

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.

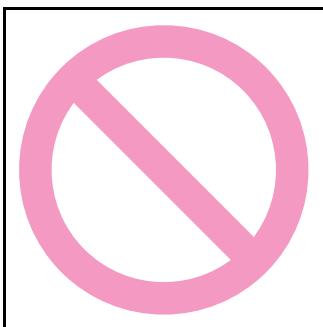
Improper repair may result in injury to the technician and may render the vehicle unsafe for the driver and passengers.

⚠ 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.
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The circle with a slash in this manual means “Don’t do this” or “Don’t let this happen”.



FOREWORD

This SUPPLEMENTARY SERVICE MANUAL is a supplement to GRAND VITARA (JB416/JB420) SERVICE MANUAL.

It has been prepared exclusively for the following applicable model.

Applicable model:

GRAND VITARA (JB416/JB420) vehicles

This supplementary service manual describes only different service information of the above applicable model as compared with GRAND VITARA (JB416/JB420) SERVICE MANUAL. Therefore, whenever servicing the above applicable models, consult this supplement first. And for any section, item or description not found in this supplement, refer to the related manual below.

When replacing parts or servicing by disassembling, it is recommended to use SUZUKI genuine parts, tools and service materials as specified in each description.

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. And used as the main subject of description is the vehicle of standard specifications among others.

Therefore, note that illustrations may differ from the vehicle being actually serviced.

The right is reserved to make changes at any time without notice.

Related Manuals:

Manual Name	Manual No.
GRAND VITARA (JB416/JB420) SERVICE MANUAL	99500-64J00-01E

SUZUKI MOTOR CORPORATION

RECOMMENDATION OF GENUINE SUZUKI PARTS AND ACCESSORIES USE

SUZUKI strongly recommends the use of genuine SUZUKI parts* and accessories. Genuine SUZUKI parts and accessories are built to the highest standards of quality and performance, and are designed to fit the vehicle's exact specifications.

A wide variety of non-genuine replacement parts and accessories for SUZUKI vehicles are currently available in the market. Using these parts and accessories can affect the vehicle performance and shorten its useful life. Therefore, installation of non-genuine SUZUKI parts and accessories is not covered under warranty.

Non-Genuine SUZUKI Parts and Accessories

Some parts and accessories may be approved by certain authorities in your country.

Some parts and accessories are sold as SUZUKI authorized replacement parts and accessories. Some genuine SUZUKI parts and accessories are sold as re-use parts and accessories. These parts and accessories are non-genuine Suzuki parts and accessories and use of these parts are not covered under warranty.

Re-use of Genuine SUZUKI Parts and Accessories

The resale or re-use of the following items which could give rise to safety hazards for users is expressly forbidden:

- 1) Air bag components and all other pyrotechnic items, including their components (e.g. cushion, control devices and sensors)
- 2) Seatbelt system, including their components (e.g. webbing, buckles, and retractors)

The air bag and seat belt pretensioner components contain explosive chemicals. These components should be removed and disposed of properly by SUZUKI authorized service shop or scrap yard to avoid unintended explosion before scrapping.

*The parts remanufactured under SUZUKI's approval can be used as genuine SUZUKI parts in Europe.

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Section 00

00

Precautions

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Precautions

Precautions

Precaution for Vehicle Equipped with ESP® System

S5JB0E0000020

- 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. When vehicle acceleration is not sensed and wheels are rotating, ESP® control module judges that wheels are in slip condition and controls engine torque to reduce by TCS control.
 - 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, G sensor and master cylinder pressure sensor (in ESP® control module) referring to “Sensor Calibration: in Section 4F”.
 - When battery or dome fuse is removed.
 - When steering angle sensor is replaced.
 - When ESP® control module is removed.
 - When yaw rate / G sensor assembly is removed.

Brakes Caution and Note

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CAUTION

All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.

NOTE

Before inspecting and servicing brakes for vehicle equipped with ABS (ESP®), make sure that ABS (ESP®) is in good condition.

Section 0

General Information

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NOTE

For the items with asterisk (*) in the “CONTENTS” below, refer to the same section of the service manual mentioned in the “FOREWORD” of this manual.

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General Information

General Description

Abbreviations

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A:
ABDC: After Bottom Dead Center
ABS: Anti-lock Brake System
AC: Alternating Current
A/C: Air Conditioning
A-ELR: Automatic-Emergency Locking Retractor
A/F: Air Fuel Mixture Ratio
ALR: Automatic Locking Retractor
API: American Petroleum Institute
ATDC: After Top Dead Center
ATF: Automatic Transmission Fluid
A/T: Automatic Transmission
AWD: All Wheel Drive
B:
BBDC: Before Bottom Dead Center
BCM: Body Electrical Control Module
BTDC: Before Top Dead Center
B+: Battery Positive Voltage
C:
CAN: Controller Area Network
CKP Sensor: Crankshaft Position Sensor
CKT: Circuit
CMP Sensor: Camshaft Position Sensor
CO: Carbon Monoxide
CPP Switch: Clutch Pedal Position Switch (Clutch Switch, Clutch Start Switch)
CPU: Central Processing Unit
CRS: Child Restraint System
D:
DC: Direct Current
DLC: Data Link Connector (Assembly Line Diag. Link, ALDL, Serial Data Link, SDL)
DOHC: Double Over Head Camshaft
DOJ: Double Offset Joint
DRL: Daytime Running Light
DTC: Diagnostic Trouble Code (Diagnostic Code)
E:
EBCM: Electronic Brake Control Module, ABS Control Module
EBD: Electronic Brake Force Distribution
ECM: Engine Control Module
ECT Sensor: Engine Coolant Temperature Sensor (Water Temp. Sensor, WTS)
EFE Heater: Early Fuel Evaporation Heater (Positive Temperature Coefficient, PTC Heater)
EGR: Exhaust Gas Recirculation
EGRT Sensor: EGR Temperature Sensor (Recirculated Exhaust Gas Temp. Sensor, REGTS)
ELR: Emergency Locking Retractor
EPS: Electronic Power Steering
ESP®: Electronic Stability Program
EVAP: Evaporative Emission
EVAP Canister: Evaporative Emission Canister (Charcoal Canister)

F:
FWD: Front Wheel Drive
4WD: 4 Wheel Drive
G:
GEN: Generator
GND: Ground
H:
HC: Hydrocarbons
HO2S: Heated Oxygen Sensor
HVAC: Heating, Ventilating and Air Conditioning
I:
IAC Valve: Idle Air Control Valve (Idle Speed Control Solenoid Valve, ISC Solenoid Valve)
IAT Sensor: Intake Air Temperature Sensor (Air temperature Sensor, ATS)
ICM: Immobilizer Control Module
IG: Ignition
IMT: Intake Manifold Tuning
ISC Actuator: Idle Speed Control Actuator (Motor)
L:
LH: Left Hand
LSPV: Load Sensing Proportioning Valve
M:
MAF Sensor: Mass Air Flow Sensor (Air Flow Sensor, AFS, Air Flow Meter, AFM)
MAP Sensor: Manifold Absolute Pressure Sensor (Pressure Sensor, PS)
Max: Maximum
MFI: Multiport Fuel Injection (Multipoint Fuel Injection)
MIL: Malfunction Indicator Lamp ("SERVICE ENGINE SOON" Light)
Min: Minimum
M/T: Manual Transmission
N:
NOx: Nitrogen Oxides
O:
OBD: On-Board Diagnostic System (Self-Diagnosis Function)
OCM: Occupant Classification module
O/D: Overdrive
OHC: Over Head Camshaft
O2S: Oxygen Sensor
P:
PCM: Powertrain Control Module
PCV: Positive Crankcase Ventilation
PNP: Park / Neutral Position
PSP Switch: Power Steering Pressure Switch (P/S Pressure Switch)
P/S: Power Steering
R:
RH: Right Hand
S:
SAE: Society of Automotive Engineers
SDM: Sensing and Diagnostic Module (Air Bag Controller, Air bag Control Module)

SFI: Sequential Multiport Fuel Injection

SOHC: Single Over Head Camshaft

T:

TBI: Throttle Body Fuel Injection (Single-Point Fuel Injection, SPI)

TCC: Torque Converter Clutch

TCM: Transmission Control Module (A/T Controller, A/T Control Module)

TPMS: Tire Pressure Monitoring System

TP Sensor: Throttle Position Sensor

TVV: Thermal Vacuum Valve (Thermal Vacuum Switching Valve, TVSV, Bimetal Vacuum Switching Valve, BVSV)

TWC: Three Way Catalytic Converter (Three Way Catalyst)

2WD: 2 Wheel Drive

V:

VIN: Vehicle Identification Number

VSS: Vehicle Speed Sensor

VVT: Variable Valve Timing (Camshaft Position Control)

W:

WU-OC: Warm Up Oxidation Catalytic Converter

WU-TWC: Warm Up Three Way Catalytic Converter

Section 1

Engine

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Engine General Information and Diagnosis

Precautions

Precautions in Diagnosing Trouble

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- Don't disconnect couplers from ECM, battery cable from battery, ECM ground wire harness from engine or main fuse before confirming diagnostic information (DTC, freeze frame data, etc.) stored in ECM memory. Such disconnection will erase memorized information in ECM memory.

- Diagnostic information stored in ECM memory can be cleared as well as checked by using SUZUKI scan tool or OBD generic scan tool (Vehicle without diagnosis connector). Before using scan tool, read its Operator's (Instruction) Manual carefully to have good understanding as to what functions are available and how to use it.

It is indistinguishable which module turns on MIL because not only ECM but also TCM (for A/T model) turns on MIL (For details of on-board diagnostic system for A/T model, refer to "On-Board Diagnostic System Description: in Section 5A in related manual". Therefore, check both ECM and TCM (for A/T model) for DTC when MIL lights on.

When checking ECM for DTC, keep in mind that DTC is displayed on the scan tool as follows depending on the scan tool used.

- SUZUKI scan tool displays DTC detected by ECM.
- OBD generic scan tool displays DTC detected by each of ECM and TCM (for A/T model) simultaneously.

- Priorities for diagnosing troubles

If two or more DTCs are stored, proceed to the DTC flow which has been detected earliest in the order and follow the instruction in that flow.

If no instructions are given, troubleshoot DTCs according to the following priorities.

- a. DTCs other than DTC P0171 / P0172 (Fuel system too lean / too rich), DTC P0300 / P0301 / P0302 / P0303 / P0304 (Misfire detected) and DTC P0401 / P0402 (EGR flow malfunction)
- b. DTC P0171 / P0172 (Fuel system too lean / too rich) and DTC P0401 / P0402 (EGR flow malfunction)
- c. DTC P0300 / P0301 / P0302 / P0303 / P0304 (Misfire detected)

- Be sure to read "Precautions for Electrical Circuit Service: in Section 00 in related manual" before inspection and observe what is written there.
- ECM replacement:
When substituting a known-good ECM, check for the following conditions. Neglecting this check may cause damage to a known-good ECM.
 - Resistance value of all relays and actuators is as specified respectively.
 - MAP sensor, electric load current sensor (for J20 engine), A/C refrigerant pressure sensor (if equipped with A/C), accelerator pedal position (APP) sensor, TP sensor and CO adjust resistor (if not equipped with A/F sensor) are in good condition and none of power circuits of these sensors is shorted to ground.
- Communication of ECM, BCM, combination meter, keyless start control module (if equipped), ABS / ESP® control module, 4WD control module (if equipped), steering angle sensor (if equipped) and TCM (for A/T model) is established by CAN (Controller Area Network). (For more detail of CAN communication for ECM, refer to "CAN Communication System Description: "). Therefore, handle CAN communication line with care referring to "Precaution for CAN Communication System: in Section 00 in related manual".
- Immobilizer transponder code registration after replacing ECM:
When ECM is replaced with new one or with another one, make sure to register immobilizer transponder code with ECM correctly according to "Procedure after ECM Replacement: in Section 10C in related manual".

General Description

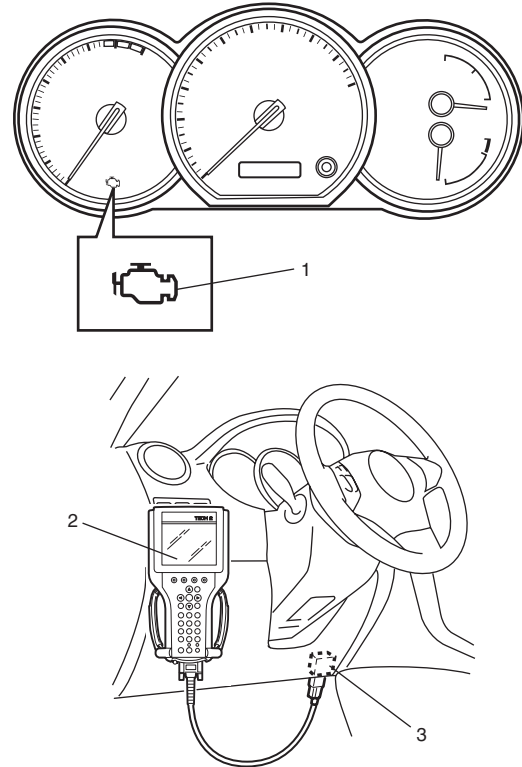
On-Board Diagnostic System Description

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Vehicle not Equipped with Diagnosis Connector

ECM in this vehicle has the following functions.

- When the ignition switch is turned ON with the engine at a stop, malfunction indicator lamp (MIL) (1) turns ON to check the circuit of the malfunction indicator lamp (1).
- When ECM detects a malfunction which gives an adverse effect to vehicle emission while the engine is running, it makes the malfunction indicator lamp (1) in the meter cluster of the instrument panel turn ON or flash (flashing only when detecting a misfire which can cause damage to the catalyst) and stores the malfunction area in its memory.
(If it detects that continuously 3 driving cycles are normal after detecting a malfunction, however, it makes MIL (1) turn OFF although DTC stored in its memory will remain.)
- As a condition for detecting a malfunction in some areas in the system being monitored by ECM and turning ON the malfunction indicator lamp (1) due to that malfunction, 2 driving cycle detection logic is adopted to prevent erroneous detection.
- When a malfunction is detected, engine and driving conditions then are stored in ECM memory as freeze frame data. (For the details, refer to description on "Freeze Frame Data (Vehicle Not Equipped with Diagnosis Connector):".)
- It is possible to communicate by using not only SUZUKI scan tool (2) but also OBD generic scan tool. (Diagnostic information can be accessed by using a scan tool.)



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3. DLC

Vehicle Equipped with Diagnosis Connector

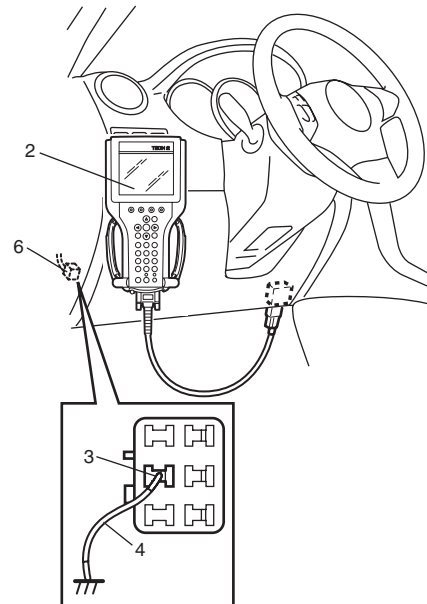
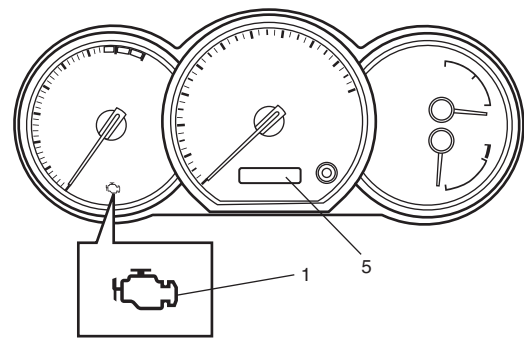
ECM diagnosis troubles which may occur in the area including the following parts when the ignition switch is ON and the engine is running, and indicates the result by turning on or flashing malfunction indicator lamp (1).

- A/F sensor (if equipped)
- Heated oxygen sensor (if equipped)
- ECT sensor
- TP sensor
- MAF sensor
- IAT sensor
- MAP sensor
- CMP sensor
- CKP sensor
- Knock sensor
- Wheel speed sensor
- CPU (Central Processing Unit) of ECM
- APP sensor
- Oil control valve (for M16 engine)
- Radiator cooling fan relay

ECM and malfunction indicator lamp (1) operate as follows.

- Malfunction indicator lamp (1) lights when the ignition switch is turned ON (but the engine at stop) with the diagnosis switch terminal ungrounded regardless of the condition of Engine and Emission control system. This is only to check the malfunction indicator lamp (1) in the combination meter and its circuit.
- If the above areas of Engine and Emission control system is free from any trouble after the engine start (while engine is running), malfunction indicator lamp (1) turns OFF.
- When ECM detects a trouble which has occurred in the above areas, it makes malfunction indicator lamp (1) turn ON while the engine is running to warn the driver of such occurrence of trouble and at the same time it stores the trouble area in ECM back-up memory. (The memory is kept as it is even if the trouble was only temporary and disappeared immediately. And it is not erased unless the power to ECM is shut off for specified time or it is cleared by SUZUKI scan tool (2).)

In addition, DTC can be read by not only using SUZUKI scan tool but also displayed on odometer (5) of the combination meter. (i.e. when diagnosis switch terminal (3) is grounded with a service wire (4) and ignition switch is turned ON.) For further detail of the checking procedure, refer to "DTC Check: in related manual".



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6. Diagnosis connector

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 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 malfunction indicator lamp does not light at this time. It lights up at the second detection of same malfunction also in the next driving cycle.

Pending DTC

Pending DTC means a DTC detected and stored temporarily at 1 driving cycle of the DTC which is detected in the 2 driving cycle detection logic.

1A-4 Engine General Information and Diagnosis:

Freeze Frame Data (Vehicle Not Equipped with Diagnosis Connector)

ECM stores the engine and driving conditions (in the form of data as shown in the figure) at the moment of the detection of a malfunction in its memory. This data is called "Freeze frame data".

Therefore, it is possible to know engine and driving conditions (e.g., whether the engine was warm or not, where the vehicle was running or stopped, where air/fuel mixture was lean or rich) when a malfunction was detected by checking the freeze frame data. Also, ECM has a function to store each freeze frame data for three different malfunctions in the order as each malfunction is detected. Utilizing this function, it is possible to know the order of malfunctions that have been detected. Its use is helpful when rechecking or diagnosing a trouble.

Code List	
***** → Engine →	
Freeze Data → ***** → Trouble Codes →	
Code	Description
P0102	MAF Crt Low Input
P0102 (1)	MAF Crt Low Input
P0133 (2)	IAT Crt High Input

[A]



Freeze Data	
Trouble Code	0102
Coolant Temp	93 °C
Engine Speed	676 RPM
Short FT B1	0.0 %
Long FT B1	0.7 %
Calc Load	0.3 %
Fuel System B1	CLSD
MAP	43 kPa
Vehicle Speed	0 km/h
***** END *****	

Change Units

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[A]: 1st or 2nd in parentheses here represents which position in the order the malfunction is detected.

Priority of freeze frame data:

ECM has 4 frames where the freeze frame data can be stored. The first frame stores the freeze frame data of the malfunction which was detected first. However, the freeze frame data stored in this frame is updated according to the priority described. (If malfunction as described in the upper square "1" is detected while the freeze frame data in the lower square "2" has been stored, the freeze frame data "2" will be updated by the freeze frame data "1".)

Priority	Freeze frame data in frame 1
1	Freeze frame data at initial detection of malfunction among misfire detected (P0300 – P0304), fuel system too lean (P0171) and fuel system too rich (P0172)
2	Freeze frame data when a malfunction other than those in "1" is detected

In the 2nd through the 4th frames, the freeze frame data of each malfunction is stored in the order as each malfunction is detected. These data are not updated.

Shown in the table are examples of how freeze frame data are stored when two or more malfunctions are detected.

Malfunction detected order	Frame			
	Frame 1 Freeze frame data to be updated	Frame 2 1st freeze frame data	Frame 3 2nd freeze frame data	Frame 4 3rd freeze frame data
No malfunction	No freeze frame data			
1 P0401 (EGR) detected	Data at P0401 detection	Data at P0401 detection	—	—
2 P0171 (Fuel system) detected	Data at P0171 detection	Data at P0401 detection	Data at P0171 detection	—
3 P0300 (Misfire) detected	Data at P0171 detection	Data at P0401 detection	Data at P0171 detection	Data at P0300 detection
4 P0301 (Misfire) detected	Data at P0171 detection	Data at P0401 detection	Data at P0171 detection	Data at P0300 detection

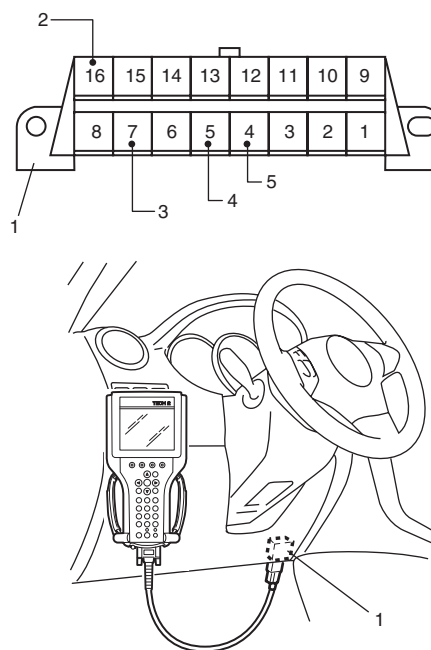
Freeze frame data clearance:

The freeze frame data is cleared at the same time as clearance of DTC.

Data Link Connector (DLC)

DLC (1) is in compliance with SAE J1962 in the shape of connector and pin assignment.

OBD serial data line (3) (K line of ISO 9141) is used for SUZUKI scan tool or OBD generic scan tool to communicate with ECM, Air bag SDM, immobilizer control module (in ECM), BCM (Body electrical Control Module), TCM (Transmission Control Module (for A/T model)), 4WD control module (if equipped) and ABS / ESP® control module.



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2. B + (Unswitched vehicle battery positive)
4. ECM ground (Signal ground)
5. Vehicle body ground (Chassis ground)

Engine and Emission Control System Description

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The engine and emission control system is divided into 4 major sub-systems: air intake system, fuel delivery system, electronic control system and emission control system.

Air intake system includes air cleaner, throttle body, and intake manifold.

Fuel delivery system includes fuel pump, delivery pipe, etc.

Electronic control system includes ECM, various sensors and controlled devices.

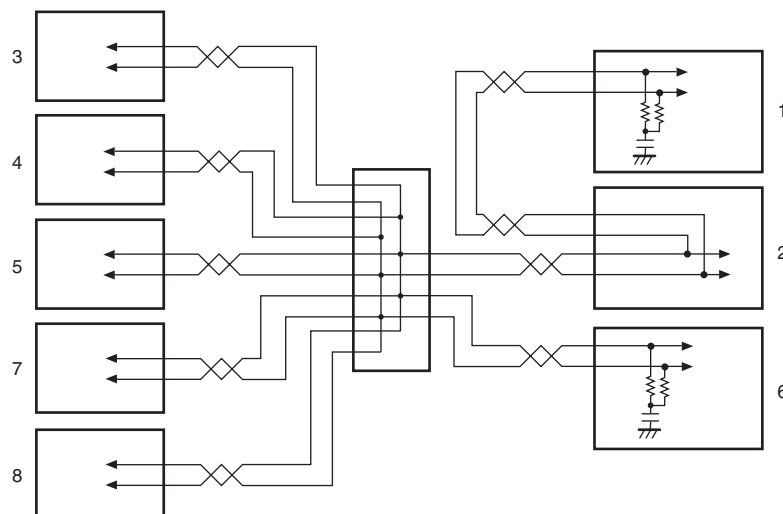
Emission control system includes EGR, EVAP and PCV system.

CAN Communication System Description

S5JB0E1101005

ECM (1), ABS / ESP® control module (2), TCM (for A/T model) (3), BCM (4), 4WD control module (if equipped) (5), combination meter (6), keyless start control module (if equipped) (7) and steering angle sensor (for vehicle with ESP®) (8) of this vehicle communicate control data between each control module.

Communication of each control module is established by CAN (Controller Area Network) communication system.



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1A-6 Engine General Information and Diagnosis:

CAN communication system uses the serial communication in which data is transmitted at a high speed. It uses a twisted pair of two communication lines for the high-speed data transmission. As one of its characteristics, multiple control modules can communicate simultaneously. In addition, it has a function to detect a communication error automatically. Each module reads necessary data from the received data and transmits data. ECM communicates control data with each control module as follows.

ECM Transmission Data

Transmit data of ECM	TCM (for A/T model)	ABS hydraulic unit/control module assembly (for vehicle without ESP®)	ESP® control module (for vehicle with ESP®)	BCM	Combination meter	4WD control module (if equipped)	Keyless start control module (if equipped)
Engine torque signal	○		○				
Accelerator pedal position	○		○				
Engine speed	○		○	○	○	○	
Throttle position	○						
Stand by to engage air conditioning compressor	○						
Top gear inhibit	○						
Torque converter clutch control inhibit	○						
Lock up / slip control inhibit signal	○						
Immobilizer indication					○		
Engine emissions related malfunction					○		
Engine coolant temperature	○			○	○		
Fuel level percent					○		
Cruise control signal (if equipped)	○						
Cruise control system indication (if equipped)					○		
Vehicle speed	○			○	○	○	○
Brake pedal switch active	○	○	○	○			
Air conditioning compressor clutch engaged (if equipped with A/C)	○			○			
A/C refrigerant pressure	○			○			
Distance kilometers per liter of fuel				○			
Engine diagnostic trouble codes (if equipped with diagnosis connector)					○		

I5JB0D110001-02

NOTE

In communication between ECM and combination meter, between ECM and keyless start control module (if equipped) and between ECM and 4WD control module (if equipped), data is transmitted only from ECM to combination meter, keyless start control module (if equipped) and 4WD control module (if equipped). (Combination meter, keyless start control module (if equipped) and 4WD control module (if equipped) does not transmit data to ECM.)

ECM Reception Data

Receives data of ECM	TCM (for A/T model)	ABS hydraulic unit/control module assembly (for vehicle without ESP®)	ESP® control module (for vehicle with ESP®)	BCM
Torque reduction request	○		○	
Slip control signal	○			
Transmission malfunction indication on	○			
Transmission emissions related malfunction active	○			
Transmission gear selector position	○			
Daytime running light active (if equipped with DRL)				○
Air conditioning switch ON (if equipped with A/C)				○
A/T mode status				○
Electric load active (low beam)				○
Electric load active (high beam)				○
Electric load active (tail light)				○
Electric load active (rear defogger)				○
Blower fan step				○
Torque up request		○	○	
Wheel speed pulse (rear right)		○	○	
Wheel speed pulse (rear left)		○	○	
Electronic stability program system active			○	
Electronic stability program system off			○	
Antilock brake system active		○		

I5JB0D110002-02

Electronic Control System Description

S5JB0E1101011

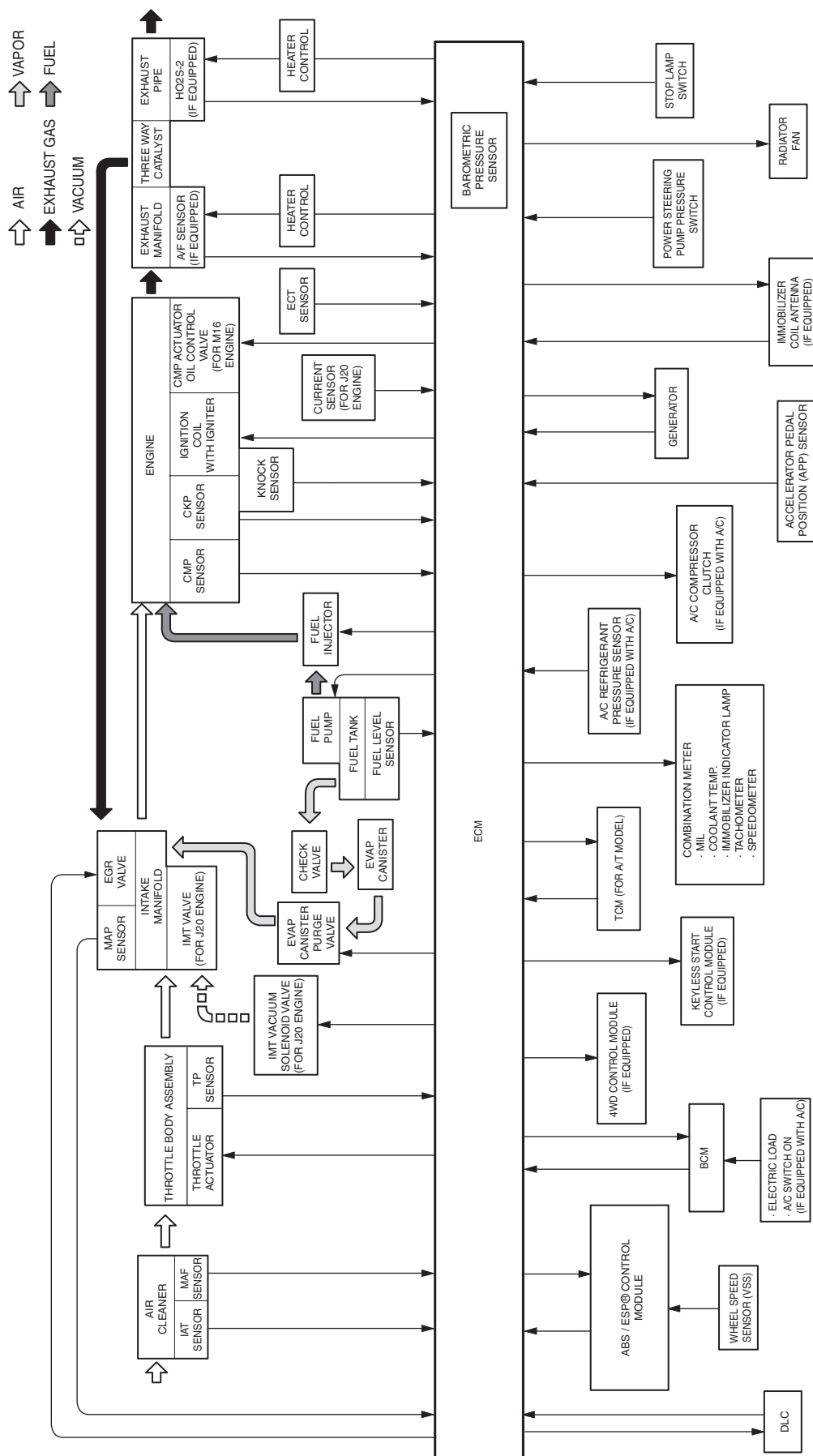
The electronic control system consists of 1) various sensors which detect the state of engine and driving conditions, 2) ECM which controls various devices according to the signals from the sensors and 3) various controlled devices. Functionally, it is divided into the following sub systems:

- Fuel injection control system
- Ignition control system
- Intake manifold tuning valve control system (for J20 engine)
- Electric Throttle Body Control System
- Fuel pump control system
- Radiator cooling fan control system
- Evaporative emission control system (if equipped)
- EGR system
- A/F sensor heater control system (if equipped)
- Oxygen sensor heater control system (if equipped)
- A/C control system (if equipped with A/C)
- Camshaft position control system (for M16 engine)
- Immobilizer control system (if equipped)
- Generator control system (for J20 engine)
- Controller (computer) communication system

Especially, ECM (Engine Control Module), BCM (Body electrical Control Module), combination meter, TCM (Transmission Control Module (For A/T model)), ABS / ESP® control module, 4WD control module (if equipped), keyless start control module (if equipped) and steering angle sensor (for vehicle with ESP®) intercommunicate by means of CAN (Controller Area Network) communication.

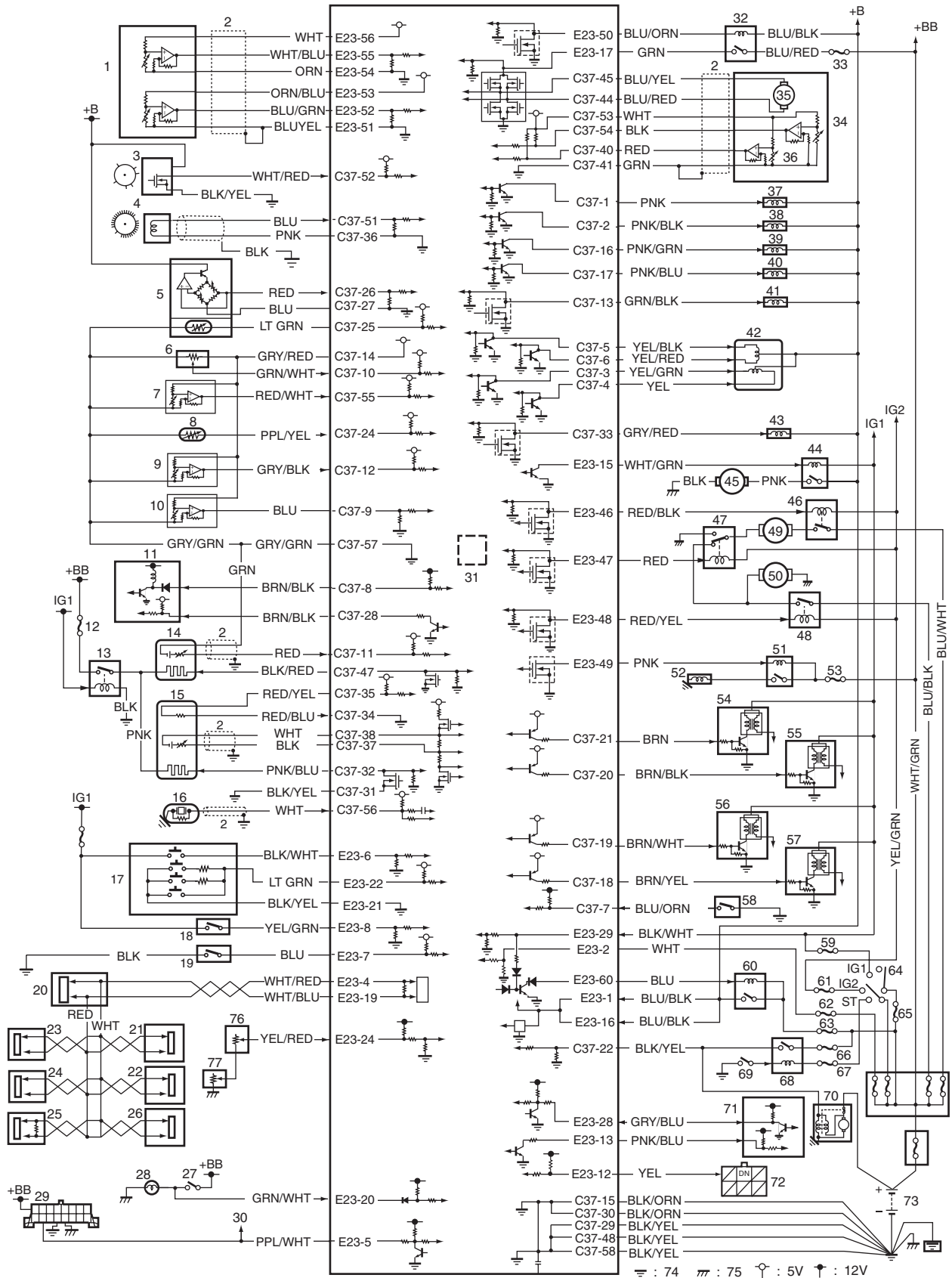
1A-8 Engine General Information and Diagnosis:

Engine and Emission Control System Flow Diagram



ECM Input / Output Circuit Diagram

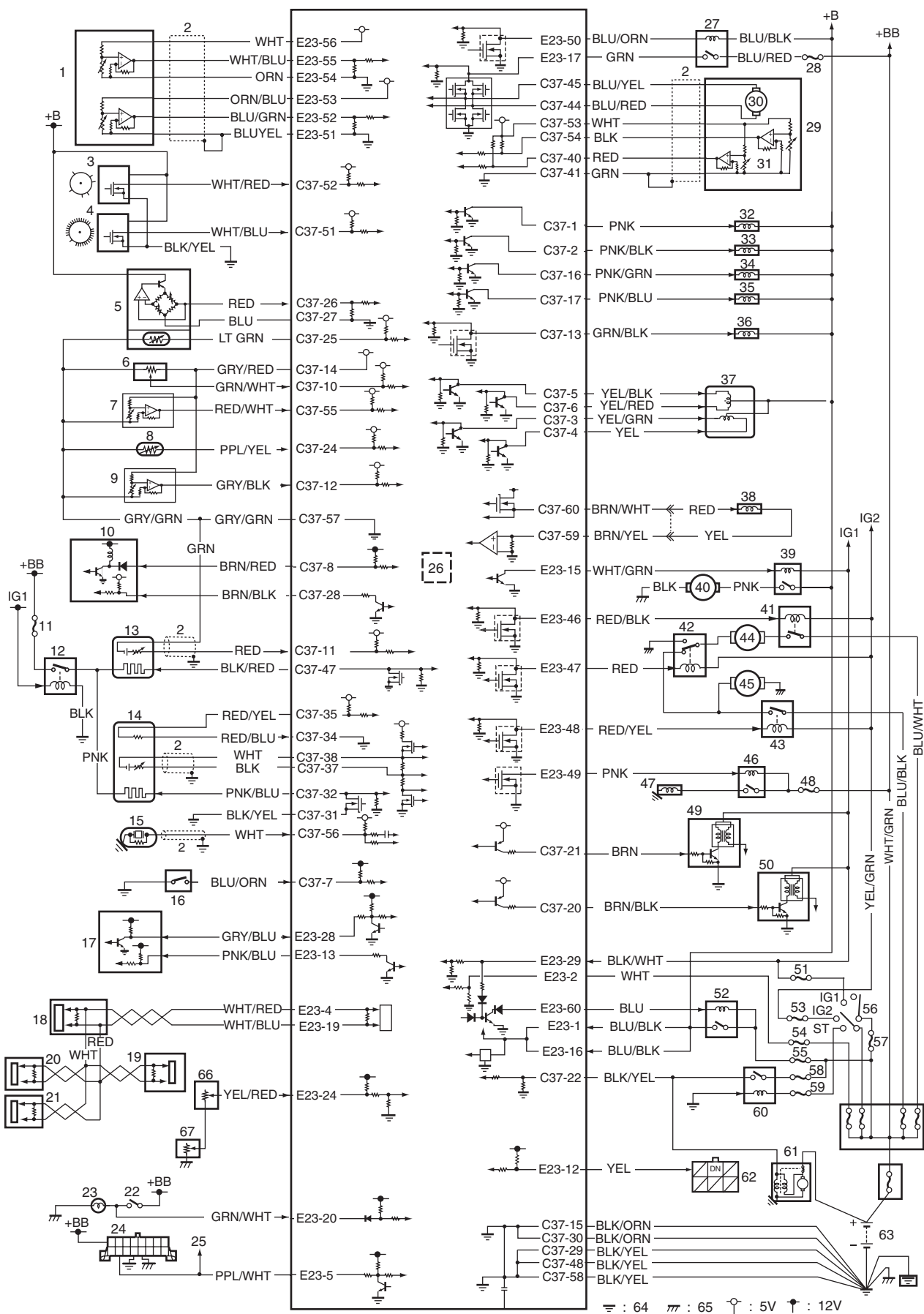
For J20 engine



1A-10 Engine General Information and Diagnosis:

1. Accelerator pedal position (APP) sensor assembly	27. Stop lamp switch	53. "CPRSR" fuse
2. Shield wire	28. Stop lamp	54. Ignition coil assembly (for No.1 spark plug)
3. CMP sensor	29. DLC	55. Ignition coil assembly (for No.2 spark plug)
4. CKP sensor	30. To TCM (for A/T model), BCM, ABS / ESP® control module and 4WD control module (if equipped)	56. Ignition coil assembly (for No.3 spark plug)
5. MAF and IAT sensor	31. Barometric pressure sensor	57. Ignition coil assembly (for No.4 spark plug)
6. CO adjust resistor (if equipped)	32. Throttle actuator control relay	58. Power steering pump pressure switch
7. MAP sensor	33. "THR MOT" fuse	59. "IG COIL" fuse
8. ECT sensor	34. Electric throttle body assembly	60. Main relay
9. A/C refrigerant pressure sensor (if equipped with A/C)	35. Throttle actuator	61. "IG2 SIG" fuse
10. Electric load current sensor	36. Throttle position sensor	62. "DOME" fuse
11. Generator	37. Fuel injector No.1	63. "FI" fuse
12. "O2 HTR" fuse	38. Fuel injector No.2	64. Ignition switch
13. HO2S heater relay	39. Fuel injector No.3	65. "IGN" fuse
14. HO2S-2	40. Fuel injector No.4	66. "STR MOT" fuse
15. A/F sensor	41. EVAP canister purge valve	67. "ST SIG" fuse
16. Knock sensor	42. EGR valve	68. Starting motor control relay
17. Cruise control switch (if equipped)	43. IMT vacuum solenoid valve	69. Transmission range switch (for A/T model)
18. Brake pedal switch (for cruise control)	44. Fuel pump relay	70. Starting motor
19. Clutch pedal position switch (for cruise control)	45. Fuel pump	71. Immobilizer coil antenna (if equipped)
20. ABS / ESP® control module	46. Radiator cooling fan relay No.1	72. Diagnosis connector (if equipped)
21. BCM	47. Radiator cooling fan relay No.2	73. Battery
22. TCM (for A/T model)	48. Radiator cooling fan relay No.3	74. Engine ground
23. Combination meter	49. Radiator cooling fan motor No.1	75. Body ground
24. 4WD control module (if equipped)	50. Radiator cooling fan motor No.2	76. Main fuel level sensor
25. Keyless start control module (if equipped)	51. A/C compressor relay (if equipped with A/C)	77. Sub fuel level sensor
26. Steering angle sensor (for vehicle with ESP®)	52. A/C compressor (if equipped with A/C)	

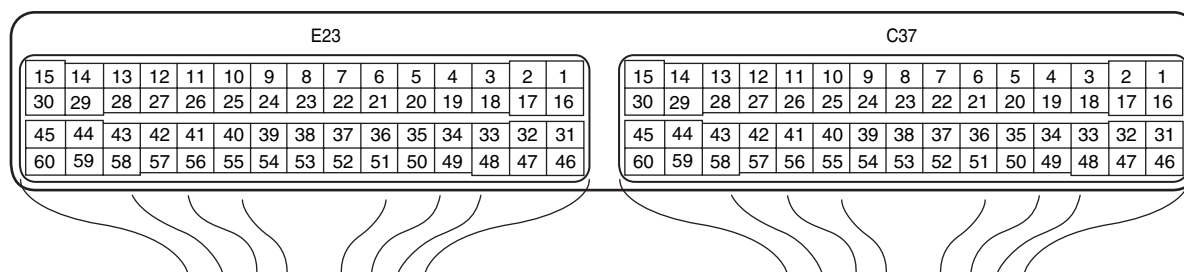
For M16 engine



1A-12 Engine General Information and Diagnosis:

1. Accelerator pedal position (APP) sensor assembly	24. DLC	47. A/C compressor (if equipped with A/C)
2. Shield wire	25. To BCM and ABS / ESP® control module	48. "CPRSR" fuse
3. CMP sensor	26. Barometric pressure sensor	49. Ignition coil assembly (for No.1 and No.4 spark plugs)
4. CKP sensor	27. Throttle actuator control relay	50. Ignition coil assembly (for No.2 and No.3 spark plugs)
5. MAF and IAT sensor	28. "THR MOT" fuse	51. "IG COIL" fuse
6. CO adjust resistor (if equipped)	29. Electric throttle body assembly	52. Main relay
7. MAP sensor	30. Throttle actuator	53. "IG2 SIG" fuse
8. ECT sensor	31. Throttle position sensor	54. "DOME" fuse
9. A/C refrigerant pressure sensor (if equipped with A/C)	32. Fuel injector No.1	55. "FI" fuse
10. Generator	33. Fuel injector No.2	56. Ignition switch
11. "O2 HTR" fuse	34. Fuel injector No.3	57. "IGN" fuse
12. HO2S heater relay	35. Fuel injector No.4	58. "STR MOT" fuse
13. HO2S-2	36. EVAP canister purge valve	59. "ST SIG" fuse
14. A/F sensor	37. EGR valve	60. Starting motor control relay
15. Knock sensor	38. Oil control valve (Camshaft position control)	61. Starting motor
16. Power steering pump pressure switch	39. Fuel pump relay	62. Diagnosis connector (if equipped)
17. Immobilizer coil antenna (if equipped)	40. Fuel pump	63. Battery
18. ABS / ESP® control module	41. Radiator cooling fan relay No.1	64. Engine ground
19. BCM	42. Radiator cooling fan relay No.2	65. Body ground
20. Combination meter	43. Radiator cooling fan relay No.3	66. Main fuel level sensor
21. Steering angle sensor (for vehicle with ESP®)	44. Radiator cooling fan motor No.1	67. Sub fuel level sensor
22. Stop lamp switch	45. Radiator cooling fan motor No.2	
23. Stop lamp	46. A/C compressor relay (if equipped with A/C)	

Terminal Arrangement of ECM Coupler (Viewed from Harness Side)



I4RS0A110008-01

Connector: C37

Terminal	Wire color	Circuit	Terminal	Wire color	Circuit
1	PNK	Fuel injector No.1	31	BLK/YEL	Ground for A/F sensor heater
2	PNK/BLK	Fuel injector No.2	32	PNK/BLU	Heater output of A/F sensor
3	YEL/GRN	EGR valve (stepper motor coil 3)	33	GRY/RED	Intake manifold tuning vacuum solenoid valve output (for J20 engine)
4	YEL	EGR valve (stepper motor coil 4)	34	RED/BLU	Ground for A/F sensor adjusting resistor
5	YEL/BLK	EGR valve (stepper motor coil 1)	35	RED/YEL	A/F sensor adjusting resistor signal
6	YEL/RED	EGR valve (stepper motor coil 2)	36	PNK	Crankshaft position (CKP) sensor (–) (for J20 engine)
7	BLU/ORN	Power steering pump pressure switch signal	37	BLK	A/F sensor signal (–)
8	BRN/RED (for M16 engine) BRN/BLK (for J20 engine)	Generator field coil monitor signal	38	WHT	A/F sensor signal (+)

Terminal	Wire color	Circuit	Terminal	Wire color	Circuit
9	BLU	Electric load current sensor signal (for J20 engine)	39	—	—
10	GRN/WHT	CO adjusting resistor signal (if equipped)	40	RED	Throttle position sensor (sub) signal
11	RED	Oxygen signal of heated oxygen sensor-2	41	GRN	Ground for throttle position sensor
12	GRY/BLK	A/C refrigerant pressure sensor signal (if equipped with A/C)	42	—	—
13	GRN/BLK	EVAP canister purge valve output	43	—	—
14	GRY/RED	Output of 5 V power source for MAP sensor, A/C refrigerant pressure sensor, electric load current sensor (for J20 engine) and CO adjusting resistor (if equipped)	44	BLU/RED	Output of throttle actuator
15	BLK/ORN	Ground for ECM	45	BLU/YEL	Output of throttle actuator
16	PNK/GRN	Fuel injector No.3	46	—	—
17	PNK/BLU	Fuel injector No.4	47	BLK/RED	Heater output of heated oxygen sensor-2
18	BRN/YEL	Ignition coil No.4 (for J20 engine)	48	BLK/YEL	Ground for ECM
19	BRN/WHT	Ignition coil No.3 (for J20 engine)	49	—	—
20	BRN/BLK	Ignition coil No.2 and No.3 (for M16 engine)	50	—	—
		Ignition coil No.2 (for J20 engine)			
21	BRN	Ignition coil No.1 and No.4 (for M16 engine)	51	WHT/BLU	CKP sensor signal (for M16 engine)
		Ignition coil No.1 (for J20 engine)		BLU	Crankshaft position (CKP) sensor (+) (for J20 engine)
22	BLK/YEL	Starting motor signal	52	WHT/RED	CMP sensor signal
23	—	—	53	WHT	Output for 5 V power source of throttle position sensor
24	PPL/YEL	Engine coolant temp. (ECT) sensor signal	54	BLK	Throttle position sensor (main) signal
25	LT GRN	Intake air temp. (IAT) sensor signal	55	RED/WHT	Manifold absolute pressure (MAP) sensor signal
26	RED	Mass air flow (MAF) sensor signal	56	WHT	Knock sensor signal
27	BLU	Ground for MAF sensor	57	GRY/GRN	Ground for sensors
28	BRN/BLK	Generator control signal output	58	BLK/YEL	Ground for ECM
29	BLK/YEL	Ground for ECM	59	BRN/YEL	Oil control valve ground (for M16 engine)
30	BLK/ORN	Ground for ECM	60	BRN/WHT	Oil control valve output (for M16 engine)

Connector: E23

Terminal	Wire color	Circuit	Terminal	Wire color	Circuit
1	BLU/BLK	Main power supply	31	—	—
2	WHT	Power source for ECM internal memory	32	—	—
3	—	—	33	—	—
4	WHT/RED	CAN (high) communication line (active high signal) to ABS / ESP® control module	34	—	—

1A-14 Engine General Information and Diagnosis:

Terminal	Wire color	Circuit	Terminal	Wire color	Circuit
5	PPL/WHT	12 V serial communication line of data link connector	35	—	—
6	BLK/WHT	Cruise control main switch signal (if equipped with cruise control system)	36	—	—
7	BLU	Clutch pedal position switch signal (if equipped with cruise control system)	37	—	—
8	YEL/GRN	Brake pedal position switch (if equipped with cruise control system)	38	—	—
9	—	—	39	—	—
10	—	—	40	—	—
11	—	—	41	—	—
12	YEL	Diagnosis switch terminal (if equipped)	42	—	—
13	PNK/BLU	Clock signal for immobilizer coil antenna (if equipped)	43	—	—
14	—	—	44	—	—
15	WHT/GRN	Fuel pump relay output	45	—	—
16	BLU/BLK	Main power supply	46	RED/BLK	Radiator cooling fan relay No.1 output
17	GRN	Power supply of throttle actuator drive circuit	47	RED	Radiator cooling fan relay No.2 output
18	—	—	48	RED/YEL	Radiator cooling fan relay No.3 output
19	WHT/BLU	CAN (low) communication line (active low signal) to ABS / ESP® control module	49	PNK	A/C compressor relay output (if equipped with A/C)
20	GRN/WHT	Stop lamp switch signal	50	BLU/ORN	Throttle actuator control relay output
21	BLK/YEL	Cruise control command switch ground (if equipped with cruise control system)	51	BLU/YEL	Ground for accelerator pedal position (APP) sensor (sub)
22	LT GRN	Cruise control command switch signal (if equipped with cruise control system)	52	BLU/GRN	Accelerator pedal position (APP) sensor (sub) signal
23	—	—	53	ORN/BLU	Output for 5 V power source of accelerator pedal position (APP) sensor (sub)
24	YEL/RED	Fuel level sensor signal	54	ORN	Ground for accelerator pedal position (APP) sensor (main)
25	—	—	55	WHT/BLU	Accelerator pedal position (APP) sensor (main) signal
26	—	—	56	WHT	Output for 5 V power source of accelerator pedal position (APP) sensor (main)
27	—	—	57	—	—
28	GRY/BLU	Serial communication line for immobilizer coil antenna (if equipped)	58	—	—
29	BLK/WHT	Ignition switch signal	59	—	—
30	—	—	60	BLU	Main power supply relay output

Engine and Emission Control Input / Output Table

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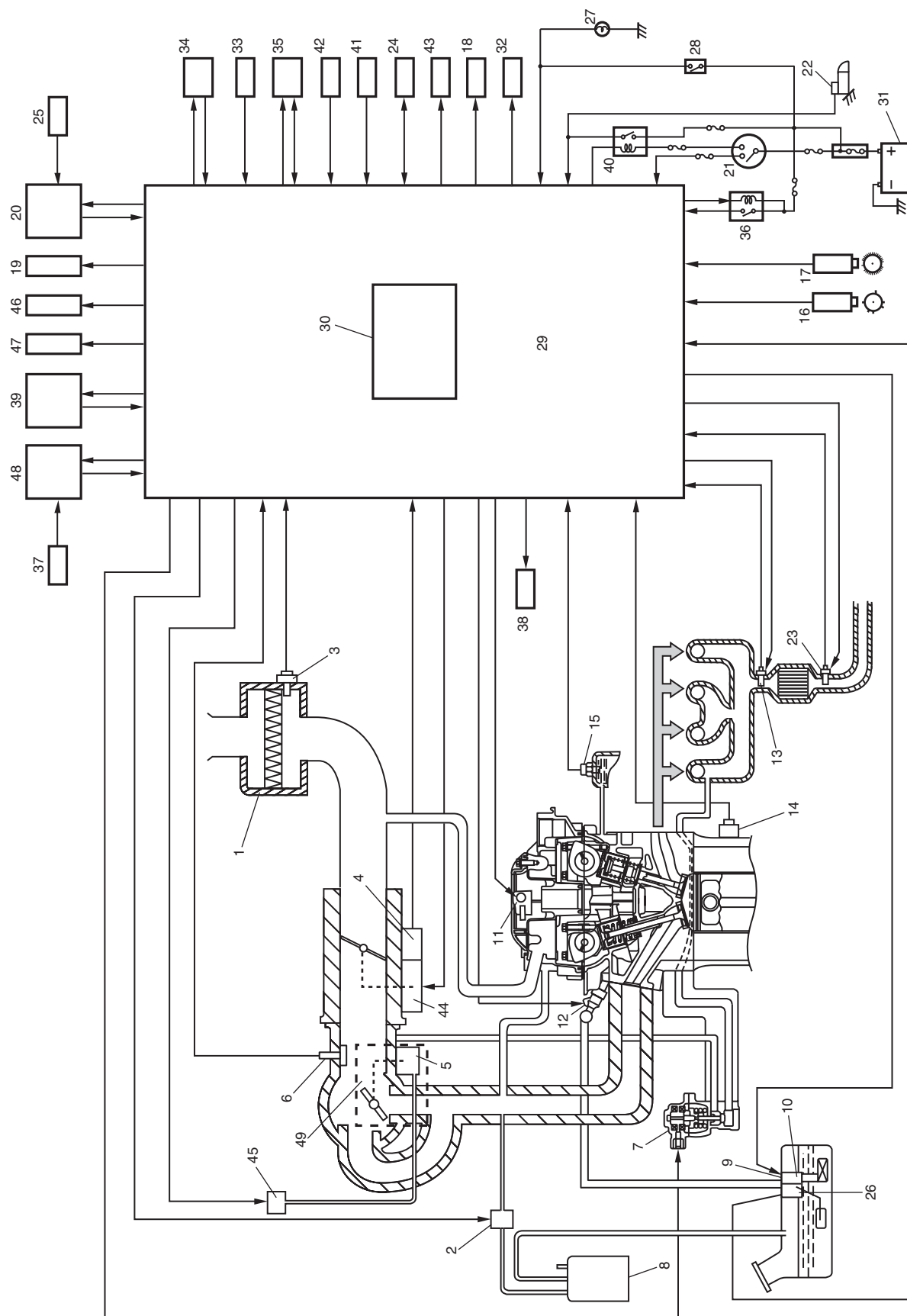
INPUT OUTPUT		ELECTRIC CONTROL DEVICE															
		FUEL PUMP RELAY	FUEL INJECTOR	A/F SENSOR HEATER & HO2S HEATER	THROTTLE ACTUATOR	IGNITION COIL WITH IGNITER	EGR VALVE	EVAP CANISTER PURGE VALVE	A/C COMPRESSOR RELAY (if equipped with A/C)	RADIATOR FAN RELAY	MIL	MAIN RELAY	THROTTLE ACTUATOR CONTROL RELAY	OIL CONTROL VALVE (for M16 engine)	IMT VACUUM SOLENOID VALVE (for J20 engine)	GENERATOR CONTROL	
SIGNAL FROM SENSOR, SWITCH AND CONTROL MODULE	FUEL LEVEL SENSOR	For detecting fuel level															
	BAROMETRIC PRESSURE SENSOR		○		○			○			○						
	STOP LAMP SWITCH				○												
	START SWITCH	○	○		○	○			○							○	
	IGNITION SWITCH	○	○	○	○	○	○	○	○	○	○	○	○	○			
	A/C REFRIGERANT PRESSURE SENSOR (if equipped with A/C)				○				○	○							
	BLOWER SWITCH				○				○							○	
	A/C SWITCH (if equipped with A/C)				○			○	○	○							
	A/C EVAP OUTLET AIR TEMP. SENSOR (if equipped with A/C)				○				○	○							
	WHEEL SPEED SENSOR				○		○	○	○	○	○			○			
	A/F SENSOR		○					○			○						
	HEATED OXYGEN SENSOR-2		○								○						
	MAF SENSOR OF MAF AND IAT SENSOR		○	○	○	○	○	○			○			○			
	IAT SENSOR OF MAF AND IAT SENSOR		○		○	○	○	○			○			○			
	ECT SENSOR		○	○	○	○	○	○	○	○	○			○	○		
	POWER STEERING PRESSURE SWITCH				○												
	TP SENSOR		○	○	○	○	○	○	○		○		○		○		
	ACCELERATOR PEDAL POSITION (APP) SENSOR				○						○		○				
	MAP SENSOR										○						
	CMP SENSOR		○			○					○			○	○		
	CKP SENSOR	○	○	○	○	○	○	○	○		○			○			
	KNOCK SENSOR					○					○						
	ABS / ESP® CONTROL MODULE				○												
	IMMOBILIZER CONTROL MODULE (in ECM) (if equipped)	○	○			○					○						
	SHIFT RANGE SWITCH (except "P" or "N" range) (for A/T model)				○												
	ELECTRIC LOAD (headlight, rear defogger)				○											○	
	GENERATOR										○						

I5JB0D110006-01

Schematic and Routing Diagram

Engine and Emission Control System Diagram

S5JB0E1102001



I5JB0A110015-04

1. Air cleaner	18. Radiator cooling fan motor	35. Immobilizer coil antenna (if equipped)
2. EVAP canister purge valve	19. Combination meter	36. Main relay
3. MAF and IAT sensor	20. BCM	37. Wheel speed sensor (VSS)
4. TP sensor	21. Ignition switch	38. Oil control valve (for M16 engine)
5. IMT valve (for J20 engine)	22. Starter magnetic switch	39. TCM (for A/T or model)
6. MAP sensor	23. Heated oxygen sensor (HO2S)-2	40. Starting motor control relay
7. EGR valve	24. DLC	41. A/C refrigerant pressure sensor (if equipped with A/C)
8. EVAP canister	25. Electric load	42. Accelerator pedal position (APP) sensor
9. Tank pressure control valve (built-in fuel pump)	26. Fuel level sensor	43. Throttle actuator control relay
10. Fuel pump	27. Stop lamp	44. Throttle actuator
11. Ignition coil assembly	28. Stop lamp switch	45. IMT vacuum solenoid valve (for J20 engine)
12. Fuel injector	29. ECM	46. Keyless start control module (if equipped)
13. A/F sensor	30. Barometric pressure sensor	47. 4WD control module (if equipped)
14. Knock sensor	31. Battery	48. ABS / ESP® control module
15. ECT sensor	32. A/C compressor relay (if equipped with A/C)	49. For J20 engine
16. CMP sensor	33. Power steering pump pressure switch	
17. CKP sensor	34. Generator	

Component Location

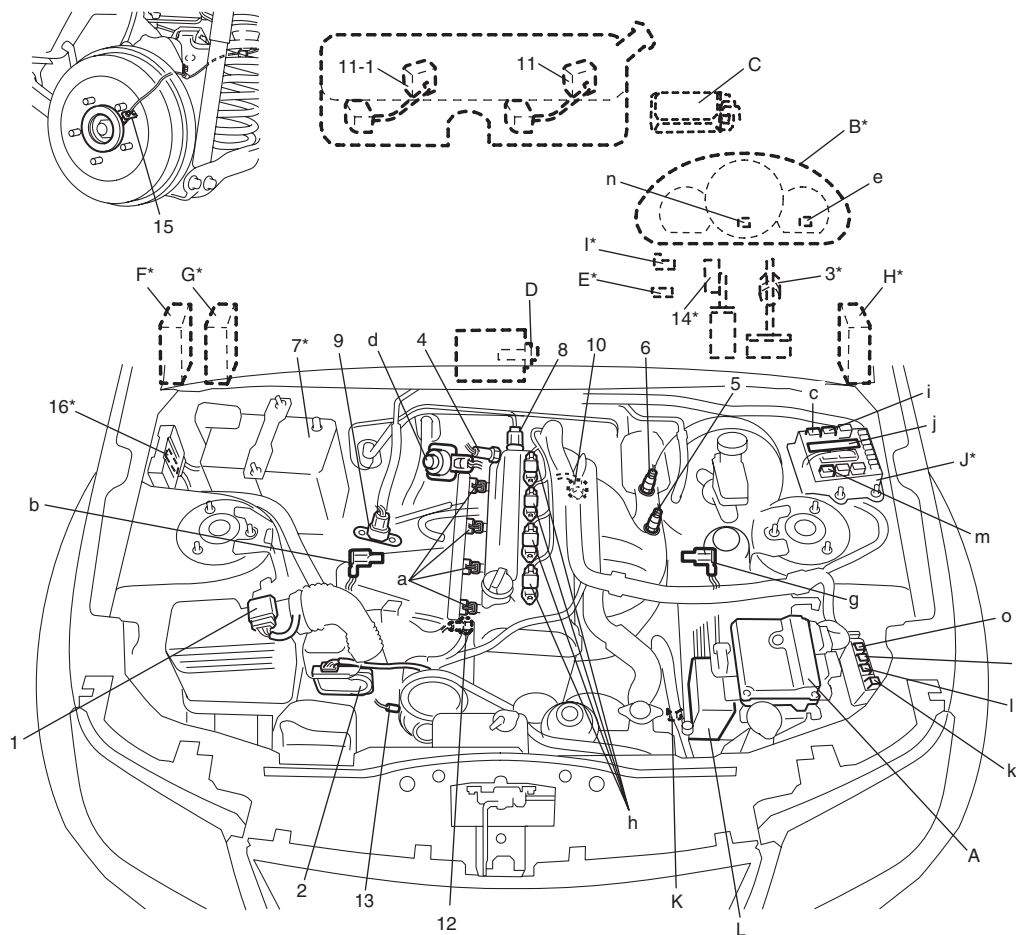
Electronic Control System Components Location

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For J20 Engine

NOTE

The figure shows left-hand steering vehicle. For right-hand steering vehicle, parts with (*) are installed at the opposite side.



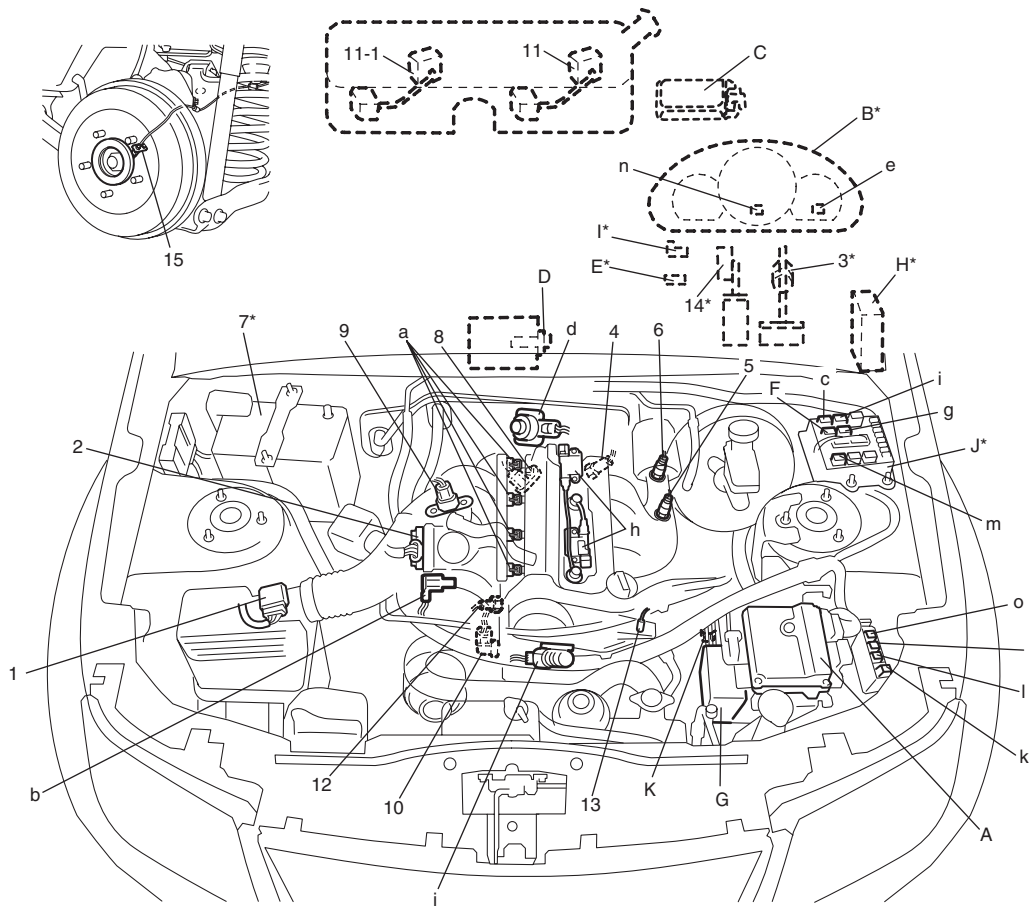
1A-18 Engine General Information and Diagnosis:

Information sensors	Control devices	Others
1. MAF and IAT sensor	a: Fuel injector	A: ECM
2. Electric throttle body assembly (built-in throttle position sensor and throttle actuator)	b: EVAP canister purge valve	B: Combination meter
3. Stop lamp switch	c: Fuel pump relay	C: EVAP canister
4. ECT sensor	d: EGR valve	D: A/C evaporator outlet air temp. sensor (if equipped with A/C)
5. A/F sensor	e: Malfunction indicator lamp	E: Data link connector
6. Heated oxygen sensor-2	f: Radiator cooling fan relay No.1	F: 4WD control module (if equipped)
7. Battery	g: IMT vacuum solenoid valve	G: TCM (for A/T model)
8. CMP sensor	h: Ignition coil assembly (with ignitor)	H: BCM
9. MAP sensor	i: Main relay	I: Immobilizer coil antenna (if equipped)
10. CKP sensor	j: Integration relay No.2 (built-in HO2S heater relay, compressor relay and A/T relay)	J: Fuse box No.2
11. Main fuel level sensor	k: Radiator cooling fan relay No.2	K: A/C refrigerant pressure sensor (if equipped with A/C)
11-1. Sub fuel level sensor	l: Radiator cooling fan relay No.3	L: ABS / ESP® control module
12. Knock sensor	m: Starting motor control relay	
13. Power steering pump pressure switch	n: Immobilizer indicator lamp (if equipped)	
14. Accelerator pedal position (APP) sensor	o: Throttle actuator control relay	
15. Rear wheel speed sensor (RH, LH) (VSS)		
16. Electric load current sensor		

For M16 Engine

NOTE

The figure shows left-hand steering vehicle. For right-hand steering vehicle, parts with (*) are installed at the opposite side.



Information sensors	Control devices	Others
1. MAF and IAT sensor	a: Fuel injector	A: ECM
2. Electric throttle body assembly (built-in throttle position sensor and throttle actuator)	b: EVAP canister purge valve	B: Combination meter
3. Stop lamp switch	c: Fuel pump relay	C: EVAP canister
4. ECT sensor	d: EGR valve	D: A/C evaporator outlet air temp. sensor (if equipped with A/C)
5. A/F sensor	e: Malfunction indicator lamp	E: Data link connector
6. Heated oxygen sensor-2	f: Radiator cooling fan relay No.1	F: A/C compressor relay (if equipped)
7. Battery	g: HO2S heater relay	G: ABS / ESP® control module
8. CMP sensor	h: Ignition coil assembly (with ignitor)	H: BCM
9. MAP sensor	i: Main relay	I: Immobilizer coil antenna (if equipped)
10. CKP sensor	j: Oil control valve	J: Fuse box No.2
11. Main fuel level sensor	k: Radiator cooling fan relay No.2	K: A/C refrigerant pressure sensor (if equipped with A/C)
11-1. Sub fuel level sensor	l: Radiator cooling fan relay No.3	
12. Knock sensor	m: Starting motor control relay	
13. Power steering pump pressure switch	n: Immobilizer indicator lamp (if equipped)	
14. Accelerator pedal position (APP) sensor	o: Throttle actuator control relay	
15. Rear wheel speed sensor (RH, LH) (VSS)		

Diagnostic Information and Procedures

DTC Table

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NOTE

- For the vehicle equipped with diagnosis connector, some of DTC No. with delta (Δ) mark in the following table can not be detected by ECM depending on vehicle specification and local regulation.
- With the generic scan tool, only star (*) marked DTC No. in the following table can be read.
- 1 driving cycle: MIL lights up when DTC is detected during 1 driving cycle.
- 2 driving cycles: MIL lights up when the same DTC is detected also in the next driving cycle after DTC is detected and stored temporarily in the first driving cycle.
- *2 driving cycles:
MIL blinks or lights up. Refer to “DTC P0300 / P0301 / P0302 / P0303 / P0304: Random Misfire Detected / Cylinder 1 / Cylinder 2 / Cylinder 3 / Cylinder 4 Misfire Detected: in related manual” for details.

DTC No.	Detecting item	Detecting condition (DTC will set when detecting:)	MIL
*P0010	Camshaft position actuator circuit (for M16 engine)	Oil control valve circuit open or short.	1 driving cycle
*P0011	Camshaft position – timing over-advanced or system performance (for M16 engine)	Actual value of advanced valve timing does not reach target value, or valve timing is advanced although ECM command is most retarding.	2 driving cycles
*P0012	Camshaft position – timing over-retarded (for M16 engine)		2 driving cycles
Δ *P0030	HO2S heater control circuit (Sensor-1)	Impedance of A/F sensor element is higher than or lower than specified range for more than 200 sec. even though A/F sensor heater is turned ON for more than specified time.	2 driving cycles
Δ *P0031	HO2S heater control circuit low (Sensor-1)	A/F sensor circuit voltage is lower than specification for more than specified time continuously even though control duty ratio of A/F sensor heater is less than specification.	2 driving cycles
Δ *P0032	HO2S heater control circuit high (Sensor-1)	A/F sensor circuit voltage is higher than specification for more than specified time continuously even though control duty ratio of A/F sensor heater is more than specification.	2 driving cycles

1A-20 Engine General Information and Diagnosis:

DTC No.	Detecting item	Detecting condition (DTC will set when detecting:)	MIL
 △*P0037	HO2S heater control circuit low (Sensor-2)	HO2S-2 circuit voltage is lower than specification for more than specified time continuously even though control duty ratio of HO2S-2 heater is less than specification.	2 driving cycles
 △*P0038	HO2S heater control circuit high (Sensor-2)	HO2S-2 circuit voltage is higher than specification for more than specified time continuously even though control duty ratio of HO2S-2 heater is more than specification.	2 driving cycles
 △*P0101	Mass air flow circuit range/performance	MAF sensor volume is more than specification or less than specification.	2 driving cycles
 *P0102	Mass air flow circuit low input	Output voltage of MAF sensor is less than specification.	1 driving cycle
 *P0103	Mass air flow circuit high input	Output voltage of MAF sensor is more than specification.	1 driving cycle
 △*P0106	Manifold absolute pressure circuit range/performance	Difference between Max. manifold absolute pressure value and Min. manifold pressure value is less than specification or difference between barometric pressure value and manifold pressure value is less than specification	2 driving cycles
 *P0107	Manifold absolute pressure circuit low input	Output voltage of MAP sensor is less than specification.	1 driving cycle
 *P0108	Manifold absolute pressure circuit high input	Output voltage of MAP sensor is more than specification.	1 driving cycle
 △*P0111	Intake air temperature sensor circuit range/performance	Variation of intake air temperature from engine start is less than specification.	2 driving cycles
 *P0112	Intake air temperature sensor circuit low	Circuit voltage of IAT sensor is less than specification.	1 driving cycle
 *P0113	Intake air temperature sensor circuit high	Circuit voltage of IAT sensor is more than specification.	1 driving cycle
 △*P0116	Engine coolant temperature circuit range/performance	Engine coolant temperature is less than specified temperature for specified time from engine start.	2 driving cycles
 *P0117	Engine coolant temperature circuit low	Circuit voltage of ECT sensor is less than specification.	1 driving cycle
 *P0118	Engine coolant temperature circuit high	Circuit voltage of ECT sensor is more than specification.	1 driving cycle
 *P0122	Throttle position sensor (main) circuit low	Output voltage of throttle position sensor (main) is lower than specification.	1 driving cycle
 *P0123	Throttle position sensor (main) circuit high	Output voltage of throttle position sensor (main) is higher than specification.	1 driving cycle
 △*P0131	O2 sensor (HO2S) circuit low voltage (Sensor-1)	Output voltage or sensor current of A/F sensor is less than specification.	2 driving cycles
 △*P0132	O2 sensor (HO2S) circuit high voltage (Sensor-1)	Output voltage or sensor current of A/F sensor is more than specification.	2 driving cycles
 △*P0133	O2 sensor (HO2S) circuit slow response (Sensor-1)	Ratio between integrated value of A/F sensor output variation and integrated value of short term fuel trim variation is more than specification.	2 driving cycles
 △*P0134	O2 sensor (HO2S) circuit no activity detected (Sensor-1)	Impedance of A/F sensor element is higher than specification for more than 160 sec. even though A/F sensor heater is turned ON for more than specified time.	2 driving cycles
 △*P0137	O2 sensor (HO2S) circuit low voltage (Sensor-2)	HO2S-2 voltage is lower than 0.4 V for more than specified time continuously while vehicle is driving with high engine load (high speed). And HO2S-2 max. voltage minus HO2S-2 min. voltage is less than 0.2 V for specified time continuously.	2 driving cycles
 △*P0138	O2 sensor (HO2S) circuit high voltage (Sensor-2)	HO2S-2 voltage is higher than 0.85 V for more than specified time continuously while vehicle is driving with high engine load (high speed). And HO2S-2 max. voltage minus HO2S-2 min. voltage is less than 0.2 V for specified time continuously.	2 driving cycles

DTC No.	Detecting item	Detecting condition (DTC will set when detecting:)	MIL
 Δ *P0140	O2 sensor (HO2S) circuit no activity detected (Sensor-2)	Output voltage of HO2S-2 is more than specification after warming up engine.	2 driving cycles
 Δ *P0171	System too lean	Total fuel trim is larger than specification for specified time or longer. (Fuel trim toward rich side is large.)	2 driving cycles
 Δ *P0172	System too rich	Total fuel trim is smaller than specification for specified time or longer. (Fuel trim toward lean side is large.)	2 driving cycles
 *P0222	Throttle position sensor (sub) circuit low	Output voltage of throttle position sensor (sub) is lower than specification.	1 driving cycle
 *P0223	Throttle position sensor (sub) circuit high	Output voltage of throttle position sensor (sub) is higher than specification.	1 driving cycle
 Δ *P0300	Random misfire detected	Misfire of such level as to cause damage to three way catalyst.	*2 driving cycles
 Δ *P0301/  Δ *P0302/  Δ *P0303/  Δ *P0304	Cylinder 1 misfire detected Cylinder 2 misfire detected Cylinder 3 misfire detected Cylinder 4 misfire detected	Misfire of such level as to deteriorate emission but not to cause damage to three way catalyst.	2 driving cycles
 *P0327	Knock sensor circuit low	Output voltage of knock sensor is less than specification.	1 driving cycle
 *P0328	Knock sensor circuit high	Output voltage of knock sensor is more than specification.	1 driving cycle
 *P0335	Crankshaft position sensor circuit	No signal of CKP sensor for specified time even if starting motor signal is input.	1 driving cycle
 *P0340	Camshaft position sensor circuit	CMP sensor pulse is out of specification.	1 driving cycle
 Δ *P0401	Exhaust gas recirculation flow detected as insufficient	Difference in intake manifold absolute pressure between opened EGR valve and closed EGR valve is less than specification.	2 driving cycles
 Δ *P0402	Exhaust gas recirculation flow detected as excessive	Difference in intake manifold absolute pressure between opened EGR valve and closed EGR valve is more than specification.	2 driving cycles
 *P0403	Exhaust gas recirculation control circuit	Output voltage is different from output command with more than one pole out of 4 poles.	1 driving cycle
 Δ *P0420	Catalyst system efficiency below threshold	Ratio between integrated value of A/F sensor output variation and integrated value of HO2S-2 output variation is more than specification.	2 driving cycles
 *P0443	Evaporative emission system purge control valve circuit	Monitor signal of EVAP canister purge valve is different from command signal. (circuit open or shorted to ground)	2 driving cycles
 P0462	Fuel level sensor circuit low	Circuit voltage of fuel level sensor is less than specification.	—
 P0463	Fuel level sensor circuit high	Circuit voltage of fuel level sensor is more than specification.	—
 *P0480	Fan 1 (Radiator cooling fan) control circuit	Monitor signal of radiator cooling fan relay is different from command signal.	1 driving cycle
 *P0500	Vehicle speed sensor (VSS) malfunction	No vehicle speed signal during fuel cut for specified time or longer, or vehicle speed signal is not input even if vehicle is driving with more than specified engine speed and D-range (for A/T model).	2 driving cycles
 Δ *P0504	Brake switch "A"/"B" correlation	Brake pedal switch signal (Brake switch 2) is inconsistent with stop lamp switch signal (Brake switch 1).	—
 P0532	A/C refrigerant pressure sensor circuit low	Output voltage of A/C refrigerant pressure sensor is less than specification.	—
 P0533	A/C refrigerant pressure sensor circuit high	Output voltage of A/C refrigerant pressure sensor is more than specification.	—
 *P0601	Internal control module memory check sum error	Data write error or check sum error.	1 driving cycle
 P0602	Control module programming error	Data programming error.	1 driving cycle

1A-22 Engine General Information and Diagnosis:

DTC No.	Detecting item	Detecting condition (DTC will set when detecting:)	MIL
🔧 *P0607	Control module performance	Data programming error.	1 driving cycle
🔧 △*P0616	Starter relay circuit low	Starter signal is low voltage even though engine is started with vehicle at stop.	2 driving cycles
🔧 △*P0617	Starter relay circuit high	Starter signal is high voltage for specified time while engine is running.	2 driving cycles
🔧 P0620	Generator control circuit	Battery voltage is higher than specification even through generator control is maximum regulation, or battery voltage is lower than specification even through generator control is minimum regulation and electric load is less than 20 A.	—
🔧 P0625	Generator field terminal circuit low	Generator field coil duty is 100% (low voltage) for more than specified time even through generator control is maximum regulation, or generator field coil duty is 100% (low voltage) when engine is starting.	—
🔧 P0626	Generator field terminal circuit high	Generator field coil duty is 0% (high voltage) for more than specified time even through generator control is minimum regulation	—
🔧 P0660	Intake manifold tuning valve circuit / open (for J20 engine)	Monitor signal of intake manifold tuning vacuum solenoid valve is different from command signal. (circuit open or shorted to ground)	—
🔧 P1501	Electric load current sensor circuit low (for J20 engine)	Electric load current sensor circuit voltage is lower than specified range.	—
🔧 P1502	Electric load current sensor circuit high (for J20 engine)	Electric load current sensor circuit voltage is higher than specified range.	—
🔧 *P1510	ECM backup power supply malfunction	Backup power voltage is no input after starting engine.	1 driving cycle
🔧 P1603	TCM trouble code detected (for J20 engine)	When ECM receives a trouble code from TCM, which indicates that some problem occurred in sensor circuits and its calculated values used for operations such as idle speed control, engine power control and so on by TCM, this DTC is detected by ECM.	1 driving cycle
🔧 P1674	CAN communication (bus off error)	Transmission error that is inconsistent between transmission data and transmission monitor (CAN bus monitor) data is detected more than 7 times continuously.	—
🔧 *P1676	CAN communication (reception error for TCM)	Reception error of communication data for TCM is detected for longer than specified time continuously.	1 driving cycle
🔧 P1678	CAN communication (reception error for BCM)	Reception error of communication data for BCM is detected for longer than specified time continuously.	—
🔧 *P1685	CAN communication (reception error for ABS / ESP® control module)	Reception error of communication data for ABS control module or ESP® control module is detected for longer than specified time continuously.	1 driving cycle
🔧 *P2101	Throttle actuator control motor circuit range/performance	Monitor signal of throttle actuator output (duty output) is inconsistent with throttle actuator control command.	1 driving cycle
🔧 *P2102	Throttle actuator control motor circuit low	Power supply voltage of throttle actuator control circuit is lower than specification even if throttle actuator control relay turned on.	1 driving cycle
🔧 *P2103	Throttle actuator control motor circuit high	Power supply voltage of throttle actuator control circuit is higher than specification even if throttle actuator control relay turned off.	1 driving cycle
🔧 *P2111	Throttle actuator control system – stuck open	Throttle valve default opening is greater than 7° from complementary closed position when diagnosing throttle valve at ignition switch turned OFF.	1 driving cycle
🔧 *P2119	Throttle actuator control throttle body range/performance	Difference between actual throttle valve opening angle and opening angle calculated by ECM is more than specification.	1 driving cycle
🔧 *P2122	Pedal position sensor (main) circuit low input	Output voltage of pedal position sensor (main) is lower than specification.	1 driving cycle

DTC No.	Detecting item	Detecting condition (DTC will set when detecting:)	MIL
☞ *P2123	Pedal position sensor (main) circuit high input	Output voltage of pedal position sensor (main) is higher than specification.	1 driving cycle
☞ *P2127	Pedal position sensor (sub) circuit low input	Output voltage of pedal position sensor (sub) is lower than specification.	1 driving cycle
☞ *P2128	Pedal position sensor (sub) circuit high input	Output voltage of pedal position sensor (sub) is higher than specification.	1 driving cycle
☞ *P2135	Throttle position sensor (main / sub) voltage correlation	Difference between the opening angle based on throttle position sensor (main) and the opening angle based on throttle position sensor (sub) is more than specification.	1 driving cycle
☞ *P2138	Pedal position sensor (main / sub) voltage correlation	Difference between the opening angle based on accelerator pedal position sensor (main) and the opening angle based on accelerator pedal position sensor (sub) is more than specification.	1 driving cycle
☞ △*P2195	O2 sensor signal stuck lean (Sensor-1)	A/F sensor output is lower than specification.	2 driving cycles
☞ △*P2196	O2 sensor signal stuck rich (Sensor-1)	A/F sensor output is higher than specification.	2 driving cycles
☞ *P2227	Barometric pressure circuit range/performance	Difference of barometric pressure value and intake manifold pressure value is more than specification at engine start.	2 driving cycles
☞ △*P2228	Barometric pressure circuit low	Barometric pressure sensor voltage is less than specification.	1 driving cycle
☞ *P2229	Barometric pressure circuit high	Barometric pressure sensor voltage is more than specification.	1 driving cycle
△P1614	Transponder response error	Refer to "Diagnostic Trouble Code (DTC) Table: in Section 10C".	—
△P1615	ID code does not registered (vehicle equipped with keyless start system only)	Refer to "Diagnostic Trouble Code (DTC) Table: in Section 10C".	—
△P1616	Different registration ID codes (vehicle equipped with keyless start system only)	Refer to "Diagnostic Trouble Code (DTC) Table: in Section 10C".	—
△P1618	CAN communication error (reception error for keyless start control module) (vehicle equipped with keyless start system only)	Refer to "Diagnostic Trouble Code (DTC) Table: in Section 10C".	—
△P1621	Immobilizer communication line error	Refer to "Diagnostic Trouble Code (DTC) Table: in Section 10C".	—
△P1622	EEPROM error	Refer to "Diagnostic Trouble Code (DTC) Table: in Section 10C".	—
△P1623	Unregistered transponder	Refer to "Diagnostic Trouble Code (DTC) Table: in Section 10C".	—
△P1625	Immobilizer antenna error	Refer to "Diagnostic Trouble Code (DTC) Table: in Section 10C".	—
P1636	Immobilizer information registration failure	Refer to "Diagnostic Trouble Code (DTC) Table: in Section 10C".	—
P1638	Immobilizer information mismatched	Refer to "Diagnostic Trouble Code (DTC) Table: in Section 10C".	—

For Vehicle Equipped with A/T

When using OBD generic scan tool, not only the previous star (*) marked ECM DTC(s) but also the following DTC(s) is displayed on OBD generic scan tool simultaneously.

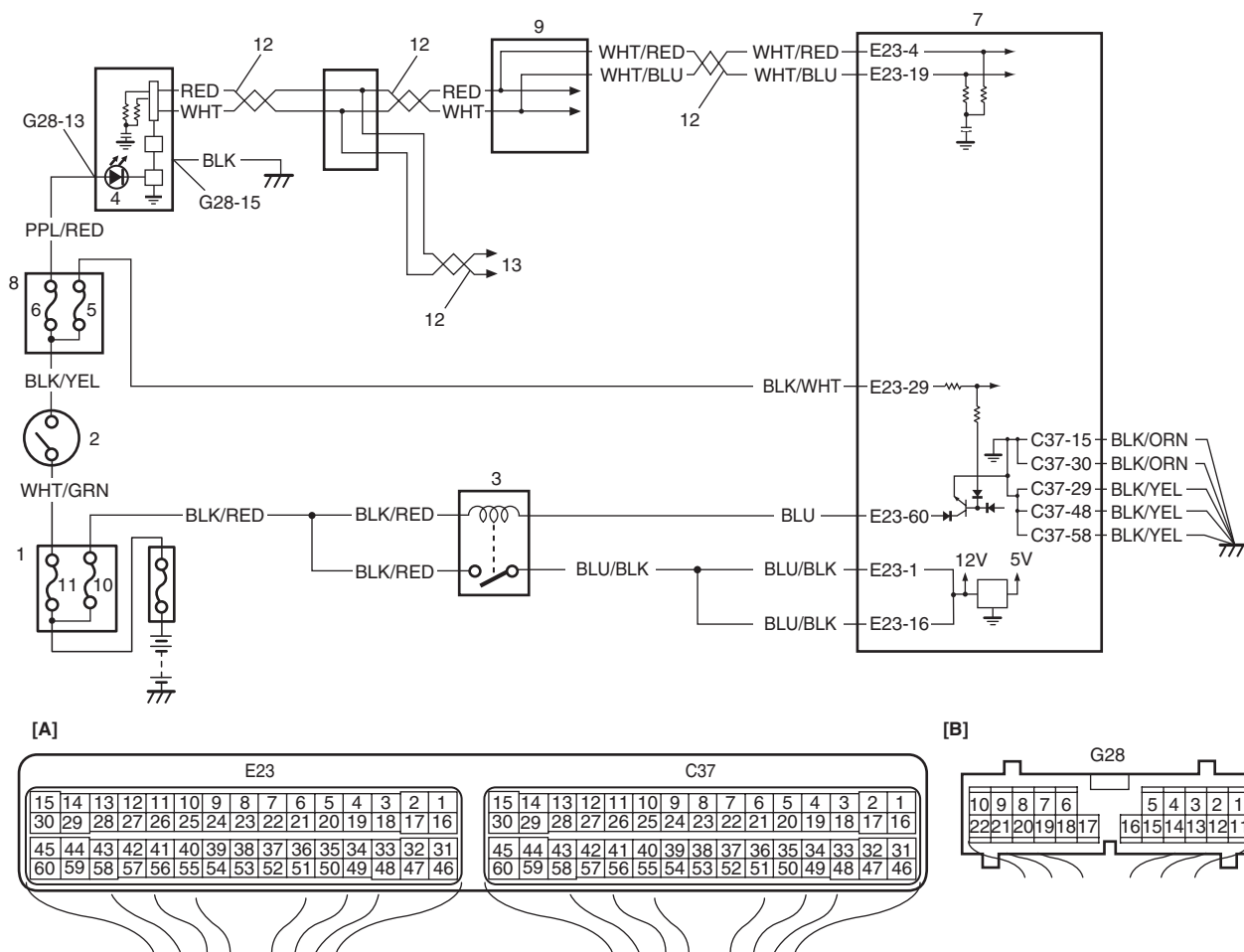
1A-24 Engine General Information and Diagnosis:

DTC No.	Detecting item	Detecting condition (DTC will set when detecting)
*P0705	Transmission range sensor circuit malfunction (PRNDL input)	Refer to "DTC Table: in Section 5A".
*P0707	Transmission range sensor circuit low	
*P0712	Transmission fluid temperature sensor circuit low	
*P0713	Transmission fluid temperature sensor circuit high	
*P0717	Input / Turbine speed sensor circuit no signal	
*P0722	Output speed sensor circuit no signal	
*P0741	Torque converter clutch circuit performance or stuck off	
*P0742	Torque converter clutch circuit stuck on	
*P0751	Shift solenoid-A (No.1) performance or stuck off	
*P0752	Shift solenoid-A (No.1) stuck on	
*P0756	Shift solenoid-B (No.2) performance or stuck off	
*P0757	Shift solenoid-B (No.2) stuck on	
*P0962	Pressure control solenoid control circuit low	
*P0963	Pressure control solenoid control circuit high	
*P0973	Shift solenoid-A (No.1) control circuit low	
*P0974	Shift solenoid-A (No.1) control circuit high	
*P0976	Shift solenoid-B (No.2) control circuit low	
*P0977	Shift solenoid-B (No.2) control circuit high	
*P1702	Internal control module memory check sum error	
*P1774	Control module communication bus off	
*P1777	TCM lost communication with ECM (Reception error)	
*P1874	4L switch circuit malfunction (Short)	
*P1875	4L switch circuit malfunction (Open)	
*P2763	Torque converter clutch pressure control solenoid control circuit high	
*P2764	Torque converter clutch pressure control solenoid control circuit low	

Malfunction Indicator Lamp Does Not Come ON with Ignition Switch ON and Engine Stop (but Engine Can Be Started)

S5JB0E1104011

Wiring Diagram



I5JB0A110025-02

[A]: ECM connector (viewed from harness side)	7. ECM
[B]: Combination meter connector (viewed from harness side)	8. Junction block
1. Fuse box No.2	9. ABS / ESP® control module
2. Ignition switch	10. "FI" fuse
3. Main relay	11. "IGN" fuse
4. Malfunction indicator lamp in combination meter	12. CAN communication line
5. "IG COIL" fuse	13. To other control module (TCM (for A/T model), BCM, 4WD control module (if equipped), steering angle sensor (for vehicle with ESP®) and keyless start control module (if equipped))
6. "METER" fuse	

Circuit Description

When the ignition switch is turned ON, ECM causes the main relay to turn ON (close the contact point). Then, ECM being supplied with the main power, transmits indication ON signal of malfunction indicator lamp (MIL) to combination meter in order to turn MIL ON. And then, combination meter turns MIL ON. When the engine starts to run and no malfunction is detected in the system, ECM transmits MIL indication OFF signal to combination meter in order to turn MIL OFF. And then, combination meter turns MIL OFF, but if a malfunction was or is detected, MIL remains ON even when the engine is running.

Troubleshooting

NOTE

- Before performed troubleshooting, be sure to read the “Precautions of ECM Circuit Inspection: in related manual”.
- When measuring circuit voltage, resistance and/or pulse signal at ECM connector, connect the special tool to ECM and/or the ECM connectors referring to “Inspection of ECM and Its Circuits: ”.

Step	Action	Yes	No
1	MIL power supply check 1) Turn ignition switch to ON position. <i>Do other warning lights come ON?</i>	Go to Step 2.	Go to Step 5.
2	DTC check 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Turn ON ignition switch and check DTC. <i>Is there DTC(s) P1674 and/or P1685?</i>	Go to applicable DTC diag. flow.	Go to Step 3.
3	DTC check in ABS / ESP® control module assembly 1) Check DTC in ABS / ESP® control module assembly. <i>Is there DTC(s) U1073 and/or U1100?</i>	Go to applicable DTC diag. flow.	Go to Step 4.
4	DTC check in BCM 1) Check DTC in BCM. <i>Is there DTC U1100?</i>	Go to applicable DTC diag. flow.	Substitute a known-good combination meter and recheck. If MIL still remains OFF, substitute a known-good ECM and recheck.
5	CAN communication line circuit check 1) Check CAN communication circuit between combination meter and ECM, TCM (for A/T model), ABS / ESP® control module, 4WD control module (if equipped), keyless start control module (if equipped) referring to Step 9 to 15 of “DTC P1674: CAN Communication (Bus Off Error): ” <i>Is circuit in good condition?</i>	Go to Step 6.	Repair or replace.
6	“METER” fuse check 1) Turn ignition switch to OFF position. 2) Check for fuse blown at “METER” fuse in junction block. <i>Is “METER” fuse in good condition?</i>	Go to Step 7.	Replace “METER” fuse and check for short.
7	Combination meter power supply check 1) Remove combination meter referring to “Combination Meter Removal and Installation: in Section 9C in related manual”. 2) Check for proper connection to combination meter connector at “G28-13” and “G28-15” terminals. 3) If OK, then turn ignition switch to ON position and measure voltage between combination meter connector at “G28-13” terminal and vehicle body ground. <i>Is it 10 – 14 V?</i>	Go to Step 8.	“PPL/RED” wire is open circuit.

Step	Action	Yes	No
8	Combination meter circuit check 1) Turn ignition switch to OFF position. 2) Measure resistance between "G28-15" terminal of combination meter connector and vehicle body ground. <i>Is resistance 1 Ω or less?</i>	Substitute a known-good combination meter and recheck. If MIL still remains OFF, substitute a known-good ECM and recheck.	"BLK" wire is open or high resistance circuit.

Malfunction Indicator Lamp Remains ON after Engine Starts

S5JB0E1104012

Wiring Diagram

Refer to "Malfunction Indicator Lamp Does Not Come ON with Ignition Switch ON and Engine Stop (but Engine Can Be Started):".

Circuit Description

When the ignition switch is turned ON, ECM causes the main relay to turn ON (close the contact point). Then, ECM being supplied with the main power, transmits indication ON signal of malfunction indicator lamp (MIL) to combination meter in order to turn MIL ON. And then, combination meter turns MIL ON. When the engine starts to run and no malfunction is detected in the system, ECM transmits MIL indication OFF signal to combination meter in order to turn MIL OFF. And then, combination meter turns MIL OFF, but if a malfunction was or is detected, MIL remains ON even when the engine is running.

Troubleshooting

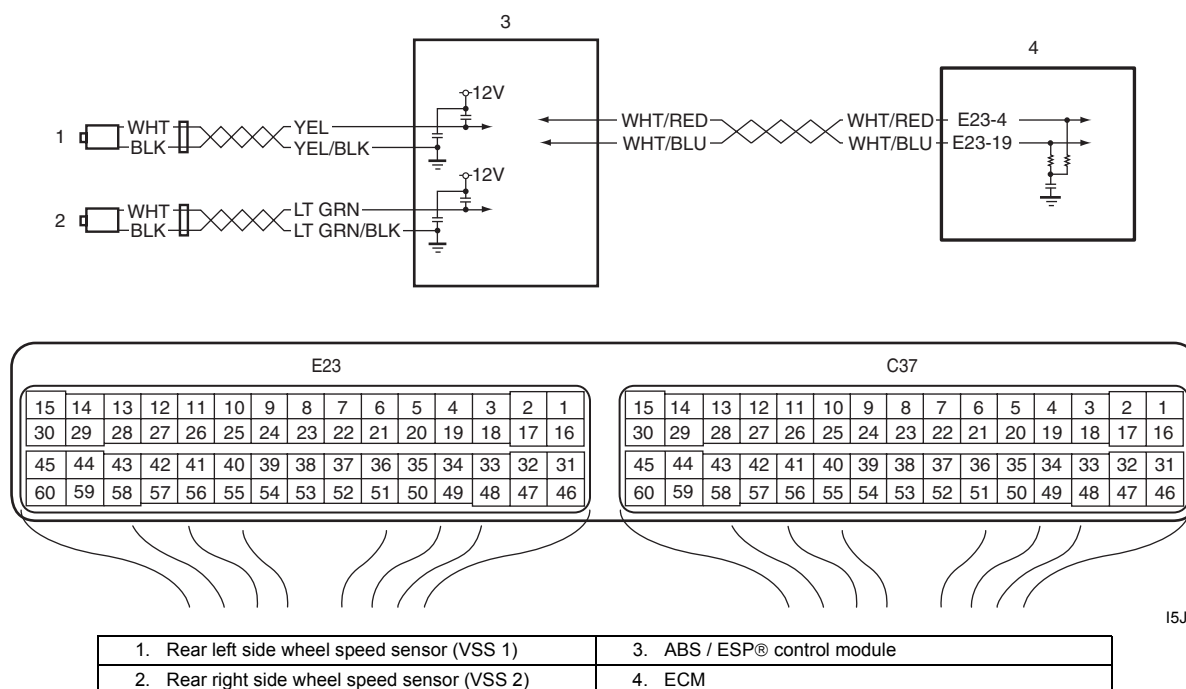
NOTE

- Before performed troubleshooting, be sure to read the "Precautions of ECM Circuit Inspection: in related manual".
- When measuring circuit voltage, resistance and/or pulse signal at ECM connector, connect the special tool to ECM and/or the ECM connectors referring to "Inspection of ECM and Its Circuits: ".

Step	Action	Yes	No
1	DTC check 1) Start engine and recheck DTC of ECM and TCM (for A/T model) while engine running. <i>Is there any DTC(s)?</i>	Go to Step 2 of "Engine and Emission Control System Check: in related manual", Step 2 of "A/T System Check: in Section 5A in related manual".	Go to Step 2.
2	CAN communication line circuit check 1) Check CAN communication line circuit between combination meter and ECM, TCM (for A/T model), ABS / ESP® control module, 4WD control module (if equipped), keyless start control module (if equipped) referring to Step 9 to 15 "DTC P1674: CAN Communication (Bus Off Error): ". <i>Is circuit in good condition?</i>	Substitute a known-good combination meter and recheck. If MIL still remains ON, substitute a known-good ECM and recheck.	Repair or replace CAN communication circuit.

DTC P0500: Vehicle Speed Sensor (VSS) Malfunction

S5JB0E1104051

Wiring Diagram

I5JB0A110060-03

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
- Vehicle speed signal is not input while fuel is cut at deceleration for 4 seconds continuously at 3600 rpm or less. - Vehicle speed signal is not input even if engine is running with more than 3700 rpm at D-Range for 4 sec. (for A/T model). (2 driving cycle detection logic)	- Wheel speed sensor (VSS) - Wheel speed sensor circuit - ABS / ESP® control module - ECM

DTC Confirmation Procedure**⚠ WARNING**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out by 2 persons, a driver and a tester.

- With ignition switch turned OFF, connect scan tool.
- Turn ON ignition switch and clear DTC using scan tool.
- Warm up engine to normal operating temperature.
- Drive vehicle at 4000 rpm (engine speed) with 3rd gear (for M/T vehicle) or "3" range (for A/T vehicle).
- Release accelerator pedal and with engine brake applied, keep vehicle coasting for 6 sec. or more (fuel cut condition for 5 sec. or more) and stop vehicle.
- For A/T model, drive vehicle at more than 3700 rpm for 10 sec.
- Check pending DTC and DTC.

DTC Troubleshooting

NOTE

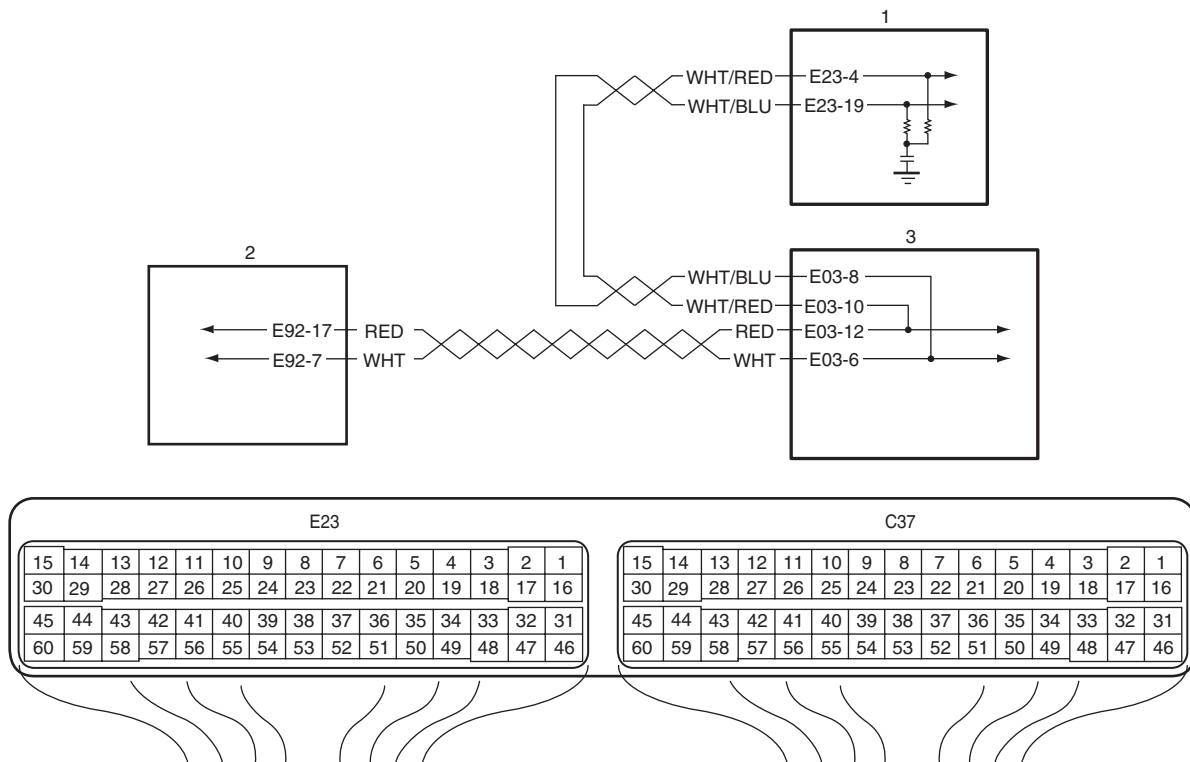
Before this trouble shooting is performed, read the precautions for DTC troubleshooting referring to "Precautions For DTC Troubleshooting: in related manual".

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check: in related manual".
2	Vehicle speed signal check Is vehicle speed displayed on scan tool in Step 4) and 5) of "DTC Confirmation Procedure"?	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".	Go to Step 3.
3	DTC check in ABS / ESP® control module 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Check ABS / ESP® control module for DTC. Is there any DTDC(s) in ABS / ESP® control module?	Go to applicable DTC diag. flow.	Substitute a known-good ECM and recheck.

DTC P1603: TCM Trouble Code Detected (For J20 Engine)

S5JB0E1104063

Wiring Diagram



I5JB0A110067-02

1. ECM	2. TCM (for A/T model)	3. ABS / ESP® control module
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1A-30 Engine General Information and Diagnosis:

DTC Detecting Condition

When ECM receives a trouble code from TCM, which indicates that some problem occurred in sensor circuits and its calculated values used for operations such as idle speed control, engine power control, and so on by TCM, ECM sets DTC P1603. (TCM outputs the trouble code to ECM when TCM can not compute the engine control signal due to malfunctions of sensor circuits used for gear shift control.)

DTC Troubleshooting

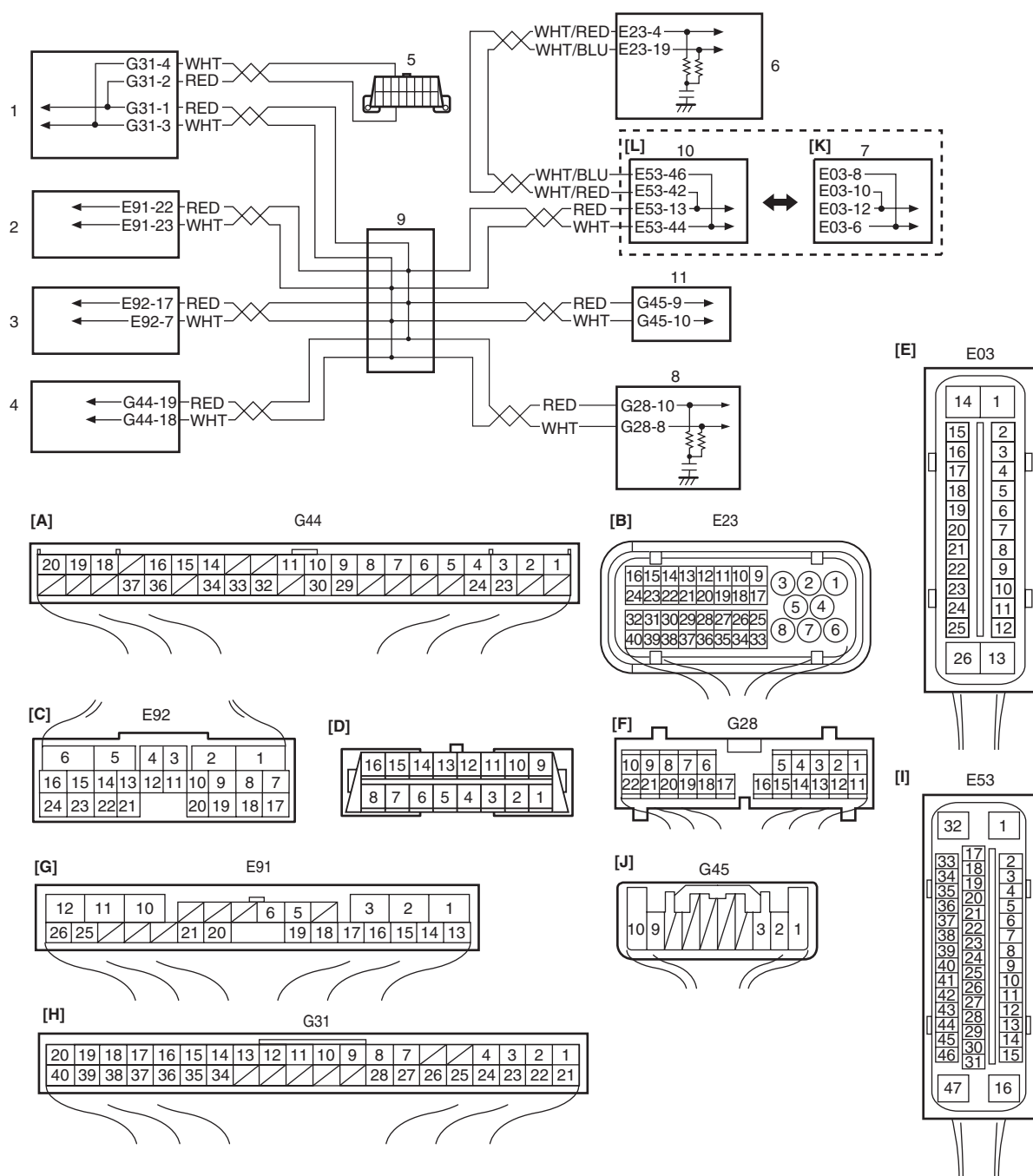
NOTE

Before this trouble shooting is performed, read the precautions for DTC troubleshooting referring to "Precautions For DTC Troubleshooting: in related manual".

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check: in related manual".
2	DTC check 1) Check DTC of TCM referring to "DTC Check: in Section 5A in related manual". <i>Is there any DTC(s)?</i>	Go to applicable DTC diag. flow.	Substitute a known-good ECM and recheck.

DTC P1674: CAN Communication (Bus Off Error)

Wiring Diagram



I5JB0D110007-01

[A]: Keyless start control module connector (if equipped) (viewed from harness side)	1. BCM
[B]: ECM connector (viewed from harness side)	2. 4WD control module (if equipped)
[C]: TCM connector (for A/T model) (viewed from harness side)	3. TCM (for A/T model)
[D]: DLC (viewed from terminal side)	4. Keyless start control module (if equipped)
[E]: ABS hydraulic unit / control module connector (viewed from terminal side)	5. DLC
[F]: Combination meter connector (viewed from harness side)	6. ECM
[G]: 4WD control module connector (viewed from harness side)	7. ABS hydraulic unit / control module assembly
[H]: BCM connector (viewed from harness side)	8. Combination meter
[I]: ESP® control module connector (viewed from harness side)	9. CAN circuit junction connector
[J]: Steering angle sensor connector (viewed from harness side)	10. ESP® control module
[K]: Vehicle without ESP®	11. Steering angle sensor (for vehicle with ESP®)
[L]: Vehicle with ESP®	

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Transmission error that is inconsistent between transmission data and transmission monitor (CAN bus monitor) data is detected more than 7 times continuously. (1 driving detection logic)	• ECM • BCM • TCM (for A/T model) • Keyless start control module (if equipped) • ABS or ESP® control module • 4WD control module (if equipped) • Combination meter • CAN communication line circuit • Steering angle sensor (for vehicle with ESP®)

DTC Confirmation Procedure

- 1) Connect scan tool to DLC with ignition switch turned OFF.
- 2) Turn ON ignition switch and clear DTC by using scan tool.
- 3) Start engine and run it for 1 min. or more.
- 4) Check DTC.

DTC Troubleshooting

NOTE

Before this trouble shooting is performed, read the precautions for DTC troubleshooting referring to "Precautions For DTC Troubleshooting: in related manual".

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check: in related manual".
2	DTC check 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Check ECM, TCM (for A/T model), ABS / ESP® control module, 4WD control module (if equipped), keyless start control module (if equipped) and BCM for DTC. <i>Is there any DTC(s) other than CAN communication DTC(s) at each control module (other than DTC P1618, P1674, P1676, P1678, P1685 in ECM, DTC P1774, P1777, P1778 in TCM (for A/T model), DTC U1073, U1100, U1101, U1121, U1126, U1139, U1140, U1144 in BCM, ABS / ESP® control module and 4WD control module (if equipped) and DTC No.31 / 33 in keyless start control module (if equipped))?</i>	Go to applicable DTC diag. flow.	Go to Step 3.

Step	Action	Yes	No
3	ECM, TCM (for A/T model), BCM, ABS / ESP® control module, 4WD control module (if equipped), combination meter, keyless start control module (if equipped) and steering angle sensor (for vehicle with ESP®) connectors check 1) Check for proper connection at each ECM, TCM (for A/T model), BCM, ABS / ESP® control module, 4WD control module (if equipped), combination meter, keyless start control module (if equipped) and steering angle sensor (for vehicle with ESP®) connector terminals with ignition switch turned OFF. 2) If connections are OK, recheck ECM for DTC with engine running. <i>Is there DTC P1674?</i>	Go to Step 4.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
4	ECM power and ground circuit check 1) Check ECM power and ground circuit referring to "ECM Power and Ground Circuit Check: in related manual". <i>Are they in good condition?</i>	Go to Step 5.	Repair ECM power and/or ground circuits.
5	DTC check in BCM, TCM (for A/T model), ABS / ESP® control module, 4WD control module (if equipped) and keyless start control module (if equipped) (bus off) 1) Check DTC(s) in TCM (for A/T model), ABS / ESP® control module, 4WD control module (if equipped) and BCM. <i>Is there DTC(s) P1774 in TCM (for A/T model), U1073 in BCM, ABS / ESP® control module and 4WD control module (if equipped) and/or DTC No.33 in keyless start control module (if equipped)?</i>	Go to Step 6.	Go to Step 7.
6	DTC check in ECM (bus off) 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Check TCM (for A/T model), BCM, ABS / ESP® control module and 4WD control module (if equipped) for DTC(s). <i>Is there DTC(s) P1774 in TCM (for A/T model), U1073 in BCM, ABS / ESP® control module, 4WD control module (if equipped) and/or DTC No.33 in keyless start control module (if equipped)?</i>	Go to Step 7.	CAN communication circuit wire between ECM and ABS / ESP® control module is open or high resistance. If wires are OK, substitute a known-good ECM and recheck.
7	DTC check in ECM 1) Connect connectors to ECM and disconnect connector from BCM with ignition switch turned OFF. 2) Check ECM for DTC(s). <i>Is there DTC P1674?</i>	Go to Step 8.	CAN communication circuit wire between BCM and CAN circuit junction connector is open or high resistance. If wires are OK, substitute a known-good BCM and recheck.
8	DTC check in ECM 1) Disconnect connectors from TCM (for A/T model) with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1674?</i>	Go to Step 9.	CAN communication circuit wire between TCM and CAN circuit junction connector is open or high resistance. If wires are OK, substitute a known-good TCM (for A/T model) and recheck.

1A-34 Engine General Information and Diagnosis:

Step	Action	Yes	No
9	DTC check in ECM 1) Disconnect connector from keyless start control module (if equipped) with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1674?</i>	Go to Step 10.	CAN communication circuit wire between keyless start control module and CAN circuit junction connector is open or high resistance. If wires are OK, substitute a known-good keyless start control module and recheck.
10	DTC check in ECM 1) Disconnect connector from combination meter with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1674?</i>	Go to Step 11.	CAN communication circuit wire between combination meter and CAN circuit junction connector is open or high resistance. If wires are OK, substitute a known-good combination meter or keyless start control module (if equipped) and recheck.
11	DTC check in ECM 1) Disconnect connector from 4WD control module (if equipped) with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1674?</i>	Go to Step 12.	CAN communication circuit wire between 4WD control module and CAN circuit junction connector is open or high resistance. If wires are OK, substitute a known-good 4WD control module and recheck.
12	DTC check 1) Disconnect connector from steering angle sensor (vehicle equipped with ESP® control module) with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1674?</i>	Go to Step 13.	CAN communication circuit wire between steering angle sensor and CAN circuit junction connector is open or high resistance. If wires are OK, check steering angle sensor power and ground circuits. If circuits are OK, substitute a known-good steering angle sensor and recheck.
13	ABS or EPS® control module check 1) Measure resistance at following connector terminals. • Between "WHT/BLU" terminal and "WHT" terminal of ABS or EPS® control module connector. • Between "WHT/RED" terminal and "RED" terminal of ABS or EPS® control module connector. <i>Is measured resistance below 1 Ω?</i>	Go to Step 14.	Substitute a known-good ABS or EPS® control module and recheck.

Step	Action	Yes	No
14	CAN communication circuit check 1) Disconnect connectors from all control modules (ECM, TCM (if equipped), BCM, ABS or ESP® control module, 4WD control module (if equipped), keyless start control module (if equipped), combination meter, steering angle sensor (if equipped)) with ignition switch turned OFF. 2) Check that CAN communication circuit is as follows. • All wire harness resistance of CAN communication circuit is less than 1 Ω between each control module. • Insulation resistance between CAN communication circuit wires is infinity at each control module connector. • Insulation resistance between each CAN communication circuit wire and vehicle body ground is infinity at each control module connector. • Circuit voltage of CAN communication circuit is 0 V with ignition switch turned ON. <i>Are they in good condition?</i>	Go to Step 15.	Repair or replace defective CAN communication circuit.
15	DTC check 1) Connect connectors to ECM with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1674?</i>	Substitute a known-good ECM and recheck.	Check ABS or ESP® control module power and ground circuits. If circuits are OK, substitute a known-good ABS or ESP® and recheck.

DTC P1676: CAN Communication (Reception Error for TCM (for A/T model))

S5JB0E1104065

Wiring Diagram

Refer to "DTC P1674: CAN Communication (Bus Off Error):".

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Reception error of communication data for TCM is detected for longer than specified time continuously. (1 driving detection logic)	• ECM • TCM (for A/T model) • CAN communication line circuit

DTC Confirmation Procedure

- 1) Connect scan tool to DLC with ignition switch turned OFF.
- 2) Turn ON ignition switch and clear DTC by using scan tool.
- 3) Start engine and run it for 1 min. or more.
- 4) Check DTC.

DTC Troubleshooting**NOTE**

Before this trouble shooting is performed, read the precautions for DTC troubleshooting referring to "Precautions For DTC Troubleshooting: in related manual".

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check: in related manual".

1A-36 Engine General Information and Diagnosis:

Step	Action	Yes	No
2	DTC check 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Check ECM, TCM (for A/T model), ABS / ESP® control module, 4WD control module (if equipped), keyless start control module (if equipped) and BCM for DTC. <i>Is there any DTC(s) other than CAN communication DTC(s) at each control module (other than DTC P1618, P1674, P1676, P1678, P1685 in ECM, DTC P1774, P1777, P1778 in TCM (for A/T model), DTC U1073, U1100, U1101, U1121, U1126, U1139, U1140, U1144 in BCM, ABS / ESP® control module and 4WD control module (if equipped), and DTC No.31 / 33 in keyless start control module (if equipped))?</i>	Go to applicable DTC diag. flow.	Go to Step 3.
3	Check CAN communication error for ECM 1) Check ECM for DTC. <i>Is there DTC P1674?</i>	Go to "DTC P1674: CAN Communication (Bus Off Error):".	Go to Step 4.
4	ECM, ABS / ESP® control module and TCM (for A/T model) connector check 1) Check for proper connection at each ECM, ABS / ESP® control module and TCM (for A/T model) connector terminals with ignition switch turned OFF. 2) If connections are OK, recheck ECM for DTC with engine running. <i>Is there DTC P1676?</i>	Go to Step 5.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
5	ECM power and ground circuit check 1) Check ECM power and ground circuits referring to "ECM Power and Ground Circuit Check: in related manual". <i>Are they in good condition?</i>	Go to Step 6.	Repair ECM power and/or ground circuits.
6	DTC check in TCM (for A/T model) 1) Check DTC P1774 in TCM (for A/T model). <i>Is it indicated?</i>	Go to "DTC P1774: CAN Communication Bus Off: in Section 5A".	Go to Step 7.
7	CAN communication circuit check 1) Disconnect connectors from TCM and ECM with ignition switch turned OFF. 2) Check that CAN communication circuit is as follows. • Circuit resistance of CAN communication circuit is less than 1 Ω between "WHT/RED" terminal of ECM connector and "RED" terminal of TCM connector. • Circuit resistance of CAN communication circuit is less than 1 Ω between "WHT/BLU" terminal of ECM connector and "WHT" terminal of TCM connector. <i>Is it in good condition?</i>	Go to Step 9.	Go to Step 8.
8	ABS or ESP® control module check 1) Measure resistance at following connector terminals. • Between "WHT/BLU" terminal and "WHT" terminal of ABS or ESP® control module connector. • Between "WHT/RED" terminal and "RED" terminal of ABS or ESP® control module connector. <i>Is measured resistance below 1 Ω?</i>	CAN communication circuit wire between TCM and ECM connector is open or high resistance.	Substitute a known-good ABS or ESP® control module and recheck.

Step	Action	Yes	No
9	DTC check in ECM 1) Connect connectors to ECM and TCM with ignition switch turned OFF. 2) Disconnect connectors from BCM with ignition switch turned OFF. 3) Check ECM for DTC(s). <i>Is there DTC P1676?</i>	Go to Step 10.	CAN communication circuit wire between BCM and CAN circuit junction connector is open or high resistance. If wires are OK, check BCM power and ground circuit. If circuits are OK, substitute a known-good BCM and recheck.
10	DTC check 1) Disconnect connector from keyless start control module (if equipped) with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1676?</i>	Go to Step 11.	CAN communication circuit wire between keyless start control module and CAN circuit junction connector is open or high resistance. If wires are OK, check keyless start control module power and ground circuits. If circuits are OK, substitute a known-good keyless start control module and recheck.
11	DTC check 1) Disconnect connector from combination meter with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1676?</i>	Go to Step 12.	CAN communication circuit wire between combination meter and CAN circuit junction connectors is open or high resistance. If wires are OK, check combination meter power and ground circuits. If circuits are OK, substitute a known-good combination meter and recheck.
12	DTC check 1) Disconnect connector from 4WD control module (if equipped) with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1676?</i>	Go to Step 13.	CAN communication circuit wire between 4WD control module and CAN circuit injection connector is open or high resistance. If wires are OK, check 4WD control module power and ground circuits. If circuits are OK, substitute a known-good 4WD control module and recheck.

1A-38 Engine General Information and Diagnosis:

Step	Action	Yes	No
13	DTC check 1) Disconnect connector from steering angle sensor (vehicle with ESP®) with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1676?</i>	Go to Step 14.	CAN communication circuit wire between steering angle sensor and CAN circuit junction connector is open or high resistance. If wires are OK, check steering angle sensor power and ground circuits. If circuits are OK, substitute a known good steering angle sensor and recheck.
14	CAN communication circuit check 1) Disconnect connectors from all control modules (ECM, TCM (if equipped), BCM, ABS or ESP® control module, 4WD control module (if equipped), keyless start control module (if equipped), combination meter, steering angle sensor (vehicle with ESP®) with ignition switch turned OFF. 2) Check that CAN communication circuit is as follows. • All wire harness resistance of CAN communication circuit is less than 1 Ω between each control module. • Insulation resistance between CAN communication circuit wires is infinity at each control module connector. • Insulation resistance between each CAN communication circuit wire and vehicle body ground is infinity at each control module connector. • Circuit voltage of CAN communication circuit is 0 V with ignition switch turned ON. <i>Are they in good condition?</i>	Go to Step 15.	Repair or replace defective CAN communication circuit.
15	DTC check in BCM 1) Connect connectors to all control modules communicating by CAN with ignition switch turned OFF. 2) Check DTC U1101 in BCM. <i>Is it indicated?</i>	Check TCM power and ground circuit. If circuit is OK, substitute a known-good TCM and recheck.	Substitute a known-good ECM and recheck.

DTC P1678: CAN Communication (Reception Error for BCM)

S5JB0E1104066

Wiring Diagram

Refer to "DTC P1674: CAN Communication (Bus Off Error):".

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Reception error of communication data for BCM is detected for longer than specified time continuously. (1 driving detection logic but MIL does not light up)	• ECM • BCM • CAN communication line circuit

DTC Confirmation Procedure

- 1) Connect scan tool to DLC with ignition switch turned OFF.
- 2) Turn ON ignition switch and clear DTC by using scan tool.
- 3) Start engine and run it for 1 min. or more.
- 4) Check DTC.

DTC Troubleshooting

NOTE

Before this trouble shooting is performed, read the precautions for DTC troubleshooting referring to "Precautions For DTC Troubleshooting: in related manual".

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check: in related manual".
2	DTC check 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Check ECM, TCM (for A/T model), ABS / ESP® control module, 4WD control module (if equipped), keyless start control module (if equipped) and BCM for DTC. <i>Is there any DTC(s) other than CAN communication DTC(s) at each control module (other than DTC P1618, P1674, P1676, P1678, P1685 in ECM, DTC P1774, P1777, P1778 in TCM (for A/T model), DTC U1073, U1100, U1101, U1121, U1126, U1139, U1140, U1144 in BCM, ABS / ESP® control module and 4WD control module (if equipped), and DTC No.31 / 33 in keyless start control module (if equipped))?</i>	Go to applicable DTC diag. flow.	Go to Step 3.
3	CAN communication error check for ECM 1) Check ECM for DTC. <i>Is there DTC P1674?</i>	Go to "DTC P1674: CAN Communication (Bus Off Error): ".	Go to Step 4.
4	ECM, ABS / ESP® control module and BCM connector check 1) Check for proper connection at each ECM, ABS / ESP® control module and BCM connector terminals with ignition switch turned OFF. 2) If connections are OK, recheck ECM for DTC with engine running. <i>Is there DTC P1678?</i>	Go to Step 5.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
5	ECM power and ground circuit check 1) Check ECM power and ground circuits referring to "ECM Power and Ground Circuit Check: in related manual". <i>Are they in good condition?</i>	Go to Step 6.	Repair ECM power and/or ground circuits.
6	DTC check in BCM 1) Check DTC U1073 in BCM. <i>Is it indicated?</i>	Go to "DTC U1073 (No. 1073): Control Module Communication Bus Off: in Section 10B".	Go to Step 7.
7	CAN communication circuit check 1) Disconnect connectors from BCM and ECM. 2) Check that CAN communication circuit is as follows. • Circuit resistance of CAN communication circuit is less than 1 Ω between "WHT/RED" terminal of ECM connector and "RED" terminal of BCM connector. • Circuit resistance of CAN communication circuit is less than 1 Ω between "WHT/BLU" terminal of ECM connector and "WHT" terminal of BCM connector. <i>Is it in good condition?</i>	Go to Step 9.	Go to Step 8.

1A-40 Engine General Information and Diagnosis:

Step	Action	Yes	No
8	ABS or ESP® control module check 1) Measure resistance at following connector terminals. • Between “WHT/BLU” terminal and “WHT” terminal of ABS or ESP® control module connector. • Between “WHT/RED” terminal and “RED” terminal of ABS or ESP® control module connector. <i>Is measured resistance below 1 Ω?</i>	CAN communication circuit wire between BCM and ECM connector is open or high resistance.	Substitute a known-good ABS or ESP® control module and recheck.
9	DTC check 1) Connect connectors to BCM and ECM with ignition switch turned OFF. 2) Disconnect connectors from TCM (for A/T model) with ignition switch turned OFF. 3) Check ECM for DTC. <i>Is there DTC P1678?</i>	Go to Step 10.	CAN communication circuit wire between TCM and CAN circuit junction connector is open or high resistance. If wires are OK, check TCM power and ground circuits. If circuits are OK, substitute a known-good TCM (for A/T model) and recheck.
10	DTC check 1) Disconnect connector from keyless start control module (if equipped) with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1678?</i>	Go to Step 11.	CAN communication circuit wire between keyless start control module and CAN circuit junction connector is open or high resistance. If wires are OK, check keyless start control module power and ground circuits. If circuits are OK, substitute a known-good keyless start control module and recheck.
11	DTC check 1) Disconnect connector from combination meter with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1678?</i>	Go to Step 12.	CAN communication circuit wire between combination meter and CAN circuit junction connector is open or high resistance. If wires are OK, check combination meter power and ground circuits. If circuits are OK, substitute a known-good combination meter and recheck.

Step	Action	Yes	No
12	DTC check 1) Disconnect connector from 4WD control module (if equipped) with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1678?</i>	Go to Step 13.	CAN communication circuit wire between 4WD control module and CAN circuit junction connector is open or high resistance. If wires are OK, check 4WD control module power and ground circuits. If circuits are OK, substitute a known-good 4WD control module and recheck.
13	DTC check 1) Disconnect connector from steering angle sensor (vehicle with ESP®) with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1678?</i>	Go to Step 14.	CAN communication circuit wire between steering angle sensor and CAN circuit junction connector is open or high resistance. If wires are OK, check steering angle sensor power and ground circuits. If circuits are OK, substitute a known-good steering angle sensor and recheck.
14	CAN communication circuit check 1) Disconnect connectors from all control modules (ECM, TCM (if equipped), BCM, ABS or ESP® control module, 4WD control module (if equipped), keyless start control module (if equipped), combination meter, steering angle sensor (vehicle with ESP®) with ignition switch turned OFF. 2) Check that CAN communication circuit is as follows. • All wire harness resistance of CAN communication circuit is less than 1 Ω between each control module. • Insulation resistance between CAN communication circuit wires is infinity at each control module connector. • Insulation resistance between each CAN communication circuit wire and vehicle body ground is infinity at each control module connector. • Circuit voltage of CAN communication circuit is 0 V with ignition switch turned ON. <i>Are they in good condition?</i>	Go to Step 15.	Repair or replace defective CAN communication circuit.
15	Vehicle spec check <i>Is vehicle equipped with A/T?</i>	Go to Step 16.	Go to Step 17.
16	DTC check in TCM (for A/T model) 1) Connect connectors to all control modules with ignition switch turned OFF. 2) Check DTC P1778 in TCM (for A/T model). <i>Is it indicated?</i>	Go to Step 17.	Substitute a known-good ECM and recheck.

1A-42 Engine General Information and Diagnosis:

Step	Action	Yes	No
17	Combination meter operation check 1) Check combination meter operation for seat belt warning lamp by fastening and unfastening driver side seat belt with ignition switch turned ON. <i>Is it check result satisfactory?</i>	Substitute a known-good ECM and recheck.	Check BCM power and ground circuits, If circuits are OK, substitute a known-good BCM and recheck.

DTC P1685: CAN Communication (Reception Error for ABS or ESP® Control Module)

S5JB0E1104067

Wiring Diagram

Refer to "DTC P1674: CAN Communication (Bus Off Error):".

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Reception error of communication data for ABS or ESP® control module is detected for longer than specified time continuously. (1 driving detection logic)	• ECM • ABS or ESP® control module • CAN communication line circuit

DTC Confirmation Procedure

- 1) Connect scan tool to DLC with ignition switch turned OFF.
- 2) Turn ON ignition switch and clear DTC by using scan tool.
- 3) Start engine and run it for 1 min. or more.
- 4) Check DTC.

DTC Troubleshooting**NOTE**

Before this trouble shooting is performed, read the precautions for DTC troubleshooting referring to "Precautions For DTC Troubleshooting: in related manual".

Step	Action	Yes	No
1	<i>Was "Engine and Emission Control System Check" performed?</i>	Go to Step 2.	Go to "Engine and Emission Control System Check: in related manual".
2	DTC check 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Check ECM, TCM (for A/T model), ABS / ESP® control module, 4WD control module (if equipped), keyless start control module (if equipped) and BCM for DTC. <i>Is there any DTC(s) other than CAN communication DTC(s) at each control module (other than DTC P1618, P1674, P1676, P1678, P1685 in ECM, DTC P1774, P1777, P1778 in TCM (for A/T model), DTC U1073, U1100, U1101, U1121, U1126, U1139, U1140, U1144 in BCM, ABS / ESP® control module and 4WD control module (if equipped), and DTC No.31 / 33 in keyless start control module (if equipped))?</i>	Go to applicable DTC diag. flow.	Go to Step 3.
3	Check CAN communication error for ECM 1) Check ECM for DTC. <i>Is there DTC P1674?</i>	Go to "DTC P1674: CAN Communication (Bus Off Error):".	Go to Step 4.

Step	Action	Yes	No
4	ECM and ABS / ESP® control module connector check 1) Check for proper connection at each ECM and ABS / ESP® control module connector terminals with ignition switch turned OFF. 2) If connections are OK, recheck ECM for DTC with engine running. <i>Is there DTC P1685?</i>	Go to Step 5.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
5	ECM power and ground circuit check 1) Check ECM power and ground circuits referring to "ECM Power and Ground Circuit Check: in related manual". <i>Are they in good condition?</i>	Go to Step 6.	Repair ECM power and/or ground circuits.
6	DTC check in ABS / ESP® control module 1) Check DTC U1073 in ABS / ESP® control module. <i>Is it indicated?</i>	- For vehicle without ESP®, go to "DTC U1073: Control Module Communication Bus Off: in Section 4E". - For vehicle with ESP®, go to "DTC U1073: Control Module Communication Bus Off: in Section 4F".	Go to Step 7.
7	CAN communication circuit check 1) Disconnect connectors from ABS or ESP® control module and ECM. 2) Check that CAN communication circuit is as follows. - Circuit resistance of CAN communication circuit is less than 1 Ω between "WHT/RED" terminal of ECM connector and "WHT/RED" terminal of ABS or ESP® connector. - Circuit resistance of CAN communication circuit is less than 1 Ω between "WHT/BLU" terminal of ECM connector and "WHT/BLU" terminal of ABS / ESP® control module connector. <i>Is it in good condition?</i>	Go to Step 9.	Go to Step 8.
8	CAN communication circuit check 1) Connect connector to ABS or ESP® control module with ignition switch turned OFF. 2) Measure resistance at following connector terminals. - Between "WHT/BLU" and "WHT" terminals of ABS or ESP® control module connector. - Between "WHT/RED" and "RED" terminals of ABS or ESP® control module connector. <i>Is resistance below 1 Ω?</i>	CAN communication circuit wire between ABS or ESP® control module and ECM connector is open or high resistance.	Substitute a known-good ABS or ESP® control module assembly and recheck.

1A-44 Engine General Information and Diagnosis:

Step	Action	Yes	No
9	DTC check in ECM 1) Connect connectors to ABS or ESP® control module and ECM with ignition switch turned OFF. 2) Disconnect connector from BCM with ignition switch turned OFF. 3) Check ECM for DTC(s). <i>Is there DTC P1685?</i>	Go to Step 8.	CAN communication circuit wire between BCM and CAN circuit junction connector is open or high resistance. If wires are OK, check BCM power and ground circuits. If circuits are OK, substitute a known-good BCM and recheck.
10	DTC check in ECM 1) Disconnect connectors from TCM (for A/T model) with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1685?</i>	Go to Step 9.	CAN communication circuit wire between TCM and CAN circuit junction connector is open or high resistance. If wires are OK, check TCM power and ground circuits. If circuits are OK, substitute a known-good TCM (for A/T model) and recheck.
11	DTC check in ECM 1) Disconnect connector from keyless start control module (if equipped) with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1685?</i>	Go to Step 10.	CAN communication circuit wire between keyless start control module and CAN circuit junction connector is open or high resistance. If wires are OK, check keyless start control module power and ground circuit. If circuit are OK, substitute a known-good keyless start control module and recheck.
12	DTC check in ECM 1) Disconnect connector from combination meter with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1685?</i>	Go to Step 11.	CAN communication circuit wire between combination meter and CAN circuit junction connector is open or high resistance. If wires are OK, check combination meter power and ground circuits. If circuits are OK, substitute a known-good combination meter and recheck.

Step	Action	Yes	No
13	DTC check in ECM 1) Disconnect connector from 4WD control module (if equipped) with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1685?</i>	Go to Step 12.	CAN communication circuit wire between 4WD control module and CAN circuit junction connector is open or high resistance. If wires are OK, check 4WD control module power and ground circuits. If circuits are OK, substitute a known-good 4WD control module and recheck.
14	DTC check 1) Disconnect connector from steering angle sensor (vehicle with ESP®) with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P1685?</i>	Go to Step 15.	CAN communication circuit wire between steering angle sensor and CAN circuit junction connector is open or high resistance. If wires are OK, check steering angle sensor power and ground circuits. If circuits are OK, substitute a known-good steering angle sensor and recheck.
15	CAN communication circuit check 1) Disconnect connectors from all control modules (ECM, TCM (if equipped), BCM, ABS or ESP® control module, 4WD control module (if equipped), keyless start control module (if equipped), combination meter, steering to angle sensor (vehicle with ESP®) with ignition switch turned OFF. 2) Check that CAN communication circuit is as follows. • All wire harness resistance of CAN communication circuit is less than 1 Ω between each control module. • Insulation resistance between CAN communication circuit wires is infinity at each control module connector. • Insulation resistance between each CAN communication circuit wire and vehicle body ground is infinity at each control module connector. • Circuit voltage of CAN communication circuit is 0 V with ignition switch turned ON. <i>Are they in good condition?</i>	Go to Step 16.	Repair or replace defective CAN communication circuit.
16	ABS warning lamp check 1) Connect connectors to all control modules communicating by CAN. 2) Turn ignition switch ON. <i>Is ABS warning lamp light up?</i>	Substitute a known-good ABS or ESP® control module and recheck.	Substitute a known-good ECM and recheck.

Inspection of ECM and Its Circuits

ECM and its circuits can be checked by measuring voltage, pulse signal and resistance with special tool connected.

⚠ CAUTION

ECM cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to ECM with ECM connectors disconnected from it.

Voltage Check

- 1) Remove ECM (1) from its bracket referring to “Engine Control Module (ECM) Removal and Installation: in Section 1C in related manual”.
- 2) Connect special tool between ECM and ECM connectors securely.

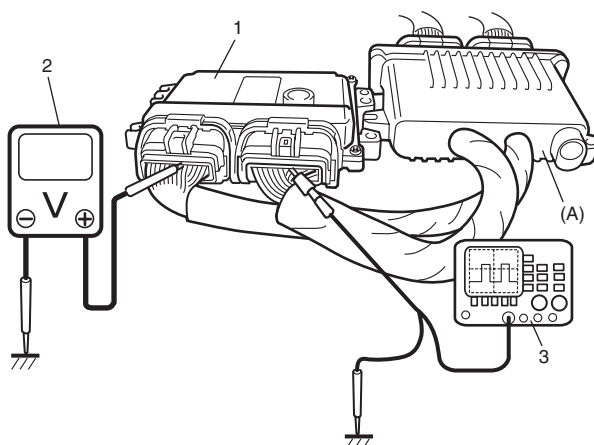
Special tool

(A): 09933-06320

- 3) Check voltage and/or pulse signal using voltmeter (2) and oscilloscope (3).

NOTE

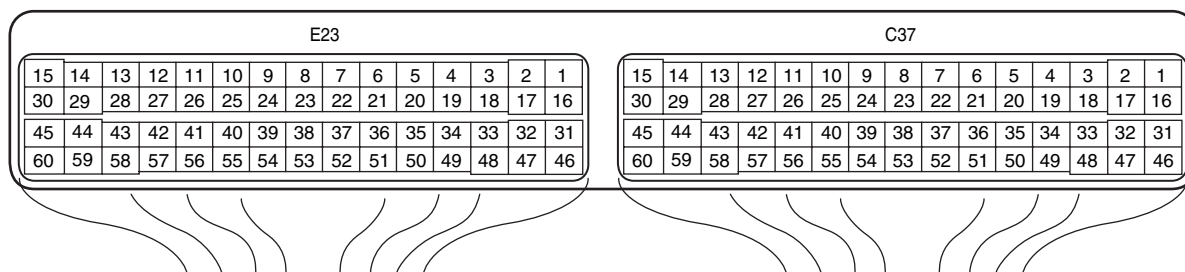
- As each terminal voltage is affected by battery voltage, confirm that it is 11 V or more when ignition switch is turned ON.
- Voltage with asterisk (*) cannot be measured with voltmeter because it is pulse signal. Use oscilloscope for its check if necessary.



I5JB0A110073-01

- Before performed this inspection, be sure to read the “Precautions of ECM Circuit Inspection: in related manual”.

Viewed from harness side



I4RS0A110055-01

Terminal No.	Wire color	Circuit	Normal voltage	Condition	Remarks
C37-1	PNK	Fuel injector No.1	10 – 14 V	Ignition switch turned ON.	—
			*0 – 0.6 V ↑↓ 10 – 14 V ("Reference waveform No.1: ", "Reference waveform No.2: " and "Reference waveform No.31: ")	Engine running at idle after warmed up engine.	Output signal is active low pulse. Pulse frequency varies depending on engine speed.
C37-2	PNK/ BLK	Fuel injector No.2	10 – 14 V	Ignition switch turned ON.	—
			*0 – 0.6 V ↑↓ 10 – 14 V ("Reference waveform No.1: " and "Reference waveform No.3: ")	Engine running at idle after warmed up engine.	Output signal is active low pulse. Pulse frequency varies depending on engine speed.
C37-3	YEL/ GRN	EGR valve (stepper motor coil 3)	10 – 14 V	Ignition switch turned ON.	—
			*0 – 1 V ↑↓ 10 – 14 V ("Reference waveform No.4: ")	Ignition switch is turned to ST (cranking) position.	Output signal is active low duty pulse. Number of pulse generated times varies depending on vehicle condition.
C37-4	YEL	EGR valve (stepper motor coil 4)	10 – 14 V	Ignition switch turned ON.	—
			*0 – 1 V ↑↓ 10 – 14 V ("Reference waveform No.4: ")	Ignition switch is turned to ST (cranking) position.	Output signal is active low duty pulse. Number of pulse generated times varies depending on vehicle condition.
C37-5	YEL/ BLK	EGR valve (stepper motor coil 1)	10 – 14 V	Ignition switch turned ON.	—
			*0 – 1 V ↑↓ 10 – 14 V ("Reference waveform No.4: ")	Ignition switch is turned to ST (cranking) position.	Output signal is active low duty pulse. Number of pulse generated times varies depending on vehicle condition.
C37-6	YEL/ RED	EGR valve (stepper motor coil 2)	10 – 14 V	Ignition switch turned ON.	—
			*0 – 1 V ↑↓ 10 – 14 V ("Reference waveform No.4: ")	Ignition switch is turned to ST (cranking) position.	Output signal is active low duty pulse. Number of pulse generated times varies depending on vehicle condition.
C37-7	BLU/ ORN	Power steering pump pressure switch signal	10 – 14 V	Ignition switch turned ON.	—
			0 – 1 V	With engine at idle speed, turning steering wheel to the right or left as far as it stops.	
C37-8	BRN/ RED (for M16 engine) BRN/ BLK (for J20 engine)	Generator field coil monitor signal	10 – 14 V	Ignition switch turned ON.	Signal is duty pulse. Duty ratio varies depending on vehicle condition.
			*0 – 1 V ↑↓ 10 – 14 V ("Reference waveform No.5: " and "Reference waveform No.6: ")	Engine running at idle after warmed up engine.	

1A-48 Engine General Information and Diagnosis:

Terminal No.	Wire color	Circuit	Normal voltage	Condition	Remarks
C37-9	BLU	Electric load current sensor signal (for J20 engine)	0.5 – 1.0 V	Ignition switch turned ON.	—
			1.3 – 1.7 V	Run engine at 2000 rpm, headlight switch turned ON.	
			1.8 – 2.4 V	Run engine at 2000 rpm, headlight switch ON and blower selector at HI position.	
C37-10	GRN/ WHT	CO adjusting resistor signal (for J20 engine, if equipped)	0 – 5 V	Ignition switch turned ON.	—
C37-11	RED	Oxygen signal of heated oxygen sensor-2	4 – 5 V	Ignition switch turned ON.	—
			*Approx. 0.15 V ("Reference waveform No.7: " and "Reference waveform No.8: ")	Engine running at idle after warmed up engine.	
C37-12	GRY/ BLK	A/C refrigerant pressure sensor signal (if equipped with A/C)	1.38 – 1.52 V	Engine running, A/C switch OFF and blower selector at OFF position, A/C refrigerant pressure: 800 kPa (116 psi)	—
			2.15 – 2.38 V	Engine running, A/C switch ON and blower selector at 1st position or more, A/C refrigerant pressure: 1400 kPa (203 psi)	
			2.67 – 2.95 V	Engine running, A/C switch ON and blower selector at 1st position or more, A/C refrigerant pressure: 1800 kPa (261 psi)	
C37-13	GRN/ BLK	EVAP canister purge valve output	10 – 14 V	Ignition switch turned ON with engine at stop.	—
			*0 – 0.6 V ↑↓ 10 – 14 V ("Reference waveform No.9: ")	Set EVAP canister purge valve at 52% by using "Misc Test" of scan tool.	Output signal is active low duty pulse. Duty ratio varies depending on vehicle condition.
C37-14	GRY/ RED	Output of 5 V power source for MAP sensor, A/C refrigerant pressure sensor, electric load current sensor (for J20 engine) and CO adjusting resistor (if equipped)	4.5 – 5.5 V	Ignition switch turned ON.	—
C37-15	BLK/ ORN	Ground for ECM	Below 0.3 V	Ignition switch turned ON.	—

Terminal No.	Wire color	Circuit	Normal voltage	Condition	Remarks
C37-16	PNK/ GRN	Fuel injector No.3	10 – 14 V	Ignition switch turned ON.	—
			*0 – 0.6 V ↑↓ 10 – 14 V ("Reference waveform No.1: " and "Reference waveform No.10: ")	Engine running at idle after warmed up engine.	Output signal is active low pulse. Pulse frequency varies depending on engine speed.
C37-17	PNK/ BLU	Fuel injector No.4	10 – 14 V	Ignition switch turned ON.	—
			*0 – 0.6 V ↑↓ 10 – 14 V ("Reference waveform No.1: " and "Reference waveform No.11: ")	Engine running at idle after warmed up engine.	Output signal is active low pulse. Pulse frequency varies depending on engine speed.
C37-18	BRN/ YEL	Ignition coil No.4 (for J20 engine)	0 – 0.6 V	Ignition switch turned ON.	—
			*0 – 0.6 V ↑↓ 3 – 5 V ("Reference waveform No.12: " and "Reference waveform No.13: ")	Engine running at idle after warmed up engine.	Output signal is active high pulse. Pulse frequency varies depending on engine speed.
C37-19	BRN/ WHT	Ignition coil No.3 (for J20 engine)	0 – 0.6 V	Ignition switch turned ON.	—
			*0 – 0.6 V ↑↓ 3 – 5 V ("Reference waveform No.12: " and "Reference waveform No.14: ")	Engine running at idle after warmed up engine.	Output signal is active high pulse. Pulse frequency varies depending on engine speed.
C37-20	BRN/ BLK	Ignition coil No.2 and No.3 (for M16 engine)	0 – 0.6 V	Ignition switch turned ON.	—
		Ignition coil No.2 (for J20 engine)	*0 – 0.6 V ↑↓ 3 – 5 V ("Reference waveform No.12: " and "Reference waveform No.15: ")	Engine running at idle after warmed up engine.	Output signal is active high pulse. Pulse frequency varies depending on engine speed.
C37-21	BRN	Ignition coil No.1 and No.4 (for M16 engine)	0 – 0.6 V	Ignition switch turned ON.	—
		Ignition coil No.1 (for J20 engine)	*0 – 0.6 V ↑↓ 3 – 5 V ("Reference waveform No.12: " and "Reference waveform No.16: ")	Engine running at idle after warmed up engine.	Output signal is active high pulse. Pulse frequency varies depending on engine speed.
C37-22	BLK/ YEL	Starting motor control relay output	0 – 1 V	Ignition switch turned ON.	—
			8 – 14 V	Ignition switch turned to ST (engine cranking) position.	
C37-23	—	—	—	—	—

1A-50 Engine General Information and Diagnosis:

Terminal No.	Wire color	Circuit	Normal voltage	Condition	Remarks
C37-24	PPL/ YEL	Engine coolant temp. (ECT) sensor signal	3.3 – 3.8 V	Ignition switch turned ON, ECT at 0 °C, 32 °F.	—
			1.38 – 1.72 V	Ignition switch turned ON, ECT at 50 °C, 122 °F.	
			0.40 – 0.53 V	Ignition switch turned ON, ECT at 100 °C, 212 °F.	
C37-25	LT GRN	Intake air temp. (IAT) sensor signal	3.18 – 3.67 V	Ignition switch turned ON, IAT at 0 °C, 32 °F.	—
			1.32 – 1.65 V	Ignition switch turned ON, IAT at 40 °C, 104 °F.	
			0.46 – 0.60 V	Ignition switch turned ON, IAT at 80 °C, 176 °F.	
C37-26	RED	Mass air flow (MAF) sensor signal	0.5 – 1.0 V	Ignition switch turned ON with engine at stop.	—
			1.3 – 1.8 V ("Reference waveform No.17: ")	When engine running at specified idle speed after warmed up.	
C37-27	BLU	Ground for MAF sensor	Below 0.3 V	Ignition switch turned ON.	—
C37-28	BRN/ BLK	Generator control signal output	*0 – 0.6 V ↑↓ 5 – 7 V ("Reference waveform No.5: " and "Reference waveform No.6: ")	Engine running at idle speed, headlight switch turned ON.	Output signal is active low duty pulse. Duty ratio varies depending on vehicle condition.
C37-29	BLK/ YEL	Ground for ECM	Below 0.3 V	Ignition switch turned ON.	—
C37-30	BLK/ ORN	Ground for ECM	Below 0.3 V	Ignition switch turned ON.	—
C37-31	BLK/ YEL	Ground for A/F sensor heater	Below 0.3 V	Ignition switch turned ON.	—
C37-32	PNK/ BLU	Heater output of A/F sensor	10 – 14 V	Ignition switch turned ON.	Output signal is active low duty pulse. Duty ratio varies depending on engine condition.
			*0 – 1 V ↑↓ 10 – 14 V ("Reference waveform No.18: ")	Engine running at idle after warmed up engine.	
C37-33	GRY/ RED	Intake manifold tuning vacuum solenoid valve output (for J20 engine)	10 – 14 V	Ignition switch turned ON.	—
			0 – 1 V ("Reference waveform No.19: ")	Engine running at idle after warmed up engine.	
C37-34	RED/ BLU	Ground for A/F sensor adjusting resistor	Below 0.3 V	Ignition switch turned ON.	—
C37-35	RED/ YEL	A/F sensor adjusting resistor signal	0.15 – 4.82 V	Ignition switch turned ON.	—
C37-36	PNK	Crankshaft position (CKP) sensor (–) (for J20 engine)	0 – 1 V	Ignition switch turned ON.	Output signal is sinusoidal waveform. Waveform frequency varies depending on engine speed. (30 (36 – 6) pulses are generated per 1 crankshaft revolution.)
			*4 – 6 V ↑↓ –4 – –6 V ("Reference waveform No.20: " and "Reference waveform No.21: ")	Engine running at idle after warmed up engine.	

Terminal No.	Wire color	Circuit	Normal voltage	Condition	Remarks
C37-37	BLK	A/F sensor signal (-)	2.6 – 2.8 V ("Reference waveform No.18: ")	Engine running at idle after warmed up engine.	—
C37-38	WHT	A/F sensor signal (+)	3.0 – 3.2 V ("Reference waveform No.18: ")	Engine running at idle after warmed up engine.	—
C37-39	—	—	—	—	—
C37-40	RED	Throttle position sensor (sub) signal	1.60 – 1.91 V	Ignition switch turned ON and accelerator pedal at idle position after warmed up engine.	—
			3.88 – 4.45 V	Ignition switch turned ON and accelerator pedal at full depressed position after warmed up engine.	
C37-41	GRN	Ground for throttle position sensor	Below 0.3 V	Ignition switch turned ON.	—
C37-42	—	—	—	—	—
C37-43	—	—	—	—	—
C37-44	BLU/ RED	Output of throttle actuator	0 – 1 V	Ignition switch turned ON and accelerator pedal at idle position after warmed up engine.	Output signal is duty pulse. Duty ratio varies depending on throttle valve and accelerator pedal position.
			*0 – 1 V ↑↓ 10 – 14 V ("Reference waveform No.22: " and "Reference waveform No.23: ")	Ignition switch turned ON and accelerator pedal at full depressed position after warmed up engine.	
C37-45	BLU/ YEL	Output of throttle actuator	0 – 1 V	Ignition switch turned ON and accelerator pedal at full depressed position after warmed up engine.	Output signal is duty pulse. Duty ratio varies depending on throttle valve and accelerator pedal position.
			*0 – 1 V ↑↓ 10 – 14 V ("Reference waveform No.22: " and "Reference waveform No.23: ")	Ignition switch turned ON and accelerator pedal at idle position after warmed up engine.	
C37-46	—	—	—	—	—
C37-47	BLK/ RED	Heater output of heated oxygen sensor-2	10 – 14 V	Ignition switch turned ON.	Output signal is active low duty pulse. Duty ratio varies depending on engine condition.
			*0 – 1 V ↑↓ 10 – 14 V ("Reference waveform No.7: " and "Reference waveform No.8: ")	Engine running at idle after warmed up engine.	
C37-48	BLK/ YEL	Ground for ECM	Below 0.3 V	Ignition switch turned ON.	—
C37-49	—	—	—	—	—
C37-50	—	—	—	—	—

1A-52 Engine General Information and Diagnosis:

Terminal No.	Wire color	Circuit	Normal voltage	Condition	Remarks
C37-51	WHT/ BLU	CKP sensor signal (for M16 engine)	0 – 1 V or 4 – 5 V	Ignition switch turned ON.	—
			*4 – 5 V ↑↓ 0 – 0.6 V ("Reference waveform No.20: " and "Reference waveform No.21: ")	Engine running at idle after warmed up engine.	Sensor signal is pulse. Pulse frequency which varies depending on engine speed. (30 (36 – 6) pulses are generated per 1 crankshaft revolution.)
	GRN	Crankshaft position (CKP) sensor (+) (for J20 engine)	0 – 1 V	Ignition switch turned ON.	—
			*4 – 6 V ↑↓ –4 – –6 V ("Reference waveform No.20: " and "Reference waveform No.21: ")	Engine running at idle after warmed up engine.	Output signal is sinusoidal waveform. Waveform frequency varies depending on engine speed. (30 (36 – 6) pulses are generated par 1 crankshaft revolution.)
C37-52	WHT/ RED	CMP sensor signal	0 – 1 V or 4 – 5 V	Ignition switch turned ON.	—
			*0 – 0.6 V ↑↓ 4 – 5 V ("Reference waveform No.20: " and "Reference waveform No.21: ")	Engine running at idle after warmed up engine.	Sensor signal is pulse. Pulse frequency varies depending on engine speed. (6 pulses are generated per 1 camshaft revolution.)
C37-53	WHT	Output for 5 V power source of throttle position sensor	4.5 – 5.5 V	Ignition switch turned ON.	—
C37-54	BLK	Throttle position sensor (main) signal	0.72 – 1.04 V	Ignition switch turned ON and accelerator pedal at idle position after warmed up engine.	—
			3.67 – 4.25 V	Ignition switch turned ON and accelerator pedal at full depressed position after warmed up engine.	
C37-55	RED/ WHT	Manifold absolute pressure (MAP) sensor signal	Approx. 4 V ("Reference waveform No.24: ")	Ignition switch turned ON with barometric pressure at 100 kPa, 760 mmHg.	—
			0.4 – 2.0 V ("Reference waveform No.25: ")	While engine running at specified idle speed after warmed up with barometric pressure at 100 kPa, 760 mmHg.	
C37-56	WHT	Knock sensor signal	2 – 3 V ("Reference waveform No.26: " and "Reference waveform No.27: ")	Ignition switch turned ON. Engine running at 4000 r/ min. after warmed up.	—
C37-57	GRY/ GRN	Ground for sensors	Below 0.3 V	Ignition switch turned ON.	—
C37-58	BLK/ YEL	Ground for ECM	Below 0.3 V	Ignition switch turned ON.	—
C37-59	BRN/ YEL	Oil control valve ground (for M16 engine)	Below 1.3 V	Ignition switch turned ON.	—

Terminal No.	Wire color	Circuit	Normal voltage	Condition	Remarks
C37-60	BRN/ WHT	Oil control valve output (for M16 engine)	*0 – 0.6 V ↑↓ 10 – 14 V ("Reference waveform No.28: " and "Reference waveform No.29: ")	At the moment of ignition switch turned ON.	Output signal is active high pulse. Duty ratio varies depending on vehicle condition.

Terminal No.	Wire color	Circuit	Normal voltage	Condition	Remarks
E23-1	BLU/ BLK	Main power supply	10 – 14 V	Ignition switch turned ON.	—
E23-2	WHT	Power source for ECM internal memory	10 – 14 V	Ignition switch turned ON.	—
E23-3	—	—	—	—	—
E23-4	WHT/ RED	CAN (high) communication line (active high signal)	*2.5 – 4.5 V ("Reference waveform No.30: ")	Ignition switch turned ON with engine at stop.	CAN communication line signal is pulse. Pulse signal displayed with a regular frequency which varies depending on engine condition.
E23-5	PPL/ WHT	Serial communication line of data link connector 12 V	8 – 14 V	Ignition switch turned ON.	—
E23-6	BLK/ WHT	Cruise control main switch signal (if equipped with cruise control system)	10 – 14 V	Ignition switch turned ON, cruise control main switch to ON position. (cruise control main switch is kept in push)	—
E23-7	BLU	Clutch pedal position switch signal (for M/T model, if equipped with cruise control system)	4 – 6 V	Ignition switch turned ON, clutch pedal not depressed.	—
			0 – 1 V	Ignition switch turned ON, clutch pedal full depressed.	
E23-8	YEL/ GRN	Brake pedal position switch signal (if equipped with cruise control system)	10 – 14 V	Ignition switch turned ON, stop lamp not lit up.	—
			0 – 1 V	Ignition switch turned ON, stop lamp lit up.	
E23-9	—	—	—	—	—
E23-10	—	—	—	—	—
E23-11	—	—	—	—	—
E23-12	YEL	Diagnosis switch terminal (if equipped)	4 – 5 V	Ignition switch turned ON.	—
E23-13	PNK/ BLU	Clock signal for immobilizer coil antenna (if equipped)	10 – 14 V	Ignition switch turned ON.	—
E23-14	—	—	—	—	—

1A-54 Engine General Information and Diagnosis:

Terminal No.	Wire color	Circuit	Normal voltage	Condition	Remarks
E23-15	WHT/ GRN	Fuel pump relay output	0 – 2.5 V	For 2 sec. from the time ignition switch is turned ON or while engine is running.	—
			10 – 14 V	On and after 2 sec. from the time ignition switch is turned ON or while engine is at stop.	
E23-16	BLU/ BLK	Main power supply	10 – 14 V	Ignition switch turned ON.	—
E23-17	GRN	Power supply of throttle actuator drive circuit	10 – 14 V	Ignition switch turned ON.	—
E23-18	—	—	—	—	—
E23-19	WHT/ BLU	CAN (low) communication line (active low signal)	*0.5 – 2.5 V (“Reference waveform No.30: ”)	Ignition switch turned ON with engine stop.	CAN communication line signal is pulse. Pulse signal displayed with a regular frequency which varies depending on engine condition.
E23-20	GRN/ WHT	Stop lamp switch signal	0 – 1 V	Ignition switch turned ON, stop lamp not lit up.	—
			10 – 14 V	Ignition switch turned ON, stop lamp lit up.	
E23-21	BLK/ YEL	Cruise control command switch ground (if equipped with cruise control system)	Below 1.3 V	Ignition switch turned ON.	—
E23-22	LT GRN	Cruise control command switch signal (if equipped with cruise control system)	4 – 6 V	Ignition switch turned ON.	—
E23-23	—	—	—	—	—
E23-24	YEL/ RED	Fuel level sensor signal	0 – 6 V	Ignition switch turned ON. Voltage varies depends on fuel level.	—
E23-25	—	—	—	—	—
E23-26	—	—	—	—	—
E23-27	—	—	—	—	—
E23-28	GRY/ BLU	Serial communication line for immobilizer coil antenna (if equipped)	10 – 14 V	Ignition switch turned ON.	—
E23-29	BLK/ WHT	Ignition switch signal	0 – 1 V	Ignition switch turned OFF.	—
			10 – 14 V	Ignition switch turned ON.	
E23-30	—	—	—	—	—
E23-31	—	—	—	—	—
E23-32	—	—	—	—	—
E23-33	—	—	—	—	—
E23-34	—	—	—	—	—
E23-35	—	—	—	—	—
E23-36	—	—	—	—	—
E23-37	—	—	—	—	—
E23-38	—	—	—	—	—
E23-39	—	—	—	—	—

Terminal No.	Wire color	Circuit	Normal voltage	Condition	Remarks
E23-40	—	—	—	—	—
E23-41	—	—	—	—	—
E23-42	—	—	—	—	—
E23-43	—	—	—	—	—
E23-44	—	—	—	—	—
E23-45	—	—	—	—	—
E23-46	RED/ BLK	Radiator cooling fan relay No.1 output	10 – 14 V	Ignition switch turned ON, engine coolant temp.: below 95 °C (203 °F), or A/C refrigerant pressure: below 300 kPa (43.5 psi) with A/C switch turned on while engine is running.	—
			0 – 2 V	Ignition switch turned ON, engine coolant temp.: 97.5 °C (207.5 °F) or higher, or A/C refrigerant pressure: 340 kPa (49.3 psi) or higher with A/C switch turned on while engine is running.	
E23-47	RED	Radiator cooling fan relay No.2 output	10 – 14 V	Ignition switch turned ON, engine coolant temp.: below 100 °C (212 °F), or A/C refrigerant pressure: below 1300 kPa (188.5 psi) with A/C switch turned on while engine is running.	—
			0 – 2 V	Ignition switch turned ON, engine coolant temp.: 102.5 °C (216.5 °F) or higher, or A/C refrigerant pressure: 1600 kPa (232 psi) or higher with A/C switch turned on while engine is running.	
E23-48	RED/ YEL	Radiator cooling fan relay No.3 output	10 – 14 V	Ignition switch turned ON, engine coolant temp.: below 100 °C (212 °F), or A/C refrigerant pressure: below 1300 kPa (188.5 psi) with A/C switch turned on while engine is running.	—
			0 – 2 V	Ignition switch turned ON, engine coolant temp.: 102.5 °C (216.5 °F) or higher, or A/C refrigerant pressure: 1600 kPa (232 psi) or higher with A/C switch turned on while engine is running.	
E23-49	PNK	A/C compressor relay output (if equipped with A/C)	10 – 14 V	Engine running, A/C switch OFF and blower selector at OFF position.	—
			0 – 1 V	Engine running, A/C switch ON and blower selector at 1st position or more.	

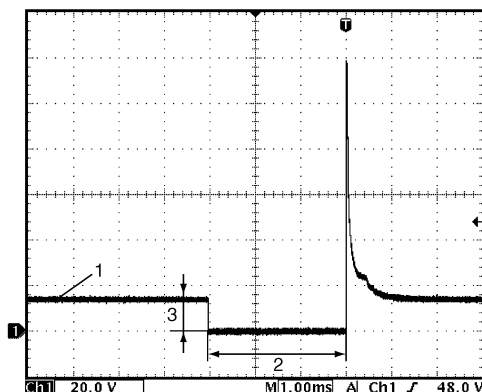
1A-56 Engine General Information and Diagnosis:

Terminal No.	Wire color	Circuit	Normal voltage	Condition	Remarks
E23-50	BLU/ ORN	Throttle actuator control relay output	0 – 1 V	Ignition switch turned ON.	—
E23-51	BLU/ YEL	Ground for accelerator pedal position (APP) sensor (sub)	Below 0.3 V	Ignition switch turned ON.	—
E23-52	BLU/ GRN	Accelerator pedal position (APP) sensor (sub) signal	0.30 – 0.44 V	Ignition switch turned ON and accelerator pedal at idle position after warmed up engine.	—
			1.74 – 2.17 V	Ignition switch turned ON and accelerator pedal at full depressed position after warmed up engine.	
E23-53	ORN/ BLU	Output for 5 V power source of accelerator pedal position (APP) sensor (sub)	4.5 – 5.5 V	Ignition switch turned ON.	—
E23-54	ORN	Ground for accelerator pedal position (APP) sensor (main)	Below 0.3 V	Ignition switch turned ON.	—
E23-55	WHT/ BLU	Accelerator pedal position (APP) sensor (main) signal	0.65 – 0.82 V	Ignition switch turned ON and accelerator pedal at idle position after warmed up engine.	—
			3.50 – 4.27 V	Ignition switch turned ON and accelerator pedal at full depressed position after warmed up engine.	
E23-56	WHT	Output for 5 V power source of accelerator pedal position (APP) sensor (main)	4.5 – 5.5 V	Ignition switch turned ON.	—
E23-57	—	—	—	—	—
E23-58	—	—	—	—	—
E23-59	—	—	—	—	—
E23-60	BLU	Main power supply relay output	10 – 14 V	Ignition switch turned OFF.	—
			0 – 2 V	Ignition switch turned ON.	

Reference waveform No.1

Fuel injector signal (1) with engine idling

Measurement terminal	CH1: "C37-2" to "C37-58"
Oscilloscope setting	CH1: 20 V/DIV TIME: 1 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine at specified idle speed



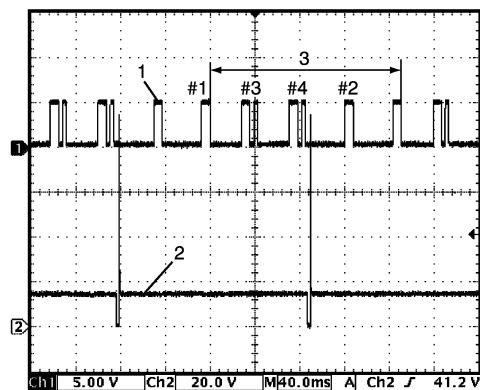
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|--|
| 2. Fuel injection pulse width: 2-4 msec. |
| 3. 10 – 14 V |

Reference waveform No.2

No.1 fuel injector signal (2) with engine idling

Measurement terminal	CH1: "C37-52" to "C37-58" CH2: "C37-1" to "C37-58"
Oscilloscope setting	CH1: 5 V/DIV, CH2: 20 V/DIV TIME: 40 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine at specified idle speed



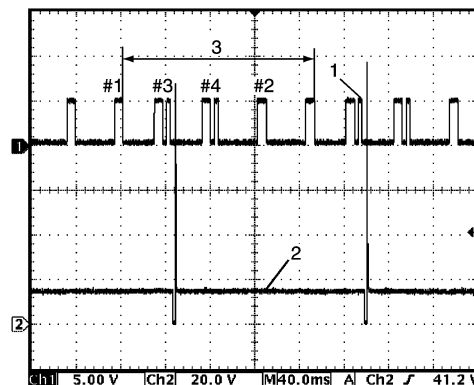
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|---|
| 1. Cylinder reference signal (CMP reference signal) |
| 3. 720° crank angle |

Reference waveform No.3

No.2 fuel injector signal (2) with engine idling

Measurement terminal	CH1: "C37-52" to "C37-58" CH2: "C37-2" to "C37-58"
Oscilloscope setting	CH1: 5 V/DIV, CH2: 20 V/DIV TIME: 40 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine at specified idle speed



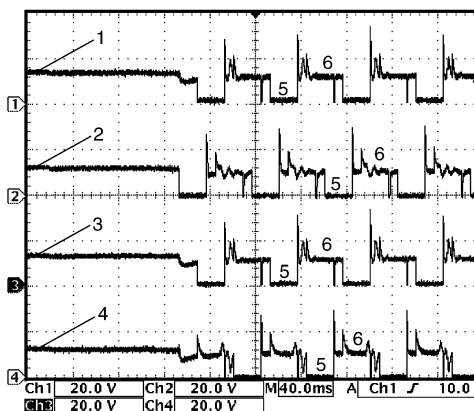
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|---|
| 1. Cylinder reference signal (CMP reference signal) |
| 3. 720° crank angle |

Reference waveform No.4

EGR valve signal

Measurement terminal	CH1: "C37-5" to "C37-58" CH2: "C37-6" to "C37-58" CH3: "C37-3" to "C37-58" CH4: "C37-4" to "C37-58"
Oscilloscope setting	CH1: 20 V/DIV, CH2: 20 V/DIV CH3: 20 V/DIV, CH4: 20 V/DIV TIME: 40 ms/DIV
Measurement condition	Engine at cranking



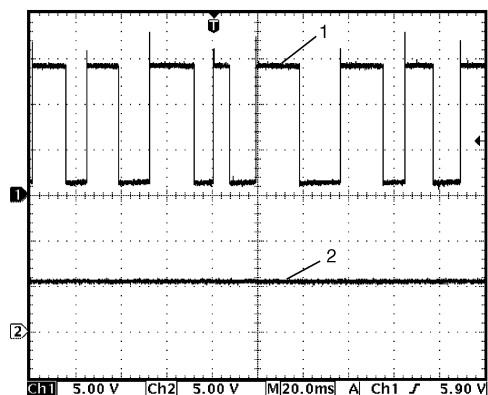
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- | |
|--|
| 1. EGR valve stepper motor coil 1 signal |
| 2. EGR valve stepper motor coil 2 signal |
| 3. EGR valve stepper motor coil 3 signal |
| 4. EGR valve stepper motor coil 4 signal |
| 5. ON signal |
| 6. OFF signal |

Reference waveform No.5

Generator field coil monitor signal (1) at engine idling

Measurement terminal	CH1: "C37-8" to "C37-58" CH2: "C37-28" to "C37-58"
Oscilloscope setting	CH1: 5 V/DIV, CH2: 5 V/DIV TIME: 20 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine at specified idle speed - All accessory switch turned off



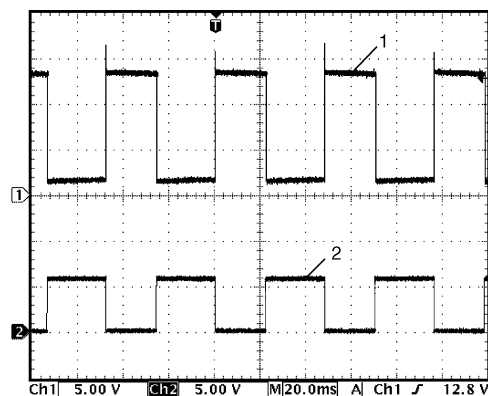
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2. Generator output control signal

Reference waveform No.6

Generator field coil monitor signal (1) at engine idling

Measurement terminal	CH1: "C37-8" to "C37-58" CH2: "C37-28" to "C37-58"
Oscilloscope setting	CH1: 5 V/DIV, CH2: 5 V/DIV TIME: 20 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine at specified idle speed - For a few sec. from headlight switch turned ON



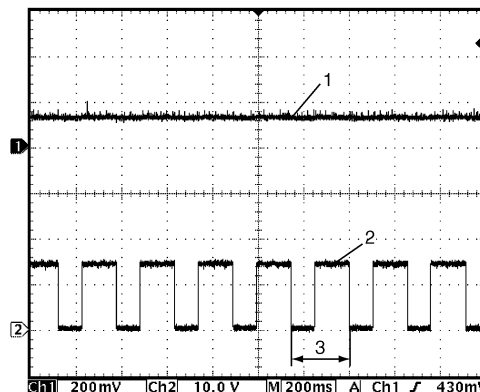
I5JB0A110078-01

2. Generator output control signal

Reference waveform No.7

Heated oxygen sensor-2 signal (1) with engine idling

Measurement terminal	CH1: "C37-11" to "C37-57" CH2: "C37-47" to "C37-58"
Oscilloscope setting	CH1: 200 mV/DIV, CH2: 10 V/DIV TIME: 200 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine at specified idle speed



I5JB0A110079-01

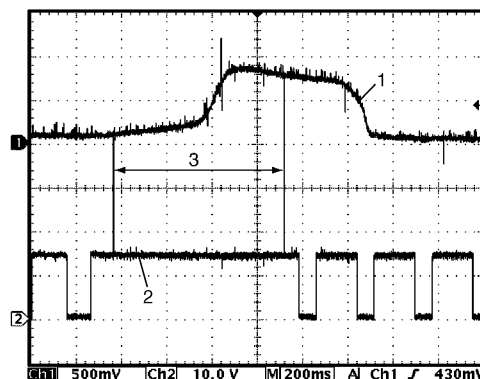
2. Heated oxygen sensor-2 heater signal

3. One duty cycle

Reference waveform No.8

Heated oxygen sensor-2 signal (1) with engine racing

Measurement terminal	CH1: "C37-11" to "C37-57" CH2: "C37-47" to "C37-58"
Oscilloscope setting	CH1: 500 mV/DIV, CH2: 10 V/DIV TIME: 200 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine racing



I5JB0A110080-03

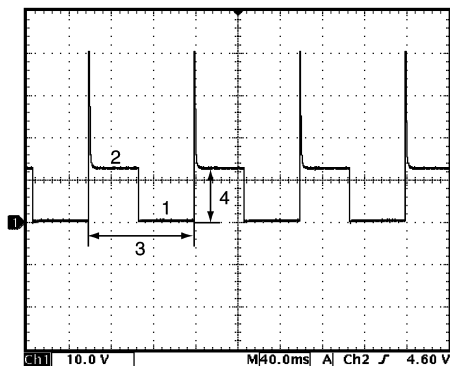
2. Heated oxygen sensor-2 heater signal

3. Engine racing

Reference waveform No.9

EVAP canister purge valve signal

Measurement terminal	CH1: "C37-13" to "C37-58"
Oscilloscope setting	CH1: 10 V/DIV TIME: 40 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Set EVAP canister purge valve at 52% by using "Misc Test" of scan tool



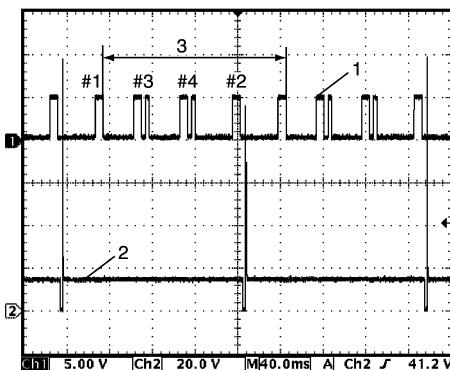
I4RS0B110067-01

1. ON signal
2. OFF signal
3. One duty cycle
4. 10 – 14 V

Reference waveform No.10

No.3 fuel injector signal (2) with engine idling

Measurement terminal	CH1: "C37-52" to "C37-58" CH2: "C37-16" to "C37-58"
Oscilloscope setting	CH1: 5 V/DIV, CH2: 20 V/DIV TIME: 40 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine at specified idle speed



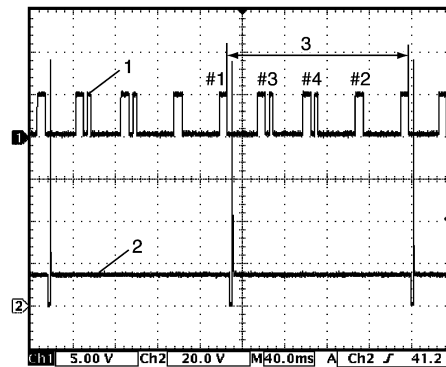
I5JB0A110081-01

1. Cylinder reference signal (CMP reference signal)
3. 720° crank angle

Reference waveform No.11

No.4 fuel injector signal (2) with engine idling

Measurement terminal	CH1: "C37-52" to "C37-58" CH2: "C37-17" to "C37-58"
Oscilloscope setting	CH1: 5 V/DIV, CH2: 20 V/DIV TIME: 40 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine at specified idle speed



I5JB0A110082-01

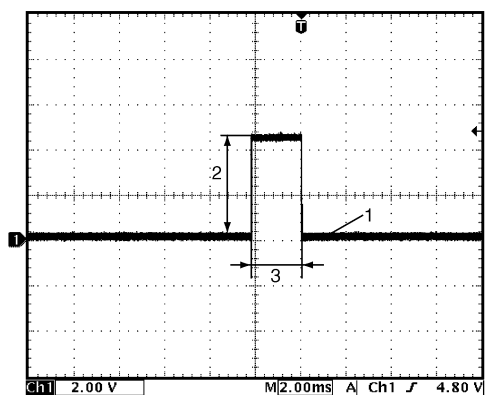
1. Cylinder reference signal (CMP reference signal)
3. 720° crank angle

Reference waveform No.12

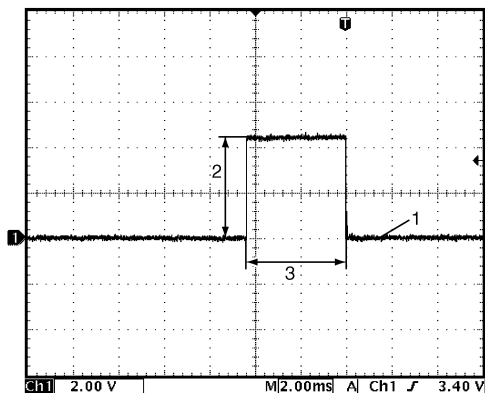
Ignition coil signal (1) with engine idling

Measurement terminal	CH1: "C37-20" to "C37-58"
Oscilloscope setting	CH1: 2 V/DIV TIME: 2 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine at specified idle speed

[A]



[B]



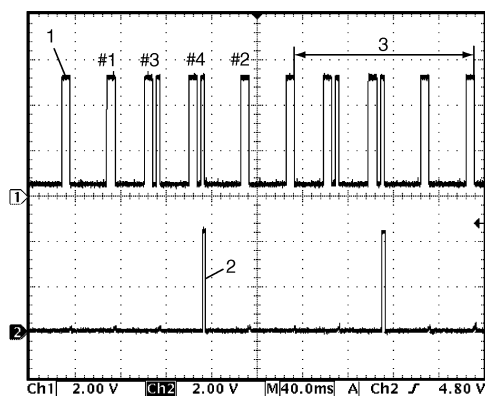
I5JB0A110083-02

[A]: For J20 engine
[B]: For M16 engine
1. 4 – 6 V
3. Ignition coil pulse width

Reference waveform No.13

Ignition coil No.4 signal (2) with engine idling (for J20 engine)

Measurement terminal	CH1: "C37-52" to "C37-58" CH2: "C37-18" to "C37-58"
Oscilloscope setting	CH1: 2 V/DIV, CH2: 2 V/DIV TIME: 40 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine at specified idle speed



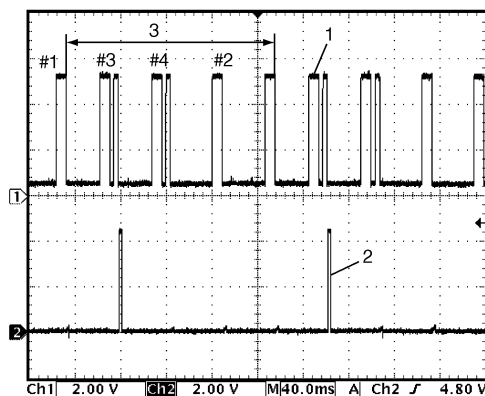
I5JB0A110084-01

- | |
|---|
| 1. Cylinder reference signal (CMP reference signal) |
| 3. 720° crank angle |

Reference waveform No.14

Ignition coil No.3 signal (2) with engine idling (for J20 engine)

Measurement terminal	CH1: "C37-52" to "C37-58" CH2: "C37-19" to "C37-58"
Oscilloscope setting	CH1: 2 V/DIV, CH2: 2 V/DIV TIME: 40 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine at specified idle speed



I5JB0A110085-01

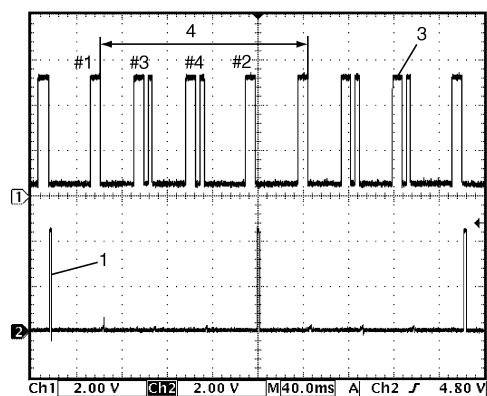
- | |
|---|
| 1. Cylinder reference signal (CMP reference signal) |
| 3. 720° crank angle |

Reference waveform No.15

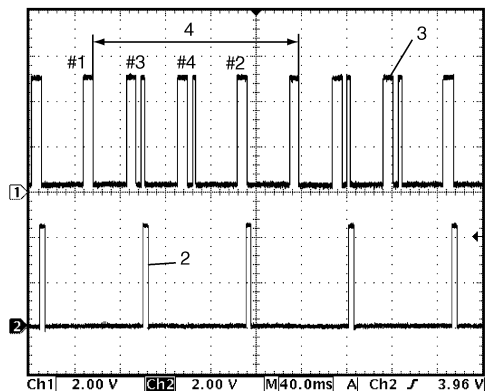
- Ignition coil No.2 signal (1) with engine idling (for J20 engine)
- Ignition coil No.2 and No.3 signal (2) with engine idling (for M16 engine)

Measurement terminal	CH1: "C37-52" to "C37-58" CH2: "C37-20" to "C37-58"
Oscilloscope setting	CH1: 2 V/DIV, CH2: 2 V/DIV TIME: 40 ms/DIV
Measurement condition	• After warmed up to normal operating temperature • Engine at specified idle speed

[A]



[B]



I5JB0A110086-01

[A]: For J20 engine

[B]: For M16 engine

3. Cylinder reference signal (CMP reference signal)

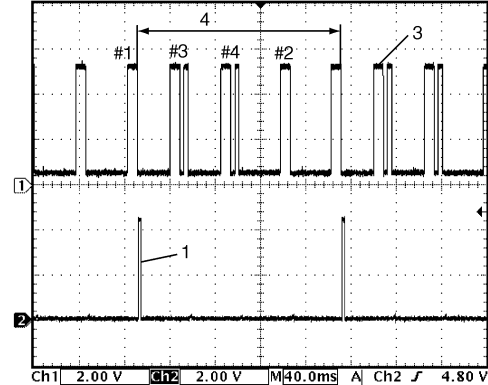
4. 720° crank angle

Reference waveform No.16

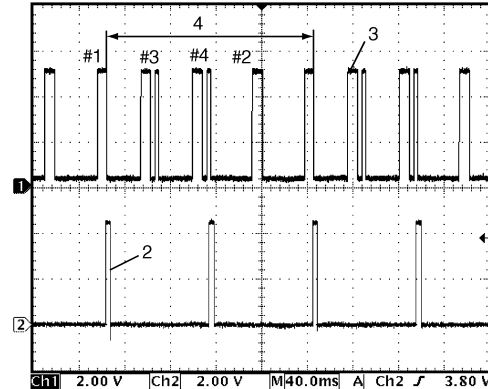
- Ignition coil No.1 signal (1) with engine idling (for J20 engine)
- Ignition coil No.1 and No.4 signal (2) with engine idling (for M16 engine)

Measurement terminal	CH1: "C37-52" to "C37-58" CH2: "C37-21" to "C37-58"
Oscilloscope setting	CH1: 2 V/DIV, CH2: 2 V/DIV TIME: 40 ms/DIV
Measurement condition	• After warmed up to normal operating temperature • Engine at specified idle speed

[A]



[B]



I5JB0A110087-02

[A]: For J20 engine

[B]: For M16 engine

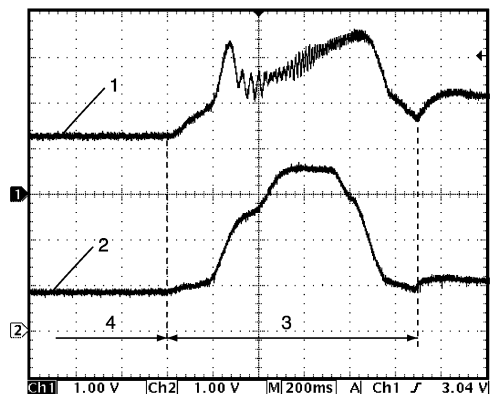
3. Cylinder reference signal (CMP reference signal)

4. 720° crank angle

Reference waveform No.17

Mass air flow sensor signal (1) with engine racing

Measurement terminal	CH1: "C37-26" to "C37-27" CH2: "C37-54" to "C37-41"
Oscilloscope setting	CH1: 1 V/DIV, CH2: 1 V/DIV TIME: 200 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine racing



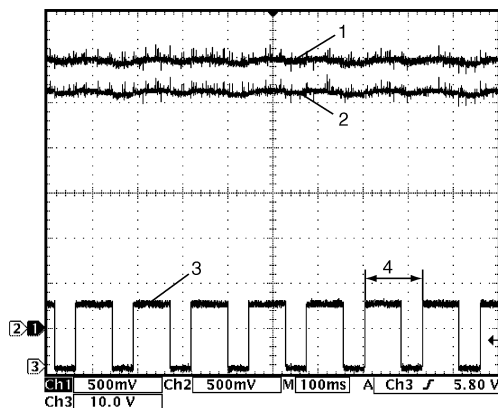
I5JB0A110088-02

2. Throttle position sensor (main) signal
3. Racing
4. Idle

Reference waveform No.18

A/F sensor signal with engine idling

Measurement terminal	CH1: "C37-38" to "C37-58" CH2: "C37-37" to "C37-58" CH3: "C37-32" to "C37-31"
Oscilloscope setting	CH1: 500 mV/DIV, CH2: 500 mV/DIV, CH3: 10 V/DIV TIME: 100 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine at specified idle speed



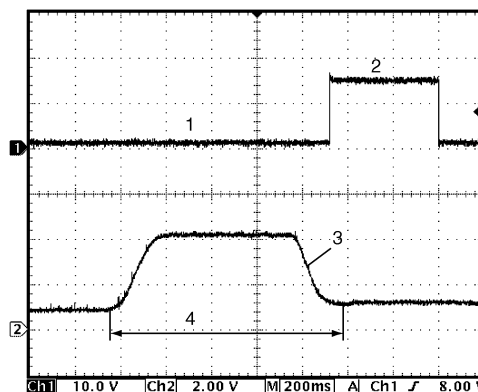
I5JB0A110089-01

1. A/F sensor signal (+)
2. A/F sensor signal (-)
3. A/F sensor heater signal
4. One duty cycle

Reference waveform No.19

Intake manifold tuning vacuum solenoid valve signal with engine racing (for J20 engine)

Measurement terminal	CH1: "C37-33" to "C37-58" CH2: "C37-54" to "C37-41"
Oscilloscope setting	CH1: 10 V/DIV, CH2: 2 V/DIV TIME: 200 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine racing



I5JB0A110090-02

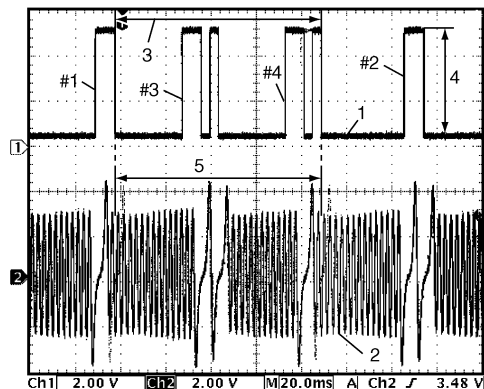
1. ON signal (IMT valve closed)
2. OFF signal (IMT valve opened)
3. Throttle position sensor (main) signal
4. Racing

Reference waveform No.20

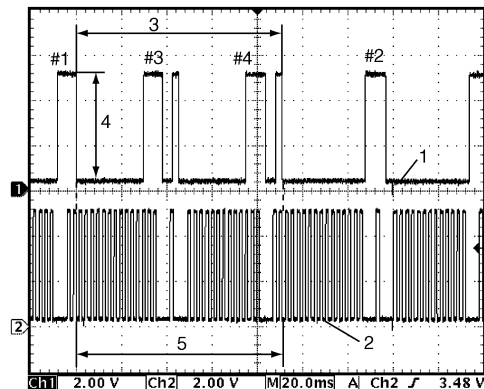
CMP sensor signal with engine idling

Measurement terminal	CH1: "C37-52" to "C37-58" CH2: "C37-51" to "C37-36" (for J20 engine), "C37-58" (for M16 engine)
Oscilloscope setting	CH1: 2 V/DIV, CH2: 2 V/DIV TIME: 20 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine at specified idle speed

[A]



[B]



I5JB0A110091-01

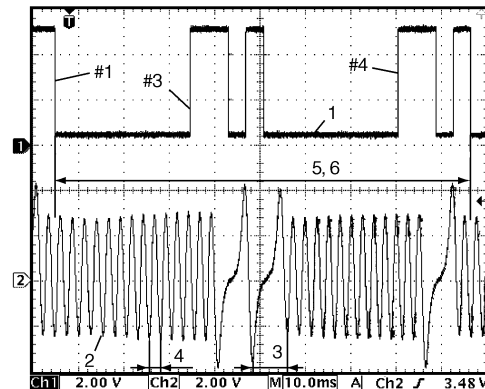
[A]: For J20 engine
[B]: For M16 engine
1. Cylinder reference signal (CMP reference signal)
2. CKP signal
3. 360° crank angle
4. 4 – 5 V
5. 36 – 6 = 30 CKP pulse

Reference waveform No.21

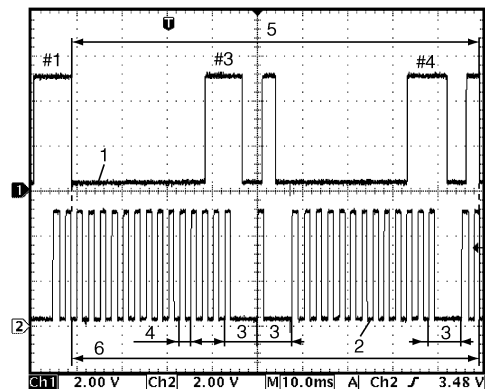
CMP sensor signal with engine idling

Measurement terminal	CH1: "C37-52" to "C37-58" CH2: "C37-51" to "C37-36" (for J20 engine), "C37-58" (for M16 engine)
Oscilloscope setting	CH1: 2 V/DIV, CH2: 2 V/DIV TIME: 10 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine at specified idle speed

[A]



[B]



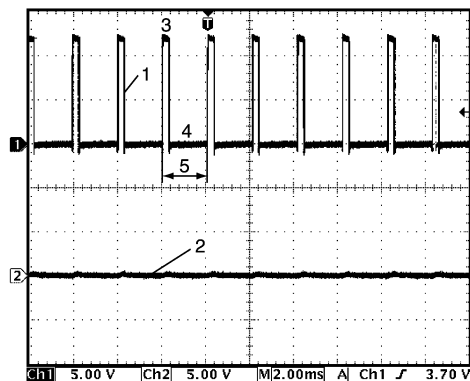
I5JB0A110092-02

[A]: For J20 engine
[B]: For M16 engine
1. Cylinder reference signal (CMP reference signal)
2. CKP signal
3. 30° crank angle
4. 10° crank angle
5. 360° crank angle
6. 36 – 6 = 30 CKP pulse

Reference waveform No.22

Throttle actuator output signal with ignition switch turned ON

Measurement terminal	CH1: "C37-45" to "C37-58" CH2: "C37-44" to "C37-58"
Oscilloscope setting	CH1: 5 V/DIV, CH2: 5 V/DIV TIME: 2 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Ignition switch turned ON and accelerator pedal at idle position



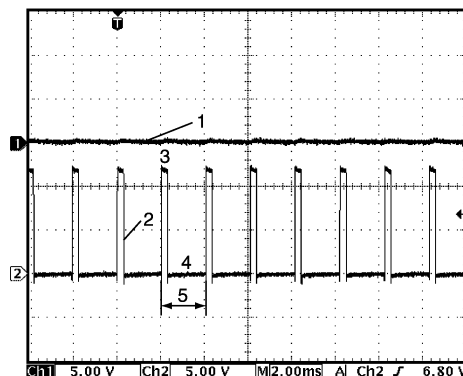
I4RS0B110081-02

1. Throttle actuator drive signal ("C37-45" terminal)
2. Throttle actuator drive signal ("C37-44" terminal)
3. ON signal
4. OFF signal
5. One duty cycle

Reference waveform No.23

Throttle actuator output signal with ignition switch turned ON

Measurement terminal	CH1: "C37-45" to "C37-58" CH2: "C37-44" to "C37-58"
Oscilloscope setting	CH1: 5 V/DIV, CH2: 5 V/DIV TIME: 2 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Ignition switch turned ON and accelerator pedal at full depressed position



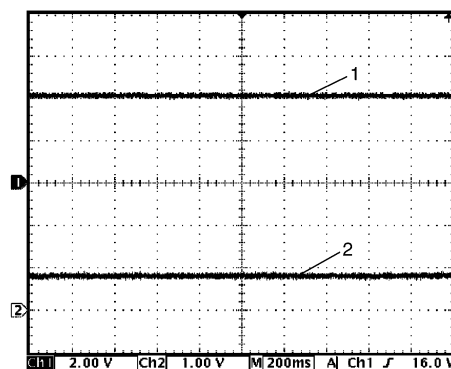
I4RS0B110082-02

1. Throttle actuator drive signal ("C37-45" terminal)
2. Throttle actuator drive signal ("C37-44" terminal)
3. ON signal
4. OFF signal
5. One duty cycle

Reference waveform No.24

Manifold absolute pressure sensor signal (1) with ignition switch turned ON

Measurement terminal	CH1: "C37-55" to "C37-57" CH2: "C37-54" to "C37-41"
Oscilloscope setting	CH1: 2 V/DIV, CH2: 1 V/DIV TIME: 200 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Ignition switch turned ON



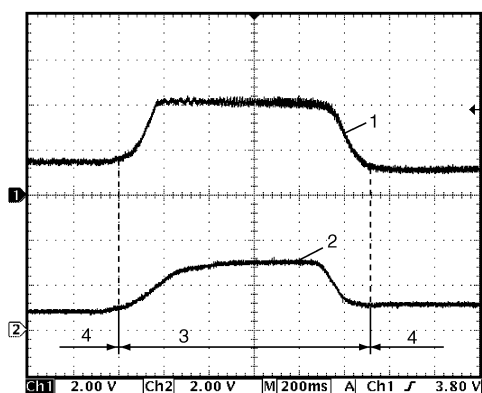
I4RS0B110070-01

2. Throttle position sensor (main) signal

Reference waveform No.25

Manifold absolute pressure sensor signal (1) with engine racing

Measurement terminal	CH1: "C37-55" to "C37-57" CH2: "C37-54" to "C37-41"
Oscilloscope setting	CH1: 2 V/DIV, CH2: 2 V/DIV TIME: 200 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine racing



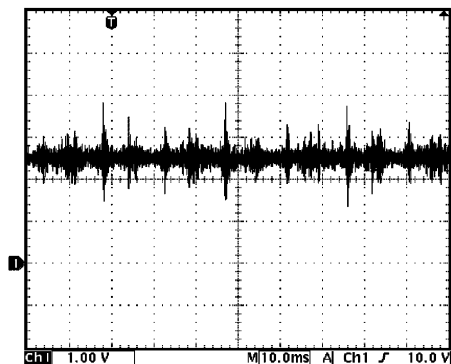
I5JB0A110093-01

- | |
|---|
| 2. Throttle position sensor (main) signal |
| 3. Racing |
| 4. Idle |

Reference waveform No.26

Knock sensor signal at engine speed 4000 r/min.

Measurement terminal	CH1: "C37-56" to "C37-58"
Oscilloscope setting	CH1: 1 V/DIV TIME: 10 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Run engine at 4000 r/min.

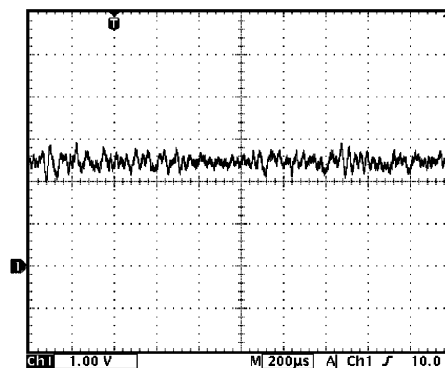


I4RS0B110072-01

Reference waveform No.27

Knock sensor signal at engine speed 4000 r/min.

Measurement terminal	CH1: "C37-56" to "C37-58"
Oscilloscope setting	CH1: 1 V/DIV TIME: 200 μ s/DIV
Measurement condition	- After warmed up to normal operating temperature - Run engine at 4000 r/min.

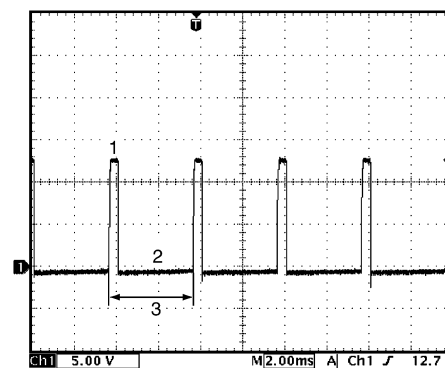


I4RS0B110073-01

Reference waveform No.28

Oil control valve signal with engine idling (for M16 engine)

Measurement terminal	CH1: "C37-60" to "C37-59"
Oscilloscope setting	CH1: 5 V/DIV TIME: 2 ms/DIV
Measurement condition	At the moment of the ignition switch turned on



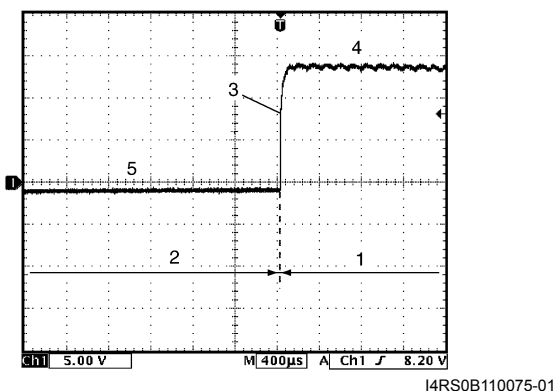
I4RS0B110074-01

- | |
|--------------------|
| 1. ON signal |
| 2. OFF signal |
| 3. Only duty cycle |

Reference waveform No.29

Oil control valve signal with engine racing (for M16 engine)

Measurement terminal	CH1: "C37-60" to "C37-59"
Oscilloscope setting	CH1: 5 V/DIV TIME: 400 μ s/DIV
Measurement condition	- After warmed up to normal operating temperature - Drive vehicle at 20 km/h (12 mph) and depress accelerator pedal fully



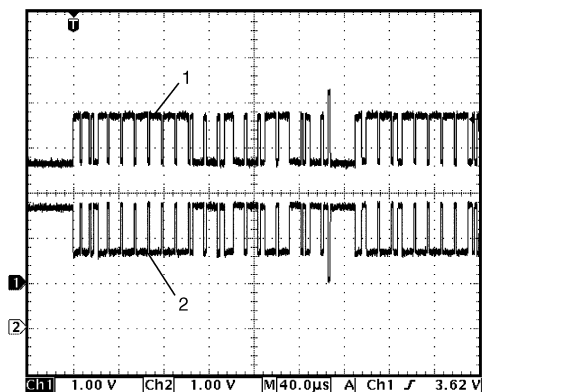
I4RS0B110075-01

1. Accelerator pedal depressed fully
2. Accelerator pedal depressed partially
3. Oil control valve signal
4. ON signal
5. OFF signal

Reference waveform No.30

CAN communication line signal with ignition switch turned ON

Measurement terminal	CH1: "E23-4" to "C37-58" CH2: "E23-19" to "C37-58"
Oscilloscope setting	CH1: 1 V/DIV, CH2: 1 V/DIV TIME: 40 μ s/DIV
Measurement condition	Ignition switch turned ON (Signal pattern is depending on communication data)



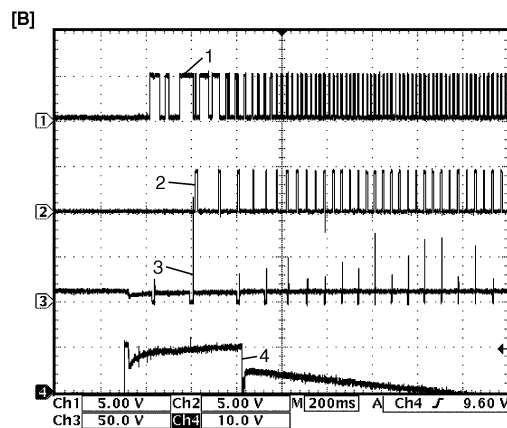
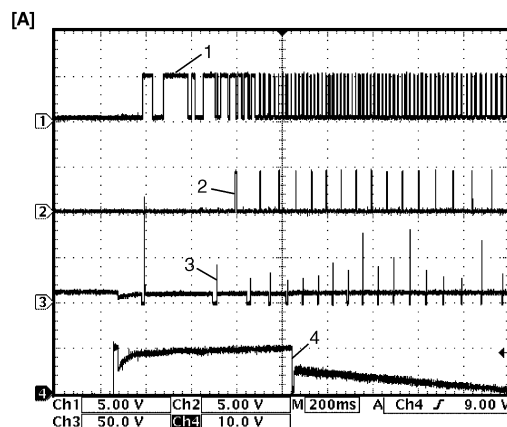
I5JB0A110094-01

1. CAN communication line signal (High)
2. CAN communication line signal (Low)

Reference waveform No.31

Ignition coil signal and fuel injector signal with engine cranking

Measurement terminal	CH1: "C37-52" to "C37-58" CH2: "C37-21" to "C37-58" CH3: "C37-1" to "C37-58" CH4: "C37-22" to "C37-58"
Oscilloscope setting	CH1: 5 V/DIV, CH2: 5 V/DIV CH3: 50 V/DIV, CH4: 10 V/DIV TIME: 200 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine at cranking



I5JB0A110095-01

[A]: For J20 engine
[B]: For M16 engine
1. Cylinder reference signal (CMP reference signal)
2. Ignition coil signal
3. No.1 fuel injector signal
4. Engine start signal

Resistance Check

- 1) Remove ECM from its bracket referring to "Engine Control Module (ECM) Removal and Installation: in Section 1C in related manual".

⚠ CAUTION

Never touch terminals of ECM itself or connect voltmeter or ohmmeter (2).

- 2) Connect special tool to ECM connectors securely.

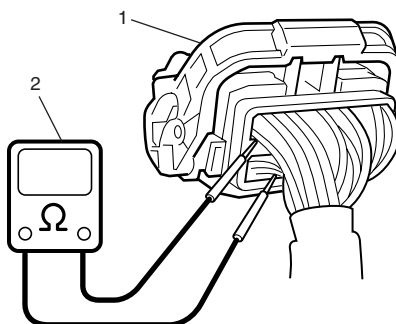
NOTE

Do not connect the other connector of special tool to ECM.

- 3) Check resistance between each pair of terminals of disconnected connectors (1) as listed in the following table.

⚠ CAUTION

- Be sure to connect ohmmeter probe from wire harness side of coupler.
- Be sure to turn OFF ignition switch for this check.
- Resistance in the following table represents that measured when parts temperature is 20 °C (68 °F).



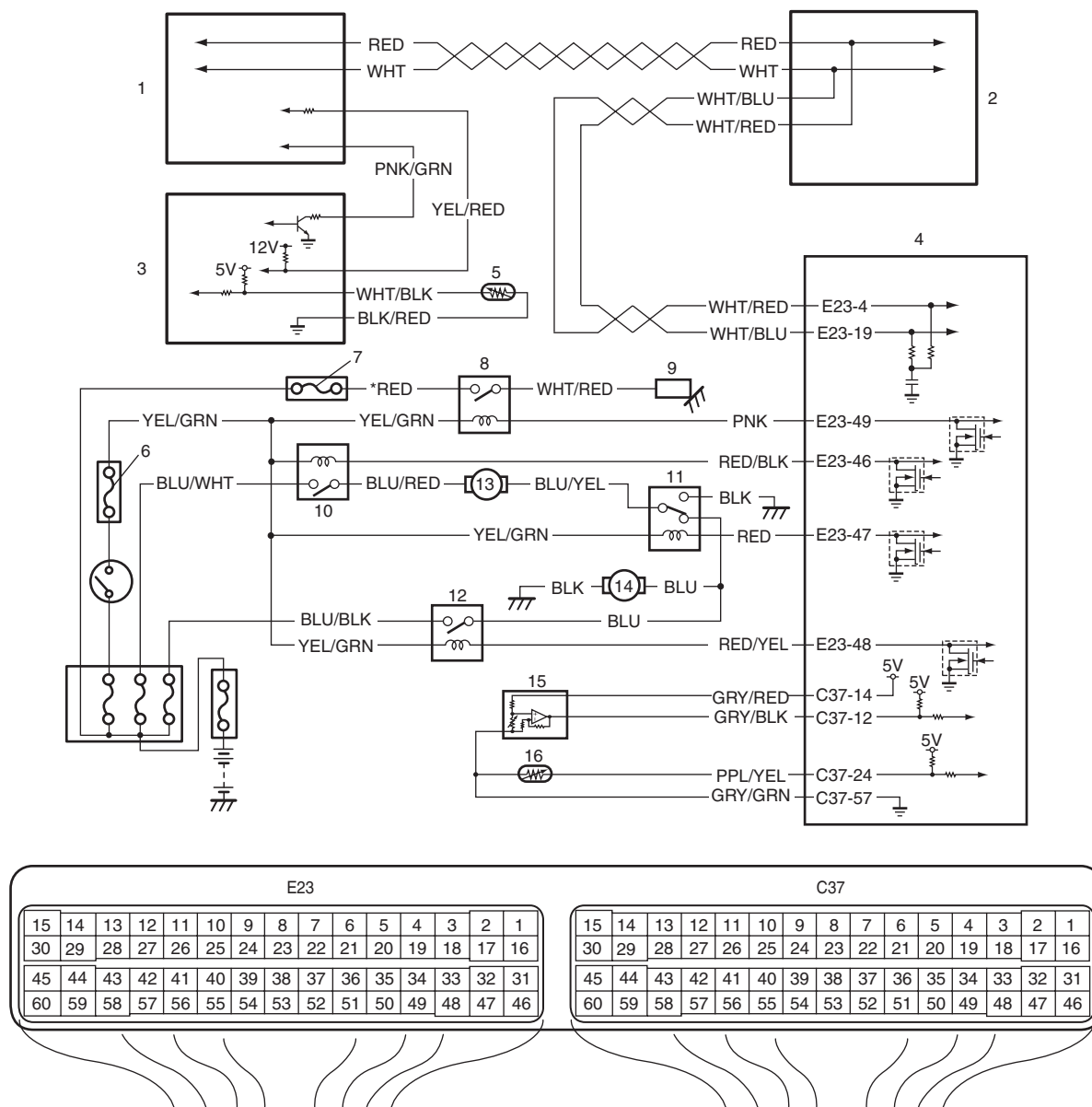
I4RS0A110086-02

Terminals	Circuit	Standard resistance	Condition
E23-60 to E23-29	Main relay	160 – 240 Ω	Battery disconnected and ignition switch turned ON
E23-15 to E23-29	Fuel pump relay	160 – 240 Ω	—
C37-16 to E23-1/16	No.3 fuel injector	10.8 – 18.2 Ω	—
C37-17 to E23-1/16	No.4 fuel injector		
C37-5 to E23-1/16	EGR valve (stepping motor No.1 coil)	20 – 31 Ω	—
C37-13 to E23-1/16	EVAP canister purge valve	28 – 35 Ω	—
C37-2 to E23-1/16	No.2 fuel injector	10.8 – 18.2 Ω	—
C37-6 to E23-1/16	EGR valve (stepping motor No.2 coil)	20 – 31 Ω	—
C37-3 to E23-1/16	EGR valve (stepping motor No.4 coil)		
C37-4 to E23-1/16	EGR valve (stepping motor No.3 coil)		
C37-1 to E23-1/16	No.1 fuel injector	10.8 – 18.2 Ω	—
C37-33 to E23-1/16	Intake manifold tuning vacuum solenoid valve	33 – 45 Ω	—
C37-60 to C37-59	Oil control valve (for M16 engine)	6 – 15 Ω	—
E23-50 to E23-1/16	Throttle actuator control relay	160 – 240 Ω	—

A/C System Circuits Check

S5JB0E1104085

Wiring Diagram



I5JB0A110103-02

1. BCM	6. "IG2 SIG" fuse	11. Radiator cooling fan relay No.2	16. ECT sensor
2. ABS / ESP® control module	7. "CPRSR" fuse	12. Radiator cooling fan relay No.3	*: For M16 engine
3. HVAC control module	8. Compressor relay	13. Radiator cooling fan No.1	
4. ECM	9. Compressor	14. Radiator cooling fan No.2	
5. Evaporator temperature sensor	10. Radiator cooling fan relay No.1	15. A/C refrigerant pressure sensor	

Troubleshooting

NOTE

- Before performed troubleshooting, be sure to read the "Precautions of ECM Circuit Inspection: in related manual".
- When measuring circuit voltage, resistance and/or pulse signal at ECM connector, connect the special tool to ECM and/or the ECM connectors referring to "Inspection of ECM and Its Circuits: ".
- When A/C evaporator outlet air temp. is below 0 °C (32 °F) (for J20 engine) or 1.3 °C (34.3 °F) (for M16 engine), A/C remains OFF ("E23-49" terminal voltage becomes 10 – 14 V). This condition is not abnormal.

Step	Action	Yes	No
1	Reception data check from BCM 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Turn ON ignition switch. 3) Check DTC for reception data from BCM. <i>Is there DTC P1678?</i>	Go to applicable DTC diag. flow.	Go to Step 2.
2	DTC check of HVAC control module 1) Check HVAC control module for DTC. <i>Is there DTC(s)?</i>	Go to applicable DTC diag. flow.	Go to Step 3.
3	A/C switch signal circuit check 1) Start engine and select "DATA LIST" mode on scan tool. 2) Check A/C switch signal under following conditions respectively. A/C switch signal Engine running, A/C switch OFF: OFF Engine running, A/C switch ON and blower speed selector turned 1st position or more: ON <i>Is check result satisfactory?</i>	Go to Step 4.	Check HVAC control module and its circuit.
4	DTC check of ECT sensor circuit 1) Check ECM for DTC of ECT sensor circuit. <i>Is there DTC P0116, DTC P0117 or DTC P0118?</i>	Go to applicable DTC diag. flow.	Go to Step 5.
5	Radiator cooling fan control system check <i>Is radiator cooling fan started when A/C and blower speed selector switch are turned ON with engine running?</i>	Go to Step 11.	Go to Step 6.
6	Radiator cooling fan control circuit check 1) Check DTC with scan tool. <i>Is DTC P0480 displayed?</i>	Go to "DTC P0480: Fan 1 (Radiator Cooling Fan) Control Circuit: in related manual".	Go to Step 7.
7	Evaporator temperature sensor check 1) Check evaporator temperature sensor referring to "A/C Evaporator Temperature Sensor Inspection: in Section 7B in related manual". <i>Is resistance within specification?</i>	Go to Step 8.	Faulty evaporator temperature sensor.
8	DTC check of A/C refrigerant pressure sensor circuit 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Turn ON ignition switch. 3) Check ECM for DTC of A/C refrigerant pressure sensor circuit. <i>Is there DTC P0532 or DTC P0533?</i>	Go to applicable DTC diag. flow.	Go to Step 9.
9	A/C refrigerant pressure sensor voltage check 1) Check A/C refrigerant pressure sensor voltage referring to "Inspection of ECM and Its Circuits: ". <i>Is voltage within specified value?</i>	Go to Step 10.	Check amount of refrigerant. If OK, replace A/C refrigerant pressure sensor.
10	Radiator cooling fan check 1) Check radiator cooling fan referring to "Radiator Cooling Fan Motor On-Vehicle Inspection: in Section 1F in related manual". <i>Is check result satisfactory?</i>	Radiator cooling fan drive circuit malfunction. If circuit is OK, go to Step 7.	Replace radiator cooling fan motor.

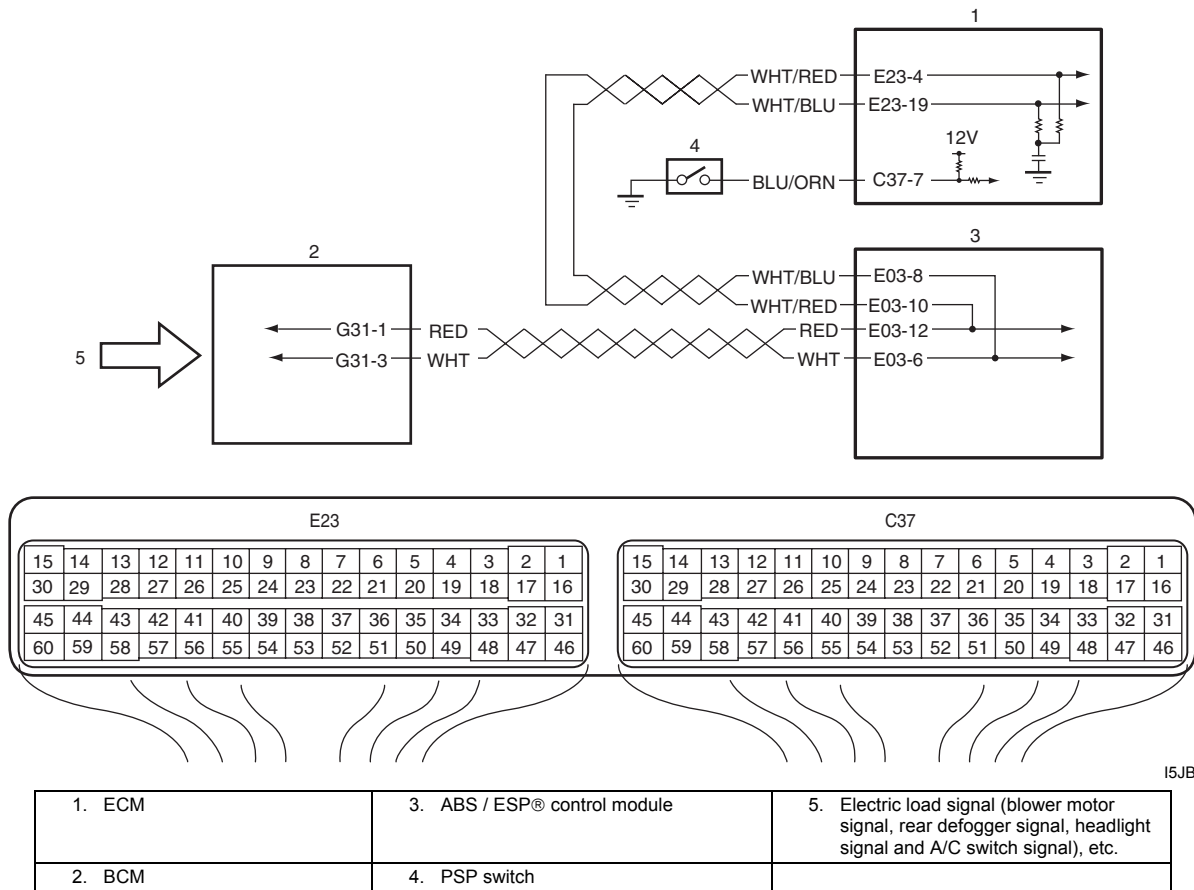
1A-70 Engine General Information and Diagnosis:

Step	Action	Yes	No
11	A/C compressor control system check <i>Is A/C compressor started when A/C and blower speed selector switch are turned ON with engine running?</i>	A/C system is in good condition.	Go to Step 12.
12	A/C compressor relay circuit check 1) Measure voltage between "E23-49" wire terminal of ECM connector and vehicle body ground under following conditions respectively. <u>Voltage between "E23-49" terminal of ECM connector and ground</u> While engine running and A/C switch turned OFF: 10 – 14 V While engine running, A/C and blower speed selector switch turned ON: 0 – 1 V <i>Is check result satisfactory?</i>	Go to Step 13.	Go to Step 14.
13	A/C compressor relay check 1) Check A/C compressor relay referring to "A/C Compressor Relay Inspection: in Section 7B in related manual". <i>Is it in good condition?</i>	A/C compressor drive circuit malfunction.	Replace A/C compressor relay.
14	A/C compressor relay circuit check 1) Remove A/C compressor relay with ignition switch turned OFF. 2) Turn ON ignition switch, measure voltage between "YEL/GRN" wire terminal of A/C compressor relay connector and vehicle body ground. <i>Is voltage 10 – 14 V?</i>	Go to Step 15.	"YEL/GRN" wire is open circuit.
15	A/C compressor relay check 1) Check A/C compressor relay referring to "A/C Compressor Relay Inspection: in Section 7B in related manual". <i>Is it in good condition?</i>	"PNK" wire is open circuit. If OK, substitute a known-good ECM and recheck.	Replace A/C compressor relay.

Electric Load Signal Circuit Check

S5JB0E1104086

Wiring Diagram



I5JB0A110104-02

Troubleshooting

NOTE

- Before performed troubleshooting, be sure to read the “Precautions of ECM Circuit Inspection: in related manual”.
- When measuring circuit voltage, resistance and/or pulse signal at ECM connector, connect the special tool to ECM and/or the ECM connectors referring to “Inspection of ECM and Its Circuits: ”.

Step	Action	Yes	No
1	DTC check 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Turn ON ignition switch and check DTC. <i>Is there DTC P1674 and/or P1678?</i>	Go to applicable DTC diag. flow.	Go to Step 2.

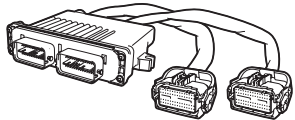
1A-72 Engine General Information and Diagnosis:

Step	Action	Yes	No
2	Electric load signal circuit check 1) Start engine and select "DATA LIST" mode on scan tool. 2) Check electric load signal under following conditions respectively. <u>A/C switch signal</u> Engine running, A/C switch OFF: OFF Engine running, A/C switch ON and blower speed selector turned 1st position or more: ON <u>Blower fan signal</u> Engine running, blower speed selector OFF: OFF Engine running, blower speed selector 5th position or more: ON <u>PSP signal</u> Engine running, steering wheel to neutral position: OFF Engine running, turning steering wheel to the right or left as far as it stops: ON <u>Electric load signal</u> Engine running, rear defogger switch or headlight switch OFF: OFF Engine running, rear defogger switch or headlight switch ON: ON <i>Is check result satisfactory?</i>	Electric load signal circuit is in good condition	Check defective signal circuit.

Special Tools and Equipment

Special Tool

S5JB0E1108001

09933-06320 ECM check harness (120P) 	
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Section 2

Suspension

CONTENTS

NOTE

For the items with asterisk (*) in the “CONTENTS” below, refer to the same section of the service manual mentioned in the “FOREWORD” of this manual.

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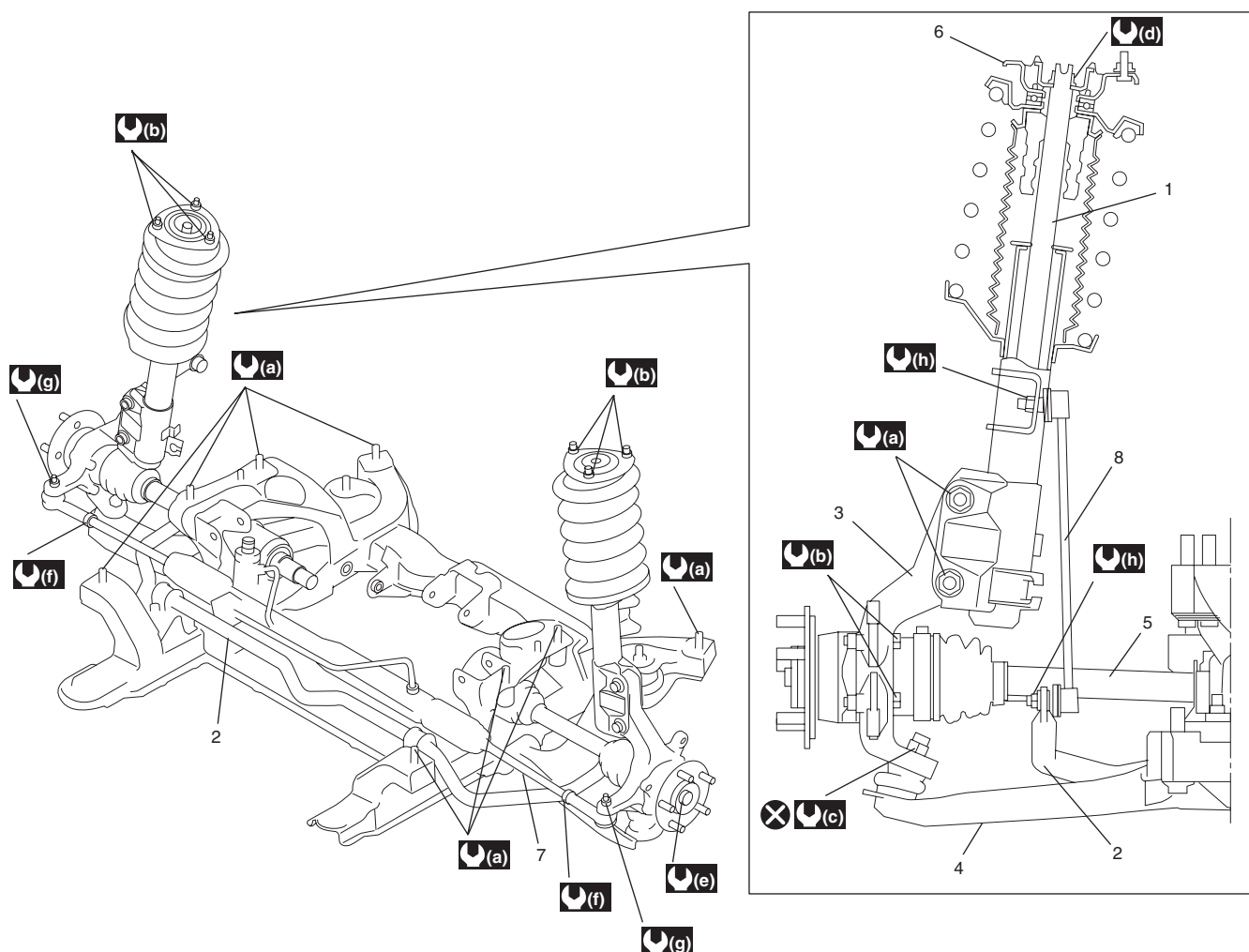
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Front Suspension

General Description

Front Suspension Construction

S5JB0E2201001



I5JB0A220001-03

1. Front strut assembly	7. Tie-rod	(e) : 200 N·m (20.0 kgf-m, 145.0 lb-ft)
2. Stabilizer bar	8. Stabilizer bar joint	(f) : 65 N·m (6.5 kgf-m, 47.0 lb-ft)
3. Steering knuckle	(a) : 135 N·m (13.5 kgf-m, 98.0 lb-ft)	(g) : 43 N·m (4.3 kgf-m, 31.0 lb-ft)
4. Suspension control arm	(b) : 50 N·m (5.0 kgf-m, 36.5 lb-ft)	(h) : 60 N·m (6.0 kgf-m, 43.5 lb-ft)
5. Front drive shaft	(c) : 55 N·m (5.5 kgf-m, 40.0 lb-ft)	: Do not reuse.
6. Vehicle body	(d) : 70 N·m (7.0 kgf-m, 51.0 lb-ft)	

2B-2 Front Suspension:

Front Wheel Alignment Construction

S5JB0E2201002

Among factors for front wheel alignment, only toe setting can be adjusted. Camber and caster are not adjustable. Therefore, should camber or caster be out of specification due to the damage caused by hazardous road conditions or collision, whether the damage is in body or in suspension should be determined and damaged body should be repaired or damaged suspension should be replaced.

Preliminary Checks Prior to Adjustment Front Wheel Alignment

Steering and vibration complaints are not always the result of improper wheel alignment. An additional item to be checked is the possibility of tire lead due to worn or improperly manufactured tires. "Lead" is the vehicle deviation from a straight path on a level road without hand pressure on the steering wheel. Refer to "Radial Tire Lead / Pull Description: in Section 2D in related manual" in order to determine if the vehicle has a tire lead problem. Before making any adjustment affecting wheel alignment, the following checks and inspections should be made to ensure correctness of alignment readings and alignment adjustments:

- Check all tires for proper inflation pressures and approximately the same tread wear.

- Check for loose of ball joints. Check tie-rod ends; if excessive looseness is noted, it must be corrected before adjusting.
- Check for run-out of wheels and tires.
- Check vehicle trim heights; if it is out of limit and a correction is needed, it must be done before adjusting toe.
- Check for loose of suspension control arms.
- Check for loose or missing stabilizer bar attachments.
- Consideration must be given to excess loads, such as tool boxes. If this excess load is normally carried in vehicle, it should remain in vehicle during alignment checks.
- Consider condition of equipment being used to check alignment and follow manufacturer's instructions.
- Regardless of equipment used to check alignment, vehicle must be placed on a level surface.

NOTE

To prevent possible incorrect reading of toe, camber or caster, vehicle front and rear end must be moved up and down a few times before inspection.

Repair Instructions

Front Wheel Alignment Inspection and Adjustment

S5JB0E2206001

Toe Inspection and Adjustment

Preparation for toe inspection and adjustment.

- Place vehicle in unloaded state on level surface.
- Set steering wheel in straight state.
- Check that inflation pressure of each tire is adjusted properly and wheel is free from deflection.
- Check that each suspension part is free from bend, dent, wear or damage in any other form.
- Check that ground clearance at the right and left is just about the same.

Inspection

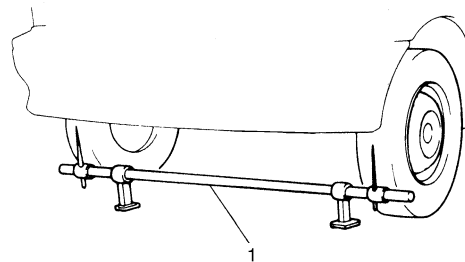
Measure toe with toe-in gauge (1).

Toe should be within following specifications.

If toe is out of the specification, adjust toe properly.

Toe

IN 0 ± 2.0 mm (0 ± 0.0787 in.)



I2RH01220062-01

Adjustment

- 1) Loosen right and left tie-rod end lock nuts (1) first.
- 2) Rotate right and left tie-rods (2) by the same amount to align toe to specification. In this adjustment, the lengths "A" of both right and left tie-rod should be equal.

NOTE

Before rotating tie-rods (2), apply grease between tie-rods and rack boots so that boots won't be twisted.

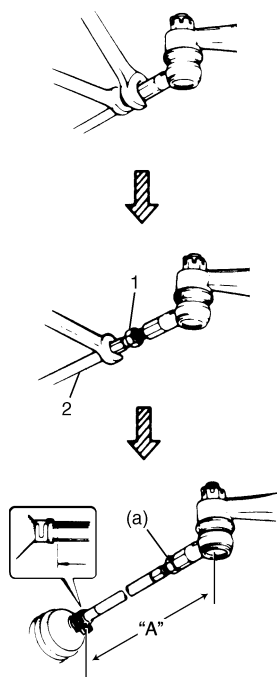
- 3) After adjustment, tighten lock nuts (1) to specified torque.

Tightening torque

Tie-rod end lock nut (a): 65 N·m (6.5 kgf-m, 47.0 lb-ft)

NOTE

Make sure that rack boots are not twisted.



I5JB0A220002-01

Steering Angle Check and Adjustment

When tie-rod or tie-rod end was replaced, check toe and then also steering angle with turning radius gauge (1). If steering angle is not correct, check whether right and left tie-rods length "A" are equal.

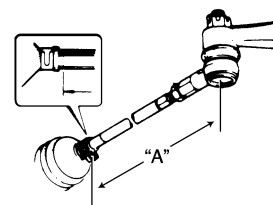
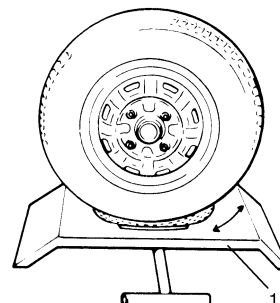
NOTE

If tie-rod lengths were changed to adjust steering angle, reinspect toe-in.

Steering angle

Inside: $37.0^\circ \pm 3^\circ$

Outside: $32.0^\circ \pm 3^\circ$



I5JB0A220003-01

Reference Information**Side slip**

When checked with side slip tester, side slip should satisfy following specification.

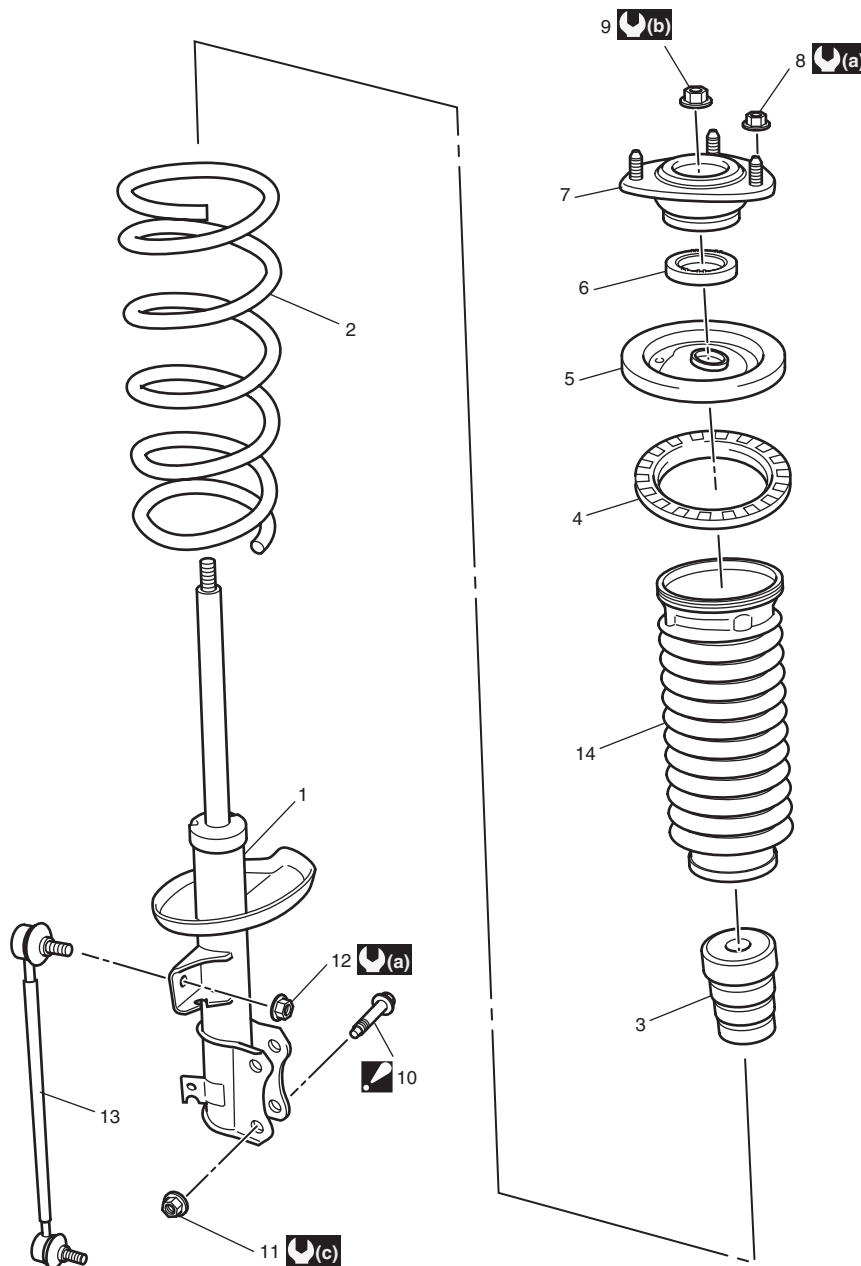
Side slip

IN 1.5 to OUT 1.5 mm/m (IN 0.0591 to OUT 0.0591 in. / 3.3 ft)

If side slip exceeds the limit, toe or front wheel alignment may not be correct.

Front Strut Assembly Components

S5JB0E2206002



I5JB0A220004-01

1. Strut assembly	7. Strut support	13. Stabilizer joint
2. Coil spring	8. Strut support nut	14. Strut dust cover
3. Bump stopper	9. Strut nut	(a) : 50 N-m (5.0 kgf-m, 36.5 lb-ft)
4. Coil spring seat	10. Strut bracket bolt : Insert from vehicle front side. : If reuse bolt, apply engine oil to thread, bearing and trunk surface.	(b) : 70 N-m (7.0 kgf-m, 51.0 lb-ft)
5. Coil spring upper seat	11. Strut bracket nut : If reuse nut, apply engine oil to thread and bearing.	(c) : 135 N-m (13.5 kgf-m, 98.0 lb-ft)
6. Strut bearing	12. Stabilizer joint nut	(d) : 60 N-m (6.0 kgf-m, 43.5 lb-ft)

Front Strut Assembly Removal and Installation

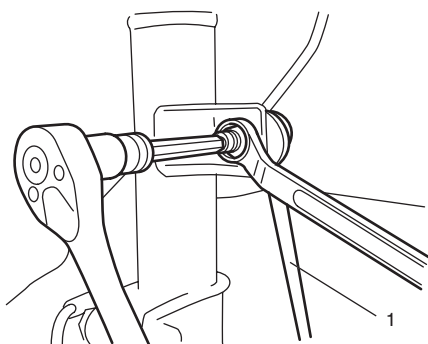
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Removal

NOTE

When servicing component parts of strut assembly, remove strut rod cap and then loosen strut nut a little before removing strut assembly. This will make service work easier. Note that the nut must not be removed at this point.

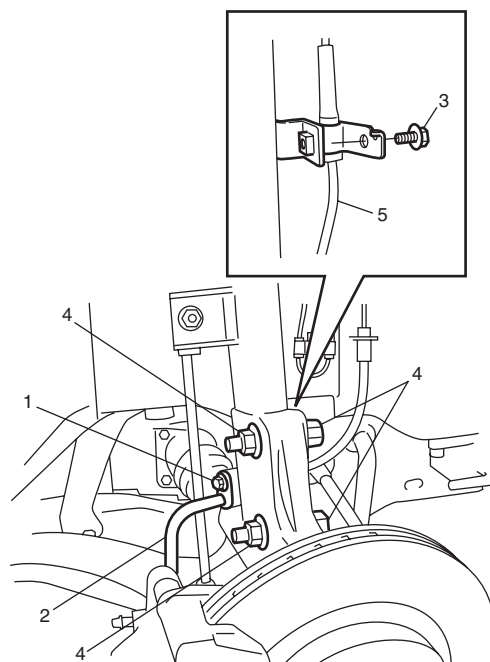
- 1) Hoist vehicle, allowing front suspension to hang free.
 - 2) Remove wheel and disconnect stabilizer joint (1) from strut bracket.
- When loosening joint nut, hold stud with hexagon wrench.



I5JB0A220005-02

- 3) Remove brake hose mounting bolt (1) and remove brake hose (2) from bracket.
- 4) Disconnect front height sensor (if equipped) from suspension control arm for left side referring to "Height Sensor Removal and Installation (If Equipped)": in Section 9B in related manual".
- 5) Remove front wheel speed sensor harness clamp bolt (3) (if equipped) and then detach front speed sensor harness (5) from strut bracket as shown in figure.

- 6) Remove strut bracket bolts and nuts (4).

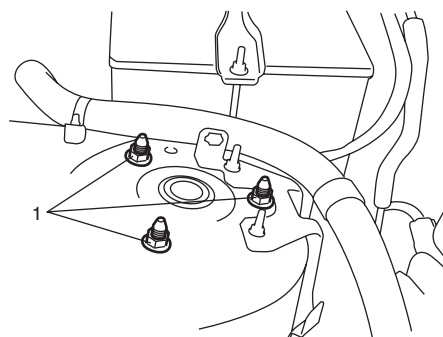


I5JB0A220006-01

- 7) Remove strut support nuts (1).

NOTE

Hold strut by hand so that it will not fall off.



I5JB0A220007-01

- 8) Remove strut assembly.

2B-6 Front Suspension:

Installation

Install strut assembly by reversing removal procedure, noting the following instructions.

- Insert bolts in such direction as shown in figure.
- Tighten all fasteners to specified torque.

Tightening torque

Strut bracket nut (a): 135 N·m (13.5 kgf-m, 98.0 lb-ft)

Brake hose mounting bolt (c): 25 N·m (2.5 kgf-m, 18.0 lb-ft)

Stabilizer joint nut (d): 60 N·m (6.0 kgf-m, 43.5 lb-ft)

Front wheel speed sensor harness clamp bolt (e): 10 N·m (1.0 kgf-m, 7.5 lb-ft)

- Lower hoist and vehicle in unloaded condition, tighten strut support nuts (b) to specified torque.

Tightening torque

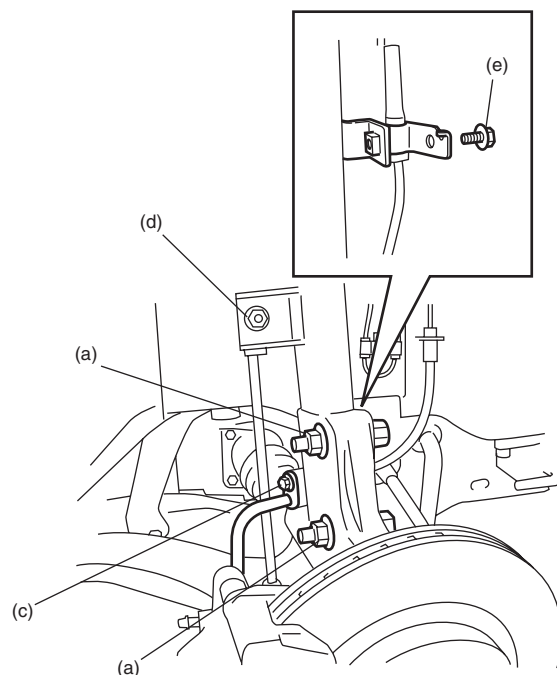
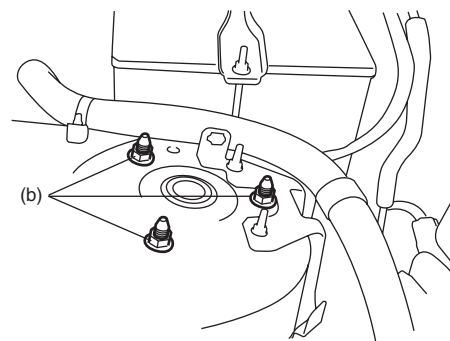
Strut support nut (b): 50 N·m (5.0 kgf-m, 36.5 lb-ft)

⚠ CAUTION

If reuse strut bracket bolt and nut, apply engine oil to thread, bearing and trunk surface.

NOTE

- Don't twist brake hose and ABS wheel speed sensor harness (if equipped) when installing them.
- Insert strut bracket bolt from vehicle forward.



I5JB0A220008-01

- Tighten wheel nuts to specified torque.

Tightening torque

Wheel nut: 100 N·m (10.0 kgf-m, 72.5 lb-ft)

- After installation, confirm front wheel alignment and adjust headlight auto leveling system referring to "Initialization of Auto Leveling Headlight System: in Section 9B in related manual".

Front Strut Assembly Disassembly and Assembly

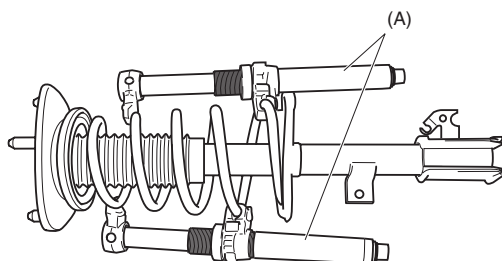
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Disassembly

- 1) Attach special tool (A) to coil spring as shown. Turn special tool bolts alternately until coil spring tension is released. Rotate the strut around its axis to confirm that the coil spring is released or not.

Special tool

(A): 09943-25010



I5JB0A220059-01

⚠ WARNING

Use a regular coil spring compressor and follow the operation procedure described in the Instruction Manual.

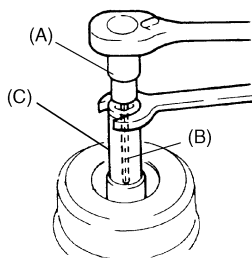
- 2) While keeping coil spring compressed, remove strut nut with special tools as shown.

Special tool

(A): 09900-00411

(B): 09900-00414

(C): 09941-56510



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- 3) Disassemble strut assembly.

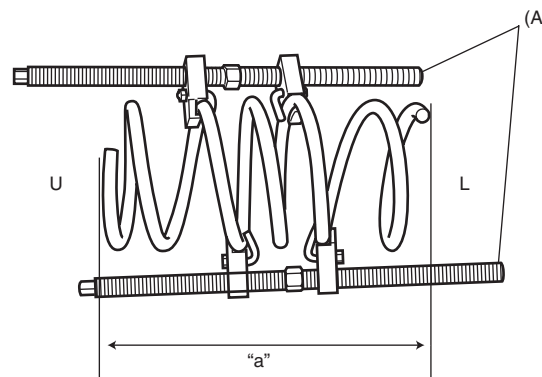
Assembly

For assembly, reverse disassembly procedure, noting the following instructions.

- 1) Compress coil spring with special tool (A) until total length becomes about 310 mm (12.2 in.) as shown.

Length

"a": 310 mm (12.2 in.)



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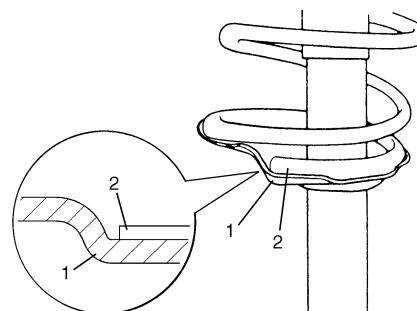
U: Upper side (small dia.)

L: Lower side (large dia.)

- 2) Install bump stopper onto strut rod. For installing direction, refer to the figure in "Front Strut Assembly Components: ".
- 3) Install compressed coil spring to strut, and place coil spring end (2) onto spring lower seat (1) as shown.

NOTE

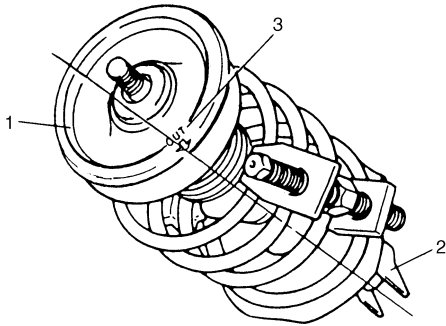
End of coil spring must not interfere with step of spring lower seat.



I4RS0A220011-01

2B-8 Front Suspension:

- 4) Pull strut rod as far up as possible and use care not to allow it to retract into strut.
- 5) Attach coil spring seat to coil spring upper seat and then install strut dust cover firmly.
- 6) Install coil spring upper seat with strut dust cover on coil spring and then spring upper seat (1) aligning "OUT" mark (3) on spring upper seat and center of strut bracket (2).



I2RH01220019-01

- 7) Install bearing (3), strut support (2) and strut nut (1) in this sequence.
Tighten strut nut (1) holding stud with special tools.

Special tool

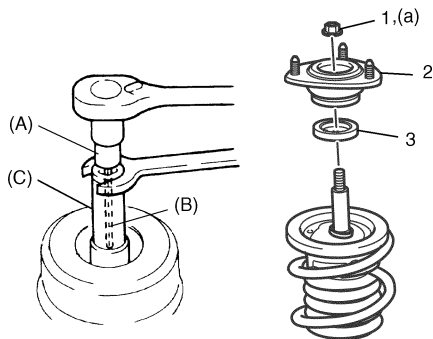
(A): 09900-00411

(B): 09900-00414

(C): 09941-56510

Tightening torque

Strut nut (a): 90 N·m (9.0 kgf-m, 65.0 lb-ft)

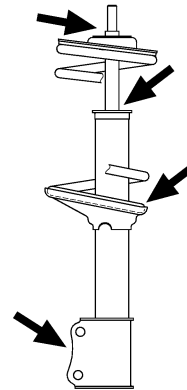


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Front Strut Assembly Check

S5JB0E2206005

- Inspect strut for oil leakage, damage or deformation. If defect is found, replace strut as an assembly unit, because it can not be disassembled.



I4RS0A220014-01

- Inspect strut function referring to the following procedures:

1) Check and adjust tire pressures as specified.

2) Bounce vehicle body up and down 3 or 4 times continuously by pushing front end of the vehicle side body to check strut.

Also, note how many times vehicle body rebounds to stop after force application.

3) Repeat the same procedure to the other strut to confirm that the both side struts equally respond.

If conditions of struts are in doubt, compare them with known-good vehicle or strut.

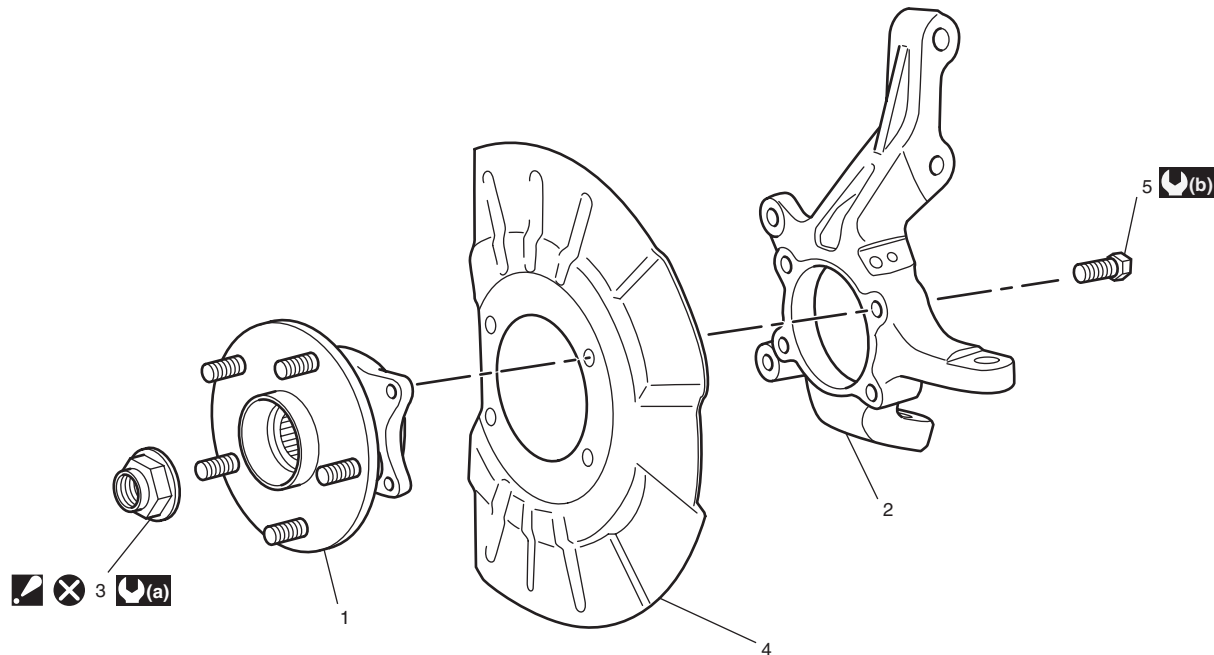
- Inspect bearing for wear, abnormal noise or gripping. If defective, replace.
- Inspect coil spring seat for cracks or deformation. If defective, replace.
- Inspect bump stopper for deterioration. If defective, replace.
- Inspect rebound stopper and strut mount for wear, cracks or deformation. If defective, replace.

Front Wheel Hub Assembly and Steering Knuckle Components

S5JB0E2206006

⚠ CAUTION

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



I5JB0A220012-01

1. Front wheel hub assembly	4. Dust cover	⌚(b) : 50 N·m (5.0 kgf-m, 36.0 lb-ft)
2. Steering knuckle	5. Wheel hub housing bolt	⊗ : Do not reuse.
⚡ 3. Drive shaft nut : Calk, after tightening.	⌚(a) : 200 N·m (20.0 kgf-m, 145.0 lb-ft)	

Front Wheel Hub Assembly Removal and Installation

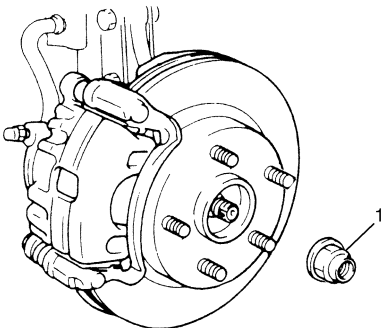
S5JB0E2206007

⚠ CAUTION

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

Removal

- 1) Hoist vehicle and remove wheel.
- 2) Uncaulk drive shaft nut (1).
- 3) Depress foot brake pedal and hold it. Remove drive shaft nut (1).



I5JB0A220013-01

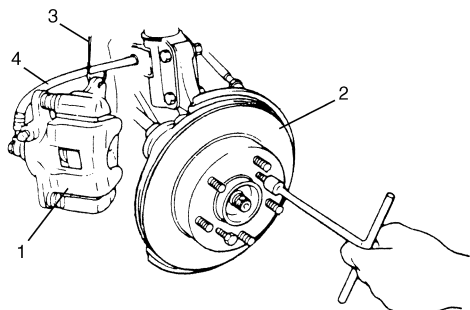
2B-10 Front Suspension:

- 4) Remove caliper (1) with carrier.

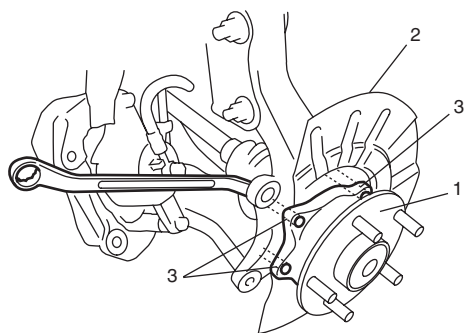
NOTE

Hang removed caliper with a wire hook or the like (3) so as to prevent brake hose (4) from bending, twisting or tension. Do not depress brake pedal during pads removal. Do not operate brake pedal with pads removed.

- 5) Pull brake disc (2) off by using two 8 mm bolts.



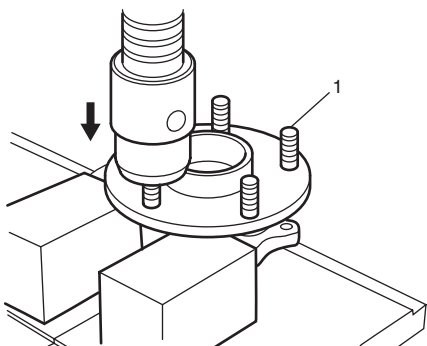
- 6) Remove wheel hub housing bolts (3), and then remove wheel hub assembly (1) and dust cover (2).



- 7) Remove hub bolts (1) with copper hammer or hydraulic press.

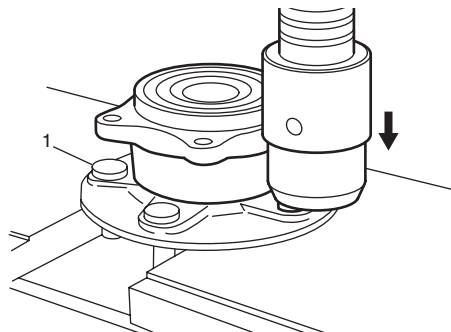
CAUTION

Never remove bolt unless replacement is necessary.
Be sure to use a new bolt for replacement.



Installation

- 1) Insert new hub bolt (1) in hub hole. Rotate hub bolt slowly to assure that serrations are aligned with those made by original bolt.

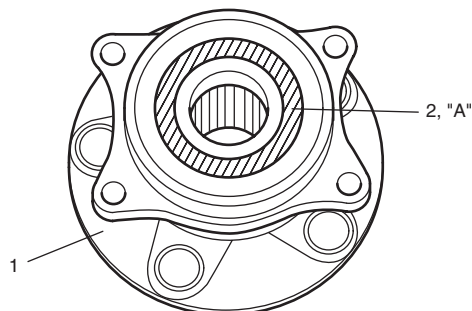


- 2) Apply grease to end face of inner ring (2) before front wheel hub (1) installation.

CAUTION

Do not apply the grease to the encoder section to avoid the encoder malfunction.

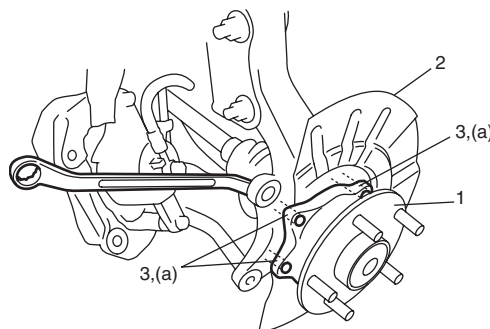
“A”: Grease 99000-25010 (SUZUKI Super Grease A)



- 3) Install wheel hub (1) and dust cover (2) to steering knuckle.
4) Tighten wheel hub housing bolts (3) to specified torque

Tightening torque

Wheel hub housing bolt (a): 50 N·m (5.0 kgf-m, 36.5 lb-ft)



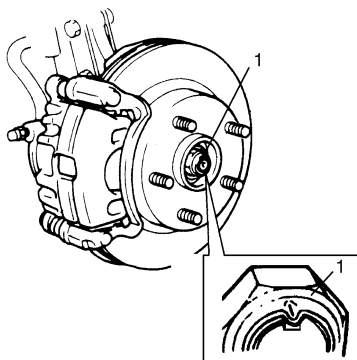
- 5) Install brake disk and brake caliper.
- 6) Tighten caliper carrier bolt to specified torque.

Tightening torque**Caliper carrier bolt: 85 N·m (8.5 kgf-m, 61.5 lb-ft)**

- 7) Depress foot brake pedal and hold it there. Tighten new drive shaft nut (1) to specified torque.

Tightening torque**Drive shaft nut (a): 200 N·m (20.0 kgf-m, 145.0 lb-ft)****⚠ CAUTION****Never reuse drive shaft nut (1).**

- 8) Caulk drive shaft nut (1) as shown.



I5JB0A220021-01

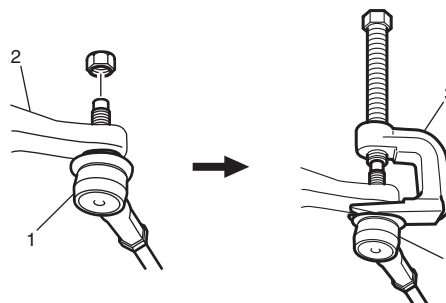
- 9) Tightening wheel nuts to specified torque.

Tightening torque**Wheel nut: 100 N·m (10.0 kgf-m, 72.5 lb-ft)****Steering Knuckle Removal and Installation**

S5JB0E2206008

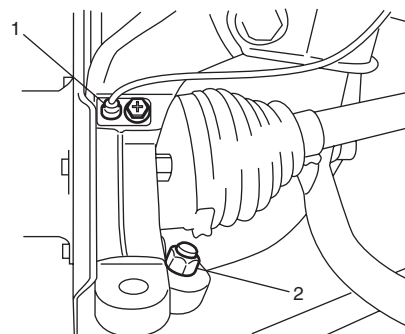
Removal

- 1) Hoist vehicle and remove wheel.
- 2) Remove Front wheel hub assembly referring to "Front Wheel Hub Assembly Removal and Installation: ".
- 3) Disconnect tie-rod end (1) from steering knuckle (2) with puller (3).



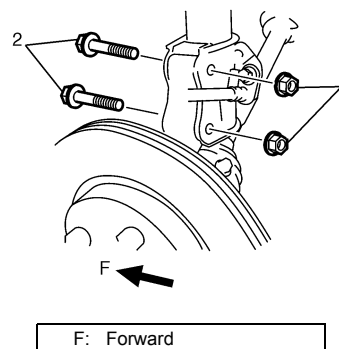
I5JB0A220020-01

- 4) Disconnect front height sensor (if equipped) from suspension control arm for left side referring to "Height Sensor Removal and Installation (If Equipped): in Section 9B in related manual".
- 5) Remove front wheel speed sensor (1) from knuckle (if ABS equipped).
- 6) Loosen ball joint nut (2).



I5JB0A220022-01

- 7) Remove strut bracket bolts (2) and nuts (1).

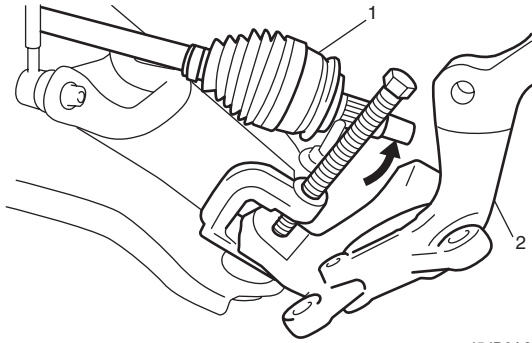


I5JB0A220023-01

F: Forward

2B-12 Front Suspension:

- 8) Disconnect ball joint from steering knuckle (2) with puller and then remove steering knuckle (2).



I5JB0A220024-01

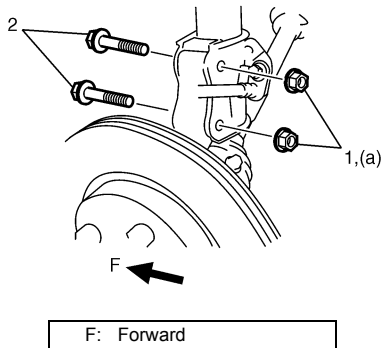
Installation

For installation, reverse removal procedure, noting the following instructions.

- 1) Connect steering knuckle to suspension arm.
- 2) Install strut bracket bolts (2) and nuts (1).
- 3) Tighten strut bracket nuts (1) to specified torque.

Tightening torque

Strut bracket nut (a): 135 N·m (13.5 kgf-m, 98.0 lb-ft)



I5JB0A220025-01

- 4) Tighten new suspension arm ball joint nut (1) to specified torque.

⚠ CAUTION

Never reuse the removed suspension arm ball joint nut.

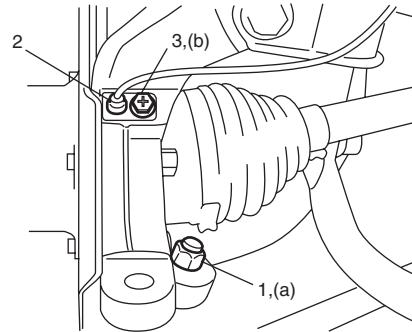
Tightening torque

Suspension arm ball joint nut (a): 55 N·m (5.5 kgf-m, 40.0 lb-ft)

- 5) Install ABS wheel speed sensor (2) (if ABS equipped) and tighten front wheel speed sensor bolt (3).

Tightening torque

Front wheel speed sensor bolt (b): 10 N·m (1.0 kgf-m, 7.5 lb-ft)

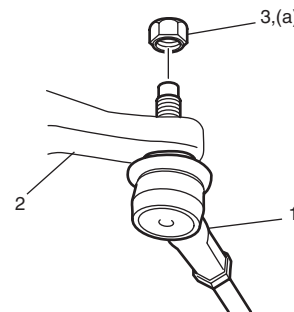


I5JB0A220026-01

- 6) Connect front height sensor (if equipped) to suspension control arm for left side referring to "Height Sensor Removal and Installation (If Equipped): in Section 9B in related manual".
- 7) Connect tie-rod end (1) to steering knuckle (2), tighten new nut (3) to specified torque.

Tightening torque

Tie-rod end nut (a): 45 N·m (4.5 kgf-m, 32.5 lb-ft)



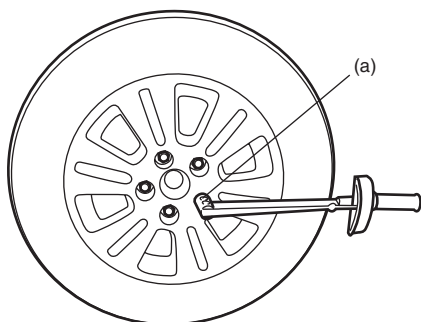
I5JB0A220028-01

- 8) Install front wheel hub assembly and dust cover to steering knuckle referring to "Steering Knuckle Removal and Installation: ".
- 9) Check front wheel alignment adjust it as necessary. For check and adjustment procedures, refer to "Front Wheel Alignment Inspection and Adjustment: ".
- 10) Adjust headlight auto leveling system, refer to "Initialization of Auto Leveling Headlight System: in Section 9B in related manual".

Front Wheel Hub, Disc, Nut and Bearing Check

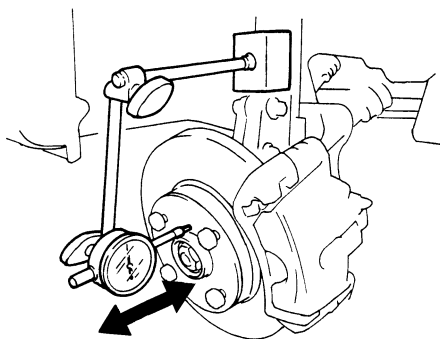
S5JB0E2206009

- Inspect each wheel disc for dents, distortion and cracks.
A disc in badly damaged condition must be replaced.
- Check rust of installation face inside of wheel disc.
As rust affects adversely, remove it thoroughly.
- Check tightness of wheel nuts and, if necessary, retighten them to specified torque.

Tightening torque**Wheel nut (a): 100 N·m (10.0 kgf-m, 72.5 lb-ft)**

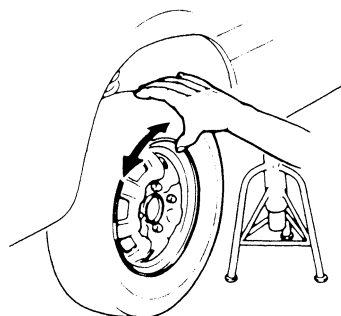
I5JB0A220029-01

- Check wear of wheel bearing. When measuring thrust play, apply a dial gauge to wheel hub as shown in figure.

Thrust play limit**0.1 mm (0.004 in.)**

I3RM0A220034-01

- Check wheel bearing noise and smooth wheel rotation by rotating wheel in figure.
If defective, replace bearing.



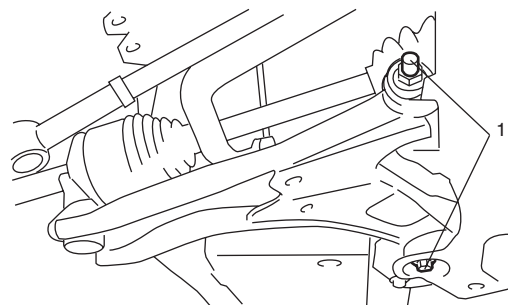
I2RH01220011-01

Suspension Control Arm Removal and Installation

S5JB0E2206010

Removal

- 1) Remove steering knuckle from suspension control arm referring to "Steering Knuckle Removal and Installation: ".
- 2) Remove suspension control arm bolts (1).



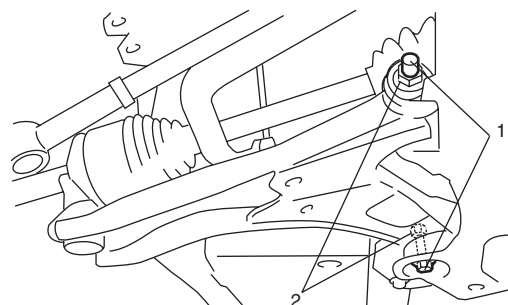
I5JB0A220031-01

Installation

- 1) Install suspension control arm bolts (1) and tighten suspension control arm nuts (2) temporarily by hand.

⚠ CAUTION

If reuse suspension control arm bolt and nut, apply engine oil to thread, bearing and trunk surface.



I5JB0A220033-01

- 2) Connect steering knuckle to suspension control arm referring to "Steering Knuckle Removal and Installation: ".
- 3) Tighten suspension control arm nuts to specified torque with vehicle weight on suspension.

⚠ CAUTION

It is the most desirable to have vehicle off hoist and in non-loaded condition when tightening them.

Tightening torque**Suspension control arm nut: 135 N·m (13.5 kgf-m, 98.0 lb-ft)**

2B-14 Front Suspension:

Suspension Control Arm / Bushing Disassembly and Assembly

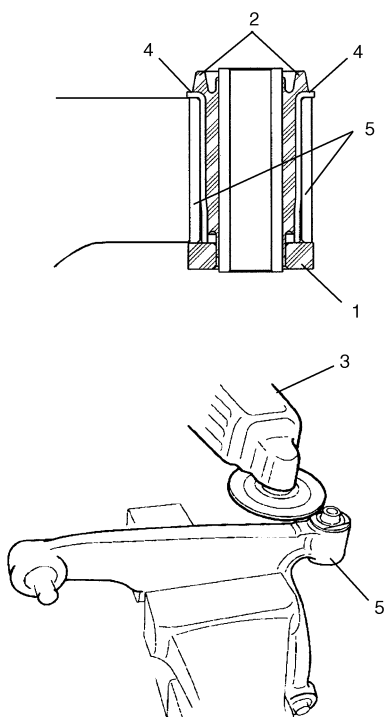
S5JB0E2206011

Disassembly

- 1) Remove rubber stopper (1).
- 2) Cut rubber (2) of flange of suspension control arm front bushing.
- 3) Using grinder (3), grind off flange (4) of front bushing.

⚠ CAUTION

Be careful not to damage suspension control arm (5) when grinding flange (4) of front bushing with grinder.



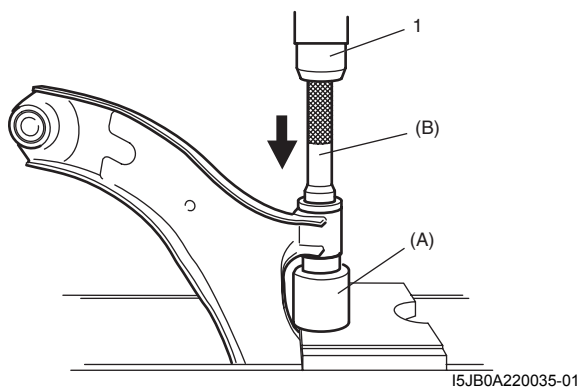
I5JB0A220027-02

- 4) Push out bushing by using hydraulic press (2) and special tools.

Special tool

(A): 09945-55410

(B): 09913-75821



Assembly

⚠ CAUTION

Apply grease (included in the repair kit) to ball joint and inside of ball stud boot when the ball stud boot is replaced.

- 1) Front bushing

Press-fit front bushing (1) by using special tools and press (2).

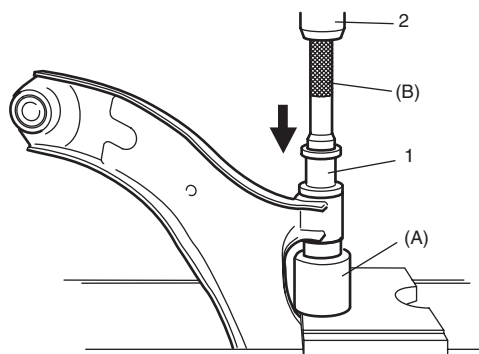
Special tool

(A): 09945-55410

(B): 09913-75821

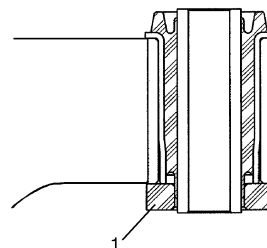
⚠ CAUTION

Be sure to use new bushing.



I5JB0A220036-01

- 2) Install rubber stopper (1).

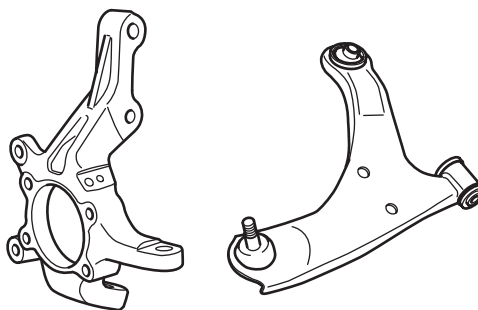


I5JB0A220037-01

Suspension Control Arm / Steering Knuckle Check

S5JB0E2206012

Inspect for cracks, deformation or damage.
If defective, replace.



I5JB0A220038-01

Suspension Control Arm Joint Check

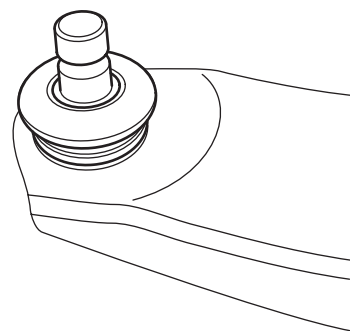
S5JB0E2206014

- Check smooth rotation of ball stud.
- Check damages of ball stud.
- Check damages of dust cover.

NOTE

Suspension control arm and arm joint cannot be separated.

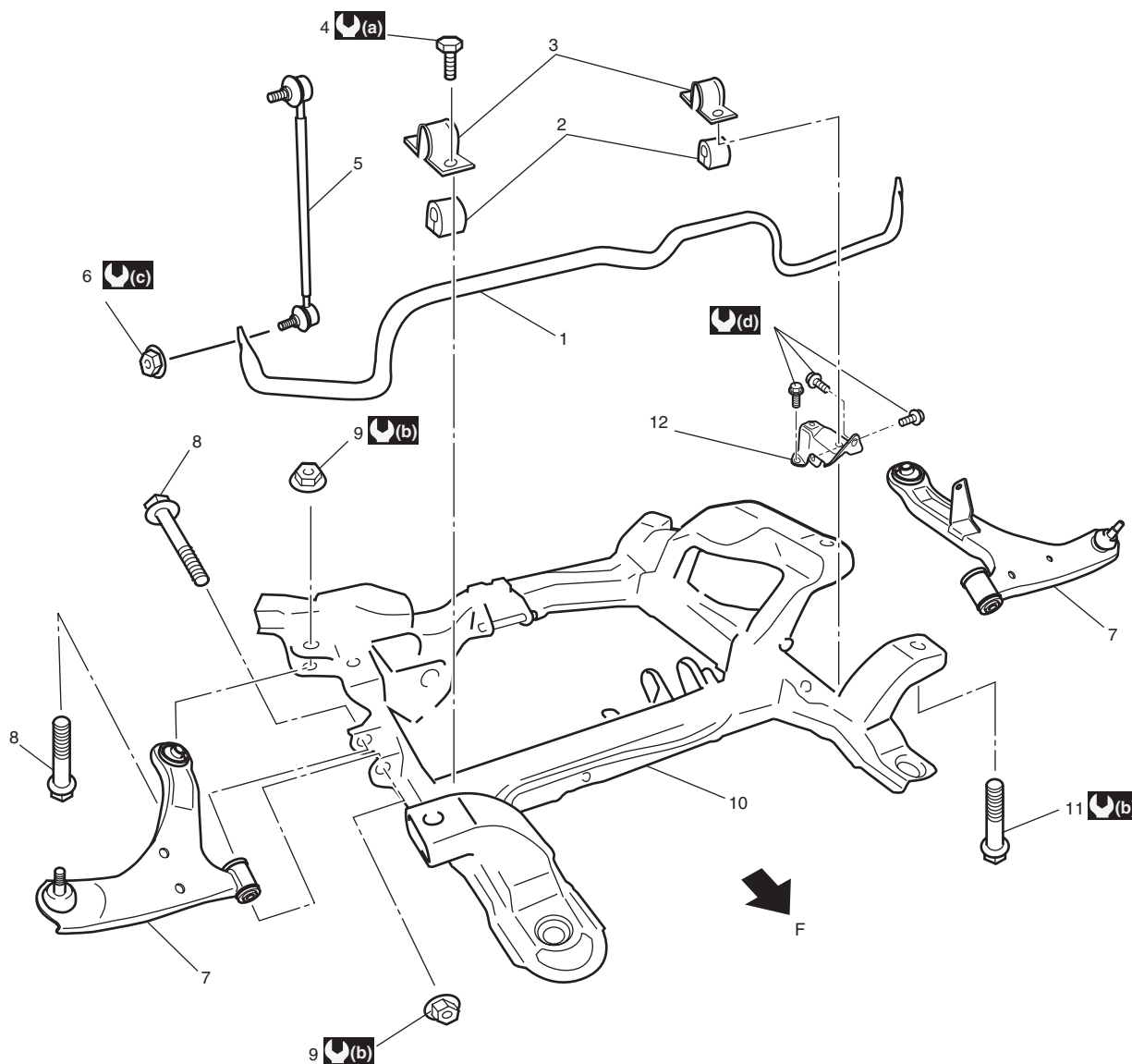
If there is any damage to either parts, control arm assembly must be replaced as a complete unit.



I4RS0B220023-01

Front Suspension Frame, Stabilizer Bar and/or Bushings Components

S5JB0E2206015



I5JB0A220040-02

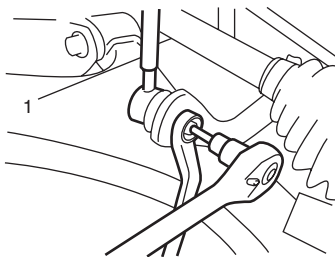
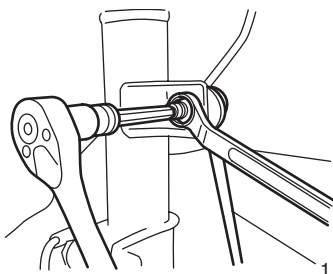
F: Forward	6. Stabilizer joint nut	12. Stabilizer mount
1. Stabilizer bar	7. Suspension control arm	(a) : 50 N·m (5.0 kgf-m, 36.5 lb-ft)
2. Stabilizer bushing	8. Control arm mounting bolt	(b) : 135 N·m (13.5 kgf-m, 98.0 lb-ft)
3. Stabilizer mounting bracket	9. Control arm nut	(c) : 60 N·m (6.0 kgf-m, 43.5 lb-ft)
4. Stabilizer bar mounting bracket bolt	10. Suspension frame	(d) : 55 N·m (5.5 kgf-m, 40.0 lb-ft)
5. Stabilizer joint	11. Suspension frame mounting bolt : If reuse bolt, apply engine oil to thread, bearing and trunk surface.	

Front Suspension Frame, Stabilizer Bar and/or Bushings Removal and Installation

S5JB0E2206016

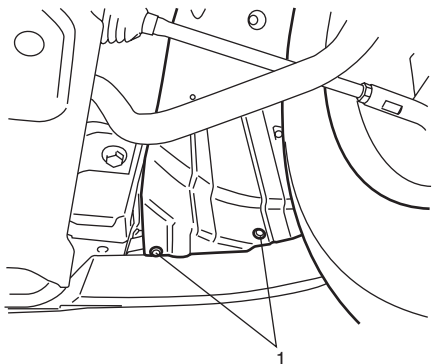
Removal

- 1) Hoist vehicle and remove wheels (right & left).
- 2) Remove engine under cover.
- 3) Remove suspension control arm referring to "Suspension Control Arm Removal and Installation: ."
- 4) Remove right side and left side front drive shaft assembly referring to "Front Drive Shaft Assembly Removal and Installation: Front in Section 3A in related manual".
- 5) Remove stabilizer joints (1). When loosening joint nut, hold stud with hexagon wrench.



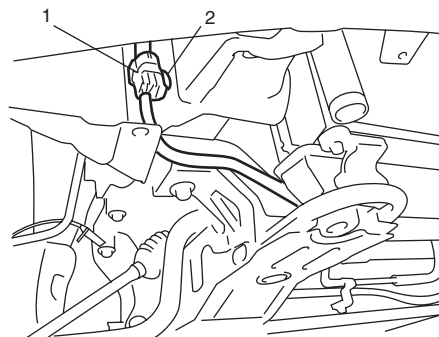
I5JB0A220041-01

- 6) Disconnect front fender lining clip (1) (if equipped with head light auto leveling system).



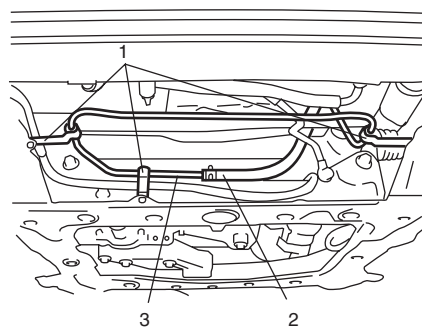
I5JB0A220042-01

- 7) Disconnect front height sensor connector (1) (if equipped with head light auto leveling system) and then detach clip (2).



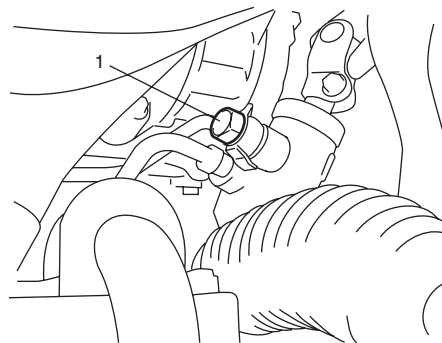
I5JB0A220043-01

- 8) Disconnect steering lower shaft from pinion shaft referring to "P/S Gear Case Assembly Removal and Installation: in Section 6C in related manual".
- 9) Detach low pressure return hose (2) from low pressure return pipe (3) and then disconnect pipe bracket (1).



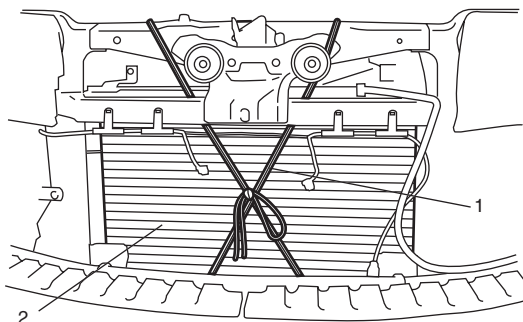
I5JB0A220044-01

- 10) Remove gear box union bolt (1).



I5JB0A220045-01

- 11) Remove front propeller shaft referring to "Propeller Shaft Removal and Installation: in Section 3D in related manual".
- 12) Fix radiator (2) to body with rope (1) to avoid the radiator (2) fall off when front suspension frame lowered.



I5JB0A220046-01

- 13) Support engine assemble as follows.
 - For using engine supporting device
Using engine supporting device, support engine according to "Engine Supporting Points: in Section 0A in related manual".

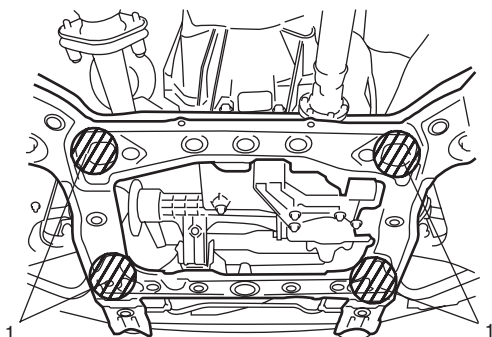
⚠ CAUTION

Be sure to support engine by using engine front hunger only. Failure to follow this instruction could result in damage to engine front and rear hungers.

- For using chain hoist
 - a) Remove hood referring to "Hood Removal and Installation: in Section 9J in related manual".
 - b) Support engine assemble by using chain hoist.
- 14) Support suspension frame at the specified positions (1) indicated in figure.

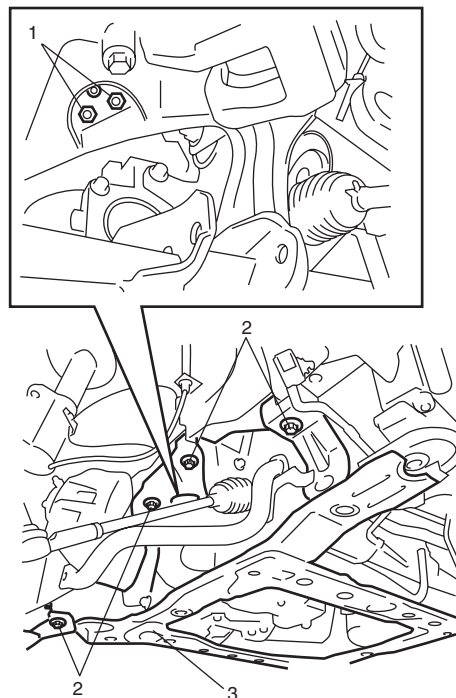
⚠ WARNING

When removing suspension frame, be sure to apply some supporting equipment under it at well-balanced position as shown in the figure section so as to prevent from its drop.



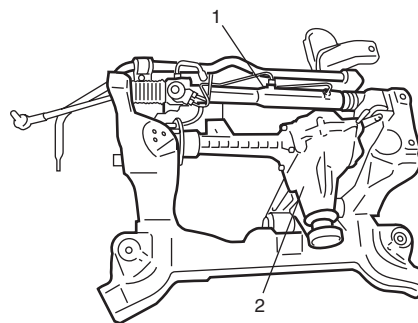
I5JB0A220047-01

- 15) Remove engine front body side mounting nuts (1).
- 16) Remove suspension frame mounting bolts (2), and then lower suspension frame (3) with stabilizer bar, P/S gear box assembly and front differential assembly.



I5JB0A220048-01

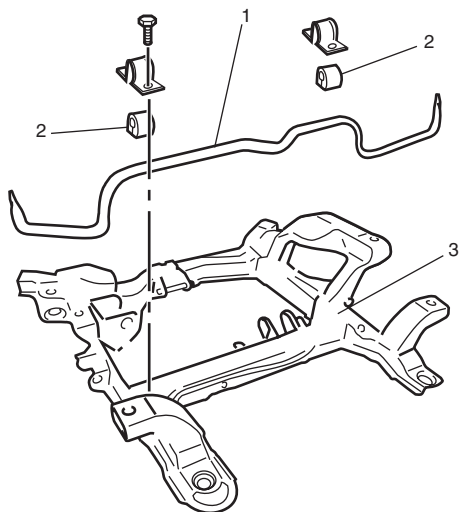
- 17) Remove P/S gear box assembly (1) and front differential assembly (2) referring to "P/S Gear Case Assembly Removal and Installation: in Section 6C in related manual" and "Front Differential Dismounting and Remounting: Front in Section 3B in related manual".



I5JB0A220049-01

2B-18 Front Suspension:

- 18) Remove stabilizer bar (1) and bushing (2) from suspension frame (3).



I5JB0A220050-01

Installation

- 1) When installing stabilizer, loosely assemble all components while insuring that stabilizer is centered, side-to-side.
- 2) Install stabilizer bar (1), stabilizer bushing (2) and stabilizer mounting bracket (3) to suspension frame.

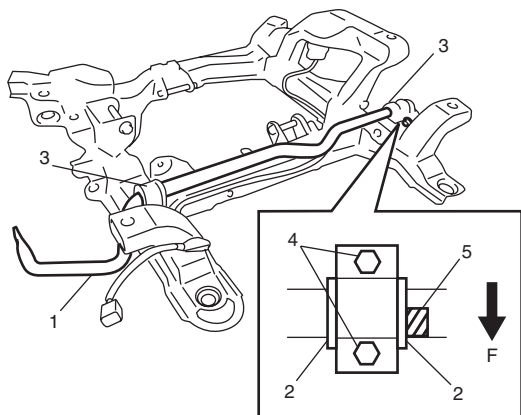
NOTE

Install the stabilizer bar whose mark (5) is to front.

- 3) Tighten stabilizer bar mounting bracket bolts (4) to specified torque.

Tightening torque

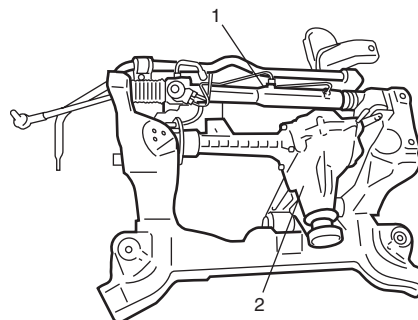
Stabilizer bar mounting bracket bolt (a): 50 N·m (5.0 kgf-m, 36.5 lb-ft)



I5JB0A220051-01

F: Forward

- 4) Install P/S gear box assembly (1) and front differential assembly (2) referring to "P/S Gear Case Assembly Removal and Installation: in Section 6C in related manual" and "Front Differential Dismounting and Remounting: Front in Section 3B in related manual".



I5JB0A220049-01

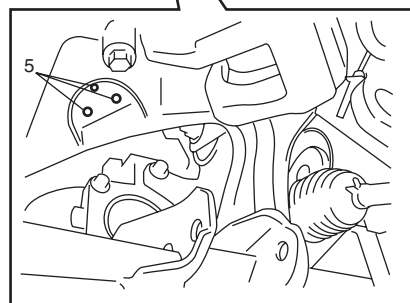
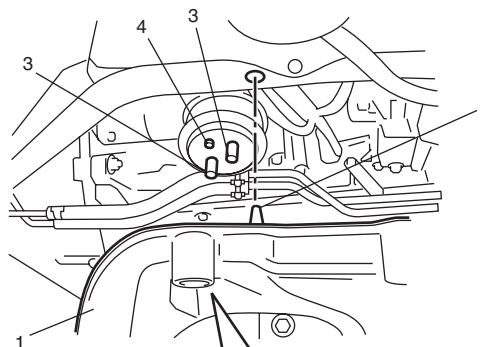
- 5) Install suspension frame.

⚠ WARNING

When installing suspension frame, be sure to apply some supporting equipment under it at well-balanced position as shown in the figure section so as to prevent from its drop.

⚠ CAUTION

Lug (2) in suspension frame (1) must be mated to the corresponding hole in body. And also engine front body side mounting bolts (3) and engine mount lug (4) must be mated to the corresponding holes in suspension frame.



I5JB0A220052-02

- 6) Tighten suspension frame mounting bolts (1) and engine front body side mounting nuts (2) to specified torque.

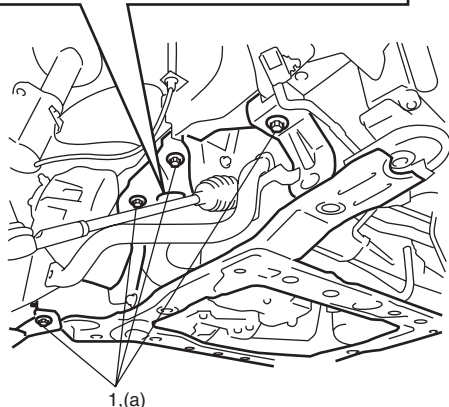
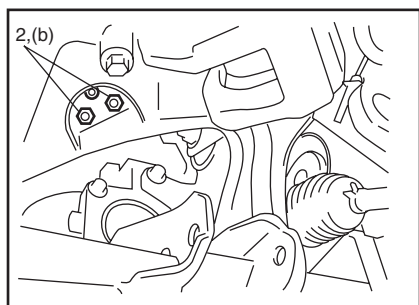
⚠ CAUTION

If reuse suspension frame mounting bolt, apply engine oil to thread, bearing and trunk surface.

Tightening torque

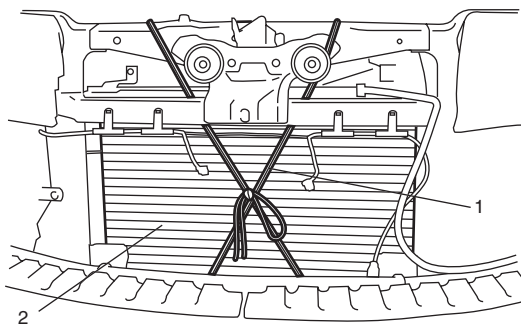
Suspension frame mounting bolt (a): 135 N·m (13.5 kgf-m, 98.0 lb-ft)

Engine front body side mounting nut (b): 55 N·m (5.5 kgf-m, 40.0 lb-ft)



I5JB0A220053-01

- 7) Remove chain hoist from engine and the rope (1) from the radiator (2).

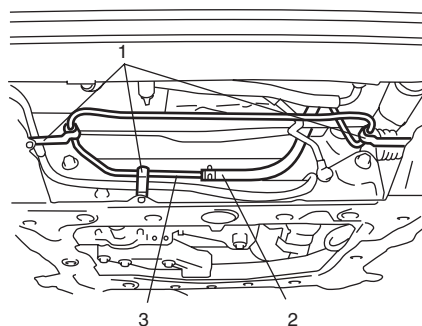


I5JB0A220046-01

- 8) Install hood referring to "Hood Removal and Installation: in Section 9J in related manual".
- 9) Install front propeller shaft referring to "Propeller Shaft Removal and Installation: in Section 3D in related manual".
- 10) Tighten pipe bracket (1) bolts to specified torque and then insert low pressure return hose (2) to low pressure return pipe (3).

Tightening torque

Pipe bracket bolt: 11 N·m (1.1 kgf-m, 8.0 lb-ft)

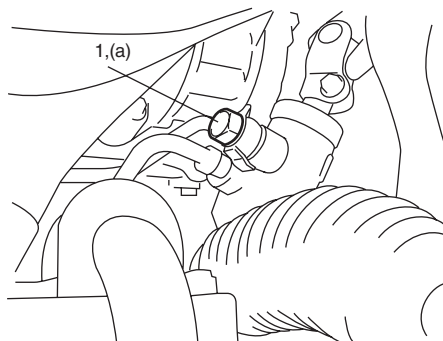


I5JB0A220044-01

- 11) Tighten union gear box bolt (1) to specified torque.

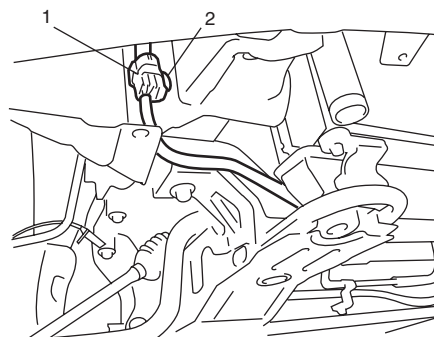
Tightening torque

Union gear box bolt (a): 35 N·m (3.5 kgf-m, 25.5 lb-ft)



I5JB0A220054-01

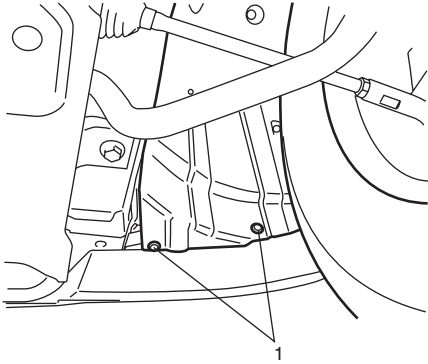
- 12) Connect steering lower shaft from pinion shaft
Steering referring to "P/S Gear Case Assembly Removal and Installation: in Section 6C in related manual".
- 13) Connect front height sensor connector (1) (if equipped with head light auto leveling system) and then detach clip (2).



I5JB0A220043-01

2B-20 Front Suspension:

- 14) Connect front fender lining clip (1) (if equipped with head light auto leveling system).

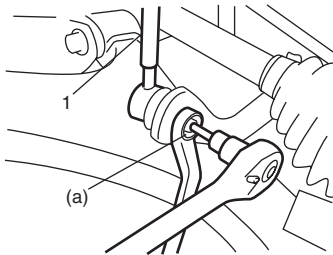
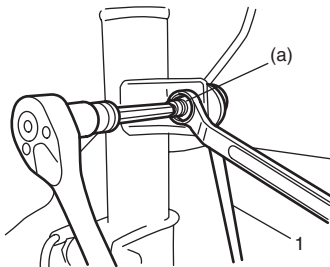


I5JB0A220042-01

- 15) Install stabilizer joints (1), and tighten nuts to specified torque. When tightening, hold stud with hexagon wrench.

Tightening torque

Stabilizer joint nut (a): 60 N·m (6.0 kgf-m, 43.5 lb-ft)



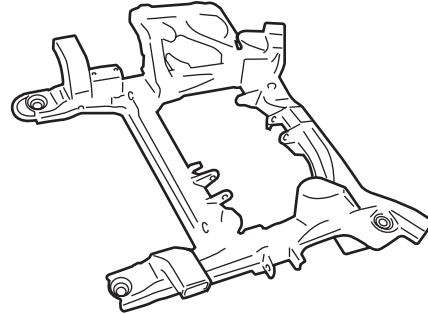
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- 16) Install right side and left side front drive shaft assembly referring to "Front Drive Shaft Assembly Removal and Installation: Front in Section 3A in related manual".
- 17) Install suspension control arm referring to "Suspension Control Arm Removal and Installation: ".
- 18) Install engine under cover.
- 19) Install wheels (right & left) and lower hoist.
- 20) After installation, be sure to fill specified power steering fluid and bleed air referring to "P/S System Air Bleeding Procedure: in Section 6C in related manual".
- 21) Adjust headlight auto leveling system, refer to "Initialization of Auto Leveling Headlight System: in Section 9B in related manual".

Front Suspension Frame Check

S5JB0E2206017

Inspect for cracks, deformation or damage.
If defective, replace.



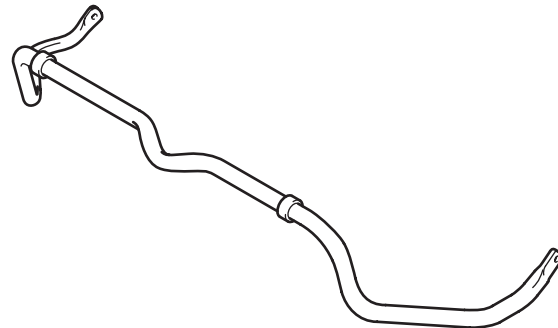
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Front Stabilizer Bar, Bushing and/or Joint Check

S5JB0E2206018

Stabilizer Bar

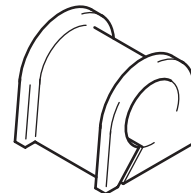
Inspect for damage or deformation.
If defective, replace.



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Stabilizer Bushing

Inspect for damage, wear or deterioration.
If defective, replace.



I5JB0D220002-01

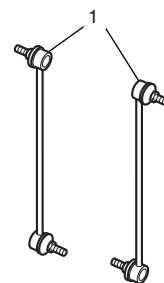
Stabilizer Joint

- 1) Check for smooth rotation.
- 2) Check damages of ball stud.
- 3) Check damages of dust cover.

NOTE

Stabilizer joint (1) cannot be disassembled.

If there is any damage to either parts, stabilizer joint assembly must be replaced as a complete unit.



I4RH01220007-01

Front Suspension Fasteners Check

S5JB0E2206019

Check each bolt and nut fastening suspension parts for tightness. Tighten loose one, if any, to specified torque, referring to "Front Suspension Construction: ".

Specifications**Tightening Torque Specifications**

S5JB0E2207001

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
Tie-rod end lock nut	65	6.5	47.0	☞
Strut bracket nut	135	13.5	98.0	☞ / ☞
Brake hose mounting bolt	25	2.5	18.0	☞
Stabilizer joint nut	60	6.0	43.5	☞ / ☞
Front wheel speed sensor harness clamp bolt	10	1.0	7.5	☞
Strut support nut	50	5.0	36.5	☞
Wheel nut	100	10.0	72.5	☞ / ☞ / ☞
Strut nut	90	9.0	65.0	☞
Wheel hub housing bolt	50	5.0	36.5	☞
Caliper carrier bolt	85	8.5	61.5	☞
Drive shaft nut	200	20.0	145.0	☞
Suspension arm ball joint nut	55	5.5	40.0	☞
Front wheel speed sensor bolt	10	1.0	7.5	☞
Tie-rod end nut	45	4.5	32.5	☞
Suspension control arm nut	135	13.5	98.0	☞
Stabilizer bar mounting bracket bolt	50	5.0	36.5	☞
Suspension frame mounting bolt	135	13.5	98.0	☞
Engine front body side mounting nut	55	5.5	40.0	☞
Pipe bracket bolt	11	1.1	8.0	☞
Union gear box bolt	35	3.5	25.5	☞

NOTE

The specified tightening torque is also described in the following.

"Front Suspension Construction: "

"Front Strut Assembly Components: "

"Front Wheel Hub Assembly and Steering Knuckle Components: "

"Front Suspension Frame, Stabilizer Bar and/or Bushings Components: "

Reference:

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

Special Tools and Equipment

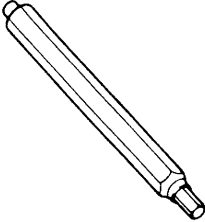
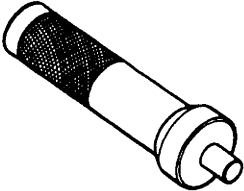
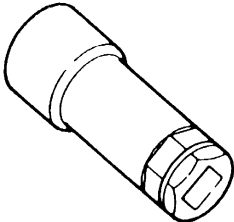
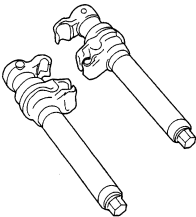
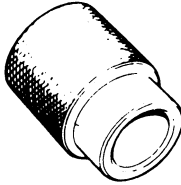
Recommended Service Material

S5JB0E2208001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI Super Grease A	P/No.: 99000-25010	

Special Tool

S5JB0E2208002

09900-00411 Hexagon bit socket  /  	09900-00414 Hexagon bit (6 mm)  /  
09913-75821 Bearing installer attachment  /  	09941-56510 Socket wrench (19 mm)  /  
09943-25010 Spring compressor  	09945-55410 Bushing installer  /  

Section 3

Driveline / Axle

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Transfer

Motor-Shift Type (Transfer with Shift Actuator)

Precautions

Transfer Warning

S5JB0E3310001

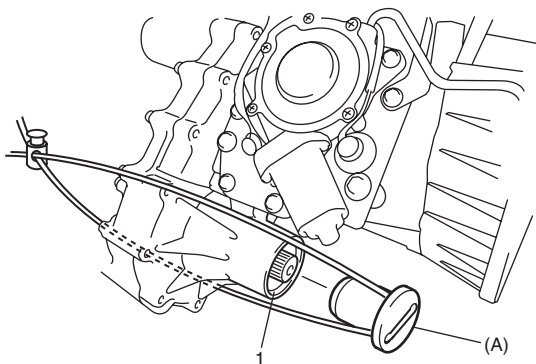
⚠ WARNING

This transfer has a center differential. When testing with 2-wheel chassis dynamometer or speedometer tester (which tester roller is driven by vehicle wheels), be sure to make the vehicle as rear wheel drive or as front wheel drive temporarily as follows. Otherwise, front wheels drive rear wheels or vise-versa and personal injury may result.

- 1) Remove front propeller shaft or rear propeller shaft referring to "Propeller Shaft Removal and Installation: in Section 3D in related manual".
- 2) Install special tool (cap) to flange yoke cover hole (front or rear) of transfer (1) and fix it to transfer or hook with string to prevent oil leakage from transfer.

Special tool

(A): 09928-36510

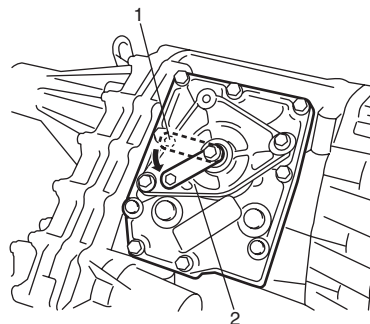


I5JB0A331107-03

- 3) Pour specified oil into transfer up to lever plug hole if front propeller shaft is removed.

- 4) Shift transfer to 4H-lock position as follows.

- Non-shift type (Transfer without shift actuator)
 - Remove lever bolt (1) on transfer, push down lever to 4H-lock position (2) and fix lever with bolt.



I5JB0A331108-01

- Motor-shift type (Transfer with shift actuator)
 - Shift transfer to 4H-lock position by turning transfer switch.

Precautions in Diagnosing Trouble

S5JB0E3310002

- Do not disconnect the following parts before confirming diagnostic information (DTC, etc.) stored in 4WD control module memory. These actions will erase memorized information in 4WD control module memory.
 - Disconnection of coupler from 4WD control module
 - Disconnection of battery cable from battery
 - Disconnection of ground wire harness of 4WD control module
 - Disconnect main fuse from fuse box
- Diagnostic information stored in 4WD control module memory can be cleared as well as checked by using SUZUKI scan tool. Before using scan tool, read its Operator's (Instruction) Manual carefully to have good understanding as to what functions are available and how to use it.
- Be sure to read "Precautions for Electrical Circuit Service:" before inspection and observe what is written there.

General Description

Transfer Description

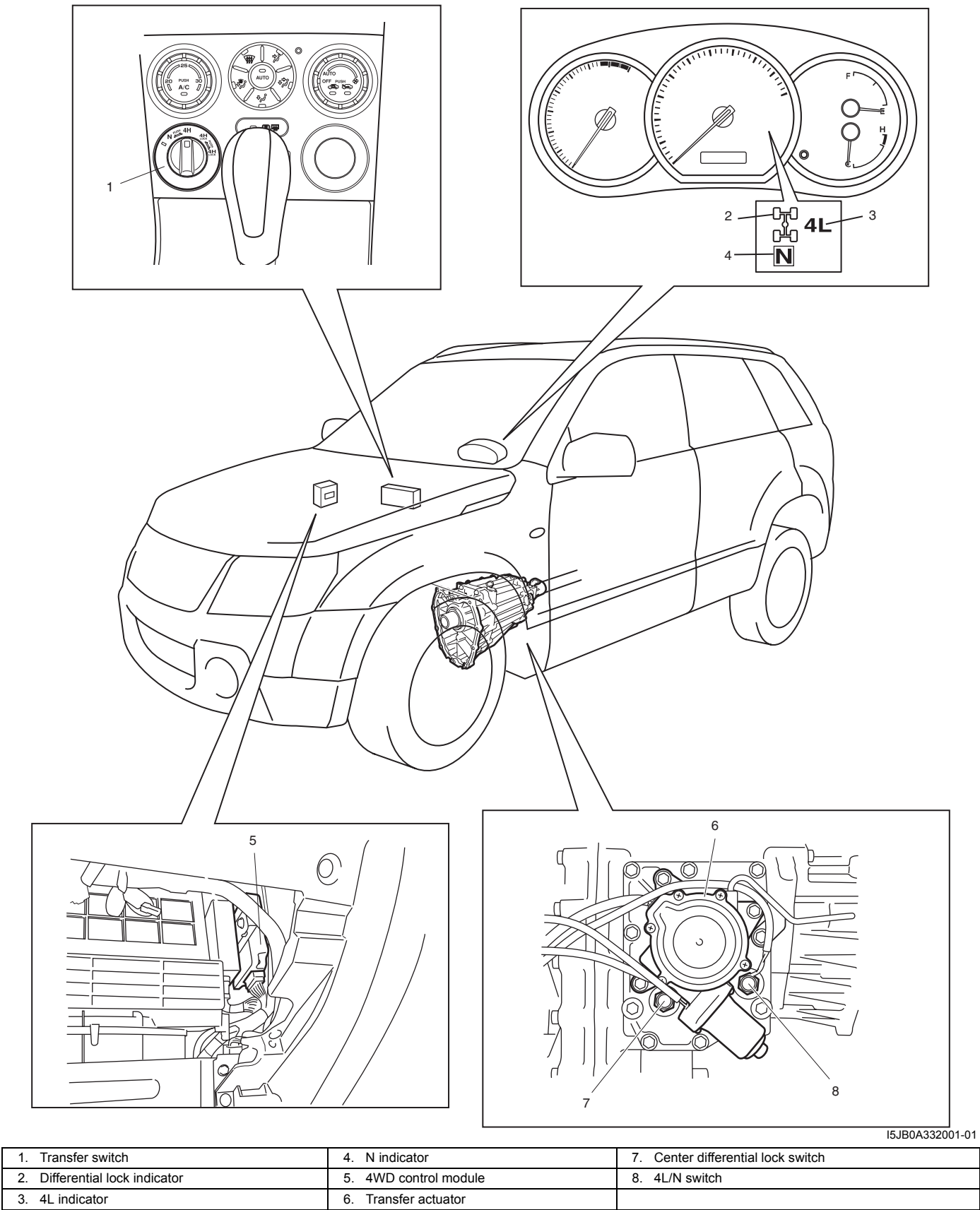
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The aluminum transfer case directly connected to the back of the transmission contains input gear, counter gear, rear output shaft, front output shaft, center differential, drive chain and their accompanying gears, hubs, sleeves, fork, etc. The center differential is installed in the transfer. With the torque induction type LSD used in the center differential, the effect of LSD works when a rotation difference between front and rear wheels is occurring.

The transfer has such a selective mechanism as to enable the shift actuator to make selection of high speed (direct connection with transmission output: main shaft), low speed (speed reduction by input gear, counter gear and low gear) or neutral by way of the reduction shift sleeve located between the input gear and low gear, and selection of center differential lock or not by way of the differential lock clutch sleeve located at the center of the rear output shaft. The case has an oil pump to provide proper lubrication.

Transfer Shift Control System Components

S5JB0E3311002



I5JB0A332001-01

1. Transfer switch	4. N indicator	7. Center differential lock switch
2. Differential lock indicator	5. 4WD control module	8. 4L/N switch
3. 4L indicator	6. Transfer actuator	

4WD Control System Description

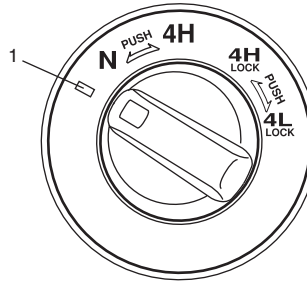
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Transfer Shift Control

The 4WD control module controls the transfer shift actuator based on the signal from the transfer switch so that the transfer is shifted to the selected position (4H, 4H-lock, N or 4L-lock). (Shifting to the N position requires that the switch to "□" position (1) keep it there for about 10 seconds then turn it to "N" position.)

The transfer actuator consists of the actuator motor and the actuator motor position switch. The 4WD control module detects the position of the actuator motor using the position switch and controls the actuator motor running / stopping operation.

Also, the 4L/N switch and center differential lock switch that detect the each position of the High / Low shift fork and the differential lock shift fork are installed the transfer assembly. The 4WD control module detects the transfer actual shift position (4H, 4H-lock, N or 4L-lock) by the signals from the 4L/N switch and center differential lock switch as follows.



I5JB0A332002-01

Relationship of transfer shift position and switches

Switch	Transfer shift position			
	4H	4H-lock	N	4L-lock
4L/N switch	OFF	OFF	ON	ON
Center differential lock switch	ON	OFF	ON	OFF

When the transfer shift actuator motor position detected by motor position switch and transfer actual shift position detected by the above-mentioned switches match, the 4WD control module judges that the transfer shifting is complete.

Retry Control

When 4WD control module cannot judge the shifting to the target position, it commands to retry the shifting up to 3 times. If retry shifting is not possible, previous shift position is restored and notify failure of the shifting with the indicator and buzzer.

Indicator And Buzzer Operation

The 4WD control module output operation signal of the differential lock indicator, 4L indicator, N indicator and the buzzer to BCM. Indicators and buzzer as follows in order to inform what state the transfer control system is.

3C-5 Transfer: Motor-Shift Type (Transfer with Shift Actuator)

Operation			Condition
Indicator		Buzzer	
Differential lock indicator	OFF	—	- Ignition switch is OFF. - Transfer is at 4H/N position.
	ON	—	- Within 2 seconds after ignition switch is turn ON (checking indicator operation). - Transfer is at 4H-lock/4L-lock position.
	Flashes at 0.25 seconds for 3 times, at intervals of 20 seconds.	Sounds at 1 second at intervals of 20 seconds.	The transfer shift position is different for transfer switch.
	Flashes at intervals of 0.25 seconds continuously	—	4WD control module detects DTC of 4WD control system.
	Flashes at intervals of 0.5 seconds continuously	—	- Transfer is shifting from 4H to 4H-lock. - Transfer is shifting from 4H-lock to 4H. - Transfer could not complete shifting to 4H-lock.
4L indicator	OFF	—	- Ignition switch is OFF. - Transfer is at 4H-lock/N position.
	ON	—	- Within 2 seconds after ignition switch is turn ON (checking indicator operation). - Transfer is at 4L-lock position.
	Flashes at 0.25 seconds for 3 times, at intervals of 20 seconds.	Sounds at 1 second at intervals of 20 seconds.	The transfer shift position is different for transfer switch.
	Flashes at intervals of 0.25 seconds continuously	—	4WD control module detects DTC of 4WD control system.
	Flashes at intervals of 0.5 seconds continuously	—	- Transfer is shifting from 4H-lock to 4L-lock. - Transfer is shifting from 4L-lock to 4H-lock. - Transfer could not complete shifting to 4L-lock.
N indicator	OFF	—	- Ignition switch is OFF. - Transfer is at 4H/4H-lock/4L-lock position.
	ON	—	- Within 2 seconds after ignition switch is turn ON (checking indicator operation). - Transfer is at N position.
	Flashes at 0.25 seconds for 3 times, at intervals of 20 seconds.	Sounds at 1 second at intervals of 20 seconds.	The transfer shift position is different for transfer switch.
	Flashes at intervals of 0.2 seconds continuously	—	4WD control module detects DTC of 4WD control system.
	Flashes at 0.5 seconds continuously	—	Transfer could not complete shifting to N.
—	—	Sounds at 0.2 seconds for 2 times, at intervals of 3 seconds.	Transfer is at N position.

Function of 4WD Control System Component

S5JB0E3311004

Part Name	Function
4L/N switch	Detects transfer shift position combining center differential lock switch.
Center differential lock switch	Detects transfer shift position combining 4L/N switch.
Transfer switch	Shifts transfer shift position.
N indicator	Indicates transfer is at N position or not.
4L indicator	Indicates transfer is at 4L-lock position or not.
Differential lock indicator	Indicates transfer is at 4H-lock, 4L-lock or not.
Transmission range sensor (N position) (for A/T model)	Detects A/T is at N range or not.
CPP switch	Detects clutch pedal is depressed or not.
Buzzer incorporated into BCM	- Indicates transfer is at "N" position. - Warns of prohibited shift operation.
4WD control module	- Controls transfer shifting. - Diagnoses 4WD control system components. - Output operation signal of indicators and buzzer to BCM.
Transfer shift actuator	- Consists of transfer shift actuator motor and transfer shift actuator motor position switch. - Shifts transfer shift position operating High / Low shift fork and differential lock shift fork via cams. - Detects transfer shift actuator motor position.
Diagnosis connector	Indicates DTC on indicators when grounding its diagnosis terminal.

4WD Control System Operation

S5JB0E3311005

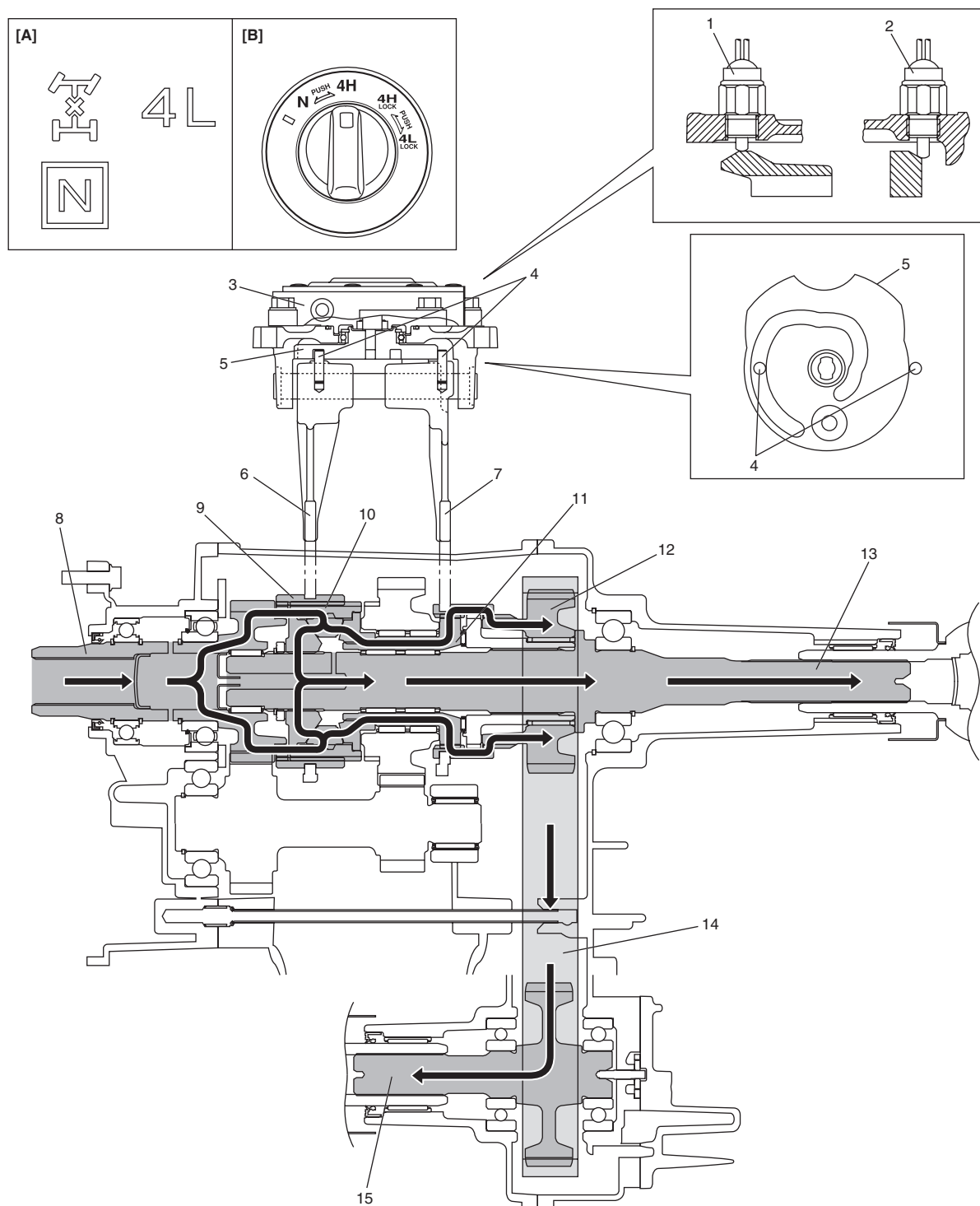
Instead of the transfer shift lever assembly, the transfer position (4H, 4H-lock, N and 4L-lock) is shifted automatically by operating the transfer switch.

The 4WD control module operates the transfer shift actuator according to the transfer switch operation.

4H (4WD High) Position

The driving force from the transmission is transmitted to the transfer input gear. As the center LSD case and transfer input gear are engaged via the reduction shift sleeve at this time, the driving force transmitted from the transfer input gear to the rear output shaft rotates them at the same speed.

Also, driving force from the center LSD is transmitted to the front drive shaft through front drive sprocket. Then, the front drive sprocket rotates the front output shaft via the drive chain.



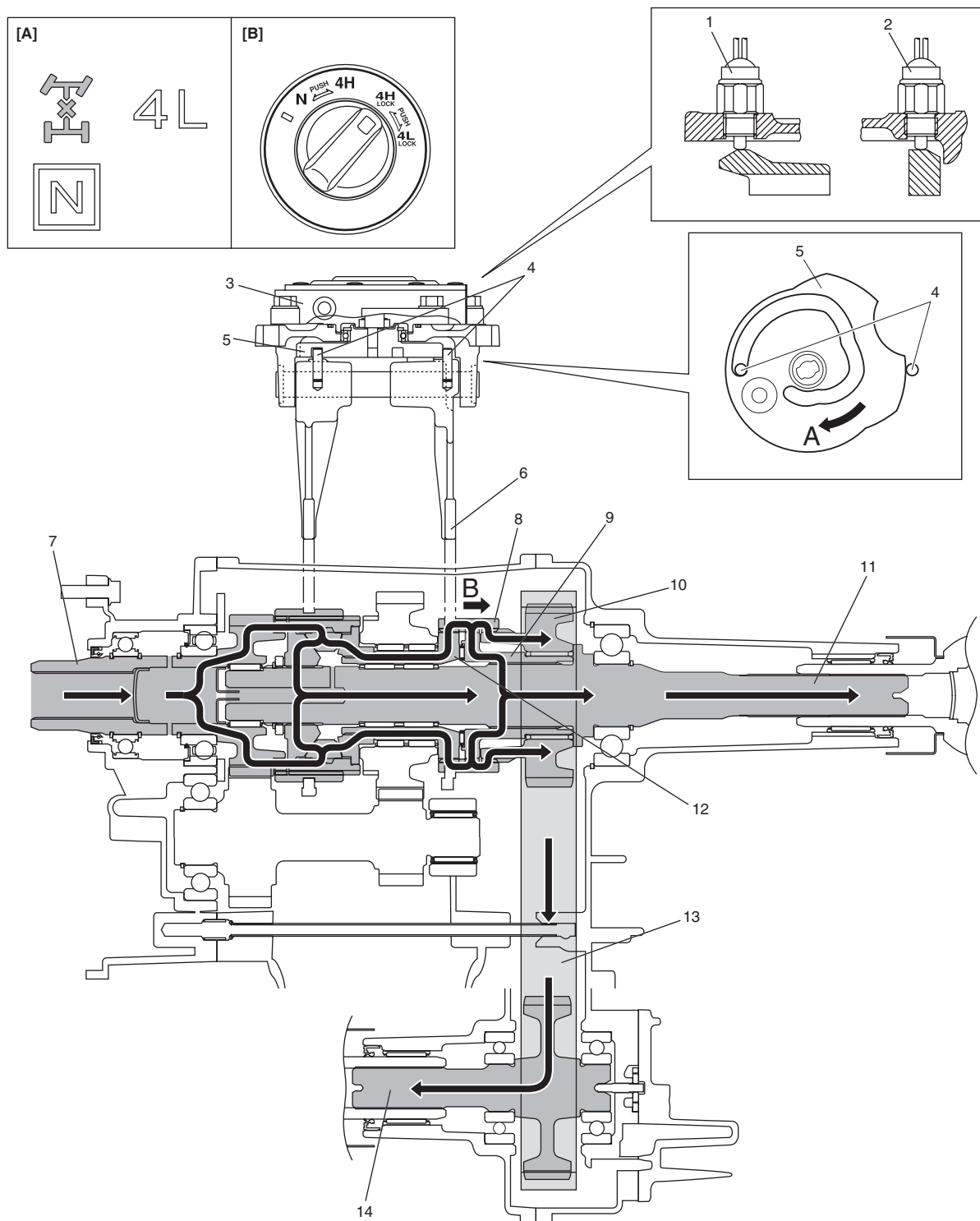
I5JB0A332003-02

[A]: Transfer position indicator	4. Shift fork pin	9. Reduction shift sleeve	14. Drive chain
[B]: Transfer switch	5. Shift cam	10. Center LSD case	15. Front output shaft
1. 4L/N switch	6. High / Low shift fork	11. Front drive shaft	
2. Center differential lock switch	7. Differential lock shift fork	12. Front drive sprocket	
3. Transfer actuator	8. Input gear	13. Rear output shaft	

4H-lock (4WD High Center Differential Lock) Position

When 4H-lock position is selected from 4H position by turning the transfer switch, the transfer shift control actuator motor runs and shift cam rotates in the arrow direction "A". The shift cam shifts the differential lock shift fork in the arrow direction "B", and the differential lock clutch sleeve also moves in the arrow direction "B".

The driving force from the transmission is transmitted from the transfer input gear to the rear output shaft, as in the case of 4H position. Also, as the front drive shaft and front drive sprocket bush are engaged via differential lock clutch sleeve, the driving force from the input gear is locked and transmitted to the rear output shaft.



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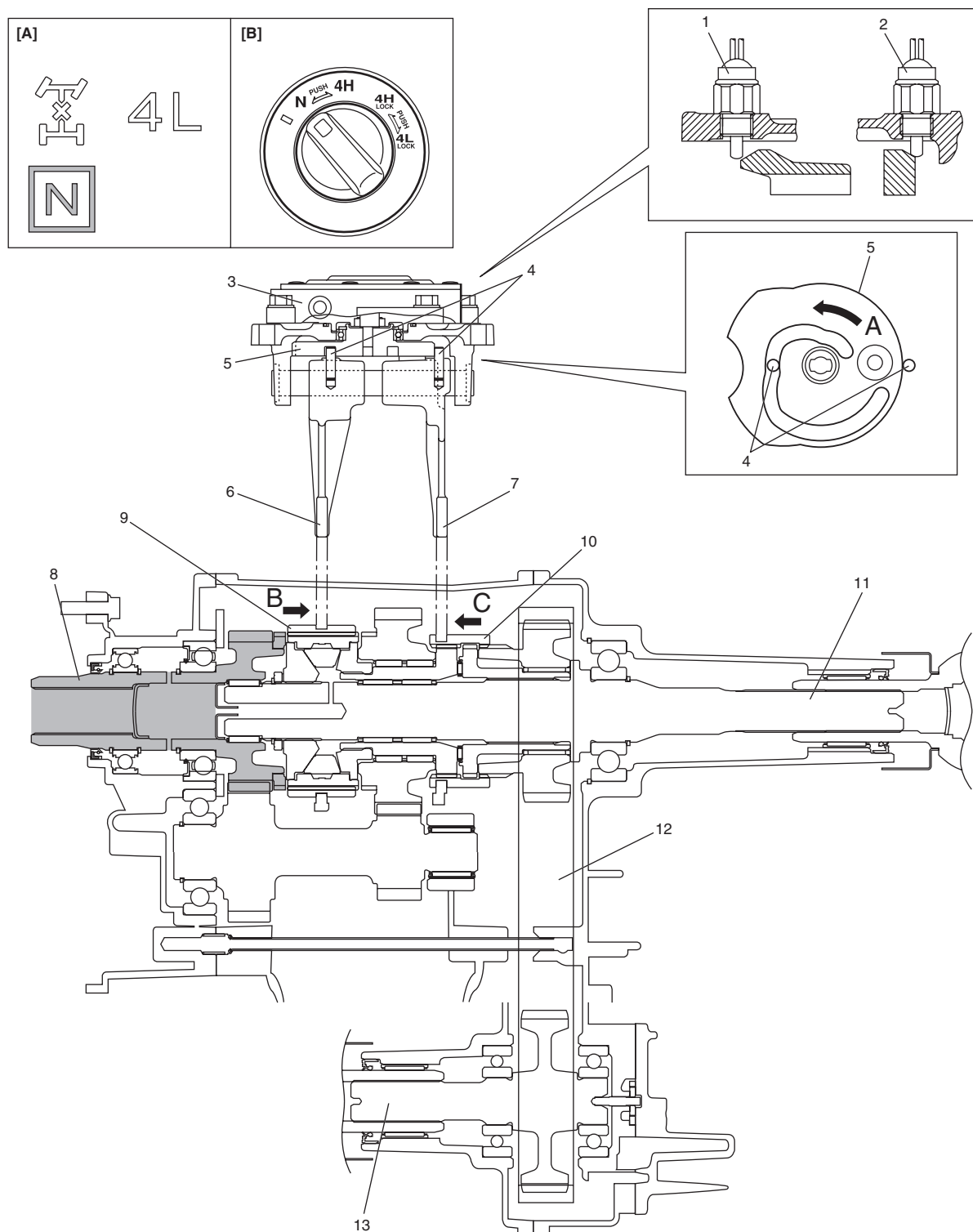
[A]: Transfer position indicator	3. Transfer actuator	7. Input gear	11. Rear output shaft
[B]: Transfer switch	4. Shift fork pin	8. Differential lock clutch sleeve	12. Front drive shaft
1. 4L/N switch	5. Shift cam	9. Front drive sprocket bush	13. Drive chain
2. Center differential lock switch	6. Differential lock shift fork	10. Front drive sprocket	14. Front output shaft

3C-9 Transfer: Motor-Shift Type (Transfer with Shift Actuator)

N (Neutral) Position

When N position is selected from 4H position by turning the transfer switch, the transfer shift control actuator motor runs and shift cam rotates in the arrow direction "A". The shift cam shifts the High / Low shift fork in the arrow direction "B", and the reduction shift sleeve moves in the arrow direction "B". Also, the shift cam shifts the differential lock shift fork in the arrow direction "C", and the differential lock clutch sleeve also moves in the arrow direction "C".

The driving force from the transmission is transmitted to the transfer input gear. However, as the reduction shift sleeve is not engaged with the transfer input gear and low gear, the driving force is not transmitted to the rear output shaft and front output shaft.



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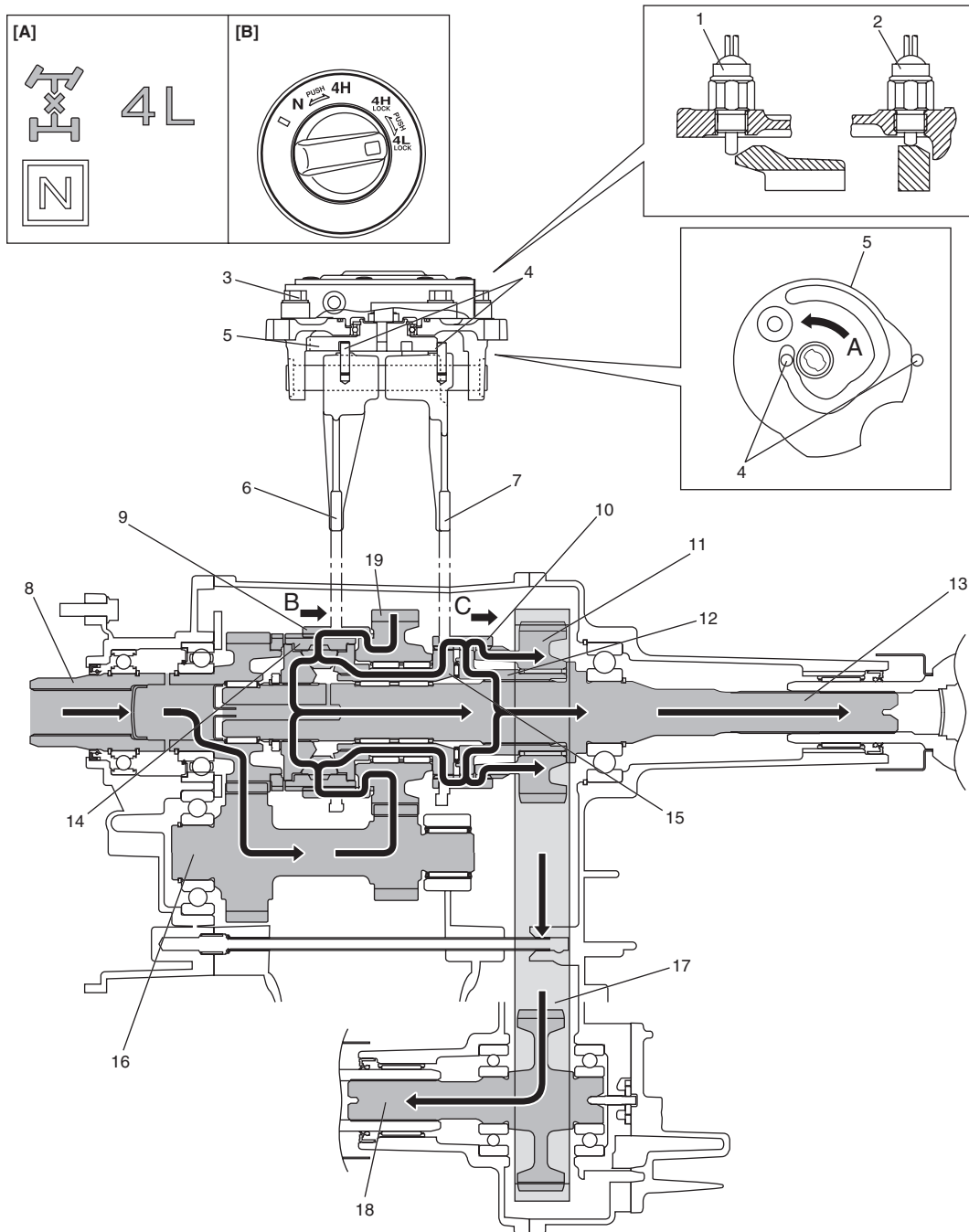
[A]: Transfer position indicator	2. Center differential lock switch	5. Shift cam	8. Input gear	11. Rear output shaft
[B]: Transfer switch	3. Transfer actuator	6. High / Low shift fork	9. Reduction shift sleeve	12. Drive chain
1. 4L/N switch	4. Shift fork pin	7. Differential lock shift fork	10. Differential lock clutch sleeve	13. Front output shaft

4L-lock (4WD Low Center Differential Lock) Position

When 4L-lock position is selected from 4H-lock position by turning the transfer switch, the transfer shift control actuator motor runs and shift cam rotates in the arrow direction "A". The shift cam shifts the High/Low shift fork in the arrow direction "B", and the reduction shift sleeve moves in the arrow direction "B". Also, the shift cam shifts the differential lock shift fork in the arrow direction "C", and the differential lock clutch sleeve also moves in the arrow direction "C".

The driving force from the transmission is transmitted from the transfer low gear, through the transfer input gear and transfer counter gear with the speed reduced. At this time, as the center LSD case and transfer low gear are engaged via reduction shift sleeve, the driving force is transmitted to the rear output shaft.

The driving force of the rear output shaft makes the front output shaft rotate via the differential lock clutch sleeve as in the case of 4H-lock position.

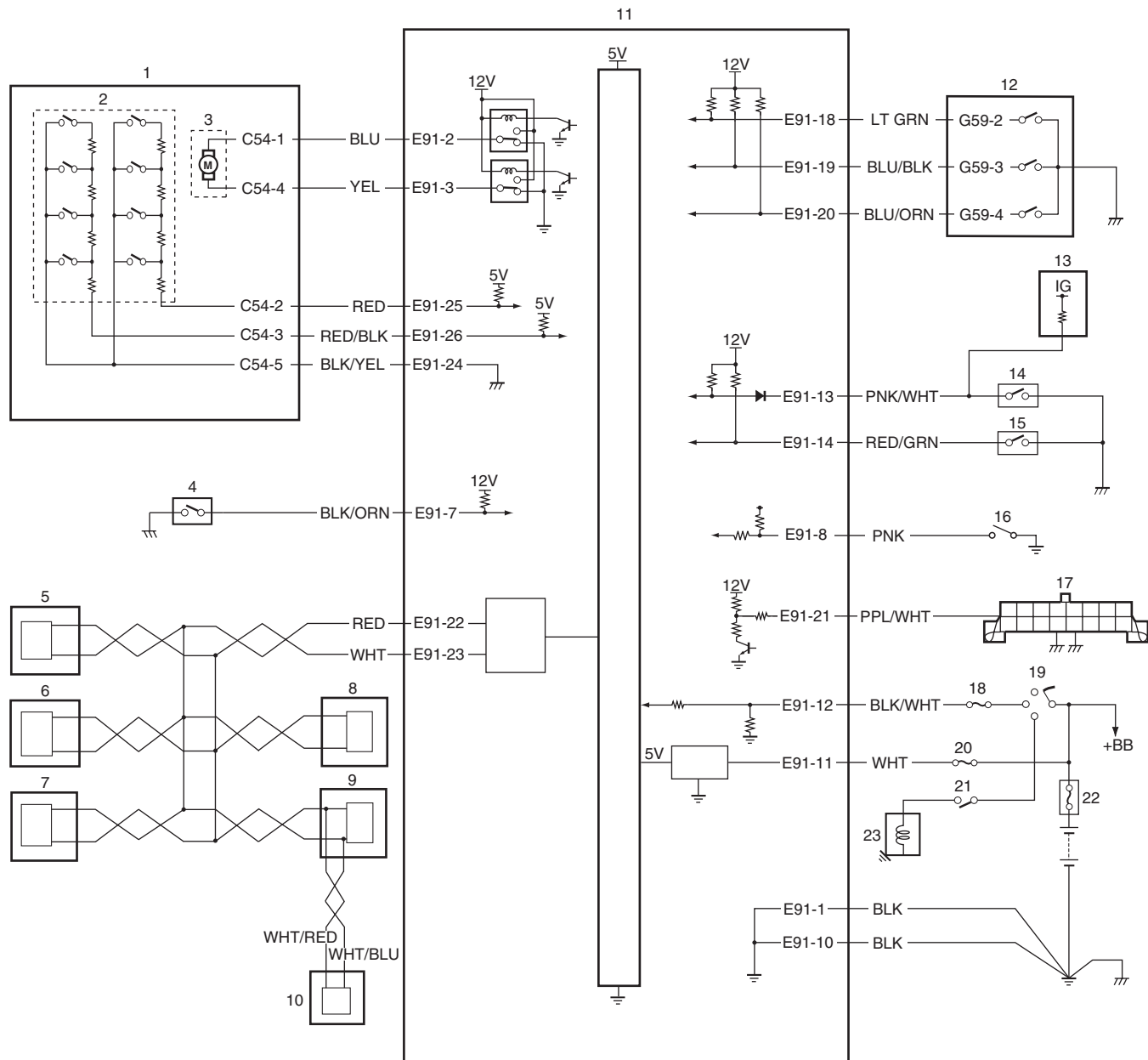


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[A]: Transfer position indicator	4. Shift fork pin	9. Reduction shift sleeve	14. Center LSD case	19. Low gear
[B]: Transfer switch	5. Shift cam	10. Differential lock clutch sleeve	15. Front drive shaft	
1. 4L/N switch	6. High / Low shift fork	11. Front drive sprocket	16. Counter gear	
2. Center differential lock switch	7. Differential lock shift fork	12. Front drive sprocket bush	17. Drive chain	
3. Transfer actuator	8. Input gear	13. Rear output shaft	18. Front output shaft	

4WD Control System Wiring Circuit Diagram

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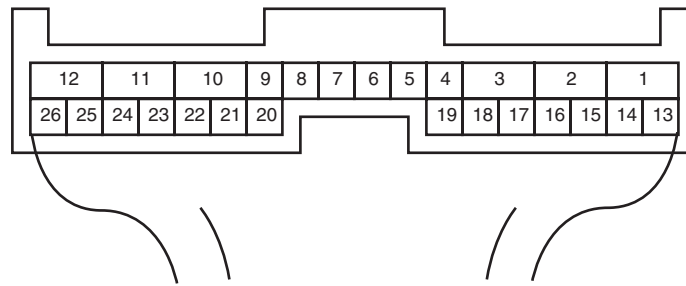
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1. Transfer actuator	9. ABS hydraulic unit / control module	17. DLC
2. Transfer actuator position switch	10. ECM	18. "IG COIL" fuse
3. Transfer actuator motor	11. 4WD control module	19. Ignition switch
4. CPP switch (for M/T model)	12. Transfer switch	20. "4WD" fuse
5. BCM	13. TCM (for A/T model)	21. Shift switch (for A/T model) or CPP switch (for M/T model)
6. TCM (for A/T model)	14. 4L/N switch	22. Main fuse box
7. Combination meter	15. Center differential lock switch	23. Starting motor
8. Keyless start control module (if equipped)	16. Diagnosis connector (if equipped)	

Terminal Arrangement of 4WD Control Module

S5JB0E3311007

[A]



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[A]: Connector "E91" viewed from harness side

Terminal	Circuit	Terminal	Circuit
E91-1	Ground	E91-18	Transfer switch 1
E91-2	Transfer actuator motor 1	E91-19	Transfer switch 2
E91-3	Transfer actuator motor 2	E91-20	Transfer switch 3
E91-7	CPP switch	E91-21	Data link connector (DLC)
E91-8	Diagnosis connector	E91-22	CAN communication line (High)
E91-10	Ground	E91-23	CAN communication line (Low)
E91-11	Power source for internal memory	E91-24	Transfer actuator position switch (ground)
E91-12	Ignition switch	E91-25	Transfer actuator position switch 1 (power)
E91-13	4L/N switch	E91-26	Transfer actuator position switch 2 (power)
E91-14	Center differential lock switch		

Input / Output Signal Table of 4WD Control Module

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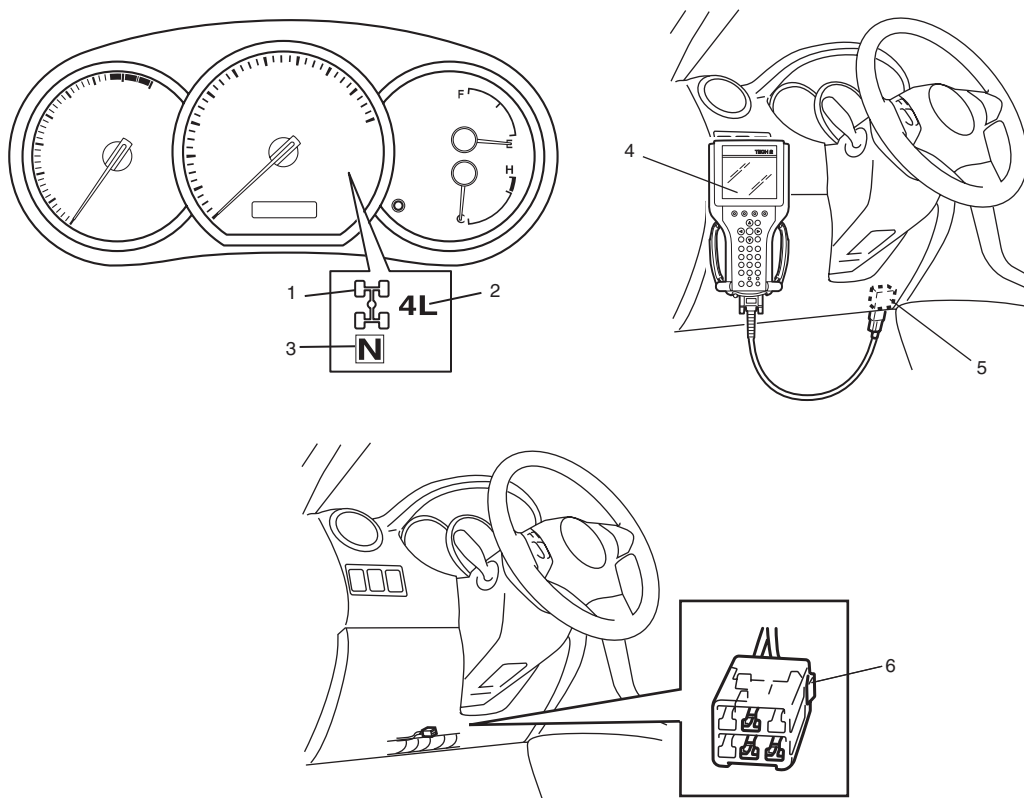
4WD control module outputs the following signals to actuators, indicators, warning buzzer, according to the transfer switch operation.

		Output signal (to each component parts)				
		Transfer shift actuator	Differential lock indicator	4L indicator	N indicator	Warning buzzer
Input signal	Transfer switch	○	○	○	○	○
	CPP switch	○		○	○	○
	TCM	○		○	○	○
	ABS hydraulic unit / control module	○	○	○	○	○
	4L/N switch			○	○	○
	Center differential lock switch		○	○		

On-Board Diagnostic System Description

For 4WD control system, 4WD control module has the following functions.

- When ignition switch is turned ON with engine at stop, differential lock indicator (1), 4L indicator (2) and N indicator (3) turn on at the same time for 2 seconds in order to check operation of these indicators.
- When 4WD control module detects any malfunction in the following area, differential lock indicator (1), 4L indicator (2) and N indicator (3) flash continuously and 4WD control module comes into fail-safe mode. For details of fail safe mode, refer to “Fail-Safe Table: Motor-Shift Type (Transfer with Shift Actuator)”.
 - Transfer switch
 - Transfer shift actuator motor
 - Transfer shift actuator motor position switch
 - 4L/N switch
 - Center differential lock switch
- DTC can be checked by either one of the following ways.
 - DTC can be checked by using SUZUKI scan tool (4) connected to DLC (5).
 - If equipped with diagnosis connector, DTC can be displayed on digital display odometer by shorting diagnosis connector (6).
- When 4WD control module detects any malfunction, 4WD control module will shift automatically transfer to either N or former position which is in before shifting process began.

**DLC (Data Link Connector)**

Refer to “Data Link Connector (DLC)” under “On-Board Diagnostic System Description: in Section 1A”.

CAN Communication System Description

S5JB0E3311010

Refer to "CAN Communication System Description: in Section 1A".

4WD Control Module Transmission Data

4WD control module		DATA		BCM	Combination Meter
				☐	
					☐
					☐
					☐
					☐

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4WD Control Module Reception Data

4WD control module		DATA		ECM	TCM	ABS hydraulic unit / control module (if equipped)	ESP® hydraulic unit / control module (if equipped)
				☐			
				☐			
				☐			
					☐		
						☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐
							☐

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Diagnostic Information and Procedures

4WD Control System Check

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Refer to the following items for the details of each step.

Step	Action	Yes	No
1	☞ Customer complaint analysis 1) Perform customer complaint analysis. <i>Was customer complaint analysis performed?</i>	Go to Step 2.	Perform customer complaint analysis.
2	☞ DTC / freeze frame data check, record and clearance 1) Check for DTC. <i>Is there any DTC(s)?</i>	Print DTC or write them down and clear them by referring to "DTC Clearance: Motor-Shift Type (Transfer with Shift Actuator)". Go to Step 3.	Go to Step 4.
3	☞ Visual inspection 1) Perform visual inspection. <i>Is there any faulty condition?</i>	Repair or replace malfunction part. Go to Step 11.	Go to Step 5.

3C-15 Transfer: Motor-Shift Type (Transfer with Shift Actuator)

Step	Action	Yes	No
4	🔧 Visual inspection 1) Perform visual inspection. <i>Is there any faulty condition?</i>	Repair or replace malfunction part. Go to Step 11.	Go to Step 8.
5	🔧 Trouble symptom confirmation 1) Shift transfer to “4H”, “4H-lock”, “4L-lock” and “N” positions referring to “4WD Control System Operation Inspection: Motor-Shift Type (Transfer with Shift Actuator)”. 2) Confirm trouble symptom. <i>Is trouble symptom identified?</i>	Go to Step 6.	Go to Step 7.
6	🔧 Rechecking and record of DTC / freeze frame data 1) Recheck for DTC referring to “DTC Check: Motor-Shift Type (Transfer with Shift Actuator)”. <i>Is there any DTC(s)?</i>	Go to Step 9.	Go to Step 8.
7	🔧 Rechecking and record of DTC / freeze frame data 1) Recheck for DTC referring to “DTC Check: Motor-Shift Type (Transfer with Shift Actuator)”. <i>Is there any DTC(s)?</i>	Go to Step 9.	Go to Step 10.
8	🔧 4WD control symptom diagnosis 1) Check and repair according to “4WD Control Symptom Diagnosis: Motor-Shift Type (Transfer with Shift Actuator)”. <i>Are check and repair complete?</i>	Go to Step 11.	Check and repair malfunction part(s). Go to Step 11.
9	🔧 Troubleshooting for DTC 1) Check and repair according to applicable DTC flow. <i>Are check and repair complete?</i>	Go to Step 11.	Check and repair malfunction part(s). Go to Step 11.
10	🔧 Check for intermittent problems 1) Check for intermittent problems. <i>Is there any faulty condition?</i>	Repair or replace malfunction part(s). Go to Step 11.	Go to Step 11.
11	🔧 Final confirmation test 1) Clear DTC if any. 2) Perform final confirmation test. <i>Is there any problem symptom, DTC or abnormal condition?</i>	Go to Step 6.	End.

Detail of 4WD Control System Check**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 a questionnaire form as shown in the following will facilitate collecting information to the point required for proper analysis and diagnosis.

Customer questionnaire (Example)

Customer's name:	Model:	VIN:	
Date of issue:	Date of Reg:	Date of problem:	Mileage:

Problem Symptoms	• Transfer position indicator abnormal: fails to turn on / fails to turn off / flashes • Abnormal noise while vehicle running: from transfer, from actuator, other _____ • No shifted to "4H" position • No shifted to "4H-lock" position • No shifted to "4L-lock" position • No shifted to "N" position
Frequency of Occurrence	• Continuous / Intermittent (_____ times a day, a month) / other _____
Conditions for Occurrence of Problem	• When starting: at initial start only / at every start / other _____ • Vehicle speed: while accelerating / while decelerating / at stop / while turning / while running at constant speed / other _____ • Road surface condition: Paved road / rough road / snow-covered road / other _____
Environmental Condition	• Weather: fine / cloudy / rain / snow / other • Temperature: _____ °F (_____ °C)
Diagnostic Trouble Code	• First check: _____ Normal code / malfunction code (_____) • Second check after test drive: Normal code / malfunction code (_____)

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NOTE

The form is a standard sample. It should be modified according to conditions characteristic of each market.

Step 2. DTC / freeze frame data check, record and clearance

First, referring to "DTC Check: Motor-Shift Type (Transfer with Shift Actuator)", check DTC and pending DTC. If DTC exists, print or write down DTC and freeze frame data and then clear malfunction DTC(s) by referring to "DTC Clearance: Motor-Shift Type (Transfer with Shift Actuator)". Malfunction DTC indicates malfunction in the system but it is not possible to know from it whether the malfunction is occurring now or it occurred in the past and normal condition has been

restored. In order to know that, check symptom in question according to Step 5 and then recheck DTC according to Step 6.

Diagnosing a trouble based on the DTC in this step only or failure to clear the DTC in this step may result in a faulty diagnosis, trouble diagnosis of a normal circuit or difficulty in troubleshooting which is otherwise unnecessary.

Step 3 and 4. Visual inspection

As a preliminary step, be sure to perform visual check of the items that support proper function of the 4WD control system referring to "Visual Inspection: Motor-Shift Type (Transfer with Shift Actuator)".

Step 5. Trouble symptom confirmation

Check trouble symptoms based on information obtained in "Step 1: Customer complaint analysis: Motor-Shift Type (Transfer with Shift Actuator)" and "Step 2. DTC / freeze frame data check, record and clearance: Motor-Shift Type (Transfer with Shift Actuator)". Also, reconfirm DTC according to "DTC Confirmation Procedure" described in each DTC flow.

Step 6 and 7. Rechecking and record of DTC and freeze frame data

Refer to "DTC Check: Motor-Shift Type (Transfer with Shift Actuator)" for checking procedure.

Step 8. 4WD control symptom diagnosis

Check the parts of the system suspected as a possible cause referring to "4WD Control Symptom Diagnosis: Motor-Shift Type (Transfer with Shift Actuator)".

Step 9. Troubleshooting for DTC

Based on the DTC indicated in Step 6 / 7 and referring to "applicable DTC flow", locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator, 4WD control module or other part and repair or replace faulty parts.

Step 10. Check for intermittent problem

Check parts where an intermittent trouble is easy to occur (e.g. wire harness, connector, etc.), referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual" and related circuit of DTC recorded in Step 2.

Step 11. Final confirmation test

Confirm that the problem symptom has gone and the vehicle is free from any abnormal conditions. If what has been repaired is related to the malfunction DTC, clear the DTC once and check to ensure that no malfunction DTC is indicated.

Transfer Position Indicator Operation Check

S5JB0E3314002

- 1) Turn ignition switch to OFF position.
- 2) Check that transfer position indicators turn on for about 2 seconds and then turns off.
If any faulty condition is found, proceed to "Transfer Position Indicator Does Not Come ON at Ignition Switch ON but Engine Stops: Motor-Shift Type (Transfer with Shift Actuator)" or "Transfer Position Indicator Remains ON Steady at Ignition Switch ON: Motor-Shift Type (Transfer with Shift Actuator)".

4WD Control System Operation Inspection

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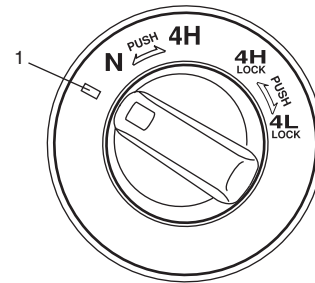
NOTE

- If it is difficult to shift between "4H" and "4H-lock" while vehicle is moving, stop vehicle and operate Transfer switch.
- When ABS operates while shifting from "4H" to "4H-lock" ("4H-lock" to "4H"), it becomes to disagreement of transfer switch and transfer position. End of the ABS operation, and then transfer shifting from "4H" to "4H-lock" ("4H-lock" to "4H").
- Transfer position indicator blinks during shifting process.
- Transfer position indicator blinks and warning buzzer sounds during "N" position at intervals of 3 seconds.
- When shifting to "N" or "4L-lock" does not shifts, try the following procedure.
 - For M/T model, shift transmission to N (Neutral) position, turn ignition switch to ON position, depress clutch pedal and brake pedal while engine is running, and then try shifting again.
 - For A/T model, turn ignition switch to ON position, move vehicles lowly back or forth a few feet, depress brake pedal, and then try shifting again.

- 1) Inspect shift operation from 4H to 4H-lock as follows.
 - a) Start engine.
 - b) Position front wheels straight ahead.
 - c) Confirm that vehicle is under following conditions.
 - Transfer shift position is 4H.
 - Vehicle speed is less than 100 km/h (60 mph).
 - d) Turn transfer switch to "4H-lock" position.
 - e) Check that differential lock indicator blinks, and then comes ON steady.
- 2) Inspect shift operation from 4H-lock to 4L-lock as follows.
 - a) Stop vehicle completely with engine running.
 - b) Position front wheels straight ahead.
 - c) Confirm that vehicle is under following conditions.
 - Transfer shift position is 4H-lock.
 - Transmission shift lever is at "N" position. (for A/T model)
 - Clutch pedal is depressed fully. (for M/T model)
 - Brake pedal is depressed.
 - d) Push and turn transfer switch to "4L-lock" position.

- e) Check that 4L indicator blink, and then differential lock indicator and 4L indicator comes ON steady.
- 3) Inspect shift operation from 4L-lock to 4H-lock as follows.
 - a) Stop vehicle completely with engine running.
 - b) Position front wheels straight ahead.
 - c) Confirm that vehicle is under following conditions.
 - Transfer shift position is 4L-lock.
 - Transmission shift lever is at "N" position. (for A/T model)
 - Clutch pedal is depressed fully. (for M/T model)
 - Brake pedal is depressed.
 - d) Push and turn transfer switch to "4H-lock" position.
 - e) Check that 4L indicator blink, and then differential lock indicator comes ON steady and 4L indicator not come ON.
- 4) Inspect shift operation from 4H-lock to 4H as follows.
 - a) Start engine.
 - b) Position front wheels straight ahead.
 - c) Confirm that vehicle is under following conditions.
 - Transfer shift position is 4H-lock.
 - Vehicle speed is less than 100 km/h (60 mph).
 - d) Turn transfer switch to "4H" position.

- e) Check that differential lock indicator blinks, and then not comes ON.
- 5) Inspect shift operation from 4H to N as follows.
 - a) Stop vehicle completely with engine running.
 - b) Position front wheels straight ahead.
 - c) Confirm that vehicle is under following conditions.
 - Transfer shift position is 4H.
 - Transmission shift lever is at "N" position. (for A/T model)
 - Clutch pedal is depressed fully. (for M/T model)
 - Brake pedal is depressed.
 - d) Turn transfer switch to "□" position (1), keep it there for about 10 seconds, and then turn it to "N" position after N indicator blinks.



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- e) Check that N indicator blinks and warning buzzer sounds, and then N indicator comes ON steady.

Visual Inspection

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Check the following parts and systems visually.

Inspection Item	Referring
• Front differential oil ---- level, leakage • Rear differential oil ---- level, leakage • Transfer gear oil ---- level, leakage • Manual transmission oil ---- level, leakage • A/T fluid ---- level, leakage • Transfer mounting(s) ---- wear and looseness • Fuses ---- burning • Battery ---- fluid level, corrosion of terminal • Connectors of electric wire harness ---- disconnection, friction • Other parts that can be checked visually	"Front Differential Oil Change: Front in Section 3B in related manual" "Rear Differential Oil Change: Rear in Section 3B in related manual" "Transfer Oil Change: Motor-Shift Type (Transfer with Shift Actuator)" "Manual Transmission Oil Change: in Section 5B in related manual" "A/T Fluid Level Check: in Section 5A in related manual" "Battery Inspection: in Section 1J in related manual" "Intermittent and Poor Connection Inspection: in Section 00 in related manual"

DTC Check

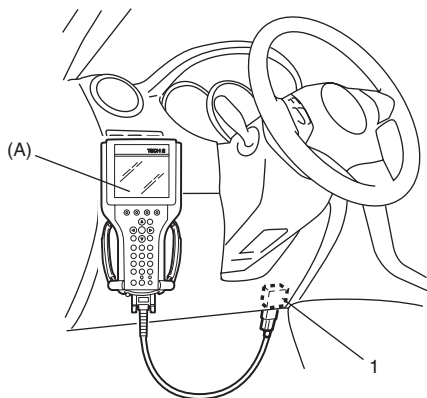
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Using SUZUKI Scan Tool

- 1) Turn ignition switch to OFF position.
- 2) Connect SUZUKI scan tool to data link connector (DLC) (1) located on underside of instrument panel.

Special tool

(A): SUZUKI scan tool



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- 3) Turn ignition switch to ON position.
- 4) Read DTC according to instructions displayed on SUZUKI scan tool and print it or write it down. Refer to SUZUKI scan tool operator's manual for further details.

If communication between SUZUKI scan tool and 4WD control module is not possible, check if SUZUKI scan tool is communicable by connecting it to 4WD control module in another vehicle. If communication is possible in this case, SUZUKI scan tool is in good condition. Then check data link connector and serial data line (circuit) in the vehicle with which communication was not possible.

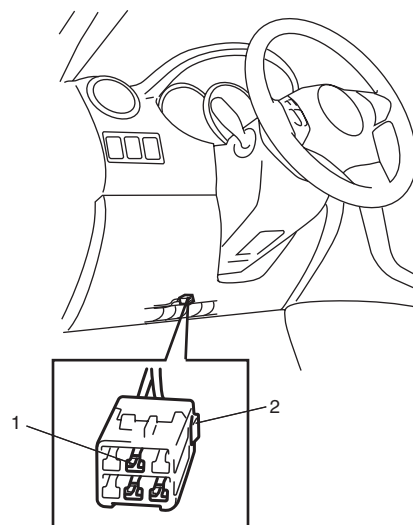
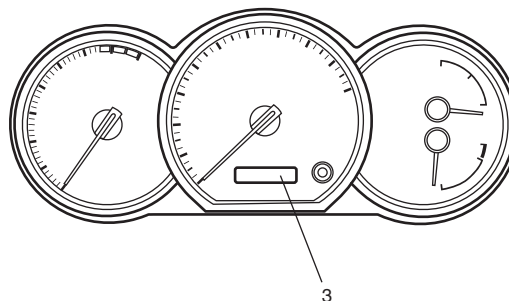
- 5) After completing the check, turn ignition switch OFF and disconnect SUZUKI scan tool from data link connector (DLC).

Using Diagnosis Connector

- 1) With ignition switch OFF position, using service wire short diagnosis switch terminal (1) of diagnosis connector (2) and body ground.
- 2) With ignition switch ON position and leaving engine OFF, read DTC displayed on digital display odometer (3) of combination meter referring to "DTC Table: Motor-Shift Type (Transfer with Shift Actuator)".

NOTE

When more than 2 DTCs are stored in memory, flashing for each DTC is repeated three times starting with the smallest DTC number in increasing order.



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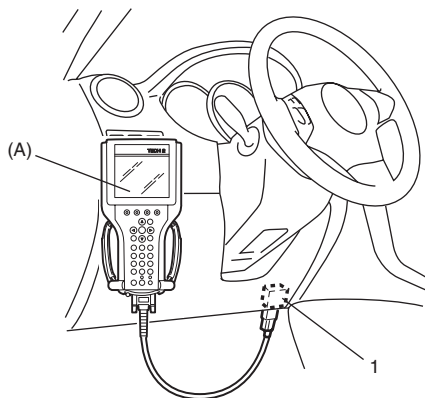
- 3) After completing the check, turn ignition switch OFF, disconnect service wire from diagnosis connector.

DTC Clearance

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Using SUZUKI Scan Tool

- 1) Turn ignition switch to OFF position.
- 2) Connect SUZUKI scan tool to data link connector (DLC) (1) located on underside of instrument panel.

Special tool**(A): SUZUKI scan tool**

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- 3) Turn ignition switch to ON position.
- 4) Erase DTC according to instructions displayed on SUZUKI scan tool. Refer to SUZUKI scan tool operator's manual for further details.
- 5) After completing clearance, turn ignition switch OFF and disconnect SUZUKI scan tool from data link connector (DLC).
- 6) Perform "DTC Check: Motor-Shift Type (Transfer with Shift Actuator)" and confirm that NO CODES is displayed.

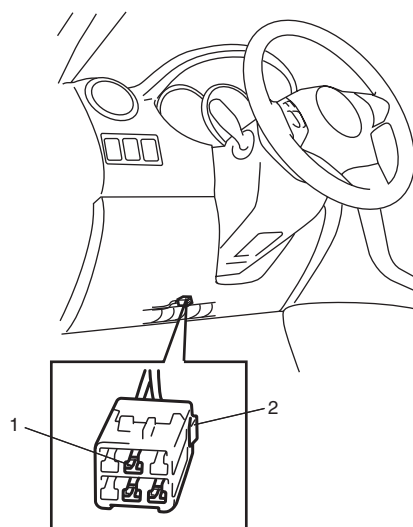
NOTE

DTC and freeze frame data stored in 4WD control module memory are also cleared in the following cases. Be careful not to clear them before keeping their record.

- When power to 4WD control module is cut off (by disconnecting battery cable, removing fuse or disconnecting 4WD control module connectors).
- When the same malfunction (DTC) is not detected again during 40 engine warm-up cycles.

Using Diagnosis Connector

- 1) Turn ignition switch to ON position.
- 2) Using service wire short diagnosis switch terminal (1) of diagnosis connector (2) and body ground more than 5 times at about 1 second interval within 10 seconds.
- 3) Wait more than 9 seconds.
- 4) Perform "DTC Check: Motor-Shift Type (Transfer with Shift Actuator)" and confirm that DTC No. is not displayed.



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DTC Table

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DTC No.	Detecting item	Detecting condition (DTC will set when detecting)	Transfer position indicators
☞ C1213	Transfer switch circuit open	Different switch combination from specification is detected.	○
☞ C1214	Transfer switch circuit short	Different switch combination from specification is detected.	○
☞ C1223	Transfer shift actuator motor position switch 1 circuit open	Actuator position switch signal voltage 4.2 V or more.	○
☞ C1224	Transfer shift actuator motor position switch 1 circuit short	Actuator position switch signal voltage 0.6 V or less.	○
☞ C1227	4L/N switch circuit open	Though actuator position switch is "4L-lock" position, the ON signal is not input from the 4L/N switch.	○

3C-21 Transfer: Motor-Shift Type (Transfer with Shift Actuator)

DTC No.	Detecting item	Detecting condition (DTC will set when detecting)	Transfer position indicators
☞ C1228	4L/N switch circuit short	Though actuator position switch is “4L-lock” position, the OFF signal is not input from the 4L/N switch.	○
☞ C1230	Transfer actuator circuit malfunction	Transfer switch is changed of position, and then actuator position switch is not changed for more than 3 seconds.	○
☞ C1235	Transfer shift actuator motor position switch 2 circuit open	Actuator position switch signal voltage 4.2 V or more.	○
☞ C1236	Transfer shift actuator motor position switch 2 circuit short	Actuator position switch signal voltage 0.6 V or less.	○
☞ C1237	Center differential lock switch circuit open	Though actuator position switch is “4H” position, the ON signal is not input from the center differential lock switch.	○
☞ C1238	Center differential lock switch circuit short	Though actuator position switch is “4L-lock” position, the OFF signal is not input from the center differential lock switch.	○
☞ C1240	4WD control module power supply circuit malfunction	Battery voltage is lower than lower limit voltage for 4WD control module diagnosis.	○
☞ C1243	Internal circuit malfunction of 4WD control module	EEPROM error	○
☞ C1246	Clutch pedal position (CPP) switch circuit short	CPP switch signal is input when vehicle speed is 30 km/h (19 mph).	○
☞ U1073	Control module communication bus off	Transmitting and receiving error of 4WD control module for specified time continuously.	○
☞ U1100	Lost communication with ECM	Receiving error of 4WD control module from ECM for specified time continuously.	○
☞ U1101	Lost communication with TCM	Receiving error of 4WD control module from TCM for specified time continuously.	○
☞ U1121	Lost communication with ABS / electronic stability program control module	Receiving error of 4WD control module from ABS / electronic stability program control module for specified time continuously.	○

NOTE

“O” in transfer position indicator column of the above table means indicator lights up when DTC is detected.

Fail-Safe Table

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This function is provided by the safe mechanism that assures safe drive ability even when the actuator, switch, sensor or its circuit fails. The following table shows the fail safe function for each fail condition of sensor, actuator, switch, 4WD control module or its circuit.

DTC No.	Trouble Area	Fail-Safe Operation
☞ C1223	Transfer actuator switch 1 circuit open	4WD control module stops outputting of control signal to transfer actuator (When shifting, it stops outputting after shifting is completed).
☞ C1224	Transfer actuator switch 1 circuit short	
☞ C1235	Transfer actuator switch 2 circuit open	
☞ C1236	Transfer actuator switch 2 circuit short	
☞ C1230	Transfer actuator circuit malfunction	4WD control module stops outputting of control signal to transfer actuator.
☞ C1240	4WD control module power supply circuit malfunction	
☞ C1246	Clutch switch circuit short	

Scan Tool Data

S5JB0E3314009

Scan Tool Data	Vehicle Condition	Normal Condition / Reference Value
Vehicle speed	At vehicle stop	0 km/h, 0 mph
Actuator Pos Sen	Transfer shifted to 4H position	4H
	Transfer being shifted between 4H-lock and 4H position	4H-lock – 4H
	Transfer shifted to 4H-lock position	4H-lock
	Transfer being shifted between 4H and N position	4H – N
	Transfer shifted to 4L-lock position	4L-lock
	Transfer being shifted between N and 4L-lock position	N – 4L-lock
	Transfer shifted to N position	N
Actuator motor Pos	Transfer shifted to 4H position	4H
	Transfer shifted to 4H-lock position	4H-lock
	Transfer shifted to 4L-lock position	4L-lock
	Transfer shifted to N position	N
Battery voltage	Ignition switch ON and engine stop	10 – 14 V
4L/N switch	Transfer shifted to 4L-lock or N position	ON
	Transfer shifted to 4H or 4H-lock position	OFF
Center diff lock SW	Transfer shifted to 4H or N position	ON
	Transfer shifted to 4H-lock or 4L-lock position	OFF
N range signal (AT)	A/T shifted to “N” range	ON
	A/T shifted to other than “N” range	OFF
CPP switch (MT)	Clutch pedal depressed	OFF
	Clutch pedal released	ON
Mode switch 1	Transfer switch selected to N position	ON
	Transfer switch selected to 4H, 4H-lock or 4L-lock position	OFF
Mode switch 2	Transfer switch selected to 4H, 4H-lock or N position	ON
	Transfer switch selected to 4L-lock position	OFF
Mode switch 3	Transfer switch selected to 4H-lock or 4L-lock position	ON
	Transfer switch selected to 4H or N position	OFF
Warning buzzer	Buzzer not being sound	OFF
	Transfer shifted to N Position	N Pos
	Transfer shifted to disagreement of transfer switch and transfer position	Error
ABS active	ABS operating	ON
	ABS not operating	OFF
ESP® active	ESP® operating	ON
	ESP® not operating	OFF

Scan Tool Data Definitions

S5JB0E3314010

Vehicle Speed (KM/H, MPH):

This parameter indicates vehicle speed calculated by 4WD control module.

Actuator Pos Sen (Transfer shift actuator motor position switch) (4H / 4H-lock / 4L-lock / N / 4H-lock-4H / 4H-N / N-4L-lock):

This parameter indicates transfer shift actuator motor position switch status detected by 4WD control module.

Actuator motor Pos (Transfer shift actuator motor position) (4H / 4H-lock / 4L-lock / N):

This parameter indicates transfer shift actuator motor position detected by 4WD control module using transfer shift actuator motor position.

Battery voltage (V):

This parameter indicates battery voltage detected by 4WD control module.

4L / N switch (ON / OFF):

This parameter indicates 4L / N switch status detected by 4WD control module.

Center diff lock Sw (ON / OFF):

This parameter indicates center differential lock switch status detected by 4WD control module.

N range signal (AT) (ON / OFF):

This parameter indicates A/T shift position (“N” range or not) detected by 4WD control module.

CPP switch (Clutch pedal position switch) (MT) (ON / OFF):

This parameter indicates clutch pedal position switch status detected by 4WD control module using CPP switch.

Mode switch 1 (Transfer switch) (ON / OFF):

ON: Transfer switch to N position.

OFF: Transfer switch to other than N position.

Mode switch 2 (Transfer switch) (ON / OFF):

ON: Transfer switch to other than 4L-lock position.

OFF: Transfer switch to 4L-lock position.

3C-23 Transfer: Motor-Shift Type (Transfer with Shift Actuator)

Mode switch 3 (Transfer switch) (ON / OFF):

ON: Transfer switch to 4H-lock or 4L-lock position.

OFF: Transfer switch to 4H or N position.

Warning buzzer (OFF / N Pos / Error):

This parameter indicates if buzzer is being commanded by 4WD control module.

ABS active (ON / OFF):

This parameter indicates ABS status detected by 4WD control module.

ESP® active (ON / OFF):

This parameter indicates ESP® status detected by 4WD control module.

4WD Control Symptom Diagnosis

S5JB0E3314011

Diagnose transfer assembly after performing the following inspections.

- 1) Perform 4WD control system check referring to “4WD Control System Check: Motor-Shift Type (Transfer with Shift Actuator)”.
- 2) Confirm 4WD control system operation referring to “4WD Control System Operation: Motor-Shift Type (Transfer with Shift Actuator)”

Condition	Possible cause	Correction / Reference Item
Transfer does not operate (Transfer position indicator does not operate)	Transfer switch faulty	Check switch referring to “Transfer Switch Inspection: Motor-Shift Type (Transfer with Shift Actuator)”.
	Transfer shift actuator faulty	Check transfer shift actuator referring to “Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)”.
	4L/N switch and/or switch center differential lock switch faulty	Check switch referring to “Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)”.
	Transmission range sensor (“N” range) faulty (for A/T model)	Adjust or check transmission range sensor referring to “Transmission Range Sensor Inspection and Adjustment: in Section 5A in related manual”.
	CPP switch faulty (for M/T model)	Check CPP switch referring to “Clutch Pedal Position (CPP) Switch Inspection and Adjustment: in Section 5C in related manual”.
	Wiring or grounding faulty	Repair as necessary.
	4WD control module faulty	Check 4WD control module referring to “Inspection of 4WD Control Module and Its Circuits: Motor-Shift Type (Transfer with Shift Actuator)”.
Transfer refuses to operate (Transfer position indicator flashes, and then transfer does not shift)	Transfer shift actuator faulty	Check transfer shift actuator referring to “Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)”.
	4L/N switch and/or center differential lock switch faulty	Check switch referring to “Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)”.
	Distorted control cover shift shaft or shift fork	Check shift fork referring to “Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)”.
	Weakened control cover shift shaft spring	Check spring referring to “Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)”.
	Distorted or dispositioned control cover shift shaft snap ring and washer	Check snap ring and washer referring to “Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)”.
	Worn chamfered tooth on sleeve or gear	Check chamfered tooth and gear referring to “Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)”.
	Wiring or grounding faulty	Repair as necessary.
	4WD control module faulty	Check 4WD control module referring to “Inspection of 4WD Control Module and Its Circuits: Motor-Shift Type (Transfer with Shift Actuator)”.

Condition	Possible cause	Correction / Reference Item
Gear slipping out of mesh	Worn control cover shift shaft	Check control cover shift shaft referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)".
	Worn shift fork or sleeve	Check shift fork or sleeve referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)".
	Weak or damaged control cover shift shaft spring	Check spring referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)".
	Worn bearings on input gear or counter gear	Check bearing referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)".
	Worn chamfered tooth on sleeve or gear	Check sleeve and gear referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)".
	Missing or disengagement of circlip(s)	Check circlip(s) referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)".
Noise	Damaged or worn bearing(s)	Refer to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)".
	Damaged or worn gear(s)	Refer to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)".
	Damaged or worn chamfered tooth on sleeve or gear	Refer to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)".

Transfer position indicator operates according to the signal from 4WD control module. If the transfer control system is in good condition, transfer position indicator light up for 2 seconds when ignition switch is turned to ON position, and then turned to OFF position. If an abnormality is detected in the system, transfer position indicator remains lighting.

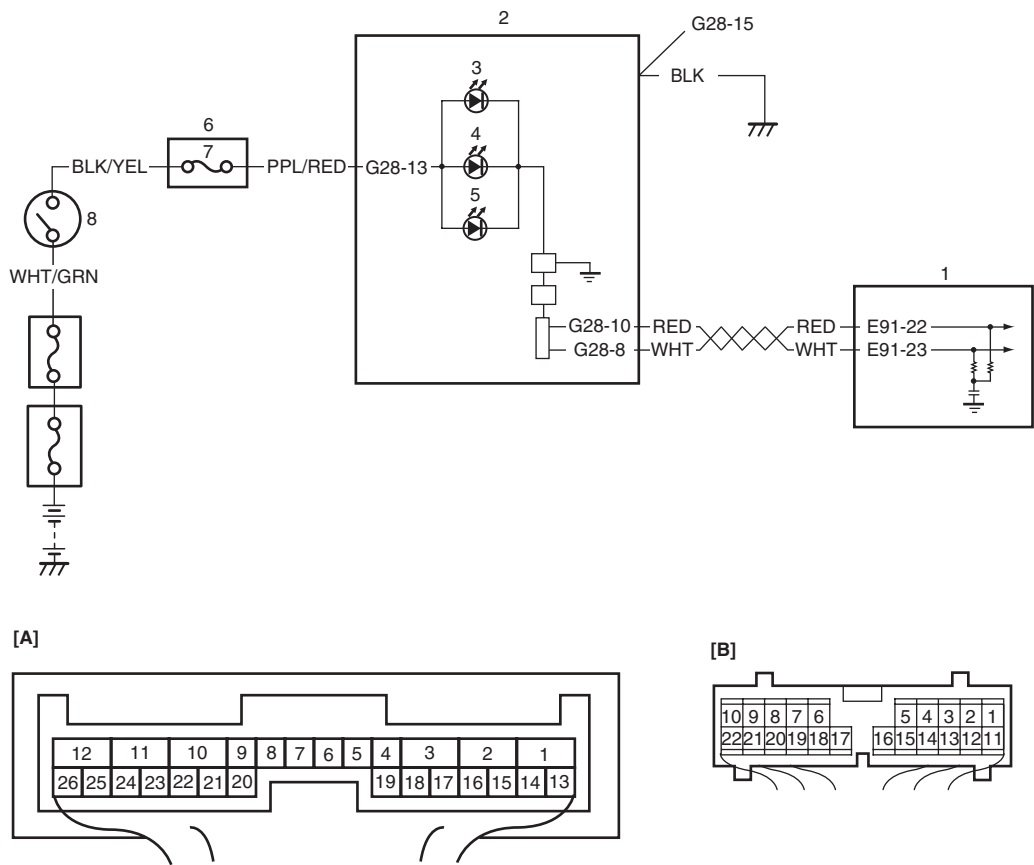
Troubleshooting

Step	Action	Yes	No
1	Transfer position indicator power supply check 1) Turn ignition switch to ON position. <i>Do other indicators come ON?</i>	Go to Step 2.	Go to Step 3.
2	Check DTC 1) Connect scan tool to DLC with ignition switch OFF. 2) Turn ignition switch to ON position and check DTC. <i>Is there DTC(s) U1073, U1100, U1101 and/or U1121?</i>	Go to applicable DTC diag. flow.	Substitute a known-good combination meter and recheck. If transfer position indicator still remains off, substitute a known-good 4WD control module and recheck.
3	CAN communication circuit check 1) Check CAN communication circuit between combination meter and 4WD control module referring to "DTC U1073: Control Module Communication Bus Off: Motor-Shift Type (Transfer with Shift Actuator)". <i>Is CAN communication circuit in good condition?</i>	Go to Step 4.	Repair or replace.
4	"METER" fuse check 1) Turn ignition switch to OFF position. 2) Check for fuse blown to "METER" fuse in junction block assembly. <i>Is "METER" fuse in good condition?</i>	Go to Step 5.	Replace "METER" fuse and check for short.
5	Combination meter power supply check 1) Remove combination meter referring to "Combination Meter Removal and Installation: in Section 9C in related manual". 2) Check proper connection to combination meter connector at "G28-13" and "G28-15" terminals. 3) If OK, then turn ignition switch to ON position and measure voltage between combination meter connector at "G28-13" terminal and vehicle body ground. <i>Is it 10 – 14 V?</i>	Go to Step 6.	"PPL/RED" wire is open circuit.
6	Combination meter ground circuit check 1) Turn ignition switch to OFF position. 2) Measure resistance between combination meter connector at "G28-15" terminal and vehicle body ground. <i>Is resistance 1 Ω or less?</i>	Substitute a known-good combination meter and recheck. If transfer position indicator still remains OFF, substitute a known-good 4WD control module and recheck.	"BLK" wire is open or high resistance circuit.

Transfer Position Indicator Remains ON Steady at Ignition Switch ON

S5JB0E3314013

Wiring Diagram



15JB0A332015-03

[A]: 4WD control module connector "E91" (viewed from harness side)	4. 4L indicator
[B]: Combination meter connector (viewed from harness side)	5. N indicator
1. 4WD control module	6. Junction block assembly
2. Combination meter	7. "METER" fuse
3. Differential lock indicator	8. Ignition switch

Circuit Description

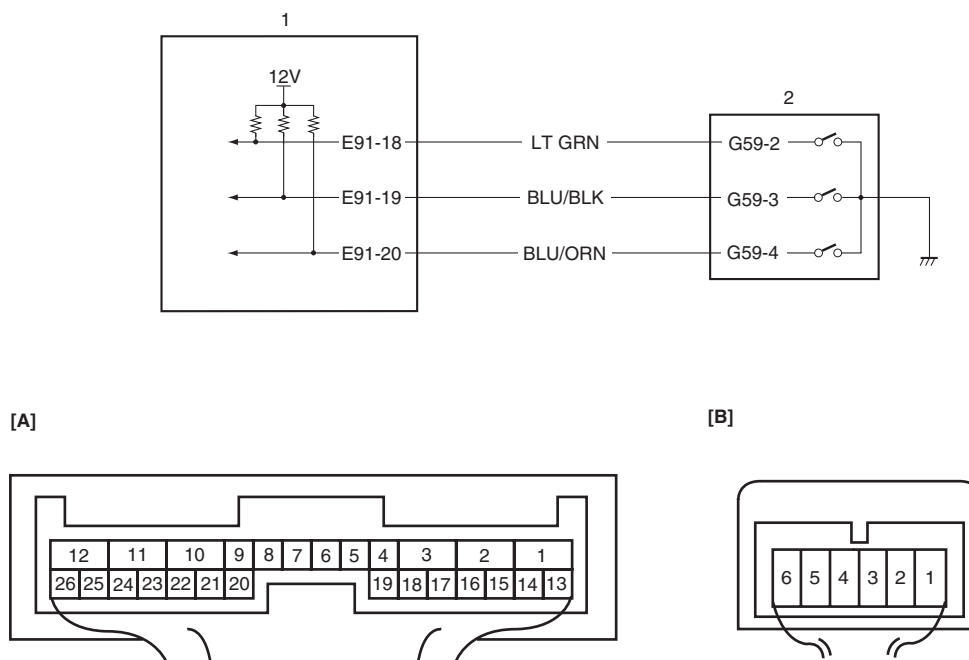
Transfer position indicator operates according to the signal from 4WD control module. If the transfer control system is in good condition, transfer position indicator light up for 2 seconds when ignition switch is turned to ON position, and then turned to OFF position. If an abnormality is detected in the system, transfer position indicator remains lighting.

Troubleshooting

Step	Action	Yes	No
1	Check DTC 1) Check DTC referring to "DTC Check: Motor-Shift Type (Transfer with Shift Actuator)". <i>Is there any DTC(s)?</i>	Perform DTC flow to repair and retry.	Go to Step 2.
2	CAN communication circuit check 1) Check CAN communication circuit between combination meter and 4WD control module referring to "DTC U1073: Control Module Communication Bus Off: Motor-Shift Type (Transfer with Shift Actuator)". <i>Is CAN communication circuit in good condition?</i>	Substitute a known-good combination meter and recheck. If transfer position indicator still remains off, substitute a known-good 4WD control module and recheck.	Repair or replace.

DTC C1213: Transfer Switch Circuit Open

S5JB0E3314014

Wiring Diagram

I5JB0A332016-01

[A]: 4WD control module connector "E91" (viewed from harness side)	1. 4WD control module
[B]: Transfer switch connector "G59" (viewed from harness side)	2. Transfer switch

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Transfer switch combination different from specification is detected for more than 0.5 seconds.	- Transfer switch - Transfer switch circuit 4WD control module

DTC Confirmation Procedure

- 1) Clear DTC using scan tool.
- 2) Select transfer switch to "4H" position and keep its position for 10 seconds. Similarly select transfer switch to "4H-lock", "N" and "4L-lock" position.
- 3) Check DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "4WD control system check" performed?	Go to Step 2.	Go to "4WD Control System Check: Motor-Shift Type (Transfer with Shift Actuator)".
2	Transfer switch circuit check 1) Disconnect transfer switch connector "G59" with ignition switch OFF. 2) Check for proper connection to "G59-2", "G59-3" and "G59-4" terminals of transfer switch connector. 3) If connection is OK, measure voltage between "G59-2", "G59-3" or "G59-4" terminal of transfer switch connector and vehicle body ground with ignition switch ON. Is it 10 – 14 V?	Go to Step 3.	Go to Step 4.

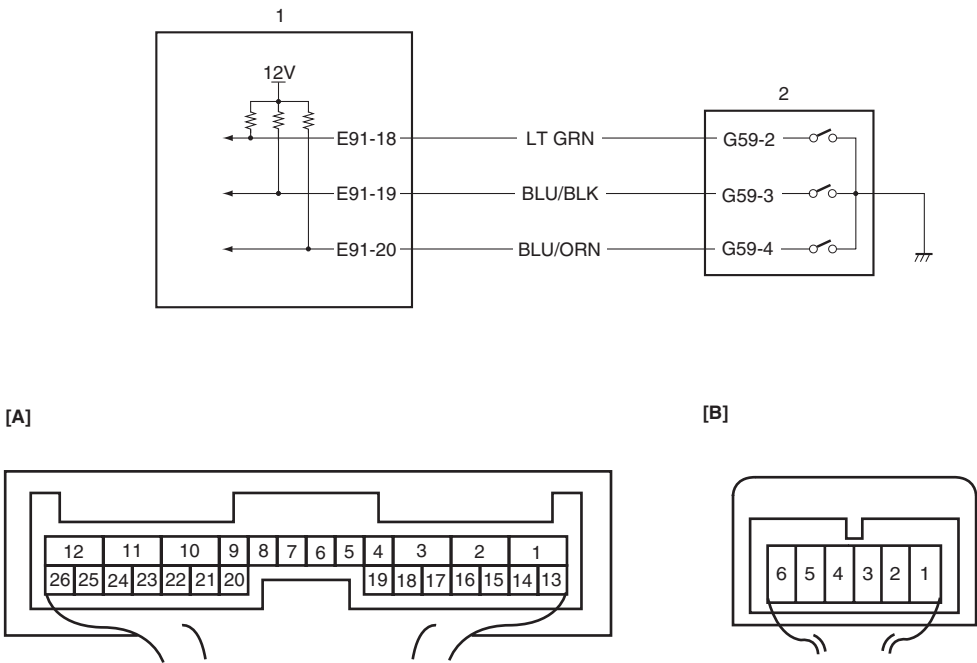
3C-29 Transfer: Motor-Shift Type (Transfer with Shift Actuator)

Step	Action	Yes	No
3	Transfer switch check 1) Check transfer switch referring to “Transfer Switch Inspection: Motor-Shift Type (Transfer with Shift Actuator)”. <i>Is switch in good condition?</i>	Substitute a known-good 4WD control module and recheck.	Replace transfer switch.
4	Wire harness check 1) Disconnect connector from 4WD control module connector “E91” with ignition switch OFF. 2) Check for open and high resistance in related circuits. - Between “G59-2” terminal of transfer switch connector and “E91-18” terminal of 4WD control module connector - Between “G59-3” terminal of transfer switch connector and “E91-19” terminal of 4WD control module connector - Between “G59-4” terminal of transfer switch connector and “E91-20” terminal of 4WD control module connector <i>Are they in good condition?</i>	Substitute a known-good 4WD control module and recheck.	Repair circuit.

DTC C1214: Transfer Switch Circuit Short

S5JB0E3314015

Wiring Diagram



I5JB0A332016-01

[A]: 4WD control module connector “E91” (viewed from harness side)	1. 4WD control module
[B]: Transfer switch connector “G59” (viewed from harness side)	2. Transfer switch

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Transfer switch combination different from specification is detected for more than 0.5 seconds.	• Transfer switch • Transfer switch circuit • 4WD control module

DTC Confirmation Procedure

- 1) Clear DTC using scan tool.
- 2) Select transfer switch to "4H" position and keep its position for 10 seconds. Similarly select transfer switch to "4H-lock", "N" and "4L-lock" position.
- 3) Check DTC.

Troubleshooting

Step	Action	Yes	No
1	<i>Was "4WD control system check" performed?</i>	Go to Step 2.	Go to "4WD Control System Check: Motor-Shift Type (Transfer with Shift Actuator)".
2	Transfer switch circuit check 1) Disconnect transfer switch connector "G59" with ignition switch OFF. 2) Check for proper connection to "G59-2", "G59-3" and "G59-4" terminals of transfer switch connector. 3) If connection is OK, measure voltage between "G59-2", "G59-3" or "G59-4" terminal of transfer switch connector and vehicle body ground with ignition switch ON. <i>Is it 10 – 14 V?</i>	Go to Step 3.	Go to Step 4.
3	Transfer switch check 1) Check transfer switch referring to "Transfer Switch Inspection: Motor-Shift Type (Transfer with Shift Actuator)". <i>Is switch in good condition?</i>	Substitute a known-good 4WD control module and recheck.	Replace transfer switch.
4	Wire harness check 1) Disconnect connector from 4WD control module connector "E91" with ignition switch OFF. 2) Check for shorted to ground in related circuits. • Between "G59-2" terminal of transfer switch connector and "E91-18" terminal of 4WD control module connector • Between "G59-3" terminal of transfer switch connector and "E91-19" terminal of 4WD control module connector • Between "G59-4" terminal of transfer switch connector and "E91-20" terminal of 4WD control module connector <i>Are they in good condition?</i>	Substitute a known-good 4WD control module and recheck.	Repair circuit.

- 1) Clear DTC using scan tool.
- 2) Select transfer switch to “4H” position and keep its position for 10 seconds. Similarly select transfer switch to “4H-lock”, “N” and “4L-lock” position.
- 3) Check DTC.

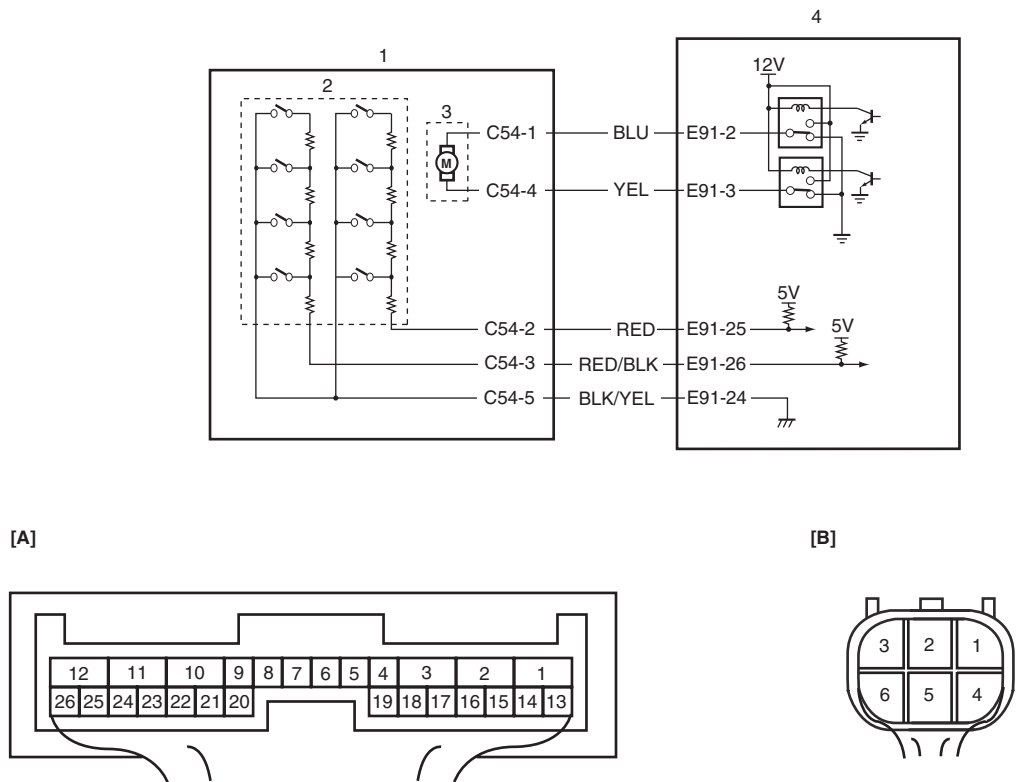
Troubleshooting

Step	Action	Yes	No
1	Was "4WD control system check" performed?	Go to Step 2.	Go to "4WD Control System Check: Motor-Shift Type (Transfer with Shift Actuator)".
2	Transfer shift actuator motor position switch circuit check 1) Disconnect transfer shift actuator connector "C54" with ignition switch OFF. 2) Check for proper connection to "C54-2", "C54-3" and "C54-5" terminals of transfer shift actuator connector. 3) If connection is OK, measure voltage between "G54-2", "G54-3" or "G54-5" terminal of transfer switch connector and vehicle body ground with ignition switch ON. <i>Is it approx. 5 V?</i>	Go to Step 3.	Go to Step 4.
3	Transfer shift actuator position switch check 1) Check transfer shift actuator position switch referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)". <i>Is actuator in good condition?</i>	Substitute a known-good 4WD control module and recheck.	Faulty actuator position switch. Replace transfer shift actuator.
4	Wire harness check 1) Disconnect connector from 4WD control module connector "E91" with ignition switch OFF. 2) Check for open and high resistance in related circuits. - Between "C54-2" terminal of transfer shift actuator connector and "E91-25" terminal of 4WD control module connector - Between "C54-3" terminal of transfer shift actuator connector and "E91-26" terminal of 4WD control module connector - Between "C54-5" terminal of transfer shift actuator connector and "E91-24" terminal of 4WD control module connector <i>Are they it in good condition?</i>	Substitute a known-good 4WD control module and recheck.	Repair circuit.

DTC C1224 / C1236: Transfer Shift Actuator Motor Position Switch 1 Circuit Short / Transfer Shift Actuator Motor Position Switch 2 Circuit Short

S5JB0E3314017

Wiring Diagram



I5JB0A332017-01

[A]: 4WD control module connector "E91" (viewed from harness side)	2. Transfer shift actuator motor position switch
[B]: Transfer shift actuator connector "C54" (engine harness side) (viewed from harness side)	3. Transfer shift actuator motor
1. Transfer shift actuator	4. 4WD control module

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Transfer shift actuator motor position switch signal voltage 0.6 V or less.	- Transfer shift actuator motor position switch - Transfer shift actuator motor position switch circuit 4WD control module

DTC Confirmation Procedure

- 1) Clear DTC using scan tool.
- 2) Select transfer switch to "4H" position and keep its position for 10 seconds. Similarly select transfer switch to "4H-lock", "N" and "4L-lock" position.
- 3) Check DTC.

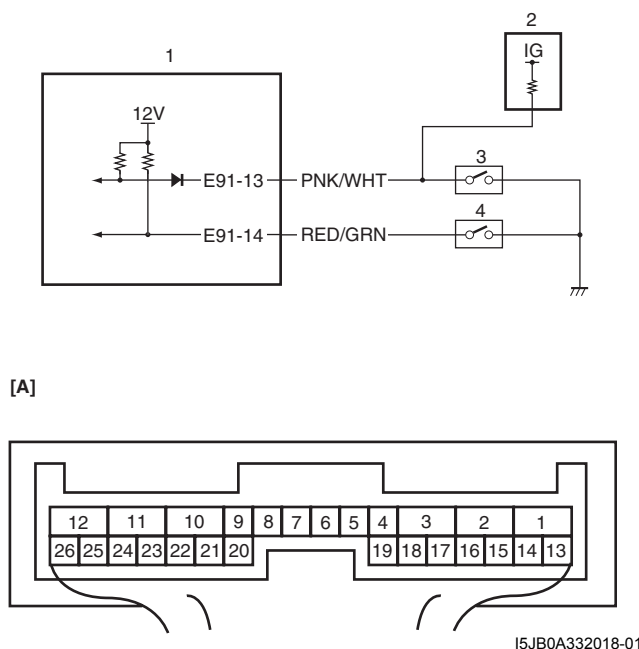
Troubleshooting

Step	Action	Yes	No
1	Was "4WD control system check" performed?	Go to Step 2.	Go to "4WD Control System Check: Motor-Shift Type (Transfer with Shift Actuator)".
2	Transfer shift actuator motor position switch circuit check 1) Disconnect transfer shift actuator connector "C54" with ignition switch OFF. 2) Check for proper connection to "C54-2", "C54-3" and "C54-5" terminals of transfer shift actuator connector. 3) If connection is OK, measure voltage between "G54-2", "G54-3" or "G54-5" terminal of transfer switch connector and vehicle body ground with ignition switch ON. <i>Is it approx. 5 V?</i>	Go to Step 3.	Go to Step 4.
3	Transfer shift actuator position switch check 1) Check transfer shift actuator position switch referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)". <i>Is actuator in good condition?</i>	Substitute a known-good 4WD control module and recheck.	Faulty actuator position switch. Replace transfer shift actuator.
4	Wire harness check 1) Disconnect connector from 4WD control module connector "E91" with ignition switch OFF. 2) Check for shorted to ground in related circuits. - Between "C54-2" terminal of transfer shift actuator connector and "E91-25" terminal of 4WD control module connector - Between "C54-3" terminal of transfer shift actuator connector and "E91-26" terminal of 4WD control module connector - Between "C54-5" terminal of transfer shift actuator connector and "E91-24" terminal of 4WD control module connector <i>Are they in good condition?</i>	Substitute a known-good 4WD control module and recheck.	Repair circuit.

DTC C1227: 4L/N Switch Circuit Open

S5JB0E3314018

Wiring Diagram



[A]: 4WD control module connector "E91" (viewed from harness side)		3. 4L/N switch
1. 4WD control module		4. Center differential lock switch
2. TCM		

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Though transfer shift actuator motor position switch is "4L-lock" position, the ON signal is not input from the 4L/N switch.	4L/N switch 4L/N switch circuit 4WD control module

DTC Confirmation Procedure

- 1) Clear DTC using scan tool.
- 2) Select transfer switch to "4L-lock" position and keep its position for 1 min.
- 3) Check DTC.

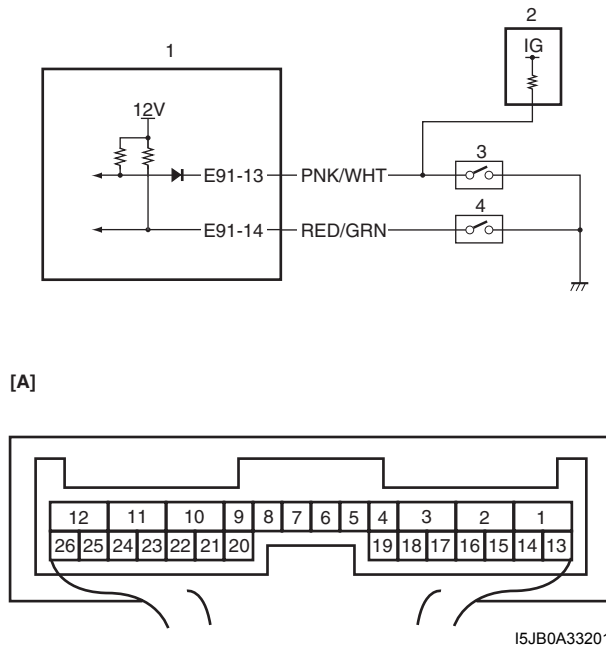
Troubleshooting

Step	Action	Yes	No
1	Was "4WD control system check" performed?	Go to Step 2.	Go to "4WD Control System Check: Motor-Shift Type (Transfer with Shift Actuator)".
2	4L/N switch circuit check 1) Disconnect 4L/N switch connector with ignition switch OFF. 2) Check for proper connection to terminal of 4L/N switch connector. 3) If connection is OK, measure voltage between "PNK/WHT" terminal of 4L/N switch connector and vehicle body ground with ignition switch ON. Is it 10 – 14 V?	Go to Step 3.	Go to Step 4.

Step	Action	Yes	No
3	4L/N switch check 1) Check 4L/N switch referring to “Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)”. <i>Is switch in good condition?</i>	Substitute a known-good 4WD control module and recheck.	Replace 4L/N switch.
4	Wire harness check 1) Disconnect connector from 4WD control module connector “E91” with ignition switch OFF. 2) Check for proper connection to “E91-13” terminal of 4WD control module connector. 3) If OK, measure resistance between “PNK/WHT” terminal of 4L/N switch connector and “E91-13” terminal of 4WD control module connector. <i>Is it 1 Ω or less?</i>	Substitute a known-good 4WD control module and recheck.	“PNK/WHT” wire is open or high resistance.

DTC C1228: 4L/N Switch Circuit Short

S5JB0E3314019

Wiring Diagram

[A]: 4WD control module connector “E91” (viewed from harness side)	3. 4L/N switch
1. 4WD control module	4. Center differential lock switch
2. TCM	

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Though transfer shift actuator motor position switch is “4L-lock” position, the OFF signal is not input from the 4L/N switch.	• 4L/N switch • 4L/N switch circuit • 4WD control module

DTC Confirmation Procedure

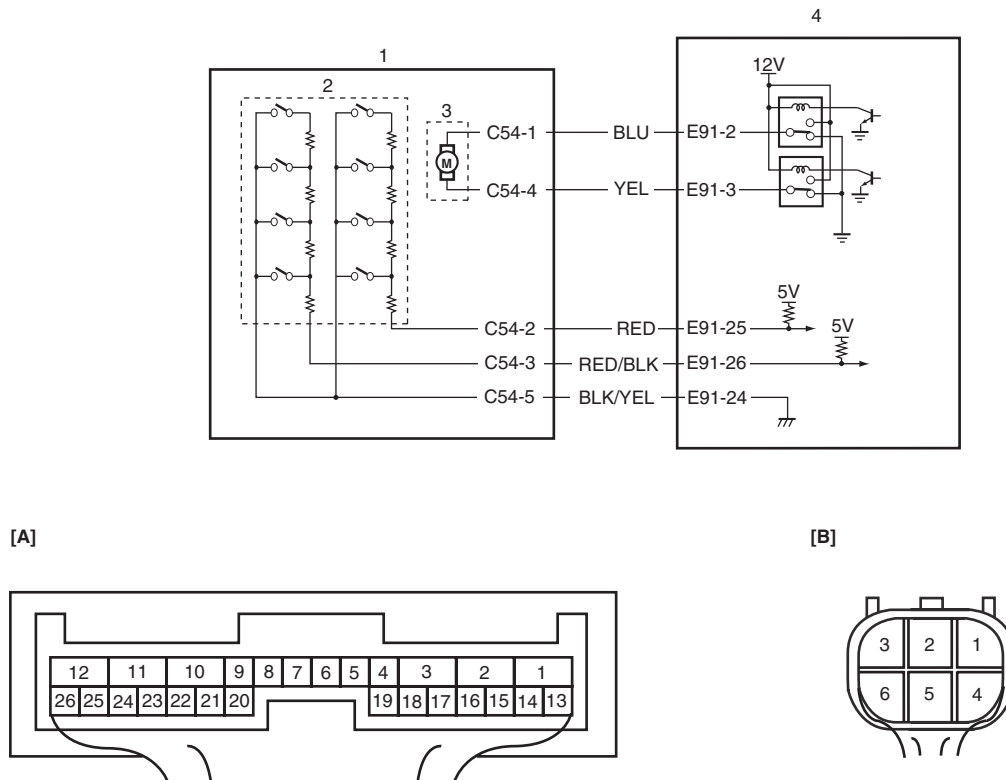
- 1) Clear DTC using scan tool.
- 2) Select transfer switch to “4L-lock” position and keep its position for 1 min.
- 3) Check DTC.

3C-37 Transfer: Motor-Shift Type (Transfer with Shift Actuator)**Troubleshooting**

Step	Action	Yes	No
1	Was "4WD control system check" performed?	Go to Step 2.	Go to "4WD Control System Check: Motor-Shift Type (Transfer with Shift Actuator)".
2	4L/N switch circuit check 1) Disconnect 4L/N switch connector with ignition switch OFF. 2) Check for proper connection to terminal of 4L/N switch connector. 3) If connection is OK, measure voltage between "PNK/WHT" terminal of 4L/N switch connector and vehicle body ground with ignition switch ON. <i>Is it 10 – 14 V?</i>	Go to Step 3.	Go to Step 4.
3	4L/N switch check 1) Check 4L/N switch referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)". <i>Is switch in good condition?</i>	Substitute a known-good 4WD control module and recheck.	Replace 4L/N switch.
4	Wire harness check 1) Disconnect connector from 4WD control module connector "E91" with ignition switch OFF. 2) Check for proper connection to "E91-13" terminal of 4WD control module connector. 3) If OK, measure resistance between "PNK/WHT" terminal of 4L/N switch connector and "E91-13" terminal of 4WD control module connector. <i>Is it 1 MΩ or more?</i>	Substitute a known-good 4WD control module and recheck.	"PNK/WHT" wire is shorted to ground circuit.

DTC C1230: Transfer Actuator Circuit Malfunction

S5JB0E3314020

Wiring Diagram

I5JB0A332017-01

[A]: 4WD control module connector "E91" (viewed from harness side)	2. Transfer shift actuator motor position switch
[B]: Transfer shift actuator connector "C54" (engine harness side) (viewed from harness side)	3. Transfer shift actuator motor
1. Transfer shift actuator	4. 4WD control module

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Select transfer switch to each position, and then transfer shift actuator position switch is not changed for more than 3 seconds.	- Transfer shift actuator - Transfer shift actuator circuit 4WD control module

DTC Confirmation Procedure

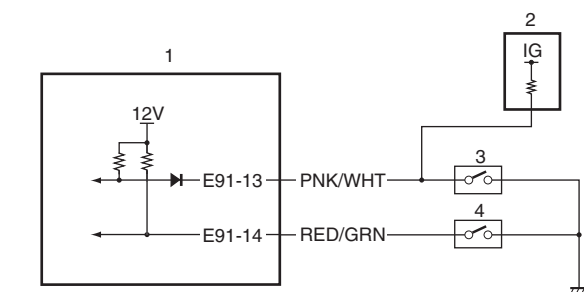
- 1) Clear DTC using scan tool.
- 2) Select transfer switch to "4H" position and keep its position for 10 seconds. Similarly select transfer switch to "4H-lock", "N" and "4L-lock" position.
- 3) Check DTC.

3C-39 Transfer: Motor-Shift Type (Transfer with Shift Actuator)**Troubleshooting**

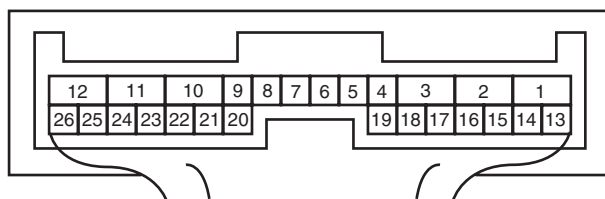
Step	Action	Yes	No
1	<i>Was "4WD control system check" performed?</i>	Go to Step 2.	Go to "4WD Control System Check: Motor-Shift Type (Transfer with Shift Actuator)".
2	Transfer shift actuator circuit check 1) Disconnect transfer shift actuator connector "C54" with ignition switch OFF. 2) Check for proper connection to "C54-1" and "C54-4" terminals of transfer shift actuator connector. 3) If connection is OK, measure voltage between "C54-1" or "C54-4" terminal of transfer shift actuator connector and vehicle body ground. <i>Is it 10 – 14 V?</i>	Go to Step 3.	Go to Step 4.
3	Transfer shift actuator check 1) Check transfer shift actuator referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)". <i>Is actuator in good condition?</i>	Substitute a known-good 4WD control module and recheck.	Replace transfer shift actuator.
4	Wire harness check 1) Disconnect connector from 4WD control module connector "E91" with ignition switch OFF. 2) Check for open and high resistance or shorted to ground in related circuits. • Between "C54-1" terminal of transfer shift actuator connector and "E91-22" terminal of 4WD control module connector • Between "C54-4" terminal of transfer shift actuator connector and "E91-3" terminal of 4WD control module connector <i>Are they in good condition?</i>	Substitute a known-good 4WD control module and recheck.	Repair circuit.

DTC C1237: Center Differential Lock Switch Circuit Open

S5JB0E3314021

Wiring Diagram

[A]



I5JB0A332018-01

[A]: 4WD control module connector "E91" (viewed from harness side)		3. 4L/N switch
1. 4WD control module		4. Center differential lock switch
2. TCM		

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Though transfer shift actuator motor position switch is "4H" position, the ON signal is not input from the center differential lock switch.	- Center differential lock switch - Center differential lock switch circuit 4WD control module

DTC Confirmation Procedure

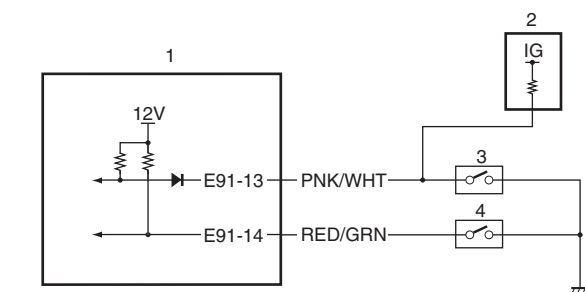
- 1) Clear DTC using scan tool.
- 2) Select transfer switch to "4H" position and keep its position for 1 min.
- 3) Check DTC.

3C-41 Transfer: Motor-Shift Type (Transfer with Shift Actuator)**Troubleshooting**

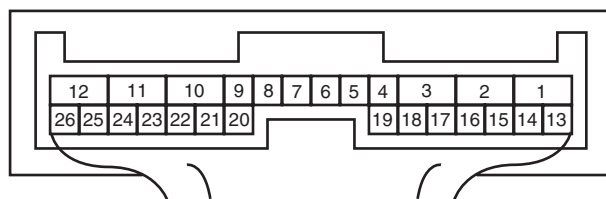
Step	Action	Yes	No
1	<i>Was "4WD control system check" performed?</i>	Go to Step 2.	Go to "4WD Control System Check: Motor-Shift Type (Transfer with Shift Actuator)".
2	Center differential lock switch circuit check 1) Disconnect center differential lock switch connector with ignition switch OFF. 2) Check for proper connection to terminal of center differential lock switch connector. 3) If connection is OK, measure voltage between "RED/GRN" terminal of center differential lock switch connector and vehicle body ground with ignition switch ON. <i>Is it 10 – 14 V?</i>	Go to Step 3.	Go to Step 4.
3	Center differential lock switch check 1) Check center differential lock switch referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)". <i>Is switch in good condition?</i>	Substitute a known-good 4WD control module and recheck.	Replace center differential lock switch.
4	Wire harness check 1) Disconnect connector from 4WD control module connector "E91" with ignition switch OFF. 2) Check for proper connection to "E91-14" terminal of 4WD control module connector. 3) If OK, measure resistance between "RED/GRN" terminal of center differential lock switch connector and "E91-14" terminal of 4WD control module connector. <i>Is it 1 Ω or less?</i>	Substitute a known-good 4WD control module and recheck.	"RED/GRN" wire is open or high resistance.

DTC C1238: Center Differential Lock Switch Circuit Short

S5JB0E3314022

Wiring Diagram

[A]



I5JB0A332018-01

[A]: 4WD control module connector "E91" (viewed from harness side)		3. 4L/N switch
1. 4WD control module		4. Center differential lock switch
2. TCM		

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Though transfer shift actuator motor position switch is "4L-lock" position, the OFF signal is not input from the center differential lock switch.	- Center differential lock switch - Center differential lock switch circuit 4WD control module

3C-43 Transfer: Motor-Shift Type (Transfer with Shift Actuator)

DTC Confirmation Procedure

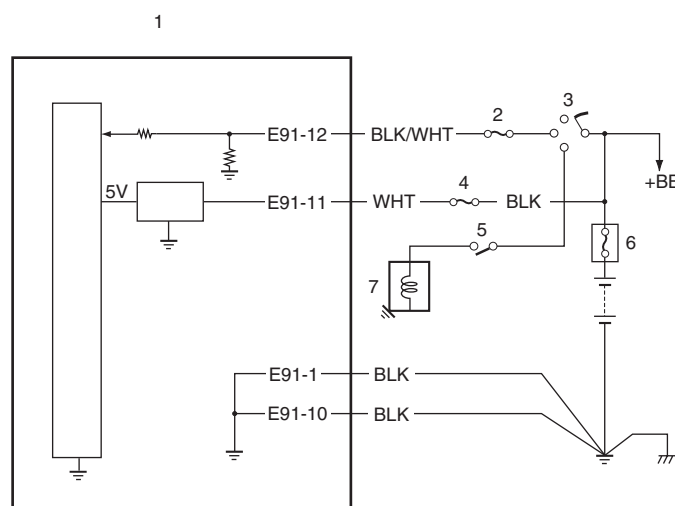
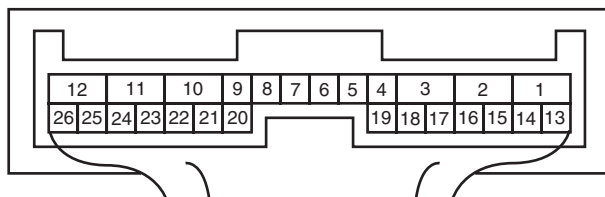
- 1) Clear DTC using scan tool.
- 2) Select transfer switch to "4L-lock" position and keep its position for 1 min.
- 3) Check DTC.

Troubleshooting

Step	Action	Yes	No
1	<i>Was "4WD control system check" performed?</i>	Go to Step 2.	Go to "4WD Control System Check: Motor-Shift Type (Transfer with Shift Actuator)".
2	Center differential lock switch circuit check 1) Disconnect center differential lock switch connector with ignition switch OFF. 2) Check for proper connection to terminal of center differential lock switch connector. 3) If connection is OK, measure voltage between "RED/GRN" terminal of center differential lock switch connector and vehicle body ground with ignition switch ON. <i>Is it 10 – 14 V?</i>	Go to Step 3.	Go to Step 4.
3	Center differential lock switch check 1) Check center differential lock switch referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)". <i>Is switch in good condition?</i>	Substitute a known-good 4WD control module and recheck.	Replace center differential lock switch.
4	Wire harness check 1) Disconnect connector from 4WD control module connector "E91" with ignition switch OFF. 2) Check for proper connection to "E91-14" terminal of 4WD control module connector. 3) If OK, measure resistance between "RED/GRN" terminal of center differential lock switch connector and "E91-14" terminal of 4WD control module connector. <i>Is it 1 MΩ or more?</i>	Substitute a known-good 4WD control module and recheck.	"RED/GRN" wire is shorted to ground circuit.

DTC C1240: 4WD Control Module Power Supply Circuit Malfunction

S5JB0E3314023

Wiring Diagram**[A]**

I5JB0A332019-01

[A]: 4WD control module connector "E91" (viewed from harness side)		4. "4WD" fuse
1. 4WD control module		5. Shift switch (for A/T model) or CPP switch (for M/T model)
2. "IG COIL" fuse		6. Main fuse box
3. Ignition switch		7. Starting motor

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
4WD control module power supply voltage is out of specification while vehicle is running at 20 km/h (12 mph) or more.	4WD control module power supply circuit

DTC Confirmation Procedure

- 1) Clear DTC using scan tool.
- 2) Start engine and drive vehicle at 30 km/h (19 mph) or more vehicle speed at least for 1 min.
- 3) Stop vehicle and check DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "4WD control system check" performed?	Go to Step 2.	Go to "4WD Control System Check: Motor-Shift Type (Transfer with Shift Actuator)".
2	4WD control module power circuit check 1) Disconnect 4WD control module connector with ignition switch OFF. 2) Check for proper connection to "E91" terminal of 4WD control module connector. 3) If connection is OK, measure voltage between "E91-11" terminal of 4WD control module connector and vehicle body ground with ignition switch ON. <i>Is it 10 – 14 V?</i>	Poor "E91-11" connection or intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual". If wire and connections are OK, substitute a known-good 4WD control module and recheck.	"4WD" fuse blown, "WHT" or "BLK" wire is circuit open or circuit short.

DTC C1243: Internal Circuit Malfunction of 4WD Control Module

S5JB0E3314024

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
EEPROM Error	• 4WD control module

DTC Confirmation Procedure

- 1) Clear DTC using scan tool.
- 2) Turn ignition switch to ON position for 60 seconds.
- 3) Check DTC.

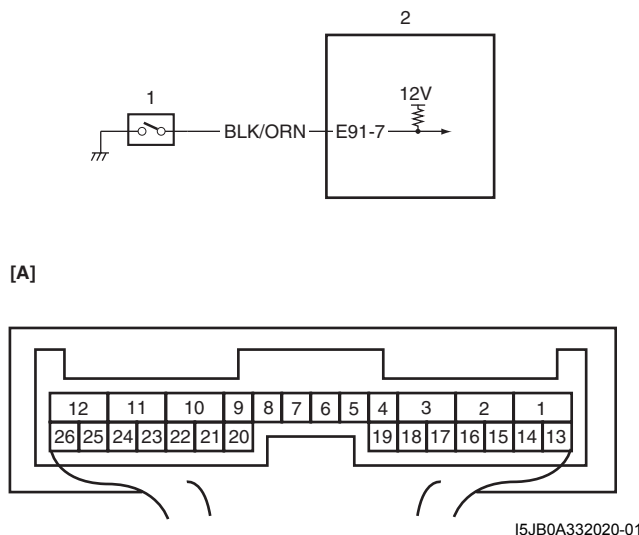
Troubleshooting

Substitute a known-good 4WD control module and recheck.

DTC C1246: Clutch Pedal Position (CPP) Switch Circuit Short

S5JB0E3314025

Wiring Diagram



[A]: 4WD control module connector "E91" (viewed from harness side)	2. 4WD control module
1. CPP switch	

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
CPP switch signal is input when vehicle speed is 30 km/h (19 mph).	• CPP switch • CPP switch circuit • 4WD control module

DTC Confirmation Procedure

- 1) Clear DTC using scan tool.
- 2) Start engine and drive vehicle at 50 km/h (31 mile/h) or more vehicle speed at least for 1 min.
- 3) Stop vehicle and check DTC.

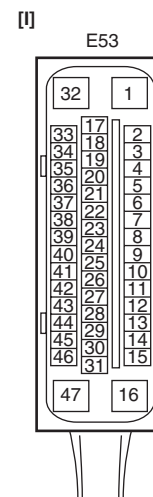
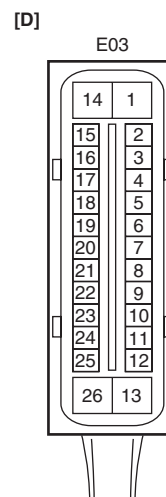
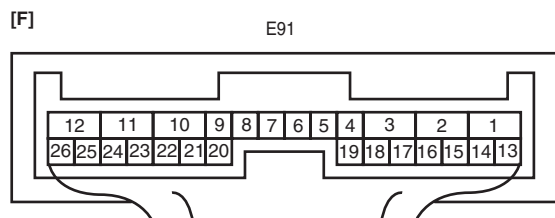
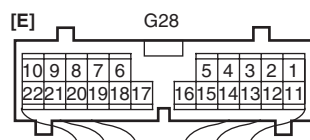
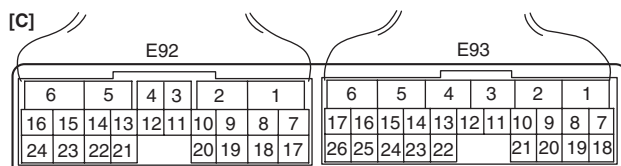
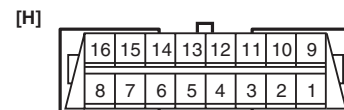
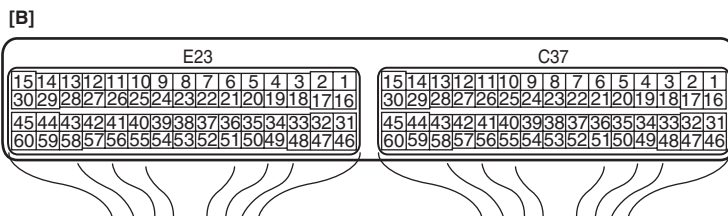
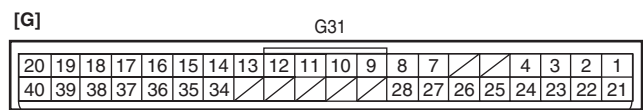
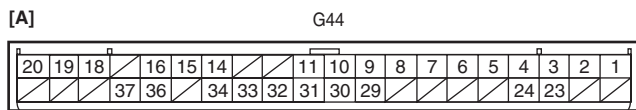
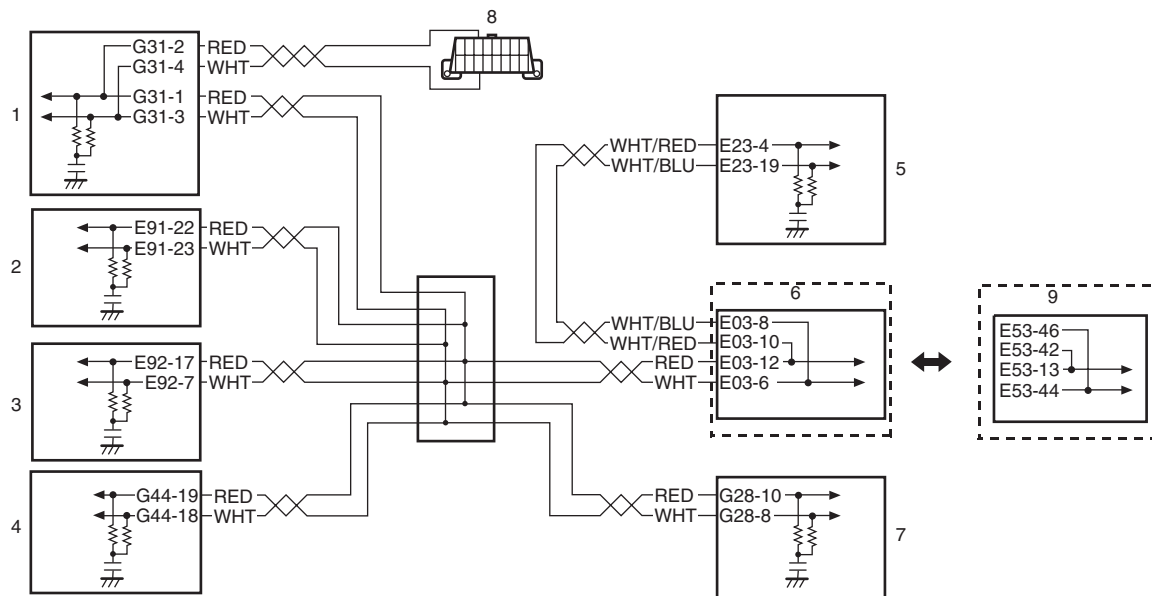
Troubleshooting

Step	Action	Yes	No
1	<i>Was "4WD control system check" performed?</i>	Go to Step 2.	Go to "4WD Control System Check: Motor-Shift Type (Transfer with Shift Actuator)".
2	CPP switch circuit check 1) Disconnect CPP switch connector with ignition switch OFF. 2) Check for proper connection to terminal of CPP switch connector. 3) If connection is OK, measure voltage between "BLK/ORN" terminal of CPP switch connector and vehicle body ground with ignition switch ON. <i>Is it 10 – 14 V?</i>	Go to Step 3.	Go to Step 4.
3	CPP switch check 1) Check CPP switch referring to "Clutch Pedal Position (CPP) Switch Inspection and Adjustment: in Section 5C in related manual". <i>Is switch in good condition?</i>	Substitute a known-good 4WD control module and recheck.	Replace CPP switch.
4	Wire harness check 1) Disconnect connector from 4WD control module connector "E91" with ignition switch OFF. 2) Check for proper connection to "E91-7" terminal of 4WD control module connector. 3) If OK, measure resistance between "BLK/ORN" terminal of CPP switch connector and "E91-7" terminal of 4WD control module connector. <i>Is it 1 MΩ or more?</i>	Substitute a known-good 4WD control module and recheck.	"BLK/ORN" wire is shorted to ground circuit.

DTC U1073: Control Module Communication Bus Off

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Wiring Diagram



[A]: Keyless start control module connector (if equipped) (viewed from harness side)	1. BCM
[B]: ECM connector (viewed from harness side)	2. 4WD control module
[C]: TCM connector (for A/T model) (viewed from harness side)	3. TCM (for A/T model)
[D]: ABS hydraulic unit / control module connector (viewed from terminal side)	4. Keyless start control module (if equipped)
[E]: Combination meter connector (viewed from harness side)	5. ECM
[F]: 4WD control module connector (viewed from harness side)	6. ABS hydraulic unit / control module (if equipped)
[G]: BCM connector (viewed from harness side)	7. Combination meter
[H]: DLC (viewed from harness side)	8. DLC
[I]: ESP® hydraulic unit / control module connector (viewed from terminal side)	9. ESP® hydraulic unit / control module (if equipped)

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Transmission error of communication data for 4WD control module is detected more than 7 times at more than specified error counts continuously.	• CAN communication circuit • ECM • BCM • 4WD control module • TCM • Combination meter • Keyless start control module (if equipped) • ABS or ESP® hydraulic unit / control module

DTC Confirmation Procedure

- 1) Clear DTC using scan tool.
- 2) Start engine and run it for 1 min. or more.
- 3) Stop vehicle and check DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "4WD control system check" performed?	Go to Step 2.	Go to "4WD Control System Check: Motor-Shift Type (Transfer with Shift Actuator)".
2	Control module connector check 1) Check connection of connectors of all control modules communicating by means of CAN. 2) Recheck DTC in TCM. <i>Is DTC U1073 detected?</i>	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
3	CAN communication circuit check 1) Turn ignition switch to OFF position. 2) Disconnect connectors of all control modules communicating by means of CAN. 3) Check CAN communication circuit between control modules for open, short and high resistance. <i>Is each CAN communication circuit in good condition?</i>	Go to Step 4.	Repair circuit.
4	Check DTC 1) Turn ignition switch to OFF position. 2) Disconnect each connector. • ECM • ABS or ESP® hydraulic unit / control module • BCM • TCM (if equipped) • Keyless start control module (if equipped) 3) Recheck DTC in 4WD control module. <i>Is DTC U1073 detected?</i>	Check 4WD control module power and ground circuit. If circuits are OK, substitute a known-good 4WD control module and recheck.	Check applicable control module power and ground circuit. If circuit is OK, substitute a known-good applicable control module and recheck.

DTC U1100: Lost Communication with ECM**Wiring Diagram**

Refer to "DTC U1073: Control Module Communication Bus Off: Motor-Shift Type (Transfer with Shift Actuator)".

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Reception error of communication data for ECM is detected for longer than specified time continuously.	• CAN communication circuit • ABS or ESP® hydraulic unit / control module • ECM • 4WD control module

DTC Confirmation Procedure

- 1) Clear DTC using scan tool.
- 2) Start engine and run it for 1 min. or more.
- 3) Stop vehicle and check DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "4WD control system check" performed?	Go to Step 2.	Go to "4WD Control System Check: Motor-Shift Type (Transfer with Shift Actuator)".
2	DTC check 1) Check DTC in 4WD control module. <i>Is DTC U1100 and DTC U1073 detected together?</i>	Go to "DTC U1073: Control Module Communication Bus Off: Motor-Shift Type (Transfer with Shift Actuator)".	Go to Step 3.
3	DTC check 1) Check DTC in ECM. <i>Is DTC P1674 detected?</i>	Go to "DTC P1674: CAN Communication (Bus Off Error): in Section 1A".	Go to Step 4.
4	Check each control module connectors 1) Check connection of connectors of all control modules communicating by means of CAN. 2) Recheck in 4WD control module. <i>Is DTC U1100 detected?</i>	Go to Step 5.	NO Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
5	CAN communication circuit check 1) Turn ignition switch to OFF position. 2) Disconnect connectors of all control modules communicating by means of CAN. 3) Check CAN communication circuit between control modules for open, short and high resistance. <i>Is each CAN communication circuit in good condition?</i>	Check ECM power and ground circuit. If circuit is OK, substitute a known-good ECM and recheck.	Repair circuit.

DTC U1101: Lost Communication with TCM**Wiring Diagram**

Refer to "DTC U1073: Control Module Communication Bus Off: Motor-Shift Type (Transfer with Shift Actuator)".

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Reception error of communication data for TCM is detected for longer than specified time continuously.	- CAN communication circuit - TCM 4WD control module

DTC Confirmation Procedure

- 1) Clear DTC using scan tool.
- 2) Start engine and run it for 1 min. or more.
- 3) Stop vehicle and check DTC.

Troubleshooting

Step	Action	Yes	No
1	<i>Was "4WD control system check" performed?</i>	Go to Step 2.	Go to "4WD Control System Check: Motor-Shift Type (Transfer with Shift Actuator)".
2	DTC check 1) Check DTC in 4WD control module. <i>Is DTC U1100 and DTC U1073 detected together?</i>	Go to "DTC U1073: Control Module Communication Bus Off: Motor-Shift Type (Transfer with Shift Actuator)".	Go to Step 3.
3	DTC check 1) Check DTC in TCM. <i>Is DTC P1774 detected?</i>	Go to "DTC P1774: CAN Communication Bus Off: in Section 5A".	Go to Step 4.
4	Check each control module connectors 1) Check connection of connectors of all control modules communicating by means of CAN. 2) Recheck in 4WD control module. <i>Is DTC U1100 detected?</i>	Go to Step 5.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
5	CAN communication circuit check 1) Turn ignition switch to OFF position. 2) Disconnect connectors of all control modules communicating by means of CAN. 3) Check CAN communication circuit between control modules for open, short and high resistance. <i>Is each CAN communication circuit in good condition?</i>	Check TCM power and ground circuit. If circuit is OK, substitute a known-good TCM and recheck.	Repair circuit.

DTC U1121: Lost Communication with ABS / Electronic Stability Program Hydraulic Unit / Control Module

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Wiring Diagram

Refer to "DTC U1073: Control Module Communication Bus Off: Motor-Shift Type (Transfer with Shift Actuator)".

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Reception error of communication data for ABS or ESP® hydraulic unit / control module is detected for longer than specified time continuously.	- CAN communication circuit - ABS or ESP® hydraulic unit / control module 4WD control module

DTC Confirmation Procedure

- 1) Clear DTC using scan tool.
- 2) Start engine and run it for 1 min. or more.
- 3) Stop vehicle and check DTC.

Troubleshooting

Step	Action	Yes	No
1	Was "4WD control system check" performed?	Go to Step 2.	Go to "4WD Control System Check: Motor-Shift Type (Transfer with Shift Actuator)".
2	DTC check 1) Check DTC in 4WD control module. <i>Is DTC U1100 and DTC U1073 detected together?</i>	Go to "DTC U1073: Control Module Communication Bus Off: Motor-Shift Type (Transfer with Shift Actuator)".	Go to Step 3.
3	DTC check 1) Check DTC in ABS or ESP® hydraulic unit / control module. <i>Is DTC U1073 detected?</i>	Go to "DTC U1073: Control Module Communication Bus Off: in Section 4E".	Go to Step 4.
4	Check each control module connectors 1) Check connection of connectors of all control modules communicating by means of CAN. 2) Recheck in 4WD control module. <i>Is DTC U1100 detected?</i>	Go to Step 5.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
5	CAN communication circuit check 1) Turn ignition switch to OFF position. 2) Disconnect connectors of all control modules communicating by means of CAN. 3) Check CAN communication circuit between control modules for open, short and high resistance. <i>Is each CAN communication circuit in good condition?</i>	Check ABS or ESP® hydraulic unit / control module power and ground circuit. If circuit is OK, substitute a known-good ABS or ESP® hydraulic unit / control module and recheck.	Repair circuit.

Inspection of 4WD Control Module and Its Circuits

4WD control module and its circuits can be checked at coupler connected to 4WD control module by measuring voltage, pulse signal.

CAUTION

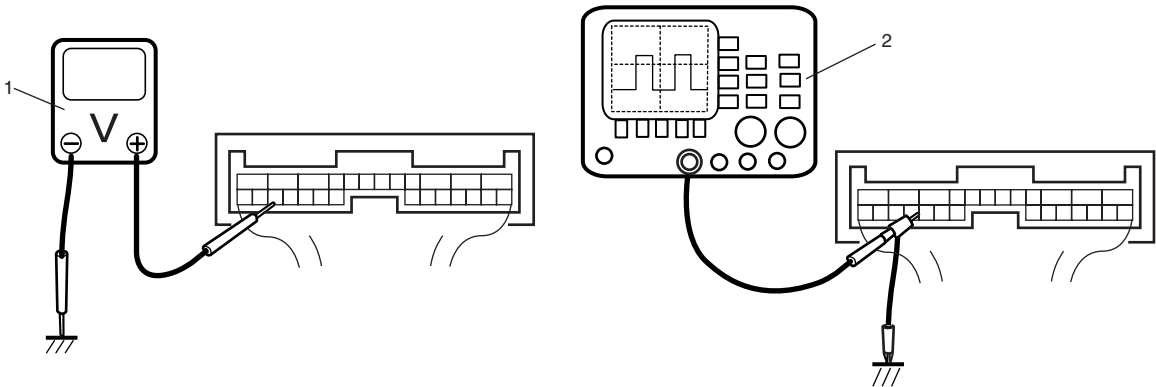
4WD control module cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to 4WD control module with couplers disconnected from it.

Voltage and Signal Check

- 1) Check voltage using voltmeter (1) connected to each terminal of couplers.
 2) Check signal using oscilloscope (2) connected to each terminal of couplers.

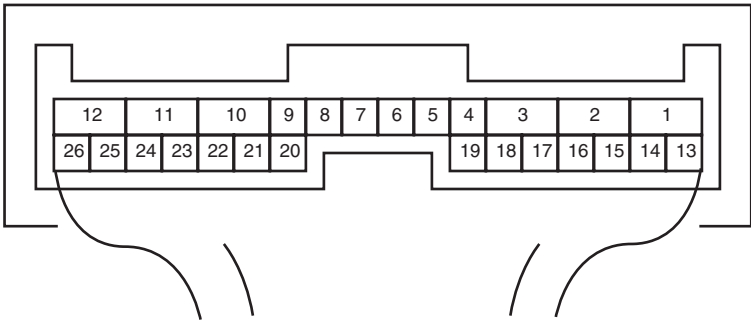
NOTE

- As each terminal voltage is affected by the battery voltage, confirm that it is 11 V or more when ignition switch is turned ON.
- Pulse signal cannot be measured by voltmeter. It can be measured by oscilloscope.
- Item with asterisk (*) in normal voltage column can be read only by oscilloscope.



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Terminal arrangement of 4WD control module connector (Viewed from harness side)



I4JA01332054-01

Terminal Number	Wire Color	Circuit	Normal Voltage	Condition
E91-1	BLK	Ground	0 – 1 V	—
E91-2	BLU	Transfer actuator motor 1	10 – 14 V	Ignition switch turned to ON position and transfer shift actuator being rotated N → 4H → 4H-lock direction or 4L-lock → 4H-lock direction
			0 – 1 V	Ignition switch turned to ON position and transfer shift actuator in other than above-mentioned condition

Terminal Number	Wire Color	Circuit	Normal Voltage	Condition
E91-3	YEL	Transfer actuator motor 2	10 – 14 V	Ignition switch turned to ON position and transfer shift actuator being rotated 4H-lock → 4H → N direction or 4H-lock → 4L-lock direction
			0 – 1 V	Ignition switch turned to ON position and transfer shift actuator in other than above-mentioned condition
E91-4	—	—	—	—
E91-5	—	—	—	—
E91-6	—	—	—	—
E91-7	BLK/ORN	Clutch switch	10 – 14 V	Ignition switch turned to ON position and clutch pedal released
			0 – 1 V	Ignition switch turned to ON position and clutch pedal kept depressing
E91-8	PNK	Diagnosis switch	4 – 5 V	Ignition switch turned to ON position
E91-9	—	—	—	—
E91-10	BLK	Ground	0 – 1 V	—
E91-11	WHT	Power source for internal memory	10 – 14 V	—
E91-12	BLK/WHT	Ignition switch	10 – 14 V	Ignition switch turned to ON position
E91-13	BLK/WHT	4L/N switch	10 – 14 V	Ignition switch turned to ON position and transfer shifted to 4H or 4H-lock position
			0 – 1 V	Ignition switch turned to ON position and transfer shifted to 4L-lock or N position
E91-14	RED/GRN	Center differential lock switch	10 – 14 V	Ignition switch turned to ON position and transfer shifted to 4H-lock or 4L-lock position
			0 – 1 V	Ignition switch turned to ON position and transfer shifted to N or 4H position
E91-15	—	—	—	—
E91-16	—	—	—	—
E91-17	—	—	—	—
E91-18	LT GRN	Transfer switch 1	10 – 14 V	Ignition switch turned to ON position and transfer switch at 4H, N or 4L-lock position
			0 – 1 V	Ignition switch turned to ON position and transfer switch at N position
E91-19	BLU/BLK	Transfer switch 2	10 – 14 V	Ignition switch turned to ON position and transfer switch at 4L-lock position
			0 – 1 V	Ignition switch turned to ON position and transfer switch at 4H, 4H-lock or N position
E91-20	BLU/ORN	Transfer switch 3	10 – 14 V	Ignition switch turned to ON position and transfer switch at 4H or N position
			0 – 1 V	Ignition switch turned to ON position and transfer switch at 4H-lock or 4L-lock position
E91-21	PPL/WHT	Data link connector (DLC)	10 – 14 V	Ignition switch turned to ON position
E91-22	RED	CAN communication line (High)	*2.5 – 3.5 V	Ignition switch turned to ON position
E91-23	WHT	CAN communication line (Low)	*1.5 – 2.5 V	Ignition switch turned to ON position
E91-24	BLK/YEL	Transfer actuator position switch (ground)	0 – 1 V	—
E91-25	RED	Transfer actuator position switch 1 (power)	Approx. 4 V	Ignition switch turned to ON position and transfer shifted to 4H-lock position
			Approx. 2 V	Ignition switch turned to ON position and transfer shifted to 4H position
			Approx. 1 V	Ignition switch turned to ON position and transfer shifted to 4L-lock or N position
			Approx. 0 V	Ignition switch turned to OFF position

Terminal Number	Wire Color	Circuit	Normal Voltage	Condition
E91-26	RED/BLK	Transfer actuator position switch 2 (power)	Approx. 4 V	Ignition switch turned to ON position and transfer shifted to 4L-lock position
			Approx. 2 V	Ignition switch turned to ON position and transfer shifted to N position
			Approx. 1 V	Ignition switch turned to ON position and transfer shifted to 4H or 4H-lock position
			Approx. 0 V	Ignition switch turned to OFF position

Repair Instructions

Transfer Oil Level Check

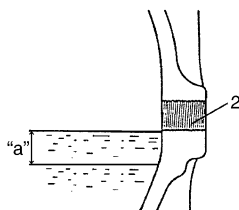
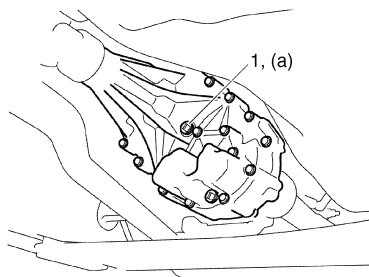
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- 1) Lift up vehicle and check oil leakage.
- 2) Remove oil level/filler plug (1) and check oil level is between 0 and 10 mm (0 and 0.394 in.) from the lower end of oil level / filler plug hole (2).
If oil is insufficient, pour specified oil up to plug hole.
- 3) Apply sealant to thread of level / filler plug, and then tighten it to specified torque.

“A”: Sealant 99000–31260 (SUZUKI Bond No.1217G)

Tightening torque

Transfer oil level / filler plug (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



“a”. 0 – 10 mm (0 – 0.394 in.)

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Transfer Oil Change

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- 1) Before changing or inspecting oil, be sure to stop engine and lift vehicle horizontally.
- 2) Check leakage.
If leakage exists, correct it.

NOTE

Whenever vehicle is hoisted for any other service work than oil change, also be sure to check for oil leakage.

- 3) Remove oil filler plug (2).
- 4) Remove drain plug (1), and drain oil.
- 5) Apply sealant to thread of drain plug (1), and tighten it to specified torque.

“A”: Sealant 99000–31260 (SUZUKI Bond No.1217G)

Tightening torque

Transfer oil drain plug (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)

- 6) Pour new specified oil up to lower end of oil level / filler plug hole (3).

NOTE

It is highly recommended to use API GL-5 80W-90 gear oil.

Transfer oil specification

: API GL-5 (For SAE classification, refer to viscosity chart [A] in figure.)

Transfer oil capacity (Reference)

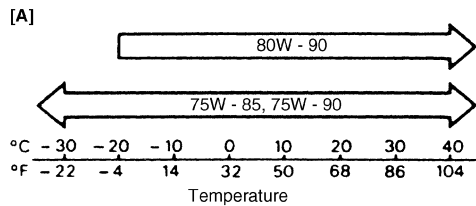
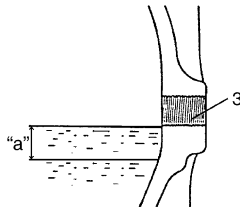
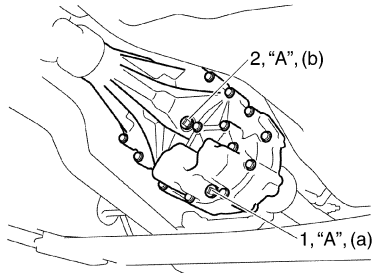
: 1.5 liters (3.2/2.6 US/Imp. pt)

- 7) Apply sealant to thread of level / filler plug, and then tighten it to specified torque.

“A”: Sealant 99000–31260 (SUZUKI Bond No.1217G)

Tightening torque

Transfer oil level / filler plug (b): 23 N·m (2.3 kgf·m, 17.0 lb·ft)



I5JB0A331002-03

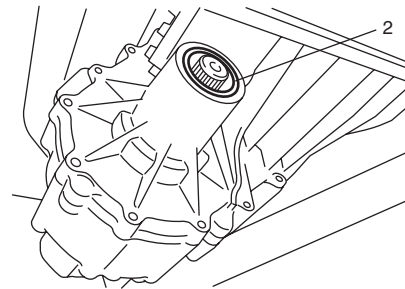
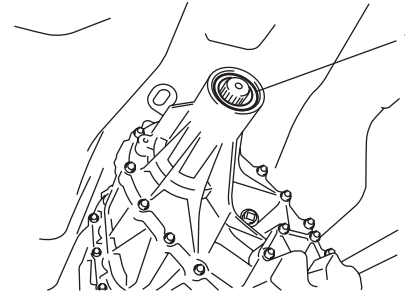
“a”. 0 – 10 mm (0 – 0.394 in.)

Transfer Oil Seal Removal and Installation

S5JB0E3316003

Removal

- 1) Lift up vehicle and drain transfer oil.
- 2) Remove front propeller shaft and/or rear propeller shaft referring to “Propeller Shaft Removal and Installation: in Section 3D in related manual”.
- 3) Remove front oil seal No.1 (1) and/or rear oil seal (2) using flat end rod or the like.



I5JB0A331031-01

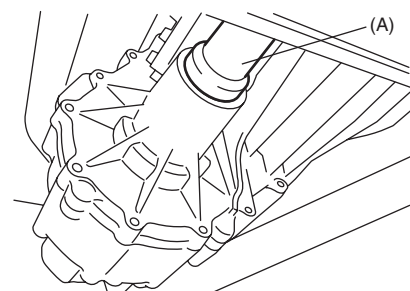
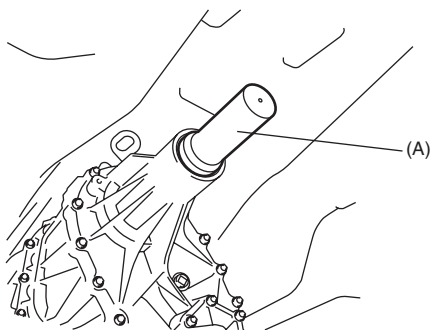
Installation

- 1) Install new oil seal using special tool and plastic hammer, and then apply grease to oil seal lip.

: Grease 99000–25010 (SUZUKI Super Grease A)

Special tool

(A): 09913–70123



I5JB0A331032-01

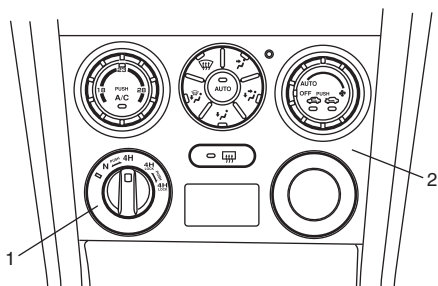
- 2) Install front propeller shaft and/or rear propeller shaft referring to “Propeller Shaft Removal and Installation: in Section 3D in related manual”.
- 3) Fill transfer oil referring to “Transfer Oil Change: Motor-Shift Type (Transfer with Shift Actuator)”.

Transfer Switch Removal and Installation

S5JB0E3316004

Removal

Remove HVAC control module referring to “HVAC Control Module Removal and Installation: in Section 7A in related manual”, and then remove transfer switch (1) from center cluster (2).



I5JB0A331003-02

Installation

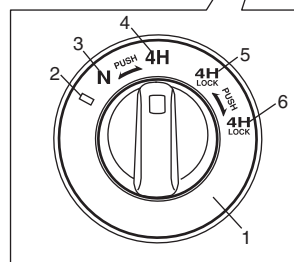
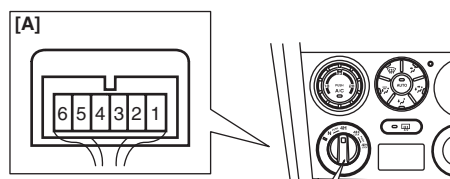
Reverse removal procedure.

Transfer Switch Inspection

S5JB0E3316005

Check continuity between following terminals when transfer switch (1) operated at each position.

Switch position	Terminal
□ (2)	1 – 2
N (3)	1 – 2 – 3
4H (4)	1 – 3
4H-lock (5)	1 – 3 – 4
4L-lock (6)	1 – 4



I5JB0A331004-04

[A]: Transfer switch connector (harness side view)

4WD Control Module Removal and Installation

S5JB0E3316006

Removal

- 1) Disconnect negative (–) cable from battery.
- 2) If the vehicle is equipped with air bag system, disable air bag system. Refer to “Disabling Air Bag System: in Section 8B in related manual”.
- 3) Disconnect connectors from 4WD control module (1).
- 4) Remove 4WD control module with TCM by removing its nuts, and then separate 4WD control module and TCM.



I5JB0A331005-01

Installation

Reverse removal procedure for installation noting the following.

- Connect 4WD control module connectors securely.
- If the vehicle is equipped with air bag system, be sure to enable air bag system after 4WD control module is back in place.

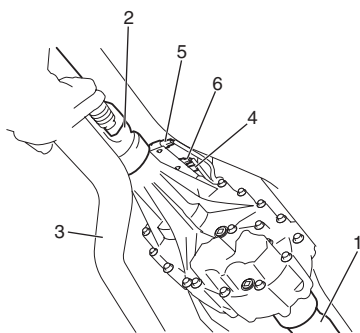
Refer to "Enabling Air Bag System: in Section 8B in related manual".

Transfer Assembly Dismounting and Remounting

S5JB0E3316007

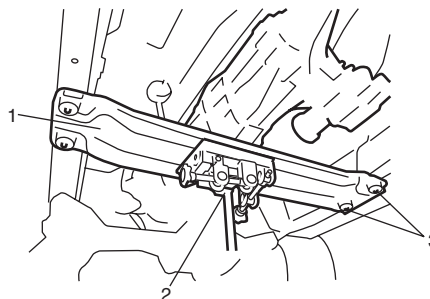
Dismounting

- 1) Shift transfer to 4H position operating transfer switch.
- 2) Disconnect negative (–) cable from battery.
- 3) Remove gear shift control lever (for M/T model) referring to "Transmission Shift Control Lever Removal and Installation: in Section 5B in related manual".
- 4) Drain transfer oil.
- 5) Remove front propeller shaft (1) and rear propeller shaft (2) referring to "Propeller Shaft Removal and Installation: in Section 3D in related manual".
- 6) Remove exhaust center pipe (3) referring to "Exhaust Pipe and Muffler Removal and Installation: in Section 1K in related manual".
- 7) Disconnect transfer actuator connector (4), center differential lock switch connector (5), 4L/N switch connector (6).



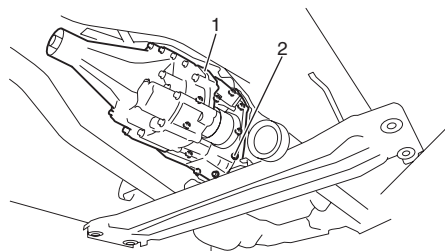
I5JB0A331006-01

- 8) Support engine rear mounting member (1) with transmission jack (2).
- 9) Remove engine rear mounting bolts (3), and then slant the transmission with transfer.



I5JB0A331007-02

- 10) Remove gear shift control lever rear case from transfer (for M/T model).
- 11) Remove transfer to transmission bolts (upper side), and then install engine rear mounting member with transmission and transfer.
- 12) Support transfer assembly (1) with transmission jack.
- 13) Remove transfer to transmission bolts (lower side) (2), and then lower transfer assembly.



I5JB0A331008-01

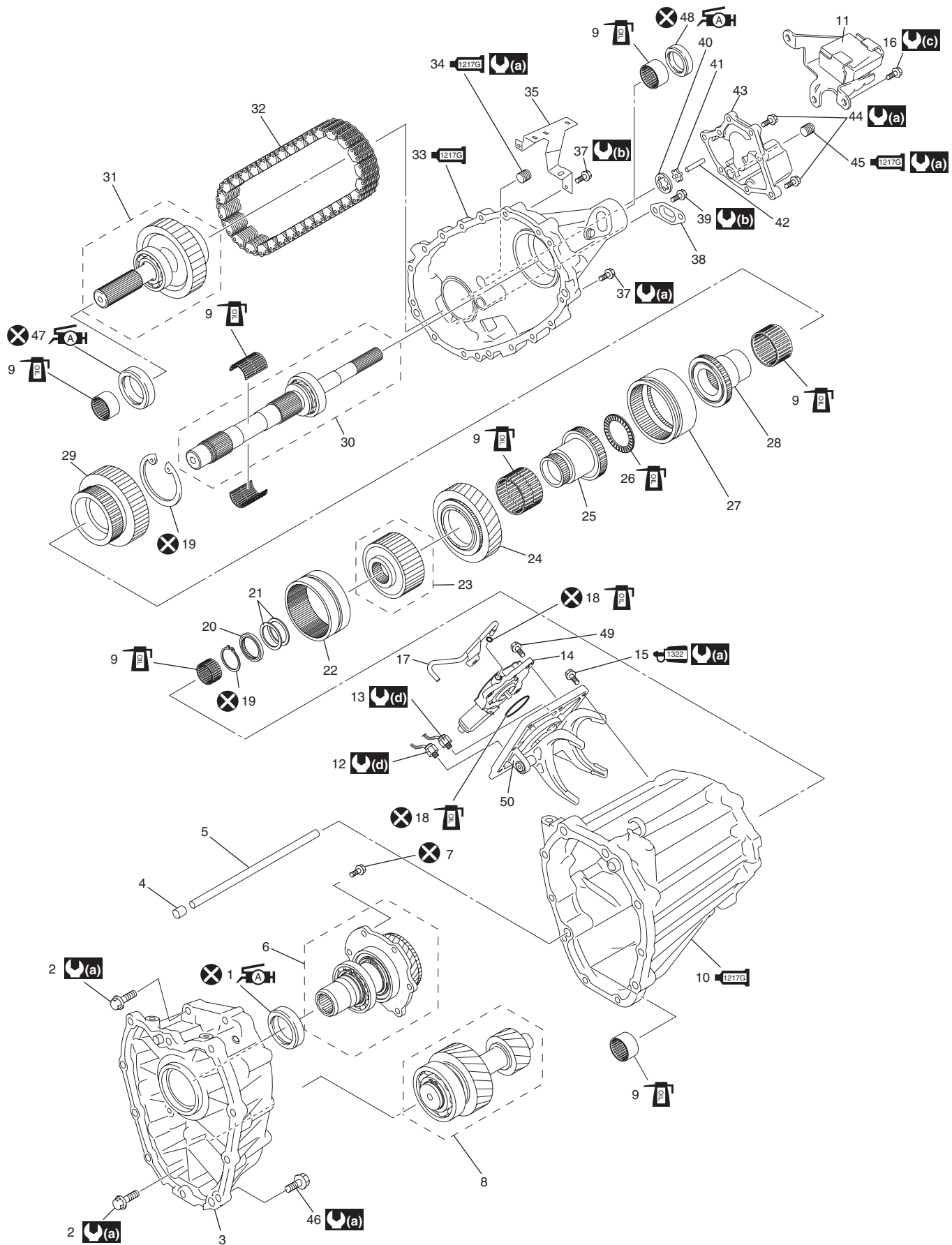
Remounting

Reverse dismounting procedure for remounting noting the following.

- Tighten each bolts and nuts referring to "Transfer Assembly Components: Motor-Shift Type (Transfer with Shift Actuator)", "Propeller Shaft Construction: in Section 3D in related manual", "Exhaust System Components: in Section 1K in related manual", "Gear Shift Control Lever Rear Case Assembly Components: in Section 5B in related manual" and "Transmission Shift Control Lever Removal and Installation: in Section 5B in related manual".
- Set each clamp for wiring securely.
- Fill transfer oil referring to "Transfer Oil Change: Motor-Shift Type (Transfer with Shift Actuator)".
- Connect battery and check for function.

Transfer Assembly Components

S5JB0E3316008



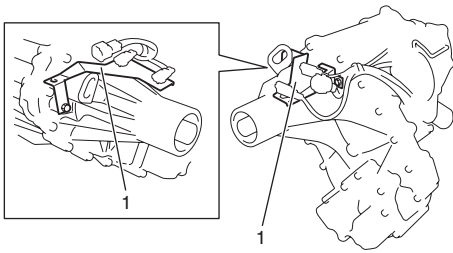
 1. Front oil seal No.1 : Apply grease 99000-25010 to oil seal lip.	20. Washer	39. Oil strainer bolt
2. Front case bolt	21. Shim	40. Oil pump outer rotor
3. Front case	22. Reduction shift sleeve	41. Oil pump inner rotor
4. Knock pin	23. Center differential assembly	42. Oil pump drive pin
5. Oil pipe	24. Low gear	43. Oil strainer bolt
6. Input gear assembly	25. Front drive shaft	44. Oil pump cover bolt
7. Input gear plate bolt	26. Thrust needle bearing	 45. Oil drain plug : Apply sealant 99000-31260 to plug thread.
8. Counter gear assembly	27. Differential lock clutch sleeve	46. Transfer to transmission bolt
9. Needle bearing	28. Front drive sprocket bush	 47. Front oil seal No.2 : Apply grease 99000-25010 to oil seal lip.
 10. Center case : Apply sealant 99000-31260 to mating surface of front case, transfer control cover and center case.	29. Front drive sprocket	 48. Rear oil seal : Apply grease 99000-25010 to oil seal lip.
11. Damper	30. Rear output shaft assembly	49. Transfer actuator bolt
12. 4L/N switch	31. Front output shaft assembly	50. Control cover
13. Center differential lock switch	32. Drive chain	 : 23 N·m (2.3 kgf-m, 17.0 lb-ft)
14. Transfer actuator assembly	 33. Rear case : Apply sealant 99000-31260 to mating surface of rear case, oil pump cover and center case.	 : 10 N·m (1.0 kgf-m, 7.5 lb-ft)
 15. Control cover bolt : Apply thread lock 99000-32110 to bolt thread.	 34. Oil level / filler plug : Apply sealant 99000-31260 to plug thread.	 : 50 N·m (5.0 kgf-m, 36.5 lb-ft)
16. Damper bolt	35. Harness bracket	 : 20 N·m (2.0 kgf-m, 14.5 lb-ft)
17. Breather pipe	36. Harness bracket bolt	 : Do not reuse.
18. O-ring	37. Rear case bolt	 : Apply transfer oil.
19. Snap ring	38. Oil strainer	

Transfer Assembly Disassembly and Reassembly

S5JB0E3316009

Disassembly

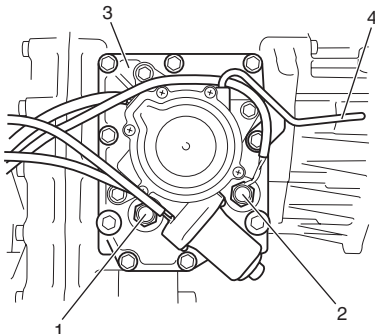
- 1) Remove harness bracket (1).



I5JB0A331010-01

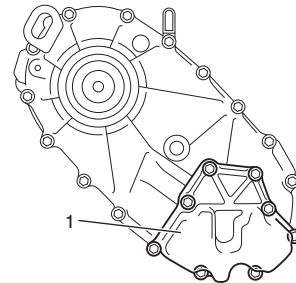
- 2) Remove center differential lock switch (1) and 4L/N switch (2).

- 3) Remove transfer actuator assembly (3) and breather pipe (4).



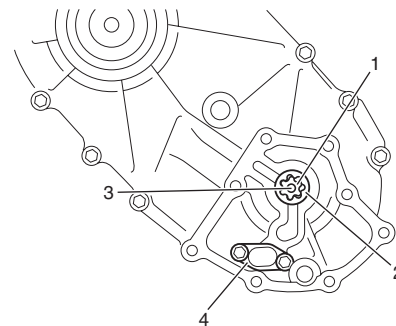
I5JB0A331011-01

- 4) Remove oil pump cover (1).



I5JB0A331012-01

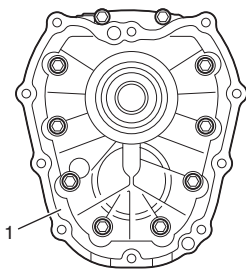
- 5) Remove oil pump inner rotor (1), outer rotor (2), oil strainer (4) and drive pin (3).



I5JB0A331013-01

3C-61 Transfer: Motor-Shift Type (Transfer with Shift Actuator)

6) Remove front case (1) using plastic hammer.

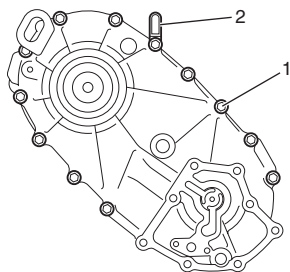


I5JB0A331014-01

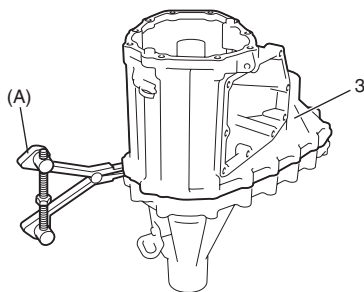
7) Remove rear case bolts (1) and clamp (2) and then separate center case (3) using special tool.

Special tool

(A): 09912-34510

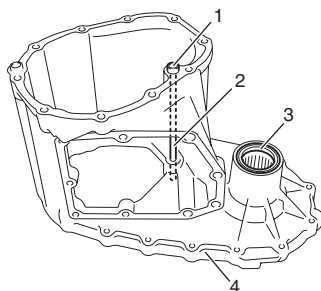


I5JB0A331015-01



I5JB0A331106-01

8) Remove knock pin (1) and oil pipe (2) from center case (4) and remove front oil seal No.1 (3) using flat end rod or the like, if necessary.



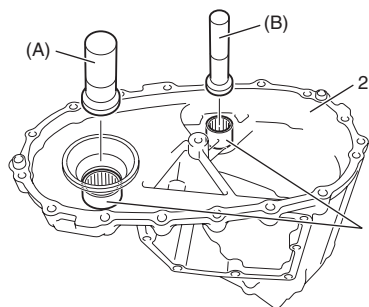
I5JB0A331017-01

9) Remove needle bearings (1) from center case (2) using special tools, if necessary.

Special tool

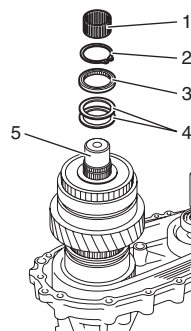
(A): 09913-76010

(B): 09925-98210



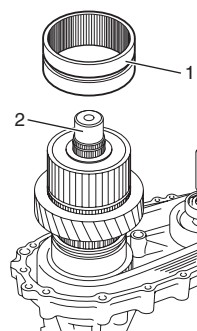
I5JB0A331018-01

10) Remove needle bearing (1), snap ring (2), washer (3) and shim(s) (4) from rear output shaft (5).



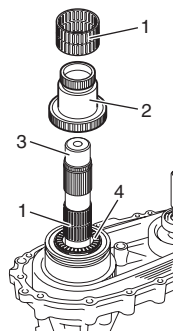
I5JB0A331019-01

11) Remove reduction shift sleeve (1), center differential and low gear from rear output shaft (2).



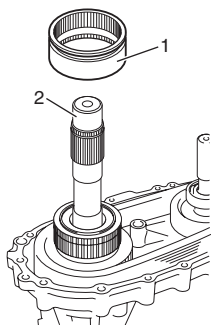
I5JB0A331020-02

12) Remove needle bearings (1), front drive shaft (2) and thrust needle bearing (4) from rear output shaft (3).



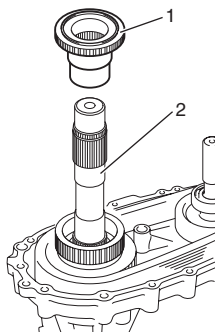
I5JB0A331021-01

- 13) Remove differential lock clutch sleeve (1) from rear output shaft (2).



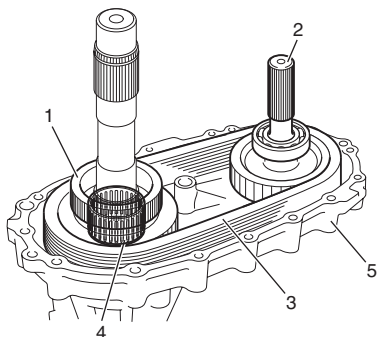
I5JB0A331022-01

- 14) Remove front drive sprocket bush (1) from rear output shaft (2).



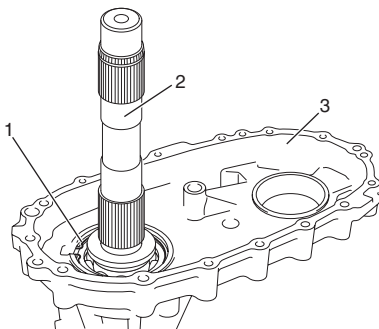
I5JB0A331023-01

- 15) Take out front drive sprocket (1), front output shaft assembly (2), drive chain (3) and needle bearing (4) from rear case (5) all at once.



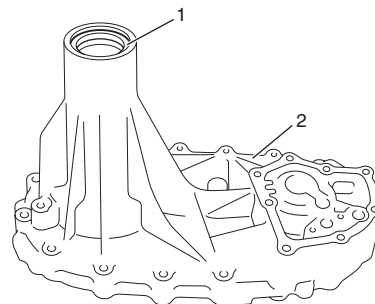
I5JB0A331024-01

- 16) Remove snap ring (1), and then remove rear output shaft assembly (2) from rear case (3).



I5JB0A331025-01

- 17) Remove rear oil seal (1) from rear case (2) using flat end rod or the like, if necessary.

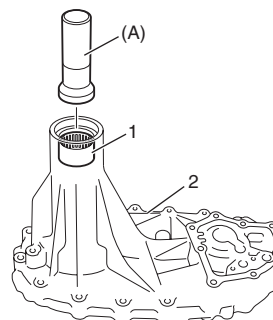


I5JB0A331026-01

- 18) Remove needle bearing (1) from rear case (2) using special tool, if necessary.

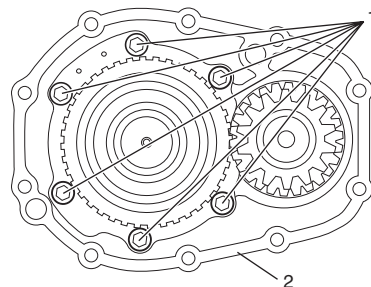
Special tool

(A): 09913-76010



I5JB0A331027-01

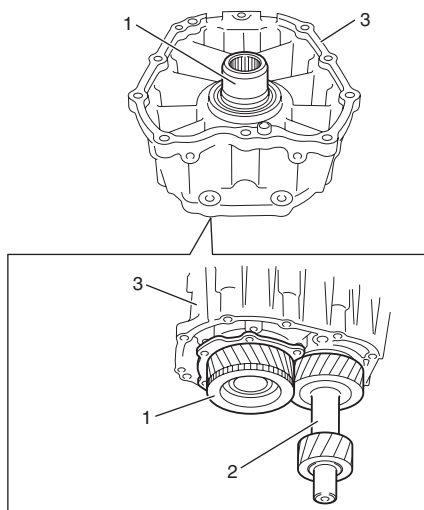
- 19) Remove input gear plate bolts (1) from front case (2).



I5JB0A331028-02

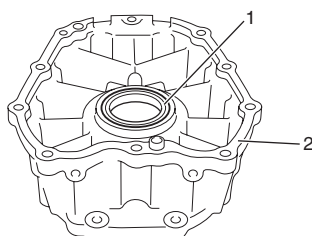
3C-63 Transfer: Motor-Shift Type (Transfer with Shift Actuator)

- 20) Remove input gear assembly (1) and counter gear assembly (2) from front case (3) using plastic hammer.



I5JB0A331029-01

- 21) Remove front oil seal No.2 (1) from front case (2) using flat end rod or the like, if necessary.



I5JB0A331030-01

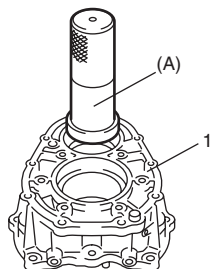
Reassembly

- 1) Install new front oil seal No.2 to front case (1) using special tool, and then apply grease to oil seal lip.

: Grease 99000-25010 (SUZUKI Super Grease A)

Special tool

(A): 09913-85210

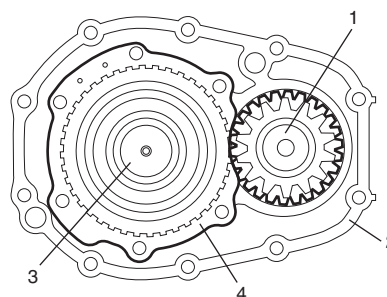
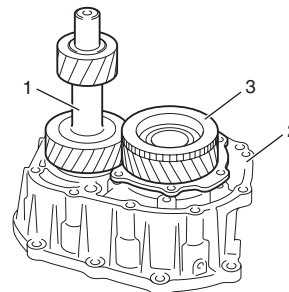


I5JB0A331033-01

- 2) Install counter gear assembly (1) to front case (2), and then install input gear assembly (3).

NOTE

Install input gear plate (4) so as not to hit counter gear assembly.

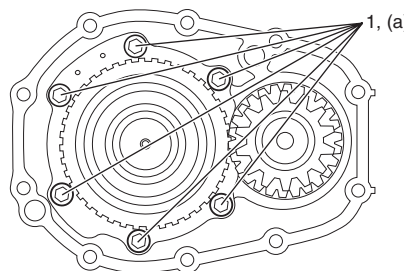


I5JB0A331034-02

- 3) Tighten new input gear plate bolts (1) to specified torque.

Tightening torque

Input gear plate bolt (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



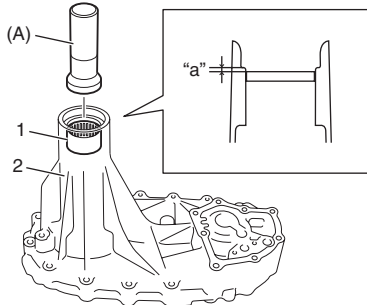
I5JB0A331035-03

- 4) Install needle bearing (1) to rear case (2) using special tool as shown in figure.

Distance between case and needle bearing "a"
: 0 – 0.5 mm (0 – 0.008 in.)

Special tool

(A): 09913-76010



I5JB0A331036-02

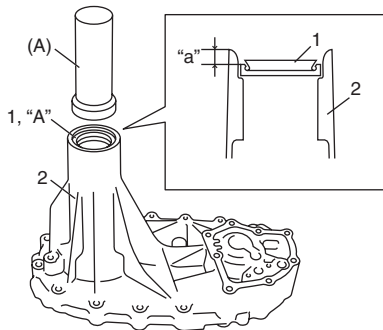
- 5) Install new rear oil seal (1) to rear case (2) using special tool as shown in figure, and then apply grease to oil seal lip.

"A": Grease 99000-25010 (SUZUKI Super Grease A)

Distance between case and oil seal "a"
: 3.5 – 4.5 mm (0.138 – 0.177 in.)

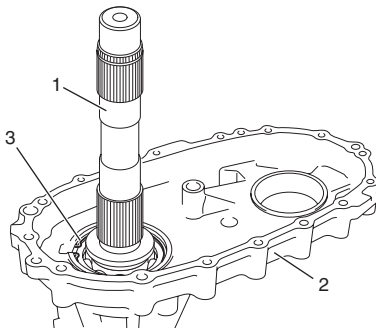
Special tool

(A): 09913-70123



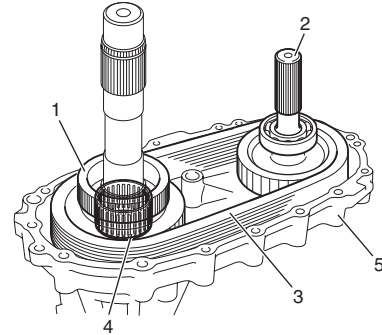
I5JB0A331037-04

- 6) Install rear output shaft assembly (1) to rear case (2), and then install snap ring (3).



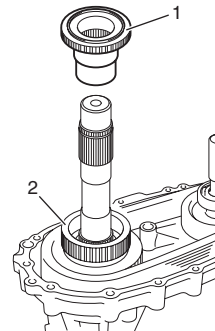
I5JB0A331038-01

- 7) Install front drive sprocket (1), front output shaft assembly (2), drive chain (3) and needle bearing (4) into rear case (5).



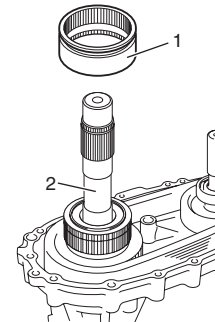
I5JB0A331024-01

- 8) Install front drive sprocket bush (1) into front drive sprocket (2).



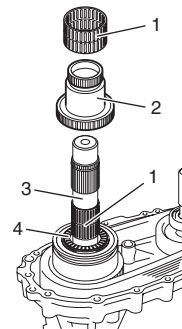
I5JB0A331039-01

- 9) Install differential lock clutch sleeve (1) to rear output shaft (2) as shown in figure.



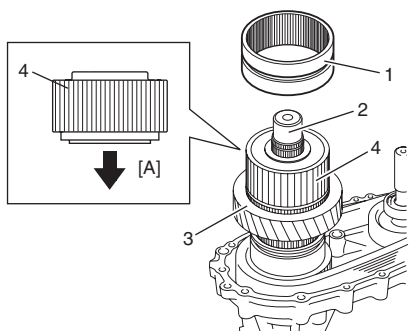
I5JB0A331040-01

- 10) Install thrust needle bearing (4), front drive shaft (1) and needle bearings (2) to rear output shaft (3).



I5JB0A331041-02

- 11) Install low gear (3), center differential (4) and reduction shift sleeve (1) to rear output shaft (2).



I5JB0A331042-02

[A]: Rear case side

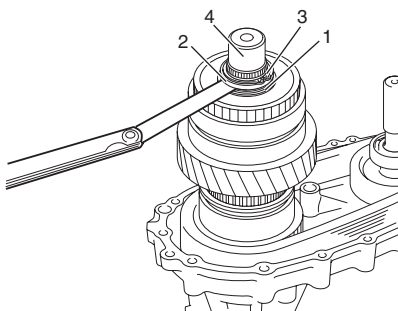
- 12) Select shim (1) as follows.

- Install shim, washer (2) and used snap ring (3) into rear output shaft (4).
- Check clearance between shim and washer.
- If clearance is out of specified value, select shim from the following table so that clearance become specified value.

Clearance between shim and washer
: 0.1 – 0.3 mm (0.004 – 0.012 in.)

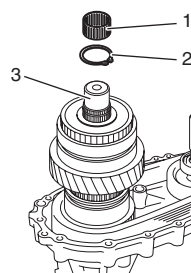
Available shim thickness

0.4 mm (0.016 in.)	1.6 mm (0.063 in.)
0.6 mm (0.024 in.)	1.8 mm (0.071 in.)
0.8 mm (0.031 in.)	2.0 mm (0.079 in.)
1.0 mm (0.039 in.)	2.2 mm (0.087 in.)
1.2 mm (0.047 in.)	2.4 mm (0.098 in.)
1.4 mm (0.055 in.)	



I5JB0A331043-01

- 13) Remove used snap ring, and then install new snap ring (2) and needle bearing (1) to rear output shaft (3).



I5JB0A331044-02

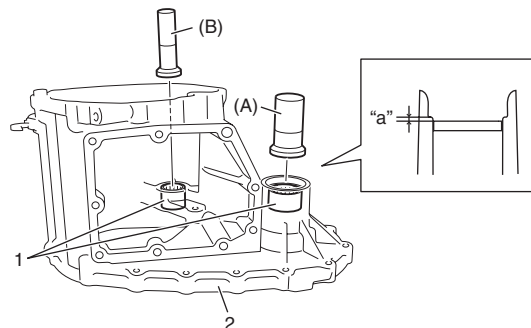
- 14) Install needle bearings (1) to center case (2) using special tools as shown in figure.

Distance between case and needle bearing “a”
: 0 – 0.5 mm (0 – 0.008 in.)

Special tool

(A): 09913–76010

(B): 09925–98210



I5JB0A331045-02

- 15) Install oil pipe (1) and knock pin (2) into center case (3).

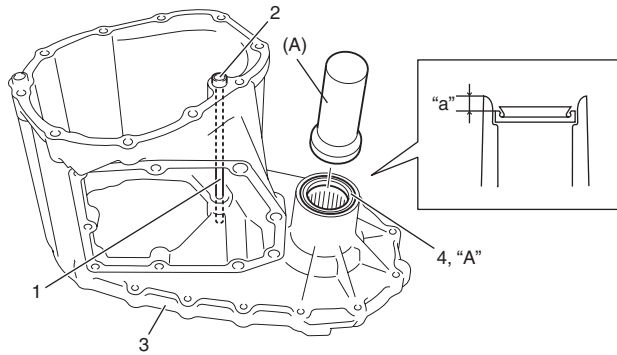
- 16) Install new front oil seal No.1 (4) into center case using special tool as shown in figure, and then apply grease to oil seal lip.

Distance between case and oil seal “a”
: 3.5 – 4.5 mm (0.138 – 0.177 in.)

“A”: Grease 99000–25010 (SUZUKI Super Grease A)

Special tool

(A): 09913–70123



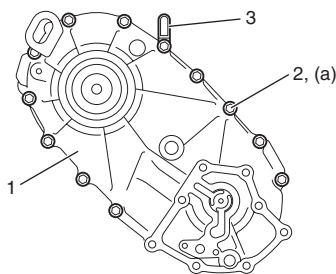
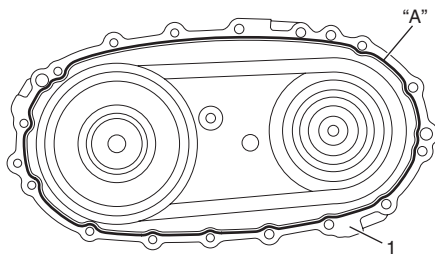
I5JB0A331046-03

- 17) Clean mating surface of both center case and rear case (1), apply sealant to rear case as shown in figure by such amount that its section is 1.2 mm (0.047 in.) in diameter, mate center case with rear case and then tighten bolts (2) to specified torque.

"A": Sealant 99000-31260 (SUZUKI Bond No.1217G)

Tightening torque

Rear case bolt (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



I5JB0A331047-02

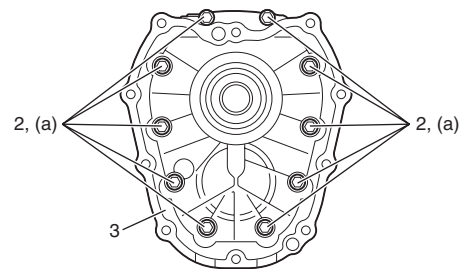
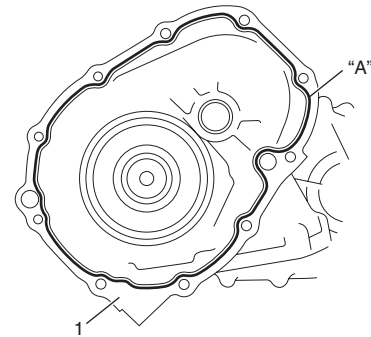
3. Clamp

- 18) Clean mating surface of both center case (1) and front case, apply sealant to center case as shown in figure by such amount that its section is 1.2 mm (0.047 in.) in diameter, mate front case (3) with center case and then tighten bolts (2) to specified torque.

"A": Sealant 99000-31260 (SUZUKI Bond No.1217G)

Tightening torque

Rear case bolt (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



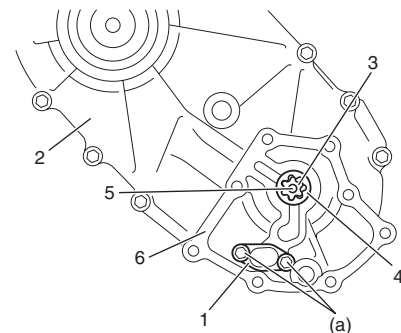
I5JB0A331048-03

- 19) Install oil strainer (1) to rear case (2).

Tightening torque

Strainer bolt (a): 10 N·m (1.0 kgf-m, 7.5 lb-ft)

- 20) Install oil pump inner rotor (3), outer rotor (4) and drive pin (5) to rear case (6).



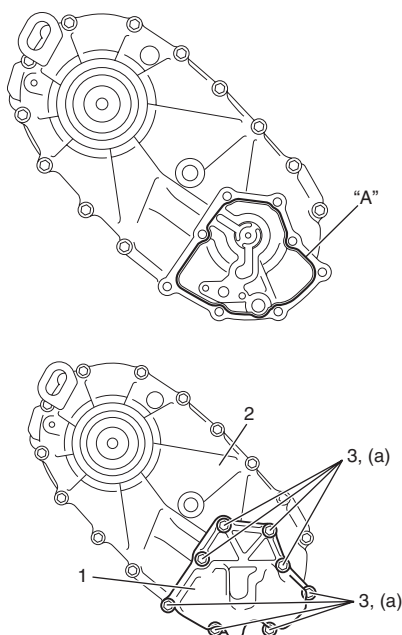
I5JB0A331050-01

- 21) Clean mating surface of oil pump cover (1) and rear case (2), apply sealant to rear case as shown in figure by such amount that its section is 1.2 mm (0.047 in.) in diameter, mate oil pump cover with rear case and then tighten bolts (3) to specified torque.

"A": Sealant 99000-31260 (SUZUKI Bond No.1217G)

Tightening torque

Oil pump cover bolt (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



I5JB0A331049-02

- 22) Clean mating surface of control cover (1) and center case (2), apply sealant to center case as shown in figure by such amount that its section is 1.2 mm (0.047 in.) in diameter, confirm the each fork of control cover is in groove of the sleeve, mate control cover with center case and then tighten control cover bolts (3) to which thread lock cement has been applied and control cover dowel bolts (4) to specified torque.

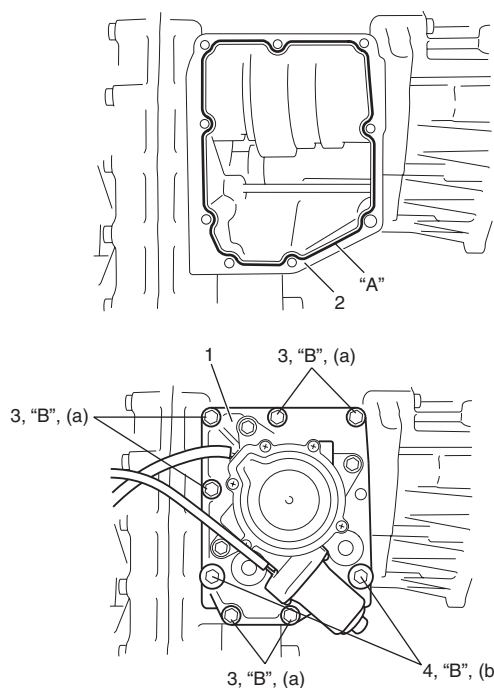
"A": Sealant 99000-31260 (SUZUKI Bond No.1217G)

"B": Thread lock cement 99000-32110 (Thread Lock Cement Super 1322)

Tightening torque

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

Control cover dowel bolt (b): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



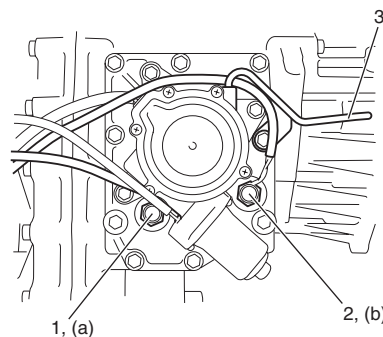
I5JB0A331051-04

- 23) Install center differential lock switch (1), 4L/N switch (2) and breather pipe (3).

Tightening torque

Center differential lock switch (a): 20 N·m (2.0 kgf-m, 14.5 lb-ft)

4L/N switch (b): 20 N·m (2.0 kgf-m, 14.5 lb-ft)

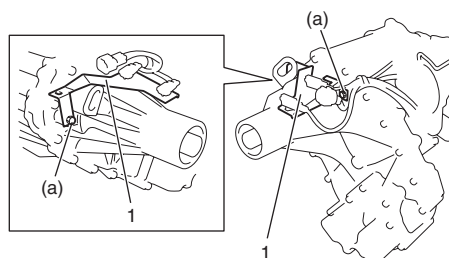


I5JB0A331052-02

- 24) Install harness bracket (1).

Tightening torque

Harness bracket bolt (a): 10 N·m (1.0 kgf-m, 7.5 lb-ft)

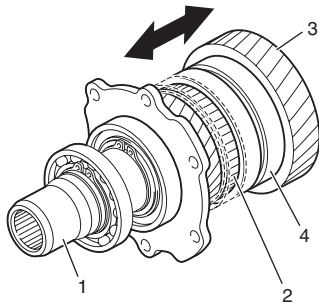


I5JB0A331053-01

Transfer Assembly Inspection

S5JB0E3316010

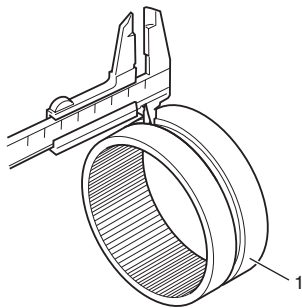
- Check needle bearing and bearing contacting surface for damage. Replace as required.
- Check gear tooth surface and shift mechanism in the same manner as with transmission. Correct or replace as necessary.
- Check drive chain and sprockets for abnormal wear or damage. Replace as required.
- Check transfer control cover assembly for abnormal wear or damage. Replace control cover assembly.
- Assemble input gear assembly (1), center differential assembly (2), low gear (3) and reduction shift sleeve (4), check whether reduction shift sleeve moves smoothly, and replace it if defect is found.



I5JB0A331054-01

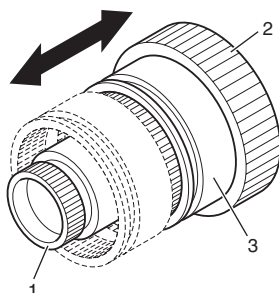
- Measure the width of groove part of reduction shift sleeve (1).
If measured value is out of specification, replace reduction sleeve.

Reduction shift sleeve groove width
: 6.9 – 7.1 mm (0.272 – 0.280 in.)



I5JB0A331055-01

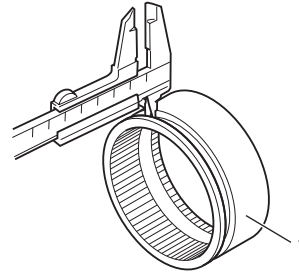
- Assemble front drive shaft (1), front drive sprocket (2) and differential lock clutch sleeve (3), check whether differential lock clutch sleeve moves smoothly, and replace it if defect is found.



I5JB0A331056-01

- Measure the width of groove part of differential lock clutch sleeve (1).
If measured value is out of specification, replace reduction sleeve.

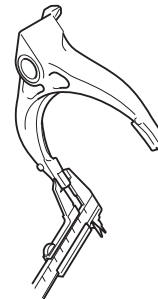
Differential lock clutch sleeve groove width
: 6.9 – 7.1 mm (0.272 – 0.280 in.)



I5JB0A331057-01

- Measure thickness of shift fork. If thickness of shift fork is out of specification, replace control cover assembly.

Shift fork thickness
: 6.5 – 6.8 mm (0.256 – 0.268 in.)



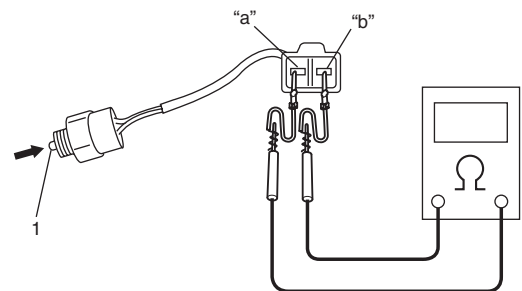
I5JB0A331082-01

- Check 4L/N switch and center differential lock switch for continuity between “a” and “b” terminals of switch. If check result is not as specified below, replace switch.

4L/N switch and center differential lock switch specification

Switch button (1) released: Continuity

Switch button (1) kept pushing: No continuity



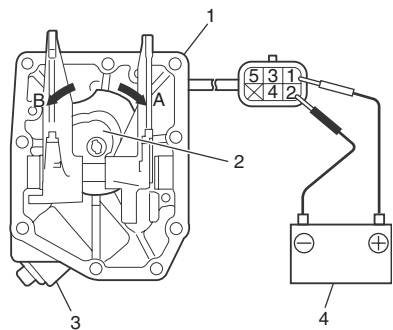
I5JB0A331058-01

3C-69 Transfer: Motor-Shift Type (Transfer with Shift Actuator)

- Connect terminal “1” of transfer actuator (3) to the positive of battery (4) and terminal “2” to the negative, and confirm cam (2) rotates in the direction of A. At the same time, connect terminal “2” of transfer actuator (3) to the positive and terminal “1” to the negative, and confirm it rotates in the direction of B. If it doesn’t operate correctly, replace transfer actuator assembly.

NOTE

- Do not rotate transfer actuator applying voltage, while transfer actuator removed from transfer control cover assembly (1).
- Do not apply voltage of the battery in the direction of rotation limit at rotation limit position of transfer actuator.

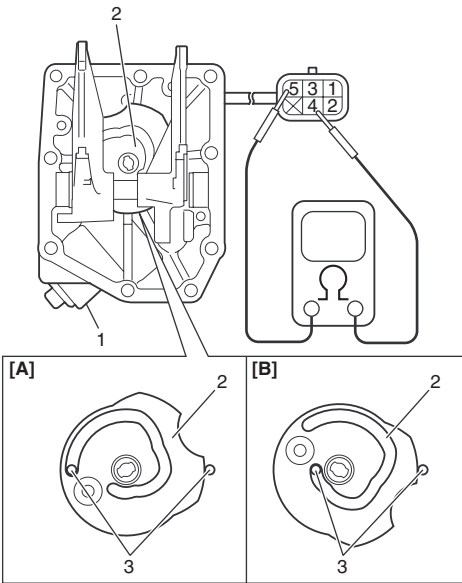


I5JB0A331059-01

- Operate the motor, and measure the resistance between following terminals of transfer actuator when matching transfer actuator (1) to 4H-lock position and 4L-lock position. If measured value is out of specification, replace transfer actuator.

Transfer actuator resistance

Transfer position	Terminal	Resistance
4H-lock	4 – 5	385 – 400 Ω
4L-lock	3 – 4	

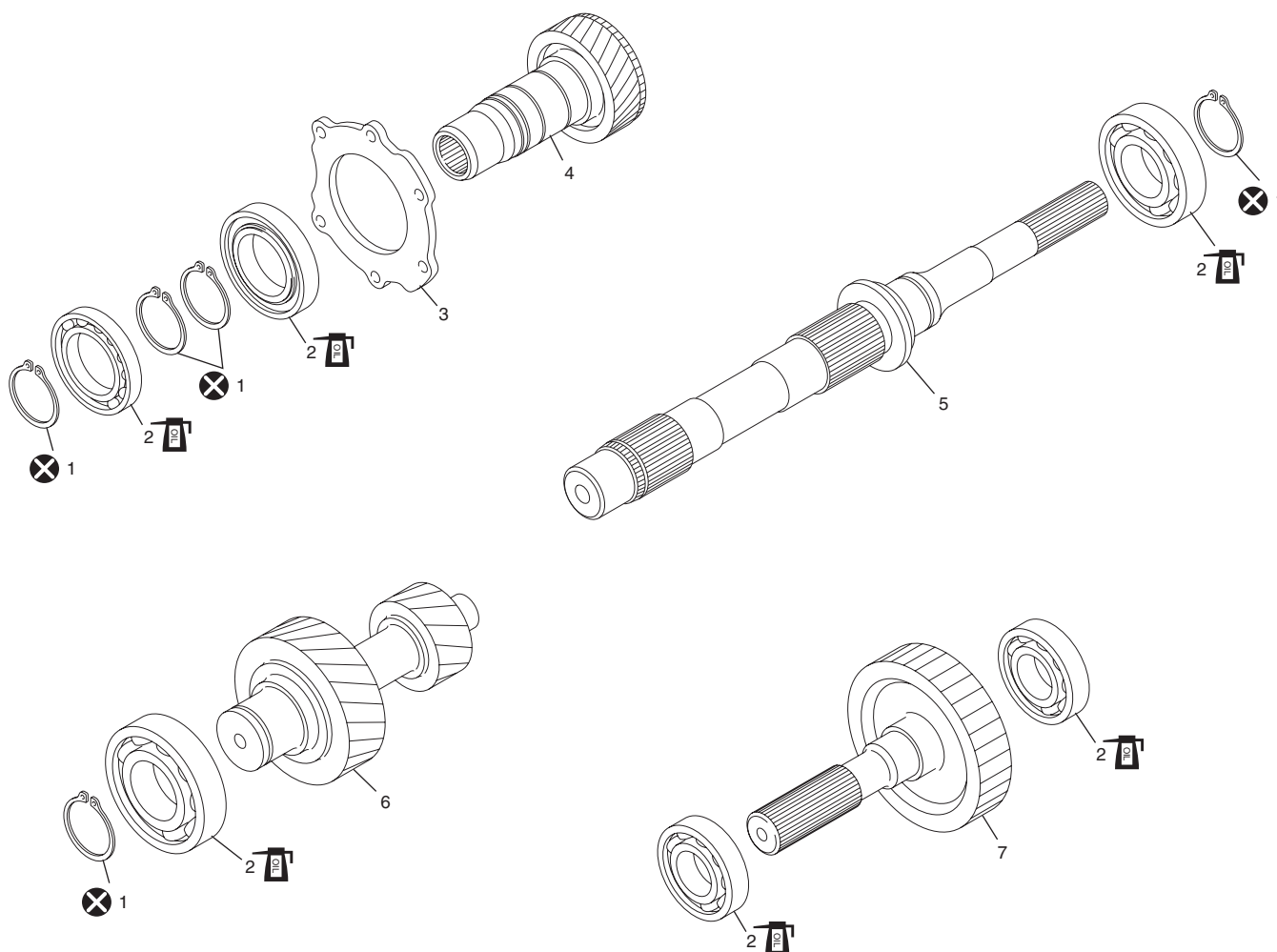


I5JB0A331060-02

[A]: 4H-lock position
[B]: 4L-lock position
2. Cam
3. Shift fork pin

Input Gear Assembly, Counter Gear Assembly, Front Output Shaft Assembly and Rear Output Shaft Assembly Components

S5JB0E3316011



1. Snap ring	6. Counter gear
2. Bearing	7. Front output shaft
3. Input gear plate	⊗ : Do not reuse.
4. Input gear	🛢️ : Apply transfer oil.
5. Rear output shaft	

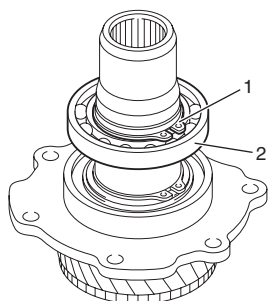
I5JB0A331061-02

Input Gear Assembly Disassembly and Reassembly

S5JB0E3316012

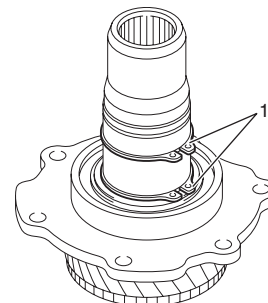
Disassembly

- 1) Remove snap ring (1) from input gear, and then remove bearing (2).



I5JB0A331062-01

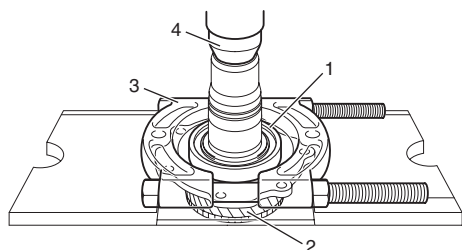
- 2) Remove snap rings (1).



I5JB0A331063-01

3C-71 Transfer: Motor-Shift Type (Transfer with Shift Actuator)

- 3) Remove bearing (1) from input gear (2) using bearing puller (3) and press (4), and then remove input gear plate.



I5JB0A331064-01

Reassembly

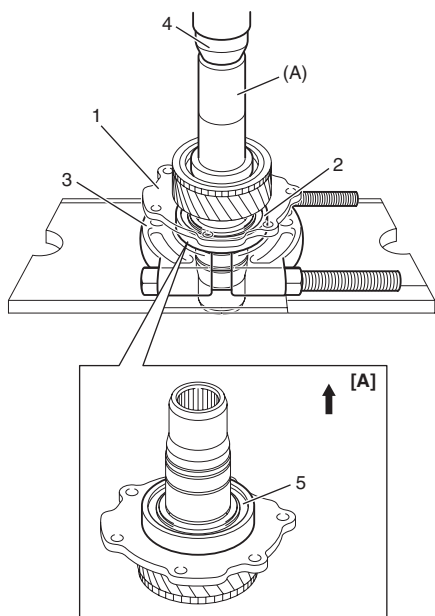
- 1) Clean all components thoroughly, inspect them for any abnormality and replace with new ones as necessary.
- 2) Install input gear plate (1), and then press-fit bearing (2) using special tool, bearing puller (3) and press (4).

NOTE

Assemble bearing so that seal side (5) may come to the front side.

Special tool

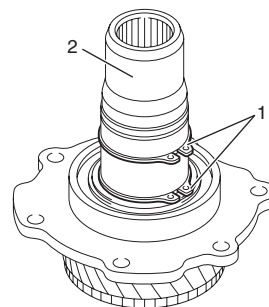
(A): 09913-85210



I5JB0A331065-02

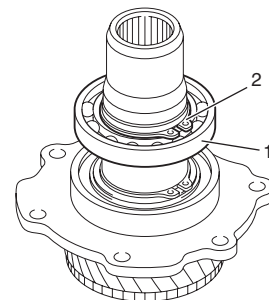
[A]: Front side

- 3) Install snap rings (1) to input gear (2).



I5JB0A331066-01

- 4) Install bearing (1) and snap ring (2).



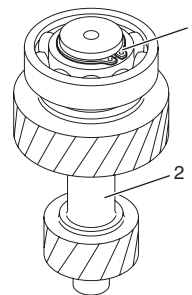
I5JB0A331067-01

Counter Gear Assembly Disassembly and Reassembly

S5JB0E3316013

Disassembly

- 1) Remove snap ring (1) from counter gear (2).

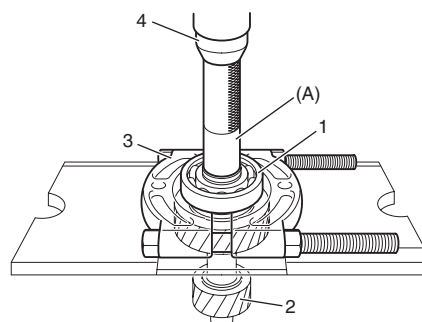


I5JB0A331068-01

- 2) Remove bearing (1) from counter gear (2) using special tool, bearing puller (3) and press (4).

Special tool

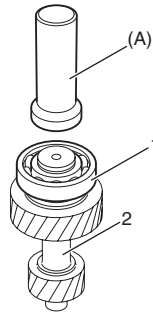
(A): 09913-80113



I5JB0A331069-02

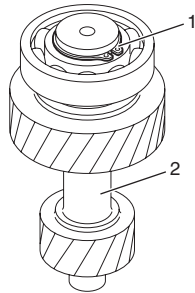
Reassembly

- 1) Clean all components thoroughly, inspect them for any abnormality and replace with new ones as necessary.
- 2) Press-fit bearing (1) to counter gear using special tool and press.

Special tool**(A): 09913-70123**

I5JB0A331070-01

- 3) Install snap ring (1) to counter gear (2).



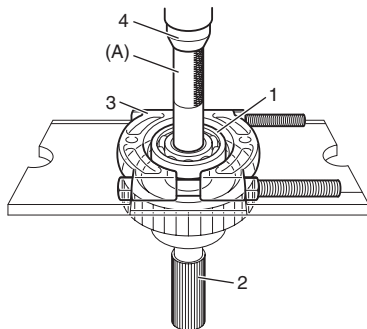
I5JB0A331068-01

Front Output Shaft Assembly Disassembly and Reassembly

S5JB0E3316014

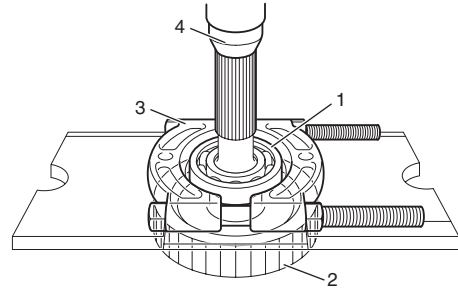
Disassembly

- 1) Remove bearing (1) from front output shaft (2) using special tool, bearing puller (3) and press (4).

Special tool**(A): 09925-98221**

I5JB0A331071-01

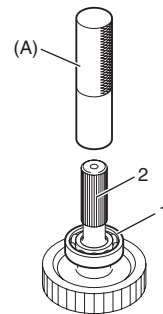
- 2) Remove bearing (1) from front output shaft (2) using bearing puller (3) and press (4).



I5JB0A331072-01

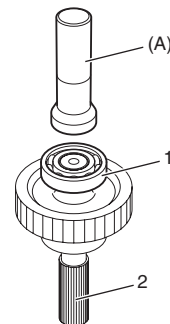
Reassembly

- 1) Clean all components thoroughly, inspect them for any abnormality and replace with new ones as necessary.
- 2) Press-fit bearing (1) to front output shaft using special tool and press.

Special tool**(A): 09913-84510**

I5JB0A331073-01

- 3) Press-fit bearing (1) to front output shaft using special tool and press.

Special tool**(A): 09913-76010**

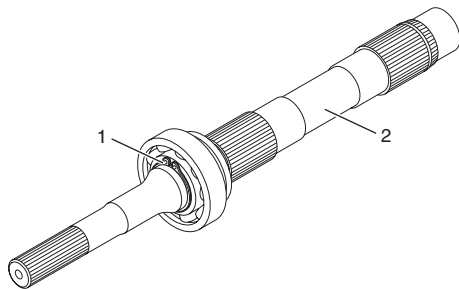
I5JB0A331074-01

Rear Output Shaft Assembly Disassembly and Reassembly

S5JB0E3316015

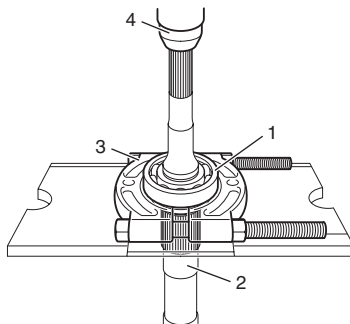
Disassembly

- 1) Remove snap ring (1) from rear output shaft (2).



I5JB0A331075-01

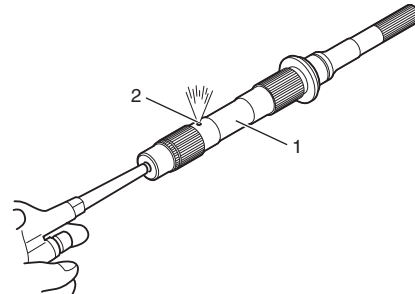
- 2) Remove bearing (1) from rear output shaft (2) using bearing puller (3) and press (4).



I5JB0A331076-01

Reassembly

- 1) Clean all components thoroughly, inspect them for any abnormality and replace with new ones as necessary.
- 2) To ensure lubrication of rear output shaft (1), air blow oil holes (2) and make sure that they are free from any obstruction.



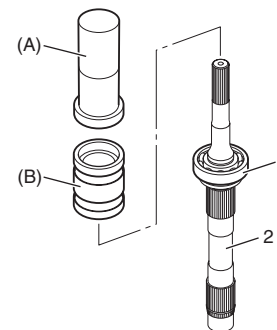
I5JB0A331077-01

- 3) Press-fit bearing (1) to rear output shaft using special tools and press.

Special tool

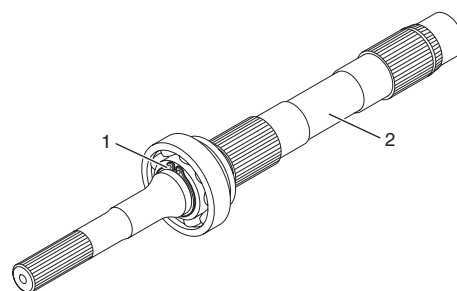
(A): 09913-85210

(B): 09940-54910



I5JB0A331078-01

- 4) Install snap ring (1) to rear output shaft (2).



I5JB0A331075-01

Specifications

Tightening Torque Specifications

S5JB0E3317001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Transfer oil level / filler plug	23	2.3	17.0	⌚ / ⌚
Transfer oil drain plug	23	2.3	17.0	⌚
Input gear plate bolt	23	2.3	17.0	⌚
Rear case bolt	23	2.3	17.0	⌚ / ⌚
Strainer bolt	10	1.0	7.5	⌚
Oil pump cover bolt	23	2.3	17.0	⌚
Control cover bolt	23	2.3	17.0	⌚
Control cover dowel bolt	23	2.3	17.0	⌚
Center differential lock switch	20	2.0	14.5	⌚
4L/N switch	20	2.0	14.5	⌚
Harness bracket bolt	10	1.0	7.5	⌚

NOTE

The specified tightening torque is also described in the following.

“Transfer Assembly Components: Motor-Shift Type (Transfer with Shift Actuator)”

Reference:

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

Special Tools and Equipment

Recommended Service Material

S5JB0E3318001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI Super Grease A	P/No.: 99000–25010	⌚ / ⌚ / ⌚ / ⌚
Sealant	SUZUKI Bond No.1217G	P/No.: 99000–31260	⌚ / ⌚ / ⌚ / ⌚ / ⌚ / ⌚ / ⌚
Thread lock cement	Thread Lock Cement Super 1322	P/No.: 99000–32110	⌚

NOTE

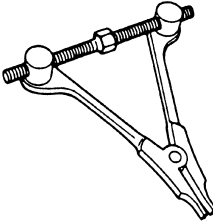
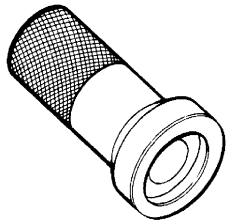
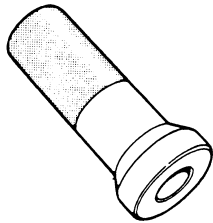
Required service material is also described in the following.

“Transfer Assembly Components: Motor-Shift Type (Transfer with Shift Actuator)”

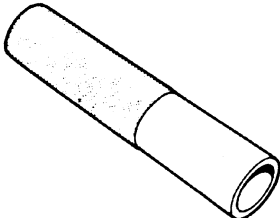
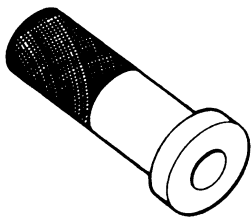
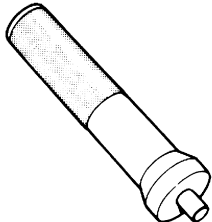
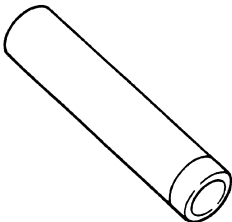
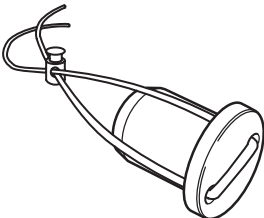
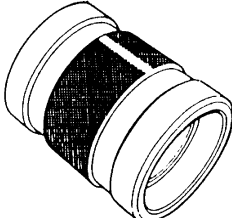
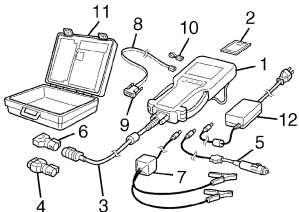
“Input Gear Assembly, Counter Gear Assembly, Front Output Shaft Assembly and Rear Output Shaft Assembly Components: Motor-Shift Type (Transfer with Shift Actuator)”

Special Tool

S5JB0E3318002

09912–34510 Case separator ⌚		09913–70123 Bearing installing tool ⌚ / ⌚ / ⌚ / ⌚	
09913–76010 Bearing installer ⌚ / ⌚ / ⌚ / ⌚ / ⌚		09913–80113 Bearing installer ⌚	

3C-75 Transfer: Motor-Shift Type (Transfer with Shift Actuator)

09913-84510 Bearing installer 	09913-85210 Bearing installer 
09925-98210 Input shaft bearing installer 	09925-98221 Bearing installer 
09928-36510 Transfer cap 	09940-54910 Front fork oil seal install driver 
SUZUKI scan tool — This kit includes following items. 1. Tech 2, 2. PCMCIA card, 3. DLC cable, 4. SAE 16/19 adapter, 5. Cigarette cable, 6. DLC loop back adapter, 7. Battery power cable, 8. RS232 cable, 9. RS232 adapter, 10. RS232 loop back connector, 11. Storage case, 12. Power supply 	

Non-Shift Type (Transfer without Shift Actuator)

Precautions

Transfer Warning

S5JB0E3320001

Refer to "Transfer Warning: Motor-Shift Type (Transfer with Shift Actuator)".

General Description

Transfer Construction

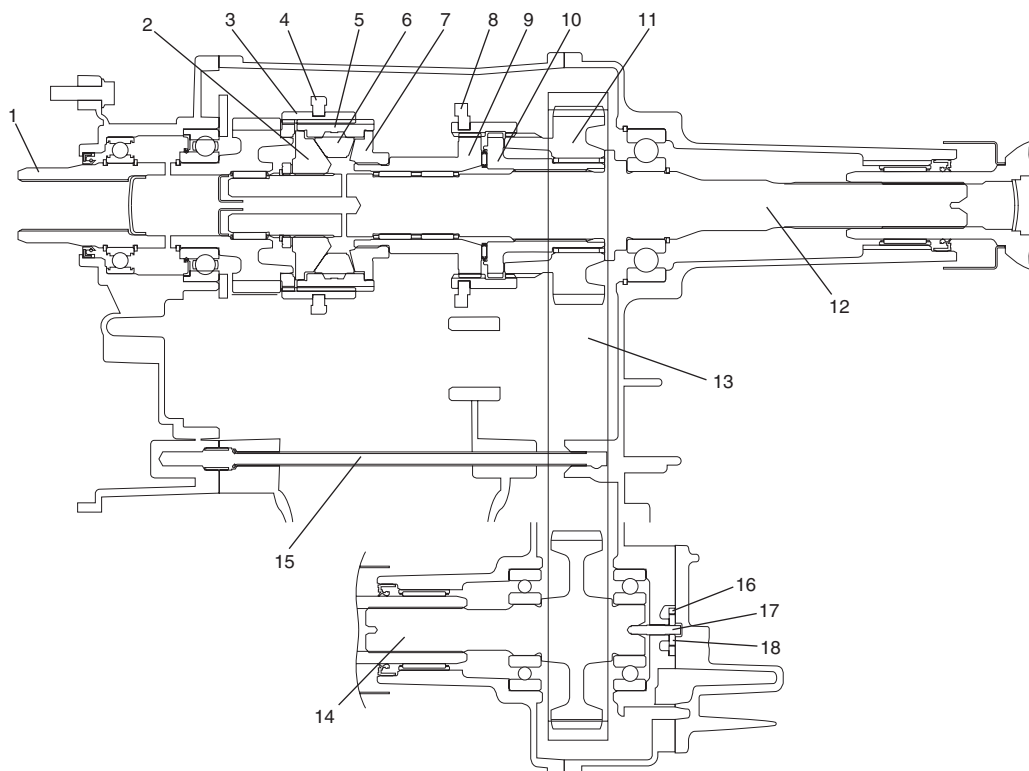
S5JB0E3321001

The aluminum transfer case directly connected to the back of the transmission contains the input gear, rear output shaft, front output shaft and drive chain.

The transfer has an oil pump to provide proper lubrication even under the strict condition of use.

The center differential is installed in the transfer. With the torque induction type LSD used in the center differential, the effect of LSD works when a rotation difference between front and rear wheels.

The differential lock lever is installed in shaft case. Center differential can be locked by operating differential lock lever, if necessary.



I5JB0A331083-02

1. Input gear	7. Front drive cam	13. Drive chain
2. Rear drive cam	8. Differential lock shift fork	14. Front output shaft
3. Reduction shift sleeve	9. Front drive shaft	15. Oil pipe
4. Reduction shift fork	10. Front drive sprocket bush	16. Oil pump outer rotor
5. Center differential case	11. Front drive sprocket	17. Oil pump drive pin
6. Center differential cam follower	12. Rear output shaft	18. Oil pump inner rotor

Diagnostic Information and Procedures

Transfer Symptom Diagnosis

Before attempting to repair the transfer or related components for any reason other than mechanical failure, the condition and possible causes should be identified.

When any of these conditions occur, the following inspections should be made before disassembling the transfer.

- Check transfer for oil level and oil deterioration.

Refer to "Transfer Oil Change: Non-Shift Type (Transfer without Shift Actuator)".

After performing the above inspections, refer to the following diagnosis table.

Condition	Possible cause	Correction / Reference Item
Gear slipping out of mesh	Worn control cover shift shaft	Replace referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)".
	Worn shift fork or sleeve	Replace referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)".
	Weak or damaged control cover shift shaft spring	Replace referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)".
	Worn bearings on input gear or counter gear	Replace referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)".
	Worn chamfered tooth on sleeve or gear	Replace sleeve and gear referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)".
	Missing or disengagement of circlip(s)	Repair or replace referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)".
Noise	Inadequate or insufficient transfer oil	Replenish referring to "Transfer Oil Change: Non-Shift Type (Transfer without Shift Actuator)".
	Damaged or worn bearing(s)	Replace referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)".
	Damaged or worn gear(s)	Replace referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)".
	Damaged or worn chamfered tooth on sleeve or gear	Replace referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator)".

Repair Instructions

Transfer Oil Change

S5JB0E3326001

Refer to "Transfer Oil Change: Motor-Shift Type (Transfer with Shift Actuator)".

The point which is different from the motor-shift type (transfer with shift actuator) is described.

Transfer oil capacity (Reference)

: 1.6 liters (3.4/2.8 US/Imp.pt)

Transfer Oil Level Check

S5JB0E3326002

Refer to "Transfer Oil Level Check: Motor-Shift Type (Transfer with Shift Actuator)".

Transfer Oil Seal Removal and Installation

S5JB0E3326003

Refer to "Transfer Oil Seal Removal and Installation: Motor-Shift Type (Transfer with Shift Actuator)".

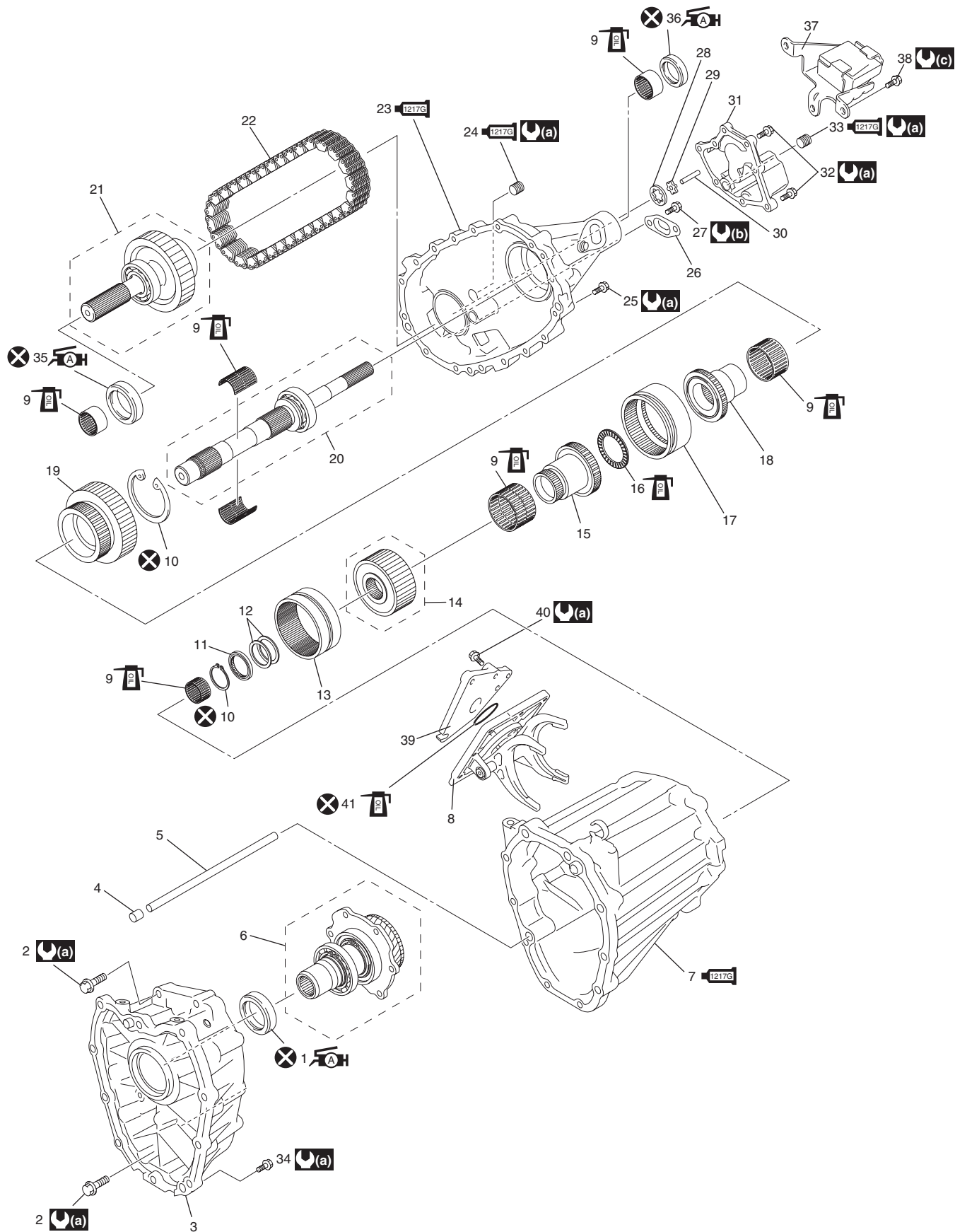
Transfer Assembly Dismounting and Remounting

S5JB0E3326004

Refer to "Transfer Assembly Dismounting and Remounting: Motor-Shift Type (Transfer with Shift Actuator)".

Transfer Assembly Components

S5JB0E3326005



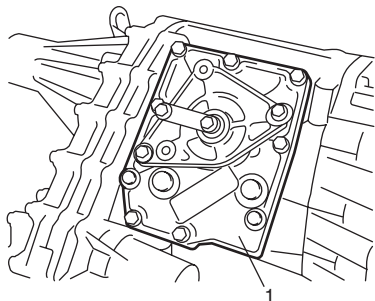
 1. Front oil seal No.1 : Apply grease 99000-25010 to oil seal lip.	17. Differential lock clutch sleeve	 33. Oil drain plug : Apply sealant 99000-31260 to plug thread.
2. Front case bolt	18. Front drive sprocket bush	34. Transfer to transmission bolt
3. Front case	19. Front drive sprocket	 35. Front oil seal No.2 : Apply grease 99000-25010 to oil seal lip.
4. Knock pin	20. Rear output shaft assembly	 36. Rear oil seal : Apply grease 99000-25010 to oil seal lip.
5. Oil pipe	21. Front output shaft assembly	37. Damper
6. Input gear assembly	22. Drive chain	38. Damper bolt
 7. Center case : Apply sealant 99000-31260 to mating surface of front case, differential lock shift lever case and center case.	 23. Rear case : Apply sealant 99000-31260 to mating surface of transfer rear case, oil pump cover and transfer center case.	39. Shift case
8. Differential lock shift lever case	 24. Oil level / filler plug : Apply sealant 99000-31260 to plug thread.	40. Shift lever case bolt
9. Needle bearing	25. Rear case bolt	41. O-ring
10. Snap ring	26. Oil strainer	 : 23 N·m (2.3 kgf-m, 17.0 lb-ft)
11. Washer	27. Oil strainer bolt	 : 10 N·m (1.0 kgf-m, 7.5 lb-ft)
12. Shim	28. Oil pump outer rotor	 : 50 N·m (5.0 kgf-m, 36.5 lb-ft)
13. Reduction shift sleeve	29. Oil pump inner rotor	 : Do not reuse.
14. Center differential assembly	30. Oil pump drive pin	 : Apply transfer oil.
15. Front drive shaft	31. Oil pump cover	
16. Thrust bearing	32. Oil pump cover bolt	

Transfer Assembly Disassembly and Reassembly

S5JB0E3326006

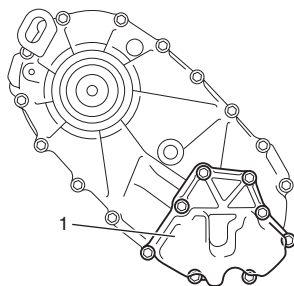
Disassembly

- 1) Remove differential lock shift lever case (1).



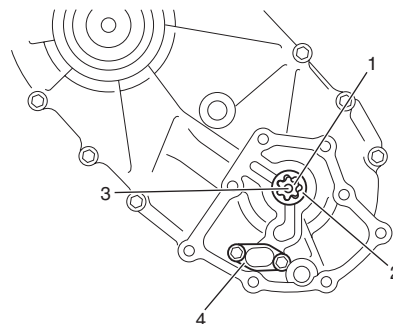
I5JB0A331085-01

- 2) Remove oil pump cover (1).



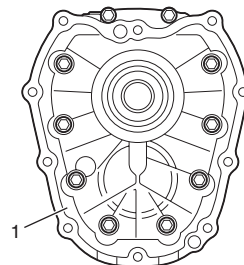
I5JB0A331086-01

- 3) Remove oil pump inner rotor (1), outer rotor (2), oil strainer (4) and drive pin (3).



I5JB0A331013-01

- 4) Remove front case (1).



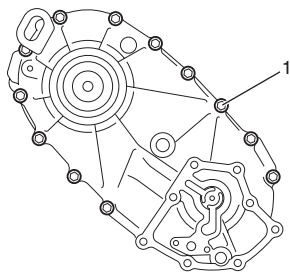
I5JB0A331014-01

3C-81 Transfer: Non-Shift Type (Transfer without Shift Actuator)

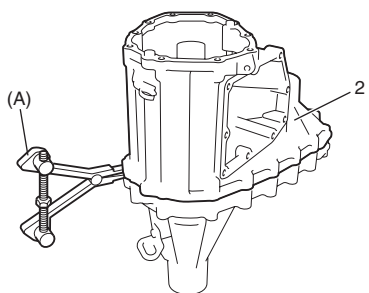
- 5) Remove rear case bolts (1), and then separate center case (2) using special tool.

Special tool

(A): 09912-34510

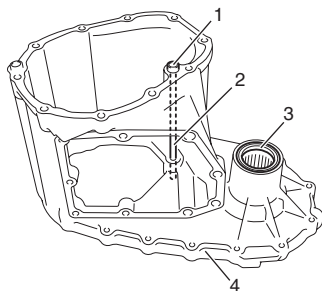


I5JB0A331087-01



I5JB0A331016-02

- 6) Remove knock pin (1) and oil pipe (2) from center case (4) and remove front oil seal No.1 (3) using flat end rod or the like, if necessary.

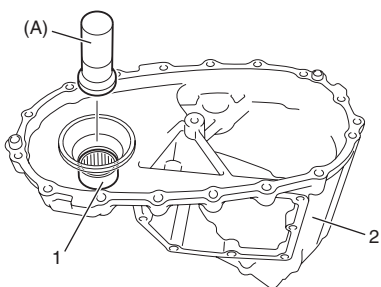


I5JB0A331017-01

- 7) Remove needle bearing (1) from center case (2) using special tool, if necessary.

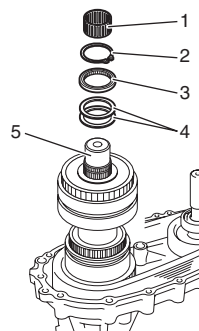
Special tool

(A): 09913-76010



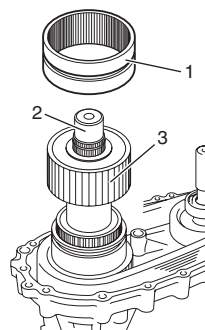
I5JB0A331088-01

- 8) Remove needle bearing (1), snap ring (2), washer (3) and shim(s) (4) from rear output shaft (5).



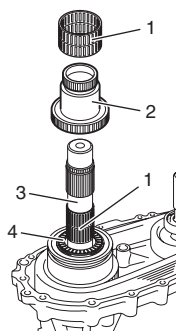
I5JB0A331089-01

- 9) Remove reduction shift sleeve (1) and center differential (3) from rear output shaft (2).



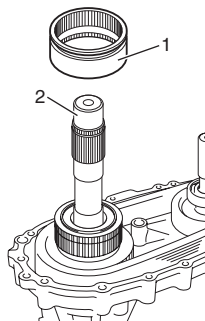
I5JB0A331090-02

- 10) Remove needle bearings (1), front drive shaft (2) and thrust needle bearing (4) from rear output shaft (3).



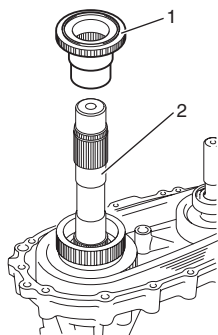
I5JB0A331041-02

- 11) Remove differential lock clutch sleeve (1) from rear output shaft (2).



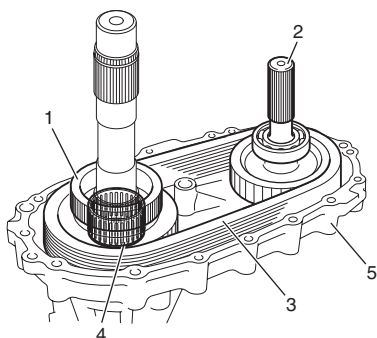
I5JB0A331022-01

- 12) Remove front drive sprocket bush (1) from rear output shaft (2).



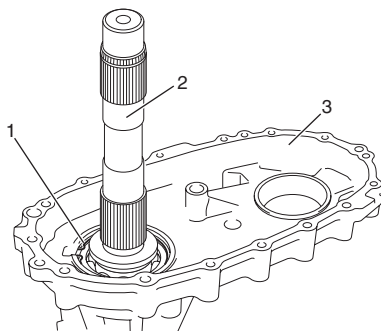
I5JB0A331023-01

- 13) Take out front drive sprocket (1), front output shaft assembly (2), drive chain (3) and needle bearing (4) from rear case (5) all at once.



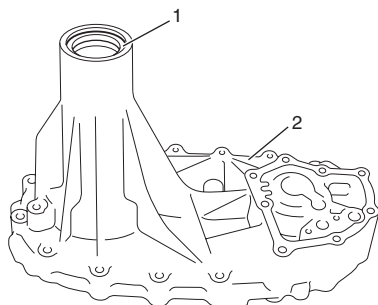
I5JB0A331024-01

- 14) Remove snap ring (1), and then rear output shaft assembly (2) from rear case (3).



I5JB0A331025-01

- 15) Remove rear oil seal (1) from rear case (2) using flat end rod or the like, if necessary.

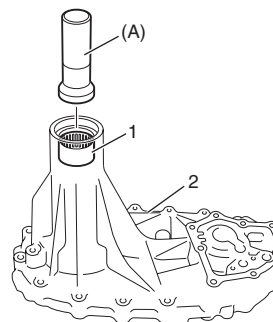


I5JB0A331026-01

- 16) Remove needle bearing (1) from rear case (2) using special tool, if necessary.

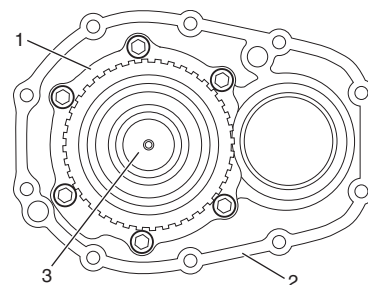
Special tool

(A): 09913-76010



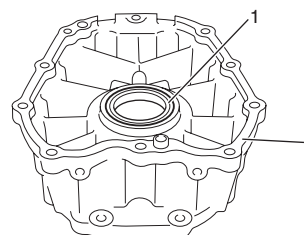
I5JB0A331027-01

- 17) Remove input gear plate (1), and then remove input gear assembly (3) from front case (2).



I5JB0A331091-01

- 18) Remove front oil seal No.2 (1) from front case (2) using flat end rod or the like, if necessary.



I5JB0A331030-01

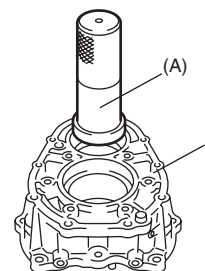
Reassembly

- 1) Install front oil seal No.2 to front case (1) using special tool, and then apply grease to oil seal lip.

: Grease 99000-25010 (SUZUKI Super Grease A)

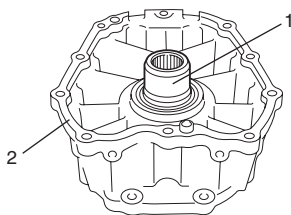
Special tool

(A): 09913-85210



I5JB0A331033-01

- 2) Install input gear assembly (1) to front case (2).

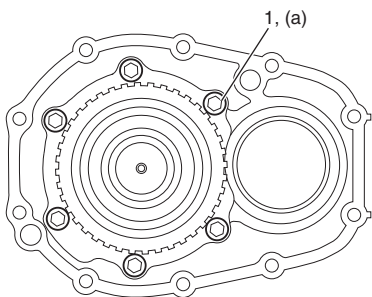


I5JB0A331092-01

- 3) Tighten new input gear plate bolts (1) to specified torque.

Tightening torque

Input gear plate bolt (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



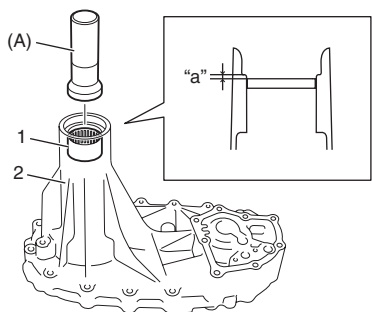
I5JB0A331093-03

- 4) Install needle bearing (1) to rear case (2) using special tool as shown in figure.

Distance between case and needle bearing "a"
: 0 – 0.5 mm (0 – 0.008 in.)

Special tool

(A): 09913-76010



I5JB0A331036-02

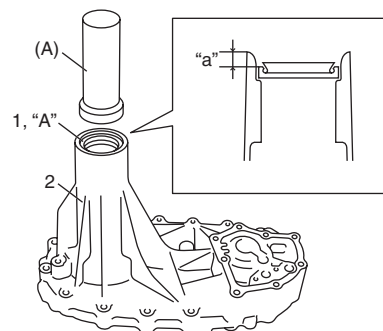
- 5) Install new rear oil seal (1) to rear case (2) using special tool as shown in figure, and then apply grease to oil seal lip.

Distance between case and oil seal "a"
: 3.5 – 4.5 mm (0.138 – 0.177 in.)

"A": Grease 99000-25010 (SUZUKI Super Grease A)

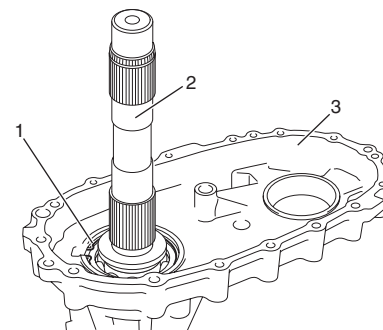
Special tool

(A): 09913-70123



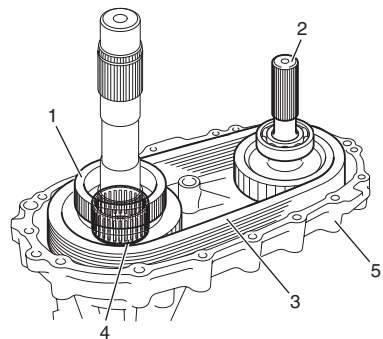
I5JB0A331094-04

- 6) Install rear output shaft assembly (2) to rear case (3), and then install snap ring (1).



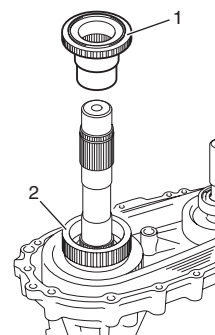
I5JB0A331025-01

- 7) Install front drive sprocket (1), front output shaft assembly (2), drive chain (3) and needle bearing (4) into rear case.



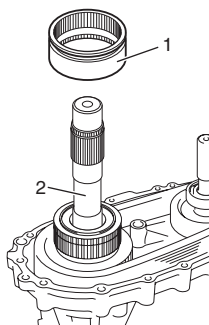
I5JB0A331024-01

- 8) Install front drive sprocket bush (1) into front drive sprocket (2).



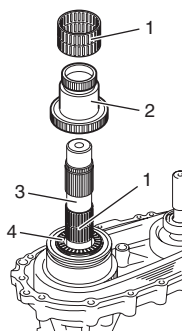
I5JB0A331039-01

- 9) Install differential lock clutch sleeve (1) to rear output shaft (2) as shown in figure.



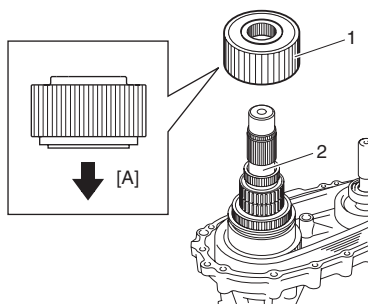
I5JB0A331040-01

- 10) Install thrust needle bearing (4), front drive shaft (2) and needle bearings (1) to rear output shaft (3).



I5JB0A331041-02

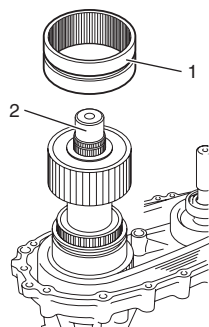
- 11) Install center differential assembly (1) to rear output shaft (2).



I5JB0A331095-02

[A]: Rear case side

- 12) Install reduction shift sleeve (1) to rear output shaft (2).



I5JB0A331096-01

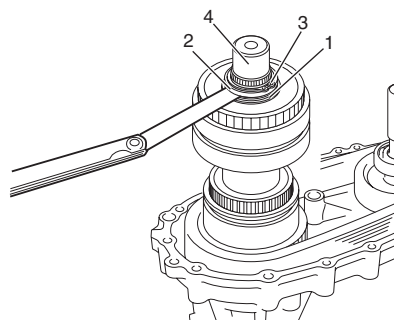
- 13) Select shim (1) as follows.

- Install shim, washer (2) and used snap ring (3) into rear output shaft (4).
- Check clearance between shim and washer.
- If clearance is out of specified value, select shim from the following table so that clearance becomes specified value.

Clearance between shim and washer
: 0.1 – 0.3 mm (0.004 – 0.012 in.)

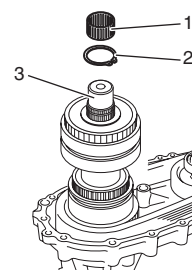
Available shim thickness

0.4 mm (0.016 in.)	1.6 mm (0.063 in.)
0.6 mm (0.024 in.)	1.8 mm (0.071 in.)
0.8 mm (0.031 in.)	2.0 mm (0.079 in.)
1.0 mm (0.039 in.)	2.2 mm (0.087 in.)
1.2 mm (0.047 in.)	2.4 mm (0.098 in.)
1.4 mm (0.055 in.)	



I5JB0A331097-01

- 14) Remove used snap ring, and then install new snap ring (2) and needle bearing (1) to rear output shaft (3).



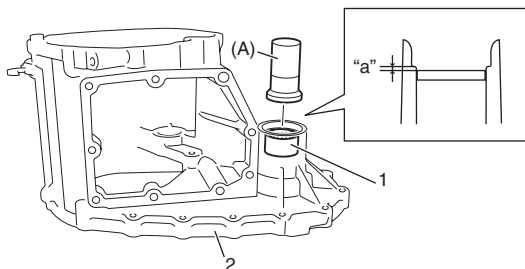
I5JB0A331098-02

- 15) Install needle bearing (1) to center case (2) using special tool as shown in figure.

Distance between case and needle bearing "a"
: 0 – 0.5 mm (0 – 0.008 in.)

Special tool

(A): 09913-76010



I5JB0A331099-02

- 16) Install oil pipe (1) and knock pin (2) into center case (3).

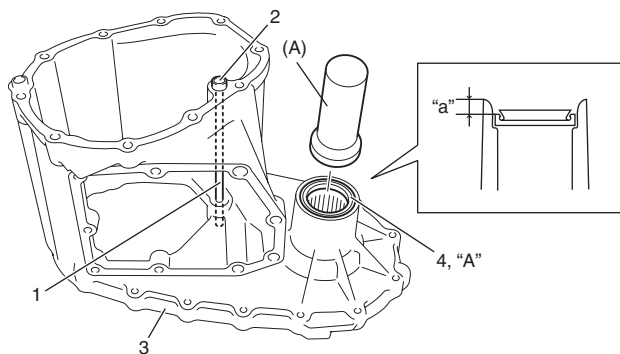
- 17) Install front oil seal No.1 (4) into center case using special tool as shown in figure, and then apply grease to oil seal lip.

Distance between case and oil seal "a"
: 3.5 – 4.5 mm (0.138 – 0.177 in.)

"A": Grease 99000-25010 (SUZUKI Super Grease A)

Special tool

(A): 09913-70123



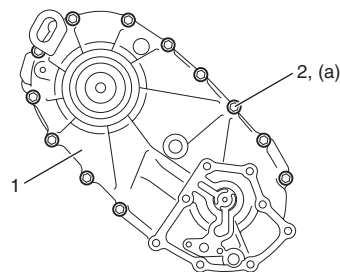
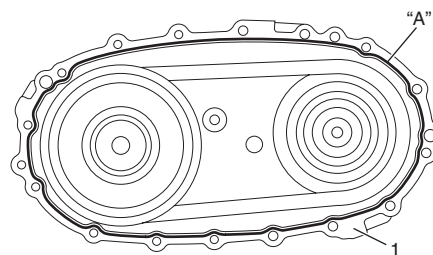
I5JB0A331100-03

- 18) Clean mating surface of both center case and rear case (1), apply sealant to rear case as shown in figure by such amount that its section is 1.2 mm (0.047 in.) in diameter, mate center case with rear case and then tighten bolts (2) to specified torque.

"A": Sealant 99000-31260 (SUZUKI Bond No.1217G)

Tightening torque

Rear case bolt (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



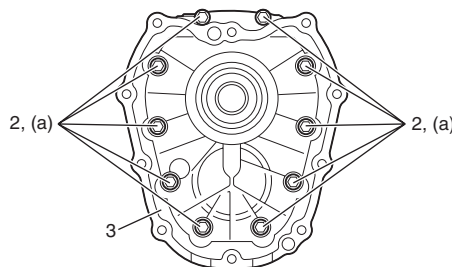
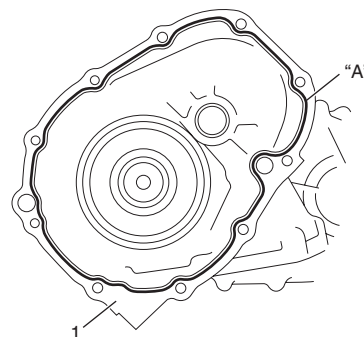
I5JB0A331101-02

- 19) Clean mating surface of both center case (1) and front case, apply sealant to center case as shown in figure by such amount that its section is 1.2 mm (0.047 in.) in diameter, mate front case (3) with center case and then tighten bolts (2) to specified torque.

"A": Sealant 99000-31260 (SUZUKI Bond No.1217G)

Tightening torque

Rear case bolt (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



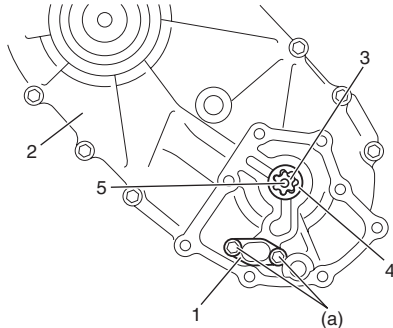
I5JB0A331102-02

- 20) Install oil strainer (1) to rear case (2).

Tightening torque

Strainer bolt (a): 10 N·m (1.0 kgf-m, 7.5 lb-ft)

- 21) Install oil pump inner rotor (3), outer rotor (4) and drive pin (5) to rear case.



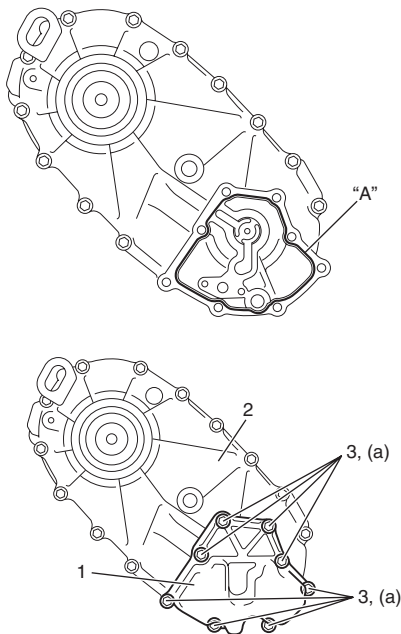
I5JB0A331103-01

- 22) Clean mating surface of oil pump cover (1) and rear case (2), apply sealant to rear case as shown in figure by such amount that its section is 1.2 mm (0.047 in.) in diameter, mate oil pump cover with rear case and then tighten bolts (3) to specified torque.

“A”: Sealant 99000–31260 (SUZUKI Bond No.1217G)

Tightening torque

Oil pump cover bolt (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



I5JB0A331104-01

- 23) Clean mating surface of differential lock shift lever case (1) and center case (5), apply sealant to center case as shown in figure by such amount that its section is 1.2 mm (0.047 in.) in diameter, confirm the each fork of lever case is in groove of the sleeve, mate differential lock shift lever case with center case and then tighten differential lock shift lever case bolts (3) to which thread lock cement has been applied and differential lock shift lever case dowel bolts (4) to specified torque.

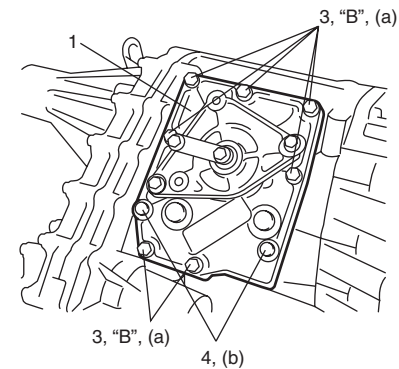
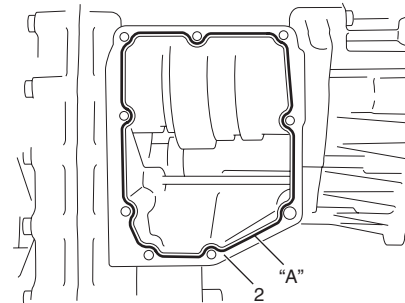
“A”: Sealant 99000–31260 (SUZUKI Bond No.1217G)

“B”: Thread lock cement 99000–32110 (Thread Lock Cement Super 1322)

Tightening torque

Differential lock shift lever case bolt (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)

Differential lock shift lever case dowel bolt (b): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



I5JB0A331105-03

Input Gear Assembly Disassembly and Reassembly

S5JB0E3326007

Refer to “Input Gear Assembly Disassembly and Reassembly: Motor-Shift Type (Transfer with Shift Actuator)”.

Front Output Shaft Assembly Disassembly and Reassembly

S5JB0E3326008

Refer to “Front Output Shaft Assembly Disassembly and Reassembly: Motor-Shift Type (Transfer with Shift Actuator)”.

Rear Output Shaft Assembly Disassembly and Reassembly

S5JB0E3326009

Refer to “Rear Output Shaft Assembly Disassembly and Reassembly: Motor-Shift Type (Transfer with Shift Actuator)”.

Specifications**Tightening Torque Specifications**

S5JB0E3327001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Input gear plate bolt	23	2.3	17.0	⌚
Rear case bolt	23	2.3	17.0	⌚ / ⌚
Strainer bolt	10	1.0	7.5	⌚
Oil pump cover bolt	23	2.3	17.0	⌚
Differential lock shift lever case bolt	23	2.3	17.0	⌚
Differential lock shift lever case dowel bolt	23	2.3	17.0	⌚

NOTE

The specified tightening torque is also described in the following.
 “Transfer Assembly Components: Non-Shift Type (Transfer without Shift Actuator)”

Reference:

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

Special Tools and Equipment**Recommended Service Material**

S5JB0E3328001

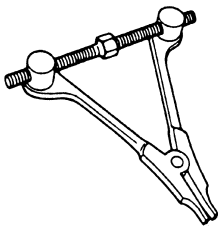
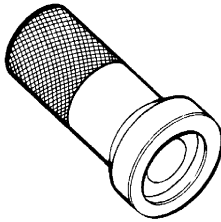
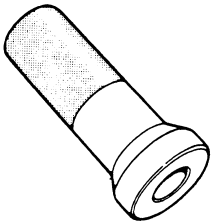
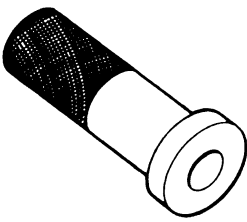
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI Super Grease A	P/No.: 99000-25010	⌚ / ⌚ / ⌚
Sealant	SUZUKI Bond No.1217G	P/No.: 99000-31260	⌚ / ⌚ / ⌚ / ⌚
Thread lock cement	Thread Lock Cement Super 1322	P/No.: 99000-32110	⌚

NOTE

Required service material is also described in the following.
 “Transfer Assembly Components: Non-Shift Type (Transfer without Shift Actuator)”

Special Tool

S5JB0E3328002

09912-34510 Case separator ⌚		09913-70123 Bearing installing tool ⌚ / ⌚	
09913-76010 Bearing installer ⌚ / ⌚ / ⌚ / ⌚		09913-85210 Bearing installer ⌚	

Section 4

Brakes

CONTENTS

NOTE

For the items with asterisk (*) in the “CONTENTS” below, refer to the same section of the service manual mentioned in the “FOREWORD” of this manual.

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Precautions

Precautions

Precautions for Brakes

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Suspension Caution

Refer to "Suspension Caution: in Section 00 in related manual".

Wheels and Tires Caution

Refer to "Wheels and Tires Caution: in Section 00 in related manual".

Brake Caution

Refer to "Brakes Caution and Note: in Section 00".

General Precautions

Refer to "General Precautions: in Section 00 in related manual".

Vehicle Lifting Points

Refer to "Vehicle Lifting Points: in Section 0A in related manual".

Fastener Caution

Refer to "Fastener Caution: in Section 00 in related manual".

Fastener Information

Refer to "Fastener Information: in Section 0A in related manual".

Brake Control System and Diagnosis

General Description

Brakes Construction

S5JB0E4101001

When the foot brake pedal is depressed, hydraulic pressure is developed in the master cylinder (2) to actuate pistons (two in front and four in rear).

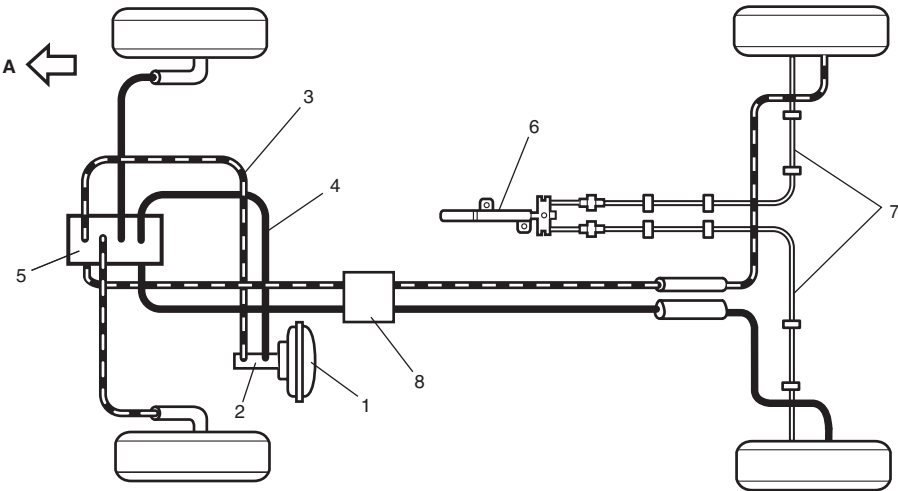
The master cylinder is a tandem master cylinder. Brake pipes are connected to the master cylinder and they make two independent circuits. One connects front right and rear left brakes and the other connects front left and rear right brakes.

In this brake system, the disc brake type is used for the front wheel brake and a drum brake type (leading / trailing shoes) for the rear brake.

The parking brake system is mechanical. It applies brake force to only rear wheels by means of the cable and mechanical linkage system. The same brake shoes are used for both parking and foot brakes.

NOTE

The difference between RH steering vehicle and LH steering vehicle is the location of the brake master and the brake booster only.

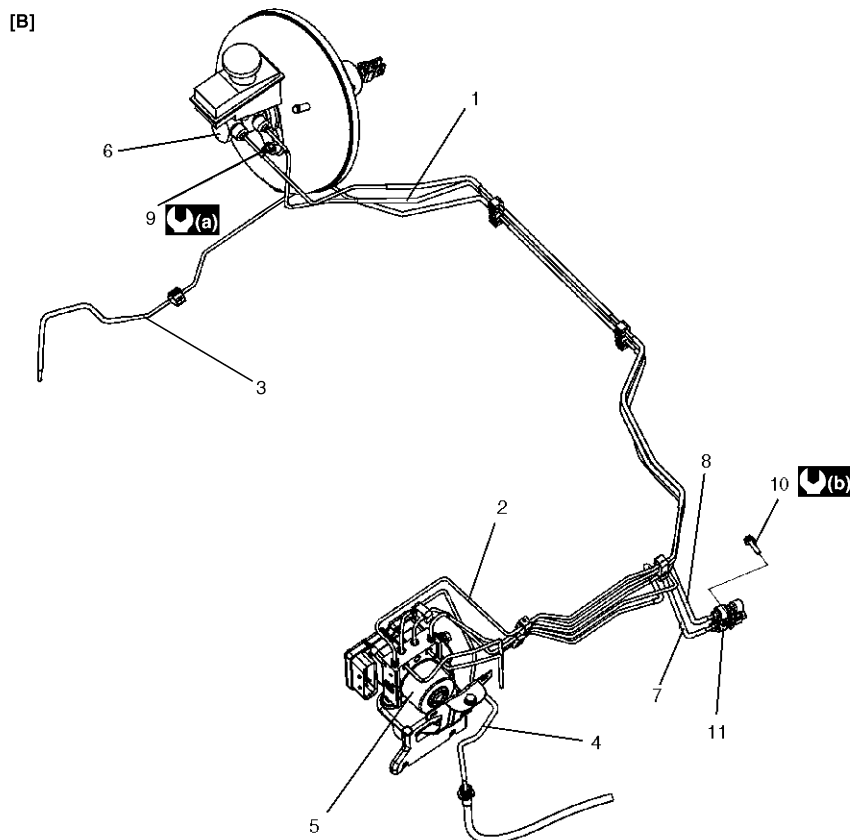
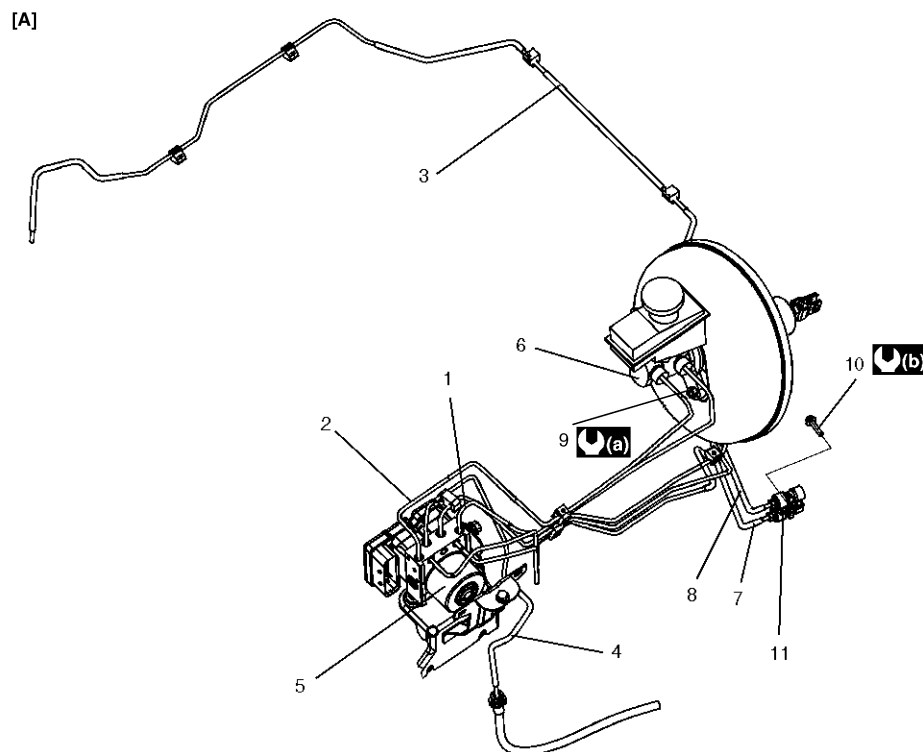


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1. Brake booster	4. Primary side	7. Parking brake cable
2. Master cylinder	5. ABS (ESP®) hydraulic unit / control module assembly	8. 4-way joint
3. Secondary side	6. Parking brake lever	A: Forward

Front Brake Hose / Pipe Construction

S5JB0E4101002



I5JB0A410002-03

[A]: For LH steering vehicle	4. From ABS hydraulic unit to left front brake	9. Master cylinder fixing nut
[B]: For RH steering vehicle	5. ABS (ESP®) hydraulic unit / control module assembly	10. Brake joint bolt
1. From master cylinder primary to ABS hydraulic unit	6. Master cylinder	11. 4-way joint
2. From master cylinder secondary to ABS hydraulic unit	7. From ABS (ESP®) hydraulic unit to left rear brake	(a) : 18 N-m (1.8 kgf-m, 13.0 lb-ft)
3. From ABS hydraulic unit to right front brake	8. From ABS (ESP®) hydraulic unit to right rear brake	(b) : 11 N-m (1.1 kgf-m, 8.0 lb-ft)

Diagnostic Information and Procedures

Brakes Symptom Diagnosis

S5JB0E4104002

Condition	Possible cause	Correction / Reference Item
Not enough braking force	Brake fluid leakage from brake lines	Locate leaking point and repair.
	Brake disc or pads stained with fluid	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 fluid or wet with water	Replace.
	Badly worn brake shoe linings	Replace.
	Defective wheel cylinders	Repair or replace.
	Malfunctioning caliper assembly	Repair or replace.
	Air in system	Bleed system.
	Malfunctioning ABS (ESP®), if equipped	Check system and replace as necessary.
Brake pull (Brakes not working in unison)	Pad or shoe linings are wet with water or stained with fluid in some brakes	Replace.
	Drum-to-shoe clearance out of adjustment in some brakes. (malfunctioning auto adjusting mechanism)	Check for inoperative auto adjusting mechanism.
	Drum is out of round in some brakes	Replace.
	Wheel tires are inflated unequally	Inflate equally.
	Malfunctioning wheel cylinders	Repair or replace.
	Disturbed front end 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 brake piping.
	Malfunctioning caliper assembly	Check for stuck or sluggish pistons and proper lubrication of caliper slide bush.
	Loose suspension parts	Caliper should slide. Check all suspension mountings.
	Loose calipers	Check and torque bolts to specifications.
Brake locked (For vehicles equipped with ABS (ESP®))	Malfunctioning ABS (ESP®), if equipped	Check system and replace as necessary.
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 systems. Check warning light. Bleed system if required.
	Air in system (pedal soft / spongy)	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.
Dragging brakes (A very light drag is present in all disc brakes immediately after pedal is released)	Master cylinder pistons not returning correctly	Replace master cylinder.
	Restricted brake pipes or hoses	Check for soft hoses or damaged pipes and replace with new hoses and/or new brake pipes.
	Incorrect parking brake adjustment on rear brakes	Check and adjust to correct specifications.
	Weakened or broken return springs in the brake	Replace.
	Sluggish parking-brake cables or linkage	Repair or replace.
	Wheel cylinder or caliper piston sticking	Repair as necessary.
	Malfunctioning ABS (ESP®), if equipped	Check system and replace as necessary.

Condition	Possible cause	Correction / Reference Item
Pedal pulsation (Pedal pulsates when depressed for braking)	Damaged or loose wheel bearings	Replace wheel bearings.
	Distorted steering knuckle or rear axle shafts	Replace knuckle or rear axle shaft.
	Excessive disc lateral runout	Check per instructions. If not within specifications, replace or machine the disc.
	Parallelism not within specifications	Check per instructions. If not with specifications, replace or machine the disc.
	Rear drums out of round	Check runout. Repair or replace drum as necessary.
Braking noise	Glazed shoe linings, or foreign matters stuck to linings	Repair or replace shoe lining.
	Worn or distorted shoe linings	Replace shoe lining (or pad).
	Loose front wheel bearings	Replace wheel bearing.
	Distorted backing plates or loose mounting bolts	Replace or retighten securing bolts.
Brake warning light turns ON after engine start	Parking brake applied	Release parking brake and check that brake warning light turns off.
	Insufficient amount of brake fluid	Add brake fluid.
	Brake fluid leaking from brake line	Investigate leaky point, correct it and add brake fluid.
	Brake warning light circuit faulty	Repair circuit.
	Malfunctioning EBD system, if equipped with ABS (ESP®)	Check system referring to "EBD Warning Lamp (Brake Warning Lamp) Comes ON Steady: in Section 4E".
Brake warning light turns on when brake is applied	Brake fluid leaking from brake line	Investigate leaky point, correct it and add brake fluid.
	Insufficient amount of brake fluid	Add brake fluid.
Brake warning light fails to turn on even when parking brake is applied	Brake warning light circuit open	Repair circuit.
ABS warning light or ESP® warning light does not turn ON for 2 – 3 sec. after ignition switch has turned ON	ABS warning light circuit open (including check relay)	Repair or replace.
	Malfunctioning ABS (ESP®)	Check system referring to "ABS Warning Lamp Does Not Come ON at Ignition Switch ON: in Section 4E" or "ESP® Warning Lamp Does Not Come ON at Ignition Switch ON: in Section 4F".
ABS warning light or ESP® warning light remains ON after ignition switch has turned ON for 2 – 3 sec.	Malfunctioning ABS (ESP®)	Check system referring to "ABS Warning Lamp Does Not Come ON at Ignition Switch ON: in Section 4E" or "ESP® Warning Lamp Does Not Come ON at Ignition Switch ON: in Section 4F".

Repair Instructions

Front Brake Hose / Pipe Removal and Installation

S5JB0E4106011

⚠ CAUTION

Do not allow brake fluid to get on painted surfaces. Painted surfaces will be damaged by brake fluid, flush it with water immediately if any fluid is spilled.

Removal

- 1) Raise and support vehicle properly. Remove tire and wheel.

NOTE

This operation is not necessary when removing pipes connecting master cylinder.

- 2) Clean dirt and foreign material from both flexible hose end and pipe end fittings.
- 3) Drain brake fluid in reservoir.
- 4) Remove brake flexible hose or pipe.

Installation

Reverse brake flexible hose removal procedure, noting the following.

- Make sure that steering wheel is in straight-forward position and flexible hose has not twist or kink.
- Tighten brake pipe flare nut to specified torque.

Tightening torque

Brake pipe flare nut for M10: 16 N·m (1.6 kgf-m, 12.0 lb-ft)

Brake pipe flare nut for M12: 19 N·m (1.9 kgf-m, 14.0 lb-ft)

- Check to make sure that flexible hose doesn't contact any part of suspension, both in extreme right and extreme left turn conditions.
If it does at any point, remove and correct. Fill and maintain brake fluid level in reservoir.
- Bleed brake system. Refer to "Air Bleeding of Brake System: in related manual".
- Perform brake test and check installed part for fluid leakage.

Rear Brake Hose / Pipe Removal and Installation

S5JB0E4106012

⚠ CAUTION

Do not allow brake fluid to get on painted surfaces. Painted surfaces will be damaged by brake fluid, flush it with water immediately if any fluid is spilled.

Removal

- 1) Raise and support vehicle properly. Remove tire and wheel.
- 2) Clean dirt and foreign material from both flexible hose end and pipe end fittings.
- 3) Drain brake fluid in reservoir.
- 4) Remove brake flexible hose or pipe.

Installation

Reverse brake flexible hose removal procedure, noting the following.

- Tighten brake pipe flare nut to specified torque.

Tightening torque

Brake pipe flare nut for M10: 16 N·m (1.6 kgf-m, 12.0 lb-ft)

- Fill and maintain brake fluid level in reservoir.
- Bleed brake system. Refer to "Air Bleeding of Brake System: in related manual".
- Perform brake test and check each installed part for fluid leakage.
- Install clamps properly referring to the figure and tighten bolts.
- When installing hose, make sure that it has no twist or kink.

Master Cylinder Reservoir Removal and Installation

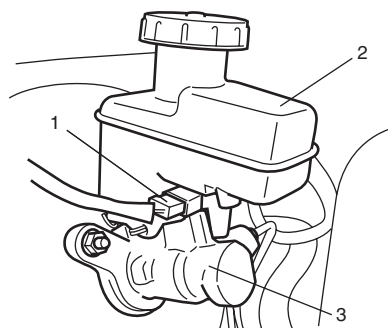
S5JB0E4106014

⚠ CAUTION

Do not allow brake fluid to get on painted surfaces. Painted surfaces will be damaged by brake fluid, flush it with water immediately if any fluid is spilled.

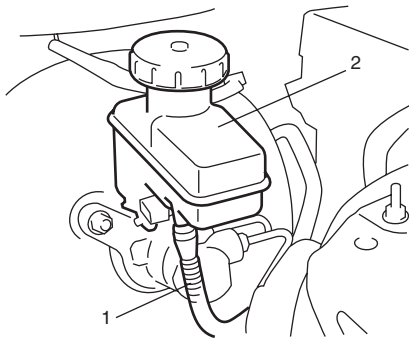
Removal

- 1) Disconnect reservoir lead wire at coupler (1).
- 2) Clean outside of reservoir (2) and master cylinder (3).



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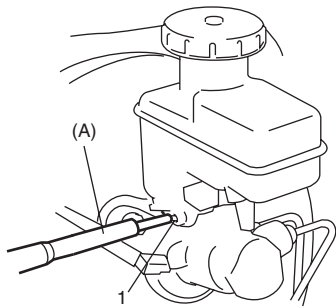
- 3) Take out fluid with syringe or such.
- 4) Disconnect clutch reservoir hose (1) from reservoir (2) for M/T vehicle.



I5JB0A410012-02

- 5) Remove reservoir connector pin (1) by using special tool and then reservoir.

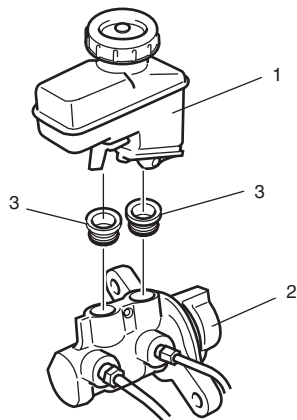
Special tool
(A): 09916-44310



I5JB0A410013-02

Installation

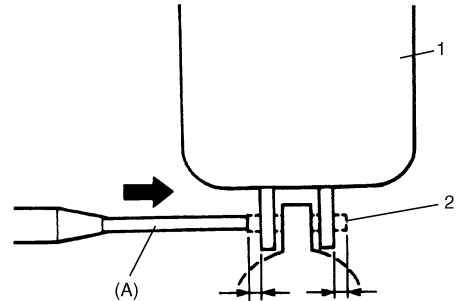
- 1) Lubricate new grommets with the same fluid as the one to fill reservoir (1) with. Then press-fit grommets (3) to master cylinder (2). Grommets (3) must be seated in place.



I5JB0A410014-01

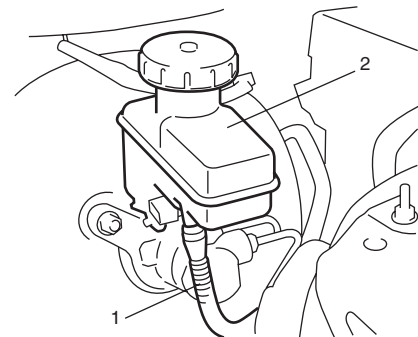
- 2) Install reservoir (1) and drive in reservoir connector pin (2) by using special tool (A). till both of its ends at the right and left of reservoir becomes the same length.

Special tool
(A): 09916-44310



I5JB0A410015-01

- 3) Connect clutch reservoir hose (1) to reservoir (2) for M/T vehicle.



I5JB0A410012-02

- 4) Connect reservoir lead wire at coupler.
- 5) Fill reservoir with specified fluid.
- 6) After installing, bleed air from brake system referring to "Air Bleeding of Brake System: in related manual" and at the same time bleed air from clutch system referring to "Air Bleeding of Clutch System: in Section 5C in related manual" for M/T vehicle.
- 7) Upon completion of installation, check for fluid leakage.

Master Cylinder Assembly Removal and Installation

S5JB0E4106015

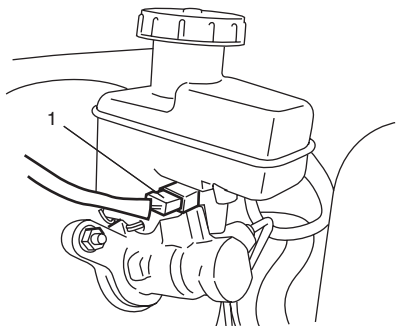
⚠ CAUTION

- **Never disassemble master cylinder. Disassembly will spoil its original function. If faulty condition is found, replace it with new one as an assembly.**
- **Do not allow brake fluid to get on painted surfaces. Painted surfaces will be damaged by brake fluid, flush it with water immediately if any fluid is spilled.**

4A-7 Brake Control System and Diagnosis:

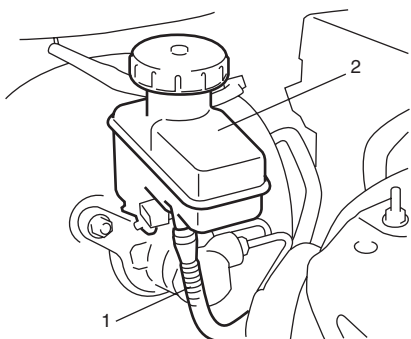
Removal

- 1) Disconnect reservoir lead wire at coupler (1).



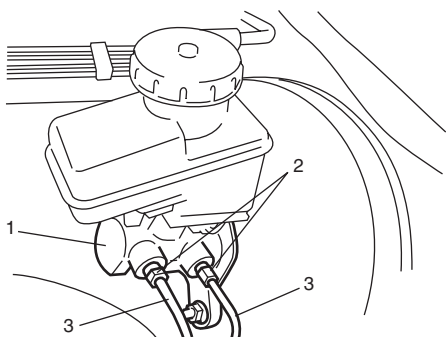
I5JB0A410016-02

- 2) Clean outside of master cylinder and take out fluid with syringe or such.
- 3) Disconnect clutch reservoir hose (1) from reservoir (2) for M/T vehicle.



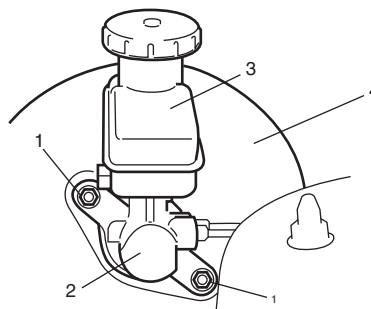
I5JB0A410012-02

- 4) Loosen brake pipe flare nuts (2) for master cylinder (1).
- 5) Disconnect brake pipes (3) from master cylinder (1).



I5JB0A410017-01

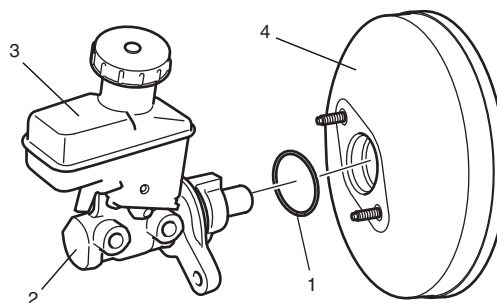
- 6) Loosen master cylinder fixing nuts (1) and then remove master cylinder (2) with reservoir (3) from brake booster (4).



I5JB0A410018-02

Installation

- 1) Install new master cylinder O-ring (1) to master cylinder.
- 2) Install master cylinder (2) with reservoir (3) to brake booster (4).

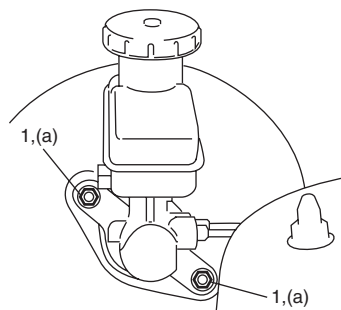


I5JB0A410019-01

- 3) Tighten master cylinder fixing nuts (1) to specified torque.

Tightening torque

Master cylinder fixing nut (a): 18 N·m (1.8 kgf-m, 13.0 lb-ft)



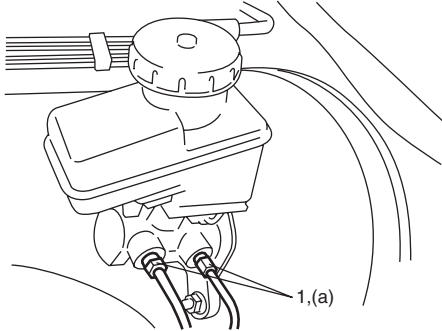
I5JB0A410021-02

- 4) Connect brake pipes to master cylinder and tighten brake pipe flare nuts (1) to specified torque.

Tightening torque

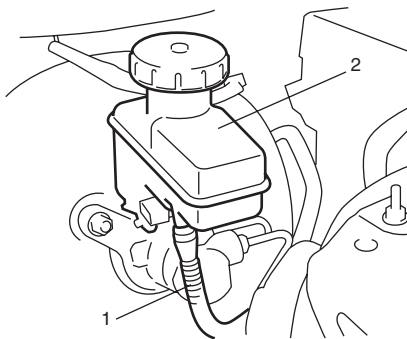
Brake pipe flare nut for M10 (a): 16 N·m (1.6 kgf-m, 12.0 lb-ft)

Brake pipe flare nut for M12 (a): 19 N·m (1.9 kgf-m, 14.0 lb-ft)



I5JB0A410020-01

- 5) Connect clutch reservoir hose (1) to reservoir (2) for M/T vehicle.



I5JB0A410012-02

- 6) Connect reservoir lead wire at coupler.
- 7) Fill reservoir with specified brake fluid.
- 8) After installing, bleed air from brake system referring to "Air Bleeding of Brake System: in related manual" and at the same time bleed air from clutch system referring to "Air Bleeding of Clutch System: in Section 5C in related manual" for M/T vehicle.
- 9) Perform brake test and check each installed part for fluid leakage.

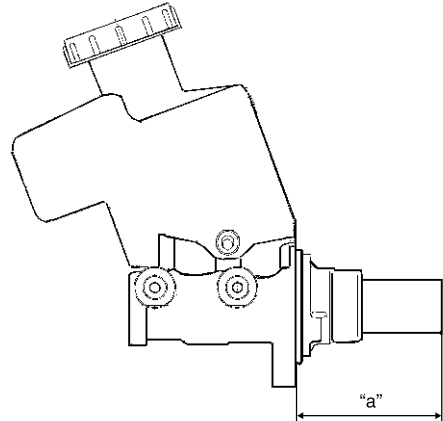
Master Cylinder Assembly Inspection

S5JB0E4106016

- Check master cylinder for corrosion and smooth operation.
- Inspect distance "a" to be the following.
If measurement is out of specification, replace master cylinder assembly.

Distance

"a": 72.0 mm (2.83 in.)



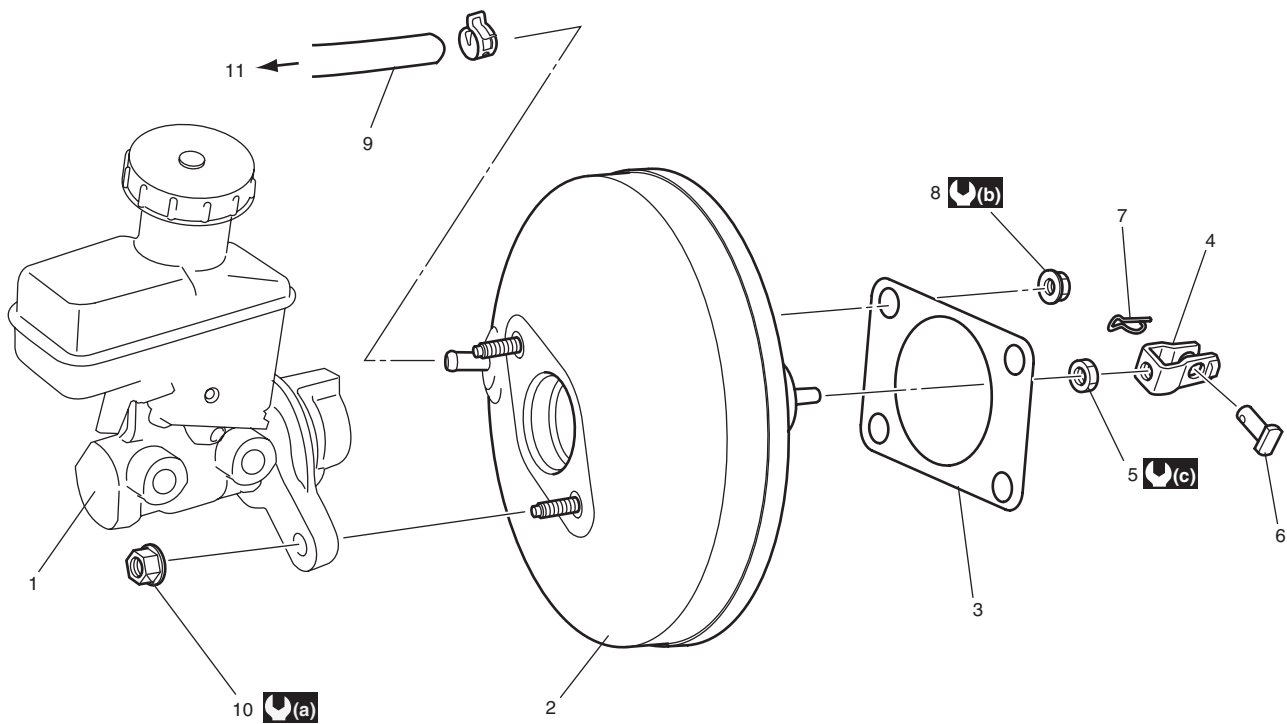
I5JB0A410022-01

Brake Booster Components

S5JB0E4106017

NOTE

The difference between RH steering vehicle and LH steering vehicle booster components is the location of vacuum hose.



I5JB0D410001-01

1. Brake master cylinder assembly	5. Clevis pin lock nut	9. Brake vacuum hose	(b) : 13 N·m (1.3 kgf·m, 9.5 lb·ft)
2. Brake booster assembly	6. Clevis pin	10. Master cylinder fixing nut	(c) : 26 N·m (2.6 kgf·m, 19.0 lb·ft)
3. Gasket	7. Clip	11. To intake manifold	
4. Push rod clevis	8. Booster attaching nut	(a) : 18 N·m (1.8 kgf·m, 13.0 lb·ft)	

Brake Booster Removal and Installation

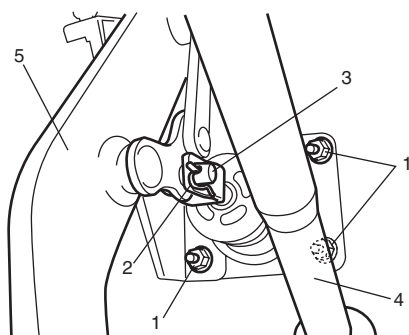
S5JB0E4106018

Removal

- 1) Disconnect brake pipes from ABS (ESP®) hydraulic unit / control module assembly if equipped.
- 2) Remove master cylinder assembly, referring to "Master Cylinder Assembly Removal and Installation: ".
- 3) Disconnect brake vacuum hose from brake booster.
- 4) Remove clip (2) and the disconnect clevis pin (3).
- 5) Remove attaching nuts (1) and then remove booster as shown in the figure.

CAUTION

Never disassemble brake booster. Disassembly will spoil its original function. If is found faulty, replace it with new one.



I5JB0A410024-01

- | |
|--------------------|
| 4. Steering column |
| 5. Brake pedal arm |

Installation

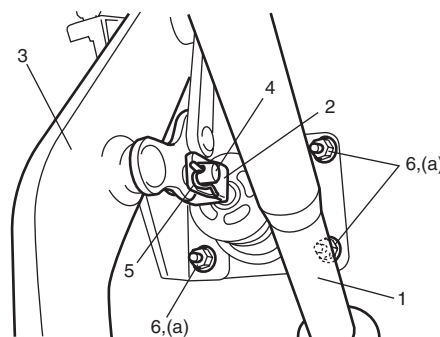
NOTE

- **Check length of push rod clevis (2). Refer to "Booster Push Rod Clevis Adjustment: in related manual".**

- 1) Install gasket to booster and then install booster to dash panel as shown in the figure. Then connect booster push rod clevis (2) to pedal arm (3) with clevis pin inserting from left (4) and clip (5).
- 2) Tighten booster attaching nuts (6) to the specified torque.

Tightening torque

Booster attaching nut (a): 13 N·m (1.3 kgf-m, 9.5 lb-ft)



I5JB0A410025-01

- | |
|--------------------|
| 1. Steering column |
|--------------------|

- 3) Connect brake vacuum hose to brake booster.
- 4) Install master cylinder referring to "Master Cylinder Assembly Removal and Installation: ".
- 5) Connect brake pipes to ABS (ESP®) hydraulic unit / control module assembly (if equipped) referring to "ABS (ESP®) Hydraulic Unit / Control Module Assembly Removal and Installation: in Section 4E".
- 6) Fill reservoir with specified brake fluid.
- 7) After installing, bleed air from brake system referring to "Air Bleeding of Brake System: in related manual" and at the same time bleed air from clutch system referring to "Air Bleeding of Clutch System: in Section 5C in related manual" for M/T vehicle.
- 8) Perform brake test and check each installed part for fluid leakage.

Specifications

Tightening Torque Specifications

S5JB0E4107001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Brake pipe flare nut for M10	16	1.6	12.0	🔧 / 🔧 / 🔧
Brake pipe flare nut for M12	19	1.9	14.0	🔧 / 🔧
Master cylinder fixing nut	18	1.8	13.0	🔧
Booster attaching nut	13	1.3	9.5	🔧

NOTE

The specified tightening torque is also described in the following.
“Front Brake Hose / Pipe Construction: ”
“Brake Booster Components: ”

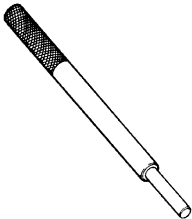
Reference:

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

Special Tools and Equipment

Special Tool

S5JB0E4108001

09916-44310 Valve guide remover (5 mm) 🔧 / 🔧 	
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Front Brakes

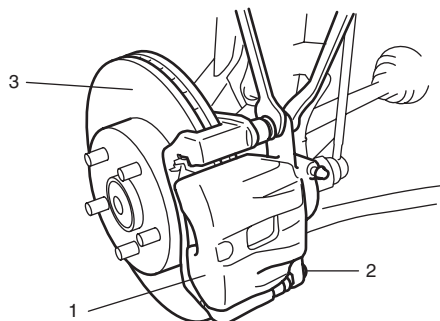
Repair Instructions

Front Disc Brake Pad Removal and Installation

S5JB0E4206003

Removal

- 1) Hoist vehicle and remove front wheel.
- 2) Remove caliper pin bolts (2).



I5JB0A420003-01

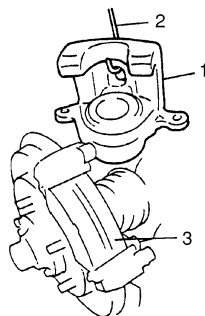
1. Caliper
3. Disc

- 3) Remove caliper (1) from caliper carrier.

NOTE

Hang removed caliper (1) with a wire hook (2) or the like so as to prevent brake hose from bending and twisting excessively or being pulled. Don't operate brake pedal with pads removed.

- 4) Remove pads (3).



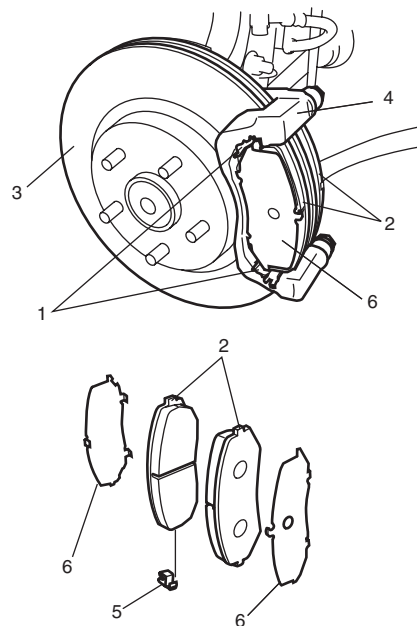
I1SQ01420004-01

Installation

- 1) Install pad spring (1) and pads (2).

NOTE

Install brake pad with wear indicator (5) to vehicle center side on right wheel brake.



I5JB0A420004-01

3. Disc	6. Shim
4. Caliper carrier	

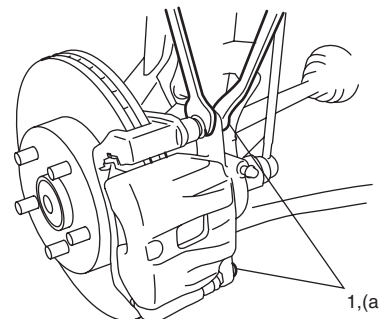
- 2) Install caliper and tighten caliper (slide) pin bolts (1) to specified torque.

NOTE

Make sure that boots are fit into groove securely.

Tightening torque

Caliper pin bolt (a): 36 N·m (3.6 kgf-m, 26.0 lb-ft)



I5JB0A420005-01

4B-2 Front Brakes:

- 3) Install wheel and lower vehicle.
- 4) Tighten wheel nuts to specified torque.

Tightening torque

Wheel nut: 100 N·m (10.0 kgf-m, 72.5 lb-ft)

- 5) Upon completion of installation, perform brake test.

Front Disc Brake Caliper Removal and Installation

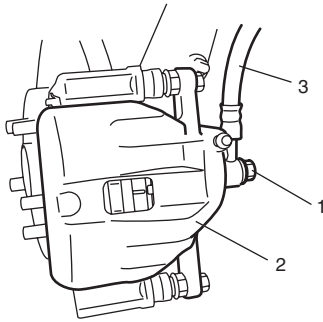
S5JB0E4206005

Removal

- 1) Hoist vehicle and remove front wheel.
- 2) Remove brake flexible hose mounting bolt (1) from caliper (2). As this will allow fluid to flow out of hose (3), have a container ready beforehand.

⚠ CAUTION

Be careful not to twist flexible hose while loosening the bolt.



I5JB0A420006-01

- 3) Remove caliper pin bolts.
- 4) Remove caliper.

Installation

- 1) Apply rubber grease to slide pin, then install caliper to caliper carrier.

NOTE

Use rubber grease whose viscosity varies very little even at -40 °C (-40 °F) if applied.

- 2) Tighten caliper pin bolts to specified torque.

NOTE

Make sure that boots are fit into groove securely.

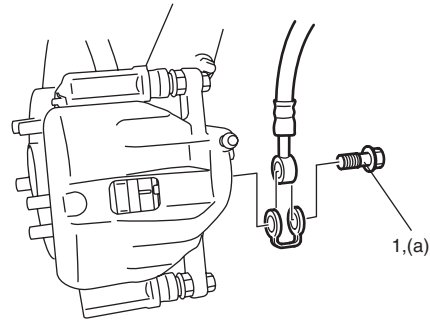
Tightening torque

Caliper pin bolt: 36 N·m (3.6 kgf-m, 26.0 lb-ft)

- 3) Install brake flexible hose as shown and tighten flexible hose joint bolt (1) to specified torque.

Tightening torque

Flexible hose joint bolt (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



I5JB0A420009-02

- 4) Install wheel and lower vehicle.
- 5) Tighten wheel nuts to specified torque.

Tightening torque

Wheel nut: 100 N·m (10.0 kgf-m, 72.5 lb-ft)

- 6) After completing installation, fill reservoir with specified brake fluid and bleed brake system. Check each installed part for oil leakage and perform brake test.

Front Brake Disc Removal and Installation

S5JB0E4206008

Removal

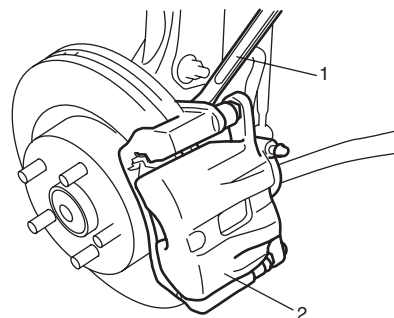
- 1) Hoist vehicle and remove front wheel.
- 2) Remove caliper assembly (2) by loosening caliper carrier bolts (1) (2 pcs).

⚠ CAUTION

During removal, be careful not to damage brake flexible hose and not to depress brake pedal.

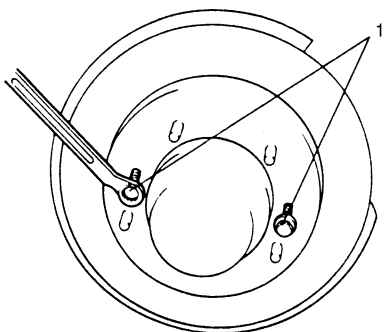
NOTE

Hang removed caliper with a wire hook or the like so as to prevent brake hose from bending and twisting excessively or being pulled.



I5JB0A420010-01

3) Remove disc by using 8 mm bolts (1) (2 pcs).



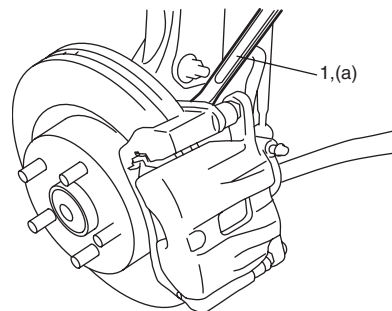
IYSQ01420025-01

Installation

- 1) Install disc to wheel hub.
- 2) Install caliper assembly to steering knuckle.
- 3) Tighten caliper carrier bolts (1) to specification.

Tightening torque

Caliper carrier bolt (a): 85 N·m (8.5 kgf-m, 61.5 lb-ft)



I5JB0A420011-01

- 4) Install wheel and lower vehicle.
- 5) Tighten wheel nuts to specified torque.

Tightening torque

Wheel nut: 100 N·m (10.0 kgf-m, 72.5 lb-ft)

- 6) Upon completion of installation, perform brake test.

Specifications

Tightening Torque Specifications

S5JB0E4207001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Caliper pin bolt	36	3.6	26.0	⌚ / ⌚
Wheel nut	100	10.0	72.5	⌚ / ⌚ / ⌚
Flexible hose joint bolt	23	2.3	17.0	⌚
Caliper carrier bolt	85	8.5	61.5	⌚

Reference:

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

ABS

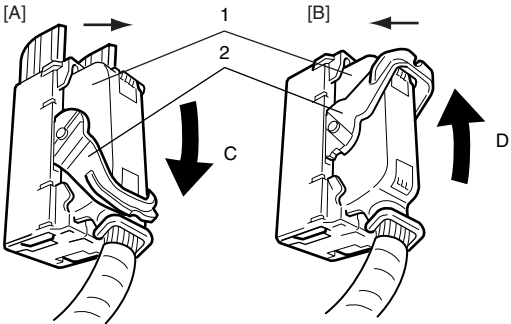
Precautions

Precautions in Diagnosing Troubles

S5JB0E4500001

To ensure that the trouble diagnosis is done accurately and smoothly, observe the following and follow “ABS Check: ”.

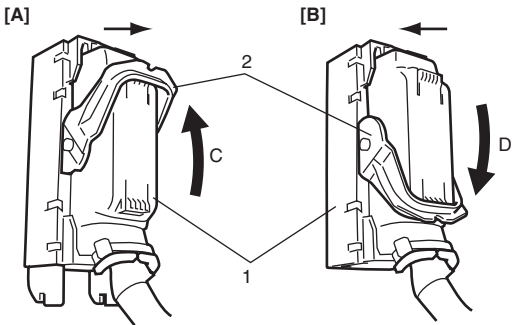
- Diagnostic information stored in ABS (ESP®) control module memory can be cleared as well as checked by using SUZUKI scan tool. Before using scan tool, read its Operator’s (Instruction) Manual carefully to have good understanding as to what functions are available and how to use it.
- If the vehicles was operated in any of the following ways, ABS warning lamp may light momentarily but this does not indicate anything abnormal in ABS.
 - The vehicle was driven with parking brake pulled.
 - The vehicle was driven with brake dragging.
 - The vehicle was stuck in mud, sand, etc.
 - Wheel spin occurred while driving.
 - Wheel(s) was rotated while the vehicle was jacked up.
- Be sure to read “Precaution for CAN Communication System: in Section 00 in related manual” before inspection and observe what is written there.
- Be sure to use the trouble diagnosis procedure as described in “ABS Check: ”. Failure to follow it may result in incorrect diagnosis. (Some other diagnosis trouble code may be stored by mistake in the memory of ABS (ESP®) control module during inspection.)
- When disconnecting ABS hydraulic unit / control module connector (1), pull down lock lever (2) of connector.
When connecting, set the connector on ABS hydraulic unit / control module assembly and pull up the lock lever (2) until it locks.



I4RH01450001-01

[A]: Disconnect	C: Pull down to disconnect
[B]: Connect	D: Pull up to connect

- When disconnecting ESP® hydraulic unit / control module connector (1), pull up lock lever (2) of connector.
When connecting, set the connector on ESP® hydraulic unit / control module assembly and pull down the lock lever (2) until it locks.



I6JB01450001-02

A: Disconnect	C: Pull up to disconnect
B: Connect	D: Pull down to connect

- Communication of ECM, TCM (for A/T model), BCM, ABS (ESP®) control module (if equipped), 4WD control module (if equipped), keyless start control module (if equipped) and combination meter is established by CAN (Controller Area Network).
Therefore, be sure to read “Precautions for Installing Mobile Communication Equipment: in Section 00 in related manual” before inspection and handle CAN communication line.

Precautions in On-Vehicle Service

S5JB0E4500002

When connector is connected to ABS (ESP®) hydraulic unit / control module assembly, do not disconnect connectors of sensors with ignition switch ON. Otherwise, DTC will be set in ABS (ESP®) control module.

Precautions in Hydraulic Unit Operation Check

S5JB0E4500003

ABS (ESP®) hydraulic unit / control module assembly function is checked by correct wheel lock / release condition when brake pressure is pressurized / depressurized using SUZUKI scan tool. The hydraulic unit operation check referring to “Hydraulic Unit Operation Check: ” should be performed to confirm the correct brake pipe connection in the following cases.

- ABS (ESP®) hydraulic unit / control module assembly was replaced.
- Brake pipe and/or hose were replaced.

General Description

ABS Description

S5JB0E4501001

ABS is controlled by ABS control module or by ESP® control module (if equipped).

ABS activation and control with ESP® are done by ESP® hydraulic unit / control module assembly.

Regarding TCS and stability control excluding ABS system with ESP®, refer to Section 4F.

The ABS (Antilock Brake System) controls the fluid pressure applied to the wheel cylinder of each brake from the master cylinder so that each wheel is not locked even when hard braking is applied.

This ABS has also the following function.

While braking is applied, but before ABS control becomes effective, braking force is distributed between the front and rear so as to prevent the rear wheels from being locked too early for better stability of the vehicle.

The main component parts of this ABS include the following parts in addition to those of the conventional brake system.

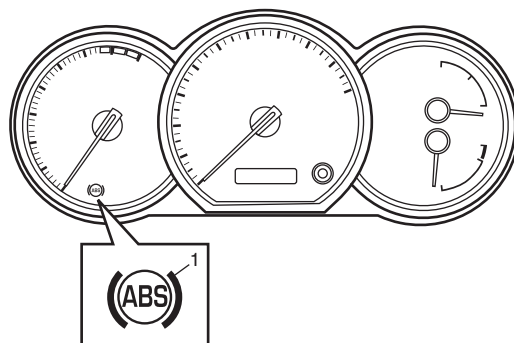
- Wheel speed sensor which senses revolution speed of each wheel and outputs its signal.
- ABS warning lamp which lights to inform abnormality when system fails to operate properly.
- ABS (ESP®) hydraulic unit / control module assembly is incorporated ABS (ESP®) control module, ABS (ESP®) hydraulic unit (actuator assembly), solenoid valve power supply driver (transistor), solenoid valve driver (transistor), pump motor driver (transistor).
 - ABS (ESP®) control module which sends operation signal to ABS (ESP®) hydraulic unit to control fluid pressure applied to each wheel cylinder based on signal from each wheel speed sensor so as to prevent wheel from locking.
 - ABS (ESP®) hydraulic unit which operates according to signal from ABS (ESP®) control module to control fluid pressure applied to wheel cylinder of each 4 wheels.
 - Solenoid valve power supply driver (transistor) which supplies power to solenoid valve in ABS (ESP®) hydraulic unit.
 - Solenoid valve driver (transistor) which controls each solenoid valves in ABS (ESP®) hydraulic unit.
 - Pump motor driver (transistor) which supplies power to pump motor in ABS (ESP®) hydraulic unit.

This ABS is equipped with Electronic Brake force Distribution (EBD) system that controls a fluid pressure of rear wheels to best condition, which is the same function as that of proportioning valve, by the signal from wheel sensor independently of change of load due to load capacity and so on. And if the EBD system fails to operate properly, the brake warning lamp lights to inform abnormality.

Self-Diagnosis Description

S5JB0E4501004

ABS (ESP®) control module diagnoses conditions of the system component parts (whether or not there is any abnormality) all the time and indicates the results (warning of abnormality occurrence and DTC) through the ABS warning lamp (1) as described.



I5JB0A450001-01

- When ignition switch is turned ON, ABS warning lamp lights for 2 seconds to check its circuit.
- When no abnormality has been detected (the system is in good condition), ABS warning lamp turns OFF after 2 seconds.
- When an abnormality in the system is detected, ABS warning lamp lights and the area where that abnormality lies is stored in the memory of EEPROM in ABS (ESP®) control module.

CAN Communication System Description

S5JB0E4501003

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

ABS Transmission Data

				ECM	Combination Meter	4WD control module (if equipped)
ABS (ESP®) control module	Transmit	DATA	Torque up request			
			Wheel speed signal (front right)			
			Wheel speed signal (front left)			
			Wheel speed signal (rear right)			
			Wheel speed signal (rear left)			
			ABS active			
			ABS indication on			
			EBD indication on			

I5JB0D450001-02

ABS Reception Data

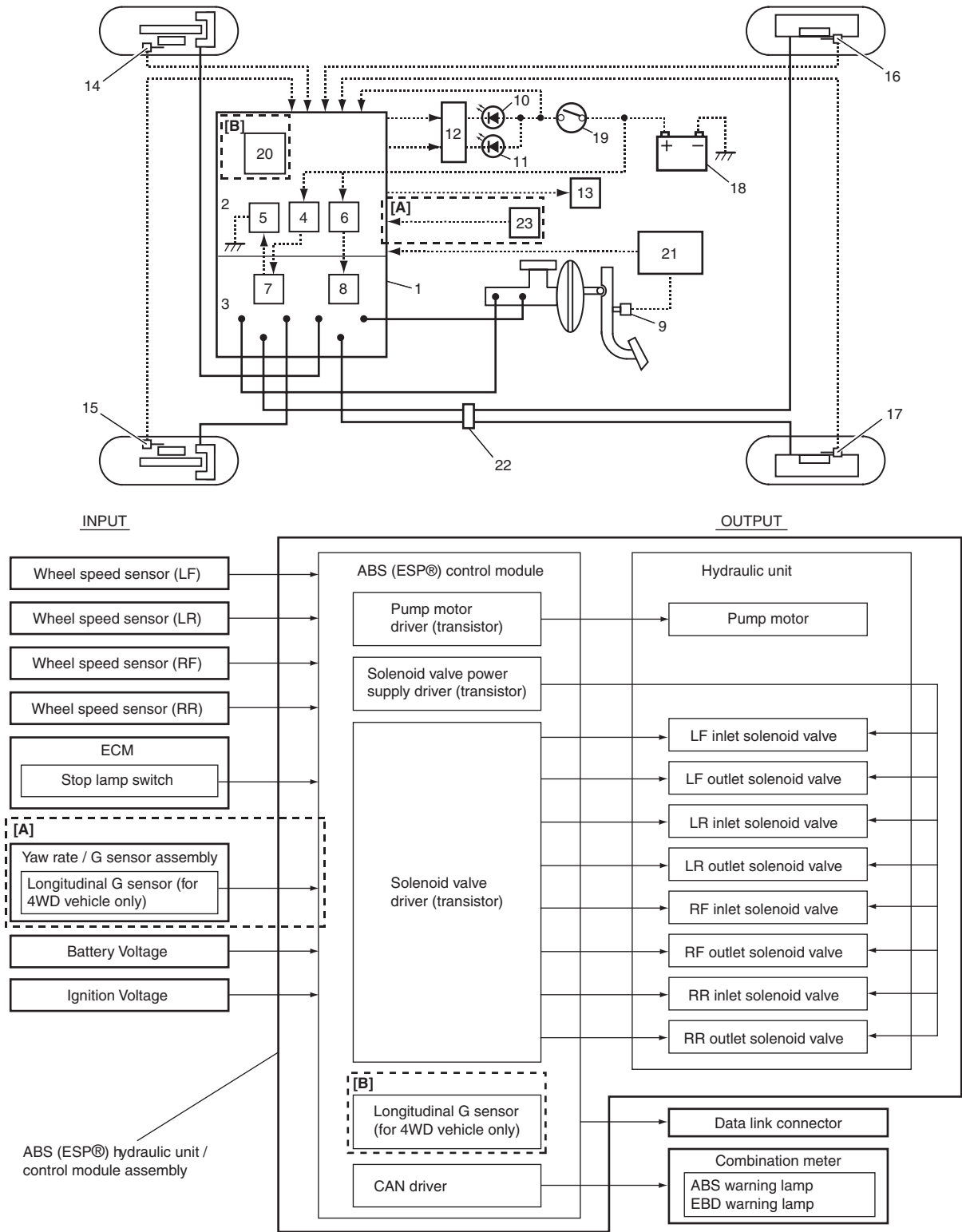
				ECM
ABS (ESP®) control module	Receive	DATA	Brake pedal switch active	

I5JB0B450002-01

Schematic and Routing Diagram

ABS Schematic

S5JB0E4502001



I5JB0D450002-03

[A]: With ESP®	8. Pump motor	17. Wheel speed sensor (Left-rear)
[B]: Without ESP®	9. Stop lamp switch	18. Battery
1. ABS (ESP®) hydraulic unit / control module assembly	10. ABS warning lamp	19. Ignition switch
2. ABS (ESP®) control module	11. EBD warning lamp (Brake warning lamp)	20. G sensor (for 4WD vehicle only)
3. ABS (ESP®) hydraulic unit	12. Lamp driver module	21. ECM
4. Solenoid valve power supply driver (transistor)	13. Data link connector	22. 4 way joint

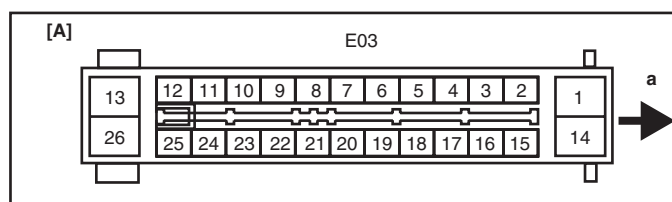
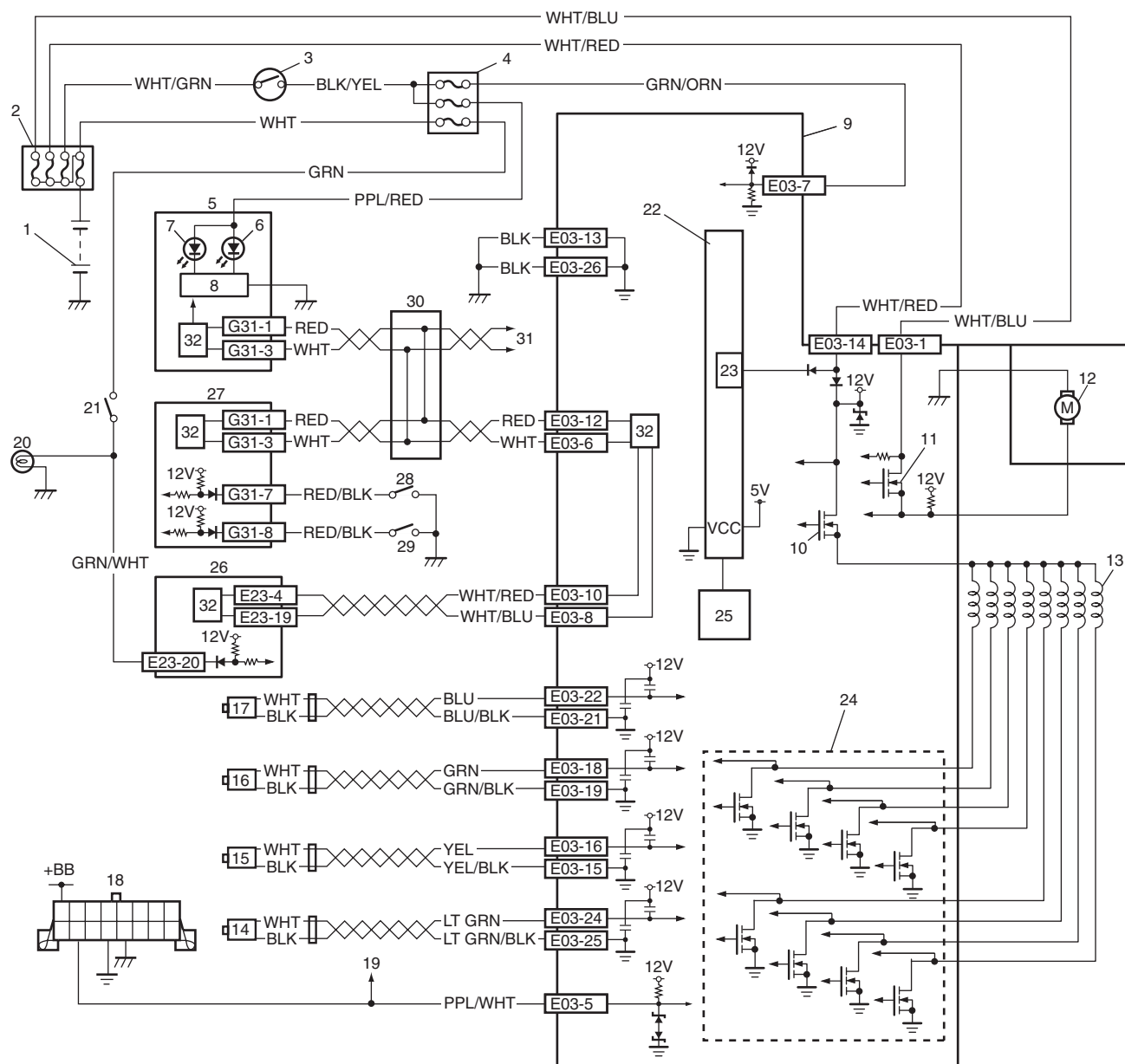
4E-5 ABS:

5. Solenoid valve driver (transistor)	14. Wheel speed sensor (Right-front)	23. Yaw rate / G sensor assembly
6. Pump motor driver (transistor)	15. Wheel speed sensor (Left-front)	
7. Solenoid valve	16. Wheel speed sensor (Right-rear)	

ABS Wiring Circuit Diagram

S5JB0E4502002

The figure shows for vehicle without ESP®. For vehicle equipped with ESP®, refer to “Electronic Stability Program Wiring Circuit Diagram: in Section 4F”.



I5JB0D450003-02

[A]: Terminal arrangement of ABS hydraulic unit / control module assembly	11. Pump motor driver (transistor)	23. Internal memory
a: Upside	12. Pump motor	24. Solenoid valve driver (transistor)
1. Battery	13. Solenoid valves	25. G sensor (4WD vehicle only)
2. Main fuse box	14. Right-rear wheel speed sensor	26. ECM
3. Ignition switch	15. Left-rear wheel speed sensor	27. BCM

4. Junction block assembly	16. Right-front wheel speed sensor	28. Brake fluid level switch
5. Combination meter	17. Left-front wheel speed sensor	29. Parking brake switch
6. ABS warning lamp	18. Data link connector	30. Junction connector
7. EBD warning lamp (Brake warning lamp)	19. To ECM, TCM, SDM, BCM and 4WD control module	31. To TCM, 4WD control module and keyless start control module
8. Lamp driver module	20. Stop lamp	32. CAN driver
9. ABS hydraulic unit / control module assembly	21. Brake light switch	
10. Solenoid valve power supply driver (transistor)	22. Power control unit	

	Terminal	Wire color	Circuit
E03	1	WHT/BLU	ABS pump motor driver (Transistor)
	2	—	—
	3	—	—
	4	—	—
	5	PPL/WHT	Data link connector
	6	WHT	CAN communication line (low) for combination meter
	7	GRN/ORN	Ignition switch
	8	WHT/BLU	CAN communication line (low) for ECM
	9	—	—
	10	WHT/RED	CAN communication line (high) for ECM
	11	—	—
	12	RED	CAN communication line (high) for combination meter
	13	BLK	Ground
	14	WHT/RED	Solenoid valve power supply driver (Transistor)
	15	YEL/BLK	Left-rear wheel speed sensor (—)
	16	YEL	Left-rear wheel speed sensor (+)
	17	—	—
	18	GRN	Right-front wheel speed sensor (+)
	19	GRN/BLK	Right-front wheel speed sensor (—)
	20	—	—
	21	BLU/BLK	Left-front wheel speed sensor (—)
	22	BLU	Left-front wheel speed sensor (+)
	23	—	—
	24	LT GRN	Right-rear wheel speed sensor (+)
	25	LT GRN/BLK	Right-rear wheel speed sensor (—)
	26	BLK	Ground

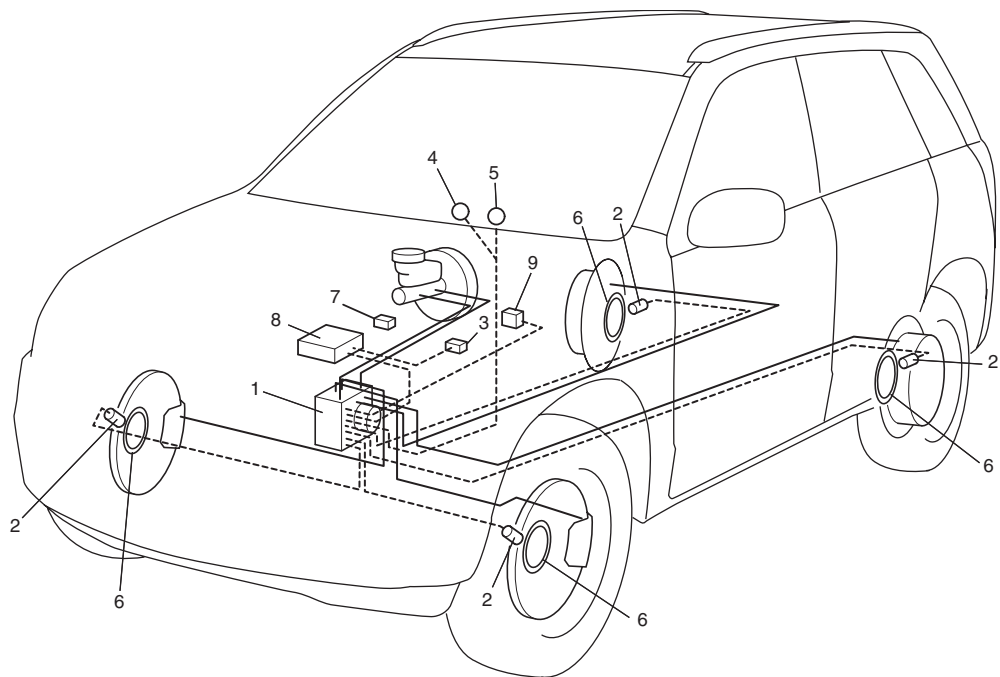
Component Location

ABS Components Location

S5JB0E4503001

NOTE

As for the difference of RH steering vehicle and LH steering vehicle, the location of the combination meter, data link connector, stop lamp switch and the brake master cylinder assembly only changes.



I6JB01450004-01

1. ABS (ESP®) hydraulic unit / control module assembly	6. Wheel encoder (included in wheel hub assembly)
2. Wheel speed sensors	7. Data link connector
3. Stop lamp switch	8. ECM
4. ABS warning lamp	9. Yaw rate / G sensor assembly (with ESP®)
5. EBD warning lamp (Brake warning lamp)	

Diagnostic Information and Procedures

ABS Check

S5JB0E4504001

Refer to the following items for the details of each step.

Step	Action	Yes	No
1	🔧 Malfunction analysis 1) Perform "Customer complaint analysis: ". 2) Perform "Problem symptom confirmation: ". 3) Perform "DTC check, record and clearance: " and recheck DTC. <i>Is there any malfunction DTC?</i>	Go to Step 4.	Go to Step 2.
2	🔧 Driving test 1) Perform "Step 2: Driving Test: ". <i>Is trouble symptom identified?</i>	Go to Step 3.	Go to Step 6.
3	🔧 DTC check 1) Perform "DTC Check: ". <i>Is it malfunction code?</i>	Go to Step 4.	Go to Step 5.
4	🔧 ABS check 1) Inspect and repair referring to applicable DTC flow. <i>Does trouble recur?</i>	Go to Step 5.	Go to Step 7.
5	🔧 Brakes diagnosis 1) Inspect and repair referring to "Brakes Symptom Diagnosis: in Section 4A". <i>Does trouble recur?</i>	Go to Step 3.	Go to Step 7.
6	🔧 Intermittent problem check 1) Check intermittent troubles referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual" and related circuit of trouble code recorded in Step 1. <i>Does trouble recur?</i>	Go to Step 4.	Go to Step 7.
7	🔧 Final confirmation test 1) Perform "Step 7: Final Confirmation Test: ". <i>Does trouble recur?</i>	Go to Step 3.	End.

Step 1: Malfunction Analysis

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 a questionnaire form as shown in the following will facilitate collecting information to the point required for proper analysis and diagnosis.

Customer questionnaire (Example)

Customer's name:	Model:	VIN:	
Date of issue:	Date of Reg:	Date of problem:	Mileage:

Problem Symptoms	• ABS warning lamp abnormal: fails to turn on/fails to go off/flashes • Abnormal noise while vehicle is running: from motor, from valve, other_____ • Wheel is locked at braking: • Pump motor does not stop (running): • Braking does not work: • Other:
Frequency of occurrence	• Continuous/Intermittent (_____ times a day, a month)/ other_____
Conditions for Occurrence of Problem	• Vehicle at stop & ignition switch ON: • When starting: at initial start only/at every start/Other_____ • Vehicle speed: while accelerating/while decelerating/at stop/ while turning/while running at constant speed/ other_____ • Road surface condition: Paved road/rough road/snow-covered road/ other_____ • Chain equipment:
Environmental Condition	• Weather: fair/cloudy/rain/snow/other_____ • Temperature: °F (_____ °C)
Diagnostic Trouble Code	• First check: _____ Normal code/malfunction code (_____) • Second check after test drive: _____ Normal code/malfunction code (_____)

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Problem symptom confirmation

Check if what the customer claimed in "Customer Questionnaire" is actually found in the vehicle and if that symptom is found, whether it is identified as a failure. (This step should be shared with the customer if possible.) Check warning lamps related to brake system referring to "EBD Warning Lamp (Brake Warning Lamp) Check: " and "ABS Warning Lamp Check: ".

DTC check, record and clearance

Perform "DTC Check: " procedure, record it and then clear it referring to "DTC Clearance: ".

Recheck DTC referring to "DTC Check: ".

When DTC which is recorded at DTC check procedure is detected again after performing DTC clearance, go to "Step 4: ABS Check: " to proceed the diagnosis.

When DTC which is recorded at DTC check procedure is not indicated anymore after performing DTC clearance, ABS (ESP®) control module does not perform the system diagnosis, or temporary abnormality may occur, therefore go to "Step 2: Driving Test: " to proceed the diagnosis.

Step 2: Driving Test

Test drive the vehicle at 40 km/h for more than a minute and check if any trouble symptom (such as abnormal lighting of ABS warning light) exists.

If the malfunction DTC is confirmed again at ignition switch ON, driving test as described is not necessary. Proceed to Step 3.

Step 3: DTC Check

Recheck DTC referring to “DTC Check: ”.

Step 4: ABS Check

According to ABS Check for the DTC confirmation in Step 3, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator assembly or other part and repair or replace faulty parts.

Step 5: Brakes Diagnosis

Check the parts or system suspected as a possible cause referring to “Brakes Symptom Diagnosis: in Section 4A” and based on symptoms appearing on the vehicle (symptom obtained through Steps 1 and 2 and repair or replace faulty parts, if any).

Step 6: Intermittent Problem Check

Check parts where an intermittent trouble is easy to occur (e.g., wire harness, connector, etc.), referring to “Intermittent and Poor Connection Inspection: in Section 00 in related manual” and related circuit of trouble code recorded in Step 1 to 3.

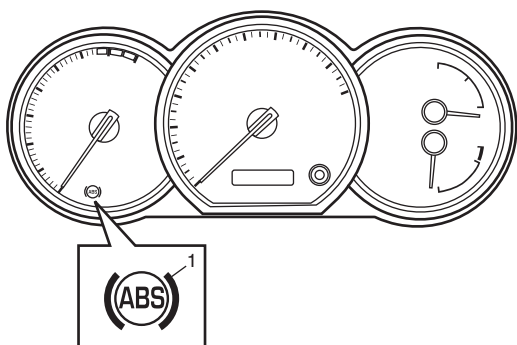
Step 7: Final Confirmation Test

Confirm that the problem symptom has gone and the ABS is free from any abnormal conditions. If what has been repaired is related to the malfunction DTC, clear the DTC once referring to “DTC Clearance: ” and perform test driving and confirm that no DTC is indicated.

ABS Warning Lamp Check

S5JB0E4504002

- 1) Turn ignition switch ON.
- 2) Check that ABS warning lamp (1) comes ON for about 2 seconds and then goes off.
If any faulty condition is found, advance to “ABS Warning Lamp Does Not Come ON at Ignition Switch ON: ” or “ABS Warning Lamp Comes ON Steady: ”.



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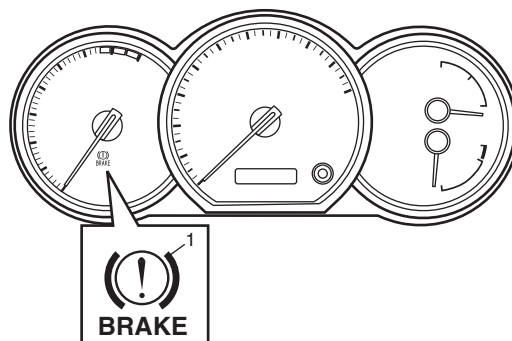
EBD Warning Lamp (Brake Warning Lamp) Check

S5JB0E4504003

NOTE

Perform this check on a level place.

- 1) Turn ignition switch ON with parking brake applied.
- 2) Check that EBD warning lamp (brake warning lamp) (1) is turned ON.
- 3) Release parking brake with ignition switch ON and check that EBD warning lamp (brake warning lamp) goes off.
If it doesn't go off, go to “EBD Warning Lamp (Brake Warning Lamp) Comes ON Steady: ”.



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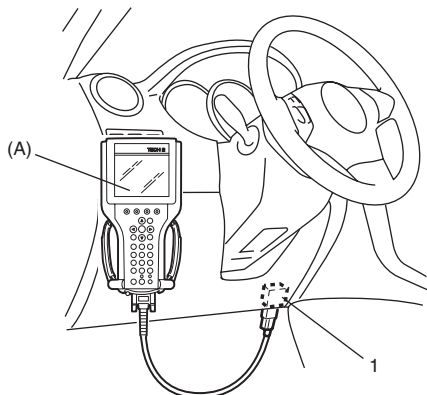
DTC Check

S5JB0E4504004

- 1) Turn ignition switch to OFF position.
- 2) Connect SUZUKI scan tool to data link connector (1).

Special tool

(A): SUZUKI scan tool



I5JB0A450008-01

- 3) Turn ignition switch to ON position.
- 4) Read DTC according to instructions displayed on SUZUKI scan tool and print it or write it down. Refer to SUZUKI scan tool operator's manual for further details.

NOTE

If SUZUKI scan tool can not communicate ABS (ESP®) hydraulic unit / control module, perform "Serial Data Link Circuit Check: ".

- 5) After completing the check, turn ignition switch off and disconnect SUZUKI scan tool from DLC.

DTC Table

S5JB0E4504005

⚠ CAUTION

Be sure to perform "ABS Check: " before starting diagnosis.

DTC (displayed on SUZUKI scan tool)	Diagnostic Items	
NO DTC	Normal	
C1015	G sensor circuit failure (for 4WD vehicle)	
C1021	RF	Wheel speed sensor circuit
C1025	LF	
C1031	RR	
C1035	LR	
C1022	RF	Wheel speed sensor or encoder failure
C1026	LF	
C1032	RR	
C1036	LR	
C1041	RF	Inlet solenoid valve circuit failure
C1042		Outlet solenoid valve circuit failure
C1045	LF	Inlet solenoid valve circuit failure
C1046		Outlet solenoid valve circuit failure
C1051	RR	Inlet solenoid valve circuit failure
C1052		Outlet solenoid valve circuit failure
C1055	LR	Inlet solenoid valve circuit failure
C1056		Outlet solenoid valve circuit failure
C1057	ABS (ESP®) control module power supply circuit failure	
C1061	Pump motor and/or motor driver circuit failure	
C1063	Solenoid valve power supply driver circuit failure	
C1071	ABS (ESP®) control module internal defect	
U1073	Control Module Communication Bus Off	
U1100	Lost Communication with ECM (Reception error)	

DTC Clearance

S5JB0E4504006

▲ WARNING

When performing a driving test, select a safe place where there is neither any traffic nor any traffic accident possibility and be very careful during testing to avoid occurrence of an accident.

After repair or replace malfunction part(s), clear all DTCs by performing the following procedure or using SUZUKI scan tool.

- 1) Connect SUZUKI scan tool to data link connector in the same manner as when making this connection for DTC check.
- 2) Turn ignition switch to ON position.
- 3) Erase DTC according to instructions displayed on scan tool. Refer to scan tool operator's manual for further details.

NOTE

For DTC C 1021, C1022, C1025, C1026, C1031, C1032, C1035, C1036 and C1061, confirm that ABS warning lamp turns off after performing Step 2 of "Test Driving" under "ABS Check:", and then clear the DTCs.

- 4) After completing the clearance, turn ignition switch OFF and disconnect scan tool from data link connector.
- 5) Perform "Driving Test" (Step 2 of "ABS Check:") and "DTC Check:" and confirm that NO DTC is displayed on scan tool.

Scan Tool Data

S5JB0E4504007

The parameter data below are values measured with the scan tool when the normally operating vehicle is under the following conditions. When taking measurements for comparison by using the scan tool, be sure to check that the vehicle is under the following conditions.

- Apply parking brake and block wheels.
- Ignition switch ON.
- Turn OFF air conditioner (if equipped).
- Apply no load to power steering (if equipped). (Don't turn it)
- Turn OFF all electric loads (except ignition).
- No DTC.
- ABS is not operated. (Normal braking operation)

Scan Tool Data	Standards	Condition
Battery Voltage	10.0 – 16.0 V	—
Pump Motor Driver	0.0 V	—
RF Wheel Speed	0 km/h, 0.0 MPH	Vehicle stop
LF Wheel Speed	0 km/h, 0.0 MPH	Vehicle stop
RR Wheel Speed	0 km/h, 0.0 MPH	Vehicle stop
LR Wheel Speed	0 km/h, 0.0 MPH	Vehicle stop
Brake Switch	ON	Brake pedal depressed
	OFF	Brake pedal released
G sensor	0 ± 0.09G	Place vehicle on the level

Scan Tool Data Definition

Battery Volt (V): Battery Voltage is an analog input signal read by the ABS (ESP®) control module. Certain ABS (ESP®) control module functions will be modified if the battery voltage falls below or rises above programmed thresholds.

Pump Motor Driver (V): This parameter indicates the operational condition of the pump motor driver (transistor).

RF Wheel Speed, LF Wheel Speed, RR Wheel Speed and LF Wheel Speed (km/h, MPH): Wheel speed is an ABS (ESP®) control module internal parameter. It is computed by reference pulses from the wheel speed sensor.

Brake Switch (ON, OFF): This switch signal informs the ABS (ESP®) control module whether the brake is active or not.

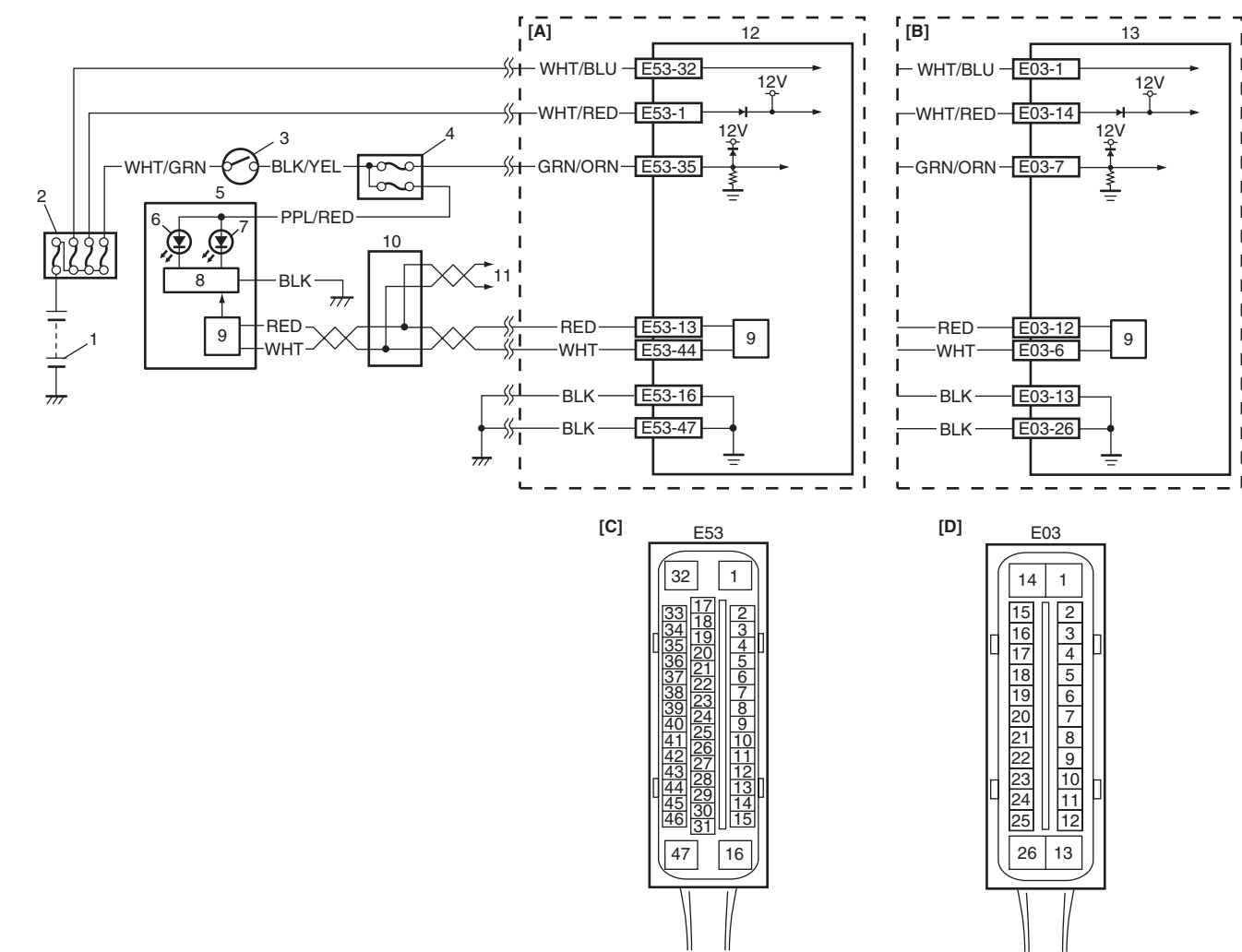
G Sensor (G): The G-Sensor converts gravity during the vehicle acceleration / deceleration in to a voltage conditions and controls the ABS for 4WD vehicle. (without ESP®)

Vehicle acceleration is measured by yaw rate / G sensor assembly and output to ESP® control module by pulse signal for 4WD vehicle. (with ESP®)

ABS Warning Lamp Does Not Come ON at Ignition Switch ON

S5JB0E4504008

Wiring Diagram



I6JB01450005-01

[A]: With ESP®	3. Ignition switch	9. CAN driver
[B]: Without ESP®	4. Junction block assembly	10. Junction connector
[C]: ESP® control module connector (viewed from terminal side)	5. Combination meter	11. To TCM, BCM, 4WD control module, keyless start control module and steering angle sensor
[D]: ABS control module connector (viewed from terminal side)	6. ABS warning lamp	12. ESP® hydraulic unit / control module assembly
1. Battery	7. EBD warning lamp (Brake warning lamp)	13. ABS hydraulic unit / control module assembly
2. Main fuse box	8. Lamp driver module	

Circuit Description

Operation (ON/OFF) of ABS warning lamp is controlled by ABS (ESP®) control module through lamp driver module in combination meter.

If the antilock brake system is in good condition, ABS (ESP®) control module turns ABS warning lamp ON at the ignition switch ON, keeps it ON for 2 seconds and then turns it OFF. If an abnormality in the system is detected, ABS warning lamp is turned ON continuously by ABS (ESP®) control module. Also, it is turned ON continuously by lamp driver module when the connector of ABS (ESP®) control module is disconnected.

Troubleshooting

Step	Action	Yes	No
1	1) Turn ignition switch to ON position. <i>Do other warning lamps come ON?</i>	Go to Step 2.	Go to Step 3.
2	1) Connect scan tool to DLC with ignition switch turned OFF. 2) Turn ignition switch to ON position and check DTC. <i>Is there DTC U1073?</i>	Go to "DTC U1073: Control Module Communication Bus Off: ".	Substitute a known-good combination meter and recheck. If ABS warning lamp remains OFF, substitute a known-good ABS (ESP®) hydraulic unit / control module assembly and recheck.
3	<i>Is Circuit fuse for combination meter in good condition?</i>	Go to Step 4.	Replace fuse and check for short circuit to ground.
4	Check CAN communication circuit between combination meter and ABS (ESP®) control module referring to "DTC U1073: Control Module Communication Bus Off: ". <i>Is CAN communication circuit in good condition?</i>	Go to Step 5.	Repair or replace.
5	1) Remove combination meter with ignition switch turned OFF. 2) Check for proper connection to "PPL/RED" and "BLK" wire of combination meter connector. 3) If OK, turn ON ignition switch and measure voltage at "PPL/RED" wire of combination meter connector and vehicle body ground. <i>Is it 10 – 14 V?</i>	Go to Step 6.	Repair power supply circuit for combination meter.
6	1) Measure resistance between "BLK" wire of combination meter connector and vehicle body ground. <i>Is resistance less than 2 Ω?</i>	Replace combination meter.	"BLK" circuit open or high resistance.

ABS Warning Lamp Comes ON Steady

S5JB0E4504009

Wiring Diagram

Refer to "ABS Warning Lamp Does Not Come ON at Ignition Switch ON: ".

Circuit Description

Operation (ON/OFF) of ABS warning lamp is controlled by ABS (ESP®) control module through lamp driver module in combination meter.

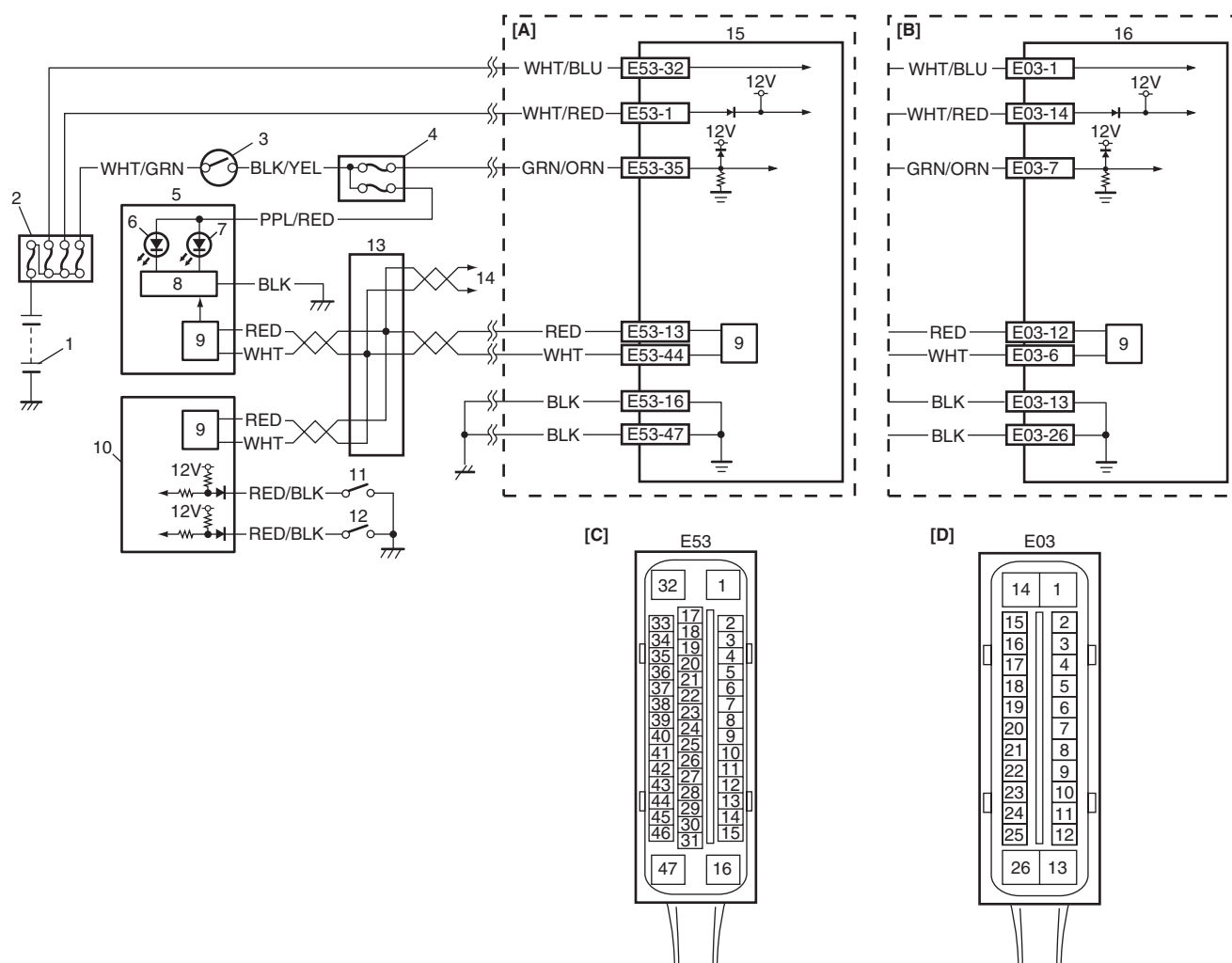
If the Antilock brake system is in good condition, ABS (ESP®) control module turns ABS warning lamp ON at the ignition switch ON, keeps it ON for 2 seconds and then turns it OFF. If an abnormality in the system is detected, ABS warning lamp is turned ON continuously by ABS (ESP®) control module. Also, it is turned ON continuously by lamp driver module when the connector of ABS (ESP®) control module is disconnected.

Troubleshooting

Step	Action	Yes	No
1	1) Perform diagnostic trouble code check. <i>Is there any DTC(s)?</i>	Go to applicable DTC diag. flow.	Go to Step 2.
2	<i>Are main fuses for ABS pump motor and ABS solenoid in good condition?</i>	Go to Step 3.	Replace fuse and check circuit for short to ground.
3	1) Turn ignition switch to OFF. 2) Disconnect ABS (ESP®) control module connector. 3) Check for proper connection to ABS (ESP®) control module connector at terminals "E03-7", "E03-13" and "E03-26" (or "E53-16", "E53-35" and "E53-47"). 4) If OK then turn ignition switch to ON position and measure voltage between terminal "E03-7" (or "E53-35") and vehicle body ground. <i>Is it 10 – 14 V?</i>	Go to Step 4.	"GRN/ORN" circuit open.
4	1) Turn ignition switch to OFF position. 2) Check for proper connection to ABS (ESP®) control module connector at terminals "E03-1" and "E03-14" (or "E53-1" and "E53-32"). 3) If OK then turn ignition switch to ON position and measure voltage between each terminal of "E03-1", "E03-14" (or "E53-1", "E53-32") and vehicle body ground. <i>Are they 10 – 14 V?</i>	Go to Step 5.	"WHT/RED" and/or "WHT/BLU" circuit open.
5	1) Turn ignition switch to OFF and measure resistance between each terminal of "E03-13", "E03-26" (or "E-53-1", "E53-32") and vehicle body ground. <i>Is resistance less than 2 Ω?</i>	Go to Step 6.	Ground circuit for ABS (ESP®) hydraulic unit / control module open or high resistance.
6	Check CAN communication circuit between combination meter and ABS (ESP®) control module referring to "DTC U1073: Control Module Communication Bus Off: ". <i>Is CAN communication circuit in good condition?</i>	Substitute a known-good combination meter and recheck. If ABS warning lamp remains ON, substitute a known-good ABS (ESP®) hydraulic unit / control module assembly and recheck.	Repair or replace.

EBD Warning Lamp (Brake Warning Lamp) Comes ON Steady

Wiring Diagram



I6JB01450006-02

[A]: With ESP®	4. Junction block assembly	11. Parking brake switch
[B]: Without ESP®	5. Combination meter	12. Brake fluid level switch
[C]: ESP® control module connector (viewed from terminal side)	6. ABS warning lamp	13. Junction connector
[D]: ABS control module connector (viewed from terminal side)	7. EBD warning lamp (Brake warning lamp)	14. To TCM, 4WD control module, keyless start control module and steering angle sensor
1. Battery	8. Lamp driver module	15. ESP® hydraulic unit / control module assembly
2. Main fuse box	9. CAN driver	16. ABS hydraulic unit / control module assembly
3. Ignition switch	10. BCM	

Circuit Description

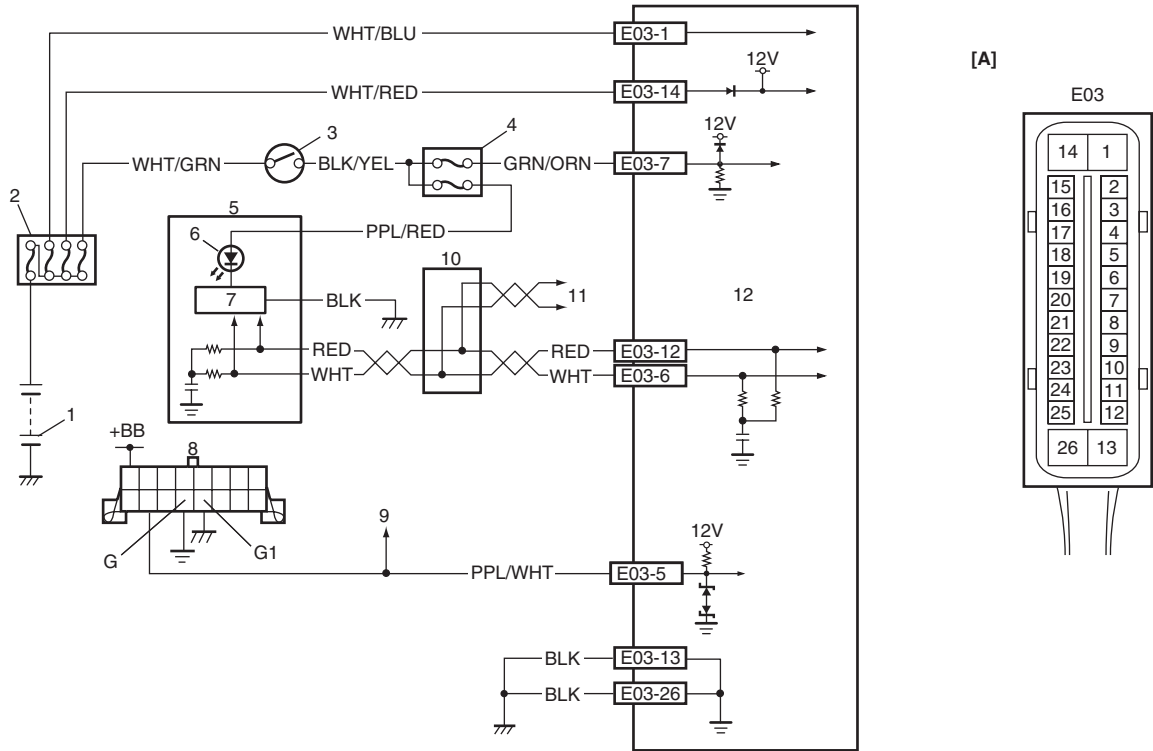
EBD warning lamp (brake warning lamp) is controlled by parking brake switch, brake fluid level switch and ABS (ESP®) control module assembly through lamp driver module in combination meter. EBD warning lamp turns ON when parking brake switch is ON and/or brake fluid level is lower than minimum level. The information of parking brake switch and brake fluid level are transmitted from BCM to lamp driver module in combination meter through CAN communication line.

Troubleshooting

Step	Action	Yes	No
1	1) Make sure that: • Parking brake is completely released. • Brake fluid level is upper than the minimum level. <i>Are the check results OK?</i>	Go to Step 2.	Release parking brake completely and/or replenish brake fluid.
2	1) Turn ignition switch to ON position. <i>Does “ABS” warning lamp come on steady?</i>	Perform “ABS Warning Lamp Comes ON Steady: ” previously outlined.	Go to Step 3.
3	1) CAN communication circuit between combination meter, ABS (ESP®) control module and BCM referring to “DTC U1073: Control Module Communication Bus Off: ”. <i>Is CAN communication circuit in good condition?</i>	Substitute a known-good combination meter and recheck. If ABS warning lamp remains ON, substitute a known-good ABS (ESP®) hydraulic unit / control module assembly and recheck.	Repair or replace.

Serial Data Link Circuit Check

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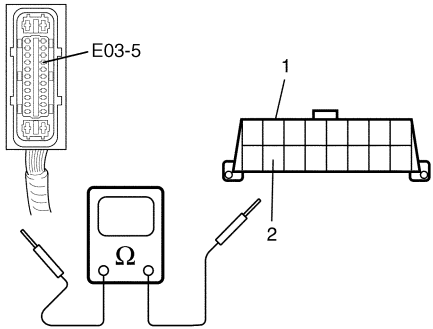


I5JB0A450012-02

[A]: ABS hydraulic unit / control module connector (viewed from terminal side)	5. Combination meter	10. Junction connector
1. Battery	6. ABS warning lamp	11. To TCM, BCM, 4WD control module and keyless start control module
2. Main fuse box	7. Lamp driver module	12. ABS hydraulic unit / control module assembly
3. Ignition switch	8. Data link connector (DLC)	
4. Junction block assembly	9. To ECM, TCM, BCM, SDM and 4WD control module	

Inspection

Step	Action	Yes	No
1	1) Turn ignition switch to ON position. <i>Does ABS warning lamp come ON?</i>	Go to Step 2.	Go to Step 6.
2	1) Turn ignition switch to OFF position. <i>Are main fuses for ABS pump motor and ABS solenoid in good condition?</i>	Go to Step 3.	Replace fuse and check for short.
3	1) Disconnect ABS hydraulic unit / control module connector. 2) Check for proper connection to ABS hydraulic unit / control module connector at terminal "E03-7". 3) If OK then turn ignition switch to ON position and measure voltage between terminal "E03-7" and vehicle body ground. <i>Is it 10 – 14 V?</i>	Go to Step 4.	"GRN/ORN" wire circuit open.
4	1) Turn ignition switch to OFF position. 2) Check for proper connection to ABS hydraulic unit / control module connector at terminals "E03-1" and "E03-14". 3) If OK then turn ignition switch to ON position and measure voltage between each terminal of "E03-1", "E03-14" and vehicle body ground. <i>Are they 10 – 14 V?</i>	Go to Step 5.	"WHT/RED" and/or "WHT/BLU" wire circuit open.
5	1) Turn ignition switch to OFF position. 2) Check for proper connection to ABS hydraulic unit / control module connector at terminals "E03-13" and "E03-26". 3) If OK, measure resistance between each terminal of "E03-13", "E03-26" and vehicle body ground. <i>Are resistance less than 2 Ω?</i>	Go to Step 6.	Ground circuit for ABS hydraulic unit / control module open or high resistance.
6	1) Check if communication is possible by trying communication with other controller (ECM, TCM, BCM, 4WD control module or SDM). <i>Is it possible to communicate with other controller?</i>	Go to Step 7.	Repair open in common section of serial data circuit ("PPL/WHT" wire circuit) used by all controllers or short to ground or power circuit which has occurred somewhere in serial data circuit ("PPL/WHT" wire circuit).
7	1) Turn ignition switch to ON position. 2) Measure voltage between terminal B of data link connector and vehicle body ground. <i>Is voltage 10 – 12 V?</i>	Go to step 8.	Terminal B circuit open or shorted to ground.
8	1) Turn ignition switch to OFF position. 2) Measure resistance between the following terminals; - Terminal G of data link connector and vehicle body ground. - Terminal G1 of data link connector and vehicle body ground. <i>Is each resistance 1 Ω or less?</i>	Go to step 9.	Terminal G and/or G1 circuit open or high resistance.

Step	Action	Yes	No
9	1) Turn ignition switch to OFF position. 2) Check proper connection at "E03-5" ("PPL/WHT" wire) terminal for serial data circuit. 3) If OK, then check resistance between "E03-5" ("PPL/WHT" wire) terminal and "PPL/WHT" wire terminal (2) for serial data circuit in DLC (1). <i>Is resistance 1 Ω or less?</i>  I4RS0A450013-02	Substitute a known-good ABS hydraulic unit / control module and recheck.	Repair high resistance or open in "PPL/WHT" wire circuit for anti lock brake system.

DTC C1015: G Sensor Circuit Failure (For 4WD vehicle)

S5JB0E4504013

For vehicle equipped with ESP®, go to "DTC C1015 / C1017 / C1023: Longitudinal G Sensor / Lateral G Sensor / Yaw Rate Sensor in Yaw Rate / G Sensor Assembly Failure: in Section 4F".

Description

If the signal voltage of G sensor while at a stop does not vary from that while running, this DTC is set. (for 4WD vehicle)

Therefore, this DTC may be set when a vehicle is lifted up and its wheel(s) is turned. In such case, clear the DTC and check again.

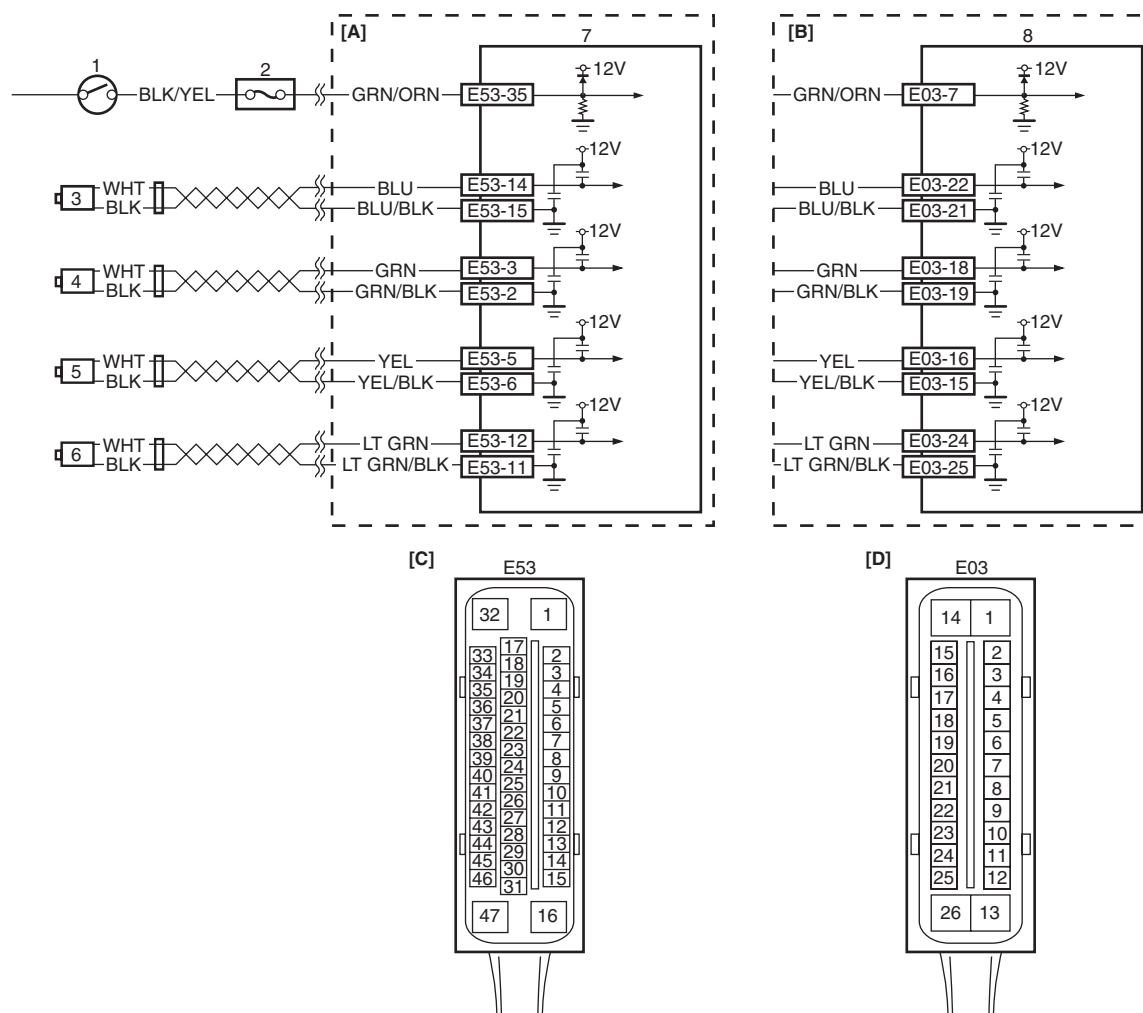
DTC Troubleshooting

- 1) Ignition switch OFF.
- 2) Check for proper connection from harness to control module.
- 3) If OK, substitute an ABS hydraulic unit/control module assembly with correct part number.
- 4) Recheck system.

DTC C1021, C1022 / C1025, C1026 / C1031, C1032 / C1035, C1036: Right-Front / Left-Front / Right-Rear / Left-Rear Wheel Speed Sensor Circuit or Encoder Failure

S5JB0E4504014

Wiring Diagram



I6JB01450007-02

[A]: With ESP®	1. Ignition switch	5. Left-rear wheel speed sensor
[B]: Without ESP®	2. Junction block assembly	6. Right-rear wheel speed sensor
[C]: ESP® control module connector (viewed from terminal side)	3. Left-front wheel speed sensor	7. ESP® hydraulic unit / control module assembly
[D]: ABS control module connector (viewed from terminal side)	4. Right-front wheel speed sensor	8. ABS hydraulic unit / control module assembly

DTC Detecting Condition

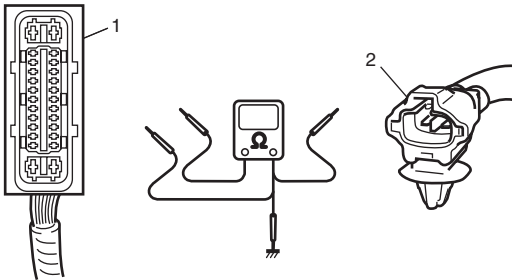
The ABS (ESP®) control module monitors the current at the terminal of each sensor while the ignition switch is ON. When the current is not within the specified range, an applicable DTC will be set. Also, when no sensor signal is inputted at running, an applicable DTC will be set.

NOTE

When the vehicle was operated in any of the following ways, one of these DTCs may be set even when the sensor is in good condition. If such possibility is suspected, clear DTC once referring to “DTC Clearance: ” and then performing the driving test as described in Step 2 of “ABS Check: ”, check whether or not any abnormality exists.

- The vehicle was driven with parking brake pulled.
- Wheel spin occurred while driving.
- Wheel(s) was turned while the vehicle was jacked up.
- The vehicle was stuck.

DTC Troubleshooting

Step	Action	Yes	No
1	Was "ABS Check" performed?	Go to Step 2.	Go to "ABS Check: ".
2	1) Turn ignition switch OFF. 2) Disconnect ABS (ESP®) control module connector. 3) Check for proper connection to ABS (ESP®) control module at each sensor terminal. 4) If OK, then turn ignition switch ON and measure voltage between applicable sensor terminal of module connector and vehicle body ground. <i>Is it 0 V?</i>	Go to Step 3.	ABS wheel speed sensor circuit shorted to power.
3	1) Disconnect applicable wheel speed sensor coupler with ignition switch OFF. 2) Measure resistance between the following points. - Both ABS (ESP®) control module connector (1) terminals a pair of applicable sensor terminals. This check result should be no continuity. - Between applicable sensor terminal of ABS (ESP®) control module connector and vehicle body ground. This check result should be no continuity. - Between applicable sensor terminal of module connector and corresponding terminal of wheel speed sensor connector (2) in main harness (for front sensor) or floor harness (for rear sensor). This check result should be continuity.  I5JB0A450014-02	Go to Step 4.	Circuit open or short to ground.
	<i>Are each check results OK?</i>		
4	1) Remove applicable wheel speed sensor. 2) Check sensor for damage or foreign material attached. <i>Is it in good condition?</i>	Go to Step 5.	Clean, repair or replace.
5	Check front and/or rear encoder for the following (remove front and/or rear drive shaft): - Encoder surface neither crack nor damaged - No foreign material being attached - Encoder not being eccentric - Wheel bearing free from excessive play <i>Are they in good condition?</i>	Go to Step 6.	Clean, repair or replace wheel hub assembly.
6	1) Install wheel speed sensor to knuckle. 2) Tighten sensor bolt to specified torque and check that there is no clearance between sensor and knuckle. <i>Is it OK?</i>	Go to Step 7.	Replace ABS wheel speed sensor.

Step	Action	Yes	No
7	Refer to "Front Wheel Speed Sensor On-Vehicle Inspection:" and/or "Rear Wheel Speed Sensor On-Vehicle Inspection:", check output voltage or waveform. <i>Is specified voltage and/or waveform obtained?</i>	Substitute a known-good ABS (ESP®) hydraulic unit / control module assembly and recheck.	Replace sensor and recheck.

DTC C1041 / C1042 / C1043 / C1044 / C1045 / C1046 / C1051 / C1052 / C1053 / C1054 / C1055 / C1056:
Inlet Solenoid Circuit Failure, Outlet Solenoid Circuit Failure, Master Cylinder Cut Solenoid Circuit
Failure, Low Pressure Solenoid Circuit Failure

S5JB0E4504022

DTC C1041 / C1045 / C1051 / C1055: Right-Front / Left-Front / Right-Rear / Left-Rear Inlet Solenoid
Circuit Failure

DTC C1042 / C1046 / C1052 / C1056: Right-Front / Left-Front / Right-Rear / Left-Rear Outlet Solenoid
Circuit Failure

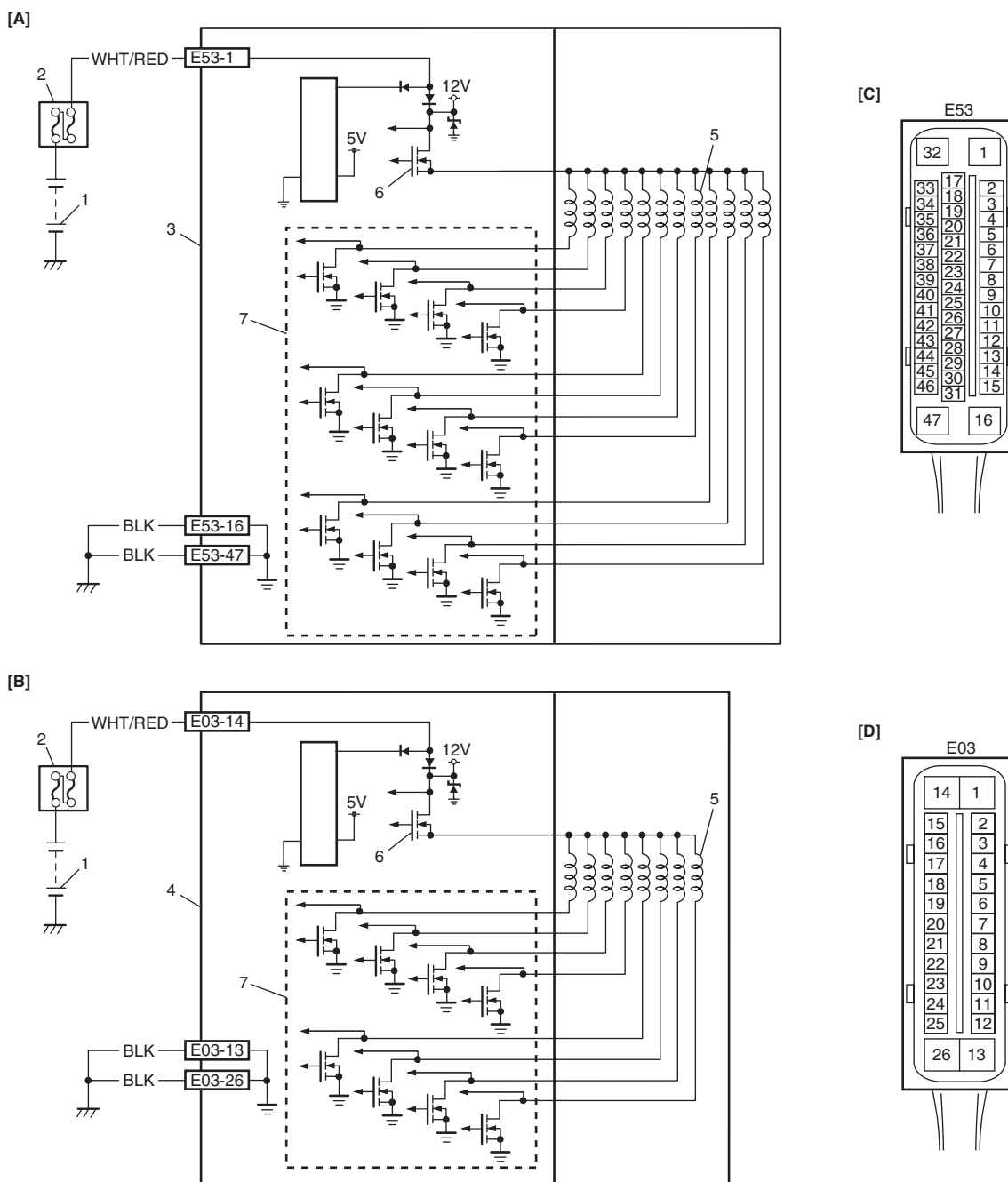
DTC C1043 / C1044: Master Cylinder Cut Solenoid Circuit No. 1 / No. 2 Failure

DTC C1053 / C1054: Low Pressure Solenoid Circuit No. 1 / No. 2 Failure

NOTE

The DTC C1043, C1044, C1053 and C1054 are DTC only for ESP®

Wiring Diagram



[A]: With ESP®	1. Battery	5. Solenoid valve
[B]: Without ESP®	2. Main fuse box	6. Solenoid valve power supply driver (transistor)
[C]: ESP® control module connector (viewed from terminal side)	3. ESP® hydraulic unit / control module assembly	7. Solenoid valve driver
[D]: ABS control module connector (viewed from terminal side)	4. ABS hydraulic unit / control module assembly	

DTC Detecting Condition

The ABS (ESP®) control module monitors the output from the valve.

When the output of each valve exceeds the specified value compared with the signal sent from ABS (ESP®) control module, this DTC is set.

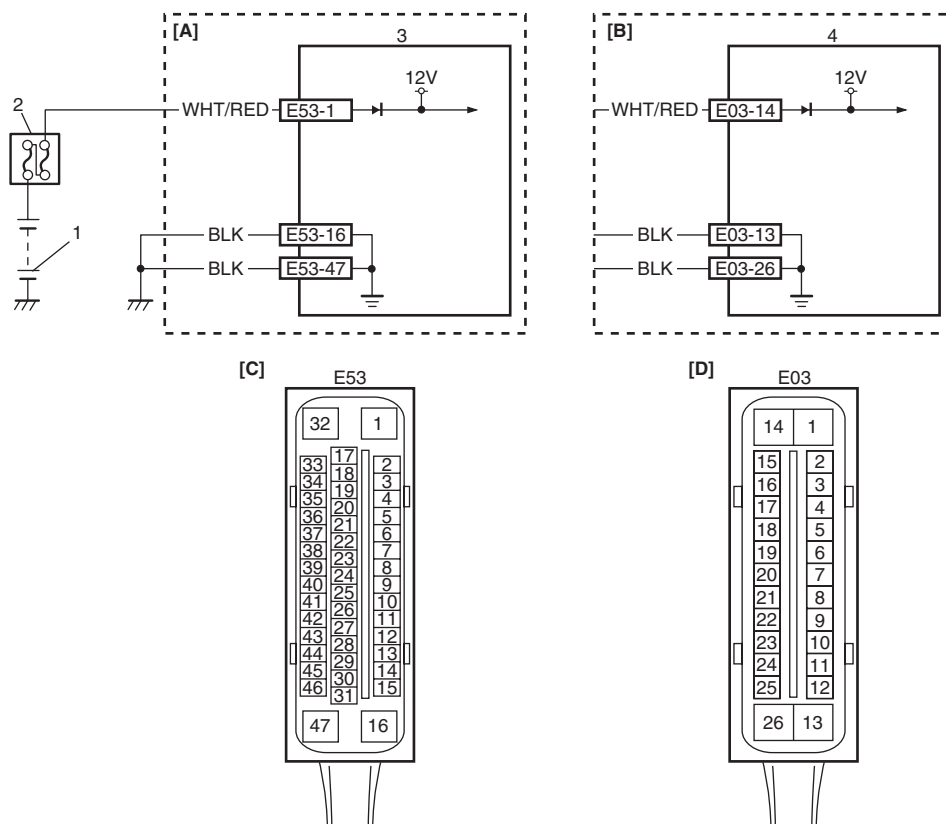
DTC Troubleshooting

Step	Action	Yes	No
1	Was "ABS Check" performed?	Go to Step 2.	Go to "ABS Check: ".
2	1) Turn ignition switch to OFF position. 2) Disconnect ABS (ESP®) control module connector. 3) Check for proper connection to ABS (ESP®) control module connector at terminal "E03-14". 4) If OK, then measure voltage between terminal "E03-14" (or "E53-1") of module connector and "E03-13", "E03-26" (or "E53-16", "E53-47"). Are they 10 – 14 V?	Substitute a known-good ABS (ESP®) hydraulic unit /control module assembly and recheck.	"WHT/RED" or "BLK" circuit open.

DTC C1057: ABS (ESP®) Control Module Power Supply Circuit Failure

S5JB0E4504016

Wiring Diagram



I6JB01450009-02

[A]: With ESP®	[D]: ABS control module connector (viewed from terminal side)	3. ESP® hydraulic unit / control module assembly
[B]: Without ESP®	1. Battery	4. ABS hydraulic unit / control module assembly
[C]: ESP® control module connector (viewed from terminal side)	2. Main fuse box	

DTC Detecting Condition

The ABS (ESP®) control module monitors the power source voltage at terminal “E03-14” (or “E53-1”). When the power source voltage becomes extremely high or low while vehicle is running at more than 20 km/h (13 MPH), this DTC will be set. As soon as the power source voltage becomes normal, the ABS warning lamp will be turned off and the ABS (ESP®) control module will return to normal operation, but the set DTC will remain.

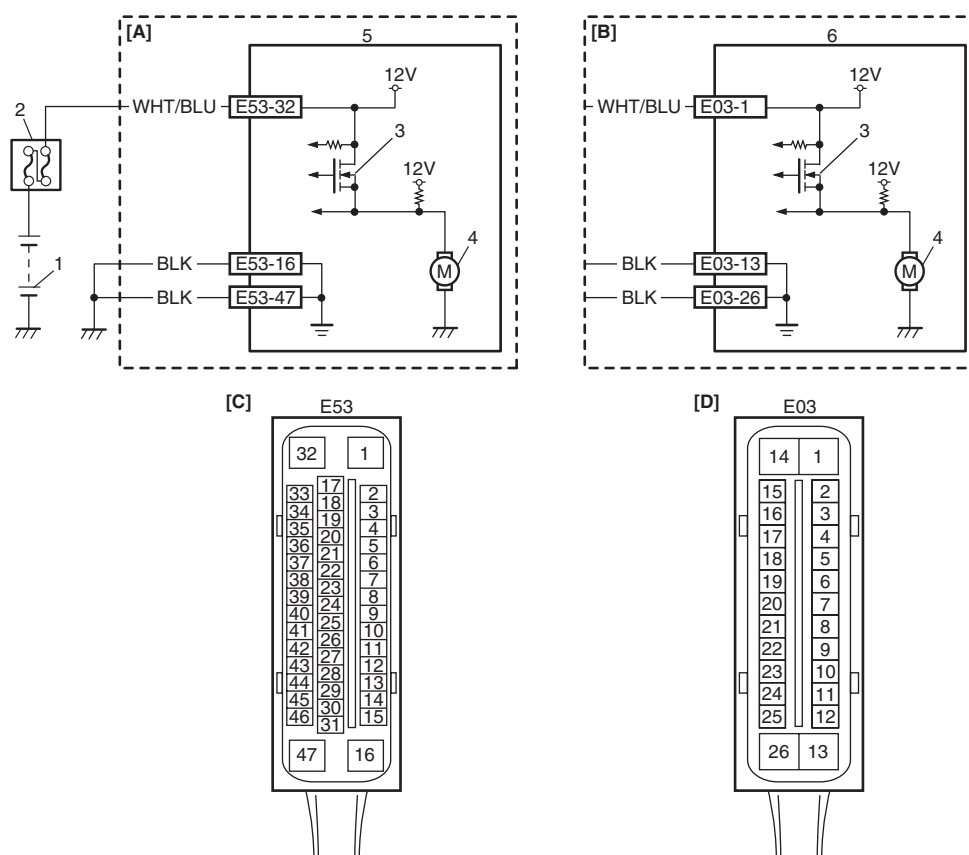
DTC Troubleshooting

Step	Action	Yes	No
1	Was “ABS Check” performed?	Go to Step 2.	Go to “ABS Check: ”.
2	1) Disconnect ABS (ESP®) hydraulic unit / control module connector with ignition switch turned OFF. 2) Check for proper connection to ABS (ESP®) control module connector at terminals “E03-14”, “E03-13” and “E03-26” (or “E53-1”, “E53-16” and “E53-47”). 3) If OK, then turn ignition switch to ON position and measure voltage between terminals “E03-14” and “E03-13”, “E03-26” (or “E53-1” and “E53-16”, “E53-47”). Are voltage 9.7 ± 0.3 V or more?	Go to Step 5.	Go to Step 3.
3	1) Turn ignition switch to OFF position. 2) Check for proper connection to ABS (ESP®) control module connector at terminals “E03-13” and “E03-26” (or “E53-16” and “E53-47”). 3) If OK then turn ignition switch to ON and measure resistance between each terminal of “E03-13”, “E03-26” (or “E53-16”, “E53-47”) and vehicle body ground. Is resistance less than 2Ω ?	Go to Step 4.	“BLK” wire circuit in open or high resistance.
4	1) Measure voltage between positive battery terminal and vehicle body ground with engine running. Is voltage 9.7 ± 0.3 V or more?	Imperfect short between “WHT/RED” wire circuit and body ground.	Check charging system referring to “Generator Test (Undercharged Battery Check): in Section 1J in related manual”.
5	1) Measure voltage between terminals “E03-14” and “E03-13”, “E03-26” (or “E53-1” and “E53-16”, “E53-47”) with engine running. Are voltage 18 ± 1.0 V or less?	Poor connection of “E03-14”, “E03-13” and/or “E03-26” (or “E53-1”, “E53-16” and/or “E53-47”) terminals. If the terminals are in good condition, substitute a known-good ABS (ESP®) hydraulic unit / control module and recheck.	Check charging system referring to “Generator Test (Overcharged Battery Check): in Section 1J in related manual”.

DTC C1061: Pump Motor and/or Motor Driver Circuit

S5JB0E4504017

Wiring Diagram



I6JB01450010-01

[A]: With ESP®	1. Battery	5. ESP® hydraulic unit / control module assembly
[B]: Without ESP®	2. Main fuse box	6. ABS hydraulic unit / control module assembly
[C]: ESP® control module connector (viewed from terminal side)	3. Pump motor driver (transistor)	
[D]: ABS control module connector (viewed from terminal side)	4. Pump motor	

DTC Detecting Condition

The ABS (ESP®) control module monitors the voltage at monitor terminal of pump motor circuit constantly with the ignition switch turned ON. It sets this DTC when the voltage at the monitor terminal does not become high / low according to ON/OFF commands to the motor driver (transistor) of the module (does not follow these commands).

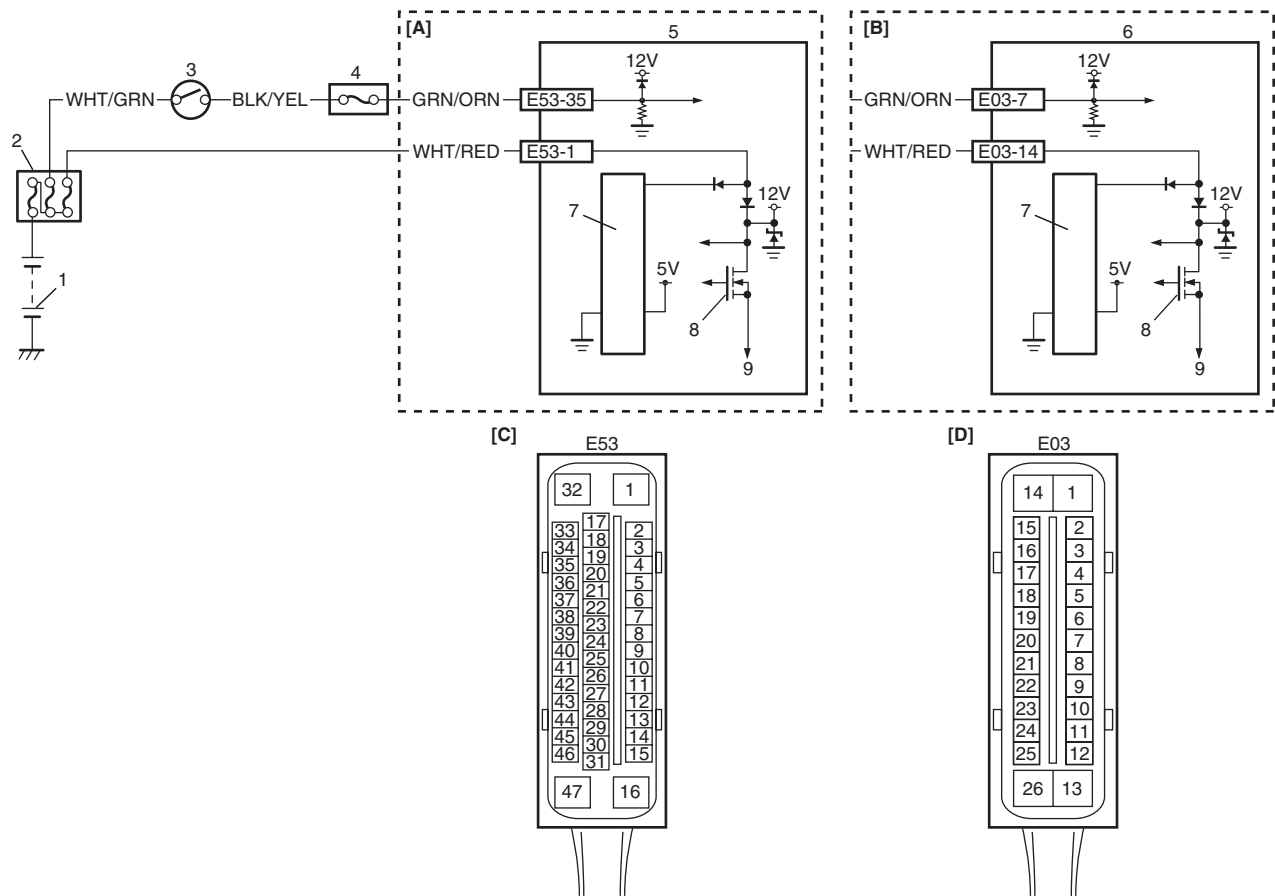
DTC Troubleshooting

Step	Action	Yes	No
1	Was "ABS Check" performed?	Go to Step 2.	Go to "ABS Check: ".
2	1) Turn Ignition switch to OFF position. 2) Disconnect ABS (ESP®) control module connector. 3) Check for proper connection to ABS (ESP®) control module connector at terminal "E03-1" (or "E53-32"). 4) If OK, then measure voltage between terminal "E03-1" (or "E53-32") of module connector and body ground. Is it 10 – 14 V?	Go to Step 3.	"WHT/BLU" circuit open.
3	Measure resistance between terminal "E03-13" and "E03-26" (or "E53-16" and "E53-47") of ABS (ESP®) hydraulic unit / control module connector and vehicle body ground. Is resistance less than 1 Ω?	Substitute a known-good ABS (ESP®) hydraulic unit / control module assembly and recheck.	Ground circuit for ABS (ESP®) control module open or high resistance.

DTC C1063: Solenoid Valve Power Supply Driver Circuit Failure

S5JB0E4504018

Wiring Diagram



I6JB01450011-02

[A]: With ESP®	2. Main fuse box	7. Power control unit
[B]: Without ESP®	3. Ignition switch	8. Solenoid valve power supply driver (transistor)
[C]: ESP® control module connector (viewed from terminal side)	4. Junction block assembly	9. To solenoid valve
[D]: ABS control module connector (viewed from terminal side)	5. ESP® hydraulic unit / control module assembly	
1. Battery	6. ABS hydraulic unit / control module assembly	

DTC Detecting Condition

ABS (ESP®) control module monitors the voltage at the terminal of solenoid circuit constantly with ignition switch turned ON. Also, immediately after ignition switch is turned ON, perform initial check as follows.

Switch solenoid valve power supply driver (transistor) in the order of OFF → ON and check if voltage changes to Low → High. If anything faulty is found in the initial check and when the voltage is low with ignition switch turned ON, this DTC will be set.

DTC Troubleshooting

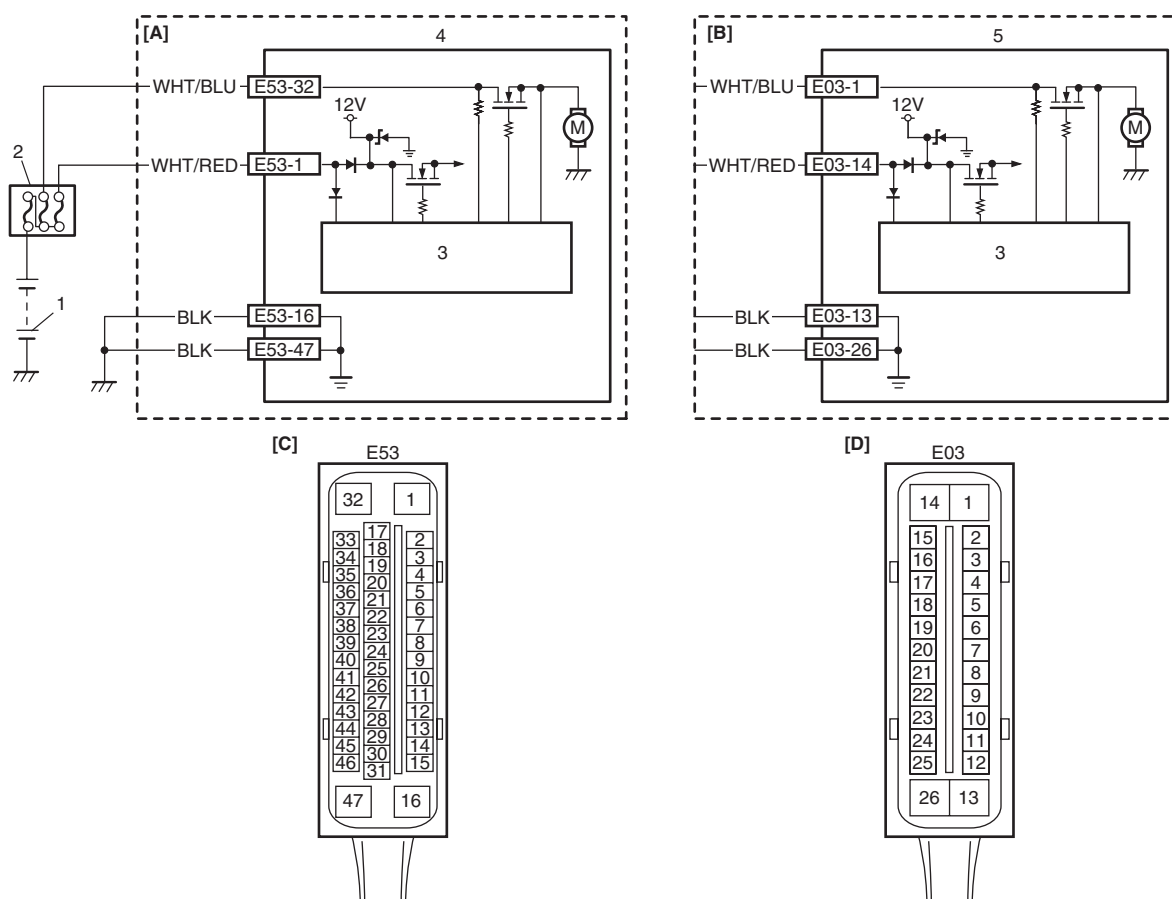
Step	Action	Yes	No
1	Was "ABS Check" performed?	Go to Step 2.	Go to "ABS Check: ".
2	Check battery voltage. Is it about 11 V or higher?	Go to Step 3.	Check charging system referring to "Battery Inspection: in Section 1J in related manual" and "Generator Test (Undercharged Battery Check): in Section 1J in related manual".

Step	Action	Yes	No
3	Check main fuse for ABS solenoid and its terminal. <i>Is it in good condition?</i>	Go to Step 4.	Replace fuse and check for short circuit to ground.
4	1) Turn ignition switch to OFF position. 2) Disconnect ABS (ESP®) control module connector. 3) Check for proper connection to ABS (ESP®) control module at terminal “E03-14” (or “E53-1”). 4) If OK, then measure voltage between connector terminal “E03-14” (or “E53-1”) and body ground. <i>Is it 10 – 14 V?</i>	Substitute a known-good ABS (ESP®) hydraulic unit / control module assembly and recheck.	“WHT/BLU” circuit imperfect short to ground.

DTC C1071: ABS (ESP®) Control Module Internal Defect

S5JB0E4504019

Wiring Diagram



I6JB01450012-02

[A]: With ESP®	[D]: ABS control module connector (viewed from terminal side)	3. Power control unit
[B]: Without ESP®	1. Battery	4. ESP® hydraulic unit / control module assembly
[C]: ESP® control module connector (viewed from terminal side)	2. Main fuse box	5. ABS hydraulic unit / control module assembly

DTC Detecting Condition

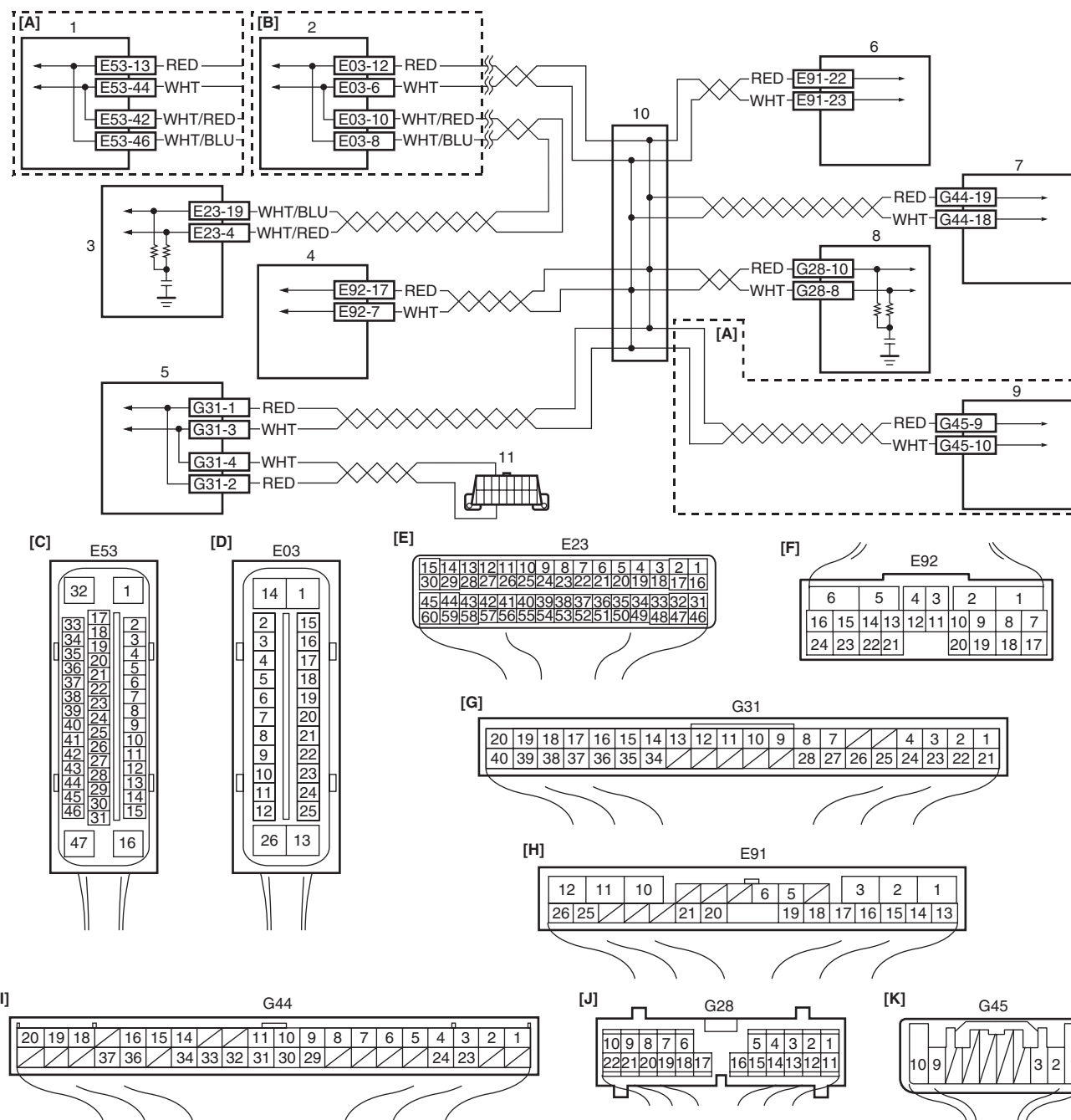
This DTC will be set when an internal malfunction is detected in the ABS (ESP®) control module.

DTC Troubleshooting

Step	Action	Yes	No
1	Was "ABS Check" performed?	Go to Step 2.	Go to "ABS Check: ".
2	Clear all DTCs and check DTC. <i>Is it DTC C1071?</i>	Go to Step 3.	Could be a temporary malfunction of the ABS (ESP®) control module.
3	1) Check for proper connection of ABS (ESP®) control module connector. 2) If OK, disconnect ABS (ESP®) control module connector and check the following. • Voltage "E03-1" (or "E53-32") terminal: 10 – 14 V • Voltage "E03-14" (or "E53-1") terminal: 10 – 14 V • Resistance between "E03-13" (or "E53-16") and body ground: Continuity • Resistance between "E03-26" (or "E53-47") and body ground: Continuity <i>Are the check result as specified?</i>	Replace ABS (ESP®) hydraulic unit / control module assembly.	Repair "WHT/RED", "WHT/BLU" and/or "BLK" circuit and recheck.

DTC U1073: Control Module Communication Bus Off

Wiring Diagram



I5JB0D450004-01

[A]: With ESP®	[I]: Keyless start control module connector (viewed from harness side)	6. 4WD control module (if equipped)
[B]: Without ESP®	[J]: Combination meter connector (viewed from harness side)	7. Keyless start control module (if equipped)
[C]: ESP® control module connector (viewed from terminal side)	[K]: Steering angle sensor connector (viewed from harness side)	8. Combination meter
[D]: ABS control module connector (viewed from terminal side)	1. ESP® hydraulic unit / control module assembly	9. Steering angle sensor (if equipped)
[E]: ECM connector (viewed from harness side)	2. ABS hydraulic unit / control module assembly	10. Junction connector
[F]: TCM connector (viewed from harness side)	3. ECM	11. Data link connector (DLC)
[G]: BCM connector (viewed from harness side)	4. TCM	
[H]: 4WD control module connector (viewed from harness side)	5. BCM	

DTC Detecting Condition

Transmission error that is inconsistent between transmission data and transmission monitor (CAN bus monitor) data is detected more than 7 times continuously.

DTC Troubleshooting

Step	Action	Yes	No
1	<i>Was "ABS Check" performed?</i>	Go to Step 2.	Go to "ABS Check: ".
2	1) Check connection of connectors of all control modules communicating by means of CAN. 2) Recheck DTC. <i>Is DTC U1073 indicated?</i>	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
3	1) Turn ignition switch to OFF position. 2) Disconnect connectors of all control modules communicating by means of CAN. 3) Check CAN communication circuit between control modules for open, short and high resistance. <i>Is each CAN communication circuit in good condition?</i>	Go to Step 4.	Repair insulation of CAN communication line circuit referring to "Precaution for CAN Communication System: in Section 00 in related manual".
4	1) Turn ignition switch to OFF position. 2) Connect connectors of disconnected control modules communicating by means of CAN. 3) Disconnect each connector. • ECM • TCM (for A/T model) • BCM • 4WD control module (if equipped) • Keyless start control module (if equipped) • Steering angle sensor (with ESP®) 4) Recheck DTC. <i>Is DTC U1073 detected?</i>	Check ABS (ESP®) control module power and ground circuit. If circuits are OK, substitute a known-good ABS (ESP®) hydraulic unit / control module assembly and recheck.	Check applicable control module power and ground circuit. If circuit is OK, substitute a known-good applicable control module and recheck.

DTC U1100: Lost Communication with ECM (Reception Error)

S5JB0E4504021

Wiring Diagram

Refer to "DTC U1073: Control Module Communication Bus Off: ".

DTC Detecting Condition

Reception error of communication data for ECM is detected more than specified time continuously.

DTC Troubleshooting

Step	Action	Yes	No
1	Was "ABS Check" performed?	Go to Step 2.	Go to "ABS Check: ".
2	1) Check DTC for ABS (ESP®). Is DTC U1073 detected?	Go to "DTC U1073: Control Module Communication Bus Off: ".	Go to Step 3.
3	1) Check DTC for ECM. Is DTC P1674 detected?	Go to "DTC P1674: CAN Communication (Bus Off Error): in Section 1A".	Go to Step 4.
4	1) Check connection of connectors of all control modules communicating by means of CAN. 2) Check DTC for ABS (ESP®). Is DTC U1100 detected?	Go to Step 5.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
5	1) Turn ignition switch to OFF position. 2) Disconnect connectors of ABS (ESP®) control module and ECM communicating by means of CAN. 3) Check CAN communication circuit between ABS (ESP®) control module and ECM for open, short and high resistance. Is CAN communication circuit in good condition?	Go to Step 6.	Repair or replace the CAN communication line.
6	1) Disconnect connectors of all control modules communicating by means of CAN. 2) Check CAN communication circuit between control modules other than Step 5 for open, short and high resistance. Is each CAN communication circuit in good condition?	Go to Step 7.	Repair or replace the CAN communication line.
7	1) Connect connectors of disconnected control modules communicating by means of CAN. 2) Disconnect each connector. • ECM • TCM (for A/T model) • BCM • 4WD control module (if equipped) • Keyless start control module (if equipped) • Steering angle sensor (with ESP®) 3) Check DTC for ABS (ESP®). Is DTC U1140 detected?	Check ABS (ESP®) control module power and ground circuit. If circuits are OK, substitute a known-good ABS (ESP®) hydraulic unit / control module assembly and recheck.	Check applicable control module power and ground circuit. If circuit is OK, substitute a known-good applicable control module and recheck.

Repair Instructions

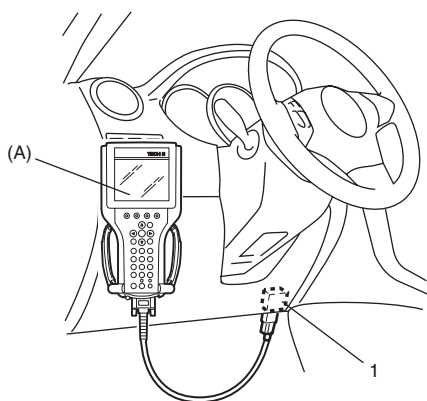
Hydraulic Unit Operation Check

S5JB0E4506001

- 1) Check that basic brake system other than ABS or ESP® is in good condition.
- 2) Check that battery voltage is 11 V or higher.
- 3) Lift up vehicle.
- 4) Set transmission to neutral and release parking brake.
- 5) Turn each wheel gradually by hand to check if brake dragging occurs. If it does, correct.
- 6) Connect SUZUKI scan tool to data link connector (DLC) (1) with ignition switch OFF.

Special tool

(A): SUZUKI scan tool



I5JB0A450008-01

- 7) Turn ignition switch to ON position and select menu press / depress in "HYDRAULIC CONTROL TEST" under "miscellaneous test" ("MISC. TEST") mode of SUZUKI scan tool. Refer to SUZUKI scan tool operator's manual for further details.

NOTE

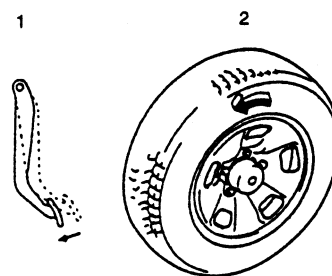
"Press" in the menu is functionable only vehicle with ESP®.

- 8) Perform the following checks with help of another person.

- **Depressurization check**
Step on brake pedal (1) and then select testing wheel by SUZUKI scan tool and the wheel (2) should be turned by another person's hand. At this time, check whether the wheel rotates freely due to brake depressurization.
- **Pressurization check**
Step off brake pedal (1) and then select testing wheel by SUZUKI scan tool and the wheel (2) should be turned by another person's hand. At this time, check whether the wheel locks due to brake pressurization.

NOTE

Pressurization / Depressurization by SUZUKI scan tool is available for 0.5 second.



I4RH01450021-01

- 9) Check for all 4-wheels condition respectively. If a faulty condition is found, replace hydraulic unit / control module assembly.
- 10) After completing the check, turn ignition switch to OFF position and disconnect SUZUKI scan tool from DLC.

ABS (ESP®) Hydraulic Unit / Control Module Assembly On-Vehicle Inspection

S5JB0E4506003

⚠ CAUTION

Never disassemble ABS (ESP®) hydraulic unit / control module assembly, loosen blind plug or remove motor. Performing any of these prohibited services will affect original performance of ABS (ESP®) hydraulic unit / control module assembly.

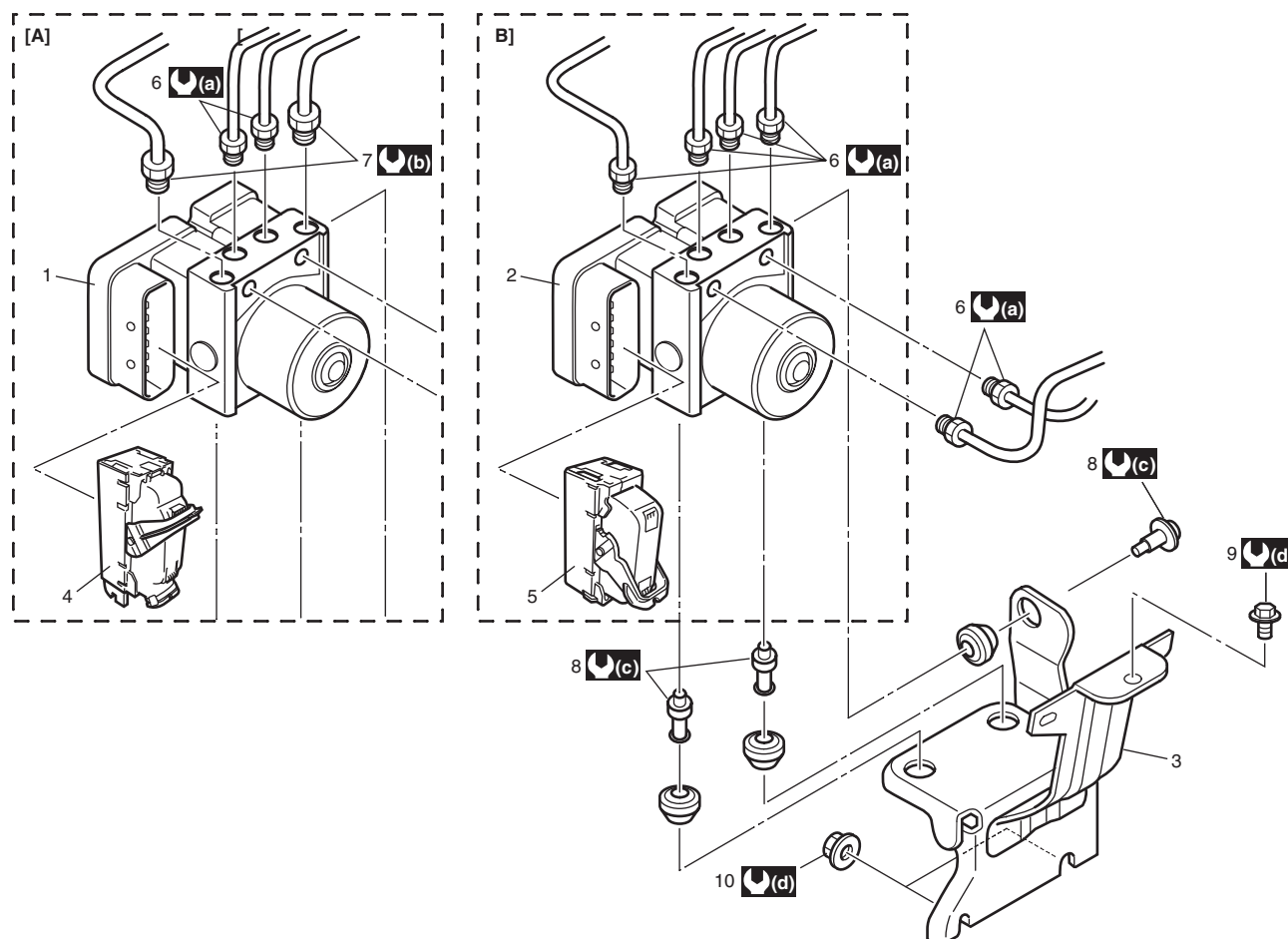
Check hydraulic unit for fluid leakage.
If any, repair or replace.

ABS (ESP®) Hydraulic Unit / Control Module Assembly Removal and Installation

S5JB0E4506004

⚠ CAUTION

Never disassemble ABS (ESP®) hydraulic unit / control module assembly, loosen blind plug or remove motor. Performing any of these prohibited services will affect original performance of ABS (ESP®) hydraulic unit / control module assembly.

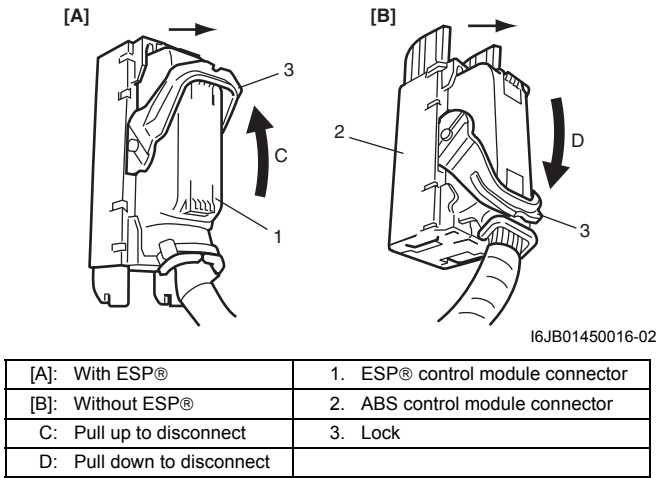


I5JB0B450006-01

[A]: With ESP®	5. ABS control module connector	⚙(a) : 16 N·m (1.6 kgf-m, 11.5 lb-ft)
[B]: Without ESP®	6. Brake pipe flare nut for M10	⚙(b) : 19 N·m (1.9 kgf-m, 14.0 lb-ft)
1. ABS hydraulic unit / control module assembly	7. Brake pipe flare nut for M12	⚙(c) : 9 N·m (0.9 kgf-m, 6.5 lb-ft)
2. ESP® hydraulic unit / control module assembly	8. ABS (ESP®) hydraulic unit / control module assembly bolt	⚙(d) : 25 N·m (2.5 kgf-m, 18.0 lb-ft)
3. Bracket	9. ABS (ESP®) hydraulic unit / control module assembly bracket bolt	
4. ESP® control module connector	10. ABS (ESP®) hydraulic unit / control module assembly bracket nut	

Removal

- 1) Disconnect negative (–) cable from battery.
- 2) Remove ECM referring to “Engine Control Module (ECM) Removal and Installation: in Section 1C in related manual”.
- 3) Disconnect ABS (ESP®) control module connector as shown in figure.

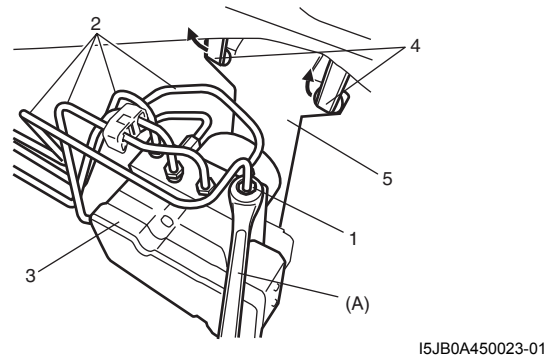


- 4) Using special tool, loosen flare nuts (1) and disconnect brake pipes (2) from ABS (ESP®) hydraulic unit / control module assembly (3).

Special tool
(A): 09950–78220

NOTE
Put bleeder plug cap or the like onto pipe to prevent fluid from spilling. Do not allow brake fluid to get on painted surfaces.

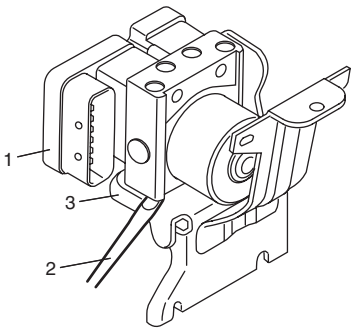
- 5) Disconnect harness clamps (4) from bracket (5).



- 6) Remove ABS (ESP®) hydraulic unit / control module with bracket from vehicle by removing bracket bolt and two bracket nuts.
- 7) Remove bolt and pull out ABS (ESP®) hydraulic unit / control module assembly (1) from bracket (3) using flat end rod or the like (2).

CAUTION

- Do not give an impact to hydraulic unit.
- Use care not to allow dust to enter hydraulic unit.
- Do not place hydraulic unit on its side or upside down. Handling it in inappropriate way will affect its original performance.

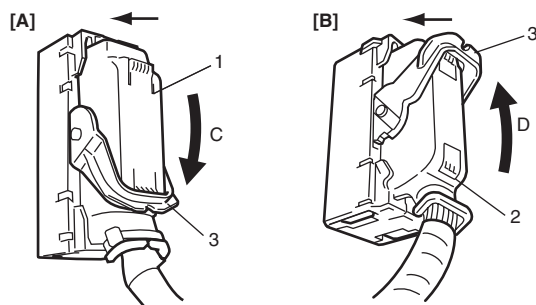


Installation

- 1) Install hydraulic unit / control module assembly by reversing removal procedure.

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

- 2) Connect ABS (ESP®) control module connector and lock it as shown in figure.



I6JB01450018-03

[A]: With ESP®	1. ESP® control module connector
[B]: Without ESP®	2. ABS control module connector
C: Pull down until lock to connect	3. Lock
D: Pull up until lock to connect	

- 3) Connect harness clamp to bracket.
 4) Install ECM referring to "Engine Control Module (ECM) Removal and Installation: in Section 1C in related manual".
 5) Connect negative (–) cable at battery.
 6) Bleed air from brake system referring to "Air Bleeding of Brake System: in Section 4A in related manual".
 7) Check each installed part for fluid leakage and perform "Hydraulic Unit Operation Check: ".

NOTE

For new ABS (ESP®) hydraulic unit / control module assembly, if "Hydraulic Unit Operation Check: " has not been performed, ABS warning lamp may flash when ignition switch is turned ON position. Accordingly preform "Hydraulic Unit Operation Check: " to stop flashing of ABS warning lamp.

Front Wheel Speed Sensor On-Vehicle Inspection

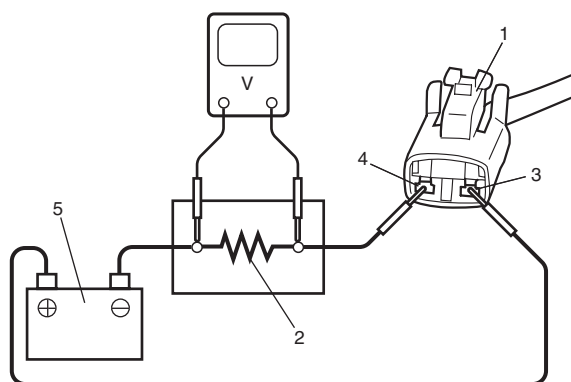
S5JB0E4506005

Output Voltage Inspection

- 1) Disconnect negative (–) cable from battery.
- 2) Hoist vehicle a little.
- 3) Disconnect wheel speed sensor connector.
- 4) Disconnect wheel speed grommet from vehicle body.
- 5) Set up measuring devices as shown in figure, the resistance to 115 Ω and the power supply voltage to 12 V.

⚠ CAUTION

Incorrect voltage and/or wrong connection cause damage to wheel speed sensor.



I5JB0A450026-03

1. Wheel speed sensor connector	4. "BLK" wire terminal
2. Resistance (115 Ω)	5. Power supply (12 V)
3. "WHT" wire terminal	

- 6) Measure voltage at resistance without wheel rotation.
 If voltage is out of specification, check sensor, mating encoder and their installation conditions.

Voltage at the resistance (115 Ω) without wheel rotation

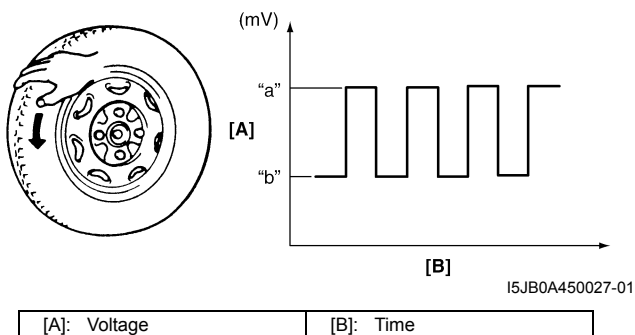
680 to 960 mV

- 7) Measure voltage at resistance with wheel rotation and confirm voltage alternately changes between high and low voltages.
If voltage does not change with wheel rotation, check sensor, mating encoder and their installation conditions.

Voltage at the resistance (115 Ω) with wheel rotation

High voltage "a": 1360 to 1930 mV

Low voltage "b": 680 to 960 mV



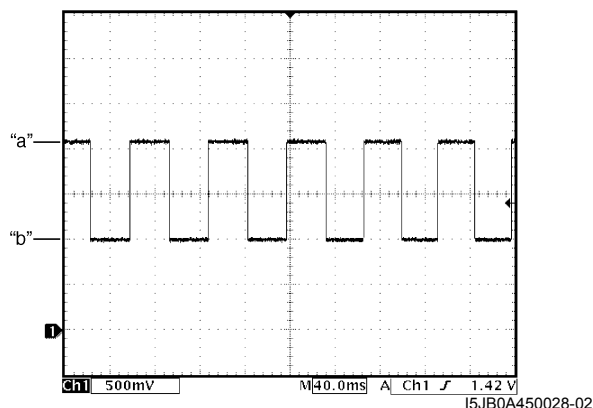
Reference

When using oscilloscope for this check, check if peak-to-peak voltage and waveform meet specification.

Peak-to-peak Voltage at the resistance (115 Ω) with wheel rotation

High voltage "a": 1360 to 1930 mV

Low voltage "b": 680 to 960 mV



Front Wheel Speed Sensor Removal and Installation

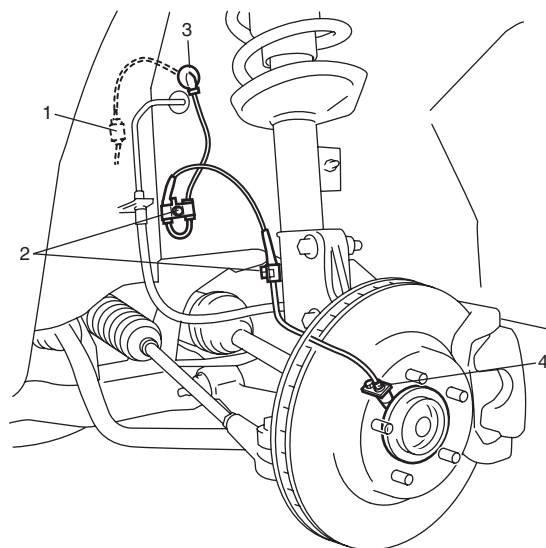
S5JB0E4506006

Removal

- 1) Disconnect negative (–) cable from battery.
- 2) Disconnect front wheel speed sensor coupler (1).
- 3) Hoist vehicle and remove wheel.
- 4) Remove harness clamp, clamp bolts (2) and grommet (3).
- 5) Remove front wheel speed sensor (4) from knuckle.

⚠ CAUTION

- Do not pull wire harness when removing front wheel speed sensor.
- Do not cause damage to surface of front wheel speed sensor and do not allow dust, etc. to enter its installation hole.



I5JB0A450029-01

Installation

- 1) Check that no foreign material is attached to sensor (1) and mating encoder (2).
- 2) Install it by reversing removal procedure.

Tightening torque

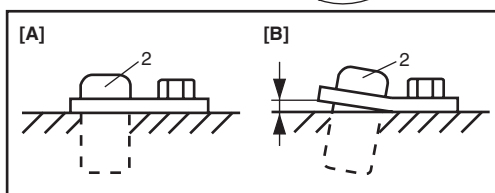
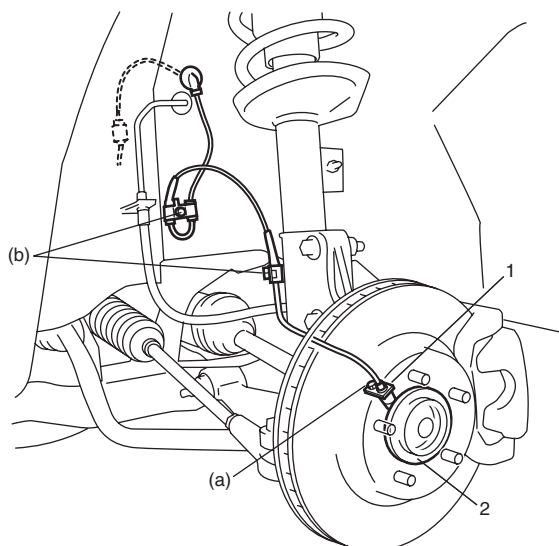
Front wheel speed sensor bolt (a): 11 N·m (1.1 kgf-m, 8.0 lb-ft)

Front wheel speed sensor harness clamp bolt (b): 11 N·m (1.1 kgf-m, 8.0 lb-ft)

⚠ CAUTION

Do not pull or twist wire harness more than necessary when installing front wheel speed sensor.

- 3) Check that there is no clearance between sensor and knuckle.



I5JB0A450030-01

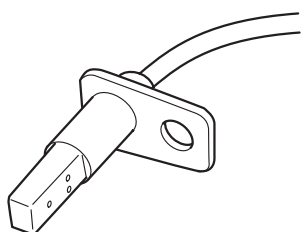
[A]: OK

[B]: NG

Front Wheel Speed Sensor Inspection

S5JB0E4506007

Check sensor for damage.
If any malfunction is found, replace.



I5JB0A450031-01

Rear Wheel Speed Sensor On-Vehicle Inspection

S5JB0E4506008

Refer to "Front Wheel Speed Sensor On-Vehicle Inspection:" since rear wheel speed sensor is the same as front wheel speed sensor.

Rear Wheel Speed Sensor Removal and Installation

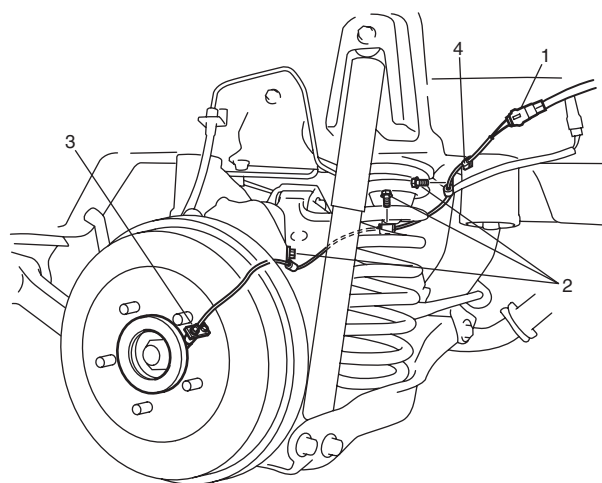
S5JB0E4506009

Removal

- 1) Disconnect negative (-) cable from battery.
- 2) Disconnect rear wheel speed sensor coupler (1).
- 3) Hoist vehicle and remove wheel.
- 4) Remove harness clamp (4) and clamp bolts (2).
- 5) Remove rear wheel speed sensor (3) from knuckle.

⚠ CAUTION

- Do not pull wire harness when removing rear wheel speed sensor.
- Do not cause damage to surface of rear wheel speed sensor and do not allow dust, etc. to enter its installation hole.



I5JB0A450032-02

Installation

Reverse removal procedure for installation noting the following.

- Check that no foreign material is attached to sensor (1) and mating encoder (2).
- Be sure to install wheel speed sensor (1) and its bolt at the correct (upper) position as shown in figure. Tighten sensor bolt and harness clamp bolts to specified torque.

Tightening torque

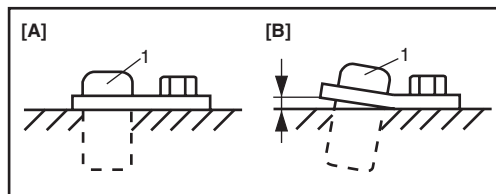
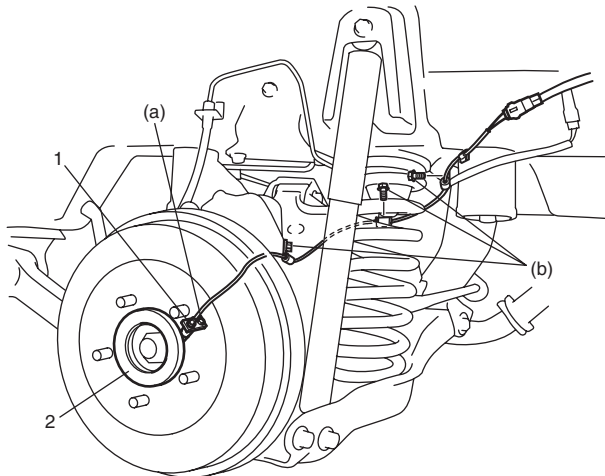
Rear wheel speed sensor bolt (a): 11 N·m (1.1 kgf-m, 8.0 lb-ft)

Rear wheel speed sensor harness clamp bolt (b): 11 N·m (1.1 kgf-m, 8.0 lb-ft)

⚠ CAUTION

Do not pull or twist wire harness more than necessary when installing rear wheel speed sensor.

- Check that there is no clearance between sensor and brake back plate.



I5JB0A450033-01

[A]: OK	[B]: NG
---------	---------

Rear Wheel Speed Sensor Inspection

S5JB0E4506010

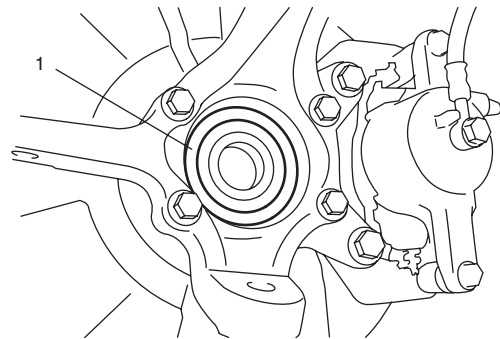
Refer to "Front Wheel Speed Sensor Inspection:" since rear wheel speed sensor is the same as front wheel speed sensor.

Front Wheel Encoder On-Vehicle Inspection

S5JB0E4506011

Before inspect front wheel encoder, remove front drive shaft or front wheel spindle referring to "Front Drive Shaft Assembly Removal and Installation: Front in Section 3A in related manual" or "Front Wheel Hub Assembly Removal and Installation: in Section 2B".

- Check encoder (1) for being crack, damaged or deformed.
 - Turn wheel and check if encoder rotation is free from eccentricity and looseness.
 - Check that no foreign material is attached.
- If any faulty is found, repair or replace. Refer to "Front Wheel Hub Assembly Removal and Installation: in Section 2B".



I5JB0A450034-01

Front Wheel Encoder Removal and Installation

S5JB0E4506012

⚠ CAUTION

Front wheel encoder is included in front wheel hub assembly. If front wheel encoder needs to be replaced, replace it as a front wheel hub assembly.

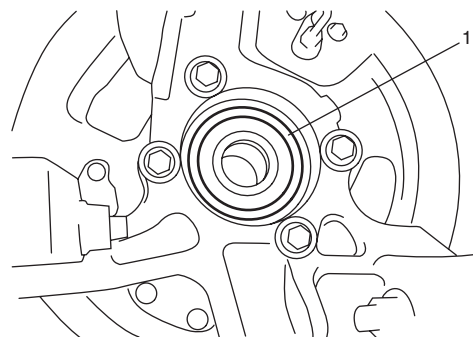
For removal and installation of front wheel hub assembly, referring to "Front Wheel Hub Assembly Removal and Installation: in Section 2B".

Rear Wheel Encoder On-Vehicle Inspection

S5JB0E4506013

Before inspect rear wheel encoder, remove rear drive shaft referring to "Rear Drive Shaft Assembly Removal and Installation: Rear in Section 3A in related manual".

- Check encoder (1) for being crack, damaged or deformed.
 - Turn wheel and check if encoder rotation is free from eccentricity and looseness.
 - Check that no foreign material is attached.
- If any faulty is found, repair or replace. Refer to "Rear Wheel Hub Assembly Removal and Installation: in Section 2C in related manual".



I5JB0A450035-01

Rear Wheel Encoder Removal and Installation

S5JB0E4506014

⚠ CAUTION

Rear wheel encoder is included in rear wheel hub assembly. If rear wheel encoder needs to be replaced, replace it as a rear wheel hub assembly.

For removal and installation of front wheel hub assembly, referring to “Rear Wheel Hub Assembly Removal and Installation: in Section 2C in related manual”.

Specifications**Tightening Torque Specifications**

S5JB0E4507001

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
Brake pipe flare nut for M10	16	1.6	11.5	🔧
Brake pipe flare nut for M12	19	1.9	14.0	🔧
ABS (ESP®) hydraulic unit / control module assembly bolt	9	0.9	6.5	🔧
ABS (ESP®) hydraulic unit / control module assembly bracket bolt	25	2.5	18.0	🔧
ABS (ESP®) hydraulic unit / control module assembly bracket nut	25	2.5	18.0	🔧
Front wheel speed sensor bolt	11	1.1	8.0	🔧
Front wheel speed sensor harness clamp bolt	11	1.1	8.0	🔧
Rear wheel speed sensor bolt	11	1.1	8.0	🔧
Rear wheel speed sensor harness clamp bolt	11	1.1	8.0	🔧

NOTE

The specified tightening torque is also described in the following.

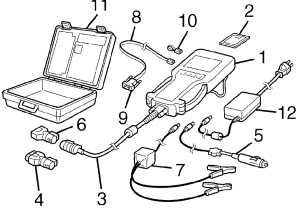
“ABS (ESP®) Hydraulic Unit / Control Module Assembly Removal and Installation: ”

Reference:

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

Special Tools and Equipment**Special Tool**

S5JB0E4508001

09950-78220 Flare nut wrench (10 mm) 🔧 	SUZUKI scan tool — This kit includes following items. 1. Tech 2, 2. PCMCIA card, 3. DLC cable, 4. SAE 16/19 adapter, 5. Cigarette cable, 6. DLC loop back adapter, 7. Battery power cable, 8. RS232 cable, 9. RS232 adapter, 10. RS232 loop back connector, 11. Storage case, 12. Power supply 
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Electronic Stability Program

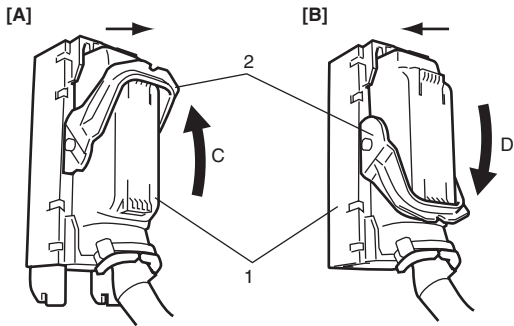
Precautions

Precautions in Diagnosing Troubles

S5JB0E4600001

To ensure that the trouble diagnosis is done accurately and smoothly, observe the following and follow “Electronic Stability Program Check: ”.

- Diagnostic information stored in ESP® control module memory can be cleared as well as checked by using SUZUKI scan tool. Before using scan tool, read its Operator’s (Instruction) Manual carefully to have good understanding as to what functions are available and how to use it.
- If the vehicles was operated in any of the following ways, ESP® warning lamp may light momentarily but this does not indicate anything abnormal in ESP®.
 - The vehicle was driven with parking brake pulled.
 - The vehicle was driven with brake dragging.
 - The vehicle was stuck in mud, sand, etc.
 - Wheel spin occurred while driving.
 - Wheel(s) was rotated while the vehicle was jacked up.
- Be sure to read “Precaution for CAN Communication System: in Section 00 in related manual” before inspection and observe what is written there.
- Be sure to use the trouble diagnosis procedure as described in “Electronic Stability Program Check: ”. Failure to follow it may result in incorrect diagnosis. (Some other diagnosis trouble code may be stored by mistake in the memory of ESP® control module during inspection.)
- When disconnecting ESP® control module connector (1), pull up lock lever (2) of connector.
When connecting, set the connector on ESP® hydraulic unit / control module assembly and pull down the lock lever (2) until it locks.



I6JB01460001-01

[A]: Disconnect	C: Pull up to disconnect
[B]: Connect	D: Pull down to connect

- Communication of ECM, TCM (for A/T model), BCM, ESP® (ABS) control module (if equipped), 4WD control module (if equipped), keyless start control module (if equipped), combination meter and steering angle sensor is established by CAN (Controller Area Network).
Therefore, be sure to read “Precautions for Installing Mobile Communication Equipment: in Section 00 in related manual” before inspection and handling CAN communication line.

Precautions in On-Vehicle Service

S5JB0E4600002

When connector is connected to ESP® hydraulic unit / control module assembly, do not disconnect connectors of sensors with ignition switch ON. Otherwise, DTC will be set in ESP® control module.

Precautions in Hydraulic Unit Operation Check

S5JB0E4600003

ESP® hydraulic unit / control module assembly function is checked by correct wheel lock / release condition when brake pressure is pressurized / depressurized using SUZUKI scan tool. The hydraulic unit operation check referring to “Hydraulic Unit Operation Check: in Section 4E” should be performed to confirm the correct brake pipe connection in the following cases.

- ESP® hydraulic unit / control module assembly was replaced.
- Brake pipe and/or hose were replaced.

Precautions in Sensor Calibration

S5JB0E4600004

ESP® control module stores calibration points data of yaw rate / G sensor assembly and master cylinder pressure sensor. Steering angle sensor stores calibration point data of itself.

TCS and stability control system use these sets of data.

When the following operation is done, calibration should be performed since the original calibration points are deleted.

Sensor	Procedures required calibration
Steering angle sensor	- Power is not supplied to steering angle sensor. (battery and/or fuse is removed.) - Steering angle sensor is replaced. - Power is not supplied to ESP® control module. (battery, fuse and/or connector is removed.) - ESP® hydraulic unit / control module assembly is replaced.
Master cylinder pressure sensor	ESP® hydraulic unit / control module assembly is removed or replaced.
Yaw rate / G sensor assembly	- Yaw rate / G sensor assembly is removed or replaced. - ESP® hydraulic unit / control module assembly is replaced.

Perform sensor calibration according to "Sensor Calibration: ".

Precautions in Speedometer Test or Other Tests

S5JB0E4600005

When performing speedometer or a bench test while rotating a tire, ESP® function must be kept at stop. It is possible to stop ESP® function temporarily by ESP® OFF switch. In this case, however, the function is forced to come back to work when the speed exceeds 30 km/h (18.5 mph) and may hinder accurate testing.

There are two ways to stop the ESP® function completely as described below.

- Connect the SUZUKI scan tool, set to the "MISC. TEST" mode to stop the ESP® function. Refer to SUZUKI scan tool operator's manual for further details.
- Disconnect the connector of the steering angle sensor, and ESP® function is forced to enter the fail-safe mode, then ESP® function is stopped.

However, when this method is used, DTC remains in the memory of the ESP® control module. Therefore, after the test, re-connect the connector, clear DTC in the memory of the ESP® control module. And calibrate steering angle sensor referring to "Sensor Calibration: ".

General Description

Electronic Stability Program Description

S5JB0E4601001

Electronic Stability Program (ESP®) main function is to control ABS / EBD, TCS and stability.

- ABS / EBD
ABS function is that four wheel brake forces are independently varied with referring each wheel slip condition.
EBD function is that front and rear wheel braking forces are varied with referring loading distribution of the vehicle.
ABS improves the vehicle stability, controllability and braking performance.
For the details, refer to "ABS Description: in Section 4E".
- TCS (Traction Control System)
TCS function is that engine torque is controlled and brake is applied with referring wheel spin condition during vehicle starting and accelerating.
- Stability control system

Stability control system is that engine torque is controlled and brake is applied with referring vehicle condition (over steering, under steering) during cornering.

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ESP® Hydraulic Unit / Control Module Assembly Description

S5JB0E4601002

ESP® control module is a component of ESP® hydraulic unit / control module assembly and has the following functions.

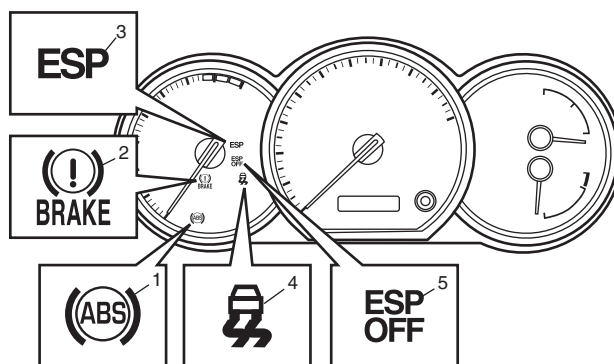
Self-Diagnosis Function

ESP® control module monitors each input and output signals. When ESP® control module detects any malfunction, some of ABS warning lamp (1), EBD warning lamp (brake warning lamp) (2), ESP® warning lamp (3), SLIP indicator lamp (4), ESP® OFF lamp (5) are turned ON and indicate the abnormality to driver.

- When ignition switch is turned ON, ABS warning lamp, EBD warning lamp, ESP® warning lamp, SLIP indicator lamp and ESP® OFF lamp light for 2 seconds to check its circuit.

4F-3 Electronic Stability Program:

- When no abnormality is detected (the system is in good condition), ABS warning lamp, EBD warning lamp, ESP® warning lamp, SLIP indicator lamp and ESP® OFF lamp turn OFF after 2 seconds.
- When an abnormality in the system is detected, some of ABS warning lamp, EBD warning lamp (brake warning lamp), ESP® warning lamp, SLIP indicator lamp and/or ESP® OFF lamp are turned ON and the area where that abnormality lies is stored in the memory in ESP® control module.



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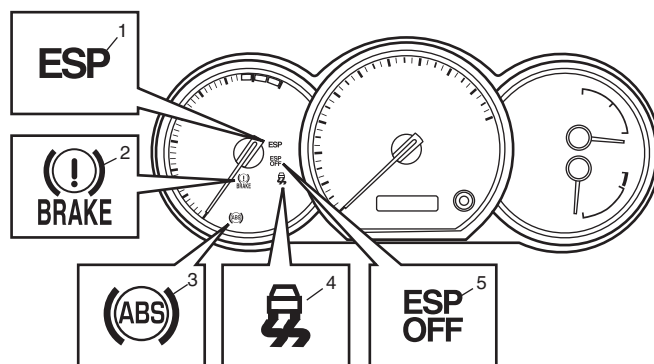
Fail-Safe Mode

When ESP® control module detects abnormality, the system goes into fail-safe mode. And some of functions of ABS, TCS, stability control system are shut down. For details of fail safe mode, refer to “Fail-Safe Table: ”.

Warning Lamp, Indicator Lamp Description

S5JB0E4601003

There are five types of warning lamp and indicator lamp in instrument cluster, which are controlled by ESP® control module. They give warning / indication to driver by changing the modes light ON / blinking / light OFF.



I6JB01460003-02

1. ESP® warning lamp	3. ABS warning lamp	5. ESP® OFF lamp
2. EBD warning lamp (brake warning lamp)	4. SLIP indicator lamp	

The followings are the condition and operation of warning lamps and indicator lamps.

Warning lamp / Indicator lamp	Condition and operation
ABS warning lamp	If ABS has abnormality, the lamp turns “ON”.
EBD warning lamp (brake warning lamp)	- If EBD system has abnormality, the lamp turns “ON”. - If brake fluid level in reservoir is lower than minimum level, the lamp turns “ON”. - Parking brake switch is ON, the lamp turns “ON”.
ESP® warning lamp	If ESP® systems has abnormality, the lamp turns “ON”.
SLIP indicator lamp	- If stability control system and traction control system is active, the lamp blinks at 5 Hz. - If Steering angle sensor calibration is incompleted, the lamp blinks at 1 Hz.

Warning lamp / Indicator lamp	Condition and operation
ESP® OFF lamp	- If ESP® OFF switch is turned "ON", the ESP® OFF lamp light up. When it is "ON", TCS and stability control system functions are controlled not to work. However, when the speed is over 30 km/h (18.5 mph), ESP® OFF lamp is turned "OFF" and TCS and stability control system function is back to work automatically. - When transfer shift position (if equipped) is in 4L-lock, the ESP® OFF lamp light up to indicate engine torque down and stability control system in TCS are controlled not to activate to increase the driving force. However, the brake-traction control works through ESP® OFF lamp light up. - ESP® OFF lamp light up to indicate that brake control of traction control function is controlled not to act if brake pad temperature is over 350 °C (662 °F) and any of wheel is in wheel spin condition.

CAN Communication System Description

S5JB0E4601004

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	4WD control module (if equipped)	Steering angle sensor
ESP® control module		DATA	Torque up request	○			
			Torque down request	○			
			Wheel speed signal (front right)	○		○	
			Wheel speed signal (front left)	○		○	
			Wheel speed signal (rear right)	○		○	
			Wheel speed signal (rear left)	○		○	
			ESP® system (other than ABS) active	○	○	○	
			ABS active	○		○	
			ESP® OFF indication ON	○	○		
			ESP® indication ON		○		
			ABS indication on		○		
			EBD indication on		○		
			Steering angle neutral position				○

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ESP® Control Module Reception Data

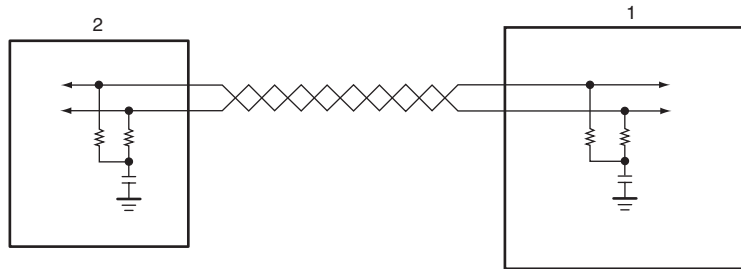
				ECM	TCM (for A/T model)	BCM	4WD control module (if equipped)	Steering angle sensor
ESP® control module		DATA	Engine torque signal	○				
			Accelerator pedal position	○				
			Engine speed	○				
			Cruise control signal (if equipped)	○				
			Brake pedal switch signal	○				
			Transmission gear selector position		○			
			Brake fluid level switch signal			○		
			Parking brake switch signal			○		
			4WD shift position (if equipped)				○	
			Steering angle signal					○

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CAN Communication System For Electronic Stability Program Description

S5JB0E4601005

There is CAN communication system only for ESP® control module (1) and yaw rate / G sensor assembly (2).
This CAN communication system is independent from other control modules.



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ESP® communicates control data with yaw rate / G sensor assembly as follows.

ESP® Transmission Data to Yaw Rate / G Sensor Assembly

- Longitudinal G neutral position
- Lateral G neutral position

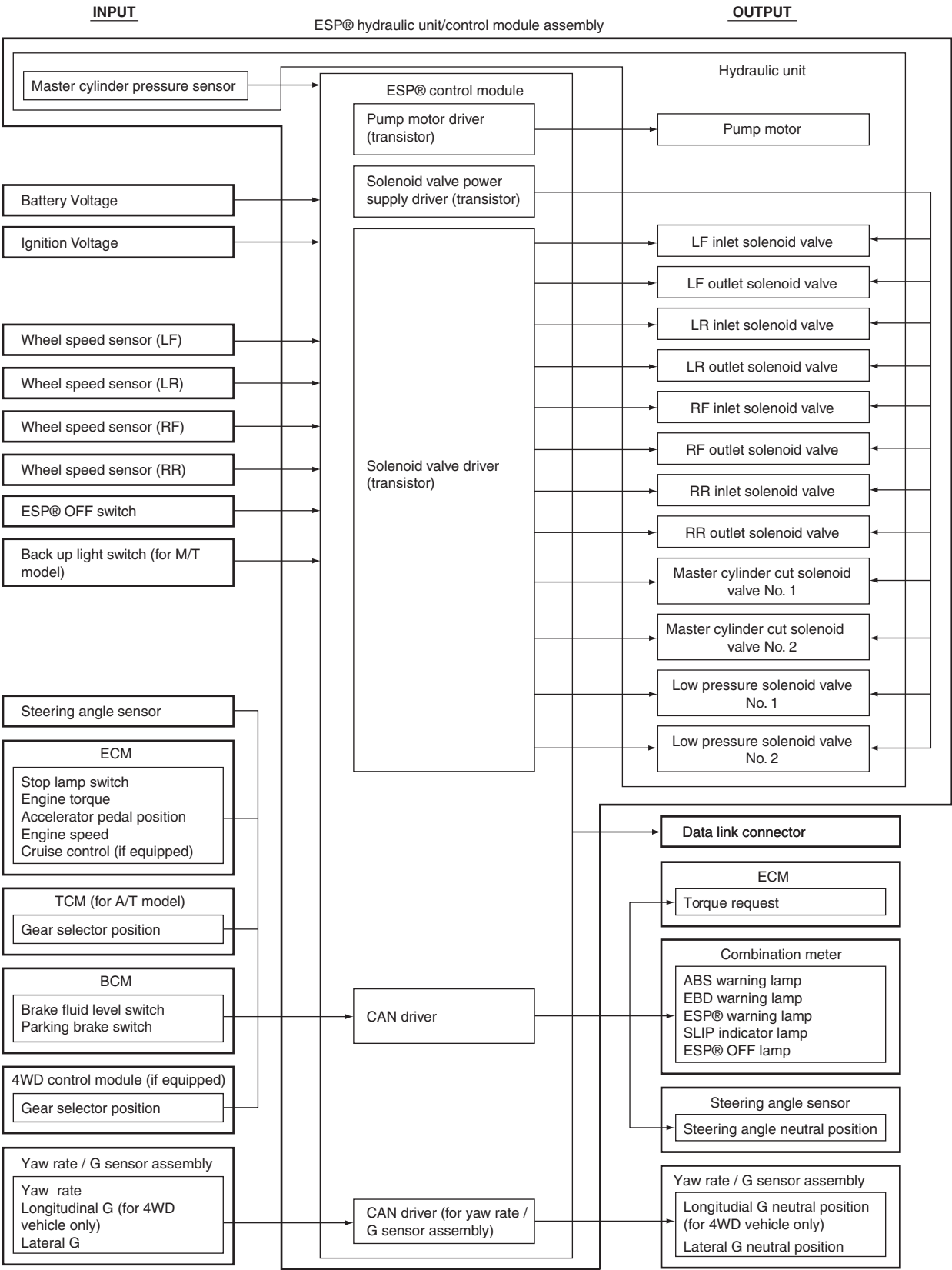
ESP® Reception Data from Yaw Rate / G Sensor Assembly

- Vehicle yaw rate signal
- Vehicle longitudinal G signal
- Vehicle lateral G signal
- Yaw rate / G sensor assembly related malfunction

Schematic and Routing Diagram

Electronic Stability Program Schematic

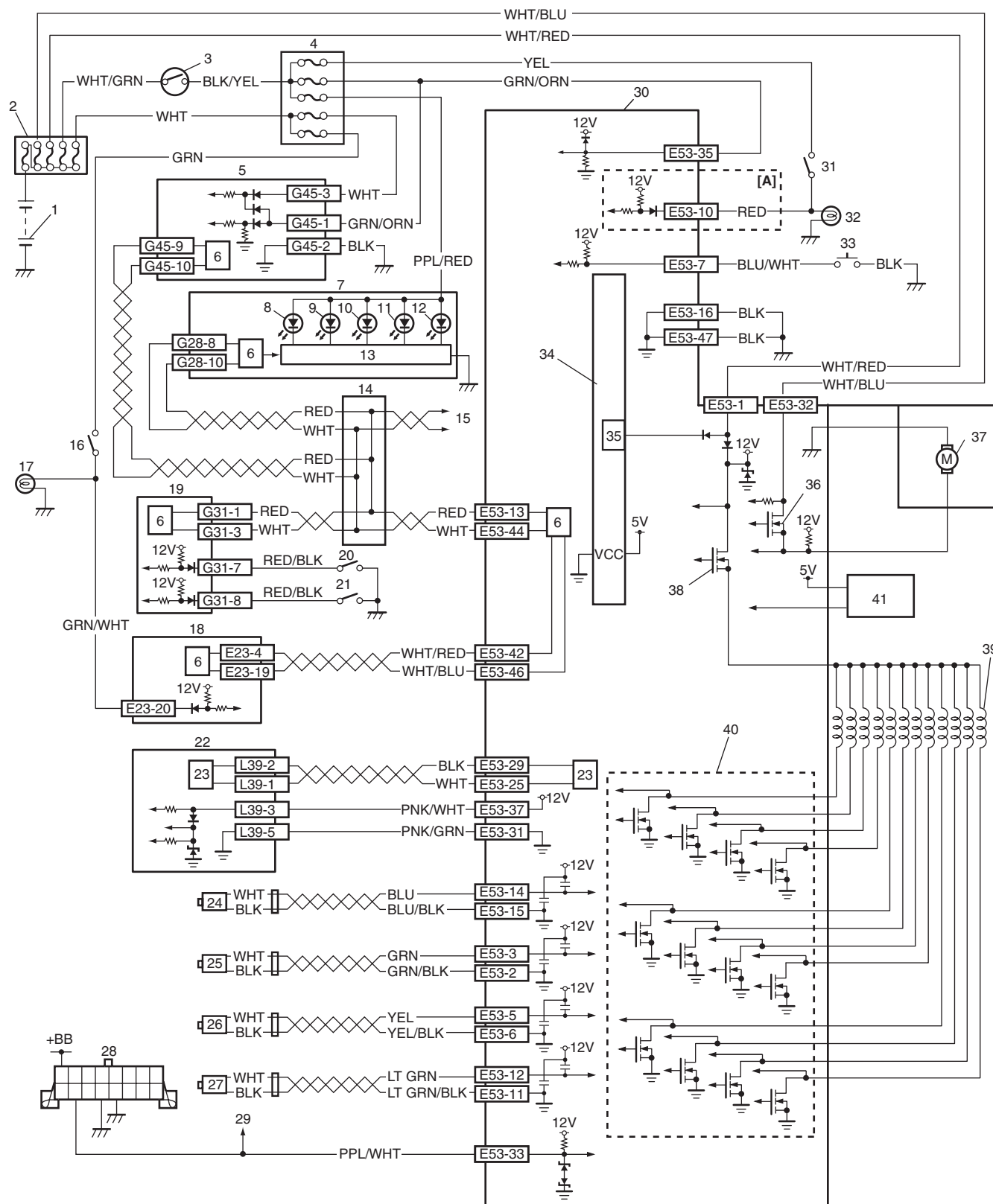
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Electronic Stability Program Wiring Circuit Diagram

S5JB0E4602002

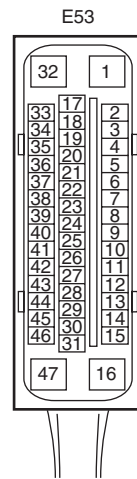


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[A]: For M/T model	14. Junction connector	28. Data link connector
1. Battery	15. To TCM, 4WD control module and keyless start control module	29. To ECM, TCM, SDM, BCM and 4WD control module
2. Main fuse box	16. Stop lamp switch	30. ESP® hydraulic unit / control module assembly
3. Ignition switch	17. Stop lamp	31. Back up light switch
4. Junction block assembly	18. ECM	32. Back-up light

5. Steering angle sensor	19. BCM	33. ESP® OFF switch
6. CAN driver	20. Brake fluid level switch	34. Power control unit
7. Combination meter	21. Parking brake switch	35. Internal memory
8. SLIP indicator lamp	22. Yaw rate / G sensor assembly	36. Pump motor driver (transistor)
9. ESP® OFF lamp	23. CAN driver (for yaw rate / G sensor assembly)	37. Pump motor
10. ESP® warning lamp	24. Left-front wheel speed sensor	38. Solenoid valve power supply driver (transistor)
11. ABS warning lamp	25. Right-front wheel speed sensor	39. Solenoid valves
12. EBD warning lamp (brake warning lamp)	26. Left-rear wheel speed sensor	40. Solenoid valve driver (transistor)
13. Lamp driver module	27. Right-rear wheel speed sensor	41. Master cylinder pressure sensor

Terminal Arrangement of ESP® Control Module Connector (Viewed from Terminal Side)



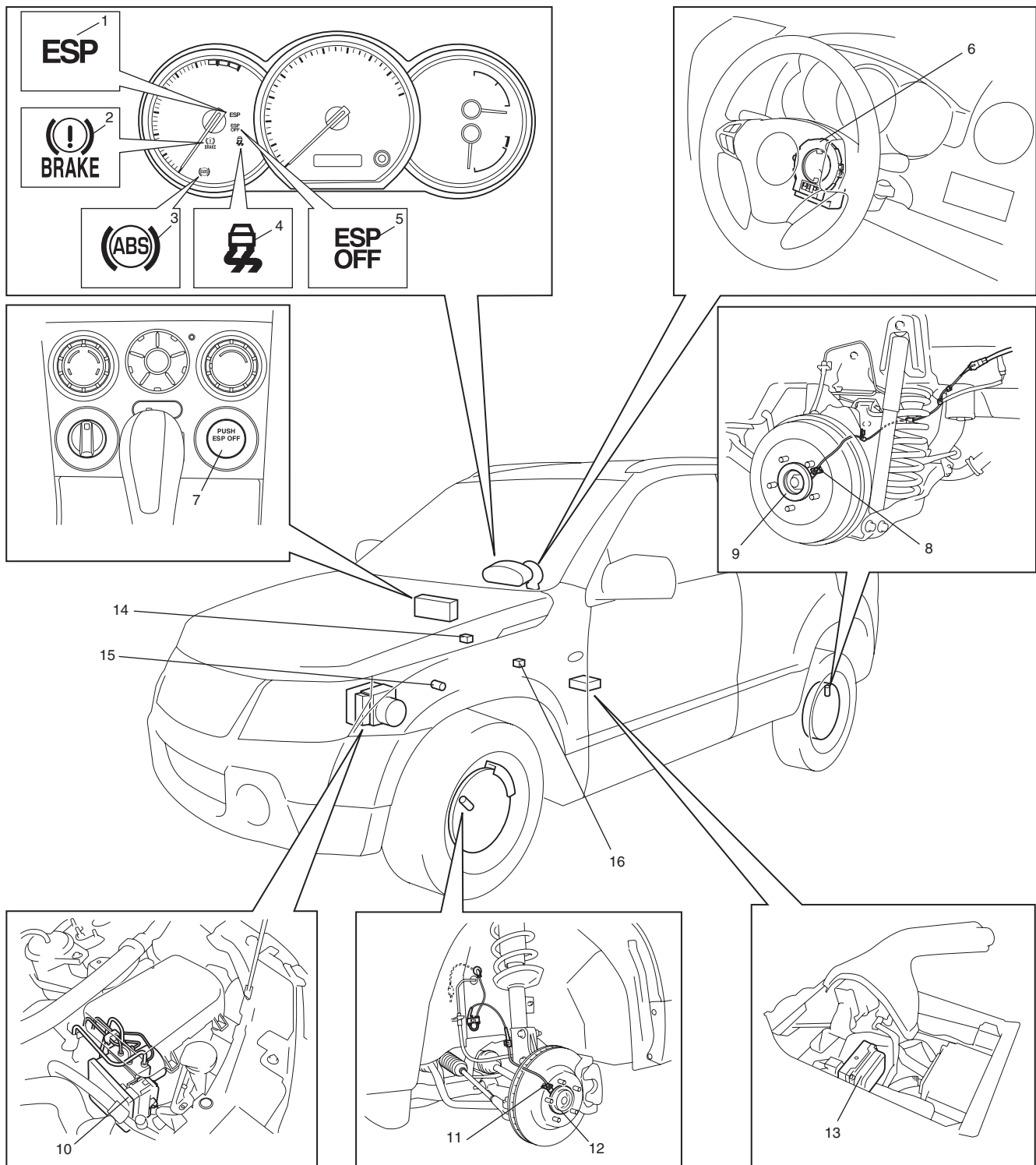
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Terminal	Circuit	Terminal	Circuit
E53-1	Solenoid valve power supply driver (transistor)	E53-25	CAN communication line (low) for yaw rate / G sensor assembly
E53-2	Right-front wheel speed sensor (–)	E53-26	—
E53-3	Right-front wheel speed sensor (+)	E53-27	—
E53-4	—	E53-28	—
E53-5	Left-rear wheel speed sensor (+)	E53-29	CAN communication line (high) for yaw rate / G sensor assembly
E53-6	Left-rear wheel speed sensor (–)	E53-30	—
E53-7	ESP® OFF switch signal	E53-31	Ground for yaw rate / G sensor assembly
E53-8	—	E53-32	Pump motor driver (transistor)
E53-9	—	E53-33	Data link connector
E53-10	Back up light Input (for M/T model)	E53-34	—
E53-11	Right-rear wheel speed sensor (–)	E53-35	Ignition switch
E53-12	Right-rear wheel speed sensor (+)	E53-36	—
E53-13	CAN communication line (high)	E53-37	Power source for yaw rate / G sensor assembly
E53-14	Left-front wheel speed sensor (+)	E53-38	—
E53-15	Left-front wheel speed sensor (–)	E53-39	—
E53-16	Ground	E53-40	—
E53-17	—	E53-41	—
E53-18	—	E53-42	CAN communication line (high) for ECM
E53-19	—	E53-43	—
E53-20	—	E53-44	CAN communication line (low)
E53-21	—	E53-45	—
E53-22	—	E53-46	CAN communication line (low) for ECM
E53-23	—	E53-47	Ground
E53-24	—		

Component Location

Electronic Stability Program Component Location

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16JB01460010-03

1. ESP® warning lamp	7. ESP® OFF switch	13. Yaw rate / G sensor assembly
2. EBD warning lamp (brake warning lamp)	8. Rear wheel speed sensor	14. Data link connector
3. ABS warning lamp	9. Rear wheel encoder	15. Back up light switch
4. SLIP indicator lamp	10. ESP® hydraulic unit / control module assembly	16. Stop lamp switch
5. ESP® OFF lamp	11. Front wheel speed sensor	
6. Steering angle sensor	12. Front wheel encoder	

Diagnostic Information and Procedures

Electronic Stability Program Check

S5JB0E4604001

Refer to the following items for the details of each step.

Step	Action	Yes	No
1	🔧 Malfunction analysis 1) Perform "Customer complaint analysis: ". 2) Perform "Problem symptom confirmation: ". 3) Perform "DTC check, record and clearance: " and recheck DTC. <i>Is there any malfunction DTC?</i>	Go to Step 4.	Go to Step 2.
2	🔧 Driving test 1) Perform "Step 2: Driving Test: ". <i>Is trouble symptom identified?</i>	Go to Step 3.	Go to Step 6.
3	🔧 DTC check 1) Perform "DTC Check: ". <i>Is it malfunction code?</i>	Go to Step 4.	Go to Step 5.
4	🔧 ESP® check 1) Inspect and repair referring to applicable DTC flow. <i>Does trouble recur?</i>	Go to Step 5.	Go to Step 7.
5	🔧 Brakes diagnosis 1) Inspect and repair referring to "Brakes Symptom Diagnosis: in Section 4A". <i>Does trouble recur?</i>	Go to Step 3.	Go to Step 7.
6	🔧 Intermittent problem check 1) Check intermittent troubles referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual" and related circuit of trouble code recorded in Step 1. <i>Does trouble recur?</i>	Go to Step 4.	Go to Step 7.
7	🔧 Final confirmation test 1) Perform "Step 7: Final Confirmation Test: ". <i>Does trouble recur?</i>	Go to Step 3.	End.

Step 1: Malfunction Analysis

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 a questionnaire form as shown in the following will facilitate collecting information to the point required for proper analysis and diagnosis.

Customer questionnaire (Example)

Customer's name:	Model:	VIN:	
Date of issue:	Date of Reg:	Date of problem:	Mileage:
Problem Symptoms	● ESP® warning lamp abnormal: fails to turn on / fails to turn off ● ABS warning lamp abnormal: fails to turn on / fails to turn off ● EBD warning lamp abnormal: fails to turn on / fails to turn off ● Abnormal noise while vehicle is running: from motor, from valve, other_____ ● Wheel is locked at braking: ● Wheel is skidded at turning. ● Pump motor does not stop (running): ● Braking does not work: ● Other:		
Frequency of occurrence	● Continuous/Intermittent (_____ times a day, a month)/ other_____		
Conditions for Occurrence of Problem	● Vehicle at stop & ignition switch ON: ● When starting: at initial start only/at every start/Other_____ ● Vehicle speed: while accelerating/while decelerating/at stop/ while turning/while running at constant speed/ other_____ ● Road surface condition: Paved road/rough road/snow-covered road/ other_____ ● Chain equipment:		
Environmental Condition	● Weather: fair/cloudy/rain/snow/other_____ ● Temperature: °F (_____ °C)		
Diagnostic Trouble Code	● First check: _____ Normal code/malfunction code (_____) ● Second check after test drive: Normal code/malfunction code (_____)		

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Problem symptom confirmation

If symptom in "Customer Questionnaire" is found or reproduced in the vehicle, confirm the symptom is problem or not. (This step should be done with the customer if possible.) Check warning lamps related to brake system referring to "EBD Warning Lamp (Brake Warning Lamp) Check: in Section 4E", "ABS Warning Lamp Check: in Section 4E" and "ESP® Warning lamp Check: ".

DTC check, record and clearance

Perform "DTC Check: " procedure, record it and then clear it referring to "DTC Clearance: ".

Recheck DTC referring to "DTC Check: ".

When DTC which is recorded at DTC check procedure is detected again after performing DTC clearance, go to "Step 4: ESP® Check: " to proceed the diagnosis.

When DTC which is recorded at DTC check procedure is not indicated anymore after performing DTC clearance, ESP® control module does not perform the system diagnosis, or temporary abnormality may occur, therefore go to "Step 2: Driving Test: " to proceed the diagnosis.

Step 2: Driving Test

Test the vehicle at 40 km/h for more than a minute including left and right turns and check if any trouble symptom (such as ESP® warning lamp and/or ABS warning lamp) exists.

If the malfunction DTC is confirmed at ignition switch ON, proceed to Step 3.

If the malfunction DTC is not confirmed at ignition switch ON, proceed to Step 6.

Step 3: DTC Check

Recheck DTC referring to “DTC Check: ”.

Step 4: ESP® Check

According to ESP® Check for the DTC confirmation in Step 3, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator assembly or other part and repair or replace faulty parts.

Step 5: Brakes Diagnosis

Check the parts or system suspected as a possible cause referring to “Brakes Symptom Diagnosis: in Section 4A” and based on symptoms appearing on the vehicle (symptom obtained through Steps 1 and 2 and repair or replace faulty parts, if any).

Step 6: Intermittent Problem Check

Check parts where an intermittent trouble is easy to occur (e.g., wire harness, connector, etc.), referring to “Intermittent and Poor Connection Inspection: in Section 00 in related manual” and related circuit of trouble code recorded in Step 1 to 3.

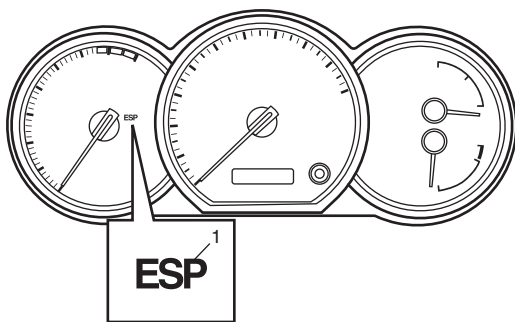
Step 7: Final Confirmation Test

Confirm that the problem symptom has gone and the ESP® is free from any abnormal conditions. If what has been repaired is related to the malfunction DTC, clear the DTC once referring to “DTC Clearance: ” and perform test driving and confirm that no DTC is indicated.

ESP® Warning lamp Check

S5JB0E4604022

- 1) Turn ignition switch ON.
- 2) Check that ESP® warning lamp (1) comes ON for about 2 seconds and then goes off.
If any faulty condition is found, advance to “ESP® Warning Lamp Does Not Come ON at Ignition Switch ON: ” or “ESP® Warning Lamp Comes ON Steady: ”.



I6JB01460012-01

ABS Warning Lamp Check

S5JB0E4604002

Refer to “ABS Warning Lamp Check: in Section 4E”.

EBD Warning Lamp (Brake Warning Lamp) Check

S5JB0E4604003

Refer to “EBD Warning Lamp (Brake Warning Lamp) Check: in Section 4E”.

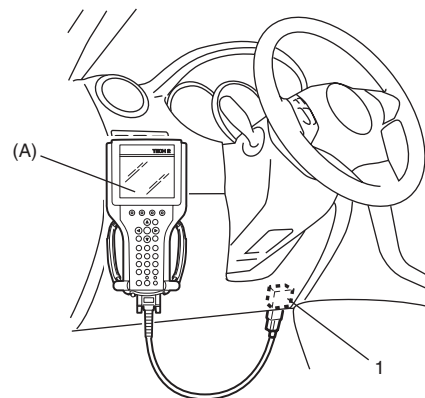
DTC Check

S5JB0E4604004

- 1) Turn ignition switch to OFF position.
- 2) Connect SUZUKI scan tool to data link connector (1).

Special tool

(A): SUZUKI scan tool



I5JB0A450008-01

4F-13 Electronic Stability Program:

- 3) Turn ignition switch to ON position.
- 4) Read DTC according to instructions displayed on SUZUKI scan tool and print it or write it down. Refer to SUZUKI scan tool operator's manual for further details.

NOTE

If SUZUKI scan tool can not communicate ESP® control module, perform "Serial Data Link Circuit Check: ".

- 5) After completing the check, turn ignition switch off and disconnect SUZUKI scan tool from DLC.

DTC Table

S5JB0E4604005

⚠ CAUTION

Be sure to perform "Electronic Stability Program Check: " before starting diagnosis.

DTC (displayed on SUZUKI scan tool)	Diagnostic Items		Detecting condition (DTC will be set when detecting)	ABS warning lamp	EBD warning lamp	ESP® warning lamp
NO DTC	Normal		—	—	—	—
 C1015	Longitudinal G sensor in yaw rate / G sensor assembly failure		Longitudinal G sensor signal is out of specified range. (for 4WD vehicle)	○	—	○
 C1016	Stop lamp switch failure		Vehicle behavior and stop lamp switch signal is disagreed for specified time.	—	—	—
 C1017	Lateral G sensor in yaw rate / G sensor assembly failure		Lateral G sensor signal is out of specified range.	—	—	○
 C1018	Brake fluid level switch failure		• Brake fluid level is too low. • Input voltage of brake fluid level switch to BCM is low.	—	—	○
 C1020	Master cylinder pressure sensor power supply failure		Power supply voltage to master cylinder pressure sensor in ESP® hydraulic unit / control module assembly is too low.	—	—	○
 C1021	RF	Wheel speed sensor circuit failure	Wheel sensor signal is out of specified range.	○	*1	○
 C1025	LF					
 C1031	RR					
 C1035	LR					
 C1022	RF	Wheel speed sensor or encoder failure	Abnormal wheel speed sensor signal is detected.	○	*1	○
 C1026	LF					
 C1032	RR					
 C1036	LR					
 C1023	Yaw rate sensor in yaw rate / G sensor assembly failure		• Yaw rate sensor signal is out of range. • Vehicle behavior and yaw rate signal is disagreed.	—	—	○
 C1024	Steering angle sensor circuit failure		• Steering angle sensor internal defect is detected by CPU in steering angle sensor. • Steering angle sensor signal is out of specified range.	—	—	○

DTC (displayed on SUZUKI scan tool)	Diagnostic Items		Detecting condition (DTC will be set when detecting)	ABS warning lamp	EBD warning lamp	ESP® warning lamp
 C1027	ESP® OFF switch circuit failure		Mechanical switch failure, failure in switch wiring is shorted to ground.	—	—	—
 C1028	Master cylinder pressure sensor circuit failure		Input signal voltage from master cylinder pressure sensor in ESP® control module is too high or low.	—	—	○
 C1034	Yaw rate / G sensor assembly power supply failure		Power supply voltage of yaw rate / G sensor assembly is too high when ignition switch OFF.	*2	—	○
			Power supply voltage of yaw rate / G sensor assembly is too low when ignition switch ON.			
 C1037	Steering angle sensor power supply failure		Power supply voltage to steering angle sensor is too low.	—	—	—
 C1038	Steering angle sensor detect rolling counter failure from ESP® control module		ESP® control module rolling counter failure is detected by steering angle sensor.	—	—	○
 C1039	Yaw rate / G sensor assembly internal failure		Yaw rate / G sensor assembly internal failure is detected.	*2	—	○
 C1040	Stability control system function failure		Stability control is active for more than specified time without yaw rate change.	—	—	○
 C1041	RF	Inlet solenoid valve circuit failure	Mismatching solenoid output and solenoid monitor is detected.	○	○	○
 C1042		Outlet solenoid valve circuit failure				
 C1045	LF	Inlet solenoid valve circuit failure				
 C1046		Outlet solenoid valve circuit failure				
 C1051	RR	Inlet solenoid valve circuit failure				
 C1052		Outlet solenoid valve circuit failure				
 C1055	LR	Inlet solenoid valve circuit failure				
 C1056		Outlet solenoid valve circuit failure				
 C1043	Master cylinder cut solenoid valve circuit No.1 failure					
 C1044	Master cylinder cut solenoid valve circuit No.2 failure					
 C1053	Low pressure solenoid valve circuit No.1 failure					
 C1054	Low pressure solenoid valve circuit No.2 failure					
 C1050	Back switch failure		Back up light switch and/or switch circuit failure is detected. (for M/T model)	—	—	○
 C1057	ESP® (ABS) control module power supply circuit failure *3		ESP® (ABS) control module power supply voltage is too high.	○	○	○
			ESP® (ABS) control module power supply voltage is too low.	○	*5	○
 C1061	Pump motor and/or motor circuit failure		Defective pump motor and/or motor power supply voltage is too low.	○	—	○
 C1063	Solenoid valve power supply driver circuit failure		Mismatching solenoid output and solenoid monitor is detected.	○	○	○

4F-15 Electronic Stability Program:

DTC (displayed on SUZUKI scan tool)	Diagnostic Items	Detecting condition (DTC will be set when detecting)	ABS warning lamp	EBD warning lamp	ESP® warning lamp
 C1071	ESP® (ABS) control module internal defect	ESP® (ABS) control module internal defect is detected.	○	○	○
 C1073	Lost communication with yaw rate / G sensor assembly	CAN line communication error in ESP® control module and yaw rate / G sensor assembly is detected.	*2	—	○
 C1075	Steering angle sensor calibration incomplete *4	Missing steering angle sensor calibration point data is detected.	—	—	—
 C1076	Master cylinder pressure sensor calibration incomplete	Master cylinder pressure sensor calibration is incompleted.	—	—	○
 C1077	Longitudinal G sensor in yaw rate / G sensor assembly calibration incomplete	Longitudinal G sensor in yaw rate / G sensor assembly calibration is incompleted. (for 4WD vehicle)	○	—	○
 C1078	Lateral G sensor in yaw rate / G sensor assembly calibration incomplete	Lateral G sensor in yaw rate / G sensor assembly calibration is incompleted.	—	—	○
 C1090	ECM detect rolling counter failure from ESP® control module	ESP® control module rolling counter failure is detected by ECM.	—	—	○
 C1091	ECM data in CAN line failure	ECM sent invalid signal to ESP® control module.	—	—	○
 C1092	TCM data in CAN line failure	TCM sent invalid signal to ESP® control module. (for A/T model)			
 C1093	4WD control module data in CAN line failure	4WD control module sent invalid signal to ESP® control module. (if equipped 4WD control module)			
 U1073	Control module communication bus off	Transmission error that is inconsistent between transmission data and transmission monitor (CAN bus monitor) data is detected more than 7 times continuously.	—	—	○
 U1100	Lost communication with ECM (reception error)	ECM message data is missing from CAN communication.	—	—	○
 U1101	Lost communication with TCM (reception error)	TCM message data is missing from CAN communication. (for A/T model)			
 U1126	Lost communication with steering angle sensor (reception error)	Steering angle sensor message data is missing from CAN communication.			
 U1139	Lost communication with 4WD control module (reception error)	4WD control module message data is missing from CAN communication. (if equipped 4WD control module)			
 U1140	Lost communication with BCM (reception error)	BCM message data is missing from CAN communication.			

NOTE

- “O” in ABS warning lamp, EBD warning lamp and ESP® warning lamp column of the above table means warning lamp is lit when DTC is detected.
- *1: If two or more wheel speed sensor are defective, ABS warning lamp, EBD warning lamp and ESP® warning lamp are lit and all the control functions are deactivated. If one wheel speed sensor is defective, ABS warning lamp and ESP® warning lamp are lit and ABS and TCS / stability control are deactivated.
- *2: For 4WD vehicle, ABS warning lamp and ESP® warning lamp are lit and ABS and TCS / stability control are deactivated. For 2WD vehicle, ESP® warning lamp is lit and TCS / stability control is deactivated.
- *3: SLIP indicator lamp and ESP® OFF lamp turn ON when power supply circuit voltage is low.
- *4: SLIP indicator lamp flashes continuously at Intervals of 1 Hz.
- *5: EBD warning lamp is lit when power supply circuit voltage is too low.

DTC Clearance

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▲ WARNING

When performing a driving test, select a safe place where there is neither any traffic nor any traffic accident possibility and be very careful during testing to avoid occurrence of an accident.

After repair or replace malfunction part(s), clear all DTCs by performing the following procedure or using SUZUKI scan tool.

- 1) Connect SUZUKI scan tool to data link connector in the same manner as when making this connection for DTC check.
- 2) Turn ignition switch to ON position.
- 3) Erase DTC according to instructions displayed on scan tool. Refer to scan tool operator's manual for further details.

NOTE

For DTC C 1021, C1022, C1025, C1026, C1031, C1032, C1035, C1036 and C1061, confirm that ABS warning lamp turns off after performing Step 2 of “Test Driving” under “Electronic Stability Program Check: ”, and then clear the DTCs.

- 4) After completing the clearance, turn ignition switch OFF and disconnect scan tool from data link connector.
- 5) Perform “Driving Test” (Step 2 of “Electronic Stability Program Check: ”) and “DTC Check: ” and confirm that NO DTC is displayed on scan tool.

Fail-Safe Table

When any of the following DTC(s) is detected, ESP® system is in fail-safe mode per its DTC and ABS, EBD and/or TCS / stability functions are deactivated until the resolution is applied.

DTC No.	Fail-safe operation			Fail-safe condition resoluteive
	ABS	EBD	TCS / stability	
 C1015	X	○	X	When ESP® control module detects the system as normal, after ignition switch turned OFF to ON.
 C1016	○	○	○	—
 C1017	○	○	X	When ESP® control module detects the system as normal, after ignition switch turned OFF to ON.
 C1018	○	○	X	
 C1020	○	○	X	
 C1021	X	*1	X	When estimated vehicle speed exceeds 10 km/h (6.5 mile/h) and detects system as normal.
 C1025				
 C1031				
 C1035				
 C1022	X	*1	X	
 C1026				
 C1032				
 C1036				
 C1023	○	○	X	When ESP® control module detects the system as normal, after ignition switch turned OFF to ON.
 C1024	○	○	X	
 C1027 *3	○	○	○	—
 C1028	○	○	X	When ESP® control module detects the system as normal, after ignition switch turned OFF to ON.
 C1034	*2	○	X	
 C1037	○	○	○	
 C1038	○	○	X	
 C1039	*2	○	X	
 C1040	○	○	X	

DTC No.	Fail-safe operation			Fail-safe condition resolvable
	ABS	EBD	TCS / stability	
 C1041	X	X	X	When ESP® control module detects the system as normal, after ignition switch turned OFF to ON.
 C1042				
 C1043				
 C1044				
 C1045				
 C1046				
 C1051				
 C1052				
 C1053				
 C1054				
 C1055				
 C1056				
 C1050	○	○	X	When ESP® control module detects the system as normal, after ignition switch turned OFF to ON.
 C1057	X	*4	X	
 C1061	X	○	X	When estimated vehicle speed exceeds 10 km/h (6.5 mile/h) and detects system as normal.
 C1063	X	X	X	When ESP® control module detects the system as normal, after ignition switch turned OFF to ON.
 C1071	X	X	X	
 C1073	*2	○	X	
 C1075	○	○	X	Steering angle sensor calibration completed.
 C1076	○	○	X	Master cylinder pressure sensor calibration completed.
 C1077	X	○	X	Yaw rate / G sensor assembly calibration completed.
 C1078	○	○	X	

4F-19 Electronic Stability Program:

DTC No.	Fail-safe operation			Fail-safe condition resolute
	ABS	EBD	TCS / stability	
 C1090	○	○	X	When ESP® control module detects the system as normal, after ignition switch turned OFF to ON.
 C1091	○	○	X	
 C1092				
 C1093				
 U1073	○	○	X	
 U1100	○	○	X	
 U1101				
 U1126				
 U1139				
 U1140				

NOTE

- ○: Activated
- X: Deactivated
- *1: If two or more wheel speed sensor are defective, ABS warning lamp, EBD warning lamp and ESP® warning lamp are lit and all the control functions are deactivated. If one wheel speed sensor is defective, ABS warning lamp and ESP® warning lamp are lit and ABS and TCS / stability control are deactivated.
- *2: For 4WD vehicle, ABS warning lamp and ESP® warning lamp are lit and ABS and TCS / stability control are deactivated. For 2WD vehicle, ESP® warning lamp is lit and TCS / stability control is deactivated.
- *3: ESP® OFF mode is cancelled and all control functions are activated.
- *4: EBD control function is activated only if power supply circuit is low voltage malfunction.

Scan Tool Data

The parameter data below are values measured with the scan tool when the normally operating vehicle is under the following conditions. When taking measurements for comparison by using the scan tool, be sure to check that the vehicle is under the following conditions.

- Apply parking brake and block wheels.
- Ignition switch ON.
- Turn OFF air conditioning (if equipped).
- Set the wheel in straight-ahead position and hands off steering wheel.
- Turn OFF all electric loads (except ignition).
- Check that there is no DTC.

Scan Tool Data	Standards	Condition
Battery Voltage	10.0 – 16.0 V	—
Pump Motor Driver	0.0 V	—
RF Wheel Speed	0 km/h, 0.0 MPH	Vehicle is in stationary condition.
LF Wheel Speed	0 km/h, 0.0 MPH	Vehicle is in stationary condition.
RR Wheel Speed	0 km/h, 0.0 MPH	Vehicle is in stationary condition.
LR Wheel Speed	0 km/h, 0.0 MPH	Vehicle is in stationary condition.
Brake Switch	ON	Brake pedal is depressed
	OFF	Brake pedal is released
G sensor	0 ± 0.1 G	Vehicle is on the level
Master Cyl Press	0 ± 0.8 MPa	Brake pedal is released
G Sensor (lateral)	0 ± 0.1 G	Vehicle is on the level
Yaw rate sensor	0 ± 4 Deg/s	Vehicle is on the level
Steering angle Sen	$0 \pm 3^\circ$	Front wheels are in straight-ahead position
Stability control	INACTIVE	Stability control system is not working
TCS control (brake)	INACTIVE	Brake function by TCS is not working
TCS control (engine)	INACTIVE	Torque control by TCS is not working
ESP® off state (cont)	ESP® ON	ESP® OFF switch is OFF condition
	ESP® OFF	ESP® OFF switch is ON condition
Steering angle Sen	Neutral	Front wheels are in straight-ahead position

Scan Tool Data Definition

Battery Volt (V): Battery Voltage is an analog input signal read by the ESP® control module. Certain ESP® control module functions will be modified if the battery voltage falls below or rises above programmed thresholds.

Pump Motor Driver (V): This parameter indicates the operational condition of the pump motor driver (transistor).

RF Wheel Speed, LF Wheel Speed, RR Wheel Speed and LR Wheel Speed (km/h, MPH): Wheel speed is ESP® control module internal parameter. It is computed by reference pulses from the wheel speed sensor.

Brake Switch (ON, OFF): This switch signal informs the ESP® control module whether the brake is active or not.

G Sensor (G): Vehicle acceleration is measured by yaw rate / G sensor assembly and output to ESP® control module by pulse signal for 4WD vehicle.

Master Cyl Press (MPa): Brake fluid pressure from brake master cylinder.

G Sensor (lateral) (G): Lateral acceleration is measured by yaw rate / G sensor assembly and output to ESP® control module by pulse signal.

Yaw rate sensor (Deg/s): Yaw rate sensor is measured by yaw rate / G sensor assembly and output to ESP® control module by pulse signal.

Steering angle Sen (°): Steering wheel rotation angle is measured by steering angle sensor and output to ESP® control module by pulse signal.

Stability control (ACTIVE, INACTIVE): This indicates stability control in activation / deactivation.

TCS control (brake) (ACTIVE, INACTIVE): This indicates brake function of TCS in activation / deactivation.

TCS control (engine) (ACTIVE, INACTIVE): This indicates torque control of TCS in activation / deactivation.

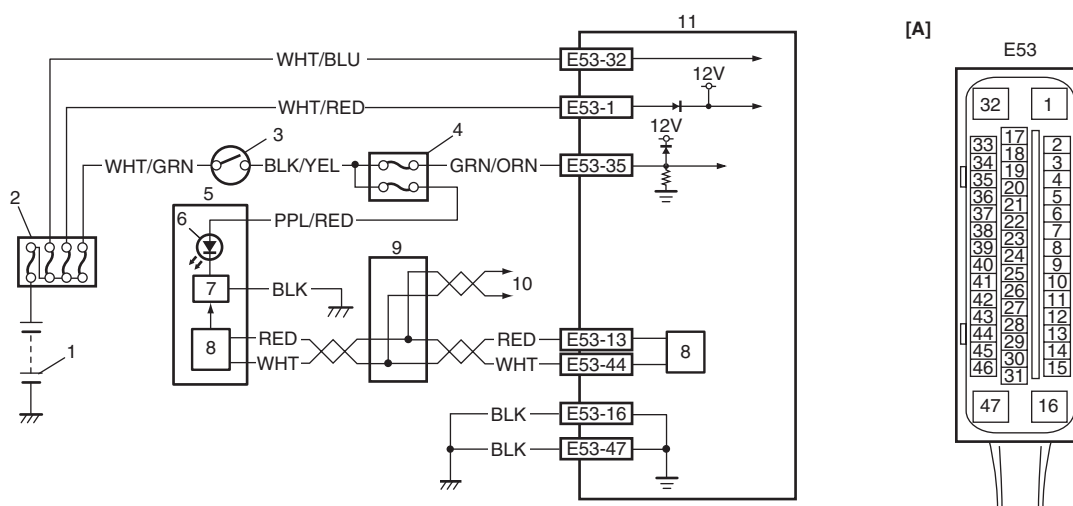
ESP® off state (cont) (ESP® ON, ESP® OFF): State of ESP® OFF switch.

Steering angle Sen (Neutral, NONnewtral): This indicates steering wheel angle measured by steering angle sensor is in straight-ahead or not.

ESP® Warning Lamp Does Not Come ON at Ignition Switch ON

S5JB0E4604008

Wiring Diagram



16JB01460013-01

[A]: ESP® control module connector (viewed from terminal side)	4. Junction block assembly	8. CAN driver
1. Battery	5. Combination meter	9. Junction connector
2. Main fuse box	6. ESP® warning lamp	10. To TCM, BCM, 4WD control module, keyless start control module and steering angle sensor
3. Ignition switch	7. Lamp driver module	11. ESP® hydraulic unit / control module assembly

Circuit Description

Operation (ON/OFF) of ESP® warning lamp is controlled by ESP® control module through lamp driver module in combination meter.

If ESP® system is in good condition, ESP® control module turns ESP® warning lamp ON at the ignition switch ON, keeps it ON for 2 seconds and then turns it OFF. If an abnormality in the system is detected, ESP® warning lamp is turned ON continuously by ESP® control module. Also, it is turned ON continuously by lamp driver module when the connector of ESP® control module is disconnected.

Troubleshooting

Step	Action	Yes	No
1	1) Turn ignition switch to ON position. <i>Do other warning lamps come ON?</i>	Go to Step 2.	Go to Step 3.
2	1) Connect scan tool to DLC with ignition switch turned OFF. 2) Turn ignition switch to OFF position and check DTC. <i>Is there DTC U1073?</i>	Go to "DTC U1073: Control Module Communication Bus Off: " for troubleshooting.	Substitute a known-good combination meter and recheck. If ESP® warning lamp remains OFF, substitute a known-good ESP® hydraulic unit / control module assembly and recheck.
3	<i>Is Circuit fuse for combination meter in good condition?</i>	Go to Step 4.	Replace fuse and check for short circuit to ground.
4	1) Check CAN communication circuit between combination meter and ESP®, control module referring to "DTC U1073: Control Module Communication Bus Off: " <i>Is CAN communication circuit in good condition?</i>	Go to Step 5.	Repair or replace.

Step	Action	Yes	No
5	1) Remove combination meter with ignition switch turned OFF. 2) Check for proper connection to "PPL/RED" and "BLK" wire of combination meter connector. 3) If OK, turn ON ignition switch and measure voltage at "PPL/RED" wire of combination meter connector and vehicle body ground. <i>Is it 10 – 14 V?</i>	Go to Step 6.	Repair power supply circuit for combination meter.
6	1) Measure resistance between "BLK" wire of combination meter connector and vehicle body ground. <i>Is resistance less than 2 Ω?</i>	Replace combination meter.	"BLK" circuit open or high resistance.

ESP® Warning Lamp Comes ON Steady

S5JB0E4604009

Wiring Diagram

Refer to "ESP® Warning Lamp Does Not Come ON at Ignition Switch ON: ".

Circuit Description

Operation (ON/OFF) of ESP® warning lamp is controlled by ESP® control module through lamp driver module in combination meter.

If ESP® system is in good condition, ESP® control module turns ESP® warning lamp ON at the ignition switch ON, keeps it ON for 2 seconds and then turns it OFF. If an abnormality in the system is detected, ESP® warning lamp is turned ON continuously by ESP® control module. Also, it is turned ON continuously by lamp driver module when the connector of ESP® control module is disconnected.

Troubleshooting

Step	Action	Yes	No
1	1) Perform diagnostic trouble code check. <i>Is there any DTC(s)?</i>	Go to applicable DTC diag. flow.	Go to Step 2.
2	<i>Are main fuses for ABS pump motor and ABS solenoid in good condition?</i>	Go to Step 3.	Replace fuse and check circuit for short to ground.
3	1) Turn ignition switch to OFF. 2) Disconnect ESP® control module connector. 3) Check for proper connection to ESP® control module connector at terminals "E53-35", "E53-16" and "E53-47". 4) If OK then turn ignition switch to ON position and measure voltage between terminal "E53-35" and vehicle body ground. <i>Is it 10 – 14 V?</i>	Go to Step 4.	"GRN/ORN" circuit open.
4	1) Turn ignition switch to OFF position. 2) Check for proper connection to ESP® control module connector at terminals "E53-1" and "E53-32". 3) If OK then turn ignition switch to ON position and measure voltage between each terminal of "E53-1", "E53-32" and vehicle body ground. <i>Are they 10 – 14 V?</i>	Go to Step 5.	"WHT/RED" and/or "WHT/BLU" circuit open.
5	1) Turn ignition switch to OFF and measure resistance between each terminal of "E53-16", "E53-47" and vehicle body ground. <i>Is resistance less than 2 Ω?</i>	Go to Step 6.	Ground circuit for ESP® control module open or high resistance.

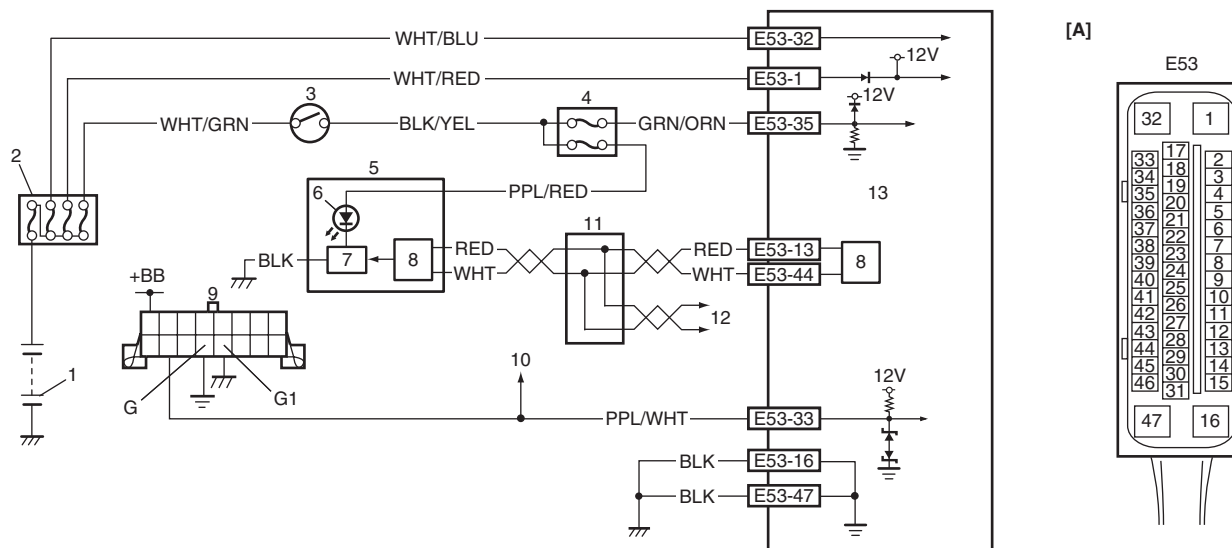
4F-23 Electronic Stability Program:

Step	Action	Yes	No
6	1) Check CAN communication circuit between combination meter and ESP® control module referring to “DTC U1073: Control Module Communication Bus Off:”. <i>Is CAN communication circuit in good condition?</i>	Substitute a known-good combination meter and recheck. If ABS warning lamp remains ON, substitute a known-good ESP® hydraulic unit / control module assembly and recheck.	Repair or replace.

Serial Data Link Circuit Check

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Wiring Diagram

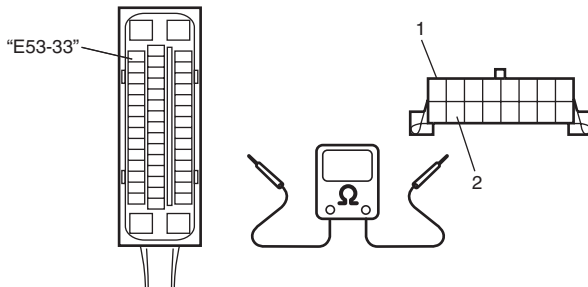


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[A]: ESP® control module connector (viewed from terminal side)	5. Combination meter	10. To ECM, TCM, BCM, SDM and 4WD control module
1. Battery	6. ESP® warning lamp	11. Junction connector
2. Main fuse box	7. Lamp driver module	12. To TCM, BCM, 4WD control module, keyless start control module and steering angle sensor
3. Ignition switch	8. CAN driver	13. ESP® hydraulic unit / control module assembly
4. Junction block assembly	9. Data link connector (DLC)	

Inspection

Step	Action	Yes	No
1	1) Turn ignition switch to ON position. <i>Does ESP® warning lamp come ON?</i>	Go to Step 2.	Go to Step 6.
2	1) Turn ignition switch to OFF position. <i>Are main fuses for ABS pump motor and ABS solenoid in good condition?</i>	Go to Step 3.	Replace fuse and check for short.
3	1) Disconnect ESP® control module connector. 2) Check for proper connection to ESP® control module connector at terminal “E53-35”. 3) If OK then turn ignition switch to ON position and measure voltage between terminal “E53-35” and vehicle body ground. <i>Is it 10 – 14 V?</i>	Go to Step 4.	“GRN/ORN” wire circuit open.

Step	Action	Yes	No
4	1) Turn ignition switch to OFF position. 2) Check for proper connection to ESP® control module connector at terminals “E53-1” and “E53-32”. 3) If OK then turn ignition switch to ON position and measure voltage between each terminal of “E53-1”, “E53-32” and vehicle body ground. <i>Are they 10 – 14 V?</i>	Go to Step 5.	“WHT/RED” and/or “WHT/BLU” wire circuit open.
5	1) Turn ignition switch to OFF position. 2) Check for proper connection to ESP® control module connector at terminals “E53-16” and “E53-47”. 3) If OK, measure resistance between each terminal of “E53-16”, “E53-47” and vehicle body ground. <i>Are resistance less than 2 Ω?</i>	Go to Step 6.	Ground circuit for ESP® control module open or high resistance.
6	1) Check if communication is possible by trying communication with other controller (ECM, TCM, BCM, 4WD control module or SDM). <i>Is it possible to communicate with other controller?</i>	Go to Step 7.	Repair open in common section of serial data circuit (“PPL/WHT” wire circuit) used by all controllers or short to ground or power circuit which has occurred somewhere in serial data circuit (“PPL/WHT” wire circuit).
7	1) Turn ignition switch to ON position. 2) Measure voltage between terminal B of data link connector and vehicle body ground. <i>Is voltage 10 – 12 V?</i>	Go to step 8.	Terminal B circuit open or shorted to ground.
8	1) Turn ignition switch to OFF position. 2) Measure resistance between the following terminals; - Terminal G of data link connector and vehicle body ground. - Terminal G1 of data link connector and vehicle body ground. <i>Is each resistance 1 Ω or less?</i>	Go to step 9.	Terminal G and/or G1 circuit open or high resistance.
9	1) Turn ignition switch to OFF position. 2) Check proper connection at “E53-33” (“PPL/WHT” wire) terminal for serial data circuit. 3) If OK, then check resistance between “E53-33” (“PPL/WHT” wire) terminal and “PPL/WHT” wire terminal (2) for serial data circuit in DLC (1). <i>Is resistance 1 Ω or less?</i> 	Substitute a known-good ESP® hydraulic unit / control module and recheck.	Repair high resistance or open in “PPL/WHT” wire circuit for anti lock brake system.

DTC C1015 / C1017 / C1023: Longitudinal G Sensor / Lateral G Sensor / Yaw Rate Sensor in Yaw Rate / G Sensor Assembly Failure

S5JB0E4604025

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
C1015: Longitudinal G sensor signal is out of specified range. (for 4WD vehicle) C1017: Lateral G sensor signal is out of specified range. C1023: - Yaw rate sensor signal is out of range. - Vehicle behavior and yaw rate signal is disagreed.	- Yaw rate / G sensor assembly - ESP® control module

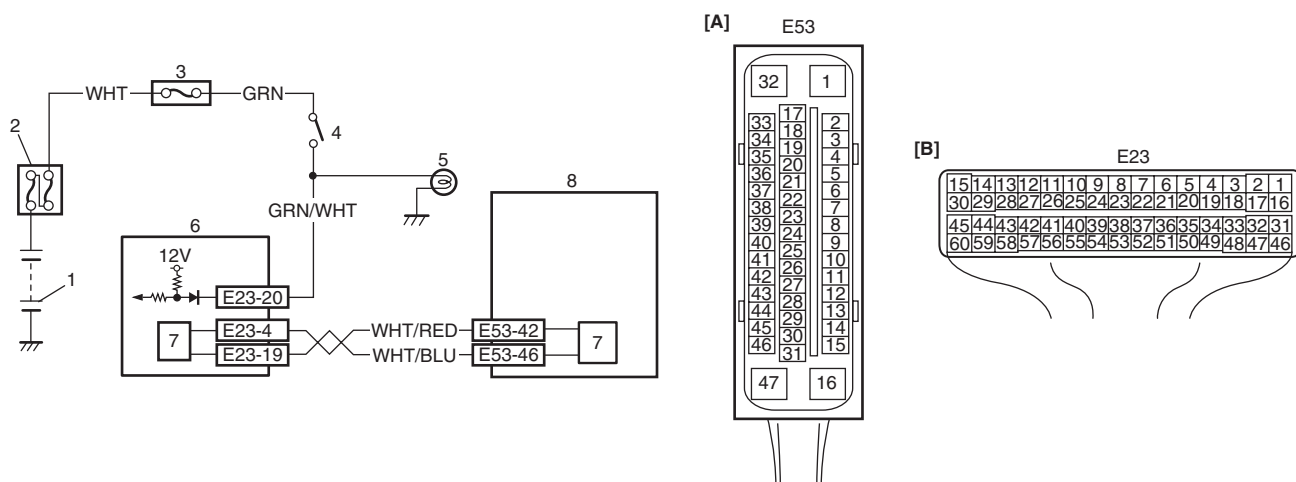
DTC Troubleshooting

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®. <i>Are DTC C1034 and/or C1073 detected?</i>	Go to applicable DTC diag. flow.	Go to Step 3.
3	Check sensor calibration 1) Calibrate yaw rate / G sensor assembly referring to "Sensor Calibration: ". 2) Clear all DTCs and check DTC for ESP®. <i>Are DTC C1015, C1017 and/or C1023 still detected?</i>	Go to Step 4.	Yaw rate / G sensor assembly calibration is incomplete.
4	Check yaw rate / G sensor assembly 1) Check yaw rate / G sensor assembly referring to "Yaw Rate / G Sensor Assembly On-Vehicle Inspection: ". <i>Is it good condition?</i>	Substitute a known-good ESP® hydraulic unit / control module assembly and recheck.	Replace yaw rate / G sensor assembly.

DTC C1016: Stop Lamp Switch Circuit Failure

S5JB0E4604026

Wiring Diagram



15JB0D460004-01

[A]: ESP® control module connector (viewed from terminal side)	3. Junction block assembly	7. CAN driver
[B]: ECM connector (viewed from harness side)	4. Stop lamp switch	8. ESP® hydraulic unit control module assembly
1. Battery	5. Stop lamp	
2. Main fuse box	6. ECM	

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Vehicle behavior and stop lamp switch signal is disagreed for specified time.	• Back up light switch circuit • Back up light switch • ECM • ESP® control module

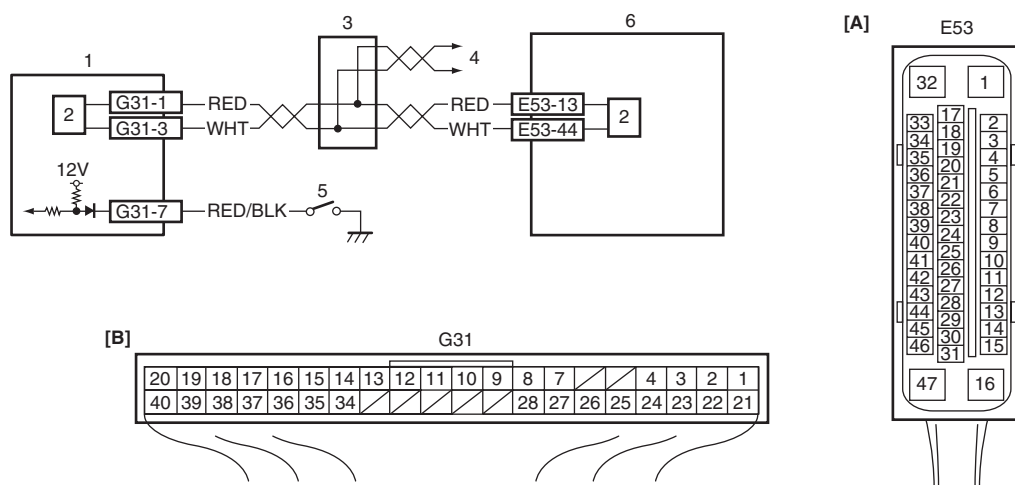
DTC Troubleshooting

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®. <i>Is DTC U1073 and/or U1100 detected?</i>	Go to applicable DTC diag. flow.	Go to Step 3.
3	Check stop lamp switch 1) Check stop lamp (brake pedal) switch referring to "Stop (Brake) Lamp Switch Inspection: in Section 9B in related manual". <i>Is it in good condition?</i>	Go to Step 4.	Replace stop lamp switch.
4	Check stop lamp switch circuit 1) Disconnect connector from stop lamp switch connector with ignition switch turned OFF. 2) Check for proper connection to switch connector. 3) If connection are OK, measure voltage between "GRN" wire terminal of stop lamp switch connector and vehicle body ground. <i>Is it 10 – 14 V?</i>	Go to Step 5.	Replace fuse and/or repair "GRN" wire circuit.
5	Check stop lamp switch circuit 1) Disconnect connectors from ECM. 2) Check for proper connection to "E23-20" wire of ECM connector. 3) If connections are OK, check stop lamp switch circuit for the following. • Resistance of "GRN/WHT" wire terminal of stop lamp switch between stop lamp switch connector and ECM connector is less than 1Ω (continuity check) • Resistance between "GRN/WHT" wire terminal of stop lamp switch connector and vehicle body ground is infinity (ground short check) • Voltage of between "GRN/WHT" wire terminal of stop switch connector and vehicle body ground is 0 V with ignition switch tuned ON (power short check) <i>Is it in good condition?</i>	Substitute a known-good ECM and recheck. If DTC C1016 is still detected, substitute a known-good ESP® hydraulic unit / control module assembly and recheck.	Repair or replace defective wire.

DTC C1018: Brake Fluid Level Switch Failure

S5JB0E4604027

Wiring Diagram



I6JB01460017-02

[A]: ESP® control module connector (viewed from terminal side)	2. CAN driver	5. Brake fluid level switch
[B]: BCM connector (viewed from harness side)	3. Junction connector	6. ESP® hydraulic unit control module assembly
1. BCM	4. To TCM, 4WD control module, keyless start control module, combination meter and steering angle sensor	

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
- Brake fluid level is too low. - Input voltage of brake fluid level switch to BCM is low.	- Brake fluid level - Brake fluid level switch circuit - Brake fluid level switch - BCM - 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	Check brake fluid level 1) Check brake fluid level in reservoir. <i>Is brake fluid level upper than the minimum level?</i>	Go to Step 3.	Replenish brake fluid to reservoir.
3	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®. <i>Is DTC U1073 and/or U1140 detected?</i>	Go to applicable DTC diag. flow.	Go to Step 3.
4	Check brake fluid level switch 1) Turn ignition switch to OFF position. 2) Disconnect brake fluid level switch connector. 3) Check for proper connection at each terminal of brake fluid level switch connector. 4) If OK, then check brake fluid level switch referring to "Brake Fluid Level Switch Inspection: in Section 9C in related manual". <i>Is check result OK?</i>	Go to Step 5.	Replace brake fluid level switch.

Step	Action	Yes	No
5	Check brake fluid level switch circuit 1) Disconnect BCM connector. 2) Check for proper connection to BCM connector at "G31-7" terminal. 3) If OK, then check resistance between "G31-7" terminal and vehicle body ground. <i>Is resistance infinity?</i>	Go to Step 6.	"BLKL/RED" wire circuit is shorted to ground.
6	Check BCM 1) Connect brake fluid level switch connector and BCM connector. 2) Check voltage at "G31-7" terminal of BCM referring to "Inspection of BCM and its Circuits: in Section 10B in related manual". <i>Is voltage in good condition?</i>	Substitute a known-good ESP® hydraulic unit / control module assembly and recheck.	Check BCM power and ground circuit. If circuit is OK, substitute a known-good BCM and recheck.

DTC 1020: Master Cylinder Pressure Sensor Power Supply Failure

S5JB0E4604028

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Power supply voltage to master cylinder pressure sensor in ESP® hydraulic unit / control module assembly is too low.	ESP® control module

DTC Troubleshooting

- 1) Turn ignition switch to OFF position.
- 2) Check for proper connection from harness to ESP® control module.
- 3) If OK, substitute an ESP® hydraulic unit / control module assembly with correct part number.
- 4) Recheck system.

DTC C1021, C1022 / C1025, C1026 / C1031, C1032 / C1035, C1036: Right-Front / Left-Front / Right-Rear / Left-Rear Wheel Speed Sensor Circuit or Encoder Failure

S5JB0E4604014

Refer to "DTC C1021, C1022 / C1025, C1026 / C1031, C1032 / C1035, C1036: Right-Front / Left-Front / Right-Rear / Left-Rear Wheel Speed Sensor Circuit or Encoder Failure: in Section 4E".

DTC C1024: Steering Angle Sensor Circuit Failure

S5JB0E4604029

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
- Steering angle sensor internal defect is detected by CPU in steering angle sensor. - Steering angle sensor signal is out of specified range.	- Steering angle 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®. <i>Are DTC C1037, U1073 and/or U1126 detected?</i>	Go to applicable DTC diag. flow.	Go to Step 3.

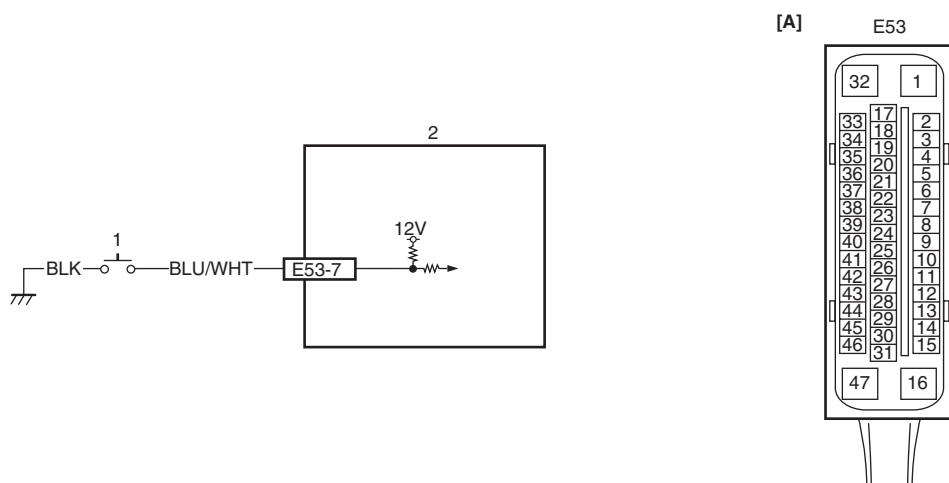
4F-29 Electronic Stability Program:

Step	Action	Yes	No
3	Check sensor calibration 1) Calibrate steering angle sensor referring to "Sensor Calibration: ". 2) Clear all DTC(s) and check DTC for ESP®. <i>Is DTC C1024 still detected?</i>	Go to Step 4.	Steering angle sensor calibration was incompleting.
4	Check steering angle sensor 1) Check steering angle sensor referring to "Steering Angle Sensor On-Vehicle Inspection: ". <i>Is it good condition?</i>	Substitute a known-good ESP® hydraulic unit / control module assembly and recheck.	Replace steering angle sensor.

DTC C1027: ESP® OFF Switch Circuit Failure

S5JB0E4604030

Wiring Diagram



I6JB01460018-01

[A]: ESP® control module connector (viewed from terminal side)	1. ESP® OFF Switch	2. ESP® hydraulic unit control module assembly
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DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Mechanical switch failure, failure in switch wiring is shorted to ground.	- ESP® OFF switch - ESP® OFF switch circuit - 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	Check ESP® OFF switch condition <i>Is ESP® OFF switch is OFF condition?</i>	Go to Step 3.	ESP® OFF switch turned OFF condition and recheck.

Step	Action	Yes	No
3	Check ESP® OFF switch 1) Turn ignition switch to OFF position. 2) Remove ESP® OFF switch referring to "ESP® OFF Switch Removal and Installation: ". 3) Check for proper connection at each terminal of ESP® OFF switch. 4) If OK, then check ESP® OFF switch referring to "ESP® OFF Switch Inspection: ". <i>Is it good condition?</i>	Go to Step 4.	Replace ESP® OFF switch.
4	Check ESP® OFF switch circuit 1) Disconnect ESP® control module connector. 2) Check for proper connection to ESP® control module connector at "E53-7" terminal. 3) If OK, then check resistance between "E53-7" terminal and vehicle body ground. <i>Is resistance infinity?</i>	Substitute a known-good ESP® hydraulic unit / control module assembly and recheck.	"BLU/WHT" wire circuit is shorted to ground.

DTC C1028: Master Cylinder Pressure Sensor Circuit Failure

S5JB0E4604031

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Input signal voltage from master cylinder pressure sensor in ESP® control module is too high or low.	- Leakage or air in the hydraulic brake system - Clearance between brake pad and disc too high

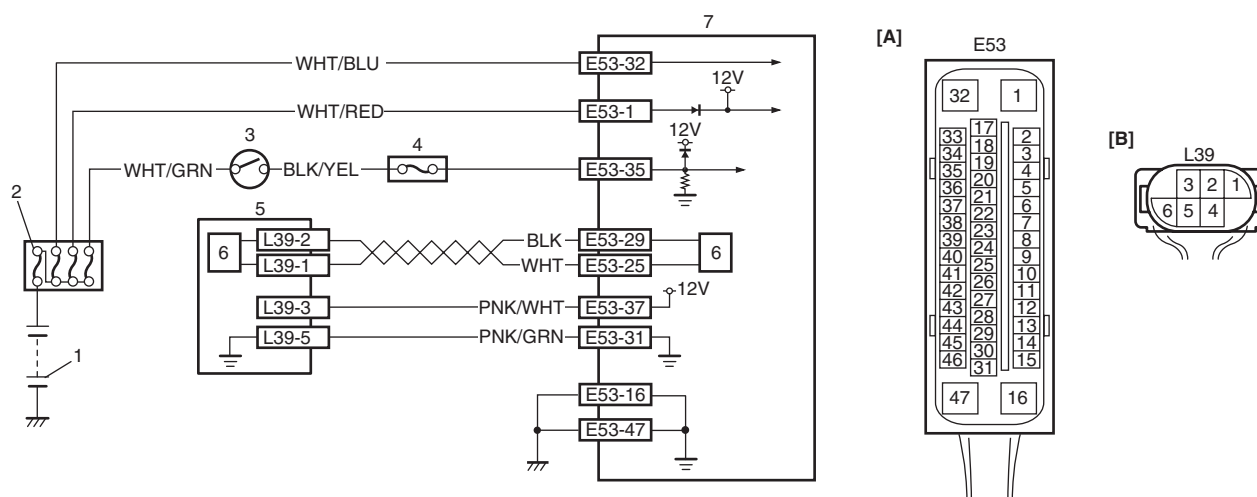
DTC Troubleshooting

Step	Action	Yes	No
1	Was "Electronic Stability Program Check" performed?	Go to Step 2.	Go to "Electronic Stability Program Check: ".
2	Check brake system 1) Check brake system as follows. - Leakage or air in the hydraulic brake system - Clearance between brake pad and disc too high <i>Are they in good condition?</i>	Go to Step 3.	Repair, replace or adjust.
3	Check sensor calibration 1) Calibrate master cylinder pressure sensor referring to "Sensor Calibration: ". 2) Clear all DTC(s) and recheck DTC. <i>Is DTC C1028 still detected?</i>	Substitute a known-good ESP® hydraulic unit / control module assembly and recheck.	Master cylinder pressure sensor calibration was incompleting.

DTC C1034: Yaw Rate / G Sensor Assembly Power Supply Failure

S5JB0E4604032

Wiring Diagram



I6JB01460019-03

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

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
- Power supply voltage of yaw rate / G sensor assembly is too high when ignition switch OFF. - Power supply voltage of yaw rate / G sensor assembly is too low when ignition switch ON.	- Yaw rate / G sensor assembly power supply circuit - ESP® control module power supply circuit - Yaw rate / G sensor assembly - ESP® control module

DTC Troubleshooting

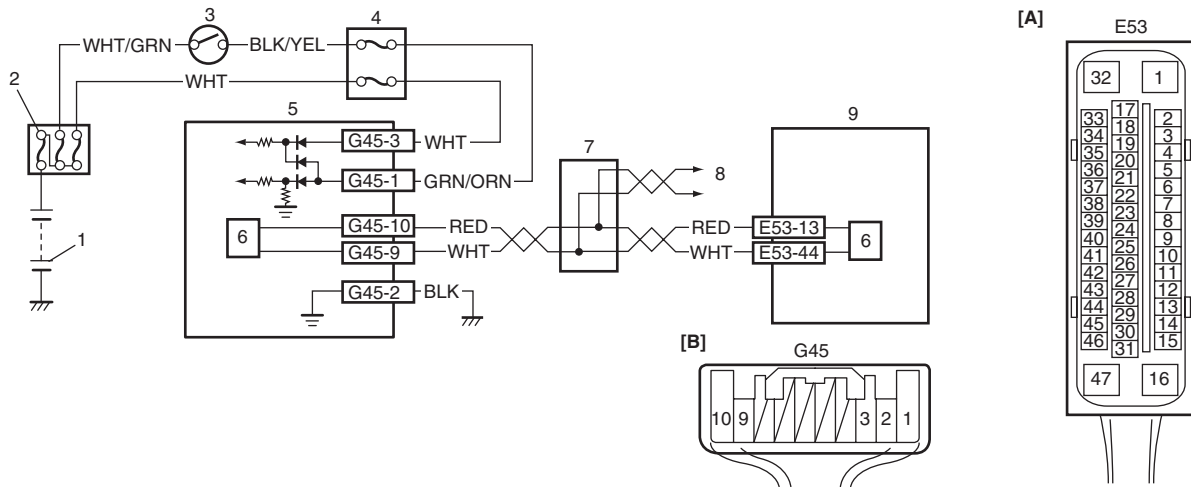
Step	Action	Yes	No
1	Was "Electronic Stability Program Check" performed?	Go to Step 2.	Go to "Electronic Stability Program Check: ".
2	DTC check for ESP® 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Turn ignition switch ON and check DTC for ESP®. Are DTC C1057 and/or C1073 detected?	Go to applicable DTC diag. flow.	Go to Step 3.
3	Check yaw rate / G sensor assembly power supply circuit 1) Turn ignition switch to OFF position. 2) Disconnect yaw rate / G sensor assembly connector. 3) Check for proper connection to yaw rate / G sensor assembly connector terminals at "L39-3" and "L39-5". 4) If OK, then measure voltage between connector terminal "L39-3" and vehicle body ground. Is it 0 V?	Go to Step 4.	Go to Step 5.

Step	Action	Yes	No
4	Check yaw rate / G sensor assembly power supply circuit 1) Measure voltage between connector terminal "L39-3" and "L39-5" with ignition switch turned ON. <i>Is it 10 – 14 V?</i>	Substitute a known-good yaw rate / G sensor assembly and recheck.	Go to Step 5.
5	Check yaw rate / G sensor assembly power supply circuit 1) Turn ignition switch to OFF position. 2) Disconnect ESP® control module connector. 3) Check for proper connection to ESP® control module connector terminals at "E53-31" and "E53-37". 4) If OK, then measure voltage between connector terminal "E53-37" and vehicle body ground. <i>Is it 0 V?</i>	Go to Step 6.	"PNK/WHT" wire circuit is shorted to power circuit.
6	Check yaw rate / G sensor assembly power supply circuit 1) Measure resistance between the following points. - Between terminal "E53-37" of module connector and terminal "L39-3" of sensor terminal. - Between terminal "E53-31" of module connector and terminal "L39-5" of sensor terminal. <i>Are resistance less than 2 Ω?</i>	Substitute a known-good ESP® hydraulic unit / control module assembly and recheck.	"PNK/WHT" and/or "PNK/GRN" wire circuit open or high resistance.

DTC C1037: Steering Angle Sensor Power Supply Failure

S5JB0E4604033

Wiring Diagram



I6JB01460020-02

[A]: ESP® control module connector (viewed from terminal side)	3. Ignition switch	7. Junction connector
[B]: Steering angle sensor connector (viewed from harness side)	4. Junction block assembly	8. To TCM, BCM, 4WD control module, keyless start control module and combination meter
1. Battery	5. Steering angle sensor	9. ESP® hydraulic unit / control module assembly
2. Main fuse box	6. CAN driver	

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Power supply voltage to steering angle sensor is too low.	- Steering angle sensor power supply circuit - Steering angle 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	Check steering angle sensor power supply circuit 1) Check circuit fuses for steering angle sensor and its circuit. <i>Is it good condition?</i>	Go to Step 3.	Replace fuse and check for short circuit to ground.
3	Check steering angle sensor power supply circuit 1) Turn ignition switch to OFF position. 2) Disconnect steering angle sensor connector. 3) Check for proper connection to steering angle sensor connector terminals at "E45-1", "E45-2" and "E45-3". 4) If OK, then measure voltage between connector terminal "E45-3" and vehicle body ground. <i>Is it 10 – 14 V?</i>	Go to Step 4.	"WHT" wire circuit open.
4	Check steering angle sensor power supply circuit 1) Measure voltage between connector terminal "E45-1" and vehicle body ground with ignition switch turned ON. <i>Is it 10 – 14 V?</i>	Go to Step 5.	"GRN/ORN" wire circuit open.
5	Check steering angle sensor power supply circuit 1) Turn ignition switch to OFF position. 2) Measure resistance between connector terminal "E45-2" and vehicle body ground. <i>Is resistance less than 2 Ω?</i>	Go to Step 6.	"BLK" wire circuit open or high resistance.
6	Check steering angle sensor 1) Connect steering angle sensor connector. 2) Check steering angle sensor referring to "Steering Angle Sensor On-Vehicle Inspection: ". <i>Is it good condition?</i>	Substitute a known-good ESP® hydraulic unit / control module assembly and recheck.	Replace steering angle sensor.

DTC C1038: Steering Angle Sensor Detect Rolling Counter Failure from ESP® Control Module

S5JB0E4604034

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
ESP® control module rolling counter failure is detected by steering angle sensor.	- CAN communication circuit - Steering angle 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	Check DTC 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Turn ignition switch ON and check DTC. <i>Is there any DTC(s) other than C1038 and C1090?</i>	Go to applicable DTC diag. flow.	Go to Step 3.

Step	Action	Yes	No
3	Check ESP® control module 1) Turn ignition switch to OFF position. 2) Substitute a known-good steering angle sensor. 3) Calibrate steering angle sensors referring to "Sensor Calibration: ". 4) Clear all DTC(s) and recheck DTC. <i>Is DTC C1038 still detected?</i>	Substitute a known-good ESP® hydraulic unit / control module assembly and recheck.	Steering angle sensor was malfunction.

DTC C1039: Yaw Rate / G Sensor Assembly Internal Failure

S5JB0E4604035

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Yaw rate / G sensor assembly internal failure is detected.	- Yaw rate / G sensor assembly - ESP® control module

DTC Troubleshooting

Step	Action	Yes	No
1	<i>Was "Electronic Stability Program Check" performed?</i>	Go to Step 2.	Go to "Electronic Stability Program Check: ".
2	DTC check 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Turn ignition switch ON and check DTC. <i>Are DTC C1034 and/or C1073 detected?</i>	Go to applicable DTC diag. flow.	Go to Step 3.
3	Check sensor calibration 1) Calibrate yaw rate / G sensor assembly referring to "Sensor Calibration: ". 2) Clear all DTC(s) and recheck DTC. <i>Is DTC C1039 still detected?</i>	Go to Step 4.	Yaw rate / G sensor assembly calibration was incompleated.
4	Check yaw rate / G sensor assembly 1) Check yaw rate / G sensor assembly referring to "Yaw Rate / G Sensor Assembly On-Vehicle Inspection: ". <i>Is it good condition?</i>	Substitute a known-good ESP® hydraulic unit / control module assembly and recheck.	Replace yaw rate / G sensor assembly.

DTC C1040: Stability Control System Function Failure

S5JB0E4604036

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Stability control is active for more than specified time without yaw rate change.	ESP® control module

DTC Troubleshooting

Step	Action	Yes	No
1	<i>Was "Electronic Stability Program Check" performed</i>	Go to Step 2.	Go to "Electronic Stability Program Check: ".
2	Check DTC for ESP® 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Turn ignition switch ON and check DTC for ESP®. <i>Is there any DTC(s) other than C1040?</i>	Go to applicable DTC diag. flow.	Substitute a known-good ESP® hydraulic unit / control module assembly and recheck.

DTC C1041 / C1042 / C1043 / C1044 / C1045 / C1046 / C1051 / C1052 / C1053 / C1054 / C1055 / C1056:
Inlet Solenoid Circuit Failure, Outlet Solenoid Circuit Failure, Master Cylinder Cut Solenoid Circuit Failure, Low Pressure Solenoid Circuit Failure

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DTC C1041 / C1045 / C1051 / C1055: Right-Front / Left-Front / Right-Rear / Left-Rear Inlet Solenoid Circuit Failure

DTC C1042 / C1046 / C1052 / C1056: Right-Front / Left-Front / Right-Rear / Left-Rear Outlet Solenoid Circuit Failure

DTC C1043 / C1044: Master Cylinder Cut Solenoid Circuit No. 1 / No. 2 Failure

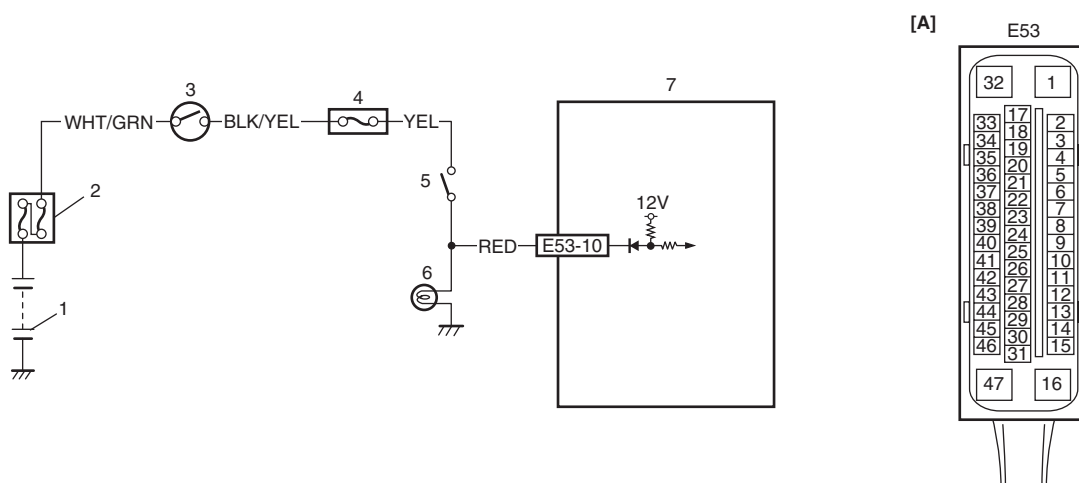
DTC C1053 / C1054: Low Pressure Solenoid Circuit No. 1 / No. 2 Failure

Refer to "DTC C1041 / C1042 / C1043 / C1044 / C1045 / C1046 / C1051 / C1052 / C1053 / C1054 / C1055 / C1056: Inlet Solenoid Circuit Failure, Outlet Solenoid Circuit Failure, Master Cylinder Cut Solenoid Circuit Failure, Low Pressure Solenoid Circuit Failure: in Section 4E".

DTC C1050: Back Switch Failure

S5JB0E4604037

Wiring Diagram



I6JB01460021-01

[A]: ESP® control module connector (viewed from terminal side)	3. Ignition switch	6. Back-up light
1. Battery	4. Junction block assembly	7. ESP® hydraulic unit control module assembly
2. Main fuse box	5. Back up light switch	

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Back up light switch and/or switch circuit failure is detected. (for M/T model)	- Back-up light - Back up light switch - Back up light switch circuit - 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	Check back up light switch and its circuit 1) Turn ignition switch to ON position. 2) Check back-up lights, back up light switch and their circuit check referring to "Back-Up Light Symptom Diagnosis: in Section 9B in related manual". <i>Are they in good condition?</i>	Go to Step 3.	Repair or replace.

Step	Action	Yes	No
3	Check back up light switch circuit 1) Turn ignition switch to OFF position. 2) Disconnect ESP® control module connector. 3) Check for proper connection to ESP® control module connector terminal at “E53-10”. 4) If OK, then measure voltage between connector terminal “E53-10” and vehicle body ground. <i>Is it 0 V?</i>	Go to Step 4.	“RED” wire circuit is shorted to power circuit.
4	Check back up light switch circuit 1) Turn ignition switch to ON position. 2) Measure voltage between connector terminal “E53-10” and vehicle body ground with the shift lever in “Reverse” position. <i>Is it 10 – 14 V?</i>	Substitute a known-good ESP® hydraulic unit / control module assembly and recheck.	“RED” wire circuit open.

DTC C1057: ESP® (ABS) control module power supply circuit failure

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Refer to “DTC C1057: ABS (ESP®) Control Module Power Supply Circuit Failure: in Section 4E”.

DTC C1061: Pump Motor and/or Motor Driver Circuit Failure

S5JB0E4604017

Refer to “DTC C1061: Pump Motor and/or Motor Driver Circuit: in Section 4E”.

DTC C1063: Solenoid Valve Power Supply Driver Circuit Failure

S5JB0E4604018

Refer to “DTC C1063: Solenoid Valve Power Supply Driver Circuit Failure: in Section 4E”.

DTC C1071: ESP® (ABS) Control Module Internal Defect

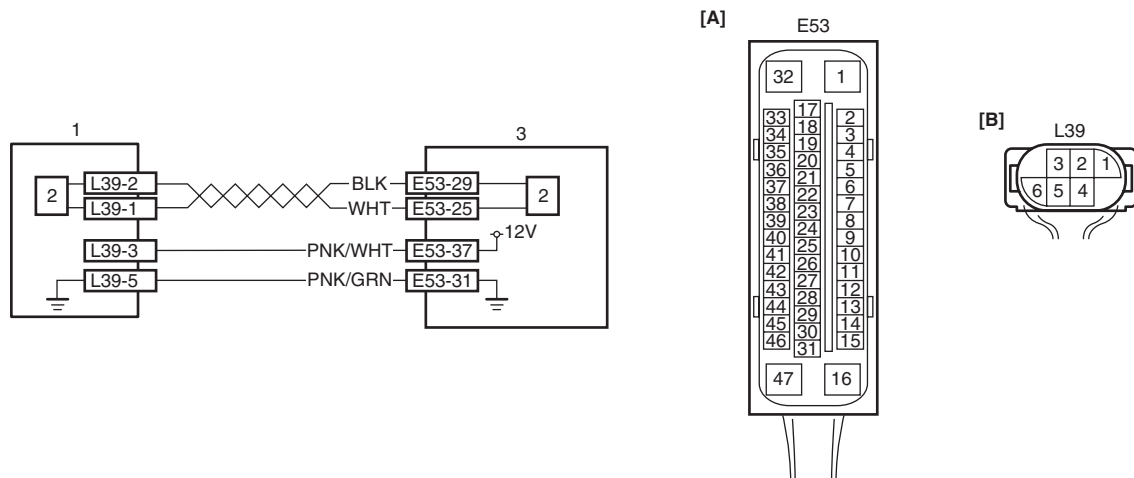
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Refer to “DTC C1071: ABS (ESP®) Control Module Internal Defect: in Section 4E”.

DTC C1073: Lost Communication With Yaw Rate / G Sensor Assembly

S5JB0E4604038

Wiring Diagram



I6JB01460022-03

[A]: ESP® control module connector (viewed from terminal side)	1. Yaw rate / G sensor assembly	3. ESP® hydraulic unit control module assembly
[B]: Yaw rate / G sensor assembly connector (viewed from harness side)	2. CAN driver (for yaw rate / G sensor assembly)	

4F-37 Electronic Stability Program:**DTC Detecting Condition and Trouble Area**

DTC Detecting Condition	Trouble Area
CAN line communication error in ESP® control module and yaw rate / G sensor assembly is detected.	• CAN communication circuit (for yaw rate / G sensor assembly) • Yaw rate / G sensor assembly • 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®. <i>Is DTC C1057 detected?</i>	Go to applicable DTC diag. flow.	Go to Step 3.
3	Check each control module connectors 1) Check connection of connectors of all control modules communicating by means of CAN (for yaw rate / G sensor assembly). 2) Check DTC for ESP®. <i>Is DTC C1073 detected?</i>	Go to Step 4.	Check for intermittent trouble referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
4	CAN communication circuit check 1) Turn ignition switch to OFF position. 2) Disconnect connectors of ESP® control module and yaw rate / G sensor assembly. <i>Is each CAN communication circuit between ESP® control module and yaw rate / G sensor assembly opened, shorted or high resistance?</i>	Repair or replace the CAN communication line.	Go to Step 5.
5	Check yaw rate / G sensor assembly 1) Substitute a known-good yaw rate / G sensor assembly. 2) Connect connectors to ESP® control module and yaw rate / G sensor assembly. 3) Clear all DTC(s) and check DTC for ESP®. <i>Is DTC C1073 still detected?</i>	Substitute a known-good ESP® hydraulic unit / control module assembly and recheck.	Yaw rate / G sensor assembly was malfunction.

DTC C1075 / 1076 / 1077 / 1078: Steering Angle Sensor / Master Cylinder Pressure Sensor / Longitudinal G Sensor / Lateral G Sensor in Yaw Rate / G Sensor Assembly Calibration Incomplete

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DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
C1075: Missing steering angle sensor calibration point data is detected.	• Steering angle sensor • Steering angle sensor calibration is incompleted • ESP® control module
C1076: Master cylinder pressure sensor calibration is incompleted.	• Master cylinder pressure sensor • Master cylinder pressure sensor calibration is incompleted • ESP® control module
C1077: Longitudinal G sensor in yaw rate / G sensor assembly calibration is incompleted. (for 4WD vehicle)	• Yaw rate / G sensor assembly • Longitudinal G sensor calibration is incompleted • ESP® control module

DTC Detecting Condition	Trouble Area
C1078: Lateral G sensor in yaw rate / G sensor assembly calibration is incompleted.	• Yaw rate / G sensor assembly • Lateral G sensor calibration is incompleted • 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®. <i>Is there any DTC(s) other than C1075, C1076, C1077 and C1078?</i>	Go to applicable DTC diag. flow.	Go to Step 3.
3	Check sensor calibration 1) Calibrate all sensors referring to "Sensor Calibration: ". 2) Clear all DTC(s) and check DTC for ESP®. <i>Is DTC C1075, C1076, C1077 and/or C1078 still detected?</i>	DTC C1075: Replace steering angle sensor. DTC C1076: Replace ESP® hydraulic unit / control module assembly. DTC C1077 / 1078: Replace yaw rate / G sensor assembly.	Calibration was incompleted.

DTC C1090: ECM Detect Rolling Counter Failure from ESP® Control Module

S5JB0E4604040

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
ESP® control module rolling counter failure is detected by ECM.	• CAN communication circuit • ECM • 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®. <i>Is there any DTC(s) other than C1038 and C1090?</i>	Go to applicable DTC diag. flow.	Go to Step 3.
3	DTC check for ECM 1) Check DTC for ECM. <i>Is DTC U0073 and/or DTC U0121 detected?</i>	Go to applicable DTC diag. flow.	Substitute a known-good ESP® hydraulic unit / control module assembly and recheck.

DTC C1091 / 1092 / 1093: ECM / TCM / 4WD Control Module Data in CAN Line Failure

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DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
C1091: ECM sent invalid signal to ESP® control module.	• Engine control system • ECM • ESP® control module
C1092: TCM sent invalid signal to ESP® control module. (for A/T model)	• A/T system • TCM • ESP® control module
C1093: 4WD control module sent invalid signal to ESP® control module. (if equipped 4WD control module)	• 4WD control system • 4WD control module • 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 other control module than ESP® 1) Check DTC for ECM, TCM and/or 4WD control module. <i>Is there any DTC(s)?</i>	Go to applicable DTC diag. flow.	Substitute a known-good ESP® hydraulic unit / control module assembly and recheck.

DTC U1073: Control Module Communication Bus Off

S5JB0E4604020

Refer to "DTC U1073: Control Module Communication Bus Off: in Section 4E".

DTC U1100: Lost Communication with ECM (Reception Error)

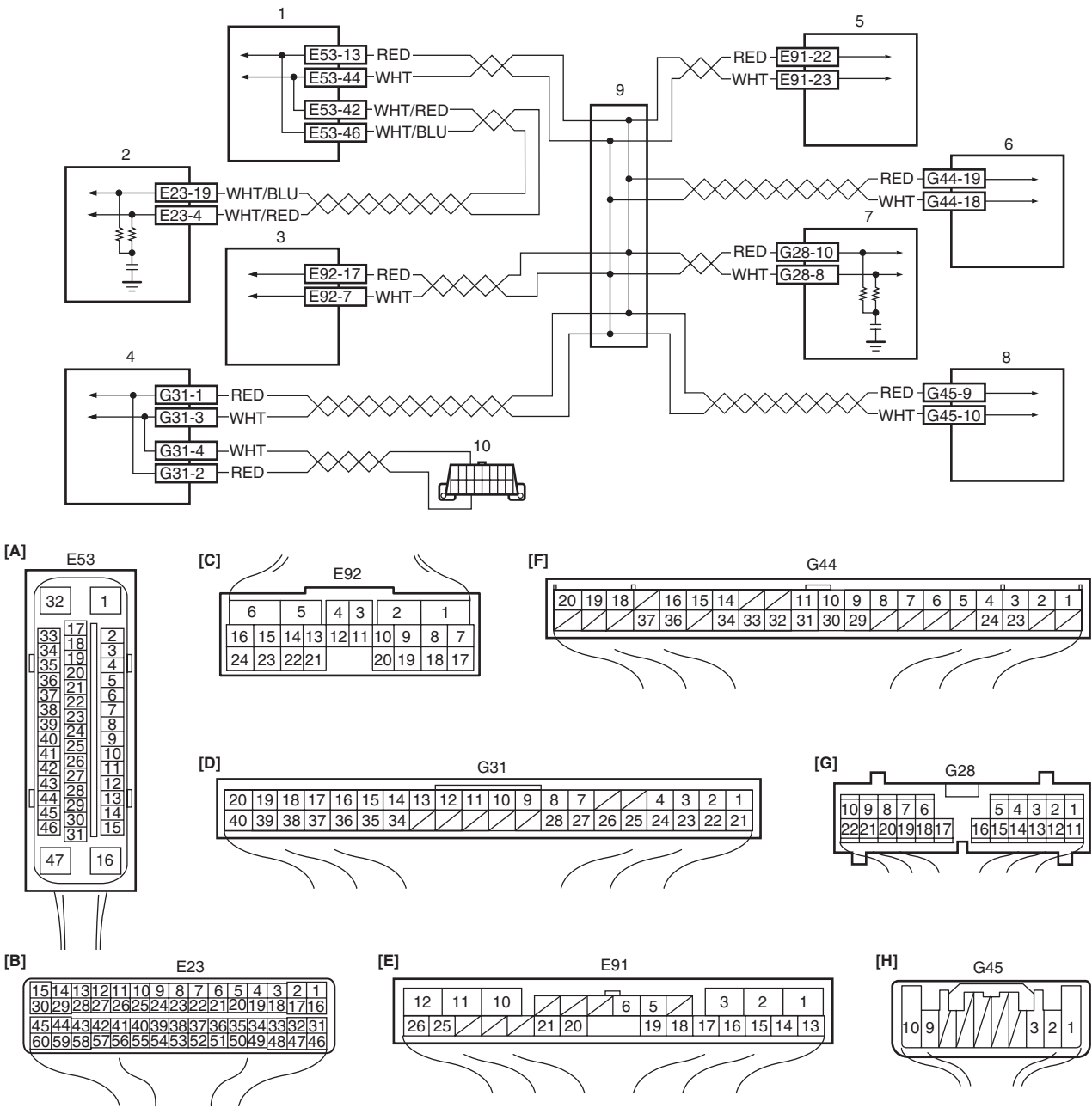
S5JB0E4604021

Refer to "DTC U1100: Lost Communication with ECM (Reception Error): in Section 4E".

DTC U1101: Lost Communication with TCM (Reception Error)

S5JB0E4604042

Wiring Diagram



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[A]: ESP® control module connector (viewed from terminal side)	[G]: Combination meter connector (viewed from harness side)	5. 4WD control module (if equipped)
[B]: ECM connector (viewed from harness side)	[H]: Steering angle sensor connector (viewed from harness side)	6. Keyless start control module (if equipped)
[C]: TCM connector (viewed from harness side)	1. ESP® hydraulic unit / control module assembly	7. Combination meter
[D]: BCM connector (viewed from harness side)	2. ECM	8. Steering angle sensor (if equipped)
[E]: 4WD control module connector (viewed from harness side)	3. TCM	9. Junction connector
[F]: Keyless start control module connector (viewed from harness side)	4. BCM	10. Data link connector (DLC)

4F-41 Electronic Stability Program:**DTC Detecting Condition and Trouble Area**

DTC Detecting Condition	Trouble Area
TCM message data is missing from CAN communication. (for A/T model)	• CAN communication circuit • TCM • 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) Check DTC for ESP®. <i>Is DTC U1101 and DTC U1073 detected together?</i>	Go to "DTC U1073: Control Module Communication Bus Off: in Section 4E" for troubleshooting.	Go to Step 3.
3	DTC check for TCM 1) Check DTC for TCM. <i>Is DTC P1774 detected?</i>	Go to "DTC P1774: CAN Communication Bus Off: in Section 5A" for troubleshooting.	Go to Step 4.
4	Check each control module connectors 1) Check connection of connectors of all control modules communicating by means of CAN. 2) Check DTC for ESP®. <i>Is DTC U1101 detected?</i>	Go to Step 5.	Check for intermittent trouble referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
5	CAN communication circuit check 1) Turn ignition switch to OFF position. 2) Disconnect connectors of ESP® control module and TCM communicating by means of CAN. <i>Is each CAN communication circuit between ESP® control module and TCM opened, shorted or high resistance?</i>	Repair or replace the CAN communication line.	Go to Step 6.
6	CAN communication circuit check 1) Disconnect connectors of all control modules communicating by means of CAN. <i>Is each CAN communication circuit between disconnected control modules (other than ESP® control module and TCM) opened, shorted or high resistance?</i>	Go to Step 7.	Repair or replace the CAN communication line.
7	DTC check for ESP® 1) Connect connectors of disconnected control modules communicating by means of CAN. 2) Disconnect each connector. • ECM • TCM • BCM • 4WD control module (if equipped) • Keyless start control module (if equipped) • Steering angle sensor 3) Check DTC for ESP®. <i>Is DTC U1101 detected?</i>	Check ESP® control module power and ground circuit. If circuits are OK, substitute a known-good ESP® hydraulic unit / control module assembly and recheck.	Check applicable control module power and ground circuit. If circuit is OK, substitute a known-good applicable control module and recheck.

DTC U1126: Lost Communication with Steering Angle Sensor (Reception Error)

S5JB0E4604043

Wiring Diagram

Refer to "DTC U1101: Lost Communication with TCM (Reception Error):".

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Steering angle sensor message data is missing from CAN communication.	- CAN communication circuit - Steering angle 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) Check DTC for ESP®. <i>Is DTC U1126 and DTC U1073 detected together?</i>	Go to "DTC U1073: Control Module Communication Bus Off: in Section 4E" for troubleshooting.	Go to Step 3.
3	Check each control module connectors 1) Check connection of connectors of all control modules communicating by means of CAN. 2) Check DTC for ESP®. <i>Is DTC U1126 detected?</i>	Go to Step 4.	Check for intermittent trouble referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
4	CAN communication circuit check 1) Turn ignition switch to OFF position. 2) Disconnect connectors of ESP® control module and steering angle sensor communicating by means of CAN. <i>Is each CAN communication circuit between ESP® control module and steering angle sensor opened, shorted or high resistance?</i>	Repair or replace the CAN communication line.	Go to Step 5.
5	CAN communication circuit check 1) Disconnect connectors of all control modules communicating by means of CAN. <i>Is each CAN communication circuit between disconnected control modules (other than ESP® control module and steering angle sensor) opened, shorted or high resistance?</i>	Go to Step 6.	Repair or replace the CAN communication line.
6	DTC check for ESP® 1) Connect connectors of disconnected control modules communicating by means of CAN. 2) Disconnect each connector. - ECM - TCM (for A/T model) - BCM 4WD control module (if equipped) - Keyless start control module (if equipped) - Steering angle sensor 3) Check DTC for ESP®. <i>Is DTC U1126 detected?</i>	Check ESP® control module power and ground circuit. If circuits are OK, substitute a known-good ESP® hydraulic unit / control module assembly and recheck.	Check applicable control module power and ground circuit. If circuit is OK, substitute a known-good applicable control module and recheck.

DTC U1139: Lost Communication with 4WD Control Module (Reception Error)**Wiring Diagram**

Refer to "DTC U1101: Lost Communication with TCM (Reception Error):".

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
4WD control module message data is missing from CAN communication. (if equipped 4WD control module)	• CAN communication circuit • 4WD control module • 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) Check DTC for ESP®. <i>Is DTC U1139 and DTC U1073 detected together?</i>	Go to "DTC U1073: Control Module Communication Bus Off: in Section 4E" for troubleshooting.	Go to Step 3.
3	DTC check for 4WD control module 1) Check DTC for 4WD control module. <i>Is DTC P1073 detected?</i>	Go to "DTC U1073: Control Module Communication Bus Off: Motor-Shift Type (Transfer with Shift Actuator) in Section 3C" for troubleshooting.	Go to Step 4.
4	Check each control module connectors 1) Check connection of connectors of all control modules communicating by means of CAN. 2) Check DTC for ESP®. <i>Is DTC U1139 detected?</i>	Go to Step 4.	Check for intermittent trouble referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
5	CAN communication circuit check 1) Turn ignition switch to OFF position. 2) Disconnect connectors of ESP® control module and 4WD control module communicating by means of CAN. <i>Is each CAN communication circuit between ESP® control module and 4WD control module opened, shorted or high resistance?</i>	Repair or replace the CAN communication line.	Go to Step 6.
6	CAN communication circuit check 1) Disconnect connectors of all control modules communicating by means of CAN. <i>Is each CAN communication circuit between disconnected control modules (other than ESP® control module and 4WD control module) opened, shorted or high resistance?</i>	Go to Step 7.	Repair or replace the CAN communication line.

Step	Action	Yes	No
7	DTC check for ESP® 1) Connect connectors of disconnected control modules communicating by means of CAN. 2) Disconnect each connector. • ECM • TCM (for A/T model) • BCM • 4WD control module • Keyless start control module (if equipped) • Steering angle sensor 3) Check DTC for ESP®. <i>Is DTC U1139 detected?</i>	Check ESP® control module power and ground circuit. If circuits are OK, substitute a known-good ESP® hydraulic unit / control module assembly and recheck.	Check applicable control module power and ground circuit. If circuit is OK, substitute a known-good applicable control module and recheck.

DTC U1140: Lost Communication with BCM (Reception Error)

S5JB0E4604045

Wiring Diagram

Refer to "DTC U1101: Lost Communication with TCM (Reception Error):".

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
BCM message data is missing from CAN communication.	• CAN communication circuit • 4WD control module • ESP® control module

DTC Troubleshooting

Step	Action	Yes	No
1	<i>Was "Electronic Stability Program Check" performed?</i>	Go to Step 2.	Go to "Electronic Stability Program Check:".
2	DTC check for ESP® 1) Check DTC for ESP®. <i>Is DTC U1140 and DTC U1073 detected together?</i>	Go to "DTC U1073: Control Module Communication Bus Off: in Section 4E" for troubleshooting.	Go to Step 3.
3	DTC check for BCM 1) Check DTC for BCM. <i>Is DTC U1073 detected?</i>	Go to "DTC U1073 (No. 1073): Control Module Communication Bus Off: in Section 10B" for troubleshooting.	Go to Step 4.
4	Check each control module connectors 1) Check connection of connectors of all control modules communicating by means of CAN. 2) Check DTC for ESP®. <i>Is DTC U1140 detected?</i>	Go to Step 4.	Check for intermittent trouble referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
5	CAN communication circuit check 1) Turn ignition switch to OFF position. 2) Disconnect connectors of ESP® control module and BCM communicating by means of CAN. <i>Is each CAN communication circuit between ESP® control module and BCM opened, shorted or high resistance?</i>	Repair or replace the CAN communication line.	Go to Step 6.

Step	Action	Yes	No
6	CAN communication circuit check 1) Disconnect connectors of all control modules communicating by means of CAN. <i>Is each CAN communication circuit between disconnected control modules (other than ESP® control module and BCM) opened, shorted or high resistance?</i>	Go to Step 7.	Repair or replace the CAN communication line.
7	DTC check for ESP® 1) Connect connectors of disconnected control modules communicating by means of CAN. 2) Disconnect each connector. • ECM • TCM (for A/T model) • BCM • 4WD control module (if equipped) • Keyless start control module (if equipped) • Steering angle sensor 3) Check DTC for ESP®. <i>Is DTC U1140 detected?</i>	Check ESP® control module power and ground circuit. If circuits are OK, substitute a known-good ESP® hydraulic unit / control module assembly and recheck.	Check applicable control module power and ground circuit. If circuit is OK, substitute a known-good applicable control module and recheck.

Repair Instructions

Hydraulic Unit Operation Check

S5JB0E4606001

Refer to "Hydraulic Unit Operation Check: in Section 4E".

Sensor Calibration

S5JB0E4606015

⚠ CAUTION

If any DTC(s) other than C1075, C1076, C1077 or C1078 are detected, sensor calibration can not be completed. Repair the detected DTC first.

NOTE

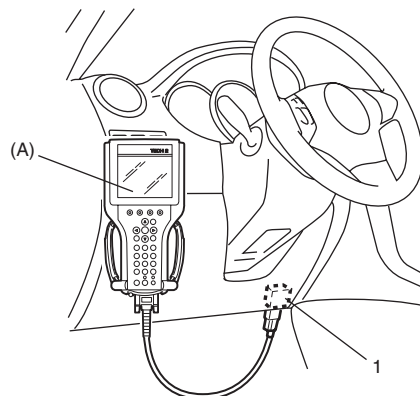
Steering angle sensor calibration is needed when battery, dome fuse or the steering angle sensor is removed.
 This sensor calibration can be done with/without SUZUKI Scan Tool.
 When ESP® control module and/or yaw rate / G sensor assembly is removed, sensor calibration is needed with SUZUKI Scan Tool.

Sensor Calibration (Using SUZUKI Scan Tool)

- 1) Set steering wheel in straight-ahead position.
- 2) Connect SUZUKI scan tool to data link connector (DLC) (1) with ignition switch OFF.

Special tool

(A): SUZUKI scan tool



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- 3) Turn ignition switch to ON position and confirm that only any of DTC(s) C1075, C1076, C1077 and/or C1078 is detected. If any other DTC are detected, repair the detected DTC.
- 4) Park and level the vehicle with parking brake, stop engine with ignition switch ON, set steering in straight and without stepping on the brake pedal.

⚠ CAUTION

Hold the above condition in Step 4) to calibrate sensor correctly until sensor calibration is completed.

- 5) Select menu "SENSOR CALIBRATION" under "MISC. TEST" mode of SUZUKI scan tool and calibrate sensor. Refer to scan tool operator's manual for further details.
- 6) After completing the calibration, turn ignition switch to OFF position and disconnect SUZUKI scan tool from DLC.

Steering Angle Sensor Calibration (Not Using SUZUKI Scan Tool)

⚠ CAUTION

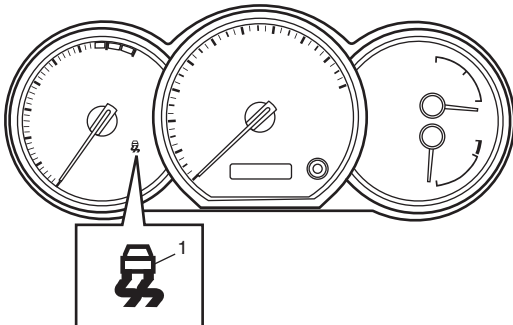
When power is not supplied to the steering angle sensor by removing battery or fuse, steering angle sensor should be calibrated.

- 1) Set steering wheel in straight-ahead position.
- 2) Connect battery terminals and/or fuse and start engine.

⚠ CAUTION

When power is not supplied to the steering angle sensor by removing battery or fuse, DTC C1075 is detected and SLIP indicator lamp (1) flashes.

If DTC other than C1075 is detected, SLIP indicator lamp flushes and other indicator illuminate. In that case, repair the detected DTC first.



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- 3) Drive vehicle straight on level ground at 15 km/h (9.5 mph) or above for few seconds without spinning wheels. And confirm that SLIP indicator lamp is OFF.

**ESP® Hydraulic Unit / Control Module
Assembly On-Vehicle Inspection**

S5JB0E4606003

Refer to "ABS (ESP®) Hydraulic Unit / Control Module Assembly On-Vehicle Inspection: in Section 4E".

**ESP® Hydraulic Unit / Control Module
Assembly Removal and Installation**

S5JB0E4606004

Refer to "ABS (ESP®) Hydraulic Unit / Control Module Assembly Removal and Installation: in Section 4E".

**Front Wheel Speed Sensor On-Vehicle
Inspection**

S5JB0E4606005

Refer to "Front Wheel Speed Sensor On-Vehicle Inspection: in Section 4E".

**Front Wheel Speed Sensor Removal and
Installation**

S5JB0E4606006

Refer to "Front Wheel Speed Sensor Removal and Installation: in Section 4E".

Front Wheel Speed Sensor Inspection

S5JB0E4606007

Refer to "Front Wheel Speed Sensor Inspection: in Section 4E".

**Rear Wheel Speed Sensor On-Vehicle
Inspection**

S5JB0E4606008

Refer to "Front Wheel Speed Sensor On-Vehicle Inspection: " since rear wheel speed sensor is the same as front wheel speed sensor.

**Rear Wheel Speed Sensor Removal and
Installation**

S5JB0E4606009

Refer to "Rear Wheel Speed Sensor Removal and Installation: in Section 4E".

Rear Wheel Speed Sensor Inspection

S5JB0E4606010

Refer to "Front Wheel Speed Sensor Inspection: " since rear wheel speed sensor is the same as front wheel speed sensor.

Front Wheel Encoder On-Vehicle Inspection

S5JB0E4606011

Refer to "Front Wheel Encoder On-Vehicle Inspection: in Section 4E".

Front Wheel Encoder Removal and Installation

S5JB0E4606012

⚠ CAUTION

Front wheel encoder is included in front wheel hub assembly. If front wheel encoder needs to be replaced, replace it as a front wheel hub assembly.

For removal and installation of front wheel hub assembly, referring to "Front Wheel Hub Assembly Removal and Installation: in Section 2B".

Rear Wheel Encoder On-Vehicle Inspection

S5JB0E4606013

Refer to "Rear Wheel Encoder On-Vehicle Inspection: in Section 4E".

Rear Wheel Encoder Removal and Installation

S5JB0E4606014

⚠ CAUTION

Rear wheel encoder is included in rear wheel hub assembly. If rear wheel encoder needs to be replaced, replace it as a rear wheel hub assembly.

For removal and installation of front wheel hub assembly, referring to "Rear Wheel Hub Assembly Removal and Installation: in Section 2C in related manual".

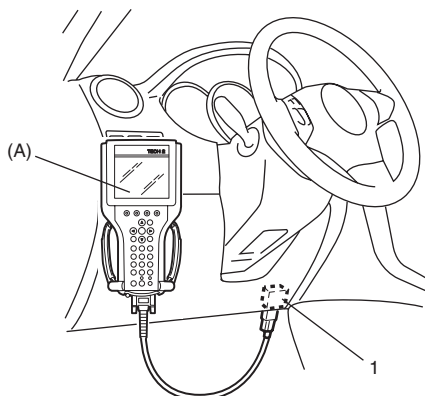
Master Cylinder Pressure Sensor On-Vehicle Inspection

S5JB0E4606016

- 1) Calibrate yaw rate / G sensor assembly referring to "Sensor Calibration: ".
- 2) Check that basic brake system other than ESP® refer to "Brake Diagnosis Note: in Section 4A in related manual".
- 3) Connect SUZUKI scan tool to data link connector (DLC) (1) with ignition switch OFF.

Special tool

(A): SUZUKI scan tool



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- 4) Turn ignition switch to ON position and select menu "DATA LIST" mode of SUZUKI scan tool. Refer to scan tool operator's manual for further details.
- 5) When brake pedal is released, check "Master Cyl Press" under "DATA LIST" of SUZUKI scan tool. If pressure is out of specification, replace ESP® hydraulic unit / control module assembly.

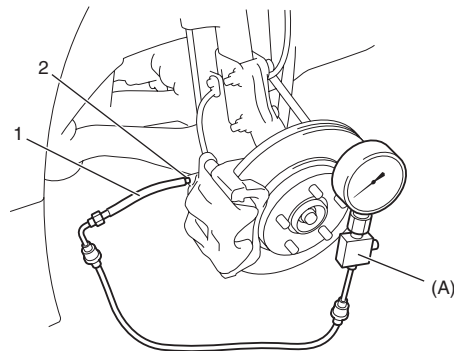
Master cylinder pressure specification

Brake pedal released: 0 ± 0.8 MPa (0 ± 8 kg/cm², 0 ± 113 psi)

- 6) Hoist vehicle and remove right-side front wheel.
- 7) Connect special tool with rubber hose (1) to Front brake caliper bleeder plug (2).

Special tool

(A): 09956-02311



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- 8) When bleeder plug loosens and depress brake pedal to make special tool gauge reading 10 MPa (100 kg/cm², 1422 psi), check "Master Cyl Press" under "DATA LIST" of SUZUKI scan tool. If pressure displayed on SUZUKI scan tool is out of specification, replace ESP® hydraulic unit / control module assembly.

Master cylinder pressure specification

Brake pedal depressed 10 MPa (100 kg/cm², 1422 psi): 10 ± 1.2 MPa (100 ± 12 kg/cm², 1422 ± 170 psi)

- 9) After completing the check, turn ignition switch to OFF position and disconnect SUZUKI scan tool from DLC.
- 10) Tighten bleeder plug and bleed air from brake system, referring to "Air Bleeding of Brake System: in Section 4A in related manual".

Yaw Rate / G Sensor Assembly On-Vehicle Inspection

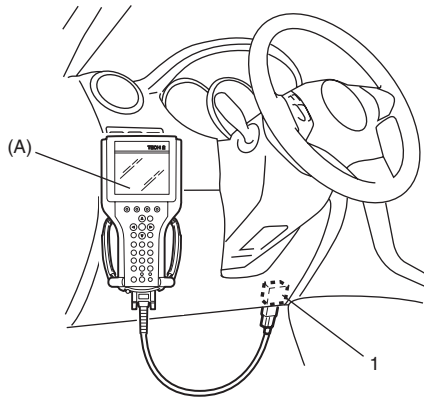
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Longitudinal G Inspection

- 1) Calibrate yaw rate / G sensor assembly referring to "Sensor Calibration: ".
- 2) Park and level the vehicle with parking brake and fix wheels with chokes.
- 3) Check yaw rate / G sensor assembly installation condition.
- 4) Connect SUZUKI scan tool to data link connector (DLC) (1) with ignition switch OFF.

Special tool

(A): SUZUKI scan tool



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- 5) Turn ignition switch to ON position and select menu "DATA LIST" mode of SUZUKI scan tool. Refer to scan tool operator's manual for further details.
- 6) Check "G Sensor" under "DATA LIST" of SUZUKI scan tool in the following vehicle conditions.

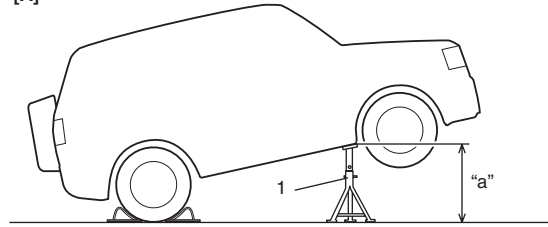
- Level condition
- Front-up condition
- Rear-up condition

If Longitudinal G condition is out of specification, replace yaw rate / G sensor assembly.

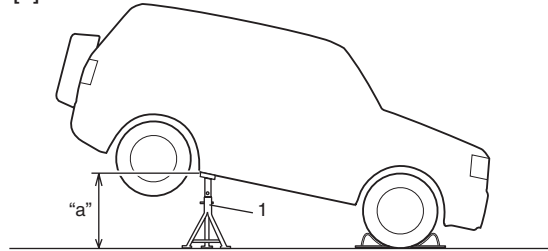
Longitudinal G specification

Vehicle condition	Longitudinal G
Level condition	$0 \pm 0.1 \text{ G}$
Front-up condition	$0.1 \pm 0.1 \text{ G}$
Rear-up condition	$-0.1 \pm 0.1 \text{ G}$

[A]



[B]



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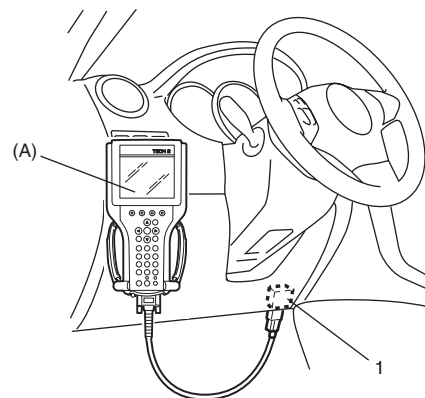
[A]: Front-up condition	"a": Approx 400 mm (15.75 in.)
[B]: Rear-up condition	1. Safety stand

Lateral G Inspection

- 1) Calibrate yaw rate / G sensor assembly referring to "Sensor Calibration: ".
- 2) Park and level the vehicle with parking brake and fix wheels with chokes.
- 3) Check yaw rate / G sensor assembly installation condition.
- 4) Connect SUZUKI scan tool to data link connector (DLC) (1) with ignition switch OFF.

Special tool

(A): SUZUKI scan tool



I5JB0A450008-01

- 5) Turn ignition switch to ON position and select menu "DATA LIST" mode of SUZUKI scan tool. Refer to scan tool operator's manual for further details.
- 6) Check "G Sensor (lateral)" under "DATA LIST" of SUZUKI scan tool in the following vehicle conditions.

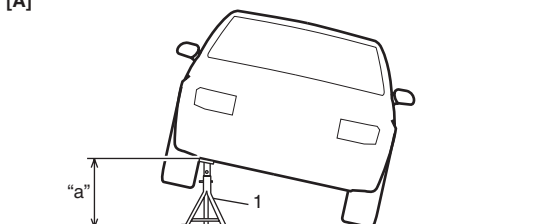
- Level condition
- Right-up condition
- Left-up condition

If Lateral G condition is out of specification, replace yaw rate / G sensor assembly.

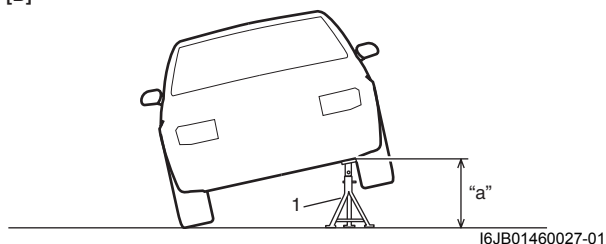
Lateral G specification

Vehicle condition	G Sensor (lateral)
Level condition	$0 \pm 0.1 \text{ G}$
Right -up condition	$0.1 \pm 0.1 \text{ G}$
Left-up condition	$-0.1 \pm 0.1 \text{ G}$

[A]



[B]



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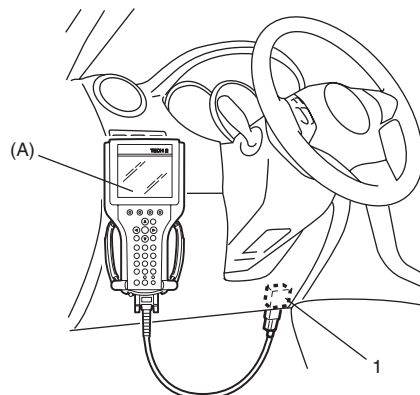
[A]: Right-up condition	"a": Approx. 350 mm (13.78 in.)
[B]: Left-up condition	1. Safety stand

Yaw Rate Inspection

- 1) Calibrate yaw rate / G sensor assembly referring to "Sensor Calibration: ".
- 2) Check yaw rate / G sensor assembly installation condition.
- 3) Connect SUZUKI scan tool to data link connector (DLC) (1) with ignition switch OFF.

Special tool

(A): SUZUKI scan tool



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- 4) Turn ignition switch to ON position and select menu "DATA LIST" mode of SUZUKI scan tool. Refer to scan tool operator's manual for further details.
- 5) Check "Yaw rate sensor" under "DATA LIST" of SUZUKI scan tool in the following vehicle conditions.
 - Parking condition
 - Drive vehicle in right turning condition with steering wheel fully turned
 - Drive vehicle in left turning condition with steering wheel fully turned

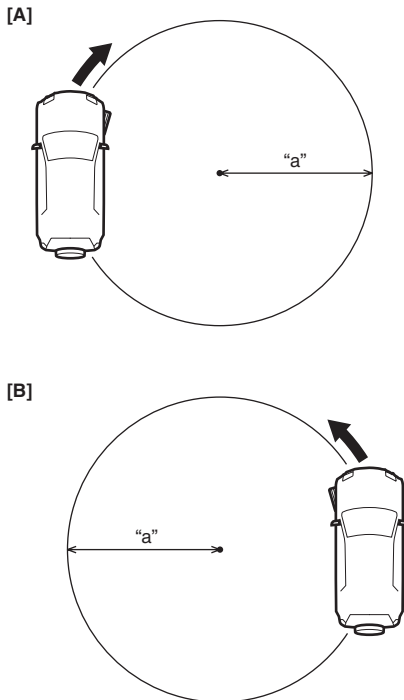
If yaw rate condition is out of specification, replace yaw rate / G sensor assembly.

Yaw rate specification

Vehicle condition	Yaw rate
Parking	$0 \pm 4 \text{ deg/s}$
Right turning	$30 \pm 4 \text{ deg/s}$
Left turning	$-30 \pm 4 \text{ deg/s}$

NOTE

- Drive the vehicle on level ground and at 10 km/h (6.2 mph).
- Minimum turning radius is 5.3 m (17.4 ft).



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[A]: Right turning	"a": Approx. 5.3 m (17.4 ft)
[B]: Left turning	

Yaw Rate / G Sensor Assembly Removal and Installation

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CAUTION

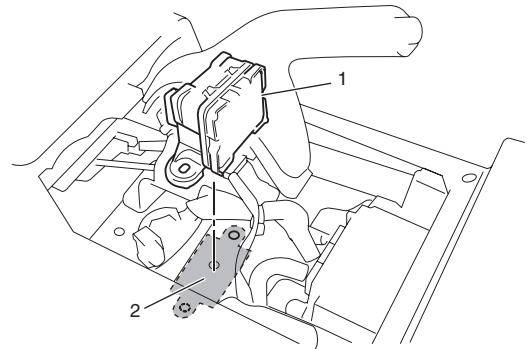
- When yaw rate / G sensor assembly is replaced, ESP® control module needs zero calibration. Perform zero calibration by SUZUKI scan tool referring to "Sensor Calibration: ".
- Regarding yaw rate / G sensor assembly removal/installation, confirm specified torque and never use impact wrench to avoid damage.
- When handling the yaw rate / G sensor assembly, be careful not to drop it or apply an impact to it.
If an excessive impact was applied, never attempt disassembly or repair but replace it with a new one.

Removal

- 1) Disconnect negative (–) cable at battery.
- 2) Remove console rear panel referring to "Console Box Components: in Section 9H in related manual".
- 3) Remove yaw rate / G sensor assembly from floor panel.

Installation

- 1) Before installing yaw rate / G sensor assembly (1), check installing condition as follows.
 - Deformations around sensor installation area (2) (in floor panel).
 - Foreign matters on mating surface between sensor and floor panel.

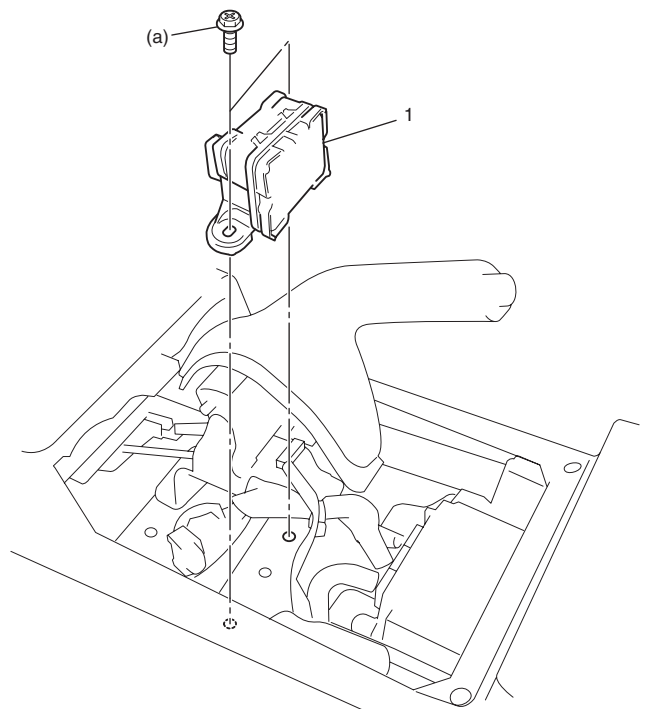


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- 2) Install yaw rate / G sensor assembly (1) to floor panel.

Tightening torque

Yaw rate / G sensor assembly bolt (a): 8 N·m (0.8 kgf-m, 6.0 lb-ft)



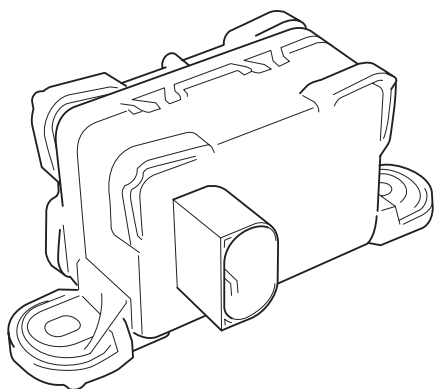
I6JB01460030-02

- 3) Install console rear panel referring to "Console Box Components: in Section 9H in related manual".
- 4) Connect negative (–) cable to battery.
- 5) After completing installation, calibrate yaw rate / G sensor assembly referring to "Sensor Calibration: ".

Yaw Rate / G Sensor Inspection

S5JB0E4606019

- Check sensor for dents, cracks or deformation.
- Check sensor connector (sensor side and harness side) and sensor connector lock mechanism for damage or crack.
- Check connector terminals for bend, corrosion or rust. If it is found faulty, replace yaw rate / G sensor assembly.



I6JB01460031-01

Steering Angle Sensor On-Vehicle Inspection

S5JB0E4606020

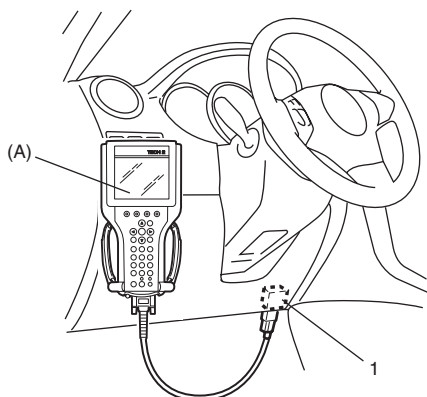
⚠ CAUTION

Before each inspection, confirm steering angle sensor calibration is completed. If calibration is incompletes, calibrate sensor referring to "Sensor Calibration: ".

- 1) Connect SUZUKI scan tool to data link connector (DLC) (1) with ignition switch OFF.

Special tool

(A): SUZUKI scan tool



I5JB0A450008-01

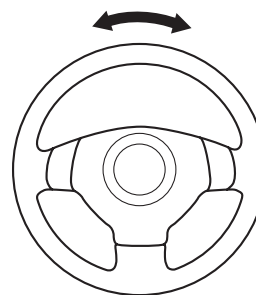
- 2) Turn ignition switch to ON position and select menu "DATA LIST" mode of SUZUKI scan tool. Refer to scan tool operator's manual for further details.

- 3) Check "Steering angle Sen" under "DATA LIST" of SUZUKI scan tool in the following steering wheel conditions.

- Front wheels in straight-ahead position
 - Rotate steering wheel a round in clockwise (counter clockwise) from straight-ahead position
- If steering angle condition is out of specification, replace steering angle sensor.

Steering angle Specification

Vehicle condition	Steering angle
Front wheels in straight-ahead position	$0 \pm 3^\circ$
Rotate steering wheel a round in clockwise	$360 \pm 3^\circ$
Rotate steering wheel a round in counterclockwise	$-360 \pm 3^\circ$



I6JB01460032-01

Steering Angle Sensor Removal and Installation

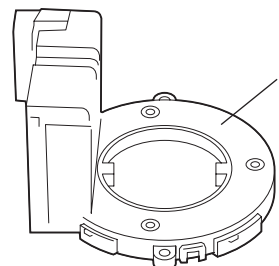
S5JB0E4606021

Refer to "Steering Angle Sensor Removal and Installation: in Section 6B".

Steering Angle Sensor Inspection

S5JB0E4606022

- Check sensor for dents, cracks or deformation.
- Check sensor connector (sensor side and harness side) and sensor connector lock mechanism for damage or crack.
- Check connector terminals for bend, corrosion or rust. If it is found faulty, replace steering angle sensor (1).



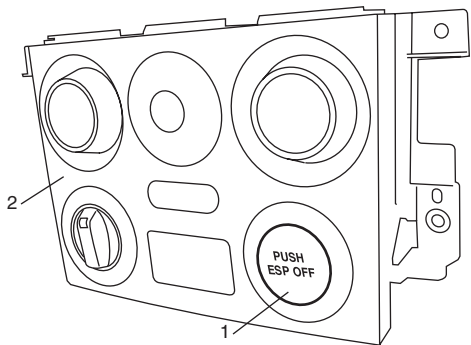
I6JB01460033-01

ESP® OFF Switch Removal and Installation

S5JB0E4606023

Removal

- 1) Disconnect negative (–) cable at battery.
- 2) Remove center garnish with audio unit (if equipped) and HVAC control module referring to “Audio Unit Removal and Installation: in Section 9C in related manual”.
- 3) Remove HVAC control module from center garnish, referring to “HVAC Control Module Removal and Installation: in Section 7A in related manual”.
- 4) Remove ESP® OFF Switch (1) from center garnish (2).



I6JB01460034-01

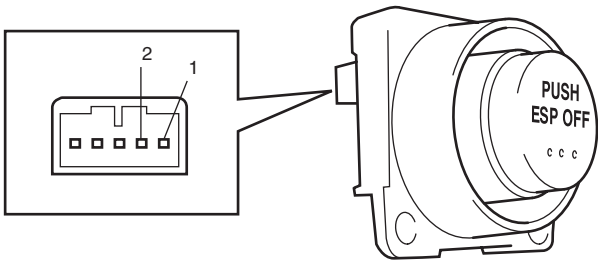
Installation

Reverse removal procedure.

ESP® OFF Switch Inspection

S5JB0E4606024

Check for continuity between terminals at each switch position.
If check result is not as specified, replace ESP® OFF switch.



Terminal		1	2
ESP OFF switch			
FREE			
PUSH		○	○

I6JB01460035-02

Specifications

Tightening Torque Specifications

S5JB0E4607001

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
Yaw rate / G sensor assembly bolt	8	0.8	6.0	🔧

Reference:

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

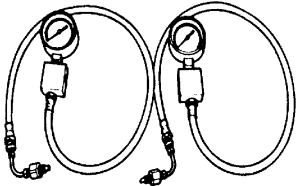
Special Tools and Equipment

Special Tool

S5JB0E4608001

09956–02311

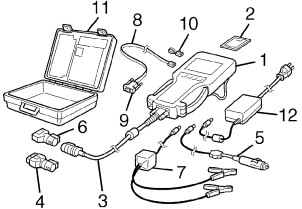
Brake pressure gauge



SUZUKI scan tool

—

This kit includes following items. 1. Tech 2, 2. PCMCIA card, 3. DLC cable, 4. SAE 16/19 adapter, 5. Cigarette cable, 6. DLC loop back adapter, 7. Battery power cable, 8. RS232 cable, 9. RS232 adapter, 10. RS232 loop back connector, 11. Storage case, 12. Power supply 🔧 / 🔧 / 🔧 / 🔧 / 🔧 / 🔧 / 🔧 / 🔧



Section 5

Transmission / Transaxle

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For the items with asterisk (*) in the “CONTENTS” below, refer to the same section of the service manual mentioned in the “FOREWORD” of this manual.

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Automatic Transmission/Transaxle

Precautions

Precautions in Diagnosing Trouble

S5JB0E5100001

- Do not disconnect couplers from TCM, battery cable from battery, TCM ground wire harness from engine or main fuse before checking the diagnostic information (DTC, freeze frame data, etc.) stored in TCM memory. Such disconnection will clear memorized information in TCM memory.
- For vehicle without engine diagnosis connector, diagnostic information stored in TCM memory can be cleared as well as checked by using SUZUKI scan tool or OBD generic scan tool. Before using scan tool, read its Operator's (Instruction) Manual carefully to have good understanding as to what functions are available and how to use it.
It is indistinguishable which module turns on MIL because not only ECM but also TCM turns on MIL. Therefore, check both ECM and TCM for DTC when MIL lights on.
When checking TCM for DTC, keep in mind that DTC is displayed on the scan tool as follows depending on the scan tool used.
 - SUZUKI scan tool displays DTC detected by TCM.
 - OBD generic scan tool displays DTC detected by each of ECM and TCM simultaneously.
- For vehicle with engine diagnosis connector, using SUZUKI scan tool the diagnostic information stored in TCM memory can be checked and cleared as well. Before its use, be sure to read Operator's Manual supplied with it carefully to have good understanding of its functions and usage.

- Not using scan tool (if equipped with AT monitor connector), the DTC stored in TCM memory also can be checked and cleared. DTC stored in the TCM memory is outputted by displaying DTC on digital display odometer with diagnosis terminal of monitor connector grounded. If no DTC is stored in TCM memory, DTC 0000 is outputted. If one or more DTCs are stored in TCM memory, they are outputted starting from smallest code number in increasing order. After all DTCs are outputted, all DTCs are outputted repeatedly.
- Be sure to read "Precautions for Electrical Circuit Service: in Section 00 in related manual" before inspection and observe what is written there.
- TCM and/or ECM replacement:
When substituting a known-good TCM and/or ECM, check for the following conditions.
Neglecting this check may result in damage to a good TCM and/or ECM.
 - All relays and actuators have resistance of specified value.
 - MAF sensor, Manifold absolute pressure (MAP) sensor, TP sensor and fuel tank pressure sensor are in good condition. Also, the power circuit of these sensors is not shorted to the ground.
- Communication of ECUs, ECM, TCM, BCM, combination meter, 4WD control module (if equipped), ABS/ESP® control module, keyless start control module (if equipped), steering angle sensor (if equipped) and DLC is established by CAN (controller Area Network). For more detail of CAN communication, refer to "CAN Communication System Description: ". Therefore, handle CAN communication line with care referring to "Precaution for CAN Communication System: in Section 00 in related manual".

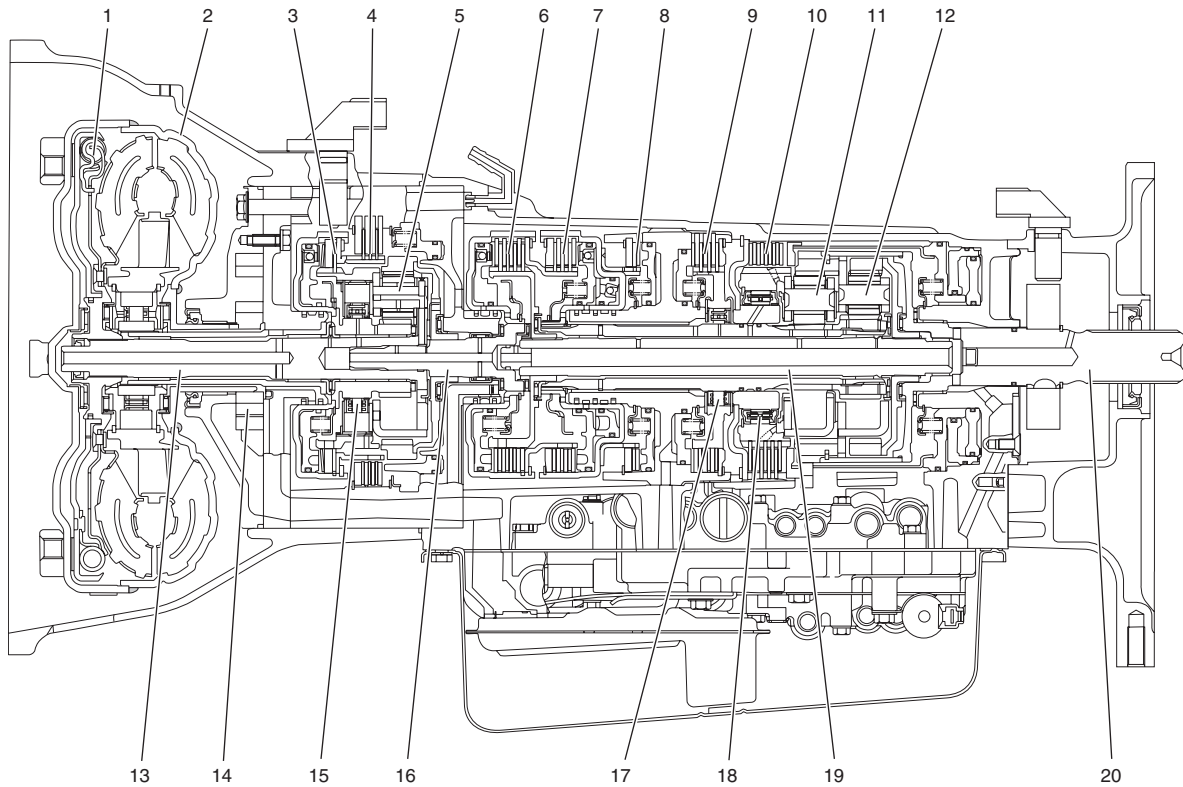
General Description

Automatic Transmission Description

S5JB0E5101001

This automatic transmission is a full automatic type with 3-speed plus overdrive (O/D).

The torque converter is a 3-element, 1-step and 2-phase type and is equipped with an electronically controlled lock-up mechanism. The gear shift device consists of 3 sets of planetary gear units, 3 disc type clutches, 4 disc type brakes and 3 one-way clutches. The gear shift is done by selecting one of 7 positions ("P", "R", "N", "D", "3", "2" and "L") by means of the select lever installed on the floor. Also, by using the P/N mode switch located on the console box, it is possible to select the gear change timing of 2 modes, normal and power.



I5JB0A510004-01

1. Torque converter clutch (TCC)	8. Second coast brake	15. O/D one-way clutch
2. Torque converter	9. Second brake	16. Forward clutch input shaft
3. O/D clutch	10. Reverse brake	17. One-way clutch No.1
4. O/D brake	11. Front planetary gear	18. One-way clutch No.2
5. O/D planetary gear	12. Rear planetary gear	19. Intermediate shaft
6. Forward clutch	13. O/D input shaft	20. Output shaft
7. Direct clutch	14. Oil pump	

5A-3 Automatic Transmission/Transaxle:

Item		Specifications	
Torque converter	Type	3-element, 1-step, 2-phase type (with TCC (lock-up) mechanism)	
	Stall torque ratio	2.05	
Oil pump	Type	Trochoid type oil pump	
	Drive system	Engine driven	
Gear change device	Type	Forward 4-step, reverse 1-step planetary gear type	
	Shift position	"P" range	Gear in neutral, output shaft fixed, engine start
		"R" range	Reverse
		"N" range	Gear in neutral, engine start
		"D" range	Forward 1st ↔ 2nd ↔ 3rd ↔ 4th (O/D) automatic gear change
		"D" range (Transfer 4L (4WD model only))	Forward 1st ↔ 2nd ↔ 3rd gear change
		"3" range	Forward 1st ↔ 2nd ↔ 3rd automatic gear change
		"2" range (Normal mode)	Forward 1st ↔ 2nd ← 3rd automatic gear change
		"2" range (Power mode)	Forward 2nd ← 3rd automatic gear change
		"L" range	Forward 1st ← 2nd reduction, and fixed at 1st gear
	Gear ratio	1st	2.826
		2nd	1.493
		3rd	1.000
		4th	0.688
		Reverse	2.703
	Control elements		Wet type multi-disc clutch ... 3 sets Wet type multi-disc brake ... 4 sets One-way clutch ... 3 sets
	Transfer (4WD model only)		Hi: 1.000 Lo: 1.970
	Final gear reduction ratio		5.125
Lubrication	Lubrication system		Forced feed system by oil pump
Cooling	Cooling system		Radiator assisted cooling (water-cooled)
Fluid used		SUZUKI ATF 3317 or Mobil ATF 3309	

CAN Communication System Description

S5JB0E5101004

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

TCM Transmission Data

TCM		DATA		ECM	BCM	Combination Meter	4WD control module (if equipped)
			Torque reduction request	○			
			Slip control signal	○			
			Transmission malfunction indication ON	○ ^{*1}		○ ^{*1}	
			Transmission emissions related malfunction active	○ ^{*2}		○ ^{*2}	
			Transmission gear selector position	○	○	○	○
			Transmission diagnostic trouble codes			○	

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NOTE

- *1: Vehicle is equipped with engine diagnosis connector only.**
***2: Vehicle is not equipped with engine diagnosis connector only.**

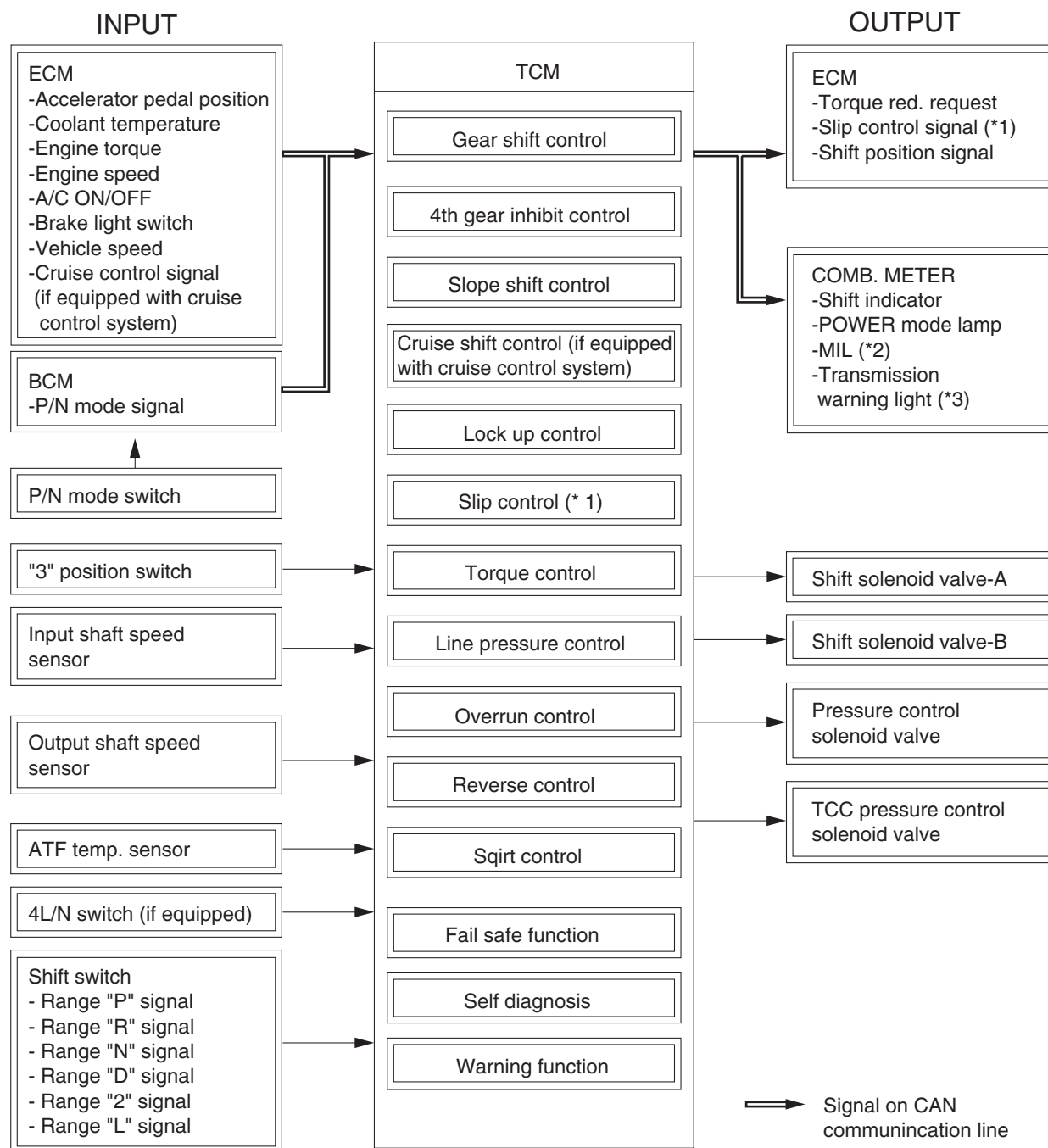
TCM Reception Data

TCM		DATA		ECM	BCM
			Engine torque signal	○	
			Accelerator pedal position	○	
			Engine speed	○	
			4th gear inhibit	○	
			Torque converter clutch control inhibit	○	
			Lock up/ slip control inhibit signal	○	
			Throttle position	○	
			Stand by to engage air conditioning compressor	○	
			Engine coolant temperature	○	
			Cruise control signal (if equipped with cruise control system)	○	
			Vehicle speed	○	
			Brake pedal switch active	○	
			AT mode status		○
			Air conditioning compressor clutch engaged (if equipped with A/C)	○	

I5JB0A510007-03

Electronic Shift Control Input / Output Table

S5JB0E5101005



I5JB0D510003-02

NOTE

***1:** For vehicle not equipped with engine diagnosis connector model (Except RH steering vehicle not equipped with rear fog light model)

***2:** For vehicle not equipped with engine diagnosis connector model

***3:** For vehicle equipped with engine diagnosis connector model

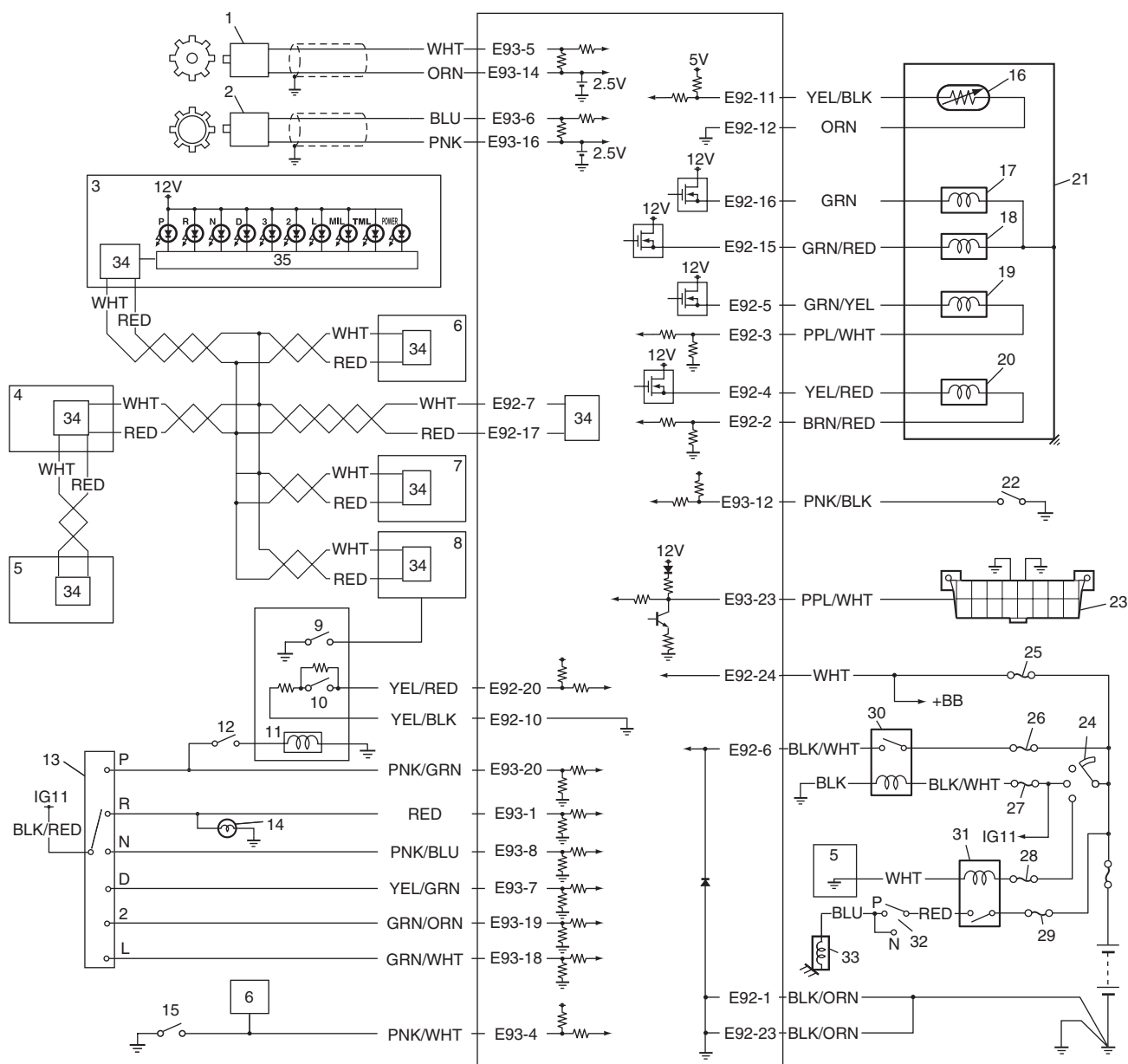
INPUT / OUTPUT		CONTROL												
		Gear Shift control	4th gear inhibit control	Slope shift control	Cruise shift control	Lock-up control	Slip control	Line pressure control	Torque control	Overrun control	Reverse control	Squirt control	Speed meter indicate	
Input	Accelerator effective position	☐		☐	☐	☐	☐	☐	☐					
	Throttle position				☐									
	Coolant temperature		☐			☐	☐							
	Engine torque			☐				☐	☐					
	Engine speed						☐	☐	☐					
	A/C ON/OFF						☐							
	Brake light switch	☐		☐		☐								
	Vehicle speed												☐	
	Cruise control signal (if equipped with cruise control system)				☐									
	P/N mode switch	☐			☐									
	"3" position switch	☐								☐				
	Input shaft speed sensor					☐	☐	☐	☐					
	Output shaft speed sensor	☐		☐	☐	☐	☐	☐	☐	☐	☐	☐		
	ATF temperature sensor	☐					☐	☐				☐		
	4L/N switch (if equipped)	☐		☐	☐	☐								
	Shift switch	☐		☐	☐	☐	☐	☐		☐	☐	☐		
Output	Torque reduction request								☐					
	Slip control signal *1						☐							
	Shift solenoid valve-A	☐	☐	☐	☐					☐	☐	☐		
	Shift solenoid valve-B	☐	☐	☐	☐					☐	☐	☐		
	Pressure control solenoid valve							☐						
	TCC pressure control solenoid valve				☐	☐	☐							

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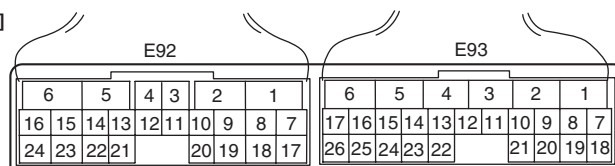
NOTE

***1: For vehicle not equipped with engine diagnosis connector model (Except RH steering vehicle not equipped with rear fog light model)**

Electronic Shift Control System Wiring Diagram



[A]



15JB0A510009-03

[A]: TCM connector (viewed from harness side)	9. P/N mode switch	18. Shift solenoid valve-B	27. "IG COIL" fuse
1. Output shaft speed sensor	10. "3" position switch	19. TCC pressure control solenoid valve	28. "ST SIG" fuse
2. Input shaft speed sensor	11. Shift lock solenoid	20. Pressure control solenoid valve	29. "ST" fuse
3. Combination meter	12. Brake light switch	21. Valve body assembly	30. AT relay included in integration relay No.2 in main fuse box
4. ABS/ESP® control module	13. Transmission range switch	22. Monitor connector (if equipped)	31. Starting motor relay
5. ECM	14. Back-up light	23. DLC	32. Inhibit switch
6. 4WD control module (if equipped)	15. 4L/N switch (if equipped)	24. Ignition switch	33. Starting motor
7. Keyless start control module (if equipped)	16. Transmission fluid temperature sensor	25. "DOME" fuse	34. CAN driver
8. BCM	17. Shift solenoid valve-A	26. "AT" fuse	35. Meter driver

Schematic and Routing Diagram

Automatic Gear Shift Table

S5JB0E5102001

Automatic gear shift schedule is shown in the following table. Test-drive the vehicle on a flat road in the D position.

Normal Mode

1. Shift Point in D position and normal mode

	Throttle opening (%)	Shift	Vehicle speed km/h (mph)	Remark
UP shift	Over 80%	1st → 2nd	50 – 55 (31 – 34)	
		2nd → 3rd	99 – 104 (62 – 65)	
		3rd → 4th	154 – 159 (96 – 99)	
	50%	1st → 2nd	26 – 31 (16 – 19)	98-103 (61-64) (with cruise set condition)
		2nd → 3rd	56 – 61 (35 – 38)	
		3rd → 4th	91 – 96 (57 – 59)	
	10%	1st → 2nd	10 – 15 (6 – 9)	
		2nd → 3rd	25 – 30 (16 – 19)	
		3rd → 4th	41 – 46 (25 – 29)	
DOWN shift	Over 80%	4th → 3rd	148 – 153 (92 – 95)	
		3rd → 2nd	84 – 89 (52 – 55)	
		2nd → 1st	41 – 46 (25 – 29)	
	50%	4th → 3rd	68 – 73 (42 – 45)	75 – 80 (47 – 50) (with cruise set condition)
		3rd → 2nd	42 – 47 (26 – 29)	
		2nd → 1st	23 – 28 (14 – 17)	14 – 19 (9 – 12) (with cruise set condition)
	0%	4th → 3rd	22 – 27 (14 – 17)	With applying brake pedal (cost down condition)
		3rd → 2nd	18 – 23 (11 – 14)	
		2nd → 1st	16 – 21 (10 – 13)	

2. Lock-up point in D position and normal mode

	Lock-up clutch status	Throttle opening (%)	Vehicle speed km/h (mph)	Remark
3 rd gear lock-up	ON	50%	85 – 90 (53 – 56)	
		20 – 30%	56 – 61 (35 – 38)	
	OFF	50%	76 – 81 (47 – 50)	
		30 – 40%	43 – 48 (27 – 30)	
4 th gear lock-up	ON	50%	132 – 136 (82 – 85)	152 – 156 (94 – 97) (with cruise set condition)
		20 – 30%	64 – 69 (40 – 43)	
	OFF	50%	102 – 107 (63 – 66)	85 – 90 (53 – 56) (with cruise set condition)
		20 – 30%	55 – 60 (34 – 37)	

3. Slip lock-up point in D and/or 3 position *1

	Slip lock-up clutch status	Throttle opening (%)	Vehicle speed km/h (mph)	Remark
3 rd gear	Slip ON	10 – 15%	29 – 34 (18 – 21)	Without lock-up condition
	Slip OFF	10 – 15%	25 – 30 (16 – 19)	
4 th gear	Slip ON	10 – 15%	39 – 44 (24 – 27)	Without lock-up condition
	Slip OFF	10 – 15%	35 – 40 (22 – 25)	

Power Mode

1. Shift Point in D position and power mode

	Throttle opening (%)	Shift	Vehicle speed km/h (mph)	Remark
UP shift	Over 80%	1st → 2nd	50 – 55 (31 – 34)	
		2nd → 3rd	99 – 104 (62 – 65)	
		3rd → 4th	154 – 159 (96 – 99)	
	50%	1st → 2nd	35 – 40 (22 – 25)	
		2nd → 3rd	66 – 71 (41 – 44)	
		3rd → 4th	106 – 111 (66 – 69)	
	10%	1st → 2nd	10 – 15 (6 – 9)	
		2nd → 3rd	25 – 30 (16 – 19)	
		3rd → 4th	41 – 46 (25 – 29)	
DOWN shift	Over 80%	4th → 3rd	148 – 153 (92 – 95)	
		3rd → 2nd	84 – 89 (52 – 55)	
		2nd → 1st	45 – 50 (28 – 31)	
	50%	4th → 3rd	82 – 87 (51 – 54)	
		3rd → 2nd	53 – 58 (33 – 36)	
		2nd → 1st	24 – 29 (15 – 18)	
	0%	4th → 3rd	35 – 40 (14 – 17)	With applying brake pedal (cost down condition)
		3rd → 2nd	18 – 23 (11 – 14)	
		2nd → 1st	16 – 21 (10 – 13)	

2. Lock-up point in D position and power mode

	Lock-up clutch status	Throttle opening (%)	Vehicle speed km/h (mph)	Remark
3rd gear lock-up	ON	50%	106 – 111 (66 – 69)	
		20 – 30%	56 – 61 (35 – 38)	
	OFF	50%	76 – 81 (47 – 50)	
		30 – 40%	43 – 48 (27 – 30)	
4th gear lock-up	ON	50%	137 – 141 (85 – 88)	
		20 – 30%	64 – 69 (40 – 43)	
	OFF	50%	126 – 131 (78 – 81)	
		20 – 30%	55 – 60 (34 – 37)	

3. Slip lock-up point in D and/or 3 position *1

	Slip lock-up clutch status	Throttle opening (%)	Vehicle speed km/h (mph)	Remark
3rd gear	Slip ON	10 – 15%	29 – 34 (18 – 21)	Without lock-up condition
	Slip OFF	10 – 15%	25 – 30 (16 – 19)	
4th gear	Slip ON	10 – 15%	39 – 44 (24 – 27)	Without lock-up condition
	Slip OFF	10 – 15%	35 – 40 (22 – 25)	

NOTE

***1: For vehicle not equipped with engine diagnosis connector model (Except RH steering vehicle not equipped with rear fog light model)**

The gear change is done at the shift point different from the above while any of the following control functions is working. Bear this in mind when performing inspection.

- **Slope Shift Control**

When the AT controller makes up-slope judgment, Slope Shift Control (on up-slope) is executed by changing the gear change point to the high-speed side so as to reduce frequent up-shift and down-shift operations. When the AT controller makes down-shift judgment, Slope Shift Control (on down-slope) is executed by changing the gear change point to the low-speed side so as to use engine-brake function effectively while driving on a down-slope.

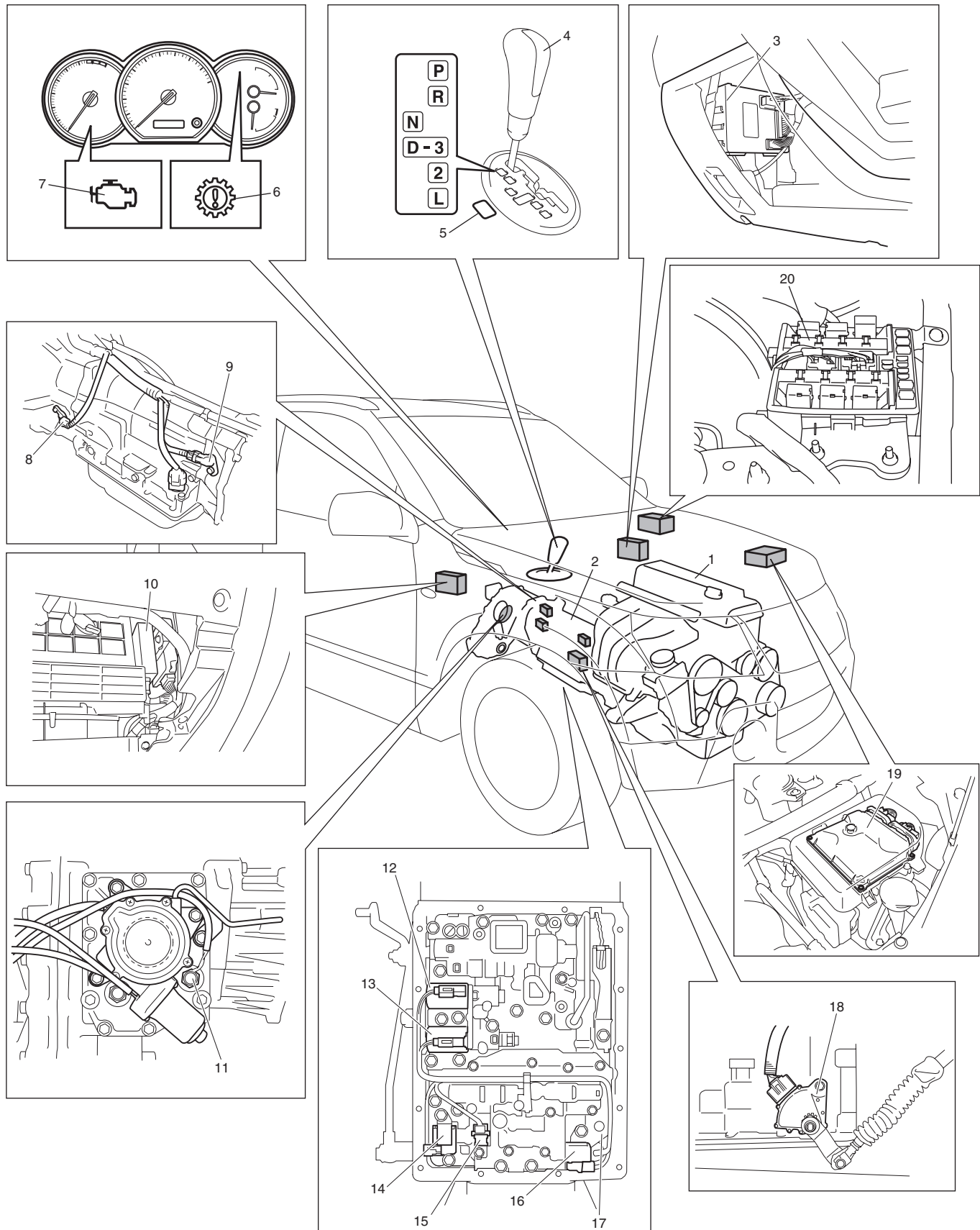
- **Cruise Shift Control (if equipped with cruise control system)**

Cruise Shift Control is executed by selecting appropriate gear according to requirement for retaining a constant vehicle speed or acceleration so as to reduce frequent up-shift and down-shift operations while cruising.

Component Location

Electronic Shift Control System Components Location

S5JB0E5103001



1. Engine	6. Transmission warning light (vehicle is equipped with engine diagnosis connector)	11. 4L/N low switch (if equipped)	16. Shift solenoid valve-B
2. Transmission	7. MIL (vehicle is not equipped with engine diagnosis connector)	12. Pressure control solenoid valve	17. Valve body assembly
3. BCM	8. Input shaft speed sensor	13. TCC pressure control solenoid valve	18. Transmission range sensor
4. Selector lever assembly including "3" position switch	9. Output shaft speed sensor	14. Shift solenoid valve-A	19. ECM
5. P/N mode switch	10. TCM	15. Transmission fluid temperature sensor	20. AT relay included power integration No.2 in main fuse box

Diagnostic Information and Procedures

DTC Table

S5JB0E5104005

NOTE

Confirmation available table of automatic transmission related DTC is shown below.

	Vehicle is not equipped with engine diagnosis connector	Vehicle is equipped with engine diagnosis connector
SUZUKI scan tool	○	○
Generic scan tool	○	X
Not using scan tool (if equipped with A/T monitor connector)	X	○

○: Available-DTC can be confirmed

X: Not available-DTC can not be confirmed

NOTE

A: Driving cycles when MIL lighting and storing DTC in TCM memory for vehicle is not equipped with engine diagnosis connector.

B: Driving cycles when transmission warning light lighting and storing DTC in TCM memory for vehicle is equipped with engine diagnosis connector.

DTC No.	Detecting item	Detecting condition (DTC will set when detecting)	A	B
0000	No malfunction is detected	—	—	—
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	Multiple signals are inputted simultaneously.	1 driving cycle	1 driving cycle
P0707	Transmission Range Sensor Circuit Low	No sensor signal is inputted.	2 driving cycles	2 driving cycles
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low	Sensor output voltage is too low.	1 driving cycle	1 driving cycle
P0713	Transmission Fluid Temperature Sensor "A" Circuit High	Sensor output voltage is too high.	1 driving cycle	1 driving cycle
P0717	Input / Turbine Speed Sensor Circuit No Signal	No sensor signal is detected although output speed sensor signal is inputted.	1 driving cycle	1 driving cycle
P0722	Output Speed Sensor Circuit No Signal	No sensor signal is inputted although input speed sensor signal is inputted.	1 driving cycle	1 driving cycle
P0741	Torque Converter Clutch Circuit Performance or Stuck Off	Difference in revolution between engine and input shaft is too large although TCM is commanding TCC pressure control solenoid to turn ON.	2 driving cycles	2 driving cycles *2
P0742	Torque Converter Clutch Circuit Stuck On	Difference in revolution between engine and input shaft is too small although TCM is commanding TCC pressure control solenoid to turn OFF.	2 driving cycles	2 driving cycles *2
P0751	Shift Solenoid "A" Performance or Stuck Off	The gear commanded by TCM does not match the actual gear when driving.	2 driving cycles	2 driving cycles *2
P0752	Shift Solenoid "A" Stuck On	The gear commanded by TCM does not match the actual gear when driving.	2 driving cycles	2 driving cycles *2
P0756	Shift Solenoid "B" Performance or Stuck Off	The gear commanded by TCM does not match the actual gear when driving.	2 driving cycles	2 driving cycles *2
P0757	Shift Solenoid "B" Stuck On	The gear commanded by TCM does not match the actual gear when driving.	2 driving cycles	2 driving cycles *2
P0962	Pressure Control Solenoid "A" Control Circuit Low	No electric flow is detected on pressure control solenoid circuit.	1 driving cycle	1 driving cycle
P0963	Pressure Control Solenoid "A" Control Circuit High	Too much electric flow is detected on pressure control solenoid circuit.	1 driving cycle	1 driving cycle
P0973	Shift Solenoid "A" Control Circuit Low	Voltage of shift solenoid terminal is low although TCM is commanding shift solenoid to turn ON.	1 driving cycle	1 driving cycle

DTC No.	Detecting item	Detecting condition (DTC will set when detecting)	A	B
P097 4	Shift Solenoid "A" Control Circuit High	Voltage of shift solenoid terminal is high although TCM is commanding shift solenoid to turn OFF.	1driving cycle	1driving cycle
P097 6	Shift Solenoid "B" Control Circuit Low	Voltage of shift solenoid terminal is low although TCM is commanding shift solenoid to turn ON.	1driving cycle	1driving cycle
P097 7	Shift Solenoid "B" Control Circuit High	Voltage of shift solenoid terminal is high although TCM is commanding shift solenoid to turn OFF.	1driving cycle	1driving cycle
P170 2	Internal Control Module Memory Check Sum Error	Calculation of current data stored in TCM is not correct comparing with pre-stored checking data in TCM.	1driving cycle	1driving cycle
P170 3	CAN Invalid Data- TCM	TCM receives malfunction signal of throttle position, engine coolant temperature, engine revolution and engine torque from ECM.	1driving cycle *1	1driving cycle *2
P172 3	Range Select Switch Malfunction	3 position switch signal is inputted out of specified value.	1driving cycle *1	1driving cycle *2
P177 4	Control Module Communication Bus OFF	Transmitting error detected to TCM for specified time continuously.	1driving cycle	1driving cycle
P177 7	TCM Lost Communication with ECM (Reception Error)	Receiving error from ECM detected to TCM for specified time continuously.	1driving cycle	1driving cycle
P177 8	TCM Lost Communication with BCM (Reception Error)	Receiving error from BCM detected to TCM for specified time continuously.	1driving cycle *1	1driving cycle *2
P187 4	4L switch circuit malfunction (Short)	Actual transfer position is 4H although transfer low signal is inputted. (if equipped with 4L/N switch)	1driving cycle	1driving cycle *2
P187 5	4L switch circuit malfunction (Open)	Actual transfer position is 4L or N although transfer low signal is not inputted. (if equipped with 4L/N switch)	1driving cycle	1driving cycle *2
P187 8	Torque Converter Clutch Shudder	Variation in the output revolution speed of the specified amplitude and specified cycle is detected under slip lock-up condition.	20driving cycle *1	—
P276 3	Torque Converter Clutch Circuit High	Too much electric flow is detected on TCC pressure control solenoid circuit.	1driving cycle	1driving cycle
P276 4	Torque Converter Clutch Circuit Low	No electric flow is detected on TCC pressure control solenoid circuit.	1driving cycle	1driving cycle

NOTE

*1: MIL does not light although DTC is detected and stored.

*2: Transmission warning light does not light although DTC is detected and stored.

Fail Safe Table

S5JB0E5104008

This function is provided by the safe mechanism that assures safe driveability even when the solenoid valve, sensor or its circuit fails. The following table shows the fail safe function for each fail condition of sensor, solenoid, TCM or its circuit.

DTC No.	Trouble Area	Fail Safe Operation
P07 05	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	• TCM control is performed in priority order below. 3> D> 2> L> R> N> P • Slip controlled lock-up function is inhibited to operate. • Reverse control is inhibited. • Cruise control function is inhibited to operate. (if equipped with cruise control system) • Power mode is inhibited.

5A-15 Automatic Transmission/Transaxle:

DTC No.	Trouble Area	Fail Safe Operation
P0707	Transmission Range Sensor Circuit Low	- Range is assumed to be "D" range. - Slip controlled lock-up function is inhibited to operate. - Reverse control is inhibited. - Cruise control function is inhibited to operate. (if equipped with cruise control system) - Power mode is inhibited.
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low	- A/T fluid temperature is assumed to be 80 °C (176 °F). - Lock-up function is inhibited to operate. - Line pressure control at gear shifting is inhibited.
P0713	Transmission Fluid Temperature Sensor "A" Circuit High	
P0717	Input / Turbine Speed Sensor Circuit No Signal	- Torque reducing request to ECM (torque reduction control) is inhibited. - Lock-up function is inhibited to operate. - Line pressure control at gear shifting is inhibited.
P0722	Output Speed Sensor Circuit No Signal	- Vehicle speed which is calculated by input shaft speed sensor signal is used for gear shifting control instead of vehicle speed calculated by output shaft speed sensor (VSS) signal. - Upshifting to 4th gear is inhibited. - Lock-up function is inhibited to operate. - Torque reducing request to ECM (torque reduction control) is inhibited. - Line pressure control at gear shifting is inhibited.
P0742	Torque Converter Clutch Circuit Stuck On	When vehicle speed is less than 10 km/h (6 mile/h), gear position is fixed in 1st gear for prevention of engine stall.
P0752	Shift Solenoid "A" Stuck On	Upshifting to 4th gear is inhibited.
P0962	Pressure Control Solenoid "A" Control Circuit Low	- Power supply for all solenoid valves is cut. - Gear position is fixed according to select lever position as shown in the following. R: Reverse D: 4th 3: 4th 2: 3rd L: 1st - Lock-up function is inhibited to operate. - Line pressure control at gear shifting is inhibited.
P0963	Pressure Control Solenoid "A" Control Circuit High	
P0973	Shift Solenoid "A" Control Circuit Low	
P0974	Shift Solenoid "A" Control Circuit High	
P0976	Shift Solenoid "B" Control Circuit Low	
P0977	Shift Solenoid "B" Control Circuit High	
P1702	Internal Control Module Memory Check Sum Error	- Power supply for all solenoid valves is cut. - Gear position is fixed according to select lever position as shown in the following. R: Reverse D: 4th 3: 4th 2: 3rd L: 1st - Lock-up function is inhibited to operate. - Line pressure control at gear shifting is inhibited.

DTC No.	Trouble Area	Fail Safe Operation
P1703	CAN Invalid Data- TCM	In case of throttle position signal malfunction: - Throttle opening used for line pressure control is assumed to be 100%. - Throttle opening used for gear shifting control is assumed to be 0%. - Lock-up function is inhibited to operate. - Line pressure control at gear shifting is inhibited. In case of engine coolant temperature signal malfunction: - Engine coolant temperature is assumed to be 80 °C (176 °F). - Slip controlled lock-up function is inhibited to operate. In case of engine revolution signal malfunction: - Engine revolution is assumed to be maximum revolution. - Lock-up function is inhibited to operate. In case of engine torque signal malfunction: - Slip controlled lock-up function is inhibited to operate. - Engine torque is assumed to be maximum torque. In case of vehicle speed signal: - Cruise control function is inhibited to operate. (if equipped with cruise control system)
P1774	CAN communication problem-TCM	Throttle opening used for line pressure control is assumed to be 100%.
P1777	TCM Lost Communication with ECM (Reception Error)	- Throttle opening used for gear shifting control is assumed to be 0%. - Engine revolution is assumed to be maximum revolution. - Engine torque is assumed to be maximum torque. - Engine coolant temperature is assumed to be 80 °C (176 °F). - Lock-up function is inhibited to operate. - Line pressure control at gear shifting is inhibited. - Torque reducing request to ECM (torque reduction control) is inhibited. - Line pressure is outputted maximum value. - Power mode is inhibited. (P1774 only)
P1778	TCM Lost Communication with BCM (Reception Error)	Power mode is inhibited.
P1874	4L switch circuit malfunction (Short)	Slip controlled lock-up function is inhibited to operate. (if equipped with 4L/N switch)
P1875	4L switch circuit malfunction (Open)	
P1878	Torque Converter Clutch Shudder	Slip controlled lock-up function is inhibited to operate.
P2763	Torque Converter Clutch Circuit High	Power supply for TCC pressure control solenoid is cut.
P2764	Torque Converter Clutch Circuit Low	- Lock-up function is inhibited to operate. - When vehicle speed is less than 10 km/h (6 mile/h), gear position is fixed in 1st gear for prevention of engine stall.

Scan Tool Data

As the data values given in the following table are standard values estimated on the basis of values obtained from the normally operating vehicles by using a scan tool, use them as reference value. Even when the vehicle is in good condition, there may be cases where the checked value does not fall within each specified data range. Therefore, judgment as abnormal should not be made by checking with these data alone.

Also, condition in the following table that can be checked by the scan tool are those detected by TCM and output from TCM as commands and there may be cases where the automatic transmission or actuator is not operating (in the condition) as indicated by the scan tool.

Scan Tool Data	Vehicle Condition		Normal Condition / Reference Values
Gear Position	Ignition switch ON POWER mode OFF	Select lever is in "P" position	P/N
		Select lever is in "R" position	R
		Select lever is in "N" position	P/N
		Select lever is in "D" position	1st
		Select lever is in "3" position	1st
		Select lever is in "2" position	1st
		Select lever is in "L" position	1st
Throttle Position	Ignition switch ON	Accelerator pedal is depressed	0 – 100% (varies depending on depressed value)
		Accelerator pedal is released	0 – 5%
Input Shaft Rev	At engine idle speed and selector lever is in "P" position		(Engine idle speed is displayed in increments of 50 rpm)
	At 40 km/h (25 mile/h) constant speed, 20% or less throttle opening and 3rd gear ("3" range)		2300 RPM (displayed in increments of 50 rpm)
	At 60 km/h (37.5 mile/h) constant speed, 20% or less throttle opening and 4th gear ("D" range)		0 RPM
Output Shaft Rev	At vehicle stop		0 RPM
	At 40 km/h (25 mile/h) constant speed, 20% or less throttle opening and 3rd gear ("3" range)		2300 RPM (displayed in increments of 50 rpm)
Vehicle Speed 1	At vehicle stop		0 km/h, 0 MPH
Battery Voltage	Ignition switch ON and engine stop		Battery voltage is displayed (8 – 16 V)
ATF Temp	After driving at 60 km/h (37.5 mile/h) for 15 minutes or more, and A/T fluid temperature around sensor reaches 70 – 80 °C (158 – 176 °F)		70 – 80 °C (158 – 176 °F)
TCC Sol Duty	At vehicle stop, closed throttle and 1st gear		0%
	At 80 km/h (50 mile/h) constant speed, 30% or less throttle opening and 3th gear. ("3" range)		100%
Press Cont Sol	At vehicle stop, closed throttle, engine idle speed and 1st gear		9.5%
Slip RPM	Engine running at idle speed and selector lever is in "P" range		0 ±25 RPM
	Engine running, vehicle stop and selector lever is in "D" range		Engine speed is displayed
Vehicle Speed 2	At vehicle stop		0 km/h, 0 MPH
Engine Speed	At engine idle speed		Engine idle speed is displayed
Coolant Temp	Ignition switch ON		Engine coolant temperature is displayed
Target Engine Torque	Ignition switch ON		0 N·m
Engine Torque	Ignition switch ON		0 N·m
MIL request (for E-OBD)	Ignition switch ON		OFF
Malfunction Indication On (for Non E-OBD)	Ignition switch ON		OFF
Fuel Cut Flag	Ignition switch ON		OFF
O/D Off Switch	Ignition switch ON	Shift selector lever to "3" range	ON
		Shift selector lever to other above range	OFF

Scan Tool Data	Vehicle Condition		Normal Condition / Reference Values
Trans Range	Ignition switch ON	Select lever is in "P" position	P
		Select lever is in "R" position	R
		Select lever is in "N" position	N
		Select lever is in "D" position	D
		Select lever is in "3" position	D
		Select lever is in "2" position	2
		Select lever is in "L" position	L
Shift Sol A Con	At vehicle stop, closed throttle and 1st gear		ON
	At 60 km/h (37.5 mile/h) constant speed, 20% or less throttle opening and 3rd gear		OFF
Shift Sol A Mon	At vehicle stop, closed throttle and 1st gear		ON
	At 60 km/h (37.5 mile/h) constant speed, 20% or less throttle opening and 3rd gear		OFF
Shift Sol B Con	At vehicle stop, closed throttle and 1st gear		OFF
	At 20 km/h (12.5 mile/h) constant speed, 20% or less throttle opening and 2nd gear		ON
Shift Sol B Mon	At vehicle stop, closed throttle and 1st gear		OFF
	At 20 km/h (12.5 mile/h) constant speed, 20% or less throttle opening and 2nd gear		ON
Mode Select Switch	Ignition switch ON, P/N mode switch is at Normal position		NORMAL
	Ignition switch ON, P/N mode switch is at Power position		POWER
4WD Low Switch	Ignition switch ON, 4L/N switch is "4H" position (if equipped)		OFF
	Ignition switch ON, 4L/N switch is "4L" or "N" position (if equipped)		ON
D Range Signal	Ignition switch ON	Select lever is in "P" position	P/N range
		Select lever is in "R" position	D range
		Select lever is in "N" position	P/N range
		Select lever is in "D" position	D range
		Select lever is in "3" position	D range
		Select lever is in "2" position	D range
		Select lever is in "L" position	D range
A/C Switch	Ignition switch ON and air conditioner switch OFF		Cancel
Brake Switch	Ignition switch ON	Brake pedal is depressed	ON
		Brake pedal is released	OFF
Accel Actual Pos	Ignition switch ON	Accelerator pedal is depressed	0 – 100% (varies depending on depressed value)
		Accelerator pedal is released	0%

Scan Tool Data Definitions

Gear Position (1ST, 2ND, 3RD, 4TH, N, R): This parameter is indicated actual gear position.

Throttle Position (%): Throttle valve opening ratio sent from ECM on CAN communication line.

Input Shaft Rev (RMP): Input shaft revolution computed by reference pulses coming from input shaft speed sensor on transmission case.

Output Shaft Rev (RMP): Output shaft revolution computed by reference pulses coming from output shaft speed sensor on transmission case.

Vehicle Speed 1 (Km/h): This parameter is computed by output shaft speed sensor and 4L/N switch (if equipped) on TCM. Gear shift schedule relate this parameter.

Battery Voltage (V): Battery voltage read by TCM as analog input signal by TCM.

ATF Temp (°C): ATF temperature detected by signal from transmission fluid temperature sensor installed in valve body.

TCC Sol Duty (%): Electric current value ration between electric current value being outputted from TCM to TCC pressure control solenoid and maximum value can be outputted by TCM.

Press Cont Sol (%): Electric current value ratio between electric current value being outputted from TCM to pressure control solenoid-A and maximum value can be outputted by TCM.

Slip RPM (RMP): This parameter indicates slipping rotation in the torque converter (difference between input shaft rotation and engine rotation).

Vehicle Speed 2 (Km/h): Actual vehicle speed detected by signal on CAN communication line fed from ECM.

Engine Speed (RPM): Engine speed computed by signal on CAN communication line fed from ECM.

Coolant Temp (°C): Engine coolant temperature detected by signal on CAN communication line fed from ECM.

Target Engine Torque (N·m): Target engine torque detected by signal on CAN communication line fed from ECM.

Engine Torque (N·m): Actual engine torque detected by signal on CAN communication line fed from ECM.

MIL Request (ON, OFF) (for E-OBD model): ON: Signal which TCM requires combination meter to turn ON malfunction indicator lamp.
OFF: Signal which TCM does not require combination meter to turn ON malfunction indicator lamp.

Malfunction Indication On (ON, OFF) (for non E-OBD model): ON: Signal which TCM requires combination meter to turn ON transmission warning lamp.
OFF: Signal which TCM does not require combination meter to turn ON transmission warning lamp.

Fuel Cut Flag: ON: Signal which inform that fuel cut is operating.
OFF: Signal which inform that fuel cut is not operating.

O/D Off Switch (ON, OFF): Inputted signal from "3" position switch in selector lever assembly.
ON: Shift selector lever to "3" range
OFF: Shift selector lever to other above range

Trans Range (P, R, N, D, 2, L): It indicates transmission range according to transmission range switch signal.

Shift Sol A Con/ MON (ON, OFF): COM-ON: ON command being outputted to shift solenoid-A.
COM-OFF: OFF command not being outputted to shift solenoid-A.
MON-ON: Electricity being passed to shift solenoid-A.
MON-OFF: Electricity not being passed to shift solenoid-A.

Shift Sol B Con / MON (ON, OFF): COM-ON: ON command being outputted to shift solenoid-B.
COM-OFF: OFF command not being outputted to shift solenoid-B.
MON-ON: Electricity being passed to shift solenoid-B.
MON-OFF: Electricity not being passed to shift solenoid-B.

Mode Select Switch (NORMAL, POWER): Inputted signal from P/N mode switch on center console.
NORMAL: P/N mode switch is at OFF position.
POWER: P/N mode switch is at ON position.

4WD Low Switch (if equipped) (ON, OFF): Inputted signal from 4L/N switch on transfer case.
ON: Transfer gear position is 4L or N
OFF: Transfer gear position is 4H

D RANGE SIGNAL (P/N range, D range): ON: Signal which TCM require ECM to increase idle speed
OFF: Signal which TCM does not require ECM to increase idle speed

A/C Switch (ON, OFF): ON: Signal which inform that air conditioner compressor is turned ON.
OFF: Signal which inform that air conditioner compressor is turned OFF.

Brake Switch (ON, OFF): Brake light switch position detected by signal on CAN communication line fed from ECM.
ON: Brake pedal depressed
OFF: Brake pedal released

Accel Actual Pos (%): Accelerator pedal opening ratio detected by signal on CAN communication line fed from ECM.

No Gear Shift to 4th Gear

System Description

TCM does not shift to 4th gear under any of the following condition.

- “3” position switch signal is inputted.
- 4L/N switch (if equipped) is turned ON. (4L or N mode)
- TCM detects the following DTCs.
DTC, P0722, P0752, P0962, P0963, P0973, P0974, P0976, P0977, P1702

Troubleshooting

▲ WARNING

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and tester, on a level road.

Step	Action	Yes	No
1	Was “A/T System Check” performed?	Go to Step 2.	Go to “A/T System Check: in related manual”.
2	Check DTC <i>Is DTC, P0722, P0752, P0962, P0963, P0973, P0974, P0976, P0977 or P1702 detected?</i>	Perform DTC Flow to repair and retry.	Go to Step 3.
3	ECT check 1) Warm up engine to normal operating temperature. 2) Check ECT monitored by TCM using scan tool. <i>Is ECT indicated -40 °C (-40 °F)?</i>	Go to Step 4.	Faulty ECT sensor, its circuit or engine cooling system. If OK, substitute a known-good TCM and recheck.
4	“3” position switch signal inspection 1) With ignition switch ON, check voltage between terminal “E92-20” of TCM connector and ground under the following conditions. “3” position switch specification Shift selector lever to “P”, “R”, “N” or “D” range: 2.9 – 3.8 V Shift selector lever to “3”, “2” or “L” range: 1.4 – 2.0 V <i>Is result as specified?</i>	• For vehicle equipped with 4L/N switch, go to Step 5. • For vehicle equipped without 4L/N switch, substitute a known-good TCM and recheck.	Faulty “3” position switch or its circuit. If OK, substitute a known-good TCM and recheck.
5	4L/N switch signal inspection 1) With ignition switch ON, check voltage between terminal “E93-4” of TCM connector and ground. 4L/N switch specification Transfer gear position “4H”: Battery voltage Transfer gear position “4L” or “N”: 0 – 2 V <i>Is result as specified?</i>	Substitute a known-good TCM and recheck.	Faulty 4L/N switch or its circuit. If OK, substitute a known-good TCM and recheck.

No Lock-Up Occurs

System Description

TCM turns TCC pressure control solenoid OFF under any of the following conditions.

- Engine coolant temperature is lower than 60 °C (140 °F).
- 4L/N switch (if equipped) is turned ON. (4L or N mode)
- Brake light switch is turned ON. (Brake pedal is depressed)
- TCM detects the following DTCs.
P0712, P0713, P0717, P0722, P0962, P0963, P0973, P0974, P0976, P0977, P1702, P1703, P1774, P1777, P2763 and P2764

Troubleshooting

⚠ WARNING

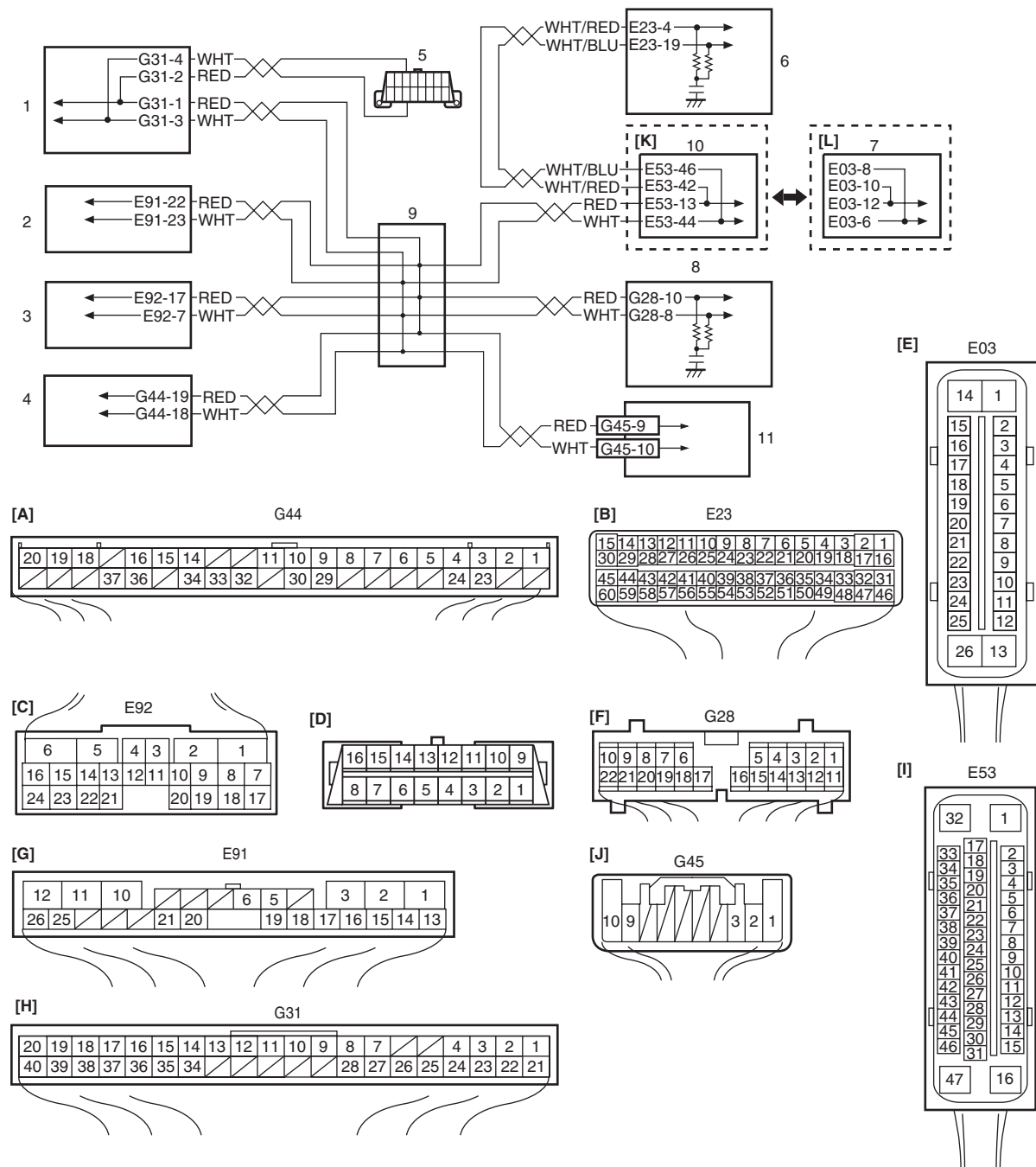
- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and tester, on a level road.

Step	Action	Yes	No
1	Was "A/T System Check" performed?	Go to Step 2.	Go to "A/T System Check: in related manual".
2	Check DTC <i>Is DTC P0712, P0713, P0717, P0722, P0962, P0963, P0973, P0974, P0976, P0977, P1702, P1703, P1774, P1777, P2763 or P2764 detected?</i>	Perform DTC Flow to repair and retry.	Go to Step 3.
3	ECT check 1) Warm up engine to normal operating temperature. 2) Check ECT using scan tool. <i>Is ECT more than 60 °C (140 °F)?</i>	• For vehicle equipped with 4L/N switch, go to Step 4. • For vehicle equipped without 4L/N switch, go to Step 5.	Faulty ECT sensor, its circuit or engine cooling system. If OK, substitute a known-good TCM and recheck.
4	4L/N switch signal inspection 1) With ignition switch ON, check voltage between terminal "E92-4" of TCM connector and ground. 4L/N switch specification Transfer gear position or "4H": Battery voltage Transfer gear position "4L" or "N": 0 – 2 V <i>Is result as specified?</i>	Go to Step 5.	Faulty "4L" switch or its circuit. If OK, substitute a known-good TCM and recheck.
5	Brake light switch signal inspection 1) With ignition switch ON, check voltage between terminal "E61-34" of ECM connector and ground. Brake light switch specification Brake pedal is released: 0 – 1 V Brake pedal is depressed: Battery voltage <i>Is result as specified?</i>	Substitute a known-good TCM and recheck.	Mis-adjusted brake light switch, faulty brake light switch or its circuit. If OK, substitute a known-good TCM and recheck.

DTC P1774: CAN Communication Bus Off

S5JB0E51040-01

Wiring Diagram



ISJB0D510005-01

[A]: Keyless start control module connector (if equipped) (viewed from harness side)	[G]: 4WD control module connector (if equipped) (viewed from harness side)	1. BCM	7. ABS hydraulic unit / control module
[B]: ECM connector (viewed from harness side)	[H]: BCM connector (viewed from harness side)	2. 4WD control module (if equipped)	8. Combination meter
[C]: TCM connector (viewed from harness side)	[I]: ESP® control module connector (if equipped) (viewed from terminal side)	3. TCM	9. Junction connector
[D]: DLC (viewed from terminal side)	[J]: Steering angle sensor connector (if equipped) (viewed from harness side)	4. Keyless start control module (if equipped)	10. ESP® control module (if equipped)
[E]: ABS hydraulic unit / control module connector (viewed from terminal side)	[K]: Vehicle equipped with ESP® system	5. DLC	11. Steering angle sensor (if equipped)
[F]: Combination meter connector (viewed from harness side)	[L]: Vehicle equipped without ESP® system	6. ECM	

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Transmission error that is inconsistent between transmission data and transmission monitor (CAN bus monitor) data is detected more than 7 times continuously. (1 driving cycle detection logic)	• ECM • TCM • Combination meter • BCM • ABS/ESP® control module • Steering angle sensor (if equipped) • 4WD control module (if equipped) • Keyless start control module (if equipped) • CAN communication line circuit

DTC Confirmation Procedure

- 1) Connect scan tool to DLC with ignition switch turned OFF.
- 2) Turn ON ignition switch and clear DTC by using scan tool.
- 3) Start engine and run it for 1 min. or more.
- 4) Check DTC and pending DTC.

DTC Troubleshooting**NOTE**

Upon completion of inspection and repair work, perform "DTC Confirmation Procedure: " and confirm that the trouble has been corrected.

Step	Action	Yes	No
1	<i>Was "A/T System Check" performed?</i>	Go to Step 2.	Go to "A/T System Check: in related manual".
2	Control module connector check 1) Check connection of connectors of all control modules communicating by means of CAN. 2) Recheck DTC in TCM referring to "DTC Check: in related manual". <i>Is there DTC P1774?</i>	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
3	CAN communication circuit check 1) Turn ignition switch to OFF position. 2) Disconnect connectors of all control modules communicating by means of CAN. 3) Check CAN communication circuit between control modules for open, short and high resistance. <i>Is each CAN communication circuit in good condition?</i>	Go to Step 4.	Repair circuit.

Step	Action	Yes	No
4	DTC check 1) Turn ignition switch to OFF position. 2) Connect connectors of disconnected control modules communicating by means of CAN. 3) Disconnect connector of any one of control module other than TCM. 4) Recheck DTC for TCM. <i>Is DTC P1774 detected?</i>	Disconnect connectors of control modules other than the one whose connector is disconnected in Step 3) one by one and check that DTC P1774 is detected by TCM each time connector is disconnected. When DTC P1774 is not detected by TCM while checking in this way, go to description under "NO" below. If DTC P1774 is detected by TCM even when connectors of all control modules that use CAN communication with TCM are disconnected, substitute a known-good TCM and recheck.	Check power and ground circuit of control module disconnected in Step 3). If circuit is OK, substitute a known-good control module disconnected in Step 3) and recheck.

DTC P1777: TCM Lost Communication with ECM (Reception Error)

S5JB0E5104042

Wiring Diagram

Refer to "DTC P1774: CAN Communication Bus Off: ".

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Reception error of communication data for ECM is detected for longer than specified time continuously. (1 driving cycle detection logic)	• ECM • ABS/ESP® control module • TCM • CAN communication line circuit

DTC Confirmation Procedure

- 1) Connect scan tool to DLC with ignition switch turned OFF.
- 2) Turn ON ignition switch and clear DTC by using scan tool.
- 3) Start engine and run it for 1 min. or more.
- 4) Check DTC and pending DTC.

DTC Troubleshooting

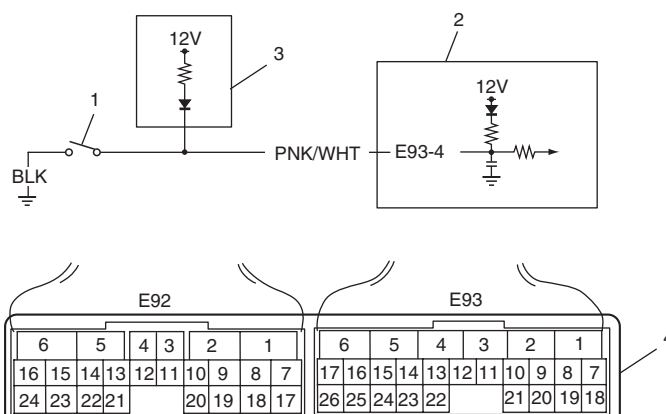
NOTE

Upon completion of inspection and repair work, perform "DTC Confirmation Procedure: " and confirm that the trouble has been corrected.

Step	Action	Yes	No
1	Was "A/T System Check" performed?	Go to Step 2.	Go to "A/T System Check: in related manual".
2	Control module connector check 1) Check connection of connectors of all control modules communicating by means of CAN. 2) Recheck DTC in TCM referring to "DTC Check: in related manual". <i>Is there DTC P1777?</i>	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
3	DTC check in ABS/ESP® control module 1) Check DTC in ABS/ESP® control module. <i>Is there DTC U1100?</i>	Go to Step 4.	Go to Step 5.
4	DTC check 1) Check DTC in ECM referring to "DTC Check: in Section 1A in related manual". <i>Is there DTC P1674?</i>	Go to "DTC P1674: CAN Communication (Bus Off Error): in Section 1A".	Check ECM power and ground circuit. If circuit is OK, CAN communication circuit between ECM and ABS/ESP® control module is open circuit.
5	CAN communication circuit check 1) Turn ignition switch to OFF position. 2) Disconnect connectors of all control modules communicating by means of CAN. 3) Check CAN communication circuit between control modules for open, short and high resistance. <i>Is each CAN communication circuit in good condition?</i>	Check TCM power and ground circuit. If circuit is OK, substitute a known-good TCM and recheck.	Repair circuit.

DTC P1874 4L Switch Circuit Malfunction (Short)

S5JB0E5104044

Wiring Diagram

I5JB0A510026-01

1. 4L/N switch	3. 4WD control module
2. TCM	4. Terminal arrangement of TCM connector (viewed from harness side)

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Actual transfer position is 4H although TCM detected 4L/N switch is turned ON with vehicle speed between 29 km/h (18 mile/h) and 88 km/h (55 mile/h). (if equipped with 4L/N switch) (1 driving cycle detection logic)	4L/N switch or its circuit. - TCM

DTC Confirmation Procedure

- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTCs in TCM and ECM memories by using scan tool.
- 3) Start engine and transfer position switch to "4H" position.
- 4) Keep engine running at idle speed for 10 seconds or more with select lever "D" range.
- 5) Start vehicle and increase vehicle speed to about 60 km/h (37 mile/h) for 2 minutes.
- 6) Stop vehicle.
- 7) Check DTC, pending DTC and freeze frame data.

DTC Troubleshooting

Step	Action	Yes	No
1	Vehicle speed signal check 1) Check DTC in ECM and ABS/ESP® control module referring to "DTC Check: in Section 1A in related manual" or "DTC Check: in Section 4E". <i>Is there DTC P P0500: Vehicle speed sensor (VSS) malfunction in ECM and/or DTC C1021, C1022, C1025, C1026, C1031, C1032, C1035 and/or C1036 in ABS/ESP® control module?</i>	Go to applicable DTC diag. flow.	Go to Step 2.
2	<i>Was "A/T System Check" performed?</i>	Go to Step 2.	Go to "A/T System Check: in related manual".
3	<i>Do you have SUZUKI scan tool?</i>	Go to Step 4.	Go to Step 5.

5A-27 Automatic Transmission/Transaxle:

Step	Action	Yes	No
4	4L switch and its circuit check 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON. 3) Select "DATA LIST" mode on scan tool. 4) Check 4L/N switch signal (ON or OFF) on display when turning transfer position switch to each position. <u>4L/N switch specifications (scan tool)</u> "4H" position: OFF "4L" position: ON <i>Is OFF / ON displayed as described above?</i>	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual". If OK, substitute a known-good TCM and recheck.	Go to Step 6.
5	4L/N switch and its circuit check 1) Turn ignition switch ON. 2) Check terminal voltage "E93-4" of TCM connector connected when turning transfer position switch to each position. <u>4L/N switch specifications</u> "4H" position: 10 – 14 V "4L" position: 0 – 1 V <i>Is voltage as specified?</i>	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual". If OK, substitute a known-good TCM and recheck.	Go to Step 6.
6	4L/N switch check 1) Check 4WD low switch for operation referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator) in Section 3C". <i>Is check result satisfactory?</i>	4L/N circuit is shorted to ground. If wire and connections are OK, substitute a known-good TCM and recheck.	Replace 4L/N switch.

DTC P1875 4L Switch Circuit Malfunction (Open)

S5JB0E5104045

Wiring Diagram

Refer to "DTC P1874 4L Switch Circuit Malfunction (Short):".

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Actual transfer position is 4L although TCM detected low switch is turned OFF with vehicle speed between 29 km/h (18 mile/h) and 88 km/h (55 mile/h). (if equipped with 4L/N switch) (1 driving cycle detection logic)	4L/N switch or its circuit. - TCM

DTC Confirmation Procedure

- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTCs in TCM and ECM memories by using scan tool.
- 3) Start engine and transfer position switch to "4L" position.
- 4) Keep engine running at idle speed for 10 seconds or more with select lever "D" range.
- 5) Start vehicle and increase vehicle speed to about 50 km/h (31 mile/h) in "4L" position for 2 minutes.
- 6) Stop vehicle.
- 7) Check DTC, pending DTC and freeze-frame data.

DTC Troubleshooting

Step	Action	Yes	No
1	Vehicle speed signal check 1) Check DTC in ECM and ABS/ESP® control module referring to “DTC Check: in Section 1A in related manual” or “DTC Check: in Section 4E”. <i>Is there DTC P P0500: Vehicle speed sensor (VSS) malfunction in ECM and/or DTC C1021, C1022, C1025, C1026, C1031, C1032, C1035 and/or C1036 in ABS/ESP® control module?</i>	Go to applicable DTC diag. flow.	Go to Step 2.
2	Was “A/T System Check” performed?	Go to Step 3.	Go to “A/T System Check: in related manual”.
3	Do you have SUZUKI scan tool?	Go to Step 4.	Go to Step 5.
4	4L switch and its circuit check 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON. 3) Select “DATA LIST” mode on scan tool. 4) Check 4L/N switch signal (ON or OFF) on display when turning transfer position switch to each position. <u>4L/N switch specifications</u> “4H” position: OFF “4L” position: ON <i>Is OFF / ON displayed as described above?</i>	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to “Intermittent and Poor Connection Inspection: in Section 00 in related manual”. If OK, substitute a known-good TCM and recheck.	Go to Step 6.
5	4L/N switch and its circuit check 1) Turn ignition switch ON. 2) Check terminal voltage “E93-4” of TCM connector connected when turning transfer position switch to each position. <u>4L/N switch specifications</u> “4H” position: 10 – 14 V “4L” position: 0 – 1 V <i>Is voltage as specified?</i>	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to “Intermittent and Poor Connection Inspection: in Section 00 in related manual”. If OK, substitute a known-good TCM and recheck.	Go to Step 6.
6	4L/N switch check 1) Check 4L/N switch for operation referring to “Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator) in Section 3C”. <i>Is check result satisfactory?</i>	4L/N switch circuit open. If wire and connections are OK, substitute a known-good TCM and recheck.	Replace 4L/N switch.

Inspection of TCM and Its Circuits

TCM and its circuits can be checked at TCM wiring connectors by measuring voltage, pulse signal and resistance.

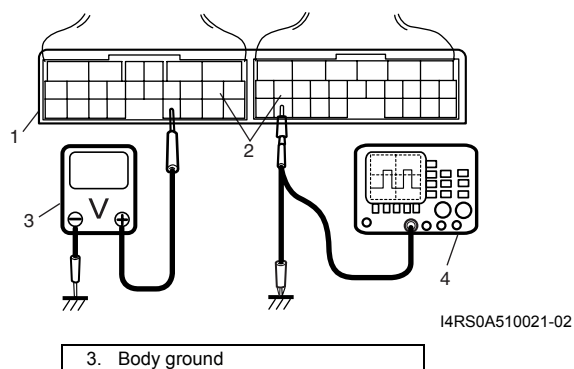
⚠ CAUTION

TCM cannot be checked by itself, it is strictly prohibited to connect voltmeter or ohmmeter to TCM with connector disconnected from it.

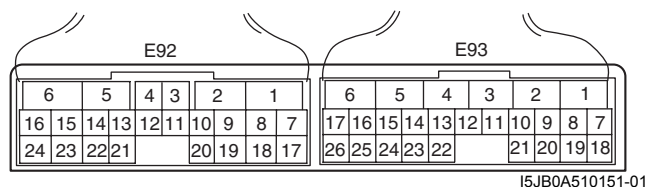
- 1) Remove TCM (1) from vehicle referring to "Transmission Control Module (TCM) Removal and Installation: in related manual".
- 2) Connect TCM connectors (2) to TCM.
- 3) Check voltage and/or pulse signal at each terminal of connectors connected using voltmeter (3) and oscilloscope (4).

NOTE

- As each terminal voltage is affected by battery voltage, confirm that it is 11 V or more when ignition switch is ON.
- Voltage with asterisk (*) cannot be measured by voltmeter because it is pulse signal. Check it with oscilloscope if necessary.



Terminal arrangement of TCM coupler (Viewed from harness side)



Connector "E92"

Terminal	Wire color	Circuit	Standard voltage	Condition
1	BLK/ORN	Ground	0 – 1 V	Ignition switch ON
2	BRN/RED	Pressure control solenoid valve (–)	0.6 – 1.0 V	Ignition switch ON
3	PPL/WHT	TCC pressure control solenoid valve (–)	0.6 – 1.0 V	Ignition switch ON
4	YEL/RED	Pressure control solenoid valve (+)	*0 – 0.6 V ↑↓ 10 – 14 V ("Reference Waveform No. 1: ")	Engine running at idling. (Output signal is duty pulse. Duty ratio varies depending on throttle valve opening.)
5	GRN/YEL	TCC pressure control solenoid valve (+)	*0 – 0.6 V ↑↓ 10 – 14 V ("Reference Waveform No. 2: ")	Engine running at idling. (Output signal is duty pulse. Duty ratio varies depending on torque converter clutch operating condition.)
6	BLK/WHT	Power source	10 – 14 V	Ignition switch ON
7	WHT	CAN communication line (Low)	*2.5 – 3.6 V ↑↓ 1.6 – 2.5 V ("Reference Waveform No. 3: ")	Engine running at idling with after warming up. (CAN communication signal is pulse. Pulse signal frequency varies depending on engine condition.))
8	—	—	—	—
9	—	—	—	—
10	YEL/BLK	3 position switch (–)	0 – 1 V	Ignition switch ON
11	YEL/BLK	Transmission fluid temperature sensor (+)	2.9 – 3.1 V 0.3 – 0.5 V	Ignition switch ON, fluid temperature is 20 °C (68 °F) Ignition switch ON, fluid temperature is 100 °C (212 °F)
12	ORN	Transmission fluid temperature sensor (–)	0 – 1 V	Ignition switch ON
13	—	—	—	—
14	—	—	—	—
15	GRN/RED	Shift solenoid valve-B (No.2)	9 – 14 V	Ignition switch ON, select lever in "P" range
16	GRN	Shift solenoid valve-A (No.1)	9 – 14 V	Ignition switch ON, select lever in "P" range
17	RED	CAN communication line (High)	*2.5 – 3.6 V ↑↓ 1.6 – 2.5 V ("Reference Waveform No. 3: ")	Engine running at idling with after warming up. (CAN communication signal is pulse. Pulse signal frequency varies depending on engine condition.)
18	—	—	—	—
19	—	—	—	—
20	YEL/RED	3 position switch (+)	2.4 – 4.3 V 0.8 – 2.4 V	Ignition switch ON, select lever in "P", "R", "N" or "D" range Ignition switch ON, select lever in "3", "2" or "L" range
21	—	—	—	—
22	—	—	—	—
23	BLK	Ground	0 – 1 V	Ignition switch ON
24	WHT	Power source for back-up	10 – 14 V	Constantly

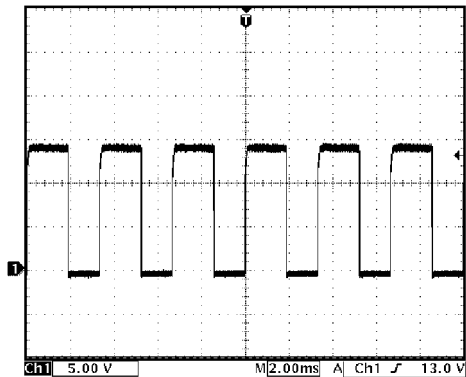
Connector "E93"

Terminal	Wire color	Circuit	Standard voltage	Condition
1	RED	Transmission range sensor ("R" range)	8 – 14 V	Ignition switch ON, selector lever at "R" range
			0 – 1 V	Ignition switch ON, selector lever at other than "R" range
2	—	—	—	—
3	—	—	—	—
4	PNK/WHT	4L/N switch (if equipped)	8 – 14 V	Ignition switch ON, transfer position in 4H
			0 – 1 V	Ignition switch OFF, transfer position in 4L and N
5	WHT	Output shaft speed sensor (+)	0 – 1 V	Ignition switch ON, engine stops
			*("Reference Waveform No. 4: ")	While engine running. (Output signal is waveform. Waveform frequency varies depending on output shaft speed. (18 pulses are generated per 1 input shaft revolution.))
6	BLU	Input shaft speed sensor (+)	0 – 1 V	Ignition switch ON, engine stops.
			*("Reference Waveform No. 5: ")	While engine running. (Output signal is waveform. Waveform frequency varies depending on output shaft speed. (24 pulses are generated per 1 input shaft revolution.))
7	GRN	Transmission range sensor ("D" range)	8 – 14 V	Ignition switch ON, selector lever at "D" range
			0 – 1 V	Ignition switch ON, selector lever at other than "D" range
8	GRN/ORN	Transmission range sensor ("N" range)	8 – 14 V	Ignition switch ON, selector lever at "N" range
			0 – 1 V	Ignition switch ON, selector lever at other than "N" range
9	—	—	—	—
10	—	—	—	—
11	—	—	—	—
12	PNK/BLK	Diagnosis switch	8 – 14 V	Ignition switch ON
13	—	—	—	—
14	ORN	Output shaft speed sensor (–)	2 – 3 V	Ignition switch ON, engine at stop
15	—	—	—	—
16	PNK	Input shaft speed sensor (–)	2 – 3 V	Ignition switch ON, engine at stop
17	—	—	—	—
18	GRN/WHT	Transmission range sensor ("L" range)	8 – 14 V	Ignition switch ON, selector lever at "L" range
			0 – 1 V	Ignition switch ON, selector lever at other than "L" range
19	GRN/ORN	Transmission range sensor ("2" range)	8 – 14 V	Ignition switch ON, selector lever at "2" range
			0 – 1 V	Ignition switch ON, selector lever at other than "2" range
20	PNK	Transmission range sensor ("P" range)	8 – 14 V	Ignition switch ON, selector lever at "P" range
			0 – 1 V	Ignition switch ON, selector lever at other than "P" range
21	—	—	—	—
22	—	—	—	—
23	PPL/WHT	Data link connector	8 – 14 V	Ignition switch ON
24	—	—	—	—
25	—	—	—	—
26	—	—	—	—

Reference Waveform No. 1

Pressure control solenoid valve signal at engine idling.

Measurement terminal	CH1: "E92-4" to "E92-1"
Oscilloscope setting	CH1: 5 V/DIV TIME: 20 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine at specified idle speed with "P" range.

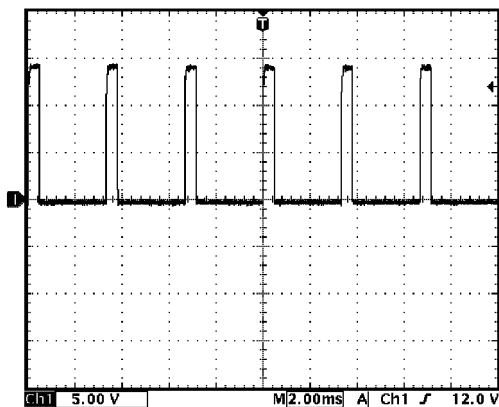


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Reference Waveform No. 2

TCC pressure control solenoid valve signal at engine idling.

Measurement terminal	CH1: "E92-5" to "E92-1"
Oscilloscope setting	CH1: 5 V/DIV Time: 2 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine at specified idle speed with "P" range

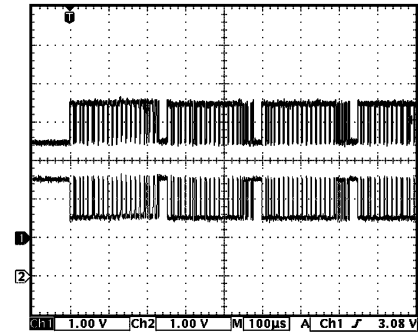


I4RS0A510024-01

Reference Waveform No. 3

CAN communication line (High & Low) signal at engine idling.

Measurement terminal	CH1: "E92-7" to "E92-1" CH2: "E92-17" to "E92-1"
Oscilloscope setting	CH1: 1 V/DIV TIME: 100 μ s/DIV
Measurement condition	- After warmed up to normal operating temperature - Engine at specified idle speed with "P" range.

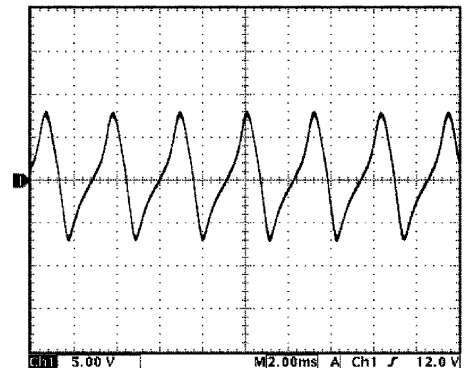


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Reference Waveform No. 4

Output shaft speed sensor signal at vehicle speed 40 km/h (25 mile/h).

Measurement terminal	CH1: "E93-5" to "E92-1"
Oscilloscope setting	CH1: 5 V/DIV TIME: 2 ms/DIV
Measurement condition	- After warmed up to normal operating temperature - Drive vehicle at 40 km/h (25 mile/h).

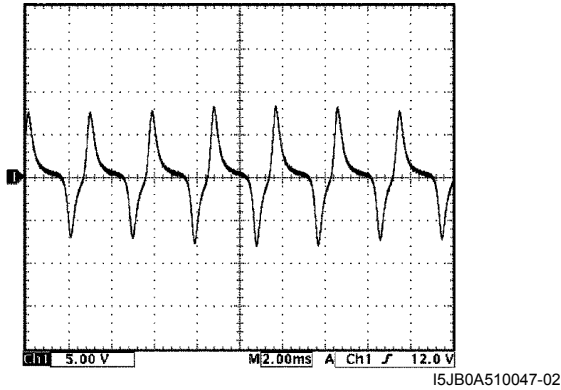


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Reference Waveform No. 5

Input shaft speed sensor signal at engine speed 3000 rpm.

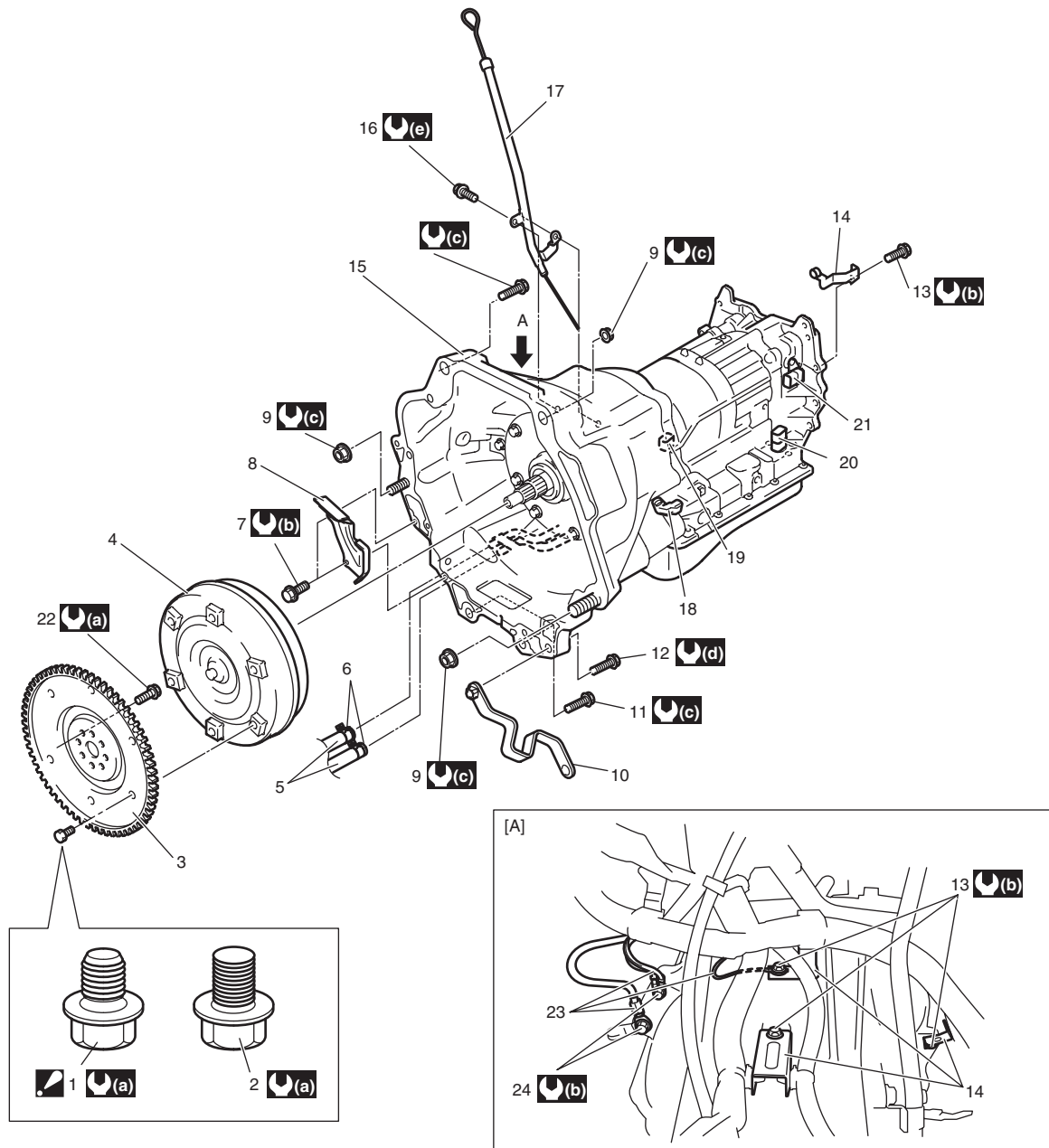
Measurement terminal	CH1: "E93-6" to "E92-1"
Oscilloscope setting	CH1: 2 V/DIV TIME: 10 ms/DIV
Measurement condition	• After warmed up to normal operating temperature • Engine at 3,000 rpm with "P" range.



Repair Instructions

Automatic Transmission Unit Components

S5JB0E5106027



I5JB0D510006-01

[A]: View A	8. Drive plate cover	16. Oil filler tube bolt	24. Engine earth cable bolt
1. Torque converter mounting bolt No.1 : After tightening torque converter mounting bolt No.1, tighten torque converter mounting bolt No.2.	9. Engine to transmission bolt	17. Oil filler tube	(a) : 65 N·m (6.5 kgf-m, 47.0 lb-ft)
2. Torque converter mounting bolt No.2	10. Exhaust pipe No.2 bracket	18. Input shaft speed sensor	(b) : 10 N·m (1.0 kgf-m, 7.5 lb-ft)
3. Drive plate	11. Transmission to engine bolt	19. Output shaft speed sensor	(c) : 80 N·m (8.0 kgf-m, 58.0 lb-ft)
4. Torque converter	12. Exhaust pipe No.2 bracket bolt	20. Transmission wire connector	(d) : 50 N·m (5.0 kgf-m, 36.5 lb-ft)
5. Oil cooler hose	13. Harness bracket bolt	21. Output shaft speed sensor	(e) : 23 N·m (2.3 kgf-m, 17.0 lb-ft)
6. Clamp	14. Harness bracket	22. Drive plate bolt	
7. Drive plate cover bolt	15. Transmission	23. Engine earth cable	

Automatic Transmission Unit Assembly

S5JB0E5106052

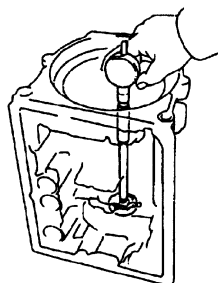
⚠ CAUTION

When replacing pressure control solenoid valve and/or TCC pressure control solenoid valve, it is strictly required to replace it together with valve body assembly as a set. Replacing pressure control solenoid valve and/or TCC pressure control solenoid valve independently may cause excessive shift shock.

- 1) Measure inside diameter of transmission case bushing. If inside diameter exceeds limit, replace transmission case.

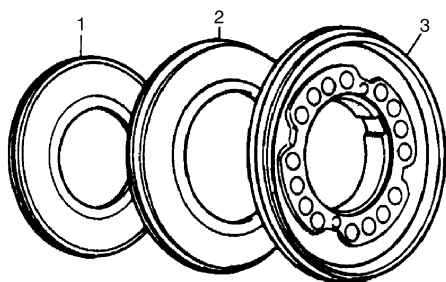
Transmission case bushing inside diameter standard

38.113 – 38.138 mm (1.5005 – 1.5015 in.)



I5JB0A510129-01

- 2) After applying A/T fluid to new O-rings, install them to reverse brake piston (3), reaction sleeve (2) and secondary reverse piston (1).



IYSQ01510236-01

- 3) Measure free length of reverse brake piston return spring.

Standard free length of reverse brake piston return spring

16.84 mm (0.663 in.)

- 4) Install reverse brake piston assembly and brake piston return spring to transmission case, using care not to damage O-ring. Then install snap ring (1) with special tools.

NOTE

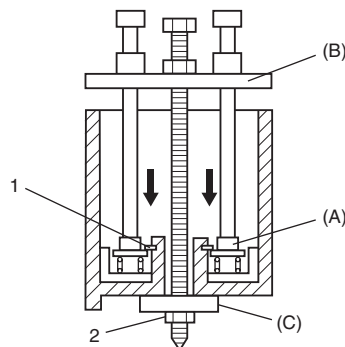
- Install so that opening in snap ring (1) will not align with any of 3 lugs of spring seat.
- Do not compress spring more than necessary and do not allow it fall or tilt.

Special tool

(A): 09926-98320

(B): 09926-98390

(C): 09944-88210



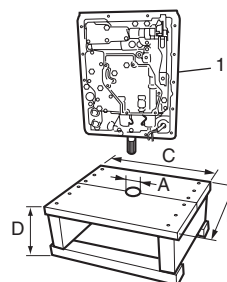
I5JB0A510128-01

2. Nut M12 x 1.75

- 5) Prepare a stand as shown. It is necessary because work will be done with transmission case (1) set upright from this step on.

NOTE

- To protect transmission case against damage, spread cloth on stand where case contacts.
- A stand of such size as shown in the figure will facilitate work.



I5JB0A510079-01

A: 50 mm (1.9 in.)

C: 400 mm (15.7 in.)

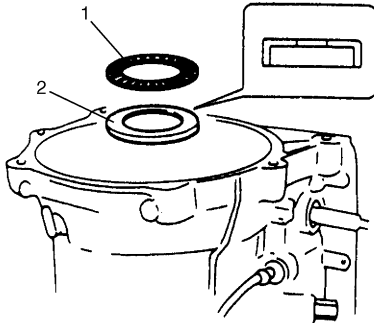
B: 350 mm (13.8 in.)

D: 200 mm (7.9 in.)

- 6) Install thrust bearing (1) and thrust bearing race (2) after lubricating them with grease.

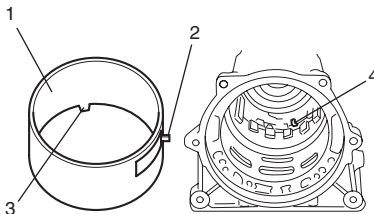
NOTE

Make sure that thrust bearing output shaft race is installed in proper direction.



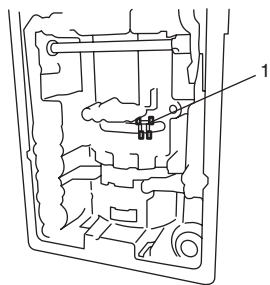
I5JB0A510160-01

- 7) Install brake applying tube (1) so that its lug (2) fits in a in transmission case (4). After installation, check that 4 lugs (3) along the underside of brake applying tube fit inside of reverse brake piston.



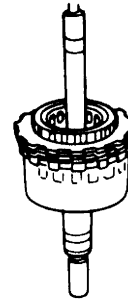
I5JB0A510130-02

- 8) Install leaf spring (1) as shown in figure.



I5JB0A510131-02

- 9) Remove reverse brake reaction plate of planetary gear assembly and align lugs of reverse brake plate, reverse brake disc and reverse brake backing plate. Install planetary gear assembly to transmission case so that aligned lugs fit in groove in transmission case.



IYSQ01510241-01

- 10) Measure clearance between reverse brake plate and lugs of transmission case.

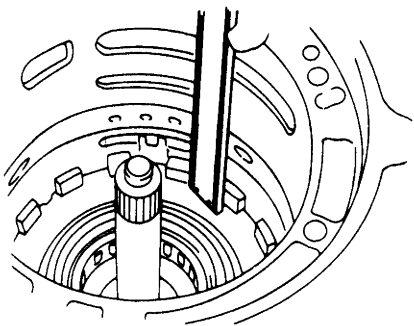
If measured value is less than standard range, it is possible that something is installed improperly or dust or fluid is on reverse brake disc, etc. If it exceeds standard range, adjust it to standard clearance with selective reverse brake backing plates as shown after making sure reverse brake disc, reverse brake plate and reverse brake backing plate are in good condition. If the clearance is out of specification, select another plate with suitable thickness from the list below and replace it.

Standard clearance between reverse brake plate and lugs of transmission case

0.52 – 1.27 mm (0.020 – 0.050 in.)

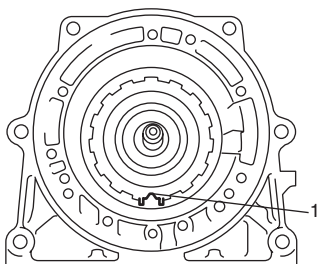
Available plate thickness

Identification No.	Thickness
No identification	2.95 – 3.05 mm (0.116 – 0.120 in.)
“325”	3.20 – 3.30 mm (0.126 – 0.120 in.)
“350”	3.45 – 3.55 mm (0.136 – 0.140 in.)
“375”	3.70 – 3.80 mm (0.146 – 0.150 in.)
“400”	3.95 – 4.05 mm (0.156 – 0.159 in.)
“425”	4.20 – 4.30 mm (0.165 – 0.169 in.)



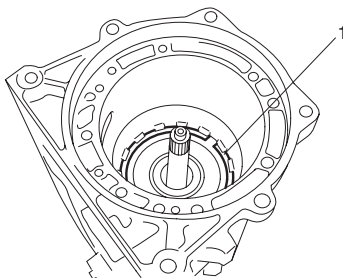
IYSQ01510242-01

- 11) Install reverse brake reaction plate so that its lug with dent (1) comes to specified position as shown in figure.



I5JB0A510132-01

- 12) Using screwdriver with vinyl tape or the like wound at its tip, install retaining reaction plate ring (1). After installation, check that ring is in groove securely.

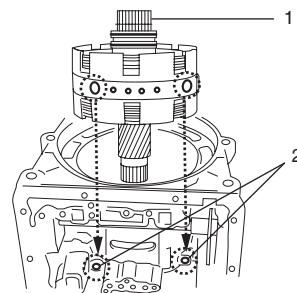


I5JB0A510084-01

- 13) After confirming that lugs of all brake plates and brake discs are in grooves securely, hold retaining ring (1) of planetary sun gear, install center support assembly by aligning bolt holes (2) in center support and transmission case.

NOTE

Unless retaining ring of planetary sun gear is held, brake valve gets off center support and that will make it impossible to align fluid holes with bolt holes.

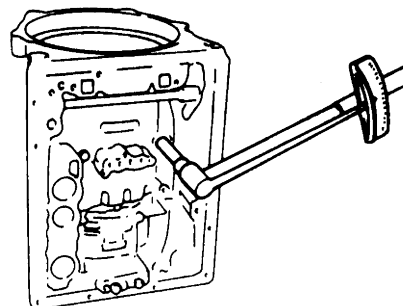


I5JB0A510133-01

- 14) Tighten center support bolts by certain amount at a time till specified tightening torque is obtained.

Tightening torque

Center support bolt: 26 N·m (2.6 kgf-m, 19.0 lb-ft)

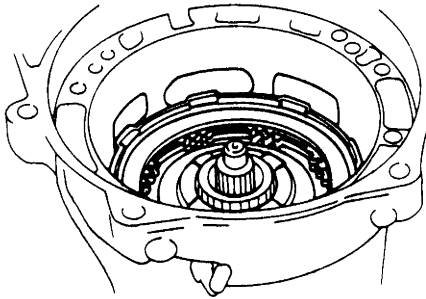


IYSQ01510246-01

- 15) Install direct clutch assembly by aligning splines in direct clutch cylinder with planetary sun gear.

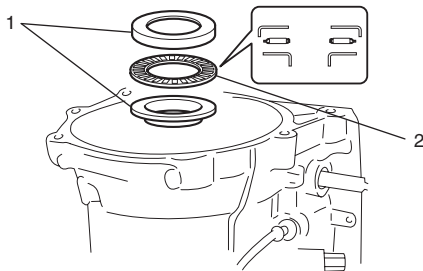
NOTE

Ends of splines in direct clutch cylinder and planetary sun gear should come almost in match.



IYSQ01510247-01

- 16) Apply grease to thrust bearing (1) and bearing races (2), and then install them to direct clutch.

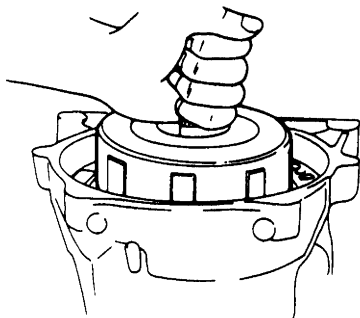


I5JB0A510134-01

- 17) Install forward clutch assembly by putting all lugs of direct clutch disc hub together and matching them with groove cut in direct clutch input hub, and at the same time aligning splines in forward clutch hub with inner shaft.

NOTE

Use care not to let forward clutch rear No.1 race and thrust bearing installed to forward clutch hub fall off.



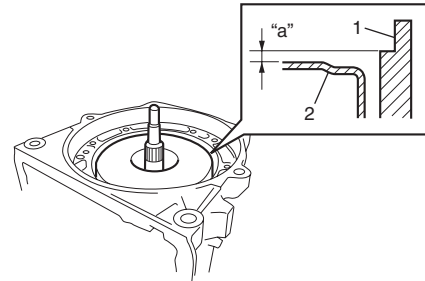
IYSQ01510249-01

- 18) When clutch disc and plate have been replaced, check height difference between forward clutch input shaft and transmission case (1) by measuring as shown in the figure.

NOTE

If measured value is less than standard value, remove forward clutch assembly and install it again.

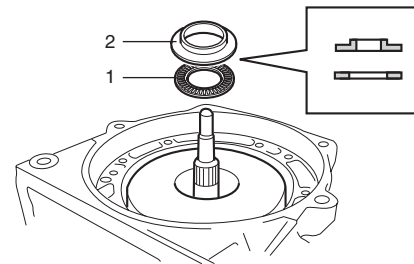
Standard height difference between forward clutch input shaft and transmission case
"a": About 2.0 mm (0.079 in.)



I5JB0A510135-01

2. Forward clutch

- 19) Apply grease to thrust bearing (1) and bearing race (2), and then install them to forward clutch input shaft.

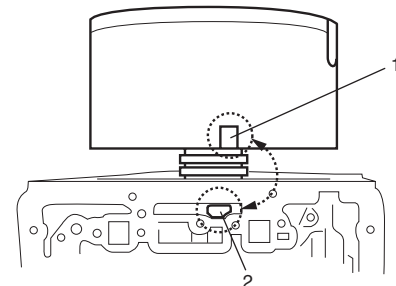


I5JB0A510136-01

- 20) Install O/D case by aligning cutout in O/D case (1) and that in transmission case.

NOTE

Use care not to drop thrust rear race installed to O/D case.



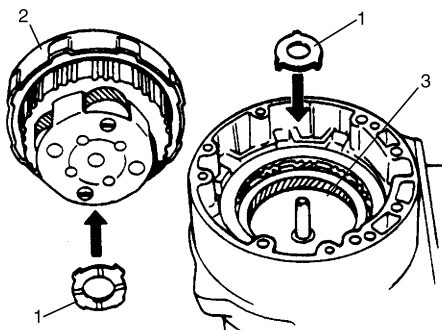
I5JB0A510137-02

2. Cutout in automatic transmission

- 21) Apply grease to thrust washers (1) and install them to O/D planetary gear (2) and planetary ring gear (3), and then install O/D input shaft assembly to O/D case.

NOTE

- Fit claws of thrust washer into holes securely.
- Use care not to drop thrust washer installed to O/D planetary gear.



I5JB0A510138-01

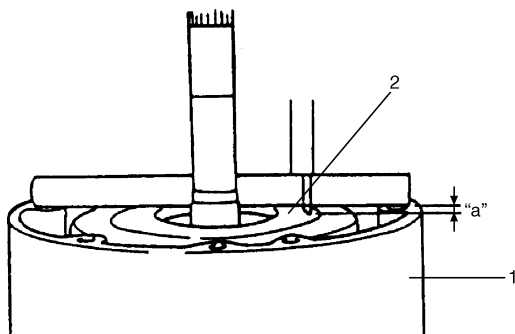
- 22) When clutch disc or plate has been replaced, check height difference between O/D case (1) and O/D clutch cylinder (2) by measuring it as shown in the figure.

NOTE

Measure at the highest point along inner circumference of O/D clutch cylinder.

Standard height difference between O/D case and O/D clutch cylinder

"a": About 3.5 mm (0.138 in.)



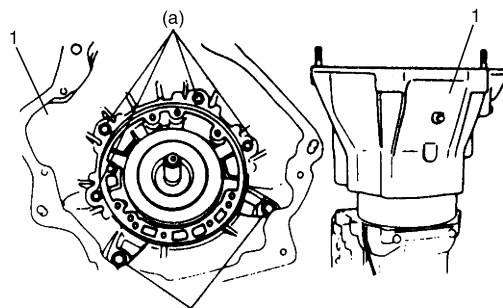
I5JB0A510161-01

- 23) Apply A/T fluid to new housing O-ring and install it to O/D case. Then install converter housing (1) and tighten housing bolt to specified torque.

Tightening torque

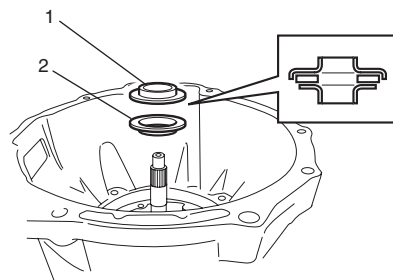
Torque converter housing bolt (a): 35 N·m (3.5 kgf-m, 25.5 lb-ft)

Torque converter housing bolt (b): 58 N·m (5.8 kgf-m, 42.0 lb-ft)



I5JB0A510162-01

- 24) Apply grease to bearing race (1) and thrust bearing (2) and install them to O/D clutch cylinder.

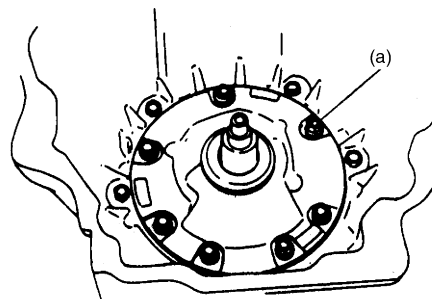


I5JB0A510139-01

- 25) Apply A/T fluid to new oil pump cover O-ring and install it to oil pump assembly. Then install oil pump assembly aligning bolt holes in O/D case with those in transmission case oil pump assembly. Apply seal packing to oil pump assembly bolts and tighten them by certain amount of torque at each time one after another till specified torque is attained.

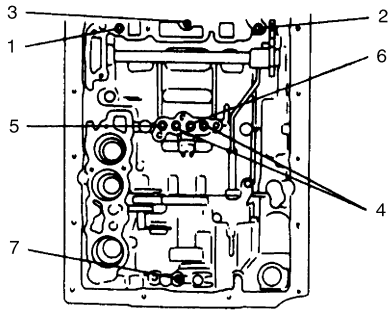
Tightening torque

Oil pump bolt (a): 22 N·m (2.2 kgf-m, 16.0 lb-ft)



IYSQ01510257-01

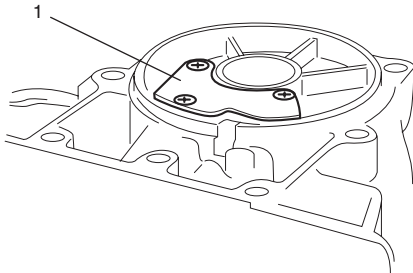
- 26) Apply 2 – 4 kg/cm² air pressure into fluid holes in the figure as numbered and check operation sound of each part.



IYSQ01510258-01

1. O/D clutch	5. Second coast brake
2. O/D brake	6. Second brake
3. Forward clutch	7. Reverse brake
4. Direct clutch	

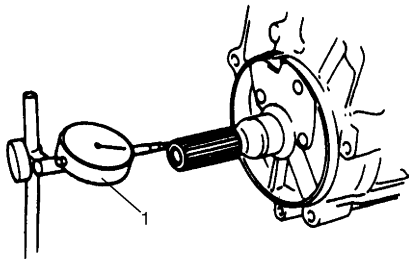
- 27) Take down transmission from stand and install new gasket and cover plate (1).



I5JB0A510089-01

- 28) Measure clearance in shaft direction by applying dial gauge (1) to output shaft as shown in the figure.

Standard clearance in shaft direction
0.3 – 0.9 mm (0.012 – 0.035 in.)



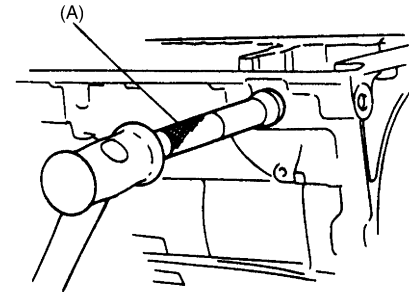
IYSQ01510259-01

- 29) Check that inner shaft runs smoothly.

- 30) Apply grease to lip of new oil lip seal and drive in oil lip seal with special tool till it contacts transmission case.

Special tool

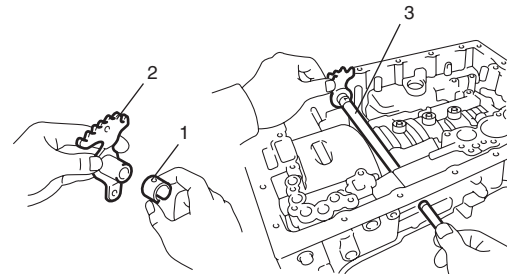
(A): 09923-46020



IYSQ01510261-01

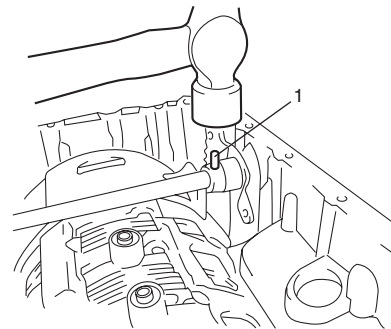
- 31) Install a new spacer (1) to manual shift lever (2).

- 32) Install manual shift shaft (3) to transmission case through manual shift lever.



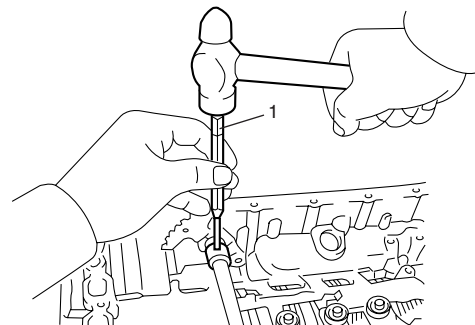
I4JA01512266-01

- 33) Drive in manual shift lever pin (1) by using hammer.



I4JA01512267-01

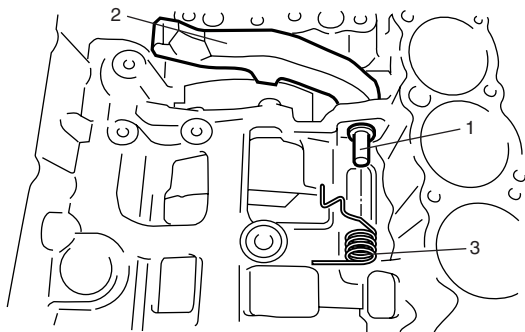
- 34) Align hole in sleeve cover with dent in manual shift lever and caulk securely with pin punch (1). Then check that manual shift shaft turns smoothly.



I4JA01512268-01

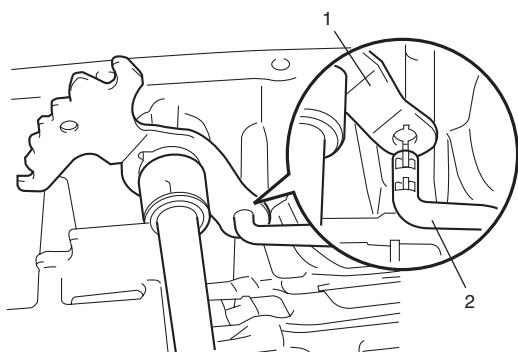
5A-41 Automatic Transmission/Transaxle:

- 35) Install parking lock pawl (2), parking pawl pin (1) and parking pawl spring (3).



I4JA01512269-01

- 36) Connect parking lock rod (2) to manual shift lever (1) as shown in the figure.

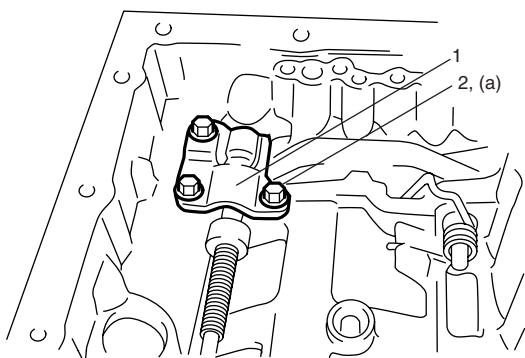


I4JA01512270-01

- 37) Install parking lock pawl bracket (1).
Tighten parking pawl bracket bolts (2) to specified torque.

Tightening torque

Parking pawl bracket bolt (a): 7.4 N·m (0.74 kgf-m, 5.5 lb-ft)

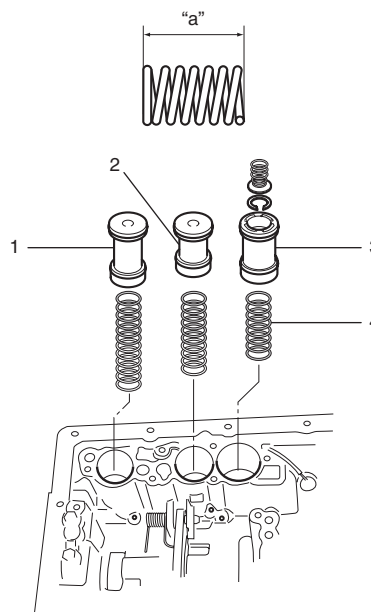


I4JA01512271-01

- 38) Apply A/T fluid to new O-ring and spring and install them to accumulator piston and install accumulator piston to transmission case.

Accumulator spring specification

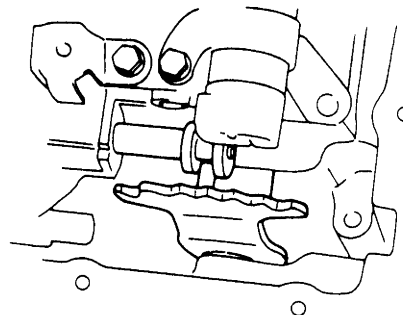
Accumulator piston	Accumulator spring	
	Spring free length "a"	Color
Forward clutch	75.03	White + Blue
Direct clutch	57.74	White + Purple
Second brake	56.16	Purple



I5JB0A510140-02

- | |
|--------------------------------------|
| 1. Forward clutch accumulator piston |
| 2. Direct clutch accumulator piston |
| 3. Second brake accumulator piston |
| 4. Accumulator spring |

- 39) After confirming that accumulator piston is pushed all the way down, match pin of manual shift lever with groove in manual valve.



IYSQ01510269-01

- 40) Fix valve body (1) by using bolts with each nominal length as indicated in the figure and tightening to specified torque.

Tightening torque

Valve body bolt: 10 N·m (1.0 kgf-m, 7.5 lb-ft)

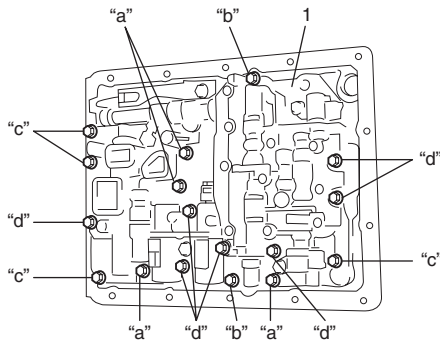
Valve body bolt nominal length

"a": 28 mm (1.10 in.)

"b": 30 mm (1.18 in.)

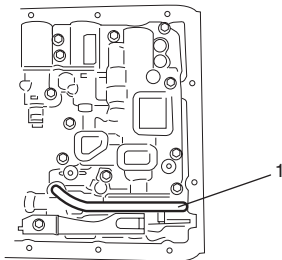
"c": 36 mm (1.42 in.)

"d": 45 mm (1.77 in.)



I5JB0A510141-01

- 41) Install O/D brake applying tube (1).

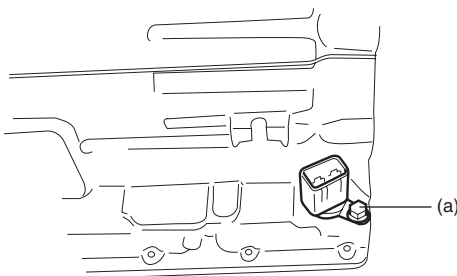


I5JB0A510143-02

- 42) Lubricate new O-ring with A/T fluid and attach it to grommet of solenoid wire harness. Then connect solenoid wire harness to transmission case and fix it with solenoid wire harness clamp. Connect each connector to solenoid. And install new gasket and brake applying cover.

Tightening torque

Transmission wire connector bolt (a): 16 N·m (1.6 kgf-m, 11.5 lb-ft)



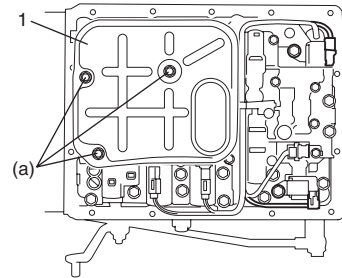
I5JB0A510142-01

- 43) Connect solenoid coupler to each solenoid.

- 44) Install oil strainer (1) to valve body assembly.

Tightening torque

Oil strainer bolt (a): 5.5 N·m (0.55 kgf-m, 4.0 lb-ft)



I5JB0A510144-01

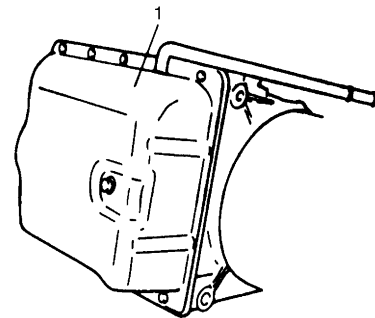
- 45) Install transmission oil pan (1) with new oil pan gasket.

NOTE

Align cutout in oil pan gasket with that in transmission case.

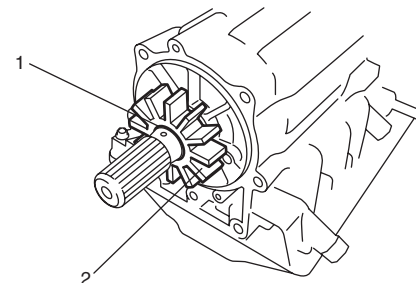
Tightening torque

Transmission oil pan bolt: 4.5 N·m (0.45 kgf-m, 3.5 lb-ft)



IYSQ01510094-01

- 46) With wood rough key attached to output shaft, install sensor rotor (2) by aligning its key groove with wood rough key and install C-ring.



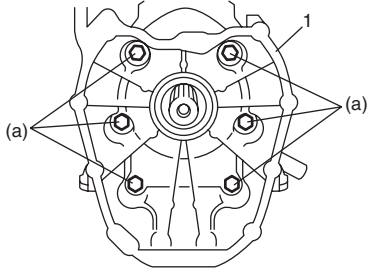
I5JB0A510072-01

1. C-ring

- 47) Install adapter case (1) with new adapter gasket to transmission case and tighten adapter case bolts to specified torque.

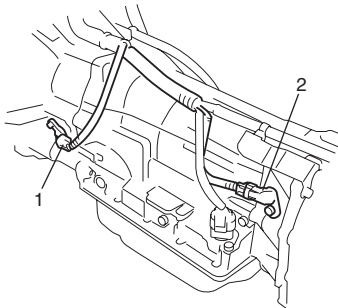
Tightening torque

Adapter case bolt (a): 31 N·m (3.1 kgf-m, 30.0 lb-ft)



I5JB0A510145-01

- 48) Apply A/T fluid to new O-rings and install them to input shaft speed sensor (1) and output shaft speed sensor (2), and then install input shaft speed sensor (1) and output shaft speed sensor (2).



I5JB0A510163-01

- 49) After turning manual shift shaft fully rearward, turn it back by 2 notches and set it to "N" range. Then install shift switch, lock washer and nut and tighten nut. After tightening it, bend claws of lock washer.

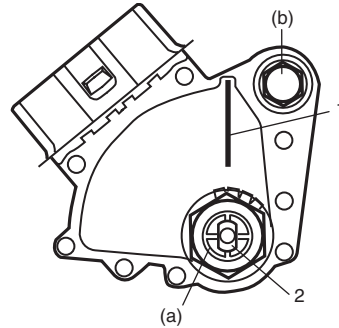
Tightening torque

Manual shift shaft nut (a): 12.5 N·m (1.25 kgf-m, 9.0 lb-ft)

- 50) With neutral reference line (1) and cut groove (2) in switch aligned, tighten lock bolt.

Tightening torque

Transmission range sensor bolt (b): 5.3 N·m (0.53 kgf-m, 4.0 lb-ft)

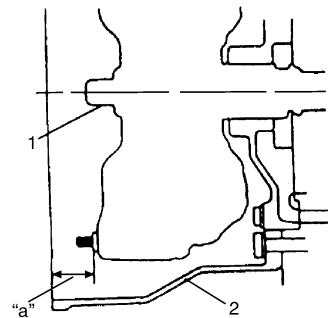


I5JB0A510147-01

- 51) Confirm that torque converter is fully fitted in transmission. Confirmation can be done by measuring dimension between end surface of housing case (2) and drive plate installation seat.

Standard dimension between end surface of case housing and drive plate installation seat "a" 17.4 mm (0.69 in.)

- 52) Check that torque converter turns smoothly and apply grease to center piece (1) of torque converter.



IYSQ01510279-01

Specifications

Tightening Torque Specifications

S5JB0E5107001

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
Center support bolt	26	2.6	19.0	⌚
Torque converter housing bolt	35	3.5	25.5	⌚
Torque converter housing bolt	58	5.8	42.0	⌚
Oil pump bolt	22	2.2	16.0	⌚
Parking pawl bracket bolt	7.4	0.74	5.5	⌚
Valve body bolt	10	1.0	7.5	⌚
Transmission wire connector bolt	16	1.6	11.5	⌚
Oil strainer bolt	5.5	0.55	4.0	⌚
Transmission oil pan bolt	4.5	0.45	3.5	⌚
Adapter case bolt	31	3.1	30.0	⌚
Manual shift shaft nut	12.5	1.25	9.0	⌚
Transmission range sensor bolt	5.3	0.53	4.0	⌚

NOTE

The specified tightening torque is also described in the following.
 “Automatic Transmission Unit Components: ”

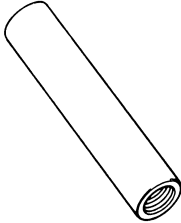
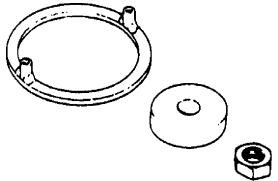
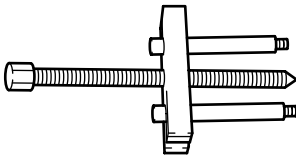
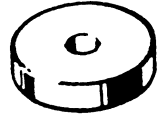
Reference:

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

Special Tools and Equipment

Special Tool

S5JB0E5108001

09923-46020 Joint pipe 	09926-98320 Spring compressor No. 1 set 
09926-98390 Remover 	09944-88210 Bearing housing installer 

Section 6

Steering

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For the items with asterisk (*) in the “CONTENTS” below, refer to the same section of the service manual mentioned in the “FOREWORD” of this manual.

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Steering Wheel and Column

Precautions

Service Precautions of Steering Angle Sensor

S5JB0E6200004

For service precautions, refer to "Precautions in Sensor Calibration: in Section 4F".

General Description

Steering Wheel and Column Construction

S5JB0E6201001

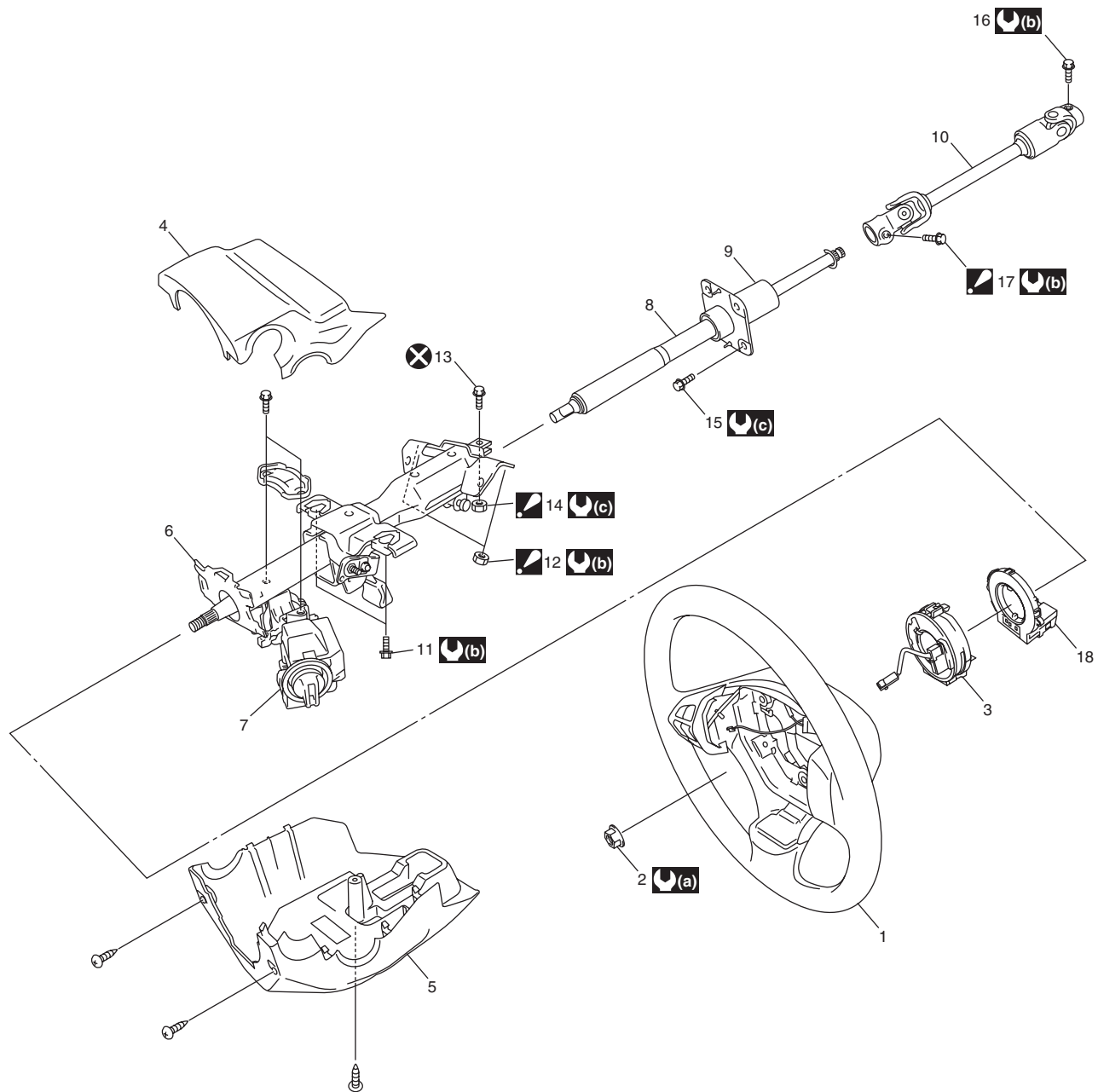
This double tube type steering column has the following three important features in addition to the steering function:

- The column is energy absorbing, designed to compress in a front-end collision.
- The ignition switch and lock are mounted conveniently on this column.
- With the column mounted lock, the ignition and steering operations can be locked to inhibit theft of the vehicle.

To insure the energy absorbing action, it is important that only the specified screws, bolts and nuts be used as designated, and that they are tightened to the specified torque. When the column assembly (6) is removed from the vehicle, special care must be taken in handling it. Use of a steering wheel puller or a sharp blow on the end of the steering shaft, leaning on the assembly, or dropping the assembly could shear the plastic shear pins which maintain column length and position.

The driver air bag (inflator) module is one of the supplemental restraint (air bag) system components and is mounted to the center of the steering wheel (1). During certain frontal crashes, the air bag system supplements the restraint of the driver's and passenger's seat belts by deploying the air bags. The air bag (inflator) module should be handled with care to prevent accidental deployment. When servicing, be sure to observe "Precautions on Service and Diagnosis of Air Bag System: in Section 8B in related manual".

6B-2 Steering Wheel and Column:



I6JB01620001-01

1. Steering wheel	9. Steering column lower seal	17. Steering lower shaft assembly upper joint bolt : After tightening all mounting bolts and nuts and all joint bolts and nuts, tighten lower shaft lower joint bolt.
2. Steering shaft nut	10. Steering lower shaft assembly	18. Steering angle sensor (if equipped)
3. Contact coil cable assembly	11. Steering column assembly mounting bolt	(a) : 33 N-m (3.3 kgf-m, 24.0 lb-ft)
4. Steering column upper cover	12. Steering column assembly mounting nut : After tightening column mounting nut, tighten column mounting bolt.	(b) : 25 N-m (2.5 kgf-m, 18.0 lb-ft)
5. Steering column lower cover	13. Steering upper shaft assembly upper joint bolt	(c) : 23 N-m (2.3 kgf-m, 17.0 lb-ft)
6. Steering column assembly	14. Steering upper shaft assembly upper joint nut : After tightening upper shaft mounting bolts, tighten upper shaft joint nut.	⊗ : Do not reuse.
7. Steering lock assembly	15. Steering upper shaft mounting bolt	
8. Steering upper shaft assembly	16. Steering lower shaft assembly lower joint bolt	

Repair Instructions

Contact Coil Cable Assembly Removal and Installation

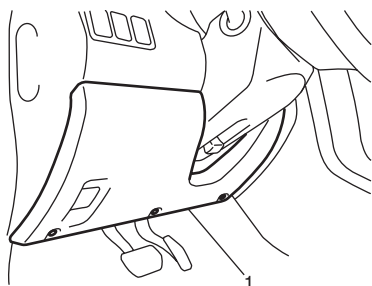
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⚠ CAUTION

Do not turn contact coil cable assembly more than allowable number of turns (about two and a half turns from the center position clockwise or counterclockwise respectively), or coil will break.

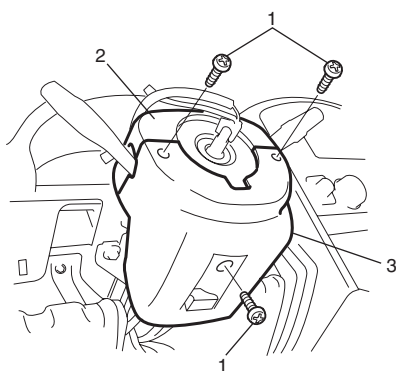
Removal

- 1) Remove steering wheel from steering column. Refer to "Steering Wheel Removal and Installation: in related manual".
- 2) Remove steering column hole cover (1).



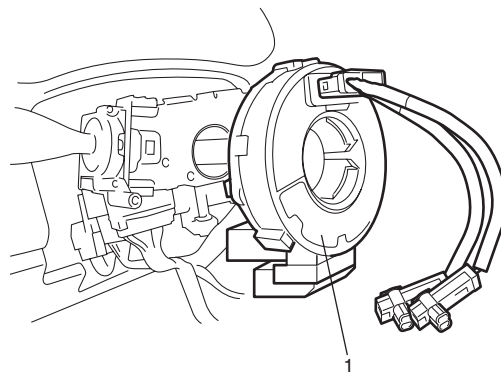
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- 3) Remove steering column cover screws (1) (3 pieces).
- 4) Separate upper cover (2) and lower cover (3), then remove them.



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- 5) Disconnect all connectors for contact coil cable assembly.
- 6) Remove contact coil cable assembly (1) with steering angle sensor (if equipped) from steering column.



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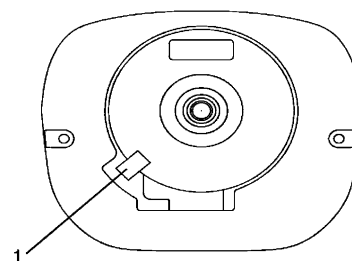
- 7) Separate steering angle sensor from contact coil cable assembly referring to "Steering Angle Sensor Removal and Installation: ".

Installation

- 1) Check to make sure that vehicle's front tires are set at straight-ahead position and then ignition switch is at "LOCK" position.
- 2) Install contact coil cable assembly to steering column.

NOTE

New contact coil cable assembly is supplied with contact coil cable assembly set and held at its center position with a lock pin (1). Remove this lock pin after installing contact coil cable assembly to steering column.



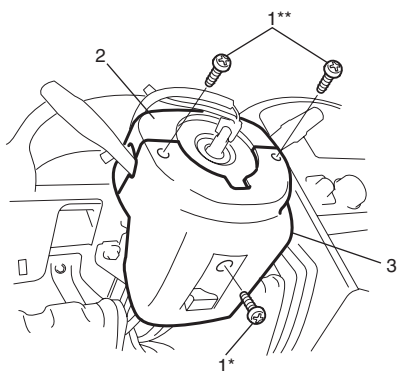
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6B-4 Steering Wheel and Column:

- 3) Connect all connectors that have been removed in "Removal".
- 4) Install steering column upper cover (2) and lower cover (3), and then tighten steering column cover screws (1).

⚠ CAUTION

When installing lower cover (3) and upper cover (2), be careful so that each lead wire is not caught between covers.

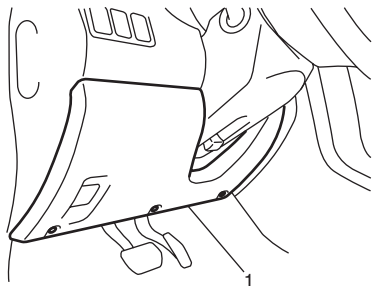


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*: Standard screw

**: Tapping screw

- 5) Install steering column hole cover (1).



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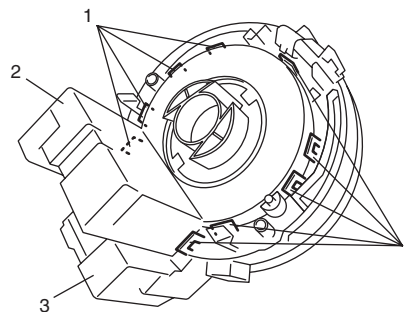
- 6) Install steering wheel to steering column. Refer to "Steering Wheel Removal and Installation: in related manual".

Steering Angle Sensor Removal and Installation

S5JB0E6206014

Removal

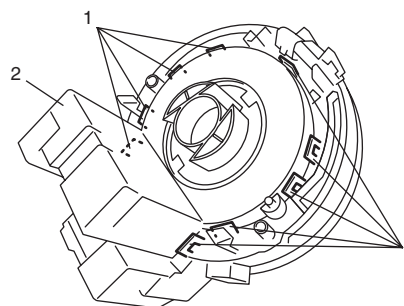
- 1) Remove steering wheel and contact coil cable assembly. Refer to "Steering Wheel Removal and Installation: in related manual" and "Contact Coil Cable Assembly Removal and Installation: ".
- 2) Remove steering angle sensor (2) from contact coil cable assembly (3) while opening fitting parts (1) of contact coil cable assembly.



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Installation

- 1) Install steering angle sensor (2) by fitting engagement parts (1) of contact coil cable assembly to claws of steering angle sensor as shown in figure.



I6JB01620004-01

- 2) Install contact coil cable assembly and steering wheel. Refer to "Contact Coil Cable Assembly Removal and Installation: " and "Steering Wheel Removal and Installation: in related manual".

Steering Angle Sensor Inspection

S5JB0E6206015

Refer to "Steering Angle Sensor Inspection: in Section 4F".

Specifications

Tightening Torque Specifications

S5JB0E6207001

NOTE

The specified tightening torque is also described in the following.

“Steering Wheel and Column Construction: ”

Reference:

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

Section 7

HVAC

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Heater and Ventilation

Schematic and Routing Diagram

Heater and Ventilation Wiring Circuit Diagram

S5JB0E7102001

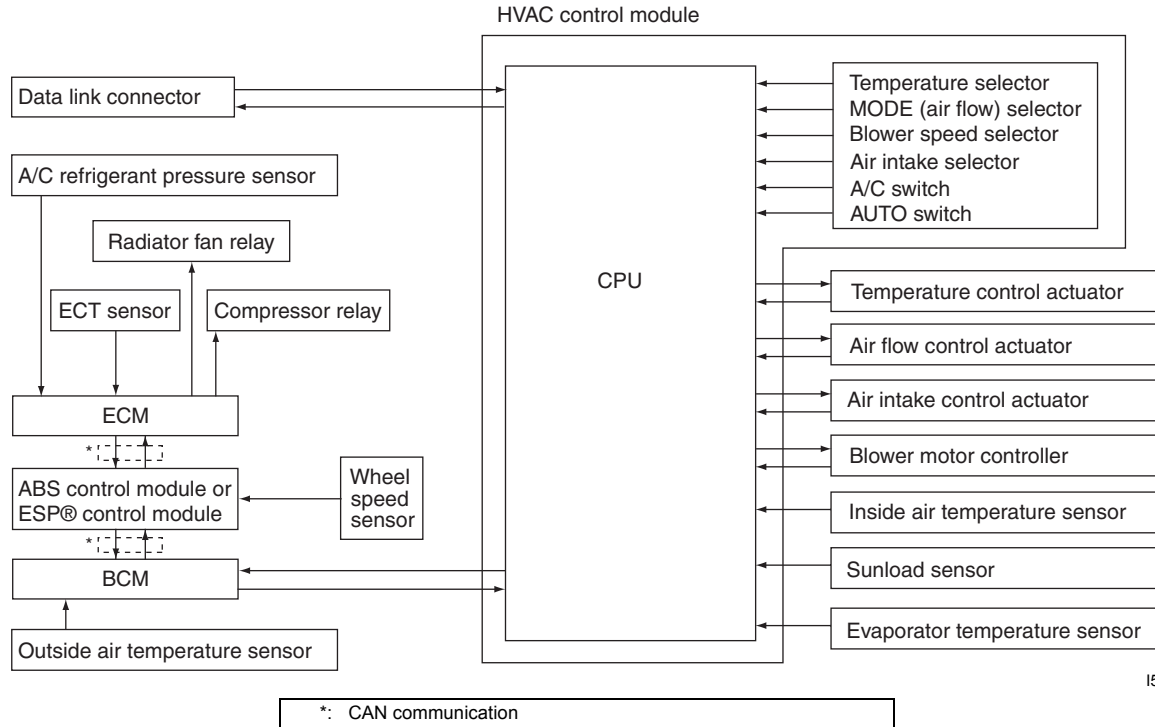
Refer to "A/C System Wiring Circuit Diagram: in Section 7B".

Air Conditioning System

General Description

Auto A/C Electronic Control Input / Output Table

S5JB0E7201003

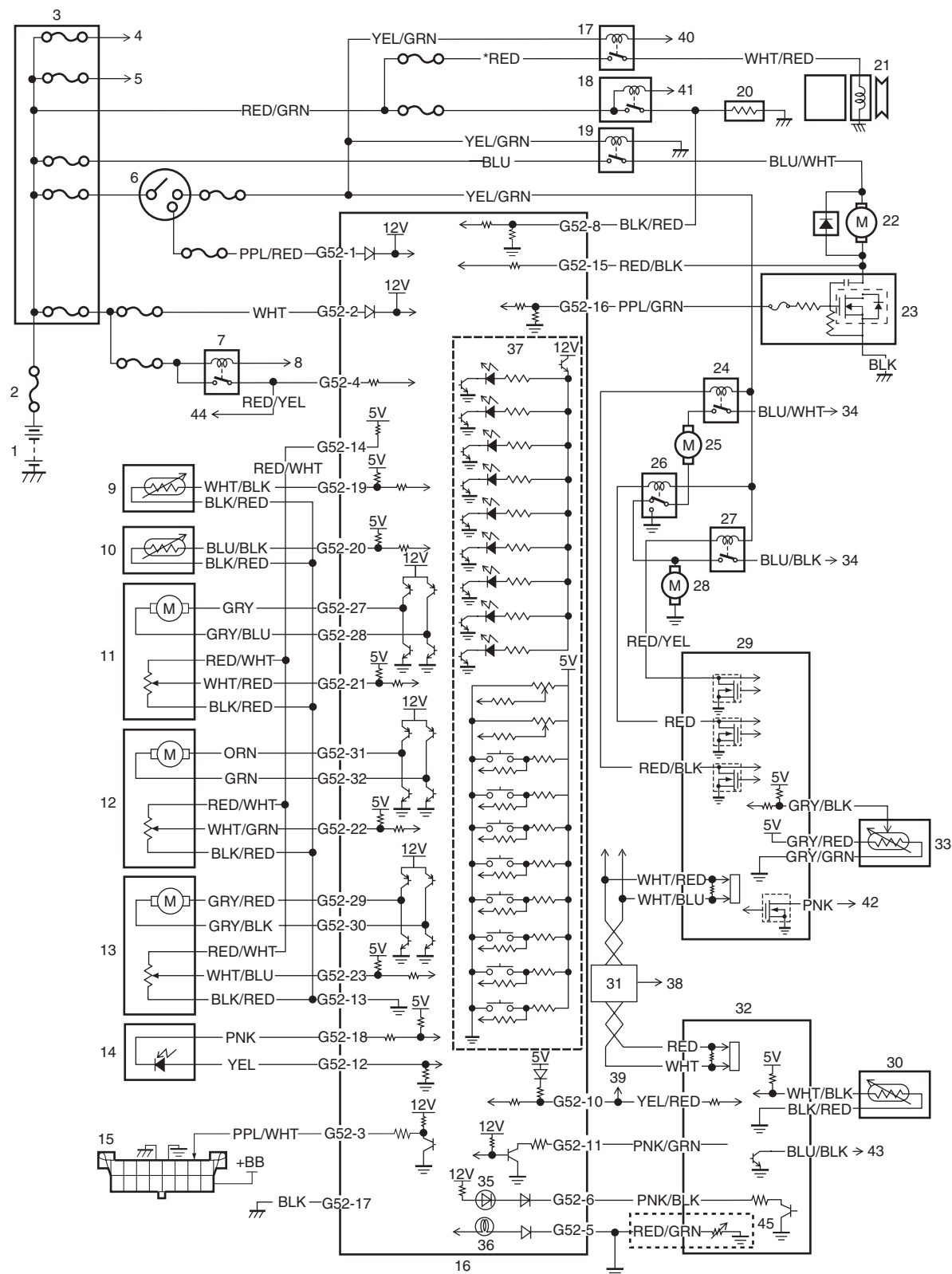


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Schematic and Routing Diagram

A/C System Wiring Circuit Diagram

S5JB0E7202001



15JB0A720007-05

1. Battery	17. Compressor relay	33. Refrigerant pressure sensor
2. Main fuse	18. Rear defogger relay	34. To fuse box
3. Fuse box	19. Blower motor relay	35. Theft deterrent light
4. To radiator fan relay No.1	20. Rear defogger	36. Illumination lamp

5. To radiator fan relay No.3	21. A/C compressor	37. Indicator lamp, switch, selector
6. Ignition switch	22. Blower motor	38. To wheel speed sensor
7. Small lamp relay	23. Blower motor selector	39. To information display
8. To BCM	24. Radiator fan relay No.1	40. To ECM
9. Evaporator temperature sensor	25. Radiator fan No.1	41. To BCM
10. Inside air temperature sensor	26. Radiator fan relay No.2	42. To compressor relay
11. Temperature control actuator	27. Radiator fan relay No.3	43. To rear defogger relay
12. Air intake control actuator	28. Radiator fan No.2	44. To combination switch
13. Air flow control actuator	29. ECM	45. AUTO-ON head light system vehicle
14. Sunload sensor	30. Outside temperature sensor	*: M16 engine model
15. Data link connector	31. ABS/ESP® control module	
16. HVAC control module	32. BCM	

Diagnostic Information and Procedures

DTC B1553: CAN Communication Circuit Malfunction

S5JB0E7204026

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
HVAC control module receives error code from BCM continuously.	- CAN communication circuit - Steering angle sensor (if equipped) - Keyless start control module (if equipped) 4WD control module (if equipped) - TCM (if equipped) - Combination meter - ABS/ESP® control module - BCM - HVAC control module - ECM

DTC Troubleshooting

Step	Action	Yes	No
1	DTC check 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Check ECM and BCM for DTC. <i>Is there DTC(s)?</i>	Go to applicable DTC diag. flow.	Substitute a known-good HVAC control module and recheck.

DTC B1556: Camshaft Position (CMP) Sensor and/or Its Circuit Malfunction

S5JB0E7204027

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
HVAC control module receives error code from BCM continuously.	• CMP sensor circuit • CMP sensor • HVAC control module

DTC Troubleshooting

Step	Action	Yes	No
1	DTC check 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Check ECM for DTC. <i>Is there DTC P0340?</i>	Go to applicable DTC diag. flow.	Substitute a known-good HVAC control module and recheck.

DTC B1557: Wheel Speed Sensor and/or Its Circuit Malfunction

S5JB0E7204028

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
HVAC control module receives error code from BCM continuously.	• Wheel speed sensor circuit • Wheel speed sensor • ABS/ESP® control module • HVAC control module

DTC Troubleshooting

Step	Action	Yes	No
1	DTC check 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Check ABS/ESP® control module for DTC. <i>Is there DTC C1021, C1022 / C1025, C1026 / C1031, C1032 / C1035, C1036?</i>	Go to applicable DTC diag. flow.	Substitute a known-good HVAC control module and recheck.

A/C System Inspection at ECM

S5JB0E7204033

Voltage Check

When checking voltage at ECM terminals related to A/C system, refer to "Inspection of ECM and Its Circuits: in Section 1A".

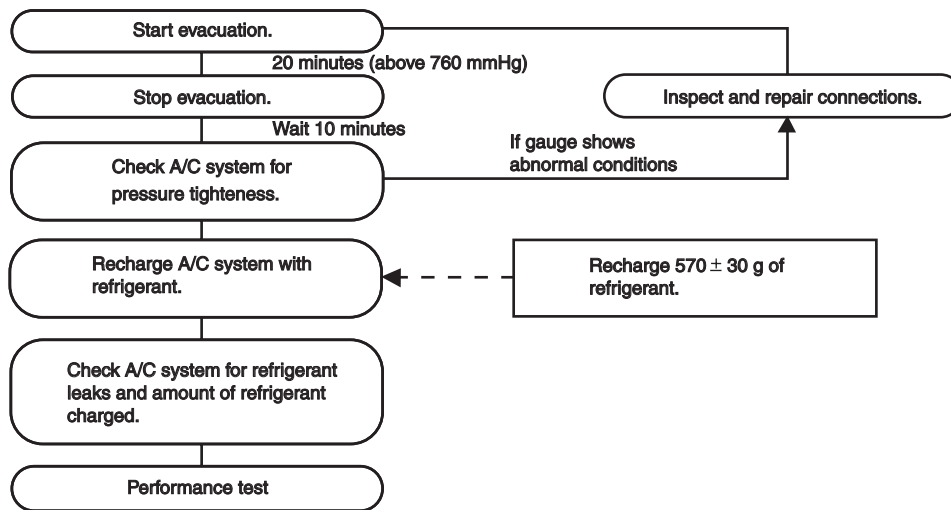
Repair Instructions

Operation Procedure for Charging A/C with Refrigerant

S5JB0E7206001

⚠ WARNING

- Your eyes should not be exposed to refrigerant (liquid). Any liquid Refrigerant-134a escaping by accident shows a temperature as low as approx. -6°C (21.2°F) below freezing point. Should liquid HFC-134a (R-134a) get into your eyes, it may cause a serious injury. To protect your eyes against such accident, it is necessary to always wear goggles. Should it occur that HFC-134a (R-134a) strikes your eye(s), consult a doctor immediately.
 - Do not use your hand to rub the affected eye(s). Instead, use quantities of fresh cold water to splash it over the affected area to gradually raise temperature of such area above freezing point.
 - Obtain proper treatment as soon as possible from a doctor or eye specialist.
- Should the liquid refrigerant HFC-134a (R-134a) is exposed to your skin, the affected area should be treated in the same manner as when skin is frostbitten or frozen.
- Do not handle refrigerant near any place where welding or steam cleaning is performed.
- Refrigerant should be kept in a cold and dark place. It should never be stored in any place where temperature is high, e.g. where exposed to direct sun light, close to fire or inside vehicle (including trunk room).
- Avoid breathing fume produced when HFC-134a (R-134a) is burned. Such fume may be hazardous to your health.



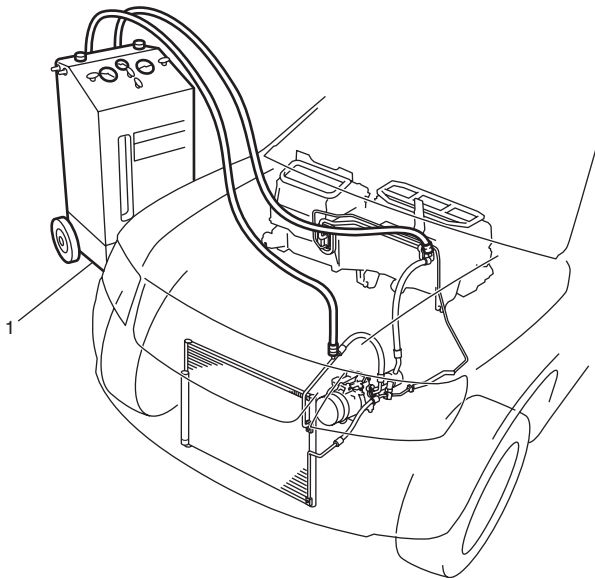
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Recovery

When discharging refrigerant out of A/C system, always recover it by using refrigerant recovery and recycling equipment (1). Discharging refrigerant HFC-134a (R134a) into atmosphere would cause adverse effect to environments.

NOTE

- After recovering refrigerant from system the amount of removed compressor oil must be measured for replenishing compressor oil. Refer to "Precautions on Replenishing Compressor Oil: in related manual".
- When handling recovery and recycling equipment, be sure to follow the instruction manual for the equipment.



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Evacuation

⚠ CAUTION

Do not evacuate before recovering refrigerant in system.

NOTE

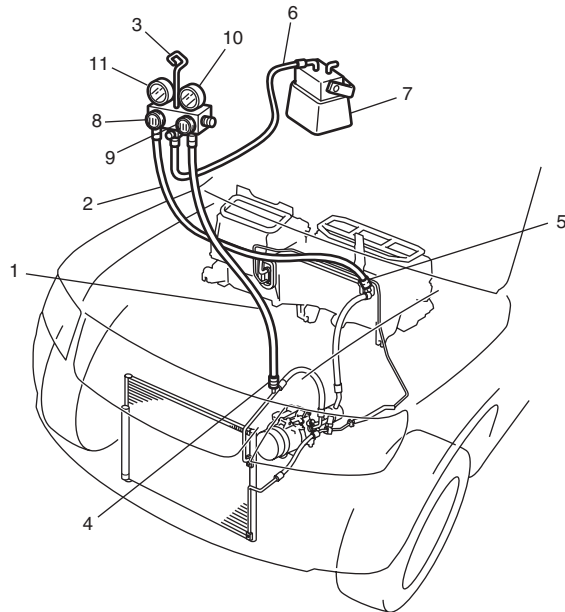
Once A/C system circuit is opened (exposed to atmospheric air) air conditioning system must be evacuated by using a vacuum pump. The A/C system should be attached with a manifold gauge set, and should be evacuated for approx. 20 minutes.

- 1) Connect high charging hose (1) and low charging hose (2) of manifold gauge set (3) respectively as follows:
High charging hose (1) → High pressure charging valve (4) on discharge hose
Low charging hose (2) → Low pressure charging valve (5) on suction pipe
- 2) Attach center charging hose (6) of manifold gauge set (3) to vacuum pump (7).
- 3) Operate vacuum pump (7), and then open discharge-side valve (9) (Hi) of manifold gauge set (3).
If there is no blockage in the system, there will be an indication on high pressure gauge (10).
In this case, open the other-side valve (8) (Lo) of the set and repair the system.
- 4) Approx. 10 minutes later, low pressure gauge (11) should show a vacuum lower than -100 kPa (-1.0 kg/cm^2 , -760 mmHg , -14.2 psi) providing no leakage exists.

NOTE

- If the system does not show a vacuum below -100 kPa (-1.0 kg/cm^2 , -760 mmHg , -14.2 psi), close both valves, stop vacuum pump and watch movement of low pressure gauge.
- Increase in the gauge reading suggests existence of leakage. In this case, repair the system before continuing its evacuation.
- If the gauge shows a stable reading (suggesting no leakage), continue evacuation.

- 5) Evacuation should be carried out for a total of at least 20 minutes.
- 6) Continue evacuation until low pressure gauge indicates a vacuum less than -100 kPa (-1.0 kg/cm^2 , -760 mmHg , -14.2 psi), and then close both valves (8), (9).
- 7) Stop vacuum pump (7). Disconnect center charging hose (6) from pump inlet. Now, the system is ready for charging refrigerant.



I5JB0A720033-01

Checking of A/C System for Pressure Leaks

After completing the evacuation, close manifold gauge high pressure valve (Hi) and low-pressure valve (Lo) and wait 10 minutes. Verify that low-pressure gauge reading has not changed.

⚠ CAUTION

If the gauge reading moves closer to "0", there is a leak somewhere. Inspect the tubing connections, make necessary corrections. And then evacuate system once again and make sure that there are no leaks.

Charge

⚠ CAUTION

- Because the sight glass is not used for this A/C system, do not perform an additional charge to the A/C system. To charge the proper amount of refrigerant, recover and evacuate the A/C system first. And then, charge the proper amount of refrigerant into the A/C system.
- Always charge through low pressure-side of A/C system at after the initial charging is performed from the high-pressure side with the engine stopped.
- Never charge to high pressure-side of A/C system with engine running.
- Do not charge while compressor is hot.
- When installing tap valve to refrigerant container to make a hole there through, carefully follow directions given by manufacturer.
- A pressure gauge should always be used before and during charging.
- The refrigerant container should be emptied of refrigerant when discarding it.
- The refrigerant container should not be heated up to $40 \text{ }^{\circ}\text{C}$ ($104 \text{ }^{\circ}\text{F}$) or over.
- Refrigerant container should not be reversed in direction during charging. Reversing in direction causes liquid refrigerant to enter compressor, causing troubles, such as compression of liquid refrigerant and the like.

NOTE

The A/C system contains HFC-134a (R-134a). Described here is a method to charge the A/C system with refrigerant from the refrigerant service container.

When charging refrigerant recovered by using the refrigerant and recycling equipment (when recycling refrigerant), follow the procedure described in the equipment manufacturer's instruction manual.

Charge proper amount of refrigerant accurately in accordance with the following procedure.

Specified amount of refrigerant

$570 \pm 30 \text{ g}$ ($20.1 \pm 1.0 \text{ oz}$)

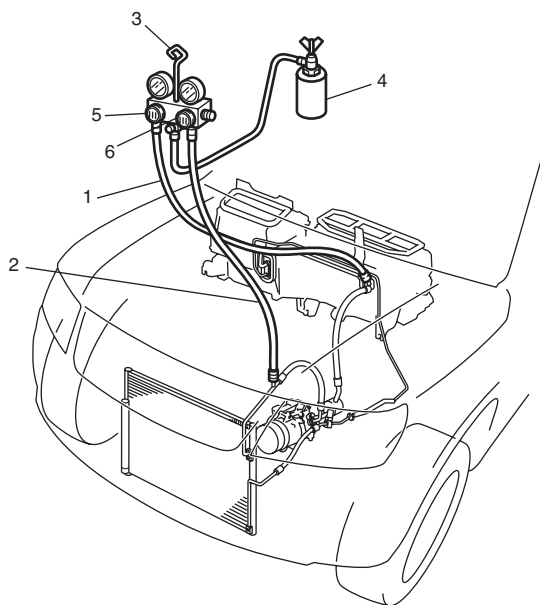
7B-8 Air Conditioning System:

The initial charging of the A/C system is performed from the high-pressure side with the engine stopped. And next, this method must be followed by charging from the low-pressure side with the engine running.

- 1) Check to make sure that hoses are routed properly after evacuating the system.
- 2) Connect low charging hose (1) and high charging hose (2) of the manifold gauge set (3) in position. Thus open refrigerant container valve (4) to purge the charging line.
- 3) Open the high-pressure side valve (6) and charge refrigerant to system.
- 4) After a while, open the low-pressure side valve (5) and close the high-pressure side valve (6).

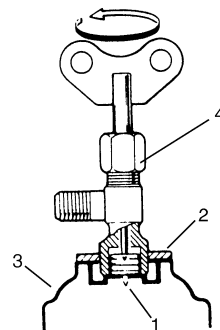
⚠ WARNING

Make sure that high pressure-side valve is closed securely.



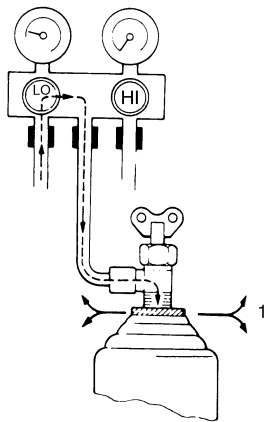
I5JB0A720034-01

- 5) Start engine and keep engine speed at 1,500 rpm. Then, operate A/C system.
- 6) Charge A/C system with refrigerant in vapor state. At this time, refrigerant container should be held upright.
- 7) When refrigerant container (3) is emptied, the use following procedure to replace it with a new refrigerant container (3).
 - a) Close low pressure valve.
 - b) Replace empty container (3) with a refrigerant container which has been charged with refrigerant. When using refrigerant container tap valve (4), use the following procedure for replacement.
 - i) Retract needle (1) and remove refrigerant container tap valve (4) by loosening its plate nut (2).
 - ii) Install previously-removed refrigerant container tap valve (4) to a new refrigerant container (3).



IYSQ01720015-01

- c) Purge any air existing in center charging hose. When using refrigerant container tap valve, use the following procedure to purge air.
- Once fully tighten refrigerant container tap valve and then loosen (open) plate nut slightly.
 - Open low pressure valve of manifold gauge set a little.
 - As soon as refrigerant comes out with a "hiss" (1) through a clearance between refrigerant container and tap valve, tighten plate nut as well as manifold gauge set low pressure valve.
 - Turn handle of tap valve clockwise so that its needle is screwed into the new container to make a hole for refrigerant flow.



IYSQ01720016-01

- 8) After the system has been charged with specified amount (570 ± 30 g) of refrigerant or when low pressure gauge and high pressure gauge have indicated the following specified value, close low pressure side valve on manifold gauge set.

Low side and high side pressure example	
Gauges should read as follows when ambient temperature is 30 °C (86 °F)	
Pressure on high pressure gauge	M16 engine model: 1150 – 1410 kPa 11.5 – 14.1 kg/cm ² 164 – 201 psi J20 engine model: 1300 – 1630 kPa 13.0 – 16.3 kg/cm ² 185 – 232 psi
Pressure on low pressure gauge	M16 engine model: 280 – 410 kPa 2.8 – 4.1 kg/cm ² 40 – 58 psi J20 engine model: 250 – 370 kPa 2.5 – 3.7 kg/cm ² 36 – 53 psi

Removal of Manifold Gauge Set

⚠ WARNING

High pressure side is under high pressure. Therefore, be careful not to get injured especially on your eyes and skin.

For the A/C system charged with the specified amount of refrigerant, remove manifold gauge set as follows:

- Close low pressure side valve of manifold gauge set. (The high pressure side valve is closed continuously during the process of charging.)
- Close refrigerant container valve.
- Stop engine.
- Using shop rag, remove charging hoses from service valves. This operation must be performed quickly.
- Put caps on service valves.

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 lines and/or connections, it is advisable to check for leaks.

Common sense should be used in performing any 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

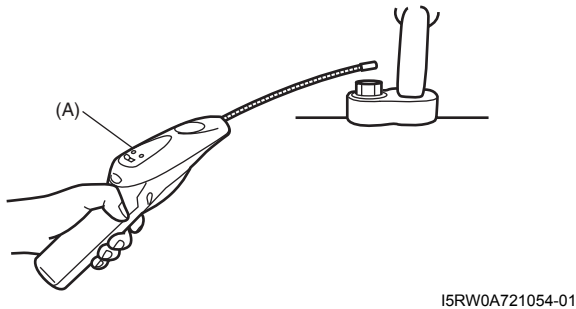
⚠ WARNING

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

7B-10 Air Conditioning System:

There are a number of fittings and places throughout the air conditioning 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 bubbles will form within seconds if there is a leak. For confined areas, such as sections of the evaporator and condenser, an electronic (gas) leak detector (1) is more practical for determining leaks.

Special tool
(A): 09990-86012

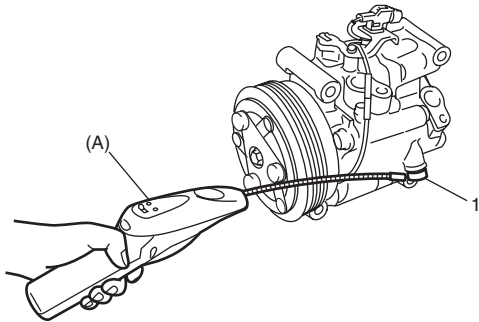


Relief Valve On-Vehicle Inspection for M16 Engine Model

S5JB0E7206044

Using special tool, check is there is refrigerant leakage. If there is refrigerant leakage, replace relief valve (1).

Special tool
(A): 09990-86012

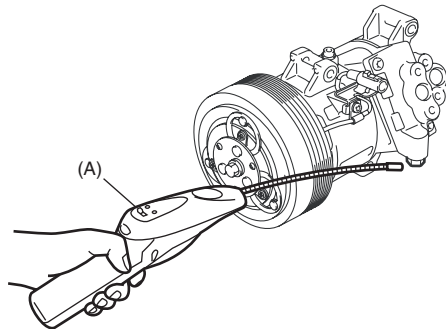


Relief Valve On-Vehicle Inspection For J20 Engine Model

S5JB0E7206045

Using special tool (A), check is there is refrigerant leakage. If there is refrigerant leakage, replace compressor body.

Special tool
(A): 09990-86012



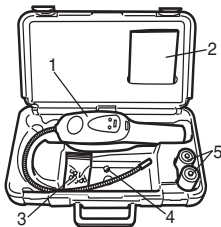
Special Tools and Equipment

Special Tool

S5JB0E7208001

09990-86012

Gas leak detector
This kit includes following items.
1. Gas leak detector, 2. Instruction manual, 3. Filter, 4. Sensor, 5. Dri-sell battery (size D) / / /



Section 9

Body, Cab and Accessories

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For the items with asterisk (*) in the “CONTENTS” below, refer to the same section of the service manual mentioned in the “FOREWORD” of this manual.

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Precautions

Precautions

Precautions on Body, Cab and Accessories

S5JB0E9000001

Air Bag Warning

Refer to "Air Bag Warning: in Section 00 in related manual".

Fastener Caution

Refer to "Fastener Caution: in Section 00 in related manual".

Precautions for Body Service

Refer to "Precautions for Body Service: ".

Fastener Caution for Body Service:

Refer to "Fastener Caution for Body Service: ".

Cautions in Body Electrical System Servicing

Refer to "Cautions in Body Electrical System Servicing: in Section 9A in related manual".

Precautions for Wiring System

Refer to "Precautions for Wiring System: in Section 9A in related manual".

Precautions for Discharge Headlight Service

Refer to "Precautions for Discharge Headlight Service (If Equipped): in Section 9B in related manual".

Precautions for Body Service

S5JB0E9000002

⚠ WARNING

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

When servicing vehicle body, if shock may be applied to air bag system component parts, remove those parts beforehand.

Fastener Caution for Body Service

S5JB0E9000003

⚠ CAUTION

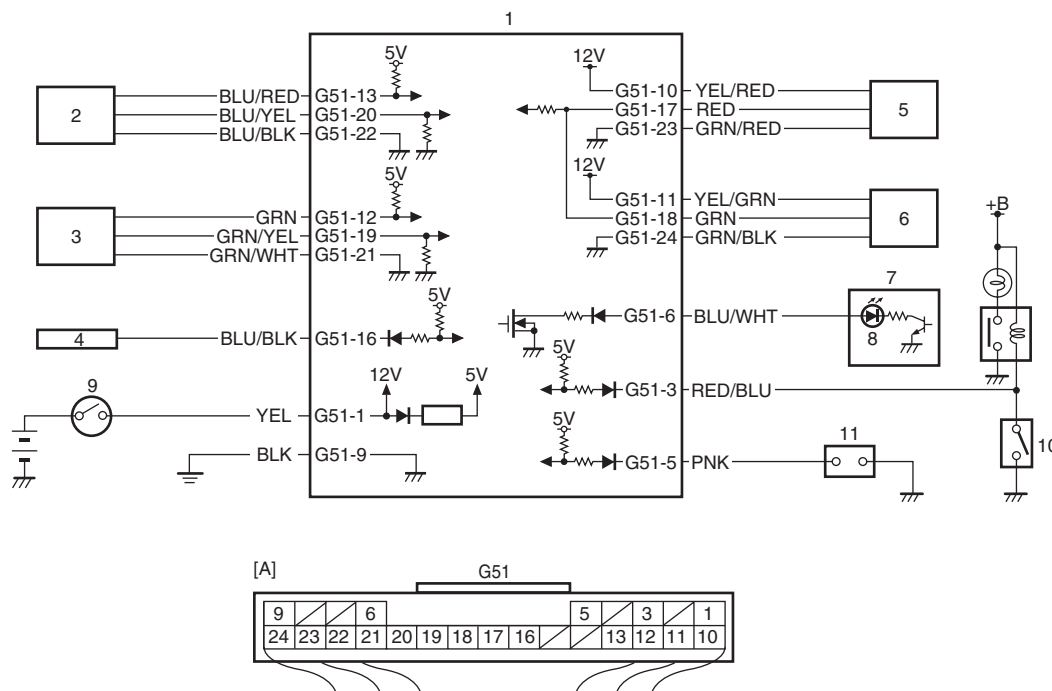
- Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement become necessary.
- Do not use a replacement part of lesser quality or substitute a design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

Lighting Systems

Schematic and Routing Diagram

Headlight Auto Leveling System wiring Circuit Diagram

S5JB0E9202001



i5JB0D920001-01

[A]: Headlight leveling control module connector (viewed from harness side)	4. BCM	8. Headlight leveling warning light
1. Headlight leveling control module	5. Right headlight leveling actuator	9. Ignition switch
2. Front height sensor	6. Left headlight leveling actuator	10. Lighting switch
3. Rear height sensor	7. Combination meter	11. Diagnosis connector

Diagnostic Information and Procedures

DRL System Symptom Diagnosis (If Equipped)

S5JB0E9204006

NOTE

- Use of SUZUKI scan tool makes it easy to check whether a faulty condition is on the input side or output side of BCM. For checking procedure, refer to “Diagnosis Using Output Test Function of SUZUKI Scan Tool” under “Scan Tool Data: in Section 10B”.
- Check each part in the order from the top of the following list.

Condition	Possible cause	Correction / Reference Item
Headlight does not light when lighting switch is in OFF position and engine is running	Lighting switch faulty	Check lighting switch referring to “Headlight Switch (in Lighting Switch) Inspection: ”.
	BCM faulty	Check BCM for function referring to “Inspection of BCM and its Circuits: in Section 10B in related manual”.
	Wiring or grounding faulty	Repair circuit.

Condition	Possible cause	Correction / Reference Item
Headlight lights even if engine stop and lighting switch is OFF position	Lighting switch faulty	Check system referring to "Headlight Switch (in Lighting Switch) Inspection: ".
	Wiring or grounding faulty	Repair circuit.
	BCM faulty	Check BCM for function referring to "Inspection of BCM and its Circuits: in Section 10B in related manual".

Turn Signal and Hazard Warning Light Symptom Diagnosis

S5JB0E9204009

Condition	Possible cause	Correction / Reference Item
Flash rate high or one side only flashes	Bulb blown on "flash rate high"-side	Replace bulb.
	Incorrect bulb	Replace bulb.
	Turn signal / hazard warning relay faulty	Check turn signal / hazard warning relay referring to "Turn Signal and Hazard Warning Relay Inspection: in related manual".
	Open circuit or high resistance existing either; between turn signal switch and non lighting bulb, or between hazard warning switch and non lighting bulb	Repair circuit.
	Wiring or grounding faulty	Repair circuit.
No flashing NOTE • Use of SUZUKI scan tool makes it easy to check whether a faulty condition is on the input side or output side of BCM. For checking procedure, refer to "Diagnosis Using Output Test Function of SUZUKI Scan Tool" under "Scan Tool Data: in Section 10B". • Check each part in the order from the top of the following list.	Circuit fuse(s) blown	Replace fuse(s) and check for short circuit.
	Turn signal / hazard warning relay faulty	Check turn signal / hazard warning relay referring to "Turn Signal and Hazard Warning Relay Inspection: in related manual".
	Turn signal light switch faulty	Check turn signal light switch referring to "Turn Signal Light Switch (in Lighting Switch) Inspection: ".
	Hazard warning switch faulty	Check hazard warning switch referring to "Hazard Warning Switch Inspection: in related manual".
	Open circuit or high resistance existing between battery and switch	Repair circuit.
	Wiring or grounding faulty	Repair circuit.
	BCM faulty	Replace after making sure that none of above parts is faulty.
Flash rate low	Supply voltage low	Check charging system.
	Turn signal / hazard warning relay faulty	Check turn signal / hazard warning relay referring to "Turn Signal and Hazard Warning Relay Inspection: in related manual".

Front Fog Light Symptom Diagnosis (If Equipped)

S5JB0E9204013

NOTE

- Use of SUZUKI scan tool makes it easy to check whether a faulty condition is on the input side or output side of BCM. For checking procedure, refer to “Diagnosis Using Output Test Function of SUZUKI Scan Tool” under “Scan Tool Data: in Section 10B”.
- Check each part in the order from the top of the following list.

Condition	Possible cause	Correction / Reference Item
Only one light does not light	Bulb blown	Replace bulb.
	Wiring or grounding faulty	Repair circuit.
Front fog lights do not light	Circuit fuse blown	Replace fuse and check for short circuit.
	Bulbs blown	Replace bulbs.
	Front fog light switch faulty	Check front fog light switch referring to “Front Fog Light Switch Inspection (If Equipped): in related manual”.
	Front fog light relay faulty	Check front fog light relay referring to “Front Fog Light Relay Inspection (If Equipped): in related manual”.
	Wiring or grounding faulty	Repair circuit.
	BCM faulty	Check BCM for function referring to “Inspection of BCM and its Circuits: in Section 10B in related manual”.

Illumination Cancel System Symptom Diagnosis (If Equipped)

S5JB0E9204015

Condition	Possible cause	Correction / Reference Item
Illumination cancel do not normal operation	Circuit fuse blown	Replace fuse and check for short circuit.
	Illumination cancel switch faulty	Check illumination cancel switch referring to “Illumination Cancel Switch Inspection (If Equipped): ”.
	Combination meter and/or information display (clock) faulty	Replace combination meter and/or information display (clock).
	Wiring or grounding faulty	Repair circuit.

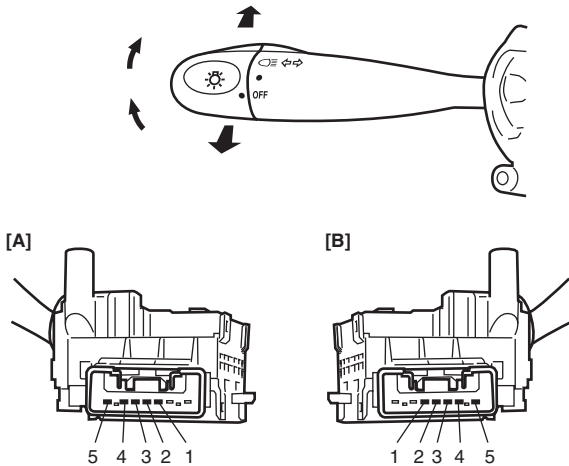
Repair Instructions

Headlight Switch (in Lighting Switch)
Inspection

S5JB0E9206007

Check for continuity between terminals at each switch position. If check result is not as specified, replace switch.

Without rear fog light switch and auto-on headlight switch

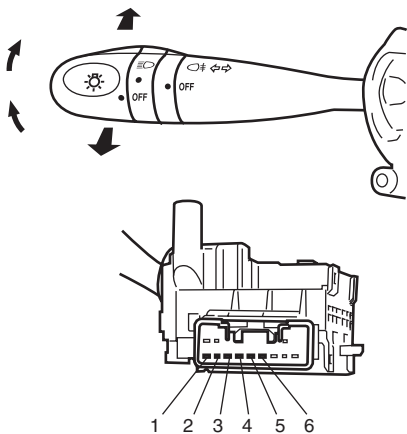


[D] \ [C]		5	3	1	2	4
OFF	LOW					
	PASS				○	○
	HI					
•	LOW	○	○			
	PASS	○	○		○	○
	HI	○	○			
☰	LOW	○	○	○		○
	PASS	○	○		○	○
	HI	○	○		○	○

I5JB0D920007-01

[A]: LH steering vehicle
[B]: RH steering vehicle
[C]: Terminal
[D]: Shaft condition

With rear fog light switch

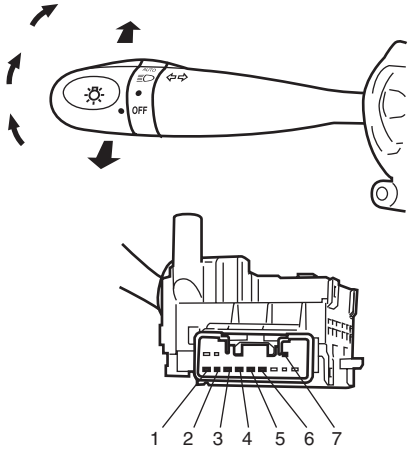


[B] \ [A]		1	4	2	3	5	6
OFF	LOW						
	PASS				○	○	
	HI						
•	LOW	○	○				
	PASS	○	○		○	○	
	HI	○	○				
☰	LOW	○	○	○	○		○
	PASS	○	○	○	○	○	
	HI	○	○	○	○	○	

I5JB0D920011-04

[A]: Terminal
[B]: Shaft condition

With auto-on headlight switch



[B]		[A]						
		1	4	2	3	5	6	7
OFF	LOW							
	PASS							
	HI							
•	LOW							
	PASS							
	HI							
⦿	LOW							
	PASS							
	HI							
AUTO	LOW							
	PASS							
	HI							

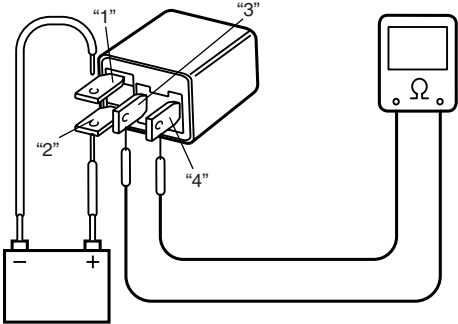
I5JB0D920015-01

[A]:	Terminal
[B]:	Shaft condition

Headlight Relay Inspection

S5JB0E9206030

- 1) Disconnect negative (–) cable at battery.
- 2) Remove headlight relay from main fuse box.
- 3) Check that there is no continuity between terminal “3” and “4”. If there is continuity, replace relay.
- 4) Connect battery positive (+) terminal to terminal “2” of relay and battery negative (–) terminal to terminal “1” of relay.
- 5) Check continuity between terminal “3” and “4”. If there is no continuity when relay is connected to the battery, replace relay.

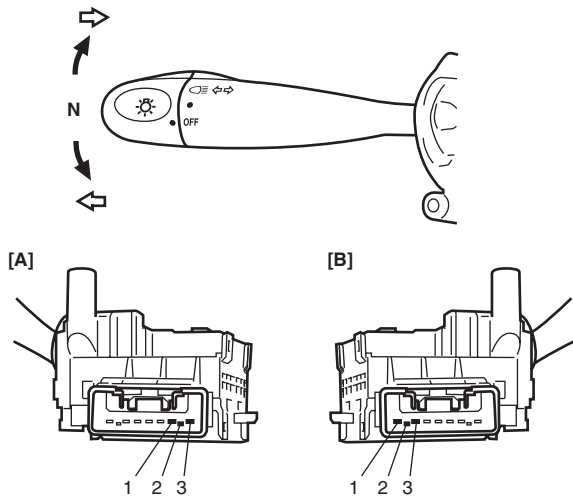


I4RS0A920022-01

Turn Signal Light Switch (in Lighting Switch) Inspection

S5JB0E9206012

Check for continuity between terminals at each switch position. If check result is not as specified, replace switch.



[D]	[C]	[C]		
		1	2	3
	←		○	○
	N			
	→	○	○	

I5JB0D920018-01

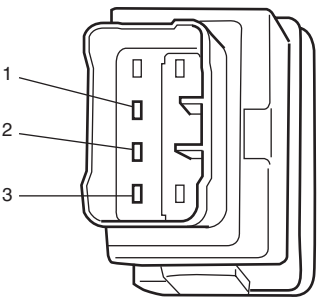
[A]: Other than RH steering vehicle without rear fog light
[B]: RH steering vehicle without rear fog light
[C]: Terminal
[D]: Switch position

Headlight Manual Leveling Switch Inspection (If Equipped)

S5JB0E9206021

Check for continuity between terminals at each switch position.

If check result is not as specified, replace switch.



Switch Position	Terminal	Resistance (Ω)
-	1 and 2	4370 - 4830
	1 and 3	646 - 714
0	2 and 3	3724 - 4116
	1 and 3	1292 - 1428
1	2 and 3	3078 - 3402
	1 and 3	1938 - 2142
2	2 and 3	2432 - 2688
	1 and 3	2584 - 2856
3	2 and 3	1786 - 1974
	1 and 3	3230 - 3570
4	2 and 3	1140 - 1260
	1 and 3	1140 - 1260

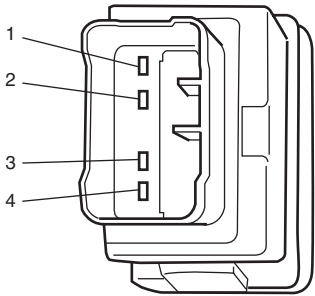
I4RS0B920012-01

Illumination Cancel Switch Inspection (If Equipped)

S5JB0E9206028

Check for continuity between terminals at each switch position.

If check result is not as specified, replace switch.



Terminal	Switch Position			
	1	2	3	4
OFF	○	○	○	○
ON (PUSH IN)		○	○	○

I4RS0B920014-01

Instrumentation / Driver Info. / Horn

General Description

CAN Communication System Description

S5JB0E9301001

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

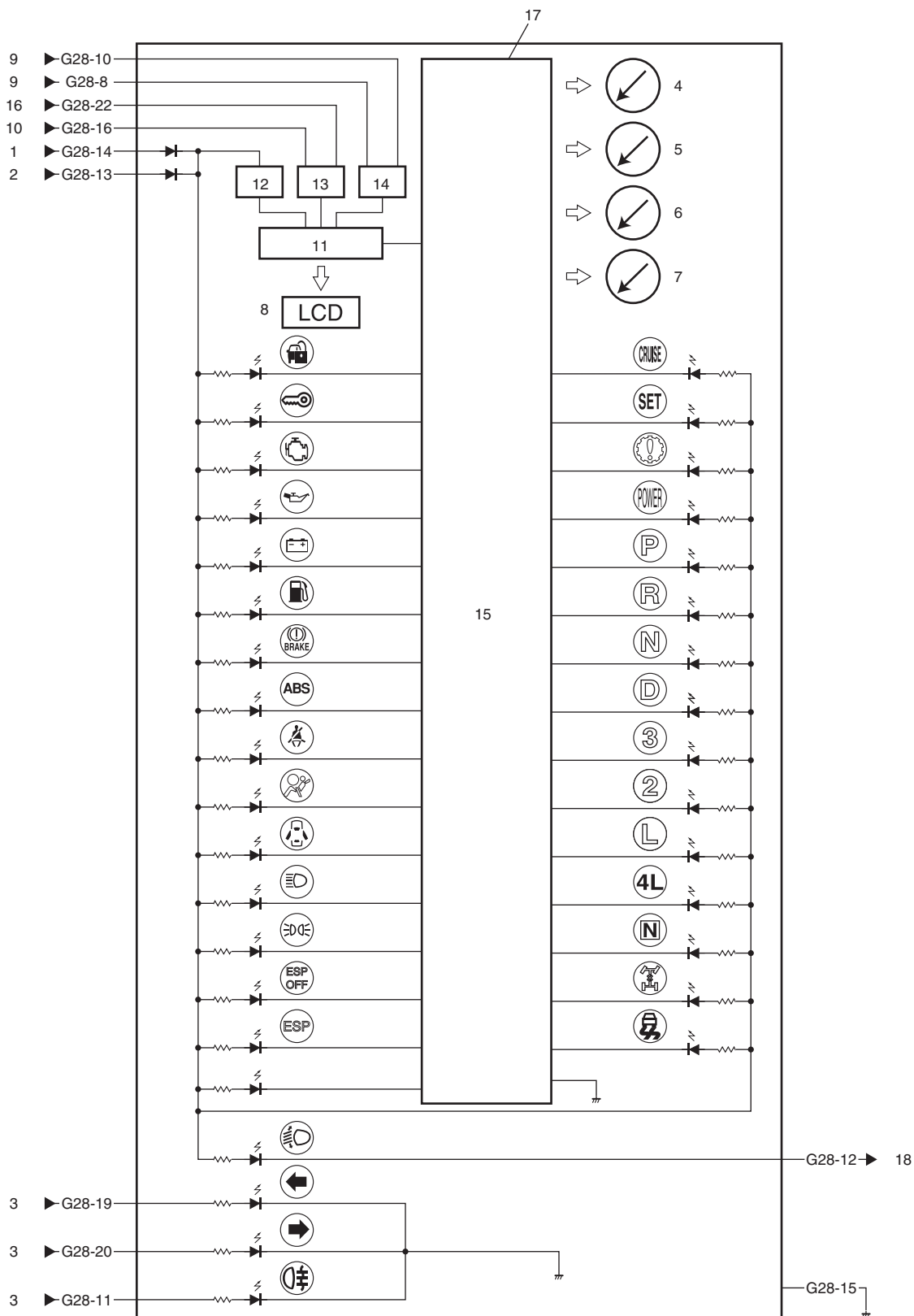
Combination Meter Reception Data

			ECM	TCM (A/T model)	BCM	ABS Control Module (vehicle not equipped with ESP®)	ESP® Control Module (vehicle equipped with ESP®)	4WD Control Module (if equipped)	Keyless Start Control Module (if equipped)
Combination Meter	DATA Receive	Engine revolution speed signal	○						
		Immobilizer indicator light control signal	○						
		Vehicle speed signal	○						
		Engine coolant temperature signal	○						
		Fuel level signal	○						
		CRUSE and SET indicator light control signal	○						
		Malfunction indicator lamp (MIL) control signal	○	○					
		Transmission warning light control signal		○					
		Transmission range sensor signal		○					
		Automatic transmission mode indicator light control signal			○				
		Diagnostic trouble code (DTC)	○	○	○	○	○	○	
		Brake fluid level switch signal (brake warning light control signal)			○				
		Driver side seat belt buckle switch signal (seat belt reminder light control signal)			○				
		Charging system warning light signal (charge warning light control signal)			○				
		Engine oil pressure switch signal (oil pressure warning light control signal)			○				
		Parking brake switch signal (brake warning light control signal)			○				
		Lighting switch signal			○				
		Door switch signal (open door warning light control signal)			○				
		HI beam indicator light control signal			○				
		ABS warning light control signal				○	○		
		EBD warning light control signal (brake warning light control signal)				○	○		
		ESP® status signal					○		
		4WD mode indicator control signal						○	
		Key indicator lamp control signal							○

Schematic and Routing Diagram

Combination Meter Circuit Diagram

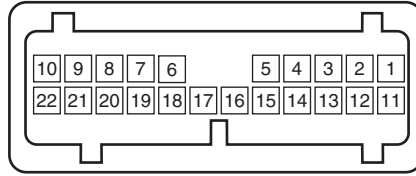
S5JB0E9302001



I5JB0D930002-01

1. Main fuse	6. Fuel meter	11. CPU	16. Illumination cancel switch (if equipped)
2. METER fuse	7. ECT meter	12. Power supply	17. Combination meter
3. Combination switch	8. ODO-TRIP	13. Interface circuit	18. Headlight auto leveling control module (if equipped)
4. Tachometer	9. Junction connector	14. CAN driver	
5. Speedometer	10. SDM	15. Stepper motor and LED output driver	

Terminal arrangement of coupler viewed from combination meter side



I5JB0A930002-01

Terminal	Circuit	Terminal	Circuit
G28-1	—	G28-12	To headlight auto leveling control module (if equipped)
G28-2	—	G28-13	Power source
G28-3	—	G28-14	Backup power source
G28-4	—	G28-15	GND
G28-5	—	G28-16	To SDM (Air bag warning light signal)
G28-6	—	G28-17	—
G28-7	—	G28-18	—
G28-8	CAN communication line (Active Low Signal)	G28-19	To turn signal light switch (turn L)
G28-9	—	G28-20	To turn signal light switch (turn R)
G28-10	CAN communication line (Active High Signal)	G28-21	—
G28-11	To rear fog light switch (if equipped)	G28-22	To illumination cancel switch (if equipped)

Diagnostic Information and Procedures

Speedometer Symptom Diagnosis

S5JB0E9304001

Condition	Possible cause	Correction / Reference Item
Speedometer shows no operation or incorrect operation	Circuit fuse blown	Replace fuse and check for short circuit.
	Data (information) can not be received by CAN communication	Check ECM for DTC referring to "DTC Check: in Section 1A in related manual".
	Rear wheel speed sensor or sensor ring faulty	Check rear wheel speed sensor or sensor ring referring to "Rear Wheel Speed Sensor On-Vehicle Inspection: in Section 4E" or "Rear Wheel Encoder On-Vehicle Inspection: in Section 4E".
	Wiring or ground faulty	Repair circuit.
	Combination meter faulty	Replace combination meter.
	ECM faulty	Replace after making sure that none of above parts is faulty.

Tachometer Symptom Diagnosis

S5JB0E9304002

Condition	Possible cause	Correction / Reference Item
Tachometer shows no operation or incorrect operation	Circuit fuse blown	Replace fuse and check for short circuit.
	Data (information) can not be received by CAN communication	Check ECM for DTC referring to "DTC Check: in Section 1A in related manual".
	Wiring or ground faulty	Repair circuit.
	Combination meter faulty	Replace combination meter.
	ECM faulty	Replace after making sure that none of above parts is faulty.

Low Fuel Warning Light Symptom Diagnosis

NOTE

Confirm that fuel meter is in good condition before referring to the following possible causes.

- When fuel level meter circuit is shorted to ground circuit, fuel level meter indicates empty even if fuel tank does not empty.
- The low fuel warning light comes ON when fuel level is lower than specification below.

Low fuel warning light operation:

Low fuel warning light operation:	Fuel amount:	Resistance of fuel level sensor:
ON	Approx. 8.3 liter (3 door model) Approx. 9.9 liter (5 door model)	250.8 – 255.8 Ω

Condition	Possible cause	Correction / Reference Item
Low fuel warning light does not come ON when fuel level is lower than specification	Circuit fuse blown	Replace fuse and check for short circuit.
	Data (information) can not be received by CAN communication	Check ECM for DTC referring to "DTC Check: in Section 1A in related manual".
	Fuel level sensor faulty	Check fuel level sensor referring to "Fuel Level Sensor Inspection: ".
	Wiring or ground faulty	Repair circuit.
	Combination meter faulty	Replace combination meter.
	ECM faulty	Replace after making sure that none of above parts is faulty.
Low fuel warning light comes ON steady	Low fuel	Refill fuel.
	Data (information) can not be received by CAN communication	Check ECM for DTC referring to "DTC Check: in Section 1A in related manual".
	Fuel level sensor faulty	Check fuel level sensor referring to "Fuel Level Sensor Inspection: ".
	Combination meter faulty	Replace combination meter.
	ECM faulty	Replace after making sure that none of above parts is faulty.

Seat Belt Reminder Light Symptom Diagnosis (If Equipped)

Condition	Possible cause	Correction / Reference Item
Seat belt reminder light does not light up	Circuit fuse blown	Replace fuse and check for short circuit.
	Data (information) can not be received by CAN communication	Check BCM for DTC referring to "DTC Check: in Section 10B in related manual".
	Seat belt switch faulty	Check seat belt switch referring to "Front Seat Belt Inspection: in Section 8A in related manual".
	Wiring or ground faulty	Repair circuit.
	Combination meter faulty	Replace combination meter.
	BCM faulty	Replace after making sure that none of above parts is faulty.
Seat belt reminder light stays ON	Data (information) can not be received by CAN communication	Check BCM for DTC referring to "DTC Check: in Section 10B in related manual".
	Seat belt switch faulty	Check seat belt switch referring to "Front Seat Belt Inspection: in Section 8A in related manual".
	Wiring or ground faulty	Repair circuit.
	Combination meter faulty	Replace combination meter.
	BCM faulty	Replace after making sure that none of above parts is faulty.

Warning Buzzer Circuit Symptom Diagnosis

S5JB0E9304015

NOTE

- Use of SUZUKI scan tool makes it easy to check whether a faulty condition is on the input side or output side of BCM. For checking procedure, refer to “Diagnosis Using Output Test Function of SUZUKI Scan Tool” under “Scan Tool Data: in Section 10B”.
- Check each part in the order from the top of the following list.

Condition	Possible cause	Correction / Reference Item
Warning buzzer shows no sounding	Circuit fuse blown	<i>Replace fuse and check for short circuit.</i>
	Driver side door switch faulty	<i>Check driver side door switch referring to “Door Switch (Front / Rear / Rear End Door) Inspection: in related manual”.</i>
	Lighting switch faulty	<i>Check lighting switch referring to “Headlight Switch (in Lighting Switch) Inspection: in Section 9B”.</i>
	Key reminder switch faulty	<i>Check key reminder switch referring to “Ignition Switch Inspection: ”.</i>
	Wiring or ground faulty	<i>Repair circuit.</i>
	BCM faulty	<i>Replace after making sure that none of above parts is faulty.</i>

Information Display Symptom Diagnosis (If Equipped)

NOTE

This thermometer indicates the ambient temperature in back of front bumper member. Under any one of the following listed conditions, however, even when the ambient temperature goes up, the thermometer display does not rise so as to correct the rise of the ambient temperature caused by the radiant heat of the engine. When the ambient temperature drops, the thermometer reading follows the change in the temperature.

Be sure to bear this in mind when diagnosing trouble.

- The vehicle speed is 30 km/h (18 mph) or lower.
- VSS signal is faulty.
- The ignition switch is turned on again within 2 hours.

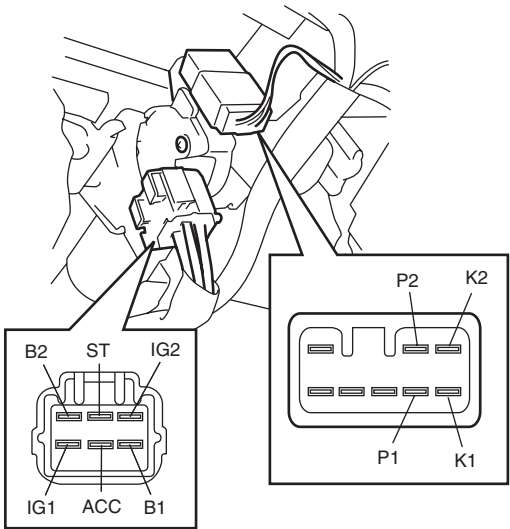
Condition	Possible cause	Correction / Reference Item
No displaying of information display	Circuit fuse Blown	Replace fuse and check for short circuit.
	Wiring or grounding faulty	Repair as necessary.
	Information display unit faulty	Replace unit.
Incorrect thermometer display	Outside air temperature sensor faulty	Check outside air temperature sensor referring to "Outside Air Temperature Sensor Inspection (If Equipped): in related manual".
	Vehicle speed signal faulty	Check ECM for DTC referring to "DTC Check: in Section 1A in related manual".
	Wiring or grounding faulty	Repair as necessary.
	BCM faulty	Replace after making sure that none of above parts is faulty.
Display does not change at -30 °C	Outside air temperature is -30 °C (-22 °F) or less	—
	Outside air temperature sensor faulty	Check outside air temperature sensor referring to "Outside Air Temperature Sensor Inspection (If Equipped): in related manual".
	BCM faulty	Replace after making sure that none of above parts is faulty.
Display does not change at 50 °C	Outside air temperature is 50 °C (122 °F) or more	—
	Outside air temperature sensor faulty	Check outside air temperature sensor referring to "Outside Air Temperature Sensor Inspection (If Equipped): in related manual".
	BCM faulty	Replace after making sure that none of above parts is faulty.
Display of thermometer does not change at "- - - °C"	Outside air temperature sensor faulty	Check outside air temperature sensor referring to "Outside Air Temperature Sensor Inspection (If Equipped): in related manual".
	Outside air temperature sensor circuit is open or short	Repair circuit.
	Wiring or grounding faulty	Repair circuit.
	BCM faulty	Replace after making sure that none of above parts is faulty.
Display of fuel consumption does not change at "- - - l / 100 km (km/l, MPG)"	Vehicle is not running (instantaneous fuel consumption mode)	—
	Fuel consumption was reset (average fuel consumption mode, if equipped)	Vehicle runs for a while.
	Vehicle speed signal faulty	Check ECM for DTC referring to "DTC Check: in Section 1A in related manual".
	Wiring or grounding faulty	Repair circuit.
	ECM faulty	Check input and output signal of ECM referring to "Inspection of ECM and Its Circuits: in Section 1A".
	BCM faulty	Replace after making sure that none of above parts is faulty.

Repair Instructions

Ignition Switch Inspection

S5JB0E9306002

- Check for continuity between terminals at each switch position. If check result is not as specified, replace switch.



Terminal		B1	B2	ACC	IG1	IG2	ST	K1	K2
Key	Position								
OUT	LOCK	○							
		○							
IN	ACC	○		○					
	ON	○	○	○	○	○		○	○
	START	○	○		○		○		

Terminal		P1	P2
Ignition knob switch (with keyless start system only)			
OFF (ignition knob switch released)			
ON (ignition knob switch pushed)		○	○

I5RS0D930003-02

Fuel Level Sensor Removal and Installation

S5JB0E9306004

Main Fuel Level Sensor

For removal and installation, refer to “Fuel Pump Assembly Removal and Installation: in Section 1G in related manual”.

Sub Fuel Level Sensor

For removal and installation, refer to “Sub Fuel Level Sensor Removal and Installation: in Section 1G in related manual”.

Fuel Level Sensor Inspection

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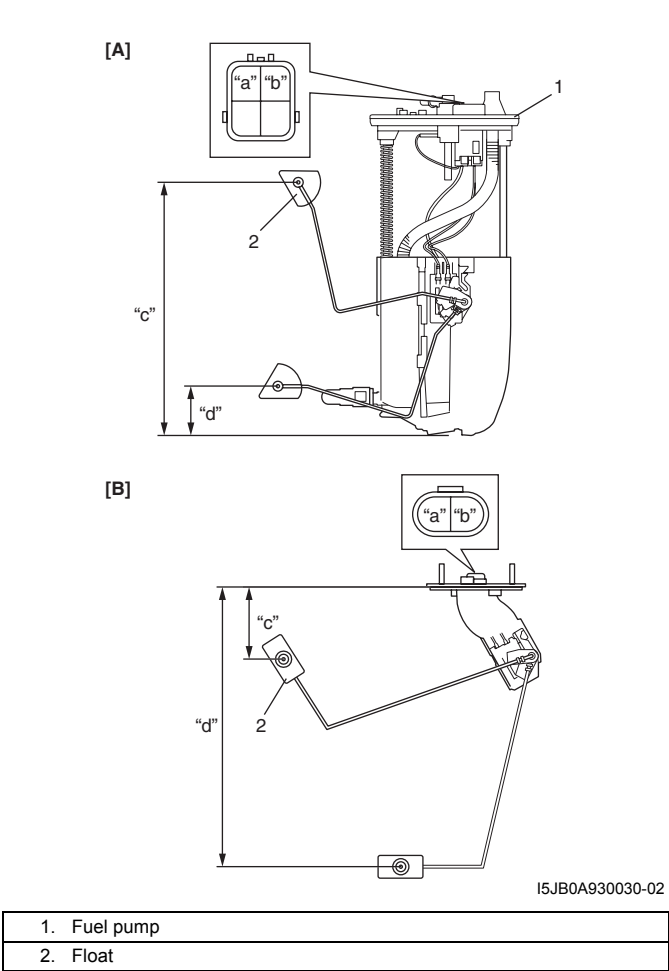
- Check that resistance between terminals “a” and “b” of fuel level sensor changes with change of float position.
- Check resistance between terminals “a” and “b” at each float position in the following.
If the measured value is out of specification, replace fuel pump and/or sub fuel level sensor.

Main fuel level sensor [A] specifications

	Float position		Resistance (Ω)
3 door model	Full Upper “C”	193.7 mm (7.626 in.)	19.0 – 21.0
	Full Lower “D”	42.2 mm (1.661 in.)	111.9 – 115.3
5 door model	Full Upper “C”	196.8 mm (7.748 in.)	19.0 – 21.0
	Full Lower “D”	34.9 mm (1.374 in.)	129.0 – 132.4

Sub fuel level sensor [B] specifications

	Float position		Resistance (Ω)
3 door model	Full Upper “C”	48.1 mm (1.894 in.)	19.0 – 21.0
	Full Lower “D”	252.8 mm (9.953 in.)	164.7 – 168.1
5 door model	Full Upper “C”	64.1 mm (2.524 in.)	19.0 – 21.0
	Full Lower “D”	244.8 mm (9.638 in.)	147.6 – 151.0



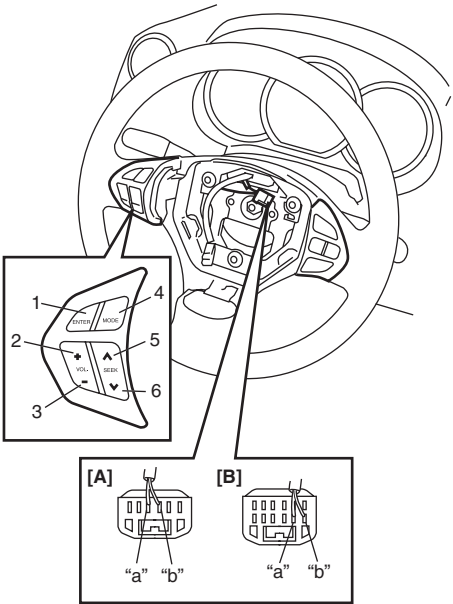
Remote Audio Control Switch Inspection

S5JB0E9306026

- 1) Remove driver air bag (inflator) module referring to “Driver Air Bag (Inflator) Module Removal and Installation: in Section 8B in related manual”.
- 2) Disconnect remote audio control switch connector from contact coil.
- 3) Check switch for resistance between “a” and “b” terminals under each condition below.
If check result is not satisfactory, replace remote audio control switch.

Remote audio control switch resistance

- All switches released (OFF): 4700 – 5600 Ω
- “ENTER” switch (1) pushing on (ON): 50 – 60 Ω
- “+” switch (2) pushing on (ON): 120 – 140 Ω
- “-” switch (3) pushing on (ON): 220 – 260 Ω
- “MODE” switch (4) pushing on (ON): 370 – 460 Ω
- “^” witch (5) pushing on (ON): 680 – 820 Ω
- “V” switch (6) pushing on (ON): 1400 – 1700 Ω



I6JB01930012-02

[A]:	Without cruise control system
[B]:	With cruise control system

Wipers / Washers

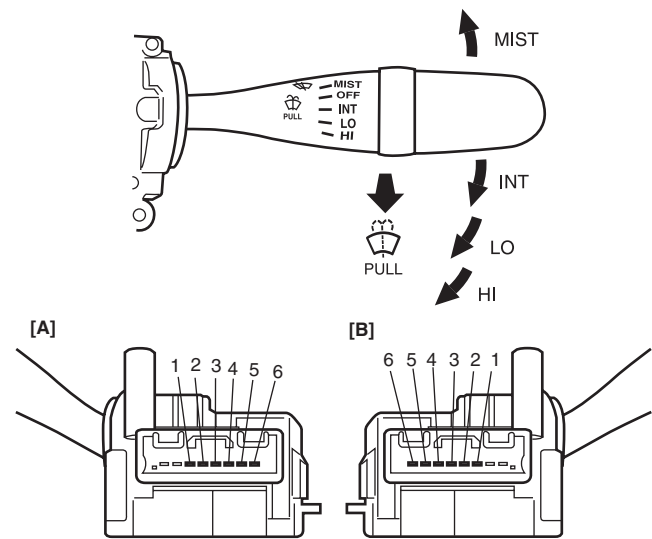
Repair Instructions

Windshield Wiper and Washer Switch Inspection

S5JB0E9406009

Windshield Wiper and Washer Switch

Check for continuity between terminals at each switch position. If check result is not as specified, replace switch.



[D]	[C]	6	5	4	3
OFF				○	○
INT				○	○
LO			○	○	
HI		○	○		
MIST			○	○	

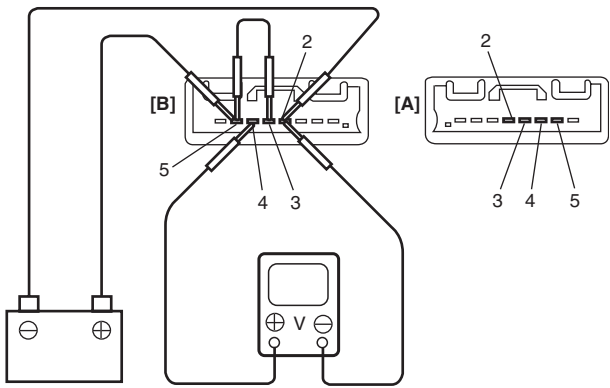
[E]	[C]	1	2
ON		○	○
OFF			

I5JB0D940001-01

[A]: RH steering vehicle without rear fog light
[B]: Other than RH steering vehicle without rear fog light
[C]: Terminal
[D]: Wiper switch
[E]: Washer switch

Intermittent Wiper Relay Circuit

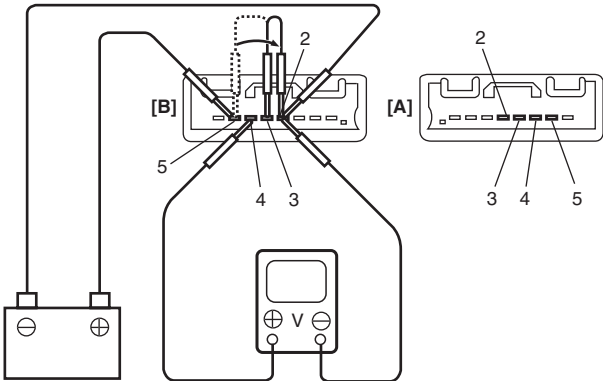
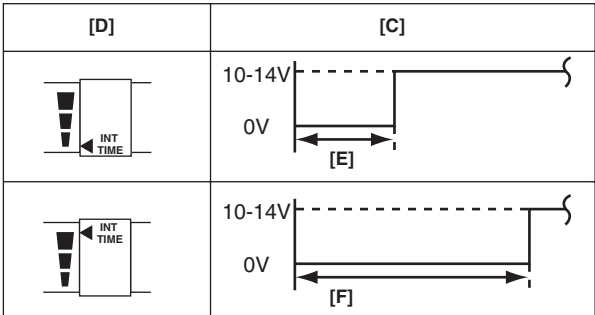
- 1) Turn the windshield wiper switch to “INT” position.
- 2) Connect battery positive (+) terminal to terminal “5” and its negative (–) terminal to terminal “2”.
- 3) Connect voltmeter positive lead to terminal “4” and its negative lead to terminal “2”.
- 4) Check that the voltmeter indicates the battery voltage (10 – 14 V).
- 5) Connect terminal “3” and terminal “5” by a jumper wire.



I5JB0D940002-02

[A]: RH steering vehicle without rear fog light
[B]: Other than RH steering vehicle without rear fog light

- Disconnect end of the jumper wire from terminal “5”.
 - Connect disconnected jumper wire end to terminal “2”, then check that voltage between terminal “4” and terminal “2” changes as shown.
- If check result is not satisfied, replace switch.

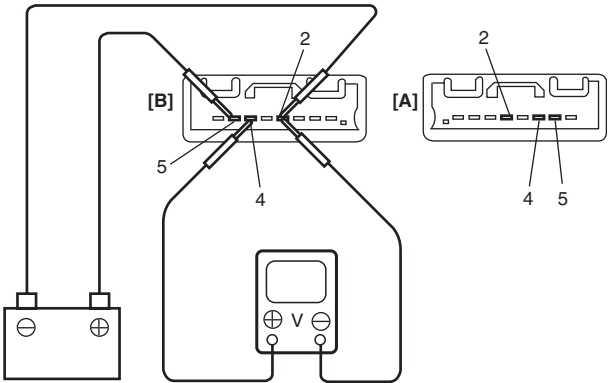
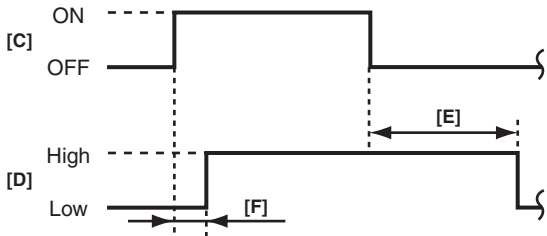


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[A]:	RH steering vehicle without rear fog light
[B]:	Other than RH steering vehicle without rear fog light
[C]:	Voltage
[D]:	INT time control switch position
[E]:	1.6 ± 1 sec.
[F]:	10.7 ± 5 sec.

Washer Linked Circuit

- Make sure that front wiper switch is at “OFF” position.
 - Connect battery positive (+) terminal to terminal “5” and its negative (–) terminal to terminal “2”.
 - Connect voltmeter positive lead to terminal “4” and its negative lead to terminal “2”.
 - When front washer switch is ON, check that voltage changes as shown in figure.
- If check result is not satisfied, replace switch.



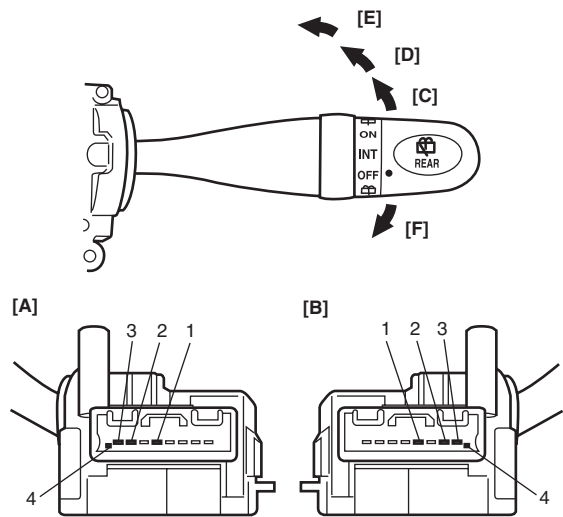
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[A]:	RH steering vehicle without rear fog light
[B]:	Other than RH steering vehicle without rear fog light
[C]:	Wiper switch
[D]:	Voltage
[E]:	Approx. 2.2 sec.
[F]:	Approx. 0.3 sec.

Rear Wiper and Washer Switch Inspection

S5JB0E9406011

Check for continuity between terminals at each switch position. If check result is not as specified, replace switch.



	1	2	3	4
OFF				
[C]	○			○
[D]	○		○	
[E]	○	○	○	
[F]	○	○		

I5JB0D940005-01

[A]: RH steering vehicle without rear fog light
[B]: Other than RH steering vehicle without rear fog light

Section 10

Control systems

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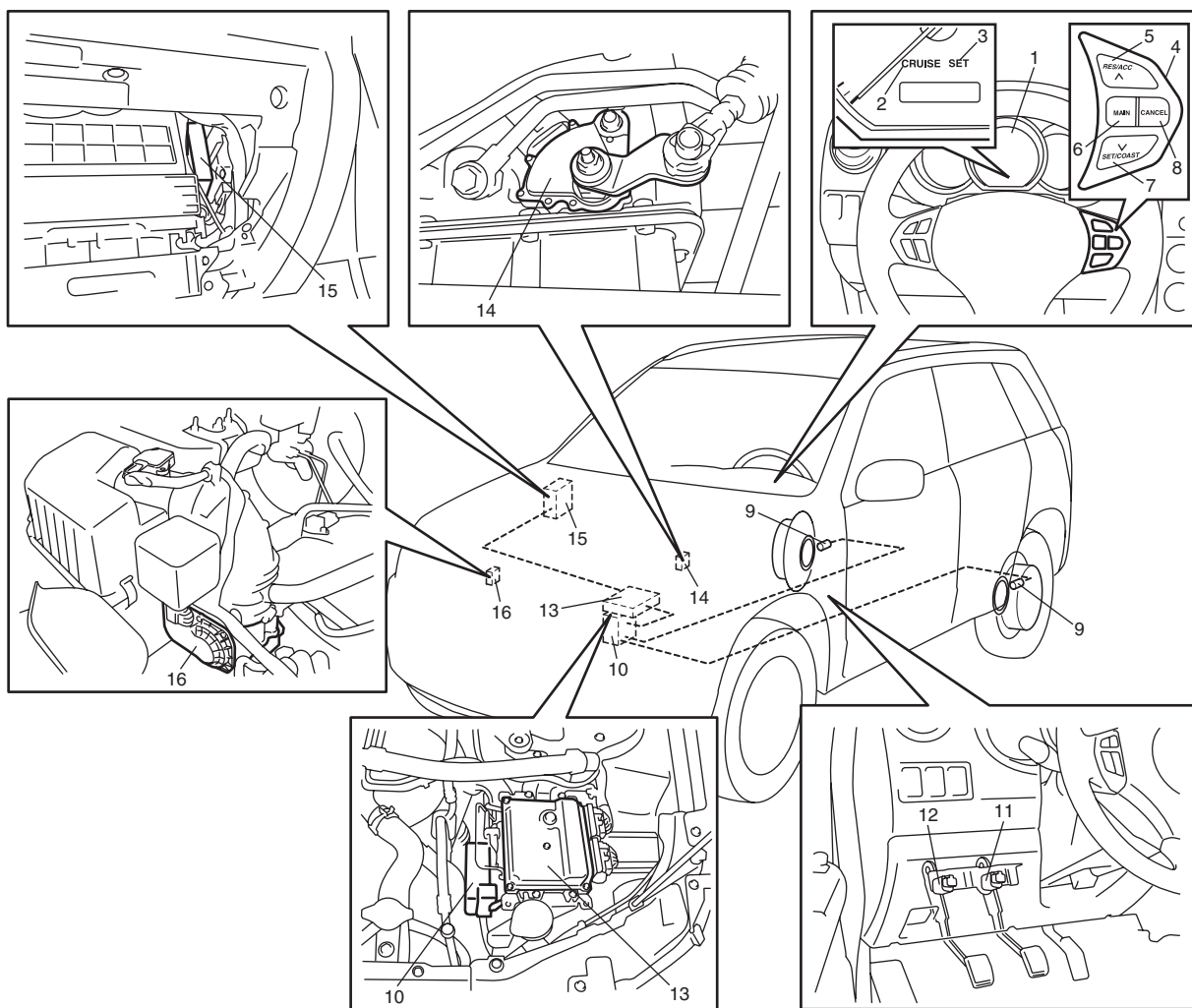
Cruise Control System

General Description

Cruise Control System Construction

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The cruise control system is a device which maintains a preset vehicle speed while driving at a high speed, e.g., on a highway. It allows the driver to drive his vehicle at a constant speed of 40 km/h (25 mile/h) or higher without depressing the accelerator pedal. The system also has such functions as to change the vehicle speed without operating the accelerator pedal (but using SET/COAST and RES/ACC switches), cancel cruise control (CANCEL switch) and resume the speed in memory automatically after cruise control is cancelled (RES/ACC switch). The system mainly consists of electric throttle body assembly, ECM, cruise control switch (MAIN (ON/OFF) switch, SET/COAST switch, RES/ACC switch and CANCEL switch), etc.



I5JB0AA10001-01

1. Combination meter	7. SET/COAST switch	13. ECM
2. "CRUISE" indicator lamp	8. CANCEL switch	14. Transmission range switch (A/T vehicle only)
3. "SET" indicator lamp	9. Wheel speed sensor (vehicle speed signal)	15. TCM (A/T vehicle only)
4. Cruise control switch assembly	10. ABS or ESP® control module	16. Electric throttle body assembly
5. RES/ACC switch	11. Brake light switch with brake pedal position switch	
6. MAIN (ON/OFF) switch	12. Clutch pedal position switch (M/T vehicle only)	

Components and Functions of Cruise Control System

Component	Function
ECM and electric throttle body assembly	ECM executes centralized control over all functions including setting a constant speed, resuming it, setting coast, cancelling cruise control limiting minimum speed. ECM controls electric throttle valve opening to keep actual vehicle speed at set (target) speed.
MAIN (ON/OFF) switch	This switch has a momentary contact type button to press cruise control system ON and OFF.
SET/COAST switch	When this switch is pressed (ON) and then released (OFF) while vehicle is running at a speed 40 km/h (25 mile/h) or higher, vehicle speed at that OFF moment is stored in memory and it is maintained (constant cruising). Pressing this switch (ON) continuously during constant cruising keeps slowing down vehicle speed as long as it is ON. When it is released (OFF), vehicle speed at that moment is stored in memory and vehicle starts constant cruising.
RES/ACC switch	When this switch is pressed (ON) during constant cruising, vehicle speed keeps increasing as long as it is ON. When it is released (OFF), vehicle speed at that moment is stored in memory and vehicle starts constant cruising. If vehicle speed is higher than 40 km/h (25 mile/h) after cruise control is cancelled, pressing this switch ON momentarily will resume the speed at which vehicle was running before cancellation.
CANCEL switch	When this switch is pressed (ON), cruise control (throttle valve control) is cancelled.
Wheel speed sensor (vehicle speed signal)	ECM receives speed sensor signal from ABS or ESP® control module through CAN communication and calculates vehicle speed using that signal.
Brake light switch	Brake light switch has 2 contact points. One contact point closes when brake pedal is depressed to light brake light and provides a voltage signal to the ECM. The other contact point (brake pedal position switch) opens when brake pedal is depressed, to shut off power to cruise control of ECM, thereby cancelling cruise control (throttle valve control). This switch is installed to cancel cruise control (constant cruising).
Clutch pedal position switch (M/T vehicle only)	When clutch pedal is depressed, clutch pedal position switch closes and provides a ground signal to ECM. ECM cancels cruise control (throttle valve control) when this signal is inputted.
Transmission range switch (A/T vehicle only)	When selector lever is placed in either "P", "R" or "N" position, transmission range switch closes and provides a ground signal to TCM. TCM transmits signal from transmission range switch to ECM through CAN communication. When ECM receives a signal indicating that selector lever position is "P", "R" or "N", it cancels cruise control (throttle valve control).
TCM	TCM receives the SET signal for the cruise control from ECM through CAN communication. When TCM receives the SET signal from ECM, the gear shift control is performed by using the gear shift map for the cruise control changed from the one for normal gear shift. For details, refer to "Automatic Gear Shift Table: in Section 5A".
"CRUISE" indicator lamp	In the state with ignition switch ON and cruise control system OFF, pressing MAIN (ON/OFF) switch once and releasing it will activate the cruise control system and ECM will cause indicator lamp to light up.
"SET" indicator lamp	It lights up when cruise control (throttle valve control) is functioning.

Cancel Conditions of Cruise Control System

S5JB0EA101003

Constant cruising is cancelled under the following conditions.

- *Ignition switch is turned OFF.
- MAIN (ON/OFF) switch is turned OFF.
- Vehicle speed becomes lower than minimum operating speed (40 km/h (25 mile/h)).
- *Vehicle speed varies beyond cancel speed range (– 10 km/h (–6 mile/h)) from preset speed.
- *Brake pedal is depressed. (Brake light switch is turned ON).
- *Clutch pedal is depressed (Clutch pedal position switch is turned ON) (For M/T vehicle).
- *Selector lever is shifted to “P”, “R” or “N” range.
- *CANCEL switch is turned ON.
- *ESP® is operating (if equipped).

NOTE

When constant cruising is cancelled under any condition with * (asterisk), vehicle speed before cancellation can be resumed by operating RES/ACC switch, provided that vehicle speed is higher than 40 km/h (25 mile/h).

Input / Output Diagram

S5JB0EA101004

Input

Cruise control switch

MAIN switch
RES/ACC switch
SET/COAST switch
CANCEL switch

CPP switch
(M/T model)

Stop (brake) lamp switch

Transmission range switch
("P", "R" or "N" range signal)
(A/T model)

Wheel speed sensor
(vehicle speed signal)

ABS or ESP®
control module

ECM

Output

Electric throttle body
(throttle valve control)

Combination meter
(Indicator lamp control)

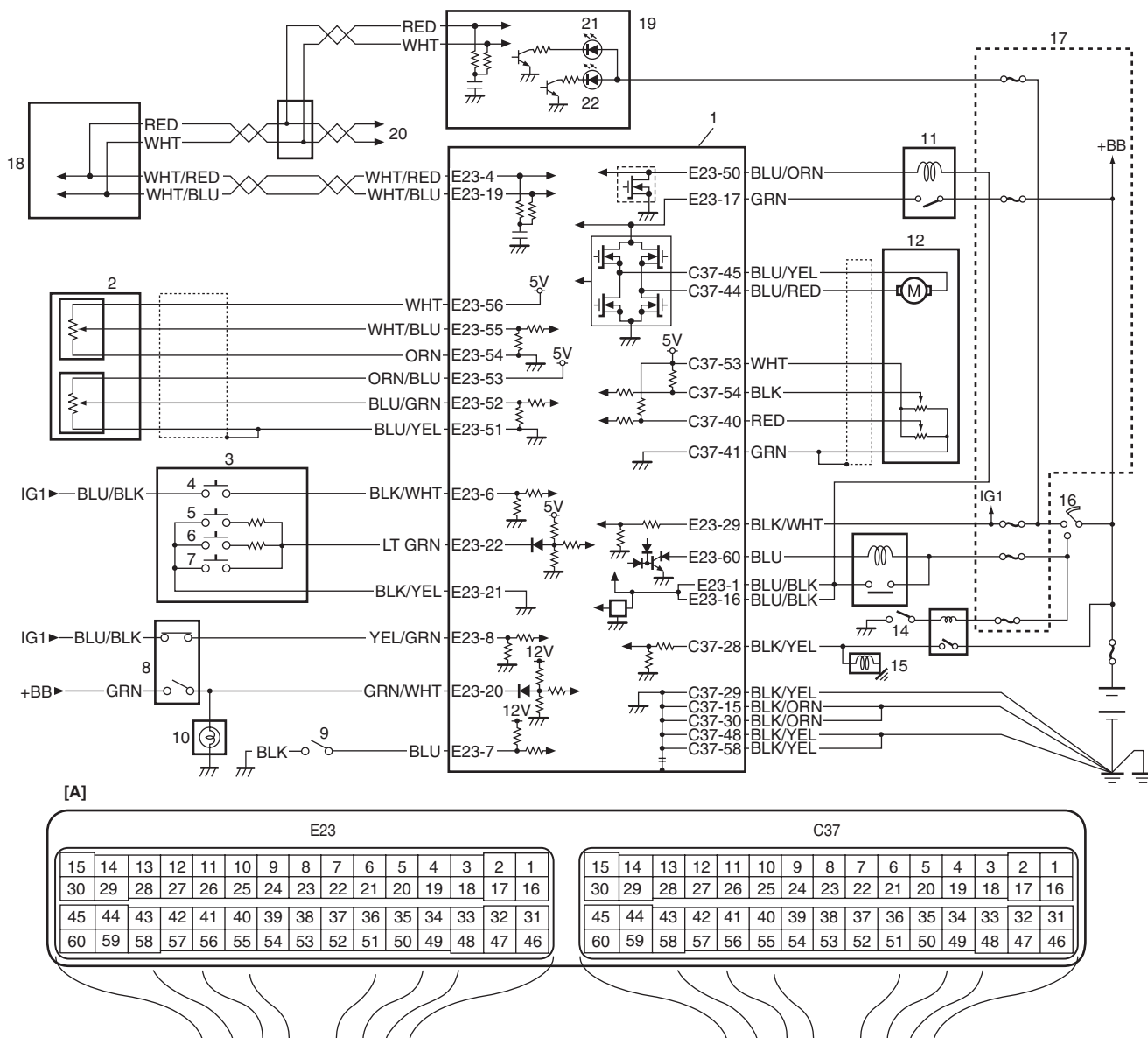
TCM (Shift control)
(A/T model)

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Schematic and Routing Diagram

Cruise Control System Wiring Diagram

S5JB0EA102001



I5JB0DA10001-01

[A]: ECM connector (viewed from harness side)	8. Stop (brake) lamp switch	16. Ignition switch
1. ECM	9. CPP switch	17. Junction block assembly
2. Accelerator pedal position sensor	10. Brake lamp	18. ABS or ESP® control module
3. Cruise control switch assembly	11. Electric throttle valve relay	19. Combination meter
4. MAIN (ON/OFF) switch	12. Electric throttle body assembly	20. Other control modules
5. RES/ACC switch	13. Main relay	21. "CRUISE" indicator lamp
6. SET/COAST switch	14. Transmission range switch (A/T model)	22. "SET" indicator lamp
7. CANCEL switch	15. Starting motor	

Diagnostic Information and Procedures

Cruise Control System Symptom Diagnosis

S5JB0EA104001

NOTE

- ECM uses TCM, ABS or ESP® control module and CAN communication to transmit and receive data for cruise control. Therefore, check that no DTC is detected from ECM, TCM, ABS or ESP® control module before performing this Cruise Control System Symptom Diagnosis. If DTC is detected, correct trouble indicated by that DTC first.
- Check each part in the order from the top of the following list.

Condition	Possible cause	Correction / Reference Item
CRUISE or SET indicator lamp does not turn ON or OFF	MAIN (ON/OFF) switch faulty	Check MAIN (ON/OFF) switch for function referring to "Cruise Control Switch Inspection: in related manual".
	SET/COAST switch faulty	Check SET/COAST switch for function referring to "Cruise Control Switch Inspection: in related manual".
	Stop (brake) lamp switch faulty	Check stop (brake) lamp switch for function referring to "Stop (Brake) Lamp Switch Inspection: in related manual".
	Wiring or grounding faulty	Repair.
	Combination meter faulty	Replace.
	ECM faulty	Replace after making sure that none of above parts is faulty.
Vehicle speed can not be set	MAIN (ON/OFF) switch faulty	Check MAIN (ON/OFF) switch for function referring to "Cruise Control Switch Inspection: in related manual".
	SET/COAST switch faulty	Check SET/COAST switch for function referring to "Cruise Control Switch Inspection: in related manual".
	Stop (brake) lamp switch faulty	Check stop (brake) lamp switch for function referring to "Stop (Brake) Lamp Switch Inspection: in related manual".
	CPP switch faulty (M/T model)	Check CPP switch for function referring to "Clutch Pedal Position (CPP) Switch (for Cruise Control) Inspection and Adjustment: in related manual".
	Wiring or grounding faulty	Repair.
	ECM faulty	Replace after making sure that none of above parts is faulty.
Acceleration or deceleration is not available by using RES/ACC or SET/COAST switch	RES/ACC or SET/COAST switch faulty	Check RES/ACC or SET/COAST switch for function referring to "Cruise Control Switch Inspection: in related manual".
	Wiring or grounding faulty	Repair.
	ECM faulty	Replace after making sure that none of above parts is faulty.

10A-6 Cruise Control System:

Condition	Possible cause	Correction / Reference Item
<i>Cruise control cannot be cancelled</i>	CANCEL switch faulty	<i>Check CANCEL switch for function referring to “Cruise Control Switch Inspection: in related manual”.</i>
	Stop (brake) lamp switch faulty	<i>Check stop (brake) lamp switch for function referring to “Stop (Brake) Lamp Switch Inspection: in related manual”.</i>
	CPP switch faulty	<i>Check CPP switch for function referring to “Clutch Pedal Position (CPP) Switch (for Cruise Control) Inspection and Adjustment: in related manual”.</i>
	Wiring or grounding faulty	<i>Repair.</i>
	ECM faulty	<i>Replace after making sure that none of above parts is faulty.</i>
<i>Cruise control at vehicle speed stored in memory cannot be resumed after cruise control was cancelled by means other than MAIN (ON/OFF) switch</i>	RES/ACC switch faulty	<i>Check RES/ACC switch for function referring to “Cruise Control Switch Inspection: in related manual”.</i>
	Wiring or grounding faulty	<i>Repair.</i>
	ECM faulty	<i>Replace after making sure that none of above parts is faulty.</i>

Body Electrical Control System

Precautions

Precautions in Diagnosing Trouble

S5JB0EA200001

- Diagnostic information stored in BCM memory can be cleared as well as checked by using SUZUKI scan tool. Before using scan tool, read its Operator's (Instruction) Manual carefully to have good understanding as to what functions are available and how to use it.
- Be sure to read "Precautions for Electrical Circuit Service: in Section 00 in related manual" before inspection and observe what is written there.

- Communication of ECM, TCM (if equipped), BCM, ABS or ESP® control module (if equipped), 4WD control module (if equipped), keyless start control module (if equipped), steering angle sensor (if equipped) and combination meter is established by CAN (Controller Area Network). Therefore, be sure to read "Precaution for CAN Communication System: in Section 00 in related manual" before inspection and handle CAN communication line.

General Description

BCM General Description

S5JB0EA201001

The BCM incorporates relays and controllers which are used for the following systems and controls them.

- Power door lock (if equipped)
- Keyless entry (if equipped)
- Door lock function of keyless start system (if equipped)
- Rear wiper
- Combination meter
- Interior light / luggage room light
- Warning buzzer
- Rear end door window defogger and door mirror heater (if equipped)
- DRL (if equipped)
- Auto-on headlight (if equipped)
- Front fog light (if equipped)
- Theft deterrent light

Also, the BCM has a function to cause the interior light and open door warning lamp in the combination meter to turn off when any door is left open for longer than 15 minutes to reduce wasteful battery consumption. In addition, it is possible to check operation of actuator which is controlled by BCM by using the output test function of SUZUKI scan tool to operate actuator simulatively.

CAN Communication System Description

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

BCM Transmission Data

				ECM	TCM (A/T model)	ESP® Control Module (vehicle equipped with ESP®)	Combination Meter	Keyless Start Control Module (if equipped)
BCM	Transmit	DATA	A/C switch ON signal	○				
			Blower fan signal	○				
			DRL ON signal	○				
			Electric load signal	○			○	
			A/T mode status signal	○	○		○	
			Brake fluid level switch signal			○	○	
			Parking brake switch signal			○	○	
			Seat belt buckle switch signal				○	
			Charging system signal				○	
			Engine oil pressure switch signal				○	
			Illumination ON signal				○	
			Diagnostic trouble code (DTC)				○	
			Door switch status				○	○
			Door lock status					○

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BCM Reception Data

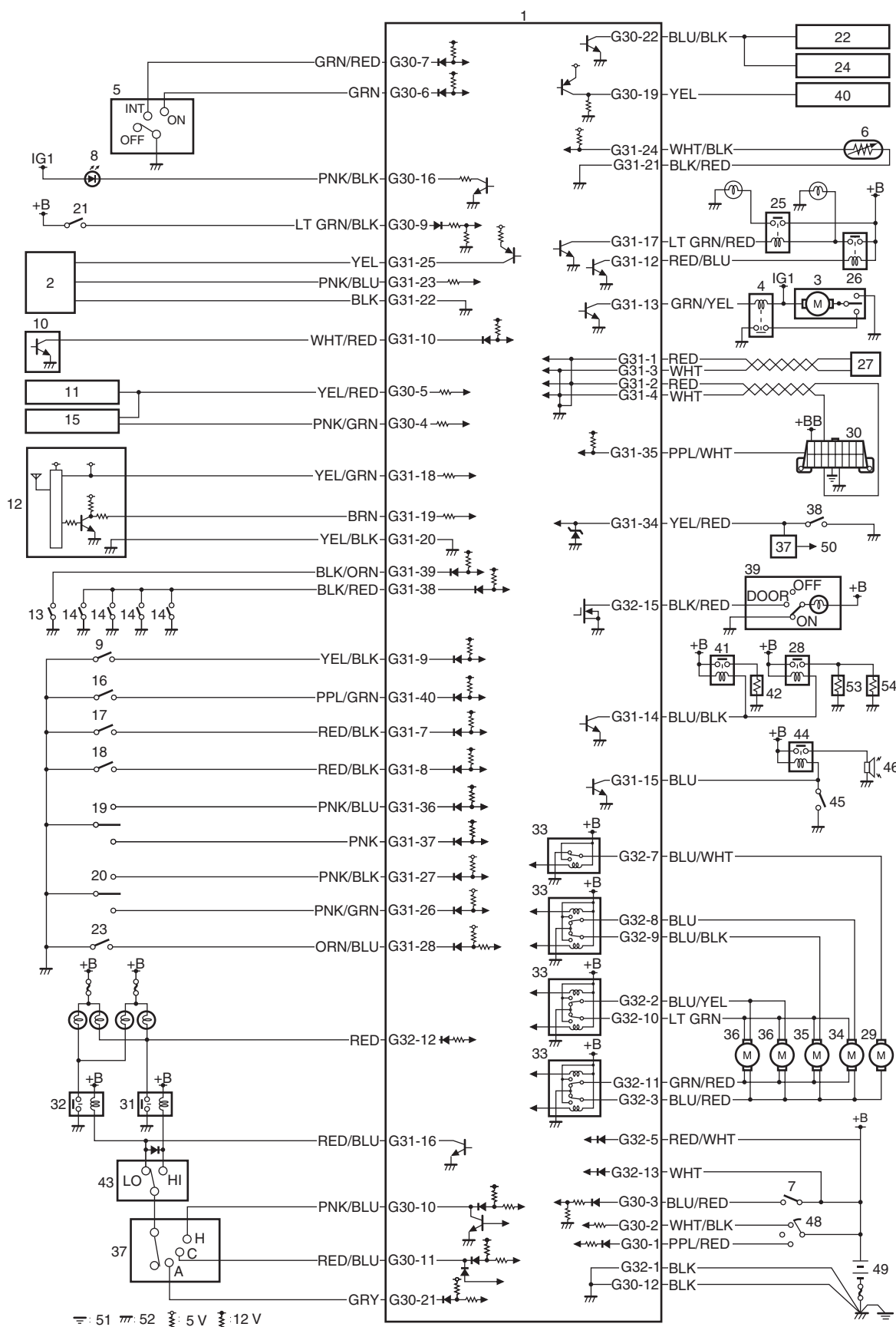
				ECM	TCM (for A/T model)	4WD Control Module (if equipped)	Keyless Start Control Module (if equipped)
BCM	Receive	DATA	Engine speed signal	○			
			Engine coolant temp. signal	○			
			Vehicle speed signal	○			
			Stop (brake) lamp switch signal	○			
			Magnet clutch signal	○			
			A/C refrigerant pressure signal	○			
			Distance kilometers per liter of fuel signal	○			
			Transmission range sensor signal (A/T select lever position)		○		
			Buzzer request signal			○	○
			Door lock/unlock request signal				○
			Ignition knob switch signal				○
			Answer back request signal				○

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Schematic and Routing Diagram

Body Electrical Control System Wiring Circuit Diagram

S5JB0EA202001



10B-4 Body Electrical Control System:

1. BCM	22. Navigation	43. Dimmer and passing switch
2. Auto-ON headlight sensor	23. POWER/NORMAL mode switch	44. Horn relay
3. Rear wiper motor	24. Headlight auto leveling control module	45. Horn switch
4. Rear wiper relay	25. Front fog light relay	46. Horn
5. Rear wiper and washer switch	26. Tail light relay	47. Lighting switch
6. Outside air temperature sensor	27. Junction connector	48. Ignition switch
7. Ignition key switch	28. Door mirror heater relay	49. Battery
8. Theft deterrent light	29. Rear end door lock actuator	50. To turn signal light
9. Oil pressure switch	30. Data link connector (DLC)	51. Body ground
10. Generator	31. Headlight high beam relay	52. Engine ground
11. Information display	32. Headlight low beam relay	53. Right side door mirror heater
12. Keyless entry receiver	33. Door lock motor relay	54. Left side door mirror heater
13. Driver side door switch	34. Driver side door lock actuator	INT: Intermittent position
14. Other than driver side door switch	35. Passenger side door lock actuator	ON: Rear wiper ON position
15. HVAC control module	36. Rear door lock actuator	LO: Low beam position
16. Driver side seat belt switch	37. Turn signal and hazard warning relay	HI: High beam position
17. Brake fluid level switch	38. Hazard warning switch	A: Auto position
18. Parking brake switch	39. Interior light	C: Clearance position
19. Door key cylinder switch (included in door lock actuator)	40. Air bag control module	H: Head position
20. Manual door lock switch	41. Rear window defogger relay	
21. Front fog light switch	42. Rear window defogger	

Diagnostic Information and Procedures

Body Electrical Control System Check

S5JB0EA204002

Step	Action	Yes	No
1	☞ Customer complaint analysis 1) Perform customer complaint analysis. <i>Was customer complaint analysis performed?</i>	Go to Step 2.	Perform customer complaint analysis.
2	☞ Problem symptom confirmation 1) Perform problem symptom confirmation. <i>Does trouble recur?</i>	Go to Step 3.	Go to Step 7.
3	☞ DTC check 1) Check DTC. <i>Is it malfunction code?</i>	Go to Step 4.	Go to Step 5.
4	☞ Troubleshooting for DTC 1) Check and repair according to DTC diag. flow. <i>Are check and repair completed?</i>	Go to Step 7.	Check and repair malfunction part(s).
5	☞ Body electrical control system symptom diagnosis 1) Perform check and repair referring to "Symptom Diagnosis" of system having a trouble. <i>Is there faulty condition?</i>	Repair or replace malfunction part(s).	Go to Step 6.
6	☞ Check for intermittent problem 1) Check for intermittent problem. <i>Is there faulty condition?</i>	Repair or replace malfunction part(s).	Go to Step 7.
7	☞ Final confirmation test 1) Clear DTC referring to "DTC Clearance: in related manual". 2) Check DTC referring to "DTC Check: in related manual". <i>Is there any DTC?</i>	Go to Step 4.	End.

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 a questionnaire form as shown in the figure will facilitate collecting information to the point required for proper analysis and diagnosis.

Customer questionnaire (example)

Customer's name:	Model:	VIN:	
Date of issue:	Date Reg:	Date of problem:	Mileage:

Problem Symptoms	• Power door lock system does not operate • Keyless entry system does not operate • Rear end door window defogger does not operate • Rear wiper does not operate • Rear end door opener does not operate • Warning buzzer does not sound • Interior light does not light • Theft deterrent light does not flush • Other_____
Frequency of Occurrence	• Continuous / Intermittent (times a day, a month) / Other_____
Environmental Condition	• Weather: Fine / Cloudy / Rain / Snow / Other_____ • Temperature: °C(° F)
Diagnostic Trouble Code	• Normal code / Malfunction code ()

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Problem Symptom Confirmation

Check if what the customer claimed in "Customer Questionnaire" is accurately found in the vehicle. If that symptom is found, check whether the symptom is identified as a failure. (This step should be shared with the customer if possible.)

DTC check

Check DTC stored in BCM memory referring to "DTC Check: in related manual", record it and then clear it referring to "DTC Clearance: in related manual". DTC indicates malfunction that occurred in the system but does not indicate whether it exists now or it occurred in the past and the normal condition has been restored now. To check which case applies, clear DTC once and check whether or not any fault exists.

Troubleshooting for DTC

Based on the DTC indicated in Step 3 and referring to applicable DTC flow, locate the cause of the trouble, namely in a sensor, wire harness, connector, BCM or other part and repair or replace faulty parts.

Body Electrical Control System Symptom Diagnosis

Check the parts or system suspected as a possible cause referring to symptom diagnosis of each system.

Check for Intermittent Problem

Check parts where an intermittent trouble is easy to occur (e.g., wire harness, connector, etc.), referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".

10B-6 Body Electrical Control System:**Final Confirmation Test**

Confirm that the problem symptom has gone and the body electrical control system is free from any abnormal conditions. If what has been repaired is related to the malfunction DTC, check DTC again and confirm that no DTC is indicated.

Scan Tool Data

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Scan tool Data	Condition	Normal condition / reference value
Vehicle Speed	At stop with ignition switch turned ON	0 km/h
Outside air Temp	Reference value is relative to outside air temperature	-40 °C – 70 °C (-40 °F – 158 °F)
Battery Voltage	At specified idle speed after warming up	10 – 14 V
Coolant Temp	At specified idle speed after warming up	80 °C – 100 °C (176 °F – 212 °F)
Engine Speed	Engine idling with no load applied after warming up	Desired idle speed ± 50 rpm
Fuel Consumption	At specified idle speed after warming up	0.0 km/l
Key Reminder Sw	Ignition key inserted in ignition key cylinder	Key in
	Ignition key pulled out from ignition key cylinder	Pulled
Door key Sw	Key cylinder switch of driver side door at lock position	LOCK
	Key cylinder switch of driver side door not turned	Neutral
	Key cylinder switch of driver side door at unlock position	Unlock
Door Lock Sw	Lock side of manual door lock switch pressed	LOCK
	Manual door lock switch not pressed	Neutral
	Unlock side of manual door lock switch pressed	Unlock
Driv Door Sw	Driver side door open	Open
	Driver side door closed	Close
Pass Door Sw	Doors other than driver side door open	Open
	Doors other than driver side door closed	Close
Brake Fluid Level	Brake fluid level at MIN level or higher	Normal
	Brake fluid level lower than MIN level	Low
Parking Brake Sw	Parking brake lever pulled	ON
	Parking brake lever released	OFF
Rear Defogger Sw	Rear end door window defogger switch turned ON with engine running	ON
	Rear end door window defogger switch turned OFF with engine running	OFF
Tail Light Sw	Lighting switch at HEAD or CLEARANCE position	ON
	Lighting switch at OFF position	OFF
Driv Seat belt Sw	Driver side seat belt fastened	Fasten
	Driver side seat belt unfastened	Unfasten
Charge Light	Engine at stop with ignition switch turned ON	ON
	Engine running	OFF
Oil pressure switch	Engine at stop with ignition switch turned ON	ON
	Engine running	OFF
A/C Switch	A/C and ignition switch turned ON	ON
	A/C switch turned OFF	OFF
Rear Wiper Sw	Rear wiper switch at ON position	ON
	Rear wiper switch at INT position	INT
	Rear wiper switch at OFF position	OFF
Front Fog Light Sw	Lighting switch at HEAD or CLEARANCE position and front fog light switch at ON position	ON
	Lighting switch at HEAD or CLEARANCE position and front fog light switch at OFF position	OFF
Headlight Sw	Lighting switch at HEAD position	ON
	Lighting switch at OFF position	OFF

Scan Tool Data Definitions

Vehicle Speed (km/h, mph): This parameter indicates the vehicle speed computed by ECM.

Outside air Temp (°C, °F): It is detected by outside air temperature sensor.

Battery Voltage (V): This parameter indicates battery positive voltage inputted to BCM.

Coolant Temp (Engine coolant temperature) (°C, °F): This parameter indicates the engine coolant temperature computed by ECM.

Engine Speed (RPM): This parameter indicates the engine speed computed by ECM.

Fuel Consumption (km/l): This parameter indicates the fuel consumption computed by ECM.

Key Reminder Sw (Key reminder switch) (Pulled / Key in): This parameter indicates the state of the key reminder switch.

Door key Sw (Door key cylinder switch) (Lock / Neutral / Unlock): This parameter indicates the state of the door key cylinder switch.

Door lock Sw (Manual door lock switch) (Lock / Neutral / Unlock): This parameter indicates the state of the manual door lock switch.

Driv Door Sw (Driver side door switch) (Open / Close): This parameter indicates the state of the driver side door switch.

Pass Door Sw (Other than driver side door switch) (Open / Close): This parameter indicates the state of the door switches other than driver side door switch.

Brake Fluid Level (Low / Normal): Low: Brake fluid level is lower than specified level.

Normal: Brake fluid level is higher than MIN level.

Parking Brake Sw (Parking brake switch) (ON / OFF): ON: Parking brake lever is pulled up.

OFF: Parking lever is released

Rear Defogger Sw (Rear end door window defogger switch) (ON / OFF): This parameter indicates the state of the rear end door window defogger switch.

Tail Light Sw (Lighting switch) (ON / OFF): This parameter indicates the state of the lighting switch.

Driv Seat belt Sw (Driver seat belt switch) (Fasten / Unfasten): This parameter indicates the state of the driver side seat belt buckle switch.

Charge Light (ON / OFF): This parameter indicates the state of the charge system monitor switch.

Oil pressure switch (ON / OFF): This parameter indicates the state of the oil pressure switch.

A/C Switch (ON / OFF): This parameter indicates the state of the air conditioning switch.

Rear Wiper Sw (Rear wiper switch) (ON / INT / OFF): This parameter indicates the state of the rear wiper switch.

Front Fog Light Sw (Front fog light switch) (ON / OFF): This parameter indicates the state of the front fog light switch.

Headlight Sw (Headlight switch) (ON / OFF): This parameter indicates the state of the lighting switch.

Diagnosis Using Output Test Function of SUZUKI Scan Tool

SUZUKI scan tool has the output test function which can force operation of following actuators and relays of the system controlled by BCM. When a malfunction is found in the system controlled by BCM, execute the output test which enables easy judgment whether the malfunction is on the input side or output side of BCM. For detailed information on operation of SUZUKI scan tool, refer to "SUZUKI Scan Tool Operator's Manual".

Output Test Item	Controlled Parts
Hazard Warning Light	Turn signal and hazard warning relay
Interior (Dome) Light	Interior (Dome) light (when interior light switch is at DOOR position)
Parking/Tail Light	Tail light relay
Front Fog Light	Front fog light relay (when lighting switch is at CLEARANCE position)
Rear defogger	Rear defogger and mirror heater relays
D.R.L.	Headlight low beam relay
Auto on headlight	Headlight low beam and tail light relays
Door	Each door lock actuator
Dead lock	Each door lock actuator
Warning buzzer	Warning buzzer (in BCM)
Rear wiper	Rear wiper relay
Alarm indicator	Theft deterrent light (in HVAC control module)

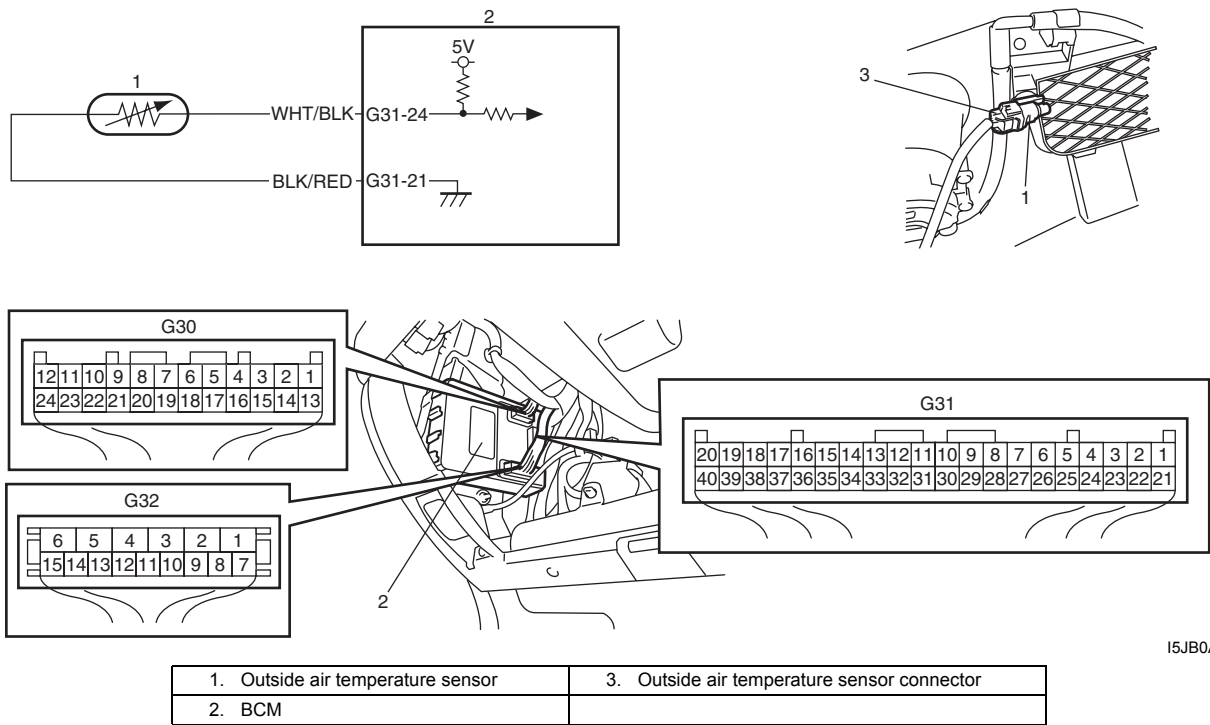
DTC Table

DTC (displayed on SUZUKI scan tool)	DTC (indicated by theft deterrent light)	DTC (displayed on odometer in combination meter)	Detected item	Detecting condition
NO DTC	0000	0000	—	No DTC detected
 B1133	1133	b1133	Battery voltage too high	Battery voltage too high
 B1141	1141	b1141	Outside air temperature (ambient temperature) sensor circuit open	Sensor output voltage too high
 B1142	1142	b1142	Outside air temperature (ambient temperature) sensor circuit short to ground	Sensor output voltage too low
 B1150	1150	b1150	Air bag communication circuit malfunction	Air bag communication circuit open or short to ground
 B1157	1157	b1157	Air bag deployment signal input	Air bag deployment signal inputted
 B1170	1170	b1170	EEPROM access error	Memory error
 U1073	1073	U1073	Control module communication bus off	Transmitting and receiving error of BCM for specified time continuously
 U1100	1100	U1100	Lost communication with ECM	Receiving error of BCM from ECM for specified time continuously
 U1101	1101	U1101	Lost communication with TCM	Receiving error of BCM from TCM for specified time continuously
 U1144	1144	U1144	Lost communication with keyless start control module	Receiving error of BCM from keyless start control module for specified time continuously

DTC B1141 / DTC B1142 (No. 1141 / No. 1142) Outside Air Temperature (Ambient Temp.) Sensor
Circuit Malfunction

S5JB0EA204009

Wiring Diagram



I5JB0AA20007-01

DTC Detecting Condition and Possible Cause

DTC detecting condition	Possible cause
DTC B1141 (DTC No. 1141): Input signal from outside air temperature sensor is higher than 4.88 V.	• Open in outside air temperature sensor circuit • Outside air temperature sensor malfunction • BCM malfunction
DTC B1142 (DTC No. 1142): Input signal from outside air temperature sensor is lower than 0.1 V.	• Short in outside air temperature sensor circuit • Outside air temperature sensor malfunction • BCM malfunction

Flow Test Description

Step 1: Check whether malfunction is in outside air temperature sensor.

Step 2: Check outside air temperature sensor circuit.

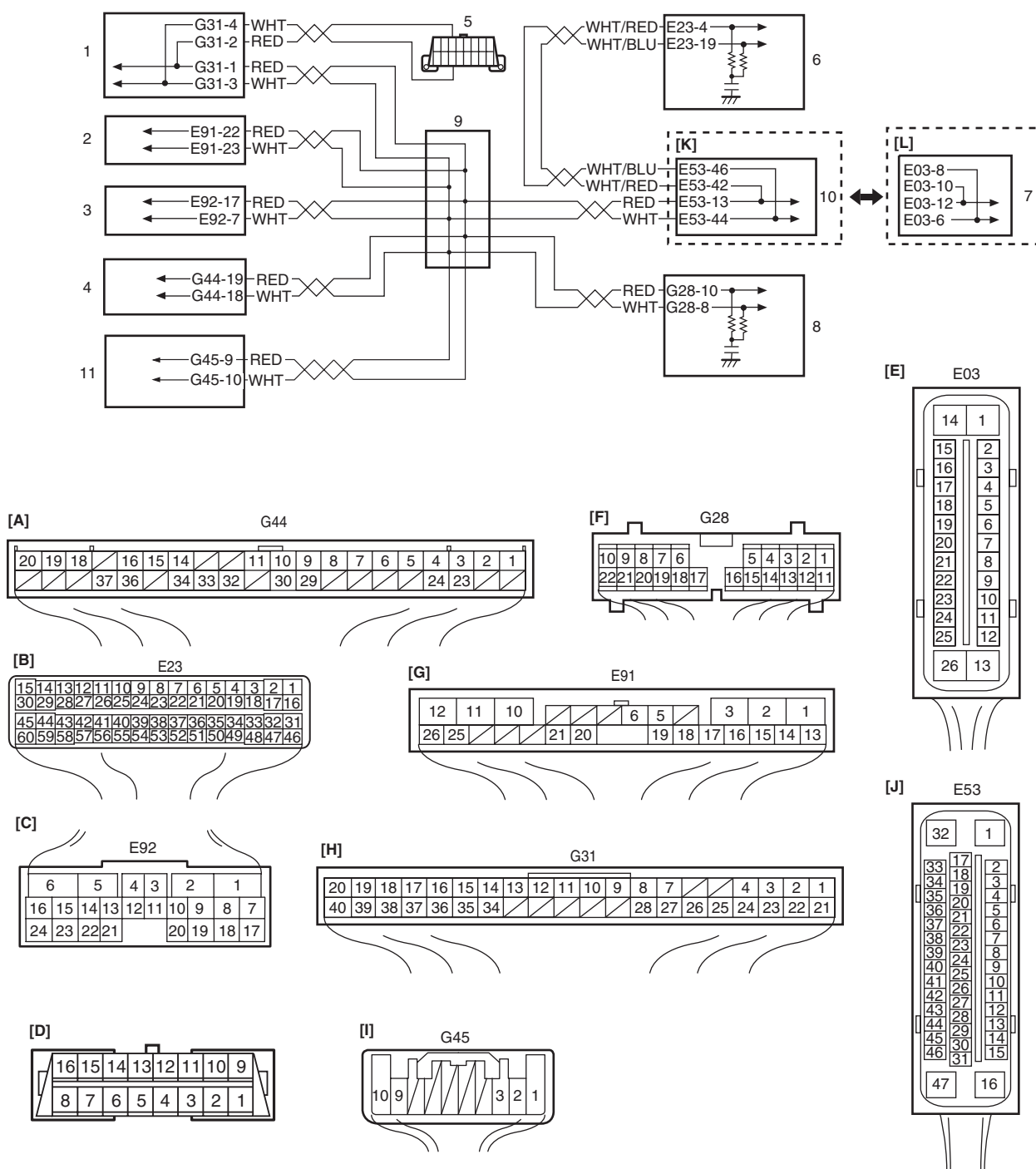
10B-10 Body Electrical Control System:**DTC Troubleshooting**

Step	Action	Yes	No
1	Outside air temperature sensor check 1) Turn ignition switch to OFF position. 2) Disconnect connector from outside air temperature sensor. 3) Check outside air temperature sensor for resistance referring to "Outside Air Temperature Sensor Inspection (If Equipped): in Section 9C in related manual". <i>Is it in good condition?</i>	Go to Step 2.	Replace outside air temperature sensor.
2	Outside air temperature sensor circuit check 1) Disconnect connector from BCM and check for proper terminal connection to BCM connector. 2) If connections are OK, check outside air temperature sensor circuit for open, short and high resistance. <i>Is each circuit in good condition?</i>	Substitute a known-good BCM (included in junction block assembly) and recheck.	Repair circuit.

DTC U1073 (No. 1073): Control Module Communication Bus Off

S5JB0EA204013

Wiring Diagram



I5JB0DA20004-01

[A]: Keyless start control module connector (viewed from harness side)	1. BCM
[B]: ECM connector (viewed from harness side)	2. 4WD control module (if equipped)
[C]: TCM connector (viewed from harness side)	3. TCM (A/T model)
[D]: DLC (viewed from terminal side)	4. Keyless start control module (if equipped)
[E]: ABS control module connector (viewed from terminal side)	5. DLC
[F]: Combination meter connector (viewed from harness side)	6. ECM
[G]: 4WD control module connector (viewed from harness side)	7. ABS control module
[H]: BCM connector (viewed from harness side)	8. Combination meter
[I]: Steering angle sensor connector (viewed from harness side)	9. Junction connector
[J]: ESP® control module connector (viewed from terminal side)	10. ESP® control module
	11. Steering angle sensor (if equipped)

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Transmission error that is inconsistent between transmission data and transmission monitor (CAN bus monitor) data is detected more than 7 times continuously. (1 driving detection logic)	• CAN circuit • Combination meter • BCM • 4WD control module (if equipped) • ABS or ESP® control module • TCM (A/T model) • Keyless start control module (if equipped) • ECM • Steering angle sensor (if equipped)

DTC Confirmation Procedure

- 1) Connect scan tool to DLC with ignition switch turned OFF.
- 2) Turn ON ignition switch and clear DTC by using scan tool.
- 3) Start engine and run it for 1 min. or more.
- 4) Check DTC and pending DTC.

DTC Troubleshooting

Step	Action	Yes	No
1	Control module connector check 1) Check connection of connectors of all control modules communicating by means of CAN and reconnect securely. 2) Recheck DTC and reconnect securely. <i>Is DTC U1073 detected?</i>	Go to Step 2.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
2	CAN communication circuit check 1) Turn ignition switch to OFF position. 2) Disconnect connectors of all control modules communicating by means of CAN. 3) Check CAN communication circuit between control modules for open, short and high resistance. <i>Is each CAN communication circuit in good condition?</i>	Go to Step 3.	Repair circuit.

Step	Action	Yes	No
3	DTC check of BCM 1) Turn ignition switch to OFF position. 2) Connect connectors of disconnected control modules communicating by means of CAN. 3) Disconnect connector from any one of control modules other than BCM. 4) Recheck DTC for BCM. <i>Is DTC U1073 detected?</i>	Disconnect connectors of control modules other than the one whose connector is disconnected in Step 3) one by one and check that DTC U1073 is detected by BCM each time connector is disconnected. When DTC U1073 is not detected by BCM while checking in this way, go to description under "NO" below. If DTC U1073 is detected by BCM even when connectors of all control modules that use CAN communication with BCM are disconnected, substitute a known-good BCM and recheck.	Check power and ground circuit of control module disconnect in Step 3). If circuit is OK, substitute a known-good control module disconnected in Step 3) and recheck.

DTC U1100 (No. 1100): Lost Communication with ECM

S5JB0EA204014

Wiring Diagram

Refer to "DTC U1073 (No. 1073): Control Module Communication Bus Off: ".

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
BCM can not receive CAN data from ECM for longer than specified time continuously.	• CAN communication circuit • BCM • ECM

DTC Confirmation Procedure

- 1) Connect scan tool to DLC with ignition switch turned OFF.
- 2) Turn ON ignition switch and clear DTC by using scan tool.
- 3) Start engine and run it for 1 min. or more.
- 4) Check DTC.

DTC Troubleshooting

Step	Action	Yes	No
1	DTC check of BCM <i>Is DTC U1100 (No. 1100) and DTC U1073 (No. 1073) detected together?</i>	Go to "DTC U1073 (No. 1073): Control Module Communication Bus Off: ".	Go to Step 2.
2	DTC check of ECM 1) Check ECM for DTC. <i>Is DTC P1674 detected?</i>	Go to "DTC P1674: CAN Communication (Bus Off Error): in Section 1A".	Go to Step 3.
3	DTC check of ABS or ESP® control module 1) Check DTC for ABS or ESP® control module. <i>Is DTC U1073 detected?</i>	Go to "DTC U1073: Control Module Communication Bus Off: in Section 4E".	Go to Step 4.

10B-14 Body Electrical Control System:

Step	Action	Yes	No
4	Control module connector check 1) Check connection of connectors of all control modules communicating by means of CAN. 2) Recheck BCM for DTC. <i>Is DTC U1100 (No. 1100) detected?</i>	Go to Step 5.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
5	DTC check of ABS or ESP® control module 1) Check DTC for ABS or ESP® control module. <i>Is DTC U1100 detected?</i>	Go to Step 6.	Go to Step 7.
6	CAN communication circuit check 1) Disconnect connectors from ECM and ABS or ESP® control module. 2) Check CAN communication circuit between ECM and ABS or ESP® control module for open, short and high resistance. <i>Is each CAN communication circuit in good condition?</i>	Check ECM power and ground circuit. If circuit is OK, substitute a known-good ECM and recheck.	Repair circuit.
7	CAN communication circuit check 1) Disconnect connectors from BCM and ABS or ESP® control module. 2) Check CAN communication circuit between BCM and ABS or ESP® control module for open, short and high resistance. <i>Is each CAN communication circuit in good condition?</i>	Go to Step 8.	Repair circuit.
8	CAN communication circuit check 1) Disconnect connectors of all control modules communicating by means of CAN. 2) Check CAN communication circuit between control modules other than Step 7 for open, short and high resistance. <i>Is each CAN communication circuit in good condition?</i>	Go to Step 9.	Repair circuit.
9	DTC check of BCM 1) Connect connectors of disconnected control modules communicating by means of CAN. 2) Disconnect connector of any one of control module other than BCM. 3) Recheck BCM for DTC. <i>Is DTC U1100 (No. 1100) detected?</i>	Disconnect connectors of control modules other than the one whose connector is disconnected in Step 2) one by one and check that DTC U1100 is detected by BCM each time connector is disconnected. When DTC U1100 is not detected by BCM while checking in this way, go to description under "NO" below. If DTC U1100 is detected by BCM even when connectors of all control modules that use CAN communication with BCM are disconnected, substitute a known-good BCM and recheck.	Check power and ground circuit of control module disconnected in Step 2). If circuit is OK, substitute a known-good control module disconnected in Step 2) and recheck.

DTC U1101 (No. 1101): Lost communication with TCM

S5JB0EA204015

Wiring Diagram

Refer to "DTC U1073 (No. 1073): Control Module Communication Bus Off: ".

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
BCM can not receive CAN data from TCM (A/T model) for longer than specified time continuously.	- CAN communication circuit - BCM - TCM (A/T model)

DTC Confirmation Procedure

- 1) Connect scan tool to DLC with ignition switch turned OFF.
- 2) Turn ON ignition switch and clear DTC by using scan tool.
- 3) Start engine and run it for 1 min. or more.
- 4) Check DTC.

DTC Troubleshooting

Step	Action	Yes	No
1	DTC check of BCM <i>Is DTC U1101 (No. 1101) and DTC U1073 (No. 1073) detected together?</i>	Go to "DTC U1073 (No. 1073): Control Module Communication Bus Off: ".	Go to Step 2.
2	DTC check of TCM 1) Check TCM for DTC. <i>Is DTC P1774 detected?</i>	Go to "DTC P1774: CAN Communication Bus Off: in Section 5A".	Go to Step 3.
3	Control module connector check 1) Check connection of connectors of all control modules communicating by means of CAN. 2) Recheck BCM for DTC. <i>Is DTC U1101 (No. 1101) detected?</i>	Go to Step 4.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
4	CAN communication circuit check 1) Disconnect connectors from BCM and TCM. 2) Check CAN communication circuit for open, short and high resistance. Between TCM and BCM <i>Is each CAN communication circuit in good condition?</i>	Go to Step 5.	Repair circuit.
5	CAN communication circuit check 1) Disconnect connectors of all control modules communicating by means of CAN. 2) Check CAN communication circuit between control modules other than Step 4 for open, short and high resistance. <i>Is each CAN communication circuit in good condition?</i>	Go to Step 6.	Repair circuit.
6	DTC check of ECM 1) Connect connectors of disconnected control modules communicating by means of CAN. 2) Check ECM for DTC. <i>Is DTC U1101 detected?</i>	Check TCM power and ground circuit. If circuit is OK, substitute a known-good TCM and recheck.	Go to Step 7.

10B-16 Body Electrical Control System:

Step	Action	Yes	No
7	DTC check of BCM 1) Turn ignition switch to OFF position. 2) Disconnect connector of any one of control module other than BCM. 3) Recheck BCM for DTC. <i>Is DTC U1101 (No.1101) detected?</i>	Disconnect connectors of control modules other than the one whose connector is disconnected in Step 2) one by one and check that DTC U1101 is detected by BCM each time connector is disconnected. When DTC U1101 is not detected by BCM while checking in this way, go to description under "NO" below. If DTC U1101 is detected by BCM even when connectors of all control modules that use CAN communication with BCM are disconnected, substitute a known-good BCM and recheck.	Check power and ground circuit of control module disconnected in Step 2). If circuit is OK, substitute a known-good control module disconnected in Step 2) and recheck.

DTC U1144 (No. 1144): Lost Communication with Keyless Start Control Module

S5JB0EA204016

Wiring Diagram

Refer to "DTC U1073 (No. 1073): Control Module Communication Bus Off: ".

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
BCM can not receive data sent by CAN from keyless start control module for longer than specified time continuously.	- CAN communication circuit - Keyless start control module - BCM

DTC Confirmation Procedure

- 1) Connect scan tool to DLC with ignition switch turned OFF.
- 2) Turn ON ignition switch and clear DTC by using scan tool.
- 3) Start engine and run it for 1 min. or more.
- 4) Check DTC.

DTC Troubleshooting

Step	Action	Yes	No
1	DTC check of BCM <i>Is DTC U1144 (No. 1144) and DTC U1073 (No. 1073) detected together?</i>	Go to "DTC U1073 (No. 1073): Control Module Communication Bus Off: ".	Go to Step 2.
2	DTC check of keyless start control module 1) Check keyless start control module for DTC. <i>Is DTC No. 33 detected?</i>	Go to "DTC No. 33: Control Module Communication Bus Off: in Section 10E".	Go to Step 3.
3	Control module connector check 1) Check connection of connectors of all control modules communicating by means of CAN. 2) Recheck BCM for DTC. <i>Is DTC U1144 (No. 1144) detected?</i>	Go to Step 4.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
4	CAN communication circuit check 1) Turn ignition switch to OFF position. 2) Disconnect connectors of BCM and keyless start control module communicating by means of CAN. 3) Check CAN communication circuit between BCM and keyless start control module for open, short and high resistance. <i>Is each CAN communication circuit in good condition?</i>	Go to Step 5.	Repair circuit.
5	CAN communication circuit check 1) Disconnect connectors of all control modules communicating by means of CAN. 2) Check CAN communication circuit between control modules other than Step 4 for open, short and high resistance. <i>Is each CAN communication circuit in good condition?</i>	Go to Step 6.	Repair circuit.
6	Key indicator lamp operation check 1) Connect connectors of disconnected control modules communicating by means of CAN. 2) Push ignition knob switch of steering lock unit. <i>Does key indicator lamp turn ON?</i>	Go to Step 7.	Check keyless start control module power and ground circuit. If circuit is OK, substitute a known-good keyless start control module and recheck.

10B-18 Body Electrical Control System:

Step	Action	Yes	No
7	DTC check of BCM 1) Disconnect connector of any one of control module other than BCM. 2) Recheck BCM for DTC. <i>Is DTC U1144 (No.1144) detected?</i>	Disconnect connectors of control modules other than the one whose connector is disconnected in Step 1) one by one and check that DTC U1144 is detected by BCM each time connector is disconnected. When DTC U1144 is not detected by BCM while checking in this way, go to description under "NO" below. If DTC U1144 is detected by BCM even when connectors of all control modules that use CAN communication with BCM are disconnected, substitute a known-good BCM and recheck.	Check power and ground circuit of control module disconnected in Step 1). If circuit is OK, substitute a known-good control module disconnected in Step 1) and recheck.

Immobilizer Control System

Precautions

Precautions in Diagnosing Troubles

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- Before confirming the diagnostic trouble code (DTC), do not disconnect connector from ECM, battery cable from battery, ground wire harness, or main fuse. Such disconnection will erase DTC stored in ECM.
- DTC stored in ECM memory can be checked as well as cleared by using SUZUKI scan tool. Before using SUZUKI scan tool, read its operator's manual carefully to know how to use it and what functions are available.
- Be sure to read "Precautions for Electrical Circuit Service: in Section 00 in related manual" before inspection.
- Communication of ECM, BCM, combination meter, TCM, keyless start control module (if equipped), ABS/ESP® control module, 4WD control module (if equipped), Steering angle sensor (if equipped) and DLC is established by CAN (Computer Area Network). (For more detail of CAN communication, refer to "CAN Communication System Description: in Section 1A") Therefore, handle CAN communication lines with care referring to "Precaution for CAN Communication System: in Section 00 in related manual".

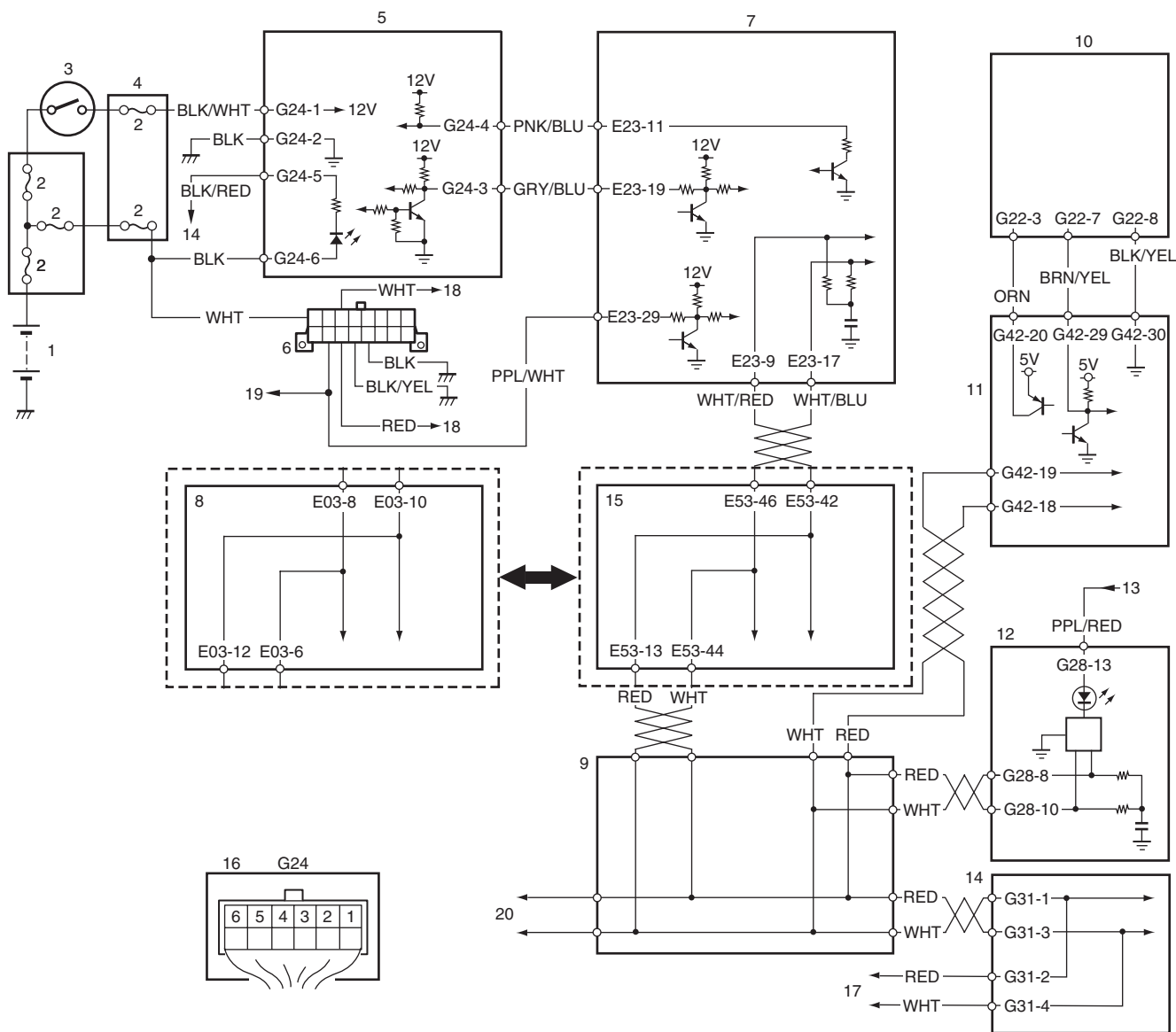
Schematic and Routing Diagram

Immobilizer Control System Wiring Circuit Diagram

S5JB0EA302001

NOTE

For more details about power supply and ground wire circuits for ECM, BCM, ABS/ESP® control module, keyless start control module and combination meter, refer to “System Circuit Diagram: in Section 9A in related manual”.



I5JB0DA30001-02

1. Battery	6. Data link connector (DLC)	11. Keyless start control module	16. Immobilizer control module (ICM) connector (harness side view)
2. Fuse	7. ECM	12. Combination meter	17. To DLC
3. Ignition switch	8. ABS control module	13. From fuse	18. To BCM
4. Junction block assembly	9. Junction connector	14. BCM	19. To BCM and ABS/ESP® control module
5. Immobilizer control module (ICM)	10. Steering lock unit	15. ESP® control module (Vehicle equipped with ESP® system)	20. To TCM, 4WD control module and steering angle sensor (if equipped)

Diagnostic Information and Procedures

Diagnostic Trouble Code (DTC) Table

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ECM

NOTE

ECM detects diagnostic trouble code (DTC). Immobilizer control module (ICM) does not.

DTC No.	Detecting Item	Detecting Condition	Immobilizer Indicator Lamp
P1614	Transponder response error	Transponder code in the transponder built in the ignition key cannot be read through immobilizer control module (ICM).	Flash
P1615	Steering lock unit communication error (for vehicle with keyless start system)	- While registering the transponder code in the transponder built in the ignition key in ECM, the keyless start control module sent a signal to ECM indicating that the ID code could not be registered. - The ID code could not be registered in the keyless start control module or ECM.	Flash
P1616	Unregistered keyless start control module (for vehicle with keyless start system)	ECM detects different ID codes registered in ECM and keyless start system.	Flash
P1618	Keyless start control module CAN communication error (for vehicle with keyless start system)	Reception error of communication data for keyless start control module is detected for longer than specified time continuously.	Flash
P1621	Immobilizer communication line error	Communication error between immobilizer control module (ICM) and ECM is detected by ECM.	Flash
P1622	EEPROM read/write error	EEPROM in ECM is corrupted.	Flash
P1623	Unregistered transponder	Transponder code in the transponder built in the ignition key is invalid.	Flash
P1625	Immobilizer antenna error	Immobilizer control module (ICM) is faulty.	Flash
P1636	Immobilizer information registration failure	Communication error between ECM and BCM is detected by ECM.	No operation
P1638	Immobilizer information mismatched	- Communication error between ECM and BCM is detected by ECM. - Wrong ECM or BCM is used.	No operation

NOTE

If any DTC other than the above DTCs is detected, refer to "DTC Table: in Section 1A".

DTC P1614: Transponder Response Error**Wiring Diagram**

Refer to "Immobilizer Control System Wiring Circuit Diagram: "

Detecting Condition and Trouble Area

Detecting Condition	Trouble Area
Transponder code in the transponder built in the ignition key cannot be read through immobilizer control module (ICM).	• Use of the ignition key without the transponder • Use of the unregistered ignition key • Corruption of the transponder in the ignition key • Immobilizer control module (ICM) faulty • ECM faulty

Troubleshooting

Step	Action	Yes	No
1	Diagnostic Trouble Code (DTC) confirmation 1) Clear DTC(s) referring to "Diagnostic Trouble Code (DTC) Clearance: in related manual". 2) Turn the ignition switch to OFF position. 3) Check if any DTC is detected referring to "Diagnostic Trouble Code (DTC) Check: in related manual". <i>Is DTC P1614 still detected?</i>	Go to Step 2.	The troubleshooting is completed.
2	Diagnostic Trouble Code (DTC) check 1) Check if any DTC other than P1614 is detected referring to "Diagnostic Trouble Code (DTC) Check: in related manual". <i>Is any DTC other than P1614 is detected?</i>	Perform troubleshooting referring to the corresponding flowchart in this section, and then go to Step 3.	Go to Step 3.
3	Registration of the ignition key in use with ECM and Diagnostic Trouble Code (DTC) Check 1) There is a possibility that the unregistered ignition key is used. Therefore, register the transponder code in the transponder in the ignition key with ECM referring to "Registration of the Ignition Key: in related manual". 2) Check if DTC P1614 is detected referring to "Diagnostic Trouble Code (DTC) Check: in related manual". <i>Is DTC P1614 detected?</i>	Go to Step 4.	The troubleshooting is completed.
4	Registration of the new ignition key with ECM and Diagnostic Trouble Code (DTC) check 1) The transponder in the ignition key is corrupted or the ignition key without the transponder is used. Therefore, prepare the new ignition key. 2) Register the transponder code in the transponder in the new ignition key with ECM referring to "Registration of the Ignition Key: in related manual". 3) Check if that DTC P1614 is detected referring to "Diagnostic Trouble Code (DTC) Check: in related manual". <i>Is DTC P1614 detected?</i>	Go to Step 5.	The troubleshooting is completed.

Step	Action	Yes	No
5	Immobilizer control module (ICM) check 1) Check immobilizer control module (ICM) referring to "Inspection of Immobilizer Control Module (ICM) and Its Circuit: in related manual". <i>Is immobilizer control module (ICM) normal?</i>	Replace ECM with new one referring to "Engine Control Module (ECM) Removal and Installation: in Section 1C in related manual", and then perform "Procedure after ECM Replacement: in related manual".	Replace immobilizer control module (ICM) with new one referring to "Immobilizer Control Module (ICM) Removal and Installation: in related manual".

DTC P1615: Steering Lock Unit Communication Error (for Vehicle with Keyless Start System)

S5JB0EA304009

Wiring Diagram

Refer to "Immobilizer Control System Wiring Circuit Diagram: "

Circuit Description

When the transponder code in the ignition key is registered in ECM, the remote controller ID code is registered in both ECM and keyless start control module at the same time. This DTC is detected only in case that the remote controller ID code cannot be registered in both ECM and keyless start control module when the transponder code in the ignition key is registered in ECM.

NOTE

- Perform the troubleshooting for DTC P1618 first if both DTC P1615 and P1618 are detected at the same time.
- After replacing ECM, be sure to register the transponder code in the ignition key with ECM referring to "Registration of the Ignition Key: in related manual". After replacing the keyless start control module of the vehicle equipped with the keyless start system, be sure to perform "Registration of the Ignition Key: in related manual".

Detecting Condition and Trouble Area

Detecting Condition	Trouble Area
• While registering the transponder code in ECM, the keyless start control module sent a signal to ECM indicating that the remote controller ID code could not be registered. • The remote controller ID code could not be registered in the keyless start control module or ECM. And, the registration of the transponder code in ECM was terminated forcibly.	• Wire circuits between steering lock unit and keyless start control unit open or shorted • CAN communication wire circuits faulty • Steering lock unit faulty • Keyless start control module faulty • ECM faulty

Troubleshooting

Step	Action	Yes	No
1	Diagnostic Trouble Code (DTC) confirmation 1) Clear DTC(s) referring to "Diagnostic Trouble Code (DTC) Clearance: in related manual". 2) Turn the ignition switch to OFF position. 3) Check if any DTC is detected referring to "Diagnostic Trouble Code (DTC) Check: in related manual". <i>Is DTC P1615 still detected?</i>	Go to Step 2.	The troubleshooting is completed.
2	Registration of the ignition key 1) Turn the ignition switch to OFF position. 2) Turn the ignition switch to ON position, and register the transponder code in the transponder in the ignition key with ECM referring to "Registration of the Ignition Key: in related manual". <i>Was it possible to register the ignition key (transponder code) in ECM?</i>	The troubleshooting is completed.	Go to Step 3.
3	Diagnostic Trouble Code (DTC) check 1) Check if any DTC is detected referring to "Diagnostic Trouble Code (DTC) Check: in related manual". <i>Is any DTC detected?</i>	Go to Step 4.	Replace ECM with a known-good one and recheck.
4	Diagnostic Trouble Code (DTC) check <i>Is any DTC other than P1615 detected in Step 3?</i>	Perform the troubleshooting referring to the corresponding flowchart.	Go to Step 5.
5	Steering lock unit check 1) Turn on the engine start knob of the keyless start system. <i>Is the engine start knob at ON position?</i>	Replace the steering lock unit with a known-good one and recheck.	Go to Step 6.
6	Steering lock unit operation check 1) Check the steering lock unit for operation referring to "Ignition Switch Inspection: in Section 9C". <i>Does the engine start knob operate as specified?</i>	Go to Step 7.	Replace the steering lock unit referring to "Steering Lock Assembly (Ignition Switch) Removal and Installation: in Section 6B in related manual".
7	Check for open in wire circuits between steering lock unit and keyless start control module 1) Disconnect steering lock unit connector "G22" and keyless start control module connector "G42". 2) Measure resistance at the following connector terminals. - Between "G22-3" terminal of steering lock unit connector and "G42-20" terminal of keyless start control module connector. - Between "G22-7" terminal of steering lock unit connector and "G42-29" terminal of keyless start control module connector. - Between "G22-8" terminal of steering lock unit connector and "G42-30" terminal of keyless start control module connector. <i>Is each resistance 1 Ω or less?</i>	Go to Step 8.	Repair open or high resistance in malfunctioning wire circuit.

Step	Action	Yes	No
8	Check for short of wire circuits between steering lock unit and keyless start control module 1) Measure resistance at the following connector terminals. - Between "G22-3", "G22-7" and "G22-8" terminal of steering lock unit connector. - Between "G42-20", "G42-29" and "G42-30" terminal of keyless start control module. <i>Is each resistance infinity?</i>	Go to Step 9.	Make sure of insulation of each wire circuit.
9	Check for short to ground wire circuit in wire circuits between steering lock unit and keyless start control module 1) Measure resistance at the following connector terminals. - Between "G22-3" terminal of steering lock unit connector and vehicle body ground. - Between "G22-7" terminal of steering lock unit connector and vehicle body ground. - Between "G22-8" terminal of steering lock unit connector and vehicle body ground. - Between "G42-20" terminal of keyless start control module connector and vehicle body ground. - Between "G42-29" terminal of keyless start control module connector and vehicle body ground. - Between "G42-30" terminal of keyless start control module connector and vehicle body ground. <i>Is each resistance infinity?</i>	Go to Step 10.	Repair short to ground wire circuit in malfunctioning wire circuit.
10	Check for short to power supply wire circuit in wire circuits between steering lock unit and keyless start control module 1) Measure voltage at the following connector terminals with ignition switch turned ON. - Between "G22-3" terminal of steering lock unit connector and vehicle body ground. - Between "G22-7" terminal of steering lock unit connector and vehicle body ground. - Between "G22-8" terminal of steering lock unit connector and vehicle body ground. - Between "G42-20" terminal of keyless start control module connector and vehicle body ground. - Between "G42-29" terminal of keyless start control module connector and vehicle body ground. - Between "G42-30" terminal of keyless start control module connector and vehicle body ground. <i>Is each voltage 0 – 1 V?</i>	Replace keyless start control module with a known-good one and recheck. If DTC P1615 is still detected, replace ECM with a known-good one and recheck.	Repair short to power supply wire circuit in malfunctioning wire circuit.

DTC P1616: Unregistered Keyless Start Control Module (for Vehicle with Keyless Start System)

S5JB0EA304010

Wiring Diagram

Refer to "Immobilizer Control System Wiring Circuit Diagram: "

Circuit Description

P1616 is detected when ECM detects different ID codes registered in ECM and keyless control module after turning engine start knob to ON position. Normally, when keyless start control module is replaced with new one, ECM automatically registers the applicable code in keyless start control module after turning ignition switch to ON position. However, when keyless start control module is replaced with used one, ECM does not automatically register the applicable code in keyless start control module even if ignition switch is turned to ON position.

Detecting Condition and Trouble Area

Detecting Condition	Trouble Area
ECM detects different ID codes registered in ECM and keyless control module.	• Keyless start control unit faulty • ECM faulty

Troubleshooting

Step	Action	Yes	No
1	Diagnostic Trouble Code (DTC) confirmation 1) Clear DTC(s) referring to "Diagnostic Trouble Code (DTC) Clearance: in related manual". 2) Turn the ignition switch to OFF position. 3) Check if any DTC is detected referring to "Diagnostic Trouble Code (DTC) Table: ". <i>Is DTC P1616 still detected?</i>	Go to Step 2.	The troubleshooting is completed.
2	Registration of the ignition key 1) Clear DTC referring to "Diagnostic Trouble Code (DTC) Clearance: in related manual". 2) Register the transponder code in the transponder in the ignition key with ECM referring to "Registration of the Ignition Key: in related manual". <i>Was it possible to register the ignition key (transponder code) in ECM?</i>	Go to Step 3.	Go to Step 4.
3	Keyless start system operation check 1) Start engine using keyless start system. <i>Does engine start?</i>	The troubleshooting is completed.	Check if any DTC is detected by ECM. If detected, perform the troubleshooting referring to the corresponding flowchart.
4	Diagnostic Trouble Code (DTC) check 1) Check ECM for DTC referring to "Diagnostic Trouble Code (DTC) Check: in related manual". <i>Are DTC P1618 and/or P1615 detected other than P1616?</i>	Go to DTC P1618 troubleshooting.	Go to DTC P1615 troubleshooting.

DTC P1618: Keyless Start Control Module CAN Communication Error (for Vehicle with Keyless Start System)

S5JB0EA304011

Wiring Diagram

Refer to "Immobilizer Control System Wiring Circuit Diagram: "

Detecting Condition and Trouble Area

Detecting Condition	Trouble Area
Reception error of communication data for keyless start control module is detected for longer than specified time continuously.	• CAN communication wire circuits faulty • Steering angle sensor (if equipped) faulty • Keyless start control module faulty • 4WD control module (if equipped) faulty • TCM (if equipped) faulty • BCM faulty • ABS/ESP® control module faulty • Combination meter faulty • ECM faulty

Troubleshooting

Step	Action	Yes	No
1	Diagnostic Trouble Code (DTC) confirmation 1) Clear DTC(s) referring to "Diagnostic Trouble Code (DTC) Clearance: in related manual". 2) Turn the ignition switch to OFF position. 3) Check if any DTC is detected referring to "Diagnostic Trouble Code (DTC) Check: in related manual". <i>Is DTC P1618 still detected?</i>	Go to Step 2.	The troubleshooting is completed.
2	Diagnostic Trouble Code (DTC) check in ECM <i>Is any DTC other than P1618 detected in Step 1?</i>	Perform the troubleshooting referring to the corresponding flowchart.	Go to Step 3.
3	Poor connection check at ECM, ABS/ESP® control module and keyless start control module connectors 1) With the ignition key at OFF position, check each connector and wire terminal at ECM, ABS/ESP® control module and keyless control module for secure connection. <i>Is each connector and wire terminal connected securely?</i>	Go to Step 4.	Repair poor connection(s).

10C-10 Immobilizer Control System:

Step	Action	Yes	No
4	Check for open and high resistance in CAN communication wire circuits between ABS/ESP® control module and keyless start control module 1) Disconnect connector "E03" from ABS control module or "E53" from ESP® control module. 2) Disconnect connector "G42" from keyless start control module. 3) Measure resistance at the following wire terminals. Vehicle equipped without ESP® control module • Between "E03-12" wire terminal at ABS connector and "G42-19" wire terminal at keyless start control module connector • Between "E03-6" wire terminal at ABS connector and "G42-18" wire terminal at keyless start control module connector Vehicle equipped with ESP® control module • Between "E53-13" wire terminal at ESP® control module connector and "G42-19" wire terminal at keyless start control module connector • Between "E53-44" wire terminal at ESP® control module connector and "G42-18" wire terminal at keyless start control module connector <i>Is each resistance 1 Ω or less?</i>	Go to Step 5.	Repair open or high resistance in malfunctioning wire circuit.
5	Check for short between CAN communication wire circuits between ABS/ESP® control module and keyless start control module 1) Disconnect connector "G31" from BCM connector. 2) Disconnect connector "G28" from combination meter. 3) Measure resistance at the following wire terminals. Vehicle equipped without ESP® control module • Between "E03-12" wire terminal at ABS control module connector and "G42-18" wire terminal at keyless start control module connector. Vehicle equipped with ESP® system • Between "E53-13" wire terminal at ESP® control module connector and "G42-18" wire terminal at keyless start control module connector <i>Is resistance infinite?</i>	Go to Step 6.	Repair short between CAN communication wire circuits.
6	Check for short to ground wire circuit in CAN communication wire circuits 1) Measure resistance at the following wire terminals. Vehicle equipped without ESP® system • Between "E03-6" wire terminal at ABS control module connector and body ground • Between "E03-12" wire terminal at ABS control module connector and body ground Vehicle equipped with ESP® system • Between "E53-13" wire terminal at ESP® control module connector and body ground • Between "E53-44" wire terminal at ESP® control module connector and body ground <i>Is resistance infinite?</i>	Go to Step 7.	Repair short to ground wire circuit in CAN communication wire circuits.

Step	Action	Yes	No
7	Check for short to power supply wire circuit in CAN communication wire circuits 1) Measure resistance at the following wire terminals with the ignition switch at ON position. Vehicle equipped without ESP® system - Between “E03-6” wire terminal at ABS control module connector and body ground - Between “E03-12” wire terminal at ABS control module connector and body ground Vehicle equipped with ESP® system - Between “E53-13” wire terminal at ESP® control module connector and body ground - Between “E53-44” wire terminal at ESP® control module connector and body ground <i>Is voltage 0 V?</i>	Go to Step 8.	Repair short to power supply wire circuit in CAN communication wire circuits.
8	Check of keyless start control module power and ground wire circuits 1) Check keyless start control module power and ground wire circuits referring to “Keyless Start Control Module Power and Ground Circuit Check: in Section 10E in related manual”. <i>Are they in normal?</i>	Replace keyless start control module with a known-good one and recheck.	Repair malfunctioning wire circuit.

DTC P1621: Immobilizer Communication Line Error

S5JB0EA304012

Wiring Diagram

Refer to “Immobilizer Control System Wiring Circuit Diagram: ”

Detecting Condition and Trouble Area

Detecting Condition	Trouble Area
Communication error between immobilizer control module (ICM) and ECM is detected by ECM.	- Related fuse(s) blown - Poor connection at immobilizer control module (ICM) connector - Poor connection at ECM connector - Open in power supply wire circuit - Open in ground wire circuit - Open in communication wire circuits - Short to ground wire circuit in communication wire circuits - Short to power supply wire circuit in communication wire circuits - Short of communication wire circuits - Immobilizer control module (ICM) faulty - ECM faulty

10C-12 Immobilizer Control System:**Troubleshooting**

Step	Action	Yes	No
1	Diagnostic Trouble Code (DTC) confirmation 1) Clear DTC(s) referring to "Diagnostic Trouble Code (DTC) Clearance: in related manual". 2) Turn the ignition switch to OFF position. 3) Check if any DTC is detected referring to "Diagnostic Trouble Code (DTC) Check: in related manual". <i>Is DTC P1621 still detected?</i>	Go to Step 2.	The troubleshooting is completed.
2	Fuse check 1) Check if any related fuse is blown. <i>Is any fuse blown?</i>	Replace blown fuse(s) with new one(s).	Go to Step 3.
3	Immobilizer control module (ICM) poor connection check 1) Disconnect immobilizer control module (ICM) connector "G24" referring to "Immobilizer Control Module (ICM) Removal and Installation: in related manual". 2) Check if wire connections are normal at immobilizer control module (ICM) connector "G24". <i>Is each wire connection normal?</i>	Go to Step 4.	Repair poor connection(s).
4	ECM poor connection check 1) Disconnect ECM connector "E23" referring to "Engine Control Module (ECM) Removal and Installation: in Section 1C in related manual". 2) Check if wire connections at "E23-13" and "E23-28" wire terminals are normal. <i>Is each wire connection normal?</i>	Go to Step 5.	Repair poor connection(s).
5	Check for open in power supply wire circuit 1) Connect immobilizer control module (ICM) connector "G24" referring to "Immobilizer Control Module (ICM) Removal and Installation: in related manual". 2) With the ignition switch at ON position, check voltage between "G24-1" wire terminal at immobilizer control module (ICM) and body ground. <i>Is voltage about 12 V?</i>	Go to Step 6.	Repair open in power supply wire circuit.
6	Check for open in ground wire circuit 1) With the ignition switch at ON position, check voltage between "G24-2" wire terminal at immobilizer control module (ICM) and body ground. <i>Is voltage 0?</i>	Go to Step 7.	Repair open in ground wire circuit.
7	Check for open in communication wire circuit 1) Disconnect immobilizer control module (ICM) connector "G24" referring to "Immobilizer Control Module (ICM) Removal and Installation: in related manual". 2) Disconnect ECM connector "E23" referring to "Engine Control Module (ECM) Removal and Installation: in Section 1C in related manual". 3) Check resistance between "G24-3" wire terminal at immobilizer control module (ICM) connector and "E23-28" wire terminal at ECM connector. <i>Is resistance infinite?</i>	Repair open in communication wire circuit.	Go to Step 8.

Step	Action	Yes	No
8	Check for short to ground circuit in communication wire circuit 1) With immobilizer control module (ICM) connector "G24" and ECM connector "E23" disconnected, check resistance between "G24-3" wire terminal at immobilizer control module (ICM) connector and body ground. <i>Is resistance infinite?</i>	Go to Step 9.	Repair short to ground wire circuit in communication wire circuit.
9	Check for short to power circuit in communication wire circuit 1) With immobilizer control module (ICM) connector "G24" and ECM connector "E23" disconnected, turn the ignition switch to ON position. 2) Check voltage between "G24-3" wire terminal at immobilizer control module (ICM) connector and body ground. <i>Is voltage 0 V?</i>	Go to Step 10.	Repair short to power supply wire circuit in communication wire circuit.
10	Check for open in communication wire circuit 1) With immobilizer control module (ICM) connector "G24" and ECM connector "E23" disconnected, check resistance between "G24-4" wire terminal at immobilizer control module (ICM) connector and "E23-13" wire terminal at ECM connector. <i>Is resistance infinite?</i>	Repair open in communication wire circuit.	Go to Step 11.
11	Check for short to ground wire circuit in communication wire circuit 1) With immobilizer control module (ICM) connector "G24" and ECM connector "E23" disconnected, check resistance between "G24-4" wire terminal at immobilizer control module (ICM) connector and body ground. <i>Is resistance infinite?</i>	Go to Step 12.	Repair short to ground wire circuit in communication wire circuit.
12	Check for short to power circuit in communication wire circuit 1) With immobilizer control module (ICM) connector "G24" and ECM connector "E23" disconnected, turn the ignition switch to ON position. 2) Check voltage between "G24-4" wire terminal at immobilizer control module (ICM) connector and body ground. <i>Is voltage 0 V?</i>	Go to Step 13.	Repair short to power supply wire circuit in communication wire circuit.
13	Check for short of communication wire circuit 1) With immobilizer control module (ICM) connector "G24" and ECM connector "E23" disconnected, check resistance between "G24-3" wire terminal and "G24-4" wire terminal at immobilizer control module (ICM) connector. <i>Is resistance infinite?</i>	Go to Step 14.	Repair short of communication wire circuits.

10C-14 Immobilizer Control System:

Step	Action	Yes	No
14	Immobilizer control module (ICM) check 1) Check immobilizer control module (ICM) referring to "Inspection of Immobilizer Control Module (ICM) and Its Circuit: in related manual". <i>Is immobilizer control module (ICM) normal?</i>	Replace ECM with new one referring to "Engine Control Module (ECM) Removal and Installation: in Section 1C in related manual", and then perform "Procedure after ECM Replacement: in related manual".	Replace immobilizer control module (ICM) with new one referring to "Immobilizer Control Module (ICM) Removal and Installation: in related manual".

DTC P1622: EEPROM Error

S5JB0EA304013

Wiring Diagram

Refer to "Immobilizer Control System Wiring Circuit Diagram: "

Detecting Condition and Trouble Area

Detecting Condition	Trouble Area
EEPROM in ECM is corrupted.	Internal failure (EEPROM corruption) of ECM

Troubleshooting

- 1) Clear DTC(s) referring to "Diagnostic Trouble Code (DTC) Clearance: in related manual".
- 2) Turn the ignition switch to OFF position.
- 3) Check if DTC P1622 is still detected referring to "Diagnostic Trouble Code (DTC) Check: in related manual". If still detected, go to the next step. If not, the troubleshooting is completed.
- 4) Replace ECM with new one referring to "Engine Control Module (ECM) Removal and Installation: in Section 1C in related manual".
- 5) Perform "Procedure after ECM Replacement: in related manual".

DTC P1623: Unregistered Transponder

S5JB0EA304014

Wiring Diagram

Refer to "Immobilizer Control System Wiring Circuit Diagram: "

Detecting Condition and Trouble Area

Detecting Condition	Trouble Area
Transponder code in the transponder built in the ignition key is invalid.	• Use of the unregistered ignition key • Immobilizer control module (ICM) faulty • ECM faulty

Troubleshooting

Step	Action	Yes	No
1	Diagnostic Trouble Code (DTC) confirmation 1) Clear DTC(s) referring to "Diagnostic Trouble Code (DTC) Clearance: in related manual". 2) Turn the ignition switch to OFF position. 3) Check if any DTC is detected referring to "Diagnostic Trouble Code (DTC) Check: in related manual". <i>Is DTC P1623 still detected?</i>	Go to Step 2.	The troubleshooting is completed.
2	Diagnostic Trouble Code (DTC) check <i>Is any DTC other than P1623 is detected in Step 1?</i>	Perform the troubleshooting referring to the corresponding flowchart, and then go to Step 3.	Go to Step 3.

Step	Action	Yes	No
3	Registration of the unregistered ignition key with ECM and Diagnostic Trouble Code (DTC) check 1) Register the transponder code in the transponder in the unregistered ignition key with ECM referring to "Registration of the Ignition Key: in related manual". 2) Check if that DTC P1623 is detected referring to "Diagnostic Trouble Code (DTC) Check: in related manual". <i>Is DTC P1623 detected?</i>	Go to Step 4.	The troubleshooting is completed.
4	Immobilizer control module (ICM) check 1) Check immobilizer control module (ICM) referring to "Inspection of Immobilizer Control Module (ICM) and Its Circuit: in related manual". <i>Is immobilizer controller assembly normal?</i>	Replace ECM with new one referring to "Engine Control Module (ECM) Removal and Installation: in Section 1C in related manual", and then perform "Procedure after ECM Replacement: in related manual".	Replace immobilizer control module (ICM) with new one referring to "Immobilizer Control Module (ICM) Removal and Installation: in related manual".

DTC P1625: Immobilizer Antenna Error

S5JB0EA304015

Wiring Diagram

Refer to "Immobilizer Control System Wiring Circuit Diagram: "

Detecting Condition and Trouble Area

Detecting Condition	Trouble Area
Immobilizer control module (ICM) is faulty.	- Immobilizer control module faulty - ECM faulty

Troubleshooting

Step	Action	Yes	No
1	Diagnostic Trouble Code (DTC) confirmation 1) Clear DTC(s) referring to "Diagnostic Trouble Code (DTC) Clearance: in related manual". 2) Turn the ignition switch to OFF position. 3) Check if any DTC is detected referring to "Diagnostic Trouble Code (DTC) Check: in related manual". <i>Is DTC P1625 still detected?</i>	Go to Step 2.	The troubleshooting is completed.
2	Immobilizer control module (ICM) replacement and Diagnostic Trouble Code (DTC) check 1) Replace immobilizer control module (ICM) referring to "Immobilizer Control Module (ICM) Removal and Installation: in related manual". 2) Check if DTC P1625 is still detected referring to "Diagnostic Trouble Code (DTC) Check: in related manual". <i>Is DTC P1625 still detected?</i>	Replace ECM with new one referring to "Engine Control Module (ECM) Removal and Installation: in Section 1C in related manual", and then perform "Procedure after ECM Replacement: in related manual".	The troubleshooting is completed.

DTC P1636: Immobilizer Information Registration Failure**Wiring Diagram**

Refer to "Immobilizer Control System Wiring Circuit Diagram: "

DTC Detecting Condition and Trouble Area

Detecting Condition	Trouble Area
The registration of the immobilizer control system information in ECM is failed.	• CAN communication wire circuits faulty • Steering angle sensor (if equipped) faulty • Keyless start control module (if equipped) faulty • 4WD control module (if equipped) faulty • TCM (if equipped) faulty • BCM faulty • ABS/ESP® control module faulty • Combination meter faulty • ECM faulty

Troubleshooting

Step	Action	Yes	No
1	Diagnostic Trouble Code (DTC) confirmation 1) Clear DTC(s) referring to "Diagnostic Trouble Code (DTC) Clearance: in related manual". 2) Turn the ignition switch to OFF position. 3) Check if any DTC is detected referring to "Diagnostic Trouble Code (DTC) Check: in related manual". <i>Is DTC P1636 still detected?</i>	Go to Step 2.	The troubleshooting is completed.
2	Diagnostic Trouble Code (DTC) check in ECM <i>Is any DTC other than P1636 detected in Step 1?</i>	Perform the troubleshooting referring to the corresponding flowchart.	Go to Step 3.
3	Diagnostic Trouble Code (DTC) check in BCM 1) Check BCM for DTC referring to "DTC Check: in Section 10B in related manual". <i>Is any DTC detected?</i>	Perform the troubleshooting referring to the corresponding flowchart in Section 10B.	Go to Step 4.
4	Replacement of BCM 1) Replace BCM with new one referring to "BCM Removal and Installation: in Section 10B in related manual". 2) Check ECM for DTC referring to "Diagnostic Trouble Code (DTC) Check: in related manual". <i>Is DTC P1636 still detected?</i>	Go to Step 5.	The troubleshooting is completed.
5	Replacement of ECM 1) Replace ECM with new one referring to "Engine Control Module (ECM) Removal and Installation: in Section 1C in related manual". 2) Check ECM for DTC referring to "Diagnostic Trouble Code (DTC) Check: in related manual". <i>Is DTC P1636 still detected?</i>	Recheck CAN communication wire circuits and poor connection at ECM, ABS/ESP® control module and BCM connectors.	The troubleshooting is completed.

DTC P1638: Immobilizer Information Mismatched

S5JB0EA304017

Wiring Diagram

Refer to "Immobilizer Control System Wiring Circuit Diagram: "

DTC Detecting Condition and Trouble Area

Detecting Condition	Trouble Area
- The immobilizer control system information in ECM and the one in BCM does not match. - The registration of the immobilizer control system information in ECM is failed.	- Use of the wrong ECM - Steering angle sensor (if equipped) faulty - Keyless start control module (if equipped) faulty 4WD control module (if equipped) - TCM (if equipped) faulty - CAN communication wire circuits faulty - BCM faulty - Combination meter faulty - ABS/ESP® control module faulty - ECM faulty

Troubleshooting

Step	Action	Yes	No
1	Diagnostic Trouble Code (DTC) confirmation 1) Clear DTC(s) referring to "Diagnostic Trouble Code (DTC) Clearance: in related manual". 2) Turn the ignition switch to OFF position. 3) Check if any DTC is detected referring to "Diagnostic Trouble Code (DTC) Check: in related manual". <i>Is DTC P1638 still detected?</i>	Go to Step 2.	The troubleshooting is completed.
2	Diagnostic Trouble Code (DTC) confirmation 1) Disconnect negative (–) cable from battery for more than 5 seconds. 2) Connect negative (–) cable to battery. 3) Check if any DTC is detected referring to "Diagnostic Trouble Code (DTC) Check: in related manual". <i>Is DTC P1638 still detected?</i>	Go to Step 3.	The troubleshooting is completed.
3	Check ECM specification 1) Check ECM part number to see if ECM is applicable to the vehicle in service. <i>Is a correct ECM used for the vehicle in service?</i>	Go to Step 2.	Replace ECM with the correct one and recheck if DTC P1638 is still detected by ECM.
4	Diagnostic Trouble Code (DTC) check in ECM <i>Is any DTC other than P1638 detected in Step 1?</i>	Perform the troubleshooting referring to the corresponding flowchart.	Go to Step 3.
5	Diagnostic Trouble Code (DTC) check in BCM 1) Check BCM for DTC referring to "DTC Check: in Section 10B in related manual". <i>Is any DTC detected?</i>	Perform the troubleshooting referring to the corresponding flowchart in Section 10B.	Go to Step 5.

10C-18 Immobilizer Control System:

Step	Action	Yes	No
6	Replacement of BCM 1) Replace BCM with new one referring to “BCM Removal and Installation: in Section 10B in related manual”. 2) Check ECM for DTC referring to “Diagnostic Trouble Code (DTC) Check: in related manual”. <i>Is DTC P1638 still detected?</i>	Go to Step 6.	The troubleshooting is completed.
7	Replacement of ECM 1) Replace ECM with new one referring to “Engine Control Module (ECM) Removal and Installation: in Section 1C in related manual”. 2) Check ECM for DTC referring to “Diagnostic Trouble Code (DTC) Check: in related manual”. <i>Is DTC P1638 still detected?</i>	Recheck CAN communication wire circuits and poor connection at ECM, ABS/ESP® control module and BCM connectors.	The troubleshooting is completed.

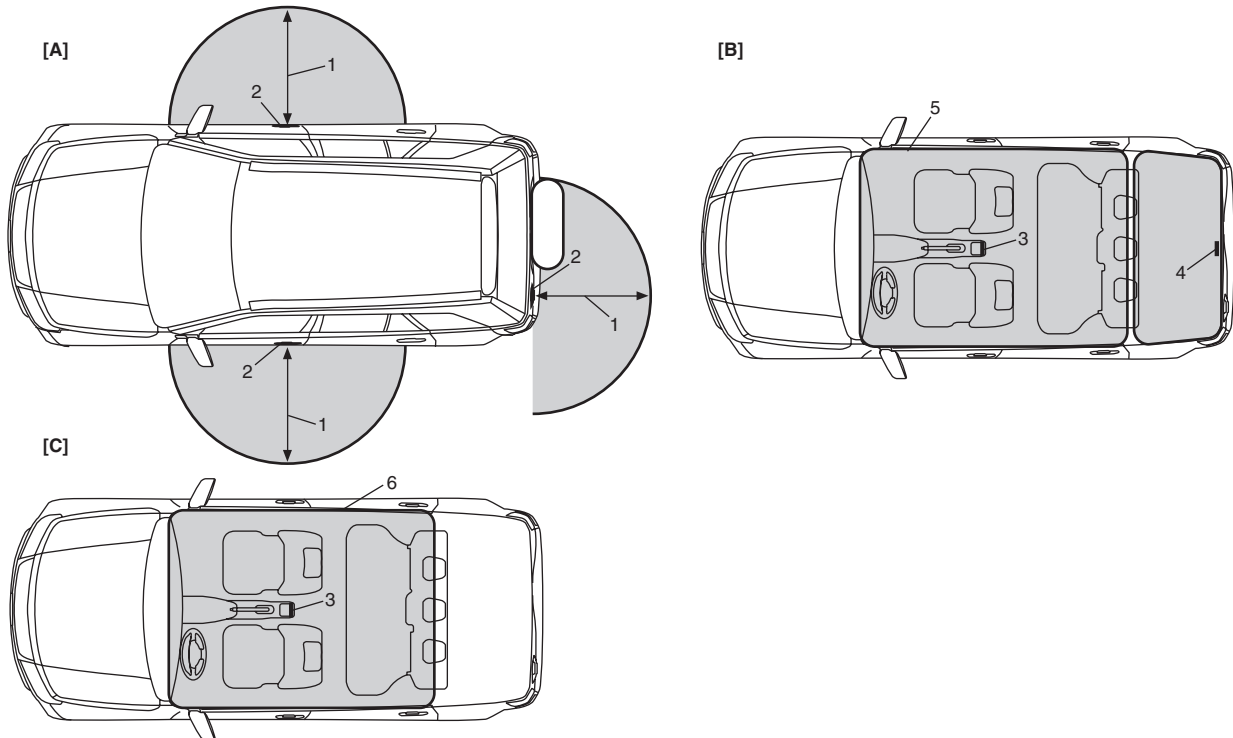
Keyless Start System

General Description

Operation Area of Remote Controller

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Shown below are the operation areas of the remote controller for the keyless engine start function and door lock function of the keyless start system.



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[A]: Door lock function of keyless start system	3. Center antenna
[B]: Function of keyless start system to prevent remote controller from being closed in vehicle compartment	4. Luggage room antenna
[C]: Keyless engine start function	5. Vehicle compartment including luggage room
1. About 80 cm (31.5 in, 2.6 ft)	6. Vehicle compartment excluding luggage room
2. Each door antenna	

However, even when the remote controller is within the operation area as shown above, there are cases where the keyless start system doesn't work under certain conditions as described below. And when the keyless engine start function doesn't work, the key indicator lamp in the combination meter may light up.

- Doors cannot be locked or unlocked using the door lock function of keyless start system when:
 - The remote controller which has been registered in the keyless start control module and another un-registered one are both carried at the same time
 - The remote controller is kept in some metallic container which disturb radio wave transmission/reception
 - One of doors is open
 - The ignition key is inserted in the ignition key cylinder
- The function of the keyless start system to prevent the remote controller from being closed in the vehicle compartment doesn't work when:
 - The remote controller is in the door pocket or in the glove box
 - The remote controller is kept in some metallic container which disturb radio wave transmission/reception
 - The remote controller is placed close to outside of the vehicle compartment (such as on the instrument panel beside the front window shield glass or in a corner of the luggage room)

10E-2 Keyless Start System:

- The ignition knob switch cannot be turned using the keyless engine start function fails to turn:
 - The remote controller which has been registered in the keyless start control module and another un-registered one are both carried at the same time
 - The remote controller is kept in some metallic container which disturbs radio wave transmission/reception
 - The ignition knob switch has been pushed for 5 seconds or longer
 - The remote controller is placed close to outside of the vehicle compartment (such as on the instrument panel beside the front window shield glass or in a corner of the luggage room)

CAN Communication System Description

S5JB0EA501007

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

Keyless Start Control Module Transmission Data

				ECM	BCM	Combination Meter
Keyless Start Control Module		DATA	ID code of keyless start control module	○		
			ECM-keyless start control module code	○		
			Ignition knob switch signal		○	
			Door lock/unlock request signal		○	
			Buzzer request signal		○	
			Answer back request signal		○	
			Key indicator lamp control signal			○

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Keyless Start Control Module Reception Data

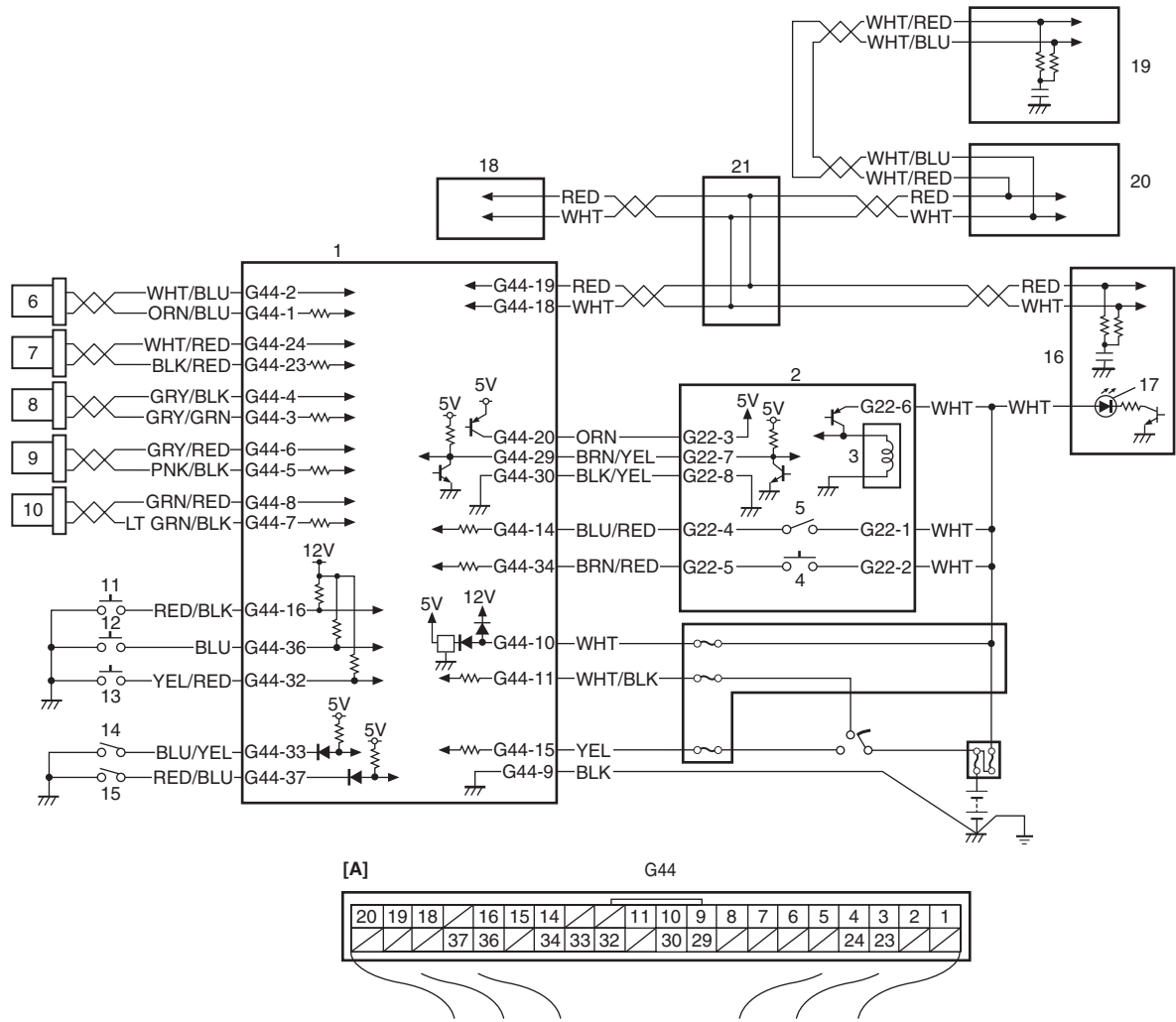
				ECM	BCM
Keyless Start Control Module		DATA	Vehicle speed signal	○	
			ECM-keyless start control module code	○	
			Door switch status		○
			Door lock status		○

I5RW0AA50006-04

Schematic and Routing Diagram

Keyless Start System Electric Wiring Circuit Diagram

S5JB0EA502001



I5JB0DA50002-01

[A]: Keyless start control module connector (viewed from harness side)	8. Rear end door antenna	16. Combination meter
1. Keyless start control module	9. Center antenna	17. Key indicator lamp
2. Steering Lock unit	10. Luggage room antenna	18. BCM
3. Steering lock solenoid	11. Driver side door request switch	19. ECM
4. Ignition knob switch	12. Passenger side door request switch	20. ABS or ESP® control module
5. Key reminder switch	13. Rear end door request switch	21. Junction connector
6. Driver side door antenna	14. Driver side door lock switch	
7. Passenger side door antenna	15. Passenger side door lock switch	

Diagnostic Information and Procedures

Precautions in Diagnosing Troubles

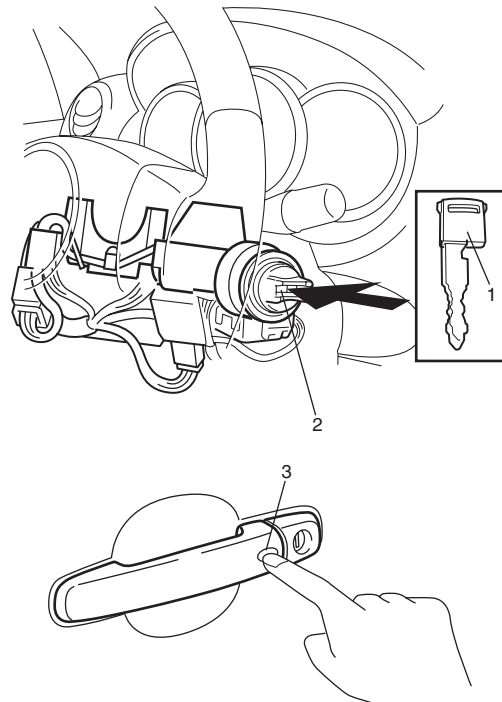
S5JB0EA504001

- The keyless start system executes data transmission/reception by means of the radio wave. Therefore, proper operation may not be obtained if use of the door lock function and engine start function of the keyless start system is attempted near the place where strong radio wave is emitted (TV and radio broadcasting stations, etc.).
- Diagnostic information stored in keyless start control module memory can be checked only by key indicator lamp.
- Be sure to use the trouble diagnosis procedure as described in "Keyless Start System Check: in related manual". Failure to follow it may result in incorrect diagnosis. (Some other DTC may be stored by mistake in the memory of keyless start control module during inspection.)
- Be sure to read "Precautions for Electrical Circuit Service: in Section 00 in related manual" before inspection and observe what is written there.
- Communication of ECM, BCM, TCM (A/T model), 4WD control module (if equipped), ABS or ESP® control module, keyless start control module, steering angle sensor (if equipped) and combination meter is established by CAN (Controller Area Network). (For detail of CAN communication for keyless start control module, refer to "CAN Communication System Description: "). Therefore, handle CAN communication line with care referring to "Precaution for CAN Communication System: in Section 00 in related manual".
- Replacement of the keyless start control module
When keyless start control module is replaced with new one, make sure that register remote controller ID code to Keyless start control module correctly according to "Registration Procedure for Remote Controller ID Code: in related manual".
- Keyless start control module substitution
When the keyless start control module used in another vehicle was installed in the vehicle, register the ID code of the remote controller in the keyless start control module as well as the ignition key transponder code for the immobilizer control system in ECM. For the registration procedure of the ignition key transponder code, refer to "Registration of the Ignition Key: in Section 10C in related manual".

DTC Check

S5JB0EA504007

- 1) Check to make sure that all doors are closed.
- 2) Open driver side door window glass and door.
- 3) Check to make sure that ignition key is not inserted in ignition key cylinder. If it is, remove it.
- 4) Perform "Key Indicator Lamp Check: in related manual".
- 5) Close driver side door and within 15 seconds after that, perform Steps a) through e) described below.
 - a) Insert ignition key (1) in ignition key cylinder (2).
 - b) Remove ignition key from ignition key cylinder.
 - c) Repeat Steps a) and b) twice.
 - d) Insert ignition key in ignition key cylinder.
 - e) Push driver side door request switch (3) 4 times.
At the end of Step e), buzzer sounds 4 times to inform that trouble diagnosis mode has started.

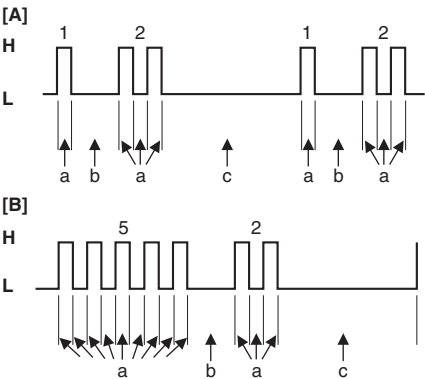
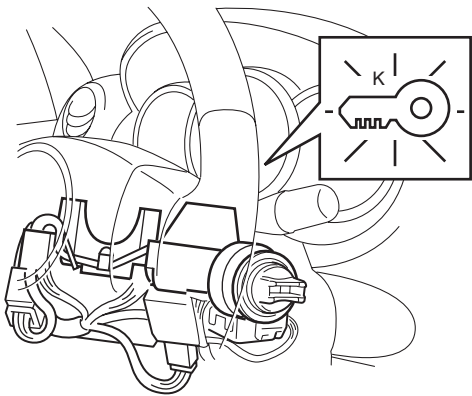


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6) Read flashing pattern of key indicator lamp which represents DTC as shown in example below and write it down. When more than 2 DTCs are stored in memory, flashing for each DTC is repeated three times starting with the smallest DTC number in increasing order.

NOTE

Go to “No DTC Detection After Performing DTC Check: in related manual” in case that any DTC is detected after performing the procedure mentioned above.



I6JB01A50004-01

[A]: DTC NO. 12 (Normal)	K: Key indicator lamp
[B]: DTC NO. 52	a: 0.3 seconds
H: Key indicator lamp turned ON	b: 1.0 second
L: Key indicator lamp turned OFF	c: 3.0 seconds

7) After completing the check, remove ignition key from ignition key cylinder.

Inspection of Keyless Start Control Module and Its Circuits

Keyless start control module and its circuits can be checked at keyless start control module wiring couplers by measuring voltage and resistance.

⚠ CAUTION

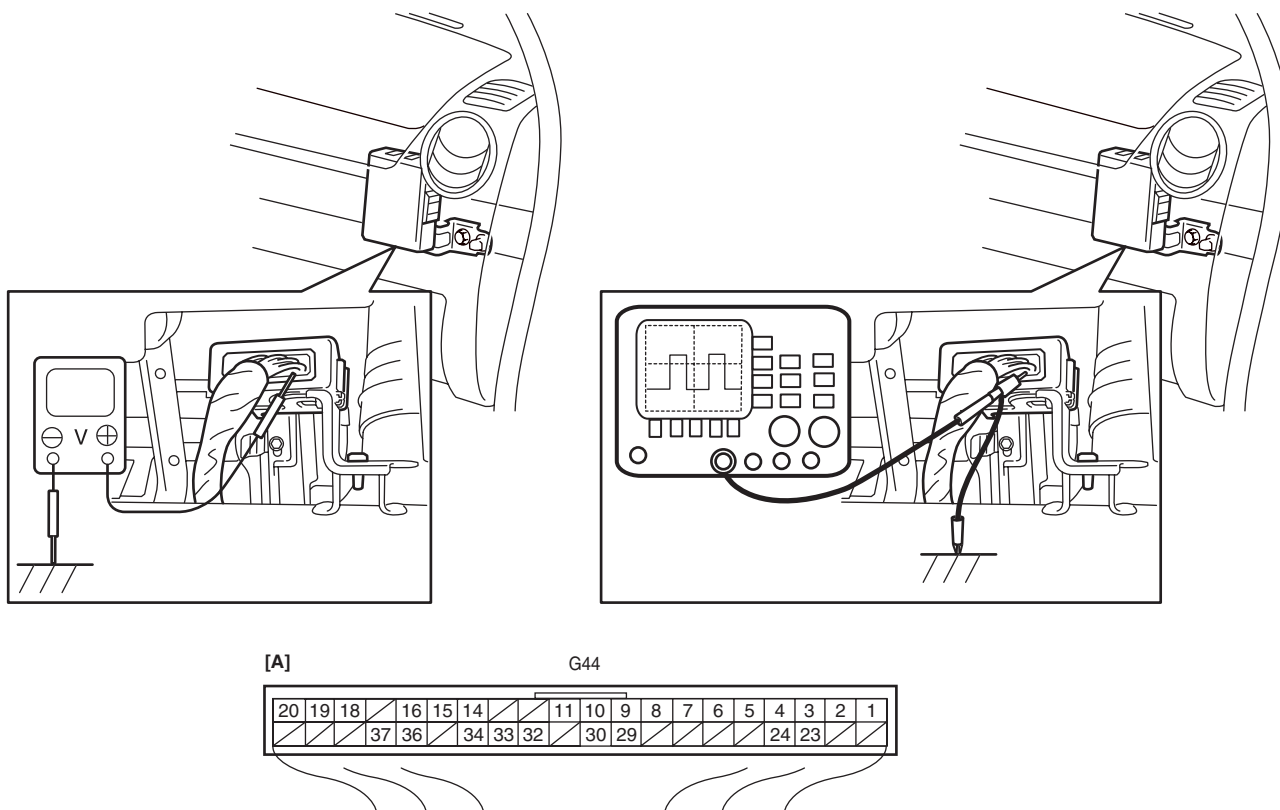
Keyless start control module cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to keyless start control module with coupler disconnected from it.

Voltage Check

- 1) Disconnect negative cable (–) at battery.
- 2) Remove keyless start control module from vehicle body referring to “Keyless Start Control Module Removal and Installation: in related manual”.
- 3) Connect connector to keyless start control module.
- 4) Check voltage at each terminal number of couplers connected.

NOTE

- As each terminal voltage is affected by the battery voltage, confirm that it is 11 V or more when ignition switch is ON.
- Voltage with asterisk (*) cannot be measured by voltmeter because it is pulse signal.



I5JB0AA50012-02

[A]: Keyless start control module connector (viewed from harness side)

Terminal Number	Circuit	Normal Voltage	Condition
G44-1	Driver side door antenna (–)	*0 – 5 V	Refer to “Reference waveform No. 1: ”
G44-2	Driver side door antenna (+)		
G44-3	Rear end door antenna (–)	*0 – 5 V	Refer to “Reference waveform No. 1: ”
G44-4	Rear end door antenna (+)		
G44-5	Center antenna (–)	*–1 – 1 V	Refer to “Reference waveform No. 2: ”
G44-6	Center antenna (+)	*–10 – 20 V	
G44-7	Luggage room antenna (–)	*–10 – 10 V	Refer to “Reference waveform No. 3: ”
G44-8	Luggage room antenna (+)	*–8 – 14 V	
G44-9	Ground for keyless start control module	0 – 1 V	Ignition switch is at all positions
G44-10	Power source	10 – 12 V	Ignition switch is at all positions
G44-11	Ignition switch (ACC signal)	10 – 12 V	Ignition switch is at ACC or ON position
		0 – 1 V	Ignition switch is at any position other than ACC or ON position
G44-12	—	—	—
G44-13	—	—	—
G44-14	Ignition switch (key reminder signal)	10 – 12 V	Insert ignition key to ignition key cylinder
		0 – 1 V	Pull out ignition key from ignition key cylinder
G44-15	Ignition switch (ON signal)	10 – 12 V	Ignition switch is at ON position
		0 – 1 V	Ignition switch is at any position other than ON position
G44-16	Driver side door request switch	10 – 12 V	Request switch of driver side door is released
		0 – 1 V	Request switch of driver side door is pushed
G44-17	—	—	—
G44-18	CAN communication line (low)	*1.6 – 2.5 V	Refer to “Reference waveform No. 4: ”
G44-19	CAN communication line (high)	*2.5 – 3.6 V	
G44-20	Power supply for steering lock unit	4 – 6 V	Full time
G44-21	—	—	—
G44-22	—	—	—
G44-23	Passenger side door antenna (–)	*0 – 5 V	Refer to “Reference waveform No. 1: ”
G44-24	Passenger side door antenna (+)		
G44-25	—	—	—
G44-26	—	—	—
G44-27	—	—	—
G44-28	—	—	—
G44-29	Signal for steering lock unit	4 – 6 V	Ignition knob switch is at any position other than ON and OFF position
		*0 – 5 V	Refer to “Reference waveform No. 5: ”
G44-30	Ground for steering lock unit	0 – 1 V	Full time
G44-31	—	—	—
G44-32	Rear end door request switch	10 – 12 V	Request switch of rear end door is at any position other than ON position
		0 – 1 V	Request switch of rear end door is at ON position
G44-33	Driver side door lock switch	*0 – 5 V	Refer to “Reference waveform No. 6: ”
G44-34	Ignition knob switch	10 – 12 V	When pushing ignition knob switch of steering lock unit
		0 – 1 V	When releasing ignition knob switch of steering lock unit
G44-35	—	—	—
G44-36	Passenger side door request switch	10 – 12 V	Request switch of passenger side door is at any position other than ON position
		0 – 1 V	Request switch of passenger side door is at ON position
G44-37	Passenger side door lock switch	*0 – 5 V	Refer to “Reference waveform No. 6: ”
G44-38	—	—	—

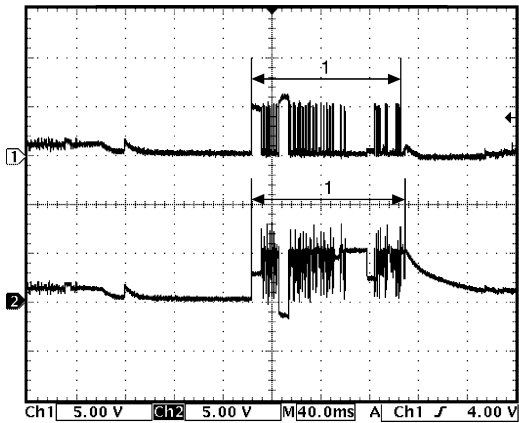
10E-8 Keyless Start System:

Terminal Number	Circuit	Normal Voltage	Condition
G44-39	—	—	—
G44-40	—	—	—

Reference waveform No. 1

Driver, passenger and rear end door antenna request signals (Request signal (1) transmitted by each door antenna when each door request switch is pushed)

Measurement terminal	Driver side door antenna • CH1: “G44-2” to “G44-9” • CH2: “G44-1” to “G44-9” Passenger side door antenna • CH1: “G44-24” to “G44-9” • CH2: “G44-23” to “G44-9” Rear end door antenna • CH1: “G44-4” to “G44-9” • CH2: “G44-3” to “G44-9”
Oscilloscope setting	CH1: 5 V/DIV, CH2: 5 V/DIV TIME: 40 ms/DIV
Measurement condition	Request switch of each door is pushed with remote controller carried

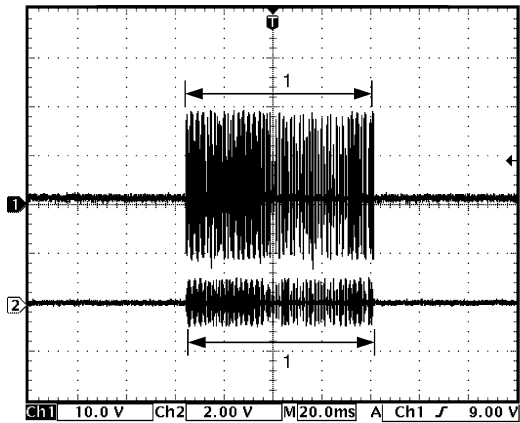


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Reference waveform No. 2

Center antenna signal (Request signal (1) transmitted by center antenna when each door request switch is pushed)

Measurement terminal	CH1: “G44-6” to “G44-9” CH2: “G44-5” to “G44-9”
Oscilloscope setting	CH1: 10 V/DIV, CH2: 2 V/DIV TIME: 20 ms/DIV
Measurement condition	• Ignition knob switch of steering lock unit is pushed • Request switch of each door is pushed with remote controller carried



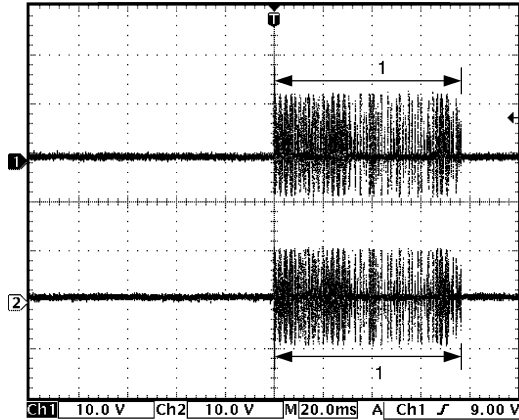
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Reference waveform No. 3

Luggage room antenna signal

(Request signal (1) transmitted by luggage room antenna when each door request switch is pushed)

Measurement terminal	CH1: "G44-8" to "G44-9" CH2: "G44-7" to "G44-9"
Oscilloscope setting	CH1: 10 V/DIV, CH2: 10 V/DIV TIME: 20 ms/DIV
Measurement condition	Request switch of each door is pushed with remote controller carried



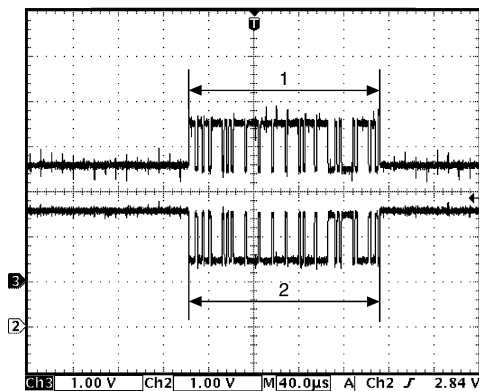
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Reference waveform No. 4

CAN communication signals for combination meter

(CAN signal communicated between keyless start control module and combination meter when ignition switch is turned ON)

Measurement terminal	CH1: "G44-19" to "G44-9" CH2: "G44-18" to "G44-9"
Oscilloscope setting	CH1: 1 V/DIV, CH2: 1 V/DIV TIME: 40 μ s/DIV
Measurement condition	Ignition switch is at ON position



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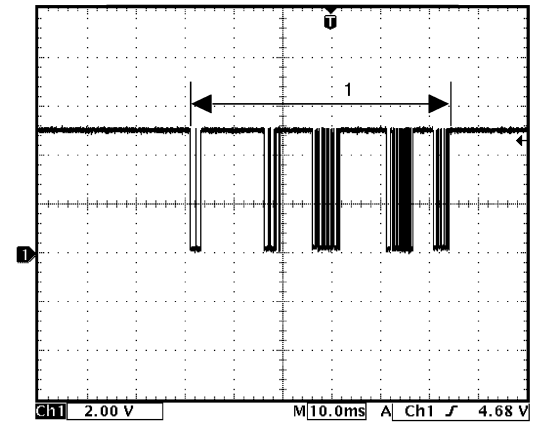
- | |
|---|
| 1. CAN communication line signal (high) |
| 2. CAN communication line signal (low) |

Reference waveform No. 5

Steering lock unit signal

(Signal (1) communicated between keyless start control module and steering lock unit when measurement condition described below applies)

Measurement terminal	CH1: "G44-29" to "G44-9"
Oscilloscope setting	CH1: 2 V/DIV TIME: 10 ms/DIV
Measurement condition	- Ignition knob switch of steering lock unit is pushed - Request switch of each door is pushed with remote controller carried



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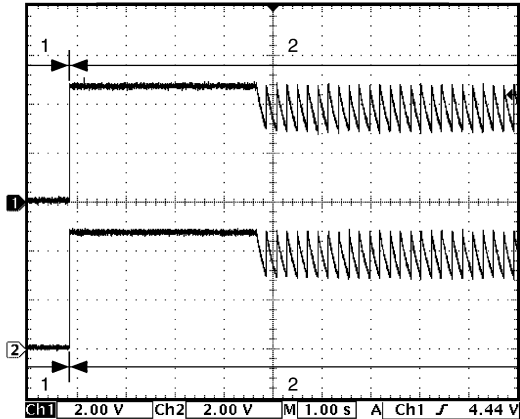
Reference waveform No. 6

Driver and passenger side door lock switch.

(This signal indicates door lock status.)

In case the position of driver and passenger side door lock is changed from the unlock to the lock.

Measurement terminal	Driver side door lock switch • CH1: "G42-33" to "G42-9" Passenger side door lock switch • CH2: "G42-37" to "G42-9"
Oscilloscope setting	CH1: 2 V/DIV CH2: 2 V/DIV TIME: 1 s/DIV
Measurement condition	Press lock side of manual door lock switch

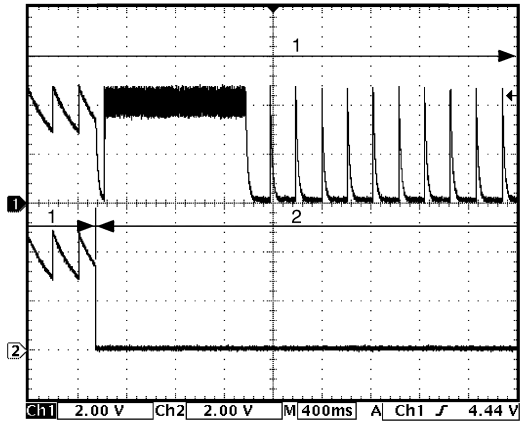


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1. Unlock signal	2. Lock signal
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In case the position of passenger side door lock is changed from the lock to the unlock when the position of driver and passenger side door is at the lock

Measurement terminal	Driver side door lock switch • CH1: "G42-33" to "G42-9" Passenger side door lock switch • CH2: "G42-37" to "G42-9"
Oscilloscope setting	CH1: 2 V/DIV CH2: 2 V/DIV TIME: 400 ms/DIV
Measurement condition	Driver door is at lock position and passenger side door is at unlock position

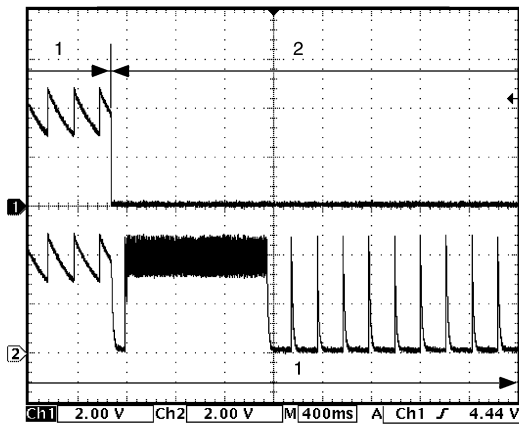


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1. Lock signal	2. Unlock signal
----------------	------------------

In case the position of driver side door lock is changed from the lock to the unlock when the position of driver and passenger side door is at the lock.

Measurement terminal	Driver side door lock switch • CH1: "G42-33" to "G42-9" Passenger side door lock switch • CH2: "G42-37" to "G42-9"
Oscilloscope setting	CH1: 2 V/DIV CH2: 2 V/DIV TIME: 400 ms/DIV
Measurement condition	Driver door is at unlock position and passenger side door is at lock position

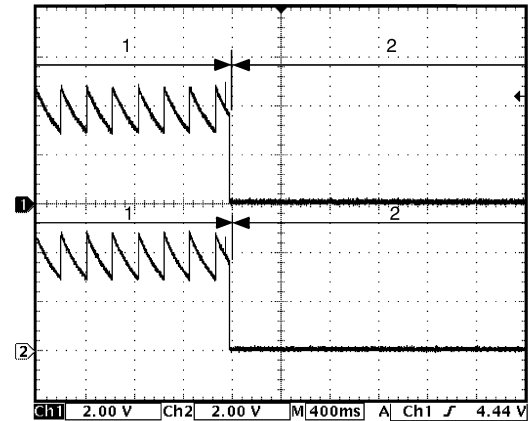


I5JB0AA50029-02

1. Lock signal	2. Unlock signal
----------------	------------------

In case the position of driver and passenger side door lock is changed from the lock to the unlock.

Measurement terminal	Driver side door lock switch • CH1: "G42-33" to "G42-9" Passenger side door lock switch • CH2: "G42-37" to "G42-9"
Oscilloscope setting	CH1: 2 V/DIV CH2: 2 V/DIV TIME: 400 ms/DIV
Measurement condition	Driver door is at unlock position and passenger side door is at lock position



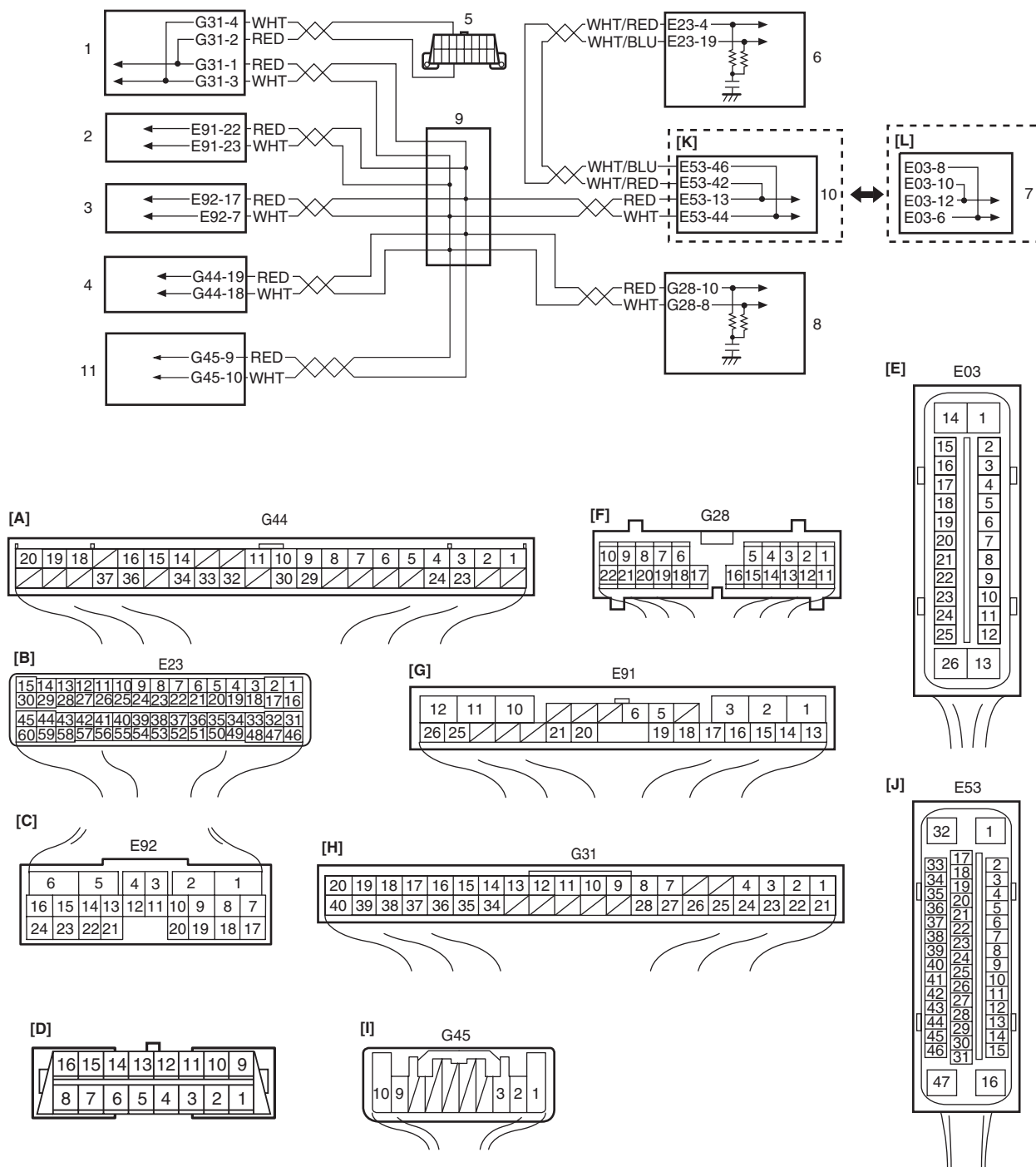
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1. Lock signal	2. Unlock signal
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DTC No. 31: Lost Communication with BCM

S5JB0EA504020

Wiring Diagram



[A]: Keyless start control module connector (viewed from harness side)	1. BCM
[B]: ECM connector (viewed from harness side)	2. 4WD control module (if equipped)
[C]: TCM connector (viewed from harness side)	3. TCM (if equipped)
[D]: DLC (viewed from terminal side)	4. Keyless start control module
[E]: ABS control module connector (viewed from terminal side)	5. DLC
[F]: Combination meter connector (viewed from harness side)	6. ECM
[G]: 4WD control module connector (viewed from harness side)	7. ABS control module
[H]: BCM connector (viewed from harness side)	8. Combination meter
[I]: Steering angle sensor connector (viewed from harness side)	9. Junction connector
[J]: ESP® control module connector (viewed from terminal side)	10. ESP® control module
[K]: Vehicle equipped with ESP®	11. Steering angle sensor (if equipped)
[L]: Vehicle not equipped with ESP®	

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DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Keyless start control module cannot receive data sent by CAN from BCM	• CAN communication circuit • Keyless start control module • BCM

DTC Confirmation Procedure

- 1) Clear DTC referring to "DTC Clearance: in related manual".
- 2) Turn ignition key knob by pushing ignition key knob.
- 3) Check DTC referring to "DTC Check: ".

Troubleshooting

Step	Action	Yes	No
1	<i>Was "Keyless Start System Check" performed?</i>	Go to Step 2.	Go to "Keyless Start System Check: in related manual".
2	DTC check of keyless start control module <i>Is DTC No. 33 detected?</i>	Go to "DTC No. 33: Control Module Communication Bus Off: ".	Go to Step 3.
3	DTC check of BCM 1) Check BCM for DTC referring to "DTC Check: in Section 10B in related manual" <i>Is DTC U1073, DTC U1100 or DTC U1101 detected?</i>	Go to applicable DTC diag flow.	Go to Step 4.
4	CAN communication circuit check 1) Check connection of connectors of all control modules communicating by means of CAN. 2) Disconnect connectors from BCM and keyless start control module. 3) Check CAN communication circuit between BCM and keyless start control module for open, short and high resistance. <i>Is each CAN communication circuit in good condition?</i>	Go to Step 5.	Repair circuit.
5	CAN communication circuit check 1) Disconnect connectors of all control modules communicating by means of CAN. 2) Check CAN communication circuit between control modules other than Step 4 for open, short and high resistance. <i>Is each CAN communication circuit in good condition?</i>	Go to Step 6.	Repair circuit.
6	DTC check of ECM 1) Connect connectors of disconnected control modules communicating by means of CAN. 2) Check ECM for DTC. <i>Is DTC P1678 detected?</i>	Check BCM power and ground circuit. If circuit is OK, substitute a known-good BCM and recheck.	Go to Step 7.

10E-14 Keyless Start System:

Step	Action	Yes	No
7	DTC check of keyless start control module 1) Turn ignition switch to OFF position. 2) Disconnect connector of any one of control module other than keyless start control module. 3) Recheck keyless start control module for DTC. <i>Is DTC No.31 detected?</i>	Using same method, disconnect connectors of control module other than keyless start control module one by one to check if DTC No.31 is detected. If DTC No.31 is detected even through connector of control module other than keyless start control module is disconnected, substitute a known-good keyless start control module and recheck.	Check power and ground circuit of disconnected control module and recheck. If circuit is OK, substitute a known-good disconnected control module and recheck.

DTC No. 33: Control Module Communication Bus Off**Wiring Diagram**

Refer to "DTC No. 31: Lost Communication with BCM: ".

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
Communication is not available with all control modules connected by CAN	• CAN communication circuit • Combination meter • Keyless start control module • BCM • 4WD control module (if equipped) • ABS or ESP® control module • TCM (A/T model) • ECM • Steering angle sensor (if equipped)

DTC Confirmation Procedure

- 1) Clear DTC referring to "DTC Clearance: in related manual".
- 2) Start engine and run it for 1 min. or more.
- 3) Check DTC referring to "DTC Check: ".

Troubleshooting

Step	Action	Yes	No
1	<i>Was "Keyless Start System Check" performed?</i>	Go to Step 2.	Go to "Keyless Start System Check: in related manual".
2	Control module connector check 1) Check connection of connectors of all control modules communicating by means of CAN. 2) Recheck keyless start control module for DTC. <i>Is DTC No. 33 detected?</i>	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00 in related manual".
3	CAN communication circuit check 1) Turn ignition switch to OFF position. 2) Disconnect connectors of all control modules communicating by means of CAN. 3) Check CAN communication circuit between control modules for open, short and high resistance. <i>Is each CAN communication circuit in good condition?</i>	Go to Step 4.	Repair circuit.

10E-16 Keyless Start System:

Step	Action	Yes	No
4	DTC check of keyless start control module 1) Turn ignition switch to OFF position. 2) Connect connectors of disconnected control modules communicating by means of CAN. 3) Disconnect connector of any one control module other than keyless start control module and combination meter. 4) Recheck DTC for keyless start control module. <i>Is DTC No.33 detected?</i>	Using same method, disconnect connectors of control module other than keyless start control module and combination meter one by one to check if DTC No.33 is detected. If DTC No.33 is detected even though connector of control module other than keyless start control module and combination meter is disconnected, substitute a known-good keyless start control module and recheck.	Check power and ground circuit of disconnected control module. If circuit is OK, substitute a known-good disconnected control module and recheck.

Prepared by
SUZUKI MOTOR CORPORATION

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SUPPLEMENTARY SERVICE MANUAL
FOR ESP MODEL
JB416 / JB420

SUPPLEMENTARY SERVICE MANUAL
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