

## GROUP 35A


# BASIC BRAKE SYSTEMS

### GENERAL

#### OUTLINE OF CHANGES

- Service procedures have been established to correspond to change of the rear drum brake.

#### SPECIAL TOOL

Tool	Number	Name	Use
 8991008	MB991008(F)	Wheel cylinder piston cup installer	Installation of drum brake wheel cylinder piston cup

## REAR DRUM BRAKE

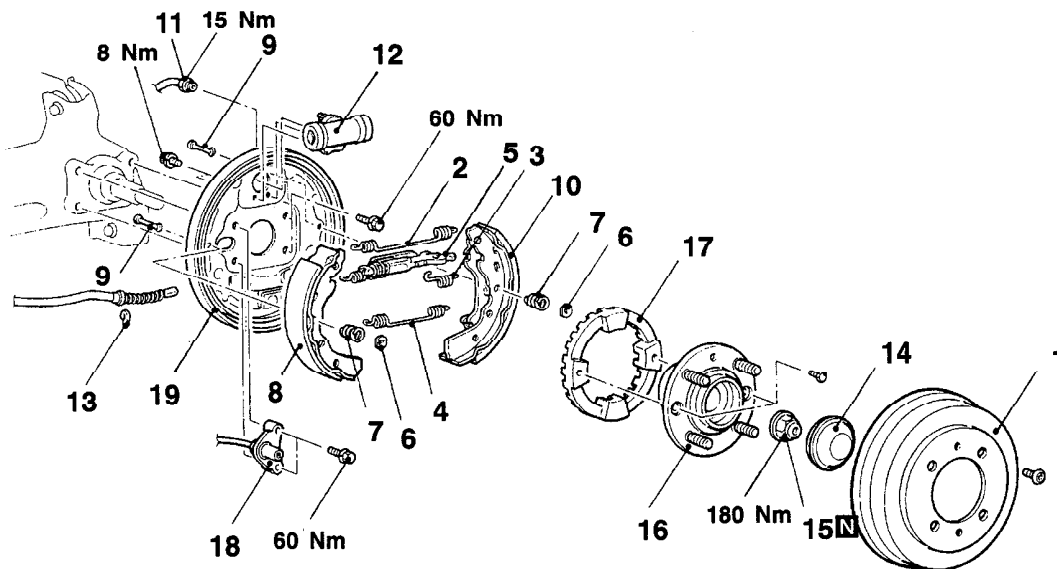
### REMOVAL AND INSTALLATION

#### Pre-removal Operation

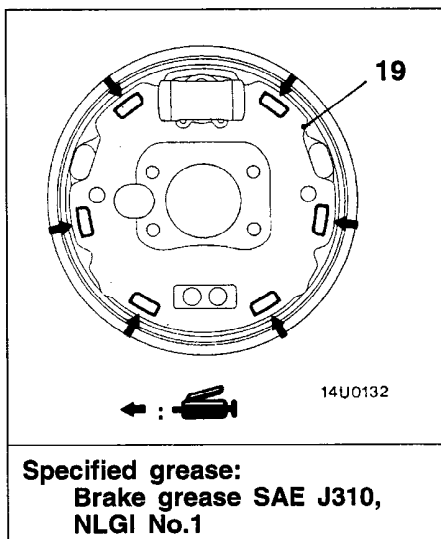
- Loosening the Parking Brake Cable Adjusting Nut.
- Brake Fluid Draining

#### Post-installation Operation

- Brake Line Bleeding
- Parking Brake Lever Stroke Adjustment



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#### Rear drum brake removal steps

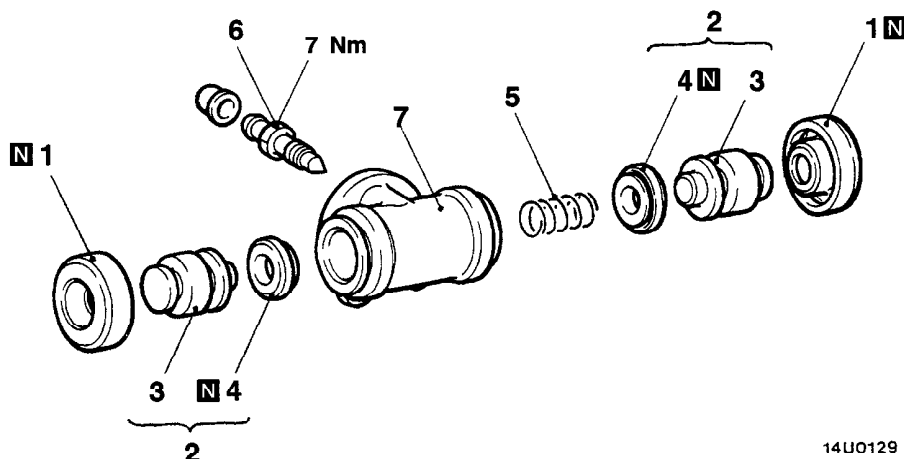
1. Brake drum
2. Return shoe spring
3. Strut retaining spring
4. Retaining shoe spring
5. Auto-adjuster assembly
6. Shoe hold-down cup
7. Shoe hold-down spring
8. Shoe and lining assembly
9. Shoe hold-down pin
10. Shoe, lining and lever assembly
11. Brake pipe connection
12. Wheel cylinder assembly

13. Snap ring
14. Hub cap
15. Flange nut
16. Rear hub assembly (Refer to GROUP 27 – Rear Axle Hub.)\*
17. Rotor <Vehicles with ABS>
18. Wheel speed sensor <Vehicles with ABS>
19. Backing plate

#### NOTE

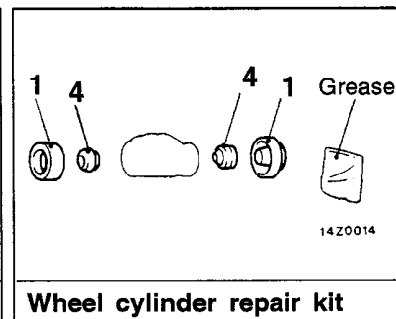
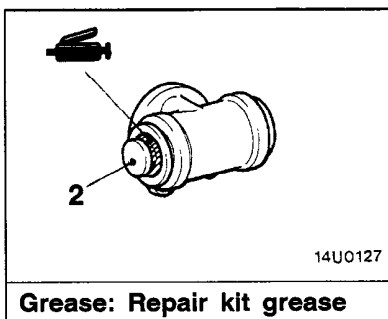
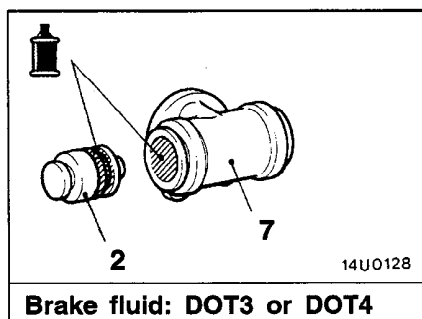
\*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

## WHEEL CYLINDER ASSEMBLY DISASSEMBLY AND REASSEMBLY



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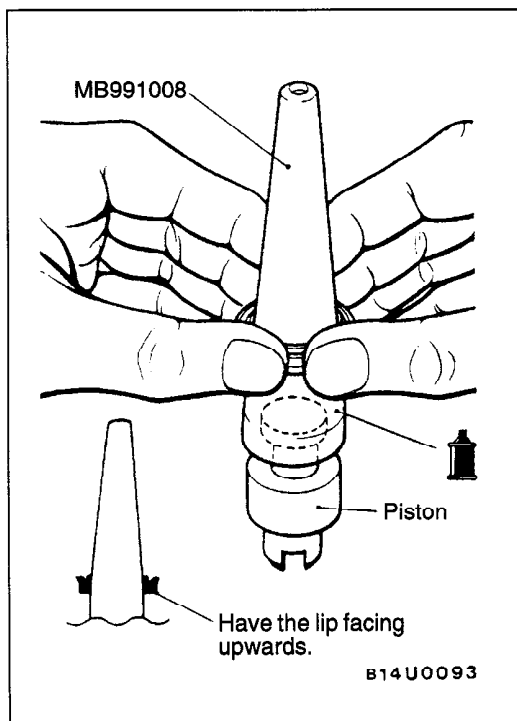
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### Disassembly steps

1. Boots
2. Piston assembly
3. Pistons
4. Piston cups

5. Spring
6. Bleeder
7. Wheel cylinder body



## REASSEMBLY SERVICE POINT

### ►A◄ PISTON CUP/PISTON REASSEMBLY

- (1) Use alcohol or specified brake fluid to clean the wheel cylinder and the piston.
- (2) Apply the specified brake fluid to the piston cups and the special tool.

#### Specified brake fluid: DOT3 or DOT4

- (3) Set the piston cup on the special tool with the lip of the cup facing up, fit the cup onto the special tool, and then slide it down the outside of the tool into the piston groove.

#### Caution

In order to keep the piston cup from becoming twisted or slanted, slide the piston cup down the tool slowly and carefully, without stopping.

## GROUP 35B

# ANTI-SKID BRAKING SYSTEM (ABS) <2WD>

## GENERAL

### OUTLINE OF CHANGES

- The hydraulic unit has been changed.
- ABS-ECU connectors have been changed. Correspond to this, troubleshooting and inspection procedure for the wheel speed sensor have been changed.

## TROUBLESHOOTING

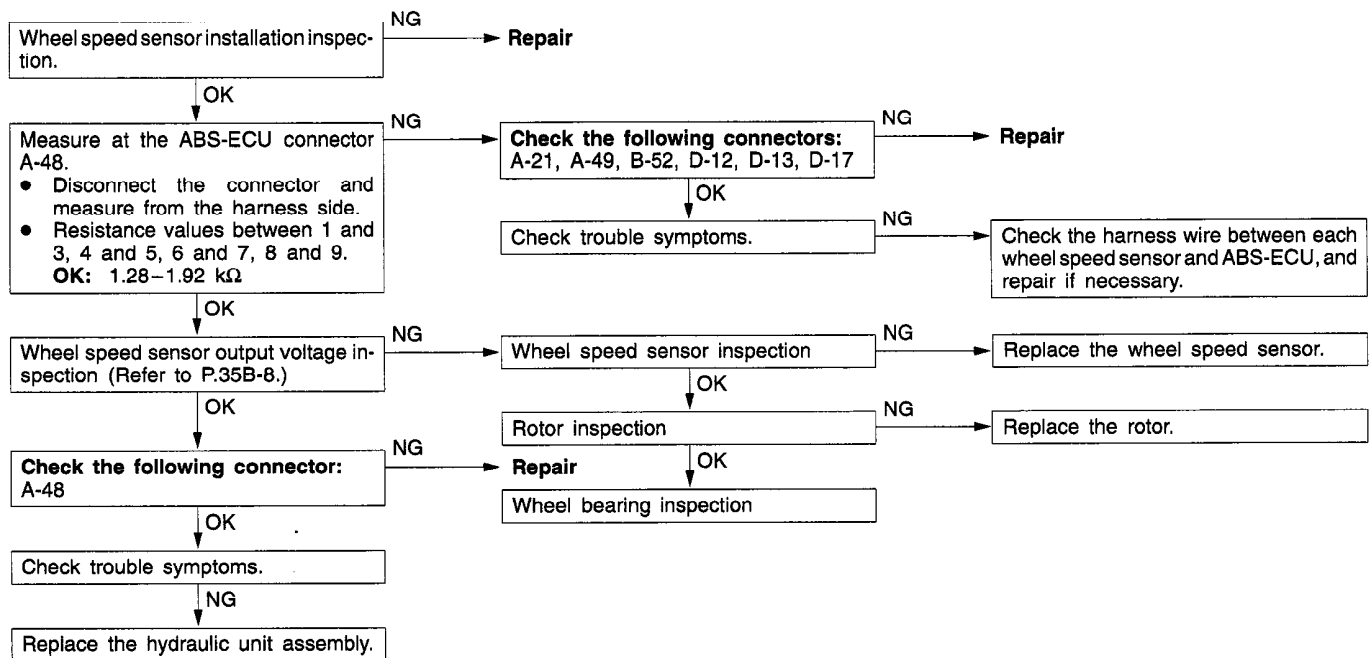
### INSPECTION CHART FOR DIAGNOSIS CODES

Inspect according to the inspection chart that is appropriate for the malfunction code.

Diagnosis code No.	Inspection item	Diagnosis content	Reference page
11	Front right wheel speed sensor	Open circuit	35B-2
12	Front left wheel speed sensor		
13	Rear right wheel speed sensor		
14	Rear left wheel speed sensor		
16	Power supply system		35B-2
21	Front right wheel speed sensor	Short circuit	35B-2
22	Front left wheel speed sensor		
23	Rear right wheel speed sensor		
24	Rear left wheel speed sensor		
38	Stop lamp switch system		35B-3
41	Front right inlet solenoid valve		35B-9 (Replace the hydraulic unit assembly)
42	Front left inlet solenoid valve		
43	Rear right inlet solenoid valve		
44	Rear left inlet solenoid valve		
45	Front right outlet solenoid valve		
46	Front left outlet solenoid valve		
47	Rear right outlet solenoid valve		
48	Rear left outlet solenoid valve		
51	Valve power supply		35B-3
53	Pump motor		35B-4
63	ABS-ECU		35B-9 (Replace the hydraulic unit assembly)

## INSPECTION PROCEDURE FOR DIAGNOSIS CODES

<b>Code Nos.11, 12, 13 and 14 Wheel speed sensor open circuit</b>	<b>Probable cause</b>
<b>Code Nos.21, 22, 23 and 24 Wheel speed sensor short circuit</b>	
Code Nos.11, 12, 13 and 14 are output if the ABS-ECU detects an open circuit in any one of the four wheel speed sensors.	<ul style="list-style-type: none"> <li>• Malfunction of wheel speed sensor</li> <li>• Malfunction of wiring harness or connector</li> <li>• Malfunction of ABS-ECU</li> </ul>
Code Nos.21, 22, 23 and 24 are output in the following cases. <ul style="list-style-type: none"> <li>• When there is no input from any one of the four wheel speed sensors when traveling at 12 km/h or more, even though open circuit verified.</li> <li>• When a chipped or blocked-up ABS rotor is detected during driving at 12 km/h or more.</li> </ul>	<ul style="list-style-type: none"> <li>• Malfunction of wheel speed sensor</li> <li>• Malfunction of wiring harness or connector</li> <li>• Malfunction of rotor</li> <li>• Malfunction of ABS-ECU</li> <li>• Malfunction of wheel bearing</li> </ul>

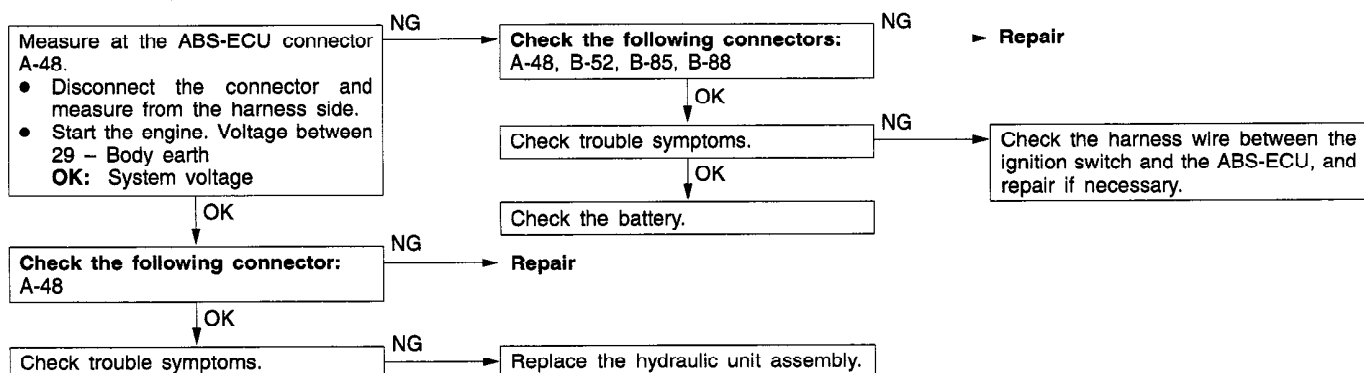


<b>Code No. 16 Power supply system</b>	<b>Probable cause</b>
The voltage of the ABS-ECU power supply drops lower or rises higher than the specified value. If the voltage returns to the specified value, this code is no longer output.	<ul style="list-style-type: none"> <li>• Malfunction of wiring harness or connector.</li> <li>• Malfunction of ABS-ECU</li> </ul>

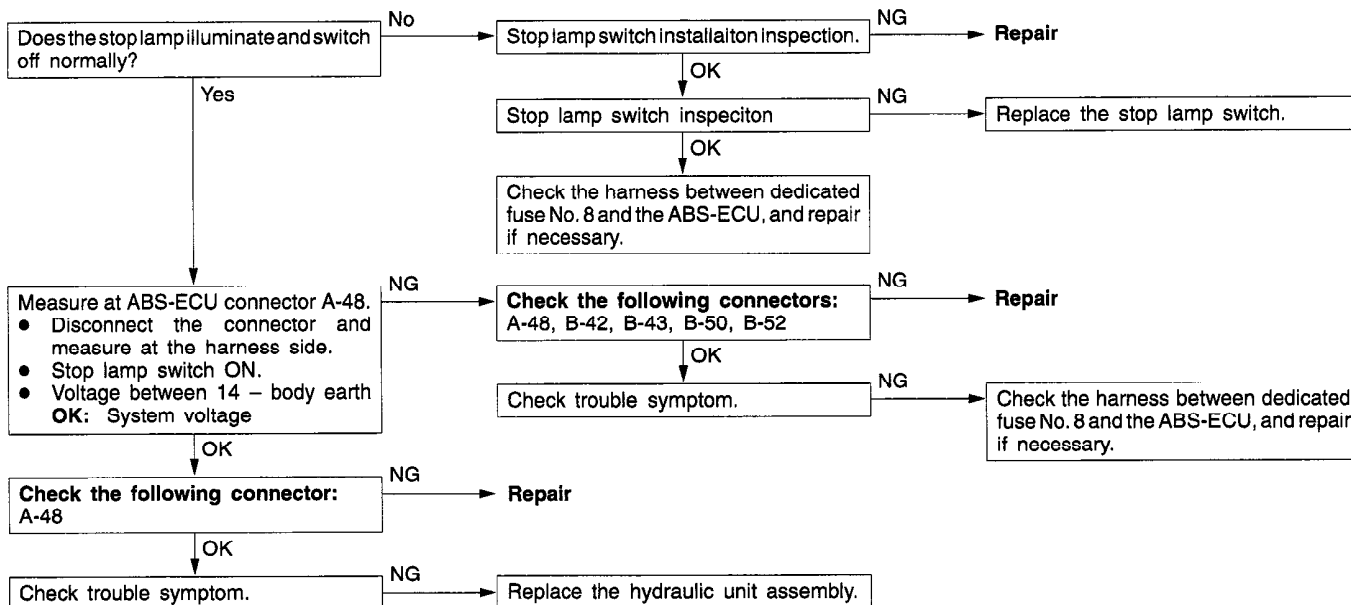
**Caution**

If battery voltage drops or rises during inspection, this code will be output as well. If the voltage returns to standard value, this code is no longer output.

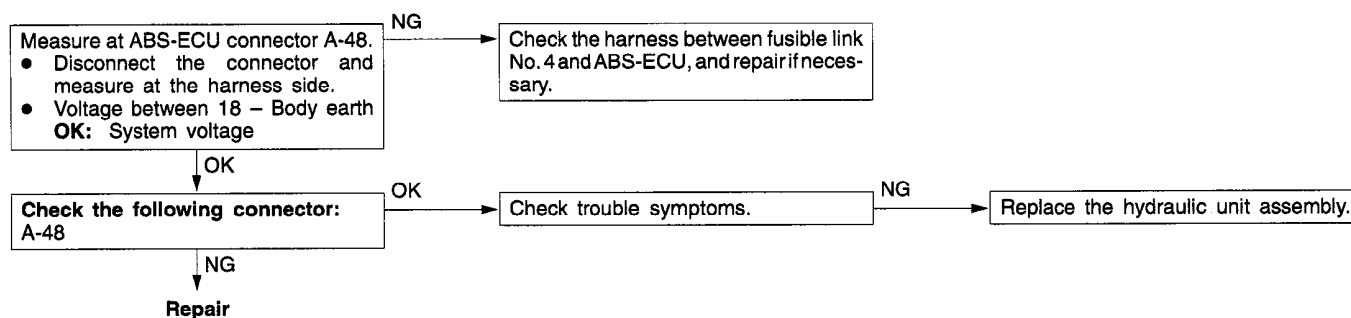
Before carrying out the following inspection, check the battery level, and refill it if necessary.



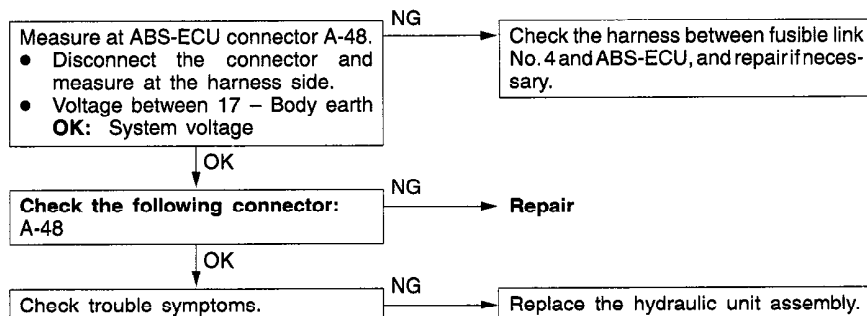
Code No. 38 Stop lamp switch system	Probable cause
<p>These codes are output at the following times:</p> <ul style="list-style-type: none"> <li>When the stop lamp switch is not be turned off (when the stop lamp switch stays on for 15 minutes or more although the ABS is not operating).</li> <li>When the ABS-ECU determines that there is an open circuit in harness of the stop lamp switch system.</li> </ul>	<ul style="list-style-type: none"> <li>Malfunction of stop lamp switch</li> <li>Malfunction of harness or connector</li> <li>Malfunction of ABS-ECU</li> </ul>



Code No. 51 Valve power supply	Probable cause
<p>This code is output when there is an abnormality in the solenoid valve power supply system.</p>	<ul style="list-style-type: none"> <li>Malfunction of wiring harness or connector</li> <li>Malfunction of ABS-ECU</li> </ul>



Code No. 53 Pump motor	Probable cause
This code is output when there is an abnormality in the pump motor system.	<ul style="list-style-type: none"> <li>• Malfunction of wiring harness or connector</li> <li>• Malfunction of hydraulic unit</li> <li>• Malfunction of ABS-ECU</li> </ul>



## INSPECTION CHART FOR TROUBLE SYMPTOMS

Get an understanding of the trouble symptoms and check according to the inspection procedure chart.

Trouble symptoms		Inspection procedure No.	Reference page
Communication with MUT-II is not possible.	Communication with all systems is not possible.	1	*
	Communication with ABS only is not possible.	2	35B-5
Faulty ABS operation	Unequal braking power on both sides	5	35B-6
	Insufficient braking power		
	ABS operates under normal braking conditions		
	ABS operates before vehicle stops under normal braking conditions		
	Large brake pedal vibration (Caution 2.)	–	–

### NOTE

\*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

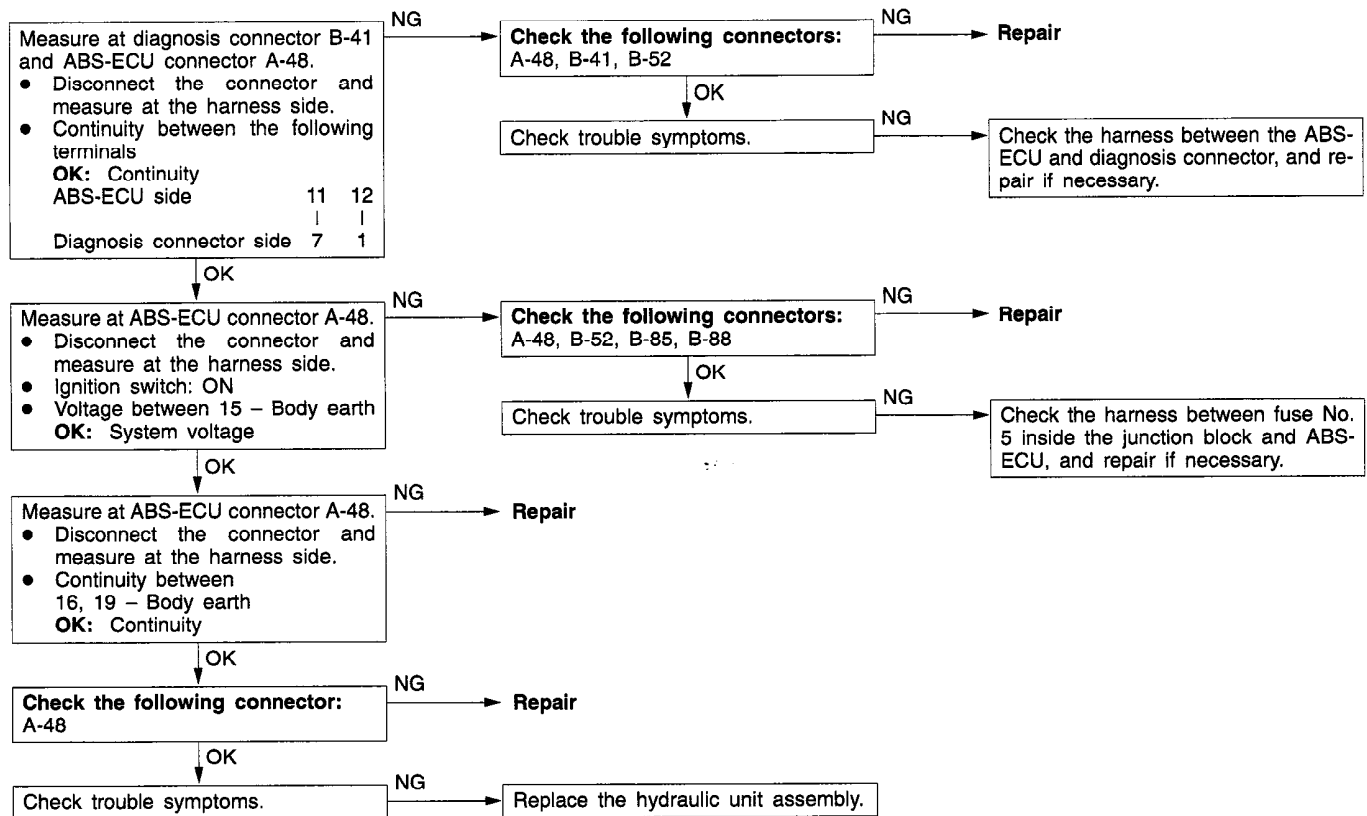
### Caution

1. 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 even though 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.
2. During ABS operation, the brake pedal may vibrate or may not be able to be depressed. Such phenomena are due to intermittent changes in hydraulic pressure inside the brake line to prevent the wheels from locking and is not an abnormality.

## INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

### Inspection Procedure 2

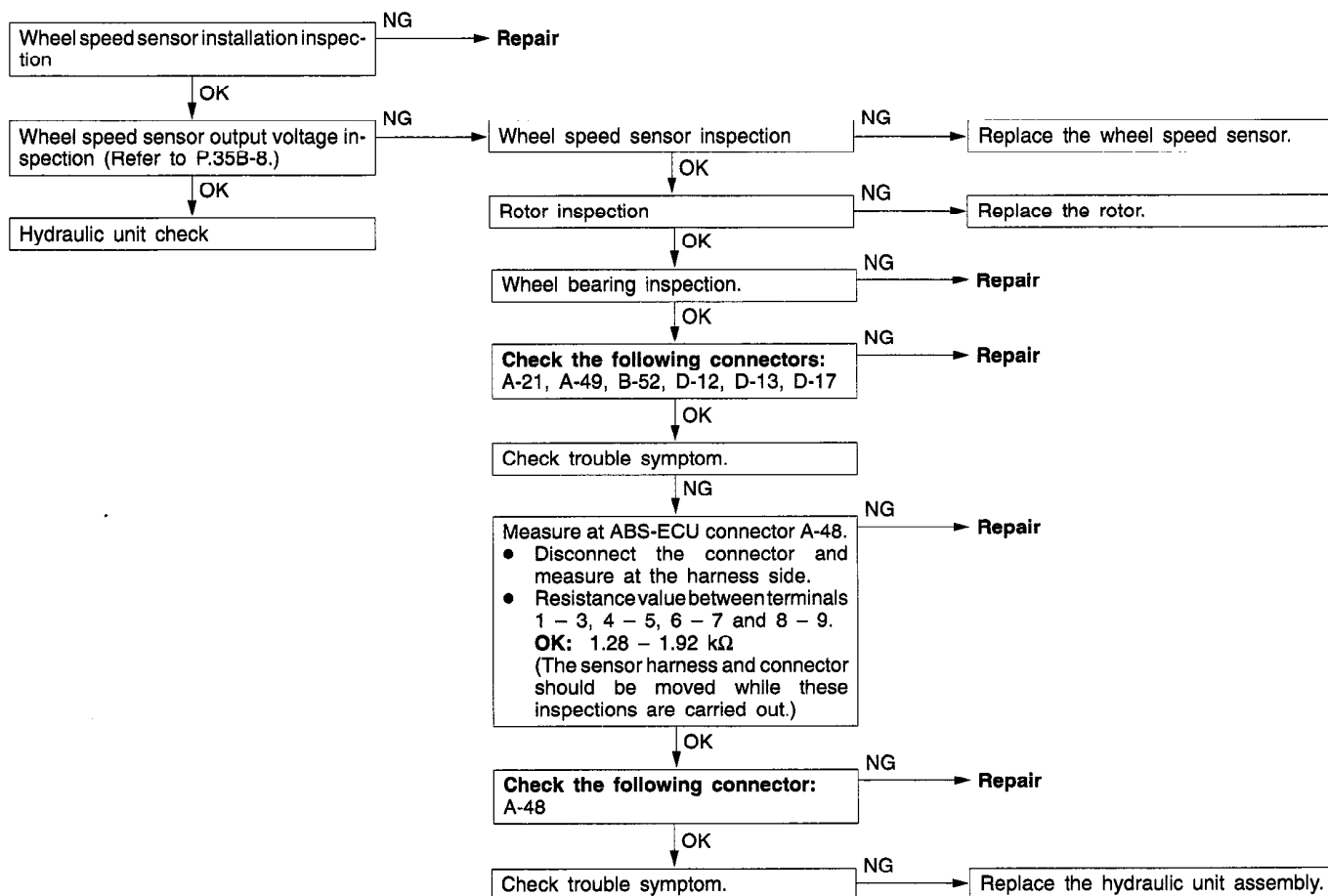
Communication with MUT-II is not possible. (Communication with ABS only is not possible.)	Probable cause
When communication with the MUT-II is not possible, the cause is probably an open circuit in the ABS-ECU power circuit or an open circuit in the diagnosis output circuit.	<ul style="list-style-type: none"> <li>Blown fuse</li> <li>Malfunction of wiring harness or connector</li> <li>Malfunction of ABS-ECU</li> </ul>





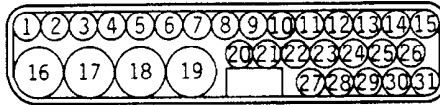
## Inspection Procedure 5

Brake operation is abnormal.	Probable cause
This varies depending on the driving conditions and the road surface conditions, so problem diagnosis is difficult. However, if a normal diagnosis code is displayed, carry out the following inspection.	<ul style="list-style-type: none"> <li>• Improper installation of wheel speed sensor</li> <li>• Incorrect sensor harness contact</li> <li>• Foreign material adhering to wheel speed sensor</li> <li>• Malfunction of wheel speed sensor</li> <li>• Malfunction of rotor</li> <li>• Malfunction of wheel bearing</li> <li>• Malfunction of hydraulic unit</li> <li>• Malfunction of ABS-ECU</li> </ul>



**CHECK AT ABS-ECU****TERMINAL VOLTAGE CHECK CHART**

1. Measure the voltages between terminals (16) and (19) (earth terminals) and each respective terminal.
2. The terminal layouts are shown in the illustrations below.

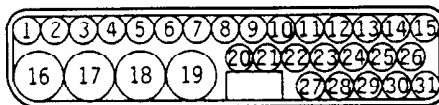


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Connector terminal No.	Signal	Checking requirements		Normal condition
11	MUT-II	Connect the MUT-II.		Serial communication with MUT-II
		Do not connect the MUT-II.		1 V or less
12	Input from diagnosis indication selection	Connect the MUT-II.		0 V
		Do not connect the MUT-II.		Approx. 12 V
14	Input from stop lamp switch	Ignition switch: ON	Stop lamp switch: ON	System voltage
			Stop lamp switch: OFF	1 V or less
15	ABS-ECU power supply	Ignition switch: ON		System voltage
		Ignition switch: START		0 V
17	Pump motor power supply	Always		System voltage
18	Solenoid valve power supply	Always		System voltage
21	Output to ABS warning lamp	Ignition switch: ON	The lamp is switched off.	System voltage
			The lamp is illuminated.	0 – 2 V

**RESISTANCE AND CONTINUITY BETWEEN HARNESS-SIDE CONNECTOR TERMINALS**

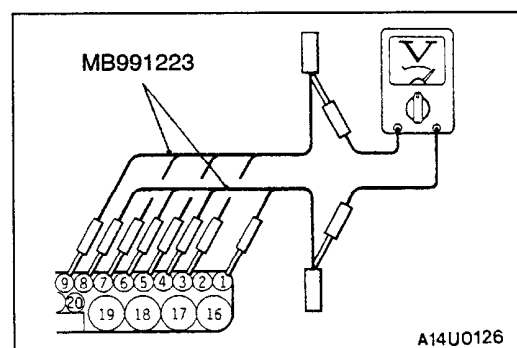
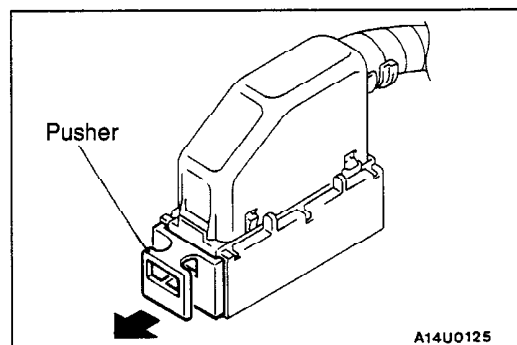
1. Turn the ignition switch off and disconnect the ABS-ECU connectors before checking resistance and continuity.
2. Check them between the terminals indicated in the table below.
3. The terminal layouts are shown in the illustrations below.



14U0122

Connector terminal No.	Signal	Normal condition
1 – 3	Rear-right wheel speed sensor (+ wire)	1.28 – 1.92 k $\Omega$
4 – 5	Front-right wheel speed sensor (+ wire)	1.28 – 1.92 k $\Omega$

Connector terminal No.	Signal	Normal condition
6 – 7	Front-left wheel speed sensor (+ wire)	1.28–1.92 k $\Omega$
8 – 9	Rear-left wheel speed sensor (+ wire)	1.28–1.92 k $\Omega$
16 – Body earth	ABS-ECU earth	Continuity
19 – Body earth		



## ON-VEHICLE SERVICE

### WHEEL SPEED SENSOR OUTPUT VOLTAGE CHECK

1. Lift up the vehicle and release the parking brake.
2. Pull the pusher in the direction indicated by the arrow and disconnect the connector.
3. Use the special tool (inspection harness for connector pin contact pressure) to measure the output voltage at the harness-side connector.
4. Rotate the wheel to be measured at approximately 1/2–1 rotation per second, and check the output voltage using a circuit tester or an oscilloscope.

Wheel speed sensor	Front left	Front right	Rear left	Rear right
Terminal No.	6 7	4 5	8 9	1 3

### Output voltage

**When measuring with a circuit tester:**  
50 mV or more

**When measuring with an oscilloscope:**  
120 mV p-p or more

5. If the output voltage is lower than the above values, the reason could be as follow:
  - Faulty wheel speed sensor.
 So replace the wheel speed sensor.

## HYDRAULIC UNIT

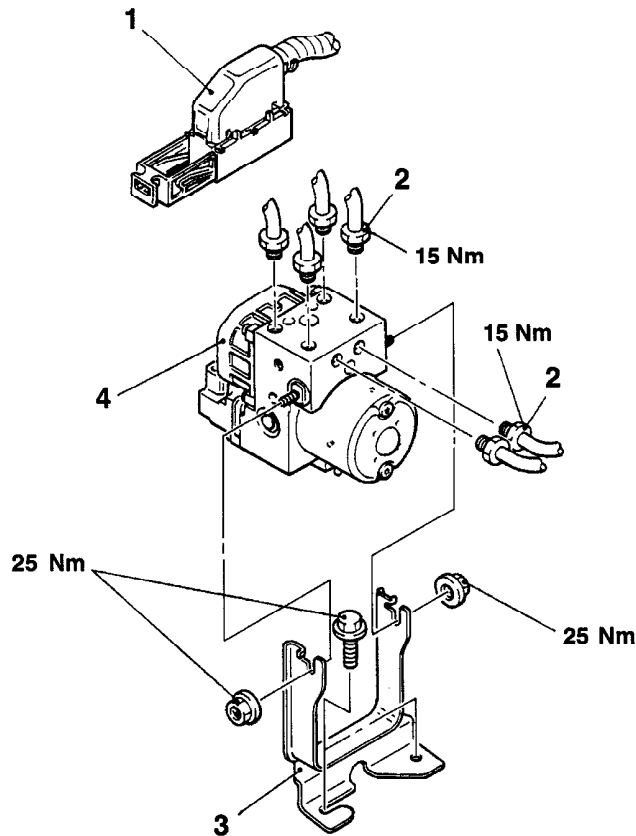
### REMOVAL AND INSTALLATION

**Pre-removal Operation**

- Brake Fluid Draining
- A/C Relay Box Removal

**Post-installation Operation**

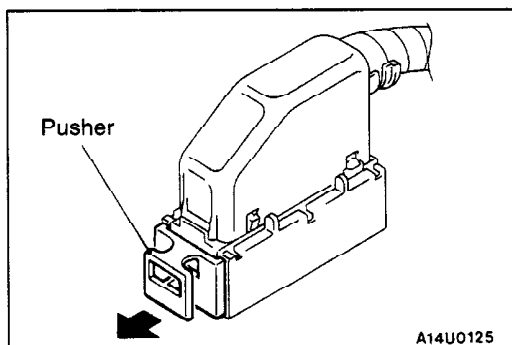
- A/C Relay Box Installation
- Brake Fluid Supplying
- Brake Line Bleeding
- Brake Pedal Adjustment



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**Removal steps**

- ◀A▶ ▶A▶
- ◀B▶
1. ABS-ECU connector
  2. Brake pipe connection
  3. Hydraulic unit bracket
  4. Hydraulic unit assembly



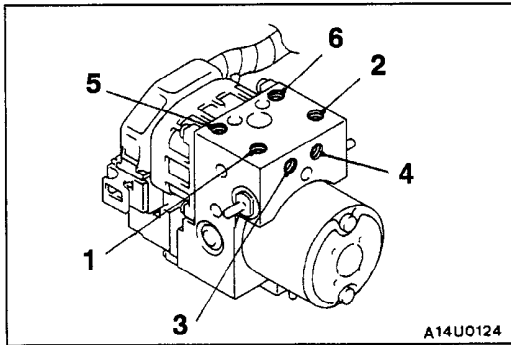
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**REMOVAL SERVICE POINTS****◀A▶ ABS-ECU CONNECTOR REMOVAL**

Pull the pusher in the direction indicated by the arrow, and then disconnect the connector.

**◀B▶ HYDRAULIC UNIT ASSEMBLY REMOVAL****Caution**

1. The hydraulic unit assembly is heavy, and so care should be taken when removing it.
2. The hydraulic unit assembly is not to be disassembled; its nuts and bolts should absolutely not be loosened.
3. The hydraulic unit assembly must not be dropped or otherwise subjected to impact shocks.
4. The hydraulic unit assembly must not be turned upside down or laid on its side.

**INSTALLATION SERVICE POINT****▶A◀ BRAKE PIPE CONNECTION**

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

1. From the master cylinder (Primary)
2. From the master cylinder (Secondary)
3. To the proportioning valve (RH)
4. To the proportioning valve (LH)
5. To the front brake (LH)
6. To the front brake (RH)