

## GROUP 13B

# FUEL SUPPLY

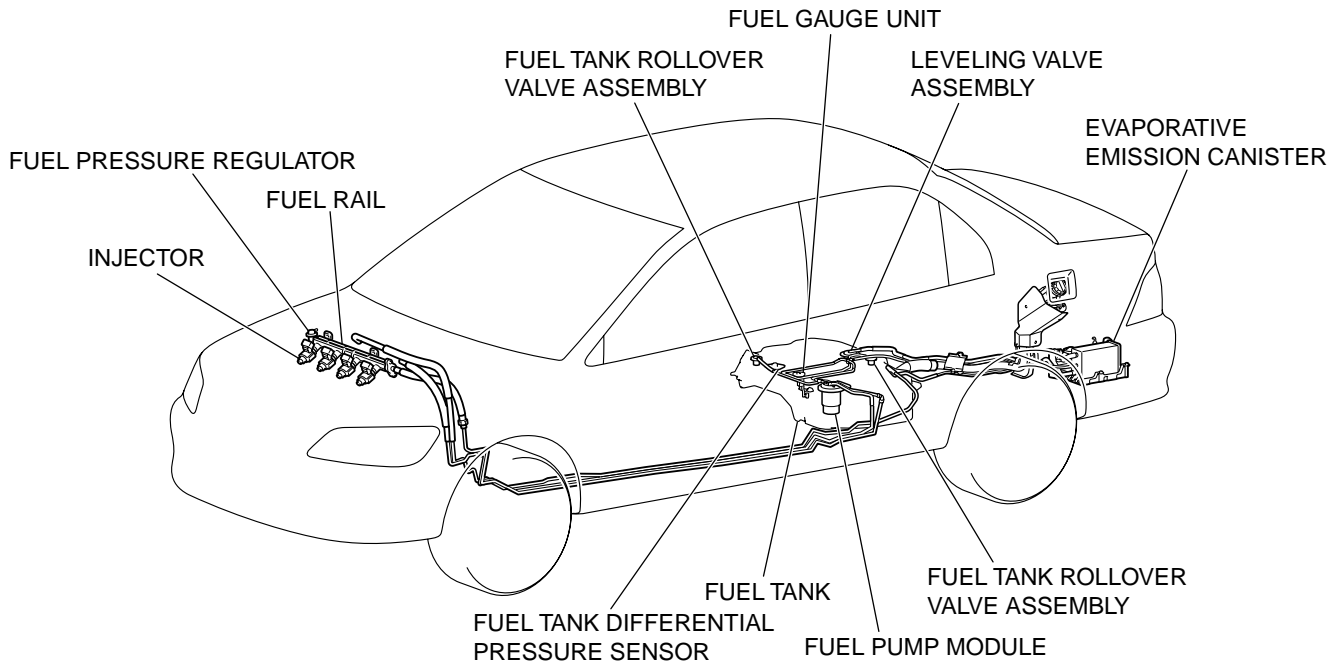
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## GENERAL DESCRIPTION

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- The fuel tank is located under the floor of the rear seats to provide increased protection and a more luggage space.
- A fuel tank rollover valve assembly has been adopted to prevent fuel from leaking out in case of a collision.
- A fuel pump module, including fuel pump, fuel filter, reservoir cup and fuel gauge unit, has been adopted to lighten weight and improve serviceability.



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## FUEL SUPPLY DIAGNOSIS

### INTRODUCTION TO FUEL SUPPLY DIAGNOSIS

The fuel system is used to supply an appropriate mixture to the engine. The system consists of the fuel tank, fuel filter, fuel pump and fuel pipe that each part. An evaporative emission control system is provided to prevent evaporated fuel from escaping into the atmosphere.

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.

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### 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 to find most of the fuel supply faults.

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

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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, twisted or clogged fuel pipe or hose.
- Malfunction of the 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**

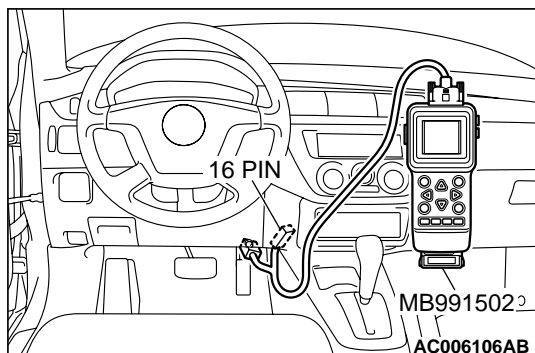
To prevent damage to scan tool MB991502, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.

- (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-19).

**NO** : Go to Step 2.



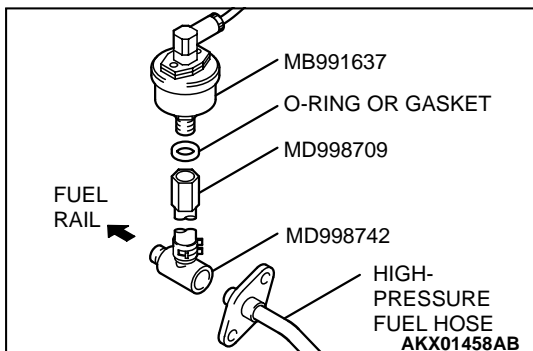
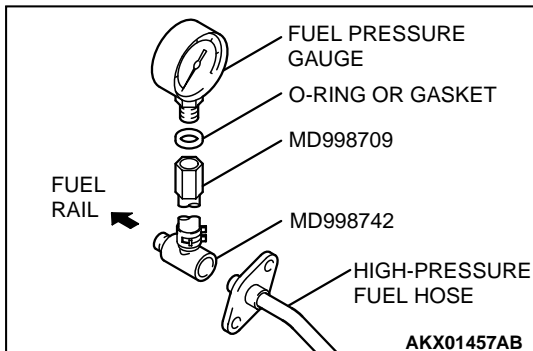
**STEP 2. Check the fuel pressure.**

- (1) Release residual pressure from the fuel line to prevent fuel spray. (Refer to GROUP 13A, On-Vehicle Service – Fuel Pump Connector Disconnection (How to Reduce Pressurized Fuel Lines [P.13Aa-17.](#))

**⚠ 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.



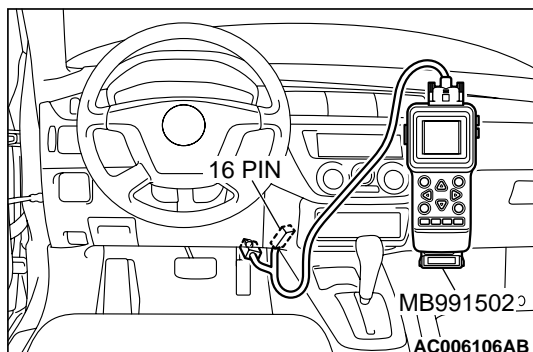
- (5) When using the special tool MB991637 (fuel pressure gauge set)
  - a. Remove the union joint and bolt from special tool MD998709 (adaptor hose) and instead attach special tool MD998742 (hose adaptor) to the adaptor hose.
  - b. Install special tool MB991637 (fuel pressure gauge set) to assembled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

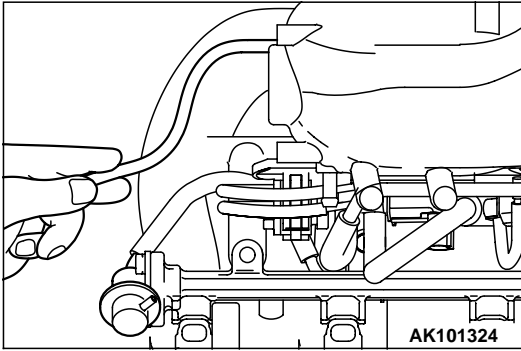
**⚠ CAUTION**

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

- (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.

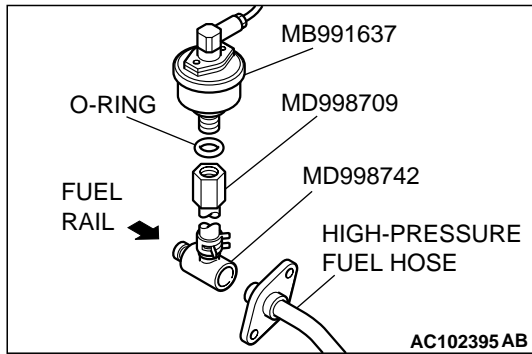
SYMPTOM	PROBABLE CAUSE	REMEDY
<ul style="list-style-type: none"> <li>Fuel pressure too low</li> <li>Fuel pressure drops after racing</li> <li>No fuel pressure in fuel return hose</li> </ul>	Clogged fuel filter	Replace fuel filter
	Fuel leaking to return side due to poor fuel regulator valve seating or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

- 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

- (16) Release residual pressure from the fuel pipe line. [Refer to GROUP 13A, On-Vehicle Service – Fuel Pump Connector Disconnection (How to Reduce Pressurized Fuel Lines [P.13Aa-17](#)).]

**⚠ 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:  $4.9 \pm 1.0$  ( $44 \pm 8$  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) Disconnect scan tool MB991502.

**Q: Are the fuel pressure test in good condition?**

**YES :** Go to Step 5.

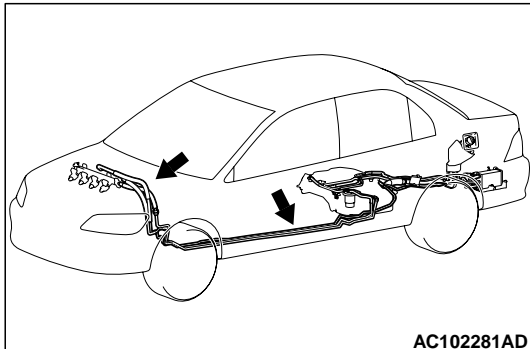
**NO :** Repair or replace. Then go to Step 3.

**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.

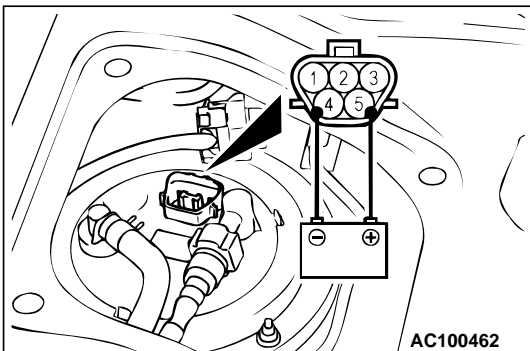
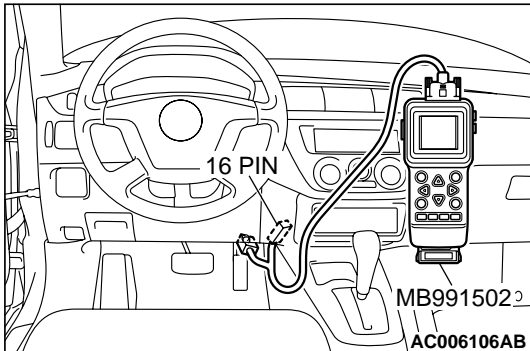


**STEP 4. Check the fuel pump module operation.**

**⚠ 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.
- Turn the ignition switch to the "LOCK" (OFF) position.
  - Remove the rear seat assembly. (Refer to GROUP 52A, Rear Seat Assembly P.52A-18.)
  - Remove the service hole cover.
  - Disconnect the fuel pump module connector.
  - 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.*

- Check for fuel pressure by pinching the fuel hose with fingertips.
- Connect the fuel pump module connector.
- Install the service hole cover.
- Install the rear seat assembly. (Refer to GROUP 52A, Rear Seat Assembly 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.**

- Drain fuel.
- Remove the fuel tank. (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. Retest the system.**

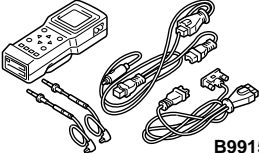
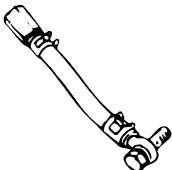



**Q: Is the engine malfunction eliminated?**

**YES :** Finish.

**NO :** Return to Step 1.

## SPECIAL TOOLS

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TOOLS	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
 B991502	MB991502 Scan tool <MUT-II>	MB991496-OD	<ul style="list-style-type: none"> <li>• Reading diagnostic trouble code</li> <li>• MFI system inspection</li> </ul>
	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 GAUGE UNIT CHECK

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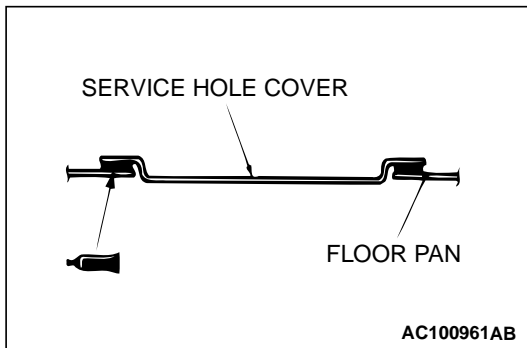
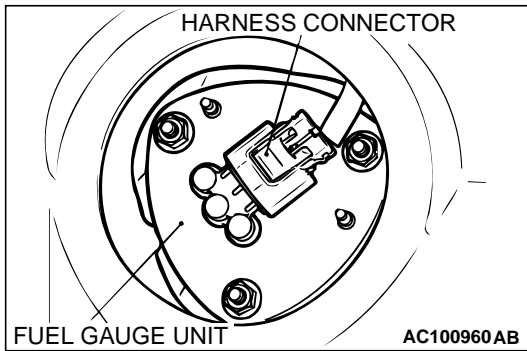
Refer to GROUP 54A, Combination Meter Assembly and Vehicle Speed Sensor – On-vehicle Service [P.54A-40](#).

## FUEL GAUGE UNIT REPLACEMENT

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1. Remove the rear seat cushion assembly. (Refer to GROUP 52A, Rear Seat Assembly [P.52A-18](#).)
2. Prise out the service hole cover.





3. Disconnect the harness connector.
4. Unscrew the mounting nuts to remove the fuel gauge unit.  
*NOTE: Check the fuel gauge unit (Refer to GROUP 54A, Combination Meter Assembly and Vehicle Speed Sensor – On-vehicle Service P.54A-40). If defective, replace it.*
5. Install the fuel gauge unit. Tighten the mounting nuts to the specified torque.

**Tightening torque:  $2.5 \pm 0.5$  N·m ( $23 \pm 4$  in-lb)**

6. Connect the harness connector.
7. Apply the specified sealant to the contact surfaces of the service hole cover and the floor pan, and install the service hole cover.

**Specified sealant: 3M™ 8513 Grommets Windshield Sealer (Black)**

8. Install the rear seat cushion assembly. (Refer to GROUP 52A, Rear Seat Assembly P.52A-18.)

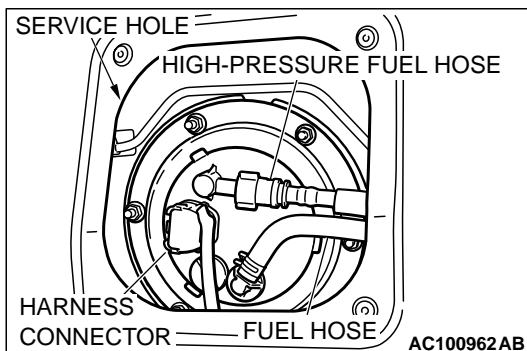
## FUEL PUMP OPERATION CHECK

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Refer to GROUP 13A, On-vehicle Service P.13Aa-17.

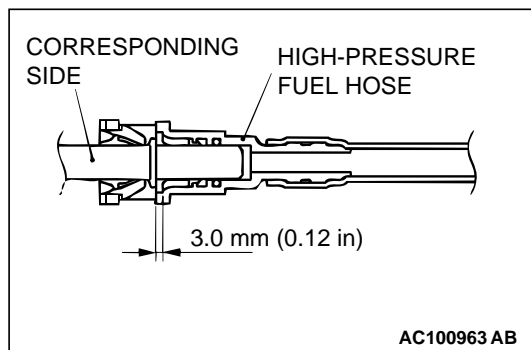
## FUEL PUMP MODULE REPLACEMENT

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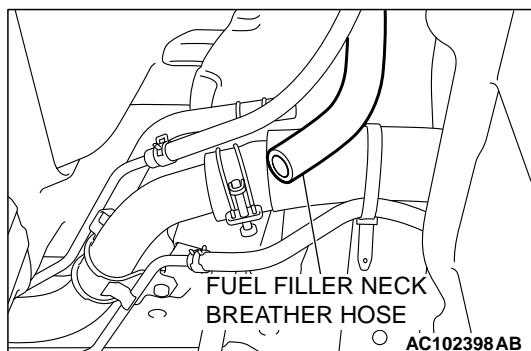
1. Remove the rear seat assembly. (Refer to GROUP 52A, Rear Seat Assembly P.52A-18.)
2. Remove the service hole cover mounting screws to remove the cover.
3. Disconnect the harness connector.  
*NOTE: Check the fuel pump (Refer to GROUP 13A, On-vehicle Service P.13Aa-17). If defective, replace the fuel pump, which is incorporated in the fuel pump module.*
4. Disconnect high-pressure fuel hose and fuel hose.
5. Unscrew the mounting nuts to remove the fuel pump module.
6. Replace the fuel pump. (Refer to P.13B-13.)
7. Install the fuel pump module. Tighten the mounting nuts to the specified torque.

**Tightening torque:  $2.5 \pm 0.5$  N·m ( $23 \pm 4$  in-lb)**

**⚠ CAUTION**

Snap the high-pressure fuel hose one-touch joint into place, then pull back slightly on the hose to assure it is secure. However, the connection should have a play of approximately 3.0 mm (0.12 inch).

8. Connect the harness connector, high-pressure fuel hose and fuel hose.
9. Retain the service hole cover with the screws.
10. Install the rear seat cushion assembly. (Refer to GROUP 52A, Rear Seat Assembly [P.52A-18.](#))

**LEVELING VALVE CHECK**

M1135004300066

1. Place a drain pan, and disconnect the fuel filler neck breather hose at pipe side.

*NOTE: If fuel leaks from the fuel filler neck breather hose at this stage, the leveling valve may be defective.*

2. Open the fuel tank filler cap, and fill the fuel tank up.
3. If fuel does not leak from the fuel tank filler neck 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 filler neck breather hose at the pipe side.

# FUEL TANK

## REMOVAL AND INSTALLATION

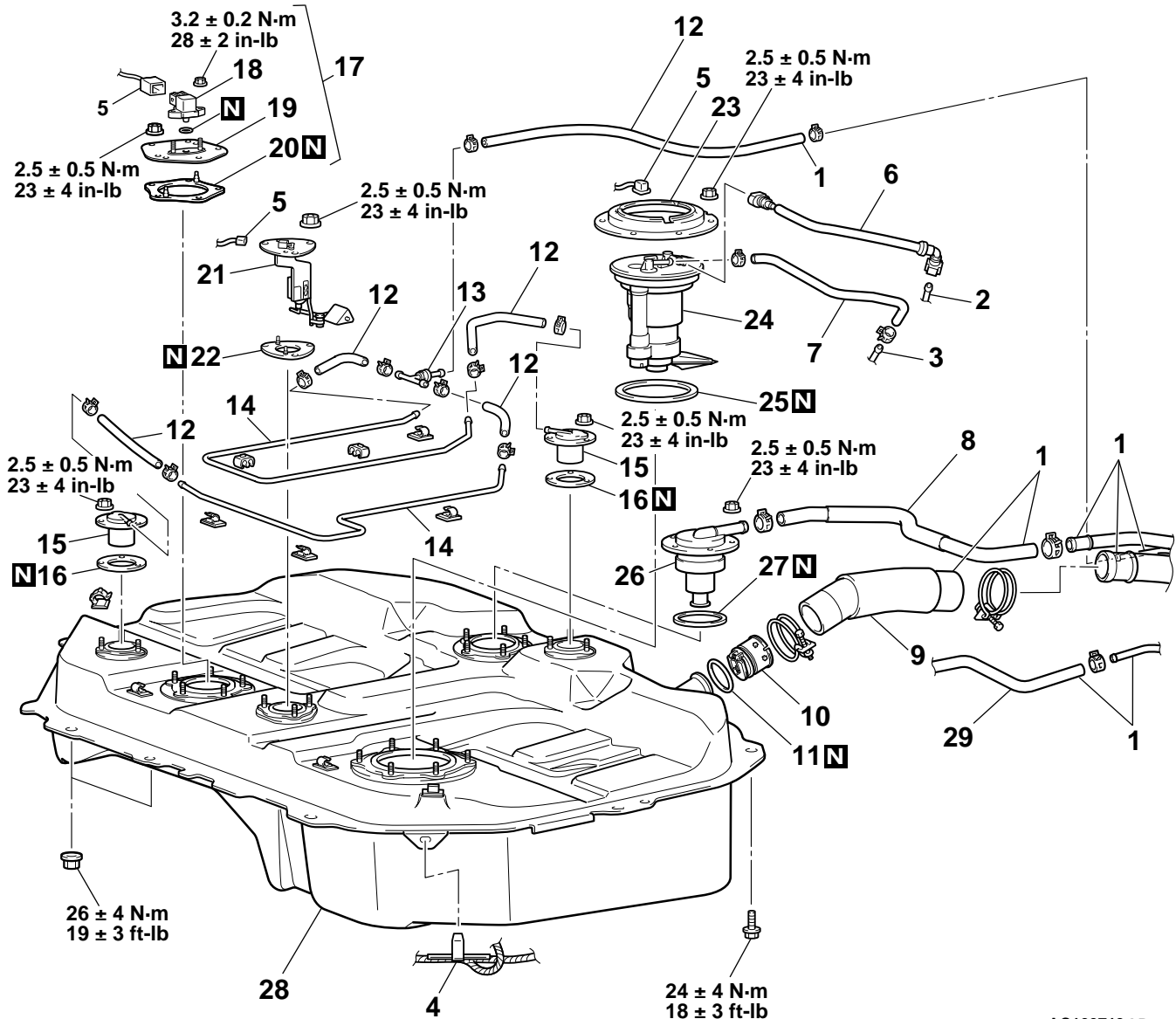
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### Pre-removal Operation

- Draining Fuel
- Fuel Pump Connector Disconnection (How to Reduce Fuel Pressure.) (Refer to GROUP 13A, On-vehicle Service P.13Aa-17.)
- Center Exhaust Pipe Removal (Refer to GROUP 15, Exhaust Pipe and Main Muffler P.15-9.)

### Pre-installation Operation

- Center Exhaust Pipe Installation (Refer to GROUP 15, Exhaust Pipe and Main Muffler P.15-9.)
- Refilling Fuel
- Checking for Fuel Leaks



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### REMOVAL STEPS

1. FUEL FILLER NECK CONNECTION
2. FUEL MAIN PIPE
3. FUEL RETURN PIPE
4. FUEL TANK HARNESS CLAMP CONNECTION
5. HARNESS CONNECTOR CONNECTION

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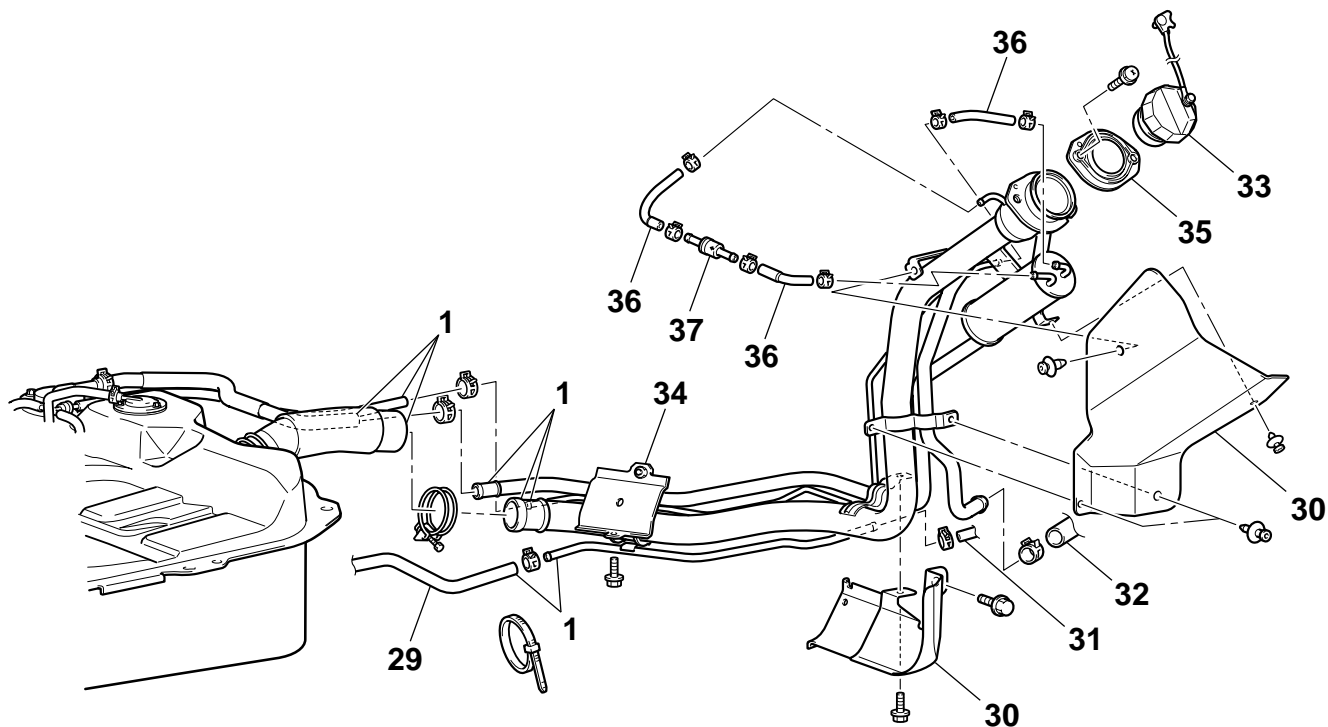
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### REMOVAL STEPS (Continued)

- FUEL TANK ASSEMBLY
- 6. HIGH-PRESSURE FUEL HOSE
- 7. FUEL RETURN HOSE
- 8. FUEL FILLER NECK BREATHER HOSE
- 9. FUEL FILLER HOSE
- 10. FUEL SHUT-OFF VALVE
- 11. O-RING

**REMOVAL STEPS (Continued)**

12. FUEL TANK HOSE
13. FUEL TANK VAPOR HOSE 2-WAY VALVE
14. FUEL TANK VAPOR PIPE
15. FUEL TANK ROLLOVER VALVE ASSEMBLY
16. PACKING
17. FUEL TANK DIFFERENTIAL PRESSURE SENSOR ASSEMBLY
18. FUEL TANK DIFFERENTLY PRESSURE SENSOR
19. PLATE
20. PACKING
21. FUEL TANK GAUGE UNIT
22. PACKING
23. FUEL PUMP BRACKET PLATE
24. FUEL PUMP MODULE
25. PACKING
26. LEVELING VALVE ASSEMBLY
27. PACKING
28. FUEL TANK
29. FUEL VAPOR PURGE HOSE A



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**REMOVAL STEPS**

30. FUEL FILLER NECK PROTECTOR
31. FUEL VAPOR PURGE HOSE B
32. FUEL VAPOR CONTROL LINE HOSE
33. FUEL TANK FILLER CAP

**REMOVAL STEPS (Continued)**

34. FUEL FILLER NECK
35. PACKING
36. FUEL FILLER NECK BREATHER HOSE
37. FUEL FILLER NECK VALVE

**Required Special Tool:**

- MB991348: Test Harness Set

## REMOVAL SERVICE POINTS

### <<A>> DISCONNECT HARNESS CONNECTOR /FUEL TANK ASSEMBLY REMOVAL

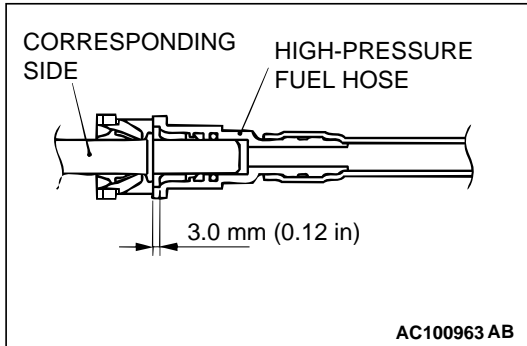
Lower the fuel tank halfway to disconnect the fuel tank harness connector.

## INSTALLATION SERVICE POINT

### >>A<< FUEL HIGH-PRESSURE HOSE INSTALLATION

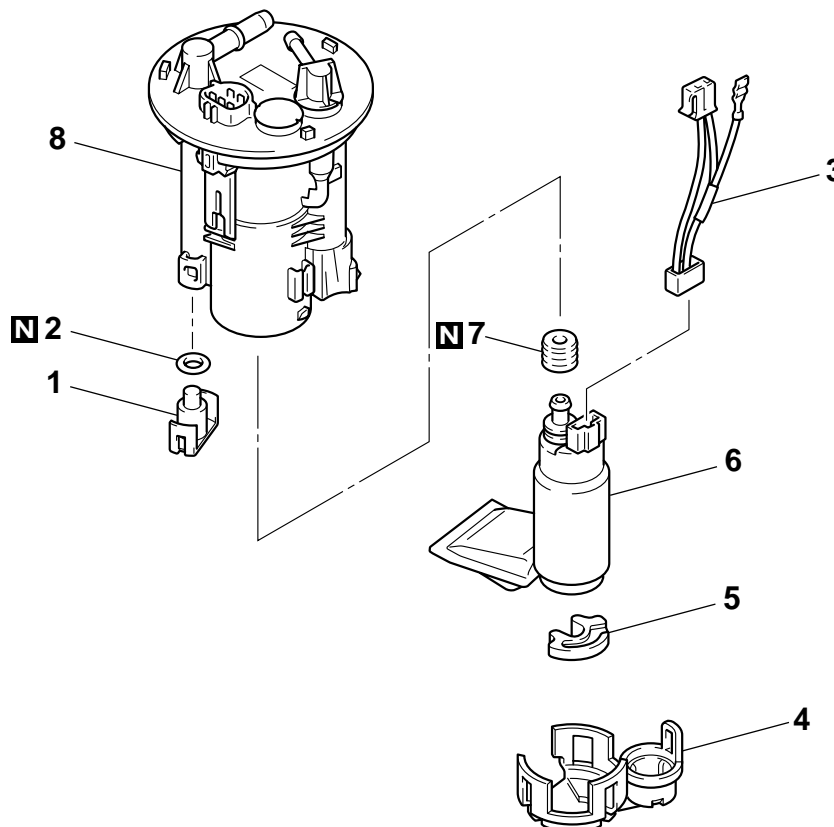
#### ⚠ CAUTION

After connecting the quick action joint of the fuel high-pressure hose, pull the joint lightly away from the quick action joint to confirm that it is secure. In addition, confirm that there is a play of approximately 3.0 mm (0.12 inch) at the joint.



## FUEL PUMP MODULE DISASSEMBLY AND ASSEMBLY

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### DISASSEMBLY STEPS

- >>A<<
1. CAP
  2. O-RING
  3. PUMP HARNESS
  4. FUEL PUMP BRACKET

### DISASSEMBLY STEPS

- >>A<<
5. FUEL PUMP CUSHION
  6. FUEL PUMP
  7. GROMMET
  8. FUEL FILTER ASSEMBLY

**ASSEMBLY SERVICE POINT****>>A<< GROMMET / O-RING INSTALLATION**

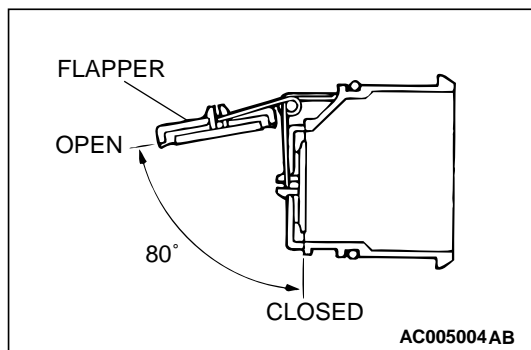
Apply gasoline on the grommet and the O-ring before mounting them to prevent damage or twisting.

**INSPECTION**

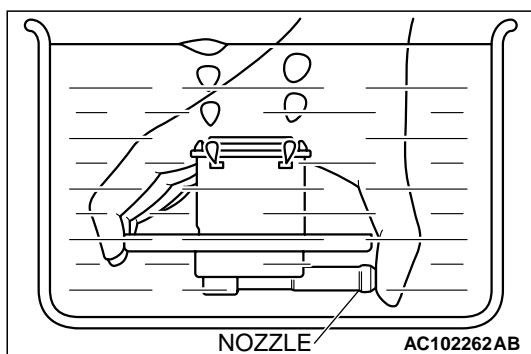
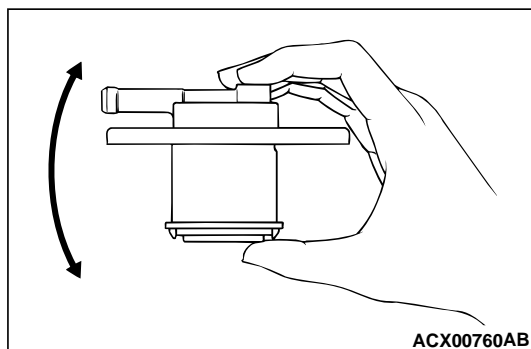
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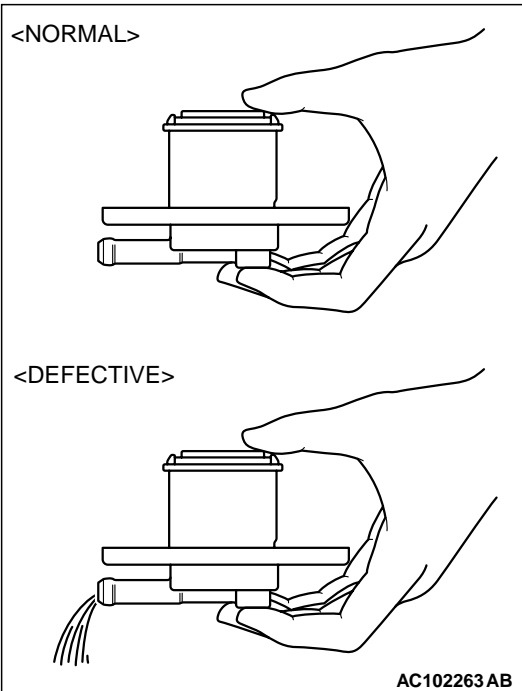
**FUEL SHUT-OFF VALVE CHECK**

Check that the flapper of the fuel shut-off valve opens and closes as shown in the illustration.

**FUEL TANK ROLLOVER VALVE ASSEMBLY CHECK**

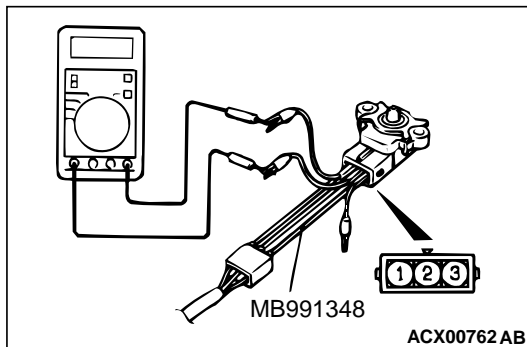
1. Shake the fuel tank rollover valve assembly up and down to check the float inside the fuel tank rollover valve assembly is not seized.
2. Obtain a container, which is full of water.
3. Invert the fuel tank rollover valve assembly, and submerge it slowly in the water while placing your fingers over the nozzle.
4. Check that no more air bubbles appears from the fuel tank rollover valve assembly, and withdraw it slowly.





- 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



- Disconnect the fuel tank differential pressure sensor connector and connect special tool MB991348 between the terminals of the disconnected connector.
- Turn the ignition switch to "ON" and measure the output voltage between terminals 2 and 3.

**Standard value: 2.0 – 3.0 V**

## SPECIFICATIONS

### FASTENER TIGHTENING SPECIFICATIONS

M1135003900236

ITEMS	SPECIFICATIONS
Fuel tank gauge unit	$2.5 \pm 0.5$ N·m (23 ± 4 in-lb)
Fuel pump module and fuel pump bracket plate mounting nut	$2.5 \pm 0.5$ N·m (23 ± 4 in-lb)
Fuel tank rollover valve assembly nut	$2.5 \pm 0.5$ N·m (23 ± 4 in-lb)
Fuel tank differential pressure sensor assembly nut (With plate)	$2.5 \pm 0.5$ N·m (23 ± 4 in-lb)
Fuel tank differential pressure sensor nut	$3.2 \pm 0.2$ N·m (28 ± 2 in-lb)
Levelling valve assembly nut	$2.5 \pm 0.5$ N·m (23 ± 4 in-lb)
Fuel tank mounting nut	$26 \pm 4$ N·m (19 ± 3 in-lb)
Fuel tank mounting bolt	$24 \pm 4$ N·m (18 ± 3 in-lb)

SERVICE SPECIFICATION

M1135000300127

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

SEALANT AND ADHESIVE

M1135000500024

ITEMS	SPECIFIED SEALANT
Service hole cover and floor pan	3M™ 8513 Grommets windshield sealer (Black)