IMPORTANT

WARNING/CAUTION/NOTE

Please read this manual and follow its instructions carefully. To emphasize special information, the words **⚠ WARNING**, **⚠ CAUTION** and **NOTE** have special meanings. Pay special attention to the messages highlighted by these signal words.

⚠ WARNING

Indicates a potential hazard that could result in death or injury.

⚠ CAUTION

Indicates a potential hazard that could result in vehicle damage.

NOTE:

Indicates special information to make maintenance easier or instructions clearer.

⚠ WARNING

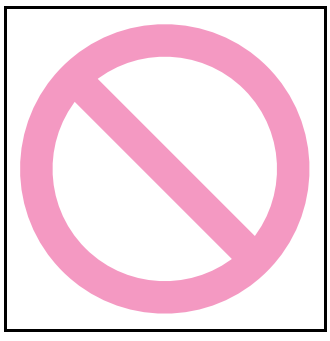
This service manual is intended for authorized Suzuki dealers and qualified service technicians only. Inexperienced technicians or technicians without the proper tools and equipment may not be able to properly perform the services described in this manual.
Improper repair may result in injury to the technician and may render the vehicle unsafe for the driver and passengers.

⚠ WARNING

For vehicles equipped with a Supplemental Restraint (Air Bag) System:

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **If the air bag system and another vehicle system both need repair, Suzuki recommends that the air bag system be repaired first, to help avoid unintended air bag system activation.**
- **Do not modify the steering wheel, instrument panel or any other air bag system component on or around air bag system components or wiring. Modifications can adversely affect air bag system performance and lead to injury.**
- **If the vehicle will be exposed to temperatures over 93 °C (200 °F), for example, during a paint baking process, remove the air bag system components, that is air bag (inflator) modules, SDM and/or seat belt with pretensioner, beforehand to avoid component damage or unintended activation.**

The circle with a slash in this manual means "Don't do this" or "Don't let this happen".



Precaution for Vehicle Equipped with ESP® System

S6RW0G0000015

- When testing with any of the following equipments (when vehicle is tested by rotating wheels (tires) under vehicle stop), be sure to deactivate ESP® system referring to “Precautions in Speedometer Test or Other Tests in Section 4F” to obtain correct data.
  - 2 or 4-wheel chassis dynamometer
  - Speedometer tester
  - Brake tester
  - Etc.

ESP® control module

- When ESP® control module is removed / installed, do not use impact wrenches which generate shock or impact to avoid damaging sensors in ESP® control module.
- When any of the following operation is done, calibrate steering angle sensor referring to “Steering Angle Sensor Calibration in Section 4F”.
  - When battery or dome fuse is removed.
  - When steering angle sensor is replaced.
  - When ESP® control module is removed or replaced.

Precautions for Catalytic Converter

S6RW0G0000005

- Use only specified fuel and be careful not to let a large amount of unburned fuel enter the converter or they can be damaged.
- Be careful not to expose catalytic converter to excessive shock to avoid an damage to them.

Engine Coolant Inspection

S6RW0G0206037

Check engine coolant for leakage, level and freeze protection referring to “Engine Cooling System Inspection and Cleaning in Section 1F”.
If malfunction is found, repair or correct.

Engine Coolant Change

S6RW0G0206038

⚠ WARNING

To avoid danger of being burned, do not remove degassing tank cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.

Change engine coolant referring to “Cooling System Flushing in Section 1F”.

Exhaust System Inspection

S6RW0G0206039

⚠ WARNING

To avoid danger of being burned, do not touch exhaust system when it is still hot. Any service on exhaust system should be performed when it is cool.

When carrying out periodic maintenance or vehicle is raised for other service, check exhaust system as follows:

- Check rubber mountings for damage and deterioration.
- Check exhaust system for leakage, loose connections, dents and damages.
  If bolts or nuts are loose, tighten them to specification. Refer to “Exhaust System Components in Section 1K” for torque specification of bolts and nuts.
- Check nearby body areas for damaged, missing or mispositioned parts, open seams, holes, loose connections or other defects which could permit exhaust fumes to seep into the vehicle.
- Make sure that exhaust system components have enough clearance from the underbody to avoid overheating and possible damage to floor carpet.
- Any defects should be fixed at once.

Air Cleaner Filter Inspection

S6RW0G0206040

Check air cleaner filter for dirt, damage or clogging referring to “Air Cleaner Filter Inspection and Cleaning in Section 1D”.
Clean or replace if necessary.

Air Cleaner Filter Replacement

S6RW0G0206041

NOTE

Replace air cleaner filter more often under dusty conditions. Ask your dealer for proper replacement interval for your driving conditions.

Replace air cleaner filter with new one referring to “Air Cleaner Filter Removal and Installation in Section 1D”.

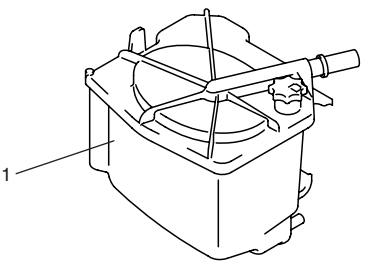
Fuel Filter Replacement

S6RW0G0206011

⚠ WARNING

This work must be performed in a well ventilated area and away from any open flames (such as gas hot water heaters).

Fuel filter (1) is located under air cleaner inlet hose. Replace fuel filter with new one, referring to “Fuel Filter and Fuel Heater Removal and Installation in Section 1G” for proper procedure.



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Water Draining of Fuel Filter

S6RW0G0206042

Bleed fuel filter of water referring to “Water Draining of Fuel Filter in Section 1G”.

- When ECM detects a malfunction which gives an adverse effect to vehicle emission while the engine is running, it makes the MIL turns ON and stores the malfunction area in ECM.
- When ECM and ICM detects a malfunction which is effect on immobilizer control system, it makes the SVS light flushing ON and OFF and store the malfunction area in its memory.
- As a condition for detecting a malfunction in some areas in the system being monitored by ECM and turning on MIL due to that malfunction, 1 driving cycle, 2 driving cycle or 3 driving cycle detection logic is adopted to prevent erroneous detection.

NOTE

When SVS light flashes, ECM or ICM has detected some trouble in the immobilizer control system.
For details, refer to "DTC Table in Section 10C".

Warm-Up Cycle
A "warm-up cycle" means sufficient vehicle operation such that the coolant temperature has risen by at least 22 °C (40 °F) from engine starting and reaches a minimum temperature of 70 °C (160 °F).

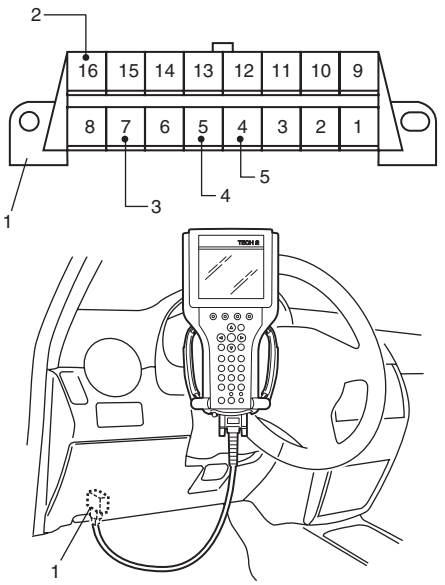
Driving Cycle
A "driving cycle" consists of two parts, engine startup and engine shutoff.

2 Driving Cycle Detection Logic
The malfunction detected in the first driving cycle is stored in ECM memory (in the form of pending DTC) but the MIL does not light at this time.
It lights up at the second detection of the same malfunction also in the next driving cycle.

3 Driving Cycle Detection Logic
The malfunction detected in the first driving cycle is stored in ECM memory (in the form of pending DTC) but the MIL does not light at this time.
The MIL does not light up at the second detection of the same malfunction also in the second driving cycle. The MIL lights up at the third detection of the same malfunction also in the third driving cycle.

Pending DTC
Pending DTC means a DTC detected and stored temporarily at first or second driving cycle of the DTC which is detected in the 2 or 3 driving cycle detection logic.

DLC
DLC (1) is in compliance with SAE J1962 in its installation position, the shape of connector and pin assignment.
K line (3) of ISO 9141 is used for SUZUKI scan tool to communicate with ECM, immobilizer control module, BCM and ABS/ESP® control module.



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2. B+ (Continuously battery power)
4. ECM ground (Signal ground)
5. Vehicle body ground (Chassis ground)

Step 1: Customer Complaint Analysis

Record details of the problem (failure, complaint) and how it occurred as described by the customer. For this purpose, use of such an inspection form will facilitate collecting information to the point required for proper analysis and diagnosis.

User name:	Model:	VIN:	
Date of issue:	Date Reg.	Date of problem:	Mileage:

PROBLEM SYMPTOMS

☐ **Difficult Starting** ☐ No cranking ☐ No initial combustion ☐ No combustion ☐ Poor starting at (☐cold ☐warm ☐always) ☐ Other_____	☐ **Poor Driveability** ☐ Hesitation on acceleration ☐ Back fire/☐After fire ☐ Lack of power ☐ Surging ☐ abnormal knocking ☐ Other_____
☐ **Poor Idling** ☐ Poor fast idle ☐ Abnormal idling speed (☐High ☐Low) (r/min.) ☐ Unstable ☐ Hunting (r/min. to r/min.) ☐ Other_____	☐ **Engine Stall when** ☐ Immediately after start ☐ Accel. pedal is depressed ☐ Accel. pedal is released ☐ Load is applied ☐ A/C ☐Electric load ☐P/S ☐ Other_____ ☐ Other_____
☐ OTHERS:	

VEHICLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS

Environmental Condition	
Weather Temperature Frequency Road	☐Fair ☐Cloudy ☐Rain ☐Snow ☐Always ☐Other_____ ☐Hot ☐Warm ☐Cool ☐Cold (°F/ °C) ☐Always ☐Always ☐Sometimes (times/ day, month) ☐Only once ☐Under certain condition ☐Urban ☐Suburb ☐Highway ☐Mountainous (☐Uphill ☐Downhill) ☐Tarmacadam ☐Gravel ☐Other_____
Vehicle Condition	
Engine condition	☐Cold ☐Warming up phase ☐Warmed up ☐Always ☐Other at starting ☐Immediately after start ☐Racing without load ☐Engine speed (r/min)
Vehicle condition	During driving: ☐Constant speed ☐Accelerating ☐Decelerating ☐Right hand corner ☐Left hand corner ☐When shifting (Lever position) ☐At stop ☐Vehicle speed when problem occurs (km/h, Mile/h) ☐Other

Malfunction indicator lamp condition	☐Always ON ☐Sometimes ON ☐Always OFF ☐Good condition
Diagnostic trouble code	First check: ☐No code ☐Malfunction code ( )
	Second check: ☐No code ☐Malfunction code ( )

I2RH01110010-02

Scan tool data	Vehicle condition		Normal condition / reference value	Reference item
☞ A/C pressure	At specified idle speed after warming up	A/C switch and blower motor switch turned ON (A/C compressor relay is turned ON) at ambient temperature: 30 °C (86 °F) and humidity: 50%.	14400 – 17400 mbar (1440 – 1740 kPa) For more details, refer to pressure of high pressure gage under “A/C System Performance Inspection in Section 7B”.	“A/C System Performance Inspection in Section 7B”
		A/C switch and blower motor switch turned OFF (A/C compressor relay is turned OFF) at ambient temperature: 30 °C (86 °F) and engine coolant temperature: 90 – 100 °C (194 – 212 °F).	6000 – 10000 mbar (600 – 1000 kPa) After longer than 10 min from A/C switch turned off.	
☞ A/C switch	Ignition switch ON / Engine running	A/C switch and blower motor switch turned ON	ON	—
		A/C switch and blower motor switch turned OFF	OFF	
☞ Radiator fan	At rising ECT: ECT > 97 °C At falling ECT: ECT > 94 °C		ON	“Table C-10: Radiator Cooling Fan Operation Check”
	At rising ECT: ECT < 97 °C At falling ECT: ECT < 94 °C		OFF	
☞ Radiator sub fan	ECT > 104 °C		ON	“Table C-10: Radiator Cooling Fan Operation Check”
	ECT < 102 °C		OFF	
☞ Vehicle speed	At vehicle stop		0 km/h (0 mph)	—
☞ Accel position	Ignition switch ON / Engine stop	Accelerator pedal released	Approx. 0%	“Table C-7: APP Sensor Check”
		Accelerator pedal depressed fully	Approx. 100%	
☞ Brake switch	Ignition switch ON / Engine stop	Brake pedal depressed	ON	—
		Brake pedal released	OFF	
☞ CPP switch	Ignition switch ON / Engine stop	Clutch pedal depressed	ON	—
		Clutch pedal released	OFF	

NOTE

Reference value of “Injected fuel quantity” is the one at new car. This value will change by aged deterioration.

Step	Action	Yes	No
8	**Boost pressure sensor check** 1) Check Boost pressure sensor referring to “Table B-3: Boost Pressure Sensor Operation Check”.	Go to Step 9.	Repair or replace.
9	**MAF sensor check** 1) Check MAF sensor referring to “Table B-2: MAF Sensor Operation Check”.	Go to Step 10.	Repair or replace.
10	**Cylinder compression check** 1) Carry out cylinder compression check referring to “Compression Check in Section 1D”.	End.	Cylinder compression insufficient. Repair or replace.

Improper Engine Idling or Engine Stops at Idle

Step	Action	Yes	No
1	**Preliminary check** 1) Check the following. • Check that engine oil level is correct referring to “Engine Oil and Oil Filter Change in Section 0B”. • Check that intake air / vacuum circuit is working properly referring to “Table B-1: Air Intake / Vacuum / Turbocharger Circuit Check”. • Check that rest of fuel is more than 5 liters. • Check main and circuit fuses have blown.	Go to Step 2.	Repair or replace.
2	**Fuel injector calibration check** 1) If symptom is occurred after replacing fuel injector(s), it is necessary to register fuel injector calibration code in ECM described in “Fuel Injector Calibration Code Registration in Section 1C”.	Go to Step 3.	Register fuel injector calibration code referring to “Fuel Injector Calibration Code Registration in Section 1C”.
3	**Environmental parameters check** 1) Connect SUZUKI scan tool to DLC with ignition switch turned OFF. 2) Check value of the following parameters referring to “Scan Tool Data”. • Battery voltage • Accel position • Barometric press • IAT1, IAT2 • Fuel temperature • Engine speed • MAF measured • Coolant temp • Brake switch • A/C compressor • A/C pressure • A/C switch	Go to Step 4.	Check that system of faulty parameter.

Step	Action	Yes	No
7	**Timing check** 1) Check that valve timing is correct referring to "Installation" under "Timing Belt and Belt Tensioner Removal and Installation in Section 1D".	Go to Step 8.	Valve timing is not correct. Adjust valve timing referring to "Installation" under "Timing Belt and Belt Tensioner Removal and Installation in Section 1D".
8	**Lubrication system check** 1) Check lubrication system is working properly referring to "Oil Pressure Check in Section 1E".	Go to Step 9.	Repair or replace.
9	**A/C compressor magnet clutch check** 1) Check magnet clutch operation for stuck ON and chattering.	Go to Step 10.	Repair or replace.
10	**Brake system check** 1) Check brake system for dragging referring to "Brakes Symptom Diagnosis in Section 4A".	Go to Step 11.	Repair or replace.
11	**Clutch system check** 1) Check clutch system for slipping referring to "Clutch Cover, Clutch Disc and Flywheel Inspection in Section 5C".	Go to Step 12.	Repair or replace.
12	**Combustion chamber check** 1) Check combustion chamber for excessive deposit referring to "Valve and Cylinder Head Assembly Inspection in Section 1D" and "Cylinder, Piston, Piston Ring and Piston Pin Inspection in Section 1D".	End.	Repair or replace.

Engine Oil Excessive Consumption

Step	Action	Yes	No
1	**Preliminary check** 1) Check the following. • Check that engine oil level is correct referring to "Engine Oil and Oil Filter Change in Section 0B".	Go to Step 2.	Repair or replace.
2	**Cylinder compression check** 1) Carry out cylinder compression check referring to "Compression Check in Section 1D".	Go to Step 3.	Cylinder compression insufficient. Repair or replace.

DTC P0107 / P0108: Barometric Pressure Circuit Low / High Input

S6RW0G1104360

Wiring Diagram

For wiring circuit and connector number, refer to “A-5 Engine and A/C Control System Circuit Diagram (DSL 1.6L) in Section 9A”.

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0107: Voltage of barometric pressure sensor circuit is lower than specified voltage. (3 driving cycles detection logic)	• Barometric pressure sensor (included in ECM)
P0108: Voltage of barometric pressure sensor circuit is higher than specified voltage. (3 driving cycles detection logic)	

Troubleshooting

Step	Action	Yes	No
1	**Recheck DTC** 1) Clear DTC. 2) Recheck DTC and check that DTC is not detected.	End.	Substitute a known-good ECM and recheck.

DTC P0112 / P0113: IAT Sensor-1 Circuit Low / High

S6RW0G1104361

Wiring Diagram

For wiring circuit and connector number, refer to “A-5 Engine and A/C Control System Circuit Diagram (DSL 1.6L) in Section 9A”.

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0112: Voltage of IAT sensor-1circuit is lower than specified value. (3 driving cycles detection logic)	• MAF sensor and IAT sensor-1 and/or its circuit • ECM
P0113: Voltage of IAT sensor-1circuit is higher than specified value. (3 driving cycles detection logic)	

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0234: Boost pressure signal is higher than specified value. (1 driving cycle detection logic)	• Air intake system (air leaks or blocked intake air circuit) • Vacuum system (leakage, blockage) • Low pressure fuel supply circuit • High pressure fuel supply circuit • Boost pressure sensor and/or its circuit • Boost pressure control solenoid valve and/or its circuit • Turbocharger • ECM
P0299: Boost pressure signal is lower than specified value. (3 driving cycles detection logic but MIL does not lights up)	

Troubleshooting

Step	Action	Yes	No
1	**DTC check** 1) Check that DTC(s) related to following part is not detected. • Double relay	Go to Step 2.	Go to applicable DTC diag. flow.
2	**Preliminary check** 1) Check the following • Check that air intake and vacuum circuit working properly referring to “Table B-1: Air Intake / Vacuum / Turbocharger Circuit Check”. • Check that boost pressure sensor working properly referring to “Table B-3: Boost Pressure Sensor Operation Check”.	Go to Step 3.	Repair or, if necessary, replace the faulty components.
3	**Boost pressure control solenoid valve circuit check** 1) Check boost pressure control solenoid valve circuit referring to “Table B-7: Boost Pressure Control Solenoid Valve Check”.	Go to Step 4.	Repair or replace.
4	**Boost pressure sensor circuit check** 1) Check boost pressure sensor circuit referring to “Table B-3: Boost Pressure Sensor Operation Check”.	Go to Step 5.	Repair or replace.
5	**Turbocharger check** 1) Check turbocharger referring to “Turbocharger Assembly Inspection in Section 1D”.	Go to Step 6.	Repair or replace.
6	**Low pressure fuel supply circuit check** 1) Check low pressure fuel supply circuit referring to “Table A-5: Low-Pressure Fuel Supply Circuit Check”.	Go to Step 7.	Repair or replace.
7	**High pressure fuel supply circuit check** 1) Check high pressure fuel supply circuit referring to “Table A-6: High-Pressure Fuel Supply Circuit Check”.	Substitute a known-good ECM and recheck.	Repair or replace.

Step	Action	Yes	No
6	**Radiator cooling fan relay No.1 input circuit check** 1) Turn ignition switch to OFF position. 2) Check that voltage between “BLU/RED” terminal of radiator cooling fan relay No.1 connector and “E122-30” terminal of ECM connector is within 5 Ω.	Go to Step 7.	Repair or, if necessary, replace wiring harness between ECM and radiator cooling fan relay No.1.
7	**Radiator cooling fan relay check** 1) Check radiator cooling fan relay No.1 referring to “Radiator Cooling Fan Relay Inspection in Section 1F”.	Go to Step 8.	Repair or replace.
8	**Radiator cooling fan motor check** 1) Check radiator cooling fan motor referring to “Radiator Cooling Fan Motor Inspection in Section 1F”.	Substitute a known-good ECM and recheck.	Repair or replace.

DTC P0487 / P0488: Inlet Throttle Valve Control Circuit Range / Performance

S6RW0G1104379

Wiring Diagram

For wiring circuit and connector number, refer to “A-5 Engine and A/C Control System Circuit Diagram (DSL 1.6L) in Section 9A”.

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0487: Monitored inlet throttle valve opening value is overshoot compared with target inlet throttle valve opening value. (3 driving cycles detection logic)	• Inlet throttle valve and/or its circuit • ECM
P0488: Monitored inlet throttle valve opening value is undershoot compared with target inlet throttle valve opening value. (3 driving cycles detection logic)	

Troubleshooting

Step	Action	Yes	No
1	**DTC check** 1) Check that DTC(s) related to following part is not detected. • Double relay • Sensor power supply circuit 2	Go to Step 2.	Go to applicable DTC diag. flow.
2	**Inlet throttle valve check** 1) Check that Inlet throttle valve for operation referring to “Table B-6: Inlet Throttle Valve Operation Check”.	Substitute a known-good ECM and recheck.	Repair or replace.

Step	Action	Yes	No
5	**Double relay control circuit check** 1) Check that resistance between “RED/BLU” terminal of double relay connector and “C125-5” terminal of ECM connector is lower than 5 Ω.	Go to Step 6.	Repair or, if necessary, replace wiring harness between double relay and ECM.
6	**Double relay check** 1) Check double relay referring to “Double Relay Inspection in Section 1C”.	Substitute a known-good ECM and recheck.	Repair or replace.

DTC P0691 / P0692: Radiator Cooling Fan Relay No.1 Control Circuit Low / High

S6RW0G1104387

Wiring Diagram

For wiring circuit and connector number, refer to “A-5 Engine and A/C Control System Circuit Diagram (DSL 1.6L) in Section 9A”.

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0691: Radiator cooling fan relay No.1 control circuit is shorted to power supply circuit or ground circuit. (1 driving cycle detection logic but MIL does not lights up)	• Radiator cooling fan relay No.1 and/or circuit • ECM
P0692: Radiator cooling fan relay No.1 control circuit is open. (1 driving cycle detection logic but MIL does not lights up)	

Troubleshooting

Step	Action	Yes	No
1	**Radiator cooling fan output test** 1) Connect SUZUKI scan tool to DLC with ignition switch turned OFF. 2) Turn ignition switch to ON position. 3) Confirm radiator cooling fan operate low speed by using output test of SUZUKI scan tool.	Substitute a known-good ECM and recheck.	Go to Step 2.
2	**Radiator cooling fan relay No.1 power supply circuit check** 1) Turn ignition switch to OFF position. 2) Remove radiator cooling fan relay No.1. 3) Turn ignition switch to ON position. 4) Check that voltage between “BLK/RED” terminal of radiator cooling fan relay No.1 connector and vehicle body ground is within 10 – 14 V.	Go to Step 3.	Repair power supply circuit of radiator cooling fan relay No.1.
3	**Radiator cooling fan relay No.1 control circuit check** 1) Turn ignition switch to OFF position. 2) Disconnect connectors from ECM. 3) Turn ignition switch to ON position. 4) Check that voltage between “LT GRN” terminal of radiator cooling fan relay No.1 connector and vehicle body ground is within 0 – 1 V.	Go to Step 4.	Repair or, if necessary, replace wiring harness between ECM and radiator cooling fan relay No.1.

Step	Action	Yes	No
5	**Glow plug control module circuit check** 1) Check that resistance between the following terminals are lower than 5 Ω. • "BRN/YEL" terminal of glow plug control module connector and "C124-17" terminal of ECM. • "LT GRN/BLK" terminal of glow plug control module connector and "C124-1" terminal of ECM.	Go to step 6.	Repair or, if necessary, replace wiring harness between ECM and glow plug control module.
6	**Glow plug control module check** 1) Check glow plug control module referring to "Glow Plug Control Module Inspection in Section 1C".	Substitute a known-good ECM and recheck.	Repair or replace.

DTC P1366 / P1367 / P1368 / P1369: Injector Malfunction – Cylinder 1 / Cylinder 2 / Cylinder 3 / Cylinder 4

S6RW0G1104397

Wiring Diagram

For wiring circuit and connector number, refer to "A-5 Engine and A/C Control System Circuit Diagram (DSL 1.6L) in Section 9A".

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P1366: Internal fault in cylinder 1 fuel injector. (1 driving cycle detection logic)	• Fuel injector and/or its circuit • ECM
P1367: Internal fault in cylinder 2 fuel injector. (1 driving cycle detection logic)	
P1368: Internal fault in cylinder 3 fuel injector. (1 driving cycle detection logic)	
P1369: Internal fault in cylinder 4 fuel injector. (1 driving cycle detection logic)	

Troubleshooting

Step	Action	Yes	No
1	**Fuel injector calibration code check** 1) Using SUZUKI scan tool, check that fuel injector calibration codes registered in ECM are corresponded with calibration codes stamped on fuel injectors.	Go to Step 2.	Register correct fuel injector calibration codes in ECM referring to "Fuel Injector Calibration Code Registration in Section 1C".
2	**Fuel injector check** 1) Check that fuel injector is working properly referring to "Table A-1: Injector Circuit Check".	Substitute a known-good ECM and recheck.	Repair or replace.

DTC P1641: SPI Communication

S6RW0G1104408

Wiring Diagram

For wiring circuit and connector number, refer to “A-5 Engine and A/C Control System Circuit Diagram (DSL 1.6L) in Section 9A”.

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Internal fault in ECM. (3 driving cycles detection logic but MIL does not lights up)	• ECM

Troubleshooting

Step	Action	Yes	No
1	**Recheck DTC** 1) Clear DTC. 2) Recheck DTC and check that DTC is not detected.	End.	Substitute a known-good ECM and recheck.

DTC P1667: ADC Monitoring

S6RW0G1104409

Wiring Diagram

For wiring circuit and connector number, refer to “A-5 Engine and A/C Control System Circuit Diagram (DSL 1.6L) in Section 9A”.

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Internal fault in ECM (1 driving cycle detection logic)	• ECM

Troubleshooting

Step	Action	Yes	No
1	**Recheck DTC** 1) Clear DTC. 2) Recheck DTC and check that DTC is not detected.	End.	Substitute a known-good ECM and recheck.

DTC P1811: Control Module Program Error

S6RW0G1104410

Wiring Diagram

For wiring circuit and connector number, refer to “A-5 Engine and A/C Control System Circuit Diagram (DSL 1.6L) in Section 9A”.

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Vehicle variant data is incorrect or not registered. or Fuel injector calibration code is incorrect or not registered. or Internal fault in ECM. (1 driving cycle detection logic)	• No vehicle information in ECM • ECM

DTC U0121: Lost Communication with ABS Control Module

S6RW0G1104419

Wiring Diagram

For wiring circuit and connector number, refer to “A-5 Engine and A/C Control System Circuit Diagram (DSL 1.6L) in Section 9A”.

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Reception error of communication data for ABS control module. (3 driving cycles detection logic)	• CAN communication circuit • ABS control module • ECM

Troubleshooting

Refer to “DTC U1003: Control Module Communication Bus Off”.

DTC U0122: Lost Communication with ESP® Control Module

S6RW0G1104420

Wiring Diagram

For wiring circuit and connector number, refer to “A-5 Engine and A/C Control System Circuit Diagram (DSL 1.6L) in Section 9A”.

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Communication data from ESP® control module is not input. (3 driving cycles detection logic)	• CAN communication circuit • ESP® control module • ECM

Troubleshooting

Refer to “DTC U1003: Control Module Communication Bus Off”.

DTC U0140: Lost Communication with BCM

S6RW0G1104421

Wiring Diagram

For wiring circuit and connector number, refer to “A-5 Engine and A/C Control System Circuit Diagram (DSL 1.6L) in Section 9A”.

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Reception error of communication data for BCM. (2 driving cycles detection logic but MIL does not lights up)	• CAN communication circuit • BCM • ECM

Troubleshooting

Refer to “DTC U1003: Control Module Communication Bus Off”.

DTC U0416: Invalid Data Received From ESP® Control Module

S6RW0G1104422

Wiring Diagram

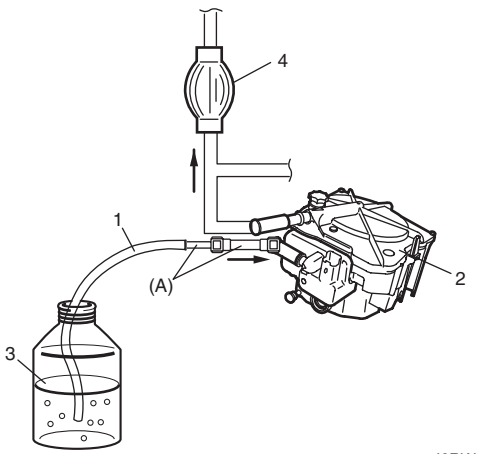
For wiring circuit and connector number, refer to “A-5 Engine and A/C Control System Circuit Diagram (DSL 1.6L) in Section 9A”.

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Reception error of communication data for ESP® control module. (2 driving cycles detection logic but MIL does not lights up)	• CAN communication circuit • ESP® control module • ECM

Troubleshooting

Refer to “DTC U1003: Control Module Communication Bus Off”.

Step	Action	Yes	No
5	**Low pressure fuel circuit check** 1) Turn ignition switch to OFF position. 2) Remove special tools. 3) Connect fuel hose (1) and special tools to fuel filter (2), and insert other end into fuel poured container (3) as shown in figure. **Special tool** **(A): 09919–48410** 4) Check that fuel is sucked from container by priming pump (4).  I6RW0G110014-01	Go to Step 7.	Go to Step 6.

Step	Action	Yes	No
8	**EGR valve position sensor circuit check** 1) Check that resistance between “LT BLU” terminal of EGR valve connector and “C124-4” terminal of ECM connector is lower than 5 Ω.	Go to Step 9.	Repair or, if necessary, replace wiring harness between ECM and EGR valve.
9	**EGR valve check** 1) Check EGR valve referring to “EGR Valve Inspection in Section 1B”.	Substitute a known good ECM and recheck.	Repair or replace.

Table B-6: Inlet Throttle Valve Operation Check

S6RW0G1104425

Troubleshooting

Step	Action	Yes	No
1	**Inlet throttle valve output test** 1) Connect SUZUKI scan tool to DLC with ignition switch turned OFF. 2) Check condition of main and circuit fuses. If not, replace fuse and check for short circuit to ground. 3) Turn ignition switch to ON position. 4) Carry out output test for inlet throttle valve. 5) Check that inlet throttle valve operating sound is heard.	End.	Go to Step 2.
2	**Inlet throttle valve motor circuit check** 1) Turn ignition switch to OFF position. 2) Disconnect inlet throttle valve connector. 3) Turn ignition switch to ON position. 4) Check that voltage between “BLK/RED” terminal of inlet throttle valve connector and vehicle body ground is within 10 – 14 V.	Go to Step 3.	Repair or, if necessary, replace wiring harness between double relay and inlet throttle valve.
3	**Inlet throttle valve motor circuit check** 1) Check that voltage between “BLK/RED” and “ORN” terminals of inlet throttle valve connector is within 10 – 14 V.	Go to Step 4.	Repair or, if necessary, replace wiring harness between double relay and inlet throttle valve.
4	**Inlet throttle position sensor power supply circuit check** 1) Check that voltage between “RED/YEL” terminal of inlet throttle valve connector and vehicle body ground is within 4 – 6 V.	Go to Step 5.	Repair or, if necessary, replace wiring harness between ECM and inlet throttle valve.
5	**Inlet throttle position sensor ground circuit check** 1) Check that voltage between “RED/YEL” and “GRY/BLU” terminals of inlet throttle valve connector is within 4 – 6 V.	Go to Step 6.	Repair or, if necessary, replace wiring harness between ECM and inlet throttle valve.

Step	Action	Yes	No
6	**APP sensor circuit check** 1) Turn ignition switch to OFF position. 2) Check that resistance between the following terminals are higher than 500 kΩ. • "GRN" terminal of APP sensor connector and vehicle body ground. • "YEL" terminal of APP sensor connector and vehicle body ground.	Go to Step 7.	Repair or, if necessary, replace wiring harness between ECM and APP sensor.
7	**APP sensor circuit check** 1) Check that resistance between the following terminals are within 5 Ω. • "GRN" terminal of APP sensor connector and "E122-3" terminal of ECM connector. • "YEL" terminal of APP sensor connector and "E122-4" terminal of ECM connector.	Go to Step 8.	Repair or, if necessary, replace wiring harness between ECM and APP sensor.
8	**APP sensor check** 1) Check APP sensor referring to "Accelerator Pedal Position (APP) Sensor Assembly Inspection in Section 1C".	Substitute a known-good ECM and recheck.	Replace APP sensor.

Engine Electrical Devices

Precautions

Precaution in Replacing ECM

S6RW0G1300001

- Register the following vehicle information to new or substitute ECM according to “Registration for ECM Replacement”.
  Otherwise, the engine cannot be started or it will adversely affect an original engine performance.
  – Fuel injector calibration codes
  – Vehicle variant data
  – EGR valve data
  – Inlet throttle valve data
  – Password and secret key code (immobilizer model)

General Description

ECM Registration

S6RW0G1301001

The following vehicle information is registered in ECM.

- Fuel injector calibration codes
- Vehicle variant data
- EGR valve data
- Inlet throttle valve data
- Password and secret key code (immobilizer model)

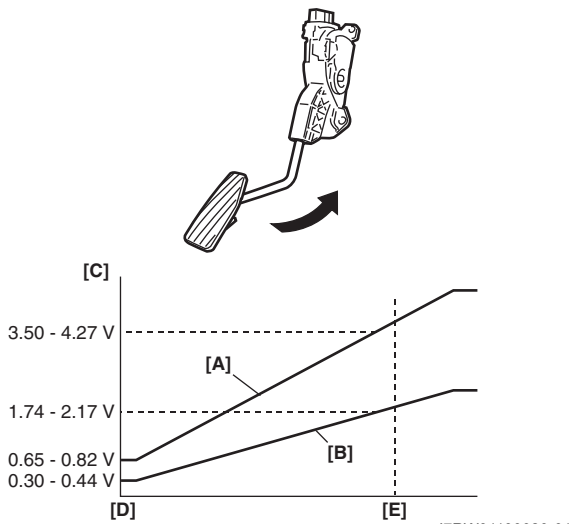
If any one of the following parts is replaced, register / initialize the necessary information in ECM as table below.

Part	Registered / initialized data	Reference
ECM	• Fuel injector calibration codes • Vehicle variant data • EGR valve data • Inlet throttle valve data • Password and secret key code (immobilizer model)	Go to “For ECM Replacement” under “Registration for ECM Replacement”.
Fuel injector(s)	• Fuel injector calibration codes	Go to “Fuel Injector Calibration Code Registration”.
EGR valve	• EGR valve data	Go to “EGR Valve Date Initialization”.
Inlet throttle valve	• Inlet throttle valve data	Go to “Inlet Throttle Valve Date Initialization”.

Accelerator Pedal Position (APP) Sensor Assembly On-Vehicle Inspection

S6RW0G1306013

1) Check that APP sensor assembly has been mounted to vehicle body properly (no pinched floor carpet, etc.).
   If mounting is not properly, reinstall APP sensor assembly properly referring to “Accelerator Pedal Position (APP) Sensor Assembly Removal and Installation”.
2) Connect scan tool to DLC with ignition switch turned OFF.
3) Turn ON ignition switch and select “Data List” mode on scan tool.
4) Check that accelerator pedal position sensor voltage varies as the following graph.
   If sensor voltage is out of specified value or does not vary linearly as the following graph, check APP sensor assembly referring to “Accelerator Pedal Position (APP) Sensor Assembly Inspection”.



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[A]:	APP sensor (main) voltage
[B]:	APP sensor (sub) voltage
[C]:	Voltage
[D]:	Idle position of accelerator pedal
[E]:	Full depressed position of accelerator pedal

Accelerator Pedal Position (APP) Sensor Assembly Removal and Installation

S6RW0G1306014

⚠ CAUTION

- **Do not disassemble APP sensor assembly. If any repair is required on APP sensor assembly, replace it as assembly.**
- **Do not expose APP sensor assembly to excessive shock like a dropping it. If APP sensor assembly has been exposed to excessive shock, it should be replaced.**
- **Be careful not to expose sensor section of APP sensor assembly to water.**

Removal

1) Disconnect negative cable at battery.
2) Disconnect connector from APP sensor assembly.
3) Remove APP sensor assembly from its bracket.

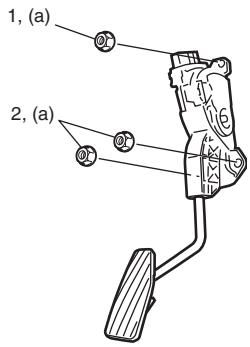
Installation

Reverse removal procedure for installation noting the following.

- Tighten APP sensor assembly upper nut (1) first and then lower nuts (2) to specified torque.

Tightening torque

APP sensor assembly nut (a): 6 N·m (0.6 kgf-m, 4.5 lb-ft)



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- Connect connector to APP sensor assembly securely.

Installation
Reverse removal procedure for installation noting the following.

- Tighten intercooler hose clamps to specified torque.

  Tightening torque
  Intercooler hose clamp: 4 N·m (0.4 kgf-m, 3.0 lb-ft)

- Install front bumper referring to Front Bumper and Rear Bumper Components in Section 9K in related manual"Front Bumper and Rear Bumper Components in Section 9K.

Intercooler Inspection and Cleaning

S6RW0G1406047

Inspection
Check intercooler for leakage or damage. Straighten bent fins, if any.

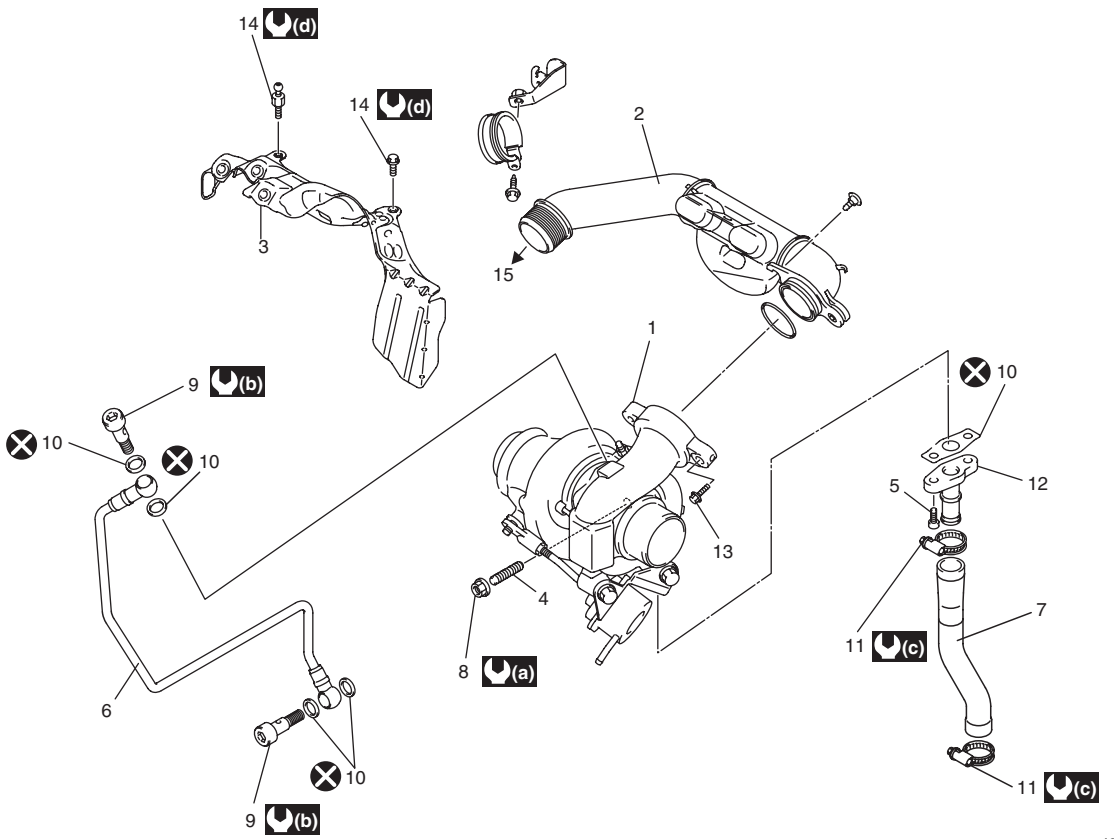
Cleaning
Clean frontal area of intercooler core.

Turbocharger Assembly Components

S6RW0G1406048

⚠ CAUTION

- **To avoid danger of being burned, do not service turbocharger and exhaust system while it is still hot. Service should be performed after system cools down.**
- **Never disassemble turbocharger assembly. Disassembly will spoil its original function. If faulty condition is found, replace it with new one.**



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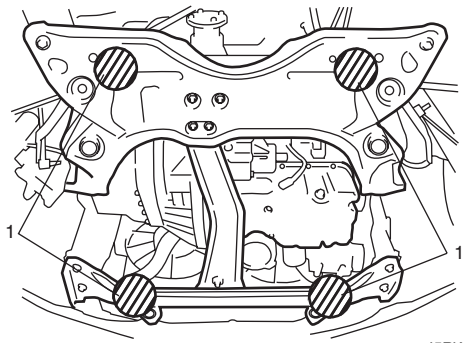
1. Turbocharger assembly : Never disassemble	6. Turbocharger lubrication pipe	11. Clamp	(a) : 25 N·m (2.5 kgf-m, 18.0 lb-ft)
2. Turbocharger outlet pipe	7. Oil return hose	12. Oil return pipe	(b) : 22 N·m (2.2 kgf-m, 16.0 lb-ft)
3. Turbocharger / exhaust manifold heat shield	8. Turbocharger nut	13. Turbocharger outlet pipe bolt	(c) : 4 N·m (0.4 kgf-m, 3.0 lb-ft)
4. Turbocharger stud bolt	9. Turbocharger lubrication pipe union bolt	14. Turbocharger / exhaust manifold heat shield bolt	(d) : 10 N·m (1.0 kgf-m, 7.5 lb-ft)
5. Oil return pipe bolt	10. Gasket	15. To intercooler.	: Do not reuse.

20) Support front suspension frame and front lower cross member putting jack against hatched parts (1) indicated in figure.



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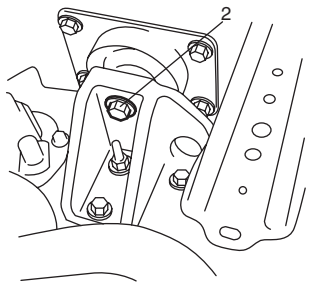
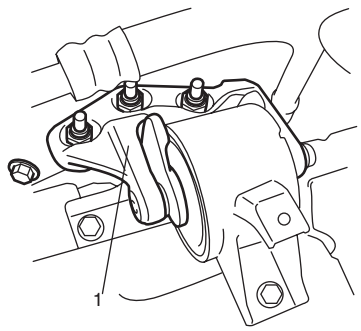
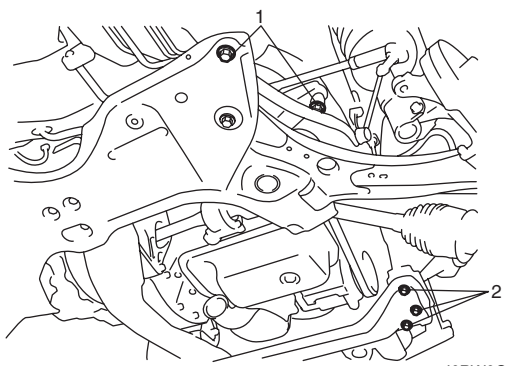
21) Remove engine right mounting bracket No.1 (1) and engine left mounting bush bolt (2).





I5RW0B140009-03

22) Remove suspension frame mounting bolts (1) and front lower cross member bolts (2).



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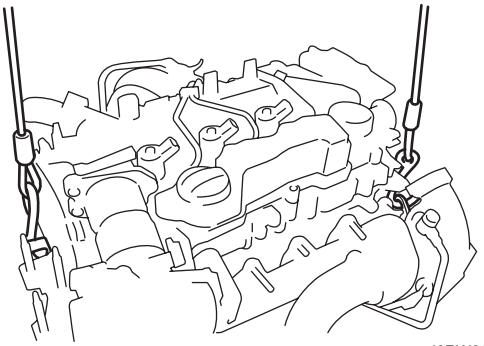
23) Lower engine with transaxle, front suspension frame, front lower cross member and steering gear case.

24) Disconnect steering gear case from suspension frame referring to Steering Gear Case Assembly Components in Section 6C in related manual”Steering Gear Case Assembly Components in Section 6C, if necessary.

25) Dismount engine from suspension frame as follows, if necessary.

a) Remove vacuum pump referring to “Vacuum Pump Removal and Installation”.

b) Install lifting device to engine hangers, and lift up engine.



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c) Remove engine from transaxle.

d) Remove clutch cover, clutch disc and flywheel referring to “Clutch Cover, Clutch Disc and Flywheel Removal and Installation in Section 5C”, if equipped.

Installation

1) Remount engine to suspension frame as follows, if removed.

a) Install clutch cover, clutch disc and flywheel referring to “Clutch Cover, Clutch Disc and Flywheel Removal and Installation in Section 5C”, if removed.

b) Install engine to transaxle referring to “Manual Transaxle Unit Components in Section 5B”.

c) Remove lifting device from engine hangers.

d) Install vacuum pump referring to “Vacuum Pump Removal and Installation”.

2) Connect steering gear case to suspension frame referring to Steering Gear Case Assembly Components in Section 6C in related manual”Steering Gear Case Assembly Components in Section 6C, if removed.

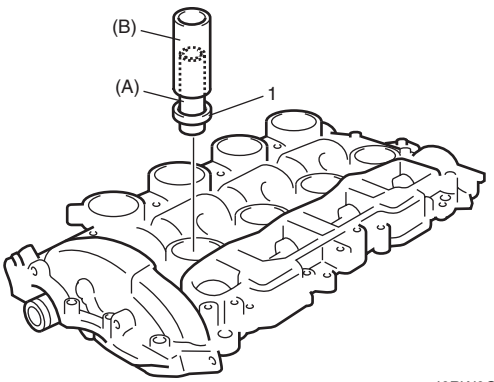
3) Lift engine with transaxle, front suspension frame, front lower cross member and steering gear case into engine compartment with jack.

2) Install injector seal as follows.
   a) Fit new injector seal (1) to special tool (A).

      Special tool
      (A): 09923–46030

   b) Install injector seal to camshaft housing tapping special tool (B) lightly with a plastic hammer.

      Special tool
      (B): 09925–98221



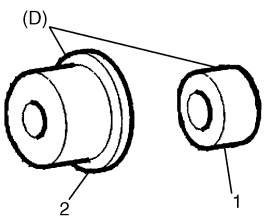
I6RW0G140041-01

3) Using special tool, install camshaft oil seal as follows.

⚠ CAUTION

Do not apply oil to surface of oil seal.

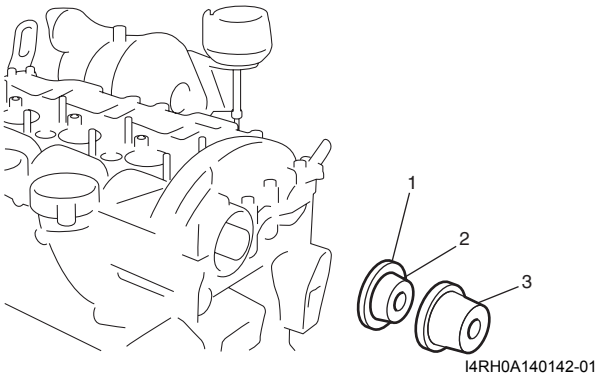
Special tool
(D): Camshaft oil seal fitting tool



I4RH0A140054-01

1. Fitting	2. Installer

   a) Fit new oil seal (1) to fitting (2).
   b) Install oil seal (1) to camshaft tapping installer (3) lightly with a plastic hammer.

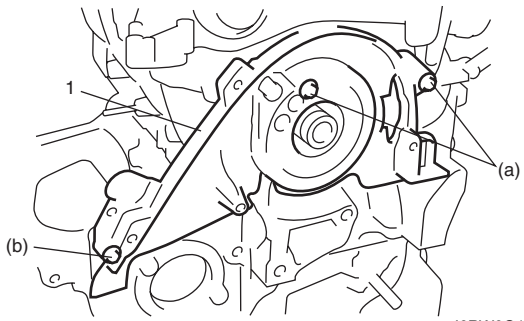


I4RH0A140142-01

   c) Remove special tool (D).

4) Install timing belt inner cover (1).

Tightening torque
Timing belt inner cover bolt (a): 5 N·m (0.5 kgf-m, 4.0 lb-ft)
Timing belt inner cover bolt (b): 1.5 N·m (0.15 kgf-m, 1.0 lb-ft)



I6RW0G140042-01

Cylinder Head Assembly Disassembly and Reassembly

S6RW0G1406025

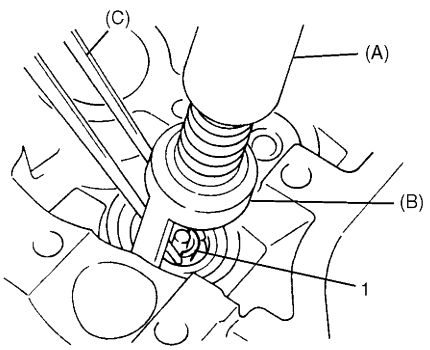
⚠ CAUTION

- **Note original position in which each valves was installed, and then install them to original position.**
  If each valve is not installed to original position, engine will spoil its original performance.
- **Never remove valve guide from cylinder head.**

Disassembly

1) Using special tool (A) and (B), compress valve springs, and then remove valve cotters.

   Special tool
   (A): 09916–14510
   (B): 09916–14530
   (C): 09916–84511



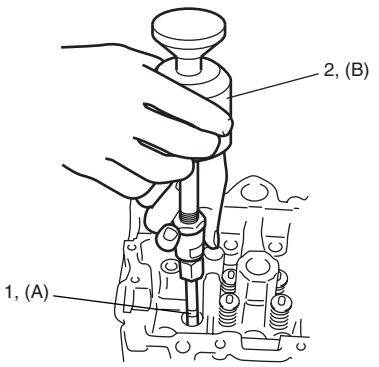
I2RH0B140101-01

2) Release special tool, and remove spring retainer and valve spring.
3) Remove valve from combustion chamber side.
4) Remove valve stem seal as follows.
   a) Install valve stem seal remover (1) to valve stem seal.
   b) Install sliding hammer (2) to remover (1), and then remove valve stem seal.

   Special tool
   (A): 09917–95410
   (B): 09917–95420

NOTE

Do not reuse seal once disassembled. Be sure to use new oil seal when assembling.



I4RH0A140081-01

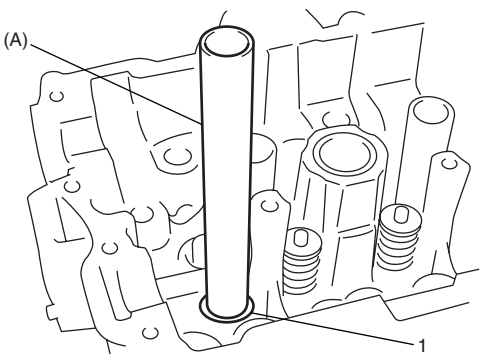
Reassembly

1) Apply engine oil to valve guide bore and valve stem, and install valve to valve guide.
2) Install valve stem seal (1) using special tool by hand.

⚠ CAUTION

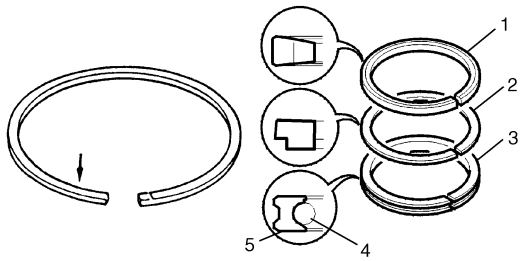
Do not tap special tool by hammer.
It may result in misinstalling of valve stem seal and damage of special tool.

Special tool
(A): 09916–58130 Mot.15511-01



I4RH0A140124-01

3) Install piston rings to piston noting the following instructions.
   - As indicated in figure, 1st and 2nd rings have "TOP" mark respectively. When installing these piston rings to piston, direct marked side of each ring toward top of piston.
   - 1st ring (1) differs from 2nd ring (2) in thickness, shape and color of surface contacting cylinder wall.
     Distinguish 1st ring from 2nd ring referring to the figure.
   - When installing oil ring (3), install spacer (4) first and then rail (5).



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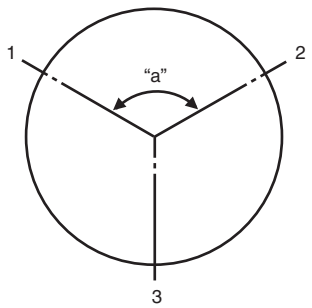
4) After installing three rings (1st, 2nd and oil rings), distribute their end gaps as shown in figure.



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"a": 120°	2. 2nd ring end gap and oil ring spacer gap
1. 1st ring end gap	3. Oil ring rail gap

Cylinder, Piston, Piston Ring and Piston Pin Inspection

S6RW0G1406079

Cylinder

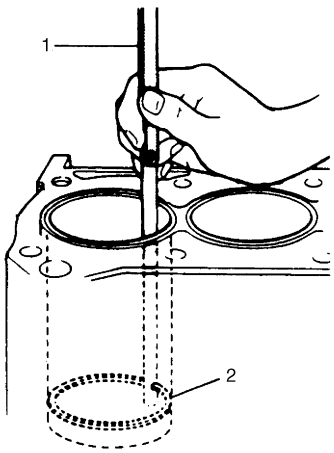
Inspect cylinder walls for scratches, roughness or ridges which indicate excessive wear. If cylinder bore is very rough, deeply scratched or ridged, replace cylinder block.

Piston Ring

Piston ring end gap

To measure end gap, insert piston ring (2) into cylinder bore and then measure the gap by using thickness gauge (1).
If measured gap out of specification, replace ring.

Piston ring end gap
Top ring: 0.15 – 0.25 mm (0.0059 – 0.0098 in.)
2nd ring: 0.30 – 0.50 mm (0.0119 – 0.0196 in.)
Oil ring: 0.35 – 0.55 mm (0.0138 – 0.0216 in.)



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Piston Pins and Connecting Rod Inspection

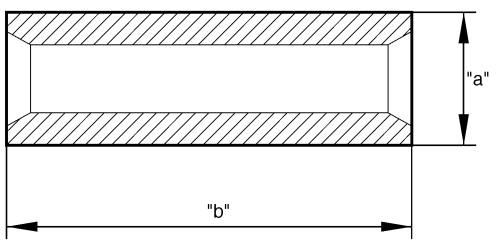
S6RW0G1406080

Piston Pin

Piston pin diameter and length

Inspect piston pin for uneven wear or damage. Measure piston pin diameter and length.
If piston pin is damaged or out of specification, replace piston pin.

Piston pin specification
Piston pin diameter "a": 25.995 – 26.000 mm (1.02343 – 1.02362 in.)
Piston pin length "b": 60.7 – 61.0 mm (2.390 – 2.401 in.)



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Connecting Rod

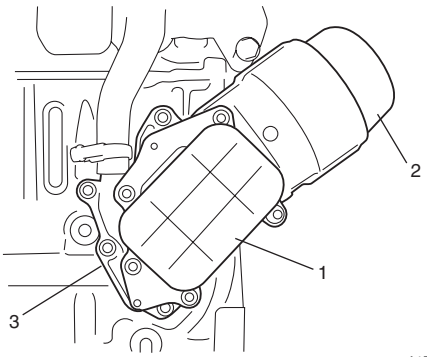
Check piston pin, connecting rod small end bore and piston bore for wear or damage, paying particular attention to condition of small end bore bush. If pin, connecting rod small end bore or piston bore is badly worn or damaged, replace pin, connecting rod and/or piston.

Heat Exchanger and Oil Filter Block Removal and Installation

S6RW0G1506008

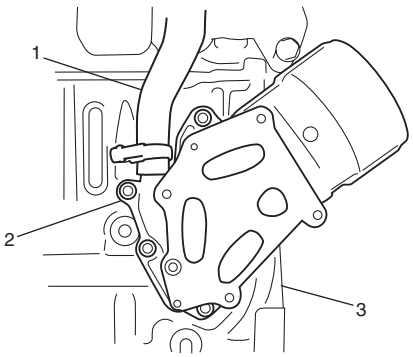
Removal

1) Drain engine oil referring to “Engine Oil and Oil Filter Change in Section 0B”.
2) Drain coolant referring to “Cooling System Draining in Section 1F”.
3) Remove catalytic converter and catalytic converter heat shield referring to “Catalytic Converter Assembly Removal and Installation in Section 1K”.
4) Remove heat exchanger (1) and oil filter cap (2) from oil filter block (3).



I4RH0A140022-01

5) Disconnect oil return hose (1) from oil filter block (2).
6) Remove oil filter block (2) from cylinder block (3).



I4RH0A140023-01

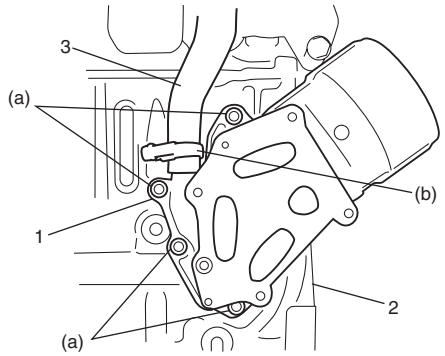
Installation

1) Install oil filter block (1) to cylinder block (2) with new gasket.

Tightening torque
Oil filter block bolt (a): 10 N·m (1.0 kgf-m, 7.5 lb-ft)

2) Connect oil return hose (3) to oil filter block (1).

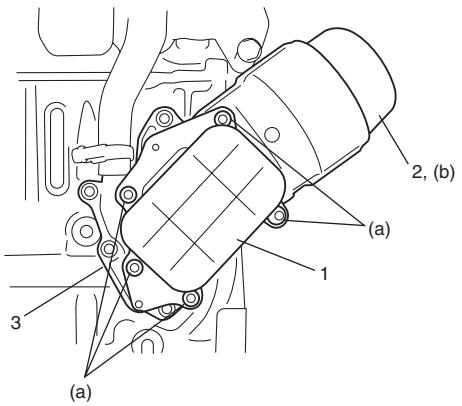
Tightening torque
Oil return hose clamp (b): 4 N·m (0.4 kgf-m, 3.0 lb-ft)



I4RH0A140024-01

3) Apply engine oil to O-ring and install heat exchanger (1) and oil filter cap (2) to oil filter block (3) with new gasket and O-ring.

Tightening torque
Heat exchanger bolt (a): 12 N·m (1.2 kgf-m, 9.0 lb-ft)
Oil filter cap (b): 25 N·m (2.5 kgf-m, 18.0 lb-ft)



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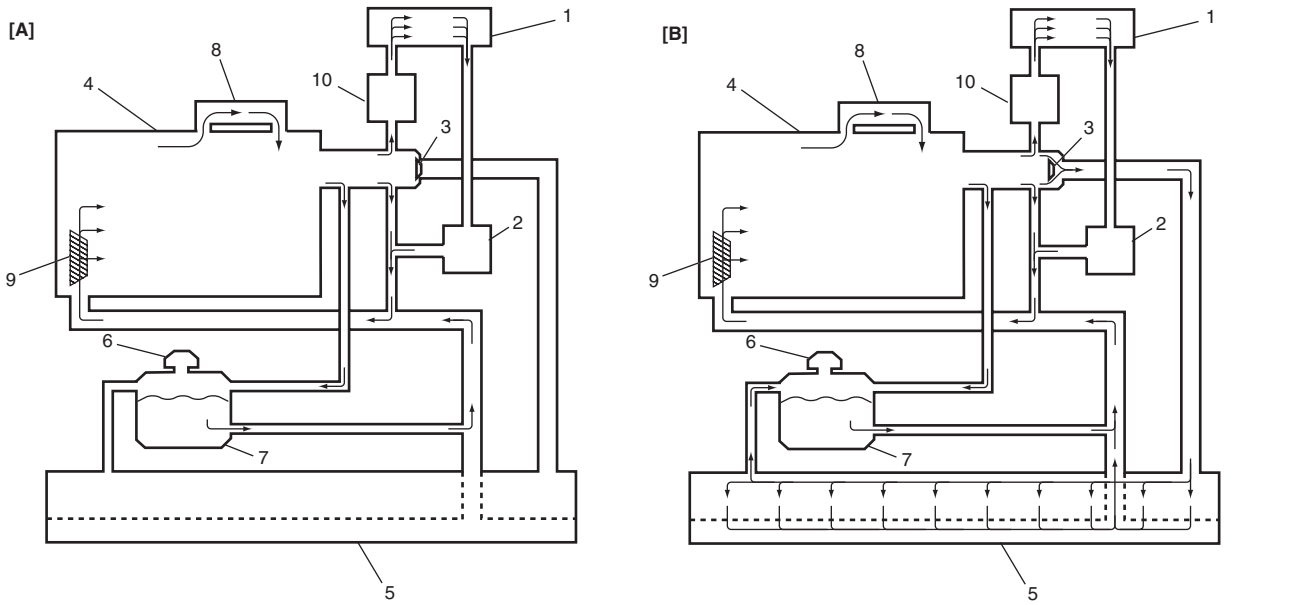
4) Install catalytic converter and catalytic converter heat shield referring to “Catalytic Converter Assembly Removal and Installation in Section 1K”.
5) Refill engine oil referring to “Engine Oil and Oil Filter Change in Section 0B”.
6) Refill coolant referring to “Cooling System Draining in Section 1F”.
7) Check to make sure that there is no oil leakage and exhaust gas leakage at each connection.

Schematic and Routing Diagram

Coolant Circulation

S6RW0G1602001



I6RW0G160001-01

[A]: When thermostat is close	3. Thermostat	7. Degassing tank
[B]: When thermostat is open	4. Cylinder block and cylinder head	8. Heat exchanger
1. Heater core	5. Radiator	9. Water pump
2. EGR cooler	6. Degassing tank cap	10. Additional heater (if equipped)

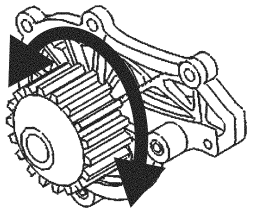
Water Pump Inspection

S6RW0G1606017

⚠ CAUTION

Never disassemble water pump. Disassembly will spoil its original function. If faulty condition is found, replace it with new one.

Rotate water pump by hand to check for smooth operation. If pump does not rotate smoothly or makes abnormal noise, replace it.



I4RH0A160016-01

Thermostat Assembly Removal and Installation

S6RW0G1606023

⚠ CAUTION

Never disassemble thermostat assembly. Disassembly will spoil its original function. If faulty condition is found, replace it with new one.

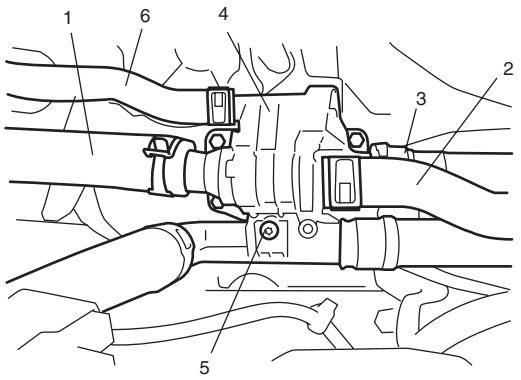
Removal

1) Disconnect negative (–) cable at battery.
2) Remove air cleaner inlet hose and pipe referring to “Air Cleaner Assembly Removal and Installation in Section 1D”.
3) Drain coolant referring to “Cooling System Draining”.
4) Remove ECT sensor referring to “ECT Sensor Removal and Installation in Section 1C”.
5) Disconnect radiator inlet hose (1), heater inlet hose (2), EGR cooler outlet hose (3) and engine outlet No.1 hose (6) from thermostat assembly (4).

⚠ CAUTION

Do not use sharp tools or hammer for any part removal and installation operation. If the part is dropped or receives a sharp knock, it must be replaced.

6) Remove radiator outlet pipe bolt (5).
7) Remove thermostat assembly (4) from cylinder head.



I6RW0G160014-01

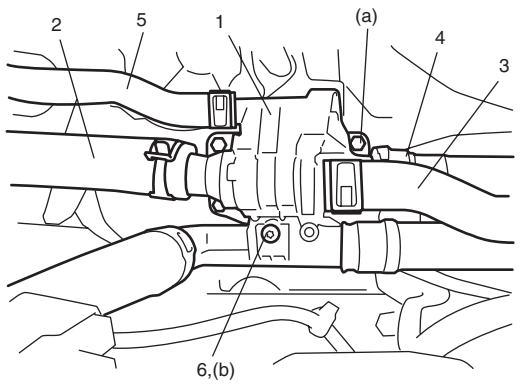
Installation

1) Install thermostat assembly (1) to cylinder head as follows.
   a) Fit thermostat assembly (1) to cylinder head with new gasket.
   b) Tighten thermostat bolts to 3 N·m (0.3 kgf-m, 2.5 lb-ft).
   c) Tighten thermostat bolts to 7 N·m (0.7 kgf-m, 5.0 lb-ft).

   Tightening torque
   Thermostat bolt (a): Tighten 3 N·m (0.3 kgf-m, 2.5 lb-ft) and 7 N·m (0.7 kgf-m, 5.0 lb-ft) by the specified procedure

2) Connect radiator inlet hose (2), heater inlet hose (3), EGR cooler outlet hose (4) and engine outlet No.1 hose (5) to thermostat assembly.
3) Tighten radiator outlet pipe bolt (6).

   Tightening torque
   Radiator outlet pipe bolt (b): 5 N·m (0.5 kgf-m, 4.0 lb-ft)

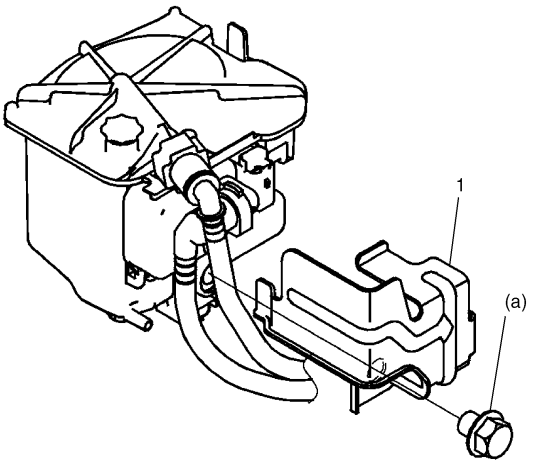


I6RW0G160015-01

4) Install ECT sensor referring to “ECT Sensor Removal and Installation in Section 1C”.
5) Install air cleaner inlet hose and pipe referring to “Air Cleaner Assembly Removal and Installation in Section 1D”.
6) Connect negative (–) cable at battery.
7) Refill coolant referring to “Cooling System Refilling”.

8) Install fuel filter cover (1).

Tightening torque
Fuel filter cover bolt (a): 5 N·m (0.5 kgf-m, 4.0 lb-ft)



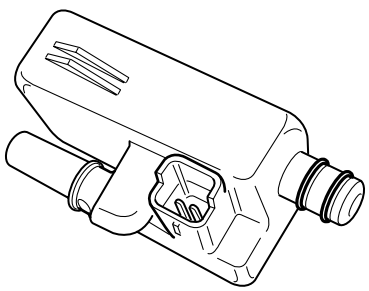
I4RH0A170069-01

9) Install air cleaner inlet pipe, turbocharger inlet pipe and air cleaner case with MAF sensor referring to "Air Cleaner Assembly Removal and Installation in Section 1D".
10) Connect negative (–) cable at battery.
11) Bleed air in fuel system referring to "Air Bleeding of Fuel System".
12) Check fuel leakage referring to "Fuel Leakage Check Procedure".

Fuel Heater Inspection

S6RW0G1706028

- Check for terminals of fuel heater and O-rings for damage.
  If damage is found, replace fuel heater and/or O-rings.



I4RH0A170055-01

Fuel Temperature Sensor Removal and Installation

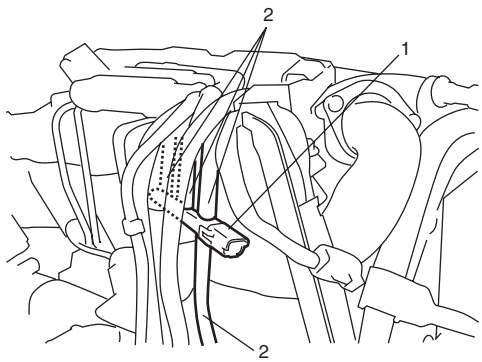
S6RW0G1706029

Removal

⚠ CAUTION

Never disassemble fuel temperature sensor. Disassembly will spoil its original function. If faulty condition is found, replace it with new one.

1) Disconnect fuel temperature sensor connector (1).
2) Clean all fuel connectors on fuel temperature sensor.
3) Disconnect fuel return hoses (2).
4) Plug disconnected hoses and fuel temperature sensor with plug cap referring to "Precautions on Fuel System Service".
5) Remove fuel temperature sensor assembly.



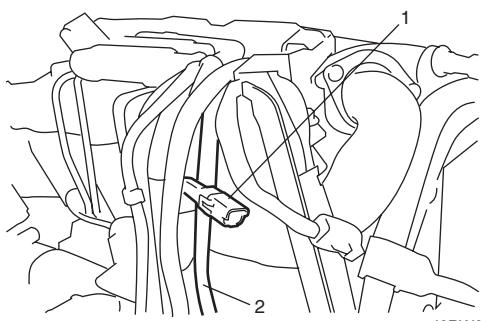
I6RW0G170007-01

Fuel Temperature Sensor Inspection

S6RW0G1706030

Check resistance between terminals of fuel temperature sensor (1).
If resistance is out of specification, replace fuel temperature assembly referring to "Fuel Temperature Sensor Removal and Installation".

Fuel temperature sensor resistance
Approx. 2252 Ω at 25 °C (77.0 °F)
Approx. 811 Ω at 50 °C (122.0 °F)
Approx. 283 Ω at 80 °C (176 °F)

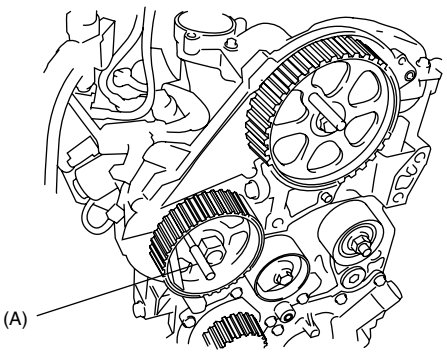


I6RW0G170008-01

2. Fuel return pipe

8) Turn high pressure pump pulley clockwise, and stop it just aligning hole of high pressure pump pulley with hole of high pressure pump bracket.
9) Install special tool (A) to holes of high pressure pump pulley and high pressure pump bracket.

Special tool
(A): Injector pump positioner (ϕ 6 mm (ϕ 0.24 in))



I4RH0A170065-01

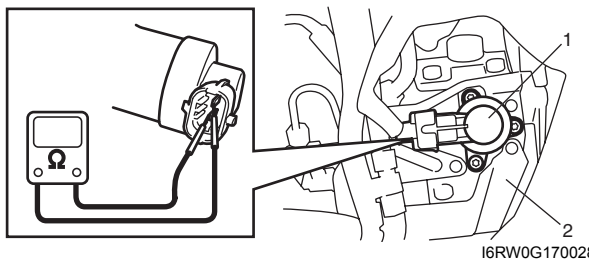
10) Install timing belt and timing belt tensioner referring to “Timing Belt and Belt Tensioner Removal and Installation in Section 1D”.
11) Install engine assembly referring to “Engine Assembly Removal and Installation in Section 1D”.
12) Check fuel leakage referring to “Fuel Leakage Check Procedure”.

Fuel Flow Actuator On-Vehicle Inspection

S6RW0G1706035

Check resistance between terminals of fuel flow actuator (1).
If resistance is out of specification, replace high pressure pump referring to “High Pressure Pump Removal and Installation”.

Fuel flow actuator resistance
4.77 – 5.83 Ω at 20 °C (68 °F)



I6RW0G170028-02

2. High pressure pump

Common Rail and Fuel Pressure Sensor Removal and Installation

S6RW0G1706017

⚠ WARNING

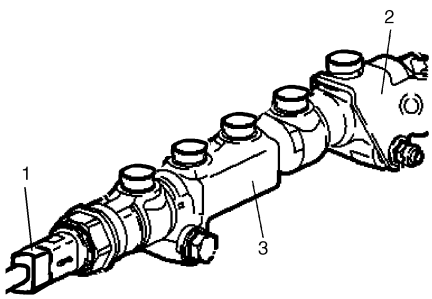
Before servicing fuel system, be sure to observe “Precautions on Fuel System Service”.

⚠ CAUTION

- **Do not reuse fuel pressure sensor because it has the possibility that fuel leaks.**
- **Never leave fuel pressure sensor orifice open. Replace new fuel pressure regulator valve and fuel pressure sensor at once in order to prevent fuel circuit from contamination.**

Removal

1) Relief fuel pressure referring to “Fuel Pressure Relief Procedure”.
2) Disconnect negative (–) cable at battery.
3) Remove high pressure pipe referring to “High Pressure Pipe Removal and Installation”.
4) Disconnect fuel pressure sensor connector (1).
5) Remove high pressure pipe bracket (2).
6) Remove common rail (3).



I6RW0G170031-01

Charging System

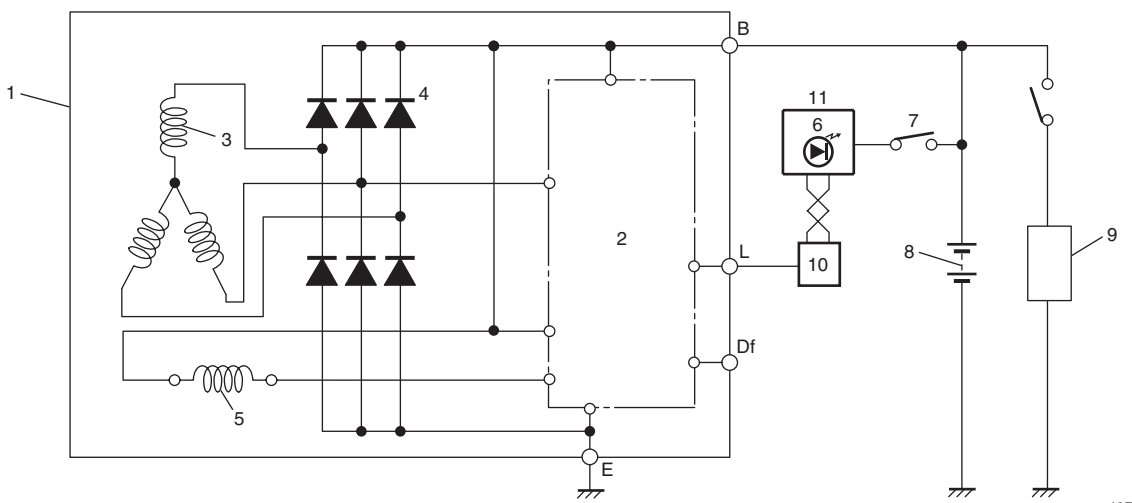
General Description

Generator Description

S6RW0G1A01002

The generator is a small and high performance type with an IC regulator incorporated. The internal components are connected electrically as shown in the following figure.
The generator features are as follows:

- Solid state regulator is mounted inside the generator.
- All regulator components are enclosed into a solid mold.
- This unit along with the brush holder assembly is attached to the rear housing.
- The IC regulator uses integrated circuits and controls the voltage produced by the generator, and the voltage setting cannot be adjusted.
- The generator rotor bearings contain enough grease to eliminate the need for periodic lubrication. Two brushes carry current through the two slip rings to the field coil mounted on the rotor, and under normal conditions will provide long period of attention-free service.
- The stator windings are assembled on the inside of a laminated core that forms part of the generator frame.



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1. Generator with regulator assembly	4. Diode	7. Main switch	10. BCM
2. I.C. regulator	5. Field coil (rotor coil)	8. Battery	11. Combination meter
3. Stator coil	6. Charge indicator light	9. Load	

Exhaust Manifold Removal and Installation

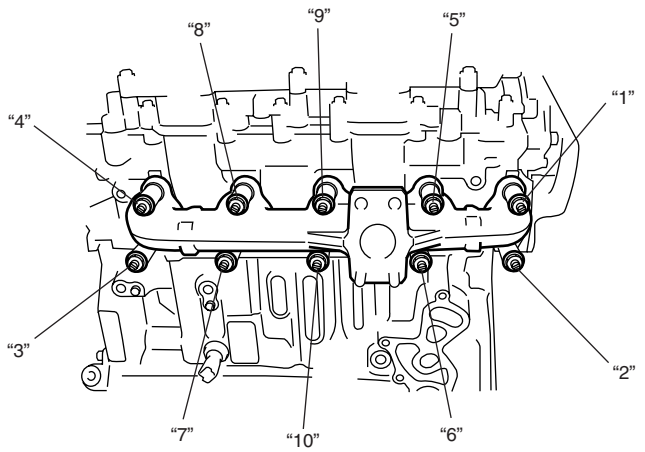
S6RW0G1B06003

Removal

⚠ WARNING

To avoid danger of being burned, do not service exhaust system while it is still hot. Service should be performed after system cools down.

1) Remove turbocharger referring to “Turbocharger Assembly Removal and Installation in Section 1D”.
2) Loosen exhaust manifold nuts in numerical order as shown in figure, and remove them.



I4RH0A1B0002-01

3) Remove exhaust manifold.

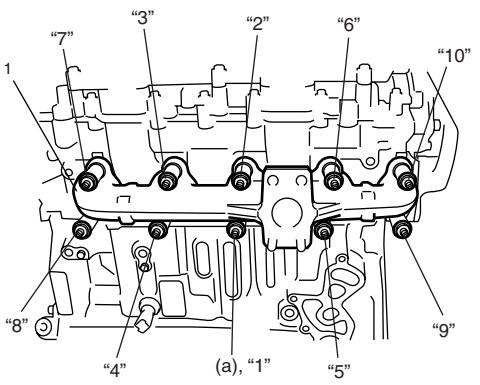
Installation

1) Install exhaust manifold as follows.
   a) Fit exhaust manifold (1) to cylinder head with new gasket.
   b) Tighten new exhaust manifold nuts to specified torque according to numerical order as shown in figure.

NOTE

Do not reuse exhaust manifold nut.

Tightening torque
Exhaust manifold nut (a): Tighten 30 N·m (3.0 kgf-m, 22.0 lb-ft) by the specified procedure



I4RH0A1B0003-01

2) Install turbocharger referring to “Turbocharger Assembly Removal and Installation in Section 1D”.

Exhaust Pipe Removal and Installation

S6RW0G1B06004

For replacement of exhaust pipe, be sure to hoist vehicle and observe WARNING under “Exhaust System Components” and the following.

- Tighten bolts and nuts to specified torque when reassembling. Refer to “Exhaust System Components” for location of bolts and nuts.
- After installation, start engine and check each joint of exhaust system for leakage.

Specifications

Tightening Torque Specifications

S6RW0G1B07001

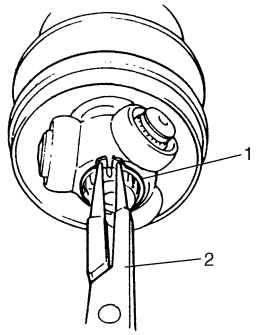
Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Exhaust manifold nut	Tighten 30 N·m (3.0 kgf-m, 22.0 lb-ft) by the specified procedure			☞

NOTE

The specified tightening torque is also described in the following.
“Exhaust System Components”
“Exhaust Manifold Components”

Reference:
For the tightening torque of fastener not specified in this section, refer to Fasteners Information in Section 0A in related manual”Fasteners Information in Section 0A.

2) Wipe off grease from shaft and take off snap ring (1) using snap ring pliers (2).

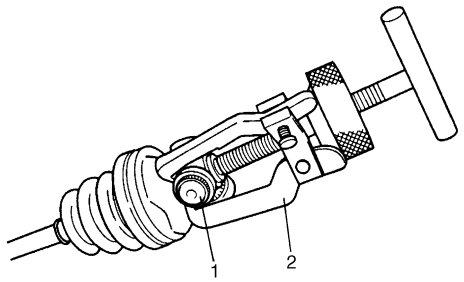


I7RW01311003-01

3) Remove tripod joint spider (1) using 3 arms puller (2).

⚠ CAUTION

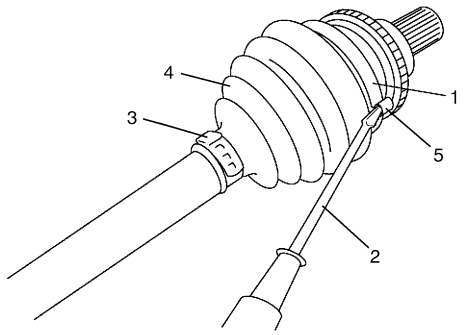
To prevent any problem caused by washing solution, do not wash tripod joint except its housing. Degreasing of tripod joint with cloth is allowed.



I3RH0A311004-01

4) Remove differential side (or center shaft side) boot small band, and then pull out differential side (or center shaft side) boot from shaft.

5) Undo caulking (5) of wheel side boot big band (1) and small band (3) using flat end rod (2) or the like, then pull out wheel side boot (4) from shaft.



I4RS0A310006-01

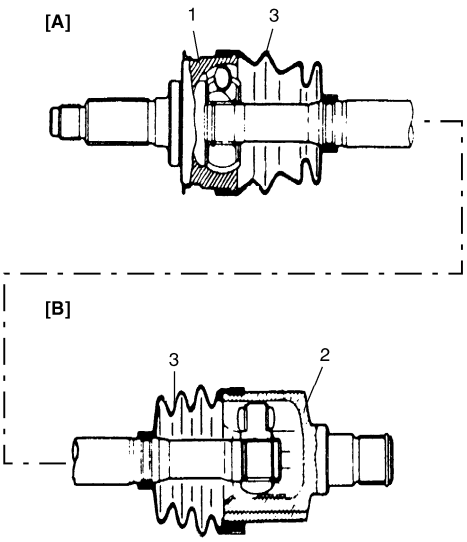
Reassembly

Judging from abnormality noted before disassembly and what is found through visual check of component parts after disassembly, prepare replacing parts and proceed to reassembly.

Make sure that wheel side joint assembly (1) and tripod joint housing (2) are washed thoroughly and air dried. Replace boot(s) (3) with new one(s).

⚠ CAUTION

- **Do not wash boots in degreaser such as gasoline or kerosene. etc. Washing in degreaser causes deterioration of boot.**
- **To ensure full performance of joint as designed, be sure to distinguish between two types of grease in repair set and apply specified volume to respective joint referring to the followings for identification of the grease.**



I4RS0A310007-01

[A]: Wheel side	[B]: Differential side (or center shaft side)

[B]: For RH steering vehicle	4. From ABS (ESP®) hydraulic unit to left front brake	(a) : 20 N·m (2.0 kgf-m, 14.5 lb-ft)
[C]: ABS model	5. ABS (ESP®) hydraulic unit / control module assembly	(b) : 16 N·m (1.6 kgf-m, 12.0 lb-ft)
[D]: ESP® model	6. Master cylinder	(c) : 19 N·m (1.9 kgf-m, 14.0 lb-ft)
1. From master cylinder primary to ABS (ESP®) hydraulic unit	7. From ABS (ESP®) hydraulic unit to left rear brake	
2. From master cylinder secondary to ABS (ESP®) hydraulic unit	8. From ABS (ESP®) hydraulic unit to right rear brake	

Diagnostic Information and Procedures

Brakes Symptom Diagnosis

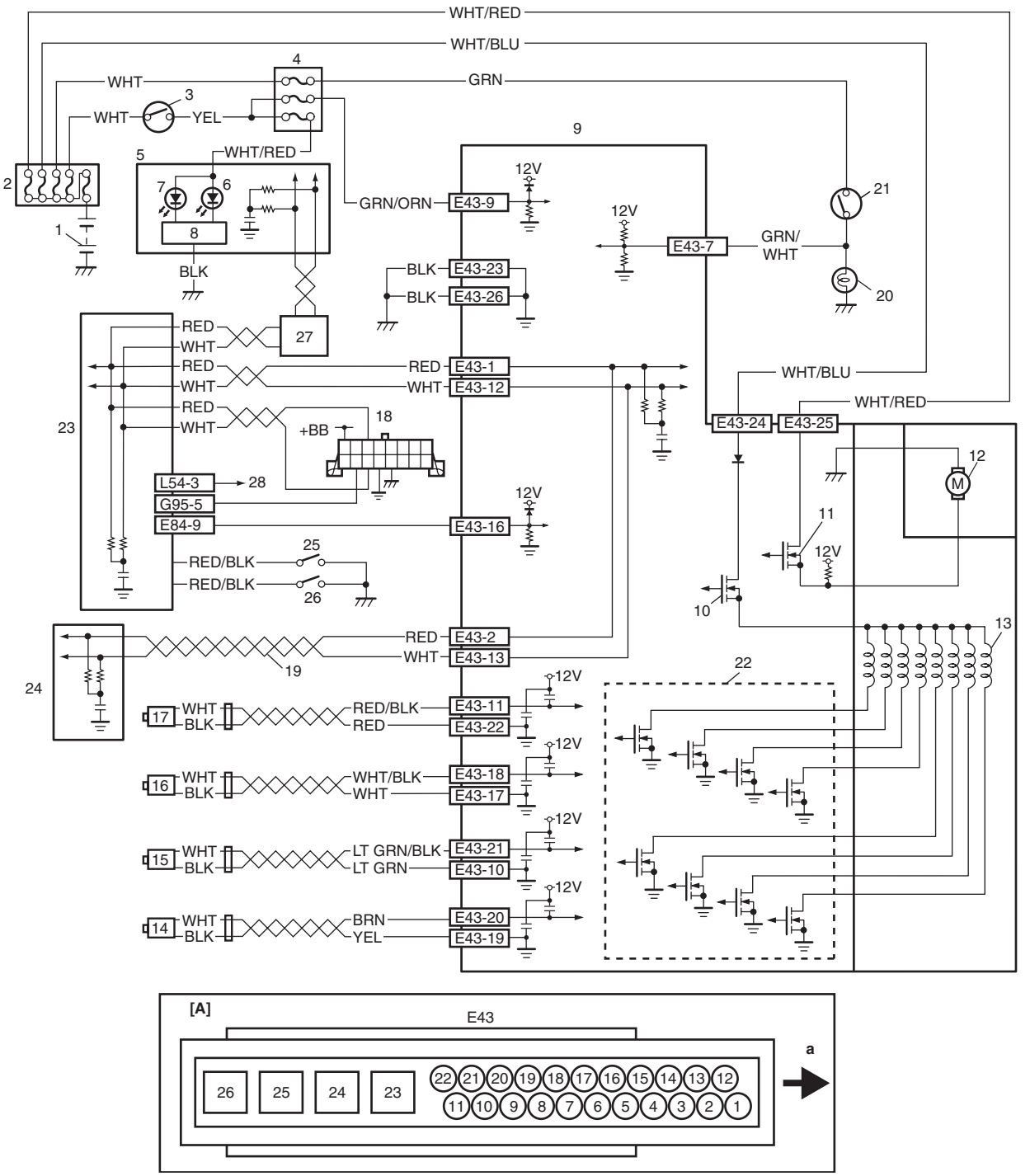
S6RW0G4104002

Condition	Possible cause	Correction / Reference Item
Not enough braking force	Brake oil leakage from brake lines	*Locate leaking point and repair.*
	Brake disc or pads stained with oil	*Clean or replace.*
	Overheated brakes	*Determine cause and repair.*
	Poor contact of shoes on brake drum	*Repair for proper contact.*
	Brake shoes linings stained with oil or wet with water	*Replace.*
	Badly worn brake pad linings	*Replace.*
	Defective wheel cylinders	*Repair or replace.*
	Malfunctioning caliper assembly	*Repair or replace.*
	Air in system	*Bleed system.*
	Malfunctioning ABS (ESP®)	*Check system and replace as necessary.*
Brake pull (Brakes not working in unison)	Pad, disc, shoe and/or drum are wet with water or stained with oil in some brakes	*Clean or replace.*
	Drum-to-shoe clearance out of adjustment in some brakes (Malfunctioning auto adjusting mechanism)	*Check for inoperative auto adjusting mechanism.*
	Disc and/or drum is out of round in some brakes	*Replace.*
	Tires are inflated unequally	*Inflate equally.*
	Malfunction in wheel cylinders	*Repair or replace.*
	Disturbed front wheel alignment	*Adjust as prescribed.*
	Unmatched tires on same axle	*Tires with approximately the same amount of tread should be used on the same axle.*
	Restricted brake pipes or hoses	*Check for soft hoses and damaged lines. Replace with new hoses and new double-walled steel brake tubing.*
	Malfunctioning caliper assembly	*Check for stuck or sluggish pistons and proper lubrication of caliper slide pin. Caliper should slide.*
	Loose suspension parts	*Check all suspension mountings.*
	Loose calipers	*Check and torque bolts to specifications.*
Noise (high pitched squeak without brake applied)	Worn rear brake shoe	*Replace brake shoe.*
	Contact wear indicator to brake disc	*Replace pads.*
Excessive pedal travel (Pedal stroke too large)	Partial brake system failure	*Check brake systems and repair as necessary.*
	Insufficient fluid in master cylinder reservoirs	*Fill reservoirs with approved brake fluid. Check for leaks and air in brake system. Check warning light. Bleed system if required.*
	Air in system (soft / spongy pedal)	*Bleed system.*
	Rear brake system not adjusted (malfunctioning auto adjusting mechanism)	*Repair auto adjusting mechanism. Adjust rear brakes.*
	Bent brake shoes	*Replace brake shoes.*
	Worn rear brake shoes	*Replace brake shoes.*

3. ABS hydraulic unit	11. EBD warning light (Brake warning light)	19. Ignition switch
4. Solenoid valve power supply driver (transistor)	12. Light driver module	20. BCM
5. Solenoid valve driver (transistor)	13. Data link connector	21. ECM
6. Pump motor driver (transistor)	14. Wheel speed sensor (Right-front)	22. Combination meter
7. Solenoid valve	15. Wheel speed sensor (Left-front)	
8. Pump motor	16. Wheel speed sensor (Right-rear)	

ABS Wiring Circuit Diagram

S6RW0G4502002



I6RW0G450003-01

[A]: Terminal arrangement of ABS hydraulic unit / control module assembly	11. ABS pump motor driver (transistor)	23. BCM
a: Upside	12. Pump motor	24. ECM
1. Battery	13. Solenoid valves	25. Brake fluid level switch
2. Main fuse box	14. Right-rear wheel speed sensor	26. Parking brake switch
3. Ignition switch	15. Left-rear wheel speed sensor	27. Junction connector

CAN Communication System Description

S6RW0G4601004

Refer to “CAN Communication System Description in Section 1A” for CAN communication system description. ESP® control module communicates control data with each control module as follows.

ESP® Control Module Transmission Data

				ECM	Combination meter	Steering angle sensor
ESP® control module	Transmit	DATA	Torque request	○		
			Wheel speed signal	○		
			ESP® status signal		○	
			ABS indication		○	
			EBD indication		○	
			Steering angle neutral position			○

I6RW0G460001-01

ESP® Control Module Reception Data

				ECM	BCM	Steering angle sensor
ESP® control module	Receive	DATA	Engine torque signal	○		
			Engine speed signal	○		
			Accelerator position	○		
			Parking brake switch signal		○	
			Steering angle signal			○
			Steering angle sensor related malfunction			○

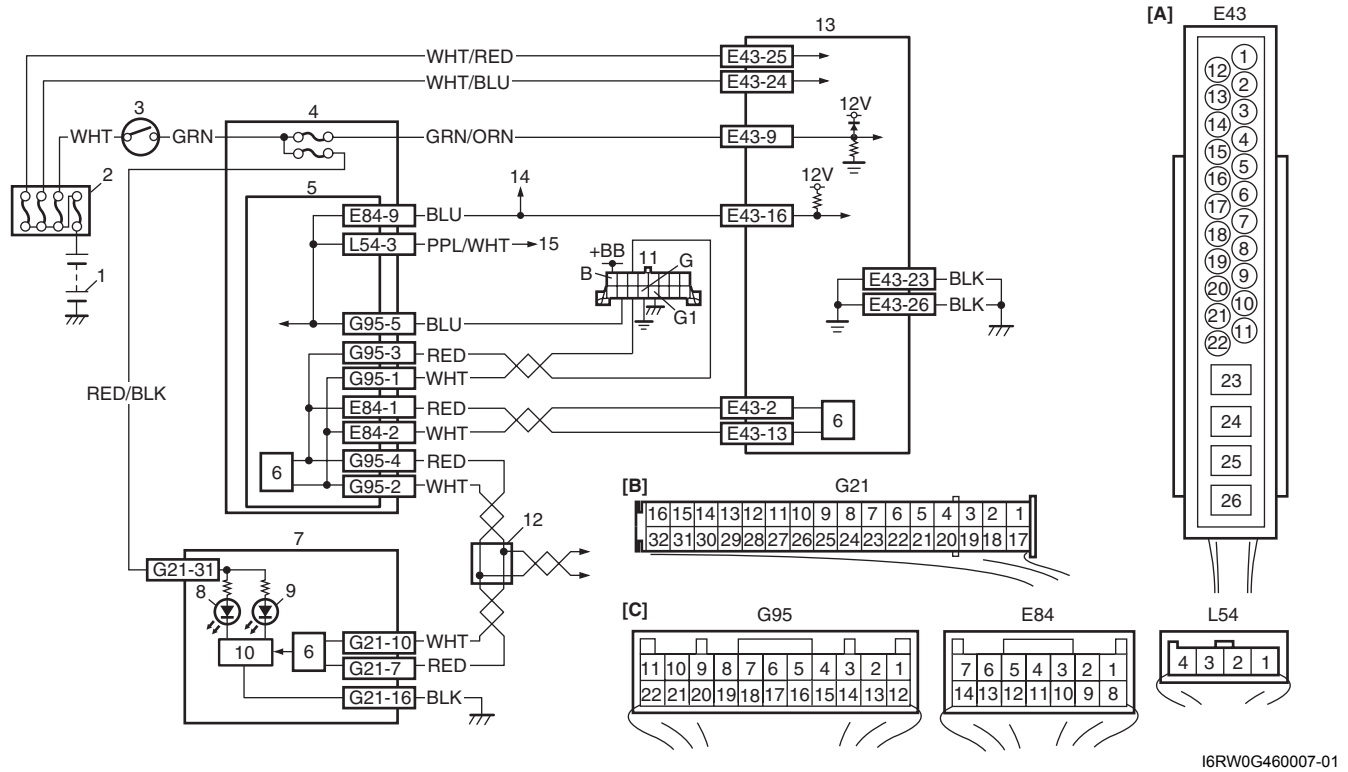
I6RW0G460002-01

DTC (displayed on SUZUKI scan tool)	Diagnostic Items			Detecting condition (DTC will be set when detecting)	ABS warning light	EBD warning light	ESP® warning light
☞ C1041	RF	Inlet solenoid		• Solenoid valve circuit is opened, shorted to power, ground and/or each valve in ESP® hydraulic unit / control module assembly. • Mismatching solenoid output and solenoid monitor is detected.	○	○	○
☞ C1045	LF						
☞ C1051	RR						
☞ C1055	LR						
☞ C1042	RF	Outlet solenoid					
☞ C1046	LF						
☞ C1052	RR						
☞ C1056	LR						
☞ C1043	Cut solenoid		No.1				
☞ C1044			No.2				
☞ C1053	Suction solenoid		No.1				
☞ C1054			No.2				
☞ C1057	Power supply voltage too high / too low			ESP® control module power supply voltage becomes 7.6 – 9.6 V.	○	—	○
				• ESP® control module power supply voltage is lower than 7.6 V. • ESP® control module power supply voltage is higher than 16.8 V.	○	○	○
☞ C1061	Pump motor circuit			• Defective pump motor and/or motor power supply voltage is too low. • Pump motor circuit in ESP® control module is opened, shorted to power or ground circuit.	○	○	○
☞ C1063	Solenoid valve power supply driver circuit			• Solenoid valve power supply driver circuit is shorted to power circuit in ESP® control module. • Solenoid valve power supply driver is stuck to ON position. • Output circuit from control unit is opened in ESP® control module.	○	—	○
				• Solenoid valve power supply driver circuit is opened, shorted to ground circuit in ESP® control module. • Solenoid valve power supply voltage is too low. • Solenoid valve power supply driver is stuck to OFF position. • Output circuit from control unit is shorted in ESP® control module. • Mismatching solenoid output and solenoid monitor is detected.	○	○	○
☞ C1071	Control module internal defect			ESP® control module internal defect is detected.	*2	*2	*2
☞ C1075	Steering angle sensor calibration *3			Missing steering angle sensor calibration point data is detected.	—	—	—
☞ C1091	CAN invalid data from ECM			ECM sent invalid signal to ESP® control module.	—	—	○
☞ C1096	Yaw rate sensor message counter error			Yaw rate sensor assembly message counter error is detected by ESP® control module.	—	—	○

Serial Data Link Circuit Check

S6RW0G4604047

Wiring Diagram



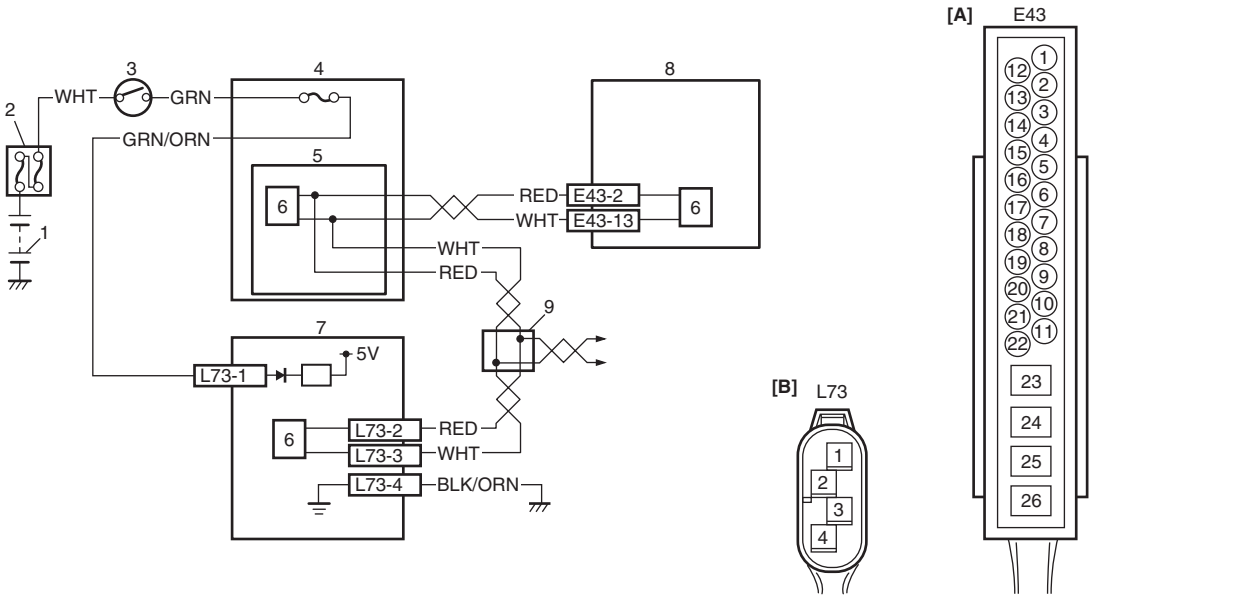
I6RW0G460007-01

[A]: ESP® control module connector (viewed from terminal side)	4. Junction block assembly	10. Lamp driver module
[B]: Combination meter connector (viewed from harness side)	5. BCM (included in junction block assembly)	11. Data link connector (DLC)
[C]: BCM connector (viewed from harness side)	6. CAN driver	12. CAN junction connector
1. Battery	7. Combination meter	13. ESP® hydraulic unit / control module assembly
2. Main fuse box	8. ESP® warning light	14. To P/S control module and immobilizer control module
3. Ignition switch	9. ABS warning light	15. To SDM

DTC C1034 / C1039: Yaw Rate Sensor Power Supply Failure / Internal Failure

S6RW0G4604023

Wiring Diagram



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[A]: ESP® control module connector (viewed from terminal side)	3. Ignition switch	7. Yaw rate sensor
[B]: Yaw Rate Sensor connector (viewed from harness side)	4. Junction block assembly	8. ESP® hydraulic unit control module assembly
1. Battery	5. BCM (included in junction block assembly)	9. CAN junction connector
2. Main fuse box	6. CAN driver	

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
DTC C1034: Power supply voltage of yaw rate sensor is too high or low. **DTC C1039:** • Yaw rate sensor internal failure is detected. • Abnormal signal from yaw rate sensor is detected.	• Yaw Rate Sensor power supply circuit • Yaw Rate Sensor • ESP® control module

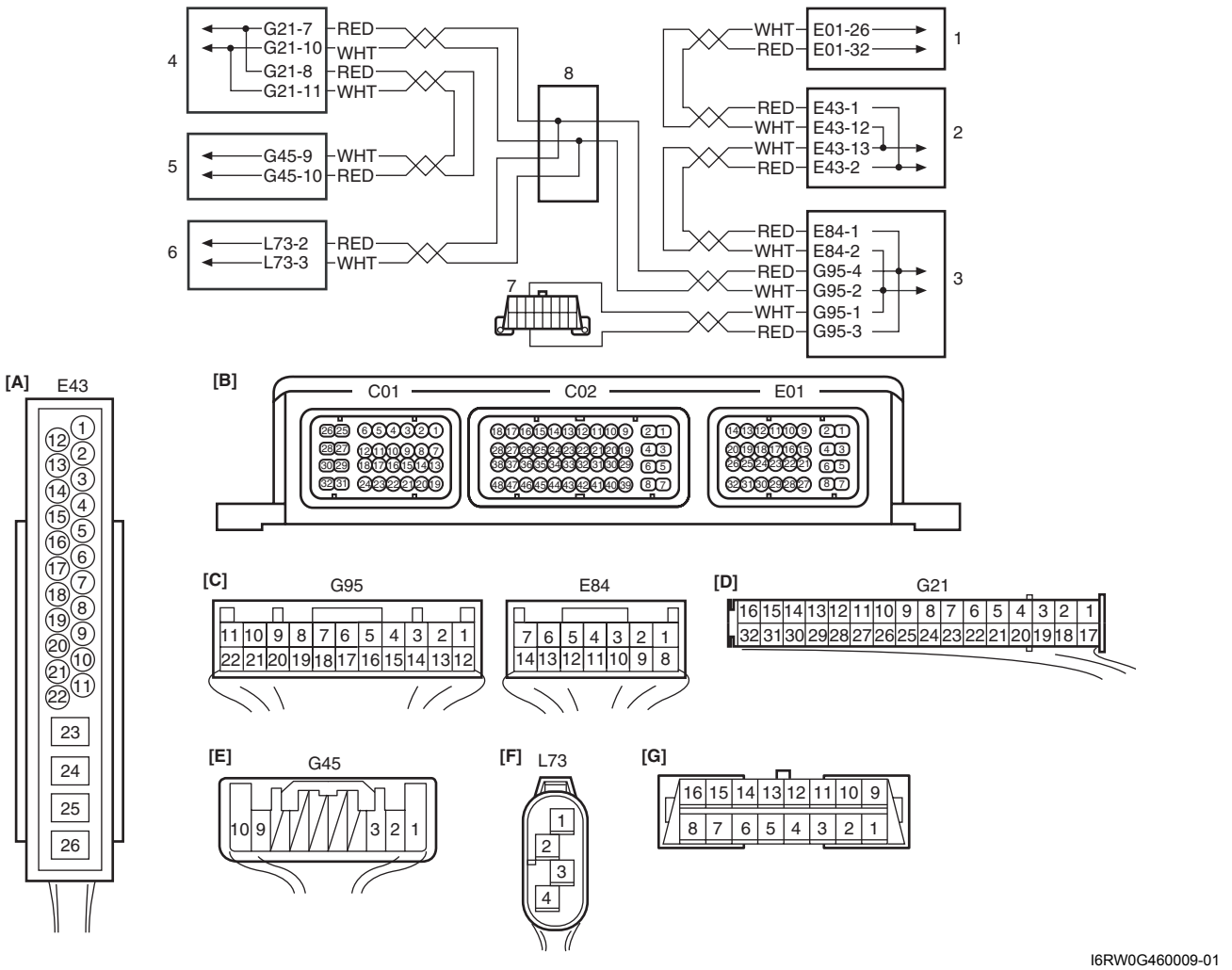
DTC Troubleshooting

Step	Action	Yes	No
1	*Was "Electronic Stability Program Check" performed?*	Go to Step 2.	Go to "Electronic Stability Program Check".
2	**DTC check for ESP®** 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Turn ignition switch ON and check DTC for ESP®. *Are DTC U0073 and/or U0123 detected?*	Go to applicable DTC diag. flow.	Go to Step 3.
3	**Check fuse** *Is Circuit fuse for yaw rate sensor in good condition?*	Go to Step 4.	Replace fuse and check for short circuit to ground.

DTC U0073: Control Module Communication Bus Off

S6RW0G4604035

Wiring Diagram



I6RW0G460009-01

[A]: ESP® control module connector (viewed from terminal side)	[F]: Yaw rate sensor connector (viewed from harness side)	4. Combination meter
[B]: ECM connector (viewed from harness side)	[G]: DLC (viewed from terminal side)	5. Steering angle sensor
[C]: BCM connector (viewed from harness side)	1. ECM	6. Yaw rate sensor
[D]: Combination meter connector (viewed from harness side)	2. ESP® control module	7. DLC
[E]: Steering angle sensor connector (viewed from harness side)	3. BCM	8. CAN junction connector

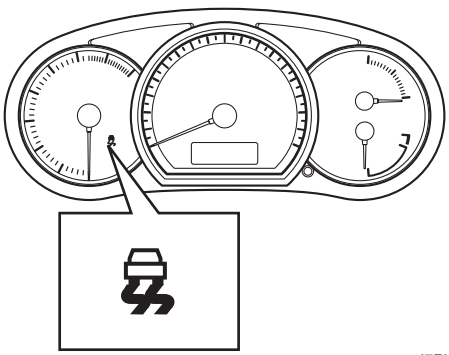
DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
• Communication is not available with all control modules connected by CAN. • CAN communication line is shorted to power, ground and/or each other circuit.	• CAN communication circuit • ESP® control module • ECM • BCM • Combination meter • Steering angle sensor • Yaw rate sensor

Installation

NOTE

- **When ESP® hydraulic unit/control module has been replaced, DTC C1075 is detected. Also, SLIP indicator light flash. As hydraulic unit operation cannot be checked while a trouble is being detected, perform sensor calibration of steering angle sensor, referring to "Steering Angle Sensor Calibration".**



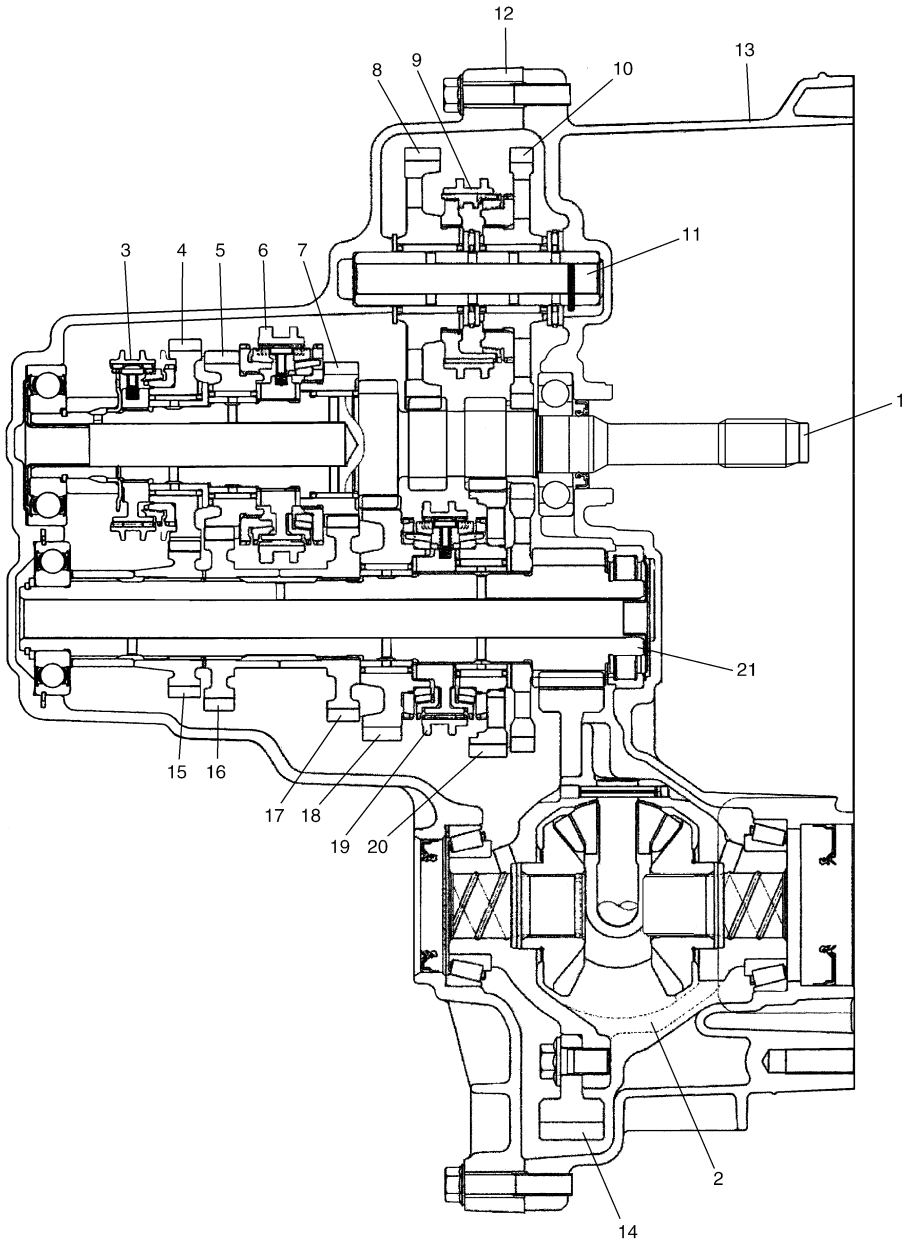
I7RW01460017-01

- **If hydraulic unit operation check is performed while air is trapped in brake system, air will enter inside of ESP® hydraulic unit/control module. To avoid it, be sure to bleed air from brake pipe before hydraulic unit operation check, referring to Air Bleeding of Brake System in Section 4A in related manual"Air Bleeding of Brake System in Section 4A.**

Install ESP® hydraulic unit / control module assembly (3) by reversing removal procedure, noting the following instructions.

1) Install hydraulic unit / control module assembly bracket bolt as follows.
   a) Tighten bracket bolt (1) and (2) by hand.
   b) Then tighten bracket bolt to specified torque.
      Tightening order (1) → (2)

Tightening torque
Hydraulic unit / control module assembly bracket bolt (a): 25 N·m (2.5 kgf-m, 18.0 lb-ft)
Hydraulic unit / control module assembly bolt (b): 9 N·m (0.9 kgf-m, 6.5 lb-ft)
Brake pipe flare nut for M10 (c): 16 N·m (1.6 kgf-m, 11.5 lb-ft)
Brake pipe flare nut for M12 (d): 19 N·m (1.9 kgf-m, 14.0 lb-ft)

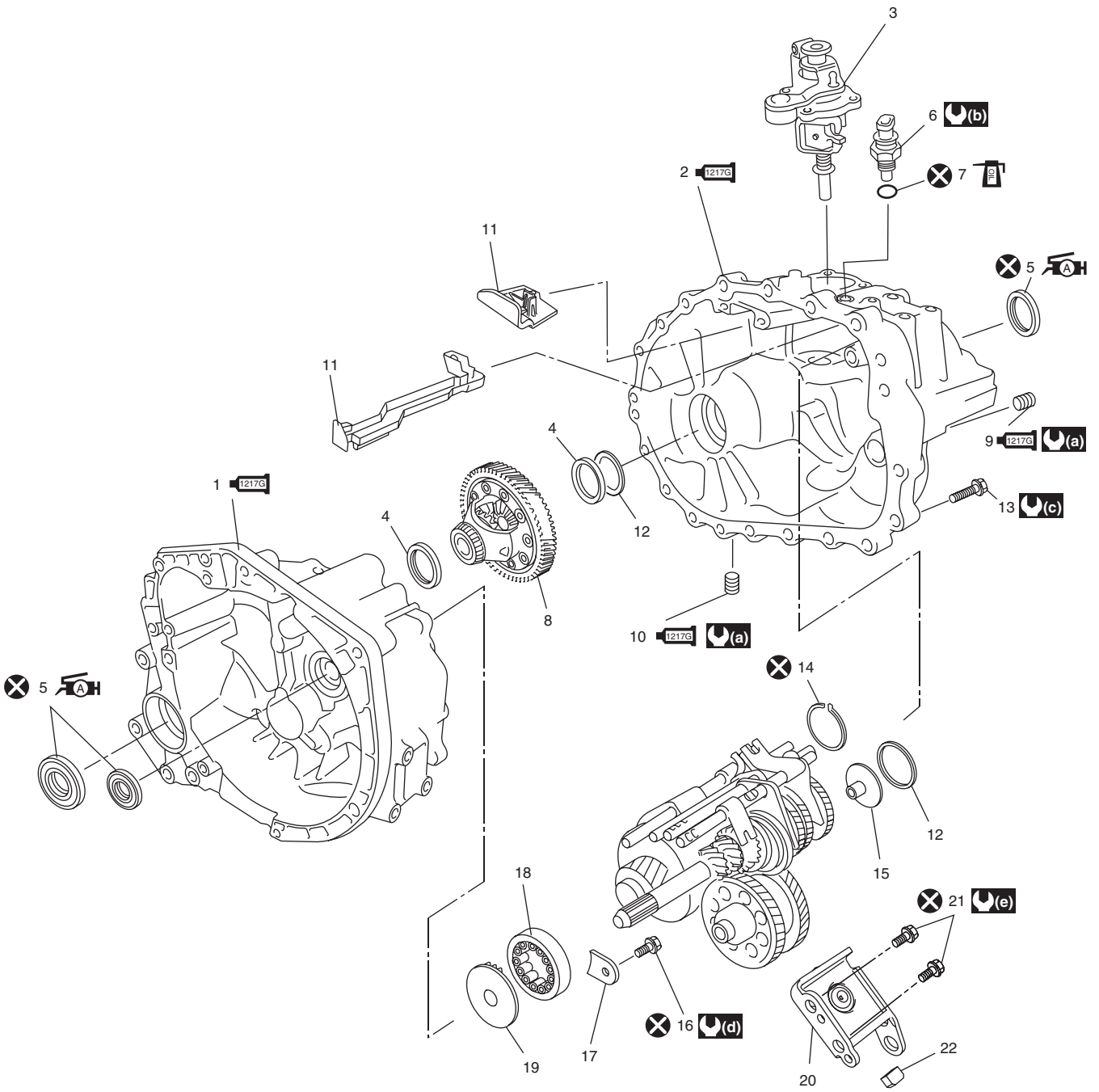


I6RW0G520001-01

1. Input shaft	7. Input shaft 3rd gear	13. Right case	19. Low speed sleeve & hub
2. Differential case	8. Left reverse idler gear	14. Final gear	20. Countershaft 1st gear
3. 5th gear sleeve & hub	9. Reverse gear sleeve	15. Countershaft 5th gear	21. Countershaft
4. Input shaft 5th gear	10. Right reverse idler gear	16. Countershaft 4th gear	
5. Input shaft 4th gear	11. Reverse gear shaft	17. Countershaft 3rd gear	
6. High speed sleeve & hub	12. Left case	18. Countershaft 2nd gear	

Manual Transaxle Assembly Components

S6RW0G5206014



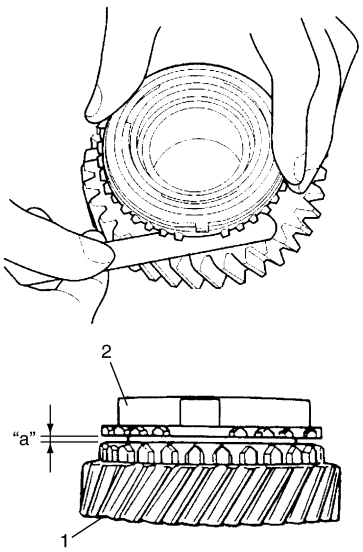
I5RW0B520020-03

1. Transaxle right case	11. Oil gutter	21. Reverse gear shift lever bolt
1217G 2. Transaxle left case : Apply sealant 99000-31260 to mating surface of left case and right case.	12. Shim	22. Shift lever cap
1217G 3. Gear shift & select shaft assembly : Apply sealant 99000-31260 to mating surface of guide case and left case.	13. Transaxle case bolts	(a) : 21 N·m (2.1 kgf-m, 15.5 lb-ft)
4. Outer race	14. Circlip	(b) : 23 N·m (2.3 kgf-m, 17.0 lb-ft)
A/H 5. Oil seal : Apply grease 99000-25011 to Oil seal lip.	15. Input shaft oil channel	(c) : 55 N·m (5.5 kgf-m, 40.0 lb-ft)
6. Back up light switch	16. Bearing stopper bolt	(d) : 11 N·m (1.1 kgf-m, 8.0 lb-ft)
7. O-ring	17. Bearing stopper plate	(e) : 25 N·m (2.5 kgf-m, 18.0 lb-ft)
8. Differential assembly	18. Countershaft right side bearing	: Do not reuse.
1217G 9. Oil level / filler plug : Apply sealant 99000-31260 to all around thread part of plug.	19. Countershaft oil channel	: Apply transaxle oil.
1217G 10. Oil drain plug : Apply sealant 99000-31260 to all around thread part of plug.	20. Reverse gear shift lever	

Reassembly

1) Clean all components thoroughly, inspect them for any abnormality and replace with new ones as necessary.
2) Check clearance “a” between synchronizer ring (2) and gear (1) and replace with new one, if necessary. Also, check gear tooth.

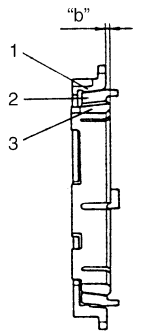
Clearance “a” between synchronizer ring and gear (4th and 5th)
Standard: 1.0 – 1.5 mm (0.040 – 0.055 in.)
Service limit: 0.7 mm (0.020 in.)



I5RW0B520080-01

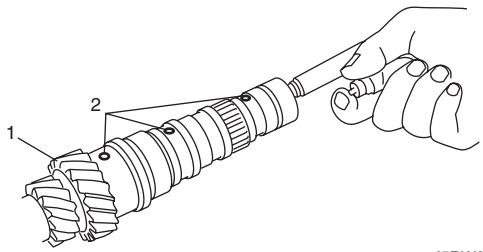
3) Put the synchronizer outer ring (1), inner ring (3) and the cone (2) together and then measure the step difference between the outer ring and the inner ring. And also check each chamfered tooth of gear and synchronizer ring and replace with new one, if necessary. Also, check gear tooth.

Difference between synchronizer outer ring and inner ring (3rd)
Standard “b”: 1.0 – 1.4 mm (0.040 – 0.055 in.)
Service limit “b”: 0.5 mm (0.019 in.)



I2RH01520059-01

4) To ensure lubrication of input shaft (1), air blow oil holes (2) and make sure that they are free from any obstruction.



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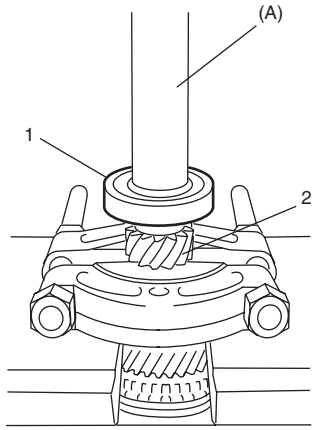
5) Drive in right bering (1) to input shaft (2) using special tool and hydraulic press.

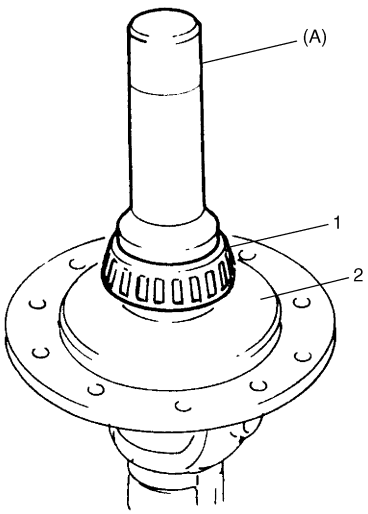
Special tool
(A): 09941–74910



I5RW0B520048-01

2) Drive in spring pin from right side till it is flush with differential case surface.
3) Press-fit left bearing (1) by using special tool and hydraulic press.

Special tool
(A): 09913–70123

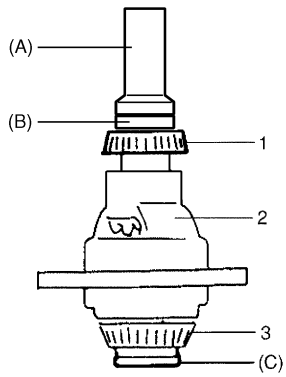


I2RH01520074-01

2. Differential case

4) Press-fit right bearing (1) by using special tools and hydraulic press.

Special tool
(A): 09925–15410
(B): 09924–07720
(C): 09913–85230



I5RW0A520048-01

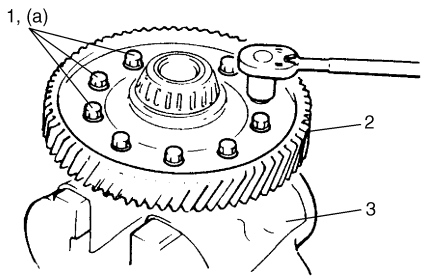
2. Differential case
3. Differential side left bearing

5) Hold differential assembly with soft jawed vise (3), install final gear (2) and then tighten new final gear bolts (1).

⚠ CAUTION

Use of any other bolts than specified ones is prohibited. Otherwise, bolts may loosen.

Tightening torque
Final gear bolt (a): 120 N·m (12 kgf-m, 87.0 lb-ft)



I5RW0A520049-01

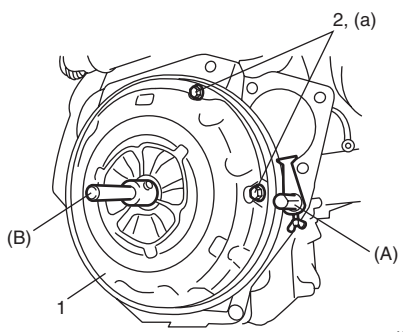
2) Aligning clutch disc to flywheel center using special tool, install clutch cover (1) and bolts (2). Then tighten bolts (2) to specification.

NOTE

- **While tightening clutch cover bolts, compress clutch disc with special tool (clutch center guide) by hand so that disc is centered.**
- **Tighten cover bolts little by little evenly in diagonal order.**

Special tool
(A): 09924–17811
(B): 09923–36320

Tightening torque
Clutch cover bolt (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



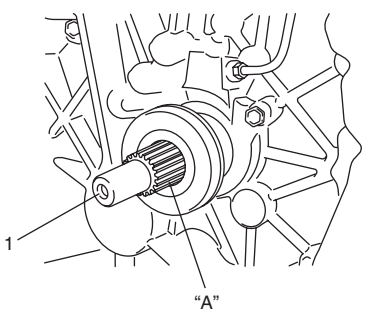
I5RW0B530009-02

3) Slightly apply grease to input shaft (1), then join manual transaxle assembly with engine referring to "Manual Transaxle Unit Dismounting and Remounting in Section 5B".

"A": Grease 99000–25210 (SUZUKI Super Grease I)

NOTE

When inserting transaxle input shaft to clutch disc, turn crankshaft little by little to match the splines.



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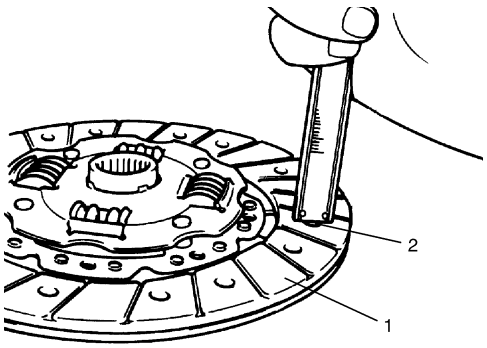
Clutch Cover, Clutch Disc and Flywheel Inspection

S6RW0G5306013

Clutch Disc

Measure depth of rivet head depression, i.e. distance between rivet head and facing surface.
If depression is found to have reached service limit at any of rivet holes (2), replace clutch disc assembly (1).

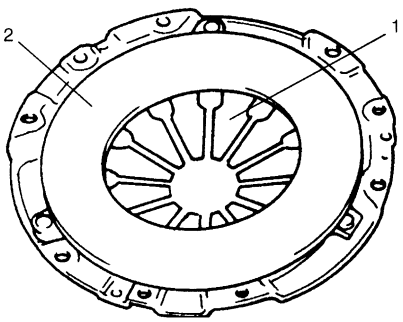
Rivet head depth
Standard: 1.65 – 2.25 mm (0.06 – 0.09 in.)
Limit: 0.5 mm (0.02 in.)



I4RS0A530019-01

Clutch Cover

1) Check diaphragm spring (1) for abnormal wear or damage.
2) Inspect pressure plate (2) for wear or heat spots.
3) If abnormality is found, replace clutch cover. Do not disassemble it into diaphragm spring and pressure plate.



I3RM0A530015-01

Flywheel

Check surface contacting clutch disc for abnormal wear or heat spots. Replace or repair as required.

[A]: P/S control module connector No.1 “E90” (viewed from harness side)	5. ECM	11. “IGN” fuse
[B]: P/S control module connector No.2 “E88” (viewed from harness side)	6. BCM	12. “P/S” fuse
1. Main fuse box	7. Front left/right wheel speed sensor	13. “IG1 SIG” fuse
2. Ignition switch	8. P/S control module	14. Vehicle speed signal circuit
3. Junction block assembly	9. ABS or ESP® control module	
4. Main fuse	10. Individual circuit fuse box No.1	

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
DTC C1121: Vehicle speed signal is 0 km/h even though engine speed is more than 4000 rpm for more than 60 seconds continuously (before elapse of 5 min from engine start) or Vehicle speed signal is 0 km/h even though engine speed is more than 2500 rpm for more than 60 seconds continuously (after elapse of 5 min for engine start). (1 driving cycle detection logic but “EPS” warning light does not light up) **DTC C1123:** Vehicle speed signal is 0 km/h with continuously more than 3 driving cycles even though engine speed is more than 4000 rpm for more than 30 seconds continuously (before elapse of 5 min from engine start) or Vehicle speed signal is 0 km/h with continuously more than 3 driving cycles even though engine speed is more than 2500 rpm for more than 30 seconds continuously (after elapse of 5 min for engine start). (3 driving cycle detection logic) **DTC C1124:** Vehicle speed signal is less than 5 km/h for more than 5 seconds continuously with more than specified deceleration speed (–20 m/s^2) from over 20 km/h. (1 driving cycle detection logic but “EPS” warning light does not light up)	• Vehicle speed signal circuit • BCM • ECM • ABS or ESP® control module • P/S control module • CAN communication line circuit

DTC Troubleshooting

Step	Action	Yes	No
1	*Was “EPS System Check” performed?*	Go to Step 2.	Go to EPS System Check in related manual”EPS System Check.
2	**DTC check** 1) Check ABS or ESP® control module and BCM for DTC referring to DTC Check in Section 4E in related manual”DTC Check in Section 4E, “DTC Check in Section 4F” and DTC Check in Section 10B in related manual”DTC Check in Section 10B. *Is there any DTC(s) detected?*	Go to applicable DTC diag. flow.	Go to Step 3.
3	**DTC check** 1) Check ECM for DTC referring to “DTC Check in Section 1A”. *Is there any DTC(s) detected?*	Go to applicable DTC diag. flow.	Go to Step 4.

Precautions

Precautions

Precautions on HVAC

S6RW0G7000001

Air Bag Warning
Refer to Air Bag Warning in Section 00 in related manual”Air Bag Warning in Section 00.

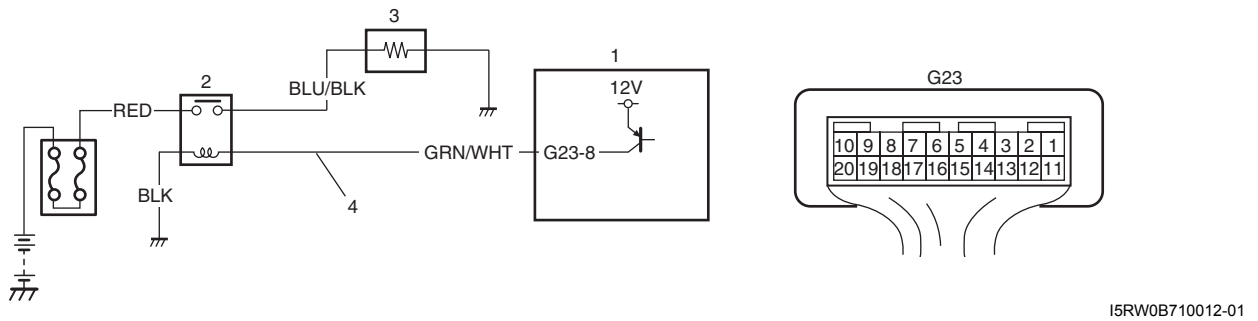
A/C System Caution
Refer to A/C System Caution in Section 7B in related manual”A/C System Caution in Section 7B.

Precautions on Servicing A/C System
Refer to “Precautions on Servicing A/C System in Section 7B”.

DTC B1536: Additional Heater Relay No.1 Output Malfunction

S6RW0G7104008

Wiring Diagram



I5RW0B710012-01

1. Additional heater controller	3. Additional heater No.1
2. Additional heater relay No.1	4. Additional heater relay No.1 output circuit

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Output voltage of additional heater relay No.1 is lower than specified value continuously.	• Additional heater relay No.1 output circuit • Additional heater relay No.1 • Additional heater controller

DTC Troubleshooting

Step	Action	Yes	No
1	**Additional heater relay No. 1 check** 1) Check additional heater relay No.1 referring to “Additional Heater Relay Inspection (If Equipped)”. *Is it in good condition?*	Go to Step 2.	Replace additional heater relay No.1.
2	**Wire harness check** 1) Turn OFF ignition switch. 2) Disconnect additional heater controller connector referring to “Additional Heater Controller Removal and Installation (If Equipped)”. 3) Check additional heater relay No.1 connector and additional heater controller connector for proper connection. 4) If OK, check for open, short and/or high resistance in additional heater relay No.1 output circuit. *Is circuit in good condition?*	Substitute a known-good additional heater controller and recheck.	Repair circuit.

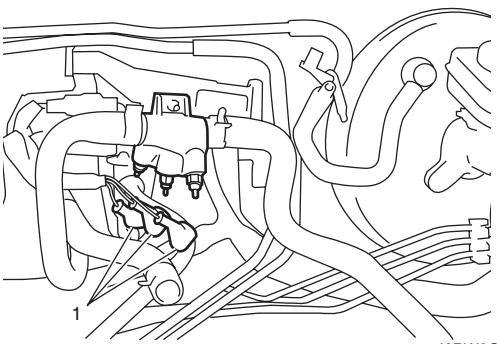
Additional Heater Assembly On-Vehicle Inspection (If Equipped)

S6RW0G7106019

1) Disconnect negative (–) cable at battery.
2) Remove air cleaner assembly referring to “Air Cleaner Assembly Removal and Installation in Section 1D”.
3) Disconnect wires from additional heater terminals.

NOTE

Make alignment marks (1) on wires and additional heater body for a guide during reinstallation, if necessary.



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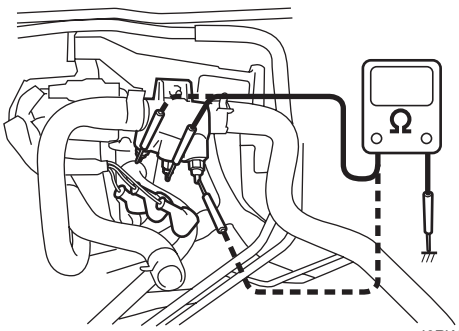
4) Check resistance between each terminal of additional heater and vehicle body ground. If resistance is out of specification, replace additional heater assembly with new one.

Additional heater terminal resistance
0.55 – 0.65 Ω at 20 °C (68 °F)



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Additional Heater Assembly Removal and Installation (If Equipped)

S6RW0G7106020

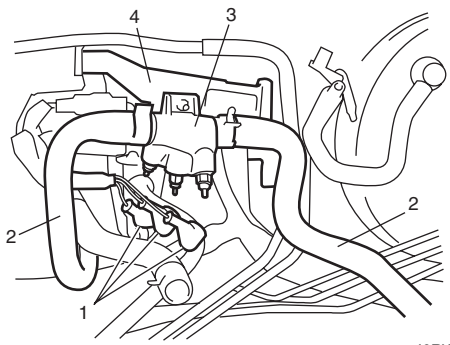
Removal

1) Disconnect negative (–) cable from battery.
2) Remove air cleaner assembly referring to “Air Cleaner Assembly Removal and Installation in Section 1D”.
3) Drain engine coolant referring to “Cooling System Draining in Section 1F”.
4) Disconnect additional heater wires (1) and heater hoses (2) from additional heater assembly (3).

NOTE

Make alignment marks on wires and additional heater body for a guide during reinstallation, if necessary.

5) Remove additional heater assembly (3) from its bracket (4).



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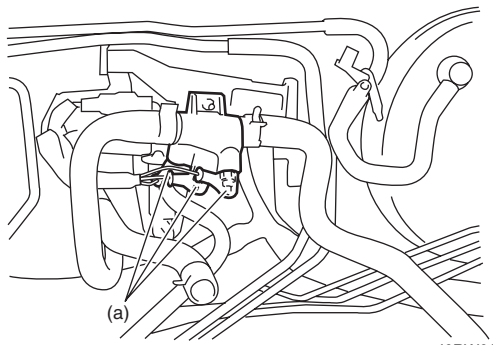
Installation

Reverse the removal procedure for installation noting the followings.

- Tighten additional heater wire nuts to specified torque.

Tightening torque
Additional heater wire nut (a): 4 N·m (0.4 kgf-m, 3.0 lb-ft)



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- Fill engine coolant referring to “Cooling System Refilling in Section 1F”.

Abnormal Noise from A/C Evaporator

Condition	Possible cause	Correction / Reference Item
Whistling sound is heard from A/C evaporator	Depending on the combination of the interior / exterior temperatures, engine rpm and refrigerant pressure, the refrigerant flowing out of the expansion valve may, under certain conditions, make a whistling sound	*At times, slightly decreasing refrigerant volume may stop this noise.* *Inspect expansion valve and replace if faulty.*

Abnormal Noise from Blower Motor

Condition	Possible cause	Correction / Reference Item
Blower motor emits a chirping sound in proportion to its speed of rotation	Worn or damaged motor brushes or commutator	*Replace blower motor.*
Fluttering noise or large droning noise is heard from blower motor	Leaves or other debris introduced from fresh air inlet to blower motor	*Remove debris and make sure that the screen at fresh air inlet is intact.*

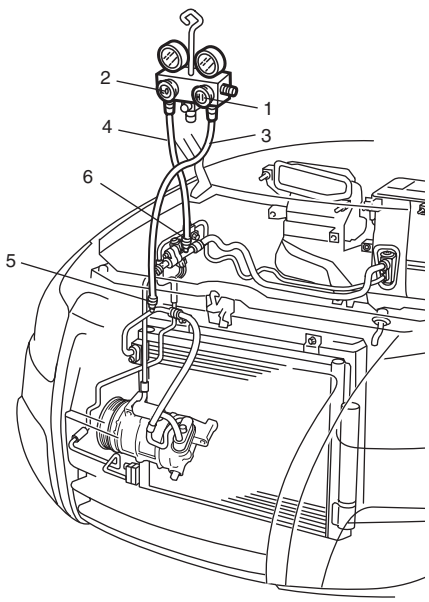
A/C System Performance Inspection

S6RW0G7204003

1) Confirm that vehicle and environmental conditions are as follows.
   - Vehicle is put indoors.
   - Ambient temperature is within 25 – 35 °C (77 – 95 °F).
   - Relative humidity is within 30 – 70%.
   - There is no wind indoors.
   - HVAC unit is normal.
   - Blower motor is normal.
   - There is no air leakage from air ducts.
   - Condenser fins are clean.
   - Are filter is not clogged with dirt and dust.
   - Battery voltage is about 12 V.
   - Radiator cooling fan operates normally.
2) Make sure that high pressure valve (1) and low pressure valve (2) of manifold gauge are firmly closed.
3) Connect high pressure charging hose (3) to high pressure service valve (5) on vehicle and low pressure charging hose (4) to low pressure service valve (6).
4) Bleed the air in charging hoses (3) and low pressure charging hose (4) by loosening their nuts respectively utilizing the refrigerant pressure. When a hissing sound is heard, immediately tighten nut.

⚠ CAUTION

Do not connect high and low pressure charging hoses in reverse.



I5RW0B721008-01

5) Warm up engine to the normal operating temperature and keep it at the specified idle speed.
6) Turn A/C switch ON, set blower speed selector at maximum speed position, temperature selector at maximum cold position, air flow selector at face position, and air intake selector at recirculation position. (Confirm that A/C compressor, A/C condenser cooling fan and radiator cooling fan are working.)
7) Wait for ten minutes to stabilize the A/C operation.
8) Open front windows, front doors and engine food.

Check A/C System for Refrigerant Leaks
Whenever a refrigerant leak is suspected in the system or any service operation has been performed which may result in malfunction of lines and connections, it is advisable to check for leaks.
Common sense should be used during refrigerant leak test, since the need and extent of any such test will, in general, depend upon the nature of a complaint and the type of a service performed on the system.

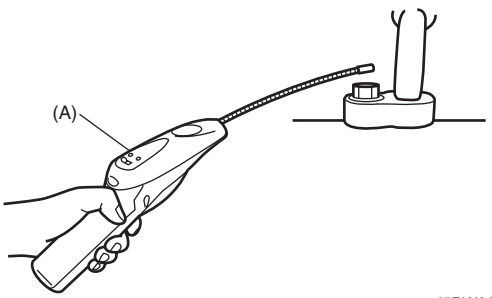
Liquid leak detector

⚠ WARNING

- **To prevent explosions and fires, make sure that there are no flammables in the vicinity.**
- **When the refrigerant exposed to fire, it turns into a poisonous gas (phosgene). Do not inhale this gas.**

There is a number of fittings and places throughout the A/C system where a liquid leak detector solution may be used to pinpoint refrigerant leaks.
By merely applying the solution to the area in question with a swab, such as attached to the cap of a vial, bubbles will form within seconds if there is a leak.
For confined areas, such as sections of the evaporator and condenser, an electronic (refrigerant) leak detector is more practical for determining leaks.

Special tool
(A): 09990–86012



I5RW0A721054-01

Condenser Cooling Fan Removal and Installation

S6RW0G7206002

Refer to “Radiator Cooling Sub Fan Removal and Installation in Section 1F”.

Condenser Cooling Fan Inspection

S6RW0G7206003

Refer to “Radiator Cooling Sub Fan Inspection in Section 1F”.

Condenser Assembly Removal and Installation

S6RW0G7206005

⚠ CAUTION

Do not damage condenser fins. If condenser fin is bent, straighten it by using flat head screwdriver or pair of pliers.

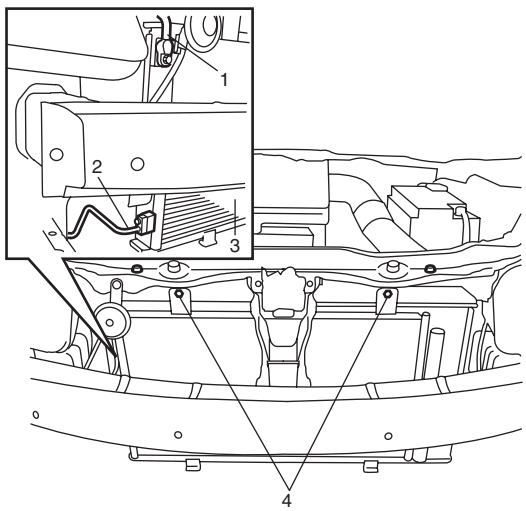
Removal

1) Recover refrigerant from A/C system referring to “Operation Procedure for Refrigerant Charge”.

NOTE

The amount of removed compressor oil must be measured for replenishing compressor oil.

2) Remove front bumper referring to Front Bumper and Rear Bumper Components in Section 9K in related manual”Front Bumper and Rear Bumper Components in Section 9K.
3) Remove inter cooler referring to “Intercooler Removal and Installation in Section 1D”.
4) Disconnect discharge hose (1) and liquid pipe (2) from condenser assembly (3).
5) Remove radiator assembly and condenser assembly mounting bolts (4).



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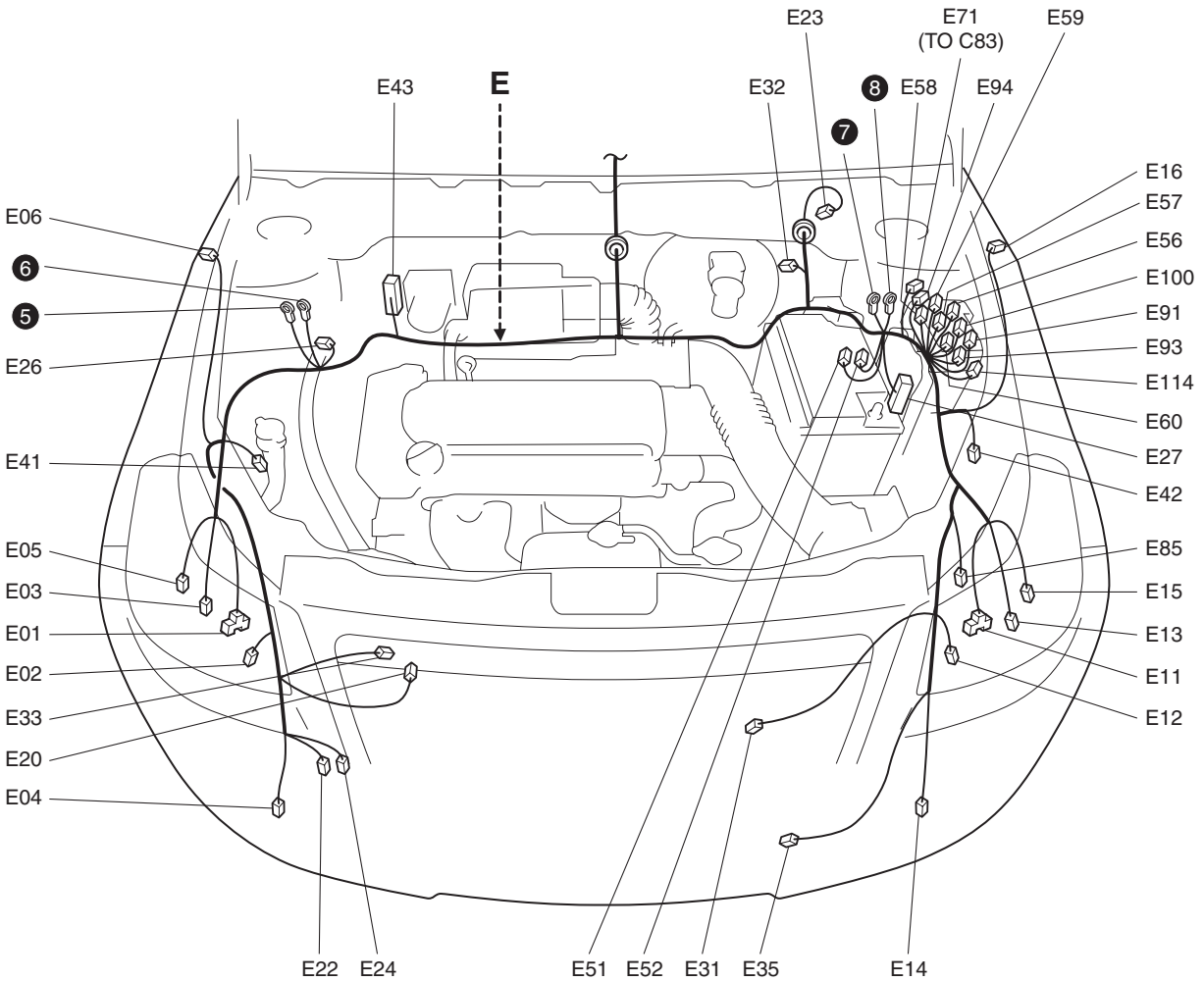
No./Color	Connective position	No./Color	Connective position
E24/BLK	Rear washer motor	E102/BLK	Radiator fan relay #3
E26/BLK	A/C refrigerant pressure sensor	E121/GRY	Engine Harness
E31/BLK	Radiator fan motor	E122/N	EPI main
E32/BRN	Brake fluid level switch	E123/N	Floor Harness
E33/GRY	Sub fan motor	E124/BRN	Double relay
E35/BLK	Ambient temperature sensor	E125/BLK	Glow control module
E42/BLU	Wheel speed sensor (FL)		

E: Main harness (Petrol LHD)



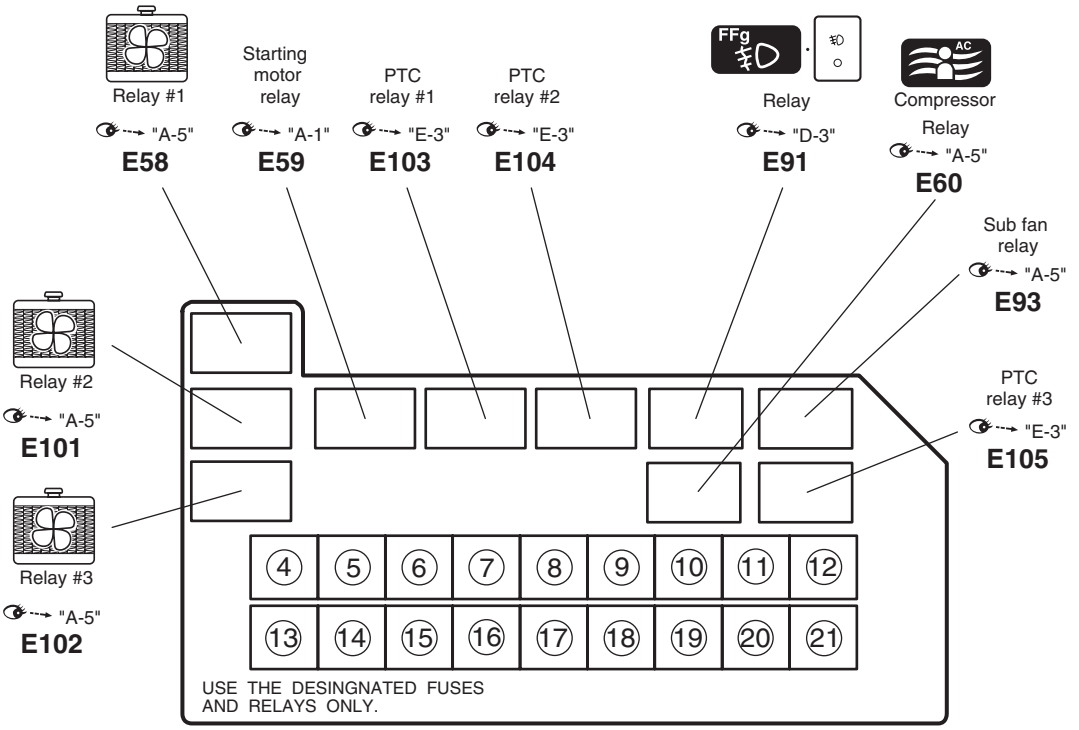
I5RW0C910905-03

E: Main harness

No./Color	Connective position	No./Color	Connective position
E01/BLK	Head light (R)	E33/BLK	Condenser fan motor
E02/GRY	Front turn signal light (R)	E35/BLK	Ambient temperature sensor
E03/N	Front position light (R)	E41/N	Wheel speed sensor (FR)
E04/BLK (IF EQPD)	Front fog light (R)	E42/BLU	Wheel speed sensor (FL)
E05/BLK	Headlight beam leveling actuator (R)	E43/BLK	ABS control module
E06/N	Side turn signal light (R)	E51/GRY	Main fuse box
E11/BLK	Headlight (R)	E52/BRN	Main fuse box
E12/GRY	Front turn signal light (L)	E56/BLK	Main relay
E13/N	Front position light (L)	E57/BLK	Fuel pump relay
E14/BLK (IF EQPD)	Front fog light (L)	E58/BLK	Radiator fan relay
E15/BLK	Headlight beam leveling actuator (L)	E59/BLK	Starting motor relay
E16/N	Side turn signal light (L)	E60/BLK	A/C compressor relay

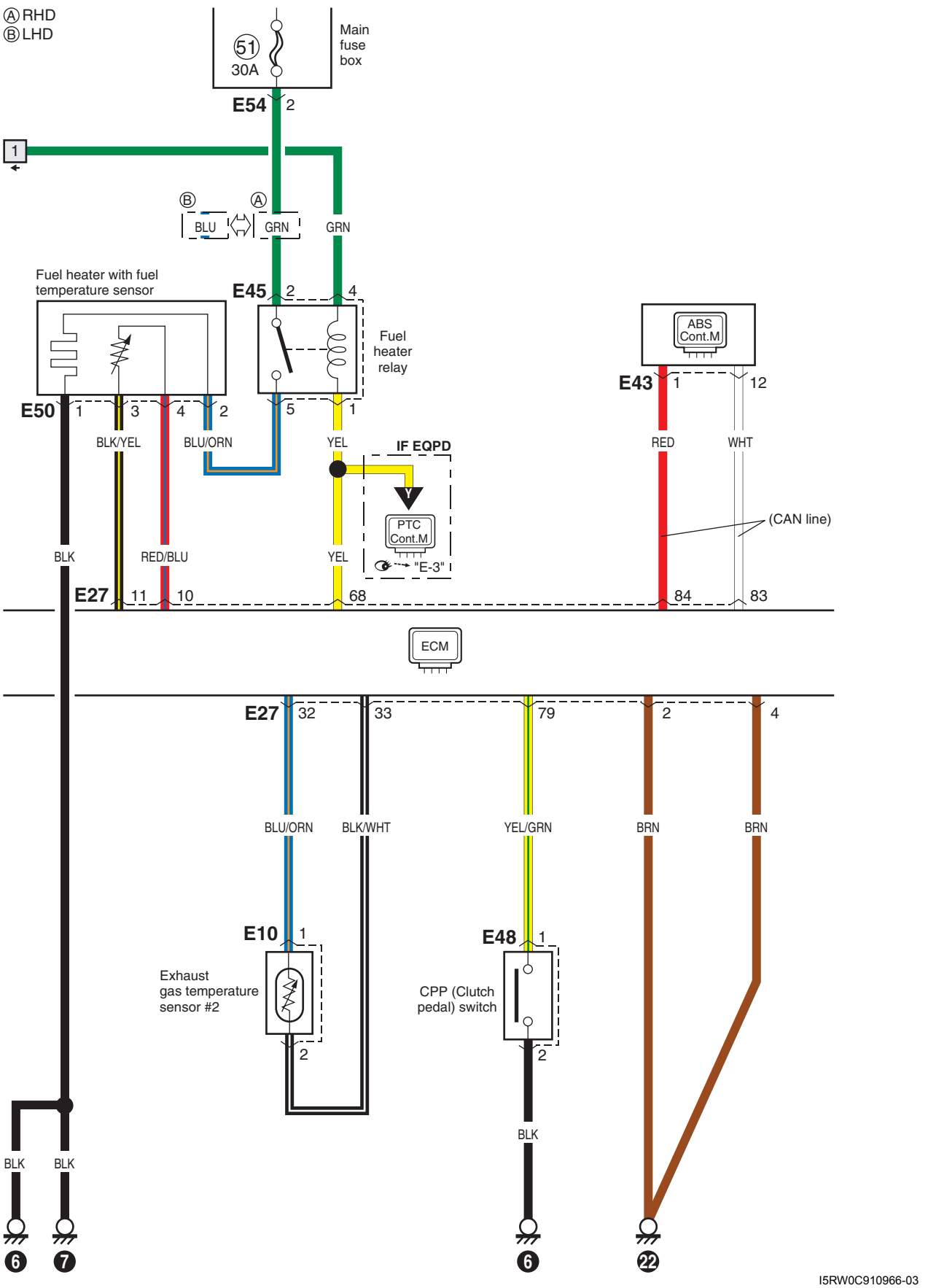
Individual Circuit Fuse Box No. 1 (DSL 1.6L)

S6RW0G910D014



I6RW0G910926-01

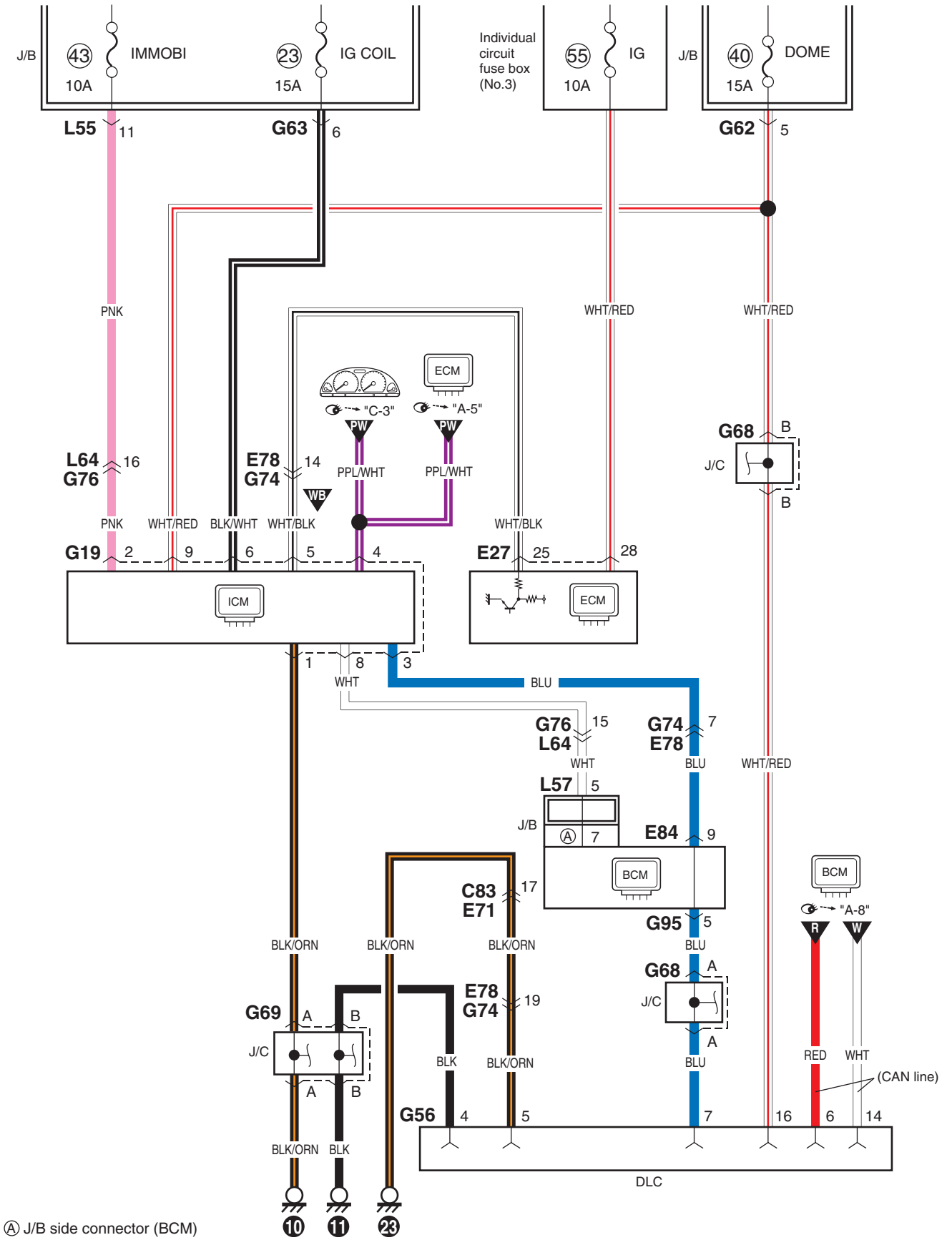
No.	Fuse	Description on the cover	Protected circuit
④	20 A	FI	Double relay
⑤	30 A	CDSR FAN	Sub fan relay
⑥	BLANK	BLANK	BLANK
⑦	10 A	A/C	A/C compressor relay
⑧	30 A	BLW	Heater relay
⑨	BLANK	BLANK	BLANK
⑩	50 A	IGN	IG switch
⑪	30 A	ST	Starting motor relay
⑫	30 A	ABS SOL	ABS control module
			ESP^{R} control module
⑬	30 A	RDTR	Radiator fan relay #1
			Radiator fan relay #2
⑭	40 A	ABS MOT	ABS control module
			ESP^{R} control module
⑮	60 A	P/S	Power steering control module
⑯	50 A	IGN2	IG switch
⑰	20 A	FR FOG	Front fog light relay
⑱	15 A	H/L L	Headlight (L)
⑲	15 A	H/L R	Headlight (R)
⑳	BLANK	BLANK	BLANK
㉑	BLANK	BLANK	BLANK



I5RW0C910966-03

A-7 Immobilizer System Circuit Diagram (DSL 1.6L)

S6RW0G910E052

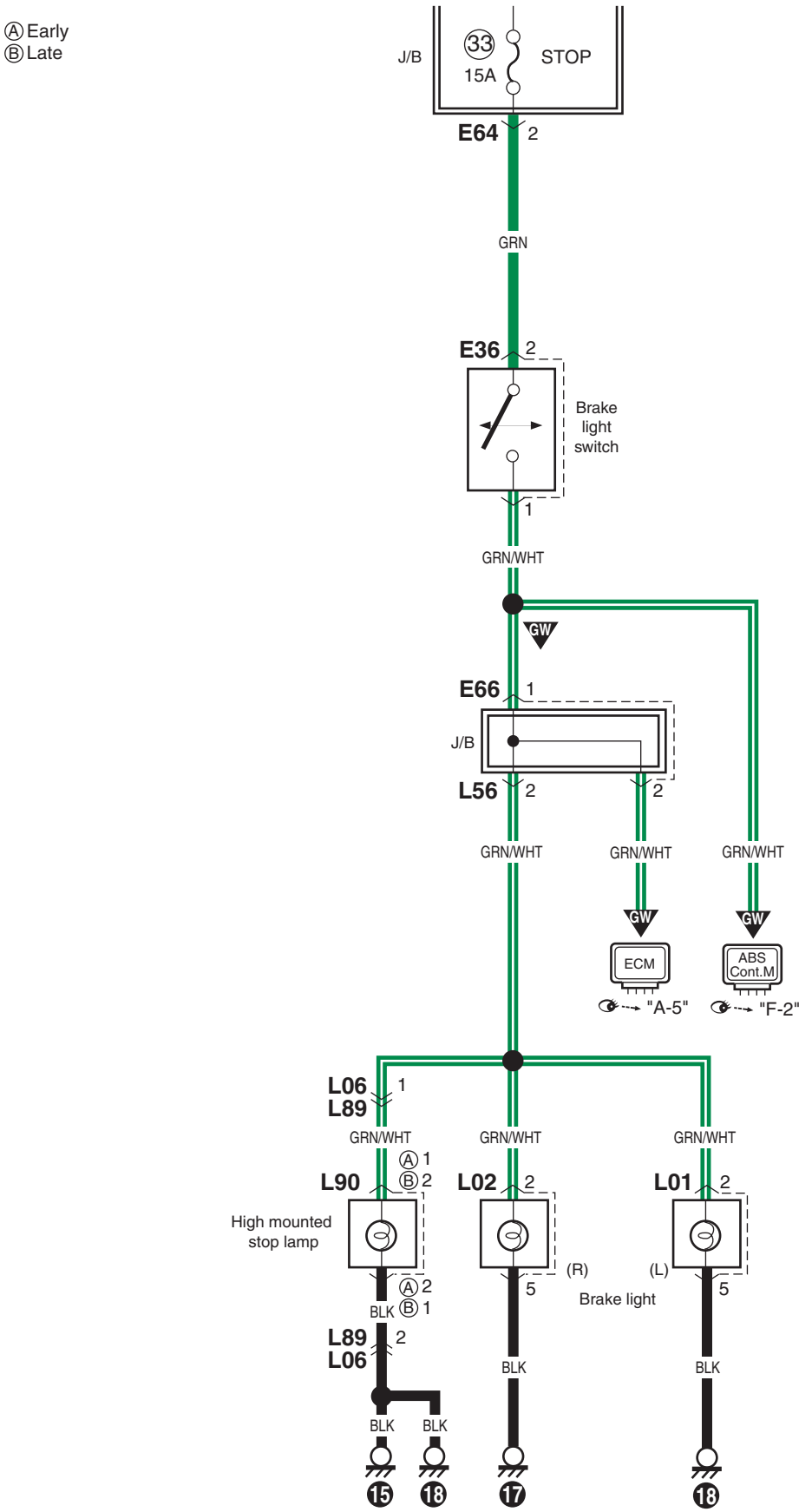


Ⓐ J/B side connector (BCM)

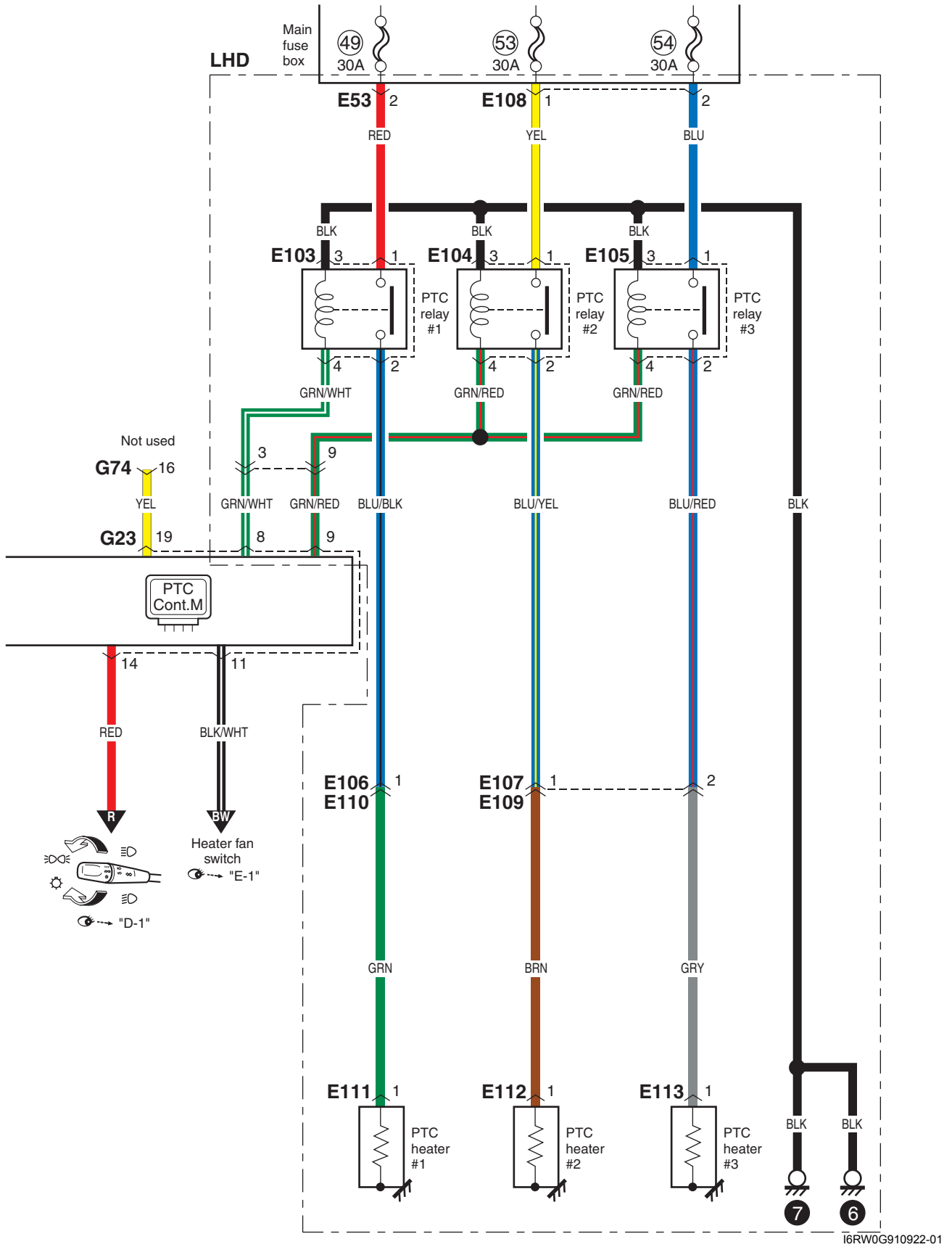
I6RW0G910915-01

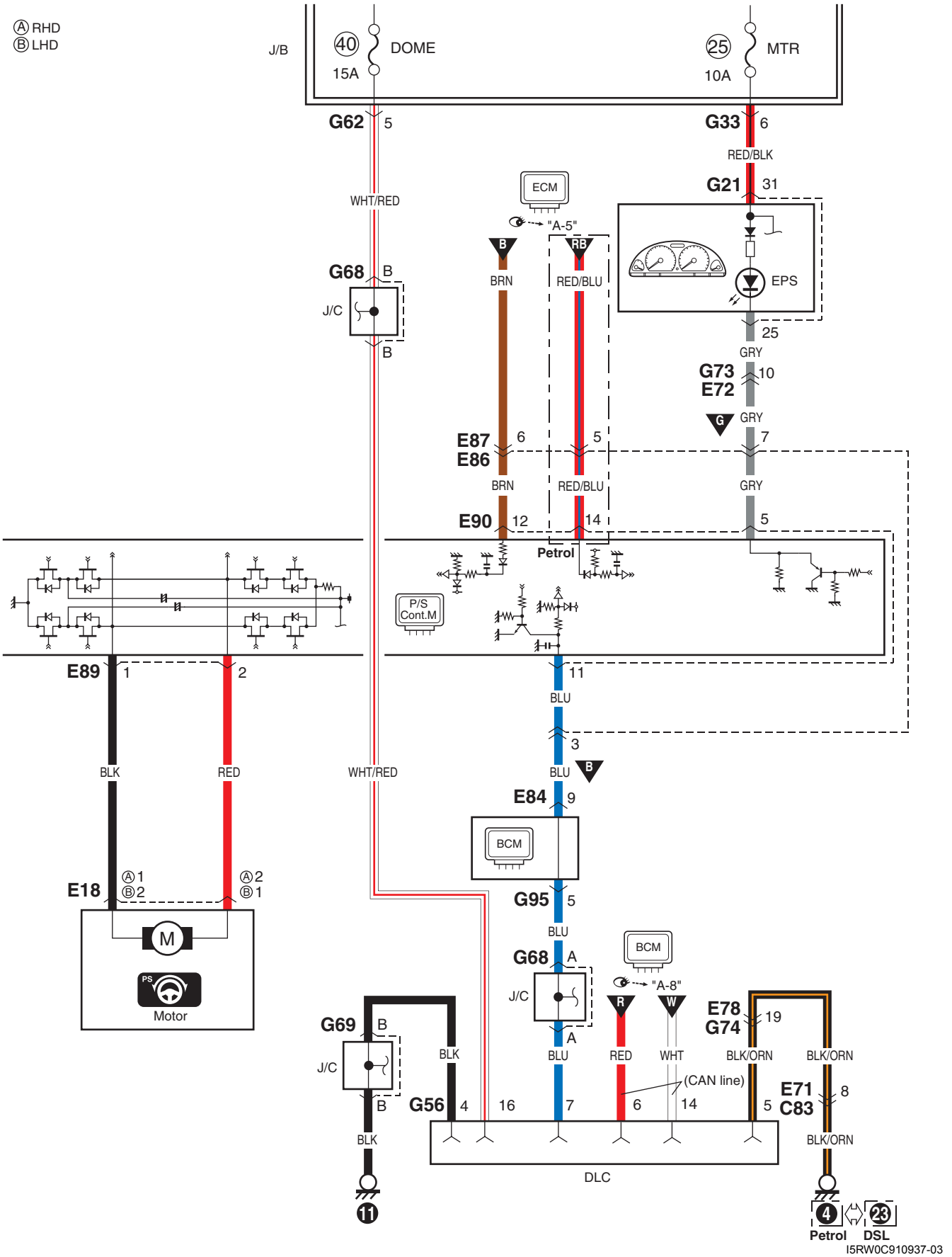
D-7 Brake Light System Circuit Diagram (DSL 1.6L)

S6RW0G910E054



I6RW0G910918-02

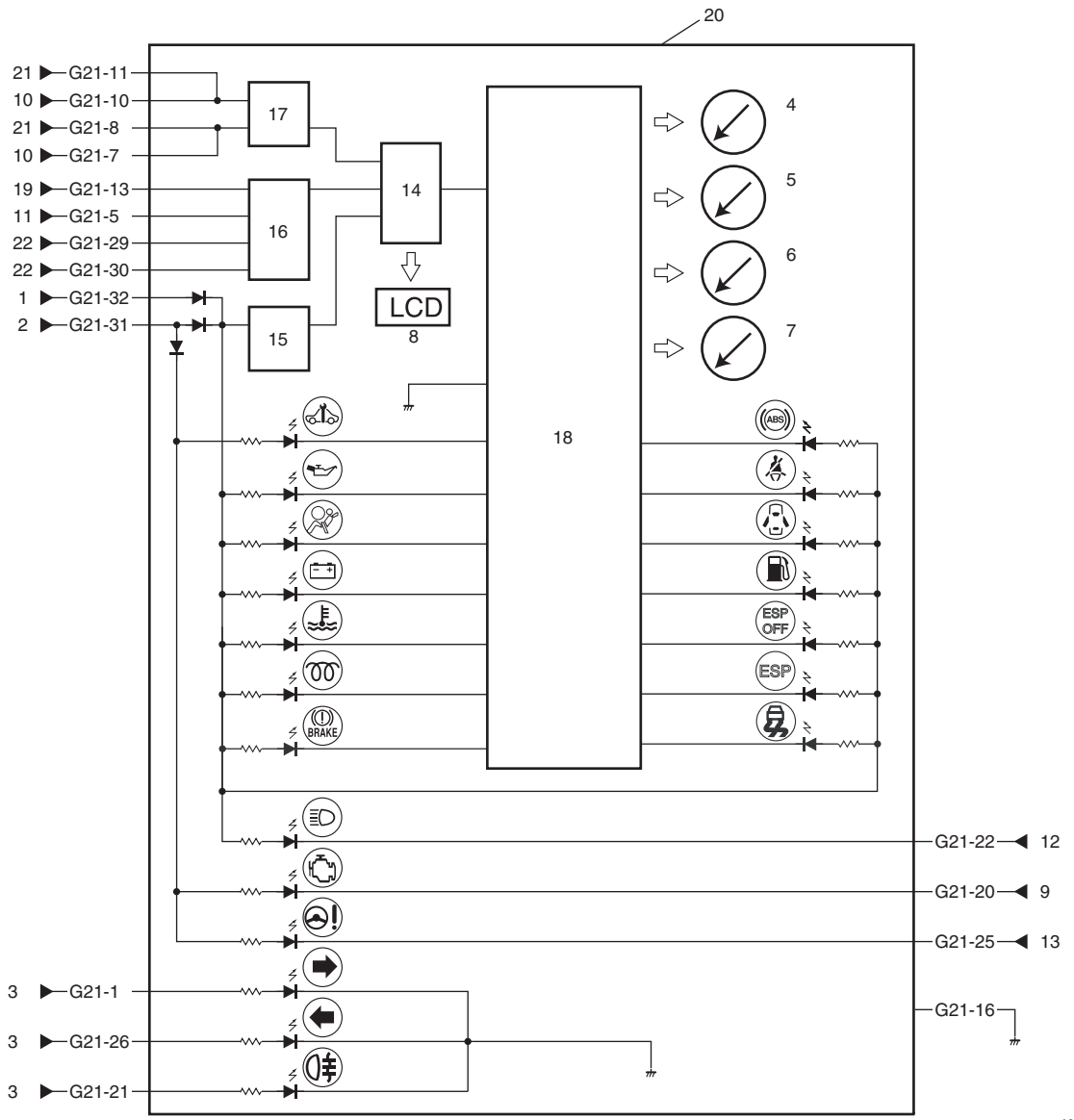

LHD
Main fuse box
49 30A
53 30A
54 30A
E53 2
E108 1
2
RED
YEL
BLU
BLK
BLK
BLK
E103 3 1
E104 3 1
E105 3 1
PTC relay #1
PTC relay #2
PTC relay #3
4 2
GRN/WHT
GRN/RED
GRN/RED
Not used
G74 16
YEL
G23 19
3
9
GRN/WHT
GRN/RED
BLU/BLK
BLU/YEL
BLU/RED
BLK
8
9
PTC Cont.M
14
11
RED
BLK/WHT
R
BW
Heater fan switch
"E-1"
"D-1"
E106 E110 1
E107 E109 1
2
GRN
BRN
GRY
E111 1
E112 1
E113 1
PTC heater #1
PTC heater #2
PTC heater #3
BLK
BLK
7
6
I6RW0G910922-01


Ⓐ RHD
Ⓑ LHD
J/B
40
DOME
15A
25
MTR
10A
G62
5
G33
6
RED/BLK
G21
31
WHT/RED
ECM
"A-5"
B
RB
BRN
RED/BLU
G68
B
J/C
B
EPS
25
GRY
G73
E72
10
G
GRY
7
E87
E86
6
5
BRN
RED/BLU
GRY
E90
12
14
5
Petrol
P/S
Cont.M
E89
1
2
11
BLU
3
BLK
RED
WHT/RED
BLU
B
E84
9
BCM
E18
Ⓐ1
Ⓑ2
Ⓐ2
Ⓑ1
G95
5
BLU
M
PS
Motor
G68
A
J/C
BCM
"A-8"
R
W
A
G69
B
J/C
B
BLK
BLU
RED
WHT
E78
G74
19
BLK/ORN
BLK/ORN
(CAN line)
E71
C83
8
G56
4
16
7
6
14
5
BLK/ORN
BLK
DLC
11
4
Petrol
23
DSL
I5RW0C910937-03

Schematic and Routing Diagram

Combination Meter Circuit Diagram

S6RW0G9302001



I6RW0G930002-01

1. DOME fuse	9. ECM	17. CAN driver
2. METER fuse	10. CAN junction connector	18. Stepper motor and LED output driver
3. Combination switch	11. SDM	19. Illumination cancel switch (if equipped)
4. Tachometer	12. Combination switch (high beam)	20. Combination meter
5. Speedometer	13. P/S control module	21. Steering angle sensor (if equipped)
6. Fuel meter	14. CPU	22. Fuel level sensor
7. ECT meter	15. Power supply	
8. ODO-TRIP	16. Interface circuit	

6. Outside air temperature sensor (if equipped)	26. A/C switch (if equipped)	46. To turn signal light
7. Key reminder switch	27. Rear wiper motor	47. Interior light
8. Theft deterrent light	28. Rear wiper relay	48. Rear end door window defogger relay
9. Information display (if equipped)	29. ECM	49. Right side door mirror heater (if equipped)
10. Additional heater controller (if equipped)	30. ABS / ESP® control module	50. Left side door mirror heater (if equipped)
11. P/S control module	31. Yaw rate / G sensor (if equipped)	51. Rear end door window defogger
12. Navigation (if equipped)	32. CAN junction connector	52. Rear end door window defogger indicator light
13. Audio unit (if equipped)	33. Combination meter	53. Horn relay
14. Generator	34. Steering angle sensor (if equipped)	54. Horn switch
15. Keyless entry receiver (if equipped)	35. DLC	55. Horn
16. Driver side door switch	36. To ICM, ABS / ESP® control module and P/S control module	56. Lighting switch
17. Other than driver side door switch	37. To SDM	57. Ignition switch
18. Rear end door switch	38. To additional heater controller (if equipped)	58. Battery
19. Driver side seat belt switch	39. Door lock actuator relay (if equipped)	59. Body ground
20. Brake fluid level switch	40. Driver side door lock actuator (if equipped)	60. Engine ground

Junction block connector "G62"

Terminal	Circuit	Normal voltage	Condition
G62-3	Ground for BCM	0 V	Ignition switch is at all positions
G62-7	Rear end door window defogger indicator light	10 – 14 V	Engine is running and rear end door window defogger indicator light is lit up
		0 V	Engine is running and rear end door window defogger indicator light is not lit up

Junction block connector "G63"

Terminal	Circuit	Normal voltage	Condition
G63-3	Horn switch	10 – 14 V	Horn switch is not pushed
		0 V	Horn switch is pushed
G63-7	Lighting switch	10 – 14 V	Engine is running (with DRL model) or lighting switch is at any position other than OFF position
		0 V	Lighting switch is at OFF position
G63-9	Ground for BCM	0 V	Ignition switch is at all positions
G63-11	Hazard warning switch	0 V	Hazard warning switch is at ON position or lock or unlock button of keyless entry transmitter (answer back control) is pushed
		10 – 14 V	Hazard warning switch is at OFF position

Junction block connector "L54"

Terminal	Circuit	Normal voltage	Condition
L54-2	Air bag communication line	*0 – 1 V ↑↓ 4 – 6 V	Refer to "Reference waveform No. 10: "
L54-3	Serial communication line of data link connector for SDM	7 – 12 V	Ignition switch is at ON position

Junction block connector "L55"

Terminal	Circuit	Normal voltage	Condition
L55-4	Ground for BCM	0 V	Ignition switch is at all positions
L55-6	Right side door mirror heater (if equipped)	10 – 14 V	Engine is running and rear end door window defogger is in operation
		0 V	Engine is running and rear end door window defogger is not in operation
L55-7	Left side door mirror heater (if equipped)	10 – 14 V	Engine is running and rear end door window defogger is in operation
		0 V	Engine is running and rear end door window defogger is not in operation
L55-8	Rear end door window defogger wire	10 – 14 V	Engine is running and rear end door window defogger is in operation
		0 V	Engine is running and rear end door window defogger is not in operation
L55-9	Rear wiper control	10 – 14 V	Ignition switch is at ON position and rear wiper is not in operation
		0 V	Ignition switch is at ON position and rear wiper is in operation

DTC Table

S6RW0GA304004

Immobilizer Control Module

DTC No.	Detected item	Detecting condition
☞ B1000	Immobilizer Control Module internal failure	Immobilizer Control Module failure
☞ B3040	W-line communication failure	Communication not finished correctly
☞ B3042	W-line circuit malfunction shorted to ground	W-line circuit voltage low
☞ B3043	W-line circuit malfunction shorted to battery	W-line circuit voltage high
☞ B3055	No transponder	Ignition key without transponder is used
☞ B3056	No transponder registered	FIX CODE is not registered in Immobilizer Control Module
☞ B3057	No password registered	PWD is not registered in Immobilizer Control Module
☞ B3059	No request from ECM	ECM/Immobilizer Control Module line (MIL control circuit) is open or shorted
☞ B3060	Incorrect transponder detected	Unregistered transponder is detected
☞ B3061	Transponder communication failure	Incorrect signal or no response from transponder
☞ B3077	Read-only transponder detected	Transponder not for this system is detected

ECM

DTC No. Display on scan tool	Detected item	Detecting condition
☞ P1610	Secret key / password not programed	SECRET KEY CODE and password are not registered in ECM
☞ P1611	Password is not matched	Stored password is incorrect
☞ P1612	No signal from immobilizer control module	Invalid signal from Immobilizer Control Module
☞ P1613	Immobilizer system malfunction	Invalid signal from Immobilizer Control Module
☞ P1614	Incorrect signal from immobilizer control module	Received response from transponder is incorrect

NOTE

- **DTC B3040, B3042 and B3043 not be confirmed by scan tool unless W-line circuit is in good condition.**
- **DTC B3059 is detected when ignition switch is turned to ON position within 5 seconds after ignition switch turned to ACC or OFF position from ON position.**