

GROUP 13C

FUEL SUPPLY

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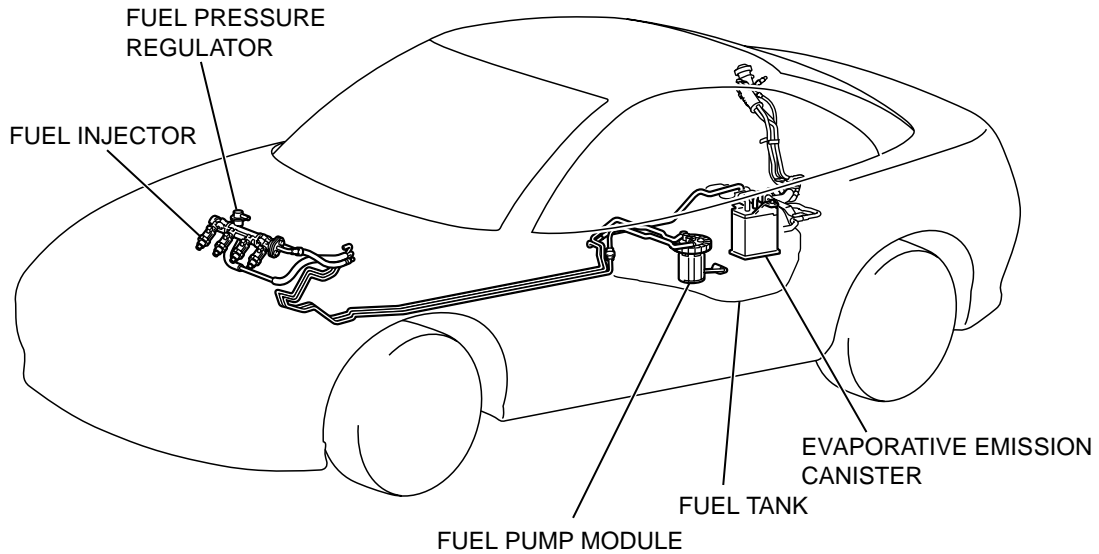
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GENERAL DESCRIPTION

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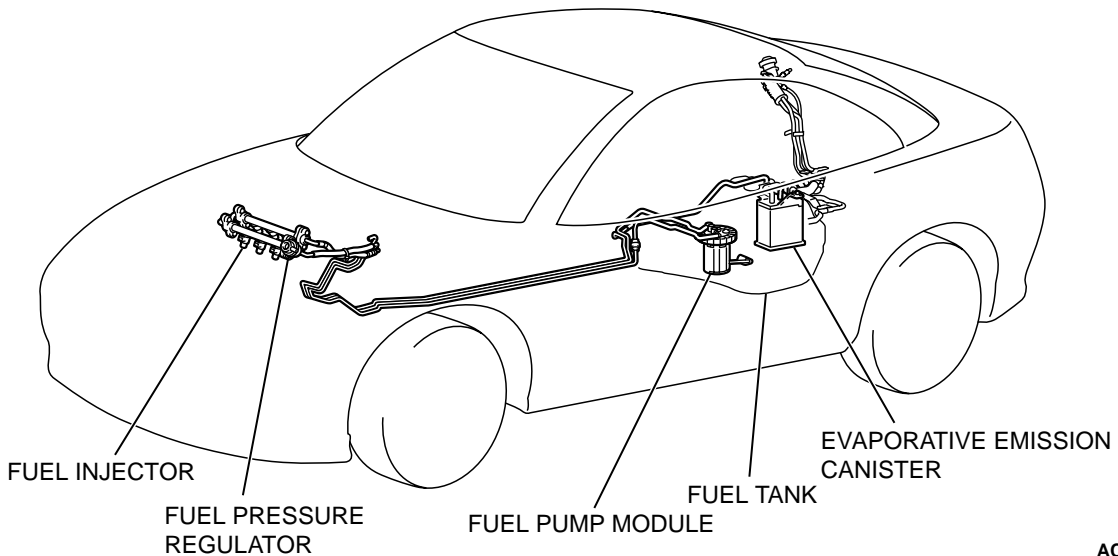
- The fuel tank is located under the floor of the rear seats to provide increased safety and a wider luggage space.
- A plastic fuel tank has been adopted to reduce weight, and improve anti-corrosion effectiveness.
- A fuel pump module, which unifies fuel pump, fuel filter, reservoir cup and fuel gauge unit, has been adopted to lighten weight and improve serviceability.

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FUEL SUPPLY DIAGNOSIS

INTRODUCTION TO FUEL SUPPLY DIAGNOSIS

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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.

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

M1135004200263

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

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1 : Engine Malfunctions Due to Insufficient Fuel Supply

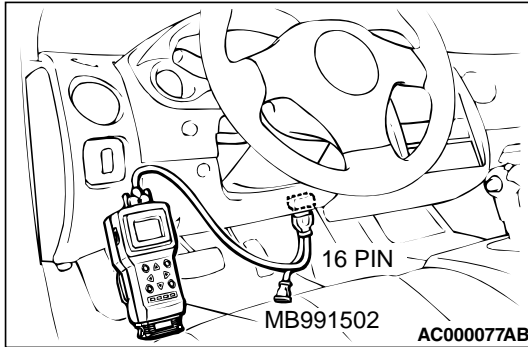
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- 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, Diagnostic Trouble Code Chart <2.4L> (Refer to P.13A-22) , <3.0L> (Refer to P.13B-22.)

NO : Go to Step 2 .

STEP 2. Check the fuel pressure.

- (1) Release residual pressure from the fuel line to prevent fuel spray. <2.4L> (Refer to P.13A-580.) <3.0L> (Refer to P.13B-682.)

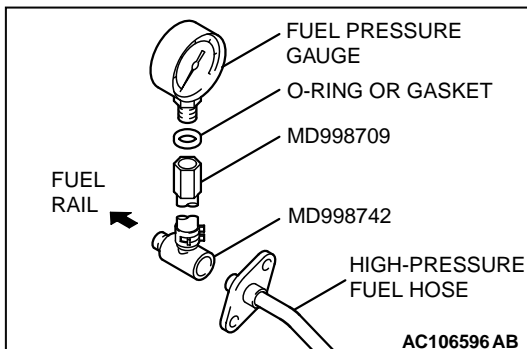
⚠ WARNING

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.

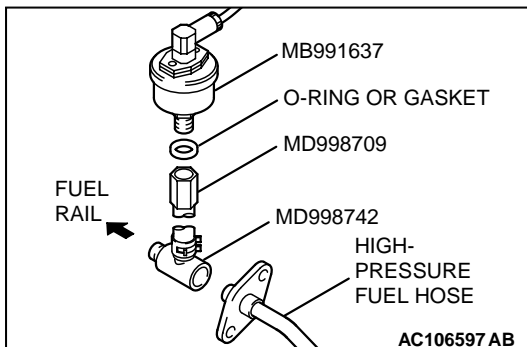
<When using the fuel pressure gauge>

- 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.

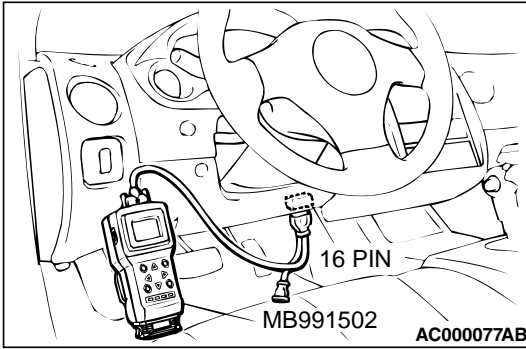


⚠ CAUTION

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

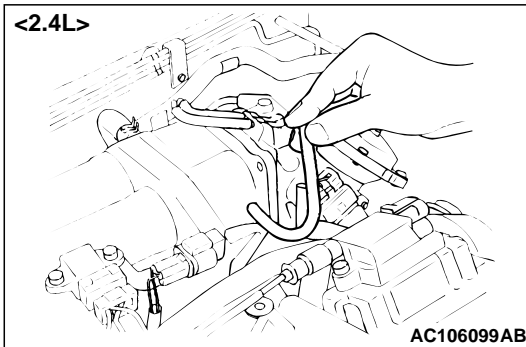
- (4) Connect scan tool MB991502 to the data link connector.
- (5) Use the Actuator test 07 to drive the fuel pump. Check that there is no fuel leaking from any section when the fuel pump is operating.
- (6) Stop the fuel pump.
- (7) Start the engine and run at idle.
- (8) Measure fuel pressure while 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.

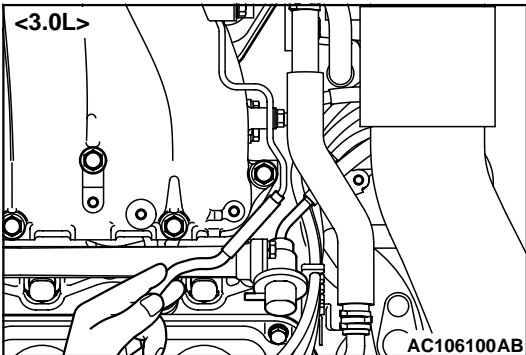
Standard value: 330 – 350 kPa (47 – 50 psi) at curb idle



- (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

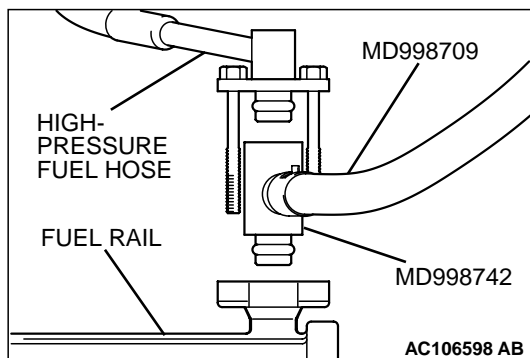
- (13) Stop the engine and observe fuel pressure gauge reading. It is normal if the reading does not drop within two minutes. If it does, observe the rate of drop and troubleshoot and repair according to the table below. Start, then stop the engine.
- Squeeze the fuel return line closed to confirm leak-down 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. <2.4L> (Refer to P.13A-580.) <3.0L> (Refer to P.13B-682.)

⚠ 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 ± 1.0 N·m (44 ± 8 in-lb)

- (18) Check for fuel leaks.
- Use scan tool MB991502 to operate the fuel pump.
 - Check the fuel line for leaks, and repair as needed.
- (19) Disconnect scan tool MB991502.

Q: Is the fuel pressure test in good condition?

YES : Go to Step 5.

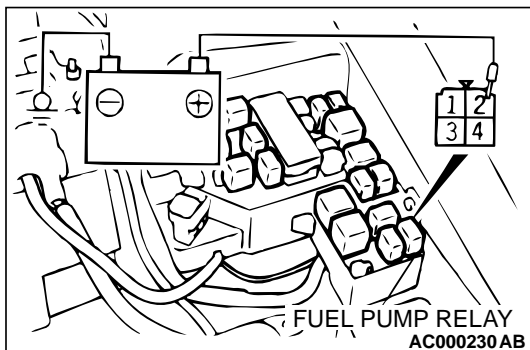
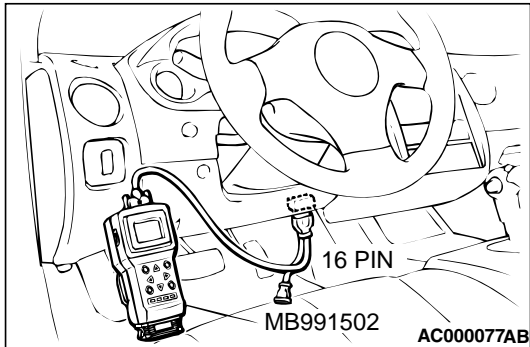
NO : Repair or replace. Then go to Step 3.

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 fuel pump relay, and apply battery voltage to harness-side connector terminal number 2. Check that an operating sound can be heard from the fuel pump.

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.

- c. Check for fuel pressure by pinching the fuel hose with fingertips.
- d. Install the fuel pump relay.

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.13C-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.

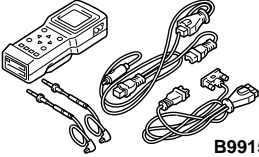
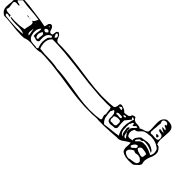


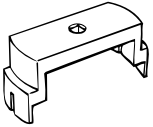

Q: Is the engine malfunction eliminated?

YES : Finish.

NO : Return to Step 1.

SPECIAL TOOLS

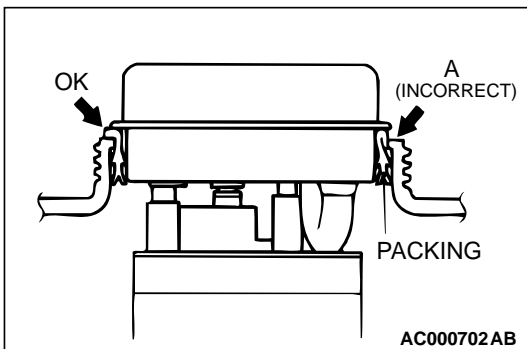
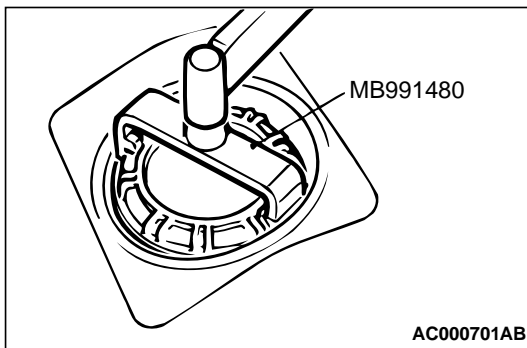
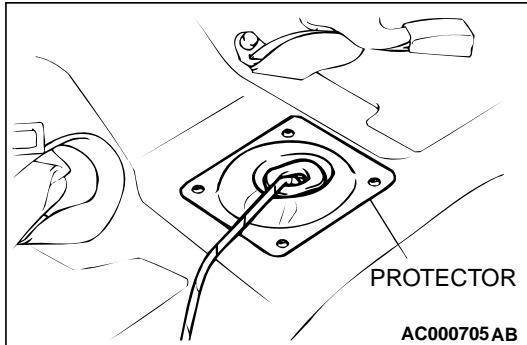
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TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
 B991502	MB991502 Scan tool <MUT-II>	MB991496-OD	<ul style="list-style-type: none"> • Reading diagnostic trouble code • MFI system inspection
	MD998709 Adaptor hose	MIT210196	Measurement of fuel pressure
	MD998742 Hose adaptor	MD998742-01	
 MB991637	MB991637 Fuel pressure gauge set	Tool not available	
 MB991480	MB991480 Tank cap wrench	–	Cap removal and installation
 MB991348	MB991348 Test harness set	–	Fuel tank differential pressure sensor check

ON-VEHICLE SERVICE

FUEL PUMP MODULE REPLACEMENT

M1135004900091



1. Remove the rear seat cushion. (Refer to GROUP 52A – Rear Seat P.52A-20.)
2. Remove the protector.
3. Bleed the residual pressure from inside the fuel pipe line to prevent the fuel from spraying out. [Refer to GROUP 13A <2.4L> P.13A-580 , 13B <3.0L> P.13B-682 – On-vehicle Service – Fuel Pump Connector Disconnection (How to Reduce Pressurized Fuel Line.)]
4. Disconnect the hose and connector connections, and then use special tool MB991480 to remove the fuel pump module.

CAUTION

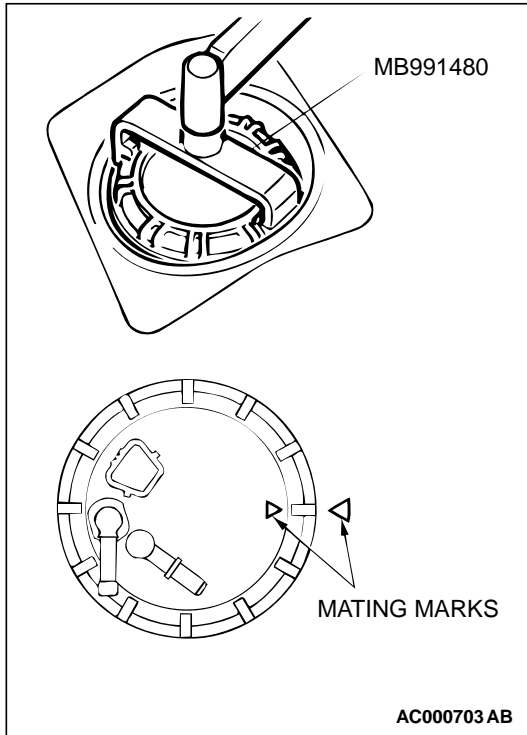
Install the packing to the fuel tank, and then install the fuel pump module to the fuel tank. Installing the packing to the fuel pump module will damage the packing lip when installing the fuel pump module to the fuel tank, and fuel leakage will occur.

5. Check that the fuel tank is not damaged or deformed, and then securely install the packing to the fuel tank.

NOTE: If the packing is damaged or deformed, replace with new packing.

CAUTION

- Do not tilt the fuel pump module when installing.
 - The packing should not be folded over as shown by "A" in the illustration.
6. Apply soap water to the inside of the packing, and then install the fuel pump module.

**⚠ CAUTION**

When Tightening, be careful not to let the fuel pump module turn together with the cap. If the mating marks are misaligned, the float may measure a remaining amount of fuel in correctly, causing the low fuel warning light to malfunction.

7. Use special tool MB991480 to align the mating marks on the fuel tank and fuel pump module, and tighten the cap.
8. Check for leaks from the installation section of the fuel pump module by the following procedure.
 - (1) Apply soapy water to the inside diameter of the cap.
 - (2) Choke the vapor hose and main hose, apply an internal pressure of 10 kPa (1.45 psi) or less from the return hose and check that no bubbles form in the soapy water.
9. Connect the connector, and then install the protector.
10. Install the rear seat cushion. (Refer to GROUP 52A – Rear Seat [P.52A-20.](#))

FUEL TANK

FUEL TANK REMOVAL AND INSTALLATION

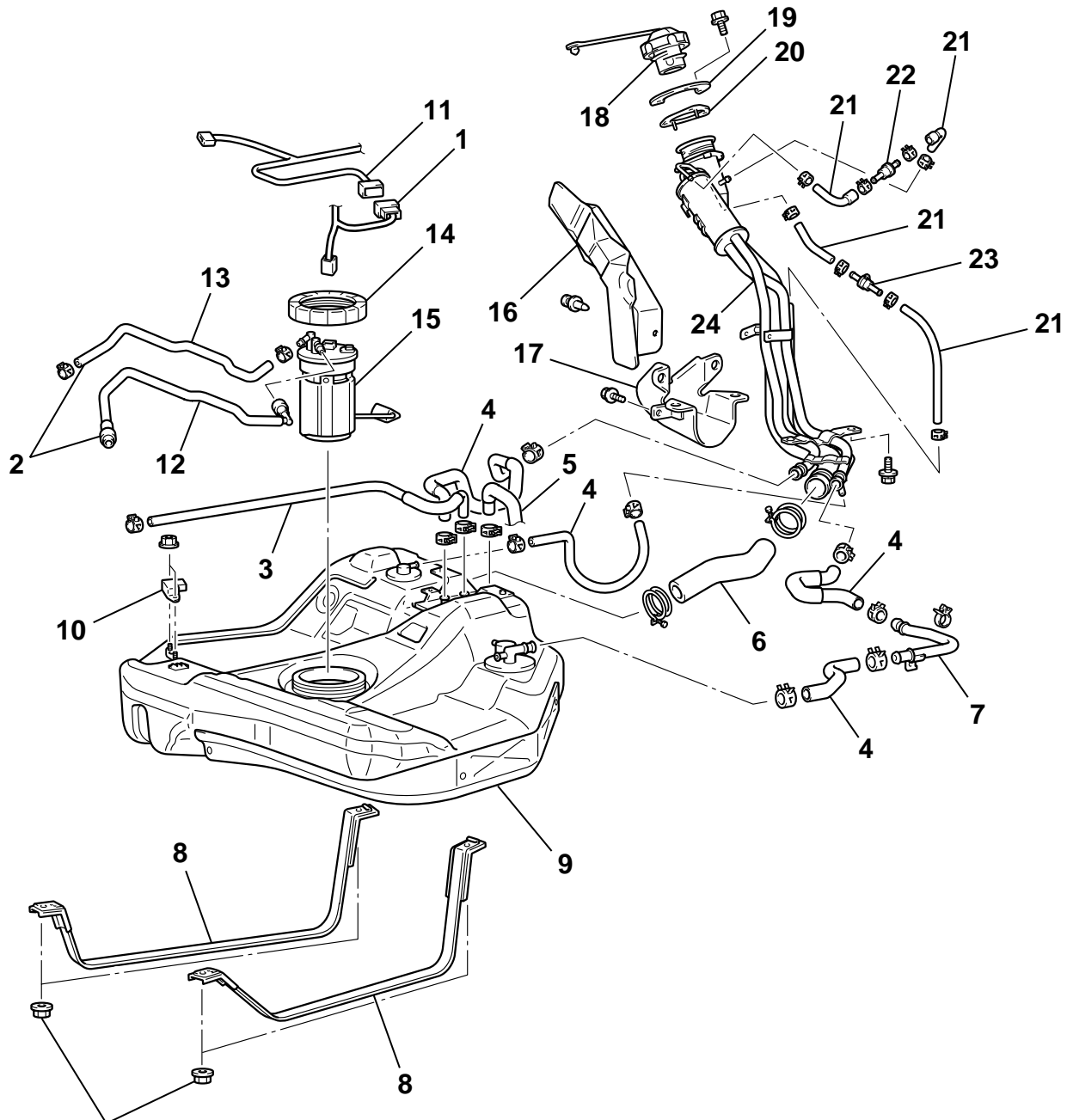
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Pre-removal Operation

- Draining Fuel
- Reduce the Inner Pressure of Fuel Line and Hose [Refer to GROUP 13A <2.4L>P.13A-580 , 13B <3.0L>P.13B-682 – On-vehicle Service – Fuel Pump Connector Disconnection (How to Reduce Pressurized Fuel Line).]
- Center Exhaust Pipe Removal (Refer to GROUP 15 <2.4L>P.15-21 , <3.0L>P.15-22 .)
- Evaporator Hose Removal (Refer to GROUP 17 – Evaporator P.17-110.)

Post-installation Operation

- Evaporator Hose Installation (Refer to GROUP 17– Evaporator P.17-110.)
- Center Exhaust Pipe Installation (Refer to GROUP 15 <2.4L>P.15-21 , <3.0L>P.15-22 .)
- Refilling Fuel
- Checking for Fuel Leaks



26 ± 4 N·m
19 ± 3 ft-lb

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REMOVAL STEPS

1. BODY HARNESS CONNECTION
2. HOSE CONNECTION
3. PURGE HOSE
4. VAPOR HOSE
5. VENT HOSE
6. FILLER HOSE
7. PIPE ASSEMBLY
8. BAND ASSEMBLY
9. FUEL TANK ASSEMBLY
10. DIFFERENTIAL PRESSURE SENSOR
11. FUEL HARNESS
- >>B<< 12. HIGH-PRESSURE FUEL HOSE

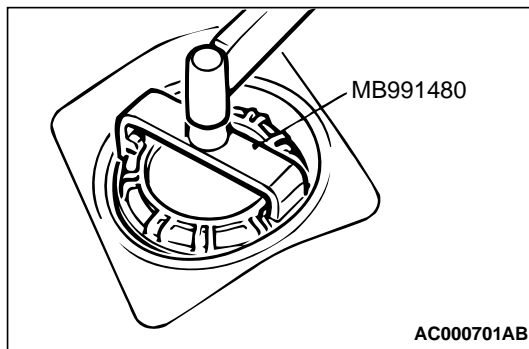
<<A>> >>A<<

REMOVAL STEPS (Continued)

13. FUEL RETURN HOSE
14. CAP
15. FUEL PUMP MODULE
16. FILLER NECK PROTECTOR
17. FILLER NECK PROTECTOR
18. FUEL CAP
19. REINFORCEMENT
20. PACKING
21. VAPOR HOSE
22. CHECK VALVE ASSEMBLY (1WAY)
23. CHECK VALVE ASSEMBLY (2WAY)
24. FUEL FILLER NECK ASSEMBLY

REMOVAL SERVICE POINT**<<A>> CAP REMOVAL**

Use special tool MB991480 to remove the cap.

**INSTALLATION SERVICE POINTS****>>A<< CAP INSTALLATION****⚠ CAUTION**

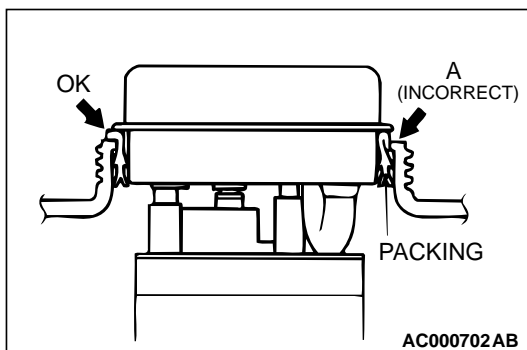
Install the packing to the fuel tank, and then install the fuel pump module to the fuel tank. Installing the packing to the fuel pump module will damage the packing lip when installing the fuel pump module to the fuel tank, and fuel leakage will occur.

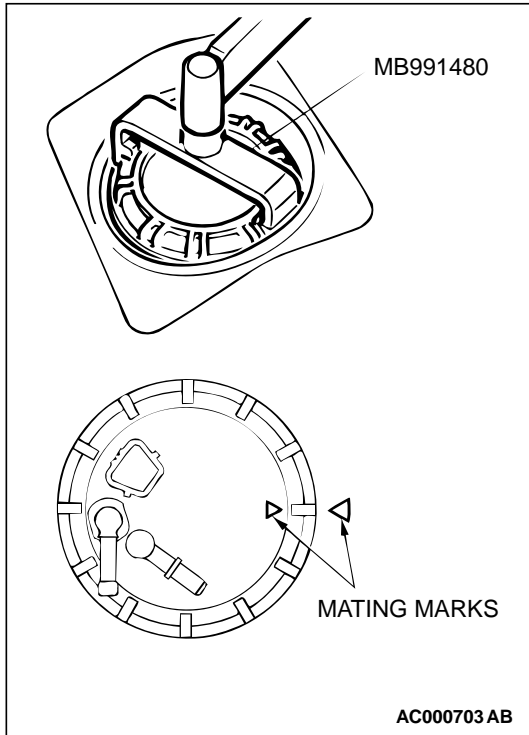
1. Check that the fuel tank is not damaged or deformed, and then securely install the packing to the fuel tank.

NOTE: If the packing is damaged or deformed, replace with new packing.

⚠ CAUTION

- Do not tilt the fuel pump module when installing.
 - The packing should not be folded over as shown by "A" in the illustration.
2. Apply soap water to the inside of the packing, and then install the fuel pump module.

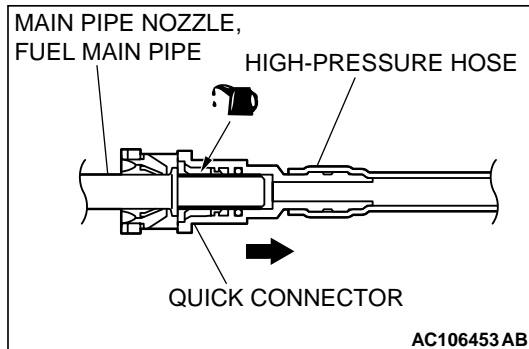




⚠ CAUTION

When tightening, be careful not to let the fuel pump module turn together with the cap. If the mating marks are misaligned, the float may measure a remaining amount of fuel incorrectly, causing the low fuel warning light to malfunction.

3. Use special tool MB991480 to align the mating marks on the fuel tank and fuel pump module, and tighten the cap.



>>B<< HIGH-PRESSURE FUEL HOSE INSTALLATION

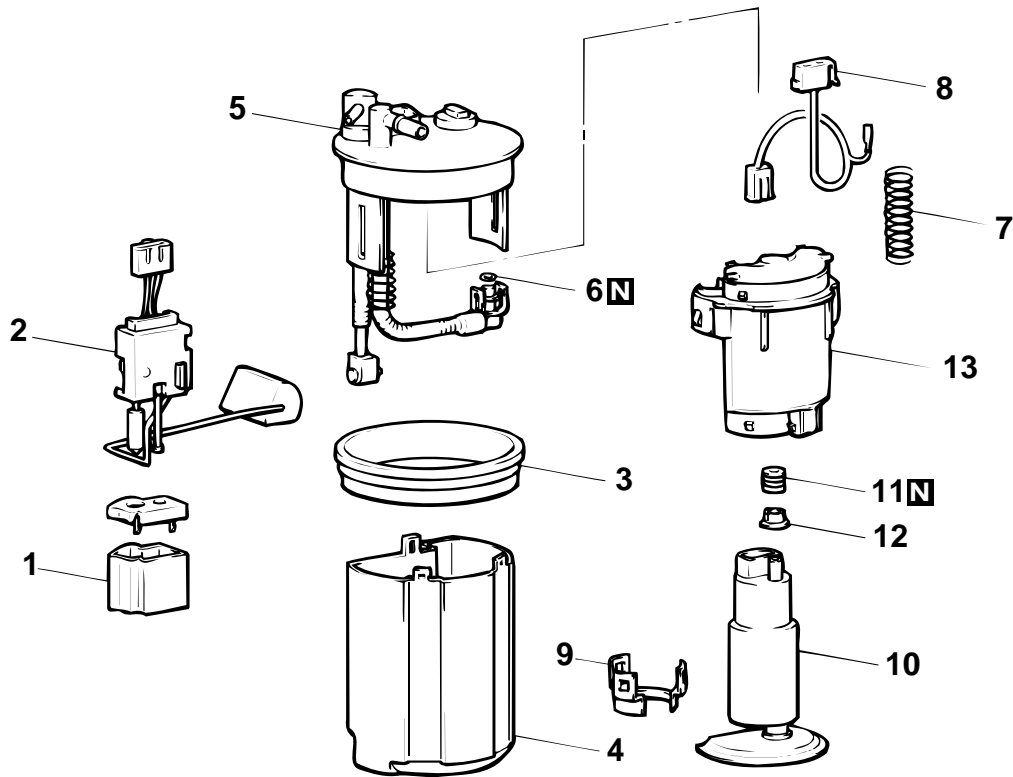
⚠ CAUTION

Connect the high-pressure hose, and then pull it gently in the direction of removal to check that the hose is firmly connected.

Apply clean engine oil to the tips of the main pipe nozzle and the fuel main pipe, and connect quick-joint connector of the high-pressure fuel hose to them.

DISASSEMBLY AND ASSEMBLY
FUEL PUMP MODULE

M1135004600131



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REMOVAL STEPS

1. THERMISTOR CASE
2. FUEL GAUGE UNIT
3. PACKING
4. RESERVOIR CUP
5. PUMP SUPPORT ASSEMBLY
- >>A<< 6. O-RING
7. SPRING

REMOVAL STEPS (Continued)

8. PUMP HARNESS
9. LOCK BRACKET
10. FUEL PUMP
- >>A<< 11. GROMMET
12. SPACER
13. FUEL FILTER

ASSEMBLY SERVICE POINT

>>A<< GROMMET/O-RING INSTALLATION

Apply a film of gasoline to the grommet and O-ring to prevent them from damaging or deforming, and then install them.

INSPECTION

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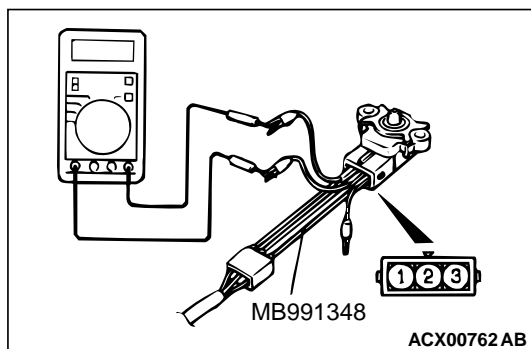
FUEL GAUGE UNIT CHECK

Refer to GROUP 54A – Combination Meter [P.54A-103](#).

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 measure the output voltage between terminals 2 and 3.

Standard value: 2.0 – 3.0 V



SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

M1135003900195

ITEMS		SPECIFICATION
Fuel supply	Band assembly nut	26 ± 4 N·m (19 ± 3 ft·lb)

SERVICE SPECIFICATIONS

M1135000300161

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

NOTES