

GROUP 13B

FUEL SUPPLY

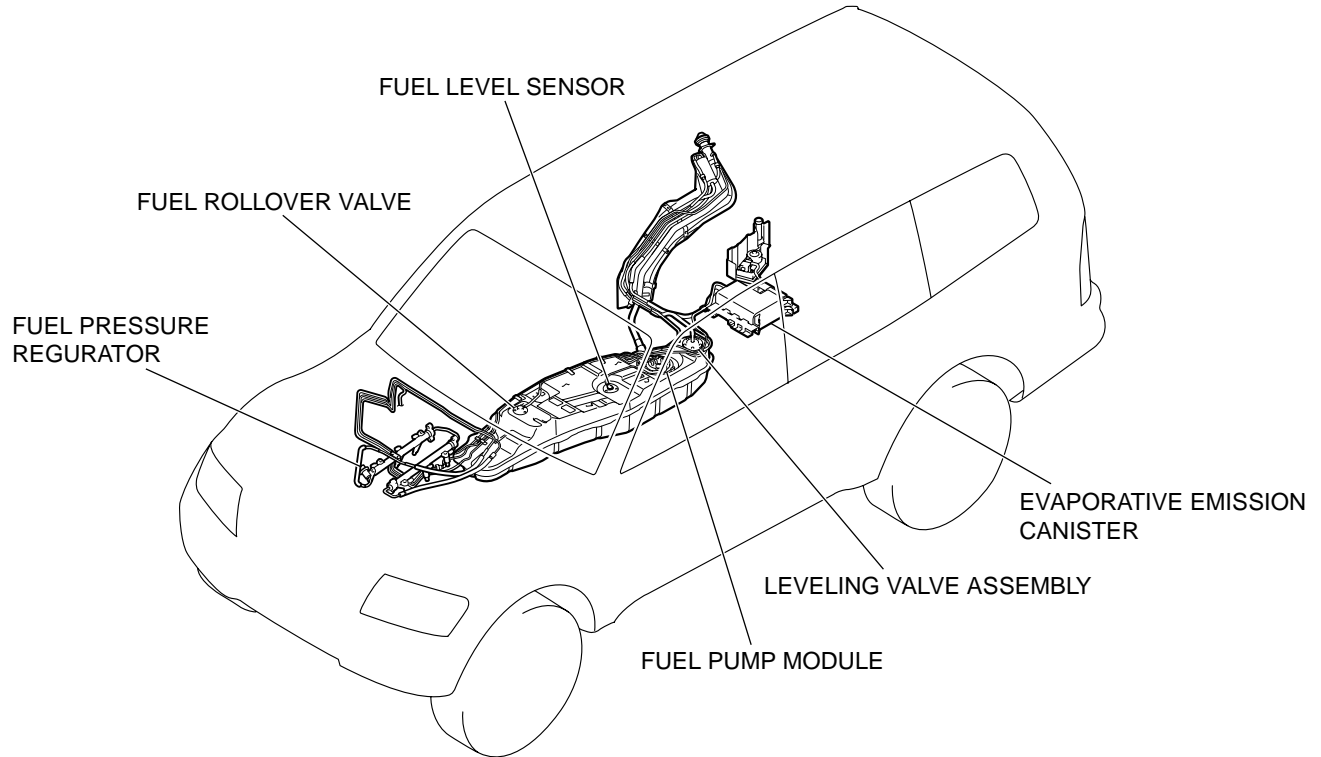
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GENERAL DESCRIPTION

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1. The fuel tank is located under the floor below the rear seats.
2. A fuel tank rollover valve prevents 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 system supplies an appropriate air/fuel mixture to the engine. There are the fuel tank, fuel pump module assembly, and the fuel pipe that couples each part. Engine malfunctions caused by insufficient fuel supply or evaporative emission system operation malfunctions can result from faults in the vapor line, fuel pipe, hose, or fuel tank pressure control valve, etc.

FUEL SUPPLY DIAGNOSTIC TROUBLESHOOTING 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 malfunction is eliminated.

SYMPTOM CHART

M1135004200188

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

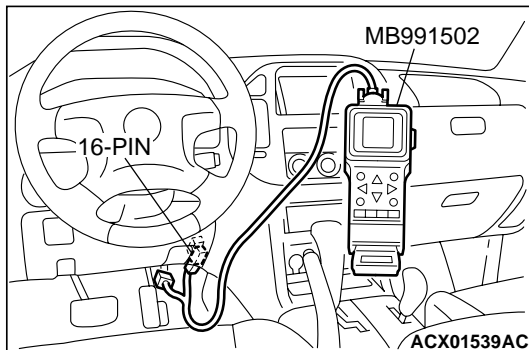
To prevent damage to scan tool MB991502, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.

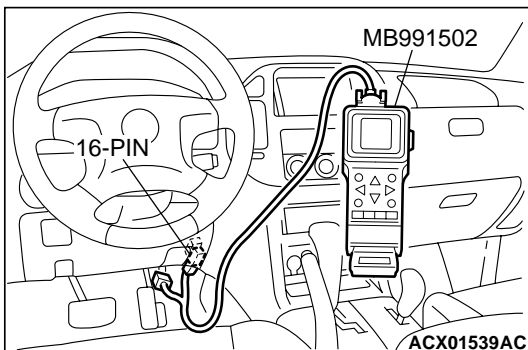
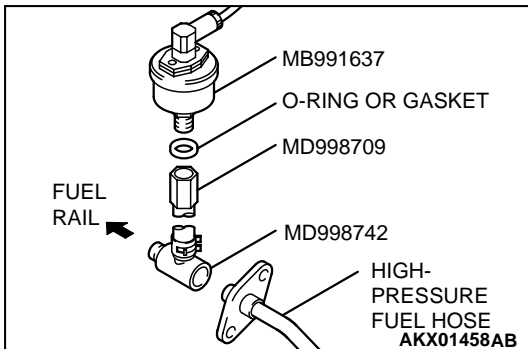
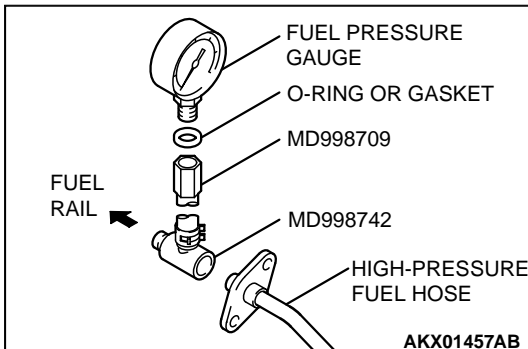
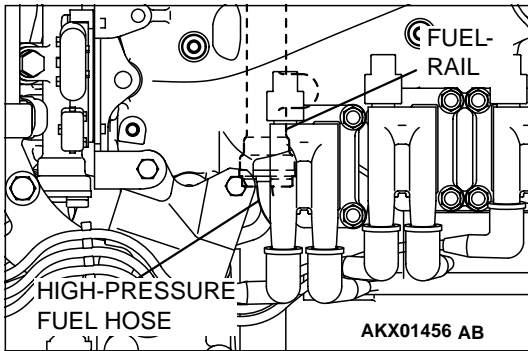
- (1) Connect scan tool MB991502 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC is output?

YES : Refer to GROUP 13A, Diagnostic Trouble Code Chart P.13Ab-22.

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-15.)

⚠ 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.

<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.

<When using the special tool MB991637 (fuel pressure gauge set)>

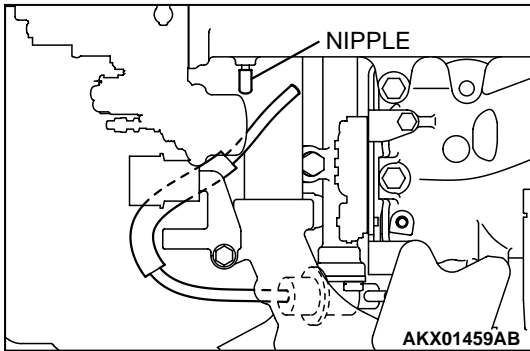
- a. Remove the union joint and bolt from special tool MD998709 (adaptor hose) and instead attach special tool MD998742 (hose adaptor) to the adaptor hose.
- b. Install special tool MB991637 (fuel pressure gauge set) to assembled special tools MD998709 and MD998742 via a gasket.
- c. Install the assembled 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.

- (4) Connect scan tool MB991502 to the data link connector.
- (5) 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.
- (6) Stop the fuel pump.
- (7) Start the engine and run at idle.
- (8) Measure fuel pressure while the engine is running at idle.

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



- (9) 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

- (10) Check to see that fuel pressure at idle does not drop even after the engine has been revved several times.
 (11) 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.

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

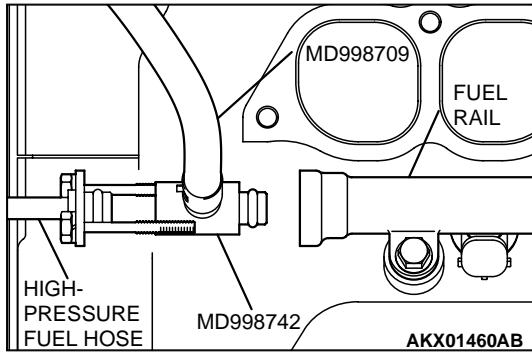
SYMPTOM	PROBABLE CAUSE	REMEDY
<ul style="list-style-type: none"> Fuel pressure too low Fuel pressure drops after racing No fuel pressure in fuel return hose 	Clogged fuel filter	Replace fuel filter
	Fuel leaking to return side due to poor fuel regulator valve seating or settled spring	Replace fuel pressure 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

- (13) 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.

- Squeeze the fuel return line closed to confirm leak-down occurs from defective fuel pressure regulator.
- Squeeze the fuel supply line closed to confirm leak-down occurs from defective fuel pump check valve.
- 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

- (14) Release residual pressure from the fuel pipe line. (Refer to [P.13Aa-15.](#))



⚠ 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.

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

Tightening torque: $4.9 \pm 1.0 \text{ N}\cdot\text{m}$ ($44 \pm 8 \text{ in}\cdot\text{lb}$)

- (18) 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.
- (19) Disconnect scan tool MB991502.

Q: Are the fuel pressure test in good condition?

YES : Go to Step 5.

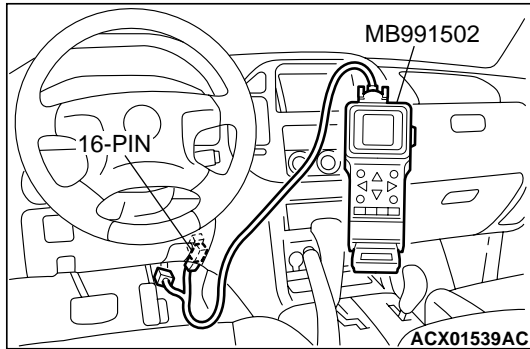
NO : Repair or replace. Then go to Step 3.

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 6.



STEP 4. Check the fuel pump module 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. If normal, check the fuel pump drive circuit.
 - a. Turn the ignition switch to the "LOCK" (OFF) position.
 - b. Remove the rear seat assembly (Refer to GROUP 52A P.52A-18).
 - c. Remove the protector.
 - d. Disconnect the fuel pump module connector.
 - e. When the fuel pump drive connector is attached directly to the battery, check if the sound of the fuel pump operation can be heard.

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.

- f. Check for fuel pressure by pinching the fuel hose with fingertips.
- g. Connect the fuel pump module connector.
- h. Install the protector and rear seat assembly (Refer to GROUP 52A P.52A-18).

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

YES : Then go to Step 5.

NO : Replace. Then go to Step 6.

STEP 5. Check the inside of the fuel tank for contamination and rust.

- (1) Draining fuel.
- (2) Fuel tank removal. (Refer to P.13B-11.)

Q: Is the fuel tank in good condition?

YES : Go to Step 6.

NO : Replace the fuel filter, and clean the fuel tank and fuel line. Then go to Step 6.

STEP 6. Check symptoms.

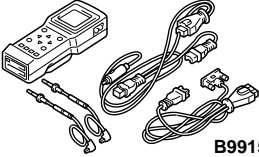
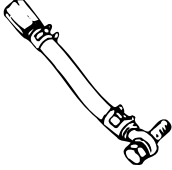



Q: Is the engine malfunction eliminated?

YES : Finish.

NO : Return to Step 1.

SPECIAL TOOLS

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TOOL	TOOL NUMBER AND NAME	SUPERSESION	APPLICATION
 B991502	MB991502 Scan tool <MUT-II>	MB991496-OD	<ul style="list-style-type: none"> • 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

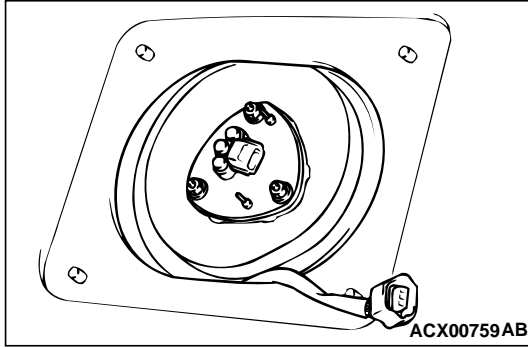
ON-VEHICLE SERVICE**FUEL LEVEL SENSOR CHECK**

M1135003100218

Refer to GROUP 54A [P.54A-63](#).**FUEL LEVEL SENSOR REPLACEMENT**

M1135001400150

1. Tumble the second (middle) seat.
2. Remove the service hole cover (upper side) and the packing located under the second seat.
3. Remove the second seat, the rear scuff plate, the anchor bolts for the outer seat belt (second) and mounting screws of the lower quarter trim. Tear off the carpet. (Refer to GROUP 52A [P.52A-18](#).)
4. Remove the service hole cover and the packing located between the front seat and the second seat.



5. Disconnect the harness connector.
6. Unscrew the mounting nut to remove the fuel level sensor.
7. Assemble the fuel level sensor and tighten the mounting nut to the specified torque.

Tightening torque: 2.5 ± 0.4 N·m (22 ± 4 in-lb)

8. Connect the harness connector.
9. Attach the service hole cover and the packing located between the front seat and the second seat.
10. Restore the carpet; attach the second seat, the rear scuff plate, anchor bolts for the outer seat belt (second) and mounting screws of the lower quarter trim. (Refer to GROUP 52A P.52A-18.)
11. Attach the service hole cover located under the second seat and the packing.
12. Restore the second seat.

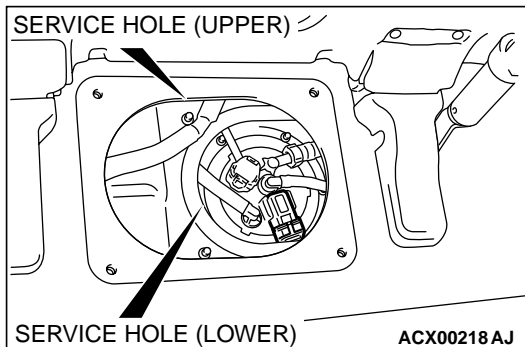
FUEL PUMP OPERATION CHECK

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Refer to GROUP 13A - On-vehicle Service P.13Aa-16.

FUEL PUMP MODULE REPLACEMENT

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1. Tumble the second seat.
2. Remove the service hole cover (upper side) and the packing.
3. Remove the service hole cover (lower side) and the packing.
4. Disconnect the harness connector.
5. Disconnect the fuel high-pressure hose and the fuel tank hose.
6. Unscrew the mounting nut to remove the fuel pump module.
7. Assemble the fuel pump module and tighten the mounting nut to the specified torque.

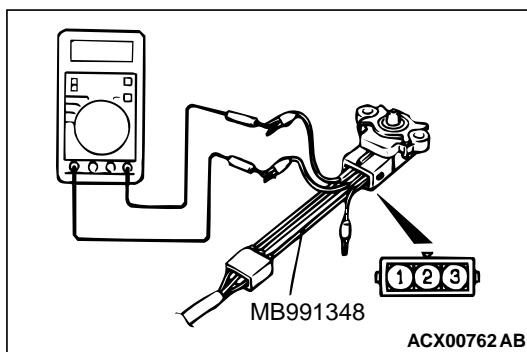
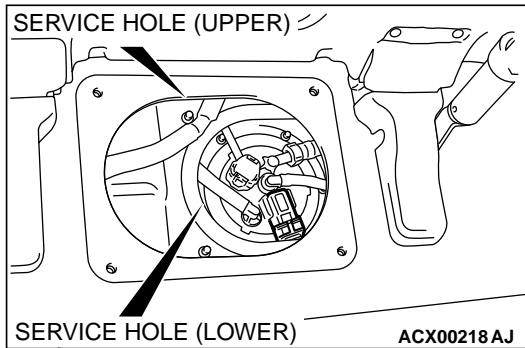
Tightening torque: 2.5 ± 0.4 N·m (22 ± 4 in-lb)

8. Connect the fuel high-pressure hose and the fuel tank hose.
9. Connect the harness connector.
10. Attach the service hole cover (lower side) and the packing.
11. Attach the service hole cover (upper side) and the packing.
12. Restore the second seat.

FUEL TANK DIFFERENTIAL PRESSURE SENSOR
CHECK

M1135003200033

1. Tumble the second seat.
2. Remove the service hole cover (upper) and packing.
3. Remove the service hole cover (lower) and packing.
4. Disconnect the harness connector.



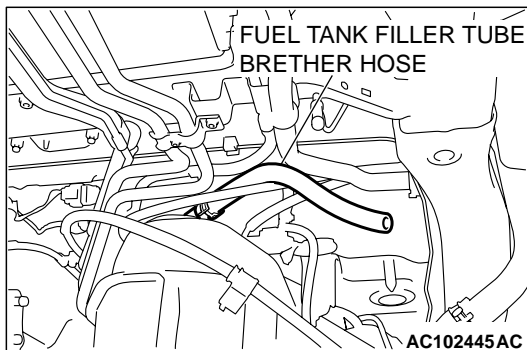
5. Disconnect the fuel tank differential pressure sensor connector and connect special tool MB991348 between the terminals of the disconnected connector.
6. Turn the ignition switch to "ON" and take a reading of Between terminals (2) and (3).

Standard value: 2.0 – 3.0 V

LEVELING VALVE CHECK

M1135004300077

1. Place a drain pan, and disconnect the fuel tank filler tube breather hose at pipe side.
NOTE: If fuel leaks from the fuel tank filler tube breather hose at this stage, the leveling valve may be defective.
2. Open the fuel cap, and fill the fuel tank up.
3. If fuel does not leak from the fuel tank filler tube breather hose with the fuel tank full, the leveling valve is normal. If not so, the leveling valve may be defective. Lower the fuel tank from the vehicle and replace the valve.
4. Reconnect the fuel tank filler tube breather hose at the pipe side.



FUEL TANK

REMOVAL AND INSTALLATION

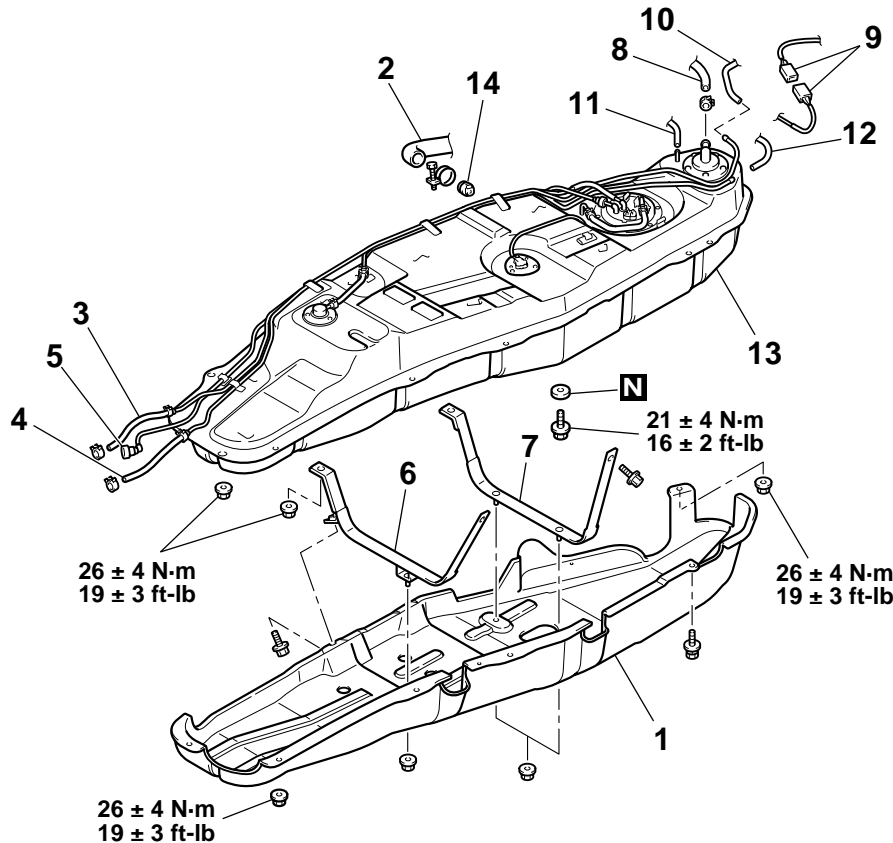
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Pre-removal Operation

- Draining Fuel
- Fuel Line Pressure Reduction (Refer to GROUP 13A P.13Aa-15.)
- Transmission Mount Center Member Assembly (Refer to GROUP 32 P.32-6.)

Pre-installation Operation

- Transmission Mount Center Member Assembly (Refer to GROUP 32 P.32-6.)
- Fuel Leakage Inspection
- Refilling Fuel



AC101596AB

REMOVAL STEPS

1. FUEL TANK UNDER COVER
2. FUEL FILLER HOSE CONNECTION
3. FUEL RETURN HOSE CONNECTION
4. FUEL VAPOR HOSE CONNECTION
5. FUEL HIGH-PRESSURE HOSE CONNECTION
6. FUEL TANK BAND FRONT
7. FUEL TANK BAND REAR
8. FUEL TANK FILLER TUBE BREATHER HOSE CONNECTION

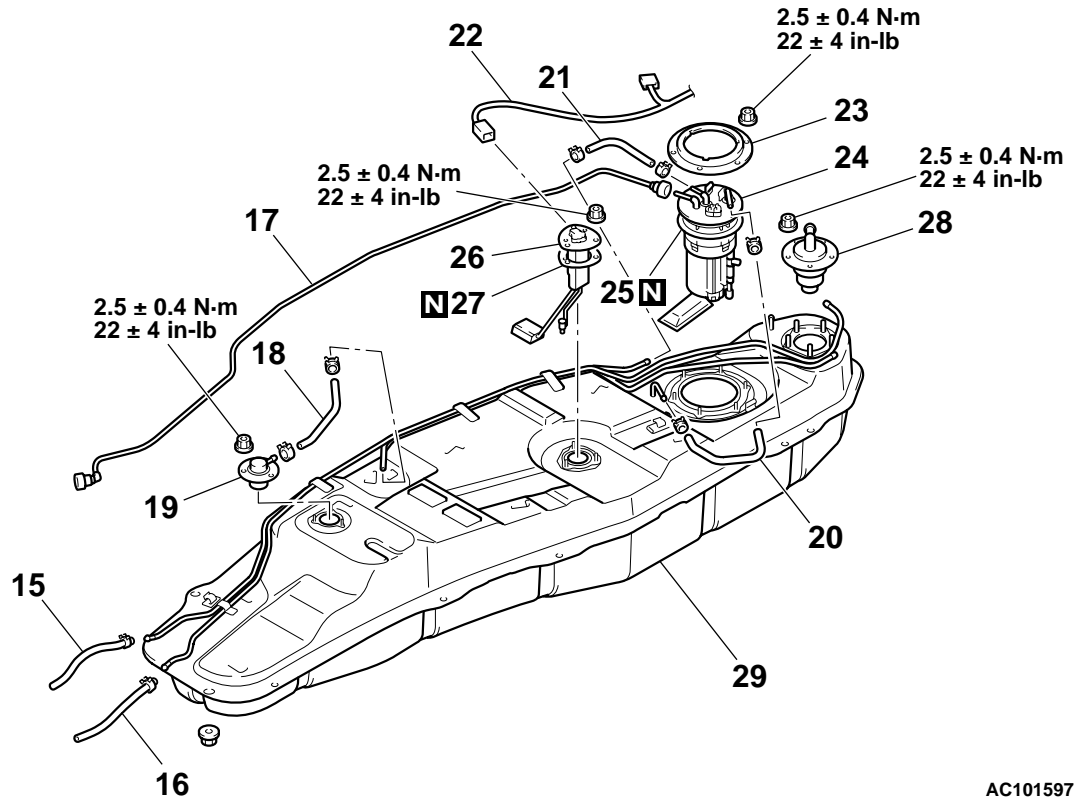
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REMOVAL STEPS (Continued)

9. FUEL TANK HARNESS CONNECTOR CONNECTION
10. FUEL TANK FILLER TUBE PURGE HOSE CONNECTION
11. FUEL TANK FILLER TUBE VAPOR HOSE A CONNECTION
12. FUEL TANK FILLER TUBE VAPOR HOSE C CONNECTION
13. FUEL TANK ASSEMBLY
14. FUEL TANK FILLER TUBE VALVE



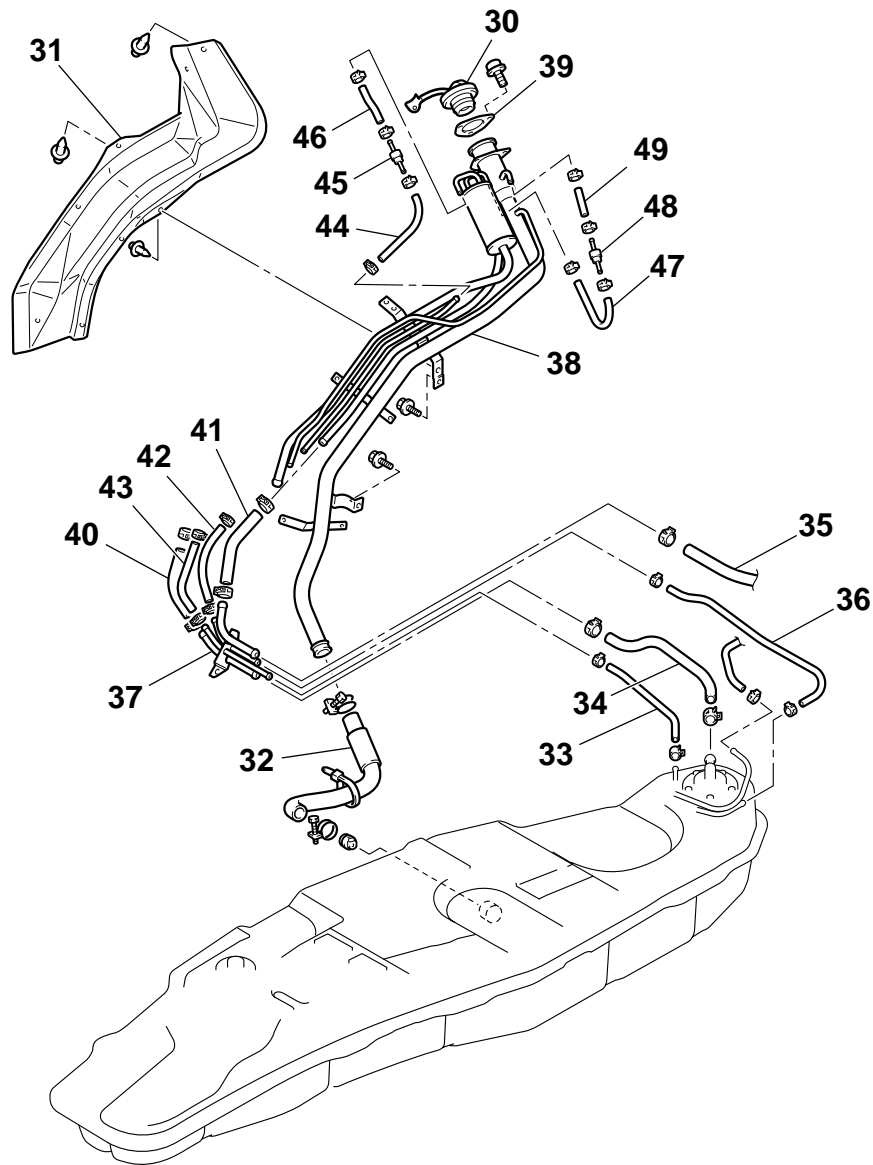
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REMOVAL STEPS

15. FUEL RETURN HOSE
16. FUEL VAPOR HOSE
17. FUEL HIGH-PRESSURE HOSE
18. FUEL TANK VAPOR HOSE
19. FUEL TANK ROLLOVER VALVE
20. FUEL TANK SUCTION HOSE
21. FUEL TANK RETURN HOSE
22. FUEL TANK HARNESS

REMOVAL STEPS (Continued)

23. TAPPING PLATE
24. FUEL PUMP MODULE ASSEMBLY
25. PACKING
26. FUEL LEVEL SENSOR
27. PACKING
28. FUEL TANK LEVELING VALVE ASSEMBLY
29. FUEL TANK



AC101598AB

REMOVAL STEPS

30. FUEL CAP
31. FUEL TANK FILLER TUBE PROTECTOR
32. FUEL FILLER HOSE
33. FUEL TANK FILLER TUBE BREATHER HOSE
34. FUEL TANK FILLER TUBE VAPOR HOSE
35. FUEL TANK FILLER TUBE VAPOR HOSE
36. FUEL TANK FILLER TUBE VAPOR HOSE
37. FUEL TANK LEVELING PIPE ASSEMBLY
38. FUEL TANK FILLER TUBE
39. FUEL TANK FILLER TUBE GASKET
40. FUEL TANK FILLER TUBE VAPOR HOSE

REMOVAL STEPS (Continued)

41. FUEL TANK FILLER TUBE VAPOR HOSE
42. FUEL TANK FILLER TUBE VAPOR HOSE
43. FUEL TANK FILLER TUBE VAPOR HOSE
44. FUEL TANK FILLER TUBE VAPOR HOSE
45. FUEL CHECK VALVE ASSEMBLY
46. FUEL TANK FILLER TUBE VAPOR HOSE
47. FUEL TANK FILLER TUBE VAPOR HOSE
48. >FUEL CHECK VALVE ASSEMBLY
49. FUEL TANK FILLER TUBE VAPOR HOSE

Required Special Tool:
MB991348: Test Harness Set

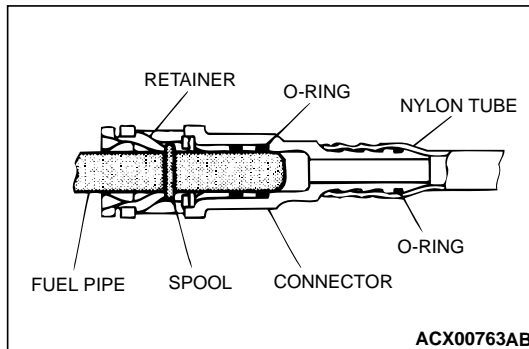
REMOVAL SERVICE POINTS

<<A>> FUEL HIGH-PRESSURE HOSE REMOVAL

⚠ 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.

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



<> DISCONNECTION OF FUEL TANK BREATHER HOSE/DISCONNECTION OF FUEL TANK HARNESS CONNECTOR

Lower the fuel tank halfway to disconnect the fuel tank breather hose and the fuel tank harness connector.

INSTALLATION SERVICE POINT

>>A<< FUEL HIGH-PRESSURE HOSE INSTALLATION

⚠ CAUTION

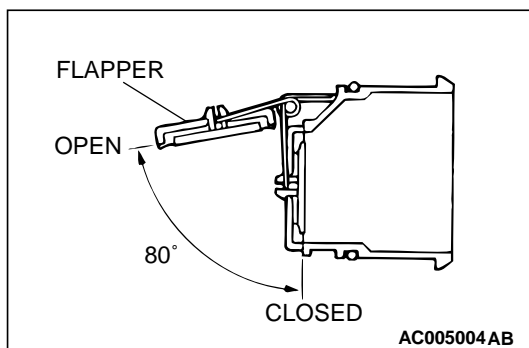
After connecting the quick action joint of the fuel high-pressure hose, pull the joint to disconnecting direction lightly to check that it is mounted securely. In addition, at this time confirm that there is a play of approx. 3 mm (0.12 inch) at the joint.

INSPECTION

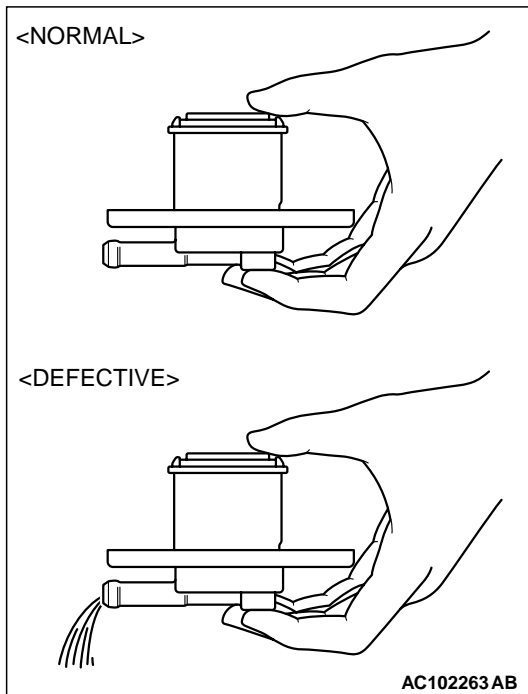
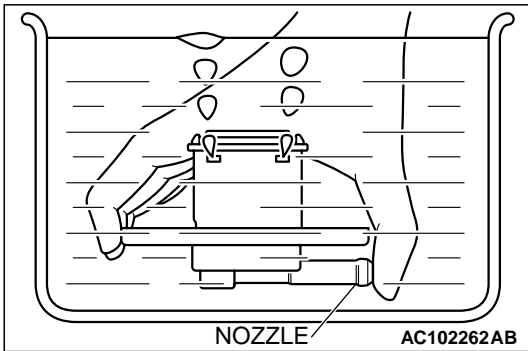
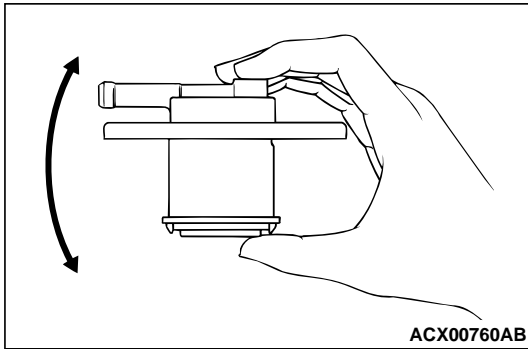
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FUEL SHUT-OFF VALVE CHECK

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



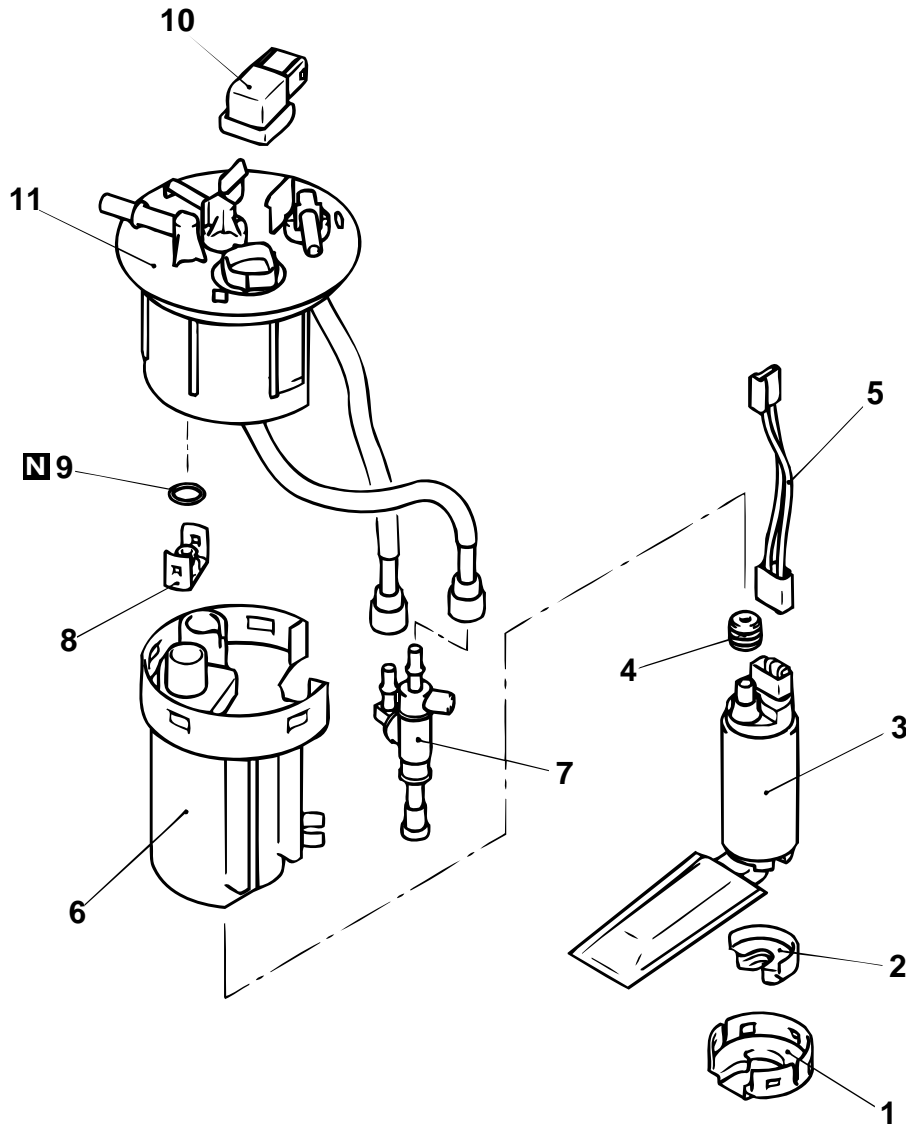
FUEL TANK ROLLOVER VALVE ASSEMBLY CHECK



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 PUMP (MODULE) DISASSEMBLY AND ASSEMBLY

M1135004600023



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DISASSEMBLY STEPS

1. FUEL PUMP BRACKET
2. FUEL PUMP CUSHION
3. FUEL PUMP
4. GROMMET
5. PUMP HARNESS
6. HOUSING

>>A<<

DISASSEMBLY STEPS (Continued)

7. ASSIST PUMP
8. CAP
9. O-RING
10. FUEL TANK DIFFERENTIAL PRESSURE SENSOR
11. FUEL HIGH-PRESSURE FILTER

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ASSEMBLY SERVICE POINT

>>A<< O-RING / GROMMET INSTALLATION

Apply gasoline on the O-ring and the grommet before mounting them to prevent damage or twisting.

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATION

M1135003900258

ITEM	SPECIFICATION
Fuel level sensor	2.5 ± 0.4 N·m (22 ± 4 in-lb)
Fuel pump module	2.5 ± 0.4 N·m (22 ± 4 in-lb)
Fuel tank drain plug	21 ± 4 N·m (16 ± 2 ft-lb)
Fuel tank mounting nut	26 ± 4 N·m (19 ± 3 ft-lb)
Fuel tank rollover valve	2.5 ± 0.4 N·m (22 ± 4 in-lb)
Fuel tank leveling valve assembly	2.5 ± 0.4 N·m (22 ± 4 in-lb)

SERVICE SPECIFICATION

M1135000300031

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

NOTES