

GROUP 35B

ANTI-SKID BRAKING SYSTEM (ABS)

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WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

⚠ WARNING

- *Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).*
- *Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.*
- *MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.*

NOTE

The SRS includes the following components: SRS-ECU, SRS warning lamp, air bag module, clock spring, and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

GENERAL INFORMATION

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Top components such as Brembo™ brakes, EBD and sports ABS improve braking power and braking stability.

SPORTS ABS

- 4-wheel independent control optimises the brake force to each wheel to achieve a balance of improved braking force and braking stability.
- A steering wheel sensor was added to monitor the steering angle status. Braking force is altered in response to the steering status to improve the quality of steering when cornering.
- The steering wheel sensor, lateral G-sensor and longitudinal G-sensor accurately monitor driving conditions and optimise ABS control to match the specific driving conditions.

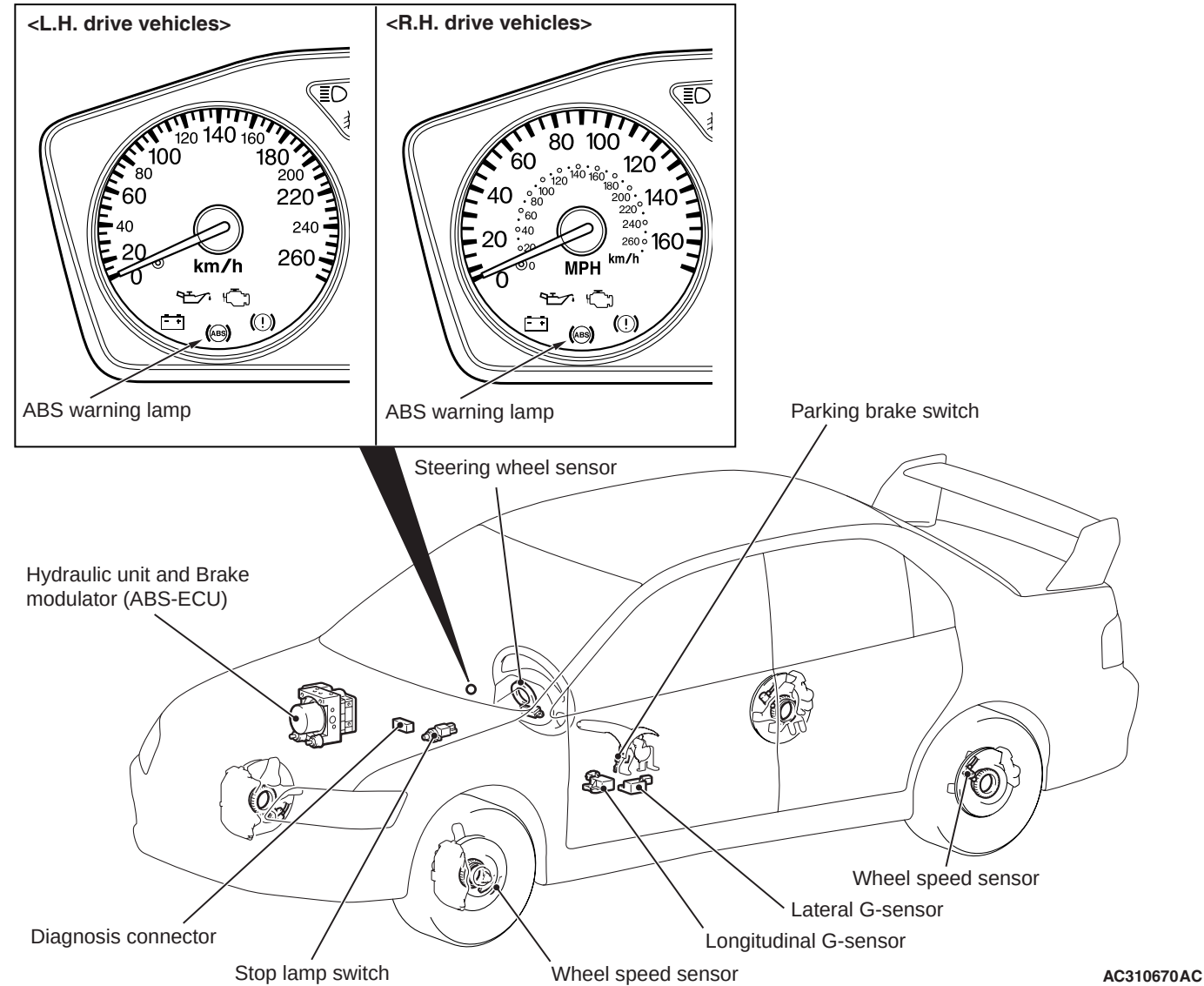
EBD (ELECTRONIC BRAKE-FORCE DISTRIBUTION SYSTEM)

- Rear brake power is electronically controlled to optimise performance in accordance with road and load conditions and to ensure optimal distribution of braking force between the front and rear brakes.
- Rear brake fluid pressure control employs a brake modulator hydraulic unit solenoid valve that made it possible to eliminate the pressure control valves (proportioning valves).
- Effective use of rear wheel brake force reduces temperature build-up in the front brakes under hard braking conditions.
- Independent control of the left and right rear brakes when braking during cornering achieves a balance of improved vehicle stability and braking force.

SPECIFICATIONS

Item			Specification
ABS control method			4-sensor, 4-channel
Number of rotor teeth	Front		43
	Rear		43
Wheel speed sensor	Type		Magnet coil type
	Gap between sensor and rotor mm	Front	0.85 (Non-adjustable type)
		Rear	0.60 (Non-adjustable type)

CONSTRUCTION DIAGRAM



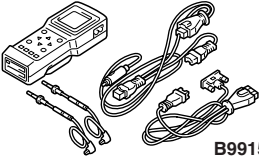
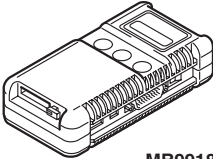
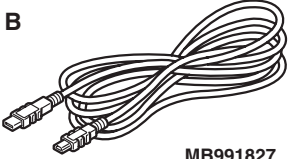
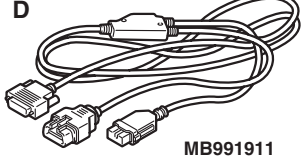
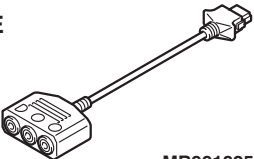
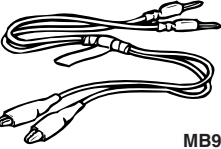
SERVICE SPECIFICATIONS

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Item		Standard value
Wheel speed sensor internal resistance kΩ		1.24 – 1.64
G-sensor output voltage V	Stationary Vehicles	2.4 – 2.6
	Arrow facing downward	3.4 – 3.6

SPECIAL TOOLS

M1352000600794

Tool	Number	Name	Use
 B991502	MB991502	M.U.T.-II sub assembly	Checking the ABS (Diagnosis display using the M.U.T.-II)
A  MB991824 B  MB991827 C  MB991910 DO NOT USE D  MB991911 E  MB991825 F  MB991826 MB991955	MB991955 A: MB991824 B: MB991827 C: MB991910 D: MB991911 E: MB991825 F: MB991826	M.U.T.-III sub-assembly A: Vehicle communication interface (V. C. I). B: M.U.T.-III USB cable C: M.U.T.-III main harness A (Vehicles with CAN communication system) D: M.U.T.-III main harness B (Vehicles without CAN communication system) E: M.U.T.-III measurement adapter F: M.U.T.-III trigger harness	Checking the ABS (Diagnosis display using the M.U.T.-III) CAUTION M.U.T.-III main harness B (MB991911) should be used. M.U.T.-III main harness A should not be used for this vehicle.
 MB991529	MB991529	Diagnosis code check harness	Checking the ABS (Diagnosis display using the ABS warning lamp)

Tool	Number	Name	Use
 MB991348	MB991348	Test harness set	Checking the G-sensor

TROUBLESHOOTING

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points [P.00-5](#).

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NOTES WITH REGARD TO DIAGNOSIS

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1. The ABS is a system which controls the brake pressure by means of the operation of the ECU. Accordingly, the following symptoms may occur at times, but these are a sign of normal ABS operation, and do not indicate a malfunction.

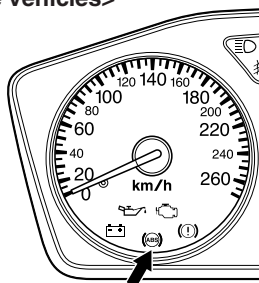
Phenomenon	Explanation of phenomenon
When the engine starts, a knocking sound can be heard coming from the engine compartment.	This sound occurs as a result of system operation checking, and is not a malfunction.
• Sound of the motor inside the ABS hydraulic unit operation. (whine) • Sound is the generated along with vibration of the brake pedal. (scraping) • When ABS operates, sound is generated from the vehicle chassis due to repeated brake application and release. (Thump: suspension; squeak: tyres)	This is the sound of normal system operation, and is not a malfunction.
Shocks are felt if the brake pedal is depressed when driving at low speed.	This is due to system operation checking (starting-of check when the vehicle speed reaches a certain number of km/h) and is not a malfunction.

2. For road surfaces such as snow-covered roads and gravel roads, the braking distance for vehicles with ABS can sometimes be longer than that for other vehicles. Accordingly, advise the customer to drive safely on such roads by lowering the vehicle speed and not being too overconfident.
3. Diagnosis detection condition can vary depending on the diagnosis code. Make sure that checking requirements listed in the "Comment" are satisfied when checking the trouble symptom again.

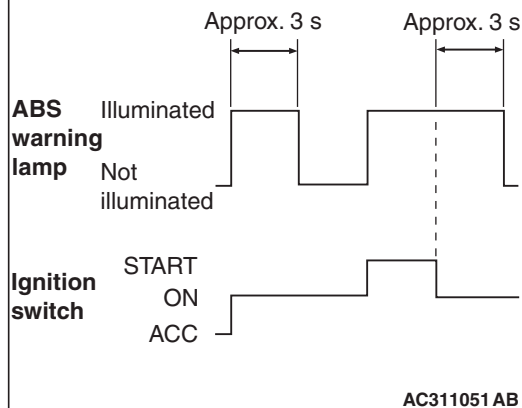
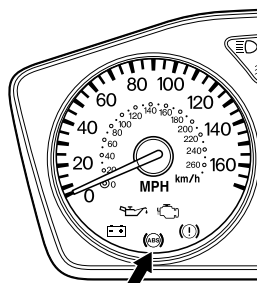
ABS WARNING LAMP INSPECTION

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<L.H. drive vehicles>



<R.H. drive vehicles>



Check that the ABS warning lamp illuminates as follows.

1. When the ignition switch is turned to the "ON" position, the ABS warning lamp illuminates for approximately 3 seconds and then switches off.
2. When the ignition switch is turned to the "START" position, the ABS warning lamp remains illuminated.

3. When the ignition switch is turned from the "START" position back to the "ON" position, the ABS warning lamp illuminates for approximately 3 seconds and then switches off.

NOTE: The ABS warning lamp may remain on until the vehicle reaches a speed of several km/h. This is limited to cases where diagnosis code Nos. 21 to 24, 41 to 44, or 53 to 55 have been recorded because of a previous problem occurring. In this case, the ABS-ECU keeps the warning lamp illuminated until the problem corresponding to that diagnosis code can be detected.

4. If the illumination is other than the above, check the diagnosis codes.

DIAGNOSIS FUNCTION

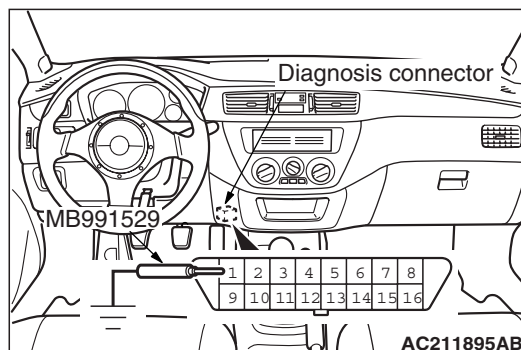
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READING DIAGNOSIS CODES
WHEN USING THE M.U.T.-II/III

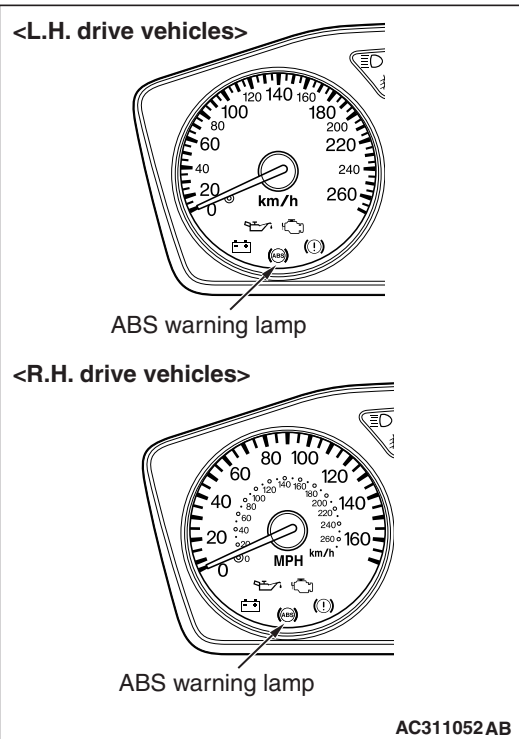
Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points [P.00-5](#).

WHEN USING THE ABS WARNING LAMP

1. Turn the ignition switch to the "LOCK" (OFF) position.



2. Use special tool diagnosis code check harness (MB991529) to earth terminal number 1 (diagnosis control terminal) of the diagnosis connector.
3. Turn the ignition switch to the "ON" position.



4. Read out a diagnosis code by observing how the warning lamp flashes.

When the diagnosis code No.24 is set	When no diagnosis code is set
ACX01777AD	ACX01778AD

5. Turn the ignition switch to the "LOCK" (OFF) position.

6. Disconnect special tool diagnosis code check harness (MB991529).

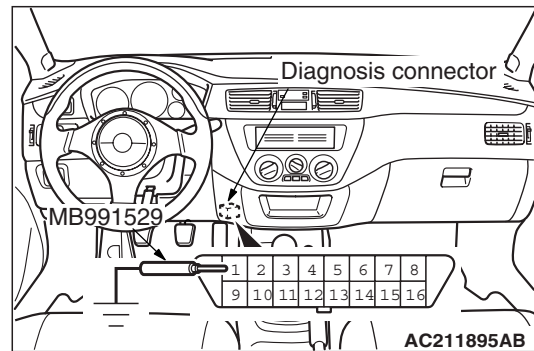
ERASING DIAGNOSIS CODES**WHEN USING THE M.U.T.-II/III**

Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points [P.00-5](#).

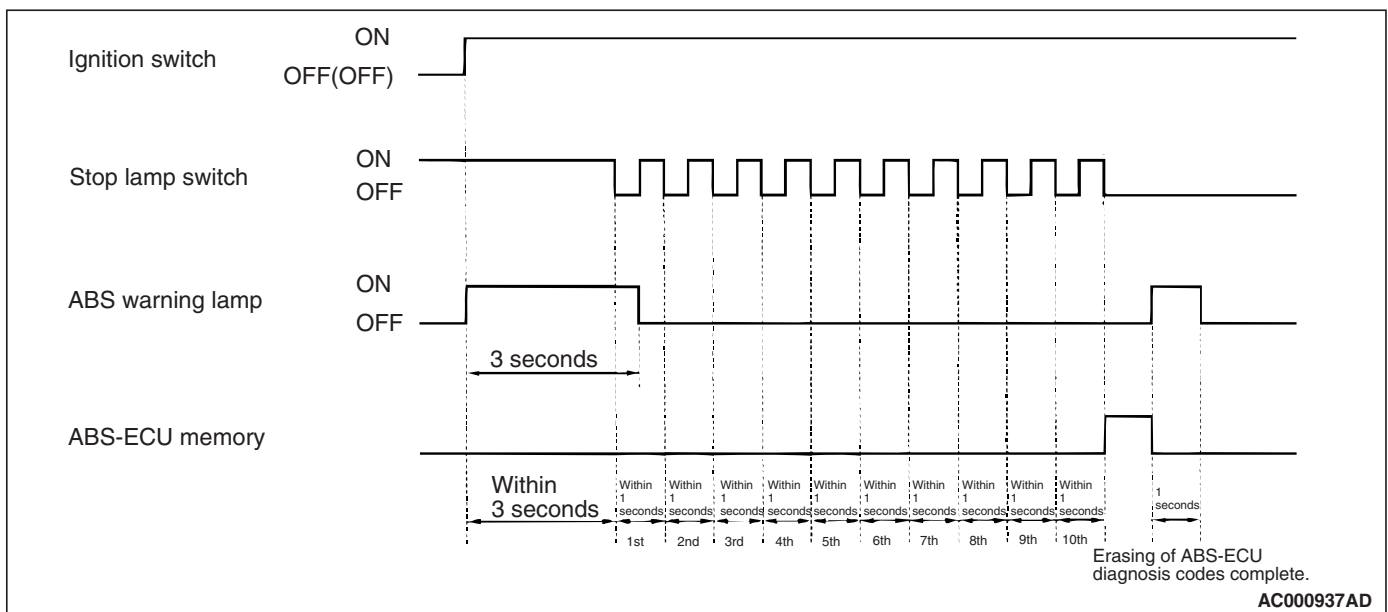
WHEN NOT USING THE M.U.T.-II/III

NOTE: If the ABS-ECU functions have stopped due to the fail-safe function, the diagnosis code cannot be erased.

1. Turn the ignition switch to the "LOCK" (OFF) position.



2. Use special tool diagnosis code check harness (MB991529) to earth terminal number 1 of the diagnosis connector.



3. Depress the brake pedal and hold it.
4. Turn the ignition switch to the "ON" position.
5. After turning the ignition switch to the "ON", release the pedal within three seconds. Repeat this process of pressing and releasing the brake pedal 10 continuous times.
6. Turn the ignition switch to the "LOCK" (OFF) position.
7. Disconnect special tool diagnosis code check harness (MB991529).

INSPECTION CHART FOR DIAGNOSIS CODE

M1352011300797

Follow the inspection chart that is appropriate for the diagnosis code.

Diagnosis code No.	Inspection item	Reference page
11	Front right wheel speed sensor (Open circuit or short-circuit)	<LH drive vehicle> P.35B-11 , <RH drive vehicle> P.35B-47
12	Front left wheel speed sensor (Open circuit or short-circuit)	
13	Rear right wheel speed sensor (Open circuit or short-circuit)	
14	Rear left wheel speed sensor (Open circuit or short-circuit)	
16	ABS-ECU power supply system (abnormal voltage drop or rise)	<LH drive vehicle> P.35B-19 , <RH drive vehicle> P.35B-55
21	Front right wheel speed sensor system	<LH drive vehicle> P.35B-11 , <RH drive vehicle> P.35B-47
22	Front left wheel speed sensor system	
23	Rear right wheel speed sensor system	
24	Rear left wheel speed sensor system	
32	Longitudinal G-sensor system	<LH drive vehicle> P.35B-22 , <RH drive vehicle> P.35B-58
41	Front right solenoid valve system	<LH drive vehicle> P.35B-29 , <RH drive vehicle> P.35B-65
42	Front left solenoid valve system	
43	Rear right solenoid valve system	
44	Rear left solenoid valve system	
51	Valve relay ON problem	Replace the brake modulator hydraulic unit (Integrated with ABS-ECU).
52	Valve relay problem (stays off)	<LH drive vehicle> P.35B-29 , <RH drive vehicle> P.35B-65
53	Motor relay problem (stays off)	
54	Motor relay ON problem	Replace the brake modulator hydraulic unit (Integrated with ABS-ECU).
55	Motor system (seized pump motor)	<LH drive vehicle> P.35B-29 , <RH drive vehicle> P.35B-65
63	ABS-ECU abnormality	Replace the brake modulator hydraulic unit (Integrated with ABS-ECU).
71	Lateral G-sensor system	<LH drive vehicle> P.35B-32 , <RH drive vehicle> P.35B-68

Diagnosis code No.	Inspection item	Reference page
81	Steering wheel sensor (ST-1) system	<LH drive vehicle> P.35B-39 , <RH drive vehicle> P.35B-75
82	Steering wheel sensor (ST-2) system	
83	Steering wheel sensor (ST-N) system	

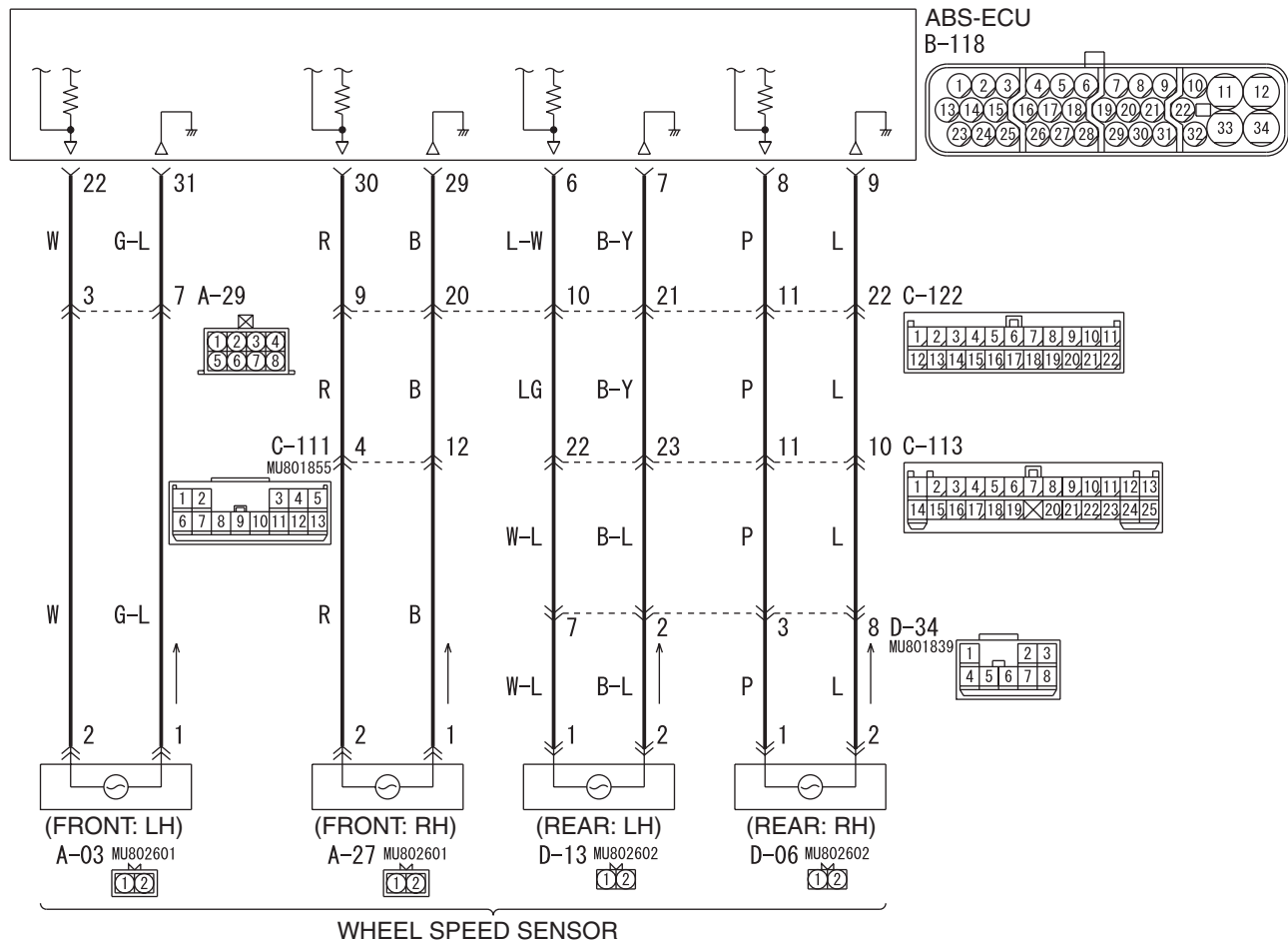
NOTE: diagnosis code No.16, 52, 63

- Code No.16 is cleared from the memory by turning the ignition switch to the "ACC" position. When the system is properly reset, this code is also cleared from the memory.
- Code No.52 and 63 are cleared from the memory by turning the ignition switch to the "ACC" position.

DIAGNOSTIC TROUBLE CODE PROCEDURES <L.H. drive vehicle>

Code No.11: Front Right Wheel Speed Sensor (Open Circuit or Short Circuit)
 Code No.12: Front Left Wheel Speed Sensor (Open Circuit or Short Circuit)
 Code No.13: Rear Right Wheel Speed Sensor (Open Circuit or Short Circuit)
 Code No.14: Rear Left Wheel Speed Sensor (Open Circuit or Short Circuit)
 Code No.21: Front Right Wheel Speed Sensor System
 Code No.22: Front Left Wheel Speed Sensor System
 Code No.23: Rear Right Wheel Speed Sensor System
 Code No.24: Rear Left Wheel Speed Sensor System

Wheel Speed Sensor Circuit



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Gray R : Red P : Pink V : Violet

W4J35E018A

OPERATION

- A toothed wheel speed rotor generates a voltage pulse as it moves across the pickup field of each wheel speed sensor.
- The amount of voltage generated at each wheel is determined by the clearance between the wheel speed rotor teeth and the wheel speed sensor, and by the speed of rotation.

- The wheel speed sensors transmit the frequency of the voltage pulses and the amount of voltage generated by each pulse to the ABS-ECU.
- The hydraulic unit modulates the amount of braking force individually applied to each wheel cylinder.

DIAGNOSIS CODE SET CONDITIONS

- Diagnosis codes 11, 12, 13, 14 are set when signal is not input due to breakage of the wires of one or more of the four wheel speed sensors.
- Diagnosis codes 21, 22, 23, 24 are set in the following cases:
 - Open circuit is not found but no input is received by one or more of the four wheel speed sensors at 10 km/h or more.
 - Sensor output drops due to a malfunctioning wheel speed sensor or warped wheel speed rotor.

PROBABLE CAUSES

The most likely causes for these diagnosis codes to set are:

Diagnosis codes 11, 12, 13, 14

- Malfunction of the wheel speed sensor
- Damaged wiring harness or connector
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)

Diagnosis codes 21, 22, 23, 24

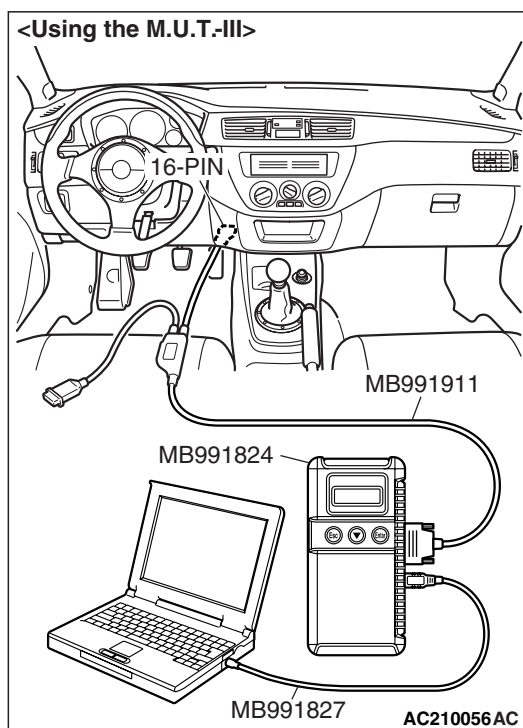
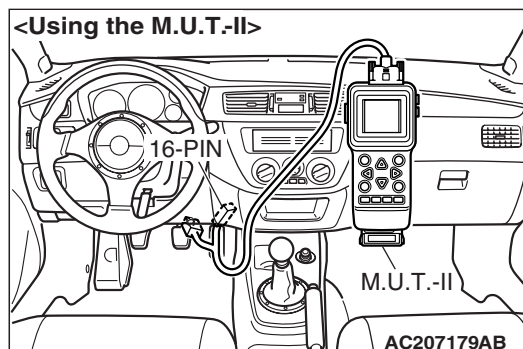
- Malfunction of the wheel speed sensor
- Damaged wiring harness or connector
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)
- Malfunction of the wheel speed rotor
- Malfunction of the wheel bearing
- Excessive clearance between the wheel speed sensor and wheel speed rotor

DIAGNOSIS

STEP 1. M.U.T.-II/III data list.

⚠ CAUTION

To prevent damage to M.U.T.-II/III, always turn the ignition switch to the "LOOK" (OFF) position before connecting or disconnecting M.U.T.-II/III.



- (1) Connect M.U.T.-II/III as shown in the illustration.
- (2) Start the engine.
- (3) Set M.U.T.-II/III to the data reading mode, and

check the data list items by driving the vehicle.

- Item 11 (diagnosis code 11 or 21 is set): Front right wheel speed sensor
- Item 12 (diagnosis code 12 or 22 is set): Front left wheel speed sensor
- Item 13 (diagnosis code 13 or 23 is set): Rear right wheel speed sensor
- Item 14 (diagnosis code 14 or 24 is set): Rear left wheel speed sensor

OK: The reading on the speedometer nearly matches the indication on M.U.T.-II/III, when driving.

(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the wheel speed sensor input normal?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope With Intermittent Malfunction [P.00-5](#).

NO : Go to Step 2.

STEP 2. Check the wheel speed sensor installation.

Q: Is the wheel speed sensor bolted securely in place at the front knuckle or the rear knuckle?

YES : Go to Step 3.

NO : Install it properly (Refer to [P.35B-146](#)). Then go to Step 15 .

STEP 3. Inspect the wheel speed sensor and/or wheel speed rotor.

Refer to [P.35B-147](#).

Check items:

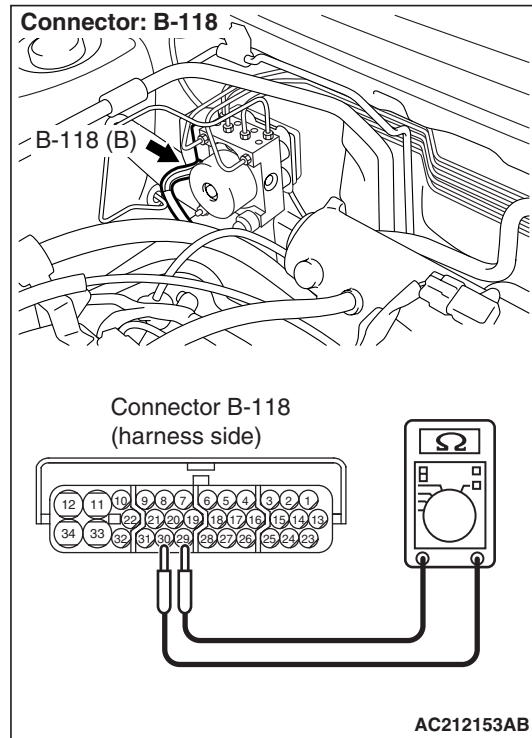
- Wheel speed sensor internal resistance: 1.24 – 1.64 k Ω
- Insulation between the wheel speed sensor body and the connector terminals
- Toothed wheel speed rotor check

Q: Is the wheel speed sensor or wheel speed rotor damaged?

YES : Replace it (Refer to [P.35B-146](#)). Then go to Step 15.

NO : Go to Step 4.

STEP 4. Check wheel speed sensor circuit. Resistance measurement at the ABS-ECU connector B-118.



(1) Disconnect the connector B-118 and measure at the harness side.

(2) Measure the resistance between the ABS-ECU connector terminals.

- If diagnosis code 11 or 21 is set: between terminals 29 and 30
- If diagnosis code 12 or 22 is set: between terminals 22 and 31
- If diagnosis code 13 or 23 is set: between terminals 8 and 9
- If diagnosis code 14 or 24 is set: between terminals 6 and 7

Standard Value: 1.24 – 1.64 k Ω

Q: Is the resistance within the standard value?

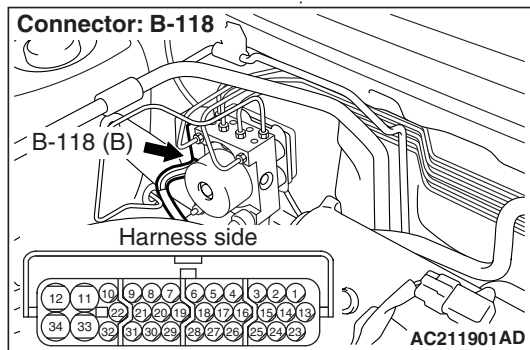
YES : Go to Step 13.

NO <The resistance between terminals 22 and 31 is not within the standard value.> : Go to Step 5.

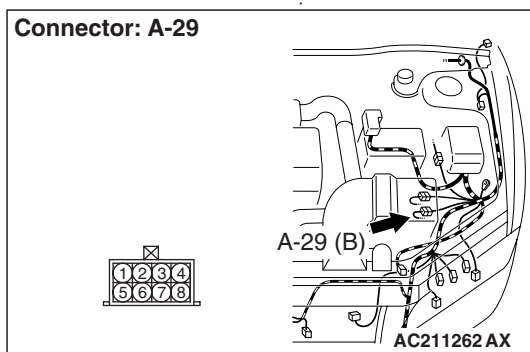
NO <The resistance between terminals 29 and 30 is not within the standard value.> : Go to Step 7.

NO <The resistance between terminals 6 and 7 is not within the standard value.> : Go to Step 9.

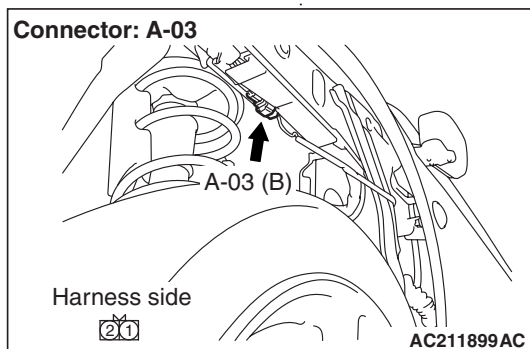
NO <The resistance between terminals 8 and 9 is not within the standard value.> : Go to Step 11.

STEP 5. Check the following connectors.

ABS-ECU connector B-118



Intermediate connector A-29



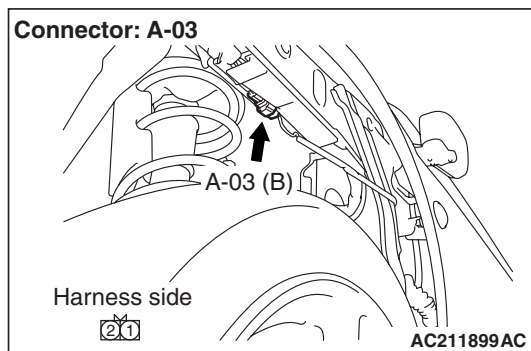
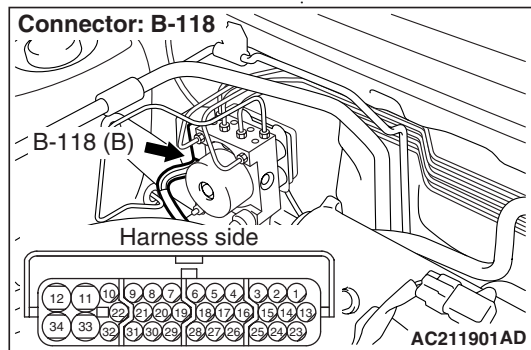
Front wheel speed sensor (LH) connector A-03

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 6.

NO : Repair it and then go to Step 15.

STEP 6. Check the following harness wires.

The wire between ABS-ECU connector B-118 (terminal 22) and front wheel speed sensor (LH) connector A-03 (terminal 2)

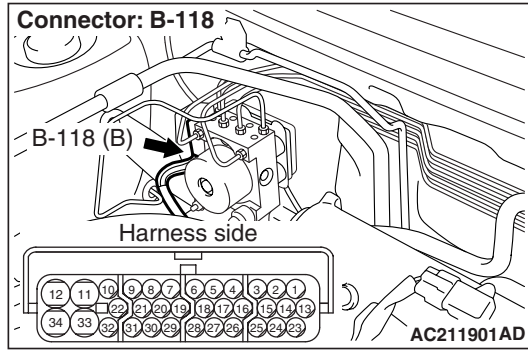
- The wire between ABS-ECU connector B-118 (terminal 31) and front wheel speed sensor (LH) connector A-03 (terminal 1)

Q: Is any harness wire damaged?

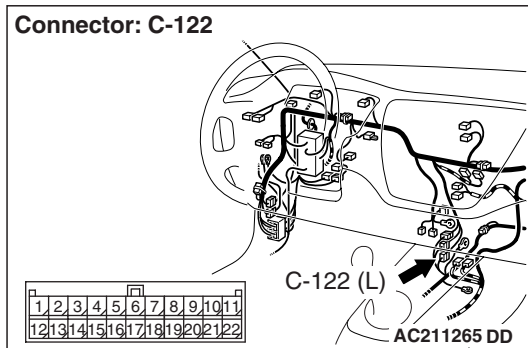
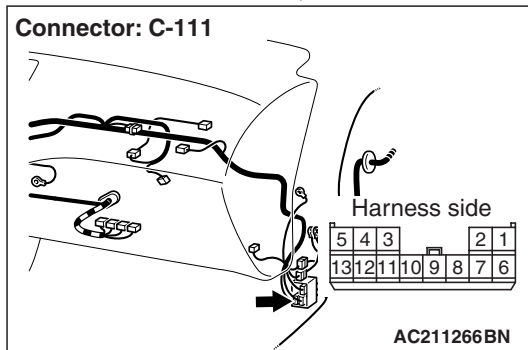
YES : Repair or replace it and then go to Step 15.

NO : Go to Step 15.

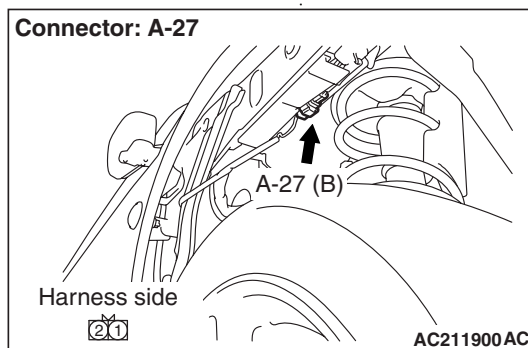
STEP 7. Check the following connectors.



ABS-ECU connector B-118



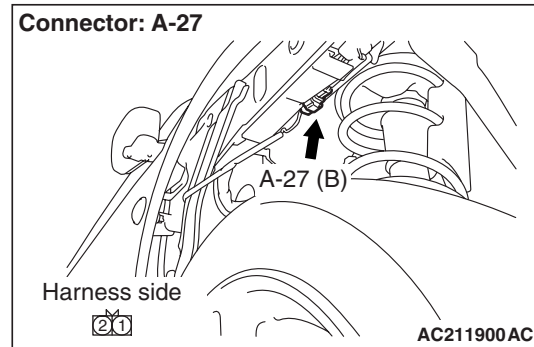
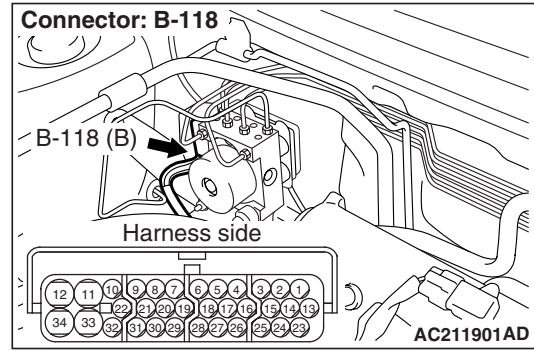
Intermediate connectors C-111, C-122



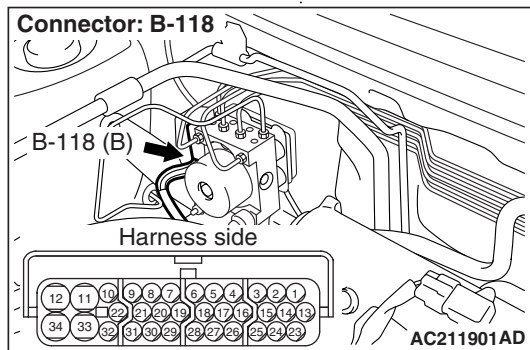
Front wheel speed sensor (RH) connector A-27
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

- Q: Are the connectors and terminals in good condition?**
YES : Go to Step 8.
NO : Repair it and then go to Step 15.

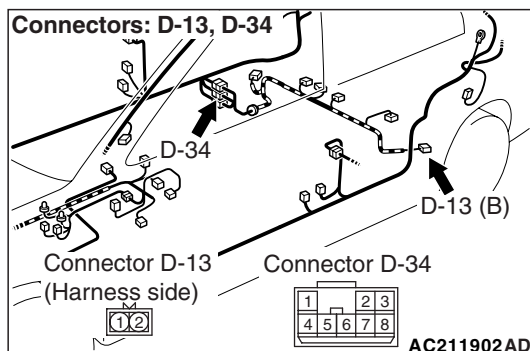
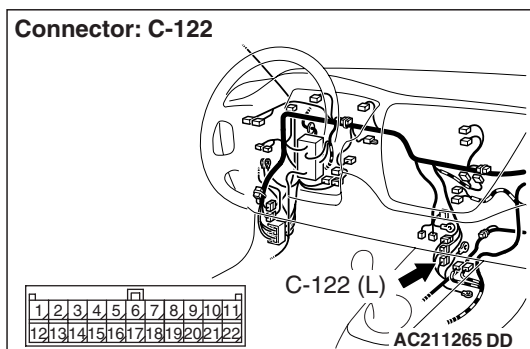
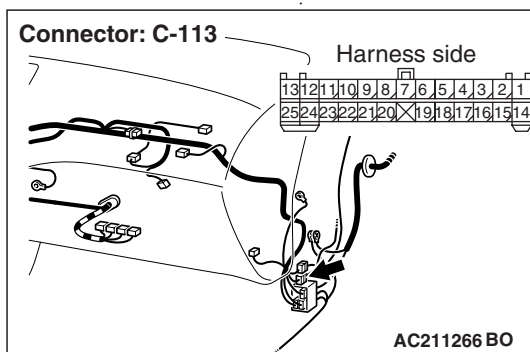
STEP 8. Check the following harness wires.



- The wire between ABS-ECU connector B-118 (terminal 29) and front wheel speed sensor (RH) connector A-27 (terminal 1)
- The wire between ABS-ECU connector B-118 (terminal 30) and front wheel speed sensor (RH) connector A-27 (terminal 2)
- Q: Is any harness wire damaged?**
YES : Repair or replace it and then go to Step 15.
NO : Go to Step 15.

STEP 9. Check the following connectors.

ABS-ECU connector B-118



Intermediate connectors C-113, C-122, D-34

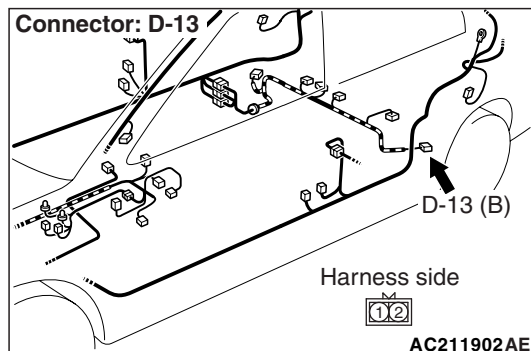
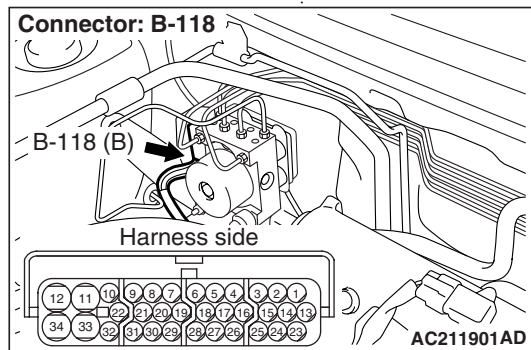
- Rear wheel speed sensor (LH) connector D-13

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

NO : Repair it and then go to Step 15.

STEP 10. Check the following harness wires.

The wire between ABS-ECU connector B-118 (terminal 6) and rear wheel speed sensor (LH) connector D-13 (terminal 1)

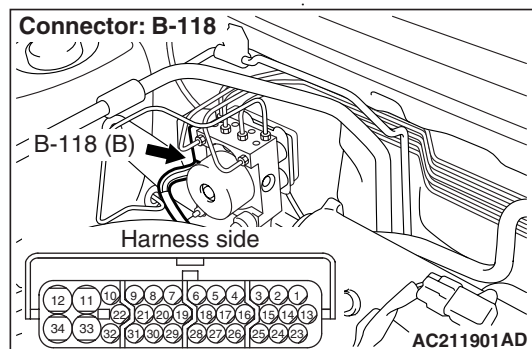
- The wire between ABS-ECU connector B-118 (terminal 7) and rear wheel speed sensor (LH) connector D-13 (terminal 2)

Q: Is any harness wire damaged?

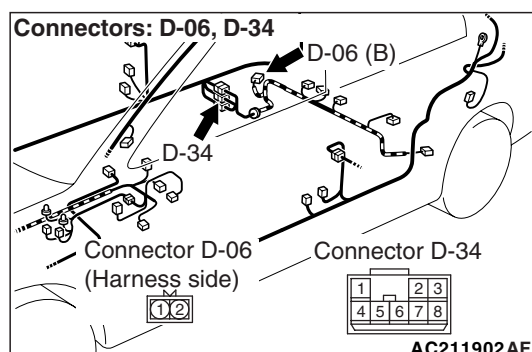
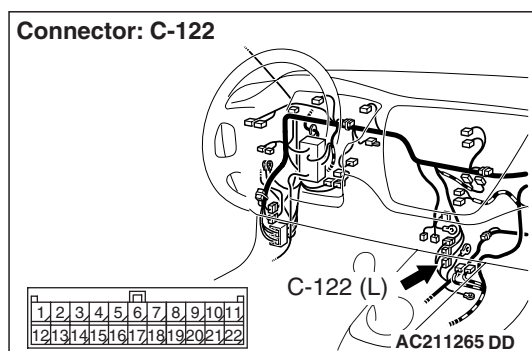
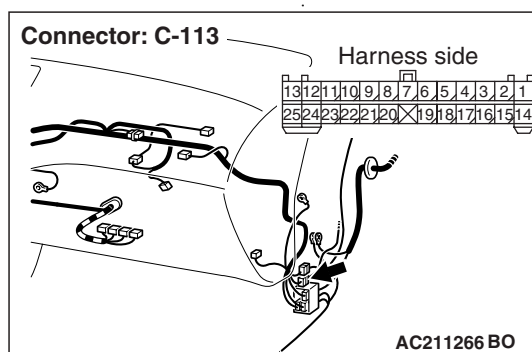
YES : Repair or replace it and then go to Step 15.

NO : Go to Step 15.

STEP 11. Check the following connectors.



ABS-ECU connector B-118



Intermediate connectors C-113, C-122, D-34

- Rear wheel speed sensor (RH) connector D-06

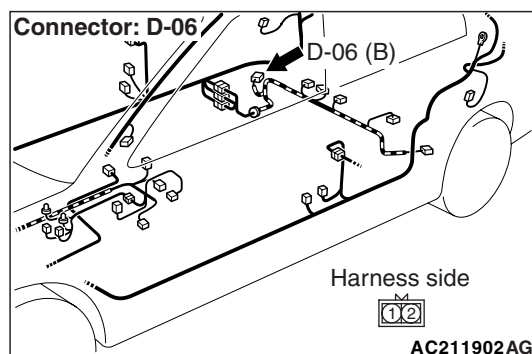
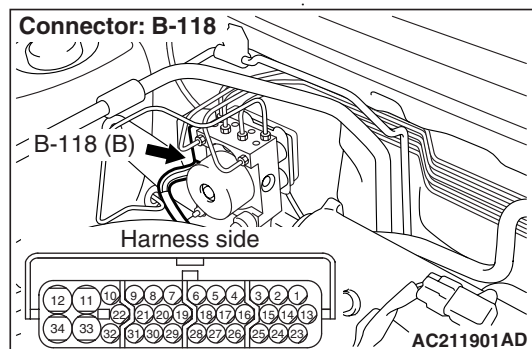
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 12.

NO : Repair it and then go to Step 15.

STEP 12. Check the following harness wires:



The wire between ABS-ECU connector B-118 (terminal 8) and rear wheel speed sensor (RH) connector D-06 (terminal 1)

- The wire between ABS-ECU connector B-118 (terminal 9) and rear wheel speed sensor (RH) connector D-06 (terminal 2)

Q: Is any harness wire damaged?

YES : Repair or replace it and then go to Step 15.

NO : Go to Step 15.

STEP 13. Measure the wheel speed sensor output voltage.

Refer to [P.35B-138](#).

Output Voltage:

- When measured with a voltmeter: 42 mV or more
- When measured with an oscilloscope (maximum voltage): 120 mV or more

Q: Does the voltage meet the specification?

YES : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 15.

NO : Go to Step 14.

STEP 14. Check the wheel bearing.

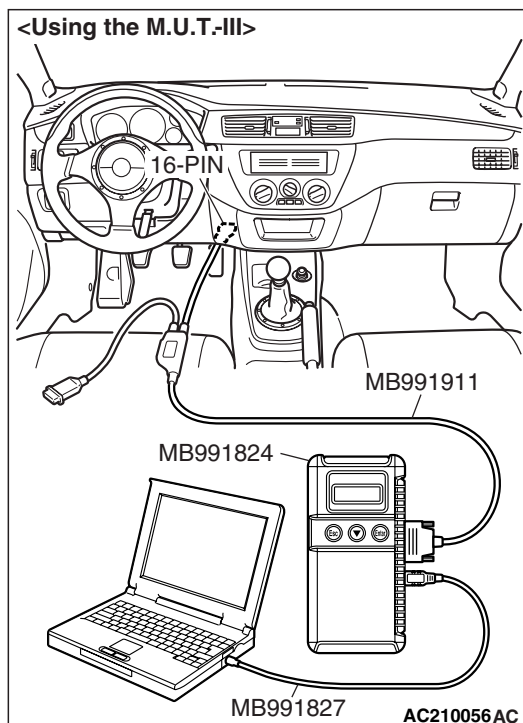
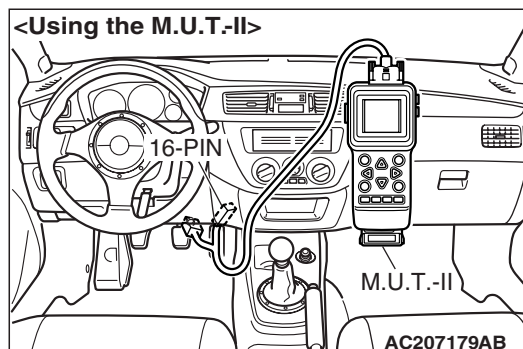
Refer to GROUP 26, On-vehicle Service – Wheel Bearing Axial Play Check <Front>P.26-6 or GROUP 27, On-vehicle Service – Wheel Bearing Axial Play Check <Rear>P.27-30. If play on the wheel bearing is not within the limit, replace the wheel bearing.

Limit: 0.05 mm

Q: Is play on the wheel bearing within the standard value?

YES : Go to Step 15.

NO : Replace it and then go to Step 15.

STEP 15. Check whether the diagnosis code is reset.

Check again if the diagnosis code is set.

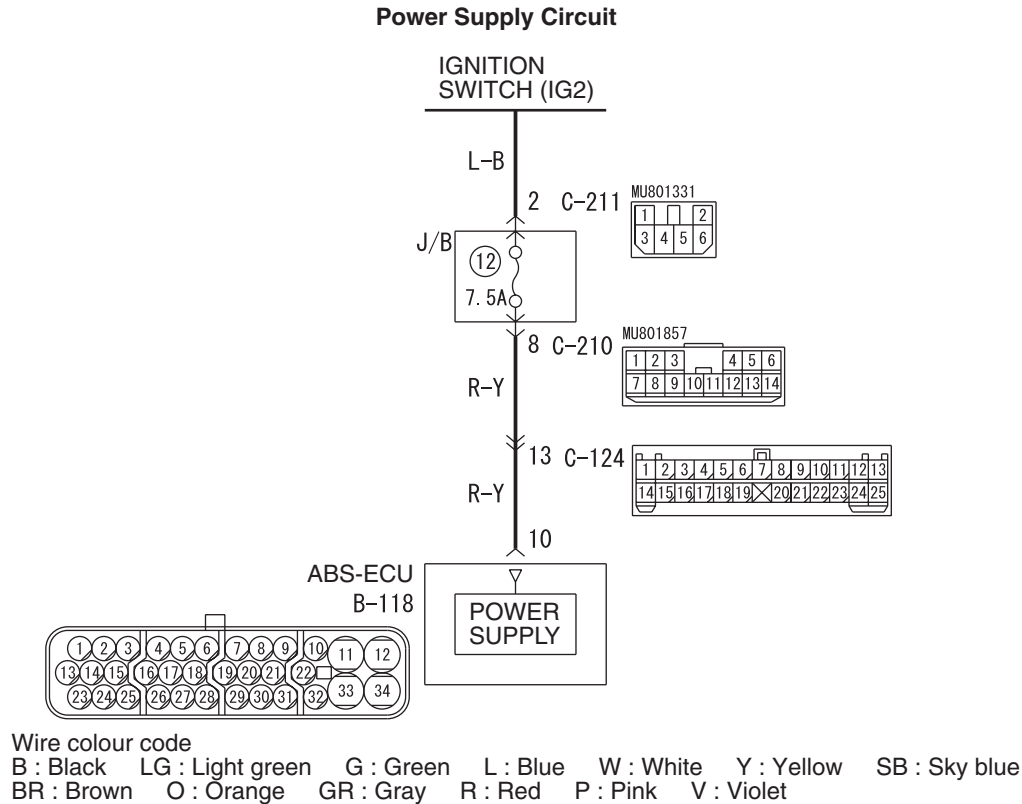
- (1) Turn the ignition switch to the "ON" position.
- (2) Erase the diagnosis code.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.
- (4) Turn the ignition switch to the "ON" position.
- (5) Check if the diagnosis code is set.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Do the diagnosis codes 11, 12, 13, 14, 21, 22, 23 or 24 reset?

YES : Go to Step 1.

NO : The procedure is complete.

Code No.16: ABS-ECU Power Supply System (abnormal voltage drop or rise)



W4J35E019A

OPERATION

The ABS-ECU power is supplied to the ABS-ECU (terminal 10) from the ignition switch (IG2) through the multi-purpose fuse number 12 in the junction block.

DIAGNOSIS CODE SET CONDITIONS

Output is provided when ABS-ECU power supply voltage drops below or rises above the normal value. Output is not provided if power supply voltage returns to normal voltage.

PROBABLE CAUSES

The most likely causes for this diagnosis code to set are:

- Malfunction of battery
- Damaged wiring harness and connector
- Malfunction of brake modulator hydraulic unit and ABS-ECU

DIAGNOSIS

STEP 1. Check the battery.

Refer to GROUP 54A, Battery – On-vehicle Service – Battery Test [P.54A-5](#).

Q: Is the battery damaged?

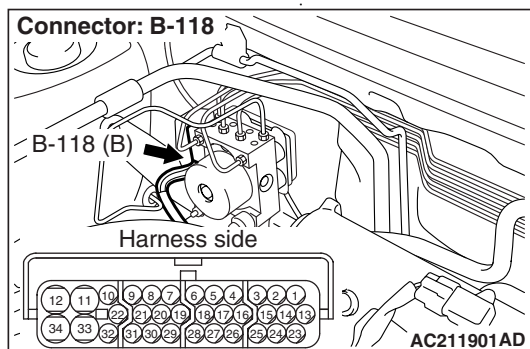
- YES** : Charge or replace the battery and then go to Step 5.
NO : Go to Step 2.

STEP 2. Check the charging system.

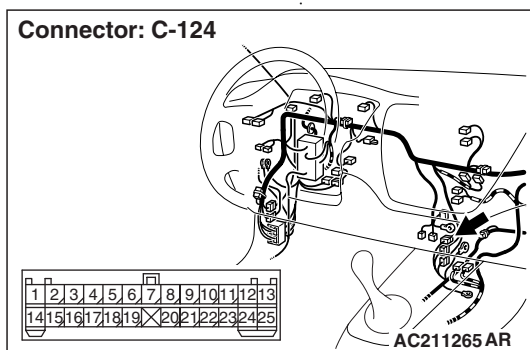
Refer to GROUP 16, Charging System – On-vehicles Service [P.16-5](#).

Q: Is the charging system damaged?

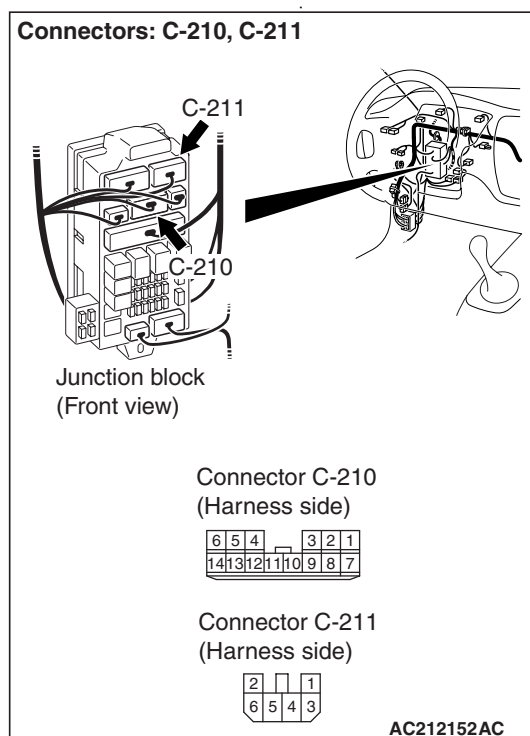
- YES** : Repair the Charging System and then go to Step 5.
NO : Go to Step 3.

STEP 3. Check the following connectors.

ABS-ECU connector B-118



Intermediate connector C-124



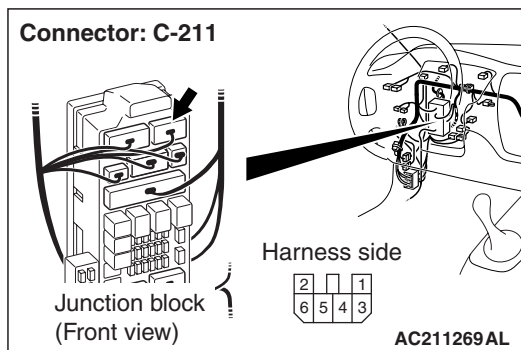
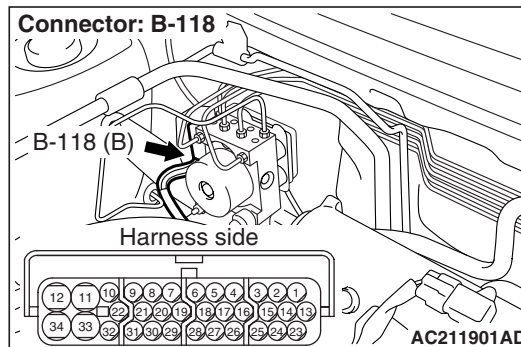
Junction block connectors C-210, C-211

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 4.

NO : Repair it and then go to Step 5.

STEP 4. Check the following harness wire.

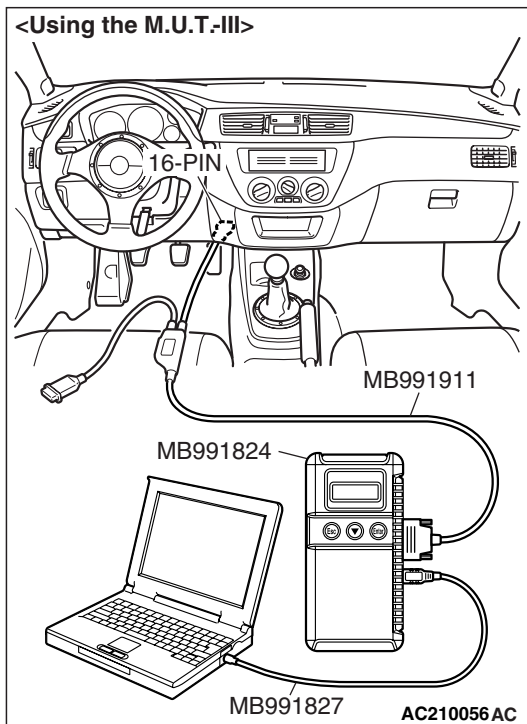
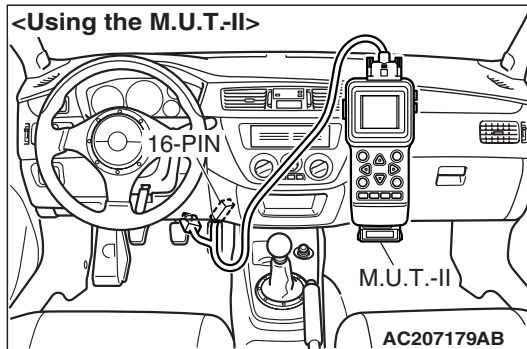
The wire between ABS-ECU connector B-118 (terminal 10) and junction block connector C-211 (terminal 2)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 5.

NO : Go to Step 5.

STEP 5. Check whether the diagnosis code is reset.



Check again if the diagnosis code is set.
(1) Turn the ignition switch to the "ON" position.

- (2) Erase the diagnosis code.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.
- (4) Turn the ignition switch to the "ON" position.
- (5) Check if the diagnosis code is set.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

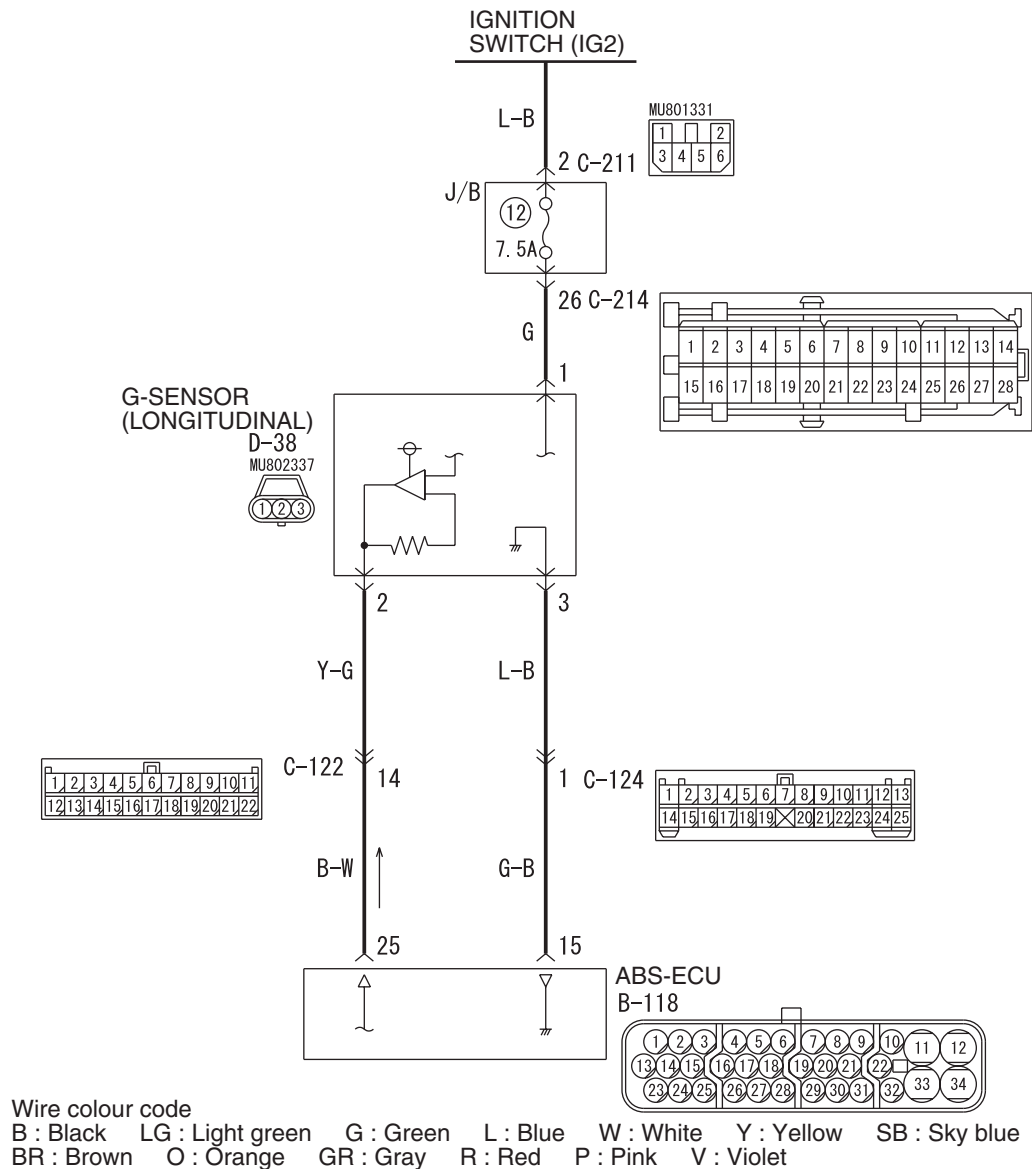
Q: Does diagnosis code No.16 reset?

YES : Start over at Step 1.

NO : The procedure is complete.

Code No.32: Longitudinal G-Sensor System

Longitudinal G-Sensor Circuit



W4J35E020A

OPERATION

The G-sensor detects the acceleration level in the forward/reverse direction of the vehicle, converts the signals into voltage signals and then sends that signal to the ABS-ECU.

DIAGNOSIS CODE SET CONDITIONS

This code is set in the following case.

- When the G-sensor output is 0.5 V or lower or 4.5 V or higher (disconnected G-sensor or G-sensor short circuit)

- If the G-sensor output power does not change (G-sensor output fastening).

PROBABLE CAUSES

The most likely causes for this diagnosis code to set are:

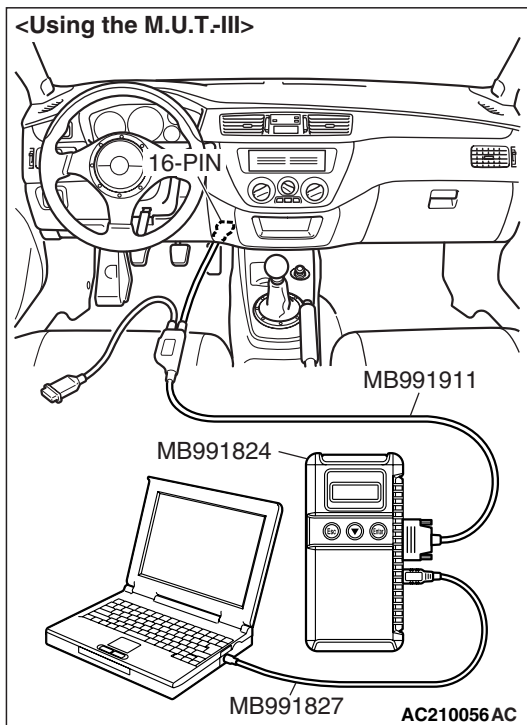
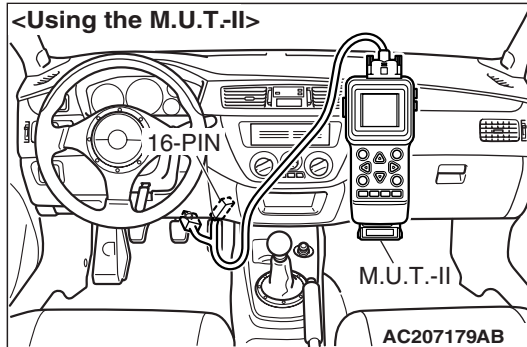
- Malfunction of the G-sensor
- Damaged wiring harness and connector
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)

DIAGNOSIS

STEP 1. M.U.T.-II/III data list.

⚠ CAUTION

To prevent damage to M.U.T.-II/III, always turn the ignition switch to the "LOOK" (OFF) position before connecting or disconnecting M.U.T.-II/III.



(1) Connect M.U.T.-II/III as shown in the illustration.

- (2) Start the engine.
- (3) Set M.U.T.-II/III to data reading mode for following item.

- Item 32: Longitudinal G-sensor

OK:

When vehicle is stationary (level): 2.4 – 2.6 V

When vehicle is being driven: 1.0 – 4.0 V

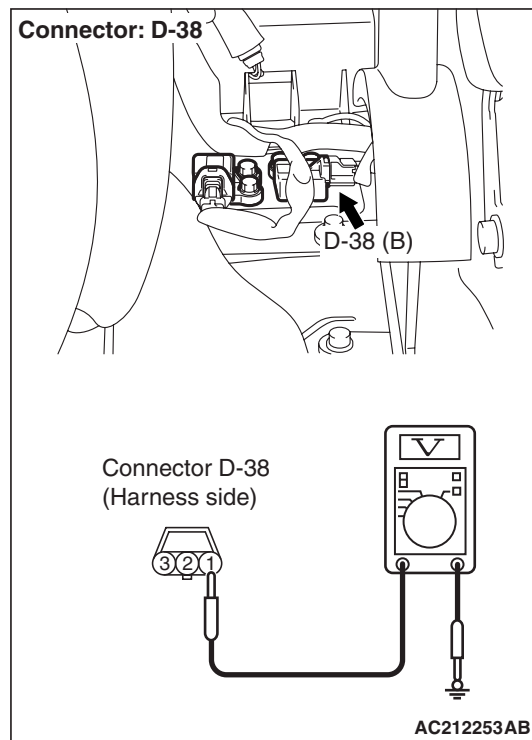
Q: Is the longitudinal G-sensor input normal?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope With Intermittent Malfunction

[P.00-5.](#)

NO : Go to Step 2.

STEP 2. Check the power supply circuit. Voltage measurement at longitudinal G-sensor connector D-38.



- (1) Disconnect connector D-38, and check at the harness side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 1 and earth.

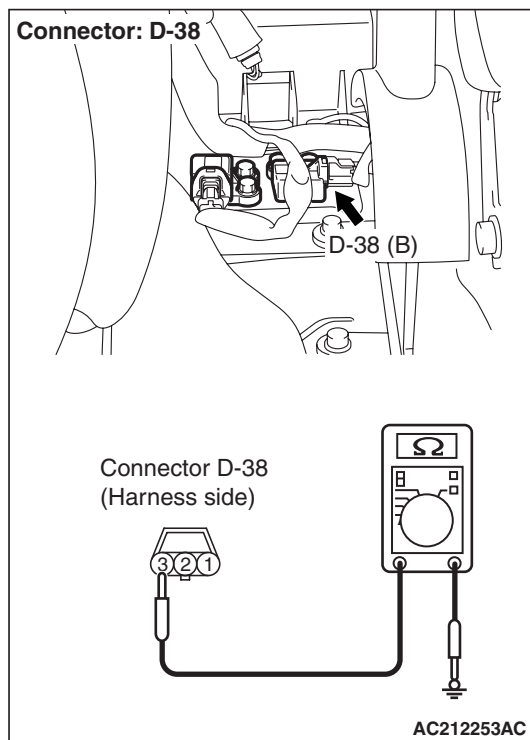
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 3.

NO : Go to Step 4.

STEP 3. Check the earth circuit. Resistance measurement at longitudinal G-sensor connector D-38.



- (1) Disconnect connector D-38, and check at the harness side.
- (2) Measure the resistance between terminal 3 and earth.

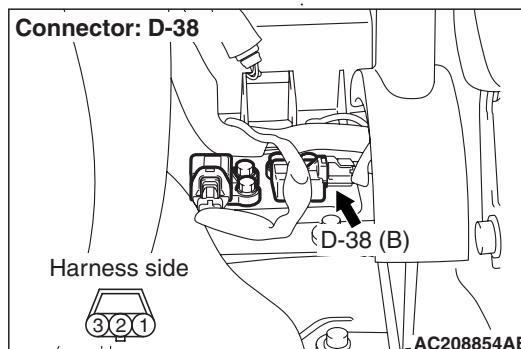
OK: 2 ohms or less

Q: Is the resistance 2 ohms or less.

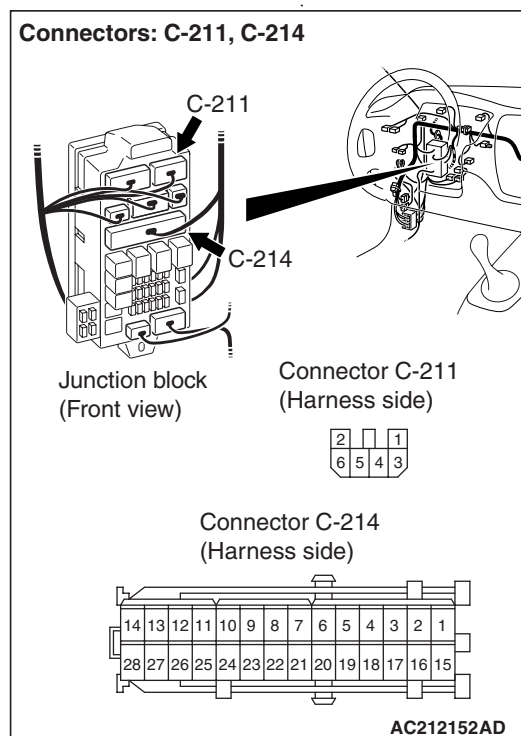
YES : Go to Step 8.

NO : Go to Step 6.

STEP 4. Check the following connectors.



Longitudinal G-sensor connector D-38



Junction block connectors C-211, C-214

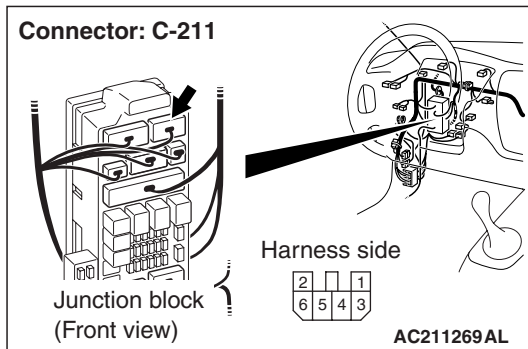
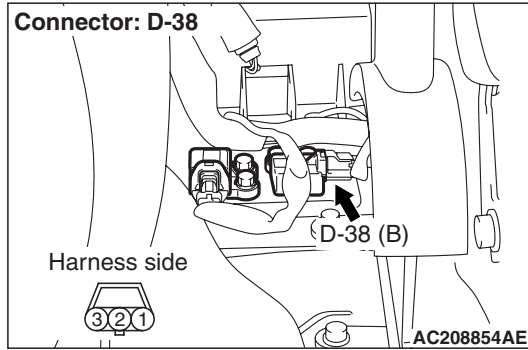
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 5.

NO : Repair it and then go to Step 11.

STEP 5. Check the following harness wire.



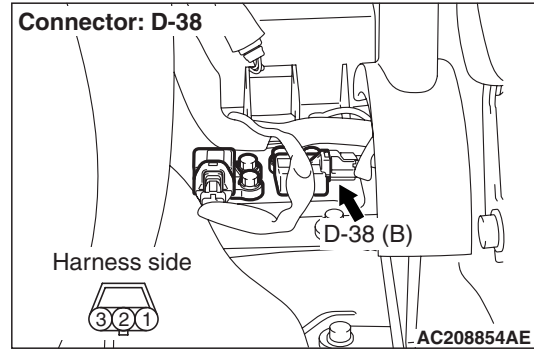
The wire between longitudinal G-sensor connector D-38 (terminal 1) and junction block connector C-211 (terminal 2)

Q: Is the harness wire damaged?

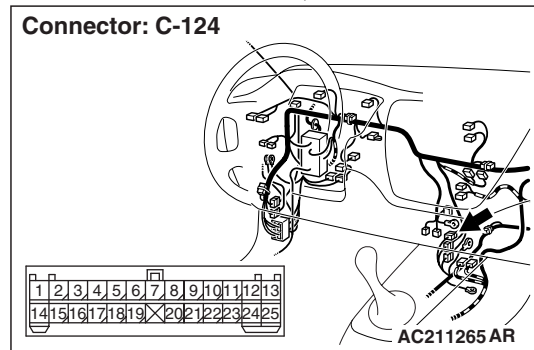
YES : Repair or replace it and then go to Step 11.

NO : Go to Step 11.

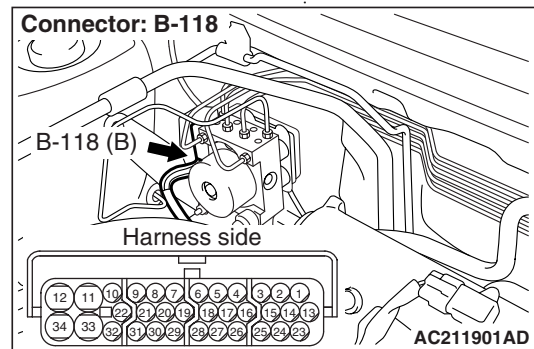
STEP 6. Check the following connectors.



Longitudinal G-sensor connector D-38



Intermediate connector C-124



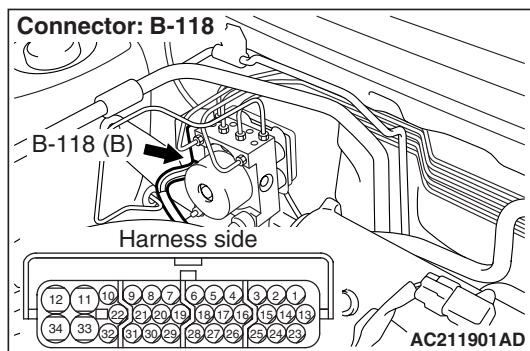
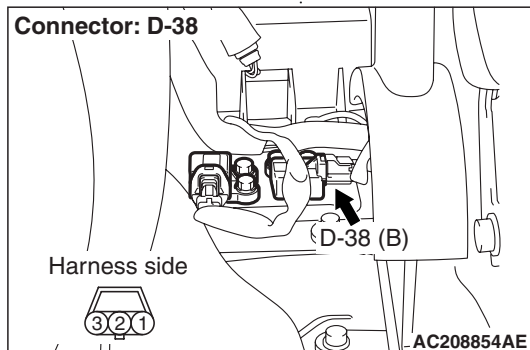
ABS-ECU connector B-118

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 7.

NO : Repair it and then go to Step 11.

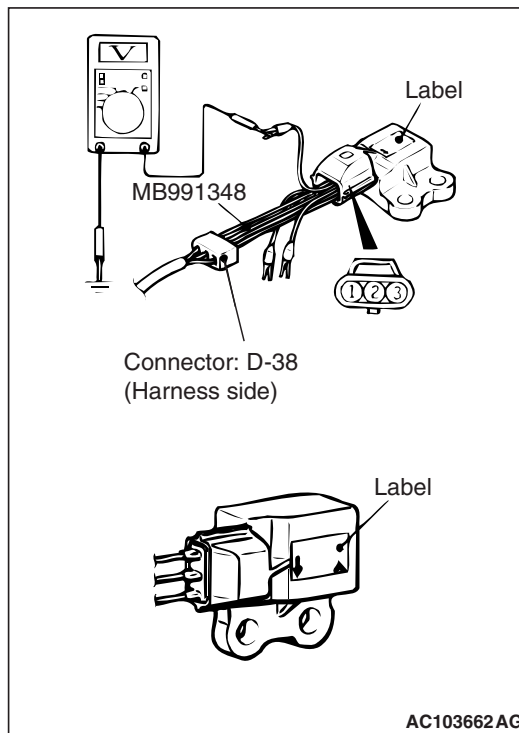
STEP 7. Check the following harness wire.

The wire between longitudinal G-sensor connector D-38 (terminal 3) and ABS-ECU connector B-118 (terminal 15)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 11.

NO : Go to Step 11.

STEP 8. Check longitudinal G-sensor output voltage.

- (1) Disconnect connector D-38, and then connect special tool harness set (MB991348) between terminals of the disconnected connectors.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 2 and earth.

OK:

When the longitudinal G-sensor is placed on a level plane: 2.4 – 2.6 volts

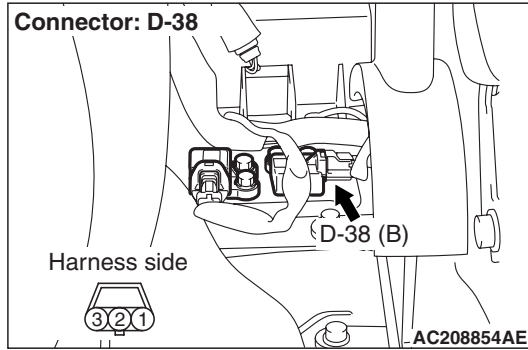
When the longitudinal G-sensor is placed with its label positioned as shown: 3.4 – 3.6 volts

Q: Is the longitudinal G-sensor output voltage normal?

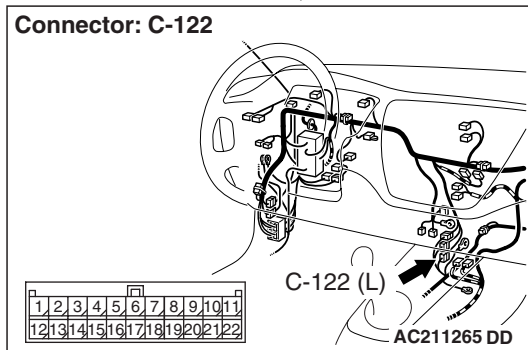
YES : Go to Step 9.

NO : Replace the longitudinal G-sensor (Refer to [P.35B-148](#)). Then go to Step 11.

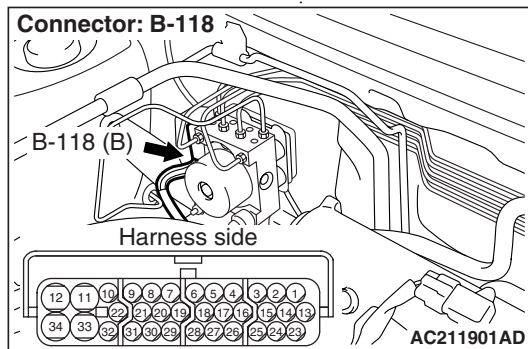
STEP 9. Check the following connectors.



Longitudinal G-sensor connector D-38



Intermediate connector C-122



ABS-ECU connector B-118

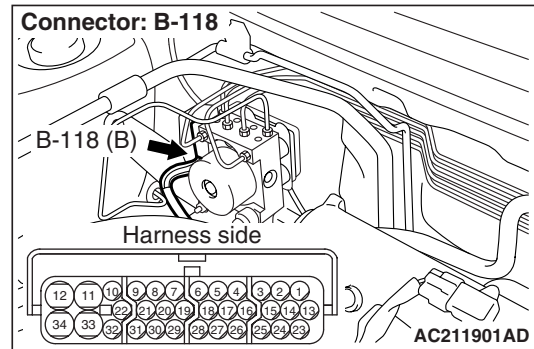
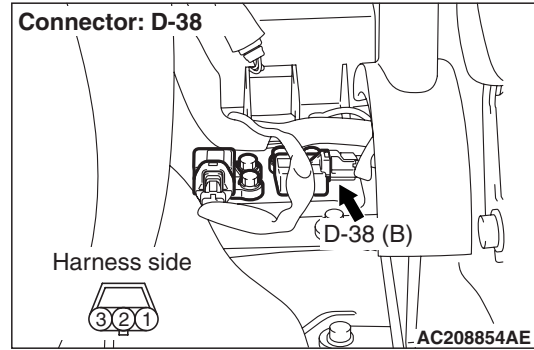
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

NO : Repair it and then go to Step 11.

STEP 10. Check the following harness wire.

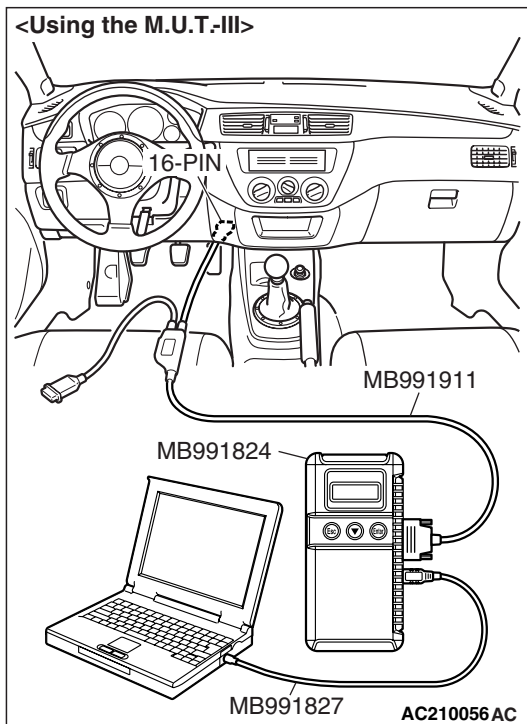
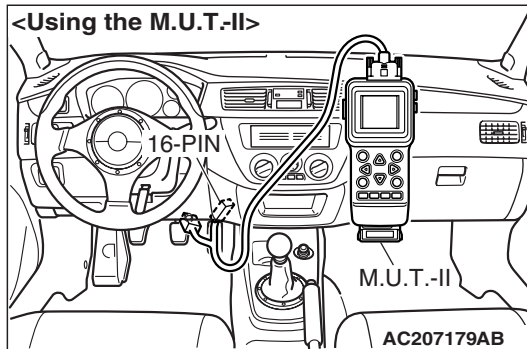


The wire between longitudinal G-sensor connector D-38 (terminal 2) and ABS-ECU connector B-118 (terminal 25)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 11.

NO : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 11.

STEP 11. Check whether the diagnosis code is reset.

Check again if the diagnosis code is set.

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

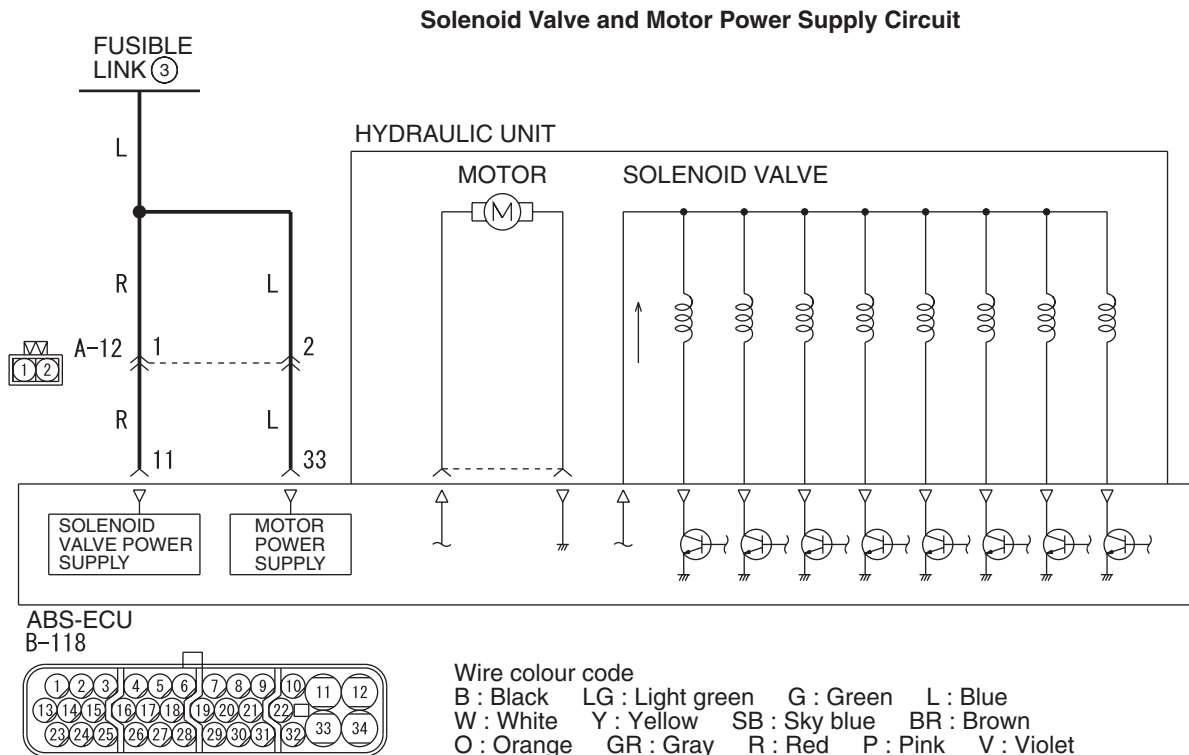
- (2) Erase the diagnosis code.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.
- (4) Turn the ignition switch to the "ON" position.
- (5) Check if the diagnosis code is set.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Does diagnosis code No.32 reset?

YES : Start over at Step 1.

NO : The procedure is complete.

Code No.41: Front Right Solenoid Valve inside Hydraulic Unit
Code No.42: Front Left Solenoid Valve inside Hydraulic Unit
Code No.43: Rear Right Solenoid Valve inside Hydraulic Unit
Code No.44: Rear Left Solenoid Valve inside Hydraulic Unit
Code No.52: Valve Relay Problem (Stays off)
Code No.53: Motor Relay Problem (Stays off)
Code No.55: Motor System (Seized Pump Motor)



W4J35E022A

OPERATION

Power is continuously supplied to the ABS-ECU through fusible link number 3 to operate the solenoid valve and motor.

DIAGNOSIS CODE SET CONDITIONS

These codes are displayed if the power supply circuit of solenoid valve or motor is open or shorted.

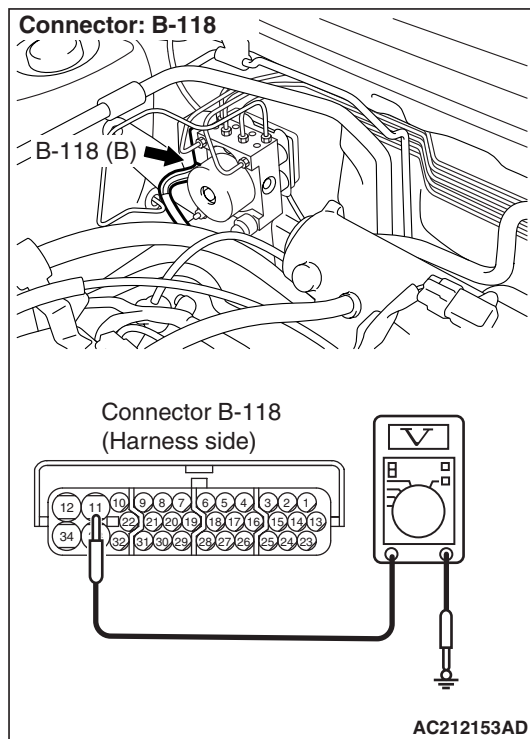
PROBABLE CAUSES

The most likely causes for these diagnosis codes to set are:

- Damaged wiring harness or connector
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)

DIAGNOSIS

STEP 1. Check the solenoid valve or motor power supply circuit. Voltage measurement at ABS-ECU connector B-118.



- (1) Disconnect ABS-ECU connector B-118 and measure at the harness side.
- (2) Measure the voltage between terminal 11 and earth, and 33 and earth.

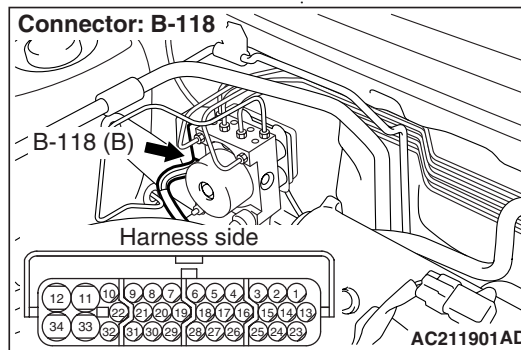
OK: System voltage

Q: Is the check result normal?

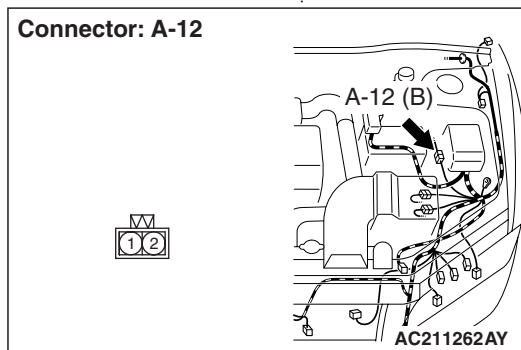
YES : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 4.

NO : Go to Step 2.

STEP 2. Check the following connectors.



ABS-ECU connector B-118



Intermediate connector A-12

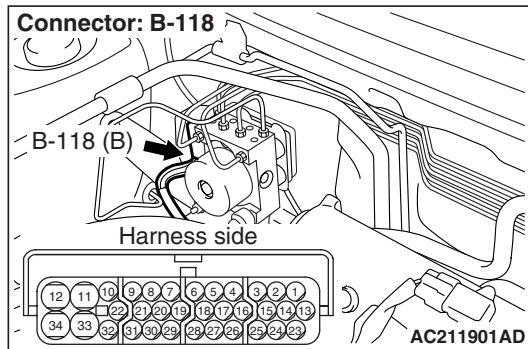
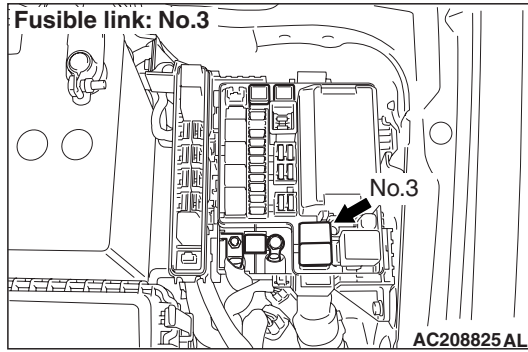
Check the connectors, for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 3.

NO : Repair it and then go to Step 4.

STEP 3. Check the following harness wires.



The wire between fusible link No.3 and ABS-ECU connector B-118 (terminal 11)

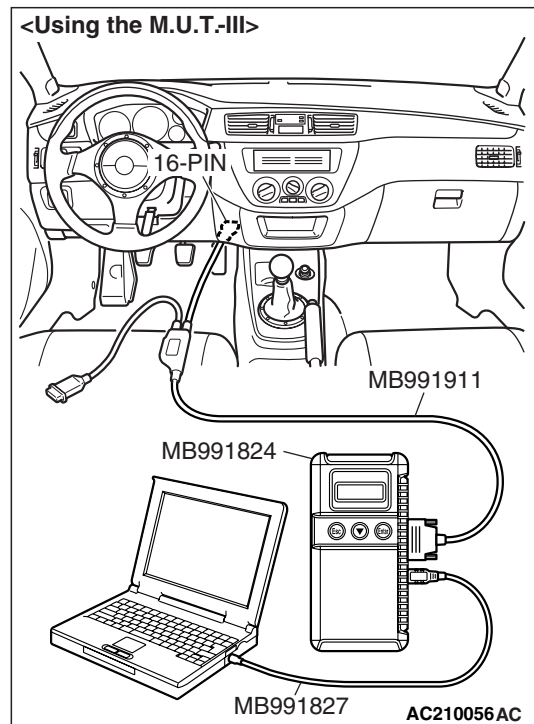
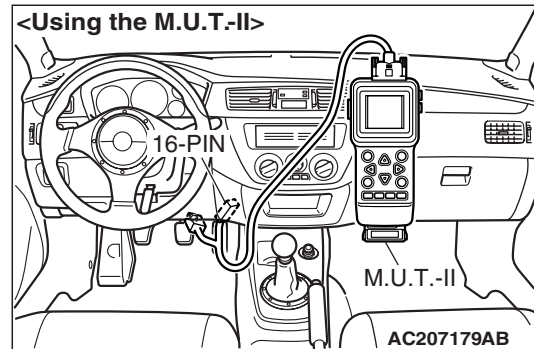
- The wire between fusible link No.3 and ABS-ECU connector B-118 (terminal 33)

Q: Is any harness wire damaged?

YES : Repair or replace it and then go to Step 4.

NO : Go to Step 4.

STEP 4. Check whether the diagnosis code is reset.



Check again if the diagnosis code is set.

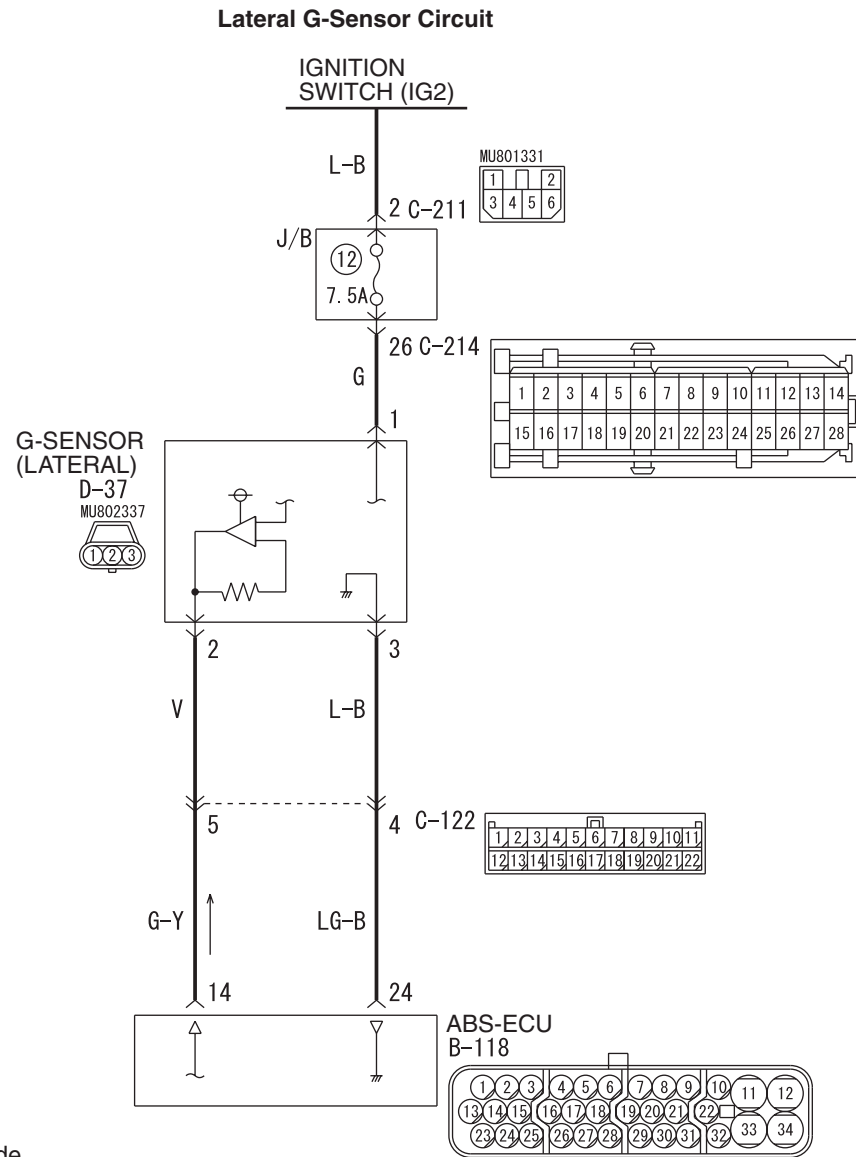
- (1) Turn the ignition switch to the "ON" position.
- (2) Erase the diagnosis code.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.
- (4) Turn the ignition switch to the "ON" position.
- (5) Check if the diagnosis code is set.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Do diagnosis codes 41, 42, 43, 44, 52, 53 or 55 reset?

YES : Return to Step 1.

NO : The procedure is complete.

Code No.71: Lateral G-Sensor System



W4J35E021A

OPERATION

The lateral G-sensor detects the acceleration level in the left/right direction of the vehicle, converts the signals into voltage signals and then sends that signal to the ABS-ECU.

DIAGNOSIS CODE SET CONDITIONS

This code is set in the following cases:

- When the G-sensor output is 0.5 V or lower or 4.5 V or higher (disconnected lateral G-sensor or lateral G-sensor short circuit)

- If the lateral G-sensor output power does not change (lateral G-sensor output fastening).

PROBABLE CAUSES

The most likely causes for diagnosis code to set are:

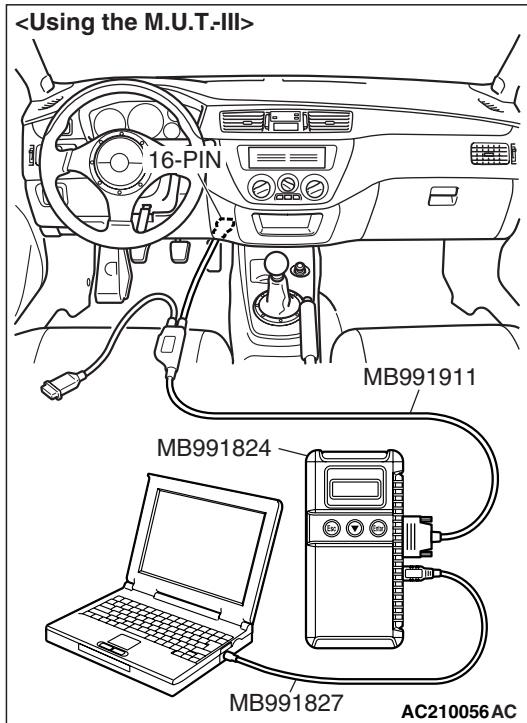
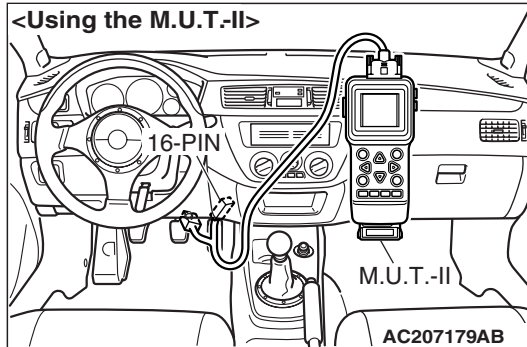
- Malfunction of the lateral G-sensor
- Damaged wiring harness and connector
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)

DIAGNOSIS

STEP 1. M.U.T.-II/III data list.

CAUTION

To prevent damage to M.U.T.-II/III, always turn the ignition switch to the "LOOK" (OFF) position before connecting or disconnecting M.U.T.-II/III.



(1) Connect M.U.T.-II/III as shown in the illustration.

- (2) Start the engine.
- (3) Set M.U.T.-II/III to data reading mode for following item.

- Item 71: Lateral G-sensor

OK:

When vehicle is stationary (level): 2.4 – 2.6 V

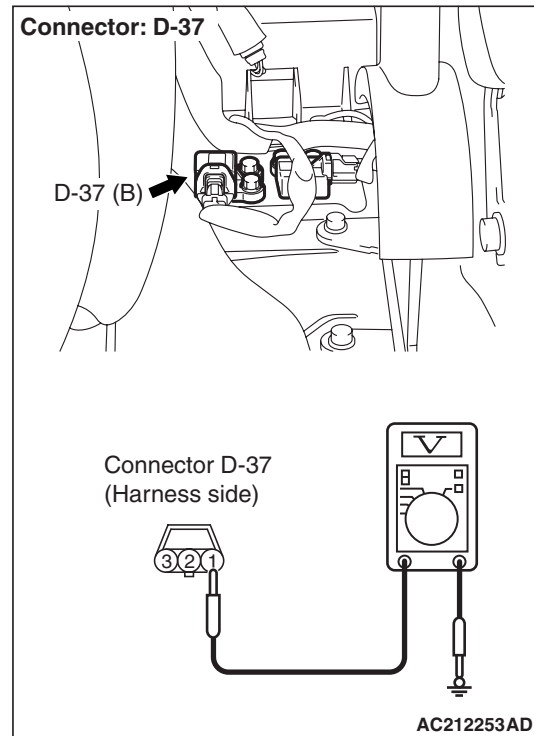
When vehicle is being driven: 1.0 – 4.0 V

Q: Is the lateral G-sensor input normal?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope With Intermittent Malfunction [P.00-5](#).

NO : Go to Step 2.

STEP 2. Check the power supply circuit. Voltage measurement at lateral G-sensor connector D-37.



- (1) Disconnect connector D-37, and check at the harness side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 1 and earth.

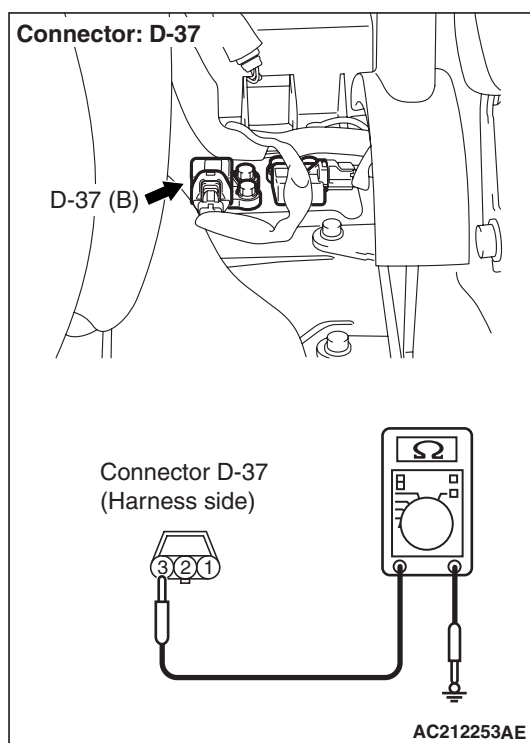
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 3.

NO : Go to Step 4.

STEP 3. Check the earth circuit. Resistance measurement at lateral G-sensor connector D-37.



- (1) Disconnect connector D-37, and check at the harness side.
- (2) Measure the resistance between terminal 3 and earth.

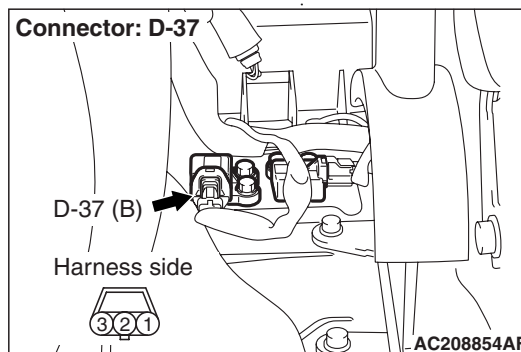
OK: 2 ohms or less

Q: Is the resistance 2 ohms or less?

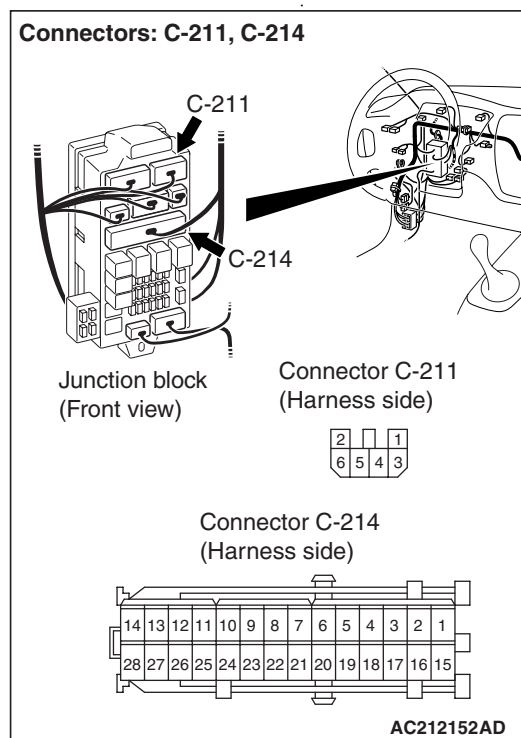
YES : Go to Step 8.

NO : Go to Step 6.

STEP 4. Check the following connectors.



Lateral G-sensor connector D-37



Junction block connectors C-211, C-214

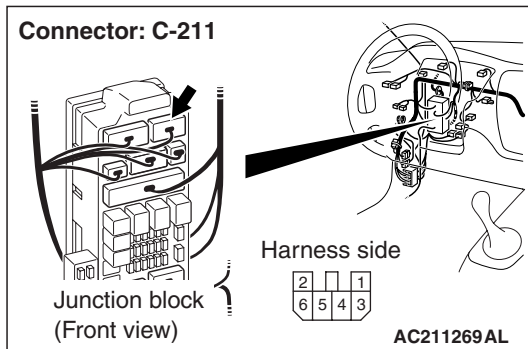
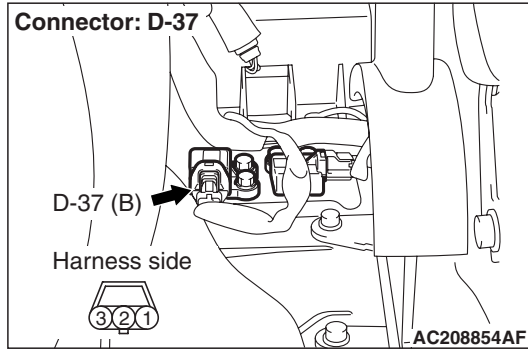
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 5.

NO : Repair it and then go to Step 11.

STEP 5. Check the following harness wire.



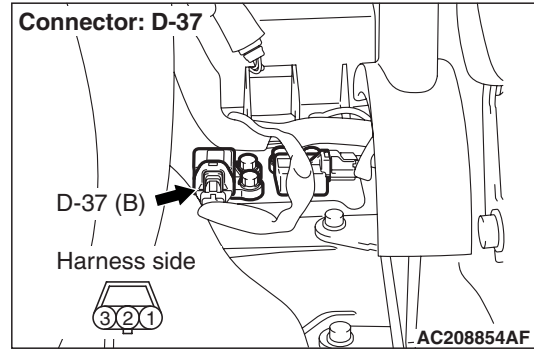
The wire between lateral G-sensor connector D-37 (terminal 1) and junction block connector C-211 (terminal 2)

Q: Is the harness wire damaged?

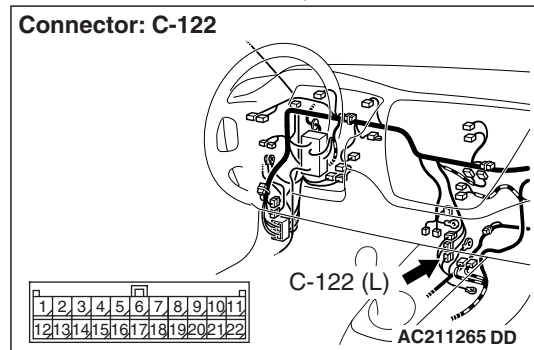
YES : Repair or replace it and then go to Step 11.

NO : Go to Step 11.

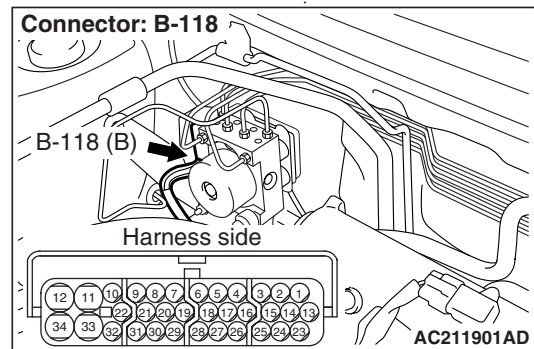
STEP 6. Check the following connectors.



Lateral G-sensor connector D-37



Intermediate connector C-122



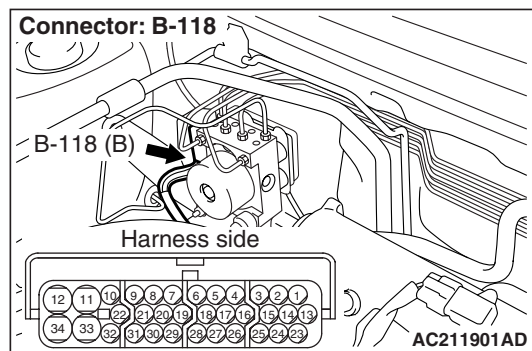
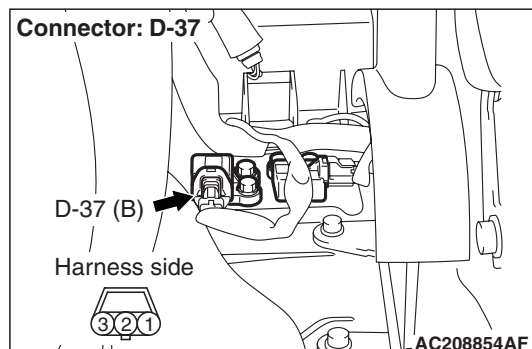
ABS-ECU connector B-118

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 7.

NO : Repair it and then go to Step 11.

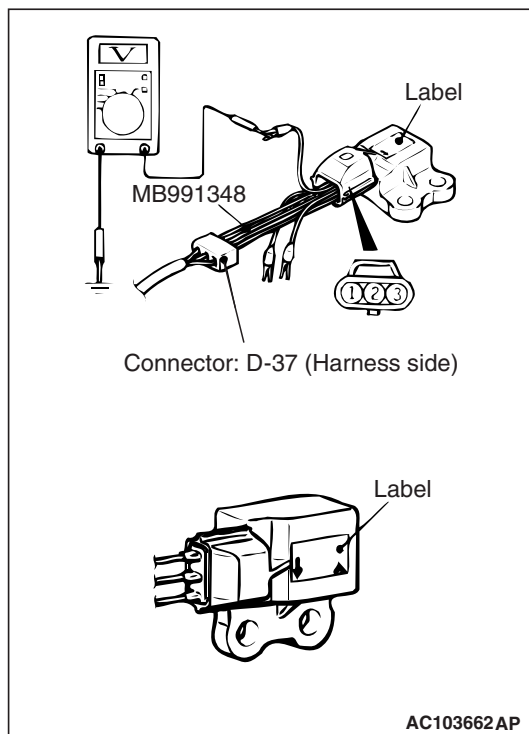
STEP 7. Check the following harness wire.

The wire between lateral G-sensor connector D-37 (terminal 3) and ABS-ECU connector B-118 (terminal 24)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 11.

NO : Go to Step 11.

STEP 8. Check lateral G-sensor output voltage.

- (1) Disconnect connector D-37, and then connect special tool harness set (MB991348) between terminals of the disconnected connectors.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 2 and earth.

OK:

When the lateral G-sensor is placed on a level plane: 2.4 – 2.6 volts

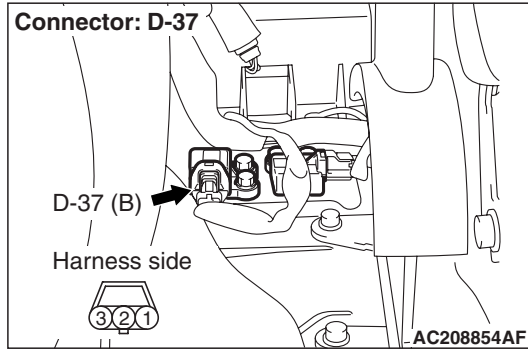
When the lateral G-sensor is placed with its label positioned as shown: 3.4 – 3.6 volts

Q: Is the lateral G-sensor output voltage normal?

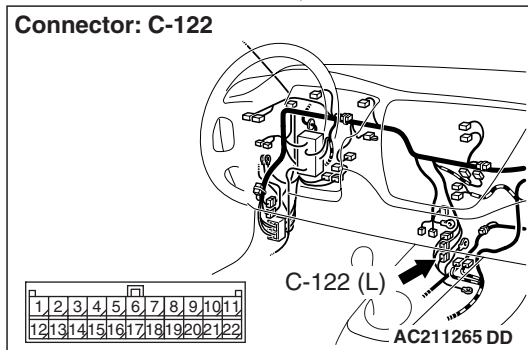
YES : Go to Step 9.

NO : Replace the lateral G-sensor (Refer to [P.35B-148](#)). Then go to Step 11.

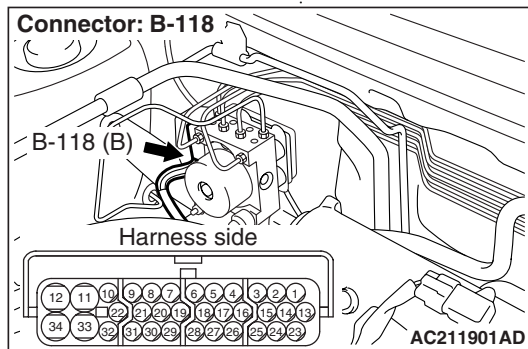
STEP 9. Check the following connectors.



Lateral G-sensor connector D-37



Intermediate connector C-122



ABS-ECU connector B-118

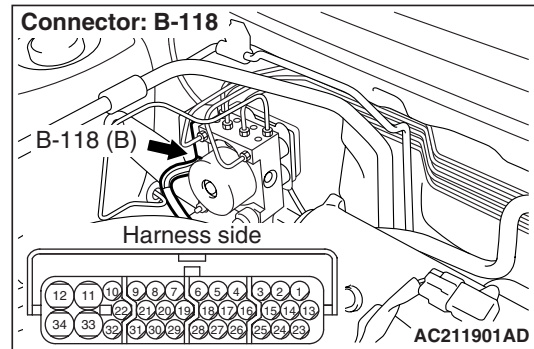
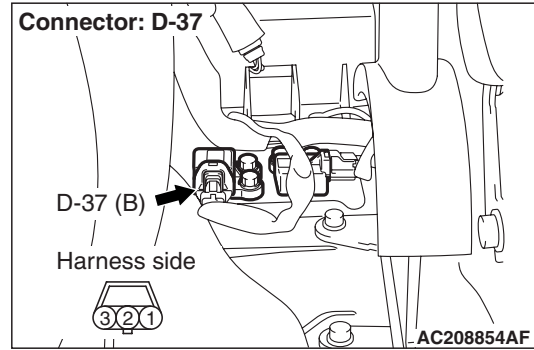
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

NO : Repair it and then go to Step 11.

STEP 10. Check the following harness wire.

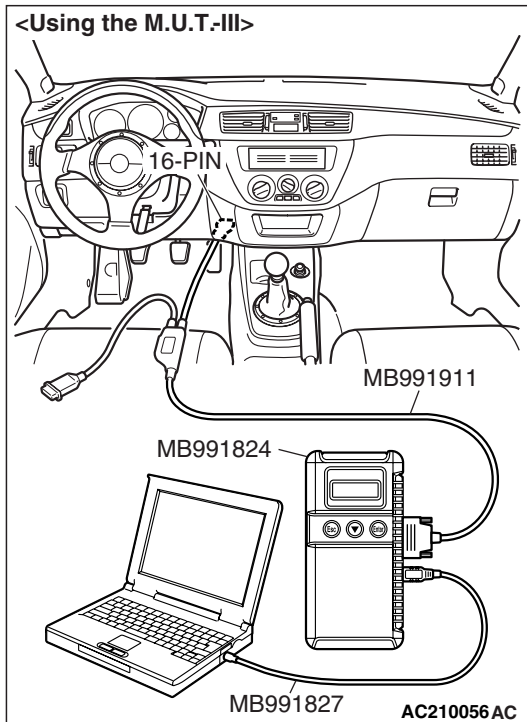
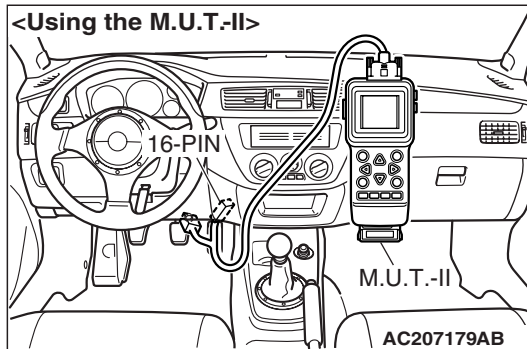


The wire between lateral G-sensor connector D-37 (terminal 2) and ABS-ECU connector B-118 (terminal 14)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 11.

NO : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 11.

STEP 11. Check whether the diagnosis code is reset.

Check again if the diagnosis code is set.

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

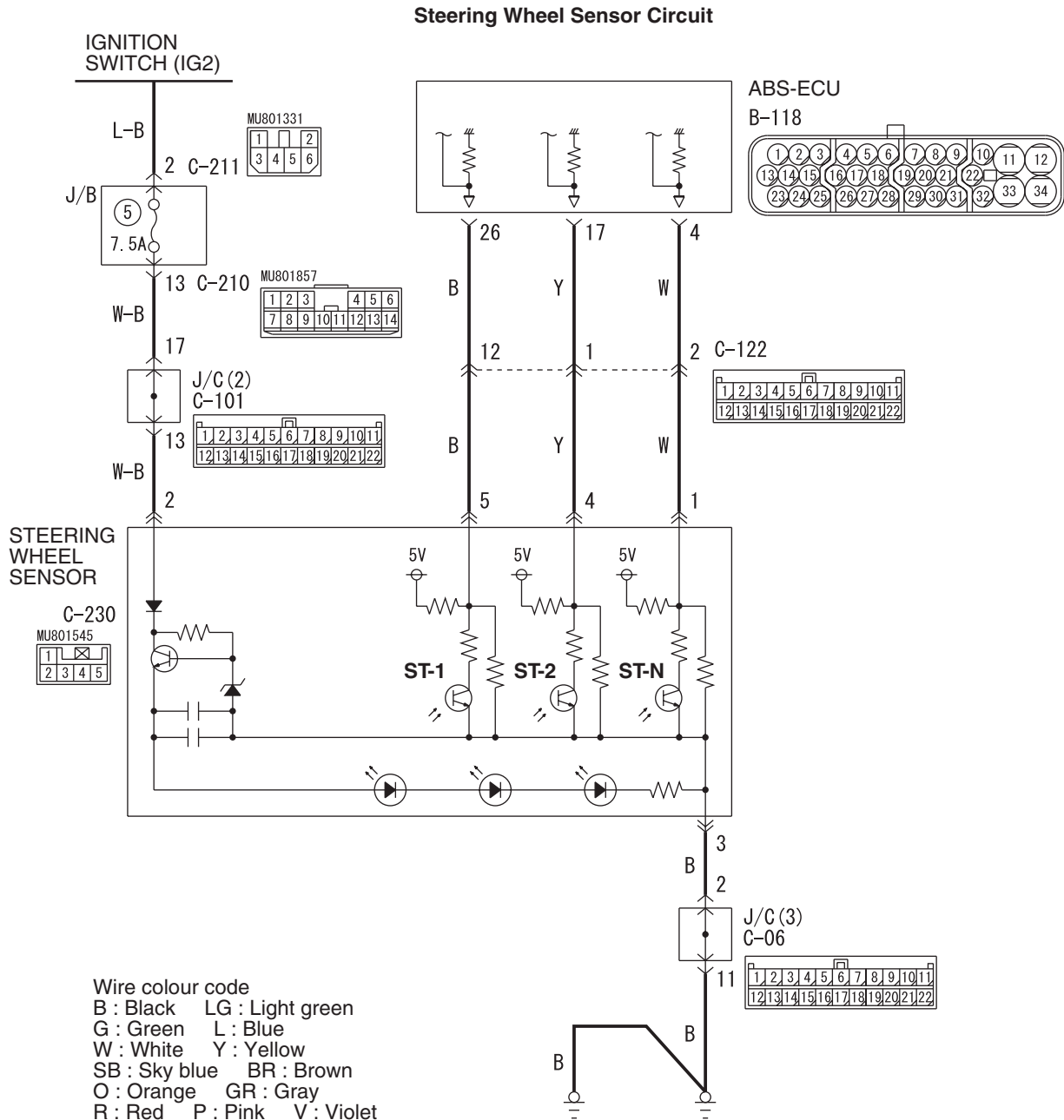
- (2) Erase the diagnosis code.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.
- (4) Turn the ignition switch to the "ON" position.
- (5) Check if the diagnosis code is set.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Does diagnosis code No.71 reset?

YES : Start over at Step 1.

NO : The procedure is complete.

Code No.81: Steering Wheel Sensor (ST-1) System
Code No.82: Steering Wheel Sensor (ST-2) System
Code No.83: Steering Wheel Sensor (ST-N) System



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OPERATION

The steering wheel sensor monitors the steering angle and sends the ST-1, ST-2 and ST-N signals. The ABS-ECU calculates the steering angle by reading the signals from the steering wheel sensor.

DIAGNOSIS CODE SET CONDITIONS

Diagnosis code No.81 (ST-1), No.82 (ST-2) and No.83 (ST-N) are set if there is a fault in the steering wheel sensor, an open circuit or short circuit in the signal lines, or the internal circuit in the hydraulic unit and ABS-ECU is defective.

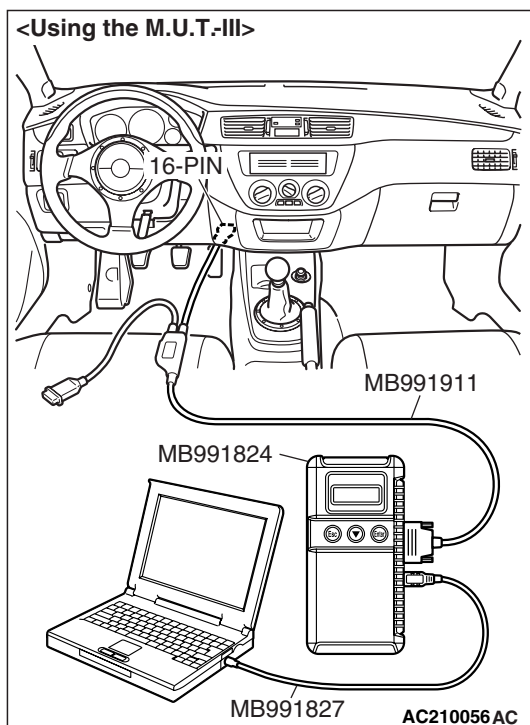
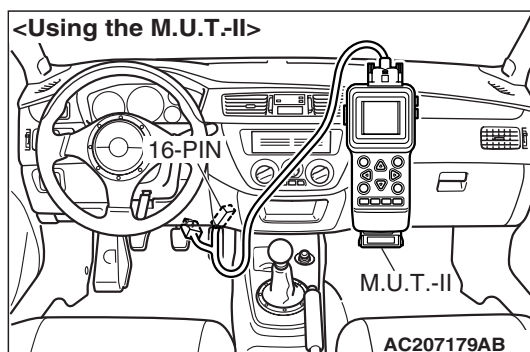
PROBABLE CAUSES

The most likely causes for these diagnosis codes to set are:

- Malfunction of the steering wheel sensor
- Damaged wiring harness and connector
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)

DIAGNOSIS**STEP 1. M.U.T.-II/III data list.****⚠ CAUTION**

To prevent damage to M.U.T.-II/III, always turn the ignition switch to the "LOOK" (OFF) position before connecting or disconnecting M.U.T.-II/III.



(1) Connect M.U.T.-II/III as shown in the illustration.

(2) Start the engine.

(3) Set M.U.T.-II/III to data reading mode for following items.

- Item 74: Steering wheel (ST-N)
- Item 75: Steering wheel (ST-1)
- Item 76: Steering wheel (ST-2)

OK:

Item No.	Check item	Checking requirement	Display
74	Steering wheel sensor (ST-N)	Steering: Neutral position and position near by $\pm 360^\circ$	ON
		Steering: Except for above	OFF
75	Steering wheel sensor (ST-1)	Steering: Turn laterally slowly.	Display ON and OFF alternately
76	Steering wheel sensor (ST-2)		

Q: Is the steering wheel sensor input normal?

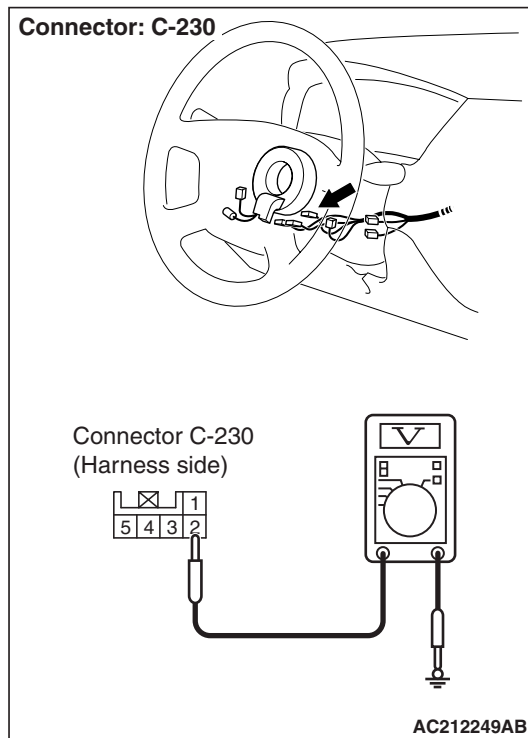
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use

Troubleshooting/Inspection Service Points –
How to Cope With Intermittent Malfunction

[P.00-5.](#)

NO : Go to Step 2.

STEP 2. Check the power supply circuit. Voltage measurement at steering wheel sensor connector C-230.



- (1) Disconnect connector C-230, and check at the harness side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 2 and earth.

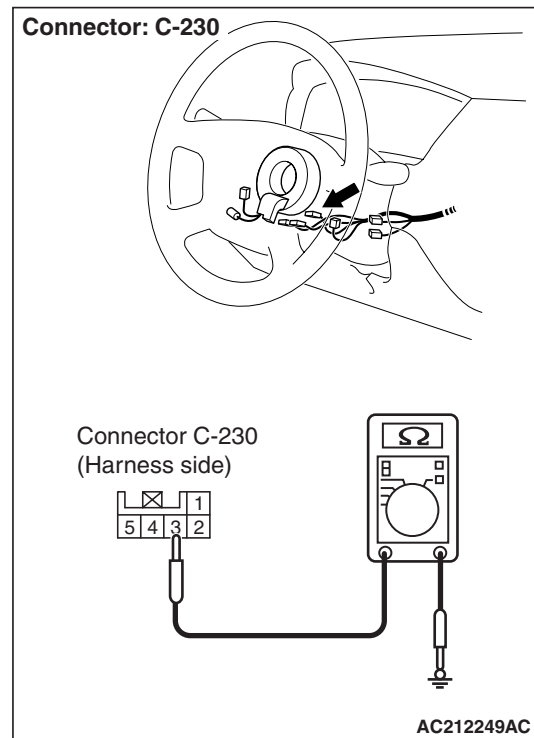
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 3.

NO : Go to Step 4.

STEP 3. Check the earth circuit. Resistance measurement at steering wheel sensor connector C-230.



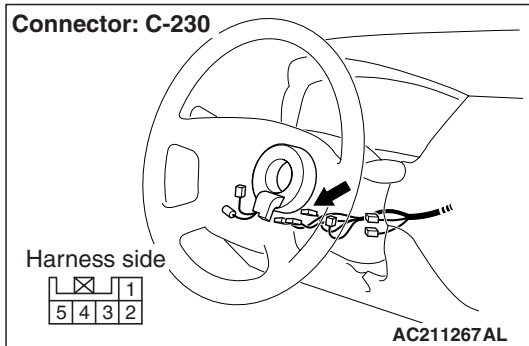
- (1) Disconnect connector C-230, and check at the harness side.
- (2) Measure the resistance between terminal 3 and earth.

OK: 2 ohms or less

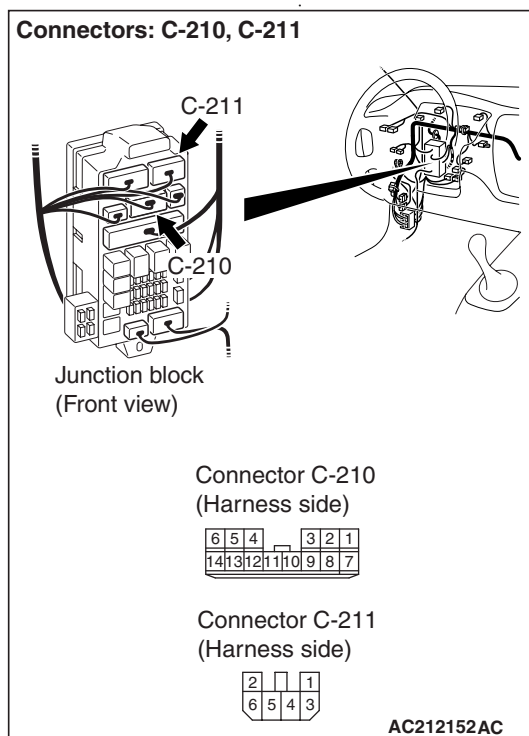
Q: Is the resistance 2 ohms or less?

YES : Go to Step 8.

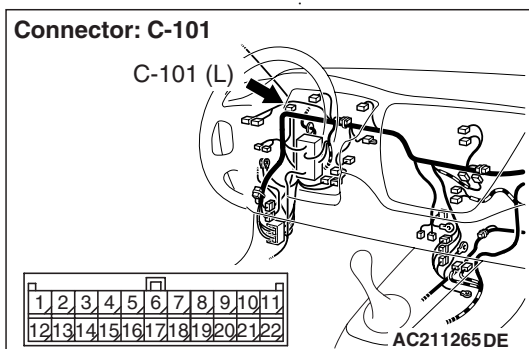
NO : Go to Step 6.

STEP 4. Check the following connectors.

Steering wheel sensor connector C-230



Junction block connectors C-210, C-211



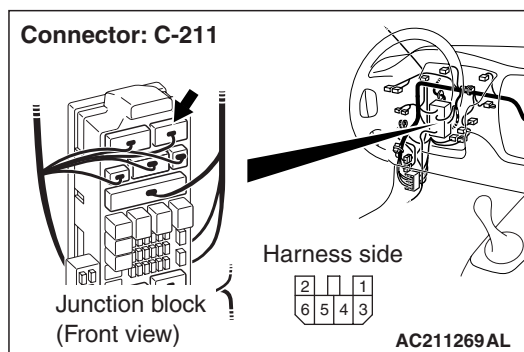
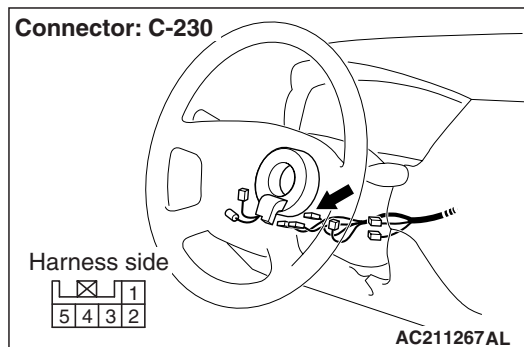
Joint connector C-101

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 5.

NO : Repair it and then go to Step 11.

STEP 5. Check the following harness wire.

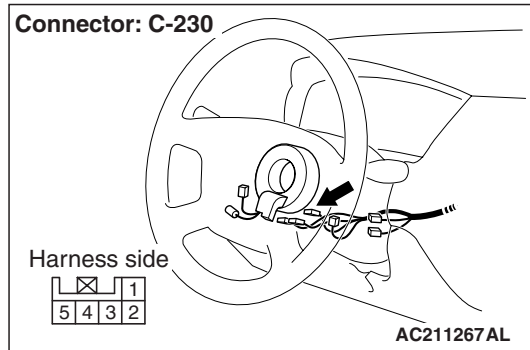
The wire between steering wheel sensor connector C-230 (terminal 2) and junction block connector C-211 (terminal 2)

Q: Is the harness wire damaged?

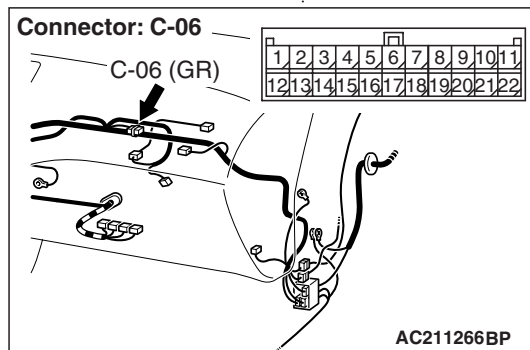
YES : Repair or replace it and then go to Step 11.

NO : Go to Step 11.

STEP 6. Check the following connectors.



Steering wheel sensor connector C-230



Joint connector C-06

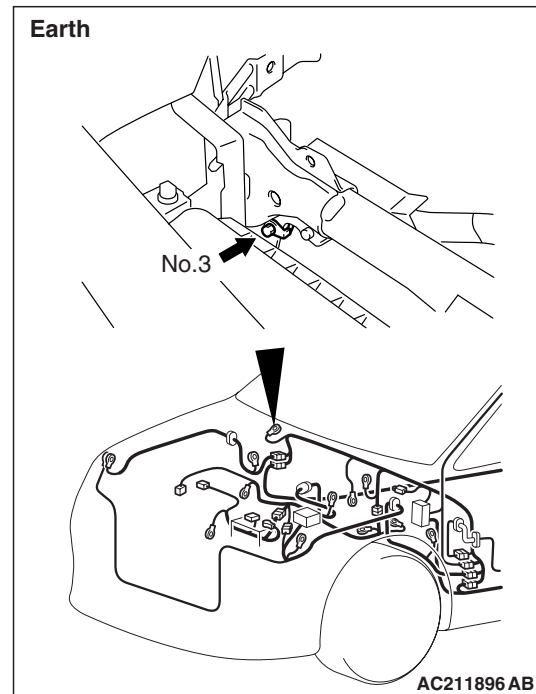
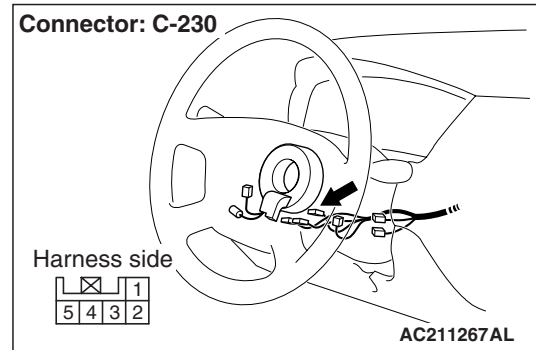
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

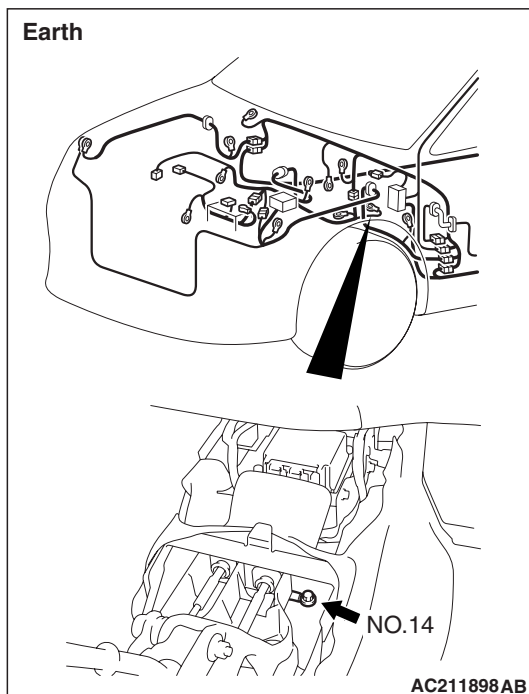
YES : Go to Step 7.

NO : Repair it and then go to Step 11.

STEP 7. Check the following harness wires.



Earth



The wire between steering wheel sensor connector C-230 (terminal 3) and earth (No.3, No.14)

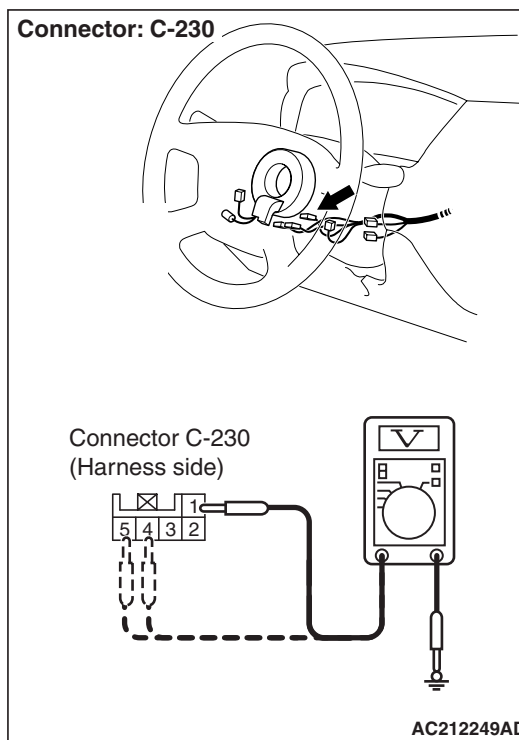
Q: Is any harness wire damaged?

YES : Repair or replace it and then go to Step 11.

NO : Go to Step 11.

STEP 8. Check steering wheel sensor output voltage.

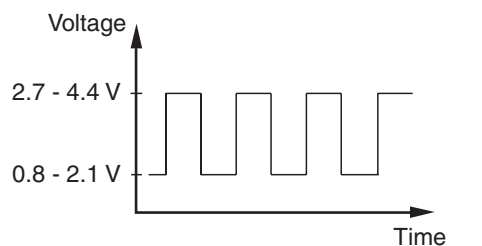
Connector: C-230



(1) Connect steering wheel sensor connector C-230.

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

Variations in voltage when turning the steering wheel



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(3) Measure the voltage, by backprobing, between terminal 1 and earth, terminal 4 and earth, and terminal 5 and earth.

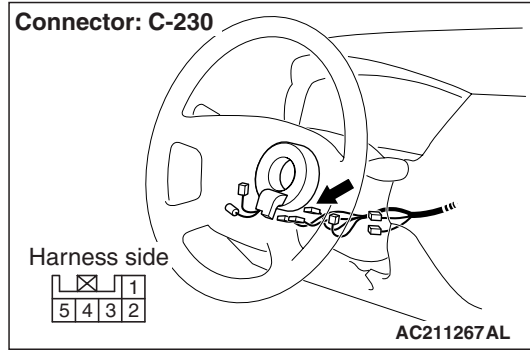
OK: The voltage should measure as indicated in the figure.

Q: Is the steering wheel sensor output voltage normal?

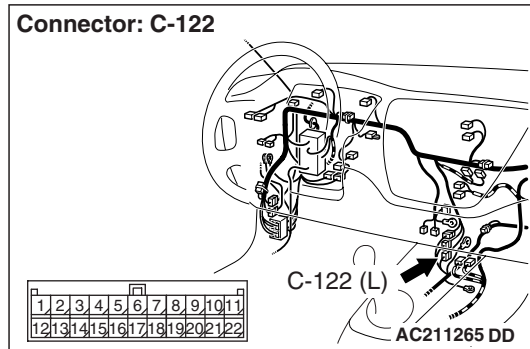
YES : Go to Step 9.

NO : Replace the steering wheel sensor (Refer to [P.35B-150](#)). Then go to Step 11.

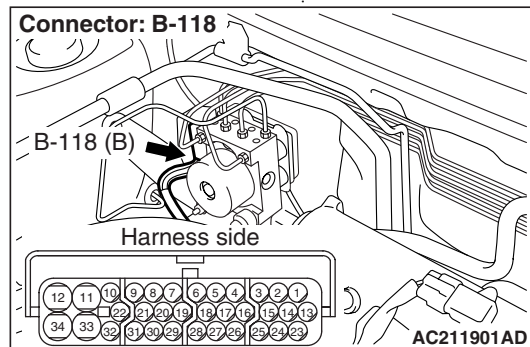
STEP 9. Check the following connectors.



Steering wheel sensor connector C-230



Intermediate connector C-122



ABS-ECU connector B-118

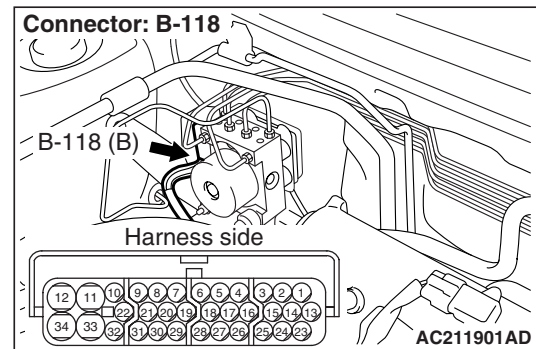
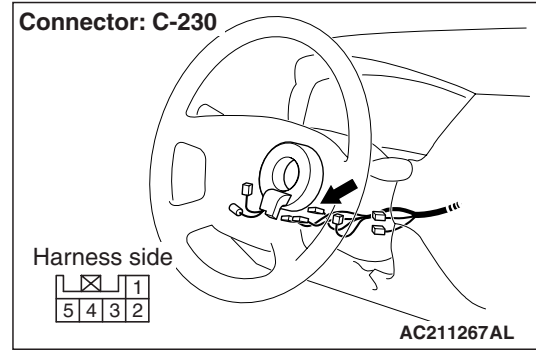
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

NO : Repair it and then go to Step 11.

STEP 10. Check the following harness wires.



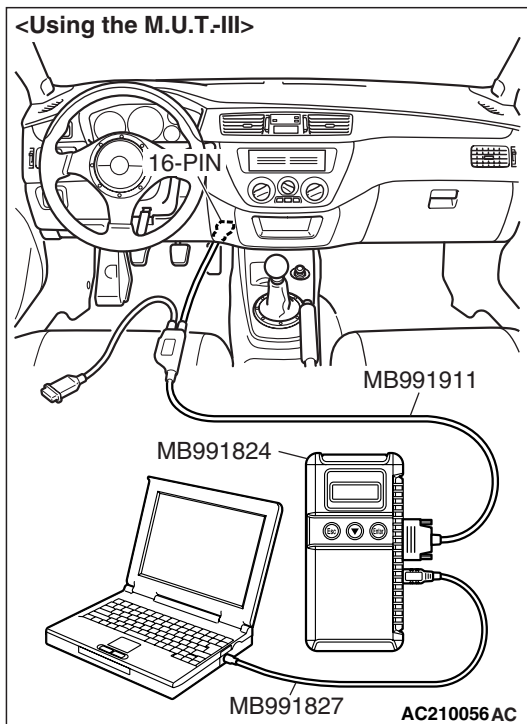
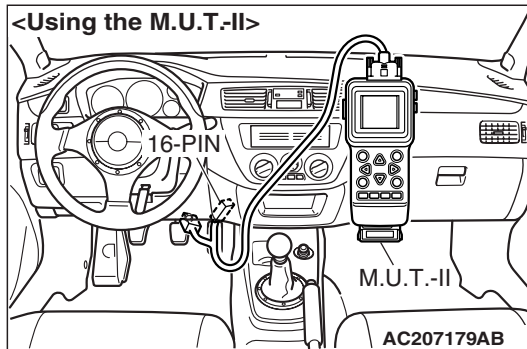
If diagnosis code No.81 (ST-1) is set: The wire between steering wheel sensor connector C-230 (terminal 5) and ABS-ECU connector B-118 (terminal 26)

- If diagnosis code No.82 (ST-2) is set: The wire between steering wheel sensor connector C-230 (terminal 4) and ABS-ECU connector B-118 (terminal 17)
- If diagnosis code No.83 (ST-N) is set: The wire between steering wheel sensor connector C-230 (terminal 1) and ABS-ECU connector B-118 (terminal 4)

Q: Is any harness wire damaged?

YES : Repair or replace it and then go to Step 11.

NO : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 11.

STEP 11. Check whether the diagnosis code is reset.

Check again if the diagnosis code is set.

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

- (2) Erase the diagnosis code.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.
- (4) Turn the ignition switch to the "ON" position.
- (5) Check if the diagnosis code is set.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Does diagnosis code No.81, 82 and/or 83 reset?

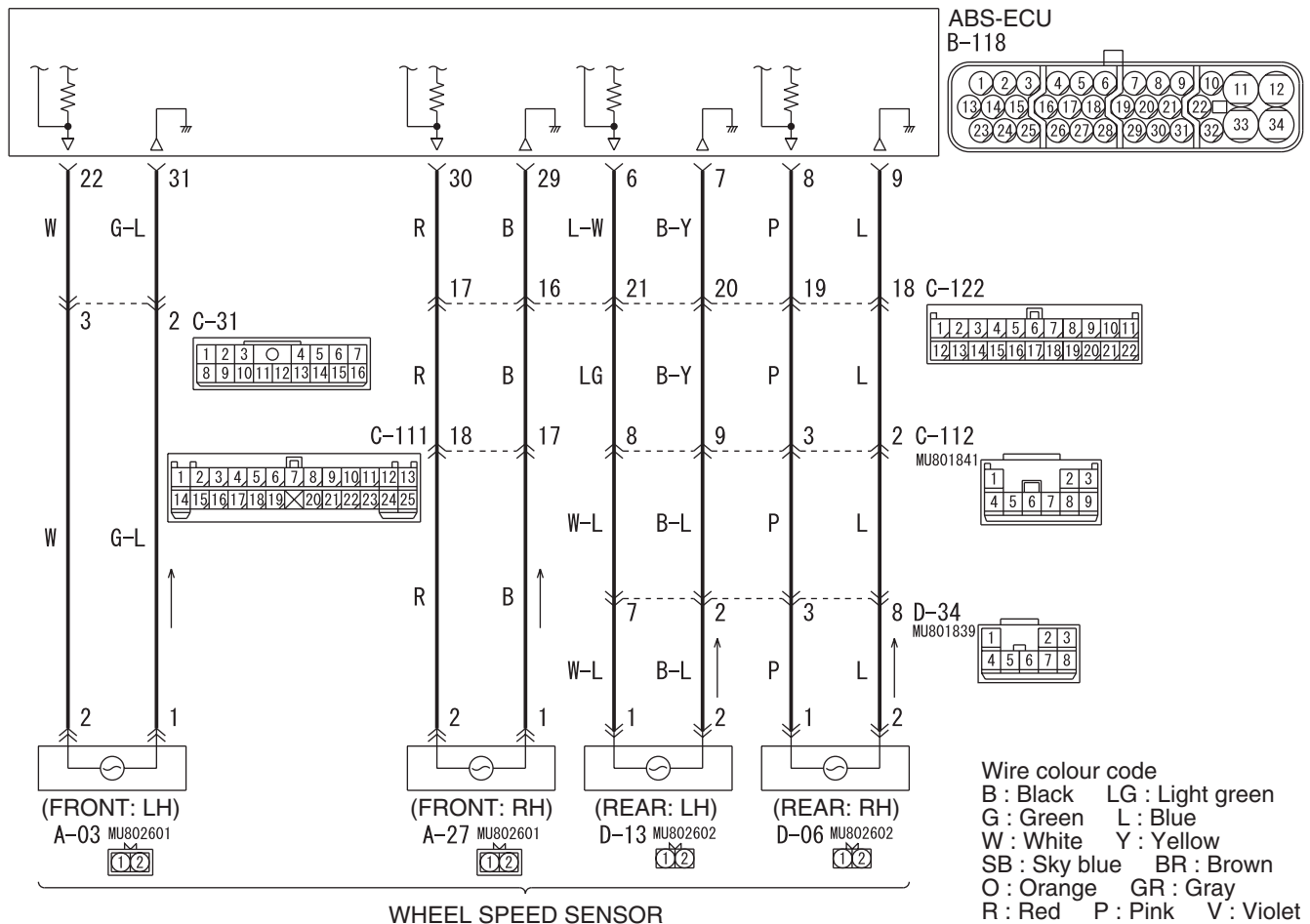
YES : Return to Step 1.

NO : The procedure is complete.

DIAGNOSTIC TROUBLE CODE PROCEDURES <R.H. drive vehicle>

Code No.11: Front Right Wheel Speed Sensor (Open Circuit or Short Circuit)
 Code No.12: Front Left Wheel Speed Sensor (Open Circuit or Short Circuit)
 Code No.13: Rear Right Wheel Speed Sensor (Open Circuit or Short Circuit)
 Code No.14: Rear Left Wheel Speed Sensor (Open Circuit or Short Circuit)
 Code No.21: Front Right Wheel Speed Sensor System
 Code No.22: Front Left Wheel Speed Sensor System
 Code No.23: Rear Right Wheel Speed Sensor System
 Code No.24: Rear Left Wheel Speed Sensor System

Wheel Speed Sensor Circuit



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OPERATION

- A toothed wheel speed rotor generates a voltage pulse as it moves across the pickup field of each wheel speed sensor.
- The amount of voltage generated at each wheel is determined by the clearance between the wheel speed rotor teeth and the wheel speed sensor, and by the speed of rotation.
- The wheel speed sensors transmit the frequency of the voltage pulses and the amount of voltage generated by each pulse to the ABS-ECU.

- The hydraulic unit modulates the amount of braking force individually applied to each wheel cylinder.

DIAGNOSIS CODE SET CONDITIONS

- Diagnosis codes 11, 12, 13, 14 are set when signal is not input due to breakage of the wires of one or more of the four wheel speed sensors.
- Diagnosis codes 21, 22, 23, 24 are set in the following cases:
 - Open circuit is not found but no input is received by one or more of the four wheel speed sensors at 10 km/h (6 mph) or more.
 - Sensor output drops due to a malfunctioning wheel speed sensor or warped wheel speed rotor.

PROBABLE CAUSES

The most likely causes for these diagnosis codes to set are:

Diagnosis codes 11, 12, 13, 14

- Malfunction of the wheel speed sensor
- Damaged wiring harness or connector
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)

Diagnosis codes 21, 22, 23, 24

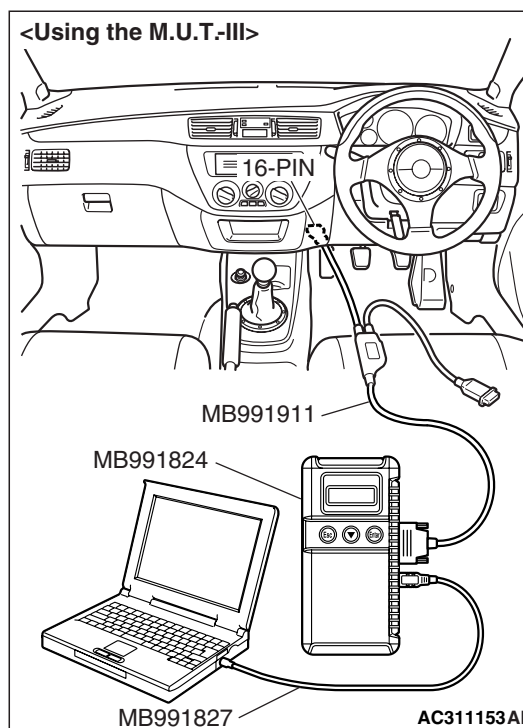
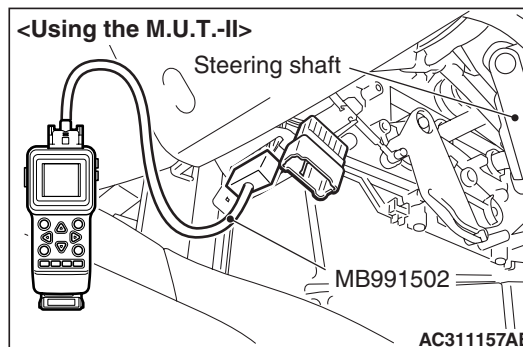
- Malfunction of the wheel speed sensor
- Damaged wiring harness or connector
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)
- Malfunction of the wheel speed rotor
- Malfunction of the wheel bearing
- Excessive clearance between the wheel speed sensor and wheel speed rotor

DIAGNOSIS

STEP 1. M.U.T.-II/III data list

CAUTION

To prevent damage to M.U.T.-II/III, always turn the ignition switch to the "LOOK" (OFF) position before connecting or disconnecting M.U.T.-II/III.



- (1) Connect M.U.T.-II/III as shown in the illustration.
- (2) Start the engine.
- (3) Set M.U.T.-II/III to the data reading mode, and

check the data list items by driving the vehicle.

- Item 11 (diagnosis code 11 or 21 is set): Front right wheel speed sensor
- Item 12 (diagnosis code 12 or 22 is set): Front left wheel speed sensor
- Item 13 (diagnosis code 13 or 23 is set): Rear right wheel speed sensor
- Item 14 (diagnosis code 14 or 24 is set): Rear left wheel speed sensor

OK: The reading on the speedometer nearly matches the indication on M.U.T.-II/III, when driving.

(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the wheel speed sensor input normal?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope With Intermittent Malfunction [P.00-5](#).

NO : Go to Step 2.

STEP 2. Check the wheel speed sensor installation.

Q: Is the wheel speed sensor bolted securely in place at the front knuckle or the rear knuckle?

YES : Go to Step 3.

NO : Install it properly (Refer to [P.35B-146](#)). Then go to Step 15 .

STEP 3. Inspect the wheel speed sensor and/or wheel speed rotor.

Refer to [P.35B-147](#).

Check items:

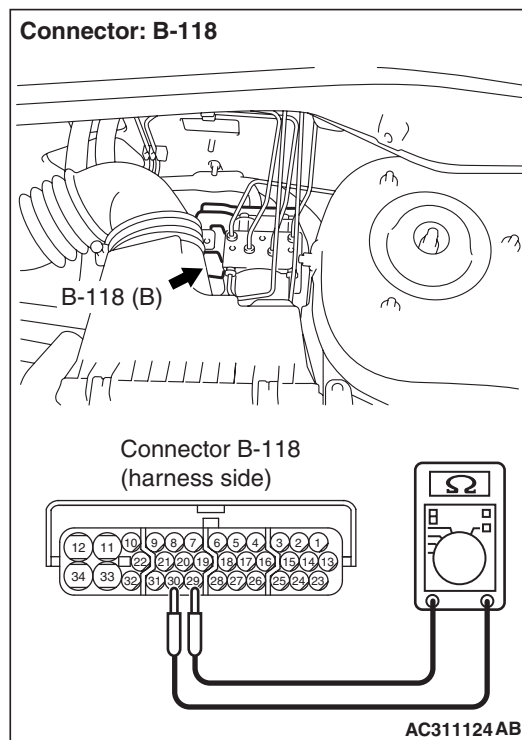
- Wheel speed sensor internal resistance: 1.24 – 1.64 k Ω
- Insulation between the wheel speed sensor body and the connector terminals
- Toothed wheel speed rotor check

Q: Is the wheel speed sensor or wheel speed rotor damaged?

YES : Replace it (Refer to [P.35B-146](#)). Then go to Step 15 .

NO : Go to Step 4.

STEP 4. Check wheel speed sensor circuit. Resistance measurement at the ABS-ECU connector B-118.



(1) Disconnect the connector B-118 and measure at the harness side.

(2) Measure the resistance between the ABS-ECU connector terminals.

- If diagnosis code 11 or 21 is set: between terminals 29 and 30
- If diagnosis code 12 or 22 is set: between terminals 22 and 31
- If diagnosis code 13 or 23 is set: between terminals 8 and 9
- If diagnosis code 14 or 24 is set: between terminals 6 and 7

Standard Value: 1.24 – 1.64 k Ω

Q: Is the resistance within the standard value?

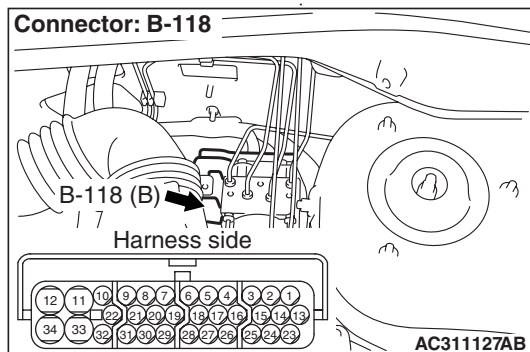
YES : Go to Step 13.

NO <The resistance between terminals 22 and 31 is not within the standard value.> : Go to Step 5.

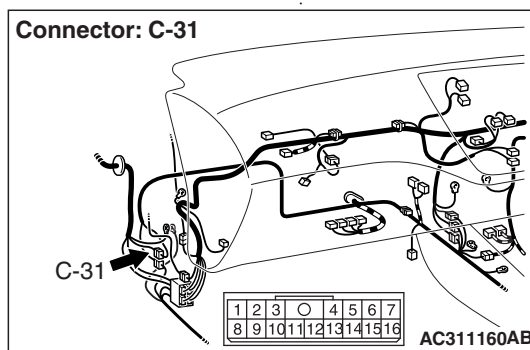
NO <The resistance between terminals 29 and 30 is not within the standard value.> : Go to Step 7.

NO <The resistance between terminals 6 and 7 is not within the standard value.> : Go to Step 9.

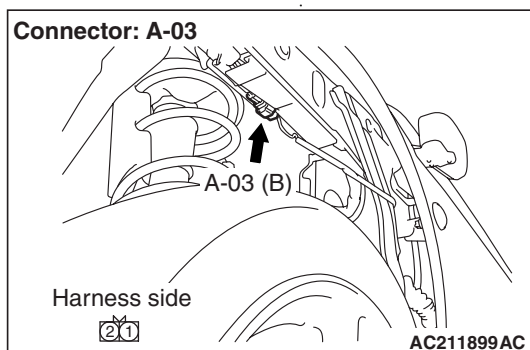
NO <The resistance between terminals 8 and 9 is not within the standard value.> : Go to Step 11.

STEP 5. Check the following connectors.

ABS-ECU connector B-118



Intermediate connector C-31



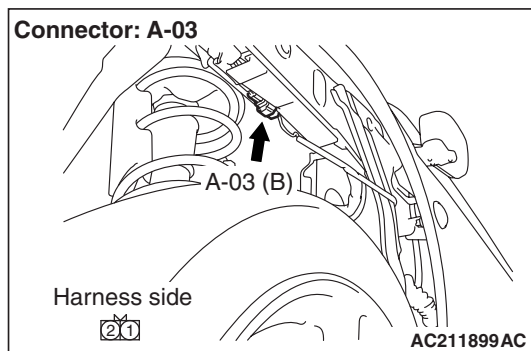
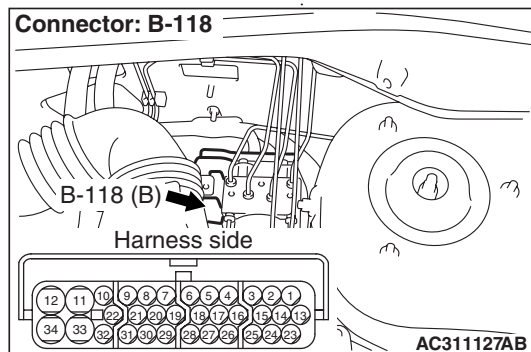
Front wheel speed sensor (LH) connector A-03

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 6.

NO : Repair it and then go to Step 15.

STEP 6. Check the following harness wires.

The wire between ABS-ECU connector B-118 (terminal 22) and front wheel speed sensor (LH) connector A-03 (terminal 2)

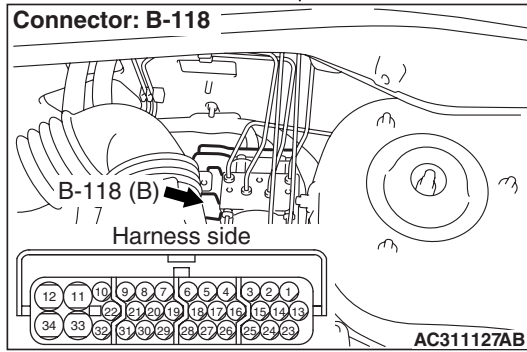
- The wire between ABS-ECU connector B-118 (terminal 31) and front wheel speed sensor (LH) connector A-03 (terminal 1)

Q: Is any harness wire damaged?

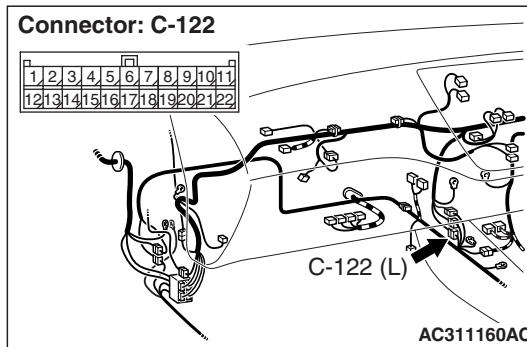
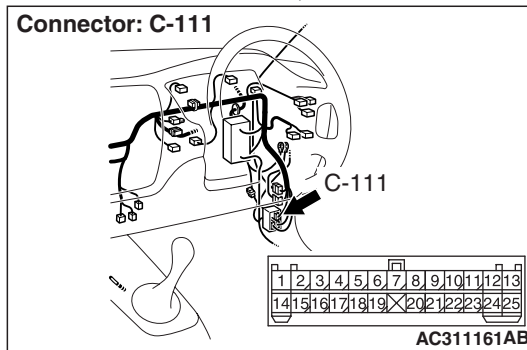
YES : Repair or replace it and then go to Step 15.

NO : Go to Step 15.

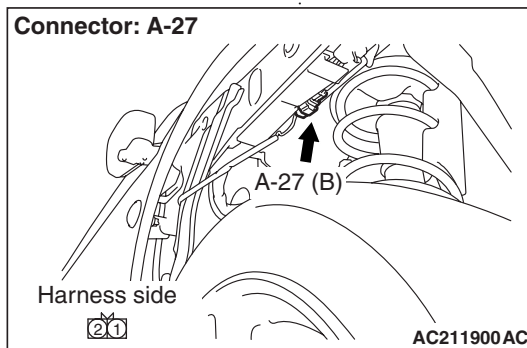
STEP 7. Check the following connectors.



ABS-ECU connector B-118



Intermediate connectors C-111, C-122



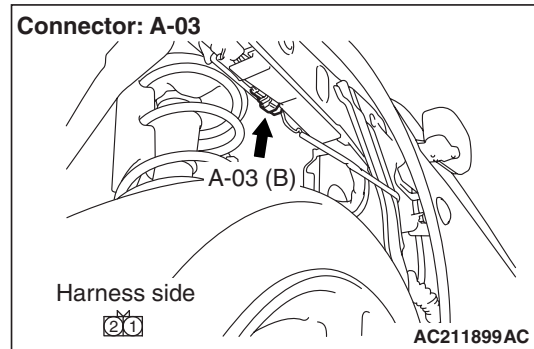
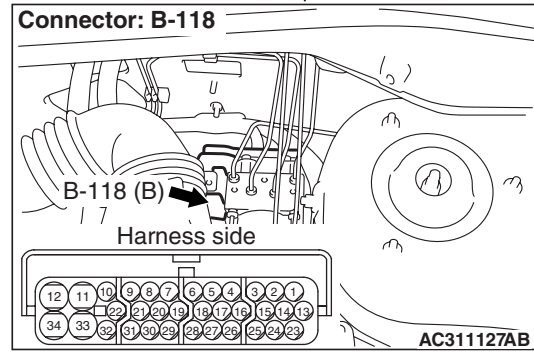
Front wheel speed sensor (RH) connector A-27
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 8.

NO : Repair it and then go to Step 15.

STEP 8. Check the following harness wires.



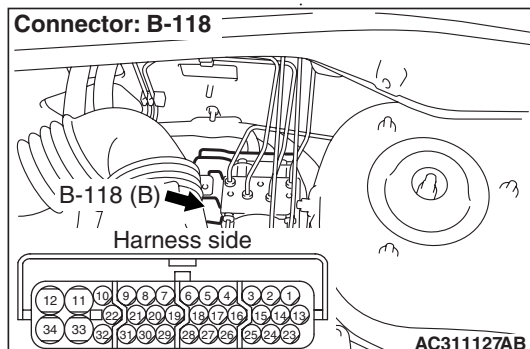
The wire between ABS-ECU connector B-118 (terminal 29) and front wheel speed sensor (RH) connector A-27 (terminal 1)

- The wire between ABS-ECU connector B-118 (terminal 30) and front wheel speed sensor (RH) connector A-27 (terminal 2)

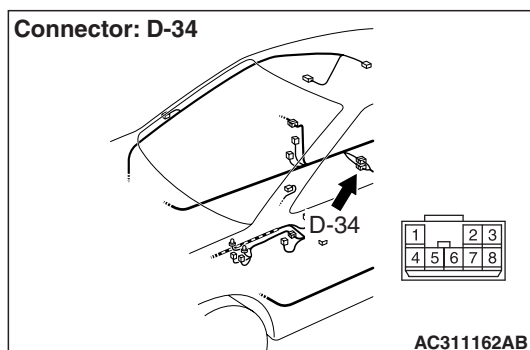
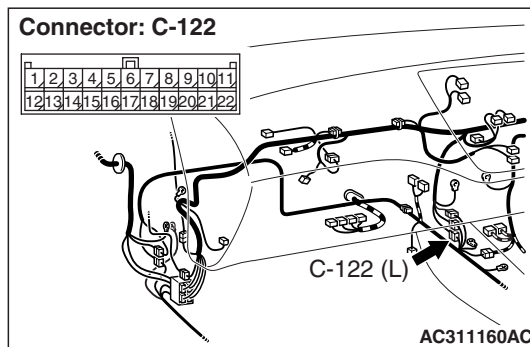
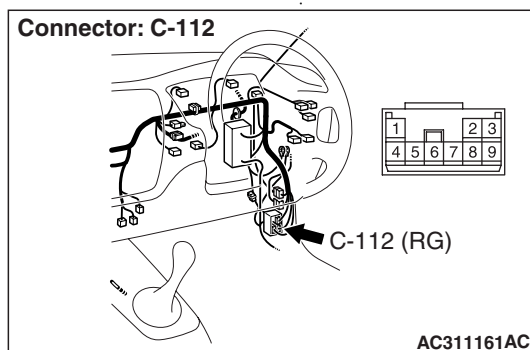
Q: Is any harness wire damaged?

YES : Repair or replace it and then go to Step 15.

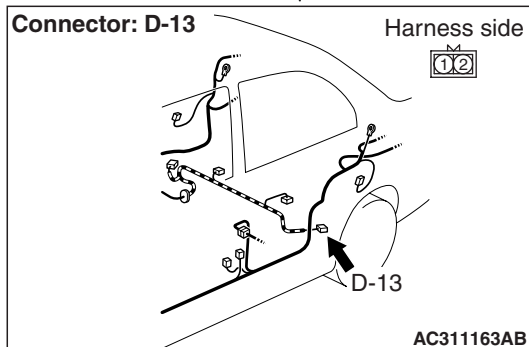
NO : Go to Step 15.

STEP 9. Check the following connectors.

ABS-ECU connector B-118



Intermediate connectors C-112, C-122, D-34

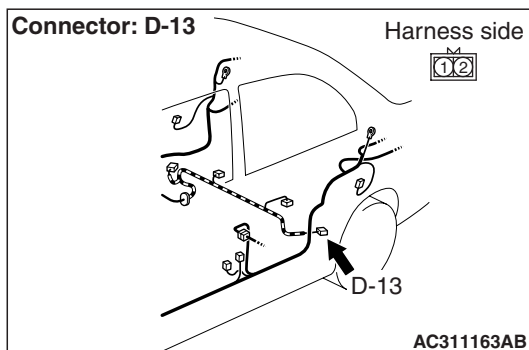
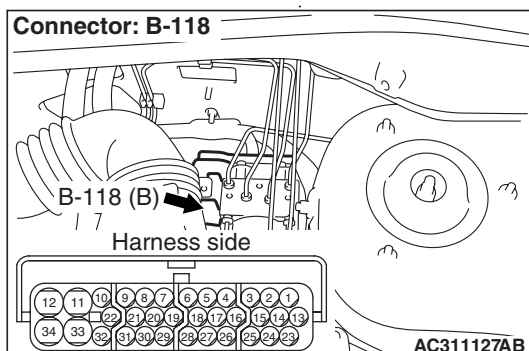


Rear wheel speed sensor (LH) connector D-13
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

NO : Repair it and then go to Step 15.

STEP 10. Check the following harness wires.

The wire between ABS-ECU connector B-118 (terminal 6) and rear wheel speed sensor (LH) connector D-13 (terminal 1)

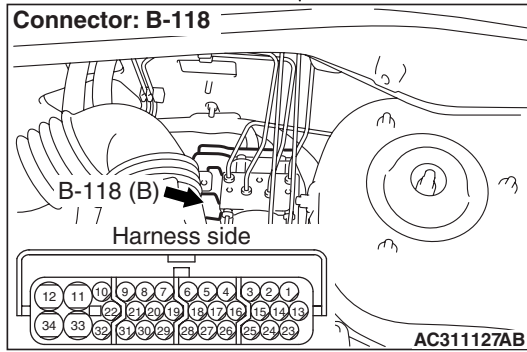
- The wire between ABS-ECU connector B-118 (terminal 7) and rear wheel speed sensor (LH) connector D-13 (terminal 2)

Q: Is any harness wire damaged?

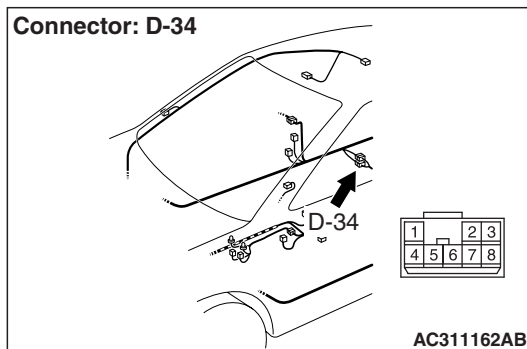
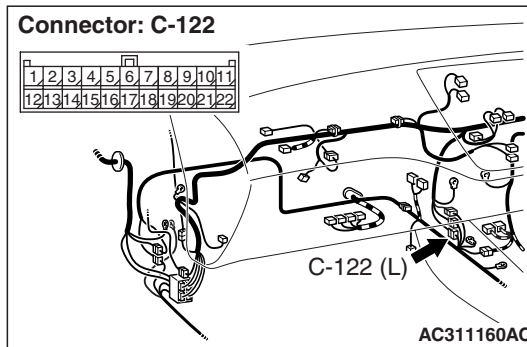
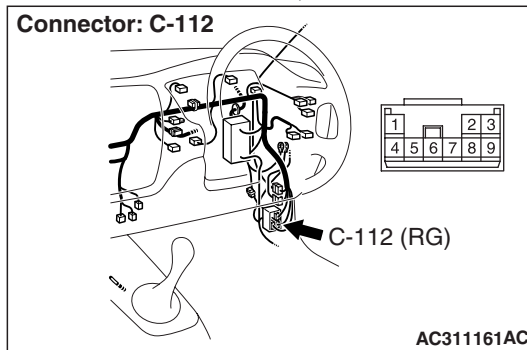
YES : Repair or replace it and then go to Step 15.

NO : Go to Step 15.

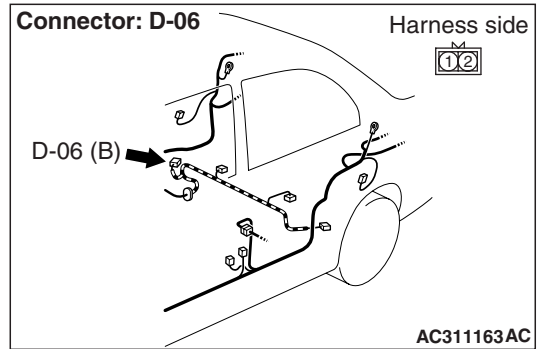
STEP 11. Check the following connectors.



ABS-ECU connector B-118



Intermediate connectors C-112, C-122, D-34



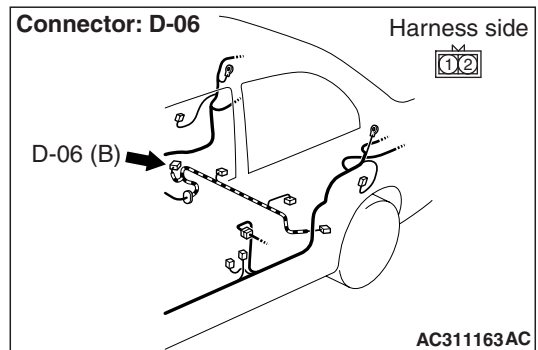
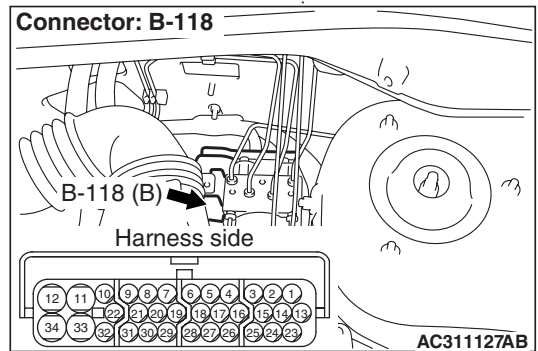
Rear wheel speed sensor (RH) connector D-06
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 12.

NO : Repair it and then go to Step 15.

STEP 12. Check the following harness wires:



The wire between ABS-ECU connector B-118 (terminal 8) and rear wheel speed sensor (RH) connector D-06 (terminal 1)

- The wire between ABS-ECU connector B-118 (terminal 9) and rear wheel speed sensor (RH) connector D-06 (terminal 2)

Q: Is any harness wire damaged?

YES : Repair or replace it and then go to Step 15.

NO : Go to Step 15.

STEP 13. Measure the wheel speed sensor output voltage.Refer to [P.35B-138](#).**Output Voltage:**

- When measured with a voltmeter: 42 mV or more
- When measured with an oscilloscope (maximum voltage): 120 mV or more

Q: Does the voltage meet the specification?

YES : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 15.

NO : Go to Step 14.

STEP 14. Check the wheel bearing.

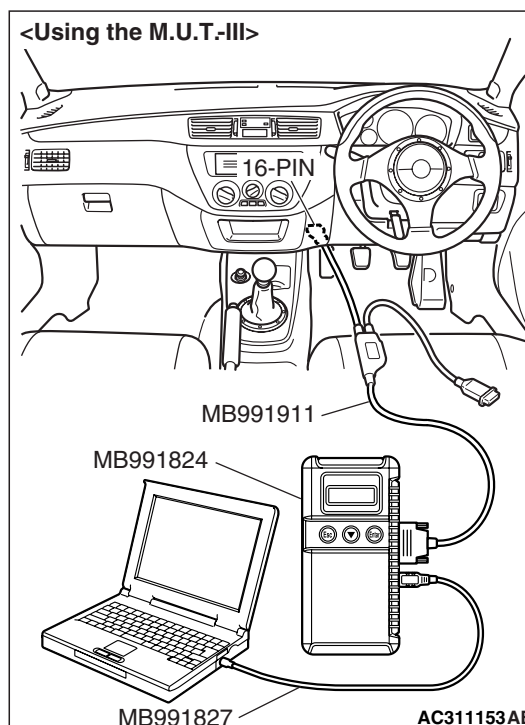
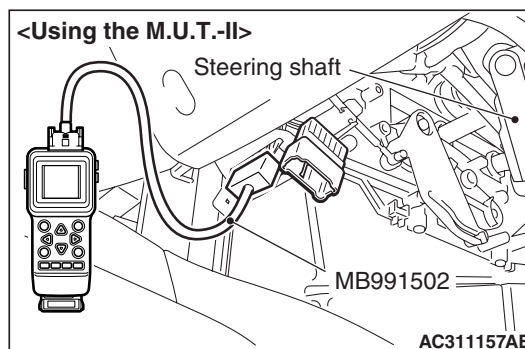
Refer to GROUP 26, On-vehicle Service – Wheel Bearing End Play Check <Front> [P.26-6](#) or GROUP 27, On-vehicle Service – Wheel Bearing End Play Check <Rear> [P.27-30](#). If play on the wheel bearing is not within the limit, replace the wheel bearing.

Limit: 0.05 mm (0.002 inch)

Q: Is play on the wheel bearing within the standard value?

YES : Go to Step 15.

NO : Replace it and then go to Step 15.

STEP 15. Check whether the diagnosis code is reset.

Check again if the diagnosis code is set.

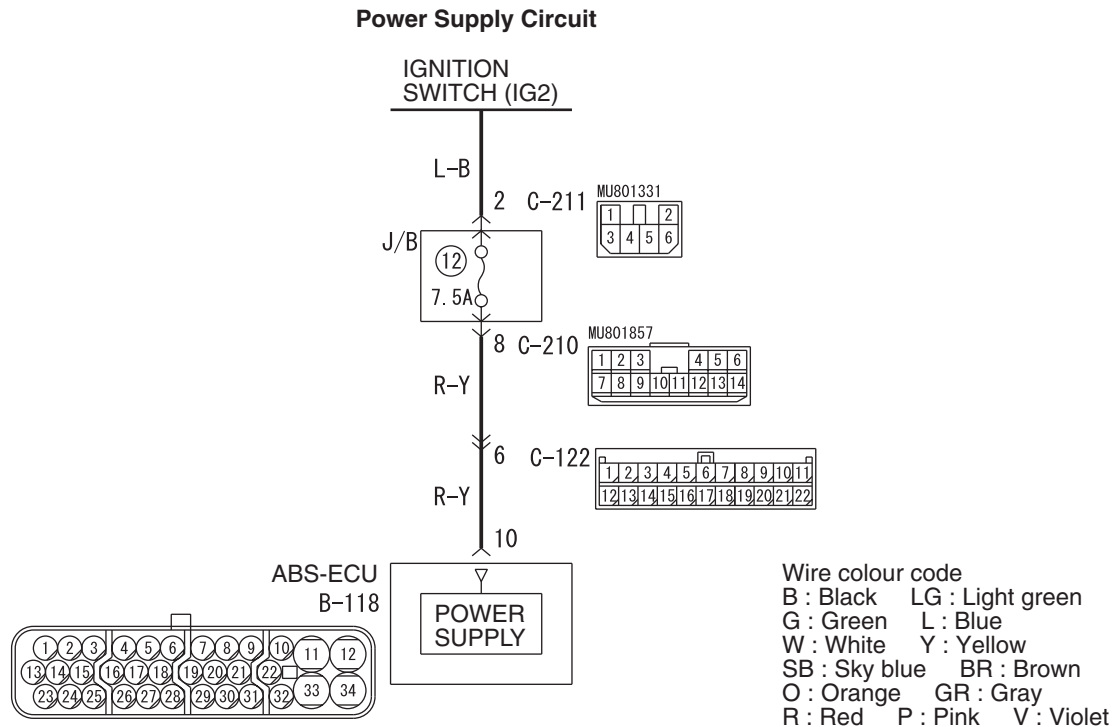
- (1) Turn the ignition switch to the "ON" position.
- (2) Erase the diagnosis code.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.
- (4) Turn the ignition switch to the "ON" position.
- (5) Check if the diagnosis code is set.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Do the diagnosis codes 11, 12, 13, 14, 21, 22, 23 or 24 reset?

YES : Go to Step 1.

NO : The procedure is complete.

Code No.16: ABS-ECU Power Supply System (abnormal voltage drop or rise)



W4J35E013A

OPERATION

The ABS-ECU power is supplied to the ABS-ECU (terminal 10) from the ignition switch (IG2) through the multi-purpose fuse number 12 in the junction block.

DIAGNOSIS CODE SET CONDITIONS

Output is provided when ABS-ECU power supply voltage drops below or rises above the normal value. Output is not provided if power supply voltage returns to normal voltage.

PROBABLE CAUSES

The most likely causes for this diagnosis code to set are:

- Malfunction of battery
- Damaged wiring harness and connector
- Malfunction of brake modulator hydraulic unit and ABS-ECU

DIAGNOSIS

STEP 1. Check the battery.

Refer to GROUP 54A, Battery – On-vehicle Service – Battery Test [P.54A-5](#).

Q: Is the battery damaged?

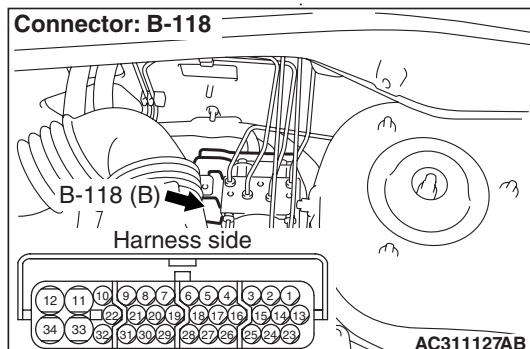
- YES** : Charge or replace the battery and then go to Step 5.
- NO** : Go to Step 2.

STEP 2. Check the charging system.

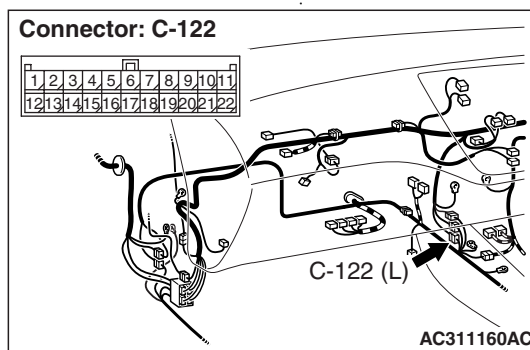
Refer to GROUP 16, Charging System – On-vehicles Service [P.16-5](#).

Q: Is the charging system damaged?

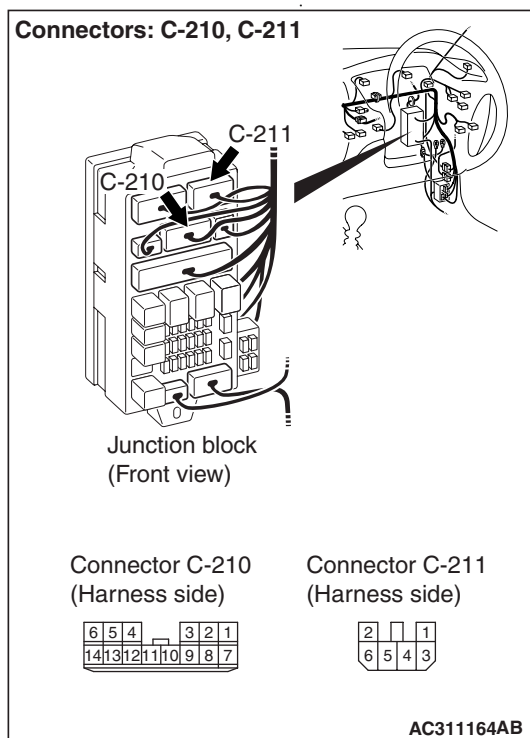
- YES** : Repair the Charging System and then go to Step 5.
- NO** : Go to Step 3.

STEP 3. Check the following connectors.

ABS-ECU connector B-118



Intermediate connector C-122



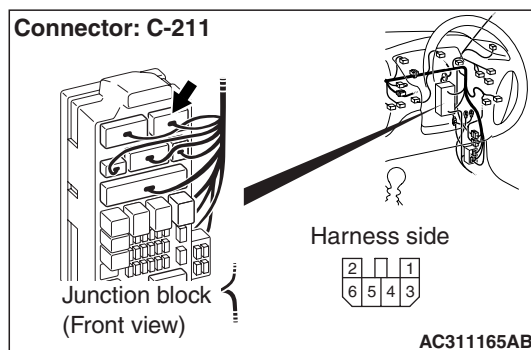
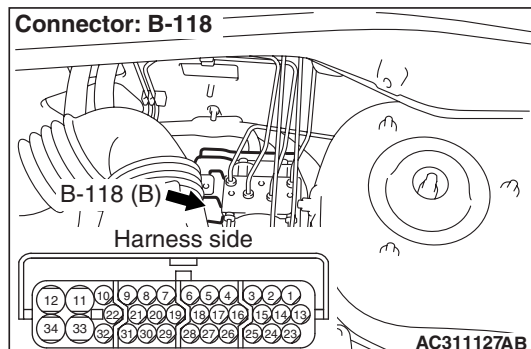
Junction block connectors C-210, C-211

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 4.

NO : Repair it and then go to Step 5.

STEP 4. Check the following harness wire.

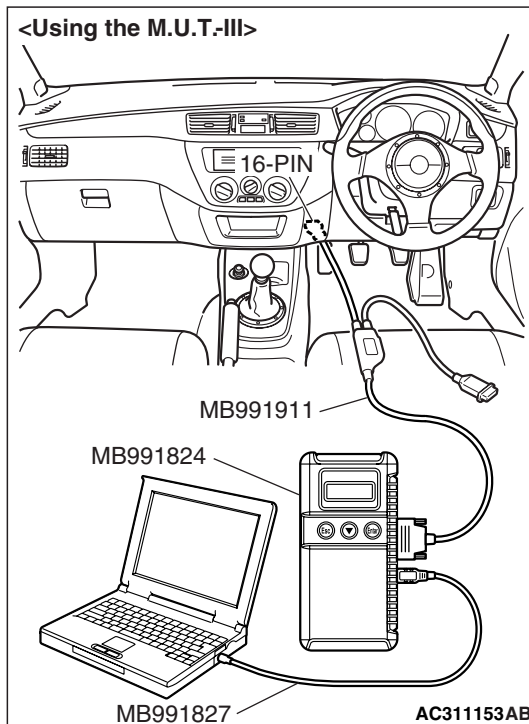
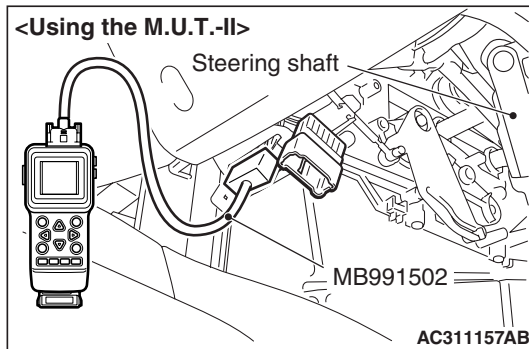
The wire between ABS-ECU connector B-118 (terminal 10) and junction block connector C-211 (terminal 2)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 5.

NO : Go to Step 5.

STEP 5. Check whether the diagnosis code is reset.



Check again if the diagnosis code is set.
(1) Turn the ignition switch to the "ON" position.

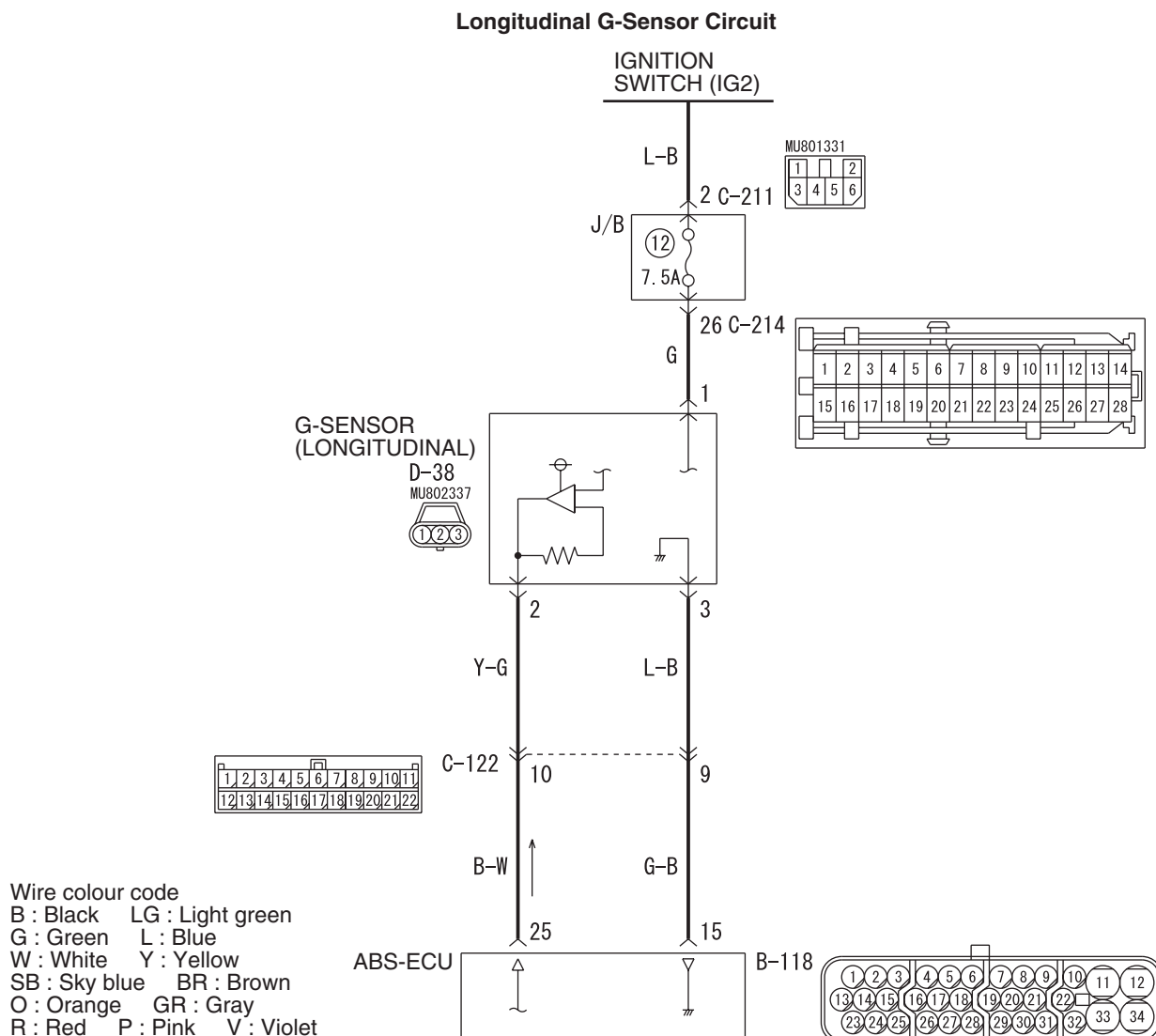
- (2) Erase the diagnosis code.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.
- (4) Turn the ignition switch to the "ON" position.
- (5) Check if the diagnosis code is set.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Does diagnosis code No.16 reset?

YES : Start over at Step 1.

NO : The procedure is complete.

Code No.32: Longitudinal G-Sensor System



W4J35E011A

OPERATION

The G-sensor detects the acceleration level in the forward/reverse direction of the vehicle, converts the signals into voltage signals and then sends that signal to the ABS-ECU.

DIAGNOSIS CODE SET CONDITIONS

This code is set in the following case.

- When the G-sensor output is 0.5 V or lower or 4.5 V or higher (disconnected G-sensor or G-sensor short circuit)

- If the G-sensor output power does not change (G-sensor output fastening).

PROBABLE CAUSES

The most likely causes for this diagnosis code to set are:

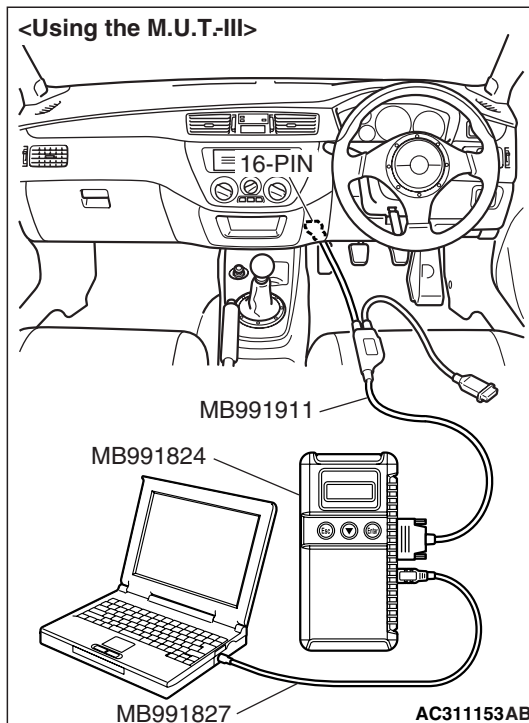
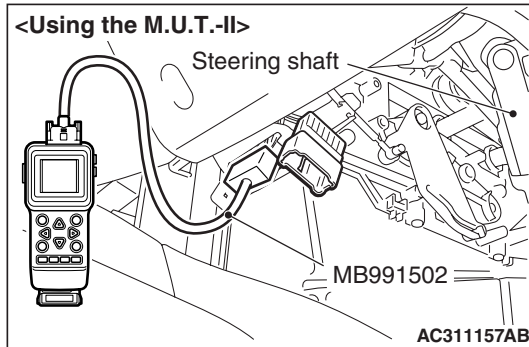
- Malfunction of the G-sensor
- Damaged wiring harness and connector
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)

DIAGNOSIS

STEP 1. M.U.T.-II/III data list.

CAUTION

To prevent damage to M.U.T.-II/III, always turn the ignition switch to the "LOOK" (OFF) position before connecting or disconnecting M.U.T.-II/III.



- (1) Connect M.U.T.-II/III as shown in the illustration.
- (2) Start the engine.

- (3) Set M.U.T.-II/III to data reading mode for following item.

- Item No.32: Longitudinal G-sensor

OK:

When vehicle is stationary (level): 2.4 – 2.6 V

When vehicle is being driven: 1.0 – 4.0 V

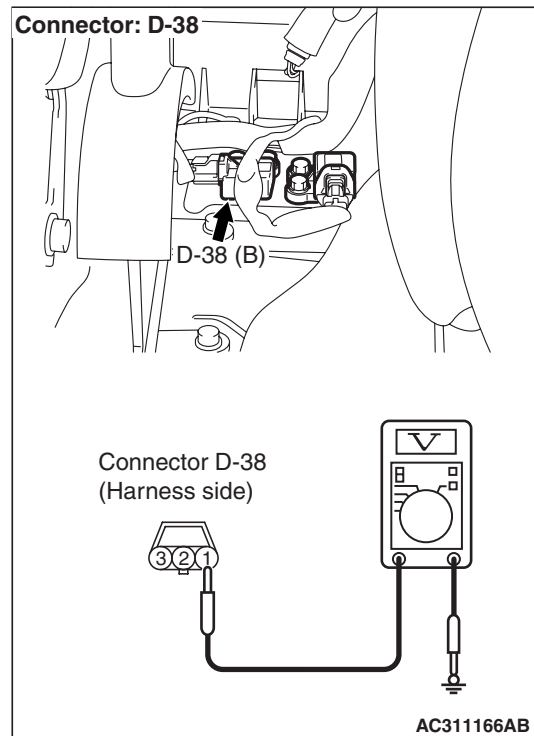
Q: Is the longitudinal G-sensor input normal?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope With Intermittent Malfunction

P.00-5.

NO : Go to Step 2.

STEP 2. Check the power supply circuit. Voltage measurement at longitudinal G-sensor connector D-38.



- (1) Disconnect connector D-38, and check at the harness side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 1 and earth.

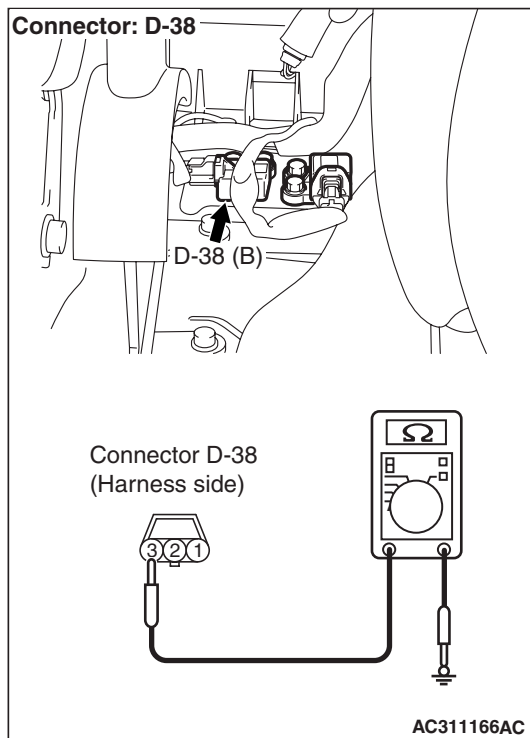
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 3.

NO : Go to Step 4.

STEP 3. Check the earth circuit. Resistance measurement at longitudinal G-sensor connector D-38.



- (1) Disconnect connector D-38, and check at the harness side.
- (2) Measure the resistance between terminal 3 and earth.

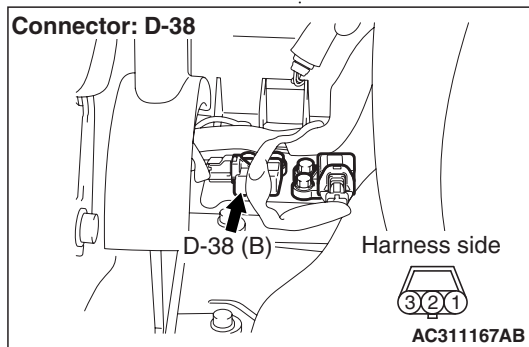
OK: 2 ohms or less

Q: Is the resistance 2 ohms or less?

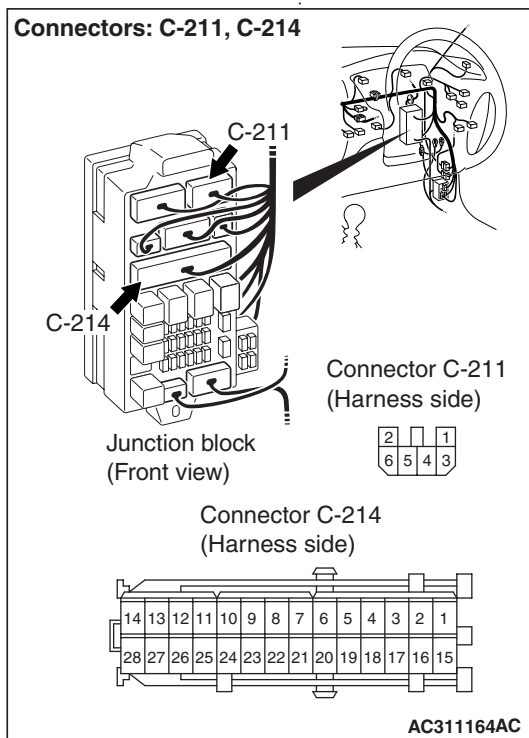
YES : Go to Step 8.

NO : Go to Step 6.

STEP 4. Check the following connectors.



Longitudinal G-sensor connector D-38



Junction block connectors C-211, C-214

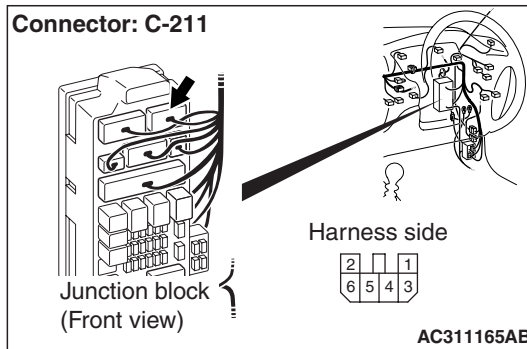
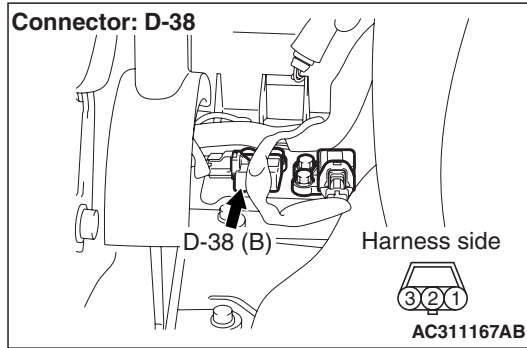
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 5.

NO : Repair it and then go to Step 11.

STEP 5. Check the following harness wire.



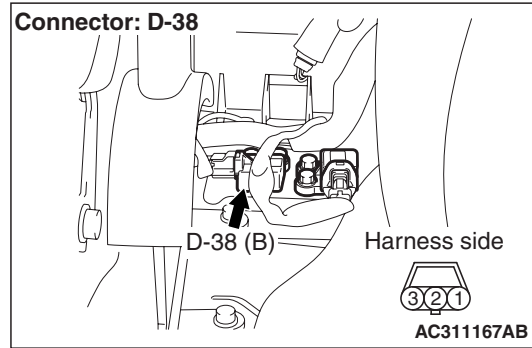
The wire between longitudinal G-sensor connector D-38 (terminal 1) and junction block connector C-211 (terminal 2)

Q: Is the harness wire damaged?

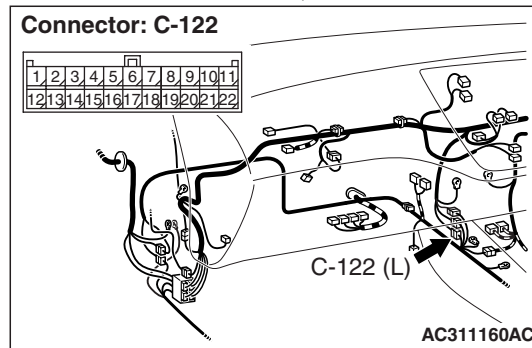
YES : Repair or replace it and then go to Step 11.

NO : Go to Step 11.

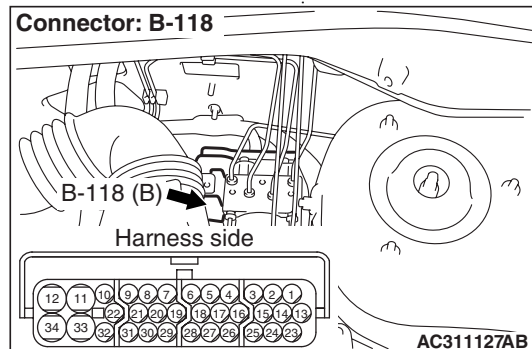
STEP 6. Check the following connectors.



Longitudinal G-sensor connector D-38



Intermediate connector C-122



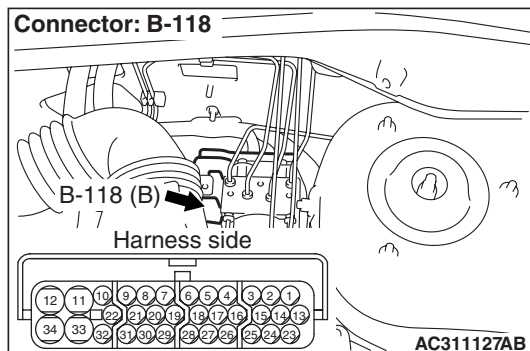
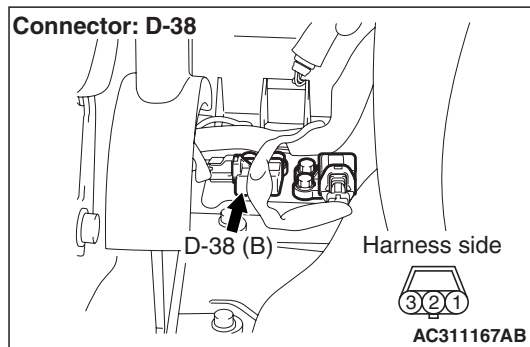
ABS-ECU connector B-118

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 7.

NO : Repair it and then go to Step 11.

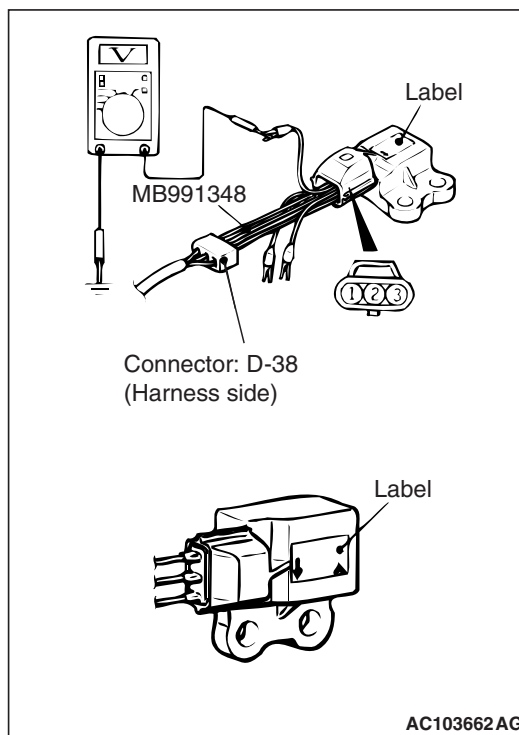
STEP 7. Check the following harness wire.

The wire between longitudinal G-sensor connector D-38 (terminal 3) and ABS-ECU connector B-118 (terminal 15)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 11.

NO : Go to Step 11.

STEP 8. Check longitudinal G-sensor output voltage.

- (1) Disconnect connector D-38, and then connect special tool harness set (MB991348) between terminals of the disconnected connectors.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 2 and earth.

OK:

When the longitudinal G-sensor is placed on a level plane: 2.4 – 2.6 volts

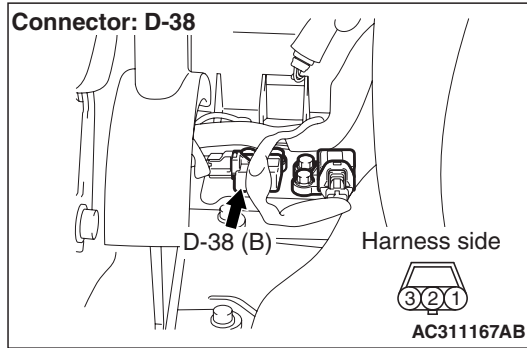
When the longitudinal G-sensor is placed with its label positioned as shown: 3.4 – 3.6 volts

Q: Is the longitudinal G-sensor output voltage normal?

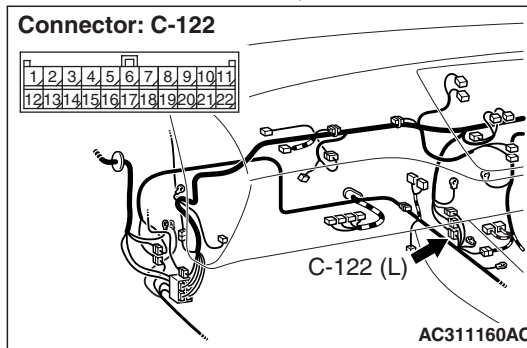
YES : Go to Step 9.

NO : Replace the longitudinal G-sensor (Refer to [P.35B-148](#)). Then go to Step 11.

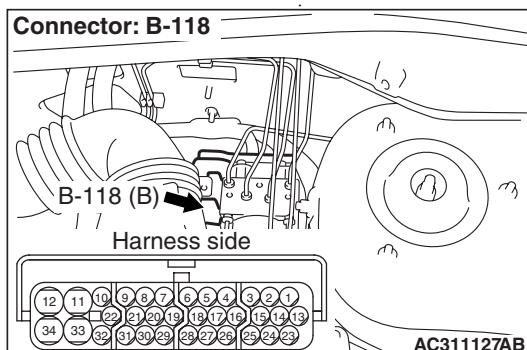
STEP 9. Check the following connectors.



Longitudinal G-sensor connector D-38



Intermediate connector C-122



ABS-ECU connector B-118

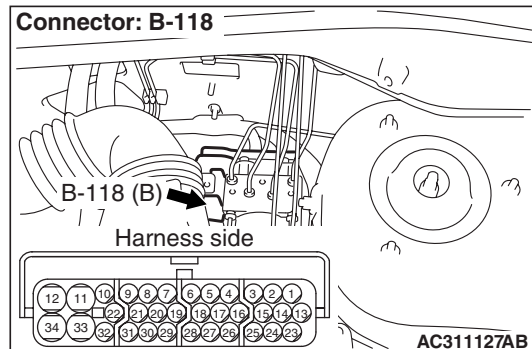
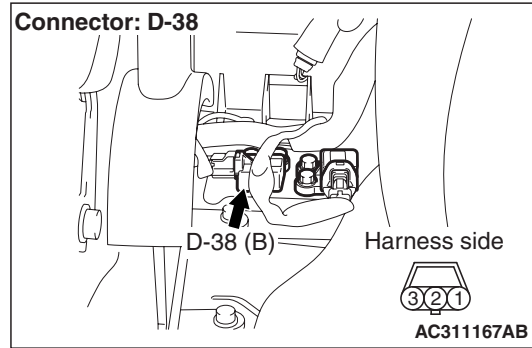
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

NO : Repair it and then go to Step 11.

STEP 10. Check the following harness wire.

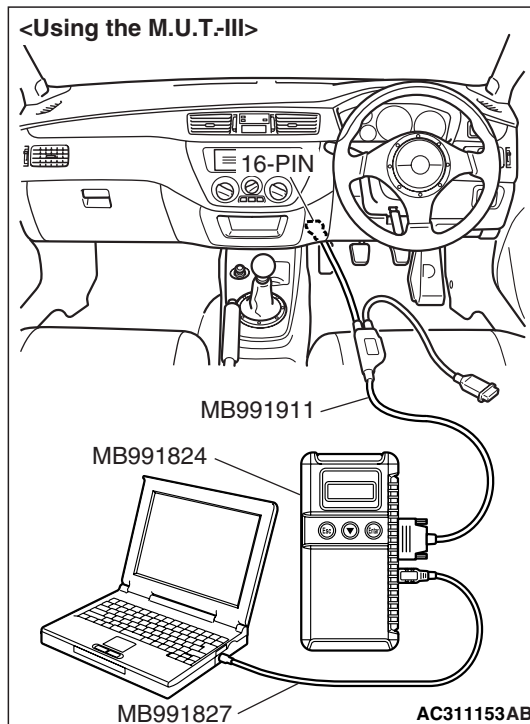
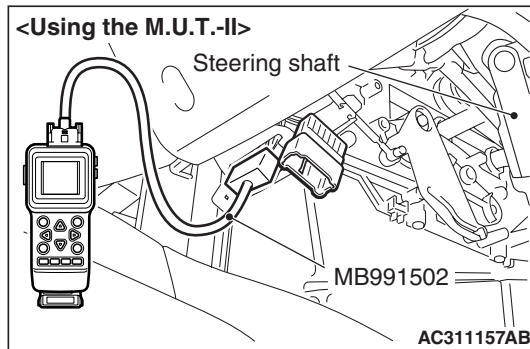


The wire between longitudinal G-sensor connector D-38 (terminal 2) and ABS-ECU connector B-118 (terminal 25)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 11.

NO : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 11.

STEP 11. Check whether the diagnosis code is reset.

Check again if the diagnosis code is set.

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

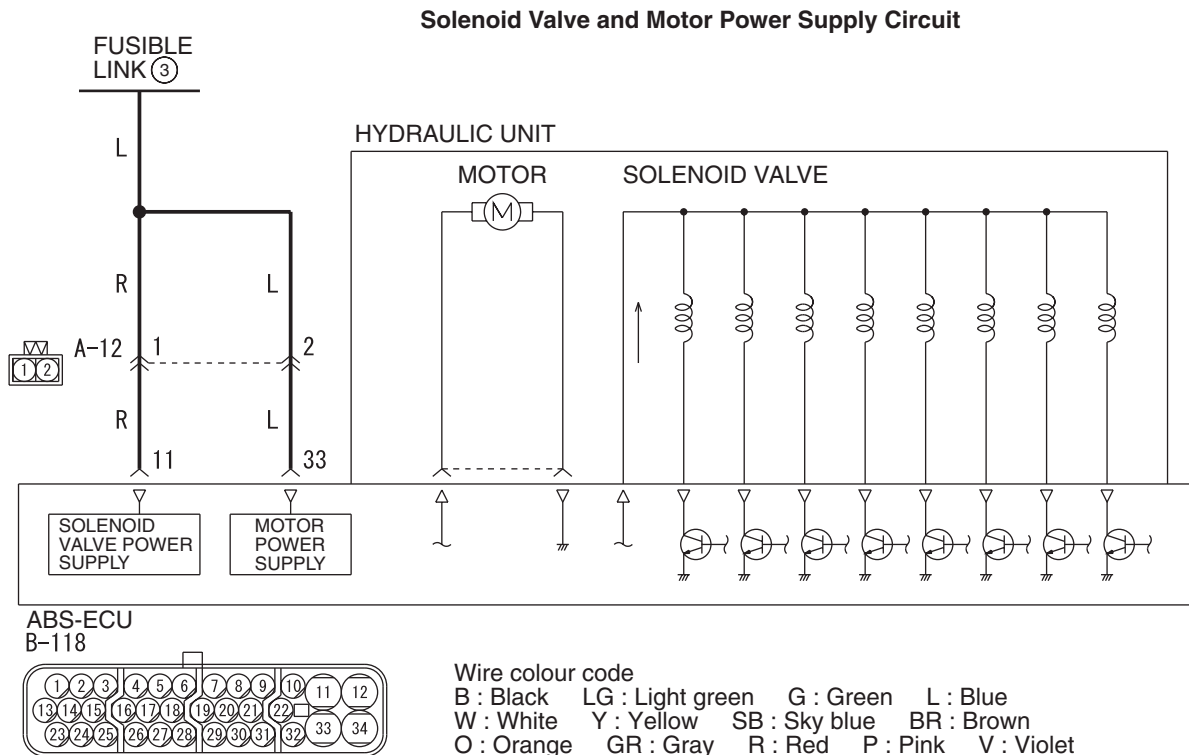
- (2) Erase the diagnosis code.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.
- (4) Turn the ignition switch to the "ON" position.
- (5) Check if the diagnosis code is set.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Does diagnosis code No.32 reset?

YES : Start over at Step 1.

NO : The procedure is complete.

Code No.41: Front Right Solenoid Valve inside Hydraulic Unit
Code No.42: Front Left Solenoid Valve inside Hydraulic Unit
Code No.43: Rear Right Solenoid Valve inside Hydraulic Unit
Code No.44: Rear Left Solenoid Valve inside Hydraulic Unit
Code No.52: Valve Relay Problem (Stays off)
Code No.53: Motor Relay Problem (Stays off)
Code No.55: Motor System (Seized Pump Motor)



W4J35E022A

OPERATION

Power is continuously supplied to the ABS-ECU through fusible link number 3 to operate the solenoid valve and motor.

DIAGNOSIS CODE SET CONDITIONS

These codes are displayed if the power supply circuit of solenoid valve or motor is open or shorted.

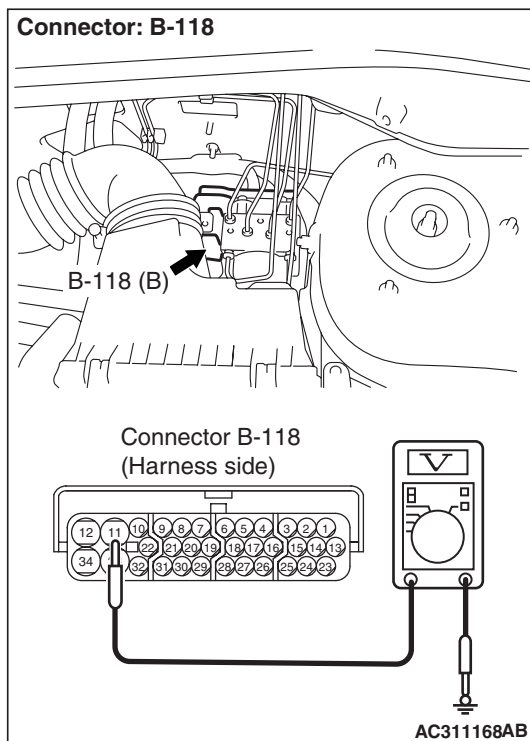
PROBABLE CAUSES

The most likely causes for these diagnosis codes to set are:

- Damaged wiring harness or connector
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)

DIAGNOSIS

STEP 1. Check the solenoid valve or motor power supply circuit. Voltage measurement at ABS-ECU connector B-118.



- (1) Disconnect ABS-ECU connector B-118 and measure at the harness side.
- (2) Measure the voltage between terminal 11 and earth, and 33 and earth.

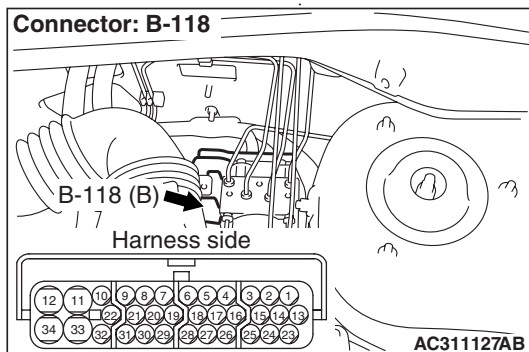
OK: System voltage

Q: Is the check result normal?

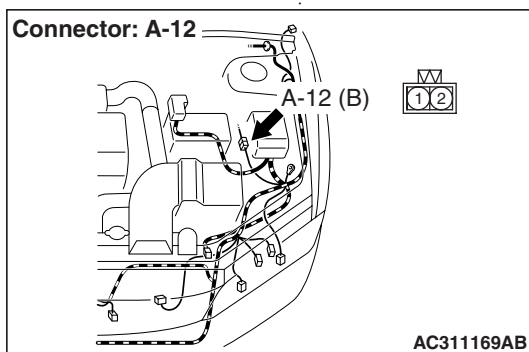
YES : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 4.

NO : Go to Step 2.

STEP 2. Check the following connectors.



ABS-ECU connector B-118



Intermediate connector A-12

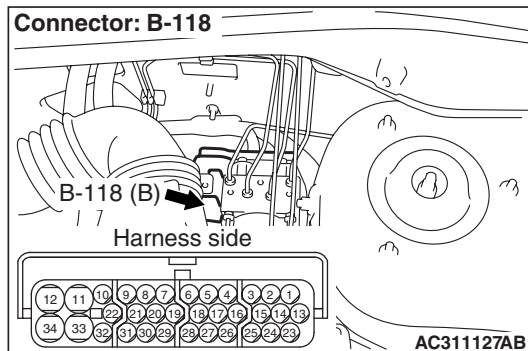
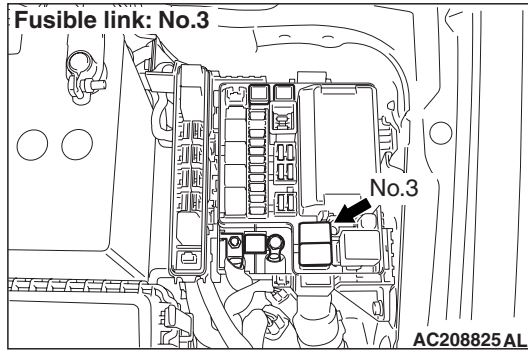
Check the connectors, for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 3.

NO : Repair it and then go to Step 4.

STEP 3. Check the following harness wires.



The wire between fusible link No.3 and ABS-ECU connector B-118 (terminal 11)

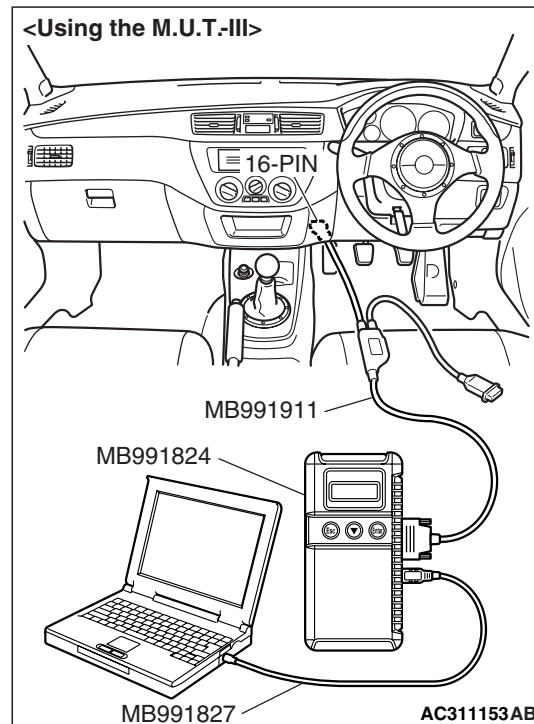
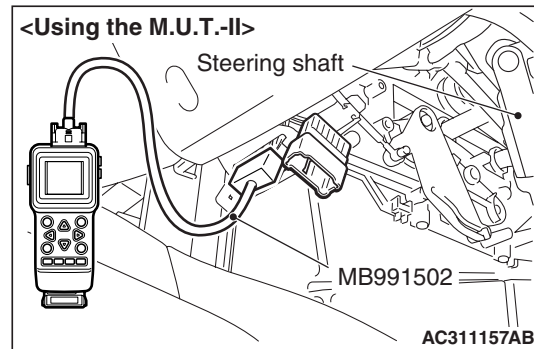
- The wire between fusible link No.3 and ABS-ECU connector B-118 (terminal 33)

Q: Is any harness wire damaged?

YES : Repair or replace it and then go to Step 4.

NO : Go to Step 4.

STEP 4. Check whether the diagnosis code is reset.



Check again if the diagnosis code is set.

- (1) Turn the ignition switch to the "ON" position.
- (2) Erase the diagnosis code.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.
- (4) Turn the ignition switch to the "ON" position.
- (5) Check if the diagnosis code is set.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

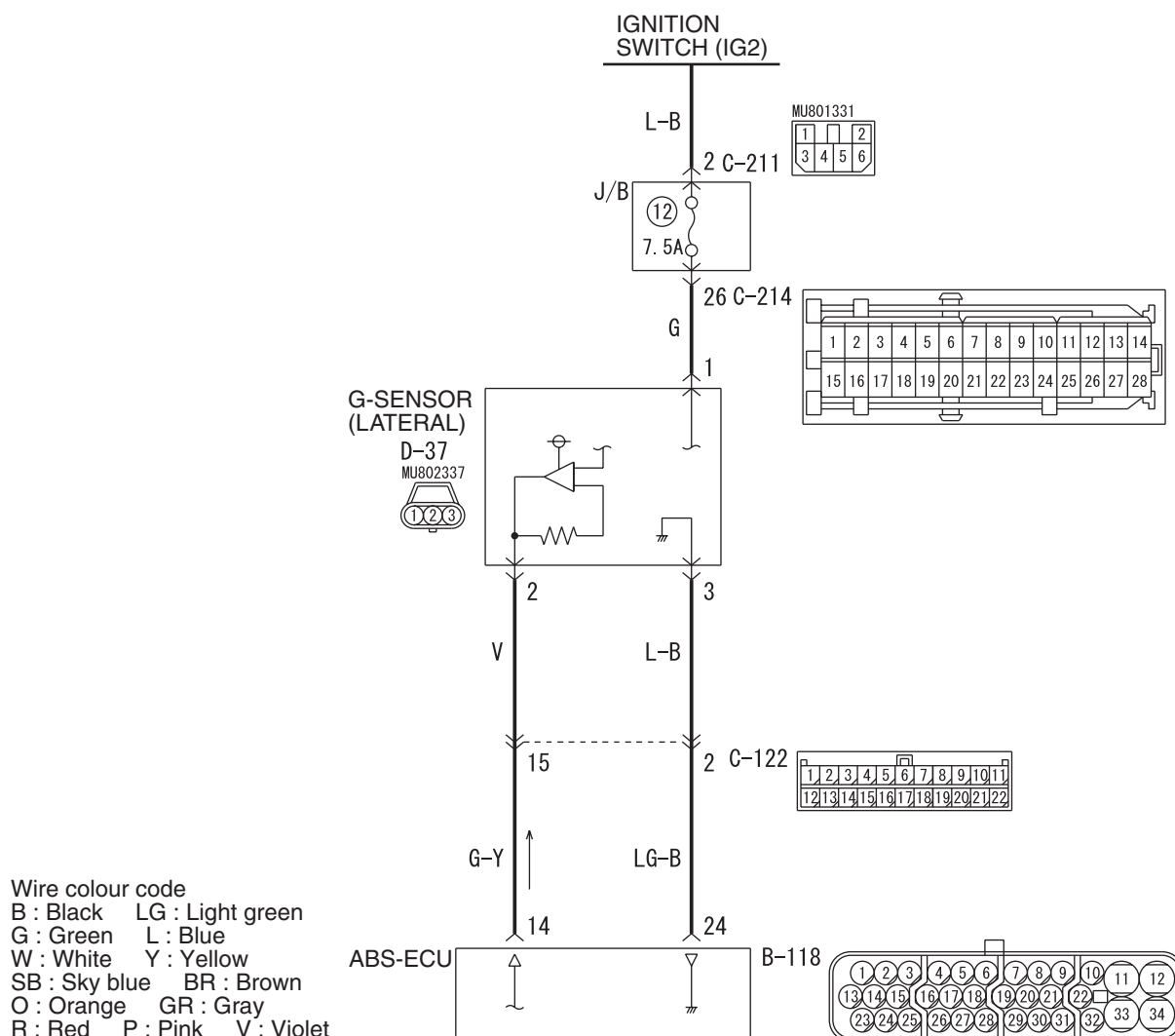
Q: Do diagnosis codes 41, 42, 43, 44, 52, 53 or 55 reset?

YES : Return to Step 1.

NO : The procedure is complete.

Code No.71: Lateral G-Sensor System

Lateral G-Sensor Circuit



W4J35E014A

OPERATION

The lateral G-sensor detects the acceleration level in the left/right direction of the vehicle, converts the signals into voltage signals and then sends that signal to the ABS-ECU.

DIAGNOSIS CODE SET CONDITIONS

This code is set in the following cases:

- When the G-sensor output is 0.5 V or lower or 4.5 V or higher (disconnected lateral G-sensor or lateral G-sensor short circuit)

- If the lateral G-sensor output power does not change (lateral G-sensor output fastening).

PROBABLE CAUSES

The most likely causes for diagnosis code to set are:

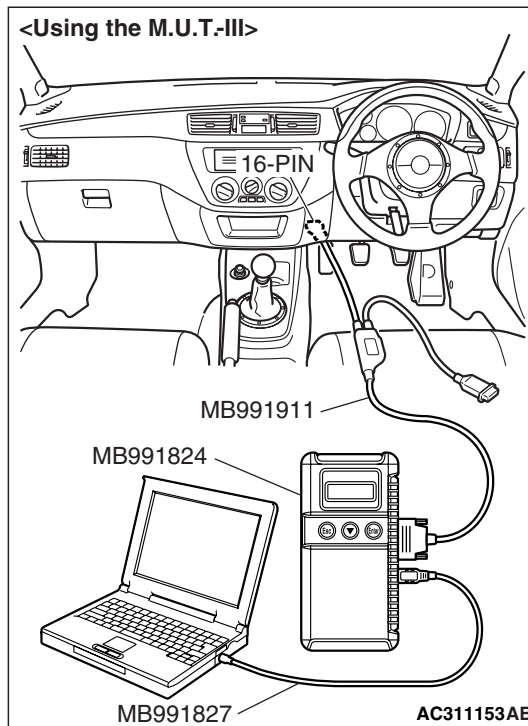
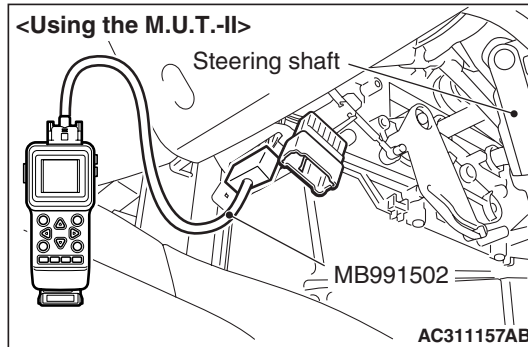
- Malfunction of the lateral G-sensor
- Damaged wiring harness and connector
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)

DIAGNOSIS

STEP 1. M.U.T.-II/III data list

CAUTION

To prevent damage to M.U.T.-II/III, always turn the ignition switch to the "LOOK" (OFF) position before connecting or disconnecting M.U.T.-II/III.



(1) Connect M.U.T.-II/III as shown in the illustration.

- (2) Start the engine.
- (3) Set M.U.T.-II/III to data reading mode for following item.

- Item No.71: Lateral G-sensor

OK:

When vehicle is stationary (level): 2.4 – 2.6 V

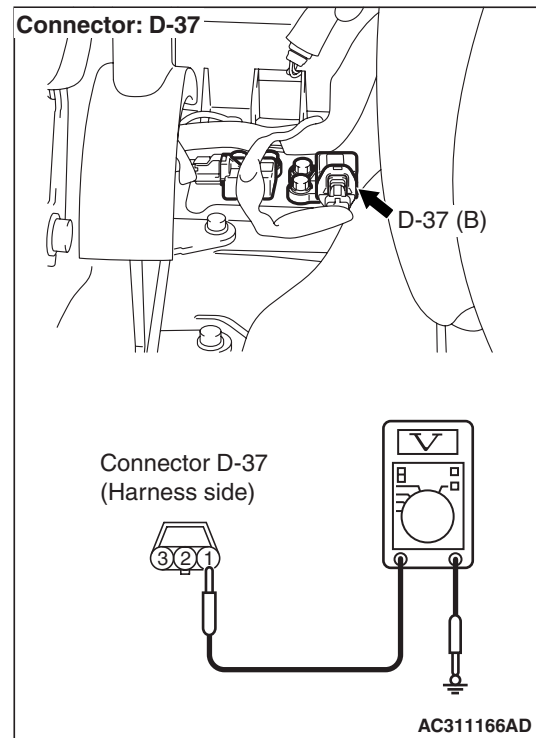
When vehicle is being driven: 1.0 – 4.0 V

Q: Is the lateral G-sensor input normal?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope With Intermittent Malfunction [P.00-5](#).

NO : Go to Step 2.

STEP 2. Check the power supply circuit. Voltage measurement at lateral G-sensor connector D-37.



- (1) Disconnect connector D-37, and check at the harness side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 1 and earth.

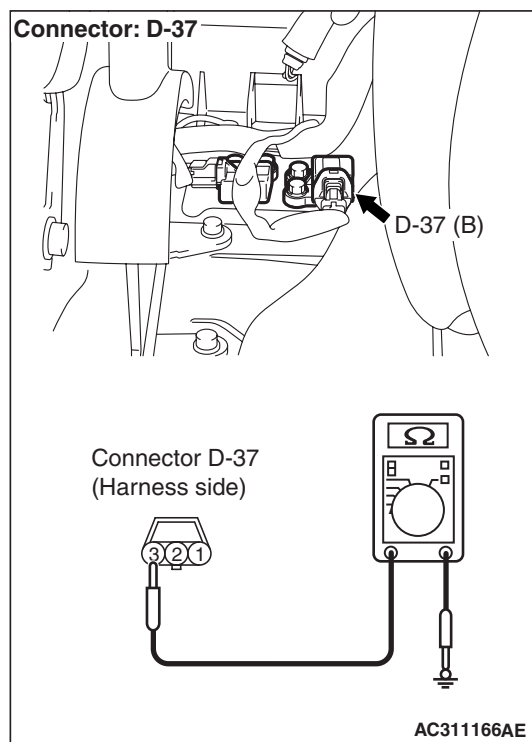
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 3.

NO : Go to Step 4.

STEP 3. Check the earth circuit. Resistance measurement at lateral G-sensor connector D-37.



- (1) Disconnect connector D-37, and check at the harness side.
- (2) Measure the resistance between terminal 3 and earth.

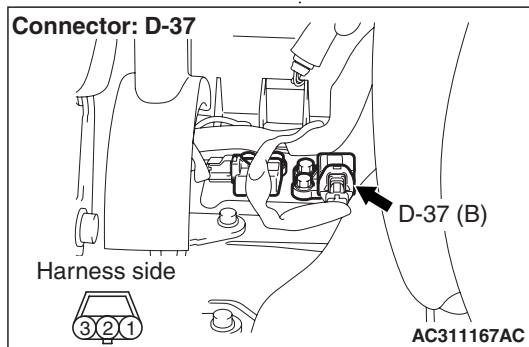
OK: 2 ohms or less

Q: Is the resistance 2 ohms or less?

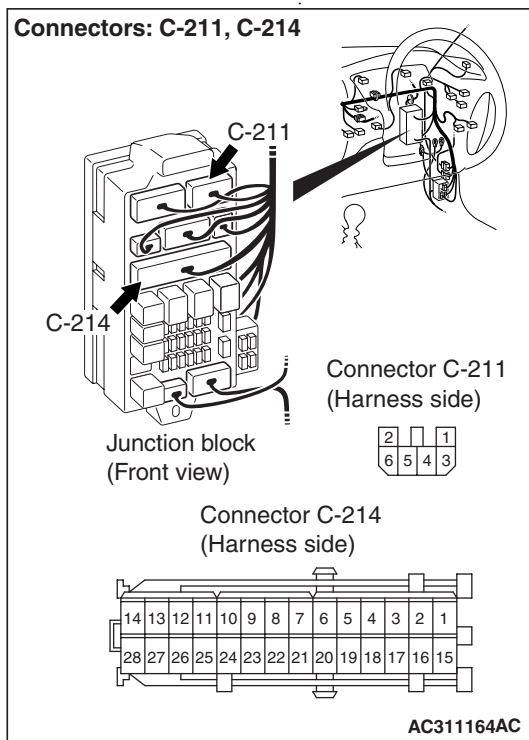
YES : Go to Step 8.

NO : Go to Step 6.

STEP 4. Check the following connectors.



Lateral G-sensor connector D-37



Junction block connectors C-211, C-214

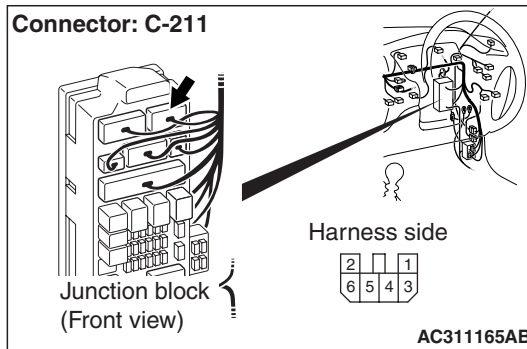
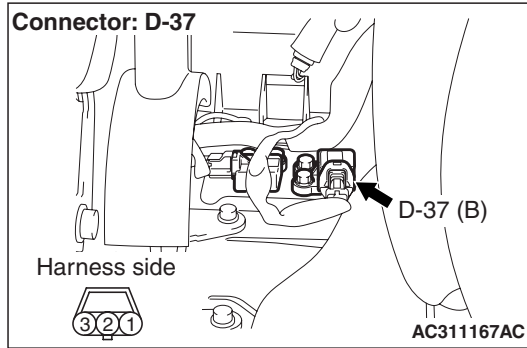
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 5.

NO : Repair it and then go to Step 11.

STEP 5. Check the following harness wire.



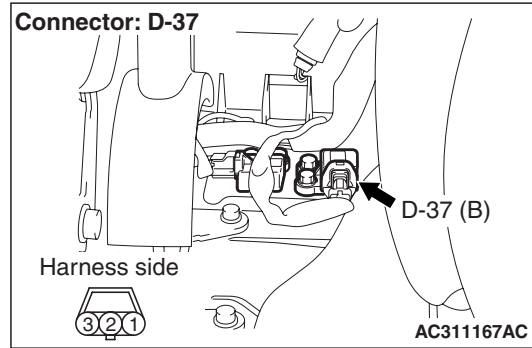
The wire between lateral G-sensor connector D-37 (terminal 1) and junction block connector C-211 (terminal 2)

Q: Is the harness wire damaged?

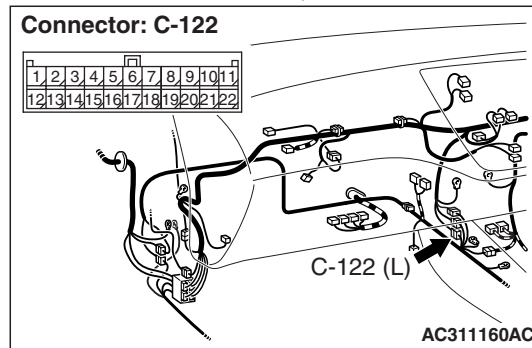
YES : Repair or replace it and then go to Step 11.

NO : Go to Step 11.

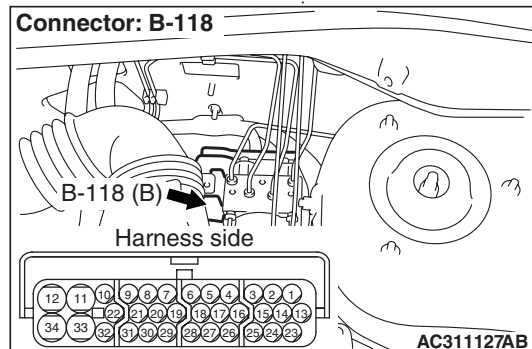
STEP 6. Check the following connectors.



Lateral G-sensor connector D-37



Intermediate connector C-122



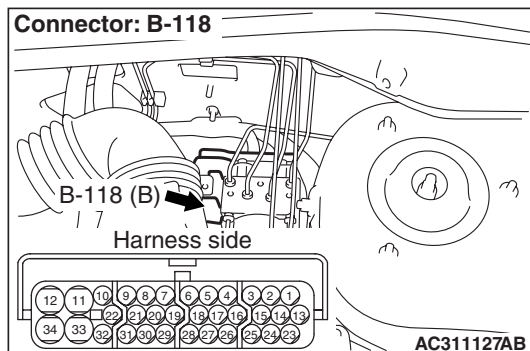
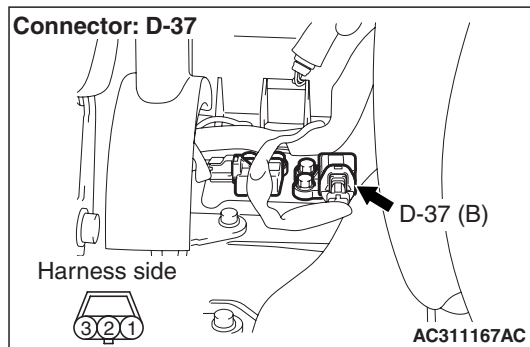
ABS-ECU connector B-118

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 7.

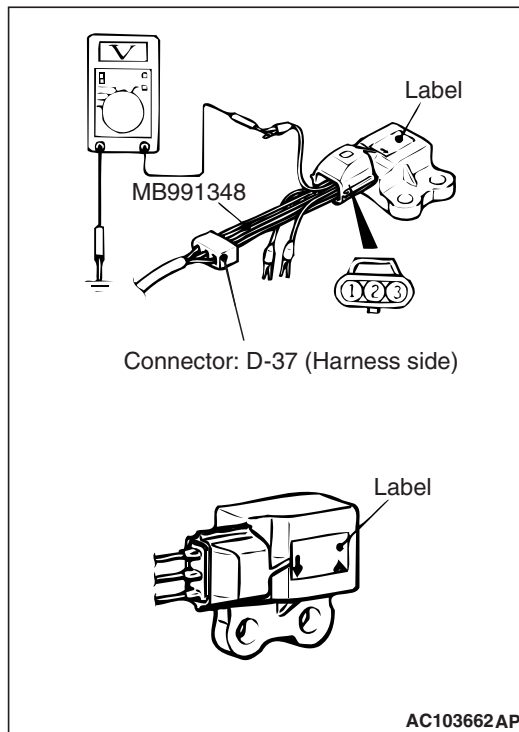
NO : Repair it and then go to Step 11.

STEP 7. Check the following harness wire.

The wire between lateral G-sensor connector D-37 (terminal 3) and ABS-ECU connector B-118 (terminal 24)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 11.
NO : Go to Step 11.

STEP 8. Check lateral G-sensor output voltage.

- (1) Disconnect connector D-37, and then connect special tool harness set (MB991348) between terminals of the disconnected connectors.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 2 and earth.

OK:

When the lateral G-sensor is placed on a level plane: 2.4 – 2.6 volts

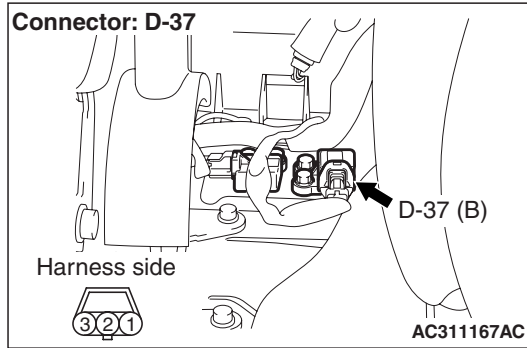
When the lateral G-sensor is placed with its label positioned as shown: 3.4 – 3.6 volts

Q: Is the lateral G-sensor output voltage normal?

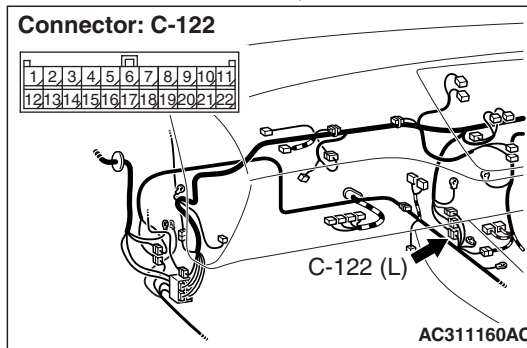
YES : Go to Step 9.

NO : Replace the lateral G-sensor (Refer to [P.35B-148](#)). Then go to Step 11.

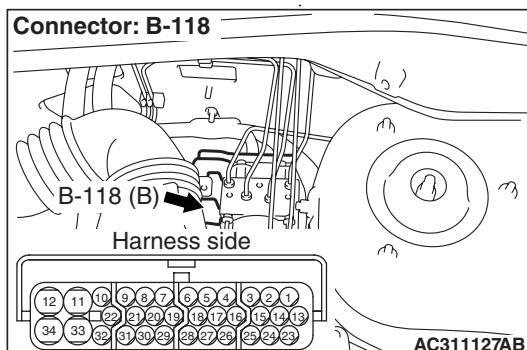
STEP 9. Check the following connectors.



Lateral G-sensor connector D-37



Intermediate connector C-122



ABS-ECU connector B-118

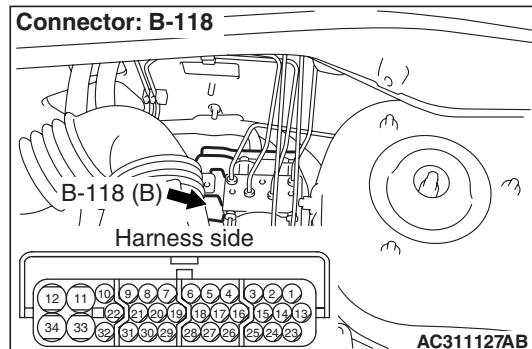
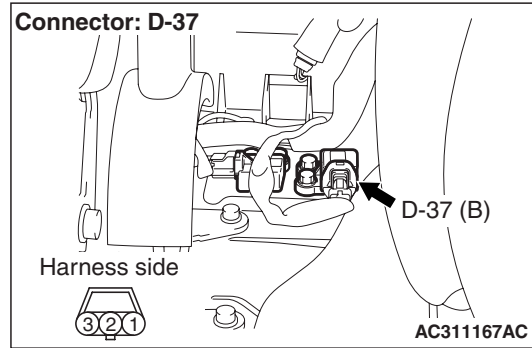
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

NO : Repair it and then go to Step 11.

STEP 10. Check the following harness wire.

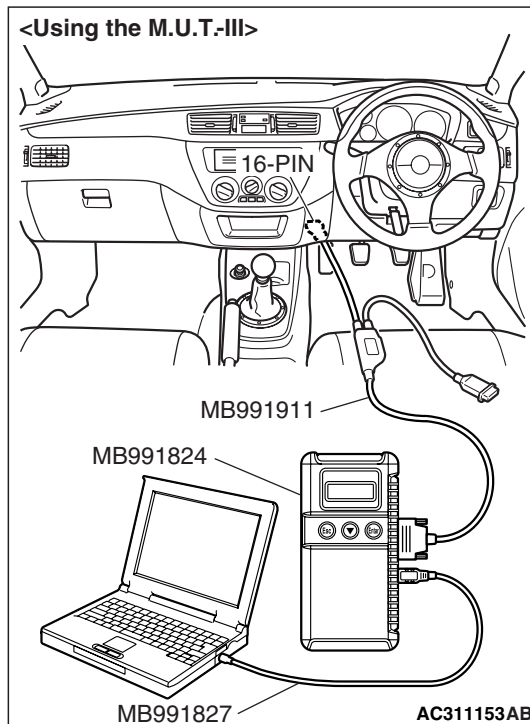
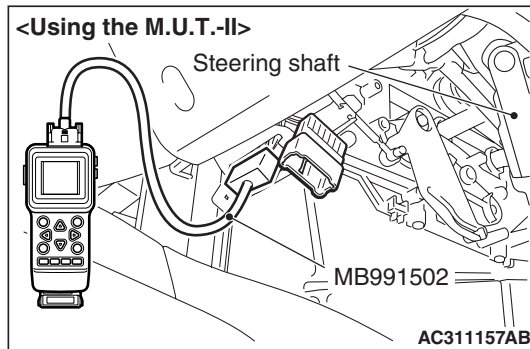


The wire between lateral G-sensor connector D-37 (terminal 2) and ABS-ECU connector B-118 (terminal 14)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 11.

NO : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 11.

STEP 11. Check whether the diagnosis code is reset.

Check again if the diagnosis code is set.

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

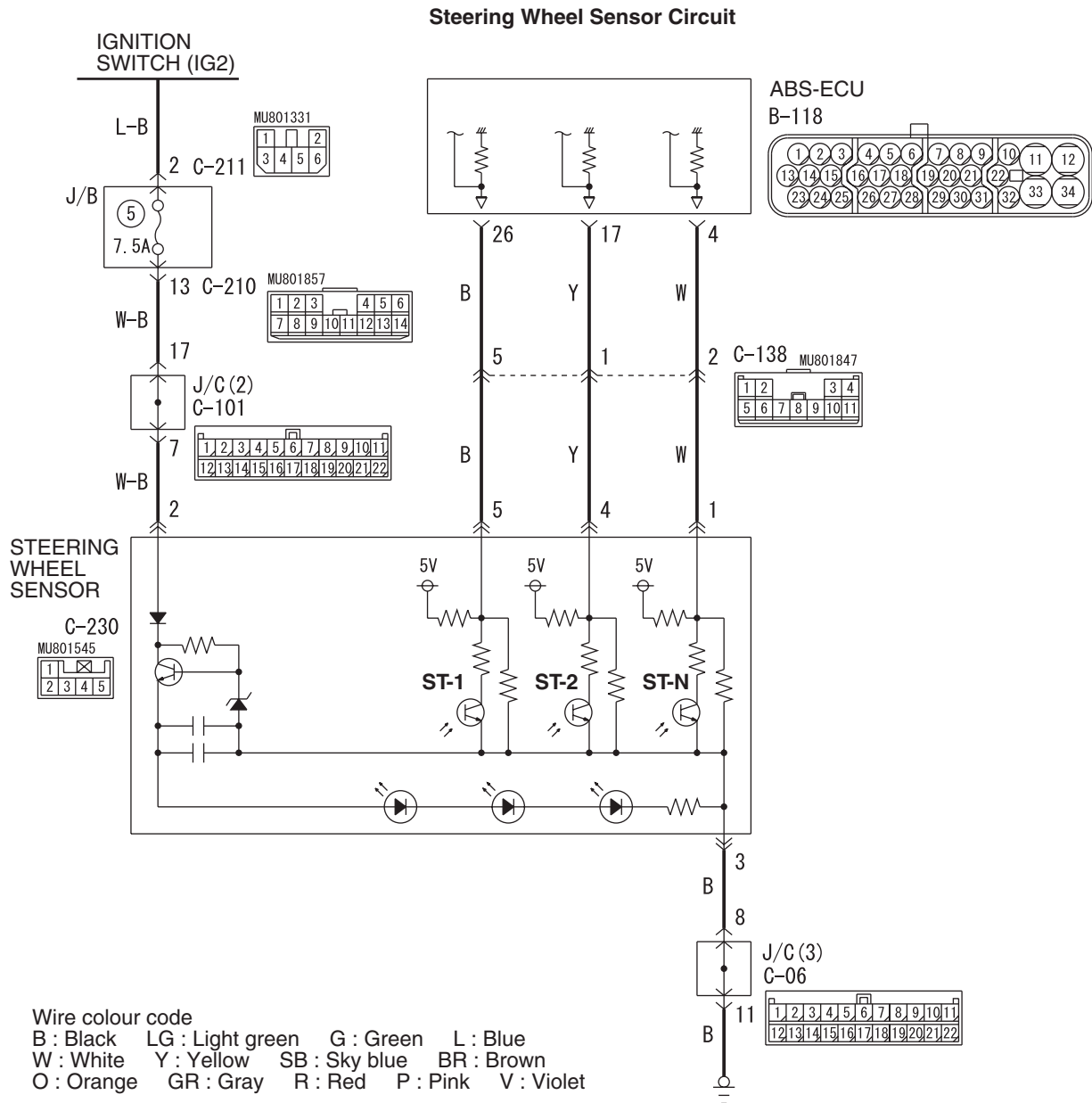
- (2) Erase the diagnosis code.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.
- (4) Turn the ignition switch to the "ON" position.
- (5) Check if the diagnosis code is set.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Does diagnosis code No.71 reset?

YES : Start over at Step 1.

NO : The procedure is complete.

Code No.81: Steering Wheel Sensor (ST-1) System
Code No.82: Steering Wheel Sensor (ST-2) System
Code No.83: Steering Wheel Sensor (ST-N) System



W4J35E015A

OPERATION

The steering wheel sensor monitors the steering angle and sends the ST-1, ST-2 and ST-N signals. The ABS-ECU calculates the steering angle by reading the signals from the steering wheel sensor.

DIAGNOSIS CODE SET CONDITIONS

Diagnosis code No.81 (ST-1), No.82 (ST-2) and No.83 (ST-N) are set if there is a fault in the steering wheel sensor, an open circuit or short circuit in the signal lines, or the internal circuit in the hydraulic unit and ABS-ECU is defective.

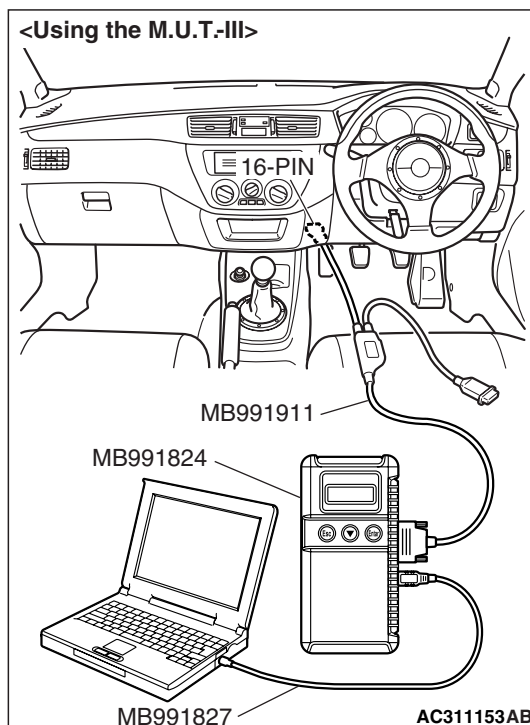
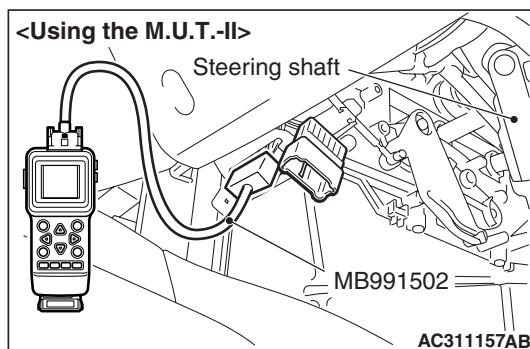
PROBABLE CAUSES

The most likely causes for these diagnosis codes to set are:

- Malfunction of the steering wheel sensor
- Damaged wiring harness and connector
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)

DIAGNOSIS**STEP 1. M.U.T.-II/III data list.****⚠ CAUTION**

To prevent damage to M.U.T.-II/III, always turn the ignition switch to the "LOOK" (OFF) position before connecting or disconnecting M.U.T.-II/III.



(1) Connect M.U.T.-II/III as shown in the illustration.

(2) Start the engine.

(3) Set M.U.T.-II/III to data reading mode for following items.

- Item No.74: Steering wheel (ST-N)
- Item No.75: Steering wheel (ST-1)
- Item No.76: Steering wheel (ST-2)

OK:

Item No.	Check item	Checking requirement	Display
74	Steering wheel sensor (ST-N)	Steering: Neutral position and position near by $\pm 360^\circ$	ON
		Steering: Except for above	OFF
75	Steering wheel sensor (ST-1)	Steering: Turn laterally slowly.	Display ON and OFF alternately
76	Steering wheel sensor (ST-2)		

Q: Is the steering wheel sensor input normal?

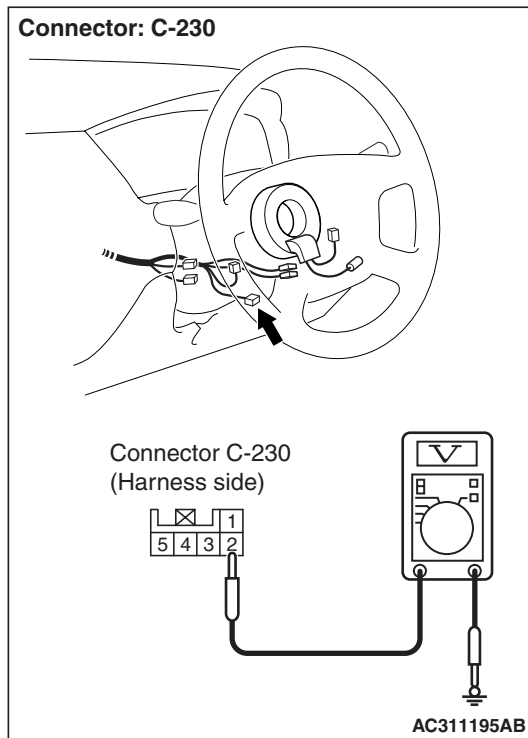
YES : This malfunction is intermittent. Refer to GROUP 00, How to Use

Troubleshooting/Inspection Service Points – How to Cope With Intermittent Malfunction

[P.00-5.](#)

NO : Go to Step 2.

STEP 2. Check the power supply circuit. Voltage measurement at steering wheel sensor connector C-230.



- (1) Disconnect connector C-230, and check at the harness side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 2 and earth.

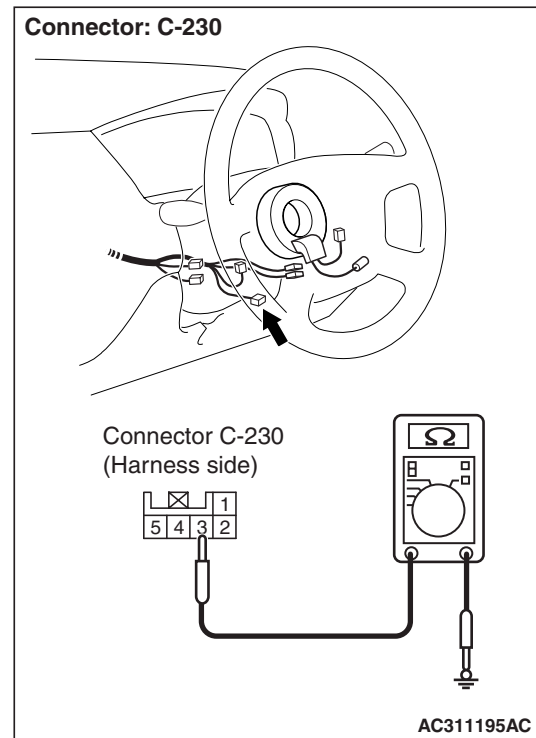
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 3.

NO : Go to Step 4.

STEP 3. Check the earth circuit. Resistance measurement at steering wheel sensor connector C-230.



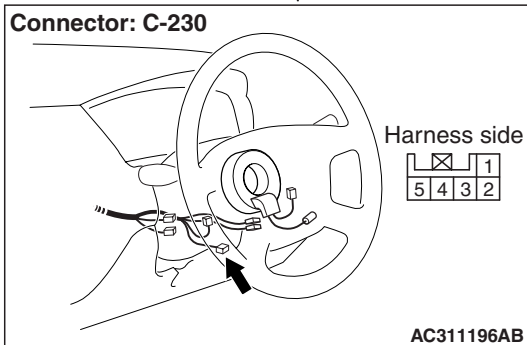
- (1) Disconnect connector C-230, and check at the harness side.
- (2) Measure the resistance between terminal 3 and earth.

OK: 2 ohms or less

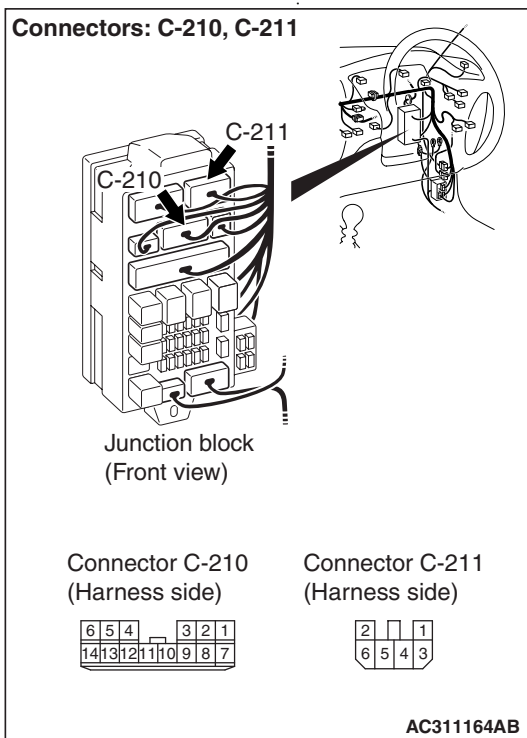
Q: Is the resistance 2 ohms or less?

YES : Go to Step 8.

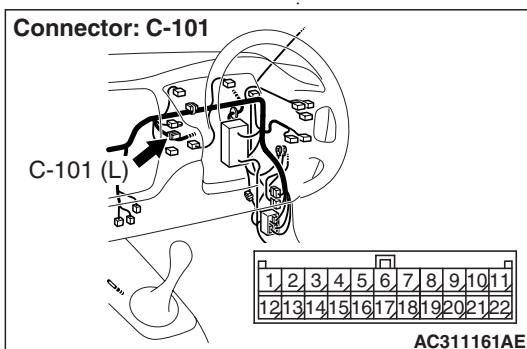
NO : Go to Step 6.

STEP 4. Check the following connectors.

Steering wheel sensor connector C-230



Junction block connectors C-210, C-211



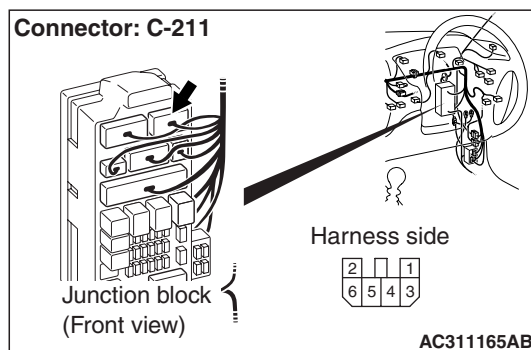
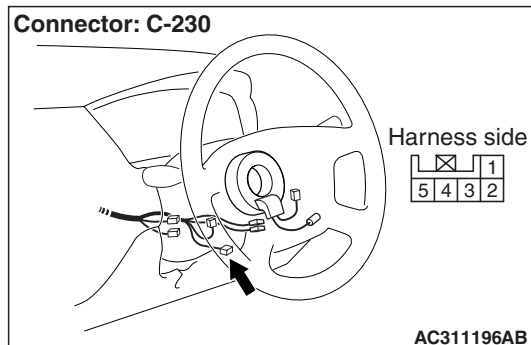
Joint connector C-101

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 5.

NO : Repair it and then go to Step 11.

STEP 5. Check the following harness wire.

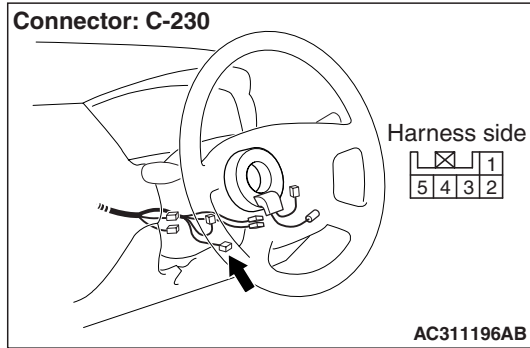
The wire between steering wheel sensor connector C-230 (terminal 2) and junction block connector C-211 (terminal 2)

Q: Is the harness wire damaged?

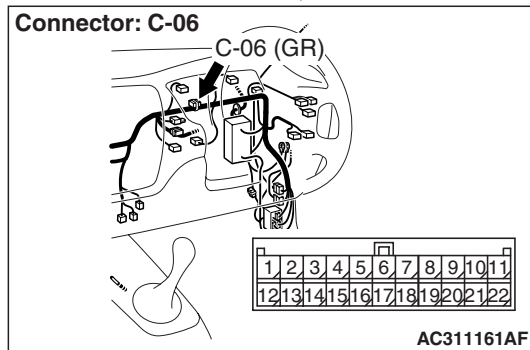
YES : Repair or replace it and then go to Step 11.

NO : Go to Step 11.

STEP 6. Check the following connectors.



Steering wheel sensor connector C-230



Joint connector C-06

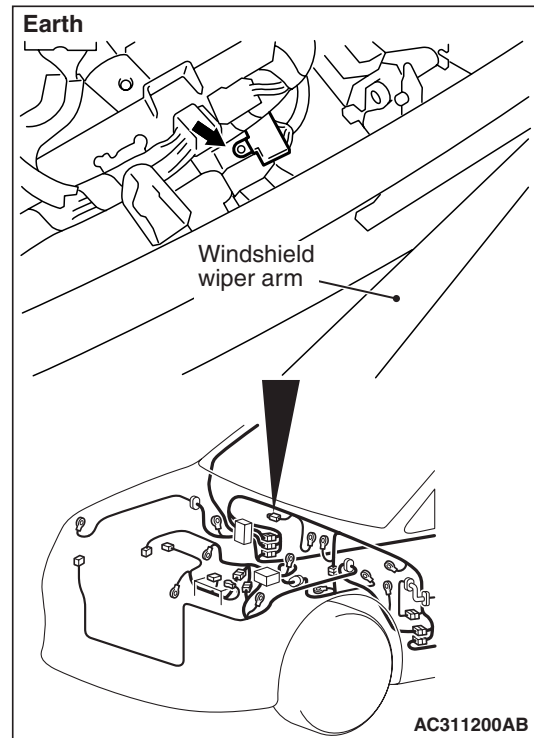
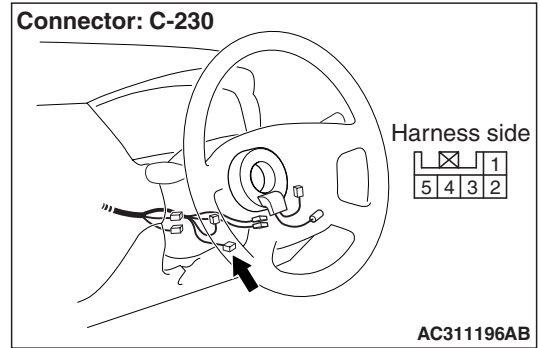
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 7.

NO : Repair it and then go to Step 11.

STEP 7. Check the following harness wires.

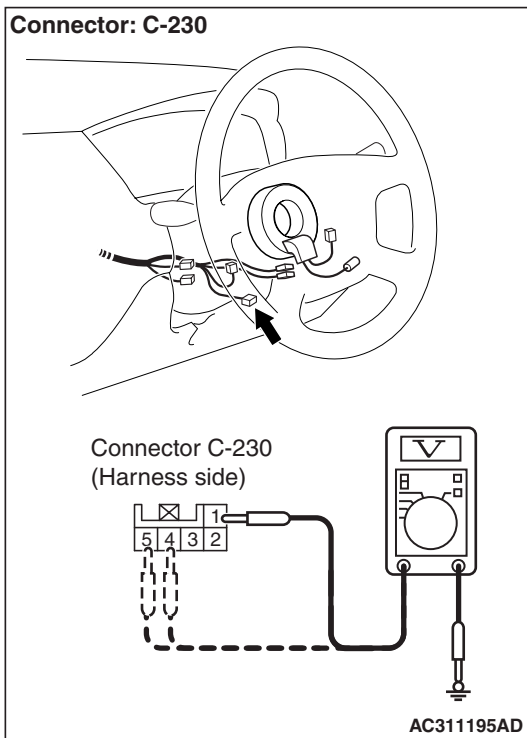


The wire between steering wheel sensor connector C-230 (terminal 3) and earth

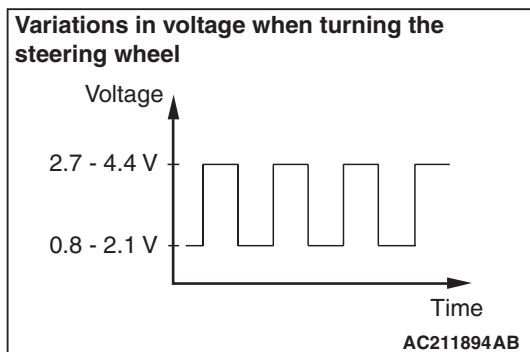
Q: Is any harness wire damaged?

YES : Repair or replace it and then go to Step 11.

NO : Go to Step 11.

STEP 8. Check steering wheel sensor output voltage.

- (1) Connect steering wheel sensor connector C-230.
- (2) Turn the ignition switch to the "ON" position.



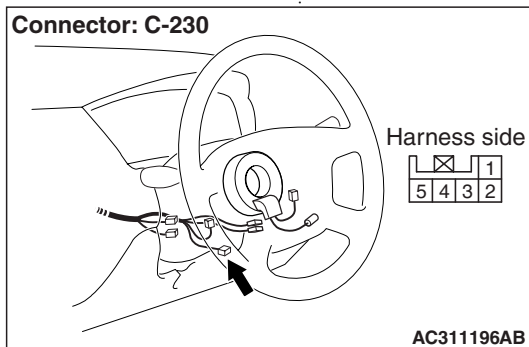
- (3) Measure the voltage, by backprobing, between terminal 1 and earth, terminal 4 and earth, and terminal 5 and earth.

OK: The voltage should measure as indicated in the figure.

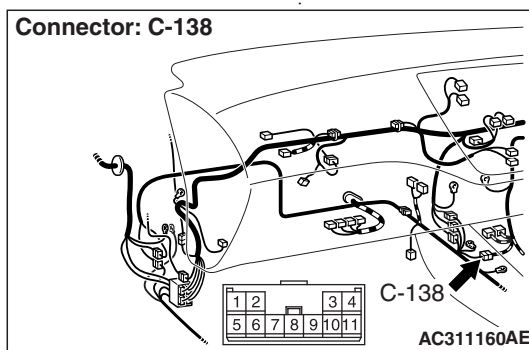
Q: Is the steering wheel sensor output voltage normal?

YES : Go to Step 9.

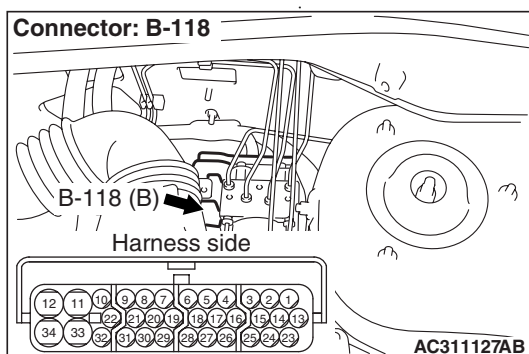
NO : Replace the steering wheel sensor (Refer to [P.35B-150](#)). Then go to Step 11.

STEP 9. Check the following connectors.

Steering wheel sensor connector C-230



Intermediate connector C-138



ABS-ECU connector B-118

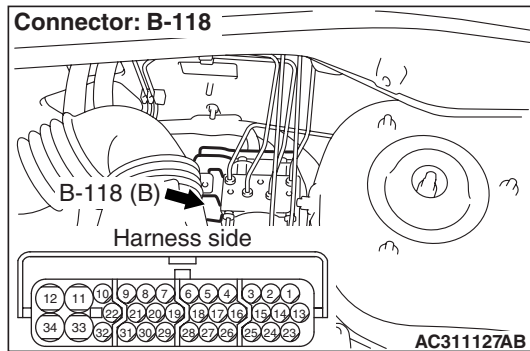
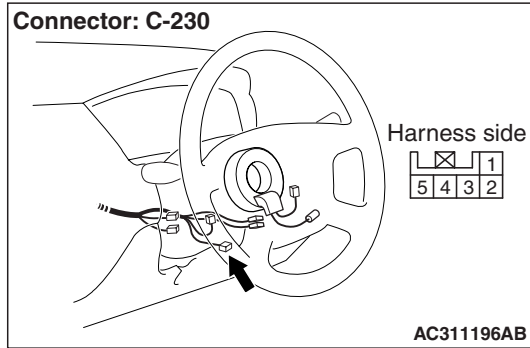
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

NO : Repair it and then go to Step 11.

STEP 10. Check the following harness wires.



If diagnosis code No.81 (ST-1) is set: The wire between steering wheel sensor connector C-230 (terminal 5) and ABS-ECU connector B-118 (terminal 26)

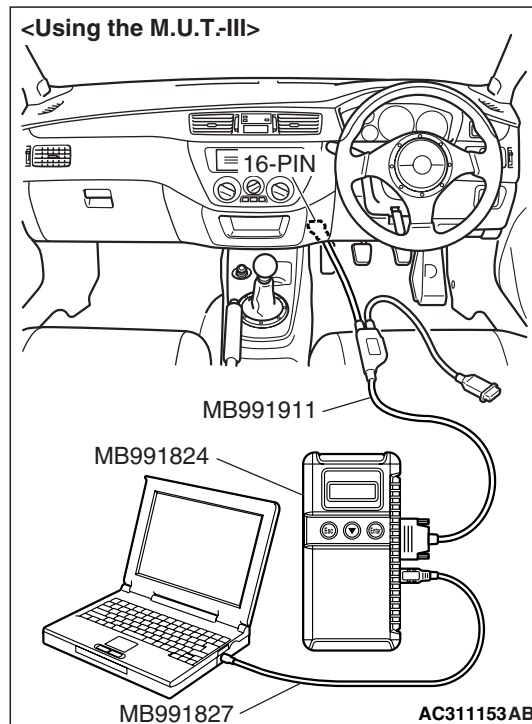
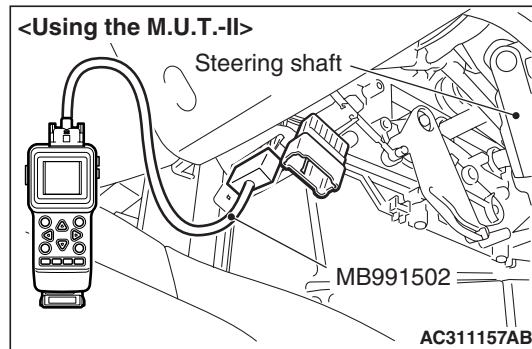
- If diagnosis code No.82 (ST-2) is set: The wire between steering wheel sensor connector C-230 (terminal 4) and ABS-ECU connector B-118 (terminal 17)
- If diagnosis code No.83 (ST-N) is set: The wire between steering wheel sensor connector C-230 (terminal 1) and ABS-ECU connector B-118 (terminal 4)

Q: Is any harness wire damaged?

YES : Repair or replace it and then go to Step 11.

NO : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 11.

STEP 11. Check whether the diagnosis code is reset.



Check again if the diagnosis code is set.

- (1) Turn the ignition switch to the "ON" position.
- (2) Erase the diagnosis code.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.
- (4) Turn the ignition switch to the "ON" position.
- (5) Check if the diagnosis code is set.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Does diagnosis code No.81, 82 and/or 83 reset?

YES : Return to Step 1.

NO : The procedure is complete.

INSPECTION CHART FOR TROUBLE SYMPTOMS

M1352011400750

NOTE: If steering movements are made when driving at high speed, or when driving on road surfaces with low frictional resistance, or when passing over bumps, the ABS may operate although sudden braking is not being applied. Because of this, when getting information from the customer, check if the problem occurred while driving under such conditions as these.

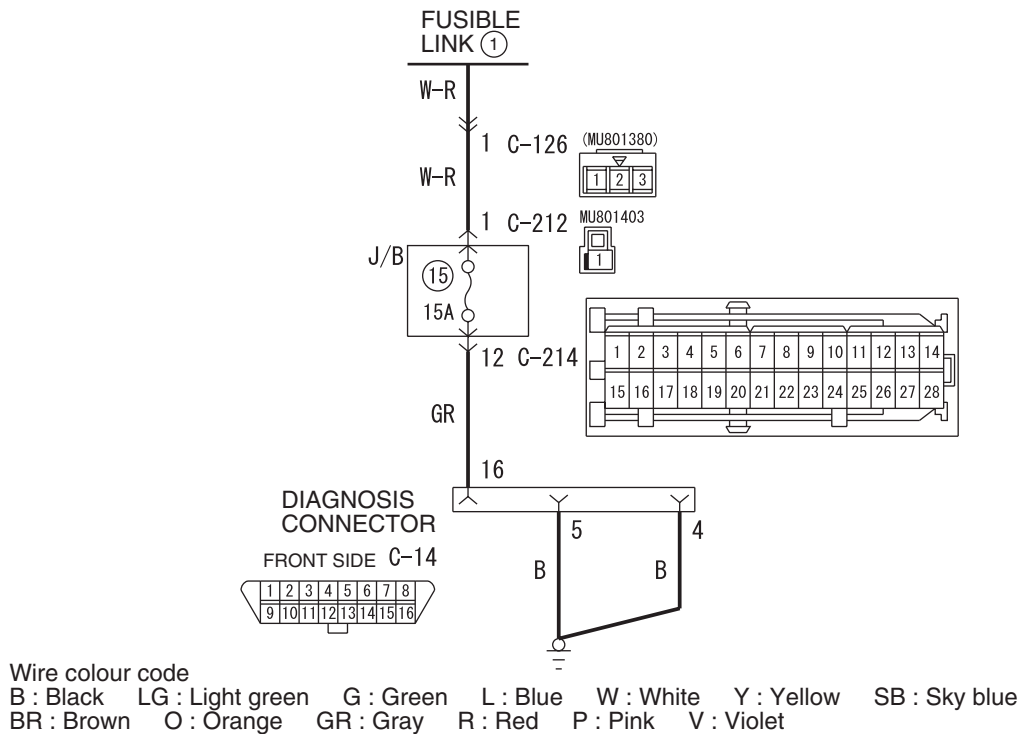
NOTE: During ABS operation, the brake pedal may vibrate a little or may not be able to be pressed. Such conditions are due to intermittent changes in hydraulic pressure inside the brake line to prevent the wheels from locking. This is normal.

Trouble symptoms	Inspection procedure No.	Reference page
Communication between the M.U.T.-II/III and all the system is not possible.	1	<LH drive vehicle> P.35B-83 , <RH drive vehicle> P.35B-109
Communication between the M.U.T.-II/III and the ABS-ECU is not possible.	2	<LH drive vehicle> P.35B-87 , <RH drive vehicle> P.35B-113
When the ignition key is turned to the "ON" position (Engine stopped), the ABS warning lamp does not illuminate.	3	<LH drive vehicle> P.35B-92 , <RH drive vehicle> P.35B-118
The ABS warning lamp remains illuminated after the engine is started.	4	<LH drive vehicle> P.35B-97 , <RH drive vehicle> P.35B-123
In the inspection with the M.U.T.-II/III data list, the parking brake switch is not turned ON or turned OFF.	5	<LH drive vehicle> P.35B-99 , <RH drive vehicle> P.35B-125
The neutral position learning of the steering wheel sensor is not detected.	6	<LH drive vehicle> P.35B-103 , <RH drive vehicle> P.35B-129
Faulty ABS operation	7	<LH drive vehicle> P.35B-108 , <RH drive vehicle> P.35B-134

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS <L.H. drive vehicle>

INSPECTION PROCEDURE 1: Communication between the M.U.T.-II/III and all the Systems is Not Possible.

Diagnosis Connector Power Supply and Earth Circuit



W4J35E026A

OPERATION

A battery positive voltage is applied on the diagnosis connector power terminal (terminal 16). The earth terminals (terminal 4, 5) are earthed to the vehicle body.

COMMENT ON TROUBLE SYMPTOM

The cause is probably a defect in power supply circuit or the earth circuit.

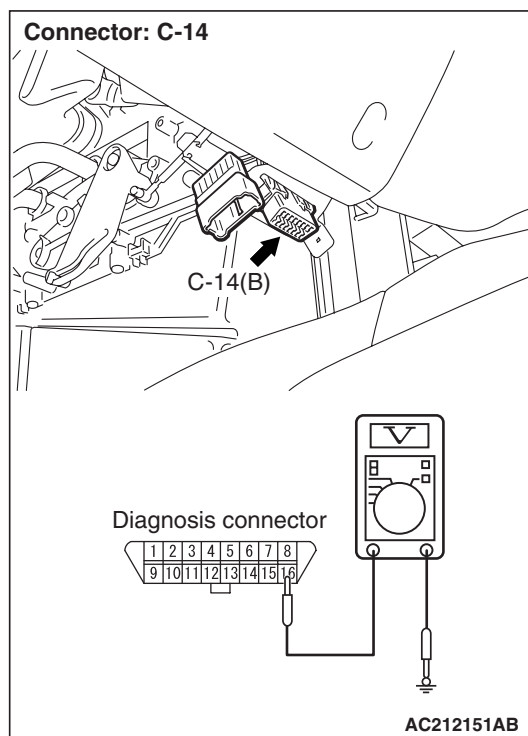
PROBABLE CAUSES

The most likely causes for this case are:

- Malfunction of the diagnosis connector
- Damaged wiring harness or connector

DIAGNOSIS

STEP 1. Check the power supply circuit. Voltage measurement at diagnosis connector C-14.



Measure the voltage between terminal 16 and earth.

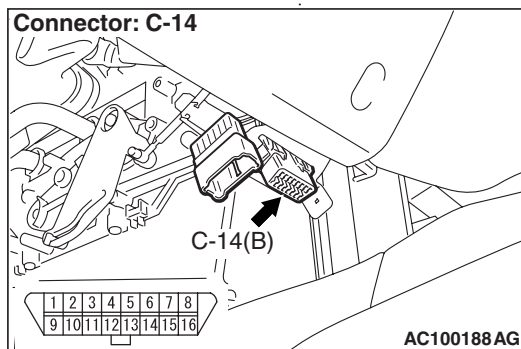
OK: System voltage

Q: Is the check result normal?

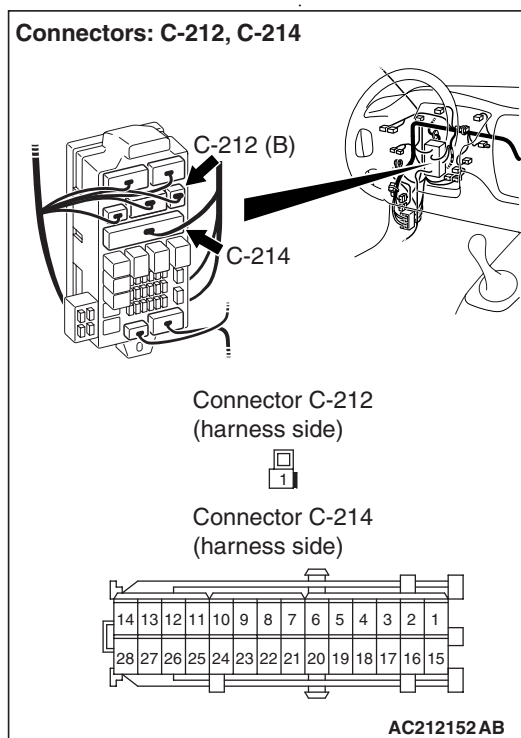
YES : Go to Step 4.

NO : Go to Step 2.

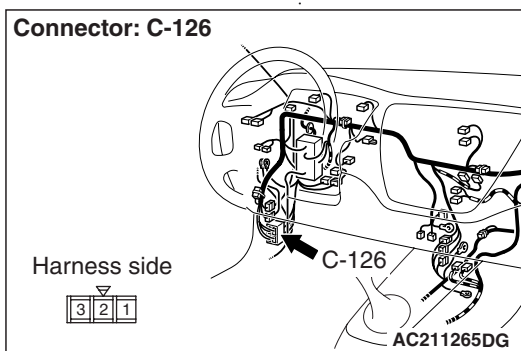
STEP 2. Check the following connectors.



Diagnosis connector C-14



Junction block connectors C-212, C-214

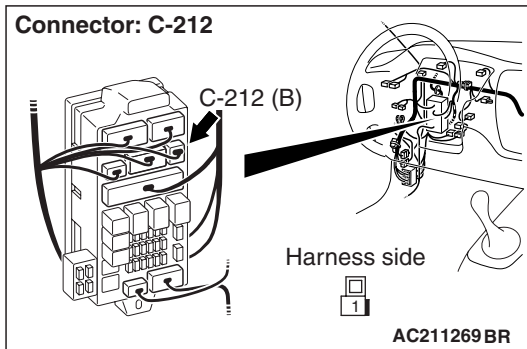
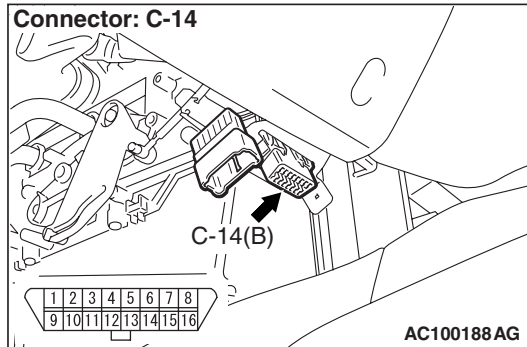


Intermediate connector C-126

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

- Q: Are the connectors and terminals in good condition?**
YES : Go to Step 3.
NO : Repair it and then go to Step 7.

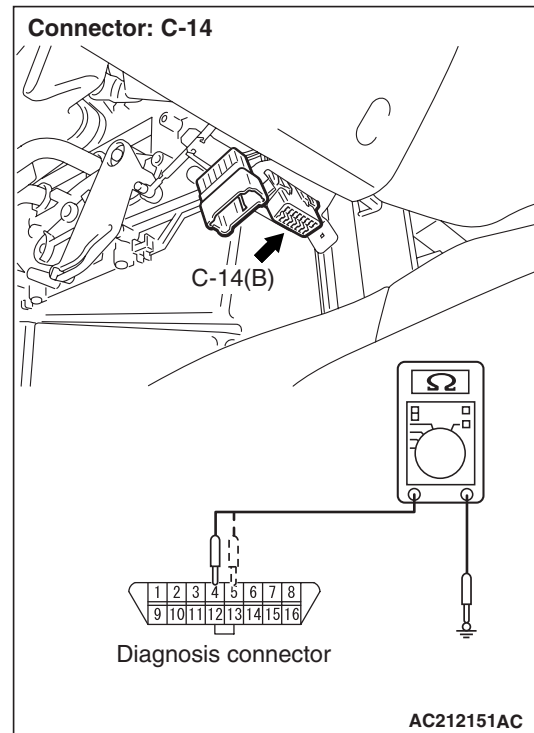
STEP 3. Check the following harness wire.



The wire between diagnosis connector C-14 (terminal 16) and junction block connector C-212 (terminal 1)

- Q: Is the harness wire damaged?**
YES : Repair or replace it and then go to Step 7.
NO : Go to Step 7.

STEP 4. Check the earth circuit. Resistance measurement at diagnosis connector C-14.

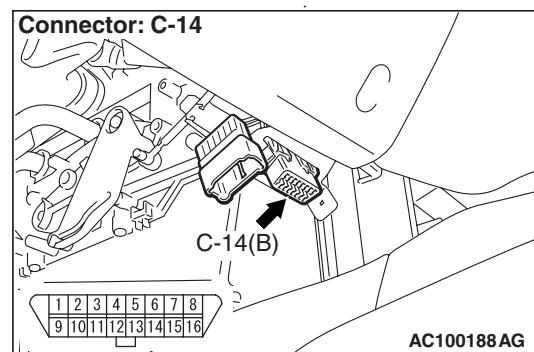


Measure the resistance between terminal 4 and earth, and terminal 5 and earth.

OK: 2 ohms or less

- Q: Is the resistance 2 ohms or less?**
YES : Replace the M.U.T.-II and then go to Step 7.
NO : Go to Step 5.

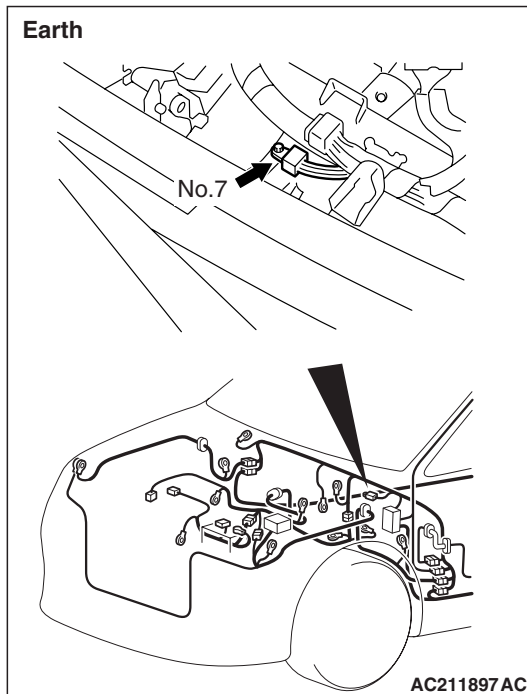
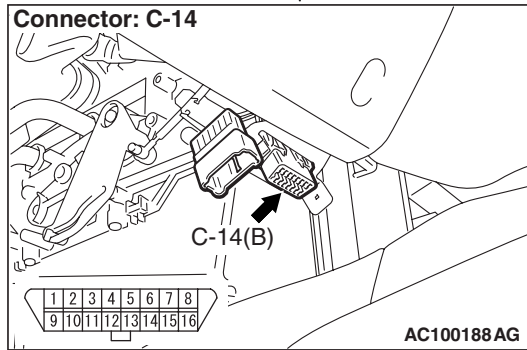
STEP 5. Check the following connector.



Diagnosis connector C-14

Check the connector, for loose, corroded or damaged terminals, or terminals pushed back in the connector.

- Q: Are the connector and terminals in good condition?**
YES : Go to Step 6.
NO : Repair it and then go to Step 7.

STEP 6. Check the following harness wires.

The wire between diagnosis connector C-14 (terminal 4) and earth (No.7)

- The wire between diagnosis connector C-14 (terminal 5) and earth (No.7)

Q: Is any harness wire damaged?

YES : Repair or replace it and then go to Step 7.

NO : Go to Step 7.

STEP 7. Retest the system.

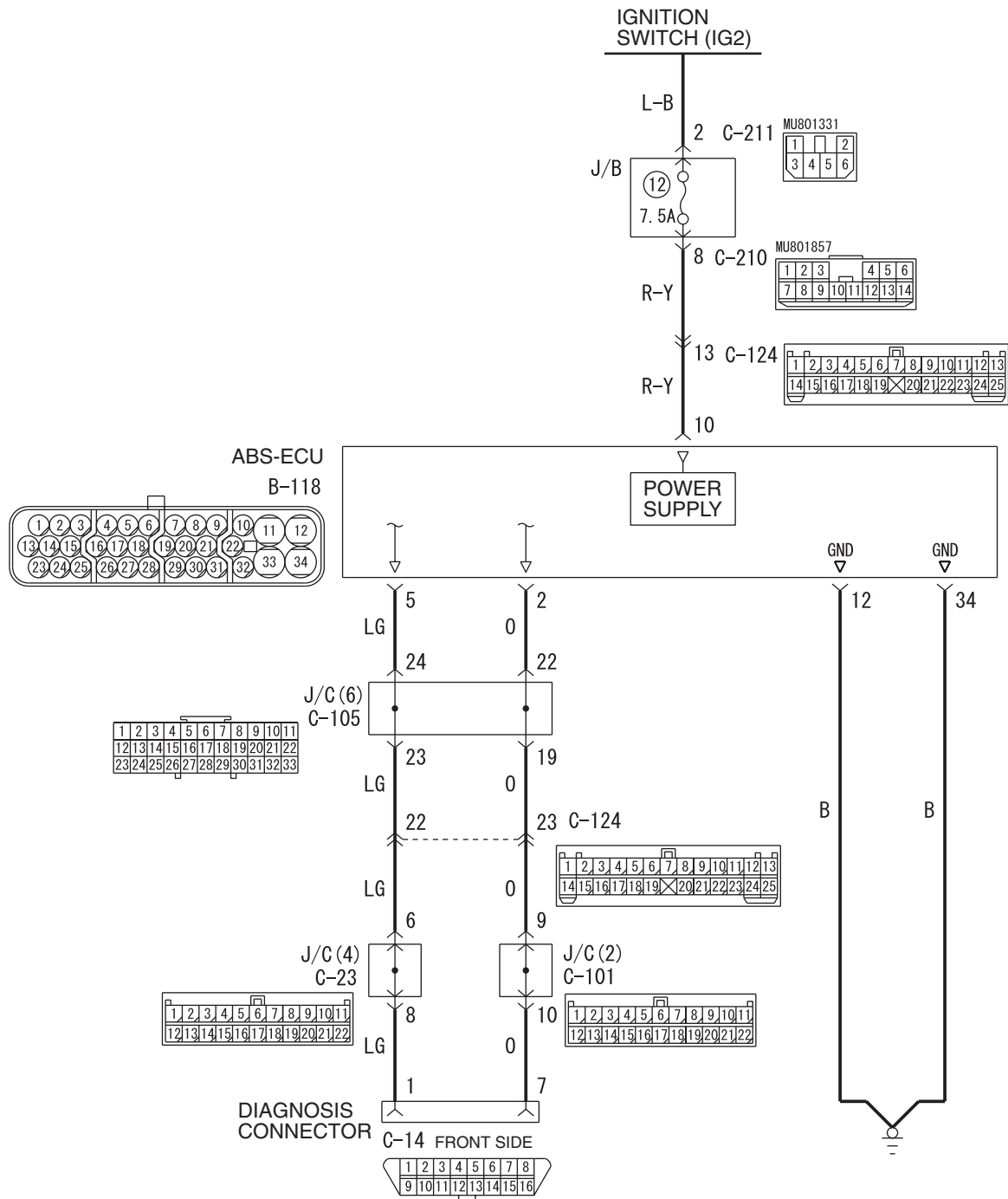
Q: Does the M.U.T.-II/III communicate with the whole system?

YES : The procedure is complete.

NO : Return to Step 1.

INSPECTION PROCEDURE 2: Communication between the M.U.T.-II/III and the ABS-ECU is not possible.

ABS-ECU Power Supply /Earth and Diagnosis Connector Circuit



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Gray R : Red P : Pink V : Violet

OPERATION

- The diagnosis code is set by the ABS-ECU (terminal 2) to the diagnostic output terminal (terminal 7) of the diagnosis connector.
- When the diagnosis connector's diagnosis test mode control terminal (terminal 1) is earthed, the ABS-ECU will go into diagnosis mode.

COMMENT ON TROUBLE SYMPTOM

When communication with the M.U.T.-II/III is not possible, the cause is probably an open circuit in the ABS-ECU power circuit or an open circuit in the diagnostic output circuit.

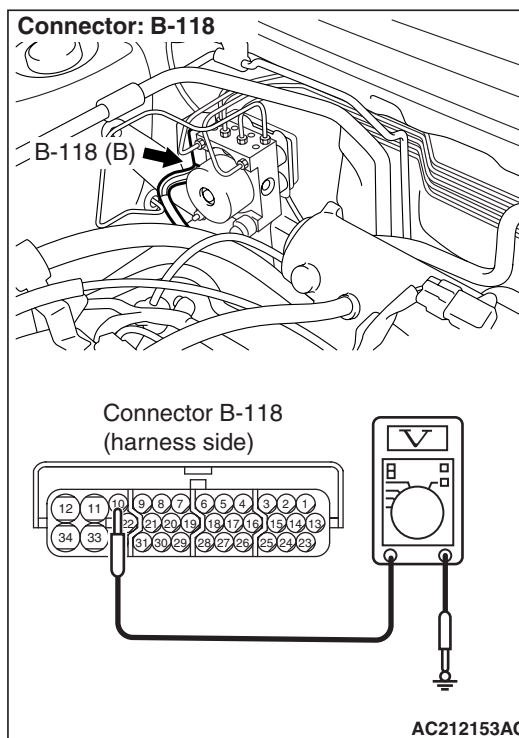
PROBABLE CAUSES

The most likely causes for this case are:

- Blown fuse
- Damaged wiring harness or connector
- Malfunction of the brake modulator hydraulic unit (Integrated with ABS-ECU)

DIAGNOSIS

STEP 1. Check the power supply circuit. Voltage measurement at ABS-ECU connector B-118.



- (1) Disconnect ABS-ECU connector B-118 and measure at the harness side.
- (2) Start the engine.
- (3) Measure the voltage between terminal 10 and earth.

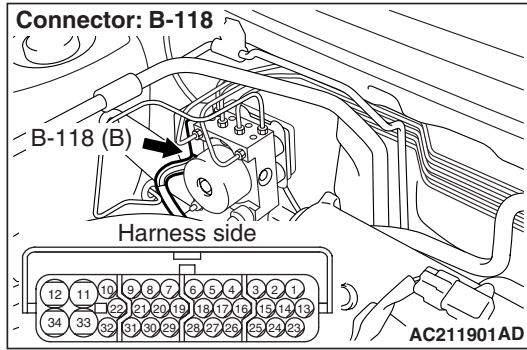
OK: System voltage

Q: Is the check result normal?

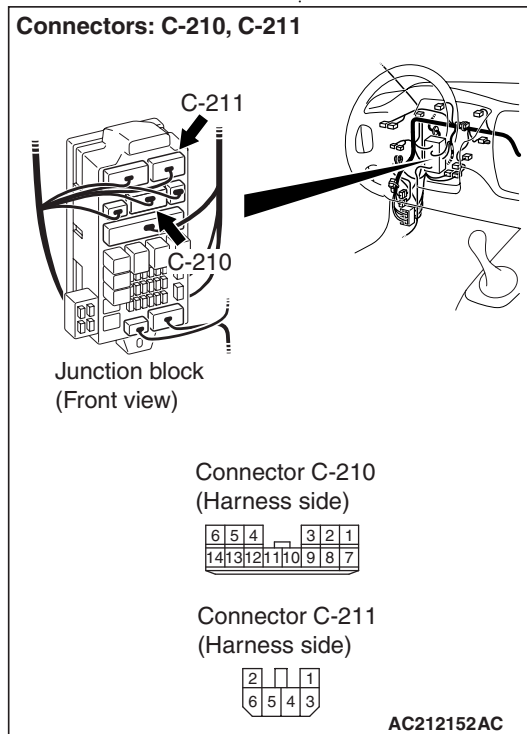
YES : Go to Step 4.

NO : Go to Step 2.

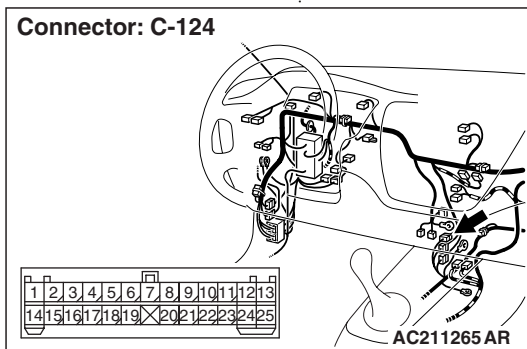
STEP 2. Check the following connectors.



ABS-ECU connector B-118



Junction block connectors C-210, C-211



Intermediate connector C-124

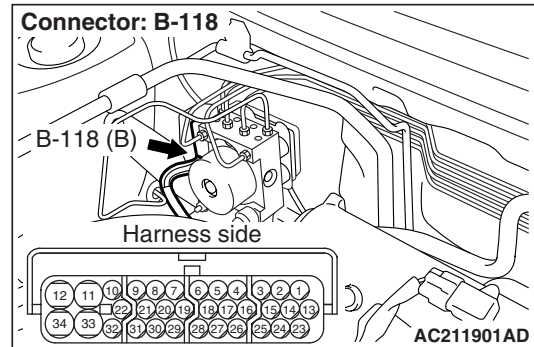
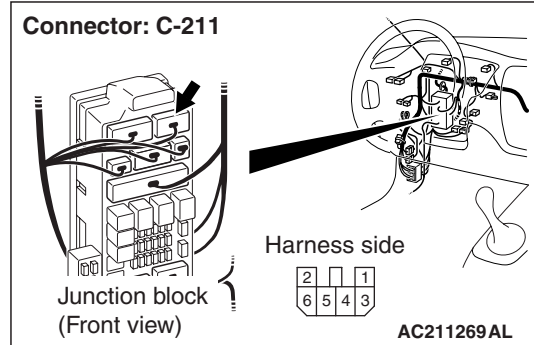
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 3.

NO : Repair it and then go to Step 9.

STEP 3. Check the following harness wire.

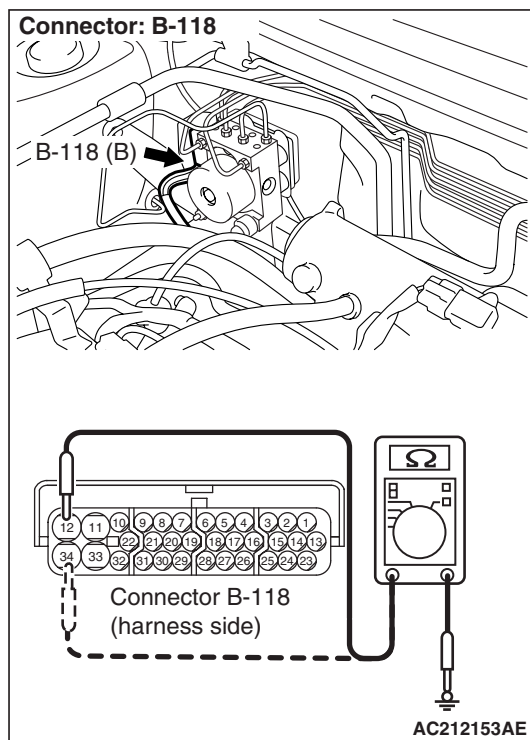


The wire between junction block connector C-211 (terminal 2) and ABS-ECU connector B-118 (terminal 10)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 9.

NO : Go to Step 9.

STEP 4. Check the earth circuit. Resistance measurement at ABS-ECU connector B-118.

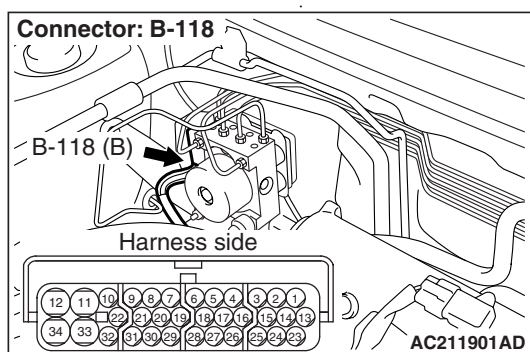
Measure the resistance between terminal 12 and earth, and terminal 34 and earth.

OK: 2 ohms or less

Q: Is the resistance 2 ohms or less?

YES : Go to Step 7.

NO : Go to Step 5.

STEP 5. Check the following connector.

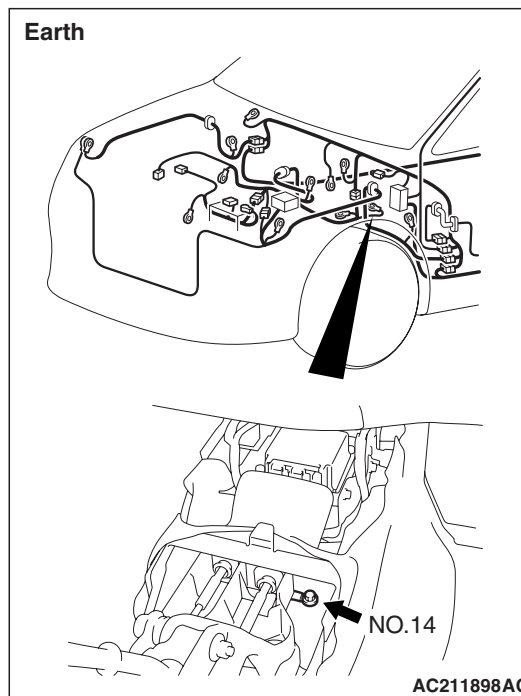
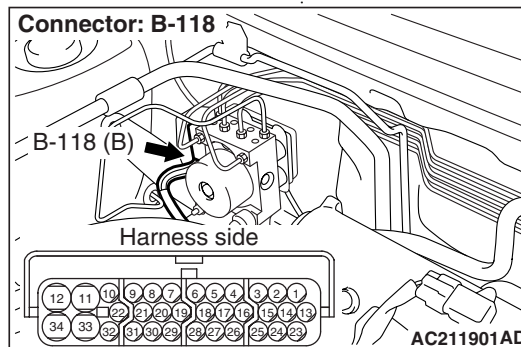
ABS-ECU connector B-118

Check the connector, for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 6.

NO : Repair it and then go to Step 9.

STEP 6. Check the following harness wires.

The wire between ABS-ECU connector B-118 (terminal 12) and earth (No.14)

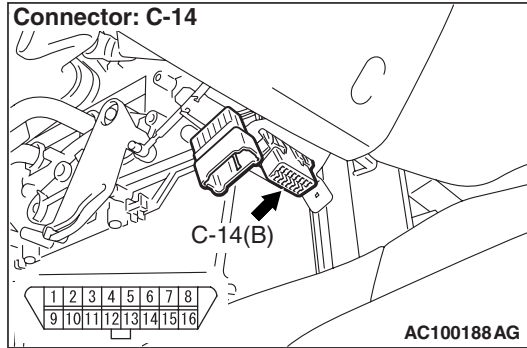
- The wire between ABS-ECU connector B-118 (terminal 34) and earth (No.14)

Q: Is any harness wire damaged?

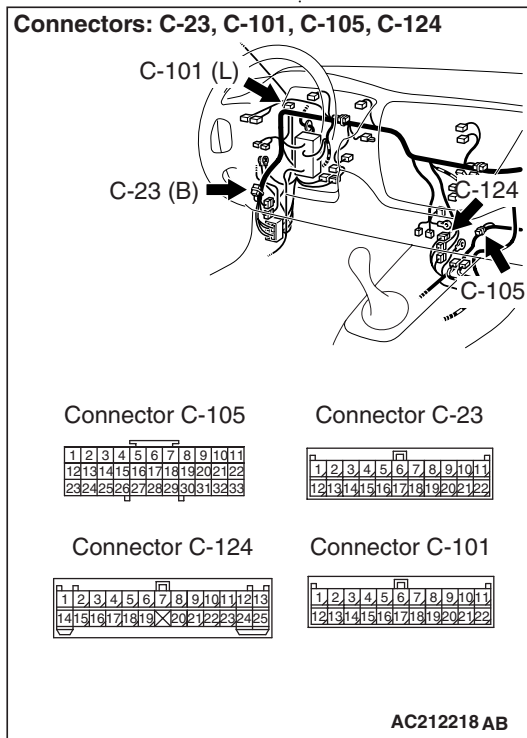
YES : Repair or replace it and then go to Step 9.

NO : Go to Step 9.

STEP 7. Check the following connectors.

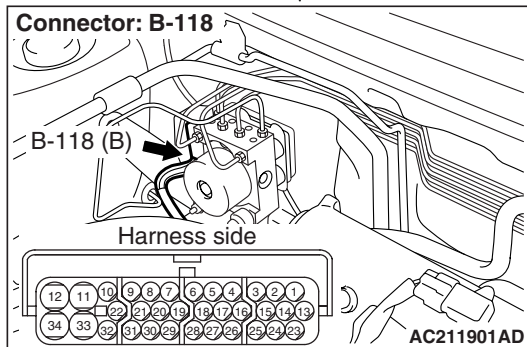


Diagnosis connector C-14



Joint connectors C-23, C-101, C-105

- Intermediate connector C-124



ABS-ECU connector B-118

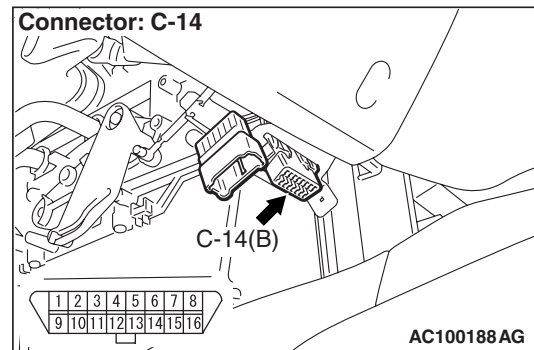
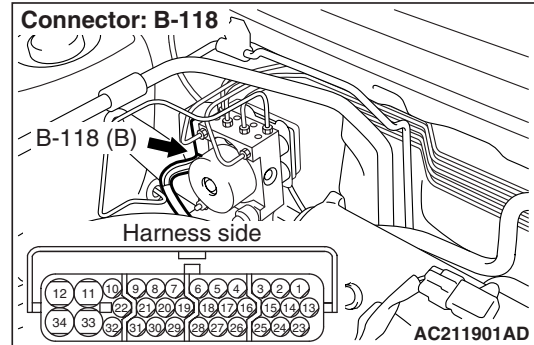
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 8.

NO : Repair it and then go to Step 9.

STEP 8. Check the following harness wires.



The wire between ABS-ECU connector B-118 (terminal 2) and diagnosis connector C-14 (terminal 7)

- The wire between ABS-ECU connector B-118 (terminal 5) and diagnosis connector C-14 (terminal 1)

Q: Is any harness wire damaged?

YES : Repair or replace it and then go to Step 9.

NO : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 9.

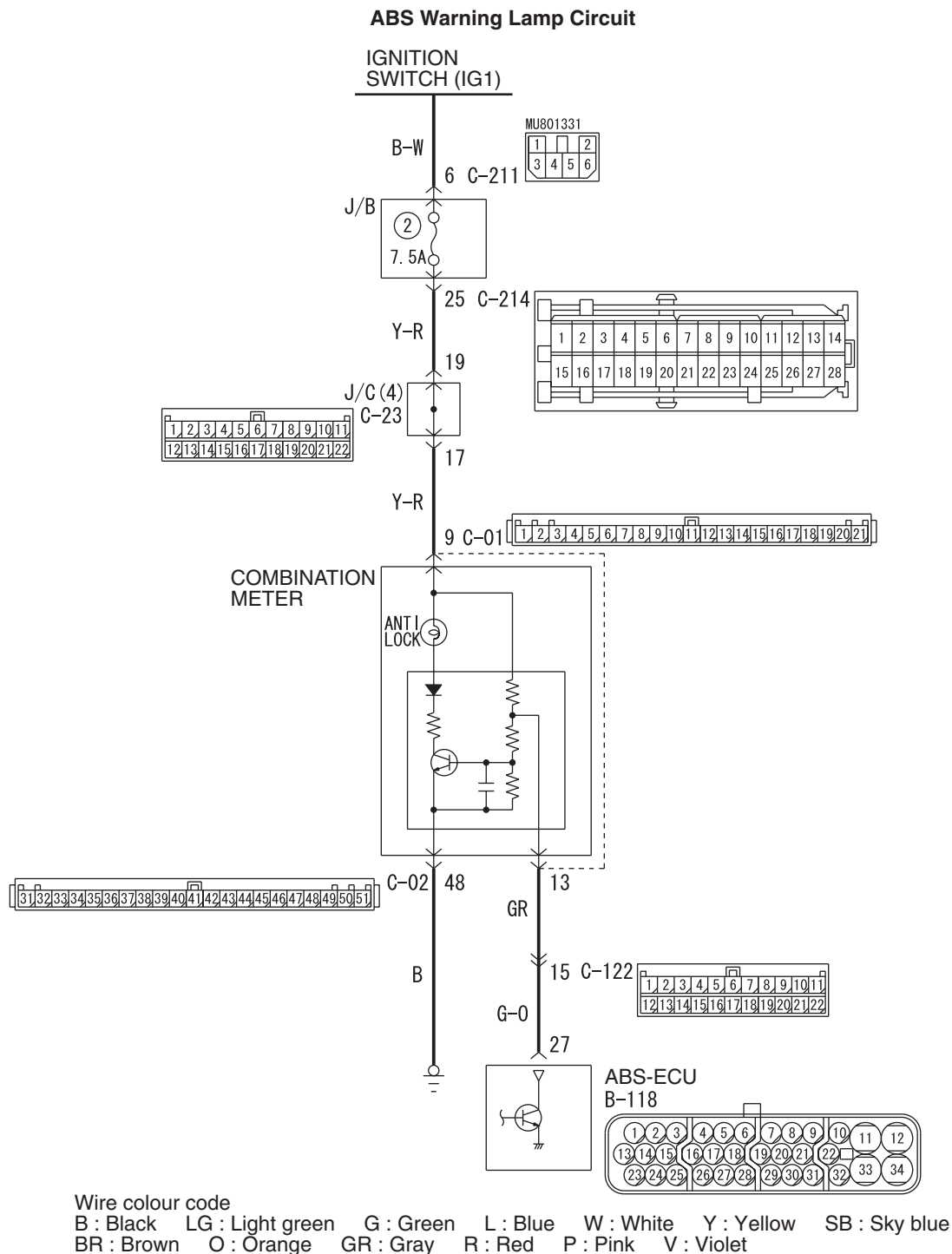
STEP 9. Retest the system.

Q: Does the M.U.T.-II/III communicate with the ABS system?

YES : The procedure is complete.

NO : Return to Step 1.

INSPECTION PROCEDURE 3: When the Ignition Key is Turned to the "ON" position (Engine Stopped), the ABS Warning Lamp does not Illuminate.



W4J35E031A

OPERATION

- The ABS warning lamp power is supplied from the ignition switch. The ABS-ECU earths the circuit to illuminate the lamp.
- The ABS-ECU illuminates the ABS warning lamp for 3 seconds while running self-check. This lamp is illuminated for 3 seconds upon start-up or when the ignition switch is turned to the "ON" position with engine stopped.

- When the ABS-ECU connector is disconnected, the circuit is earthed to illuminate the lamp.
- The ABS-ECU controls the continuity to the ABS warning lamp by turning the power transistor in the unit "OFF" and "ON," respectively.

COMMENT ON TROUBLE SYMPTOM

The cause may be an open circuit in the ABS warning lamp power supply circuit, a blown ABS warning lamp bulb, or a short circuit to earth between the ABS warning lamp and the ABS-ECU.

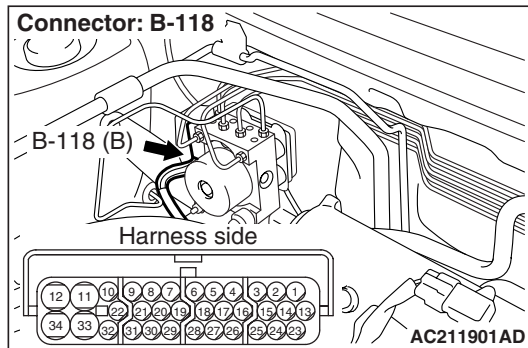
PROBABLE CAUSES

The most likely causes for this case are:

- Blown fuse
- Damaged wiring harness or connector
- Burnt out ABS warning lamp bulb
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)

DIAGNOSIS

STEP 1. Check the ABS warning lamp circuit at ABS-ECU connector B-118.



- (1) Disconnect ABS-ECU connector B-118.

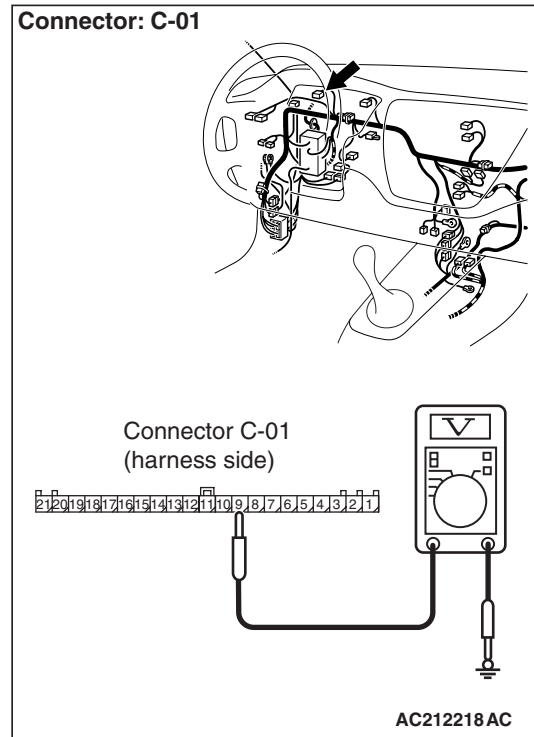
- (2) Turn the ignition switch to the "ON" position.

Q: Does the ABS warning lamp illuminate?

YES : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 10.

NO : Go to Step 2.

STEP 2. Check the power supply circuit. Voltage measurement at combination meter connector C-01.



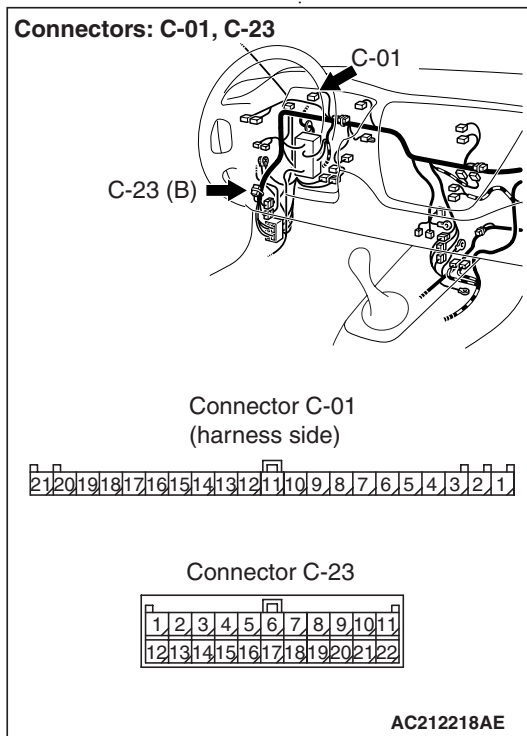
- (1) Disconnect combination meter connector C-01 and measure at the harness side.
 (2) Start the engine.
 (3) Measure the voltage between terminal 9 and earth.

OK: System voltage

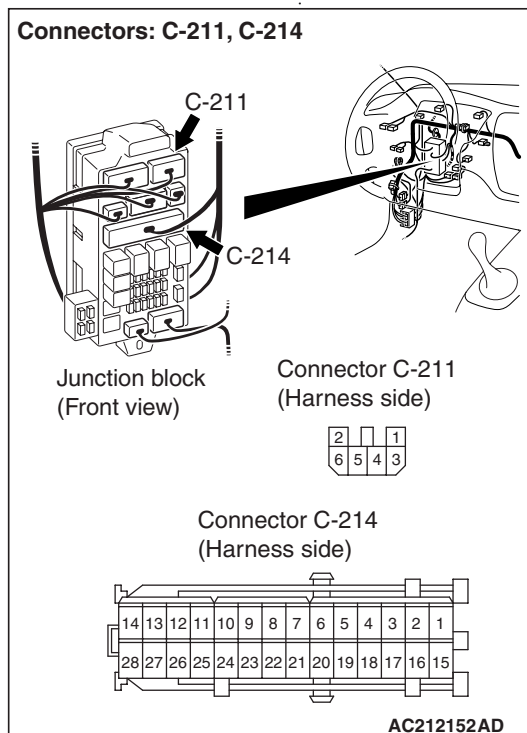
Q: Is the check result normal?

YES : Go to Step 5.

NO : Go to Step 3.

STEP 3. Check the following connectors.

Combination meter connector C-01



Junction block connectors C-211, C-214

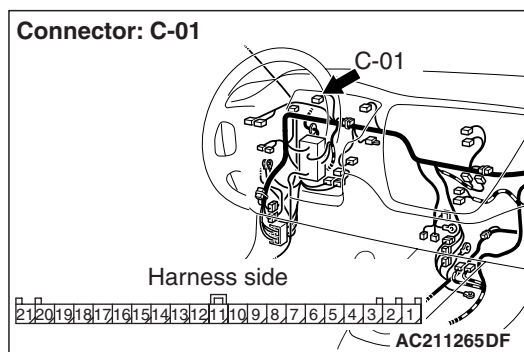
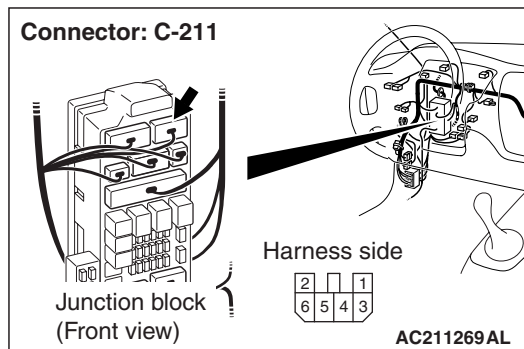
- Joint connector C-23

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 4.

NO : Repair it and then go to Step 10.

STEP 4. Check the following harness wire.

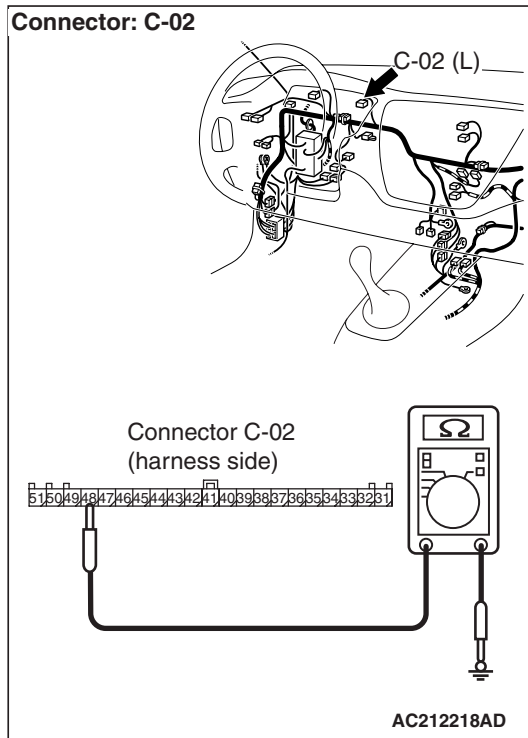
The wire between junction block connector C-211 (terminal 6) and combination meter connector C-01 (terminal 9)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 10.

NO : Go to Step 10.

STEP 5. Check the earth circuit. Resistance measurement at combination meter connector C-02.



- (1) Disconnect combination meter connector C-02 and measure at the harness side.
- (2) Measure the resistance between terminal 48 and earth.

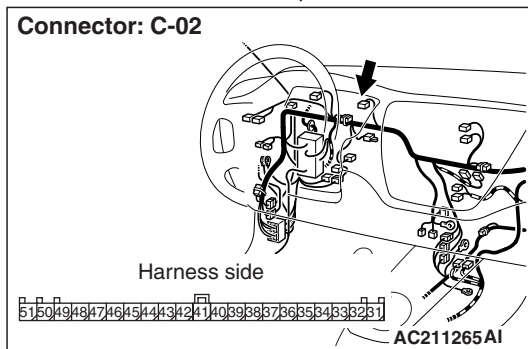
OK: 2 ohms or less

Q: Is the resistance 2 ohms or less?

YES : Go to Step 8.

NO : Go to Step 6.

STEP 6. Check the following connector.



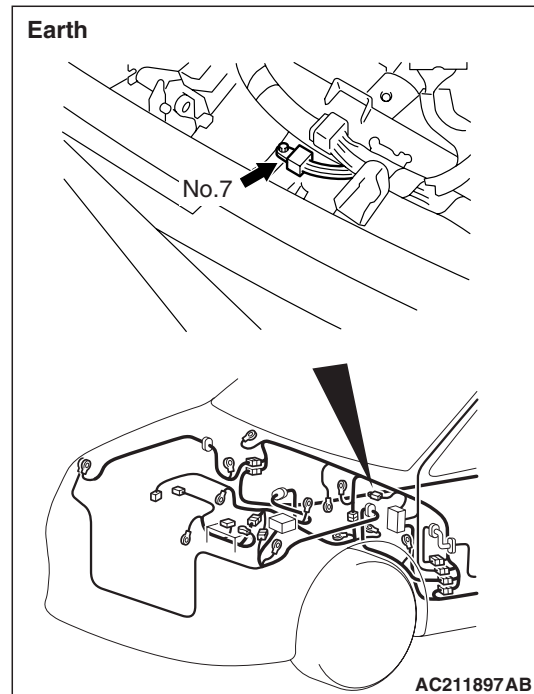
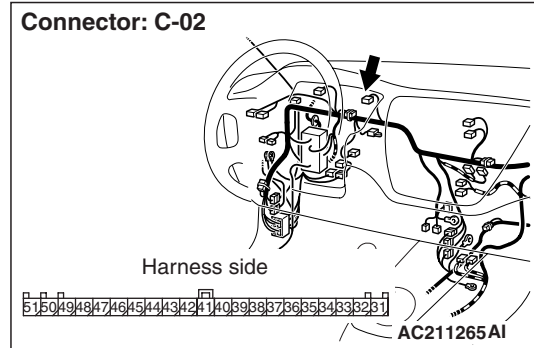
Combination meter connector C-02
Check the connector for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 7.

NO : Repair it and then go to Step 10.

STEP 7. Check the following harness wire.

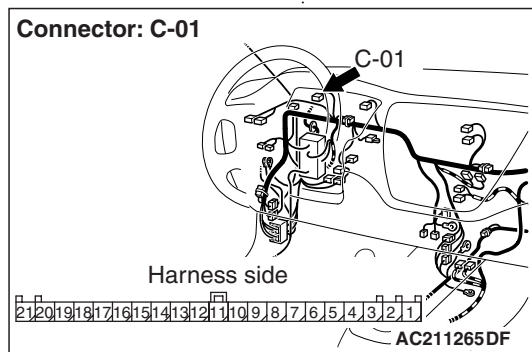


The wire between combination meter connector C-02 (terminal 48) and earth (No.7)

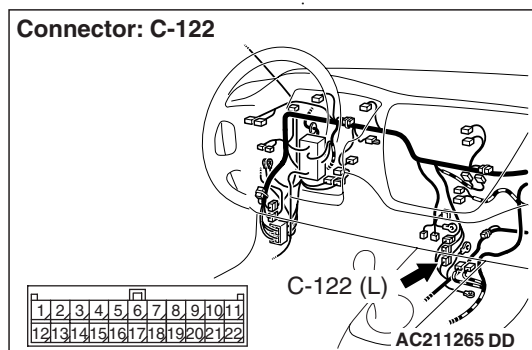
Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 10.

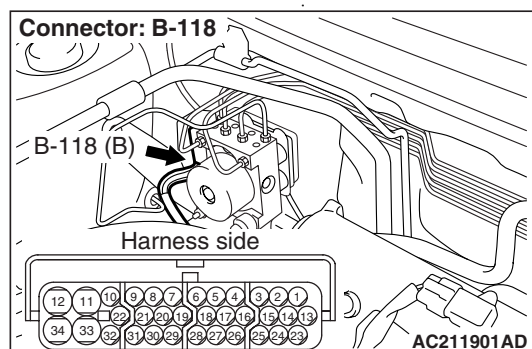
NO : Go to Step 10.

STEP 8. Check the following connectors.

Combination meter connector C-01



Intermediate connector C-122



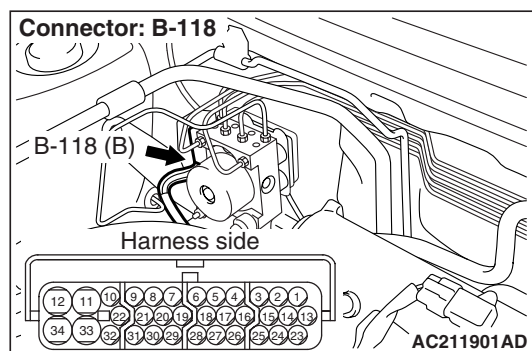
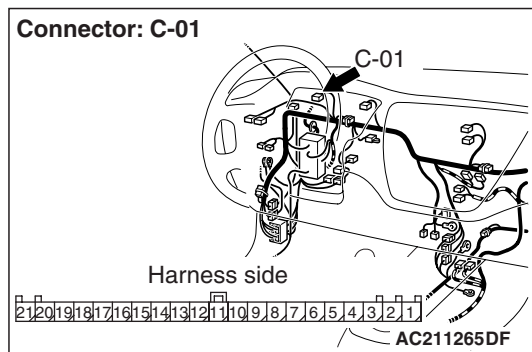
ABS-ECU connector B-118

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 9.

NO : Repair it and then go to Step 10.

STEP 9. Check the following harness wire.

The wire between combination meter connector C-01 (terminal 13) and ABS-ECU connector B-118 (terminal 27)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 10.

NO : Replace the combination meter (Refer to GROUP 54A, Combination Meter Assembly P.54A-58). Then go to Step 10.

STEP 10. Retest the system.

Q: Does the ABS warning lamp illuminate for 3 seconds when the ignition switch is turned to the "ON" position with engine stopped or upon start-up?

YES : The procedure is complete.

NO : Return to Step 1.

INSPECTION PROCEDURE 4: The ABS Warning Lamp Remains Illuminated after the Engine is Started.

NOTE: This diagnosis procedure is limited to cases where communication with the M.U.T.-II is possible (ABS-ECU power supply is normal) and no diagnosis code is set.

ABS WARNING LAMP CIRCUIT

Refer to P.35B-92.

DIAGNOSIS

CIRCUIT OPERATION

Refer to P.35B-92.

COMMENT ON TROUBLE SYMPTOM

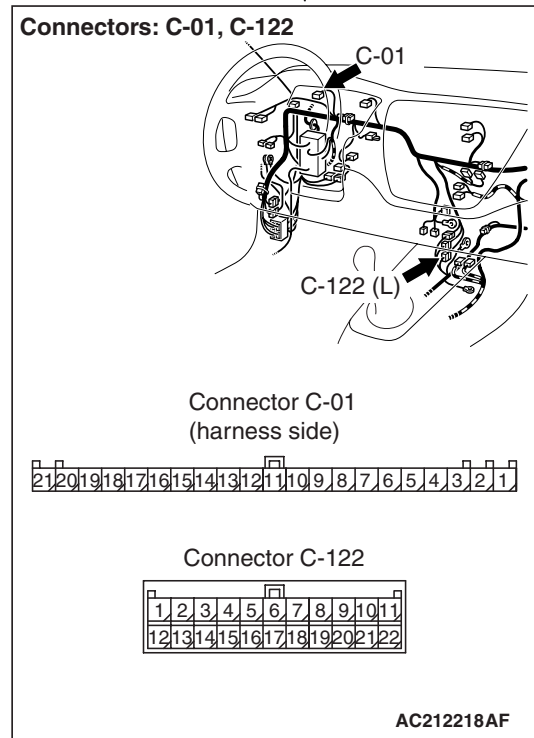
The cause is probably the ABS-ECU malfunction.

PROBABLE CAUSES

The most likely causes for this case are:

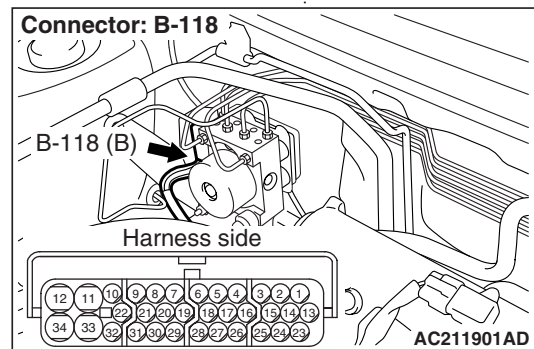
- Damaged wiring harness or connector
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)

STEP 1. Check the following connectors.



Combination meter connector C-01

- Intermediate connector C-122



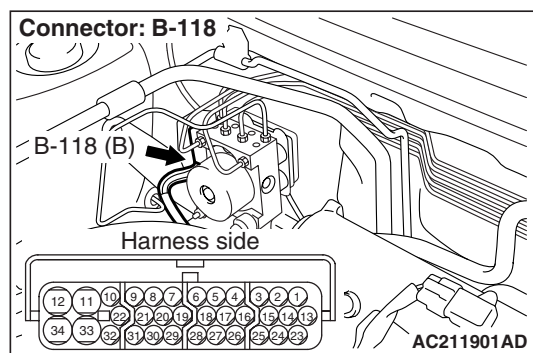
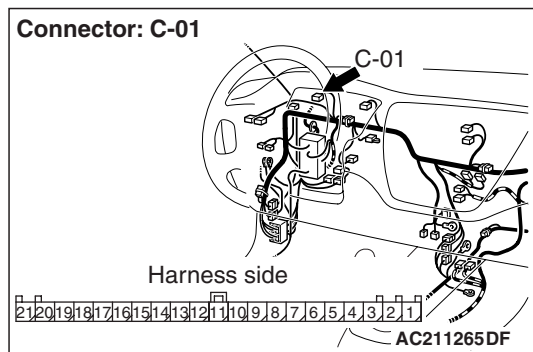
ABS-ECU connector B-118

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 2.

NO : Repair it and then go to Step 4.

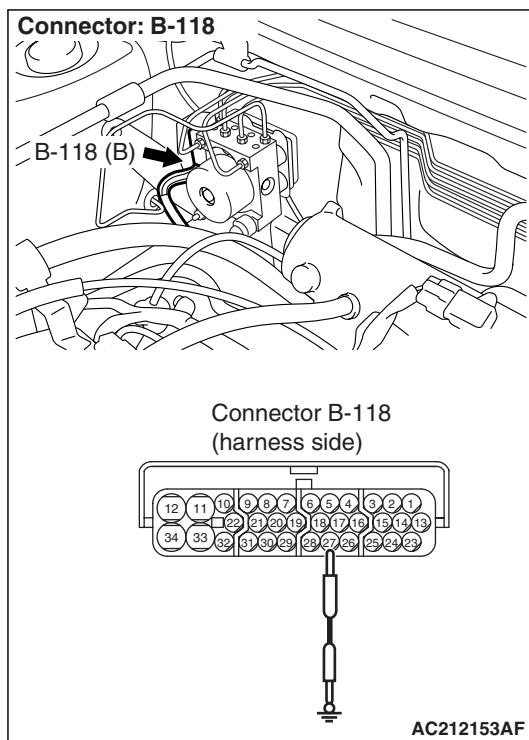
STEP 2. Check the following harness wire.

The wire between combination meter connector C-01 (terminal 13) and ABS-ECU connector B-118 (terminal 27)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 4.

NO : Go to Step 3.

STEP 3. Check the ABS warning lamp circuit at ABS-ECU connector B-118.

- (1) Disconnect ABS-ECU connector B-118 and check at the harness side connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Earth terminal 27 and check the ABS warning lamp.

Q: Does the ABS warning lamp go off?

YES : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 4.

NO : Replace the combination meter (Refer to GROUP 54A, Combination Meter Assembly [P.54A-58](#)). Then go to Step 4.

STEP 4. Retest the system.

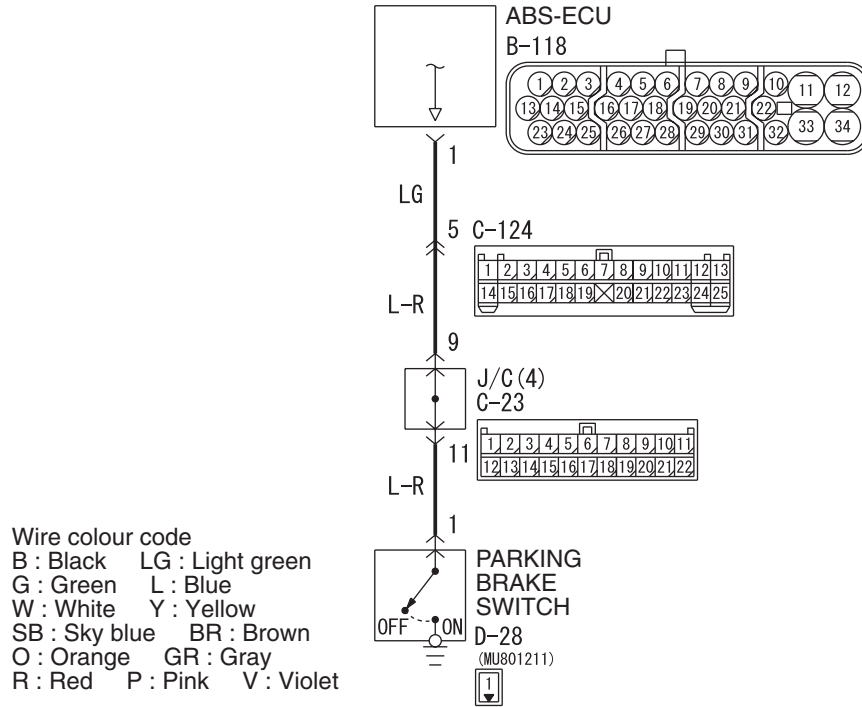
Q: Does the ABS warning lamp turn off in 3 seconds after start-up?

YES : The procedure is complete.

NO : Return to Step 1.

INSPECTION PROCEDURE 5: In the Inspection with the M.U.T.-II/III Data List, the Parking Brake Switch is not Turned ON or Turned OFF.

Parking Brake Switch Circuit



W4J35E025A

OPERATION

The ABS-ECU monitors the parking brake switch to optimise the ABS control.

COMMENT ON TROUBLE SYMPTOM

The cause may be an open or a short circuit between the parking brake switch and the ABS-ECU.

PROBABLE CAUSES

The most likely causes for this case are:

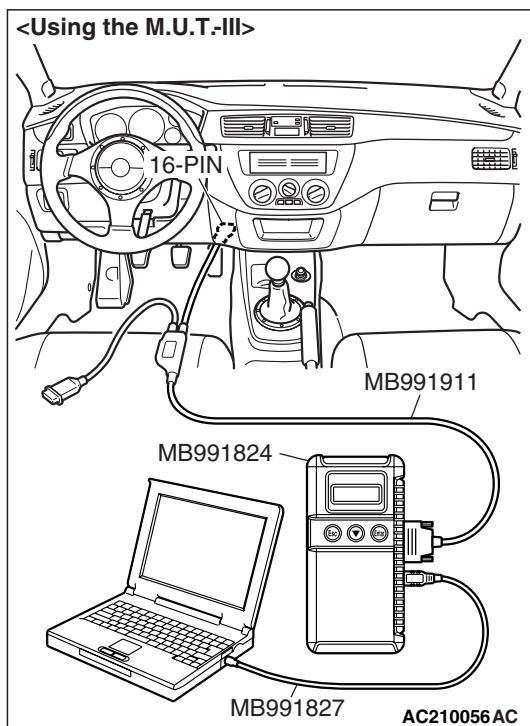
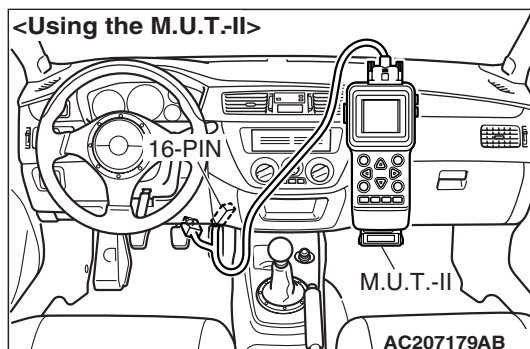
- Damaged wiring harness or connector
- Malfunction of the parking brake switch
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)

DIAGNOSIS

STEP 1. M.U.T.-II/III data list.

CAUTION

To prevent damage to M.U.T.-II/III, always turn the ignition switch to the "LOOK" (OFF) position before connecting or disconnecting M.U.T.-II/III.



- (1) Connect M.U.T.-II/III as shown in the illustration.
- (2) Start the engine.

- (3) Set M.U.T.-II/III to data reading mode for following item.

- Item No.29: Parking brake switch

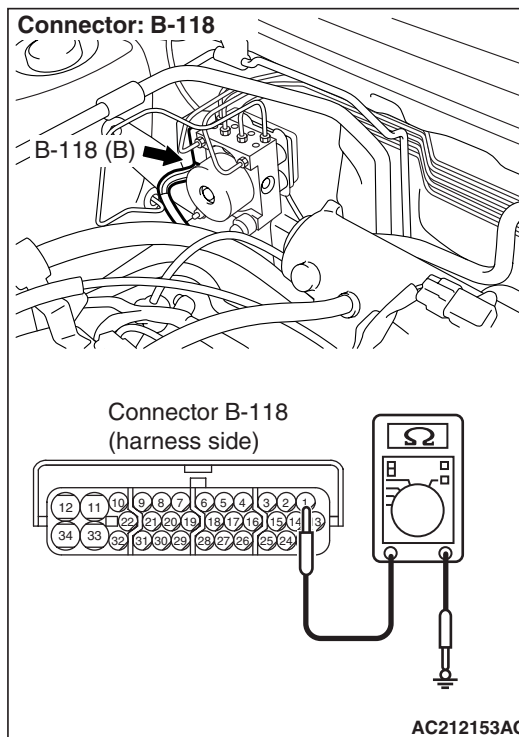
OK:

Checking requirement	Display
Pull the parking brake lever	ON
Release the parking brake lever	OFF

Q: Is the parking brake switch input normal?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope With Intermittent Malfunction [P.00-5.](#)

NO : Go to Step 2.

STEP 2. Check the parking brake switch circuit at ABS-ECU connector B-118.


- (1) Disconnect ABS-ECU connector B-118 and measure at the harness side.

- (2) Check for continuity between terminal 1 and earth with pulling or releasing the parking brake lever.

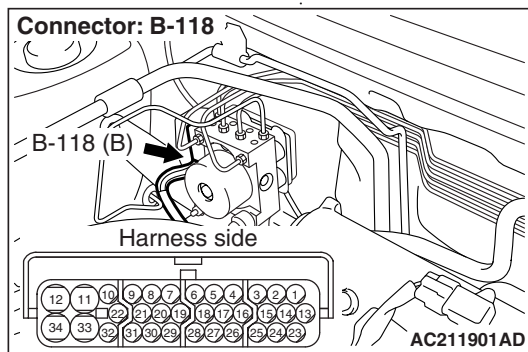
OK: If the parking brake lever is pulled, there should be no continuity, and if the parking brake lever is released, there should be continuity (less than 2 ohms).

Q: Does continuity exist when the parking brake lever is released, and dose continuity not exist when the parking brake lever is pulled?

YES : Go to Step 3.

NO : Go to Step 4.

STEP 3. Check the following connector.



ABS-ECU connector B-118

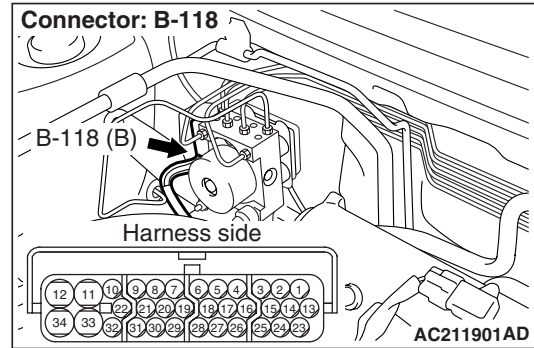
Check the connector for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

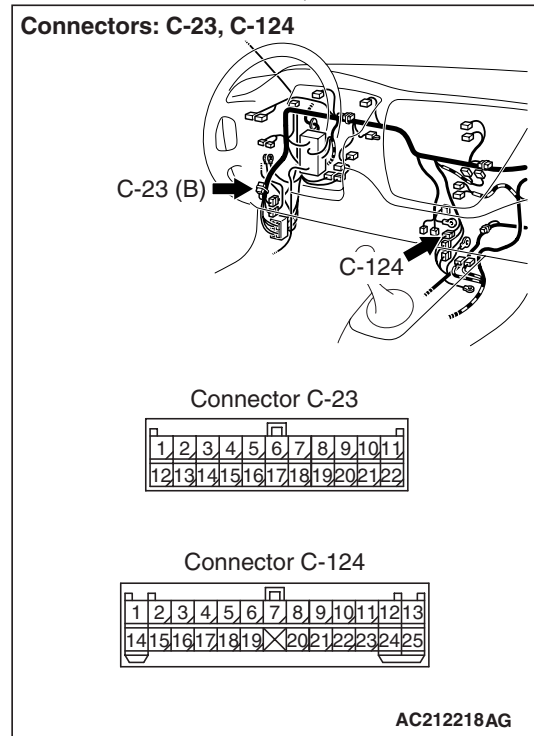
YES : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 6.

NO : Go to Step 6.

STEP 4. Check the following connectors.

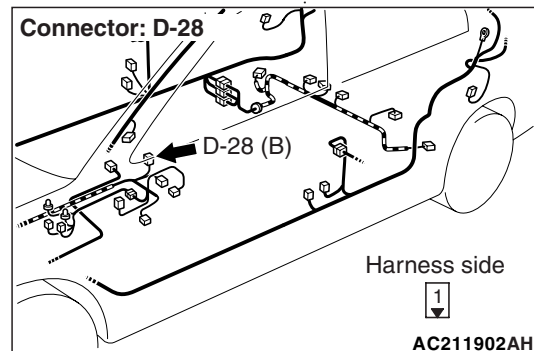


ABS-ECU connector B-118



Intermediate connector C-124

- Joint connector C-23



Parking brake switch connector D-28

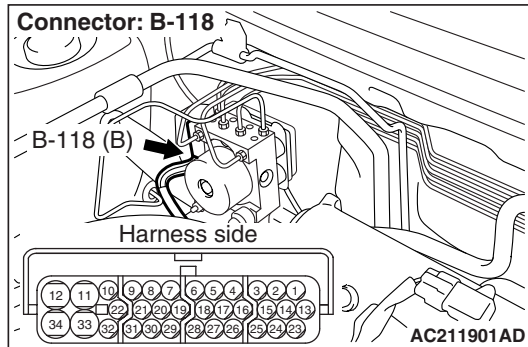
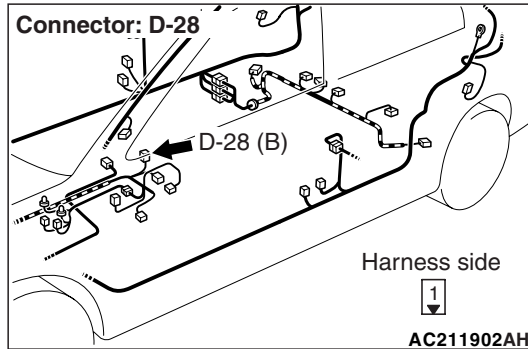
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 5.

NO : Repair it and then go to Step 6.

STEP 5. Check the following harness wire.



The wire between parking brake switch connector D-28 (terminal 1) and ABS-ECU connector B-118 (terminal 1)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 6.

NO : Replace the parking brake switch (Refer to GROUP 36, Parking Brake Lever [P.36-4](#)). Then go to Step 6.

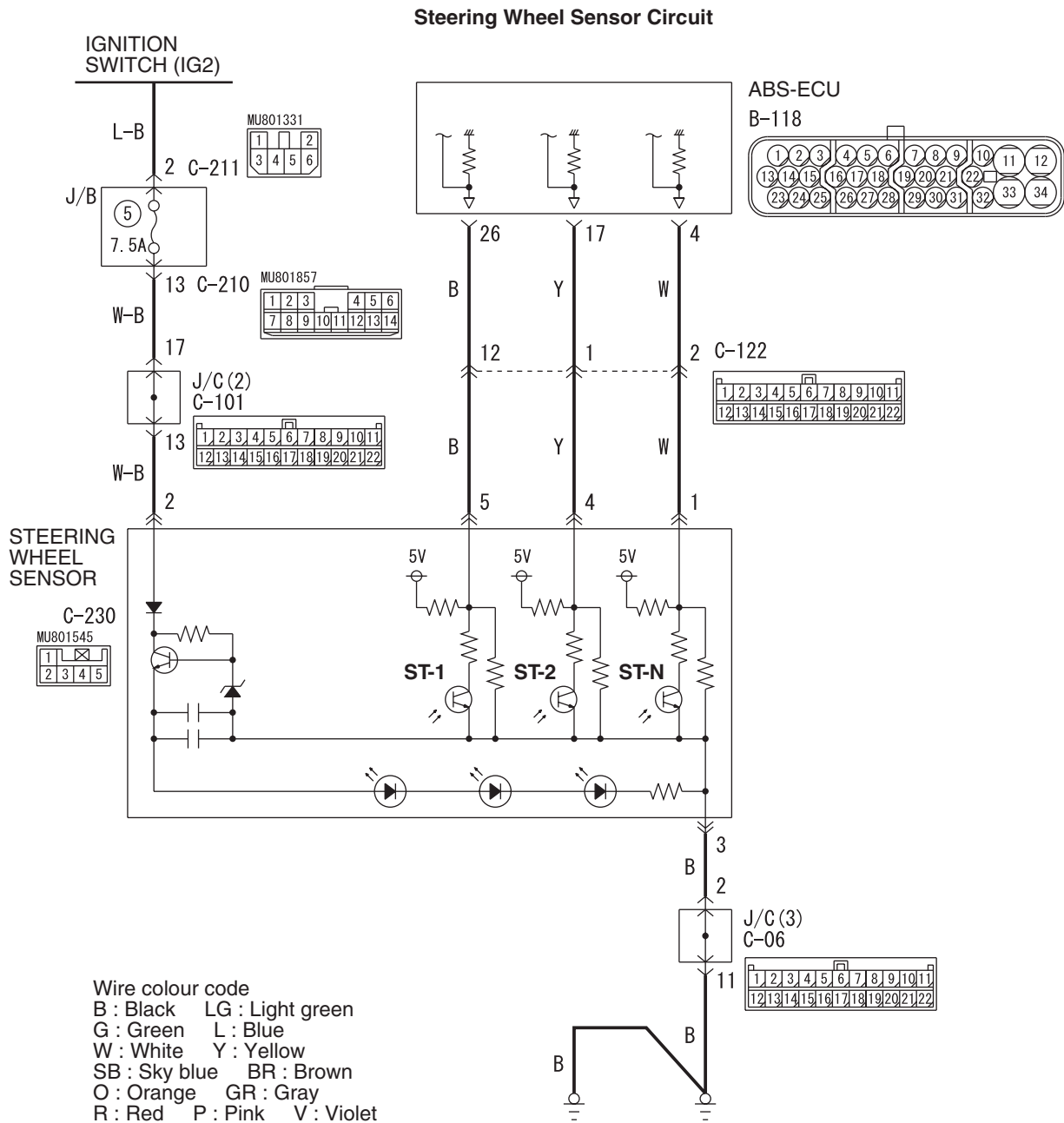
STEP 6. Check whether the diagnosis code is reset.

Q: Does the parking brake switch turn ON/OFF normally in the inspection by M.U.T.-II/III data list?

YES : The procedure is complete.

NO : Return to Step 1.

INSPECTION PROCEDURE 6: The Neutral Position Learning of the Steering Wheel Sensor is not Detected.



W4J35E023A

CIRCUIT OPERATION

The ABS system detects the neutral position learning of the steering wheel sensor by the signal from the stop lamp.

COMMENT ON TROUBLE SYMPTOM

The diagnosis is difficult because it depends on driving condition and road surface, if the diagnosis code has not been set, carry out the following checks (refer to TROUBLESHOOTING HINTS).

PROBABLE CAUSES

The most likely causes for this case are:

- Damaged wiring harness or connector
- Malfunction of the stop lamp switch system
- Tyres are not all the same diameter
- Malfunction of suspension
- Malfunction of the steering wheel sensor installation
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)

DIAGNOSIS**STEP 1. Check the front tyres.**

Q: Are the tyre diameters different?

YES : Replace the appropriate tyre and then go to Step 13.

NO : Go to Step 2.

STEP 2. Check the front suspension.

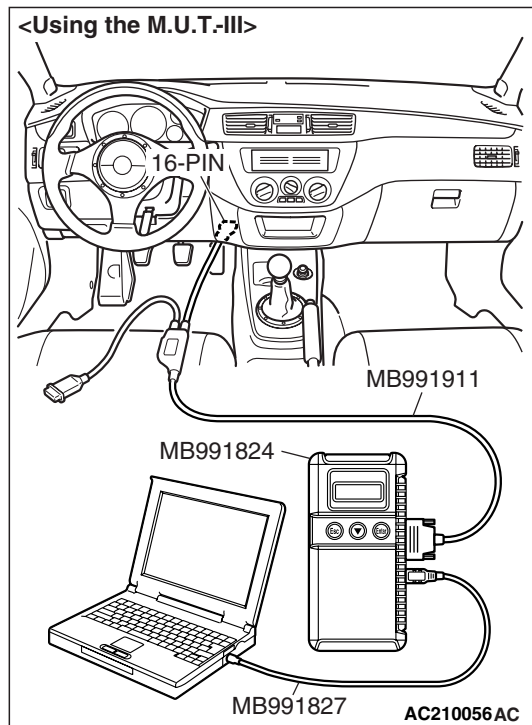
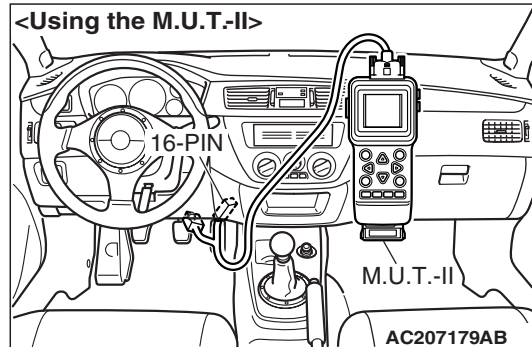
Q: Is the front suspension abnormal?

YES : Repair the front suspension and then go to Step 13.

NO : Go to Step 3.

STEP 3. M.U.T.-II/III data list.**⚠ CAUTION**

To prevent damage to M.U.T.-II/III, always turn the ignition switch to the "LOOK" (OFF) position before connecting or disconnecting M.U.T.-II/III.



- (1) Connect M.U.T.-II/III as shown in the illustration.
- (2) Start the engine.

(3) Set M.U.T.-II/III to data reading mode for following item.

- Item No.37: Steering wheel sensor neutral position learning

OK:

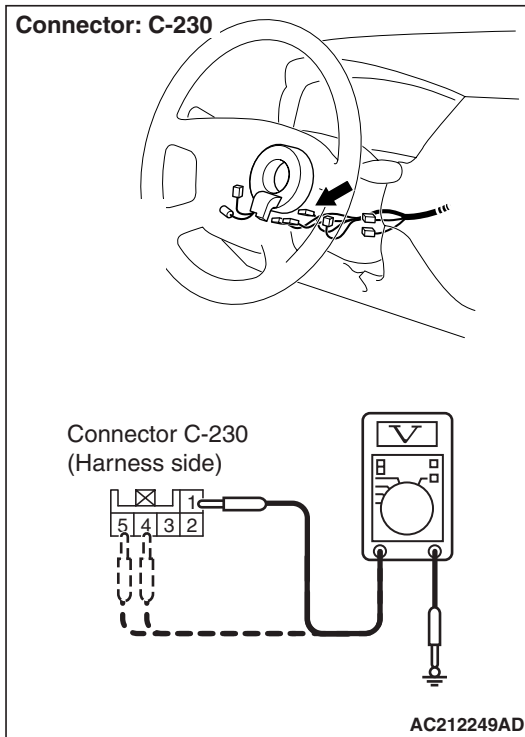
Checking requirement	Display
After driving straight at vehicle speed over than 10 km/h	ON
Before driving with ignition switch ON	OFF

Q: Is the steering wheel sensor straight ahead position learning input normal?

YES : Go to Step 5.

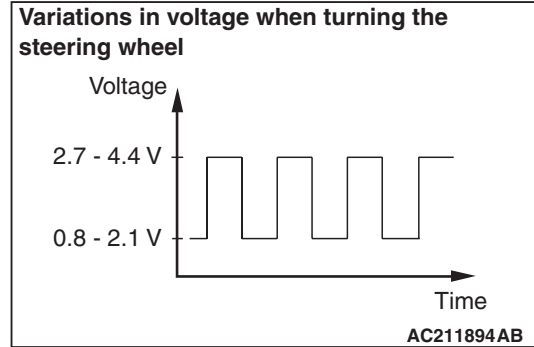
NO : Confirm the steering wheel sensor is correctly installed. Then go to Step 4.

STEP 4. Check for steering wheel sensor output voltage.



(1) Connect steering wheel sensor connector C-230.

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



(3) Measure the voltage, by backprobing, between terminal 1 and earth, terminal 4 and earth, and terminal 5 and earth.

OK: The voltage should measure as indicated in the figure.

Q: Is the steering wheel sensor output voltage normal?

YES : Go to Step 13.

NO : Replace the steering wheel sensor (Refer to [P.35B-150](#)). and then go to Step 13.

STEP 5. Check the stop lamp.

Q: Does the stop lamp turn on and off normally?

YES : Go to Step 9.

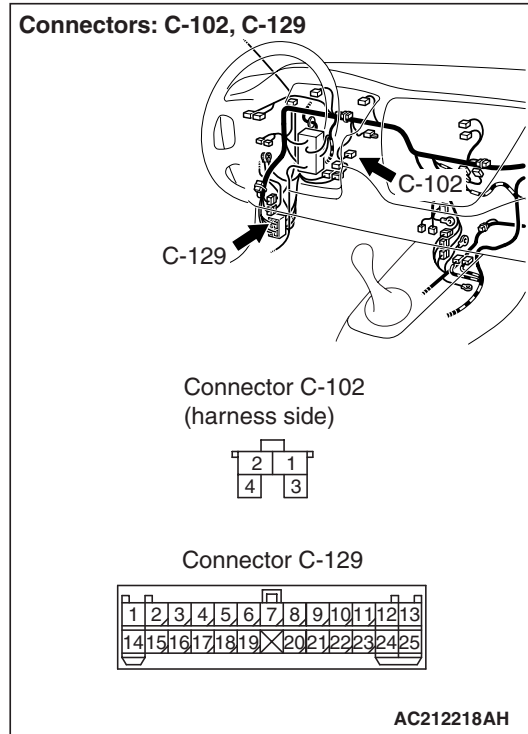
NO : Go to Step 6.

STEP 6. Check the stop lamp switch installation condition.

Q: Is the stop lamp switch installed correctly?

YES : Check the stop lamp switch (Refer to GROUP 35A, Brake pedal [P.35A-15](#)). Then go to Step 7.

NO : Repair the installation of the stop lamp switch (Refer to GROUP 35A, On-vehicle Service - Brake pedal Check and Adjustment [P.35A-5](#)). Then go to Step 13.

STEP 7. Check the following connectors.

Intermediate connectors C-129

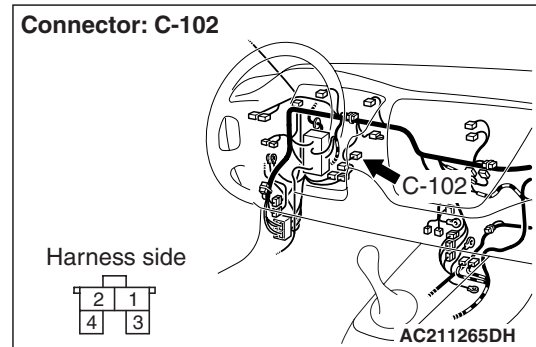
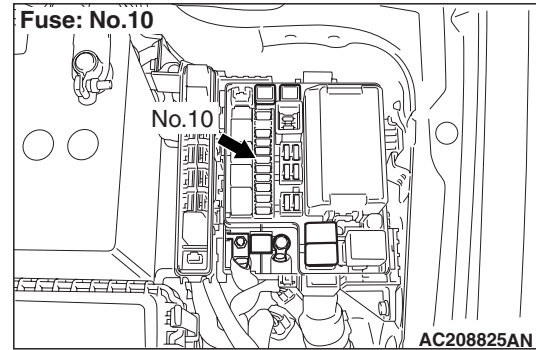
- Stop lamp switch connector C-102

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 8.

NO : Repair it and then go to Step 13.

STEP 8. Check the following harness wires.

The wire between relay box in engine compartment (fuse No.10) and stop lamp switch connector C-102 (terminal 2)

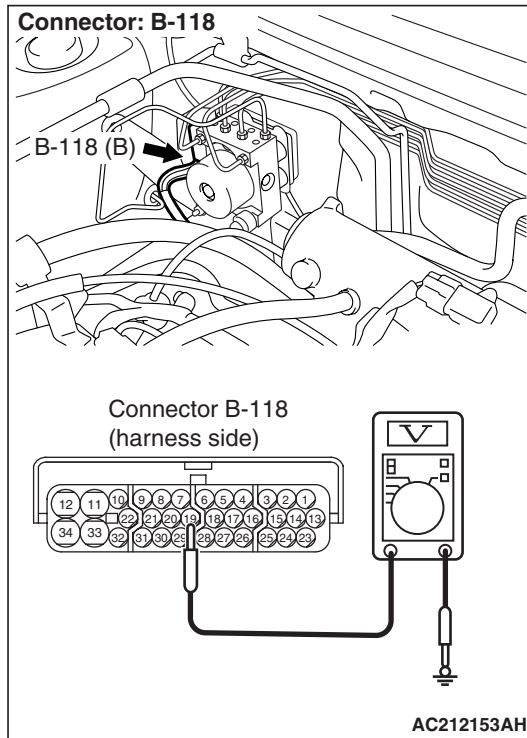
- The wire between stop lamp switch connector C-102 (terminal 1) and stop lamps

Q: Is any harness wire damaged?

YES : Repair or replace it and then go to Step 13.

NO : Go to Step 9.

**STEP 9. Check the stop lamp switch circuit.
Measure the voltage at ABS-ECU connector B-118.**



- (1) Disconnect ABS-ECU connector B-118 and measure at the harness side.
- (2) Depress the brake pedal to turn on the stop lamp switch.
- (3) Measure the voltage between terminal 19 and earth.

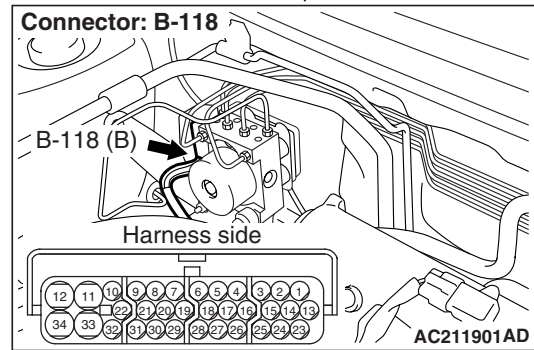
OK: System voltage

Q: Is the check result normal?

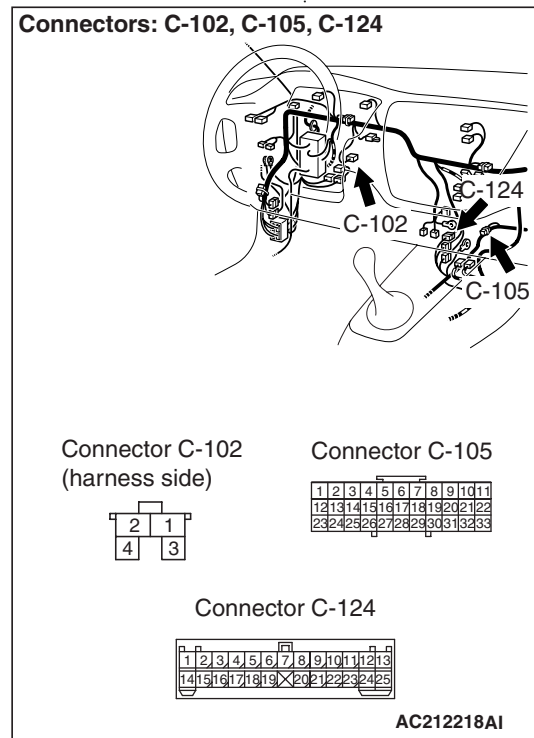
YES : Go to Step 12.

NO : Go to Step 10.

STEP 10. Check the following connectors.



ABS-ECU connector B-118



Joint connector C-105

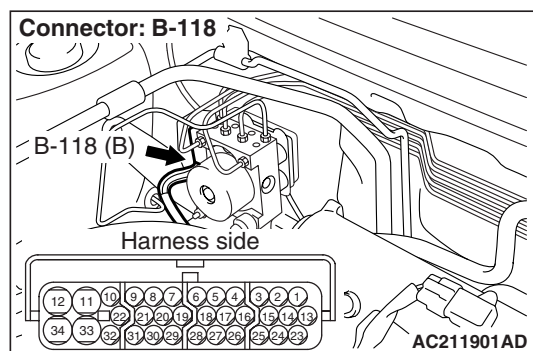
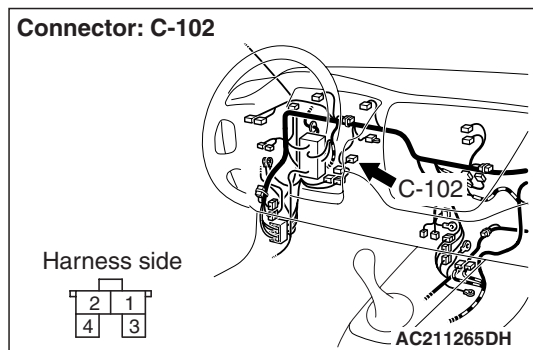
- Intermediate connector C-124
- Stop lamp switch connector C-102

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 11.

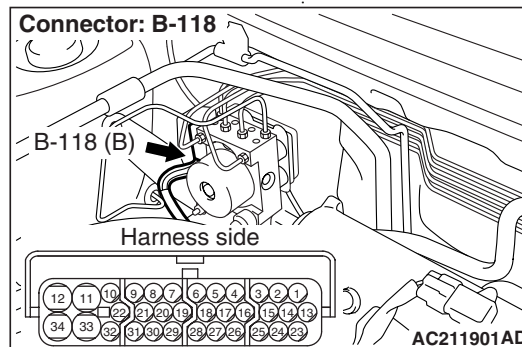
NO : Repair it and then go to Step 13.

STEP 11. Check the following harness wire.

The wire between stop lamp switch connector C-102 (terminal 1) and ABS-ECU connector B-118 (terminal 19)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 13.
NO : Go to Step 13.

STEP 12. Check the following connector.

ABS-ECU connector B-118

Check the connector for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 13.
NO : Repair it and then go to Step 13.

STEP 13. Retest the system.

Q: Is the neutral position learning of the steering wheel sensor detected by the ABS system?

YES : The procedure is complete.
NO : Return to Step 1.

INSPECTION PROCEDURE 7: Faulty ABS Operation**COMMENT ON TROUBLE SYMPTOM (COMMENT)**

The cause depends on driving and road surface conditions, so diagnosis may be difficult. However, if no diagnosis code is set, carry out the following inspection.

PROBABLE CAUSES

The most likely cause for this case is:

- Malfunction of the brake modulator hydraulic unit

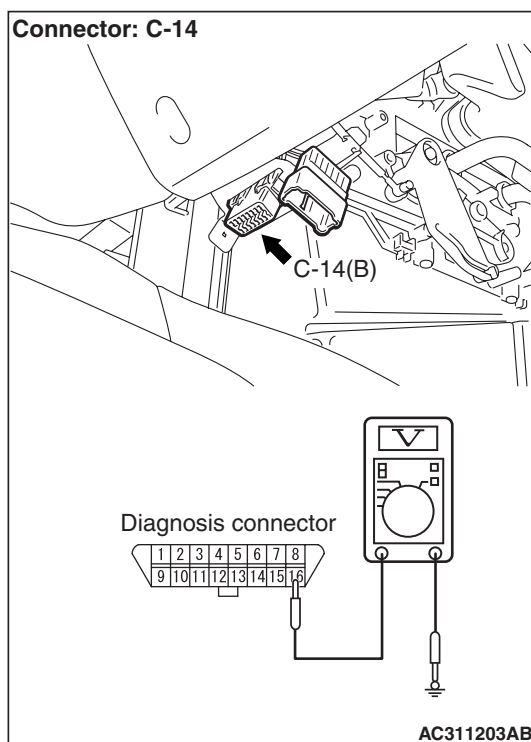
DIAGNOSIS

Check the brake modulator hydraulic unit (Refer to [P.35B-140](#)). If the brake modulator hydraulic unit (integrated with ABS-ECU) is malfunctioning, replace it. Then check that the malfunction symptom is eliminated.

- Malfunction of the diagnosis connector
- Damaged wiring harness or connector

DIAGNOSIS

STEP 1. Check the power supply circuit. Voltage measurement at diagnosis connector C-14.



Measure the voltage between terminal 16 and earth.

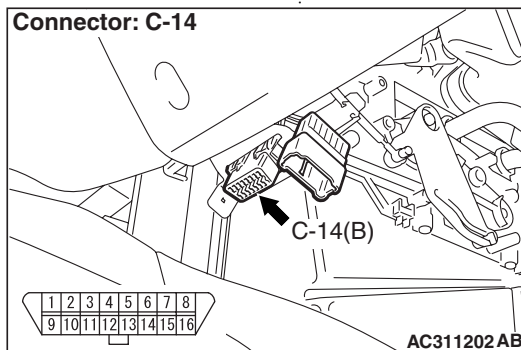
OK: System voltage

Q: Is the check result normal?

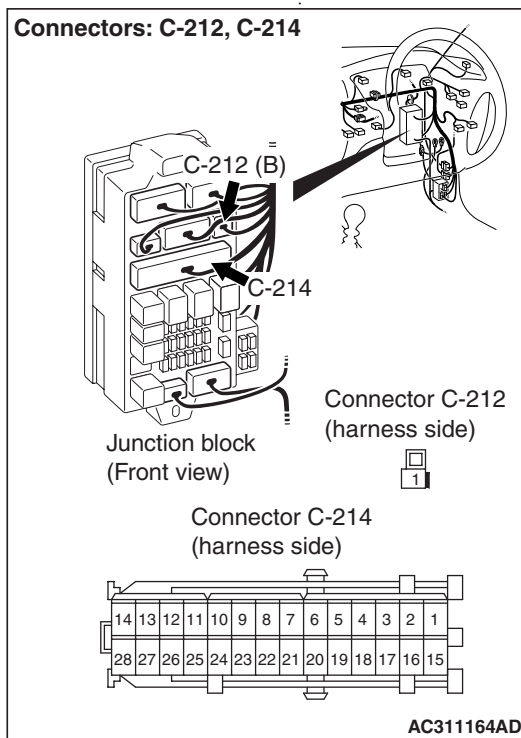
YES : Go to Step 4.

NO : Go to Step 2.

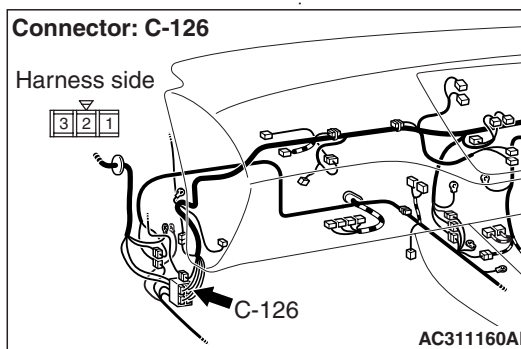
STEP 2. Check the following connectors.



Diagnosis connector C-14



Junction block connectors C-212, C-214

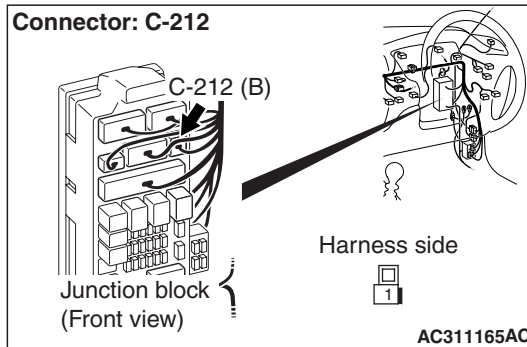
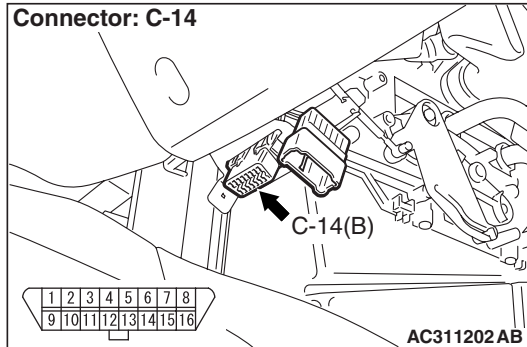


Intermediate connector C-126

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?
YES : Go to Step 3.
NO : Repair it and then go to Step 7.

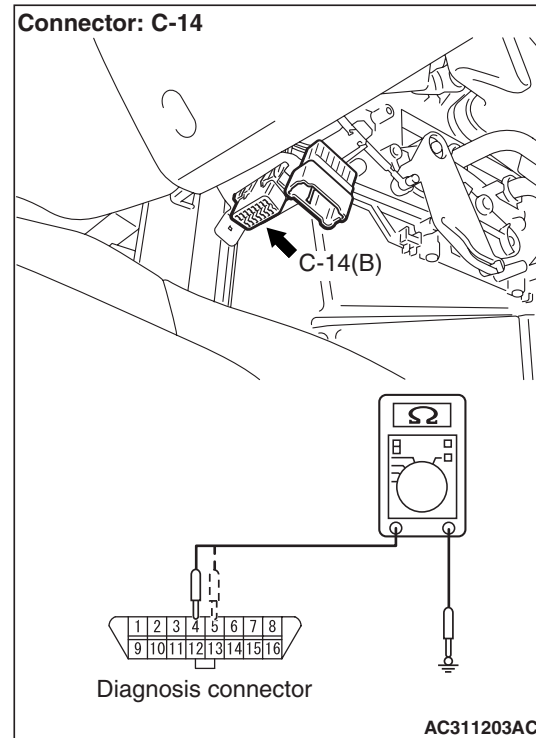
STEP 3. Check the following harness wire.



The wire between diagnosis connector C-14 (terminal 16) and junction block connector C-212 (terminal 1)

Q: Is the harness wire damaged?
YES : Repair or replace it and then go to Step 7.
NO : Go to Step 7.

STEP 4. Check the earth circuit. Resistance measurement at diagnosis connector C-14.

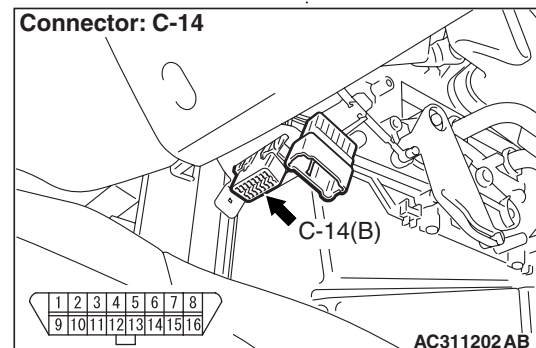


Measure the resistance between terminal 4 and earth, and terminal 5 and earth.

OK: 2 ohms or less

Q: Is the resistance 2 ohms or less?
YES : Replace the M.U.T.-II/III and then go to Step 7.
NO : Go to Step 5.

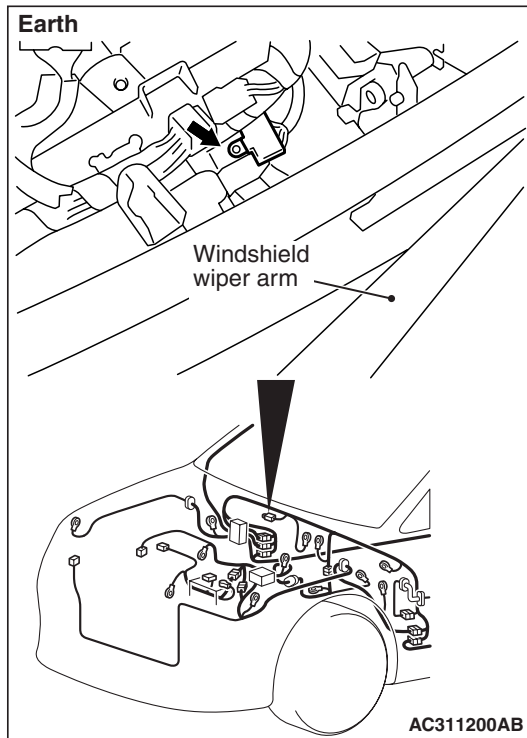
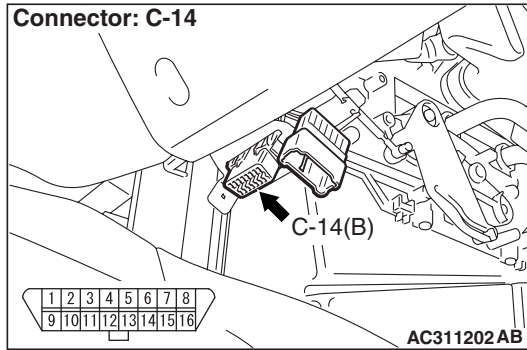
STEP 5. Check the following connector.



Diagnosis connector C-14

Check the connector, for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?
YES : Go to Step 6.
NO : Repair it and then go to Step 7.

STEP 6. Check the following harness wires.

The wire between diagnosis connector C-14 (terminal 4) and earth

- The wire between diagnosis connector C-14 (terminal 5) and earth

Q: Is any harness wire damaged?

YES : Repair or replace it and then go to Step 7.

NO : Go to Step 7.

STEP 7. Retest the system.

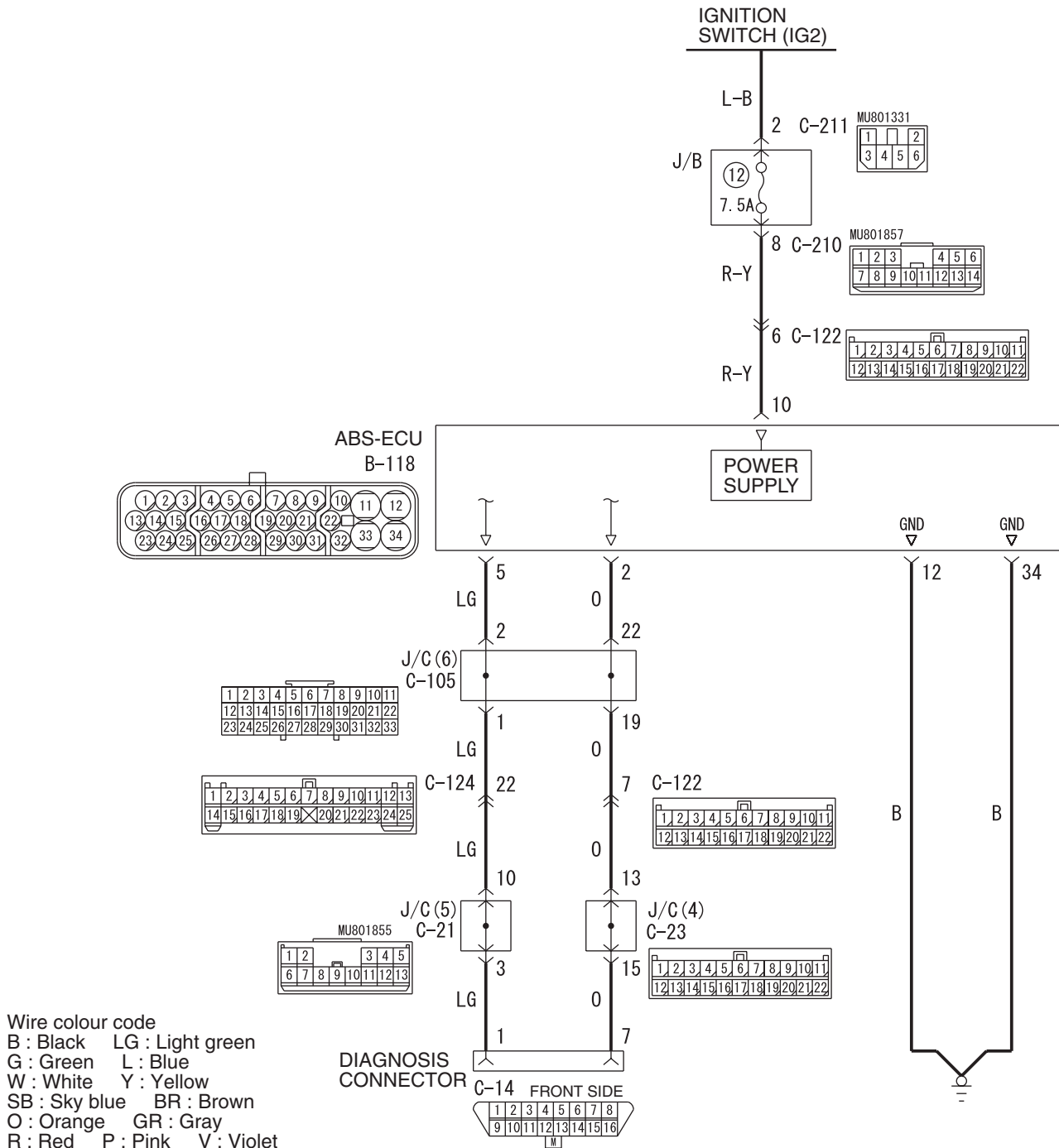
Q: Does the M.U.T.-II/III communicate with the whole system?

YES : The procedure is complete.

NO : Return to Step 1.

INSPECTION PROCEDURE 2: Communication between the M.U.T.-II/III and the ABS-ECU is not possible.

ABS-ECU Power Supply /Earth and Diagnosis Connector Circuit



W4J35E016A

OPERATION

- The diagnosis code is set by the ABS-ECU (terminal 2) to the diagnostic output terminal (terminal 7) of the diagnosis connector.
- When the diagnosis connector's diagnosis test mode control terminal (terminal 1) is earthed, the ABS-ECU will go into diagnosis mode.

COMMENT ON TROUBLE SYMPTOM

When communication with the M.U.T.-II/III is not possible, the cause is probably an open circuit in the ABS-ECU power circuit or an open circuit in the diagnostic output circuit.

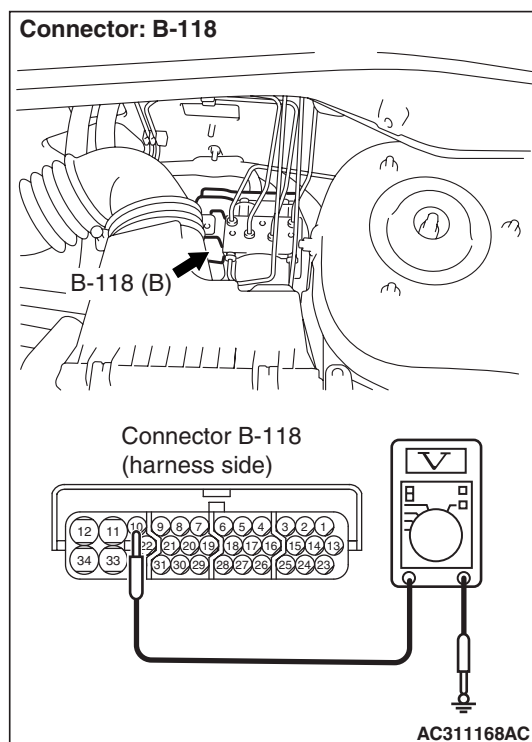
PROBABLE CAUSES

The most likely causes for this case are:

- Blown fuse
- Damaged wiring harness or connector
- Malfunction of the brake modulator hydraulic unit (Integrated with ABS-ECU)

DIAGNOSIS

STEP 1. Check the power supply circuit. Voltage measurement at ABS-ECU connector B-118.



- (1) Disconnect ABS-ECU connector B-118 and measure at the harness side.
- (2) Start the engine.
- (3) Measure the voltage between terminal 10 and earth.

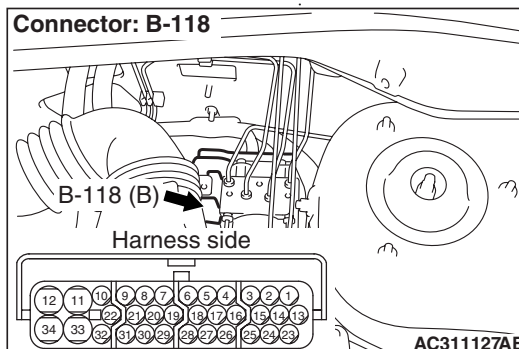
OK: System voltage

Q: Is the check result normal?

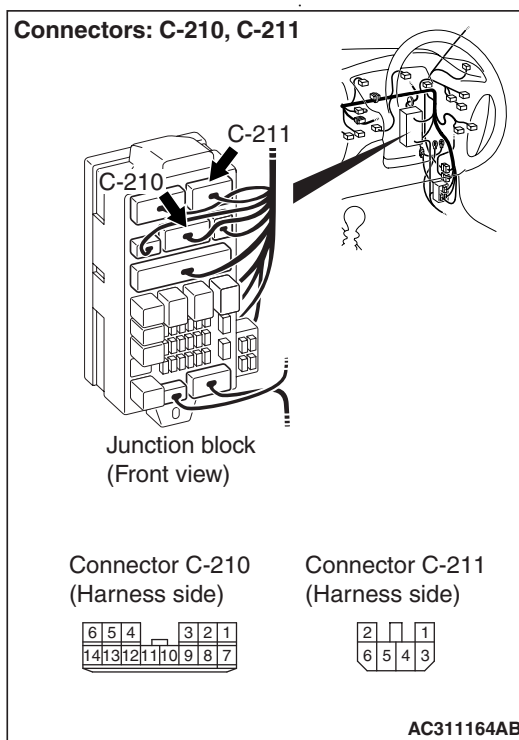
YES : Go to Step 4.

NO : Go to Step 2.

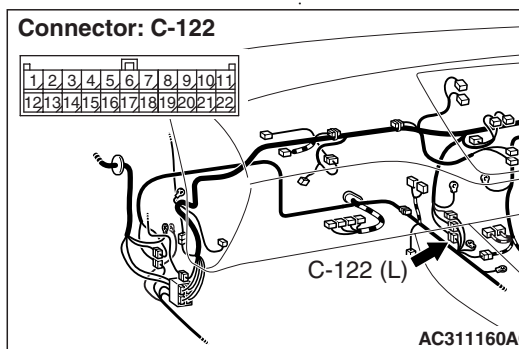
STEP 2. Check the following connectors.



ABS-ECU connector B-118



Junction block connectors C-210, C-211

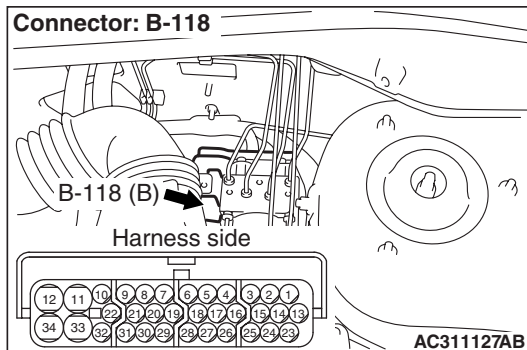
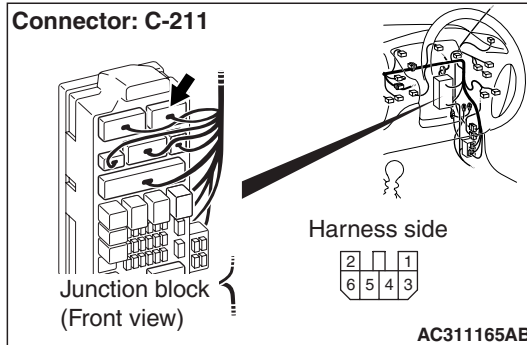


Intermediate connector C-122

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

- Q: Are the connectors and terminals in good condition?**
YES : Go to Step 3.
NO : Repair it and then go to Step 9.

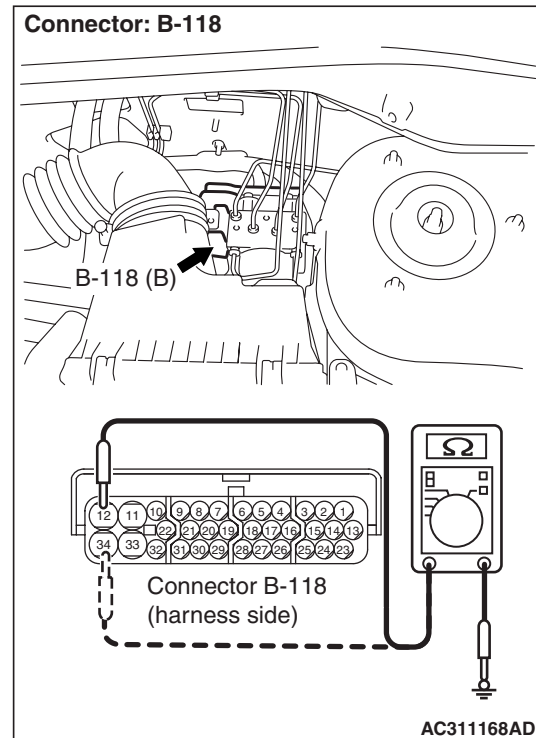
STEP 3. Check the following harness wire.



The wire between junction block connector C-211 (terminal 2) and ABS-ECU connector B-118 (terminal 10)

- Q: Is the harness wire damaged?**
YES : Repair or replace it and then go to Step 9.
NO : Go to Step 9.

STEP 4. Check the earth circuit. Resistance measurement at ABS-ECU connector B-118.

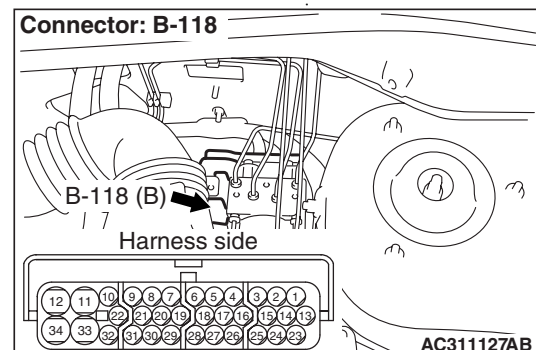


Measure the resistance between terminal 12 and earth, and terminal 34 and earth.

OK: 2 ohms or less

- Q: Is the resistance 2 ohms or less?**
YES : Go to Step 7.
NO : Go to Step 5.

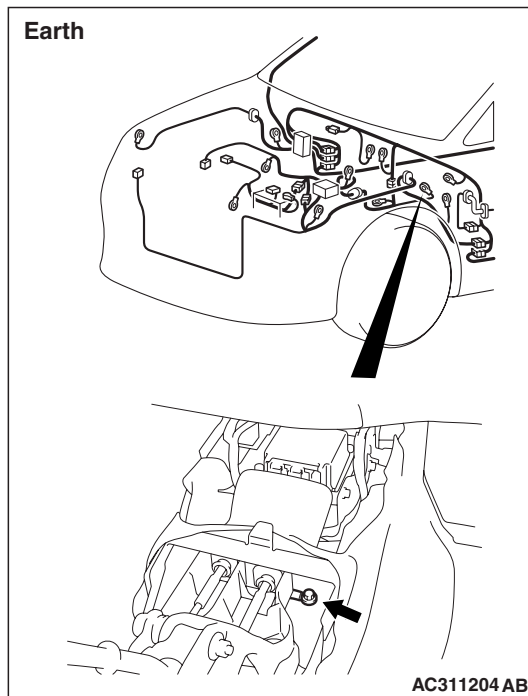
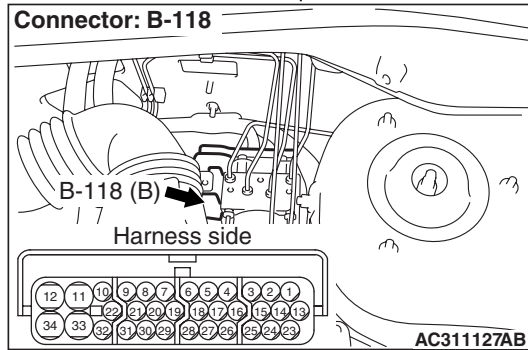
STEP 5. Check the following connector.



ABS-ECU connector B-118

Check the connector, for loose, corroded or damaged terminals, or terminals pushed back in the connector.

- Q: Are the connector and terminals in good condition?**
YES : Go to Step 6.
NO : Repair it and then go to Step 9.

STEP 6. Check the following harness wires.

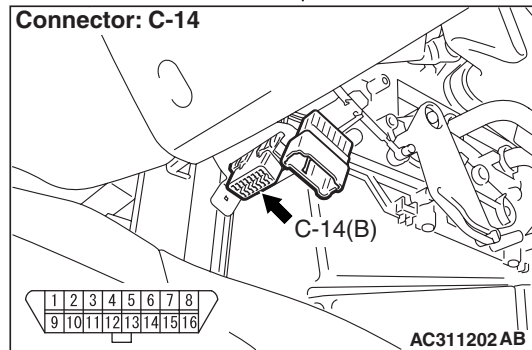
The wire between ABS-ECU connector B-118 (terminal 12) and earth

- The wire between ABS-ECU connector B-118 (terminal 34) and earth

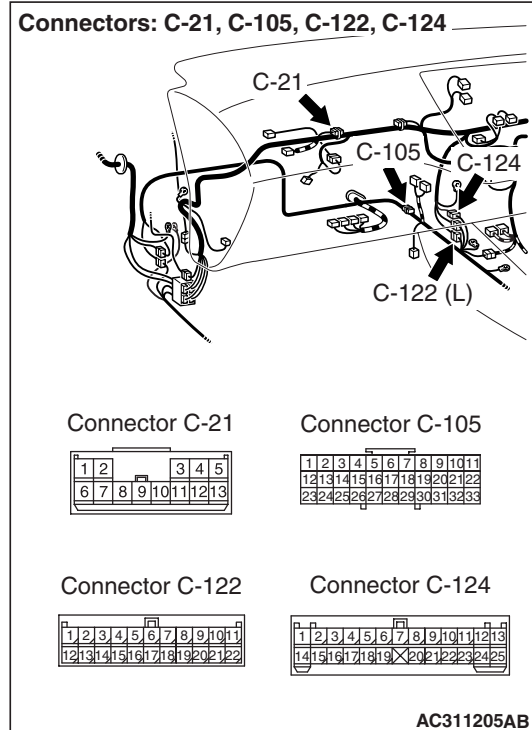
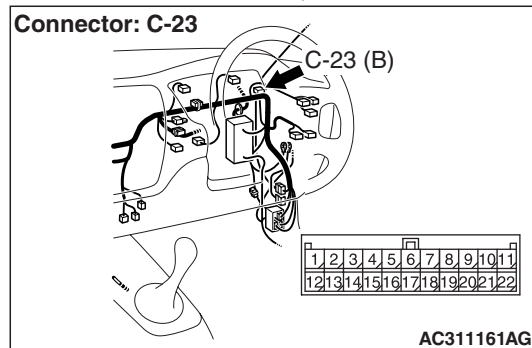
Q: Is any harness wire damaged?

YES : Repair or replace it and then go to Step 9.

NO : Go to Step 9.

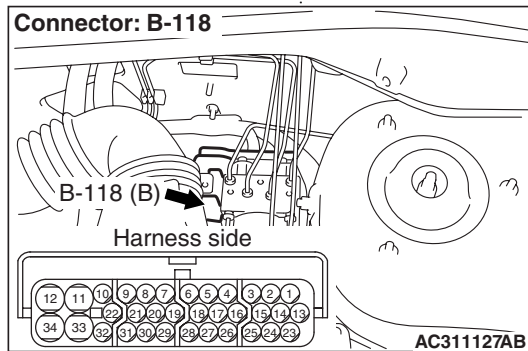
STEP 7. Check the following connectors.

Diagnosis connector C-14



Joint connectors C-21, C-23, C-105

- Intermediate connectors C-122, C-124



ABS-ECU connector B-118

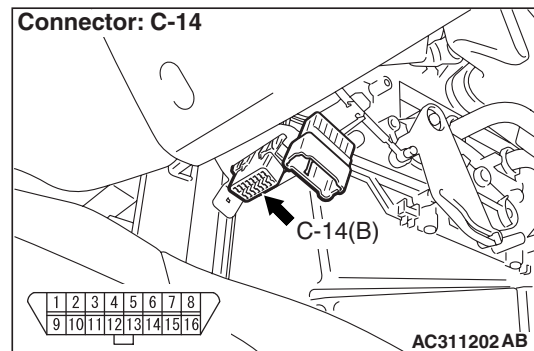
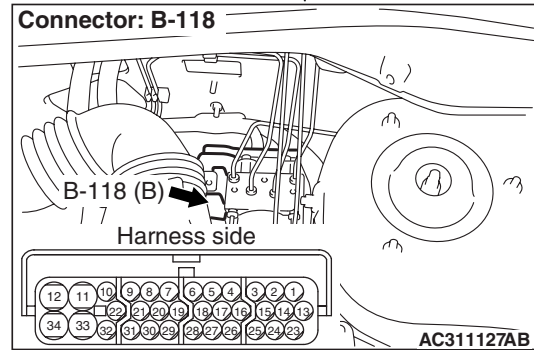
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 8.

NO : Repair it and then go to Step 9.

STEP 8. Check the following harness wires.



The wire between ABS-ECU connector B-118 (terminal 2) and diagnosis connector C-14 (terminal 7)

- The wire between ABS-ECU connector B-118 (terminal 5) and diagnosis connector C-14 (terminal 1)

Q: Is any harness wire damaged?

YES : Repair or replace it and then go to Step 9.

NO : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 9.

STEP 9. Retest the system.

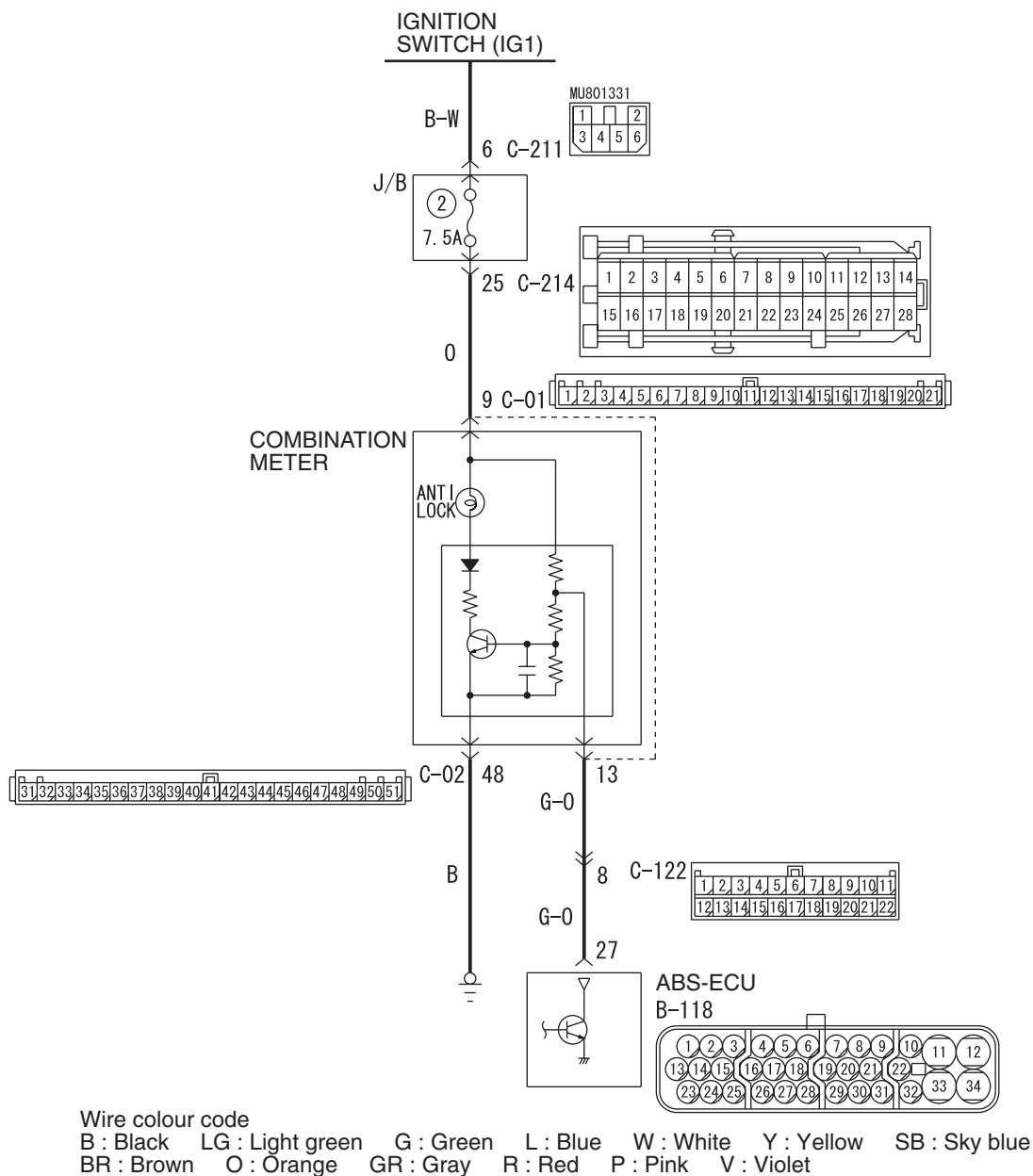
Q: Does the M.U.T.-II/III communicate with the ABS system?

YES : The procedure is complete.

NO : Return to Step 1.

INSPECTION PROCEDURE 3: When the Ignition Key is Turned to the "ON" position (Engine Stopped), the ABS Warning Lamp does not Illuminate.

ABS Warning Lamp Circuit



W4J35E028A

OPERATION

- The ABS warning lamp power is supplied from the ignition switch. The ABS-ECU earths the circuit to illuminate the lamp.
- The ABS-ECU illuminates the ABS warning lamp for 3 seconds while running self-check. This lamp is illuminated for 3 seconds upon start-up or when the ignition switch is turned to the "ON" position with engine stopped.

- When the ABS-ECU connector is disconnected, the circuit is earthed to illuminate the lamp.
- The ABS-ECU controls the continuity to the ABS warning lamp by turning the power transistor in the unit "OFF" and "ON," respectively.

COMMENT ON TROUBLE SYMPTOM

The cause may be an open circuit in the ABS warning lamp power supply circuit, a blown ABS warning lamp bulb, or a short circuit to earth between the ABS warning lamp and the ABS-ECU.

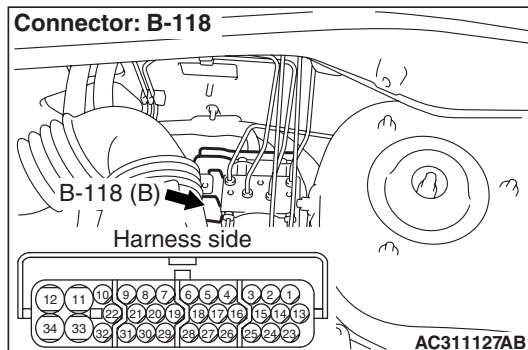
PROBABLE CAUSES

The most likely causes for this case are:

- Blown fuse
- Damaged wiring harness or connector
- Burnt out ABS warning lamp bulb
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)

DIAGNOSIS

STEP 1. Check the ABS warning lamp circuit at ABS-ECU connector B-118.



- (1) Disconnect ABS-ECU connector B-118.

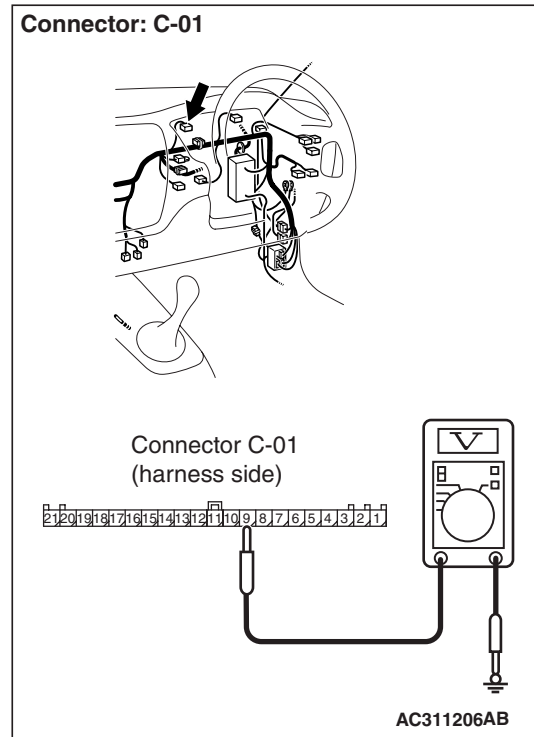
- (2) Turn the ignition switch to the "ON" position.

Q: Does the ABS warning lamp illuminate?

YES : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 10.

NO : Go to Step 2.

STEP 2. Check the power supply circuit. Voltage measurement at combination meter connector C-01.



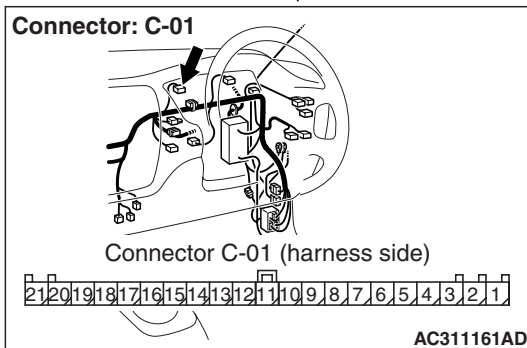
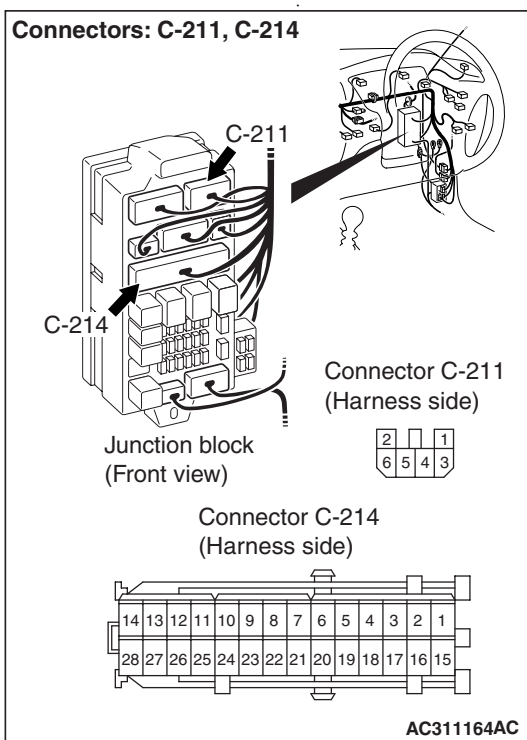
- (1) Disconnect combination meter connector C-01 and measure at the harness side.
- (2) Start the engine.
- (3) Measure the voltage between terminal 9 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5.

NO : Go to Step 3.

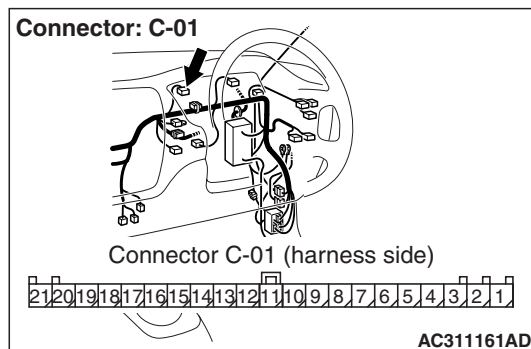
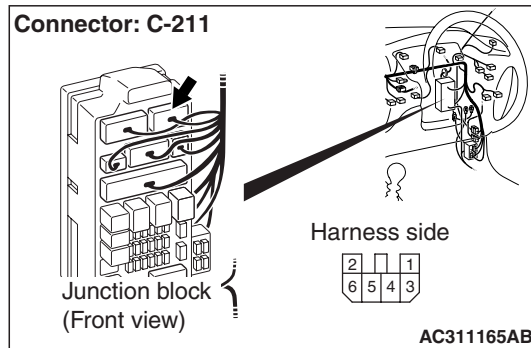
STEP 3. Check the following connectors.**Combination meter connector C-01****Junction block connectors C-211, C-214**

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 4.

NO : Repair it and then go to Step 10.

STEP 4. Check the following harness wire.

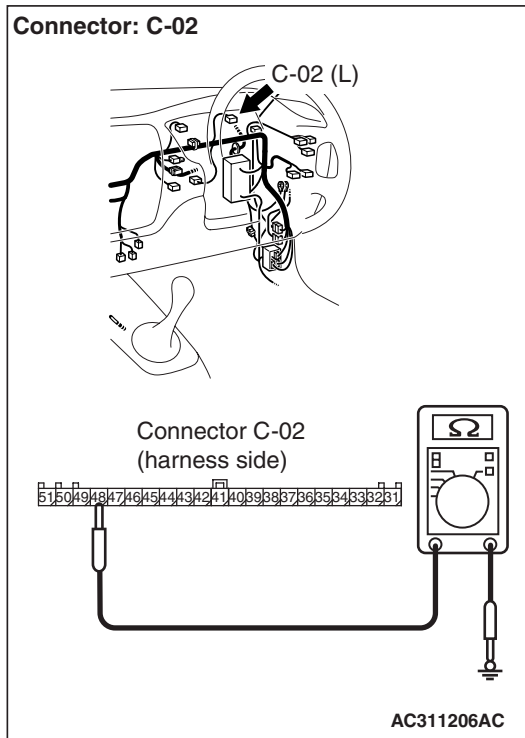
The wire between junction block connector C-211 (terminal 6) and combination meter connector C-01 (terminal 9)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 10.

NO : Go to Step 10.

STEP 5. Check the earth circuit. Resistance measurement at combination meter connector C-02.



- (1) Disconnect combination meter connector C-02 and measure at the harness side.
- (2) Measure the resistance between terminal 48 and earth.

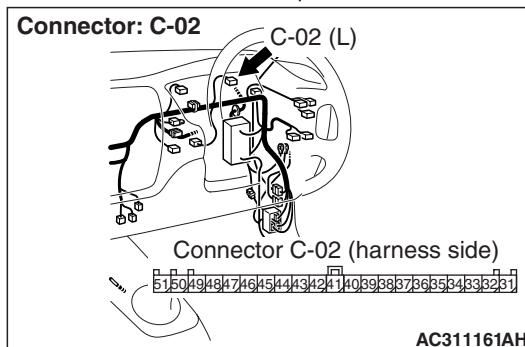
OK: 2 ohms or less

Q: Is the resistance 2 ohms or less?

YES : Go to Step 8.

NO : Go to Step 6.

STEP 6. Check the following connector.



Combination meter connector C-02

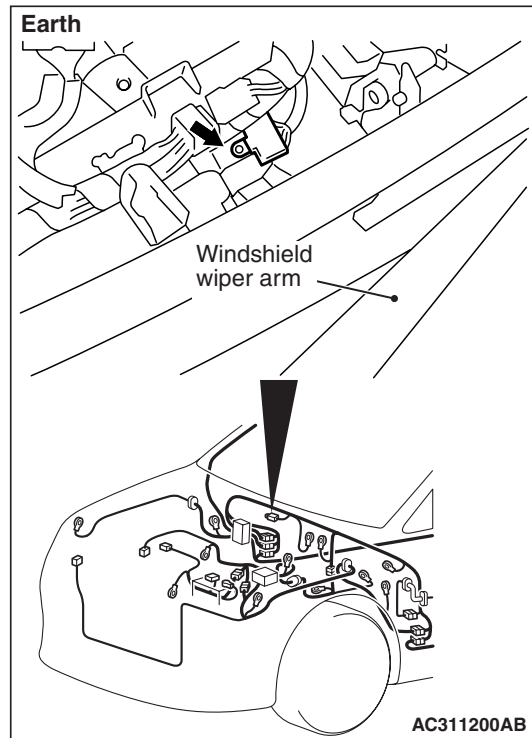
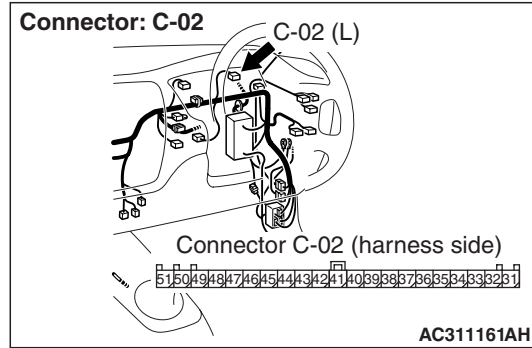
Check the connector for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 7.

NO : Repair it and then go to Step 10.

STEP 7. Check the following harness wire.

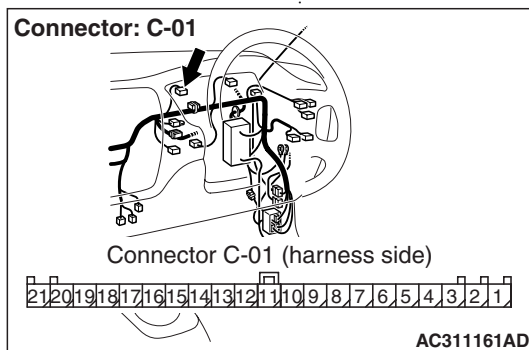


The wire between combination meter connector C-02 (terminal 48) and earth (No.7)

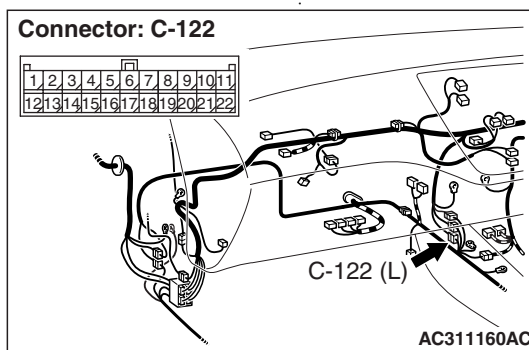
Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 10.

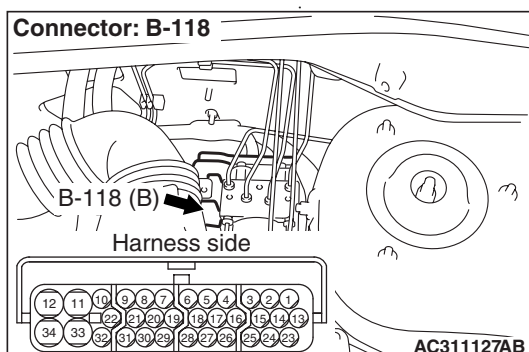
NO : Go to Step 10.

STEP 8. Check the following connectors.

Combination meter connector C-01



Intermediate connector C-122



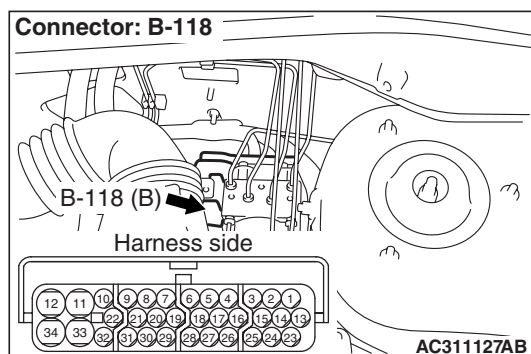
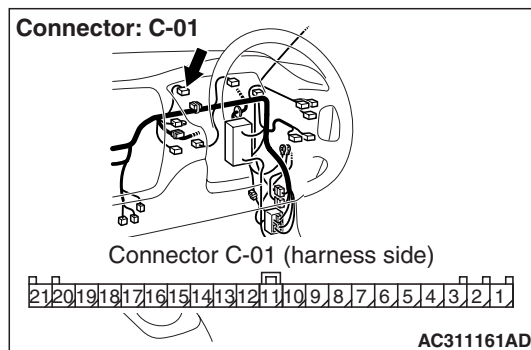
ABS-ECU connector B-118

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 9.

NO : Repair it and then go to Step 10.

STEP 9. Check the following harness wire.

The wire between combination meter connector C-01 (terminal 13) and ABS-ECU connector B-118 (terminal 27)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 10.

NO : Replace the combination meter (Refer to GROUP 54A, Combination Meter Assembly P.54A-56). Then go to Step 10.

STEP 10. Retest the system.

Q: Does the ABS warning lamp illuminate for 3 seconds when the ignition switch is turned to the "ON" position with engine stopped or upon start-up?

YES : The procedure is complete.

NO : Return to Step 1.

INSPECTION PROCEDURE 4: The ABS Warning Lamp Remains Illuminated after the Engine is Started.

NOTE: This diagnosis procedure is limited to cases where communication with the M.U.T.-II/III is possible (ABS-ECU power supply is normal) and no diagnosis code is set.

ABS WARNING LAMP CIRCUIT

Refer to P.35B-118.

CIRCUIT OPERATION

Refer to P.35B-118.

COMMENT ON TROUBLE SYMPTOM

The cause is probably the ABS-ECU malfunction.

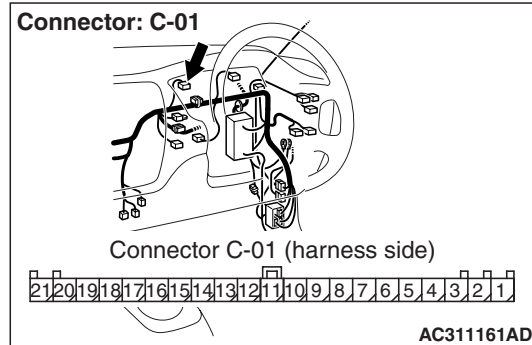
PROBABLE CAUSES

The most likely causes for this case are:

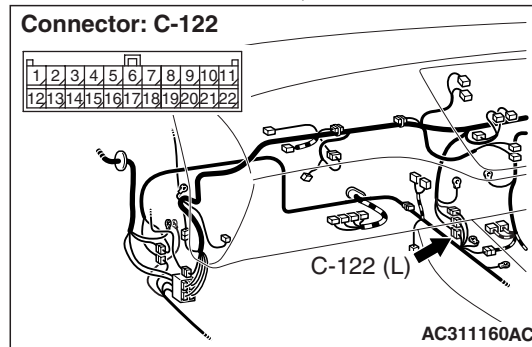
- Damaged wiring harness or connector
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)

DIAGNOSIS

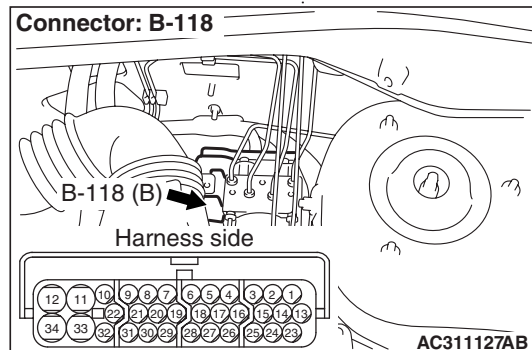
STEP 1. Check the following connectors.



Combination meter connector C-01



Intermediate connector C-122



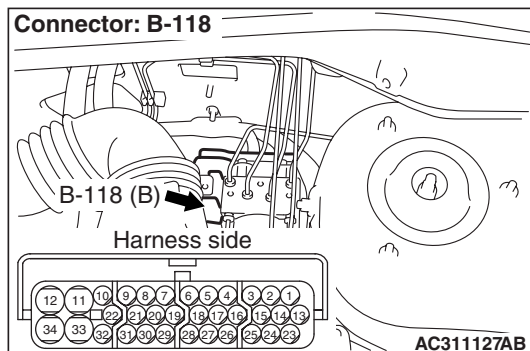
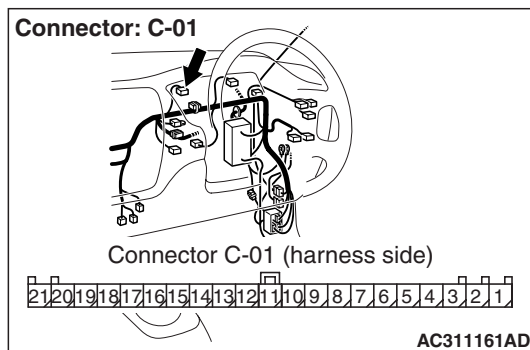
ABS-ECU connector B-118

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 2.

NO : Repair it and then go to Step 4.

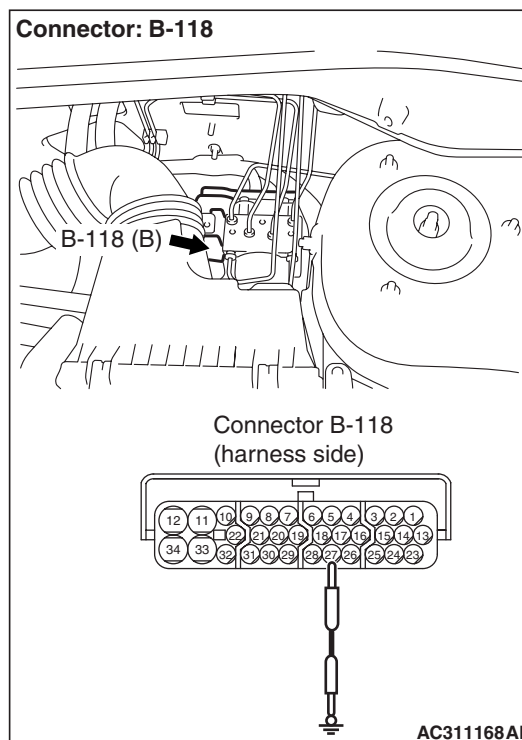
STEP 2. Check the following harness wire.

The wire between combination meter connector C-01 (terminal 13) and ABS-ECU connector B-118 (terminal 27)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 4.

NO : Go to Step 3.

STEP 3. Check the ABS warning lamp circuit at ABS-ECU connector B-118.

- (1) Disconnect ABS-ECU connector B-118 and check at the harness side connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Earth terminal 27 and check the ABS warning lamp.

Q: Does the ABS warning lamp go off?

YES : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 4.

NO : Replace the combination meter (Refer to GROUP 54A, Combination Meter Assembly [P.54A-56](#)). Then go to Step 4.

STEP 4. Retest the system.

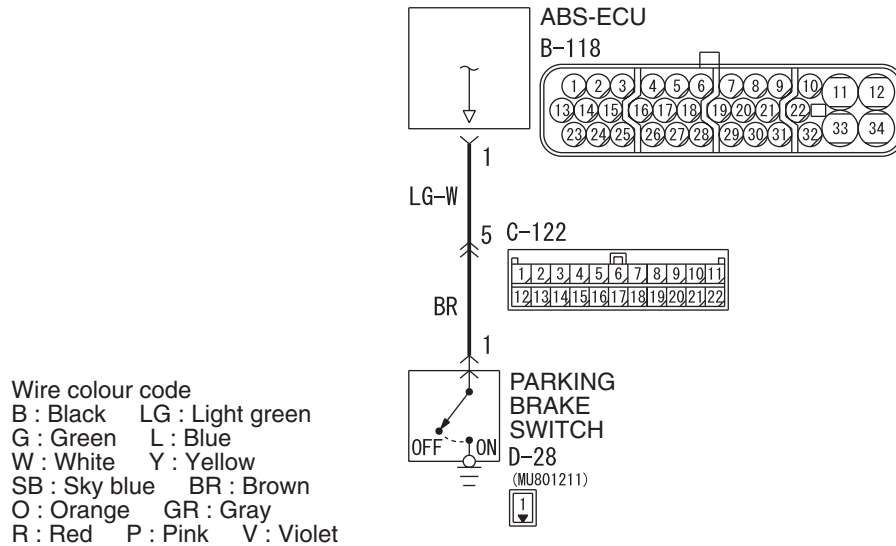
Q: Does the ABS warning lamp turn off in 3 seconds after start-up?

YES : The procedure is complete.

NO : Return to Step 1.

INSPECTION PROCEDURE 5: In the Inspection with the M.U.T.-II/III Data List, the Parking Brake Switch is not Turned ON or Turned OFF.

Parking Brake Switch Circuit



W4J35E030A

OPERATION

The ABS-ECU monitors the parking brake switch to optimise the ABS control.

COMMENT ON TROUBLE SYMPTOM

The cause may be an open or a short circuit between the parking brake switch and the ABS-ECU.

PROBABLE CAUSES

The most likely causes for this case are:

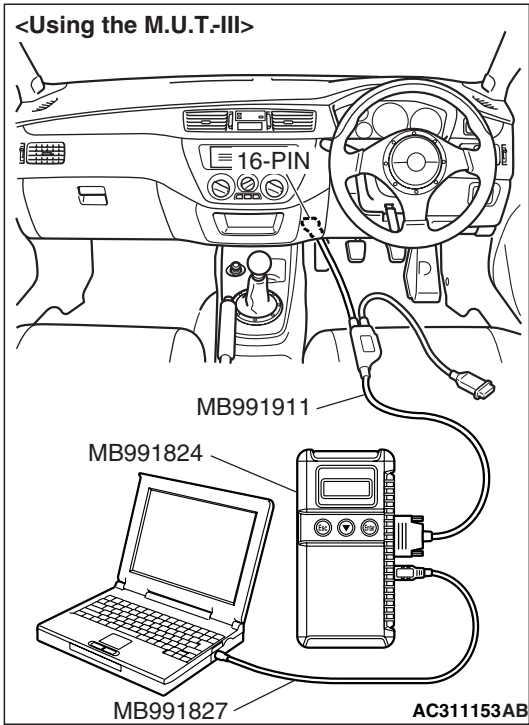
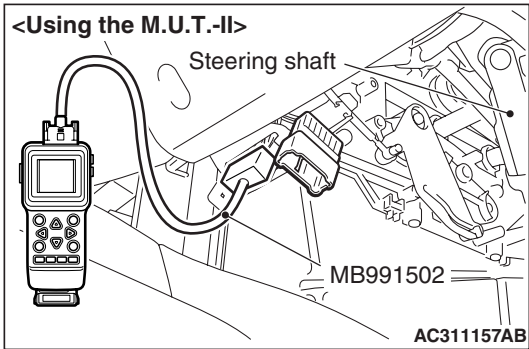
- Damaged wiring harness or connector
- Malfunction of the parking brake switch
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)

DIAGNOSIS

STEP 1. M.U.T.-II/III data list.

CAUTION

To prevent damage to M.U.T.-II/III, always turn the ignition switch to the "LOOK" (OFF) position before connecting or disconnecting M.U.T.-II/III.



- (1) Connect M.U.T.-II/III as shown in the illustration.
- (2) Start the engine.

- (3) Set M.U.T.-II/III to data reading mode for following item.

- Item No.29: Parking brake switch

OK:

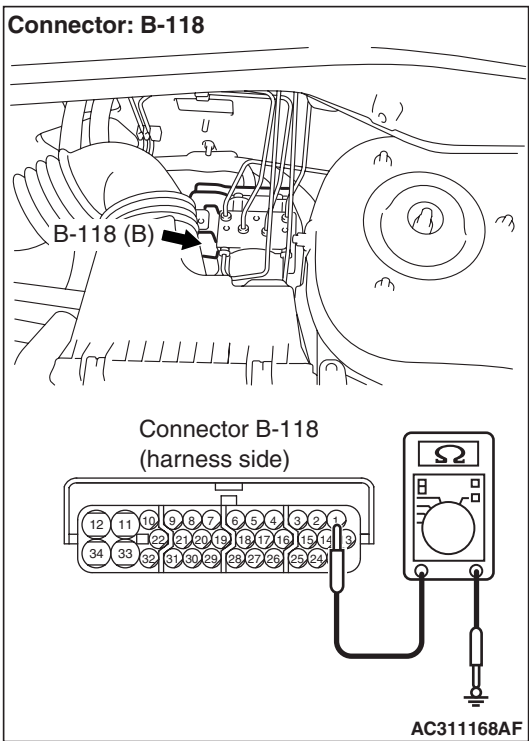
Checking requirement	Display
Pull the parking brake lever	ON
Release the parking brake lever	OFF

Q: Is the parking brake switch input normal?

YES : This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope With Intermittent Malfunction P.00-5.

NO : Go to Step 2.

STEP 2. Check the parking brake switch circuit.
Resistance measurement at ABS-ECU connector B-118.



- (1) Disconnect ABS-ECU connector B-118 and measure at the harness side.

- (2) Check for continuity between terminal 1 and earth with pulling or releasing the parking brake lever.

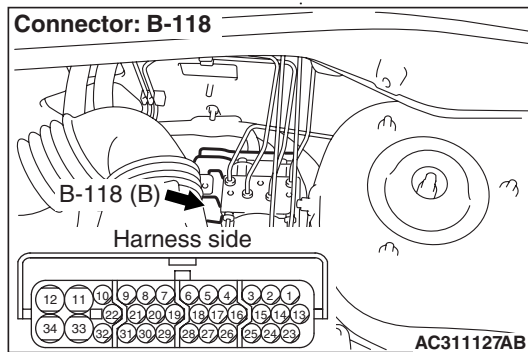
OK: If the parking brake lever is pulled, there should be no continuity, and if the parking brake lever is released, there should be continuity (less than 2 ohms).

Q: Does continuity exist when the parking brake lever is released, and dose continuity not exist when the parking brake lever is pulled?

YES : Go to Step 3.

NO : Go to Step 4.

STEP 3. Check the following connector.



ABS-ECU connector B-118

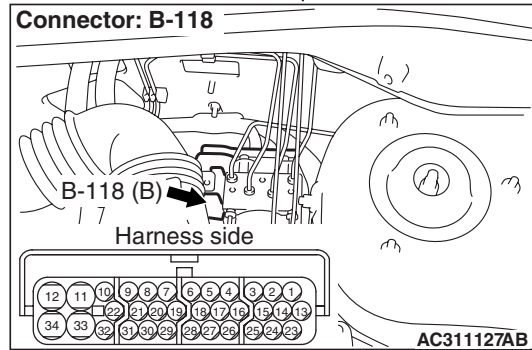
Check the connector for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

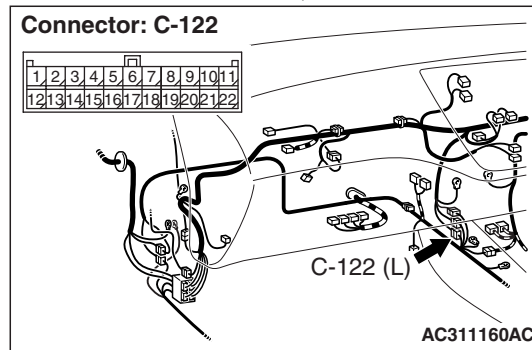
YES : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 6.

NO : Go to Step 6.

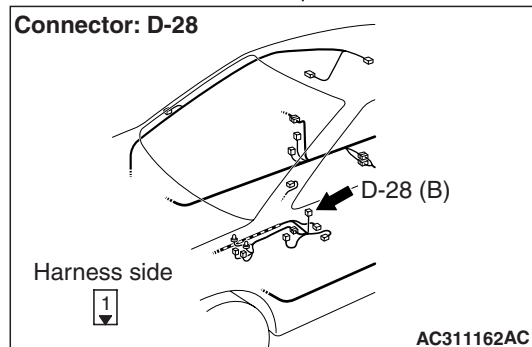
STEP 4. Check the following connectors.



ABS-ECU connector B-118



Intermediate connector C-122



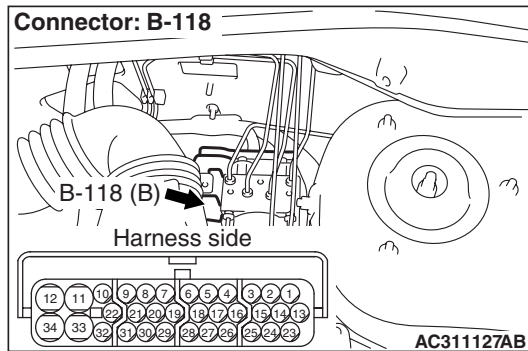
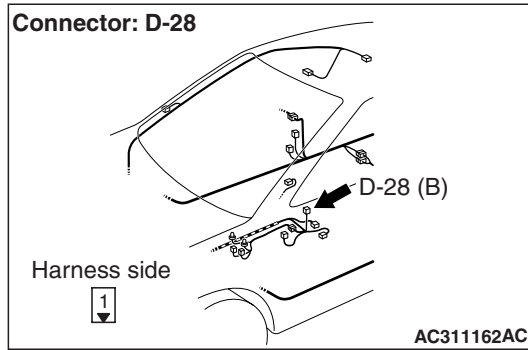
Parking brake switch connector D-28

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 5.

NO : Repair it and then go to Step 6.

STEP 5. Check the following harness wire.

The wire between parking brake switch connector D-28 (terminal 1) and ABS-ECU connector B-118 (terminal 1)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 6.

NO : Replace the parking brake switch (Refer to GROUP 36, Parking Brake Lever [P.36-4](#)).

Then go to Step 6.

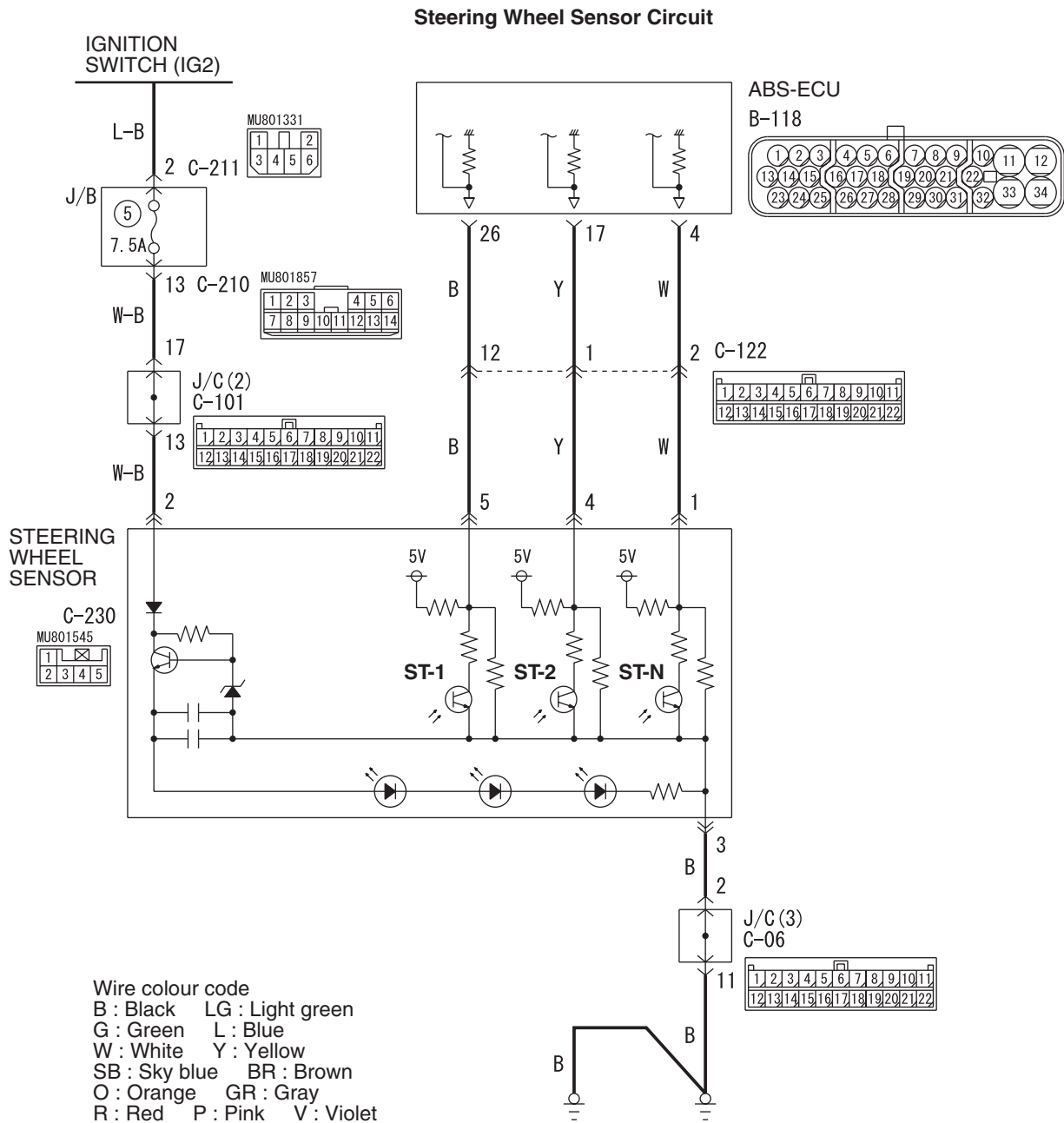
STEP 6. Check whether the diagnosis code is reset.

Q: Does the parking brake switch turn ON/OFF normally in the inspection by M.U.T.-II/III data list?

YES : The procedure is complete.

NO : Return to Step 1.

INSPECTION PROCEDURE 6: The Neutral Position Learning of the Steering Wheel Sensor is not Detected.



W4J35E023A

CIRCUIT OPERATION

The ABS system detects the neutral position learning of the steering wheel sensor by the signal from the stop lamp.

COMMENT ON TROUBLE SYMPTOM

The diagnosis is difficult because it depends on driving condition and road surface, if the diagnosis code has not been set, carry out the following checks (refer to TROUBLESHOOTING HINTS).

PROBABLE CAUSES

The most likely causes for this case are:

- Damaged wiring harness or connector
- Malfunction of the stop lamp switch system
- Tyres are not all the same diameter
- Malfunction of suspension
- Malfunction of the steering wheel sensor installation
- Malfunction of the brake modulator hydraulic unit (integrated with ABS-ECU)

DIAGNOSIS**STEP 1. Check the front tyres.**

Q: Are the tyre diameters different?

YES : Replace the appropriate tyre and then go to Step 13.

NO : Go to Step 2.

STEP 2. Check the front suspension.

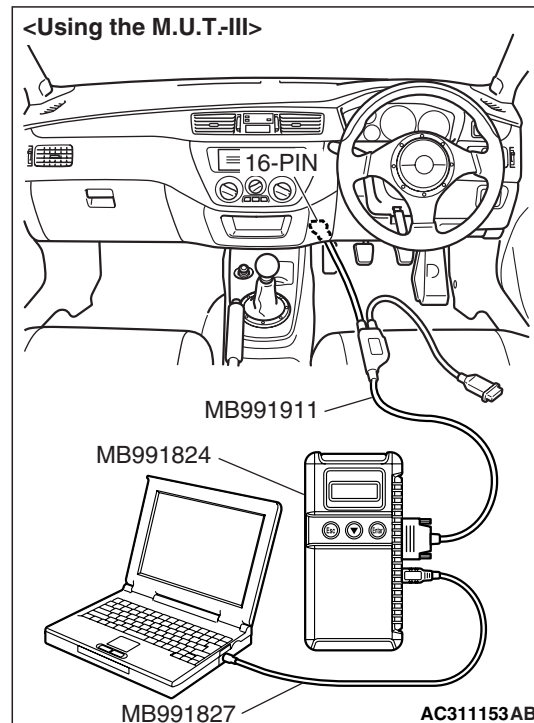
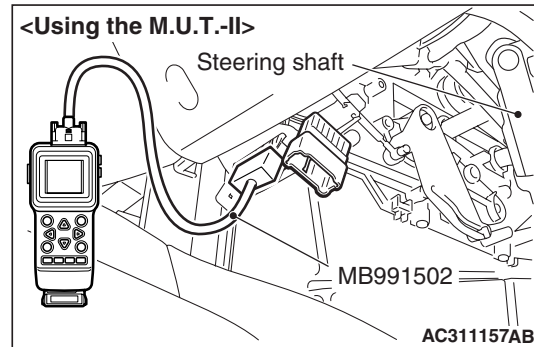
Q: Is the front suspension abnormal?

YES : Repair the front suspension and then go to Step 13.

NO : Go to Step 3.

STEP 3. M.U.T.-II/III data list.**⚠ CAUTION**

To prevent damage to M.U.T.-II/III, always turn the ignition switch to the "LOOK" (OFF) position before connecting or disconnecting M.U.T.-II/III.



- (1) Connect M.U.T.-II/III as shown in the illustration.
- (2) Start the engine.

(3) Set M.U.T.-II/III to data reading mode for following item.

- Item No.37: Steering wheel sensor neutral position learning

OK:

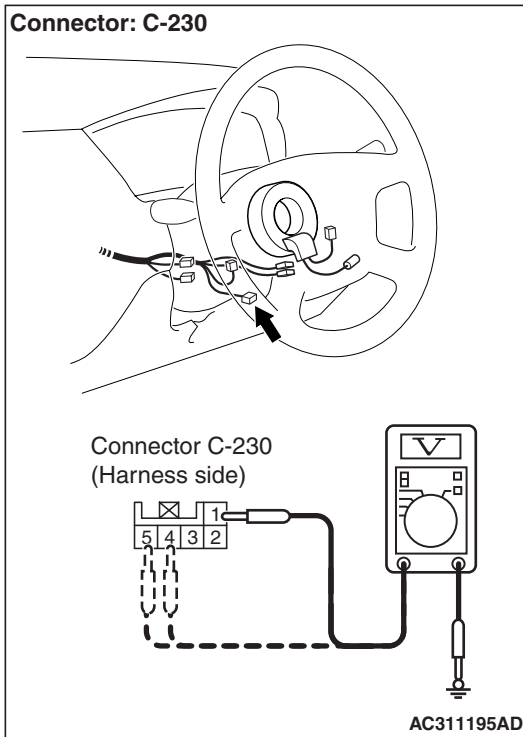
Checking requirement	Display
After driving straight at vehicle speed over than 10 km/h	ON
Before driving with ignition switch ON	OFF

Q: Is the steering wheel sensor straight ahead position learning input normal?

YES : Go to Step 5.

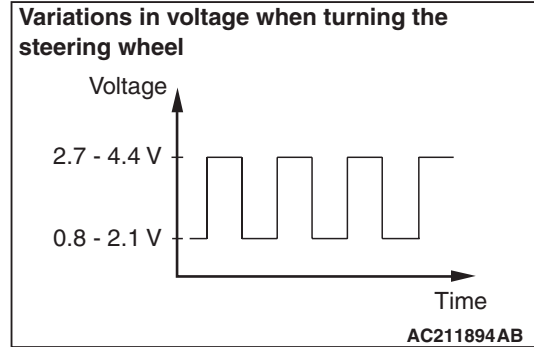
NO : Confirm the steering wheel sensor is correctly installed. Then go to Step 4.

STEP 4. Check for steering wheel sensor output voltage.



(1) Connect steering wheel sensor connector C-230.

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



(3) Measure the voltage, by backprobing, between terminal 1 and earth, terminal 4 and earth, and terminal 5 and earth.

OK: The voltage should measure as indicated in the figure.

Q: Is the steering wheel sensor output voltage normal?

YES : Go to Step 13.

NO : Replace the steering wheel sensor (Refer to [P.35B-150](#)). and then go to Step 13.

STEP 5. Check the stop lamp.

Q: Does the stop lamp turn on and off normally?

YES : Go to Step 9.

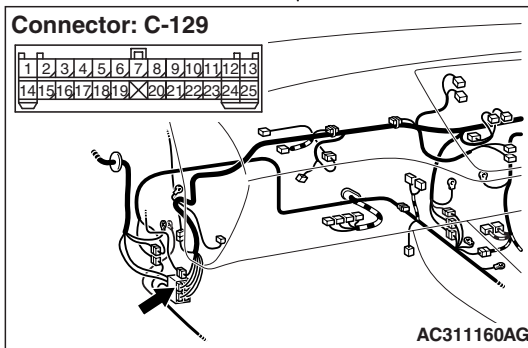
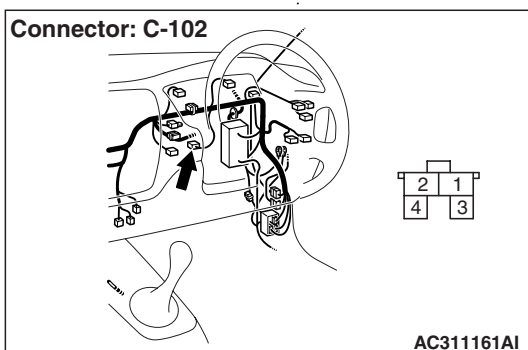
NO : Go to Step 6.

STEP 6. Check the stop lamp switch installation condition.

Q: Is the stop lamp switch installed correctly?

YES : Check the stop lamp switch (Refer to GROUP 35A, Brake pedal [P.35A-15](#)). Then go to Step 7.

NO : Repair the installation of the stop lamp switch (Refer to GROUP 35A, On-vehicle Service – Brake pedal Check and Adjustment [P.35A-5](#)). Then go to Step 13.

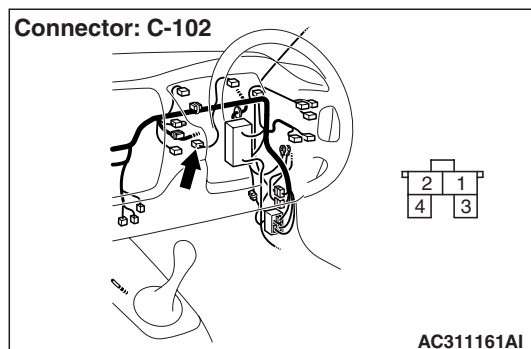
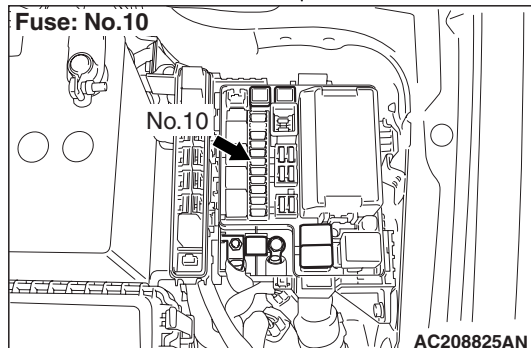
STEP 7. Check the following connectors.**Intermediate connectors C-129****Stop lamp switch connector C-102**

Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 8.

NO : Repair it and then go to Step 13.

STEP 8. Check the following harness wires.

The wire between relay box in engine compartment (fuse No.10) and stop lamp switch connector C-102 (terminal 2)

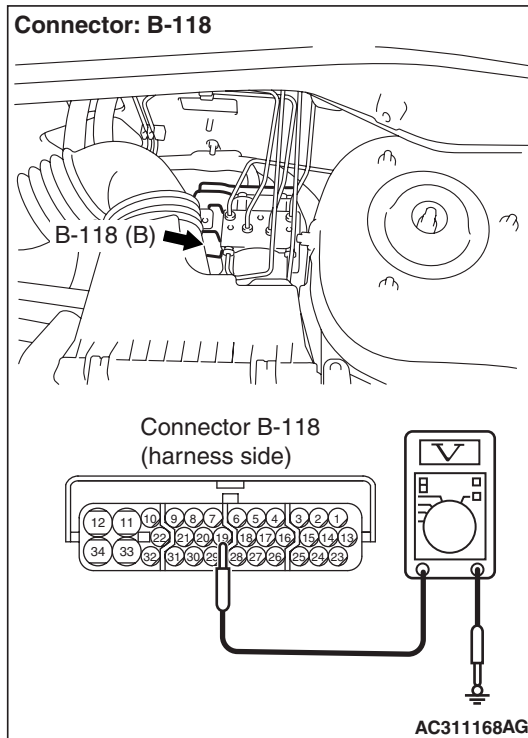
- The wire between stop lamp switch connector C-102 (terminal 1) and stop lamps

Q: Is any harness wire damaged?

YES : Repair or replace it and then go to Step 13.

NO : Go to Step 9.

**STEP 9. Check the stop lamp switch circuit.
Voltage measurement at ABS-ECU connector B-118.**



- (1) Disconnect ABS-ECU connector B-118 and measure at the harness side.
- (2) Depress the brake pedal to turn on the stop lamp switch.
- (3) Measure the voltage between terminal 19 and earth.

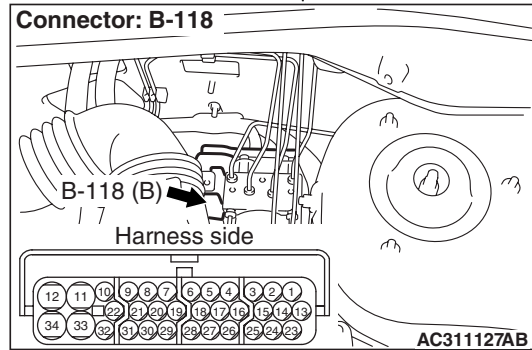
OK: System voltage

Q: Is the check result normal?

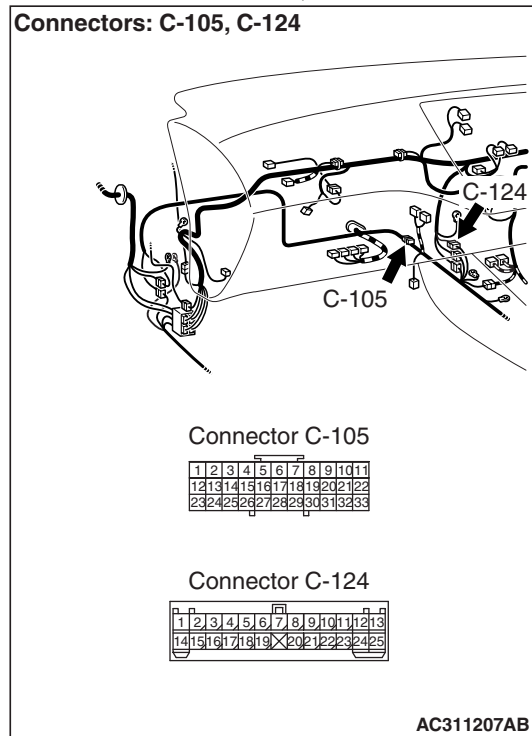
YES : Go to Step 12.

NO : Go to Step 10.

STEP 10. Check the following connectors.

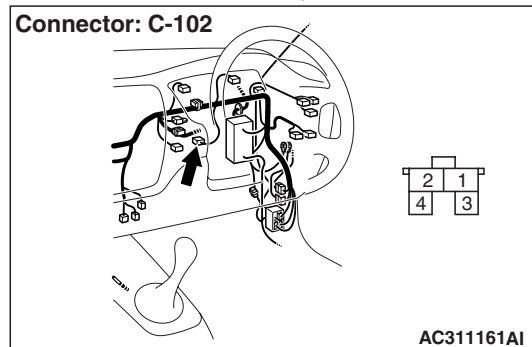


ABS-ECU connector B-118



Joint connector C-105

- Intermediate connector C-124



Stop lamp switch connector C-102

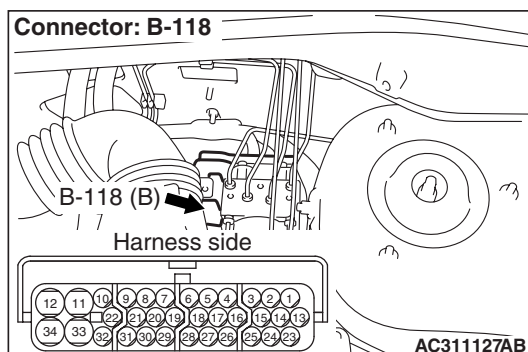
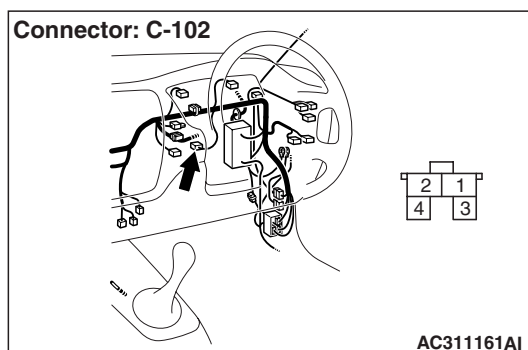
Check the connectors for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 11.

NO : Repair it and then go to Step 13.

STEP 11. Check the following harness wire.



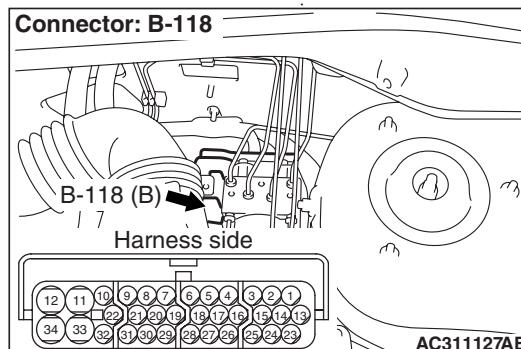
The wire between stop lamp switch connector C-102 (terminal 1) and ABS-ECU connector B-118 (terminal 19)

Q: Is the harness wire damaged?

YES : Repair or replace it and then go to Step 13.

NO : Go to Step 13.

STEP 12. Check the following connector.



ABS-ECU connector B-118

Check the connector for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Replace the brake modulator hydraulic unit (integrated with ABS-ECU) (Refer to [P.35B-143](#)). Then go to Step 13.

NO : Repair it and then go to Step 13.

STEP 13. Retest the system.

Q: Is the neutral position learning of the steering wheel sensor detected by the ABS system?

YES : The procedure is complete.

NO : Return to Step 1.

INSPECTION PROCEDURE 7: Faulty ABS Operation

COMMENT ON TROUBLE SYMPTOM (COMMENT)

The cause depends on driving and road surface conditions, so diagnosis may be difficult. However, if no diagnosis code is set, carry out the following inspection.

PROBABLE CAUSES

The most likely cause for this case is:

- Malfunction of the brake modulator hydraulic unit

DIAGNOSIS

Check the brake modulator hydraulic unit (Refer to [P.35B-140](#)). If the brake modulator hydraulic unit (integrated with ABS-ECU) is malfunctioning, replace it. Then check that the malfunction symptom is eliminated.

DATA LIST REFERENCE TABLE

M1352011500702

The following items can be read by the M.U.T.-II/III
from the ABS-ECU input data.

M.U.T.-II/III display	Item No.	Check item	Checking requirements		Normal valve
FR SNSR	11	Front-right wheel speed sensor	Drive the vehicle		Vehicle speeds displayed on the speedometer and M.U.T.-II/III are identical.
FL SNSR	12	Front-left wheel speed sensor			
RR SNSR	13	Rear-right wheel speed sensor			
RL SNSR	14	Rear-left wheel speed sensor			
BATT. VOLTAGE	21	ABS-ECU power supply voltage	Ignition switch: ON		10 – 16 V
PARKING SW	29	Parking brake switch	Pull the parking brake lever.		ON
			Release the parking brake lever.		OFF
GS (STRAIGHT)	32	Longitudinal G-sensor	When vehicle stops.		2.4 – 2.6 V
			When vehicle is driven.		1.0 – 4.0 V
STOP LAMP SW	36	Stop lamp switch	Depress the brake pedal.		ON
			Release the brake pedal.		OFF
ST-N MEMORY	37	Steering wheel sensor neutral position learning	After driving straight at vehicle speed over 10 km/h.		ON
			Before driving with ignition switch ON.		OFF
GS (LATERAL)	71	Lateral G-sensor	When vehicle stops.		2.4 – 2.6 V
			When vehicle is driven.		1.0 – 4.0 V
ST-N	74	Steering wheel sensor (ST-N)	Ignition switch: ON	Steering: Neutral position and fully turned	ON
				Steering: Except for the above	OFF
ST-1	75	Steering wheel sensor (ST-1)	Ignition switch: ON	Steering: Turn slowly.	Display ON and OFF alternately
ST-2	76	Steering wheel sensor (ST-2)			
ST ANGLE	86	Steering degree	- Ignition switch: ON - Steering wheel sensor neutral position learning is finished (service data item No.37 displays ON).	Steering: Turn 90° to the right.	+ 90°
				Steering: Neutral	OFF
				Steering: Turn 90° to the left.	- 90°

ACTUATOR TEST REFERENCE TABLE

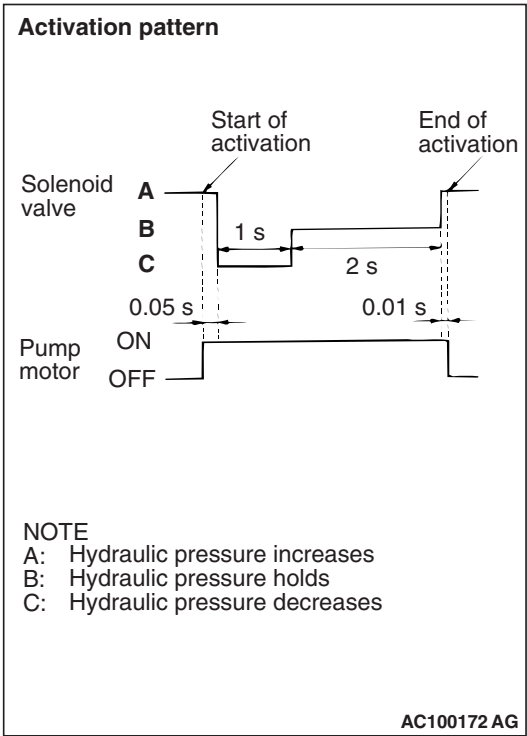
M1352011600709

The M.U.T.-II/III activates the following actuators for testing.

NOTE: If the ABS-ECU runs down, actuator testing cannot be carried out.

NOTE: Actuator testing is only possible when the vehicle is stationary.

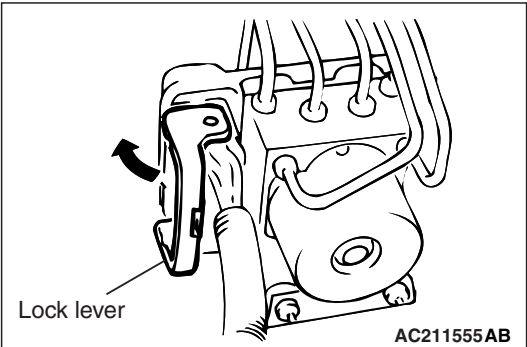
ACTUATOR TEST SPECIFICATIONS



No.	Item	
01	Solenoid valve for front-left wheel	Solenoid valves and pump motors in the hydraulic unit (simple inspection mode)
02	Solenoid valve for front-right wheel	
03	Solenoid valve for rear-left wheel	
04	Solenoid valve for rear-right wheel	

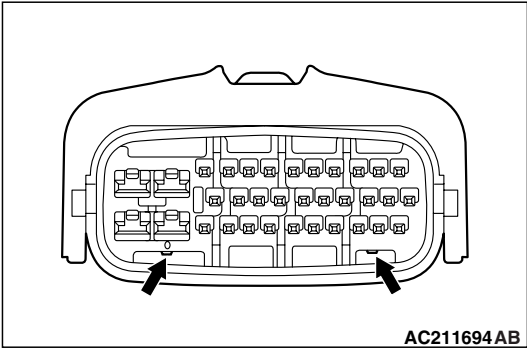
CHECK AT ABS-ECU

Use the following steps to remove the connector cover of the ABS-ECU and then measure the terminal voltage.



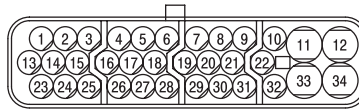
1. Move the lock lever of the ABS-ECU connector as shown in the illustration, and then disconnect the ABS-ECU as connector.

M1352011800695



2. Push up and unlock the hooks of the ABS-ECU connector as shown in the illustration, then remove the connector cover.

TERMINAL VOLTAGE CHECK CHART



AC211716

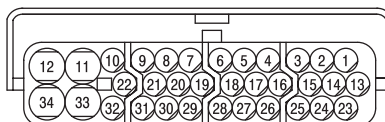
1. Measure the voltages between terminals (12) (earth terminal) and each respective terminal.
2. The terminal layout is shown in the illustration.

NOTE: Do not measure terminal voltage for approximately three seconds after the ignition switch is turned "ON." The ABS-ECU performs the initial check during that period.

Terminal No.	Check item	Checking requirements		Normal condition
1	Parking brake switch	Pull the parking brake lever.		1 V or less
		Release the parking brake lever.		System voltage
2	M.U.T.-II/III	When the M.U.T.-II/III is connected		Serial communication with M.U.T.-II/III
		When the M.U.T.-II/III is not connected		1 V or less
4	Steering wheel sensor (ST-N)	Ignition switch: "ON"	Steering wheel: Neutral position and fully turned.	0.8 – 2.1 V
			Steering wheel: Except for the above	2.7 – 4.4 V
5	Diagnosis changeover input	When the M.U.T.-II/III is connected		Approximately 0 V
		When the M.U.T.-II/III is not connected		System voltage
10	ABS-ECU power supply	Ignition switch: "ON"		System voltage
		Ignition switch: "START" or "ACC"		Approximately 0 V
11	Solenoid valve power supply	Always		System voltage
14	Lateral G-sensor input	Ignition switch: "ON"		2.4 – 2.6 V (horizontal position)
15	Longitudinal G-sensor earth	Always		0 V
17	Steering wheel sensor (ST-2)	Ignition switch: "ON"	Steering wheel: Turned	Variation in the voltage value 0.8 – 2.1 V and 2.7 – 4.4 V
19	Stop lamp monitor input	Ignition switch: "ON"	Stop lamp switch: "ON"	System voltage
			Stop lamp switch: "OFF"	1 V or less
24	Lateral G-sensor earth	Always		0 V
25	Longitudinal G-sensor input	Ignition switch: "ON"		2.4 – 2.6 V (horizontal position)

Terminal No.	Check item	Checking requirements		Normal condition
26	Steering wheel sensor (ST-1)	Ignition switch: "ON"	Steering wheel: Turned	Variation in the voltage value 0.8 – 2.1 V and 2.7 – 4.4 V
27	ABS-ECU warning lamp transistor output	Ignition switch: "ON"	When the lamp off	1 V or less
			When the lamp is illuminated	7 V or more
33	Motor power supply	Always		System voltage

RESISTANCE AND CONTINUITY BETWEEN HARNESS-SIDE CONNECTOR TERMINALS



AC211717

1. Turn the ignition switch to the "LOCK" (OFF) position and disconnect the ABS-ECU connectors before checking resistance and continuity.
2. Check the resistance and continuity between the terminals indicated in the table below.
3. The terminal layout is shown in the illustration.

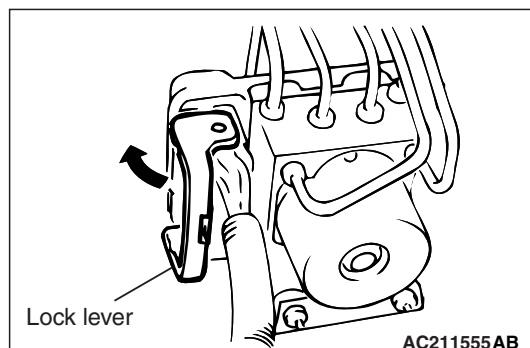
ABS-ECU terminal No.	Signal	Normal condition
6 – 7	Rear-left wheel speed sensor	1.24 – 1.64 k Ω
8 – 9	Rear-right wheel speed sensor	1.24 – 1.64 k Ω
22 – 31	Front-left wheel speed sensor	1.24 – 1.64 k Ω
29 – 30	Front-right wheel speed sensor	1.24 – 1.64 k Ω
12 – body earth	Earth	Less than 2 ohms
34 – body earth	Earth	Less than 2 ohms

ON-VEHICLE SERVICE

WHEEL SPEED SENSOR OUTPUT VOLTAGE MEASUREMENT

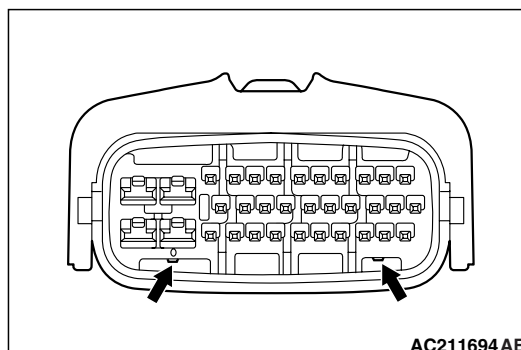
M1352001600612

Lift up the vehicle and release the parking brake.



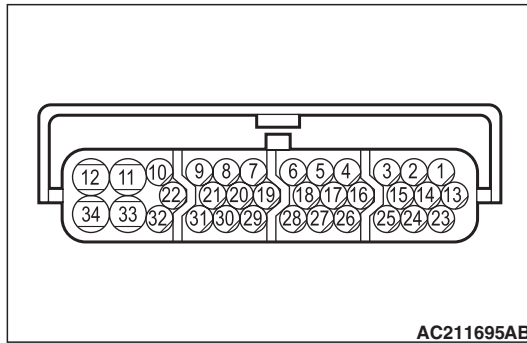
AC211555AB

1. Move the lock lever of the ABS-ECU connector as shown, and then disconnect the ABS-ECU connector.



AC211694AB

2. Push up and unlock the hooks of the ABS-ECU connector as shown in the illustration, then remove the connector cover.



- Manually turn the wheel to be measured 1/2 to 1 turn/second. Measure the output voltage with a voltmeter or oscilloscope.

NOTE: The output waveform is low when the wheel speed is low. Similarly, it will be higher as the wheel speed increases. Waveform may also be observed by driving the vehicle.

Terminal No.			
Front left	Front right	Rear left	Rear right
22	29	6	8
31	30	7	9

Output voltage:

- Minimal voltmeter reading: 42 mV
- Maximum voltmeter reading: 300 mV
- Minimal oscilloscope reading: 120 mV
- Maximum oscilloscope reading: 600 mV

Probable causes of low output voltage

- Wheel speed sensor pole piece-to-wheel speed rotor clearance too large

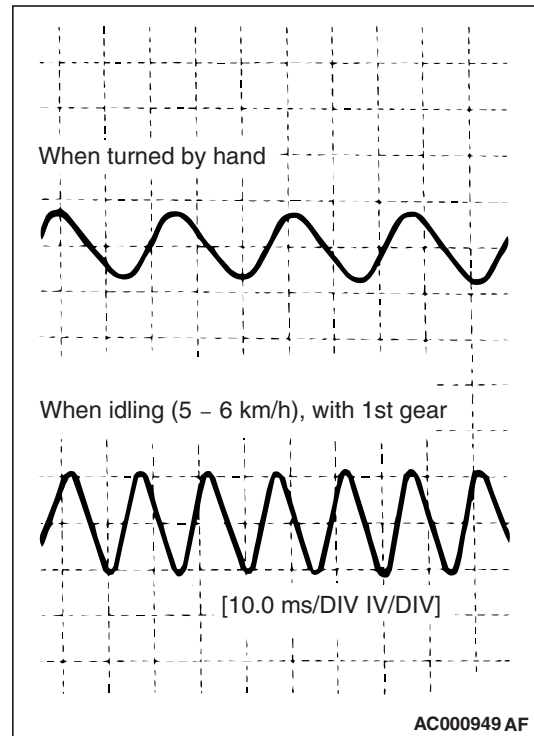
POINTS IN WAVEFORM MEASUREMENT

Symptom	Probable causes	Remedy
Too small or zero waveform amplitude	Faulty wheel speed sensor or excessive gap between it and the wheel speed rotor	Replace wheel speed sensor
Waveform amplitude fluctuates excessively (This is no problem if the minimum amplitude is 100 mV or more)	Axle hub eccentric or with large runout	Replace hub assembly
	Faulty ABS-ECU earth	Repair harness wires
Noisy or disturbed waveform	Open circuit in wheel speed sensor	Replace wheel speed sensor
	Open circuit in harness	Repair harness wire
	Incorrectly mounted wheel speed sensor	Mount wheel speed sensor correctly
	Wheel speed rotor with missing or damaged teeth	Replace wheel speed rotor

NOTE: The wheel speed sensor cable moves in relation to motion of the front or rear suspension. Therefore, it is likely that it has an open circuit only when driving on rough roads but it functions normally when driving on smooth roads. It is recommended to observe sensor output voltage waveform also under special conditions, such as driving on a rough road.

- Faulty wheel speed sensor

NOTE: Check the connection of the wheel speed sensor harness and connector before using the oscilloscope.



- To observe the waveform with an oscilloscope:
 - Front Wheels: Shift into low gear and drive the wheels.
 - Rear Wheels: Turn the wheels manually at a constant speed.

HYDRAULIC UNIT CHECK

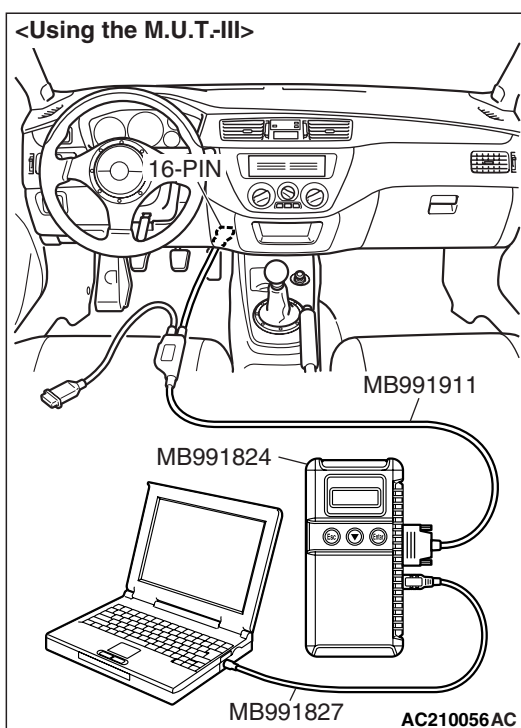
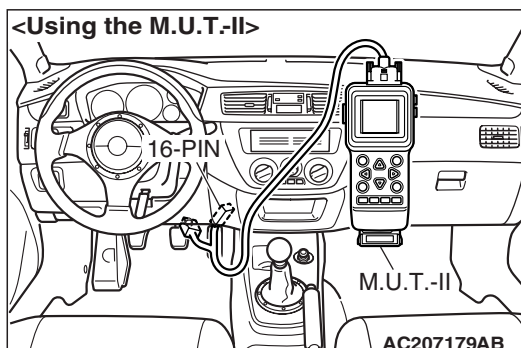
M1352001700642

CAUTION

- The roller of the braking force tester and the tyre should be dry during testing.
 - When testing the front brakes, apply the parking brake. When testing the rear brakes, stop the front wheels with chocks.
1. Jack up the vehicle. Then support the vehicle with rigid racks at the specified jack-up points or place the front or rear wheels on the rollers of the braking force tester.
 2. Release the parking brake, and feel the drag force (drag torque) on each road wheel. When using the braking force tester, take a reading of the brake drag force.
 3. Turn the ignition switch to the "LOCK" (OFF) position.

CAUTION

To prevent damage to the M.U.T.-II/III, always turn the ignition switch to the "LOOK" (OFF) position before connecting or disconnecting the M.U.T.-II/III.

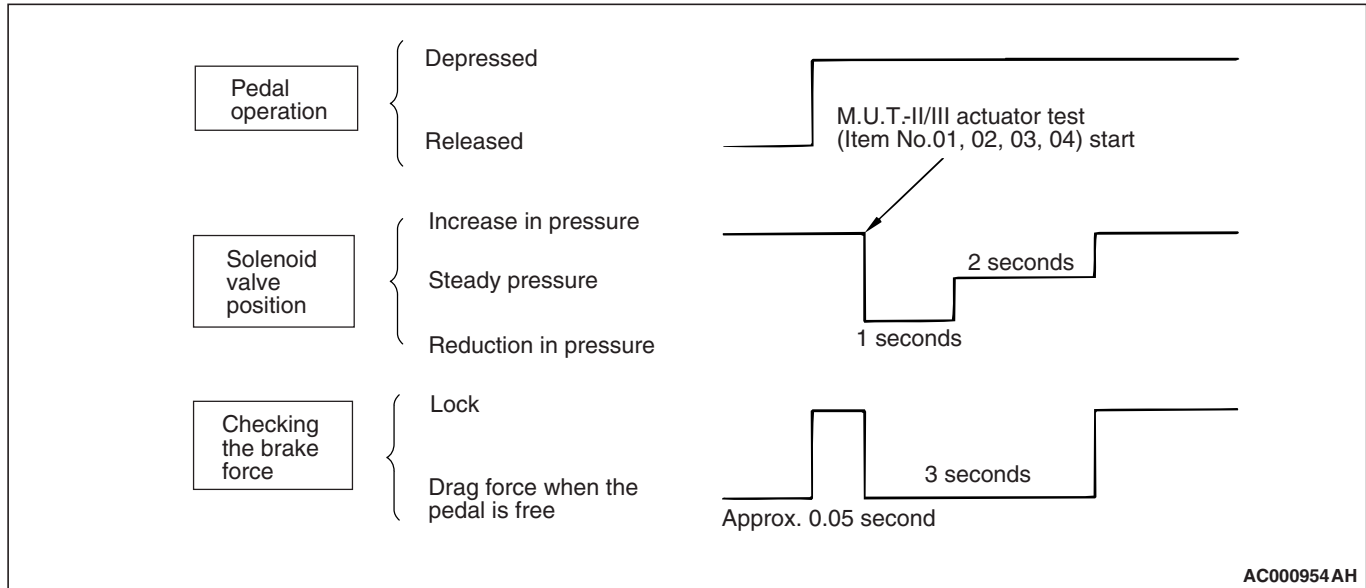


4. Connect the M.U.T.-II/III as shown in the illustration.
5. After checking that the shift lever is in neutral, start the engine.
6. Use the M.U.T.-II/III to force-drive the actuator. For the M.U.T.-II/III, follow the steps below.
 - (1) Select "Interactive Diagnosis" from the start-up screen.
 - (2) Select "System select."
 - (3) Choose "ABS" from the "CHASSIS" tab.
 - (4) Select "Actuator Test" from "ABS" screen

- (5) Choose an appropriate item for hydraulic unit check.

NOTE: The ABS system will switch to the M.U.T.-II/III mode and the ABS warning lamp will illuminate.

NOTE: When the ABS has been interrupted by the fail-safe function, the M.U.T.-II/III actuator testing cannot be used.



7. Turn the wheel by hand and check the change in braking force when the brake pedal is depressed. When using the braking force tester, depress the brake pedal until the braking force is at the following values, and check that the braking force changes to the reading taken in step 2. The result should be as shown in the diagram above.

Front wheel	785 – 981 N
Rear wheel	588 – 784 N

8. If the result of inspection is abnormal, repair according to the Diagnosis Table below.

Diagnosis Table					
M.U.T.-II/III Display	Operation	Inspection result	Judgment	Probable cause	Remedy
01 FR VALVE 02 FL VALVE 03 RR VALVE 04 RL VALVE	- Depress brake pedal to lock wheel. - Using the M.U.T.-II/III, select the wheel to be checked and force the actuator to operate. - Turn the selected wheel manually to check the change of brake force.	Brake force is released for three seconds after wheels have been locked.	Normal	—	—
		Wheel does not lock when brake pedal is depressed.	Abnormal	Clogged brake line other than hydraulic unit	Check and clean brake line
				Clogged hydraulic circuit in hydraulic unit	Replace hydraulic unit assembly
		Brake force is not released		Incorrect hydraulic unit brake tube connection	Connect correctly
				Hydraulic unit solenoid valve not functioning correctly	Replace hydraulic unit assembly

9. After inspection, disconnect the M.U.T.-II/III immediately after turning the ignition switch to the "LOCK" (OFF) position.

IN THE EVENT OF A DISCHARGED BATTERY

M1352003500600

WARNING

If the ABS is not operating, the vehicle posture will be unstable during braking, Do not drive the vehicle with the ABS-ECU connector disconnected or with the ABS not operating for any other reason.

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

M1352008600549

NOTE: The ABS-ECU is integrated in the hydraulic unit.

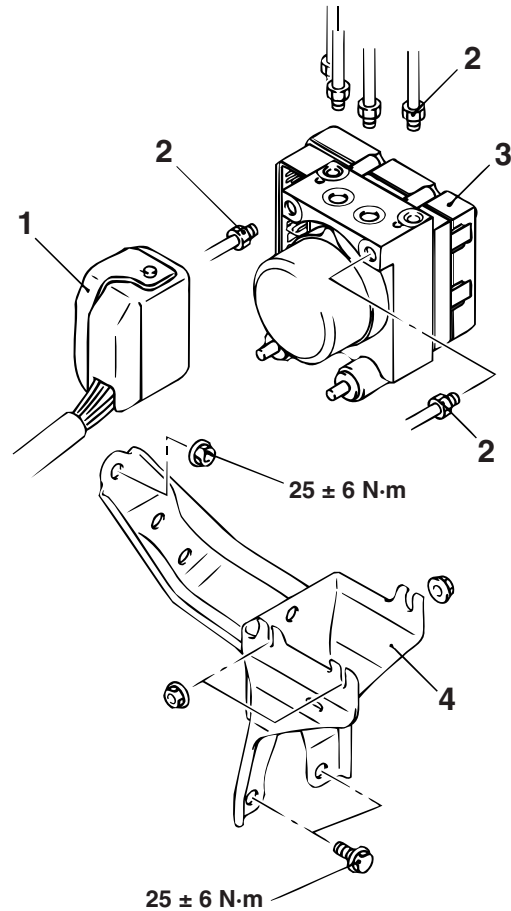
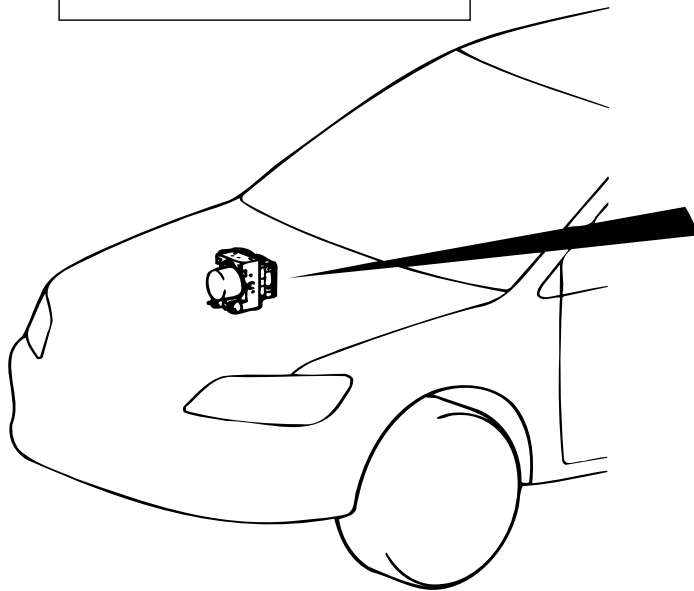
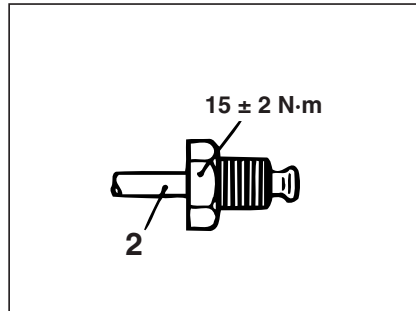
<LH DRIVE VEHICLES>

Pre-removal Operation

- Brake Fluid Draining

Post-installation Operation

- Brake Fluid Filling
- Brake Line Bleeding (Refer to P.35A-7).
- Hydraulic Unit Check (Refer to P.35B-140).



AC100173 AC

Removal steps

- <<A>> 1. ABS-ECU harness connector
>>A<< 2. Brake tube connection

<>

Removal steps (Continued)

3. Brake modulator hydraulic unit (hydraulic unit and ABS-ECU)
4. Brake hydraulic unit bracket

NOTE: The ABS-ECU is integrated in the hydraulic unit.

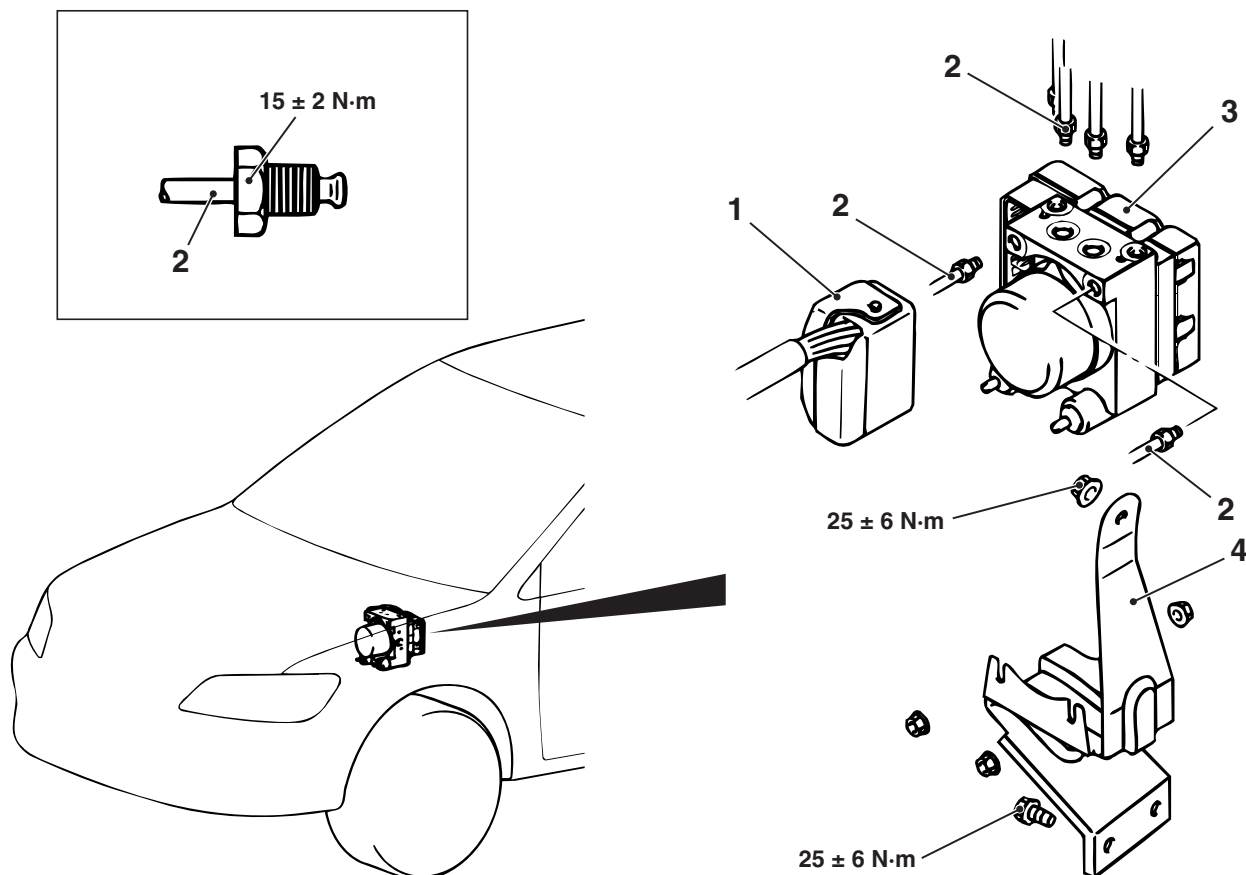
<RH DRIVE VEHICLES>

Pre-removal Operation

- Brake Fluid Draining
- Air Intake Hose and Air Cleaner Removal

Post-installation Operation

- Brake Fluid Filling
- Brake Line Bleeding (Refer to [P.35A-7](#)).
- Hydraulic Unit Check (Refer to [P.35B-140](#)).
- Air Intake Hose and Air Cleaner Installation



AC311045AB

Removal steps

- <<A>> 1. ABS-ECU harness connector
>>A<< 2. Brake tube connection

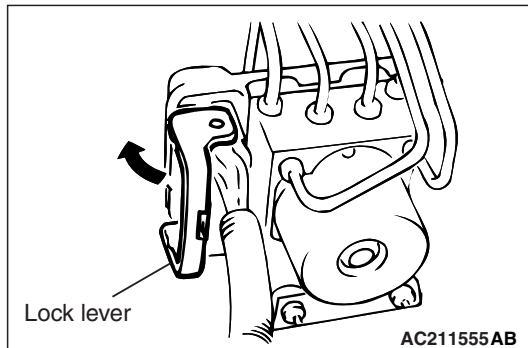
<>

Removal steps (Continued)

3. Brake modulator hydraulic unit (hydraulic unit and ABS-ECU)
4. Brake hydraulic unit bracket

REMOVAL SERVICE POINTS

<<A>> ABS-ECU HARNESS CONNECTOR DISCONNECTION



Move the lock lever of the ABS-ECU connector as shown in the illustration, and then disconnect the harness connector.

<> BRAKE MODULATOR HYDRAULIC UNIT (HYDRAULIC UNIT AND ABS-ECU) REMOVAL

WARNING

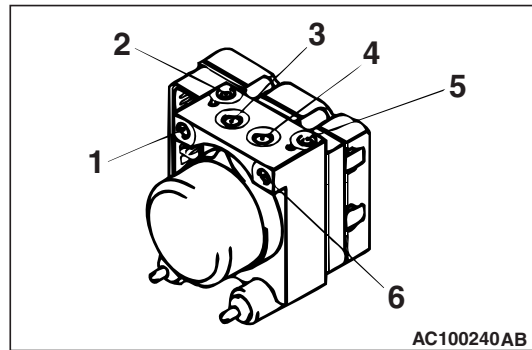
The hydraulic unit is heavy. Use care when removing it.

CAUTION

- The hydraulic unit cannot be disassembled. Never loosen its nuts or bolts.
- Do not drop or shock the hydraulic unit.
- Do not turn the hydraulic unit upside down or lay it on its side.

INSTALLATION SERVICE POINT

>>A<< BRAKE TUBE CONNECTION



Connect the tubes to the hydraulic unit assembly as shown in the illustration.

1. From the master cylinder (secondary)
2. To the front brake (LH)
3. To the rear brake (RH)
4. To the rear brake (LH)
5. To the front brake (RH)
6. From the master cylinder (primary)

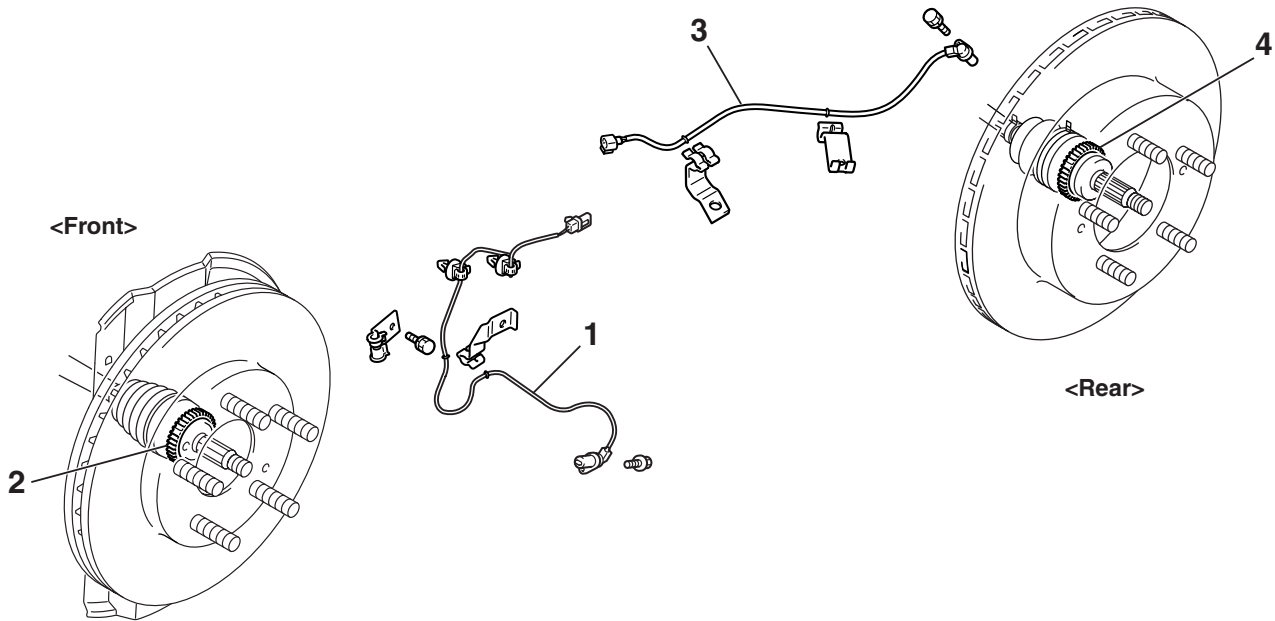
ABS SENSOR

REMOVAL AND INSTALLATION

M1352020700061

Post-installation Operation

- Wheel Speed Sensor Output Voltage Measurement (Refer to [P.35B-138](#)).



AC211696AB

<<A>>

**Front wheel speed sensor
removal steps**

1. Front wheel speed sensor
2. Front wheel speed rotor (Refer to GROUP 26, Drive Shaft Assembly [P.26-11](#)).

<<A>>

>>A<<

**Rear wheel speed sensor
removal steps**

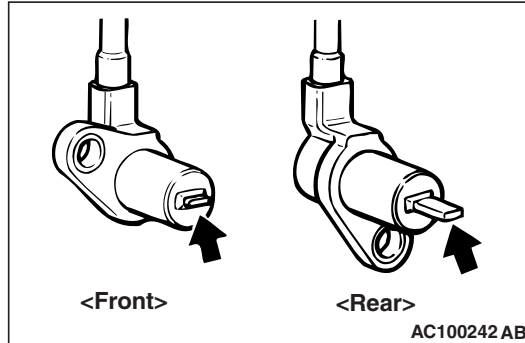
3. Rear wheel speed sensor
4. Rear wheel speed rotor (Refer to GROUP 27, Drive Shaft Assembly [P.27-36](#)).

NOTE: The wheel speed rotors are integrated with the drive shaft and cannot be disassembled.

REMOVAL SERVICE POINT

<<A>> FRONT WHEEL SPEED SENSOR/REAR WHEEL SPEED SENSOR REMOVAL

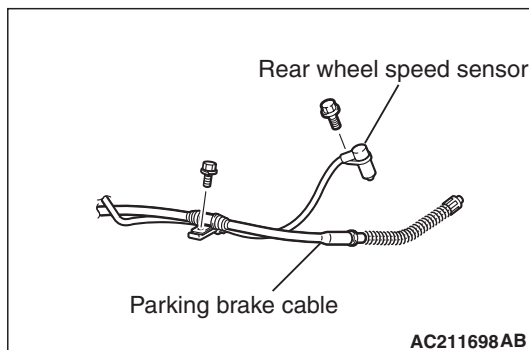
⚠ CAUTION



Be careful when handling the projection at the tip of the wheel speed sensor and the toothed edge of the wheel speed rotor so as not to damage them by contacting other parts.

INSTALLATION SERVICE POINT

>>A<< REAR WHEEL SPEED SENSOR INSTALLATION



Install the rear wheel speed sensor, crossing with the parking brake cable as shown.

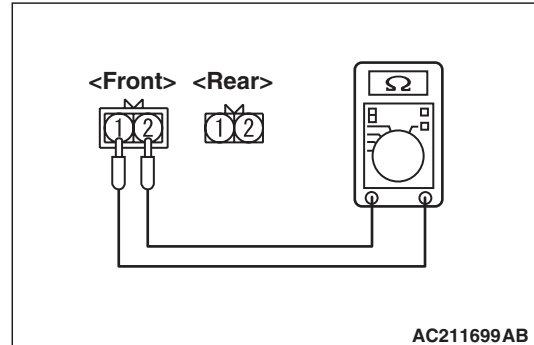
INSPECTION

M1352020800057

WHEEL SPEED SENSOR CHECK

1. Check whether any metallic foreign material has adhered to the projection at the wheel speed sensor tip. Remove any foreign material. Also check whether the pole piece is damaged. Replace it with a new one if it is damaged.

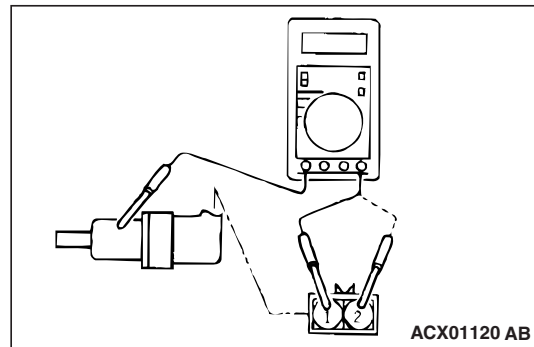
NOTE: The projection can become magnetized due to the magnet inside the wheel speed sensor, causing foreign material to easily adhere to it. The projection may not be able to correctly sense the wheel rotation speed if foreign matter is on it or if it is damaged.



2. Measure the resistance between the wheel speed sensor terminals.

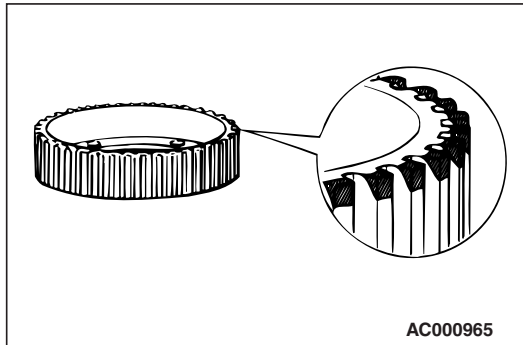
Standard value: 1.24 – 1.64 kΩ

3. If the internal resistance of the wheel speed sensor is not within the standard value, replace it with a new wheel speed sensor.



4. Remove all connections from the speed sensor. The circuit should be open between terminals (1) and (2) and the body of the wheel speed sensor. If the circuit is not open, replace with a new wheel speed sensor.
5. Check the wheel speed sensor cable for breakage, damage or disconnection. Replace with a new one if a problem is found.

NOTE: When checking for cable damage, remove the cable clamp part from the body and then gently bend and pull the cable near the clamp.

**TOOTHED WHEEL SPEED ROTOR
CHECK**

Check whether the wheel speed rotor teeth are broken or deformed. Replace the EBJ assembly of the driveshaft, respectively, if the teeth are damaged or deformed.

G-SENSOR**REMOVAL AND INSTALLATION**

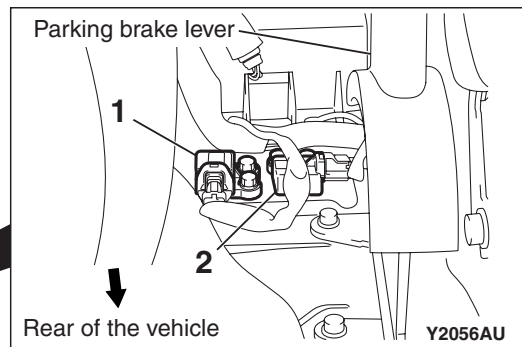
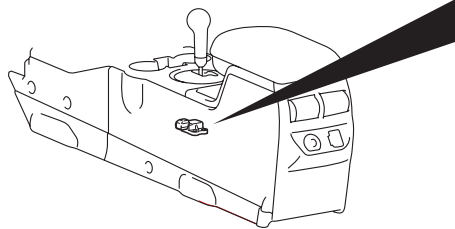
M1352010100369

⚠ CAUTION

Do not drop or apply a shock on the G-sensor.

Pre-removal and Post-installation Operation

- Rear Console Assembly Removal and Installation (Refer to GROUP 52A, Rear Floor Console Assembly [P.52A-8](#)).



- >>B<< 1. Lateral G-sensor
>>A<< 2. Longitudinal G-sensor

AC211700AB

INSTALLATION SERVICE POINTS

>>A<< LONGITUDINAL G-SENSOR INSTALLATION

The arrow mark on the G-sensor must point to front of the vehicle.

>>B<< LATERAL G-SENSOR INSTALLATION

The arrow mark on the G-sensor must point to the parking brake lever.

INSPECTION

LATERAL/LONGITUDINAL G-SENSOR CHECK

M1352018000098

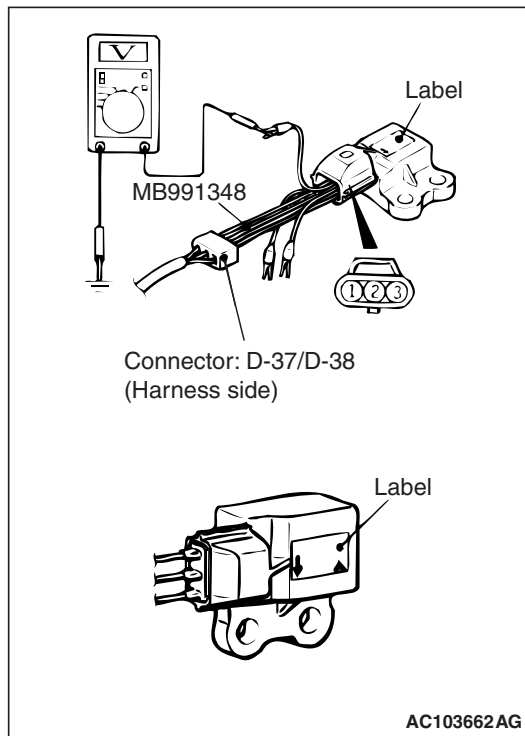
1. Disconnect the G-sensor connector and connect special tool test harness set (MB991348), between terminals of the disconnected connector.
2. With the ignition switch turned to the "ON" position, read the voltage between terminals number 2 and number 3.

Standard Value: 2.4 – 2.6 V

3. With special tool test harness set (MB991348) connected, rotate so that the arrow points straight down. Read output voltage between terminals number 2 and number 3.

Standard Value: 3.4 – 3.6 V

4. If the voltage deviates from the standard value, and nothing is wrong with the power supply wire and earth wire, replace the G-sensor.



STEERING WHEEL SENSOR

REMOVAL AND INSTALLATION

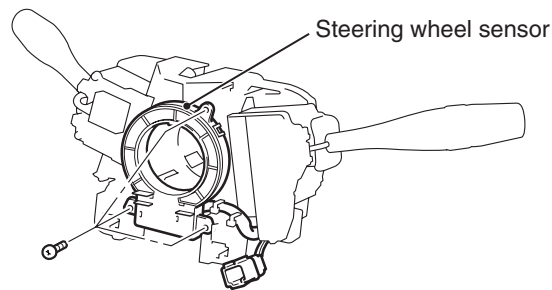
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CAUTION

- Before removing the steering wheel and air bag module assembly, be sure to refer to GROUP 52B, Service Precautions (P.52B-3) and Driver's, Front Passenger's Air Bag Module and Clock Spring (P.52B-110).
- Make sure no oil adheres to the steering wheel sensor because a photointerruptors are mounted on the steering wheel sensor.

Pre-removal and Post-installation Operation

- Steering Wheel Removal and Installation (Refer to GROUP 37, Steering Wheel P.37-13).
- Column Cover, Clock Spring and Column Switch Assembly Removal and Installation (Refer to GROUP 37, Steering Shaft P.37-15).



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