GROUP 13B

FUEL SUPPLY

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GENERAL DESCRIPTION

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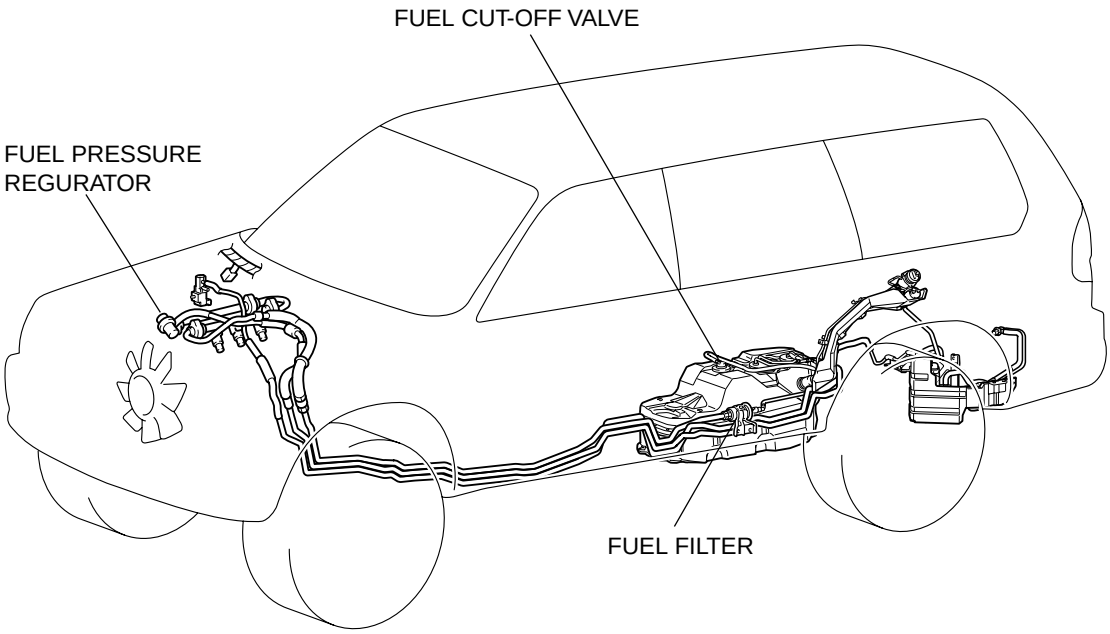
1. The fuel tank is located under the floor below the rear seats.
2. A fuel cut-off valve has been adopted to prevent fuel from leaking out in the event of a collision.



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FUEL SUPPLY DIAGNOSIS

INTRODUCTION TO FUEL SUPPLY DIAGNOSIS

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The fuel supply device is used to supply an appropriate mixture to the engine. The device is configured of the fuel tank, fuel filter, fuel pump and the fuel pipe that couples each part. An evaporative emission control system is also provided to prevent pollution from the evaporated fuel.

Engine malfunctions caused by insufficient fuel supply and evaporative emission control system operation malfunctions can be caused by faults in the vapor line, fuel pipe, hose, or fuel tank pressure control valve, etc.

FUEL SUPPLY DIAGNOSTIC TROUBOLESHOOTING STRATEGY

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Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure that you have exhausted most of the possible ways to find a fuel supply fault.

1. Gather information from the customer.
2. Verify that the condition described by the customer exists.
3. Find the malfunction by following the Symptom Chart.
4. Verify that the malfunction is eliminated.

SYMPTOM CHART

M1135004200304

SYMPTOM	INSPECTION PROCEDURE	REFERENCE PAGE
Engine malfunctions due to insufficient fuel supply	1	P.13B-3

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1:Engine Malfunctions Due to Insufficient Fuel Supply

TROUBLESHOOTING HINTS (The most likely causes for this case:)

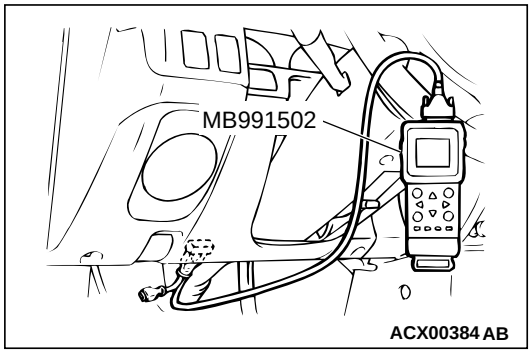
- Injector failed.
- Open or shorted injector circuit, or loose connector.
- Bent, kinked or clogged fuel pipe or hose.
- Malfunction of fuel pump module.

DIAGNOSIS

Required Special Tools:

- MB991502: Scan Tool (MUT-II)
- MB991637: Fuel Pressure Gauge Set
- MD998709: Adaptor Hose
- MD998742: Hose Adaptor

STEP 1. Using scan tool MB991502, read the diagnostic trouble code (DTC).



⚠ CAUTION

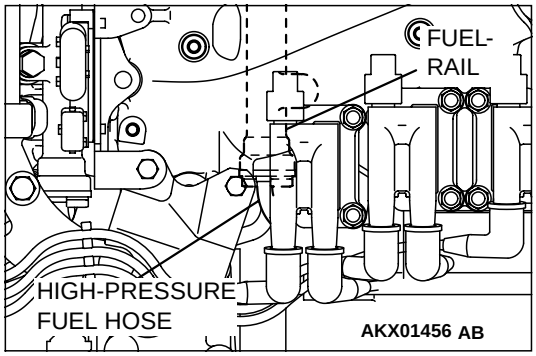
To prevent damage to scan tool MB991502, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.

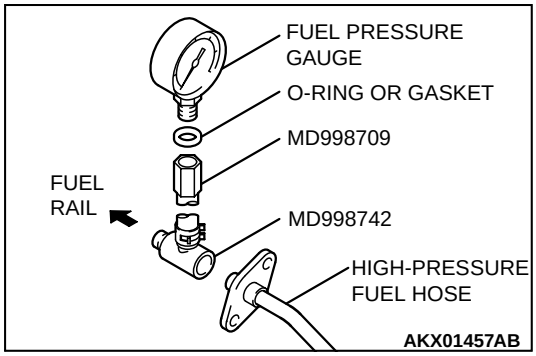
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

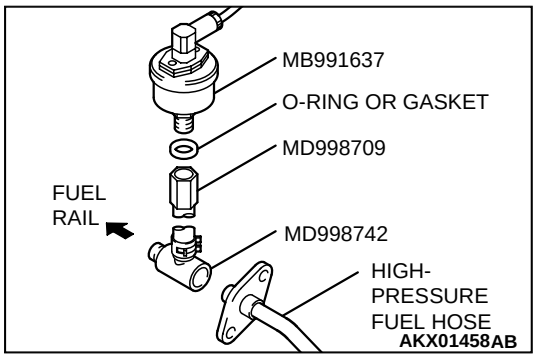
Q: Is the DTC set?

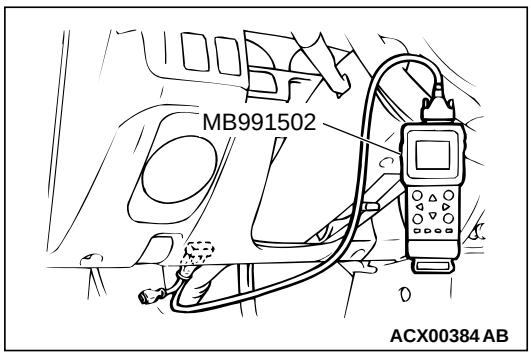
YES : Refer to GROUP 13A, Diagnostic Trouble Code Chart P.13Ab-21.

NO : Go to Step 2.









STEP 2. Check the fuel pressure.

(1) Release residual pressure from the fuel line to prevent fuel spray. (Refer to P.13Aa-18.)

⚠ WARNING

To prevent a fire, cover the hose connection with shop towels to prevent splashing of fuel that could be caused by some residual pressure in the fuel pipe line.

(2) Disconnect the high-pressure fuel hose at the fuel rail side.

(3) Assemble the fuel pressure measurement tools as follows.

(4) <When using the fuel pressure gauge>
   a. Remove the union joint and bolt from special tool MD998709 (adaptor hose) and instead attach special tool MD998742 (hose adaptor) to the adaptor hose.
   b. Place a suitable O-ring or gasket on assembled special tools MD998709 and MD998742 and install the fuel pressure gauge.
   c. Install the assembled fuel pressure measurement tools between the fuel rail and high-pressure fuel hose.

(5) <When using special tool MB991637 (fuel pressure gauge set)>
   a. Remove the union joint and bolt from special tool MD998709 (adaptor hose) and instead attach special tool MD998742 (hose adaptor) to the adaptor hose.
   b. Install special tool MB991637 (fuel pressure gauge set) to assembled special tools MD998709 and MD998742 via a gasket.
   c. Install the assembled fuel pressure measurement tools between the fuel rail and the high-pressure fuel hose.

⚠ CAUTION

To prevent damage to scan tool MB991502, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.

(6) Connect scan tool MB991502 to the data link connector.

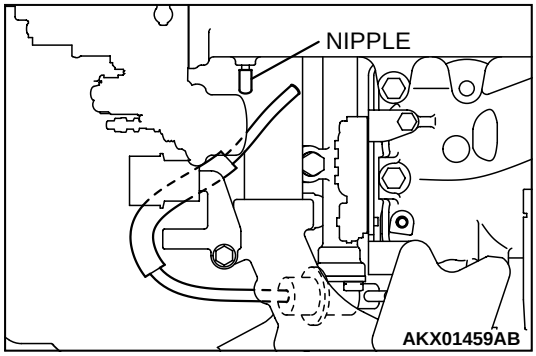
(7) Use the Actuator test 07 to drive the fuel pump. Check that there is no fuel leaking from any section when the fuel pump is operating.

(8) Stop the fuel pump.

(9) Start the engine and run at idle.

(10) Measure fuel pressure while the engine is running at idle.

Standard value: Approximately 270 kPa (38 psi) at curb idle



(11)Disconnect the vacuum hose from the fuel pressure regulator and measure fuel pressure with the hose end closed with your finger.

Standard value: 330 – 350 kPa (47 – 50 psi) at curb idle

(12)Check to see that fuel pressure at idle does not drop even after the engine has been revved several times.

(13)Revving the engine repeatedly, hold the fuel return hose lightly with your fingers to feel that fuel pressure is present in the return hose.

NOTE: If the fuel flow rate is low, there will be no fuel pressure in the return hose.

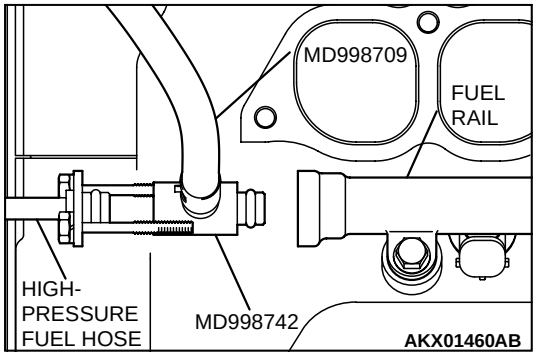
(14)If any of fuel pressure measured in steps 10 to 13 is out of specification, troubleshoot and repair according to the table below.

SYMPTOM	PROBABLE CAUSE	REMEDY
• Fuel pressure too low • Fuel pressure drops after racing • No fuel pressure in fuel return hose	Clogged fuel filter	Replace fuel filter
	Fuel leaking to return side due to poor fuel regulator valve seating or settled spring	Replace fuel pressure regulator
	Low fuel pump delivery pressure	Replace fuel pump
Fuel pressure too high	Binding valve in fuel pressure regulator	Replace fuel pressure regulator
	Clogged fuel return hose or pipe	Clean or replace hose or pipe
Same fuel pressure when vacuum hose is connected and when disconnected	Damaged vacuum hose or clogged nipple	Replace vacuum hose or clean nipple
	Defective fuel pressure regulator	Replace fuel pressure regulator

(15)Stop the engine and observe fuel pressure gauge reading. It is normal if the reading does not drop within two minutes. If it does, observe the rate of drop and troubleshoot and repair according to the table below. Start, then stop the engine.

a. Squeeze the fuel return line closed to confirm leak-down occurs from defective fuel pressure regulator.
b. Squeeze the fuel supply line closed to confirm leak-down occurs from defective fuel pump check valve.
c. If pressure continues to drop with both fuel lines squeezed closed, injector(s) are leaking.

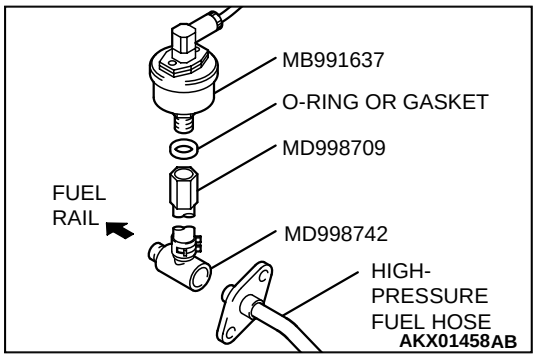
SYMPTOM	PROBABLE CAUSE	REMEDY
Fuel pressure drops gradually after engine is stopped	Leaky injector	Replace injector
	Leaky fuel regulator valve seat	Replace fuel pressure regulator
Fuel pressure drops sharply immediately after engine is stopped	Check valve in fuel pump is held open	Replace fuel pump



(16)Release residual pressure from the fuel pipe line. (Refer to GROUP 13A – On-vehicle service P.13Aa-18.)

⚠ *WARNING*

Cover the hose connection with shop towels to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.



(17)Remove the fuel pressure gauge or special tool MB991637, and special tools MD998709 and MD998742 from the fuel rail.
(18)Replace the O-ring at the end of the high-pressure fuel hose with a new one.
(19)Fit the high-pressure fuel hose into the fuel rail and tighten the bolts to specified torque.

Tightening torque: 4.9 ± 1.0 N·m (44 ± 8 in-lb)

(20)Check for fuel leaks.
a. Use scan tool MB991502 to operate the fuel pump.
b. Check the fuel line for leaks, and repair as needed.
(21)Turn the ignition switch to the "LOCK" (OFF) position.
(22)Disconnect scan tool MB991502.

Q: Are the fuel pressure test in good condition?

YES : Go to Step 6.
NO : Repair or replace. Then go to Step 3.

STEP 3. Check for bending, twisting or clogging of the fuel pipe or hose.

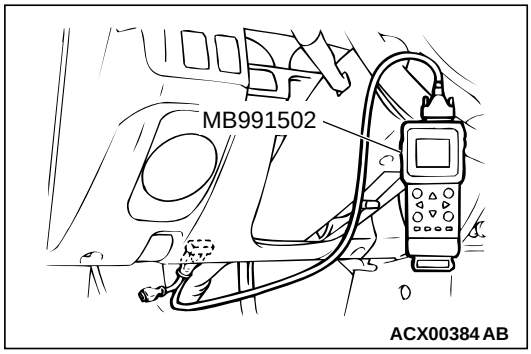
Q: Are the fuel pipe and hose in good condition?

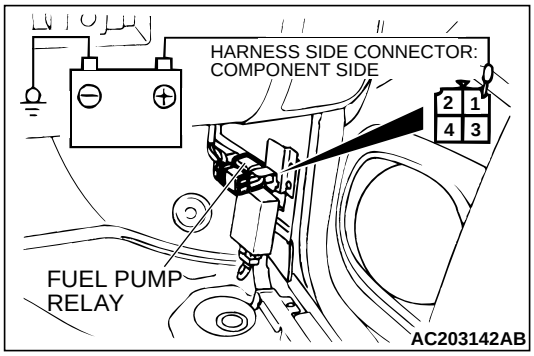
YES : Go to Step 4.
NO : Repair or replace. Then go to Step 7.

STEP 4. Check the fuel filter operation.

Q: Is the fuel filter operation in good condition?

YES : Then go to Step 5.
NO : Replace. (Refer to P.13B-11.) Then go to Step 7.





STEP 5. Check the fuel pump assembly operation.

⚠ CAUTION

To prevent damage to scan tool MB991502, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.

(1) Check the operating of the fuel pump by using scan tool MB991502 to force-drive the fuel pump.

(2) If the fuel pump will not operate, check by using the following procedure, and if it is normal, check the drive circuit.
   a. Turn the ignition switch to the "LOCK" (OFF) position.
   b. Remove the fuel pump relay connector.
   c. Connect the terminal number 1 of the harness-side connector to the battery.
   d. Check if the fuel pump operation sound can be heard at this time.

NOTE: As the fuel pump is an in-tank type, the fuel pump sound is hard to hear. Remove the fuel tank filler tube cap and check from the tank inlet.

(3) Check the fuel pressure by pinching the fuel hose with the fingertips.

Q: Is the fuel pump assembly operation in good condition?

YES : Then go to Step 6.
NO : Replace. Then go to Step 7.

STEP 6. Check the inside of the fuel tank for contamination and rust.

(1) Draining fuel.
(2) Fuel tank removal. (Refer to P.13B-9.)

Q: Is the fuel tank in good condition?

YES : Go to Step 7.
NO : Replace the fuel filter, and clean the fuel tank and fuel line. Then go to Step 7.

STEP 7. Retest the system.

Q: Is the engine malfunction eliminated?

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

SPECIAL TOOLS

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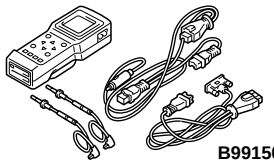
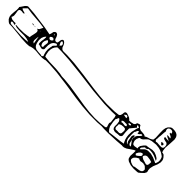
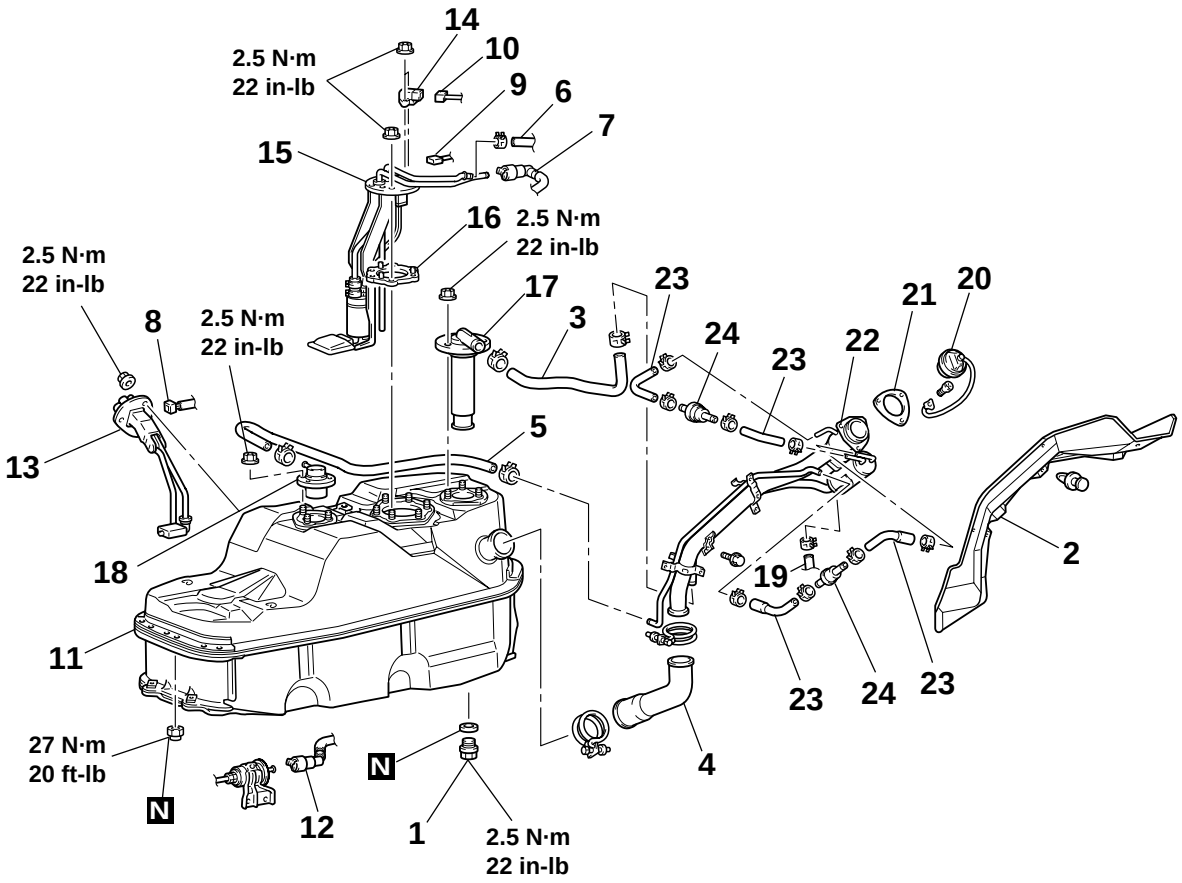
TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
 B991502	MB991502 Scan tool <MUT-II>	MB991496-OD	• Reading diagnostic trouble code • MFI system inspection
	MD998709 Adaptor hose	MIT210196	Measurement of fuel pressure
	MD998742 Hose adaptor	MD998742-01	
 MB991637	MB991637 Fuel pressure gauge set	Tool not available	
 MB991348	MB991348 Test harness set	MB991348-01	Fuel tank differential pressure sensor check

FUEL TANK

REMOVAL AND INSTALLATION

M1135001900252

Pre-removal Operation	Pre-installation Operation
• Draining Fuel • Fuel Line Pressure Reduction (Refer to GROUP 13A – On-vehicle service P.13Aa-18.)	• Refilling Fuel • Fuel Leakage Inspection



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1. DRAIN PLUG
2. FUEL TANK FILTER TUBE PROTECTOR

FUEL TANK REMOVAL STEPS

3. LEVELING HOSE
4. FILLER HOSE
5. VAPOR HOSE
6. FUEL HOSE
7. HIGH-PRESSURE FUEL HOSE CONNECTION (FUEL TANK SIDE)
8. FUEL GAUGE UNIT CONNECTOR
9. FUEL PUMP CONNECTOR
10. FUEL TANK DIFFERENTIAL PRESSURE SENSOR CONNECTOR
11. FUEL TANK
12. HIGH-PRESSURE FUEL HOSE
13. FUEL GAUGE UNIT

FUEL TANK REMOVAL STEPS

14. FUEL TANK DIFFERENTIAL PRESSURE SENSOR
15. FUEL PUMP ASSEMBLY
16. PACKING
17. LEVELING VALVE
18. FUEL CUT-OFF VALVE

FUEL TANK FILLER TUBE REMOVAL STEPS

2. FUEL TANK FILTER TUBE PROTECTOR
3. LEVELING HOSE
4. FILLER HOSE
19. VAPOR HOSE
20. FUEL TANK FILLER TUBE CAP
21. PACKING
22. FUEL TANK FILLER TUBE
23. VAPOR HOSE
24. FUEL CHECK VALVE

TSB Revision

INSPECTION

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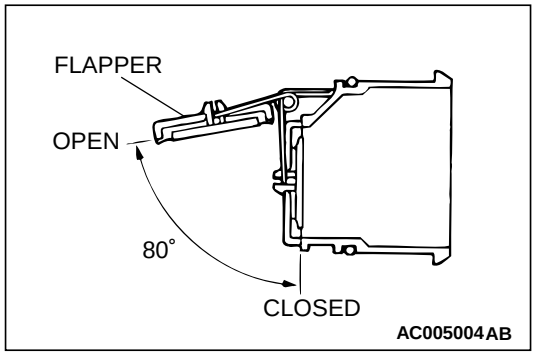
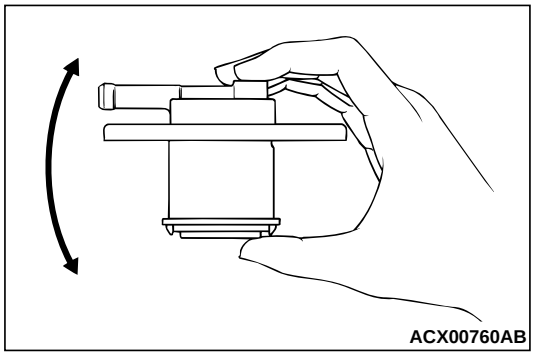
FUEL SHUT-OFF VALVE CHECK

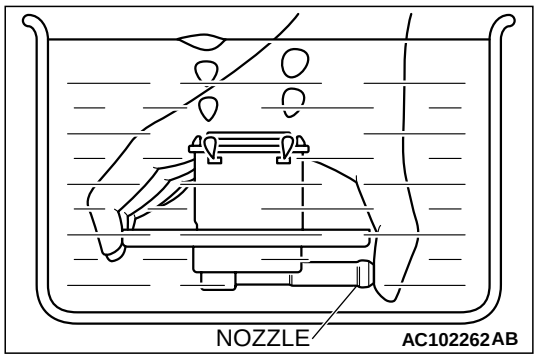


Check that the flapper and valve open and close as shown in the illustration.

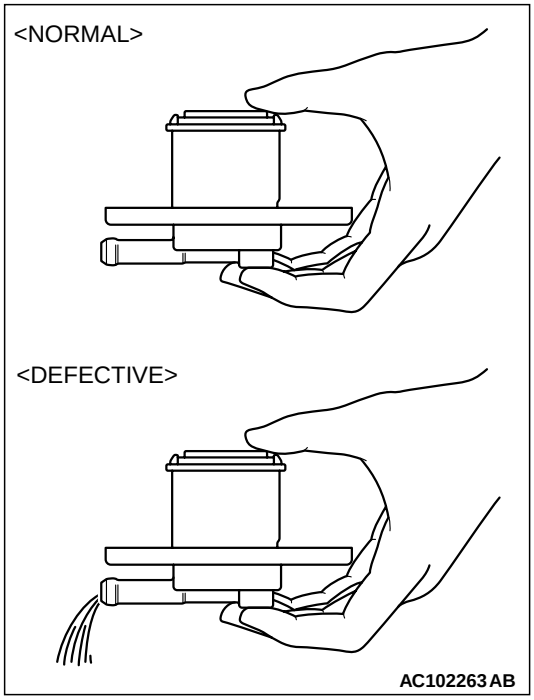
FUEL CUT-OFF VALVE CHECK



1. Shake the fuel tank rollover valve assembly up and down to check if the float inside the fuel tank rollover valve assembly is not seized. If seized, replace the fuel tank rollover valve assembly.

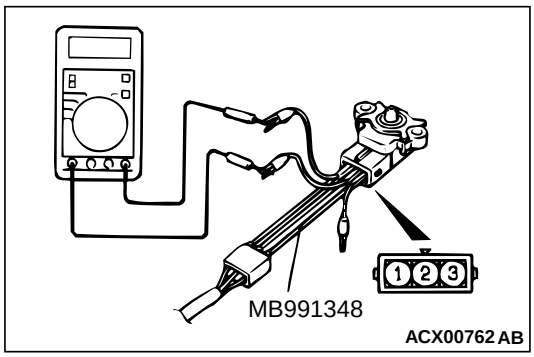


2. Obtain a container, which is full of water.
3. Invert the fuel tank rollover valve assembly, and submerge it slowly in the water while placing your fingers over the nozzle.
4. Check that no more air bubbles appears from the fuel tank rollover valve assembly, and withdraw it slowly.



5. Open the fuel tank rollover valve assembly nozzle. If no water flows out from the nozzle aperture, the valve is normal. If water flows out, the float or spring inside the fuel tank rollover valve is defective. Replace the fuel tank rollover valve assembly.

FUEL TANK DIFFERENTIAL PRESSURE SENSOR CHECK



1. Disconnect the fuel tank differential pressure sensor connector and connect special tool MB991348 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 (2) and (3).

   Standard value: 2.0 – 3.0 V

FUEL GAUGE UNIT CHECK

Refer to GROUP 54, Combination Meter P.54-105.

FUEL FILTER REPLACEMENT

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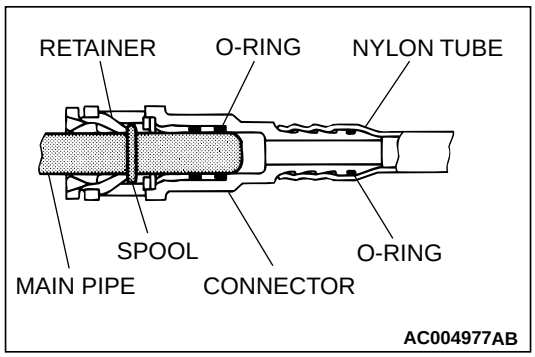
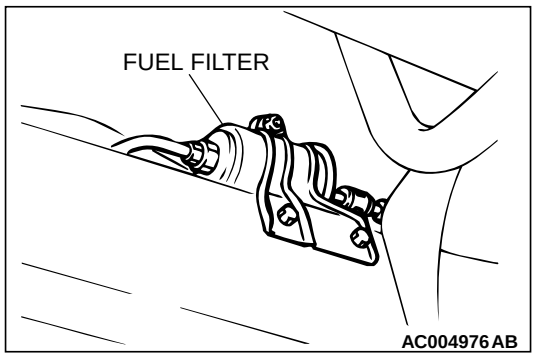
1. Bleed the residual pressure from inside the fuel line. (Refer to GROUP 13A, On-vehicle Service P.13Aa-18.)



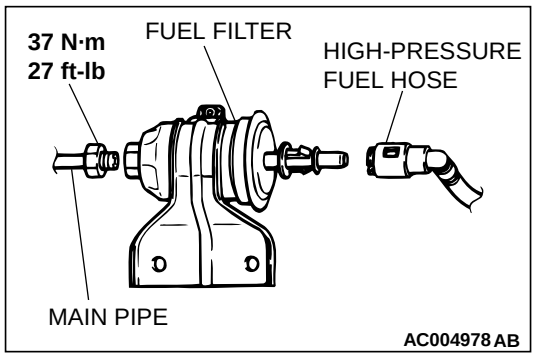
⚠ CAUTION
As there will be some pressure remaining in the fuel pipe line, cover it with a shop towel to prevent fuel from spraying out.

2. Press the high-pressure fuel hose retainer to disengage the connector, and then remove the high-pressure fuel hose.



3. Hold the fuel filter with an adjustable wrench and loosen the flare nut. Then disconnect the main pipe connection.
4. Remove the fuel filter.
5. Install the fuel filter, high-pressure fuel hose and tighten the flare nut of the main pipe to the specified torque.

   Tightening torque: 37 N·m (27 ft-lb)



6. After installation, check that there are no fuel leaks.
   (1) Apply battery to the fuel pump drive terminal to operate the fuel pump. (Refer to GROUP 13A, On-vehicle Service P.13Aa-18.)
   (2) Check for leaks when fuel pressure is applied.

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

M1135003900247

ITEM	SPECIFICATION
Fuel cut-off valve nut	2.5 N·m (22 in-lb)
Fuel gauge unit nut	2.5 N·m (22 in-lb)
Fuel main pipe flare nut	37 N·m (27 ft-lb)
Fuel pump assembly nut	2.5 N·m (22 in-lb)
Fuel tank differential pressure sensor nut	2.5 N·m (22 in-lb)
Fuel tank drain plug	2.5 N·m (22 in-lb)
Fuel tank mounting nut	27 N·m (20 ft-lb)
Leveling valve nut	2.5 N·m (22 in-lb)

SERVICE SPECIFICATION

M1135000300194

ITEM	STANDARD VALUE
Fuel tank differential pressure sensor output voltage V	2.0 – 3.0

NOTES