

ENGINE
(Y22SE 2.2L / 6VD1 3.2L)

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ENGINE

ENGINE FUEL (Y22SE 2.2L) For Short Wheel Base

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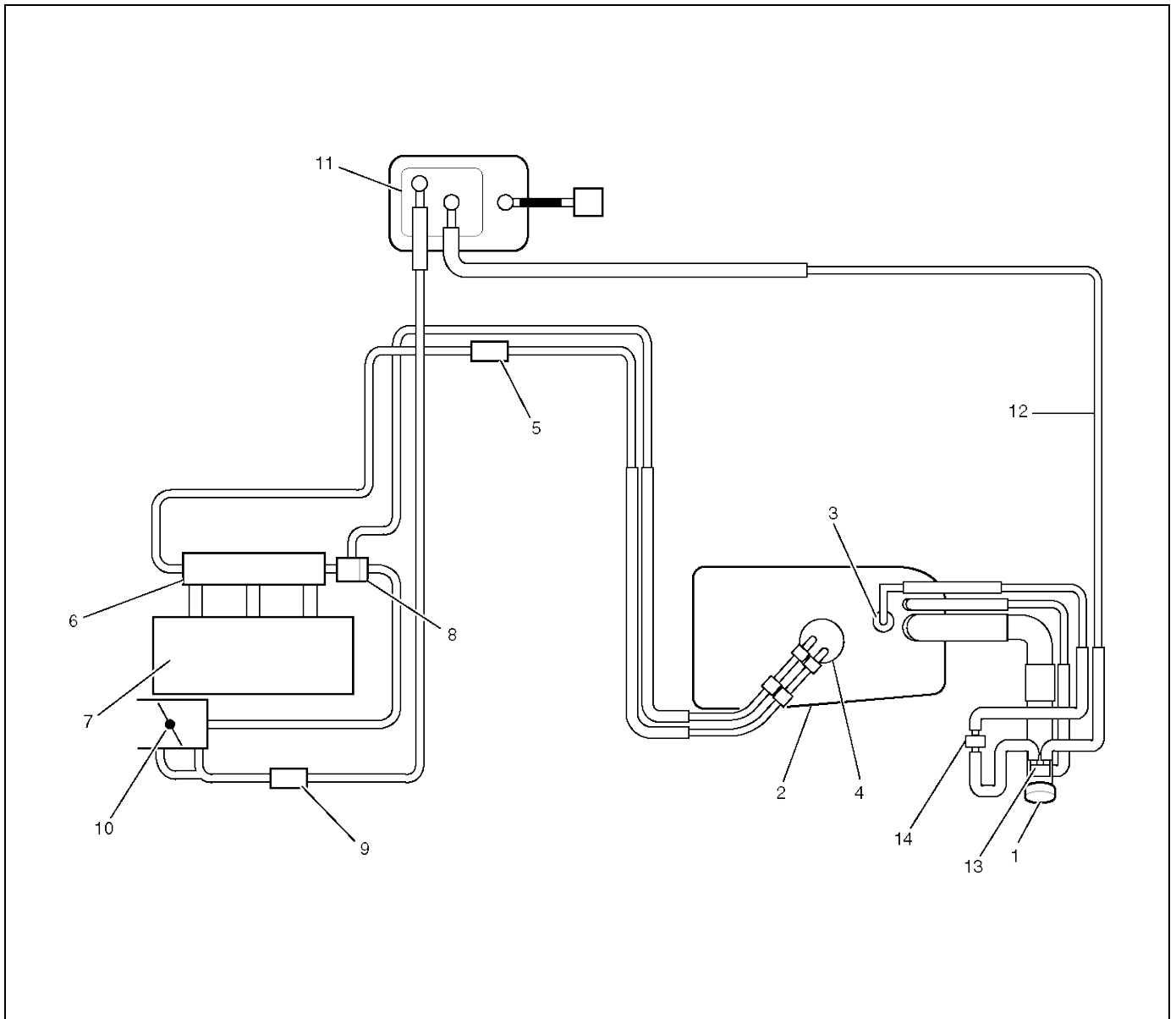
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Service Precaution

WARNING: THIS VEHICLE HAS A SUPPLEMENTAL RESTRAINT SYSTEM (SRS). REFER TO THE SRS COMPONENT AND WIRING LOCATION VIEW IN ORDER TO DETERMINE WHETHER YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING. WHEN YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING, REFER TO THE SRS SERVICE INFORMATION. FAILURE TO FOLLOW WARNINGS COULD RESULT IN POSSIBLE AIR BAG DEPLOYMENT, PERSONAL INJURY, OR OTHERWISE UNNEEDED SRS SYSTEM REPAIRS.

CAUTION: Always use the correct fastener in the proper location. When you replace a fastener, use **ONLY** the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread sealant. **UNLESS OTHERWISE SPECIFIED**, do not use supplemental coatings (Paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.

General Description



140R100024

Legend

- | | |
|-----------------------------------|---------------------------------|
| (1) Fuel Filler Cap | (8) Fuel Pressure Control Valve |
| (2) Fuel Tank | (9) Duty Solenoid Valve |
| (3) Rollover Valve | (10) Throttle Valve |
| (4) Fuel Pump and Sender Assembly | (11) Canister |
| (5) Fuel Filter | (12) Evapo Pipe. |
| (6) Fuel Rail | (13) Evapo Shut Off Valve |
| (7) Intake Manifold | (14) Separator |

When working on the fuel system, there are several things to keep in mind:

- Any time the fuel system is being worked on, disconnect the negative battery cable except for those tests where battery voltage is required.
- Always keep a dry chemical (Class B) fire extinguisher near the work area.
- Replace all pipes with the same pipe and fittings that were removed.
- Clean and inspect "O" rings. Replace if required.
- Always relieve the line pressure before servicing any fuel system components.
- Do not attempt repairs on the fuel system until you have read the instructions and checked the pictures relating to that repair.
- Adhere to all Notices and Cautions.

All gasoline engines are designed to use only unleaded gasoline. Unleaded gasoline must be used for proper emission control system operation.

Its use will also minimize spark plug fouling and extend engine oil life. Using leaded gasoline can damage the emission control system and could result in loss of emission warranty coverage.

All cars are equipped with an Evaporative Emission Control System. The purpose of the system is to minimize the escape of fuel vapors to the atmosphere.

Fuel Metering

The Powertrain Control Module (PCM) is in complete control of this fuel delivery system during normal driving conditions.

The intake manifold function, like that of a diesel, is used only to let air into the engine. The fuel is injected by separate injectors that are mounted over the intake manifold.

The Manifold Absolute Pressure (MAP) sensor measures the changes in the intake manifold pressure which result from engine load and speed changes, which the MAP sensor converts to a voltage output.

This sensor generates the voltage to change corresponding to the flow of the air drawn into the engine.

The changing voltage is transformed into an electric signal and provided to the PCM.

With receipt of the signals sent from the MAP sensor, Intake Air Temperature sensor and others, the PCM determines an appropriate fuel injection pulse width feeding such information to the fuel injector valves to affect an appropriate air/fuel ratio.

The Multiport Fuel Injection system utilizes an injection system where the injectors turn on at every crankshaft revolution. The PCM controls the injector spray so that the correct amount of fuel is metered depending on driving conditions.

Two interchangeable "O" rings are used on the injector that must be replaced when the injectors are removed.

The fuel rail is attached to the top of the intake manifold and supplies fuel to all the injectors.

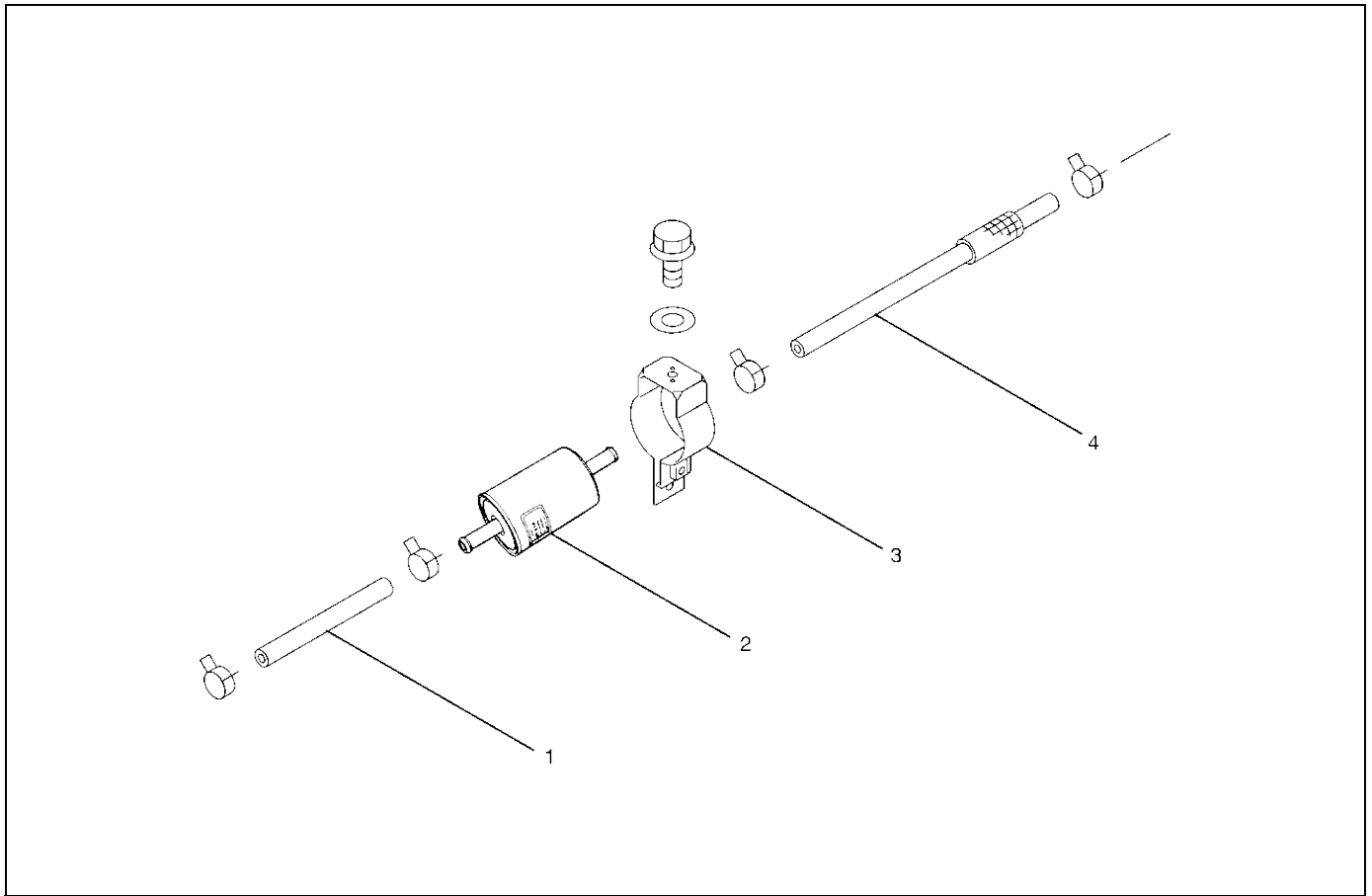
Fuel is recirculated through the rail continually while the engine is running. This removes air and vapors from the fuel as well as keeping the fuel cool during hot weather operation.

The fuel pressure control valve that is mounted on the fuel rail maintains a pressure differential across the injectors under all operating conditions. It is accomplished by controlling the amount of fuel that is recirculated back to the fuel tank based on engine demand.

See Section "Driveability and Emission" for more information and diagnosis.

Fuel Filter

Fuel Filter and Associated Parts



140R100007

Legend

- | | |
|-----------------|------------------------|
| (1) Fuel Hose | (3) Fuel Filter Holder |
| (2) Fuel Filter | (4) Fuel Hose |

Removal

CAUTION: When repair to the fuel system has been completed, start engine and check the fuel system for loose connections or leakage. For the fuel system diagnosis, see Section "Driveability and Emission".

1. Disconnect battery ground cable.

Fuel Pump Relay

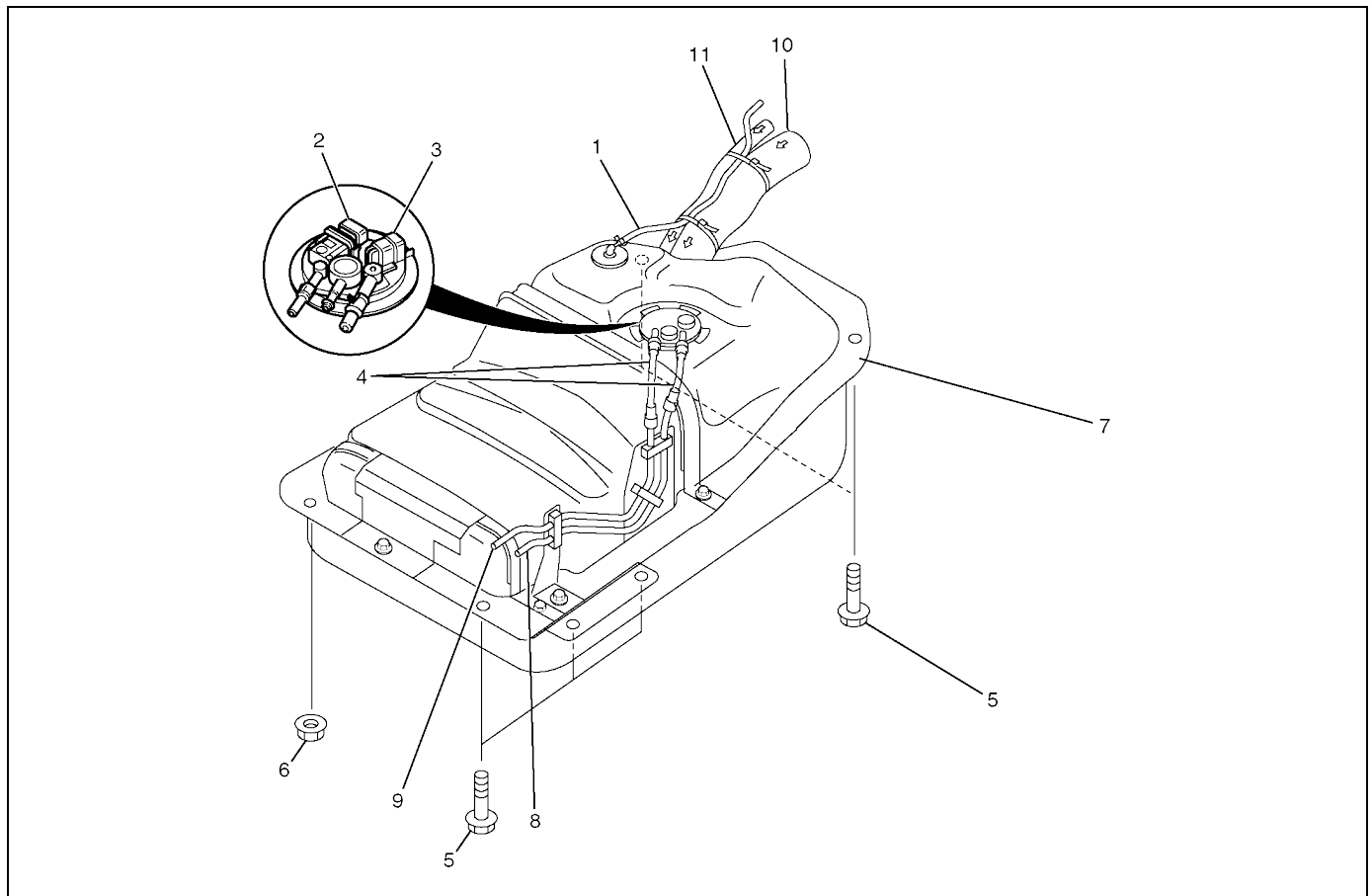
General Description

In order to control the Fuel Pump and Sender (FPS) Assembly operation, the FPS relay is provided. When the starter switch is turned to "ON" position, the FPS

relay operates the FPS assembly for 2 seconds. When it is turned to "START" position, the Engine Control Module receives the reference pulse from the Ignition Control Module and it operates the relay, again causing the FPS to feed fuel.

Fuel Tank

Fuel Tank and Associated Parts



140R200015

Legend

- | | |
|--|------------------------|
| (1) Hose; Evaporative Fuel | (7) Fuel Tank Assembly |
| (2) Connector; Fuel Tank Pressure Sensor | (8) Hose; Fuel Feed |
| (3) Connector; Fuel Feed Pump | (9) Hose; Fuel Return |
| (4) Fuel Tube/Quick Connector | (10) Fuel Filler Hose |
| (5) Bolt; Fuel Tank Asm. Fixing (QTY:5) | (11) Air Breather Hose |
| (6) Nut; Fuel Tank Asm. Fixing (QTY:1) | |

Removal

CAUTION: When repair to the fuel system has been completed, start engine and check the fuel system for loose connection or leakage. For the fuel system diagnosis, see Section “Driveability and Emission”.

1. Drain the fuel, refer to fuel pump flow test.
2. Disconnect battery ground cable.
3. Loosen fuel filler cap.
4. Support underneath of the fuel tank protector with a lifter.
5. Disconnect evaporative fuel hose (1) at the canister.
6. Disconnect fuel feed hose (8) and fuel return hose (9) near the fuel filter.

NOTE: Plug both ends of the fuel hoses to prevent fuel leakage.

7. Disconnect air breather hose (11) and fuel filler hose (10) at the fuel filler neck.

NOTE: Cover fuel hose to prevent any dust entering.

8. Remove the four fuel tank assembly fixing bolts (5).

9. Lower the tank and disconnect the electrical connectors (2,3).

10. Remove the fuel tank assembly (7).

Installation

1. Raise the fuel tank assembly and install the connectors (2,3) to the fuel pump and sending unit.
2. Install fuel tank assembly and torque the five fixing bolts and a nut.

Torque: 68 N·m (50 lb ft)

3. Connect fuel filler hose (10) and air breather hose (11), and clip them firmly.
4. Install the fuel feed hose (8) and fuel return hose (9) near the fuel filter and clip to a snug fit.
5. Connect evaporative fuel hose (1).
6. Tighten fuel filler cap until at least three clicks are heard.
7. Connect battery ground cable.

Fuel Gauge Unit

Removal and Installation

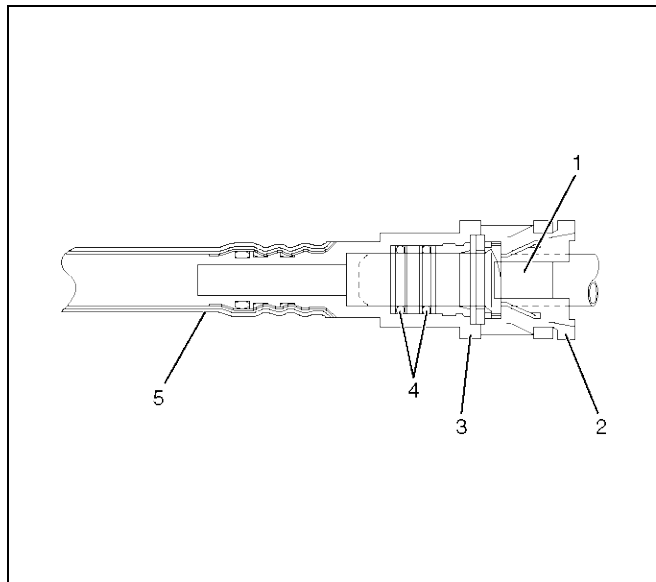
As for removal and installation of the Fuel Gauge Unit, refer to “Fuel Pump” in this section as the fuel gauge unit is combined with the fuel pump and sender assembly.

Fuel Tube / Quick – Connector Fittings

Precautions

- Lighting match, cigarette and/or lighter is prohibited.
- Keep flammable materials safely stored to prevent accidental fires.
- Disconnect the battery ground cable to prevent electrical shorts.
- Pretreat piping system to prevent thermal damage or spattering when welding or conducting other heat generating repairs.

Cautions During Work



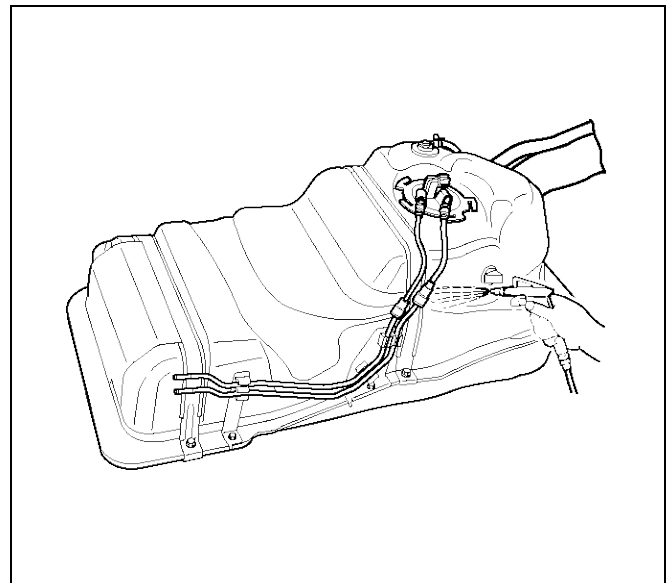
Legend

- (1) Pipe or Port
- (2) Retainer
- (3) Connector
- (4) O-ring
- (5) Plastic Tube

Prevent battery electrolyte or wiping cloth soaked with battery electrolyte on the fuel piping. Do not use fuel piping that has been exposed to battery electrolyte. Be careful not to bend or twist the fuel pipe while performing repairs. Replace fuel piping if the existing fuel piping is damaged in any way.

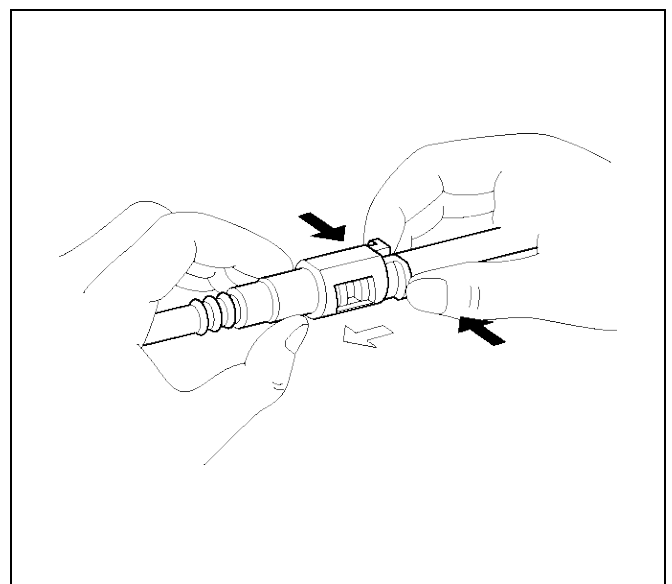
Removal

1. Open the fuel cap to relieve the fuel pressure in the tank.
Use compressed air to blow off any dirt when disconnecting the fuel quick connect fittings.

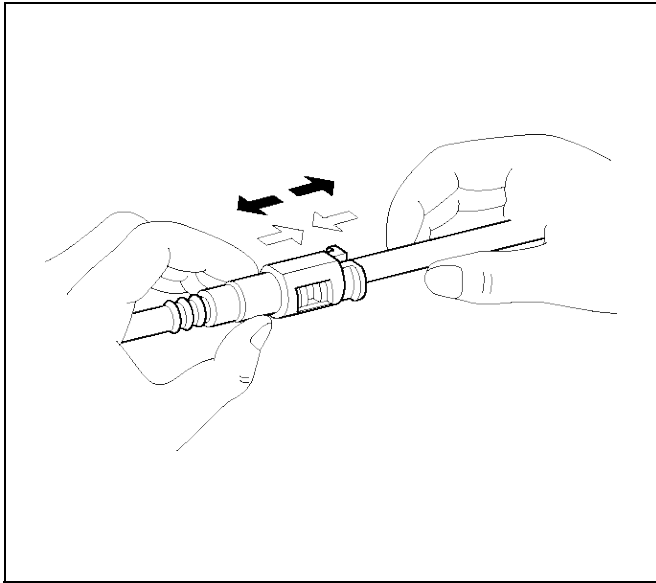


Cover the connectors with a cloth when disconnecting the piping to prevent fuel spray, in case of any existing fuel pressure in the system.

2. For removal of the pipe, hold the connector in one hand, and hold the retainer tab with the other hand and pull out the connector, as illustrated. The pipe can be removed with the retainer attached.

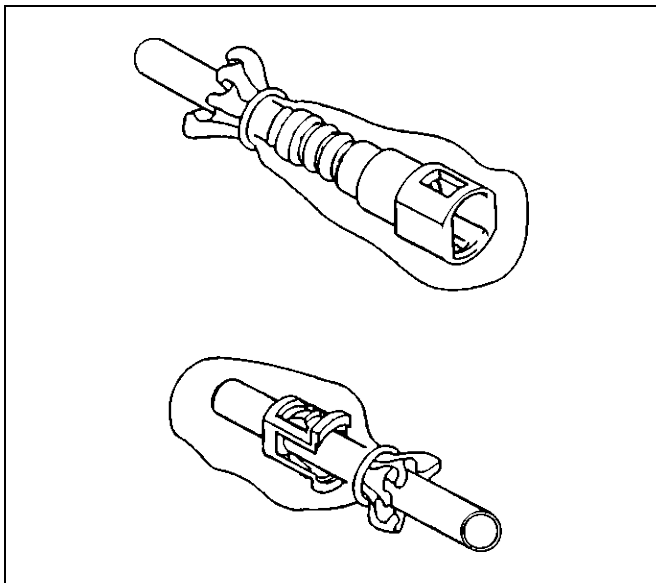


NOTE: Do not use tools of any kind. Only use bare hands when disconnecting the connector. Use a lubricant (light oil) and/or push and pull the connector until the pipe is disconnected.



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When reusing the pipe retainer, reuse without removing the retainer from the pipe. If the retainer is damaged or deformed, replace with a new retainer. Cover the connectors with a plastic bag after disassembly to prevent dirt and water from entering.



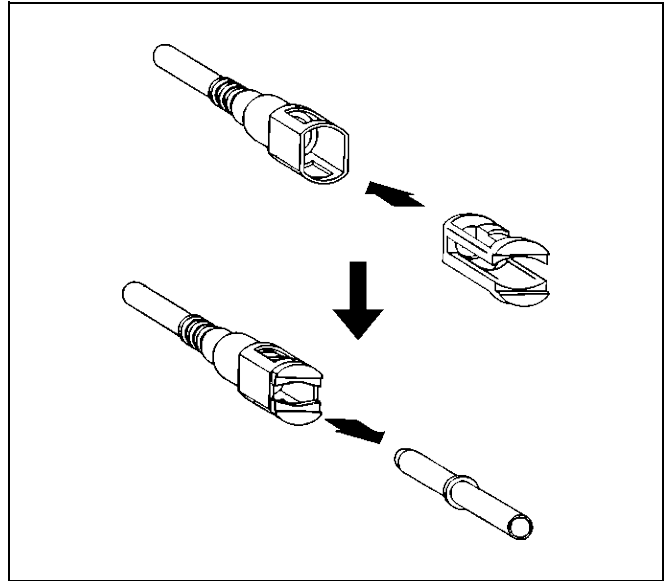
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Reuse of Quick-Connector

- Replace the pipe, port and connector if scratch, dent or crack is found.
- Clean the pipe and connector from any debris and inspect for any damage. Replace the connector and/or the pipe if a scratch, dent or crack is found.

- Clean the pipe and connector area prior to installing the retainer, a click is heard when properly installed then pull to test for snug fit. After it clicks, try pulling it out to make sure that it is not drawn and is securely locked.

NOTE: The retainer, once removed from the pipe, cannot be reused. Just replace with a new retainer. Insert the new retainer into the connector side until it clicks, and connect the pipe as inserting it into the retainer until it clicks.



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Assembling Advice

Immediately install the pipe after applying light engine oil onto pipe for easier assembly. The pipe must be clean of dirt when installing pipe or poor sealing may occur.

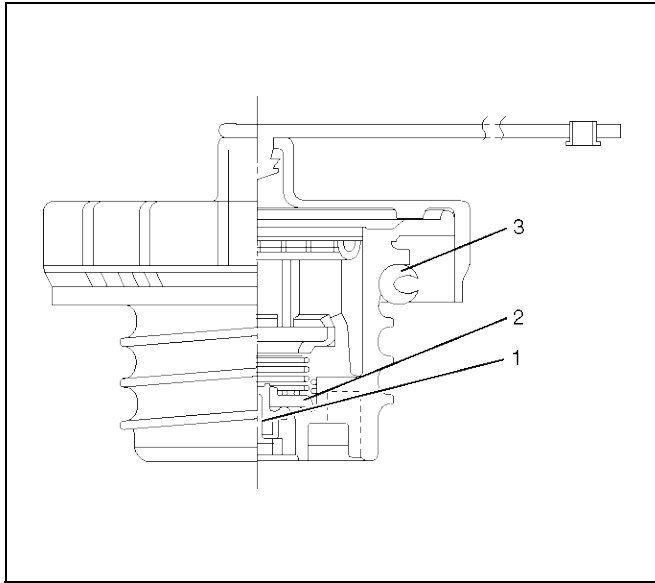
Test/Inspection After Assembling

1. Reconnect the battery negative cable.
2. Turn the ignition key to the "ON" position and listen for pump start-up. Fuel pressure will increase as soon as the fuel pump is actuated. Inspect for fuel leak.
3. Perform step 2 a few times to make sure there are no fuel leakage.
4. Start the engine and observe the engine idle speed. The presence of dirt in the fuel system may affect the fuel injection system.

Fuel Filler Cap

General Description

A vacuum valve and pressure valve are built into the fuel filler cap which adjusts the fuel pressure in the fuel tank to prevent fuel tank damage.



Legend

- (1) Vacuum Valve
- (2) Pressure Valve
- (3) Seal Ring

Inspection

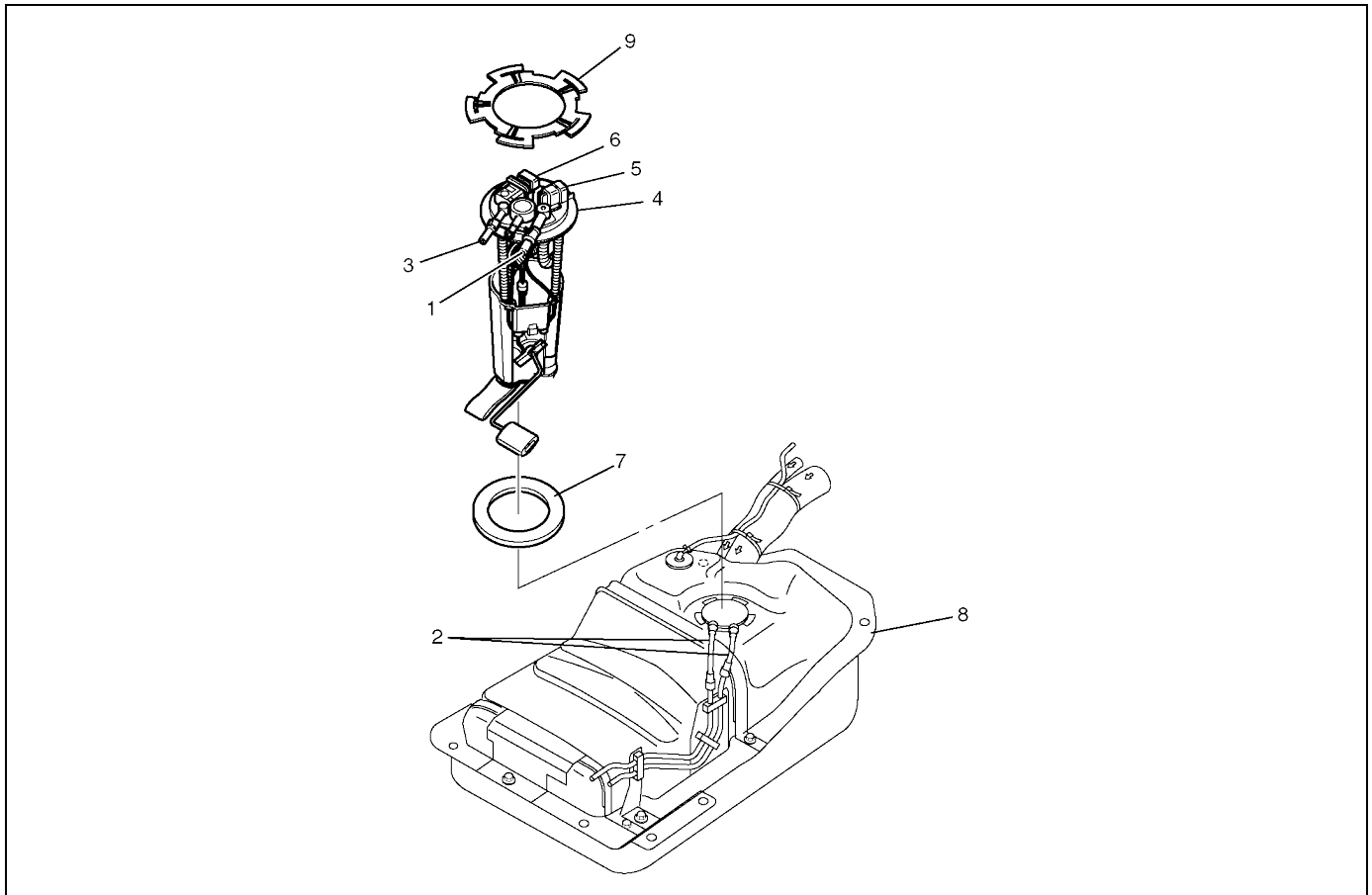
The fuel filler cap must be inspected for seal condition. The fuel filler cap must be replaced if found defective.

CAUTION:

A replacement fuel filler cap must be the same as the original. The fuel filler cap valve was designed primarily for this application and must be replaced with the same type or decreased engine performance may occur.

Fuel Pump

Fuel Pump and Associated Parts



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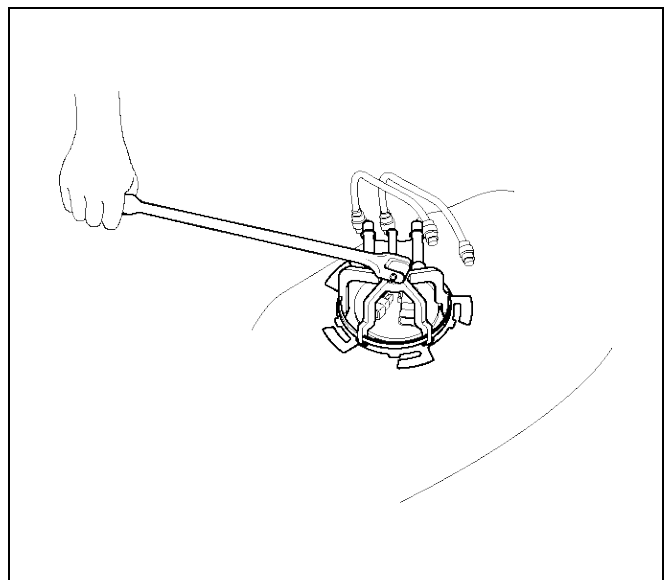
Legend

- | | |
|---|--|
| (1) Fuel Feed Port | (5) Connector; Fuel Feed Pump |
| (2) Fuel Tube/Quick Connector | (6) Connector; Fuel Tank Pressure Sensor |
| (3) Fuel Return Port | (7) Seal; Fuel Pump |
| (4) Fuel Pump and Sender (FPS) Assembly | (8) Fuel Tank Assembly |
| | (9) Retainer (Fuel pump lock) |

Removal

CAUTION: When repair to the fuel system has been completed, start engine and check the fuel system for loose connection or leakage. For the fuel system diagnosis, see section "Driveability and Emission".

1. Remove fuel tank assembly(8). Refer to "Fuel Tank Removal" in this section.
2. Remove the retainer (9) with tool J-39765 and remove fuel pump and sender (FPS) assembly(4).



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6C-12 ENGINE FUEL (Y22SE 2.2L)

NOTE:

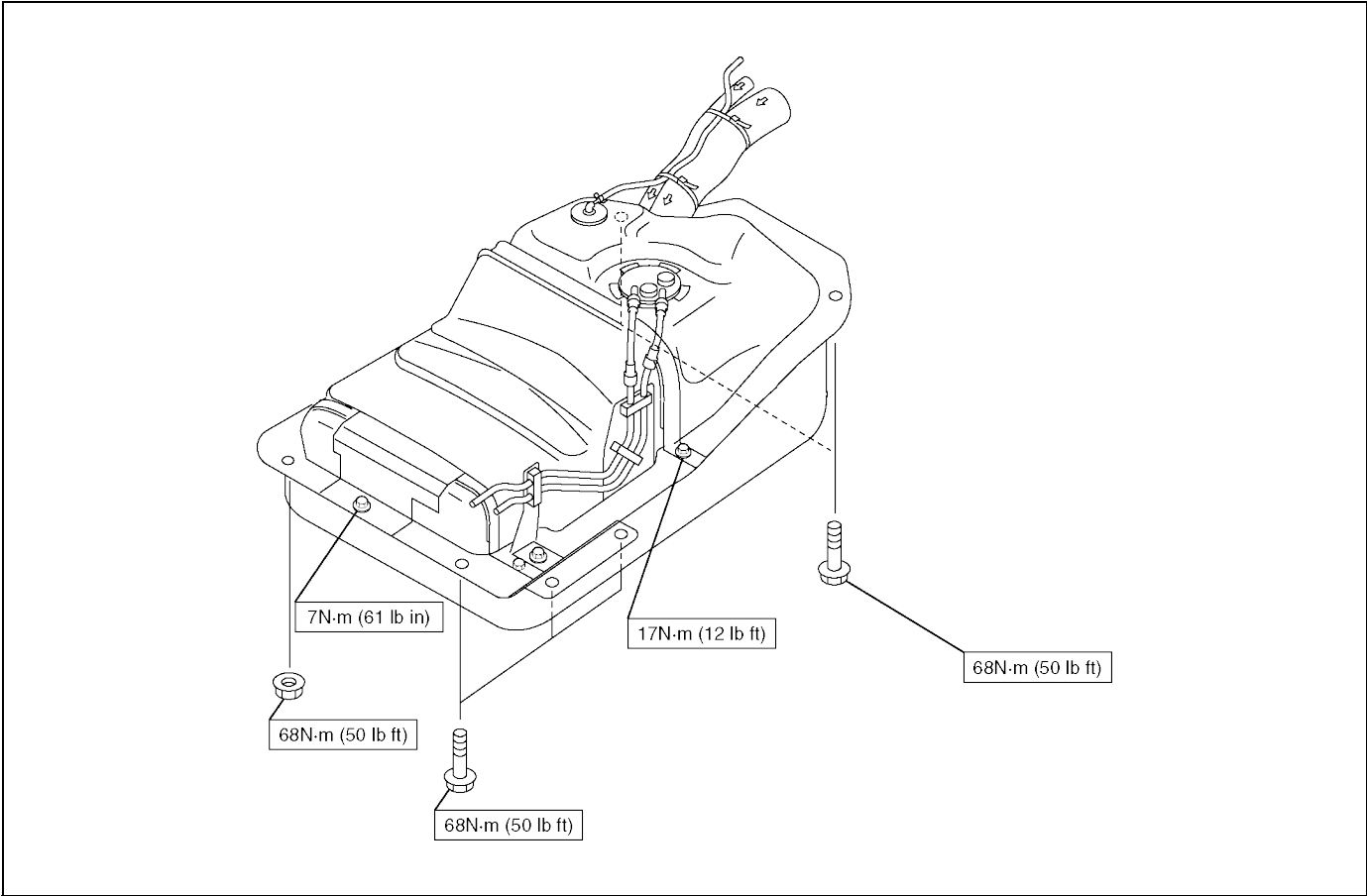
- After removing pump assembly (4), cover fuel tank to prevent any dust entering.

Installation

1. Install FPS assembly(4), with retainer and new seal; fuel pump (7) use tool J-39765.
2. Install fuel tank assembly(8). Refer to “Fuel Tank Installation”.

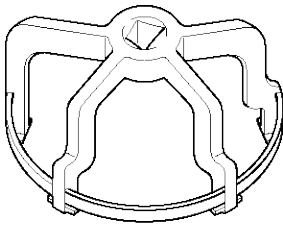
Main Data and Specifications

Torque Specification



140R200016

Special Tool

ILLUSTRATION	TOOL NO. TOOL NAME
 140R/W009	J-39765 Remover; fuel pump retainer

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Engine Exhaust	See 2002 Rodeo(UE) Workshop Manual
Engine Lubrication	See 2002 Rodeo(UE) Workshop Manual
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ENGINE

ENGINE FUEL For Short Wheel Base

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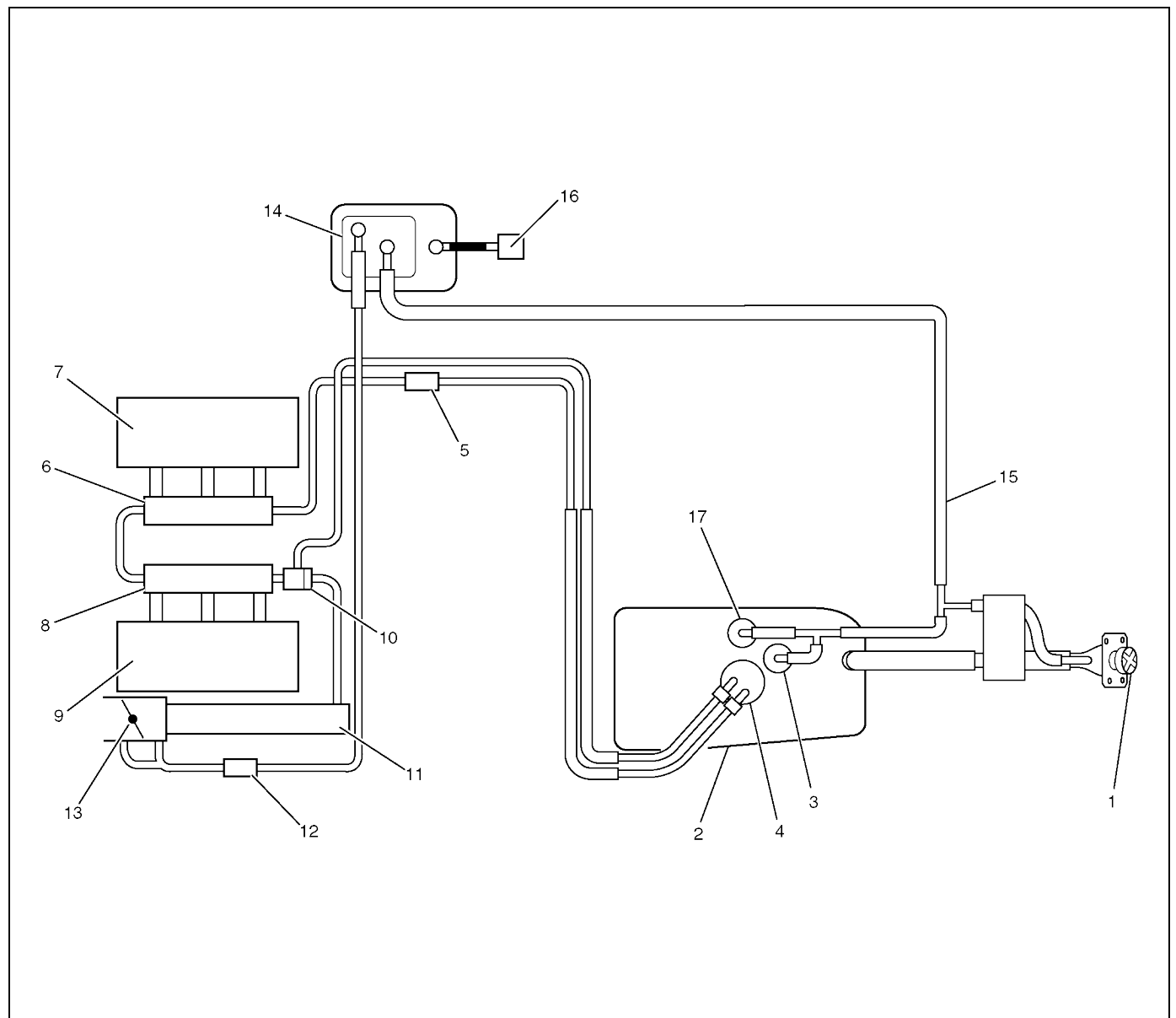
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General Description



140R200019

Legend

- | | |
|-----------------------------------|----------------------------------|
| (1) Fuel Filler Cap | (9) Left Bank |
| (2) Fuel Tank | (10) Fuel Pressure Control Valve |
| (3) Rollover Valve | (11) Common Chamber |
| (4) Fuel Pump and Sender Assembly | (12) Duty Solenoid Valve |
| (5) Fuel Filter | (13) Throttle Valve |
| (6) Fuel Rail Right | (14) Canister |
| (7) Right Bank | (15) Evapo Pipe |
| (8) Fuel Rail Left | (16) Vent Solenoid Cut Valve |
| | (17) Shut Off Valve |

When working on the fuel system, there are several things to keep in mind:

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- Always keep a dry chemical (Class B) fire extinguisher near the work area.
- Replace all pipes with the same pipe and fittings that were removed.
- Clean and inspect "O" rings. Replace if required.
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This sensor generates the voltage to change corresponding to the flow of the air drawn into the engine.

The changing voltage is transformed into an electric signal and provided to the PCM.

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The fuel rail is attached to the top of the intake manifold and supplies fuel to all the injectors.

Fuel is recirculated through the rail continually while the engine is running. This removes air and vapors from the fuel as well as keeping the fuel cool during hot weather operation.

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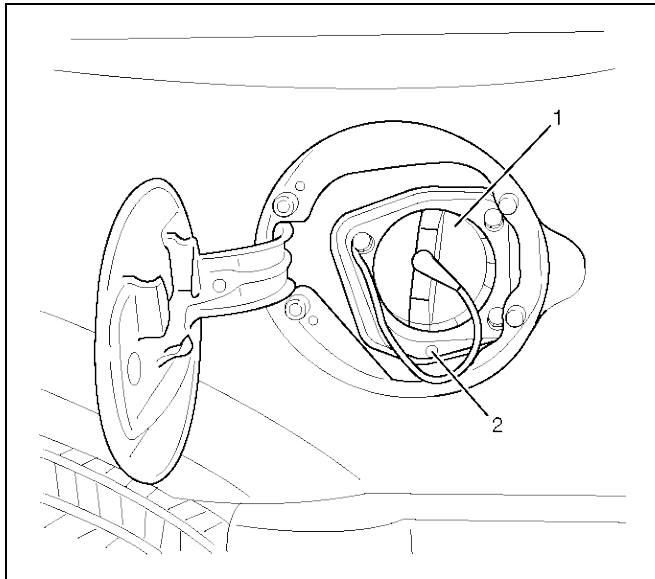
See Section "Driveability and Emission" for more information and diagnosis.

Fuel Filter

Removal

CAUTION: When repair to the fuel system has been completed, start engine and check the fuel system for loose connection or leakage. For the fuel system diagnosis, see Section "Driveability and Emission".

1. Disconnect battery ground cable.
2. Remove fuel filler cap(1).



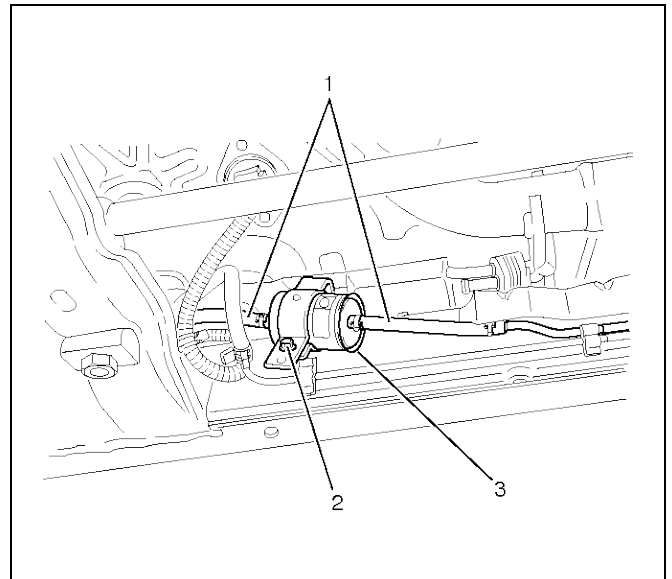
140R100023

Legend

- (1) Fuel Filler Cap
- (2) Receive Rubber Drain

3. Disconnect fuel hoses(1) from fuel filter on both engine side and fuel tank side.
4. Fuel filter fixing bolt(2).
 - Remove the fuel filter fixing bolt(2) on fuel filter holder.

5. Remove fuel filter(3).



041RW003

Legend

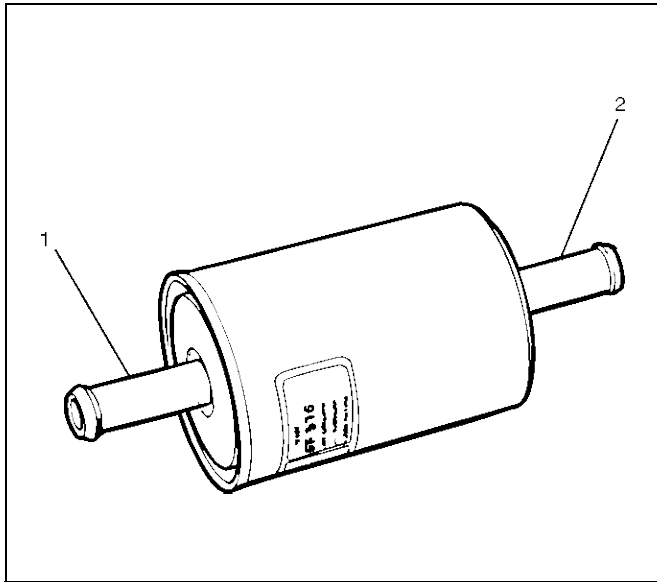
- (1) Fuel Hose
- (2) Fuel Filter Fixing Bolt
- (3) Fuel Filter

Inspection

1. Replace the fuel filter if the fuel leaks from fuel filter body or if the fuel filter body itself is damaged.
2. Replace the filter if it is clogged with dirt or sediment.
3. Check clogged drain port of the receive rubber by the foreign material, repair or clean if found clog it.

Installation

1. Install the fuel filter in the proper direction.
2. Install fuel filter holder fixing bolt.
3. Connect fuel hoses on engine side(1) and fuel tank side(2).



041RW001

4. Install fuel filler cap
5. Connect the battery ground cable.

Inspection

After installation, start engine and check for fuel leakage.

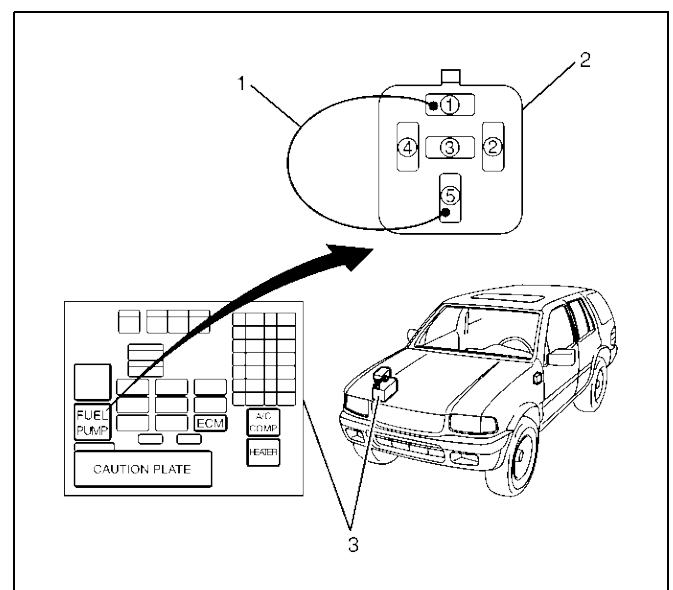
In-Tank Fuel Filter

The filter is located on the lower end of the fuel pickup tube in the fuel tank. It prevents dirt from entering the fuel pipe and prevents water from entering the fuel system not unless the filter is completely submerged in water. The fuel filter is self cleaning and maintenance free. Excess water and sediment in the tank restricts fuel supply to the engine, resulting in engine stall. Should this occur, the fuel tank would need to be cleaned thoroughly.

Fuel Pump Flow Test

If reduction of fuel supply is suspected, perform the following checks.

1. Make sure that there is fuel in the tank.
2. With the engine running, check the fuel feed pipe and hose from fuel tank to injector for evidence of leakage. Retighten, if pipe or hose connection is loose. Also, inspect for bent or damaged pipes and hoses.
3. Insert the hose from fuel feed pipe into a clean container, and check for fuel pump flow rate.
4. Connect the pump relay terminals with a jumper wire(1) as shown and start the fuel pump to measure delivery.



140R100013

CAUTION: Never generate sparks when connecting a jumper wire.

Delivery Times	Delivery
15 seconds	0.38 liters minimum

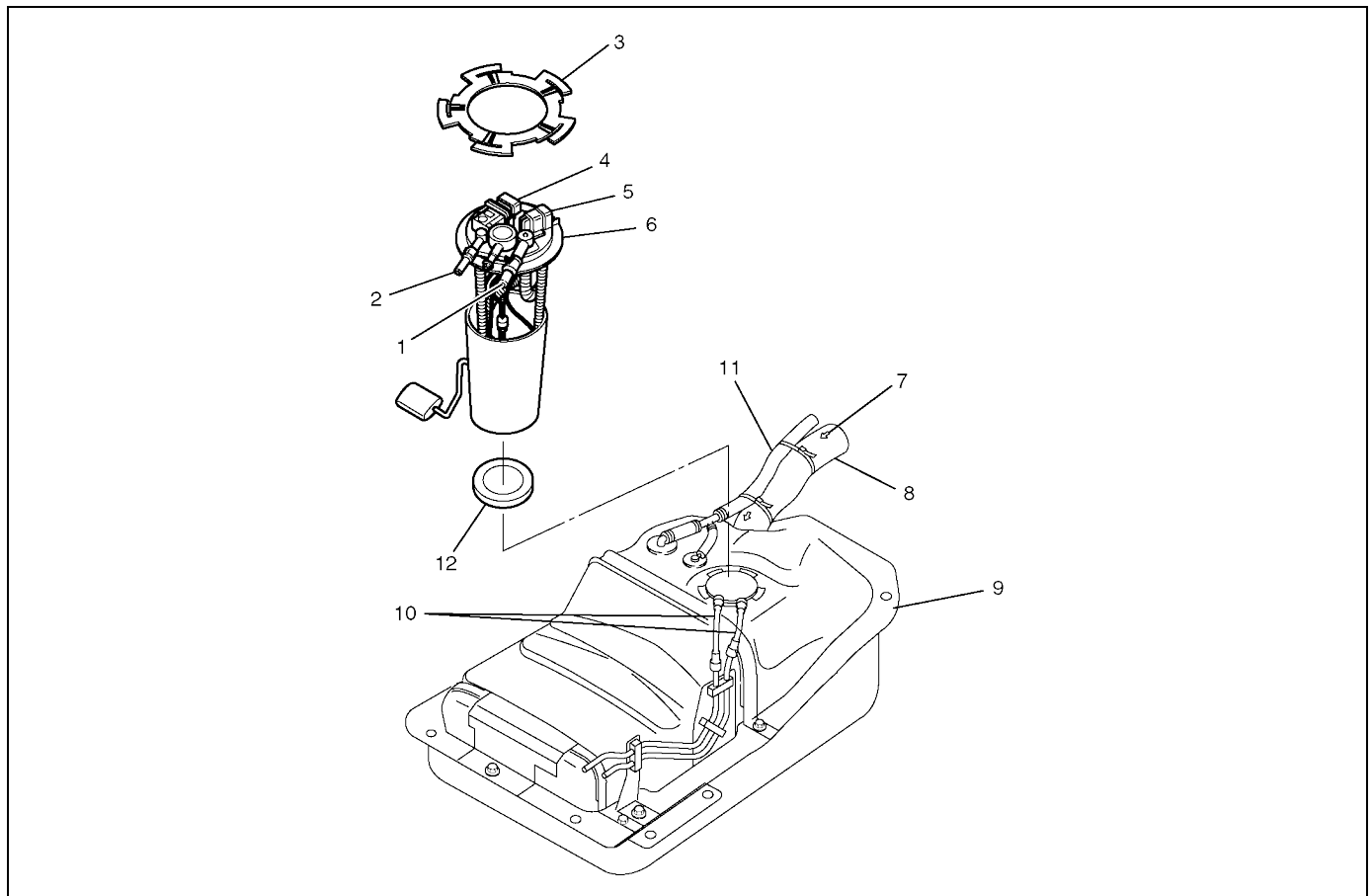
If the measure value is out of standard, conduct the pressure test.

Pressure test

For the pressure test to the fuel system, see Section 6E "Fuel Control System".

Fuel Pump

Fuel Pump and Associated Parts



140R200020

Legend

- | | |
|---|--------------------------------|
| (1) Fuel Feed Port | (7) Arrow Mark For Direction |
| (2) Fuel Return Port | (8) Hose; Fuel Filler |
| (3) Retainer (Fuel Pump Lock) | (9) Fuel Tank Assembly |
| (4) Connector; Tank Pressure Sensor | (10) Fuel Tube/Quick Connector |
| (5) Connector; Fuel Feed Pump | (11) Hose; Air Breather |
| (6) Fuel Pump and Sender (FPS) Assembly | (12) Seal; Fuel pump |

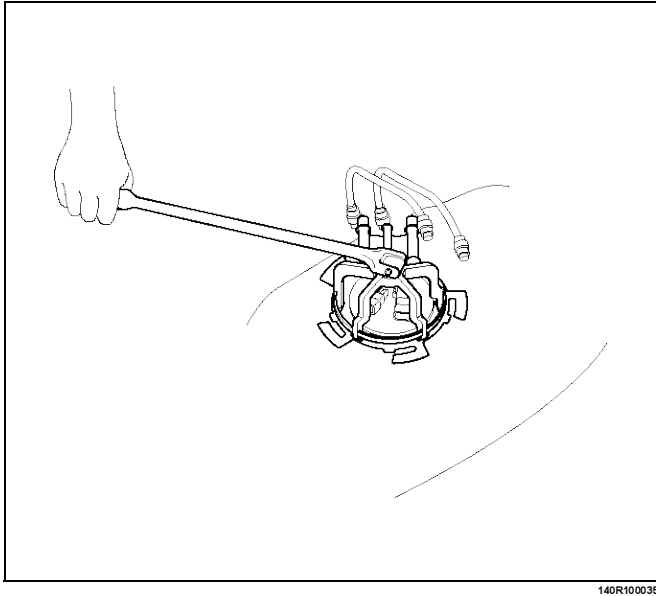
Removal

CAUTION: When repair to the fuel system has been completed, start engine and check the fuel system for loose connection or leakage. For the fuel system diagnosis, see Section "Driveability and Emission".

1. Remove fuel tank assembly(9). Refer to "Fuel Tank Removal" in this section.
2. Remove Fuel Tube/Quick Connector (10).

NOTE: Handling of the fuel tube sure to refer "Fuel Tube/Quick Connector Fittings" in this section.

3. Remove the retainer (3) with tool J-39765 and remove the fuel pump and sender (FPS) assembly (6).



NOTE: After removing pump assembly (6), cover fuel tank to prevent any dust entering.

Installation

1. Install FPS assembly (6) with retainer (3) and new seal; fuel pump (12) by J-39765.
2. Install Fuel Tube/Quick Connector (10).

NOTE: Handling of the fuel tube sure to refer "Fuel Tube/Quick Connector Fittings" in this section.

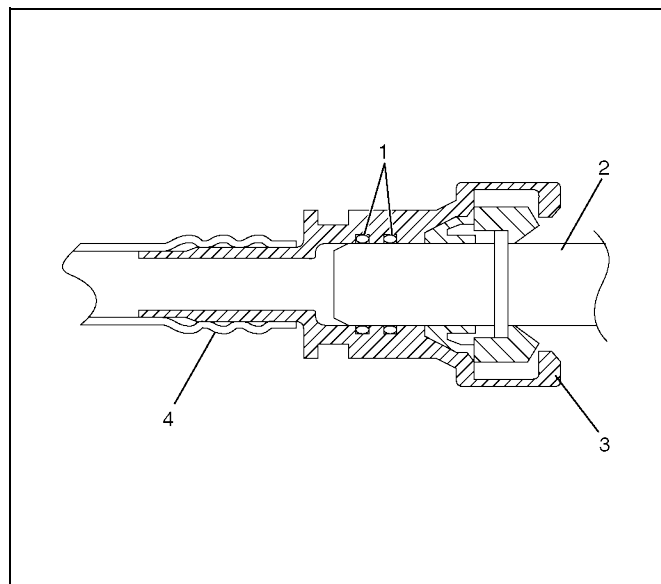
3. Install fuel tank assembly(9). Refer to "Fuel Tank Installation".

Fuel Tube / Quick – Connector Fittings

Precautions

- Do not light a match, cigarette or lighter near the area.
- Keep flammable materials away and store securely.
- Disconnect the ground (-) battery cable when performing work.
- When welding or conducting other heat-generating work on other parts, be sure to provide pretreatment to protect the piping system from thermal damage or spattering.

Cautions During Work



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Legend

- (1) O-ring
- (2) Port
- (3) Connector
- (4) Plastic Tube

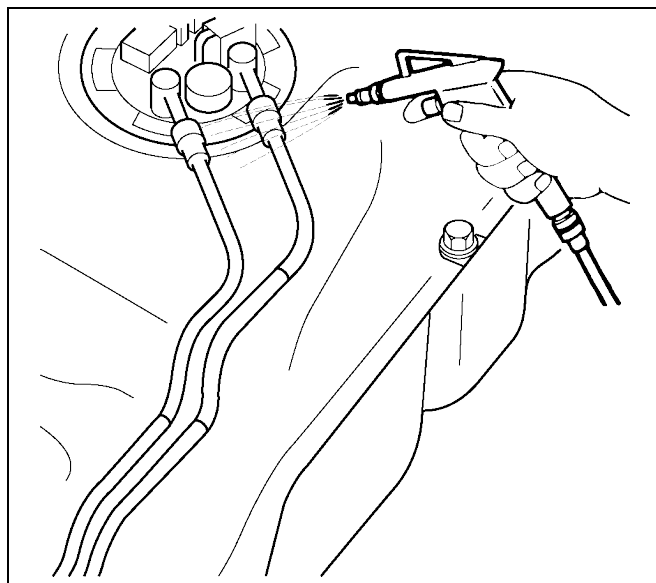
Do not expose the assembly to battery electrolyte or do not wipe the assembly with a cloth used to wipe off spilled battery electrolyte.

Piping that has been soaked with battery electrolyte cannot be used. Avoid bending or twisting the piping during assembly and disassembly. If deformed, replace with a new piping.

Removal

1. Open the fuel cap to relieve the fuel pressure in the tank.

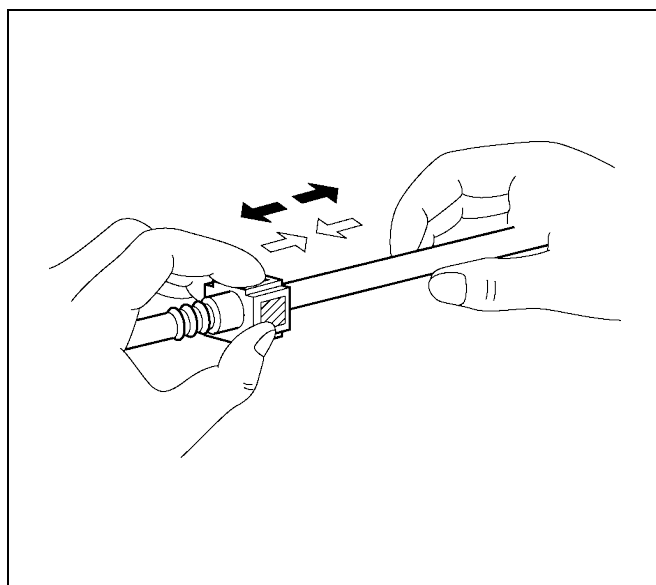
Use compressed air to blow off any dust or dirt particles around the fuel quick connect fittings prior to disassembly.



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Cover the connector with cloth when disconnecting fuel pipe connector to prevent fuel spray due to some unrelieved fuel pressure.

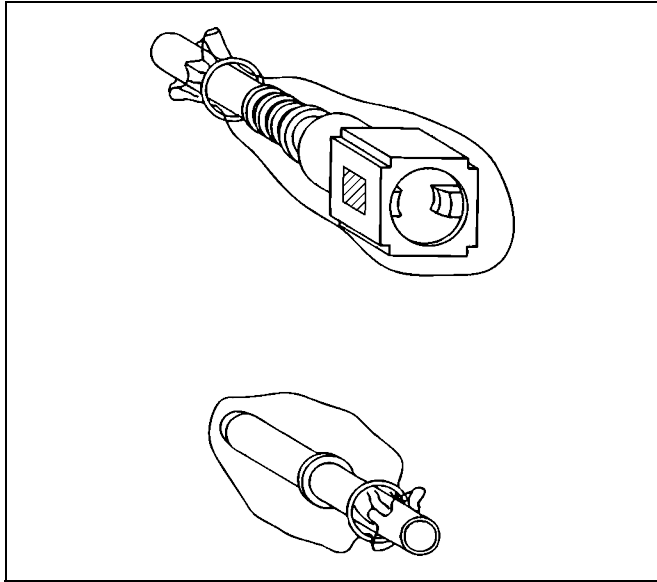
2. For removal of the quick connector, hold the quick connector in one hand, and pull out the connector with the other hand while pressing the square relieve button of the connector, as illustrated.



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NOTE: Do not use tools of any kind. Only use bare hands when disconnecting the connector. Use a lubricant (light oil) and/or push and pull the connector until the pipe is disconnected.

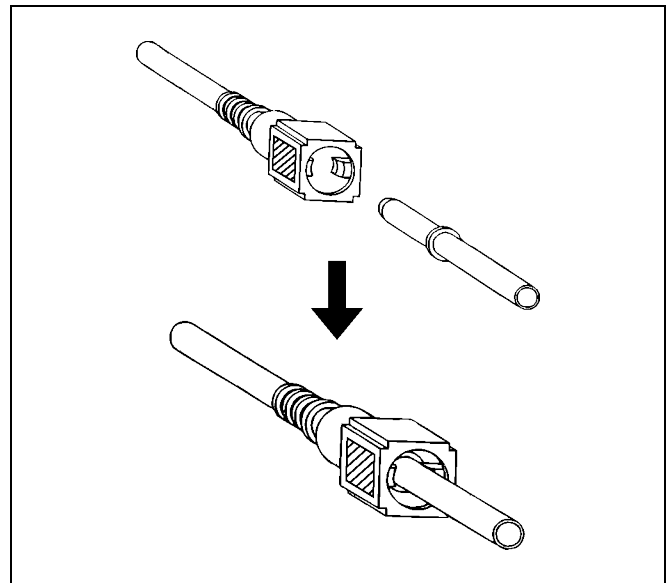
Cover the connectors that was removed with a plastic bag, to prevent dust or rain water from entering.



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Reuse of Quick-Connector

- Replace the port and connector if scratch, dent or crack is found.
- Remove any dirt build up on the port when installing the connector. Replace the connector, if there is any forms of rust, dent, scratch.
- After cleaning the port, insert it straight into the connector until it clicks. After it clicks, try pulling it out to make sure that it is not drawn and is securely locked.



140R100036

Assembling Advice

By applying engine oil or light oil to the pipe, port makes pipe assembly easier. The pipe assembly should take place immediately after applying oil (to prevent dust from sticking to the pipe surface-which may decrease sealing ability).

Test/Inspection After Assembling

1. Reconnect the battery negative cable.
2. Turn the ignition key to the "ON" position and listen for pump start-up sound. Inspect for leaks, the fuel pressure will increase as the fuel pump is actuated.
3. Perform leak inspection (step 2) several times.
4. Start the engine and observe the engine idle speed. The presence of dirt in the fuel system may affect the fuel injection system.

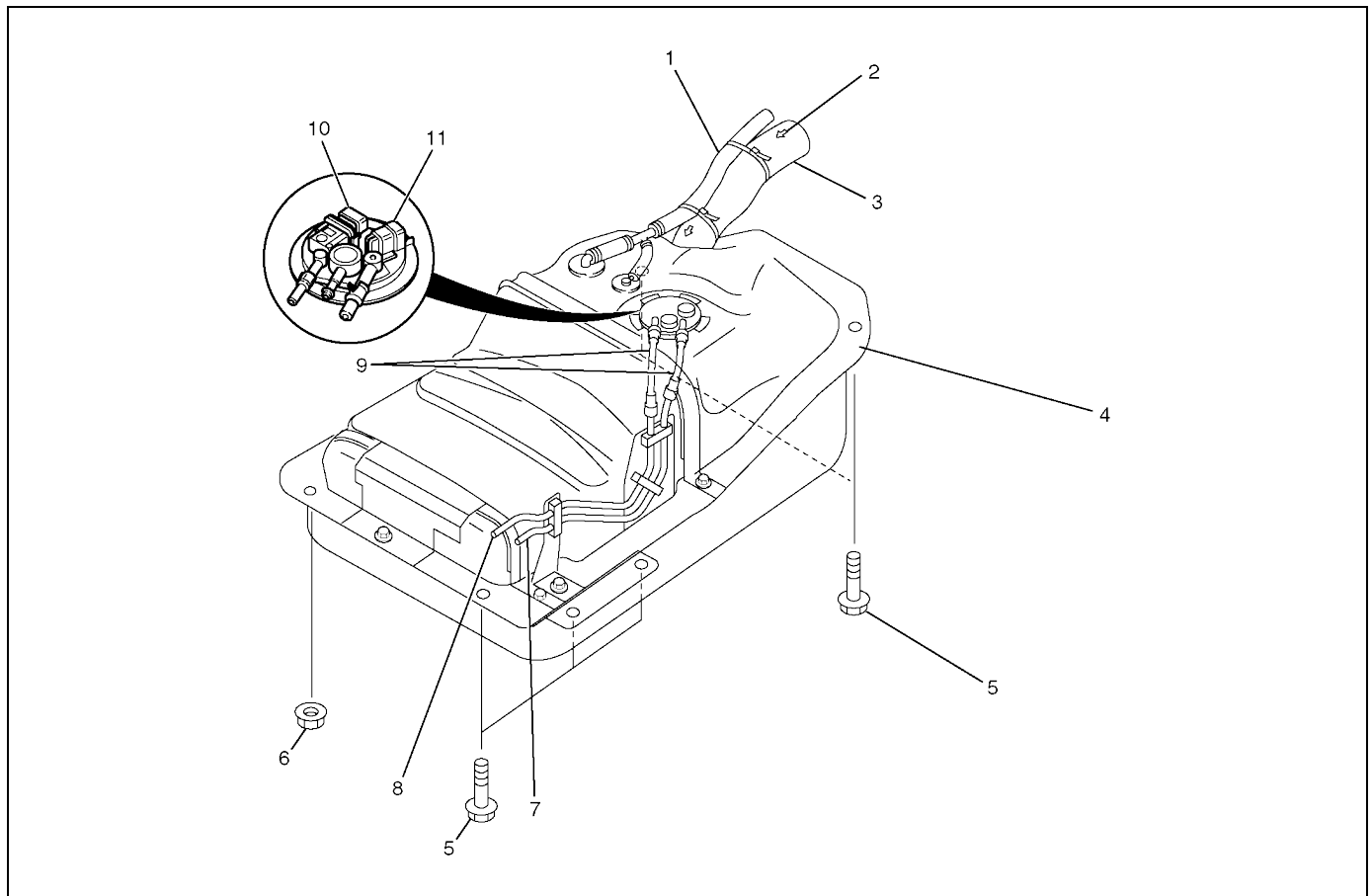
Fuel Pump Relay

General Description

In order to control the FPS operation, the FPS relay is provided. When the starter switch is turned to "ON" position, the FPS relay operates the FPS for 2 seconds. When it is turned to "START" position, the Engine Control Module receives the reference pulse from the Ignition Control Module and it operates the relay, again causing the FPS to feed fuel.

Fuel Tank

Fuel Tank and Associated Parts



140/200018

Legend

- | | |
|-----------------------------------|---|
| (1) Hose; Air Breather | (7) Fuel Feed Hose |
| (2) Arrow Mark for Direction | (8) Fuel Return Hose |
| (3) Fuel Filler Hose | (9) Fuel Tube/Quick Connector |
| (4) Fuel Tank Assembly | (10) Connector; Fuel Tank Pressure Sensor |
| (5) Fuel Tank Fixing Bolt (QTY:5) | (11) Connector; Fuel Feed Pump |
| (6) Fuel Tank Fixing Nut (QTY:1) | |

Removal

CAUTION: When repair to the fuel system has been completed, start engine and check the fuel system for loose connection or leakage. For the fuel system diagnosis, see Section "Driveability and Emission".

1. Drain the fuel from the fuel tank, refer to the "Fuel Pump Flow Test" in this section.
2. Disconnect battery ground cable.
3. Loosen fuel filler cap to reduce the pressure in fuel tank.
4. Support underneath of the fuel tank (4) with a lifter.
5. Disconnect fuel feed hose (7) and fuel return hose (8) near the fuel filter.

NOTE: Plug both ends of the fuel hoses to prevent fuel leakage.

6. Disconnect air breather hose (1) and fuel filler hose (3) at the fuel filler neck.

NOTE: Cover fuel hose to prevent any dust entering.

7. Remove the five fuel tank assembly fixing bolts (5) and one nut (6).
8. Lower the tank and disconnect the wiring connectors (10,11).
9. Remove fuel tank assembly along with protectors.

Installation

1. Lift up fuel tank assembly and connect the wiring connectors (10,11).
2. Install fuel tank assembly along with protectors and tighten the fixing bolts and a nut to the specified torque.

Torque: 68N·m (50lbft)

3. Connect fuel filler hose (3) and air breather hose (1), and clip them firmly.
4. Connect fuel feed hose and fuel return hose, and clip them firmly.
5. Tighten fuel filler cap until at least three clicks are heard.
6. Connect battery ground cable.

Fuel Gauge Unit

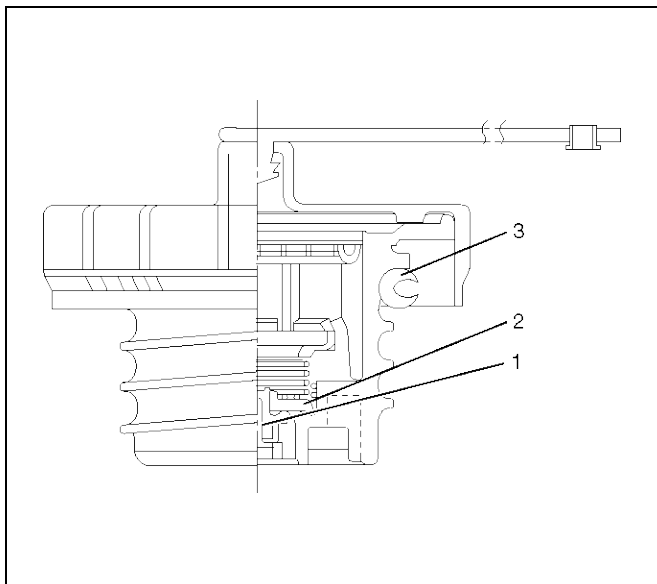
Removal and Installation

Refer to "Fuel Pump" in this section for Fuel Gauge Unit removal and installation. The fuel gauge unit is connected to the fuel pump and sender assembly.

Fuel Filler Cap

General Description

A vacuum valve and pressure valve are built into the fuel filler cap which adjusts the fuel pressure in the fuel tank to prevent fuel tank damage.



Legend

- (1) Vacuum Valve
- (2) Pressure Valve
- (3) Seal Ring

Inspection

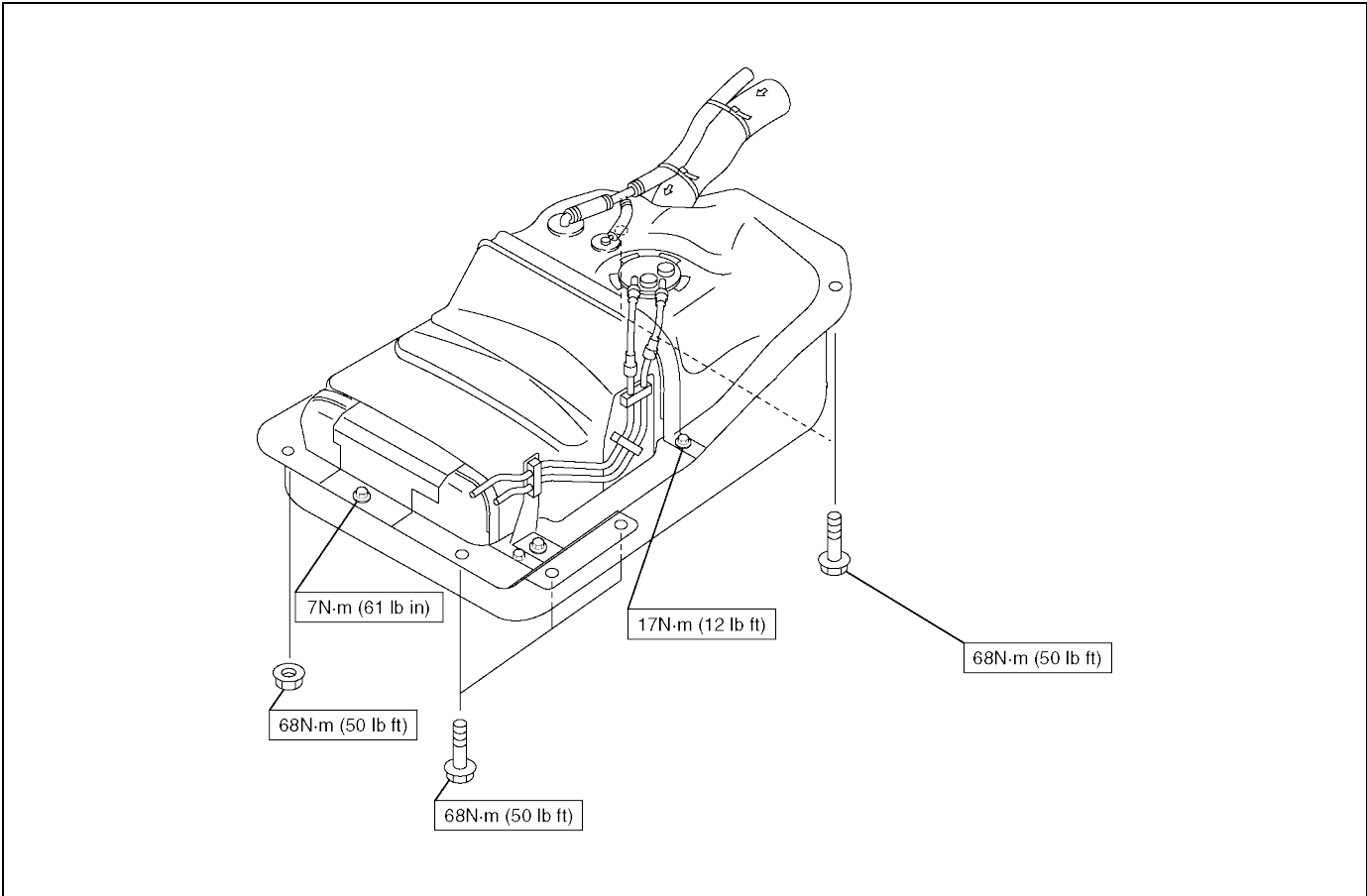
The fuel filler cap must be inspected for seal condition. The fuel filler cap must be replaced if found defective.

CAUTION:

A replacement fuel filler cap must be the same as the original. The fuel filler cap valve was designed primarily for this application and must be replaced with the same type or decreased engine performance may occur.

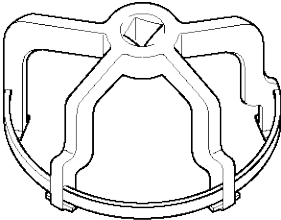
Main Data and Specifications

Torque Specification



140R200017

Special Tool

ILLUSTRATION	TOOL NO. TOOL NAME
 140R10009	J-39765 Remover; fuel pump retainer