
SERVICE BRAKES

CONTENTS

BASIC BRAKE SYSTEM	35A
ANTI-SKID BRAKING SYSTEM (ABS)	35B

BASIC BRAKE SYSTEM

CONTENTS

GENERAL	3	Proportioning Valve Function Test	
Outline of Changes	3	<Vehicles without ABS>	4
SERVICE SPECIFICATIONS	3	Brake Disc Run-out (Front) Check	4
ON-VEHICLE SERVICE	4	BRAKE PEDAL	5

GENERAL

OUTLINE OF CHANGES

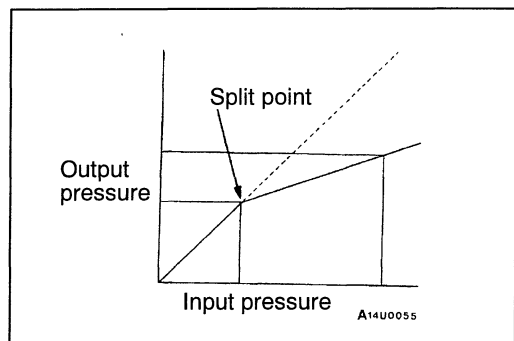
- The limit value for the front brake disc run-out has been changed.
- The proportioning valve has been discontinued since the Electronic-controlled Braking force Distribution (EBD) system, which realizes a ideal braking force, has been introduced. <Vehicles with ABS>
- On vehicles without ABS, the specifications of the proportioning valve have been changed.
- “NOTE” has been added into the brake pedal service procedure.

SERVICE SPECIFICATIONS

Items			Standard value	Limit
Proportioning valve <Vehicles without ABS>	Split point MPa	Hatchback	2.94	–
		Sedan	2.45	–
	Output fluid pressure (Input fluid pressure) MPa	Hatchback	4.66 ± 0.4 (9.81)	–
		Sedan	4.30 ± 0.4 (9.81)	–
	Output fluid pressure difference between left and right MPa		–	0.4
Front disc brake	Pad thickness mm		12.0	2.0
	Disc thickness mm		24.0	22.4
	Disc runout mm		–	0.03 or less
	Drag force (tangential force of wheel mounting bolts) N		40 or less	–

ON-VEHICLE SERVICE

The service specifications have been changed as follows.
The service procedure is the same as before.



PROPORTIONING VALVE FUNCTION TEST <Vehicles without ABS>

The service specifications have been changed as follows:

1. Input pressure (Split point)

Standard value:

<Hatchback> 2.94 MPa

<Sedan> 2.45 MPa

2. Output pressure when input pressure is 9.81 MPa

Standard value:

<Hatchback> 4.66 ± 0.4 MPa

<Sedan> 4.30 ± 0.4 MPa

BRAKE DISC RUN-OUT (FRONT) CHECK

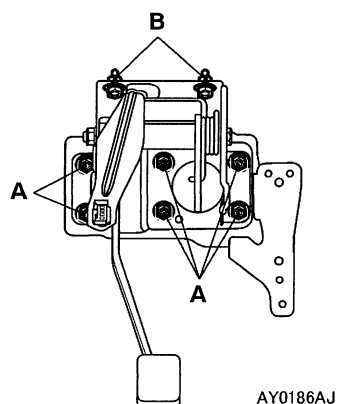
The limit value for the front brake disc run-out has been changed.

Limit: 0.03 mm or less

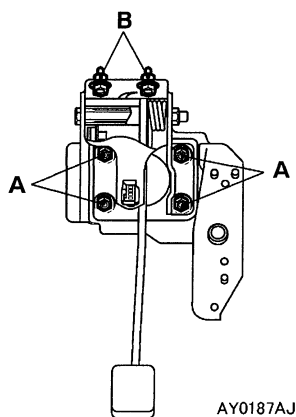
BRAKE PEDAL

Only the following service point has been changed. The other description is the same as before.

<L.H. drive vehicles>



<R.H. drive vehicles>



INSTALLATION SERVICE POINT

►A◄ BRAKE PEDAL ASSEMBLY INSTALLATION

Tighten the brake booster mounting nuts (A), and then the brake pedal mounting bolts (B).

NOTE

The pedal support member can not be positioned correctly if the pedal mounting bolts (B) are tightened first as the their holes are oblong holes.

NOTES

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

CONTENTS

GENERAL	2	ON-VEHICLE SERVICE	6
Outline of change	2	Wheel Speed Sensor Output Voltage	
TROUBLESHOOTING	2	Check	6

GENERAL

OUTLINE OF CHANGE

Electronic-controlled Braking force Distribution (EBD) system, which ensures maximum braking force regardless of luggage load condition, has been adopted. Due to this adoption, the ABS-ECU terminal layout and the ABS circuit have been changed.

EBD CONTROL

The vehicle with ABS can electronically control brake fluid pressure to rear brakes during applying braking force corresponding to deceleration and slip at the front/rear wheels calculated by wheel speed sensor signals using rear wheel solenoid valves. EBD control allows braking force of the vehicle to be compatible with stability at a high level characterized by the following features:

- Since ideal braking force to rear wheels can be obtained regardless of laden conditions of the vehicle or road surface, applied force to the braking pedal on a high-friction coefficient road can be reduced especially when the vehicle is laden.
- Due to a reduction of the load on the front brakes, temperature increase in the pads during applying braking force can be suppressed. Thus, tolerance for wear is improved.
- Control valves, such as proportioning valves are unnecessary.

TROUBLESHOOTING

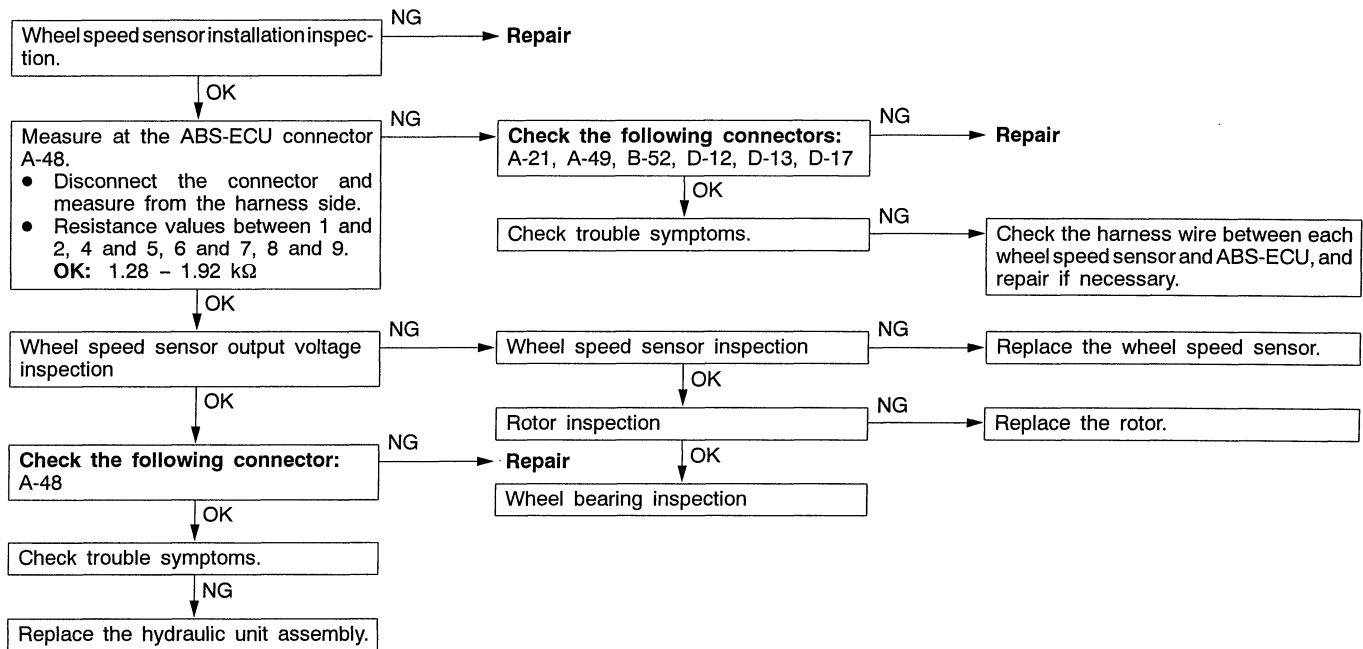
The procedures other than stated here are the same as before.

INSPECTION CHART FOR DIAGNOSIS CODES

Diagnosis code No.	Inspection item	Diagnosis content	Reference page
11	Front right wheel speed sensor	Open circuit	35B-3
12	Front left wheel speed sensor		
13	Rear right wheel speed sensor		
14	Rear left wheel speed sensor		
21	Front right wheel speed sensor	Short circuit	35B-3
22	Front left wheel speed sensor		
23	Rear right wheel speed sensor		
24	Rear left wheel speed sensor		

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code Nos.11, 12, 13 and 14 Wheel speed sensor open circuit	Probable cause
Code Nos.21, 22, 23 and 24 Wheel speed sensor short circuit	
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"> • Malfunction of wheel speed sensor • Malfunction of wiring harness or connector • Malfunction of ABS-ECU
Code Nos.21, 22, 23 and 24 are output in the following cases. <ul style="list-style-type: none"> • 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. • When a chipped or blocked-up ABS rotor is detected during driving at 12 km/h or more. 	<ul style="list-style-type: none"> • Malfunction of wheel speed sensor • Malfunction of wiring harness or connector • Malfunction of rotor • Malfunction of ABS-ECU • Malfunction of wheel bearing



INSPECTION CHART FOR TROUBLE SYMPTOMS

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

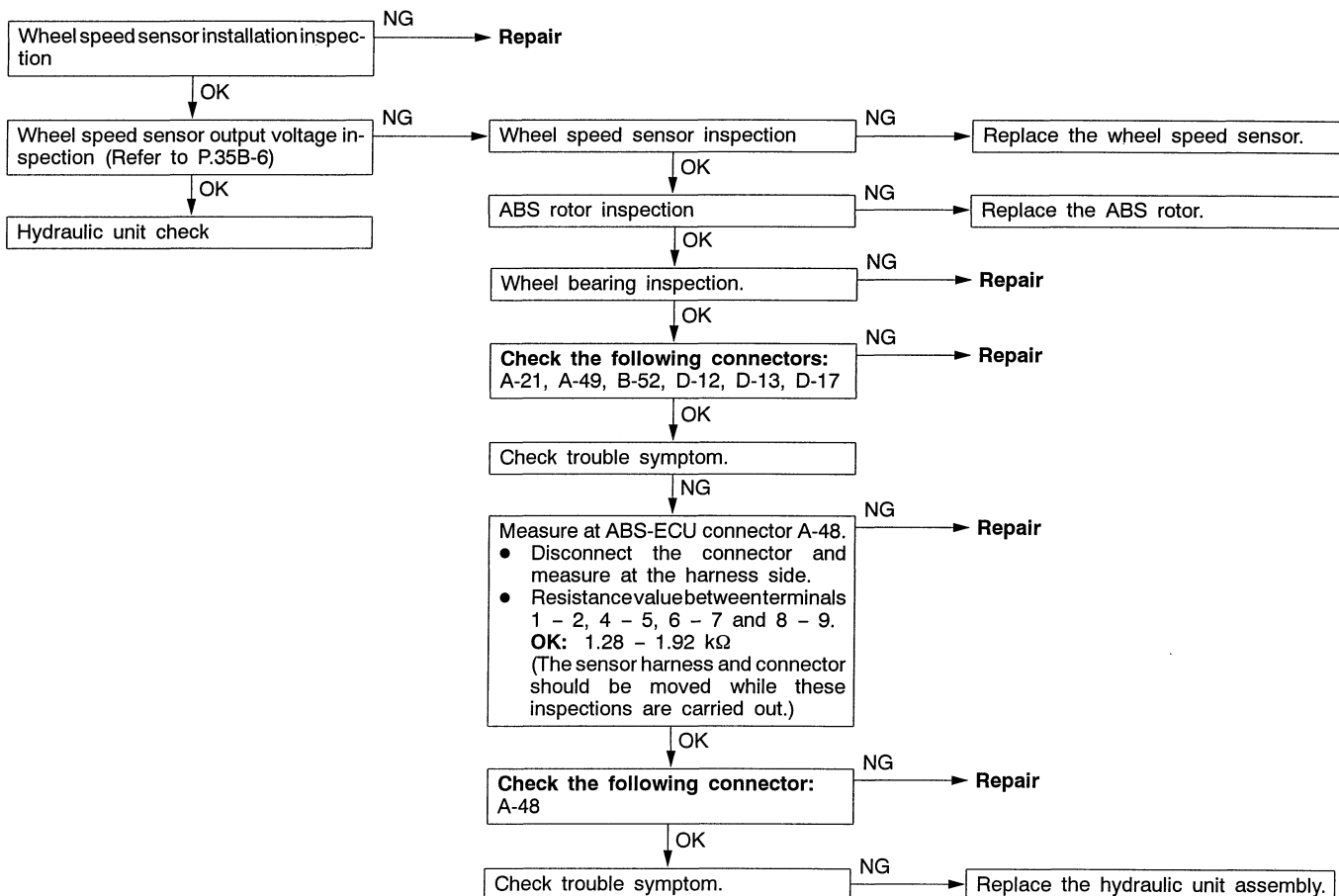
Trouble symptoms		Inspection procedure No.	Reference page
Faulty ABS operation	Unequal braking power on both sides	5	35B-4
	Insufficient braking power		
	ABS operates under normal braking conditions		
	ABS operates before vehicle stops under normal braking conditions		
	Large brake pedal vibration (Caution 2.)	-	-

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 5**

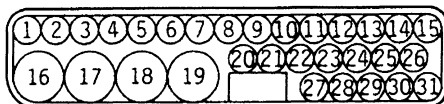
Brake operation is abnormal.	Probable cause
This varies depending on the driving conditions and the road surface conditions, so problem diagnosis is difficult. However, if a normal diagnosis code is displayed, carry out the following inspection.	<ul style="list-style-type: none"> • Improper installation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



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.

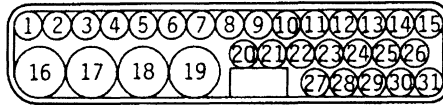


14U0122

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
20	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 – 2	Rear-right wheel speed sensor (+ wire)	1.28 – 1.92 kΩ
4 – 5	Front-right wheel speed sensor (+ wire)	1.28 – 1.92 kΩ
6 – 7	Front-left wheel speed sensor (+ wire)	1.28 – 1.92 kΩ
8 – 9	Rear-left wheel speed sensor (+ wire)	1.28 – 1.92 kΩ
16 – Body earth	ABS-ECU earth	Continuity
19 – Body earth		

ON-VEHICLE SERVICE**WHEEL SPEED SENSOR OUTPUT VOLTAGE CHECK**

The terminal numbers, which voltage is measured at, have been changed. The measurement procedures are the same as before.

Wheel speed sensor	Front left	Front right	Rear left	Rear right
Terminal No.	6	4	8	1
	7	5	9	2