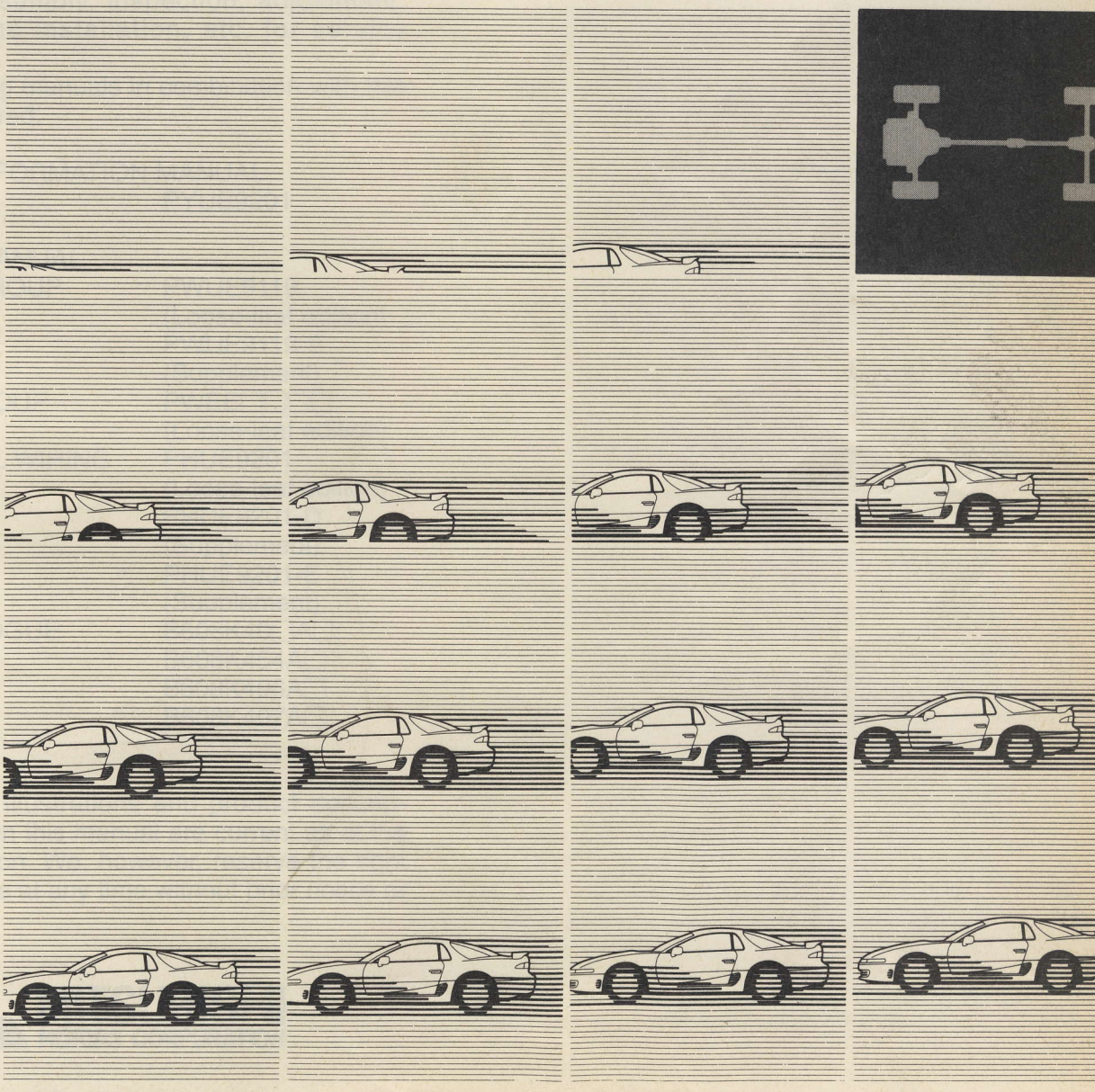
MITSUBISHI MOTORS

Workshop Manual

chassis

SUPPLEMENT

3000GT '97



Pub. No. PWUE9119-F

MITSUBISHI 3000GT

WORKSHOP MANUAL SUPPLEMENT

FOREWORD

This Workshop Manual contains procedures for removal, disassembly, inspection, adjustment, reassembly and installation, etc. for service mechanics.
Use the following manuals in combination with this manual as required.

TECHNICAL INFORMATION MANUAL	PYUE9201
WORKSHOP MANUAL	
CHASSIS GROUP	PWUE9119 (Loose-leaf edition) PWUE9119-E (Supplement)
ENGINE GROUP	PWEE□□□□ (Loose-leaf edition)
ELECTRICAL WIRING	PHUE9201 (Loose-leaf edition) PHUE9201-D (Supplement) PHUE9201-E (Supplement)
PARTS CATALOGUE	B608K40□A□ B608K454A□ B608K406A□ B608K407A□

All information, illustrations and product descriptions contained in this manual are current as at the time of publication. We, however, reserve the right to make changes at any time without prior notice or obligation.

MITSUBISHI MOTORS CORPORATION

WARNINGS REGARDING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) 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 (from rendering the SRS inoperative).

(2) If it is possible that the SRS components are subjected to heat over 93°C (200°F) in baking or in drying after painting, remove the SRS components (air bag module, SRS-ECU) beforehand.

(3) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

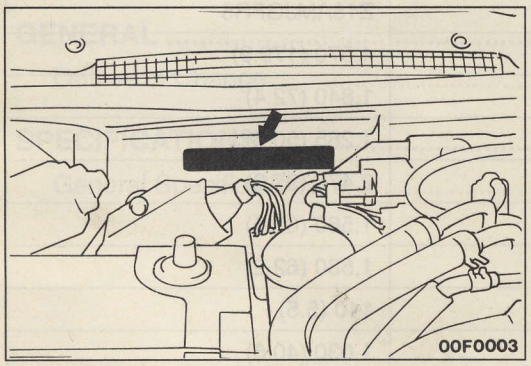
(4) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

GROUP 00
GENERAL

VEHICLE IDENTIFICATION

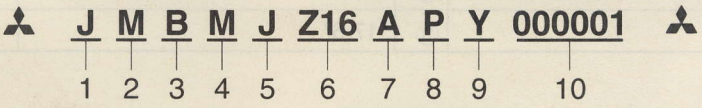
MODELS

Model code	Engine model	Transmission model	Fuel supply system
Z16AMJGFL6	6G72 (2,972 m ℓ)	W6MG1	MPI
Z16AMJGFR6			



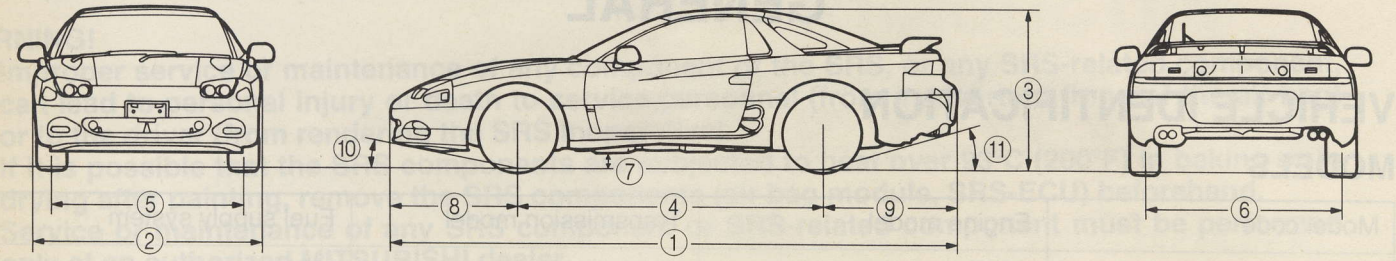
CHASSIS NUMBER

The chassis number is stamped on the toeboard inside the engine compartment.



1. Asia
2. Japan
3. MITSUBISHI
   - A – For Europe, right hand drive
   - B – For Europe, left hand drive
4. Body style
   - M – 2-door hatchback
5. Transmission type
   - N – 5-speed manual transmission
   - J – 6-speed manual transmission
6. Development order
   - Z16 – 2,972 m ℓ (Full time 4WD)
7. Sort
   - A – Passenger car
8. Model year
   - P – 1993
   - R – 1994
   - S – 1995
   - T – 1996
   - V – 1997
9. Plant
   - Y – Ohe Motor Vehicle Works
10. Serial number

MAJOR SPECIFICATIONS



00F0064

Dimensions

Items		Z16AMJGFL6	Z16AMJGFR6
Overall length mm (in.)	①	4,570 (179.9)	4,570 (179.9)
Overall width mm (in.)	②	1,840 (72.4)	1,840 (72.4)
Overall height (unladen) mm (in.)	③	1,285 (50.6)	1,285 (50.6)
Wheelbase mm (in.)	④	2,470 (97.2)	2,470 (97.2)
Track-front mm (in.)	⑤	1,560 (61.4)	1,560 (61.4)
Track-rear mm (in.)	⑥	1,580 (62.2)	1,580 (62.2)
Ground clearance (unladen) mm (in.)	⑦	140 (5.5)	140 (5.5)
Overhang-front mm (in.)	⑧	1,030 (40.6)	1,030 (40.6)
Overhang-rear mm (in.)	⑨	1,070 (42.1)	1,070 (42.1)
Angle of approach degrees	⑩	11.0°	11.0°
Angle of departure degrees	⑪	17.6°	17.6°

Weight

Items		Z16AMJGFL6	Z16AMJGFR6
Kerb weight kg (lbs.)		1,730 (3,858)	1,730 (3,858)
Gross vehicle weight kg (lbs.)		2,120 (4,674)	2,120 (4,674)
Max. axle weight kg (lbs.)	front	1,150 (2,535)	1,150 (2,535)
	rear	1,020 (2,249)	1,020 (2,249)

Seating capacity

Items	Z16AMJGFL6	Z16AMJGFR6
Seating capacity	4	4

Engine

Items	Z16AMJGFL6	Z16AMJGFR6
Model	6G72	6G72
Total displacement m ℓ	2,972	2,972

Transmission

Items	Z16AMJGFL6	Z16AMJGFR6
Model	W6MG1	W6MG1
Type	6-speed manual	6-speed manual

FUEL

CONTENTS

GENERAL

OUTLINE OF CHANGE

The maintenance service points below have been established to correspond to the separation of the engine control relay and fuel pump control relay which were previously integrated.

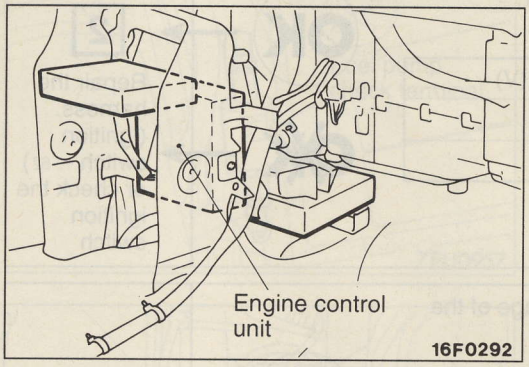
SPECIFICATIONS

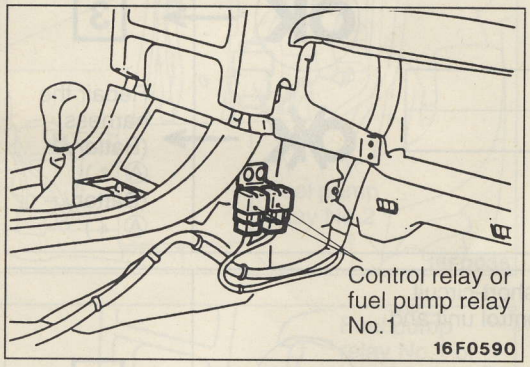
GENERAL SPECIFICATIONS

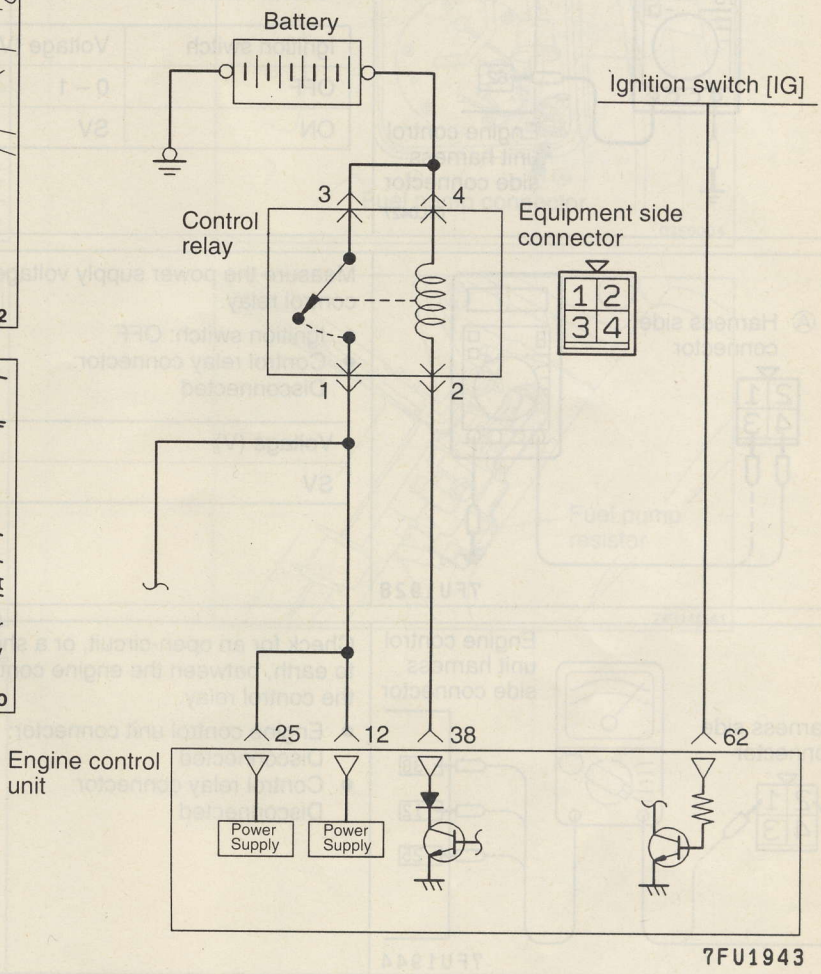
Items			Specifications
Engine control unit	Identification model No.	Vehicles without immobilizer system	E2T61379 <L.H. drive vehicles>
			E2T61380 <R.H. drive vehicles>
		Vehicles with immobilizer system	E2T61383 <L.H. drive vehicles>
			E2T61384 <R.H. drive vehicles>

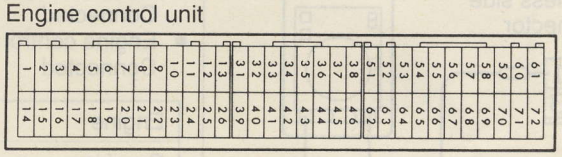
ON-VEHICLE INSPECTION OF MPI COMPONENTS

POWER SUPPLY AND IGNITION SWITCH-IG



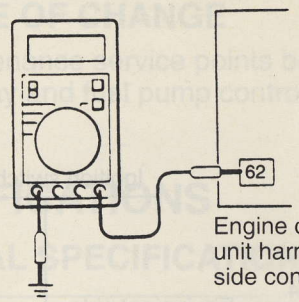






HARNESS INSPECTION

1

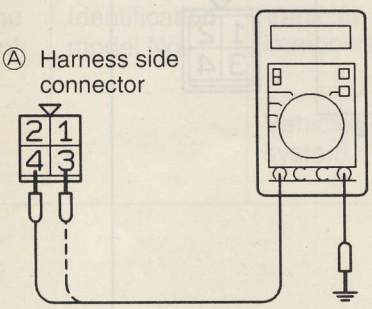


Measure the ignition switch (IG) terminal input voltage.
- Engine control unit connector: Disconnected

Ignition switch	Voltage (V)
OFF	0 – 1
ON	SV

OK → 2
Repair the harness. (Ignition switch – 62) or check the ignition switch

2

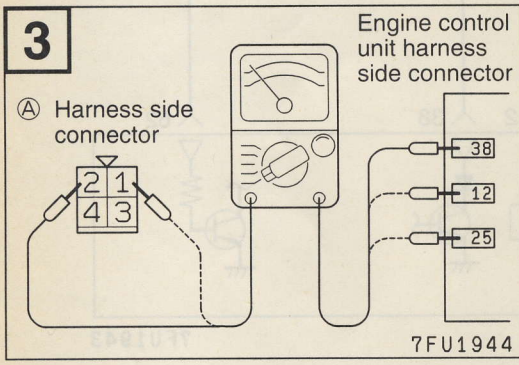


Measure the power supply voltage of the control relay.
- Ignition switch: OFF
- Control relay connector: Disconnected

Voltage (V)
SV

OK → 3
Repair the harness. (Battery – Ⓐ 3) (Battery – Ⓐ 4)

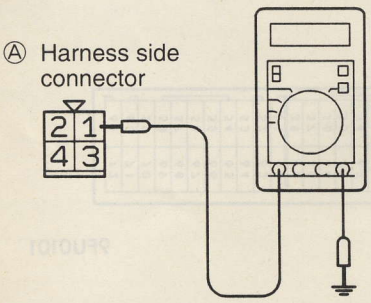
3



Check for an open-circuit, or a short-circuit to earth, between the engine control unit and the control relay.
- Engine control unit connector: Disconnected
- Control relay connector: Disconnected

OK → 4
Repair the harness. (Ⓐ 2 – 38) (Ⓐ 1 – 12, 25)

4

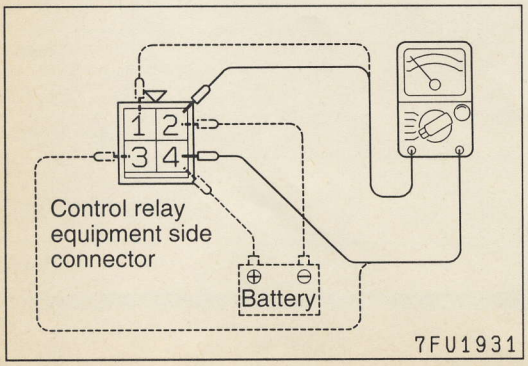


Measure power voltage to the actuator.
- Control relay connector: Connected
- Engine control unit connector: Connected

Engine	Voltage (V)
Cranking	8V or higher
Racing	SV

OK → STOP
Malfunction of control relay or engine control unit

CONTROL RELAY INSPECTION

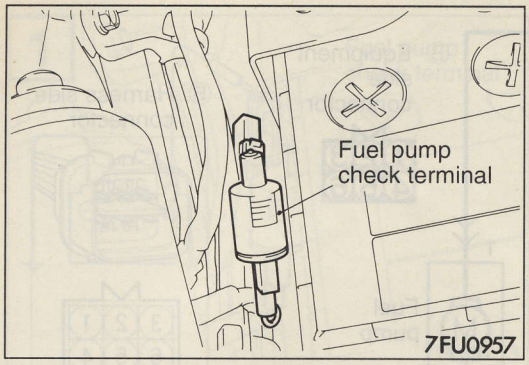


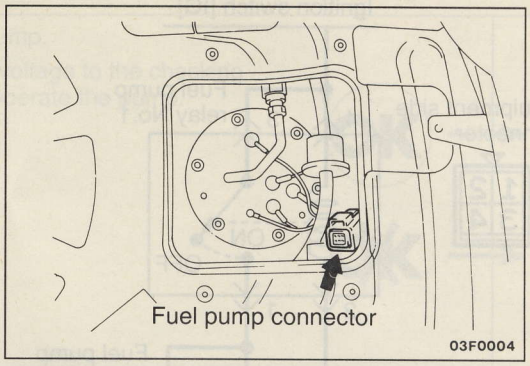
(1) Check for continuity between control relay terminals.

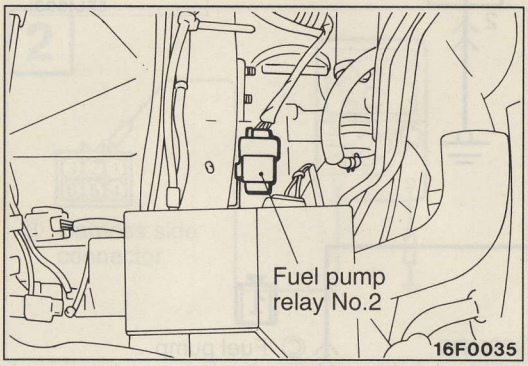
Battery voltage	Terminal No.			
	1	2	3	4
Not supplied		○		○
Supplied	○		○	
		⊖		⊕

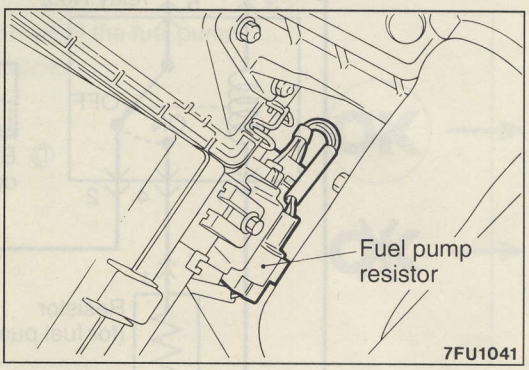
(2) Replace the control relay if faulty.

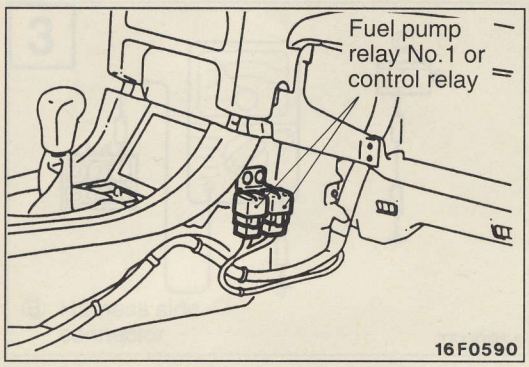
FUEL PUMP

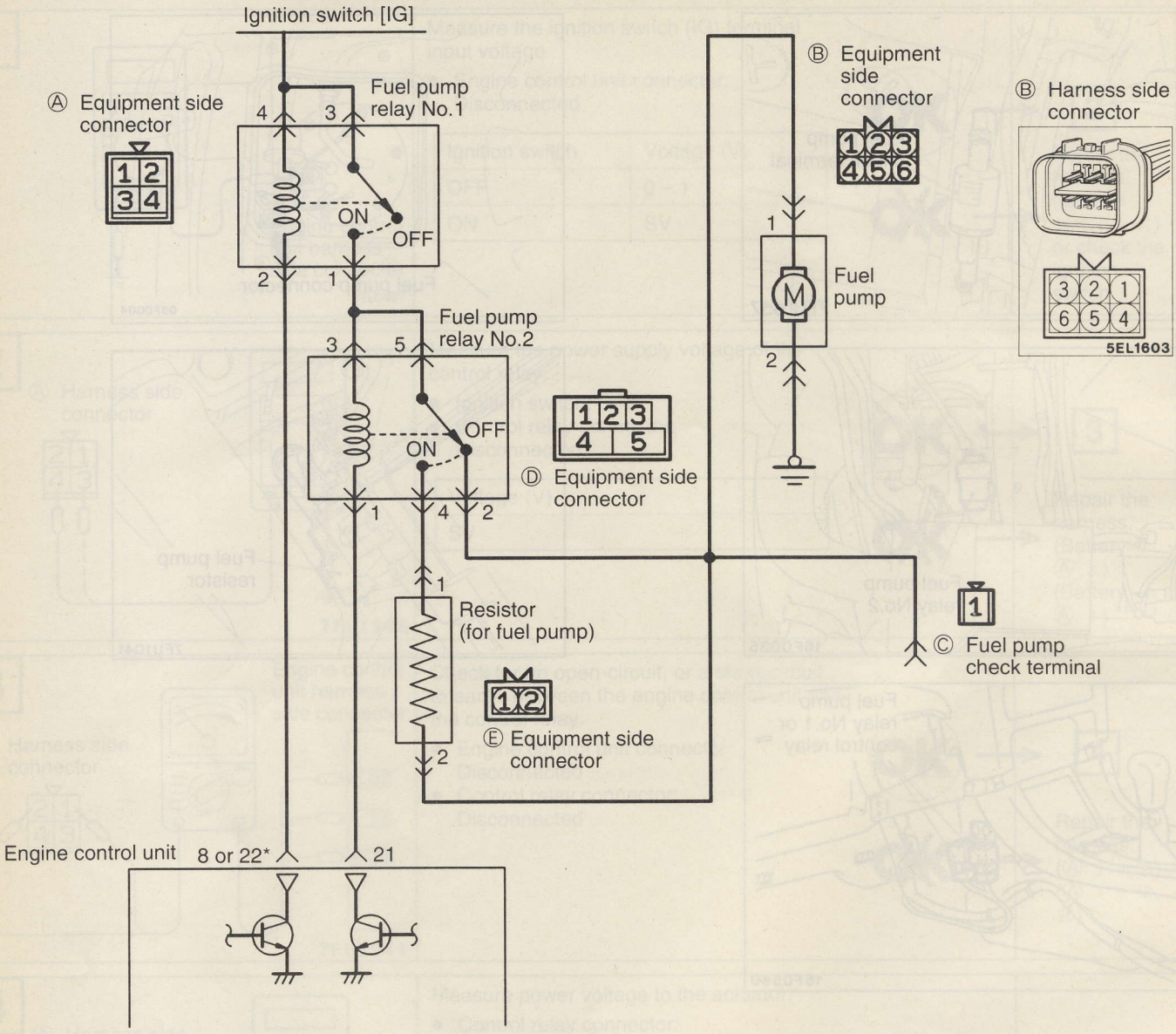

Fuel pump
check terminal
7FU0957


Fuel pump connector
03F0004


Fuel pump
relay No.2
16F0035

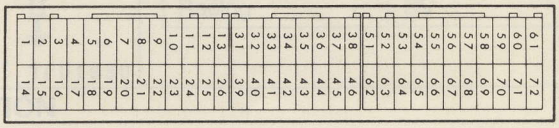

Fuel pump
resistor
7FU1041


Fuel pump
relay No.1 or
control relay
16F0590



7FU2037

Engine control unit connector

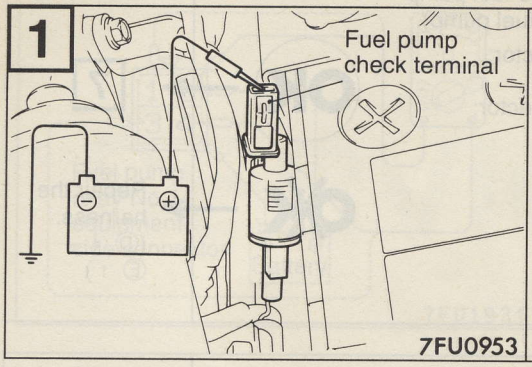


9FU0101

NOTE
*: Vehicles with immobilizer system.

HARNESS INSPECTION

1

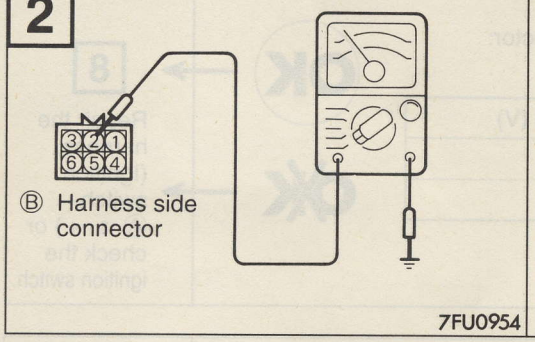


Check the fuel pump.
- Apply battery voltage to the checking terminal and operate the pump.

OK → 4

NG → 2

2

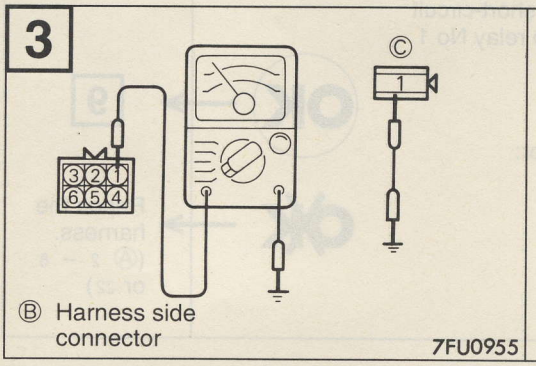


Check the earth circuit of the fuel pump.
- Fuel pump connector: Disconnected

OK → 3

NG → Repair the harness. (Ⓑ 2 – Earth)

3

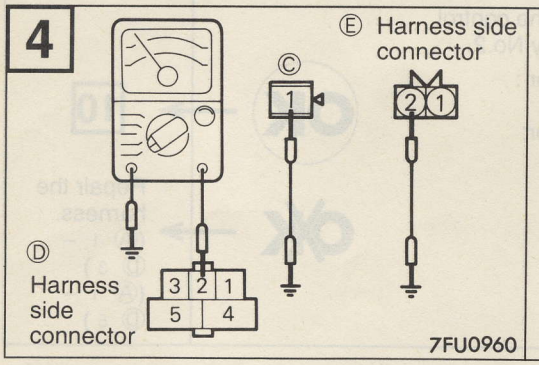


Check for continuity between the fuel pump and the checking terminal.
- Connector: Disconnected

OK → 4

NG → Repair the harness. (Ⓑ 1 – Ⓒ 1)

4

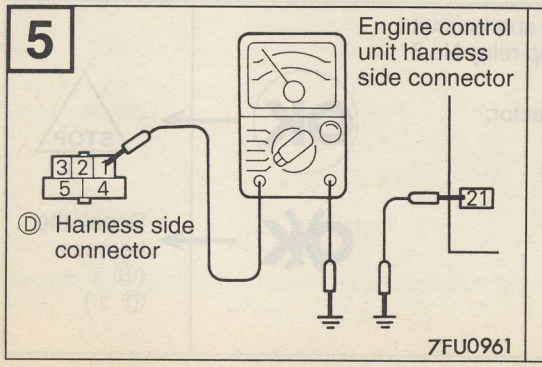


Check for continuity between the checking terminal and the fuel pump relay No.2, and between the resistor (for fuel pump).
- Fuel pump relay No.2 connector: Disconnected
- Resistor (for fuel pump) connector: Disconnected
- Fuel pump connector: Disconnected

OK → 5

NG → Repair the harness. (Ⓒ 1 – Ⓓ 2) (Ⓓ 2 – Ⓔ 2)

5

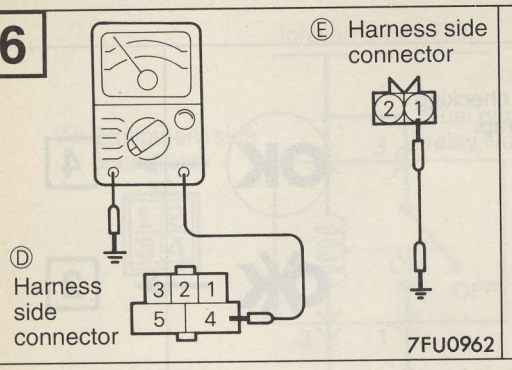


Check for an open-circuit, or a short-circuit to earth, between the fuel pump relay No.2 and the engine control unit.
- Fuel pump relay No.2 connector: Disconnected
- Engine control unit connector: Disconnected

OK → 6

NG → Repair the harness. (Ⓓ 1 – 21)

6



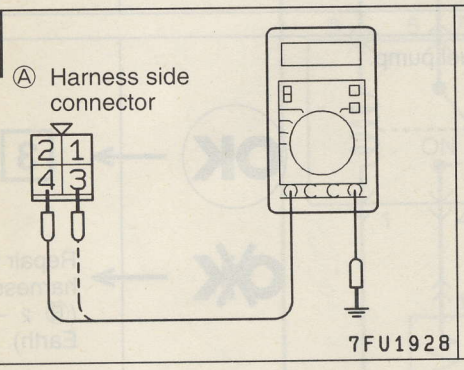
Check for continuity between the fuel pump relay No.2 and the resistor (for fuel pump).

- Fuel pump relay No.2 connector: Disconnected
- Resistor (for fuel pump)connector: Disconnected

OK → 7

NO → Repair the harness. (Ⓓ 4 – Ⓔ 1)

7



Measure the power supply voltage of the fuel pump relay No.1.

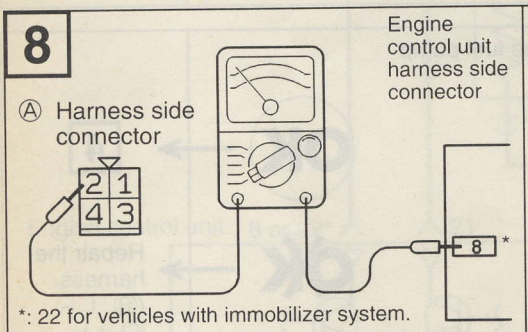
- Fuel pump relay No.1 connector: Disconnected

Ignition switch	Voltage (V)
OFF	0
ON	SV

OK → 8

NO → Repair the harness. (Ignition switch – Ⓐ 3 4) or check the ignition switch.

8



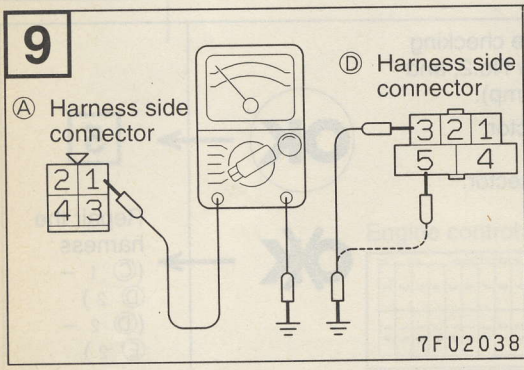
Check for an open-circuit, or a short-circuit to earth between the fuel pump relay No.1 and the engine control unit.

- Control relay connector: Disconnected
- Engine control unit connector: Disconnected

OK → 9

NO → Repair the harness. (Ⓐ 2 – 8 or 22)

9



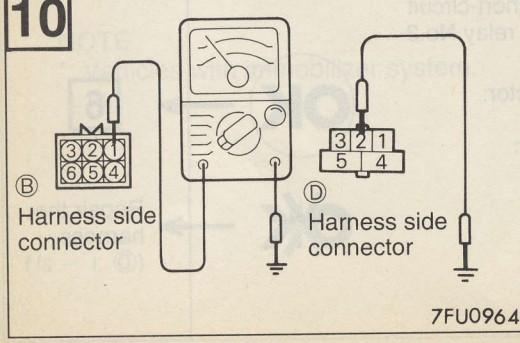
Check for continuity between the control relay No.1 and the control relay No.2.

- Control relay No.1 connector : Disconnected
- Control relay No.2 connector: Disconnected

OK → 10

NO → Repair the harness. (Ⓐ 1 – Ⓓ 3) (Ⓐ 1 – Ⓓ 5)

10

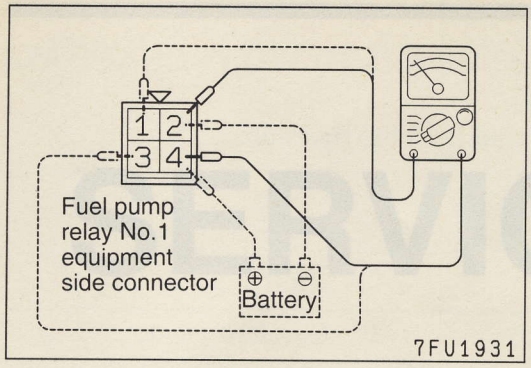


Check for an open-circuit, or a short-circuit to earth, between the fuel pump relay No.2 and the fuel pump.

- Fuel pump relay No.2 connector: Disconnected
- Fuel pump connector: Disconnected

OK → STOP

NO → Repair the harness. (Ⓑ 1 – Ⓓ 2)



FUEL PUMP RELAY No.1 INSPECTION

(1) Check for continuity between fuel pump relay No.1 terminals.

Battery voltage	Terminal No.			
	1	2	3	4
Not supplied		○		○
Supplied	○	⊖	○	⊕

(2) Replace the fuel pump relay No.1 if faulty.

SERVICE BRAKES

CONTENTS

GENERAL

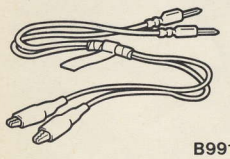
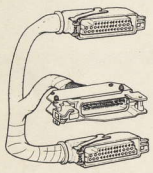
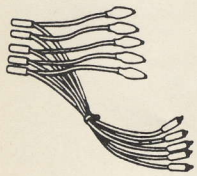
OUTLINE OF CHANGES

- The hydraulic unit has been made more lightweight and compact.
- The ABS valve relay and the ABS motor relay have been separated from the hydraulic unit.
- The G-sensor and the ABS-ECU have been changed.

SERVICE SPECIFICATION

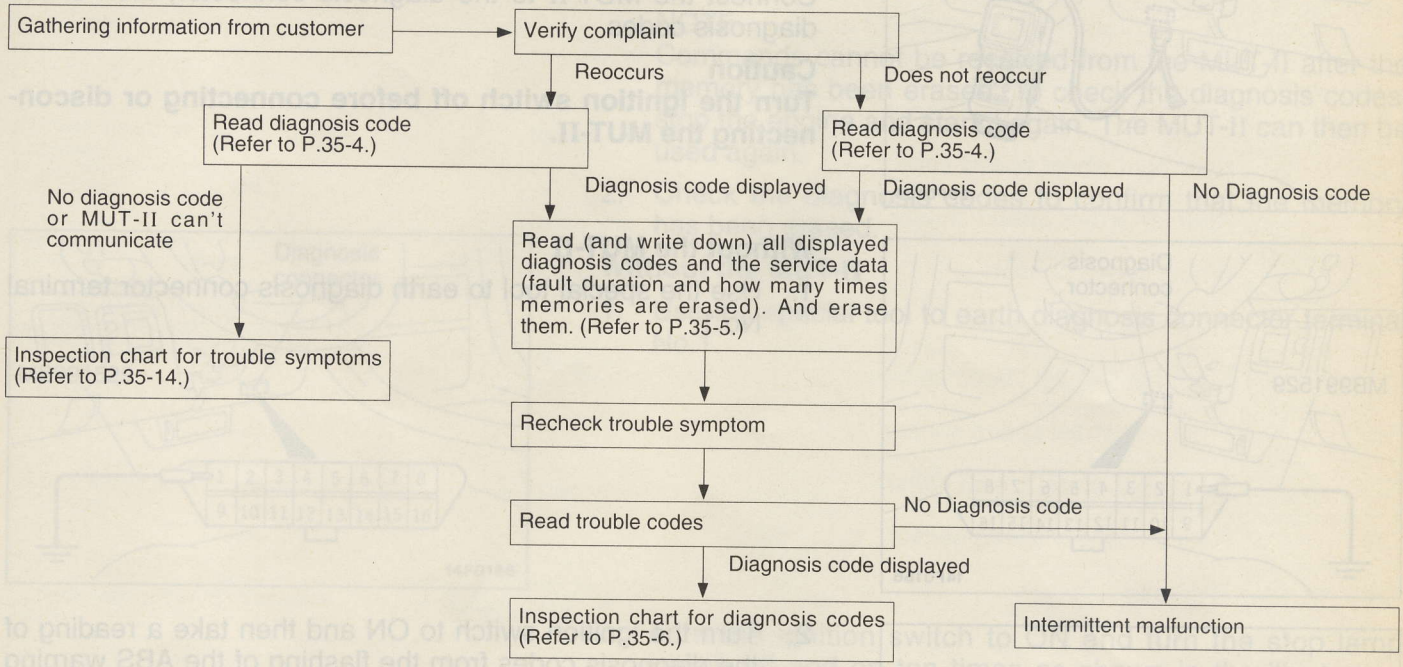
Items		Standard value
Hydraulic unit solenoid valve internal resistance Ω	OUT	4.04 – 4.54
	IN	8.04 – 9.04
Resistance between speedsensor terminals kΩ		1.4 – 1.8
G-sensor output voltage V	When installed	2.4 – 2.6
	When removed with arrow mark facing down	3.4 – 3.6

SPECIAL TOOLS

Tool	Number	Name	Use
 B991529	MB991529	ABS check harness	For checking of ABS (Diagnosis code display when using the ABS warning lamp)
	MB991638	ABS check harness	For checking of ABS
	MB991348	Test harness set	For checking of G-sensor

ABS TROUBLESHOOTING

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

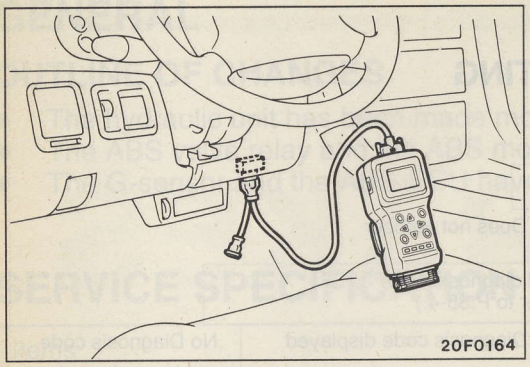


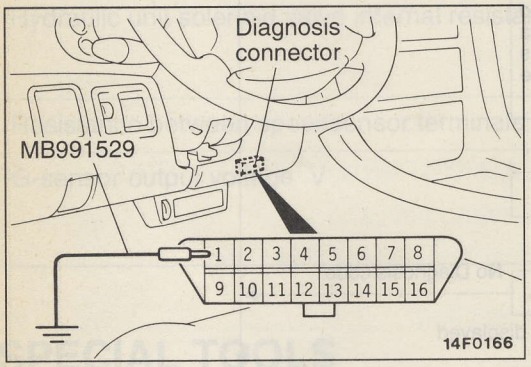
NOTES WITH REGARD TO DIAGNOSIS

The phenomena listed in the following table are not abnormal.

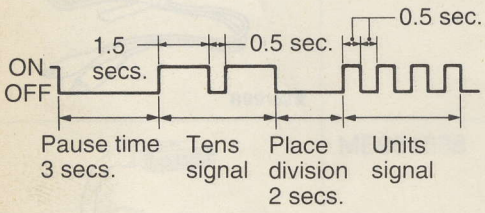
Phenomenon	Explanation of phenomenon
System check sound	When starting the engine, a thudding sound can sometimes be heard coming from inside the engine compartment, but this is because the system operation check is being performed, and is not an abnormality.
ABS operation sound	1. Sound of the motor inside the ABS hydraulic unit operation (whine) 2. Sound is generated along with vibration of the brake pedal. (scraping) 3. When ABS operates, sound is generated from the vehicle chassis due to repeated brake application and release. (Thump: suspension; squeak; tyres)
ABS operation (Long braking distance)	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.

Diagnosis detection condition can vary depending on the diagnosis code.

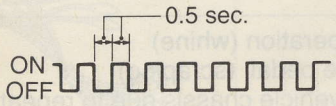




When diagnosis code No.24 is output



When no diagnosis code is output



DIAGNOSIS FUNCTION

DIAGNOSIS CODES CHECK

With the MUT-II

Connect the MUT-II to the diagnosis connector, then check diagnosis codes.

Caution
Turn the ignition switch off before connecting or disconnecting the MUT-II.

Without the MUT-II

1. Use the special tool to earth diagnosis connector terminal No.1.
2. Turn the ignition switch to ON and then take a reading of the diagnosis codes from the flashing of the ABS warning lamp.

ERASING DIAGNOSIS CODES

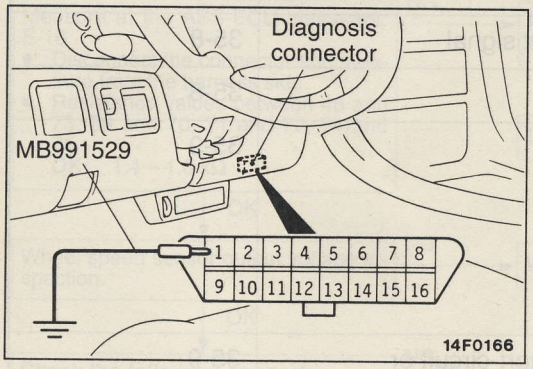
With the MUT-II

1. Connect the MUT-II to the diagnosis connector, then erase the diagnosis codes.

   NOTE
   Commands cannot be received from the MUT-II after the memory has been erased. To check the diagnosis codes, stop the engine and start it again. The MUT-II can then be used again.

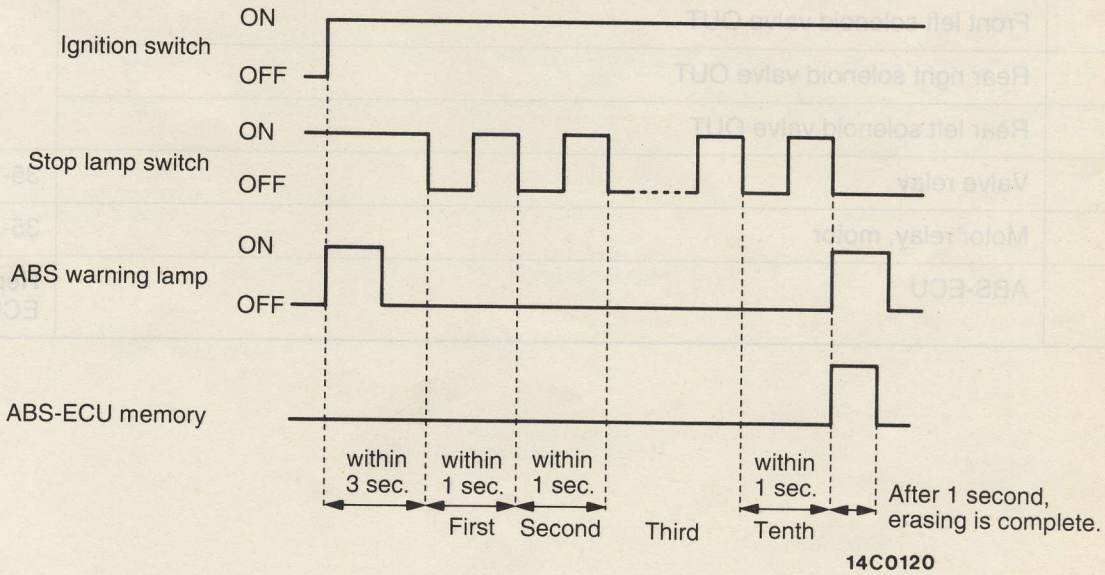
2. Check the diagnosis codes to confirm that the memory has been erased.

Without the MUT-II



1. Use the special tool to earth diagnosis connector terminal No.1.

2. Turn the ignition switch to ON and turn the stop lamp switch off and on ten times as shown in the illustration below. Once this has been done, all of the diagnosis codes will be erased.



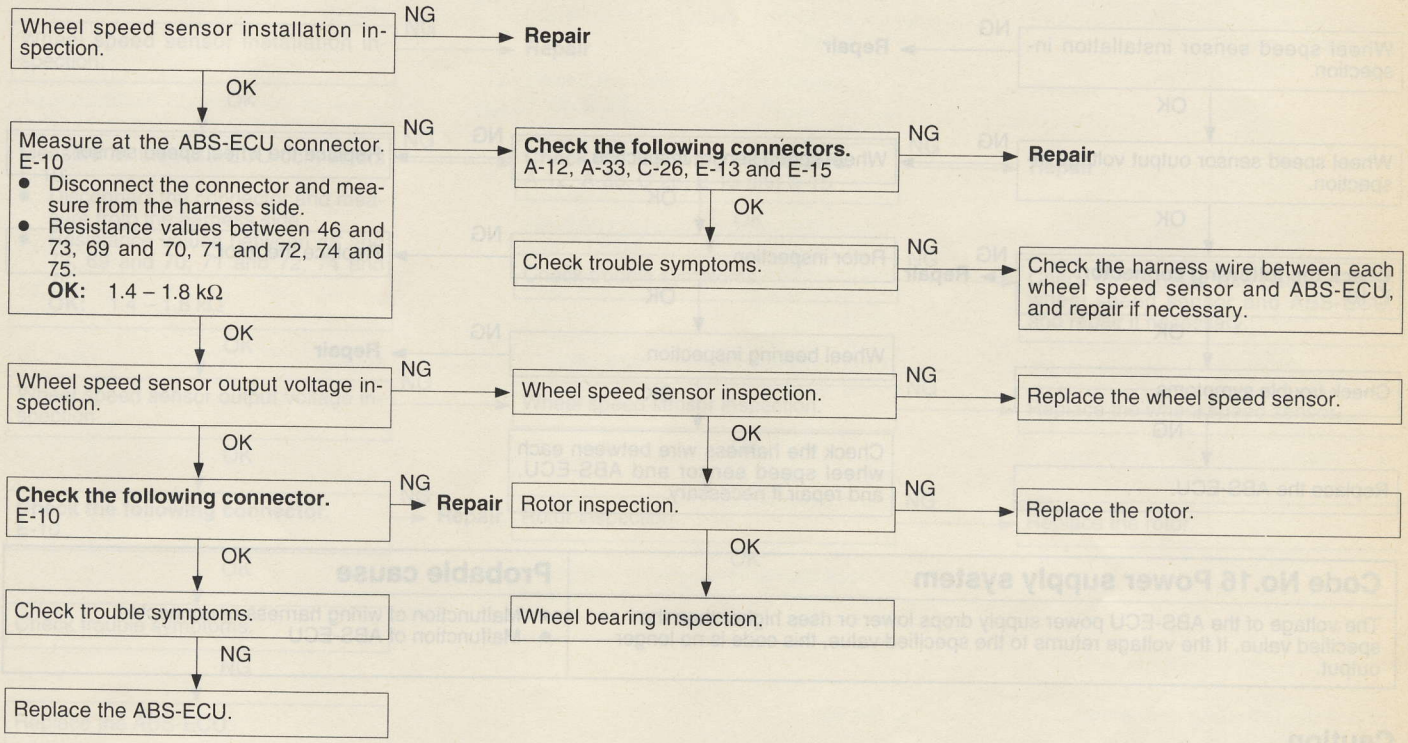
INSPECTION CHART FOR DIAGNOSIS CODES

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

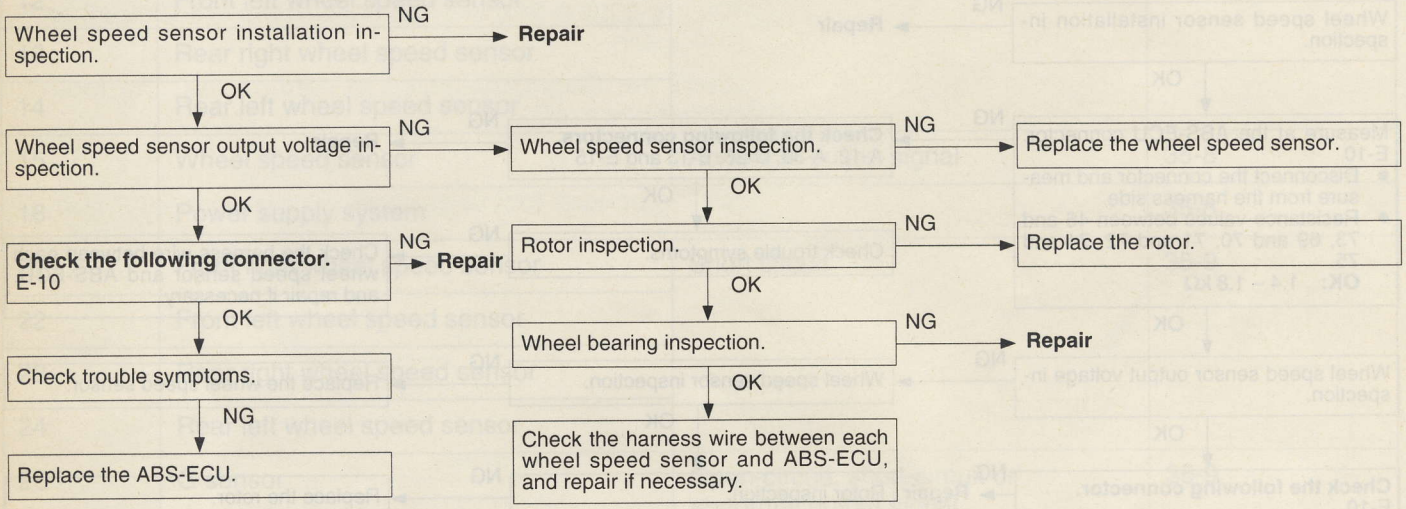
Diagnosis code No.	Inspection item	Diagnosis content	Reference page
11	Front right wheel speed sensor	Open circuit	35-7
12	Front left wheel speed sensor		
13	Rear right wheel speed sensor		
14	Rear left wheel speed sensor		
15	Wheel speed sensor	Abnormal output signal	35-8
16	Power supply system		35-8
21	Front right wheel speed sensor	Short circuit	35-9
22	Front left wheel speed sensor		
23	Rear right wheel speed sensor		
24	Rear left wheel speed sensor		
26	G sensor	Open-circuit, short-circuit or abnormal output signal	35-9
38	Stop lamp switch system		35-10
41	Front right solenoid valve IN		35-11
42	Front left solenoid valve IN		
43	Rear right solenoid valve IN		
44	Rear left solenoid valve IN		
45	Front right solenoid valve OUT		
46	Front left solenoid valve OUT		
47	Rear right solenoid valve OUT		
48	Rear left solenoid valve OUT		
51	Valve relay		35-12
53	Motor relay, motor		35-13
63	ABS-ECU		Replace the ABS-ECU.

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code No.11, 12, 13, 14 Wheel speed sensor open circuit	Probable cause
The ABS-ECU determines that an open circuit occurs in more than one line of wheel speed sensors.	• Malfunction of wheel speed sensor • Malfunction of wiring harness or connector • Malfunction of ABS-ECU

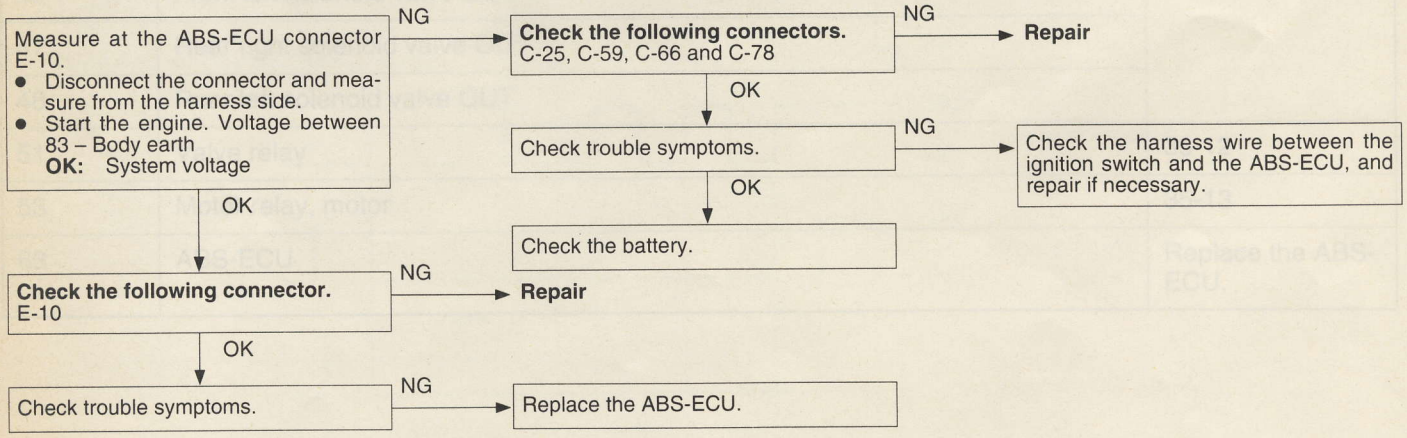


Code No.15 Wheel speed sensor (Abnormal output signal)	Probable cause
A wheel speed sensor outputs an abnormal signal (other than an open or short-circuit).	• Improper installation of wheel speed sensor • Malfunction of wheel speed sensor • Malfunction of rotor • Malfunction of wheel bearing • Malfunction of wiring harness or connector • Malfunction of ABS-ECU

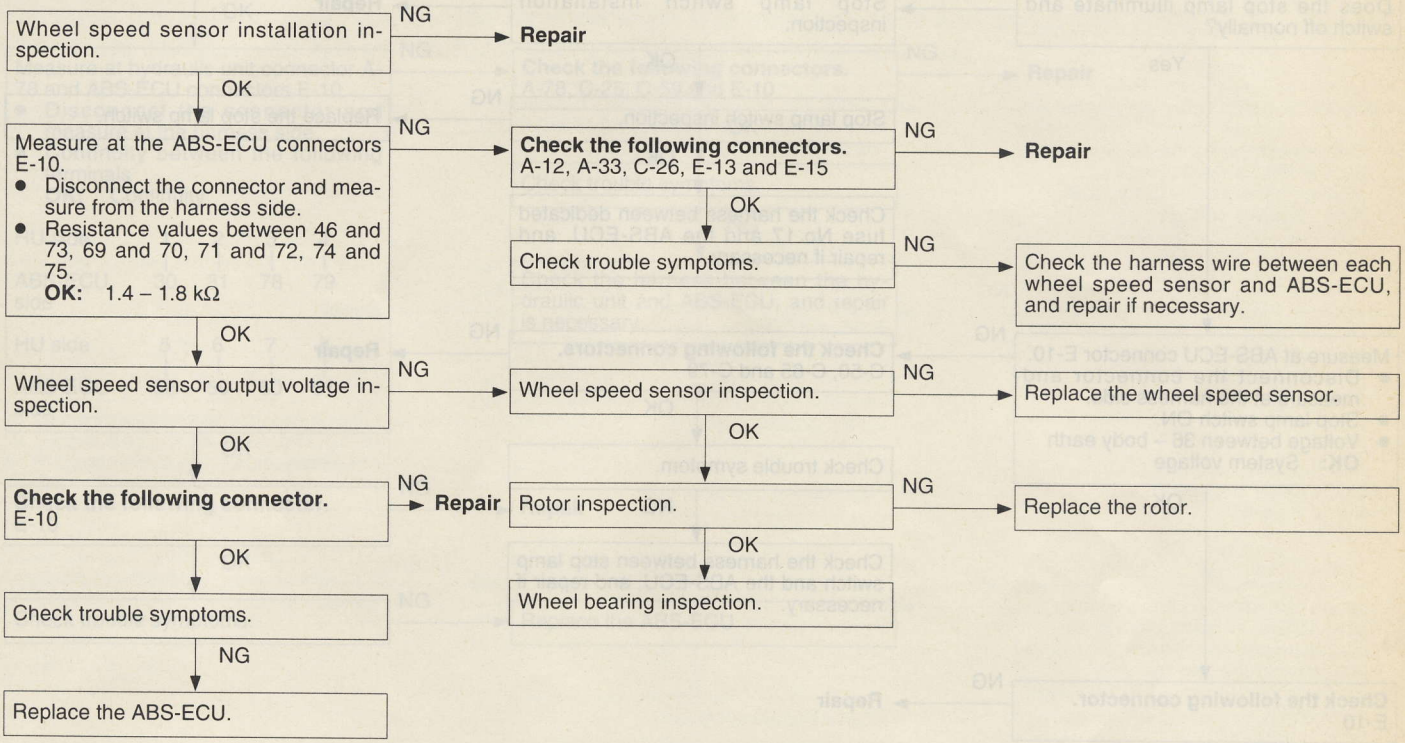


Code No.16 Power supply system	Probable cause
The voltage of the ABS-ECU power supply drops lower or rises higher than the specified value. If the voltage returns to the specified value, this code is no longer output.	• Malfunction of wiring harness or connector. • Malfunction of ABS-ECU

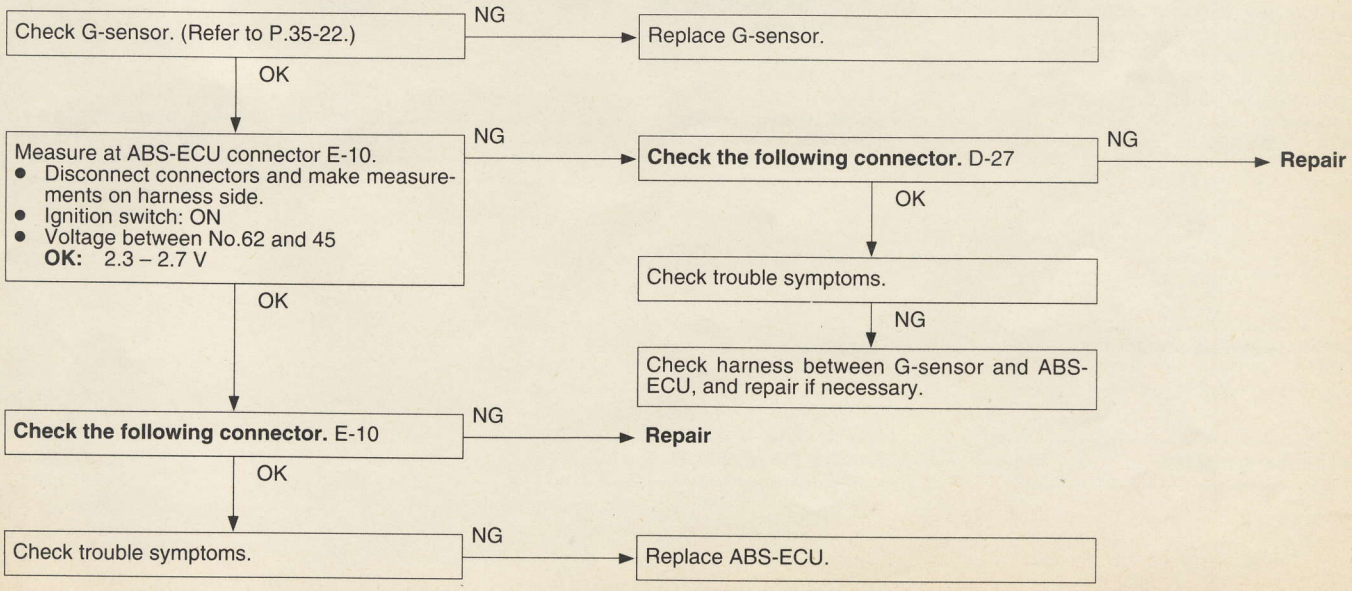
Caution
If battery voltage drops or rises during inspection, this code will be output as well. If the voltage returns to standard value, this code is no longer output.
Before carrying out the following inspection, check the battery level, and refill it if necessary.



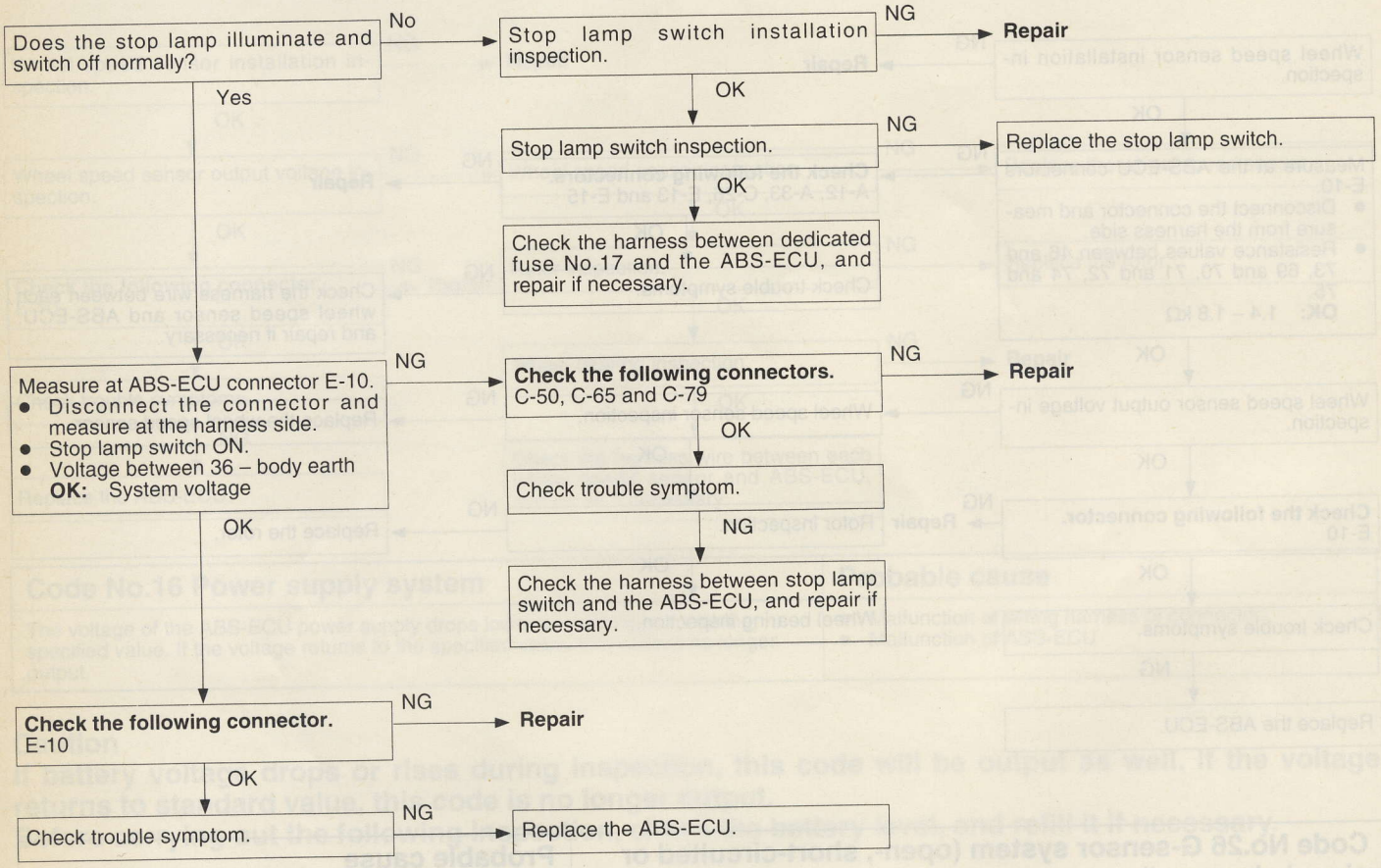
Code No.21, 22, 23, 24 Wheel speed sensor short circuit	Probable cause
These codes are output at the following times: • When an open circuit cannot be found, but more than one wheel speed sensor does not output any signal during driving at 8 km/h or higher. • When a chipped or plugged-up rotor tooth, etc. is detected. • When the sensor output drops and anti-lock control is continuously carried out due to a defective sensor or a warped rotor.	• Malfunction of wheel speed sensor • Malfunction of rotor • Malfunction of wheel bearing • Malfunction of wiring harness or connector • Malfunction of ABS-ECU



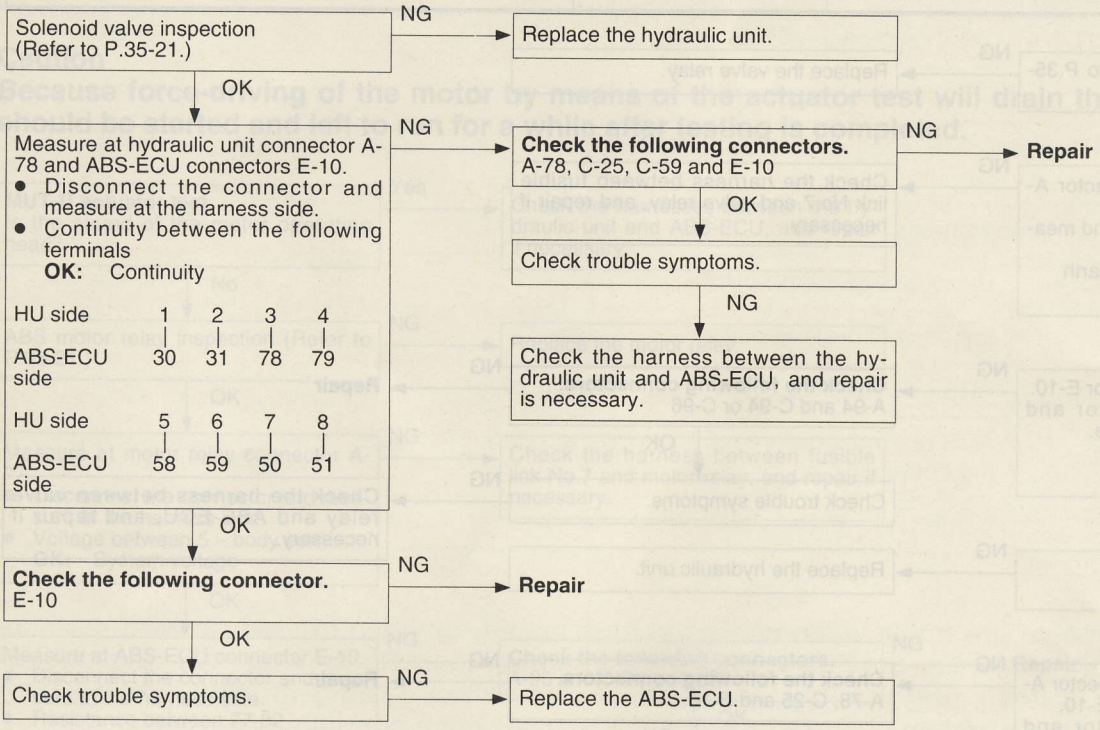
Code No.26 G-sensor system (open-, short-circuited or signal abnormal)	Probable cause
Output is provided in the following cases. • G-sensor output drops below 0.5V or rises above 4.5V • G-sensor system harness is broken or shorted	• G-sensor defective • Harness and connector defective • ABS-ECU defective



Code No.38 Stop lamp switch system	Probable cause
These codes are output at the following times: ● 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) ● When the ABS-ECU determines that there is an open circuit in harness of the stop lamp switch system.	● Malfunction of stop lamp switch ● Malfunction of harness or connector ● Malfunction of ABS-ECU



Code No.41, 42, 43, 44, 45, 46, 47, 48 Solenoid valve	Probable cause
The ABS-ECU always monitors the solenoid valve drive circuit. It determines that there is an open or short-circuit in the solenoid coil or in a harness: When no current flows in the solenoid even though the ABS-ECU turns on it, and vice versa.	• Malfunction of harness or connector • Malfunction of hydraulic unit • Malfunction of ABS-ECU



Code No.51 Valve relay	Probable cause
[Comment] The ABS-ECU continually monitors the solenoid drive circuit. If no current is being supplied to a solenoid coil even though the solenoid valve relay is on, or if current continues to be supplied to five or more solenoid coils even though the solenoid valve relay is off, the ABS-ECU judges that there is a problem with the ABS valve relay. This diagnosis code is then output.	• Malfunction of valve relay • Malfunction of wiring harness or connector • Malfunction of ABS-ECU • Malfunction of hydraulic unit

Valve relay inspection (Refer to P.35-21.)
- NG → Replace the valve relay.
- OK ↓

Measure at valve relay connector A-94.
- Disconnect the connector and measure at the harness side.
- Voltage between 5 – body earth

OK: System voltage
- NG → Check the harness between fusible link No.7 and valve relay, and repair if necessary.
- OK ↓

Measure at ABS-ECU connector E-10.
- Disconnect the connector and measure at the harness side.
- Resistance between 82-47

OK: 60 – 120 Ω
- NG → **Check the following connectors.** A-94 and C-94 or C-96
  - NG → **Repair**
  - OK ↓
- OK ↓

Check trouble symptoms.
- NG → Check the harness between valve relay and ABS-ECU, and repair if necessary.
- OK ↓

Solenoid valve inspection (Refer to P.35-21.)
- NG → Replace the hydraulic unit.
- OK ↓

Measure at hydraulic unit connector A-78 and ABS-ECU connectors E-10.
- Disconnect the connector and measure at the harness side.
- Continuity between the following terminals

OK: Continuity

HU side	1	2	3	4
ABS-ECU side	30	31	78	79
HU side	5	6	7	8
ABS-ECU side	58	59	50	51

- NG → **Check the following connectors.** A-78, C-25 and E-10
  - NG → **Repair**
  - OK ↓

Check trouble symptoms.
- NG → Check the harness between the hydraulic unit and ABS-ECU, and repair if necessary.
- OK ↓

Measure at hydraulic unit connector A-77 and valve relay connector A-94.
- Disconnect the connector and measure at the harness side.
- Continuity between the following terminals

OK: Continuity

HU side	11
Valve relay side	4

- NG → **Check the following connectors.** A-77 and A-94
  - NG → **Repair**
  - OK ↓

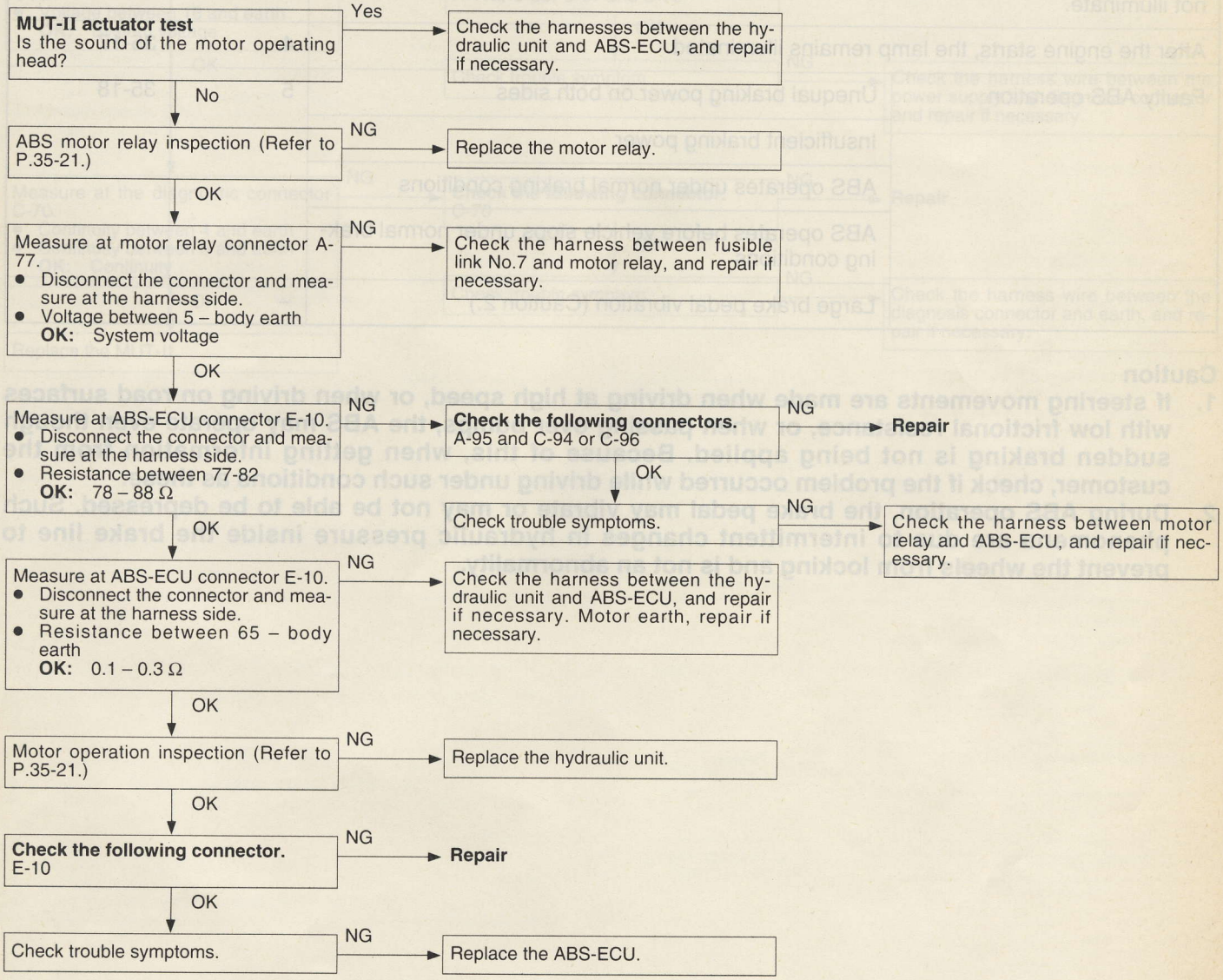
Check trouble symptoms.
- NG → Check the harness between the hydraulic unit and valve relay, and repair if necessary.
- OK ↓

Check the following connector. E-10
- NG → **Repair**
- OK ↓

Check trouble symptoms.
- NG → Replace the ABS-ECU.

Code No.53 Motor relay, motor	Probable cause
These codes are output at the following times: When the motor relay is on but no signal is input to the motor monitor line (motor is not operating, etc.) When the motor relay is off but a signal is input to the motor monitor line for 5 seconds or more (motor continues operating, etc.) When the motor relay does not operate	• Malfunction of motor relay • Malfunction of wiring harness or connector • Malfunction of hydraulic unit • Malfunction of ABS-ECU

Caution
Because force-driving of the motor by means of the actuator test will drain the battery, the engine should be started and left to run for a while after testing is completed.



INSPECTION CHART FOR TROUBLE SYMPTOMS

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

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is not possible.	Communication with all systems is not possible.	1	35-15
	Communication with ABS only is not possible.	2	35-16
When the ignition key is turned to "ON" (engine stopped), the ABS warning lamp does not illuminate.		3	35-17
After the engine starts, the lamp remains illuminated.		4	35-17
Faulty ABS operation	Unequal braking power on both sides	5	35-18
	Insufficient braking power		
	ABS operates under normal braking conditions		
	ABS operates before vehicle stops under normal braking conditions		
	Large brake pedal vibration (Caution 2.)	–	–

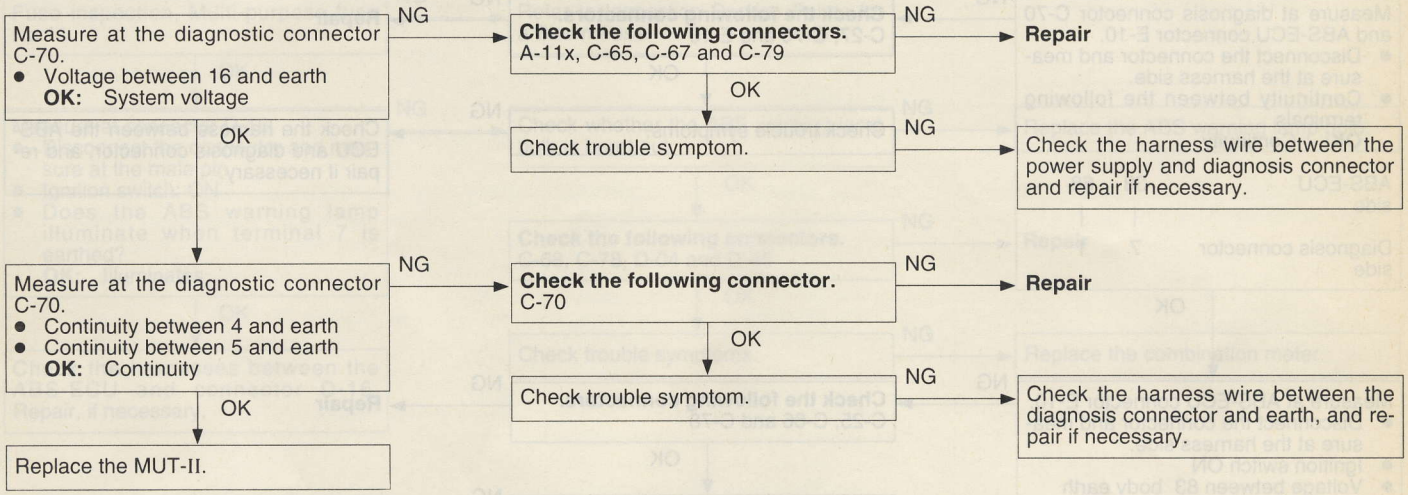
Caution

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

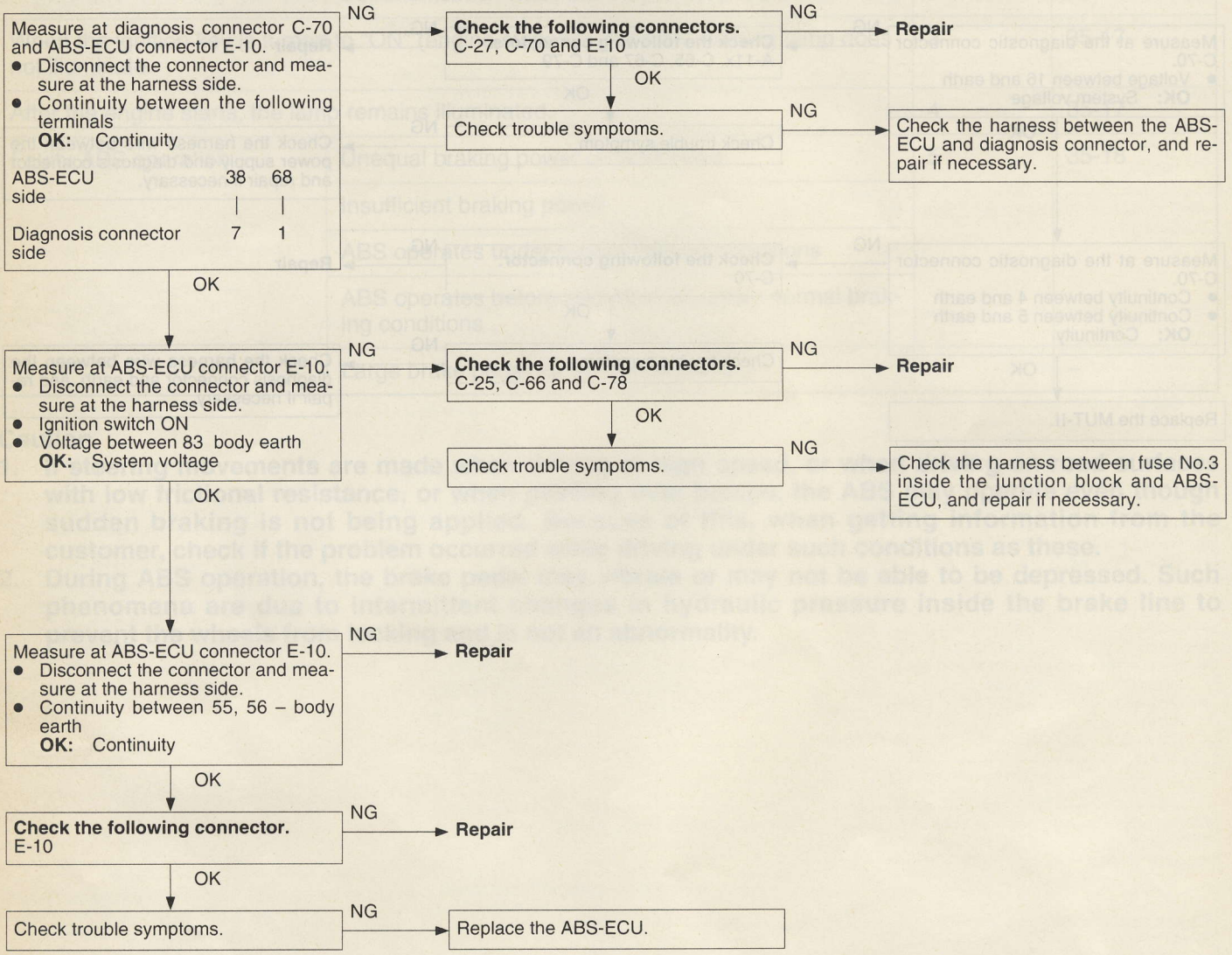
Inspection Procedure 1

Communication with MUT-II is not possible. (Communication with all systems is not possible.)	Probable cause
The cause is probably a defect in the power supply system (including earth) for the diagnosis line.	• Malfunction of the connector • Malfunction of the harness wire



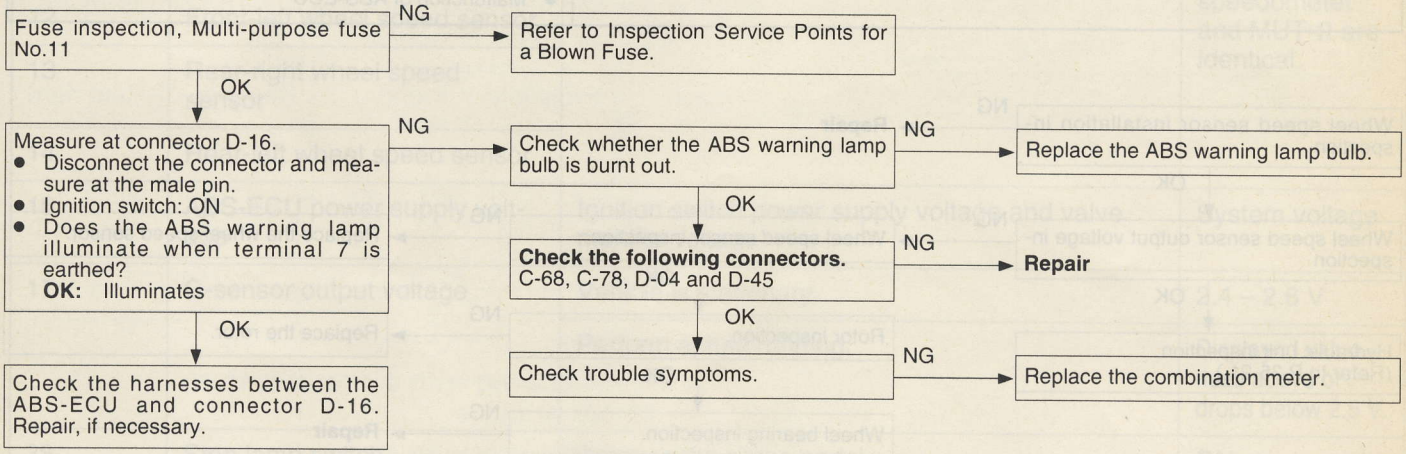
Inspection procedure 2

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.	• Blown fuse • Malfunction of wiring harness or connector • Malfunction of ABS-ECU



Inspection Procedure 3

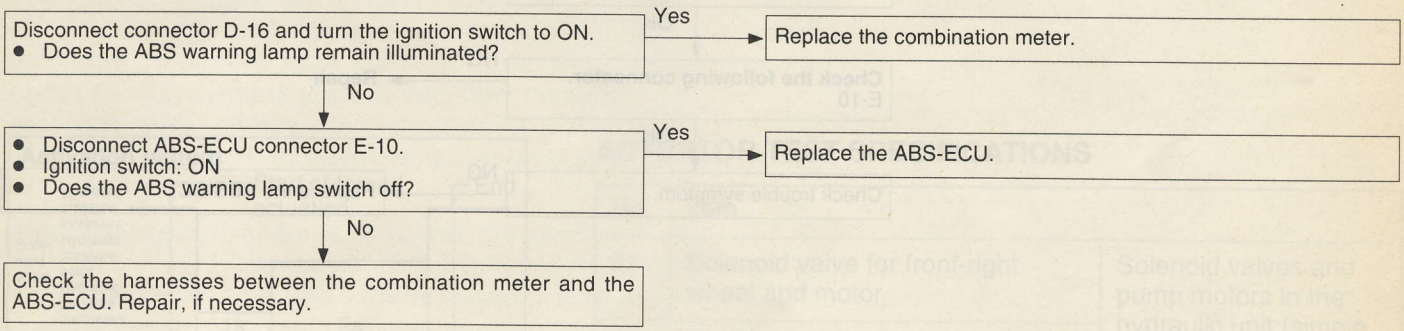
When ignition key is turned to "ON" (engine stopped), ABS warning lamp does not illuminate.	Probable cause
If the lamp does not illuminate, the cause may be: an open circuit in the lamp power supply circuit, a blown lamp bulb, an open circuit between the ABS warning lamp and the ABS-ECU.	• Blown fuse • Burnt out ABS warning lamp bulb • Malfunction of wiring harness or connector



Inspection Procedure 4

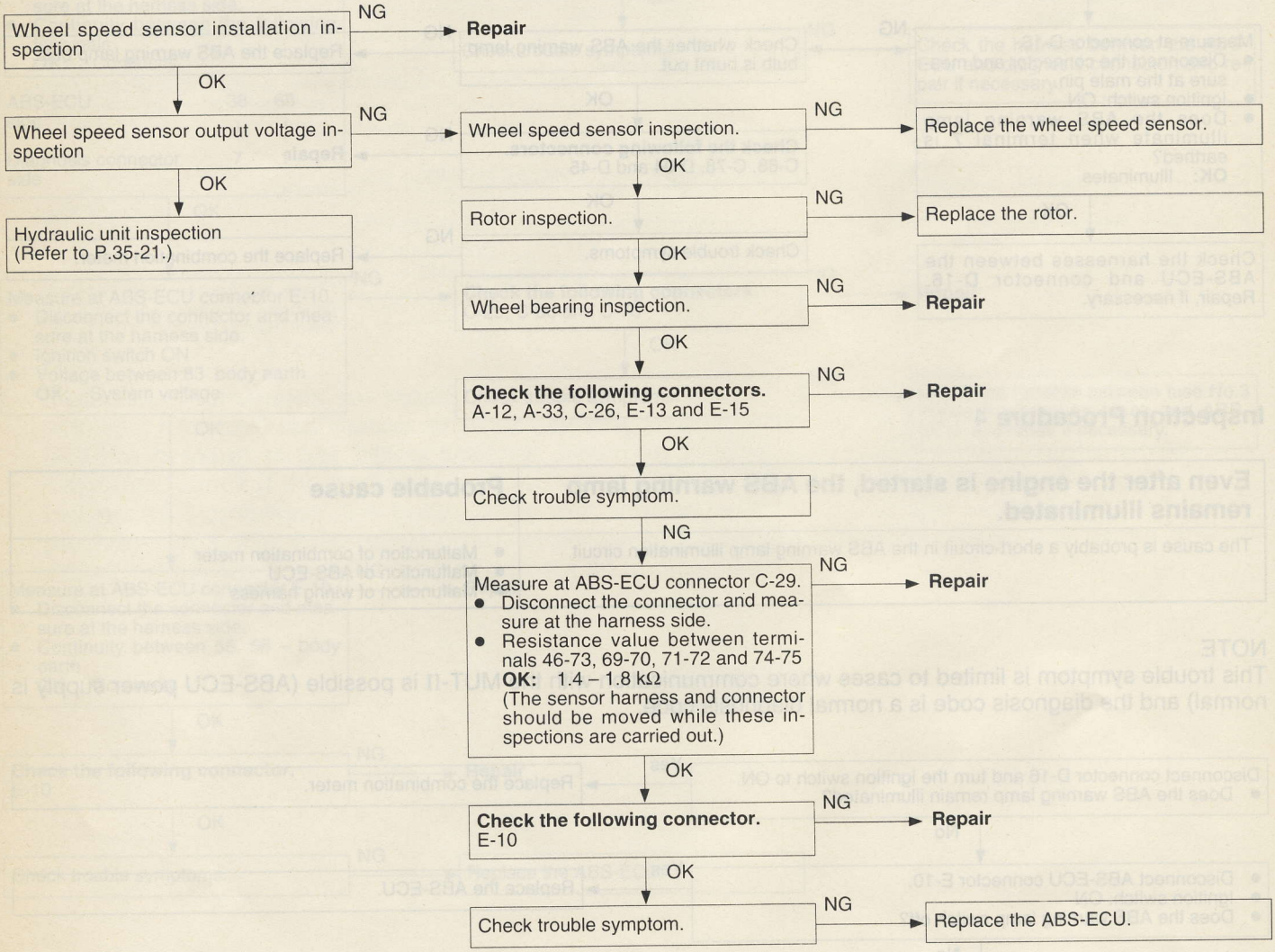
Even after the engine is started, the ABS warning lamp remains illuminated.	Probable cause
The cause is probably a short-circuit in the ABS warning lamp illumination circuit.	• Malfunction of combination meter • Malfunction of ABS-ECU • Malfunction of wiring harness

NOTE
This trouble symptom is limited to cases where communication with the MUT-II is possible (ABS-ECU power supply is normal) and the diagnosis code is a normal diagnosis code.



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.	• Improper installation of wheel speed sensor • Incorrect sensor harness contact • Foreign material adhering to wheel speed sensor • Malfunction of wheel speed sensor • Malfunction of rotor • Malfunction of wheel bearing • Malfunction of hydraulic unit • Malfunction of ABS-ECU



SERVICE DATA REFERENCE TABLE

The following items can be read by the MUT-II from the ABS-ECU input data.

1. When the system is normal

Item No.	Check Item	Checking Requirements	Normal Value
11	Front-right wheel speed sensor	Do a test run	Vehicle speeds displayed on the speedometer and MUT-II are identical.
12	Front-left wheel speed sensor		
13	Rear-right wheel speed sensor		
14	Rear-left wheel speed sensor		
16	ABS-ECU power supply voltage	Ignition switch power supply voltage and valve monitor voltage	System voltage
17	G-sensor output voltage	Vehicle is stationary.	2.4 – 2.6 V
		Perform actual running.	Displayed value rises above or drops below 2.5 V.
38	Stop lamp switch	Depress the brake pedal.	ON
		Release the brake pedal.	OFF

2. When the ABS-ECU shut off ABS operation.

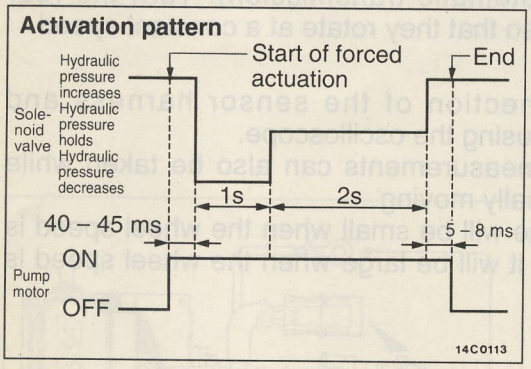
When the diagnosis system stops the ABS-ECU, the MUT-II display data will be unreliable.

ACTUATOR TEST REFERENCE TABLE

The MUT-II activates the following actuators for testing.

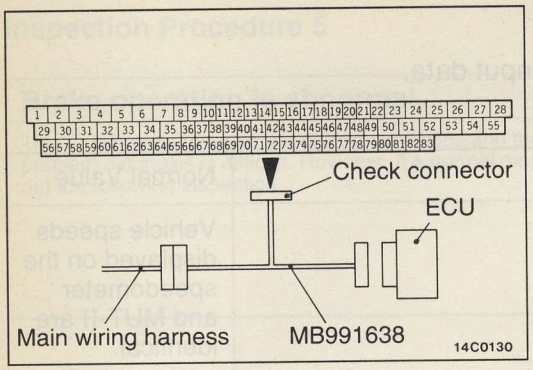
NOTE

1. If the ABS-ECU runs down, actuator testing cannot be carried out.
2. Actuator testing is only possible when the vehicle is stationary. If the vehicle speed during actuator testing exceeds 10 km/h, forced actuation will cancels.



ACTUATOR TEST SPECIFICATIONS

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



SERVICE ADJUSTMENT PROCEDURES

ABS OPERATION CHECK

WHEEL SPEED SENSOR OUTPUT VOLTAGE CHECK

1. Lift up the vehicle and release the parking brake.
2. Disconnect the ECU harness connector and use the special tool to measure from the harness side connector.
3. 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.	19	14	16	18
	20	15	17	46

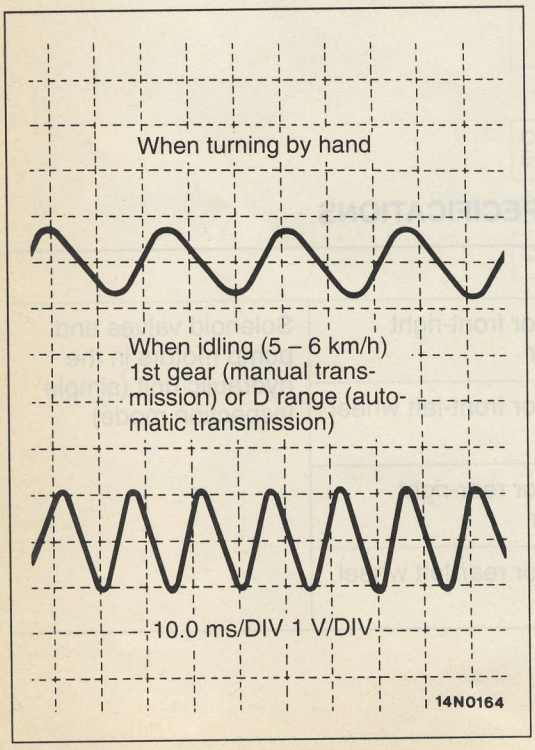
Output voltage

When measuring with a circuit tester:
70 mV or more

When measuring with an oscilloscope:
100 mV p-p or more

4. 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.



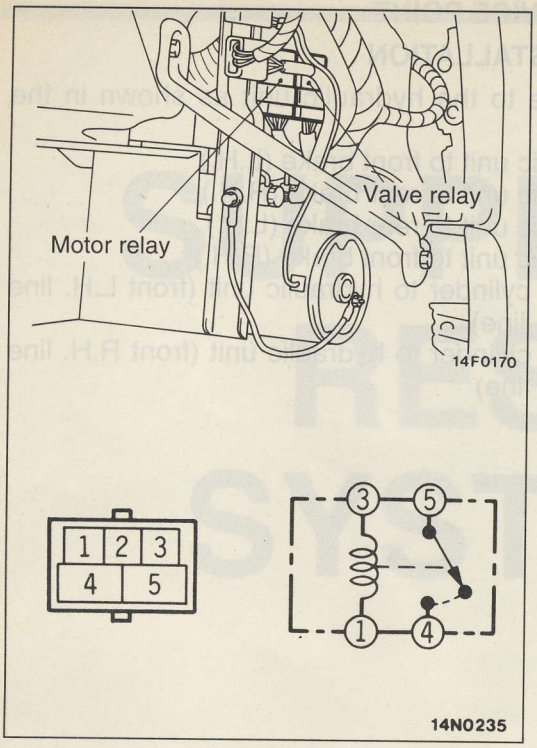
Inspecting Wave Forms With An Oscilloscope

Use the following method to observe the output voltage wave form from each wheel sensor with an oscilloscope

- Start the engine, and rotate the front wheels by engaging 1st gear (vehicles with manual transmission) or D range (vehicles with automatic transmission). Turn the rear wheels manually so that they rotate at a constant speed.

NOTE

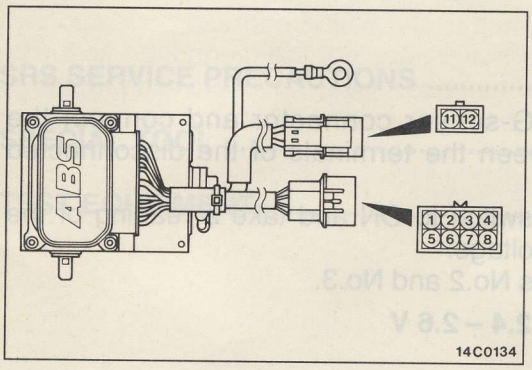
1. Check the connection of the sensor harness and connector before using the oscilloscope.
2. The wave form measurements can also be taken while the vehicle is actually moving.
3. The output voltage will be small when the wheel speed is low, and similarly it will be large when the wheel speed is high.



VALVE RELAY AND MOTOR RELAY CHECK <ABS>

Remove the splash shield (FR) and remove the relays.

Battery voltage	Terminal No.			
	1	3	4	5
Continuity no voltage	○	○		
Continuity with voltage	⊕	⊖	○	○



HYDRAULIC UNIT

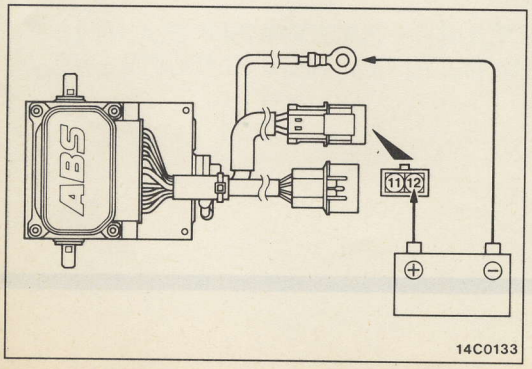
INSPECTION

SOLENOID VALVE CHECK

Measure the resistance between terminals.

Standard value:

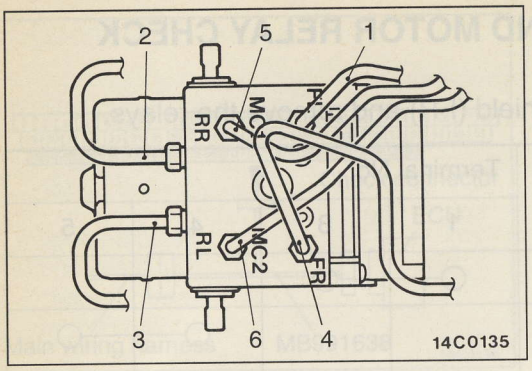
Solenoid valve	Measurement terminals	Resistance between terminals.
Front IN (right side)	1 – 11	8.04 – 9.04 Ω
Front IN (left side)	4 – 11	
Rear IN (right side)	3 – 11	
Rear IN (left side)	2 – 11	
Front OUT (right side)	5 – 11	4.04 – 4.54 Ω
Front OUT (left side)	8 – 11	
Rear OUT (right side)	7 – 11	
Rear OUT (left side)	6 – 11	



MOTOR OPERATION CHECK

Connect the battery and check to be sure that the sound of the hydraulic unit motor operating can be heard.

Caution
The battery power should not be applied for more than 1 second.

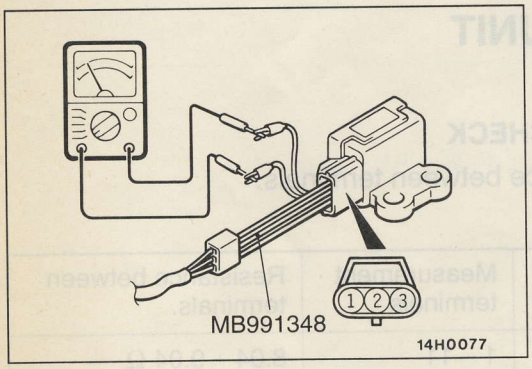


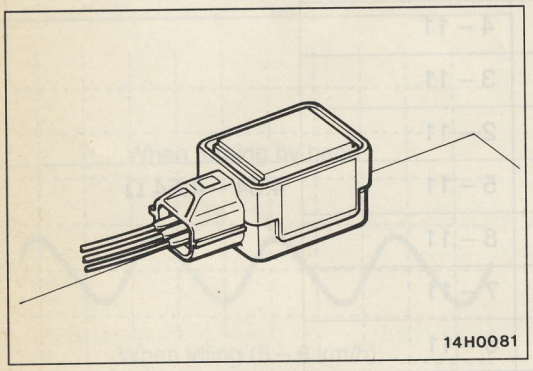
INSTALLATION SERVICE POINT

1. BRAKE PIPE INSTALLATION

Connect the tube to the hydraulic unit as shown in the illustration.

(1) From hydraulic unit to front brake (L.H.)
(2) From hydraulic unit to rear brake (R.H.)
(3) From hydraulic unit to rear brake (L.H.)
(4) From hydraulic unit to front brake (R.H.)
(5) From master cylinder to hydraulic unit (front L.H. line and rear R.H. line)
(6) From master cylinder to hydraulic unit (front R.H. line and rear L.H. line)





G-SENSOR

INSPECTION

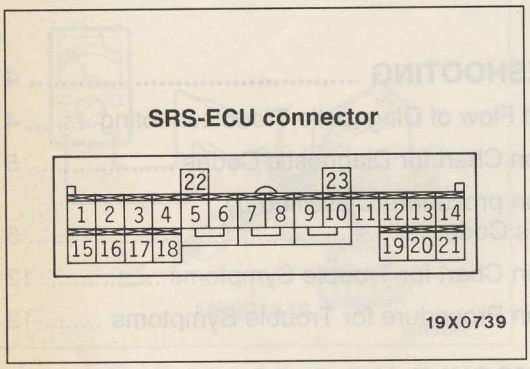
1. Disconnect the G-sensor connector and connect the special tool between the terminals of the disconnected connector.
2. Turn the ignition switch to ON and take a reading of the following output voltage.
   Between terminals No.2 and No.3.
   Standard value: 2.4 – 2.6 V
3. With the special tool still connected, secure the G-sensor so that the label surface is facing straight down, and then take a reading of the following output voltage.
   Between terminals No.2 and No.3.
   Standard value: 3.4 – 3.6 V
4. If the voltage is outside the standard value, after checking to be sure that there is no abnormality in the power supply and earth wires, replace the G-sensor.

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

CONTENTS

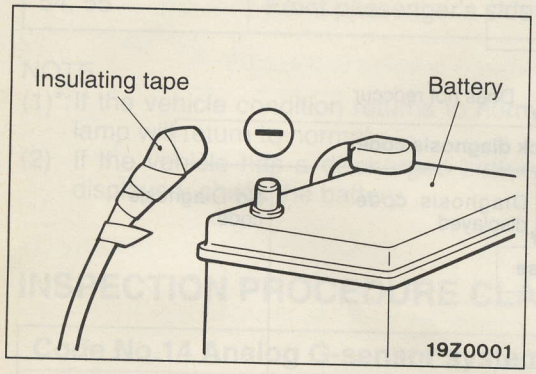
SRS SERVICE PRECAUTIONS

1. In order to avoid injury to yourself or others from accidental deployment of the air bag during servicing, read and carefully follow all the precautions and procedures described in this manual.
2. Do not use any electrical test equipment on or near SRS components, except those specified on P.52B-4.
3. **Never Attempt to Repair the Following Components:**
   - SRS air bag control unit (SRS-ECU)
   - Clock Spring
   - Air Bag Module
     (Driver's side or front passenger's side)



4. Do not attempt to repair the wiring harness connectors of the SRS. If any of the connectors are diagnosed as faulty, replace the wiring harness. If the wires are diagnosed as faulty, replace or repair the wiring harness according to the following table.

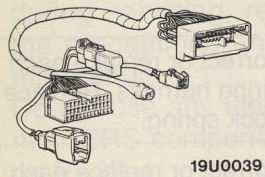
SRS-ECU terminal No.	Harness connector (No. of terminals, colour)	Destination of harness	Corrective action
1 to 4	21 pins, yellow	–	–
5		Body wiring harness → Clock spring → Air bag module (Driver's side)	Correct or replace each wiring harness. Replace clock spring.
6			
7		Body wiring harness → Air bag module (Front passenger's side)	Correct or replace each wiring harness.
8			
9, 10		–	–
11		Body wiring harness → Diagnosis connector	Correct or replace each wiring harness.
12		–	–
13		Body wiring harness → Junction block (fuse No.11)	Correct or replace each wiring harness.
14		Body wiring harness → Junction block (fuse No.18)	
15		Body wiring harness → SRS warning lamp	
16 to 19		–	–
20		Body wiring harness → Earth	Correct or replace body wiring harness.
21			



5. **After disconnecting the battery cable, wait 60 seconds or more before proceeding with the following work. The SRS system is designed to retain enough voltage to deploy the air bag for a short time even after the battery has been disconnected, so serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cables are disconnected.**
6. SRS components should not be subjected to hear over 93°C, so remove the SRS-ECU, air bag module and clock spring before drying or baking the vehicle after painting.
7. Whenever you finish servicing the SRS, check warning lamp operation to make sure that the system functions properly.
8. Make certain that the ignition switch is OFF when the MUT-II is connected or disconnected.
9. If you have any questions about the SRS, please contact your local distributor.

NOTE
SERIOUS INJURY CAN RESULT FROM UNINTENDED AIR BAG DEPLOYMENT, SO USE ONLY THE PROCEDURES AND EQUIPMENT SPECIFIED IN THIS MANUAL.

SPECIAL TOOL

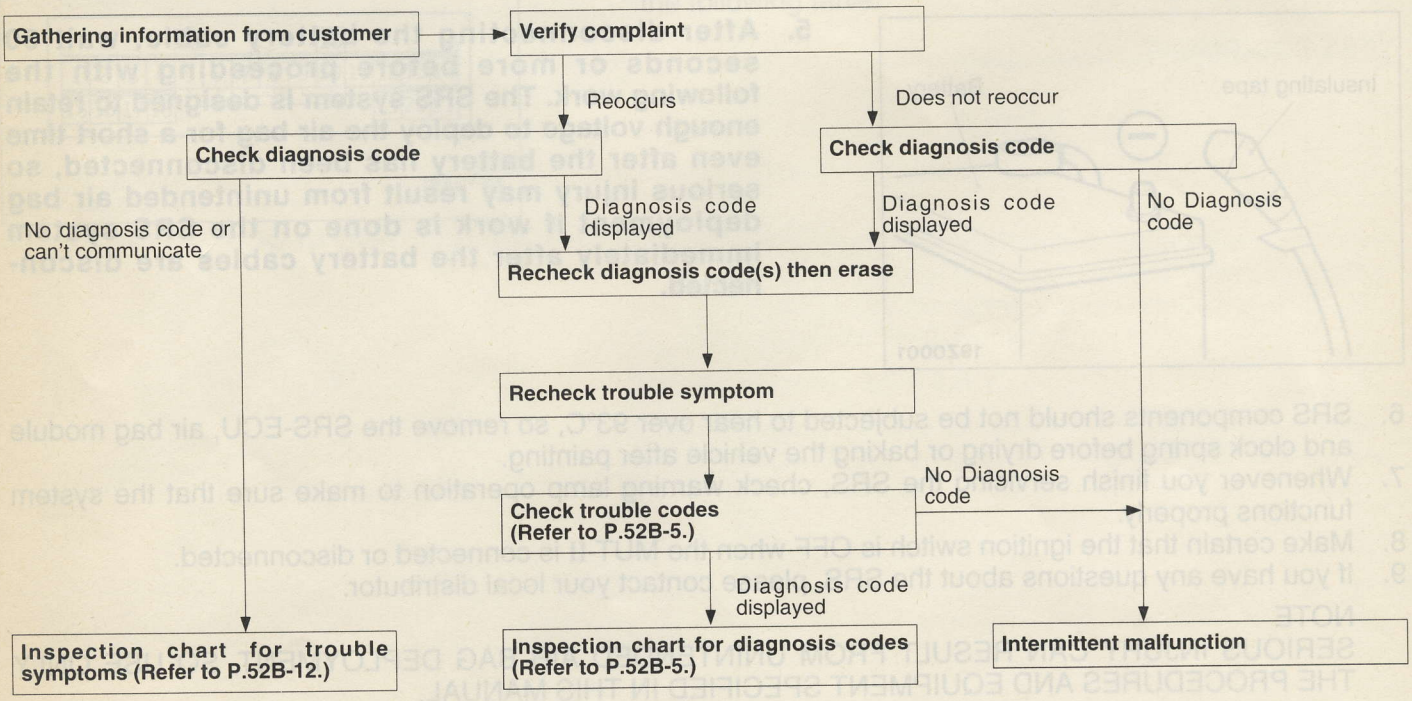
Tool	Number	Name	Use
 19U0039	MB991613	SRS check harness	Checking the SRS electrical circuitry

TEST EQUIPMENT

Tool	Name	Use
 13R0746	Digital multi-meter	Checking the SRS electrical circuitry Use a multi-meter for which the maximum test current is 2 mA or less at the minimum range of resistance measurement

TROUBLESHOOTING

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING



INSPECTION CHART FOR DIAGNOSIS CODES

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

Code No.	Diagnosis item		Reference page
14	Analog G-sensor system in the SRS-ECU		52B-5
15, 16	Safing G-sensor system in the SRS-ECU		52B-6
21, 22, 61, 62	Driver's side air bag module (squib) system		52B-6
24, 25, 64, 65	Front passenger's side air bag module (squib) system		52B-7
31, 32	SRS-ECU capacitor system		52B-7
34*	Connector lock system		52B-7
35	SRS-ECU (deployed air bag) system		52B-8
41*	IG_1 (A) power circuit system		52B-8
42*	IG_1 (B) power circuit system		52B-9
43	SRS warning lamp drive circuit system	Lamp does not illuminate.	52B-10
		Lamp does not switch off.	52B-11
44	SRS warning lamp drive circuit system		52B-11
45	SRS-ECU non-volatile memory (EEPROM) and A/D converter system		52B-11
51, 52	Driver's side air bag module (squib ignition drive circuit) system		52B-11
54, 55	Front passenger's side air bag module (squib ignition drive circuit) system		52B-11

NOTE

(1)*: If the vehicle condition returns to normal, the diagnosis code will be automatically erased, and the SRS warning lamp will return to normal.

(2) If the vehicle has a discharged battery it will store the fault codes 41 or 42. When these diagnosis codes are displayed, check the battery.

INSPECTION PROCEDURE CLASSIFIED BY DIAGNOSIS CODE

Code No.14 Analog G-sensor system in the SRS-ECU	Probable cause
The SRS-ECU monitors the output of the analog G-sensor inside the SRS-ECU. It outputs this code when any of the following are detected. • When the analog G-sensor is not operating • When the characteristics of the analog G-sensor are abnormal • When the output from the analog G-sensor is abnormal	• Malfunction of SRS-ECU

Replace the SRS-ECU.

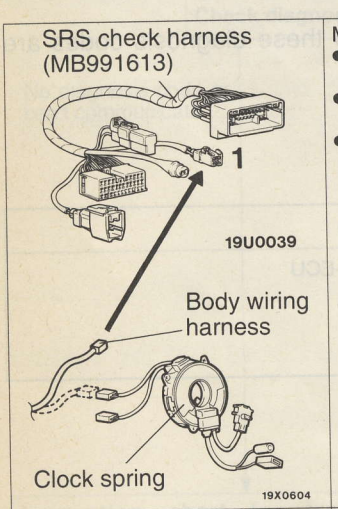
Code No.15 Safing G-sensor system in the SRS-ECU	Probable cause
This code is output if there is a short or open circuit between the terminals of the safing G-sensor inside the SRS-ECU. The trouble causes for each diagnosis code No. are as follows.	• Malfunction of SRS-ECU

Code No.	Trouble symptom
15	Short circuit in the safing G-sensor
16	Open circuit in the safing G-sensor

Replace the SRS-ECU.

Code No.21, 22, 61 or 62 Driver's side air bag module (squib) system	Probable cause
These diagnosis codes are output if there is abnormal resistance between the input terminals of the driver's side air bag module (squib). The trouble causes for each diagnosis code No. are as follows.	• Malfunction of clock spring • Malfunction of wiring harnesses or connectors • Malfunction of driver's side air bag module (squib) • Malfunction of SRS-ECU

Code No.	Trouble symptom
21	• Short in driver's side air bag module (squib) or harness short • Short in clock spring
22	• Open circuit in driver's side air bag module (squib) or open harness • Open circuit in clock spring • Malfunction of connector contact
61	• Short in driver's side air bag module (squib) harness leading to the power supply
62	• Short in driver's side air bag module (squib) harness leading to the earth



MUT-II Self-diag code
- Disconnect clock spring connector C-92.
- Connect SRS check harness connector (1).
- Erase diagnosis code memory.

Are code No.21, 22, 61 or 62 output?

Yes → **Check the following connectors:** C-92 and D-51
NG → **Repair**
OK → Check trouble symptoms.
NG → Check the harness wire between the SRS-ECU and clock spring.
NG → **Repair**
OK → Replace the SRS-ECU.

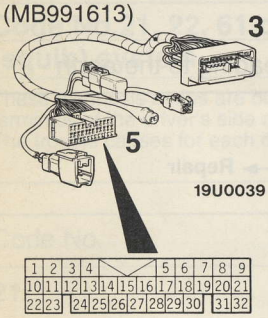
No → Check the clock spring.
NG → **Repair**
OK → Replace the driver's side air bag module.

Code No.35 SRS-ECU (deployed air bag) system	Probable cause
This diagnosis code is output after the air bag deploys. If this code is output before the air bag has deployed, the cause is probably a malfunction inside the SRS-ECU.	• Malfunction of SRS-ECU

Replace the SRS-ECU.

Code No.41 IG_1 (A) power circuit system	Probable cause
This diagnosis code is output if the voltage between the IG_1 (A) terminal and the earth is lower than the specified value for a continuous period of 5 seconds or more. However, if the vehicle condition returns to normal, diagnosis code No.41 will be automatically erased, and the SRS warning lamp will switch off.	• Malfunction of wiring harnesses or connectors • Malfunction of SRS-ECU

SRS check harness (MB991613)



19L0567

Measure at SRS check harness connector (5).
- Disconnect SRS-ECU connector D-51.
- Connect SRS check harness connector (3).
- Continuity between terminals (20) and (21)

OK: Continuity

NG → **Check the following connectors:** C74, C78 and D51 → NG → **Repair**

OK → Check trouble symptoms.

NG → Check the harness wire between the SRS-ECU and earth, and repair if necessary.

OK

Measure at SRS check harness connector (5).
- Disconnect SRS-ECU connector D-51.
- Connect SRS check harness connector (3).
- Connect negative battery cable
- Ignition switch: ON
- Voltage between terminal (14) and body earth

OK: 9 V or more

NG → **Check the following connectors:** C-74 and D-51 → NG → **Repair**

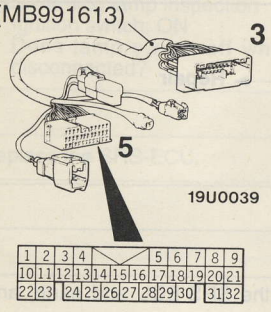
OK → Check trouble symptoms.

NG → Check the harness wire between the SRS-ECU and ignition switch IG_1, and repair if necessary.

OK → Replace the SRS-ECU.

Code No.42 IG_1 (B) power circuit system	Probable cause
This diagnosis code is output if the voltage between the IG_1 (B) terminal and the earth is lower than the specified value for a continuous period of 5 seconds or more. However, if the vehicle condition returns to normal, diagnosis code No.42 will be automatically erased, and the SRS warning lamp will switch off.	• Malfunction of wiring harnesses or connectors

SRS check harness (MB991613)



19L0567

Measure at SRS check harness connector (5).
- Disconnect SRS-ECU connector D-51.
- Connect SRS check harness connector (3).
- Continuity between terminals (20) and (21)

OK: Continuity

NG → **Check the following connectors:** C-74, C-78 and D-51 → NG → **Repair**

OK → Check trouble symptoms.

NG → Check the harness wire between the SRS-ECU and earth, and repair if necessary.

OK → Measure at SRS check harness connector (5).
- Disconnect SRS-ECU connector D-51.
- Connect SRS check harness connector (3).
- Connect negative battery cable
- Ignition switch: ON
- Voltage between terminal (13) and body earth

OK: 9 V or more

NG → **Check the following connectors:** C-79 and D-51 → NG → **Repair**

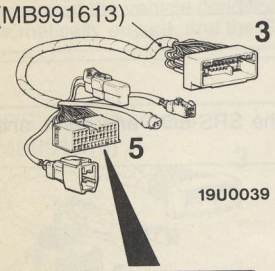
OK → Check trouble symptoms.

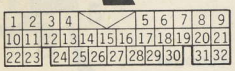
NG → Check the harness wire between the SRS-ECU and ignition switch IG_1, and repair if necessary.

OK → Replace the SRS-ECU.

Code No.43 SRS warning lamp drive circuit system (Lamp does not illuminate.)	Probable cause
This diagnosis code is output when an open circuit occurs for a continuous period of 5 seconds while the SRS-ECU in monitoring the SRS warning lamp and the lamp is OFF (transistor OFF). However, if this code is output due to an open circuit, if the vehicle condition returns to normal, this diagnosis code No.43 will be automatically erased, and the SRS warning lamp will return to normal.	• Malfunction of wiring harnesses or connectors • Blown bulb • Malfunction of SRS-ECU • Malfunction of combination meter

SRS check harness (MB991613)





Measure at SRS check harness connector (5).
- Disconnect SRS-ECU connector D-51.
- Connect SRS check harness connector (3).
- Continuity between terminals (20) and (21)

OK: Continuity

NG → **Check the following connectors:** C-74, C-78 and D-51 → NG → **Repair**

OK → Check trouble symptoms.

NG → Check the harness wire between the SRS-ECU and earth, and repair if necessary.

OK →

Measure at SRS check harness connector (5).
- Disconnect SRS-ECU connector D-51.
- Connect SRS check harness connector (3).
- Ignition switch: ON
- Connect negative battery cable
- Connect terminal (15) to the body earth.

OK: Lamp illuminates

NG → Blown bulb inspection → NG → **Repair**

OK → **Check the following connectors:** C-13, C-68, C-78, D-04 and D-05 → NG → **Repair**

OK → Check trouble symptoms.

NG → Check the harness wire between the SRS-ECU and ignition switch (IG_1). → NG → **Repair**

OK → Replace the combination meter.

OK → Replace the SRS-ECU.

Code No.43 SRS warning lamp drive circuit system (Lamp does not switch off.)	Probable cause
This diagnosis code is output when a short to earth occurs in the harness between the lamp and the SRS-ECU while SRS-ECU is monitoring the SRS warning lamp and the lamp is ON.	• Malfunction of wiring harnesses or connectors • Malfunction of SRS-ECU • Malfunction of combination meter

SRS warning lamp inspection
- Ignition switch: ON
- Does lamp switch off when SRS-ECU connector D-51 is disconnected?

No → **Check the following connectors:** C-13, D-05 and D51 — NG → **Repair**

OK → Check trouble symptoms. — NG → Check the harness wire between the SRS-ECU and combination meter, and repair if necessary.

Yes → Replace the SRS-ECU.

Code No.44 SRS warning lamp drive circuit system	Probable cause
This diagnosis code is output when a short occurs in the lamp drive circuit or a malfunction of the output transistor inside the SRS-ECU is detected while the SRS-ECU is monitoring the SRS warning lamp drive circuit.	• Malfunction of wiring harnesses or connectors • Malfunction of SRS-ECU

Check the SRS warning lamp drive circuit system. (Refer to P.52B-11.) → OK → Replace the SRS-ECU.

Code No.45. SRS-ECU non-volatile memory (EEPROM) and A/D converter system	Probable cause
This diagnosis code is output if there is a malfunction in the SRS-ECU non-volatile memory (EEPROM) and A/D converter.	• Malfunction of SRS-ECU

Replace the SRS-ECU.

Code No.51 or 52 Driver's side air bag module (squib ignition drive circuit) system	Probable cause
This diagnosis code is output if a short (No.51) or an open circuit (No.52) is detected in the circuit for the driver's seat.	• Malfunction of SRS-ECU

Replace the SRS-ECU.

Code No.54 or 55 Front passenger's side air bag module (squib ignition drive circuit) system	Probable cause
This diagnosis code is output if a short (No.54) or an open circuit (No.55) is detected in the circuit for the passenger's seat.	• Malfunction of SRS-ECU

Replace the SRS-ECU.

INSPECTION CHART FOR TROUBLE SYMPTOMS

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

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is not possible.	Communication with all systems is not possible.	1	52B-12
	Communication is not possible with SRS only.	2	52B-12
When the ignition key is turned to "ON" (engine stopped), the SRS warning lamp does not illuminate.		Refer to diagnosis code No.43.	52B-10
After the ignition switch is turned to ON, the SRS warning lamp is still on after approximately 7 seconds have passed.		Refer to diagnosis code No.43.	52B-11

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

Inspection procedure 1

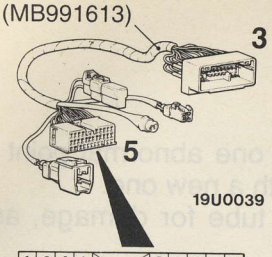
Communication with MUT-II is not possible. (Communication with all systems is not possible.)	**Probable cause**
The cause is probably a power supply system (including earth circuit) of the diagnosis line.	• Malfunction of connectors • Malfunction of wiring harness

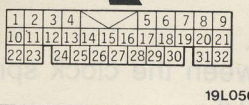
Refer to GROUP 35 – Troubleshooting.

Inspection Procedure 2

Communication with MUT-II is not possible. (Communication is not possible with SRS only.)	**Probable cause**
If communication is not possible with the SRS only, the cause is probably an open circuit in the diagnosis output circuit of the SRS or in the power circuit (including earth circuit).	• Malfunction of wiring harnesses or connectors • Malfunction of SRS-ECU

SRS check harness (MB991613)





Measure at SRS check harness connector (5).
- Disconnect SRS-ECU connector D-51.
- Connect SRS check harness connector (3).
- Continuity between terminals (20) and (21)

OK: Continuity

NG → **Check the following connectors:** C-74, C-78 and D-51 NG → **Repair**

OK → Check trouble symptoms.

NG → Check the harness wire between the SRS-ECU and earth, and repair is necessary.

OK

Measure at SRS check harness connector (5).
- Disconnect SRS-ECU connector D-51.
- Connect SRS check harness connector (3).
- Connect negative battery cable
- Ignition switch: ON
- Voltage between terminal (13) and body earth

OK: 9 V or more
- Voltage between terminal (14) and body earth

OK: 9 V or more

NG → **Check the following connectors:** C-74, C-79 and D-51 NG → **Repair**

OK → Check trouble symptoms.

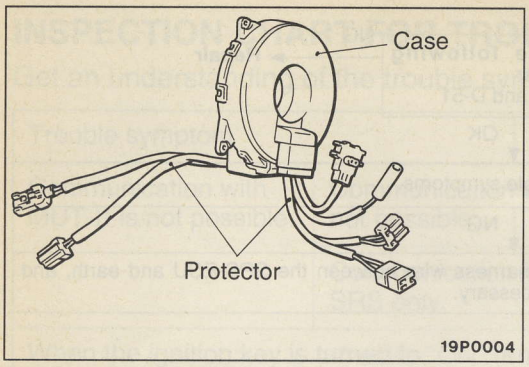
NG → Check the harness wire between the SRS-ECU and ignition switch IG_1, and repair if necessary.

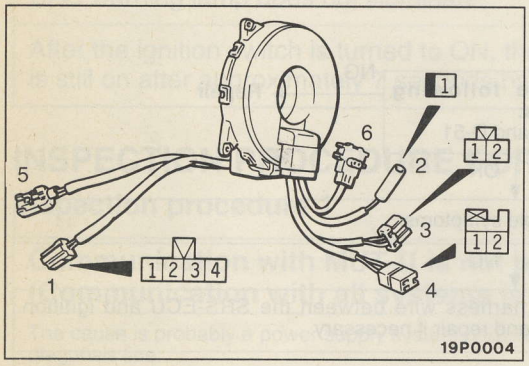
OK

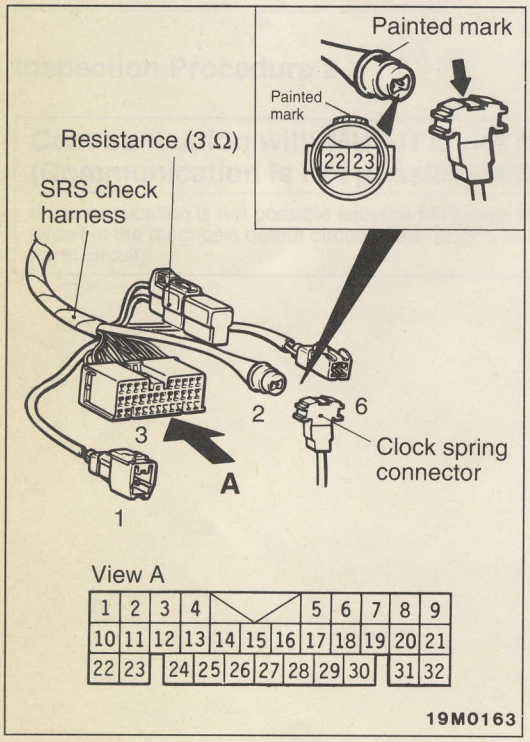
Check the harness wire between the SRS-ECU and diagnosis connector. NG → **Repair**

OK

Replace the SRS-ECU.







AIR BAG MODULE AND CLOCK SPRING

CLOCK SPRING

INSPECTION

If, as result of following checks, even one abnormal point is discovered, replace the clock spring with a new one.

1. Check connectors and protective tube for damage, and terminals for deformation.
2. Visually check the case for damage.
3. Check that there is continuity between the clock spring connectors No.1, No.2, No.3 and No.4.

Connector No.	1				2	3		4	
Terminal No.	1	2	3	4	1	1	2	1	2
Continuity between terminals	○								○
		○				○			
		○						○	
			○		○				
				○			○		

4. When joining SRS Check harness connector No.2 and clock spring connector No.6 align paint of the No.2 with the arrow portion of the No.6.
5. Check for continuity between terminal 25 and terminal 26 of SRS Check harness connector No.3.

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