FUEL

CONTENTS

FUEL SYSTEM <6G72-24 Valve Engine, 6G74 Engine>

GENERAL

OUTLINE OF CHANGE

The following service points have been established to correspond to the addition of vehicles with immobilizer system.

- An engine-ECU has been added.
- An engine warning lamp illumination topic and a diagnosis topic have been added.
- The following check items have been added.
  (1) Fuel pump
  (2) Air conditioner switch and power relay

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items			Specifications
Engine-ECU	Identification model No.	SOHC	E2T37486 <Vehicles with immobilizer system>
		DOHC	E2T39983 <Vehicles with immobilizer system>

TROUBLESHOOTING

ENGINE WARNING LAMP (CHECK ENGINE LAMP)

ITEMS INDICATED BY THE ENGINE WARNING LAMP

Immobilizer system

SELF-DIAGNOSIS

Diagnosis Chart

Diagnosis item	Malfunction code		Check item (Remedy)
	No.	Memory	
Immobilizer system	54	Retained	• Harness and connector • Immobilizer-ECU Refer to GROUP 54 – Immobilizer Troubleshooting.

NOTE
- If the engine is started while several ignition keys are in the vicinity, then interference between the different keys may occur, which will cause this code to be generated.
- This code may also be generated when registering a key ID code.

PROBLEM DIAGNOSIS CONTENT CHART

Malfunction code No.	Diagnosis item	Diagnosis contents	Probable cause	Remark (Trouble symptom, etc.)
54	Immobilizer system	Improper communication between engine-ECU and immobilizer-ECU	(1) ID code interference (2) Non-identical ID codes (3) Improper communication line between engine-ECU and immobilizer-ECU (4) Malfunction of immobilizer-ECU (5) Malfunction of the engine – ECU	• Starting is impossible.

CHECK CHART CLASSIFIED BY PROBLEM SYMPTOMS

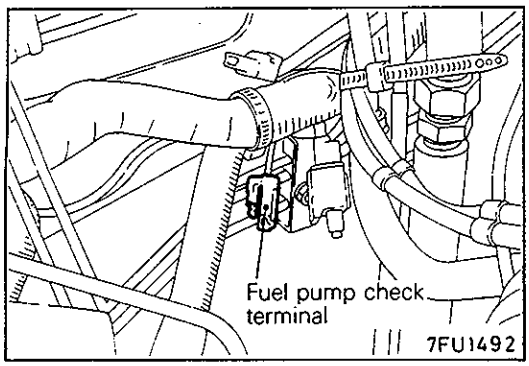
<Vehicles with immobilizer system>

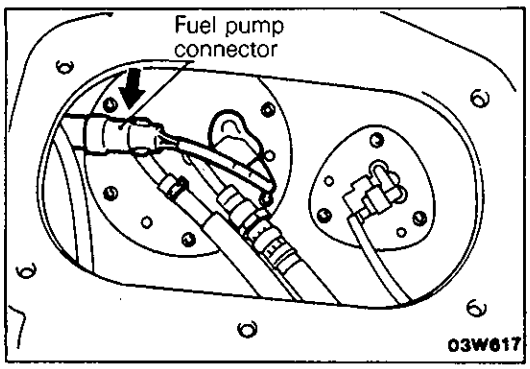
Problem symptoms / Check Items	Starting		Idling stability			Driving						Stopping	Reference page
	Will not start	Starting problem	Idling instability (Rough idling)	Incorrect idling speed	Improper idling continuity	Hesitation, sag	Poor acceleration	Stumble	Shock	Surge	Knocking	Run-on (Dieseling)	
Power Supply and Ignition Switch-IG	①1												*13-79-34
Engine Control Unit Power Earth	②2												*13-79-37
Fuel Pump	③3	①1			①1	①1	①1						*13-79-38 13-5
Air Flow Sensor					⑪⑩	⑩⑩		⑤5	⑤5		④4		*13-79-41
Intake Air Temperature Sensor			⑤			⑥6	⑤5				②2		*13-79-46
Barometric Pressure Sensor			⑦			⑨9	⑦7				③3		*13-79-49
Engine Coolant Temperature Sensor		3	⑥5	①1	⑤5	⑧8	⑥6	④4		③3			*13-79-51
Throttle Position Sensor						⑦7		③3	④4				*13-79-54
Idle Position Switch			③3	②2	④4								*13-79-57
Cam Position Sensor	⑤5	⑥7			⑧7				②2				*13-79-60
Crank Angle Sensor	⑥6	⑦8			⑨8				③3				*13-79-64
Ignition Switch-ST <M/T>	④4	③4											*13-79-67
Ignition Switch-ST and Inhibitor Switch <A/T>	④4	③4		⑤									*13-79-68
Vehicle Speed Sensor					⑥				⑥				*13-79-70
Power Steering Fluid Pressure Switch				③									*13-79-72
Air Conditioner Switch and Power Relay				④									*13-79-74 13-8
Detonation Sensor <DOHC>											①1		*13-79-76
Oxygen Sensor			⑨										*13-79-80
Injectors	⑧8	②2	②2		③3	②2	②2	①1		①1		①	*13-79-83
Idle Speed Control Servo (Stepper Motor)		④5	①1	⑥3	②2				⑧6				*13-79-88
Ignition Coil and Power Transistor	⑦7				⑩9		⑧8		①1		⑤5		*13-79-93, 99
Variable Induction Control Solenoid Valve						④4	④4						*13-79-103
Purge Solenoid			⑧										*13-79-105
EGR Control Solenoid Valve						⑤5		⑥6		④4			*13-79-107
Anti-skid Brake Signal									⑦				*13-79-109
Fuel Pressure		⑤6	④4		⑦6	③3	③3	②2		②2			*13-79-110, 113

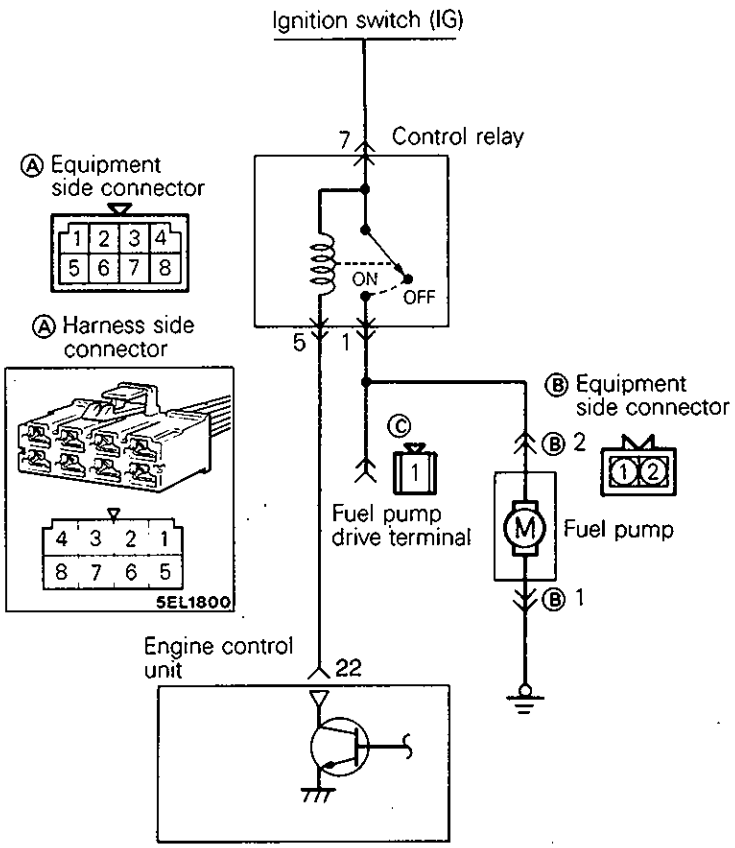
○ : Warm engine (figures inside the ○ indicate the checking sequence.)
□ : Cold engine (figures inside the □ indicate the checking sequence.)
* : Refer to PAJERO Workshop Manual (PWJE9086).

ON-VEHICLE INSPECTION OF MPI COMPONENTS

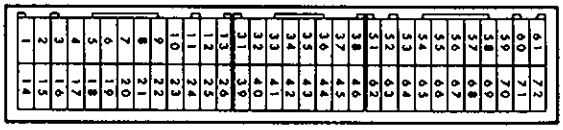
FUEL PUMP







Engine control unit connector



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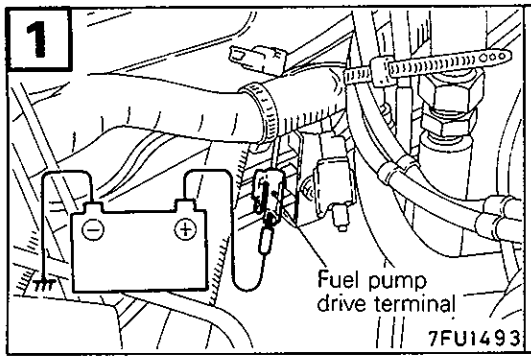
HARNESS INSPECTION

1

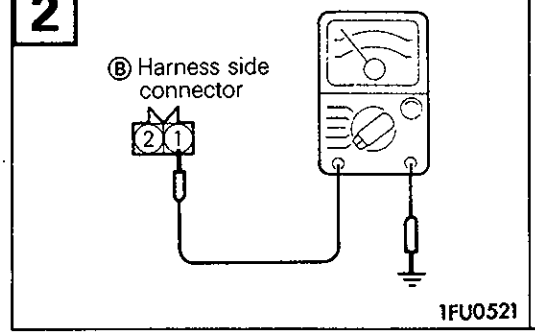


Check the fuel pump.
- Apply battery voltage to the fuel pump drive terminal and operate the pump.

OK → 4

NO → 2

2

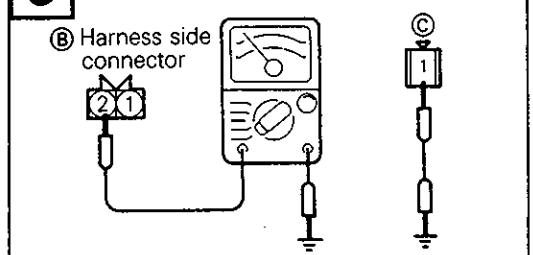


Check for continuity of the fuel pump earthing line.
- Fuel pump connector: Disconnected

OK → 3

NO → Repair the harness. (Ⓑ1 – Earth)

3

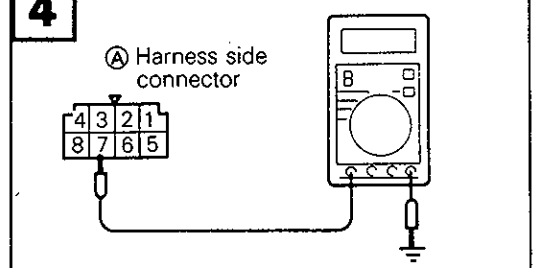


Check for open-circuit or short-circuit between the fuel pump and the fuel pump drive terminal.
- Fuel pump connector: Disconnected
- Control relay connector: Disconnected

OK → 4

NO → Repair the harness. (Ⓑ2 – Ⓒ1)

4



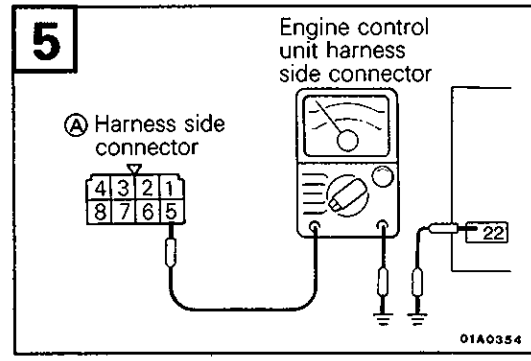
Measure the power supply voltage of the control relay.
- Control relay connector: Disconnected

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

OK → 5

NO → Repair the harness. (Ignition switch – Ⓐ7) or check for ignition switch.

5

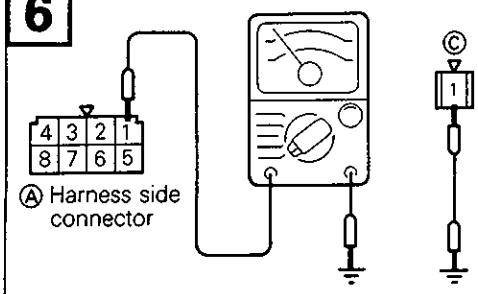


Check for an open-circuit, or a short-circuit to earth between the control relay and the engine control unit.
- Control relay connector: Disconnected
- Engine control unit connector: Disconnected

OK → 6

NO → Repair the harness. (Ⓐ5 – 22)

6



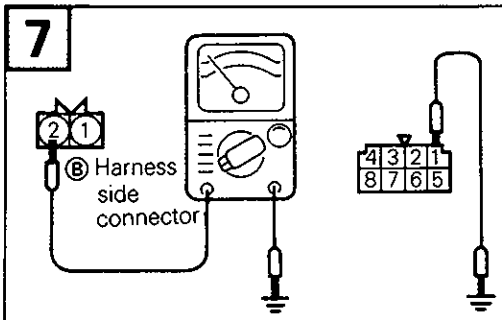
Check for continuity between the fuel pump drive terminal and the control relay.

- Control relay connector: Disconnected
- Fuel pump connector: Disconnected

OK → 7

NG → Repair the harness. (Ⓐ1 - Ⓒ1)

7



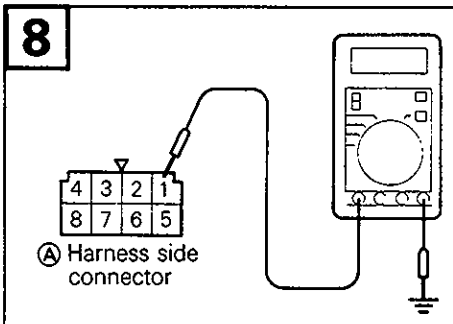
Check for an open-circuit, or a short-circuit to earth between the control relay and the fuel pump.

- Control relay connector: Disconnected
- Fuel pump connector: Disconnected

OK → 8

NG → Repair the harness. (Ⓐ1 - Ⓑ2)

8



Measure the power supply voltage of the fuel pump.

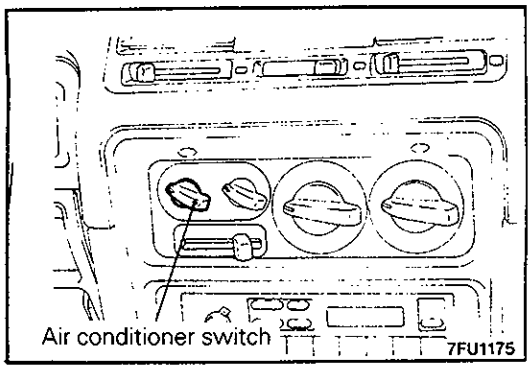
- Control relay connector: Connected
- Engine control unit connector: Connected

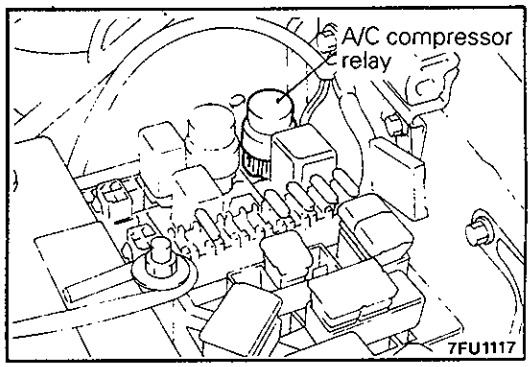
Engine	Voltage (V)
Cranking	8V or more
Racing	SV

OK → STOP

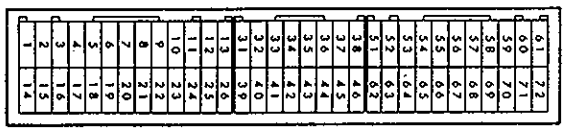
NG → Control relay or engine control unit is defective.

AIR CONDITIONER SWITCH AND POWER RELAY





Engine control unit connector



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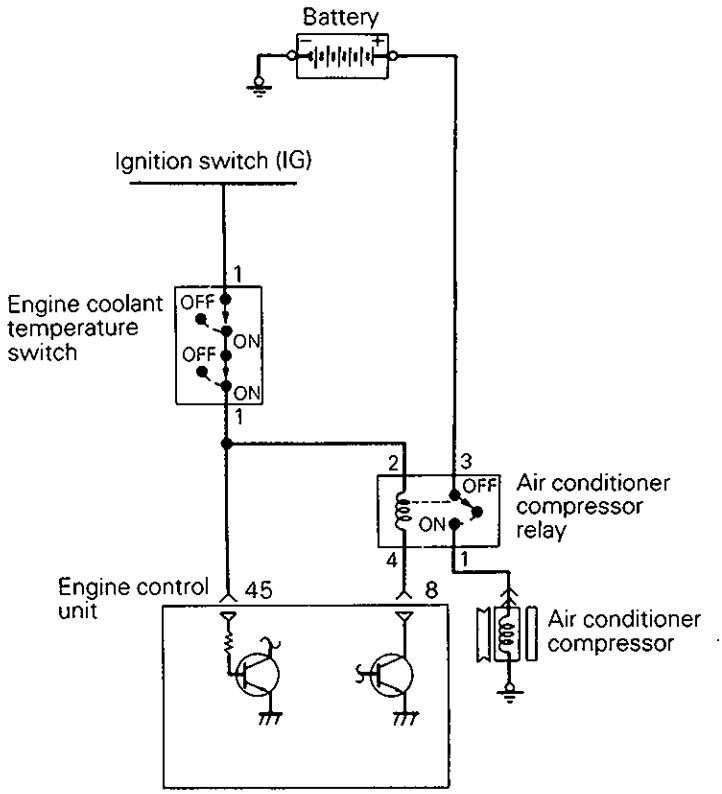

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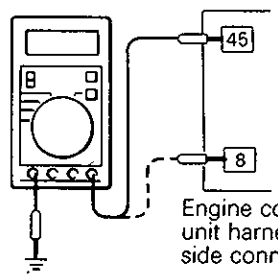
HARNESS INSPECTION

1



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Measure the power supply voltage of the air conditioner circuit.
- Engine control unit connector: Disconnect
- Ignition switch: ON
- Air conditioner switch: ON

Voltage (V)
5V

OK → STOP

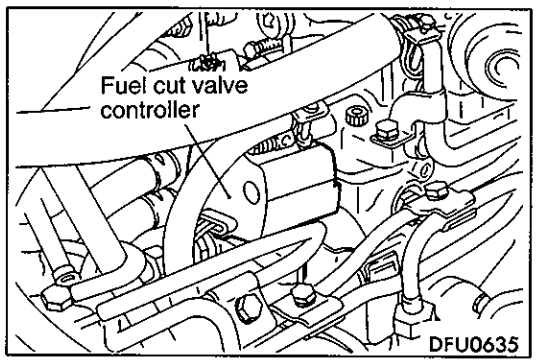
OK → Check the Air conditioner circuit.

FUEL SYSTEM <4D56 Engine, 4M40 Engine>

GENERAL

OUTLINE OF CHANGE

- The fuel cut valve controller with integrated fuel cut solenoid valve has been installed to the fuel injection pump to correspond to the addition of vehicles with immobilizer system.
- The fuel line heater has been changed and new maintenance service points have been established. As a result, the fuel line heater control unit has been abolished.



SERVICE ADJUSTMENT PROCEDURES

FUEL CUT VALVE CONTROLLER INSPECTION

Operation Inspection

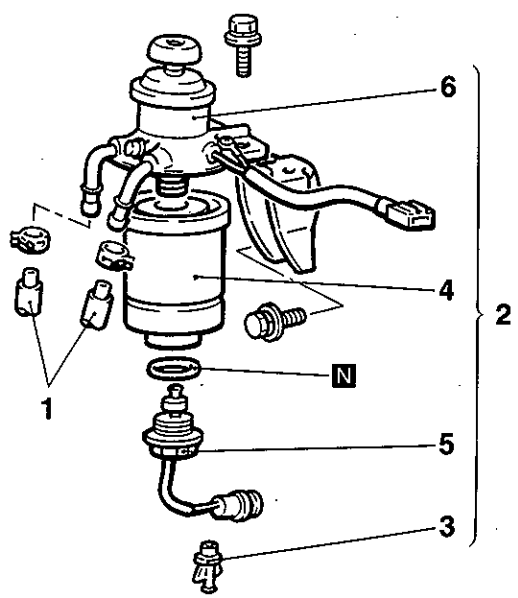
When a sound scope is held against the fuel cut valve controller and the ignition switch is turned to "ON", check that the sound of the valve operating can be heard.
If no operating sound can be heard, check the immobilizer system while referring to GROUP 54 – Immobilizer System.

FUEL FILTER <VEHICLES WITH LINE HEATER>

REMOVAL AND INSTALLATION

Pre-removal Operation
- Inter-cooler Removal

Post-installation Operation
(1) Inter-cooler Installation
(2) Air Bleeding of Fuel Line



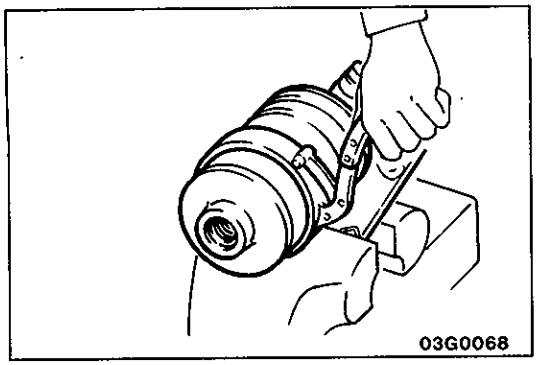
Removal steps

◀A▶ ▶A◀ 1. Main hose connection
2. Fuel filter assembly
3. Drain plug
◀B▶ ◀C▶ 4. Fuel filter cartridge
5. Water level sensor
6. Fuel filter pump body

REMOVAL SERVICE POINT

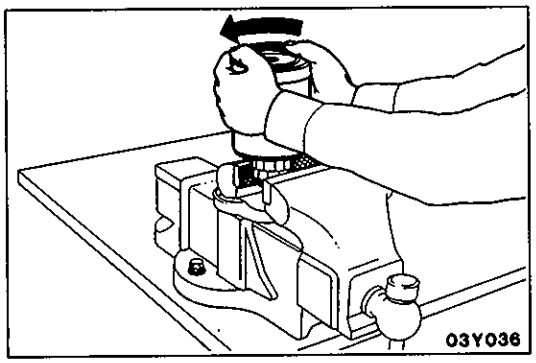
◀A▶ MAIN HOSE REMOVAL

Caution
Cover with a rag to prevent fuel from spraying out.



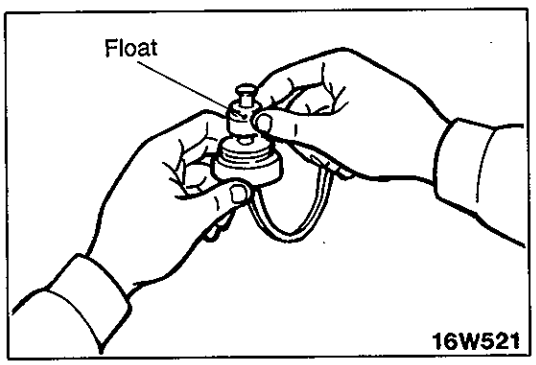
◀B▶ FUEL FILTER CARTRIGE REMOVAL

Hold fuel filter pump in vice. Remove fuel filter cartridge with oil filter wrench.



◀C▶ WALTER LEVEL SENSOR REMOVAL

Hold water level sensor in vice. Remove fuel filter cartridge by hand.

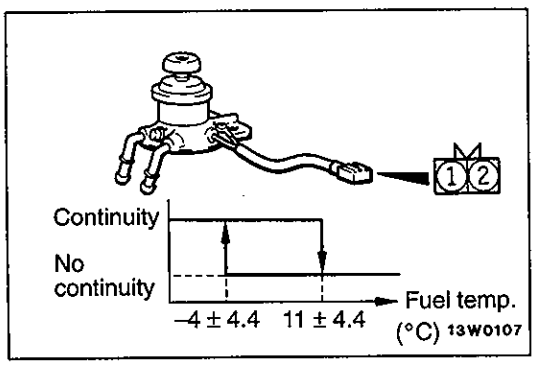


INSPECTION

- Check hoses and line for cracks, bends, deterioration or clogging.
- Check fuel filter for clogging or damage.

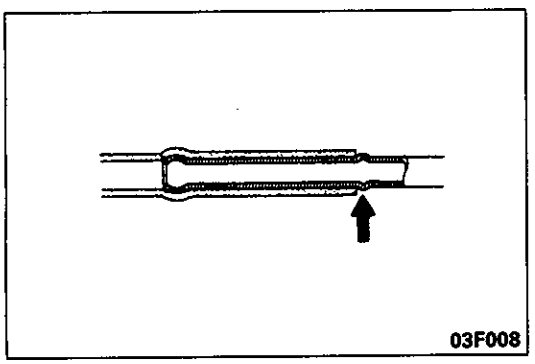
WATER LEVEL SENSOR OPERATION

Connect circuit tester to water level sensor connector. Water level sensor is operating correctly if there is continuity when float is raised and no continuity when lowered.



FUEL LINE HEATER CONTINUITY INSPECTION

There should be continuity between the terminals when the fuel filter pump is cooled to –4°C or below and continuity should disappear when the pump is gradually heated. If this is true, then the heater is working properly.



INSTALLATION SERVICE POINT

▶A◀ MAIN HOSE INSTALLATION

Insert each hose securely as far as the stepped section on the pipes.