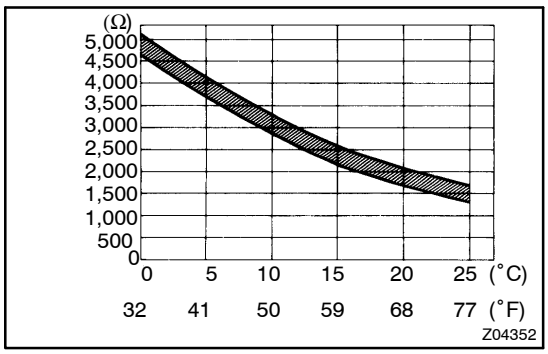
2. CHECK FITTINGS FOR CRACKS OR SCRATCHES

If necessary, repair or replace.



3. INSPECT EVAPORATOR TEMPERATURE SENSOR

(a) Place the sensor in cold water, and while changing the temperature of the water, measure resistance at the connector and at the same time, measure temperature of the water with a thermometer.



(b) Compare the 2 readings on the chart.

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

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AC1IZ–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC–67).

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AC1J0–01

INSTALLATION

Installation is in the reverse order of removal (See page AC–66).

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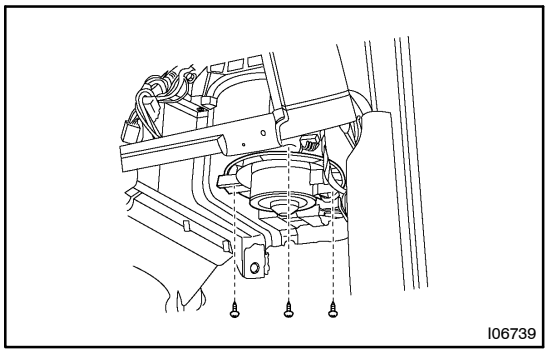


FRONT A/C BLOWER MOTOR

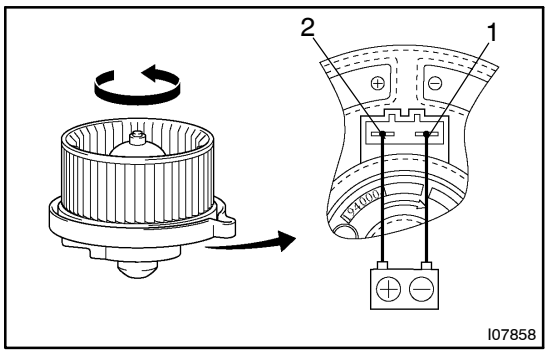
AC1J1–01

INSPECTION

1. REMOVE BLOWER MOTOR

(a) Disconnect the connector.

(b) Remove the 3 screws and blower motor.



2. INSPECT BLOWER MOTOR CIRCUIT

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

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

3. INSTALL BLOWER MOTOR

(a) Install the blower motor with 3 screws.

(b) Connect the connector.

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BLOWER RESISTOR (for Rear Heater)

AC1J3–01

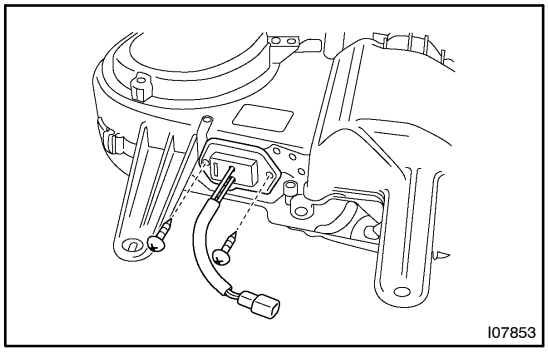
INSPECTION

1. REMOVE THESE PARTS:

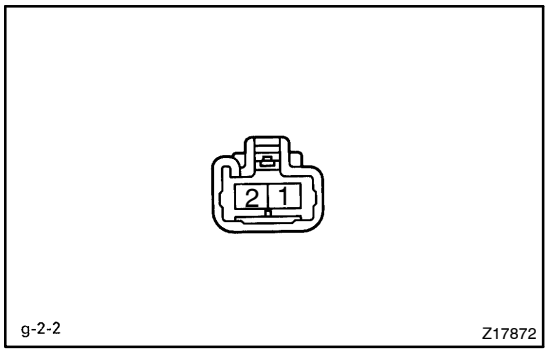
(a) Front seats
(b) Rear console box
(c) Front console box cover
(d) Lower center cluster finish panel
(e) Front door scuff plates
(f) Cowl side trims
(g) Rear door scuff pates
(h) Center pillar garnishes

2. REMOVE BLOWER RESISTOR

(a) Slide the floor carpet backward.



(b) Disconnect the connector.
(c) Remove the 2 screws and blower resistor.



3. INSPECT BLOWER RESISTOR RESISTANCE

Measure resistance between terminals.

Standard resistance: 3.2 ± 0.2 Ω

If resistance is not as specified, replace the blower resistor.

4. INSTALL BLOWER RESISTOR

5. INSTALL THESE PARTS:

(a) Center pillar garnishes
(b) Rear door scuff plates
(c) Cowl side trims
(d) Front door scuff plates
(e) Rear console box
(f) Front seats

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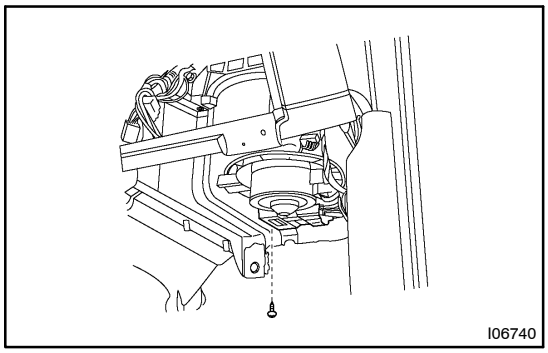


BLOWER MOTOR CONTROL RELAY

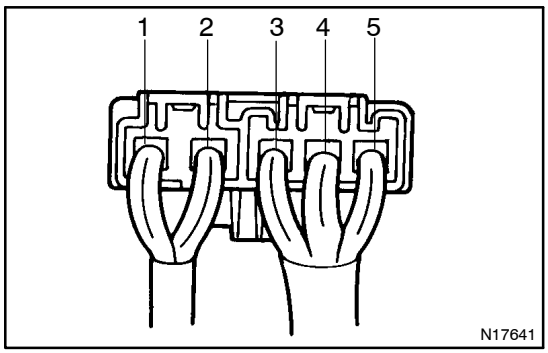
AC1J2–01

INSPECTION

1. REMOVE BLOWER MOTOR CONTROL RELAY

(a) Disconnect the connectors.

(b) Remove the screw and relay.



2. INSPECT BLOWER MOTOR CONTROL RELAY

Connect the connector to the relay and inspect the wire harness side connector from the back side as shown in the chart.

Test condition:

- Turn ignition switch to ON

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

If circuit is not as specified, replace the relay.

3. INSTALL BLOWER MOTOR CONTROL RELAY

(a) Install the relay with the screw.

(b) Connect the connectors.

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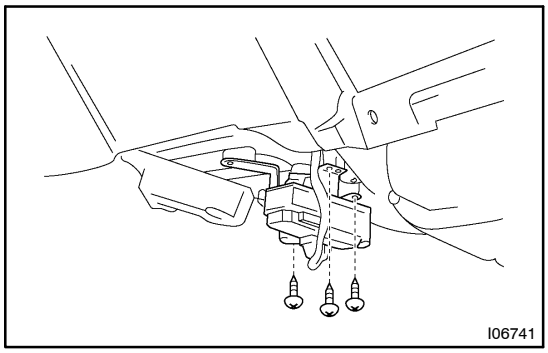


AIR MIX SERVOMOTOR

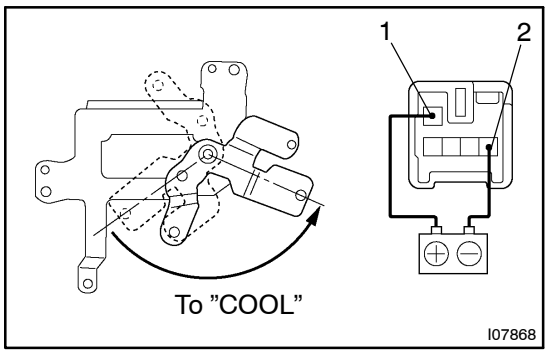
AC1J4–01

INSPECTION

1. REMOVE AIR MIX SERVOMOTOR

(a) Disconnect the connector.

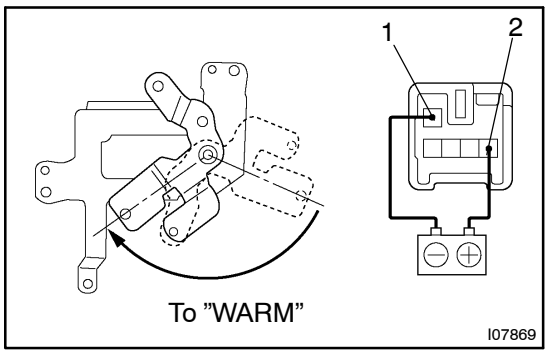
(b) Remove the 2 screws and servomotor.



2. INSPECT AIR MIX SERVOMOTOR

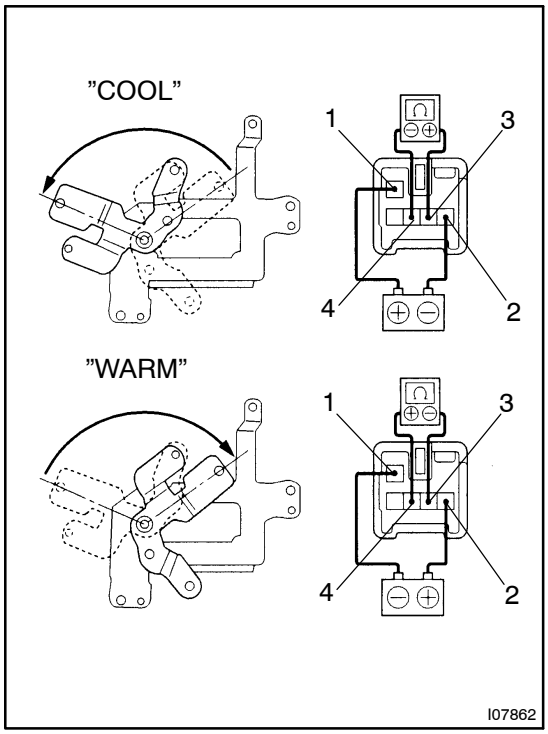
(a) Inspect servomotor operation.

(1) Connect the positive (+) lead from the battery to terminal 1 and negative (–) lead to terminal 2, then check that the arm turns to "COOL" side smoothly.



(2) Connect the positive (+) lead from the battery to terminal 2 and negative (–) lead to terminal 1, then check that the arm turns to "WARM" side smoothly.

If operations are not as specified, replace the servomotor.



(b) Inspect position sensor resistance.

Measure resistance between terminals at servomotor arm each position as shown in the chart.

Tester connection	Condition	Specified condition
4 – 5	Constant	4.2 – 7.8 kΩ
3 – 4	Arm position at "COOL"	0.76 – 1.4 kΩ
3 – 4	Arm position at "WARM"	3.4 – 6.4 kΩ

If resistance is not as specified, replace the servomotor.

3. INSTALL SERVOMOTOR

(a) Install the servomotor with the 2 screws.

(b) Connect the connector.

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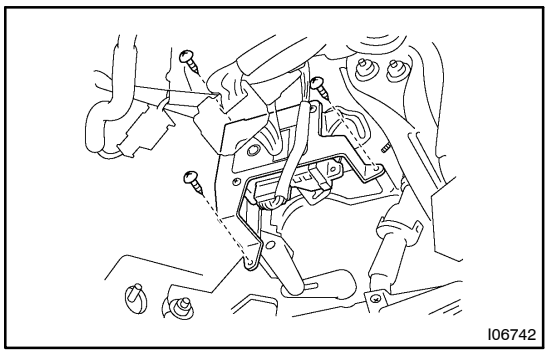
AIR OUTLET SERVOMOTOR

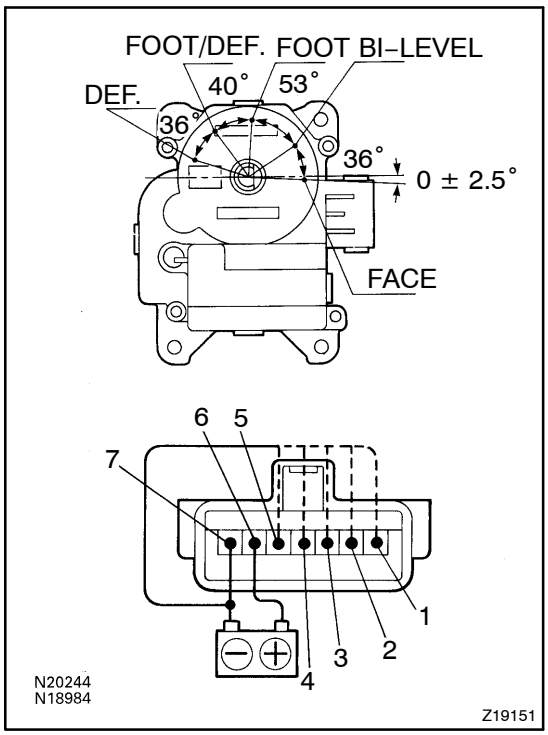
AC1J5–01

INSPECTION

1. **REMOVE LOWER NO. 1 PANEL**
(See page BO–86)



2. **REMOVE AIR OUTLET SERVOMOTOR**
(a) Disconnect the connector.
(b) Remove the 3 screws and servomotor.



3. **INSPECT AIR OUTLET SERVOMOTOR OPERATION**
(a) Connect the positive (+) lead from the battery to terminal 6 and the negative (–) lead to terminal 7.
(b) Connect the negative (–) lead from the battery to each terminal and check that the shaft rotates at each position, as shown in the chart.

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

If operation is not as specified, replace the servomotor.

4. **INSTALL AIR OUTLET SERVOMOTOR**
(a) Install the servomotor with the 3 screws.
(b) Connect the connector.

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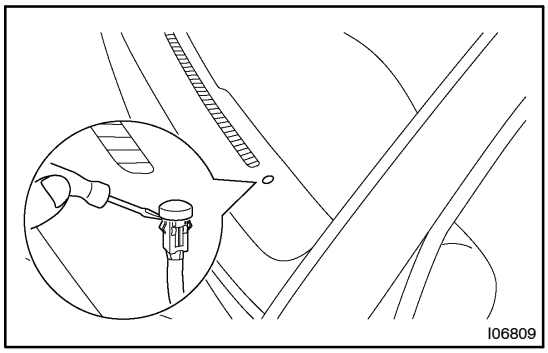


SOLAR SENSOR

AC1J6–01

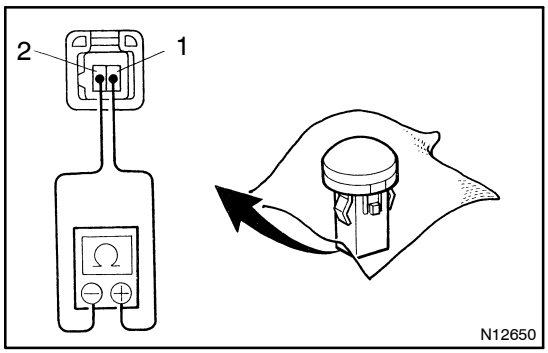
INSPECTION

1. REMOVE SOLAR SENSOR

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

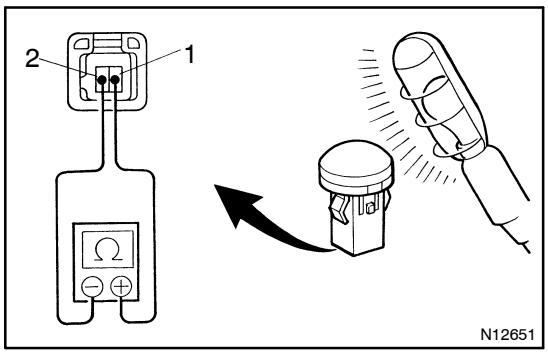
HINT:

Tape the screwdriver tip before use.



2. INSPECT SOLAR SENSOR CIRCUIT

(a) Cover the sensor with a cloth, check that the no continuity exists between terminals.



(b) Remove the cloth from the sensor and subject the sensor to electric light, check that continuity exists between terminals.

If continuity is not as specified, replace the sensor.

3. INSTALL SOLAR SENSOR

(a) Connect the connector.

(b) Insert the sensor to the instrument panel.

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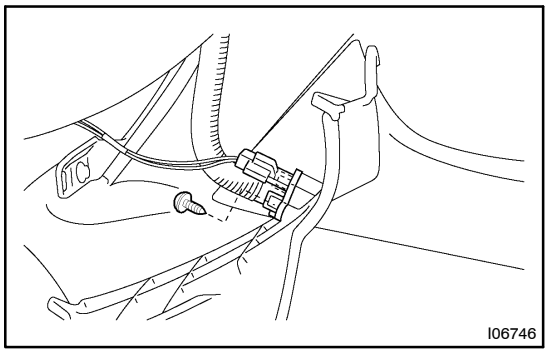
ROOM TEMPERATURE SENSOR

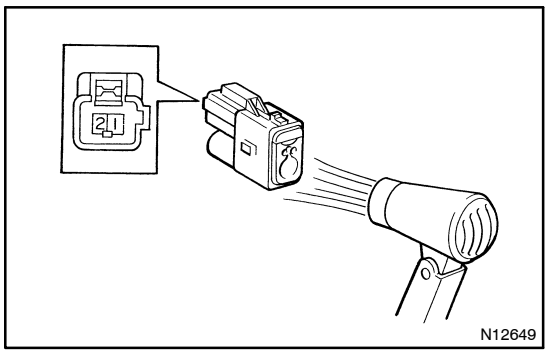
AC1J7–01

INSPECTION



1. REMOVE ROOM TEMPERATURE SENSOR

(a) Remove the lower No. 1 panel set screw.
(b) Release the lower No. 1 panel set claws.
(c) Disconnect the connector and aspirator hose.
(d) Remove the screw and sensor.



2. INSPECT ROOM TEMPERATURE SENSOR

Measure resistance between terminals at each temperature as shown in the chart.

Temperature	Specified condition
25 °C (77 °F)	1.7 ± 0.85 Ω
50 °C (122 °F)	0.6 ± 0.1 Ω

If resistance is not as specified, replace the sensor.

3. INSTALL ROOM TEMPERATURE SENSOR

(a) Install the sensor to the lower No. 1 panel with the screw.
(b) Connect the aspirator hose and connector.
(c) Install the lower No. 1 panel with the screw.

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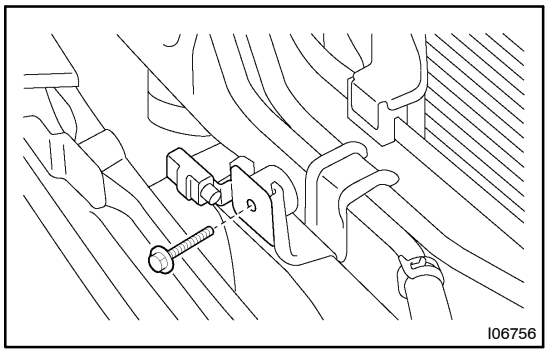


AMBIENT TEMPERATURE SENSOR

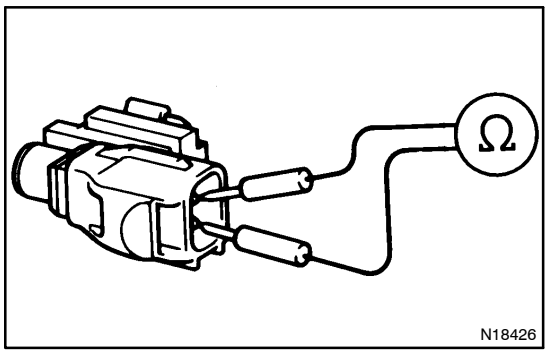
AC1J8–01

INSPECTION

1. REMOVE AMBIENT TEMPERATURE SENSOR

(a) Disconnect the connector.

(b) Remove the bolt and the sensor.



2. INSPECT AMBIENT TEMPERATURE SENSOR

Measure resistance between terminals.

Standard resistance: 1.6 – 1.8 kΩ at 25 °C (77 °F)

If resistance is not as specified, replace the sensor.

3. INSTALL AMBIENT TEMPERATURE SENSOR

(a) Install the sensor to condenser upper bracket.

(b) Connect the connector.

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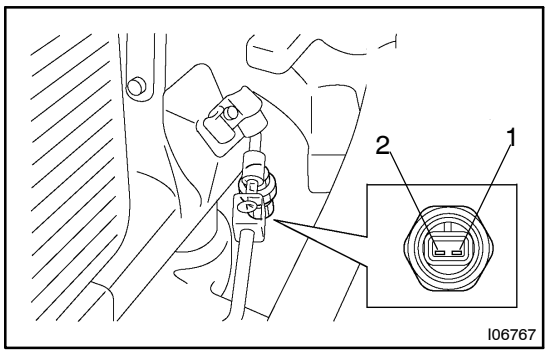
PRESSURE SWITCH

AC1JD–01

ON–VEHICLE INSPECTION

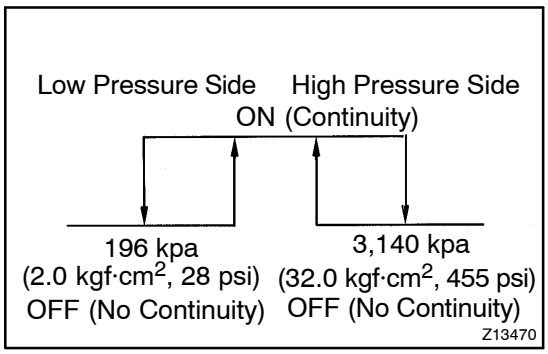
1. SET VEHICLE IN THESE CONDITION

(a) Running engine at 1,500 rpm
(b) Blower speed control switch at ”HI” position
(c) Temperature control dial at ”MAX. COOL” position
(d) Set on manifold gauge set



2. INSPECT PRESSURE SWITCH OPERATION

(a) Disconnect the connector.



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

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

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AC1JE–01

REMOVAL

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

HINT:

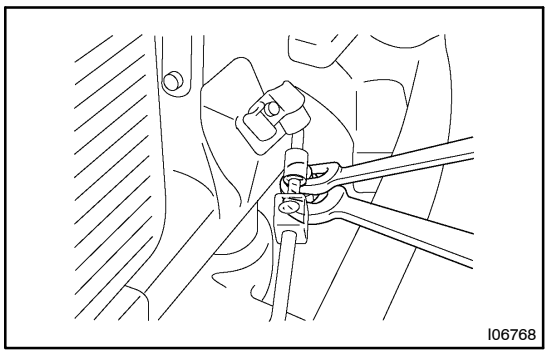
At the time of installation, please refer to the following item.

Evacuate air from refrigeration system.

Charge system with refrigerant and inspect for leakage of refrigerant.

Specified amount: 600 ± 50 g (21.16 ± 1.76 oz.)

2. REMOVE RADIATOR GRILL



3. REMOVE PRESSURE SWITCH FROM LIQUID TUBE

Disconnect the connector and remove the pressure switch.

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

HINT:

- Lock the switch mount on the tube with an open end wrench, being careful not to deform the tube, and remove the switch.
- At the time of installation, please refer to the following item.
  Lubricate a new O–ring with compressor oil and install the switch.

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AC1JF–01

INSTALLATION

Installation is in the reverse order of removal (See page AC–80).

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HEATER MAIN RELAY

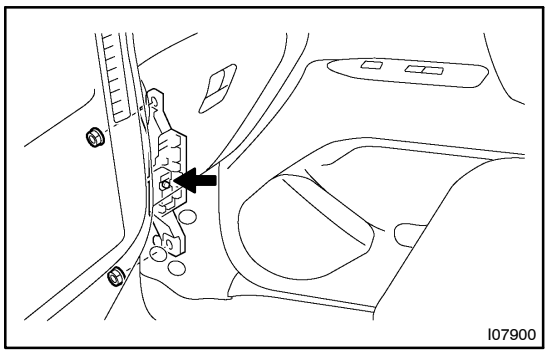
AC1J9–01

INSPECTION

1. REMOVE THESE PARTS:

(a) Front door scuff plate RH

(b) Cowl side trim RH



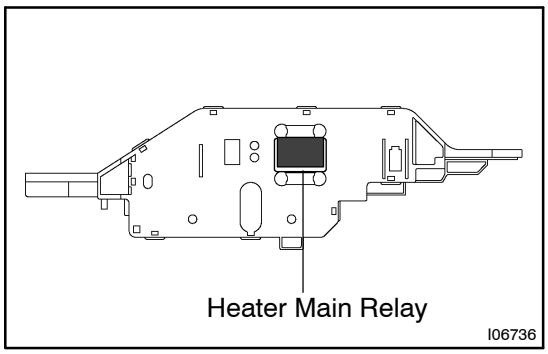
2. REMOVE HEATER MAIN RELAY

(a) Disconnect the connectors.

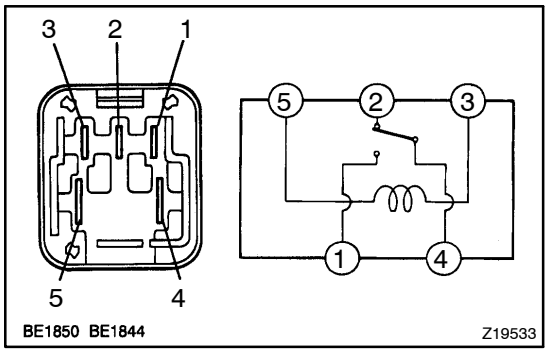
(b) Remove the 2 No. 3 junction block set nuts.

(c) Loosen the Connector set bolt.

(d) Remove the 2 No. 3 junction block set nuts.



(e) Remove the heater main relay from junction block.



3. INSPECT HEATER MAIN RELAY CONTINUITY

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

If continuity is not as specified, replace the relay.

4. INSTALL HEATER MAIN RELAY TO NO. 3 JUNCTION BLOCK

5. INSTALL 2 NO. 3 JUNCTION BLOCK SET NUTS

6. INSTALL THESE PARTS:

(a) Cowl side trim RH

(b) Front door scuff plate RH

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REAR HEATER RELAY

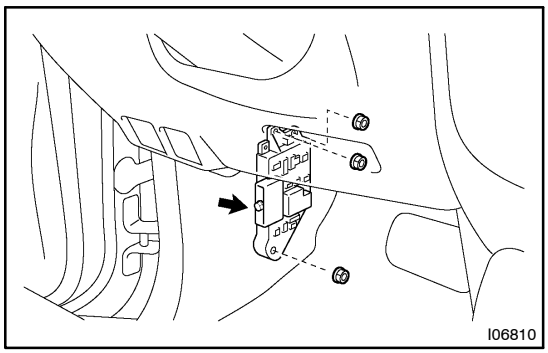
AC1JC–01

INSPECTION

1. REMOVE THESE PARTS:

(a) Front door scuff plate LH

(b) Cowl side trim LH



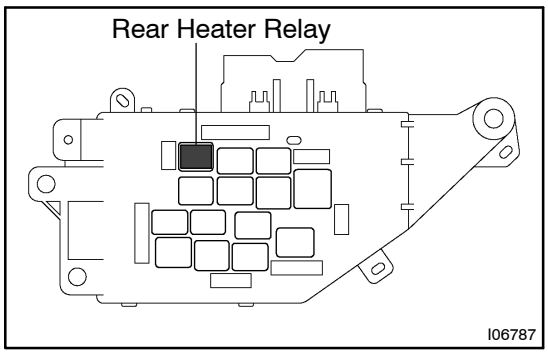
2. REMOVE REAR HEATER RELAY

(a) Disconnect the connectors.

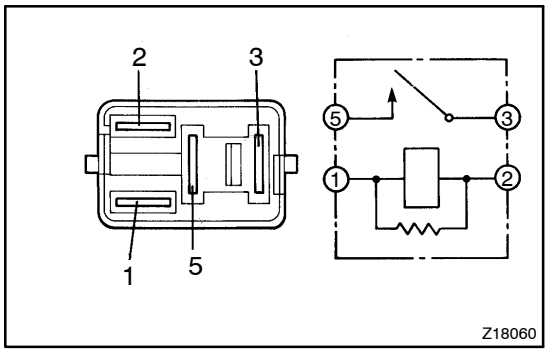
(b) Remove the 3 No.2 junction block set nuts.

(c) Loosen the connector set bolt.

(d) Pull out the junction block.



(e) Remove the relay



3. INSPECT REAR HEATER 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. INSTALL RELAY

5. INSTALL 3 NO.2 JUNCTION BLOCK SET NUTS

6. INSTALL THESE PARTS:

(a) Cowl side trim LH

(b) Front door scuff plate LH

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REAR HEATER HI RELAY

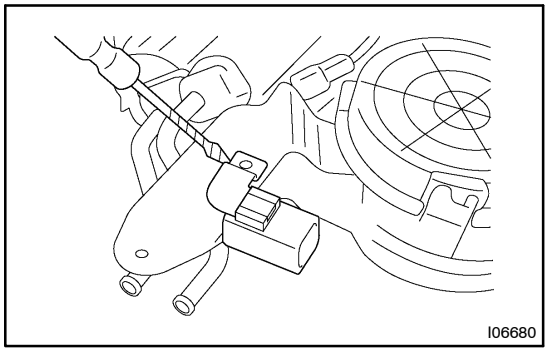
AC1JB–01

INSPECTION

1. REMOVE THESE PARTS:

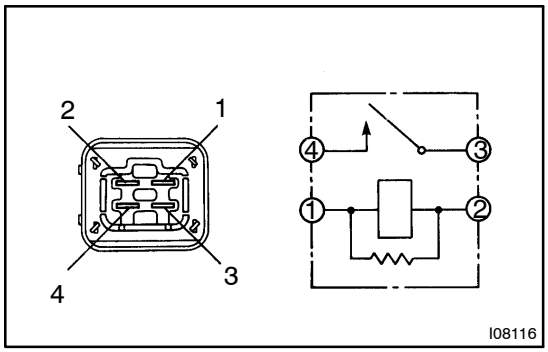
(a) Front seats
(b) Rear heater control assembly
(See page AC–95)
(c) Rear console box
(d) Front console box cover
(e) Lower center cluster finish panel
(f) Front door scuff plate
(g) Cowl side trims
(h) Rear door scuff plates
(i) Center pillar garnishes

2. SLIDE FLOOR CARPET BACKWARD



3. REMOVE REAR HEATER RELAY

(a) Disconnect the connector.
(b) Using a screwdriver, release the claw and remove the relay.



4. INSPECT REAR HEATER RELAY CONTINUITY

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

If continuity is not as specified, replace the relay.

5. INSTALL RELAY

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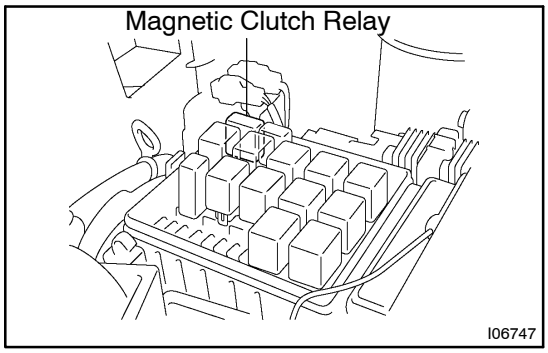
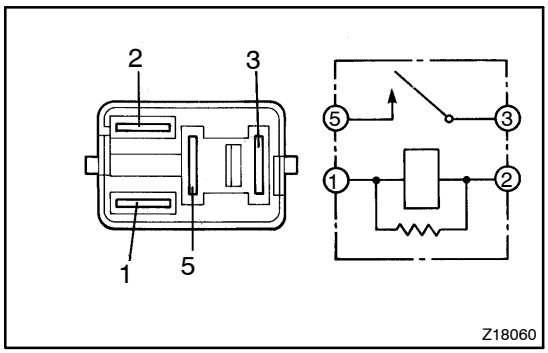


MAGNETIC CLUTCH RELAY

AC1JA–01

INSPECTION

1. REMOVE MAGNETIC CLUTCH RELAY (Marking: MG CLT) FROM ENGINE ROOM RELAY BLOCK



2. INSPECT MAGNETIC CLUTCH RELAY (Marking: MG CLT) CONTINUITY

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

If continuity is not as specified, replace the relay.

3. INSTALL RELAY TO ENGINE ROOM RELAY BLOCK

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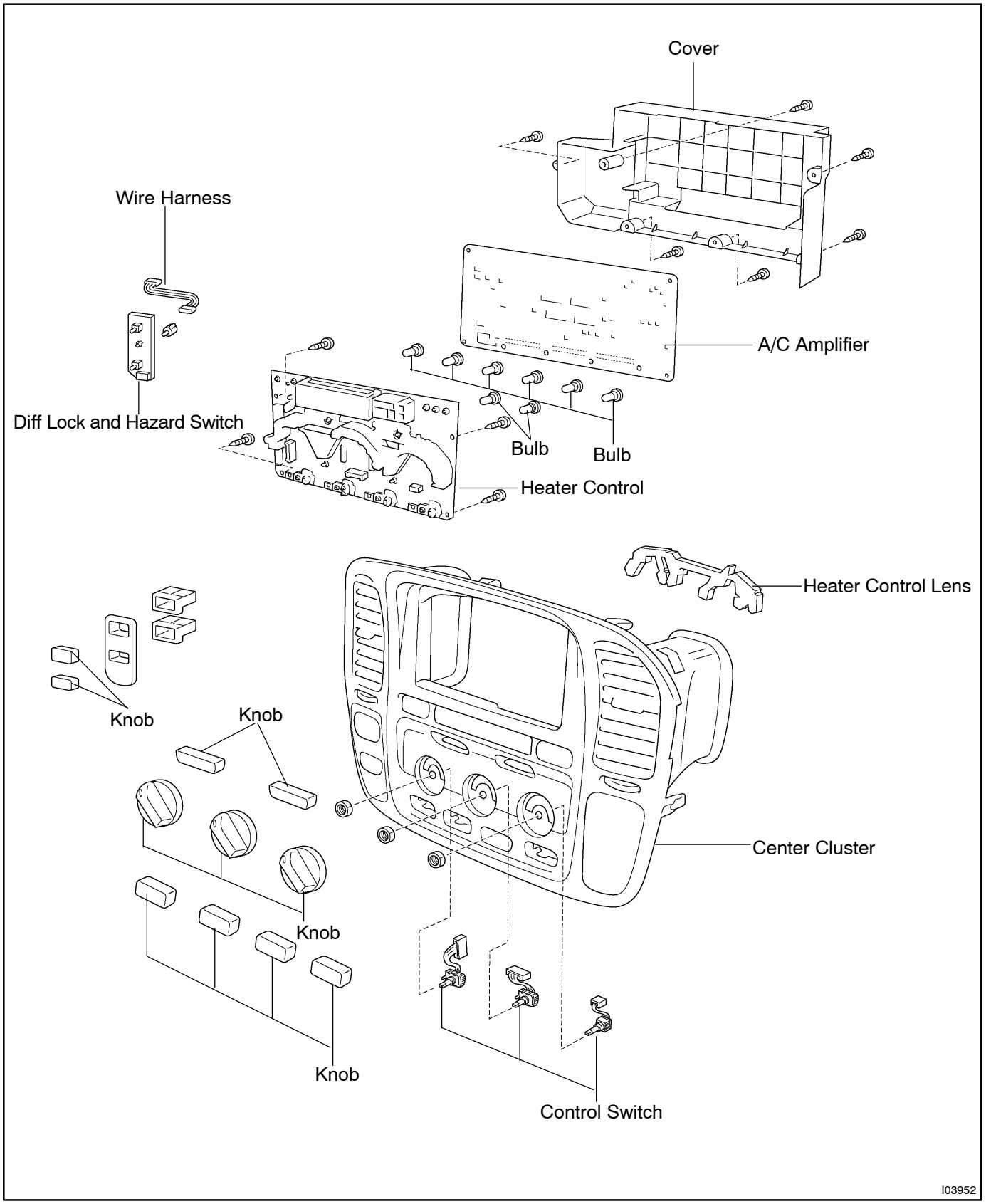
AIR CONDITIONING CONTROL ASSEMBLY

AC1JG–01

COMPONENTS



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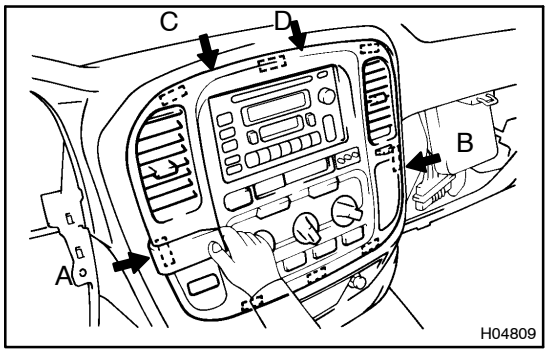
AC1JH–01



REMOVAL

REMOVE A/C CONTROL ASSEMBLY

(a) Using a moulding remover, remove the center cluster in order ”A”, ”B”, ”C”, ”D”, as shown in the illustration.

(b) Disconnect the connector.

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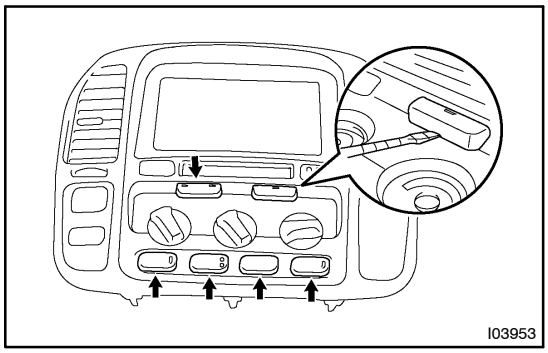
AC1JI–01

DISASSEMBLY



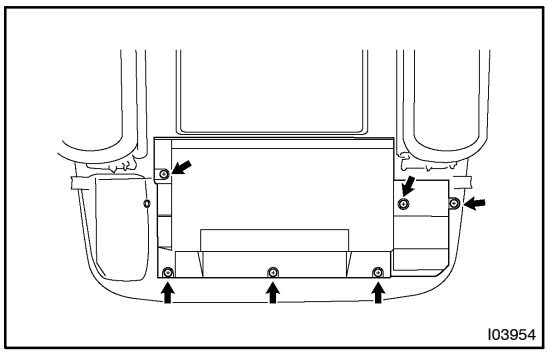
1. REMOVE KNOB

(a) Pull out the dial knobs.

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

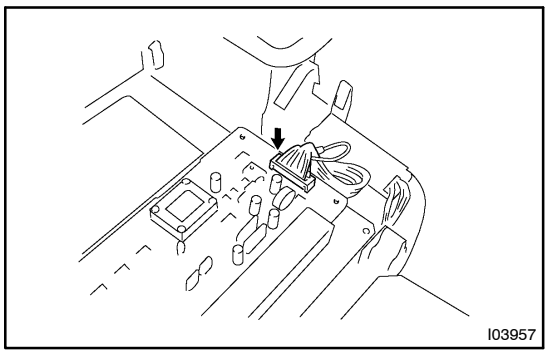
HINT:

Tape the screwdriver tip before use.

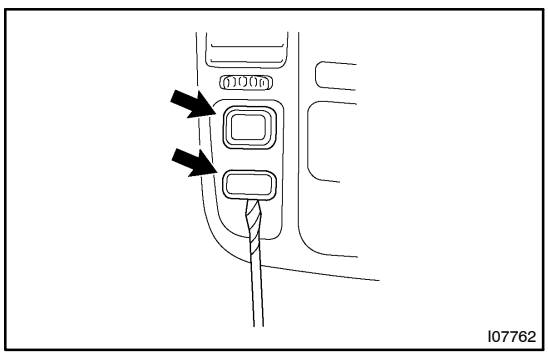


2. REMOVE A/C AMPLIFIER

(a) Remove the 6 screws and cover.



(b) Disconnect the connector and remove the amplifier.

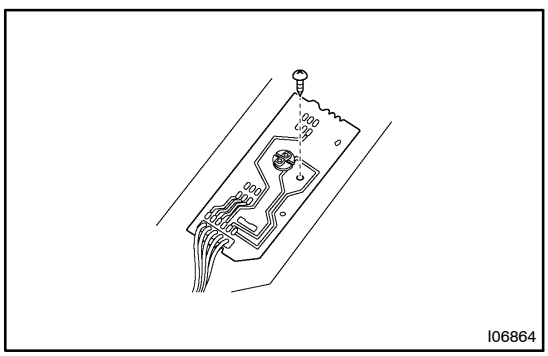


3. REMOVE DIFF LOCK AND HAZARD SWITCH

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

HINT:

Tape the screwdriver tip before use.



(b) Remove the screw and switch.

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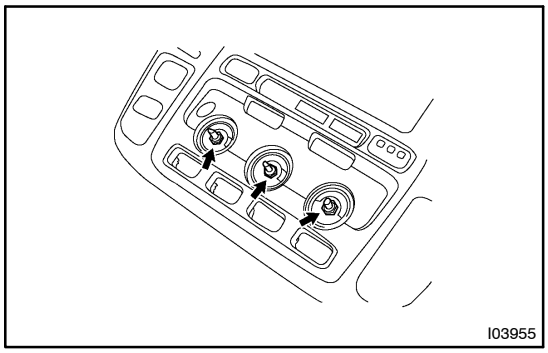
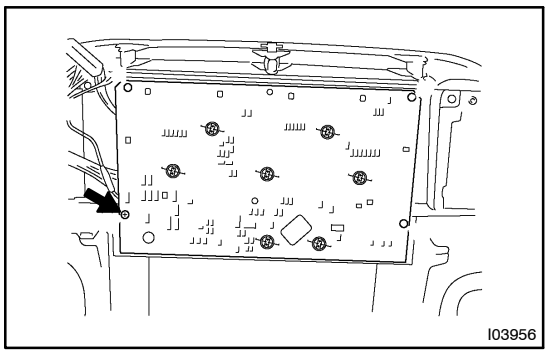
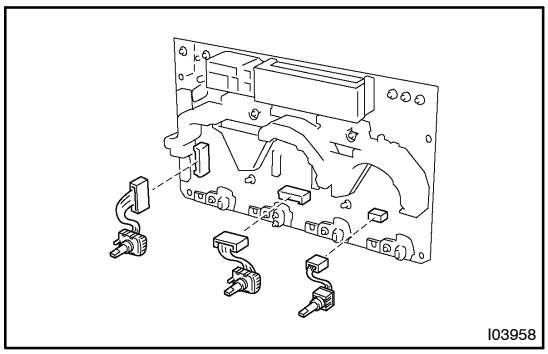


4. REMOVE HEATER CONTROL

(a) Remove the 3 nuts from the control switches.



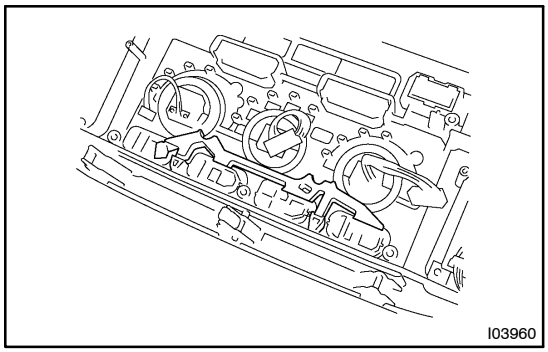
(b) Remove the 4 screws and heater control ,then disconnect the connectors.



5. REMOVE CONTROL SWITCHES

Disconnect the connectors and remove the switches.

6. REMOVE BULBS



7. REMOVE HEATER CONTROL LENS

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AC1JJ–01

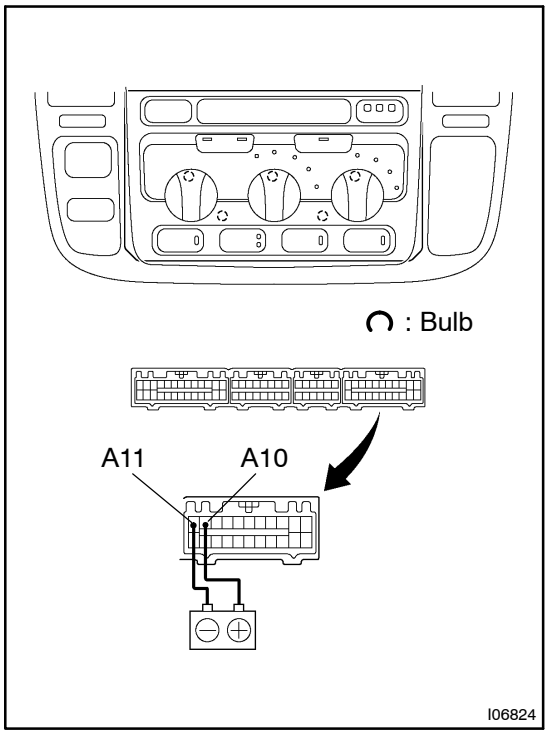
INSPECTION

1. INSPECT ILLUMINATION OPERATION

(a) Connect the positive (+) lead from the battery to terminal A–10 and negative (–) lead to terminal A–11 then check that the illuminations lights up.

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

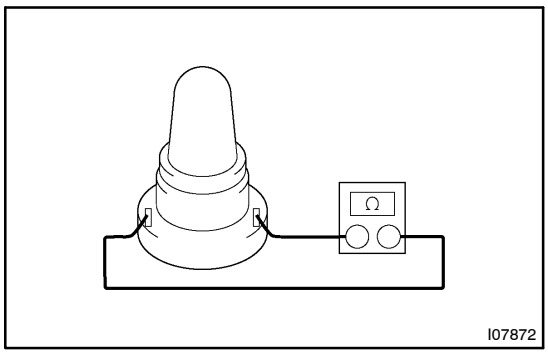
(b) Remove the bulb (See page AC–88).



(c) Apply the tester as shown in the illustration to the test for continuity.

If continuity exists, replace the heater control.

If no continuity exists, replace the bulb.

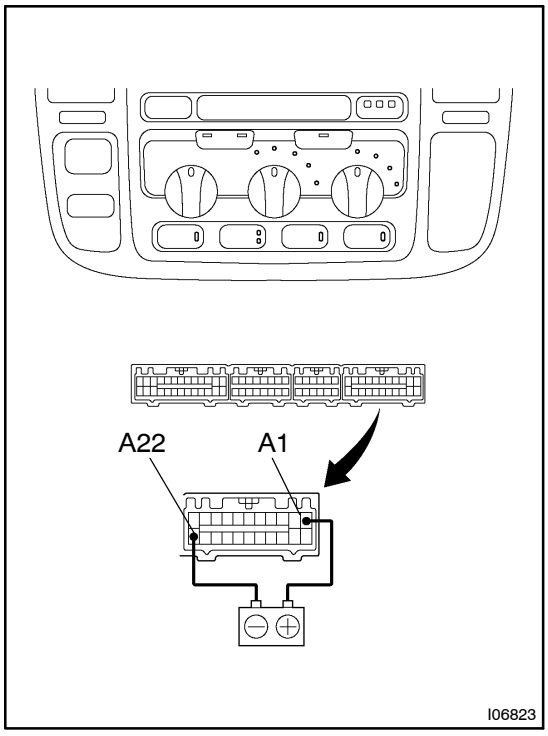


2. INSPECT INDICATORS OPERATION

(a) Connect the positive (+) lead from the battery to terminal A–1 and negative (–) lead to terminal A–22.

(b) Check that the indicators light up while operate the switches.

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



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AC1JK–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC–88).

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AC1JL–01

INSTALLATION

Installation is in the reverse order of removal (See page AC–87).

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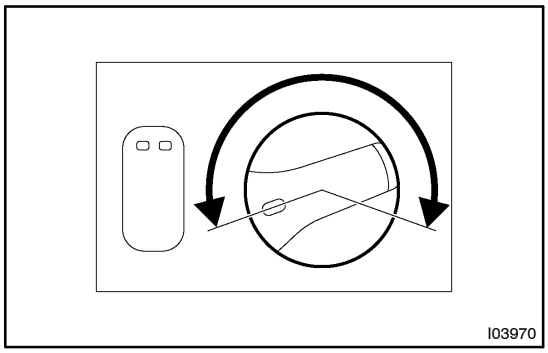

REAR HEATER CONTROL ASSEMBLY

AC1JM–01

ON–VEHICLE INSPECTION

INSPECT HEATER CONTROL DIAL OPERATION

Move the control dial to left and right then check that click sound can be heard and recoil is felt.

If click sound can not be heard or recoil is felt, adjust the control cable or check control cable and heater control assembly.

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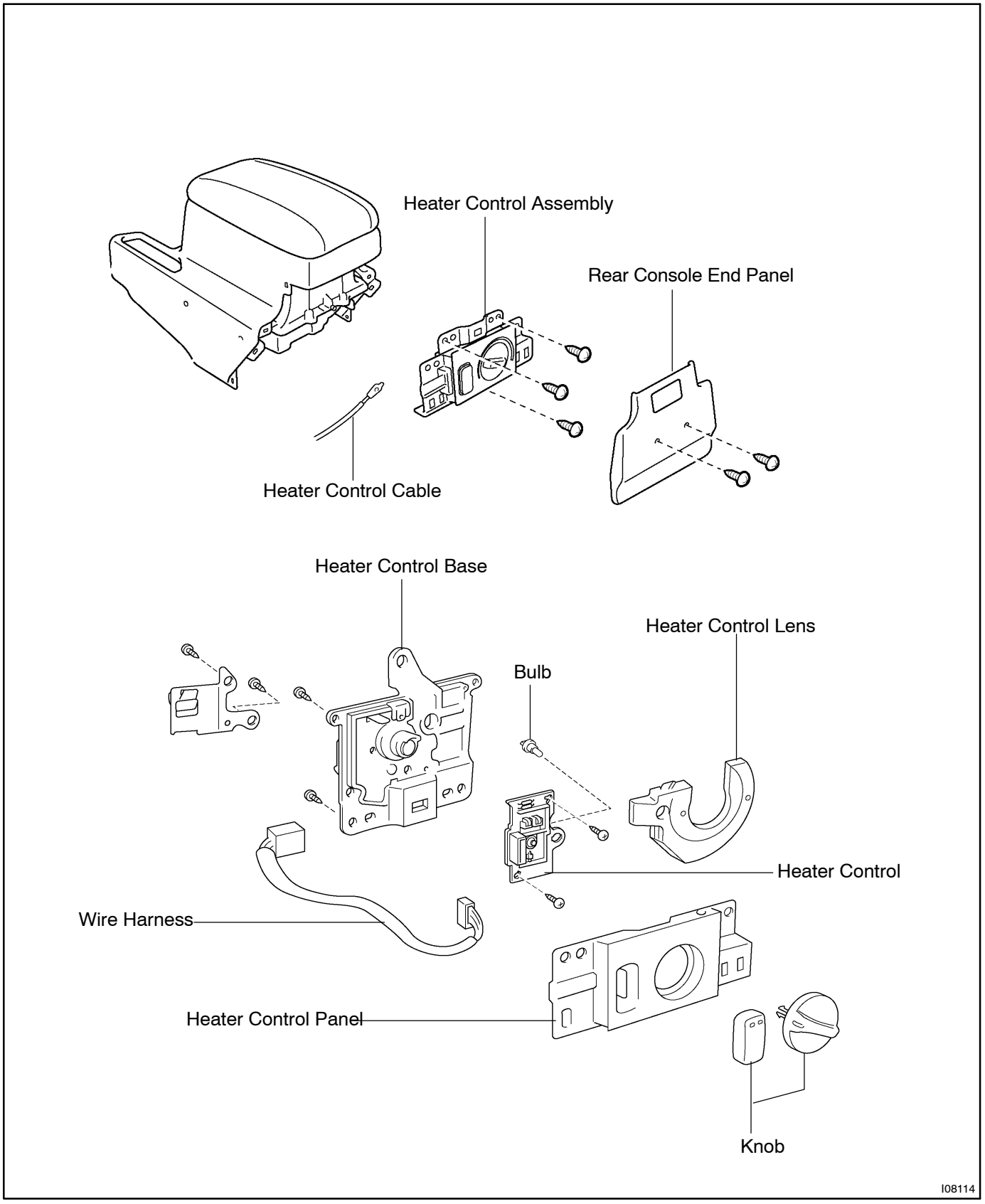
AC1JN–01

COMPONENTS



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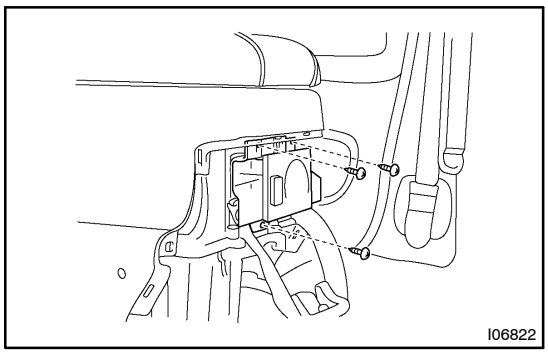
AC1JO–01

REMOVAL

1. REMOVE REAR CONSOLE END PANEL
(See page BO–86)



2. REMOVE HEATER CONTROL ASSEMBLY

(a) Turn the heater control dial to ”MAX. WARM” position.

(b) Remove the 3 screws and heater control assembly then disconnect the connector and control cable.

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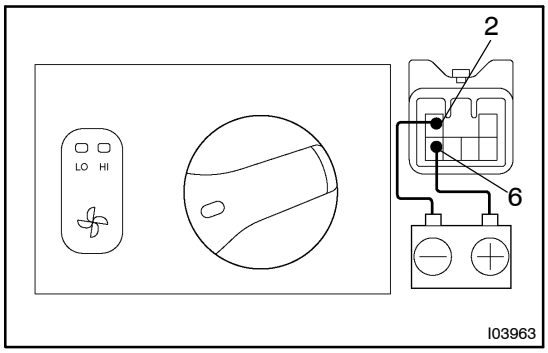
AC1JP–01

INSPECTION

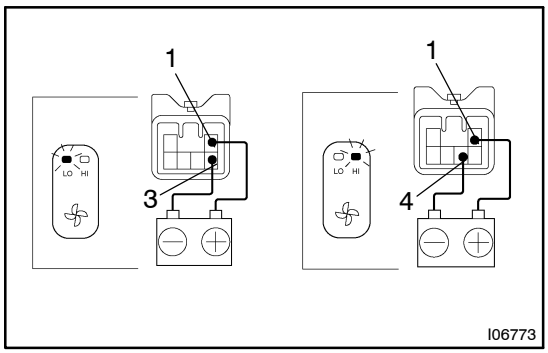
1. INSPECT HEATER CONTROL ASSEMBLY

(a) Connect the positive (+) lead from the battery to terminal 2 and negative (–) lead to terminal 6 then check that the illumination lights up



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

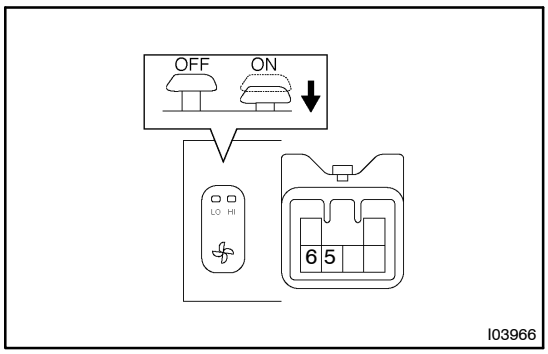
(b) Connect the positive (+) lead from the battery to terminal 1 and negative (–) lead to each terminal, then check that the ”LO” and ”HI” indicators light up as shown in the chart.



Tester connection	Indicator
3	LO
4	HI

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

(c) Check the continuity exists between terminals 5 and 6 while switch is pressed.



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

2. INSPECT HEATER CONTROL

(a) Disassemble heater control assembly.

(1) Release the 2 claws and pull out the temperature control knob.

(2) Using a screwdriver, pull out the switch knob.

HINT:

Tape the screwdriver tip before use.

(3) Remove the 2 screws and heater control upper retainer.

(4) Remove the 2 screws and separate the heater control panel and heater control base.

(5) Remove the heater control lens.

(6) Remove the 2 screws and heater control.

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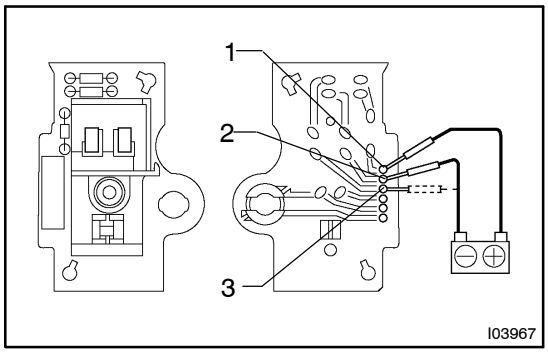
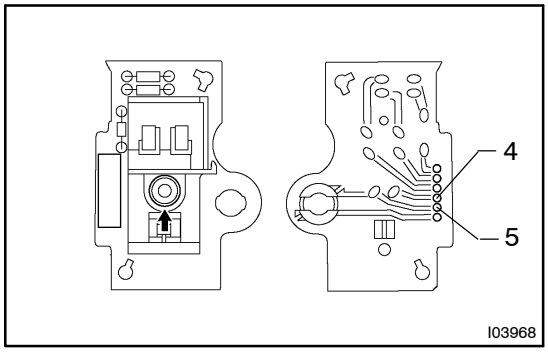


(b) Inspect heater control.

(1) Connect the positive (+) lead from the battery to terminal 1 and negative (–) lead to each terminal, then check that the ”LO” and ”HI” indicators light up as shown in the chart.

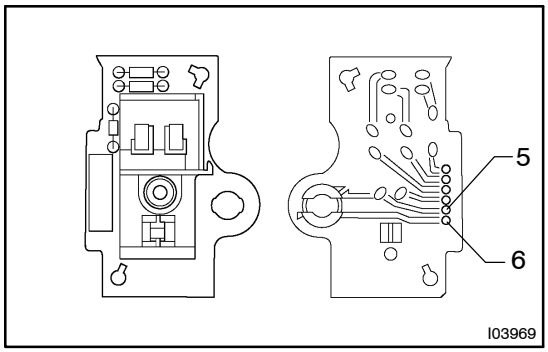
Tester connection	Indicator
2	LO
3	HI

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



(2) Check the continuity exists between terminals 4 and 5 while switch is pressed.

If no continuity exists, replace the heater control.
If continuity exists check the wire harness.



(3) Check the continuity exists between terminals 5 and 6.

If no continuity exists, replace the heater control.
If continuity exists check the wire harness.

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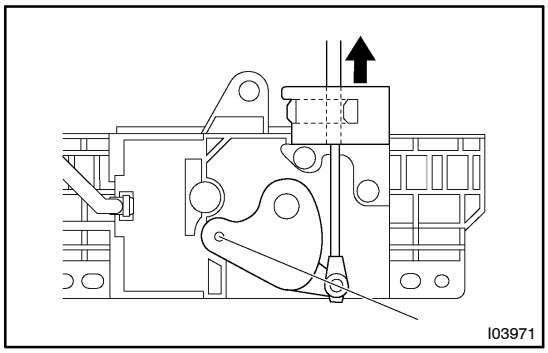
AC1JQ–01



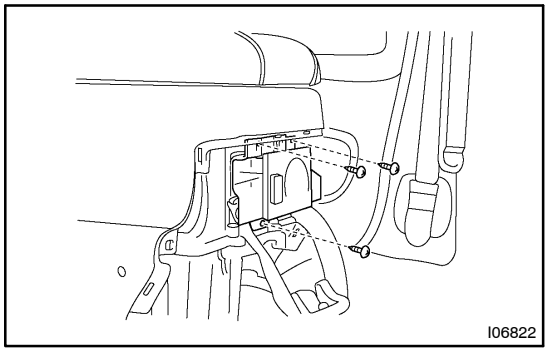
INSTALLATION

1. INSTALL HEATER CONTROL ASSEMBLY

(a) Connect the heater control cable.
  (1) Set the heater control dial to ”MAX. WARM” position.
  (2) Connect the heater control cable to the heater control assembly.

HINT:

Lock the clamp during lightly pulling the outer cable in the direction, as shown in the illustration by an arrow.



(b) Connect the connector to heater control assembly.
(c) Install the heater control assembly to rear console box with the 3 screws.

2. INSTALL REAR CONSOLE END PANEL

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A INTRODUCTION

This manual consists of the following 12 sections:

No.	Section	Description
A	INDEX	Index of the contents of this manual.
	INTRODUCTION	Brief explanation of each section.
B	HOW TO USE THIS MANUAL	Instructions on how to use this manual.
C	TROUBLE-SHOOTING	Describes the basic inspection procedures for electrical circuits.
D	ABBREVIATIONS	Defines the abbreviations used in this manual.
E	GLOSSARY OF TERMS AND SYMBOLS	Defines the symbols and functions of major parts.
F	RELAY LOCATIONS	Shows position of the Electronic Control Unit, Relays, Relay Block, etc. This section is closely related to the system circuit.
G	ELECTRICAL WIRING ROUTING	Describes position of Parts Connectors, Splice points, Ground points, etc. This section is closely related to the system circuit.
H	INDEX	Index of the system circuits.
	SYSTEM CIRCUITS	Electrical circuits of each system are shown from the power supply through ground points. Wiring connections and their positions are shown and classified by code according to the connection method. (Refer to the section, “How to use this manual”). The “System Outline” and “Service Hints” useful for troubleshooting are also contained in this section.
I	GROUND POINTS	Shows ground positions of all parts described in this manual.
J	OVERALL ELECTRICAL WIRING DIAGRAM	Provides circuit diagrams showing the circuit connections.
K	POWER SOURCE (Current Flow Chart)	Describes power distribution from the power supply to various electrical loads.
L	PART NUMBER OF CONNECTORS	Indicates the part number of the connectors used in this manual.

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This manual provides information on the electrical circuits installed on vehicles by dividing them into a circuit for each system.

The actual wiring of each system circuit is shown from the point where the power source is received from the battery as far as each ground point. (All circuit diagrams are shown with the switches in the OFF position.)

When troubleshooting any problem, first understand the operation of the circuit where the problem was detected (see System Circuit section), the power source supplying power to that circuit (see Power Source section), and the ground points (see Ground Points section). See the System Outline to understand the circuit operation.

When the circuit operation is understood, begin troubleshooting of the problem circuit to isolate the cause. Use Relay Location and Electrical Wiring Routing sections to find each part, junction block and wiring harness connectors, wiring harness and wiring harness connectors, splice points, and ground points of each system circuit. Internal wiring for each junction block is also provided for better understanding of connection within a junction block.
Wiring related to each system is indicated in each system circuit by arrows (from__, to__). When overall connections are required, see the Overall Electrical Wiring Diagram at the end of this manual.

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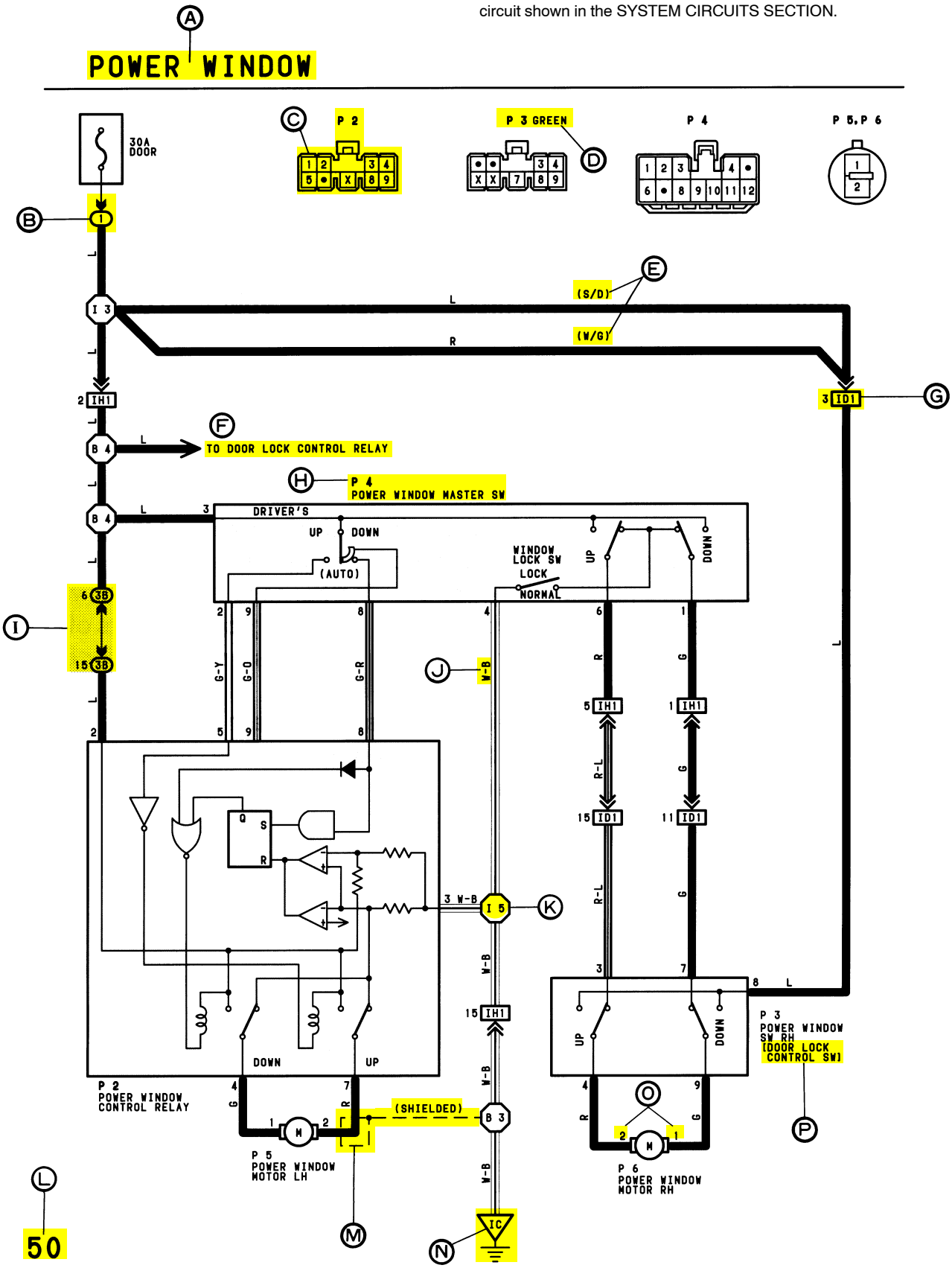
* The system shown here is an EXAMPLE ONLY. It is different to the actual circuit shown in the SYSTEM CIRCUITS SECTION.



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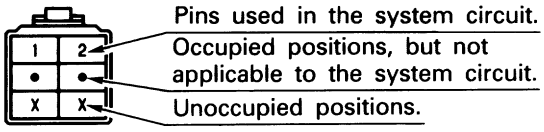
A : System Title

B : Indicates a Relay Block. No shading is used and only the Relay Block No. is shown distinguish it from the J/B.

Example: (1) Indicates Relay Block No. 1.

C : Indicates the connector to be connected to a part (the numeral indicates the pin No.)
Explanation of pin use.



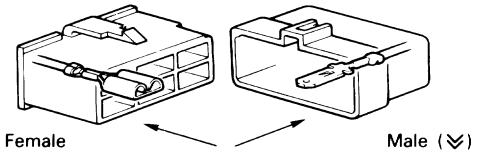
The pins shown are only for the highest grade, or only include those in the specification.

D : Connector Color Connectors not indicated are milky white in color:

E : ( ) is used to indicate different wiring and connector, etc. when the vehicle model, engine type, or specification is different.

F : Indicates related system.

G : Indicates the wiring harness and wiring harness connector. The wiring harness with male terminal is shown with arrows (⩛).



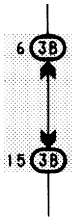
The first letter of the code for each wiring harness and wiring harness connector(s) indicates thecomponent's location, e.g, "E" for the Engine Compartment, "I" for the Instrument Panel and Surrounding area, and "B" for the Body and Surrounding area.

When more than one code has the first and second letters in common, followed by numbers (e.g, IH1, IH2), this indicates the same type of wiring harness and wiring harness connector.

H : Represents a part (all parts are shown in sky blue). The code is the same as the code used in parts position.

I : Junction Block (The number in the circle is the J/B No. and the connector code is shown beside it). Junction Blocks are shaded to clearly separate then from other parts.

Example:



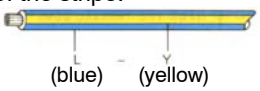
3B indicates that it is inside Junction Block No. 3.

J : Indicates the wiring color.
Wire colors are indicated by an alphabetical code.

B = Black	L = Blue	R = Red
BR = Brown	LG = Light Green	V = Violet
G = Green	O = Orange	W = White
GR = Gray	P = Pink	Y = Yellow

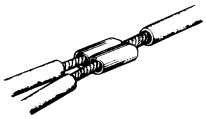
The first letter indicates the basic wire color and the second letter indicates the color of the stripe.

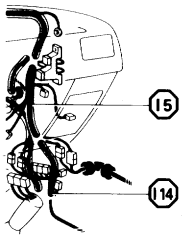
Example: L – Y



K : Indicates a wiring Splice Point (Codes are "E" for the Engine Room, "I" for the Instrument Panel, and "B" for the Body).

Example:

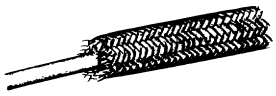




The Location of Splice Point I 5 is indicated by the shaded section.

L : Page No.

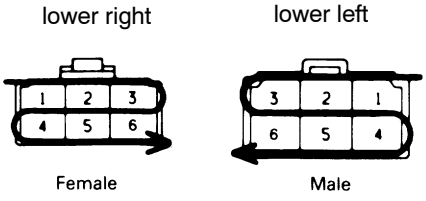
M : Indicates a shielded cable.



N : Indicates a ground point.

The first letter of the code for each ground point(s) indicates the component's location, e.g. "E" for the Engine Compartment, "I" for the Instrument Panel and Surrounding area, and "B" for the Body and Surrounding area.

O : Indicates the pin number of the connector.
The numbering system is different for female and male connectors.



P : When 2 parts both use one connector in common, the parts connector name used in the wire routing section is shown in square brackets [ ].

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Q

SYSTEM OUTLINE

WITH THE IGNITION SW TURNED ON, THE CURRENT FLOWS TO **TERMINAL 3** OF THE POWER WINDOW MASTER SW, **TERMINAL 2** OF THE POWER WINDOW CONTROL RELAY AND **TERMINAL 8** OF THE POWER WINDOW SW THROUGH THE **DOOR** FUSE.

1. DRIVER'S WINDOW "MANUAL UP" OPERATION BY MASTER SW

HOLDING MANUAL SW (DRIVER'S) ON "UP" POSITION LOCATED IN POWER WINDOW MASTER SW, THE CURRENT FLOWS TO **TERMINAL 5** OF THE POWER WINDOW CONTROL RELAY THROUGH **TERMINAL 3** OF THE MASTER SW → **TERMINAL 2** TO OPERATE A POWER WINDOW CONTROL RELAY. THUS THE CURRENT INSIDE THE RELAY FLOWS FROM **TERMINAL 2** OF THE RELAY → **TERMINAL 1** → **TERMINAL 2** OF THE POWER WINDOW MOTOR → **TERMINAL 1** → **TERMINAL 4** OF THE RELAY → **TERMINAL 3** → TO **GROUND**. THE MOTOR TURNS TO ASCENT THE WINDOW. RELEASING THIS SW, THE ROTATION OF MOTOR IS STOPPED AND THE WINDOWS CAN STOP AT WILL POINT.

(FOR THE "MANUAL DOWN" OPERATION, CURRENT FLOWS IN THE REVERSE DIRECTION BECAUSE THE TERMINALS WHERE IT FLOW ARE CHANGED).

2. DRIVER'S WINDOW "AUTO DOWN" OPERATION BY MASTER SW

ONCE THE "AUTO DOWN" BUTTON OF THE MASTER SW IS PUSHED, THE CURRENT FLOW **TERMINAL 9** OF THE POWER WINDOW CONTROL RELAY THROUGH **TERMINAL 3** OF THE MASTER SW→ **TERMINALS 8** AND **9** TO OPERATE THE RELAY. THUS THE CURRENT INSIDE THE POWER WINDOW CONTROL RELAY FLOWS FROM **TERMINAL 2** OF THE RELAY → **TERMINAL 4** → **TERMINAL 1** OF THE POWER WINDOW MOTOR → **TERMINAL 2** → **TERMINAL 1** OF THE RELAY → **TERMINAL 3** → TO **GROUND**. THE MOTOR CONTINUES THE ROTATION ENABLING TO DESCENT THE WINDOW.

THE WINDOW DESCENDS TO THE END POSITION. THE CURRENT WILL BE CUT OFF TO RELEASE THE AUTO DOWN FUNCTION BASED ON THE INCREASING CURRENT BETWEEN **TERMINAL 2** OF THE RELAY AND **TERMINAL 1** IN RELAY.

3. DRIVER'S WINDOW AUTO DOWN RELEASE OPERATION BY MASTER SW

HOLDING THE MANUAL SW (DRIVER'S) ON "UP" POSITION IN OPERATING AUTO DOWN. THE CURRENT FROM **TERMINAL 3** OF THE MASTER SW PASSING **TERMINAL 2** FLOWS **TERMINAL 5** OF THE RELAY AND RELEASES THE AUTO DOWN FUNCTION IN THE POWER WINDOW CONTROL RELAY. RELEASING THE HAND FROM SW, WINDOW STOPS AND CONTINUING ON TOUCHING SW. THE FUNCTION SWITCHES TO MANUAL UP OPERATION.

4. PASSENGER'S WINDOW UP OPERATION (MASTER SW) AND WINDOW LOCK SW OPERATION

HOLDING PASSENGER'S WINDOW SW (MASTER SW) ON "UP", THE CURRENT FLOWS FROM **TERMINAL 3** OF THE MASTER SW PASSING **TERMINAL 6** TO **TERMINAL 3** OF THE POWER WINDOW SW (PASSENGER'S) → **TERMINAL 4 TERMINAL** → **2** OF THE MOTOR → **TERMINAL 1** → **TERMINAL 9** OF THE POWER WINDOW SW → **TERMINAL 7** → **TERMINAL 1** OF THE MASTER SW → **TERMINAL 4** TO **GROUND**. THE MOTOR RUNS TO ASCENT THE WINDOW. RELEASING THIS SW, THE ROTATION OF MOTOR IS STOPPED AND WINDOW CAN STOP AT WILL PLACE. SWITCHING THE WINDOW LOCK SW IN "LOCK" POSITION, THE CIRCUIT IS OPENED AND STOPPED THE MOTOR ROTATION.

R (FOR THE DOWN OPERATION, CURRENT FLOWS IN THE REVERSE DIRECTION BECAUSE THE TERMINALS WHERE IT FLOWS ARE CHANGED).

SERVICE HINTS

P 2 POWER WINDOW CONTROL RELAY

3–GROUND: ALWAYS CONTINUITY

2–GROUND: APPROX. 12 VOLTS WITH THE IGNITION SW AT **ON** POSITION

5–GROUND: APPROX. 12 VOLTS WITH THE IGNITION SW AT **ON** POSITION AND THE MASTER SW AT **UP** POSITION

8–GROUND: APPROX. 12 VOLTS WITH THE IGNITION SW AT **ON** POSITION AND THE MASTER SW AT **AUTO DOWN** POSITION

9–GROUND: APPROX. 12 VOLTS WITH THE IGNITION SW AT **ON** POSITION AND THE MASTER SW AT **DOWN** OR **AUTO DOWN** POSITION

P 4 POWER WINDOW MASTER SW

4–GROUND: ALWAYS CONTINUITY

3–GROUND: APPROX. 12 VOLTS WITH THE IGNITION SW AT **ON** POSITION

WINDOW LOCK SW

OPEN WITH THE WINDOW LOCK SW AT **LOCK** POSITION

S ○ : **PARTS LOCATION**

CODE	SEE PAGE	CODE	SEE PAGE	CODE	SEE PAGE
P2	21	**P4**	21	**P6**	21
P3	21	**P5**	21		

T ⬭ : **RELAY BLOCKS**

CODE	SEE PAGE	RELAY BLOCK (RELAY BLOCK LOCATION)
1	16	R/B NO. 1 (INSTRUMENT PANEL LEFT)

U ⬭ : **JUNCTION BLOCK AND WIRE HARNESS CONNECTOR**

CODE	SEE PAGE	JUNCTION BLOCK AND WIRE HARNESS (CONNECTOR LOCATION)
38	14	J/B NO. 3 AND COWL WIRE (INSTRUMENT PANEL LEFT SIDE)

V □ : **CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS**

CODE	SEE PAGE	JOINING WIRE HARNESS AND WIRE HARNESS (CONNECTOR LOCATION)
ID1	26	FRONT DOOR RH WIRE AND COWL WIRE (RIGHT KICK PANEL)
IH1	26	FRONT DOOR LH WIRE AND COWL WIRE (LEFT KICK PANEL)

W ▽ : **GROUND POINTS**

CODE	SEE PAGE	GROUND POINT LOCATION
IC	24	COWL LEFT

X ⯃ : **SPLICE POINTS**

CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS	CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS
I 5	24	COWL WIRE			

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Ⓠ: Explains the system outline.

Ⓡ: Indicates values or explain the function for reference during troublesshooting.

Ⓢ: Indicates the reference page showing the position on the vehicle of the parts in the system circuit.

Example: Part “P 4” (Power Window Master SW) is on page 21 of the manual.

* The letter in the code is from the first letter of the part, and the number indicates its order in parts starting with the letter.

Example: P 4

- 4 — Part is 4th in order
- P — Power Window Master SW

Ⓣ: Indicates the reference page showing the position on the vehicle of Relay Block Connectors in the system circuit.

Example: Connector “1” is described on page 16 on this manual and is installed on the left side of the instrument panel.

Ⓤ: Indicates the reference page showing the position on the vehicle of J/B and Wire Harness in the system circuit.

Example: Connector “3B”connects the Cowl Wire and J/B No. 3. It is described on page 14 of this manual, and is installed on the instrument panel left side.

Ⓥ: Indicates the reference page describing the wiring harness and wiring harness connector (the female wiring harness is shown first, followed by the male wiring harness).

Example: Connector “ID1”connects the front door RH wire (female) and cowl wire (male). It is described on page 26 of this manual, and is installed on the right side kick panel.

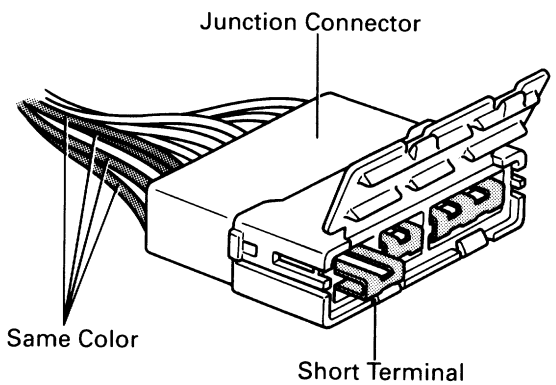
Ⓦ: Indicates the reference page showing the position of the ground points on the vehicle.

Example: Ground point “IC” is described on page 24 of this manual and is installed on the cowl left side.

Ⓧ: Indicates the reference page showing the position of the splice points on the vehicle.

Example: Splice point “I 5” is on the Cowl Wire Harness and is described on page 24 of this manual.

HINTS:



Junction connector (code: J1 to J19) in this manual include a short terminal which is connected to a number of wire harnesses. Always perform inspection with the short terminal installed. (When installing the wire harnesses, the harnesses can be connected to any position within the short terminal grouping. Accordingly, in other vehicles, the same position in the short terminal may be connected to a wire harness from a different part.)
Wire harness sharing the same short terminal grouping have the same color.

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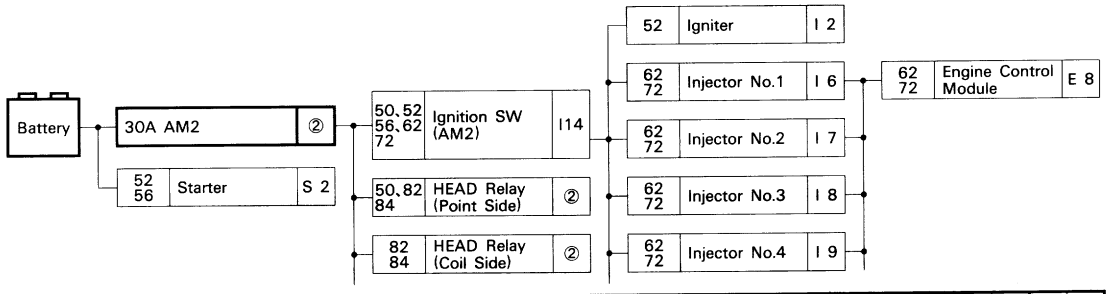
B HOW TO USE THIS MANUAL

The “Current Flow Chart” section, describes which parts each power source (fuses, fusible links, and circuit breakers) transmits current to. In the Power Source circuit diagram, the conditions when battery power is supplied to each system are explained. Since all System Circuit diagrams start from the power source, the power source system must be fully understood.

H POWER SOURCE (CURRENT FLOW CHART)

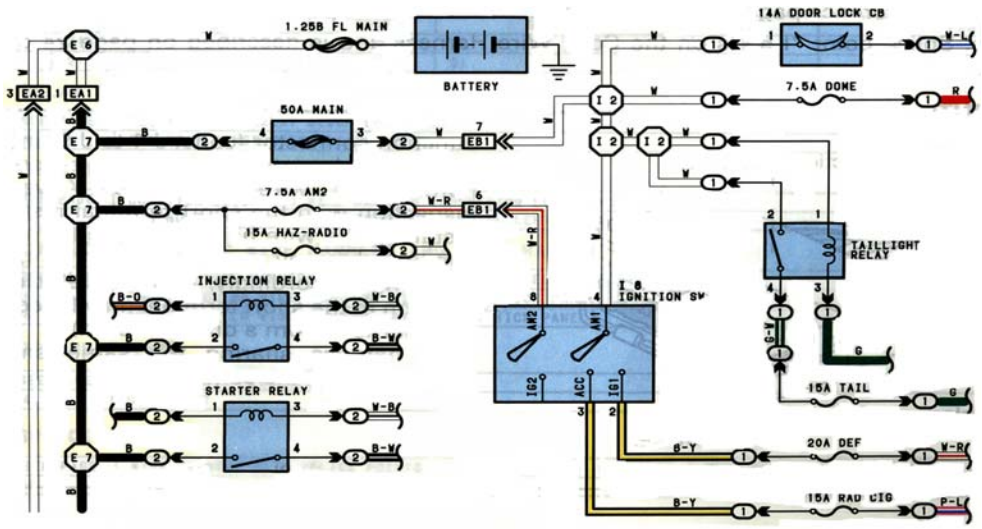
The cart below shows the route by which current flows from the battery to each electrical source (Fusible Link, Circuit Breaker, Fuse, etc.) and other parts.

The next page and following pages shown the parts to which each electrical source outputs current.



Page Nos. of Related Systems	120		132 138	166	120	120 132 138	120	174	90 174	138	127	90	166 168	98	170	98	164	90	62 72	164
Parts / Code or Location	ABS Actuator	ABS Relay	ADD Indicator SW	Auto Antenna Motor	ABS Deceleration Sensor	ABS ECU		A/C Amplifier	A/C Dual Pressure SW	A/C SW	ADD Control Relay	Airbag Sencor Assembly	Ashtray Illumination	Auto Antenna Control Relay	Back-Up Light SW	Brake Fluid Level Warning SW	Back-Up Light Relay	Cigarette Lighter	Cigarette Lighter Illumination	Circuit Opening Relay	Clock
Location / CB or Fuse	A 2	A 3	A 4	A 6	A 8	A 9	A10	A11	A12	A13	A14	A16	A17	A19	A20	B 1	B 2	B 3	C 4	C 5	C 6	C 7
15A ECU-B							●						●									
10A GAUGE	●		●	●			●	●							●	●	●	●				
10A TURN																						
① 15A ECU-IG						●	●															

POWER SOURCE



* The system shown here is an EXAMPLE ONLY. It is different to the actual circuit shown in the SYSTEM CIRCUITS SECTION.

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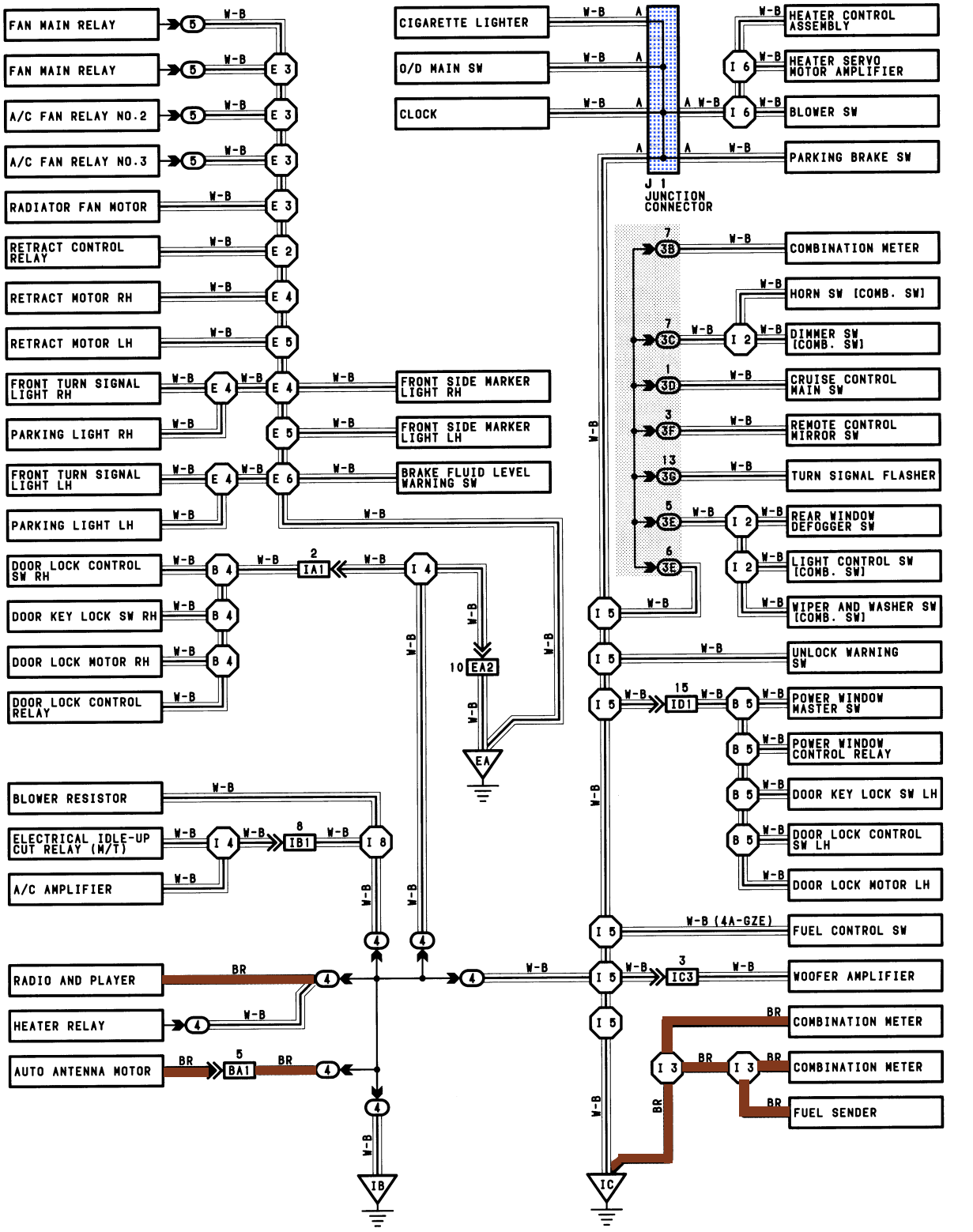
The ground points circuit diagram shows the connections from all major parts to the respective ground points. When troubleshooting a faulty ground point, checking the system circuits which use a common ground may help you identify the problem ground quickly. The relationship between ground points (EA , IB and IC shown below) can also be checked this way.

J GROUND POINT



* The system shown here is an EXAMPLE ONLY. It is different to the actual circuit shown in the SYSTEM CIRCUITS SECTION.

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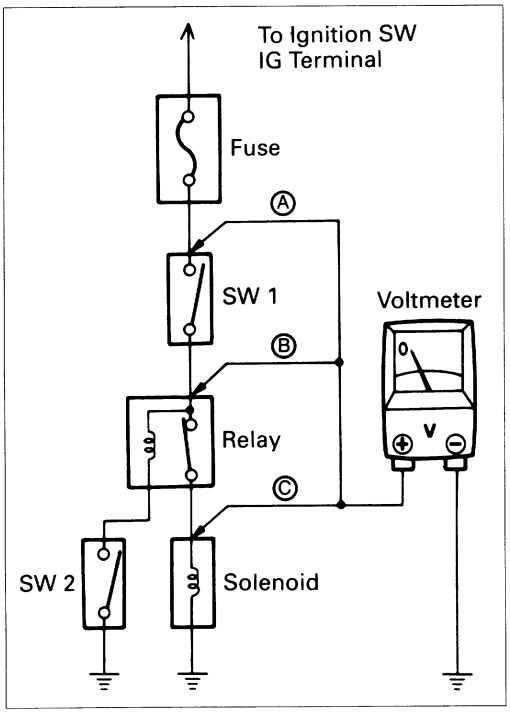


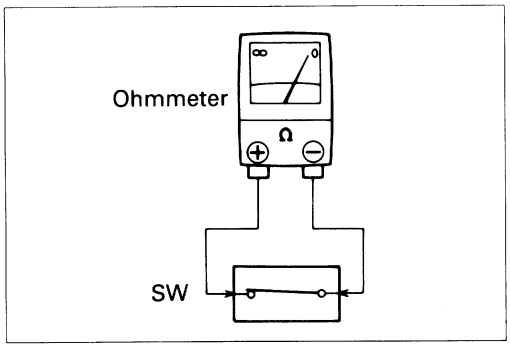
VOLTAGE CHECK

(a) Establish conditions in which voltage is check point.

Example:

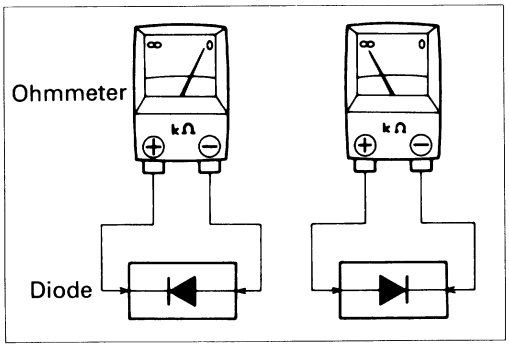
Ⓐ – Ignition SW on
Ⓑ – Ignition SW and SW 1 on
Ⓒ – Ignition SW, SW 1 and Relay on (SW2 off)

(b) Using a voltmeter, connect the negative lead to a ground point or negative battery terminal, and a positive lead to the connector or component term This check can be done with a test light instead of a voltmeter.

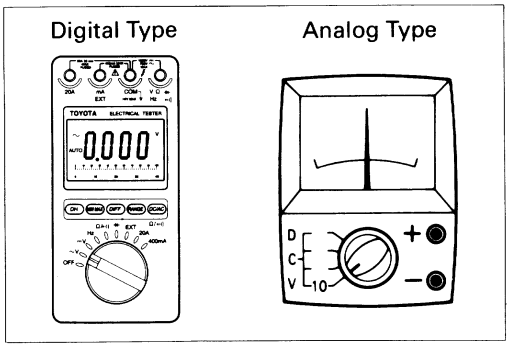


CONTINUITY AND RESISTANCE CHECK

(a) Disconnect the battery terminal or wire so there is no voltage between the check points.
(b) Contact the two leads of an ohmmeter to each of the check point.



If the circuit has diodes, reverse the two leads and check again.
When contacting the negative lead to the diode positive side and the positive lead to the negative side, there should be continuity.
When contacting the two leads in reverse, there should be no continuity.



(c) Use the volt/ohmmeter with high impedance (10kΩ/V minimum) for troubleshooting of the electrical circuit.

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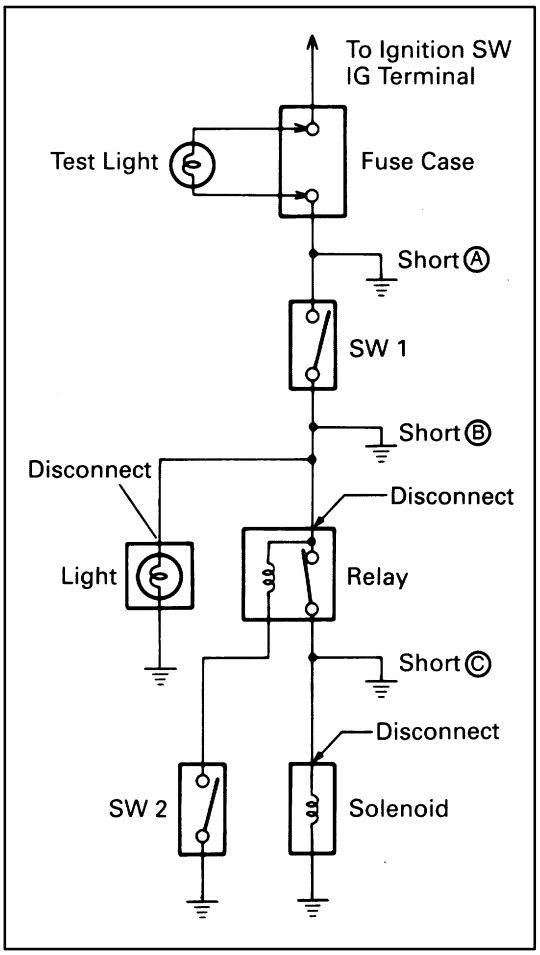


FINDING A SHORT CIRCUIT

(a) Remove the blown fuse and disconnect all loads of the fuse.
(b) Connect a test light in place of the fuse.
(c) Establish conditions in which the test light comes on.

Example:

Ⓐ – Ignition SW on
Ⓑ – Ignition SW and SW 1 on
Ⓒ – Ignition SW, SW 1 and Relay on (Connect the Relay) and SW 2 off (or Disconnect SW 2)

(d) Disconnect and reconnect the connectors while watching the test light.
The short lies between the connector where the test light stays lit and the connector where the light goes out.

(e) Find the exact location of the short by lightly shaking the problem wire along the body.

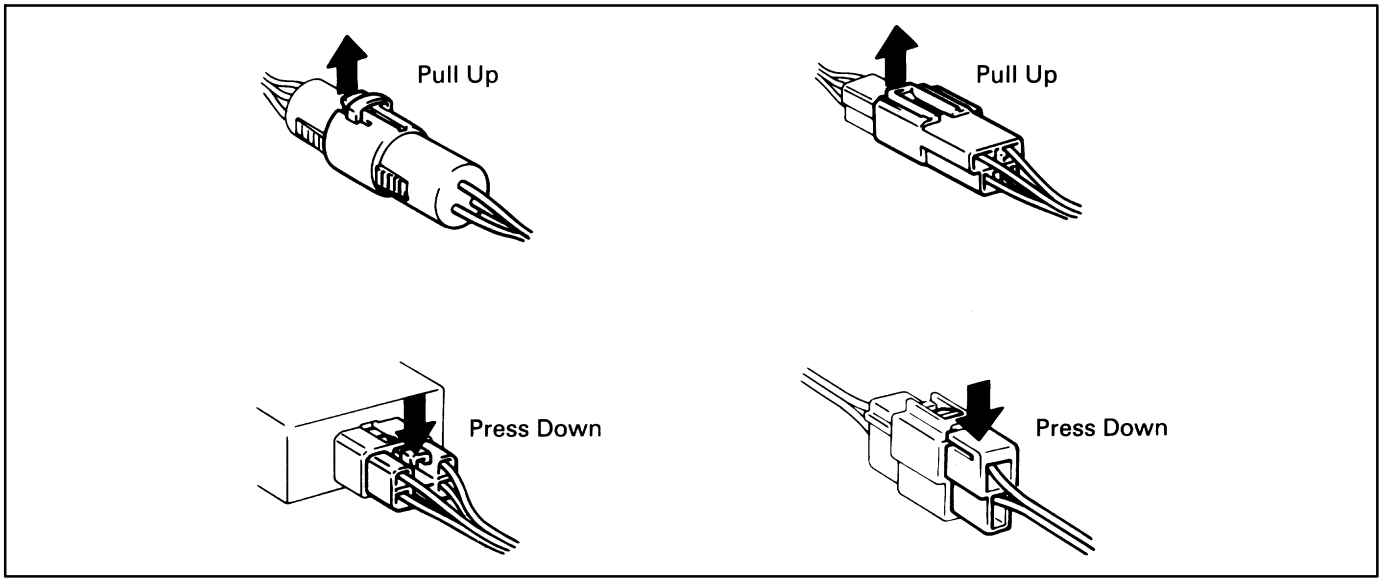
CAUTION:

(a) Do not open the cover or the case of the ECU unless absolutely necessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)
(b) When replacing the internal mechanism (ECU part) of the digital meter, be careful that no part of your body or clothing comes in contact with the terminals of leads from the IC, etc. of the replacement part (spare part).

DISCONNECTION OF MALE AND FEMALE CONNECTORS

To pull apart the connectors, pull on the connector itself, not the wire harness.

HINT: Check to see what kind of connector you are disconnecting before pulling apart.



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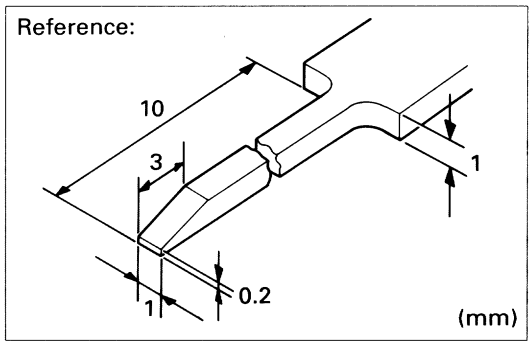

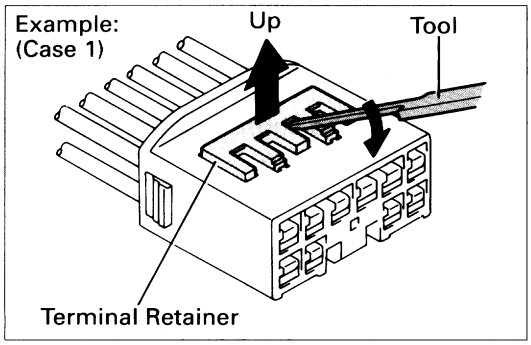

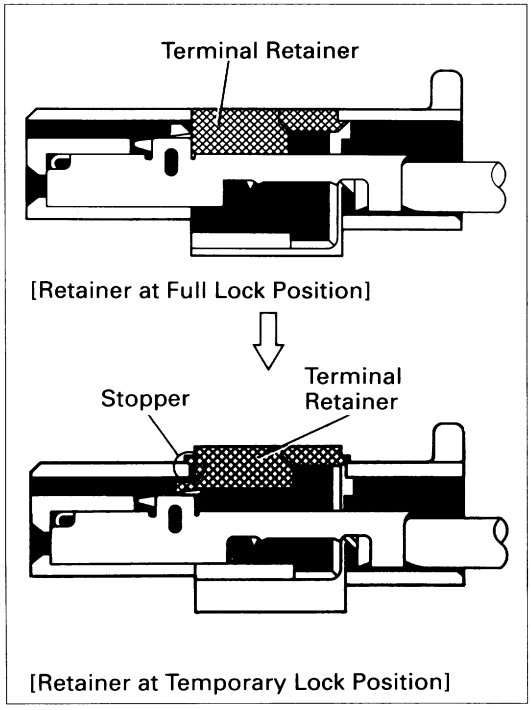

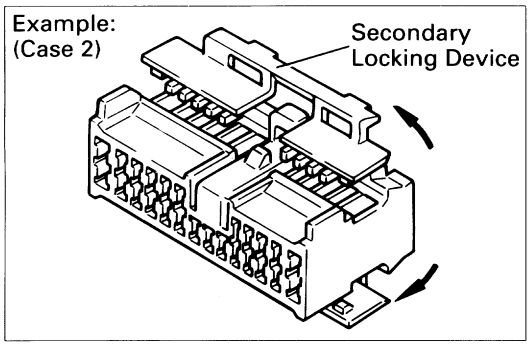

HOW TO REPLACE TERMINAL
(with terminal retainer or secondary locking device)

A PREPARE THE SPECIAL TOOL

HINT: To remove the terminal from the connector, please construct and use the special tool or like object shown on the left.

2. DISCONNECT CONNECTOR

3. DISENGAGE THE SECONDARY LOCKING DEVICE OR TERMINAL RETAINER

(a) Locking device must be disengaged before the terminal locking clip can be released and the terminal removed from the connector.

(b) Use a special tool or the terminal pick to unlock the secondary locking device or terminal retainer.

NOTICE:
Do not remove the terminal retainer from connector body.

Ⓐ For Non–Waterproof Type Connector

HINT: The needle insertion position varies according to the connector's shape (number of terminals etc.), so check the position before inserting it.

"Case 1"

Raise the terminal retainer up to the temporary lock position.

"Case 2"

Open the secondary locking device.

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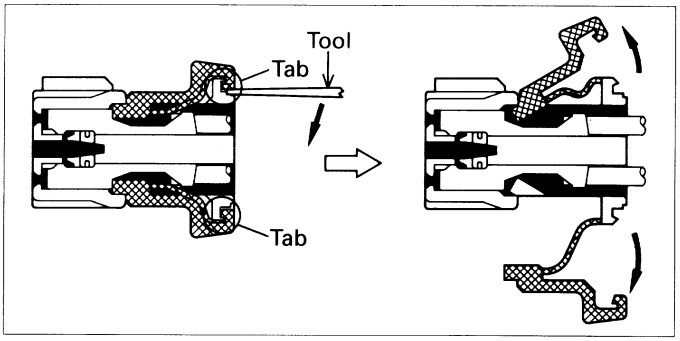
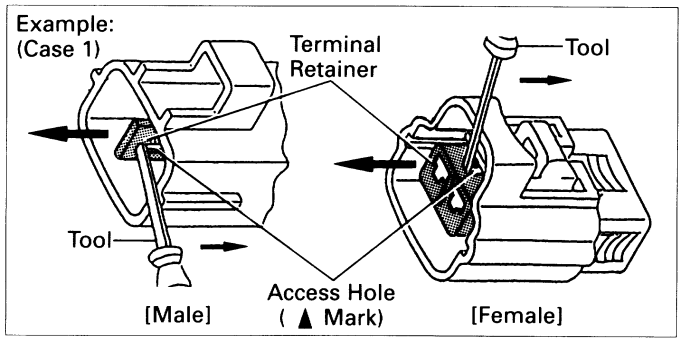


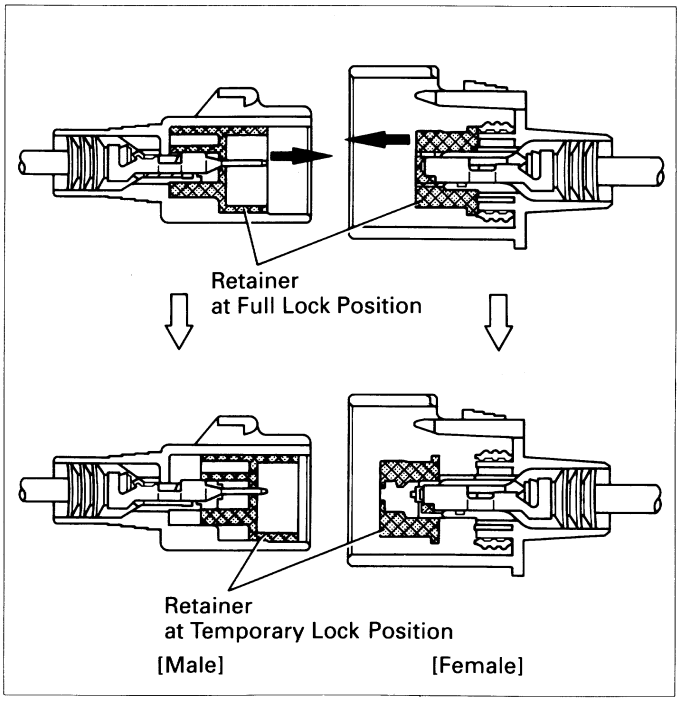


Ⓑ For Waperproof Type Connector

HINT: Terminal retainer color is different according to connector body.

Example:

Terminal Retainer	:Connector Body:
Black or White	:Gray
Black or White	:Dark Gray
Gray or White	:Black

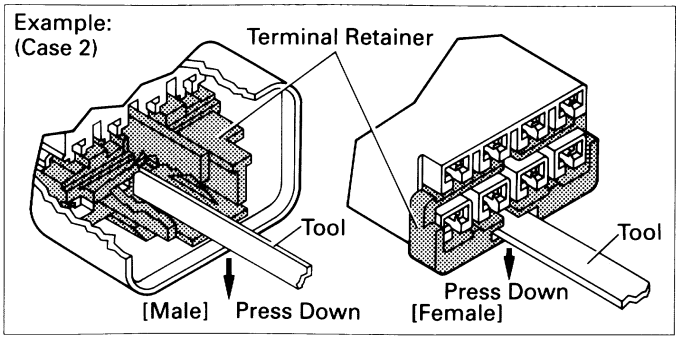


"Case 1"

Type where terminal retainer is pulled up to the temporary lock position (Pull Type).

Insert the special tool into the terminal retainer access hole (▲Mark) and pull the terminal retainer up to the temporary lock position.

HINT: The needle insertion position varies according to the connector's shape (number of terminals etc.), so check the position before inserting it.



"Case 2"

Type which cannot be pulled as far as Power Lock insert the tool straight into the access hole of terminal retainer as shown.

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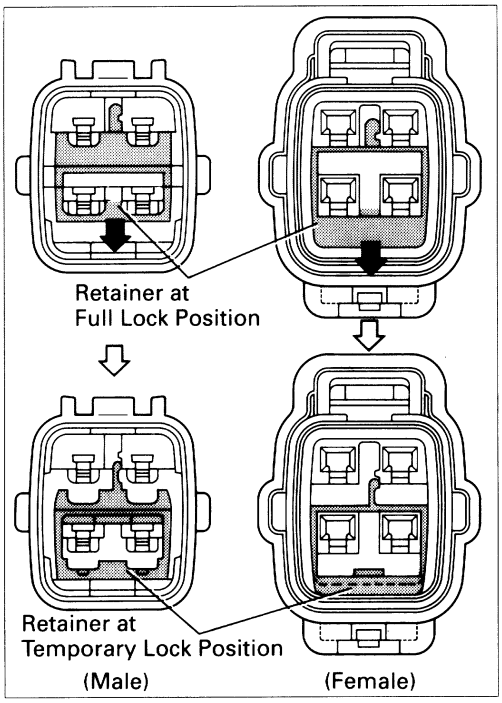
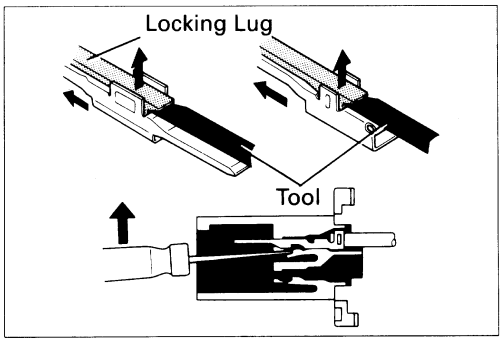
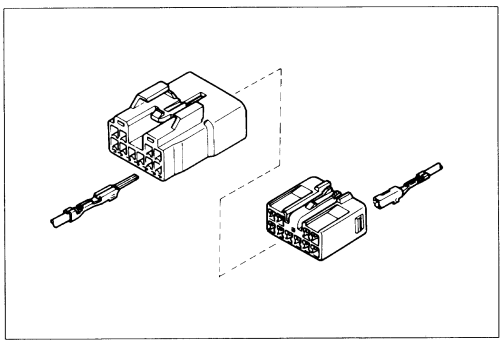


Push the terminal retainer down to the temporary lock position.



(c) Release the locking lug from terminal and pull the terminal out from rear.

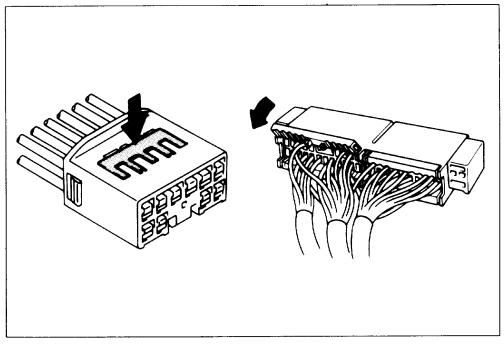


4. INSTALL TERMINAL TO CONNECTOR

(a) Insert the terminal.

HINT:

1. Make sure the terminal is positioned correctly.
2. Insert the terminal until the locking lug locks firmly.
3. Insert the terminal with terminal retainer in the temporary lock position.



(b) Push the secondary locking device or terminal retainer into the full lock position.

5. CONNECT CONNECTOR

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ABBREVIATIONS

The following abbreviations are used in this manual.

ABS	=	Anti−Lock Brake System
A/C	=	Air Conditioning
ACIS	=	Acoustic Control Induction System
A/T	=	Automatic Transaxle
COMB.	=	Combination
DIFF.	=	Differential
ECU	=	Electronic Control Unit
ESA	=	Electronic Spark Advance
ETCS−i	=	Electronic Throttle Control System intelligent
EVAP	=	Evaporative Emission
J/B	=	Junction Block
LH	=	Left−Hand
O/D	=	Overdrive
R/B	=	Relay Block
RH	=	Right−Hand
SFI	=	Sequential Multiport Fuel Injection
SRS	=	Supplemental Restraint System
SW	=	Switch
TEMP.	=	Temperature
VSV	=	Vacuum Switching Valve
w/	=	With
w/o	=	Without

* The titles given inside the components are the names of the terminals (terminal codes) and are not treated as being abbreviations.

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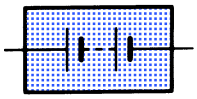
E GLOSSARY OF TERMS AND SYMBOLS

BATTERY

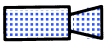


Stores chemical energy and converts it into electrical energy. Provides DC current for the auto's various electrical circuits.

CAPACITOR (Condenser)

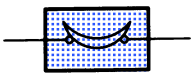
A small holding unit for temporary storage of electrical voltage.

CIGARETTE LIGHTER



An electric resistance heating element.

CIRCUIT BREAKER



Basically a reusable fuse, a circuit breaker will heat and open if too much current flows through it. Some units automatically reset when cool, others must be manually reset.

DIODE

A semiconductor which allows current flow in only one direction.

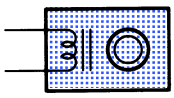
DIODE, ZENER

A diode which allows current flow in one direction but blocks reverse flow only up to a specific voltage. Above that potential, it passes the excess voltage. This acts as a simple voltage regulator.

PHOTODIODE

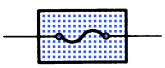
The photodiode is a semiconductor which controls the current flow according to the amount of light.

DISTRIBUTOR, IIA



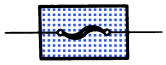
Channels high–voltage current from the ignition coil to the individual spark plugs.

FUSE

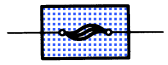


A thin metal strip which burns through when too much current flows through it, thereby stopping current flow and protecting a circuit from damage.

FUSIBLE LINK



(for Medium Current Fuse)



(for High Current Fuse or Fusible Link)

A heavy–gauge wire placed in high amperage circuits which burns through on overloads, thereby protecting the circuit. The numbers indicate the cross–section surface area of the wires.

GROUND

The point at which wiring attaches to the Body, thereby providing a return path for an electrical circuit; without a ground, current cannot flow.

HEADLIGHTS

1. **SINGLE FILAMENT**

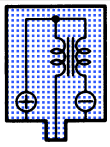
2. **DOUBLE FILAMENT**

Current flow causes a headlight filament to heat up and emit light. A headlight may have either a single (1) filament or a double (2) filament.

HORN

An electric device which sounds a loud audible signal.

IGNITION COIL



Convert low–voltage DC current into high–voltage ingition current for firing the spark plugs.

LIGHT

Current flow through a filament causes the filament to heat up and emit light.

LED (LIGHT EMITTING DIODE)

Upon current flow, these diodes emit light without producing the heat of a comparable light.

METER, ANALOG

Current flow activates a magnetic coil which causes a needle to move, thereby providing a relative display against a background calibration.

METER, DIGITAL

Current flow activates one or many LED's, LCD's, or fluoresent displays, which provide a relative or digital display.

MOTOR

A power unit which converts electrical energy into mechanical energy, especially rotary motion.

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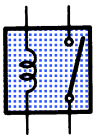
RELAY

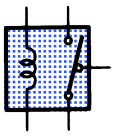
1. **NORMALLY CLOSED**



2. **NORMALLY OPEN**

Basically, an electrically operated switch which may be normally closed (1) or open (2). Current flow through a small coil creates a magnetic field which either opens or closes an attached switch.

RELAY, DOUBLE THROW

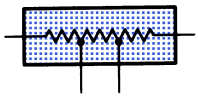


A relay which passes current through one set of contacts or the other.

RESISTOR

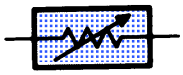
An electrical component with a fixed resistance, placed in a circuit to reduce voltage to a specific value.

RESISTOR, TAPPED



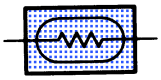
A resistor which supplies two or more different non adjustable resistance values.

RESISTOR, VARIABLE or RHEOSTAT



A controllable resistor with a variable rate of resistance. Also called a potentiometer or rheostat.

SENSOR (Thermistor)



A resistor which varies its resistance with temperature.

SENSOR, SPEED

(Reed Switch Type)

Uses magnetic impulses to open and close a switch to create a signal for activation of other components.

SHORT PIN

Used to provide an unbroken connection within a juction block.

SOLENOID

An electromagnetic coil which forms a magnetic field when current flows, to move a plunger, etc.

SPEAKER

An electromechanical device which creates sound waves from current flow.

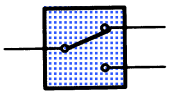
SWITCH, MANUAL

1. **NORMALLY OPEN**

2. **NORMALLY CLOSED**

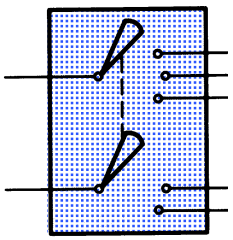
Open and closes circuits, thereby stopping (1) or allowing (2) current flow.

SWITCH, DOUBLE THROW



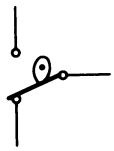
A switch which continuously passes cureent through one set of contacts or the other.

SWITCH, IGNITION



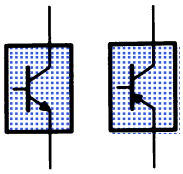
A key operated switch with several positions which allows various circuits, particularly the primary ignition circuit, to become operational.

SWITCH, WIPER PARK



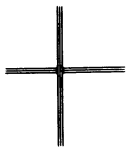
Automatically returns wipers to the stop position when the wiper switch is turned off.

TRANSISTOR

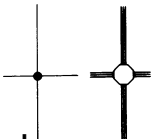


A solidstate device typically used as an electronic relay; stops or passes current depending on the voltage applied at “base.”

WIRES



(1) **NOT CONNECTED**



(2) **SPLICED**

Wires are always drawn as straight lines on wiring diagrams. Crossed wires (1) without a black dot at the junction are not joined; crossed wires (2) and a black dot or octagonal (⬡) mark at the juction as spliced (joined) connections.

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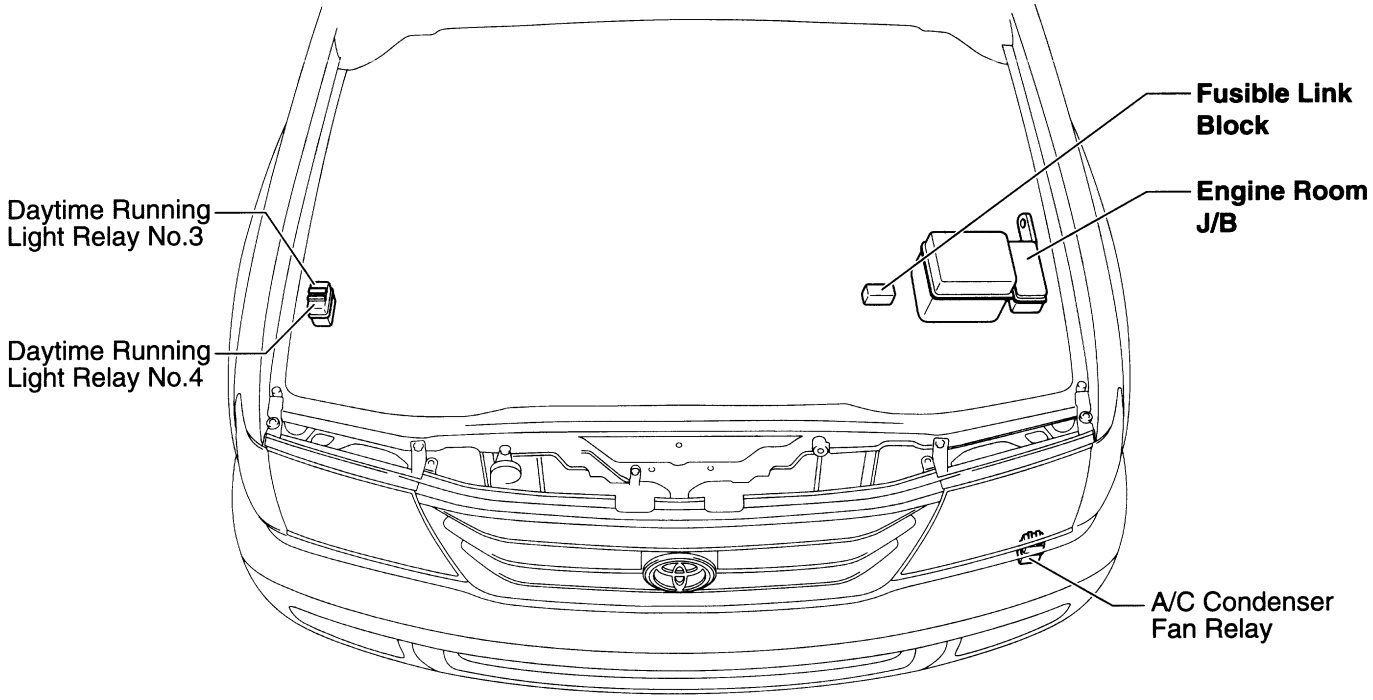
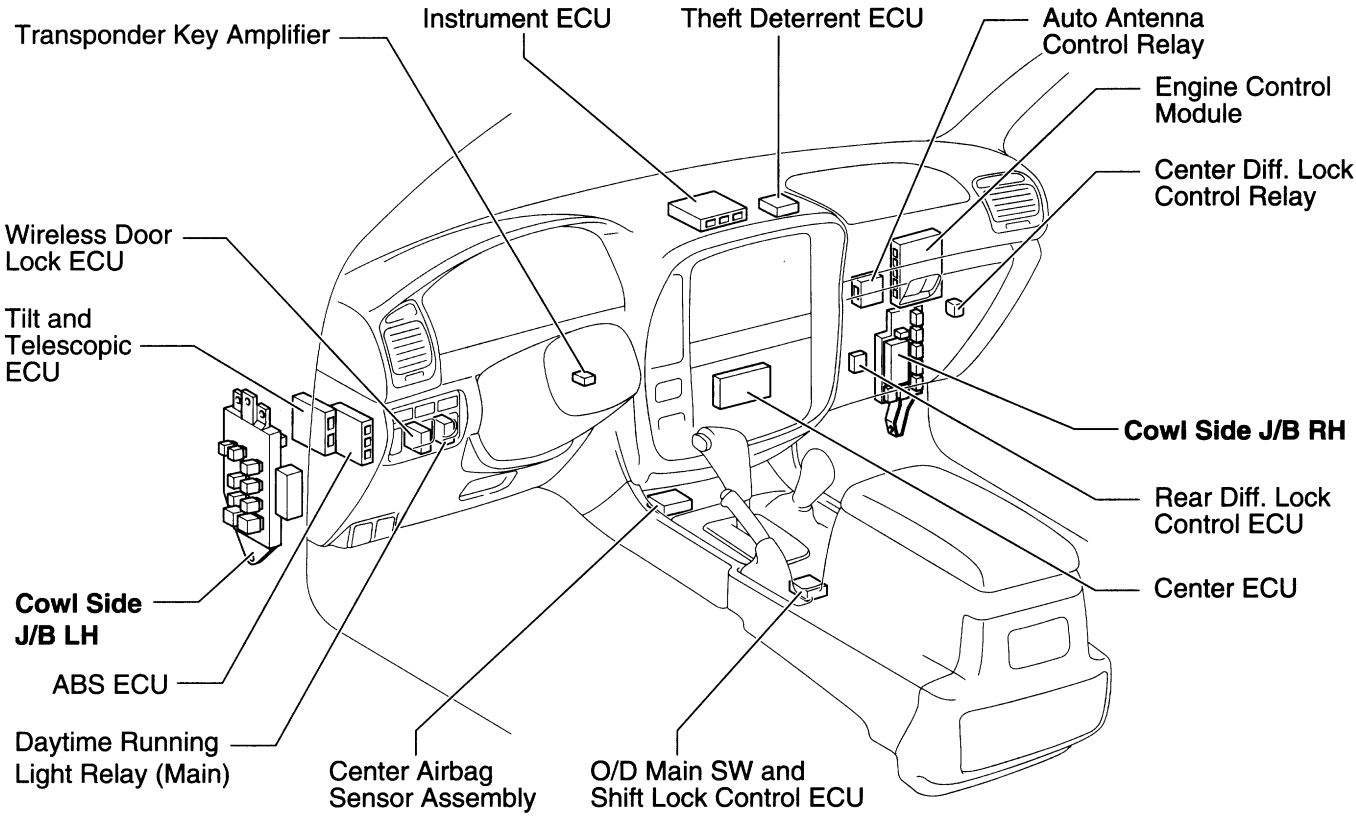
F RELAY LOCATIONS

[Engine Compartment]



[Instrument Panel]



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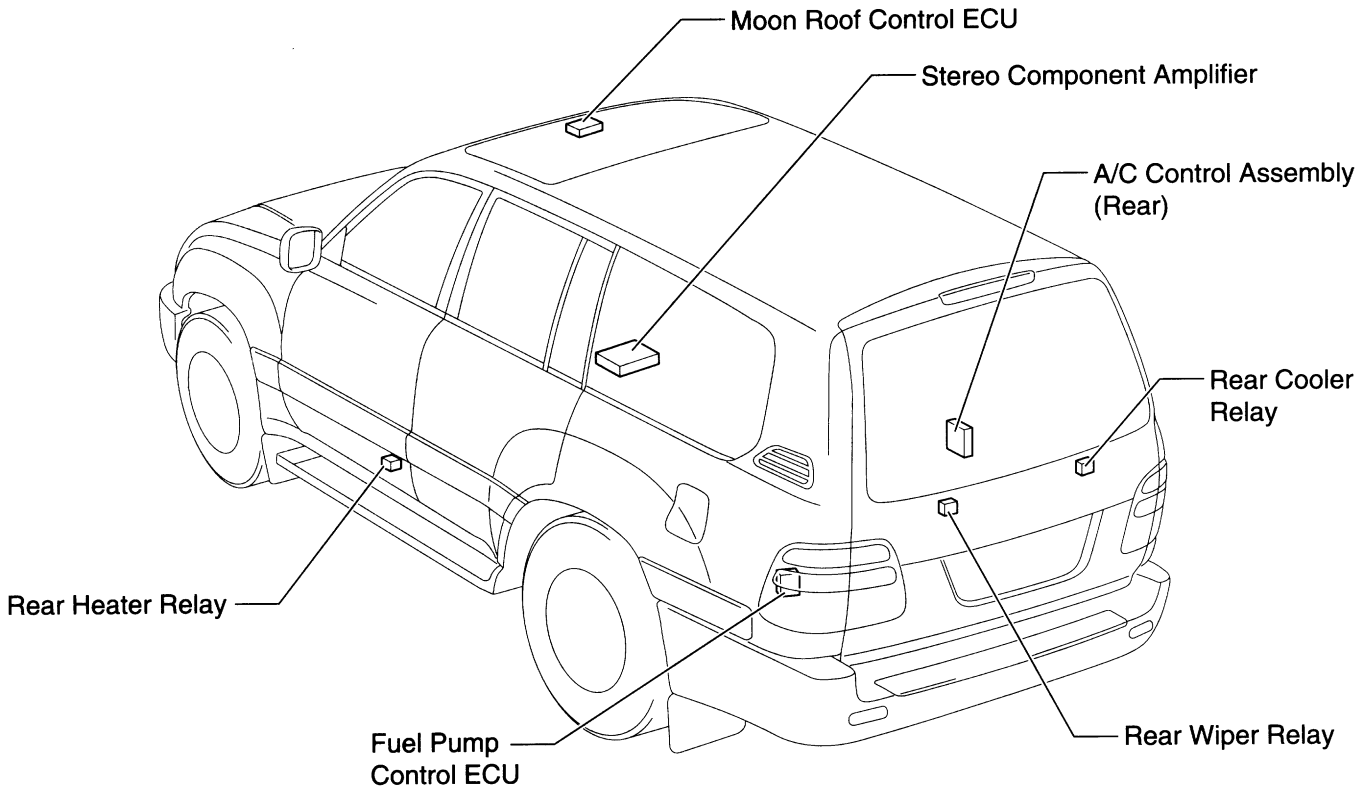
[Body]



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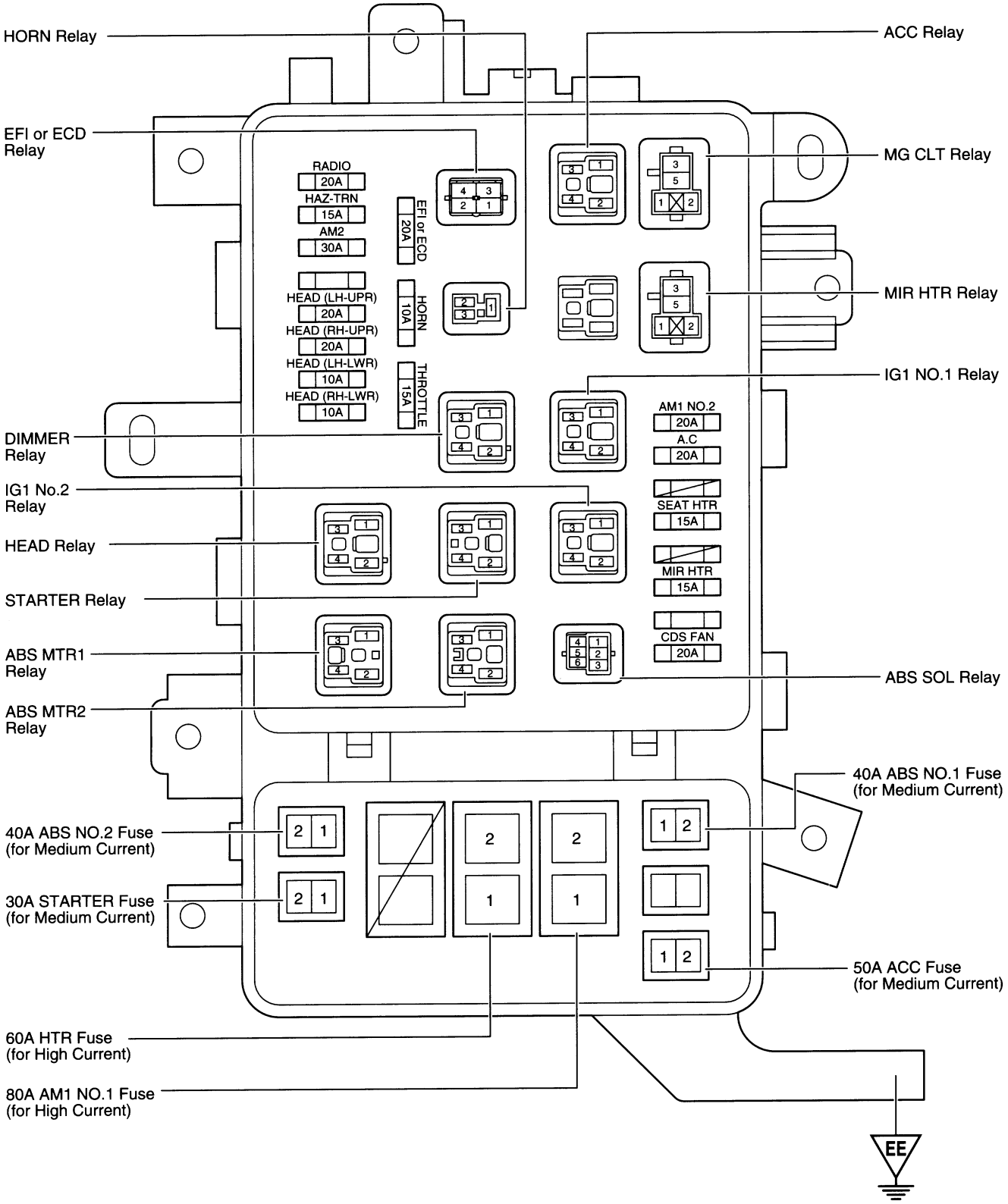
F RELAY LOCATIONS

: Engine Room J/B	Engine Compartment Left (See Page 18)



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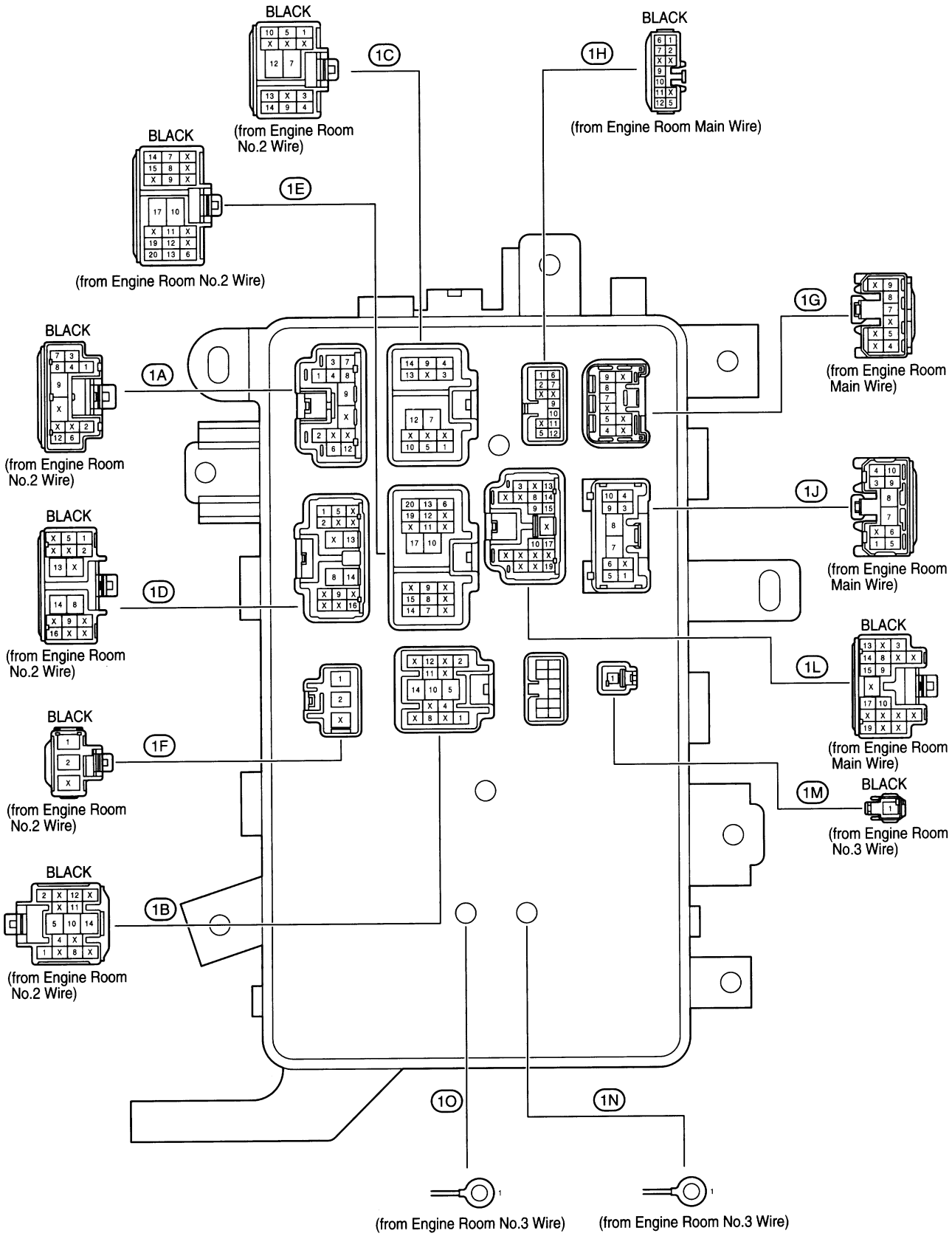

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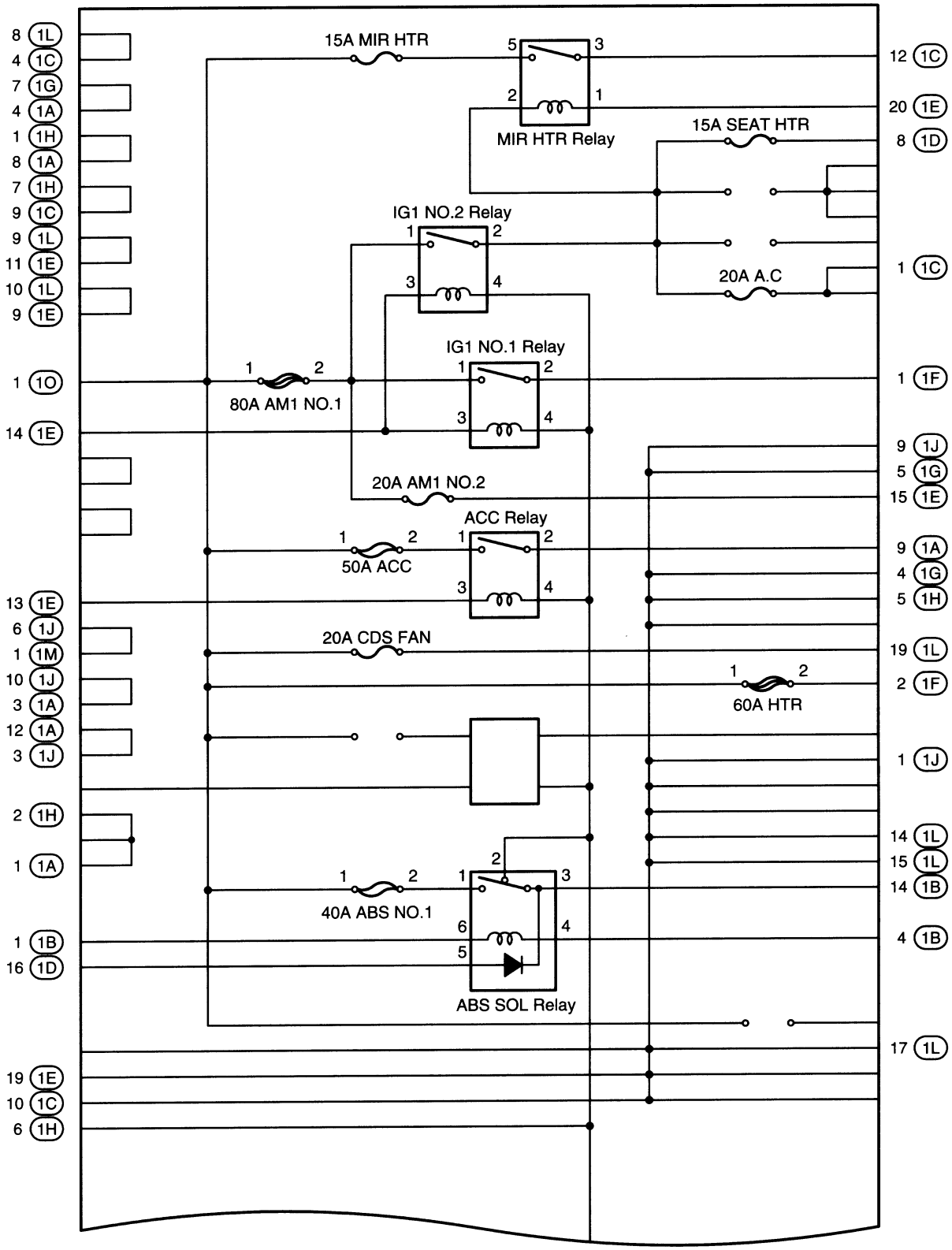
[Engine Room J/B Inner Circuit]



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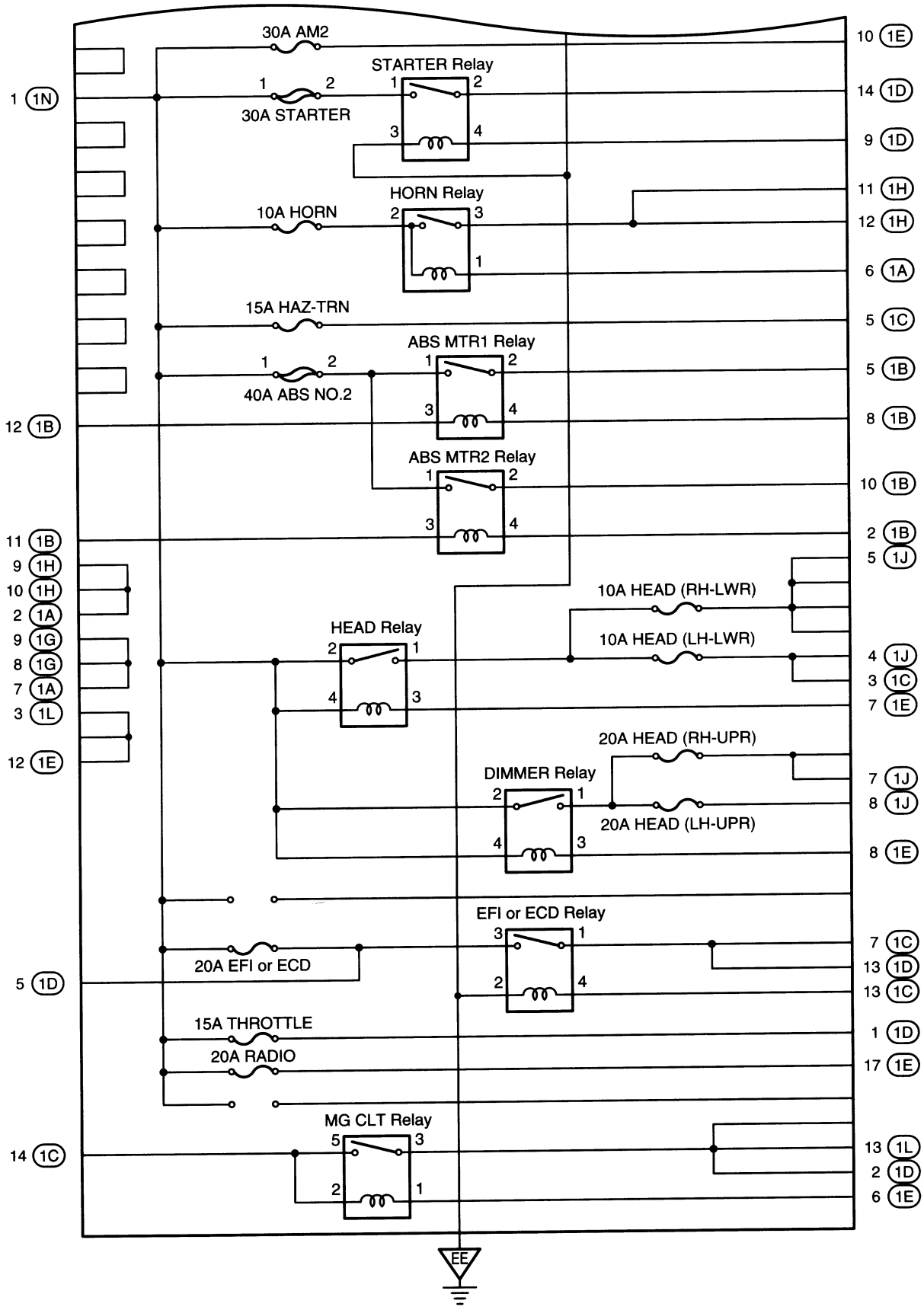

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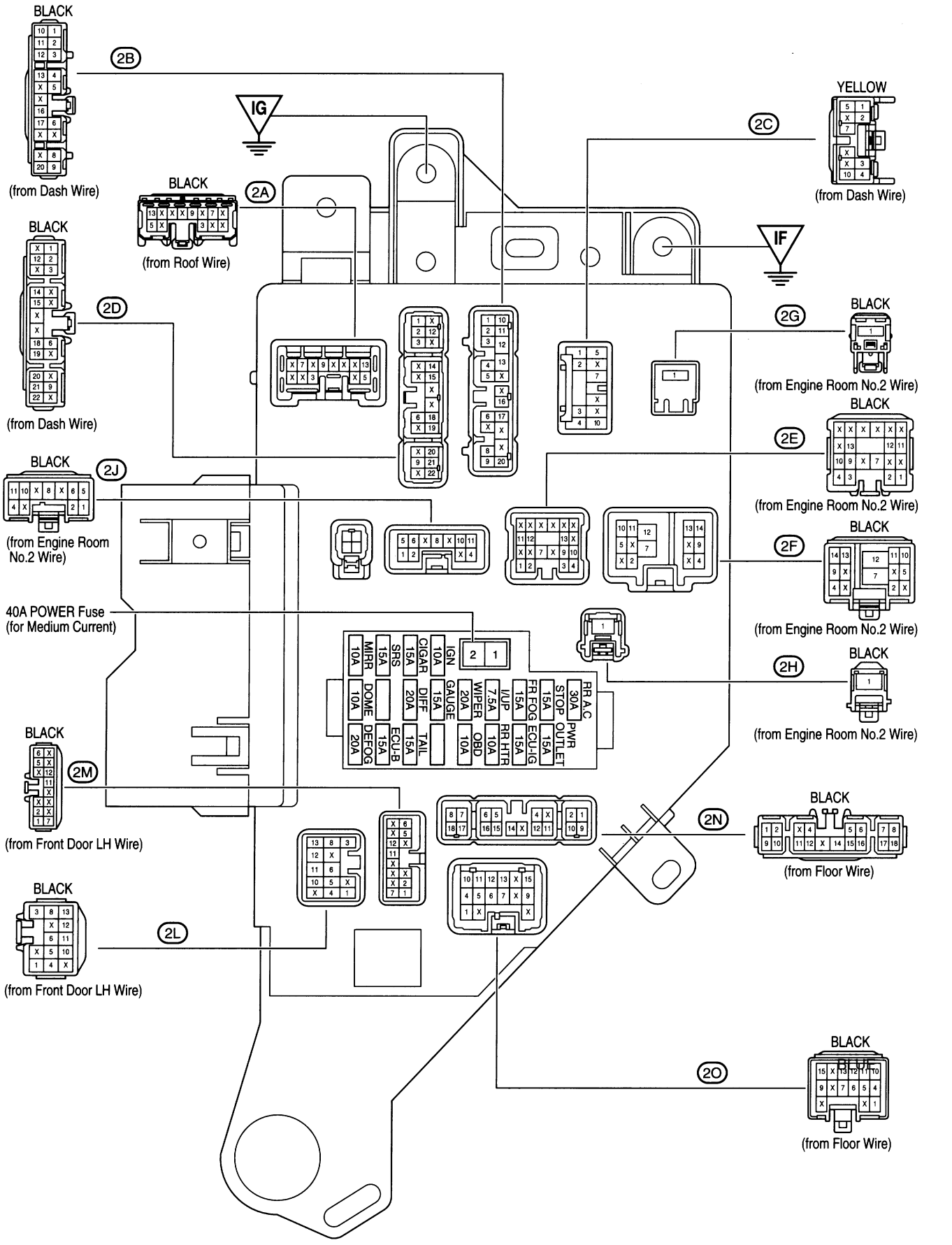
F RELAY LOCATIONS

: Cowl Side J/B LH	Left Kick Panel (See Page 18)



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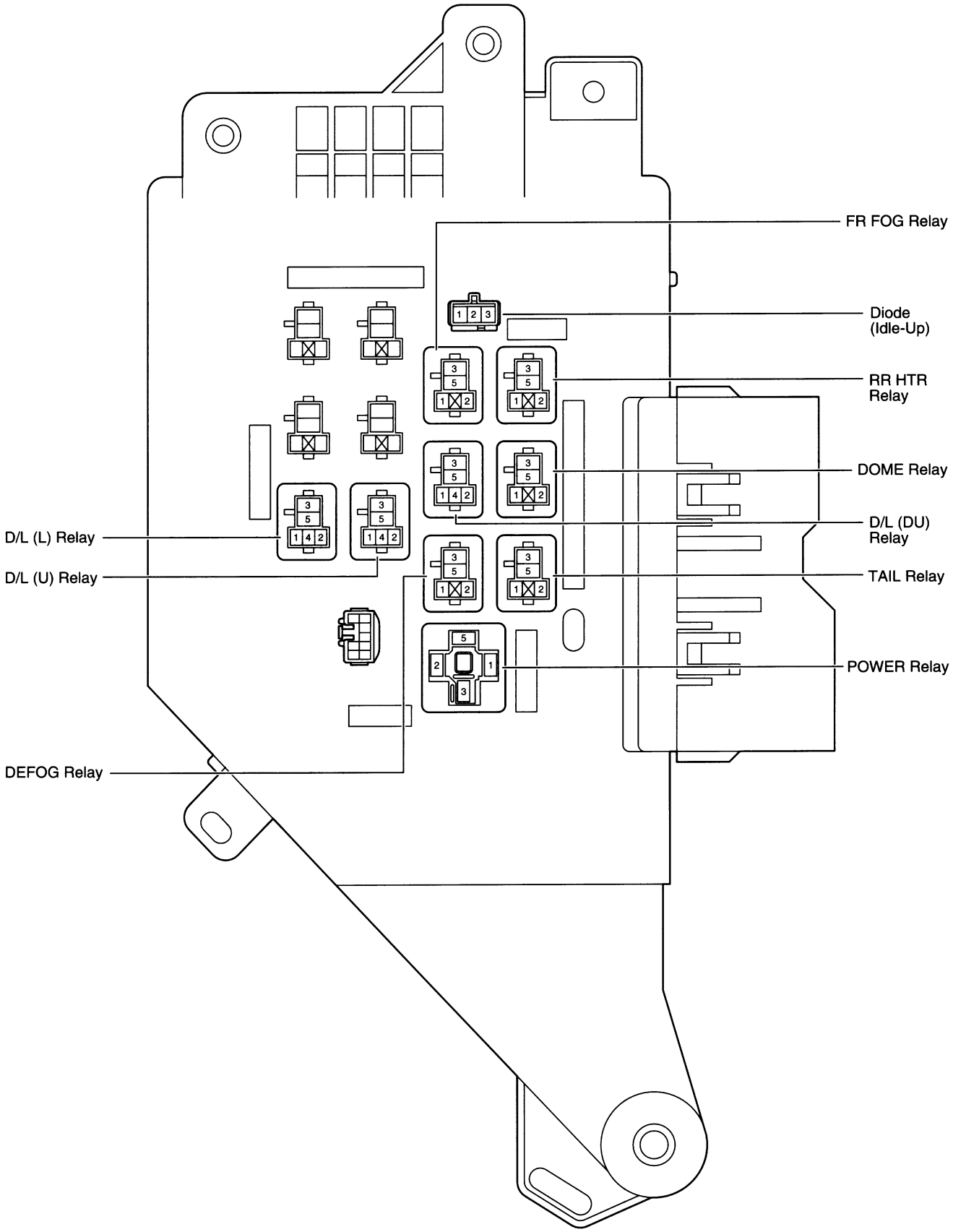

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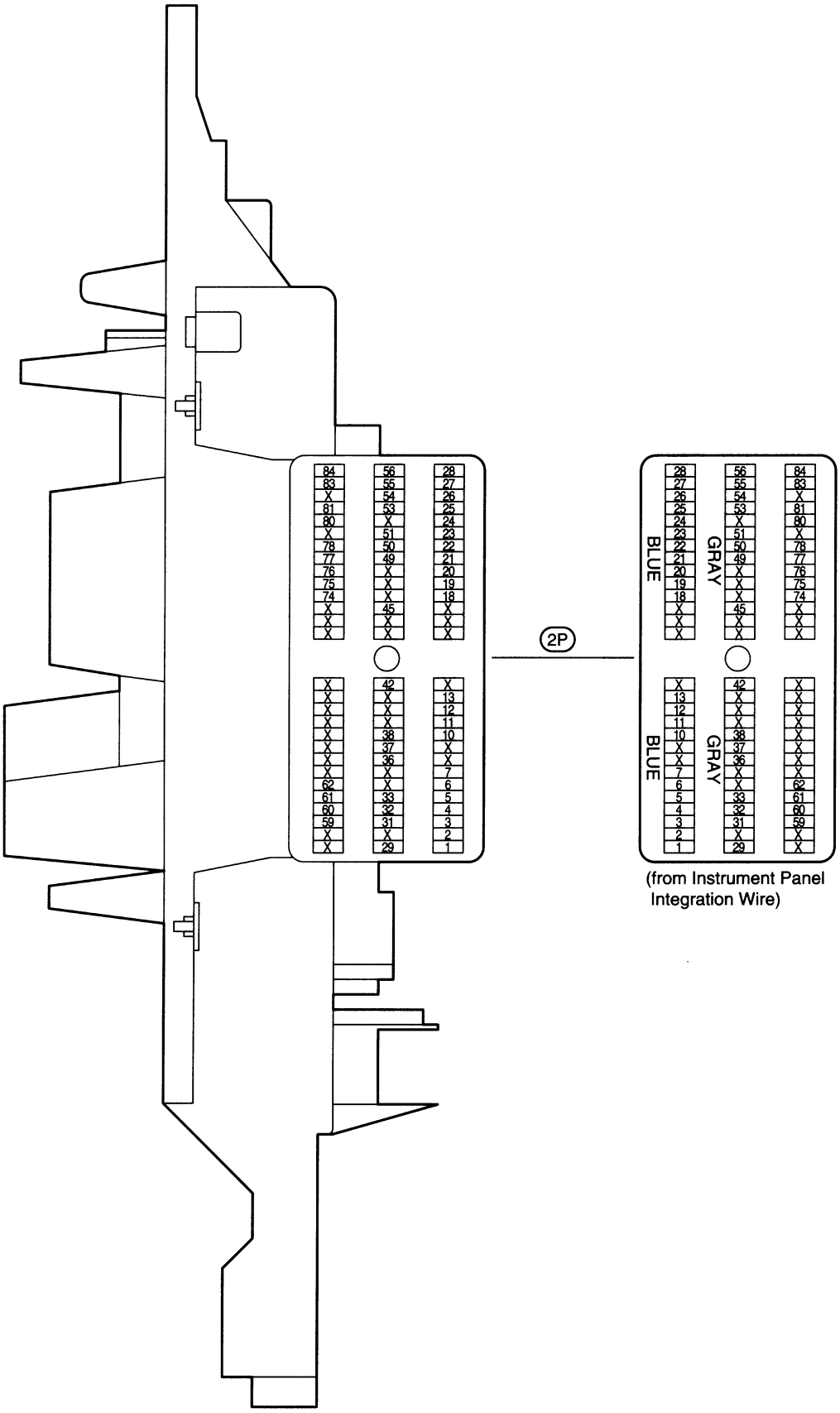
: Cowl Side J/B LH	Left Kick Panel (See Page 18)



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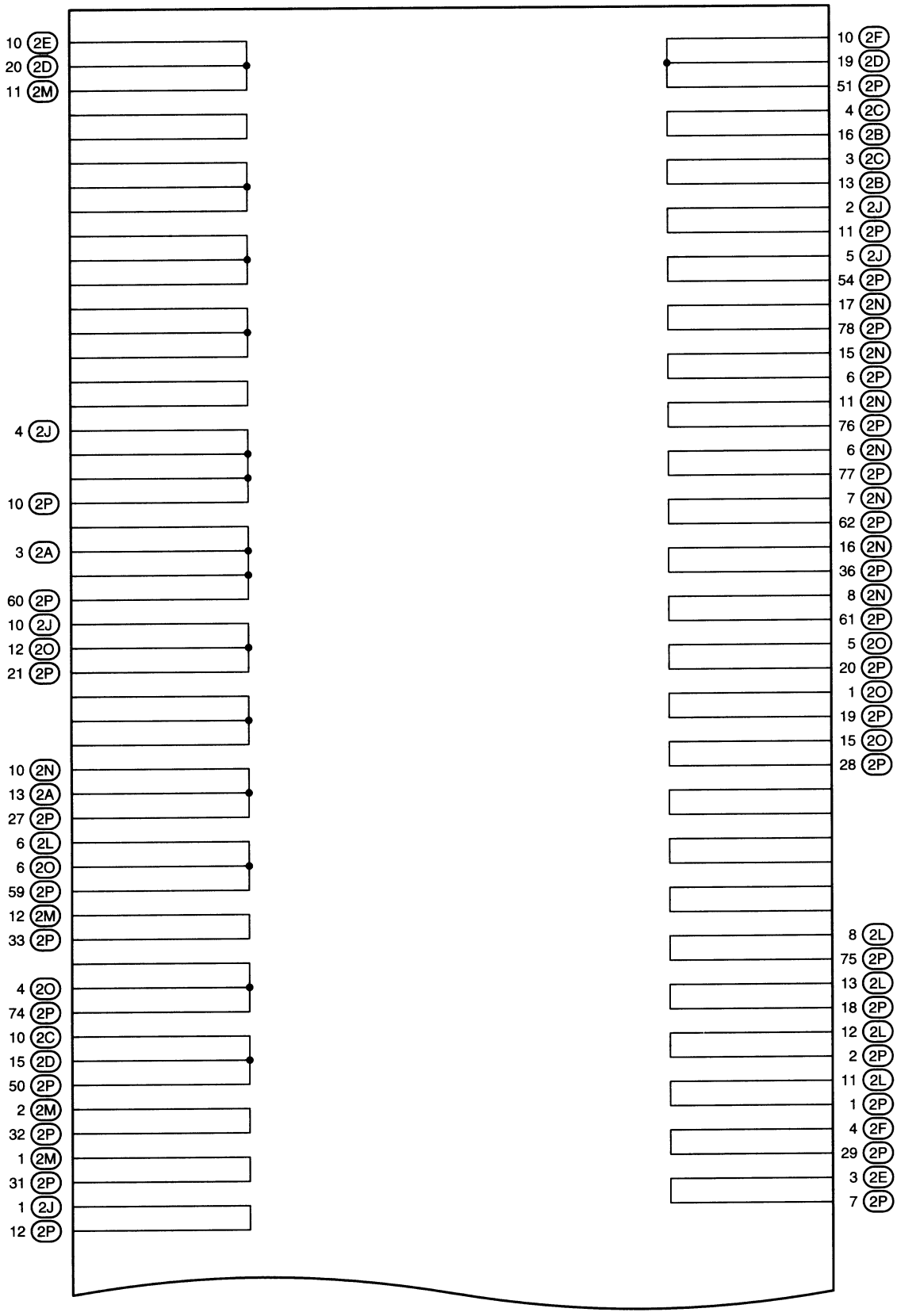
[Cowl Side J/B LH Inner Circuit]



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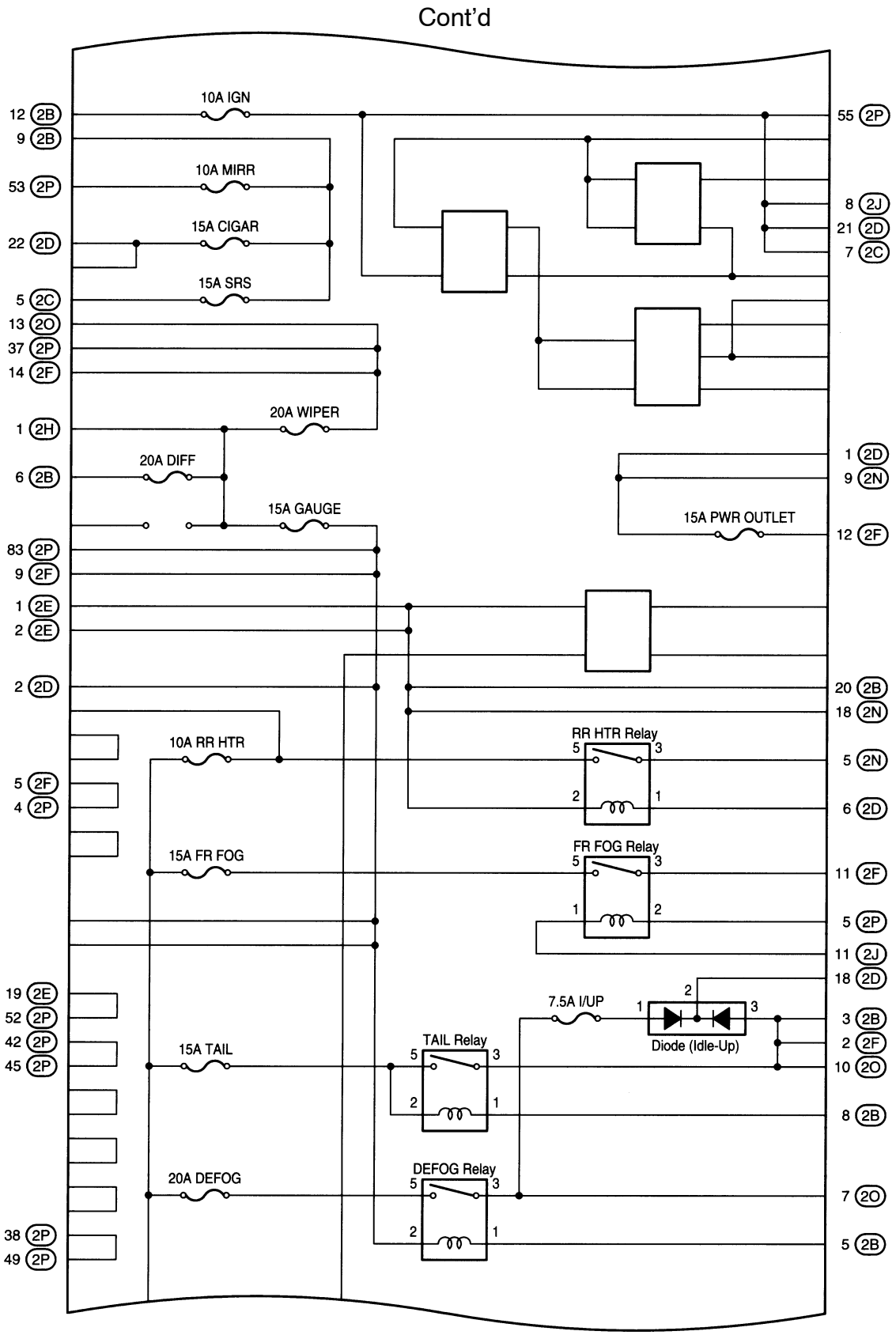
[Cowl Side J/B LH Inner Circuit]



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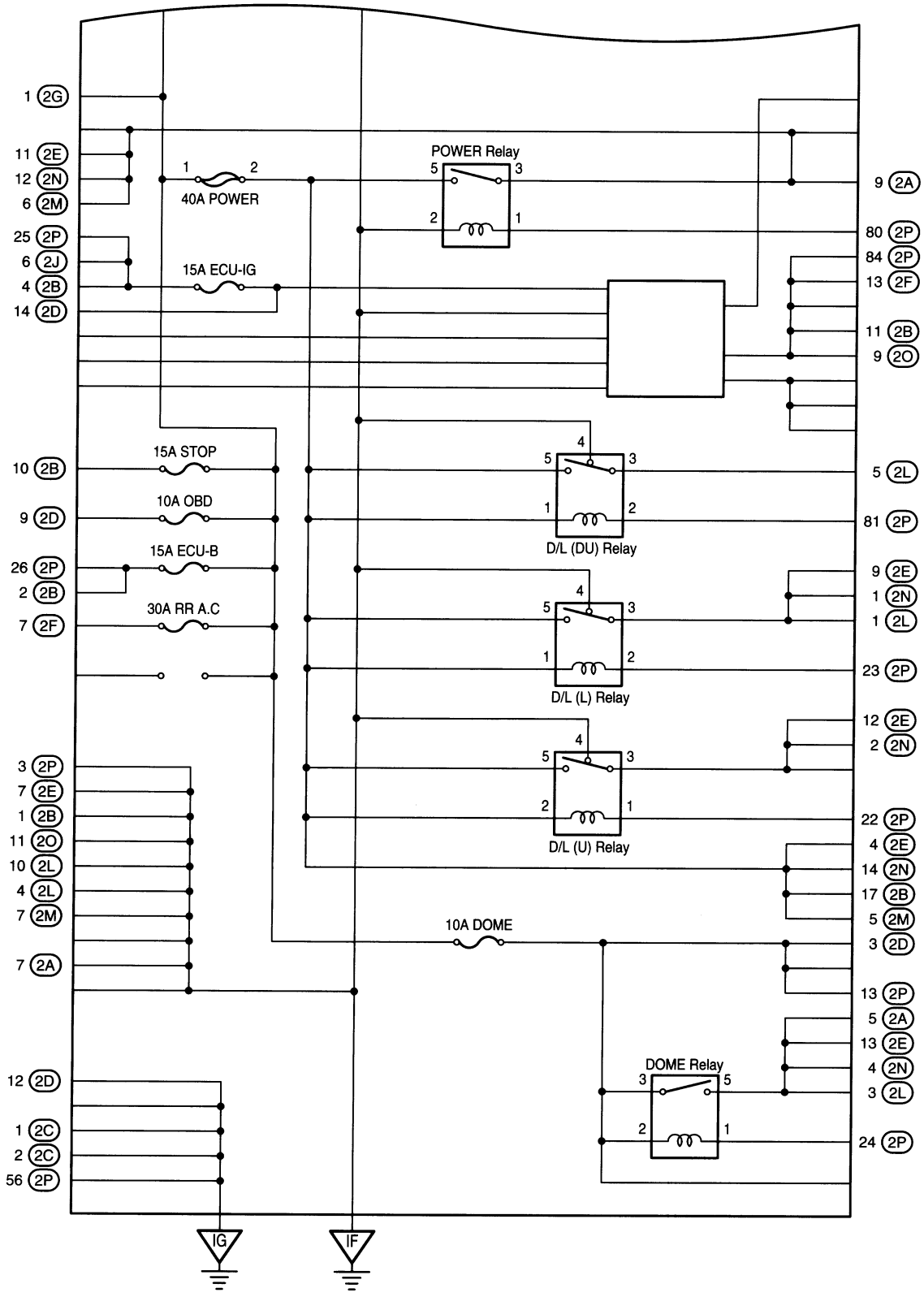

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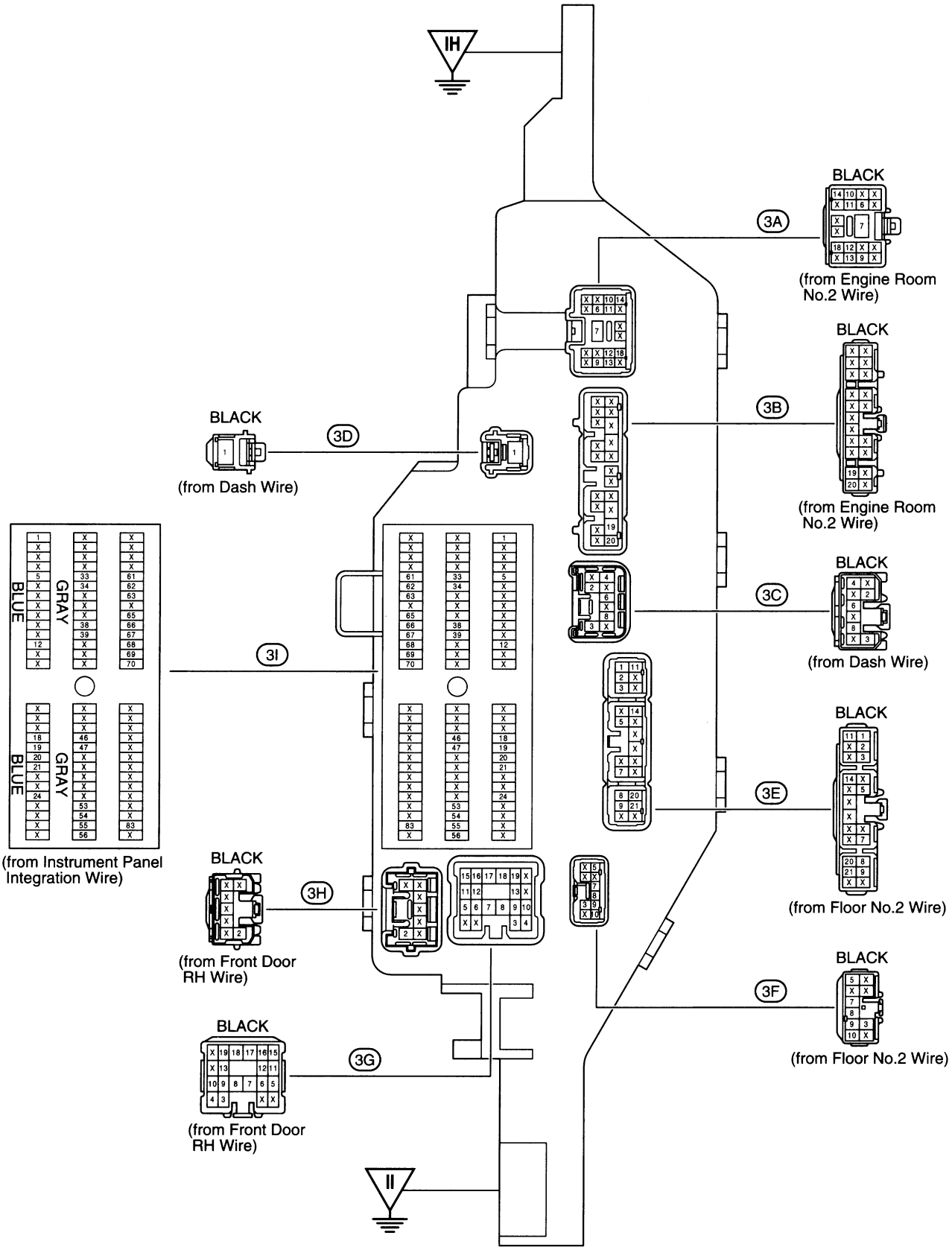
F RELAY LOCATIONS

: Cowl Side J/B RH	Right Kick Panel (See Page 18)



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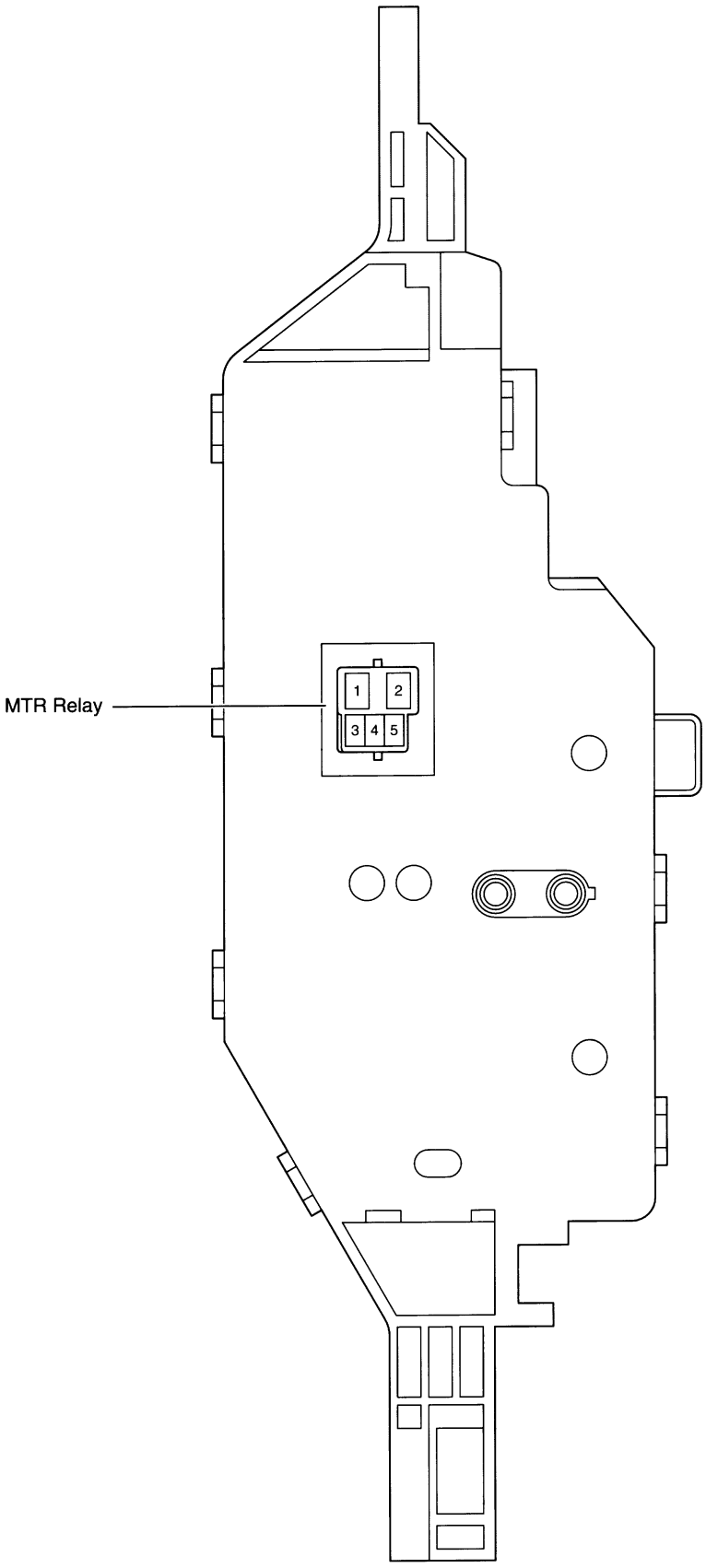

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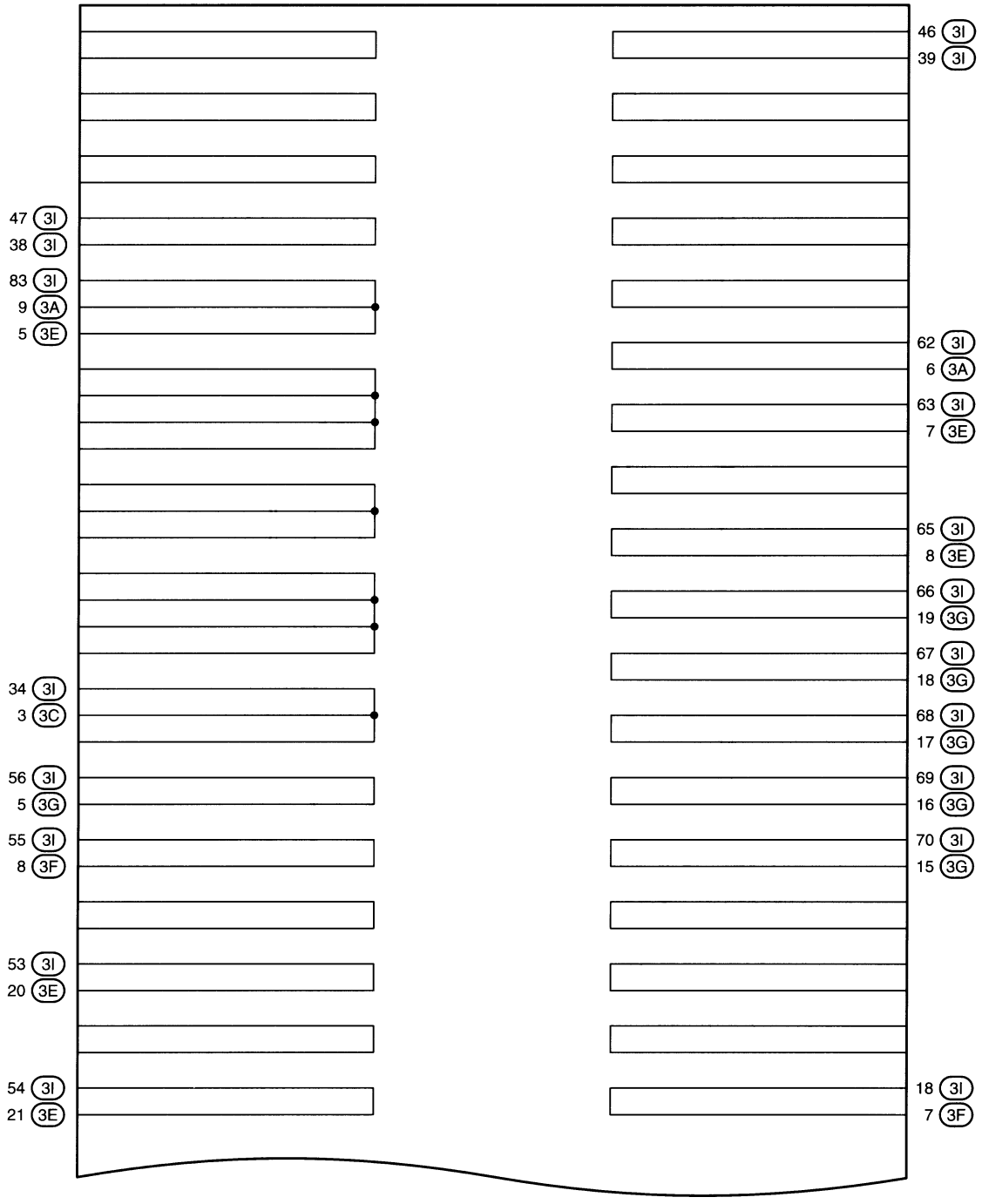
[Cowl Side J/B RH Inner Circuit]



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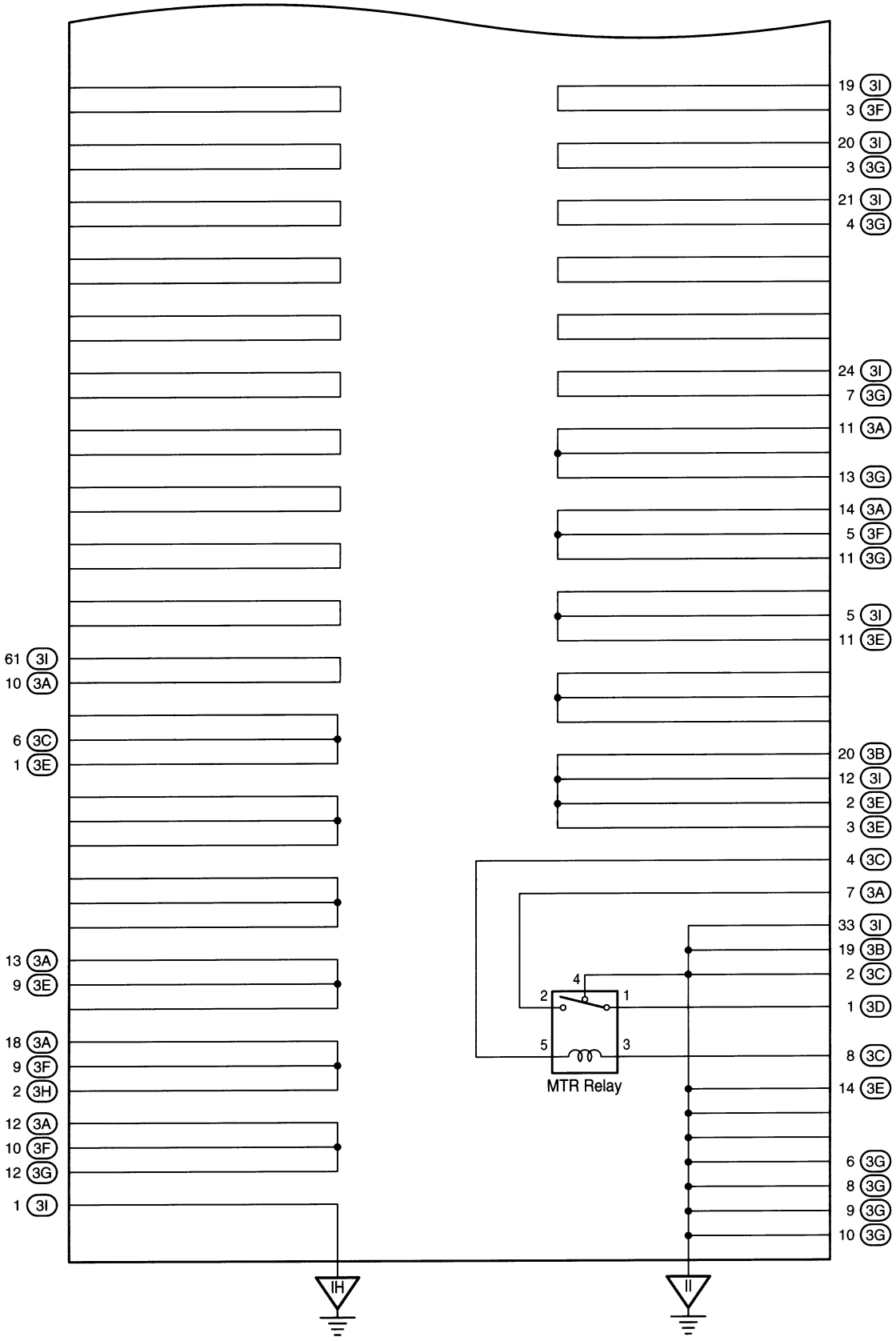

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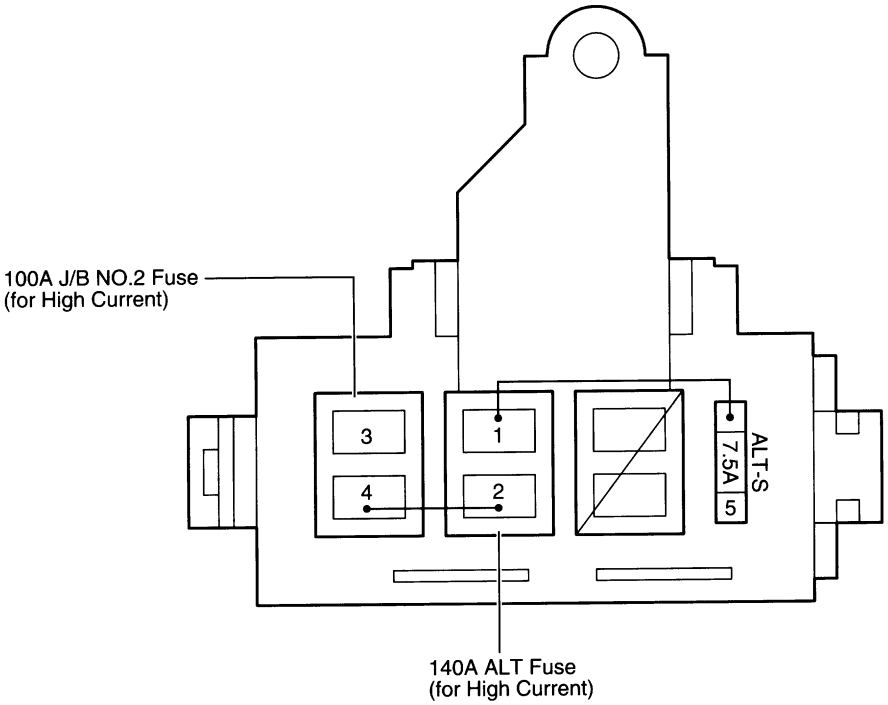
Fusible Link Block	Near the Battery (See Page 18)



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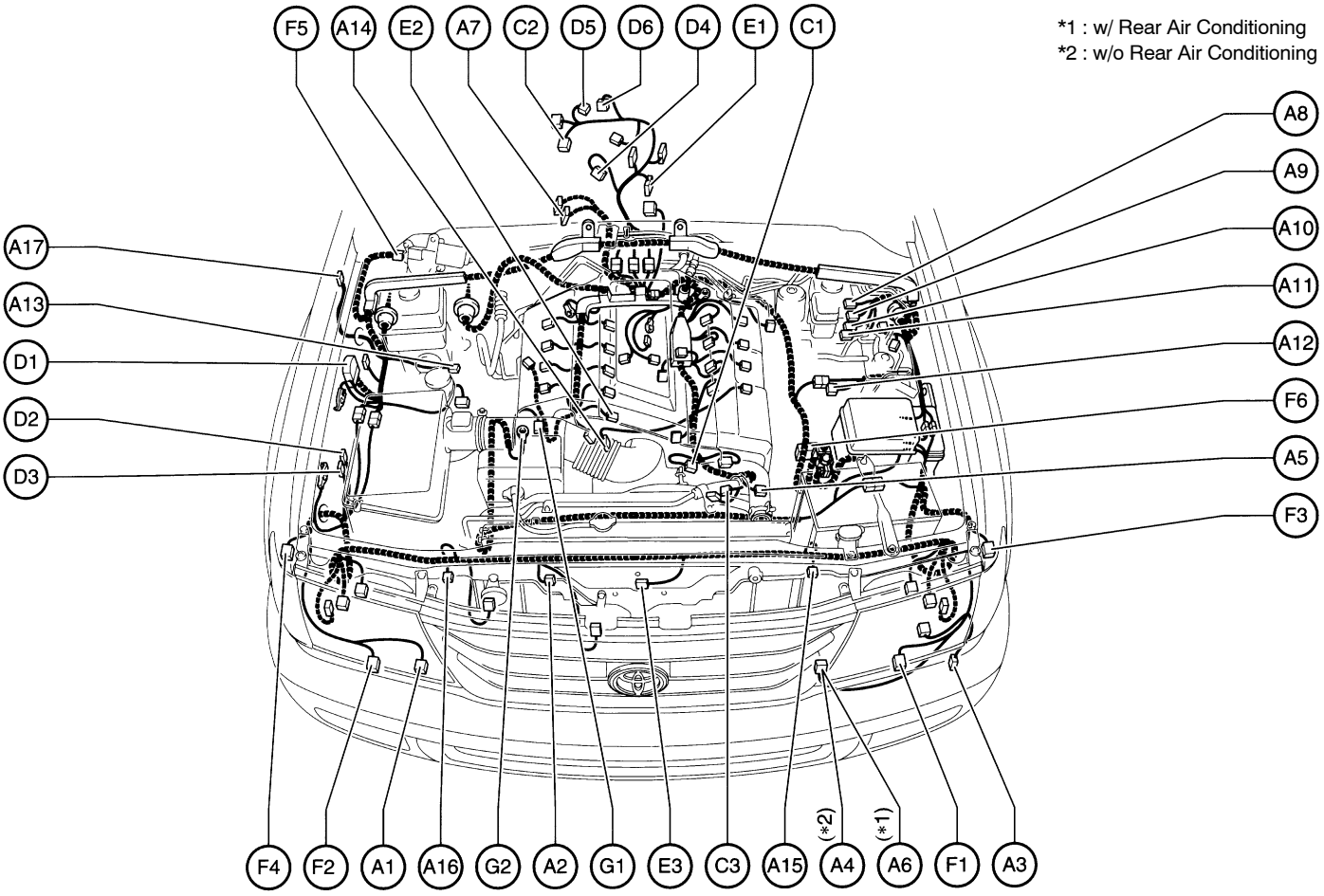
Position of Parts in Engine Compartment



A 1 A/C Ambient Temp. Sensor
A 2 A/C Condenser Fan Motor
A 3 A/C Condenser Fan Relay
A 4 A/C Dual Pressure SW
A 5 A/C Magnetic Clutch and Lock Sensor
A 6 A/C Triple Pressure SW
(A/C Dual and Single Pressure SW)
A 7 A/T Oil Temp. Sensor
A 8 ABS Actuator
A 9 ABS Actuator
A10 ABS Actuator
A11 ABS Actuator
A12 ABS Speed Sensor Front LH
A13 ABS Speed Sensor Front RH
A14 Accel Position Sensor
A15 Airbag Sensor Front LH
A16 Airbag Sensor Front RH
A17 Auto Antenna Motor

C 1 Camshaft Position Sensor
C 2 Center Diff. Lock Control Motor
C 3 Crankshaft Position Sensor

D 1 Data Link Connector 1
D 2 Daytime Running Light Relay No.3
D 3 Daytime Running Light Relay No.3
D 4 Detection SW (Center Diff. Lock)
D 5 Detection SW (Transfer L Position)
D 6 Detection SW (Transfer Neutral Position)

E 1 Electronically Controlled Transmission Solenoid
E 2 Engine Coolant Temp. Sensor
E 3 Engine Hood Courtesy SW

F 1 Front Fog Light LH
F 2 Front Fog Light RH
F 3 Front Turn Signal and Side Marker Light LH
F 4 Front Turn Signal and Side Marker Light RH
F 5 Front Wiper Motor
F 6 Fusible Link Block

G 1 Generator
G 2 Generator

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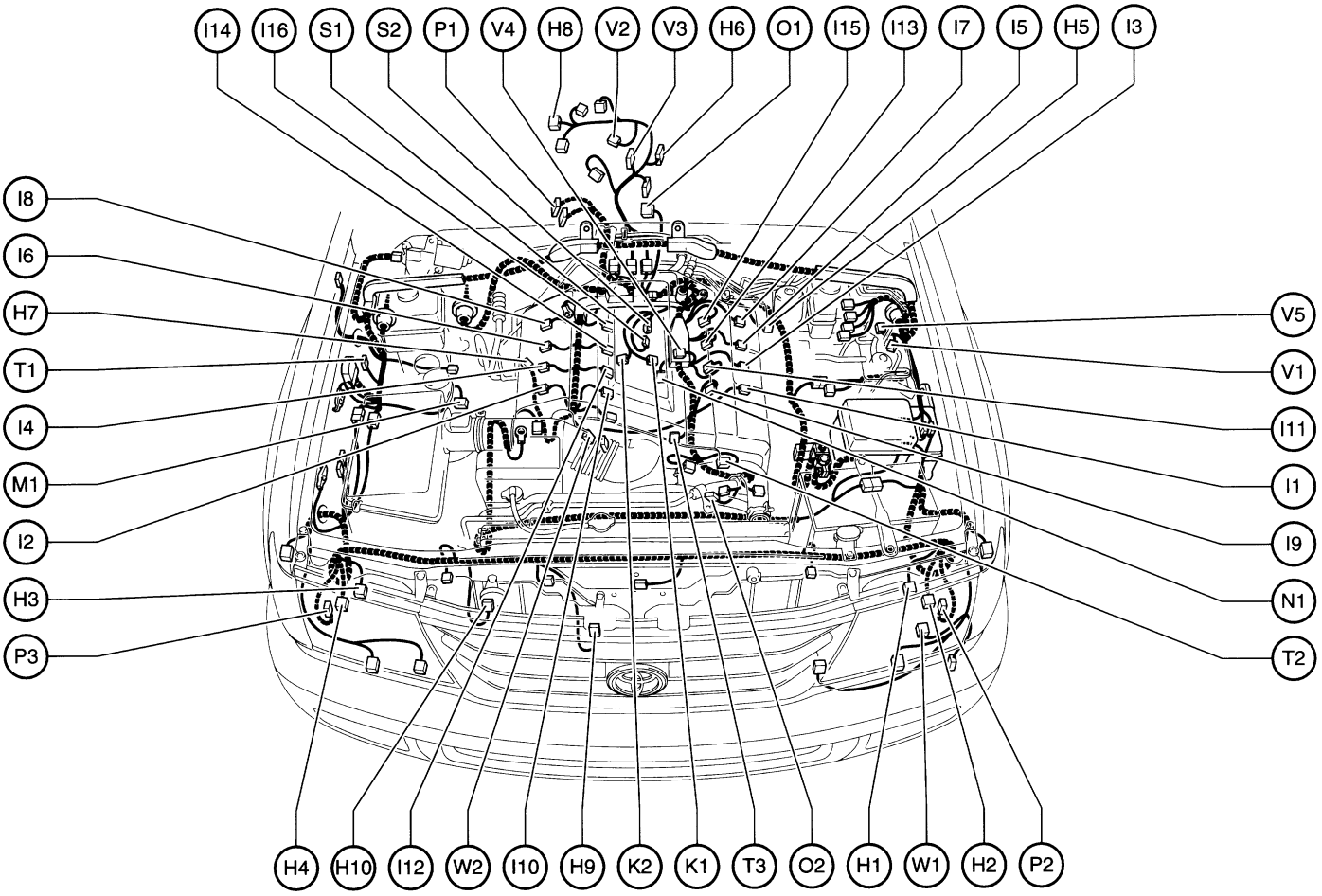
Position of Parts in Engine Compartment



H 1 Headlight LH (High)
H 2 Headlight LH (Low)
H 3 Headlight RH (High)
H 4 Headlight RH (Low)
H 5 Heated Oxygen Sensor (Bank 1 Sensor 1)
H 6 Heated Oxygen Sensor (Bank 1 Sensor 2)
H 7 Heated Oxygen Sensor (Bank 2 Sensor 1)
H 8 Heated Oxygen Sensor (Bank 2 Sensor 2)
H 9 Horn LH
H10 Horn RH

I 1 Ignition Coil and Igniter No.1
I 2 Ignition Coil and Igniter No.2
I 3 Ignition Coil and Igniter No.3
I 4 Ignition Coil and Igniter No.4
I 5 Ignition Coil and Igniter No.5
I 6 Ignition Coil and Igniter No.6
I 7 Ignition Coil and Igniter No.7
I 8 Ignition Coil and Igniter No.8
I 9 Injector No.1
I 10 Injector No.2
I 11 Injector No.3
I 12 Injector No.4
I 13 Injector No.5
I 14 Injector No.6
I 15 Injector No.7
I 16 Injector No.8

K 1 Knock Sensor 1
K 2 Knock Sensor 2

M 1 Mass Air Flow Meter

N 1 Noise Filter (Ignition)

O 1 O/D Direct Clutch Speed Sensor
O 2 Oil Pressure Sender

P 1 Park/Neutral Position SW, A/T Indicator Light SW and Pack-Up Light SW
P 2 Parking Light LH
P 3 Parking Light RH

S 1 Starter
S 2 Starter

T 1 Theft Deterrent Horn
T 2 Throttle Control Motor
T 3 Throttle Position Sensor

V 1 Vapor Pressure Sensor
V 2 Vehicle Speed Sensor (Combination Meter)
V 3 Vehicle Speed Sensor (Electronically Controlled Transmission)
V 4 VSV (EVAP)
V 5 VSV (Vapor Pressure Sensor)

W 1 Washer Motor
W 2 Water Temp. Sender

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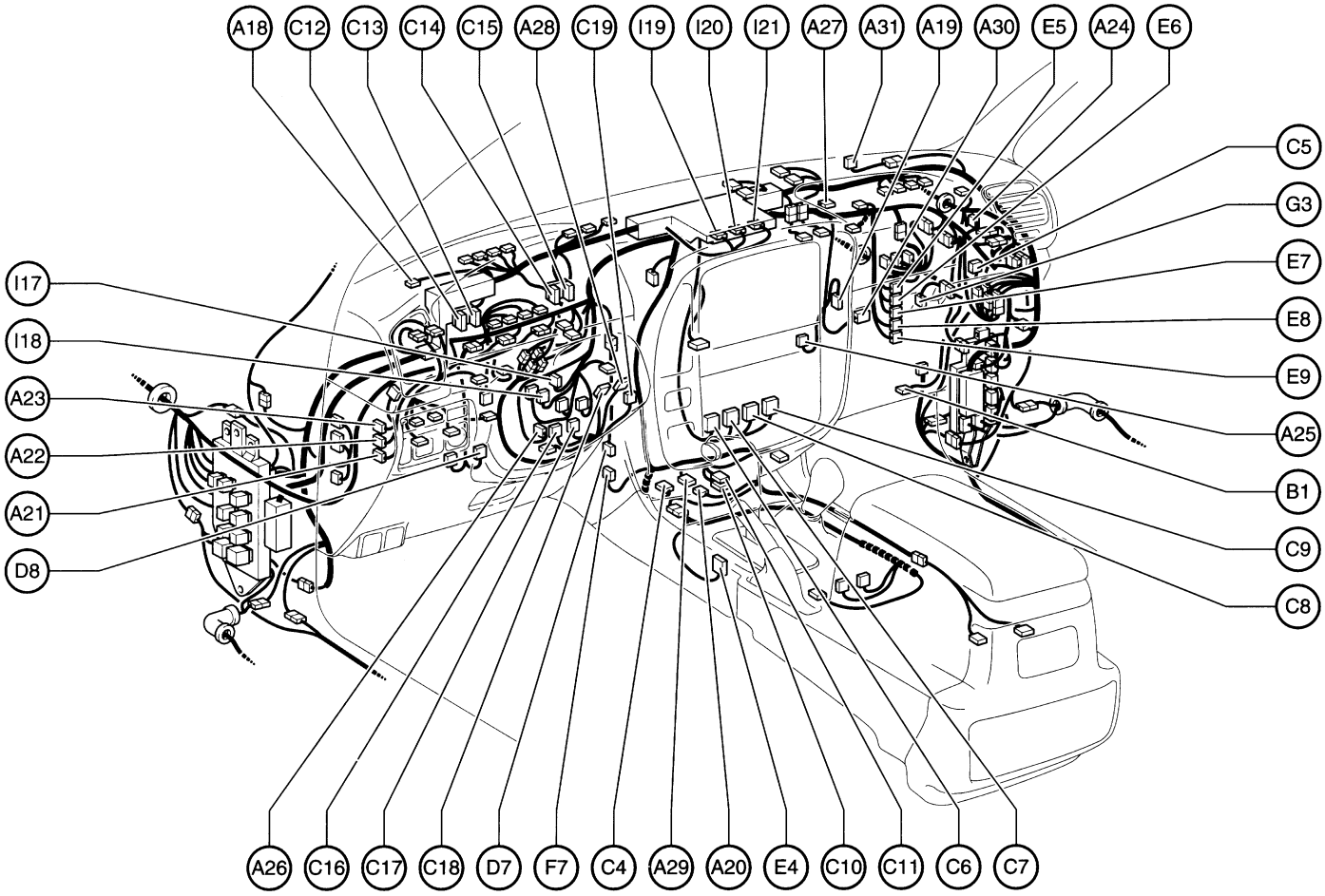
Position of Parts in Instrument Panel



A18 A/C Solar Sensor
A19 A/C Thermistor
A20 ABS Deceleration Sensor
A21 ABS ECU
A22 ABS ECU
A23 ABS ECU
A24 Air Inlet Control Servo Motor
A25 Air Mix Control Servo Motor
A26 Air Vent Mode Control Servo Motor
A27 Airbag Squib (Front Passenger Airbag Assembly)
A28 Airbag Squib (Steering Wheel Pad)
A29 Ashtray Illumination
A30 Auto Antenna Control Relay
A31 Automatic Light Control Sensor

B 1 Blower Motor Controller

C 4 Center Airbag Sensor Assembly
C 5 Center Diff. Lock Control Relay
C 6 Center ECU
C 7 Center ECU
C 8 Center ECU
C 9 Center ECU
C10 Cigarette Lighter
C11 Cigarette Lighter Illumination
C12 Combination Meter
C13 Combination Meter
C14 Combination Meter
C15 Combination Meter
C16 Combination SW
C17 Combination SW
C18 Combination SW
C19 Combination SW

D 7 Data Link Connector 3
D 8 Daytime Running Light Relay (Main)

E 4 Electronically Controlled Transmission Pattern Select SW
E 5 Engine Control Module
E 6 Engine Control Module
E 7 Engine Control Module
E 8 Engine Control Module
E 9 Engine Control Module

F 7 Fuel Control SW

G 3 Glove Box Light

I 17 Ignition Key Cylinder Light
I 18 Ignition SW
I 19 Instrument ECU
I 20 Instrument ECU
I 21 Instrument ECU

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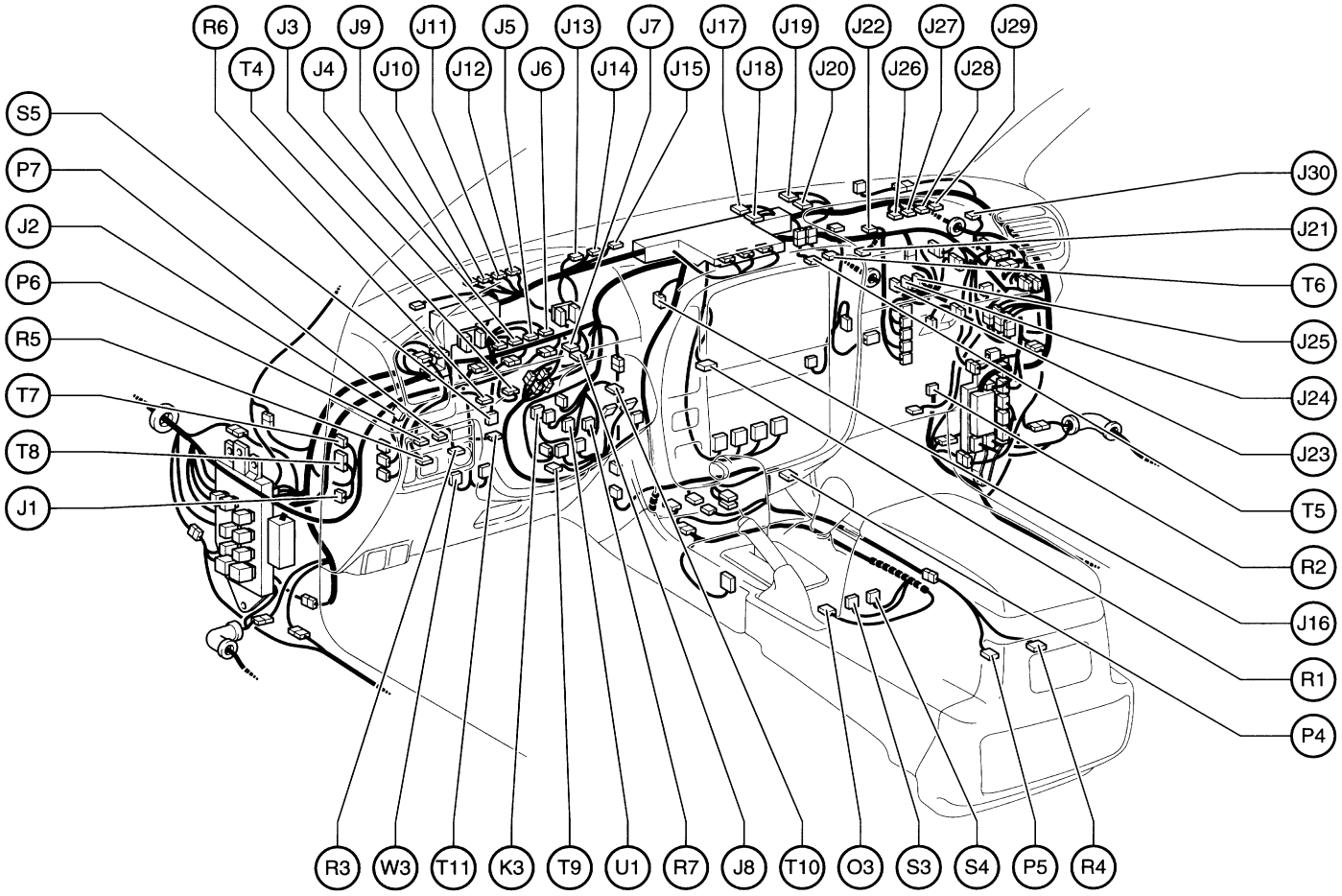
Position of Parts in Instrument Panel



J 1 Junction Connector
J 2 Junction Connector
J 3 Junction Connector
J 4 Junction Connector
J 5 Junction Connector
J 6 Junction Connector
J 7 Junction Connector
J 8 Junction Connector
J 9 Junction Connector
J10 Junction Connector
J11 Junction Connector
J12 Junction Connector
J13 Junction Connector
J14 Junction Connector
J15 Junction Connector
J16 Junction Connector
J17 Junction Connector
J18 Junction Connector
J19 Junction Connector
J20 Junction Connector
J21 Junction Connector
J22 Junction Connector
J23 Junction Connector
J24 Junction Connector
J25 Junction Connector
J26 Junction Connector
J27 Junction Connector
J28 Junction Connector
J29 Junction Connector
J30 Junction Connector

K 3 Key Interlock Solenoid

O 3 O/D Main SW and Shift Lock Control ECU

P 4 Power Outlet (Front)
P 5 Power Outlet (Rear Console Box)
P 6 Power Quarter Window SW LH
P 7 Power Quarter Window SW RH

R 1 Radio and Player
R 2 Rear Diff. Lock Control ECU
R 3 Rear Diff. Lock SW
R 4 Rear Heater SW
R 5 Remote Control Mirror SW
R 6 Rheostat
R 7 Room Temp. Sensor (Front)

S 3 Seat Heater SW (Driver's Seat)
S 4 Seat Heater SW (Front Passenger's Seat)
S 5 Stop Light SW

T 4 Telescopic Motor
T 5 Theft Deterrent ECU
T 6 Theft Deterrent ECU
T 7 Tilt and Telescopic ECU
T 8 Tilt and Telescopic ECU
T 9 Tilt Motor
T10 Transponder Key Amplifier
T11 Turn Signal Flasher

U 1 Unlock Warning SW

W 3 Wireless Door Lock ECU

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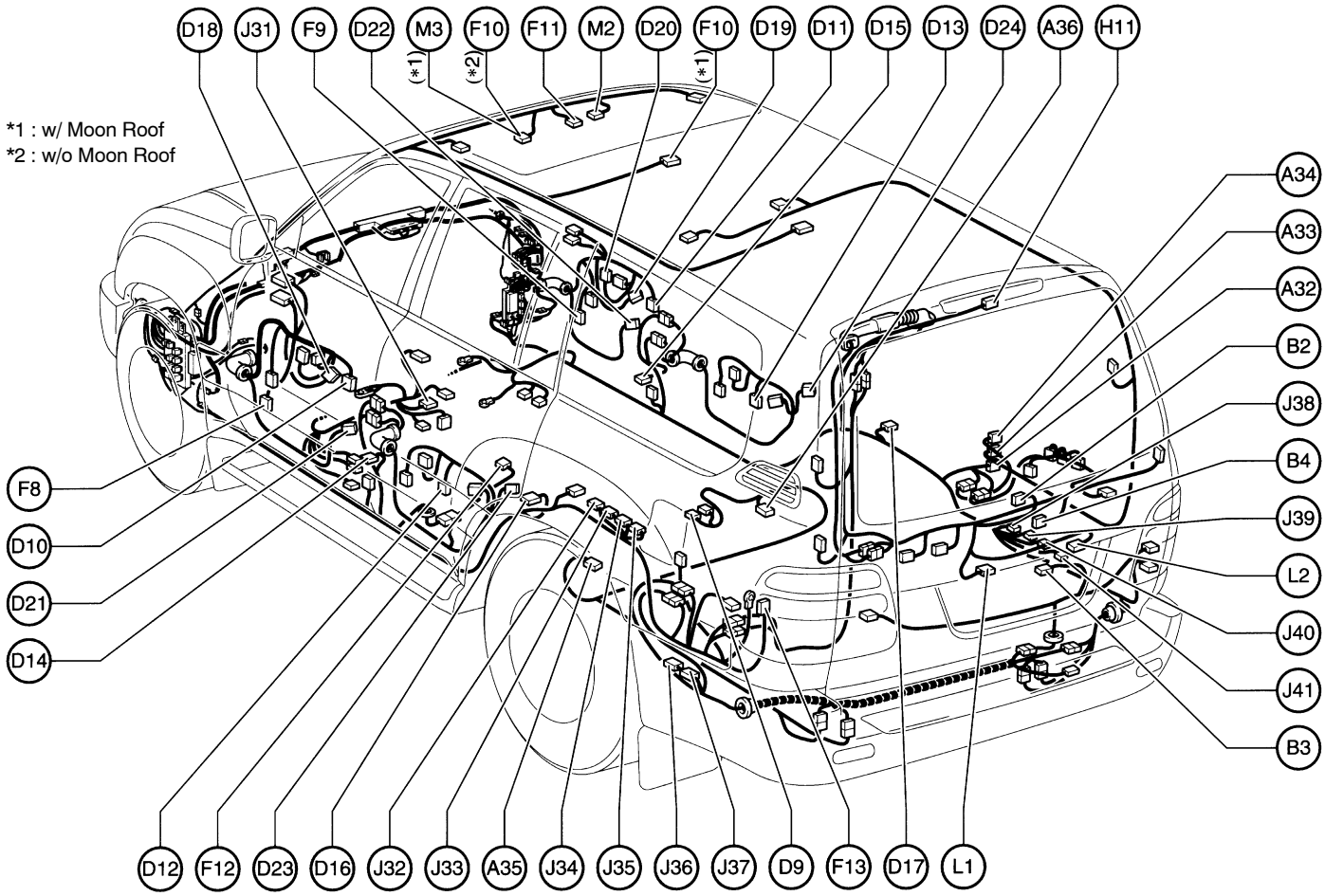
Position of Parts in Body



A32 A/C Amplifier (Rear)
A33 A/C Amplifier (Rear)
A34 A/C Amplifier (Rear)
A35 ABS Speed Sensor Rear LH
A36 ABS Speed Sensor Rear RH

B 2 Back Door Courtesy SW
B 3 Back Door Dey Lock and Unlock SW
B 4 Back Door Lock Motor and Back Door Unlock Detection SW

D 9 Detection SW (Rear Diff. Lock)
D10 Door Courtesy Light Front LH
D11 Door Courtesy Light Front RH
D12 Door Courtesy Light Rear LH
D13 Door Courtesy Light Rear RH
D14 Door Courtesy SW Front LH
D15 Door Courtesy SW Front RH
D16 Door Courtesy SW Rear LH
D17 Door Courtesy SW Rear RH
D18 Door Key Lock and Unlock SW LH
D19 Door Key Lock and Unlock SW RH
D20 Door Lock Control SW RH
D21 Door Lock Motor and Door Unlock Detection SW Front LH
D22 Door Lock Motor and Door Unlock Detection SW Front RH
D23 Door Lock Motor and Door Unlock Detection SW Rear LH
D24 Door Lock Motor and Door Unlock Detection SW Rear RH

F 8 Front Door Speaker LH
F 9 Front Door Speaker RH
F10 Front Interior Light and Rear Personal Light
F11 Front Personal Light
F12 Fuel Pump and Sender
F13 Fuel Pump Control ECU

H11 High Mounted Stop Light

J31 Junction Connector
J32 Junction Connector
J33 Junction Connector
J34 Junction Connector
J35 Junction Connector
J36 Junction Connector
J37 Junction Connector
J38 Junction Connector
J39 Junction Connector
J40 Junction Connector
J41 Junction Connector

L 1 License Plate Light LH
L 2 License Plate Light RH

M 2 Moon Roof Control ECU
M 3 Moon Roof Control SW

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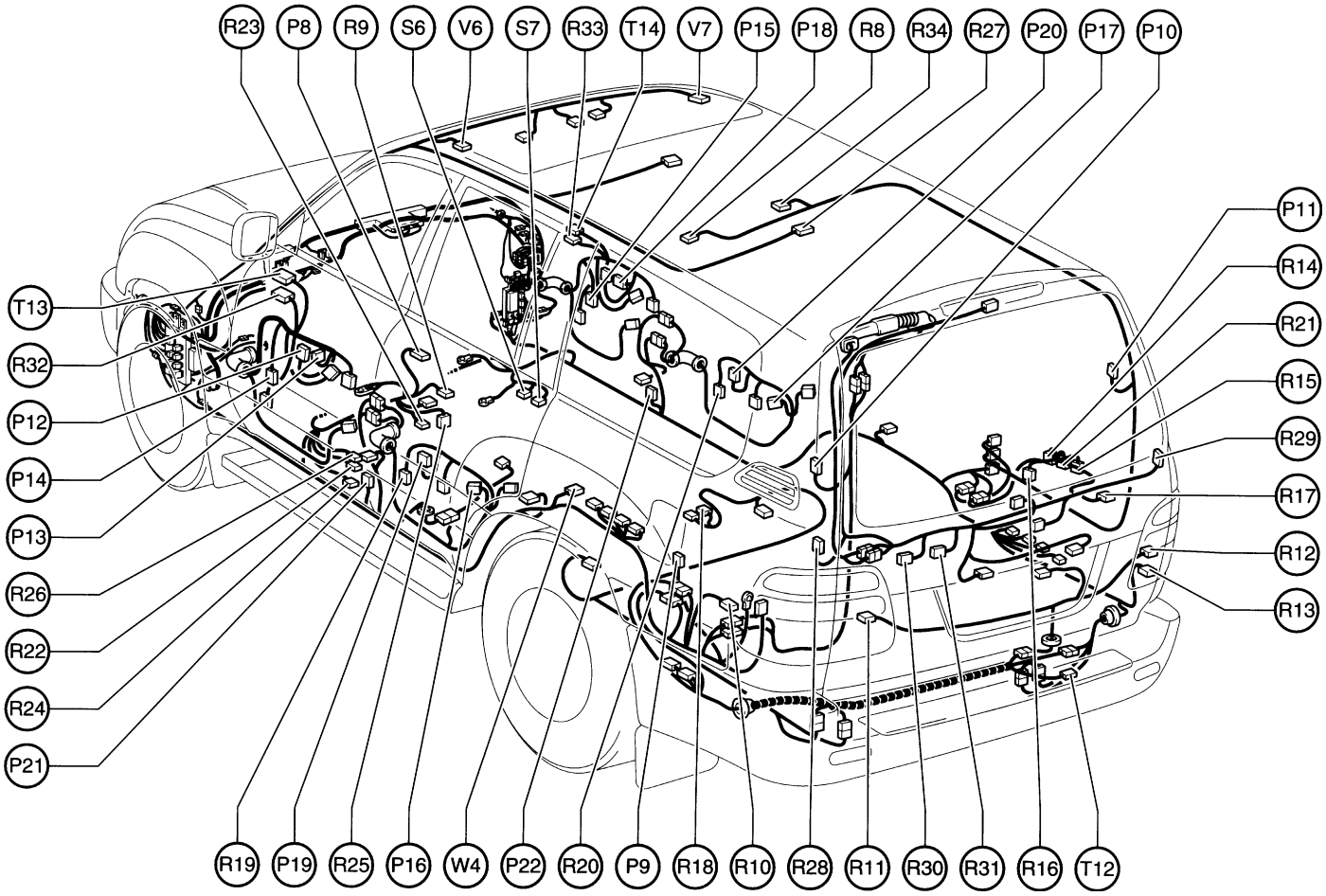
Position of Parts in Body



P 8 Parking Brake SW
P 9 Power Outlet (Luggage Compartment)
P10 Power Vent Window Motor LH
P11 Power Vent Window Motor RH
P12 Power Window Master SW
P13 Power Window Master SW
P14 Power Window Motor Front LH
P15 Power Window Motor Front RH
P16 Power Window Motor Rear LH
P17 Power Window Motor Rear RH
P18 Power Window SW Front RH
P19 Power Window SW Rear LH
P20 Power Window SW Rear RH
P21 Pretensioner LH
P22 Pretensioner RH

R 8 Rear A/C Control SW
R 9 Rear Air Mix Control Servo Motor
R10 Rear Combination Light LH
R11 Rear Combination Light LH
R12 Rear Combination Light RH
R13 Rear Combination Light RH
R14 Rear Cooler Blower Motor
R15 Rear Cooler Magnetic Valve
R16 Rear Cooler Power Transistor
R17 Rear Cooler Relay
R18 Rear Diff. Lock Motor
R19 Rear Door Speaker LH
R20 Rear Door Speaker RH
R21 Rear Evaporator Temp. Sensor
R22 Rear Heater Blower Motor
R23 Rear Heater Blower Resistor
R24 Rear Heater Fan Relay
R25 Rear Heater Power Transistor
R26 Rear Inlet Air Temp. Sensor
R27 Rear Interior Light
R28 Rear Window Defogger
R29 Rear Window Defogger
R30 Rear Wiper Motor
R31 Rear Wiper Relay
R32 Remote Control Mirror LH
R33 Remote Control Mirror RH
R34 Room Temp. Sensor (Rear)

S 6 Stereo Component Amplifier
S 7 Stereo Component Amplifier

T12 Trailer Socket
T13 Tweeter LH
T14 Tweeter RH

V 6 Vanity Light LH
V 7 Vanity Light RH

W 4 Woofer (Speaker)

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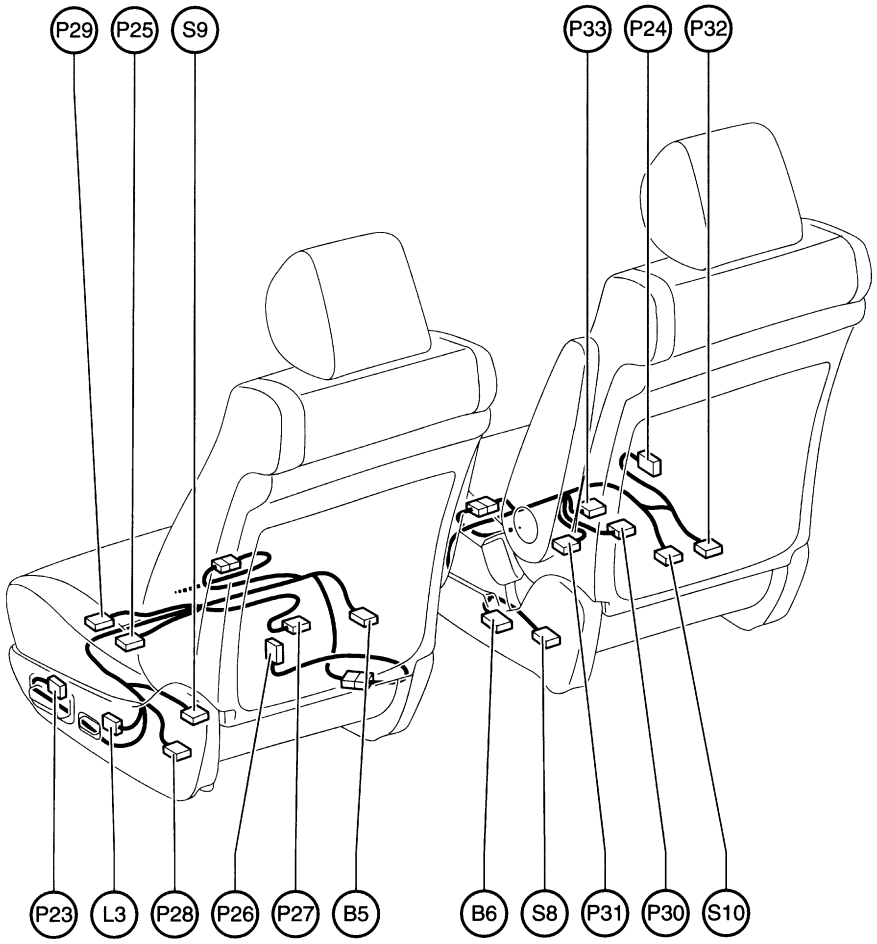
Position of Parts in Seat



B 5 Buckle SW LH
B 6 Buckle SW RH

L 3 Lumbar Support Control SW (Driver's Seat)

P23 Power Seat Control SW (Driver's Seat)
P24 Power Seat Control SW (Front Passenger's Seat)
P25 Power Seat Motor
(Driver's Seat Front Vertical Control)
P26 Power Seat Motor
(Driver's Seat Lumbar Support Control)
P27 Power Seat Motor
(Driver's Seat Rear Vertical Control)
P28 Power Seat Motor
(Driver's Seat Reclining Control)
P29 Power Seat Motor
(Driver's Seat Slide Control)
P30 Power Seat Motor
(Front Passenger's Seat Front Vertical Control)
P31 Power Seat Motor
(Front Passenger's Seat Rear Vertical Control)
P32 Power Seat Motor
(Front Passenger's Seat Reclining Control)
P33 Power Seat Motor
(Front Passenger's Seat Slide Control)

S 8 Seat Belt Warning Occupant Detection Sensor
S 9 Seat Heater (Driver's Seat)
S10 Seat Heater (Front Passenger's Seat)

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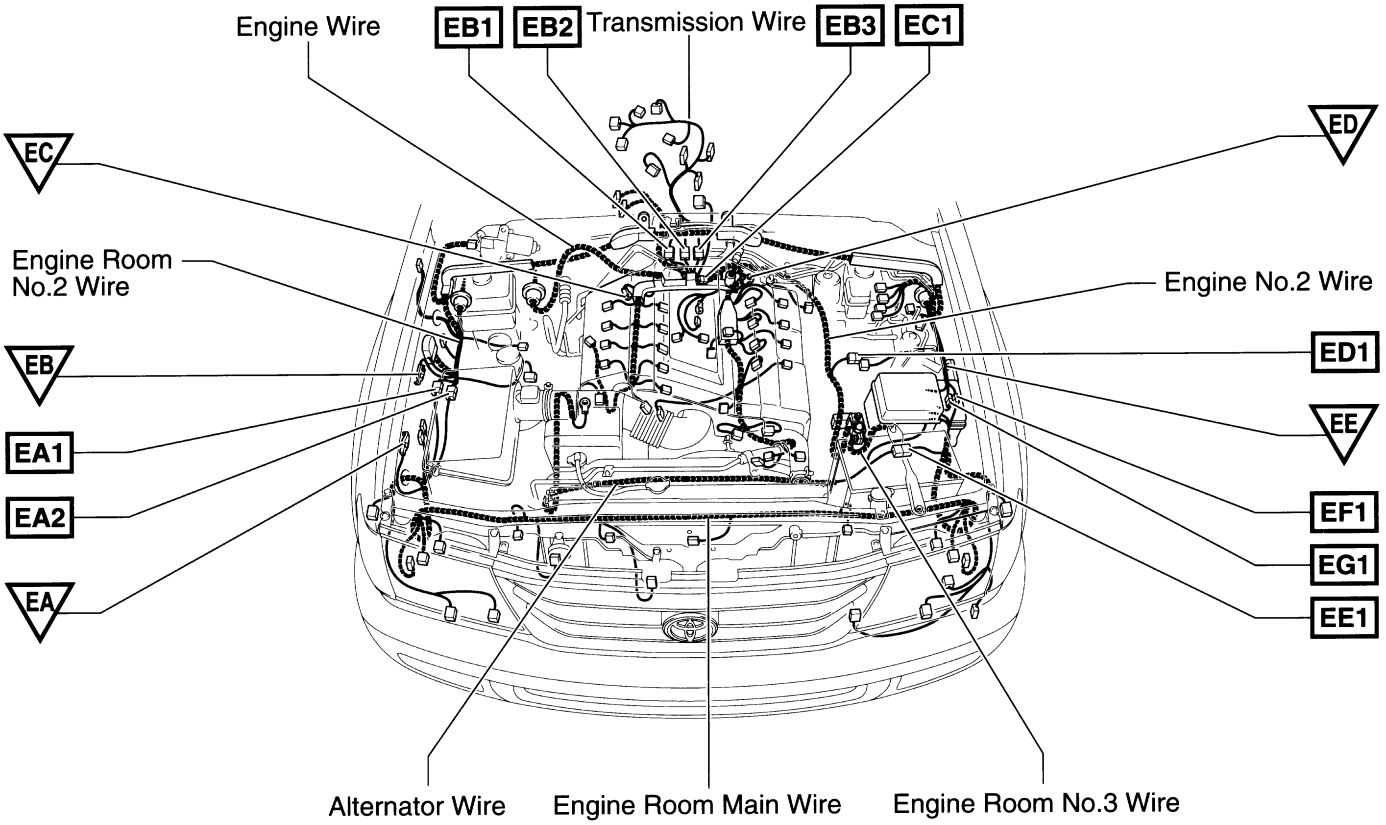
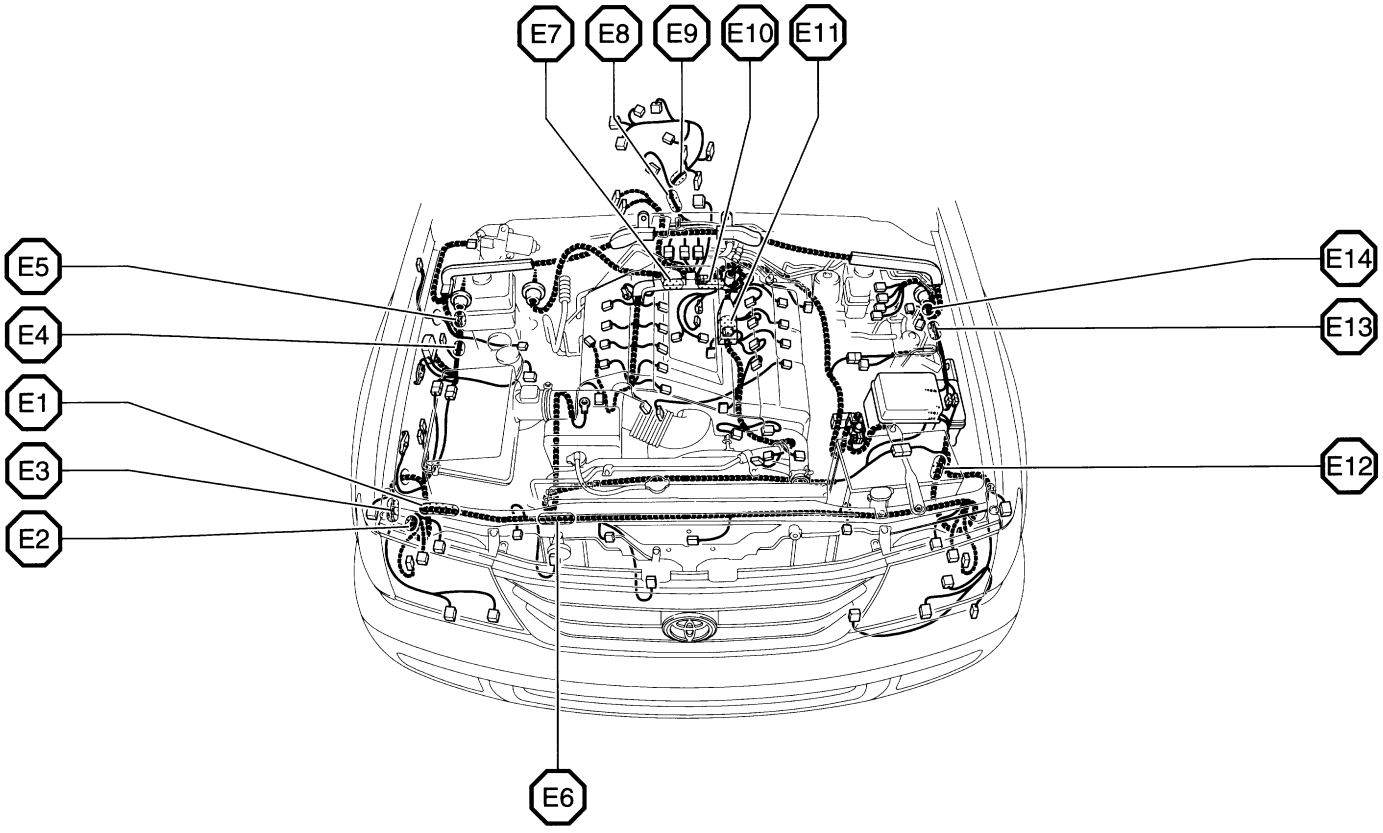
▭ : Location of Connector Joining Wire Harness and Wire Harness

▽ : Location of Ground Points



◯ : Location of Splice Points



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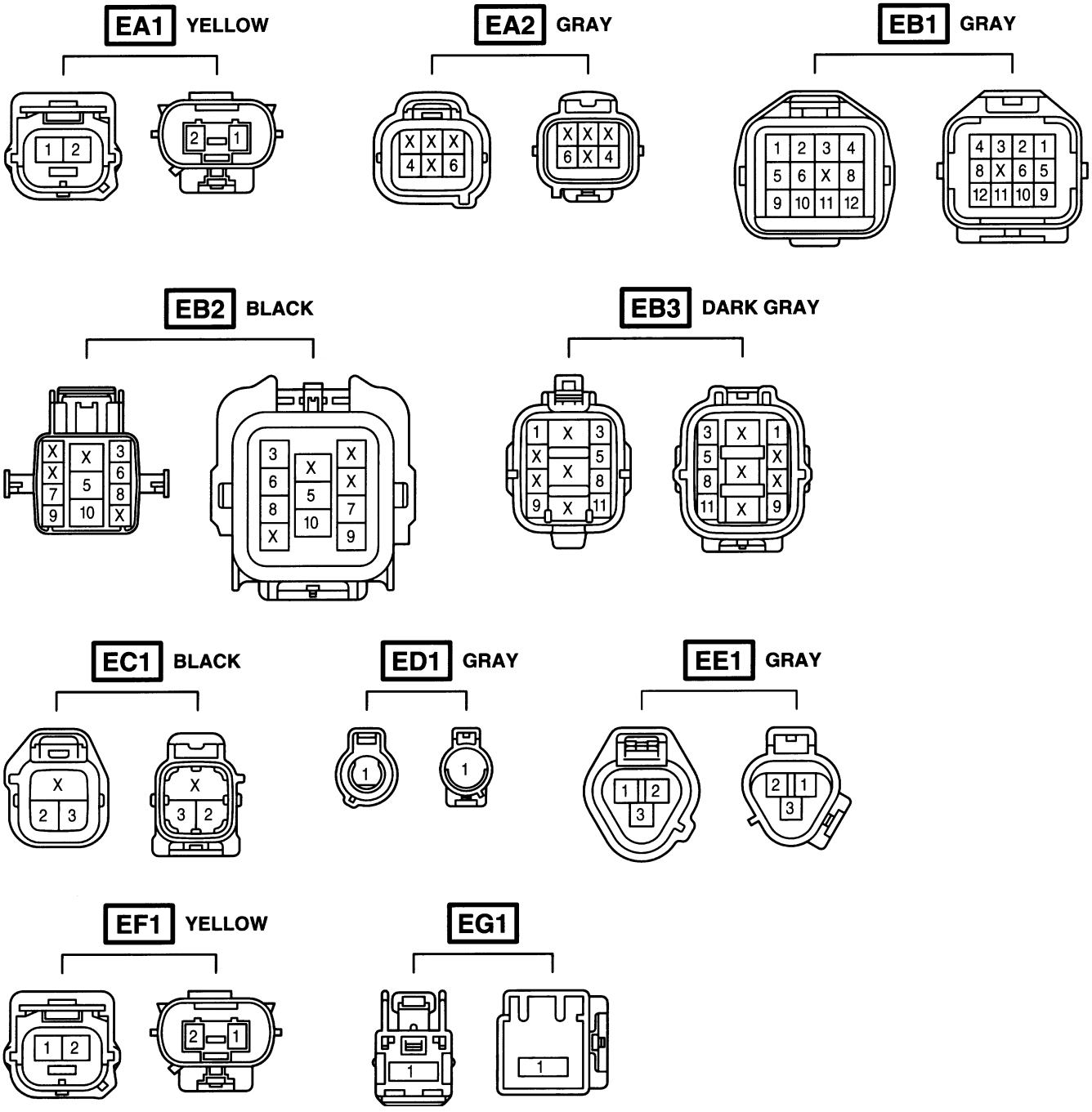
Connector Joining Wire Harness and Wire Harness



Code	Joining Wire Harness and Wire Harness (Connector Location)
EA1	Engine Room Main Wire and Engine Room No.2 Wire (Engine Compartment Right)
EA2	
EB1	Engine Wire and Transmission Wire (On the Transmission)
EB2	
EB3	
EC1	Engine No.2 Wire and Engine Wire (Rear Side of Intake Manifold)
ED1	Engine No.2 Wire and Engine Room No.2 Wire (Near the Engine Room J/B)
EE1	Engine Room Main Wire and Alternator Wire (Near the Battery)
EF1	Engine Room No.2 Wire and Engine Room Main Wire (Under the Engine Room J/B)
EG1	Engine Room No.2 Wire and Engine Room No.3 Wire (Under the Engine Room J/B)

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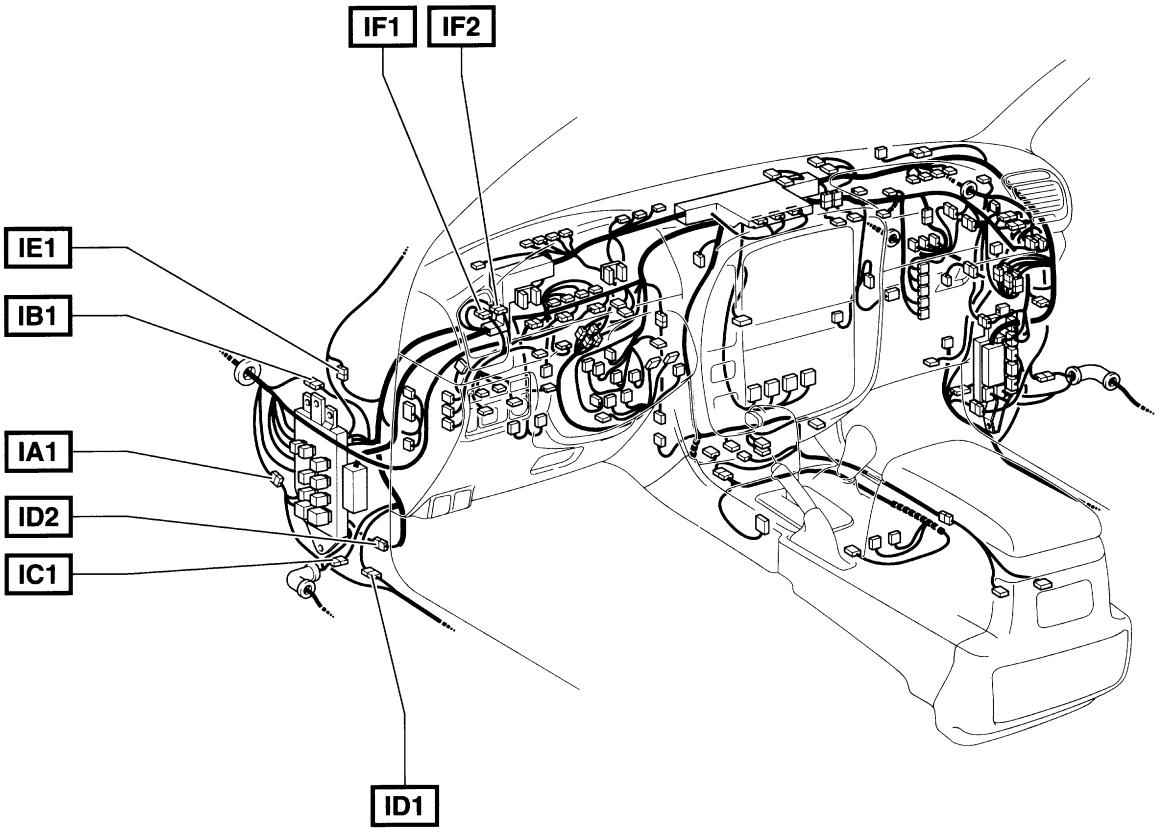
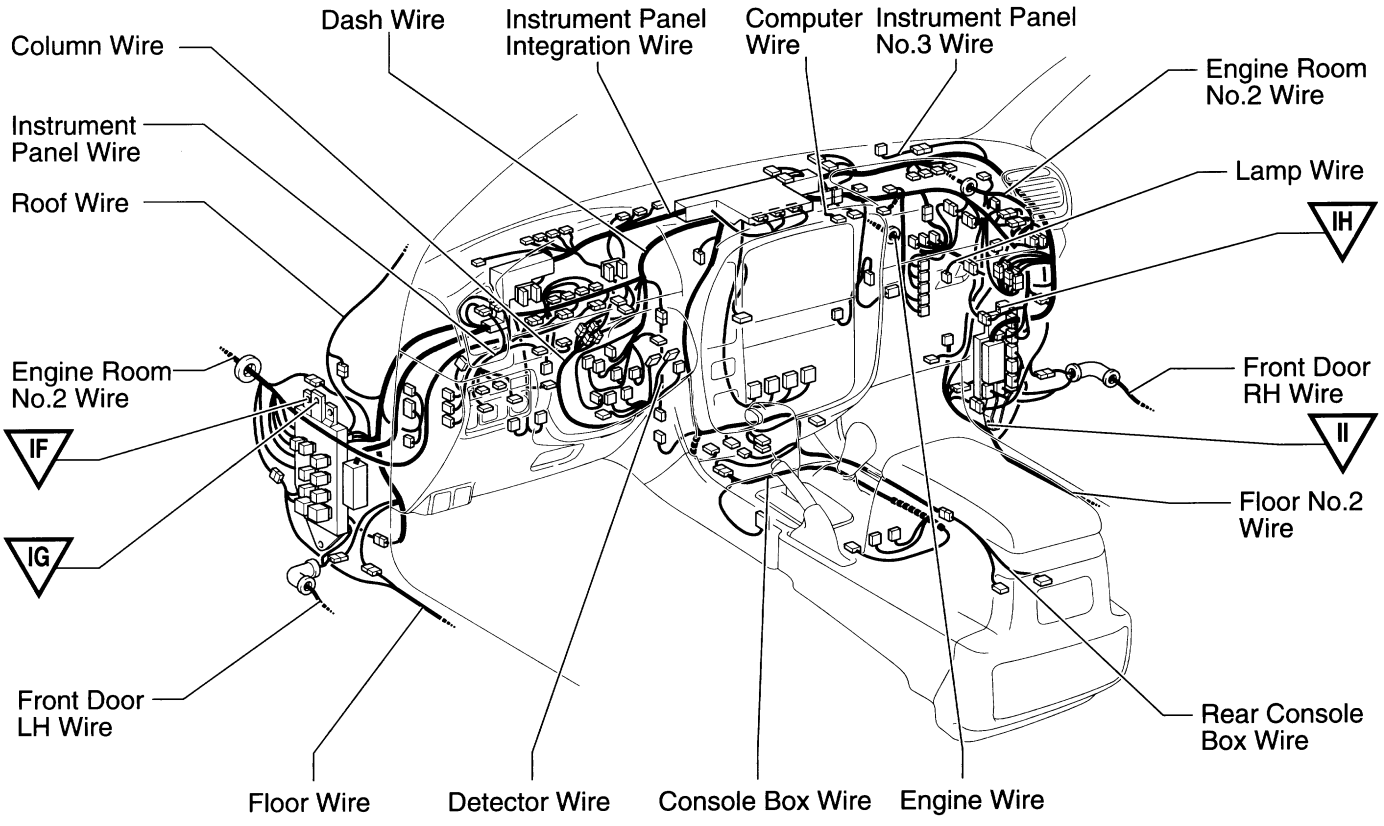
▭ : Location of Connector Joining Wire Harness and Wire Harness



▽ : Location of Ground Points



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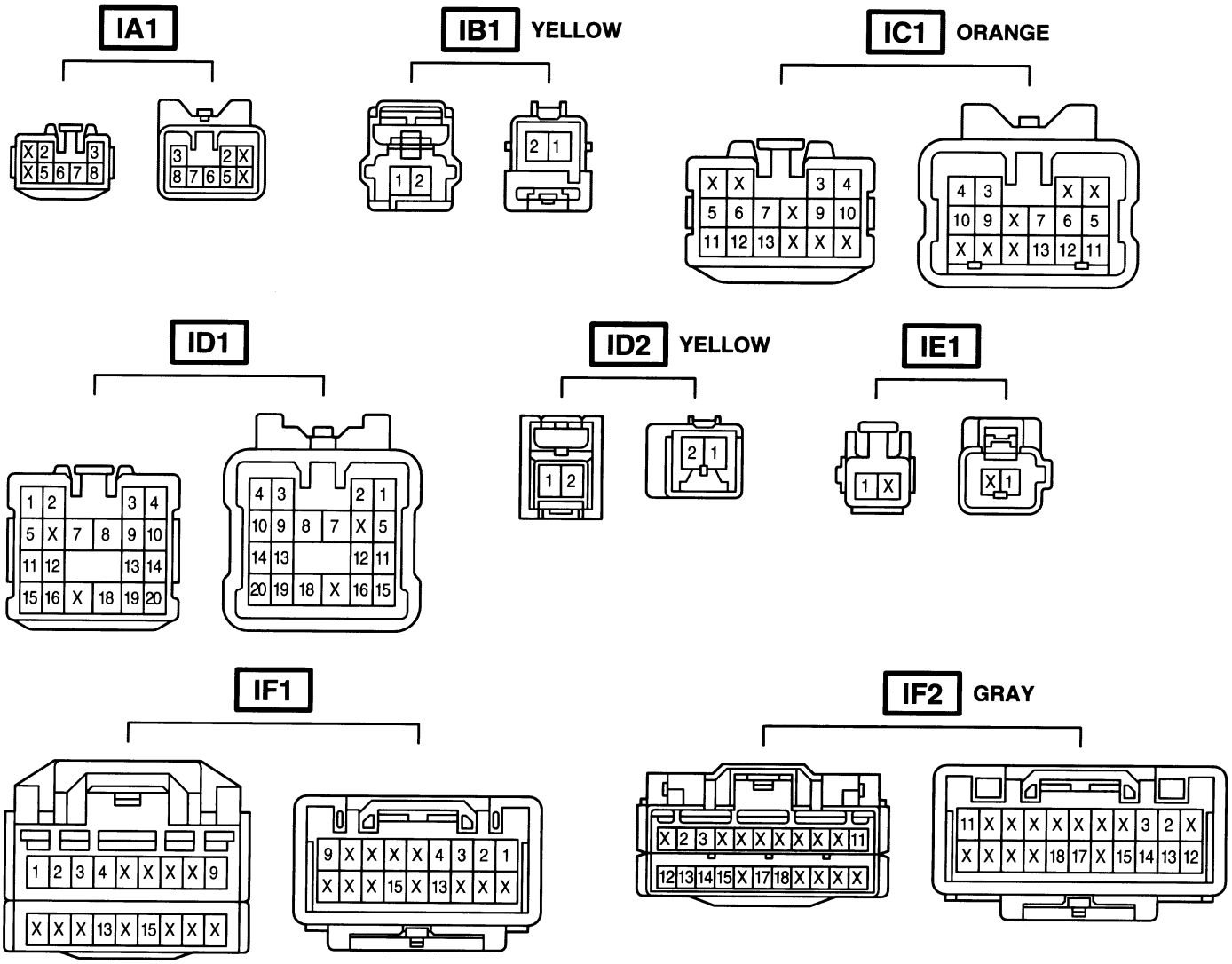
Connector Joining Wire Harness and Wire Harness



Code	Joining Wire Harness and Wire Harness (Connector Location)
IA1	Floor Wire and Engine Room No.2 Wire (Left Kick Panel)
IB1	Engine Room No.2 Wire and Dash Wire (Left Kick Panel)
IC1	Front Door LH Wire and Dash Wire (Left Kick Panel)
ID1	Dash Wire and Floor Wire (Left Kick Panel)
ID2	
IE1	Dash Wire and Floor Wire (Left Kick Panel)
IF1	Instrument Panel Integration Wire and Instrument Panel Wire (Left Side of Instrument Panel)
IF2	

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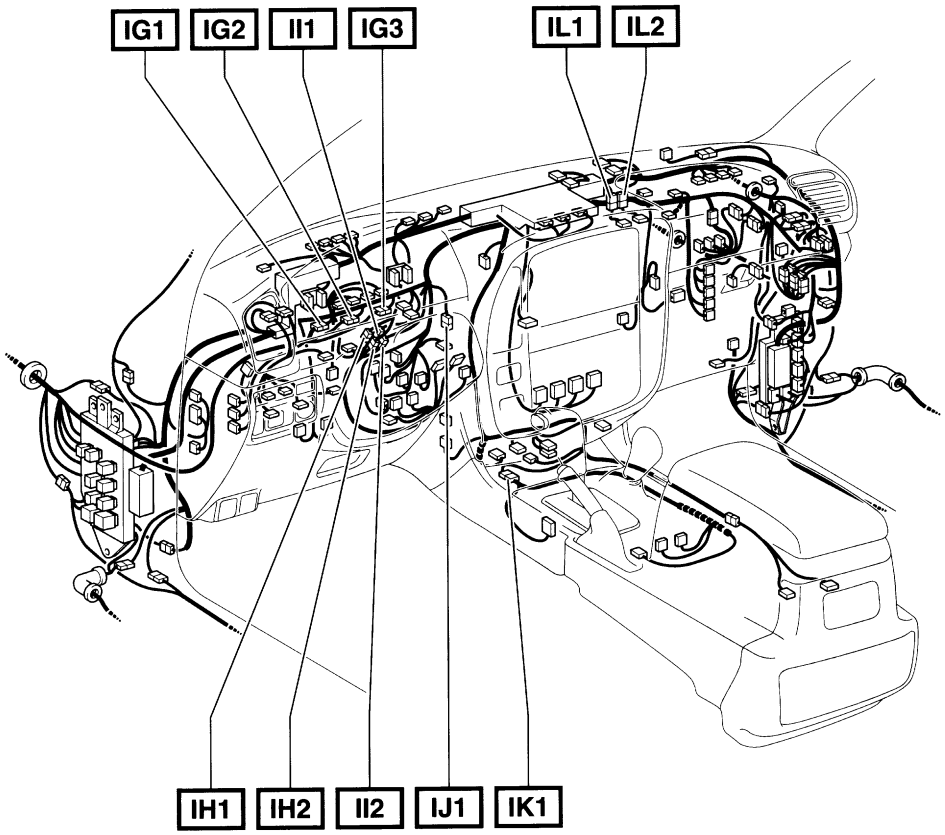
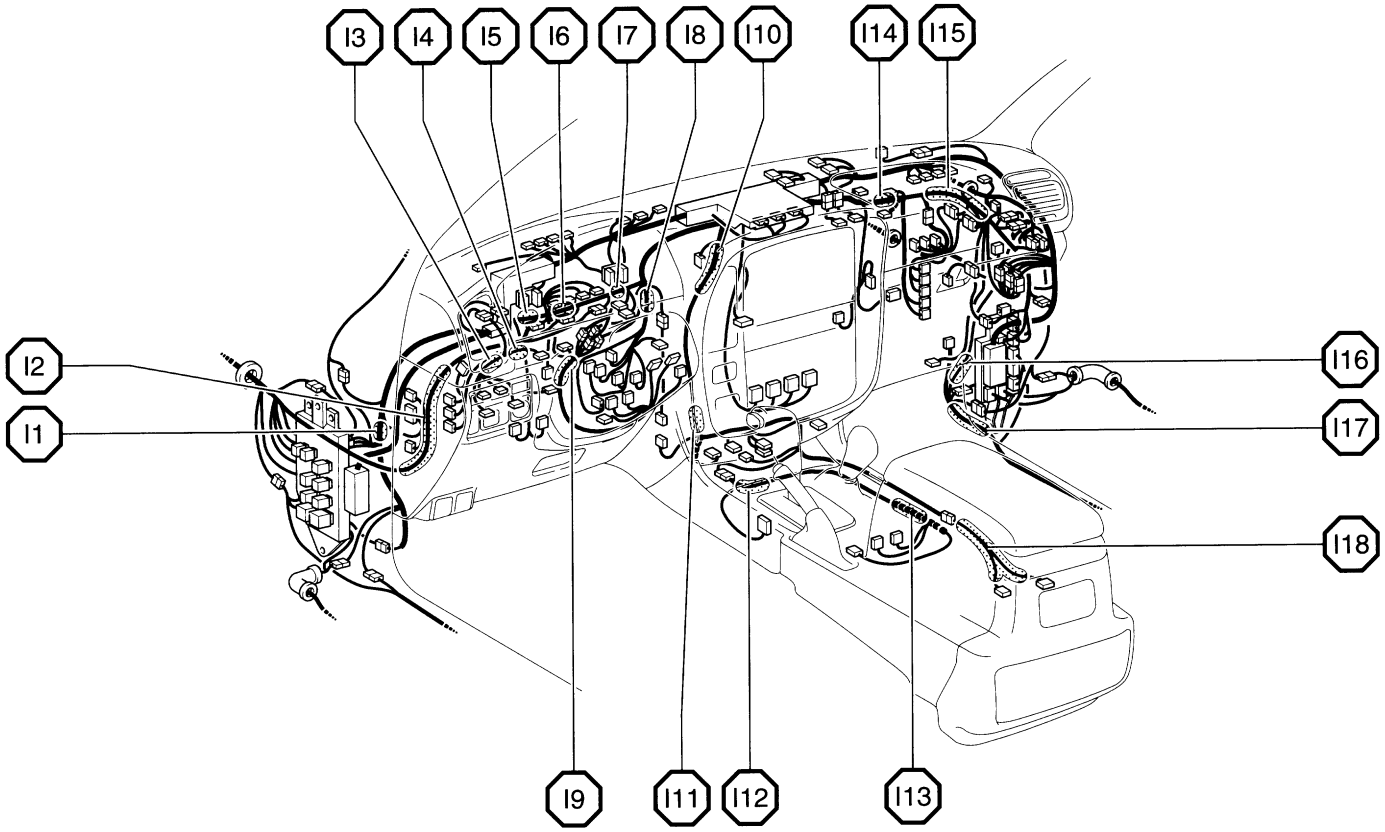
▭ : Location of Connector Joining Wire Harness and Wire Harness



⬡ : Location of Splice Points



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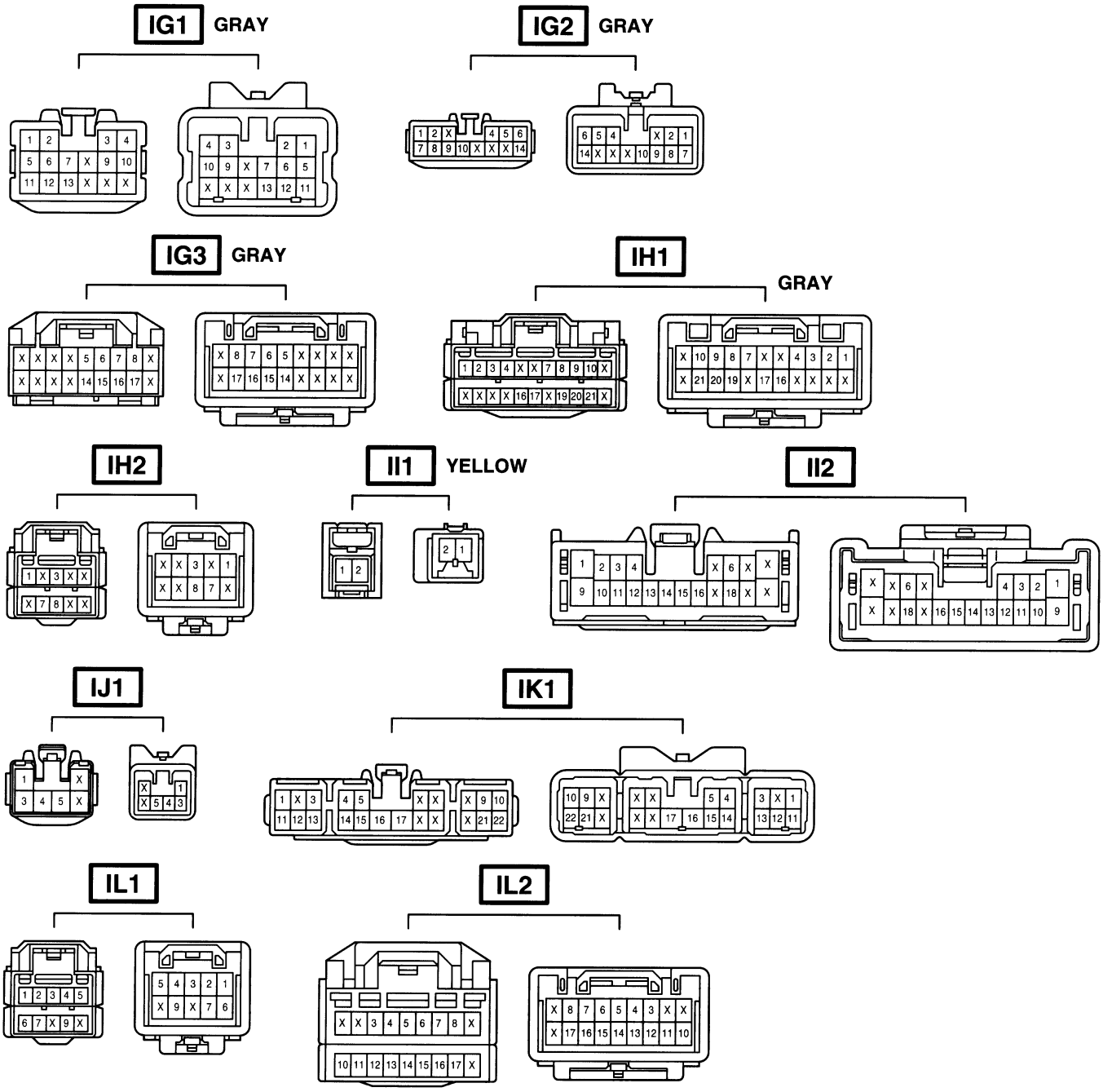
Connector Joining Wire Harness and Wire Harness



Code	Joining Wire Harness and Wire Harness (Connector Location)
IG1	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IG2	
IG3	
IH1	Instrument Panel Integration Wire and Column Wire (Near the Ignition SW)
IH2	
II1	Dash Wire and Column Wire (Near the Ignition SW)
II2	Column Wire and Dash Wire (Near the Ignition SW)
IJ1	Dash Wire and Detector Wire (Instrument Panel Center)
IK1	Console Box Wire and Dash Wire (Left Side of Front Console)
IL1	Instrument Panel Integration Wire and Computer Wire (Instrument Panel Center)
IL2	

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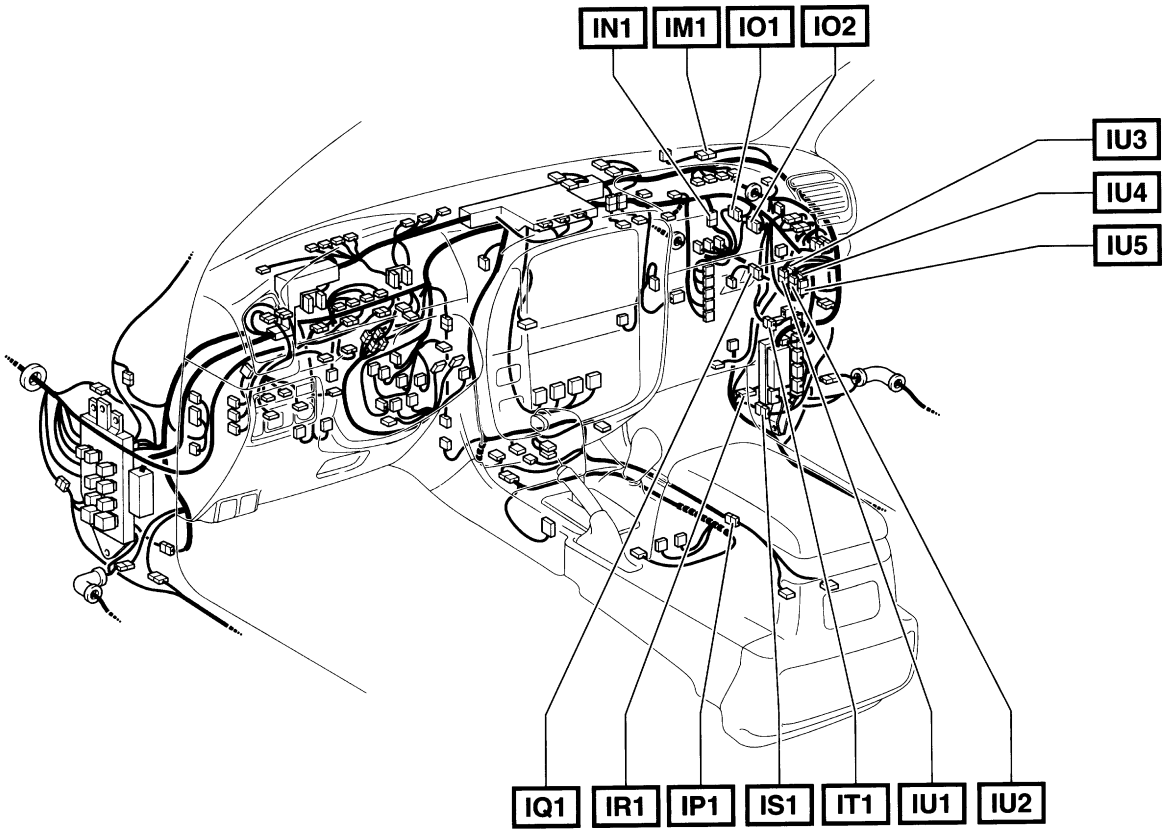
▭ : Location of Connector Joining Wire Harness and Wire Harness



Code	Joining Wire Harness and Wire Harness (Connector Location)
IM1	Instrument Panel Integration Wire and Instrument Panel No.3 Wire (Right Side of Instrument Panel)
IN1	Engine Wire and Dash Wire (Behind the Glove Box)
IO1	
IO2	
IP1	Rear Console Box Wire and Dash Wire (Right Side of Rear Console)
IQ1	Instrument Panel Integration Wire and Lamp Wire (Behind the Glove Box)
IR1	Engine Room No.2 Wire and Floor No.2 Wire (Right Kick Panel)
IS1	Dash Wire and Floor No.2 Wire (Right Kick Panel)
IT1	Engine Room No.2 Wire and Dash Wire (Right Kick Panel)
IU1	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
IU2	
IU3	
IU4	
IU5	

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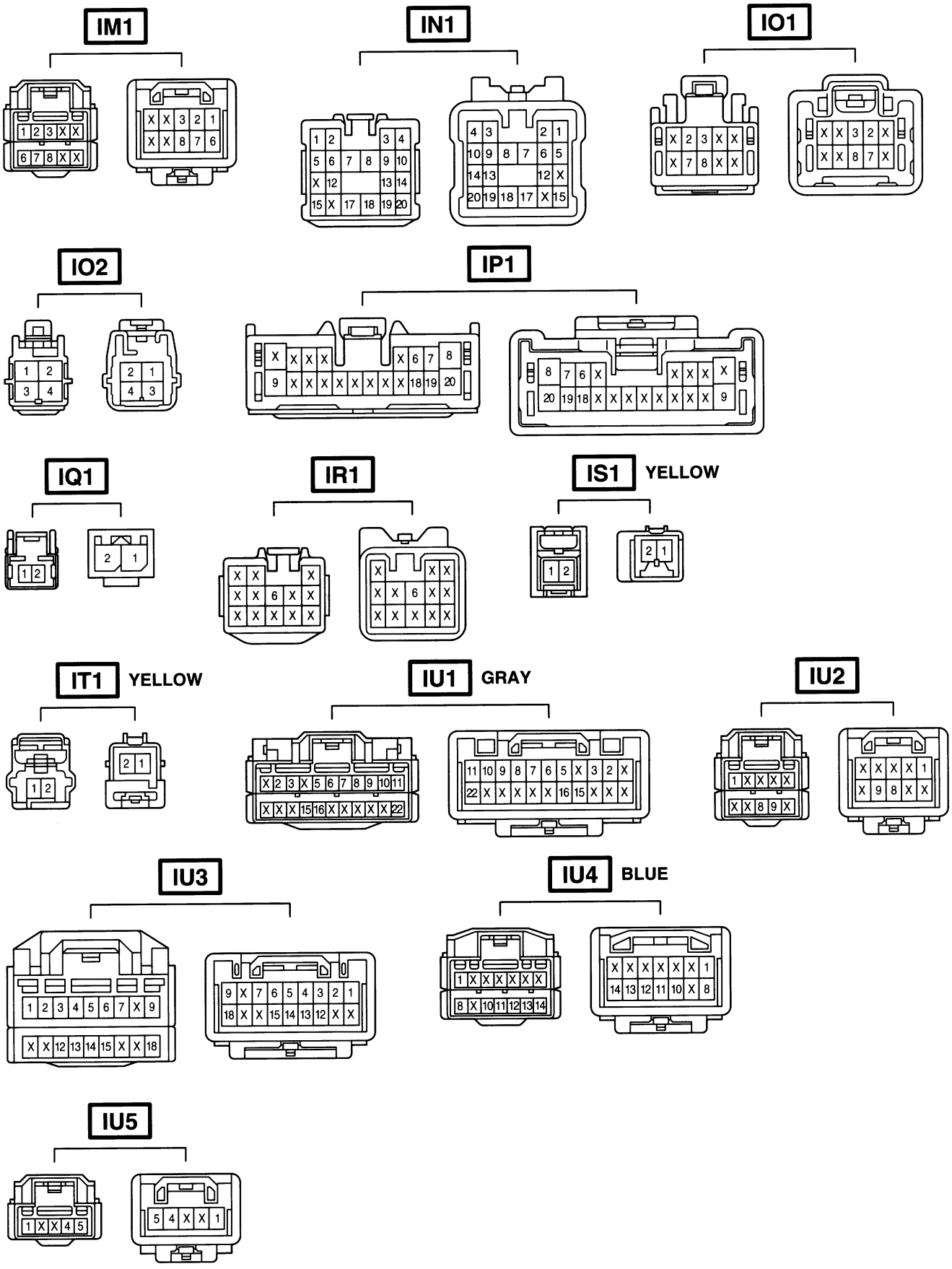
Connector Joining Wire Harness and Wire Harness



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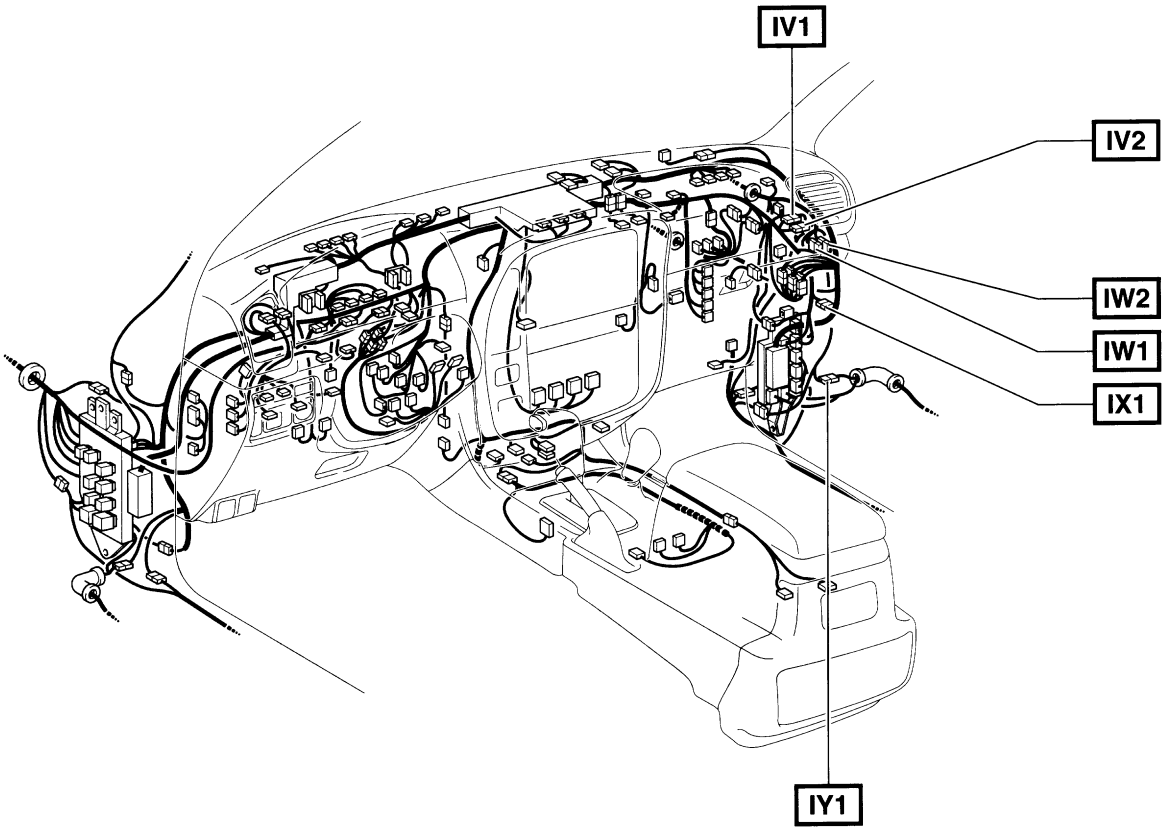
▭ : Location of Connector Joining Wire Harness and Wire Harness



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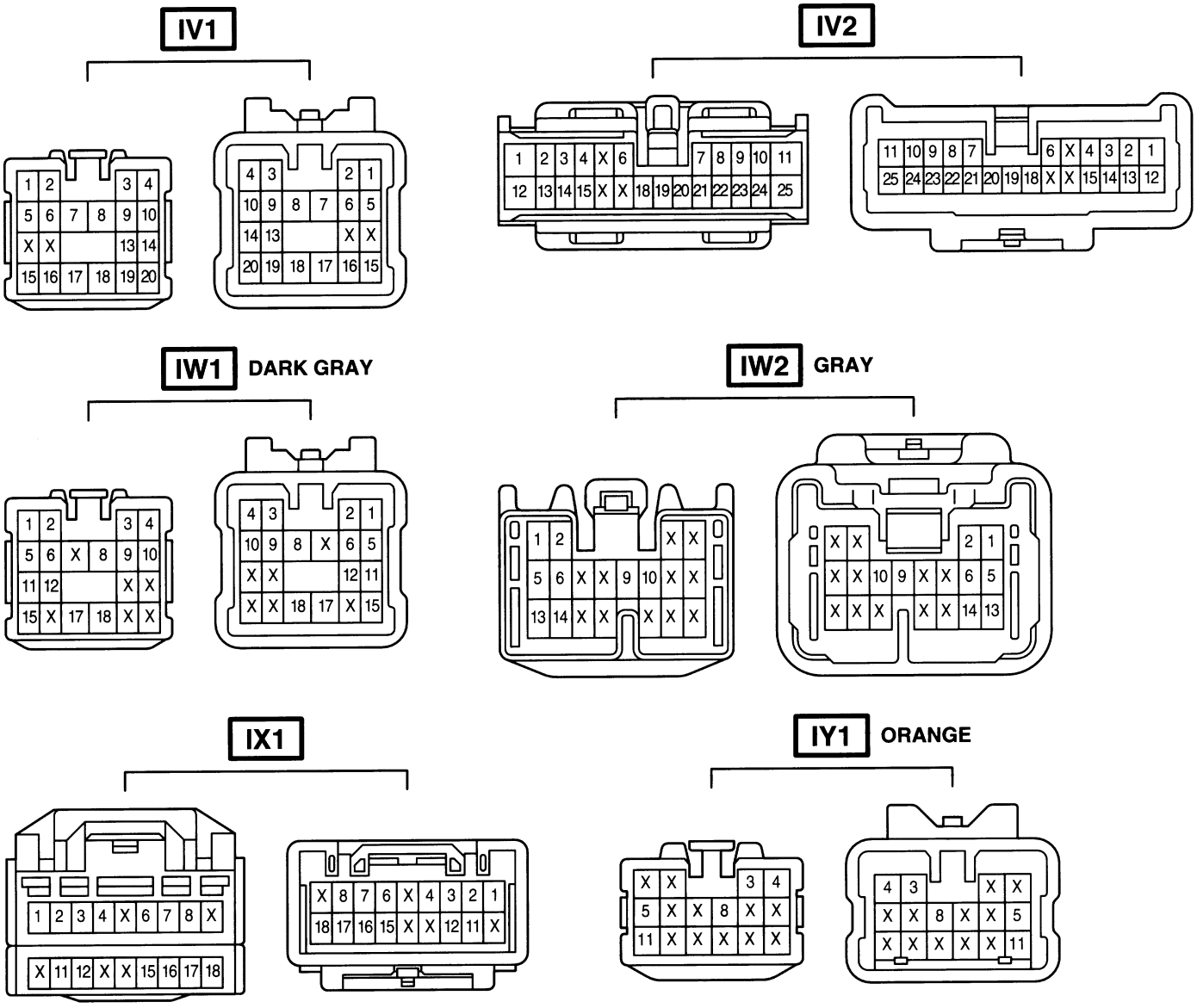
Connector Joining Wire Harness and Wire Harness



Code	Joining Wire Harness and Wire Harness (Connector Location)
IV1	Dash Wire and Floor No.2 Wire (Behind the Glove Box)
IV2	
IW1	Engine Room No.2 Wire and Dash Wire (Behind the Glove Box)
IW2	
IX1	Instrument Panel Integration Wire and Engine Wire (Behind the Glove Box)
IY1	Front Door RH Wire and Dash Wire (Right Kick Panel)

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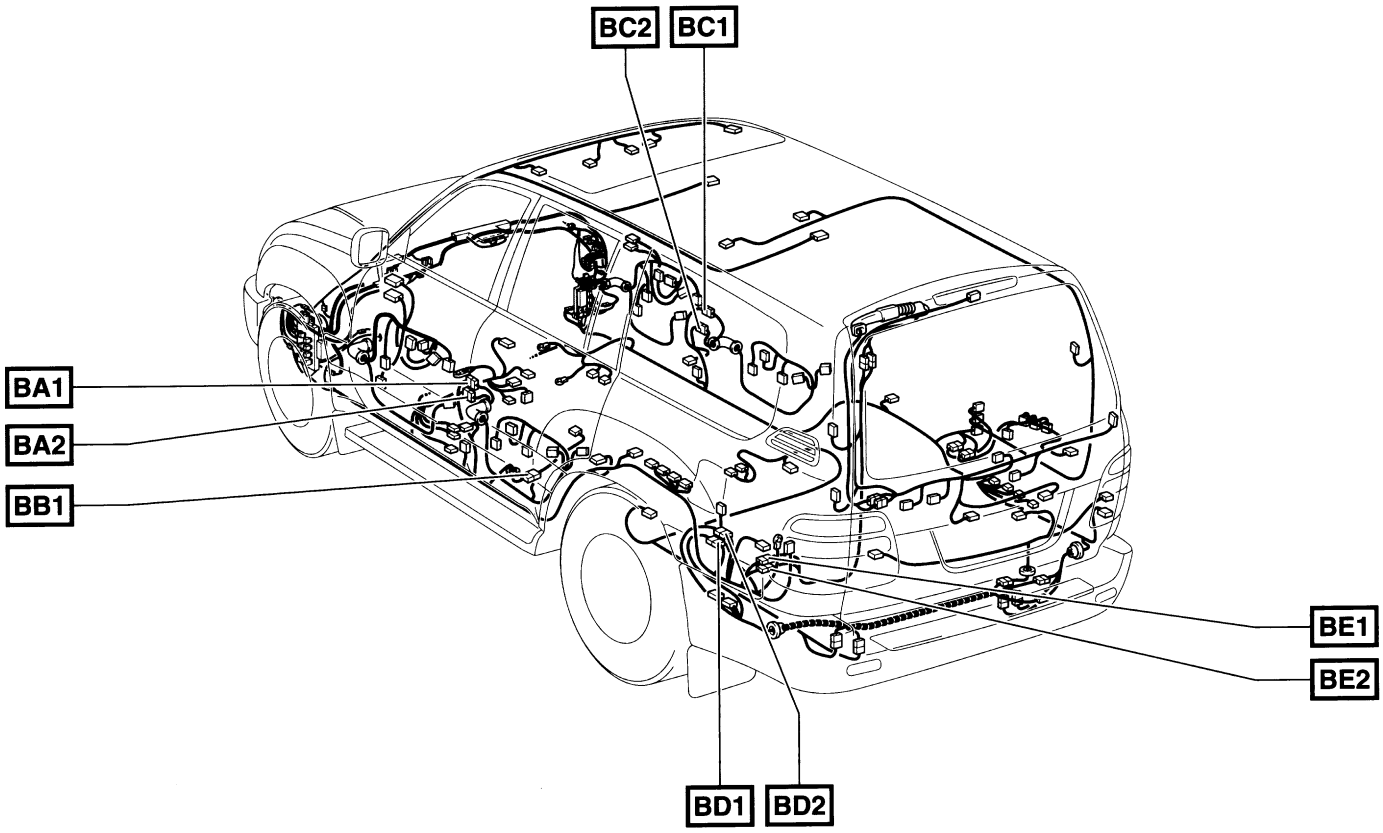
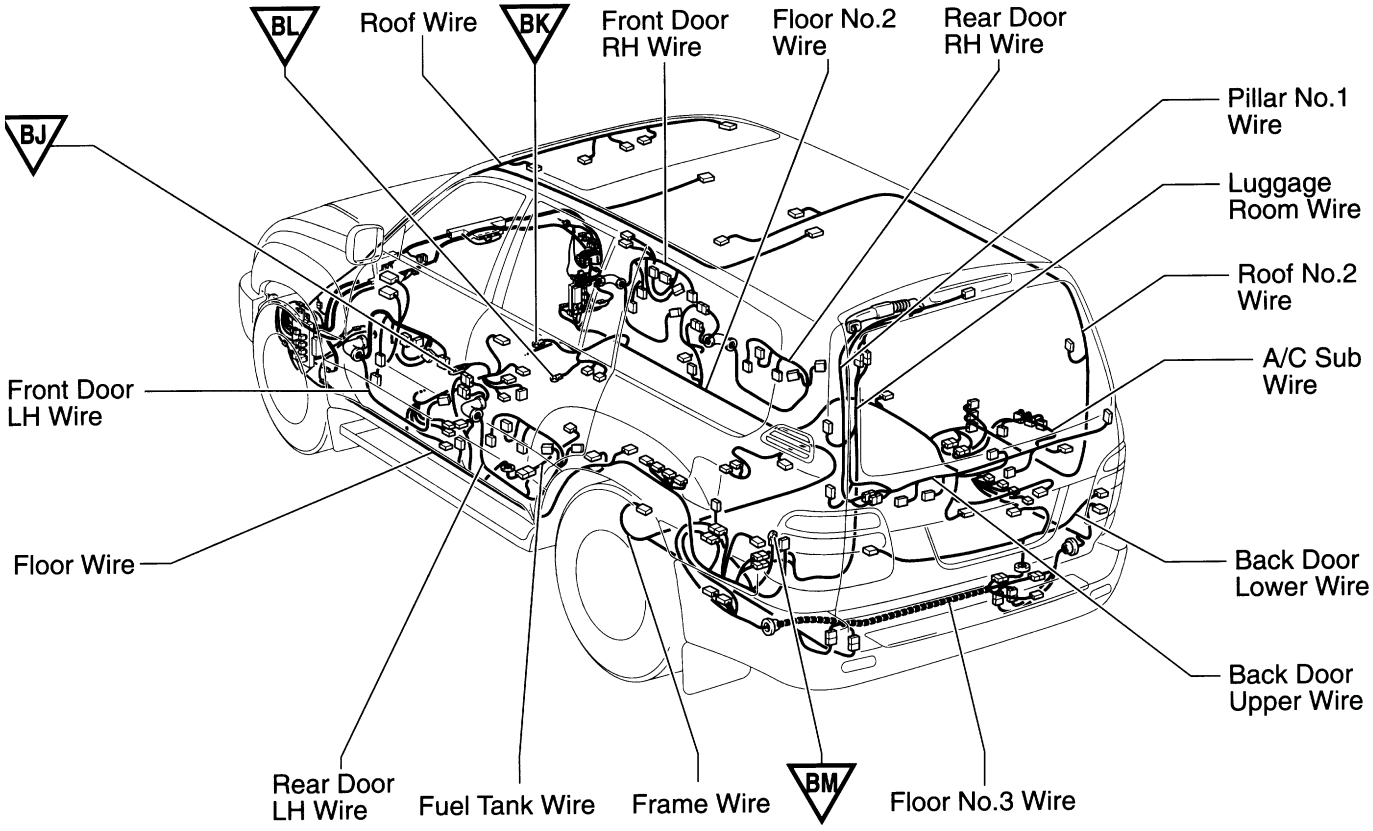
▭ : Location of Connector Joining Wire Harness and Wire Harness



▽ : Location of Ground Points



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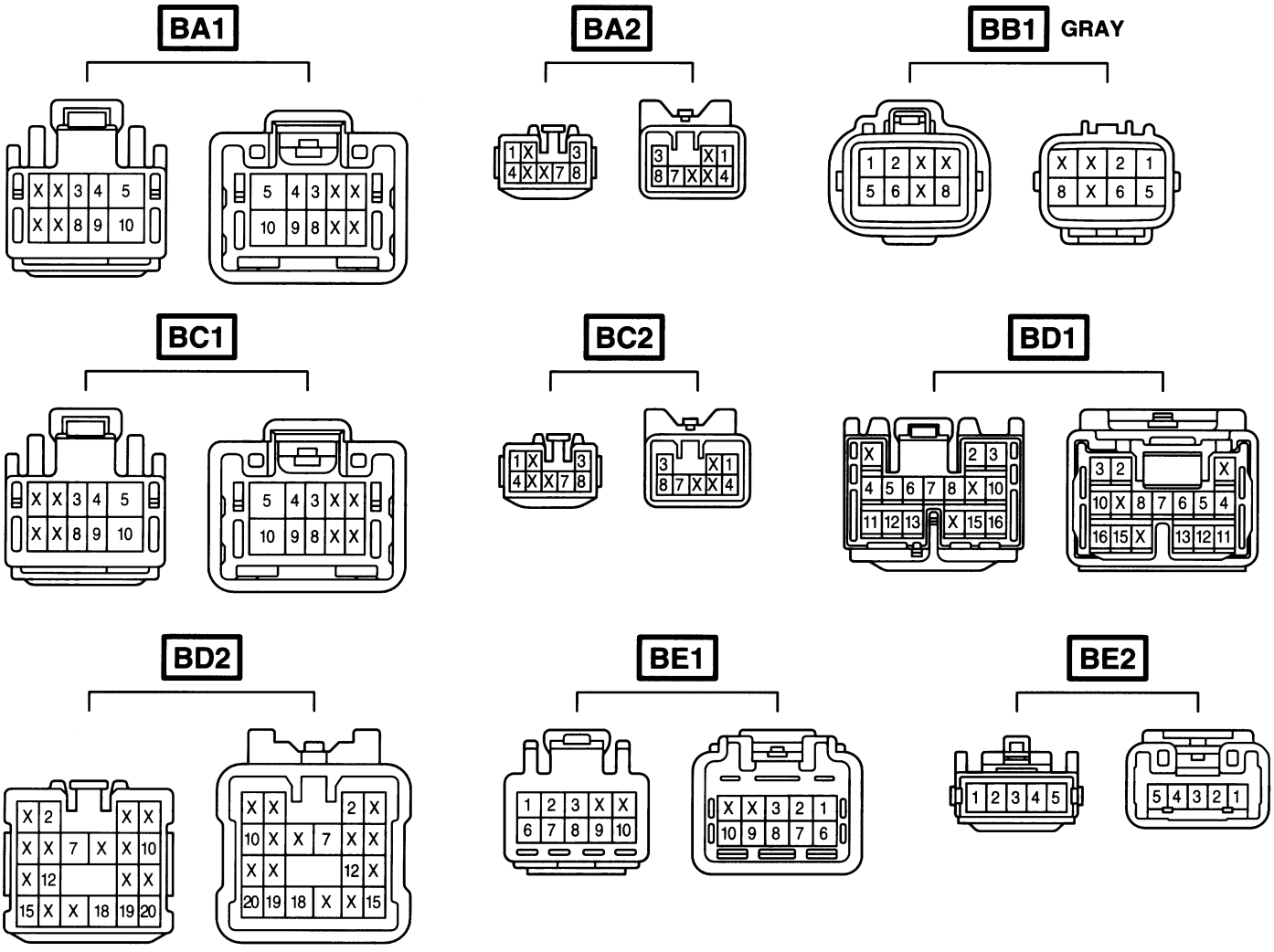
Connector Joining Wire Harness and Wire Harness



Code	Joining Wire Harness and Wire Harness (Connector Location)
BA1	Rear Door LH Wire and Floor Wire (Left Side of Center Pillar)
BA2	
BB1	Floor Wire and Fuel Tank Wire (Near the Fuel Tank)
BC1	Rear Door RH Wire and Floor No.2 Wire (Right Side of Center Pillar)
BC2	
BD1	Floor No. 3 Wire and Floor Wire (Left Rear Side Quarter Panel)
BD2	
BE1	Luggage Room Wire and Floor Wire (Left Rear Side Quarter Panel)
BE2	

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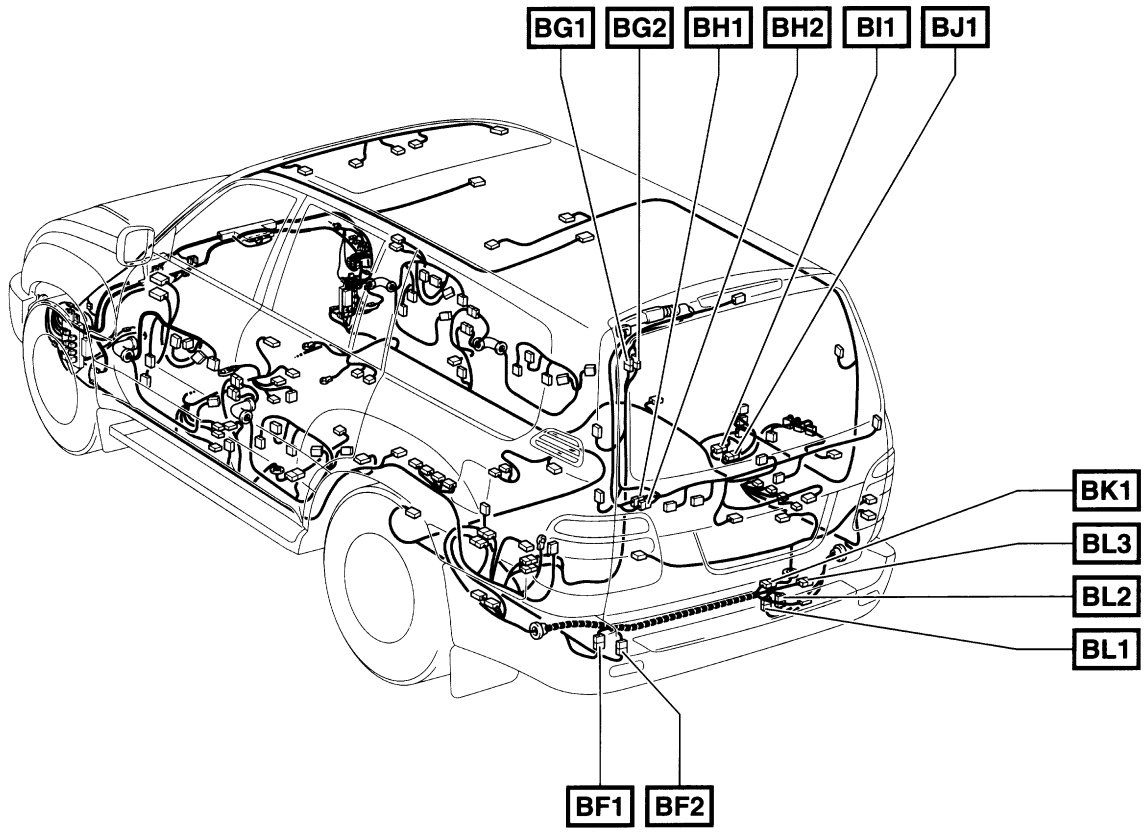
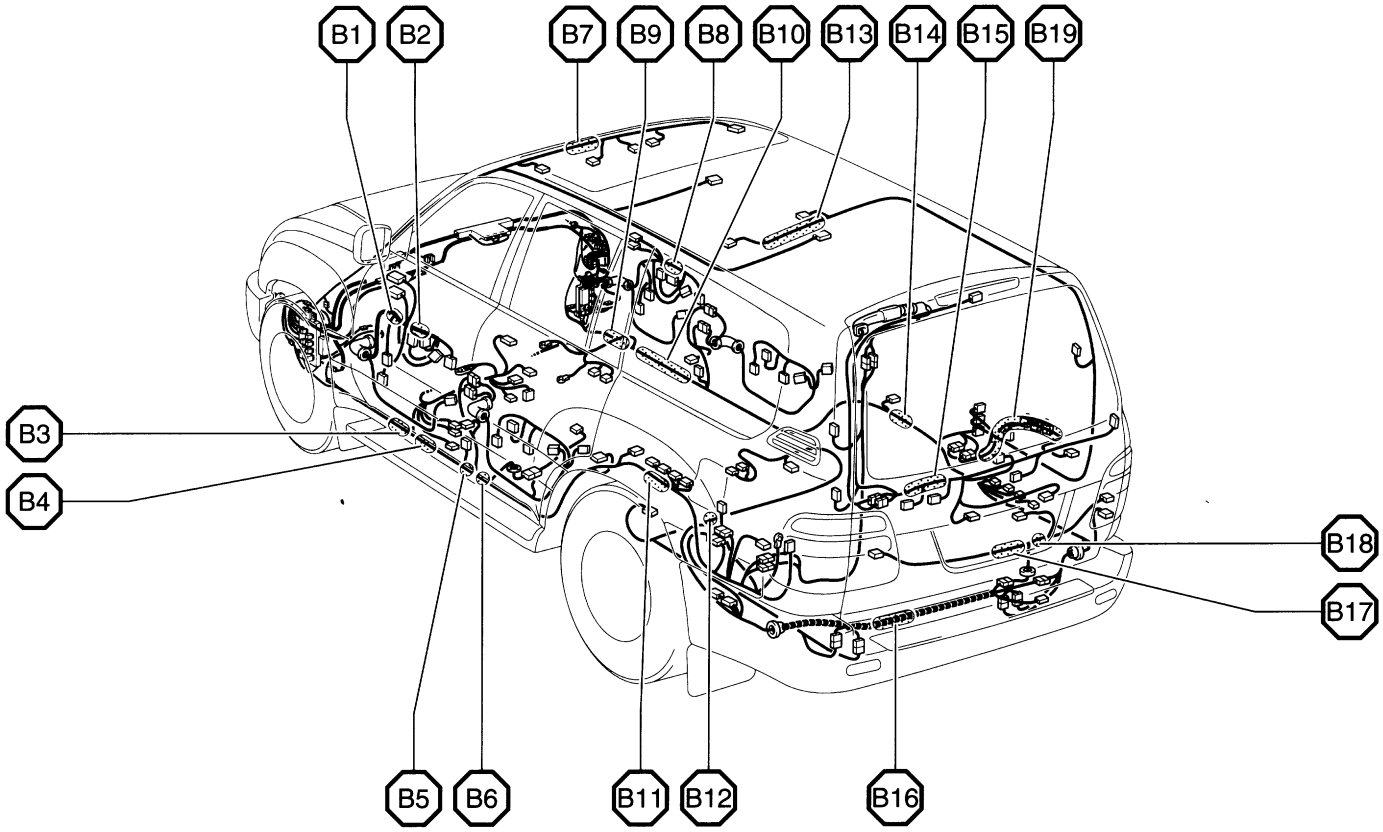
▭ : Location of Connector Joining Wire Harness and Wire Harness



⬡ : Location of Splice Points



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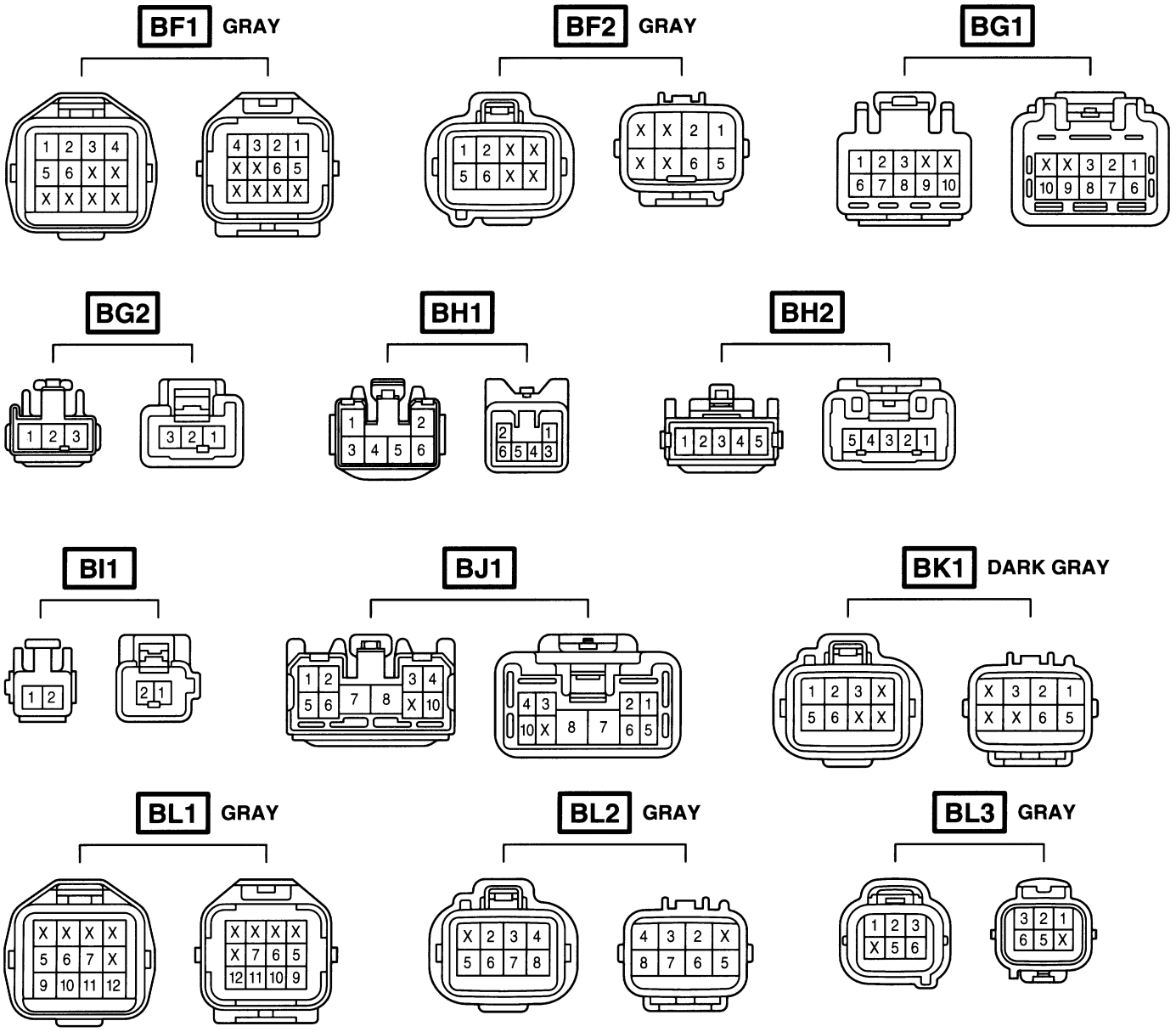
Connector Joining Wire Harness and Wire Harness



Code	Joining Wire Harness and Wire Harness (Connector Location)
BF1	Frame Wire and Floor No.3 Wire (Left Side of Rear Floor Crossmember)
BF2	
BG1	Pillar No.1 Wire and Luggage Room Wire (Left Rear Side Roof Panel)
BG2	
BH1	Pillar No.2 Wire and Luggage Room Wire (Left Rear Side Roof Panel)
BH2	
BI1	Seat No. 2 Wire LH and Seat No. 1 Wire LH (Under the Front LH Seat)
BJ1	Seat No. 2 Wire and A/C Sub Wire (Right Side Rear Quarter Panel)
BK1	Back Door Lower Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)
BL1	Floor No.2 Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember
BL2	
BL3	

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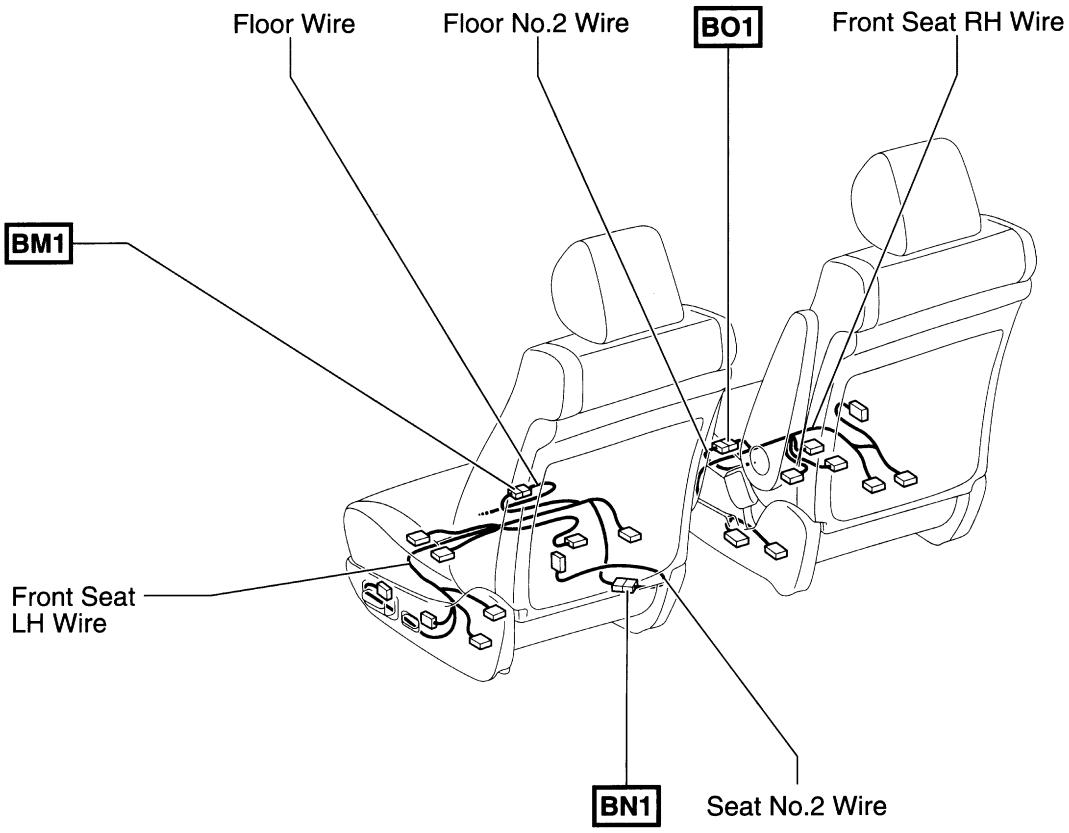
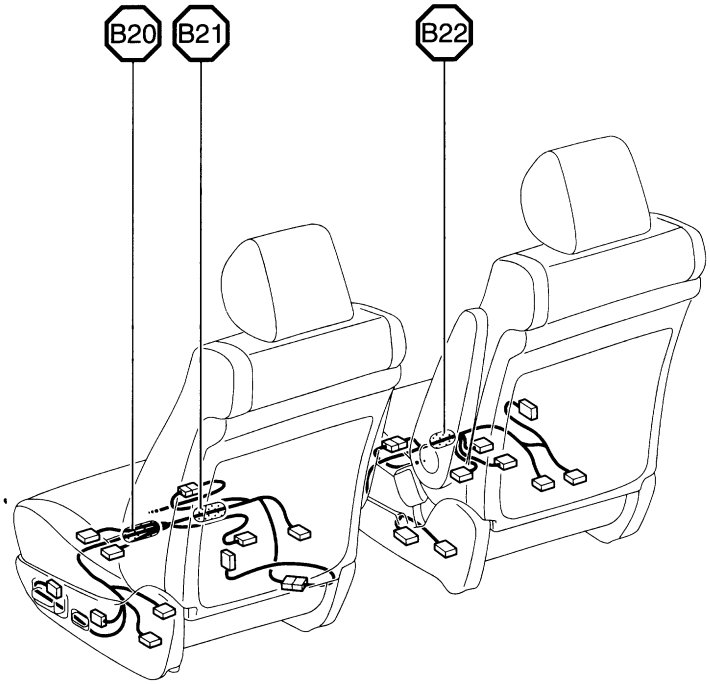
▭ : Location of Connector Joining Wire Harness and Wire Harness



⯃ : Location of Splice Points



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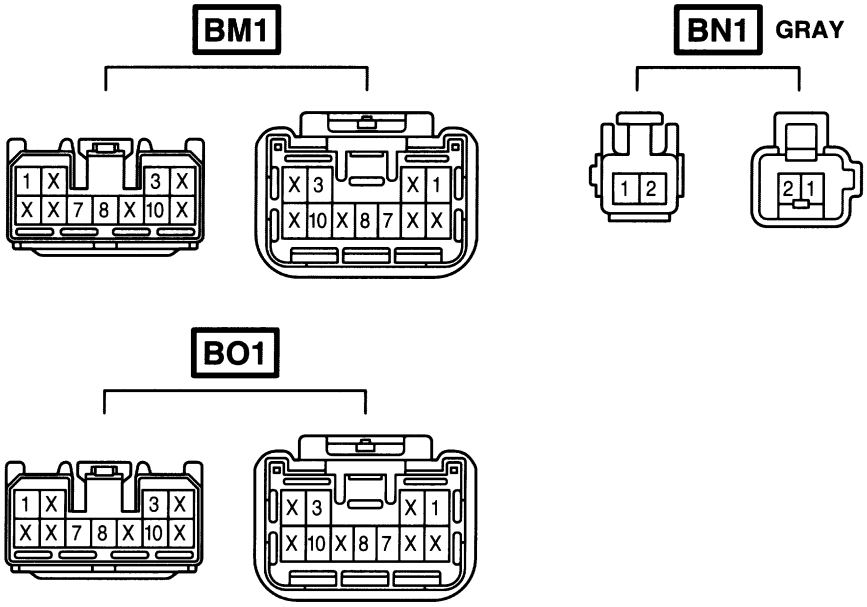
Connector Joining Wire Harness and Wire Harness



Code	Joining Wire Harness and Wire Harness (Connector Location)
BM1	Floor Wire and Front Seat LH Wire (Front Side Under the Driver's Seat)
BN1	Seat No. 2 Wire and Front Seat LH Wire (Rear Side Under the Driver's Seat)
BO1	Floor No.2 Wire and Front Seat RH Wire (Front Side Under the Front Passenger's Seat)

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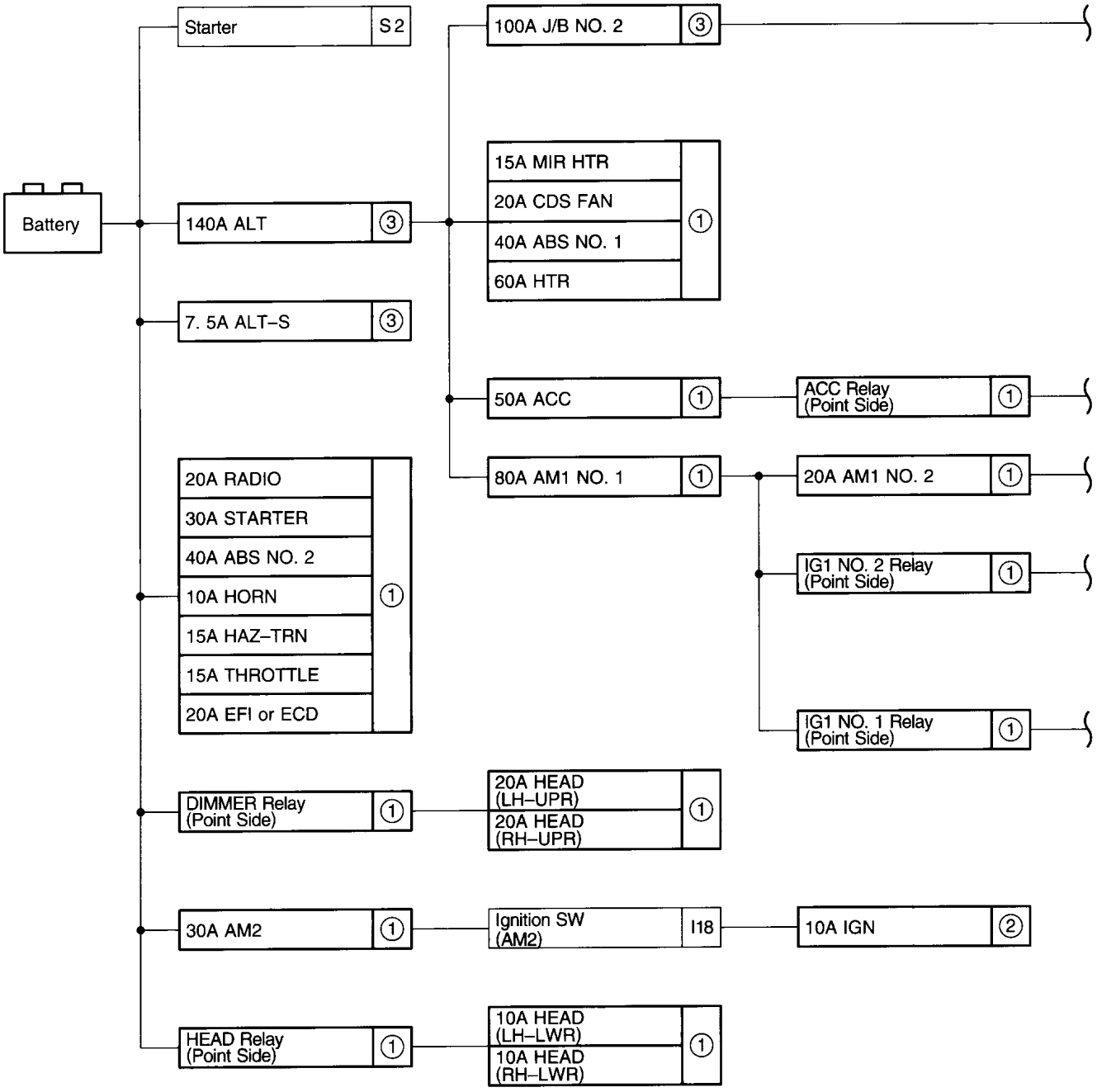
K POWER SOURCE (Current Flow Chart)

The chart below shows the route by which current flows from the battery to each electrical source (Fusible Link, Circuit Breaker, Fuse, etc.) and other Parts.



[LOCATION] ① : Engine Room J/B (See Page 20) ② : Cowl Side J/B LH (See Page 24)

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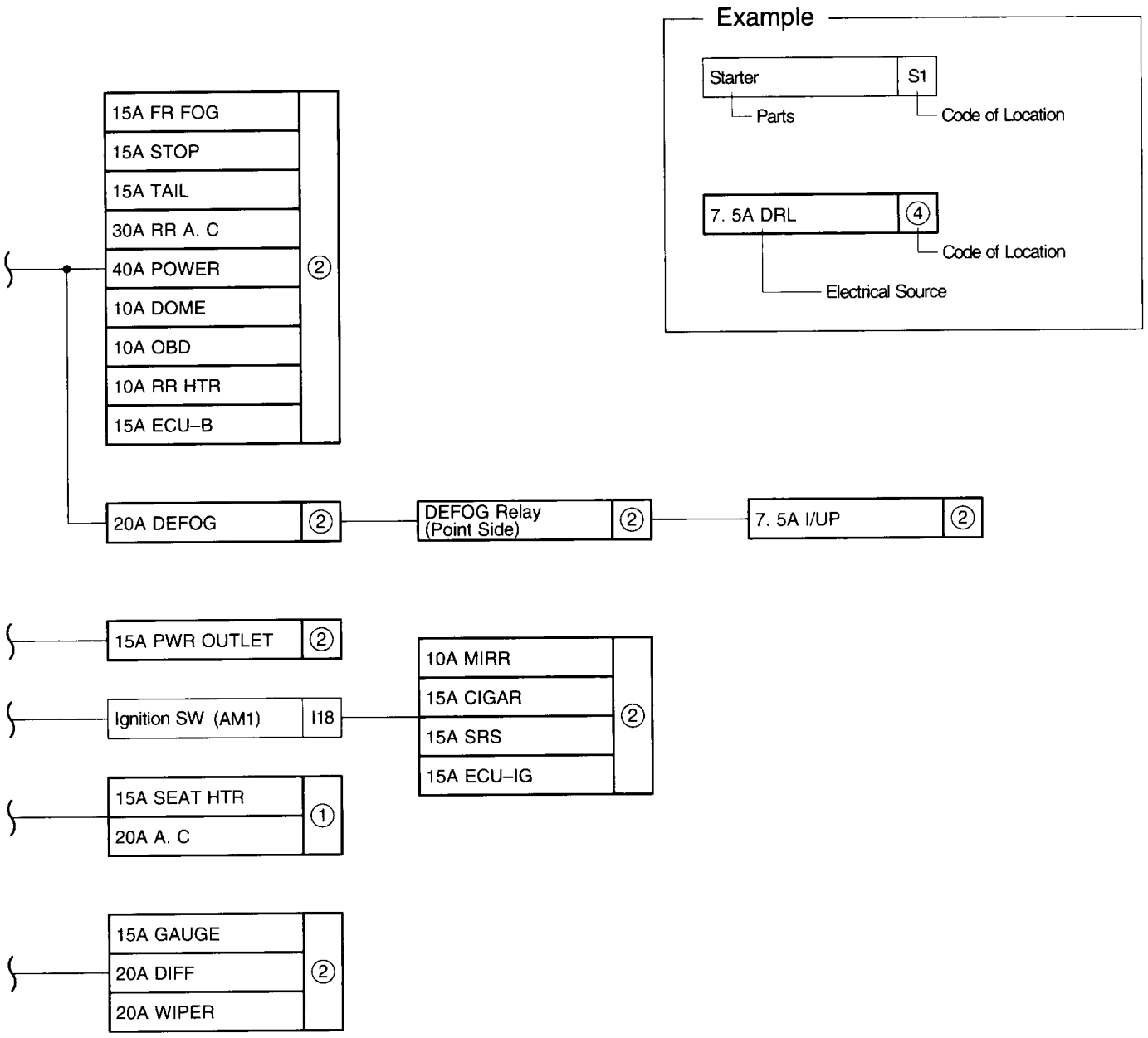

③ : Fusible Link Block (F 6 on See Page 34)

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Engine Room J/B (See Page 20)

Fuse		System	Page
10A	HEAD (LH–LWR)	Front Fog Light	94
		Headlight	88
10A	HEAD (RH–LWR)	Headlight	88
10A	HORN	Horn	146
		Theft Deterrent	220
15A	HAZ–TRN	Theft Deterrent	220
		Turn Signal and Hazard Warning Light	96
15A	MIR HTR	Rear Window Defogger and Mirror Heater	244
15A	SEAT HTR	Seat Heater	242
15A	THROTTLE	Cruise Control	158
		Electronically Controlled Transmission and A/T Indicator	148
		Engine Control and Engine Immobiliser System	74
20A	A.C	Condenser Fan and Front Air Conditioning	270
		Key Reminder and Seat Belt Warning	248
		Rear Air Conditioning	278
		Rear Heater (w/o Rear Air Conditioning)	258
20A	AM1 NO.2	Turn Signal and Hazard Warning Light	96
20A	CDS FAN	Condenser Fan and Front Air Conditioning	270
20A	EFI or ECD	Cruise Control	158
		Electronically Controlled Transmission and A/T Indicator	148
		Engine Control and Engine Immobiliser System	74
20A	HEAD (LH–UPR)	Headlight	88
20A	HEAD (RH–UPR)	Headlight	88
20A	RADIO	Auto Antenna	252
		Radio and Player	254
30A	AM2	Electronically Controlled Transmission and A/T Indicator	148
		Engine Control and Engine Immobiliser System	74
		Ignition	68
		Starting	66
30A	STARTER	Starting	66
40A	ABS NO.1	ABS	166
40A	ABS NO.2	ABS	166
60A	HTR	Condenser Fan and Front Air Conditioning	270
80A	AM1 NO.1	Rear Window Defogger and Mirror Heater	244
		Turn Signal and Hazard Warning Light	96

* These are the page numbers of the first page on which the related system is shown.

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Cowl Side J/B LH (See Page 24)

Fuse		System	Page
7.5A	I/UP	Rear Window Defogger and Mirror Heater	244
10A	DOME	Combination Meter	262
		Interior Light	110
		Key Reminder and Seat Belt Warning	248
		Theft Deterrent	220
		Wireless Door Lock Control	208
10A	IGN	ABS	166
		Charging	72
		Combination Meter	262
		Cruise Control	158
		Electronically Controlled Transmission and A/T Indicator	148
		Engine Control and Engine Immobiliser System	74
		SRS	173
10A	MIRR	Remote Control Mirror	236
10A	OBD	Cruise Control	158
		Engine Control and Engine Immobiliser System	74
10A	RR HTR	Rear Air Conditioning	278
		Rear Heater (w/o Rear Air Conditioning)	258
15A	CIGAR	Auto Antenna	252
		Cigarette Lighter	142
		Clock	140
		Condenser Fan and Front Air Conditioning	270
		Radio and Player	254
		Rear Air Conditioning	278
		Shift Lock	178
15A	ECU−B	Automatic Light Control	124
		Clock	140
		Combination Meter	262
		Condenser Fan and Front Air Conditioning	270
		Door Lock Control	88
		Headlight	110
		Interior Light	128
		Light Auto Turn Off	194
		Moon Roof	232
		Power Tilt and Power Telescopic	188
		Power Window	278
		Rear Air Conditioning	173
		SRS	220
		Theft Deterrent	208
		Wireless Door Lock Control	

* These are the page numbers of the first page on which the related system is shown.

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K POWER SOURCE (Current Flow Chart)

Fuse		System	Page
15A	ECU–IG	ABS	166
		Auto Antenna	252
		Automatic Light Control	124
		Door Lock Control	200
		Interior Light	110
		Light Auto Turn Off	128
		Moon Roof	194
		Power Tilt and Power Telescopic	232
		Power Window	188
		Shift Lock	178
		Theft Deterrent	220
		Wireless Door Lock Control	208
15A	FR FOG	Front Fog Light	94
15A	GAUGE	ABS	166
		Back–Up Light	122
		Center Differential Lock	180
		Charging	72
		Combination Meter	262
		Cruise Control	158
		Electronically Controlled Transmission and A/T Indicator	148
		Engine Control and Engine Immobiliser System	74
		Headlight	88
		Key Reminder and Seat Belt Warning	248
		Power Rear Quarter Window	240
		Rear Differential Lock	184
		Rear Window Defogger and Mirror Heater	244
		Wireless Door Lock Control	208
15A	PWR OUTLET	Power Outlet	144
15A	SRS	SRS	173
15A	STOP	ABS	166
		Cruise Control	158
		Electronically Controlled Transmission and A/T Indicator	148
		Engine Control and Engine Immobiliser System	74
		Shift Lock	178
		Stop Light	118
15A	TAIL	Automatic Light Control	124
		Illumination	104
		Light Auto Turn Off	128
		Taillight	100
		Theft Deterrent	220
		Wireless Door Lock Control	208
20A	DEFOG	Rear Window Defogger and Mirror Heater	244

* These are the page numbers of the first page on which the related system is shown.

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Fuse		System	Page
20A	DIFF	Center Differential Lock	180
		Rear Differential Lock	184
20A	WIPER	Front Wiper and Washer	132
		Rear Wiper and Washer	136
30A	RR A/C	Rear Air Conditioning	278
40A	POWER	Door Lock Control	200
		Moon Roof	194
		Power Seat	228
		Power Tilt and Power Telescopic	232
		Power Window	188
		Wireless Door Lock Control	208

Fusible Link Block (F6 on See Page 34)

Fuse		System	Page
7.5A	ALT−S	Charging	72
100A	J/B NO.2	Automatic Light Control	124
		Light Auto Turn Off	128
140A	ALT	Automatic Light Control	124
		Charging	72
		Light Auto Turn Off	128
		Turn Signal and Hazard Warning Light	96

* These are the page numbers of the first page on which the related system is shown.

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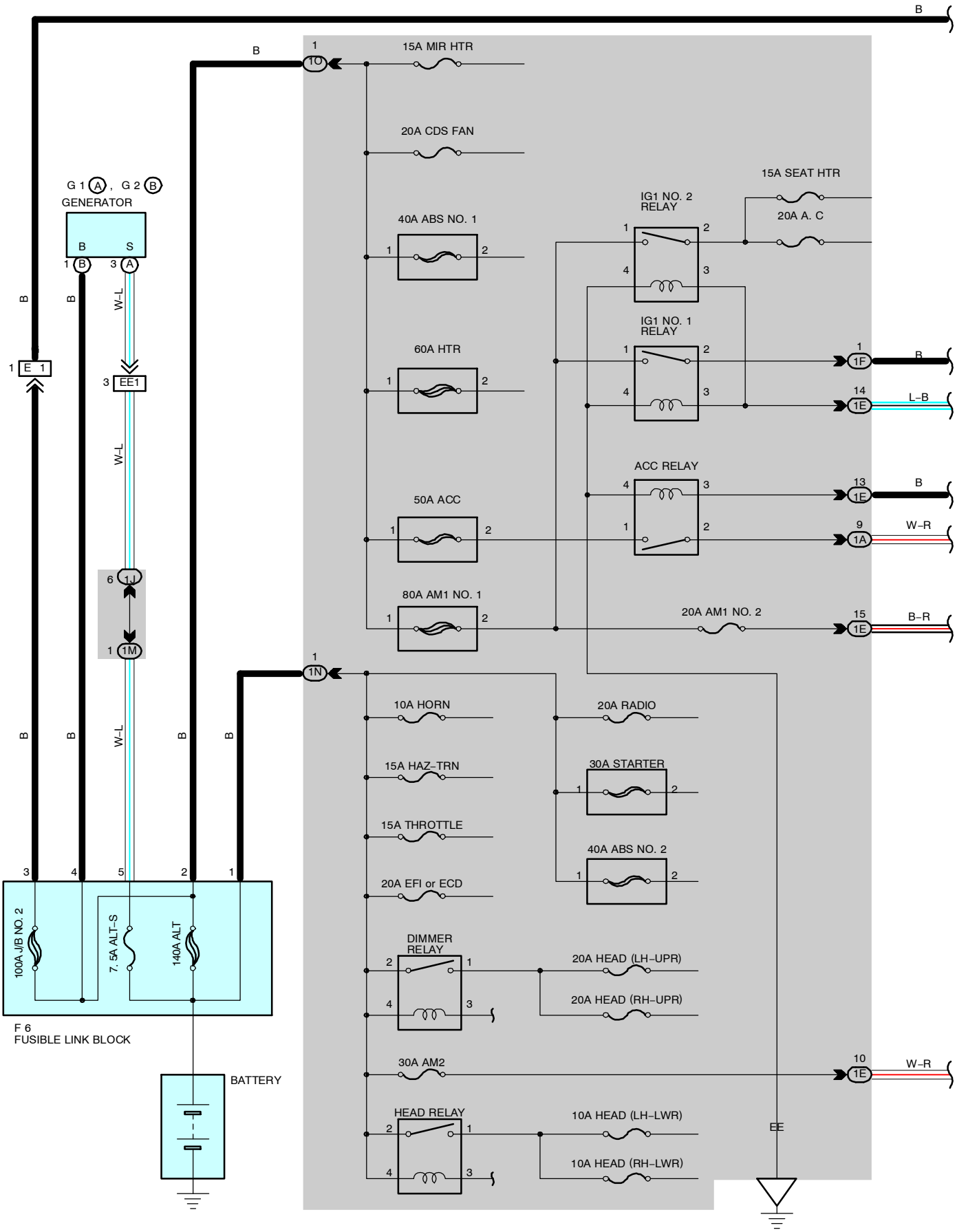

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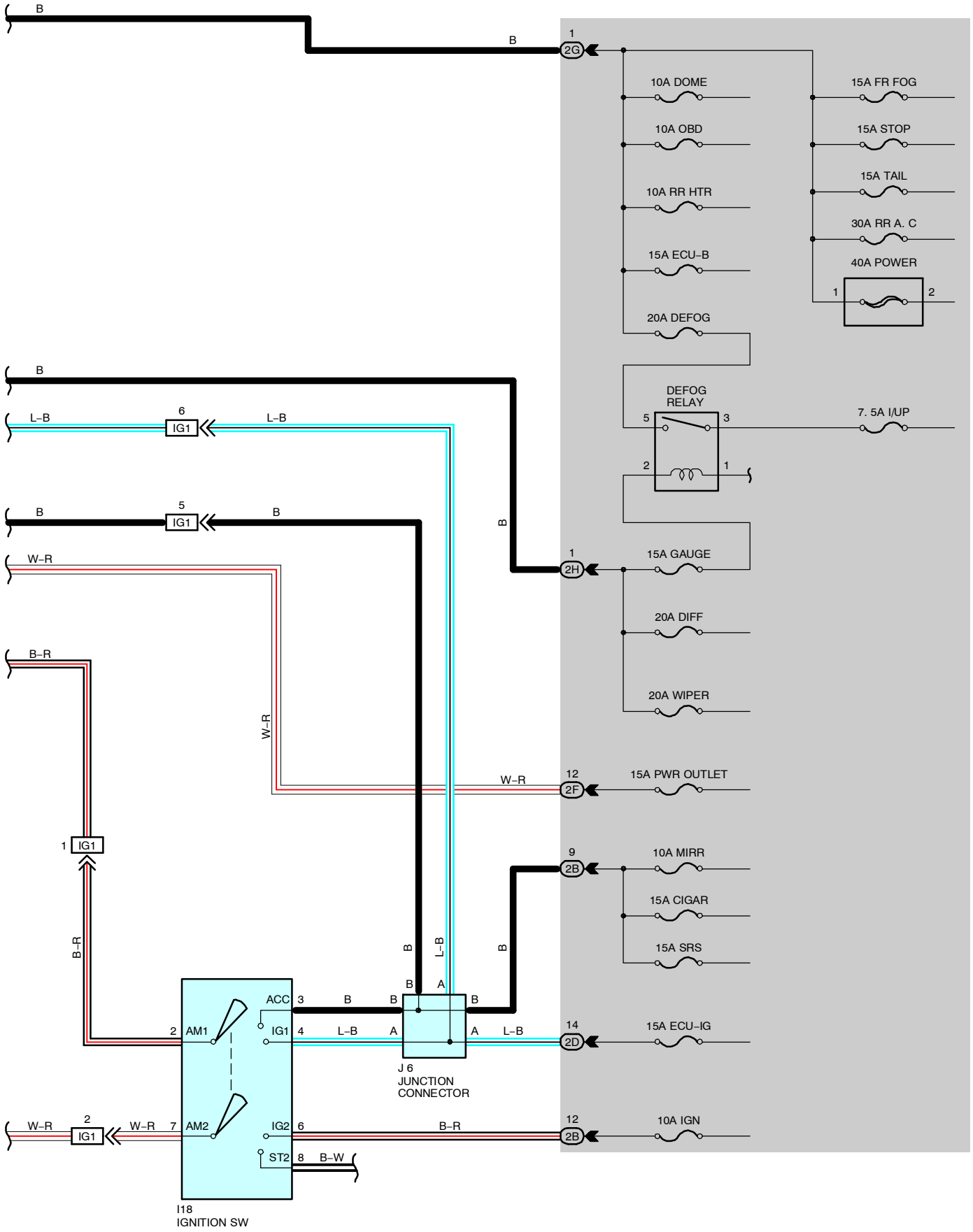

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POWER SOURCE

SERVICE HINTS

HEAD RELAY

2–1 : Closed with light control SW at **HEAD** position or dimmer SW at **FLASH** position
(When the light auto turn off system does not operate)

DIMMER RELAY

1–2 : Closed with daytime running light operation
: Closed with light control SW at **HEAD** position and dimmer SW at **HIGH** position
: Closed with dimmer SW at **FLASH** position

I18 IGNITION SW

2–3 : Closed with ignition SW at **ACC** or **ON** position
2–4 : Closed with ignition SW at **ON** or **ST** position
7–6 : Closed with ignition SW at **ON** or **ST** position
7–8 : Closed with ignition SW at **ST** position

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
F6	36	G2 B	36	J6	39
G1 A	36	I18	36		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1E		
1F		
1J	21	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)
1M	21	Engine Room No.3 Wire and Engine Room J/B (Engine Compartment Left)
1N		
1O		
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		
2F	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2G		
2H		

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EE1	44	Engine Room Main Wire and Alternator Wire (Near the Battery)
EG1	44	Engine Room No.2 Wire and Engine Room No.3 Wire (Under the Engine Room J/B)
IG1	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)

: GROUND POINTS

Code	See Page	Ground Points Location
EE	44	Front Left Side of Fender Apron

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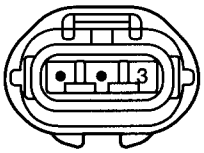
F6

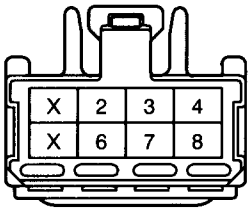
(See Page 34)

G1 (A)
BLACK



G2 (B)

I18



J6
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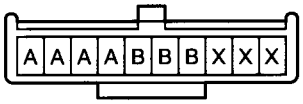

(Hint : See Page 7)

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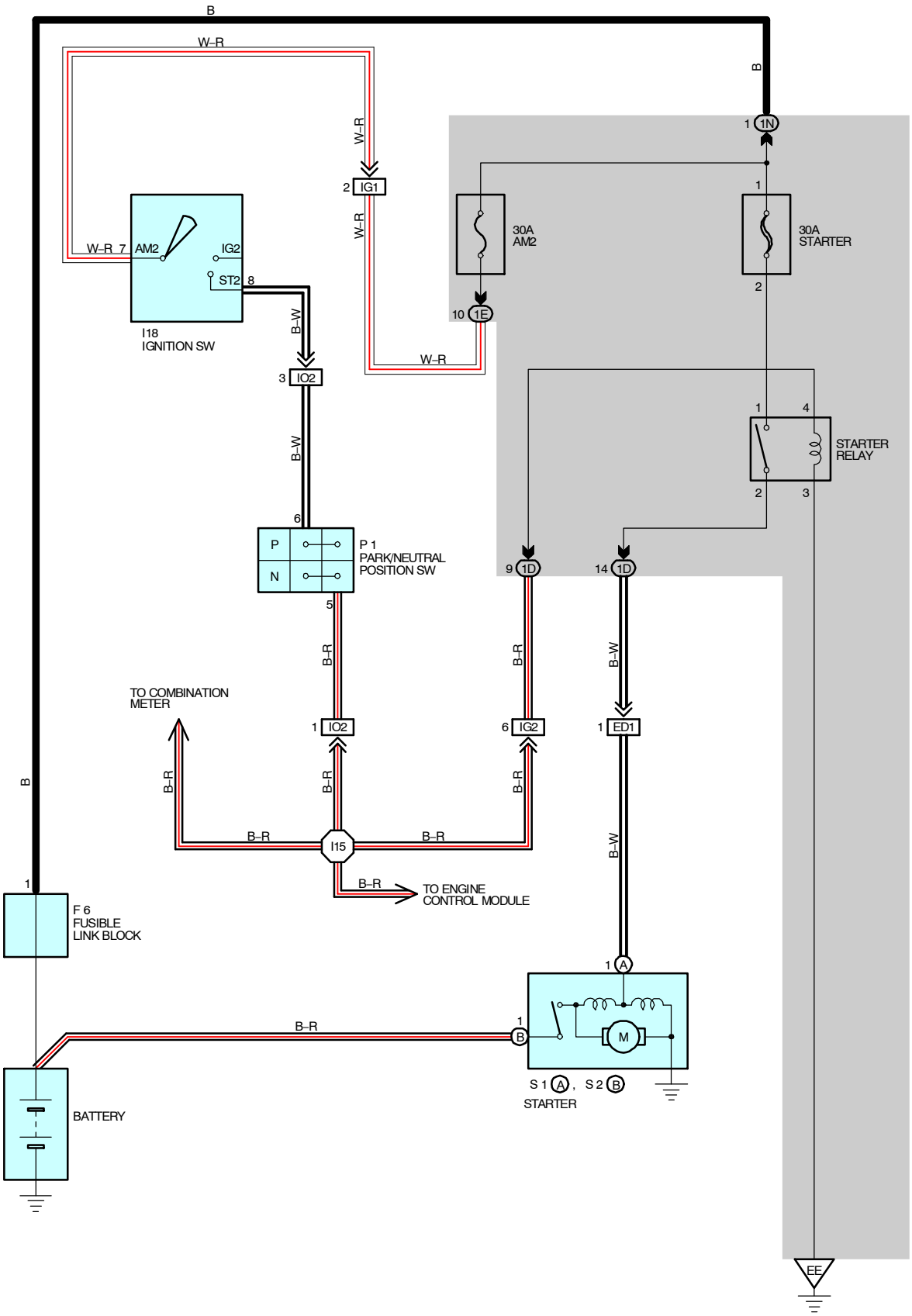

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SERVICE HINTS

I18 IGNITION SW

7–8 : Closed with ignition SW at **ST** position

P1 PARK/NEUTRAL POSITION SW

6–5 : Closed with A/T shift lever in **P** or **N** position

S1 (A), S2 (B) STARTER

Points closed with Park/Neutral position SW at **P** or **N** position and ignition SW at **ST** position

○ : PARTS LOCATION

Code	See Page	Code		See Page	Code		See Page
F6	36	P1		37	S2	B	37
I18	38	S1	A	37			

⬭ : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1D	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1E		
1N	21	Engine Room No.3 Wire and Engine Room J/B (Engine Compartment Left)

▭ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
ED1	44	Engine No.2 Wire and Engine Room No.2 Wire (Near the Engine Room J/B)
IG1	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IG2		
IO2	50	Engine Wire and Dash Wire (Behind the Glove Box)

▽ : GROUND POINTS

Code	See Page	Ground Points Location
EE	44	Front Left Side of Fender Apron

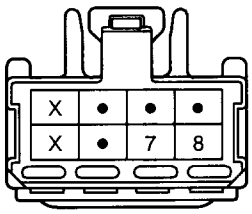
⬡ : SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I15	48	Dash Wire			

F6

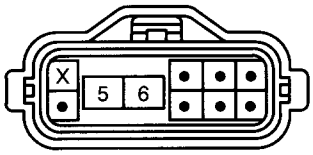
(See Page 34)

I18



P1

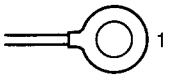
GRAY



S1 (A)

BLACK

S2 (B)



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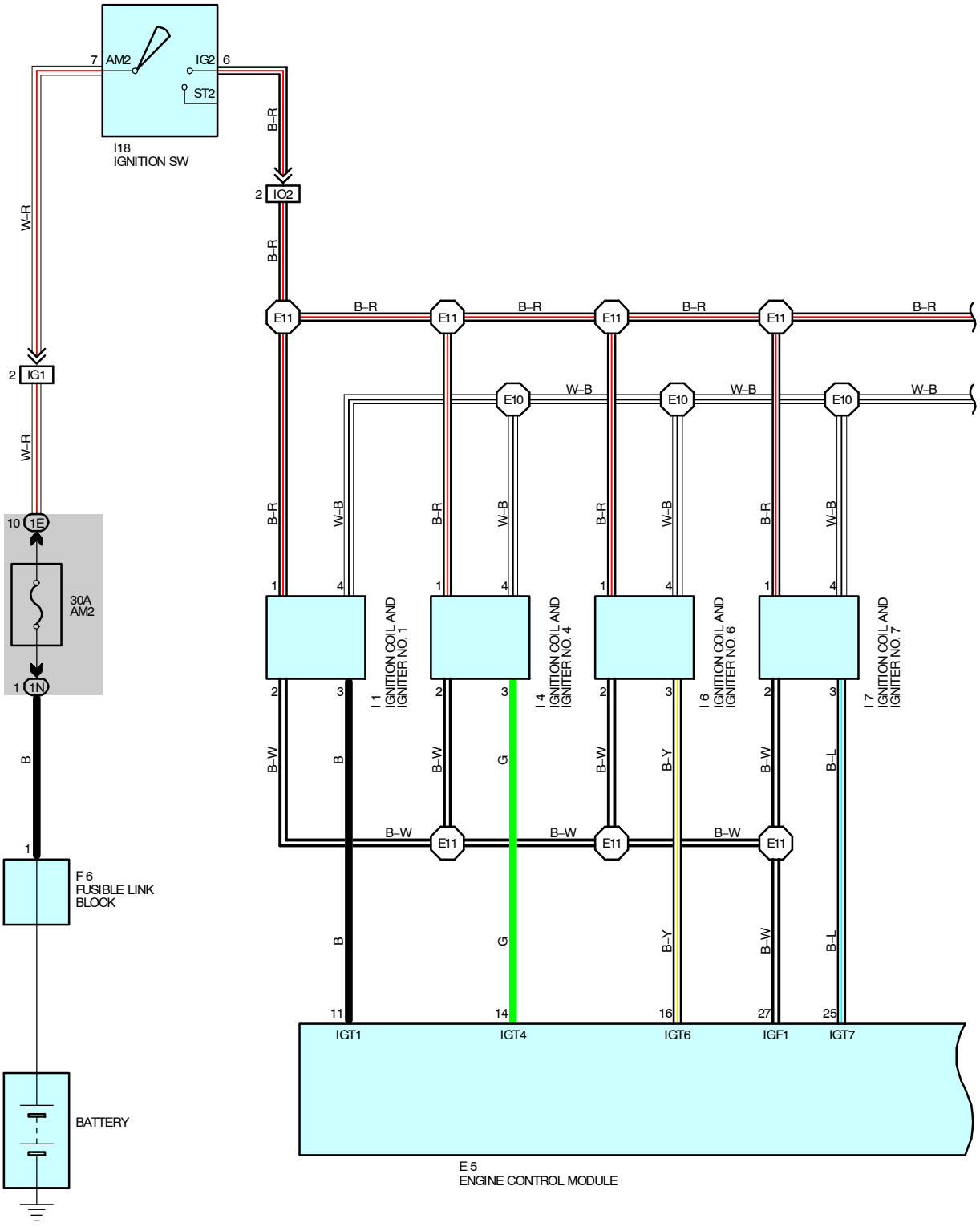

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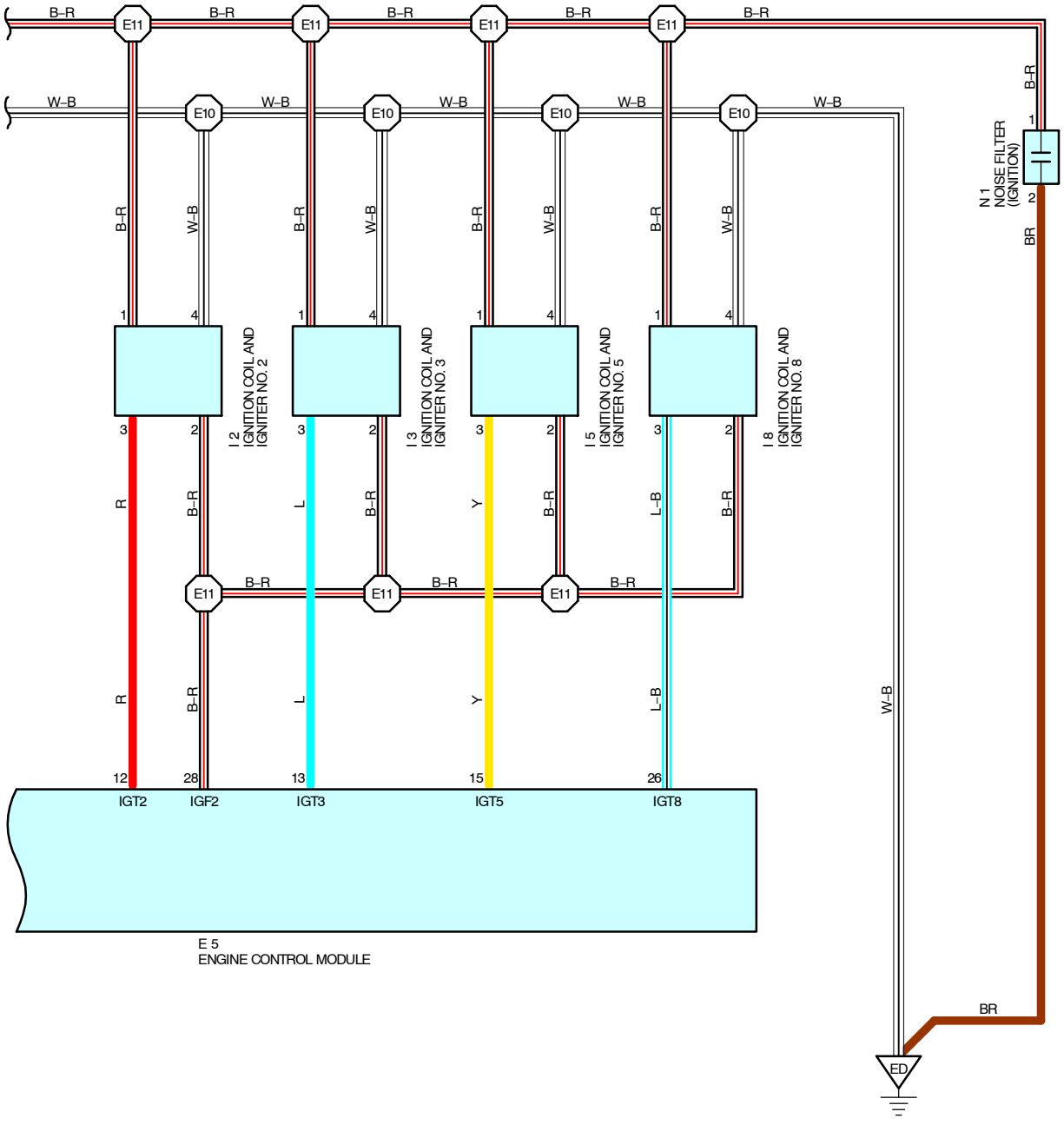

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IGNITION

SERVICE HINTS

118 IGNITION SW

7–6 : Closed with ignition SW at **ON** or **ST** position

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
E5	38	I3	37	I7	37
F6	36	I4	37	I8	37
I1	37	I5	37	I18	38
I2	37	I6	37	N1	37

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1E	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1N	21	Engine Room No.3 Wire and Engine Room J/B (Engine Compartment Left)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IG1	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IO2	50	Engine Wire and Dash Wire (Behind the Glove Box)

: GROUND POINTS

Code	See Page	Ground Points Location
ED	44	Rear Bank of Left Cylinder Head

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E10	44	Engine Wire	E11	44	Engine Wire

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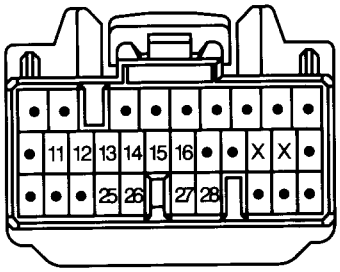
E5



F6

(See Page 34)

I1
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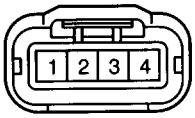

I2
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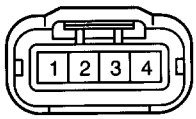

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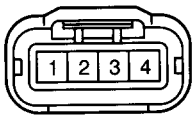

I4
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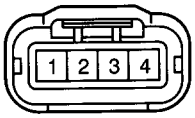

I5
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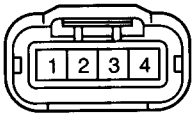

I6
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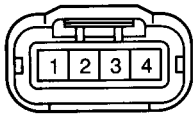
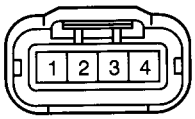


I7
BLACK



I8
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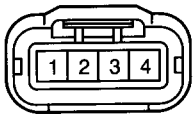
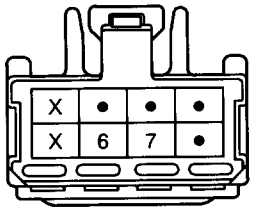


I18



N1
GRAY

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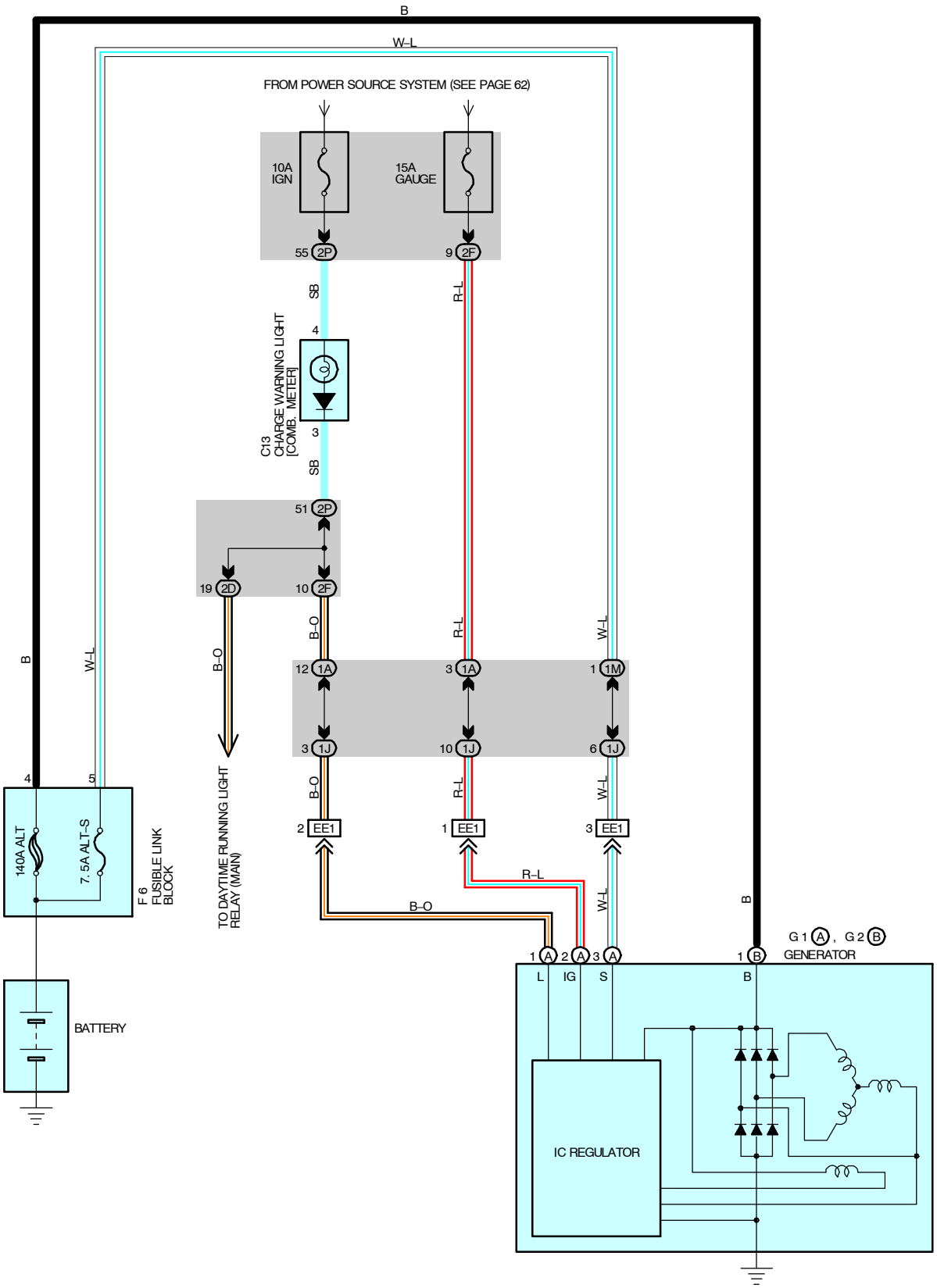

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SERVICE HINTS

G1 GENERATOR

1–GROUND: **13.2–14.0** volts with engine running at **5000** rpm and **115**°C (**239**°F)

: PARTS LOCATION

Code	See Page	Code		See Page	Code	See Page
C13	38	G1	A	36		
F6	36	G2	B	36		

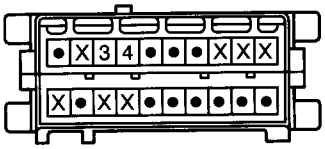
: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1J	21	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)
1M	21	Engine Room No.3 Wire and Engine Room J/B (Engine Compartment Left)
2D	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2F	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EE1	44	Engine Room Main Wire and Alternator Wire (Near the Battery)

C13

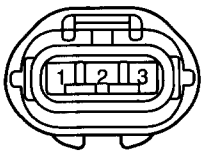


F6

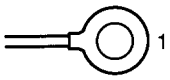
(See Page 34)

G1 (A)

BLACK



G2 (B)



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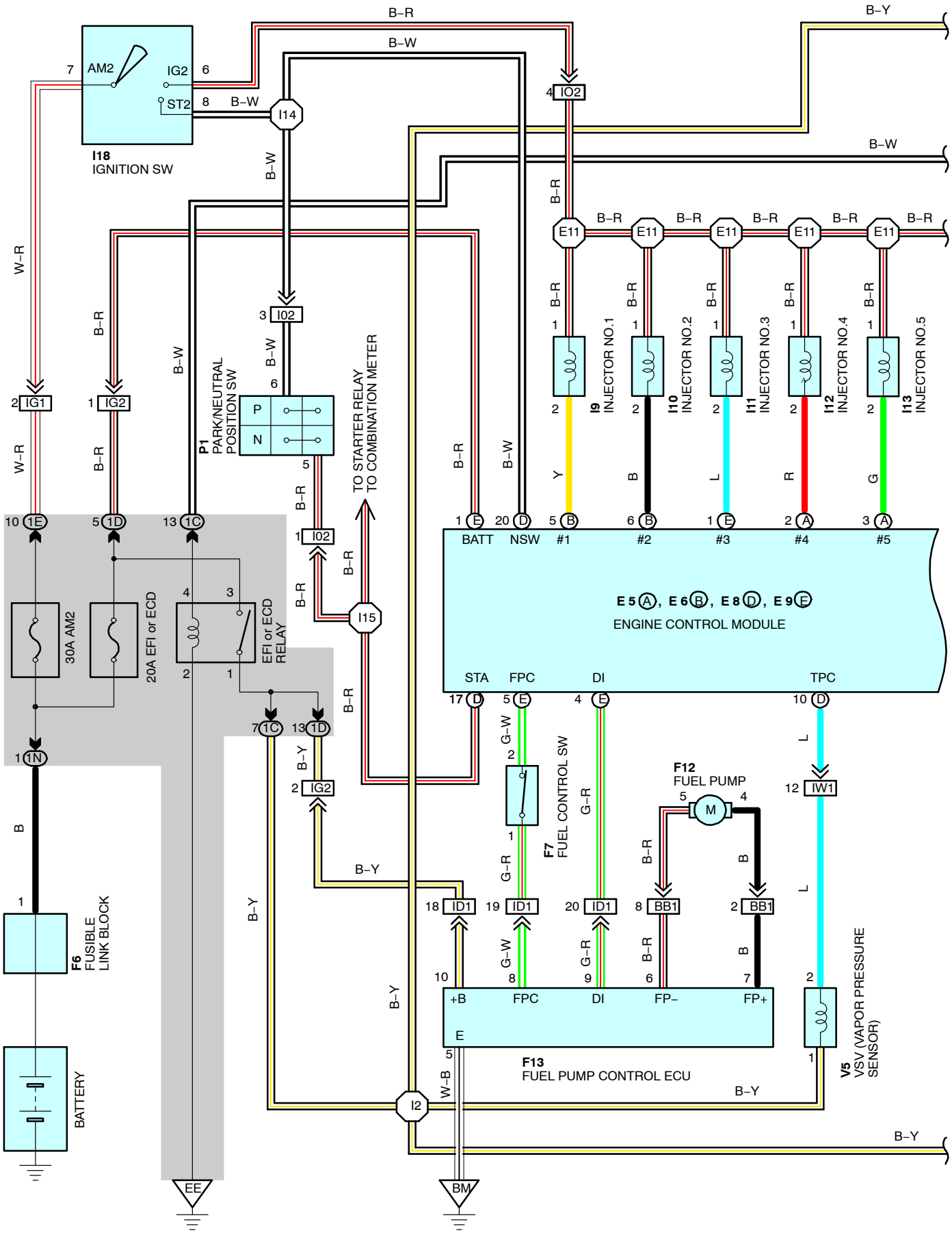
ENGINE CONTROL AND IMMOBILISER SYSTEM



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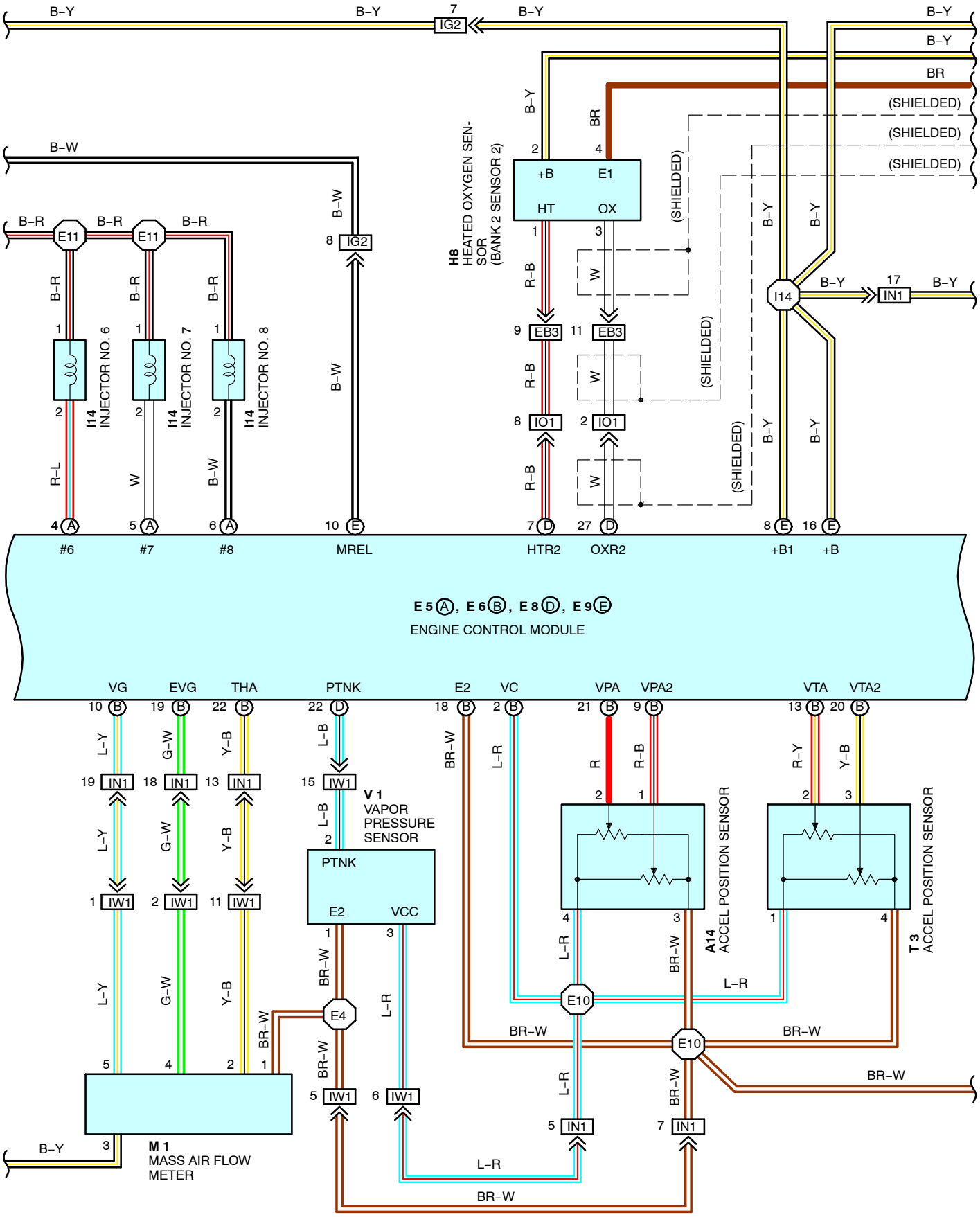

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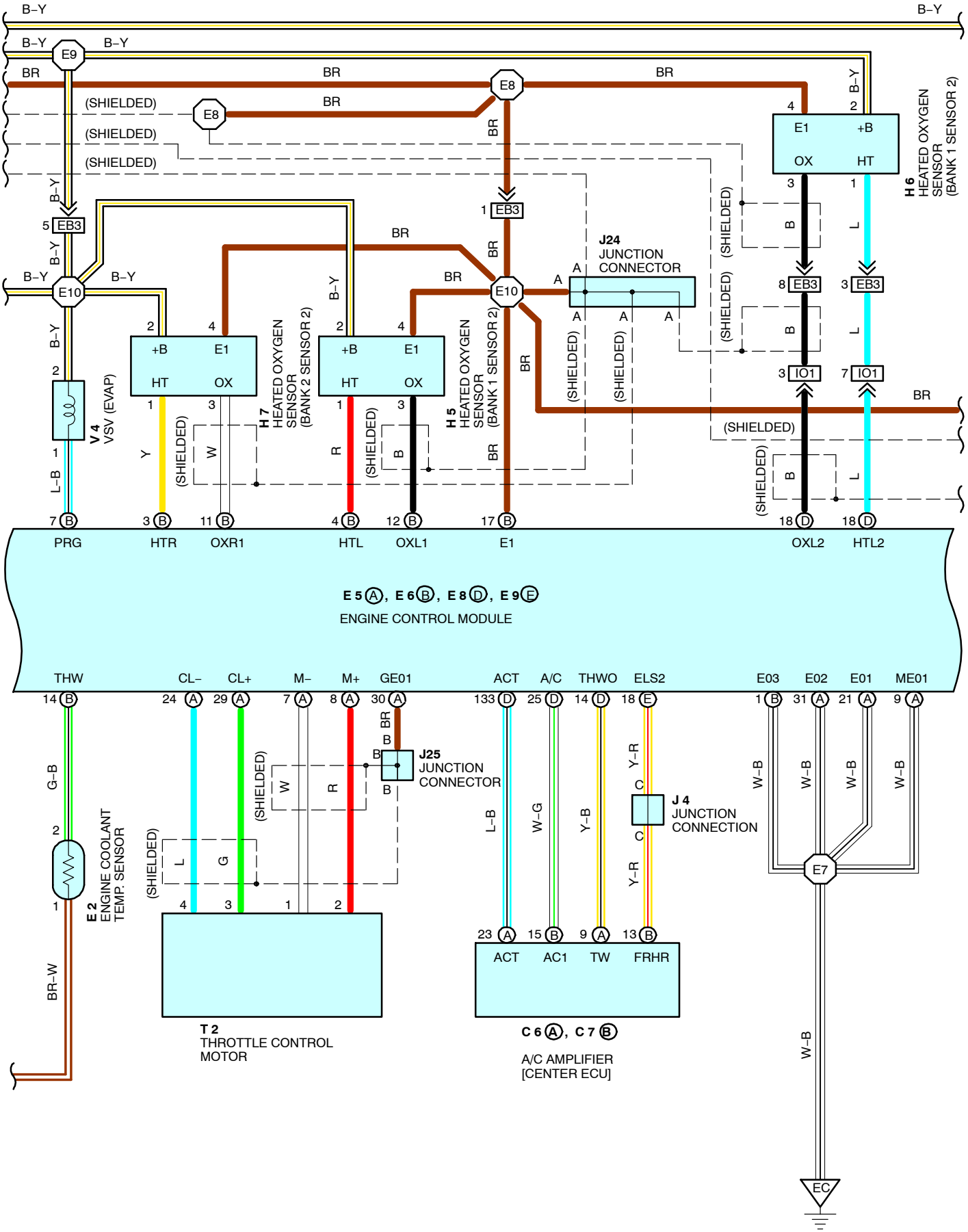

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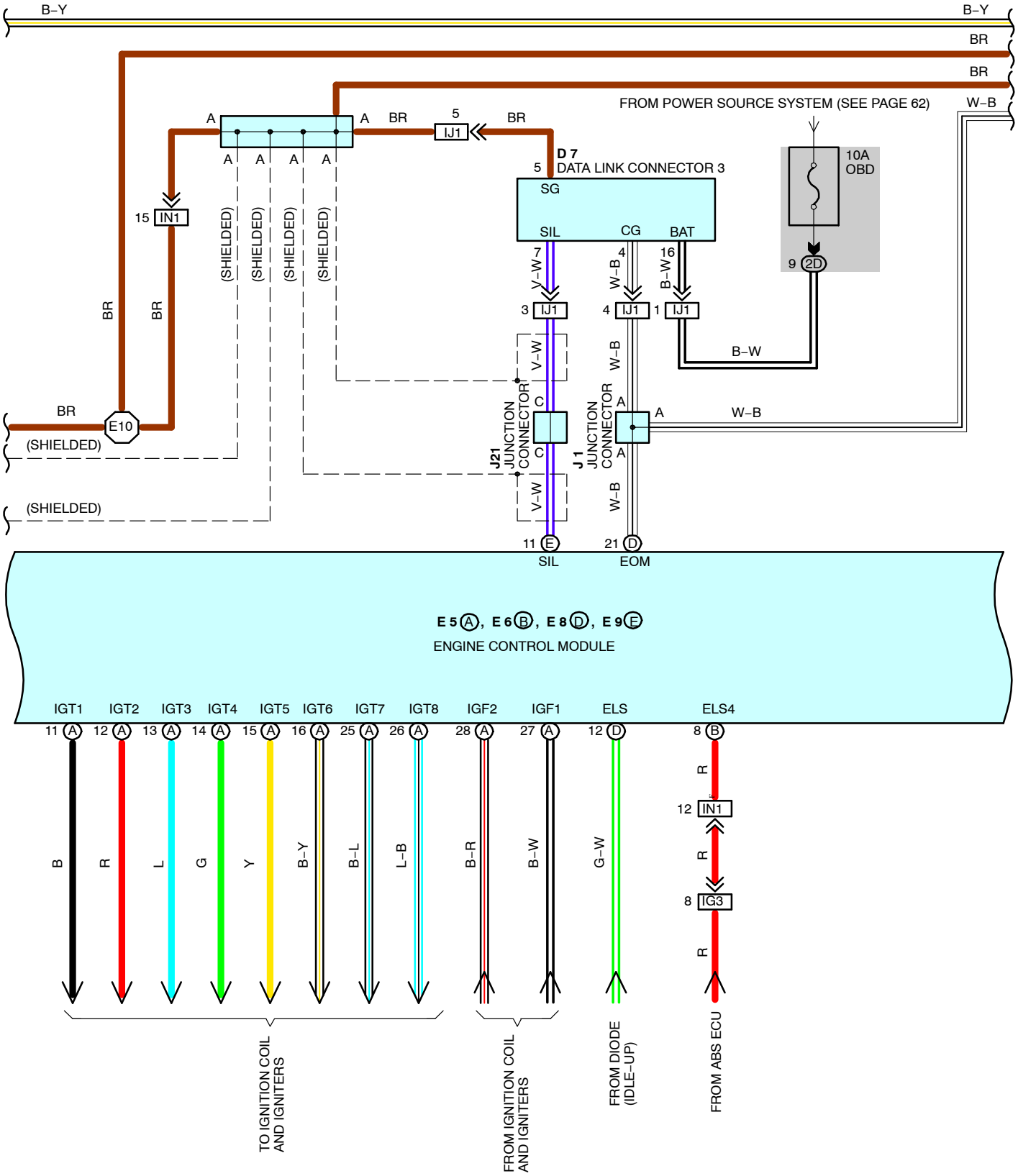

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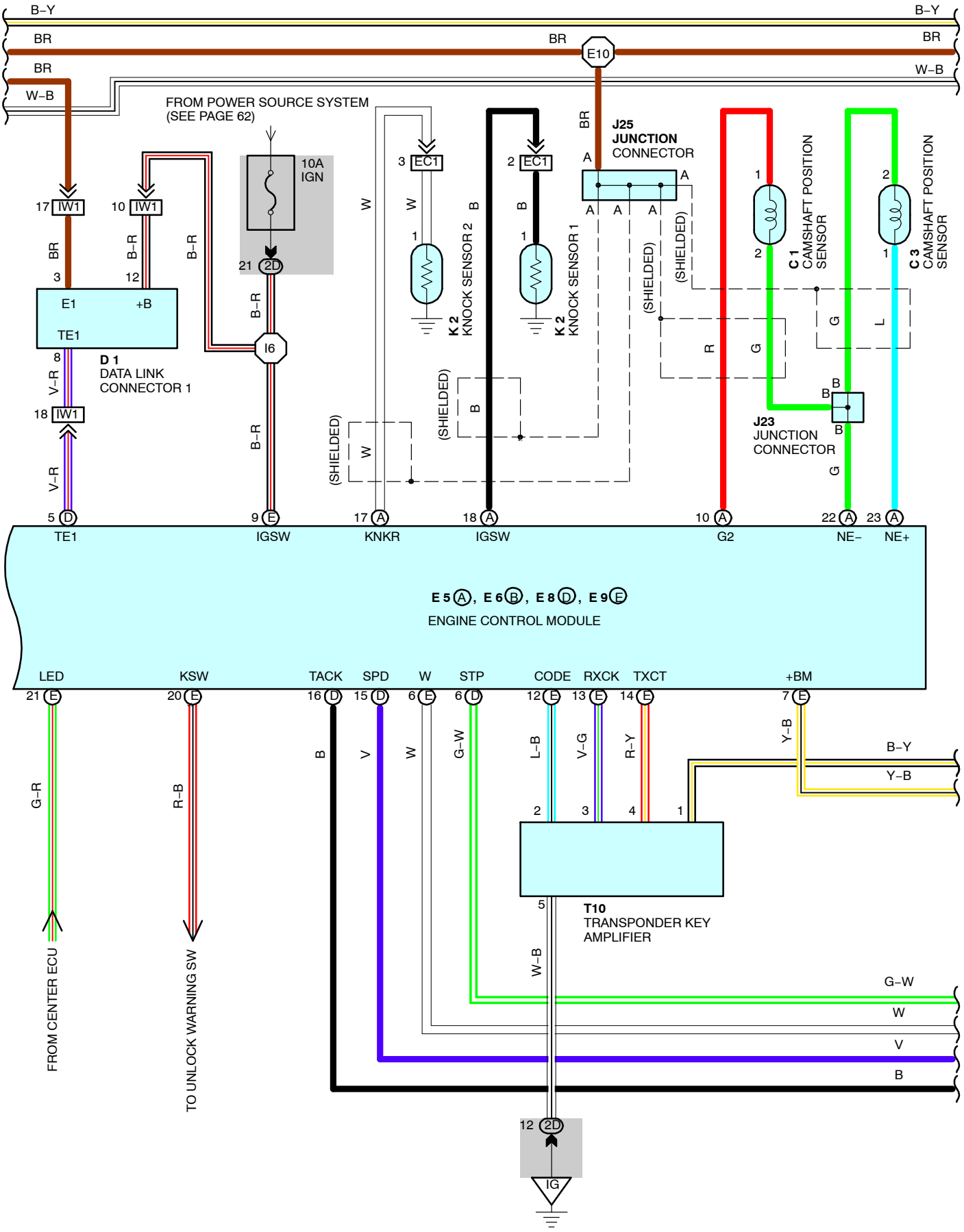

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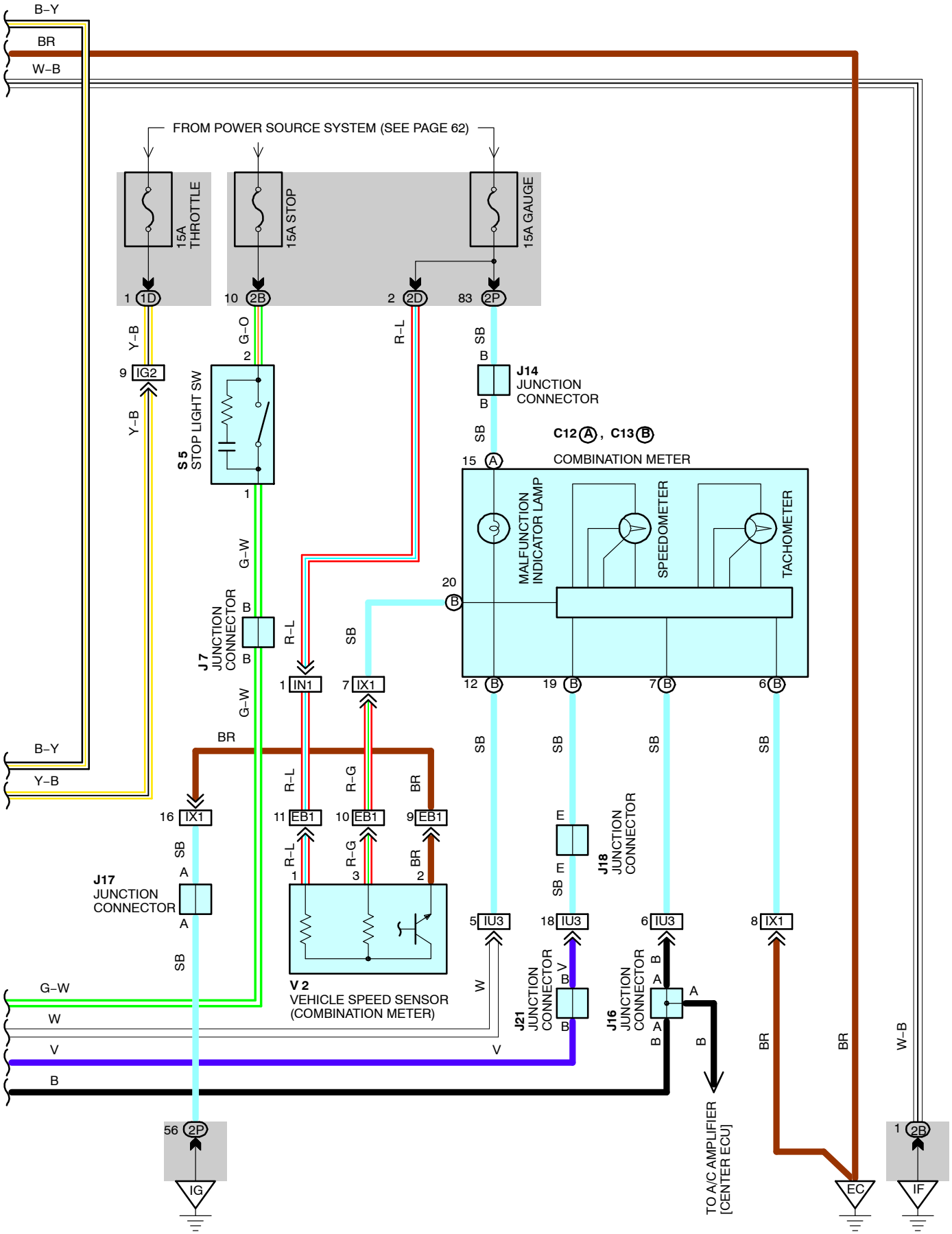

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SYSTEM OUTLINE

The engine control system utilizes a microcomputer and maintains overall control of the engine, transmission etc. An outline of the engine control is given here.

1. INPUT SIGNALS

(1) Engine coolant temp. signal circuit
The engine coolant temp. sensor detects the engine coolant temp. and has a built−in thermistor with a resistance which varies according to the engine coolant temp. The engine coolant temp. is input into **TERMINAL THW** of the engine control module as a control signal.

(2) Intake air temp. signal circuit
The intake air temp. sensor is installed in the mass air flow meter and detects the intake air temp., which is input as a control signal to **TERMINAL THA** of the engine control module.

(3) Oxygen sensor signal circuit
The oxygen density in the exhaust emission is detected and is input as a control signal from the heated oxygen sensors to **TERMINALS OXL1**, **OXR1**, **OXL2**, **OXR2** of the engine control module.

(4) RPM signal circuit
The camshaft position is detected by the camshaft position sensor and is input into **TERMINAL G2** of the engine control module as a control signal. Also, the engine RPM is detected by the crankshaft position sensor and the signal is input into **TERMINAL NE+** of the engine control module.

(5) Throttle position sensor signal circuit
The throttle position sensor detects the throttle valve opening angle as a control signal, which is input into **TERMINAL VTA** of the engine control module.

(6) Vehicle speed circuit
The vehicle speed sensor (Combination meter) detects the vehicle speed, and the signal is input into **TERMINAL SPD** of the engine control module via the combination meter.

(7) Battery signal circuit
Voltage is constantly applied to **TERMINAL BATT** of the engine control module. When the ignition SW is turned on, the voltage for engine control module start up power supply is applied through the EFI or ECD relay, to **TERMINALS +B**, **+B1** of the engine control module. The current from the **IGN** fuse flows to **TERMINAL IGSW** of the engine control module, and voltage is constantly applied to **TERMINAL +BM**.

(8) Intake air volume signal circuit
The intake air volume is detected by the mass air flow meter, and is input as a control signal to **TERMINAL VG** of the engine control module.

(9) Stop light SW signal circuit
The stop light SW is used to detect whether the vehicle is braking or not, and the signal is input into **TERMINAL STP** of the engine control module as a control signal.

(10) Starter signal circuit
To confirm whether the engine is cranking, the voltage applied to the starter motor when the engine is cranking is detected, and is input into **TERMINAL STA** of the engine control module as a control signal.

(11) Engine knock signal circuit
Engine knocking is detected by the knock sensors, and is input into **TERMINALS KNKL**, **KNKR** of the engine control module as a control signal.

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2. CONTROL SYSTEM

* SFI system
  The SFI system monitors the engine condition through the signals input from each of the sensors to the engine control module. The control signal is sent to the engine control module **TERMINALS #1**, **#2**, **#3**, **#4**, **#5**, **#6**, **#7**, **#8** to operate the injector (Fuel injection). The SFI system controls the fuel injection by the engine control module in response to the driving conditions.
* ESA system
  The ESA system monitors the engine condition through the signals input from each of the sensors to the engine control module. The best ignition timing is decided according to this data and the data memorized in the engine control module. The control signal is output to **TERMINALS IGT1**, **IGT2**, **IGT3**, **IGT4**, **IGT5**, **IGT6**, **IGT7**, **IGT8**, and these signals control the
  igniter to provide the best ignition timing.
* Heated oxygen sensor heater control system
  The heated oxygen sensor heater control system turns the heater on when the intake air volume is low (Temp. of exhaust emission is low), and warms up the heated oxygen sensors to improve their detection performance. The engine control module evaluates the signals from each of the sensors, and outputs current to **TERMINALS HTL**, **HTR**, **HTL2**, **HTR2** to control the heater.
* Fuel pump control system
  The engine control module supplies current to **TERMINAL FPC**, and controls the operation speed of the fuel pump with the fuel pump control ECU.
* ACIS
  The ACIS includes a valve in the bulkhead separating the surge tank into two parts. This valve is opened and closed in accordance with the driving conditions to control the intake manifold length in two stages, for increased engine output in all ranges from low to high speeds.
* ETCS−i
  The ETCS−i controls the engine output at its optimal level in accordance with the opening of the accelerator pedal, under all driving conditions.

3. DIAGNOSIS SYSTEM

When there is a malfunction in the engine control module signal system, the malfunctioning system is recorded in the memory. The malfunctioning system can be found by reading the code displayed on the malfunction indicator lamp.

4. FAIL−SAFE SYSTEM

When a malfunction has occurred in any system, there is a possibility of causing engine trouble due to continued control based on that system. In that case, the fail−safe system either controls the system using the data (Standard values) recorded in the engine control module memory, or else stops the engine.

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SERVICE HINTS

EFI OR ECD RELAY

1–3 : Closed with ignition SW at **ON** or **ST** position

E2 ENGINE COOLANT TEMP. SENSOR

1–2: Approx. **: 16.2** kΩ (**–20**°C, **–4**°F)
: Approx. **2.45** kΩ (**20**°C, **68**°F)
: Approx. **0.32** kΩ (**80**°C, **176**°F)

E6 (B), E8 (D), E9 (E) ENGINE CONTROL MODULE

BATT–E1 : Always **9.0–14.0** volts
+BM–E1 : Always **9.0–14.0** volts
IGSW–E1 : **9.0–14.0** volts with ignition SW at **ON** or **ST** position
+B, +B1–E1 : **9.0–14.0** volts with ignition SW at **ON** or **ST** position
VC–E2 : **4.5–5.5** volts with ignition SW on
VTA2–E2 : **2.0–2.9** volts with ignition SW on and throttle valve fully closed
: **4.6–5.0** volts with ignition SW on and throttle valve fully opened
VTA–E2 : **0.4–1.0** volts with ignition SW on and throttle valve fully closed
: **3.2–4.8** volts with ignition SW on and throttle valve fully opened
VPA–E2 : **0.25–0.9** volts with ignition SW at on and accelerator fully closed
: **3.2–4.8** volts with ignition SW at on and accelerator fully opened
VPA2–E2 : **1.8–2.7** volts with ignition SW at on and accelerator fully closed
: **4.7–5.0** volts with ignition SW at on and accelerator fully opened
THA–E2 : **0.5–3.4** volts with idling, intake air temp. **20**°C (**68**°F)
THW–E2 : **0.2–1.0** volts with idling, coolant temp. **80**°C (**176**°F)
STA–E1 : **6.0** volts or more with cranking
TE1–E1 : **9.0–14.0** volts with ignition SW on
W–E1 : **9.0–14.0** volts with idling
: **0–3.0** volts with ignition SW on

○ **: PARTS LOCATION**

Code	See Page	Code	See Page	Code	See Page
A14	36	H6	37	J21	39
C1	36	H7	37	J22	39
C3	36	H8	37	J23	39
C6 A	38	I9	37	J24	39
C7 B	38	I10	37	J25	39
C12 A	38	I11	37	K1	37
C13 B	38	I12	37	K2	37
D1	36	I13	37	M1	37
D7	38	I14	37	P1	37
E2	36	I15	37	S5	39
E5 A	38	I16	37	T2	37
E6 B	38	I18	38	T3	37
E8 D	38	J1	39	T10	39
E9 E	38	J4	39	V1	37
F6	36	J7	39	V2	37
F7	38	J14	39	V4	37
F12	40	J16	39	V5	37
F13	40	J17	39		
H5	37	J18	39		

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: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1C	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1D		
1E		
1N	21	Engine Room No.3 Wire and Engine Room J/B (Engine Compartment Left)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EB1	44	Engine Wire and Transmission Wire (On the Transmission)
EB3		
EC1	44	Engine No.2 Wire and Engine Wire (Rear Side of Intake Manifold)
ID1	46	Dash Wire and Floor Wire (Left Kick Panel)
IG1	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IG2		
IG3		
IJ1	48	Dash Wire and Detector Wire (Instrument Panel Center)
IN1	50	Engine Wire and Dash Wire (Behind the Glove Box)
IO1		
IO2		
IU3	50	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
IW1	52	Engine Room No.2 Wire and Dash Wire (Behind the Glove Box)
IX1	52	Instrument Panel Integration Wire and Engine Wire (Behind the Glove Box)
BB1	54	Floor Wire and Fuel Tank Wire (Near the Fuel Tank)

: GROUND POINTS

Code	See Page	Ground Points Location
EC	44	Rear Bank of Right Cylinder Head
EE	44	Front Left Side of Fender Apron
IF	46	Set Bolt of Cowl Side J/B LH
IG		
BM	54	Left Rear Side Quarter Panel

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E4	44	Engine Room No.2 Wire	E11	44	Engine Wire
E7	44	Engine Wire	I2	48	Engine Room No.2 Wire
E8	44	Transmission Wire	I6	48	Dash Wire
E9			I14		
E10	44	Engine Wire	I15		

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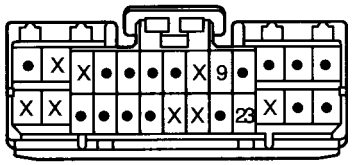
A14
BLACK

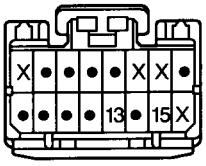
C1
DARK GRAY

C3
DARK GRAY

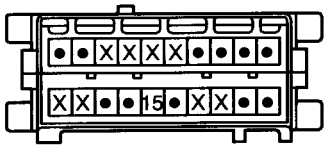
C6 (A)



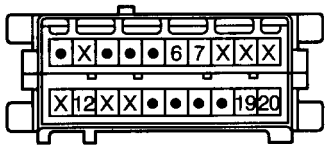
C7 (B)



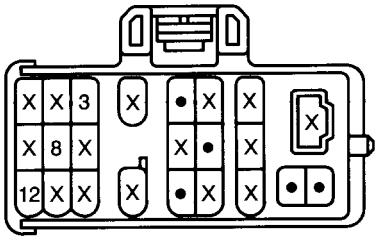
C12 (A)
GRAY



C13 (B)



D1
BLACK



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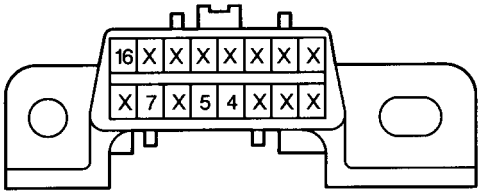
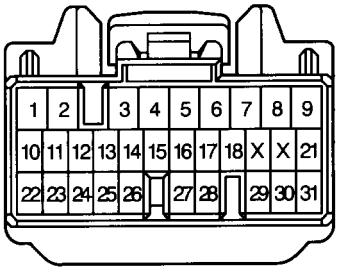
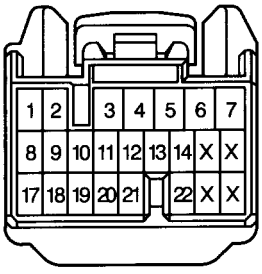


E2
GRAY

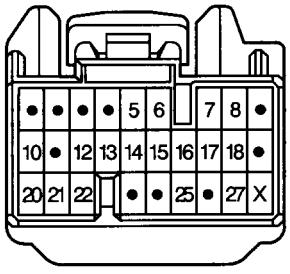
E5 (A)



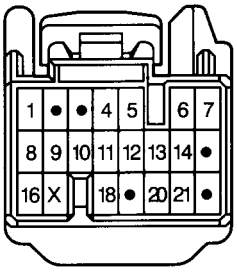
E6 (B)



E8 (D)



E9 (E)



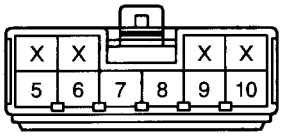
F6

(See Page 34)

F7

F12
DARK GRAY

F13
BLACK



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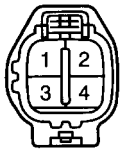
H5
DARK GRAY

H6
DARK GRAY

H7
DARK GRAY

H8
DARK GRAY



I9
BLUE

I10
BLUE

I11
BLUE

I12
BLUE

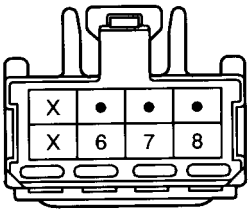
I13
BLUE

I14
BLUE

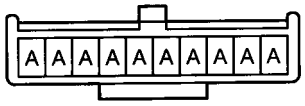
I15
BLUE

I16
BLUE

I18

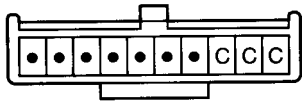


J1



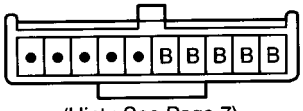
(Hint : See Page 7)

J4
BLUE



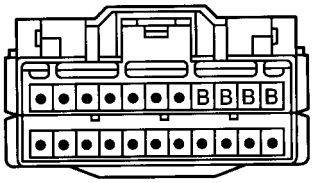
(Hint : See Page 7)

J7
GREEN



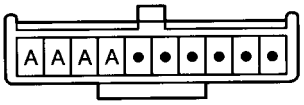
(Hint : See Page 7)

J14



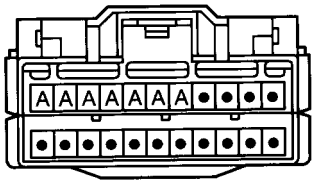
(Hint : See Page 7)

J16
BLUE



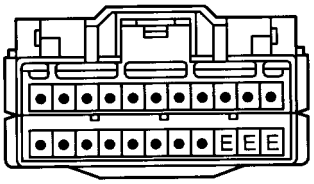
(Hint : See Page 7)

J17



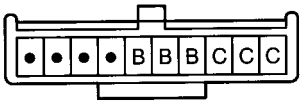
(Hint : See Page 7)

J18
GRAY



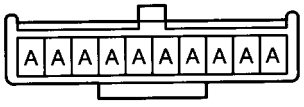
(Hint : See Page 7)

J21
BLUE



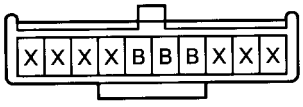
(Hint : See Page 7)

J22



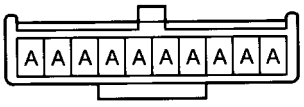
(Hint : See Page 7)

J23
BLUE



(Hint : See Page 7)

J24



(Hint : See Page 7)

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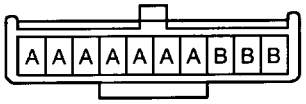
J25
RED

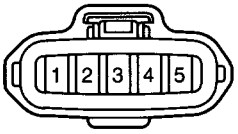


(Hint : See Page 7)

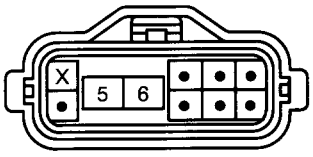
K1
DARK GRAY

K2
DARK GRAY

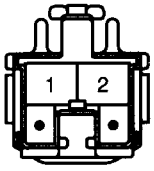
M1
BLACK



P1
GRAY

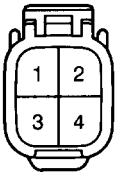


S5
BLUE

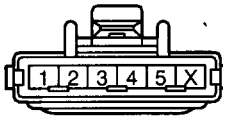


T2
GRAY

T3
GRAY



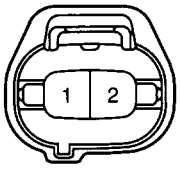
T10
BLACK



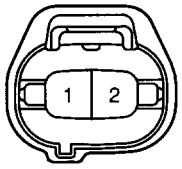
V1
BLACK

V2
BLACK

V4
BLACK



V5
BLUE



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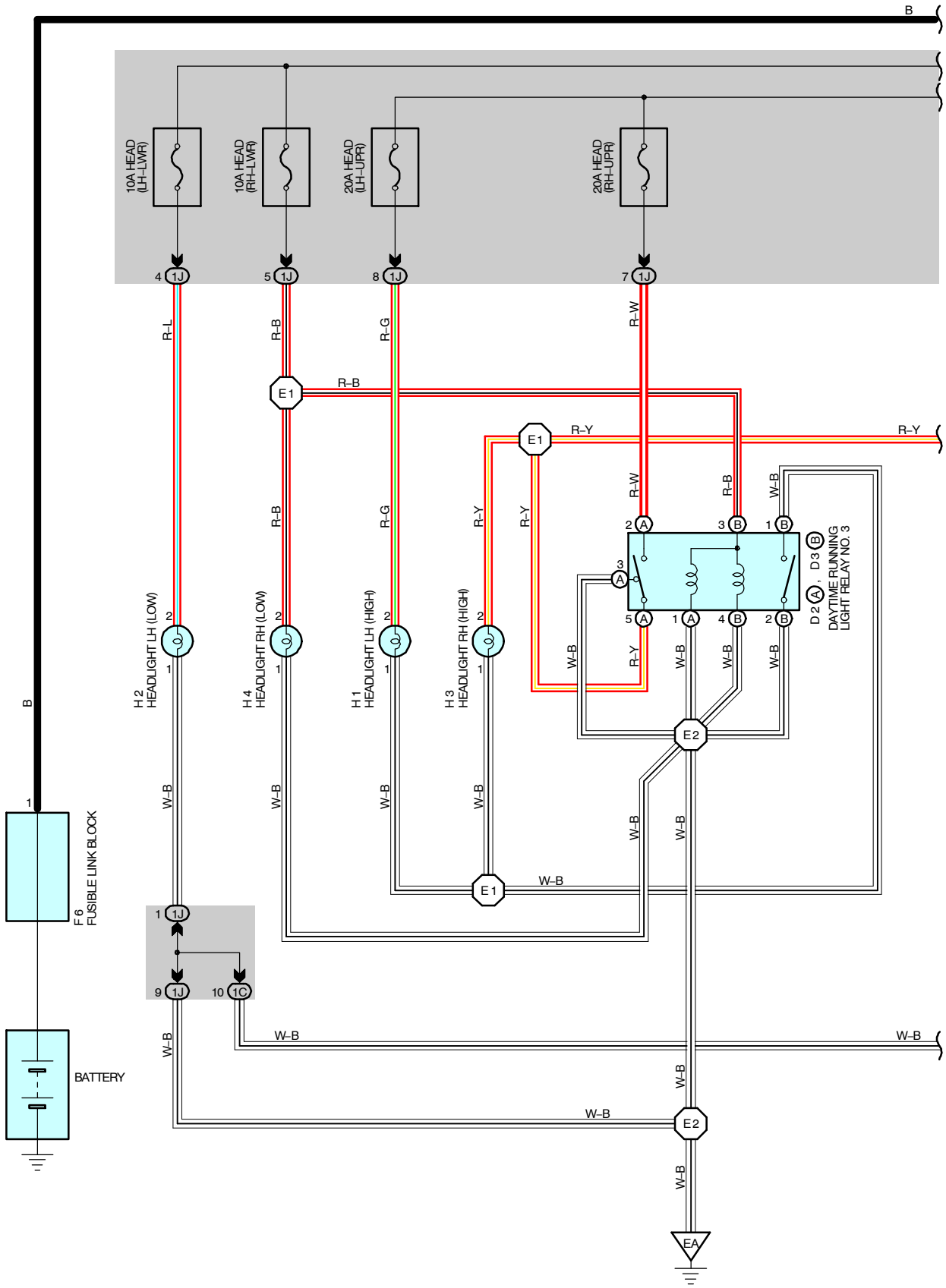

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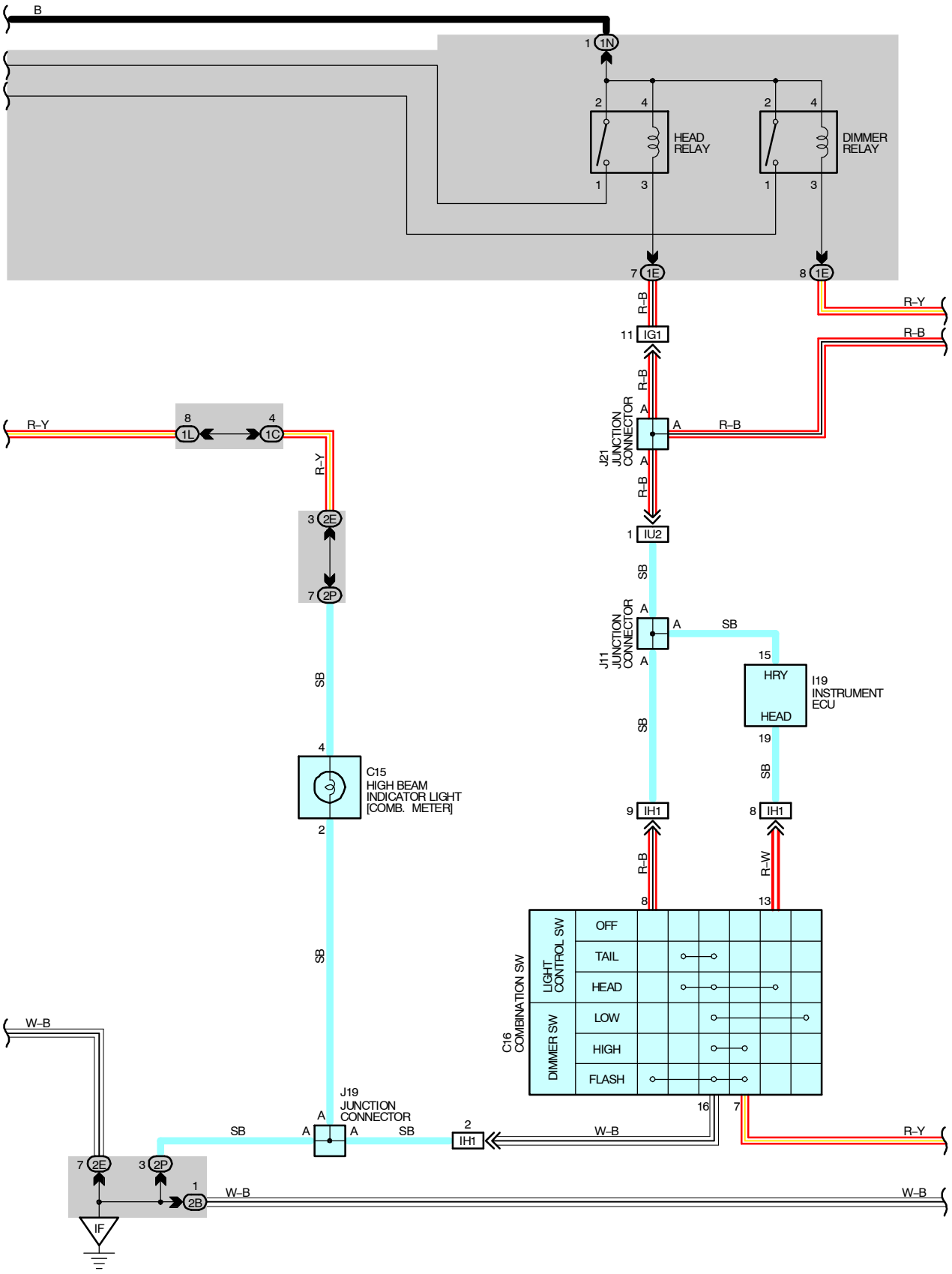

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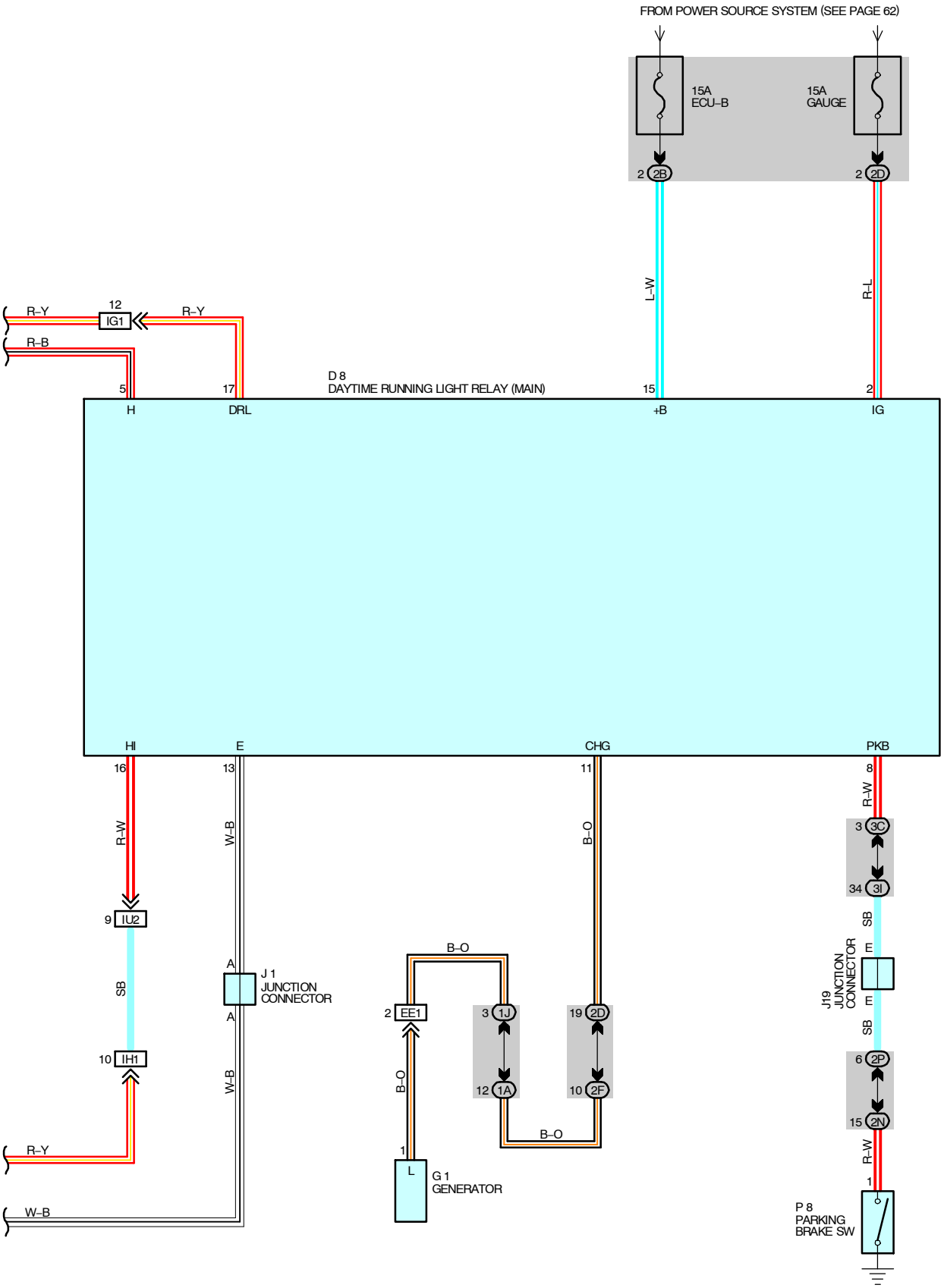
HEADLIGHT



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SYSTEM OUTLINE

1. DAYTIME RUNNING LIGHT OPERATION

When the engine is started, a signal from the generator is input to daytime running light relay (Main) **TERMINAL 11**.
At this time, if the parking brake lever is pulled up, the relay does not operate, so the daytime running light system does not operate. When the parking brake lever is released, a signal is input to daytime running light relay (Main) **TERMINAL 8**. This activates the daytime running light relay (Main), and turns on the DIMMER relay. The current from the battery flows through the fusible link block to DIMMER relay (Point side) to **HEAD (LH–UPR)** fuse to headlight LH (High) to headlight RH (High) to daytime running light relay No.3 **TERMINAL (A) 5** to **TERMINAL (A) 3** to **GROUND**, and the headlights are lit dimmer than usual. Once the daytime running light system is operated, the headlights remain lit even though the parking brake lever is pulled up. The headlights remain lit even when the engine stops with the ignition SW on, and the signal from the generator is cut off. When the ignition SW is turned from on to off, the daytime running light system is canceled and the headlights are turned off. If the engine is started with the parking brake lever released, the daytime running light system operates and the headlights are turned on when the engine starts running.

2. HEADLIGHT OPERATION

* When the light control SW is turned to **HEAD** position
When the light control SW is turned to **HEAD** position, the HEAD relay is turned on. At the same time, a signal is input to the daytime running light relay (Main) **TERMINAL 5**.
As a result, the daytime running light relay (Main) cancels the daytime running light system operation, and turns off the headlight LH, RH (High).
Simultaneously, the current from the battery flows from the fusible link block to HEAD relay (Point side) to **HEAD (LH–LWR), HEAD (RH–LWR)** fuse to headlight LH, RH (Low) to **GROUND**, and turns on the headlights at normal brightness.

* When the dimmer SW is turned to **HIGH** position
When the light control SW is turned to **HEAD** position, the low beam of the headlights are turned on, and at the same time, current flows from **HEAD (RH–LWR)** fuse to daytime running light relay No.3 (Coil side) to **GROUND**, and turns on the daytime running light relay No.3.
When the dimmer SW is turned to **HIGH** position, a signal is input to daytime running light relay (Main) **TERMINAL 16**. This activates the DIMMER relay, and the current from the battery flows from the fusible link block to DIMMER relay (Point side) to **HEAD (LH–UPR)** fuse to headlight LH (High) to daytime running light relay No.3 **TERMINAL (B) 2** to **TERMINAL (B) 1** to **GROUND**. At the same time the current flows from DIMMER relay (Point side) to **HEAD (RH–UPR)** fuse to daytime running light relay No.3 **TERMINAL (A) 2** to **TERMINAL (A) 5** to headlight RH (High) to daytime running light relay No.3 **TERMINAL (B) 2** to **TERMINAL (B) 1** to **GROUND**. Also current flows from the daytime running light relay No.3 **TERMINAL (A) 3** to **TERMINAL (A) 5** to combination meter **TERMINAL 4** to **TERMINAL 2** to **GROUND**. As a result the headlight high beam, low beam, and high beam indicator light are turned on simultaneously.

* When the dimmer SW is turned to **FLASH** position
When the dimmer SW is turned to **FLASH** position, the HEAD relay is turned on, the daytime running light system is canceled and the daytime running light relay No.3 is turned on, as when the light control SW is turned to **HEAD** position. At the same time, the DIMMER relay is turned on as when the dimmer SW is turned to **HIGH** position. As a result, the headlight high beam, low beam, and high beam indicator light are turned on simultaneously.

SERVICE HINTS

HEAD RELAY

1–2 : Closed with light control SW at **HEAD** position or dimmer SW at **FLASH** position

DIMMER RELAY

1–2 : Closed with daytime running light operation
: Closed with light control SW at **HEAD** position and dimmer SW at **HIGH** position
: Closed with dimmer SW at **FLASH** position

C16 COMBINATION SW

13–16 : Closed with light control SW at **HEAD** position
8–16 : Closed with dimmer SW at **FLASH** position
7–16 : Closed with dimmer SW at **HIGH** or **FLASH** position

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HEADLIGHT

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
C15	38	G1	36	J1	39
C16	38	H1	37	J11	39
D2 A	36	H2	37	J19	39
D3 B	36	H3	37	J21	39
D8	38	H4	37	P8	41
F6	36	I19	38		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Relay Blocks (Relay Block Location)
1A	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1C		
1E		
1J	21	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)
1L		
1N	21	Engine Room No.3 Wire and Engine Room J/B (Engine Compartment Left)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		
2E	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2F		
2N	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)
3C	30	Dash Wire and Cowl Side J/B RH (Right Kick Panel)
3I	30	Instrument Panel Integration Wire and Cowl Side J/B RH (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EE1	44	Engine Room Main Wire and Alternator Wire (Near the Battery)
IG1	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IH1	48	Instrument Panel Integration Wire and Column Wire (Near the Ignition SW)
IU2	50	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)

: GROUND POINTS

Code	See Page	Ground Points Location
EA	44	Front Right Side of Fender Apron
IF	46	Set Bolt of Cowl Side J/B LH

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E1	44	Engine Room Main Wire	E2	44	Engine Room Main Wire

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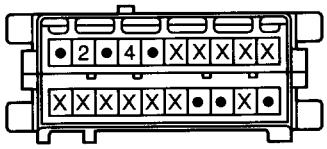
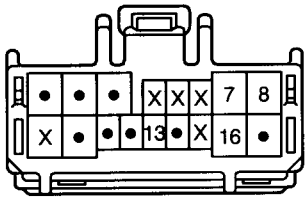
C15



C16



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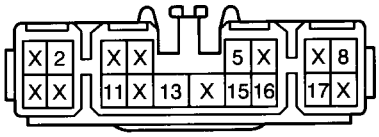
D3 (B)
BLACK

D8
GRAY



F6

(See Page 34)

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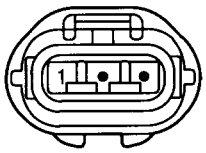

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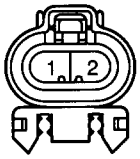

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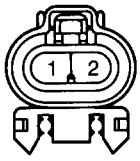

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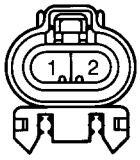

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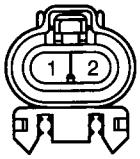
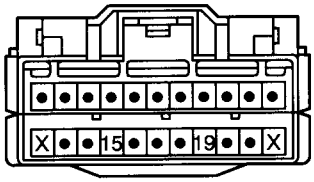
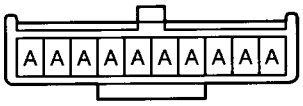
BROWN



I19

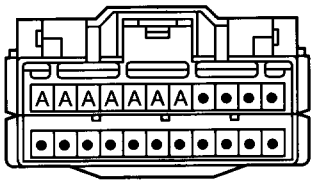


J1



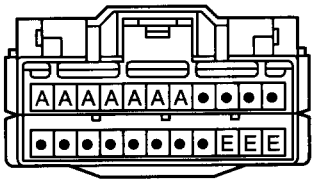
(Hint : See Page 7)

J11
GRAY



(Hint : See Page 7)

J19
GRAY



(Hint : See Page 7)

J21
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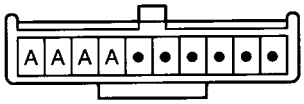

(Hint : See Page 7)

P8

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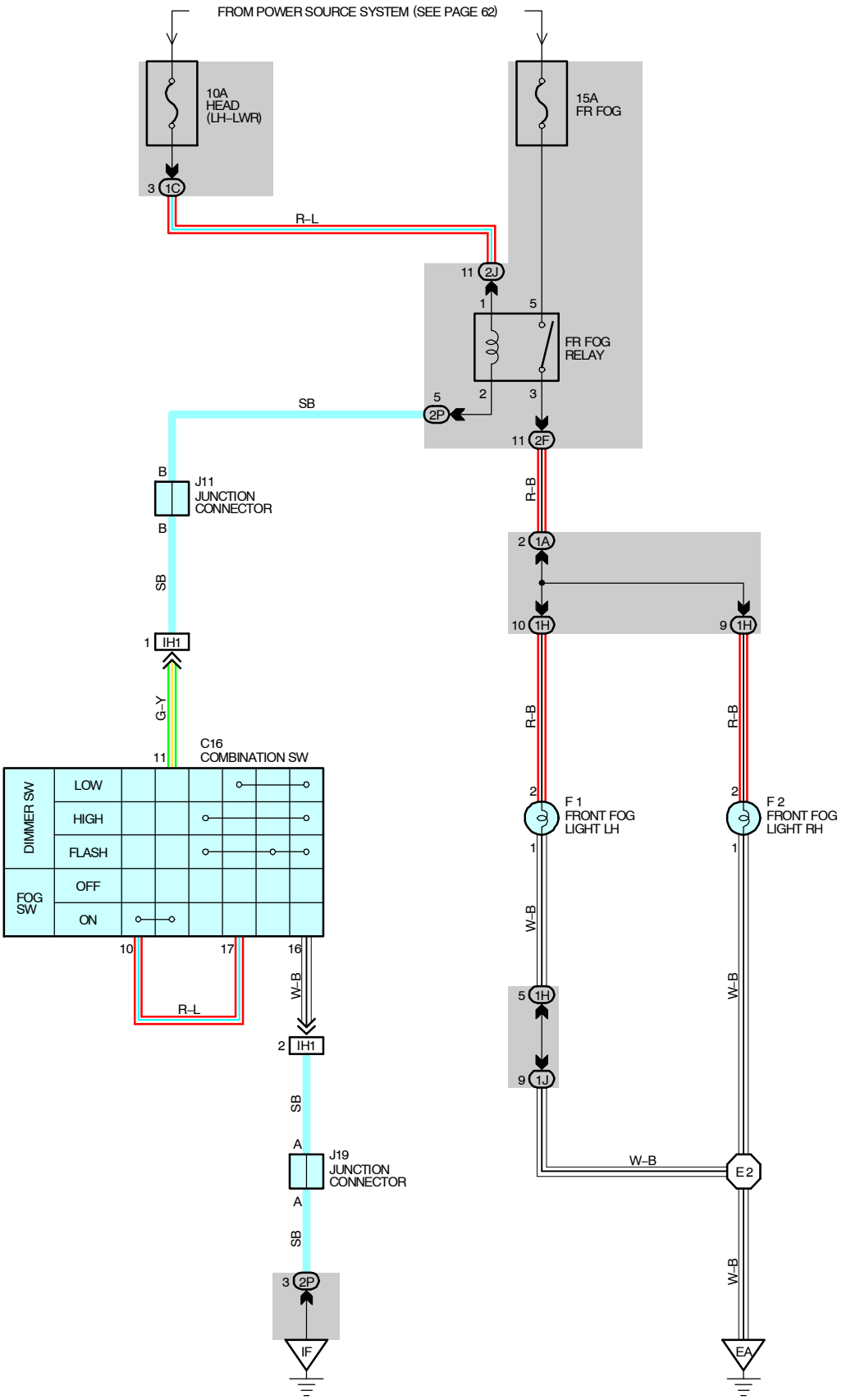
FRONT FOG LIGHT



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SERVICE HINTS

FR FOG RELAY

5–3 : Closed with light control at **HEAD** position, dimmer SW at **LOW** position and fog at **ON** position

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
C16	38	F2	36	J19	39
F1	36	J11	39		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	21	Engine Room No. 2 Wire and Engine Room J/B (Engine Compartment Left)
1C		
1H	21	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)
1J		
2F	24	Engine Room No. 2 Wire and Wire and Cowl Side J/B LH (Left Kick Panel)
2J		
2P	26	Instrument Panel Integration Wire and Cowl Side J/B (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IH1	48	Instrument Panel Integration Wire and Column Wire (Near the Ignition SW)

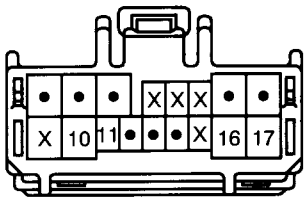
: GROUND POINTS

Code	See Page	Ground Points Location
EA	44	Front Right Side of Fender Apron
IF	46	Set Bolt of Cowl Side J/B LH

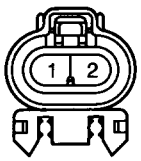
: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E2	44	Engine Room Main Wire			

C16



F1
BROWN



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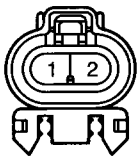
BROWN



J11
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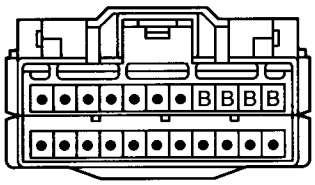
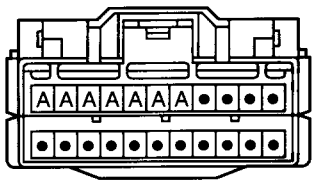


(Hint : See Page 7)

J19
GRAY



(Hint : See Page 7)

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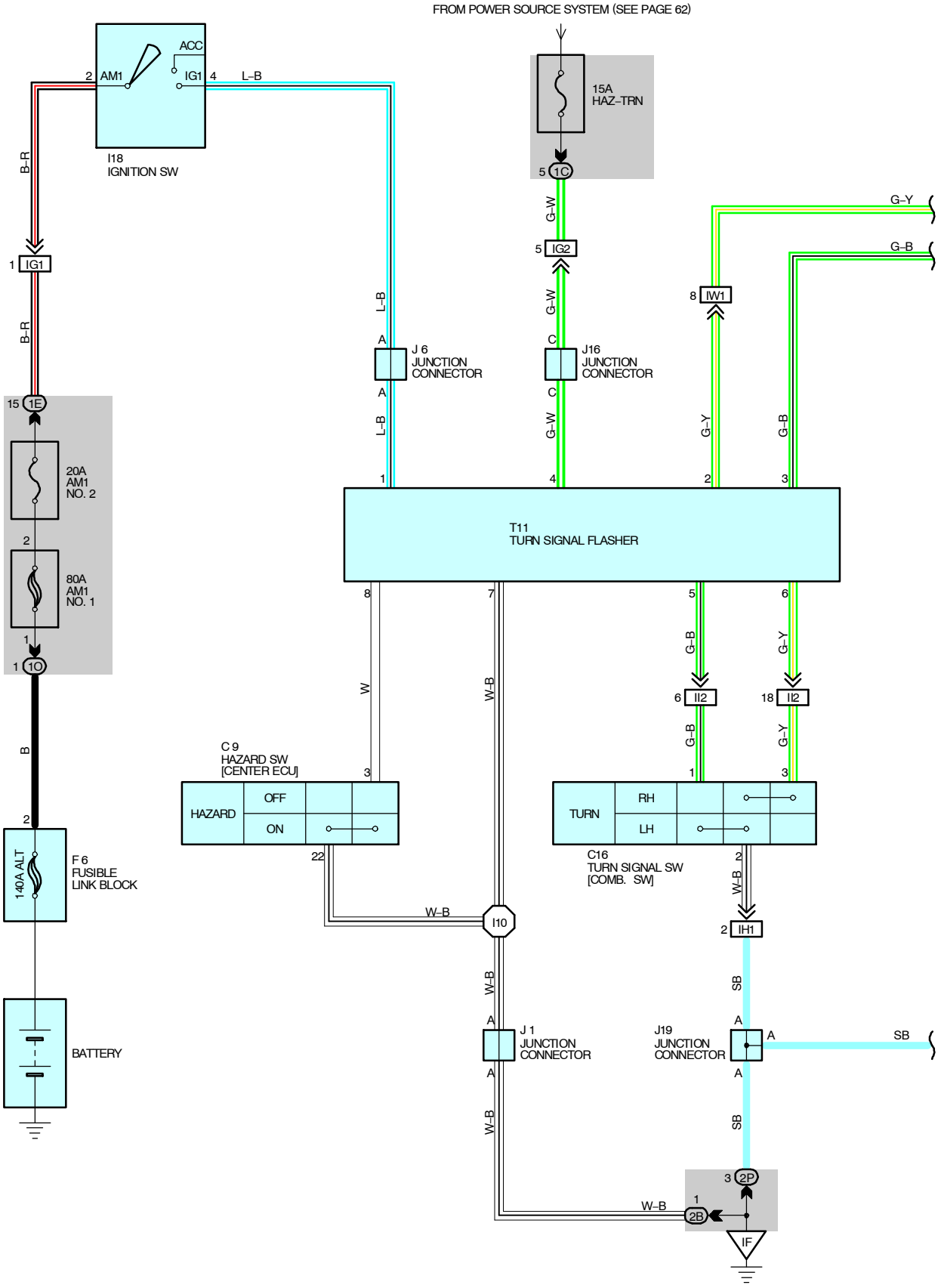
TURN SIGNAL AND HAZARD WARNING LIGHT



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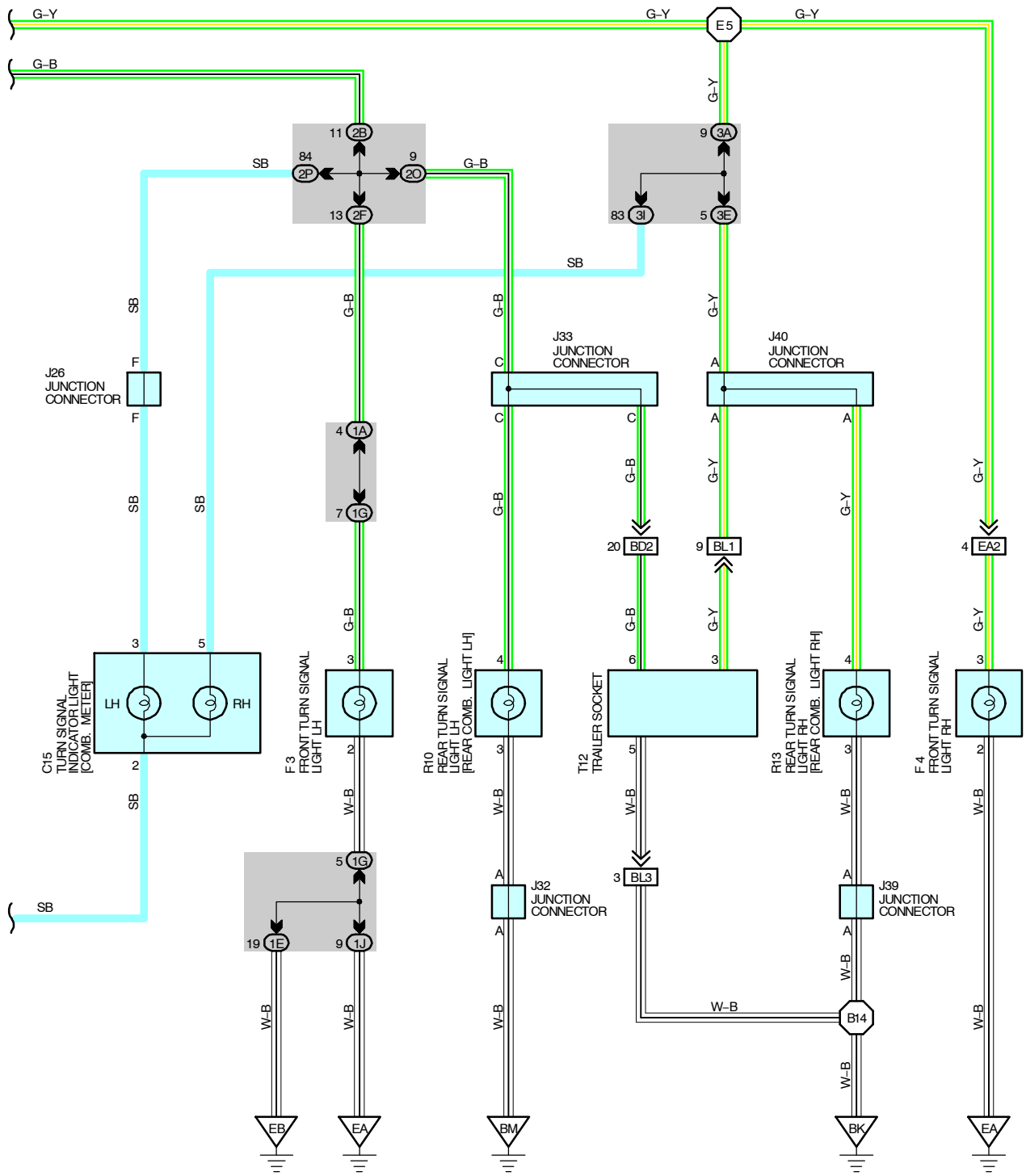

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TURN SIGNAL AND HAZARD WARNING LIGHT

SERVICE HINTS

T11 TURN SIGNAL FLASHER

4–GROUND : Always approx. **12** volts
1–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
7–GROUND : Always continuity

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
C9	38	J1	39	J39	40
C15	38	J6	39	J40	40
C16	38	J16	39	R10	41
F3	36	J19	39	R13	41
F4	36	J26	39	T11	39
F6	36	J32	40	T12	41
I18	38	J33	40		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1C		
1E		
1G	21	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)
1J		
1O	21	Engine Room No.3 Wire and Engine Room J/B (Engine Compartment Left)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2F	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2O	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)
3A	30	Engine Room No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3E	30	Floor No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3I	30	Instrument Panel Integration Wire and Cowl Side J/B RH (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA2	44	Engine Room Main Wire and Engine Room No.2 Wire (Engine Compartment Right)
IG1	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IG2		
IH1	48	Instrument Panel Integration Wire and Column Wire (Near the Ignition SW)
II2	48	Column Wire and Dash Wire (Near the Ignition SW)
IW1	52	Engine Room No,2 Wire and Dash Wire (Behind the Glove Box)
BD2	54	Floor No.3 Wire and Floor Wire (Left Rear Side Quarter Panel)
BL1	56	Floor No.2 Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)
BL3		

: GROUND POINTS

Code	See Page	Ground Points Location
EA	44	Front Right Side of Fender Apron
EB		
IF	46	Set Bolt of Cowl Side J/B LH
BK	54	Front Side Under the Front Passenger's Seat
BM	54	Left Rear Side Quarter Panel

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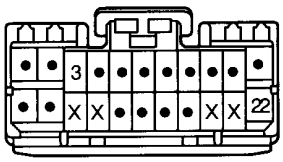
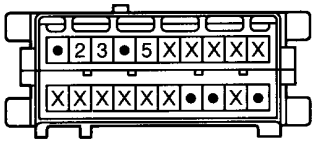
: **SPLICE POINTS**

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E5	44	Engine Room No.2 Wire	B14	56	Floor No.2 Wire
I10	48	Dash Wire			

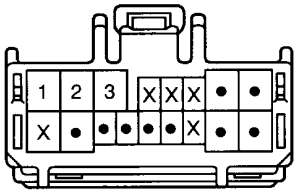
C9



C15



C16



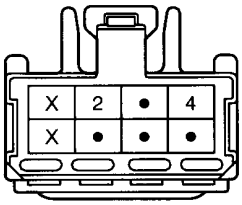
F3
GRAY

F4
GRAY

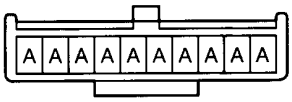
F6

(See Page 34)

I18



J1



(Hint : See Page 7)

J6
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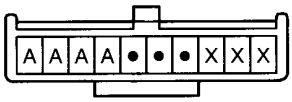

(Hint : See Page 7)

J16
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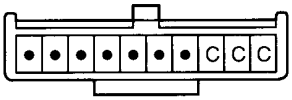

(Hint : See Page 7)

J19
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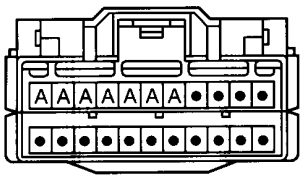

(Hint : See Page 7)

J26
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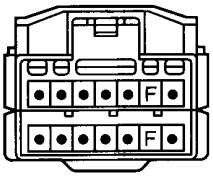
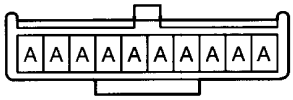


(Hint : See Page 7)

J32



(Hint : See Page 7)

J33
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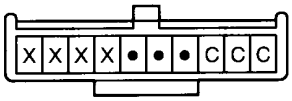
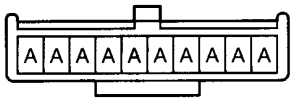


(Hint : See Page 7)

J39



(Hint : See Page 7)

J40
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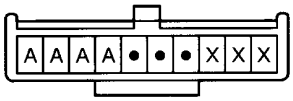
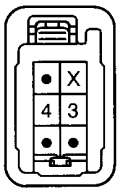
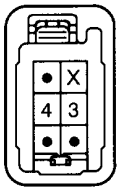


(Hint : See Page 7)

R10



R13



T11
BLACK

T12
GRAY

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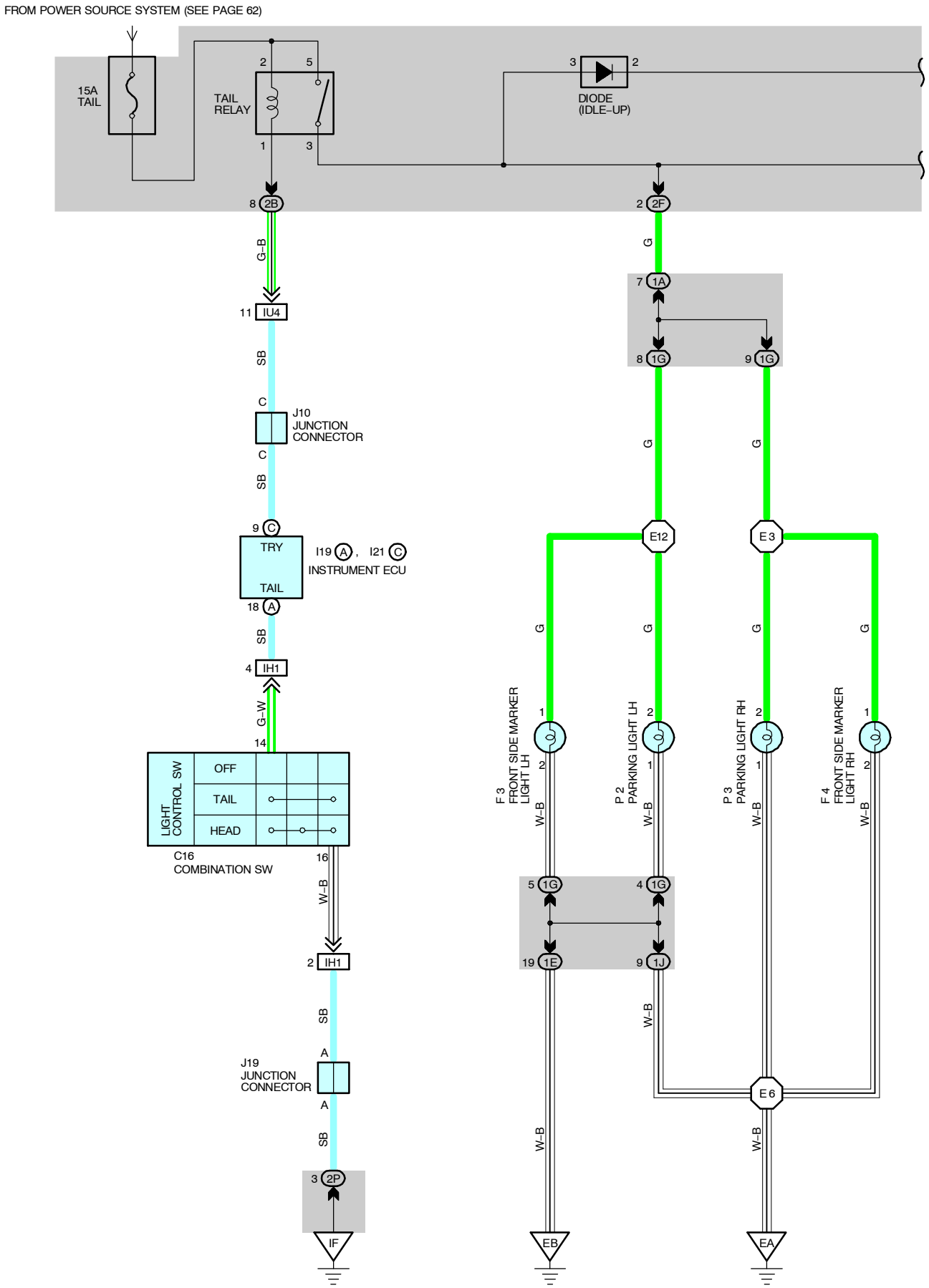

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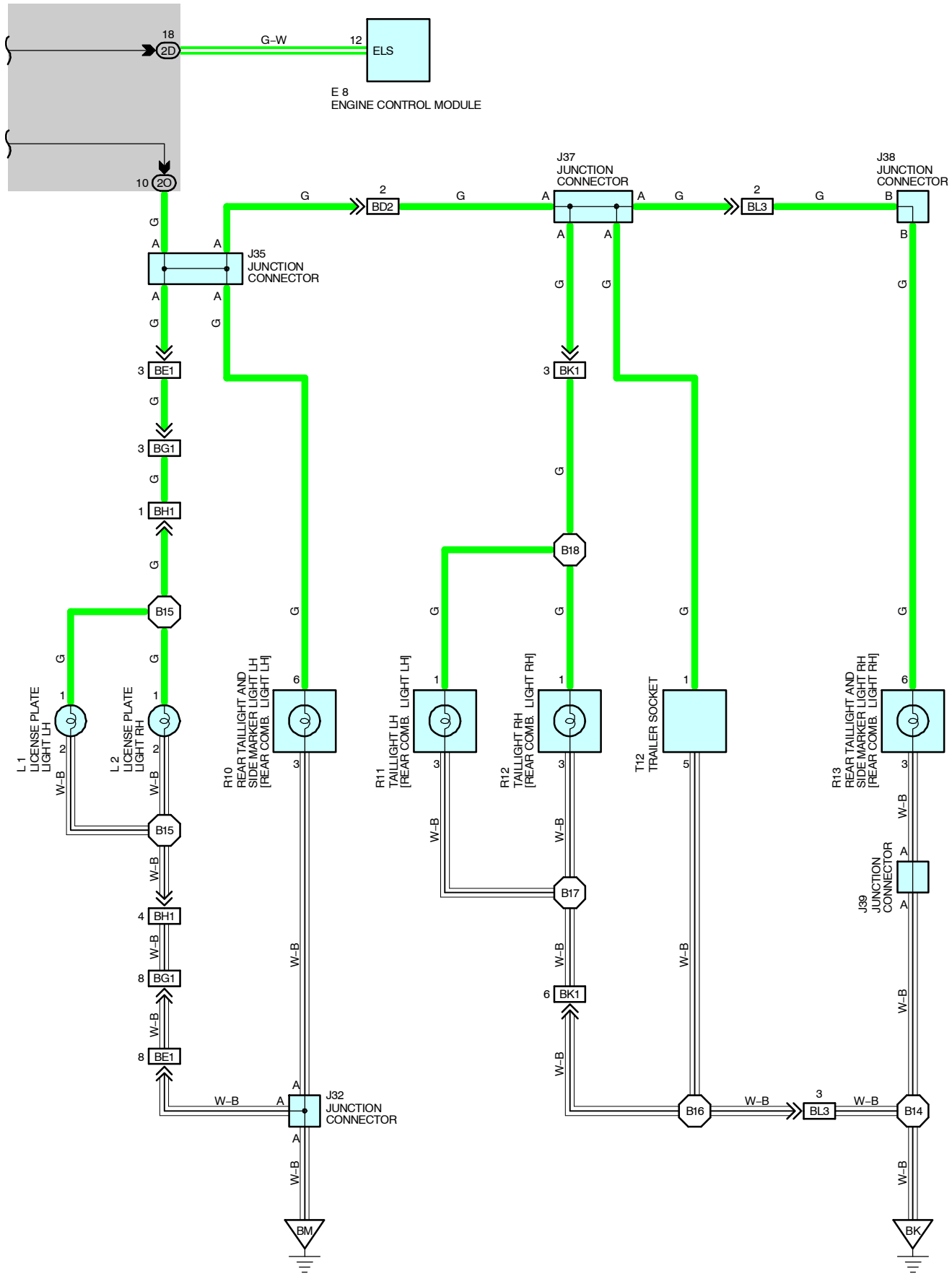

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TAILLIGHT

SERVICE HINTS

TAIL RELAY

5–3 : Closed with light control SW at **TAIL** or **HEAD** position

C16 COMBINATION SW

14–16 : Closed with light control SW at **TAIL** or **HEAD** position

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
C16	38	J32	40	P3	37
E8	38	J35	40	R10	41
F3	36	J37	40	R11	41
F4	36	J38	40	R12	41
I19 A	38	J39	40	R13	41
I21 C	38	L1	40	T12	41
J10	39	L2	40		
J19	39	P2	37		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A 1E	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1G 1J	21	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)
2B 2D	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2F	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2O	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IH1	48	Instrument Panel Integration Wire and Column Wire (Near the Ignition SW)
IU4	50	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
BD2	54	Floor No.3 Wire and Floor Wire (Left Rear Side Quarter Panel)
BE1	54	Luggage Room Wire and Floor Wire (Left Rear Side Quarter Panel)
BG1	56	Pillar No.1 Wire and Luggage Room Wire (Left Rear Side Roof Panel)
BH1	56	Pillar No.1 Wire and Back Door Upper Wire (Left Side of Back Door)
BK1	56	Back Door Lower Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)
BL3	56	Floor No.2 Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)

: GROUND POINTS

Code	See Page	Ground Points Location
EA EB	44	Front Right Side of Fender Apron
IF	46	Set Bolt of Cowl Side J/B LH
BK	54	Front Side Under the Front Passenger's Seat
BM	54	Left Rear Side Quarter Panel

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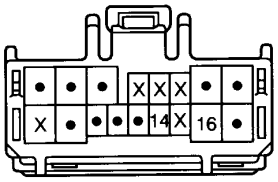
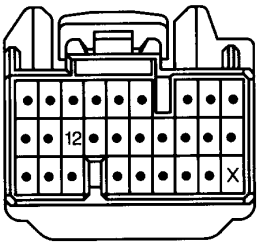
: **SPLICE POINTS**

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E3	44	Engine Room Main Wire	B15	56	Back Door Upper Wire
E6			B16	56	Floor No.3 Wire
E12			B17	56	Back Door Lower Wire
B14	56	Floor No.2 Wire	B18		

C16

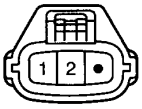


E8

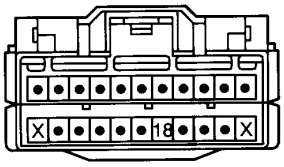


F3
GRAY

F4
GRAY



I19 (A)



I21 (C)
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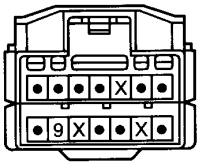
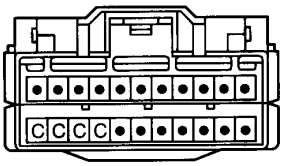
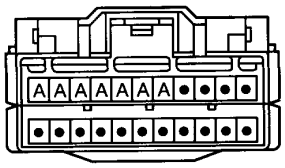


J10



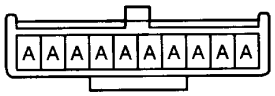
(Hint : See Page 7)

J19
GRAY



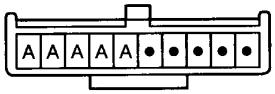
(Hint : See Page 7)

J32



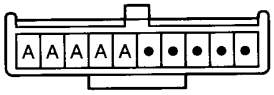
(Hint : See Page 7)

J35
GREEN



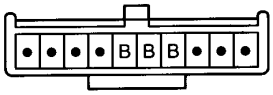
(Hint : See Page 7)

J37
GREEN



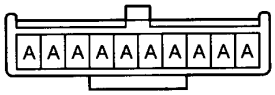
(Hint : See Page 7)

J38
BLUE



(Hint : See Page 7)

J39

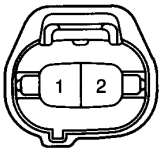


(Hint : See Page 7)

L1

L2

P2
GRAY



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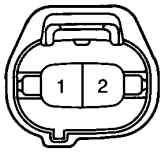
GRAY



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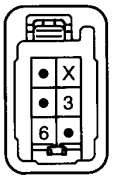

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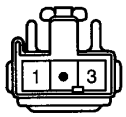

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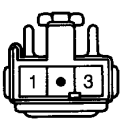

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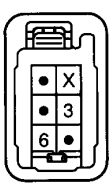

T12
GRAY

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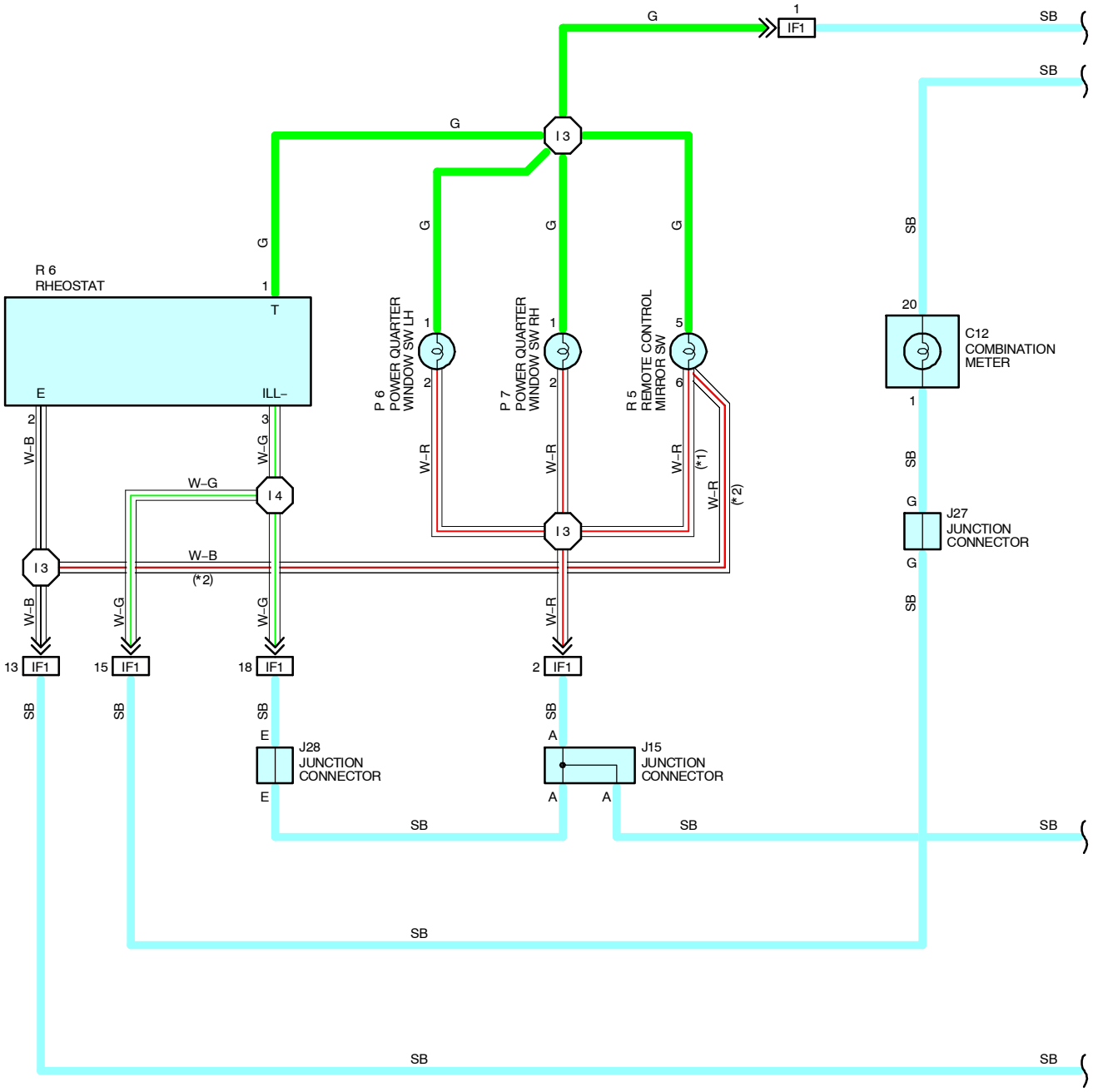
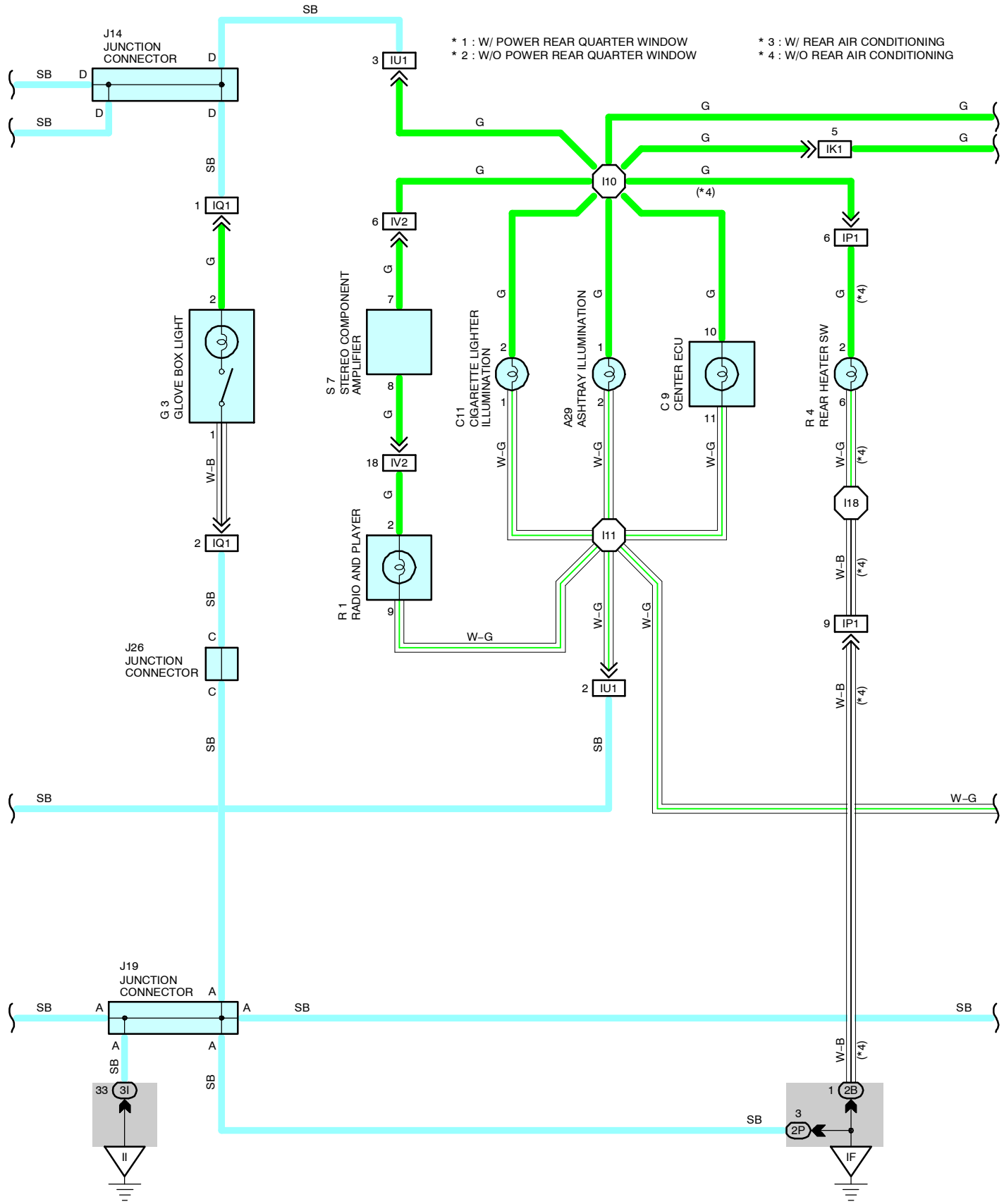


Donated by Andrew Schauer . cruisercult.com



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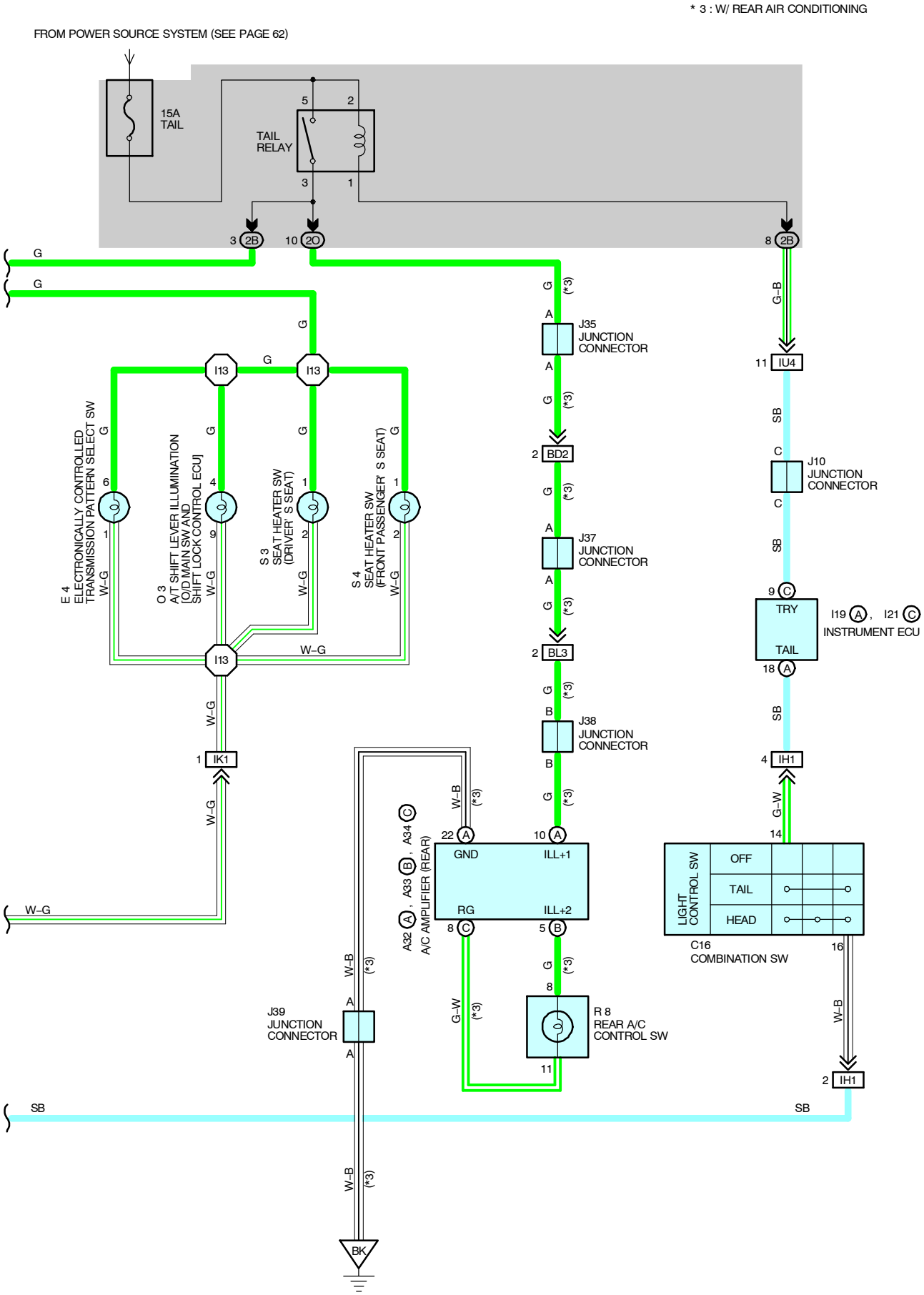

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SERVICE HINTS

TAIL RELAY

5–3 : Closed with light control SW at **TAIL** or **HEAD** position

C16 COMBINATION SW

14–16 : Closed with light control SW at **TAIL** or **HEAD** position

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
A29	38	J10	39	P6	39
A32 A	40	J14	39	P7	39
A33 B	40	J15	39	R1	39
A34 C	40	J19	39	R4	39
C9	38	J26	39	R5	39
C11	38	J27	39	R6	39
C12	38	J28	39	R8	41
C16	38	J35	40	S3	39
E4	38	J37	40	S4	39
G3	38	J38	40	S7	41
I19 A	38	J39	40		
I21 C	38	O3	39		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2O	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)
3I	30	Instrument Panel Integration Wire and Cowl Side J/B RH (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IF1	46	Instrument Panel Integration Wire and Instrument Panel Wire (Left Side of Instrument Panel)
IH1	48	Instrument Panel Integration Wire and Column Wire (Near the Ignition SW)
IK1	48	Console Box Wire and Dash Wire (Left Side of Front Console)
IP1	50	Rear Console Box Wire and Dash Wire (Right Side of Rear Console)
IQ1	50	Instrument Panel Integration Wire and Lamp Wire (Behind the Glove Box)
IU1	50	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
IU4		
IV2	52	Dash Wire and Floor No.2 Wire (Behind the Glove Box)
BD2	54	Floor No.3 Wire and Floor Wire (Left Rear Side Quarter Panel)
BL3	56	Floor No.2 Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)

: GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH
II	46	Set Bolt of Cowl Side J/B RH
BK	54	Front Side Under the Front Passenger's Seat

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I3	48	Instrument Panel Wire	I11	48	Dash Wire
I4			I13	48	Console Box Wire
I10	48	Dash Wire	I18	48	Rear Console Box Wire

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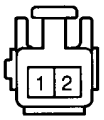
A29



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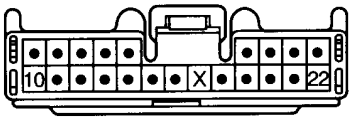

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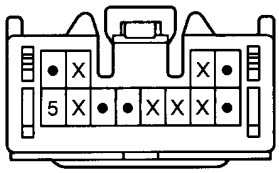

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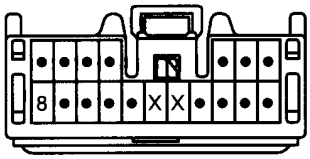
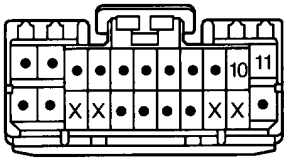
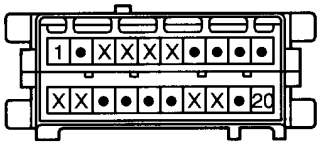


C9



C11
GRAY

C12
GRAY



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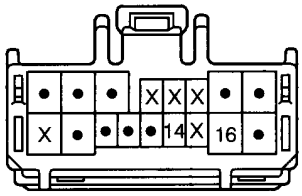
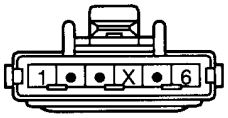


E4



G3

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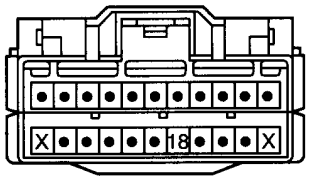

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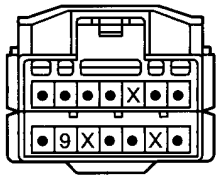

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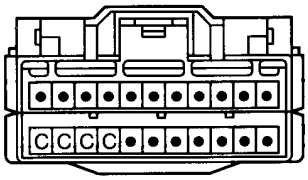
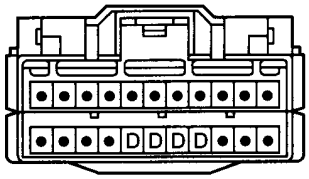


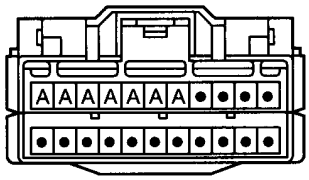
(Hint : See Page 7)

J14



(Hint : See Page 7)

J15
GRAY



(Hint : See Page 7)

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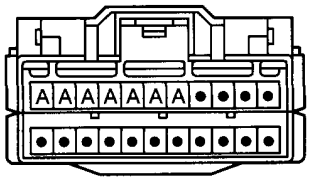

(Hint : See Page 7)

J26
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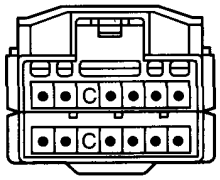
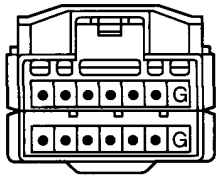


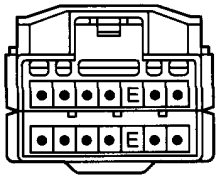
(Hint : See Page 7)

J27
GRAY



(Hint : See Page 7)

J28



(Hint : See Page 7)

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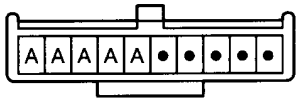

(Hint : See Page 7)

J37
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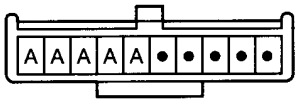

(Hint : See Page 7)

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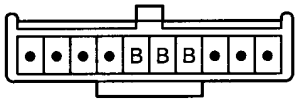

(Hint : See Page 7)

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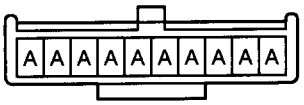
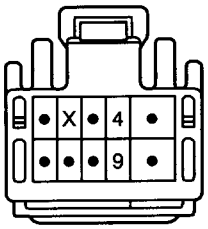
J39



(Hint : See Page 7)

O3



P6
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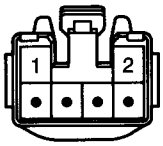

P7
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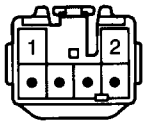
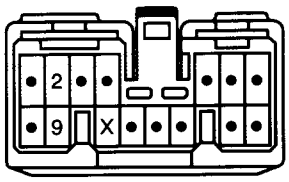


R1



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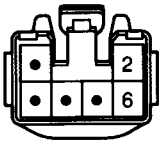

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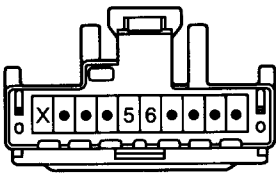
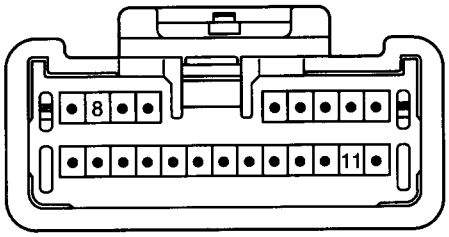


R6
(w/ Rear Diff. Lock)

R6
(w/o Rear Diff. Lock) GRAY

R8



S3
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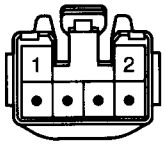
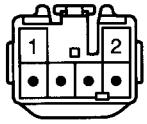
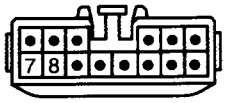


S4



S7
GRAY



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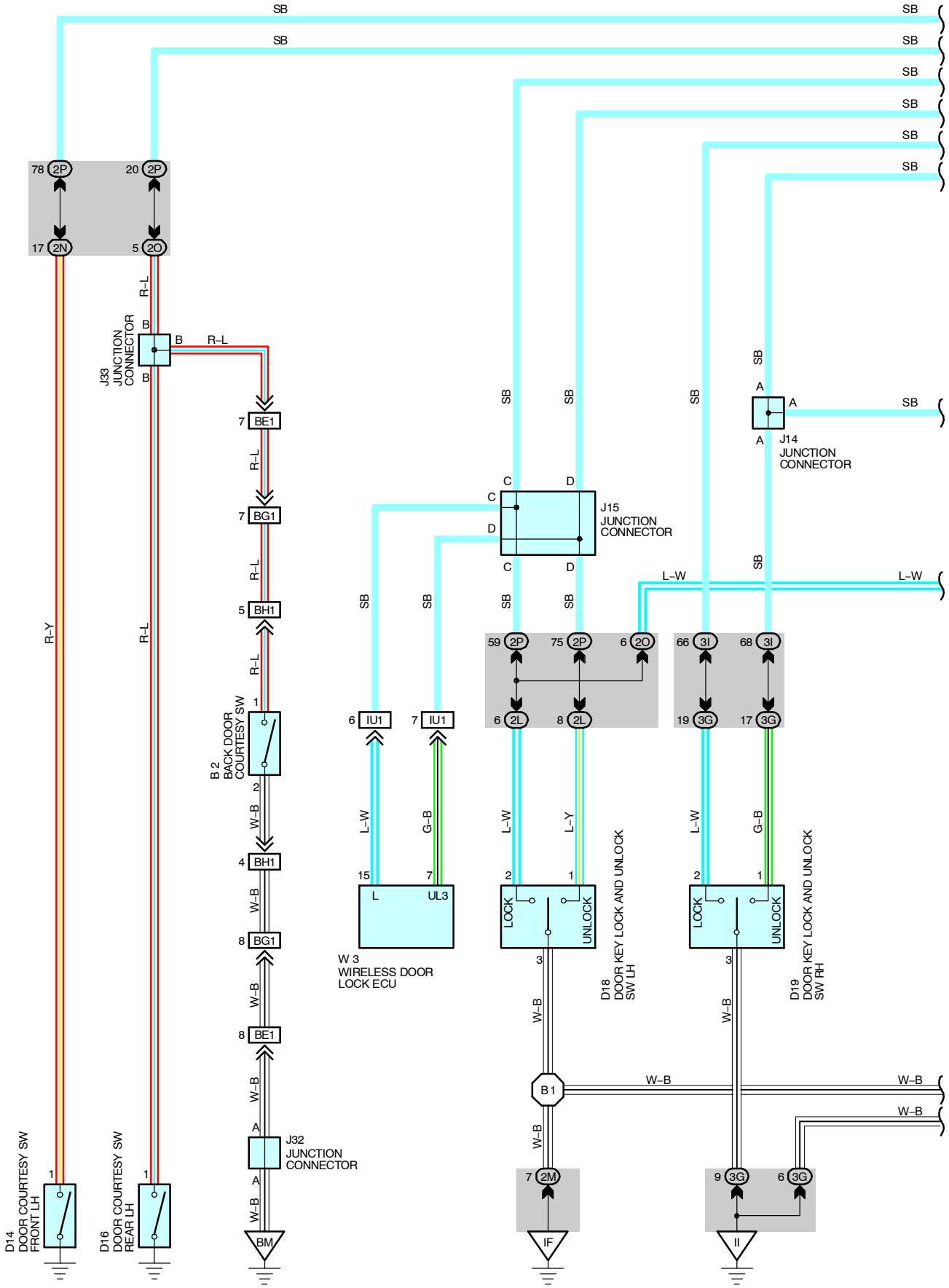

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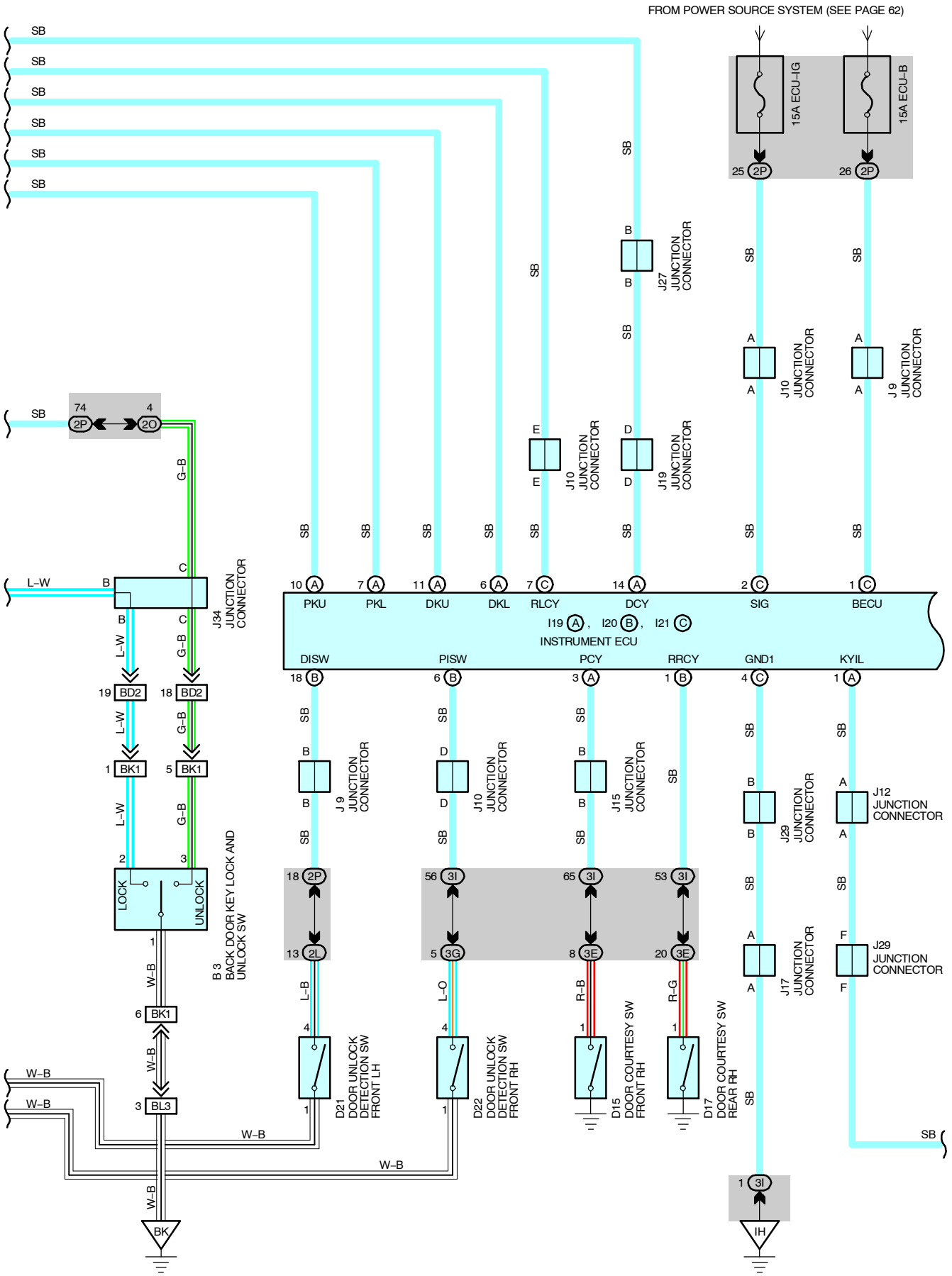

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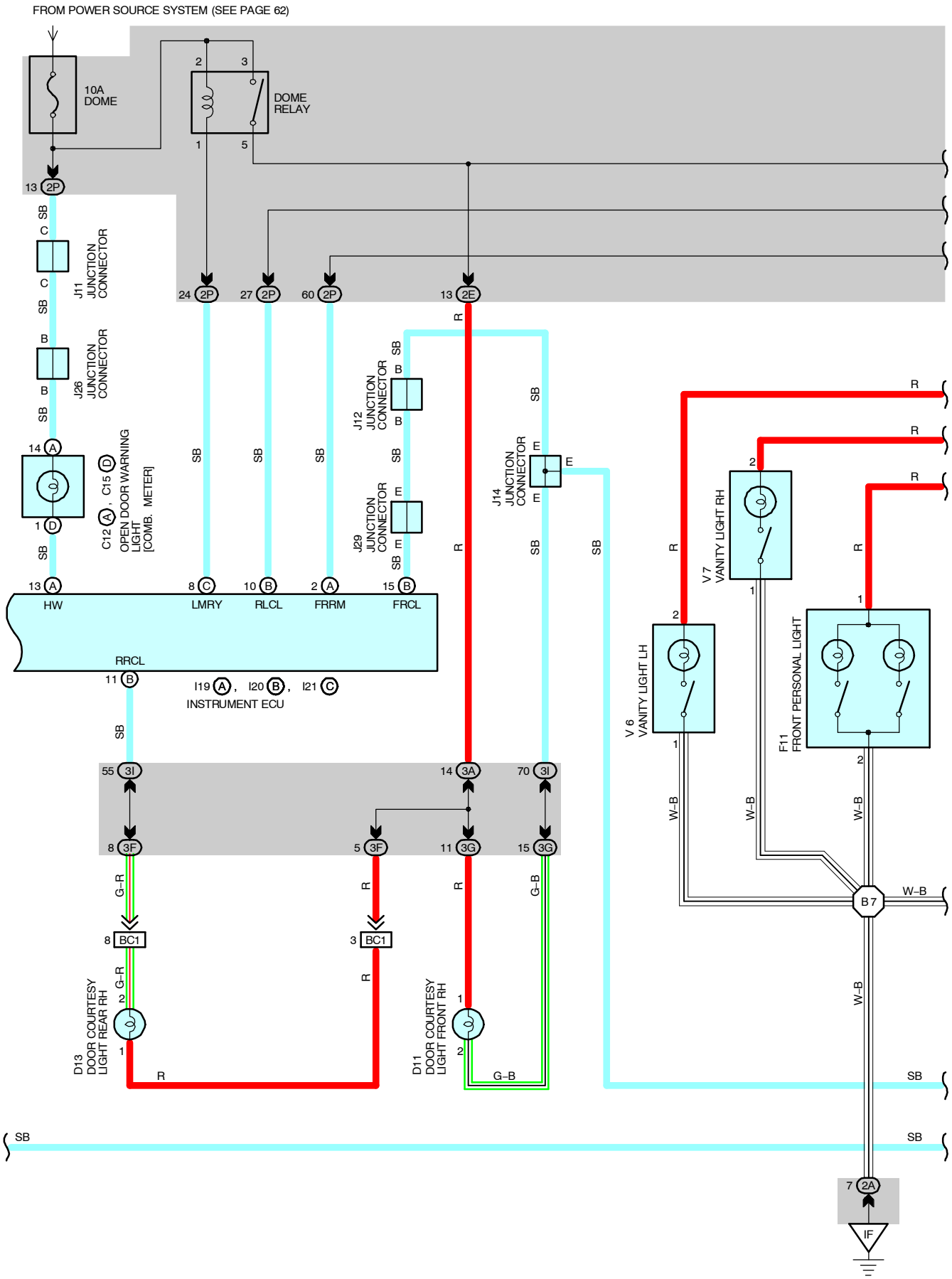
INTERIOR LIGHT



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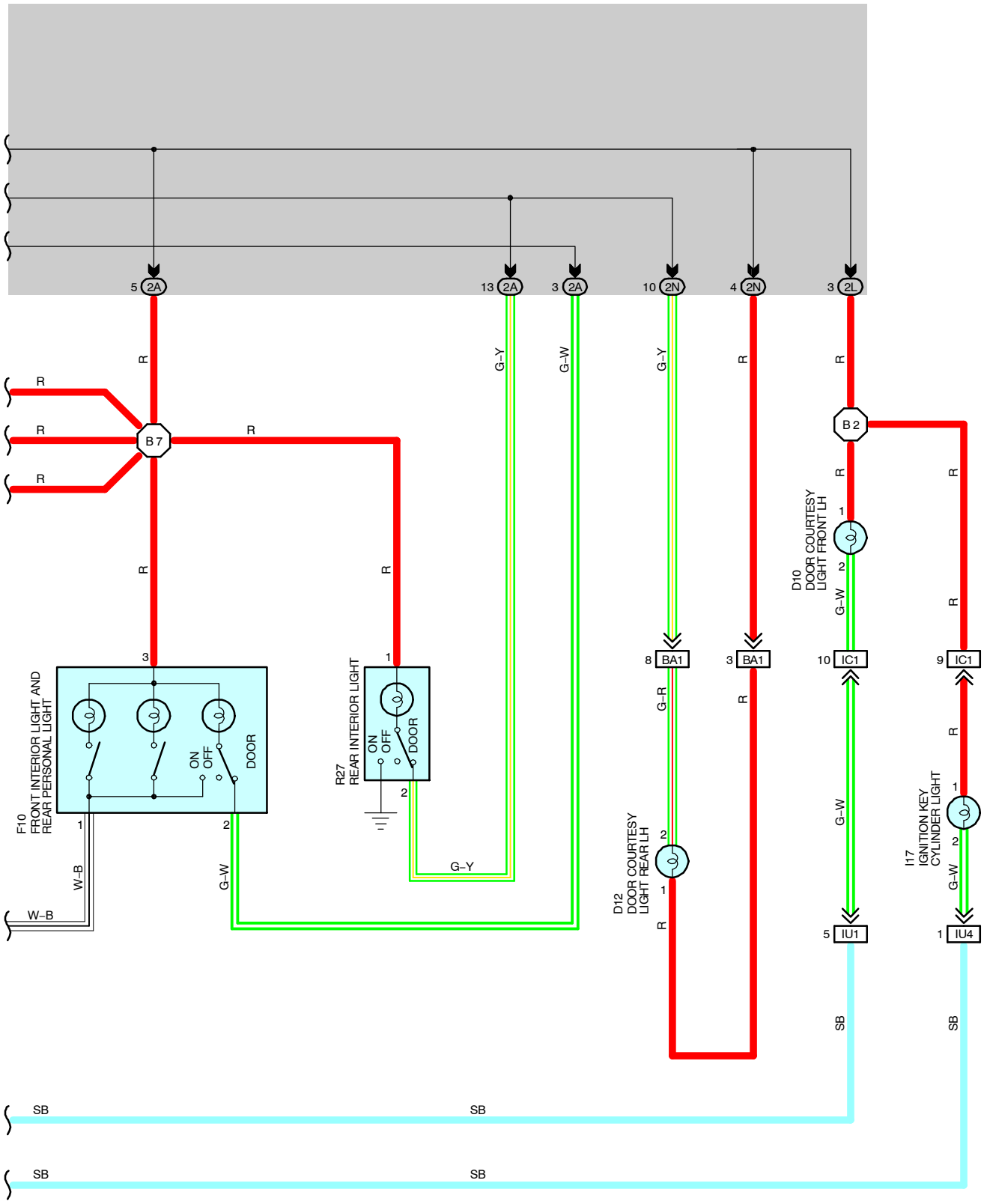
5 2A
13 2A
3 2A
10 2N
4 2N
3 2L
R
G-Y
G-W
G-R
B 7
B 2
F10
FRONT INTERIOR LIGHT AND
REAR PERSONAL LIGHT
ON
OFF
DOOR
W-B
R27
REAR INTERIOR LIGHT
D10
DOOR COURTESY
LIGHT FRONT LH
D12
DOOR COURTESY
LIGHT REAR LH
I17
IGNITION KEY
CYLINDER LIGHT
8 BA1
3 BA1
10 IC1
9 IC1
5 IU1
1 IU4
SB

INTERIOR LIGHT

SYSTEM OUTLINE

NORMAL OPERATION

* When the front Door LH or RH is opened
  When the door is opened, the door courtesy light front LH, RH and open door warning light is turned on. When the front door LH and RH are closed, the door courtesy light front LH, RH is turned off.
* When the rear door LH, RH or the back door is opened, door courtesy light rear LH, RH, rear interior light and the open door warning light is turned on. When the rear door LH, RH and back door are closed, the door courtesy light rear LH, RH is turned off.
* When all the doors are closed, the open door warning light is turned off.

TURN OFF FUNCTION

When the ignition SW turned off and there is no change in the door courtesy SW for approx. **30** minutes, the DOME relay is turned off. The DOME relay is turned on again when any of the following conditions are met.

* Ignition SW is turned from **OFF** position to **ACC** or **ON** position
* Change to any door courtesy SW
* Driver or front passenger door is unlocked by the key or transmitter

IMMEDIATE TURN OFF FUNCTION AT DOOR LOCK

When all the doors are closed, and the driver or front passenger door is locked by the key or transmitter, the DOME relay is turned off, after approx. **80** seconds. However, when the illuminated entry system is operating, the DOME relay is turned off after the operation is completed. The DOME relay is turned on again when any of the following conditions are met.

* Ignition SW is turned from **OFF** position to **ACC** or **ON** position
* Change to any door courtesy SW
* Driver or front passenger door is unlocked by the key or transmitter

ILLUMINATED ENTRY SYSTEM

* When any door is opened, each light is turned on.
* The light remains on for approx. **15** seconds after all doors are closed, and fades out.
* With the ignition SW is at **ACC** or **ON** position, and any door open, when all the doors are closed, each light fades out immediately.
* When the ignition SW is turned to **ACC** or **ON** position during timer lighting, each light fades out immediately.
* When the doors are locked during timer lighting, each light fades out immediately.
* The lights include, the front interior light, ignition key cylinder light, and front door courtesy light LH, RH.

SERVICE HINTS

D14, D15, D16, D17 DOOR COURTESY SW FRONT LH, RH, REAR LH, RH

1–GROUND : Closed with door open

B2 BACK DOOR COURTESY SW

1–2 : Closed with back door open

119 (A), 120 (B), 121 (C) INSTRUMENT ECU

(C) 1–GROUND : Always approx. **12** volt
(C) 2–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
(C) 4–GROUND : Always continuity
(A) 3–GROUND : Continuity with front passenger door open
(A)14–GROUND : Continuity with driver door open
(B) 1–GROUND : Continuity with rear RH door open
(C) 7–GROUND : Continuity with rear LH door or back door open

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○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
B2	40	D21	40	J17	39
B3	40	D22	40	J19	39
C12 A	38	F10	40	J26	39
C15 D	38	F11	40	J27	39
D10	40	I17	38	J29	39
D11	40	I19 A	38	J32	40
D12	40	I20 B	38	J33	40
D13	40	I21 C	38	J34	40
D14	40	J9	39	R27	41
D15	40	J10	39	V6	41
D16	40	J11	39	V7	41
D17	40	J12	39	W3	39
D18	40	J14	39		
D19	40	J15	39		

⬭ : RELAY BLOCKS

Code	See Page	JunctionBlock and Wire Harness (Connector Location)
2A	24	Roof Wire and Cowl Side J/B LH (Left Kick Panel)
2E	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2L	24	Front Door LH Wire and Cowl Side J/B LH (Left Kick Panel)
2M	24	
2N	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2O		
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)
3A	30	Engine Room No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3E	30	Floor No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3F		
3G	30	Front Door RH Wire and Cowl Side J/B RH (Right Kick Panel)
3I	30	Instrument Panel Integration Wire and Cowl Side J/B RH (Right Kick Panel)

▭ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire and Wire Harness (Connector Location)
IC1	46	Front Door LH Wire and Dash Wire (Left Kick Panel)
IU1	50	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
IU4		
BA1	54	Rear Door LH Wire and Floor Wire (Left Side of Center Pillar)
BC1	54	Rear Door RH Wire and Floor No.2 Wire (Right Side of Center Pillar)
BD2	54	Floor No.3 Wire and Floor Wire (Left Rear Side Quarter Panel)
BE1	54	Luggage Room Wire and Floor Wire (Left Rear Side Quarter Panel)
BG1	56	Pillar No.1 Wire and Luggage Room Wire (Left Rear Side Roof Panel)
BH1	56	Pillar No.1 Wire and Back Door Upper Wire (Left Side of Back Door)
BK1	56	Back Door Lower Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)
BL3	56	Floor No.2 Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)

▽ : GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH
IH	46	Set Bolt of Cowl Side J/B RH
II		
BK	54	Front Side Under the Front Passenger's Seat
BM	54	Left Rear Side Quarter Panel

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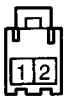
INTERIOR LIGHT

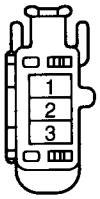
: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
B1	56	Front Door LH Wire	B7	56	Roof Wire
B2					

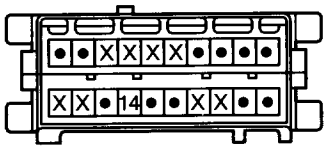
B2



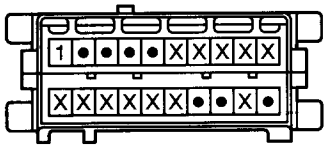
B3



C12 (A)
GRAY



C15 (D)



D10
GRAY

D11
GRAY

D12
GRAY

D13
GRAY

D14

D15

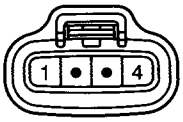
D16

D17

D18
GRAY

D19
GRAY

D21
BLACK



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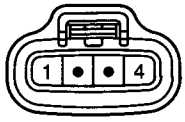
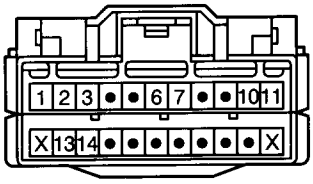


F10

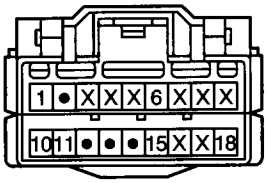
F11

I17

I19 (A)



I20 (B)



I21 (C)
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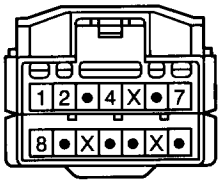
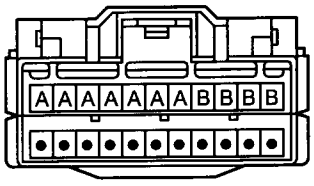
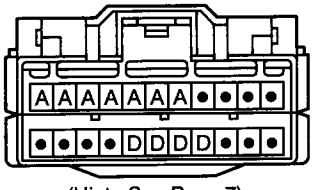


J9
GRAY



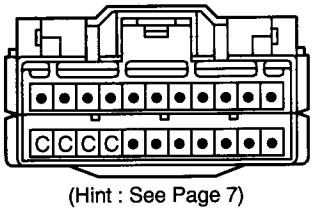
(Hint : See Page 7)

J10



(Hint : See Page 7)

J11
GRAY



(Hint : See Page 7)

J12
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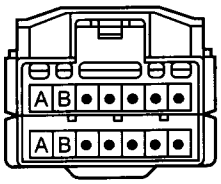
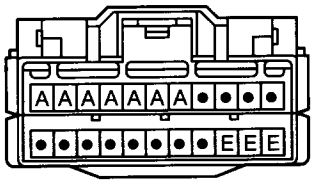


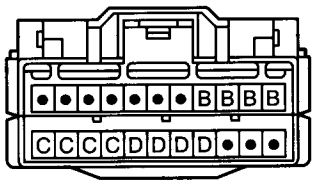
(Hint : See Page 7)

J14



(Hint : See Page 7)

J15
GRAY



(Hint : See Page 7)

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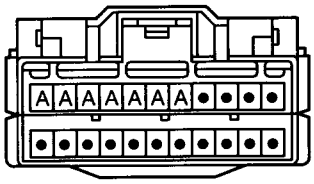
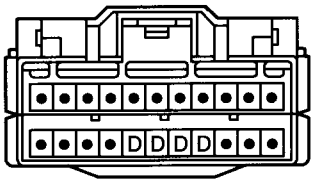
J17



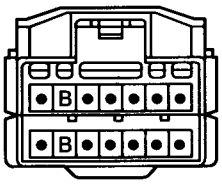
(Hint : See Page 7)

J19
GRAY



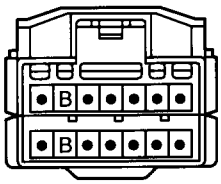
(Hint : See Page 7)

J26
BLUE



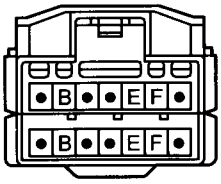
(Hint : See Page 7)

J27
GRAY



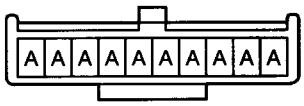
(Hint : See Page 7)

J29



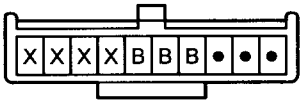
(Hint : See Page 7)

J32



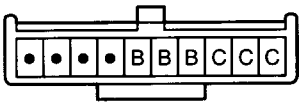
(Hint : See Page 7)

J33
BLUE



(Hint : See Page 7)

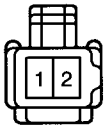
J34
BLUE



(Hint : See Page 7)

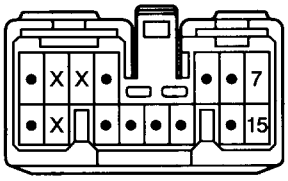
R27

V6



V7

W3



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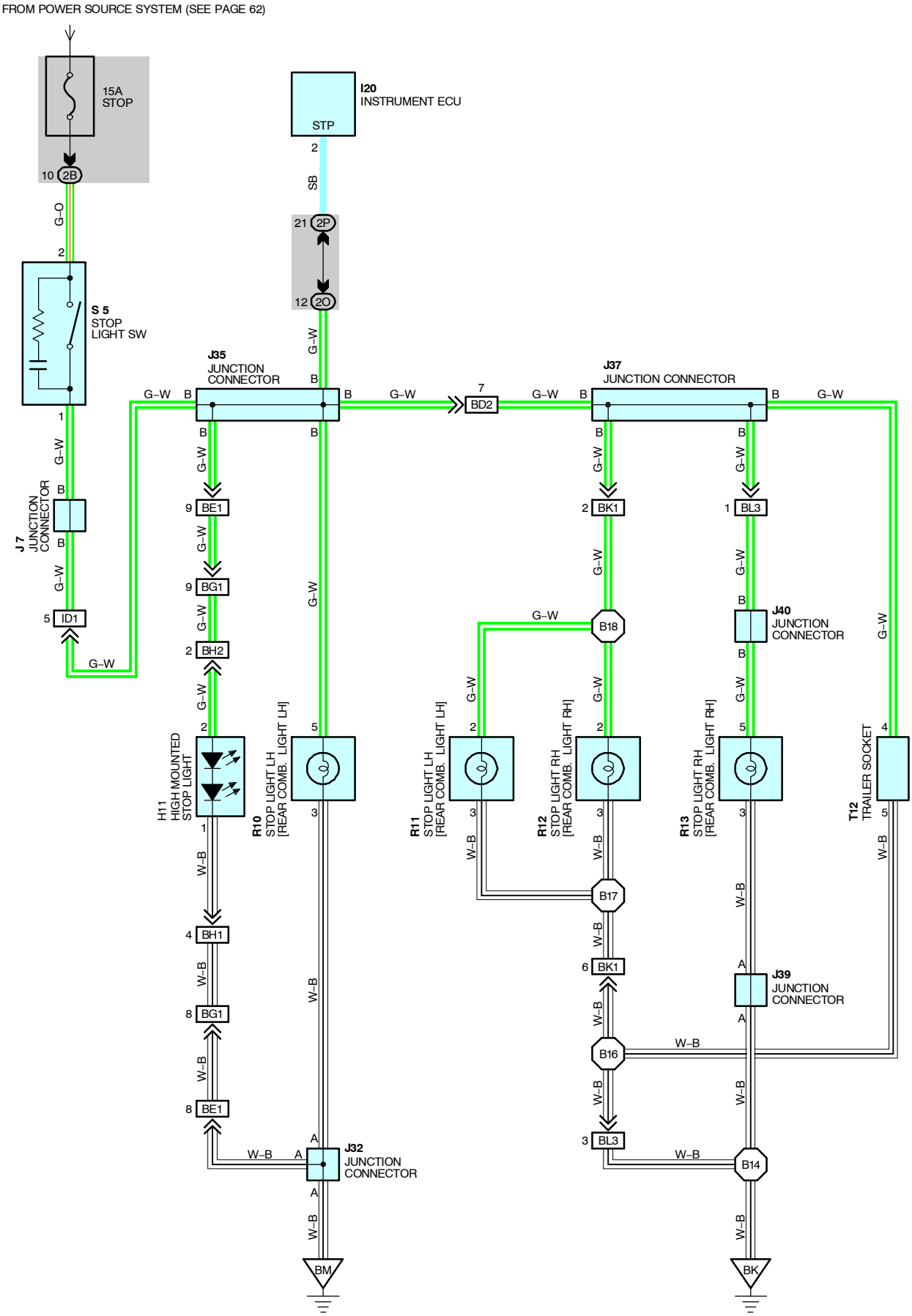
STOP LIGHT



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SERVICE HINTS

S5 STOP LIGHT SW

2–1 : Closed with brake pedal depressed

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
H11	40	J37	40	R12	41
I20	38	J39	40	R13	41
J7	39	J40	40	S5	39
J32	40	R10	41	T12	41
J35	40	R11	41		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2O	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
ID1	46	Dash Wire and Floor Wire (Left Kick Panel)
BD2	54	Floor No.3 Wire and Floor Wire (Left Rear Side Quarter Panel)
BE1	54	Luggage Room Wire and Floor Wire (Left Rear Side Quarter Panel)
BG1	56	Pillar No.1 Wire and Luggage Room Wire (Left Rear Side Roof Panel)
BH1 BH2	56	Pillar No.1 Wire and Back Door Upper Wire (Left Side of Back Door)
BK1	56	Back Door Lower Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)
BL3	56	Floor No.2 Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)

: GROUND POINTS

Code	See Page	Ground Points Location
BK	54	Front Side Under the Front Passenger's Seat
BM	54	Left Rear Side Quarter Panel

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
B14	56	Floor No.2 Wire	B17	56	Back Door Lower Wire
B16	56	Floor No.3 Wire	B18		

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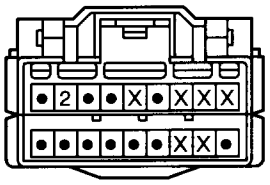
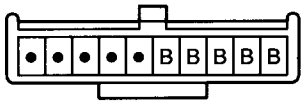
STOP LIGHT

H11

I20

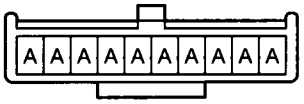


J7
GREEN



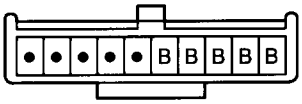
(Hint : See Page 7)

J32



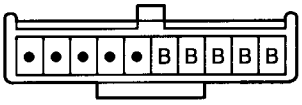
(Hint : See Page 7)

J35
GREEN



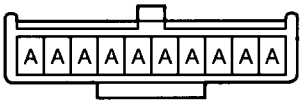
(Hint : See Page 7)

J37
GREEN



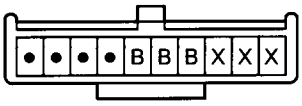
(Hint : See Page 7)

J39



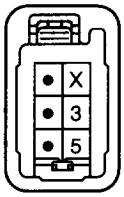
(Hint : See Page 7)

J40
BLUE



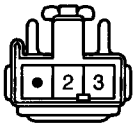
(Hint : See Page 7)

R10

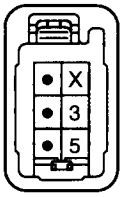


R11

R12



R13



S5
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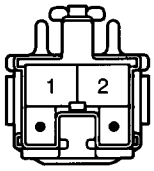
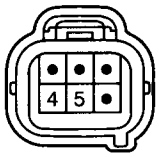


T12
GRAY



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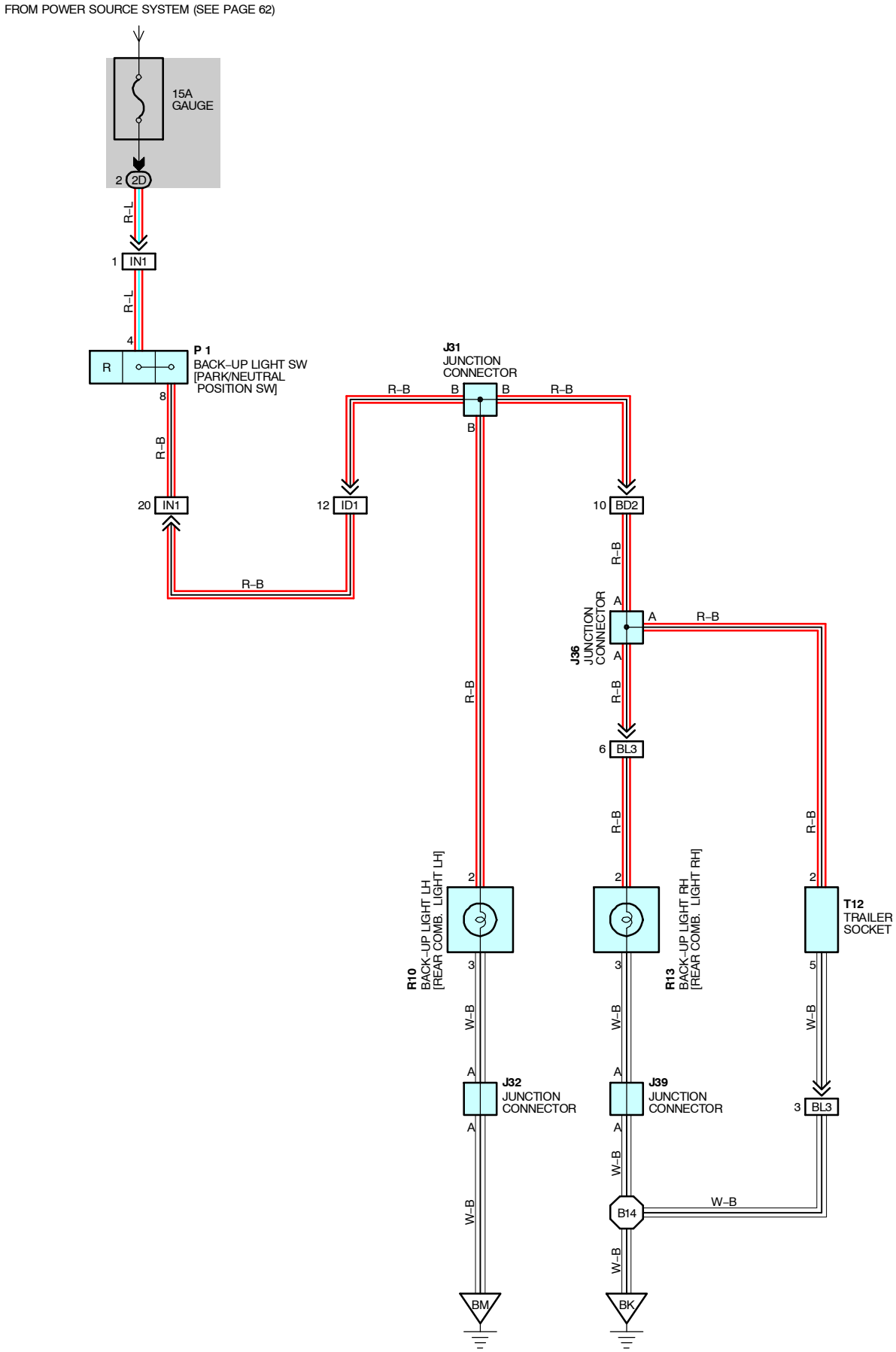
BACK–UP LIGHT



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SERVICE HINTS

P1 BACK–UP LIGHT SW [PARK/NEUTRAL POSITION SW]

4–8 : Closed with shift lever at **R** position

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
J31	40	J39	40	R13	41
J32	40	P1	37	T12	41
J36	40	R10	41		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
2D	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
ID1	46	Dash Wire and Floor Wire (Left Kick Panel)
IN1	50	Engine Wire and Dash Wire (Behind the Glove Box)
BD2	54	Floor No.3 Wire and Floor Wire (Left Rear Side Quarter Panel)
BL3	56	Floor No,2 Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)

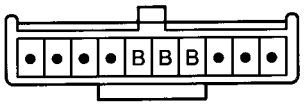
: GROUND POINTS

Code	See Page	Ground Points Location
BK	54	Front Side Under the Front Passenger's Seat
BM	54	Left Rear Side Quarter Panel

: SPLICE POINTS

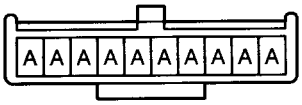
Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
B14	56	Floor No.2 Wire			

J31
BLUE



(Hint : See Page 7)

J32



(Hint : See Page 7)

J36
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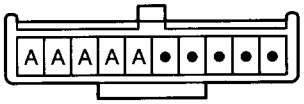
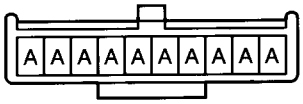


(Hint : See Page 7)

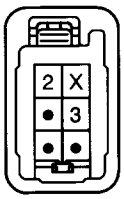
J39



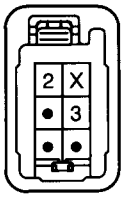
(Hint : See Page 7)

P1
GRAY

R10



R13



T12
GRAY

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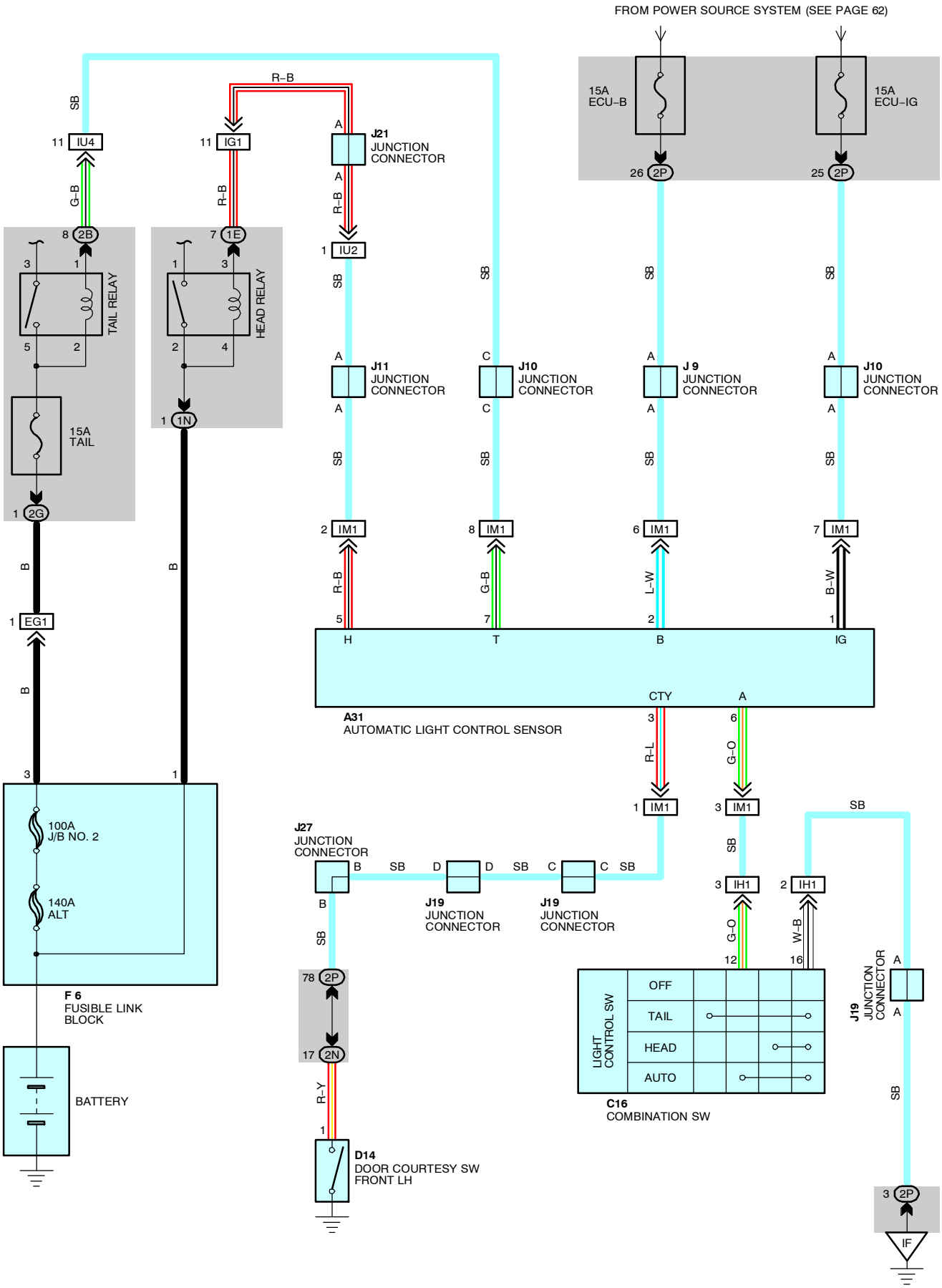
AUTOMATIC LIGHT CONTROL



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SYSTEM OUTLINE

When the light control SW is set at **AUTO** position, this system automatically turns ON/OFF the taillights and headlights depending on the brightness around the vehicle.

AUTOMATIC LIGHT CONTROL OPERATION

(1) Turn on operation

* With the ignition SW turned on, and the light control SW set at **AUTO** position, when the brightness around the vehicle drops in between a predetermined level, the timer of the automatic light control sensor starts counting, and turns on the taillight and headlight after approx. **5.8** seconds have elapsed. In case the brightness around the vehicle increases over a predetermined level during timer counting, the timer will be reset.
* With the ignition SW turned on and the light control SW set at **AUTO** position, when the brightness around the vehicle drops below a predetermined level, the timer of the automatic light control sensor starts counting, and turns on the taillight and headlight after approx. **2.9** seconds have elapsed. In case the brightness around the vehicle increases in between a predetermined level during timer counting, the timer will be stopped, and when the brightness increases over a predetermined level, the timer will be reset.

(2) Turn off operation

* When the brightness increases over a predetermined level while the automatic light control system is operating, the timer of the automatic light control sensor starts counting, and turns off the taillight and headlight after approx. **5.8** seconds have elapsed. In case the brightness around the vehicle drops below a predetermined level during timer counting, the timer will be reset.
* The taillights and headlights will be turned off when the ignition SW is turned from on to off and driver door is opened, during automatic light control system operation, with the light control SW set at **AUTO** position.

SERVICE HINTS

A31 AUTOMATIC LIGHT CONTROL SENSOR

1–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
2–GROUND : Always approx. **12** volts
3–GROUND : Continuity with driver door open
6–GROUND : Continuity with light control SW at **AUTO** position

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
A31	38	J9	39	J21	39
C16	38	J10	39	J27	39
D14	40	J11	39		
F6	36	J19	39		

⬭ : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1E	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1N	21	Engine Room No.3 Wire and Engine Room J/B (Engine Compartment Left)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2G	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2N	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel integration Wire and Cowl Side J/B LH (Left Kick Panel)

▭ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EG1	44	Engine Room No.2 Wire and Engine Room No.3 Wire (Under the Engine Room J/B)
IG1	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IH1	48	Instrument Panel Integration Wire and Column Wire (Near the Ignition SW)
IM1	50	Instrument Panel Integration Wire and Instrument Panel No.3 Wire (Right Side of Instrument Panel)
IU2	50	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
IU4		

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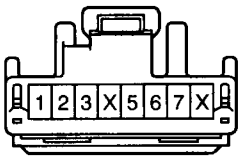
AUTOMATIC LIGHT CONTROL

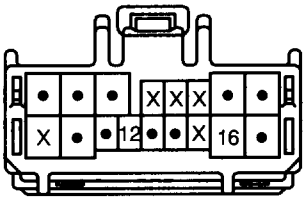
▽ : GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH

A31
BLACK



C16

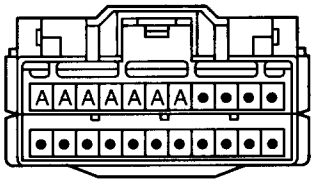


D14

F6

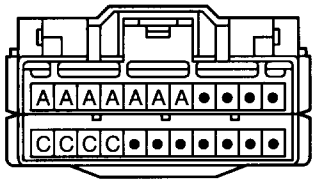
(See Page 34)

J9
GRAY



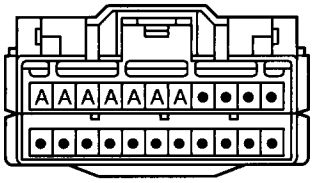
(Hint : See Page 7)

J10



(Hint : See Page 7)

J11
GRAY

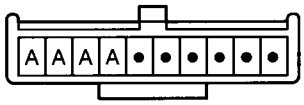


(Hint : See Page 7)

J19
GRAY

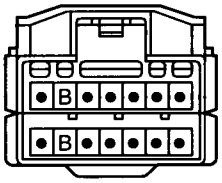
(Hint : See Page 7)

J21
BLUE



(Hint : See Page 7)

J27
GRAY



(Hint : See Page 7)

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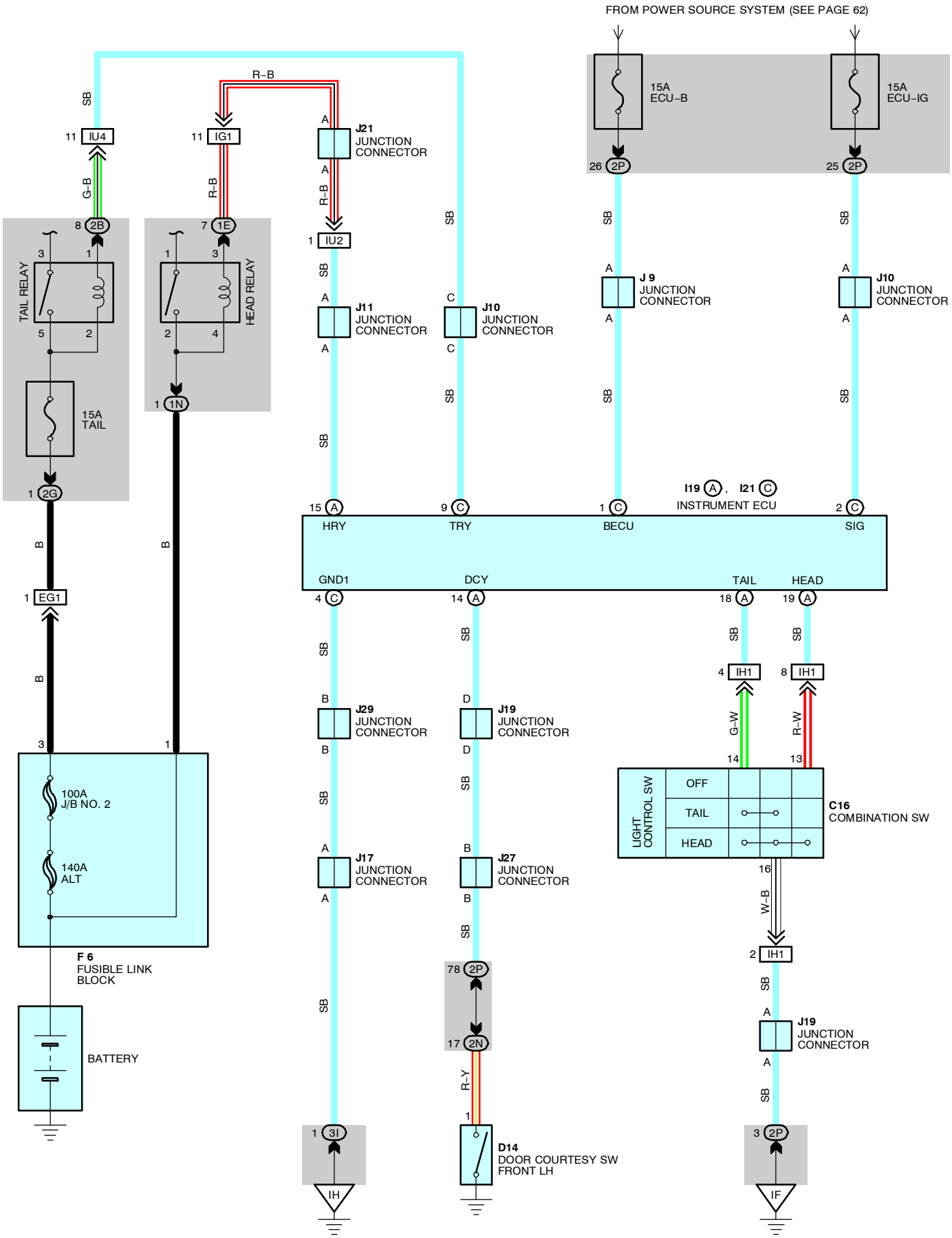
LIGHT AUTO TURN OFF



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SYSTEM OUTLINE

This system automatically turns off the taillight or headlight by the opening/closing of the driver door, to prevent the lights from remaining lit.

LIGHT AUTO TURN OFF OPERATION

* When headlights are on

  When the ignition SW is turned from on to off with the headlights on (Light control SW at **HEAD** position), a signal is input to instrument ECU **TERMINAL SIG.** When the driver door is opened at this time, a signal is input from the door courtesy SW front LH to the instrument ECU **TERMINAL DCY**. The instrument ECU **TERMINAL HRY** is controlled to turn off the HEAD relay. As a result, the current to the headlight is cut off and the light is turned off.

* When taillights are on

  When the ignition SW is turned from on to off with the taillights on (Light control SW at **TAIL** position), a signal is input to instrument ECU **TERMINAL SIG.** When the driver door is opened at this time, a signal is input from the door courtesy SW front LH to the instrument ECU **TERMINAL DCY** The instrument ECU **TERMINAL TRY** is controlled to turn off the TAIL relay. As a result, the current to the taillight is cut off and the light is turned off.

SERVICE HINTS

119 (A), 121 (C) INSTRUMENT ECU

(A)14–GROUND : Continuity with driver door open
(A)18–GROUND : Continuity with light control SW at **TAIL** or **HEAD** position
(A)19–GROUND : Continuity with light control SW at **HEAD** position
(C) 1–GROUND : Always approx. **12** volts
(C) 2–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
(C) 4–GROUND : Always continuity

D14 DOOR COURTESY SW FRONT LH

1–GROUND : Closed with door open

○ : PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
C16		38	J9	39	J21	39
D14		40	J10	39	J27	39
F6		36	J11	39	J29	39
I19	A	38	J17	39		
I21	C	38	J19	39		

⬭ : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1E	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1N	21	Engine Room No.3 Wire and Engine Room J/B (Engine Compartment Left)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2G	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2N	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)
3I	30	Instrument Panel Integration Wire and Cowl Side J/B RH (Right Kick Panel)

▭ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EG1	44	Engine Room No.2 Wire and Engine Room No.3 Wire (Under the Engine Room J/B)
IG1	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IH1	48	Instrument Panel Integration Wire and Column Wire (Near the Ignition SW)
IU2	50	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
IU4		

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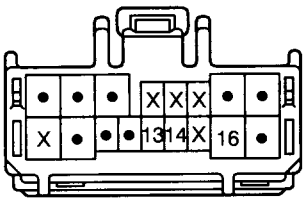
LIGHT AUTO TURN OFF

▽ : GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH
IH	46	Set Bolt of Cowl Side J/B RH

C16

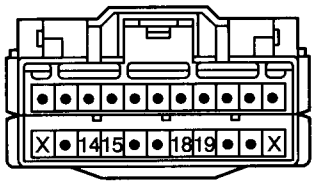


D14

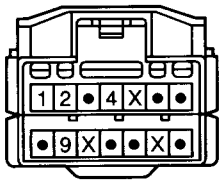
F6

(See Page 34)

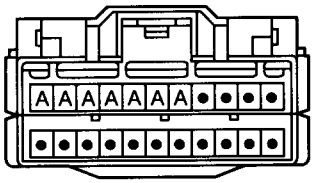
I19 (A)



I21 (C)
BLUE

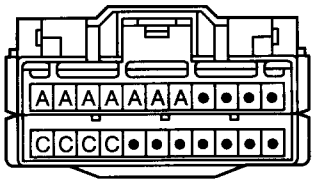


J9
GRAY



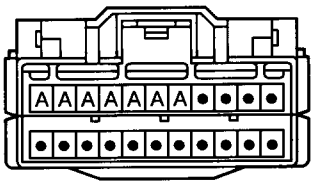
(Hint : See Page 7)

J10



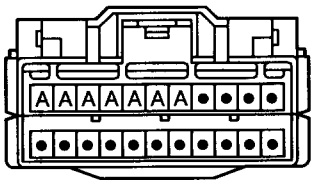
(Hint : See Page 7)

J11
GRAY



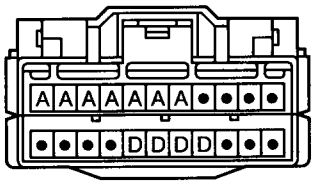
(Hint : See Page 7)

J17



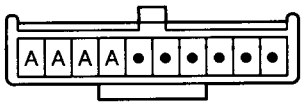
(Hint : See Page 7)

J19
GRAY



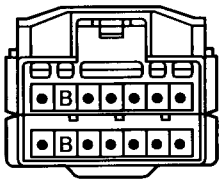
(Hint : See Page 7)

J21
BLUE



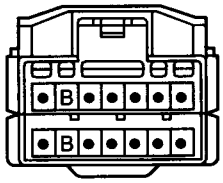
(Hint : See Page 7)

J27
GRAY



(Hint : See Page 7)

J29



(Hint : See Page 7)

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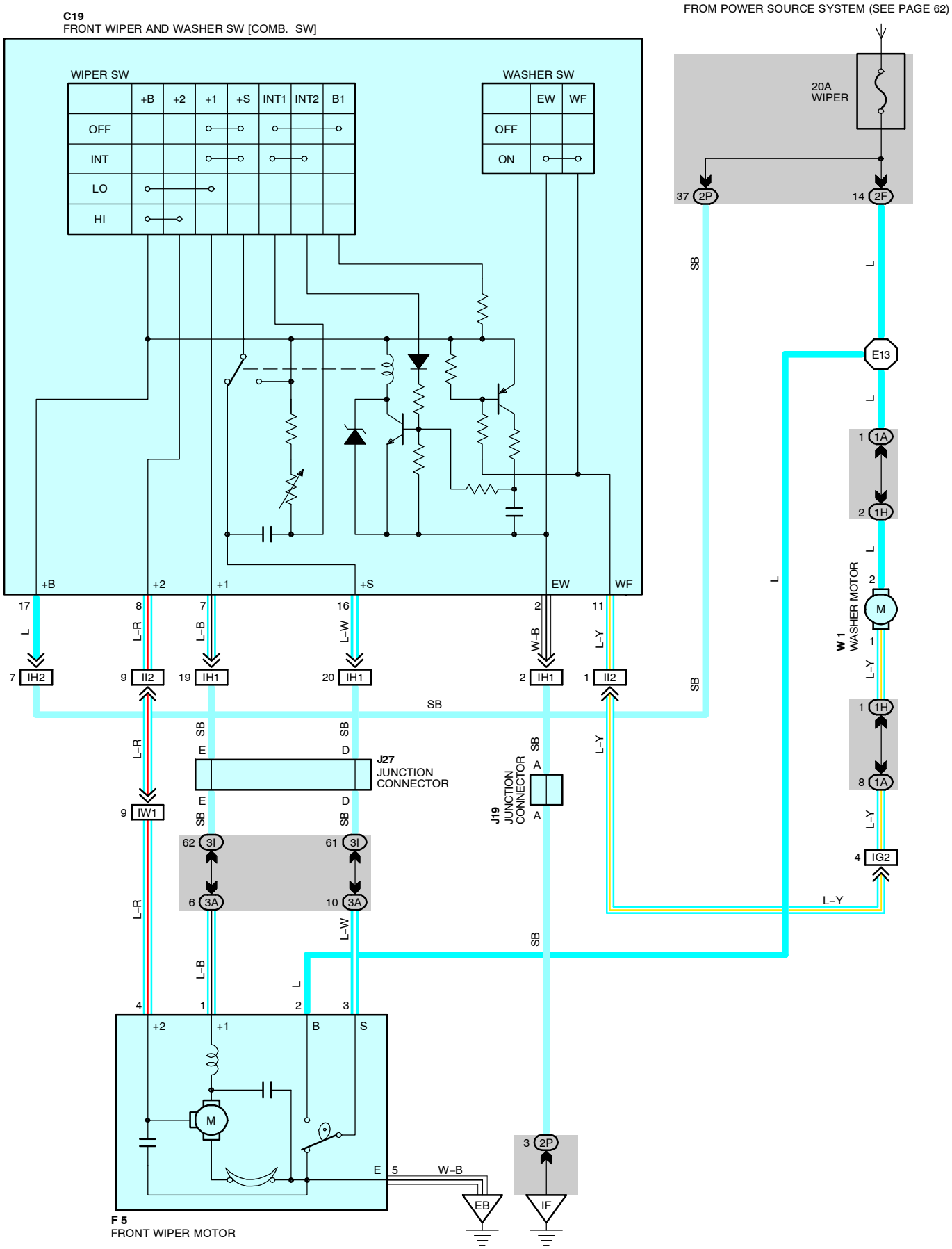
FRONT WIPER AND WASHER



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SYSTEM OUTLINE

When the ignition SW turned on, the current from the **WIPER** fuse flows to the front wiper and washer SW **TERMINAL 17**, and front wiper motor **TERMINAL 2**.

1. LOW POSITION

When the wiper SW is turned to **LO** position, the current flows from the front wiper and washer SW **TERMINAL 17** to **TERMINAL 7** to front wiper motor **TERMINAL 1** to **TERMINAL 5** to **GROUND**, and operates the front wiper motor at low speed.

2. HIGH POSITION

When the wiper SW is turned to **HI** position, the current flows from the front wiper and washer SW **TERMINAL 17** to **TERMINAL 8** to front wiper motor **TERMINAL 4** to **TERMINAL 5** to **GROUND**, and operates the front wiper motor at high speed.

3. INT POSITION

When the wiper SW is turned to **INT** position, the relay operates and the current which is connected by the relay function flows from the front wiper and washer SW **TERMINAL 17** to **TERMINAL 2** to **GROUND**, and operates the wipe.
The intermittent operation is controlled by the charge/discharge function of the condenser installed in the relay, and the intermittent time is controlled by a time control SW to change the charging time of the condenser.

4. WASHER CONTINUOUS OPERATION

When the washer SW is turned on, the current flows from the washer motor **TERMINAL 2** to **TERMINAL 1** to front wiper and washer SW **TERMINAL 11** to **TERMINAL 2** to **GROUND**, operates the washer motor and the window washer emits a water spray. This causes the current to flow to the washer continuous operation circuit in front wiper and washer SW **TERMINAL 11** to **TERMINAL 7** to front wiper motor **TERMINAL 1** to **TERMINAL 5** to **GROUND**, and operates the wiper.

SERVICE HINTS

C19 FRONT WIPER AND WASHER SW [COMB. SW]

2–GROUND : Always continuity
17–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
7–GROUND : Approx. **12** volts with front wiper and washer SW at **LO** position
: Approx. **12** volts **1.6** to **10.7** seconds intermittently with the front wiper and washer SW at **INT** position
16–GROUND : Approx. **12** volts with ignition SW on unless the front wiper motor at **STOP** position
8–GROUND : Approx. **12** volts with front wiper and washer SW at **HI** position

F5 FRONT WIPER MOTOR

2–3 : Closed unless the wiper motor at **STOP** position

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
C19	38	J19	39	W1	37
F5	36	J27	39		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1H	21	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)
2F	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)
3A	30	Engine Room No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3I	30	Instrument Panel Integration Wire and Cowl Side J/B RH (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IG2	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IH1	48	Instrument Panel Integration Wire and Column Wire (Near the Ignition SW)
IH2		
II2	48	Column Wire and Dash Wire (Near the Ignition SW)
IW1	52	Engine Room No.2 Wire and Dash Wire (Behind the Glove Box)

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FRONT WIPER AND WASHER

: GROUND POINTS

Code	See Page	Ground Points Location
EB	44	Front Right Side of Fender Apron
IF	46	Set Bolt of Cowl Side J/B LH

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E13	44	Engine Room No.2 Wire			

C19
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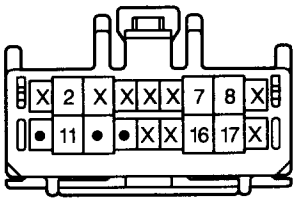

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J19
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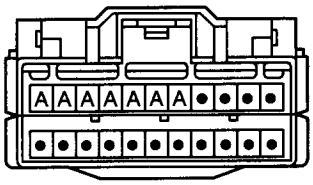

(Hint : See Page 7)

J27
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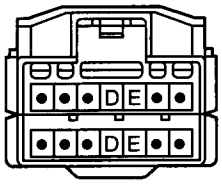

(Hint : See Page 7)

W1
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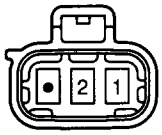

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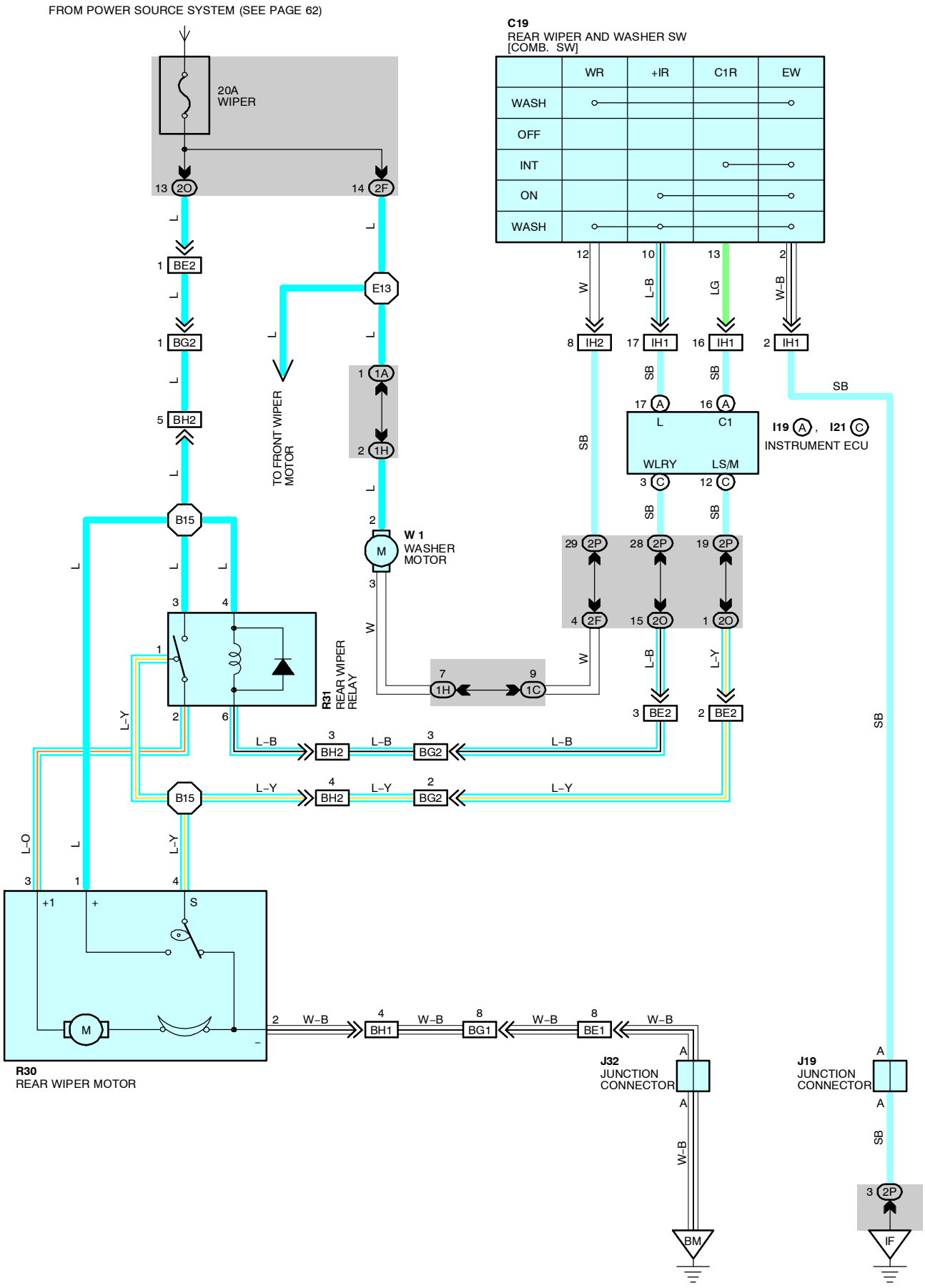

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SYSTEM OUTLINE

When the ignition SW is turned on, the current flows from **WIPER** fuse to washer motor **TERMINAL 2**, rear wiper relay **TERMINAL 3** and **TERMINAL 4**, and rear wiper motor **TERMINAL 1** respectively.

5. REAR WIPER NORMAL OPERATION

When the ignition SW is turned on, and the rear wiper and washer SW is turned to **ON** position, the current flows from rear wiper relay (Coil side) to instrument ECU **TERMINAL (C) 3** to **TERMINAL (A) 17** to rear wiper and washer SW **TERMINAL 10** to **TERMINAL 2** to **GROUND**, and turns on the rear wiper relay. As a result, the current flows from rear wipe relay **TERMINAL 3** to **TERMINAL 2** to rear wiper motor **TERMINAL 3** to **TERMINAL 2** to **GROUND**, and operates the rear wiper.

6. REAR WIPER INTERMITTENT OPERATION

When the ignition SW is turned on, and the rear wiper and washer SW is turned to **INT** position, the current flows from rear wiper relay (Coil side) to instrument ECU **TERMINAL (C) 3** to **TERMINAL (A) 16** to rear wiper and washer SW **TERMINAL 13** to **TERMINAL 2** to **GROUND**, and the intermittent circuit in the instrument ECU is controlled to operate the wiper intermittently.

7. WASHER OPERATION

When the ignition SW is turned on, and the rear wiper and washer SW is turned from **OFF** to **WASH** position, the current flows from the **WIPER** fuse to washer motor **TERMINAL 2** to **TERMINAL 3** to rear wiper and washer SW **TERMINAL 12** to **TERMINAL 2** to **GROUND**. This activates the washer motor, and the window washer emits a water spray. When the rear wiper and washer SW is turned to **ON** position, the window washer emits a water spray during rear wiper normal operation.

SERVICE HINTS

W1 WASHER MOTOR

2–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
3–GROUND : Continuity with rear wiper and washer SW at **WASH** position

R30 REAR WIPER MOTOR

1 –GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
2–GROUND : Always continuity

: PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
C19		38	J19	39	R31	41
I19	A	38	J32	40	W1	37
I21	C	38	R30	41		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1C		
1H	21	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)
2F	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2O	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IH1	48	Instrument Panel Integration Wire and Column Wire (Near the Ignition SW)
IH2		
BE1	54	Luggage Room Wire and Floor Wire (Left Rear Side Quarter Panel)
BE2		
BG1	46	Pillar No.1 Wire and Luggage Room Wire (Left Rear Side Roof Panel)
BG2		
BH1	56	Pillar No.1 Wire and Back Door Upper Wire (Left Side of Back Door)
BH2		

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REAR WIPER AND WASHER

: GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH
BM	54	Left Rear Side Quarter Panel

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E13	44	Engine Room No.2 Wire	B15	56	Back Door Upper Wire

C19
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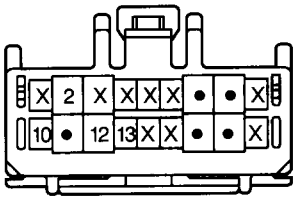
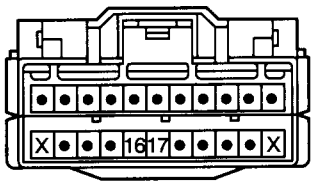


I19 (A)



I21 (C)
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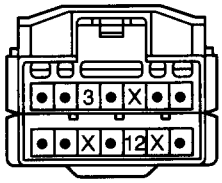

J19
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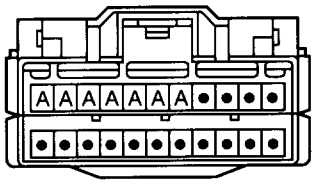
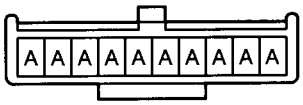


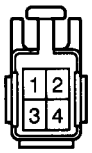
(Hint : See Page 7)

J32



(Hint : See Page 7)

R30



R31
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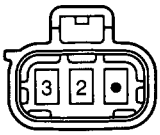
W1
GRAY



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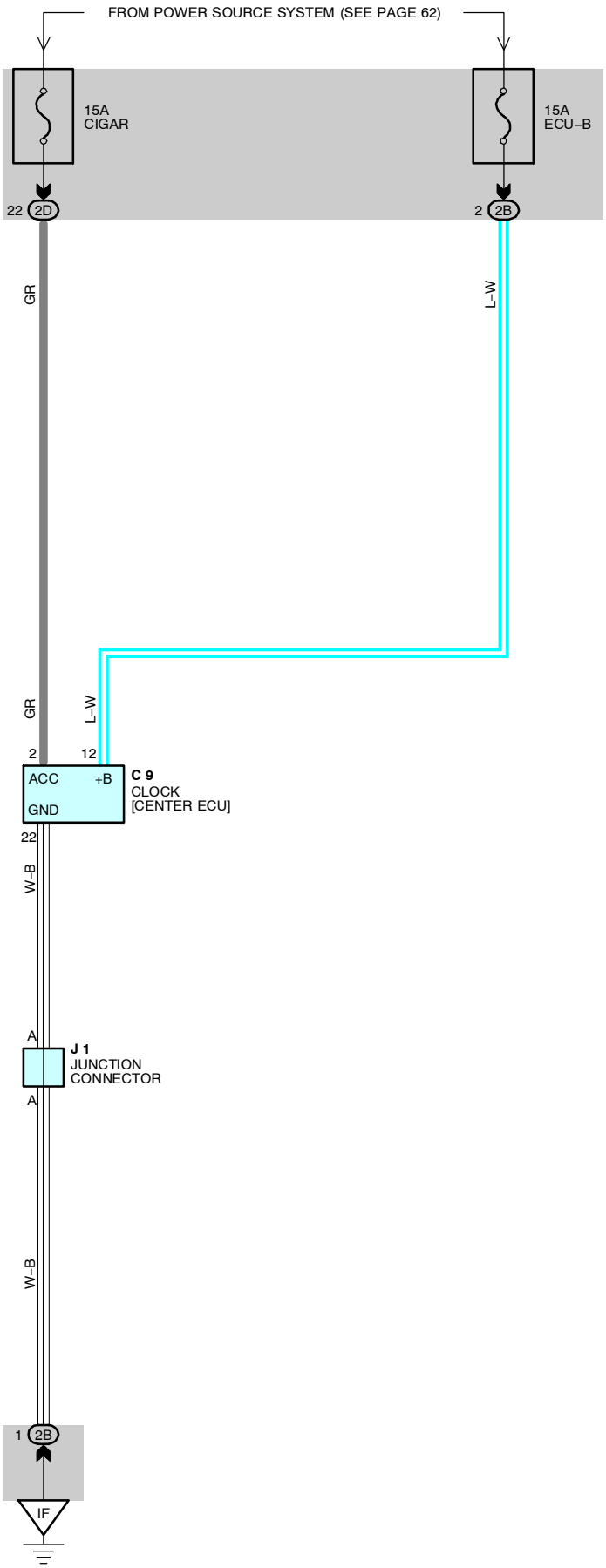

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SERVICE HINTS

C9 CLOCK [CENTER ECU]

2–GROUND : Approx. **12** volts with ignition SW at **ACC** or **ON** position
12–GROUND : Always approx. **12** volts
22–GROUND : Always continuity

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
C9	38	J1	39		

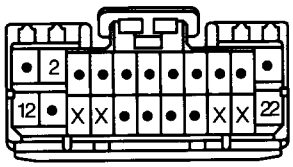
: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		

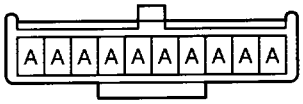
▽ : GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH

C9



J1



(Hint : See Page 7)

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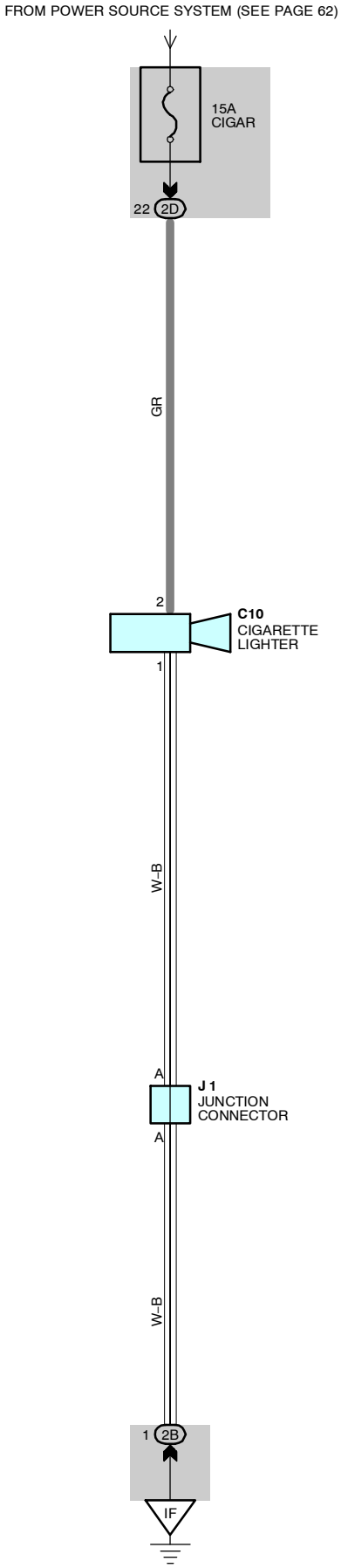

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SERVICE HINTS

C10 CIGARETTE LIGHTER

2–GROUND : Approx. 12 volts with ignition SW at **ACC** or **ON** position
1–GROUND : Always continuity

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
C10	38	J1	39		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

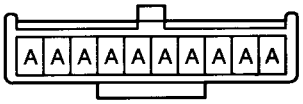
Code	See Page	Junction Block and Wire Harness (Connector Location)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		

: GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH

C10
GRAY

J1



(Hint : See Page 7)

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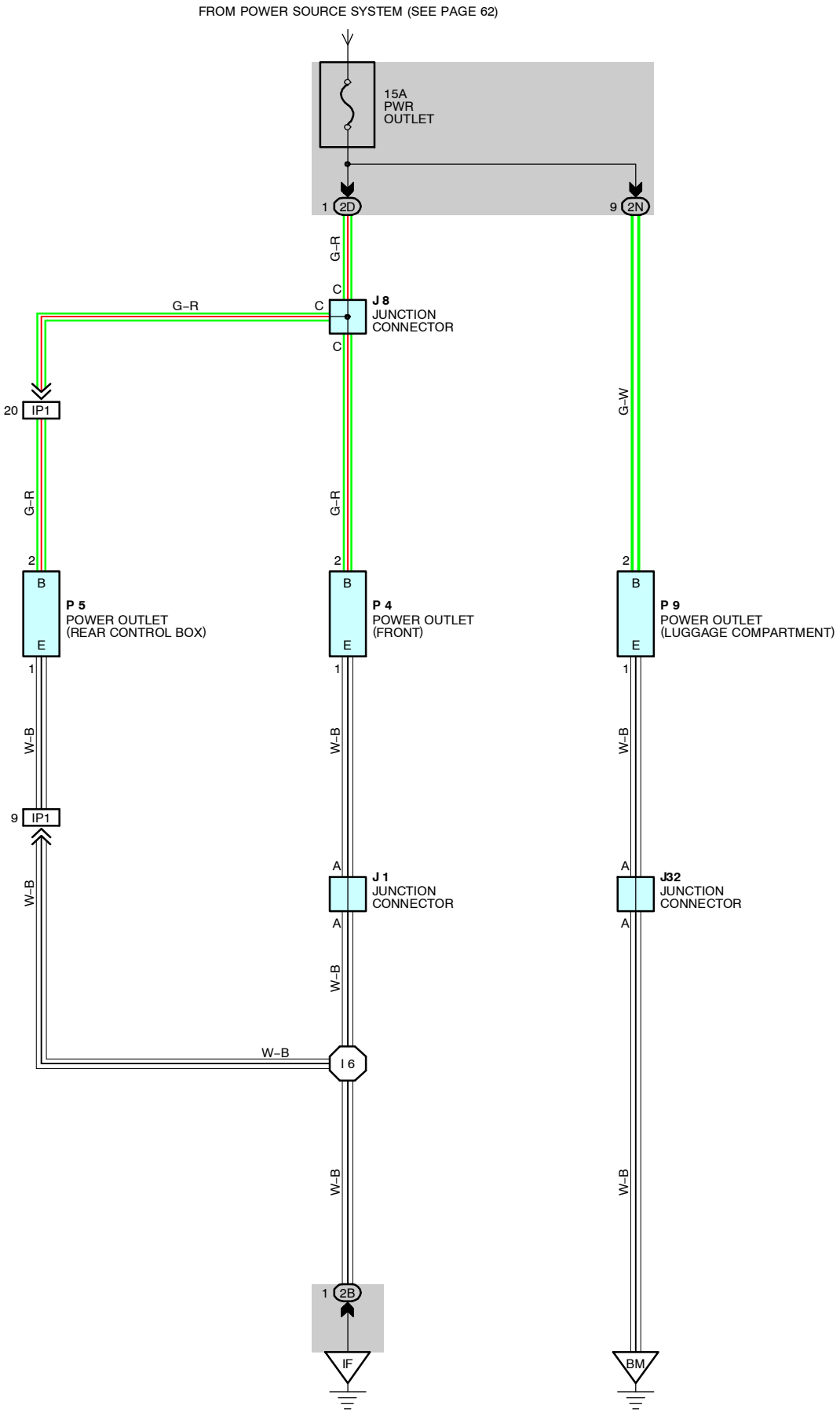
POWER OUTLET



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SERVICE HINTS

P4 POWER OUTLET (FRONT)

2–GROUND : Approx, **12** volts with ignition SW at **ACC** or **ON** position
1–GROUND : Always continuity

P5 POWER OUTLET (REAR CONSOLE BOX)

2–GROUND : Approx. **12** volts with ignition SW at **ACC** or **ON** position
1–GROUND : Always continuity

P9 POWER OUTLET (LUGGAGE COMPARTMENT)

2–GROUND : Approx. **12** volts with ignition SW at **ACC** or **ON** position
1–GROUND : Always continuity

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
J1	39	J32	40	P5	39
J8	39	P4	39	P9	41

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		
2N	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IP1		Rear Console Box Wire and Dash Wire (Right Side of Rear Console)

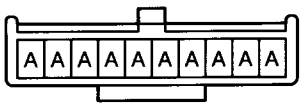
: GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH
BM	54	Left Rear Side Quarter Panel

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I6	48	Dash Wire			

J1



(Hint : See Page 7)

J8
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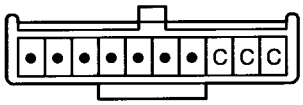
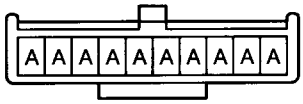


(Hint : See Page 7)

J32



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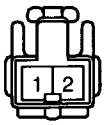
P4

P5



P9

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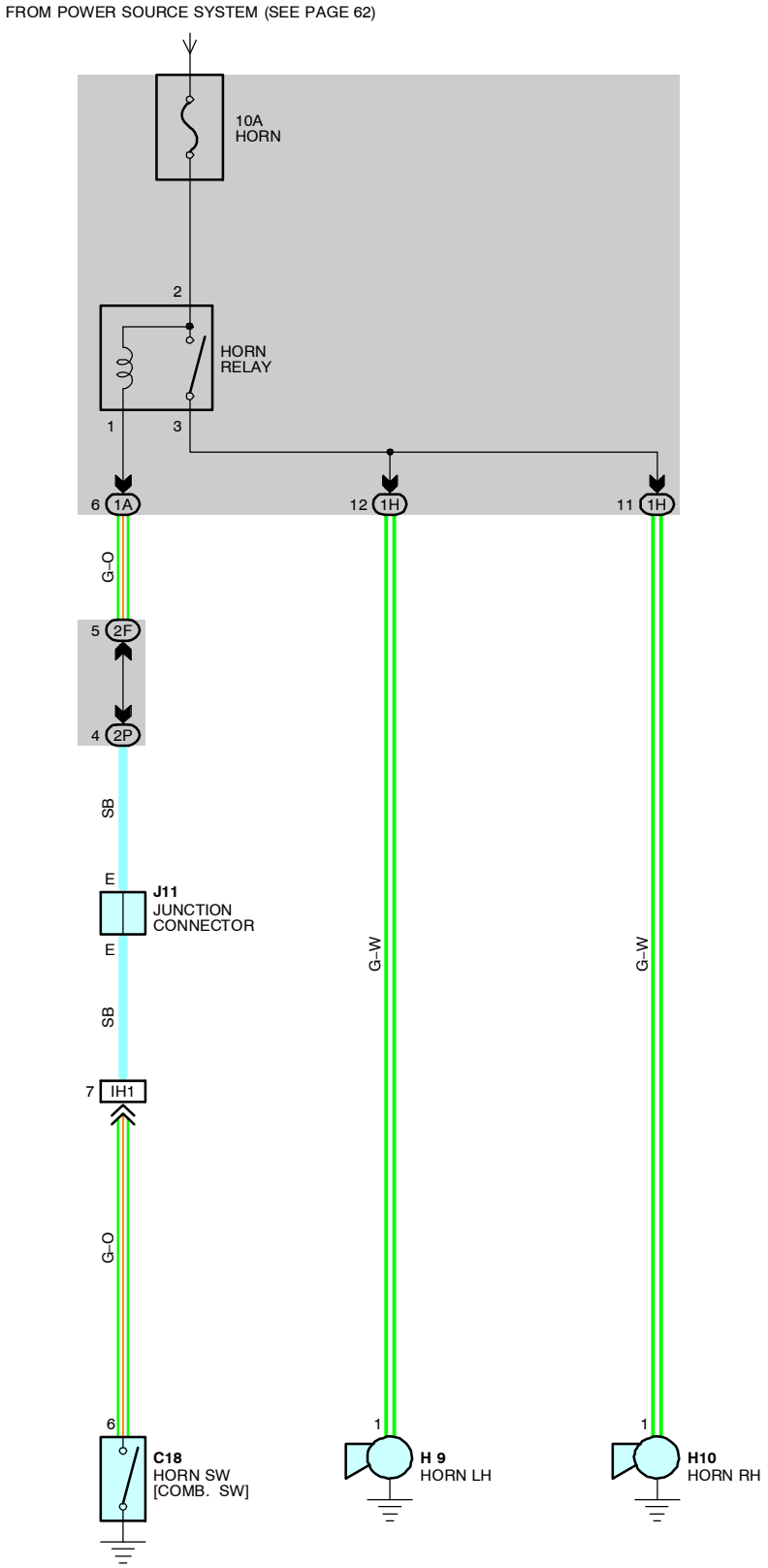

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SERVICE HINTS

HORN RELAY

2–3 : Closed horn SW on

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
C18	38	H10	37		
H9	37	J11	39		

⬭ : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1H	21	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)
2F	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)

▭ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IH1	48	Instrument Panel Integration Wire and Column Wire (Near the Ignition SW)

C18
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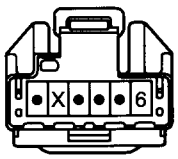
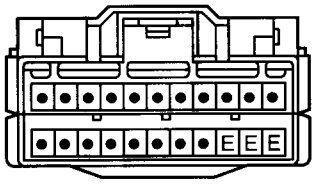


H9
BLACK

H10
BLACK

J11
GRAY



(Hint : See Page 7)

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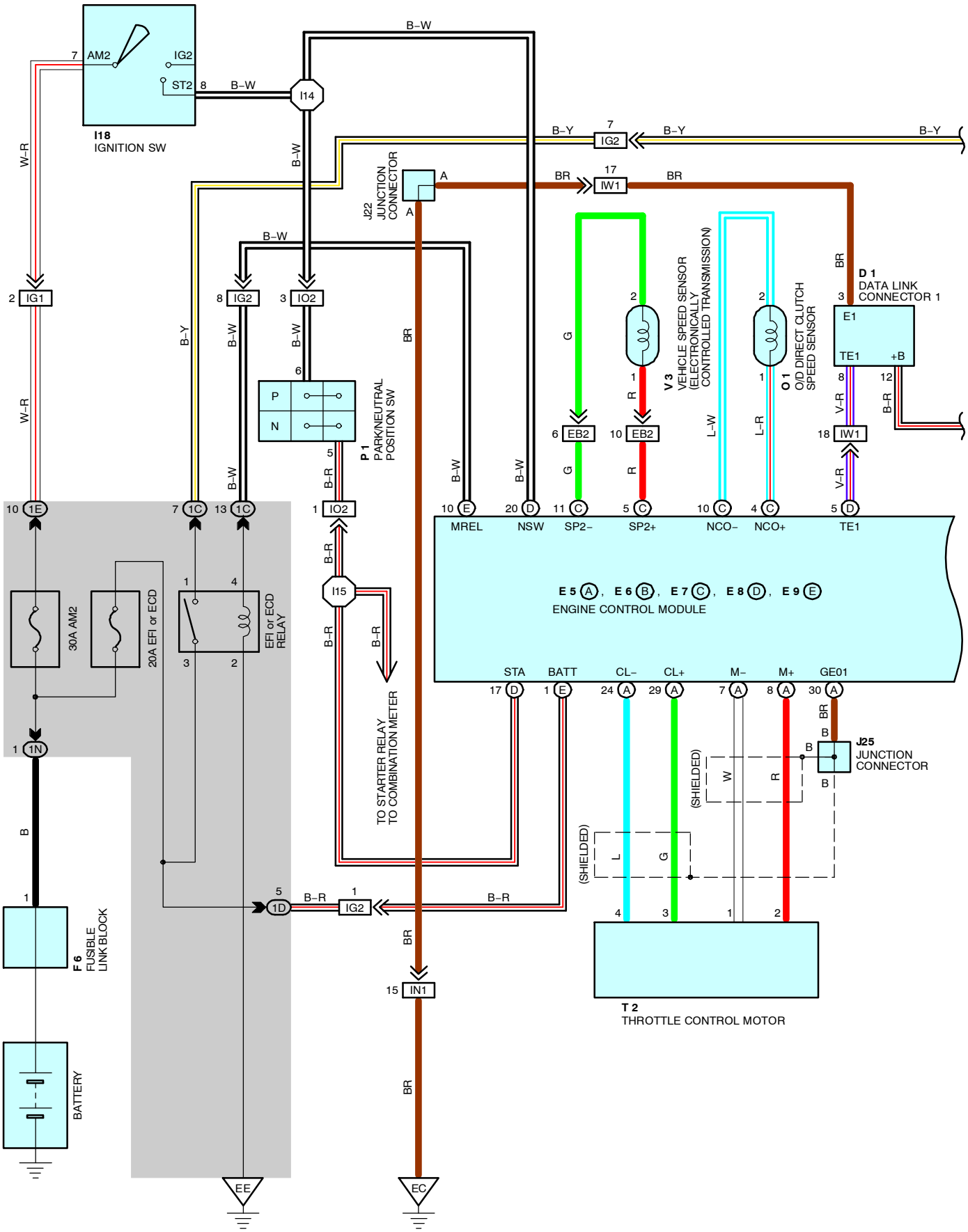
ELECTRONICALLY CONTROLLED TRANSMISSION AND A/T INDICATOR



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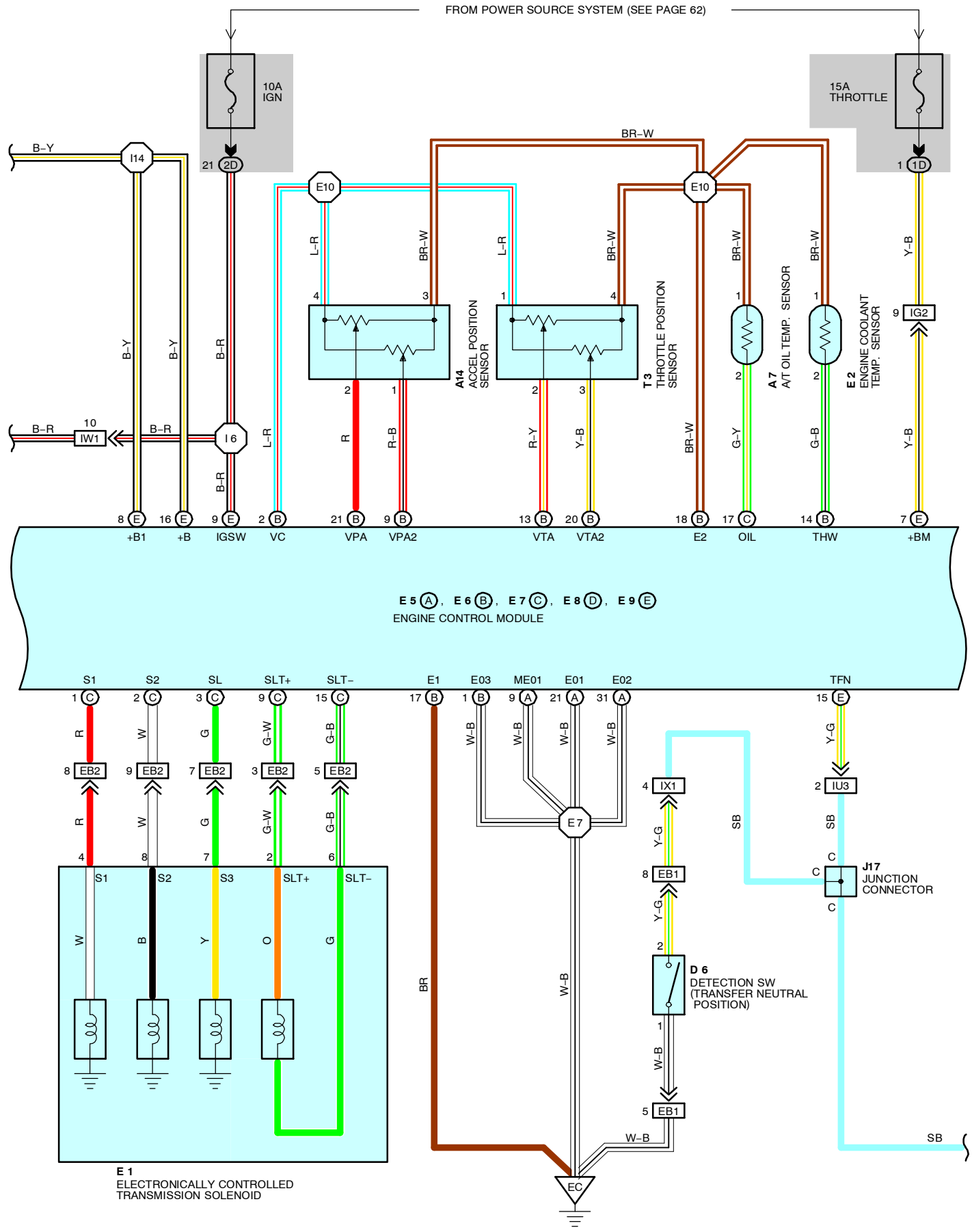

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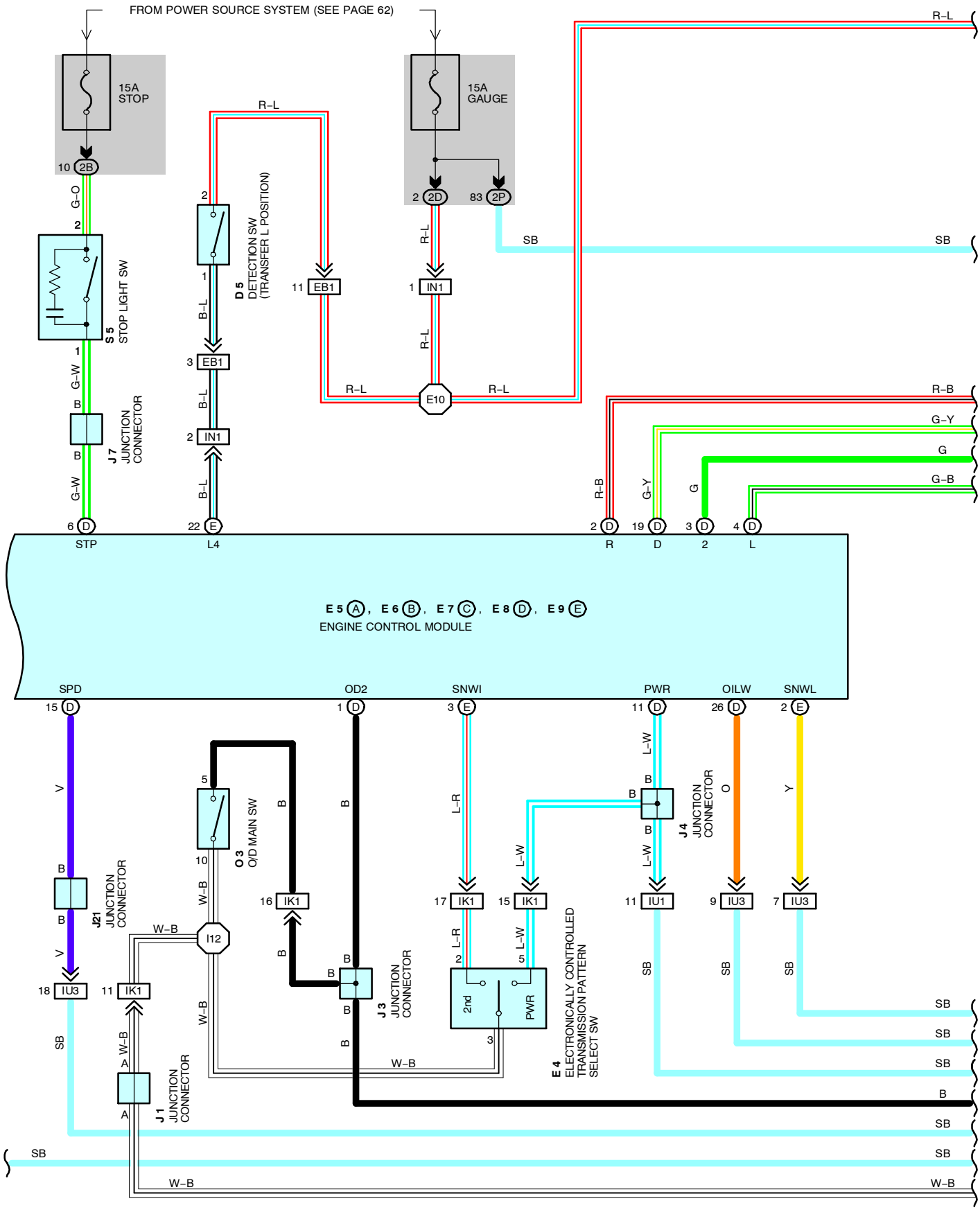
ELECTRONICALLY CONTROLLED TRANSMISSION AND A/T INDICATOR



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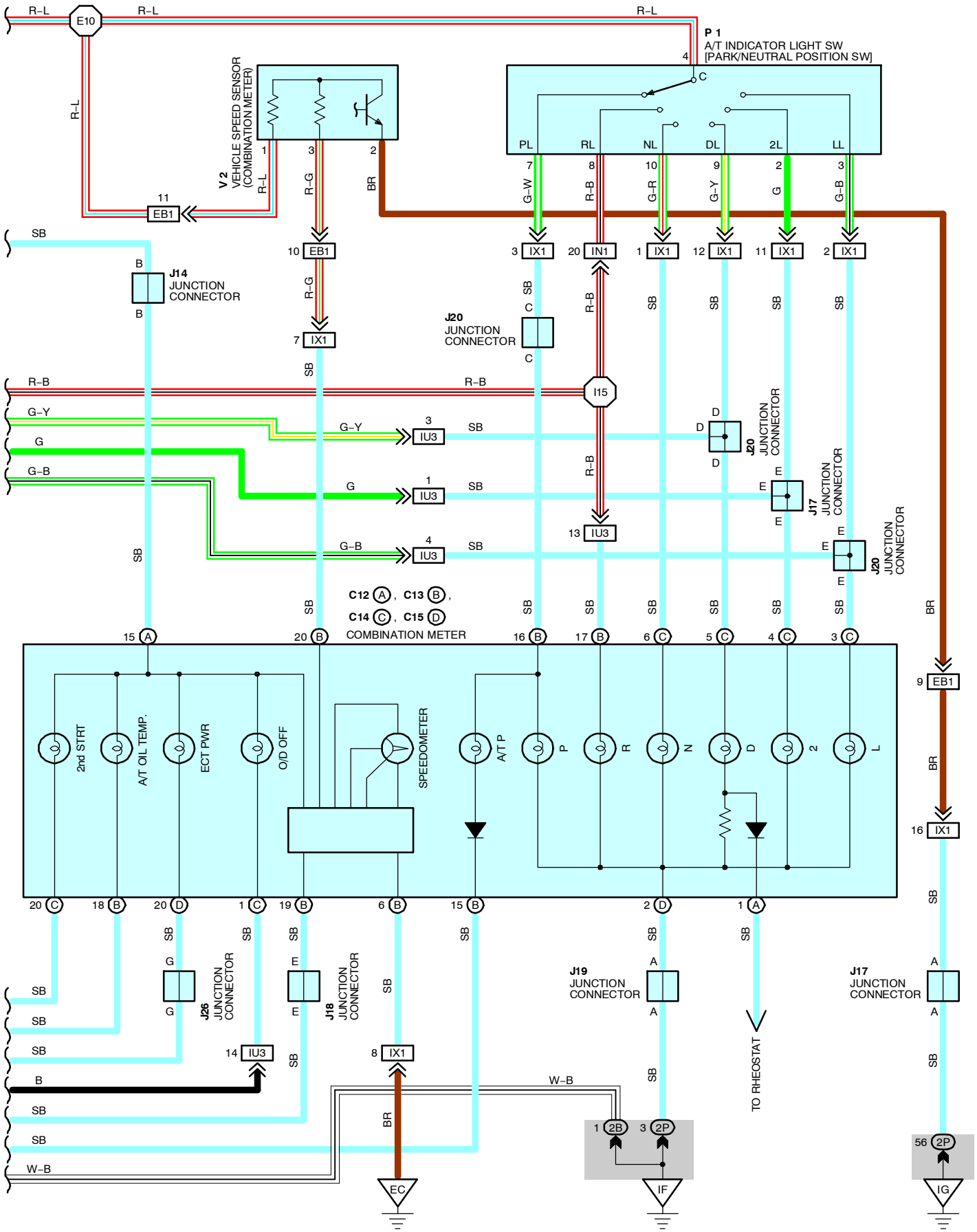

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ELECTRONICALLY CONTROLLED TRANSMISSION AND A/T INDICATOR

SYSTEM OUTLINE

The electronically controlled transmission electrically controls, the throttle pressure, lock–up pressure, and accumulator pressure etc. through the solenoid valve.
The electronically controlled transmission is a system which precisely controls the gear shift timing and lock–up timing in response to the vehicle's driving conditions and the engine condition detected by various sensors. It makes smooth driving possible by shift selection of the gear which is the most appropriate to the driving conditions at that time, and by preventing downing, squat and gear shift shock when starting off.

1. GEAR SHIFT OPERATION

When driving, the engine warm up condition is input as a control signal from the engine coolant temp. sensor to **TERMINAL THW** of the engine control module, and the vehicle speed is input to **TERMINAL SP2+** of the engine control module from the vehicle speed sensor. At the same time, the throttle valve opening signal from the throttle position sensor is input to **TERMINALS VTA, VTA2** of the engine control module as a throttle angle signal. Based on these signals, the engine control module selects the best shift position for the driving conditions and sends current to the electronically controlled transmission solenoid.

2. LOCK–UP OPERATION

When the engine control module decides based on each signal that the lock–up condition has been met, the current flows from the engine control module **TERMINAL SL** to **TERMINAL 7** of the electronically controlled transmission solenoid to **GROUND**.

3. STOP LIGHT SW CIRCUIT

If the brake pedal is depressed (Stop light SW on) when driving in lock–up position, a signal is input to **TERMINAL STP** of the engine control module. As a result, the engine control module cuts the current to the solenoid to release the lock–up.

4. ELECTRONICALLY CONTROLLED TRANSMISSION PATTERN SELECT SW CIRCUIT

When the electronically controlled transmission pattern select SW is switched to PWR, a signal is input to **TERMINAL PWR** of the engine control module, and the engine control module controls to enable shift–up and shift–down at a higher speed range than usual. In that case, the ECT PWR indicator light in the combination meter is lit up. When the electronically controlled transmission pattern select SW is switched to 2nd position, a signal is input to the engine control module **TERMINAL SNWL**, and through control of the engine control module, the gear shift of the transmission is made from 2nd position. The 2nd STRT indicator light in the combination meter is lit up.

5. OVERDRIVE CIRCUIT

* O/D main SW on
  When the O/D main SW is switched to **ON** position, a signal is input to **TERMINAL OD2** of the engine control module, and enables shift change to the overdrive range, through the control of the engine control module.
* O/D main SW off
  When the O/D main SW is switched to OFF position, a signal is input to TERMINAL OD2 of the engine control module, and prohibits shift change to the overdrive range through the control of the engine control module. When in the overdrive range already, shift down is made.

6. TRANSFER SHIFT OPERATION

When the transfer shift lever is moved to **L** position, a signal is input into **TERMINAL L4** of the engine control module.
In addition when the transfer shift lever is moved to **N** position a signal is input to engine control module **TERMINAL TFN**.
The engine control module detects the transfer condition through this.

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SERVICE HINTS

E4 ELECTRONICALLY CONTROLLED TRANSMISSION PATTERN SELECT SW

5–3 : Closed with select SW at **PWR** position
2–3 : Closed with select SW at **2nd** position

E6 (B), E8 (D), E9 (E) ENGINE CONTROL MODULE

BATT–E1 : Always **9.0–14.0** volts
+B–E1 : **9.0–14.0** volts with ignition SW at **ON** or **ST** position
+B1–EI : **9.0–14.0** volts with ignition SW at **ON** or **ST** position
NSW–E1 : **9.0–14.0** volts with ignition SW at **ST** position
: **0–3.0** volts with ignition SW on and shift lever in **P** or **N** position
STA–E1 : **6.0** volts or more with ignition SW at **ST** position and shift lever in **P** or **N** position

P1 A/T INDICATOR LIGHT SW [PARK/NEUTRAL POSITION SW]

4–7 : Closed with shift lever in **P** position
4–8 : Closed with shift lever in **R** position
4–10 : Closed with shift lever in **N** position
4–9 : Closed with shift lever in **D** position
4–2 : Closed with shift lever in **2** position
4–3 : Closed with shift lever in **L** position

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
A7	36	E7 C	38	J21	39
A14	36	E8 D	38	J22	39
C12 A	38	E9 E	38	J25	39
C13 B	38	F6	36	J26	39
C14 C	38	I18	38	O1	37
C15 D	38	J1	39	O3	39
D1	36	J3	39	P1	37
D5	36	J4	39	S5	39
D6	36	J7	39	T2	37
E1	36	J14	39	T3	37
E2	36	J17	39	V2	37
E4	38	J18	39	V3	37
E5 A	38	J19	39		
E6 B	38	J20	39		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1C	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1D		
1E		
1N	21	Engine Room No.3 Wire and Engine Room J/B (Engine Compartment Left)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)

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ELECTRONICALLY CONTROLLED TRANSMISSION AND A/T INDICATOR

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EB1	44	Engine Wire and Transmission Wire (On the Transmission)
EB2		
IG1	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IG2		
IK1	48	Console Box Wire and Dash Wire (Left Side of Front Console)
IN1	50	Engine Wire and Dash Wire (Behind the Glove Box)
IO2		
IU1	50	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
IU3		
IW1	52	Engine Room No.2 Wire and Dash Wire (Behind the Glove Box)
IX1	52	Instrument Panel Integration Wire and Engine Wire (Behind the Glove Box)

: GROUND POINTS

Code	See Page	Ground Points Location
EC	44	Rear Bank of Right Cylinder Head
EE	44	Front Left Side of Fender Apron
IF	46	Set Bolt of Cowl Side J/B LH
IG		

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E7	44	Engine Wire	I12	48	Console Box Wire
E10			I14	48	Dash Wire
I6	48	Dash Wire	I15		

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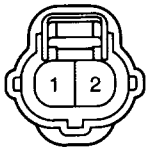
A7



A14
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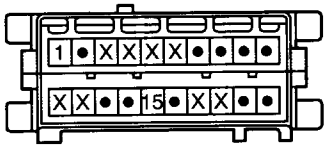
C12 (A)
GRAY



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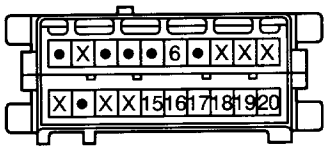

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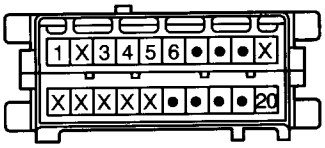

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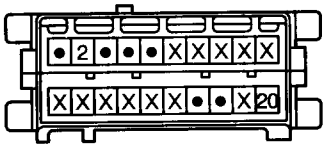

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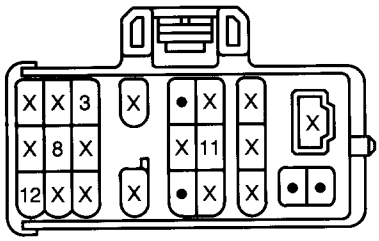

D5
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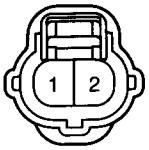
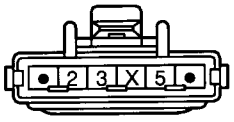
D6
GRAY



E1
GRAY

E2
GREEN

E4



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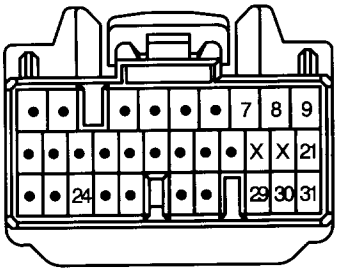

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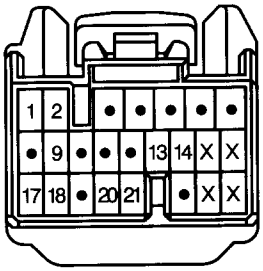

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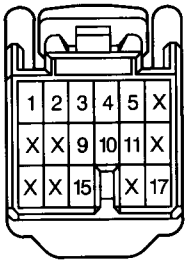

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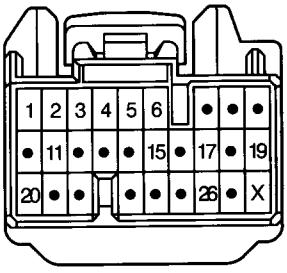
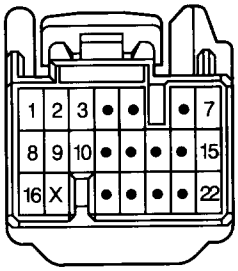


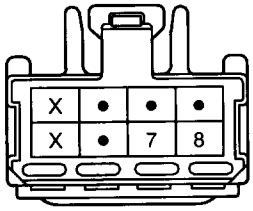
E9 (E)



F6

(See Page 34)

I18



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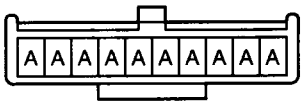
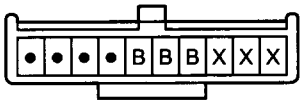
ELECTRONICALLY CONTROLLED TRANSMISSION AND A/T INDICATOR

J1



(Hint : See Page 7)

J3
BLUE



(Hint : See Page 7)

J4
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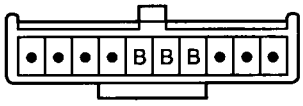
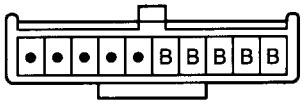


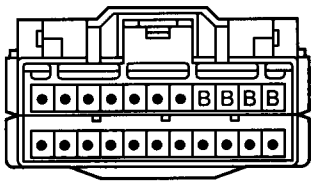
(Hint : See Page 7)

J7
GREEN



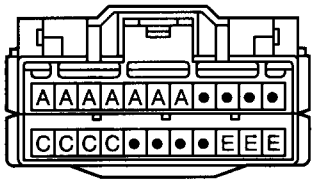
(Hint : See Page 7)

J14



(Hint : See Page 7)

J17



(Hint : See Page 7)

J18
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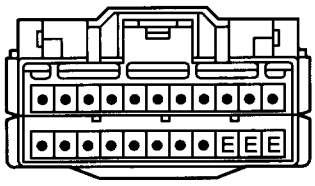

(Hint : See Page 7)

J19
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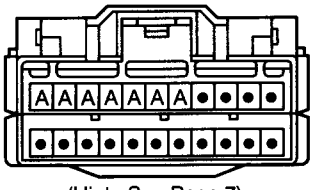
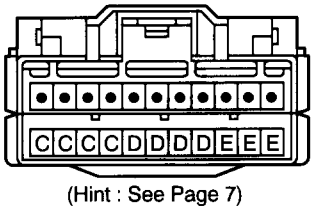


(Hint : See Page 7)

J20



(Hint : See Page 7)

J21
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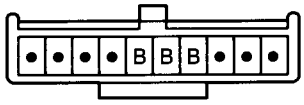
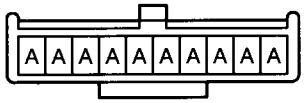


(Hint : See Page 7)

J22



(Hint : See Page 7)

J25
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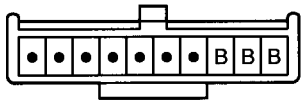
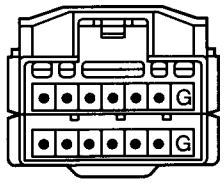


(Hint : See Page 7)

J26
BLUE



(Hint : See Page 7)

O1
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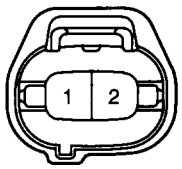
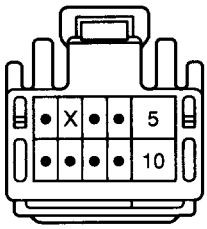


O3



P1
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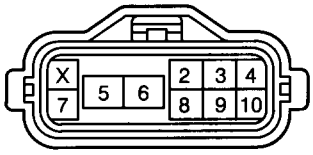

S5
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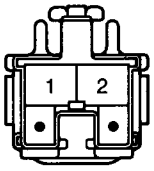

T2
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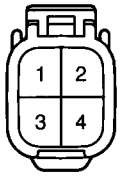
T3
GRAY



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V3
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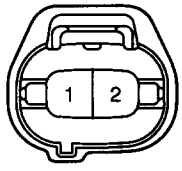

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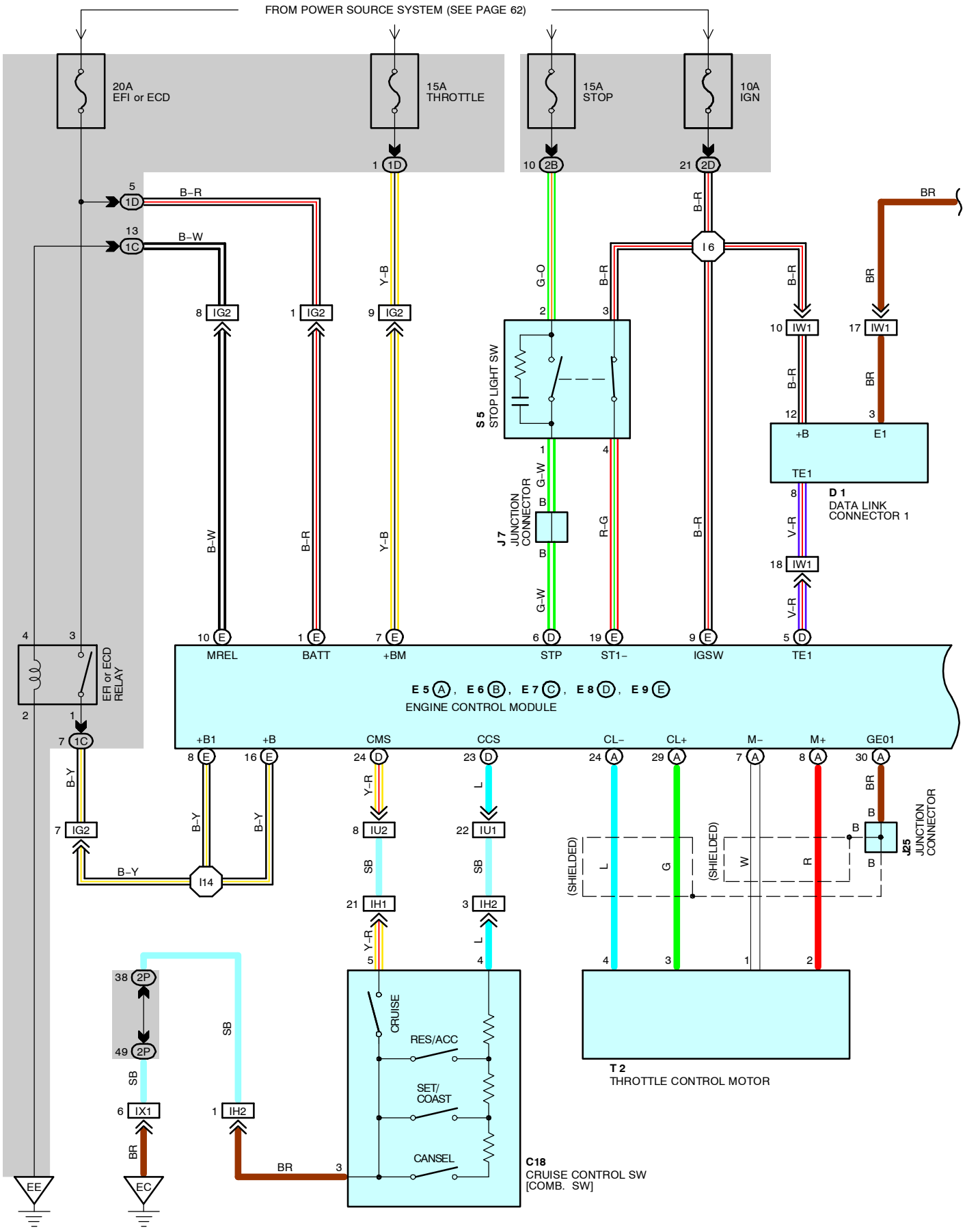

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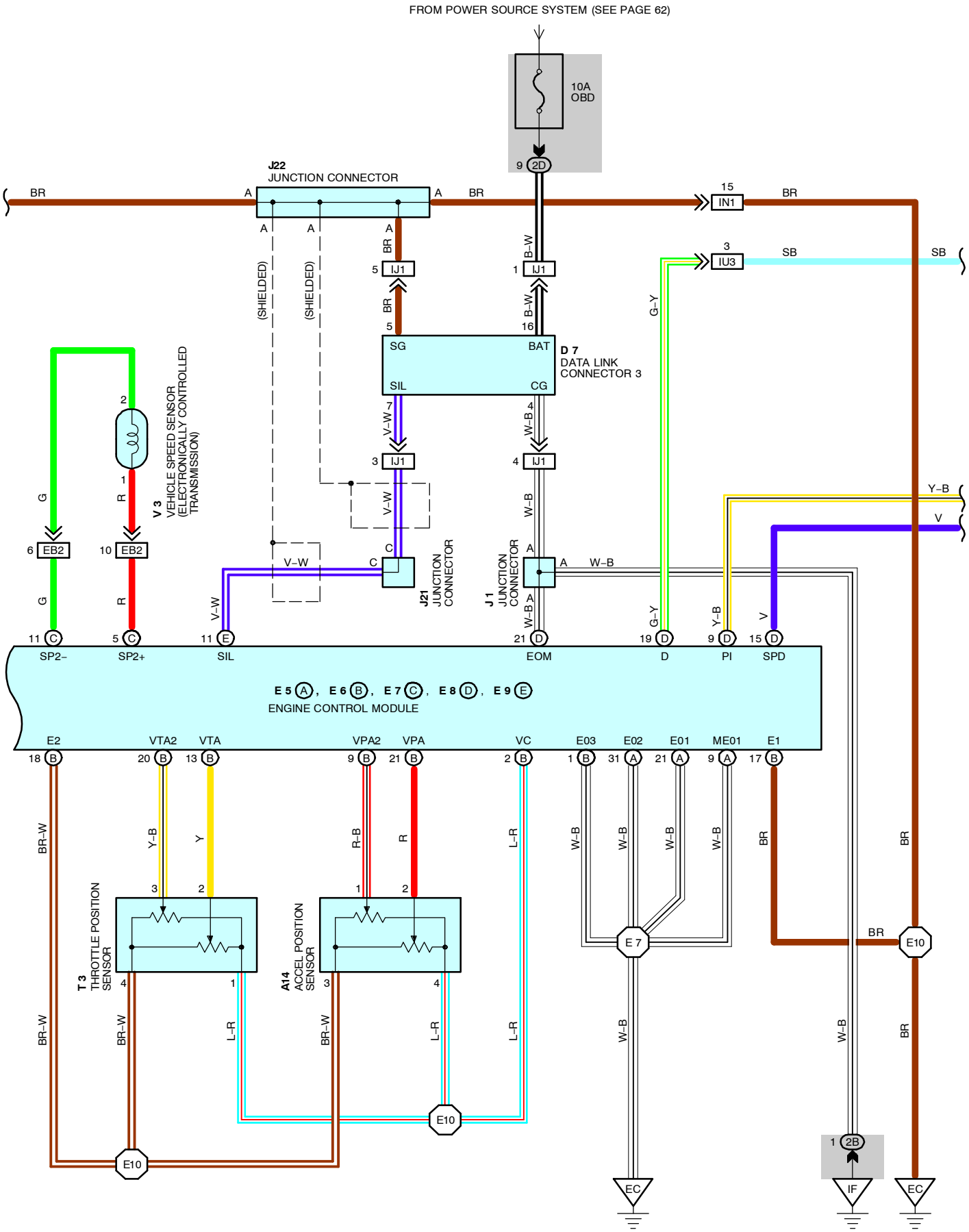

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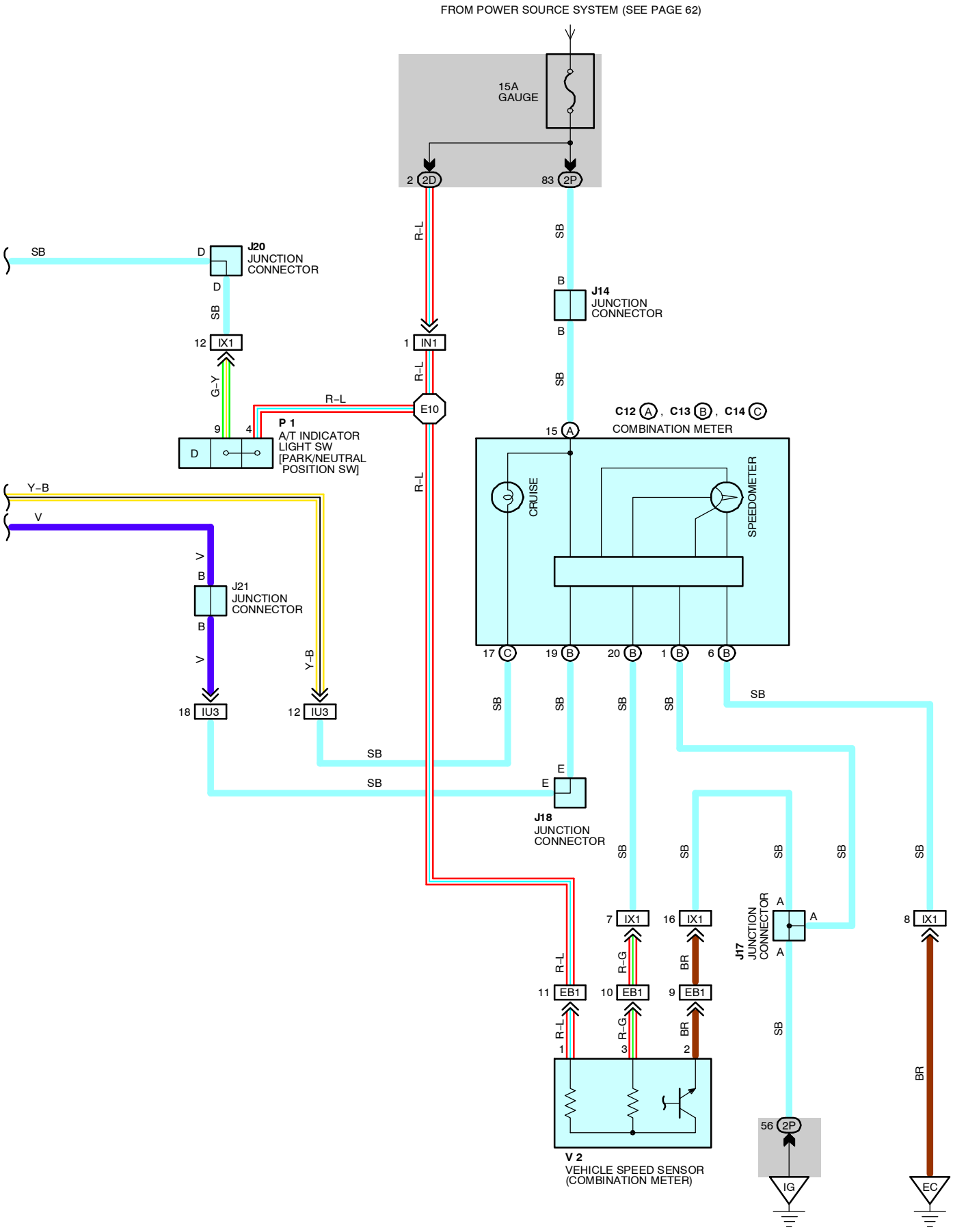

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SYSTEM OUTLINE

The cruise control system is a constant vehicle speed controller which controls the opening angle of the engine throttle valve by the SW, and allows driving at a constant speed without depressing the accelerator pedal.

SET OPERATION

When the CRUISE SW is turned on, the systems starts preparations for cruise control and turns on the indicator light in the combination meter.

SET SPEED CONTROL

When the SET/COAST SW is operated with the CRUISE SW turned on during driving, the speed is controlled at a constant speed.

COAST CONTROL

When the SET/COAST SW is kept turned on during cruise control driving, the engine control module controls the throttle valve to decelerate the vehicle speed.
Every time the SET/COAST SW is turned on instantaneously, the vehicle speed is decelerated approx. **1.5** km/h.

ACCEL CONTROL

When the RES/ACC SW is kept turned on during cruise control driving, the engine control module controls the throttle valve to accelerate the vehicle speed.
Every time the SET/COAST SW is turned on instantaneously, the vehicle speed is accelerated approx. **1.5** km/h.

RESUME CONTROL

If the vehicle speed is within the low speed limit (Approx. **40** km/h, **25** mph) when canceling the cruise control, operation of the RES/ACC SW accelerates the vehicle speed and resumes the level before canceling the cruise control.

MANUAL CANCEL MECHANISM

If any of the following signals are input during cruise control driving, the cruise control is canceled.

* The stop light SW is on
* The CANCEL SW is turned on
* The CRUISE SW is turned off

AUTO CANCEL FUNCTION

If any of the following conditions are detected, the cruise control is canceled:

* Failure in the stop light SW wiring
* Abnormality in the vehicle speed signal
* Malfunction in the electronically controlled throttle parts

OVERDRIVE FUNCTION

The overdrive may be canceled if the vehicle travels on a upward slope during cruise control driving. After the overdrive is canceled, if the vehicle speed exceeds the overdrive return speed (Set speed (**2** km/h, **1.2** mph)) and it is determined that the slope has finished, and the vehicle returns to overdrive mode again.

SERVICE HINTS

E5 (A), E6 (B), E8 (D), E9 (E) ENGINE CONTROL MODULE

IGSW–E1 : **9.0–14.0** volts with ignition SW at **ON** or **ST** position
BATT–E1 : Always approx. **9.0–14.0** volts
STP–E1 : Approx. **12** volts with stop light SW at on
: Below **1.5** volts with brake pedal is released

C18 CRUISE CONTROL SW [COMB. SW]

4–3 : Approx. **418** Ω with CANCEL SW on
: Approx. **198** Ω with SET/COAST SW on
: Approx. **68** Ω with RES/ACC SW on

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: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
A14	36	E7 C	38	J21	39
C12 A	38	E8 D	38	J22	39
C13 B	38	E9 E	38	J25	39
C14 C	38	J1	39	P1	37
C18	38	J7	39	S5	39
D1	36	J14	39	T2	37
D7	38	J17	39	T3	37
E5 A	38	J18	39	V2	37
E6 B	38	J20	39	V3	37

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1C	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1D		
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EB1	44	Engine Wire and Transmission Wire (On the Transmission)
EB2		
IG2	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IH1	48	Instrument Panel Integration Wire and Column Wire (Near the Ignition SW)
IH2		
IJ1	48	Dash Wire and Detector Wire (Instrument Panel Center)
IN1	50	Engine Wire and Dash Wire (Behind the Glove Box)
IU1	50	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
IU2		
IU3		
IW1	52	Engine Room No.2 Wire and Dash Wire (Behind the Glove Box)
IX1	52	Instrument Panel Integration Wire and Engine Wire (Behind the Glove Box)

: GROUND POINTS

Code	See Page	Ground Points Location
EC	44	Rear Bank of Right Cylinder Head
EE	44	Front Left Side of Fender Apron
IF	46	Set Bolt of Cowl Side J/B LH
IG		

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E7	44	Engine Wire	I6	48	Dash Wire
E10			I14		

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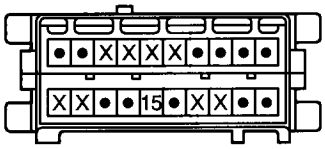
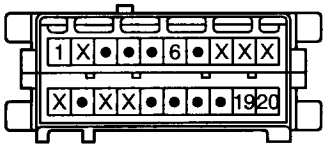
A14
BLACK

C12 (A)
GRAY



C13 (B)



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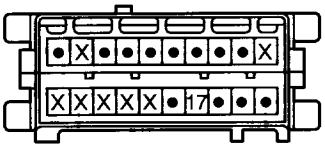

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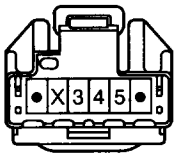

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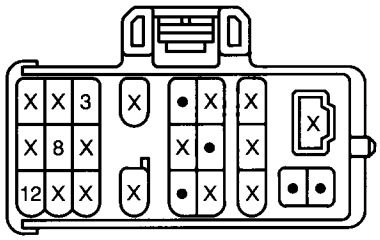

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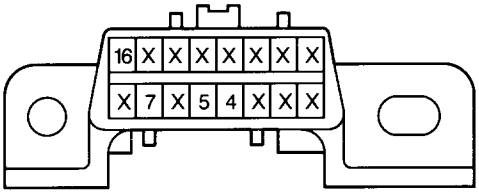
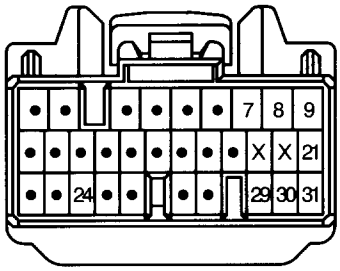
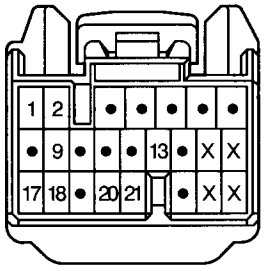


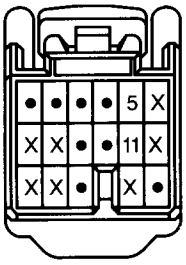
E5 (A)



E6 (B)



E7 (C)



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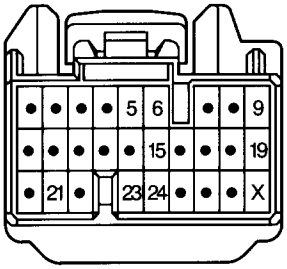

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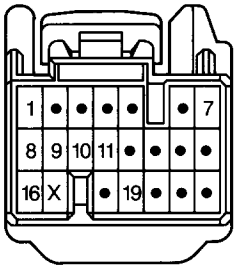
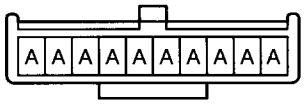


J1



(Hint : See Page 7)

J7
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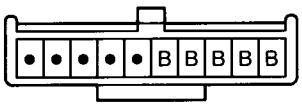
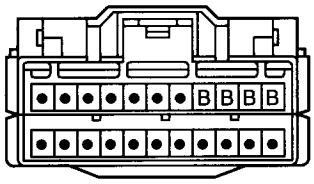


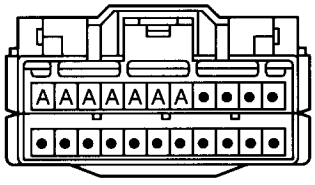
(Hint : See Page 7)

J14



(Hint : See Page 7)

J17



(Hint : See Page 7)

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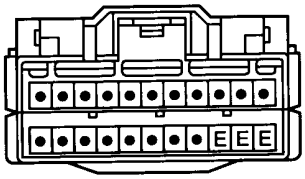
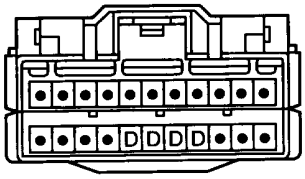
J18
GRAY



(Hint : See Page 7)

J20



(Hint : See Page 7)

J21
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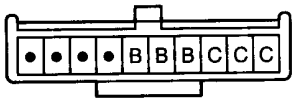
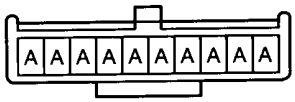


(Hint : See Page 7)

J22



(Hint : See Page 7)

J25
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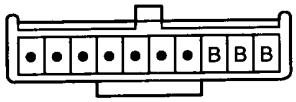
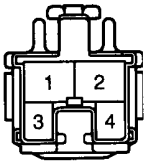


(Hint : See Page 7)

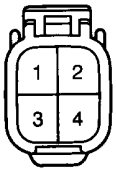
P1
GRAY

S5
BLUE



T2
GRAY

T3
GRAY



V2
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V3
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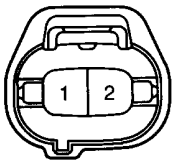

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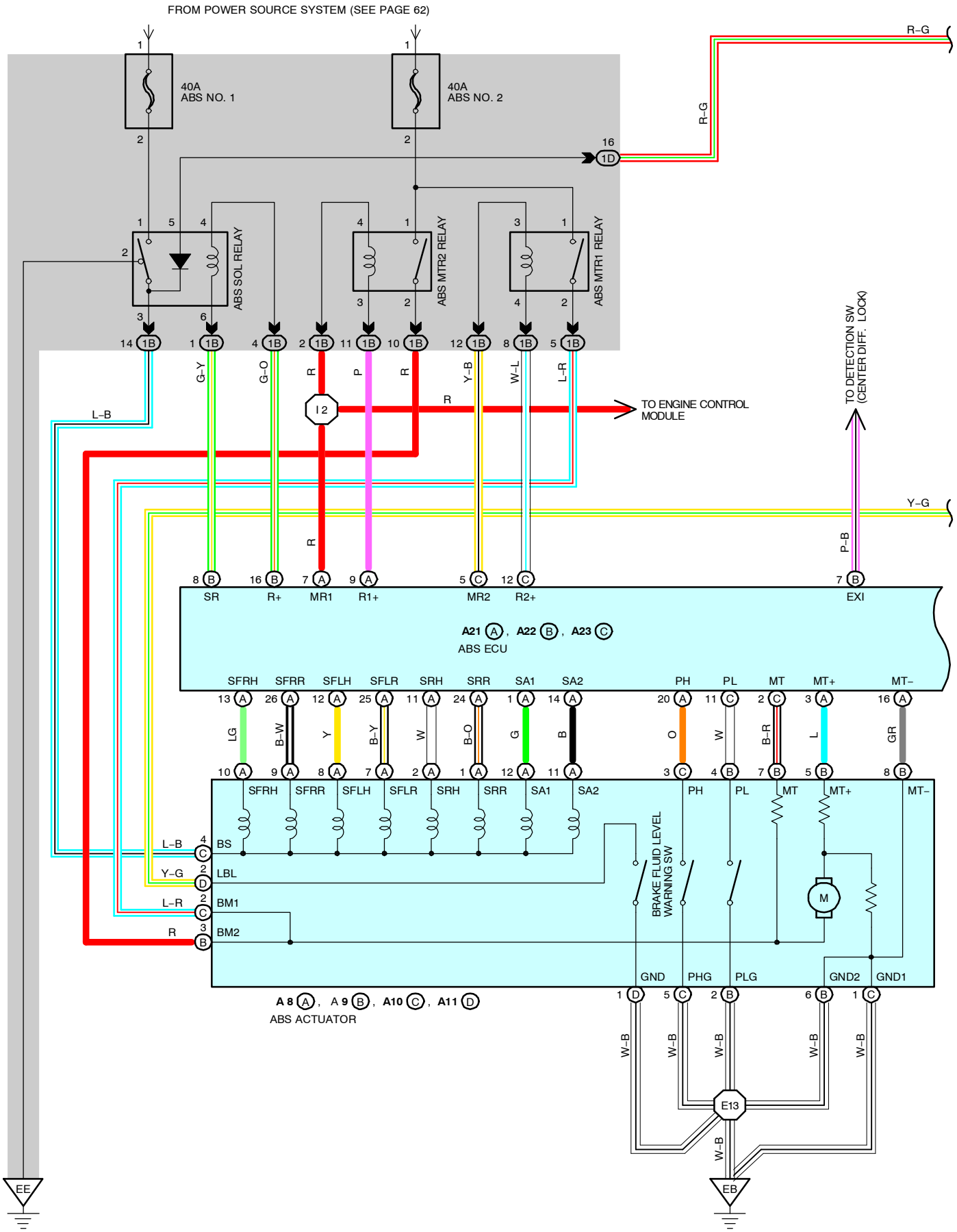

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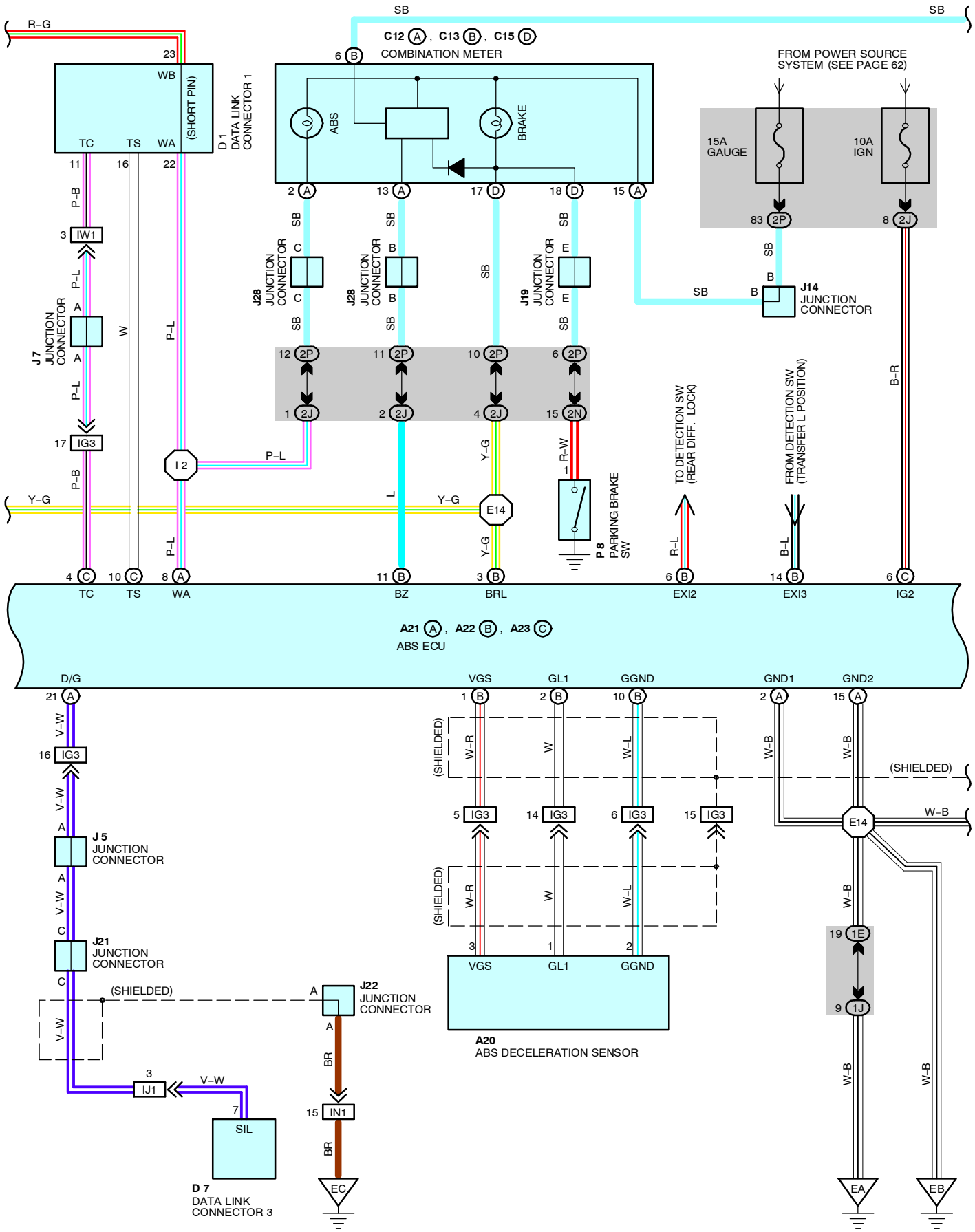

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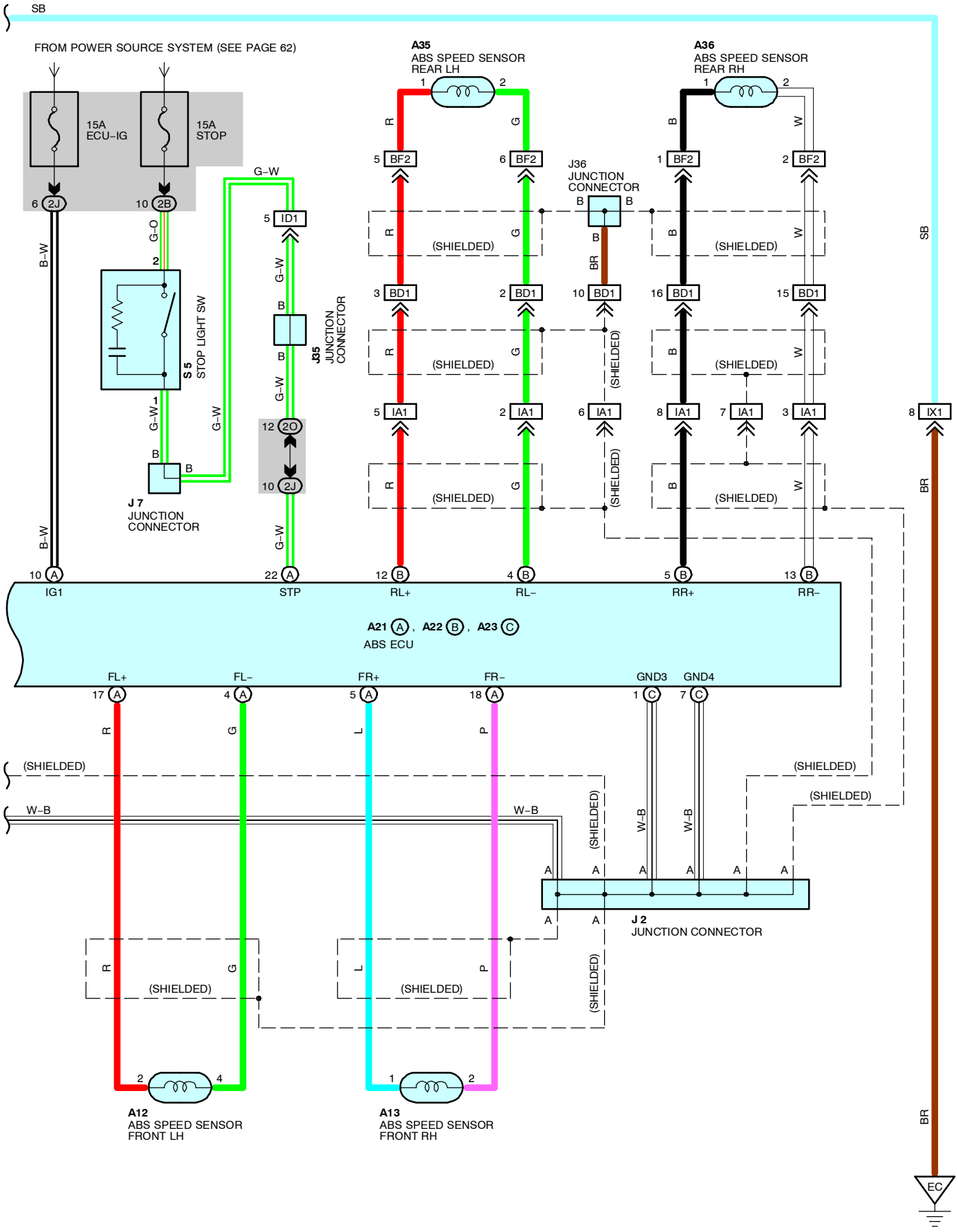

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SYSTEM OUTLINE

ABS OPERATION

If the brake pedal is depressed suddenly, the ABS controls the hydraulic pressure of the wheel cylinders to automatically avoid wheel locking and ensure the directional and steering stability of the vehicle.
In sudden braking, the ABS ECU controls the solenoids in the actuators using the signals from the sensors to move the brake fluid to the reservoir in order to release the braking pressure applied to the wheel cylinder. If the ABS ECU detects that the fluid pressure in the wheel cylinder is insufficient, the ABS ECU controls the solenoids in the actuators to increase the braking pressure.

FAIL−SAFE FUNCTION

If an error occurs in the ABS ECU, sensor signals, and/or actuators, the ABS ECU inhibits the brake actuator−control. According to this, the brake actuator turns off the solenoid, and the vehicle operates without the ABS system.

SERVICE HINTS

A21 (A), A22 (B), A23 (C) ABS ECU

(A)10−GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
(C) 6−GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
(A)22−GROUND : Approx. **12** volts with brake pedal depressed
(A) 2, (A) 15, (C) 1, (C) 7−GROUND : Always continuity
(C)10−GROUND : Approx. **12** volts with ignition SW at **ON** position and the data link connector I **TS−E1** not connected
(C) 4−GROUND : Approx. **12** volts with ignition SW at **ON** position and the data link connector 1 **TC−E1** not connected

A11 (D) BRAKE FLUID LEVEL WARNING SW IABS ACTUATOR]

(D) 2−(D) 1: Closed with the float down

A12 ABS SPEED SENSOR FRONT LH

2−4 : Approx. **1.07** kΩ (**20**° C, **68**°F)

A13 ABS SPEED SENSOR FRONT RH

1−2 : Approx. **1.07** kΩ (**20**°C, **68**°F)

A35, A36 ABS SPEED SENSOR REAR LH, RH

1−2 : Approx. **1.2** kΩ (**25**°C, **77**°F)

: PARTS LOCATION

Code		See Page	Code		See Page	Code	See Page
A8	A	36	A35		40	J14	39
A9	B	36	A36		40	J19	39
A10	C	36	C12	A	38	J21	39
A11	D	36	C13	B	38	J22	39
A12		36	C15	D	38	J28	39
A13		36	D1		36	J35	40
A20		38	D7		38	P8	40
A21	A	38	J2		39	S5	39
A22	B	38	J5		39		
A23	C	38	J7		39		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1B	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1D		
1E		
1J	21	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2J	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2N	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2O		
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)

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: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IA1	46	Floor Wire and Engine Room No.2 Wire (Left Kick Panel)
ID1	46	Dash Wire and Floor Wire (Left Kick Panel)
IG3	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IJ1	48	Dash Wire and Detector Wire (Instrument Panel Center)
IN1	50	Engine Wire and Dash Wire (Behind the Glove Box)
IW1	52	Engine Room No.2 Wire and Dash Wire (Behind the Glove Box)
IX1	52	Instrument Panel Integration Wire and Engine Wire (Behind the Glove Box)
BD1	54	Floor No.3 Wire and Floor Wire (Left Rear Side Quarter Panel)
BF2	56	Frame Wire and Floor No.3 Wire (Left Side of Rear Floor Crossmember)

: GROUND POINTS

Code	See Page	Ground Points Location
EA	44	Front Right Side of Fender Apron
EB		
EC	44	Rear Bank of Right Cylinder Head
EE	44	Front Left Side of Fender Apron

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E13	44	Engine Room No.2 Wire	I2	48	Engine Room No. 2 Wire
E14					

A8 (A)
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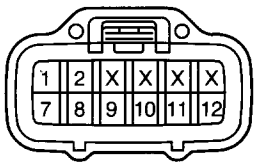

A9 (B)
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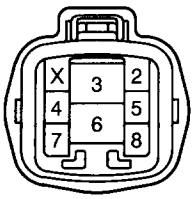

A10 (C)
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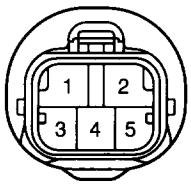
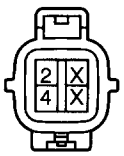


A11 (D)
GRAY

A12



A13
GRAY

A20
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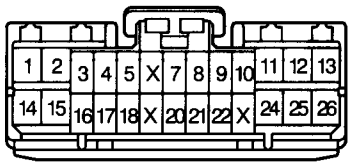
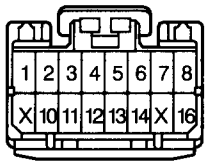
A21 (A)



A22 (B)



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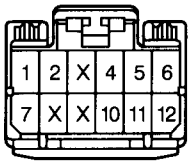
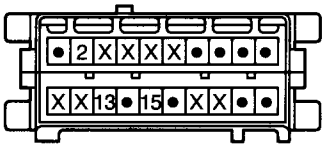


A35
GRAY

A36
GRAY

C12 (A)
GRAY



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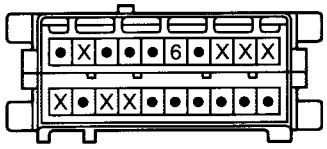
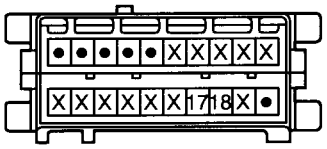
C13 (B)



C15 (D)



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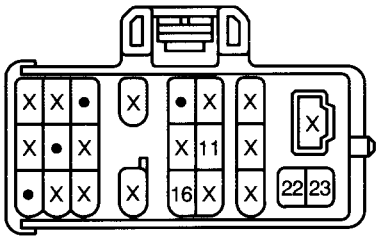

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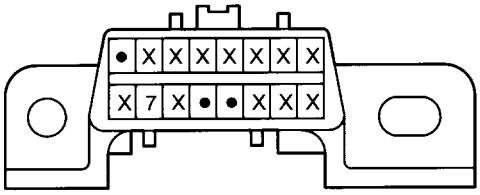
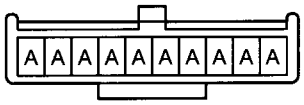


J2



(Hint : See Page 7)

J5
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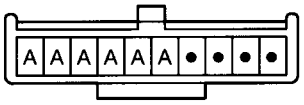

(Hint : See Page 7)

J7
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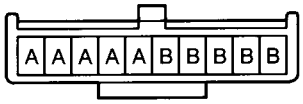
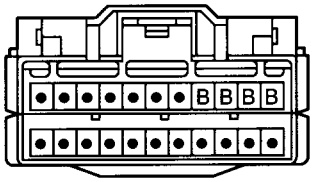


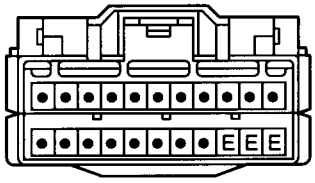
(Hint : See Page 7)

J14



(Hint : See Page 7)

J19
GRAY



(Hint : See Page 7)

J21
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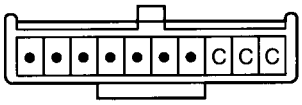
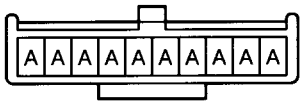


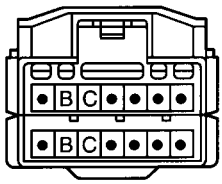
(Hint : See Page 7)

J22



(Hint : See Page 7)

J28



(Hint : See Page 7)

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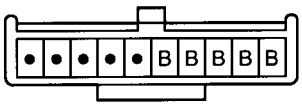

(Hint : See Page 7)

J36
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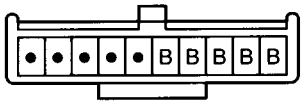

(Hint : See Page 7)

P8

S5
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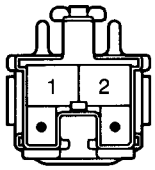

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NOTICE: When inspecting or repairing the SRS, perform the operation in accordance with the following precautionary instructions and the procedure and precautions in the Repair Manual for the applicable model year.

- Malfunction symptoms of the SRS are difficult to confirm, so the DTCs become the most important source of information when troubleshooting. When troubleshooting the SRS, always inspect the DTCs before disconnecting the battery.
- **Work must be started after 90 seconds from when the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery.**
  (The SRS is equipped with a back–up power source so that if work is started within 90 seconds from disconnecting the negative (–) terminal cable of the battery, the SRS may be deployed.)
- When the negative (–) terminal cable is disconnected from the battery, the memory of the clock and audio system will be canceled. So before starting work, make a record of the contents memorized in the audio memory system. When work is finished, reset the audio systems as they were before and adjust the clock. This vehicle has power tilt and power telescopic steering, power seat and power outside rear view mirror which are all equipped with memory function. However, it is not possible to make a record of the memory contents. So when the work is finished, it will be necessary to explain this fact tot the customer, and ask the customer to adjust the features and reset the memory. To avoid erasing the memory in each memory system, never use a back–up power supply from outside the vehicle.
- Before repairs, remove the airbag sensor if shocks are likely to be applied to the sensor during repairs.
- Do not expose the steering wheel pad, front passenger airbag assembly, seat belt pretensioner and center airbag sensor assembly directly to hot air or flames.
- Even in cases of a minor collision where the SRS does not deploy, the steering wheel pad, front passenger airbag assembly, seat belt pretensioner and center airbag sensor assembly should be inspected.
- Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.
- Never disassemble and repair the steering wheel pad, front passenger airbag assembly, seat belt pretensioner and center airbag sensor assembly in order to reuse it.
- If the steering wheel pad, front passenger airbag assembly, seat belt pretensioner and center airbag sensor assembly has been dropped, or if there are cracks, dents or other defects in the case, bracket or connector, replace them with new ones.
- Use a volt/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting the system's electrical circuits.
- Information labels are attached to the periphery of the SRS components. Follow the instructions on the notices.
- After work on the SRS is completed, perform the SRS warning light check.
- If the vehicle is equipped with a mobile communication system, refer to the precaution in the IN section of the Repair Manual.

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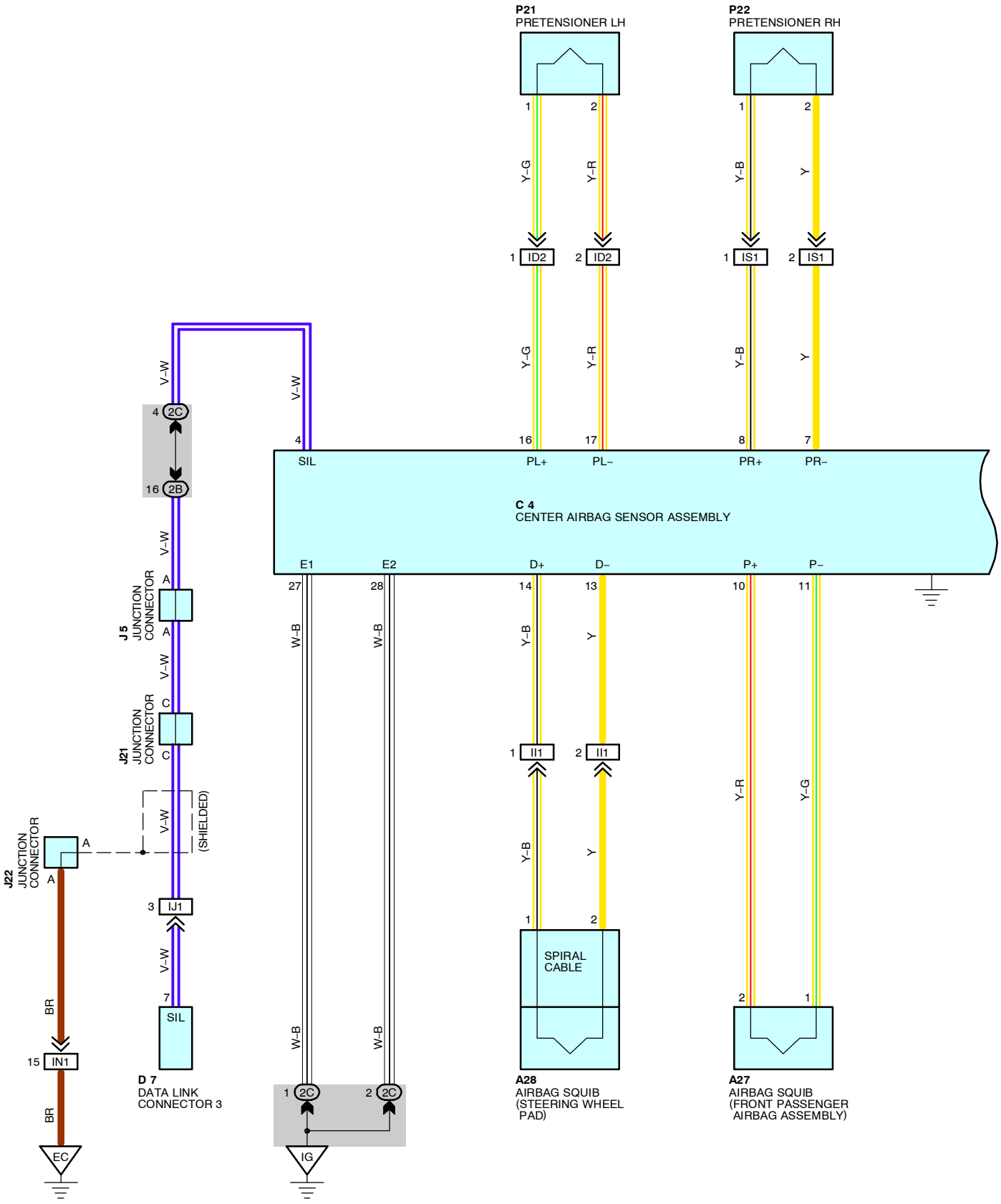

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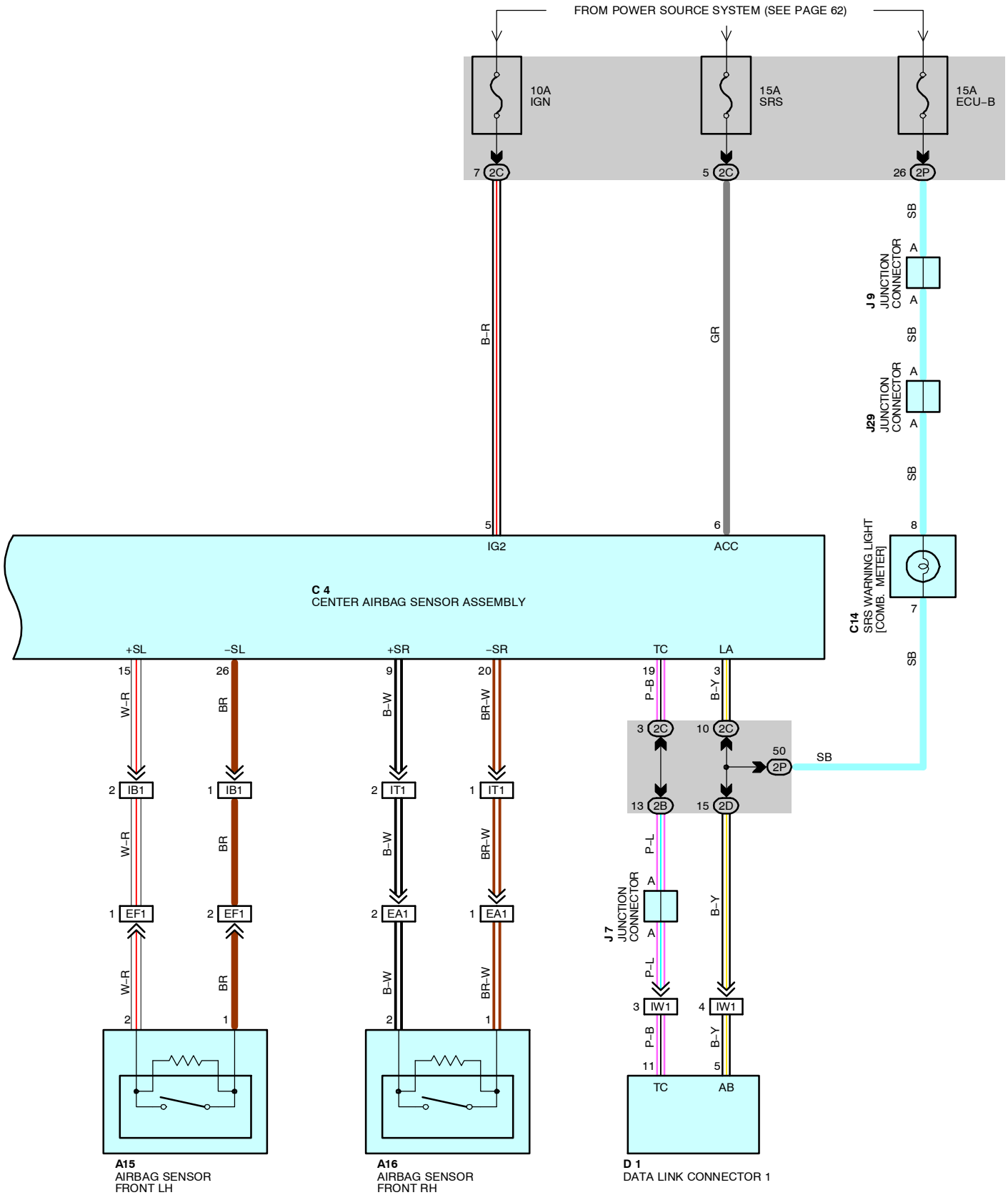

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SYSTEM OUTLINE

The SRS is a driver and front passenger protection device which has a supplemental role to the seat belts.
When the ignition SW is turned on, the current from the **SRS** fuse flows to the center airbag sensor assembly **TERMINAL 6**.
Only when the ignition SW is on does the current from the **IGN** fuse flow to center airbag sensor assembly **TERMINAL 5.**
In case an accident occurs while driving, when the frontal impact exceeds a predetermined level, the current from the **SRS** or **IGN** fuse flows to center airbag sensor assembly **TERMINALS 14, 10, 16, 8** to airbag squibs and pretensioners to center airbag sensor assembly **TERMINALS 13, 11, 17, 7** to **TERMINALS 27, 28** or **BODY GROUND** to **GROUND**.
As a result, the current flows to the airbag squibs and pretensioner squibs, and operates the airbag and pretensioners.
The airbag stored in the steering wheel pad is instantaneously expanded to soften the shock to the driver.
The airbag stored in the front passenger's instrument panel is instantaneously expanded to soften the shock to the front passenger.
The pretensioners ensure the seat belt restrainability.

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
A15	36	D1	36	J22	39
A16	36	D7	38	J29	39
A27	38	J5	39	P21	41
A28	38	J7	39	P22	41
C4	38	J9	39		
C14	38	J21	39		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2C		
2D		
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	44	Engine Room Main Wire and Engine Room No.2 Wire (Engine Compartment Right)
EF1	44	Engine Room No.2 Wire and Engine Room Main Wire (Under the Engine Room J/B)
IB1	46	Engine Room No.2 Wire and Dash Wire (Left Kick Panel)
ID2	46	Dash Wire and Floor Wire (Left Kick Panel)
II1	48	Dash Wire and Column Wire (Near the Ignition SW)
IJ1	48	Dash Wire and Detector Wire (Instrument Panel Center)
IN1	50	Engine Wire and Dash Wire (Behind the Glove Box)
IS1	50	Dash Wire and Floor No.2 Wire (Right Kick Panel)
IT1	50	Engine Room No.2 Wire and Dash Wire (Right Kick Panel)
IW1	52	Engine Room No.2 Wire and Dash Wire (Behind the Glove Box)

: GROUND POINTS

Code	See Page	Ground Points Location
EC	44	Rear Bank of Right Cylinder Head
IG	46	Set Bolt of Cowl Side J/B LH

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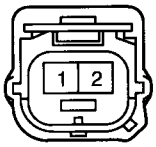
A15
YELLOW

A16
YELLOW



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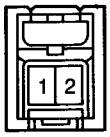
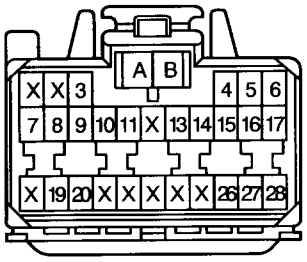
YELLOW



A28
YELLOW

C4
YELLOW



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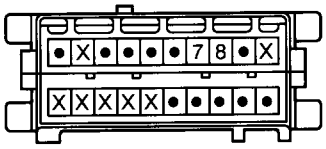

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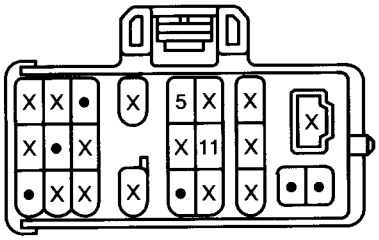

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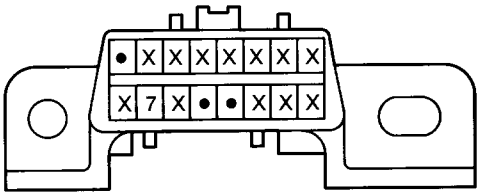

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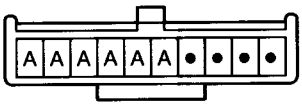

(Hint : See Page 7)

J7
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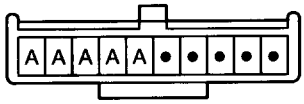
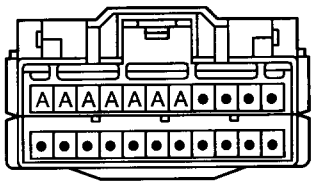


(Hint : See Page 7)

J9
GRAY



(Hint : See Page 7)

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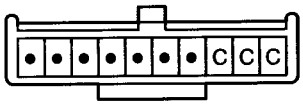

(Hint : See Page 7)

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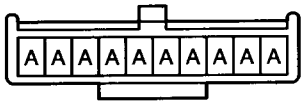

(Hint : See Page 7)

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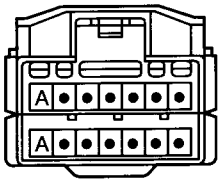

(Hint : See Page 7)

P21
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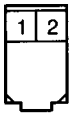

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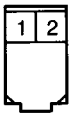

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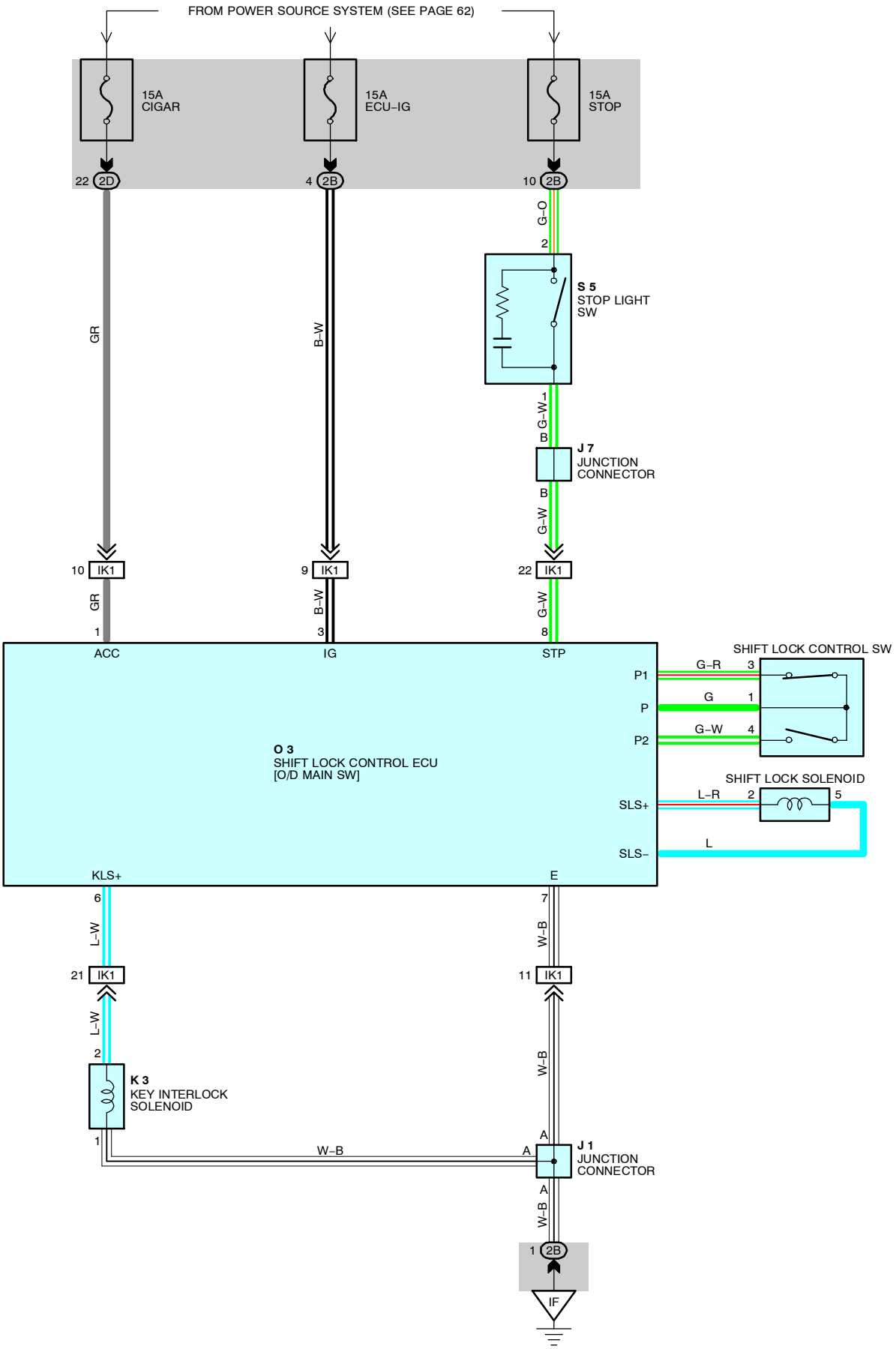

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SYSTEM OUTLINE

1. SHIFT LOCK MECHANISM

When the brake pedal is depressed with the ignition SW is turned on (Stop light SW on), the shift lock control ECU is activated and allows the driver to change the shift lever to a position other than **P** position.

2. KEY INTERLOCK MECHANISM

When the ignition SW is turned on and the shift lever is at a position other than **P** position, shift lock control ECU is activated to flow current to the key interlock solenoid. This inhibits to turn the ignition SW is turned from on to **OFF** position.

SERVICE HINTS

O3 SHIFT LOCK CONTROL ECU [O/D MAIN SW]

3–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
7–GROUND : Always continuity
1–GROUND : Approx. **12** volts with ignition SW at **ACC** or **ON** position
8–GROUND : Approx. **12** volts with brake pedal depressed

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
J1	39	K3	39	S5	39
J7	39	O3	39		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		

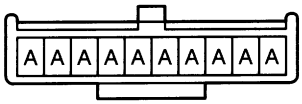
: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IK1	48	Console Box Wire and Dash Wire (Left Side of Front Console)

▽ : GROUND POINTS

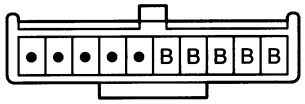
Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH

J1



(Hint : See Page 7)

J7
GREEN



(Hint : See Page 7)

K3
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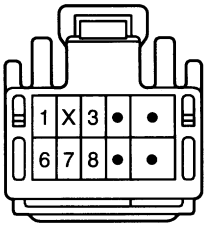
O3



S5
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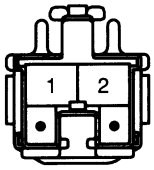

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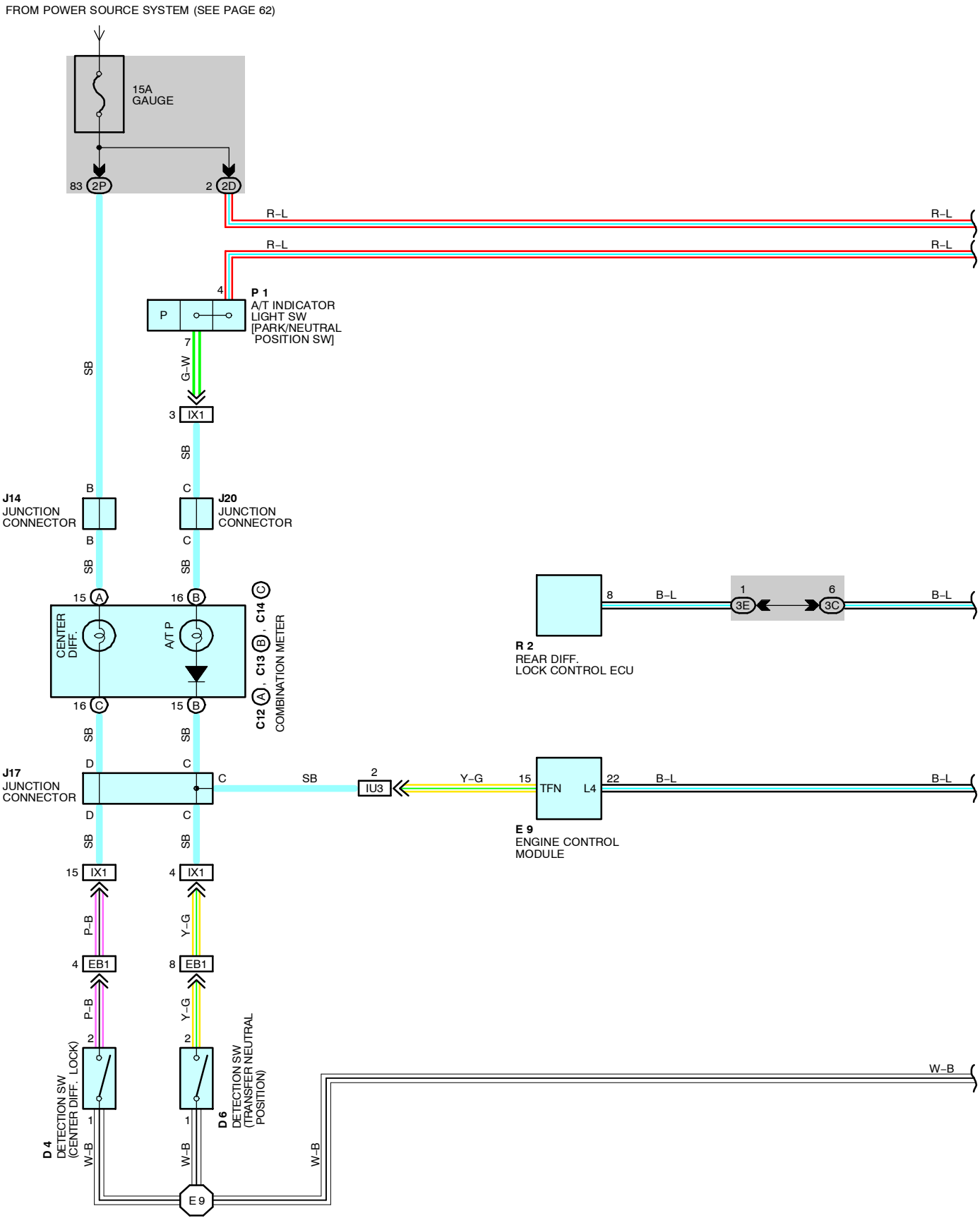
CENTER DIFFERENTIAL LOCK



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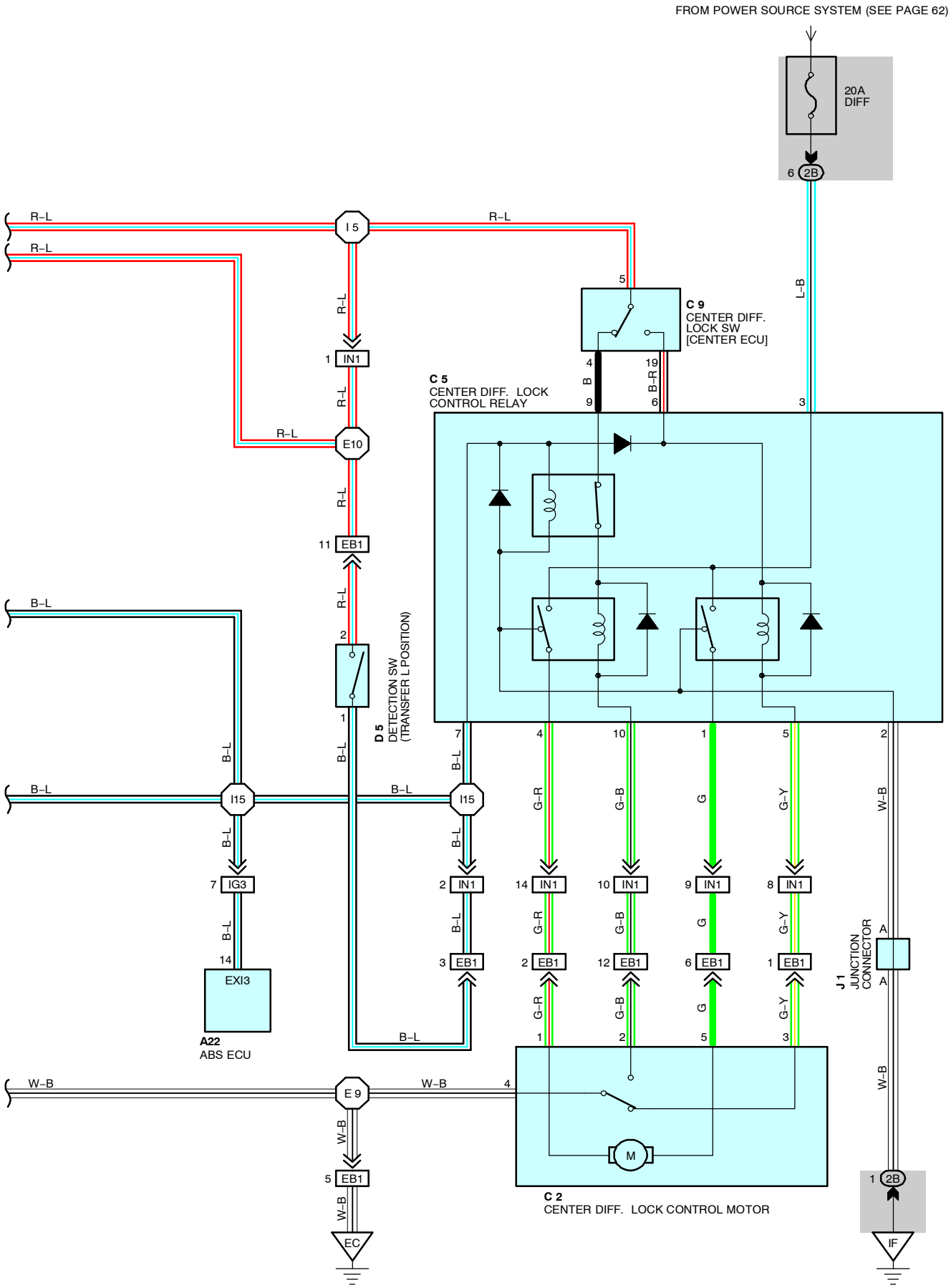

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CENTER DIFFERENTIAL LOCK

SERVICE HINTS

C5 CENTER DIFF. LOCK CONTROL RELAY

3–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
7–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position and transfer lever at **L** position
2–GROUND : Always continuity

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
A22	38	C14 C	38	J14	39
C2	36	D4	36	J17	39
C5	38	D5	36	J20	39
C9	38	D6	36	P1	37
C12 A	38	E9	38	R2	39
C13 B	38	J1	39		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)
3C	30	Dash Wire and Cowl Side J/B RH (Right Kick Panel)
3E	30	Floor No.2 Wire and Cowl Side J/B RH (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EB1	44	Engine Wire and Transmission Wire (On the Transmission)
IG3	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IN1	50	Engine Wire and Dash Wire (Behind the Glove Box)
IU3	50	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
IX1	52	Instrument Panel Integration Wire and Engine Wire (Behind the Glove Box)

: GROUND POINTS

Code	See Page	Ground Points Location
EC	44	Rear Bank of Right Cylinder
IF	46	Head Set Bolt of Cowl Side J/B LH

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E9	44	Transmission Wire	I5	48	Dash Wire
E10	44	Engine Wire	I15		

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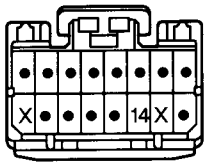
A22



C2
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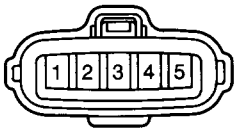
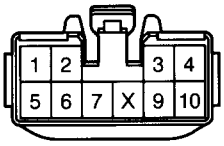
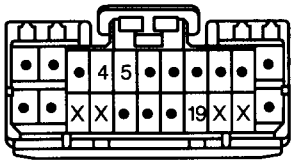


C5



C9



C12 (A)
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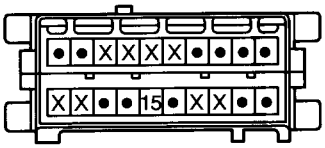
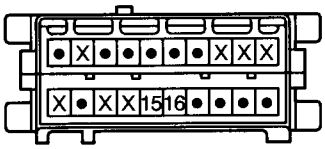


C13 (B)



C14 (C)
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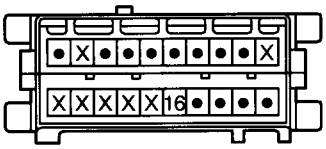
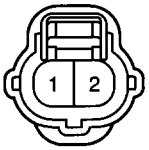


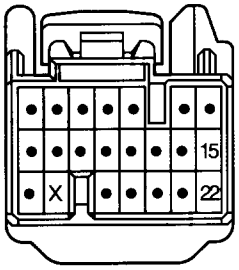
D4
GRAY

D5
GRAY

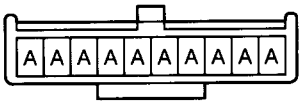
D6
GRAY



E9

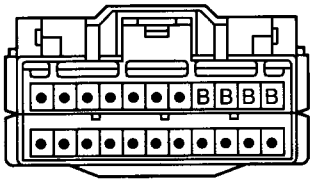


J1



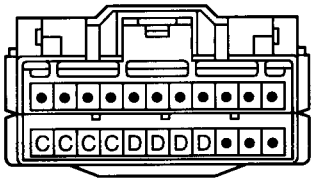
(Hint : See Page 7)

J14



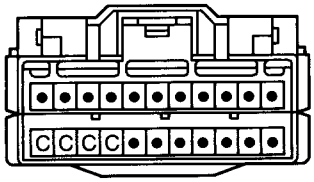
(Hint : See Page 7)

J17



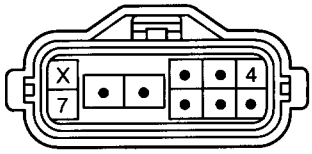
(Hint : See Page 7)

J20

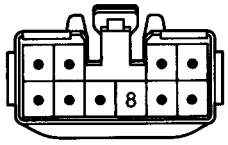


(Hint : See Page 7)

P1
GRAY



R2



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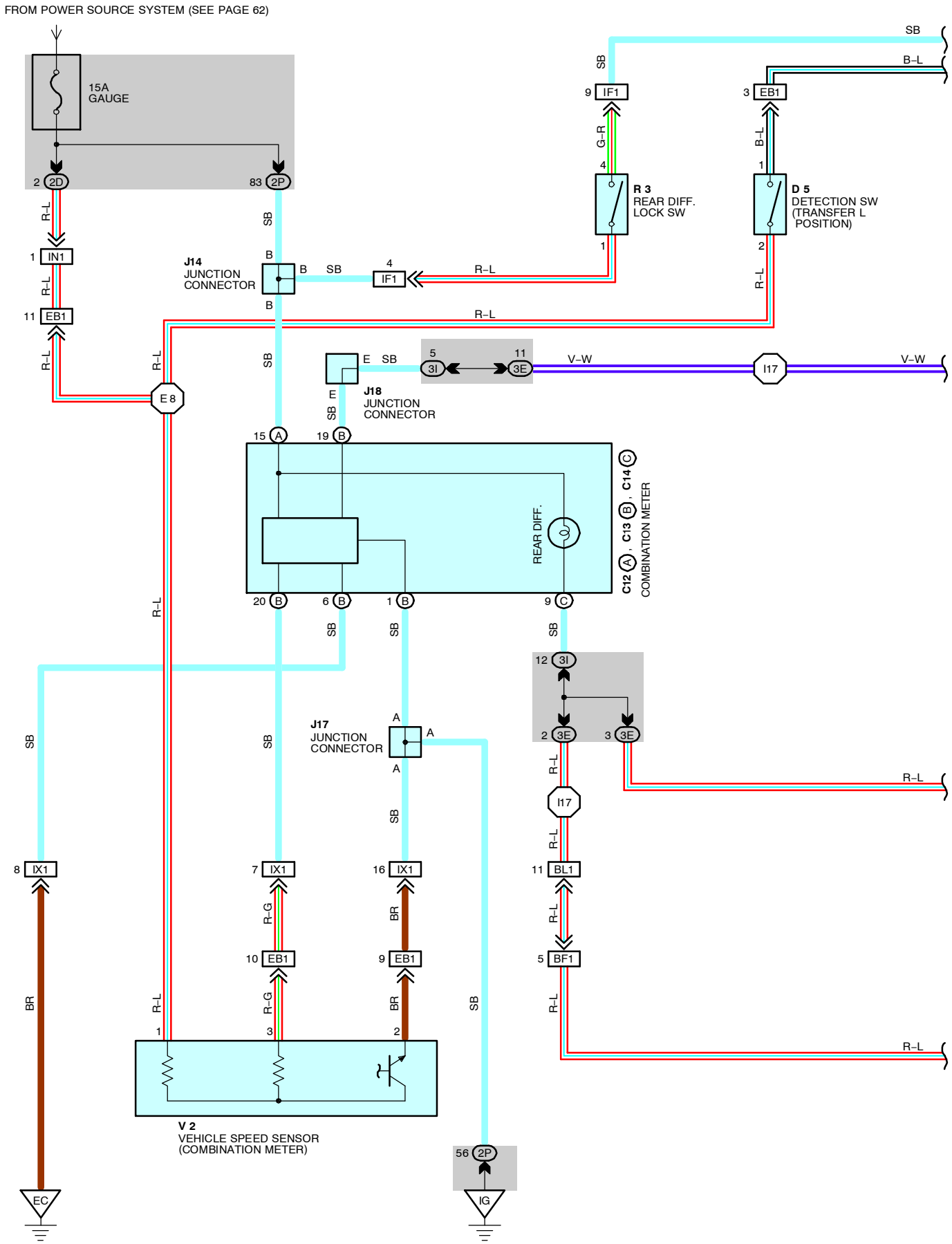
REAR DIFFERENTIAL LOCK



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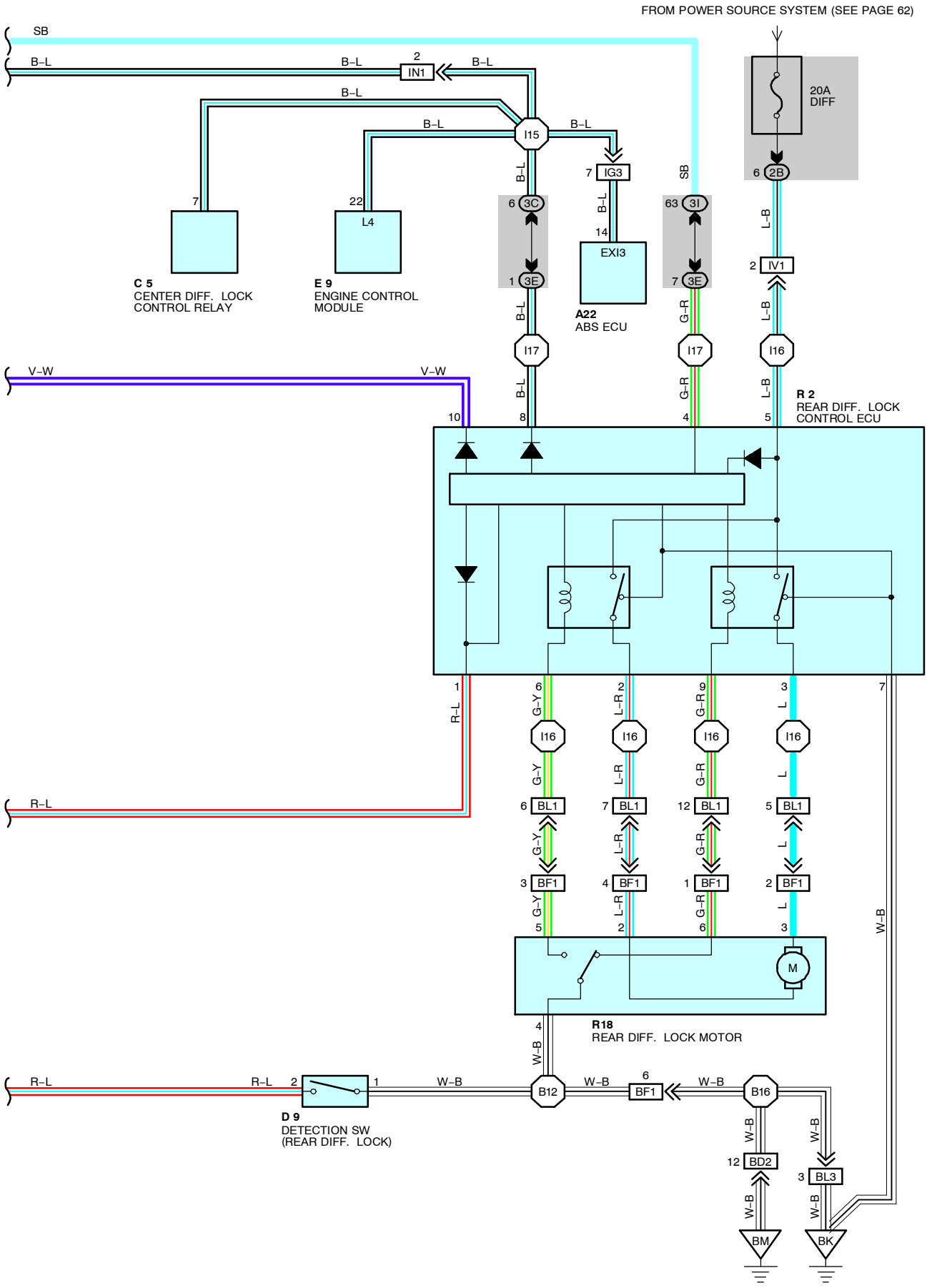
FROM POWER SOURCE SYSTEM (SEE PAGE 62)
SB
B-L
IN1
I15
IG3
EXI3
20A
DIFF
2B
IV1
3C
3E
3I
I17
I16
L4
C 5
CENTER DIFF. LOCK
CONTROL RELAY
E 9
ENGINE CONTROL
MODULE
A22
ABS ECU
R 2
REAR DIFF. LOCK
CONTROL ECU
V-W
R-L
G-Y
L-R
G-R
L
W-B
BL1
BF1
M
R18
REAR DIFF. LOCK MOTOR
D 9
DETECTION SW
(REAR DIFF. LOCK)
B12
B16
BD2
BL3
BM
BK

REAR DIFFERENTIAL LOCK

SYSTEM OUTLINE

This system locks/frees the rear differential by operation of the rear diff. lock SW.

* With the ignition SW turned on, rear diff. lock SW on, transfer lever in L, and the speed below **8** km/h (**5** mph), the relay installed in the rear diff. lock control ECU is turned on through control of the rear diff. lock control ECU, and the current flows from **DIFF** fuse to rear diff. lock control ECU **TERMINAL 5** to **TERMINAL 3** to rear diff. lock motor **TERMINAL 3** to **TERMINAL 2** to rear diff. lock control ECU **TERMINAL 2** to **TERMINAL 7** to **GROUND**. As a result, the rear differential lock operates and the rear differential is locked. At the same time, the detection SW (Rear diff. lock) is turned on, and the rear diff. indicator light in the combination meter lights up.
* When the rear diff. lock SW is turned to off from on, the relay installed in the rear diff. lock control ECU is turned on through control of the rear diff. lock control ECU, and the current flows from **DIFF** fuse to rear diff. lock control ECU **TERMINAL 5** to **TERMINAL 2** to rear diff. lock motor **TERMINAL 2** to **TERMINAL 3** to rear diff. lock control ECU **TERMINAL 3** to **TERMINAL 7** to **GROUND**. As a result, the rear differential lock operates and the rear differential is made free. At the same time, the detection SW (Rear diff. lock) is turned off, and the rear diff. indicator light in the combination meter is turned off.

The rear diff. indicator light blinks under the following conditions:

* When the rear diff. lock SW is turned on with the ignition SW on and the transfer lever at a position other than L.
* When the rear diff. lock SW is turned on at a speed over **8** km/h (**5** mph), with the ignition SW on and the transfer position lever at **L** position.
* When the rear diff. lock motor is operating the rear differential to free from lock, and the detection SW (Rear diff. lock) is off.

SERVICE HINTS

R2 REAR DIFF. LOCK CONTROL ECU

5–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
4–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position and rear diff. lock SW at **ON** position
7–GROUND : Always continuity

: PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
A22		38	D5	36	J18	39
C5		38	D9	40	R2	39
C12	A	38	E9	38	R3	39
C13	B	38	J14	39	R18	41
C14	C	38	J17	39	V2	37

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		
2P	26	Instrument Panel integration Wire and Cowl Side J/B LH (Left Kick Panel)
3C	30	Dash Wire and Cowl Side J/B RH (Right Kick Panel)
3E	30	Floor No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3I	30	Instrument Panel Integration Wire and Cowl Side J/B RH (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EB1	44	Engine Wire and Transmission Wire (On the Transmission)
IF1	46	Instrument Panel Integration Wire and Instrument Panel Wire (Left Side of Instrument Panel)
IG3	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IN1	50	Engine Wire and Dash Wire (Behind the Glove Box)
IV1	52	Dash Wire and Floor No.2 Wire (Behind the Glove Box)
IX1	52	Instrument Panel Integration Wire and Engine Wire (Behind the Glove Box)
BD2	54	Floor No.3 Wire and Floor Wire (Left Rear Side Quarter Panel)
BF1	56	Frame Wire and Floor No.3 Wire (Left Side of Rear Floor Crossmember)
BL1	56	Floor No.2 Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)
BL3		

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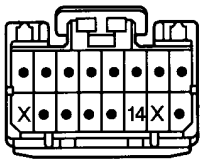
: GROUND POINTS

Code	See Page	Ground Points Location
EC	44	Rear Bank of Right Cylinder Head
IG	46	Set Bolt of Cowl Side J/B LH
BK	54	Front Side Under the Front Passenger's Seat
BM	54	Left Rear Side Quarter Panel

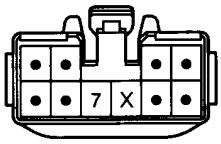
: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E8	44	Transmission Wire	I17	48	Floor No.2 Wire
I15	48	Dash Wire	B12	56	Frame Wire
I16	48	Floor No.2 Wire	B16	56	Floor No.3 Wire

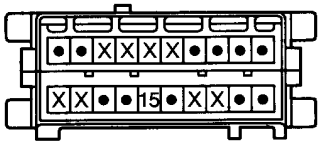
A22



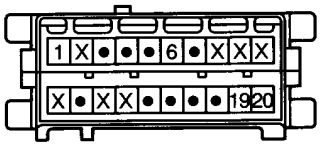
C5



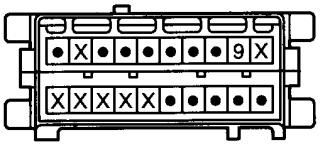
C12 (A)
GRAY



C13 (B)

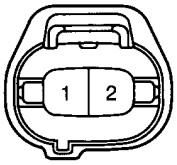


C14 (C)
GRAY

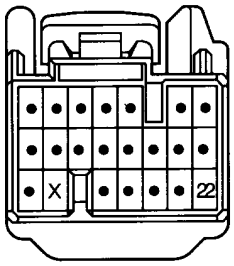


D5
GRAY

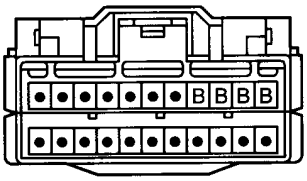
D9
BLUE



E9

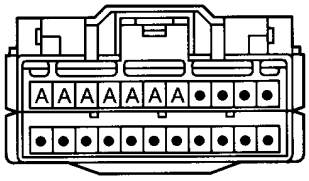


J14



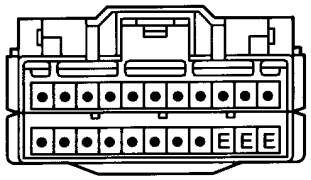
(Hint : See Page 7)

J17



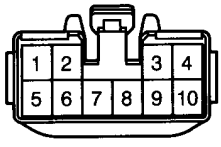
(Hint : See Page 7)

J18
GRAY



(Hint : See Page 7)

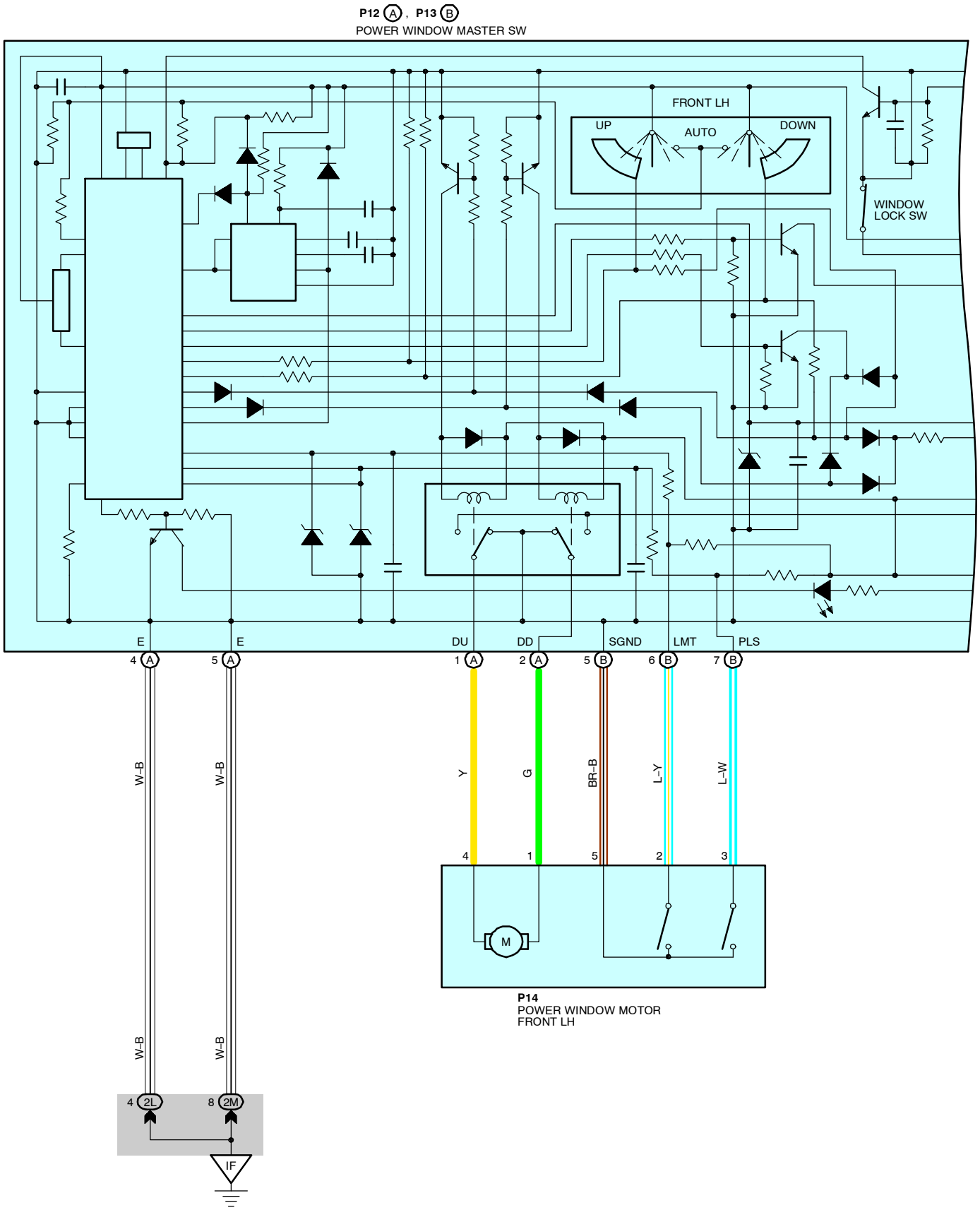
R2



R3

R18
GRAY

V2
BLACK



P14
POWER WINDOW MOTOR
FRONT LH

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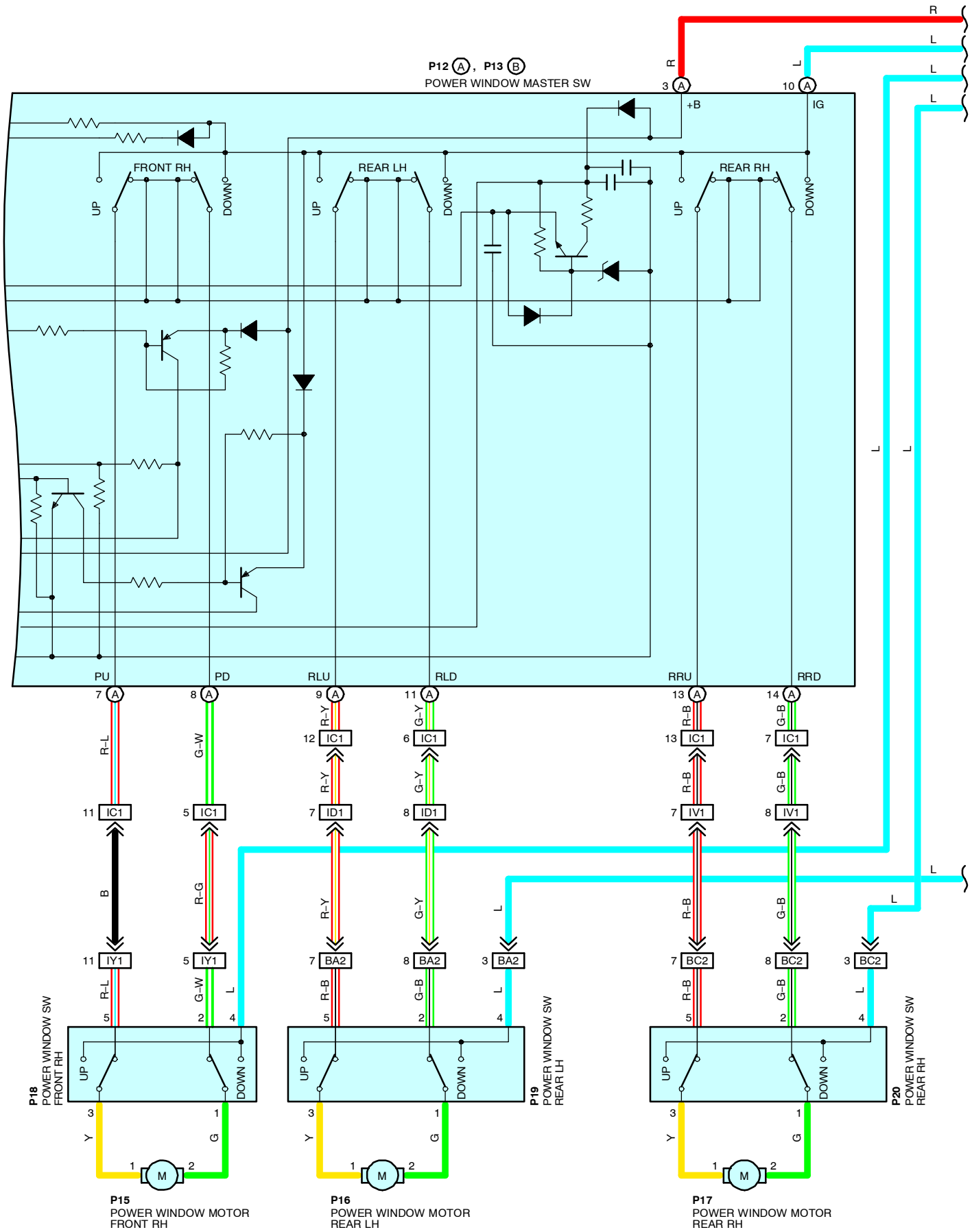

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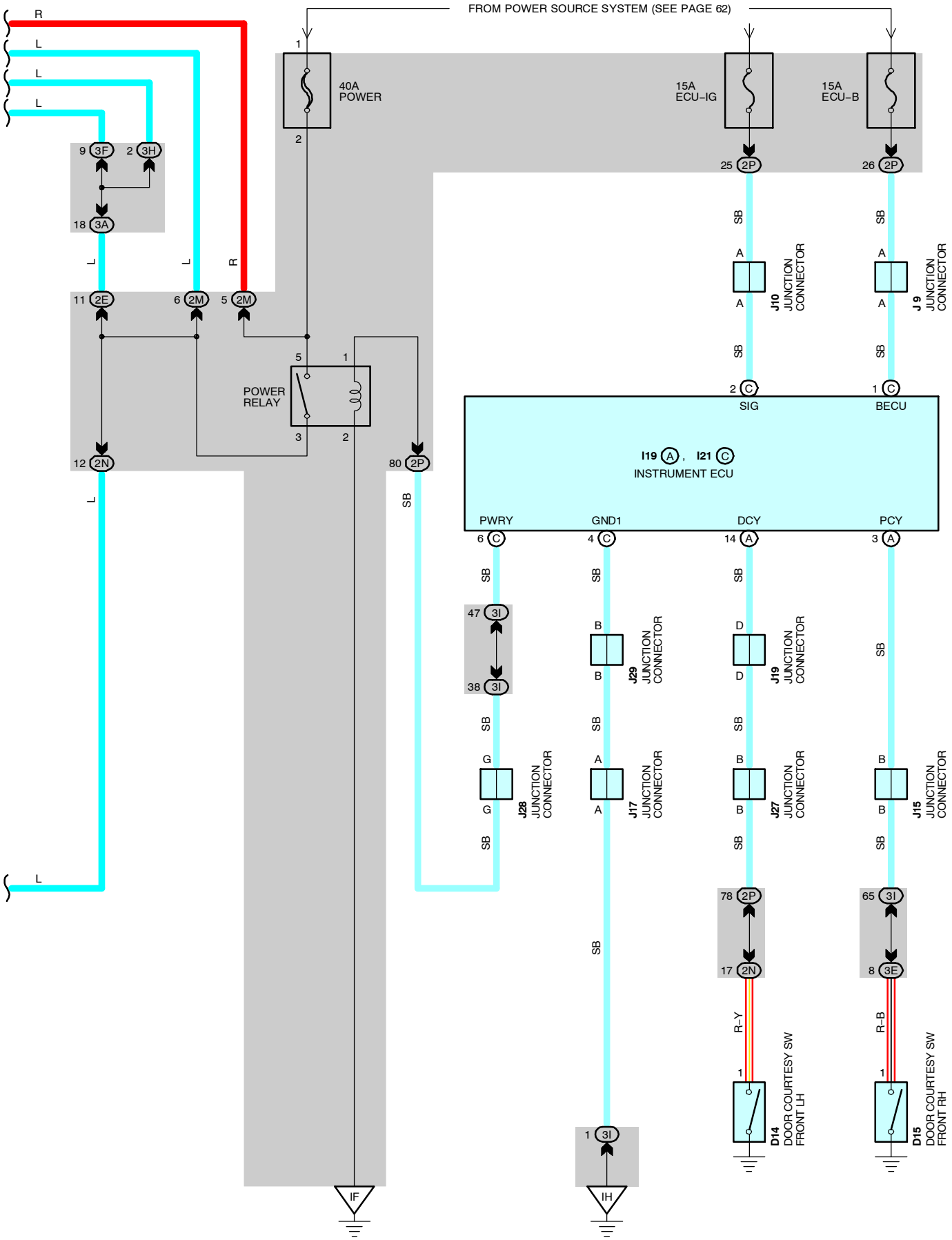
POWER WINDOW



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SYSTEM OUTLINE

1. MANUAL DOWN OR UP OPERATION (DRIVER'S SIDE)

When the power window master SW is pressed one step, the current flows from the power window master SW **TERMINAL DD** to power window motor front LH to power window master SW **TERMINAL DU** to **GROUND**, and rotates the motor to open the window.

When the power window master SW is pulled one step, the current flows from the power window master SW **TERMINAL DU** to power window motor front LH to power window master SW **TERMINAL DD** to **GROUND**, and rotates the motor to close the window.

For the other windows, as the power window master SW and power window SW is operated, the relevant door window is opened or closed.

2. AUTO DOWN OR UP OPERATION (DRIVER'S SIDE)

When the power window master SW is pushed two steps, the power window master SW determines it is in auto mode and the current flows from the power window master SW **TERMINAL DD** to power window motor front LH to power window master SW **TERMINAL DU** to **GROUND**, and rotates the motor to open the window automatically.

When the power window master SW is pulled two steps, the power window master SW determines it is in auto mode and the current flows from the power window master SW **TERMINAL DU** to power window motor front LH to power window master SW **TERMINAL DD** to **GROUND**, and rotates the motor to close the window automatically.

3. CATCHING PREVENTION FUNCTION (DRIVER'S SIDE)

When any foreign matter is caught in the window during power window up operation, the pulse sensor in the power window motor detects the changes in the number of motor rotations and forcibly opens the door window **50** mm, or when the window opening is less than **200** mm, it opens the window until the opening is **200** mm.

4. KEY OFF POWER WINDOW OPERATION

It is possible to operate the power window for approx. **43** seconds after the ignition SW is turned from on to off. However, when the door is opened while the window is being operated, the power window operation is stopped even though **43** seconds have not elapsed.

SERVICE HINTS

P12 POWER WINDOW MASTER SW

3–GROUND	:	Always approx. **12** volts
10–GROUND	:	Approx. **12** volts with ignition SW at **ON** or **ST** position
	:	Approx. **12** volts with key off power window operation
4, 5–GROUND	:	Always continuity
1–GROUND	:	Continuity with power window master SW at **MANUAL UP** position
	:	Continuity with power window master SW at **AUTO UP** position
2–GROUND	:	Continuity with power window master SW at **MANUAL DOWN** position
	:	Continuity with power window master SW at **AUTO DOWN** position

WINDOW LOCK SW

Open with the window lock SW at lock position

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
D14	40	J17	39	P14	41
D15	40	J19	39	P15	41
I19 A	38	J27	39	P16	41
I21 C	38	J28	39	P17	41
J9	39	J28	39	P18	41
J10	39	P12 A	41	P19	41
J15	39	P13 B	41	P20	41

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: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
2E	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2L	24	Front Door LH Wire and Cowl Side J/B LH (Left Kick Panel)
2M		
2N	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)
3A	30	Engine Room No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3E	30	Floor No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3F		
3H	30	Front Door RH Wire and Cowl Side J/B RH (Right Kick Panel)
3I	30	Instrument Panel Integration Wire and Cowl Side J/B RH (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IC1	46	Front Door LH Wire and Dash Wire (Left Kick Panel)
ID1	46	Dash Wire and Floor Wire (Left Kick Panel)
IV1	52	Dash Wire and Floor No.2 Wire (Behind the Glove Box)
IY1	52	Front Door RH Wire and Dash Wire (Right Kick Panel)
BA2	54	Rear Door LH Wire and Floor Wire (Left Side of Center Pillar)
BC2	54	Rear Door RH Wire and Floor No.2 Wire (Right Side of Center Pillar)

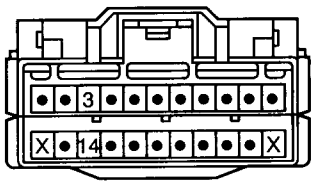
: GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH
IH	46	Set Bolt of Cowl Side J/B RH

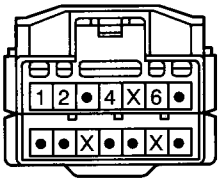
D14

D15

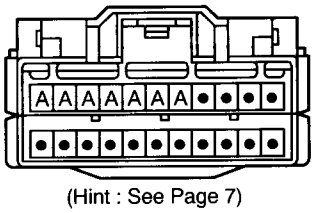
I19 (A)



I21 (C)
BLUE

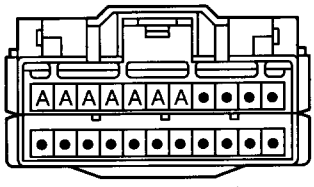


J9
GRAY



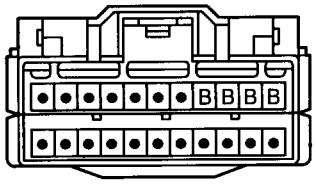
(Hint : See Page 7)

J10



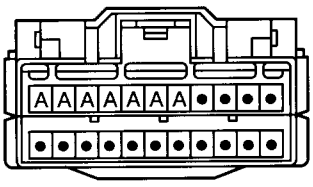
(Hint : See Page 7)

J15
GRAY



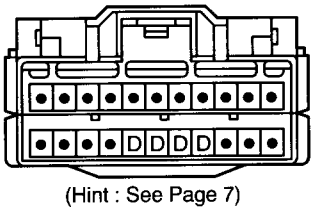
(Hint : See Page 7)

J17



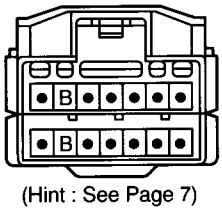
(Hint : See Page 7)

J19
GRAY



(Hint : See Page 7)

J27
GRAY



(Hint : See Page 7)

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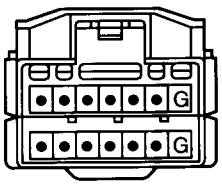
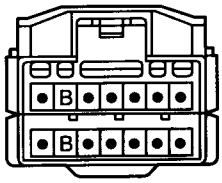
J28



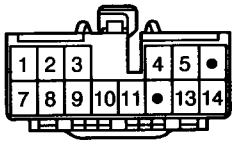
(Hint : See Page 7)

J29

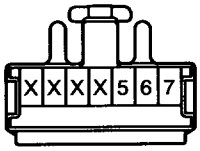


(Hint : See Page 7)

P12 (A)



P13 (B)



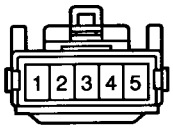
P14

P15
GRAY

P16
GRAY

P17
GRAY

P18



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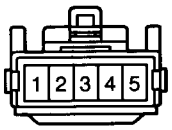

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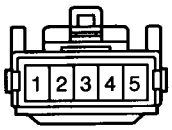

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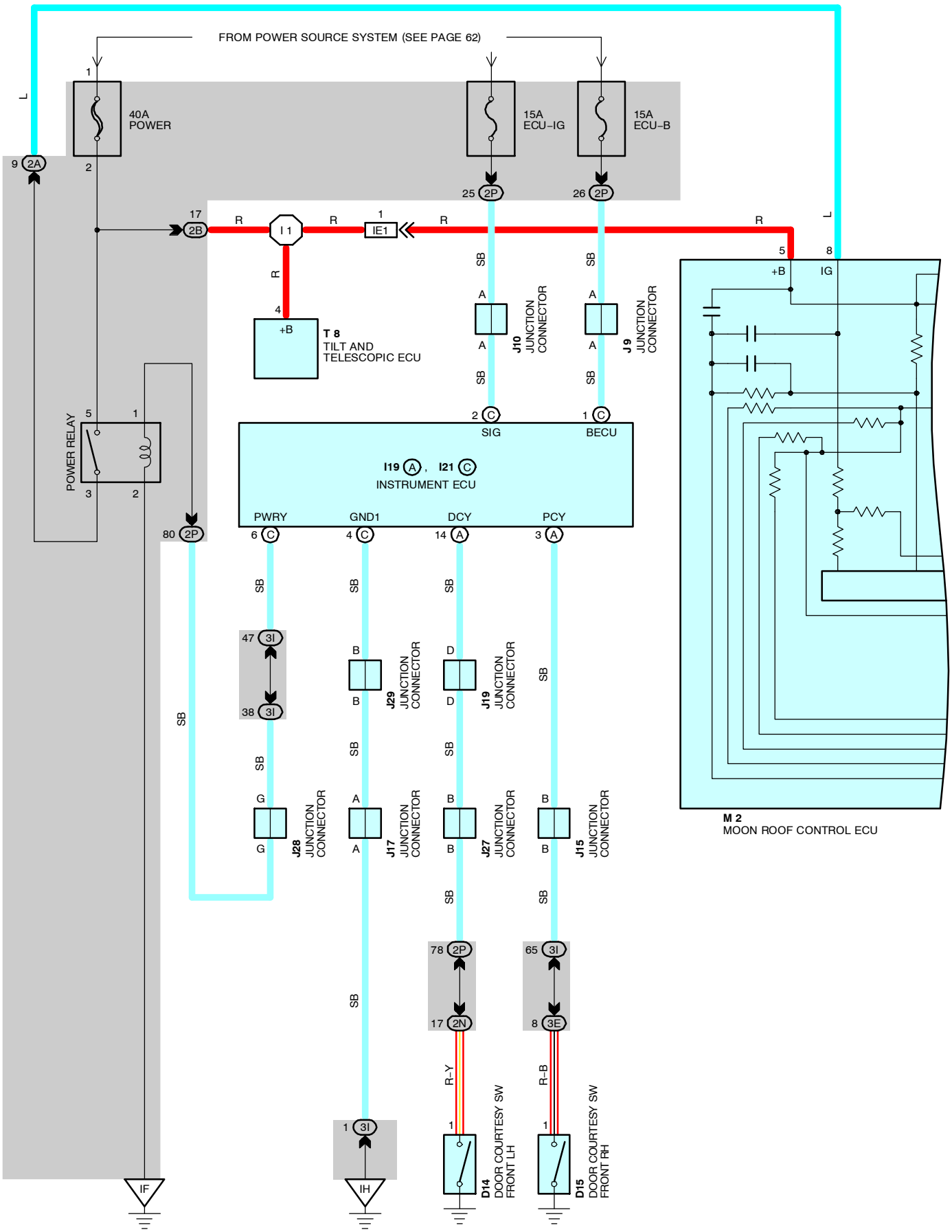
MOON ROOF



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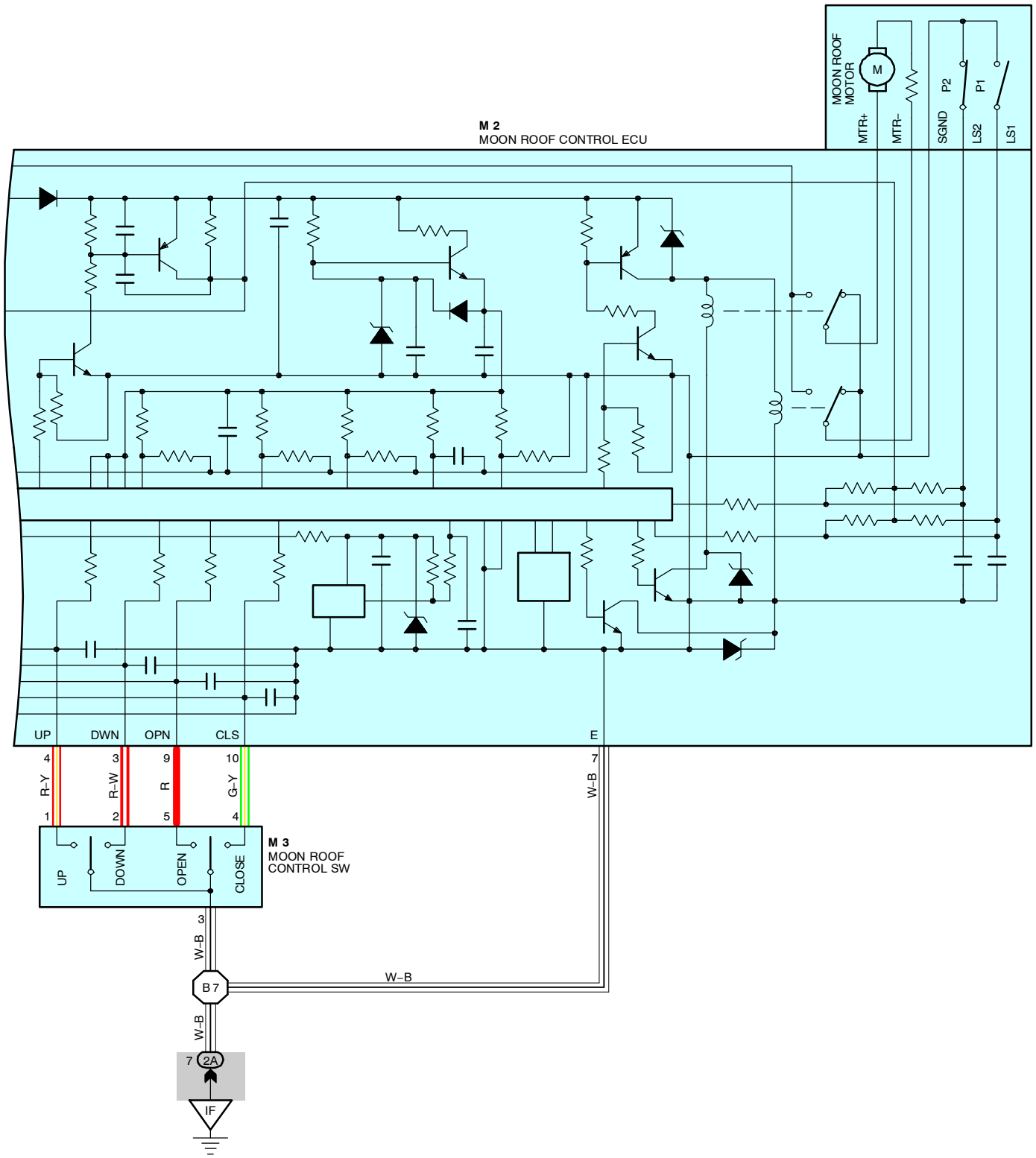

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SYSTEM OUTLINE

In this system, the HALL IC in the moon roof control ECU detects the changes in motor rotation, and allows opening/closing, tilting up/down of the moon roof by one touch operation.
In addition, catching prevention function during moon roof operation is also provided.
Voltage is constantly applied from **POWER** fuse to moon roof control ECU **TERMINAL 5**. When the ignition SW is turned on, the current flows from **POWER** fuse to moon roof control ECU **TERMINAL 8**.

1. SLIDE OPEN OPERATION

When the moon roof control SW is kept pressed to **OPEN** position for approx. **0.3** seconds or longer (Limit SW No.1 off, limit SW No.2 on), a signal is input from moon roof control SW **TERMINAL 5** to moon roof control ECU **TERMINAL 9**. This activates the moon roof control ECU and rotates the motor to open the moon roof automatically. Then, when the limit SW No.1 is turned on and then turned off again, the pulse signal sent from the HALL IC activates the moon roof control ECU, and determines that the moon roof is fully open, and stops the motor. If other operation SW or the open SW is operated while the moon roof is being opened, the moon roof control ECU is activated to stop the moon roof operation. In addition, when the moon roof is tilted up, the slide open operation does not function.

2. SLIDE CLOSE OPERATION

When the moon roof control SW is kept pressed to **CLOSE** position for approx. **0.3** seconds or longer (Limit SW No.1 off, limit SW No.2 off), a signal is input from moon roof control SW **TERMINAL 4** to moon roof control ECU **TERMINAL 10**. This activates the moon roof control ECU and rotates the motor to close the moon roof automatically. Then, when the limit SW No.2 is turned on, the pulse signal sent from the HALL IC activates the moon roof control ECU, and determines that the moon roof is closed fully, and stops the motor. If other operation SW or the close SW is operated while the moon roof is being closed, the moon roof control ECU is activated to stop the moon roof operation.

3. TILT UP OPERATION

When the moon roof control SW is kept pressed to **UP** position for approx. **0.3** seconds or longer (Limit SW No.1 off, limit SW No.2 on), a signal is input from moon roof control SW **TERMINAL 1** to moon roof control ECU **TERMINAL 4**. This activates the moon roof control ECU and rotates the motor to tilt up the moon roof automatically. If the pulse signal is not input from the HALL IC for **0.5** seconds or longer, it determines that the moon roof is fully tilted up, and stops the motor. If other operation SW or the tilt up SW is operated while the moon roof is being tilted up, the moon roof control ECU is activated to stop the moon roof operation. In addition, when the moon roof is opened, the tilt up operation does not function.

4. TILT DOWN OPERATION

When the moon roof control SW is kept pressed to **DOWN** position for approx. **0.3** seconds or longer (Limit SW No.1 on, limit SW No.2 on), a signal is input from moon roof control SW **TERMINAL 2** to moon roof control ECU **TERMINAL 3**. This activates the moon roof control ECU and rotates the motor to tilt down the moon roof automatically.
Then, when the limit SW No.1 is turned off, the pulse signal sent from the HALL IC activated the moon roof control ECU, and determines that the moon roof is closed fully, and stops the motor.
If other operation SW or the tilt down SW is operated while the moon roof is being tilted down, the moon roof control ECU is activated to stop the moon roof operation.

5. CATCHING PREVENTION FUNCTION

During slide close or tilt down operation, if the moon roof control ECU detects a catching load from the changes in the rotation of the motor, the operation is stopped, and the motor is rotated in the reverse direction.

* Slide close operation
  The moon roof is moved approx. **200** mm in the reverse direction (Slide open) after a catching load has been detected. However, if the full open position is detected before moving approx. **200** mm, the reverse movement is stopped.
* Tilt down operation
  If a catching load is detected, the moon roof is moved in the reverse direction until fully tilted up.

6. KEY OFF MOON ROOF OPERATION

Within approx. **45** seconds after the ignition SW is turned from ON to OFF, the moon roof can be operated. However, if the driver or front passenger door is opened during this period of time, the moon roof operation is stopped even though **45** seconds have not elapsed.

7. FAIL–SAFE FUNCTION

If the moon roof is operated continuously in the same direction, the current flowing to the motor is cut off when the time shown below has elapsed after the motor operation has been started.

* Slide open/close operation by the moon roof SW approx. **20** seconds
* Tilt up/down operation by the moon roof SW approx. **2** seconds
* Slide open operation for reverse movement in case of catching prevention function approx. **20** seconds
* Tilt up operation for reverse movement in case of catching prevention function approx. **2** seconds

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SERVICE HINTS

M2 MOON ROOF CONTROL ECU

5–GROUND : Always approx, **12** volts
8–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position or key off moon roof operation
: Approx. **12** volts with key off moon roof operation
7–GROUND : Always continuity

M3 MOON ROOF CONTROL SW

1–3 : Closed with moon roof control SW at **TILT UP** position
2–3 : Closed with moon roof control SW at **TILT DOWN** position
5–3 : Closed with moon roof control SW at **OPEN** position
4–3 : Closed with moon roof control SW at **CLOSE** position
3–GROUND : Always continuity

POWER RELAY

5–3 : Closed with ignition SW at **ON** or **ST** position
: Closed with key off moon roof operation

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
D14	40	J10	39	J28	39
D15	40	J15	39	J29	39
I19 A	38	J17	39	M2	40
I21 C	38	J19	39	M3	40
J9	39	J27	39	T8	39

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
2A	24	Roof Wire and Cowl Side J/B LH (Left Kick Panel)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2N	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)
3E	30	Floor No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
EI	30	Instrument Panel Integration Wire and Cowl Side J/B RH (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IE1	46	Dash Wire and Roof Wire (Left Kick Panel)

: GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH
IH	46	Set Bolt of Cowl Side J/B RH

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I1	48	Dash Wire	B7	56	Roof Wire

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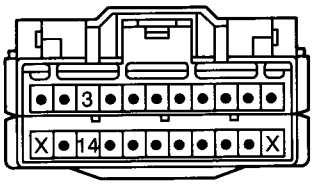
MOON ROOF

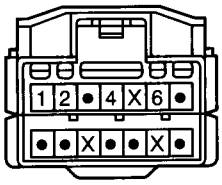
D14

D15

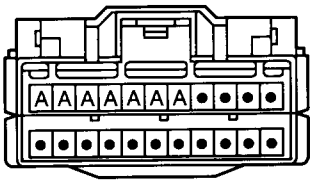
I19 (A)



I21 (C)
BLUE

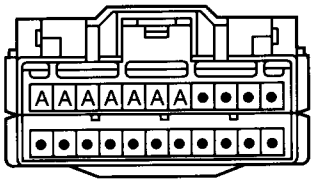


J9
GRAY



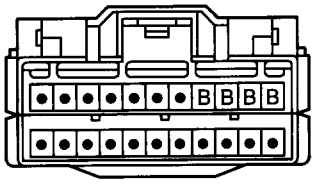
(Hint : See Page 7)

J10



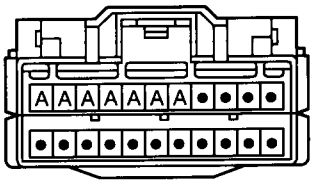
(Hint : See Page 7)

J15
GRAY



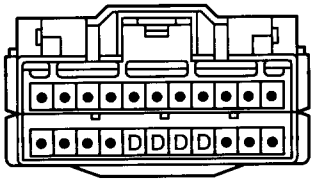
(Hint : See Page 7)

J17



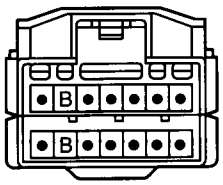
(Hint : See Page 7)

J19
GRAY



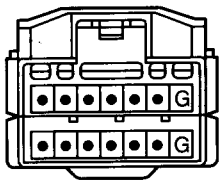
(Hint : See Page 7)

J27
GRAY



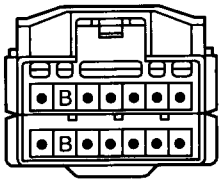
(Hint : See Page 7)

J28



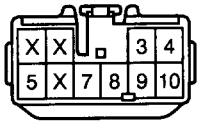
(Hint : See Page 7)

J29



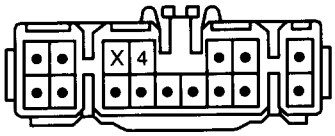
(Hint : See Page 7)

M2



M3

T8



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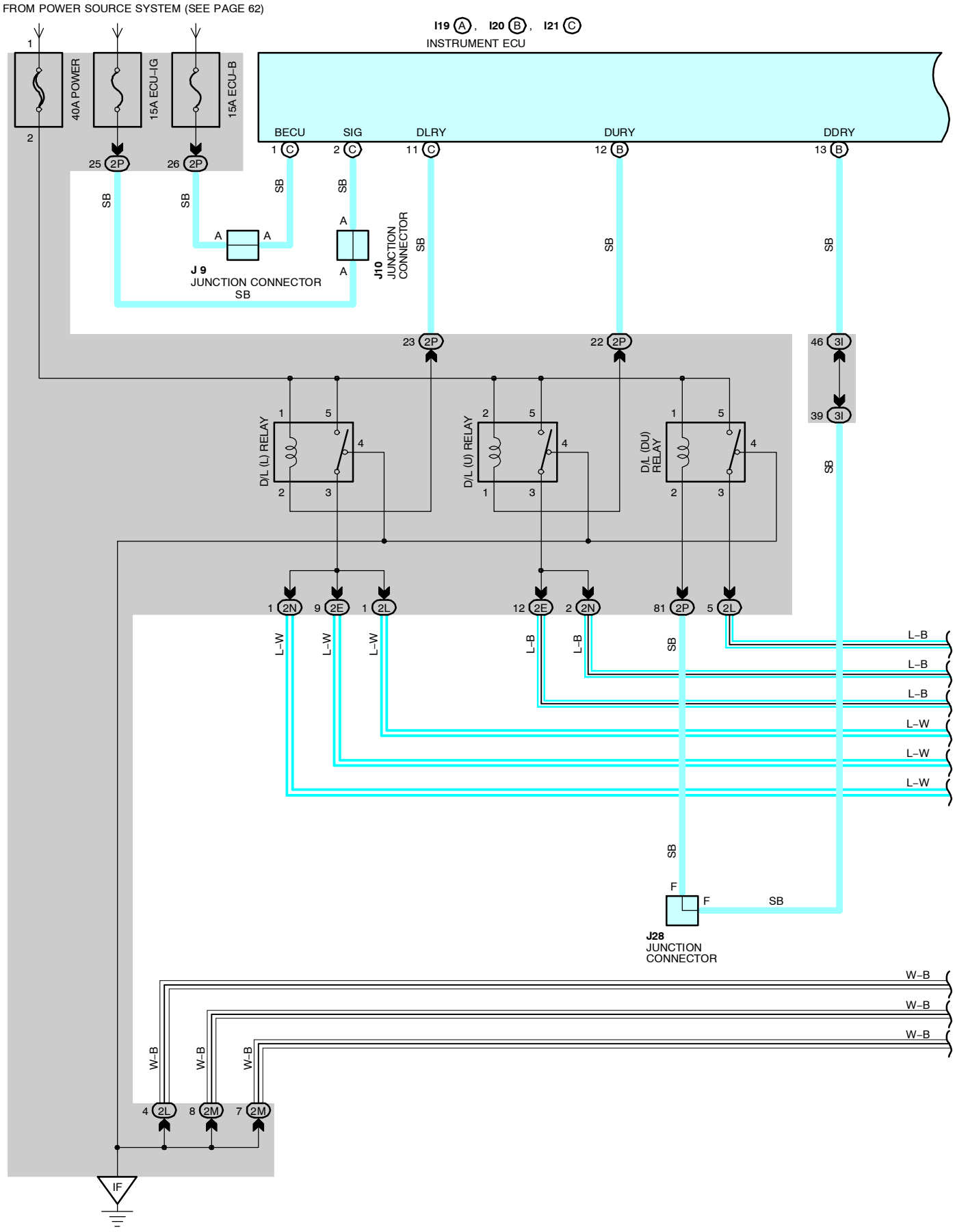
DOOR LOCK CONTROL



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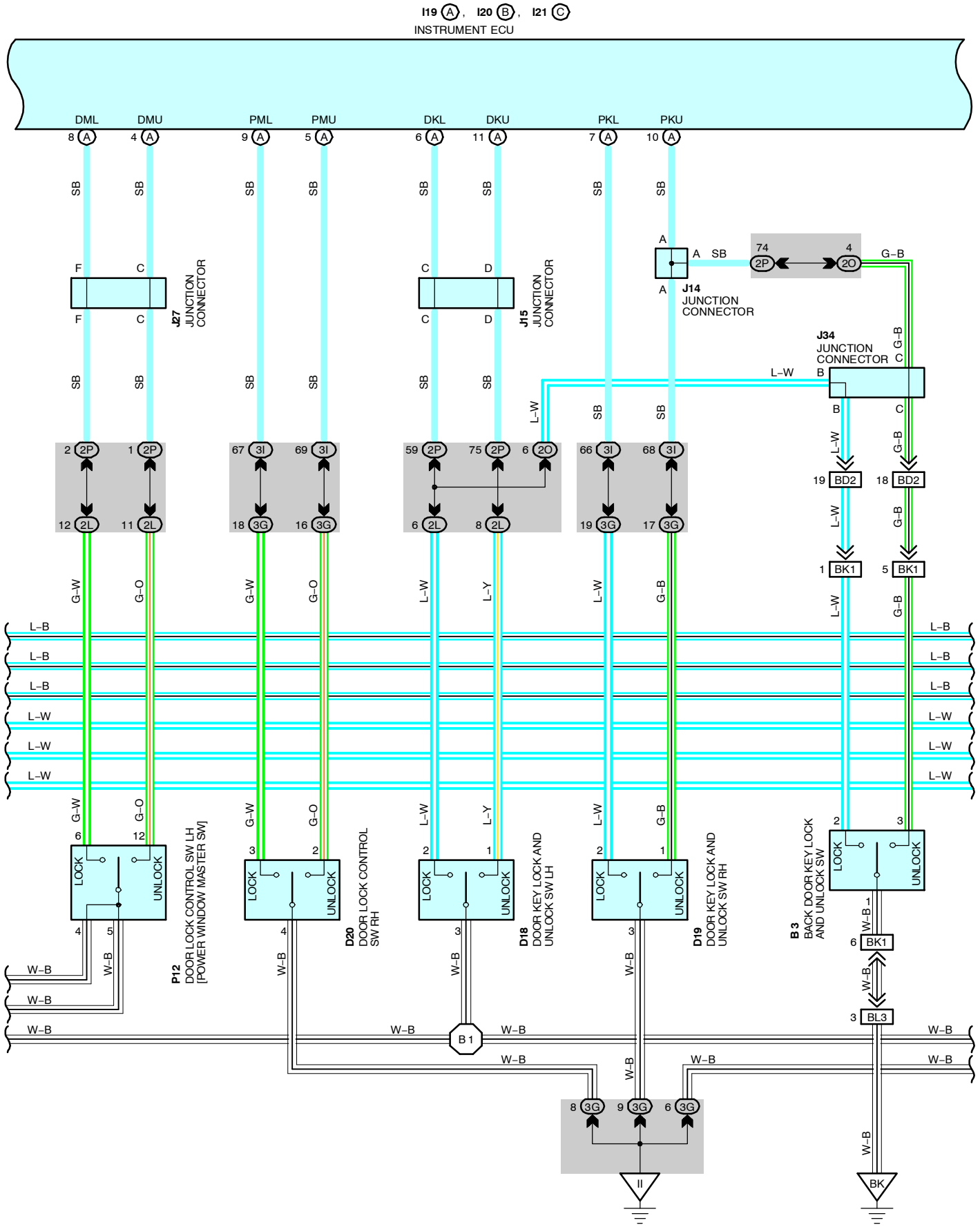

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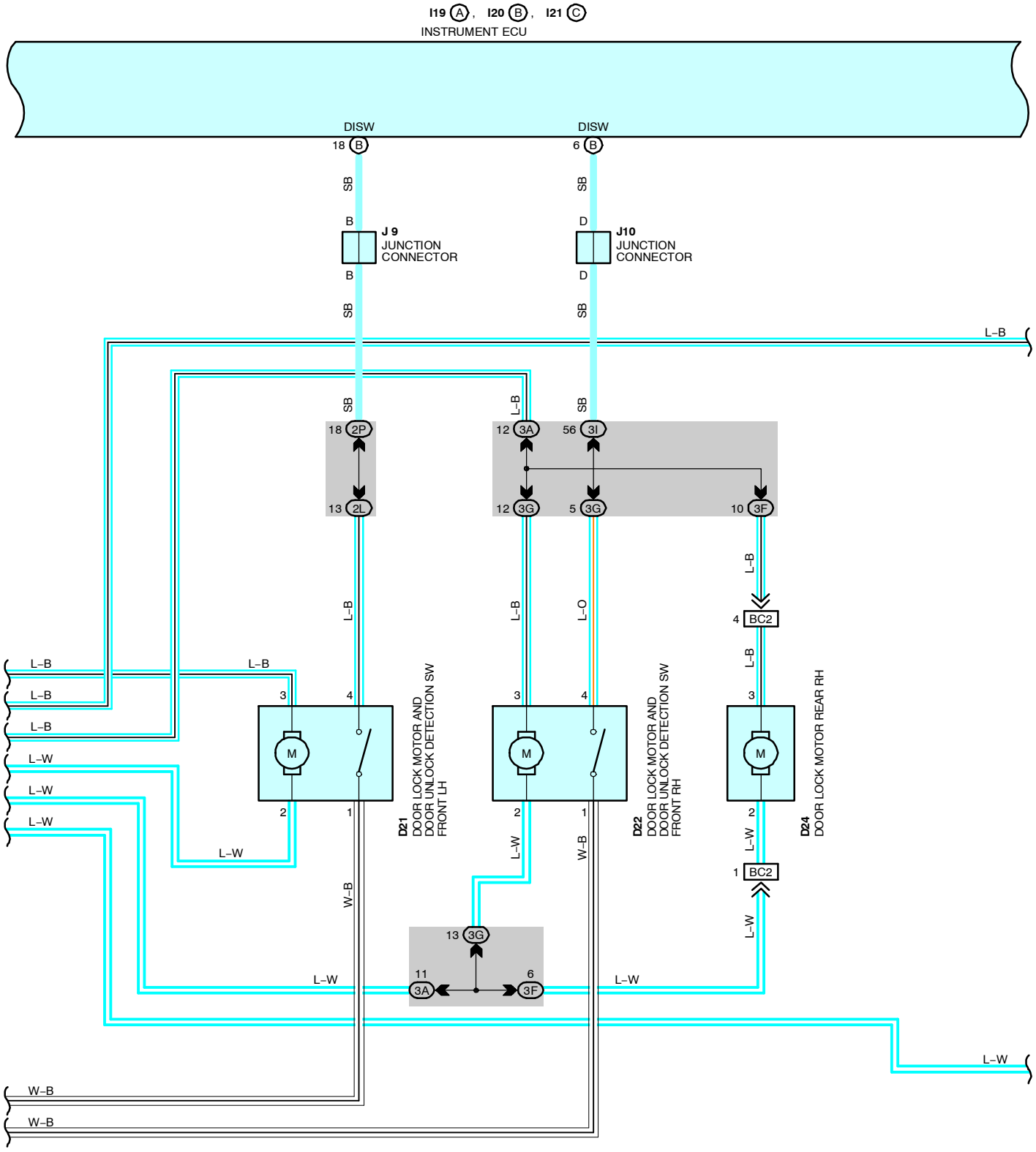
DOOR LOCK CONTROL



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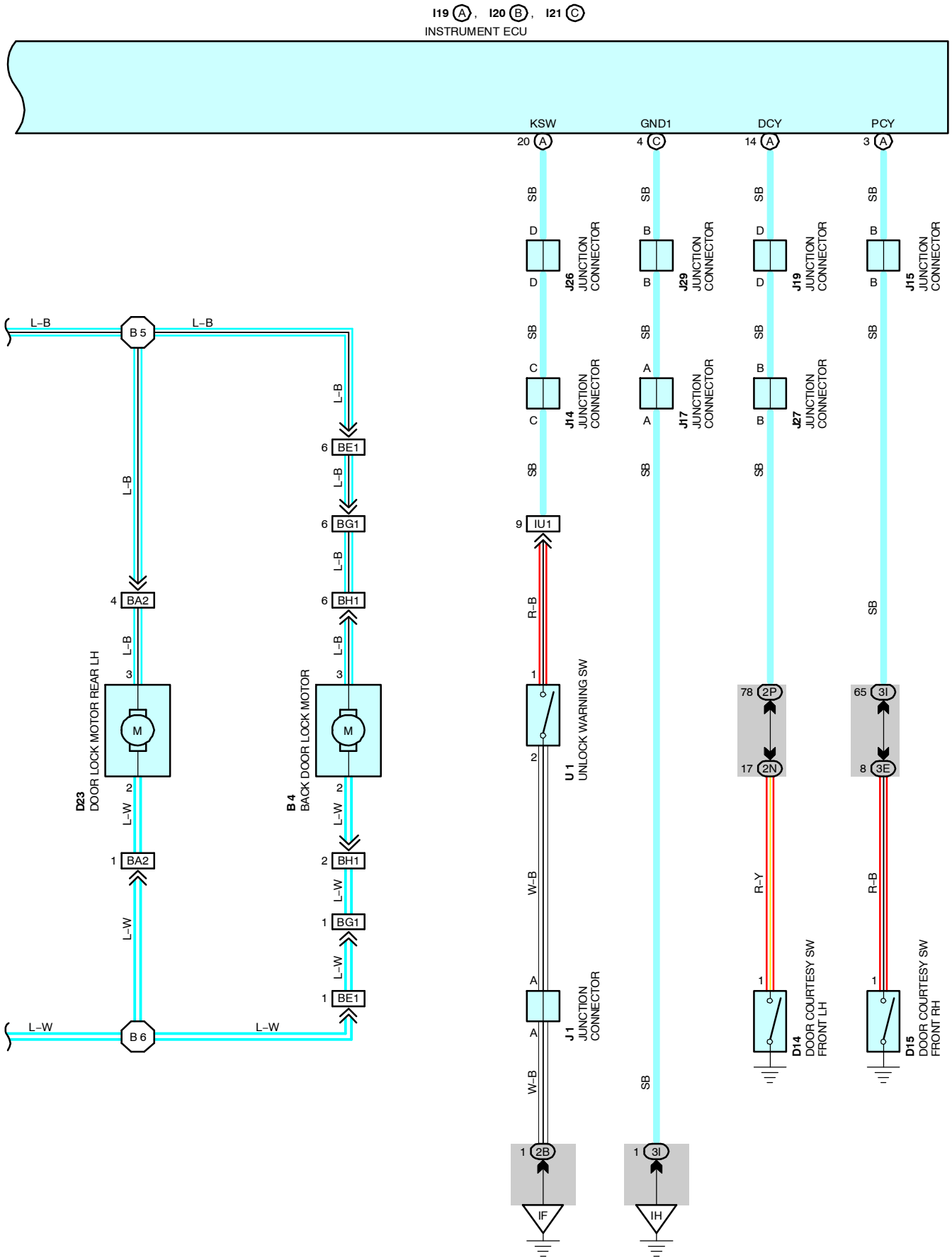

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DOOR LOCK CONTROL

SYSTEM OUTLINE

1. MANUAL UNLOCK OPERATION

When the door lock control SW of the driver or front passenger door is pressed to unlock side, a signal is input to the instrument ECU **TERMINAL DMU**, and **TERMINAL PMU** respectively. Then the current flows from the **POWER** fuse to D/L (U) relay (Coil side) to instrument ECU **TERMINAL DURY** to **TERMINAL GND1** to **GROUND**, and turns on the D/L (U) relay and D/L (DU) relay. At the same time, the current flows from the **POWER** fuse to D/L (U) relay, D/L (DU) relay **TERMINAL 5** to **TERMINAL 3** to door lock motor and back door lock motor to D/L (L) relay **TERMINAL 3** to **TERMINAL 4** to **GROUND**, and unlocks the door.

2. MANUAL LOCK OPERATION

When the door lock control SW of the driver or front passenger door is pressed to lock side, a signal is input to the instrument ECU **TERMINAL DML**, and **TERMINAL PML** respectively. Then the current flows from the **POWER** fuse to D/L (L) relay (Coil side) to instrument ECU **TERMINAL DLRY** to **TERMINAL GND1** to **GROUND**. This turns on the D/L (L) relay and the current flows from the **POWER** fuse to D/L (L) relay **TERMINAL 5** to **TERMINAL 3** to door lock motor and back door lock motor to D/L (U) relay, D/L (DU) relay **TERMINAL 3** to **TERMINAL 4** to **GROUND**, and locks the door.

3. DOOR KEY UNLOCK OPERATION

* Unlock operation from driver door

When the door is unlocked once by the ignition key from the driver side, a signal is input from door key lock and unlock SW LH to instrument ECU **TERMINAL DKU**. As a result, the instrument ECU operates and the current flows from **POWER** fuse to D/L (DU) relay (Coil side) to instrument ECU **TERMINAL DDRY** to **TERMINAL GND1** to **GROUND**, and turns on the D/L (DU) relay. At the same time, the current flows from the **POWER** fuse to D/L (DU) relay **TERMINAL 5** to **TERMINAL 3** to door lock motor front LH to D/L (L) relay **TERMINAL 3** to **TERMINAL 4** to **GROUND**, and unlocks the driver door only. Accordingly, if the second unlock operation is made within **3** seconds, a signal is input to instrument ECU **TERMINAL DKU**, and the current flows as manual unlock operation, and unlocks all the doors.

* Unlock operation from front passenger or back door

When the front passenger door or back door is unlocked using the ignition key, a signal from the door key lock and unlock SW RH and/or back door key lock and unlock SW is input to instrument ECU **TERMINAL PKU**. As a result, the current flows as manual unlock operation and unlocks all the doors at once.

*

4. IGNITION KEY REMINDER OPERATION

When the door is locked using the door lock knob with the ignition key remaining in the key cylinder and door opened, it is automatically unlocked. Additionally, if lock operation is made by the door lock control SW or door key lock SW, after the lock operation is completed, the doors are unlocked automatically.

SERVICE HINTS

119 (A), 121 (C) INSTRUMENT ECU

(C) 1–GROUND : Always approx. **12** volts
(C) 2–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
(C) 4–GROUND : Always continuity
(A) 3–GROUND : Continuity with front RH door open
(A)14–GROUND : Continuity with front LH door open
(A)20–GROUND : Continuity with ignition key in ignition key cylinder

D21, D22 DOOR LOCK MOTOR AND DOOR UNLOCK DETECTION SW FRONT LH, RH

2–GROUND : Approx. **12** volts with door lock motor at lock operate
3–GROUND : Approx. **12** volts with door lock motor at unlock operate

D23, D24 DOOR LOCK MOTOR REAR LH, RH

2–GROUND : Approx. **12** volts with door lock motor at lock operate
3–GROUND : Approx. **12** volts with door lock motor at unlock operate

B4 BACK DOOR LOCK MOTOR

2–GROUND : Approx. **12** volts with door lock motor at lock operate
3–GROUND : Approx. **12** volts with door lock motor at unlock operate

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: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
B3	40	D24	40	J19	39
B4	40	I19 A	38	J26	39
D14	40	I20 B	38	J27	39
D15	40	I21 C	38	J28	39
D18	40	J1	39	J29	39
D19	40	J9	39	J34	40
D20	40	J10	39	P12	41
D21	40	J14	39	U1	39
D22	40	J15	39		
D23	40	J17	39		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2E	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2L	24	Front Door LH Wire and Cowl Side J/B LH (Left Kick Panel)
2M		
2N	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2O		
2P	26	Instrument Panel integration Wire and Cowl Side J/B LH (Left Kick Panel)
3A	30	Engine Room No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3E	30	Floor No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3F		
3G	30	Front Door RH Wire and Cowl Side J/B RH (Right Kick Panel)
3I	30	Instrument Panel Integration Wire and Cowl Side J/B RH (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IU1	50	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
BA2	54	Rear Door LH Wire and Floor Wire (Left Side of Center Pillar)
BC2	54	Rear Door RH Wire and Floor No.2 Wire (Right Side of Center Pillar)
BD2	54	Floor No.3 Wire and Floor Wire (Left Rear Side Quarter Panel)
BE1	54	Luggage Room Wire and Floor Wire (Left Rear Side Quarter Panel)
BG1	56	Pillar No.1 Wire and Luggage Room Wire (Left Rear Side Roof Panel)
BH1	56	Pillar No.1 Wire and Back Door Upper Wire (Left Side of Back Door)
BK1	56	Back Door Lower Wire and Floor No,3 Wire (Right Side of Rear Floor Crossmember)
BL3	56	Floor No.2 Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)

: GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH
IH	46	Set Bolt of Cowl Side J/B RH
II		
BK	54	Front Side Under the Front Passenger's Seat

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
B1	56	Front Door LH Wire	B6	56	Floor Wire
B5	56	Floor Wire			

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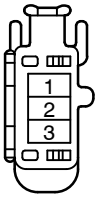
DOOR LOCK CONTROL

B3



B4
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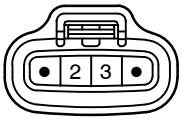


D14

D15

D18
GRAY

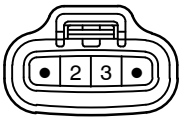
D19
GRAY

D20

D21
BLACK

D22
BLACK

D23
BLACK



D24
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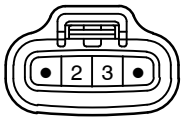
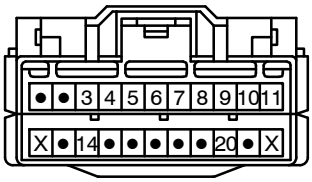


I19 (A)



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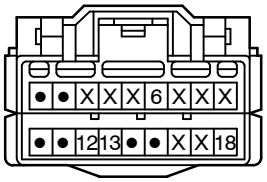

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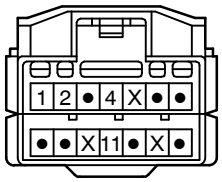

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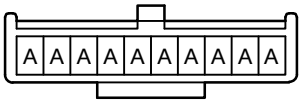

(Hint : See Page 7)

J9
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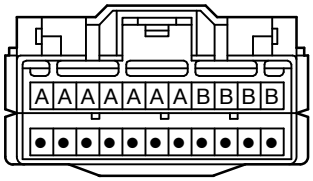

(Hint : See Page 7)

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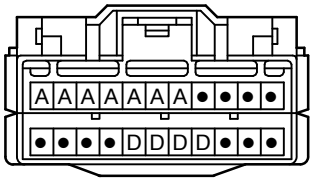

(Hint : See Page 7)

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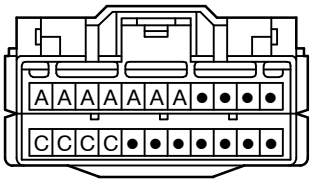

(Hint : See Page 7)

J15
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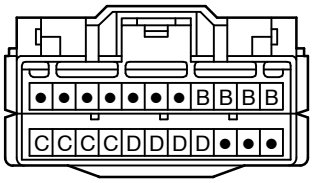

(Hint : See Page 7)

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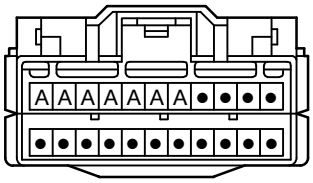

(Hint : See Page 7)

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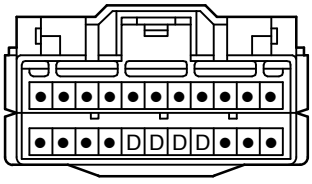

(Hint : See Page 7)

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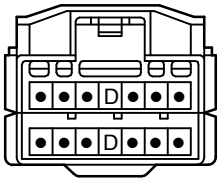

(Hint : See Page 7)

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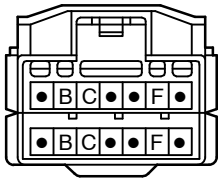
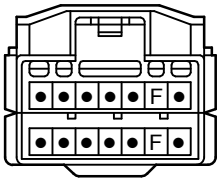


(Hint : See Page 7)

J28



(Hint : See Page 7)

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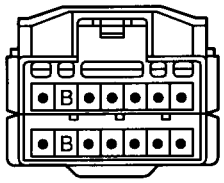
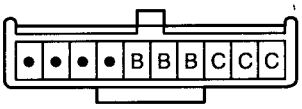
J29



(Hint : See Page 7)

J34



(Hint : See Page 7)

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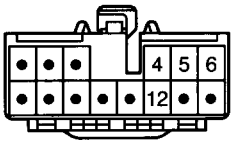

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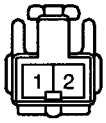

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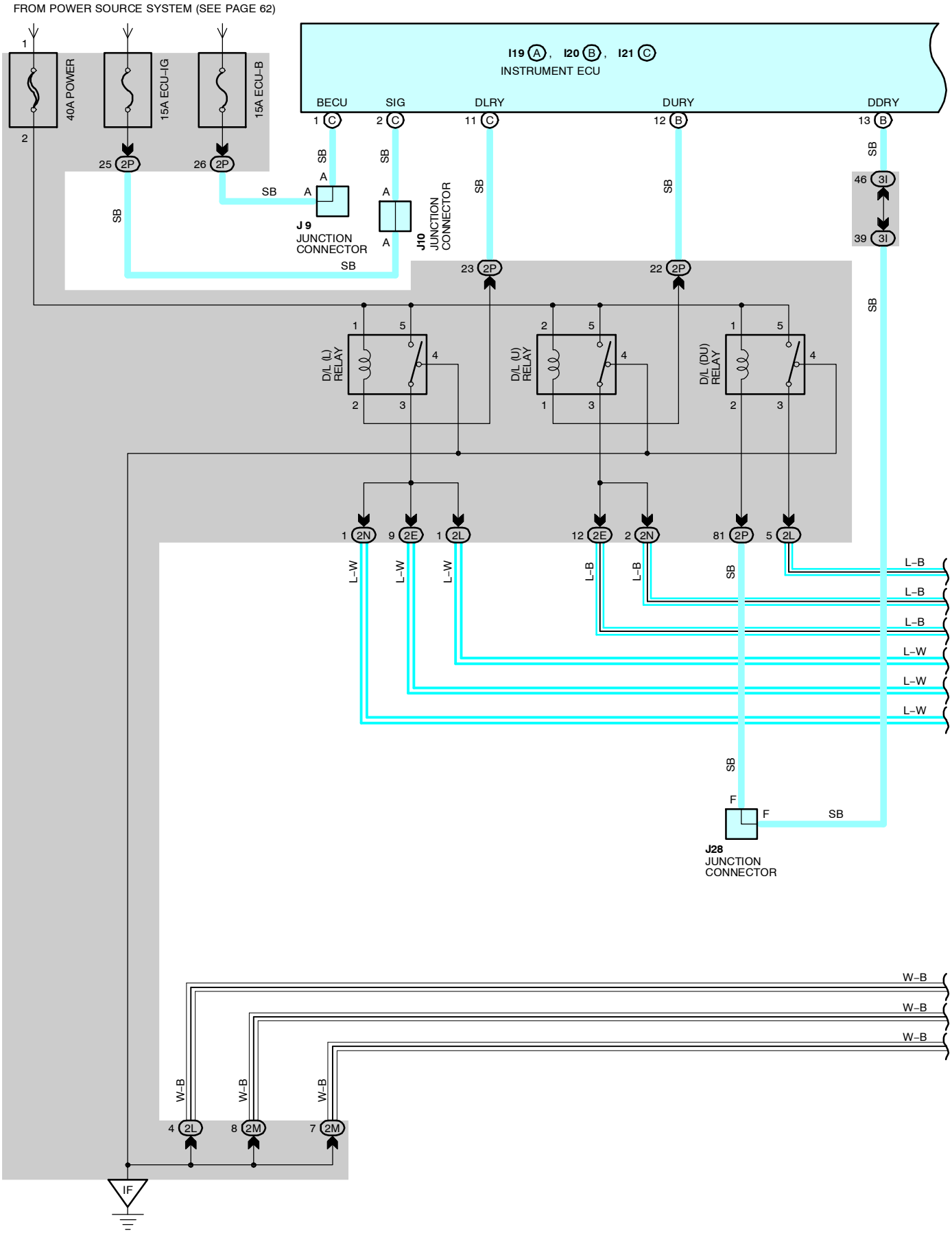
WIRELESS DOOR LOCK CONTROL



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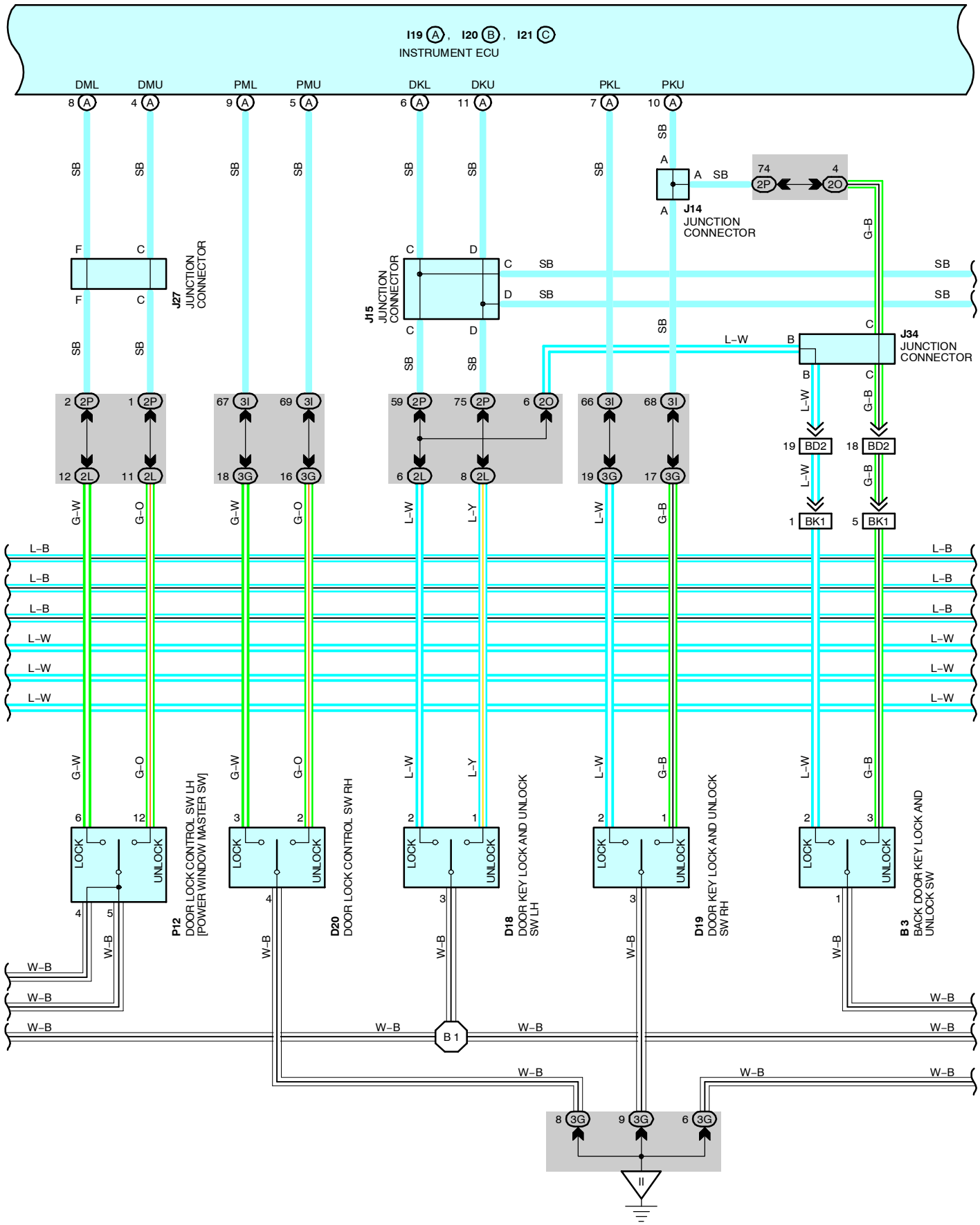

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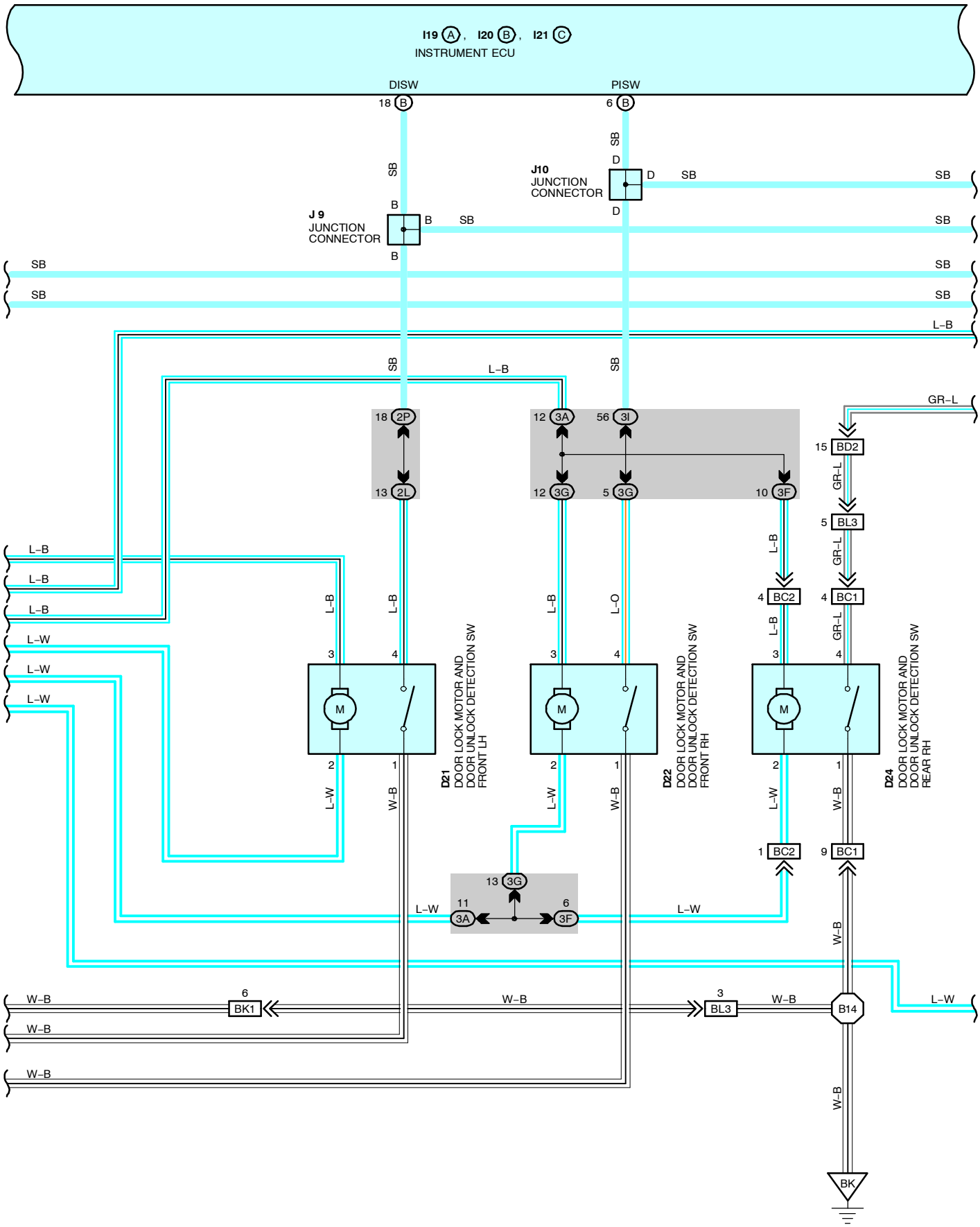
WIRELESS DOOR LOCK CONTROL



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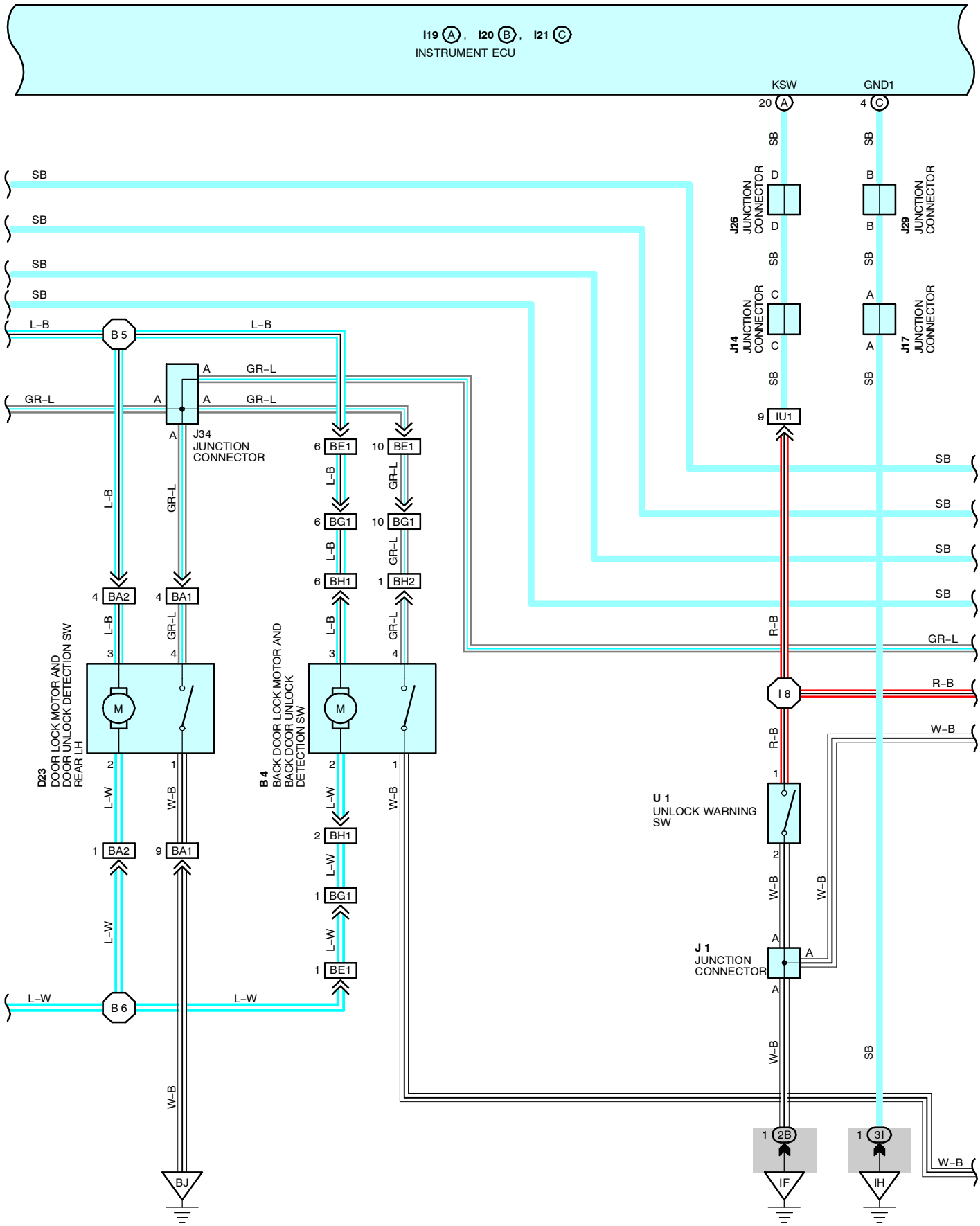

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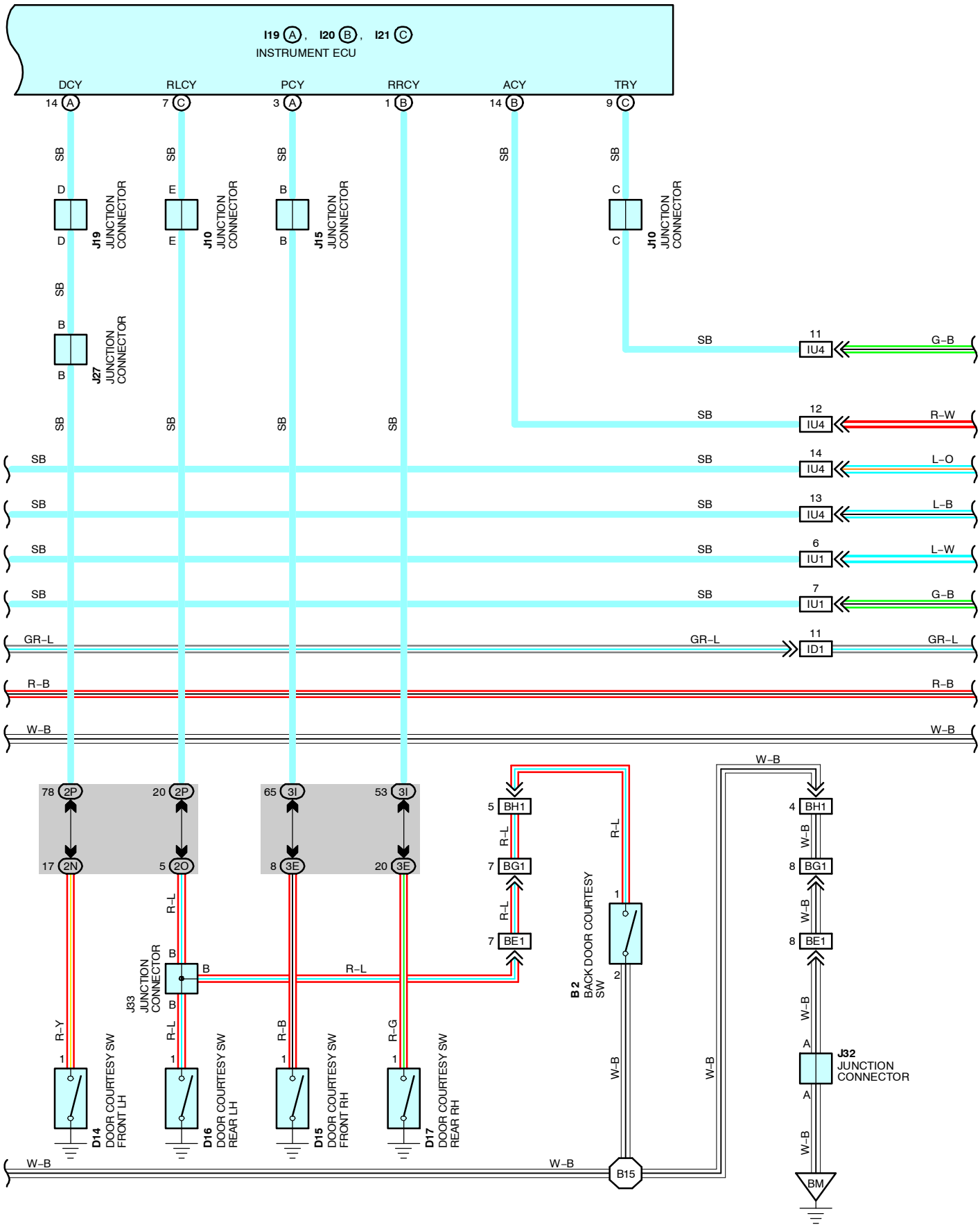
WIRELESS DOOR LOCK CONTROL



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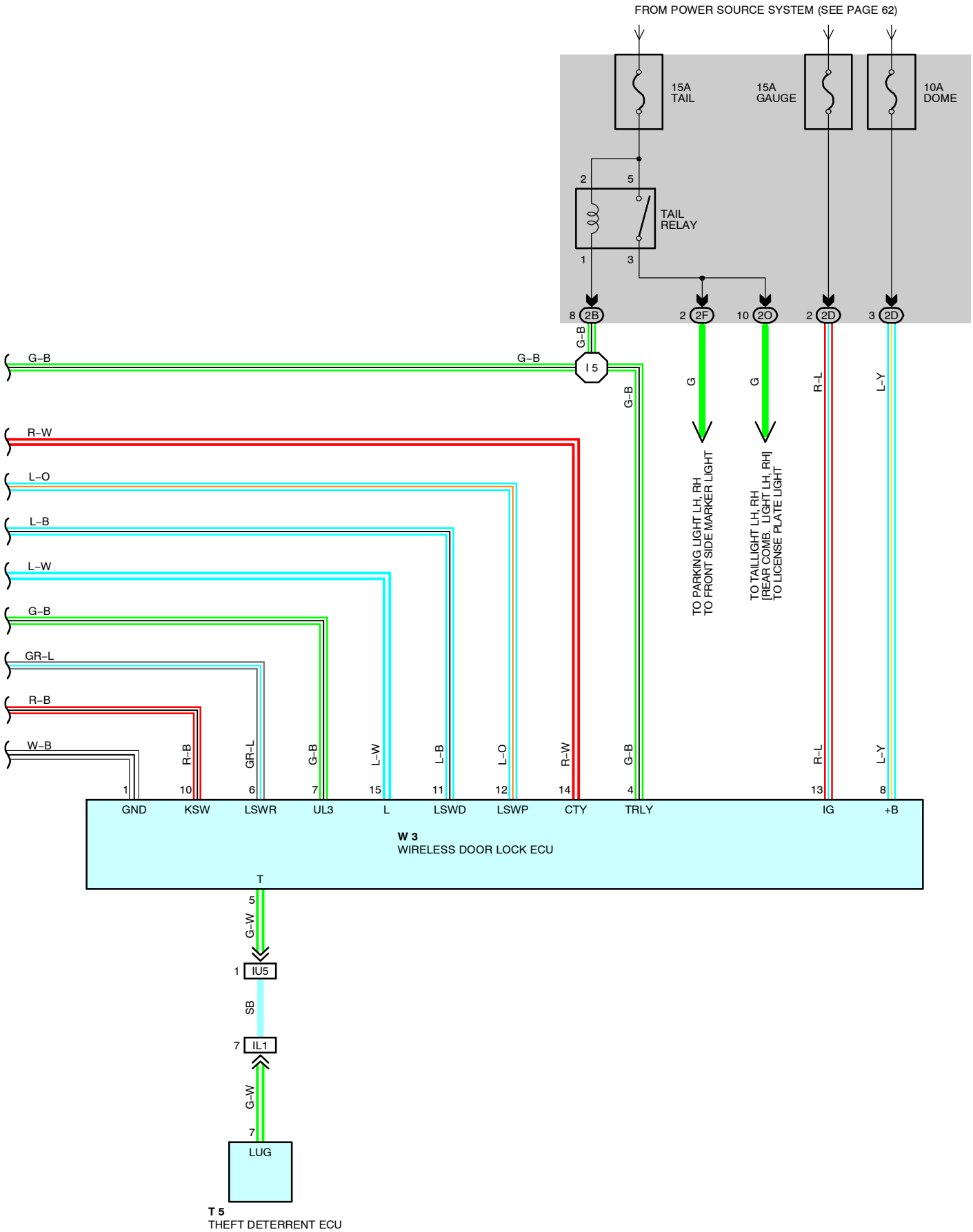

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WIRELESS DOOR LOCK CONTROL

SYSTEM OUTLINE

In this system, the wireless door lock ECU receivers weak radio wave transmitted from the transmitter built−into the ignition key, and outputs a signal to the instrument ECU. Accordingly, all the doors can be locked and unlocked by remote control.

1. NORMAL OPERATION

* Lock operation
  When the lock SW on the transmitter is pressed, all the doors are locked.
* Unlock operation
  When the unlock SW on the transmitter is pressed once, only the driver door is unlocked. When the unlock SW is pressed again within **3** seconds, all the doors are unlocked.

2. AUTO LOCK FUNCTION

When the door is not actually opened within **30** seconds after the door has been unlocked by the unlock SW on the transmitter, all the doors are automatically locked. If any of the following conditions are detected, the wireless door lock does not function.

* Any door is opened.
* The ignition key is inserted into the ignition SW.
* When the unlock detection SW of all the doors are locked.

3. WIRELESS DOOR LOCK STOP FUNCTION

If any of the following conditions are detected, the wireless door lock does not function.

Lock operation

* When any door is open (Door courtesy SW on)
* The ignition key is inserted into the ignition SW (Unlock warning SW on)
* Ignition SW is on

Unlock operation

* Ignition SW is on

4. VISUAL CONFIRMATION OF LOCK OR UNLOCK

During lock operation, when the wireless door lock ECU receives a lock signal from the door unlock detection SW, the taillight and parking light is flashed once. During unlock operation, when the wireless door lock ECU receives an unlock signal from the door unlock detection SW, the taillight and parking light is flashed twice.

5. PANIC MODE FUNCTION

When the panic SW on the transmitter is pressed, the wireless door lock ECU receives a signal and enters the panic mode. The signal input into the theft deterrent ECU from the wireless door lock ECU turns on the theft deterrent horn, and flashes the taillight and headlight. When the panic SW or the unlock SW of the transmitter is pressed during the panic mode, the panic mode is canceled, and the theft deterrent horn stops, and the taillight and headlight are turned off.

6. REPEAT FUNCTION

If the lock detection signal in response to the output signal is not received after the wireless door lock ECU has output the lock signal, the lock signal is output again.

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SERVICE HINTS

W3 WIRELESS DOOR LOCK ECU

1–GROUND : Always continuity
8–GROUND : Always approx. **12** volts
13–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position

D21, D22, D23, D24 DOOR LOCK MOTOR AND DOOR UNLOCK DETECTION SW FRONT LH, RH, REAR LH, RH

2–GROUND : Approx. **12** volts with door lock motor at lock operation
3–GROUND : Approx. **12** volts with door ulock motor at unlock operation

B4 BACK DOOR LOCK MOTOR AND BACK DOOR UNLOCK DETECTION SW

2–GROUND : Approx. **12** volts with door lock motor at lock operation
3–GROUND : Approx. **12** volts with door ulock motor at unlock operation

I19 (A), I20 (B), I21 (C) INSTRUMENT ECU

(A) 3–GROUND : Continuity with front passenger door open
(A) 14–GROUND : Continuity with driver door open
(B) 1–GROUND : Continuity with rear RH door open
(C) 7–GROUND : Continuity with rear LH door open
(C) 1–GROUND : Always approx. **12** volts
(C) 2–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
(C) 4–GROUND : Always continuity

D14, D15, D16, D17 DOOR COURTESY SW FRONT LH, RH, REAR LH, RH

1–GROUND : Closed with door open

B2 BACK DOOR COURTESY SW

1–2 : Closed with back door open

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
B2	40	D23	40	J26	39
B3	40	D24	40	J27	39
B4	40	I19 A	38	J28	39
D14	40	I19 B	38	J29	39
D15	40	I19 C	38	J32	40
D16	40	J1	39	J33	40
D17	40	J9	39	J34	40
D18	40	J10	39	P12	41
D19	40	J14	39	T5	39
D20	40	J15	39	U1	39
D21	40	J17	39	W3	39
D22	40	J19	39		

▭ : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		
2E	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2F		
2L	24	Front Door LH Wire and Cowl Side J/B LH (Left Kick Panel)
2M		
2N	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2O		
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick jPanel)
3A	30	Engine Room No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3E	30	Floor No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3F		
3G	30	Front Door RH Wire and Cowl Side J/B RH (Right Kick Panel)
3I	30	Instrument Panel Integration Wire and Cowl Side J/B RH (Right Kick Panel)

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WIRELESS DOOR LOCK CONTROL

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
ID1	46	Dash Wire and Floor Wire (Left Kick Panel)
IL1	48	Instrument Panel Integration Wire and Computer Wire (Instrument Panel Center)
IU1	50	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
IU4		
IU5		
BA1	54	Rear Door LH Wire and Floor Wire (Left Side of Center Pillar)
BA2		
BC1	54	Rear Door RH Wire and Floor No.2 Wire (Right Side of Center Pillar)
BC2		
BD2	54	Floor No.3 Wire and Floor Wire (Left Rear Side Qurarter Panel)
BE1	54	Luggage Room Wire and Floor Wire (Left Rear Side Quarter Panel)
BG1	56	Pillar No. 1 Wire and Luggage Room Wire (Left Rear Side Roof Panel)
BH1	56	Pillar No.1 Wire and Back Door Upper Wire (Left Side of Back Door)
BH2		
BK1	56	Back Door Lower Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)
BL3	56	Floor No.2 Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)

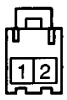
: GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH
IH	46	Set Bolt of Cowl Side J/B RH
II		
BJ	54	Under the Driver's Seat
BK	54	Front Side Under the Front Passenger's Seat
BM	54	Left Rear Side Quarter Panel

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I8	48	Dash Wire	B6	56	Floor Wire
B1	56	Front Door LH Wire	B14	56	Floor No.2 Wire
B5	56	Floor Wire	B15	56	Back Door Upper Wire

B2



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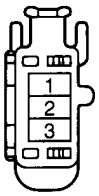

B4
BLACK

D14

D15

D16

D17

D18
GRAY

D19
GRAY

D20

D21
BLACK

D22
BLACK

D23
BLACK

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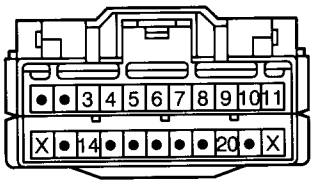
D24
BLACK

I19 (A)



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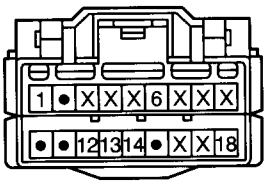

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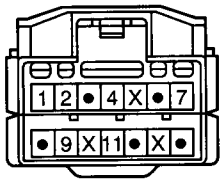
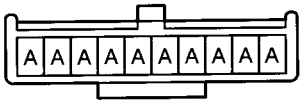


J1



(Hint : See Page 7)

J9
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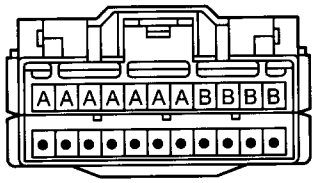

(Hint : See Page 7)

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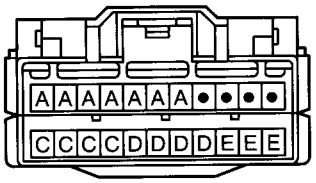

(Hint : See Page 7)

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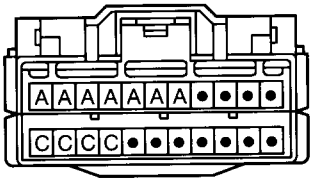

(Hint : See Page 7)

J15
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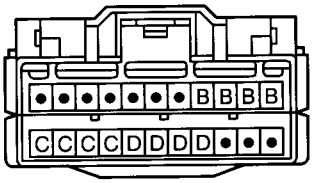

(Hint : See Page 7)

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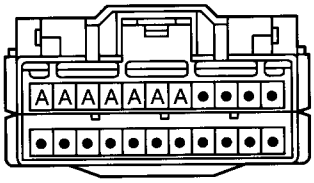

(Hint : See Page 7)

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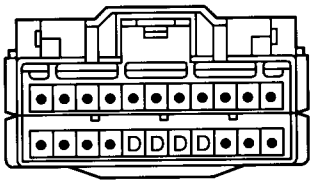

(Hint : See Page 7)

J26
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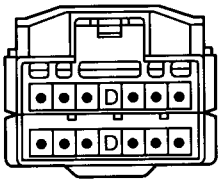

(Hint : See Page 7)

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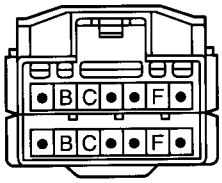

(Hint : See Page 7)

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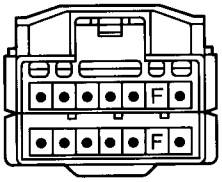
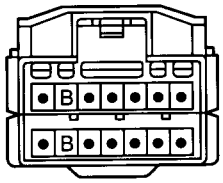


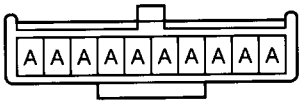
(Hint : See Page 7)

J29



(Hint : See Page 7)

J32



(Hint : See Page 7)

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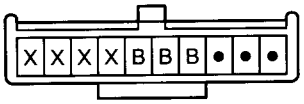

(Hint : See Page 7)

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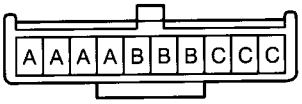

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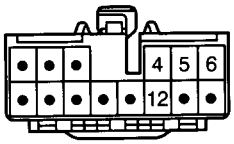

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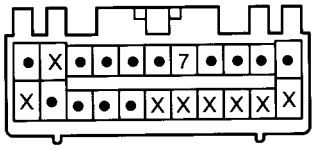

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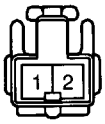

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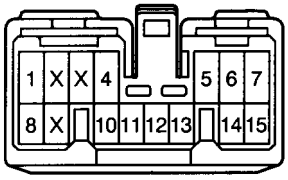
W3



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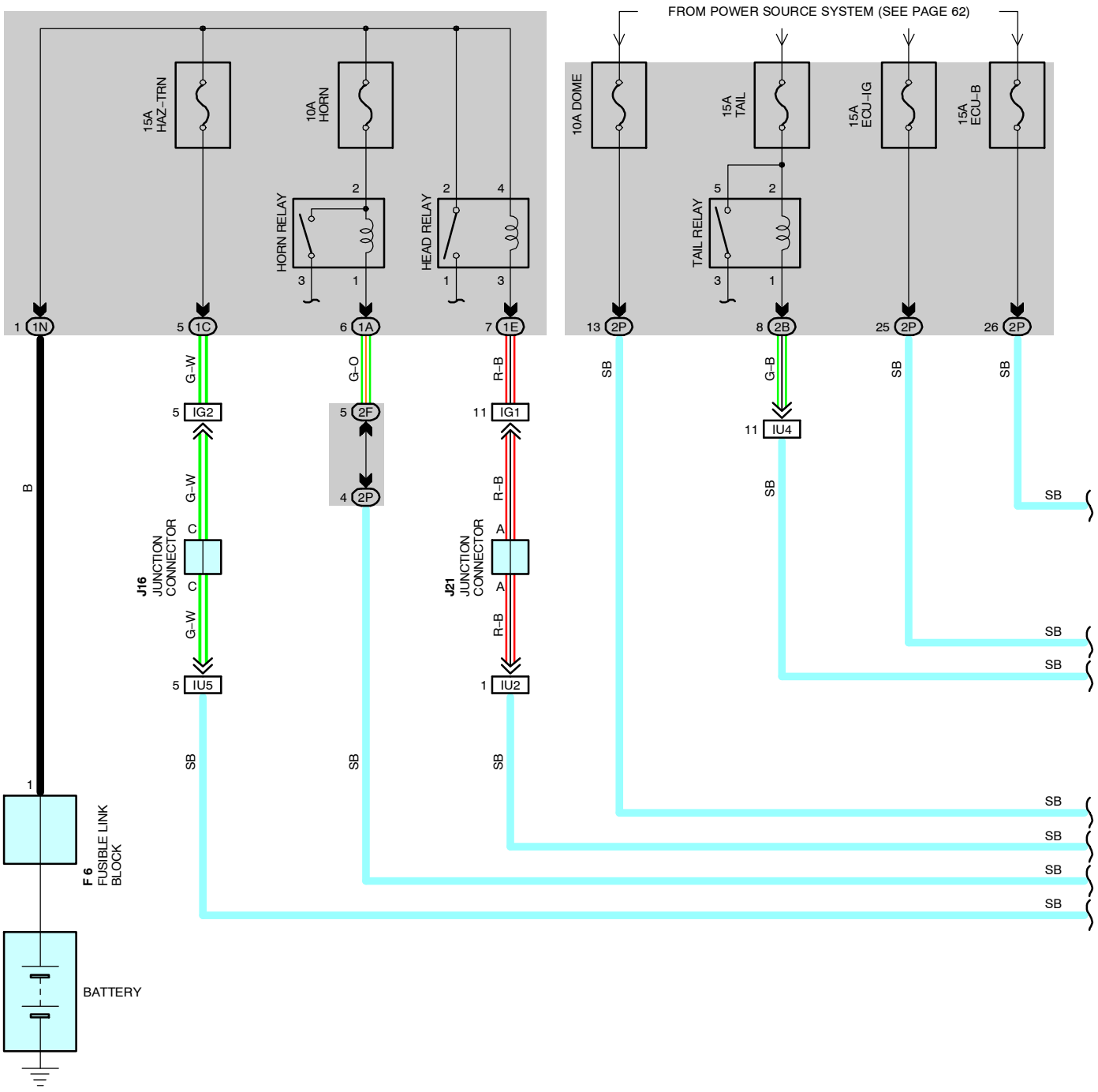
THEFT DETERRANT



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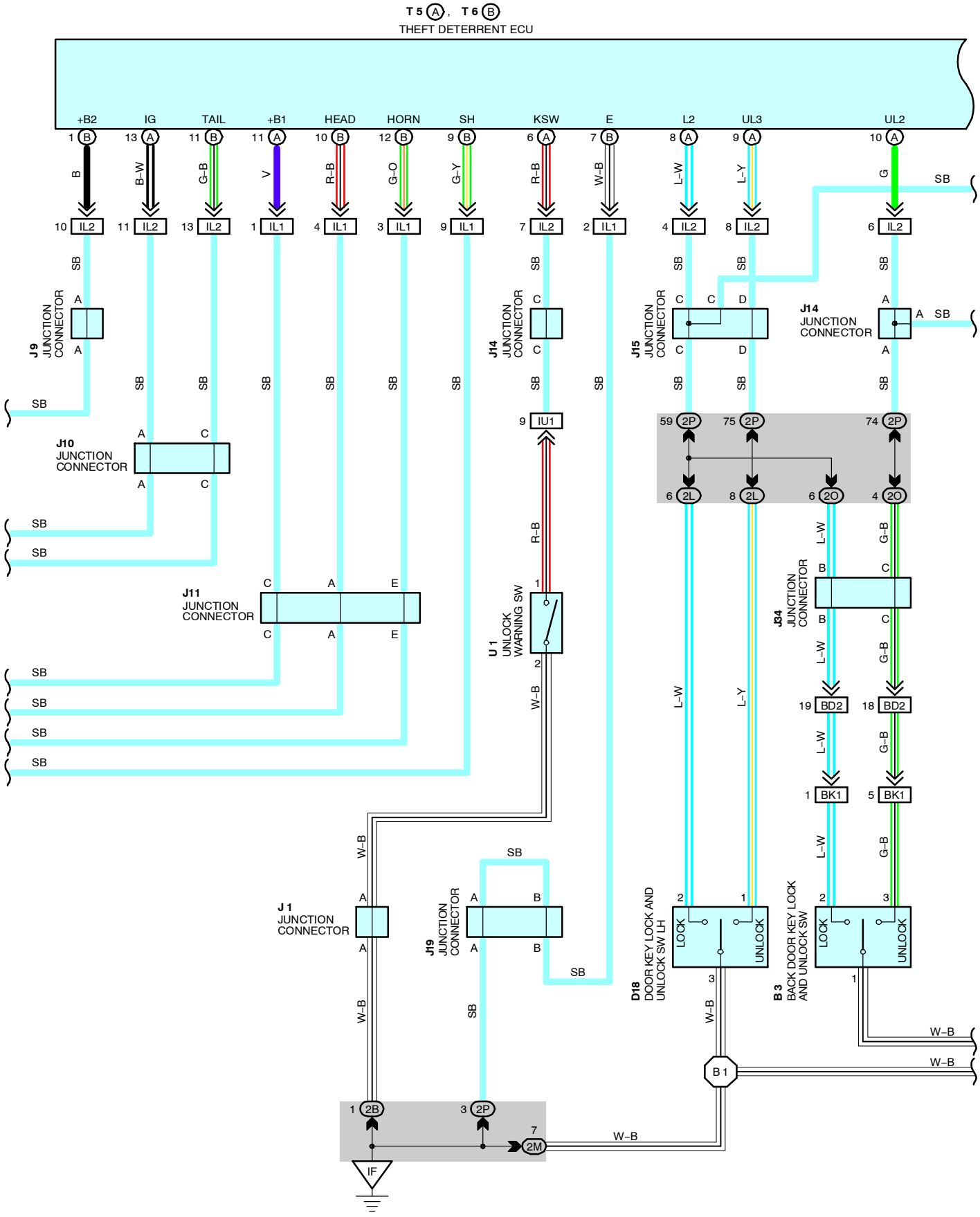

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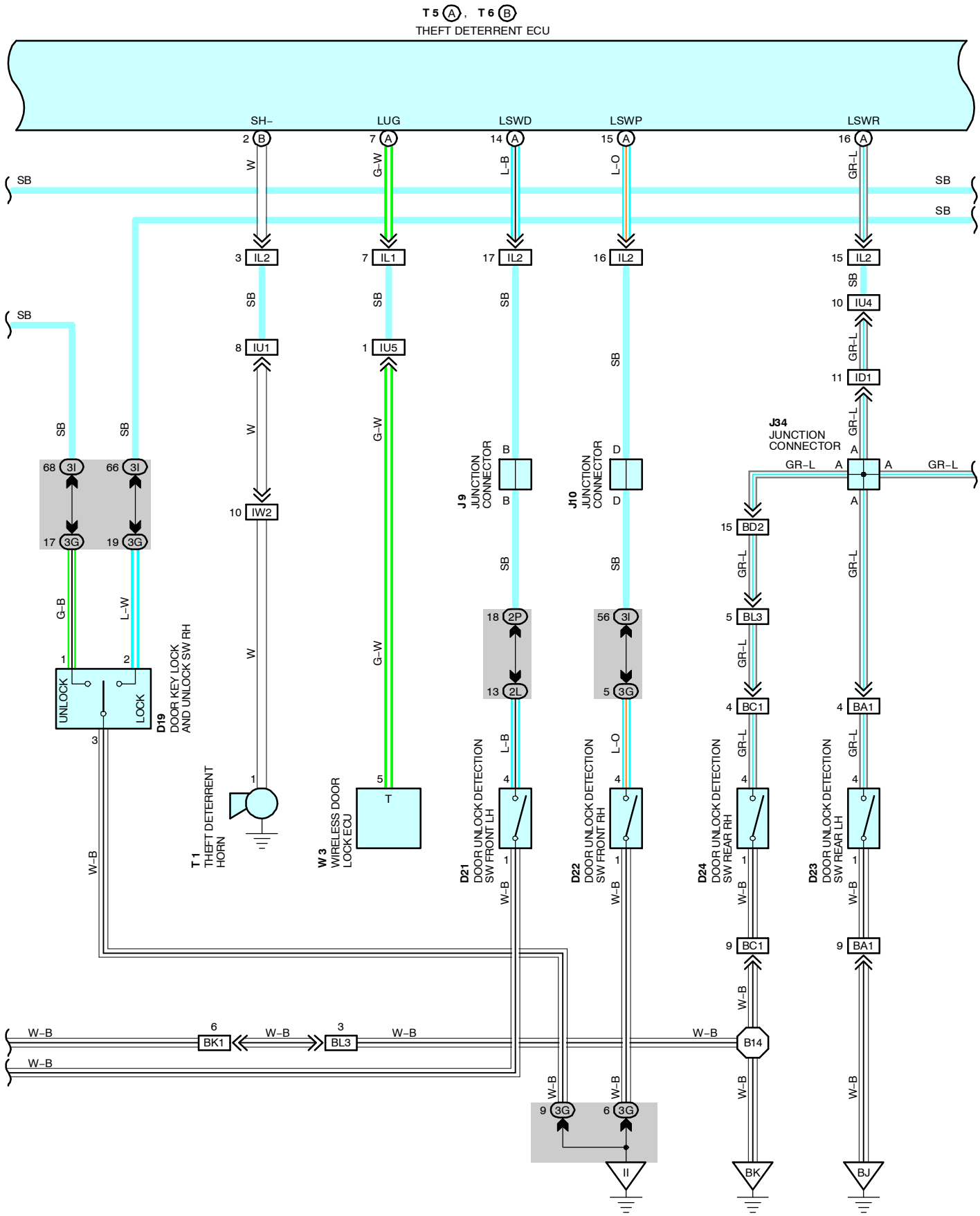

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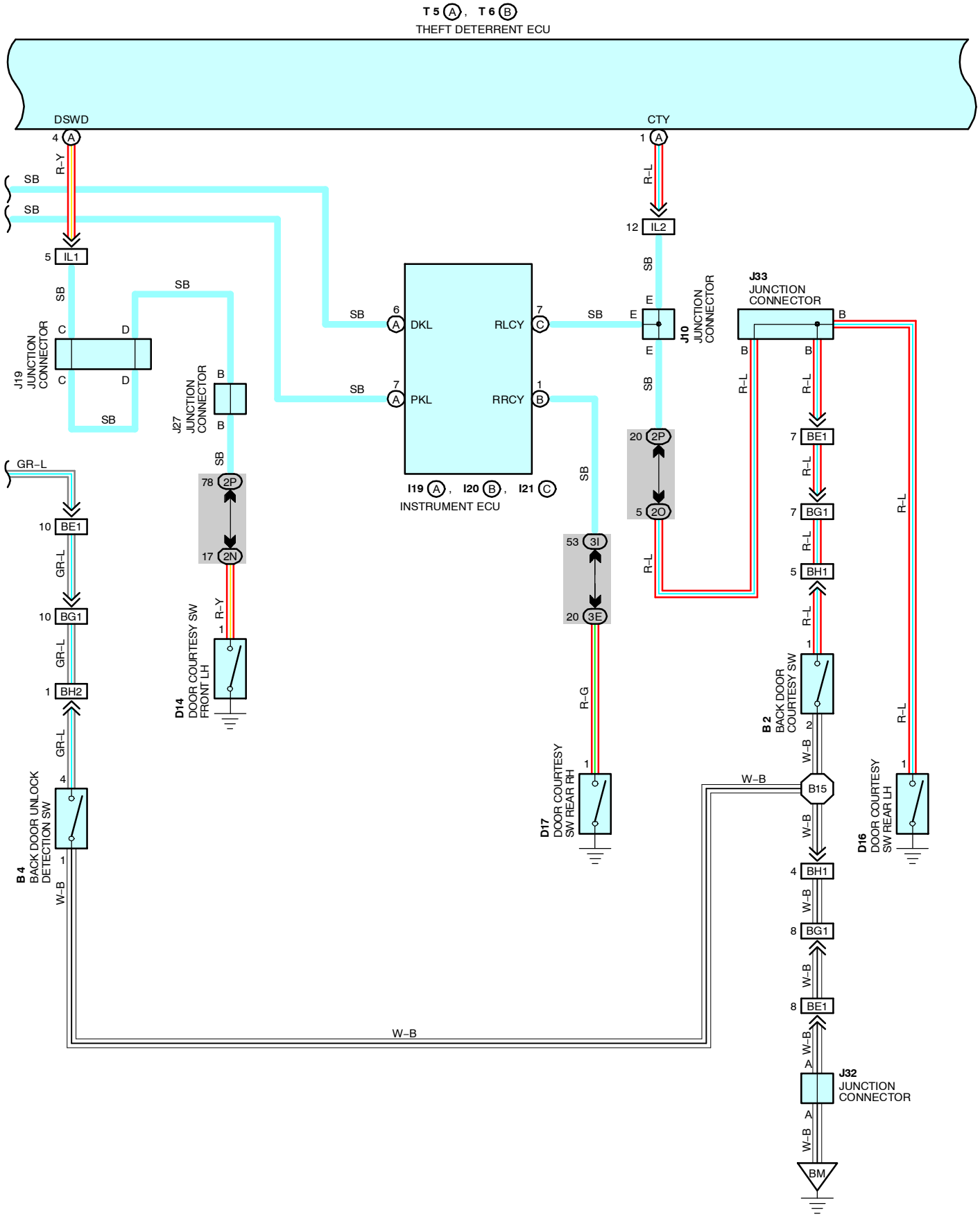

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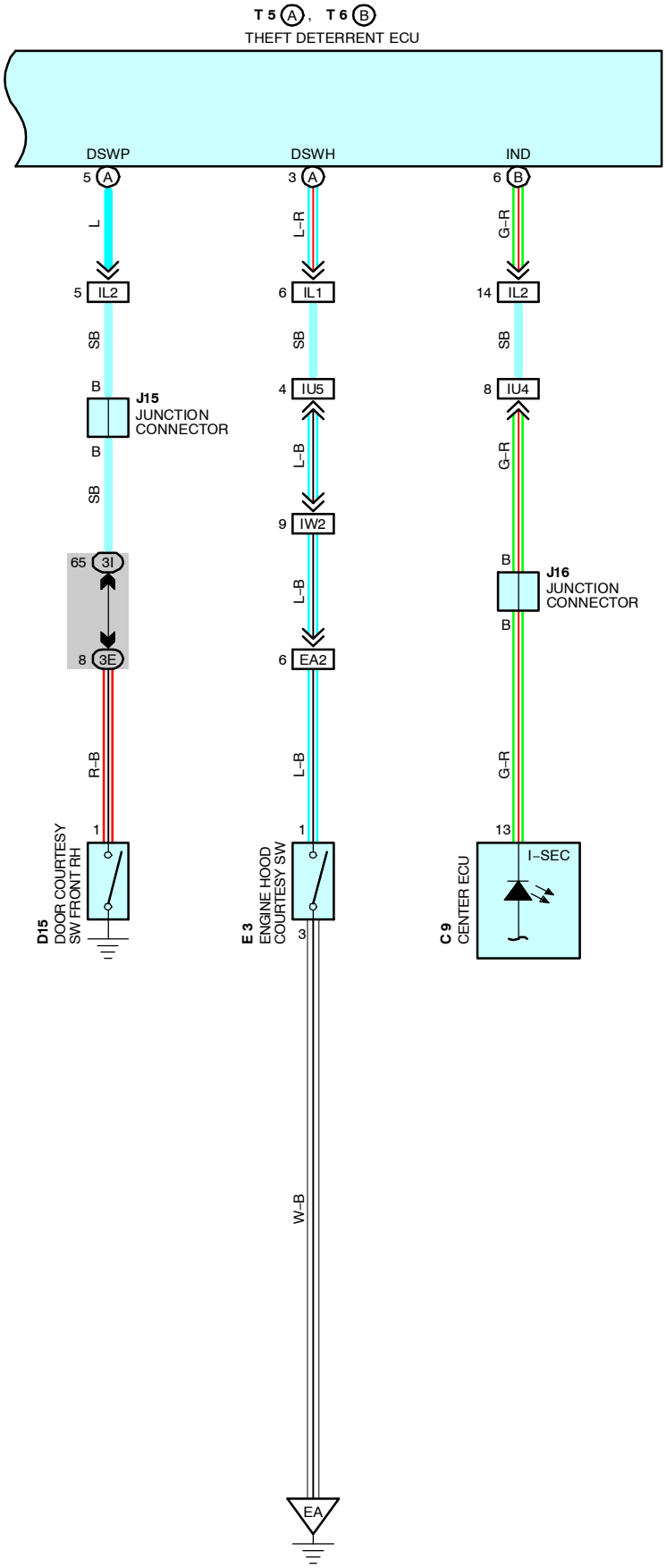

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SERVICE HINTS

D18, D19 DOOR KEY ;LOCK AND UNLOCK SW LH, RH

1–3 : Closed with door lock cylinder unlocked with key
2–3 : Closed with door lock cylinder locked with key

B3 BACK DOOR KEY LOCK AND UNLOCK SW

1–3 : Closed with door lock cylinder unlocked with key
1–2 : Closed with door lock cylinder locked with key

E3 ENGINE HOOD COURTESY SW

2–1 : Closed with ignition key in cylinder

U1 UNLOCK WARNING SW

1–3 : Closed with engine hood open

T5 (A), T6 (B) THEFT DETERRENT ECU

(A) 6–GROUND : Continuity with ignition key in cylinder
(A) 15–GROUND : Continuity with front RH door unlocked
(A) 14–GROUND : Continuity with front LH door unlocked
(A) 5–GROUND : Continuity with front RH door open
(A) 4–GROUND : Continuity with front LH door open
(A) 8–GROUND : Continuity with door key lock SW at **LOCK** position
(B) 7–GROUND : Always continuity
(A) 3–GROUND : Continuity with engine hood open
(A) 9, (B) 10–GROUND : Continuity with door key lock SW at **UNLOCK** position
(A) 11, (B) 9–GROUND : Always approx. **12** volts

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
B2	40	D24	40	J19	39
B3	40	E3	36	J21	39
B4	40	F6	36	J27	39
C9	38	I19 A	38	J32	40
D14	40	I20 B	38	J33	40
D15	40	I21 C	38	J34	40
D16	40	J1	39	T1	37
D17	40	J9	39	T5 A	39
D18	40	J10	39	T6 B	39
D19	40	J11	39	U1	39
D21	40	J14	39	W3	39
D22	40	J15	39		
D23	40	J16	39		

⬭ : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1C		
1E		
1N	21	Engine Room No.3 Wire and Engine Room J/B (Engine Compartment Left)
2B	24	Dash Wire and Cowl jSide J/B LH (Left Kick Panel)
2F	24	Engine Room No.2 Wire and Engine Room J/B LH (Left Kick Panel)
2L	24	Front Door LH Wire and Cowl Side J/B LH (Left Kick Panel)
2M		
2N	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2O		
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)
3E	30	Floor No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3G	30	Front Door RH Wire and Cowl Side J/B RH (Right Kick Panel)
3I	30	Instrument Panel Integration Wire and Cowl Side J/B RH (Right Kick Panel)

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: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

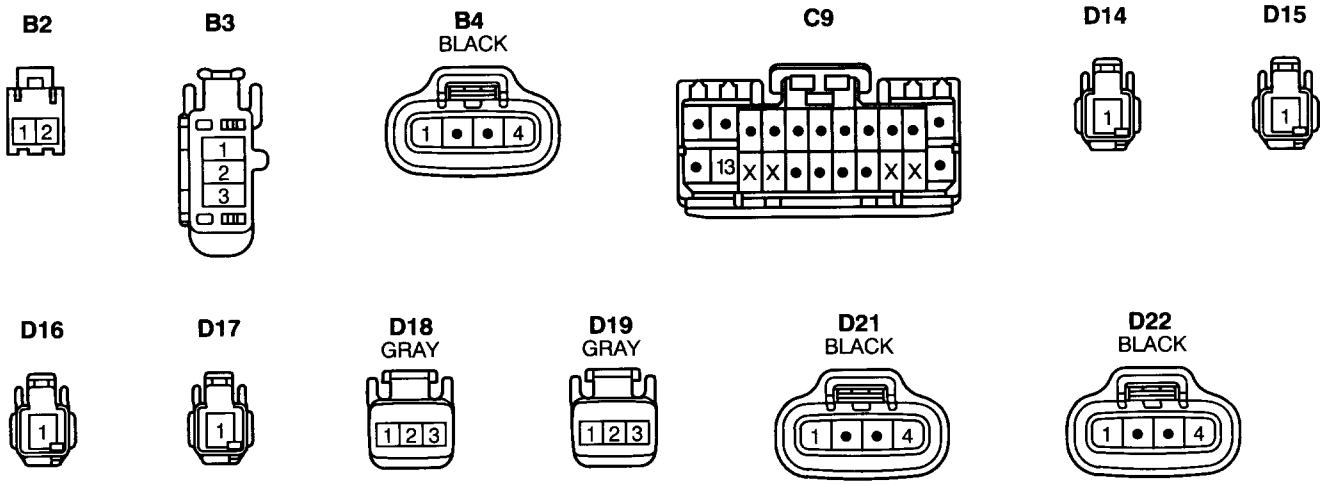
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA2	44	Engine Room Main Wire and Engine Room No.2 Wire (Engine Compartment Right)
ID1	46	Dash Wire and Floor Wire (Left Kick Panel)
IG1	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IG2		
IL1	48	Instrument Panel Integration Wire and Computer Wire (Instrument Panel Center)
IL2		
IU1	50	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
IU2		
IU4		
IU5		
IW2	52	Engine Room No.2 Wire and Dash Wire (Behind the Glove Box)
BA1	54	Rear Door LH Wire and Floor Wire (Left Side of Center Pillar)
BC1	54	Rear Door RH Wire and Floor No.2 Wire (Right Side of Center Pillar)
BD2	54	Floor No.3 Wire and Floor Wire (Left Rear Side Quarter Panel)
BE1	54	Luggage Room Wire and Floor Wire (Left Rear Side Quarter Panel)
BG1	56	Pillar No.1 Wire and Luggage Room Wire (Left Rear Side Roof Panel)
BH1	56	Pillar No.1 Wire and Back Door Upper Wire (Left Side of Back Door)
BH2		
BK1	56	Back Door Lower Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)
BL1	56	Floor No.2 Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)

: GROUND POINTS

Code	See Page	Ground Points Location
EA	44	Front Right Side of Fender Apron
IF	46	Set Bolt of Cowl Side J/B LH
II	46	Set Bolt of Cowl Side J/B RH
BJ	54	Under the Driver's Seat
BK	54	Front Side Under the Front Passenger's Seat
BM	54	Left Rear Side Quarter Panel

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
B1	56	Front Door LH Wire	B15	56	Back Door Upper Wire
B14	56	Floor No.2 Wire			



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D23
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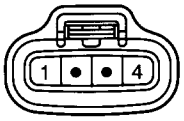

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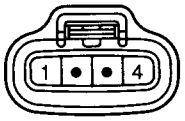

E3
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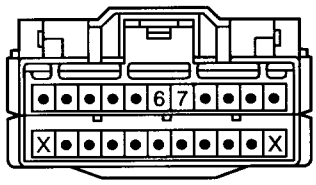
F6

(See Page 34)

I19 (A)



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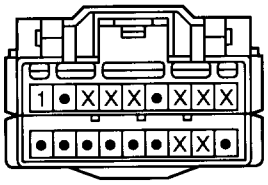

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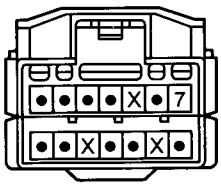

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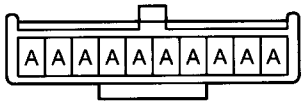
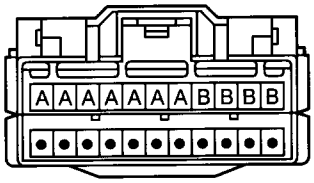


(Hint : See Page 7)

J9
GRAY



(Hint : See Page 7)

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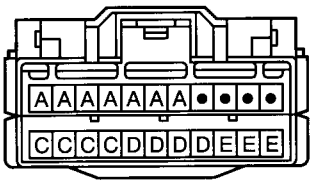
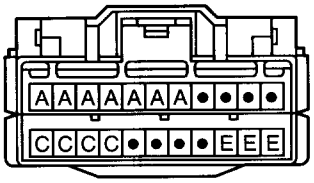


(Hint : See Page 7)

J11
GRAY



(Hint : See Page 7)

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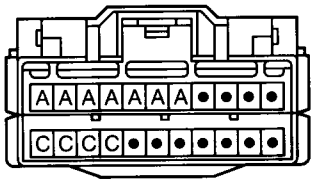

(Hint : See Page 7)

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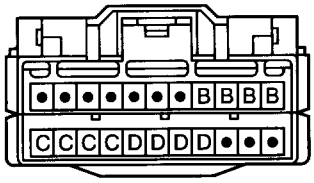

(Hint : See Page 7)

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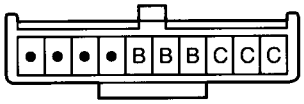

(Hint : See Page 7)

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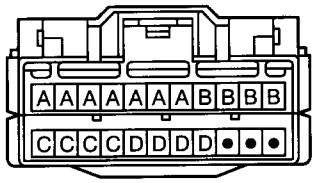

(Hint : See Page 7)

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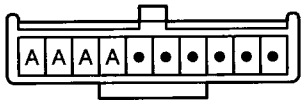

(Hint : See Page 7)

J27
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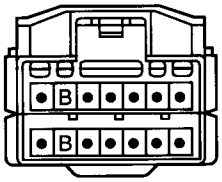
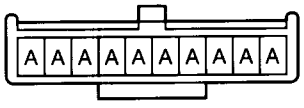


(Hint : See Page 7)

J32



(Hint : See Page 7)

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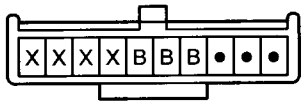

(Hint : See Page 7)

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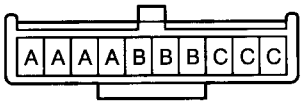

(Hint : See Page 7)

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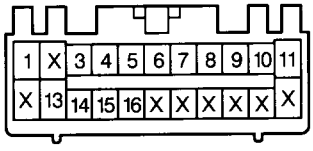
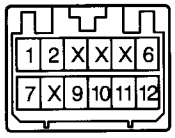


T6 (B)



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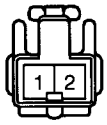

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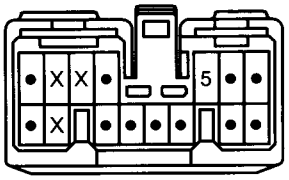

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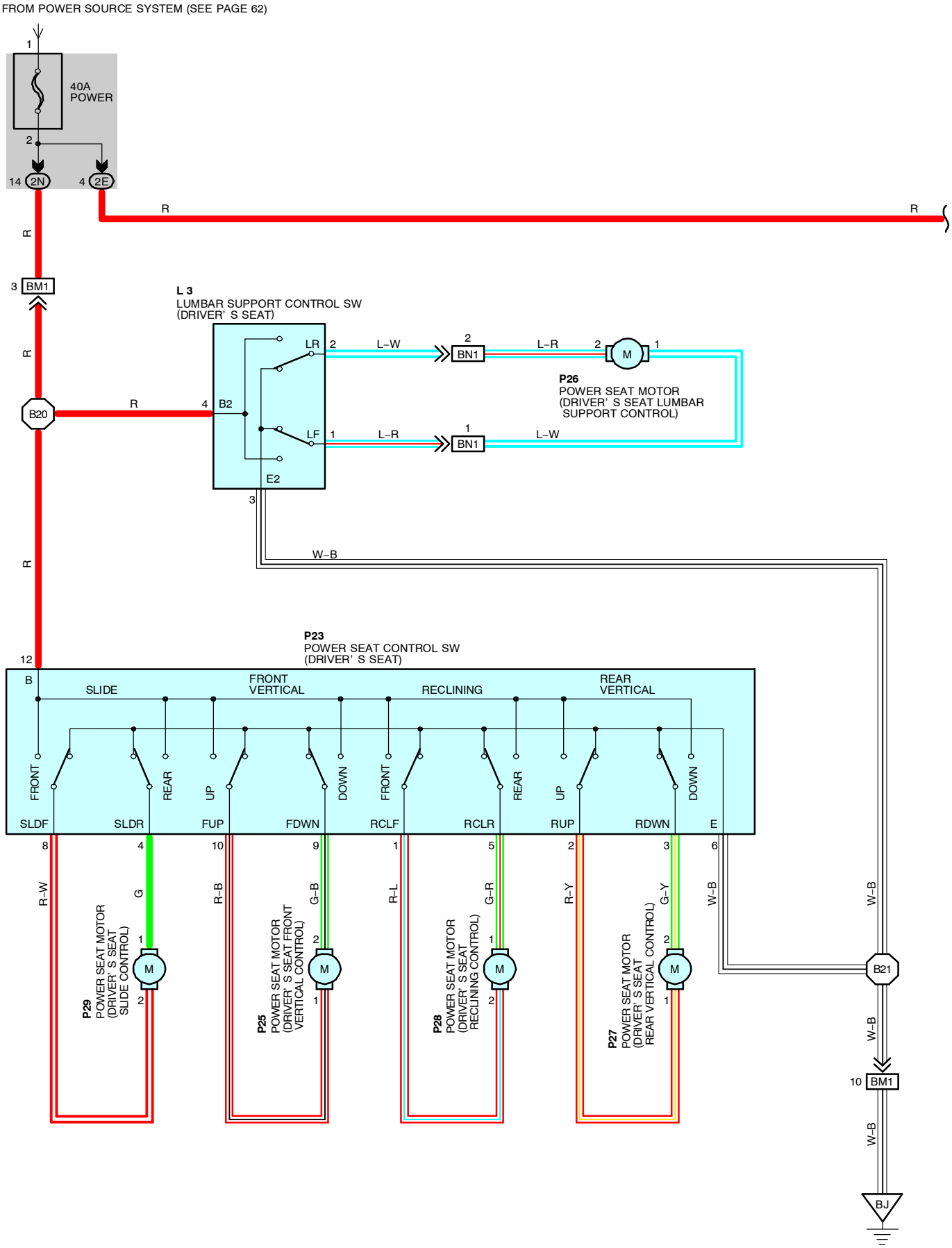
POWER SEAT



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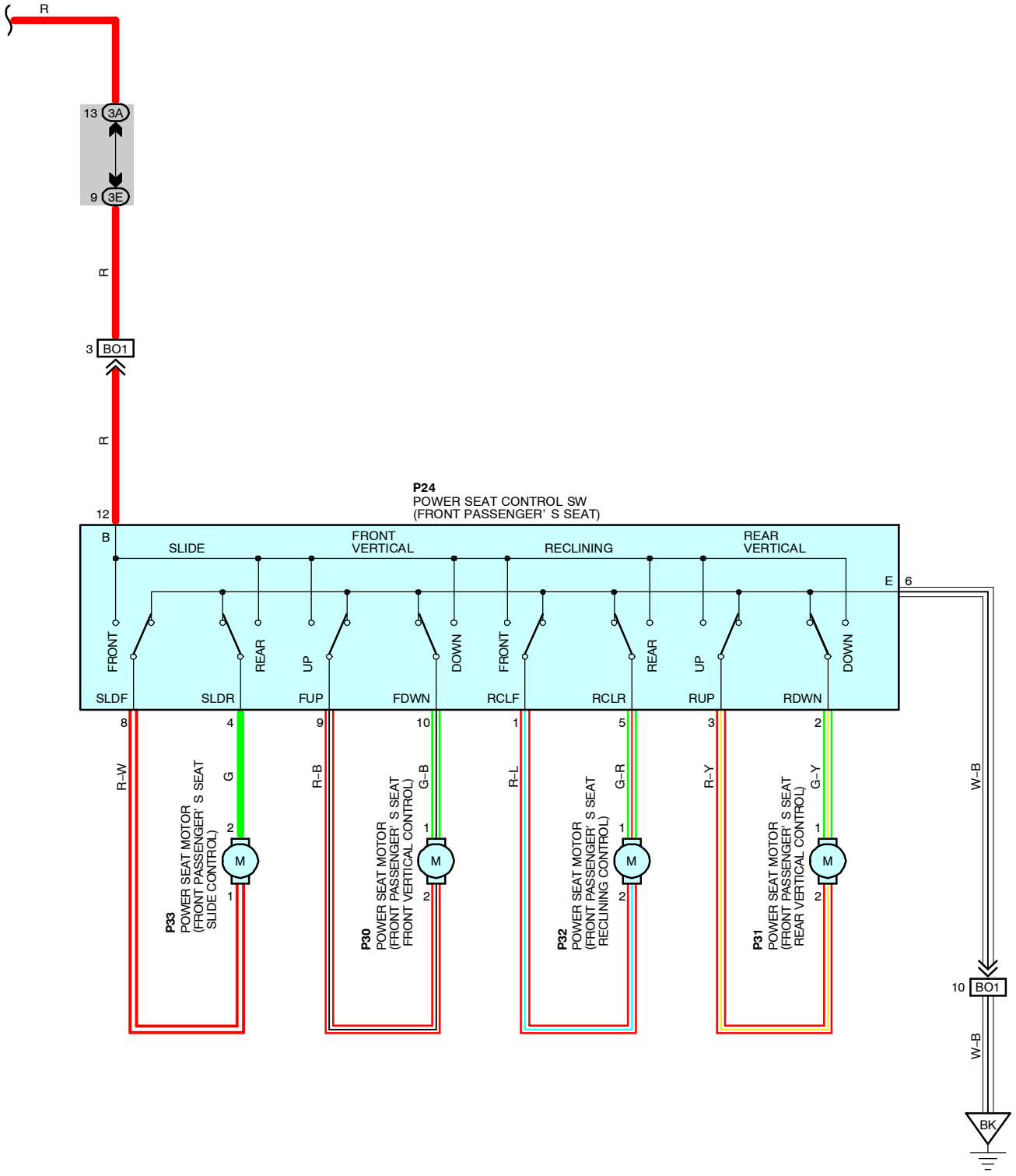

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POWER SEAT

SERVICE HINTS

P23 POWER SEAT CONTROL SW (DRIVER'S SEAT)

12–1 : Closed with driver's seat at front reclining operation
12–5 : Closed with driver's seat at rear reclining operation
12–10 : Closed with driver's seat at front vertical up operation
12–9 : Closed with driver's seat at front vertical down operation
12–2 : Closed with driver's seat at rear vertical up operation
12–3 : Closed with driver's seat at rear vertical down operation
12–8 : Closed with driver's seat at front slide operation
12–4 : Closed with driver's seat at rear slide operation
6–GROUND : Always continuity

P24 POWER SEAT CONTROL SW (FRONT PASSENGER'S SEAT)

12–1 : Closed with front passenger's seat at front reclining operation
12–5 : Closed with front passenger's seat at rear reclining operation
12–10 : Closed with front passenger's seat at front vertical up operation
12–9 : Closed with front passenger's seat at front vertical down operation
12–2 : Closed with front passenger's seat at rear vertical up operation
12–3 : Closed with front passenger's seat at rear vertical down operation
12–8 : Closed with front passenger's seat at front slide operation
12–4 : Closed with front passenger's seat at rear slide operation
6–GROUND : Always continuity

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
L3	42	P26	42	P30	42
P23	42	P27	42	P31	42
P24	42	P28	42	P32	42
P25	42	P29	42	P33	42

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
2E	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2N	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
3A	30	Engine Room No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3E	30	Floor No.2 Wire and Cowl Side J/B RH (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
BM1	58	Floor Wire and Front Seat LH Wire (Front Side Under the Driver's Seat)
BN1	58	Seat No.2 Wire and Front Seat LH Wire (Rear Side Under the Driver's Seat)
BO1	58	Floor No.2 Wire and Front Seat RH Wire (Front Side Under the Front Passenger's Seat)

: GROUND POINTS

Code	See Page	Ground Points Location
BJ	54	Under the Driver's Seat
BK	54	Front Side Under the Front Passenger's Seat

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
B20	58	Front Seat LH Wire	B21	58	Front Seat LH Wire

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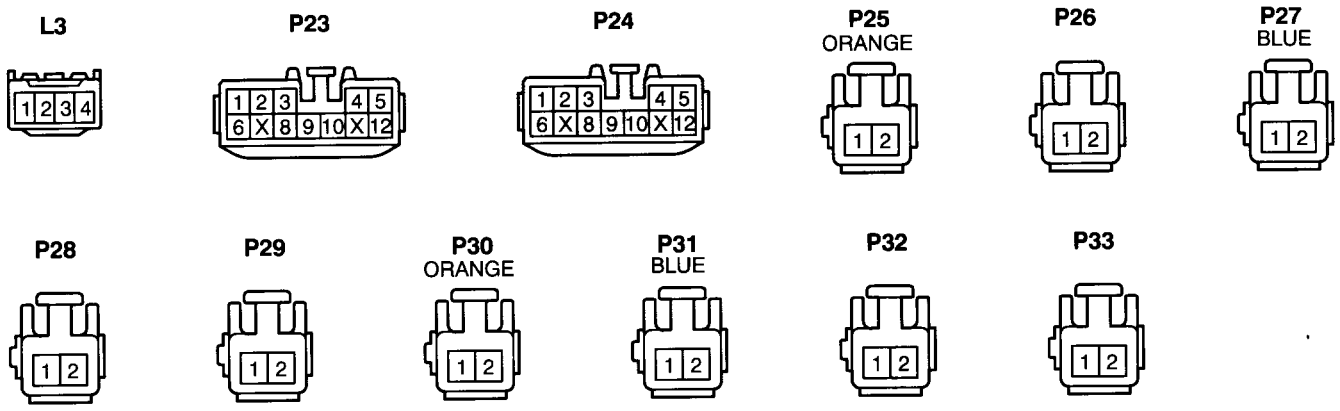

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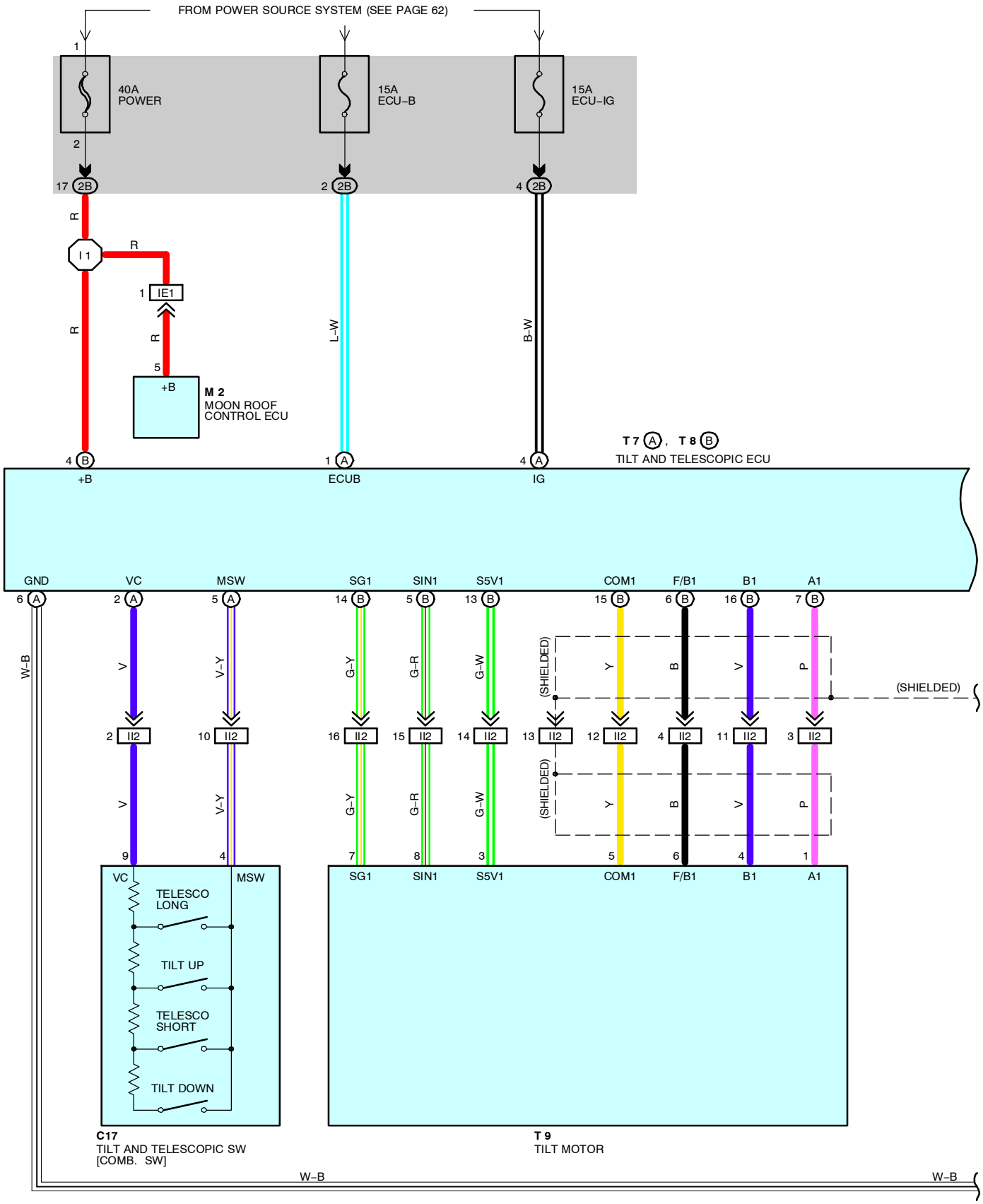
POWER TILT AND POWER TELESCOPIC



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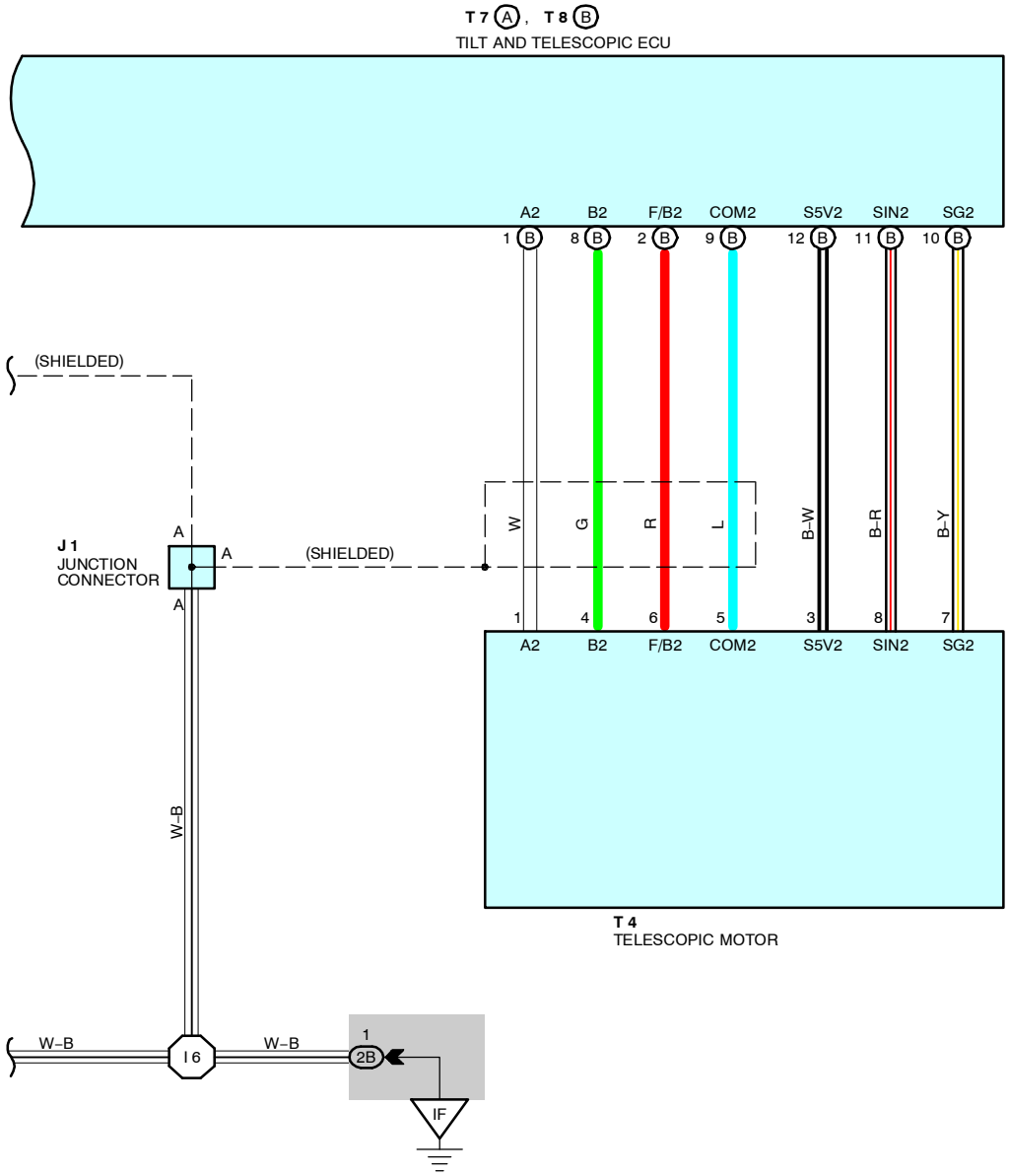

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POWER TILT AND POWER TELESCOPIC

SYSTEM OUTLINE

This system provides the automatic tilt and telescopic mechanisms using the motor drive, tilt and telescopic ECU control, allowing variable steering movement in the back and forth, and vertical directions. This makes it possible to set the steering to the desired steering position.

1. MANUAL OPERATION

The tilt and telescopic can be adjusted while the ignition key is inserted into the key cylinder.

* Tilt operation

When the tilt and telescopic SW is pressed to **TILT DOWN** position, the current flows from tilt and telescopic ECU **TERMINAL (A) 2** to tilt and telescopic SW **TERMINAL 9** to **TERMINAL 4** to tilt and telescopic ECU **TERMINAL (A) 5**, and a signal is input to the tilt and telescopic ECU. This activates the tilt and telescopic ECU and rotates the tilt motor to lower the steering while the tilt and telescopic SW is kept pressed to **TILT DOWN** position.

When the tilt and telescopic SW is pressed to **TILT UP** position, the current flows from tilt and telescopic ECU **TERMINAL (A) 2** to tilt and telescopic SW **TERMINAL 9** to **TERMINAL 4** to tilt and telescopic ECU **TERMINAL (A) 5**, and a signal is input to the tilt and telescopic ECU. This activates the tilt and telescopic ECU and rotates the tilt motor to raise the steering while the tilt and telescopic SW is kept pressed to **TILT UP** position.

* Telescopic operation

When the tilt and telescopic SW is pressed to **TELESCO LONG** position, the current flows from tilt and telescopic ECU **TERMINAL (A) 2** to tilt and telescopic SW **TERMINAL 9** to **TERMINAL 4** to tilt and telescopic ECU **TERMINAL (A) 5**, and a signal is input to the tilt and telescopic ECU. This activates the tilt and telescopic ECU and rotates the telescopic motor to extend the telescopic while the tilt and telescopic SW is kept pressed to **TELESCO LONG** position.

When the tilt and telescopic SW is pressed to **TELESCO SHORT** position, the current flows from tilt and telescopic ECU **TERMINAL (A) 2** to tilt and telescopic SW **TERMINAL 9** to **TERMINAL 4** to tilt and telescopic ECU **TERMINAL (A) 5**, and a signal is input to the tilt and telescopic ECU. This activates the tilt and telescopic ECU and rotates the telescopic motor to retract the telescopic while the tilt and telescopic SW is kept pressed to **TELESCO SHORT** position.

SERVICE HINTS

T7 (A), T8 (B) TILT AND TELESCOPIC ECU

(A) 1–GROUND : Always approx. **12** volts
(A) 4–GROUND : Always approx. **12** volts
(A) 4–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
(A) 6–GROUND : Always continuity

C17 TILT AND TELESCOPIC SW [COMB. SW]

4–9 : Approx. **160** Ω with telesco long operation
: Approx. **360** Ω with tilt up operation
: Approx. **790** Ω with telesco short operation
: Approx. **1.99** kΩ with tilt down operation

○ : PARTS LOCATION

Code	See Page	Code		See Page	Code	See Page
C17	38	T4		39	T9	39
J1	39	T7	A	39		
M2	40	T8	B	39		

⬭ : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)

▭ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IE1	46	Dash Wire and Roof Wire (Left Kick Panel)
II2	48	Column Wire and Dash Wire (Near the Ignition SW)

▽ : GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set bolt of Cowl Side J/B LH

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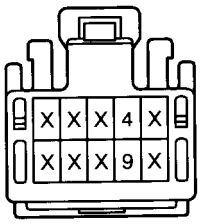
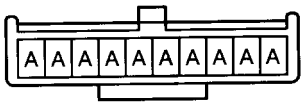
: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I1	48	Dash Wire	I6	48	Dash Wire

C17

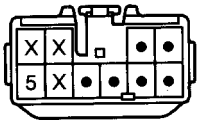


J1



(Hint : See Page 7)

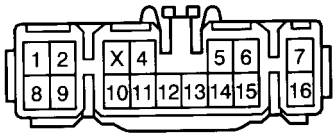
M2



T4

T7 (A)

T8 (B)



T9
BLACK

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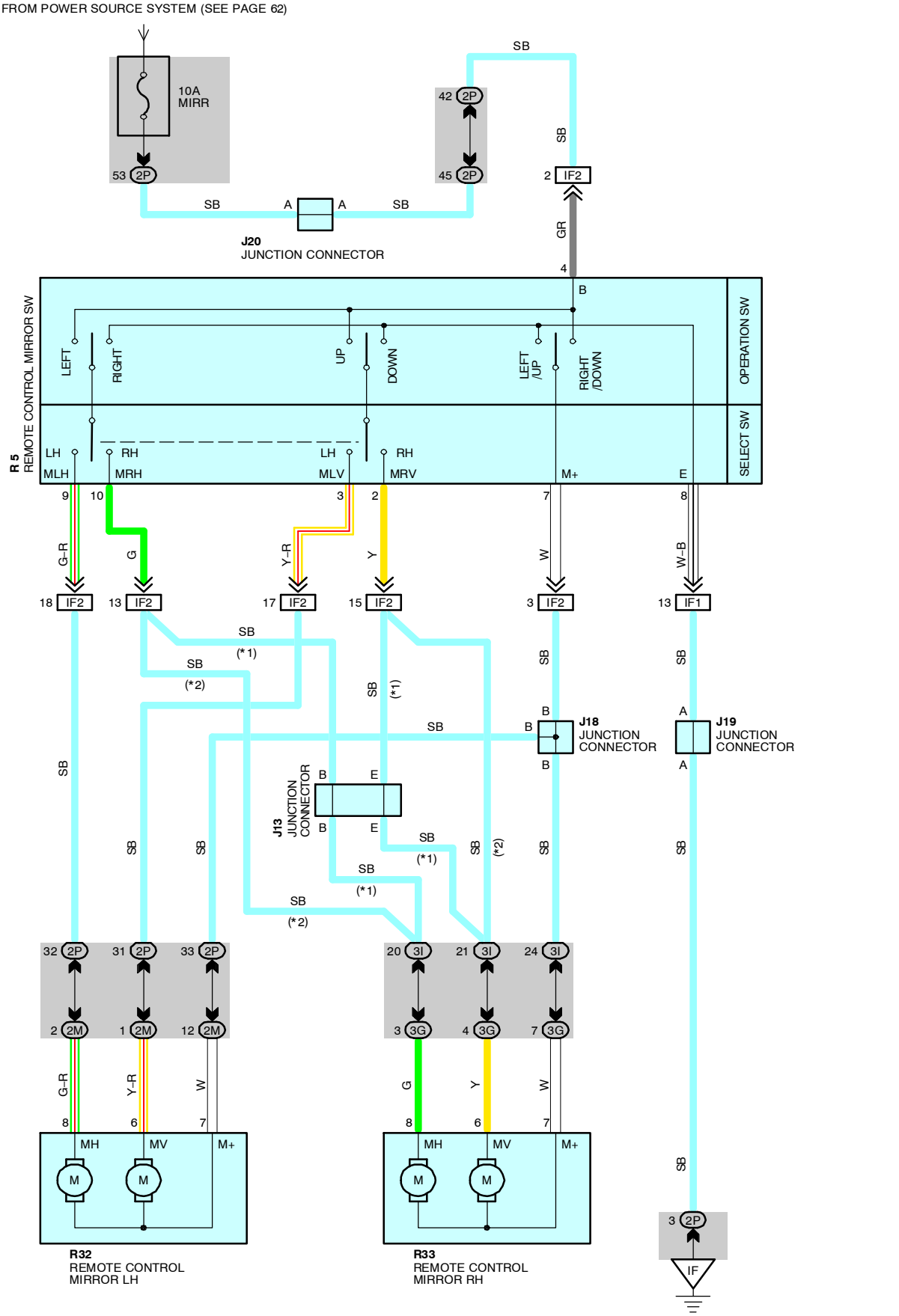
REMOTE CONTROL MIRROR

* 1 : W/ POWER REAR QUARTER WINDOW
* 2 : W/O POWER REAR QUARTER WINDOW



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SERVICE HINTS

R5 REMOTE CONTROL MIRROR SW

7–8 : Continuity with the operation SW at **UP** or **LEFT** position
4–7 : Continuity with the operation SW at **RIGHT** or **DOWN** position
4–9 : Continuity with the operation SW at **LEFT** position and the select SW at **LH** position
4–3 : Continuity with the operation SW at **UP** position and the select SW at **LH** position
8–10 : Continuity with the operation SW at **RIGHT** position and the select SW at **RH** position
2–8 : Continuity with the operation SW at **DOWN** position and the select SW at **RH** position
4–GROUND : Approx. **12** volts with ignition SW at **ACC** or **ON** position
8–GROUND : Always continuity

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
J13	39	J20	39	R33	41
J18	39	R5	39		
J19	39	R32	41		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
2M	24	Front Door LH Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)
3G	30	Front Door RH Wire and Cowl Side J/B RH (Right Kick Panel)
3I	30	Instrument Panel Integration Wire and Cowl Side J/B RH (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IF1	46	Instrument Panel Integration Wire and Instrument Panel Wire (Left Side of Instrument Panel)
IF2		

: GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH

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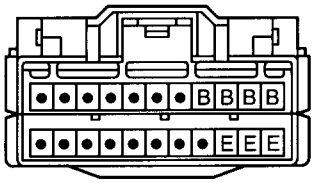
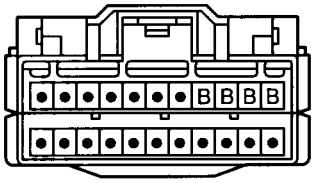
REMOTE CONTROL MIRROR

J13
GRAY



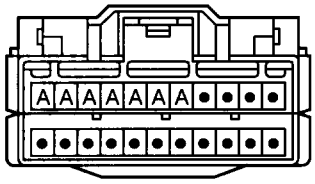
(Hint : See Page 7)

J18
GRAY



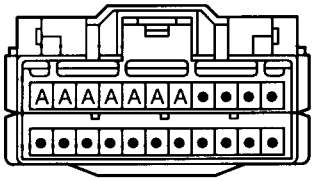
(Hint : See Page 7)

J19
GRAY



(Hint : See Page 7)

J20



(Hint : See Page 7)

R5
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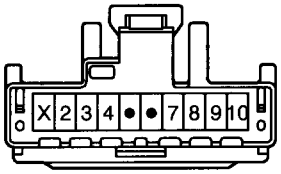
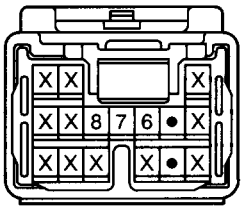
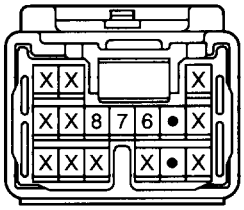


R32



R33



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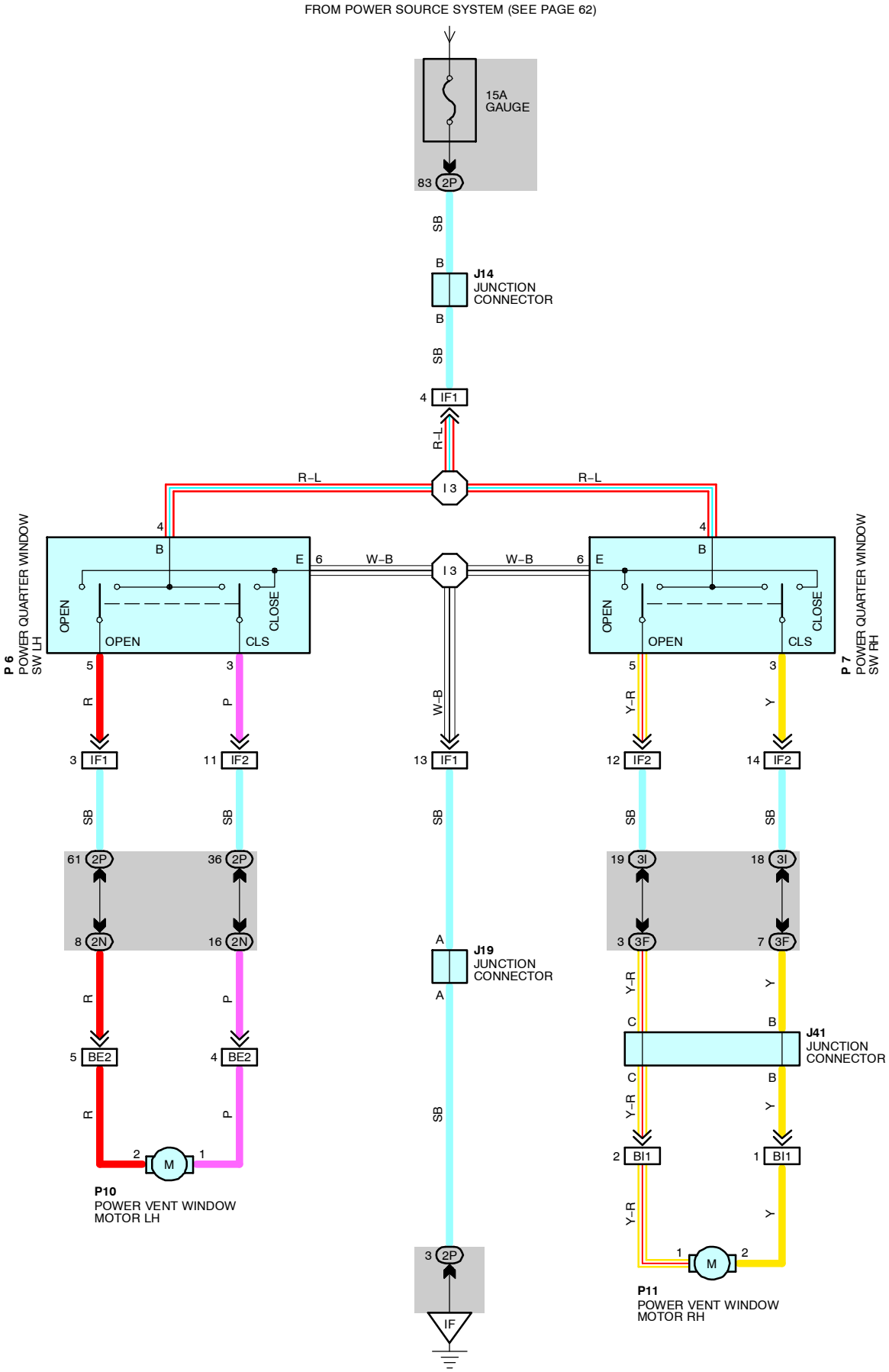
POWER REAR QUARTER WINDOW



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SERVICE HINTS

P6 POWER QUARTER WINDOW SW LH

4–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
6–GROUND : Always continuity

P7 POWER QUARTER WINDOW SW RH

4–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
6–GROUND : Always continuity

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
J14	39	P6	39	P11	41
J19	39	P7	39		
J41	40	P10	41		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
2N	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)
3F	30	Floor No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3I	30	Instrument Panel Integration Wire and Cowl Side J/B RH (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IF1	46	Instrument Panel Integration Wire and Instrument Panel Wire (Left Side of Instrument Panel)
IF2		
BE2	54	Luggage Room Wire and Floor Wire (Left Rear Side Quarter Panel)
BI1	56	Roof No.2 Wire and Floor No.2 Wire (Right Side Rear Quarter Panel)

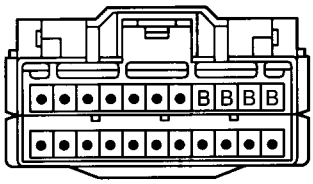
: GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH

: SPLICE POINTS

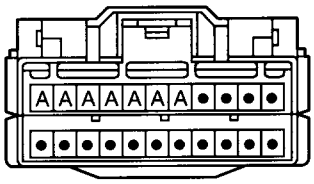
Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I3	48	Instrument Panel Wire			

J14



(Hint : See Page 7)

J19
GRAY



(Hint : See Page 7)

J41
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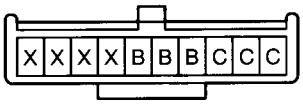

(Hint : See Page 7)

P6
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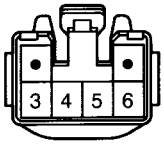

P7
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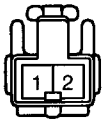
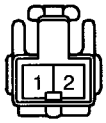
P10



P11



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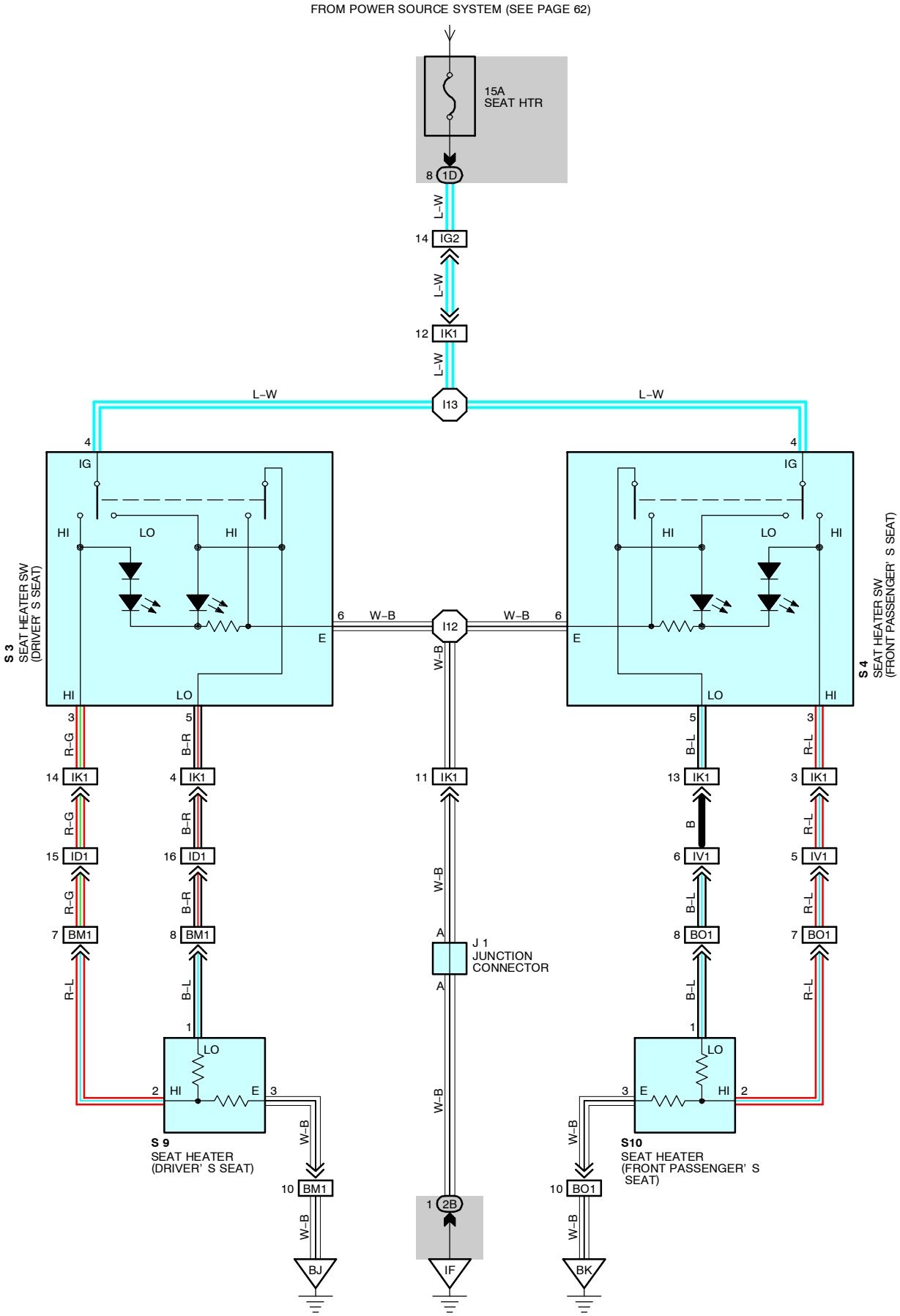

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SERVICE HINTS

S3 SEAT HEATER SW (DRIVER'S SEAT)

4–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
6–GROUND : Always continuity

S4 SEAT HEATER SW (FRONT PASSENGER'S SEAT)

4–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
6–GROUND : Always continuity

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
J1	39	S4	39	S10	42
S3	39	S9	42		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1D	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
ID1	46	Dash Wire and Floor Wire (Left Kick Panel)
IG2	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IK1	48	Console Box Wire and Dash Wire (Left Side of Front Console)
IV1	52	Dash Wire and Floor No.2 Wire (Behind the Glove Box)
BM1	58	Floor Wire and Front Seat LH Wire (Front Side Under the Driver's Seat)
BO1	58	Floor No.2 Wire and Front Seat RH Wire (Front Side Under the Front Passenger's Seat)

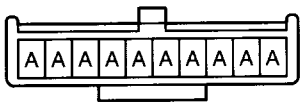
: GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH
BJ	54	Under the Driver's Seat
BK	54	Front Side Under the Front Passenger's Seat

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I12	48	Console Box Wire	I13	48	Console Box Wire

J1



(Hint : See Page 7)

S3
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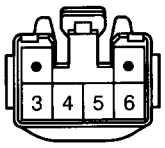
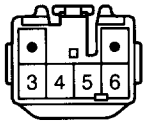


S4



S9

S10

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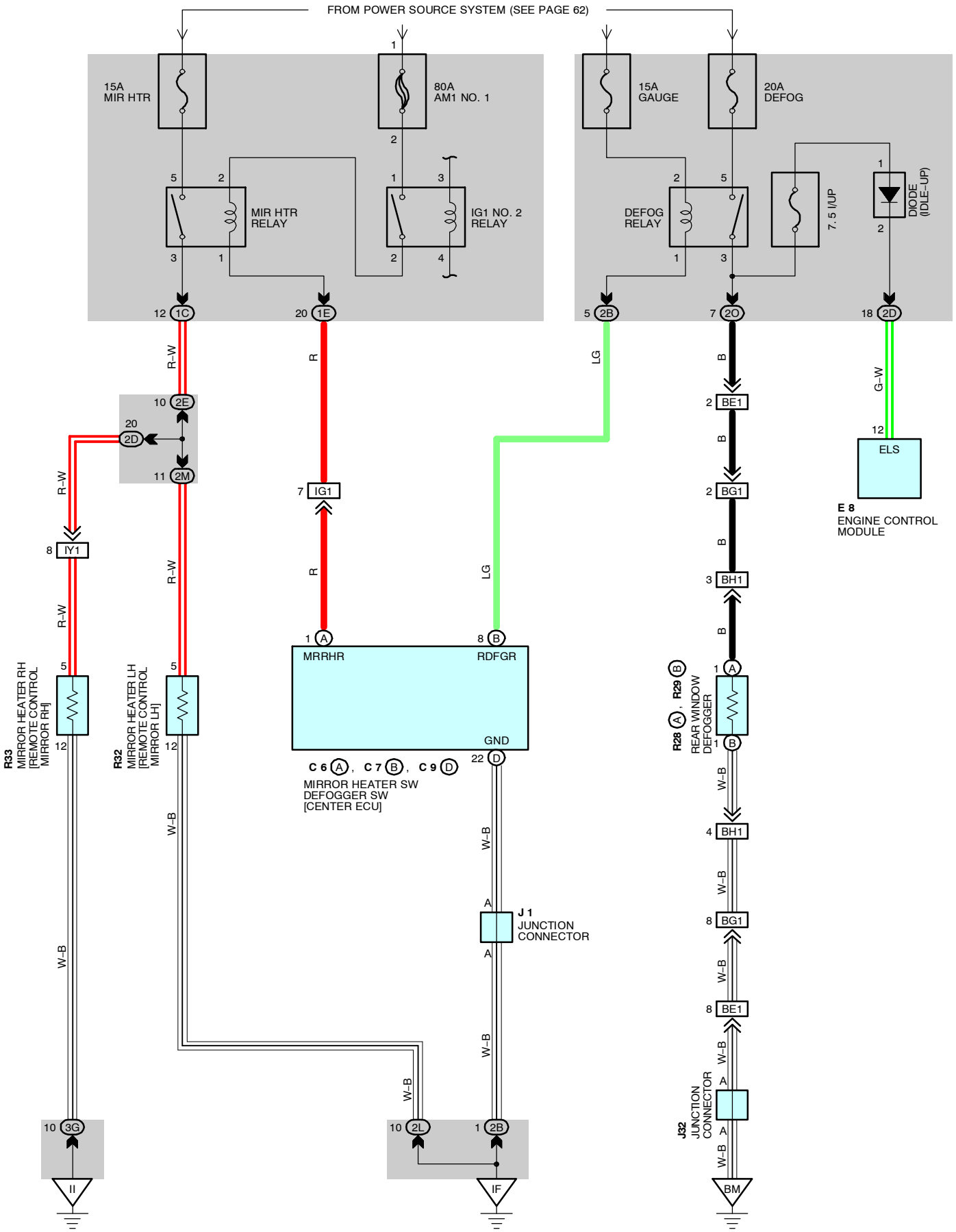
REAR WINDOW DEFOGGER AND MIRROR HEATER



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SERVICE HINTS

DEFOG RELAY

5–3 : Closed with ignition SW at **ON** or **ST** position and defogger SW on

MIR HTR RELAY

5–3 : Closed with ignition SW at **ON** or **ST** position and mirror heater SW on

○ : PARTS LOCATION

Code		See Page	Code		See Page	Code	See Page
C6	A	38	J1		39	R32	41
C7	B	38	J32		40	R33	41
C9	D	38	R28	A	41		
E8		38	R29	B	41		

⬭ : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1C	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1E		
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		
2E	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2L	24	Front Door LH Wire and Cowl Side J/B LH (Left Kick Panel)
2M		
2O	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
3G	30	Front Door RH Wire and Cowl Side J/B RH (Right Kick Panel)

▭ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IG1	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IY1	52	Front Door RH Wire and Dash Wire (Right Kick Panel)
BE1	54	Luggage Room Wire and Floor Wire (Left Rear Side Quarter Panel
BG1	56	Pillar No.1 Wire and Luggage Room Wire (Left Rear Side Roof Panel)
BH1	56	Pillar No.1 Wire and Back Door Upper Wire (Left Side of Back Door)

▽ : GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH
II	46	Set Bolt of Cowl Side J/B RH
BM	54	Left Rear Side Quarter Panel

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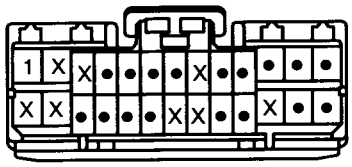
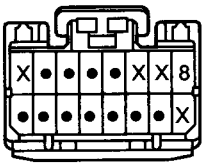
REAR WINDOW DEFOGGER AND MIRROR HEATER

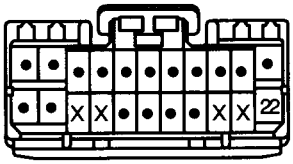
C6 (A)



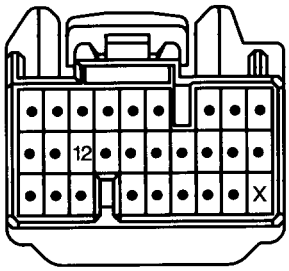
C7 (B)



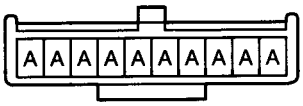
C9 (D)



E8

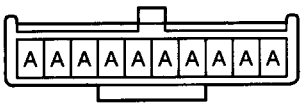


J1



(Hint : See Page 7)

J32

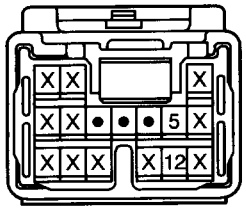


(Hint : See Page 7)

R28 (A)

R29 (B)

R32



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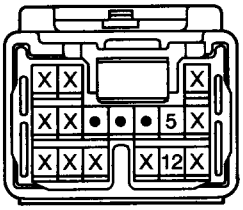

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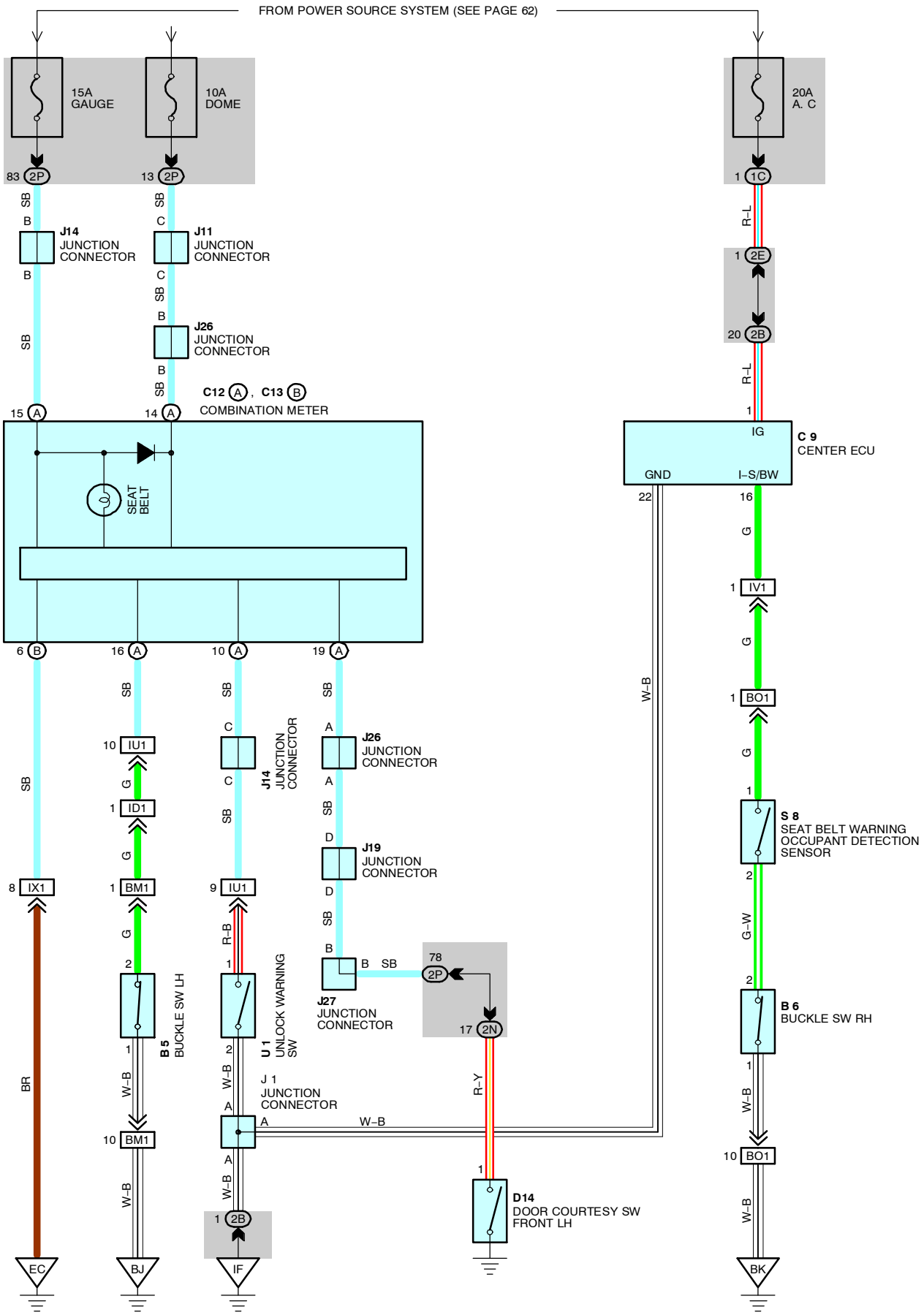
KEY REMINDER AND SEAT BELT WARNING



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SYSTEM OUTLINE

1. SEAT BELT WARNING SYSTEM

When the ignition SW turned on, a signal is input to the combination meter and center ECU. To determine whether the driver has fastened the seat belt, a signal is input from the buckle SW LH to the combination meter **TERMINAL (A) 16**. When the seat belt is not fastened, the seat belt warning light in the combination meter blinks, and emits a warning sound.
In addition, the front passenger is recognized by a sensor (Seat belt warning occupant detection sensor) is installed in the front passenger seat, and determines whether the seat belt is fastened. When not fastened, the signals from the seat belt warning occupant detection sensor and buckle SW RH is input to center ECU **TERMINAL 16**, and the passenger seat belt warning light blinks to warn the passenger.

2. KEY REMINDER SYSTEM

When the driver door is opened with the ignition SW off and ignition key remaining in the key cylinder (Unlock warning SW on), a signal is input from the unlock warning SW to the combination meter **TERMINAL (A) 10**, and from the door courtesy SW front LH to combination meter **TERMINAL (A) 19**. As a result, the buzzer in the combination meter goes on and warns the driver that the key is remaining in the key cylinder.

SERVICE HINTS

S8 SEAT BELT WARNING OCCUPANT DETECTION SENSOR

1–2 : Closed with passenger sit on the front passenger seat

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
B5	42	D14	40	J26	39
B6	42	J1	39	J27	39
C9	38	J11	39	S8	42
C12 A	38	J14	39	U1	39
C13 B	38	J19	39		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1C	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2E	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2N	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
ID1	46	Dash Wire and Floor Wire (Left Kick Panel)
IU1	50	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
IV1	52	Dash Wire and Floor No.2 Wire (Behind the Glove Box)
IX1	52	Instrument Panel Integration Wire and Engine Wire (Behind the Glove Box)
BM1	58	Floor Wire and Front Seat LH Wire (Front Side Under the Driver's Seat)
BO1	58	Floor No.2 Wire and Front Seat RH Wire (Front Side Under the Front Passenger's Seat)

: GROUND POINTS

Code	See Page	Ground Points Location
EC	44	Rear Bank of Right Cylinder Head
IF	46	Set Bolt of Cowl Side J/B LH
BJ	54	Under the Driver's Seat
BK	54	Front Side Under the Front Passenger's Seat

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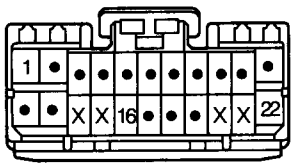
KEY REMINDER AND SEAT BELT WARNING

B5

B6

C9



C12 (A)
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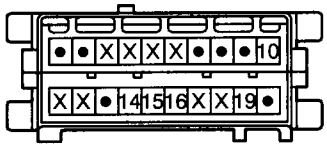
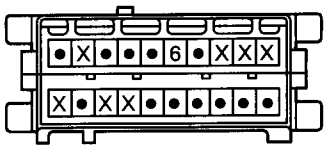
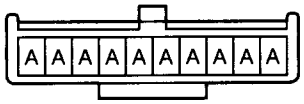


C13 (B)



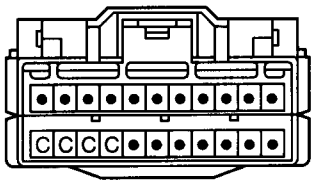
D14

J1



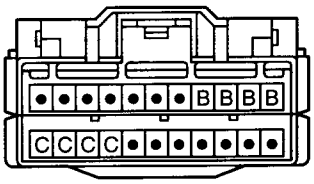
(Hint : See Page 7)

J11
GRAY



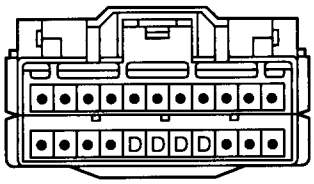
(Hint : See Page 7)

J14



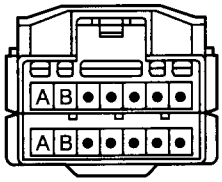
(Hint : See Page 7)

J19
GRAY



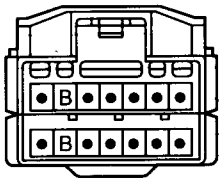
(Hint : See Page 7)

J26
BLUE



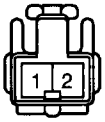
(Hint : See Page 7)

J27
GRAY

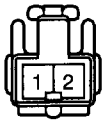


(Hint : See Page 7)

S8



U1



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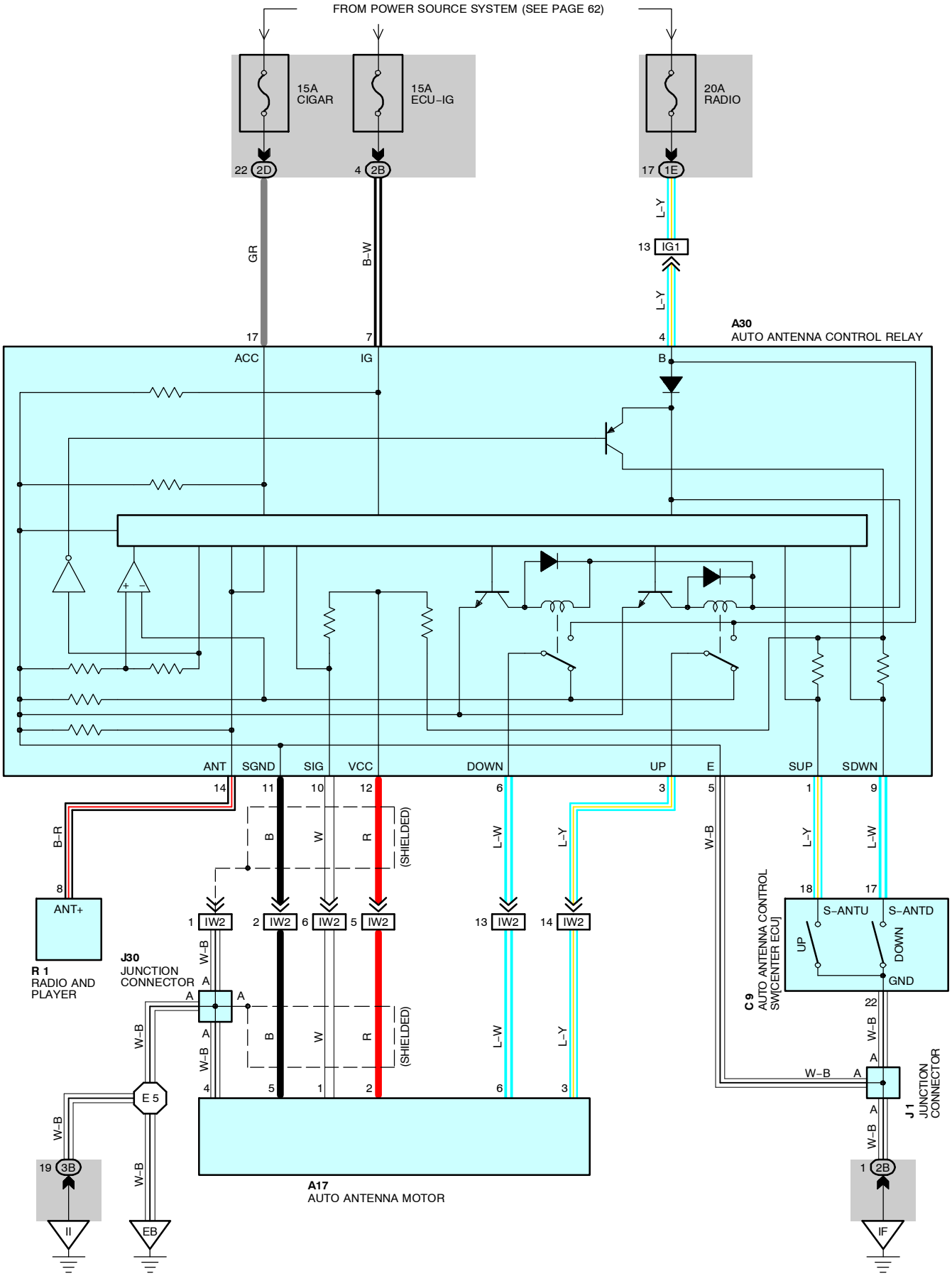
AUTO ANTENNA



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SERVICE HINTS

A30 AUTO ANTENNA CONTROL RELAY

4–GROUND : Always approx. **12** volts
7–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
17–GROUND : Approx. **12** volts with ignition SW at **ACC** or **ON** position
5–GROUND : Always continuity

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
A17	36	C9	38	J30	39
A30	38	J1	39	R1	39

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1E	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		
3B	30	Engine Room No.2 Wire and Cowl Side J/B RH (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IG1	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IW2	52	Engine Room No.2 Wire and Dash Wire (Behind the Glove Box)

: GROUND POINTS

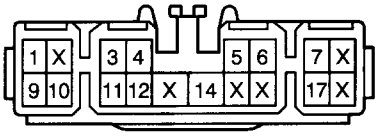
Code	See Page	Ground Points Location
EB	44	Front Right Side of Fender Apron
IF	46	Set Bolt of Cowl Side J/B LH
II	46	Set Bolt of Cowl Side J/B RH

: SPLICE POINTS

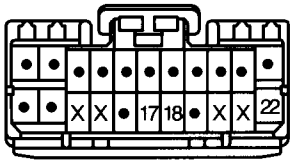
Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E5	44	Engine Room No.2 Wire			

A17

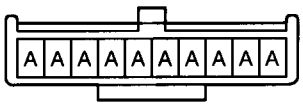
A30



C9

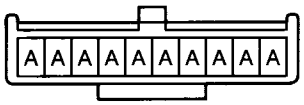


J1



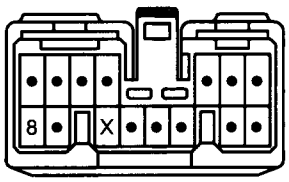
(Hint : See Page 7)

J30



(Hint : See Page 7)

R1



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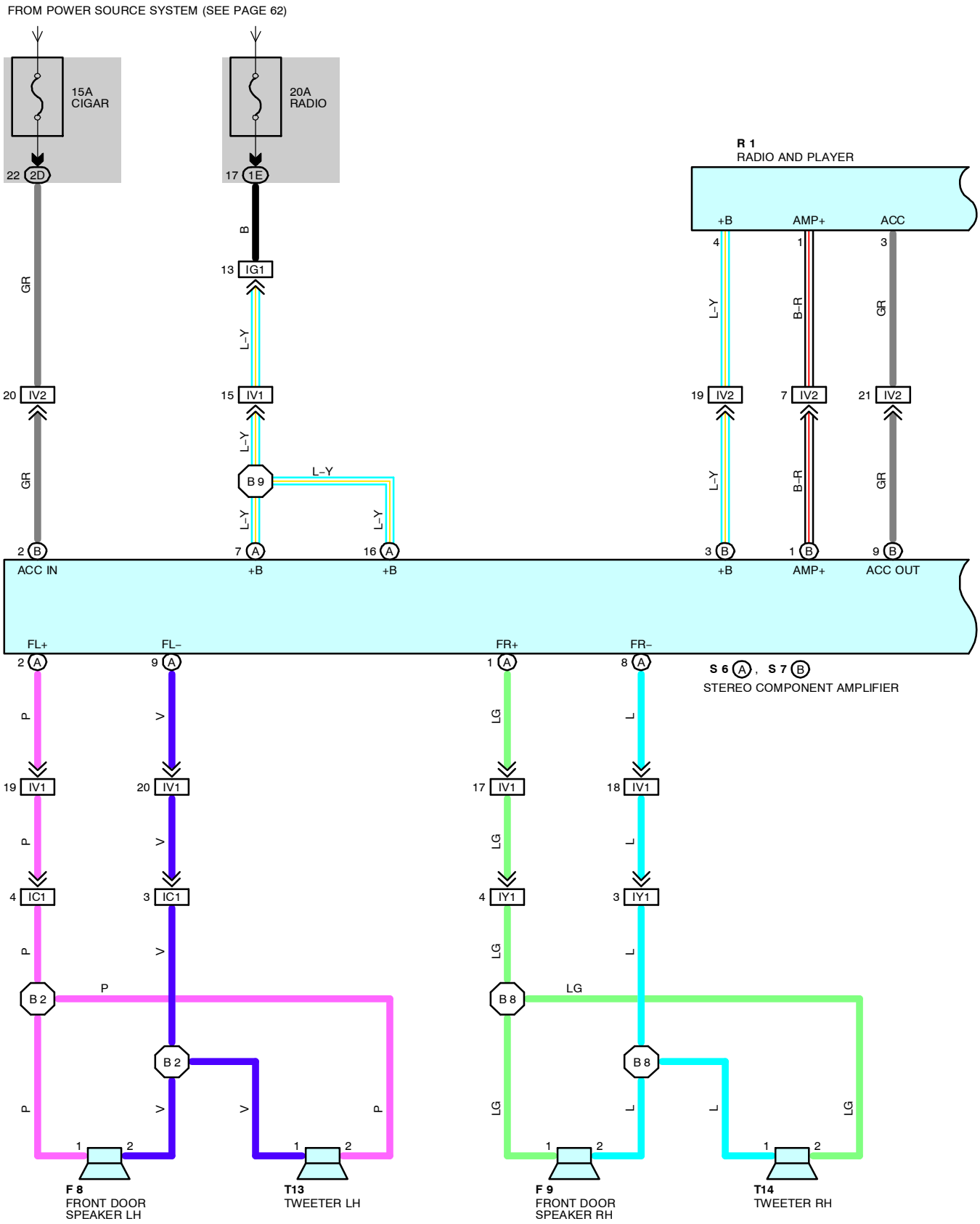
RADIO AND PLAYER



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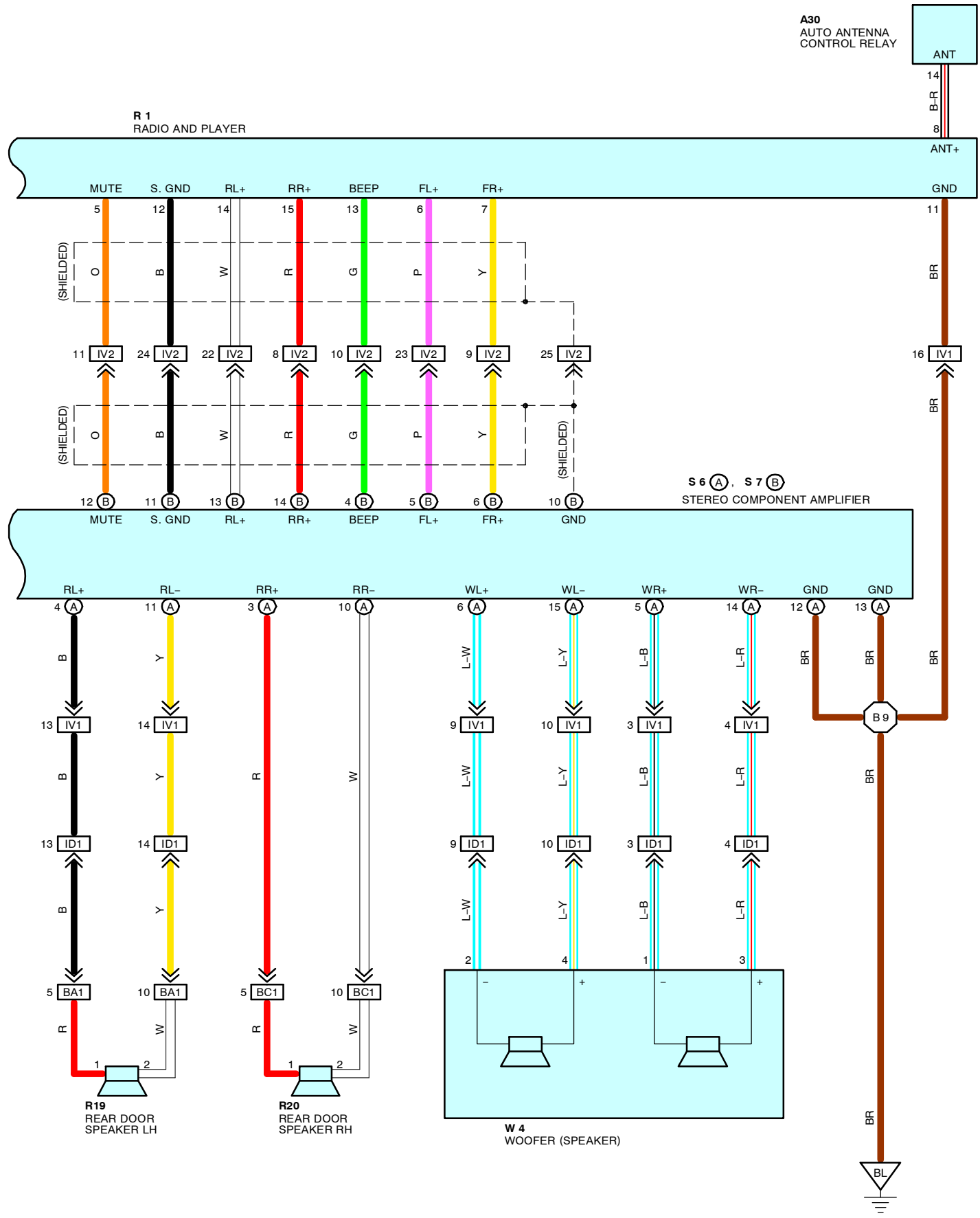

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RADIO AND PLAYER

SERVICE HINTS

R1 RADIO AND PLAYER

11–GROUND : Always continuity

S6 (A), S7 (B) STEREO COMPONENT AMPLIFIER

(B) 2–GROUND : Approx. **12** volts with ignition SW at **ACC** or **ON** position
(A) 7, (A) 16–GROUND : Always approx. **12** volts
(A) 12, (A) 13–GROUND : Always continuity

: PARTS LOCATION

Code	See Page	Code		See Page	Code	See Page
A30	38	R19		41	T13	41
F8	40	R20		41	T14	41
F9	40	S6	A	41	W4	41
R1	39	S7	B	41		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1E	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
2D	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IC1	46	Front Door LH Wire and Dash Wire (Left Kick Panel)
ID1	46	Dash Wire and Floor Wire (Left Kick Panel)
IG1	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IV1	52	Dash Wire and Floor No.2 Wire (Behind the Glove Box)
IV2		
IY1	52	Front Door RH Wire and Dash Wire (Right Kick Panel)
BA1	54	Rear Door LH Wire and Floor Wire (Left Side of Center Pillar)
BC1	54	Rear Door RH Wire and Floor No.2 Wire (Right Side of Center Pillar)

: GROUND POINTS

Code	See Page	Ground Points Location
BL	54	Rear Side Under the Front Passenger's Seat

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
B2	56	Front Door LH Wire	B9	56	Floor No.2 Wire
B8	56	Front Door RH Wire			

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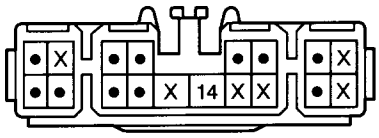
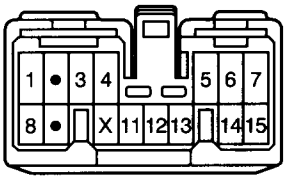
A30



F8

F9

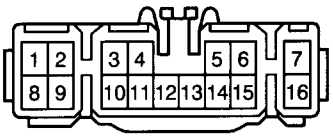
R1



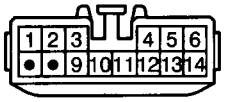
R19

R20

S6 (A)
GRAY



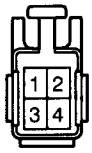
S7 (B)
GRAY



T13

T14

W4



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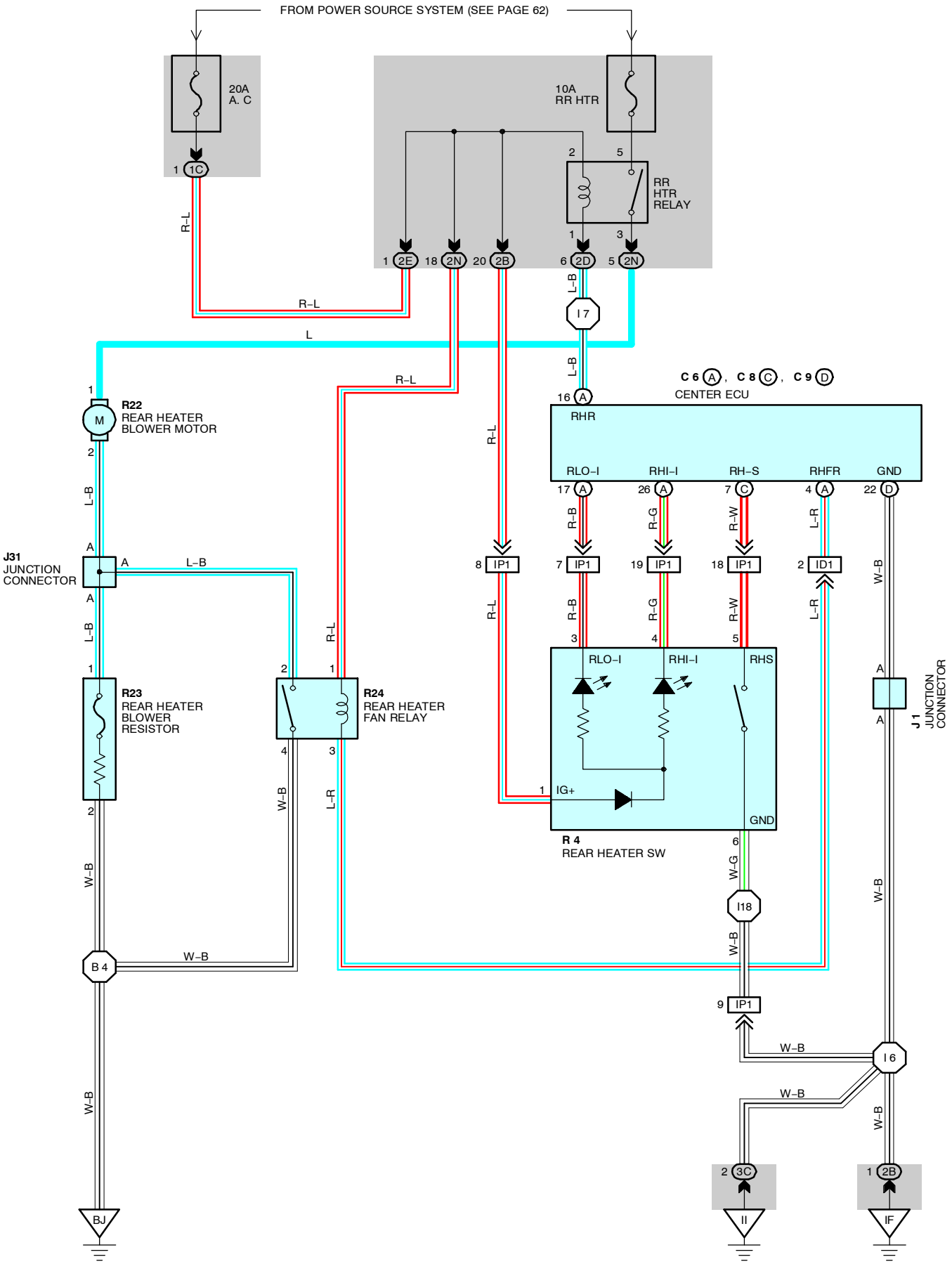
REAR HEATER (w/o REAR AIR CONDITIONING)



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SERVICE HINTS

RR HTR RELAY

5–3: Closed with the ignition SW at **ON** position and the rear heater SW on

R4 REAR HEATER SW

1–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
5–6 : Continuity with rear heater SW at **LO** or **HI** position
6–GROUND : Always continuity

: PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
C6	A	38	J1	39	R22	41
C8	C	38	J31	40	R23	41
C9	D	38	R4	39	R24	41

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1C	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		
2E	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2N	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
3C	30	Dash Wire and Cowl Side J/B RH (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
ID1	46	Dash Wire and Floor Wire (Left Kick Panel)
IP1	50	Rear Console Box Wire and Dash Wire (Right Side of Rear Console)

: GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH
II	46	Set Bolt of Cowl Side J/B RH
BJ	54	Under the Driver's Seat

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I6	48	Dash Wire	B4	56	Floor Wire
I7			I18	48	Rear Console Box Wire

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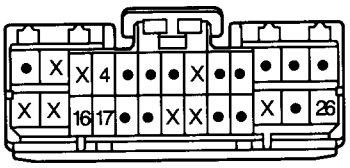
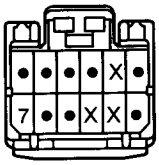
REAR HEATER (w/o REAR AIR CONDITIONING)

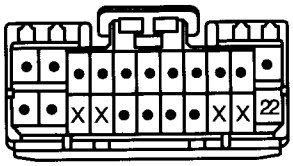
C6 (A)



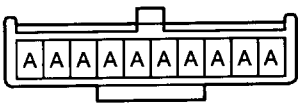
C8 (C)



C9 (D)

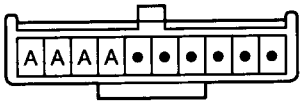


J1



(Hint : See Page 7)

J31
BLUE

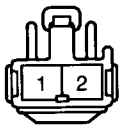


(Hint : See Page 7)

R4

R22

R23



R24

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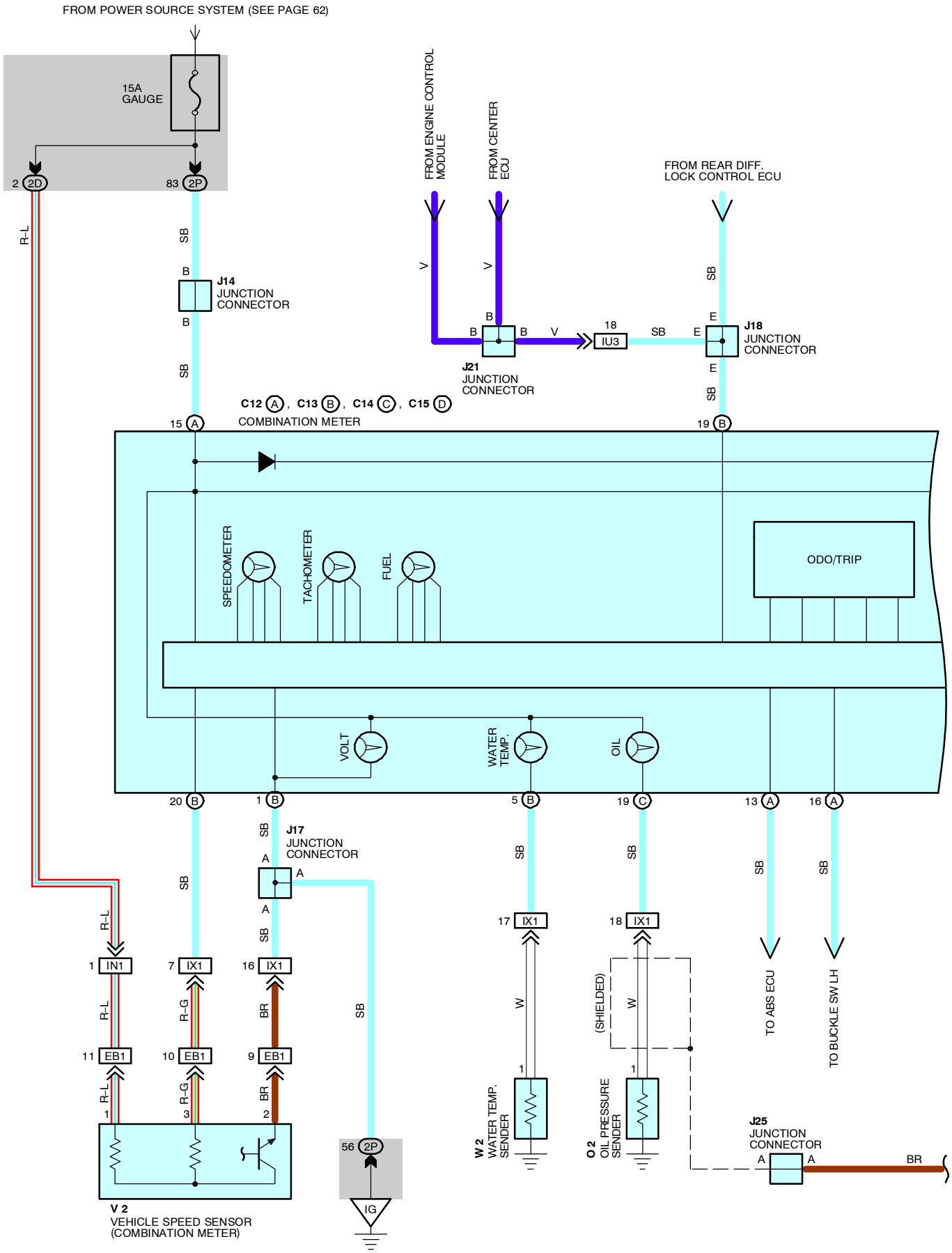
COMBINATION METER



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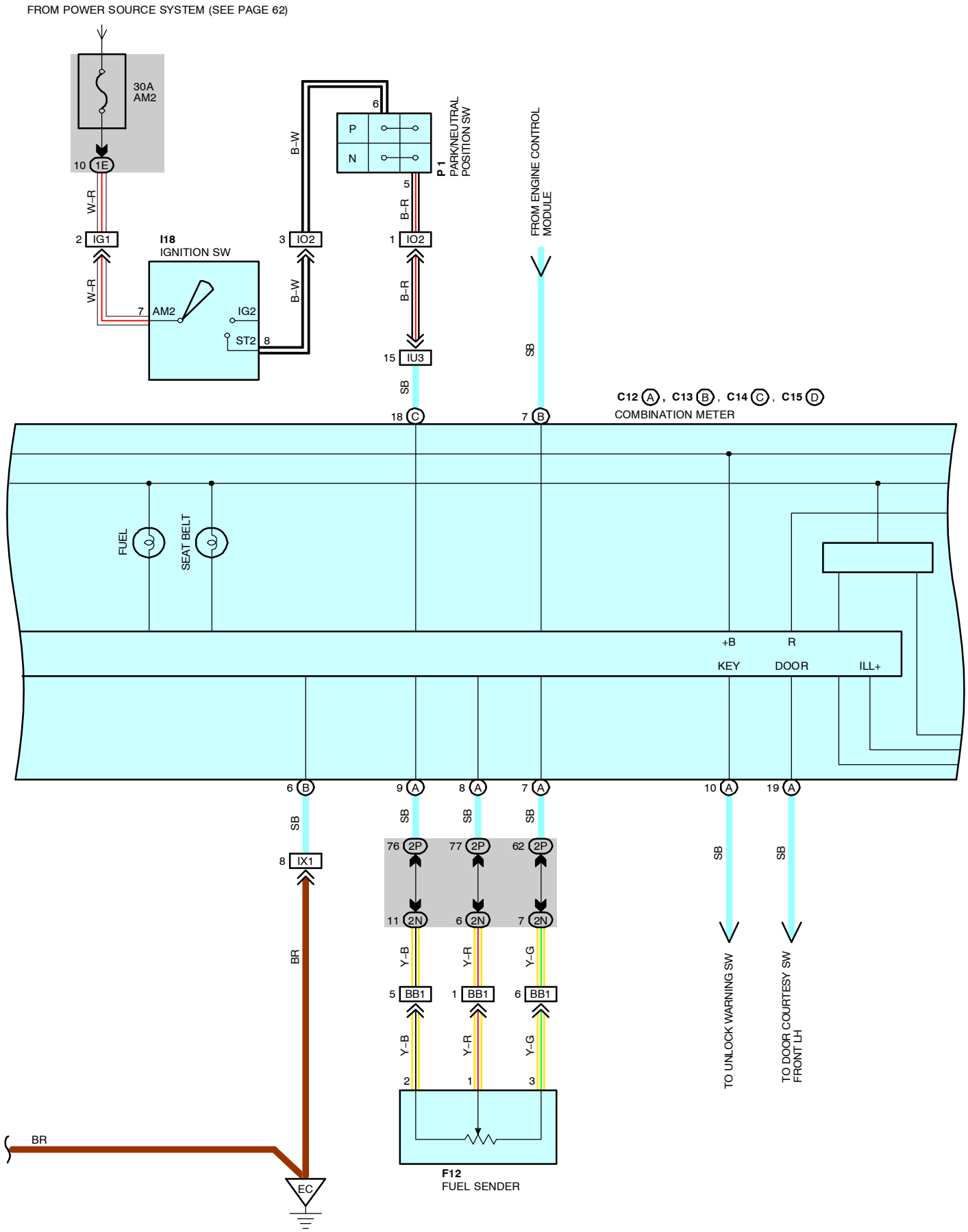

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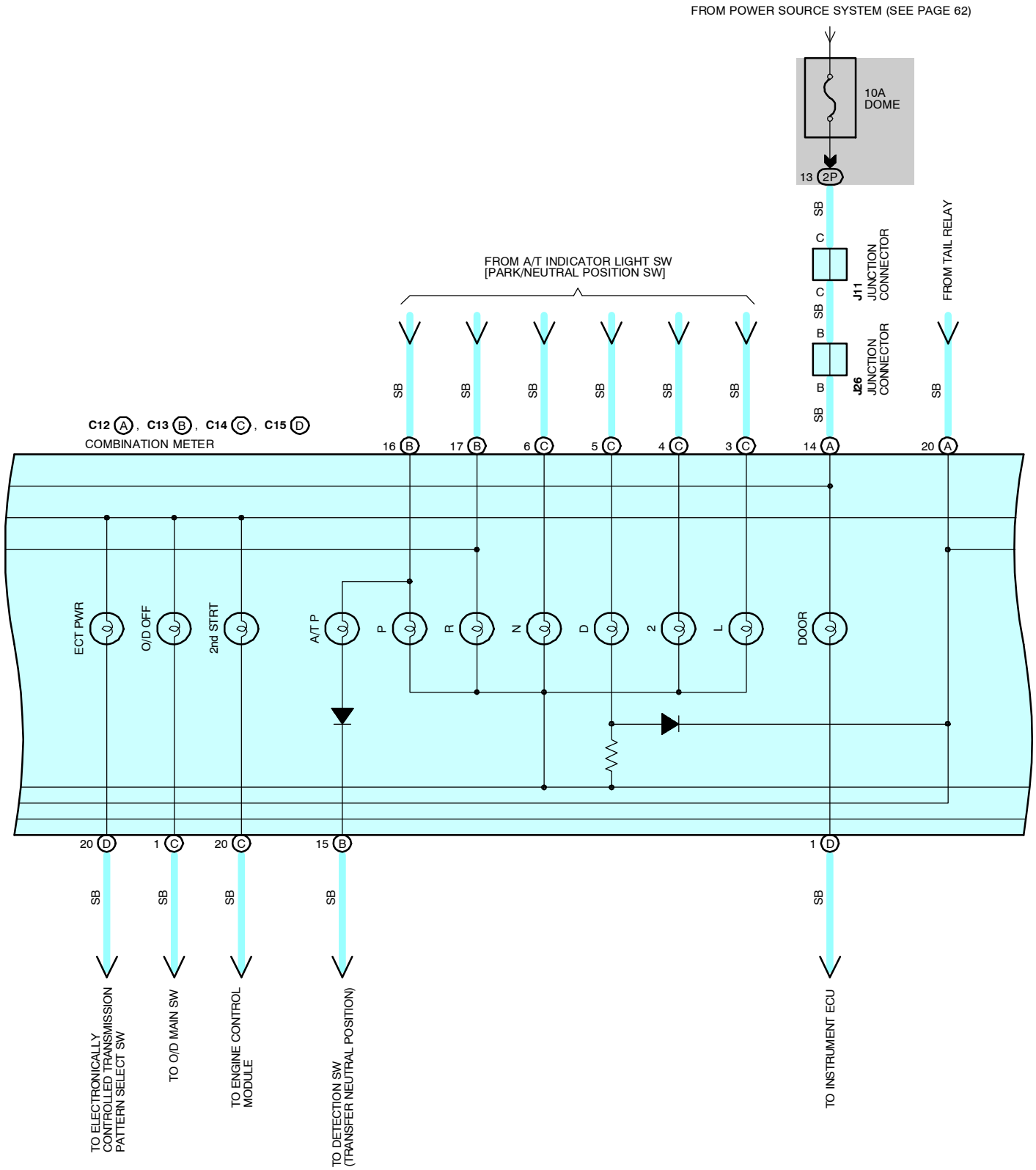
COMBINATION METER



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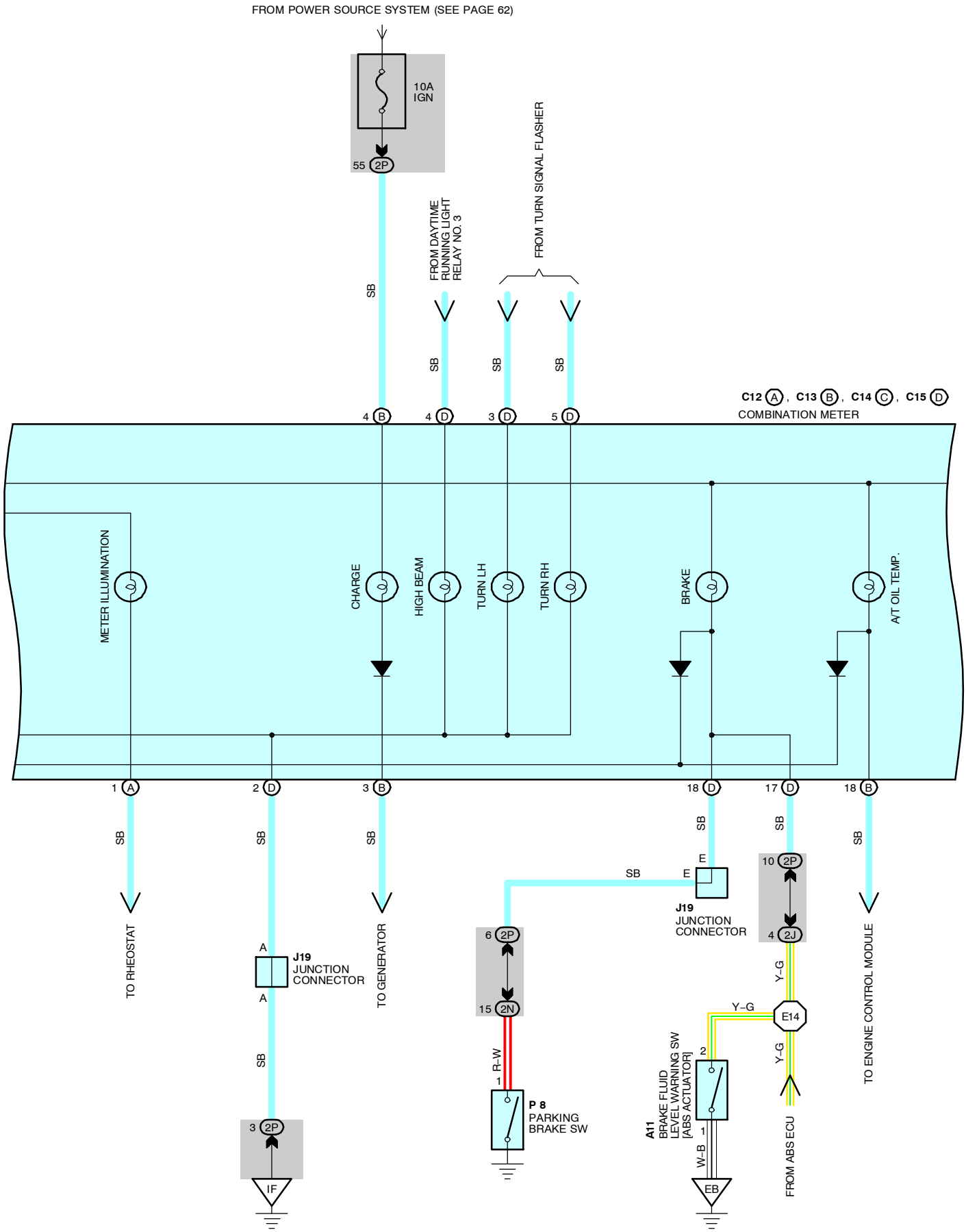

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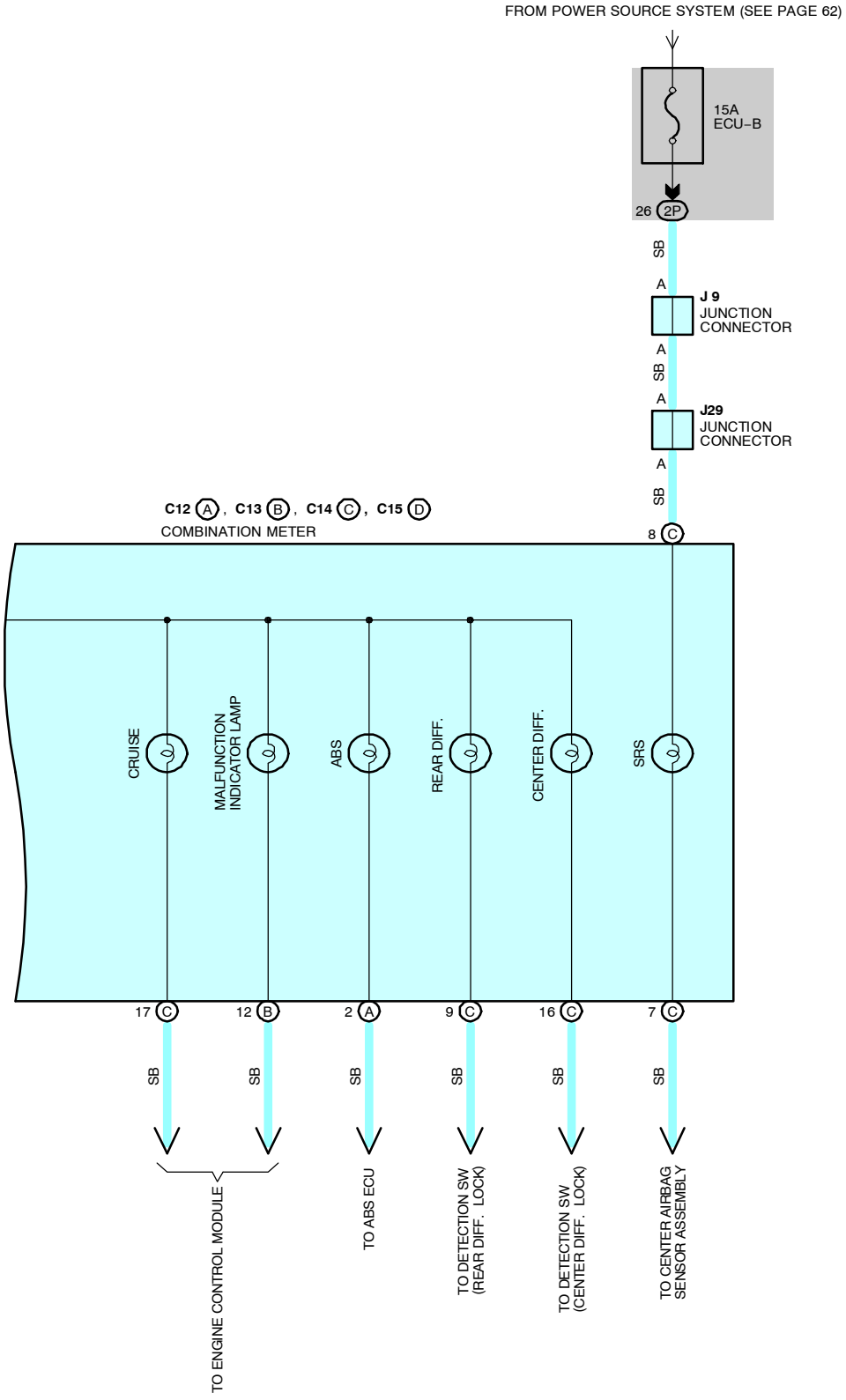

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SERVICE HINTS

All BRAKE FLUID LEVEL WARNING SW [ABS ACTUATOR]

1–2 : Closed with float down

P8 PARKING BRAKE SW

1–GROUND : Closed with parking brake lever pulled up

C12 (A), C13 (B), C14 (C), C15 (D) COMBINATION METER

(A) 14, (C) 8–GROUND : Always approx. **12** volts
(A) 15, (B) 4–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
(B) 1, (B) 6, (D) 2–GROUND : Always continuity

W2 WATER TEMP. SENDER

1–GROUND : Approx. **160–240** Ω (**50**°C, **122**°F)
: Approx. **17.1–21.2** Ω (**120**°C, **248**°F)

: PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
A11		36	J11	39	J29	39
C12	A	38	J14	39	O2	37
C13	B	38	J17	39	P1	37
C14	C	38	J18	39	P8	41
C15	D	38	J19	39	V2	37
F12		40	J21	39	W2	37
I18		38	J25	39		
J9		39	J26	39		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1E	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
2D	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2J	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2N	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel integration Wire and Cowl Side J/B LH (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EB1	44	Engine Wire and Transmission Wire (On the Transmission)
IG1	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IN1	50	Engine Wire and Dash Wire (Behind the Glove Box)
IO2		
IU3	50	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
IX1	52	Instrument Panel Integration Wire and Engine Wire (Behind the Glove Box)
BB1	54	Floor Wire and Fuel Tank Wire (Near the Fuel Tank)

: GROUND POINTS

Code	See Page	Ground Points Location
EB	44	Front Right Side of Fender Apron
EC	44	Rear Bank of Right Cylinder Head
IF	46	Set Bolt of Cowl Side J/B LH
IG		

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E14	44	Engine Room No.2 Wire			

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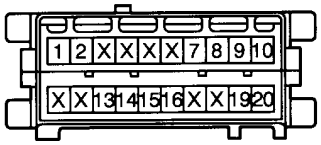
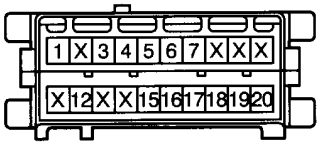
COMBINATION METER

A11
GRAY

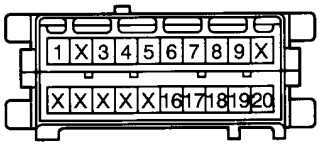
C12 (A)
GRAY



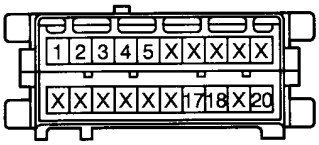
C13 (B)



C14 (C)
GRAY

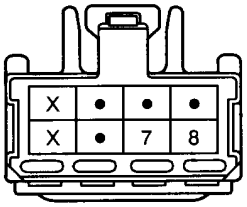


C15 (D)

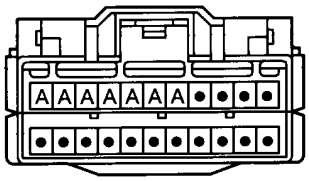


F12
DARK GRAY

I18

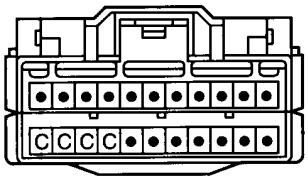


J9
GRAY



(Hint : See Page 7)

J11
GRAY



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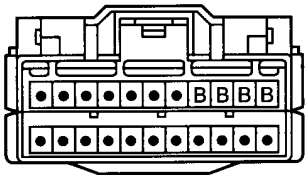
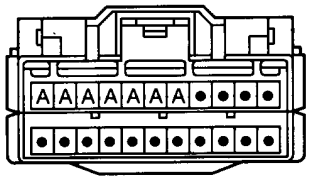
J14



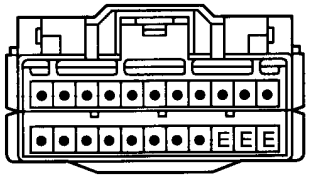
(Hint : See Page 7)

J17



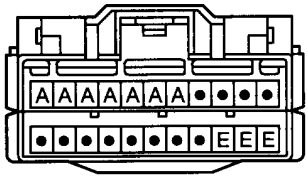
(Hint : See Page 7)

J18
GRAY



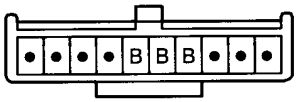
(Hint : See Page 7)

J19
GRAY



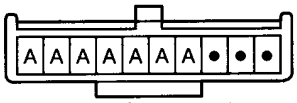
(Hint : See Page 7)

J21
BLUE



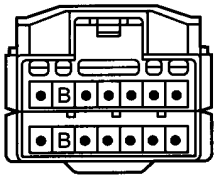
(Hint : See Page 7)

J25
RED



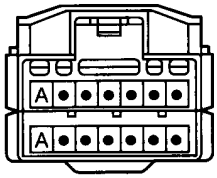
(Hint : See Page 7)

J26
BLUE



(Hint : See Page 7)

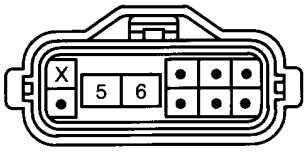
J29



(Hint : See Page 7)

O2
BLACK

P1
GRAY



P8

V2
BLACK

W2
GRAY

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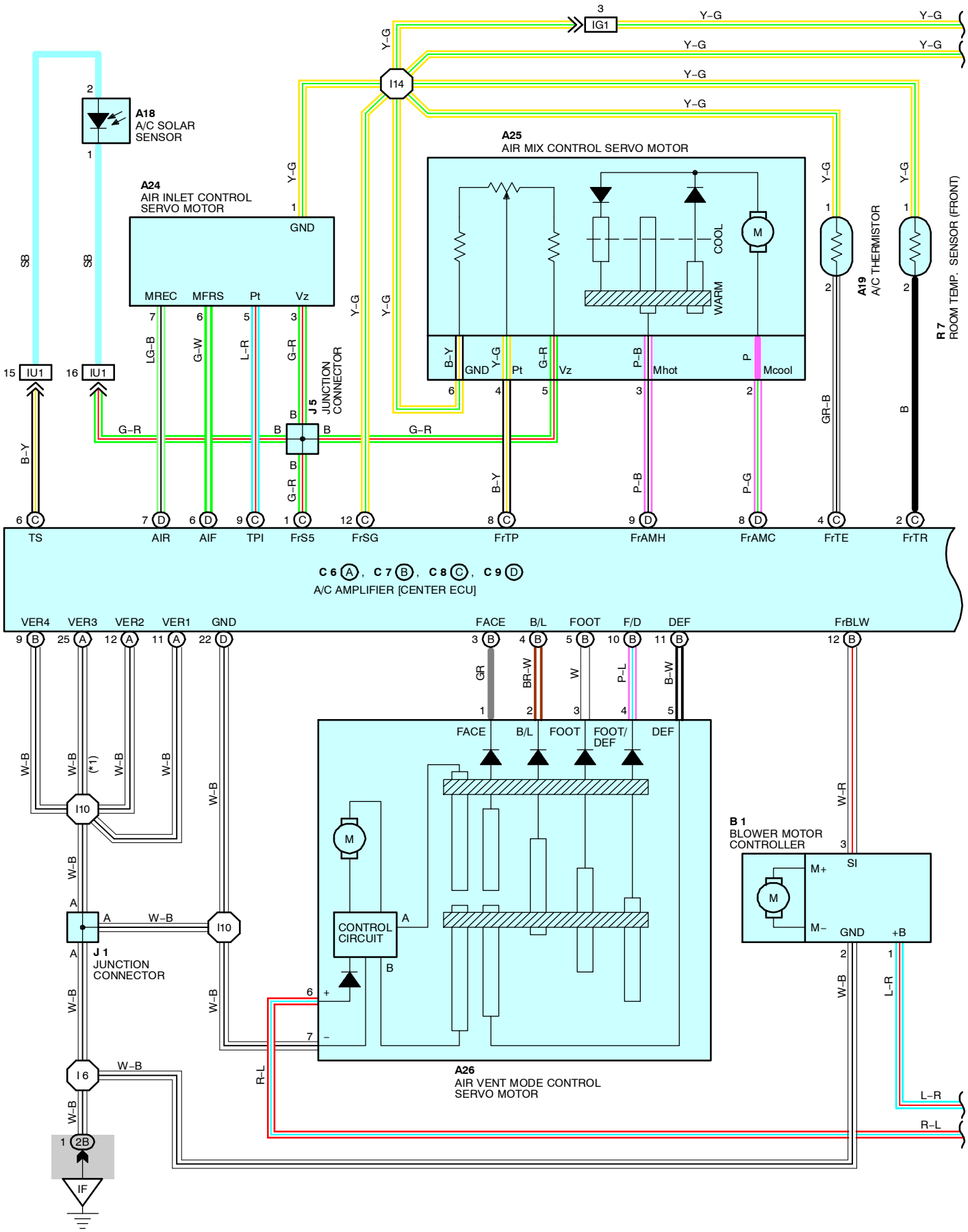
CONDENSER FAN AND FRONT AIR CONDITIONING



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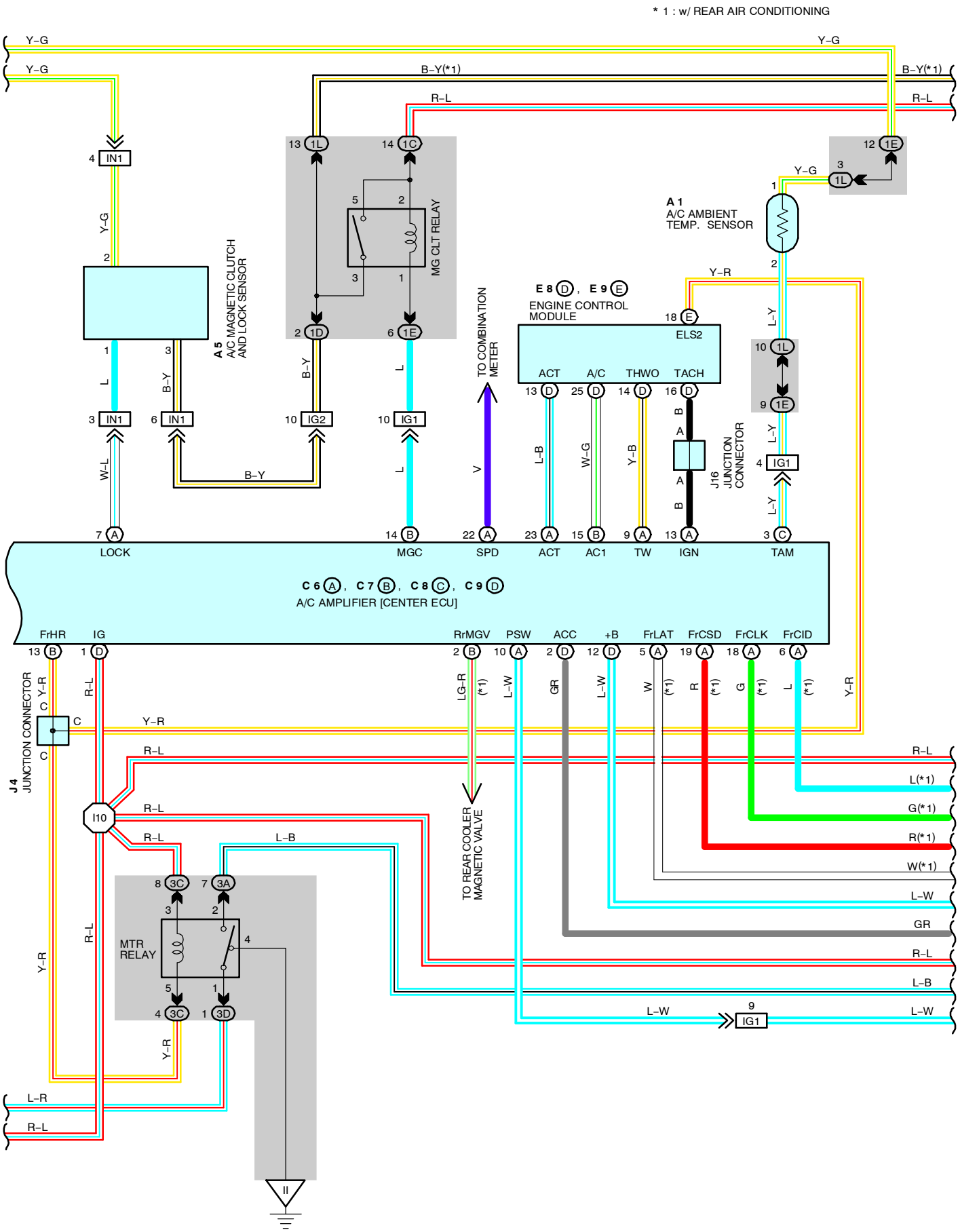

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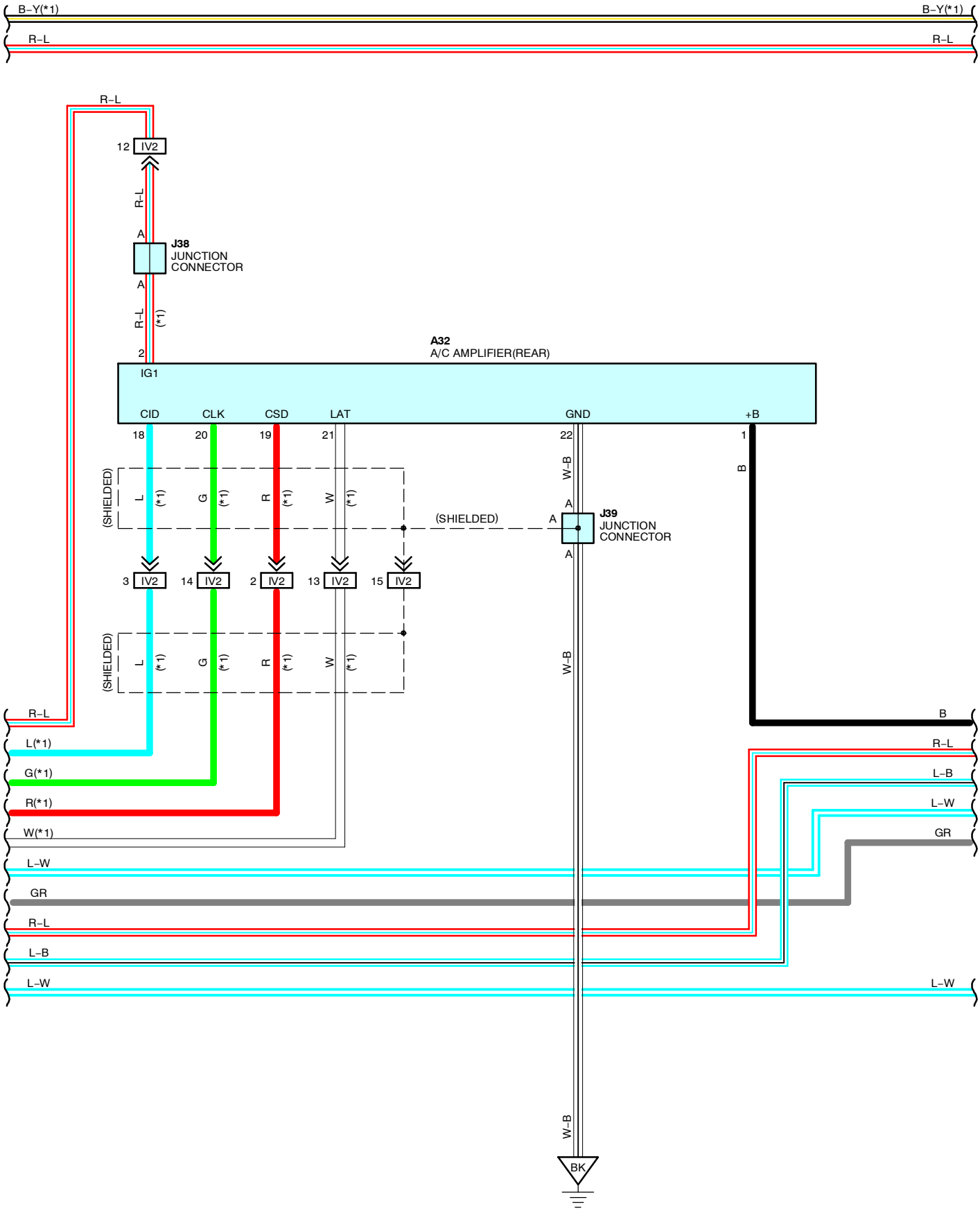

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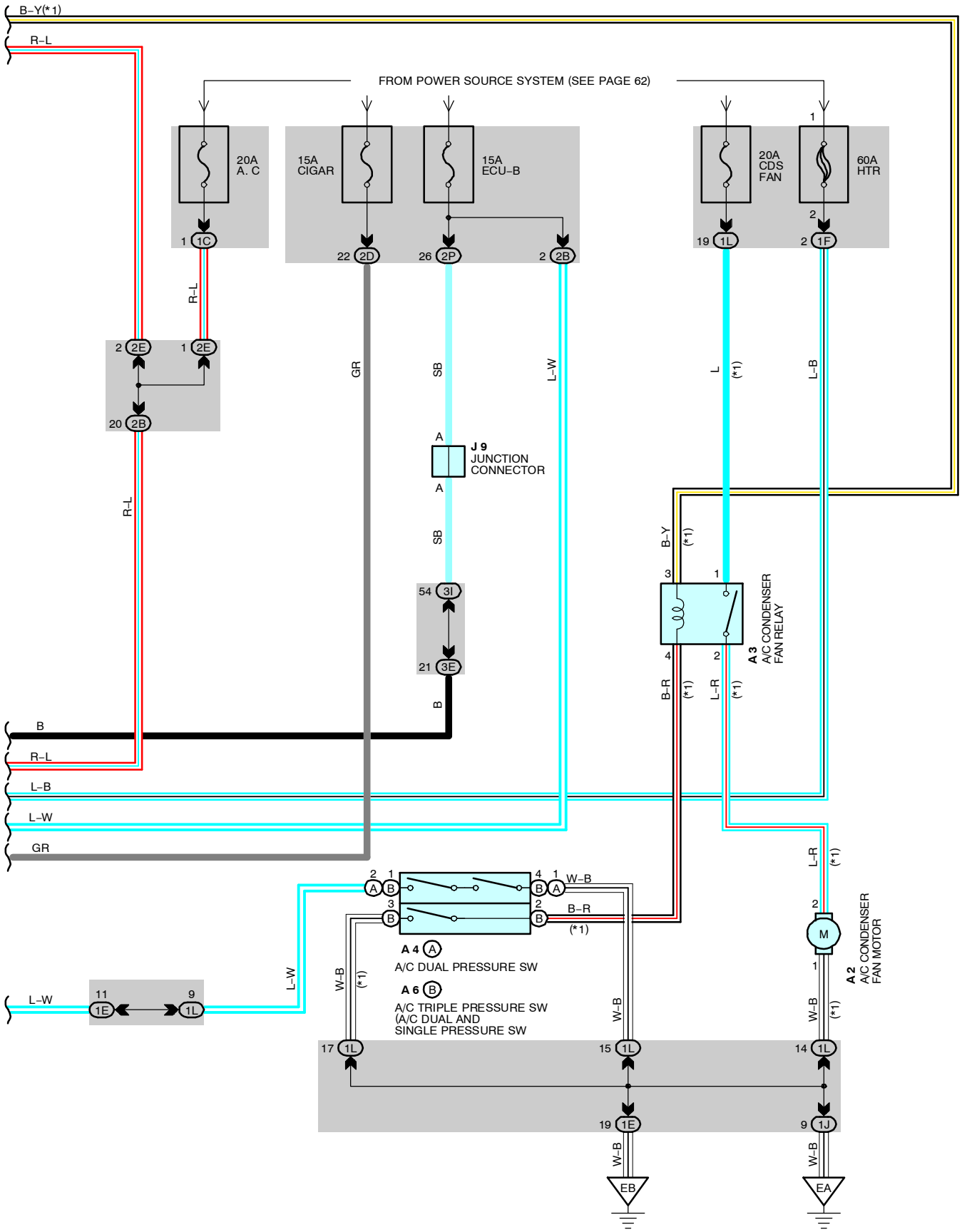
* 1 : w/ REAR AIR CONDITIONING



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CONDENSER FAN AND FRONT AIR CONDITIONING

SYSTEM OUTLINE

1. HEATER BLOWER OPERATION

Manual operation

When the blower speed is set ant any speed by the blower control SW, the center ECU sends a signal to the blower motor controller, and controls the blower motor speed.

Auto operation

When the auto SW is operated, the center ECU sends signals to the blower motor controller, according to the signals from respective sensors, commands from the temperature SW etc., and controls the blower motor automatically.

2. AIR INLET CONTROL SERVO MOTOR CONTROL

When the FRESH/RECIRC select SW is switched to RECIRC, the motor in the air inlet control servo motor rotates to move the damper to the RECIRC side. The damper position is recognized by the A/C amplifier [Center ECU] **TERMINAL TPI**, and rotates the motor until the damper reaches its position.

When the FRESH/RECIRC select SW is switched to FRESH, the motor in the air inlet control servo motor rotates to move the damper to the FRESH side. The damper position is recognized by the A/C amplifier [Center ECU] **TERMINAL TPI**, and rotates the motor until the damper reaches its position.

3. AIR VENT MODE CONTROL SERVO MOTOR

When the mode select SW in the center ECU is pushed, a signal is sent from the center ECU, and activates the air vent mode control servo motor. This causes the servo motor to rotate to the position selected using the mode select SW (FACE, BI−LEVEL, FOOT, FOOT/DEE DEF), and moves the damper.

4. AIR MIX CONTROL SERVO MOTOR

When the temperature control SW in the center ECU is pushed, a signal is sent from the center ECU, and activates the air mix control servo motor. The motor and damper is moved until it reaches the temperature set by the temperature control SW.

5. AIR CONDITIONING OPERATION

The center ECU receives various signals, i.e., the engine RPM from the crankshaft position sensor, outlet temperature from the A/C ambient temp. sensor, coolant temperature from the engine coolant temp. sensor, and the lock signal from the A/C compressor, etc. When the engine is started and the A/C SW is turned on, a signal is sent to the center ECU. As a result, the A/C magnetic clutch is turned on and operates the compressor.

In addition, when the engine control module detects that the A/C magnetic clutch is on and the A/C compressor is operating, it controls the engine in the direction to avoid lowering the engine RPM during A/C operation.

When any of the following signals are sent to the center ECU, the A/C is turned off.

* Coolant temp. is high.
* Outlet air temp. is low.
* Large difference between the engine speed and compressor speed.
* The refrigerant pressure is abnormally high or low.

6. CONDENSER FAN MOTOR OPERATION (w/ REAR AIR CONDITIONING)

When the A/C is operating and the A/C single pressure SW is on, the current flows from the **A/C** fuse to MG CLT relay **TERMINAL 5** to **TERMINAL 3** to A/C condenser fan relay **TERMINAL 3** to **TERMINAL 4** to A/C single pressure SW **TERMINAL 2** to **TERMINAL 3** to **GROUND**, and turns on the A/C condenser fan relay. As a result, the current flows from the **CDS FAN** fuse to A/C condenser fan relay **TERMINAL 1** to **TERMINAL 2** to A/C condenser fan motor **TERMINAL 2** to **TERMINAL 1** to **GROUND**, and operates the A/C condenser fan motor.

SERVICE HINTS

C6 (A), C7 (B), C9 (D) A/C AMPLIFIER [CENTER ECU]

ACC−GROUND : Approx. **12** volts with ignition SW at **ACC** or **ON** position
+B−GROUND : Always approx. 12 volts
AIF−GROUND : Approx. **12** volts with FRESH select SW on
AIR−GROUND : Approx. **12** volts with RECIRC select SW on
VER1, VER2, VER3, VER4, GND−GROUND : Always continuity

A4 (A) A/C DUAL PRESSURE SW

(A) 2−(A) 1: Open with the refrigerant pressure at less than approx. **2.0** kgf/cm^2 (**196.1** kpa, **28.4** psi) or more than approx. **32.0** kgf/cm^2 (**3138.1** kpa, **455** psi)

A6 (B) A/C TRIPLE PRESSURE SW (A/C DUAL AND SINGLE PRESSURE SW)

(B) 1 −(B) 4 : Open with the refrigerant pressure at less than approx. **2.0** kgf/cm^2 (**196.1** kpa, **28.4** psi) or more than approx. **32.0** kgf/cm^2 (**3138.1** kpa, **455** psi)
(B) 2−(B) 3 : Open below approx. **12.5** kgf/cm^2 (**1225** kpa, **178** psi)
: Closed above approx. **15.5** kgf/cm^2 (**1520** kpa, **220** psi)

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: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
A1	36	A25	38	E9 E	38
A2	36	A26	38	J1	39
A3	36	A32	40	J4	39
A4 A	36	B1	38	J5	39
A5	36	C6 A	38	J9	39
A6 B	36	C7 B	38	J16	39
A18	38	C8 C	38	J38	40
A19	38	C9 D	38	J39	40
A24	38	E8 D	38	R7	39

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1C	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1D		
1E		
1F		
1J	21	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)
1L		
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		
2E	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)
3A	30	Engine Room No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3C	30	Dash Wire and Cowl Side J/B RH (Right Kick Panel)
3D		
3E	30	Floor No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3I	30	Instrument Panel Integration Wire and Cowl Side J/B RH (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IG1	48	Engine Room No.2 Wire and Dash Wire (Behind the Combination Meter)
IG2		
IN1	50	Engine Wire and Dash Wire (Behind the Glove Box)
IU1	50	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
IV2	52	Dash Wire and Floor No.2 Wire (Behind the Glove Box)

: GROUND POINTS

Code	See Page	Ground Points Location
EA	44	Front Right Side of Fender Apron
EB		
IF	50	Set Bolt of Cowl Side J/B LH
II	50	Set Bolt of Cowl Side J/B RH
BK	52	Front Side Under the Front Passenger's Seat

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I6	48	Dash Wire	I14	48	Dash Wire
I10					

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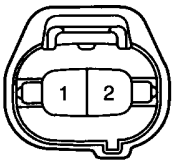
CONDENSER FAN AND FRONT AIR CONDITIONING

A1
BLACK

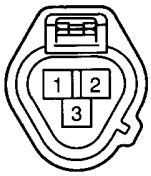
A2
BLACK

A3
GRAY

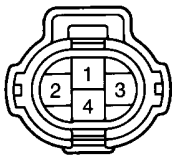
A4 (A)
GRAY



A5
GRAY

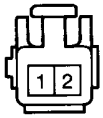


A6 (B)
DARK GRAY



A18

A19
BLACK



A24
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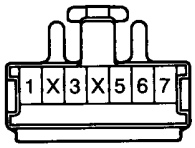

A25

A26
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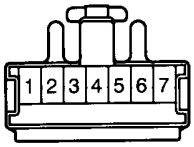
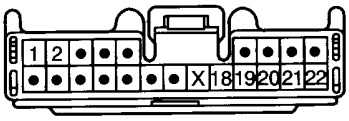
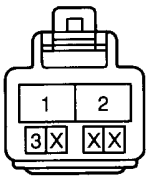


A32



B1
BLACK



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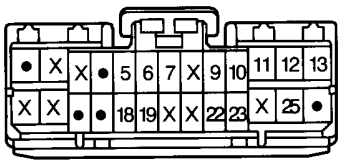

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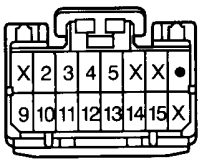

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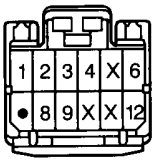
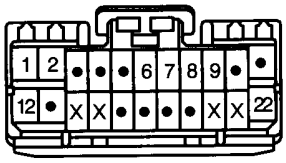


C9 (D)



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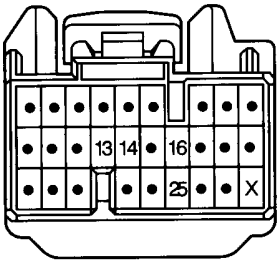
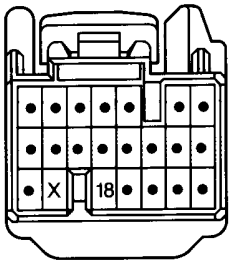
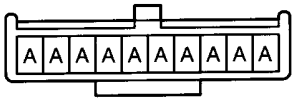


E9 (E)



J1



(Hint : See Page 7)

J4
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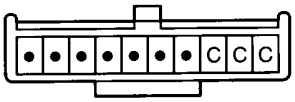

(Hint : See Page 7)

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J5
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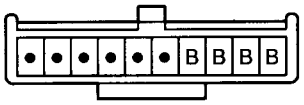

(Hint : See Page 7)

J9
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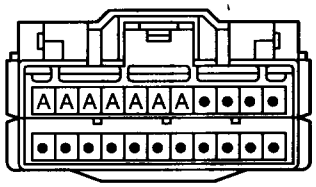

(Hint : See Page 7)

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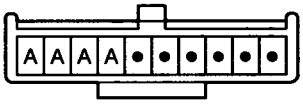

(Hint : See Page 7)

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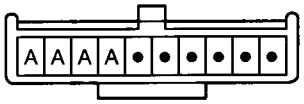
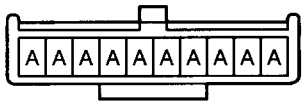


(Hint : See Page 7)

J39



(Hint : See Page 7)

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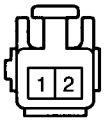

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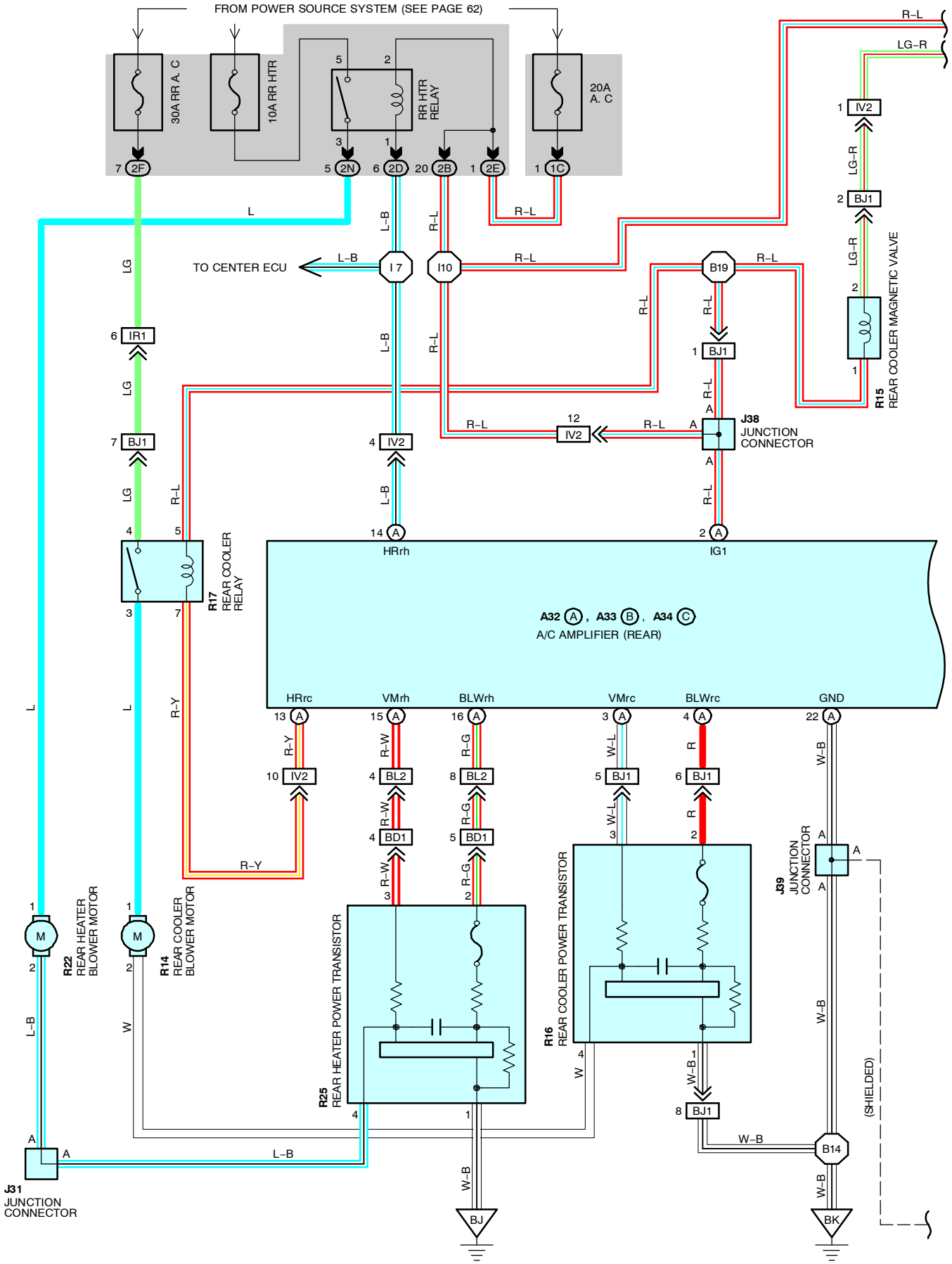

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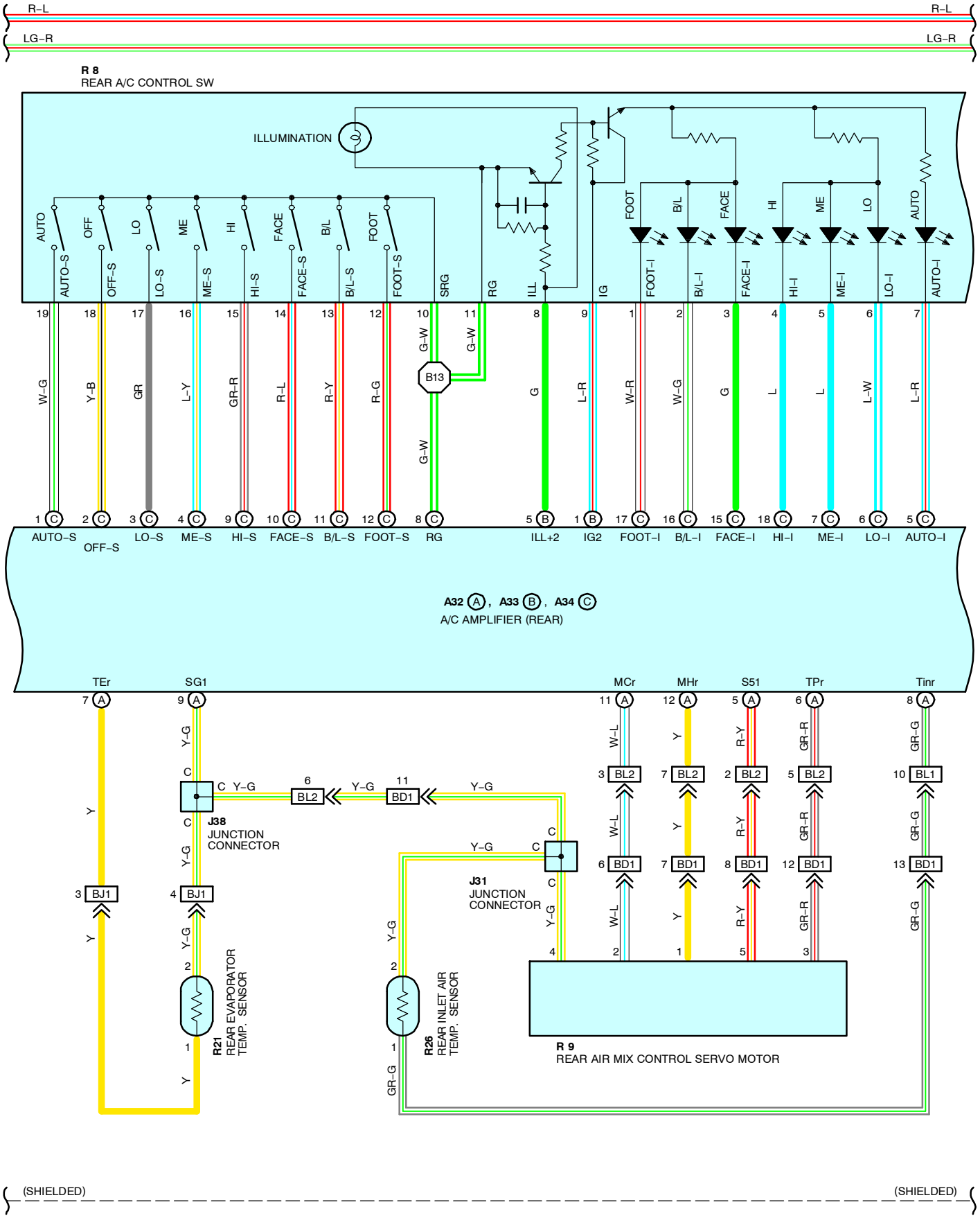

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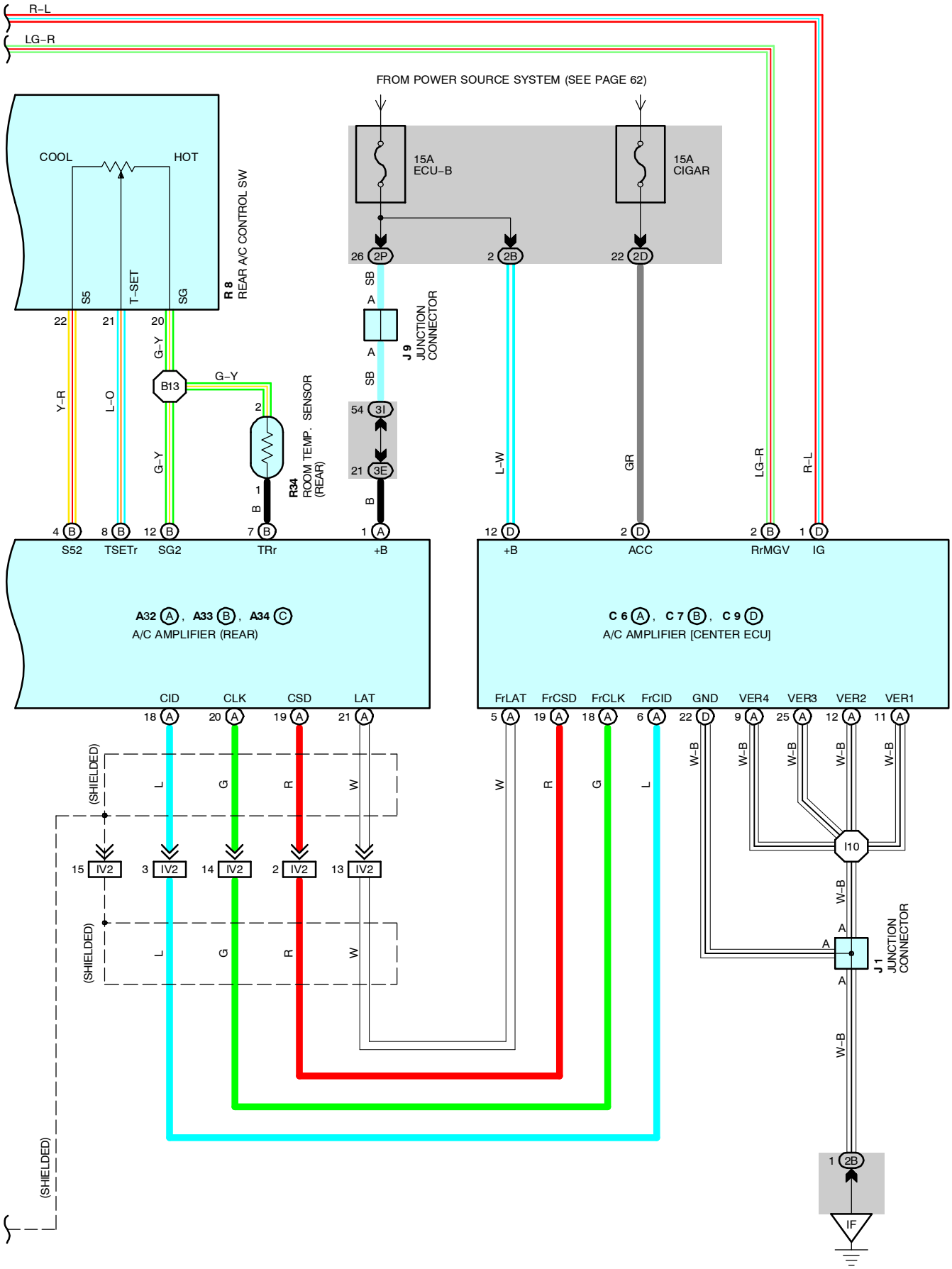

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SYSTEM OUTLINE

1. COOLER AND HEATER BLOWER OPERATION

* Manual operation
  When the blower control SW in the rear A/C control SW is set to any blower speed, a signal is sent to the A/C amplifier (Rear). The A/C amplifier (Rear) controls the power transistor and operates the rear cooler blower motor and rear heater blower motor at the set speed.
* Auto operation
  When the auto SW in the rear A/C control SW is operated, a signal is sent to the A/C amplifier (Rear). The A/C amplifier (Rear) controls the power transistor according to the signals from respective sensors, and operates the rear cooler blower motor and rear heater blower motor.

2. AIR MIX CONTROL SERVO MOTOR CONTROL

When the temperature control lever in the rear A/C control SW is operated, a signal is sent to the A/C amplifier (Rear). The A/C amplifier (Rear) controls the rear air mix control servo motor to operate the damper until it reaches the temperature set by the temperature control lever.

3. AIR CONDITIONING OPERATION

The cooler and heater operation can be switched by the mode select SW in the rear A/C control SW.

SERVICE HINTS

A32 A/C AMPLIFIER (REAR)

+B–GROUND : Always approx. **12** volts
IG1–GROUND : Approx. **12** volts with ignition SW at **ON** or **ST** position
GND–GROUND : Always continuity

: PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
A32	A	40	J31	40	R17	41
A33	B	40	J38	40	R21	41
A34	C	40	J39	40	R22	41
C6	A	38	R8	41	R25	41
C7	B	38	R9	41	R26	41
C9	D	38	R14	41	R34	41
J1		39	R15	41		
J9		39	R16	41		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1C	21	Engine Room No.2 Wire and Engine Room JIB (Engine Compartment Left)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		
2E	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2F		
2N	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)
2E	30	Floor No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3I	30	Instrument Panel Integration Wire and Cowl Side J/B RH (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IR1	50	Engine Room No.2 Wire and Floor No.2 Wire (Right Kick Panel)
IV2	52	Dash Wire and Floor No.2 Wire (Behind the Glove Box)
BD1	54	Floor No.3 Wire and Floor Wire (Left Rear Side Quarter Panel)
BJ1	56	Floor No.2 Wire and A/C Sub Wire (Right Side Rear Quarter Panel)
BL1	56	Floor No.2 Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)
BL2		

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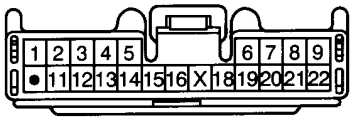
: GROUND POINTS

Code	See Page	Ground Points Location
IF	46	Set Bolt of Cowl Side J/B LH
BJ	54	Under the Driver's Seat
BK	54	Front Side Under the Front Passenger's Seat

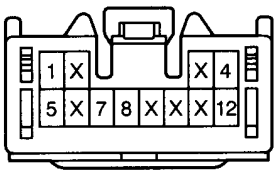
: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I7	48	Dash Wire	B14	56	Floor No.2 Wire
I10			B19	56	A/C Sub Wire
B13	56	Roof No.2 Wire			

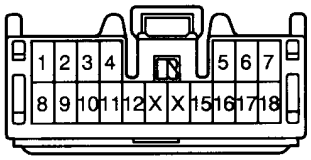
A32 (A)



A33 (B)



A34 (C)



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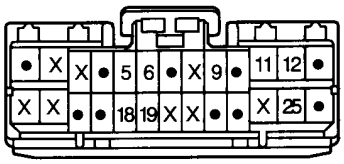

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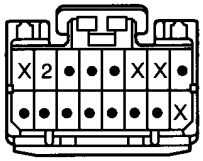

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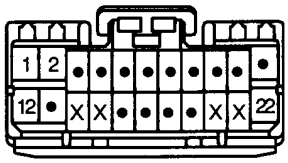

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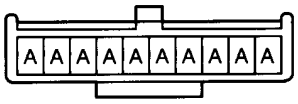

(Hint : See Page 7)

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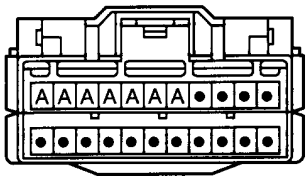

(Hint : See Page 7)

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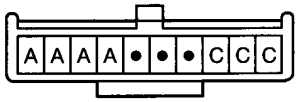

(Hint : See Page 7)

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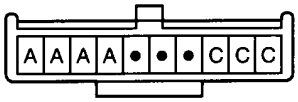

(Hint : See Page 7)

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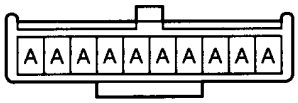

(Hint : See Page 7)

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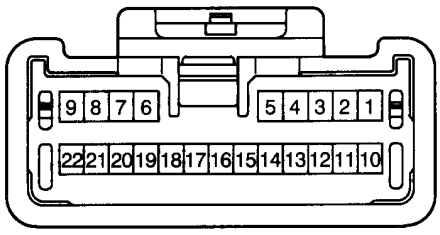

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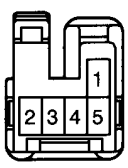

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R15
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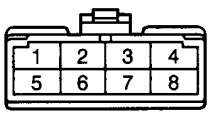
R16

R17
BLACK



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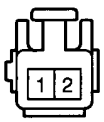

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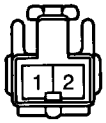
R22



R25
BLACK

R26
BLACK

R34
BLACK

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L PART NUMBER OF CONNECTORS

Code	Part Name	Part Number
A 1	A/C Ambient Temp. Sensor	90980–11070
A 2	A/C Condenser Fan Motor	90980–11237
A 3	A/C Condenser Fan Relay	90980–10940
A 4	A/C Dual Pressure SW	90980–11149
A 5	A/C Magnetic Clutch and Lock Sensor	90980–11016
A 6	A/C Triple Pressure SW (A/C Dual and Single Pressure SW)	90980–10943
A 7	A/T Oil Temp. Sensor	90980–11025
A 8	ABS Actuator	90980–11151
A 9	ABS Actuator	90980–10895
A10	ABS Actuator	90980–11413
A11	ABS Actuator	90980–11009
A12	ABS Speed Sensor Front LH	90980–10941
A13	ABS Speed Sensor Front RH	90980–11002
A14	Accel Position Sensor	90980–11150
A15	Airbag Sensor Front LH	90980–11856
A16	Airbag Sensor Front RH	
A17	Auto Antenna Motor	90980–11194
A18	A/C Solar Sensor	90980–11919
A19	A/C Thermistor	90980–10825
A20	ABS Deceleration Sensor	90980–10845
A21	ABS ECU	90980–11390
A22	ABS ECU	90980–11391
A23	ABS ECU	90980–11424
A24	Air Inlet Control Servo Motor	90980–11165
A25	Air Mix Control Servo Motor	90980–10797
A26	Air Vent Mode Control Servo Motor	90980–11165
A27	Airbag Squib (Front Passenger Airbag Assembly)	90980–11886
A28	Airbag Squib (Steering Wheel Pad)	90980–10850
A29	Ashtray Illumination	90980–10825
A30	Auto Antenna Control Relay	90980–10819
A31	Automatic Light Control Sensor	90980–11633
A32	A/C Amplifier (Rear)	90980–11502
A33	A/C Amplifier (Rear)	90980–11475
A34	A/C Amplifier (Rear)	90980–11497
A35	ABS Speed Sensor Rear LH	90980–11073
A36	ABS Speed Sensor Rear RH	
B 1	Blower Motor Controller	90980–10910
B 2	Back Door Courtesy SW	90980–10039
B 3	Back Door Key Lock and Unlock SW	90980–11490
B 4	Back Door Lock Motor and Back Door Unlock Detection SW	90980–11150
B 5	Buckle SW LH	90980–11211
B 6	Buckle SW RH	
C 1	Camshaft Position Sensor	90980–10947
C 2	Center Diff. Lock Control Motor	90980–11024
C 3	Crankshaft Position Sensor	90980–11162
C 4	Center Airbag Sensor Assembly	90980–11872
C 5	Center Diff. Lock Control Relay	90980–10801
C 6	Center ECU	90980–11390
C 7	Center ECU	90980–11391
C 8	Center ECU	90980–11408
C 9	Center ECU	90980–11392
C10	Cigarette Lighter	90980–10760
C11	Cigarette Lighter Illumination	90980–11148
C12	Combination Meter	82824–60060
C13	Combination Meter	82824–60050
C14	Combination Meter	82824–60060
C15	Combination Meter	82824–60050
C16	Combination SW	90980–11672
C17	Combination SW	90980–11581
C18	Combination SW	90980–11616
C19	Combination SW	90980–11594
D 1	Data Link Connector 1	90980–11195
D 2	Daytime Running Light Relay No.3	90980–10939
D 3	Daytime Running Light Relay No.3	90980–10940
D 4	Detection SW (Center Diff. Lock)	90980–11250
D 5	Detection SW (Transfer L Position)	
D 6	Detection SW (Transfer Neutral Position)	90980–11025
D 7	Data Link Connector 3	90980–98012
D 8	Daytime Running Light Relay (Main)	90980–10819
D 9	Detection SW (Rear Diff. Lock)	90980–11156
D10	Door Courtesy Light Front LH	90980–11148
D11	Door Courtesy Light Front RH	
D12	Door Courtesy Light Rear LH	
D13	Door Courtesy Light Rear RH	
D14	Door Courtesy SW Front LH	90980–10871
D15	Door Courtesy SW Front RH	
D16	Door Courtesy SW Rear LH	
D17	Door Courtesy SW Rear RH	
D18	Door Key Lock and Unlock SW LH	90980–11170
D19	Door Key Lock and Unlock SW RH	
D20	Door Lock Control SW RH	90980–10601
D21	Door Lock Motor and Door Unlock Detection SW Front LH	90980–11150
D22	Door Lock Motor and Door Unlock Detection SW Front RH	
D23	Door Lock Motor and Door Unlock Detection SW Rear LH	
D24	Door Lock Motor and Door Unlock Detection SW Rear RH	
E 1	Electronically Controlled Transmission Solenoid	90980–10891
E 2	Engine Coolant Temp. Sensor	90980–10737

Note: Not all of the above part numbers of the connector are established for the supply. In case of ordering a connector or terminal with wire, please confirm in advance if there is supply for it using "Parts Catalog News" (published by Parts Engineering Administration Dept.).

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Code	Part Name	Part Number
E 3	Engine Hood Courtesy SW	90980–10554
E 4	Electronically Controlled Transmission Pattern Select SW	90980–10933
E 5	Engine Control Module	90980–11421
E 6	Engine Control Module	90980–11476
E 7	Engine Control Module	90980–11586
E 8	Engine Control Module	90980–11637
E 9	Engine Control Module	90980–11638
F 1	Front Fog Light LH	90980–11660
F 2	Front Fog Light RH	
F 3	Front Turn Signal and Side Marker Light LH	90980–11020
F 4	Front Turn Signal and Side Marker Light RH	
F 5	Front Wiper Motor	90980–11599
F 6	Fusible Link Block	–
F 7	Fuel Control SW	90980–10860
F 8	Front Door Speaker LH	90980–10935
F 9	Front Door Speaker RH	
F10	Front Interior Light and Rear Personal Light	90980–10365
F11	Front Personal Light	90980–10935
F12	Fuel Pump and Sender	90980–11077
F13	Fuel Pump Control ECU	90980–10862
G 1	Generator	90980–11349
G 2	Generator	90980–09212
G 3	Glove Box Light	90980–11098
H 1	Headlight LH (High)	90980–11659
H 2	Headlight LH (Low)	90980–11660
H 3	Headlight RH (High)	90980–11659
H 4	Headlight RH (Low)	90980–11660
H 5	Heated Oxygen Sensor (Bank 1 Sensor 1)	90980–10869
H 6	Heated Oxygen Sensor (Bank 1 Sensor 2)	90980–11028
H 7	Heated Oxygen Sensor (Bank 2 Sensor 1)	90980–10869
H 8	Heated Oxygen Sensor (Bank 2 Sensor 2)	90980–11028
H 9	Horn LH	90980–10619
H10	Horn RH	
H11	High Mounted Stop Light	90980–11211
I 1	Ignition Coil and Igniter No.1	90980–11885
I 2	Ignition Coil and Igniter No.2	
I 3	Ignition Coil and Igniter No.3	
I 4	Ignition Coil and Igniter No.4	
I 5	Ignition Coil and Igniter No.5	
I 6	Ignition Coil and Igniter No.6	
I 7	Ignition Coil and Igniter No.7	
I 8	Ignition Coil and Igniter No.8	
I 9	Injector No.1	90980–11153
I10	Injector No.2	
I11	Injector No.3	
I12	Injector No.4	

Code	Part Name	Part Number
I13	Injector No.5	90980–11153
I14	Injector No.6	
I15	Injector No.7	
I16	Injector No.8	
I17	Ignition Key Cylinder Light	90980–10906
I18	Ignition SW	90980–11615
I19	Instrument ECU	90980–11927
I20	Instrument ECU	90980–11914
I21	Instrument ECU	90980–11925
J 1	Junction Connector	–
J 2	Junction Connector	
J 3	Junction Connector	
J 4	Junction Connector	
J 5	Junction Connector	
J 6	Junction Connector	
J 7	Junction Connector	
J 8	Junction Connector	
J 9	Junction Connector	90980–11927
J10	Junction Connector	
J11	Junction Connector	
J12	Junction Connector	90980–11925
J13	Junction Connector	90980–11927
J14	Junction Connector	
J15	Junction Connector	
J16	Junction Connector	–
J17	Junction Connector	90980–11927
J18	Junction Connector	
J19	Junction Connector	
J20	Junction Connector	
J21	Junction Connector	–
J22	Junction Connector	
J23	Junction Connector	
J24	Junction Connector	
J25	Junction Connector	
J26	Junction Connector	90980–11925
J27	Junction Connector	
J28	Junction Connector	
J29	Junction Connector	
J30	Junction Connector	–
J31	Junction Connector	
J32	Junction Connector	
J33	Junction Connector	
J34	Junction Connector	
J35	Junction Connector	
J36	Junction Connector	
J37	Junction Connector	

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L PART NUMBER OF CONNECTORS

Code	Part Name	Part Number
J38	Junction Connector	–
J39	Junction Connector	
J40	Junction Connector	
J41	Junction Connector	
K 1	Knock Sensor 1	90980–11166
K 2	Knock Sensor 2	
K 3	Key Interlock Solenoid	90980–10825
L 1	License Plate Light LH	90980–11148
L 2	License Plate Light RH	
L 3	Lumbar Support Control SW (Driver's Seat)	90980–10601
M 1	Mass Air Flow Meter	90980–11317
M 2	Moon Roof Control ECU	90980–10997
M 3	Moon Roof Control SW	90980–10789
N 1	Noise Filter (Ignition)	90980–10843
O 1	O/D Direct Clutch Speed Sensor	90980–11156
O 2	Oil Pressure Sender	90980–11363
O 3	O/D Main SW and Shift Lock Control ECU	90980–11614
P 1	Park/Neutral Position SW, A/T Indicator Light SW and Back–Up Light SW	90980–11332
P 2	Parking Light LH	90980–11156
P 3	Parking Light RH	
P 4	Power Outlet (Front)	90980–10760
P 5	Power Outlet (Rear Console Box)	90980–10860
P 6	Power Quarter Window SW LH	90980–10797
P 7	Power Quarter Window SW RH	90980–10996
P 8	Parking Brake SW	90980–10871
P 9	Power Outlet (Luggage Compartment)	90980–10860
P10	Power Vent Window Motor LH	
P11	Power Vent Window Motor RH	
P12	Power Window Master SW	90980–11791
P13	Power Window Master SW	90980–11165
P14	Power Window Motor Front LH	90980–11599
P15	Power Window Motor Front RH	90980–11003
P16	Power Window Motor Rear LH	
P17	Power Window Motor Rear RH	
P18	Power Window SW Front RH	90980–10789
P19	Power Window SW Rear LH	
P20	Power Window SW Rear RH	
P21	Pretensioner LH	90980–11862
P22	Pretensioner RH	
P23	Power Seat Control SW (Driver's Seat)	90980–10803
P24	Power Seat Control SW (Front Passenger's Seat)	
P25	Power Seat Motor (Driver's Seat Front Vertical Control)	90980–10825
P26	Power Seat Motor (Driver's Seat Lumbar Support Control)	
P27	Power Seat Motor (Driver's Seat Rear Vertical Control)	90980–10825
P28	Power Seat Motor (Driver's Seat Reclining Control)	
P29	Power Seat Motor (Driver's Seat Slide Control)	
P30	Power Seat Motor (Front Passenger's Seat Front Vertical Control)	
P31	Power Seat Motor (Front Passenger's Seat Rear Vertical Control)	
P32	Power Seat Motor (Front Passenger's Seat Reclining Control)	
P33	Power Seat Motor (Front Passenger's Seat Slide Control)	
R 1	Radio and Player	90980–11264
R 2	Rear Diff. Lock Control ECU	90980–10801
R 3	Rear Diff. Lock SW	90980–10631
R 4	Rear Heater SW	90980–10797
R 5	Remote Control Mirror SW	90980–11657
R 6	Rheostat	90980–10908
R 7	Room Temp. Sensor (Front)	90980–10825
R 8	Rear A/C Control SW	90980–11503
R 9	Rear Air Mix Control Servo Motor	90980–11319
R10	Rear Combination Light LH	90980–11587
R11	Rear Combination Light LH	90908–10908
R12	Rear Combination Light RH	
R13	Rear Combination Light RH	90908–11587
R14	Rear Cooler Blower Motor	90980–10214
R15	Rear Cooler Magnetic Valve	90980–10860
R16	Rear Cooler Power Transistor	90980–10171
R17	Rear Cooler Relay	90980–10175
R18	Rear Diff. Lock Motor	90980–11194
R19	Rear Door Speaker LH	90980–10935
R20	Rear Door Speaker RH	
R21	Rear Evaporator Temp. Sensor	90980–10825
R22	Rear Heater Blower Motor	90980–10860
R23	Rear Heater Blower Resistor	90980–10916
R24	Rear Heater Fan Relay	90980–10171
R25	Rear Heater Power Transistor	
R26	Rear Inlet Air Temp. Sensor	90980–11369
R27	Rear Interior Light	90980–10935
R28	Rear Window Defogger	90980–11097
R29	Rear Window Defogger	
R30	Rear Wiper Motor	90980–10795
R31	Rear Wiper Relay	90908–10797
R32	Remote Control Mirror LH	90980–11573
R33	Remote Control Mirror RH	
R34	Room Temp. Sensor (Rear)	90980–11918

Note: Not all of the above part numbers of the connector are established for the supply. In case of ordering a connector or terminal with wire, please confirm in advance if there is supply for it using "Parts Catalog News" (published by Parts Engineering Administration Dept.)

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Code	Part Name	Part Number
S 1	Starter	90980–11400
S 2	Starter	90980–09585
S 3	Seat Heater SW (Driver's Seat)	90980–10797
S 4	Seat Heater SW (Front Passenger's Seat)	90980–10996
S 5	Stop Light SW	90980–11118
S 6	Stereo Component Amplifier	90980–10848
S 7	Stereo Component Amplifier	90980–10807
S 8	Seat Belt Warning Occupant Detection Sensor	90980–10860
S 9	Seat Heater (Driver's Seat)	90980–10907
S10	Seat Heater (Front Passenger's Seat)	
T 1	Theft Deterrent Horn	90980–10619
T 2	Throttle Control Motor	90980–10942
T 3	Throttle Position Sensor	90980–11037
T 4	Telescopic Motor	90980–10799
T 5	Theft Deterrent ECU	90980–10765
T 6	Theft Deterrent ECU	90980–10973
T 7	Tilt and Telescopic ECU	90980–10799
T 8	Tilt and Telescopic ECU	90980–10848
T 9	Tilt Motor	90980–10799
T10	Transponder Key Amplifier	90980–10933
T11	Turn Signal Flasher	90980–10799
T12	Trailer Socket	90980–10988
T13	Tweeter LH	90980–11300
T14	Tweeter RH	
U 1	Unlock Warning SW	90980–10860
V 1	Vapor Pressure Sensor	90980–11143
V 2	Vehicle Speed Sensor (Combination Meter)	
V 3	Vehicle Speed Sensor (Electronically Controlled Transmission)	90980–11156
V 4	VSV (EVAP)	
V 5	VSV (Vapor Pressure Sensor)	
V 6	Vanity Light LH	90980–11369
V 7	Vanity Light RH	
W 1	Washer Motor	90980–11622
W 2	Water Temp. Sender	90980–11428
W 3	Wireless Door Lock ECU	90980–11264
W 4	Woofer (Speaker)	90980–10795

Code	Part Name	Part Number

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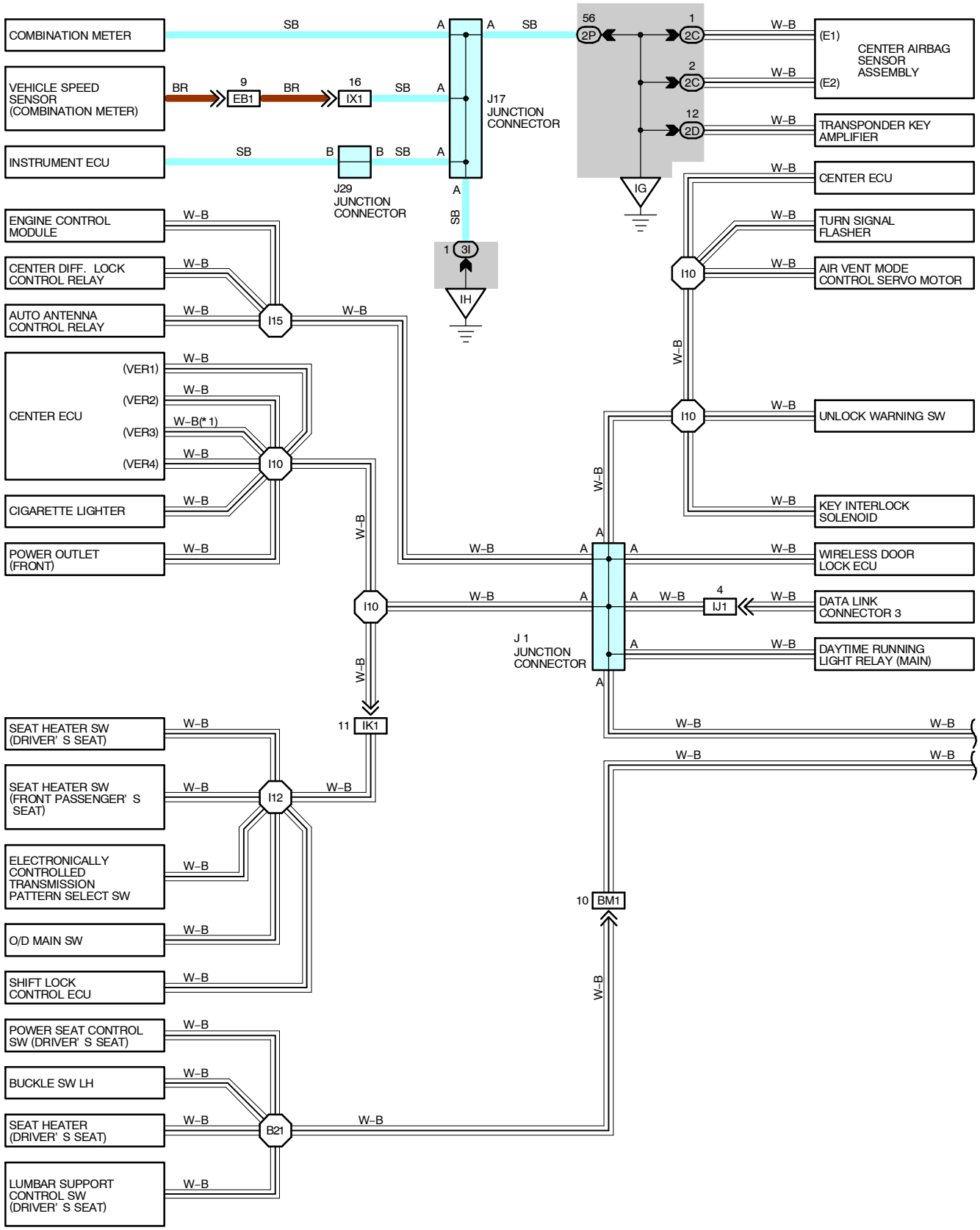
I GROUND POINT



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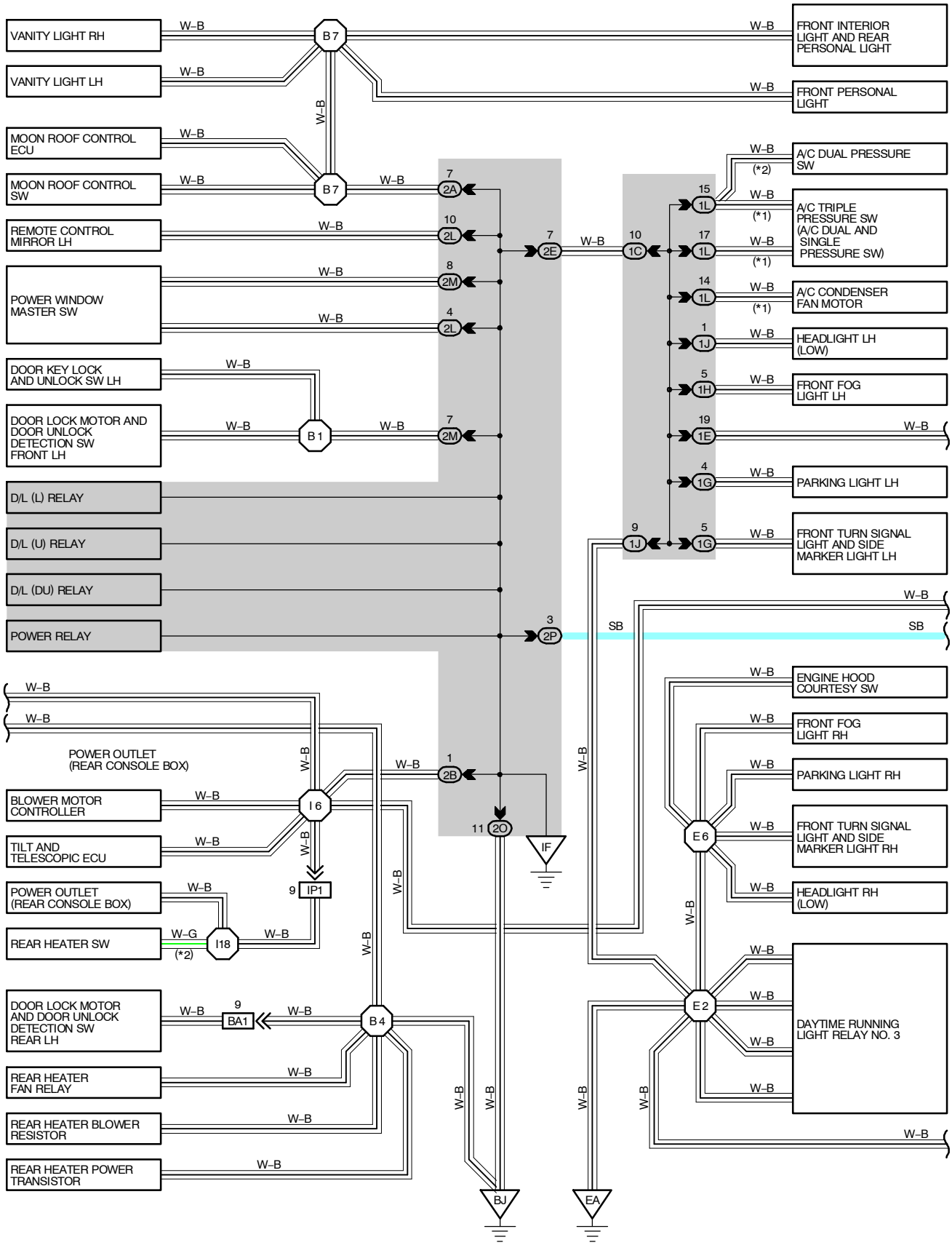
* 1 : W/ REAR AIR CONDITIONING
* 2 : W/O REAR AIR CONDITIONING



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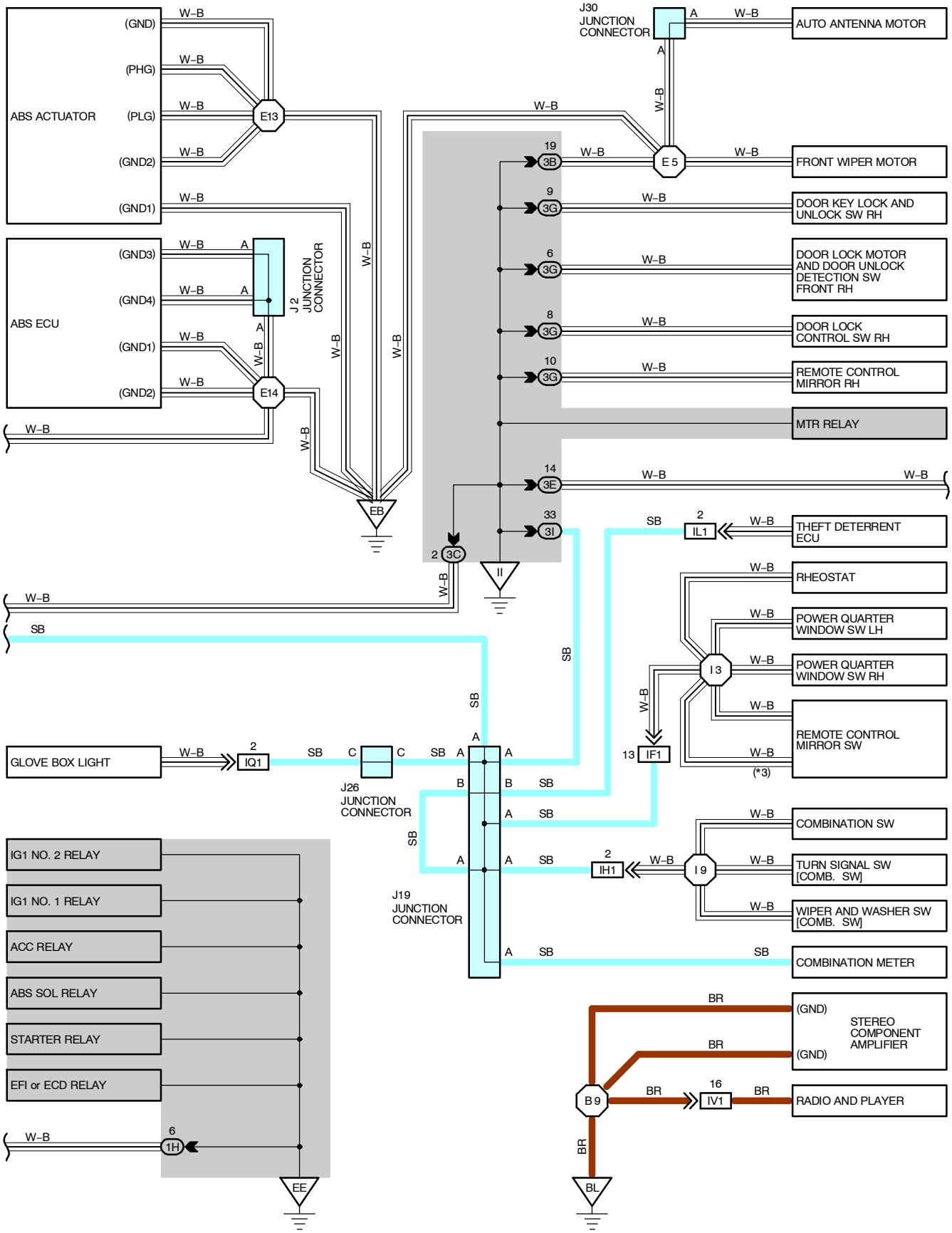
I GROUND POINT



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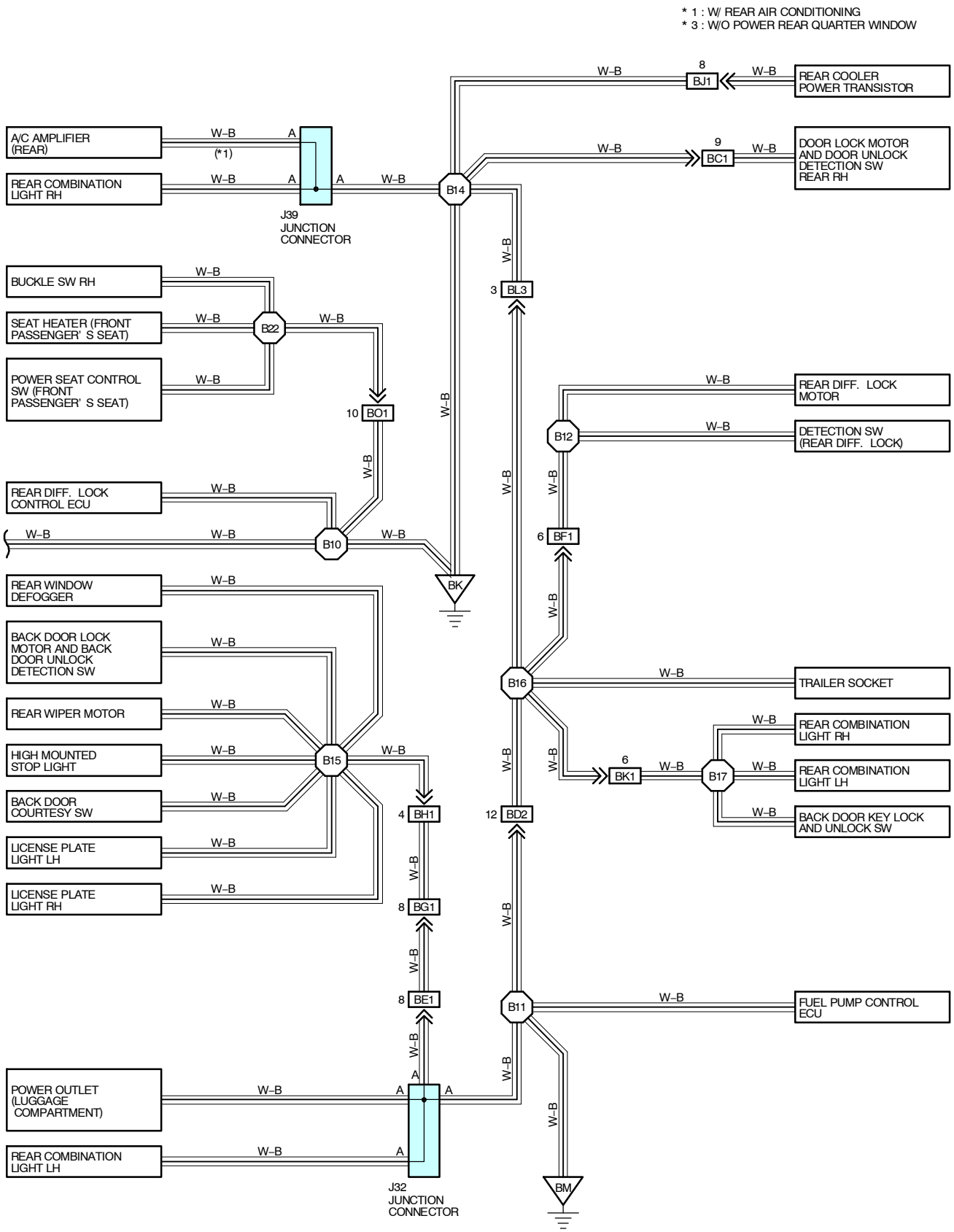

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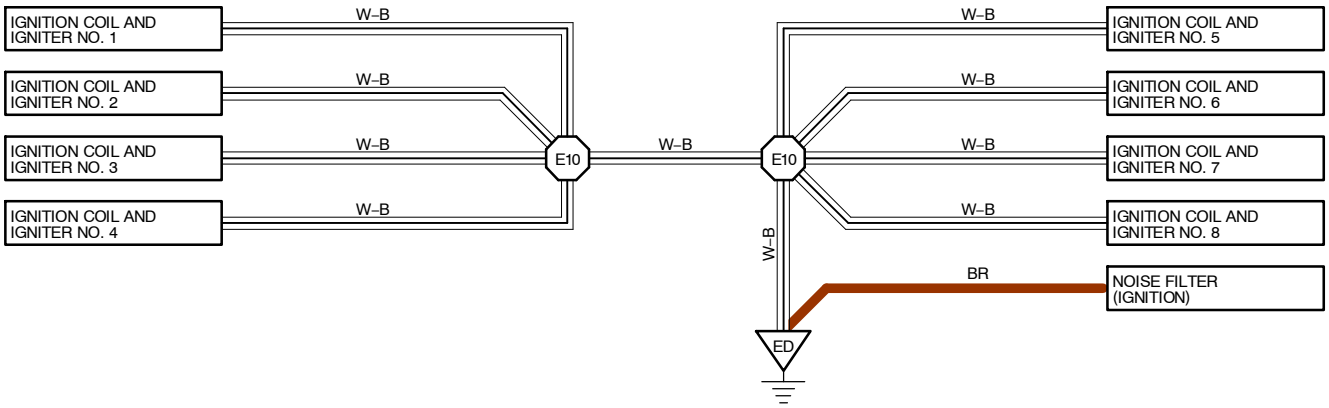
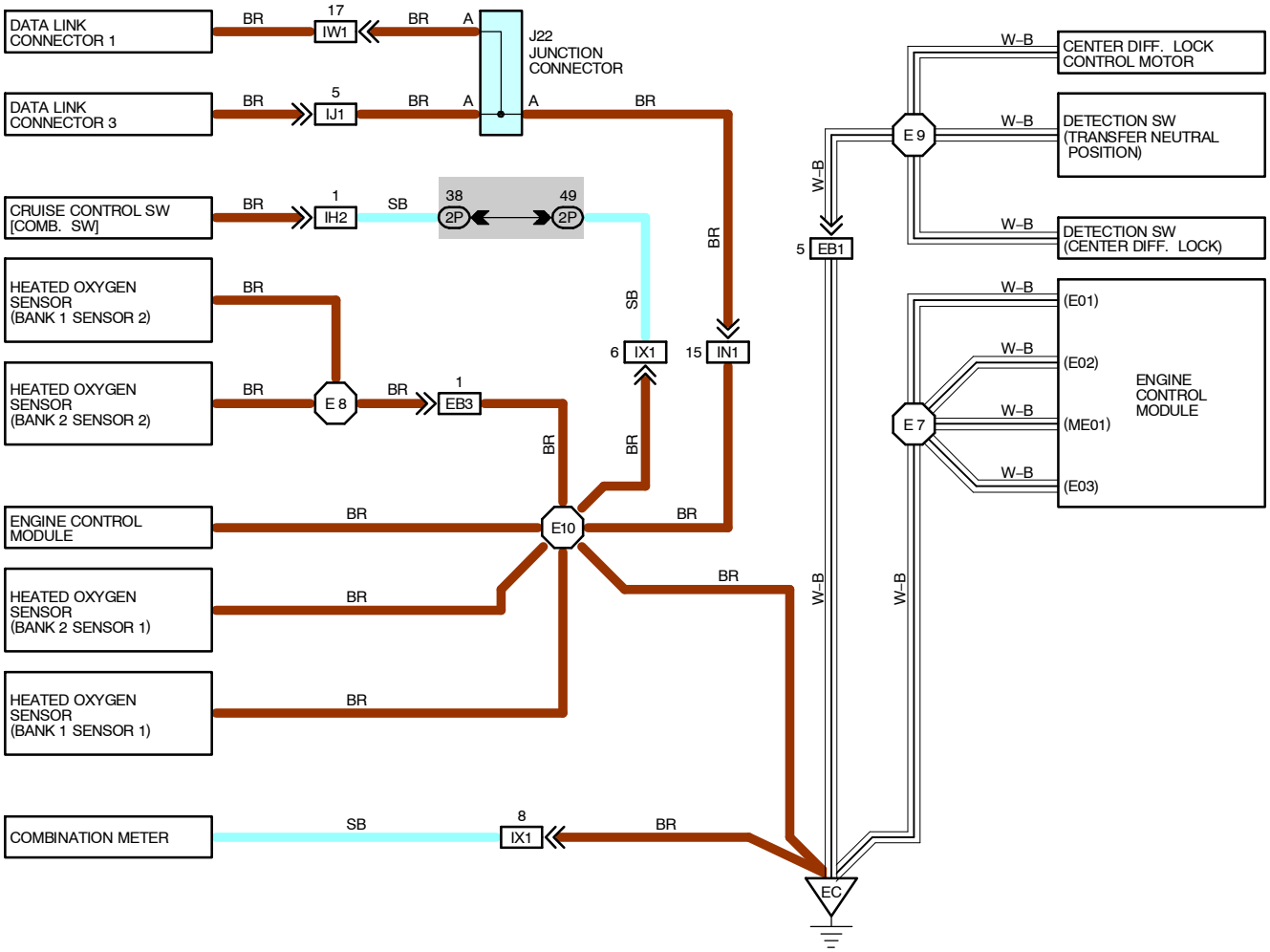
I GROUND POINT





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○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
J1	39	J22	39	J32	40
J2	39	J26	39	J39	40
J17	39	J29	39		
J19	39	J30	39		

⬭ : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1C	21	Engine Room No.2 Wire and Engine Room J/B (Engine Compartment Left)
1E		
1G	21	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)
1H		
1J		
1L		
2A	24	Roof Wire and Cowl Side J/B LH (Left Kick Panel)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2C		
2D		
2E	24	Engine Room No.2 Wire and Cowl Side J/B LH (Left Kick Panel)
2L	24	Front Door LH Wire and Cowl Side J/B LH (Left Kick Panel)
2M		
2O	24	Floor Wire and Cowl Side J/B LH (Left Kick Panel)
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)
3B	30	Engine Room No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3C	30	Dash Wire and Cowl Side J/B RH (Right Kick Panel)
3E	30	Floor No.2 Wire and Cowl Side J/B RH (Right Kick Panel)
3G	30	Front Door RH Wire and Cowl Side J/B RH (Right Kick Panel)
3I	30	Instrument Panel Integration Wire and Cowl Side J/B RH (Right Kick Panel)

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I GROUND POINT

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EB1	44	Engine Wire and Transmission Wire (On the Transmission)
EB3		
IF1	46	Instrument Panel Integration Wire and Instrument Panel Wire (Left Side of Instrument Panel)
IH1	48	Instrument Panel Integration Wire and Column Wire (Near the Ignition SW)
IH2		
IJ1	48	Dash Wire and Detector Wire (instrument Panel Center)
IK1	48	Console Box Wire and Dash Wire (Left Side of Front Console)
IL1	48	Instrument Panel Integration Wire and Computer Wire (Instrument Panel Center)
IN1	50	Engine Wire and Dash Wire (Behind the Glove Box)
IP1	50	Rear Console Box Wire and Dash Wire (Right Side of Rear Console)
IQ1	50	Instrument Panel Integration Wire and Lamp Wire (Behind the Glove Box)
IV1	52	Dash Wire and Floor No.2 Wire (Behind the Glove Box)
IW1	52	Engine Room No.2 Wire and Dash Wire (Behind the Glove Box)
IX1	52	Instrument Panel Integration Wire and Engine Wire (Behind the Glove Box)
BA1	54	Rear Door LH Wire and Floor Wire (Left Side of Center Pillar)
BC1	54	Rear Door RH Wire and Floor No.2 Wire (Right Side of Center Pillar)
BD2	54	Floor No.3 Wire and Floor Wire (Left Rear Side Quarter Panel)
BE1	54	Luggage Room Wire and Floor Wire (Left Rear Side Quarter Panel)
BF1	56	Frame Wire and Floor No.3 Wire (Left Side of Rear Floor Crossmember)
BG1	56	Pillar No.1 Wire and Luggage Room Wire (Left Rear Side Roof Panel)
BH1	56	Pillar No.1 Wire and Back Door Upper Wire (Left Side of Back Door)
BJ1	56	Floor No.2 Wire and A/C Sub Wire (Right Side Rear Quarter Panel)
BK1	56	Back Door Lower Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)
BL3	56	Floor No.2 Wire and Floor No.3 Wire (Right Side of Rear Floor Crossmember)
BM1	58	Floor Wire and Front Seat LH Wire (Front Side Under the Driver's Seat)
BO1	58	Floor No.2 Wire and Front Seat RH Wire (Front Side Under the Front Passenger's Seat)

: GROUND POINTS

Code	See Page	Ground Points Location
EA	44	Front Right Side of Fender Apron
EB		
EC	44	Rear Bank of Right Cylinder Head
ED	44	Rear Bank of Left Cylinder Head
EE	46	Front Left Side of Fender Apron
IF	46	Set Bolt of Cowl Side J/B LH
IG		
IH	46	Set Bolt of Cowl Side J/B RH
II		
BJ	54	Under the Driver's Seat
BK	54	Front Side Under the Front Passenger's Seat
BL	54	Rear Side Under the Front Passenger's Seat
BM	54	Left Rear Side Quarter Panel

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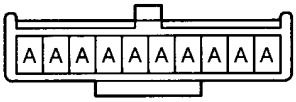
: **SPLICE POINTS**

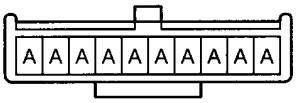
Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E2	44	Engine Room Main Wire	I18	48	Rear Console Box Wire
E5	44	Engine Room No.2 Wire	B1	56	Front Door LH Wire
E6	44	Engine Room Main Wire	B4	56	Floor Wire
E7	44	Engine Wire	B7	56	Roof Wire
E8	44	Transmission Wire	B9	56	Floor No.2 Wire
E9			B10		
E10	44	Engine Wire	B11	56	Floor Wire
E13	44	Engine Room No.2 Wire	B12	56	Frame Wire
F14			B14	56	Floor No.2 Wire
I3	48	Instrument Panel Wire	B15	56	Back Door Upper Wire
I6	48	Dash Wire	B16	56	Floor No.3 Wire
I9	48	Column Wire	B17	56	Back Door Lower Wire
I10	48	Dash Wire	B21	58	Front Seat LH Wire
I12	48	Console Box Wire	B22	58	Front Seat RH Wire
I15	48	Dash Wire			

J1



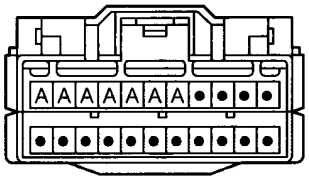
(Hint : See Page 7)

J2



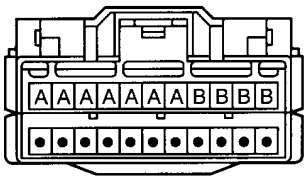
(Hint : See Page 7)

J17



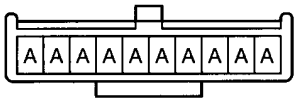
(Hint : See Page 7)

J19
GRAY



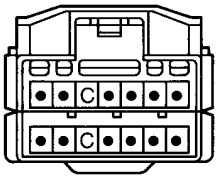
(Hint : See Page 7)

J22



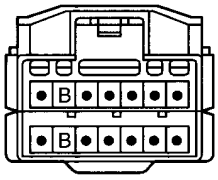
(Hint : See Page 7)

J26
BLUE



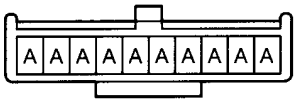
(Hint : See Page 7)

J29



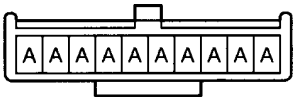
(Hint : See Page 7)

J30



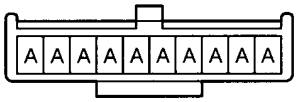
(Hint : See Page 7)

J32



(Hint : See Page 7)

J39



(Hint : See Page 7)

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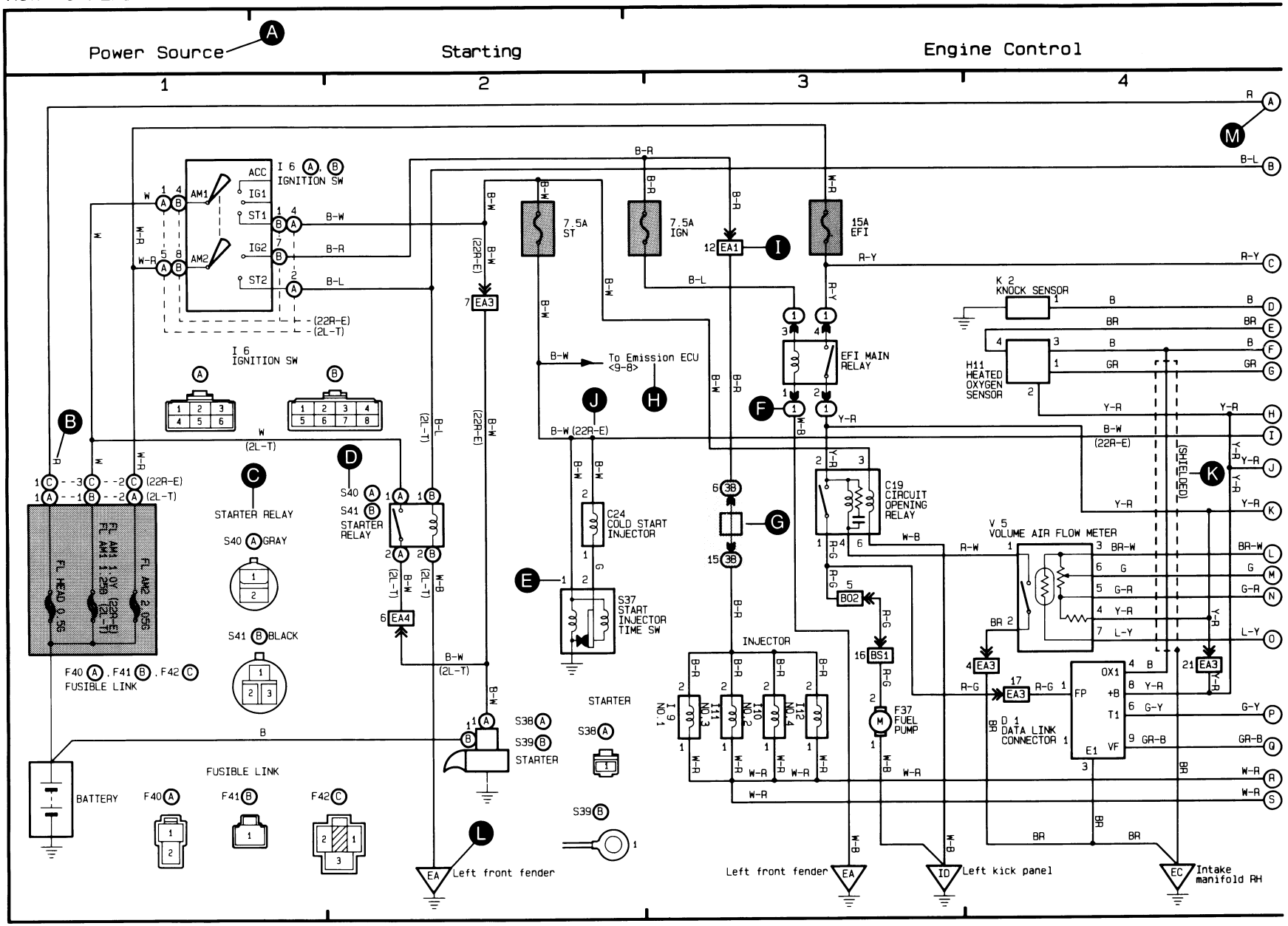
HOW TO READ THIS SECTION

* The system shown here is an EXAMPLE ONLY. It is different to the actual circuit shown in the wiring diagram section.



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Ⓐ: System Title

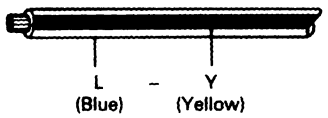
Ⓑ: Indicates the wiring color.

Wire colors are indicated by an alphabetical code.

B	= Black	L	= Blue	R	= Red
BR	= Brown	LG	= Light Green	V	= Violet
G	= Green	O	= Orange	W	= White
GR	= Gray	P	= Pink	Y	= Yellow

The first letter indicates the basic wire color and the second letter indicates the color of the stripe.

Example: L – Y

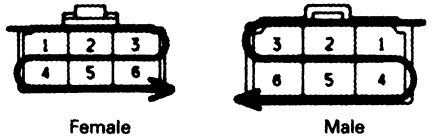


Ⓒ: Indicates the connector to be connected to a part (the numeral indicates the pin No.)

Ⓓ: The position of the parts is the same as shown in the wiring diagram and wire routing.

Ⓔ: Indicates the pin number of the connector. The numbering system is different for female and male connectors.

Example: Numbered in order from upper left to lower right / Numbered in order from upper right to lower left



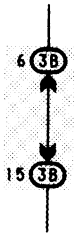
The numbering system for the overall wiring diagram is the same as above.

Ⓕ: Indicates a Relay Block. No shading is used and only the Relay Block No. is shown to distinguish it from the J/B.

Example: ① Indicates Relay Block No. 1.

Ⓖ: Junction Block (The number in the circle is the J/B No. and the connector code is shown beside it). Junction Blocks are shaded to clearly separate them from other parts.

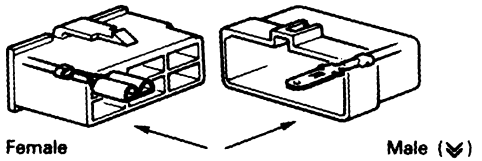
Example:



3B indicates that it is inside Junction Block No. 3.

Ⓗ: Indicates related system.

Ⓘ: Indicates the wiring harness and wiring harness connector. The wiring harness with male terminal is shown with arrows (⩔). Outside numerals are pin numbers.



Ⓙ: ( ) is used to indicate different wiring and connector, etc. when the vehicle model, engine type, or specification is different.

Ⓚ: Indicates a shielded cable.

Ⓛ: Indicates and located on ground point.

Ⓜ: The same code occuring on the next page indicates that the wire harness is continuous.

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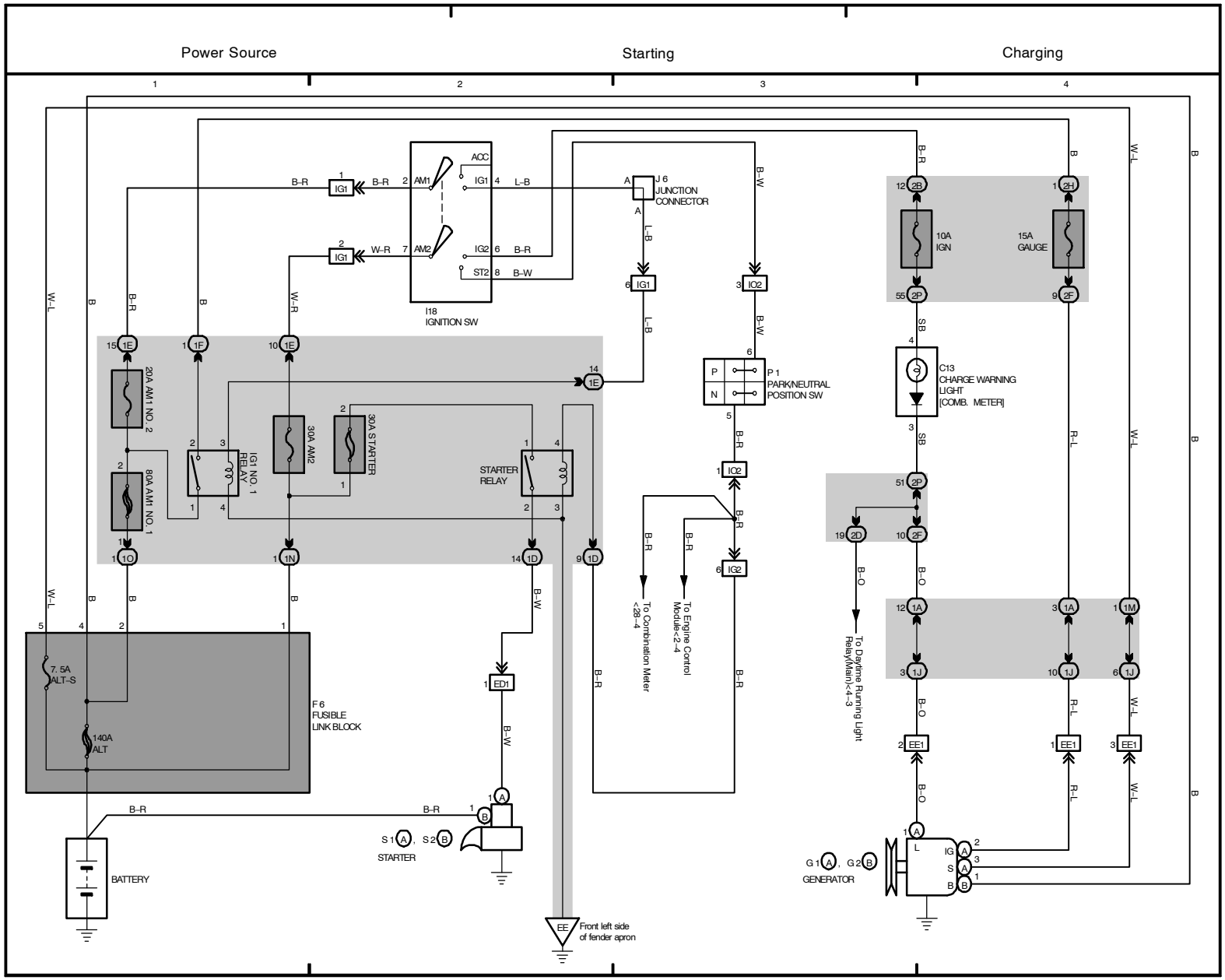
1 LAND CRUISER ELECTRICAL WIRING DIAGRAM



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2 LAND CRUISER

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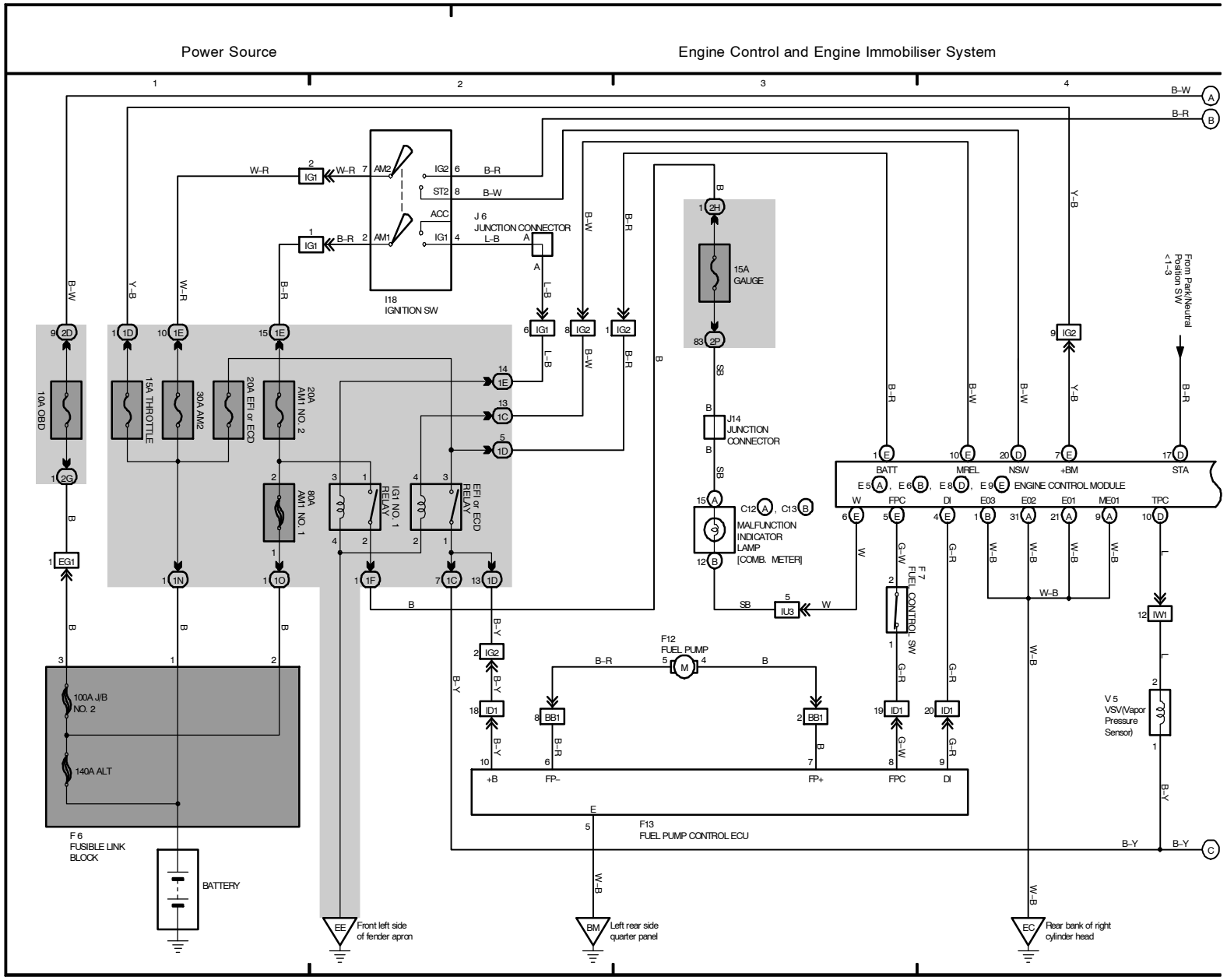

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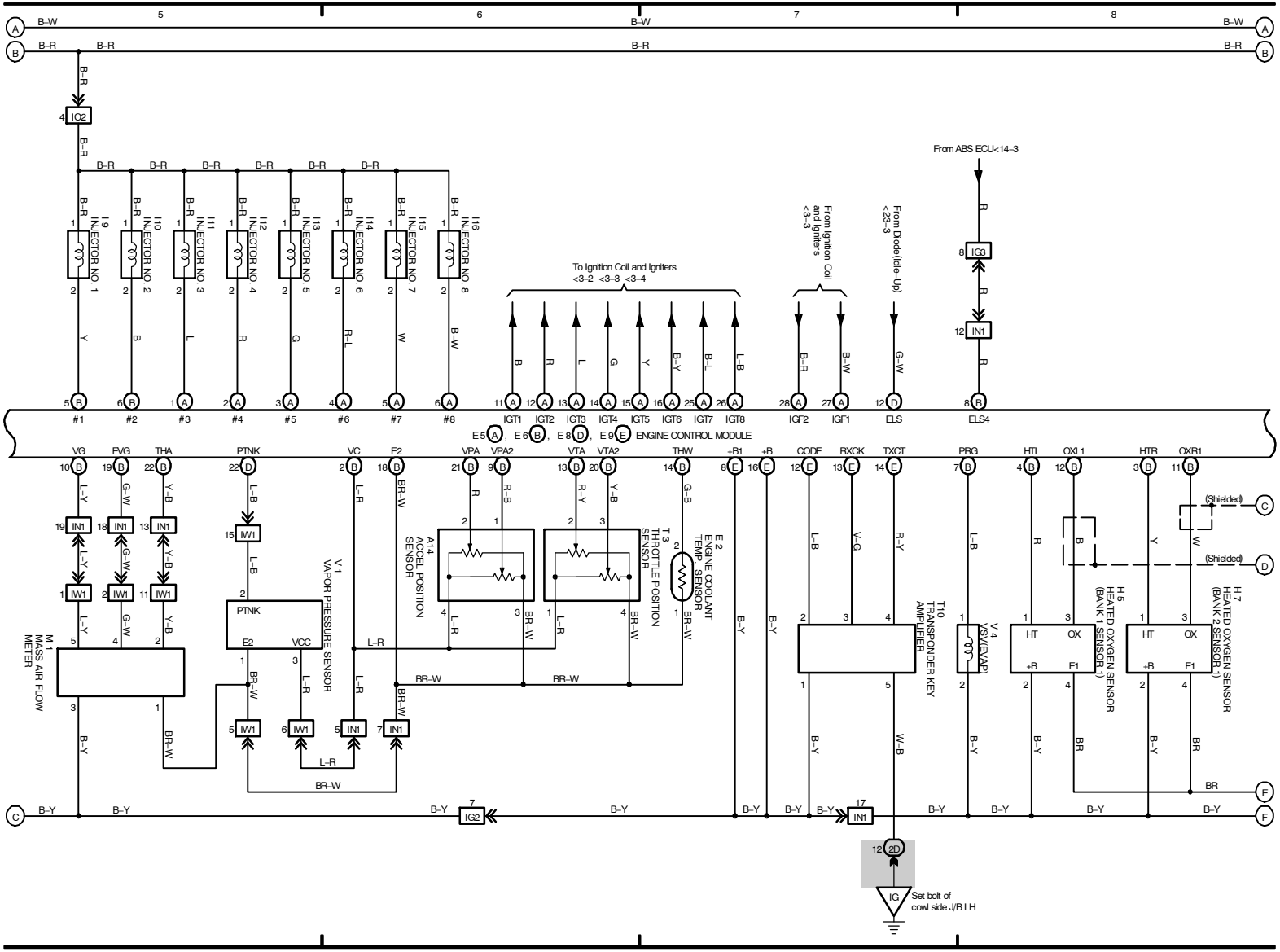

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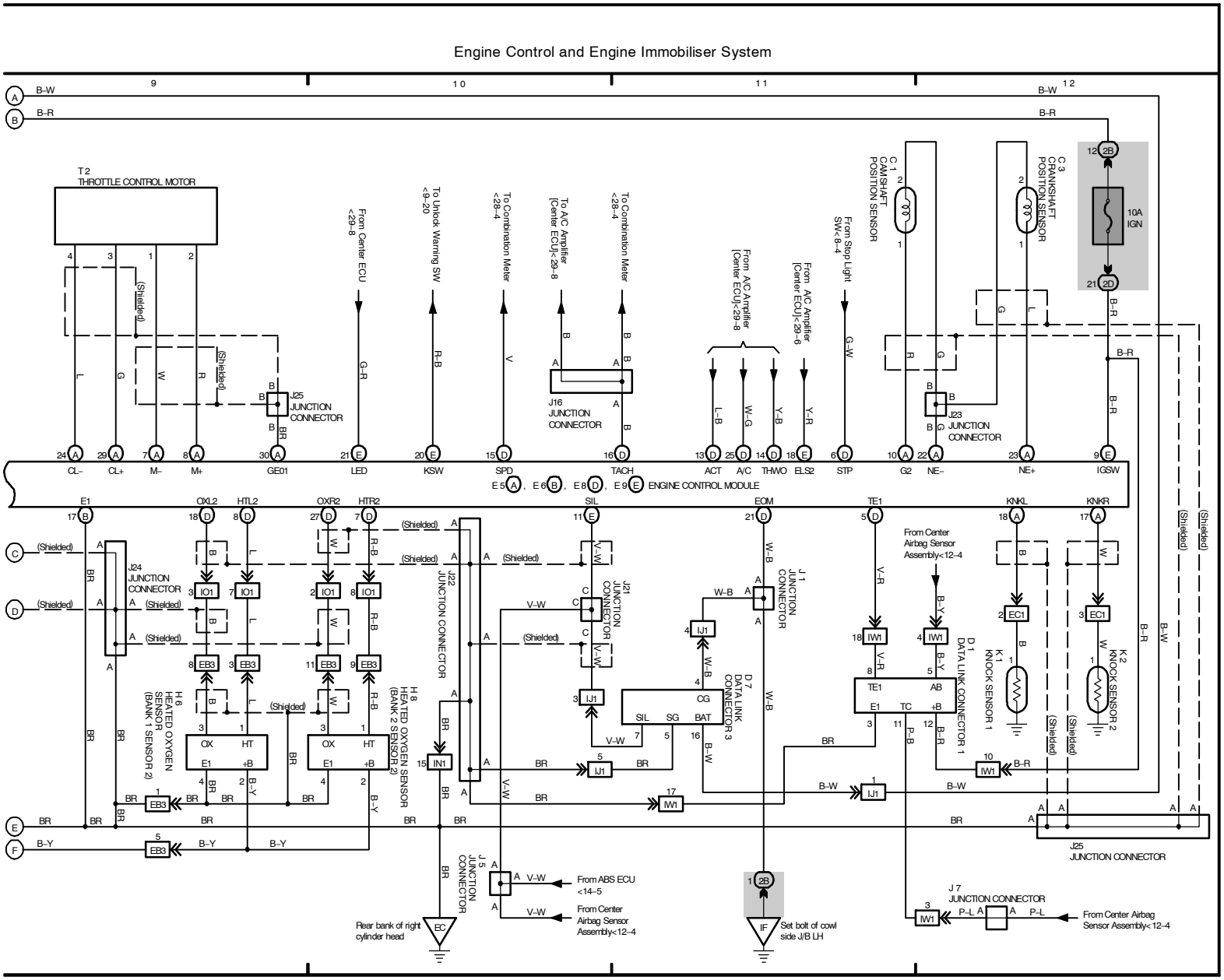

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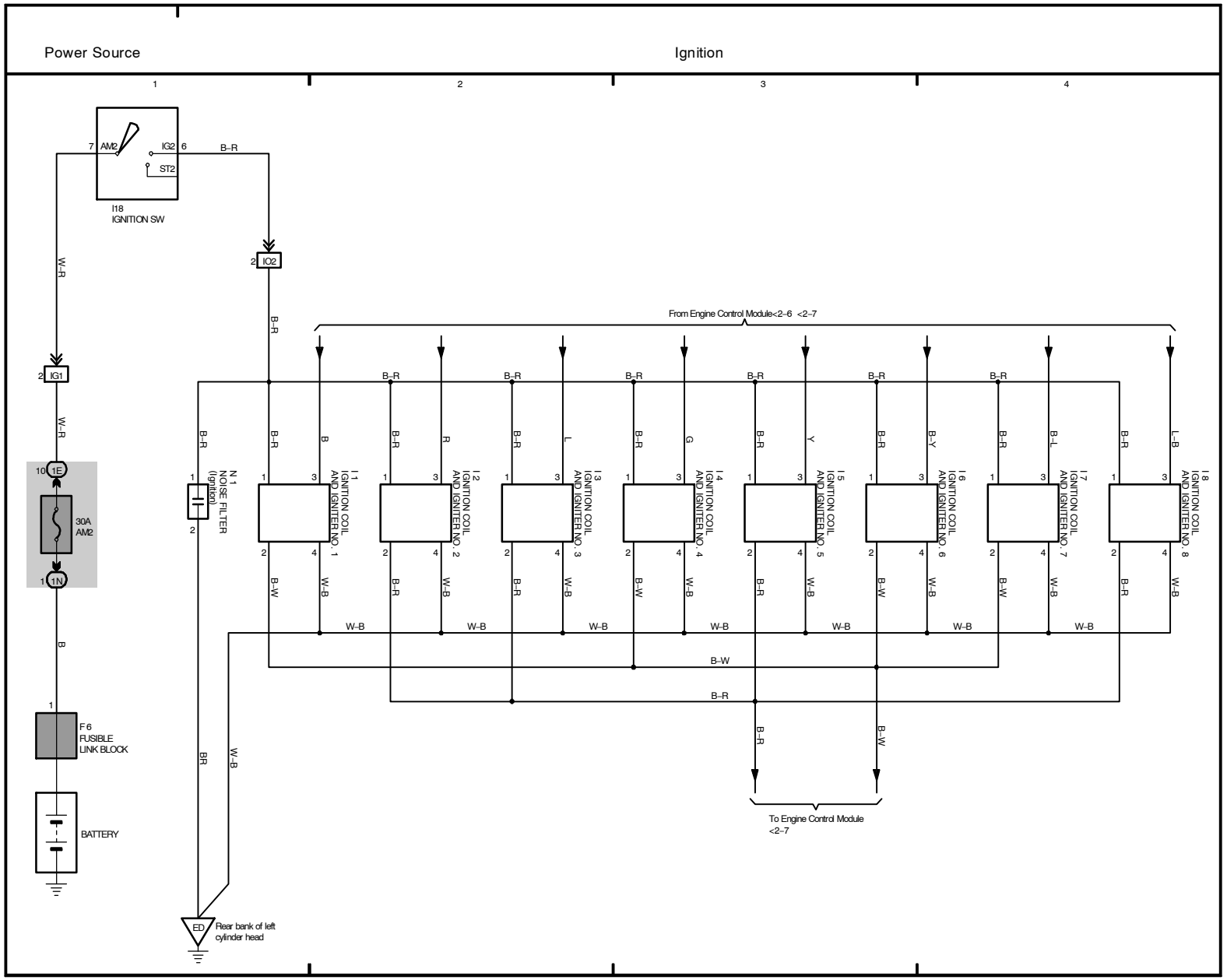

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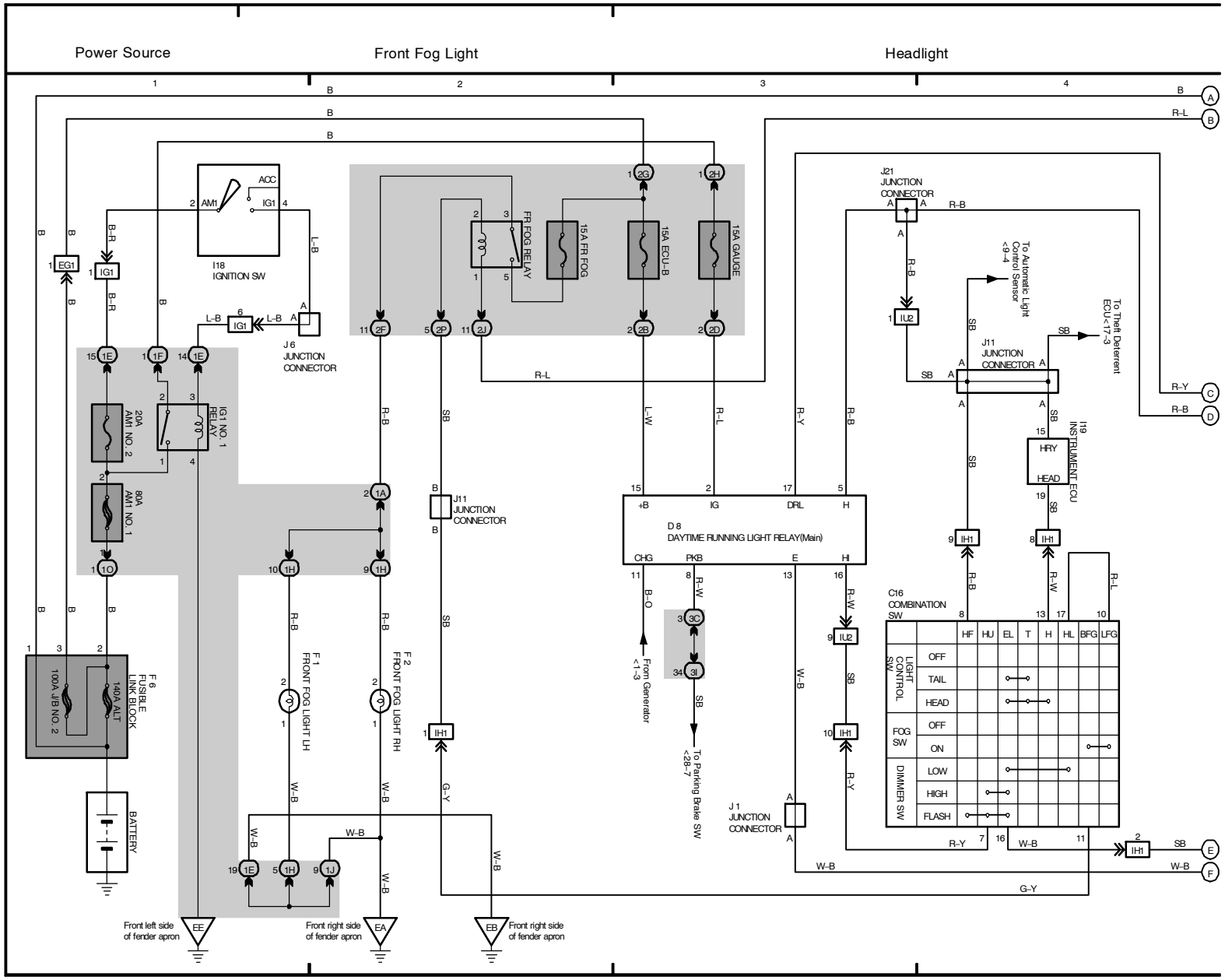

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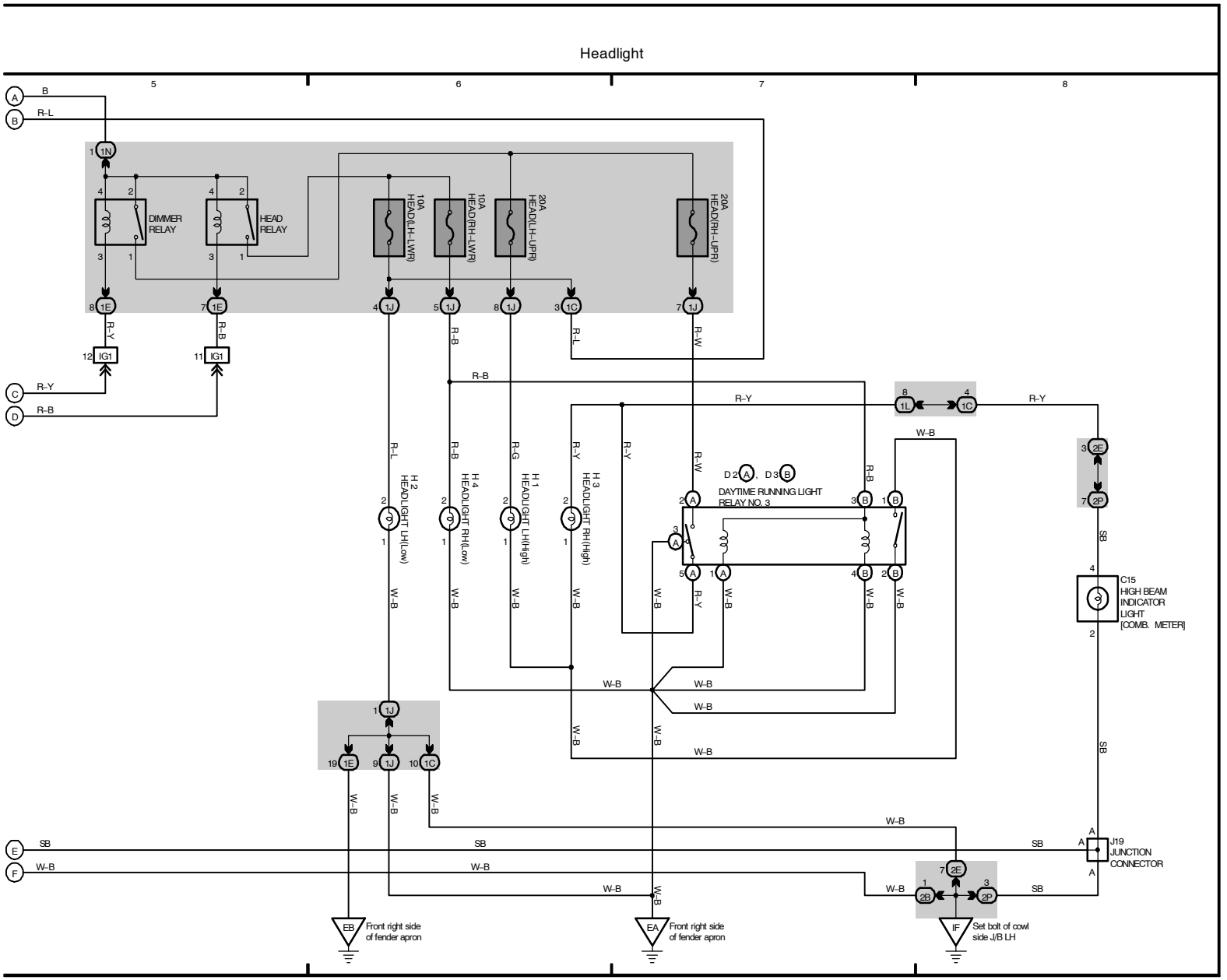

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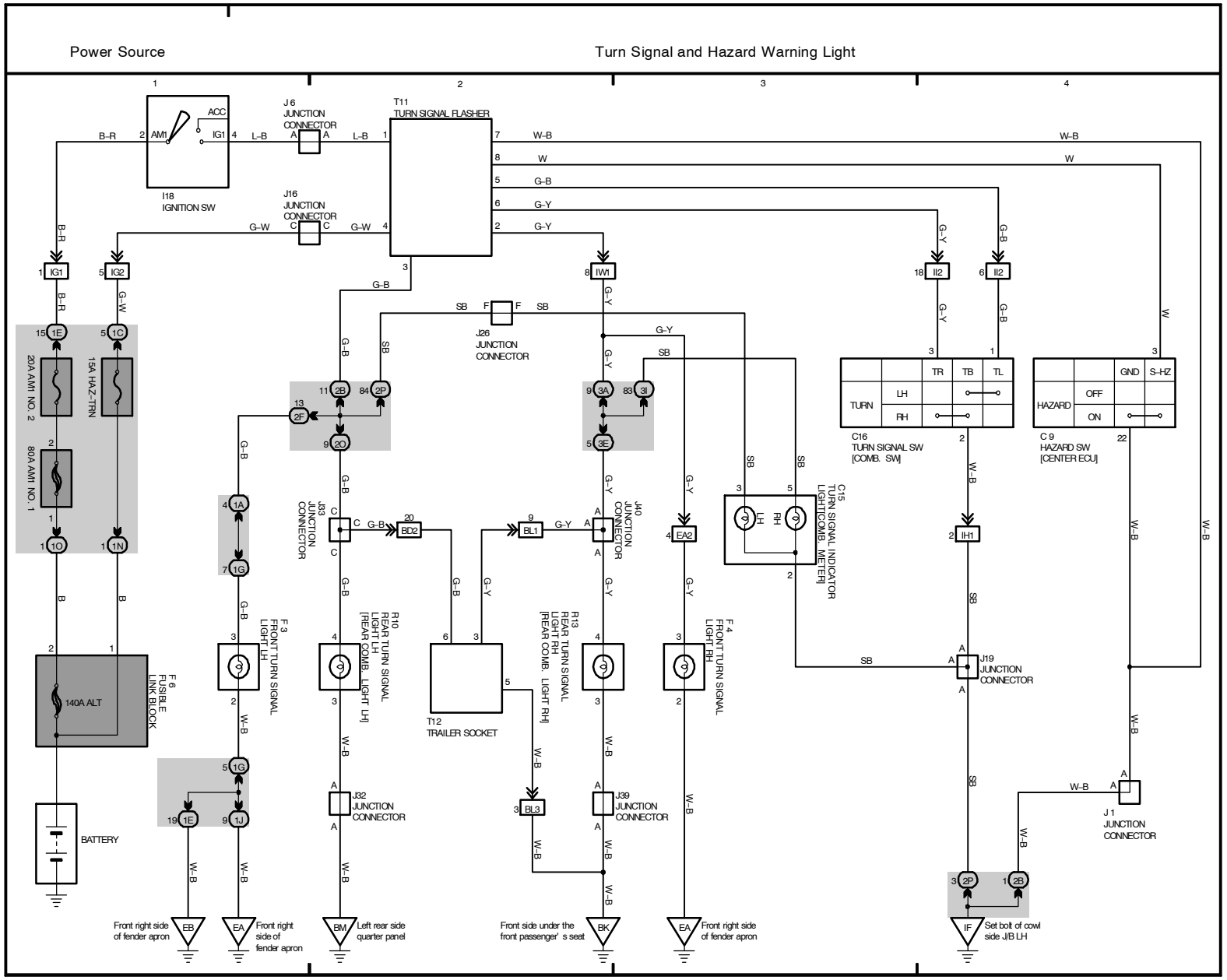

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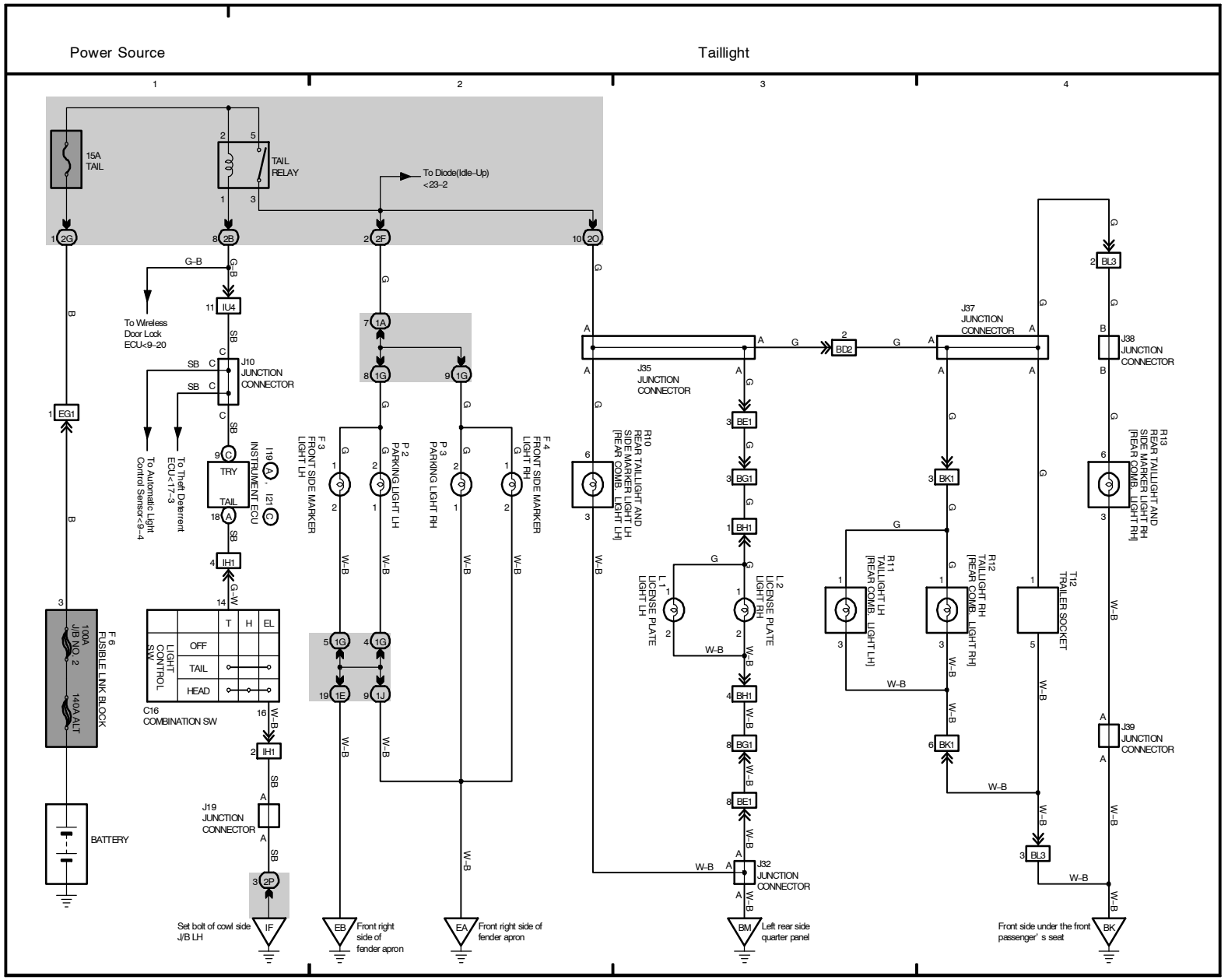

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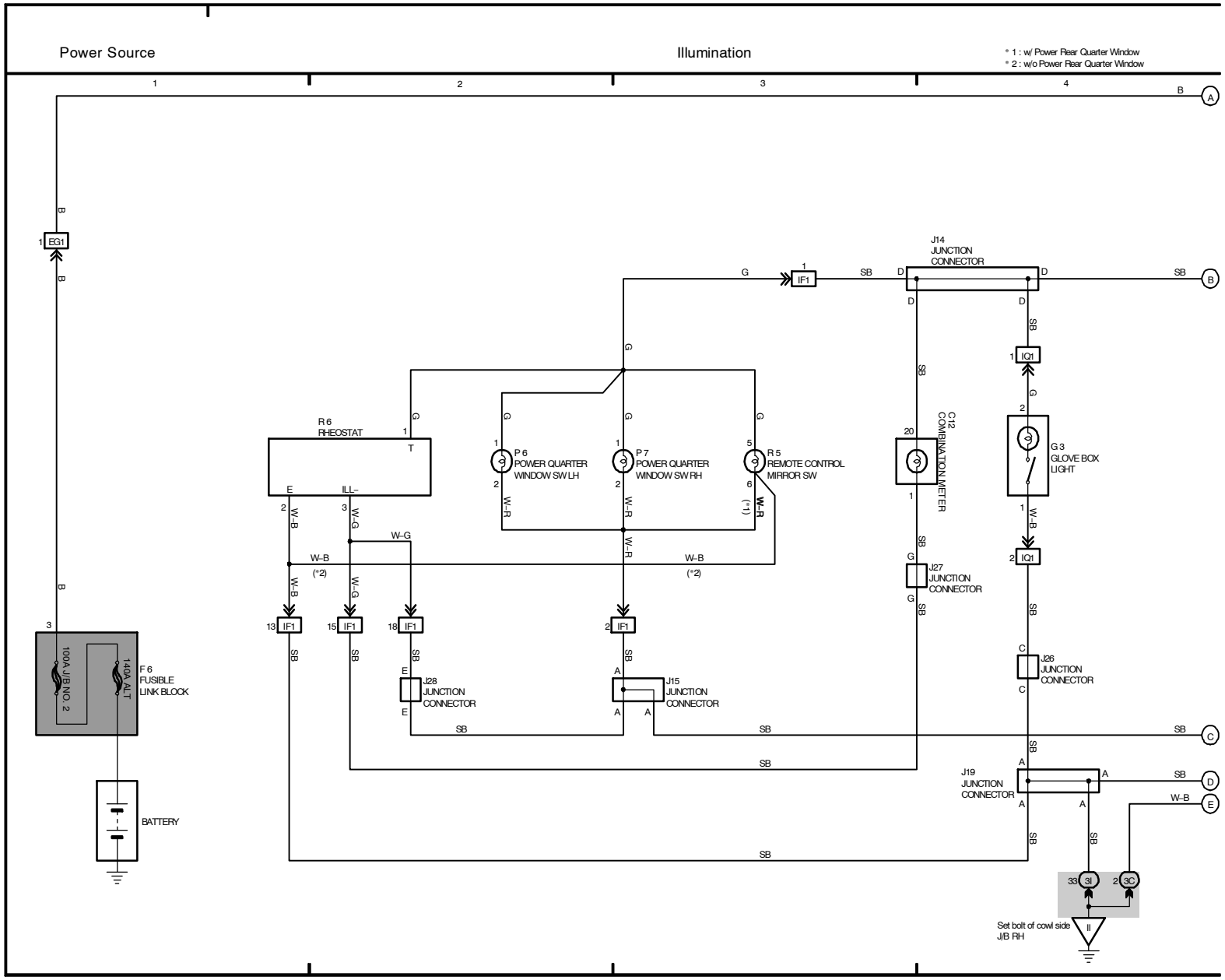

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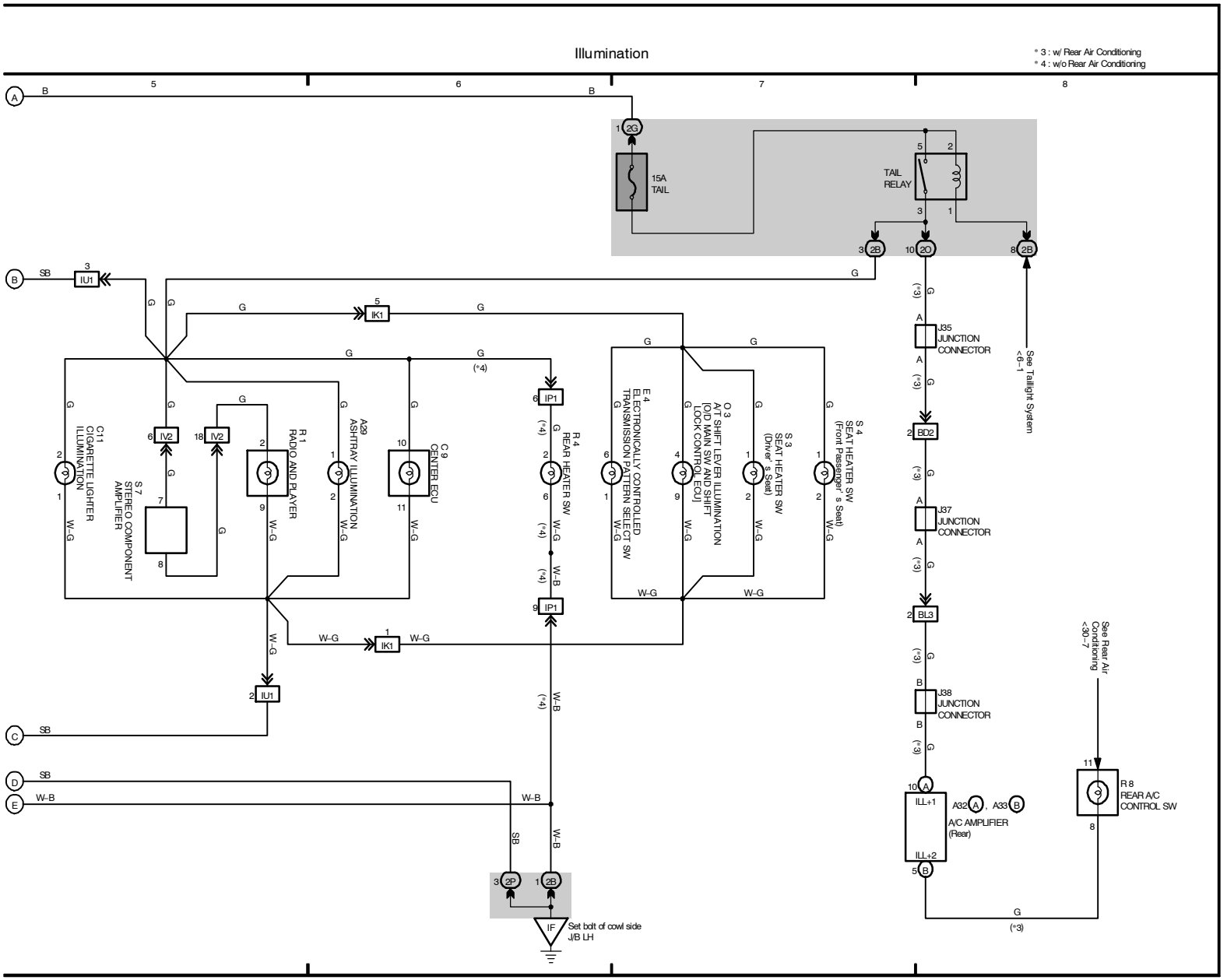

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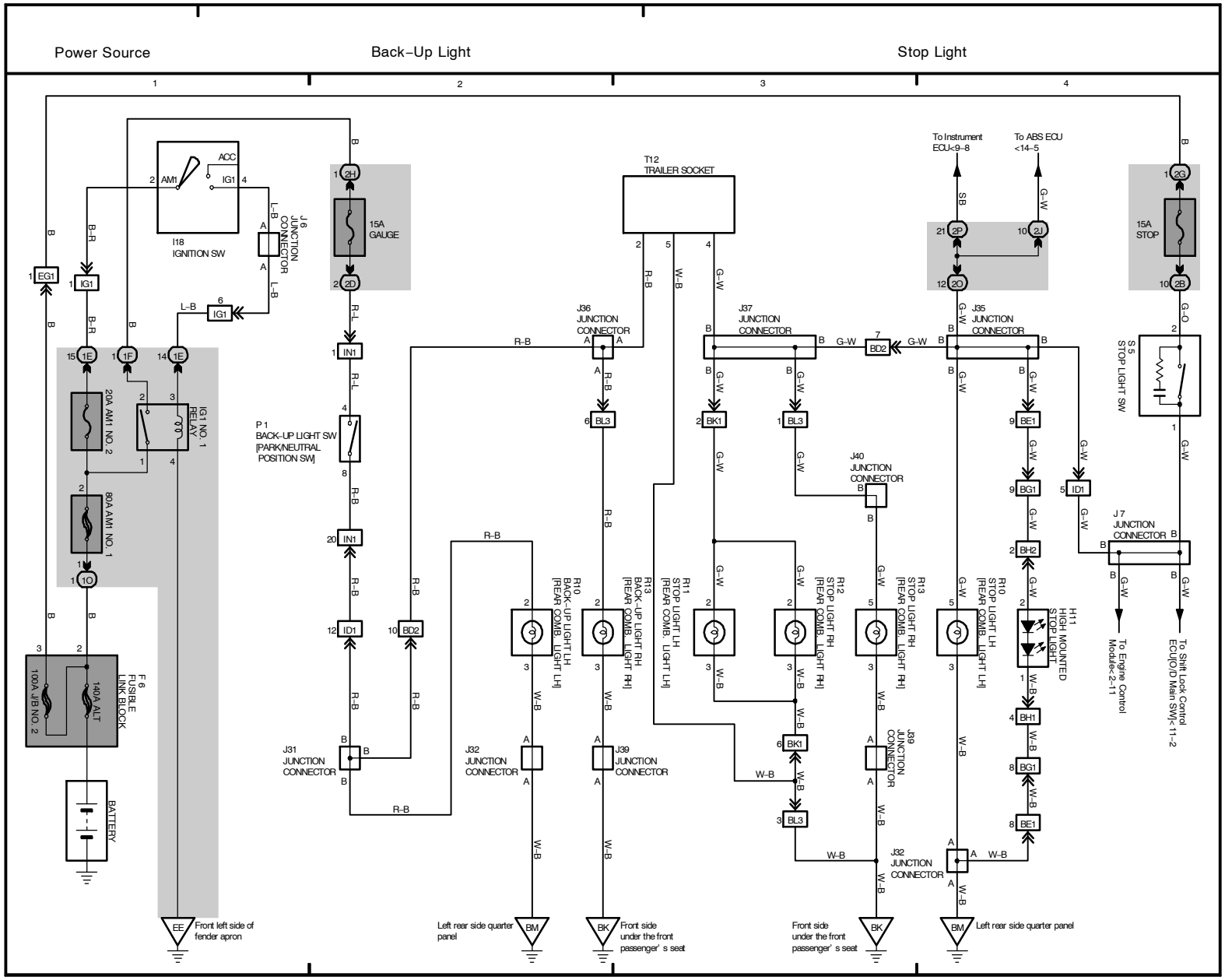

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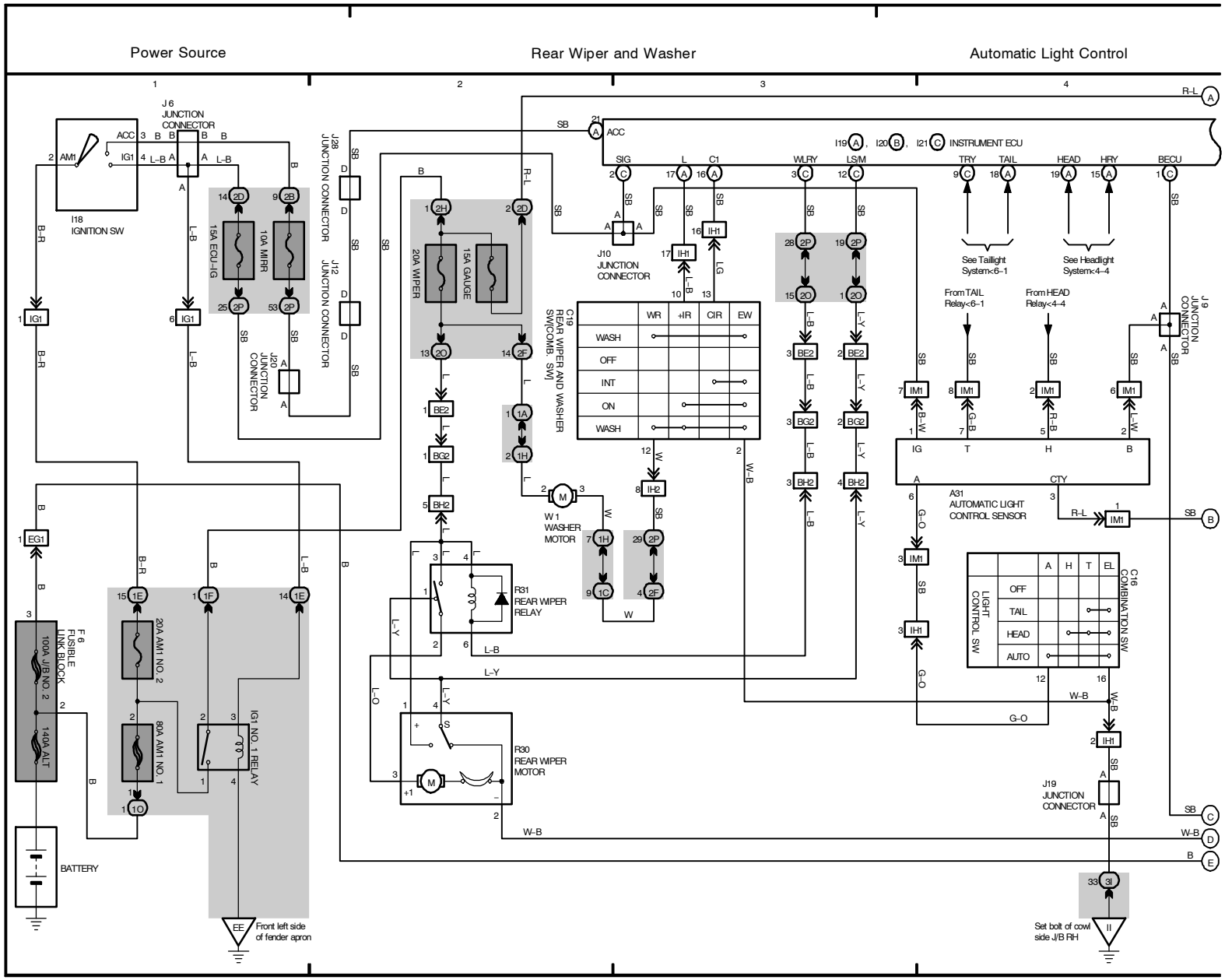

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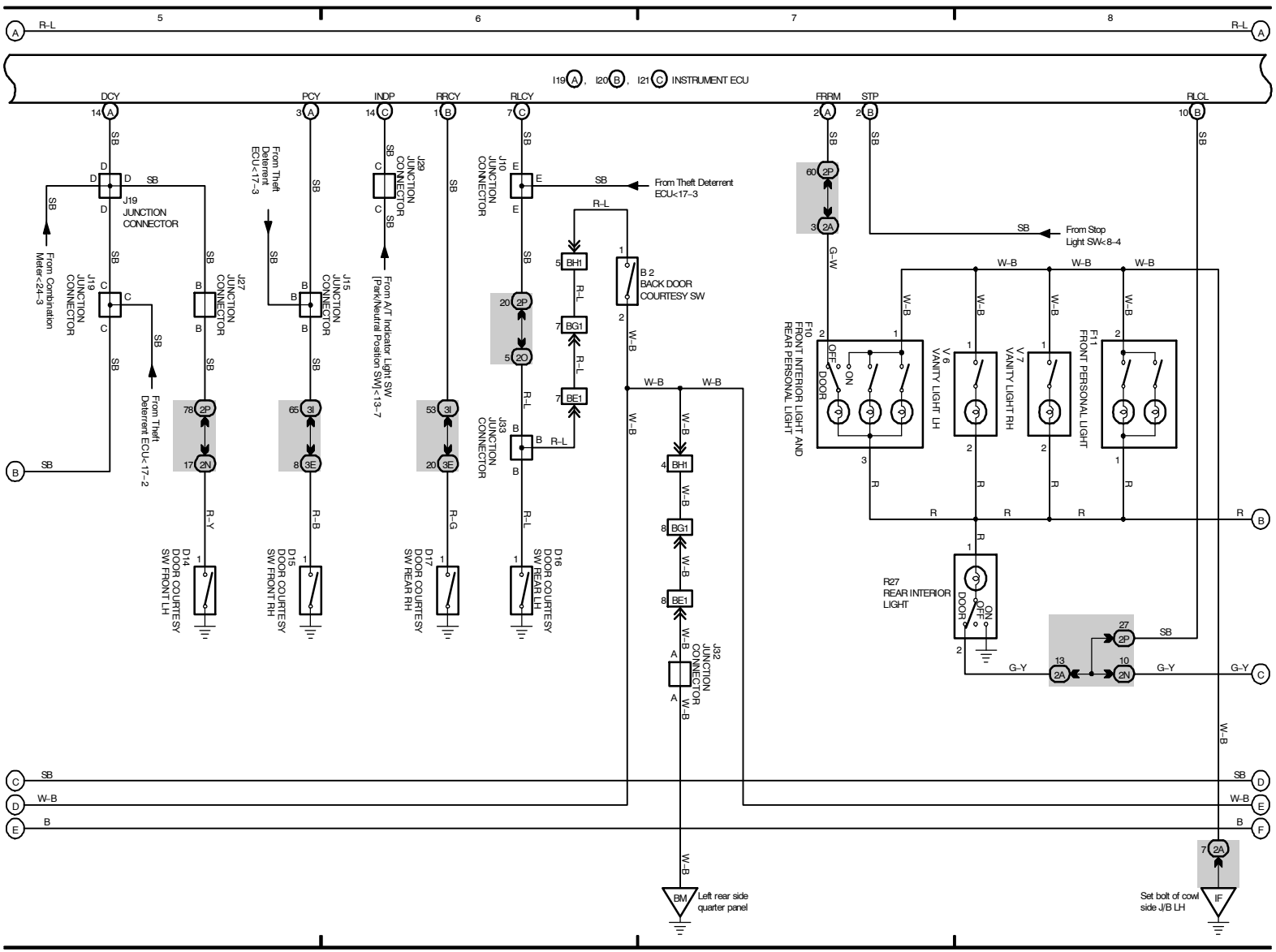
Interior Light



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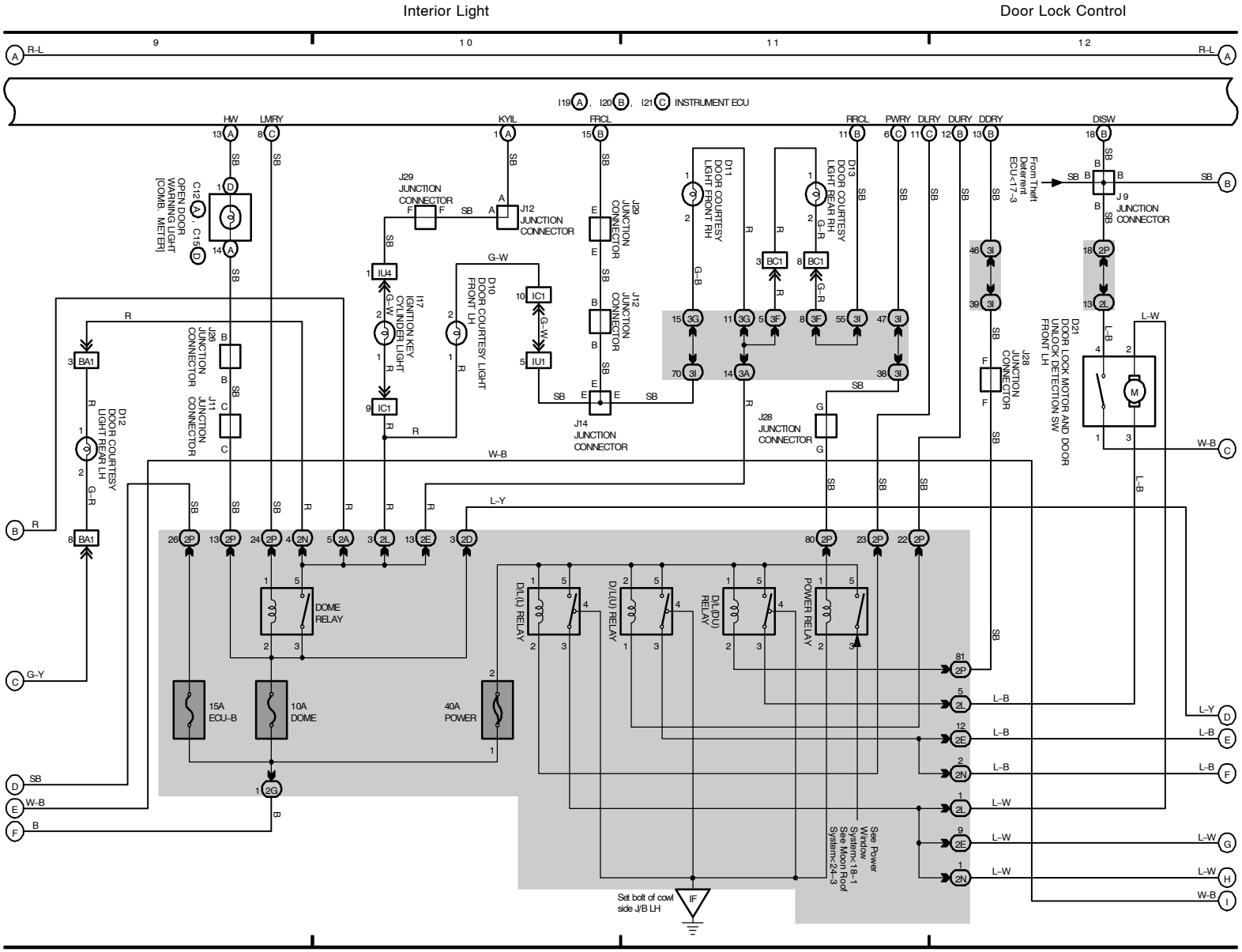

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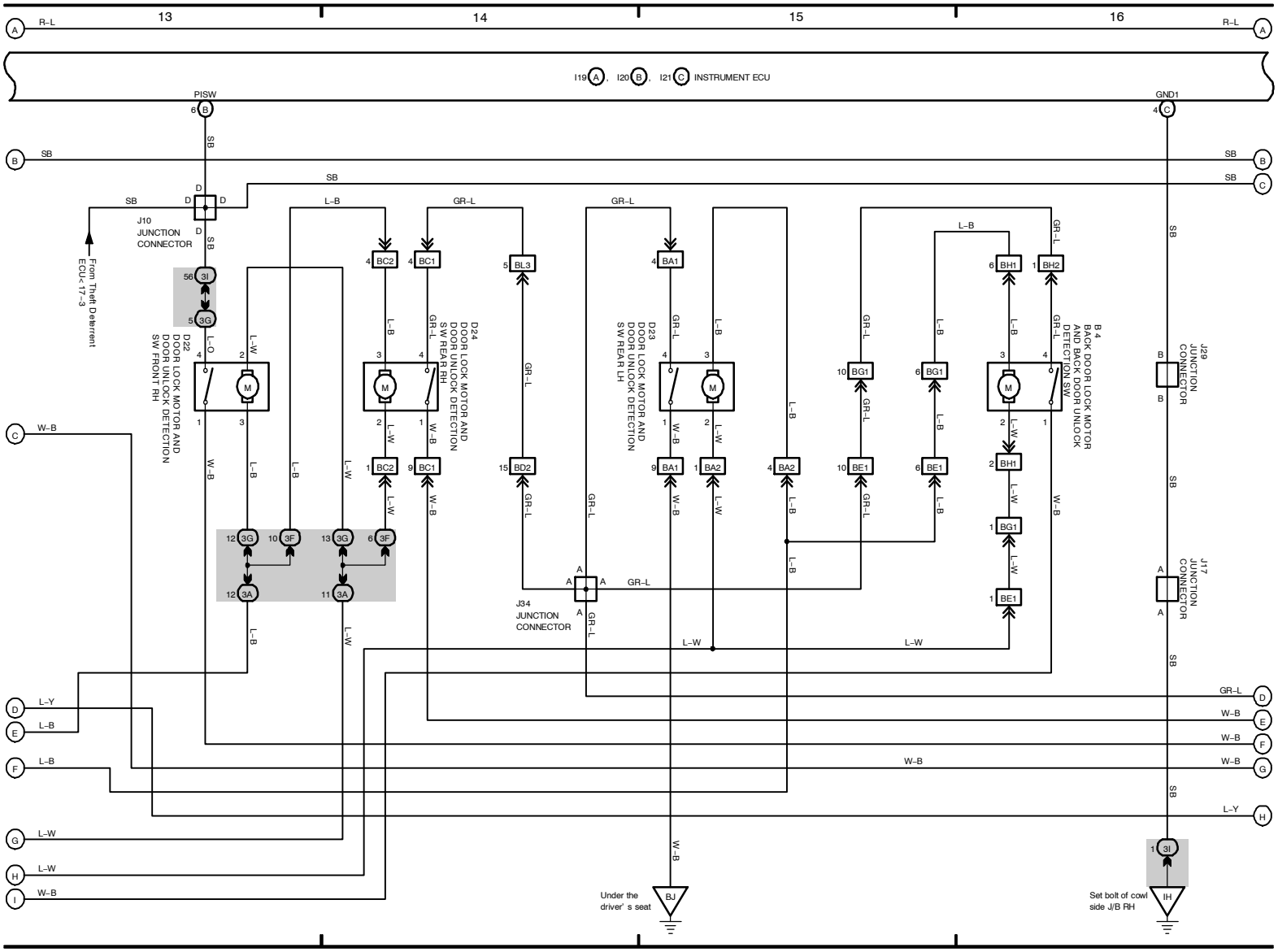
Door Lock Control



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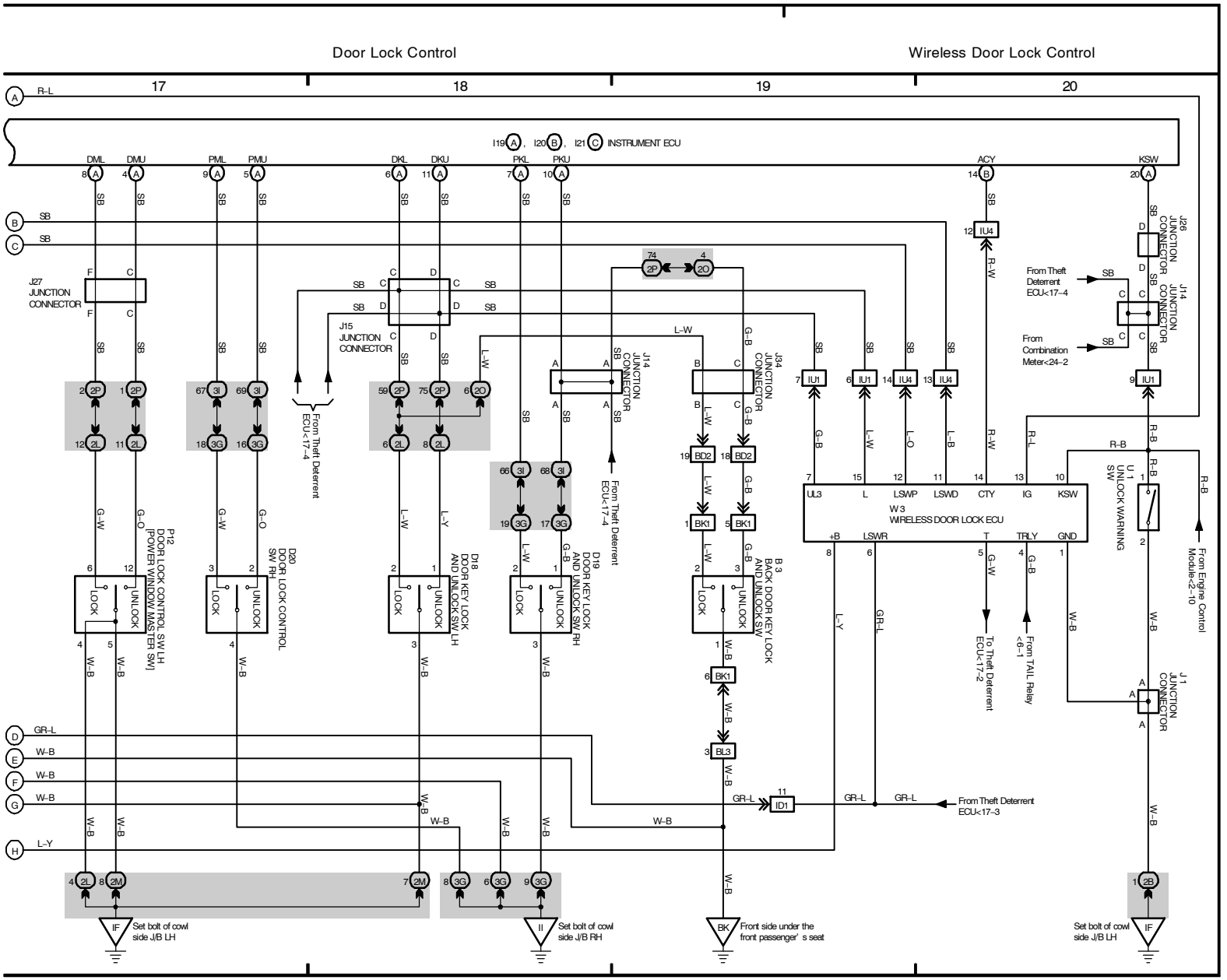

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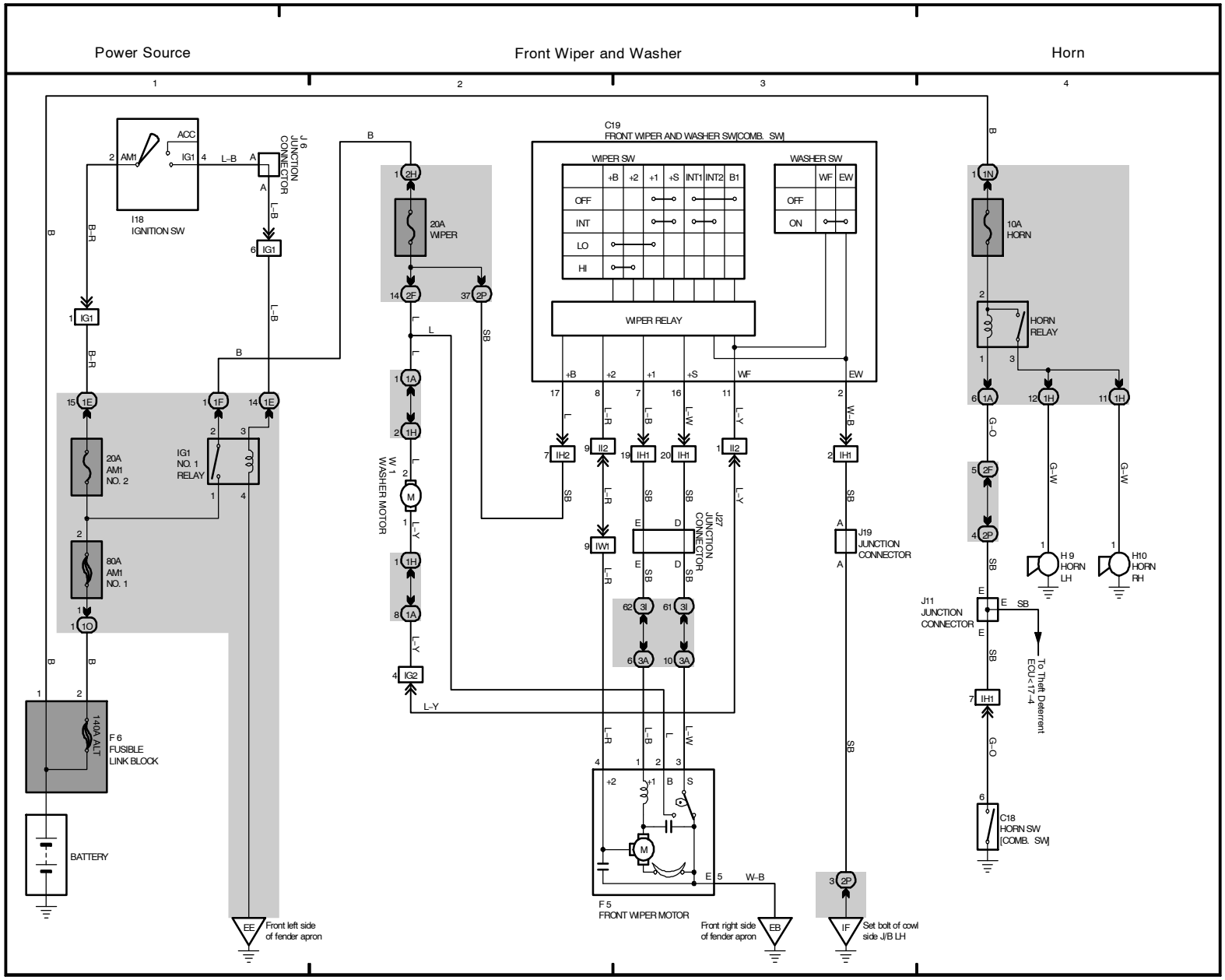

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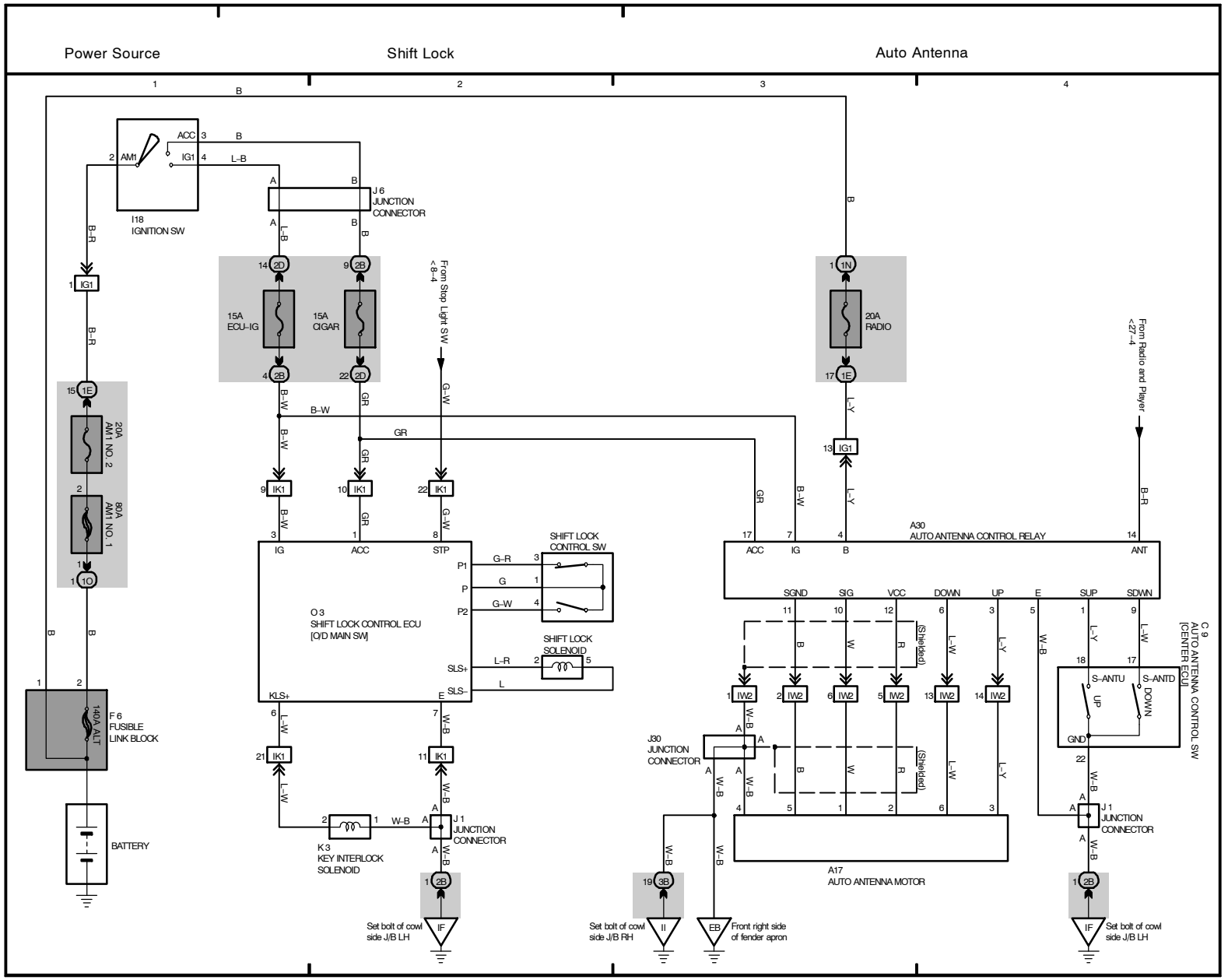

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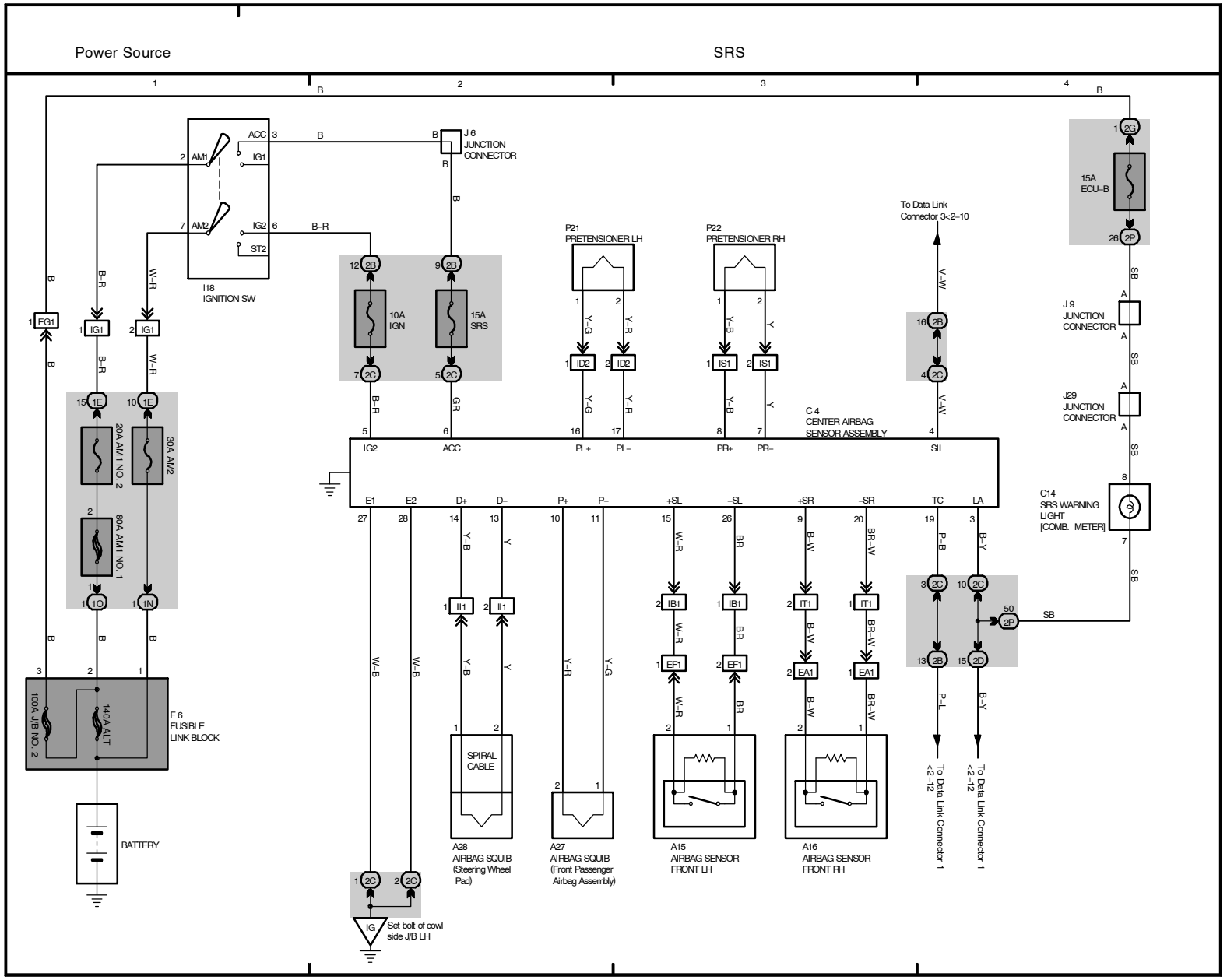

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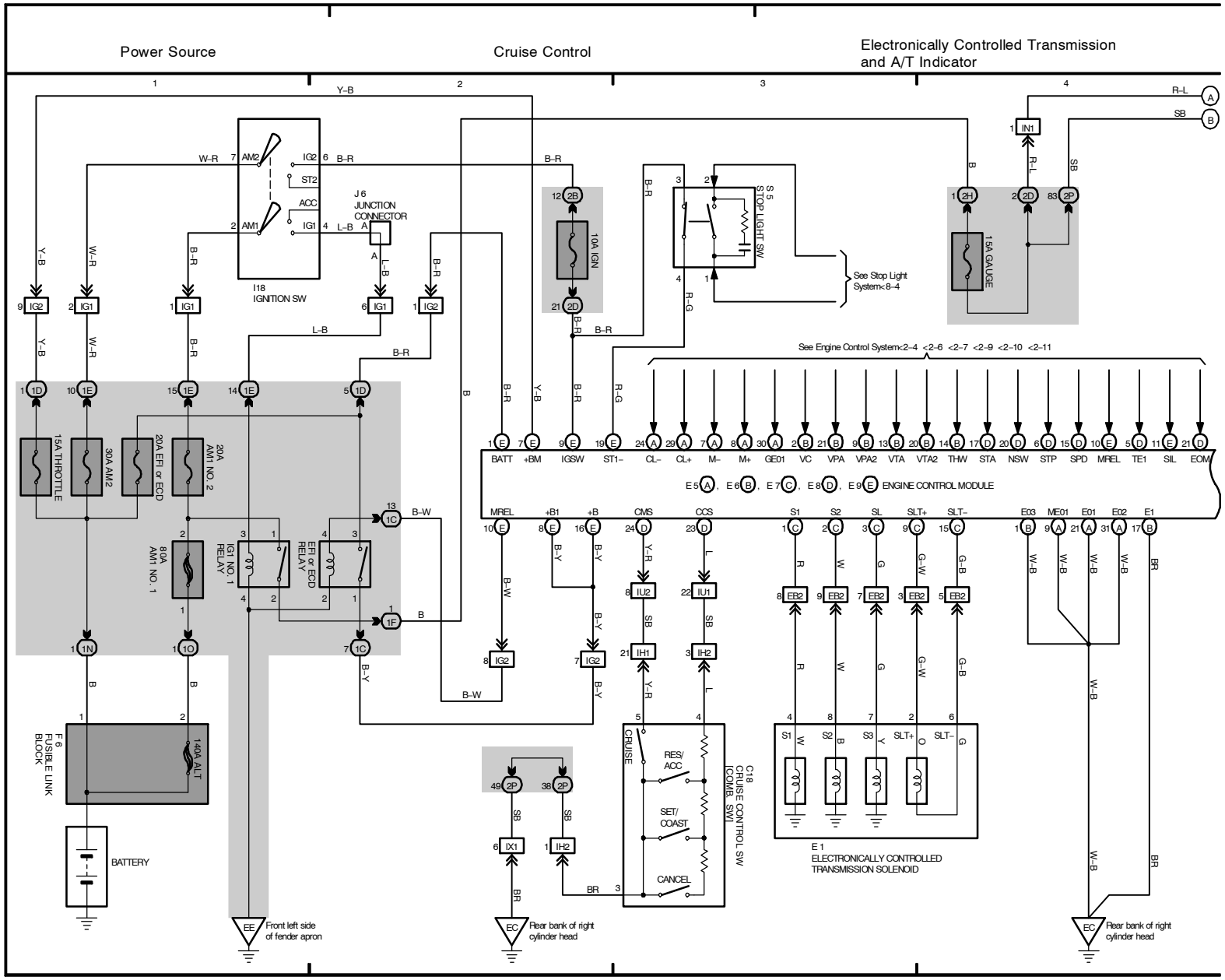

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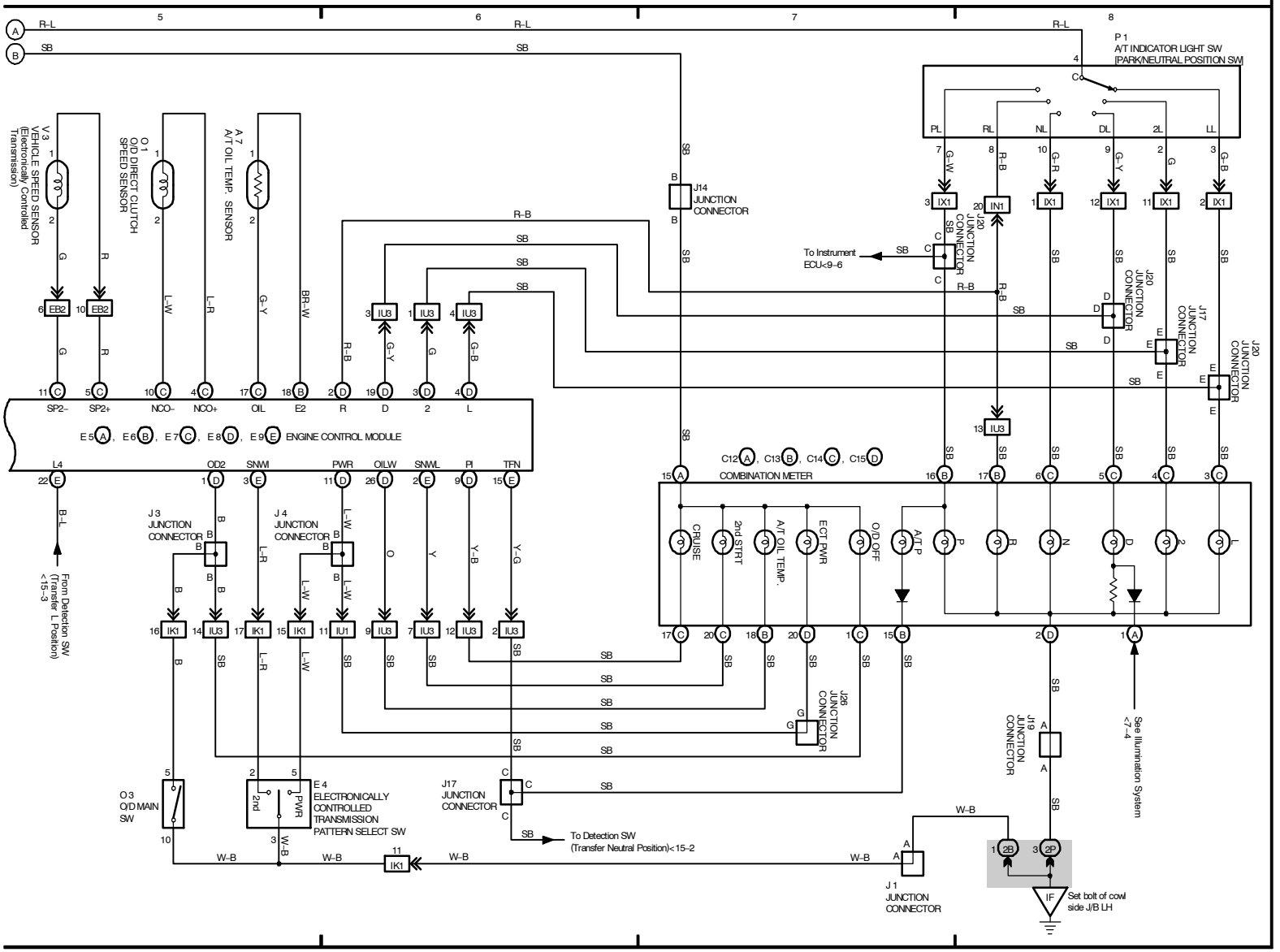
Electronically Controlled Transmission and A/T Indicator



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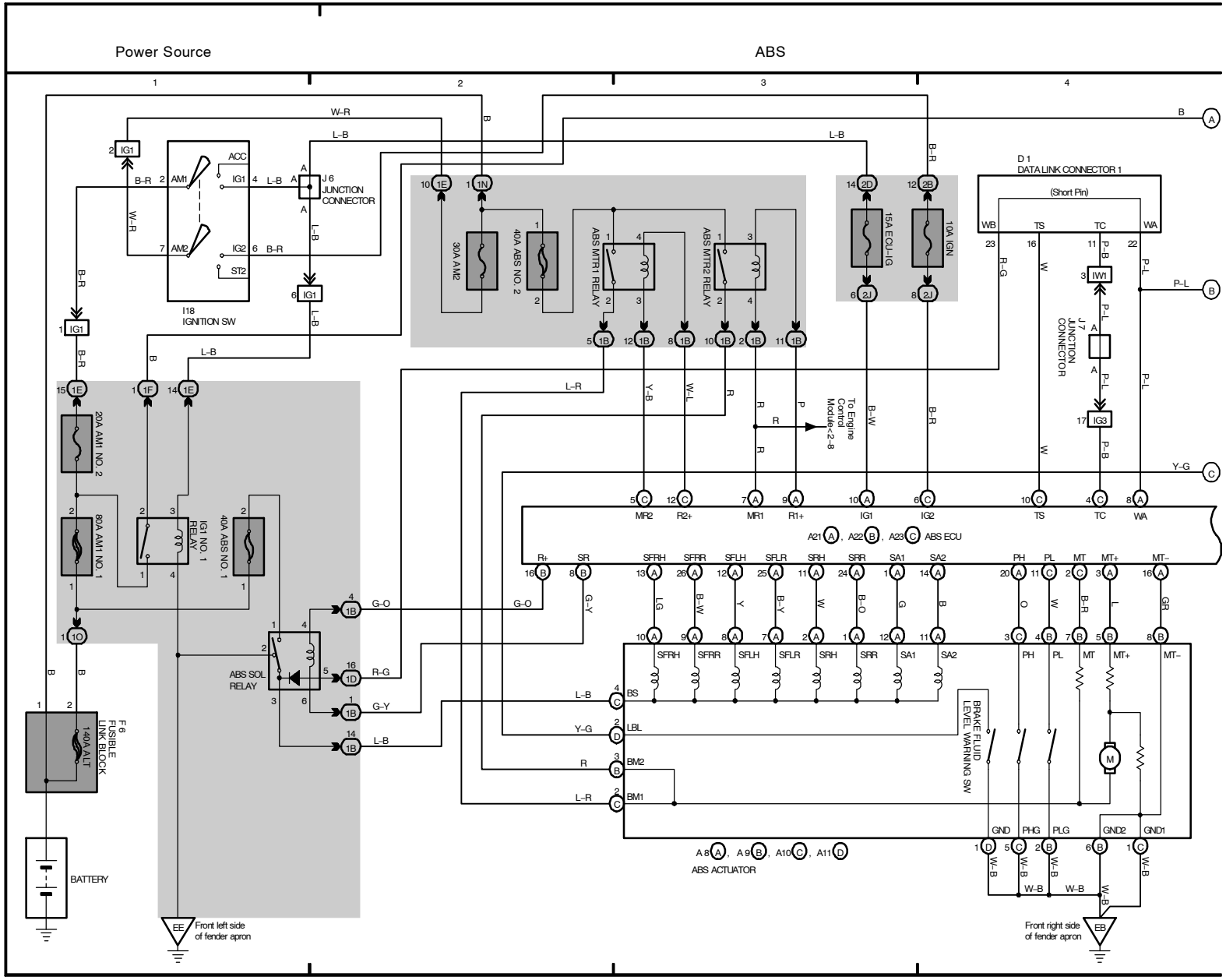

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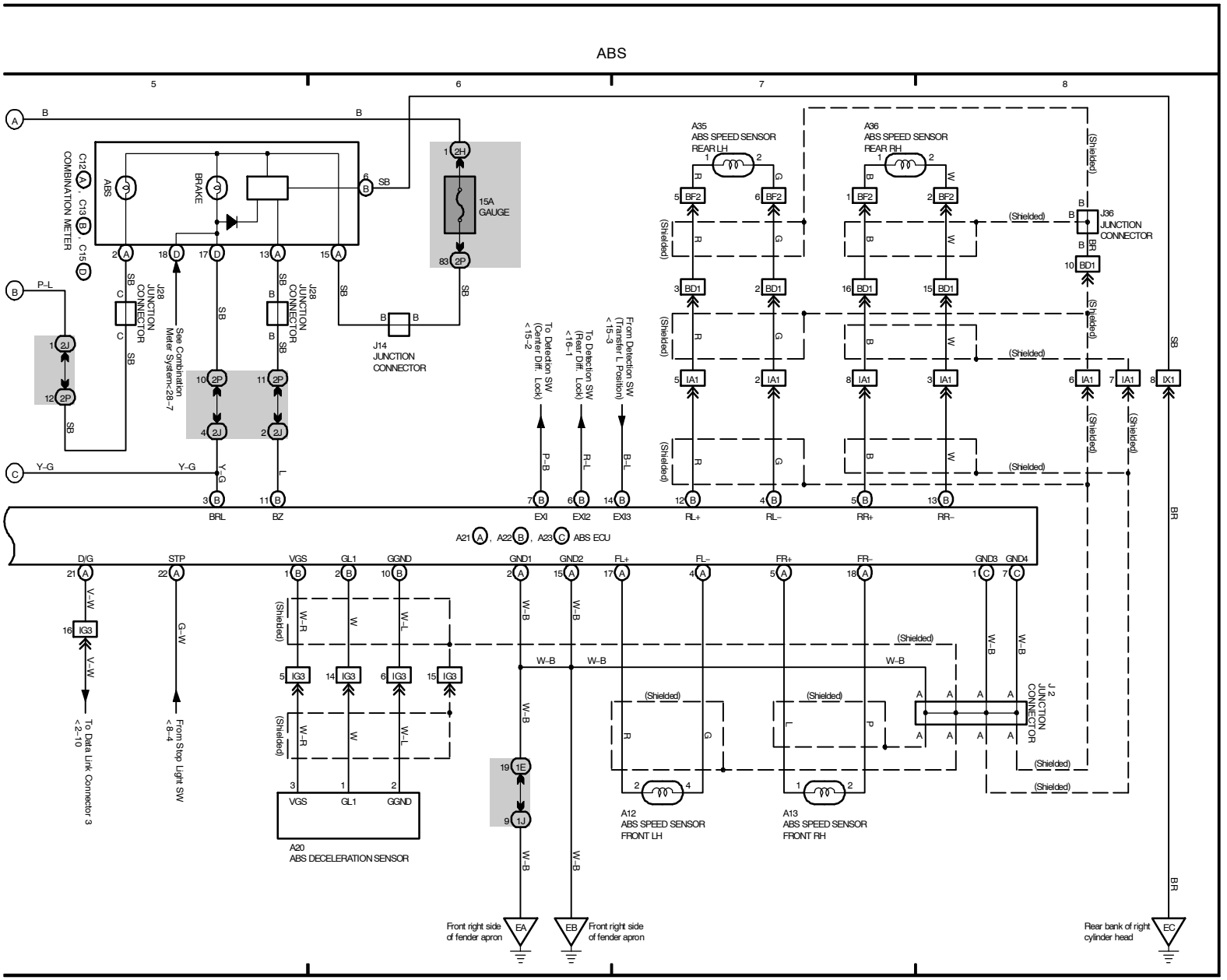

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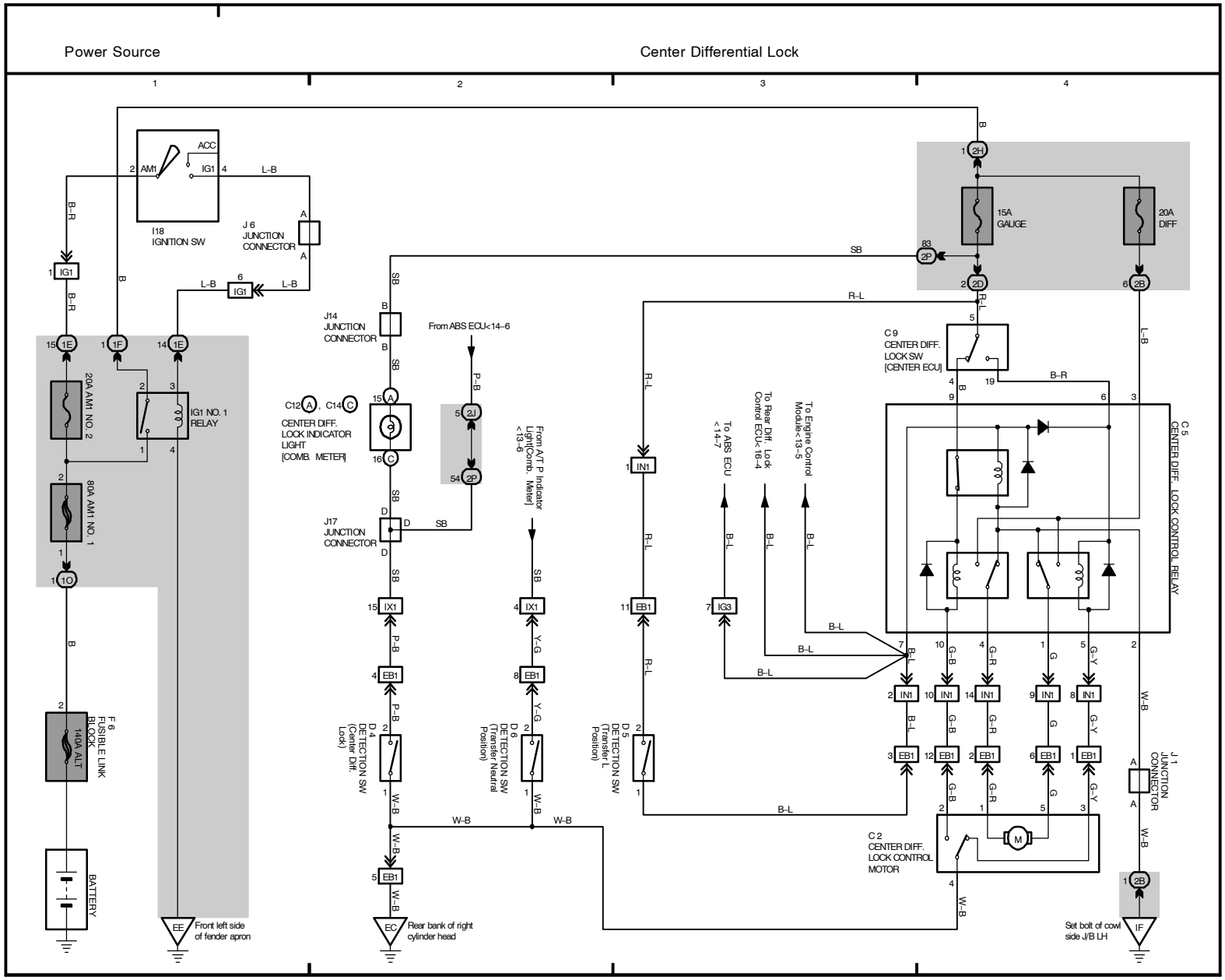

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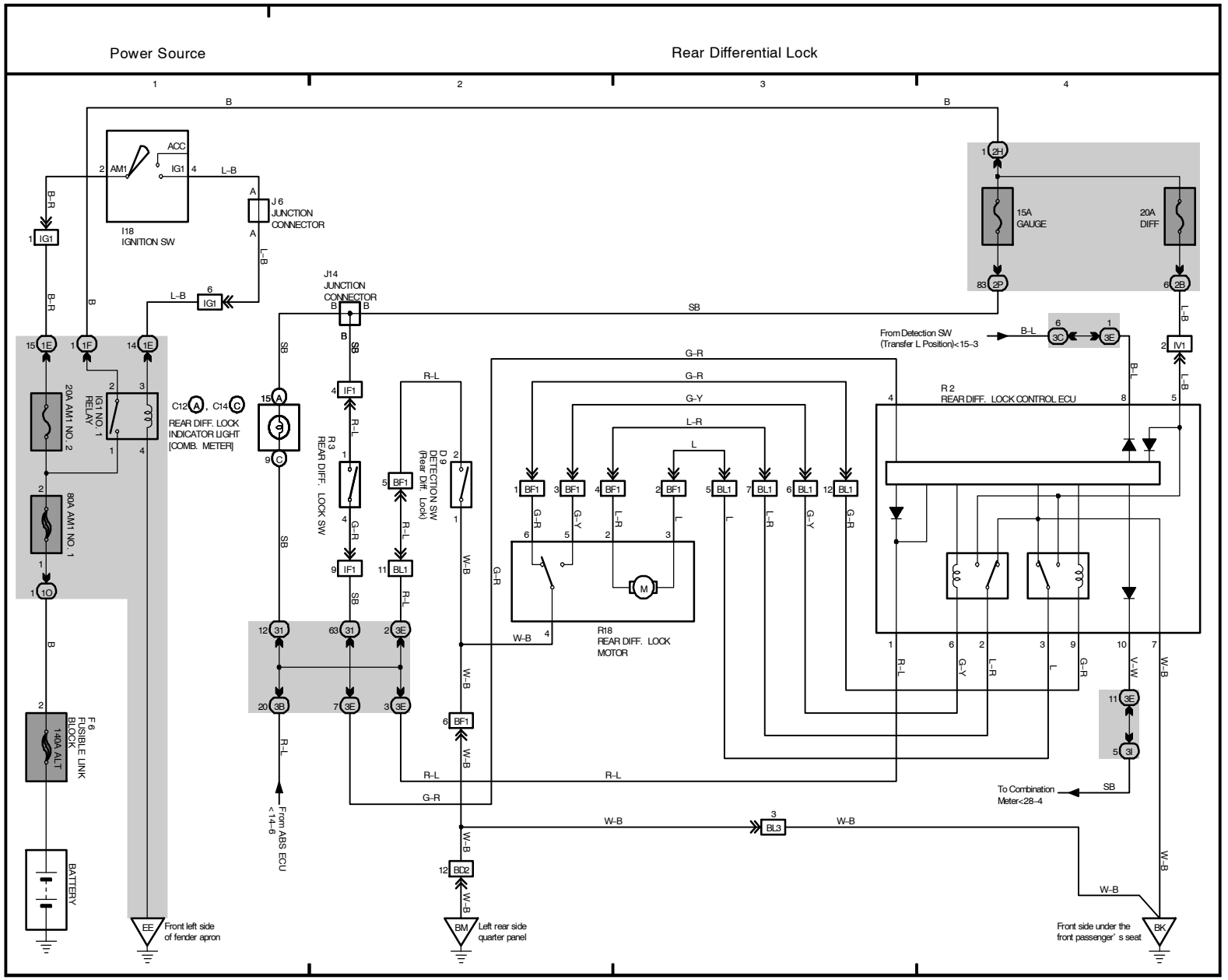

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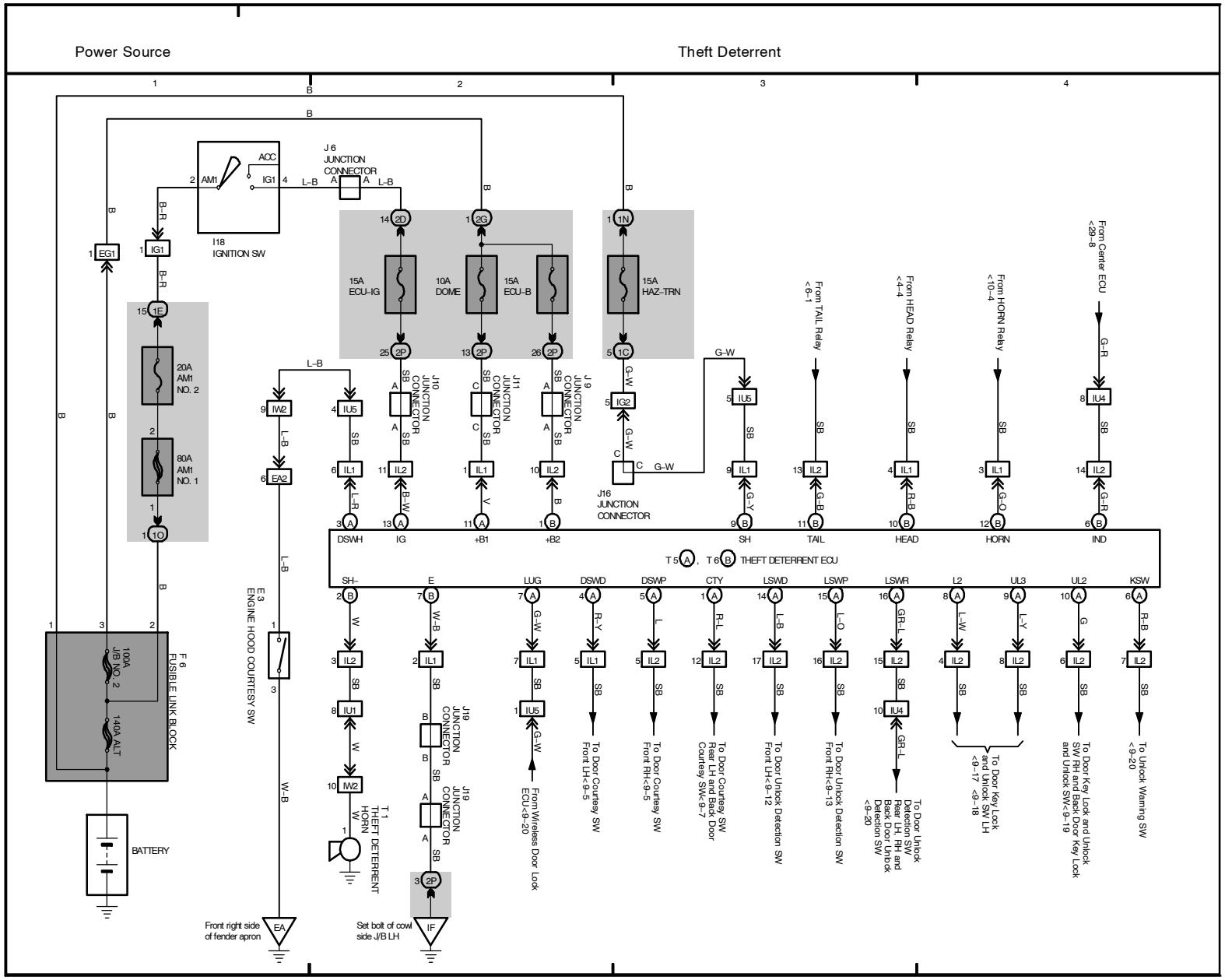

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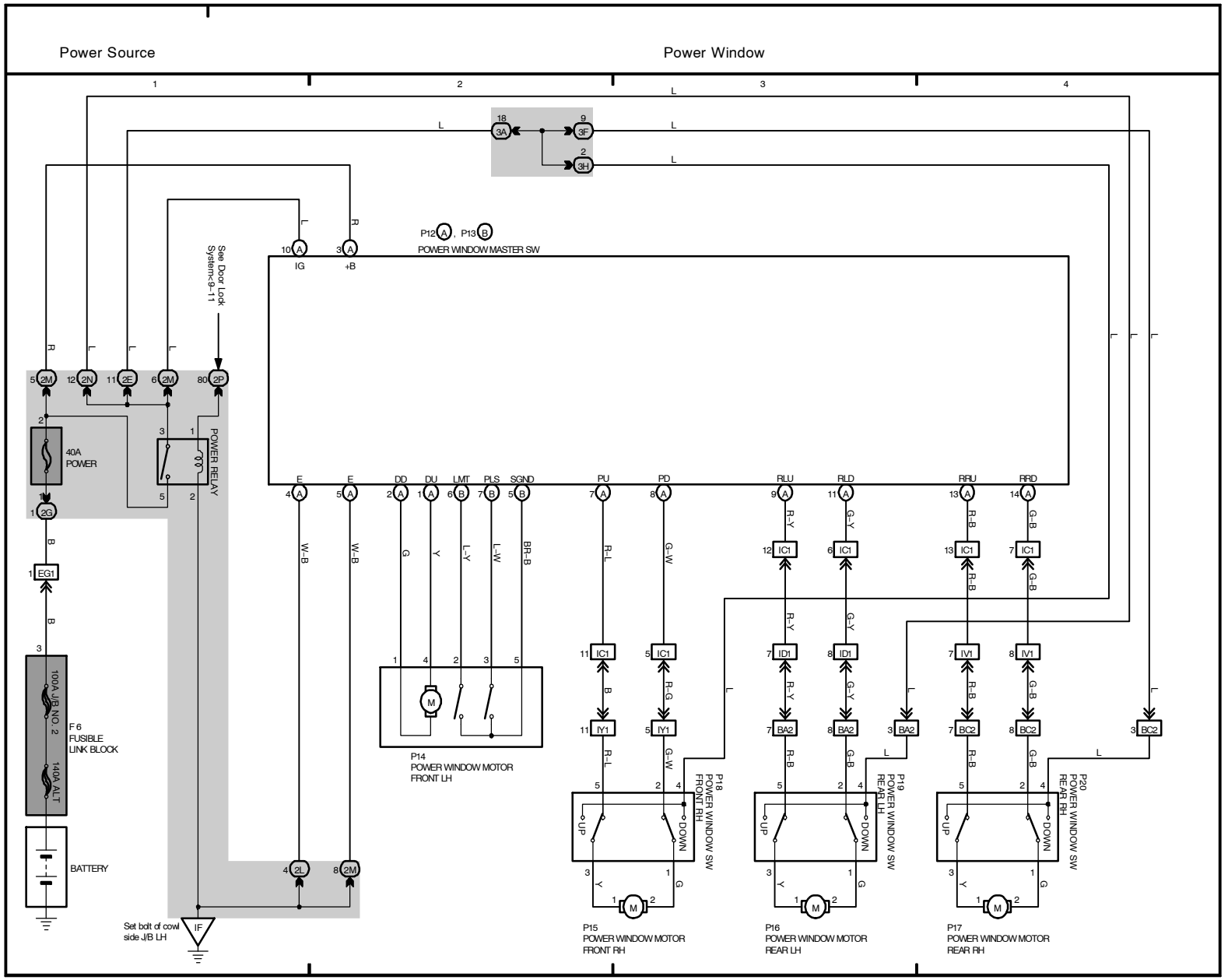

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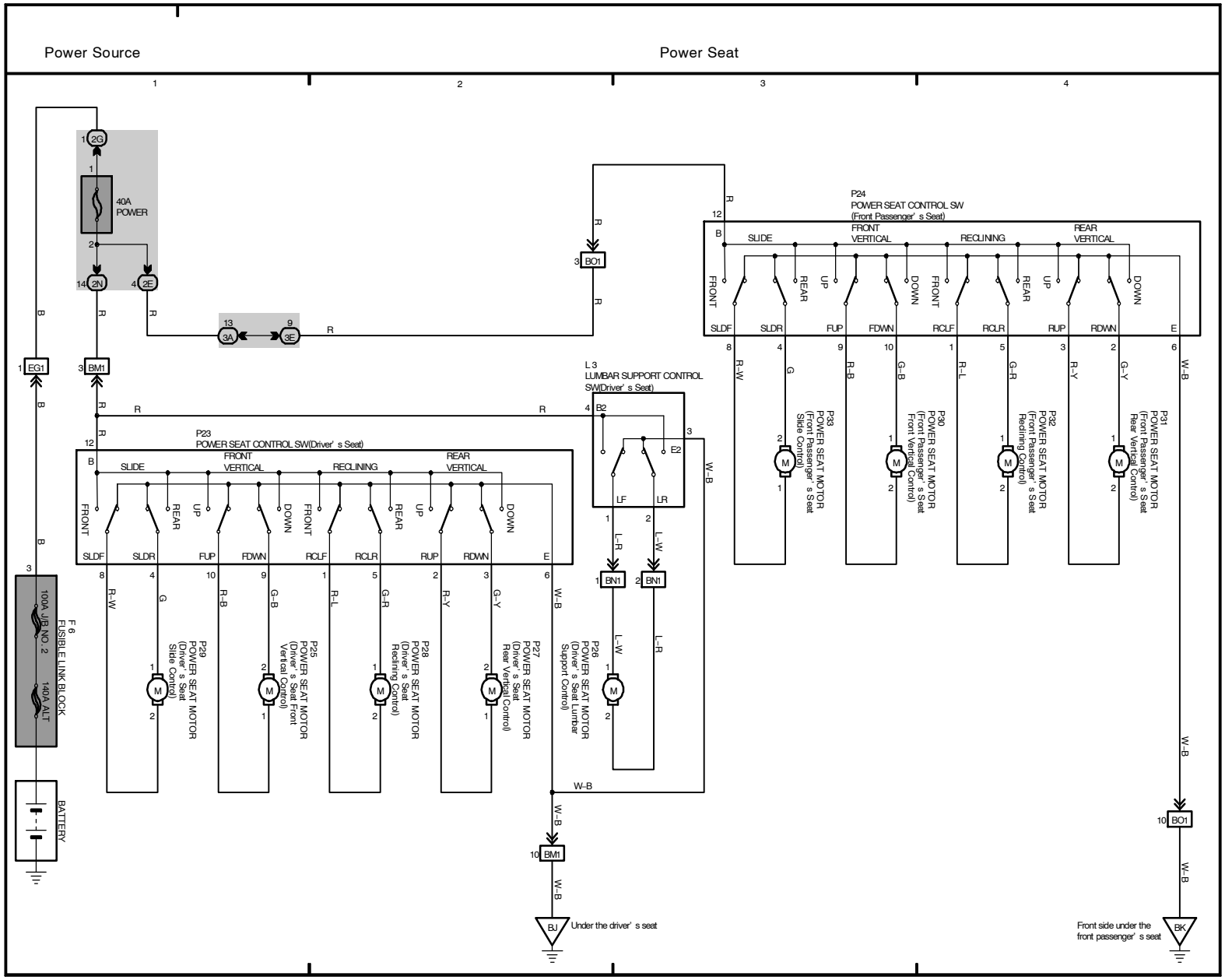

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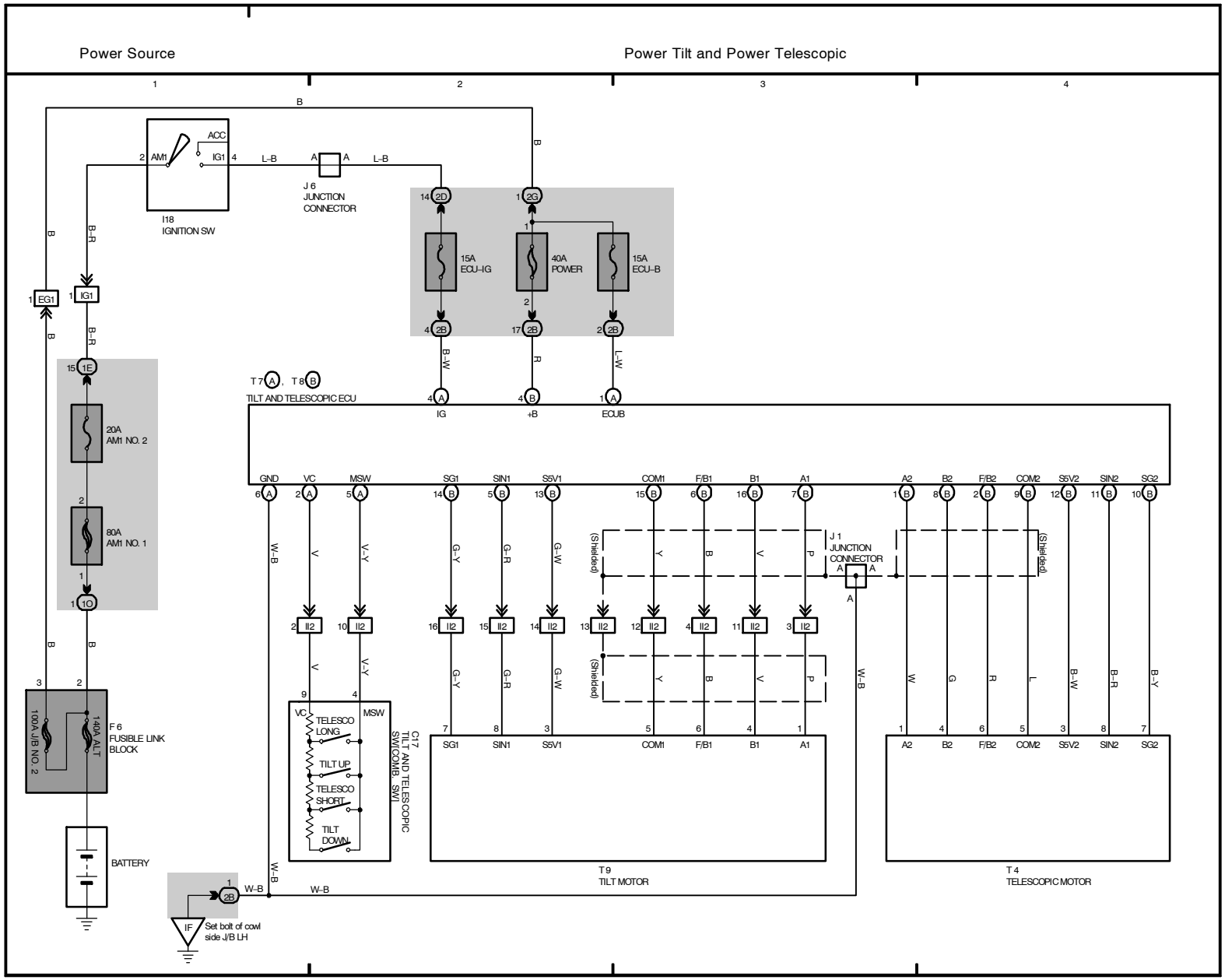

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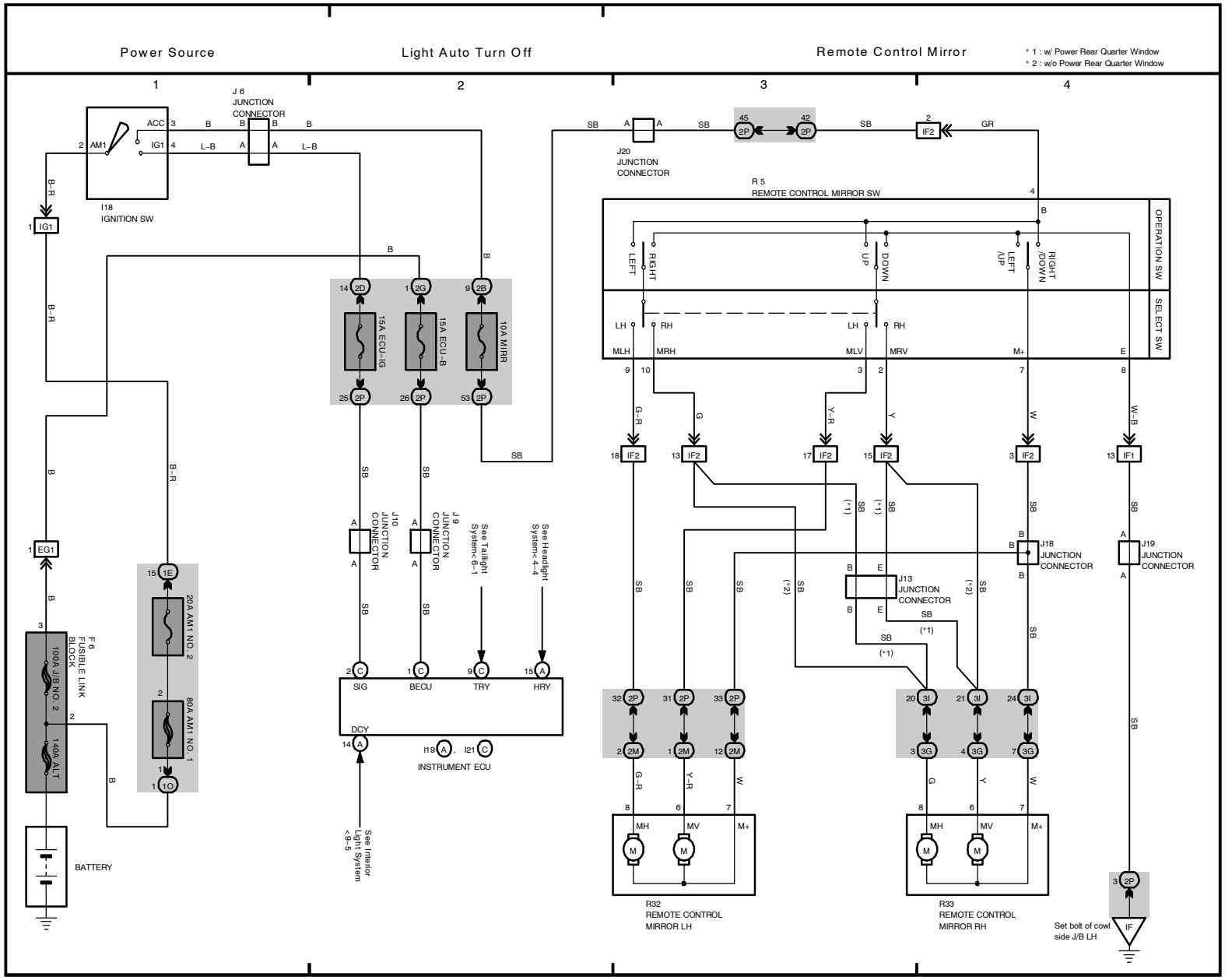

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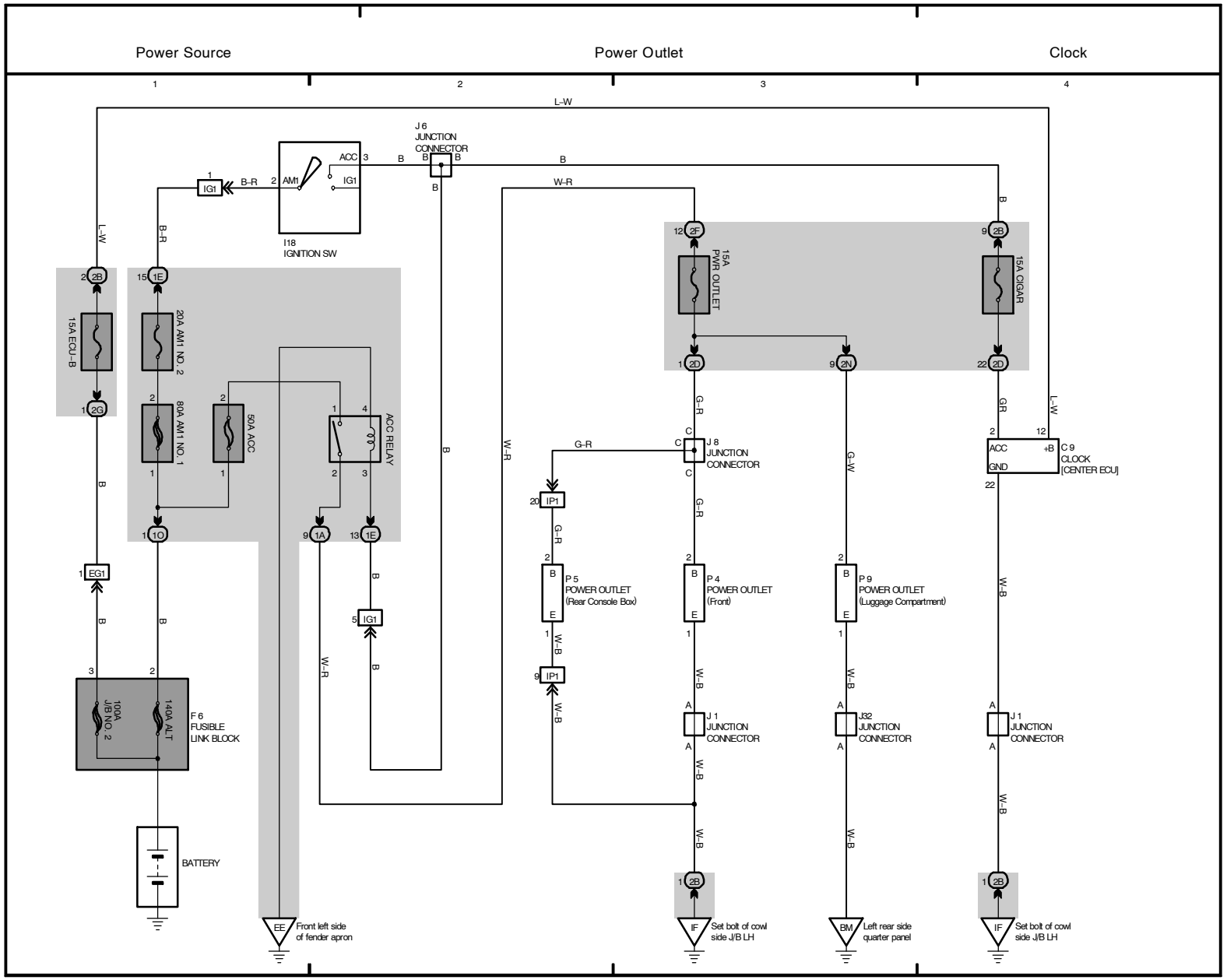

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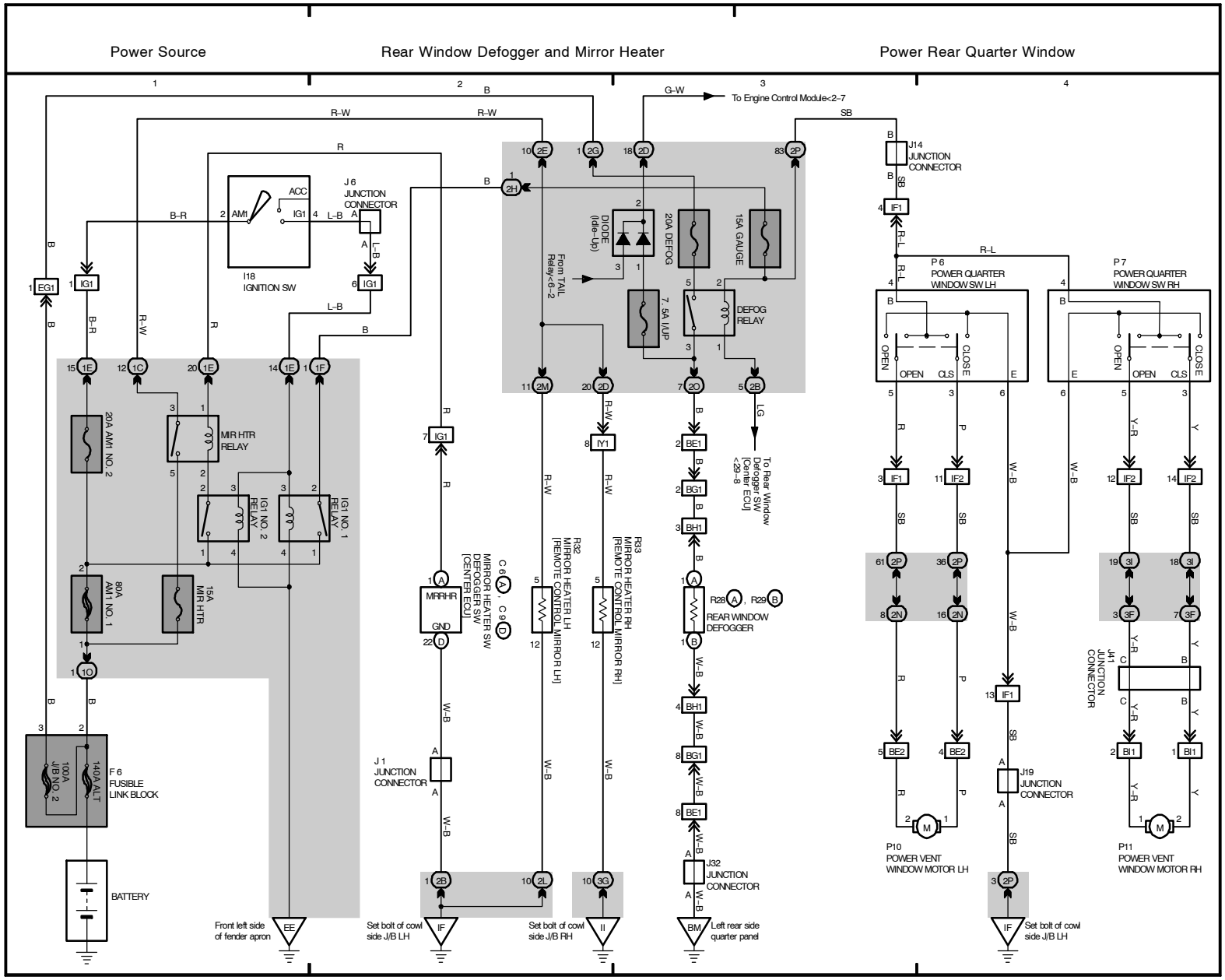

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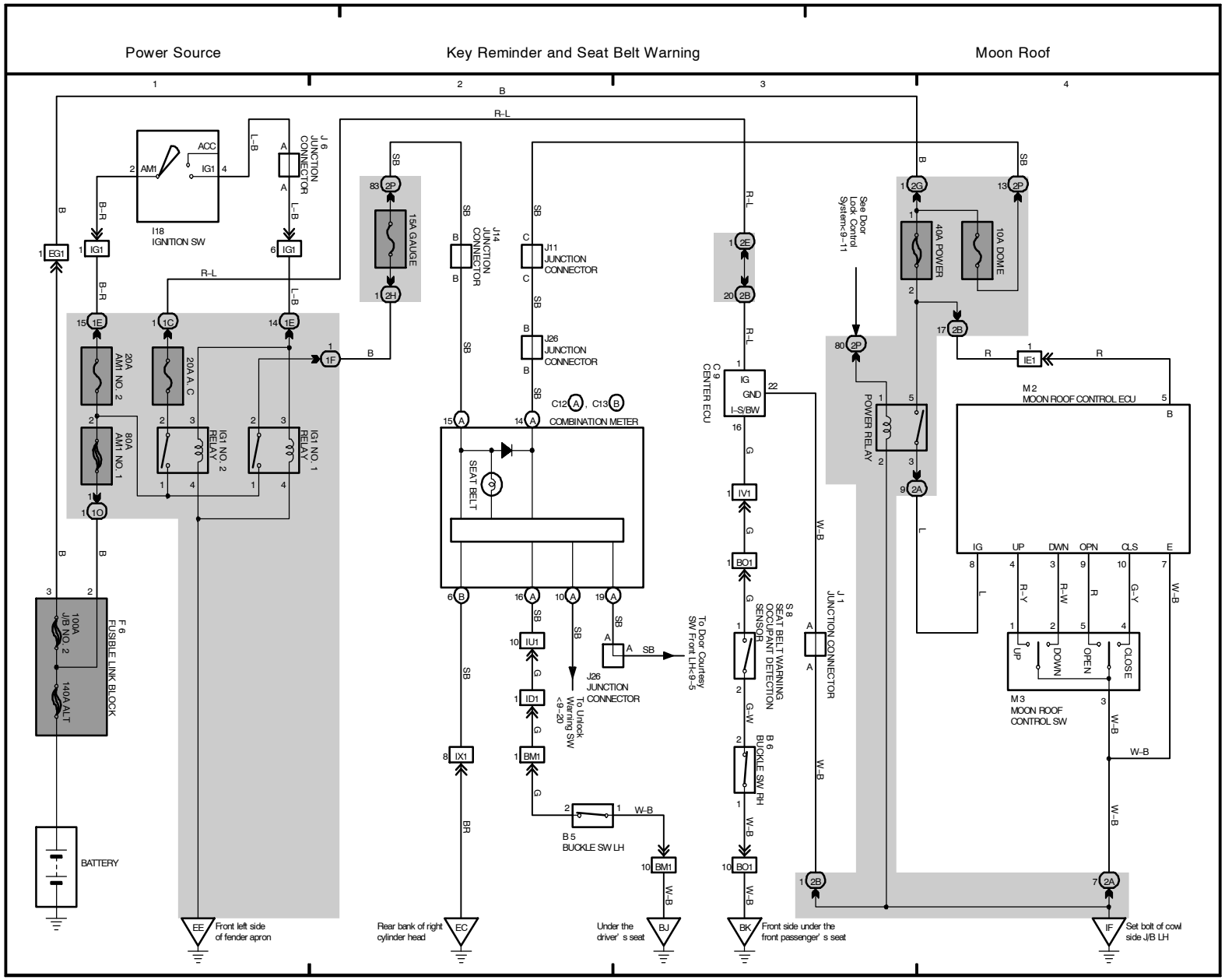

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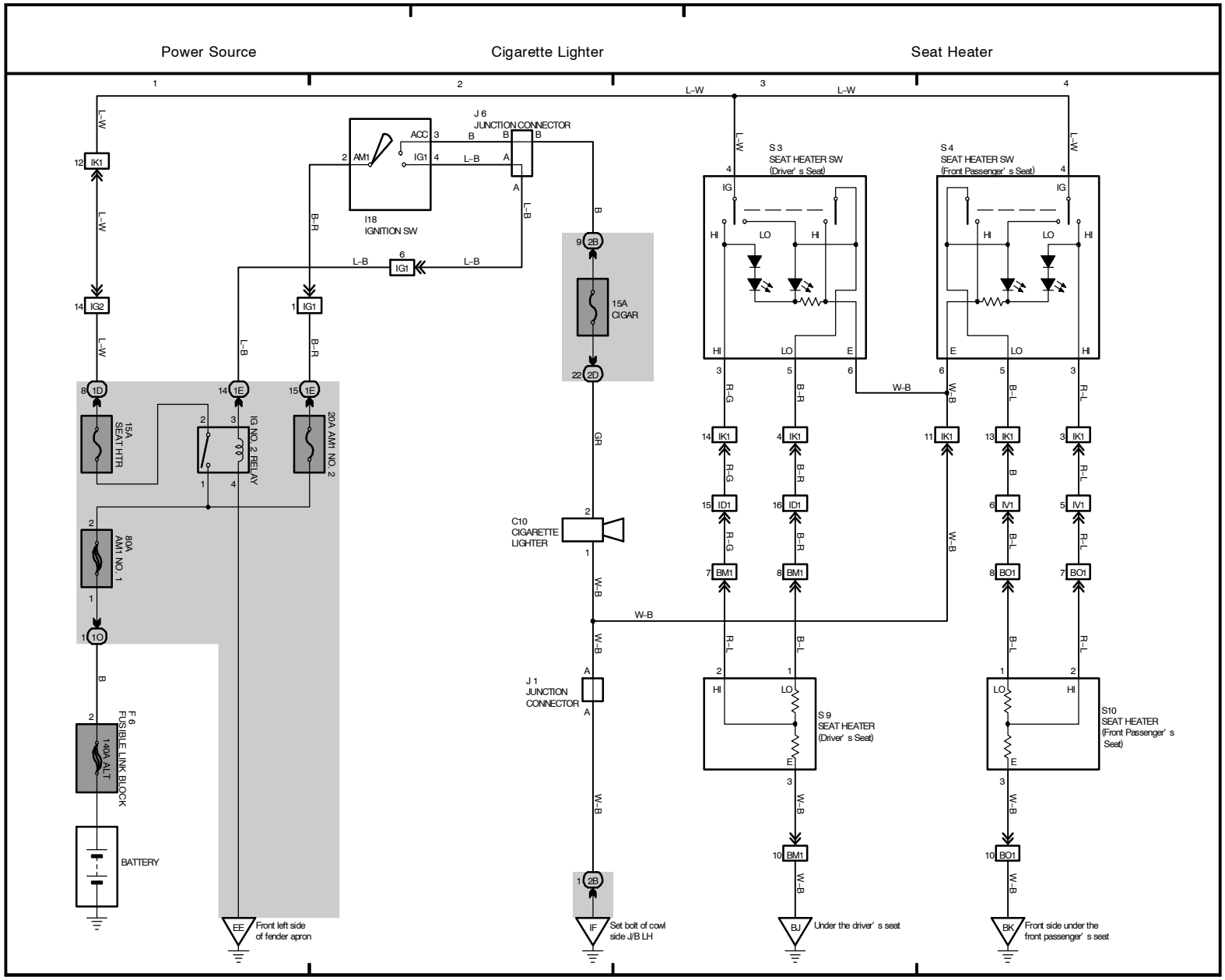

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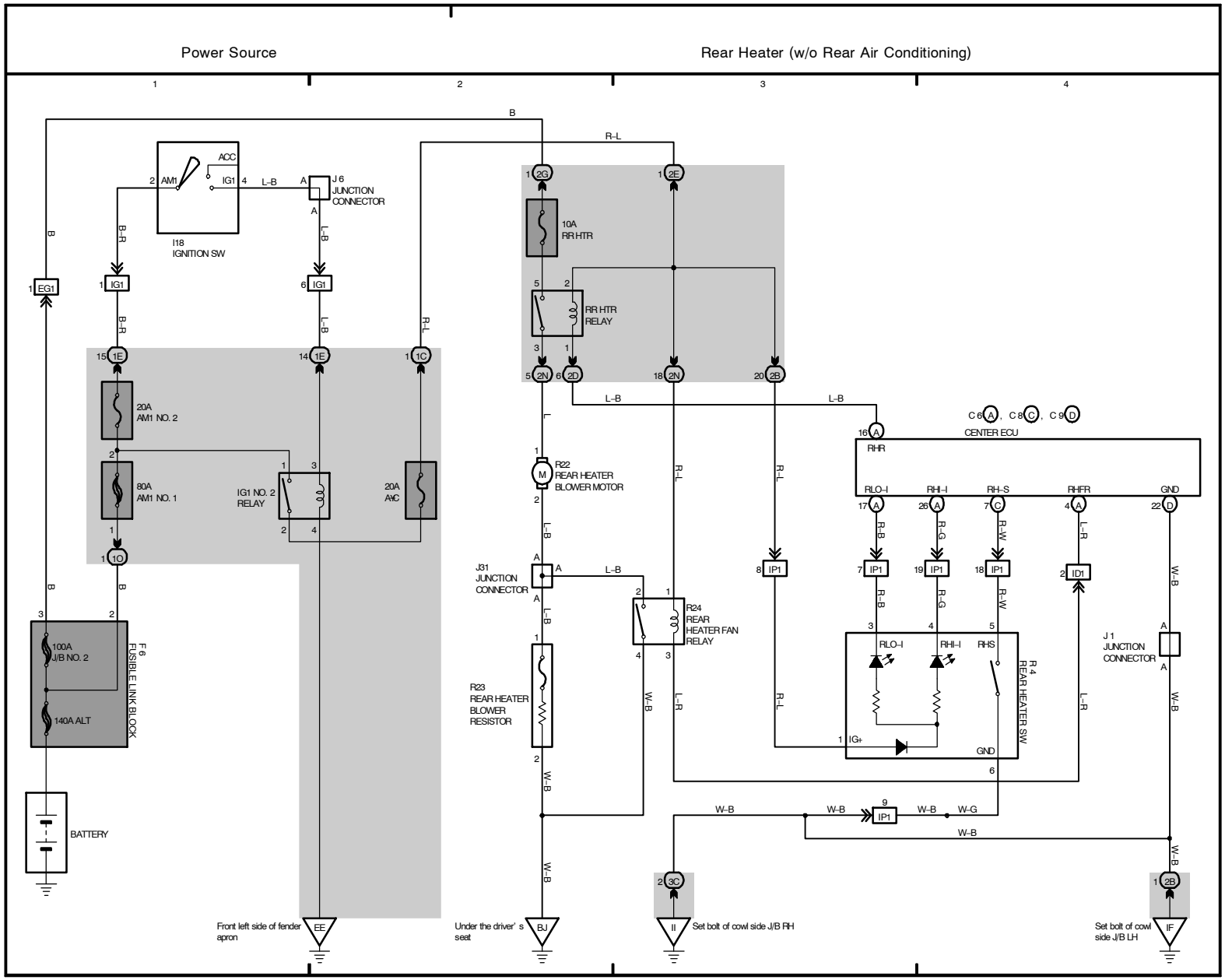

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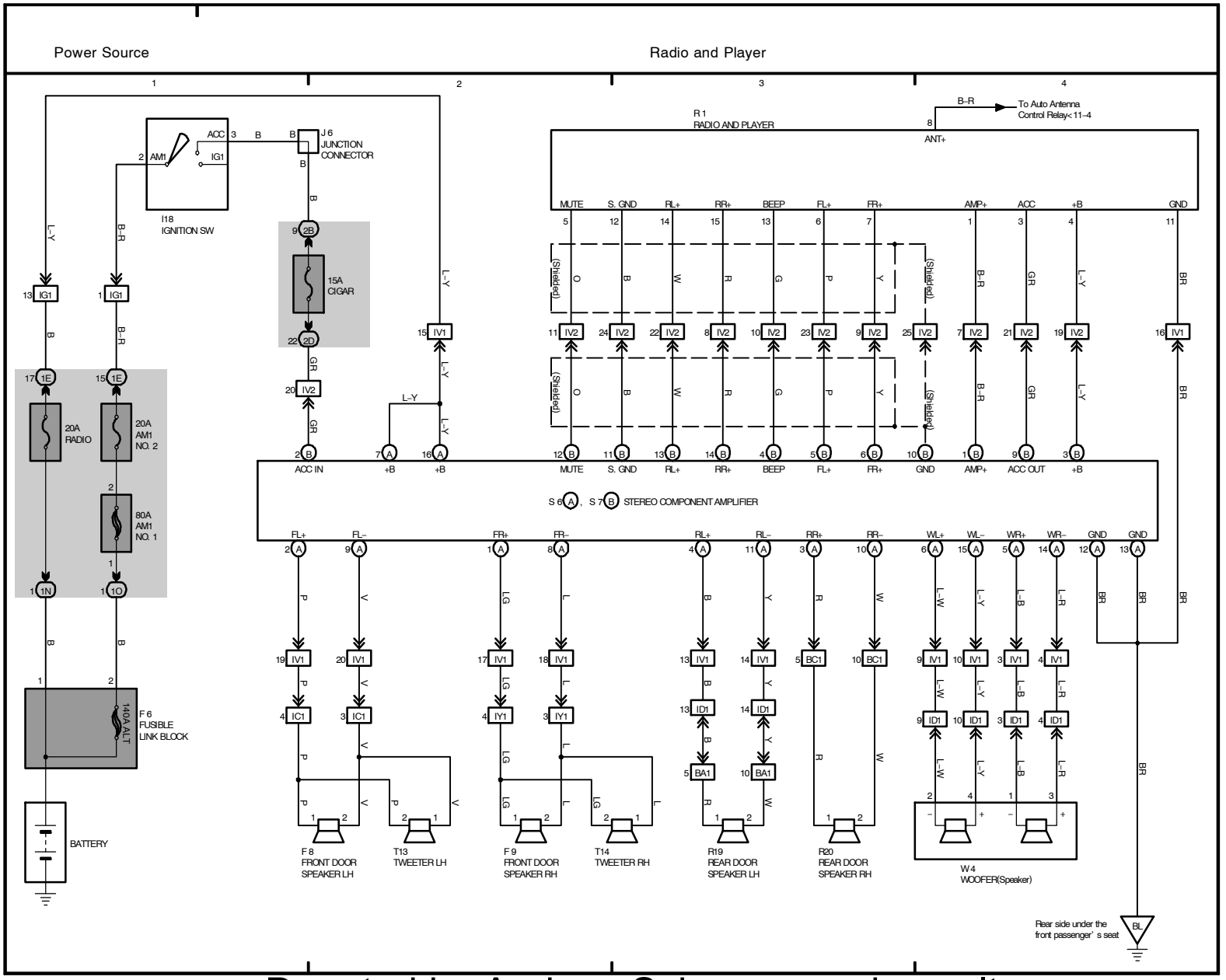

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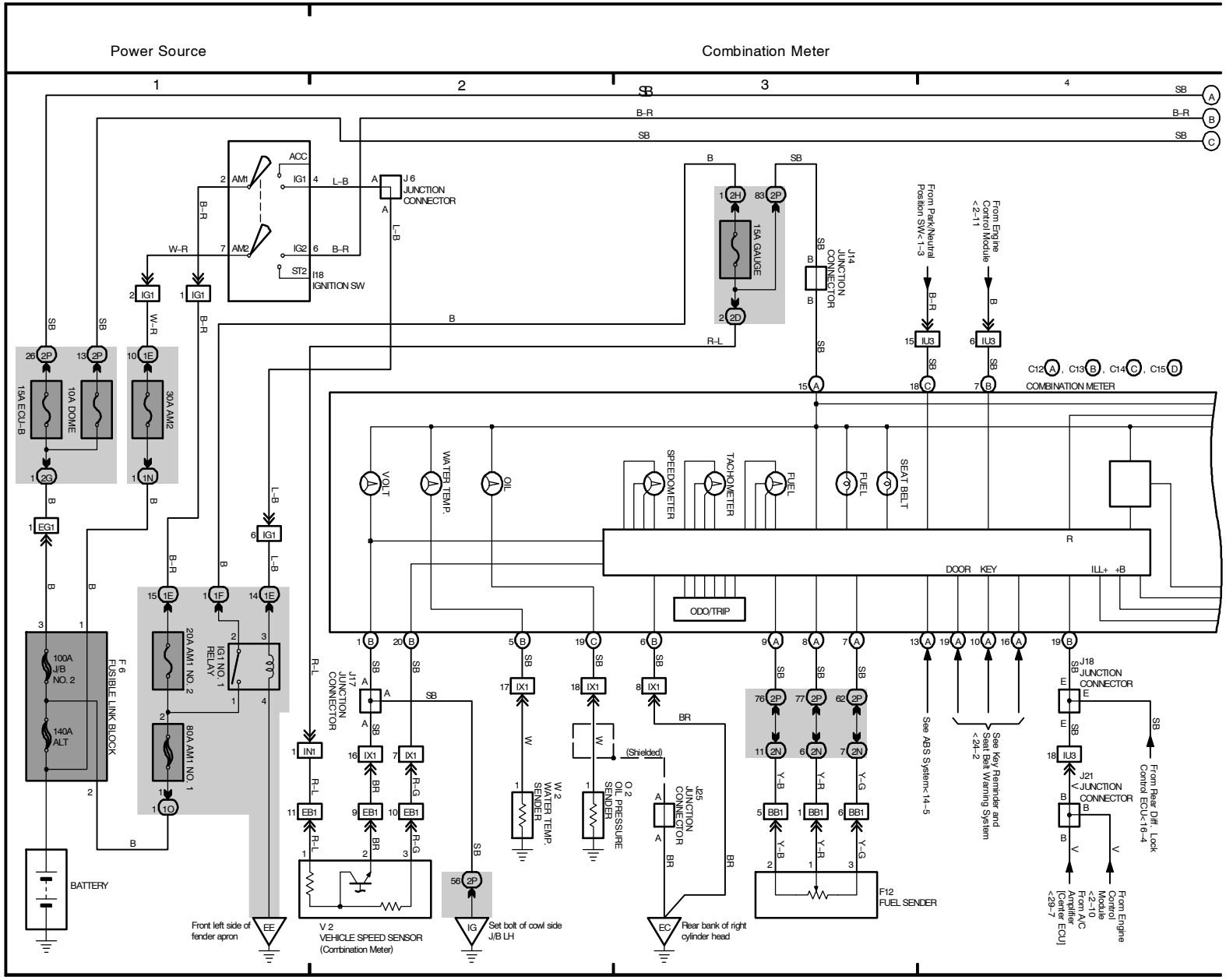

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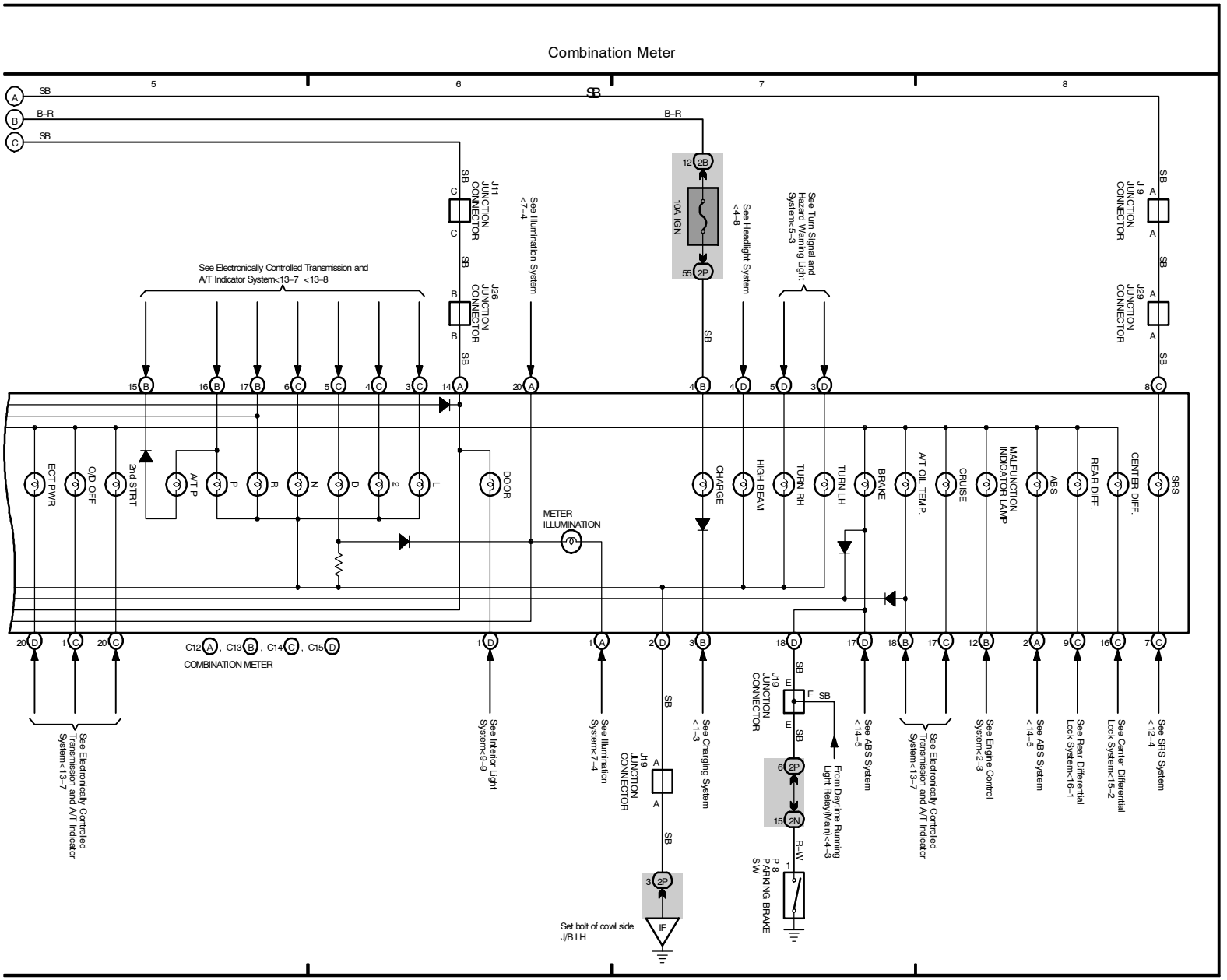

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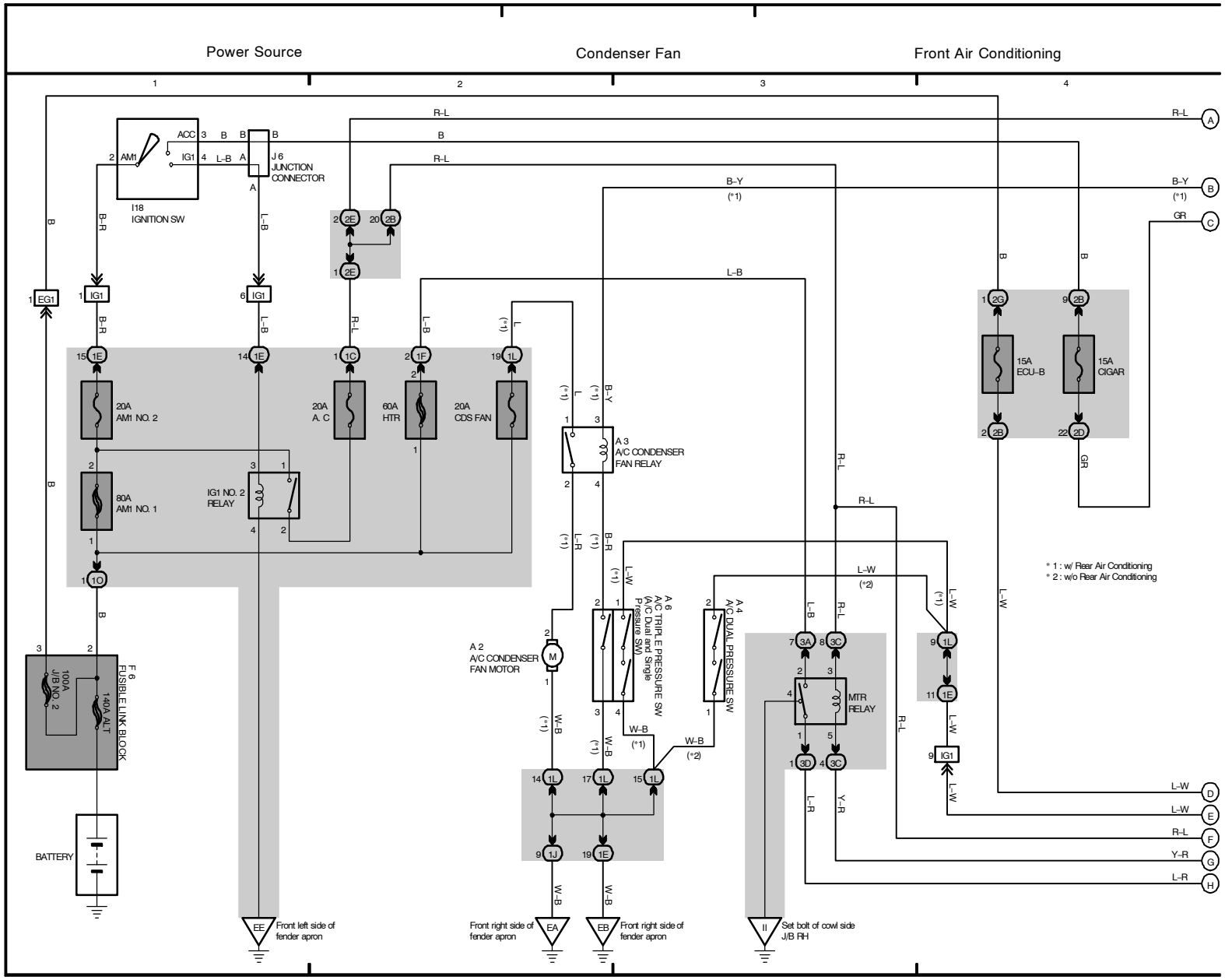

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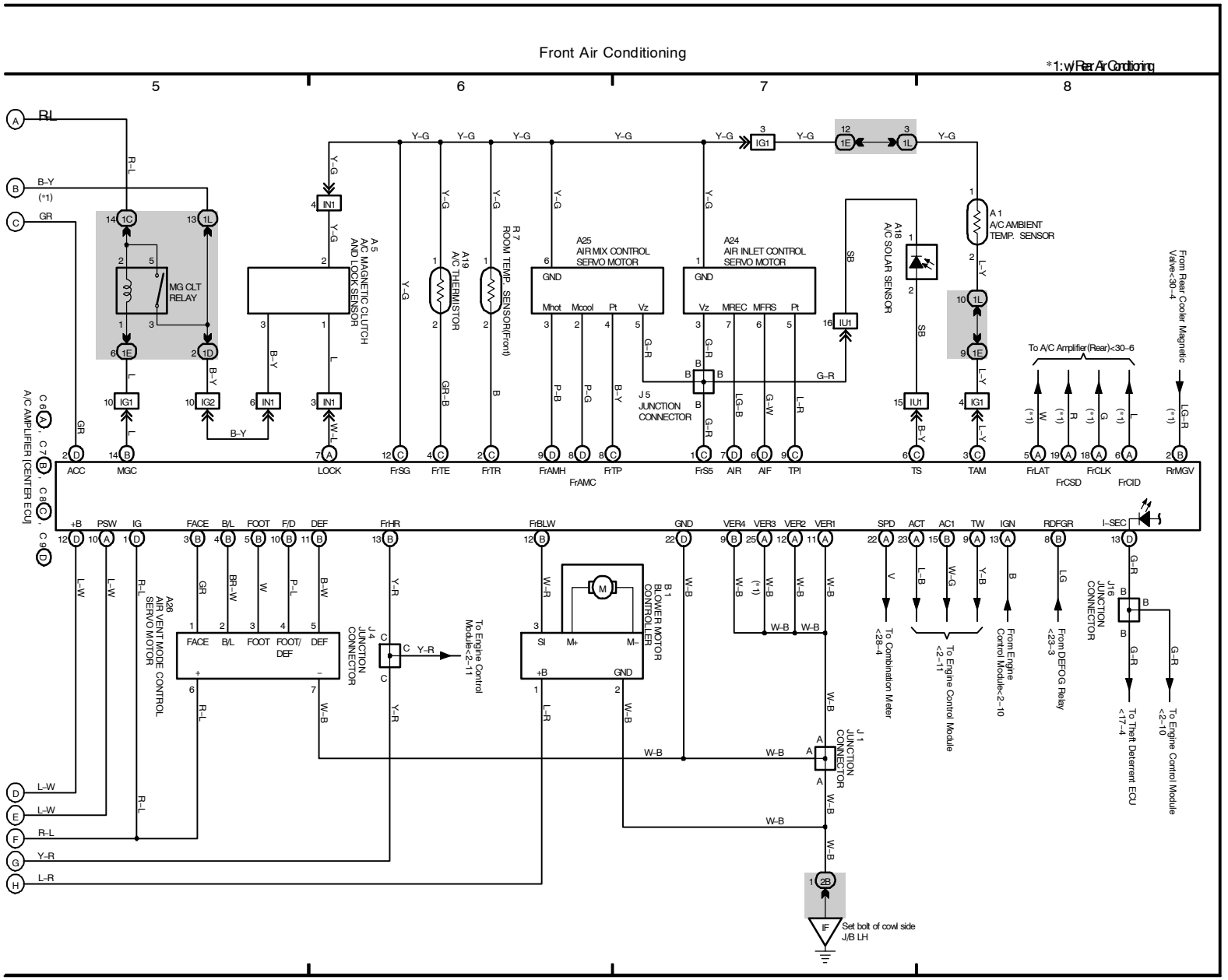

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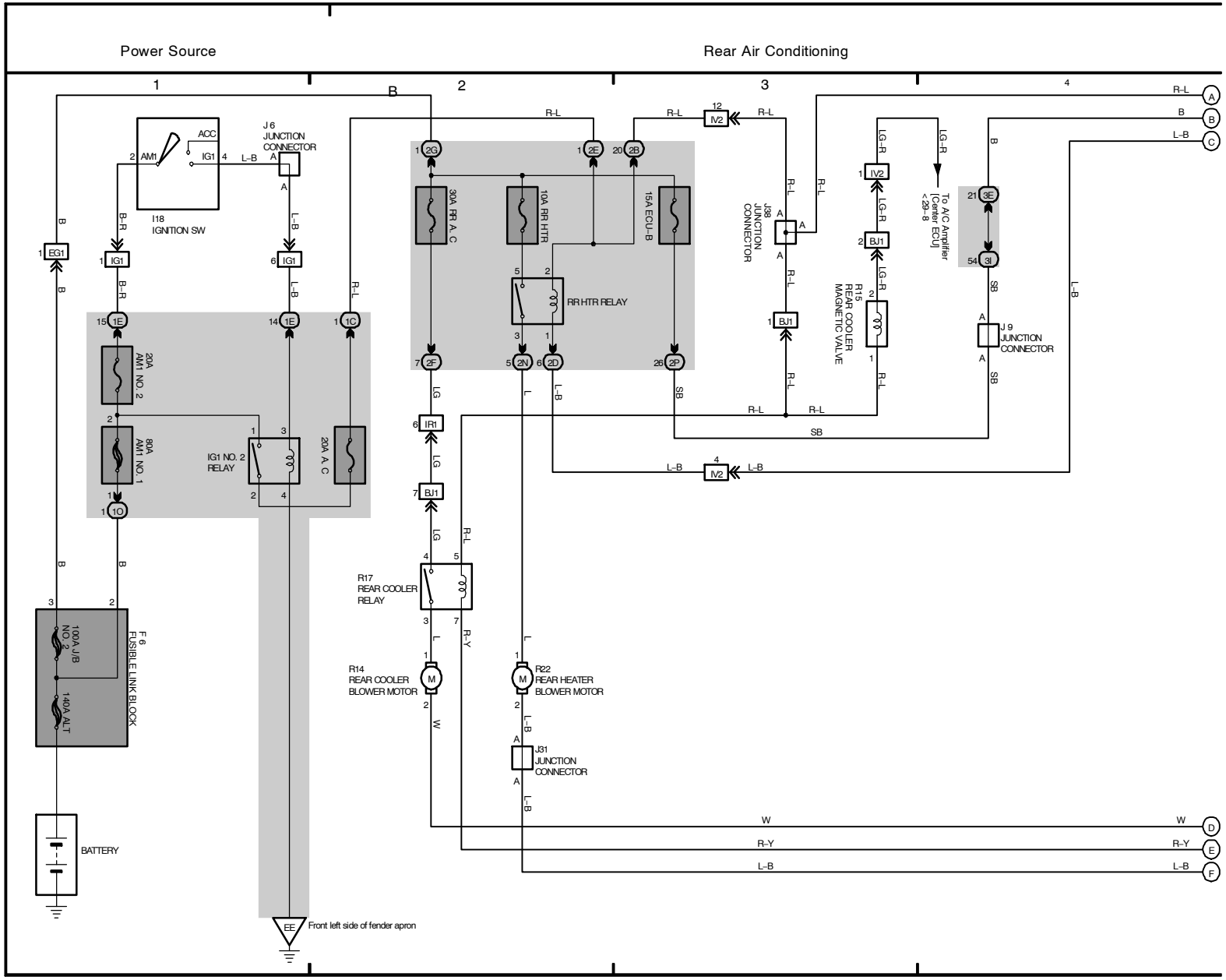

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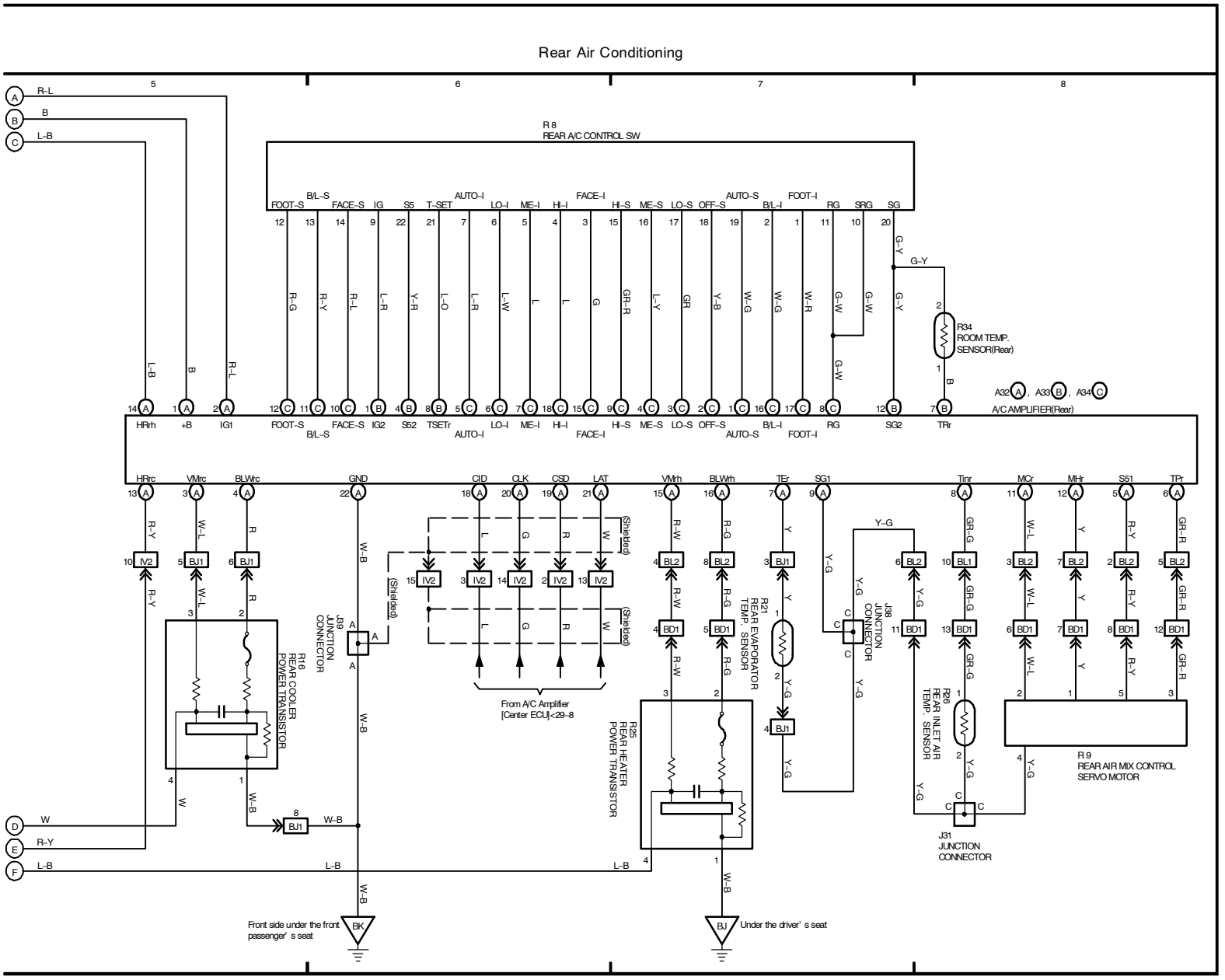

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J OVERALL ELECTRICAL WIRING DIAGRAM

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