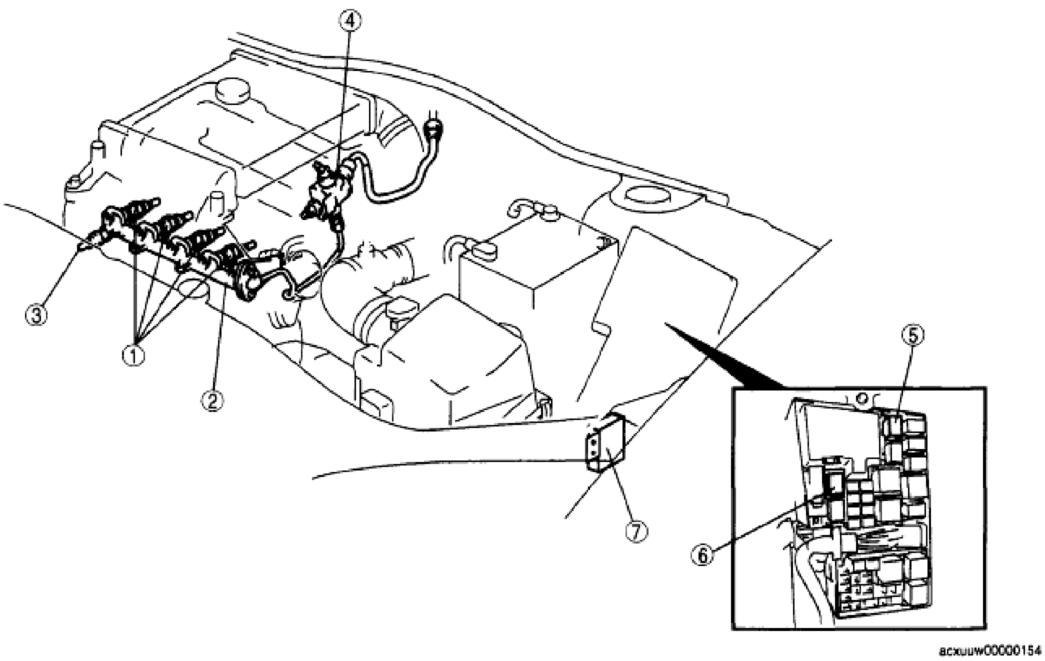
2008 ENGINE PERFORMANCE

Fuel System - CX-7

FUEL SYSTEM LOCATION INDEX[L3 WITH TC]

ENGINE ROOM SIDE

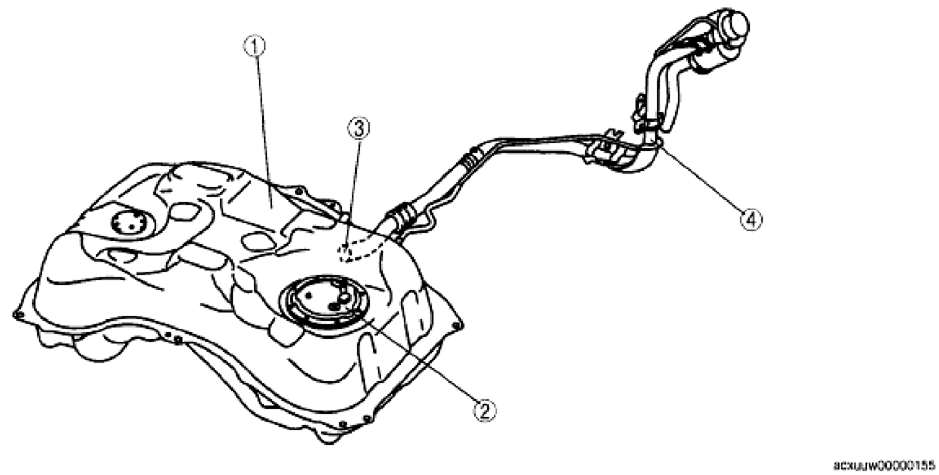


1	Fuel injector (See FUEL INJECTOR REMOVAL/ INSTALLATION[L3 WITH TC].) (See FUEL INJECTOR INSPECTION[L3 WITH TC].)
2	Fuel delivery pipe (See FUEL INJECTOR REMOVAL/ INSTALLATION[L3 WITH TC].)
3	Fuel pressure sensor (See FUEL INJECTOR REMOVAL/ INSTALLATION[L3 WITH TC].) (See FUEL PRESSURE SENSOR INSPECTION[L3 WITH TC].)

4	High pressure fuel pump (See HIGH PRESSURE FUEL PUMP REMOVAL/INSTALLATION[L3 WITH TC].) (See HIGH PRESSURE FUEL PUMP INSPECTION[L3 WITH TC].)
5	Fuel pump relay
6	Fuel pump speed control relay
7	Fuel pump resistor (See FUEL PUMP RESISTOR REMOVAL/ INSTALLATION[L3 WITH TC].) (See FUEL PUMP RESISTOR INSPECTION[L3 WITH TC].)

Fig. 1: Identifying Fuel System Location [L3 With TC] - Engine Room Side
Courtesy of MAZDA MOTORS CORP.

FUEL TANK SIDE



1	Fuel tank (See FUEL TANK REMOVAL/ INSTALLATION[L3 WITH TC].)
2	Fuel pump unit (See FUEL PUMP UNIT REMOVAL/ INSTALLATION[L3 WITH TC].) (See FUEL PUMP UNIT DISASSEMBLY/ ASSEMBLY[L3 WITH TC].) (See FUEL PUMP UNIT INSPECTION[L3 WITH TC].)
3	Nonreturn valve
4	Fuel filler pipe

Fig. 2: Identifying Fuel System Location [L3 With TC] - Fuel Tank Side
Courtesy of MAZDA MOTORS CORP.

FUEL SYSTEM DIAGRAM[L3 WITH TC]

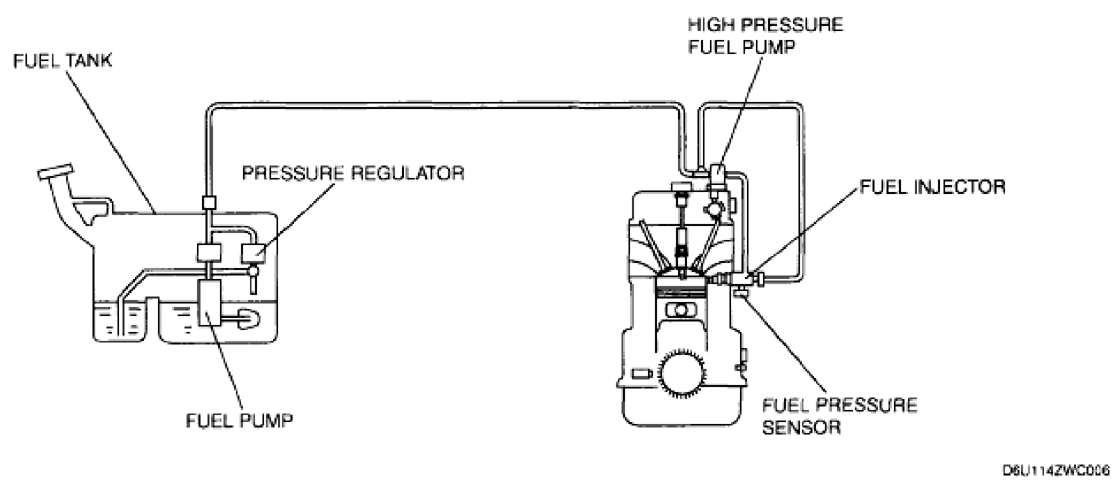


Fig. 3: Fuel System Diagram [L3 With TC]
Courtesy of MAZDA MOTORS CORP.

BEFORE REPAIR PROCEDURE[L3 WITH TC]

WARNING:

- **Fuel vapor is hazardous. It can easily ignite, causing serious injury**

and damage. Always keep sparks and flames away from fuel.

- **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the following "Fuel Line Safety Procedure".**
- **A person charged with static electricity could cause a fire or explosion, resulting in death or serious injury. Before performing work on the fuel system, discharge static electricity by touching the vehicle body.**

FUEL LINE SAFETY PROCEDURE

NOTE:

- **Fuel in the fuel system is under high pressure even when the engine is not running.**

1. Remove the fuel-filler cap and release the pressure in the fuel tank.
2. Remove the fuel pump relay.
3. Start the engine.
4. After the engine stalls, crank the engine several times.
5. Turn the ignition switch to the LOCK position.
6. Install the fuel pump relay.

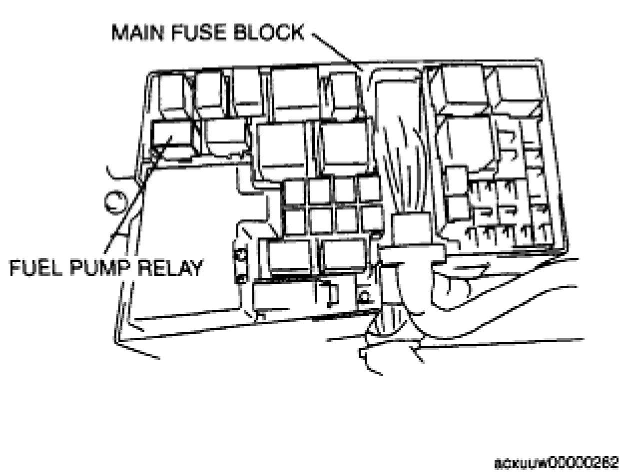


Fig. 4: Identifying Fuel Pump Relay And Main Fuse Block
Courtesy of MAZDA MOTORS CORP.

AFTER REPAIR PROCEDURE[L3 WITH TC]

WARNING:

- **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. When installing the fuel hose, perform "FUEL LEAKAGE INSPECTION" described below.**

FUEL LEAKAGE INSPECTION

WARNING:

- **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Always carry out the following procedure with the engine stopped.**
- **A person charged with static electricity could cause a fire or explosion, resulting in death or serious injury. Before performing work on the fuel system, discharge static electricity by touching the vehicle body.**

CAUTION:

- **Connecting to the wrong check connector terminal may cause a malfunction. Carefully connect only to the specified terminal.**

1. Start the fuel pump using the following procedure.

   Using M-MDS

   1. Connect the M-MDS to the DLC-2.
   2. Using the simulation function "FP", start the fuel pump.

   Without using M-MDS

   1. Disconnect the negative battery cable.
   2. Remove the fuel pump relay.

   CAUTION:

   - **Short the specified terminals because shorting the wrong terminal of the main fuse block may cause malfunctions.**

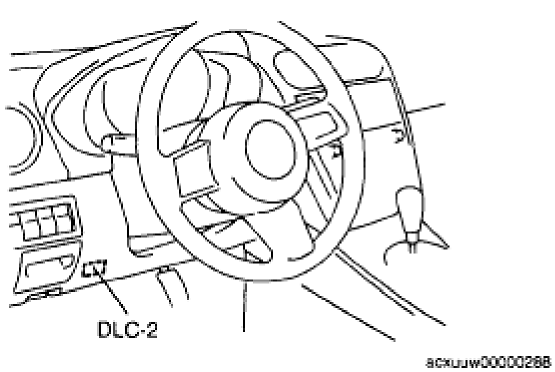


Fig. 5: Identifying DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

   3. Using a jumper wire, short fuel pump relay terminals C and D in the main fuse block.
   4. Connect the negative battery cable and operate the fuel pump.

2. Pressurize the system in this manner for **at least 5 min** to be sure there is no leakage.
    - If there is fuel leakage, inspect the fuel hoses, hose clamps, and fuel pipe sealing surface, and replace if necessary.

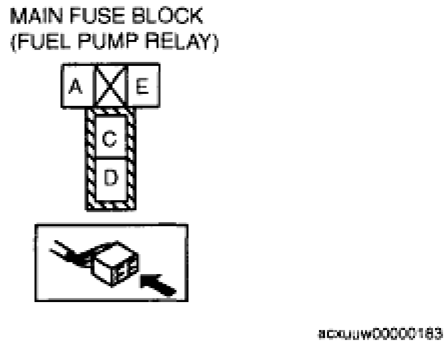


Fig. 6: Identifying Fuel Pump Relay Terminals
Courtesy of MAZDA MOTORS CORP.

3. After repair, assemble the system and repeat Steps 1 to 3.

FUEL LINE PRESSURE INSPECTION[L3 WITH TC]

LOW PRESSURE LINE (FROM THE FUEL TANK TO THE HIGH PRESSURE FUEL PUMP)

WARNING:
- **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death. Fuel can also irritate skin and eyes. To prevent this, always complete the "BEFORE REPAIR PROCEDURE". (See BEFORE REPAIR PROCEDURE[L3 WITH TC].)**

CAUTION:
- **Disconnecting/connecting the quick release connector without cleaning it may possibly cause damage to the fuel pipe and quick release connector. Always clean the quick release connector joint area before disconnecting/connecting using cloth or soft brush, and make sure that it is free of foreign material.**

1. Complete the "BEFORE REPAIR PROCEDURE".

    (See **BEFORE REPAIR PROCEDURE[L3 WITH TC]**)

2. Disconnect the vacuum hose from the intake manifold that connecting to the power brake unit.
3. Disconnect the negative battery cable.

CAUTION:
- **The quick release connector may be damaged if the tab is turned too far. Do not turn the tab over the stopper.**

4. Disconnect the quick release connector from the fuel tank. (See **QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION[L3 WITH TC]**.)
5. Push the **SST** quick release connector into the fuel pipe and plastic fuel hose into the **SST** until a click is heard.
6. Turn the lever parallel to the hose of the **SST** as shown.

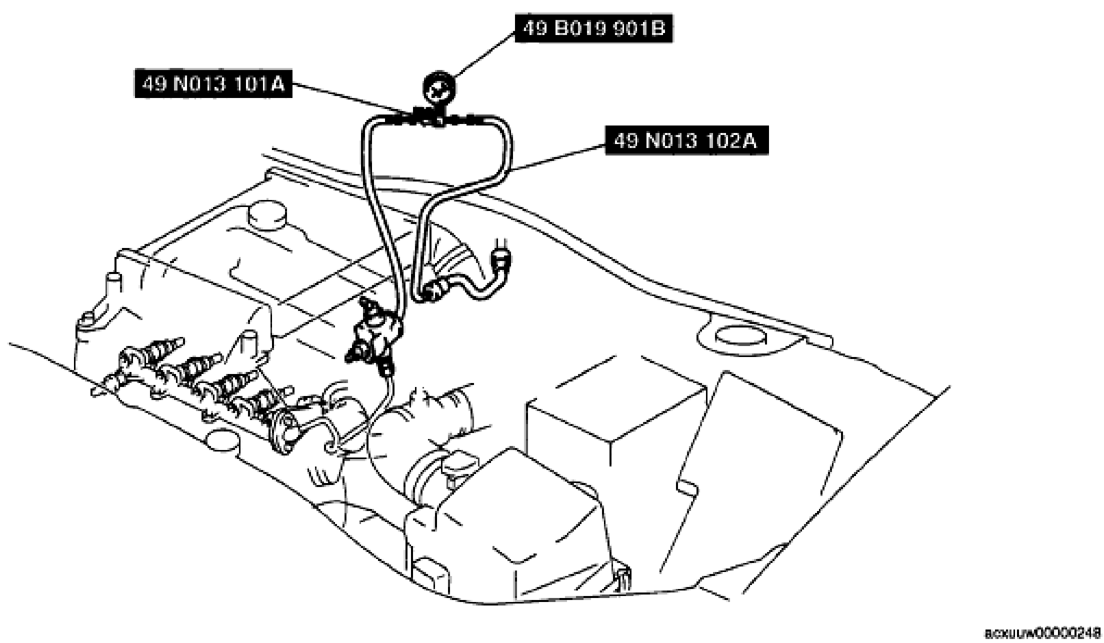


Fig. 7: Identifying Special Tools
Courtesy of MAZDA MOTORS CORP.

7. Connect the vacuum hose to the intake manifold that connecting to the brake booster.
8. Connect the negative battery cable.
9. Start the engine and let it idle. Measure the fuel line pressure.
   - If not as specified, inspect the following:

     Zero or low

     - FP circuit
     - FP
     - Fuel line (clogged)
     - Fuel leakage inside pressure regulator

     High

     - Pressure regulator for high pressure cause

     Fuel line pressure

410-490 kPa {4.2-4.9 kgf/cm^2 , 60-71 psi}

10. Turn the ignition switch to the LOCK position.
11. Measure the fuel hold pressure **after 5 min.**
    - If not as specified, inspect the following:
        - FP hold pressure
        - Fuel injector for leakage
        - Fuel line for improper routing, kinks or leakage

    Fuel hold pressure

    More than 230 kPa {2.3 kgf/cm^2 ,33 psi}

12. Complete the "BEFORE REPAIR PROCEDURE".

    (See **BEFORE REPAIR PROCEDURE[L3 WITH TC]**)

13. Disconnect the vacuum hose from the intake manifold that connecting to the brake booster.
14. Disconnect the **SST** .
15. Connect the quick release connector. (See **QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION[L3 WITH TC]**.)

HIGH PRESSURE LINE (FROM THE HIGH PRESSURE FUEL PUMP TO THE FUEL INJECTOR)

1. Inspect the fuel pressure sensor. (See **FUEL PRESSURE SENSOR REMOVAL/INSTALLATION[L3 WITH TC]**).
2. Inspect the high pressure fuel pump. (See **FUEL PRESSURE SENSOR REMOVAL/INSTALLATION[L3 WITH TC]**).

FUEL TANK REMOVAL/INSTALLATION[L3 WITH TC]

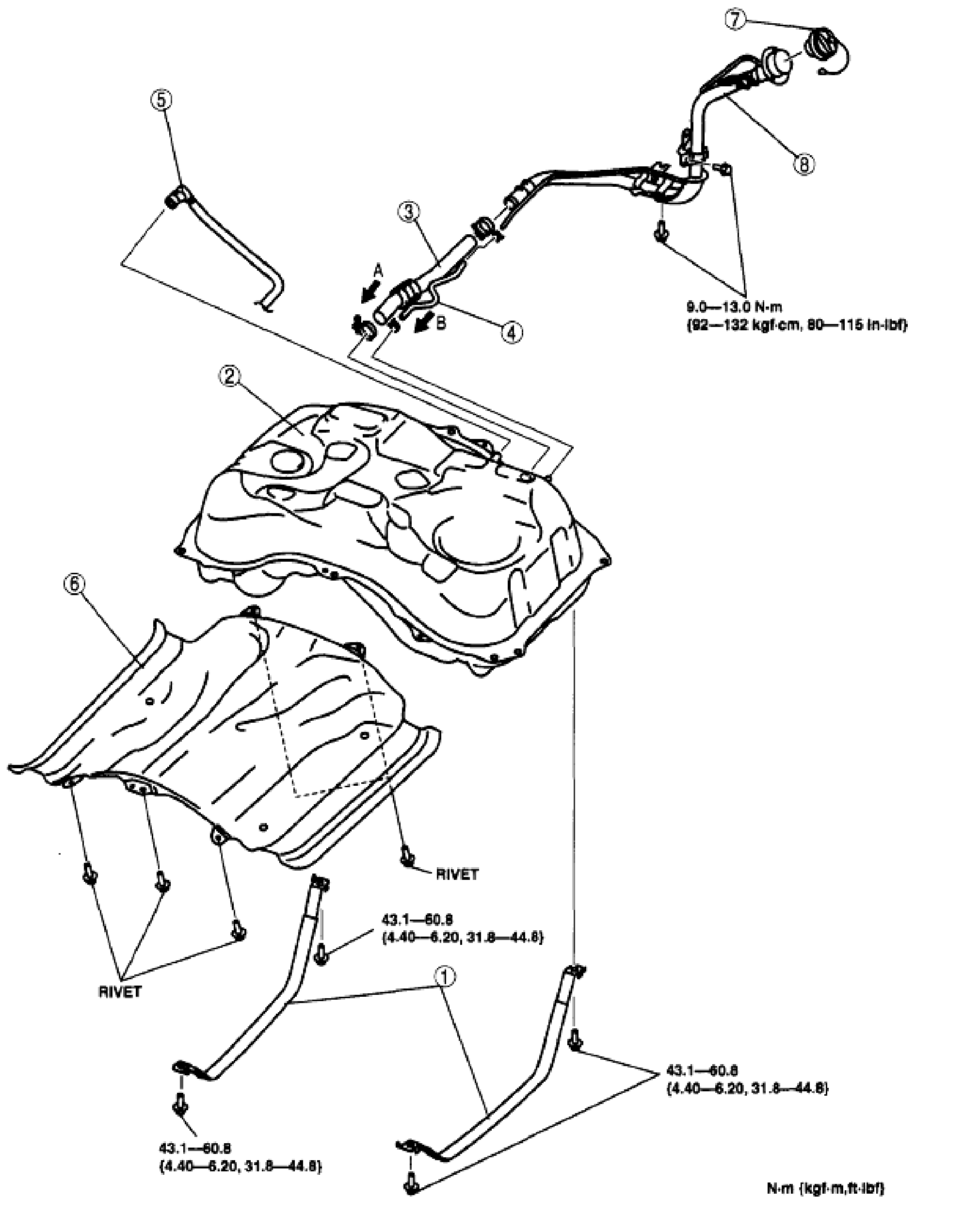
WARNING:

- **Repairing a fuel tank that has not been properly steam-cleaned can be dangerous. Explosion or fire may cause death or serious injury. Always properly steam clean a fuel tank before repairing it.**
- **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, do not damage the sealing surface of the fuel pump unit when removing or installing.**
- **A person charged with static electricity could cause a fire or explosion, resulting in death or serious injury. Before draining fuel, make sure to discharge static electricity by touching the vehicle body.**

CAUTION:

- **Disconnecting/connecting the quick release connector without cleaning it may cause damage to the fuel pipe and quick release connector. Always clean the quick release connector joint area before disconnecting/connecting using a cloth or soft brush, and make sure that it is free of foreign material.**

1. Level the vehicle.
2. Complete the "BEFORE REPAIR PROCEDURE". (See **BEFORE REPAIR PROCEDURE[L3 WITH TC]**.)
3. Disconnect the negative battery cable.
4. Remove the rear seat cushion.
5. Remove the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION[L3 WITH TC]**.)
6. Remove the fuel gauge sender unit.
7. Siphon the fuel from the fuel tank.
8. Remove the middle pipe. (See **EXHAUST SYSTEM REMOVAL/INSTALLATION[L3 WITH TC]**).
9. Remove the propeller shaft. (4WD) (See **PROPELLER SHAFT REMOVAL/INSTALLATION**).
10. Remove the rear under cover (LR, RR).
11. Remove the rear parking brake cable installation bolts, then move the rear parking brake cable out of the way.
12. Disconnect the joint hose connected between the fuel tank and the fuel-filler pipe from the fuel-filler pipe.
13. Disconnect the breather hose connected between the fuel tank and the fuel-filler pipe from the fuel-filler pipe.
14. Disconnect the evaporative hose connected between the fuel tank and the charcoal canister from the charcoal canister.
15. Remove in the order indicated in the table.



1	Strap
2	Fuel tank
3	Joint hose (See Joint Hose Installation Note)
4	Breather hose (See Breather Hose Installation Note)

5	Evaporative hose (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION[L3 WITH TC])
6	Insulator (See Rivet Removal Note)
7	Fuel-filler cap
8	Fuel-filler pipe (See Fuel-filler Pipe Removal Note)

Fig. 8: Identifying Fuel Tank Components [L3 With TC] With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

16. Install in the reverse order of removal.
17. Complete the "AFTER REPAIR PROCEDURE". (See **AFTER REPAIR PROCEDURE[L3 WITH**

TC].)

RIVET REMOVAL NOTE

CAUTION:
- **Be careful not to damage the fuel tank when removing the rivet. If the fuel tank is damaged, it may cause fuel leakage.**

NOTE:
- **The insulator is installed using rivets.**
- **When resin stalling the rivet, install the same rivet or M5 bolt and nut.**

1. Push out the mandrel using a hammer and punch

   (2-2.8 mm {0.08-0.11 in} diameter).

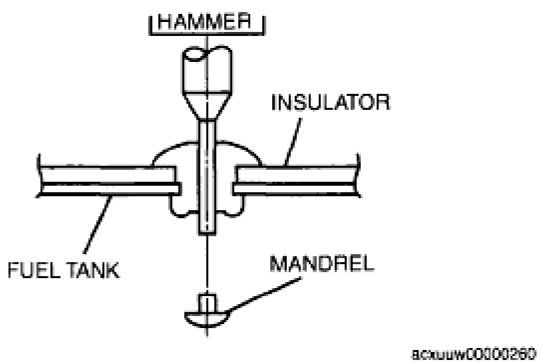


Fig. 9: Pushing Out Mandrel Using Hammer And Punch
Courtesy of MAZDA MOTORS CORP.

2. Remove the flange using a drill [5 mm (0.20 in} drill bit).

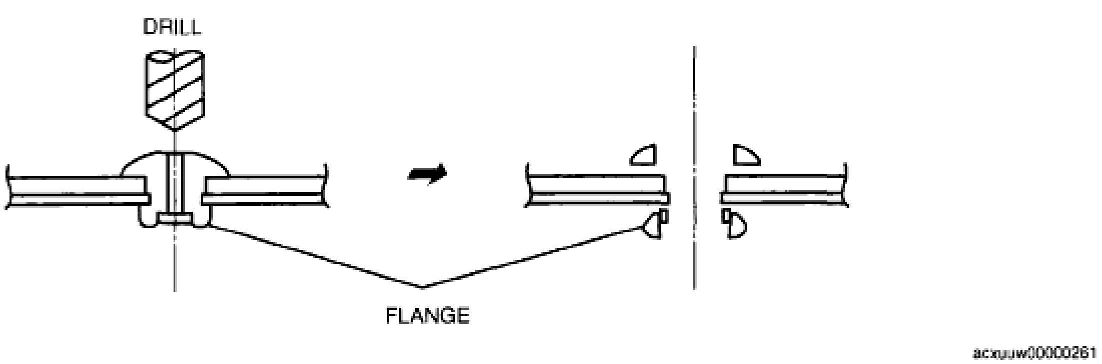


Fig. 10: Removing Flange Using Drill
Courtesy of MAZDA MOTORS CORP.

FUEL-FILLER PIPE REMOVAL NOTE

1. Remove the rear tire (LH).
2. Remove the mudguard (LH).
3. Remove the air filter.
4. Remove the fuel-filler pipe.

JOINT HOSE INSTALLATION NOTE

1. Install the joint hose and clamp as shown in the figure.

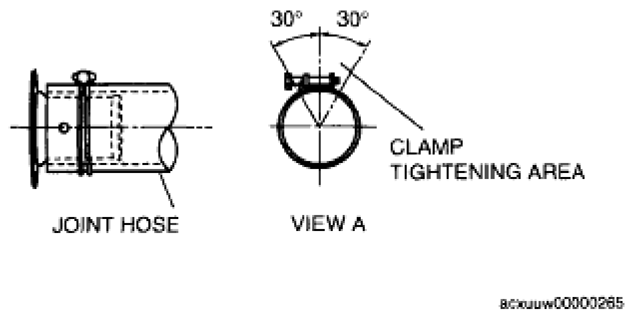


Fig. 11: Installing Joint Hose And Clamp
Courtesy of MAZDA MOTORS CORP.

BREATHER HOSE INSTALLATION NOTE

1. Install the breather hose and clamp as shown in the figure.

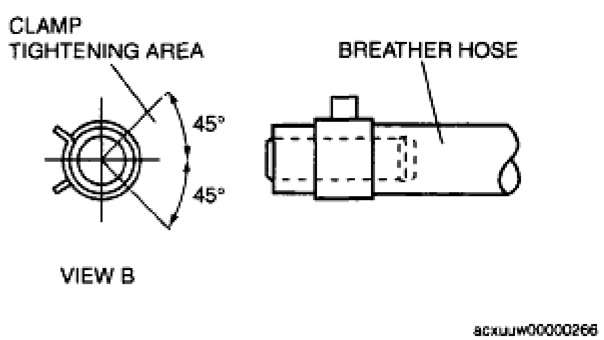


Fig. 12: View Of Breather Hose And Clamp
Courtesy of MAZDA MOTORS CORP.

FUEL PUMP UNIT REMOVAL/INSTALLATION[L3 WITH TC]

WARNING:

- **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure".**

- **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, before performing the fuel pump unit removal/installation, always complete the "Fuel Leak Inspection After Fuel Pump Unit Installation".**
- **A person charged with static electricity could cause a fire or explosion, resulting in death or serious injury. Before draining fuel, make sure to discharge static electricity by touching the vehicle body.**

CAUTION:

- **Because the fuel tank is constructed such that the fuel level is higher than the installation surface of the fuel pump, fuel leakage could occur. If the fuel gauge indicates a fuel level of half or more, perform the following Steps 1 - 6 to drain approx. 10 L {11 US gal, 8.8 Imp gal} of fuel.**
- **Disconnecting/connecting the quick release connector without cleaning it may possibly cause damage to the fuel pipe and quick release connector. Always clean the quick release connector joint area before disconnecting/connecting using a cloth or soft brush, and make sure that it is free of foreign material.**
- **To prevent the SST from coming off the fuel pump cap while performing the work, always perform the removal/installation procedure with 2 people. One person presses the SST against cap from directly above, while the other person rotates the SST.**

1. Complete the "BEFORE REPAIR PROCEDURE". (See **BEFORE REPAIR PROCEDURE[L3 WITH TC]**.)
2. Remove the rear seat cushion.
3. Remove the service hole cover.

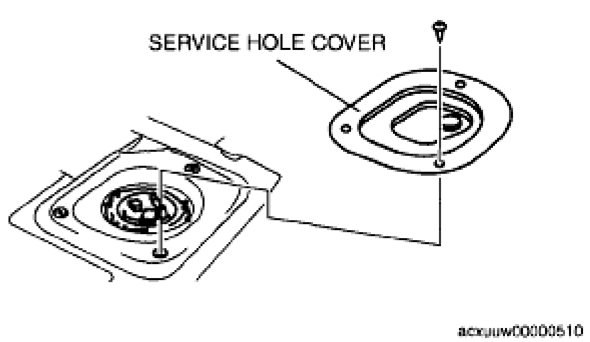


Fig. 13: Identifying Service Hole Cover
Courtesy of MAZDA MOTORS CORP.

4. Disconnect the quick release connector connected to the fuel pump unit.

5. Connect a long hose to the disconnected quick release connector and drain the fuel into a container used for collecting gasoline.

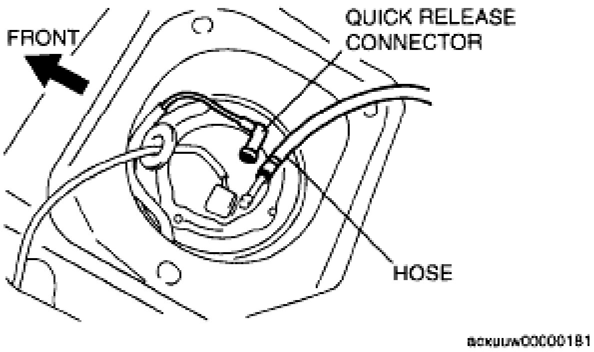


Fig. 14: Identifying Quick Release Connector And Hose
Courtesy of MAZDA MOTORS CORP.

6. Start the fuel pump using the following procedure.

Using M-MDS

1. Connect the M-MDS to the DLC-2.
2. Using the simulation function "FP", start the fuel pump.

Without using M-MDS

1. Remove the fuel pump relay.

CAUTION:

- **Short the specified terminals because shorting the wrong terminal of the main fuse block may cause malfunctions.**

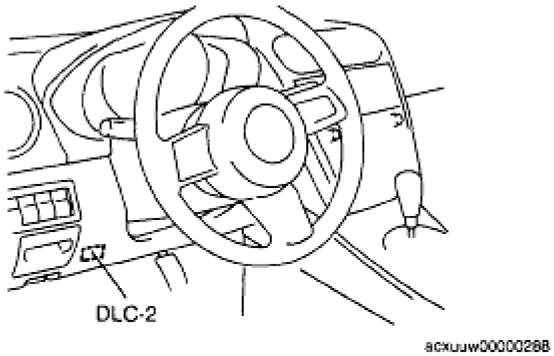


Fig. 15: Identifying DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

2. Using a jumper wire, short fuel pump relay terminals C and D in the main fuse block.

3. Connect the negative battery cable and operate the fuel pump.

CAUTION:

- **The fuel pump could be damaged if it is operated (fuel pump idling) while there is no fuel in the fuel tank. Verify the amount of fuel being discharged from the hose and stop operation of the fuel pump when essentially no fuel is being discharged.**

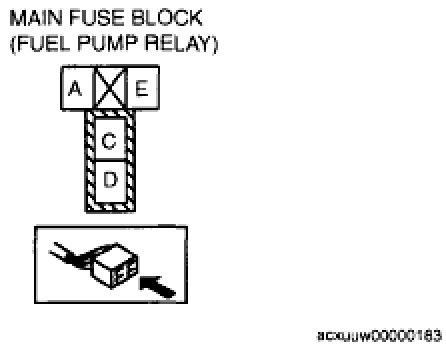


Fig. 16: Identifying Fuel Pump Relay Terminals
Courtesy of MAZDA MOTORS CORP.

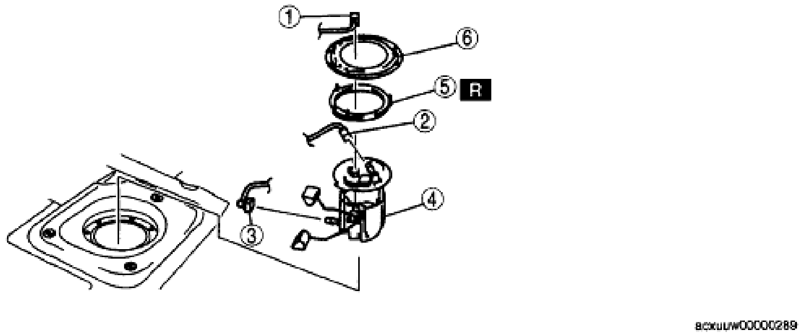
7. When essentially no fuel is being discharged, stop the fuel pump.

   Using M-MDS

   1. Using the simulation function "FP", stop the fuel pump.

   Without using M-MDS

   1. Turn the ignition switch to LOCK position to stop the fuel pump.
   2. Disconnect the jumper wire from the check connector.
8. Disconnect the negative battery cable.
9. Remove the fuel pump bracket installation screws.
10. Remove in the order indicated in the table.



1	Connector
2	Quick release connector (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION[L3 WITH TC])
3	Quick release connector (See QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION[L3 WITH TC])
4	Fuel pump unit
5	Packing
6	Fuel pump bracket

Fig. 17: Identifying Fuel Pump Unit Components [L3 With TC]
Courtesy of MAZDA MOTORS CORP.

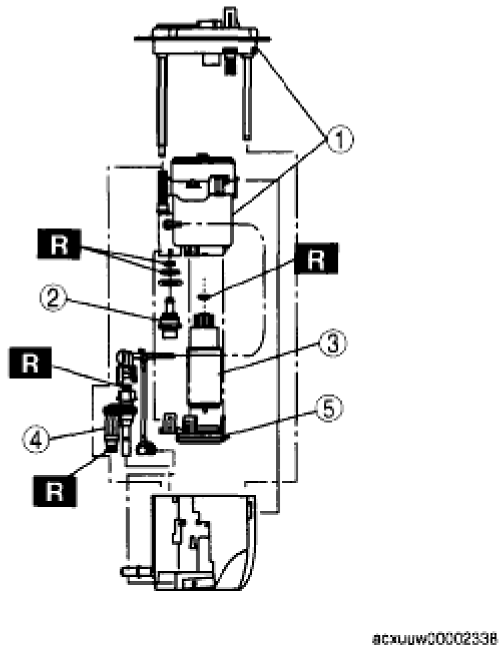
11. Install in the reverse order of removal.
12. Complete the "AFTER REPAIR PROCEDURE". (See **AFTER REPAIR PROCEDURE[L3 WITH TC]**.)

FUEL PUMP UNIT DISASSEMBLY/ASSEMBLY[L3 WITH TC]

WARNING:

- **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, do not damage the sealing surface of the fuel pump unit when removing or installing.**

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



1	Fuel filter body
2	Fuel pressure regulator
3	Fuel pump
4	Transfer
5	Filter

Fig. 18: Exploded View Of Fuel Pump Unit [L3 With TC]
Courtesy of MAZDA MOTORS CORP.

FUEL PUMP UNIT INSPECTION[L3 WITH TC]

CONTINUITY INSPECTION

NOTE:
- **Perform the following test only when directed.**

1. Disconnect the negative battery cable.
2. Remove the rear seat cushion.
3. Remove the service hole cover.
4. Disconnect the fuel pump unit connector.

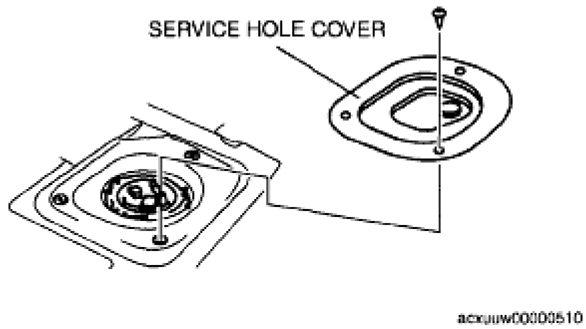


Fig. 19: Identifying Service Hole Cover
Courtesy of MAZDA MOTORS CORP.

5. Inspect for continuity between fuel pump unit connector terminals B and D.
   - If there is no continuity, replace the fuel pump body.
   - If as specified, carry out the "Circuit Open/ Short Inspection".

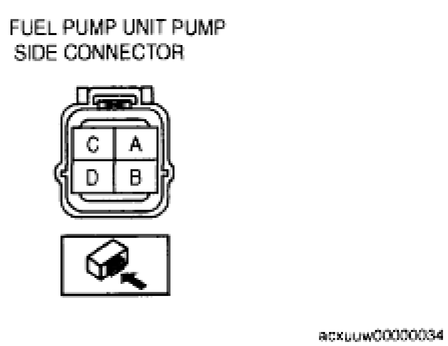


Fig. 20: Identifying Fuel Pump Unit Connector Terminals
Courtesy of MAZDA MOTORS CORP.

CIRCUIT OPEN/SHORT INSPECTION

1. Inspect the following wiring harnesses as for open or short circuit (continuity check).

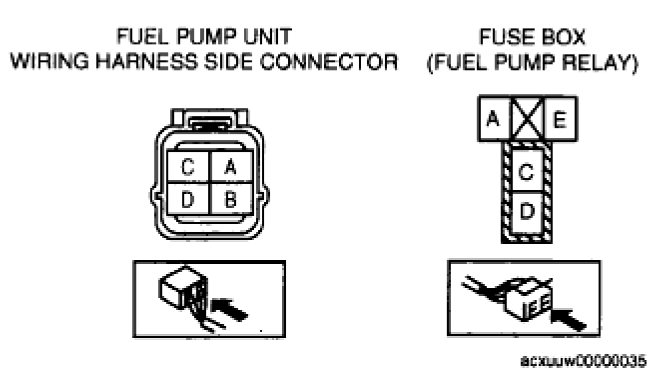


Fig. 21: Identifying Fuel Pump Relay And Unit Connector Terminals

Courtesy of MAZDA MOTORS CORP.

Open circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.
  - Fuel pump unit terminal B and fuel pump relay terminal A
  - Fuel pump unit terminal D and body ground

Short circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.
  - Fuel pump unit terminal B and power supply
  - Fuel pump unit terminal B and body ground
  - Fuel pump unit terminal D and power supply

FUEL PUMP HOLD PRESSURE INSPECTION

WARNING:

- **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Always carry out the following procedure with the engine stopped.**

CAUTION:

- **Disconnecting/connecting the quick release connector without cleaning it may cause damage to the fuel pipe and quick release connector. Always clean the quick release connector joint area before disconnecting/connecting using a cloth or soft brush, and make sure that it is free of foreign material.**

NOTE:

- **Perform the following test only when directed.**

1. Complete the "BEFORE REPAIR PROCEDURE". (See **BEFORE REPAIR PROCEDURE[L3 WITH TC]**.)
2. Disconnect the negative battery cable.
3. Remove the battery and battery tray.

CAUTION:

- **The quick release connector may be damaged if the tab is bent excessively. Do not expand the tab over the stopper.**

4. Disconnect the quick release connector from the fuel tank. (See **QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION[L3 WITH TC]**.)
5. Turn the lever 90° against the hose of the **SST** to plug the **SST** outlet.
6. Push the **SST** quick release connector into the fuel pipe until a click is heard.
7. Set the fuel hose into a container to avoid fuel spills.

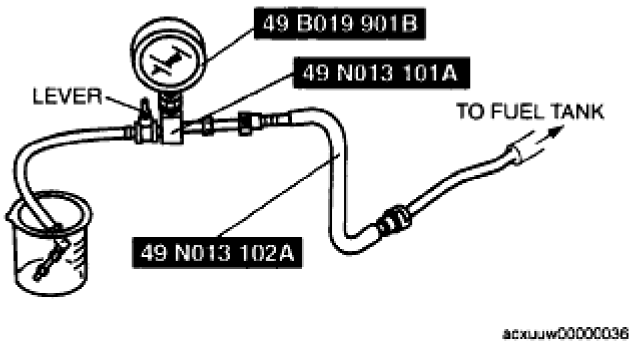


Fig. 22: Identifying Special Tools
Courtesy of MAZDA MOTORS CORP.

8. Start the fuel pump using the following procedure.

   Using M-MDS

   1. Connect the negative battery cable.
   2. Connect the M-MDS to the DLC-2.
   3. Using the simulation function "FP", start the fuel pump.

   Without using M-MDS

   1. Remove the fuel pump relay.

   CAUTION:
   - **Short the specified terminals because shorting the wrong terminal of the main fuse block may cause malfunctions.**

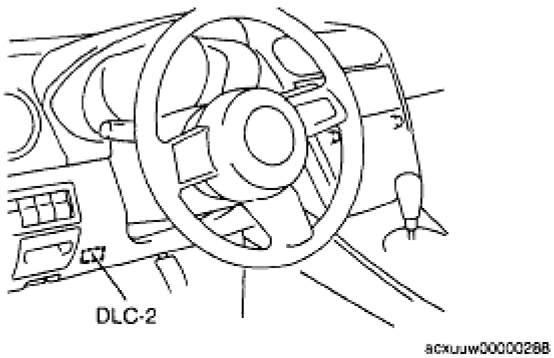


Fig. 23: Identifying DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

   2. Using a jumper wire, short fuel pump relay terminals C and D in the main fuse block.
   3. Connect the negative battery cable and operate the fuel pump.
9. Turn the ignition switch to the LOCK position.

10. Measure the fuel pump hold pressure **after 5 min.**
    - If not as specified, replace the fuel pump after inspecting the following:
        - Fuel line for clogging or leakage

    Fuel pump hold pressure

    More than 230 kPa {2.3 kgf/cm^2 33 psi}

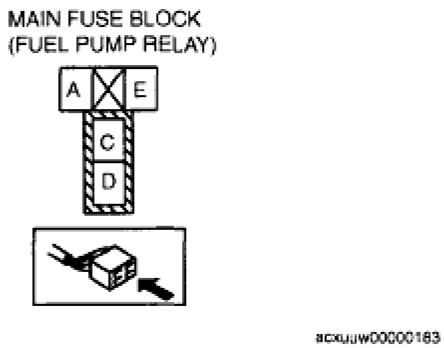


Fig. 24: Identifying Fuel Pump Relay Terminals
Courtesy of MAZDA MOTORS CORP.

11. Disconnect the jumper wire.
12. Disconnect the **SST** .
13. Connect the quick release connector. (See **QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION[L3 WITH TC]**.)

FUEL PUMP RESISTOR REMOVAL/INSTALLATION[L3 WITH TC]

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION[L3 WITH TC]**).
2. Remove the air cleaner. (See **INTAKE AIR SYSTEM REMOVAL/INSTALLATION[L3 WITH TC]**).
3. Disconnect the fuel pump resistor connector.
4. Remove in the fuel pump resistor.

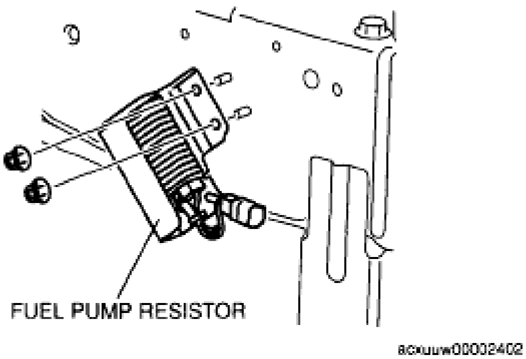


Fig. 25: Identifying Fuel Pump Resistor
Courtesy of MAZDA MOTORS CORP.

5. Install in the order as shown in the figure.

   Tightening torque

   4.2-6.2 N.m {43-63 kgf.cm, 38-54 in.lbf}

6. Connect the fuel pump resistor connector.

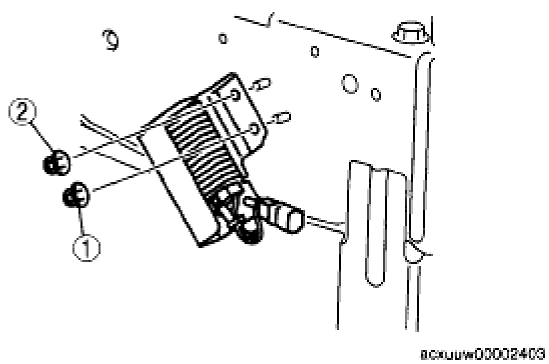


Fig. 26: Identifying Fuel Pump Resistor Installation Bolts
Courtesy of MAZDA MOTORS CORP.

FUEL PUMP RESISTOR INSPECTION[L3 WITH TC]

RESISTANCE INSPECTION

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION[L3 WITH TC]**).
2. Remove the fuel pump resister. (See **FUEL PUMP RESISTOR REMOVAL/INSTALLATION[L3 WITH TC]**.)
3. Verify that the continuity between the fuel pump resister terminal A and B is within the specification.
   - If not within the specification, replace the fuel resistor.

Fuel pump resistor continuity

0.304-0.336 ohms (20 °C {68 °F})

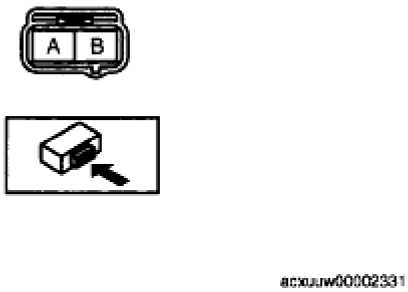


Fig. 27: Identifying Fuel Pump Resister Terminal
Courtesy of MAZDA MOTORS CORP.

HIGH PRESSURE FUEL PUMP REMOVAL/INSTALLATION[L3 WITH TC]

CAUTION:

- **Do not disassemble the high pressure fuel pump.**
- **Do not scratch or damage the fuel sealing surface of the high and low fuel ports.**
- **When removing the high pressure fuel pipe, secure the joint (pump side) so that it dose not rotate, and loosen the screw (pipe side).**

NOTE:

- **If the high pressure fuel pump is removed, replace the O-ring with a new one.**

1. Complete the "BEFORE REPAIR PROCEDURE". (See **BEFORE REPAIR PROCEDURE[L3 WITH TC]**.)
2. Disconnect the negative battery cable.
3. Remove the charge air cooler duct.
4. Disconnect the spill valve control solenoid valve connector.
5. Disconnect the quick release connector on the high pressure fuel pump. (See **QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION[L3 WITH TC]**.)
6. Remove the battery and battery tray. (See **BATTERY REMOVAL/INSTALLATION[L3 WITH TC]**).
7. Remove the air duct. (See **INTAKE AIR SYSTEM REMOVAL/INSTALLATION[L3 WITH TC]**)

WARNING:

- **If the high pressure fuel pump joint nut is loosened, fuel leakage may occur resulting in death or serious injury, or damage to the equipment or the vehicle. Fuel can also irritate the skin and eyes. When removing the high pressure line pipe, always tighten the high pressure line pipe installation nut while**

fixing the high pressure fuel pump joint nut with a wrench. If the high pressure fuel pump joint nut has rotated, replace the high pressure fuel pump with a new one.

8. Disconnect the high pressure line pipe of the high pressure fuel pump.

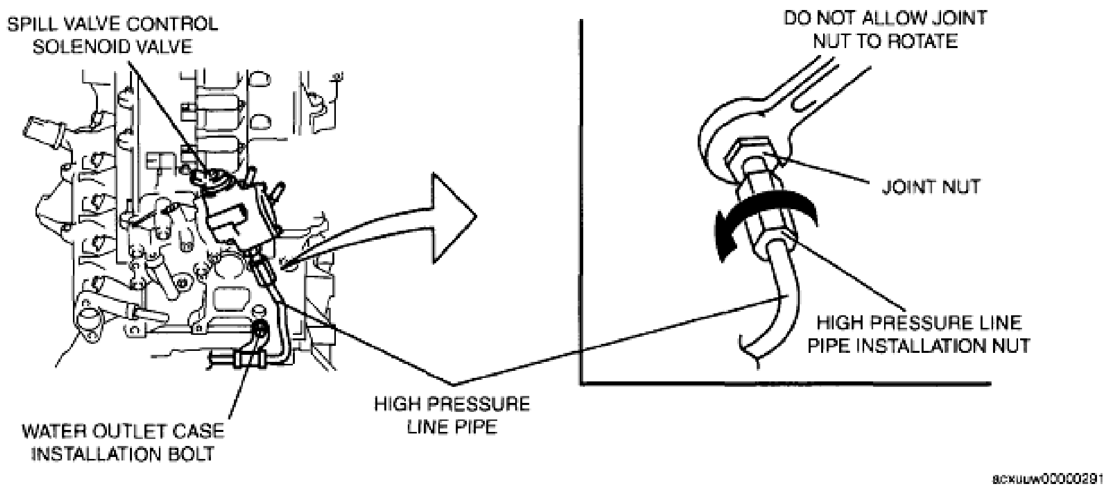


Fig. 28: Disconnecting High Pressure Line Pipe Of High Pressure Fuel Pump
Courtesy of MAZDA MOTORS CORP.

1. Fix the joint nut with a wrench on the high pressure fuel pump side as shown in the figure.
2. Loosen the high pressure line pipe installation nut.

9. Drain engine coolant. (See **ENGINE COOLANT REPLACEMENT[L3 WITH TC]**).
10. Loosen the water outlet case installation bolts securing the high pressure line pipe.
11. Remove the high pressure fuel pump.

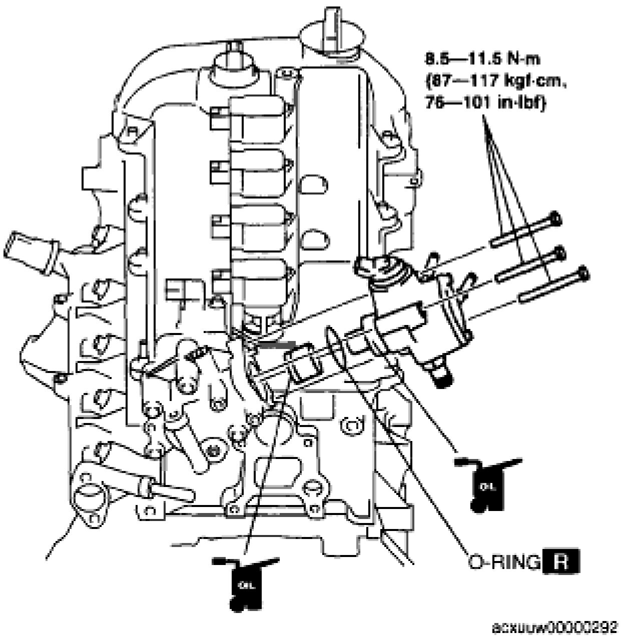


Fig. 29: Identifying High Pressure Fuel Pump, O-Rings And Bolts With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

12. Remove the high pressure fuel pump cover.
13. Tighten the bolts on the high pressure fuel pump cover.

    Tightening torque

    17-23 N.m {1.8-2.3 kgf.m, 13-16 ft.lbf}

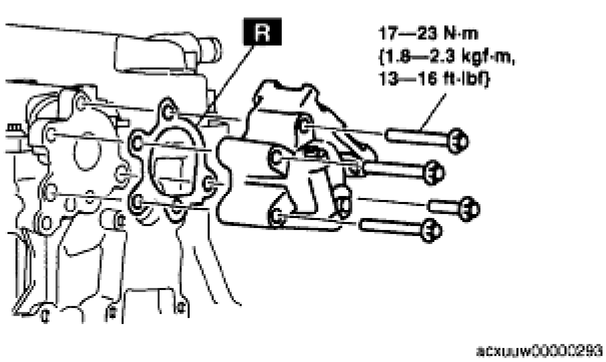


Fig. 30: Identifying High Pressure Fuel Pump Cover And Bolts With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

CAUTION:

- **If the high pressure fuel pump installation bolts are tightened with the high pressure fuel pump tilted, the high pressure fuel pump may not operate correctly. Tighten the high pressure fuel pump installation bolts in a few passes with equal torque.**

14. Tighten the bolts on the high pressure fuel pump.

Tightening torque

8.5-11.5 N.m {87-117 kgf.cm, 76-101 in.lbf}

WARNING:

- **If the high pressure fuel pump joint nut is loosened, fuel leakage may occur resulting in death or serious injury, or damage to the equipment or the vehicle. Fuel can also irritate the skin and eyes. When installing the high pressure line pipe, always tighten the high pressure line pipe installation nut while fixing the high pressure fuel pump joint nut with a wrench. If the high pressure fuel pump joint nut has rotated, replace the high pressure fuel pump with a new one.**

15. Assemble the high pressure line pipe.

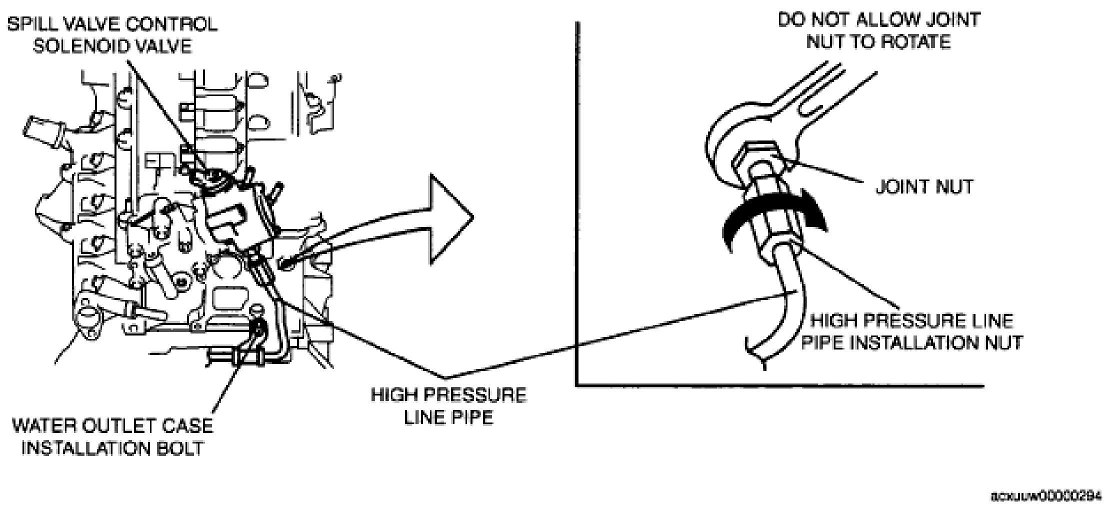


Fig. 31: Installing High Pressure Line Pipe
Courtesy of MAZDA MOTORS CORP.

1. Fix the joint nut with a wrench on the high pressure fuel pump side as shown in the figure.
2. Tighten the high pressure line pipe installation nut.

Tightening torque

23.5-35.5 N.m {2.40-3.59 kgf.m, 17.4-26.0 ft.lbf}

16. Tighten the water outlet case installation bolts.

Tightening torque

8-11.5 N.m {82-117 kgf.cm, 71-101 in.lbf}

17. Install the quick release connector. (See **QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION[L3 WITH TC]**.)

FUEL LEAKAGE INSPECTION AFTER HIGH PRESSURE FUEL PUMP INSTALLATION

1. Verify that the high pressure fuel pump is assembled securely.
2. Drive the vehicle starting from a standstill and brake suddenly **five to six times** at a low speed.
3. Stop the vehicle and verify from outside the vehicle that there is no fuel leakage around the high pressure fuel pump.

HIGH PRESSURE FUEL PUMP INSPECTION[L3 WITH TC]

NOTE:

- **Perform the following inspection only when directed.**
- **The following vacuum values are indicated by relative pressure from the fuel pressure sensor.**

1. Verify that the fuel pressure sensor is normal. (See **FUEL PRESSURE SENSOR INSPECTION[L3 WITH TC]**).
2. Connect the M-MDS to the DLC-2.
3. Turn the ignition switch to the ON position (Engine off).
4. Select the FUEL_PRES, and LOAD, RPM PIDs on the M-MDS.

CAUTION:

- **If the engine is run at a high speed, it could be damaged. When racing the engine, do not race it up to 6,700 rpm or more.**

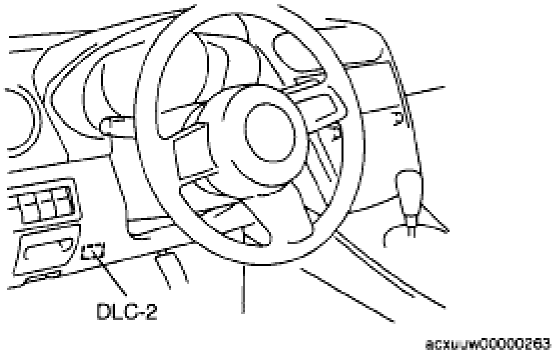


Fig. 32: Identifying DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

5. After the LOAD PID is **60% or more** while the engine is raced with the accelerator pedal fully depressed, verify that the FUEL_PRES PID is **approx.11.5Mpa.**
   - If not as verified, replace the high pressure fuel pump.

QUICK RELEASE CONNECTOR REMOVAL/INSTALLATION[L3 WITH TC]

WARNING:

- **Fuel is very flammable liquid. If fuel spills or leaks from the pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure", while referring to the BEFORE SERVICE PRECAUTION. See BEFORE REPAIR PROCEDURE[L3 WITH TC] .**

QUICK RELEASE CONNECTOR TYPE

CAUTION:

- **There are three types of quick release connectors. Verify the type and location, and install/remove properly.**

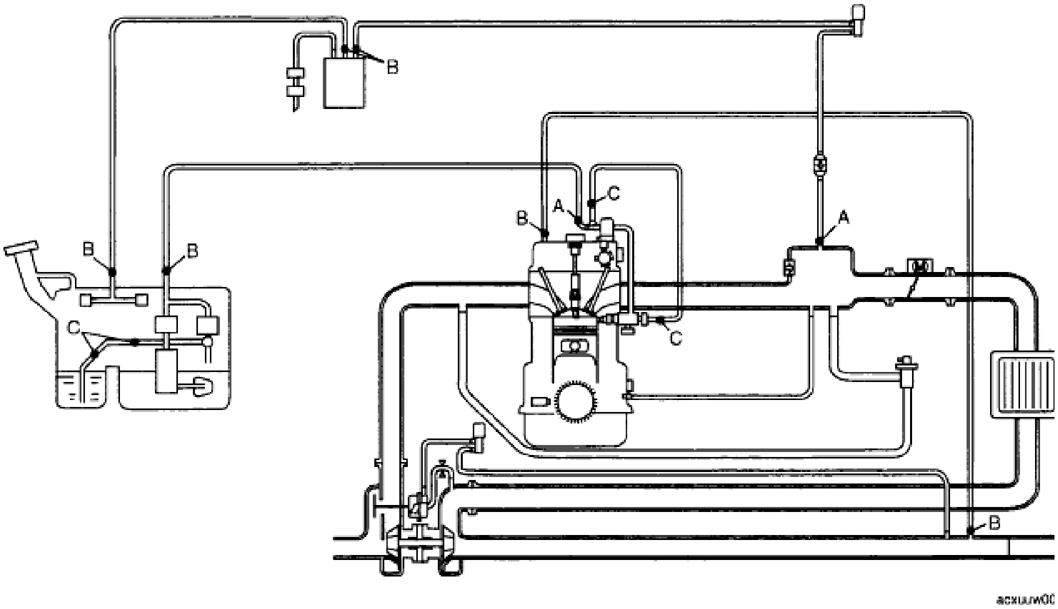


Fig. 33: Identifying Quick Release Connector Locations
Courtesy of MAZDA MOTORS CORP.

TYPE A REMOVAL

1. Follow "BEFORE REPAIR PROCEDURE" before performing any work operations to prevent fuel from spilling from the fuel system. (See **BEFORE REPAIR PROCEDURE[L3 WITH TC]**.)

CAUTION:

- **The quick release connector may be damaged if the release tab is bent excessively. Do not expand the release tab over the stopper.**

NOTE:

- **The fuel hose can be removed by pushing it to the pipe side to release the lock.**

2. Rotate the release tab on the quick release connector to the stopper position.

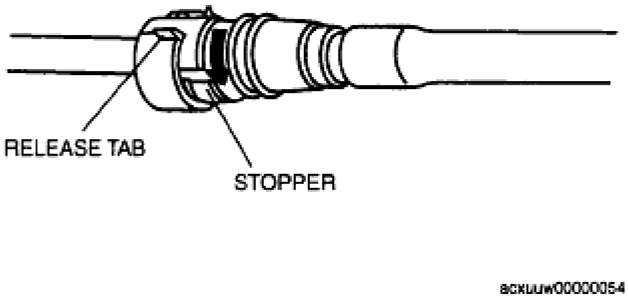


Fig. 34: Identifying Quick Release Connector Stopper And Release Tab
Courtesy of MAZDA MOTORS CORP.

3. Pull out the fuel hose straight from the fuel pipe and disconnect it.

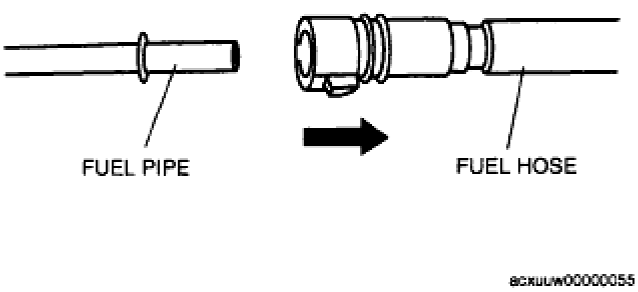


Fig. 35: Identifying Fuel Hose And Fuel Pipe
Courtesy of MAZDA MOTORS CORP.

4. Cover the disconnected quick release connector and fuel pipe with vinyl sheeting or a similar material to prevent it from scratches or dirt.

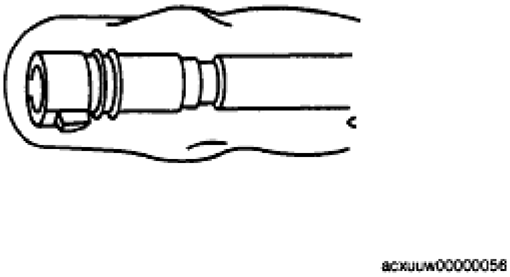


Fig. 36: Covering Disconnected Quick Release Connector
Courtesy of MAZDA MOTORS CORP.

TYPE B REMOVAL

CAUTION:
- **Be careful not to damage the pipe when unlocking the retainer.**

NOTE:
- **When removing the quick connector, either SST 49 E042 001 or 49 N013 103A.**

When using SST 49 N013 103A

1. Follow "BEFORE SERVICE PRECAUTION" and remove dirt from the connecting surfaces before performing any work operations. (See **BEFORE REPAIR PROCEDURE[L3 WITH TC]**.)
2. Insert the SST into the quick release connector.
3. Pull out the fuel hose straight from the fuel pipe and disconnect it.
4. Cover the disconnected quick release connector and fuel pipe with vinyl sheeting or a similar material to prevent it from scratches or dirt.

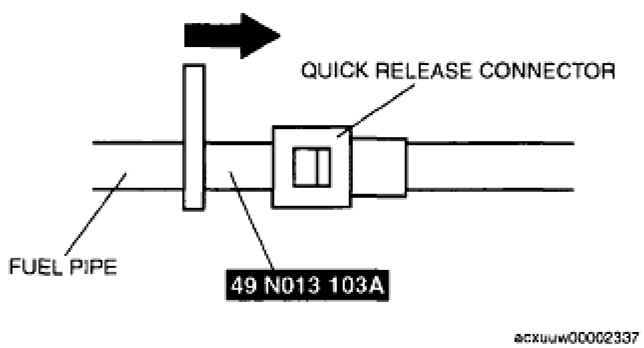


Fig. 37: Identifying Quick Release Connector And Fuel Pipe
Courtesy of MAZDA MOTORS CORP.

When using SST 49 E042 001

NOTE:
- **If the quick release connector is removed, replace the retainer with a new one.**

1. Follow "BEFORE SERVICE PRECAUTION" and remove dirt from the connecting surfaces before performing any work operations. (See **BEFORE REPAIR PROCEDURE[L3 WITH TC]**.)

   NOTE:
   - **The retainer is attached to the pipe even after the connector is disconnected.**

2. Set the **SST** parallel to the quick release connector.

NOTE:

- **The quick release connector can be removed by pushing the center of the retainer tabs.**

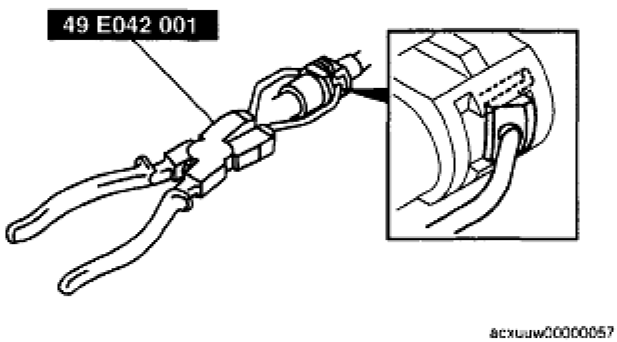


Fig. 38: Identifying SST Position On Quick Release Connector
Courtesy of MAZDA MOTORS CORP.

3. Hold the center of the retainer tabs with the **SST** ends and press the retainer.
4. Pull the connector side and disconnect the quick release connector.
5. Raise a retainer tab using the **SST** and remove the retainer.
6. Cover the disconnected quick release connector and evaporative hose with vinyl sheeting or a similar material to prevent it from scratches or dirt.

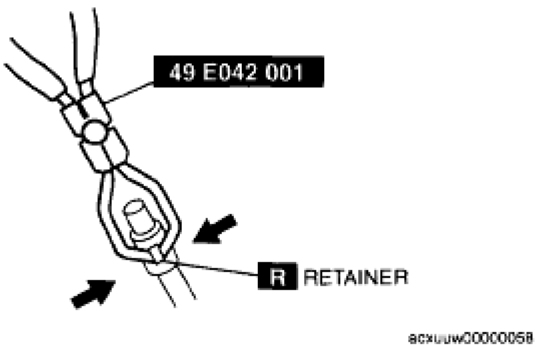


Fig. 39: Removing Retainer
Courtesy of MAZDA MOTORS CORP.

TYPE C REMOVAL

1. Follow "BEFORE REPAIR PROCEDURE" and remove dirt from the connecting surfaces before performing any work operations. (See **BEFORE REPAIR PROCEDURE[L3 WITH TC]**.)
2. Move the retainer upward using a small flathead screwdriver or a similar tool.
3. Pull out the fuel hose straight from the fuel pipe and disconnect it.

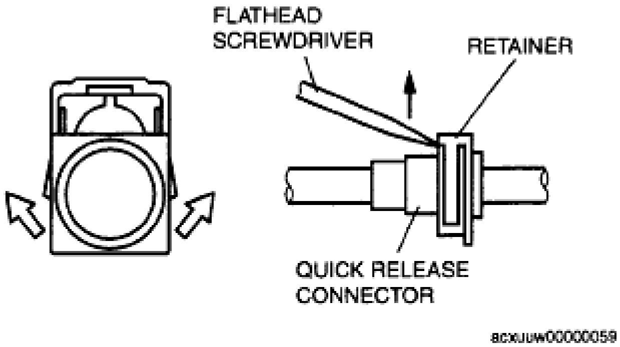


Fig. 40: Disconnecting Fuel Hose Straight From Fuel Pipe
Courtesy of MAZDA MOTORS CORP.

4. Cover the disconnected quick release connector and fuel pipe with vinyl sheeting or a similar material to prevent it from scratches or dirt.

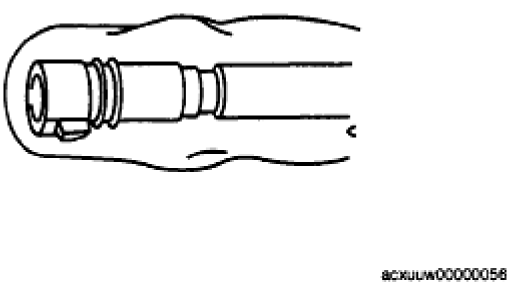


Fig. 41: Covering Disconnected Quick Release Connector
Courtesy of MAZDA MOTORS CORP.

TYPE A INSTALLATION

NOTE:

- **If the quick release connector O-ring is damaged or has slipped, replace the fuel hose.**
- **A checker tab is integrated with the quick release connector for new fuel hoses and evaporative hoses. Remove the checker tab from the quick release connector after the connector is completely engaged with the fuel pipe.**

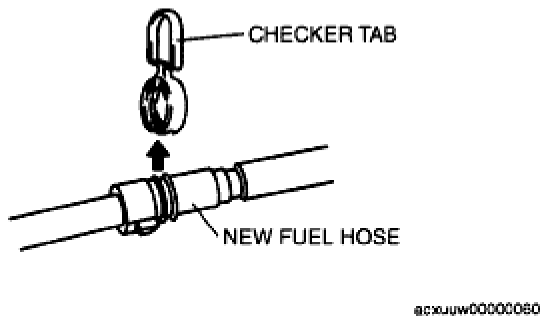


Fig. 42: Identifying Quick Release Connector Checker Tab And New Fuel Hose
Courtesy of MAZDA MOTORS CORP.

1. Inspect the fuel hose and fuel pipe sealing surface for damage and deformation.
    - If there is any malfunction, replace it with a new one.
2. Apply a small amount of clean engine oil to the sealing surface of the fuel pipe.
3. Reconnect the fuel hose straight to the fuel pipe until a click is heard.

NOTE:
- **If the quick release connector does not move at all, disconnect it, verify that the O-ring is not damaged or has not slipped, and then reconnect the quick release connector.**

4. Lightly pull and push the quick release connector a few times by hand, and then verify that it can move **2.0-3.0 mm {0.08-0.12 in}** and is connected securely.
5. Inspect all related parts by performing "AFTER REPAIR PROCEDURE". (See **AFTER REPAIR PROCEDURE[L3 WITH TC]**.)

TYPE B INSTALLATION

NOTE:
- **If the quick release connector O-ring is damaged or has slipped, replace the fuel hose.**
- **A checker tab is integrated with the quick release connector for new fuel hoses and evaporative hoses. Remove the checker tab from the quick release connector after the connector is completely engaged with the fuel pipe.**

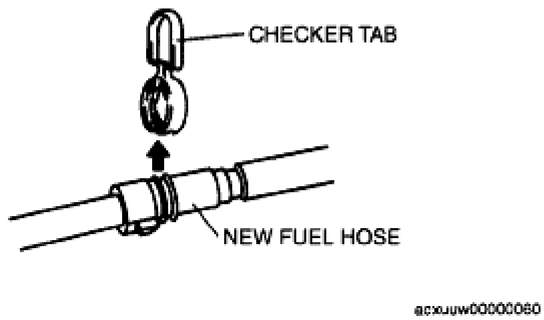


Fig. 43: Identifying Quick Release Connector Checker Tab And New Fuel Hose
Courtesy of MAZDA MOTORS CORP.

CAUTION:

- **Be sure to replace the retainer with a new one to prevent gas leakage.**
- **To prevent evaporative gas leakage, be sure not to damage the connecting part between the charcoal canister and pipe, and the locks between the quick release connector and retainer. If any of them are damaged, replace the charcoal canister or hose with a new one.**

1. Remove the retainer remaining on the charcoal canister pipe.
2. Install a new retainer to the quick release connector.
3. Reconnect the hose straight to the pipe until a click is heard.
4. Lightly pull and push the quick release connector a few times by hand, and then verify that it is connected securely.
5. Inspect all related parts by performing "AFTER REPAIR PROCEDURE". (See **AFTER REPAIR PROCEDURE[L3 WITH TC]**.)

TYPE C INSTALLATION

NOTE:

- **If the quick release connector O-ring is damaged or has slipped, replace the fuel hose.**

1. Inspect the fuel hose and fuel pipe sealing surface for damage and deformation.
    - If there is any malfunction, replace it with a new one.
2. Install the quick release connector.
    - Insert the fuel pipe straight to the end of the quick release connector.
    - Push down the retainer using a finger.
        - If the retainer cannot be pushed down, push the fuel pipe further to the quick release connector.

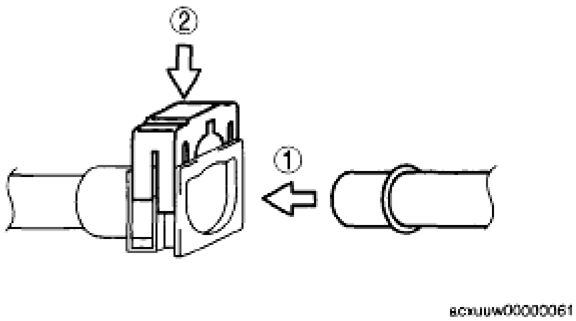


Fig. 44: Installing Quick Release Connector
Courtesy of MAZDA MOTORS CORP.

3. Lightly pull and push the quick release connector a few times by hand, and then verify that it is connected securely.
4. Inspect all related parts by performing "AFTER REPAIR PROCEDURE". (See **AFTER REPAIR PROCEDURE[L3 WITH TC]**.)

FUEL INJECTOR REMOVAL/INSTALLATION[L3 WITH TC]

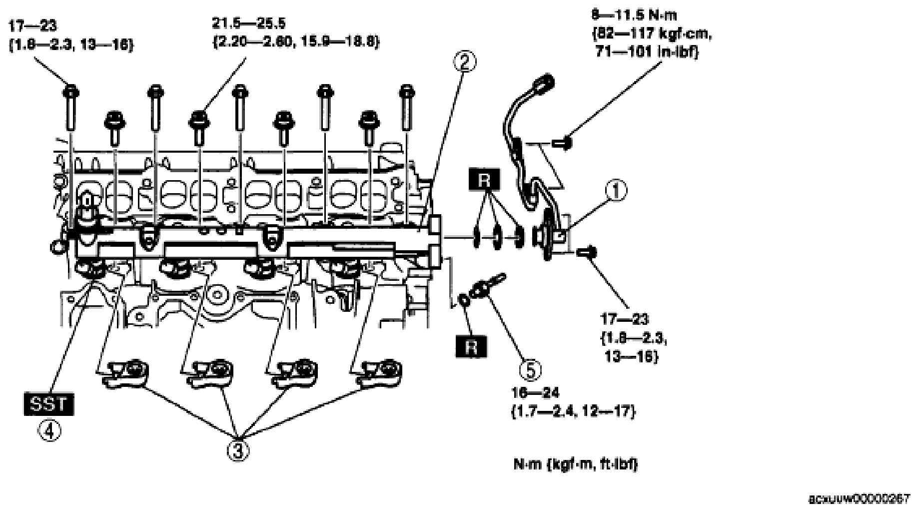
CAUTION:

- **Disconnecting/connecting the quick release connector without cleaning it may cause damage to the fuel pipe and quick release connector. Always clean the quick release connector joint area before disconnecting/connecting using a cloth or soft brush, and make sure that it is free of foreign material.**

NOTE:

- **When the fuel pressure sensor replaces, replace a new fuel delivery pipe with a new fuel pressure sensor.(See FUEL INJECTOR REMOVAL/INSTALLATION[L3 WITH TC])**

1. Complete the "BEFORE REPAIR PROCEDURE". (See **BEFORE REPAIR PROCEDURE[L3 WITH TC]**.)
2. Disconnect the negative battery cable.
3. Remove the intake manifold. (See **INTAKE AIR SYSTEM REMOVAL/INSTALLATION[L3 WITH TC]**).
4. Remove in the order indicated in the table.



1	High pressure line pipe (See High Pressure Line Pipe Removal Note.) (See High Pressure Line Pipe Installation Note.)

2	Fuel delivery pipe (See Fuel Delivery Pipe Installation Note.)
3	Fuel injector bracket
4	Fuel injector (See Fuel Injector Removal Note.)
5	Relief valve

Fig. 45: Identifying Fuel Injector Components With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.
6. Complete the "AFTER REPAIR PROCEDURE". (See **AFTER REPAIR PROCEDURE[L3 WITH TC]**.)

HIGH PRESSURE LINE PIPE REMOVAL NOTE

1. Drain engine coolant. (See **ENGINE COOLANT REPLACEMENT[L3 WITH TC]**).
2. Disconnect the high pressure line pipe of the high pressure fuel pump. (See **HIGH PRESSURE FUEL PUMP REMOVAL/INSTALLATION[L3 WITH TC]**.)

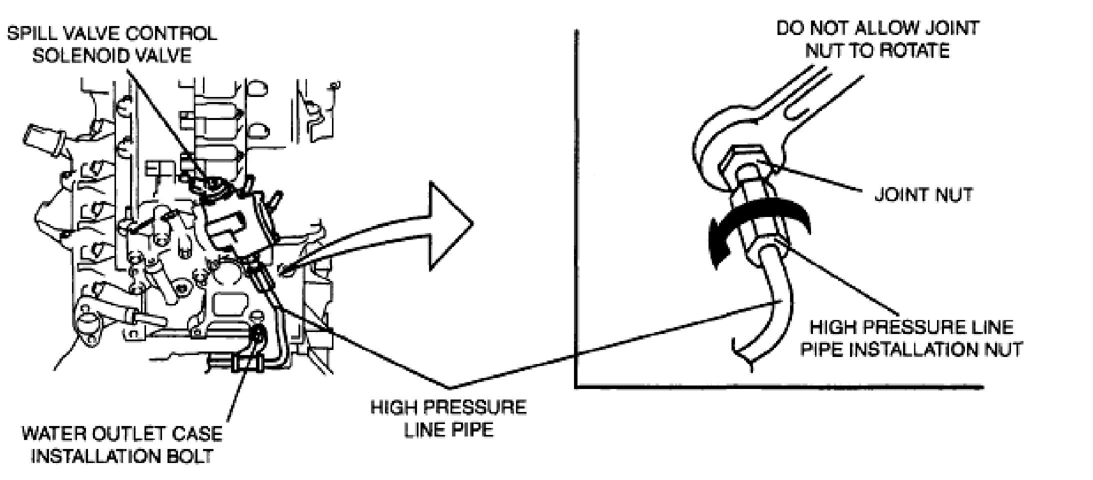


Fig. 46: Disconnecting High Pressure Line Pipe Of High Pressure Fuel Pump
Courtesy of MAZDA MOTORS CORP.

1. Fix the joint nut with a wrench on the high pressure fuel pump side as shown in the figure.
2. Loosen the high pressure line pipe installation nut.

3. Remove the high pressure line pipe.

FUEL INJECTOR REMOVAL NOTE

NOTE:

- **Depending on the driving conditions, carbon may accumulate on the inserted part of the fuel injector, causing the fuel injector to stick. Remove the fuel injector using the following procedure.**

1. Install the **SST** to the fuel injector confirming that the **SST** faces the correct direction as shown in the figure.

CAUTION:

- **If the SST slips while ratcheting up the fuel injector, the fuel injector or surrounding parts could be damaged. Press fit the SST to the fuel injector firmly and operate carefully.**
- **When ratcheting up the fuel injector, the fuel injector connector may contact the cylinder head and damage the fuel injector. Ratchet up the fuel injector so that the fuel injector connector does not contact the cylinder head.**

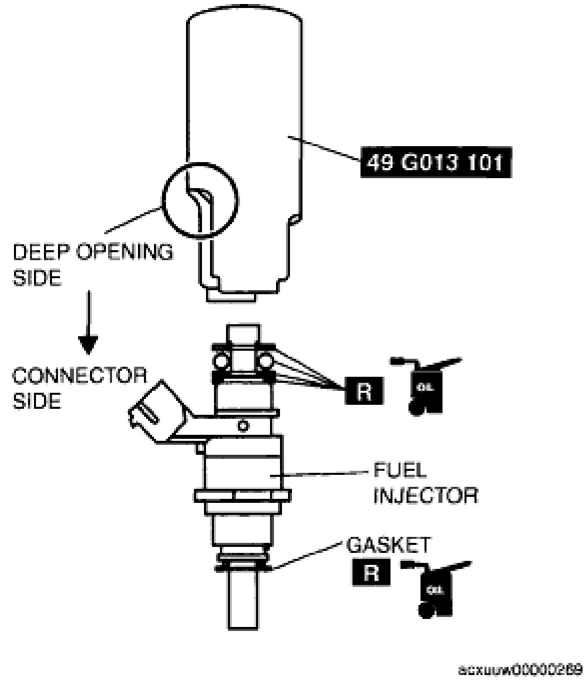


Fig. 47: Identifying Special Tool Correct Position On Fuel

Injector
Courtesy of MAZDA MOTORS CORP.

NOTE:

- **If fuel injector NO. 3 contacts the oil separator, cut the tab on the oil separator as shown in the figure. Carefully cut the tab so that the oil separator is not deformed or damaged, with no clearance on the mating surfaces of the oil separator and engine.**

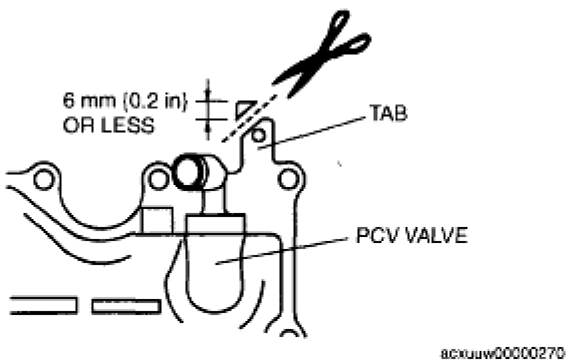


Fig. 48: Cutting Tab On Oil Separator With Specification
Courtesy of MAZDA MOTORS CORP.

2. Keep ratcheting the **SST** so that the fuel injector becomes free enough to ratchet up without using the **SST.**

CAUTION:

- **Do not apply excessive force to the fuel injector connector because the fuel injector could be damaged.**

3. Pull out the fuel injector by ratcheting it upright.
4. Verify that there are no gasket in the cylinder heads after removing the fuel injectors.

WARNING:

- **If foreign material such as metal shavings penetrates the fuel injector installation hole on the cylinder block, the engine could be damaged. Remove all foreign material and cap the fuel injector installation hole after removing the fuel injector.**

5. Clean the fuel injector and around the insertion hole using a vacuum cleaner.

FUEL DELIVERY PIPE INSTALLATION NOTE

1. Tighten the bolts in the order shown in the figure.

Tightening torque

17-23 N.m {1.8-2.3 kgf.m, 13-16 ft.lbf}

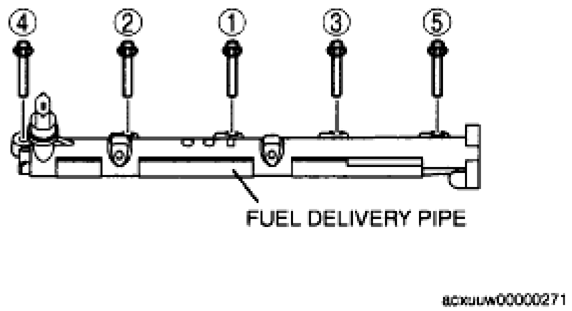


Fig. 49: Identifying Fuel Delivery Pipe Bolts Tightening Sequence
Courtesy of MAZDA MOTORS CORP.

HIGH PRESSURE LINE PIPE INSTALLATION NOTE

1. Temporarily tighten the bolts in the order shown in the figure.

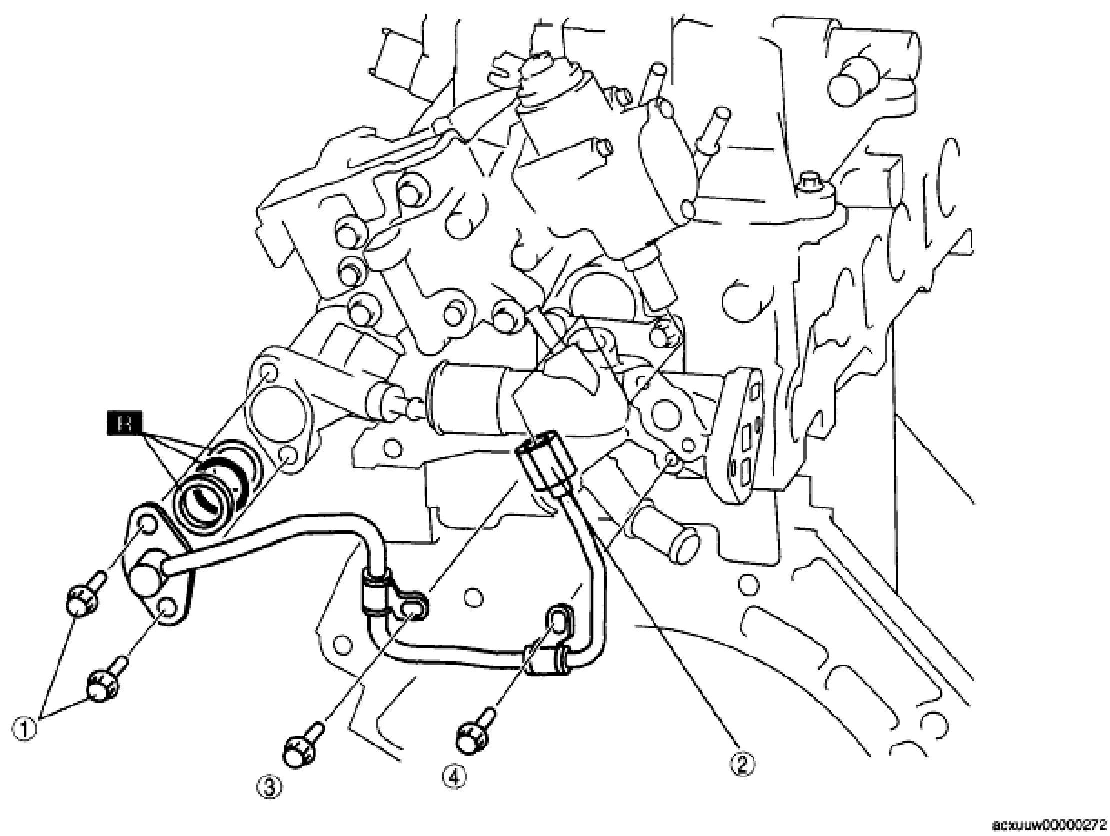


Fig. 50: Identifying High Pressure Line Pipe Bolts Tightening Sequence
Courtesy of MAZDA MOTORS CORP.

2. Tighten NO. 1 bolts shown in the figure.

Tightening torque

17-23 N.m {1.8-2.3 kgf.m, 13-16 ft.lbf}

3. Tighten NO. 2 bolts shown in the figure.

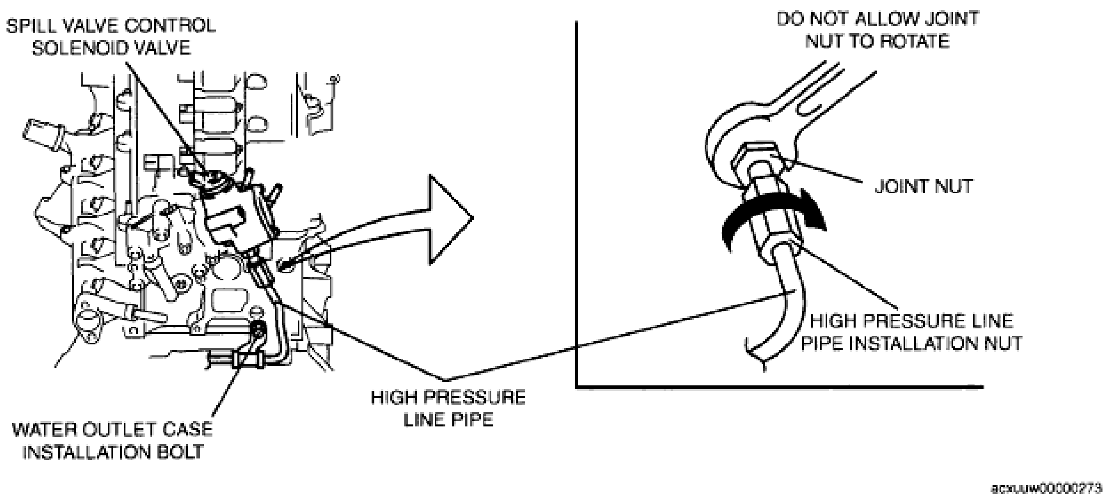


Fig. 51: Installing High Pressure Line Pipe
Courtesy of MAZDA MOTORS CORP.

1. Fix the joint nut with a wrench on the high pressure fuel pump side as shown in the figure.
2. Tighten the high pressure line pipe installation nut.

   Tightening torque

   23.5-35.5 N.m {2.40-3.61 kgf.m, 17.4-26.1 ft.lbf}

4. Tighten NO. 3, NO. 4 bolts shown in the figure.

Tightening torque

17-23 N.m {1.8-2.3 kgf.m, 13-16 ft.lbf}

FUEL INJECTOR INSPECTION[L3 WITH TC]

OPERATION TEST

1. Carry out the "Fuel Injector Operation Inspection". (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION[L3 WITH TC]**).
   - If not as specified, perform the further inspection for the fuel injectors.

RESISTANCE INSPECTION

NOTE:

- **Perform the following procedure only when directed.**

1. Turn the ignition switch to the LOCK position.
2. Disconnect the negative battery cable.
3. Remove the fuel delivery pipe. (See **FUEL INJECTOR REMOVAL/INSTALLATION[L3 WITH TC]**.)
4. Disconnect the fuel injector connectors.
5. Measure the resistance of the fuel injector using a tester.
    - If not as specified, replace the fuel injector. (See **FUEL INJECTOR REMOVAL/INSTALLATION[L3 WITH TC]**.)
    - If as specified but "Operation Test" is failed, carry out the "Circuit Open/Short Inspection". Inspect for open or short circuit.

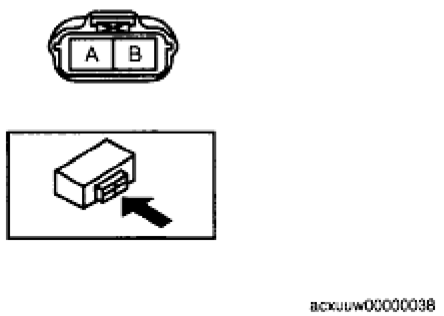


Fig. 52: Identifying Fuel Injector Connector Terminals
Courtesy of MAZDA MOTORS CORP.

Fuel injector resistance

1.0-1.2 ohms [20 °C {68 °F}]

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION[L3 WITH TC]**).
2. Inspect the following wiring harnesses for an open or short circuit (continuity check).

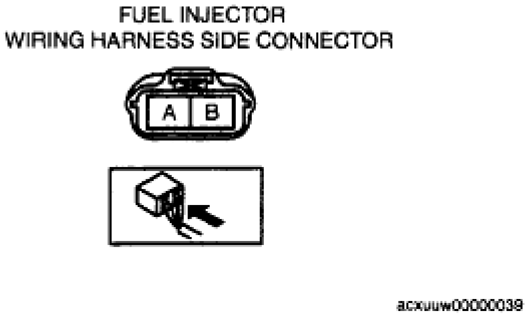


Fig. 53: Identifying Fuel Injector Wiring Harness Side Connector Terminals
Courtesy of MAZDA MOTORS CORP.

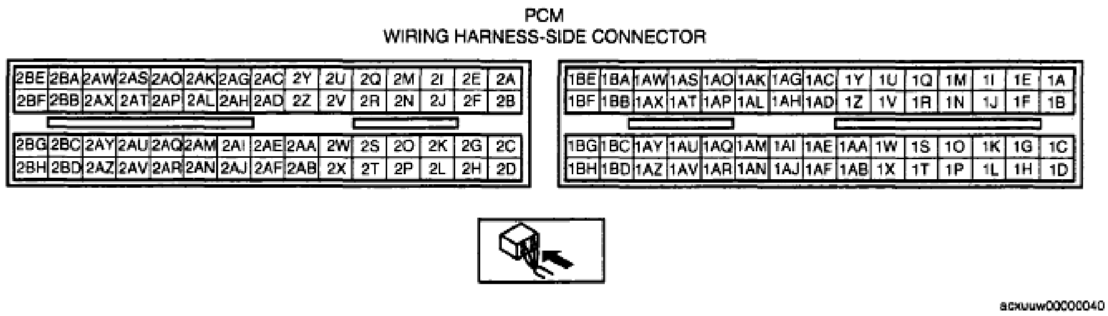


Fig. 54: Identifying PCM Wiring Harness Side Connector Terminals
Courtesy of MAZDA MOTORS CORP.

Open circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.
  - NO. 1 cylinder fuel injector terminal A and PCM terminal 2BB
  - NO. 2 cylinder fuel injector terminal A and PCM terminal 2BC
  - NO. 3 cylinder fuel injector terminal A and PCM terminal 2BD
  - NO. 4 cylinder fuel injector terminal A and PCM terminal 2AZ
  - NO. 1 cylinder fuel injector terminal B and PCM terminal 2BG
  - NO. 2 cylinder fuel injector terminal B and PCM terminal 2BH
  - NO. 3 cylinder fuel injector terminal B and PCM terminal 2BH
  - NO. 4 cylinder fuel injector terminal B and PCM terminal 2BG

Short circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.
  - NO. 1 cylinder fuel injector terminal A and power supply
  - NO. 1 cylinder fuel injector terminal A and body ground
  - NO. 2 cylinder fuel injector terminal A and power supply
  - NO. 2 cylinder fuel injector terminal A and body ground
  - NO. 3 cylinder fuel injector terminal A and power supply
  - NO. 3 cylinder fuel injector terminal A and body ground
  - NO. 4 cylinder fuel injector terminal A and power supply
  - NO. 4 cylinder fuel injector terminal A and body ground
  - NO. 1 cylinder fuel injector terminal B and power supply
  - NO. 1 cylinder fuel injector terminal B and body ground
  - NO. 2 cylinder fuel injector terminal B and power supply

- NO. 2 cylinder fuel injector terminal B and body ground
- NO. 3 cylinder fuel injector terminal B and power supply
- NO. 3 cylinder fuel injector terminal B and body ground
- NO. 4 cylinder fuel injector terminal B and power supply
- NO. 4 cylinder fuel injector terminal B and body ground

PRESSURE REGULATOR INSPECTION[L3 WITH TC]

NOTE:

- **Due to the adoption of the mechanical returnless fuel system, the pressure regulator cannot be inspected separately.**

1. Perform "**FUEL LINE PRESSURE INSPECTION**". (See **FUEL LINE PRESSURE INSPECTION [L3 WITH TC]**.)

FUEL SHUT-OFF/ROLLOVER VALVE INSPECTION[L3 WITH TC]

CAUTION:

- **Disconnecting/connecting the quick release connector without cleaning it may cause damage to the fuel pipe and quick release connector. Always clean the quick release connector joint area before disconnecting/connecting using a cloth or soft brush, and make sure that it is free of foreign material.**

NOTE:

- **This inspection is for fuel shut-off valve and rollover valve integrated in the fuel tank.**

1. Disconnect the quick release connector and the fuel pump unit connector. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION[L3 WITH TC]**.)
2. Remove the fuel tank with the fuel pump unit. (See **FUEL TANK REMOVAL/INSTALLATION[L3 WITH TC]**.)
3. Plug the port as shown in the figure.
4. Level the fuel tank.

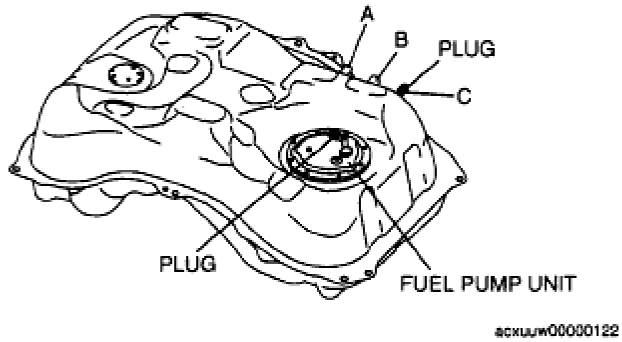


Fig. 55: Identifying Plug Ports And Fuel Pump Unit
Courtesy of MAZDA MOTORS CORP.

5. Blow through port B and verify that there is airflow from port A.
    - If there is no airflow, replace the fuel tank.
    - If there is airflow, turn the fuel tank upside down, and proceed to Step 6.
6. Blow through port B and verify that there is no airflow from port A.
    - If there is airflow, replace the fuel tank.

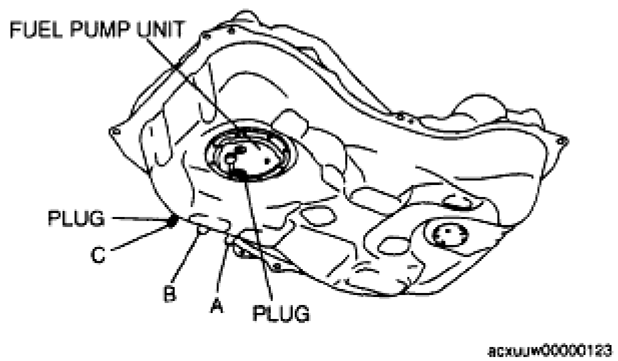


Fig. 56: Identifying Plug Ports And Fuel Pump Unit
Courtesy of MAZDA MOTORS CORP.