

GROUP 35B

ANTI-LOCK BRAKING SYSTEM (ABS)

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GENERAL INFORMATION

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FEATURES

The 4ABS ensures directional stability and control during hard braking.

This ABS uses a 4-sensor system that controls all four wheels independently of each other.

- EBD^{*1} (Electronic Brake-force Distribution system) control that can obtain ideal rear wheel brake force has been employed.
- The magnetic encoder for wheel speed detection has been installed instead of the rotor as the wheel speed sensor.
- For wiring harness saving and secure data communication, CAN^{*2} bus has been adopted as a tool of communication with another ECU.

▪ Fail-safe function which ensures that safety is maintained.

▪ Diagnostic function which provides improved serviceability.

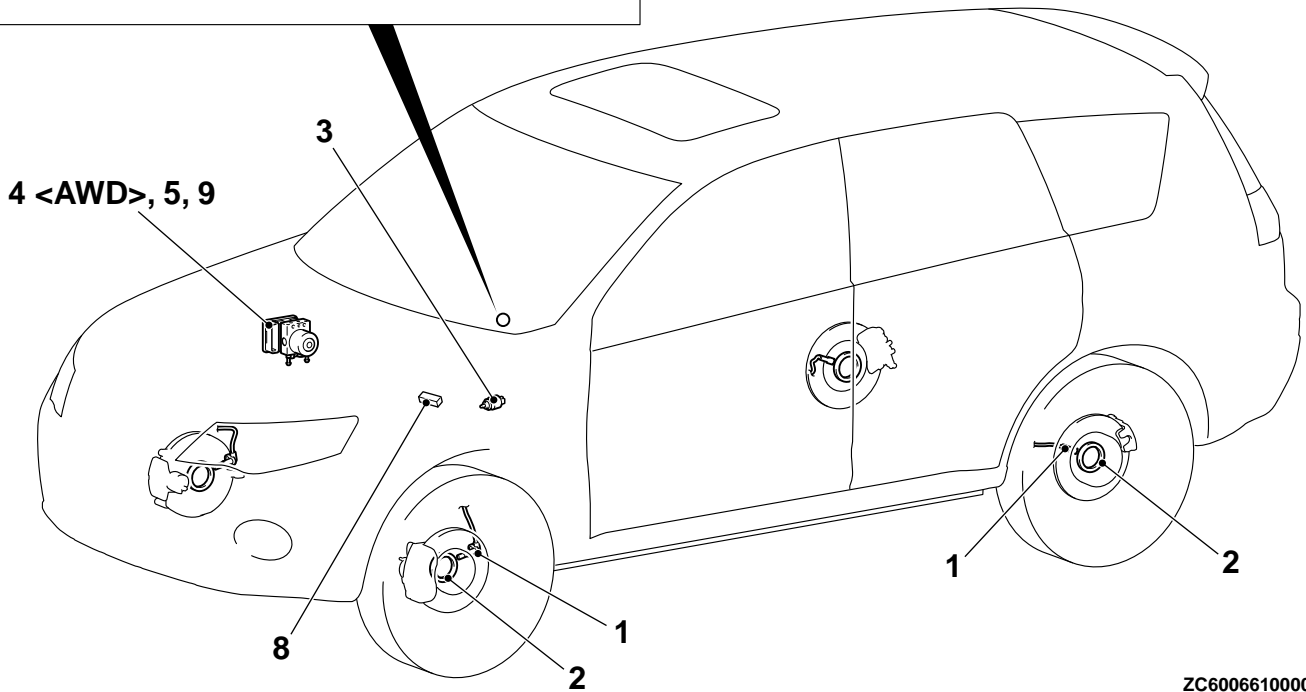
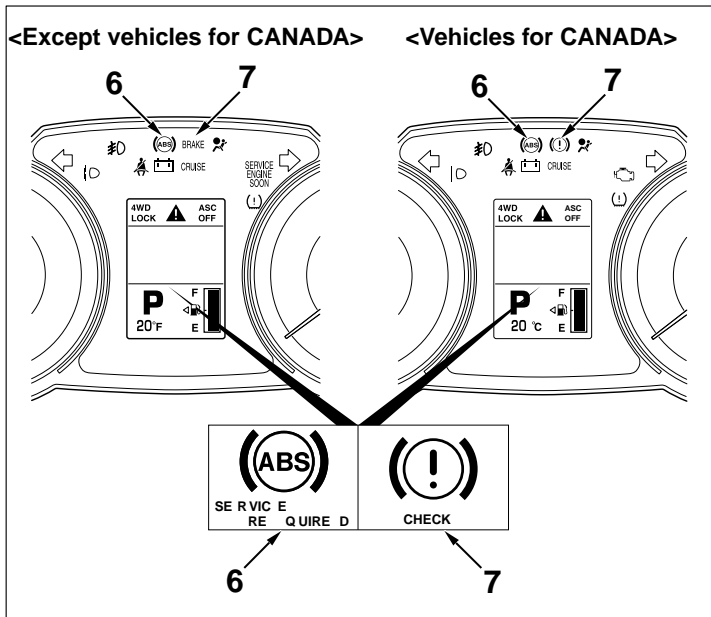
NOTE:

****1:** EBD (Electronic Brake-force Distribution)

****2:** For further details on CAN communication, refer to GROUP 54D, CAN P.54D-3.

*On vehicles with ASC, the ABS system is controlled by the ASC-ECU. For the system construction, refer to GROUP 35C, General Information P.35C-4. (Vehicle with ASC)

CONSTRUCTION DIAGRAM



ZC6006610000

Name of part		Number	Outline of function
Sensor	Wheel speed sensor	1	Outputs the frequency signal in proportion to the rotation speed of each wheel to ABS-ECU.
	Magnetic encoder for wheel speed detection	2	When the magnetic encoder for wheel speed detection (a plate on which north and south pole sides of the magnets are arranged alternately) rotates, the wheel speed sensor outputs frequency pulse signal in proportion to each wheel speed.
	Stoplight switch	3	Outputs the signal indicating whether the brake pedal is depressed or not to ABS-ECU.

**ANTI-LOCK BRAKING SYSTEM (ABS)
SPECIFICATIONS**

35B-5

Name of part		Number	Outline of function
	G sensor <AWD>	4	Incorporated in ABS-ECU, and detects the longitudinal acceleration of the vehicle.
Actuator	Hydraulic unit	5	Drives the solenoid valve using the signal from ABS-ECU, and controls the brake fluid pressure for each wheel.
	ABS warning light	6	Informs the driver of the system status by illuminating, flashing, or turning off the warning light according to the signal from ABS-ECU.
	Brake warning light	7	Used as the warning light for the parking brake, brake fluid level, and EBD control. Informs the driver of the system status by illuminating, flashing, or turning off the warning light according to the signal from ABS-ECU.
Data link connector		8	Outputs the diagnostic trouble code and establishes the communication with the scan tool.
AWD-ECU <AWD>		9	Outputs the vehicle type of FWD or AWD to ABS-ECU.
ABS-ECU		10	Controls actuators (described above) based on the signals coming from each sensor.
			Controls the self-diagnosis and fail-safe functions.
			Controls the diagnostic function (scan tool compatible).

SPECIFICATIONS

GENERAL SPECIFICATIONS

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Item			Specification
ABS control type			4-sensor
Wheel speed sensor	Magnetic encoder	Front	86 (N-pole: 43, S-pole: 43)
		Rear	86 (N-pole: 43, S-pole: 43)
	Type		Semiconductor type

SERVICE SPECIFICATIONS

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Item	Standard value
Wheel speed sensor current mA	5.9 - 8.4 or 11.8 - 16.8
Wheel speed sensor insulation resistance MΩ	5 or more

ANTI-LOCK BRAKING SYSTEM (ABS) DIAGNOSIS

INTRODUCTION TO ABS DIAGNOSIS

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The anti-lock brake system (ABS) operates differently from conventional brake systems. These differences include sounds, sensations, and vehicle performance

that owners and service technicians who are not familiar with ABS may not be used to.

Some operational characteristics may seem to be malfunctions, but they are simply signs of normal ABS operation. When diagnosing the ABS system, keep

these operational characteristics in mind. Inform the owner of the kind of performance characteristics to expect from an ABS-equipped vehicle.

ABS DIAGNOSTIC TROUBLE CODE DETECTION CONDITIONS

ABS diagnostic trouble codes (ABS DTCs) are set under different conditions, depending on the malfunction detected. Most ABS DTCs will only be set during vehicle operation. Some ABS DTCs will also be set during the ABS self-check immediately after the engine is started.

When you check if an ABS DTC will be displayed again after the DTC has been erased, you should

duplicate the ABS DTC set conditions. Depending on the detection timing and set conditions for the specific ABS DTC, you must either drive the vehicle or turn the engine off and restart it. To set the proper conditions for that DTC again, refer to "ABS DTC SET CONDITIONS" for each ABS DTC that you are trying to reset.

ABS DIAGNOSTIC TROUBLESHOOTING STRATEGY

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure that you have exhausted most of the possible ways to find an ABS fault.

1. Gather information about the problem from the customer.
2. Verify that the condition described by the customer exists.
3. Check the vehicle for any ABS DTC.
4. If you cannot verify the condition and there are no ABS DTCs, the malfunction is intermittent. Refer to GROUP 00, How to use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunctions P.00-15.
5. If you can verify the condition but there are no ABS DTCs, or the system cannot communicate with the scan tool, check that the basic brake system is operating properly.
 - *If the basic brake system is not operating properly, refer to the GROUP 35A, Basic Brake System Diagnosis P.35A-5.

M13502000111USA0000010000

- *If the basic brake system is operating properly, refer to GROUP 35A, Brake Booster Operating Check P.35A-16.

6. If there is an ABS DTC, record the number of the DTC, then erase the DTC from the memory using the scan tool.

7. Recreate the ABS DTC set conditions to see if the same ABS DTC will set again.

- *If the same ABS DTC sets again, perform the diagnostic procedures for the DTC. Refer to P. 35B-9.
- *If you cannot get the same ABS DTC to set again, the malfunction is intermittent. Refer to GROUP 00, How to use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunctions P.00-15.

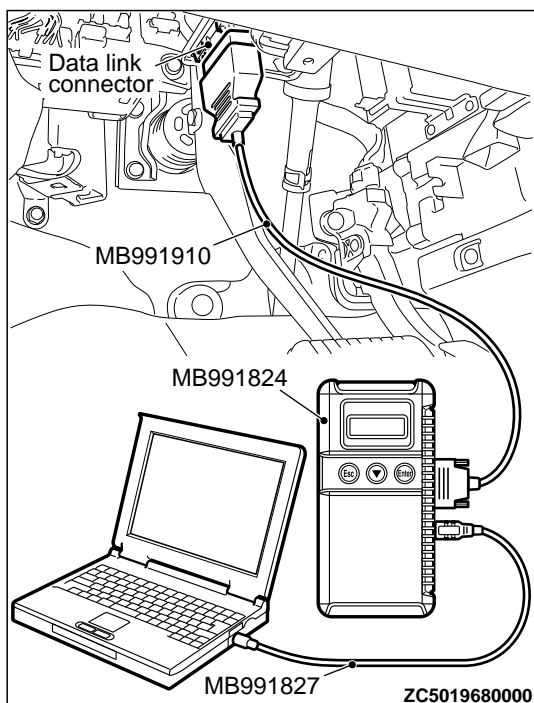
DIAGNOSIS FUNCTION

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HOW TO CONNECT THE SCAN TOOL (M.U.T.-III)

Required Special Tools:

- *MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - *MB991824: Vehicle Communication Interface (V.C.I.)
 - *MB991827: M.U.T.-III USB Cable
 - *MB991910: M.U.T.-III Main Harness A



⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to the special tool MB991824.
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch special tool MB991824 to the "ON" position.

NOTE: When the special tool MB991824 is energized, the special tool MB991824 indicator light will be illuminated in a green color.

7. Start the M.U.T.-III system on the personal computer.

NOTE: Disconnect the scan tool MB991958 in the reverse order of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

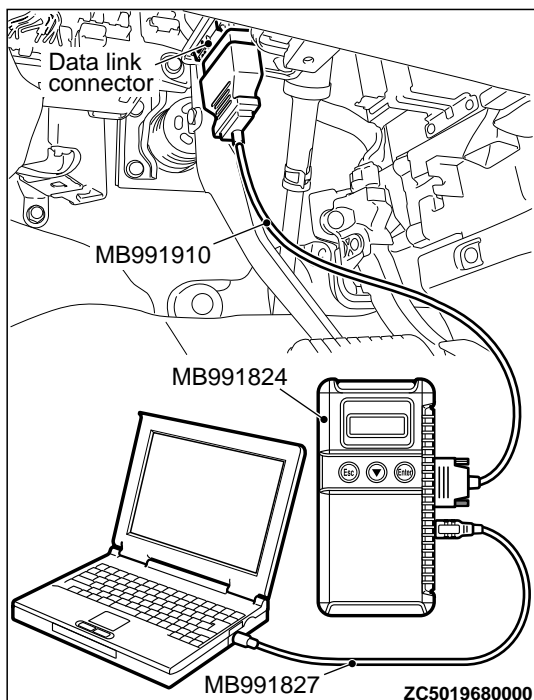
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
- MB991824: Vehicle Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

NOTE: If the battery voltage is low, diagnostic trouble codes will not be set. Check the battery if scan tool MB991958 does not display.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System Select."
4. Select "ABS/ASC/ASTC" from the system list, and select the "OK" button.
5. Select "Diagnostic Trouble Code."
6. If a DTC is set, it is shown.
7. Choose "DTC erase" to erase the DTC.



HOW TO READ DATA LIST

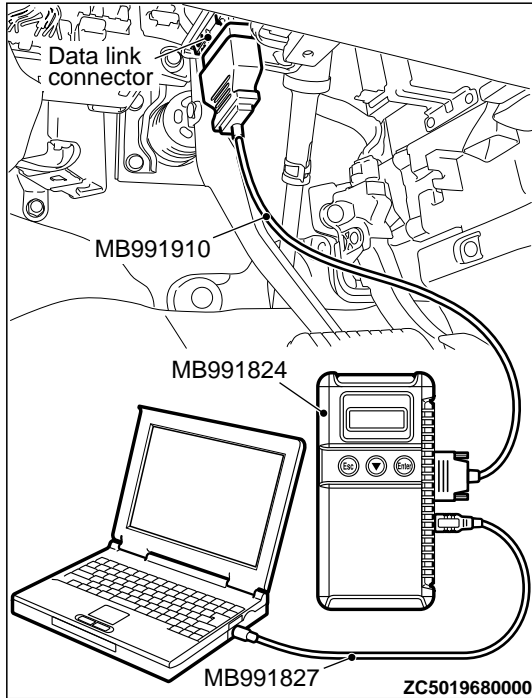
Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
- MB991824: Vehicle Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A

CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

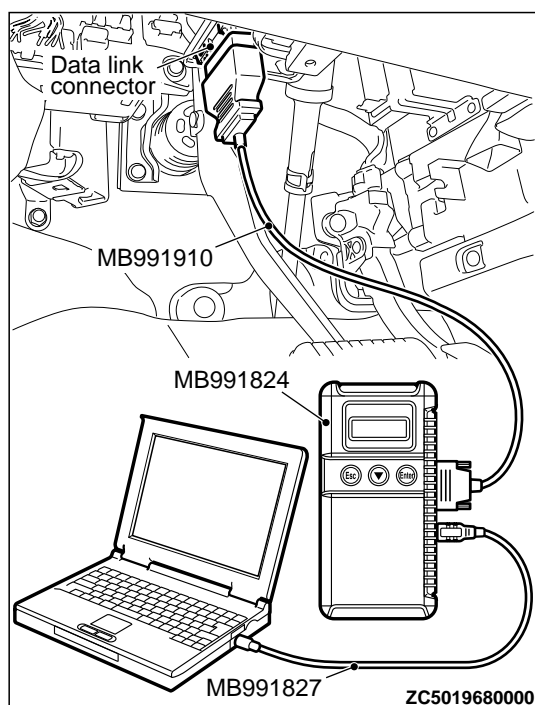
1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System Select."
4. Select "ABS/ASC/ASTC" from the system list, and select the "OK" button.
5. Select "Data List."



HOW TO PERFORM ACTUATOR TEST

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
- MB991824: Vehicle Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A



CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System Select."
4. Select "ABS/ASC/ASTC" from the system list, and select the "OK" button.
5. Choose "Actuator Test" from "ABS" screen.
6. Choose an appropriate item and select the "OK" button.

DIAGNOSTIC TROUBLE CODE CHART

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CAUTION

During diagnosis, a DTC code associated with other systems may be set when the ignition switch

is turned on with connector(s) disconnected. On completion, confirm all systems for DTCs. If DTC code(s) are set, erase them all.

DTC	Inspection item	Reference page
C100A	Abnormality in FL wheel speed sensor circuit	P.35B-11
C1015	Abnormality in FR wheel speed sensor circuit	P.35B-15
C1020	Abnormality in RL wheel speed sensor circuit	P.35B-20
C102B	Abnormality in RR wheel speed sensor circuit	P.35B-25
C1011	Abnormality in FL wheel speed sensor signal	P.35B-30
C101C	Abnormality in FR wheel speed sensor signal	P.35B-35
C1027	Abnormality in RL wheel speed sensor signal	P.35B-40
C1032	Abnormality in RR wheel speed sensor signal	P.35B-46
C1014	Mutual monitoring of FL wheel speed sensor	P.35B-52
C101F	Mutual monitoring of FR wheel speed sensor	P.35B-54
C102A	Mutual monitoring of RL wheel speed sensor	P.35B-57
C1035	Mutual monitoring of RR wheel speed sensor	P.35B-60
C1041	Abnormality in periodical signal for FL wheel speed sensor	P.35B-63
C1042	Abnormality in periodical signal for FR wheel speed sensor	P.35B-64
C1043	Abnormality in periodical signal for RL wheel speed sensor	P.35B-66
C1044	Abnormality in periodical signal for RR wheel speed sensor	P.35B-68
C1046	FL wheel speed sensor control phase time exceeded	P.35B-71
C1047	FR wheel speed sensor control phase time exceeded	P.35B-75

ANTI-LOCK BRAKING SYSTEM (ABS)
ANTI-LOCK BRAKING SYSTEM (ABS) DIAGNOSIS

DTC	Inspection item		Reference page
C1048	RL wheel speed sensor control phase time exceeded		P.35B-77
C1049	RR wheel speed sensor control phase time exceeded		P.35B-79
C104B	Abnormality in FL wheel inlet valve system		P.35B-81
C104F	Abnormality in FR wheel inlet valve system		
C1053	Abnormality in RL wheel inlet valve system		
C1057	Abnormality in RR wheel inlet valve system		
C105F	Abnormality in FL wheel outlet valve system		
C1063	Abnormality in FR wheel outlet valve system		
C1067	Abnormality in RL wheel outlet valve system		
C105B	Abnormality in RR wheel outlet valve system		
C2104	Malfunction of valve power supply circuit		
C1073	Malfunction of motor drive circuit		P.35B-87
C2116	Abnormality in pump motor power supply voltage		P.35B-91
C1000	Abnormality in stoplight switch circuit		P.35B-95
C2200	Trouble in ASC-ECU		P.35B-98
C2100	Abnormality in battery voltage (low voltage)	9.7 ± 0.3 V or less*1	P.35B-100
		8.0 ± 0.5 V or less*1	
C2101	Abnormality in battery voltage (high voltage)	18.0 ± 1.0 V or more	P.35B-103
C1395	Brake fluid filling not complete		P.35B-106
C2203	VIN not recorded		P.35B-107
C1210*2	Defective G sensor	Abnormality in output voltage	P.35B-108
C1242*2	Defective G sensor	Abnormality in output voltage	P.35B-109
C2111*2	Sensor power supply circuit/Low input		P.35B-111
C2112*2	Sensor power supply circuit/High input		
C1608	Implausible diagnosis data		P.35B-113
U0001	Bus off		P.35B-117
U0100	Engine time-out error		P.35B-118
U0114*2	AWD-ECU time-out error		
U0141	ETACS time-out error		
U1415	Variant coding not implemented		P.35B-119
U1417	Invalid variant coding value (including wrong assembly)		P.35B-121

NOTE:

**2: Vehicles for AWD.

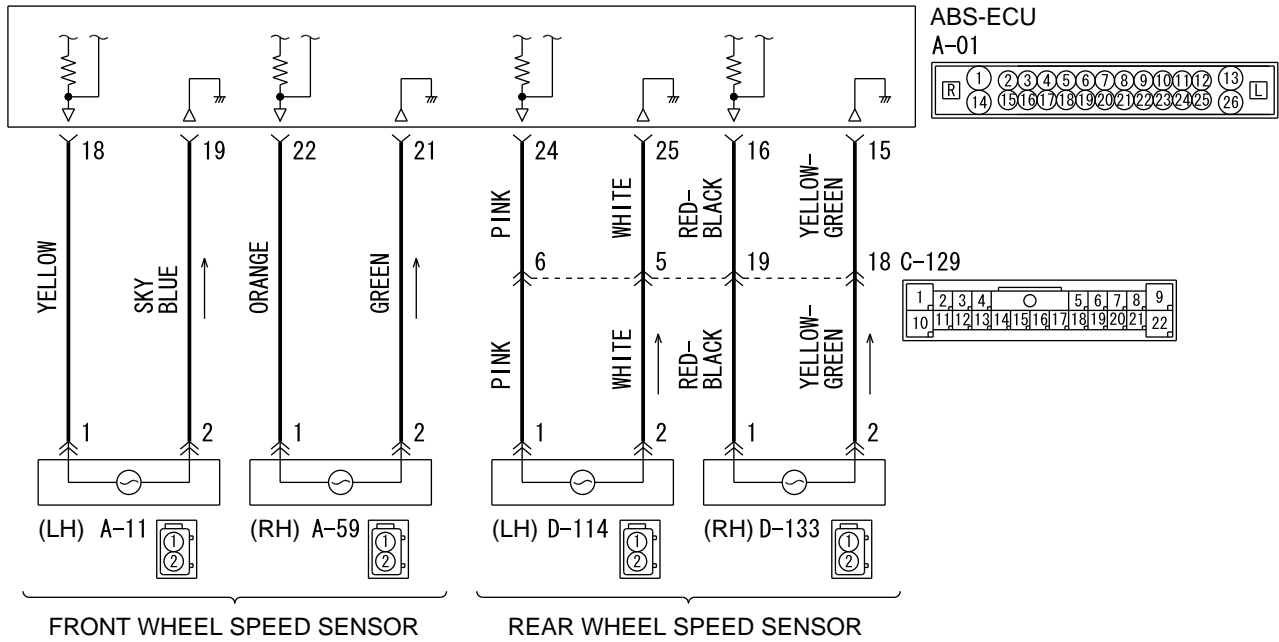
*1: This diagnostic trouble code is not set within the vehicle speed of 20 km/h or less.

DIAGNOSTIC TROUBLE CODE PROCEDURES

DTC C100A: Abnormality in FL wheel speed sensor circuit

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Wheel Speed Sensor Circuit



D7G35M023A00

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

ABS-ECU monitors the voltage fluctuation in each wheel speed sensor circuit. If ABS-ECU detects the open or short circuit in the circuit, it will set a DTC.

PROBABLE CAUSES**Current trouble**

- Damaged wiring harness and connectors
- Noise interference
- Malfunction of wheel speed sensor
- ABS-ECU malfunction

Past trouble

- Carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**Q:Is the diagnostic trouble code C100A set?**

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. M.U.T.-III data list

Check the following service data.

- Item No.01: FL wheel speed sensor

Q:Is the check result normal?

YES: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

NO: Go to Step 4.

STEP 4. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

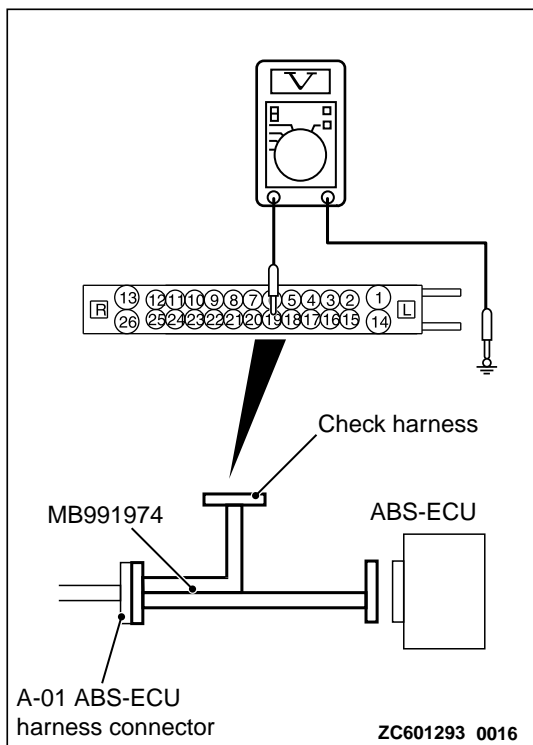
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No. 18/the ground terminal No. 19 and the body ground.

OK: 0 volt

Q: Is the check result normal?

YES: Go to Step 5.

NO (Not normal at the terminal No. 18 or 19): Go to Step 6.



STEP 5. Resistance measurement at A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

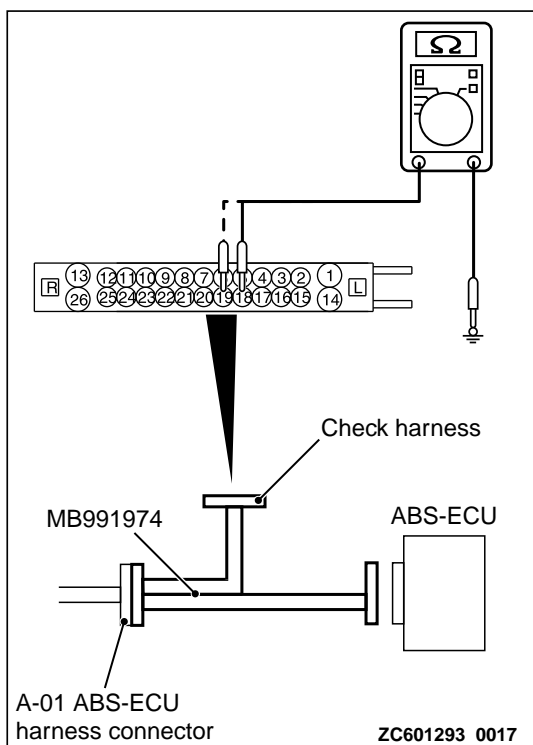
- (2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No. 18/the ground terminal No. 19 and the body ground

OK: No continuity

Q: Is the check result normal?

YES: Go to Step 8.

NO (Not normal at the terminal No. 18 or 19): Go to Step 6.



STEP 6. Connector check: A-01 ABS-ECU connector, A-11 wheel speed sensor <FL> connector

Q: Is the check result normal?

YES: Go to Step 7.

NO: Repair the defective connector.

STEP 7. Wiring harness check between A-01 ABS-ECU connector terminal No. 18/19 and A-11 wheel speed sensor <FL> connector terminal No. 1/2

* Check for short circuit in wheel speed sensor <FL> circuit

Q: Is the check result normal?

YES: Replace the wheel speed sensor <FL>.

NO: Repair the wiring harness.

STEP 8. Voltage measurement at the A-01 ABS-ECU connector

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.

(2) Turn the ignition switch to the ON position.

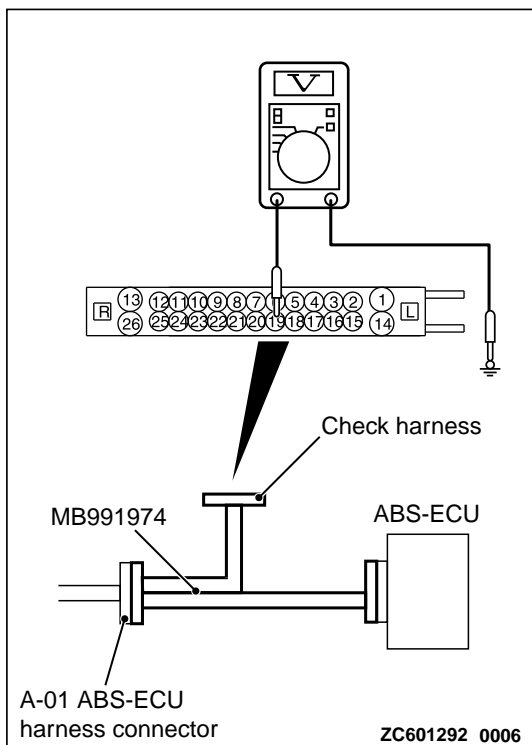
(3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No. 18 and the body ground.

OK: Approximately battery voltage

Q: Is the check result normal?

YES: Go to Step 11.

NO: Go to Step 9.



STEP 9. Connector check: A-01 ABS-ECU connector, A-11 wheel speed sensor <FL> connector

Q: Is the check result normal?

YES: Go to Step 10.

NO: Repair the defective connector.

STEP 10. Wiring harness check between A-01 ABS-ECU connector terminal No. 18/19 and A-11 wheel speed sensor <FL> connector terminal No. 1/2

* Check for open circuit in wheel speed sensor <FL> circuit.

Q: Is the check result normal?

YES: Replace the wheel speed sensor.

NO: Repair the wiring harness.

STEP 11. Check for wheel speed sensor as a single unit

Refer to P.35B-155.

Q: Is the check result normal?

YES: Go to Step 12.

NO: Replace the wheel speed sensor.

STEP 12. Check whether the diagnostic trouble code is reset.

- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q: Is DTC C100A set?

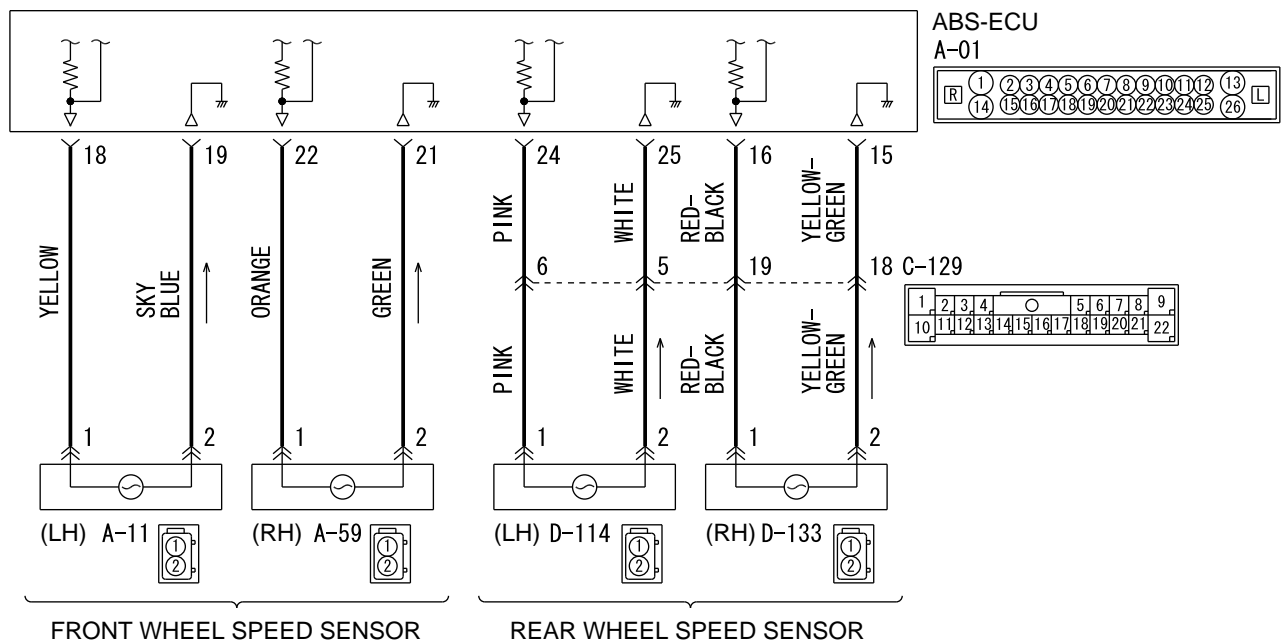
YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

DTC C1015: Abnormality in FR wheel speed sensor circuit

M13502000908USA0000010000

Wheel Speed Sensor Circuit



D7G35M023A00

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

ABS-ECU monitors the voltage fluctuation in each wheel speed sensor circuit. If ABS-ECU detects the open or short circuit in the circuit, it will set a daignostic trouble code.

PROBABLE CAUSES**Current trouble**

- Damaged wiring harness and connectors
- Noise interference
- Malfunction of wheel speed sensor
- ABS-ECU malfunction

Past trouble

- Carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
 - MB991974: ABS check harness
-

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q:Is the diagnostic trouble code No. C1015 set?

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. M.U.T.-III data list

Check the following service data.

- Item No.02: FR wheel speed sensor

Q: Is the check result normal?

YES: Intermittent malfunction (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).

NO: Go to Step 4.

STEP 4. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

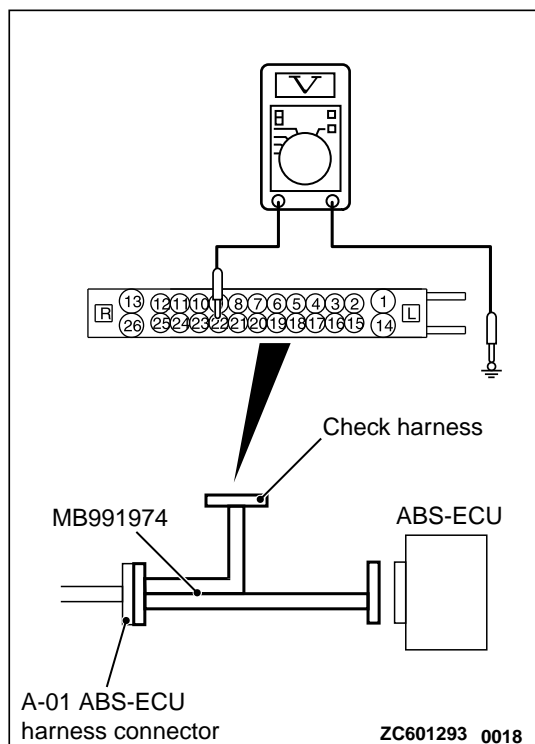
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No. 22/the ground terminal No. 21 and the body ground.

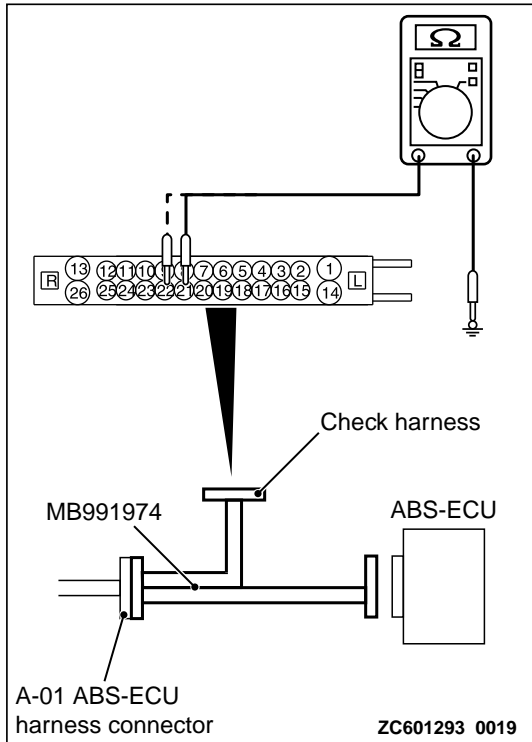
OK: 0 volt

Q: Is the check result normal?

YES: Go to Step 5.

NO (Not normal at the terminal No. 22 or 21): Go to Step 6.





STEP 5. Resistance measurement at A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

- (2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No. 22/the ground terminal No. 21 and the body ground

OK: No continuity

Q:Is the check result normal?

YES: Go to Step 8.

NO (Not normal at the terminal No. 22 or 21): Go to Step 6.

STEP 6. Connector check: A-01 ABS-ECU connector, A-59 wheel speed sensor <FR> connector

Q:Is the check result normal?

YES: Go to Step 7.

NO: Repair the defective connector.

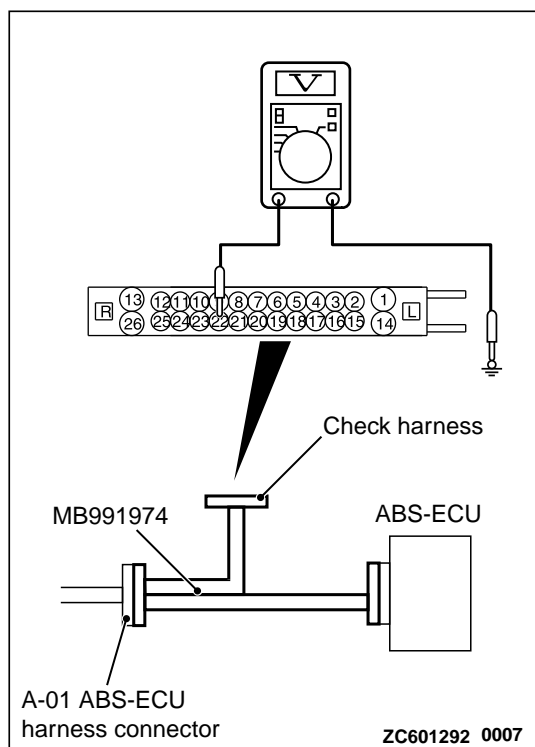
STEP 7. Wiring harness check between A-01 ABS-ECU connector terminal No. 22/21 and A-59 wheel speed sensor <FR> connector terminal No. 1/2

*Check for short circuit in wheel speed sensor <FR> circuit

Q:Is the check result normal?

YES: Replace the wheel speed sensor <FR>.

NO: Repair the wiring harness.



STEP 8. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No. 22 and the body ground.

OK: Approximately battery voltage

Q: Is the check result normal?

YES: Go to Step 11.

NO: Go to Step 9.

STEP 9. Connector check: A-01 ABS-ECU connector, A-59 wheel speed sensor <FR> connector

Q: Is the check result normal?

YES: Go to Step 10.

NO: Repair the defective connector.

STEP 10. Wiring harness check between A-01 ABS-ECU connector terminal No. 22/21 and A-59 wheel speed sensor <FR> connector terminal No. 1/2

*Check for the open circuit in the wheel speed sensor <FR> circuit.

Q: Is the check result normal?

YES: Replace the wheel speed sensor.

NO: Repair the wiring harness.

STEP 11. Check for wheel speed sensor as a single unit
Refer to P.35B-155.

Q: Is the check result normal?

YES: Go to Step 12.

NO: Replace the wheel speed sensor.

STEP 12. Check whether the diagnostic trouble code is reset.

- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q: Is DTC C1015 set?

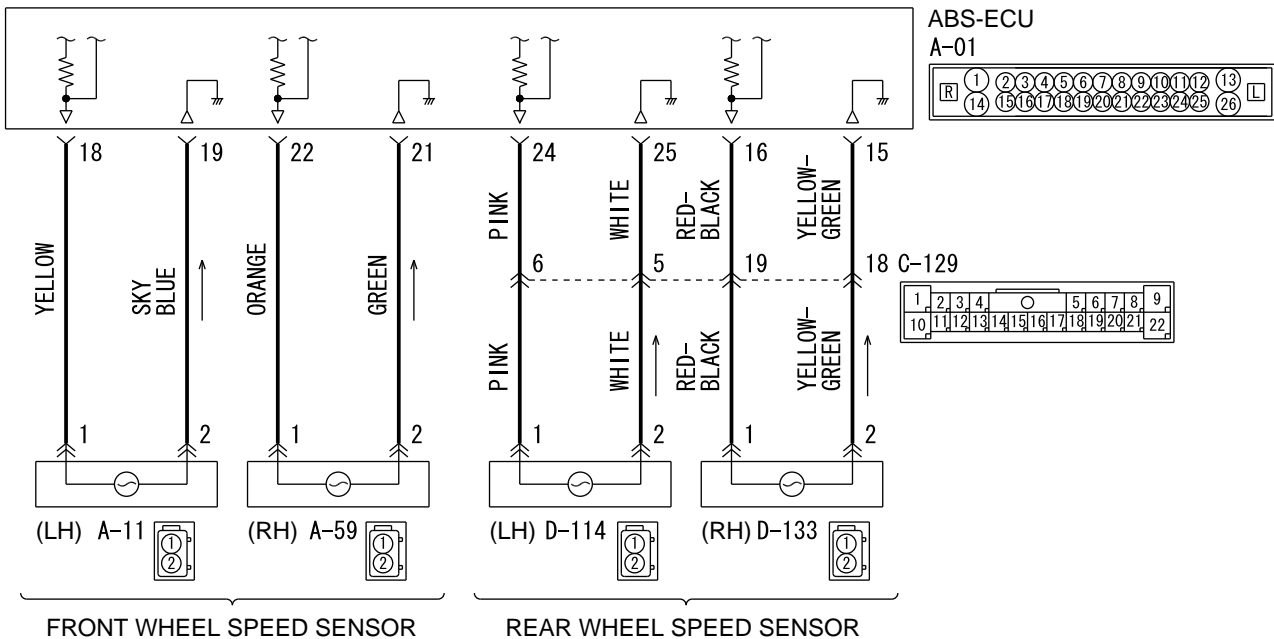
YES: Replace the ABS-ECU.

NO: Intermittent malfunction (GROUP 00 – How to Cope with Intermittent Malfunction P. 00-15).

DTC C1020: Abnormality in RL wheel speed sensor circuit

M13502000909USA0000010000

Wheel Speed Sensor Circuit



D7G35M023A00

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

ABS-ECU monitors the voltage fluctuation in each wheel speed sensor circuit. If ABS-ECU detects the open or short circuit in the circuit, it will set a daignostic trouble code.

PROBABLE CAUSES

Current trouble

- Damaged wiring harness and connectors
- Noise interference
- Malfunction of wheel speed sensor
- ABS-ECU malfunction

Past trouble

- Carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q:Is the diagnostic trouble code No. C1020 set?

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. M.U.T.-III data list

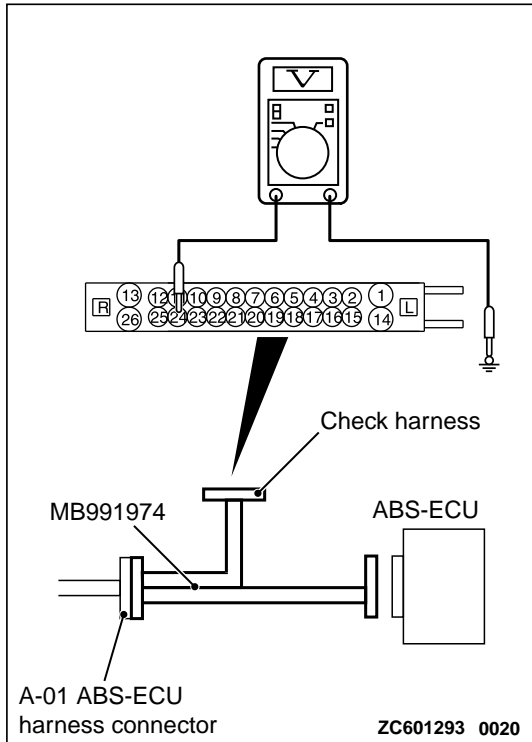
Check the following service data.

- Item No.03: RL wheel speed sensor

Q:Is the check result normal?

YES: Intermittent malfunction (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).

NO: Go to Step 4.



STEP 4. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No. 24/the ground terminal No. 25 and the body ground.

OK: 0 volt

Q:Is the check result normal?

YES: Go to Step 5.

NO (Not normal at the terminal No. 24 or 25): Go to Step 7.

STEP 5. Connector check: A-01 ABS-ECU connector, C-129 intermediate connector, D-114 wheel speed sensor <RL> connector

Q:Is the check result normal?

YES: Go to Step 6.

NO: Repair the defective connector.

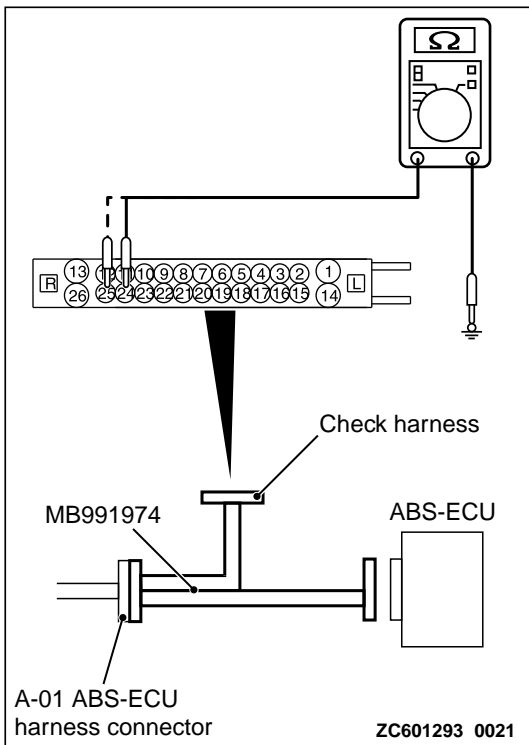
STEP 6. Wiring harness check between A-01 ABS-ECU connector terminal No. 24/25 and D-114 wheel speed sensor <RL> connector terminal No. 1/2

- *Check for short circuit in wheel speed sensor <RL> circuit

Q:Is the check result normal?

YES: Replace the wheel speed sensor <RL>.

NO: Repair the wiring harness.



STEP 7. Resistance measurement at A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

- (2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No. 24/the ground terminal No. 25 and the body ground

OK: No continuity

Q: Is the check result normal?

YES: Go to Step 10.

NO (Not normal at the terminal No. 24 or 25): Go to Step 8.

STEP 8. Connector check: A-01 ABS-ECU connector, D-114 wheel speed sensor <RL> connector

Q: Is the check result normal?

YES: Go to Step 9.

NO: Repair the defective connector.

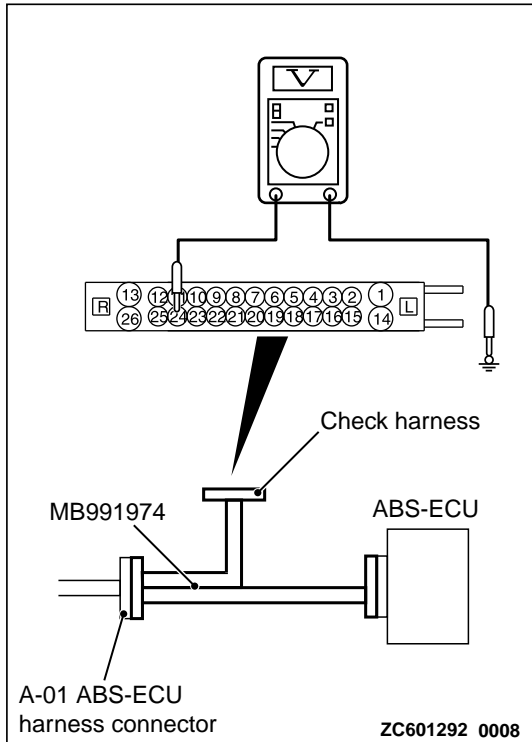
STEP 9. Wiring harness check between A-01 ABS-ECU connector terminal No. 24/25 and D-114 wheel speed sensor <RL> connector terminal No. 1/2

*Check for short circuit in wheel speed sensor <RL> circuit

Q: Is the check result normal?

YES: Replace the wheel speed sensor <RL>.

NO: Repair the wiring harness.



STEP 10. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No. 24 and the body ground.

OK: Approximately battery voltage

Q: Is the check result normal?

YES: Go to Step 13.

NO: Go to Step 11.

STEP 11. Connector check: A-01 ABS-ECU connector, D-114 wheel speed sensor <RL> connector

Q: Is the check result normal?

YES: Go to Step 12.

NO: Repair the defective connector.

STEP 12. Wiring harness check between A-01 ABS-ECU connector terminal No. 24/25 and D-114 wheel speed sensor <RL> connector terminal No. 1/2

*Check for open circuit in wheel speed sensor <RL> circuit

Q: Is the check result normal?

YES: Replace the wheel speed sensor.

NO: Repair the wiring harness.

STEP 13. Check for wheel speed sensor as a single unit

Refer to P.35B-155.

Q: Is the check result normal?

YES: Go to Step 14.

NO: Replace the wheel speed sensor.

STEP 14. Check whether the diagnostic trouble code is reset.

- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q: Is DTC C1020 set?

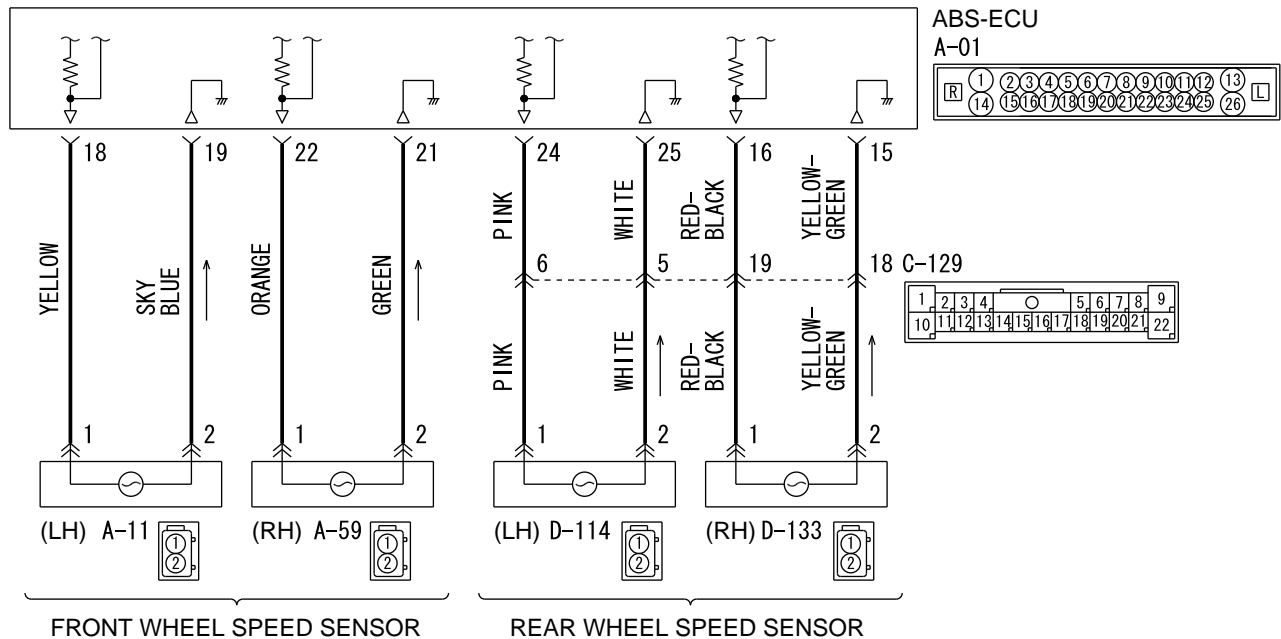
YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

DTC C102B: Abnormality in RR wheel speed sensor circuit

M13502000910USA0000010000

Wheel Speed Sensor Circuit



D7G35M023A00

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

ABS-ECU monitors the voltage fluctuation in each wheel speed sensor circuit. If ABS-ECU detects the open or short circuit in the circuit, it will set a daignostic trouble code.

PROBABLE CAUSES**Current trouble**

- Damaged wiring harness and connectors
- Noise interference
- Malfunction of wheel speed sensor
- ABS-ECU malfunction

Past trouble

- Carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
 - MB991974: ABS check harness
-

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**Q:Is the diagnostic trouble code C102B set?**

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. M.U.T.-III data list

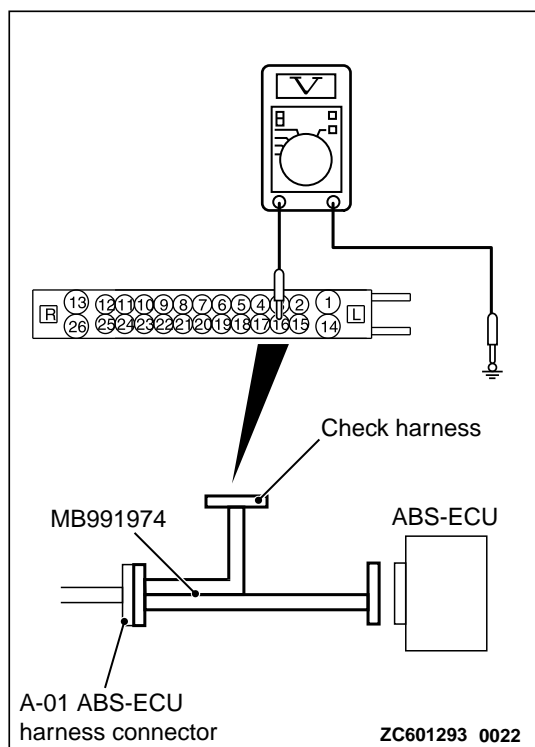
Check the following service data.

- Item No.04: RR wheel speed sensor

Q:Is the check result normal?

YES: Intermittent malfunction (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).

NO: Go to Step 4.



STEP 4. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No. 16/the ground terminal No. 15 and the body ground.

OK: 0 volt

Q: Is the check result normal?

YES: Go to Step 5.

NO (Not normal at the terminal No. 16 or 15): Go to Step 7.

STEP 5. Connector check: A-01 ABS-ECU connector, C-129 intermediate connector, D-133 wheel speed sensor <RR> connector

Q: Is the check result normal?

YES: Go to Step 6.

NO: Repair the defective connector.

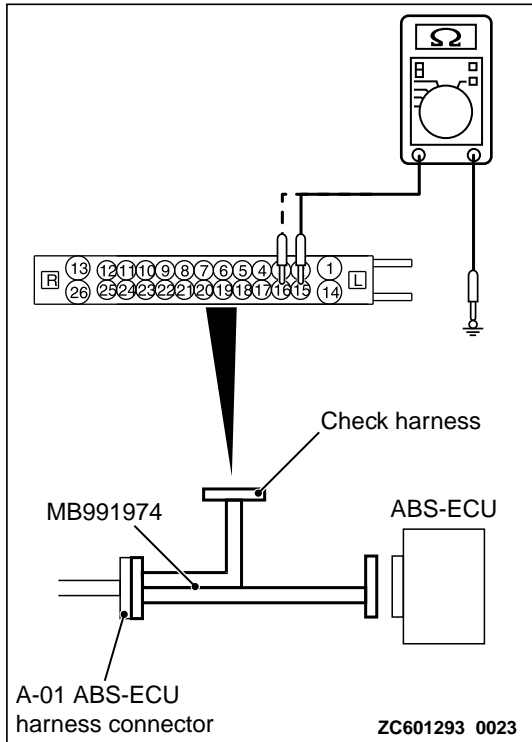
STEP 6. Wiring harness check between A-01 ABS-ECU connector terminal No. 16/15 and D-133 wheel speed sensor <RR> connector terminal No. 1/2

- *Check for short circuit in wheel speed sensor <RR> circuit

Q: Is the check result normal?

YES: Replace the wheel speed sensor <RR>.

NO: Repair the wiring harness.



STEP 7. Resistance measurement at A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

- (2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No. 16/the ground terminal No. 15 and the body ground

OK: No continuity

Q: Is the check result normal?

YES: Go to Step 10.

NO (Not normal at the terminal No. 16 or 15): Go to Step 8.

STEP 8. Connector check: A-01 ABS-ECU connector, D-133 wheel speed sensor <RR> connector

Q: Is the check result normal?

YES: Go to Step 9.

NO: Repair the defective connector.

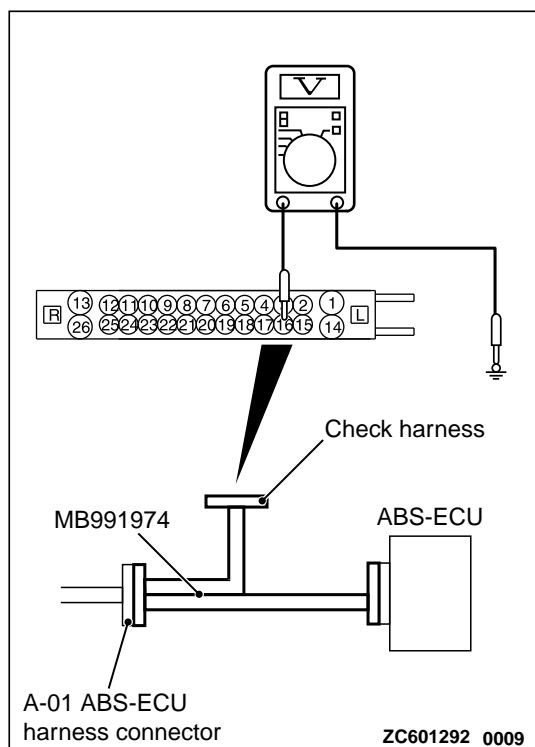
STEP 9. Wiring harness check between A-01 ABS-ECU connector terminal No. 16/15 and D-133 wheel speed sensor <RR> connector terminal No. 1/2

* Check for short circuit in wheel speed sensor <RR> circuit

Q: Is the check result normal?

YES: Replace the wheel speed sensor <RR>.

NO: Repair the wiring harness.



STEP 10. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No. 16 and the body ground.

OK: Approximately battery voltage

Q: Is the check result normal?

YES: Go to Step 13.

NO: Go to Step 11.

STEP 11. Connector check: A-01 ABS-ECU connector, D-133 wheel speed sensor <RR> connector

Q: Is the check result normal?

YES: Go to Step 12.

NO: Repair the defective connector.

STEP 12. Wiring harness check between A-01 ABS-ECU connector terminal No. 16/15 and D-133 wheel speed sensor <RR> connector terminal No. 1/2

*Check for open circuit in wheel speed sensor <RR> circuit

Q: Is the check result normal?

YES: Replace the wheel speed sensor.

NO: Repair the wiring harness.

STEP 13. Check for wheel speed sensor as a single unit
Refer to P.35B-155.

Q: Is the check result normal?

YES: Go to Step 14.

NO: Replace the wheel speed sensor.

STEP 14. Check whether the diagnostic trouble code is reset.

- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q: Is DTC C102B set?

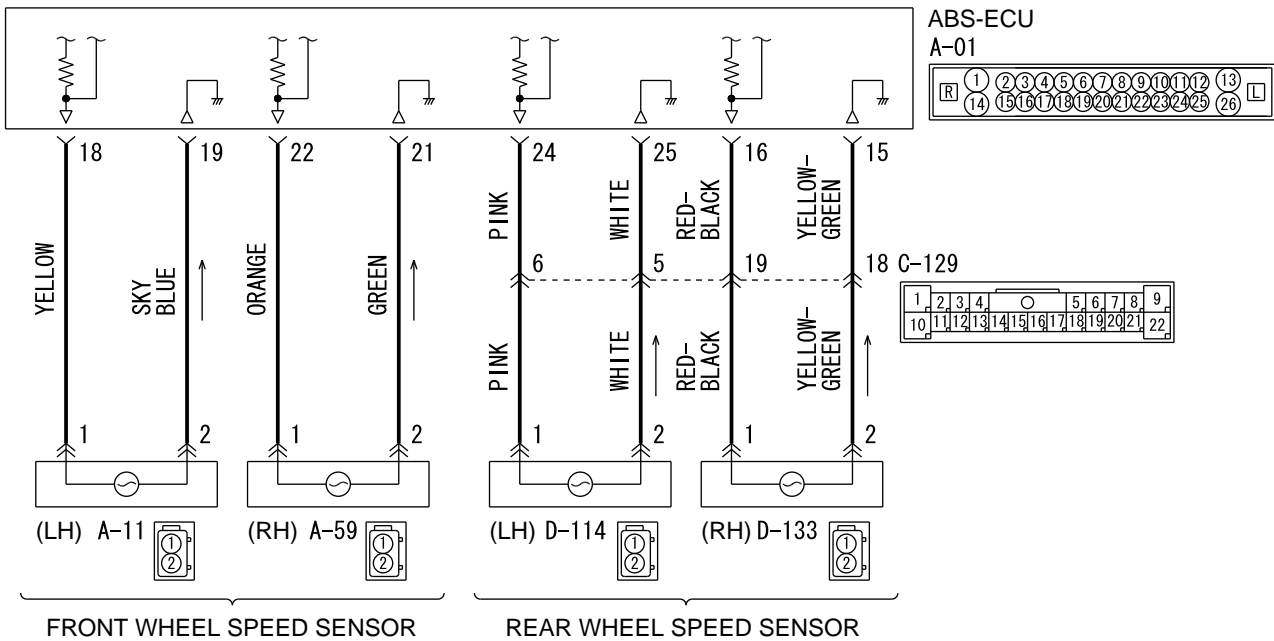
YES: Replace the ABS-ECU.

NO: Intermittent malfunction (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).

DTC C1011: Abnormality in FL wheel speed sensor signal

M13502000911USA000010000

Wheel Speed Sensor Circuit



D7G35M023A00

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any fault below is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

- Irregular change in the wheel speed sensor signal
- Wheel speed sensor signal continuously indicates high value.

PROBABLE CAUSES

Current trouble

- Excessive gap between the wheel speed sensor and the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the wheel speed detection encoder
- Wheel bearing malfunction
- Malfunction of wheel speed sensor
- Damaged wiring harness and connectors
- External noise interference
- Improper installation of the wheel speed sensor
- Deformation of the wheel speed detection encoder
- ABS-ECU malfunction
- Disturbance of magnetization pattern for wheel speed detection encoder

Past trouble

- When the diagnostic trouble code No. C100A is also set, carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).
- When the diagnostic trouble code No. C100A is not set, the following conditions may be present:
 - Right or/and left wheels are rotated.
 - Unstable vehicle attitude
 - External noise interference
 - Vehicle ran with the parking brake applied.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q: Is DTC C1011 set?

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. M.U.T.-III diagnostic trouble code

Check that the diagnostic trouble code No. C100A is also set.

Q: Is DTC C100A also set?

YES: Perform the diagnosis for the diagnostic trouble code No. C100A. (Refer to P.35B-11.)

NO: Go to Step 4.

STEP 4. Check for wheel speed sensor installation

Check how the wheel speed sensor <FL> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

Q: Is the check result normal?

YES: Go to Step 5.

NO: Reinstall the wheel speed sensor correctly.

STEP 5. Check for wheel speed sensor as a single unit

Q: Is the check result normal?

YES: Go to Step 6.

NO: Replace the wheel speed sensor.

STEP 6. Check for wheel bearing looseness

NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <FL> for looseness. (Refer to GROUP 26 - On-vehicle Service P.26-8.)

Q: Is the check result normal?

YES: Go to Step 7.

NO: Replace the wheel bearing.

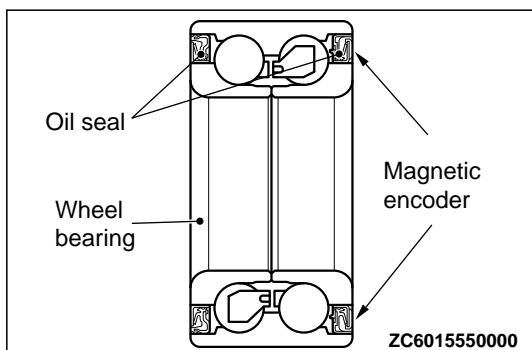
STEP 7. Check of wheel speed detection encoder

Check the encoder for adhesion of foreign materials or deformation.

Q: Is the check result normal?

YES: Go to Step 8.

NO: Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction. When the encoder is deformed, replace the wheel bearing.



STEP 8. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

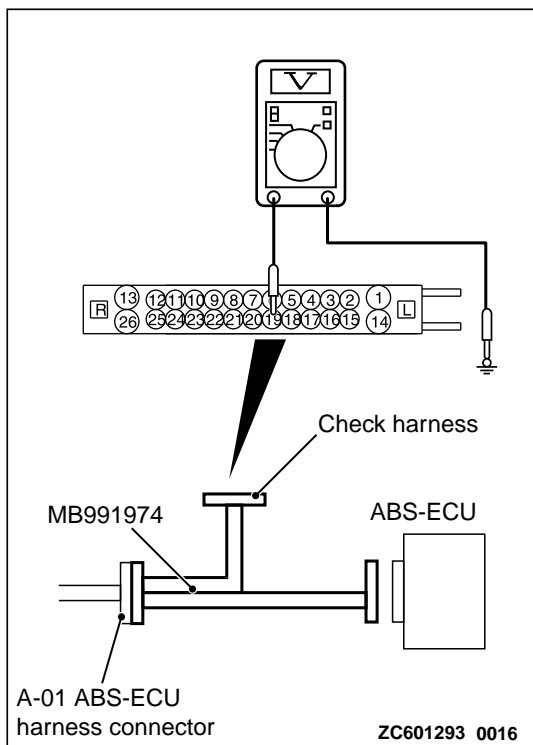
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No. 18/the ground terminal No. 19 and the body ground.

OK: 0 volt

Q: Is the check result normal?

YES: Go to Step 9.

NO (Not normal at the terminal No. 18 or 19): Go to Step 10.



STEP 9. Resistance measurement at A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

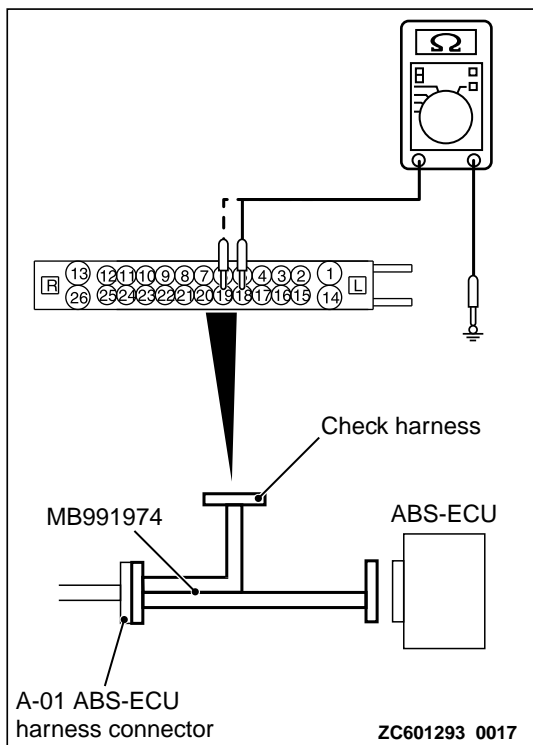
- (2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No. 18/the ground terminal No. 19 and the body ground

OK: No continuity

Q: Is the check result normal?

YES: Go to Step 11.

NO (Not normal at the terminal No. 18 or 19): Go to Step 10.



STEP 10. Connector check: A-01 ABS-ECU connector, A-11 wheel speed sensor <FL> connector

Q: Is the check result normal?

YES: The short circuit in the wheel speed sensor <FL> circuit may be present. Repair the wiring harness between the A-01 ABS-ECU connector terminal No. 18/19 and the A-11 wheel speed sensor <FL> connector terminal No. 1/2.

NO: Repair the defective connector.

STEP 11. Voltage measurement at the A-01 ABS-ECU connector

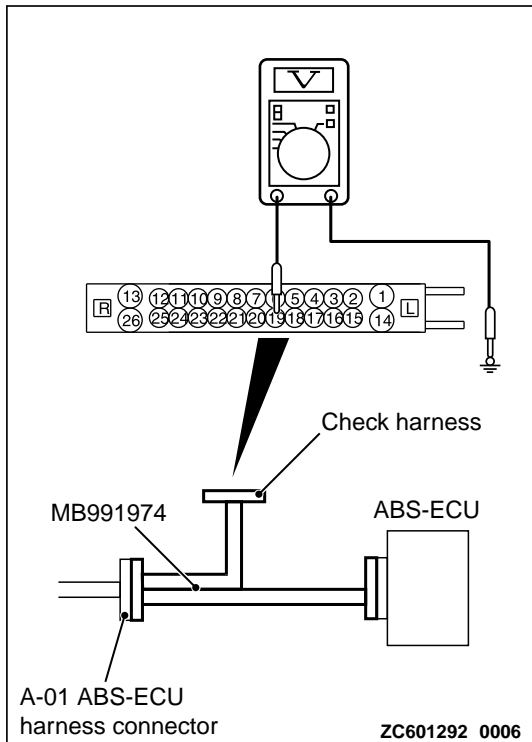
- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No. 18 and the body ground.

OK: Approximately battery voltage

Q: Is the check result normal?

YES: Go to Step 14.

NO: Go to Step 12.



STEP 12. Connector check: A-01 ABS-ECU connector, A-11 wheel speed sensor <FL> connector

Q: Is the check result normal?

YES: Go to Step 13.

NO: Repair the defective connector.

STEP 13. Wiring harness check between A-01 ABS-ECU connector terminal No. 18/19 and A-11 wheel speed sensor <FL> connector terminal No. 1/2

* Check for open circuit in wheel speed sensor <FL> circuit.

Q: Is the check result normal?

YES: Replace the wheel speed sensor.

NO: Repair the wiring harness.

STEP 14. Check whether the diagnostic trouble code is reset.

- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q: Is DTC C1011 set?

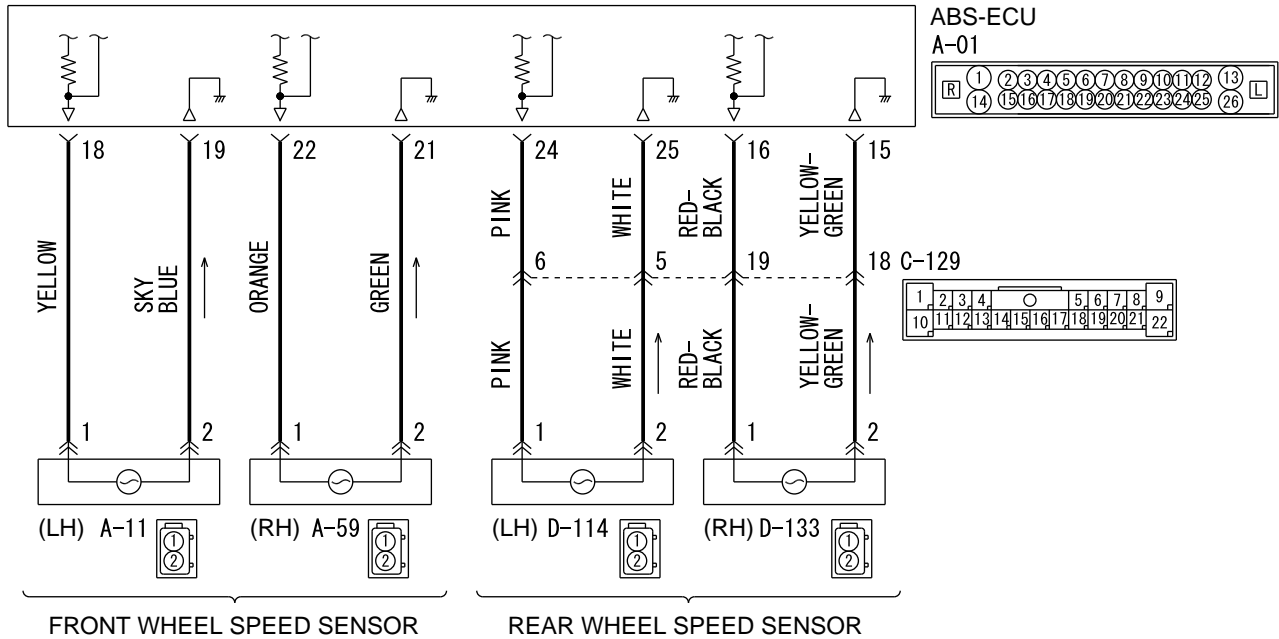
YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

DTC C101C Abnormality in FR wheel speed sensor signal

M13502000912USA0000010000

Wheel Speed Sensor Circuit



D7G35M023A00

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any fault below is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

- Irregular change in the wheel speed sensor signal
- Wheel speed sensor signal continuously indicates high value.

PROBABLE CAUSES**Current trouble**

- Excessive gap between the wheel speed sensor and the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the wheel speed detection encoder
- Wheel bearing malfunction
- Malfunction of wheel speed sensor
- Damaged wiring harness and connectors
- External noise interference
- Improper installation of the wheel speed sensor
- Deformation of the wheel speed detection encoder
- ABS-ECU malfunction
- Disturbance of magnetization pattern for wheel speed detection encoder

Past trouble

- When the diagnostic trouble code No. C1015 is also set, carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).
- When diagnostic trouble code No. C1015 is not set, the following conditions may be present:
 - Right or/and left wheels are rotated.
 - Unstable vehicle attitude
 - External noise interference
 - Vehicle ran with the parking brake applied.

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
 - MB991974: ABS check harness
-

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q: Is DTC C101C set?

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. M.U.T.-III diagnostic trouble code

Check that the diagnostic trouble code No. C1015 is also set.

Q: Is DTC C1015 also set?

YES: Perform the diagnosis for the diagnostic trouble code No. C1015. (Refer to P.35B-15.)

NO: Go to Step 4.

STEP 4. Check for wheel speed sensor installation

Check how the wheel speed sensor <FR> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

Q: Is the check result normal?

YES: Go to Step 5.

NO: Reinstall the wheel speed sensor correctly.

STEP 5. Check for wheel speed sensor as a single unit

Q: Is the check result normal?

YES: Go to Step 6.

NO: Replace the wheel speed sensor.

STEP 6. Check for wheel bearing looseness

NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <FR> for looseness. (Refer to GROUP 26 - On-vehicle Service P.26-8.)

Q: Is the check result normal?

YES: Go to Step 7.

NO: Replace the wheel bearing.

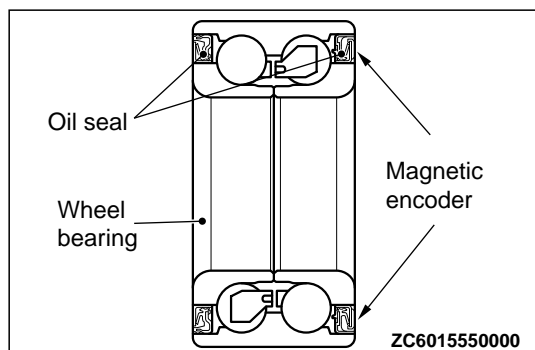
STEP 7. Check of wheel speed detection encoder

Check the encoder for adhesion of foreign materials or deformation.

Q: Is the check result normal?

YES: Go to Step 8.

NO: Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction. When the encoder is deformed, replace the wheel bearing.



STEP 8. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

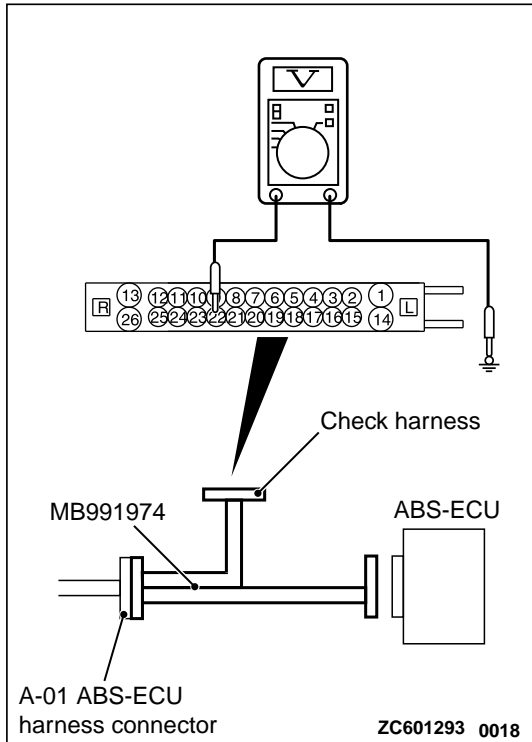
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No.22/the ground terminal No. 21 and the body ground.

OK: 0 volt

Q: Is the check result normal?

YES: Go to Step 9.

NO (Not normal at the terminal No. 22 or 21): Go to Step 10.



STEP 9. Resistance measurement at A-01 ABS-ECU connector

- (1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

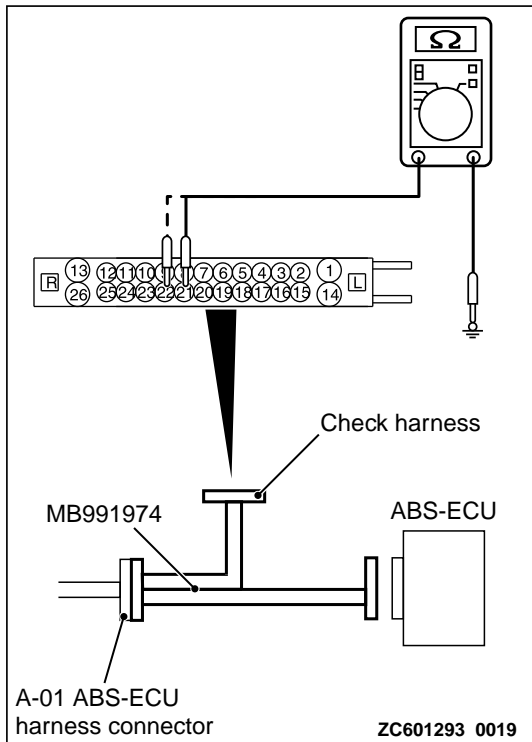
- (2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No. 22/the ground terminal No. 21 and the body ground

OK: No continuity

Q: Is the check result normal?

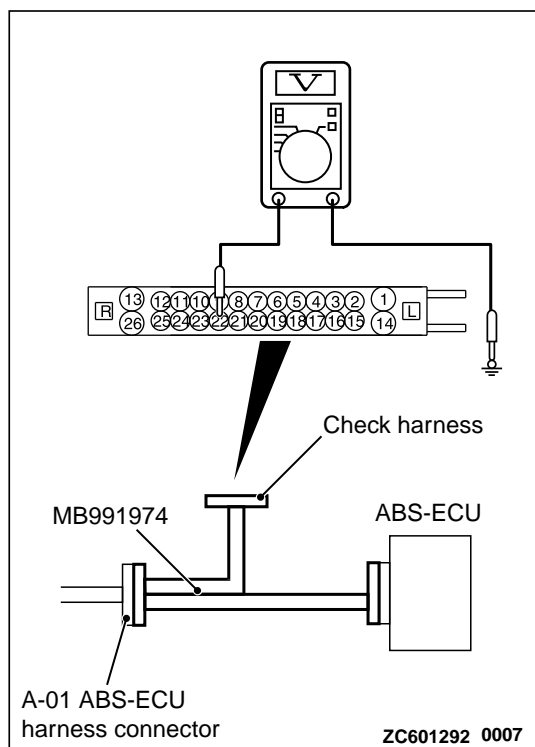
YES: Go to Step 11.

NO (Not normal at the terminal No. 22 or 21): Go to Step 10.



STEP 10. Connector check: A-01 ABS-ECU connector, A-59 wheel speed sensor <FR> connector

Q: Is the check result normal?



YES: The short circuit in the wheel speed sensor <FR> circuit may be present. Repair the wiring harness between the A-01 ABS-ECU connector terminal No. 22/21 and the A-59 wheel speed sensor <FR> connector terminal No. 1/2.

NO: Repair the defective connector.

STEP 11. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No. 22 and the body ground.

OK: Approximately battery voltage

Q: Is the check result normal?

YES: Go to Step 14.

NO: Go to Step 12.

STEP 12. Connector check: A-01 ABS-ECU connector, A-59 wheel speed sensor <FR> connector

Q: Is the check result normal?

YES: Go to Step 13.

NO: Repair the defective connector.

STEP 13. Wiring harness check between A-01 ABS-ECU connector terminal No. 22/21 and A-59 wheel speed sensor <FR> connector terminal No. 1/2

*Check for the open circuit in the wheel speed sensor <FR> circuit.

Q: Is the check result normal?

YES: Replace the wheel speed sensor.

NO: Repair the wiring harness.

STEP 14. Check whether the diagnostic trouble code is reset.

- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q:Is DTC C101C set?

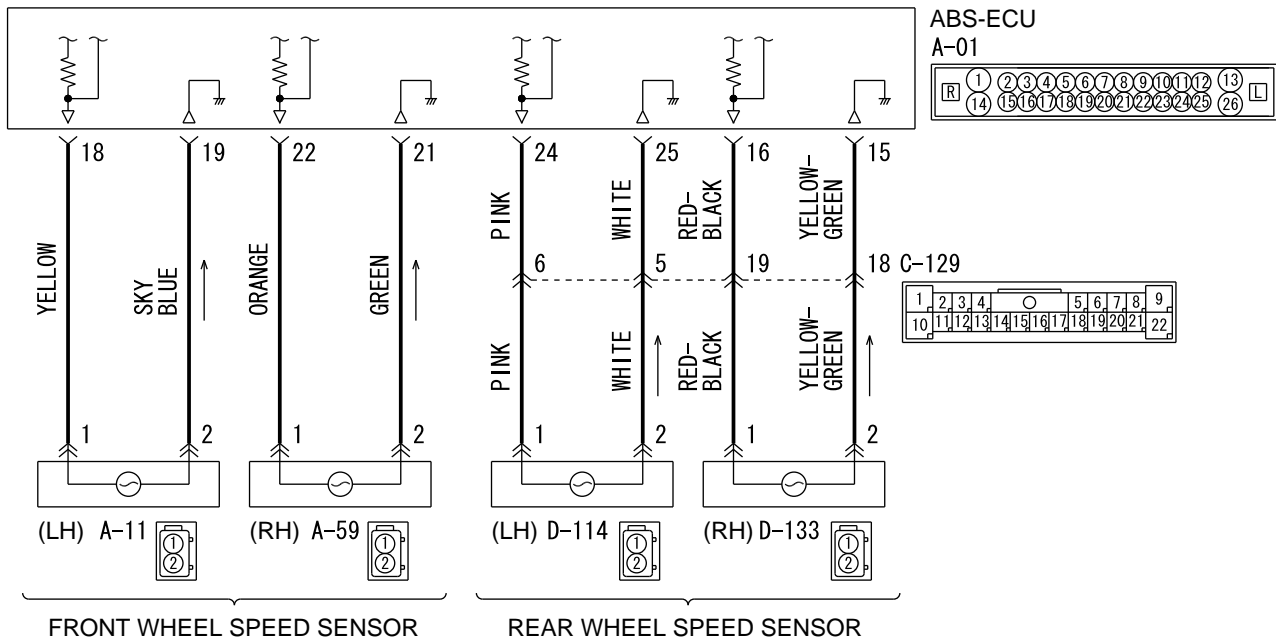
YES: Replace the ABS-ECU.

NO: Intermittent malfunction (GROUP 00 – How to Cope with Intermittent Malfunction P. 00-15).

DTC C1027: Abnormality in RL wheel speed sensor signal

M13502000913USA0000010000

Wheel Speed Sensor Circuit



D7G35M023A00

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any fault below is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

- Irregular change in the wheel speed sensor signal
- Wheel speed sensor signal continuously indicates high value.

PROBABLE CAUSES

Current trouble

- Excessive gap between the wheel speed sensor and the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the wheel speed detection encoder
- Wheel bearing malfunction
- Malfunction of wheel speed sensor
- Damaged wiring harness and connectors
- External noise interference
- Improper installation of the wheel speed sensor
- Deformation of the wheel speed detection encoder
- ABS-ECU malfunction
- Disturbance of magnetization pattern for wheel speed detection encoder

Past trouble

- When the diagnostic trouble code No. C1020 is also set, carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).
- When the diagnostic trouble code No. C1020 is not set, the following conditions may be present:
 - Right or/and left wheels are rotated.
 - Unstable vehicle attitude
 - External noise interference
 - Vehicle ran with the parking brake applied.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q: Is DTC C1027 set?

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. M.U.T.-III diagnostic trouble code

Check that the diagnostic trouble code C1020 is also set.

Q: Is DTC C1020 also set?

YES: Perform the diagnosis for the diagnostic trouble code C1020. (Refer to P.35B-20.)

NO: Go to Step 4.

STEP 4. Check for wheel speed sensor installation

Check how the wheel speed sensor <RL> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

Q: Is the check result normal?

YES: Go to Step 5.

NO: Reinstall the wheel speed sensor <RL> correctly.

STEP 5. Check for wheel speed sensor as a single unit

Q: Is the check result normal?

YES: Go to Step 6.

NO: Replace the wheel speed sensor.

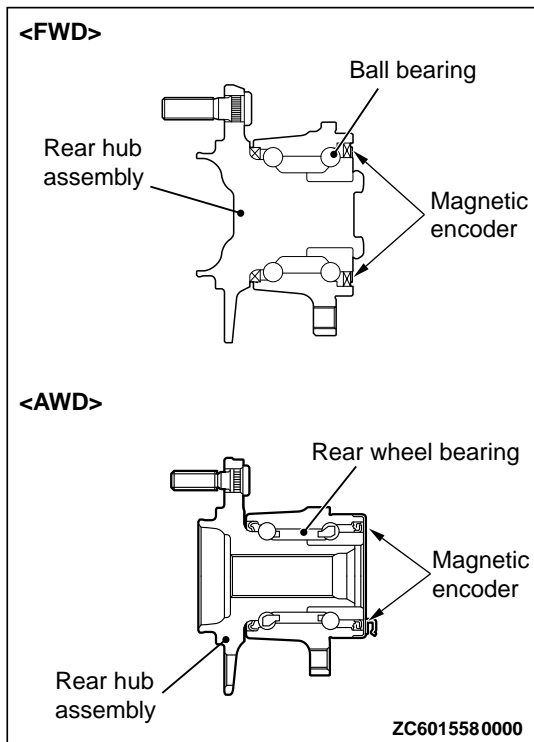
STEP 6. Check for wheel bearing looseness

NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <RL> for looseness. <Refer to GROUP 27A - On-vehicle Service P.27A-4. (FWD) or GROUP 27B - On-vehicle Service P.27B-15. (AWD)>

Q: Is the check result normal?

YES: Go to Step 7.

NO: Replace the rear wheel hub assembly.



STEP 7. Check of wheel speed detection encoder

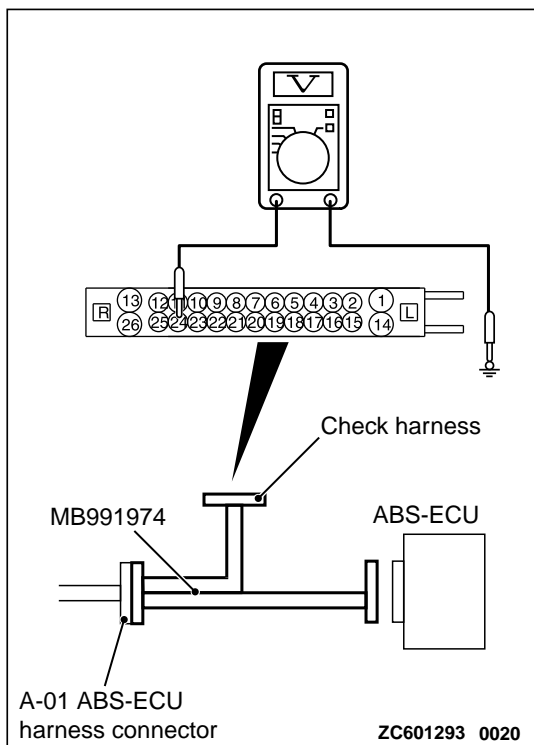
Check the encoder for adhesion of foreign materials or deformation.

Q: Is the check result normal?

YES: Go to Step 8.

NO (Adhesion of foreign materials): Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction.

NO (Deformation): Replace the rear wheel hub assembly.



STEP 8. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

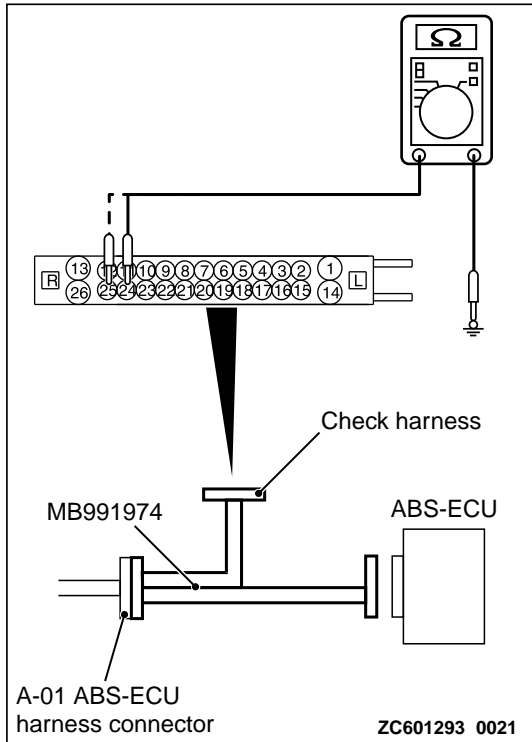
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No. 24/the ground terminal No. 25 and the body ground.

OK: 0 volt

Q: Is the check result normal?

YES: Go to Step 9.

NO (Not normal at the terminal No. 24 or 25): Go to Step 10.



STEP 9. Resistance measurement at A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

- (2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No. 24/the ground terminal No. 25 and the body ground

OK: No continuity

Q: Is the check result normal?

YES: Go to Step 11.

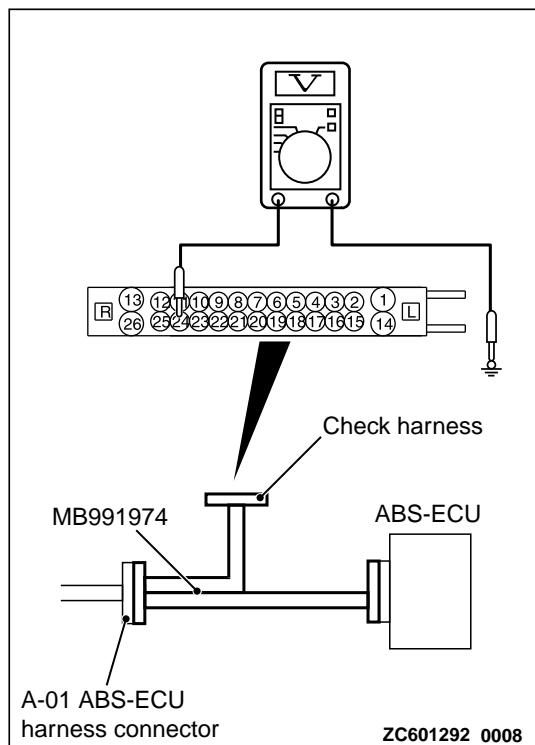
NO (Not normal at the terminal No. 24 or 25): Go to Step 10.

STEP 10. Connector check: A-01 ABS-ECU connector, C-129 intermediate connector, D-114 wheel speed sensor <RL> connector

Q: Is the check result normal?

YES: The short circuit in the wheel speed sensor <RL> circuit may be present. Repair the wiring harness between the A-01 ABS-ECU connector terminal No. 24/25 and the D-114 wheel speed sensor <RL> connector terminal No. 1/2.

NO: Repair the defective connector.



STEP 11. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No. 24 and the body ground.

OK: Approximately battery voltage

Q: Is the check result normal?

YES: Go to Step 13.

NO: Go to Step 12.

STEP 12. Connector check: A-01 ABS-ECU connector, C-129 intermediate connector, D-114 wheel speed sensor <RL> connector

Q: Is the check result normal?

YES: Replace the wheel speed sensor.

NO: Repair the defective connector.

STEP 13. Wiring harness check between A-01 ABS-ECU connector terminal No. 24/25 and D-114 wheel speed sensor <RL> connector terminal No. 1/2

- * Check for open circuit in wheel speed sensor <RL> circuit

Q: Is the check result normal?

YES: Go to Step 14.

NO: Repair the wiring harness.

STEP 14. Check whether the diagnostic trouble code is reset.

- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q: Is DTC C1027 set?

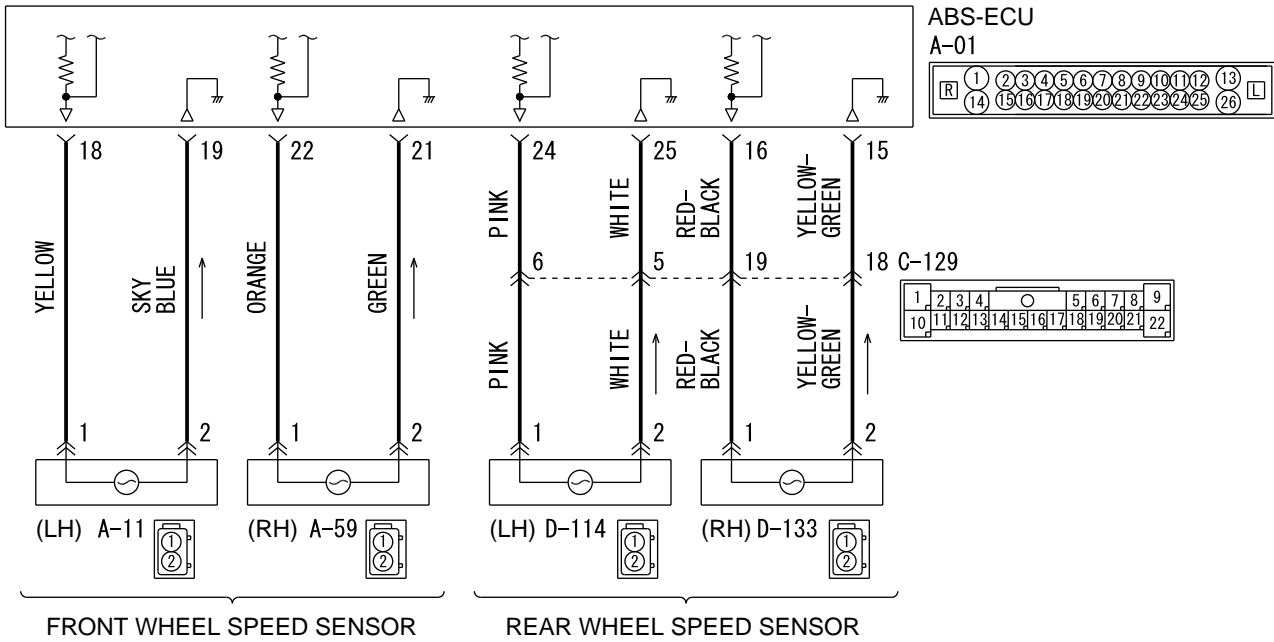
YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

DTC C1032: Abnormality in RR wheel speed sensor signal

M13502000914USA0000010000

Wheel Speed Sensor Circuit



D7G35M023A00

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any fault below is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

- Irregular change in the wheel speed sensor signal

- Wheel speed sensor signal continuously indicates high value.

PROBABLE CAUSES

Current trouble

- Excessive gap between the wheel speed sensor and the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the wheel speed detection encoder
- Wheel bearing malfunction
- Malfunction of wheel speed sensor
- Damaged wiring harness and connectors
- External noise interference
- Improper installation of the wheel speed sensor
- Deformation of the wheel speed detection encoder
- ABS-ECU malfunction
- Disturbance of magnetization pattern for wheel speed detection encoder

Past trouble

- When the diagnostic trouble code No. C102B is also set, carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).
- When the diagnostic trouble code No. C102B is not set, the following conditions may be present:
 - Right or/and left wheels are rotated.
 - Unstable vehicle attitude
 - External noise interference
 - Vehicle ran with the parking brake applied.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**Q: Is DTC C1032 set?****YES:** Go to Step 3.**NO:** The procedure is complete.

STEP 3. M.U.T.-III diagnostic trouble code

Check that the diagnostic trouble code C102B is also set.

Q: Is DTC C102B also set?**YES:** Perform the diagnosis for the diagnostic trouble code No. C102B. (Refer to P. 35B-25.)**NO:** Go to Step 4.

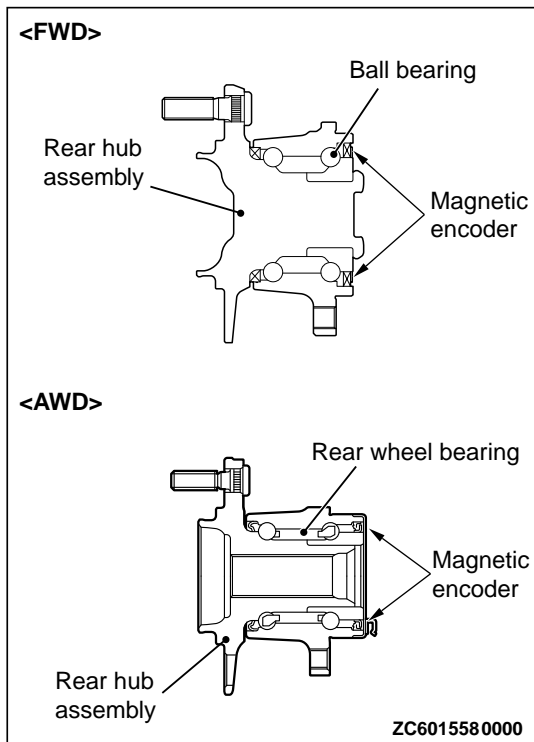
STEP 4. Check for wheel speed sensor installation

Check how the wheel speed sensor <RR> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

Q: Is the check result normal?**YES:** Go to Step 5.**NO:** Reinstall the wheel speed sensor correctly.

STEP 5. Check for wheel speed sensor as a single unit**Q: Is the check result normal?****YES:** Go to Step 6.**NO:** Replace the wheel speed sensor.

STEP 6. Check for wheel bearing looseness*NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <RR> for looseness. <Refer to GROUP 27A - On-vehicle Service P. 27A-4. (FWD) or GROUP 27B - On-vehicle Service P. 27B-15. (AWD)>***Q: Is the check result normal?****YES:** Go to Step 7.**NO:** Replace the rear wheel hub assembly.



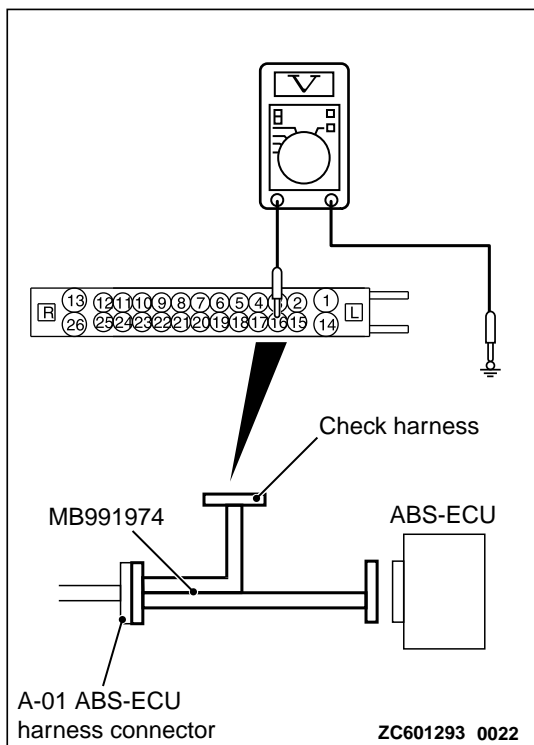
STEP 7. Check of wheel speed detection encoder

Check the encoder for adhesion of foreign materials or deformation.

Q: Is the check result normal?

YES: Go to Step 8.

NO: Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction. When the encoder is deformed, replace the rear hub assembly.



STEP 8. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

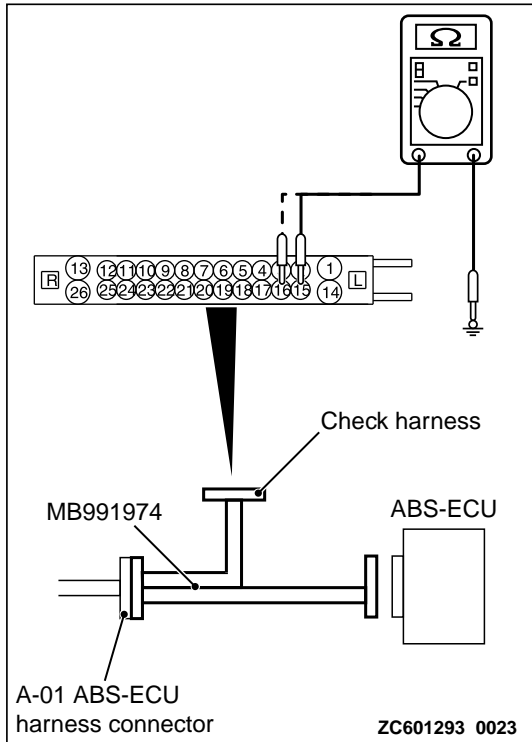
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No. 16/the ground terminal No. 15 and the body ground.

OK: 0 volts

Q: Is the check result normal?

YES: Go to Step 9.

NO (Not normal at terminal No. 16 or 15): Go to Step 10.



STEP 9. Resistance measurement at A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

- (2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No. 16/the ground terminal No. 15 and the body ground

OK: No continuity

Q: Is the check result normal?

YES: Go to Step 11.

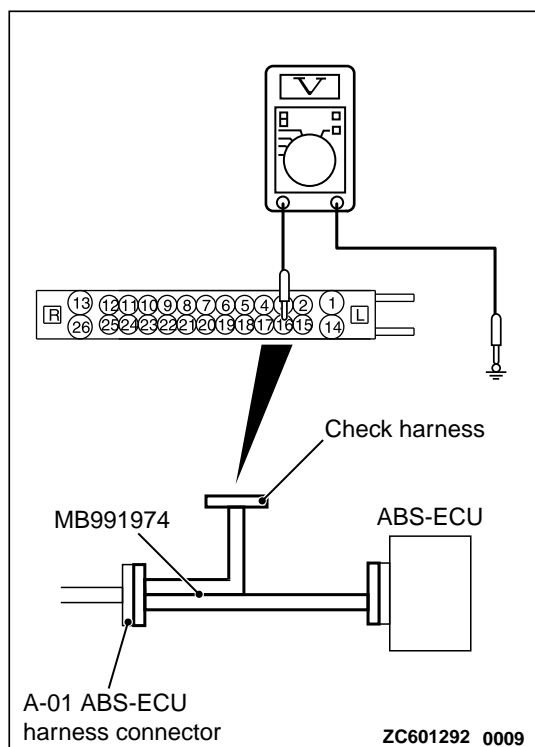
NO (Not normal at terminal No. 16 or 15): Go to Step 10.

STEP 10. Connector check: A-01 ABS-ECU connector, C-129 intermediate connector, D-133 wheel speed sensor <RR> connector

Q: Is the check result normal?

YES: The short circuit in the wheel speed sensor <RR> circuit may be present. Repair the wiring harness between the A-01 ABS-ECU connector terminal No. 16/15 and the D-133 wheel speed sensor <RR> connector terminal No. 1/2.

NO: Repair the defective connector.



STEP 11. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No. 16 and the body ground.

OK: Approximately battery voltage

Q: Is the check result normal?

YES: Go to Step 13.

NO: Go to Step 12.

STEP 12. Connector check: A-01 ABS-ECU connector, C-129 intermediate connector, D-133 wheel speed sensor <RR> connector

Q: Is the check result normal?

YES: Replace the wheel speed sensor.

NO: Repair the defective connector.

STEP 13. Wiring harness check between A-01 ABS-ECU connector terminal No. 16/15 and D-133 wheel speed sensor <RR> connector terminal No. 1/2

- * Check for open circuit in wheel speed sensor <RR> circuit

Q: Is the check result normal?

YES: Go to Step 14.

NO: Repair the wiring harness.

STEP 14. Check whether the diagnostic trouble code is reset.

- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q: Is DTC C1032 set?

YES: Replace the ABS-ECU.

NO: Intermittent malfunction (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).

DTC C1014: Mutual monitoring of FL wheel speed sensor

M13502000915USA0000010000

⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any fault below is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

- Missing wheel speed sensor signal
- Wheel speed sensor signal continuously indicates low value.

PROBABLE CAUSES**Current trouble**

- Excessive gap between the wheel speed sensor and the wheel speed detection encoder
- Wheel bearing malfunction
- Deformation of the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the wheel speed detection encoder
- Malfunction of wheel speed sensor
- Improper installation of the wheel speed sensor
- ABS-ECU malfunction

Past trouble

- When the diagnostic trouble code C100A is also set, carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).

- *When the diagnostic trouble code C100A is not set, the following conditions may be present:
 - *Right or left wheels are rotated.
 - *Unstable vehicle attitude
 - *External noise interference
 - *Vehicle ran with the parking brake applied.

DIAGNOSIS

Required Special Tools:

- *MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - *MB991824: Vehicle Communication Interface (V.C.I.)
 - *MB991827: M.U.T.-III USB Cable
 - *MB991910: M.U.T.-III Main Harness A
- *MB991974: ABS check harness

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q:Is DTC C1014 set?

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. M.U.T.-III diagnostic trouble code

Check that the diagnostic trouble code C100A is also set.

Q:Is DTC C100A also set?

YES: Perform the diagnosis for the diagnostic trouble code C100A. (Refer to P.35B-11.)

NO: Go to Step 4.

STEP 4. Check for wheel speed sensor installation

Check how the wheel speed sensor <FL> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

Q:Is the check result normal?

YES: Go to Step 5.

NO: Reinstall the wheel speed sensor correctly.

STEP 5. Check for wheel speed sensor as a single unit

Refer to P.35B-155.

Q:Is the check result normal?

YES: Go to Step 6.

NO: Replace the wheel speed sensor.

STEP 6. Check for wheel bearing looseness

NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <FL> for looseness. (Refer to GROUP 26 - On-vehicle Service P.26-8.)

Q:Is the check result normal?

YES: Go to Step 7.

NO: Replace the wheel bearing.

STEP 7. Check of wheel speed detection encoder

Check the encoder for adhesion of foreign materials or deformation.

Q:Is the check result normal?

YES: Go to Step 8.

NO (Adhesion of foreign materials): Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction.

NO (Deformation): Replace the wheel bearing.

STEP 8. Check whether the diagnostic trouble code is reset.

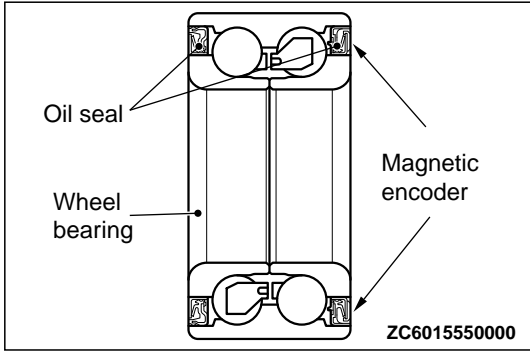
- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q:Is DTC C1014 set?

YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

**DTC C101F Mutual monitoring of FR wheel speed sensor**

M13502000916USA0000010000

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- *The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- *The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any fault below is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

- Missing wheel speed sensor signal
- Wheel speed sensor signal continuously indicates low value.

PROBABLE CAUSES

Current trouble

- Excessive gap between the wheel speed sensor and the wheel speed detection encoder
- Wheel bearing malfunction
- Deformation of the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the wheel speed detection encoder
- Malfunction of wheel speed sensor
- Improper installation of the wheel speed sensor
- ABS-ECU malfunction

Past trouble

- When the diagnostic trouble code C1015 is also set, carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).
- When diagnostic trouble code C1015 is not set, the following conditions may be present:
 - Right or/and left wheels are rotated.
 - Unstable vehicle attitude
 - External noise interference
 - Vehicle ran with the parking brake applied.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q: Is DTC C101F set?

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. M.U.T.-III diagnostic trouble code

Check that the diagnostic trouble code C1015 is also set.

Q: Is DTC C1015 also set?

YES: Perform the diagnosis for the diagnostic trouble code No. C1015. (Refer to P. 35B-15.)

NO: Go to Step 4.

STEP 4. Check for wheel speed sensor installation

Check how the wheel speed sensor <FR> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

Q: Is the check result normal?

YES: Go to Step 5.

NO: Reinstall the wheel speed sensor correctly.

STEP 5. Check for wheel speed sensor as a single unit

Q: Is the check result normal?

YES: Go to Step 6.

NO: Replace the wheel speed sensor.

STEP 6. Check for wheel bearing looseness

NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <FR> for looseness. (Refer to GROUP 26 - On-vehicle Service P. 26-8.)

Q: Is the check result normal?

YES: Go to Step 7.

NO: Replace the wheel bearing.

STEP 7. Check of wheel speed detection encoder

Check the encoder for adhesion of foreign materials or deformation.

Q: Is the check result normal?

YES: Go to Step 8.

NO (Adhesion of foreign materials): Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction.

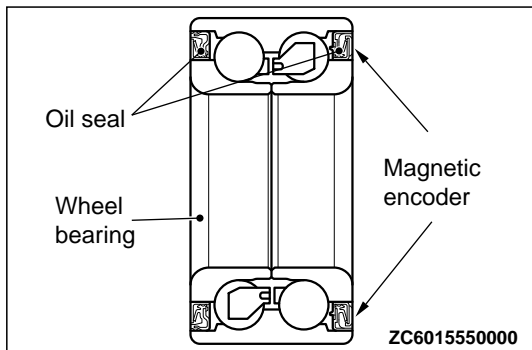
NO (Deformation): Replace the wheel bearing.

STEP 8. Check whether the diagnostic trouble code is reset.

(1) Erase the diagnostic trouble code.

(2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.



Q: Is DTC C101F set?

YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

DTC No. C102A: Mutual monitoring of RL wheel speed sensor

M13502000917USA0000010000

⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any fault below is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

- Missing wheel speed sensor signal
- Wheel speed sensor signal continuously indicates low value.

PROBABLE CAUSES

Current trouble

- Excessive gap between the wheel speed sensor and the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed sensor
- Wheel bearing malfunction
- Deformation of the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed detection encoder
- Malfunction of wheel speed sensor
- Improper installation of the wheel speed sensor
- ABS-ECU malfunction

Past trouble

- When the diagnostic trouble code C1020 is also set, carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).
- When the diagnostic trouble code C1020 is not set, the following conditions may be present:
 - Right or left wheels are rotated.
 - Unstable vehicle attitude
 - External noise interference
 - Vehicle ran with the parking brake applied.

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
 - MB991974: ABS check harness
-

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**Q:Is DTC C102A set?**

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. M.U.T.-III diagnostic trouble code

Check that the diagnostic trouble code C1020 is also set.

Q:Is DTC C1020 also set?

YES: Perform the diagnosis for the diagnostic trouble code C1020. (Refer to P.35B-20.)

NO: Go to Step 4.

STEP 4. Check for wheel speed sensor installation

Check how the wheel speed sensor <RL> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

Q:Is the check result normal?

YES: Go to Step 5.

NO: Reinstall the wheel speed sensor correctly.

STEP 5. Check for wheel speed sensor as a single unit

Refer to P.35B-155.

Q: Is the check result normal?

YES: Go to Step 6.

NO: Replace the wheel speed sensor.

STEP 6. Check for wheel bearing looseness

NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <RL> for looseness. <Refer to GROUP 27A - On-vehicle Service P. 27A-4. (FWD) or GROUP 27B - On-vehicle Service P. 27B-15. (AWD)>

Q: Is the check result normal?

YES: Go to Step 7.

NO: Replace the rear wheel hub assembly.

STEP 7. Check of wheel speed detection encoder

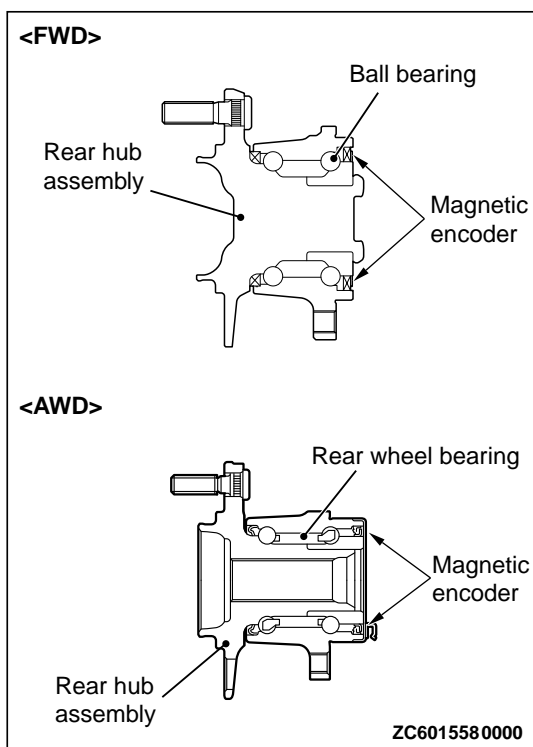
Check the encoder for adhesion of foreign materials or deformation.

Q: Is the check result normal?

YES: Go to Step 8.

NO (Adhesion of foreign materials): Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction.

NO (Deformation): Replace the rear wheel hub assembly.



STEP 8. Check whether the diagnostic trouble code is reset.

- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q: Is DTC C102A set?

YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P. 00-15.)

DTC C1035: Mutual monitoring of RR wheel speed sensor

M13502000918USA0000010000

⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any fault below is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

- Missing wheel speed sensor signal
- Wheel speed sensor signal continuously indicates low value.

PROBABLE CAUSES**Current trouble**

- Excessive gap between the wheel speed sensor and the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed sensor
- Wheel bearing malfunction
- Deformation of the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed detection encoder
- Malfunction of wheel speed sensor
- Improper installation of the wheel speed sensor
- ABS-ECU malfunction

Past trouble

- When the diagnostic trouble code C102B is also set, carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).

- *When the diagnostic trouble code C102B is not set, the following conditions may be present:
 - *Right or left wheels are rotated.
 - *Unstable vehicle attitude
 - *External noise interference
 - *Vehicle ran with the parking brake applied.

DIAGNOSIS

Required Special Tools:

- *MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - *MB991824: Vehicle Communication Interface (V.C.I.)
 - *MB991827: M.U.T.-III USB Cable
 - *MB991910: M.U.T.-III Main Harness A
- *MB991974: ABS check harness

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q:Is DTC C1035 set?

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. M.U.T.-III diagnostic trouble code

Check that the diagnostic trouble code C102B is also set.

Q:Is DTC C102B also set?

YES: Perform the diagnosis for the diagnostic trouble code C102B. (Refer to P.35B-25.)

NO: Go to Step 4.

STEP 4. Check for wheel speed sensor installation

Check how the wheel speed sensor <RR> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

Q:Is the check result normal?

YES: Go to Step 5.

NO: Reinstall the wheel speed sensor correctly.

STEP 5. Check for wheel speed sensor as a single unit

Refer to P.35B-155.

Q:Is the check result normal?

YES: Go to Step 6.

NO: Replace the wheel speed sensor.

STEP 6. Check for wheel bearing looseness

NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <RL> for looseness. <Refer to GROUP 27A - On-vehicle Service P. 27A-4 (FWD) or GROUP 27B - On-vehicle Service P. 27B-15 (AWD).>

Q: Is the check result normal?

YES: Go to Step 7.

NO: Replace the rear wheel hub assembly.

STEP 7. Check of wheel speed detection encoder

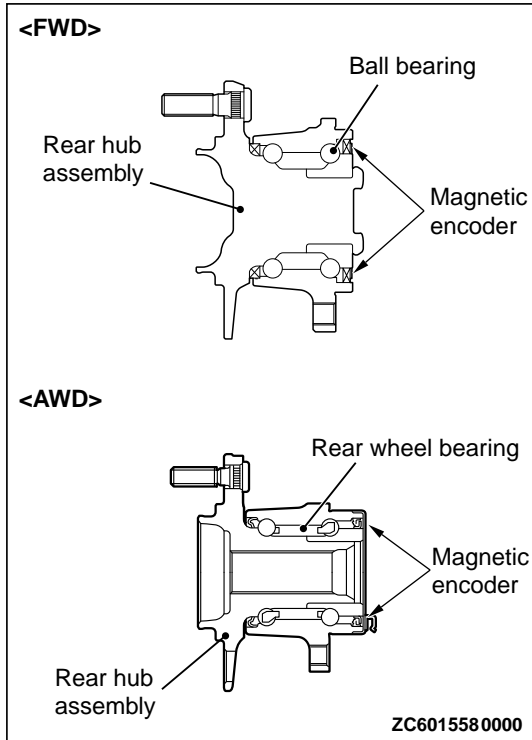
Check the encoder for adhesion of foreign materials or deformation.

Q: Is the check result normal?

YES: Go to Step 8.

NO (Adhesion of foreign materials): Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction.

NO (Deformation): Replace the rear wheel hub assembly.

**STEP 8. Check whether the diagnostic trouble code is reset.**

- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q: Is DTC C1035 set?

YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P. 00-15.)

DTC No. C1041: Abnormality in periodical signal for FL wheel speed sensor

M13502000919USA0000010000

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any periodical drop is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

PROBABLE CAUSES

- Wheel bearing malfunction
- Deformation of the wheel speed detection encoder
- Missing teeth of the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed detection encoder
- ABS-ECU malfunction

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q: Is DTC C1041 set?

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. Check for wheel bearing looseness

NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <FL> for looseness. (Refer to GROUP 26 - On-vehicle Service P.26-8.)

Q: Is the check result normal?

YES: Go to Step 4.

NO: Replace the wheel bearing.

STEP 4. Check of wheel speed detection encoder

Check the encoder for adhesion of foreign materials or deformation.

Q: Is the check result normal?

YES: Go to Step 5.

NO (Adhesion of foreign materials): Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction. When the encoder is deformed, replace the wheel bearing.

NO (Deformation): Replace the wheel bearing.

STEP 5. Check whether the diagnostic trouble code is reset.

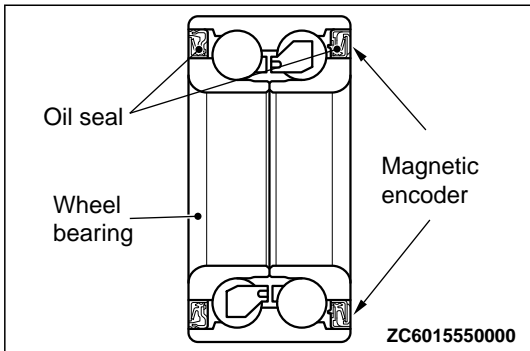
- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q: Is DTC C1041 set?

YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)



DTC C1042: Abnormality in periodical signal for FR wheel speed sensor

M13502000920USA0000010000

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ASC-ECU. ASC-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

ASC-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any periodical drop is found in these sensor signals, ASC-ECU will set the relevant diagnostic trouble code.

PROBABLE CAUSES

- Wheel bearing malfunction
- Deformation of the wheel speed detection encoder
- Missing teeth of the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed detection encoder
- ASC-ECU malfunction

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q:Is DTC C1042 set?

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. Check for wheel bearing looseness

NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <FR> for looseness. (Refer to GROUP 26 - On-vehicle Service P.26-8.)

Q:Is the check result normal?

YES: Go to Step 4.

NO: Replace the wheel bearing.

STEP 4. Check of wheel speed detection encoder

Check the encoder for adhesion of foreign materials or deformation.

Q:Is the check result normal?

YES: Go to Step 5.

NO (Adhesion of foreign materials): Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction. When the encoder is deformed, replace the wheel bearing.

NO (Deformation): Replace the wheel bearing.

STEP 5. Check whether the diagnostic trouble code is reset.

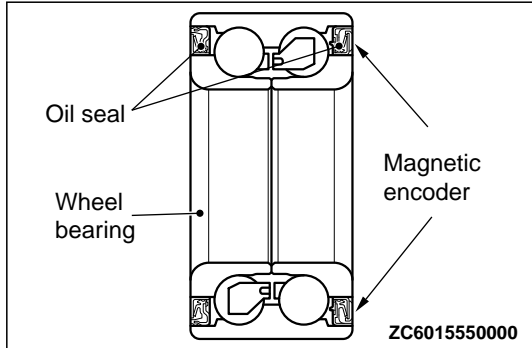
- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q:Is DTC C1042 set?

YES: Replace the ASC-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

**DTC C1043: Abnormality in periodical signal for RL wheel speed sensor**

M13502000921USA0000010000

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

*The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.

- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any periodical drop is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

PROBABLE CAUSES

- Wheel bearing malfunction
- Deformation of the wheel speed detection encoder
- Missing teeth of the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed detection encoder
- ABS-ECU malfunction

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q:Is DTC C1043 set?

YES: Go to Step 3.

NO: The procedure is complete.

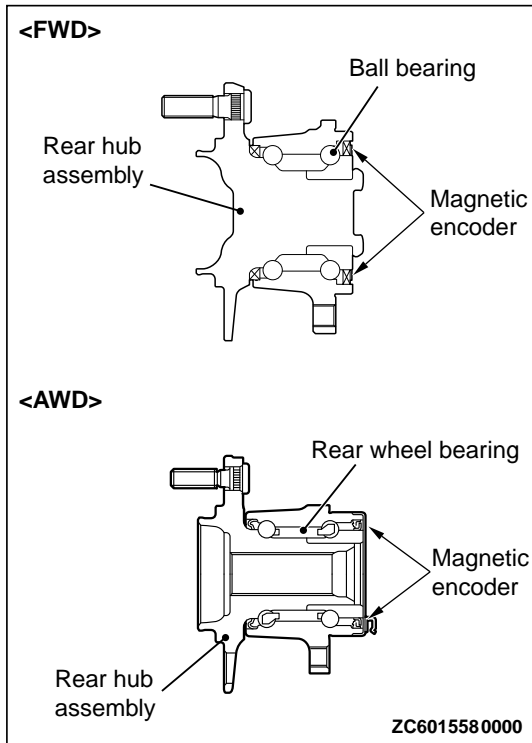
STEP 3. Check for wheel bearing looseness

NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <RL> for looseness. <Refer to GROUP 27A - On-vehicle Service P.27A-4 (FWD) or GROUP 27B - On-vehicle Service P.27B-15 (AWD).>

Q:Is the check result normal?

YES: Go to Step 4.

NO: Replace the rear wheel hub assembly.

**STEP 4. Check of wheel speed detection encoder**

Check the encoder for adhesion of foreign materials or deformation.

Q: Is the check result normal?

YES: Go to Step 5.

NO (Presence of foreign materials): Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction. When the encoder is deformed, replace the rear hub assembly.

NO (Deformation): Replace the rear wheel hub assembly.

STEP 5. Check whether the diagnostic trouble code is reset.

- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q: Is DTC C1043 set?

YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

DTC C1044: Abnormality in periodical signal for RR wheel speed sensor

M13502000922USA0000010000

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

*The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.

- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any periodical drop is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

PROBABLE CAUSES

- Wheel bearing malfunction
- Deformation of the wheel speed detection encoder
- Missing teeth of the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed detection encoder
- ABS-ECU malfunction

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q:Is DTC C1044 set?

YES: Go to Step 3.

NO: The procedure is complete.

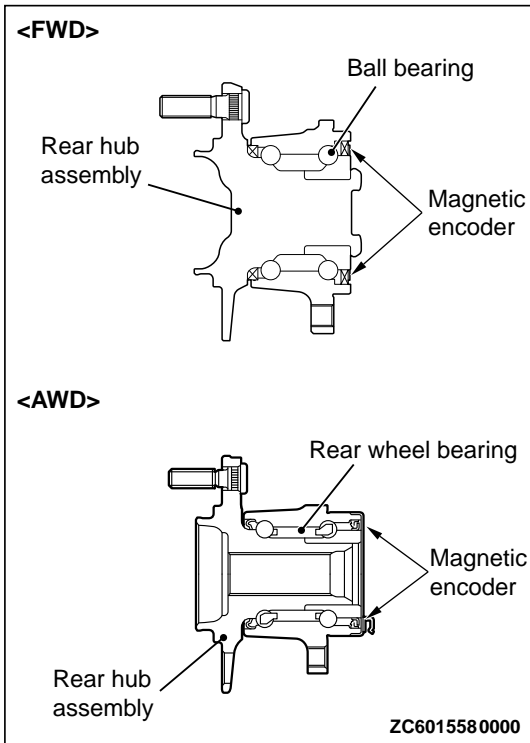
STEP 3. Check for wheel bearing looseness

NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <RR> for looseness. <Refer to GROUP 27A - On-vehicle Service P.27A-4 (FWD) or GROUP 27B - On-vehicle Service P.27B-15 (AWD).>

Q:Is the check result normal?

YES: Go to Step 4.

NO: Replace the rear wheel hub assembly.



STEP 4. Check of wheel speed detection encoder

Check the encoder for adhesion of foreign materials or deformation.

Q:Is the check result normal?

YES: Go to Step 5.

NO (Presence of foreign materials): Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction. When the encoder is deformed, replace the rear hub assembly.

NO (Deformation): Replace the rear wheel hub assembly.

STEP 5. Check whether the diagnostic trouble code is reset.

- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q:Is DTC C1044 set?

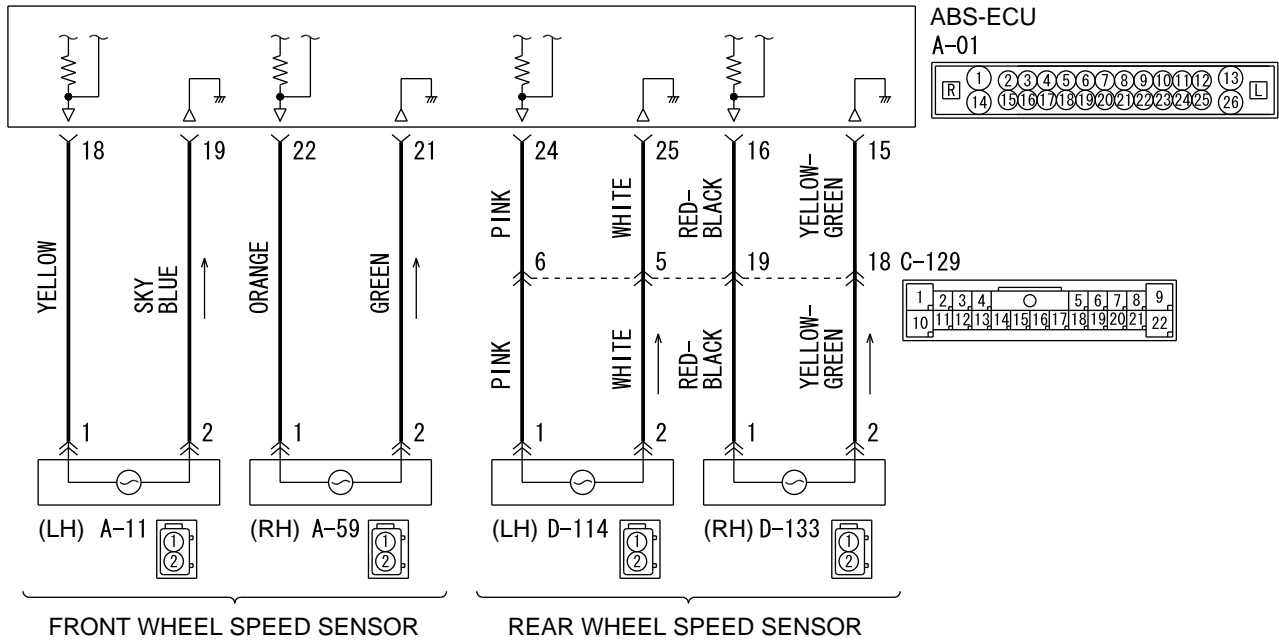
YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

DTC C1046: FL wheel speed sensor control phase time exceeded

M13502000923USA0000010000

Wheel Speed Sensor Circuit



D7G35M023A00

⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

This diagnostic trouble code is set if any malfunction below is found:

- When the brake fluid pressure is decreased for a long time.
- When the brake fluid pressure is held for a long time.

PROBABLE CAUSES

- Damaged wiring harness and connectors
- External noise interference
- Malfunction of wheel speed sensor
- ABS-ECU malfunction
- Excessive gap between the wheel speed sensor and the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the wheel speed detection encoder
- Wheel bearing malfunction
- Improper installation of the wheel speed sensor
- Deformation of the wheel speed detection encoder
- Disturbance of magnetization pattern for wheel speed detection encoder
- Missing teeth of the wheel speed detection encoder

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D – CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**Q:Is DTC C1046 set?**

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. M.U.T.-III diagnostic trouble code

Check that the diagnostic trouble codes C100A, C1011, C1014, and C1041 are also set.

Q:Are DTC C100A, C1011, C1014, and C1041 also set?

YES: Carry out the diagnosis for the relevant diagnostic trouble codes, and then go to Step 12.

NO: Go to Step 4.

STEP 4. M.U.T.-III data list

Check the following service data.

- Item No.01: FL wheel speed sensor

Q:Is the check result normal?

YES: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

NO: Go to Step 5.

STEP 5. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

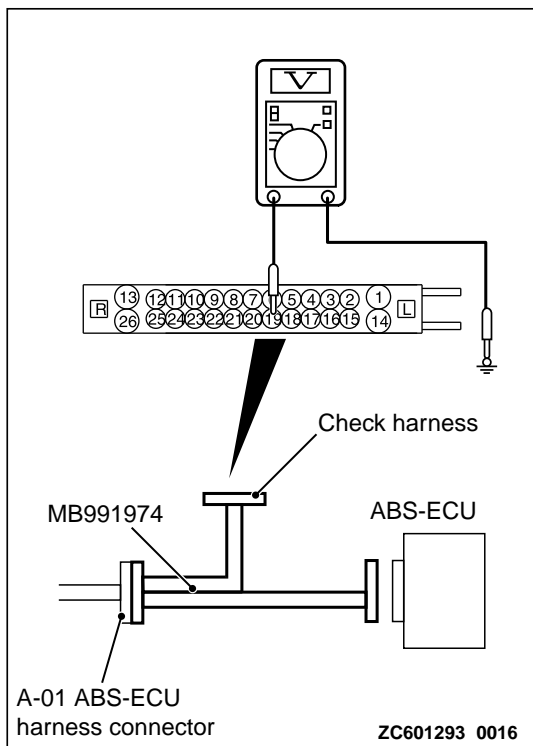
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No. 18/the ground terminal No. 19 and the body ground.

OK: 0 volt

Q: Is the check result normal?

YES: Go to Step 6.

NO (Not normal at the terminal No. 18 or 19): Go to Step 7.



STEP 6. Resistance measurement at A-01 ABS-ECU connector

- (1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

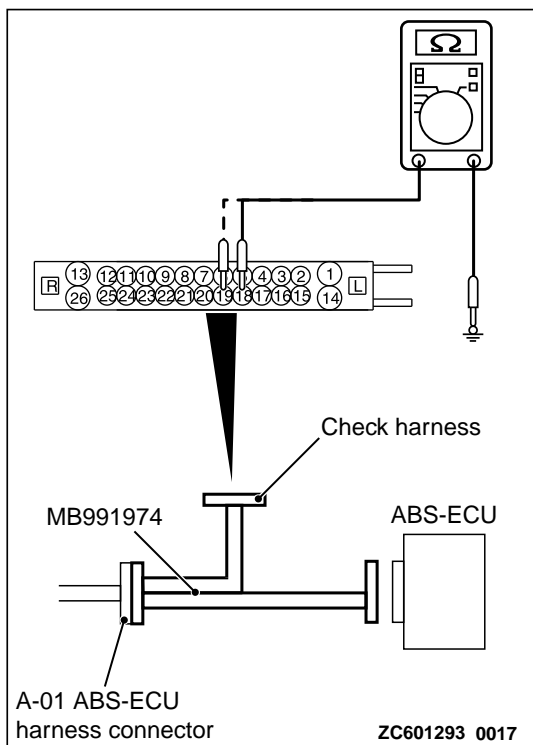
- (2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No. 18/the ground terminal No. 19 and the body ground

OK: No continuity

Q: Is the check result normal?

YES: Go to Step 9.

NO (Not normal at the terminal No. 18 or 19): Go to Step 7.



STEP 7. Connector check: A-01 ABS-ECU connector, A-11 wheel speed sensor <FL> connector

Q: Is the check result normal?

YES: Go to Step 8.

NO: Repair the defective connector.

STEP 8. Wiring harness check between A-01 ABS-ECU connector terminal No. 18/19 and A-11 wheel speed sensor <FL> connector terminal No. 1/2

* Check for short circuit in wheel speed sensor <FL> circuit

Q: Is the check result normal?

YES: Replace the wheel speed sensor <FL>.

NO: Repair the wiring harness.

STEP 9. Voltage measurement at the A-01 ABS-ECU connector

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.

(2) Turn the ignition switch to the ON position.

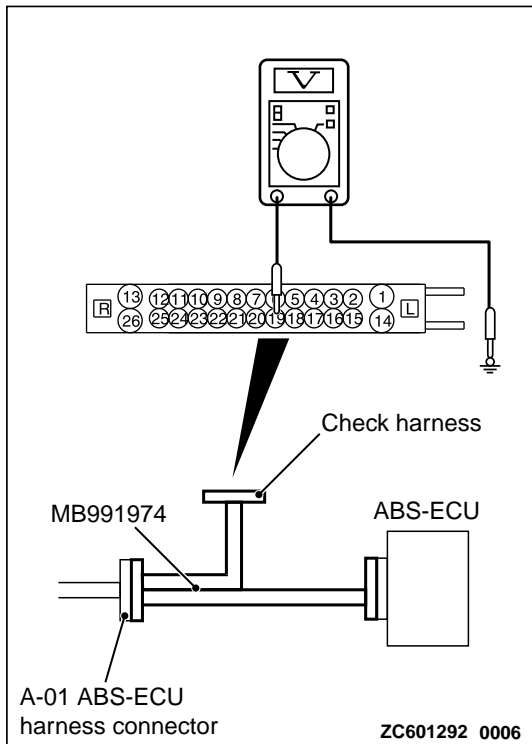
(3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No. 18 and the body ground.

OK: Approximately battery voltage

Q: Is the check result normal?

YES: Go to Step 12.

NO: Go to Step 10.



STEP 10. Connector check: A-01 ABS-ECU connector, A-11 wheel speed sensor <FL> connector

Q: Is the check result normal?

YES: Go to Step 11.

NO: Repair the defective connector.

STEP 11. Wiring harness check between A-01 ABS-ECU connector terminal No. 18/19 and A-11 wheel speed sensor <FL> connector terminal No. 1/2

* Check for open circuit in wheel speed sensor <FL> circuit.

Q: Is the check result normal?

YES: Replace the wheel speed sensor.

NO: Repair the wiring harness.

STEP 12. Check whether the diagnostic trouble code is reset.

- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q:Is DTC C1046 set?

YES: Replace the ABS-ECU, and then go to Step 13.

NO: The procedure is complete.

STEP 13. Check whether the diagnostic trouble code is reset.

- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q:Is DTC C1046 set?

YES: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

NO: The procedure is complete.

DTC C1047: FR wheel speed sensor control phase time exceeded

M13502000924USA0000010000

⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

This diagnostic trouble code is set if any malfunction below is found:

- When the brake fluid pressure is decreased for a long time.
- When the brake fluid pressure is held for a long time.

PROBABLE CAUSES

- Damaged wiring harness and connectors
- External noise interference
- Malfunction of wheel speed sensor
- ABS-ECU malfunction
- Excessive gap between the wheel speed sensor and the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the wheel speed detection encoder
- Wheel bearing malfunction
- Improper installation of the wheel speed sensor
- Deformation of the wheel speed detection encoder
- Disturbance of magnetization pattern for wheel speed detection encoder
- Missing teeth of the wheel speed detection encoder

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
 - MB991974: ABS check harness
-

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**Q:Is DTC C1047 set?**

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. M.U.T.-III diagnostic trouble code

Check that the diagnostic trouble codes C1015, C101C, C101F, and C1042 are also set.

Q:Are DTC C1015, C101C, C101F, and C1042 also set?

YES: Carry out the diagnosis for the relevant diagnostic trouble codes, and then go to Step 5.

NO: Go to Step 4.

STEP 4. Check whether the diagnostic trouble code is reset.

(1) Erase the diagnostic trouble code.

(2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q: Is DTC C1047 set?

YES: Replace the ABS-ECU, and then go to Step 5.

NO: The procedure is complete.

STEP 5. Check whether the diagnostic trouble code is reset.

(1) Erase the diagnostic trouble code.

(2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q: Is DTC C1047 set?

YES: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

NO: The procedure is complete.

DTC C1048: RL wheel speed sensor control phase time exceeded

M13502000925USA0000010000

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

This diagnostic trouble code is set if any malfunction below is found:

- When the brake fluid pressure is decreased for a long time.
- When the brake fluid pressure is held for a long time.

PROBABLE CAUSES

- Damaged wiring harness and connectors
- External noise interference

- Malfunction of wheel speed sensor
- ABS-ECU malfunction
- Excessive gap between the wheel speed sensor and the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the wheel speed detection encoder
- Wheel bearing malfunction
- Improper installation of the wheel speed sensor
- Deformation of the wheel speed detection encoder
- Disturbance of magnetization pattern for wheel speed detection encoder
- Missing teeth of the wheel speed detection encoder

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D – CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q:Is DTC C1048 set?

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. M.U.T.-III diagnostic trouble code

Check that the diagnostic trouble codes C1020, C1027, C102A, and C1043 are also set.

Q:Are DTC C1020, C1027, C102A, and C1043 also set?

YES: Carry out the diagnosis for the relevant diagnostic trouble codes, and then go to Step 5.

NO: Go to Step 4.

STEP 4. Check whether the diagnostic trouble code is reset.

(1) Erase the diagnostic trouble code.

(2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q:Is DTC C1048 set?

YES: Replace the ABS-ECU, and then go to Step 5.

NO: The procedure is complete.

STEP 5. Check whether the diagnostic trouble code is reset.

(1) Erase the diagnostic trouble code.

(2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q: Is DTC C1048 set?

YES: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

NO: The procedure is complete.

DTC C1049: RR wheel speed sensor control phase time exceeded

M13502000926USA0000010000

⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The wheel speed sensor is a kind of a pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

DTC SET CONDITIONS

This diagnostic trouble code is set if any malfunction below is found:

- When the brake fluid pressure is decreased for a long time.
- When the brake fluid pressure is held for a long time.

PROBABLE CAUSES

- Damaged wiring harness and connectors
- External noise interference
- Malfunction of wheel speed sensor
- ABS-ECU malfunction
- Excessive gap between the wheel speed sensor and the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed sensor

- Adhesion of foreign materials on the wheel speed detection encoder
- Wheel bearing malfunction
- Improper installation of the wheel speed sensor
- Deformation of the wheel speed detection encoder
- Disturbance of magnetization pattern for wheel speed detection encoder
- Missing teeth of the wheel speed detection encoder

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D – CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q:Is DTC C1049 set?

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. M.U.T.-III diagnostic trouble code

Check that the diagnostic trouble codes C102B, C1032, C1035, and C1044 are also set.

Q:Are DTC C102B, C1032, C1035, and C1044 also set?

YES: Carry out the diagnosis for the relevant diagnostic trouble codes, and then go to Step 5.

NO: Go to Step 4.

STEP 4. Check whether the diagnostic trouble code is reset.

- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q:Is DTC C1049 set?

YES: Replace the ABS-ECU, and then go to Step 5.

NO: The procedure is complete.

STEP 5. Check whether the diagnostic trouble code is reset.

- (1) Erase the diagnostic trouble code.

(2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q:Is DTC C1049 set?

YES: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

NO: The procedure is complete.

DTC C104B,C104F,C1053,C1057/C105F,C1063,C1067,C105B: Abnormality in inlet/outlet valve (FL,RL,RR,RL)

M13502000927USA0000010000

⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- ABS-ECU contains the power supply circuit (terminal No. 26) for the solenoid valve. The solenoid valve is energized by the valve relay, which is incorporated in ABS-ECU.
- The valve relay, which is incorporated in ABS-ECU, is always energizing the solenoid valve unless the initial check is in progress when the ignition switch is turned on, or the recurrent system check is in progress.
- ABS-ECU activates the solenoid valve by turning on its driving transistor.

DTC SET CONDITIONS

These diagnostic trouble codes will be set under the cases below:

- The solenoid valve is not energized even after ABS-ECU has turned on valve relay (Open circuit is present in the power supply circuit to the ABS-ECU solenoid valve, or the valve relay has failed).
- The solenoid valve is not activated even after ABS-ECU has turned on the driving transistor (Open circuit is present in the solenoid valve circuit in ABS-ECU, or the valve relay has failed).
- After ABS-ECU has turned off the valve relay, the solenoid valve still remains energized (short in the solenoid valve circuit).
- When a solenoid valve failure is detected

PROBABLE CAUSES

- ABS-ECU malfunction

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
 - MB991974: ABS check harness
-

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-10.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**Q:Are DTC C104B, C104F, C1053, C1057, C105F, C1063, C1067 or C105B set?**

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. Check whether the diagnostic trouble code is reset.**Q:Are DTC C104B, C104F, C1053, C1057, C105F, C1063, C1067 or C105B set?**

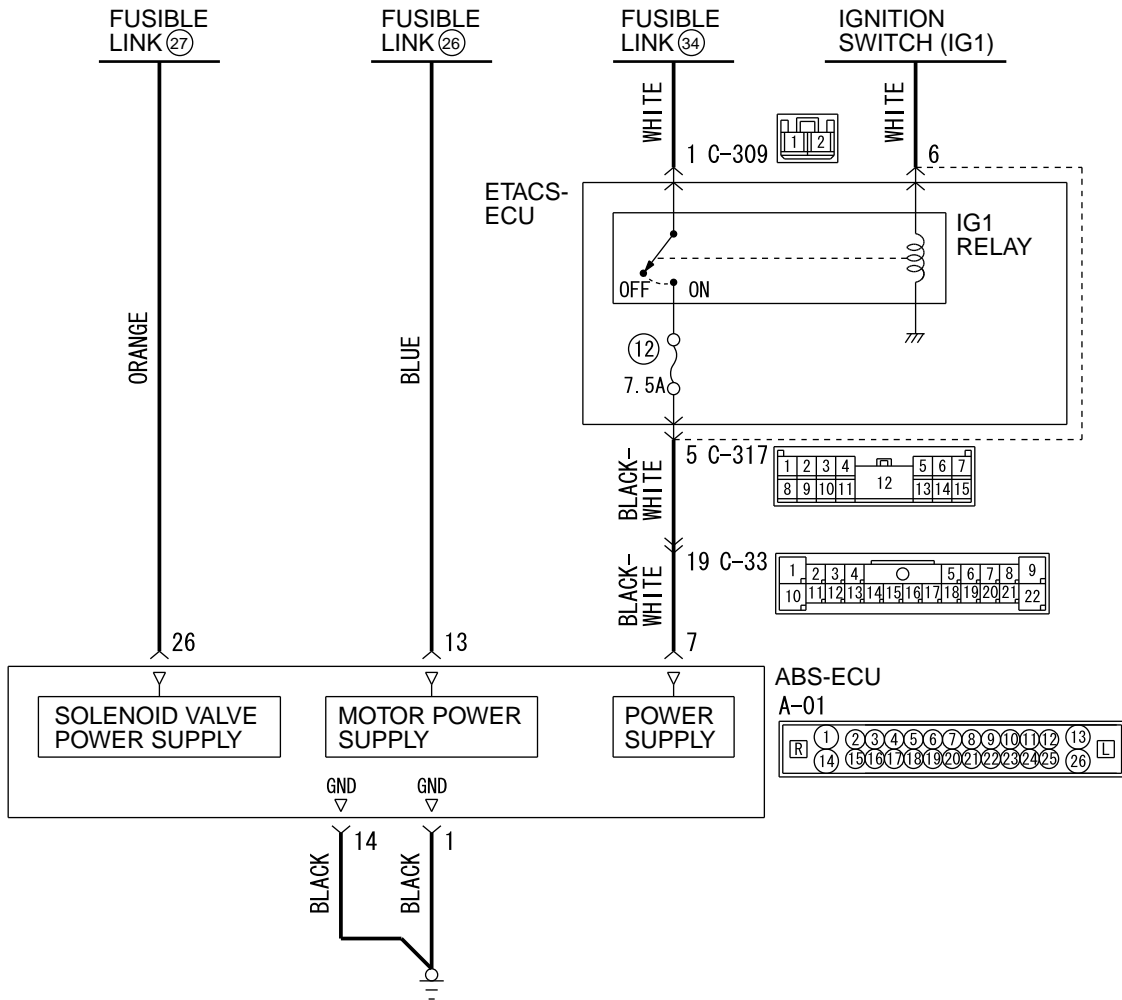
YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

DTC C2104: Faulty valve power supply circuit

M13502000935USA0000010000

Power Supply Circuit



D7G35M018A00

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

• ABS-ECU contains the power supply circuit (terminal No. 26) for the solenoid valve. The solenoid valve is energized by the valve relay, which is incorporated in ABS-ECU.

- The valve relay, which is incorporated in ABS-ECU, is always energizing the solenoid valve unless the initial check is in progress when the ignition switch is turned on, or the recurrent system check is in progress.

DTC SET CONDITIONS

This diagnostic trouble codes will be set under the cases below:

- When the solenoid valve supply voltage is not within the standard value.

PROBABLE CAUSES

Current trouble

- Fusible link malfunction
- Damaged wiring harness and connectors
- Abnormality in battery or generator
- ABS-ECU malfunction

Past trouble

- Carry out diagnosis with particular emphasis on wiring harness and connector failures between the power supply circuit (terminal No. 26) to ABS-ECU solenoid valve or ground circuit (terminal No. 1). For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic Trouble code recheck after resetting CAN bus lines

Q:Is DTC C2104 set?

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. Fusible link check: Check the fusible link No. 27.

Visually check for open circuit in the fusible link No. 27.

Q: Is the check result normal?

YES: Go to Step 4.

NO: Replace the fusible link No. 27.

STEP 4. Battery check

Refer to GROUP 54Aa - Battery Test P.54Aa-3.

Q: Is the battery in good condition?

YES: Go to Step 5.

NO: Charge or replace the battery.

STEP 5. Charging system check

Refer to GROUP 16a - Output Current Test P.16a-8.

Q: Is the charging system in good condition?

YES: Go to Step 6.

NO: Repair or replace the charging system component(s).

STEP 6. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

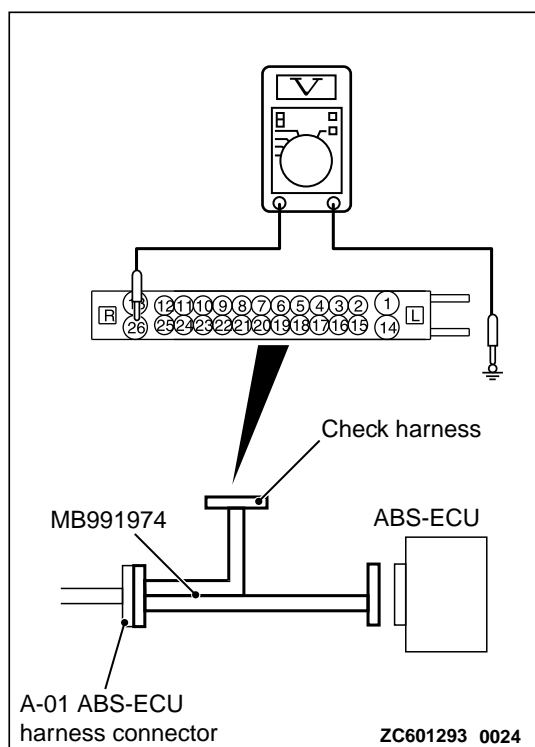
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the terminal No. 26 and the body ground.

OK: 12 volts (Battery voltage)

Q: Is the check result normal?

YES: Go to Step 8.

NO: Go to Step 7.

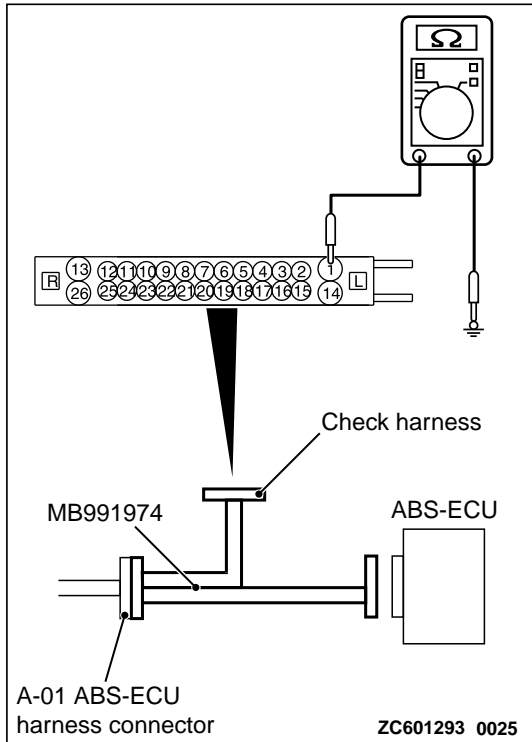


STEP 7. Connector check: A-01 ABS-ECU connector

Q: Is the check result normal?

YES: The open or short circuit may be present in the power supply circuit. Repair the wiring harness between the A-01 ABS-ECU connector terminal No. 26 and the fusible link No. 27.

NO: Repair the defective connector.



STEP 8. Resistance measurement at A-01 ABS-ECU connector

- (1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

- (2) Resistance between the terminal No. 1 and the body ground
OK: Continuity exists (2 ohms or less)

Q:Is the check result normal?

YES: Go to Step 10.

NO: Go to Step 9.

STEP 9. Connector check: A-01 ABS-ECU connector

Q:Is the check result normal?

YES: An open circuit may be present in the ground circuit. Repair the wiring harness between the A-01 ABS-ECU connector terminal No. 14 and the body ground.

NO: Repair the defective connector.

STEP 10. Check whether the diagnostic Trouble code is reset.

Q:Is DTC C2104 set?

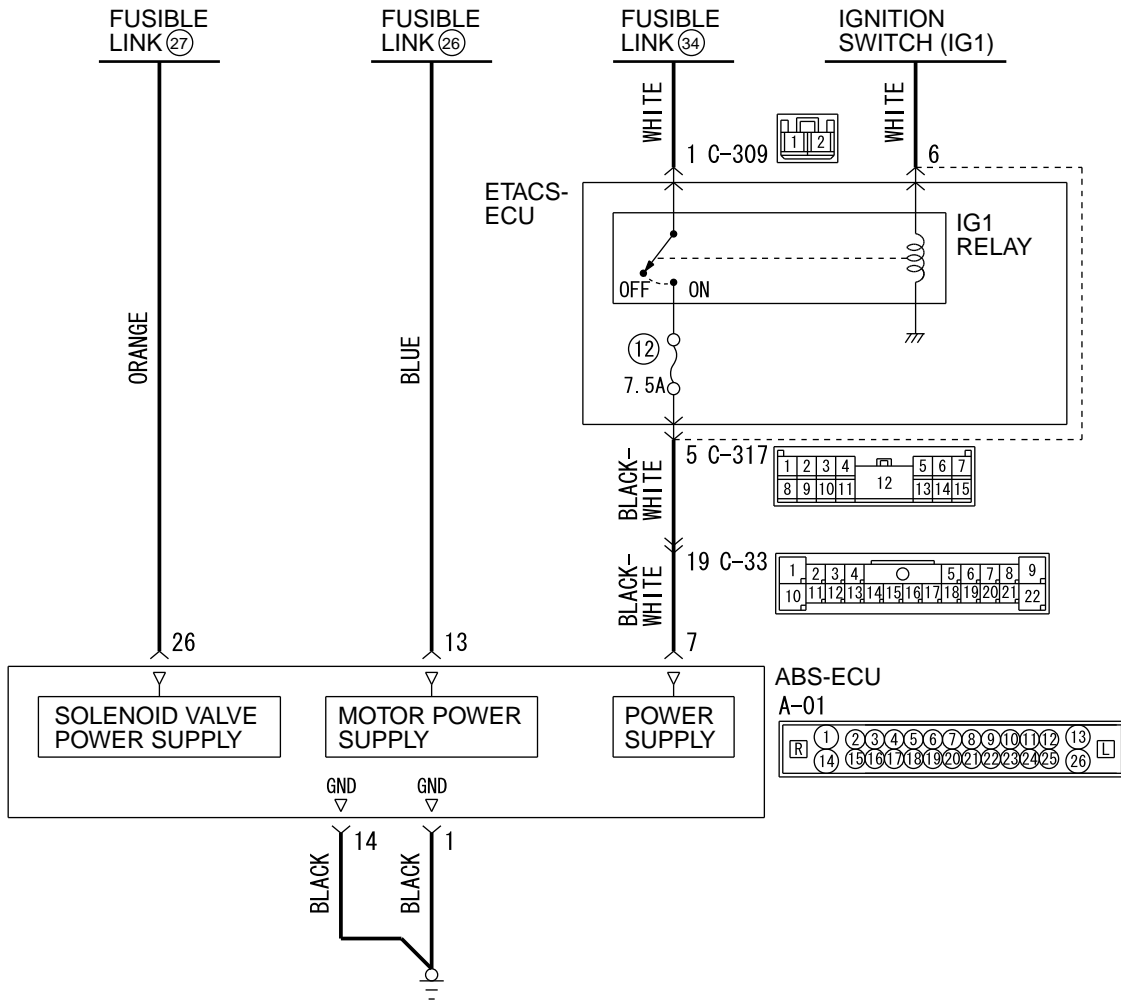
YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

DTC C1073: Faulty motor drive circuit

M13502000936USA0000010000

Power Supply Circuit



D7G35M018A00

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- ABS-ECU contains the power supply circuit (terminal No. 13) for the pump motor. The pump motor is energized by the motor switch, which is incorporated in ABS-ECU.

- The pump motor switch, which is incorporated in ABS-ECU, is always off unless the motor and solenoid valve check is activated when the vehicle is started.
- ABS-ECU activates the pump motor by turning on the ECU built-in pump motor switch.

DTC SET CONDITIONS

If the pump motor switch voltage drop indicates high value when the pump motor operates or after the operation, the pump motor operation is stopped and this diagnostic trouble code is set.

PROBABLE CAUSES

Current trouble

- Fusible link malfunction
- Damaged wiring harness and connectors
- Abnormality in battery or generator
- ABS-ECU malfunction

Past trouble

- Carry out diagnosis with particular emphasis on wiring harness and connector failures between the power supply circuit (A-01 ABS-ECU connector terminal No. 13) to the ABS-ECU motor and the ground circuit (A-01 ABS-ECU connector terminal No. 14). For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Check whether the diagnostic trouble code is reset.

Q:Is DTC C1073 set?

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. Fusible link check: Check the fusible link No. 26.

Q: Is the check result normal?

YES: Go to Step 4.

NO: Replace the fusible link No. 26.

STEP 4. Battery check

Refer to GROUP 54Aa - Battery Test P.54Aa-3.

Q: Is the battery in good condition?

YES: Go to Step 5.

NO: Charge or replace the battery.

STEP 5. Charging system check

Refer to GROUP 16a - Output Current Test P.16a-8.

Q: Is the charging system in good condition?

YES: Go to Step 6.

NO: Repair or replace the charging system component(s).

STEP 6. Voltage measurement at the A-01 ABS-ECU connector

(1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

(2) Turn the ignition switch to the ON position.

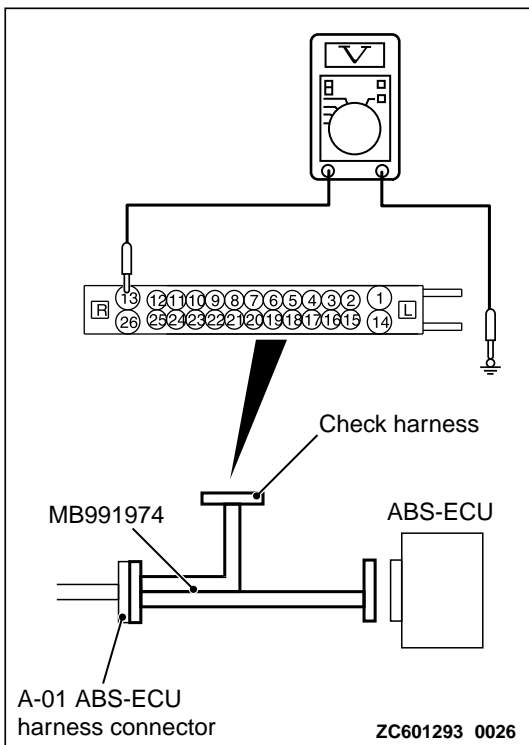
(3) Measure the voltage between the terminal No. 13 and the body ground.

OK: 12 volts (Battery voltage)

Q: Is the check result normal?

YES: Go to Step 8.

NO: Go to Step 7.

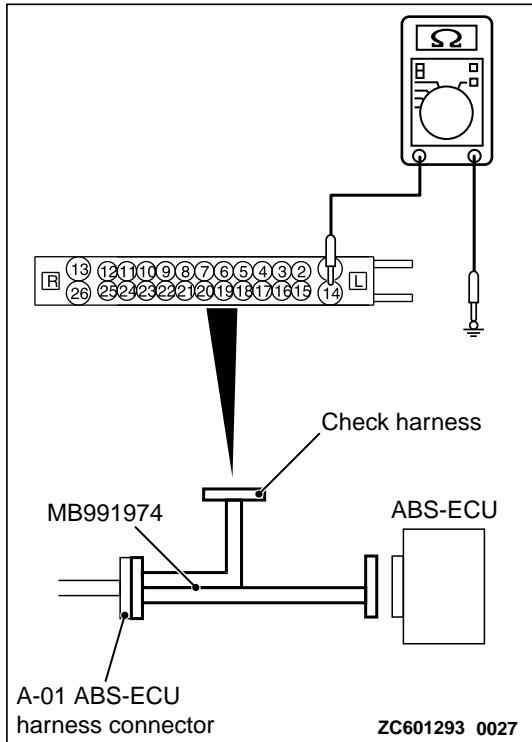


STEP 7. Connector check: A-01 ABS-ECU connector

Q: Is the check result normal?

YES: The open or short circuit may be present in the solenoid valve power supply circuit. Repair the wiring harness between the A-01 ABS-ECU connector terminal No. 13 and the fusible link No. 26.

NO: Repair the defective connector.



STEP 8. Resistance measurement at A-01 ABS-ECU connector

- (1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

- (2) Resistance between terminal No. 14 and body ground
OK: Continuity exists (2 ohms or less)

Q:Is the check result normal?

YES: Go to Step 10.

NO: Go to Step 9.

STEP 9. Connector check: A-01 ABS-ECU connector

Q:Is the check result normal?

YES: An open circuit may be present in the ground circuit. Repair the wiring harness between the A-01 ABS-ECU terminal No. 14 and the body ground.

NO: Repair the defective connector.

STEP 10. Check whether the diagnostic trouble code is reset.

- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q:Is DTC C1073 set?

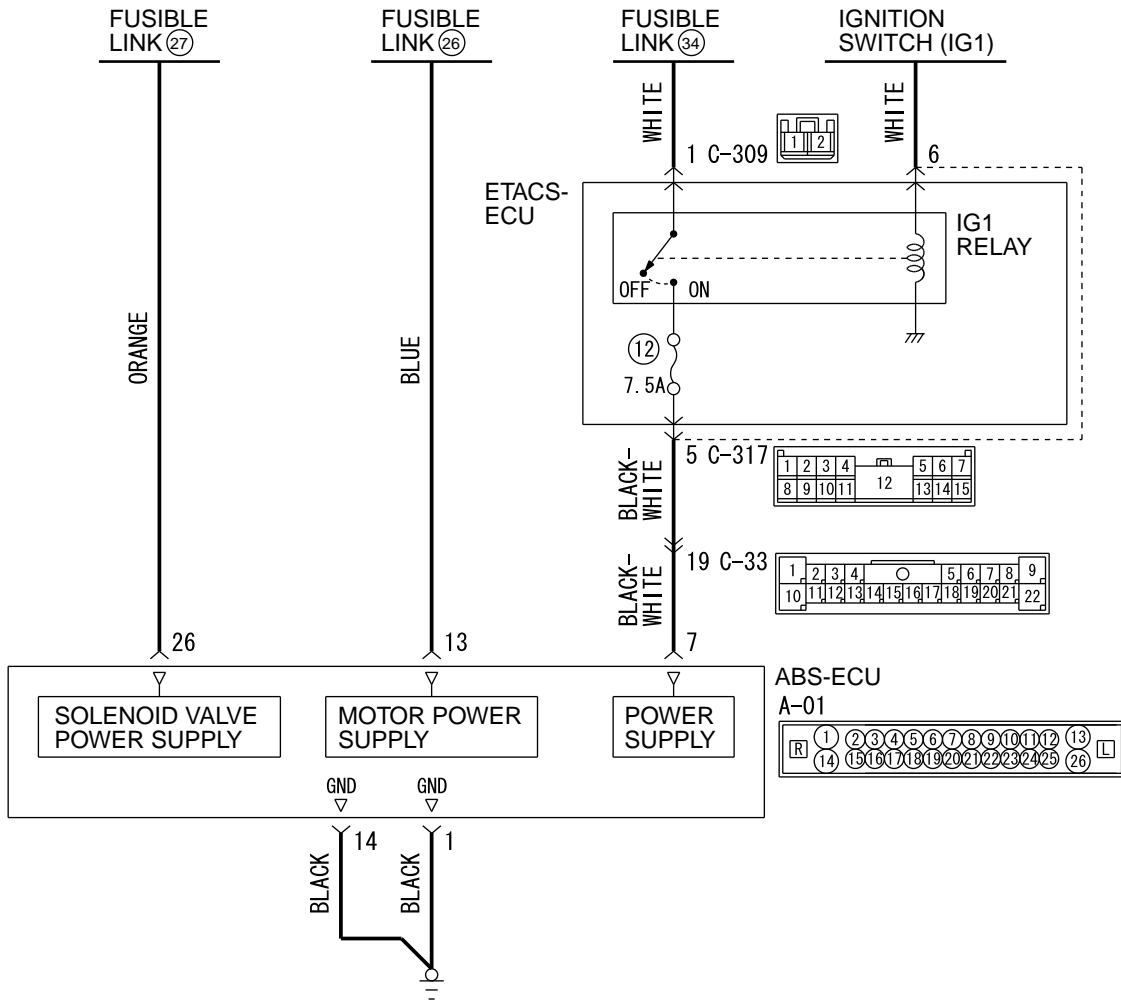
YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

DTC C2116: Abnormality in power supply voltage in pump motor

M13502000937USA0000010000

Power Supply Circuit



D7G35M018A00

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

*ABS-ECU contains the power supply circuit (terminal No. 13) for the pump motor. The pump motor is energized by the motor switch, which is incorporated in ABS-ECU.

- The pump motor switch, which is incorporated in ABS-ECU, is always off unless the motor and solenoid valve check is activated when the vehicle is started.
- ABS-ECU activates the pump motor by turning on the ECU built-in pump motor switch.

DTC SET CONDITIONS

This diagnostic trouble codes will be set under the cases below:

- When the power supply voltage of the pump motor, which is not in operation, is abnormally low for a prolonged period
- When the power supply voltage of the pump motor, which is not in operation, is abnormally high for a prolonged period

PROBABLE CAUSES

Current trouble

- Fusible link malfunction
- Damaged wiring harness and connectors
- Abnormality in battery or generator
- ABS-ECU malfunction

Past trouble

- Carry out diagnosis with particular emphasis on wiring harness and connector failures between the power supply circuit (A-01 ABS-ECU connector terminal No. 13) to the ABS-ECU motor and the ground circuit (A-01 ABS-ECU connector terminal No. 14). For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15).

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q:Is DTC C2116 set?

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. Fusible link check: Check the fusible link No. 26.

Q: Is the check result normal?

YES: Go to Step 4.

NO: Replace the fusible link No. 26.

STEP 4. Battery check

Refer to GROUP 54Aa - Battery Test P.54Aa-3.

Q: Is the battery in good condition?

YES: Go to Step 5.

NO: Charge or replace the battery.

STEP 5. Charging system check

Refer to GROUP 16a - Output Current Test P.16a-8.

Q: Is the charging system in good condition?

YES: Go to Step 6.

NO: Repair or replace the charging system component(s).

STEP 6. Voltage measurement at the A-01 ABS-ECU connector

(1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

(2) Turn the ignition switch to the ON position.

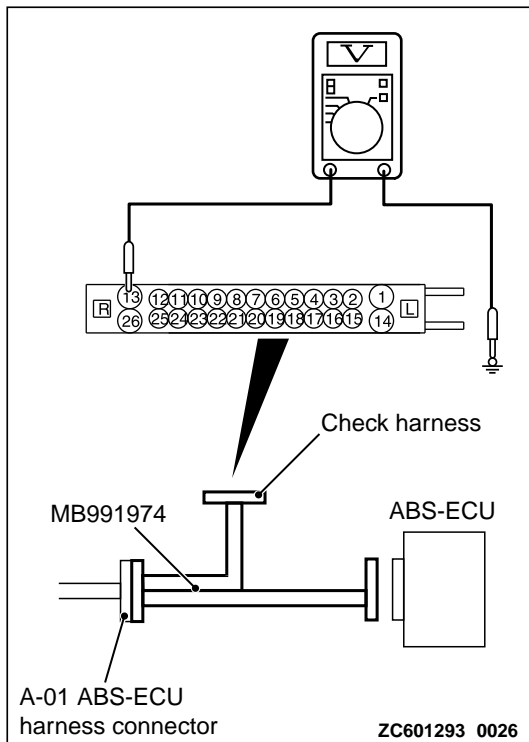
(3) Measure the voltage between the terminal No. 13 and the body ground.

OK: 12 volts (Battery voltage)

Q: Is the check result normal?

YES: Go to Step 8.

NO: Go to Step 7.

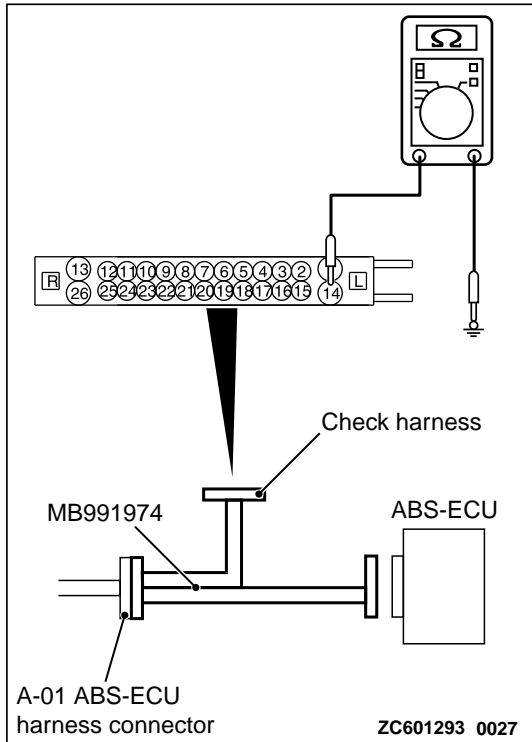


STEP 7. Connector check: A-01 ABS-ECU connector

Q: Is the check result normal?

YES: The open or short circuit may be present in the solenoid valve power supply circuit. Repair the wiring harness between the A-01 ABS-ECU connector terminal No. 13 and the fusible link No. 26.

NO: Repair the defective connector.



STEP 8. Resistance measurement at A-01 ABS-ECU connector

- (1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

- (2) Resistance between terminal No. 47 and body ground
OK: Continuity exists (2 ohms or less)

Q:Is the check result normal?

YES: Go to Step 10.

NO: Go to Step 9.

STEP 9. Connector check: A-01 ABS-ECU connector

Q:Is the check result normal?

YES: An open circuit may be present in the ground circuit. Repair the wiring harness between the A-01 ABS-ECU terminal No. 47 and the body ground.

NO: Repair the defective connector.

STEP 10. Check whether the diagnostic trouble code is reset.

- (1) Erase the diagnostic trouble code.
- (2) Drive the vehicle at 12mph (20 km/h) or more.

NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.

Q:Is DTC C2116 set?

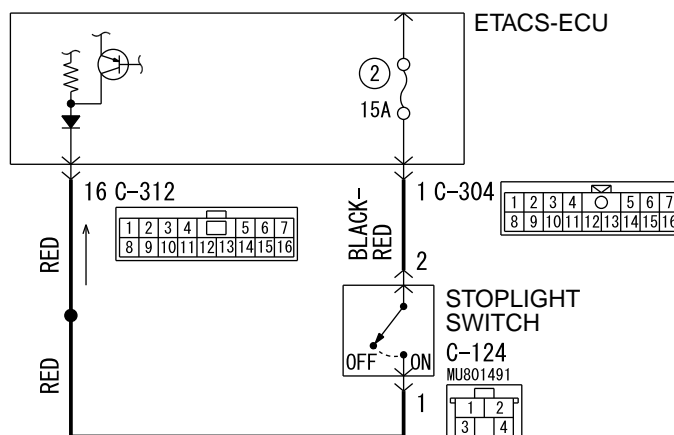
YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

DTC C1000: Abnormality in stop light switch circuit

M13502000938USA0000010000

Stoplight Switch Circuit



D7G35M020A00

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

ETACS-ECU sends the ON signal generated when the brake pedal is depressed and OFF signal generated when it is released to ABS-ECU via the CAN bus lines.

DTC SET CONDITIONS

This diagnostic trouble code is set in the following case.

- When the vehicle has run for a long time with the stop light switch turned ON.
- When there is difference between the stop light switch state and the vehicle's behavior

PROBABLE CAUSES

- Improper adjustment of stop light switch installation position
- Malfunction of the stop light switch
- Damaged wiring harness and connectors
- Malfunction of ETACS-ECU
- ABS-ECU malfunction

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
 - MB991974: ABS check harness
-

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**Q:Is DTC C1000 set?**

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. Stop light operation check

(1) Turn the ignition switch to the ON position.

(2) Check the stop light operation when the brake pedal is depressed. Check that the stop light illuminates when the brake pedal is depressed and that it goes out when the brake pedal is released.

OK:

When the brake pedal is released: OFF

When the brake pedal is depressed: ON

Q:Is the check result normal?

YES: Go to Step 9.

NO: Go to Step 4.

STEP 4. Check for stop light switch installation

Refer to GROUP 35A - On-vehicle Service P.35A-24.

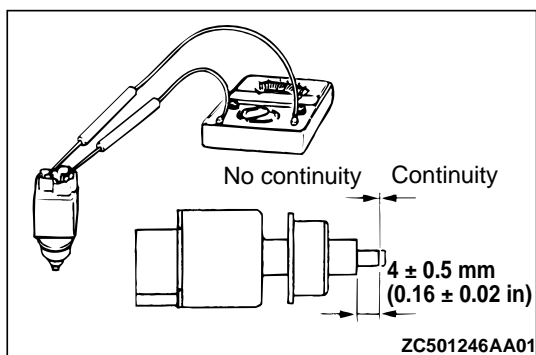
Q:Is the check result normal?

YES: Go to Step 5.

NO: Install the stop light switch correctly.

STEP 5. Stop light switch continuity check

(1) Remove the stop light switch. (Refer to GROUP 35A -Brake Pedal P.35A-22.)



- (2) Connect the circuit tester (Ω range) to the stop light switch connector terminals No. 1 and 2.
- (3) When no continuity is detected with the plunger pressed from the edge of the outer case by the dimension shown in the figure and when continuity is detected with the plunger released, the stop light switch is in good condition.

Q: Is the check result normal?

YES: Go to Step 6.

NO: Replace the stop light switch.

STEP 6. Voltage measurement at C-304 ETACS-ECU connector

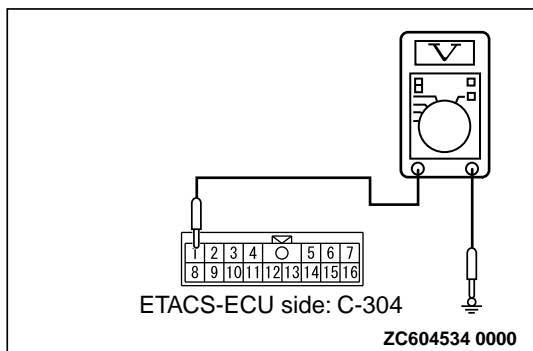
- (1) Turn the ignition switch to the ON position.
- (2) Measure the voltage between the terminal No. 1 and the body ground.

OK: 12 volts (Battery voltage)

Q: Is the check result normal?

YES: Go to Step 8.

NO: Go to Step 7.



STEP 7. Connector check: C-304 ETACS-ECU connector, C-124 stop light switch connector

Q: Is the check result normal?

YES: The short circuit between the C-304 ETACS-ECU connector terminal No. 1 and the C-124 stop light switch connector terminal No. 2 may be present. Repair the wiring harness between the C-304 ETACS-ECU connector terminal No. 1 and the C-124 stop light switch connector terminal No. 2.

NO: Repair the defective connector.

STEP 8. ETACS-ECU fuse No.2 check

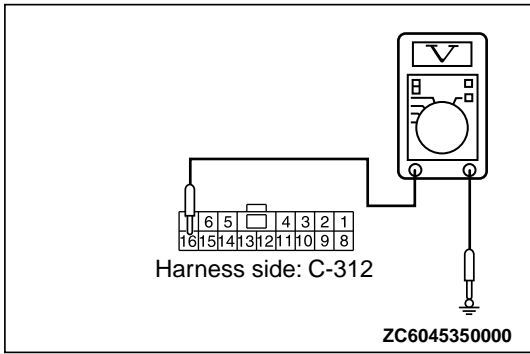
Q: Is the check result normal?

YES: Replace the ETACS-ECU, and then go to Step 11.

NO: Go to Step 9.

STEP 9. Voltage measurement at C-312 ETACS-ECU connector

- (1) Turn the ignition switch to the ON position.



(2) Measure the voltage between the terminal No. 16 and the body ground.

OK: Approx. 5 volt

Q: Is the check result normal?

YES: Go to Step 10.

NO: Replace the ETACS-ECU, and then go to Step 11.

STEP 10. Connector check: C-312 ETACS-ECU connector, C-124 stop light switch connector

Q: Is the check result normal?

YES: The short circuit between the C-312 ETACS-ECU connector terminal No. 16 and the C-124 stop light switch connector terminal No. 1 may be present. Repair the wiring harness between the C-312 ETACS-ECU connector terminal No. 16 and the C-124 stop light switch connector terminal No. 1.

NO: Repair the defective connector.

STEP 11. Check whether the diagnostic trouble code is reset.

Q: Is DTC 1000 set?

YES: Replace the ABS-ECU.

NO: The procedure is complete.

DTC C2200: Abnormality in ABS-ECU

M13502000939USA0000010000

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- ABS-ECU controls ABS by calculating the data sent from the wheel speed sensor.
- The ABS-ECU always monitors itself while the system is in operation. If the ABS-ECU detects any faults, it will set this DTC.

DTC SET CONDITIONS

This diagnostic trouble code is set when ABS-ECU or G sensor (AWD) has malfunction.

PROBABLE CAUSES

ABS-ECU malfunction

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
- MB991824: Vehicle Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 2.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q:Is DTC C2200 set?

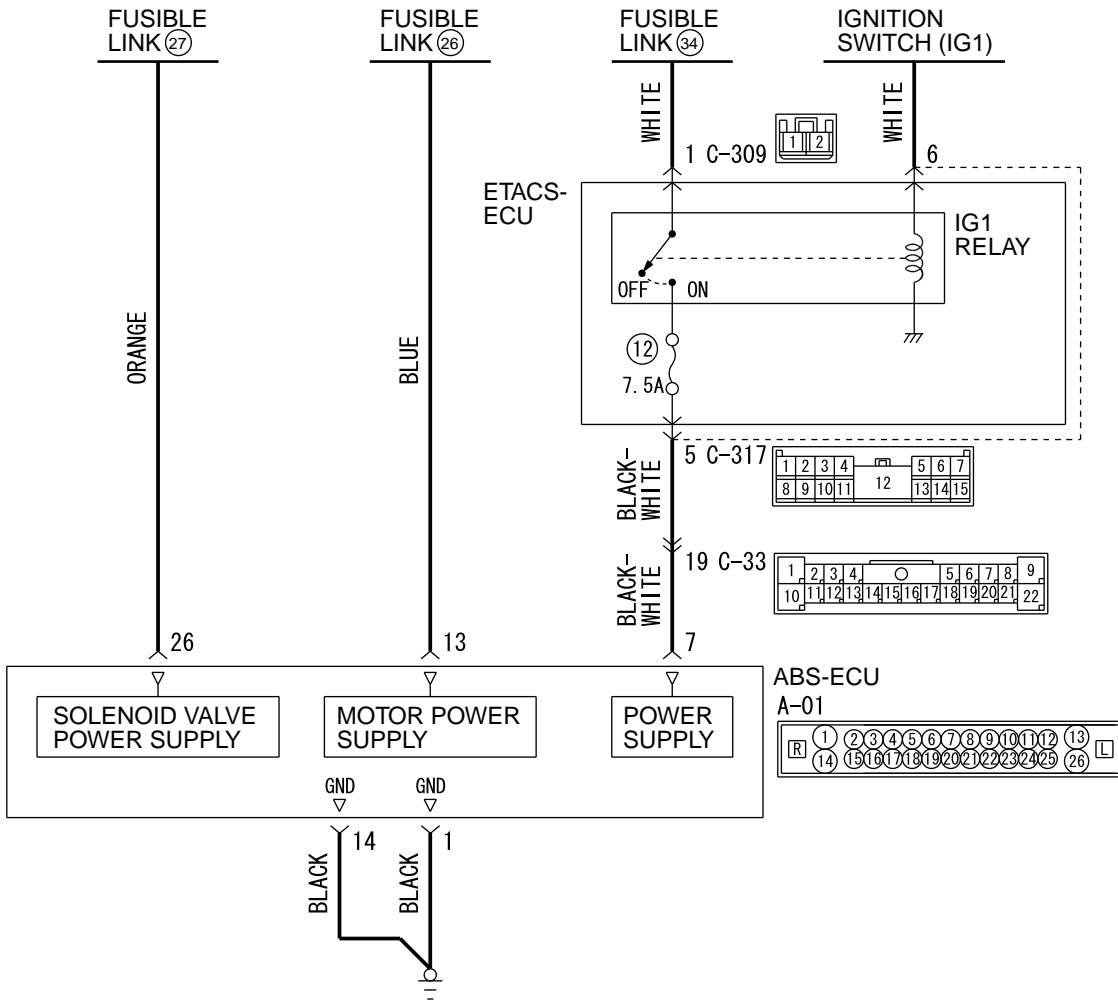
YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

DTC C2100: Abnormality in battery voltage (low voltage)

M13502000940USA0000010000

Power Supply Circuit



D7G35M018A00

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

When the power is supplied from the ignition switch (IG1) to the IG1 relay in ETACS-ECU, IG1 relay is turned on. At this time, the ABS-ECU power supply signal is sent to ABS-ECU (terminal No. 7) from the fusible link No. 34 through the multi-purpose fuse No. 12.

DTC SET CONDITIONS

This diagnostic trouble code is set in the following case.

- When the ABS-ECU power supply voltage drops below 9.7 ± 0.3 V during driving
- When the ABS-ECU power supply voltage drops below 8.0 ± 0.5 V during driving

PROBABLE CAUSES

- Battery failure
- Battery terminal looseness
- Charging system failed
- Damaged wiring harness and connectors
- ABS-ECU malfunction

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic Trouble code recheck after resetting CAN bus lines

Q:Is DTC C2100 set?

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. Fusible link check: Check the fusible link No. 27.

Visually check for open circuit in the fusible link No. 27.

Q:Is the check result normal?

YES: Go to Step 4.

NO: Replace the fusible link No. 27.

STEP 4. Battery check

Refer to GROUP 54Aa - Battery Test P.54Aa-3.

Q:Is the battery in good condition?

YES: Go to Step 5.

NO: Charge or replace the battery.

STEP 5. Charging system check

Refer to GROUP 16a - Output Current Test P.16a-8.

Q: Is the charging system in good condition?

YES: Go to Step 6.

NO: Repair or replace the charging system component(s).

STEP 6. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

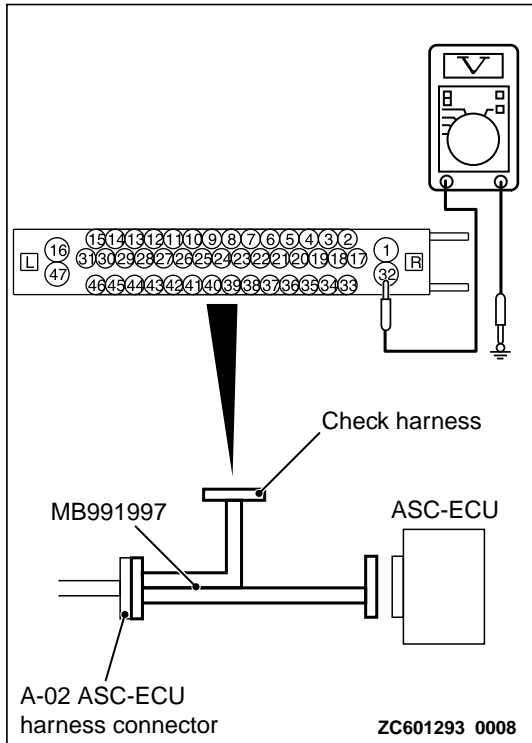
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the terminal No. 26 and the body ground.

OK: 12 volts (Battery voltage)

Q: Is the check result normal?

YES: Go to Step 8.

NO: Go to Step 7.

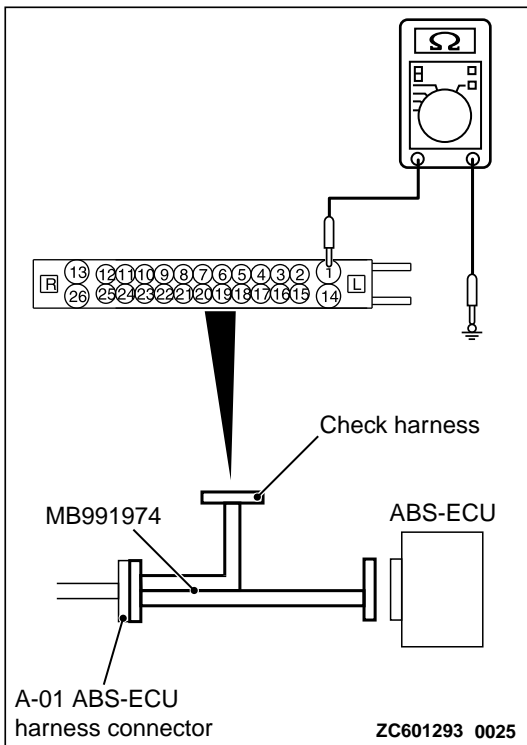


STEP 7. Connector check: A-01 ABS-ECU connector

Q: Is the check result normal?

YES: The open or short circuit may be present in the power supply circuit. Repair the wiring harness between the A-01 ABS-ECU connector terminal No. 26 and the fusible link No. 27.

NO: Repair the defective connector.



STEP 8. Resistance measurement at A-01 ABS-ECU connector

- (1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

- (2) Resistance between the terminal No. 1 and the body ground
OK: Continuity exists (2 ohms or less)

Q: Is the check result normal?

YES: Go to Step 10.

NO: Go to Step 9.

STEP 9. Connector check: A-01 ABS-ECU connector

Q: Is the check result normal?

YES: An open circuit may be present in the ground circuit. Repair the wiring harness between the A-01 ABS-ECU connector terminal No. 14 and the body ground.

NO: Repair the defective connector.

STEP 10. Check whether the diagnostic Trouble code is reset.

Q: Is DTC C2100 set?

YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

DTC C2101: Abnormality in battery voltage (high voltage)

M13502000941USA0000010000

⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

When the power is supplied from the ignition switch (IG1) to the IG1 relay in ETACS-ECU, IG1 relay is turned on. At this time, the ABS-ECU power supply signal is sent to ABS-ECU (terminal No. 7) from the fusible link No. 34 through the multi-purpose fuse No. 12.

DTC SET CONDITIONS

This diagnostic trouble code is set when the ABS-ECU power supply voltage is more than 18.0 ± 1.0 volts.

PROBABLE CAUSES

- Battery failure
- Fusible link malfunction
- Damaged wiring harness and connectors
- ABS-ECU malfunction
- Charging system failed

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
 - MB991974: ABS check harness
-

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic Trouble code recheck after resetting CAN bus lines**Q:Is DTC C2101 set?**

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. Fusible link check: Check the fusible link No. 27.

Visually check for open circuit in the fusible link No. 27.

Q:Is the check result normal?

YES: Go to Step 4.

NO: Replace the fusible link No. 27.

STEP 4. Battery check

Refer to GROUP 54Aa - Battery Test P.54Aa-3.

Q:Is the battery in good condition?

YES: Go to Step 5.

NO: Charge or replace the battery.

STEP 5. Charging system check

Refer to GROUP 16a - Output Current Test P.16a-8.

Q: Is the charging system in good condition?

YES: Go to Step 6.

NO: Repair or replace the charging system component(s).

STEP 6. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

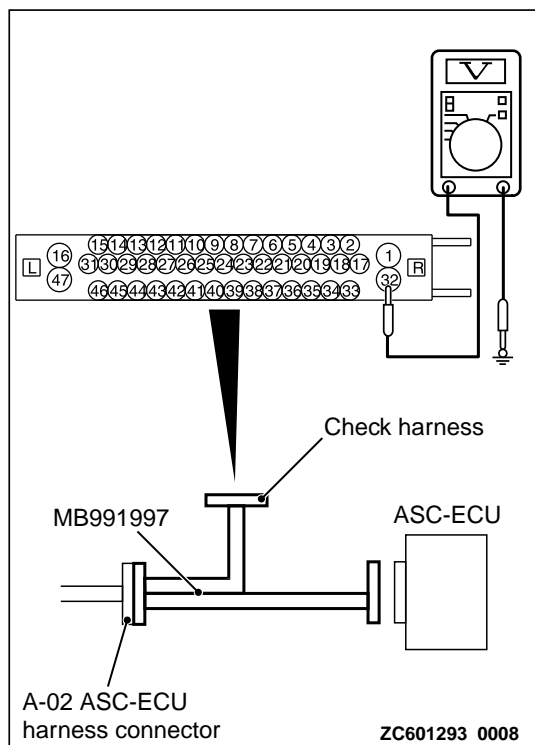
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the terminal No. 26 and the body ground.

OK: 12 volts (Battery voltage)

Q: Is the check result normal?

YES: Go to Step 8.

NO: Go to Step 7.

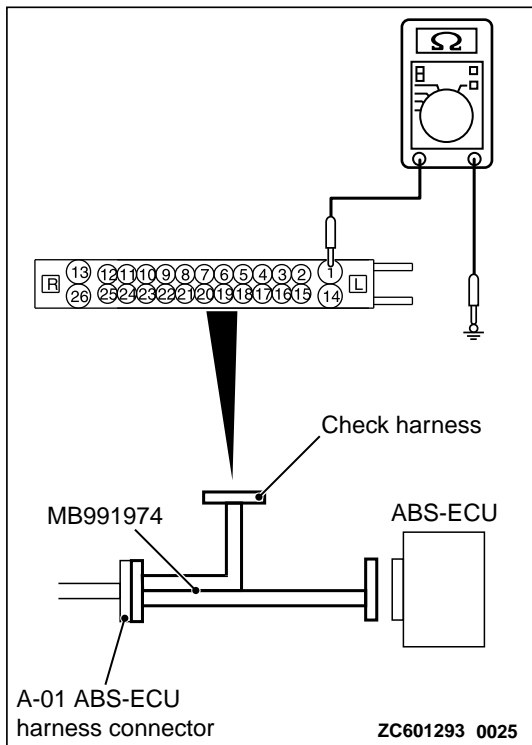


STEP 7. Connector check: A-01 ABS-ECU connector

Q: Is the check result normal?

YES: The open or short circuit may be present in the power supply circuit. Repair the wiring harness between the A-01 ABS-ECU connector terminal No. 26 and the fusible link No. 27.

NO: Repair the defective connector.

**STEP 8. Resistance measurement at A-01 ABS-ECU connector**

- (1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

- (2) Resistance between the terminal No. 1 and the body ground
OK: Continuity exists (2 ohms or less)

Q: Is the check result normal?

YES: Go to Step 10.

NO: Go to Step 9.

STEP 9. Connector check: A-01 ABS-ECU connector**Q: Is the check result normal?**

YES: An open circuit may be present in the ground circuit. Repair the wiring harness between the A-01 ABS-ECU connector terminal No. 14 and the body ground.

NO: Repair the defective connector.

STEP 10. Check whether the diagnostic Trouble code is reset.**Q: Is DTC C2101 set?**

YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

DTC C1395: Brake fluid filling not completed

M13502000942USA0000010000

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

DTC SET CONDITIONS

This diagnostic trouble code is set when the brake fluid is not filled in the hydraulic unit.

PROBABLE CAUSES

- Different hydraulic unit (For delivery to factory)
- ABS-ECU malfunction

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 2.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q:Is DTC C1395 set?

YES: Replace the ABS-ECU.

NO: The procedure is complete.

DTC C2203: VIN not recorded

M13502000943USA0000010000

CAUTION

- If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).
- When other diagnostic trouble code for ABS-ECU is set, troubleshoot that diagnostic trouble code first.

CIRCUIT OPERATION

ABS-ECU receives vehicle information number from the engine ECU and stores it.

DTC SET CONDITIONS

This diagnostic trouble code is set when ABS-ECU cannot receive the vehicle information number from the engine ECU.

PROBABLE CAUSES

- Malfunction of the CAN bus
- Engine ECU malfunction
- ABS-ECU malfunction

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
-

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D – CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**Q:Is DTC C2203 set?**

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. M.U.T.-III diagnostic trouble code

Check that the engine ECU sets a diagnostic trouble code.

Q:Is any DTC set?

YES: Troubleshoot the engine ECU diagnostic trouble code. (Refer to GROUP 13Ab – Diagnostic trouble code chart P.13Ab-44.)

NO: Go to Step 4.

STEP 4. Check whether the diagnostic trouble code is reset.**Q:Is DTC C2203 set?**

YES: Replace the ABS-ECU.

NO: The procedure is complete.

DTC C1210: Abnormality in G sensor

M13502000944USA0000010000

CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The G sensor is incorporated in the ABS-ECU.

DTC SET CONDITIONS

This diagnostic trouble code is set if any malfunction below is found:

*When the output value of the G sensor is abnormal

PROBABLE CAUSES

- *ABS-ECU malfunction
- *External noise interference

DIAGNOSIS

Required Special Tools:

- *MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - *MB991824: Vehicle Communication Interface (V.C.I.)
 - *MB991827: M.U.T.-III USB Cable
 - *MB991910: M.U.T.-III Main Harness A

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q:Is DTC C1210 set?

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. M.U.T.-III data list

Check the following service data.

- *Item 09: G sensor

Q:Is the check result normal?

YES: Go to Step 4.

NO: Replace the ABS-ECU.

STEP 4. Check whether the diagnostic trouble code is reset.

Q:Is DTC C1210 set?

YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

DTC C1242: Abnormality in G sensor

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CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

- The G sensor is incorporated in the ABS-ECU.

DTC SET CONDITIONS

This diagnostic trouble code is set when the abnormality is detected by comparing the G sensor value output from the G sensor with the value output from the wheel speed sensor.

PROBABLE CAUSES

- Improper installation of the G sensor
- Malfunction of wheel speed sensor
- ABS-ECU malfunction
- External noise interference
- When the vehicle is driven on a drum roller

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
-

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D – CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**Q:Is DTC C1242 set?**

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. Check the wheel speed sensor-related diagnostic trouble code.

Use the scan tool to check whether the wheel speed sensor-related diagnostic trouble code is set or not.

Q:Is any DTC set?

YES: Troubleshoot for the relevant diagnostic trouble code. (Refer to P. 35B-9.)

NO: Go to Step 4.

STEP 4. M.U.T.-III data list

Check the following service data.

- Item 09: G sensor

Q:Is the check result normal?

YES: Go to Step 5.

NO: Replace the ABS-ECU, and then go to Step 6.

STEP 5. Check whether the diagnostic trouble code is reset.

Q: Is DTC C1242 set?

YES: Replace the ABS-ECU.

NO: Intermittent malfunction. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

STEP 6. Check whether the diagnostic trouble code is reset.

Q: Is DTC C1242 set?

YES: Go to Step 1.

NO: The procedure is complete.

DTC C2111: Sensor Power Supply Circuit (Low input)

DTC C2112: Sensor Power Supply Circuit (High input)

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⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).

CIRCUIT OPERATION

The G sensor is incorporated in the ABS-ECU.

DTC SET CONDITIONS

This diagnostic trouble code is set when the voltage applied to the pressure sensor is not within the standard value range.

PROBABLE CAUSES

ABS-ECU malfunction

DIAGNOSIS

Required Special Tools:

- *MB991958: Scan Tool (M.U.T.-III Sub Assembly)
- *MB991824: Vehicle Communication Interface (V.C.I.)
- *MB991827: M.U.T.-III USB Cable
- *MB991910: M.U.T.-III Main Harness A

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**Q:Are DTCs C2111 and C2112 set?****YES:** Go to Step 3.**NO:** The procedure is complete.

STEP 3. Battery check

Refer to GROUP 54Aa - Battery Test P.54Aa-3.

Q:Is the battery in good condition?**YES:** Go to Step 4.**NO:** Charge or replace the battery.

STEP 4. Charging system check

Refer to GROUP 16a - Output Current Test P.16a-8.

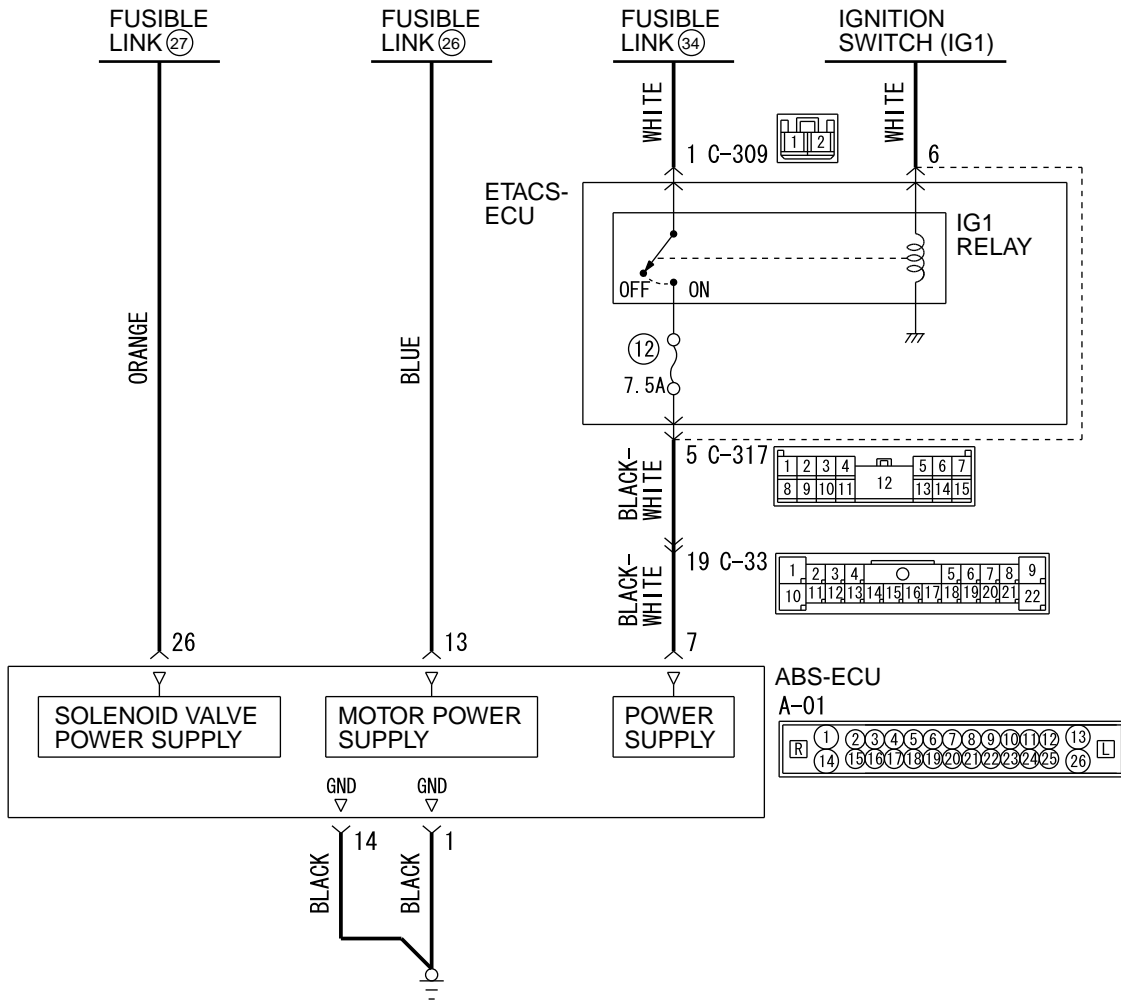
Q:Is the charging system in good condition?**YES:** Go to Step 5.**NO:** Repair or replace the charging system component(s).

STEP 5. Check whether the diagnostic trouble code is reset.**Q:Are DTCs C2111 and C2112 set?****YES:** Replace the ABS-ECU.**NO:** The procedure is complete.

DTC C1608: Implausible diagnosis data

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Power Supply Circuit



D7G35M018A00

CAUTION

- If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54D, Trouble code diagnosis P.54D-17).
- If the ABS-ECU connector is disconnected or the battery terminal is disconnected when the ignition switch is ON, this diagnostic trouble code may be set.
- Since the failure information stored in the past is erased after this diagnosis is carried out, reproduce the state of malfunction.

CIRCUIT OPERATION

The ABS-ECU stores diagnostic trouble codes and failure information in the EEPROM*.

*NOTE: *:EEPROM (Electrical Erasable and Programmable ROM)*

DTC SET CONDITIONS

This diagnostic trouble code is set when the failure information stored in the EEPROM is not reliable. The failure information stored in the past is not output, and only this diagnostic trouble code is set.

PROBABLE CAUSES

- Disconnection of the ABS-ECU connector or the battery terminal when the ignition switch is ON
- Loose battery terminal
- Abnormality in battery
- Damaged wiring harness and connectors
- ABS-ECU malfunction

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
-

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**Q:Is DTC C1608 set?**

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. Battery check

Refer to GROUP 54Aa - Battery Test P.54Aa-3.

Q:Is the battery in good condition?

YES: Go to Step 5.

NO: Go to Step 4.

STEP 4. Charging system check

Refer to GROUP 16a - Output Current Test P.16a-8.

Q: Is the charging system in good condition?

YES: Replace the battery. Then go to Step 9.

NO: Repair or replace the charging system component(s).

STEP 5. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

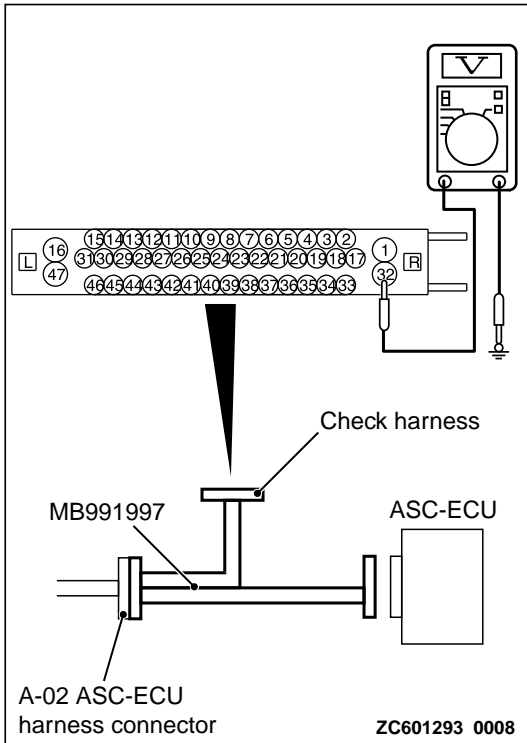
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the terminal No. 26 and the body ground.

OK: 12 volts (Battery voltage)

Q: Is the check result normal?

YES: Go to Step 6.

NO: Go to Step 7.

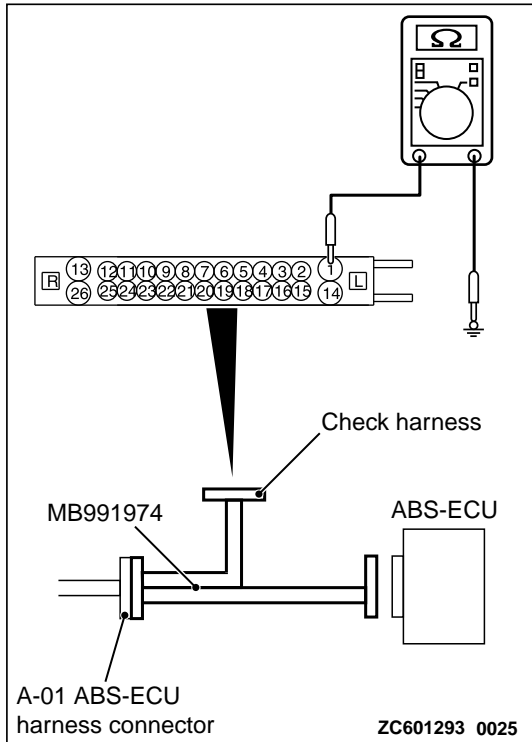


STEP 6. Connector check: A-01 ABS-ECU connector

Q: Is the check result normal?

YES: The open or short circuit may be present in the power supply circuit. Repair the wiring harness between the A-01 ABS-ECU connector terminal No. 26 and the fusible link No. 27.

NO: Repair the defective connector.



STEP 7. Resistance measurement at A-01 ABS-ECU connector

- (1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

- (2) Resistance between the terminal No. 1 and the body ground
OK: Continuity exists (2 ohms or less)

Q:Is the check result normal?

YES: Go to Step 9.

NO: Go to Step 8.

STEP 8. Connector check: A-01 ABS-ECU connector

Q:Is the check result normal?

YES: An open circuit may be present in the ground circuit. Repair the wiring harness between the A-01 ABS-ECU connector terminal No.14 and the body ground.

NO: Repair the defective connector.

STEP 9. Check whether the diagnostic Trouble code is reset.

- (1) Erase the diagnostic trouble code.
- (2) Turn the ignition switch to the "LOCK" (OFF) position.
- (3) Turn the ignition switch to the "ON" position.

Q:Is any DTC set?

YES (DTC C1608 is set): Replace the ABS-ECU.

YES (DTC other than C1608 is set): Carry out the applicable troubleshooting for the diagnostic trouble code.

NO: This diagnosis is complete.

DTC U0001: Bus-off

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CAUTION

- If diagnostic trouble code U0001 is set in ABS-ECU, always diagnose the CAN bus line. If there is any fault in the CAN bus lines, an incorrect diagnostic trouble code may be set. In this case, the set diagnostic trouble code is not highly reliable.
- Before replacing the ECU, ensure that the communication circuit is normal.

DTC SET CONDITIONS

This diagnostic trouble code is set when ABS-ECU has ceased the CAN communication (bus off).

PROBABLE CAUSES

- Wiring harness or connector failure of CAN bus line
- ABS-ECU malfunction

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 2.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 3.

STEP 2. Check whether the diagnostic trouble code is reset.

Q:Is DTC U0001 set?

YES: Replace the ABS-ECU.

NO: If the trouble symptom is resolved, an intermittent malfunction such as poorly engaged connector(s) or wiring harness is suspected. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

STEP 3. Check whether the diagnostic trouble code is reset.

Q:Is DTC U0001 set?

YES: Return to Step 1.

NO: The procedure is complete.

DTC U0100: Engine time-out error

DTC U0114: AWD time-out error

DTC U0141: ETACS time-out error

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CAUTION

- If the diagnostic trouble codes **U0100**, **U0114** and **U0141** are set in ABS-ECU, always diagnose the CAN bus line. If there is any fault in the CAN bus lines, an incorrect diagnostic trouble code may be set. In this case, the set diagnostic trouble code is not highly reliable.
- Before replacing the ECU, ensure that the communication circuit is normal.

CIRCUIT OPERATION

ABS-ECU communicates with the engine ECU, AWD-ECU and ETACS-ECU via the CAN bus lines.

DTC SET CONDITIONS

This diagnostic trouble code is set if ABS-ECU cannot receive the signal sent from other ECU for a certain period.

PROBABLE CAUSES**DTC U0100**

- Wiring harness or connector failure of CAN bus line
- Engine ECU malfunction
- ABS-ECU malfunction

DTC U0114

- Wiring harness or connector failure of CAN bus line
- AWD-ECU malfunction
- ABS-ECU malfunction

DTC U0141

- Wiring harness or connector failure of CAN bus line
- Malfunction of ETACS-ECU
- ABS-ECU malfunction

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
-

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?

YES: Go to Step 2.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 4.

STEP 2. M.U.T.-III other system diagnostic trouble code

Use scan tool to check that other diagnostic trouble code is set in the ECU corresponding to the relevant diagnosis.

Q: Is other DTC set?

YES: Troubleshoot for the relevant diagnostic trouble code.

NO: Go to Step 3.

STEP 3. M.U.T.-III diagnostic trouble code

Use scan tool to check that the diagnostic trouble code is set in ABS-ECU.

Q: Is any DTC set?

YES (DTC U0100 is set): Replace the engine ECU, and then go to Step 4.

YES (DTC U0114 is set): Replace AWD-ECU, and then go to Step 4.

YES (DTC U0141 is set): Replace the ETACS-ECU, and then go to Step 4.

NO (No DTC is set.): The procedure is complete.

STEP 4. Check whether the diagnostic trouble code is reset.

Q: Is DTC U0100, U0114 or U0141 set?

YES: Replace the ABS-ECU.

NO: The procedure is complete.

DTC U1415: Variant coding not implemented

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⚠ CAUTION

When the diagnostic trouble code U1415 is set in ABS-ECU, the diagnostic trouble code may also be set in ETACS-ECU. When the diagnostic Trouble code is set in ETACS-ECU, carry out the diagnosis of the diagnostic Trouble code for ETACS-ECU first.

CIRCUIT OPERATION

- ABS-ECU receives the vehicle information stored in the ETACS-ECU via CAN bus lines.
- The ABS-ECU stores the tire size information sent from the ETACS.

DTC SET CONDITIONS

This diagnostic trouble code is set when the tire size information is not coded to the ABS-ECU.

PROBABLE CAUSES

- Variant coding for ETACS-ECU has not been implemented.
- Malfunction of ABS-ECU.

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
-

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 2.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 4.

STEP 2. M.U.T.-III other system diagnostic Trouble code

Use scan tool to check that the diagnostic trouble code B222C is set in the ETACS-ECU.

Q:Is any DTC set?

YES: Troubleshoot the relevant diagnostic Trouble code, and then go to Step 4.

NO: Go to Step 3.

STEP 3. Check whether the diagnostic Trouble code is reset.**Q:Is DTC U1415 set?**

YES: Replace the ABS-ECU. Go to Step 4.

NO: If the trouble symptom is resolved, an intermittent malfunction such as poorly engaged connector(s) or wiring harness is suspected. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

STEP 4. Check whether the diagnostic Trouble code is reset.**Q:Is DTC U1415 set?**

YES: Return to Step 1.

NO: The procedure is complete.

DTC U1417: Variant coding value invalid (includes faulty installation)

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CAUTION

- If diagnostic trouble code U1417 is set in ABS-ECU, always diagnose the CAN bus lines. If there is any fault in the CAN bus lines, an incorrect diagnostic trouble code may be set. In this case, the set diagnostic trouble code is not highly reliable.
- Before replacing the ECU, ensure that the communication circuit is normal.
- When the diagnostic trouble code U1417 is set in ABS-ECU, the diagnostic trouble code may also be set in ETACS-ECU. When the diagnostic trouble code is set in ETACS-ECU, carry out the diagnosis of the diagnostic trouble code for ETACS-ECU first.

CIRCUIT OPERATION

ABS-ECU receives the vehicle information stored in the ETACS-ECU via CAN bus lines.

DTC SET CONDITIONS

ABS-ECU communicates with ETACS-ECU via CAN bus lines. This diagnostic trouble code is set when there is difference between the vehicle information from the ETACS-ECU and the vehicle information stored in the ABS-ECU.

PROBABLE CAUSES

- Malfunction of ETACS-ECU
- Engine ECU malfunction
- ETACS-ECUs have been interchanged between two vehicles.
- ABS-ECU malfunction
- External noise interference
- ABS-ECUs have been interchanged between two vehicles.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?

YES: Go to Step 3.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.) On completion, go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines

Q: Is DTC U1417 set?

YES: Go to Step 3.

NO: The procedure is complete.

STEP 3. M.U.T.-III other system diagnostic trouble code

Use scan tool to check whether the ETACS-ECU-related or engine ECU-related diagnostic trouble code is set or not.

Q: Is any DTC set?

YES: Troubleshoot for the relevant diagnostic trouble code.

NO: Go to Step 4.

STEP 4. Check part number of ETACS-ECU

Check the part number of ETACS-ECU.

OK: 8637A213

Q: Is the check result normal?

YES: Go to Step 5.

NO: Replace ETACS-ECU.

STEP 5. Check part number of ABS-ECU

Check the part number of ABS-ECU.

OK:

4670A037 (FWD)

4670A050 (AWD)

Q: Is the check result normal?

YES: Go to Step 6.

NO: Replace the ABS-ECU.

STEP 6. Check whether the diagnostic trouble code is reset.

Q: Is DTC U1417 set?

YES: Replace the ABS-ECU.

NO: The procedure is complete.

SYMPTOM CHART

CAUTION

- ABS may operate in the following conditions without hard braking: Slippery road surface, high-speed turn, and bumpy road surface. When asking the customers, confirm that they have/have not encountered ABS operation in corresponding conditions.
- During ABS operation, the brake pedal is pulled forward gradually, and the noise occurs at the same time. This is because the brake line

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pressure varies intermittently to prevent the wheel lock, and not a system malfunction.

- During diagnosis, a diagnostic trouble code associated with other system may be set when the ignition switch is turned on with connector (s) disconnected. On completion, confirm all systems for diagnostic trouble code(s). If diagnostic trouble code(s) are set, erase them all.

Symptoms	Inspection procedure No.	Reference page
scan tool cannot communicate only with ABS-ECU.	1	P.35B-123
Brake warning light stays ON with the parking brake lever released.	2	P.35B-124
ABS warning light does not illuminate when ignition switch is turned to the ON position (Engine stopped).	3	P.35B-128
Brake warning light does not illuminate when the ignition switch is turned to ON position (Engine stopped).	4	P.35B-131
ABS warning light stays ON after the engine is started.	5	P.35B-134
Abnormality in brake operation	6	P.35B-137
ABS system inoperative	7	P.35B-137
ABS-ECU power supply circuit system	8	P.35B-139

SYMPTOM PROCEDURES

Inspection Procedure 1: scan tool cannot communication only with ABS-ECU.

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TECHNICAL DESCRIPTION (COMMENT)

When scan tool cannot communicate with the ABS system, the CAN bus line, ABS-ECU power supply circuit system, or ABS-ECU may be faulty.

TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Damaged wiring harness and connectors
- ABS-ECU malfunction
- Wrong routing of M.U.T.-III harness
- Abnormality in battery or generator
- Abnormality in power supply voltage to ABS-ECU
- ECU malfunction of other system

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

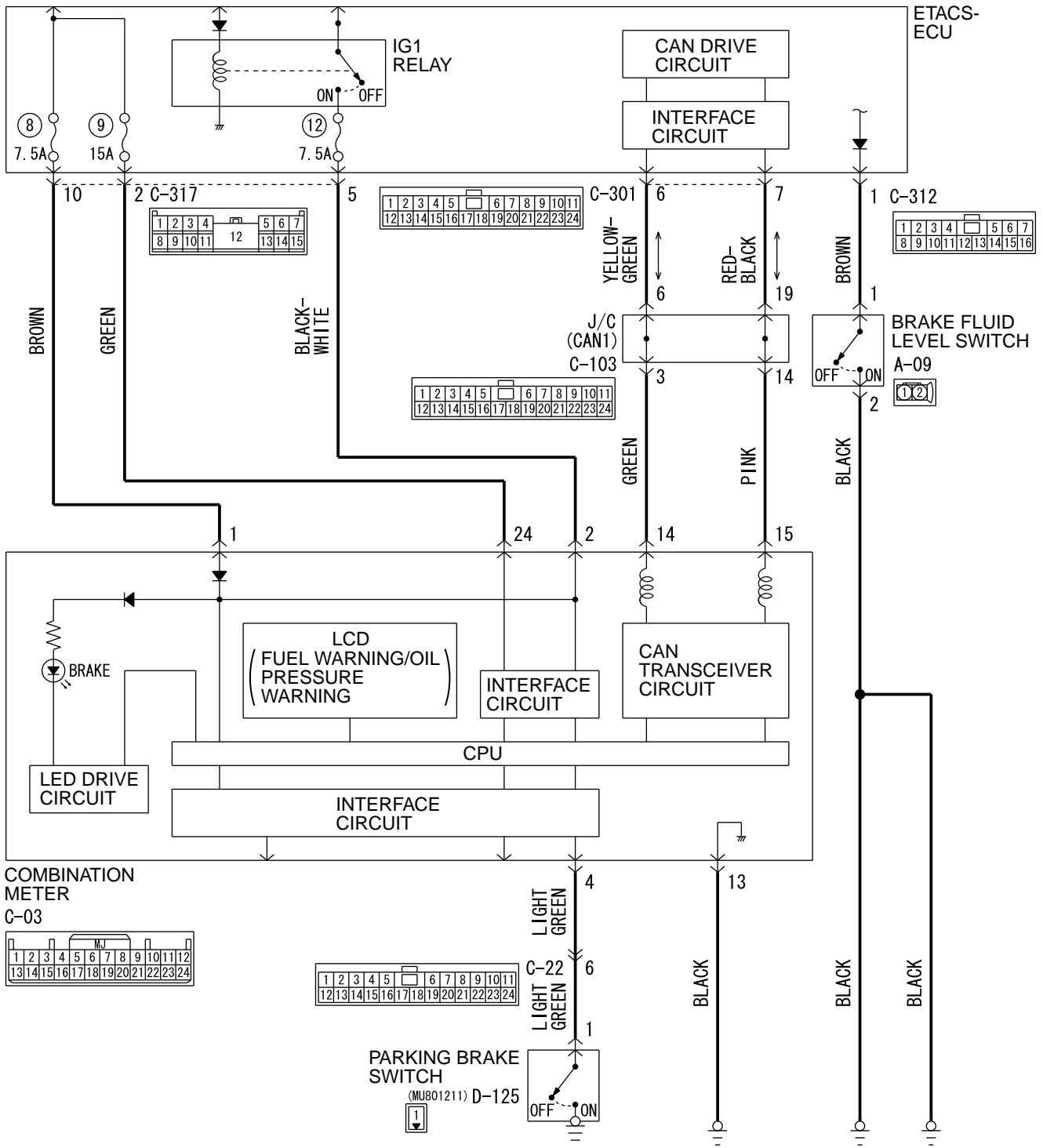
Q:Is the check result normal?

YES: Check and repair the power supply circuit system.
(Refer to P. 35B-139.)

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.)

Inspection Procedure 2: Brake Warning Light Stays ON with the Parking Brake Lever Released.

Brake Fluid Level Switch and Parking Brake Switch Circuit



CIRCUIT OPERATION

When the parking brake switch is turned ON, the combination meter terminal No. 4 is earthed, and the brake warning light illuminates.

TECHNICAL DESCRIPTION (COMMENT)

This may be caused by ground fault in the parking brake switch circuit.

TROUBLESHOOTING HINTS (The most likely causes for this case:)

- *Low brake fluid level
- *Damaged wiring harness and connectors
- *Parking brake switch malfunction
- *Combination meter malfunction
- *Malfunction of ETACS-ECU

DIAGNOSIS

Required Special Tools:

- *MB991958: Scan Tool (M.U.T.-III Sub Assembly)
- *MB991824: Vehicle Communication Interface (V.C.I.)
- *MB991827: M.U.T.-III USB Cable
- *MB991910: M.U.T.-III Main Harness A

STEP 1. Brake fluid level check

Q:Is the check result normal?

YES: Go to Step 2.

NO: Add brake fluid to the specified level.

STEP 2. Brake fluid level switch check

Refer to GROUP 35A - On-vehicle Service P.35A-19.

Q:Is the check result normal?

YES: Go to Step 3.

NO: Replace the reservoir assembly and master cylinder assembly.

STEP 3. Voltage measurement at C-312 ETACS-ECU connector

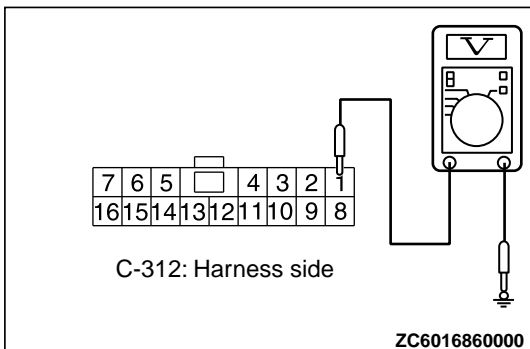
- *Measure the voltage between the terminal No. 1 and the body ground.

OK: Approx. 5 volts

Q:Is the check result normal?

YES: Go to Step 4.

NO: Replace ETACS-ECU.



STEP 4. Connector check: C-312 ETACS-ECU connector, A-09 brake fluid level switch connector

Q: Is the check result normal?

YES: Go to Step 5.

NO: Repair the defective connector.

STEP 5. Check the wiring harness between the C-312 ETACS-ECU connector terminal No. 1 and the A-09 brake fluid level switch connector terminal No. 1.

Q: Is the check result normal?

YES: Go to Step 6.

NO: Check the wiring harness between the C-312 ETACS-ECU connector terminal No. 1 and the A-09 brake fluid level switch connector terminal No. 1.

STEP 6. Parking brake lever stroke check

Refer to GROUP 36 - On-vehicle Service P.36-11.

Q: Is the check result normal?

YES: Go to Step 7.

NO: Adjust the parking brake lever stroke, and then go to Step 10.

STEP 7. Parking brake switch check

Refer to GROUP 36 - On-vehicle Service P.36-12.

Q: Is the check result normal?

YES: Go to Step 8.

NO: Replace the parking brake switch.

STEP 8. Voltage measurement at the C-03 combination meter connector

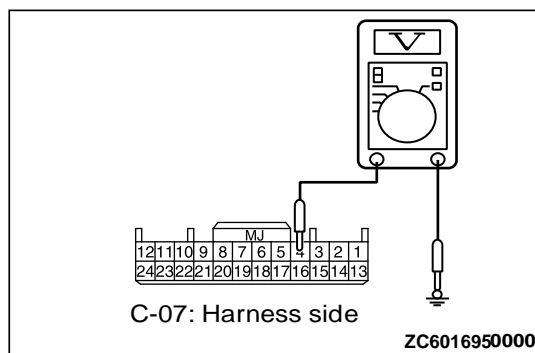
*Measure the voltage between terminal No. 4 and body ground.

OK: Approx. 5 volts

Q: Is the check result normal?

YES: Go to Step 9.

NO: Replace the combination meter assembly, and then go to Step 10.



STEP 9. Connector check: C-03 Combination meter connector, C-22 intermediate connector, D-125 parking brake switch connector

Q: Is the check result normal?

YES: Repair the wiring harness between the C-03 combination meter connector terminal No. 4 and the D-125 parking brake switch connector.

NO: Repair the defective connector.

STEP 10. Retest the system.

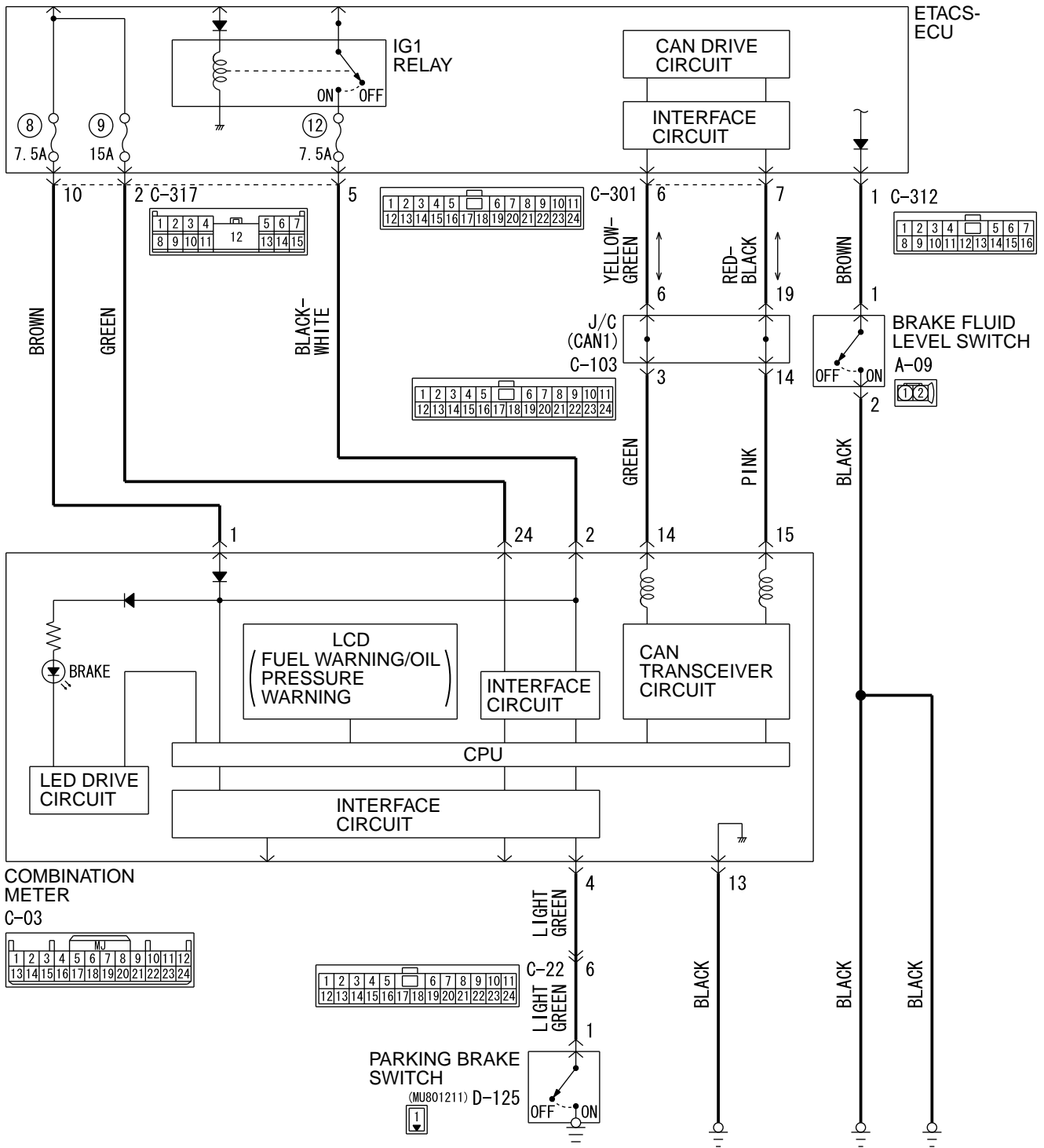
Q: Does the brake warning light turn ON and OFF normally according to the parking brake lever operation?

YES: The procedure is complete.

NO: Return to Step 1.

Inspection Procedure 3: ABS Warning Light does not illuminate when Ignition Switch is Turned to the ON Position (Engine Stopped).

Brake Fluid Level Switch and Parking Brake Switch Circuit



SYSTEM OPERATION

- ABS-ECU sends the illumination request signal of the ABS warning light to the combination meter through ETACS-ECU via CAN communication.
- ABS-ECU illuminates the ABS warning light via ETACS-ECU for approximately 3 seconds for valve check with the ignition switch turned to the ON position.

TECHNICAL DESCRIPTION (COMMENT)

This may be caused by faults in the CAN bus line, ETACS-ECU, combination meter or ABS-ECU.

PROBABLE CAUSES

- Damaged wiring harness and connectors
- Malfunction of ETACS-ECU
- Combination meter malfunction
- ABS-ECU malfunction

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
-

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 2.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.)

STEP 2. M.U.T.-III diagnostic trouble code

Use scan tool to check the diagnostic trouble code for the ASC system.

Q:Is the diagnostic trouble code set?

YES: Carry out the diagnosis for the diagnostic trouble code. (Refer to GROUP 35C, Diagnostic Trouble Code Chart P.35C-11.)

NO: Go to Step 3.

STEP 3. M.U.T.-III actuator test

Perform the actuator test No. 07 of the combination meter system, and check if the ABS warning light illuminates.

Q:Is the check result normal?

YES: Troubleshoot the combination meter, and then go to Step 5.

NO: Go to Step 4.

STEP 4. M.U.T.-III other system diagnostic trouble code

Using scan tool, check that the diagnostic trouble code No. U0141 is not set by the combination meter system.

Q:Is the diagnostic trouble code set?

YES: Troubleshoot the combination meter, and then go to Step 6.

NO: Go to Step 5.

STEP 5. M.U.T.-III other system diagnostic trouble code

Using scan tool, check that the diagnostic trouble code No. U0121 is not set by the ETACS system.

Q:Is the diagnostic trouble code set?

YES: Troubleshoot the ETACS-ECU, and then go to Step 6.

NO: Replace the ABS-ECU, and then go to Step 6.

STEP 6. Retest the system.

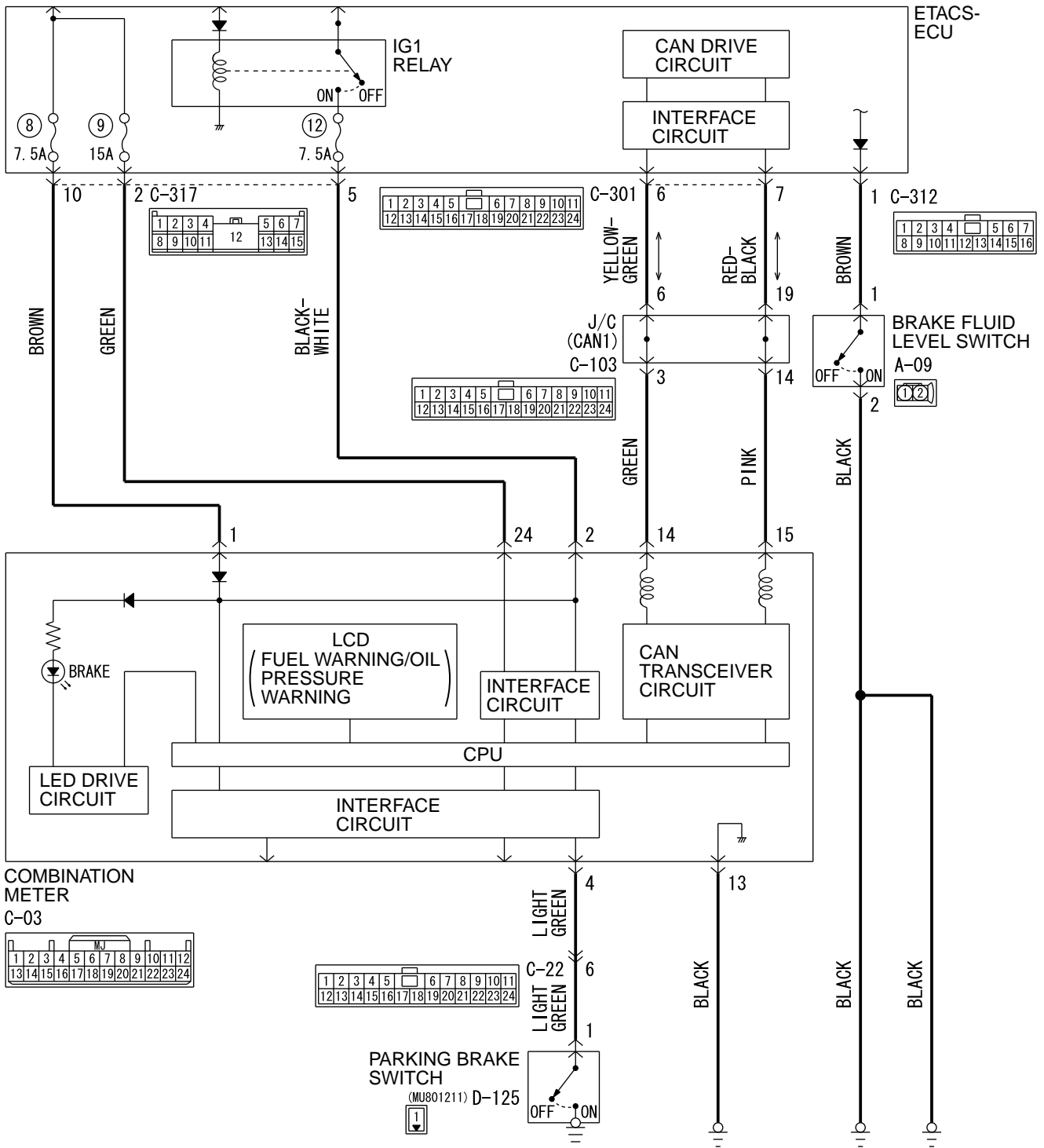
Q:Does the ABS warning light turn ON and OFF normally?

YES: The procedure is complete.

NO: Return to Step 1.

Inspection Procedure 4: Brake Warning Light does not illuminate when the Ignition Switch is Turned to ON Position (Engine Stopped).

Brake Fluid Level Switch and Parking Brake Switch Circuit



CIRCUIT OPERATION

ABS-ECU sends the illumination request signal of the break warning light to the combination meter through ETACS-ECU via the CAN communication.

TECHNICAL DESCRIPTION (COMMENT)

This may be caused by faults in the CAN bus line, ETACS-ECU, combination meter or ABS-ECU.

PROBABLE CAUSES

- Damaged wiring harness and connectors
- Malfunction of ETACS-ECU
- Combination meter malfunction
- ABS-ECU malfunction

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 2.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.)

STEP 2. M.U.T.-III diagnostic trouble code

Use scan tool to check the diagnostic trouble code for the ABS system.

Q:Is the diagnostic trouble code set?

YES: Carry out the diagnosis for the diagnostic trouble code. (Refer to P.35B-9.)

NO: Go to Step 3.

STEP 3. M.U.T.-III other system diagnostic trouble code

Using scan tool, check that the diagnostic trouble code No. U0141 is not set by the combination meter system.

Q:Is the diagnostic trouble code set?

YES: Troubleshoot the combination meter, and then go to Step 5.

NO: Go to Step 4.

STEP 4. M.U.T.-III other system diagnostic trouble code

Using scan tool, check that the diagnostic trouble code No. U0121 is not set by the ETACS system.

Q:Is the diagnostic trouble code set?

ANTI-LOCK BRAKING SYSTEM (ABS)
ANTI-LOCK BRAKING SYSTEM (ABS) DIAGNOSIS

YES: Troubleshoot the ETACS, and then go to Step 5.

NO: Replace the ABS-ECU, and then go to Step 5.

STEP 5. Retest the system.

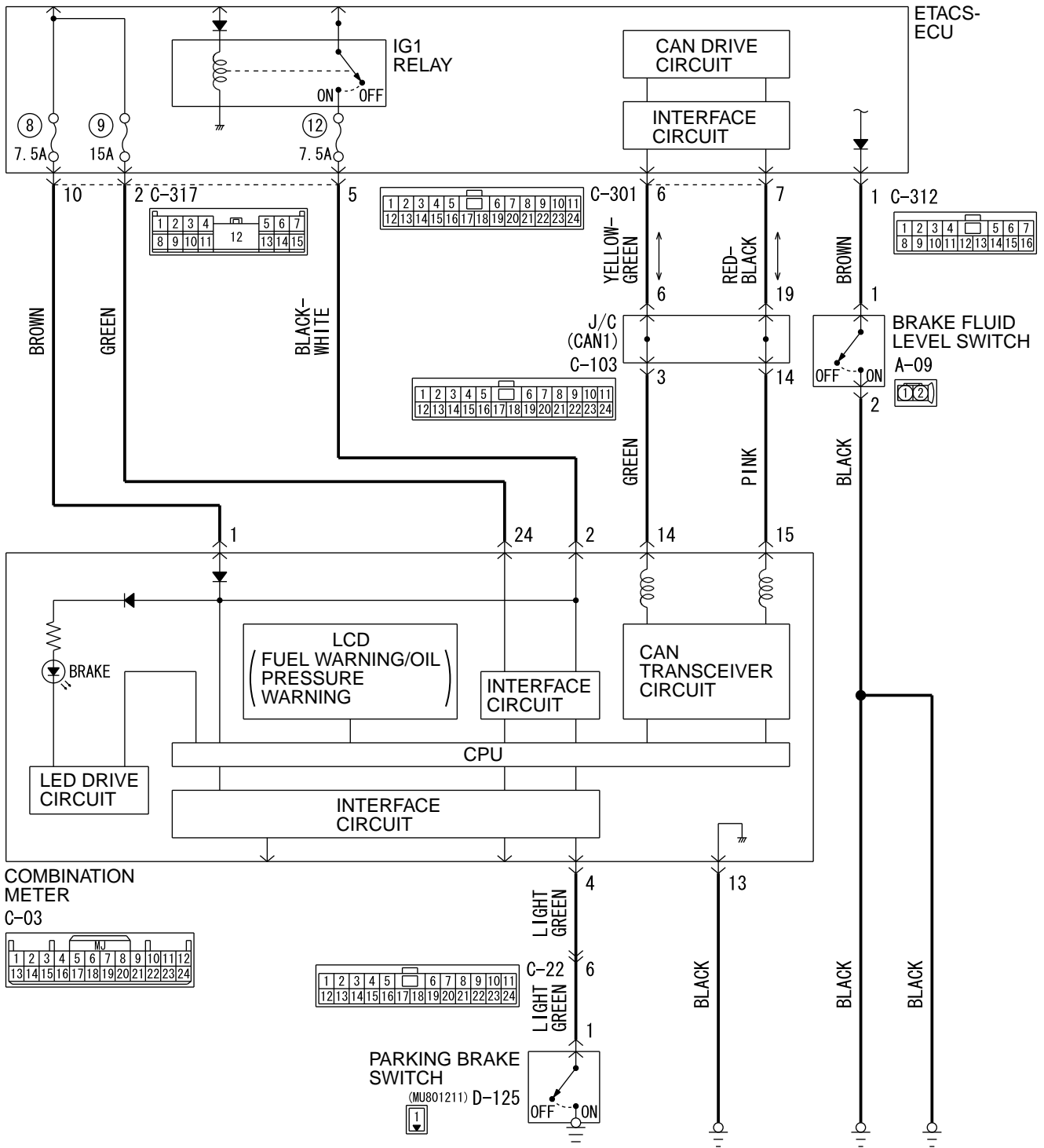
Q: Does the brake warning light turn ON and OFF normally?

YES: The procedure is complete.

NO: Return to Step 1.

Inspection Procedure 5: ABS Warning Light Stays ON after the Engine is Started.

Brake Fluid Level Switch and Parking Brake Switch Circuit



SYSTEM OPERATION

- ABS-ECU sends the illumination request signal of the ABS warning light to the combination meter through ETACS-ECU via CAN communication.
- ABS-ECU illuminates the ABS warning light via ETACS-ECU for approximately 3 seconds for valve check with the ignition switch turned to the ON position.

TECHNICAL DESCRIPTION (COMMENT)

This may be caused by faults in the CAN bus line, ETACS-ECU, combination meter or ABS-ECU.

PROBABLE CAUSES

- Damaged wiring harness and connectors
- Malfunction of ETACS-ECU
- Combination meter malfunction
- ABS-ECU malfunction

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
-

STEP 1. M.U.T.-III CAN bus diagnostics

Use scan tool to diagnose the CAN bus lines.

Q:Is the check result normal?

YES: Go to Step 2.

NO: Repair the CAN bus lines. (Refer to GROUP 54D - CAN Bus Diagnostics table P.54D-17.)

STEP 2. M.U.T.-III diagnostic trouble code

Use scan tool to check the diagnostic trouble code for the ABS system.

Q:Is the diagnostic trouble code set?

YES: Carry out the diagnosis for the diagnostic trouble code. (Refer to P.35C-11.)

NO: Go to Step 3.

STEP 3. M.U.T.-III other system diagnostic trouble code

Using scan tool, check that the diagnostic trouble code U0141 is not set by the combination meter system.

Q:Is any DTC set?

YES: Troubleshoot the combination meter, and then go to Step 5.

NO: Go to Step 4.

STEP 4. M.U.T.-III other system diagnostic trouble code

Using scan tool, check that the diagnostic trouble code U0121 is not set by the ETACS system.

Q:Is any DTC set?

YES: Troubleshoot the ETACS, and then go to Step 5.

NO: Replace the ABS-ECU, and then go to Step 5.

STEP 5. Retest the system.

Q:Does the ABS warning light turn ON and OFF normally?

YES: The procedure is complete.

NO: Return to Step 1.

Inspection Procedure 6: Abnormality in Brake Operation

M13502000160USA0000010000

TECHNICAL DESCRIPTION (COMMENT)

*Although the cause of the trouble cannot be clearly resolved since it depends on the running status and road surface condition, the malfunction of the hydraulic circuit may occur if any diagnostic trouble code is not detected.

PROBABLE CAUSES

*Hydraulic unit (HU) malfunction

DIAGNOSIS

STEP 1. Hydraulic unit (HU) check

Refer to P.35C-188.

Q:Is the check result normal?

YES: Go to Step 2.

NO: Connect the brake tubes correctly, repair the external brake lines, or replace the hydraulic unit.

STEP 2. Retest the system.

Q:Can any fault be found with the brake operation?

YES: Check the brake system related components except ABS.

NO: The procedure is complete.

Inspection Procedure 7: ABS System Inoperative.

M13502000953USA0000010000

TECHNICAL DESCRIPTION (COMMENT)

In case of this trouble symptom, ABS system operation may be disabled. Diagnostic trouble code may be set by the ABS system using scan tool.

PROBABLE CAUSES

- Low battery voltage
- Wiring harness or connector failure of CAN bus line
- ABS-ECU malfunction

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
-

STEP 1. Hydraulic unit (HU) check

Refer to P.35C-188.

Q: Is the check result normal?

YES: Go to Step 2.

NO: Repair the brake pipe or replace ABS-ECU.

STEP 2. Operation check**Q: Does TCL/ASC operate normally?**

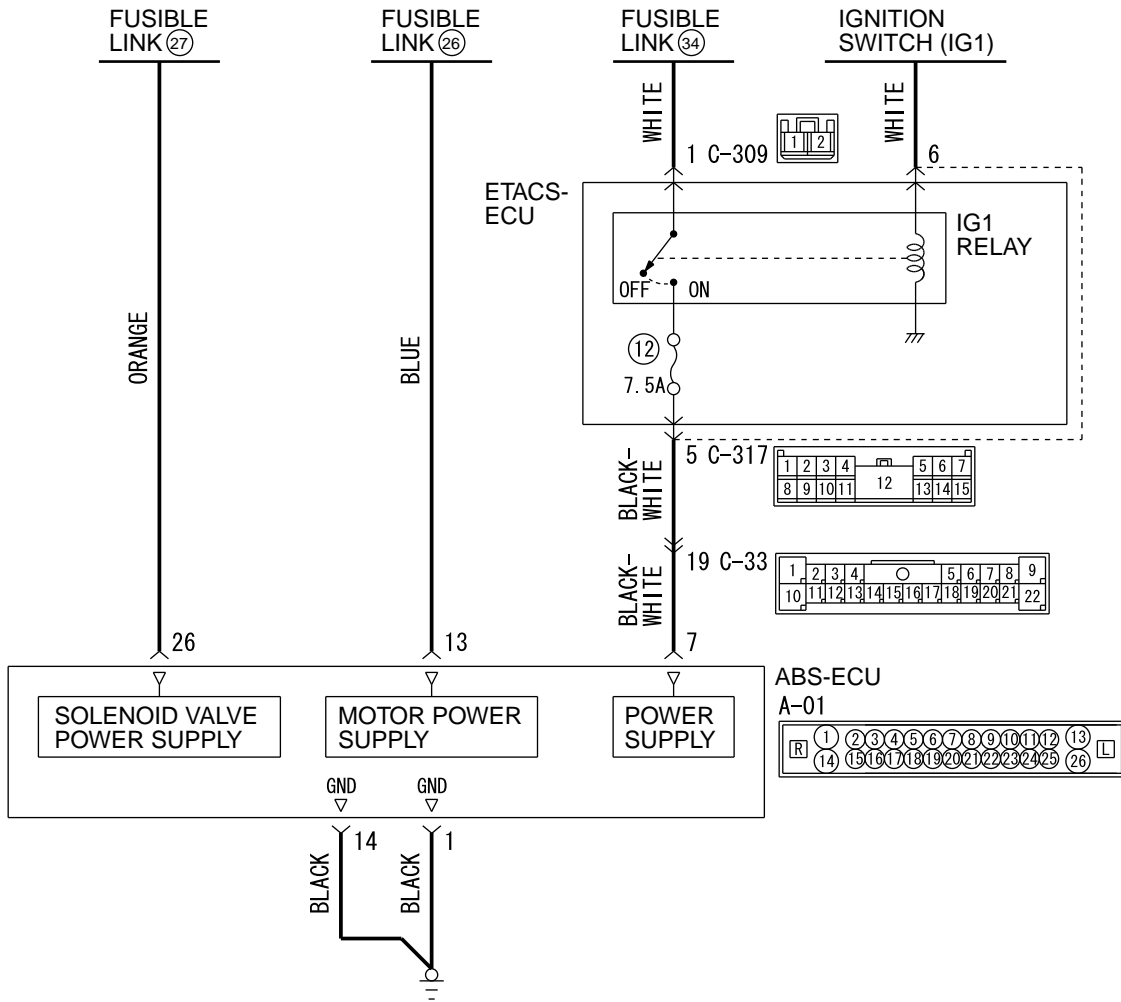
YES: The procedure is complete.

NO: Check the brake system related components except the ABS system.

Inspection Procedure 8: ABS-ECU Power Supply Circuit System

M13502000202USA0000010000

Power Supply Circuit



D7G35M018A00

SYSTEM OPERATION

- The ABS-ECU power supply signal energized by the ignition switch (IG1) is transmitted to ABS-ECU (terminal No. 7) via the multi-purpose fuse No.12.
- The ABS-ECU power supply and the valve power supply are transmitted to ABS-ECU (terminal No. 26) via the fusible link No. 27.
- When malfunction occurs in ABS-ECU power supply, the communication with scan tool becomes unavailable.

PROBABLE CAUSES

- Damaged wiring harness and connectors
- Battery failure
- Charging system failed
- ABS-ECU malfunction

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicle Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

STEP 1. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

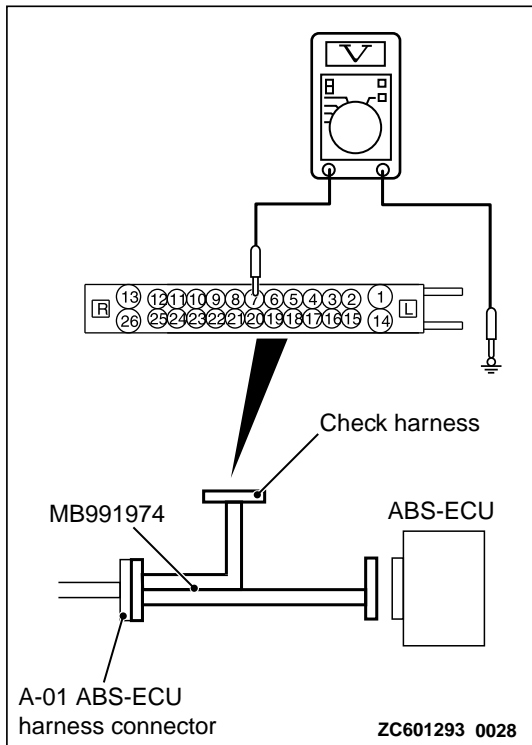
NOTE: Do not connect the special tool MB991974 to ABS-ECU.

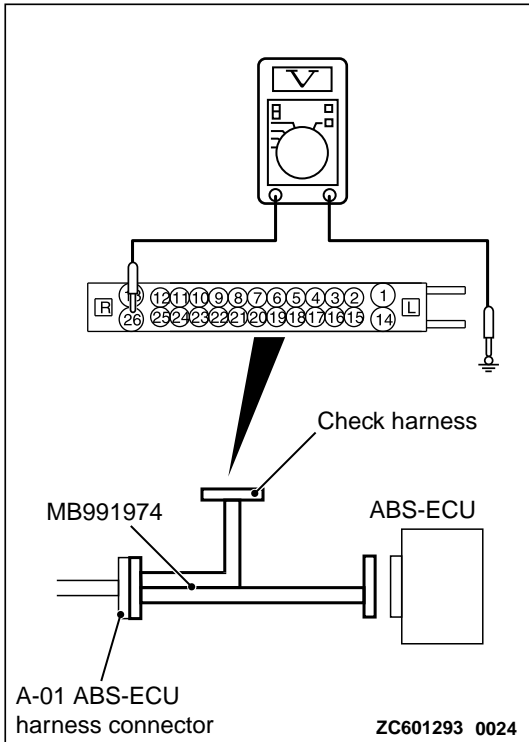
- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between terminal No. 7 and body ground.

OK: 12 volts (Battery voltage)

Q:Is the check result normal?

- YES:** Go to Step 2.
NO: Go to Step 6.





STEP 2. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

- (2) Turn the ignition switch to the ON position.
- (3) Measure the voltage between the terminal No. 26 and the body ground.

OK: 12 volts (Battery voltage)

Q: Is the check result normal?

YES: Go to Step 4.

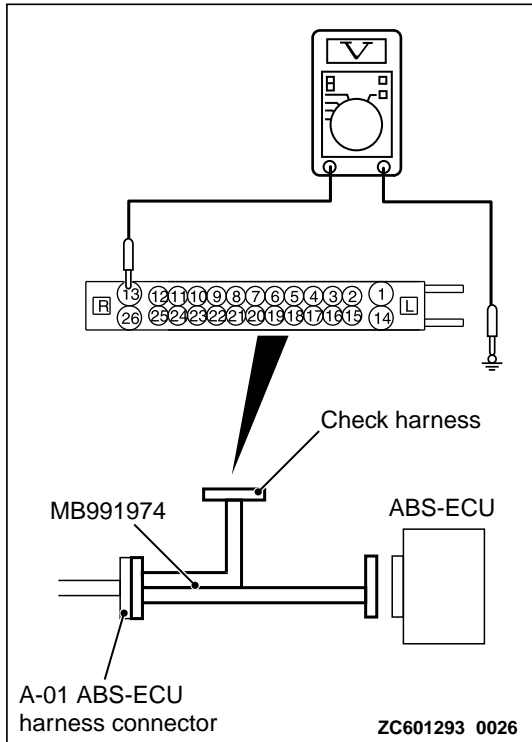
NO: Go to Step 3.

STEP 3. Connector check: A-01 ABS-ECU connector

Q: Is the check result normal?

YES: Repair the wiring harness between the fusible link No. 27 and the A-01 ABS-ECU connector terminal No. 32.

NO: Repair the defective connector.



STEP 4. Voltage measurement at the A-01 ABS-ECU connector

- (1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

NOTE: Do not connect the special tool MB991974 to ABS-ECU.

- (2) Turn the ignition switch to the ON position.
- (3) Voltage between the terminal No. 13 and the body ground
OK: 12 volts (Battery voltage)

Q:Is the check result normal?

YES: Go to Step 7.

NO: Go to Step 5.

STEP 5. Connector check: A-01 ABS-ECU connector

Q:Is the check result normal?

YES: Repair the wiring harness between the fusible link No. 26 and the A-01 ABS-ECU connector terminal No. 13.

NO: Repair the defective connector.

STEP 6. Connector check: A-01 ABS-ECU connector, C-33 intermediate connector, C-317 junction block connector, C-210 ignition switch connector

Q:Is the check result normal?

YES: The open or short circuit may be present in the power supply circuit. Repair the wiring harness between the A-01 ABS-ECU connector terminal No. 7 and the C-210 ignition switch connector.

NO: Repair the defective connector.

STEP 7. Wiring harness check between the A-01 ABS-ECU connector terminal No. 1/14 and the body ground

* Check the ground wires for open circuit.

Q:Is the check result normal?

YES: Go to Step 8.

NO: Repair the wiring harness.

STEP 8. Battery check

Refer to GROUP 54Aa - Battery Test P.54Aa-2.

Q:Is the battery in good condition?

YES: Go to Step 9.

NO: Charge or replace the battery.

STEP 9. Charging system check

Refer to GROUP 16a - Charging System P.16a-8.

Q:Is the charging system in good condition?

YES: Go to Step 10.

NO: Repair or replace the charging system component(s).

STEP 10. Retest the system.

Q:Is the communication with scan tool possible?

YES: An intermittent malfunction may be present. (Refer to GROUP 00 - How to Cope with Intermittent Malfunction P.00-15.)

NO: Make sure that the M.U.T.-III cable is properly connected and the V.C.I. switch is ON, and then replace ABS-ECU.

DATA LIST REFERENCE TABLE

M13502000115USA0000010000

The following items can be read by the scan tool from the ABS-ECU input data.

The following items of ECU input data can be read using scan tool.

1. The system is normal.

Item No.	Check item	Check conditions	Normal conditions
01	FL wheel speed sensor	Perform a test run of the vehicle.	The speedometer display and the scan tool display almost agree with each other.
02	FR wheel speed sensor		
03	RL wheel speed sensor		
04	RR wheel speed sensor		
05	Power supply voltage		10 to 18 V
07	Brake switch (input)	The brake pedal is released.	OFF
		The brake pedal is depressed.	ON
		-	Undefined
09*	G sensor (+: deceleration, -: acceleration)	Vehicle stopped (level)	-0.11 to 0.11 G
		Running	-1 to 1 G
14	Brake switch (Stop light switch)	The brake pedal is depressed.	ON
		The brake pedal is released.	OFF
87	Ignition switch (input)	Ignition switch is "ON" position	ON
		Ignition switch is "START" position	Start
88	Vehicle speed	Perform a test run of the vehicle.	The speedometer display and the scan tool display almost agree with each other.
92	Tire circumference (memorized)	-	0 mm
		-	2124 mm or 2155 mm
105	Power supply voltage (input)		10 to 18 V

NOTE: *: Vehicle for AWD

2. System shutdown by ECU

While ABS-ECU is disabled by the diagnostic function, the scan tool displayed data is different from the actual measurement.

ACTUATOR TEST REFERENCE TABLE

M13502000116USA0000010000

Using scan tool, the following actuators can be forcibly operated:

NOTE:

- *ABS is operated by ABS-ECU.
- *When ABS-ECU is disabled due to the fail-safe function, the actuator test cannot be performed.
- *The actuator test can be performed only when the vehicle is stationary.

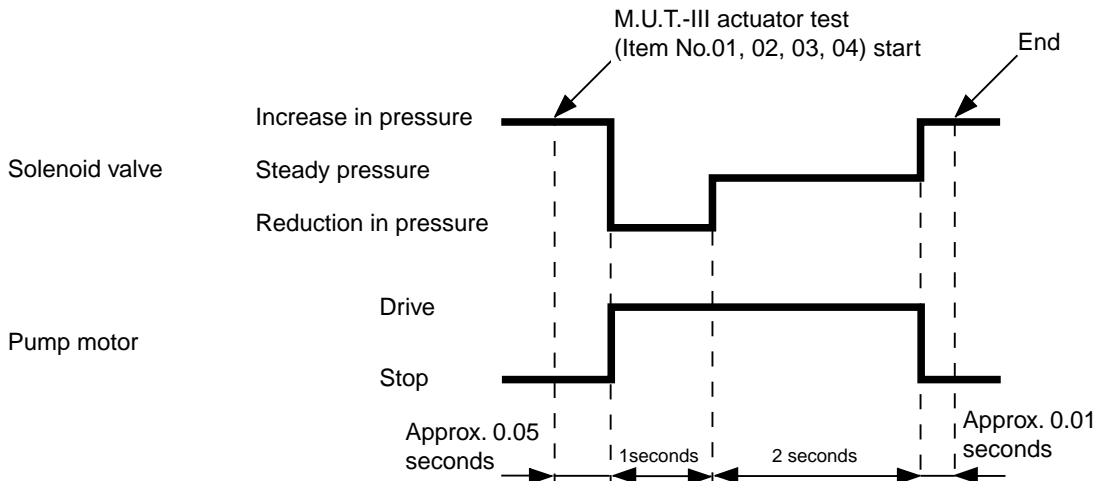
**While the actuator test is performed, the ABS warning light flashes at a rate of 2 Hz.*

**After the actuator test has been performed, the brake warning light and ABS warning light illuminate until the ignition switch is turned to ON again or the communication between scan tool and ABS-ECU is terminated.*

Actuator test specifications

Item No.	Check item	Driven component
01	FR wheel ABS drive	Solenoid valve for the corresponding wheel of the hydraulic unit and pump motor (simplified inspection mode)
02	FL wheel ABS drive	
03	RR wheel ABS drive	
04	RL wheel ABS drive	

Operation pattern of items 01 to 04



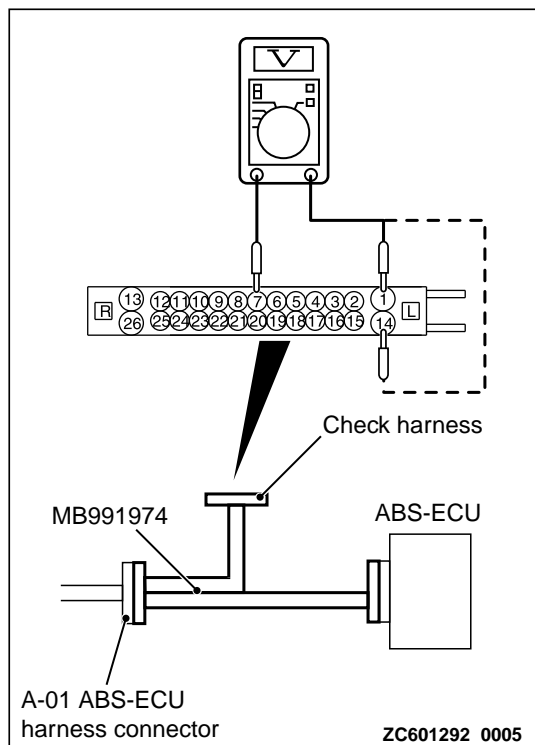
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CHECK AT ECU TERMINALS

M13502000118USA0000010000

TERMINAL VOLTAGE CHECK

Required Special Tool:
MB991974: ABS Check Harness



Connect the ABS check harness (Special tool: MB991974) to measure the voltage between each check connector terminal and the ground terminal (No. 1 or 14).

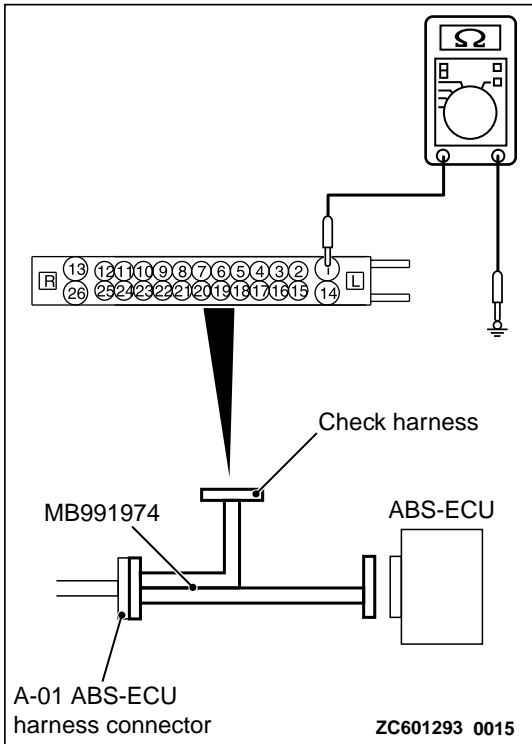
Terminal No.	Check item	Check conditions	Normal conditions
7	ABS-ECU power supply	Ignition switch: ON	Approximately battery voltage
		Ignition switch: OFF	0V
13	Motor power supply	Ignition switch: ON (OFF)	Approximately battery voltage
16	Wheel speed sensor (RR) power supply	Ignition switch: ON	Approximately battery voltage
18	Wheel speed sensor (FL) power supply	Ignition switch: ON	Approximately battery voltage
22	Wheel speed sensor (FR) power supply	Ignition switch: ON	Approximately battery voltage
24	Wheel speed sensor (RL) power supply	Ignition switch: ON	Approximately battery voltage
26	Solenoid valve power supply	Ignition switch: ON (OFF)	Approximately battery voltage

RESISTANCE AND CONTINUITY BETWEEN HARNESS-SIDE CONNECTOR TERMINALS

Required Special Tool:

MB991974: ABS Check Harness

ANTI-LOCK BRAKING SYSTEM (ABS)
 ANTI-LOCK BRAKING SYSTEM (ABS) DIAGNOSIS

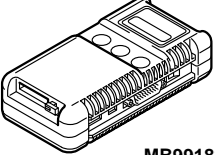
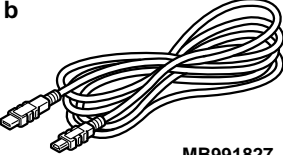
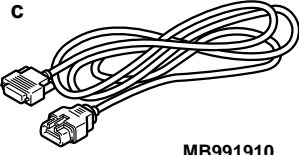
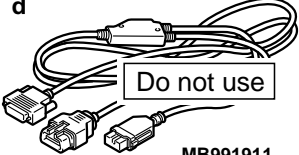
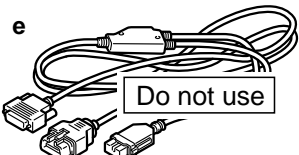
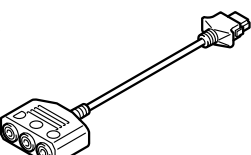
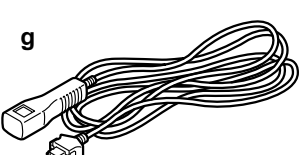
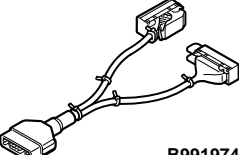


1. When performing the continuity check, turn the ignition switch to LOCK (OFF) position, connect the ABS check harness (Special tool: MB991974) as shown in the figure, and disconnect the ABS-ECU connector.
2. Check for continuity between terminals shown in the chart below.
3. Terminal layout is shown in the figure.


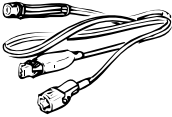
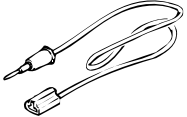
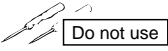
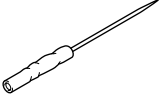
Terminal No.	Signal	Normal conditions
1 - body ground	Ground	Continuity (2 ohms or less)
14 - body ground	Ground	Continuity (2 ohms or less)

SPECIAL TOOL

M13502000006USA0000010000

Tool	Tool number and name	Supersession	Application
<p>a</p>  <p>MB991824</p> <p>b</p>  <p>MB991827</p> <p>c</p>  <p>MB991910</p> <p>d</p>  <p>MB991911</p> <p>e</p>  <p>MB991914</p> <p>f</p>  <p>MB991825</p> <p>g</p>  <p>MB991826 YB9919580000</p>	<p>MB991958</p> <p>a. MB991824</p> <p>b. MB991827</p> <p>c. MB991910</p> <p>d. MB991911</p> <p>e. MB991914</p> <p>f. MB991825</p> <p>g. MB991826</p> <p>M.U.T.-III sub assembly</p> <p>a. Vehicle communication interface (V.C.I.)</p> <p>b. M.U.T.-III USB cable</p> <p>c. M.U.T.-III main harness A (Vehicles with CAN communication system)</p> <p>d. M.U.T.-III main harness B (Vehicles without CAN communication system)</p> <p>e. M.U.T.-III main harness C (for Daimler Chrysler models only)</p> <p>f. M.U.T.-III measurement adapter</p> <p>g. M.U.T.-III trigger harness</p>	<p>MB991824-KIT</p> <p><i>NOTE: G: MB991826 M. U. T. -III Trigger Harness is not necessary when pushing V. C. I. ENTER key.</i></p>	<p>CAUTION</p> <p>M.U.T.-III main harness A (MB991910) should be used. M.U.T.-III main harness B and C should not be used for this vehicle.</p> <p>ABS check (Diagnostic trouble code display, service data display and calibration by scan tool)</p>
 <p>B991974</p>	<p>MB991974</p>	<p>ABS check harness</p>	<p>Voltage inspection at ABS-ECU terminals</p>

ANTI-LOCK BRAKING SYSTEM (ABS)
ON-VEHICLE SERVICE

Tool	Tool number and name	Supersession	Application
<p>a</p>  <p>b</p>  <p>c</p>  <p>d</p>  <p>YB9912230000</p>	<p>MB991223 a. MB991219 b. MB991220 c. MB991221 d. MB991222</p> <p>Harness set a. Test harness b. LED harness c. LED harness adaptor d. Probe</p>	<p>General service tools</p>	<p>Continuity check and voltage measurement at harness wire or connector for loose, corroded or damaged terminals, or terminals pushed back in the connector.</p> <p>a. Connector pin contact pressure inspection b. Power circuit inspection c. Power circuit inspection d. Commercial tester connection</p>
 <p>MB992006</p>	<p>MB992006 Extra fine probe</p>	<p>-</p>	<p>Continuity check and voltage measurement at harness wire or connector for loose, corroded or damaged terminals, or terminals pushed back in the connector.</p>

ON-VEHICLE SERVICE

HYDRAULIC UNIT CHECK

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Required Special Tools:

- MB991958: M.U.T.-III Sub Assembly
- MB991824: Vehicle Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

1. Raise the vehicle using a jack and support the specified points with a rigid rack.

CAUTION

Before connecting or disconnecting scan tool, always turn the ignition switch to the LOCK (OFF) position.

2. Before setting scan tool, turn the ignition key to the LOCK (OFF) position.
3. Confirm that the selector lever is in the "N" position, and then start the engine.

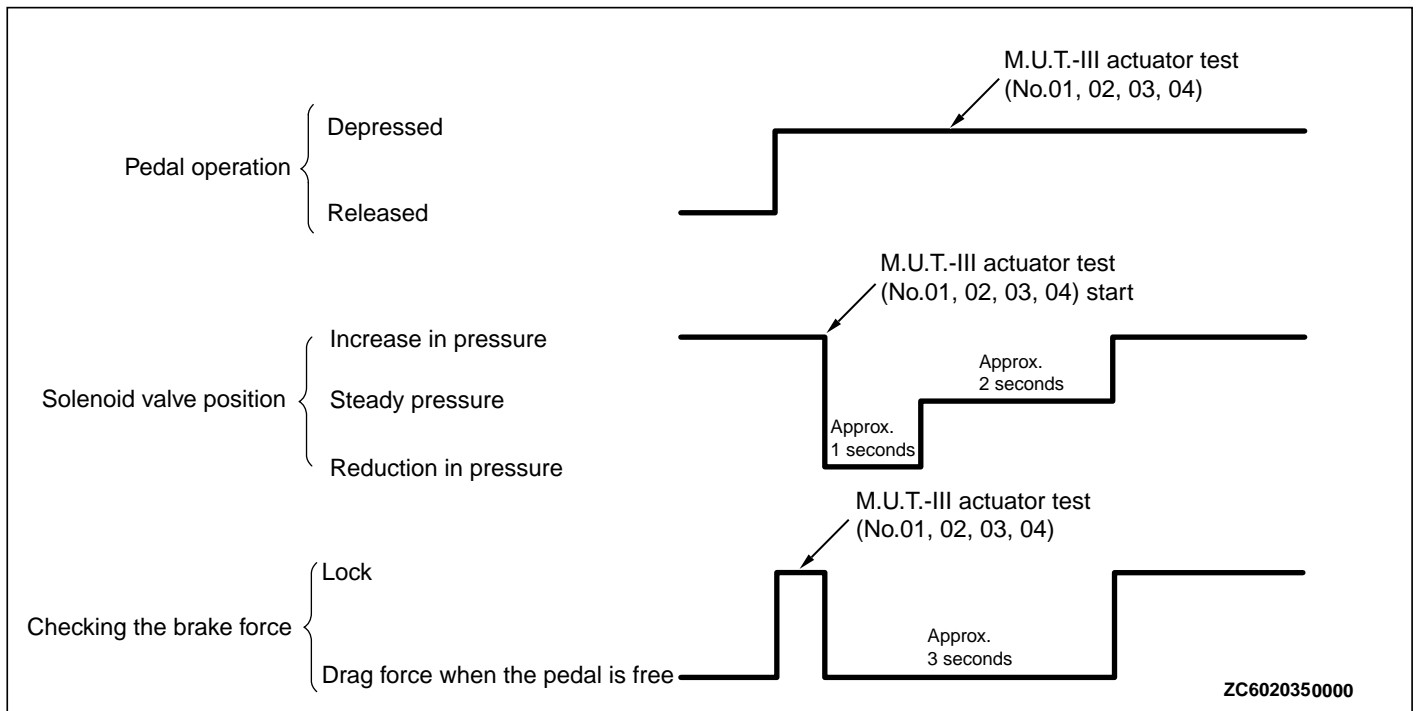
4. When carrying out the actuator tests No. 01 to 04, perform the actuator tests using scan tool while depressing the brake pedal. When carrying out the actuator tests, rotate the wheel by hands to confirm that the braking force changes.

NOTE:

*While performing the actuator test, the ABS warning light flashes at a rate of 2 Hz.

*When ABS-ECU is disabled due to the fail-safe function, the scan tool actuator test cannot be performed.

*After the actuator test has been performed, the ABS warning light and brake warning light illuminate until the ignition switch is turned to ON again or the communication between scan tool and ABS-ECU is terminated.



5. This is indicated as shown in the above.

6. When any malfunction has been found, take a necessary action according to the "Judgment Table."

Judgment Table

Display on scan tool	Operation	Inspection result	Judgment	Probable cause	Remedy
01 FR wheel ABS 02 FL wheel ABS	*Depress the brake pedal to lock the vehicle. *Select the vehicle to be inspected using scan tool, perform the actuator test.	Braking force decreases for 3 seconds from the lock status.	Normal	-	-
03 RR wheel ABS 04 RL wheel ABS		The wheel does not lock even if the brake pedal is depressed.	Error	Clogged brake line other than hydraulic unit	Check and clean the brake line.

Display on scan tool	Operation	Inspection result	Judgment	Probable cause	Remedy
	▪ Rotate the selected wheel by hands to confirm the braking force.			Clogged hydraulic circuit in the hydraulic unit	Replace the hydraulic unit assembly.
		Braking force does not decrease.		Faulty routing of hydraulic unit brake tube	Route the brake tube correctly.
				Malfunction of hydraulic unit solenoid valve operation	Replace the hydraulic unit assembly.

7. After the inspection, turn the ignition switch to the LOCK (OFF) position, and then disconnect scan tool.

IN THE EVENT OF A DISCHARGED BATTERY

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WARNING

If the ABS is not operating, the vehicle will be unstable during braking, Do not drive the vehicle with the ABS-ECU connector disconnected or with the ABS not operating.

If the engine is started using a booster cable when the battery is completely flat, and the vehicle is then driven without waiting for the battery to be recharged, the engine may misfire and it may not be possible to drive the vehicle. This is because the ABS consumes a large amount of current when carrying out its initial checks. If this happens, recharge the battery fully.

HYDRAULIC UNIT

REMOVAL AND INSTALLATION

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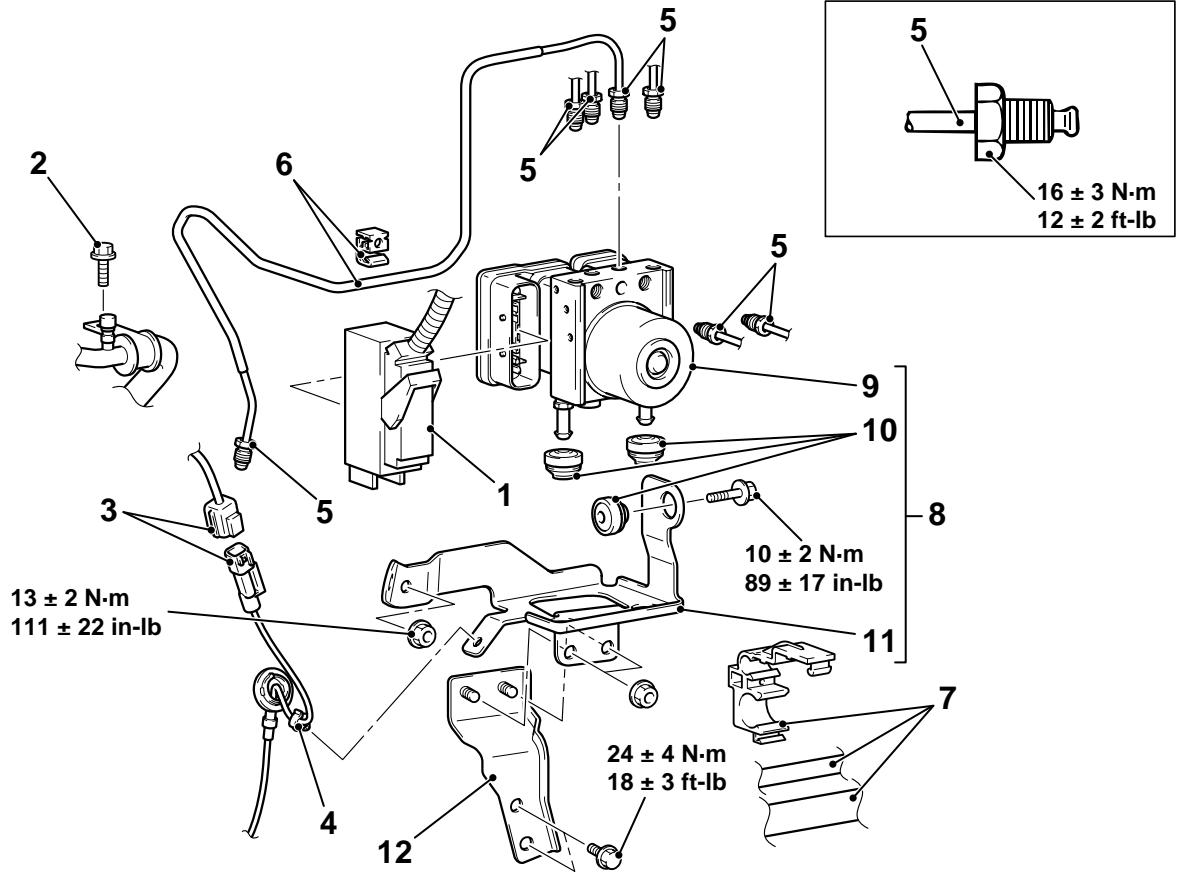
NOTE: ABS-ECU is located in the hydraulic unit.

Pre-removal operation

- Strut tower bar removal (Refer to GROUP 42Aa - Strut Tower Bar P.42Aa-11.)
- Brake fluid draining
- Intake manifold plenum removal (Refer to GROUP 15 - Intake Manifold Plenum P.15-7.)

Post-installation operation

- Intake manifold plenum installation (Refer to GROUP 15 - Intake Manifold Plenum P.15-7.)
- Brake fluid refilling and air bleeding (Refer to GROUP 35A - On-vehicle Service, Brake Fluid Level Inspection and Bleeding P.35A-18.)
- Strut tower bar installation (Refer to GROUP 42Aa - Strut Tower Bar P.42Aa-11.)
- Hydraulic unit check (Refer to P.35B-148.)



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Removal steps

1. ABS-ECU harness connector
2. Suction pipe installation bolt
3. Wheel speed sensor harness connector connection <<A>>
4. Wheel speed sensor harness clip connection
- >>A<< 5. Brake tube connection
6. Brake tube and clip connection
7. Suction pipe, liquid pipe and clip connection

Removal steps

8. Hydraulic unit (ABS-ECU) and hydraulic unit bracket
9. Hydraulic unit (ABS-ECU)
10. Hydraulic unit bracket insulator
11. Hydraulic unit bracket B
12. Hydraulic unit bracket A

REMOVAL SERVICE POINTS

<<A>> HYDRAULIC UNIT (ABS-ECU) REMOVAL

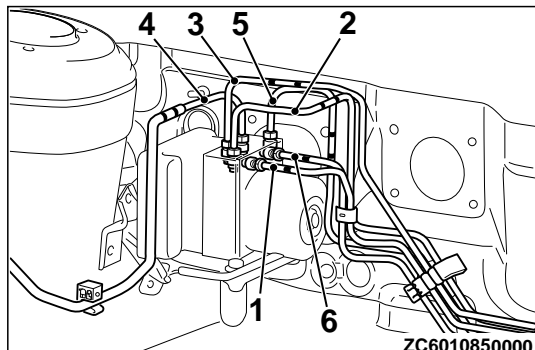
⚠ CAUTION

- Be careful when removing the hydraulic unit because it is heavy.
- Never loosen the nuts and the bolts because the hydraulic unit cannot be disassembled.
- Do not drop or shock the hydraulic unit.
- Do not turn the hydraulic unit upside down or lay down the unit because the inner air becomes difficult to be bled.

INSTALLATION SERVICE POINTS**>>A<< BRAKE TUBE CONNECTION**

Install the brake pipe to the hydraulic unit as shown in the figure.

1. To rear brake (RH) <Marking color: White>
2. From master cylinder (secondary) <Marking color: Yellow>
3. To front brake (LH) <Marking color: Red and white>
4. To front brake (RH) <Marking color: Orange and white>
5. From master cylinder (primary) <Marking color: Blue>
6. To rear brake (LH) <Marking color: Pink>

**WHEEL SPEED SENSOR****REMOVAL AND INSTALLATION****CAUTION**

The vehicle speed detection encoder collects any metallic particle easily, because it is magnetized.

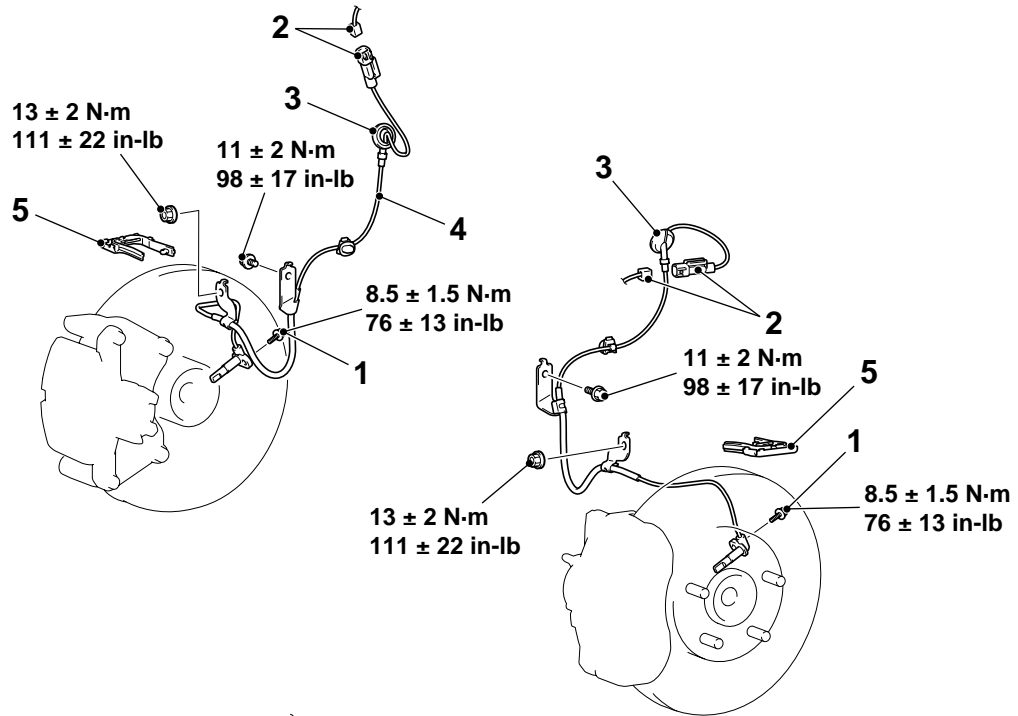
Make sure that the encoder should not collect any metallic particle. Check that there is not any trouble prior to reassembling it.

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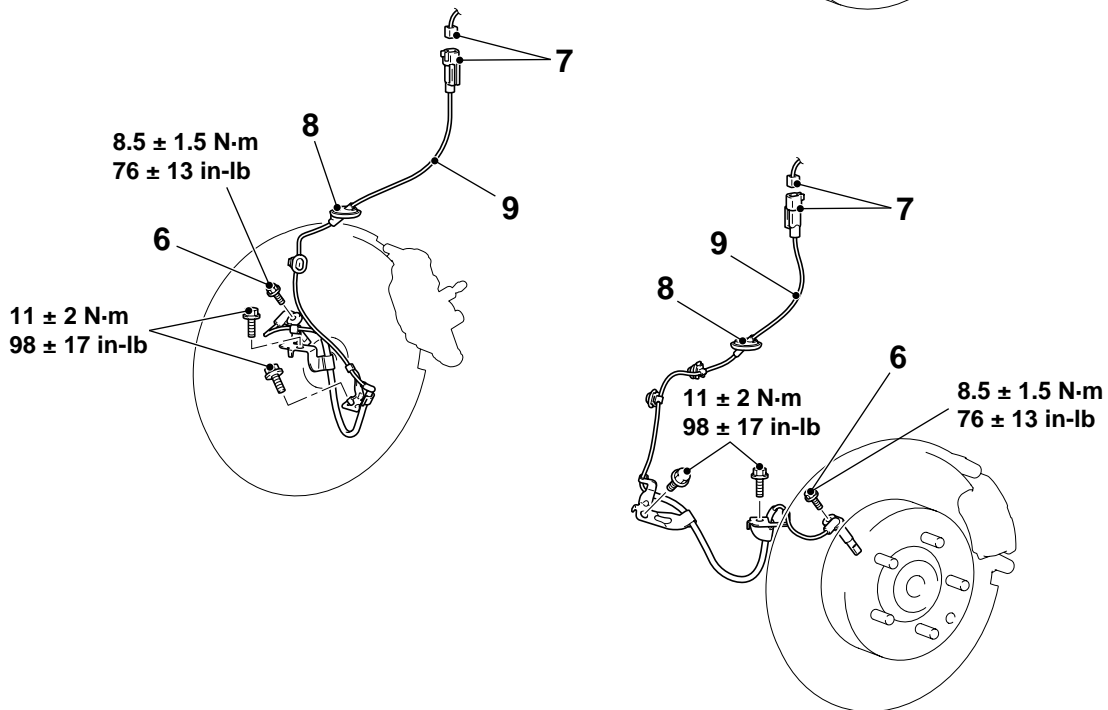
Pre-removal and post-installation operation

- Air cleaner body assembly removal and installation (Refer to GROUP 15 - Air Cleaner P.15-6.) Front wheel speed sensor (LH)
- Quarter trim removal and installation (Refer to GROUP 52A - Trim P.52A-10.) Rear wheel speed sensor

<Front>



<Rear>



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Front wheel speed sensor removal steps

1. Bolt (front wheel speed sensor and knuckle connection)
2. Front wheel speed sensor connector
3. Front wheel speed sensor grommet
4. Front wheel speed sensor

>>A<<

Front wheel speed sensor removal steps

5. Harness clip
6. Rear wheel speed sensor and trailing arm assembly connection
7. Rear wheel speed sensor connector
8. Front wheel speed sensor grommet

>>A<<

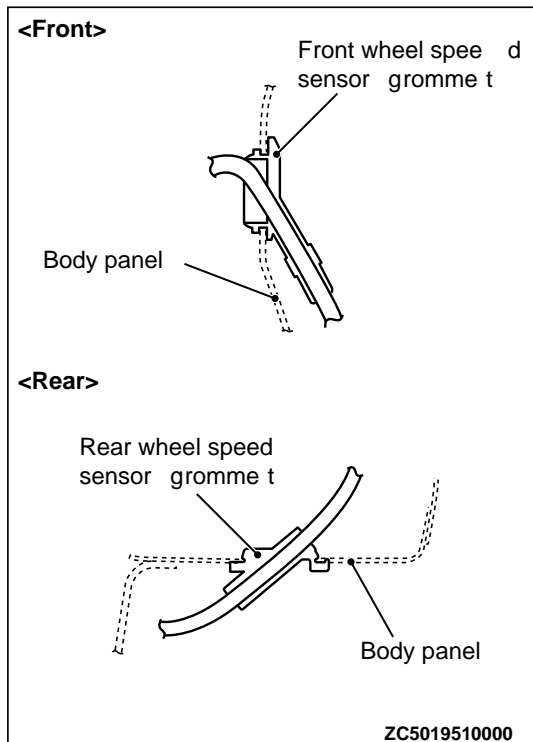
**Rear wheel speed sensor
removal steps**

9. Rear wheel speed sensor

NOTE: The vehicle speed detection encoder is integrated with the front wheel bearing and the rear hub assembly, which cannot be disassembled.

INSTALLATION SERVICE POINTS**>>A<< FRONT WHEEL SPEED SENSOR GROMMET/REAR
WHEEL SPEED SENSOR GROMMET INSTALLATION**

Install the front wheel speed sensor grommet and the rear wheel speed sensor grommet to the body panel snugly as shown in the figure.



INSPECTION

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WHEEL SPEED SENSOR CURRENT CHECK

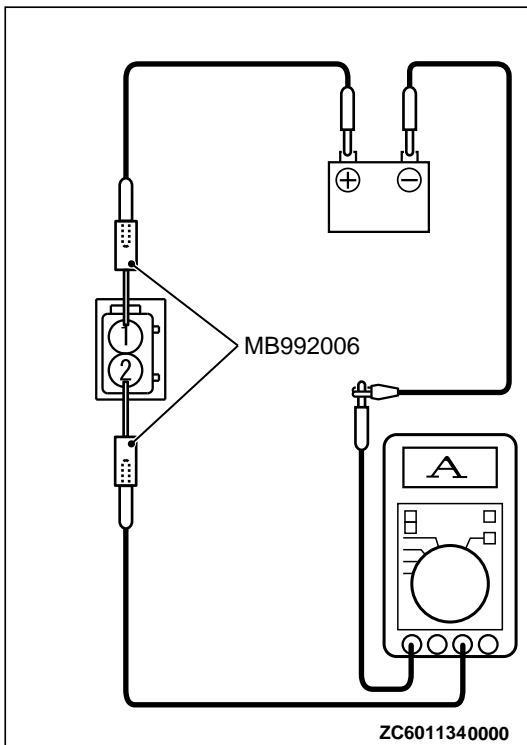
⚠ CAUTION

Do not connect the battery terminals in reverse as the wheel speed sensor may be damaged.

1. Connect the circuit tester to the wheel speed sensor using the extra fine probe (Special tool: MB992006), and measure the sensor current as a single unit.

Standard value: 5.9 to 8.4 mA or 11.8 to 16.8 mA

2. If the measurement value is not within the standard value range, replace the wheel speed sensor with a new one.



WHEEL SPEED SENSOR INSULATION CHECK

1. Connect the circuit tester to the wheel speed sensor using the extra fine probe (Special tool: MB992006), and measure the insulation resistance between the terminal No. 1/2 and the wheel speed sensor body as a single unit.

Standard value: 5 M Ω or more

2. If the insulation resistance is not within the standard value range, replace the wheel speed sensor with a new one.

