

2004 ENGINE PERFORMANCE

SFI - RAV4

SFI SYSTEM

PRECAUTION

HINT:

Any diagnostic trouble code (DTC) retained in the ECM will be erased when the negative (-) terminal cable is removed from the battery. If necessary, read the DTC before removing the negative (-) terminal cable from the battery.

- 1. BEFORE WORKING ON FUEL SYSTEM, DISCONNECT NEGATIVE (-) TERMINAL CABLE FROM BATTERY**
- 2. DO NOT SMOKE OR WORK NEAR AN OPEN FLAME WHEN WORKING ON FUEL SYSTEM**
- 3. KEEP GASOLINE AWAY FROM RUBBER OR LEATHER PARTS**
- 4. MAINTENANCE PRECAUTIONS**
 - a. To prevent engine misfire, these precautions should be taken.
 1. Check the battery terminals for proper connection.
 2. After repair, check that the ignition coil terminals and all other ignition system lines are reconnected securely.
 3. When cleaning the engine compartment, be especially careful to protect the electrical system from water.
 - b. Observe the following when handling the heated oxygen sensors.
 1. Do not drop the sensor or hit it against an object.
 2. The sensor should be free from any contact with water.
- 5. IF VEHICLE IS EQUIPPED WITH MOBILE COMMUNICATION SYSTEM (HAM, CB, ETC.)**

If the vehicle is equipped with a mobile communication system, refer to the **PRECAUTION**.

- 6. AIR INDUCTION SYSTEM**
 - a. Removal of the engine oil dipstick, oil filler cap, PCV hose may break the engine.
 - b. Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head may allow air suction and break the engine.
- 7. ELECTRONIC CONTROL SYSTEM**
 - a. Before removing the SFI wiring connectors, terminals, first disconnect the power by turning the ignition switch OFF or disconnecting the negative (-) terminal cable from the battery.

HINT:

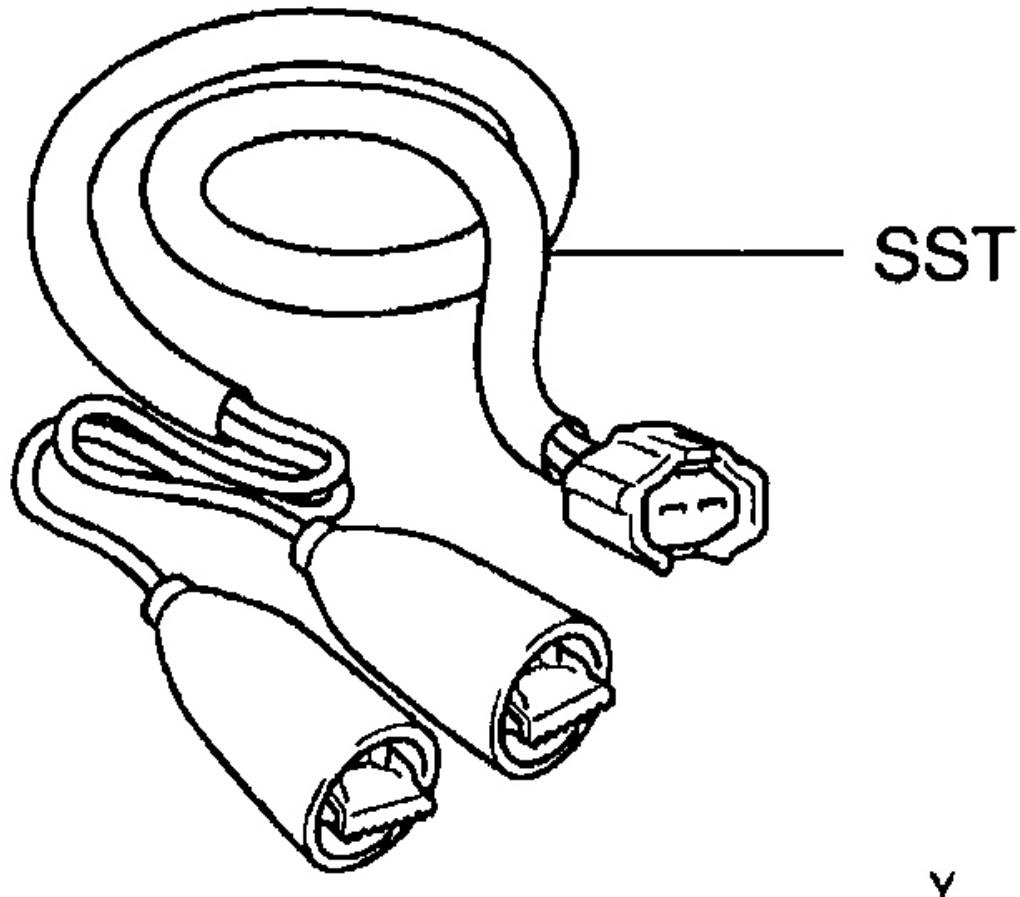
2004 Toyota RAV4

2004 ENGINE PERFORMANCE SFI - RAV4

Be sure to check the DTC before disconnecting the negative (-) terminal cable from the battery.

- b. When installing the battery, be especially careful not to incorrectly connect the positive (+) and negative (-) cables.
- c. Do not give a severe impact to the SFI parts during removal or installation. Handle all the SFI parts carefully, especially the ECM.
- d. Be careful during troubleshooting. Numerous transistor circuits are used and even slight terminal contact can cause further troubles.
- e. Do not open the ECM cover.
- f. When inspecting during rainy weather, take care to prevent entry of water. Also, when washing the engine compartment, prevent water from getting into the SFI parts and wiring connectors.
- g. Parts should be replaced as an assembly.
- h. Care should be taken when pulling out and inserting the wiring connectors.
 - 1. Release the lock and pull out the connector, pulling on the connectors.
 - 2. Fully insert the connector and check that it is locked.
- i. Use SST for the inspection or test of the injector or its wiring connector.

SST 09842-30080



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Fig. 1: Identifying SST

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. FUEL SYSTEM

- a. When disconnecting the high fuel pressure line, a large amount of gasoline will spill out. Observe these procedures:

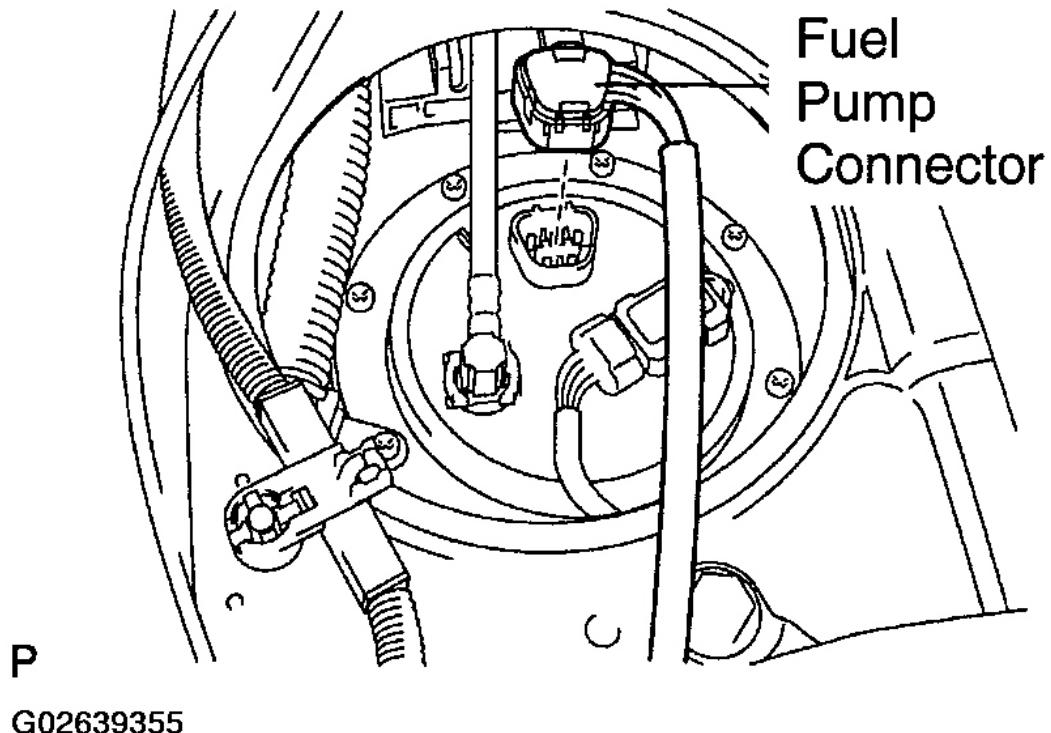
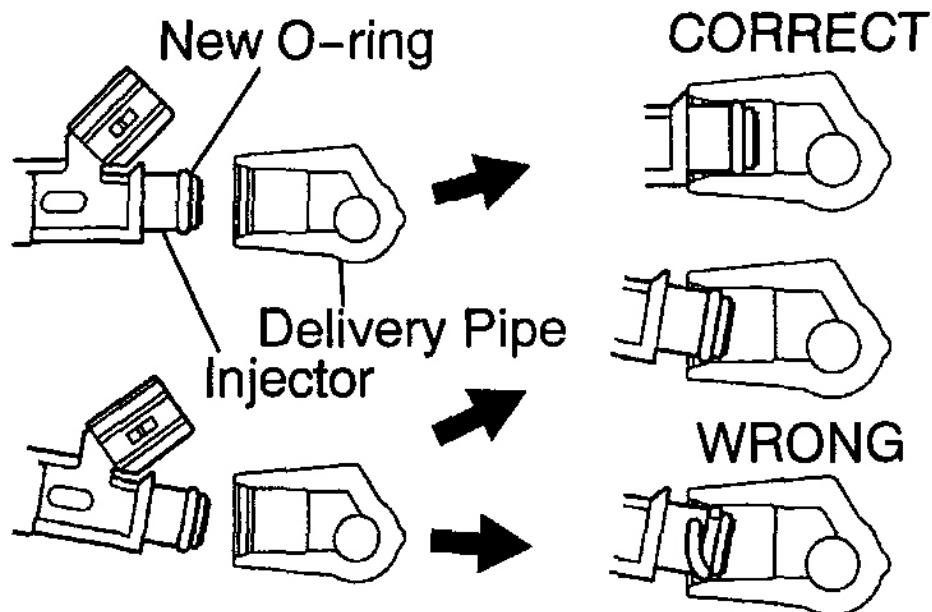


Fig. 2: Disconnecting High Fuel Pressure Line

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. Disconnect the fuel pump connector.
 2. Start the engine. After the engine has stopped on its own, turn the ignition switch OFF.
 3. Put a container under the connection.
 4. Slowly loosen the connection.
 5. Disconnect the high fuel pressure line.
 6. Reconnect the fuel pump connector.
- b. Observe the following when removing and installing the injector:



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Fig. 3: Removing/Installing Injector

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. Never reuse the O-ring.
2. When placing a new O-ring on the injector, take care not to damage it in anyway.
3. Coat a new O-ring with spindle oil or gasoline before installing. Never use engine oil, gear oil and brake oil.
- c. Install the injector to the delivery pipe and cylinder head, as shown in **Fig. 4**.

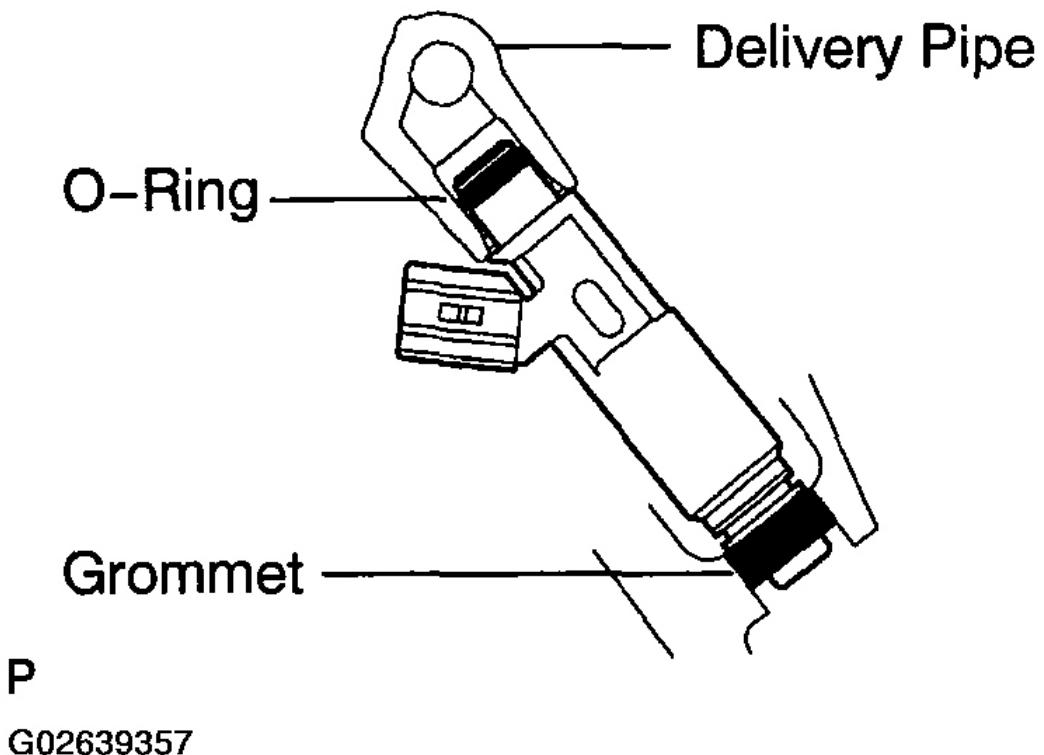
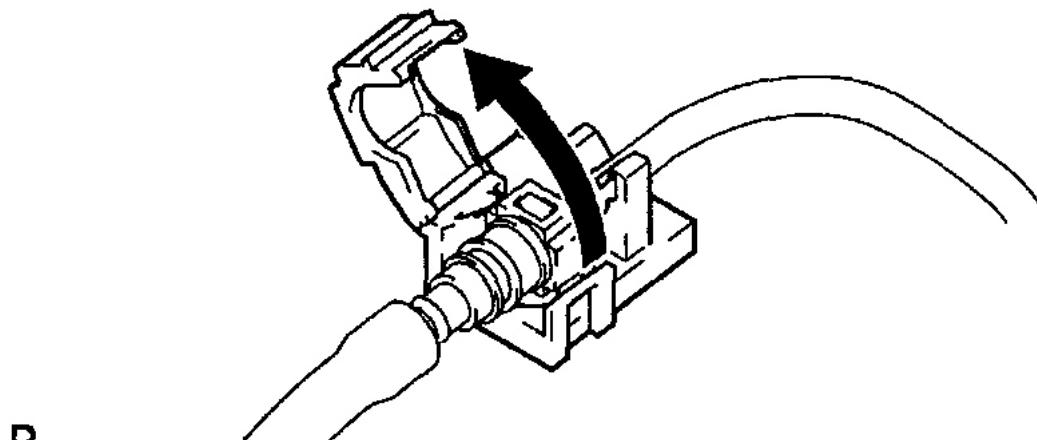


Fig. 4: Installing Injector To Delivery Pipe & Cylinder Head
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Observe the following when disconnecting the fuel tube connector (quick type):
 1. Check if there is any dirt like mud in the pipe and around the connector before disconnecting the fuel tube connector. If necessary, clean the dirt away.
 2. Disconnect the fuel pipe clamp from the connector.

Quick Type

Disconnect

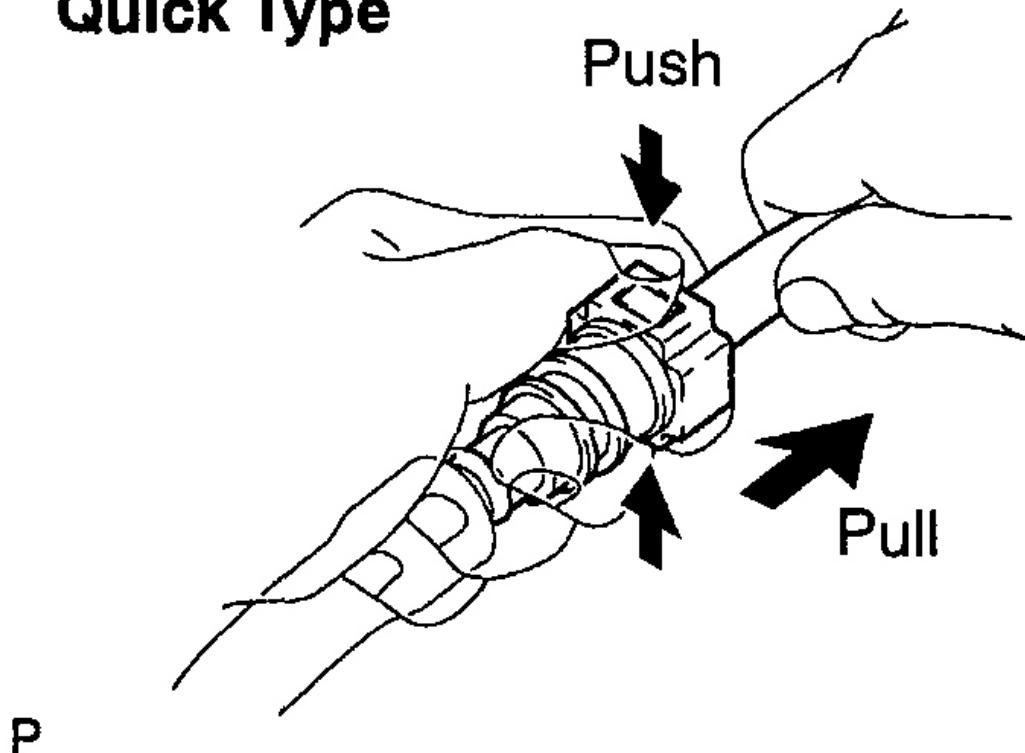


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Fig. 5: Disconnecting Fuel Pipe Clamp From Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. Be sure to disconnect them with hands.
4. When the connector and the pipe are stuck, push and pull the connector. Then disconnect and pull it out. Do not use any tools at this time.
5. Check if there is any dirt on the seal surface of the disconnected pipe. If necessary, clean the dirt away.
6. Prevent the disconnected pipe and connector from being damaged and foreign objects mixing in by covering them with a vinyl bag.

Quick Type



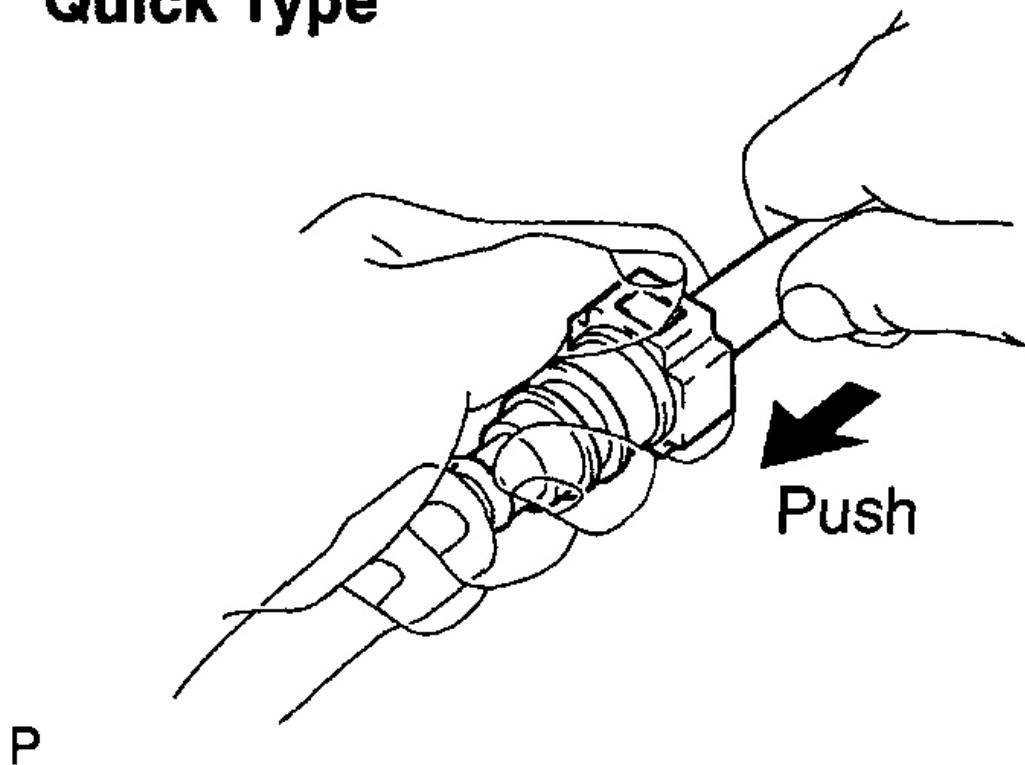
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Fig. 6: Pushing & Pulling Connector

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Observe the following when connecting the fuel tube connector (quick type):
 1. Check if there is any damage or foreign objects in the connected part of the pipe.
 2. Match the axis of the connector with the axis of the pipe, and push into the connector until a "click" sound is heard. If the connection is tight, apply little amount of fresh engine oil on the tip of the pipe.

Quick Type

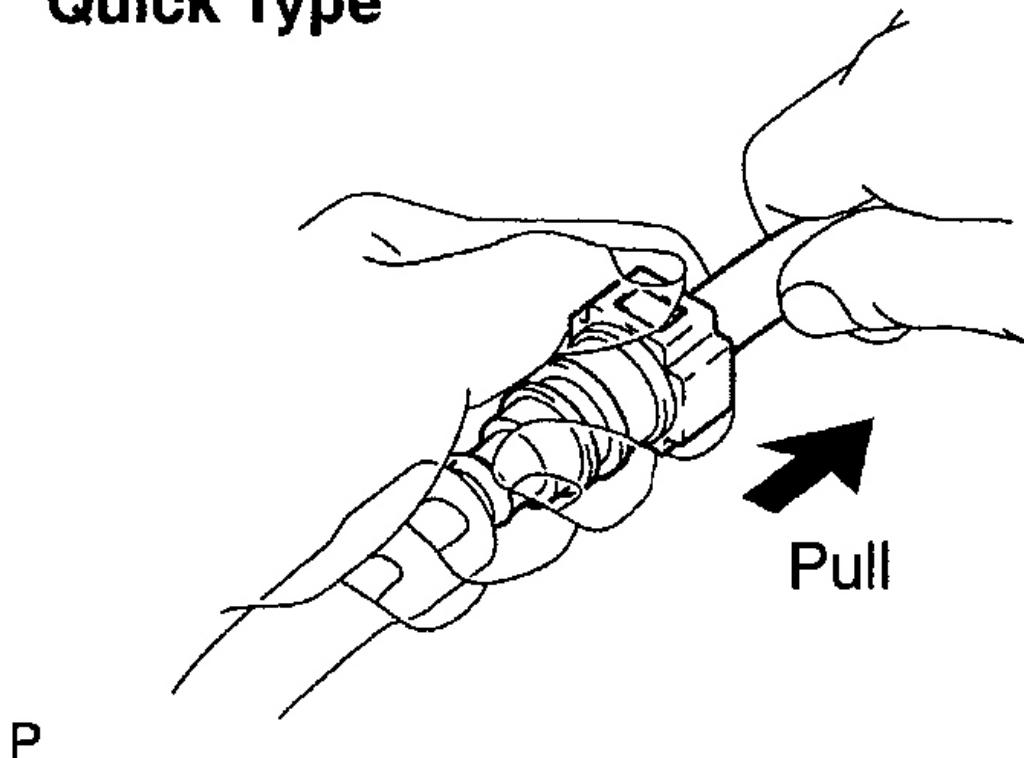


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Fig. 7: Matching Axis Of Connector With Axis Of Pipe & Pushing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. After having finished the connection, pull the pipe and the connector to ensure secure connection.

Quick Type



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Fig. 8: Pulling Pipe & Connector

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. Check to make sure no fuel leak is present.

If the result is not specified, repair or replace.

5. Install the fuel pipe clamp to the connector.

Quick Type

Install

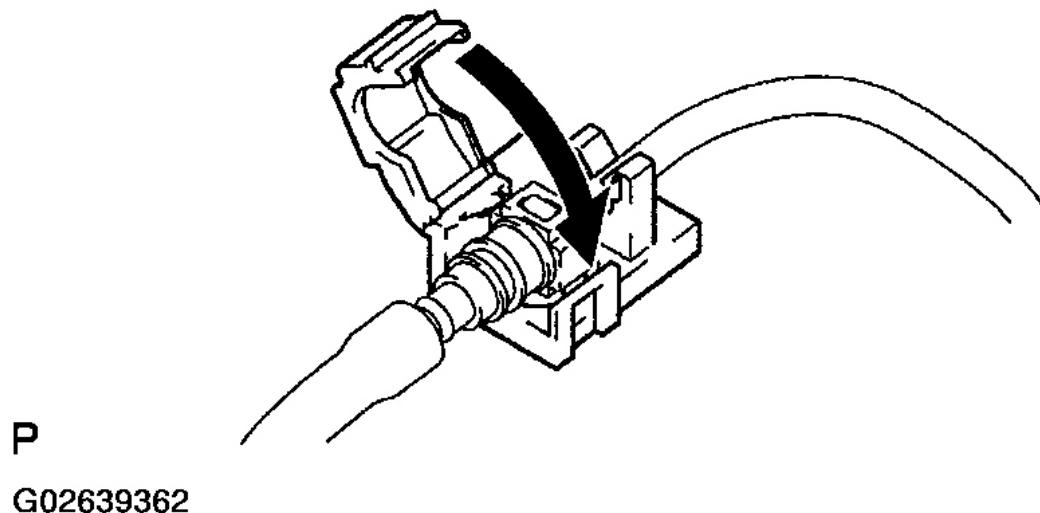


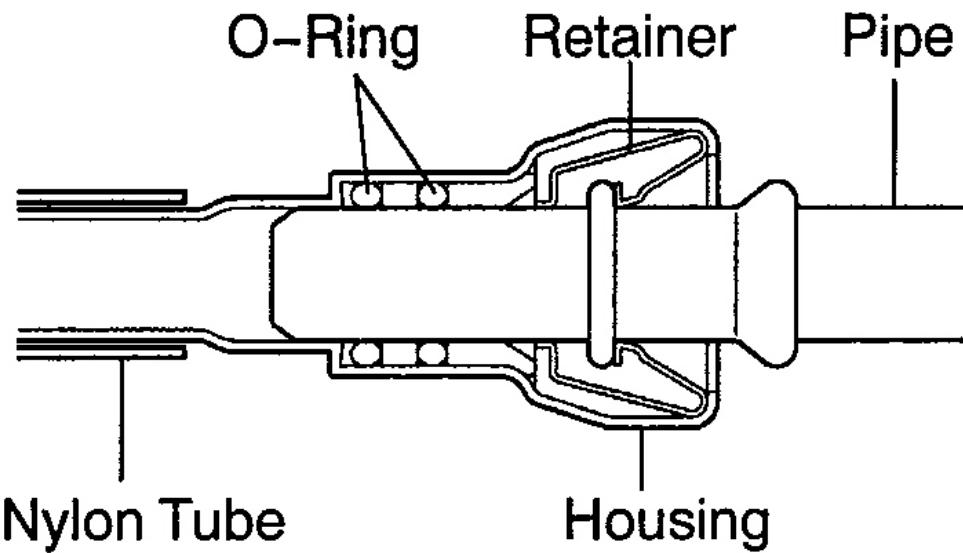
Fig. 9: Installing Fuel Pipe Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. Check to make sure no fuel leak is present.
If the result is not specified, repair or replace.
- f. Observe the following when disconnecting the fuel tube connector (metallic type):

HINT:

The structure of the metallic connector is shown in **Fig. 10**.

Metallic Type



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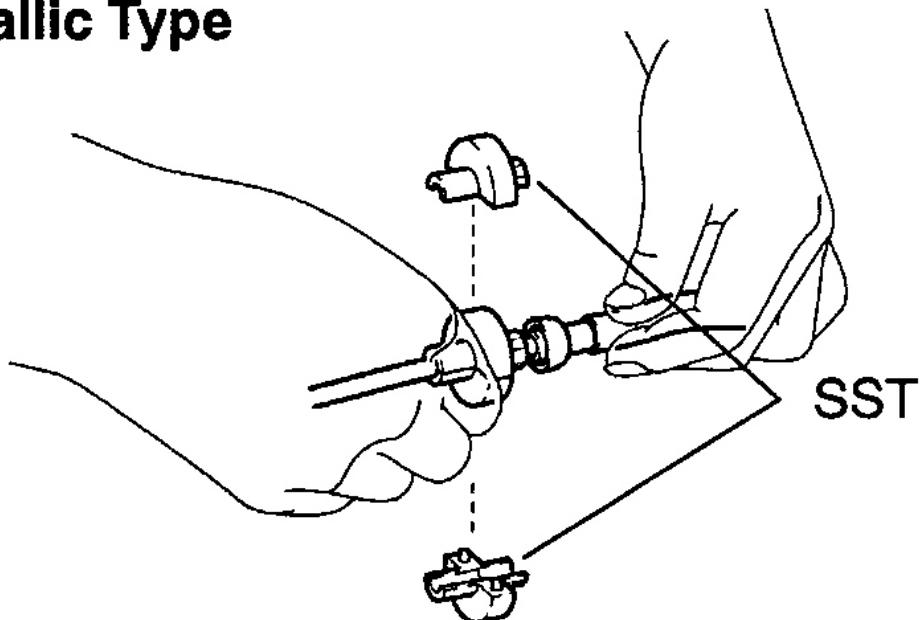
Fig. 10: Identifying Structure Of Metallic Connector

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. Check if there is any dirt like mud in the pipe and around the connector before disconnecting the fuel tube connector. If necessary, clean the dirt away.
2. Assemble SST to the connection, as shown in **Fig. 11**.

SST 09268-21010

Metallic Type



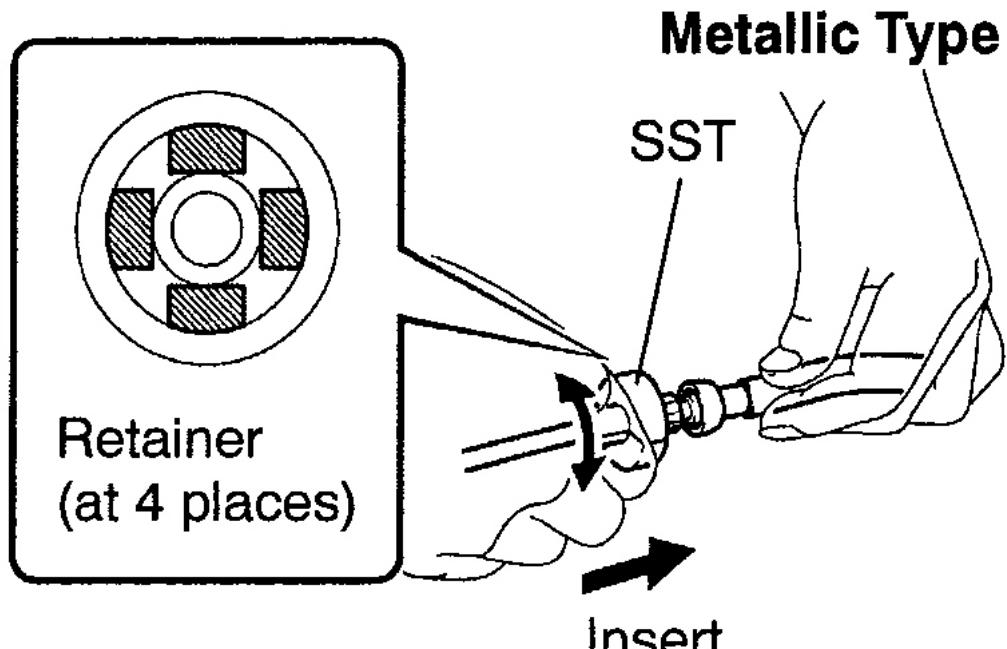
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Fig. 11: Assembling SST To Connection

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. Turn the SST, align the retainers inside the connector with the SST chamfered parts and insert the SST into the connector.

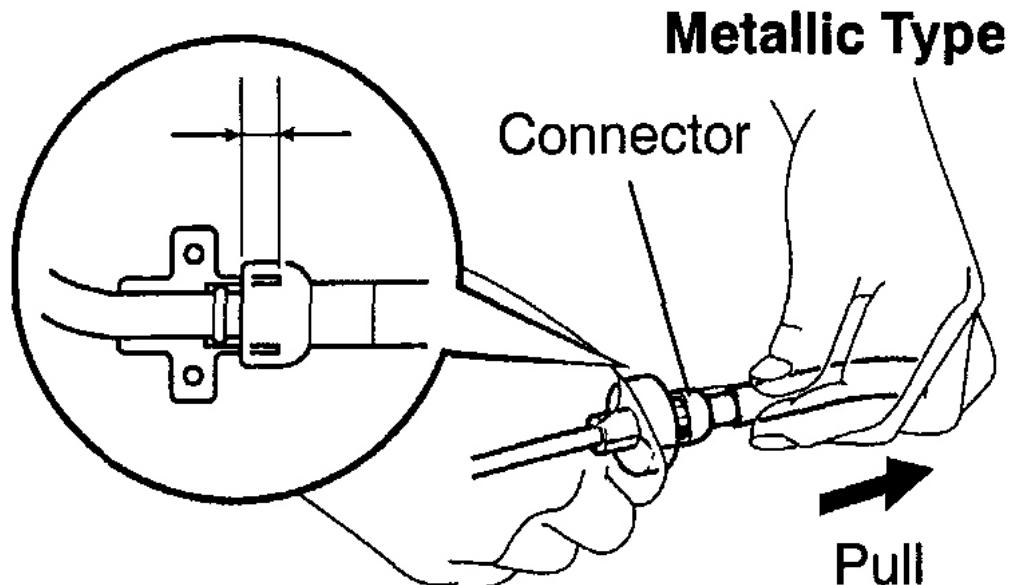


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Fig. 12: Aligning Retainers & Inserting SST Into Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. While holding the SST, pull the connector towards the SST to put the retainers on the SST chamfered parts.



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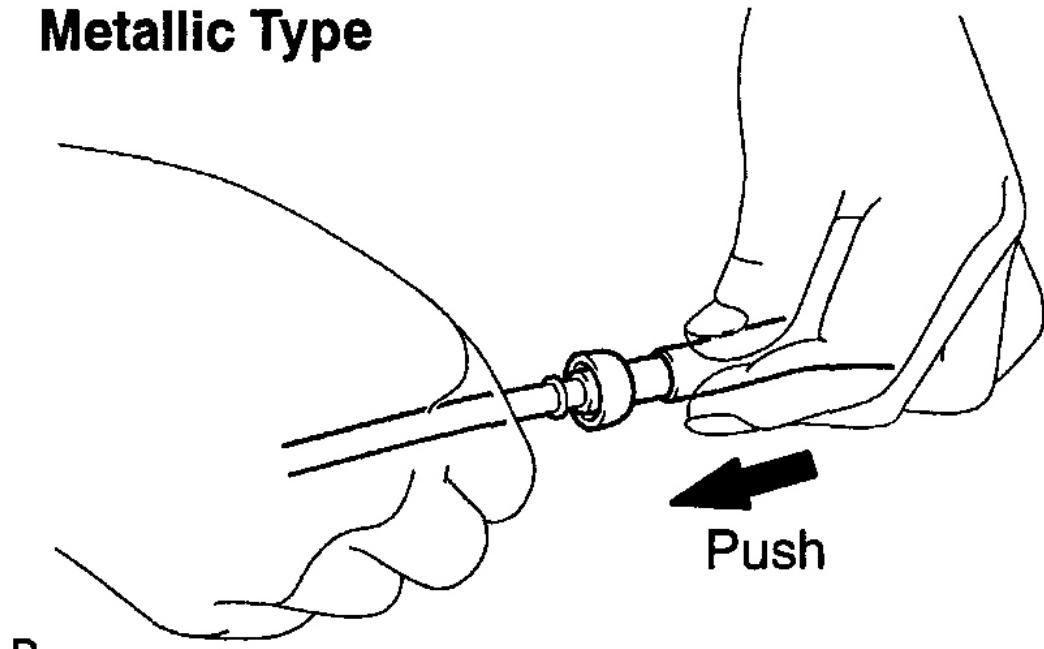
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Fig. 13: Pulling Connector Towards SST

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. Slide the SST and connector together towards the fuel tube assembly.
- g. Observe the following when connecting the fuel tube connector (metallic type):
 1. Check if there is any damage or foreign objects in the connected part of the pipe.
 2. Match the axis of the connector with the axis of the pipe, and push into the connector until a "click" sound is heard. If the connection is tight, apply little amount of fresh engine oil on the tip of the pipe.

Metallic Type



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Fig. 14: Matching Axis Of Connector With Axis Of Pipe & Pushing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. After having finished the connection, pull the pipe and the connector to ensure secure connection.

Metallic Type

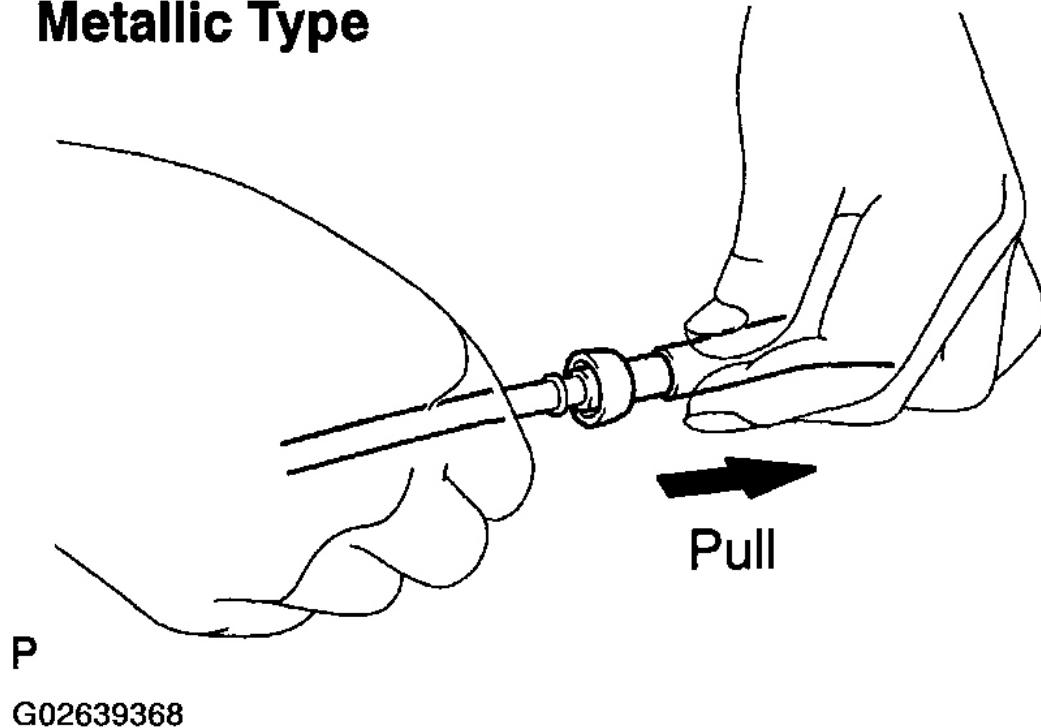
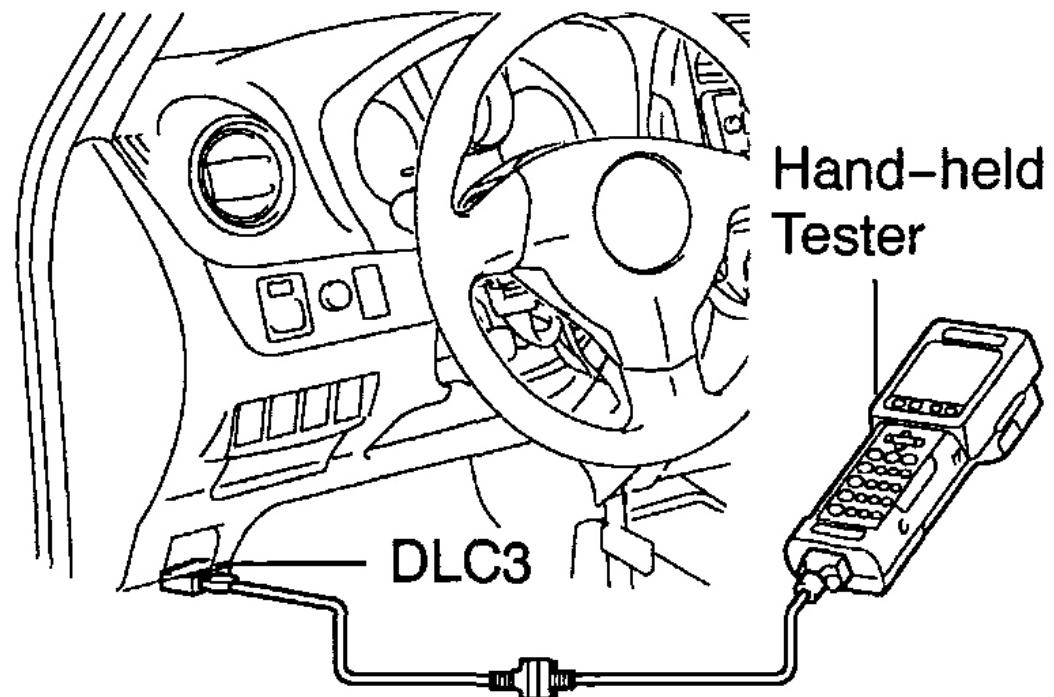


Fig. 15: Pulling Pipe And Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. Check to make sure no fuel leak is present.

If the result is not specified, repair or replace.

- h. Observer the following when handling the nylon tube:
 1. Pay attention not to turn the connected part of the nylon tube and the quick connector with tube when connecting them.
 2. Pay attention not to kink the nylon tube.
 3. Do not remove the nylon tube.
 4. Do not close the piping with the nylon tube by bending it.
- i. Check that there is no fuel leak after doing maintenance anywhere on the fuel system.
 1. Connect the hand-held tester to the DLC3.
 - Connect the hand-held tester to the DLC3.



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Fig. 16: Connecting Hand-Held Tester To DLC3

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- Turn the ignition switch ON and push the hand-held tester main switch ON.
- Select the ACTIVE TEST mode on the hand-held tester.

NOTE: **Do not start the engine.**

HINT:

Please refer to the hand-held tester operator's manual for further details.

If you have no hand-held tester, connect the battery's positive (+) and negative (-) leads to the fuel pump connector (see **FUEL PUMP**).

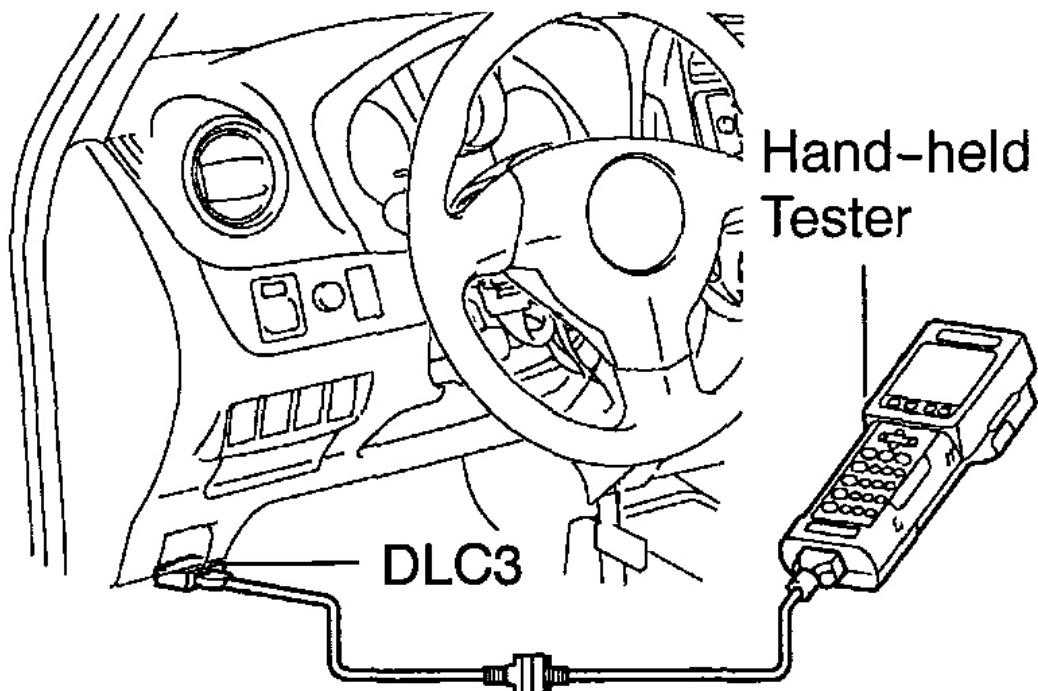
2. Check that there is no leak from any parts of the fuel system.
3. Turn the ignition switch OFF.
4. Disconnect the hand-held tester from the DLC3.

FUEL PUMP

ON-VEHICLE INSPECTION

1. CHECK FUEL PUMP OPERATION

- a. Connect the hand-held tester to the DLC3.



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Fig. 17: Connecting Hand-Held Tester To DLC3

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. Connect the hand-held tester to the DLC3.
2. Turn the ignition switch ON and push the hand-held tester main switch ON.

NOTE: **Do not start the engine.**

3. Select the ACTIVE TEST mode on the hand-held tester.

HINT:

Please refer to the hand-held tester operator's manual for further details.

If you have no hand-held tester, connect the battery's positive (+) negative (-) leads the fuel pump connector (see step 3).

- b. Check that there is pressure in the fuel inlet tube from the fuel line.

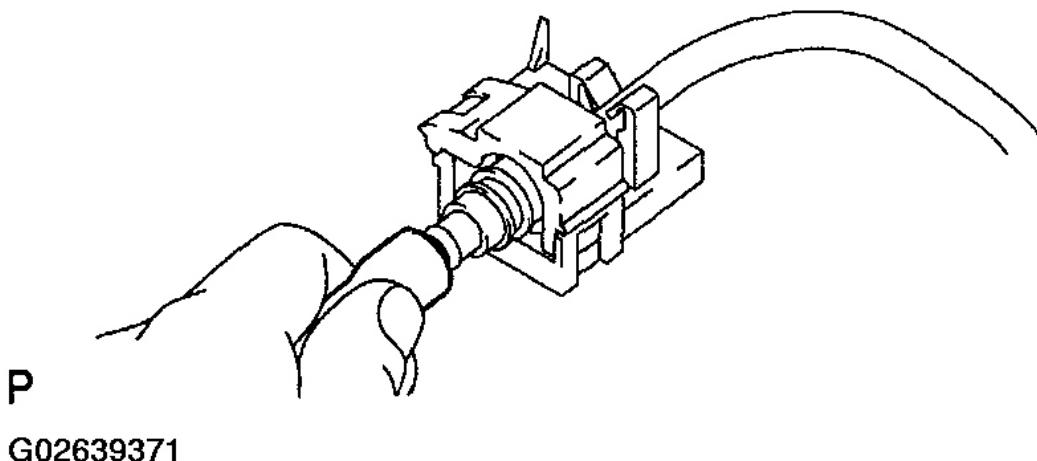


Fig. 18: Checking Pressure In Fuel Inlet Tube

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

If there is fuel pressure, you will hear the sound of the fuel flowing.

If there is no pressure, check the fusible link, fuses, EFI Main relay, fuel pump, ECM and wiring connector.

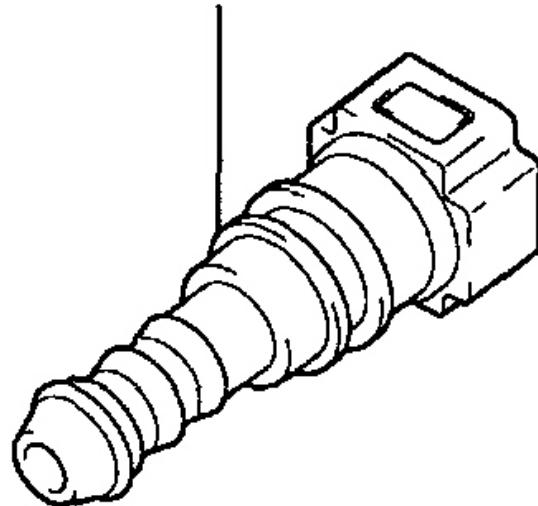
- c. Turn the ignition switch OFF.
- d. Disconnect the hand-held tester from the DLC3.

2. CHECK FUEL PRESSURE

- a. Check the battery positive voltage is above 12 V.
- b. Disconnect the negative (-) terminal cable from the battery.
- c. Purchase a new fuel tube and remove the fuel tube connector from its pipe.

Fuel tube: Part No. 23901-22110

Fuel Tube Connector



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Fig. 19: Identifying Fuel Tube Connector

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Disconnect the fuel tube clamp from the fuel tube connector.

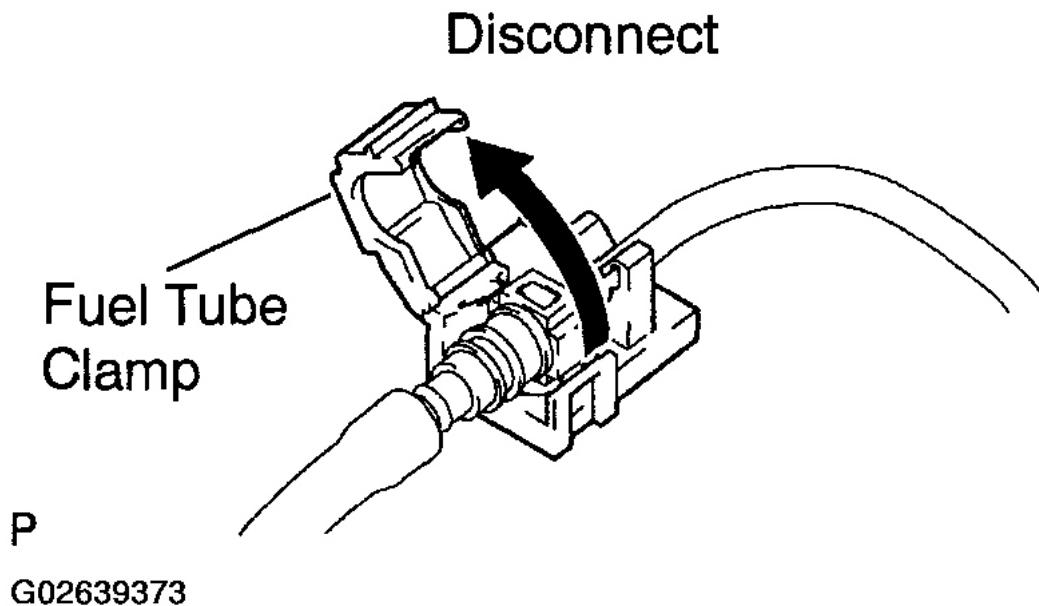
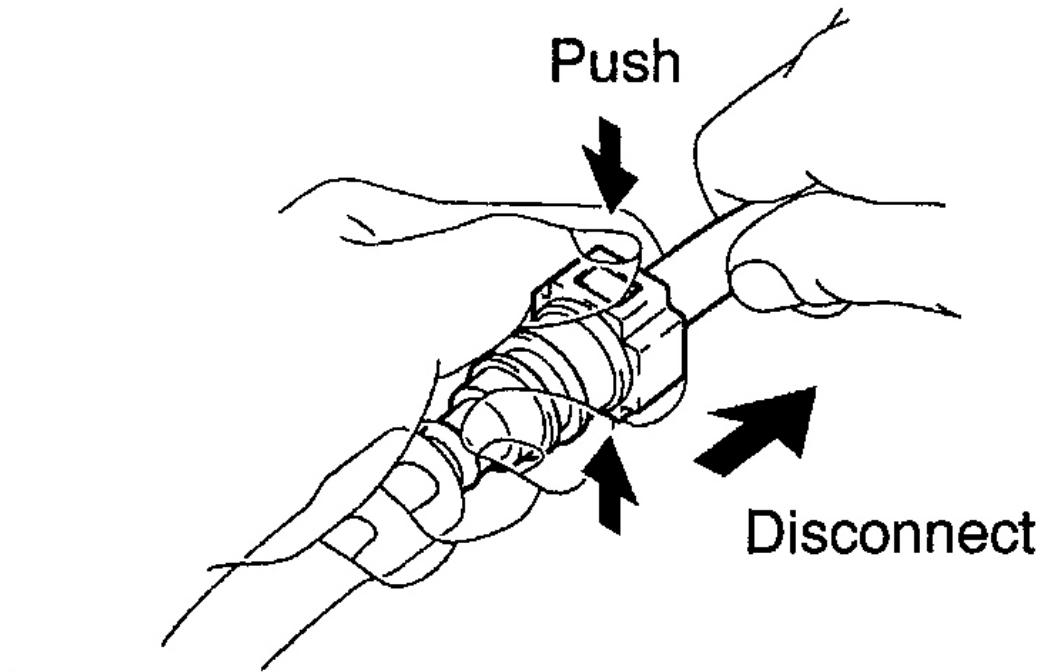


Fig. 20: Disconnecting Fuel Tube Clamp From Fuel Tube Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Disconnect the fuel inlet tube (fuel tube connector) from the fuel pipe.



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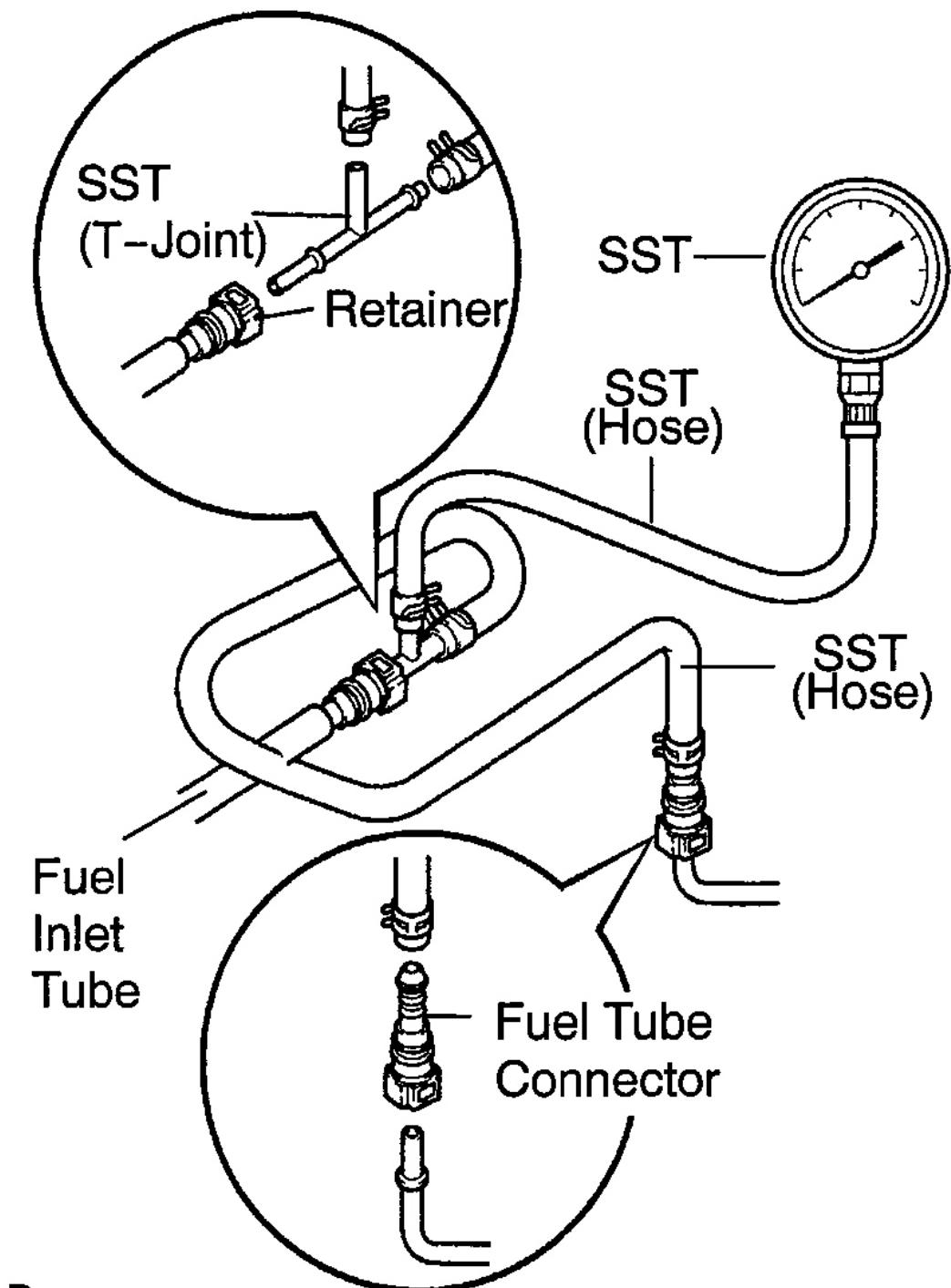
Fig. 21: Disconnecting Fuel Inlet Tube From Fuel Pipe
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- Disconnect the fuel tube connector (quick type) after observing the precaution (see SFI SYSTEM).
- If there is retained pressure in the fuel line, prevent it from splashing inside the engine compartment.

f. Install SST (pressure gauge) as shown in **Fig. 22** using SST and fuel tube connector.

SST 09268-41047, 09268-45014 (09268-41250)



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Fig. 22: Installing SST (Pressure Gauge) Using SST & Fuel Tube Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- g. Wipe off any splattered gasoline.
- h. Reconnect the negative (-) terminal cable to the battery.
- i. Connect the hand-held tester to the DLC3 (see step 1).
- j. Measure the fuel pressure.

Fuel pressure:

304 to 343 kPa (3.1 to 3.5 kgf/cm² ,44 to 50 psi)

If the pressure is high, replace the fuel pressure regulator.

If the pressure is low, check the fuel hoses and connections, fuel pump, fuel filter and fuel pressure regulator.

- k. Disconnect the hand-held tester from the DLC3.
- l. Start the engine.
- m. Measure the fuel pressure at idle.

Fuel pressure:

304 to 343 kPa (3.1 to 3.5 kgf/cm² ,44 to 50 psi)

- n. Stop the engine.
- o. Check that the fuel pressure remains as specified for 5 minutes after the engine has stopped.

Fuel pressure: 147 kPa (1.5 kgf/cm² ,21 psi) or more

If the pressure is not as specified, check the fuel pump, pressure regulator and/or injectors.

- p. After checking the fuel pressure, disconnect the negative (-) terminal cable from the battery and carefully remove the SST and fuel tube connector to prevent gasoline from splashing.

SST 09268-41047, 09268-45014

- q. Reconnect the fuel inlet tube (fuel tube connector).

CAUTION: Connect the fuel tube connector (quick type) observing the precaution (See SFI SYSTEM).

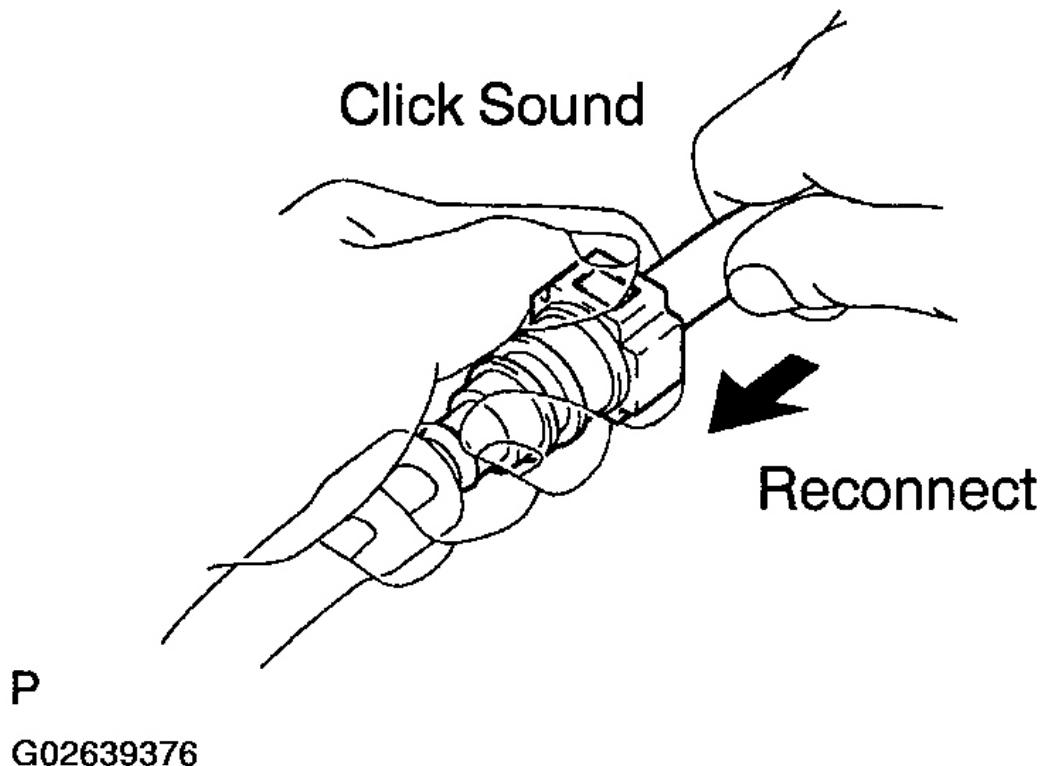


Fig. 23: Reconnecting Fuel Inlet Tube
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- r. Reconnect the fuel tube clamp to the fuel tube connector.

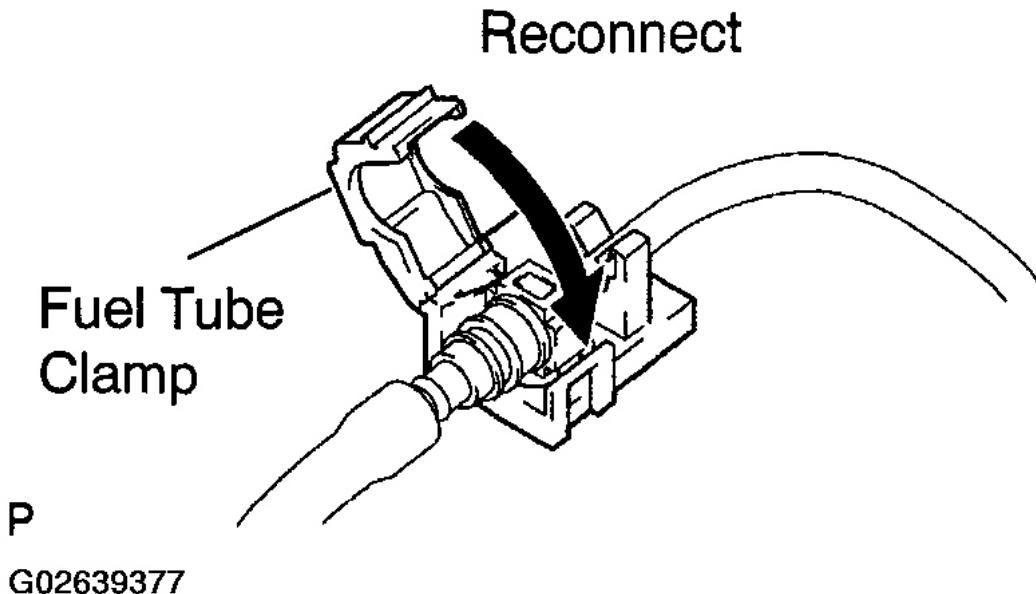


Fig. 24: Reconnecting Fuel Tube Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- s. Reconnect the negative (-) terminal cable to the battery.
- t. Check for fuel leak (see SFI SYSTEM).

3. INSPECT FUEL PUMP

- a. Remove the LH rear seat.
- b. Remove the floor service hole cover.
- c. Disconnect the fuel pump & sender gauge connector.
- d. Using an ohmmeter, measure the resistance between terminals 4 and 5.

Resistance: 0.2 to 3.0 ohm at 20°C (68°F)

If the resistance is not as specified, replace the fuel pump.

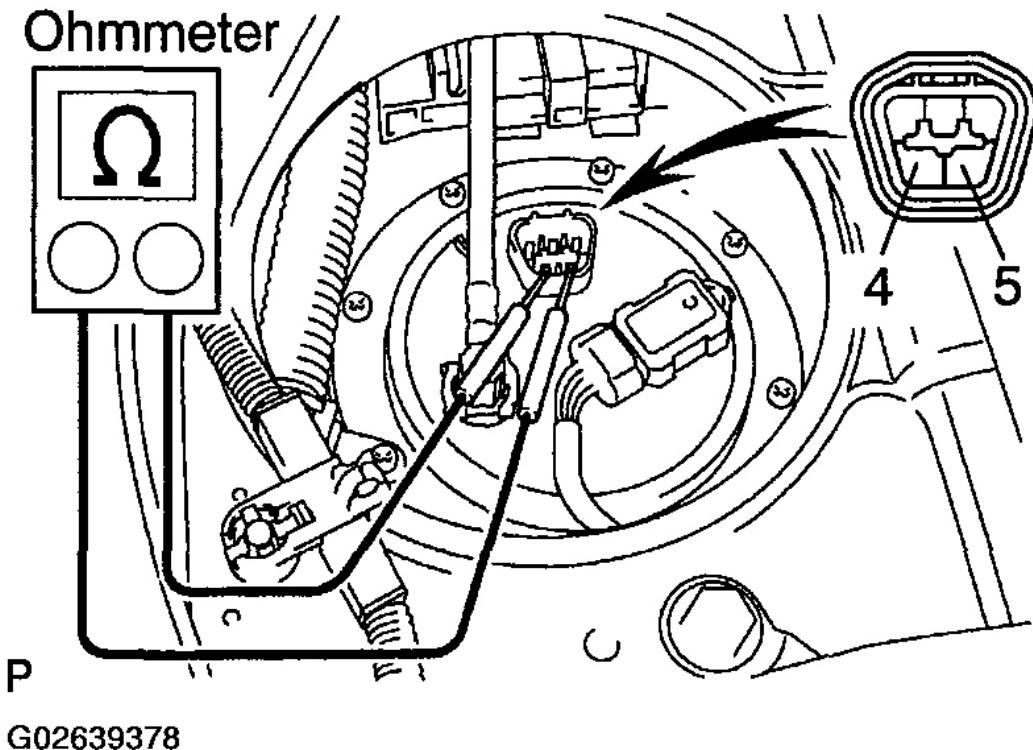
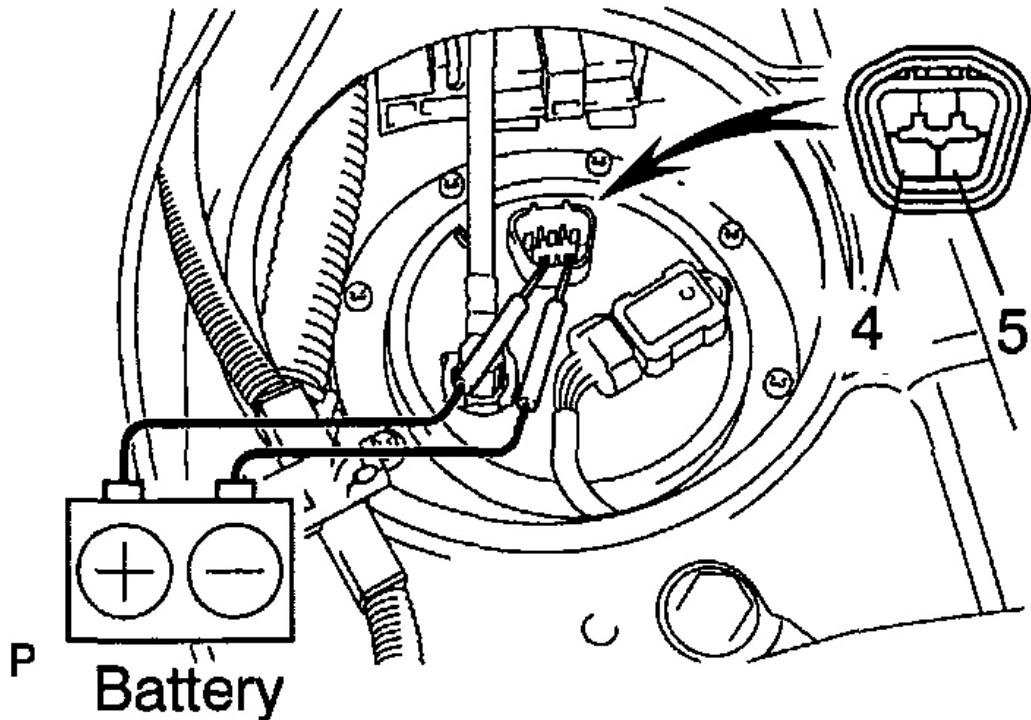


Fig. 25: Measuring Resistance Between Terminals 4 And 5 Using Ohmmeter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Inspect the fuel pump operation.

Connect the battery's positive (+) lead to terminal 4 of the connector and the negative (-) lead to terminal 5. Check that the pump operates.



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Fig. 26: Connecting Battery Leads To Terminal 4 & 5
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- These tests must be performed within 10 seconds to prevent the coil from burning out.
- Keep the fuel pump as far away from the battery as possible.

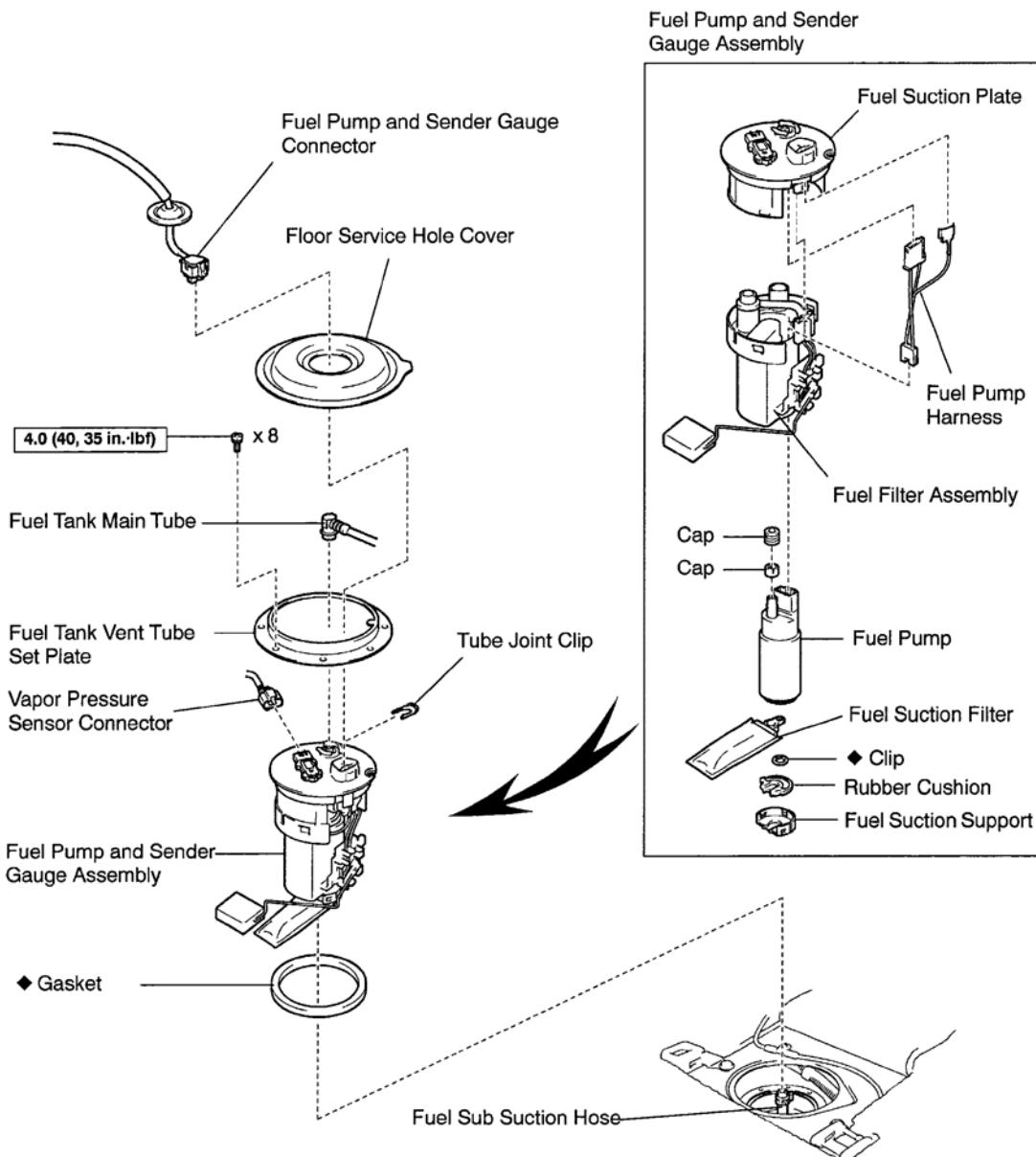
If operation is not as specified, replace the fuel pump.

- f. Reconnect the fuel pump & sender gauge connector.
- g. Reinstall the floor service hole cover.
- h. Reinstall the LH rear seat.

COMPONENTS

2004 Toyota RAV4

2004 ENGINE PERFORMANCE SFI - RAV4



[N·m (kgf·cm, ft-lbf)] : Specified torque

◆ Non-reusable part

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Fig. 27: Identifying Fuel Pump Components

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REPLACEMENT

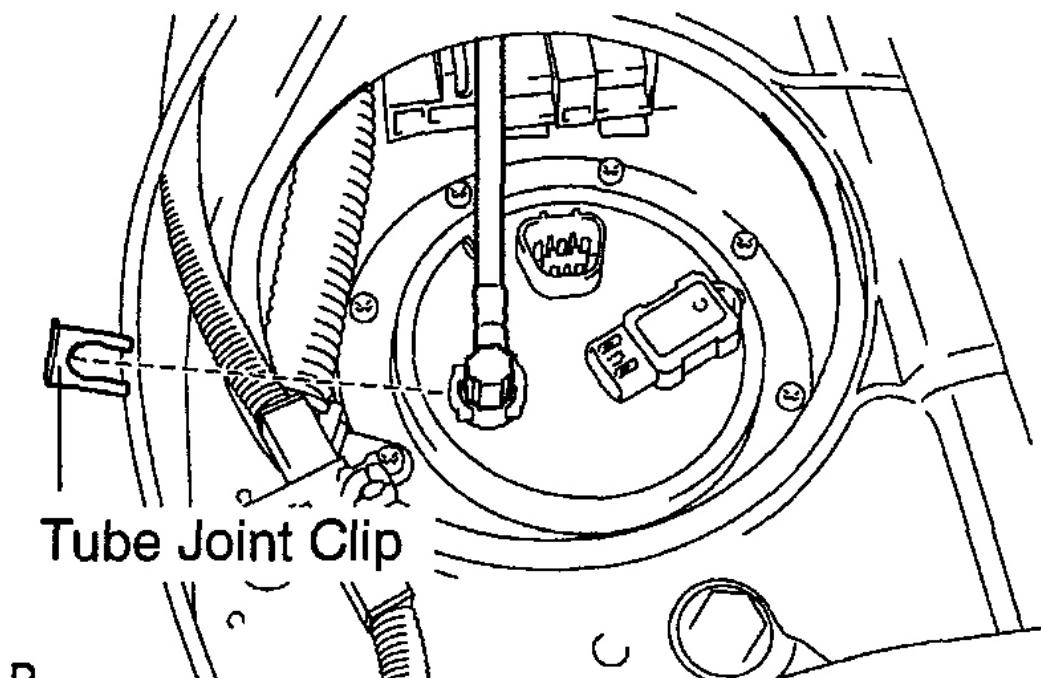
CAUTION: Do not smoke or work near an open flame when working on the fuel pump.

1. REMOVE LH REAR SEAT
2. REMOVE FLOOR SERVICE HOLE COVER
3. DISCONNECT FUEL PUMP & SENDER GAUGE CONNECTOR
4. DISCONNECT VAPOR PRESSURE SENSOR CONNECTOR
5. DISCONNECT FUEL TANK MAIN TUBE

CAUTION:

- Disconnect the fuel tube connector (quick type) observing the precaution (see SFI SYSTEM).
- As there is retained pressure in the fuel line, prevent it from splashing inside the luggage compartment.

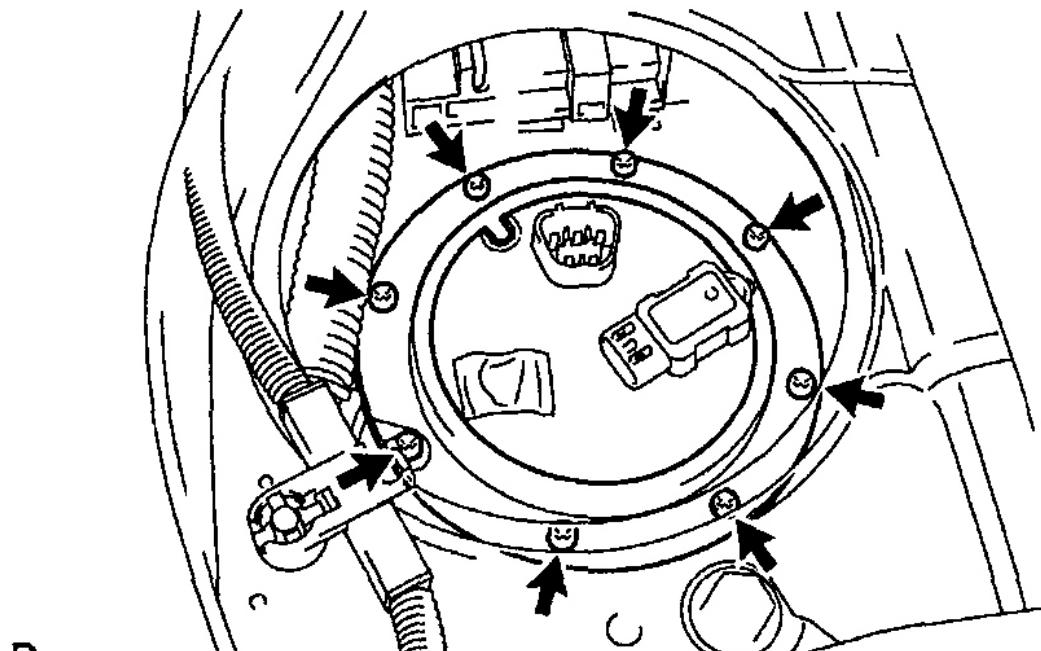
Remove the tube joint clip and disconnect the main tube.



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Fig. 28: Removing Tube Joint Clip & Disconnecting Main Tube
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. REMOVE FUEL PUMP AND SENDER GAUGE ASSEMBLY FROM FUEL TANK
 - a. Remove the 8 bolts and fuel tank vent tube set plate.



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Fig. 29: Removing Bolts & Fuel Tank Vent Tube Set Plate
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Lift up the fuel pump and sender gauge assembly, and disconnect the fuel sub suction hose from the fuel return jet tube. Remove the fuel pump, sender gauge assembly and gasket.

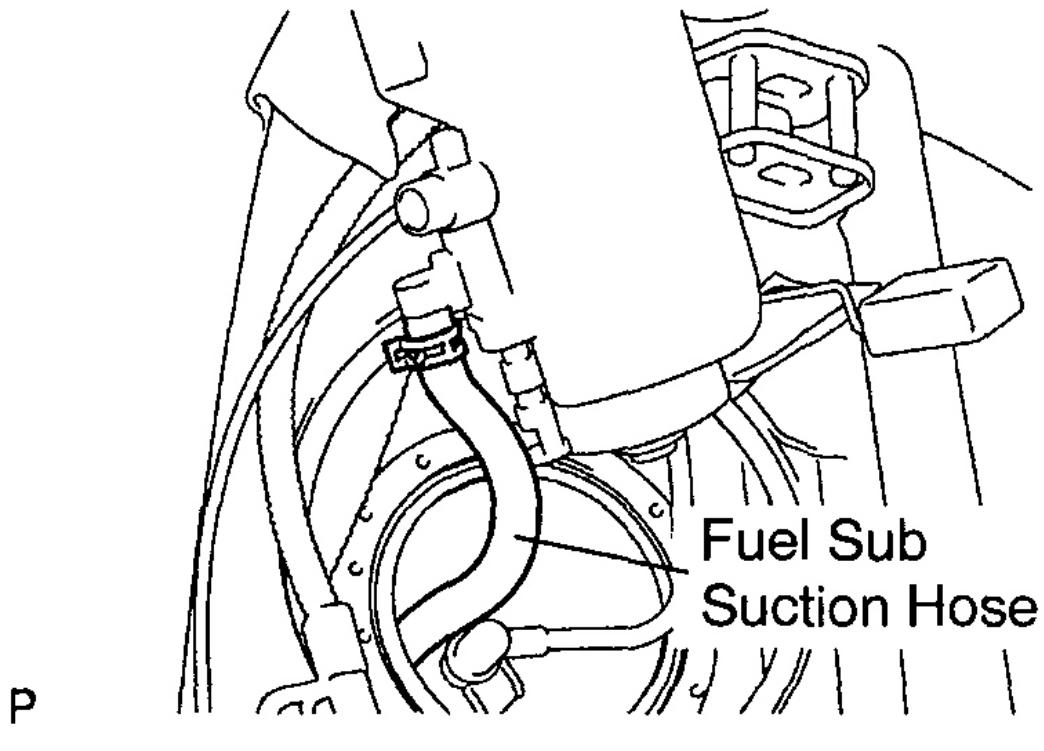


Fig. 30: Disconnecting Fuel Sub Suction Hose From Fuel Return Jet Tube
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- Do not damage the fuel suction filter.
- Be careful not to bend the arm of the sender gauge.

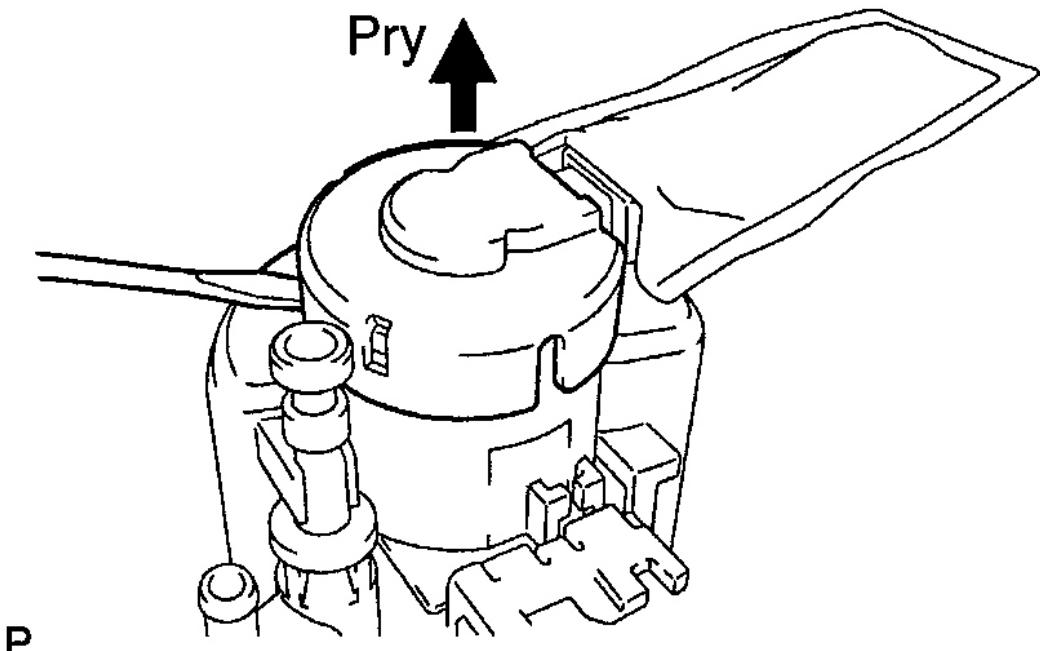
c. Remove the gasket from the suction plate.

7. REMOVE FUEL SUCTION SUPPORT

a. Using a screwdriver, pry out the fuel suction support.

NOTE: Be careful not to damage the suction support.

b. Remove the rubber cushion.



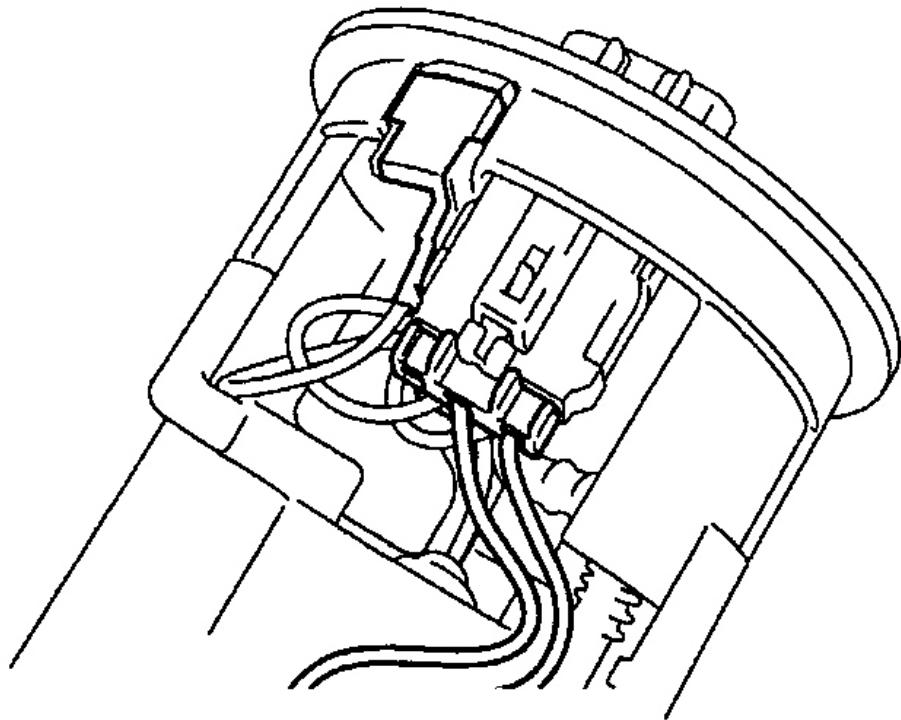
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Fig. 31: Prying Out Fuel Suction Support Using Screwdriver
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. REMOVE FUEL SUCTION PLATE

- a. Disconnect the fuel sender gauge connector and ground plate.

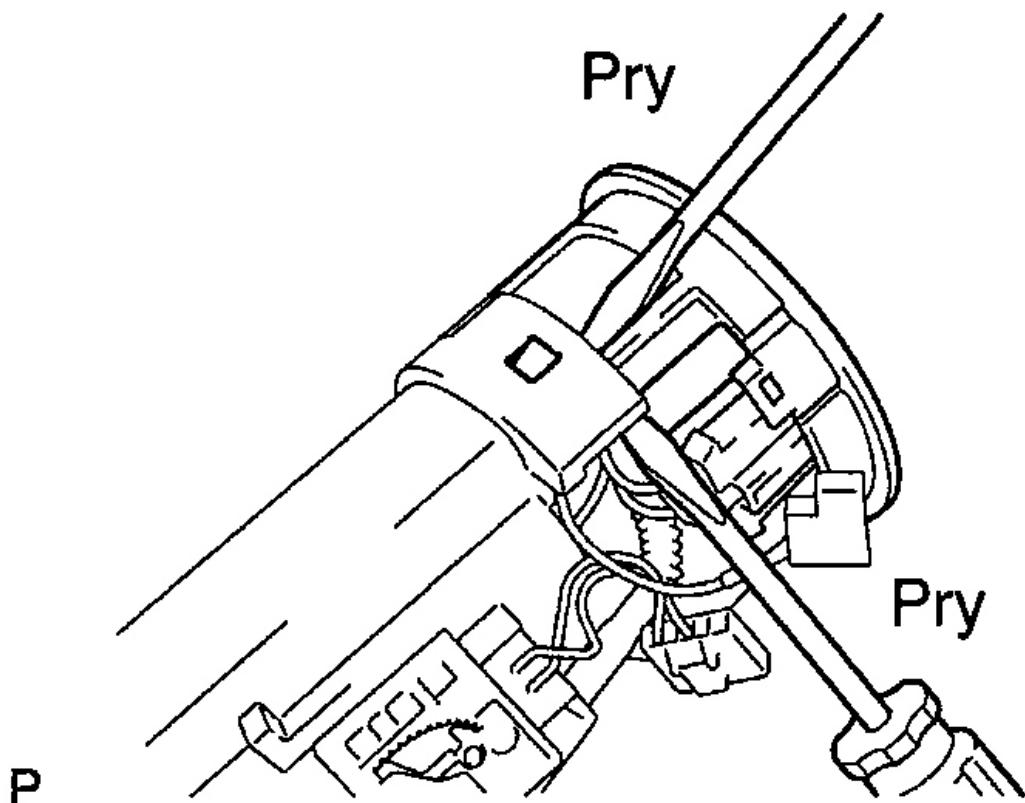


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Fig. 32: Disconnecting Fuel Sender Gauge Connector And Ground Plate
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using 2 screwdrivers, pry out the fuel suction plate.

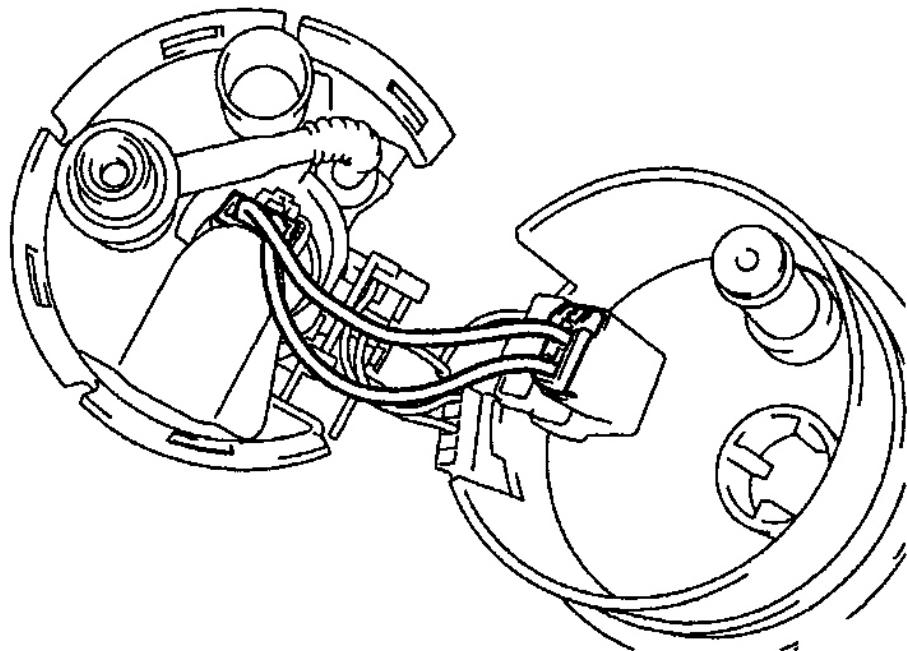


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Fig. 33: Prying Out Fuel Suction Plate Using Screwdrivers
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Be careful not to damage the suction support and suction plate.

- c. Remove the fuel pump harness.



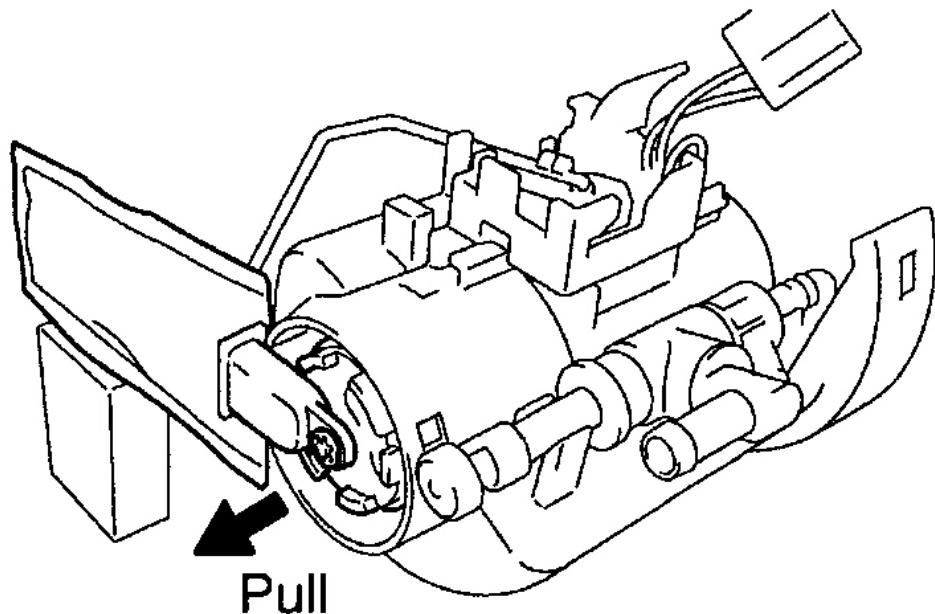
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Fig. 34: Removing Fuel Pump Harness
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. REMOVE FUEL PUMP

Pull out the fuel pump.



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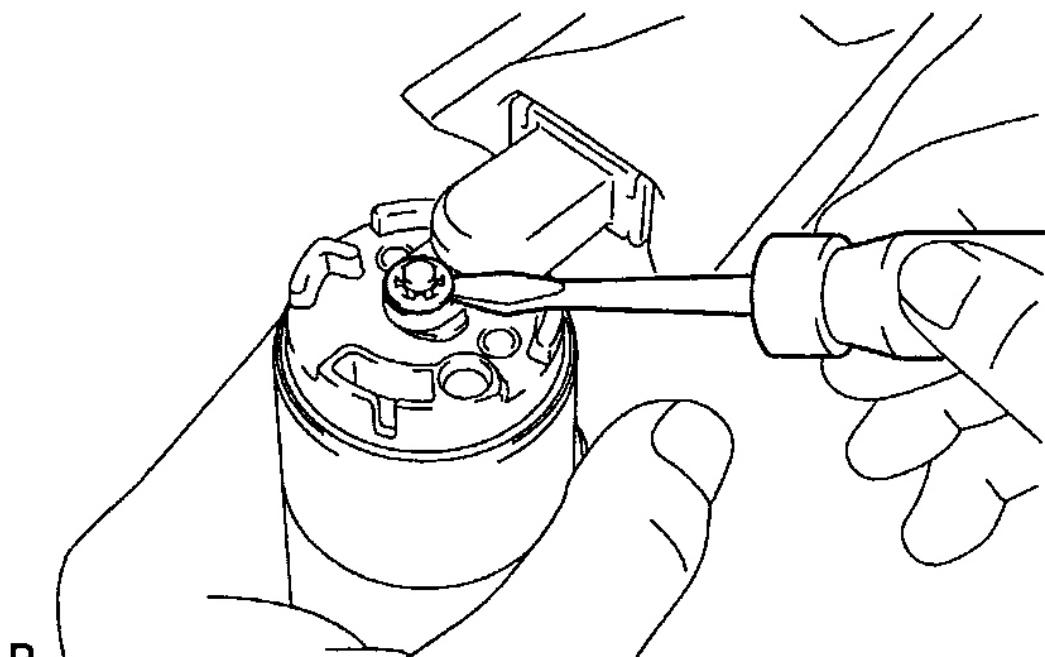
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Fig. 35: Pulling Out Fuel Pump

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. REMOVE FUEL SUCTION FILTER FROM FUEL PUMP

- a. Using a small screwdriver, pry out the clip.



G02639389

Fig. 36: Prying Out Clip Using Screwdriver

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Pull out the suction filter.

11. REINSTALL FUEL SUCTION FILTER

Install the suction filter with a new clip.

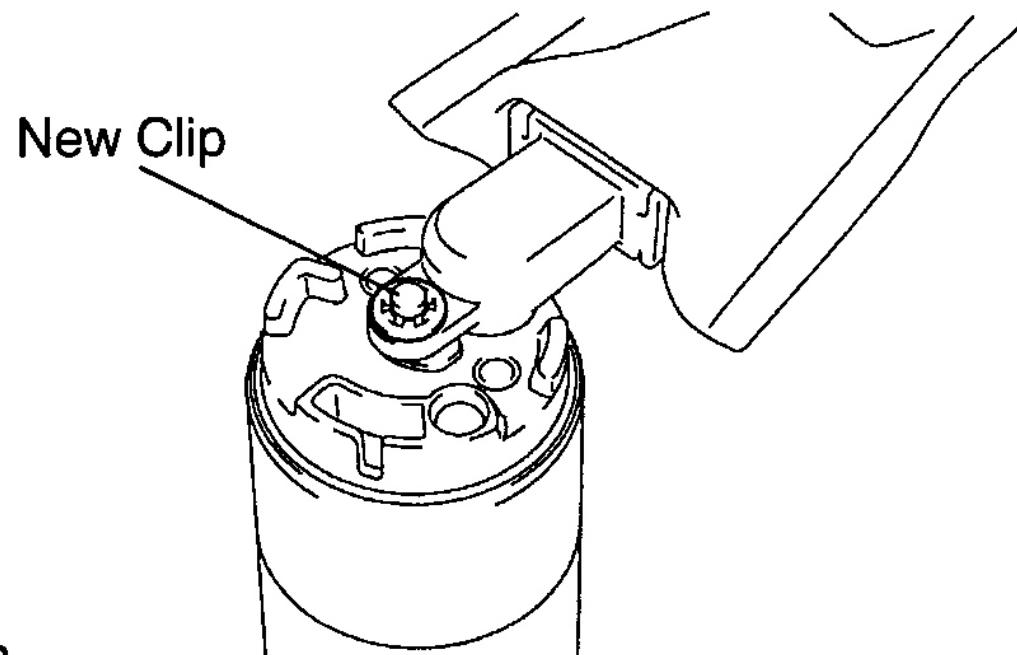
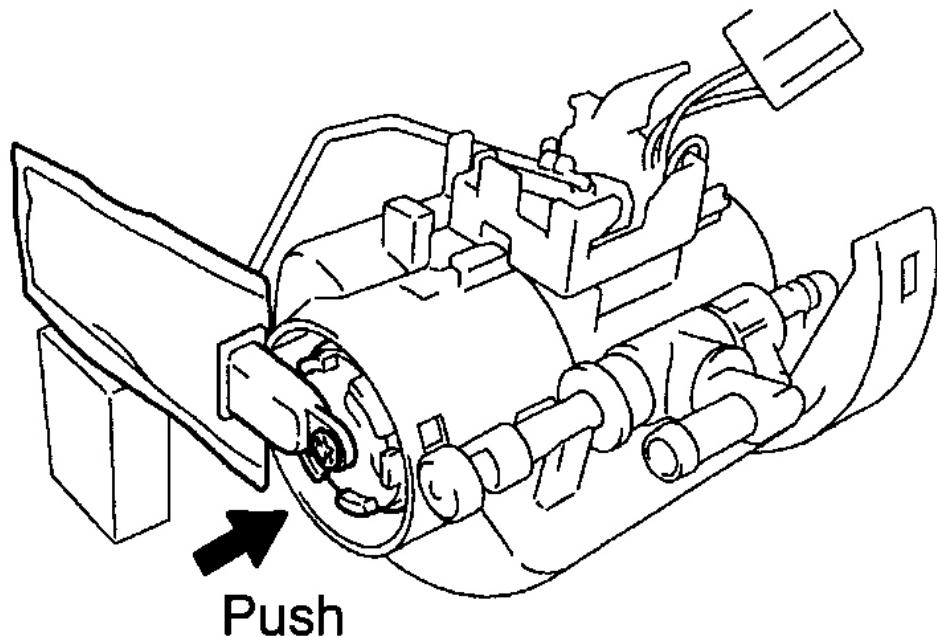


Fig. 37: Installing Suction Filter With Clip
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. REINSTALL FUEL PUMP

Push into the fuel pump.



P

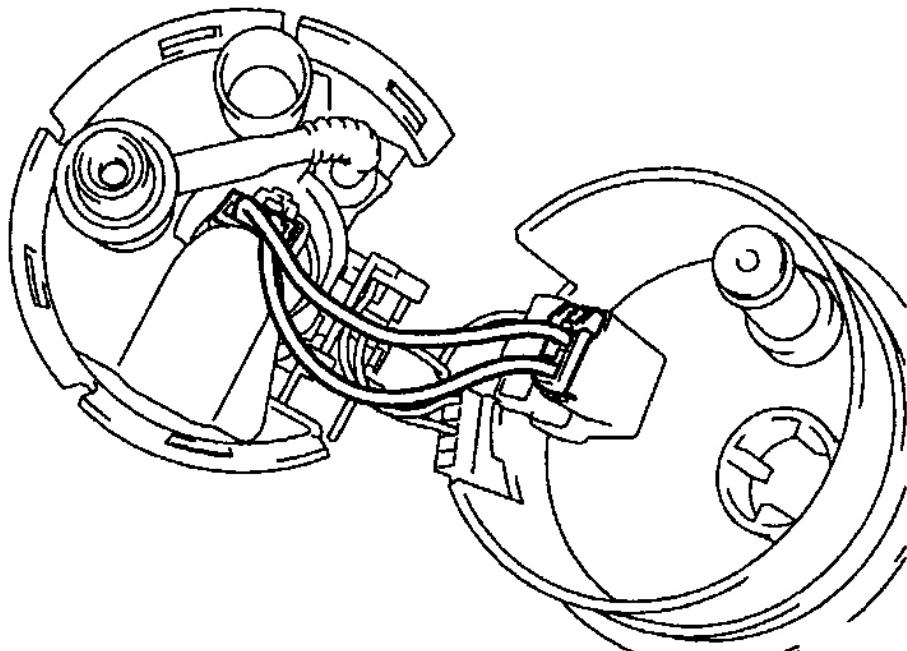
G02639391

Fig. 38: Pushing In Fuel Pump

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. REINSTALL FUEL SUCTION PLATE

- a. Connect the fuel pump harness.

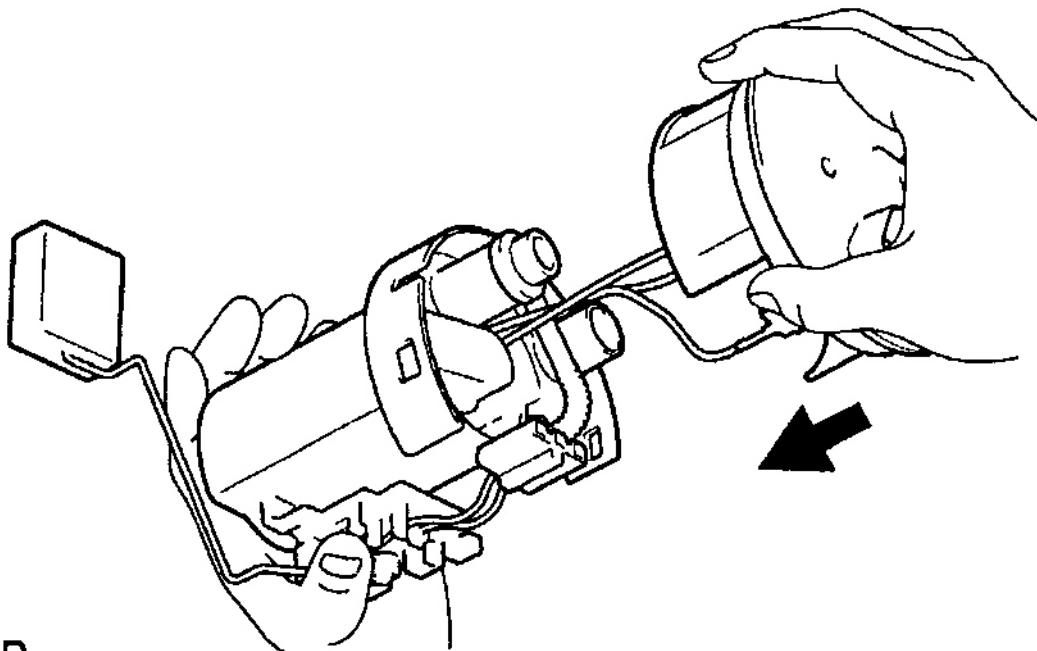


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Fig. 39: Connecting Fuel Pump Harness
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

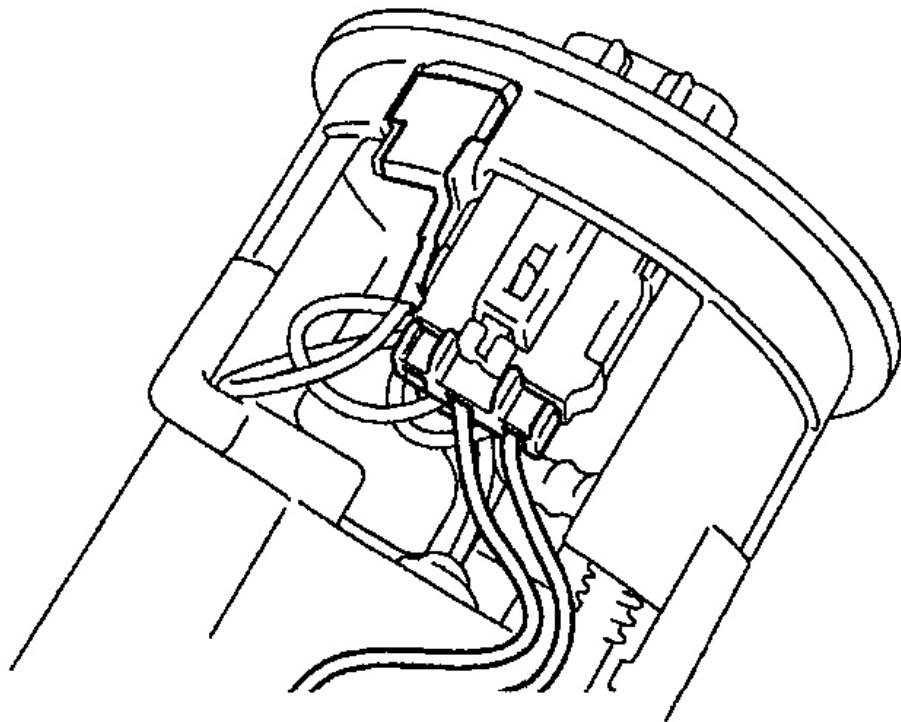
- b. Install the fuel suction plate and fuel filter assembly.



G02639393

Fig. 40: Installing Fuel Suction Plate And Fuel Filter Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Connect the fuel sender gauge connector and ground plate.



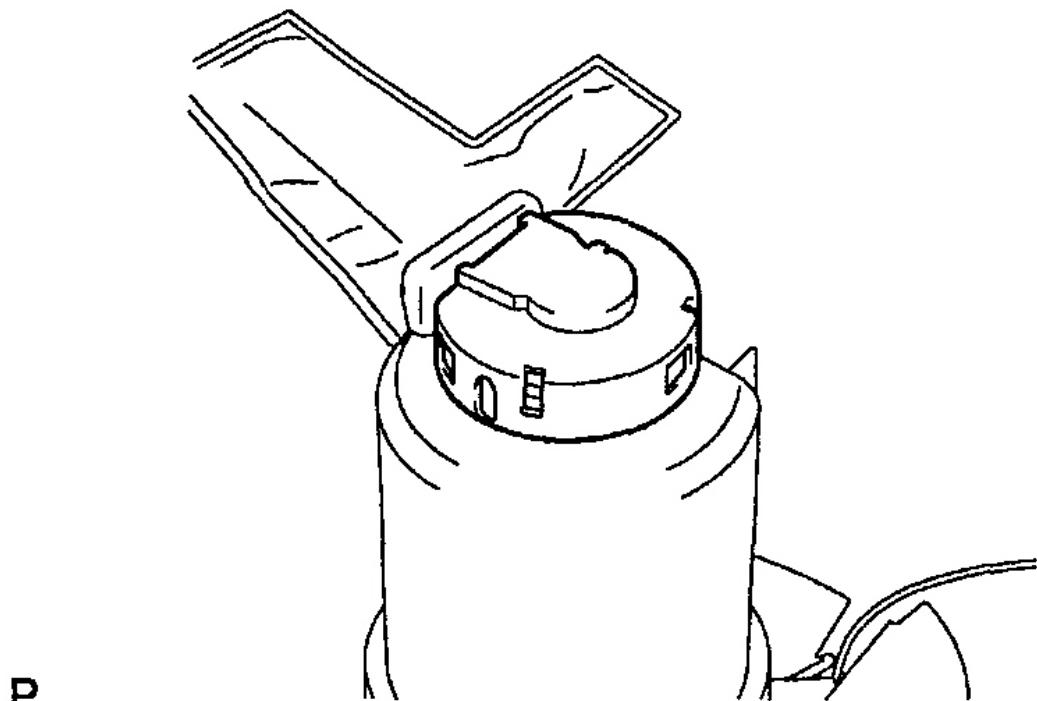
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G02639394

Fig. 41: Connecting Fuel Sender Gauge Connector And Ground Plate
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. INSTALL FUEL SUCTION SUPPORT

- a. Install the rubber cushion.
- b. Install the fuel suction support to the fuel filter assembly.



G02639395

Fig. 42: Installing Fuel Suction Support To Fuel Filter Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

15. REINSTALL FUEL PUMP AND SENDER GAUGE ASSEMBLY TO FUEL TANK

- a. Install a new gasket to the suction plate.
- b. Connect the sub suction hose to the fuel return jet tube.

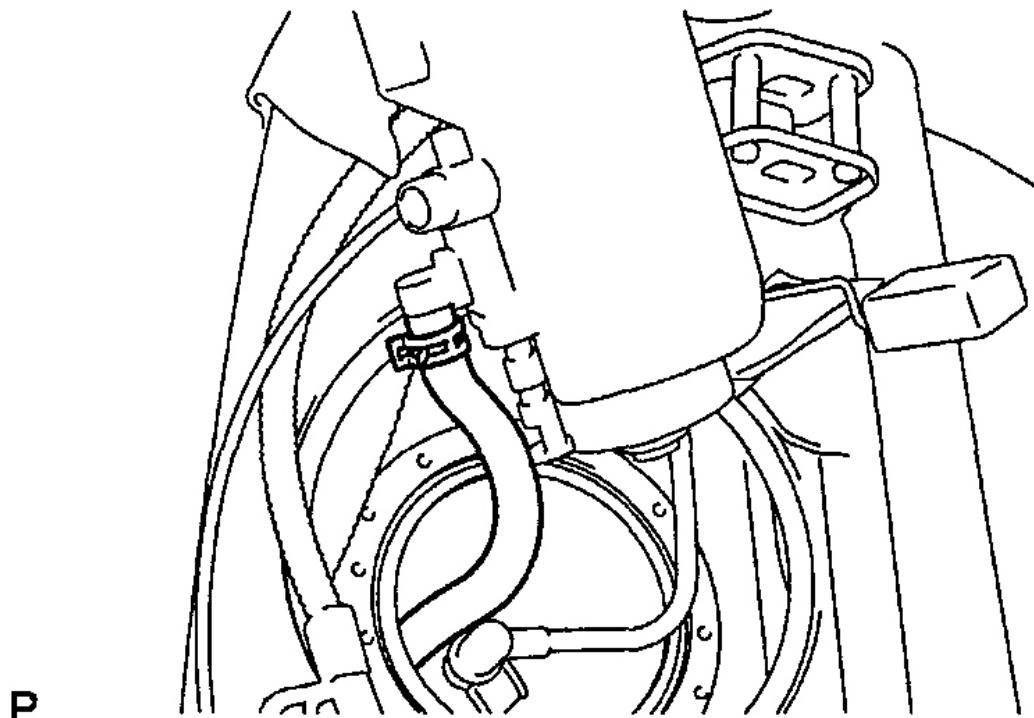


Fig. 43: Connecting Sub Suction Hose To Fuel Return Jet Tube
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Insert the fuel pump assembly into the fuel tank.

NOTE:

- Do not damage the fuel suction filter.
- Be careful not to bend the arm of the sender gauge.

- d. Align the positioning mark of the set plate with bolt hole position A.
- e. Install the fuel tank vent tube set plate with the 8 bolts.

Torque: 4.0 N.m (40 kgf.cm, 35 in.lbf)

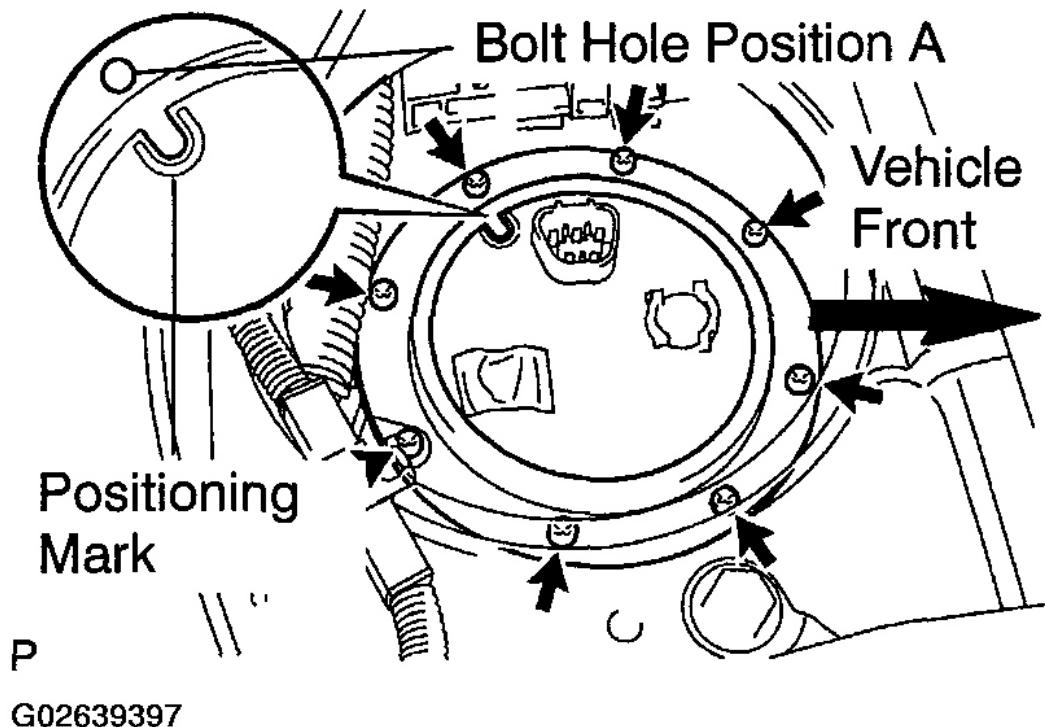
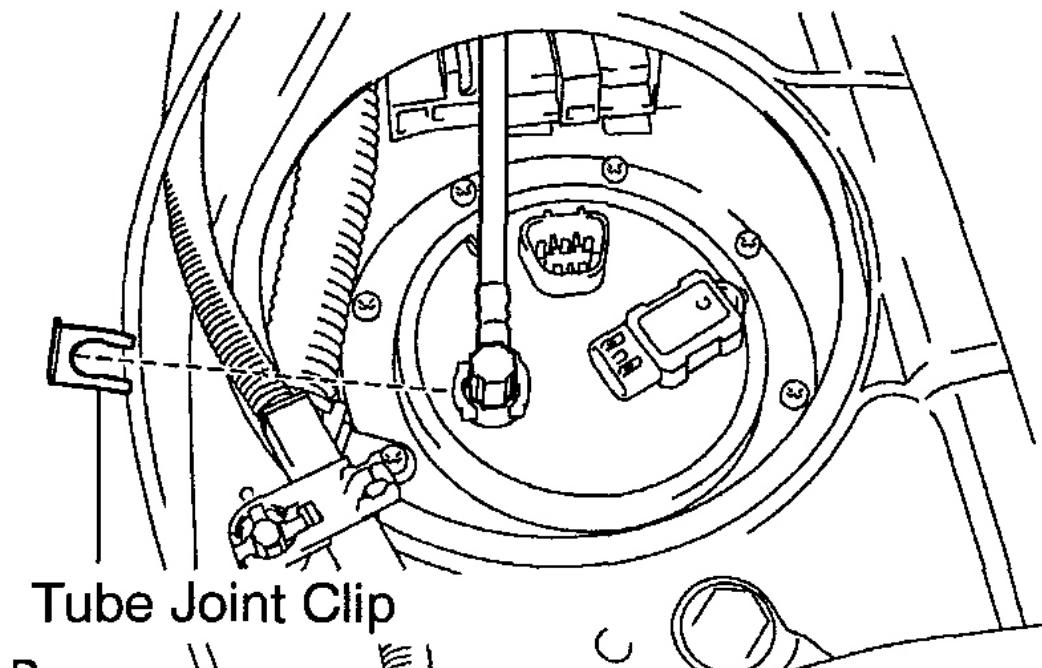


Fig. 44: Installing Fuel Tank Vent Tube With Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

16. RECONNECT FUEL TANK MAIN TUBE

Connect the main tube with the tube joint clip.



G02639398

Fig. 45: Connecting Main Tube With Tube Joint Clip

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- Check that the connector is inserted fully and securely.
- Check that the clip of the tube joint is on the collar of the connector.
- After installing the clip of the tube joint, check that the connector is not pulled off.

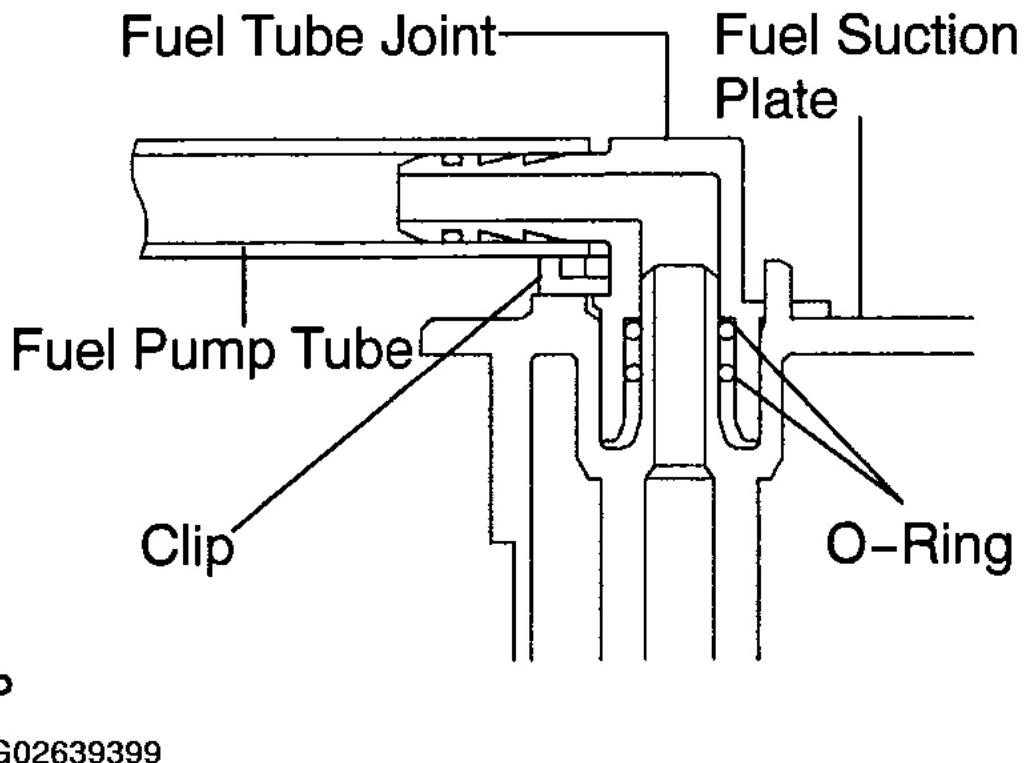
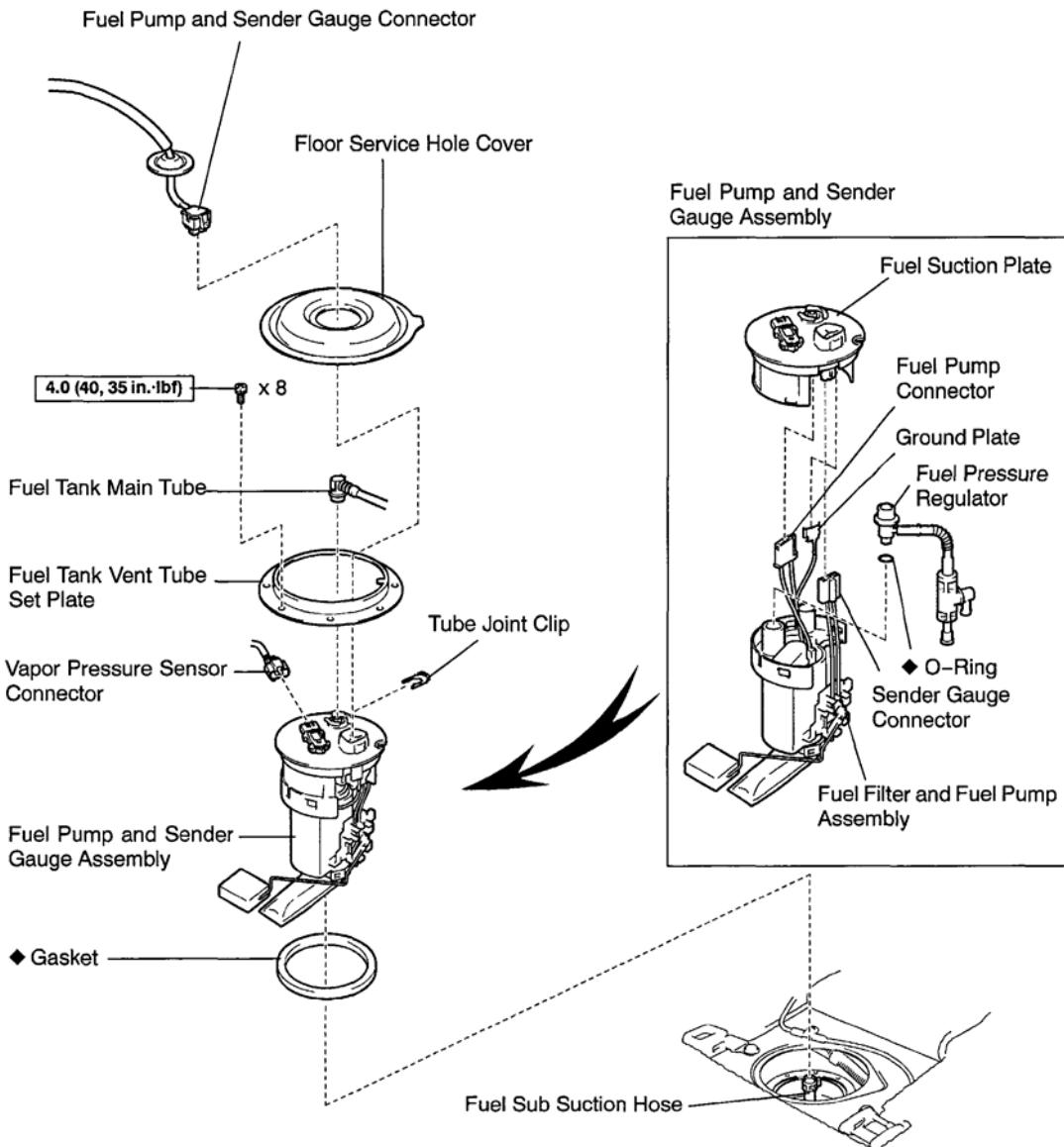


Fig. 46: Identifying Fuel Tube Joint, Fuel Suction Plate, Fuel Pump Tube, Clip & O-Ring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

17. RECONNECT VAPOR PRESSURE SENSOR CONNECTOR
18. RECONNECT FUEL PUMP and SENDER GAUGE CONNECTOR
19. CHECK FOR FUEL LEAK (See SFI SYSTEM)
20. REINSTALL FLOOR SERVICE HOLE COVER
21. REINSTALL LH REAR SEAT

FUEL PRESSURE REGULATOR

COMPONENTS



[N·m (kgf·cm, ft·lbf)] : Specified torque

p ◆ Non-reusable part

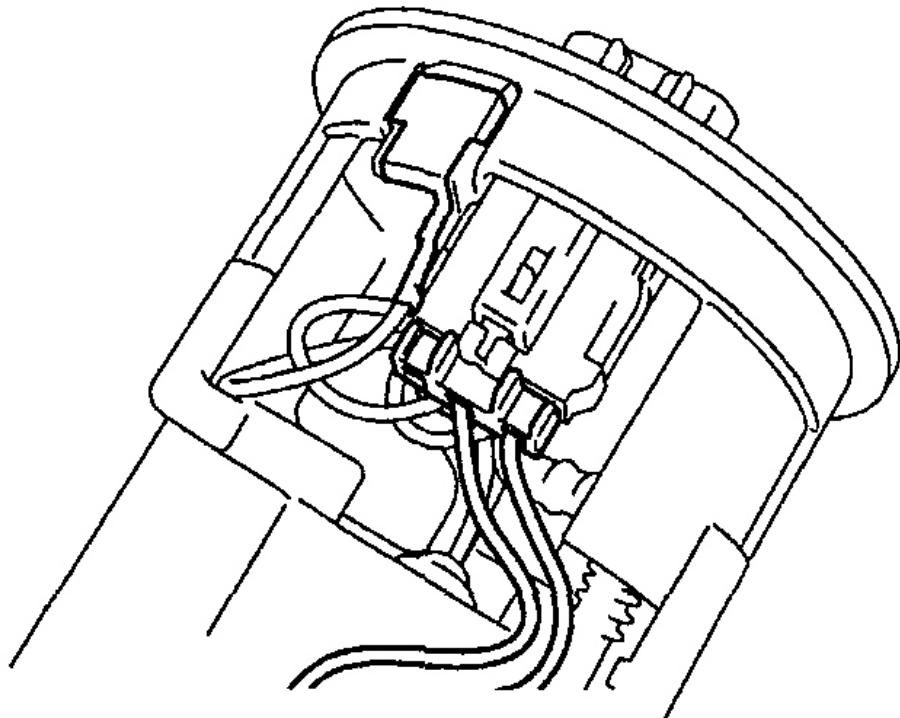
G02639400

Fig. 47: Identifying Fuel Pressure Regulator Components
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REPLACEMENT

1. REMOVE FUEL PUMP AND SENDER GAUGE ASSEMBLY FROM FUEL TANK (See REPLACEMENT)
2. REMOVE FUEL SUCTION PLATE

- a. Disconnect the fuel sender gauge connector and ground plate.



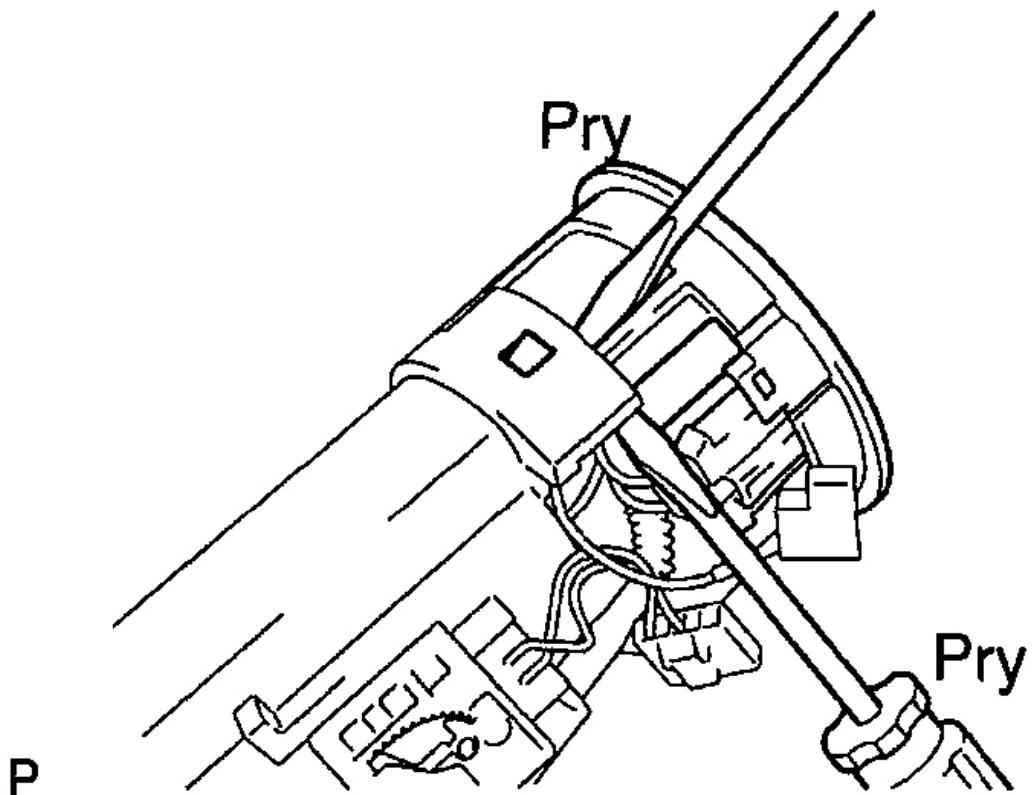
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G02639401

Fig. 48: Disconnecting Fuel Sender Gauge Connector & Ground Plate
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using 2 screwdrivers, pry out the fuel suction plate.

NOTE: Be careful not to damage the suction support and fuel suction plate.

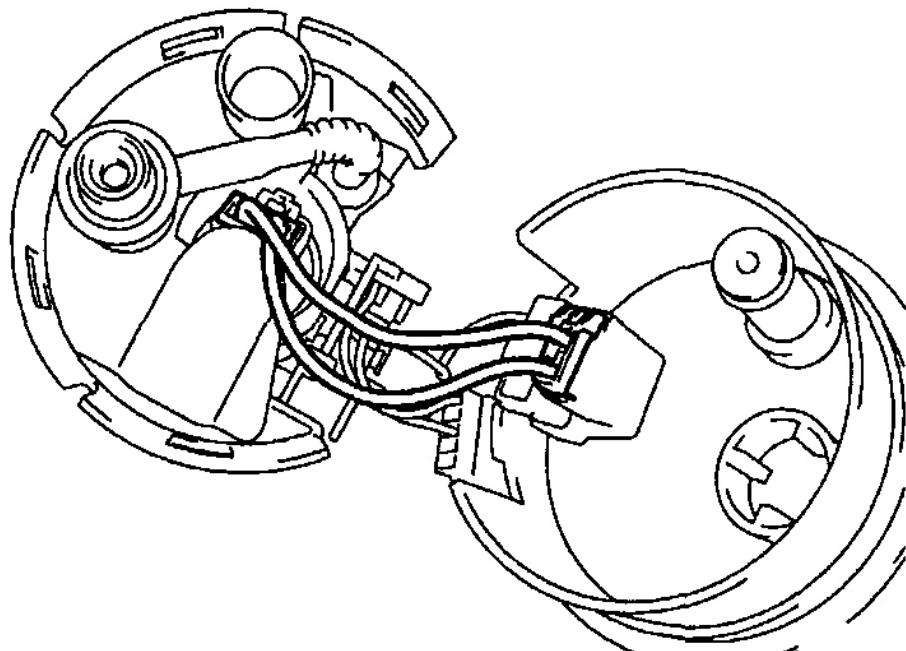


G02639402

Fig. 49: Prying Out Fuel Suction Plate Using Screwdrivers

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Disconnect the fuel pump connector.



P

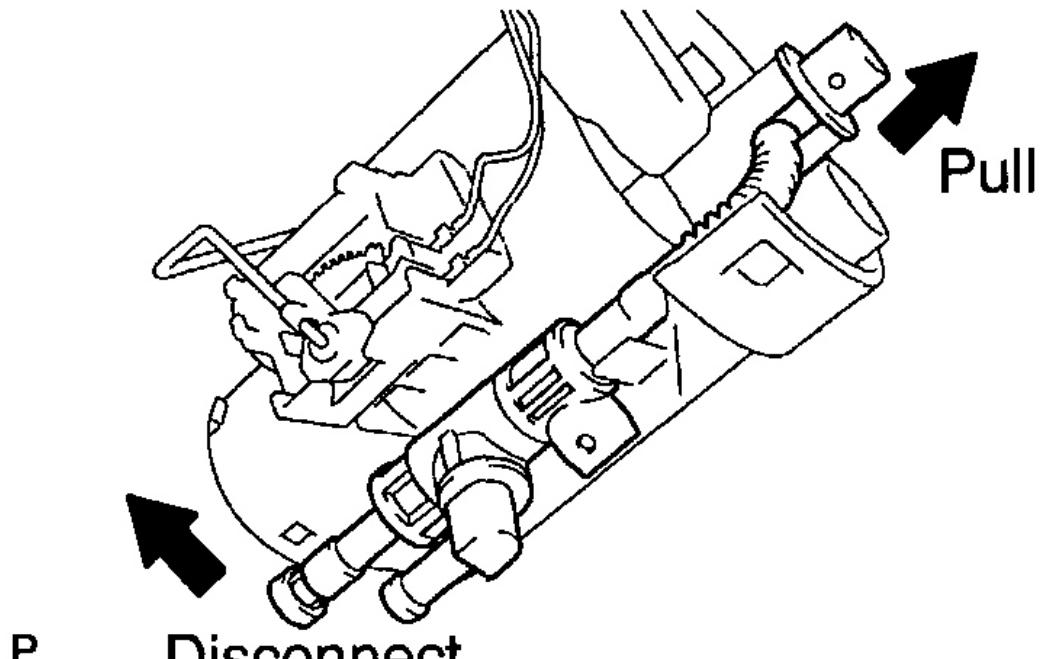
G02639403

Fig. 50: Disconnecting Fuel Pump Connector

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. REMOVE FUEL PRESSURE REGULATOR

- a. Disconnect the fuel return jet tube from the clamp.
- b. Pull out the pressure regulator.
- c. Remove the O-ring from the pressure regulator.

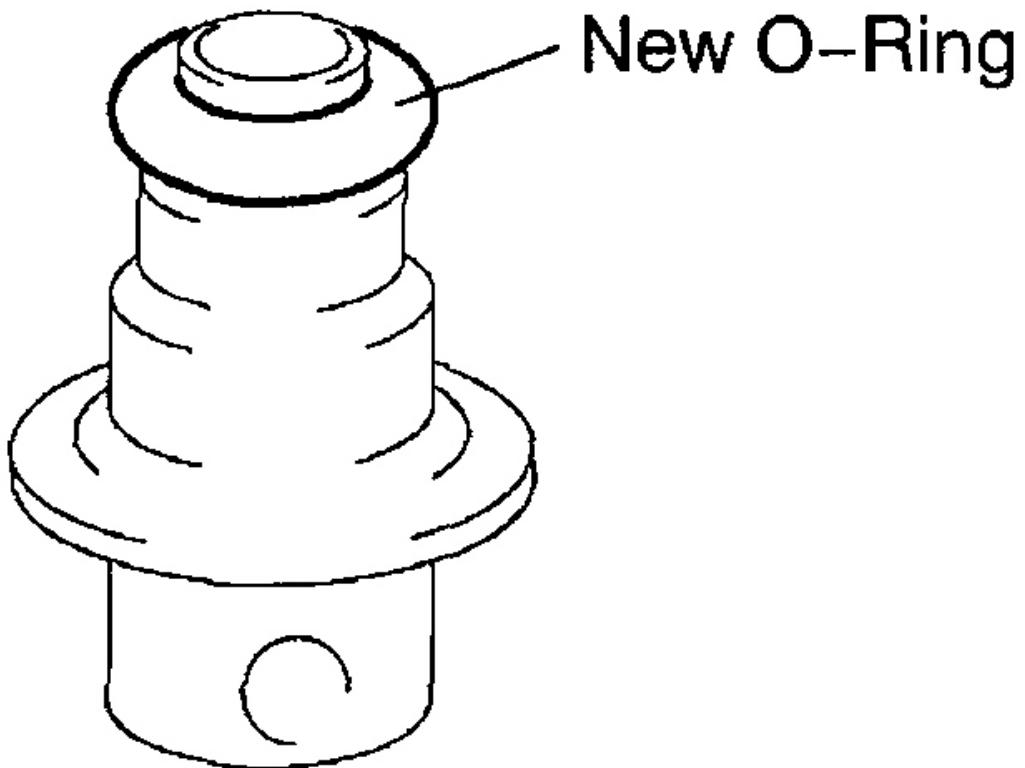


G02639404

Fig. 51: Disconnecting Fuel Return Jet Tube From Clamp & Pulling Out Pressure Regulator
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. REINSTALL FUEL PRESSURE REGULATOR

- a. Install a new O-ring to the pressure regulator.



G02639405

Fig. 52: Installing O-Ring To Pressure Regulator

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Apply a light coat of gasoline to the O-ring, and push into the pressure regulator.
- c. Connect the fuel return jet tube to the clamp.

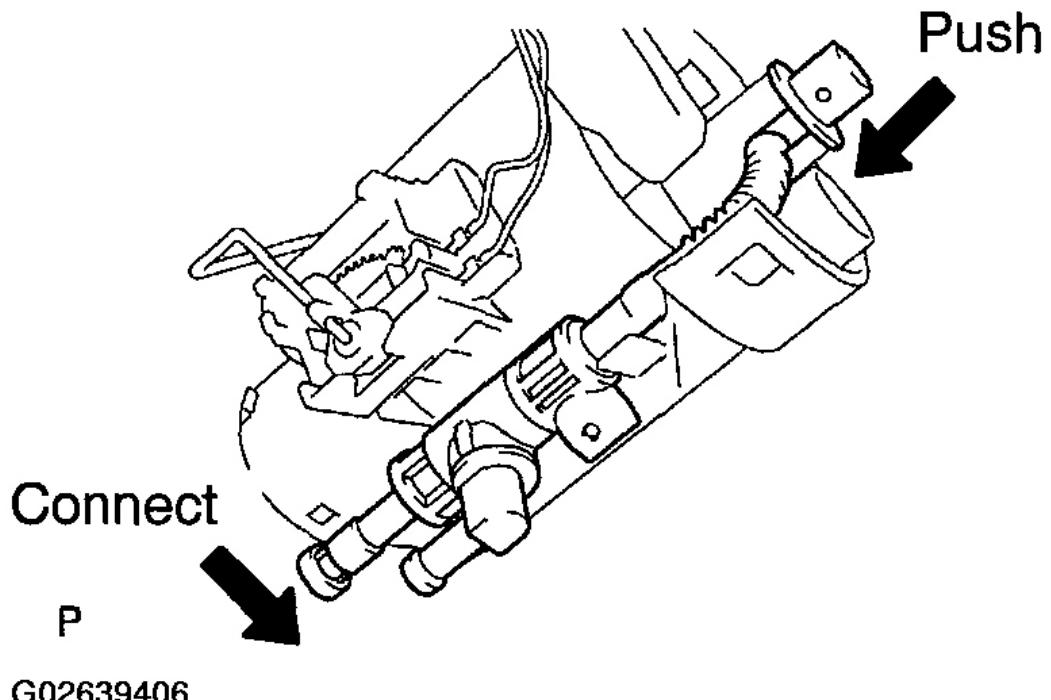
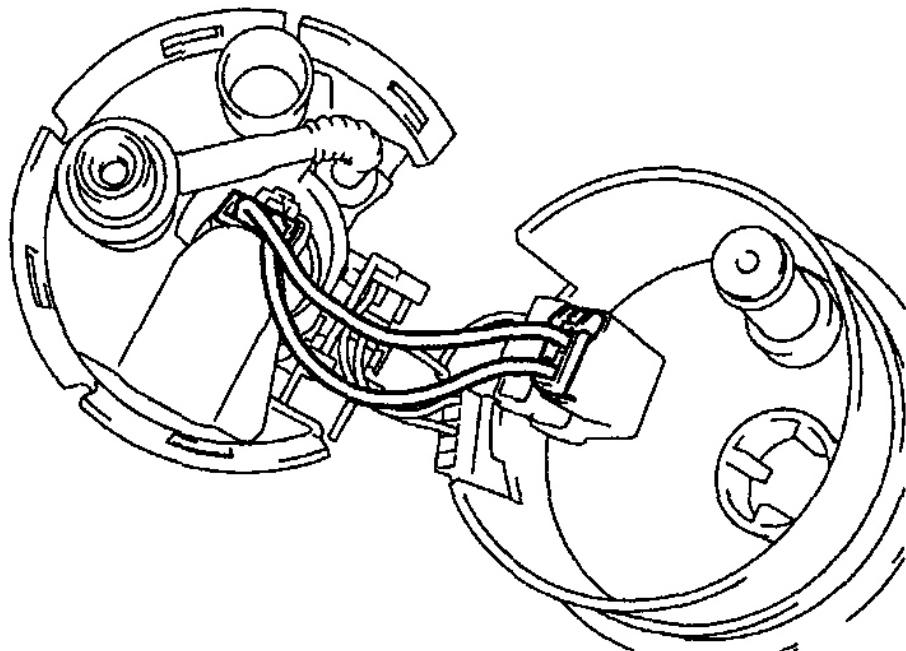


Fig. 53: Pushing O-Ring Into Pressure Regulator & Connecting Fuel Return Jet Tube To Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. REINSTALL FUEL SUCTION PLATE

- a. Connect the fuel pump connector.



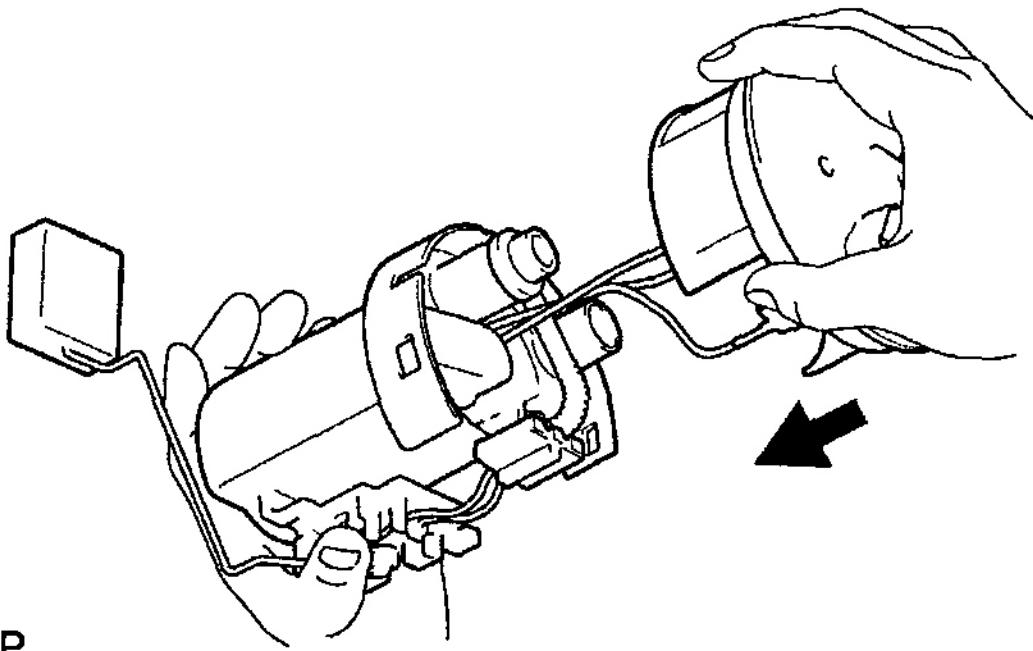
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G02639407

Fig. 54: Connecting Fuel Pump Connector

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the fuel suction plate to the fuel filter and fuel pump assembly.

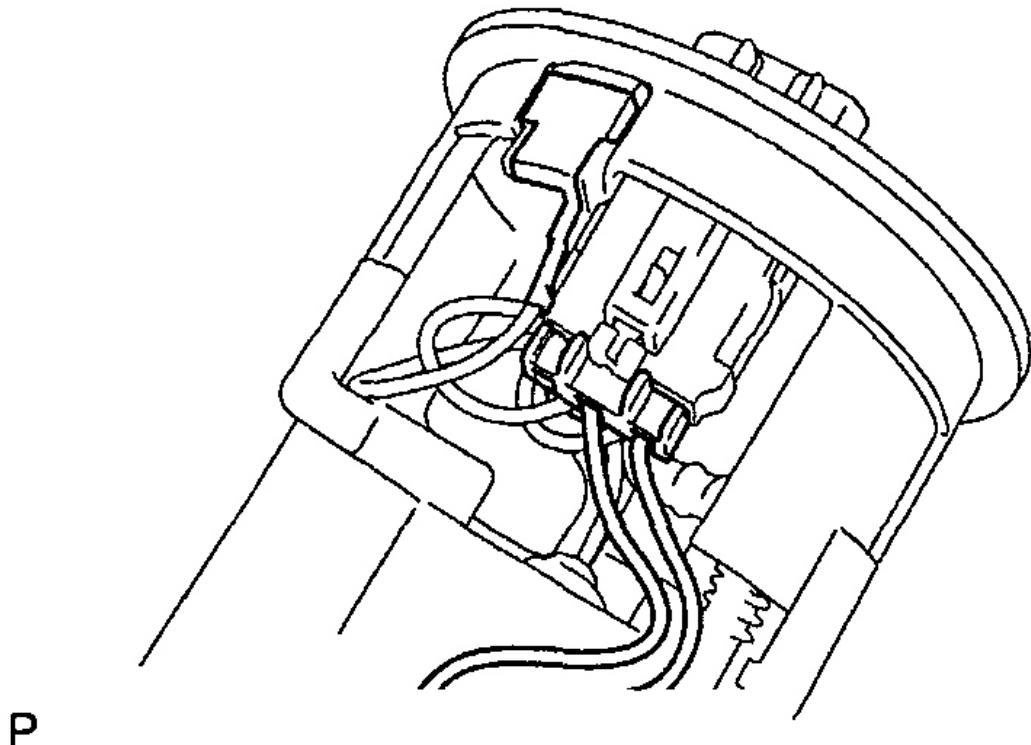


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G02639408

Fig. 55: Installing Fuel Suction Plate To Fuel Filter And Fuel Pump Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Connect the fuel sender connector and ground plate.



G02639409

Fig. 56: Connecting Fuel Sender Gauge Connector And Ground Plate
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. REINSTALL FUEL PUMP AND SENDER GAUGE ASSEMBLY TO FUEL TANK (See REPLACEMENT)

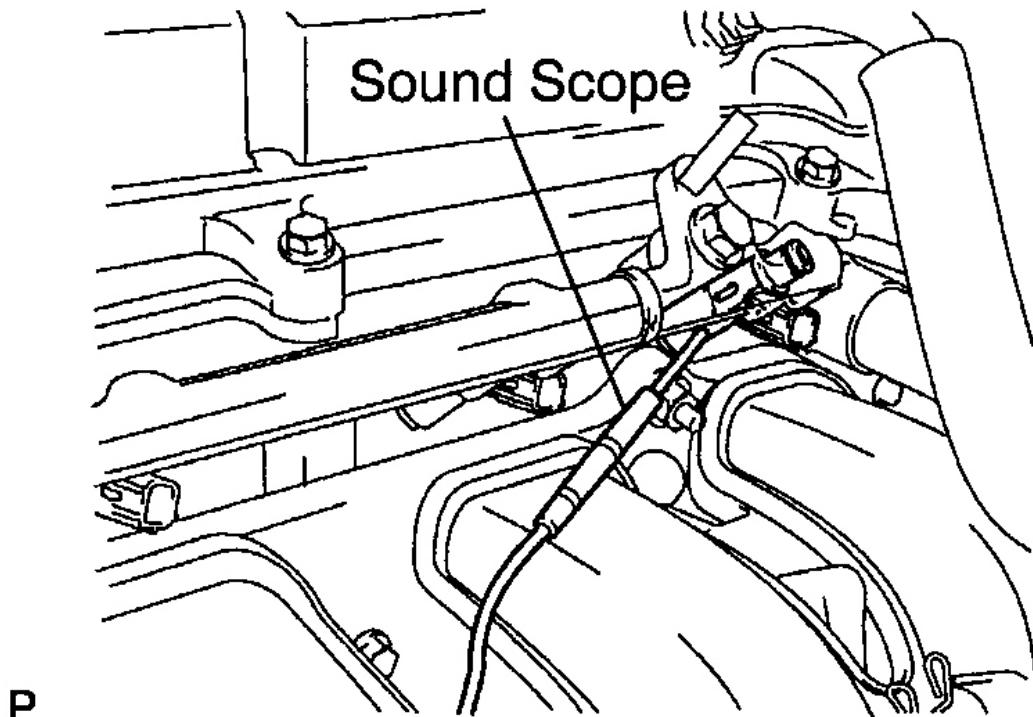
INJECTOR

ON-VEHICLE INSPECTION

- 1. REMOVE AIR CLEANER ASSEMBLY**
 - a. Disconnect the MAF meter connector.
 - b. Disconnect the VSV hose for CCV.
 - c. Remove the 3 bolts and air cleaner assembly, air cleaner inlet, MAF meter together in one piece.
- 2. INSPECT INJECTOR OPERATION**

Check the each injectors for operation sound.

1. With the engine running or cranking, use a sound scope to check that there is normal operating noise in proportion to the engine speed.



G02639410

Fig. 57: Using Sound Scope To Check For Normal Operating Noise
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. If you have no sound scope, you can check it by feeling the injector operating vibration with your finger.

If no sound or unusual sound is heard, check the wiring connector, injector or injection signal from the ECM.

3. INSPECT INJECTOR RESISTANCE

- a. Disconnect the injector connector.
- b. Using an ohmmeter, measure the resistance between the terminals.

Resistance: 11.6 to 12.4 ohm at 20°C (68°F)

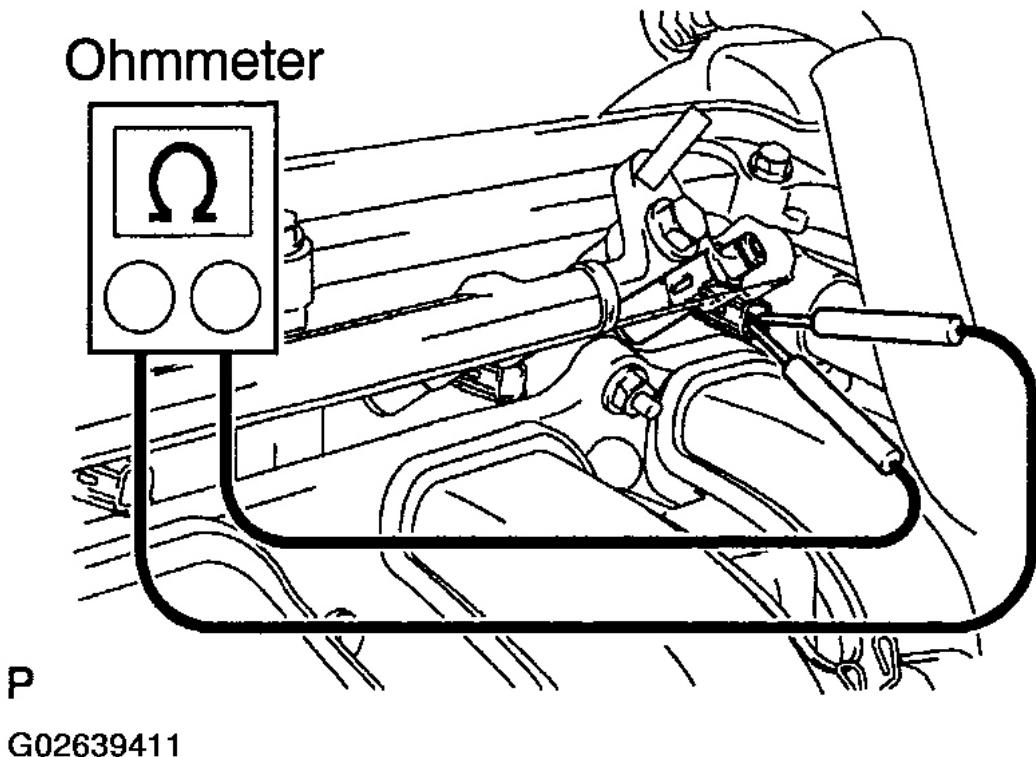


Fig. 58: Measuring Resistance Between Terminals Using Ohmmeter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the resistance is not as specified, replace the injector.

- c. Reconnect the injector connector.

4. REINSTALL AIR CLEANER ASSEMBLY

COMPONENTS

2004 Toyota RAV4

2004 ENGINE PERFORMANCE SFI - RAV4

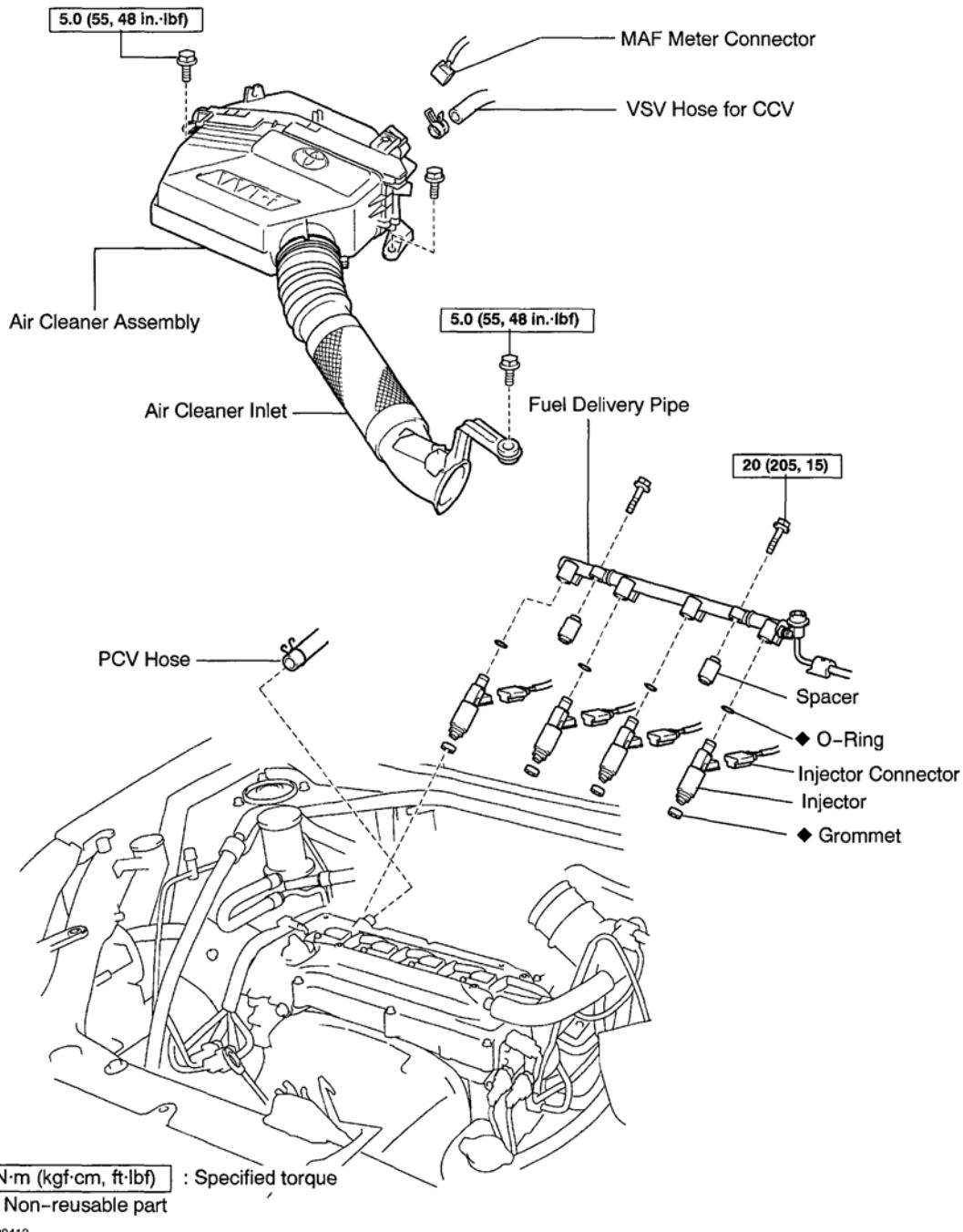


Fig. 59: Identifying Injector Components

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

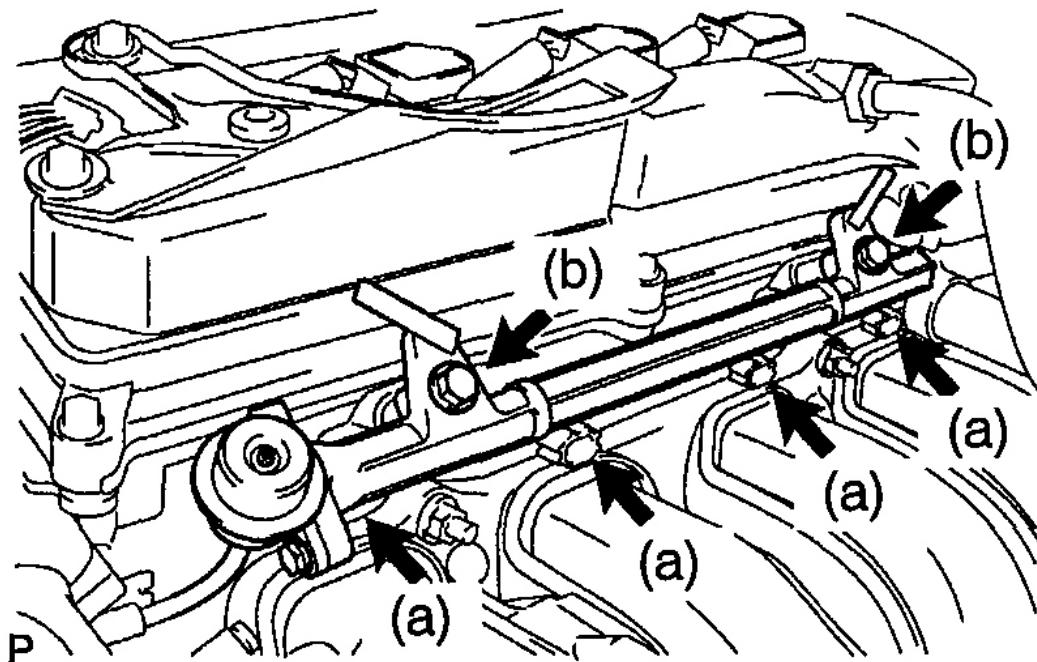
REMOVAL

1. DISCONNECT PCV HOSE
2. REMOVE AIR CLEANER INLET AND AIR CLEANER ASSEMBLY WITH MAF METER

- a. Disconnect the MAF meter connector.
- b. Disconnect the VSV hose for CCV.
- c. Remove the 3 bolts and air cleaner assembly, air cleaner inlet, MAF meter together in one piece.

3. REMOVE INJECTORS

- a. Disconnect the 4 injector connectors.
- b. Remove the 2 bolts holding the delivery pipe to the cylinder head.



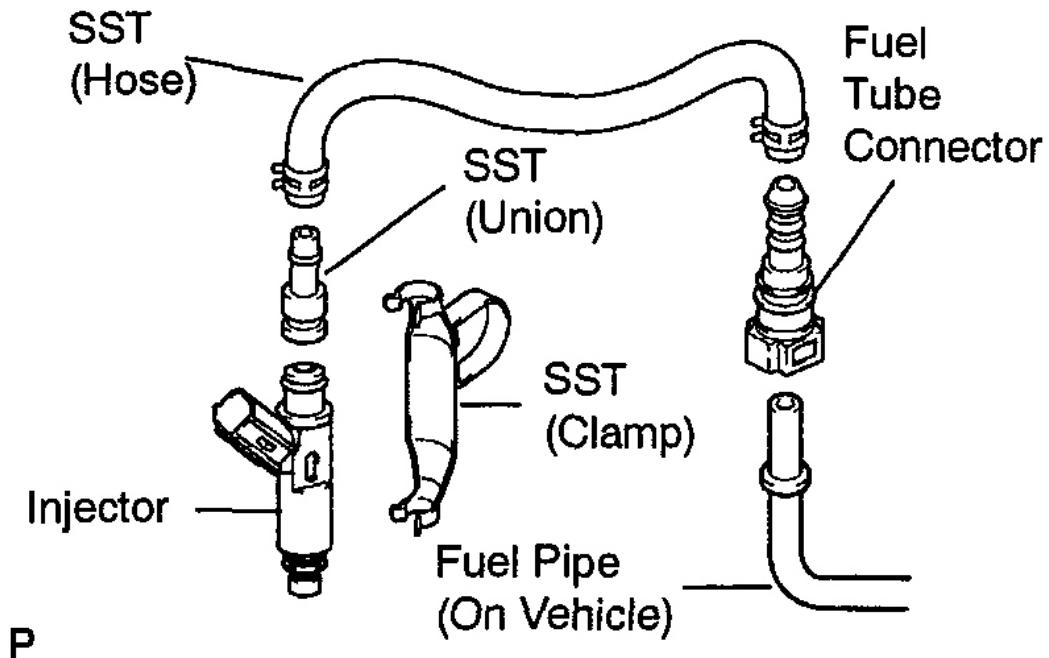
G02639413

Fig. 60: Disconnecting Injector Connectors & Removing Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Disconnect the delivery pipe together with the 4 injectors from the cylinder head.

NOTE: **Be careful not to drop the injectors when disconnecting the delivery pipe.**

- d. Remove the 2 spacers and 4 grommets.
- e. Pull out the 4 injectors from the delivery pipe.
- f. Remove the O-ring from each injector.

INSPECTION**1. INSPECT INJECTOR INJECTION**

P

G02639414

Fig. 61: Inspecting Injector Injection

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION: Keep injector clear of sparks during the test.

- a. Disconnect the fuel pipe clamp from the fuel tube connector.

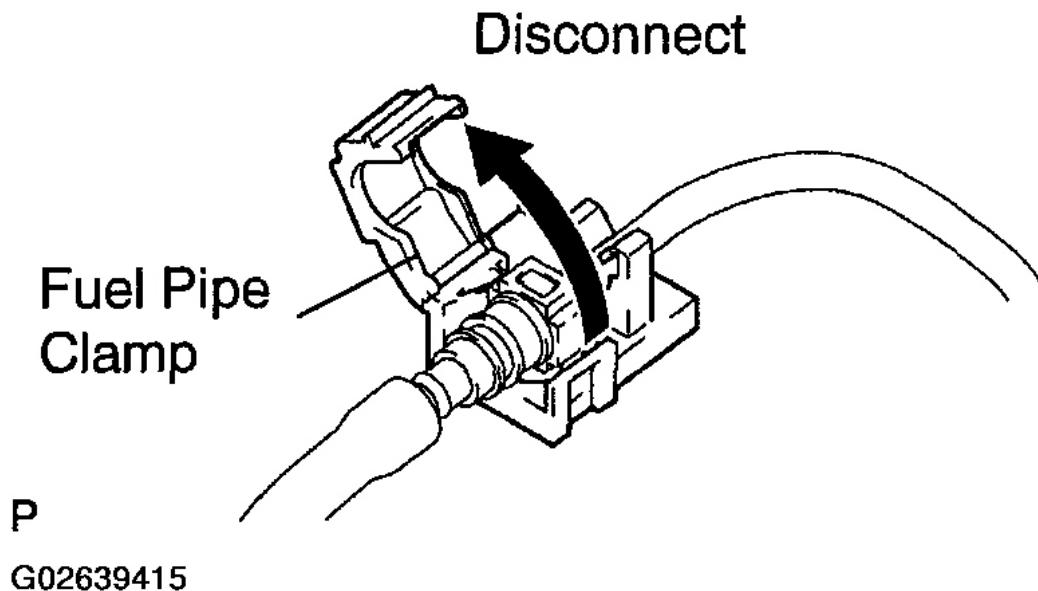


Fig. 62: Disconnecting Fuel Pipe Clamp From Fuel Tube Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Disconnect the fuel inlet tube (fuel tube connector) from the fuel pipe.

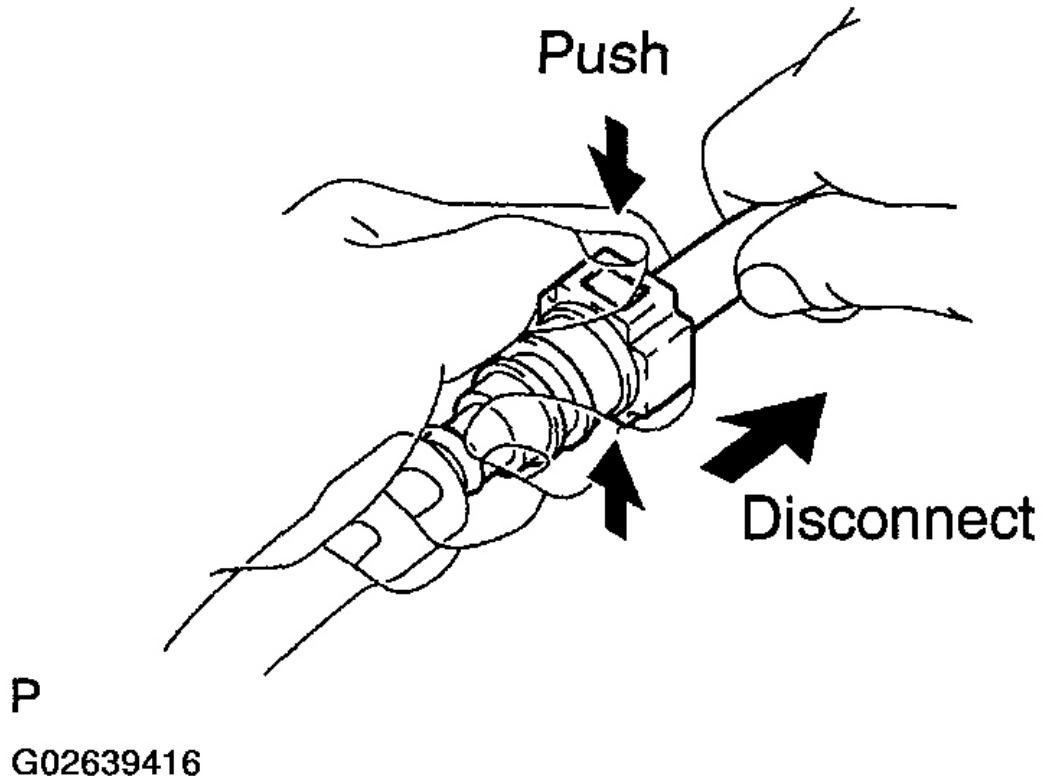


Fig. 63: Disconnecting Fuel Inlet Tube From Fuel Pipe
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

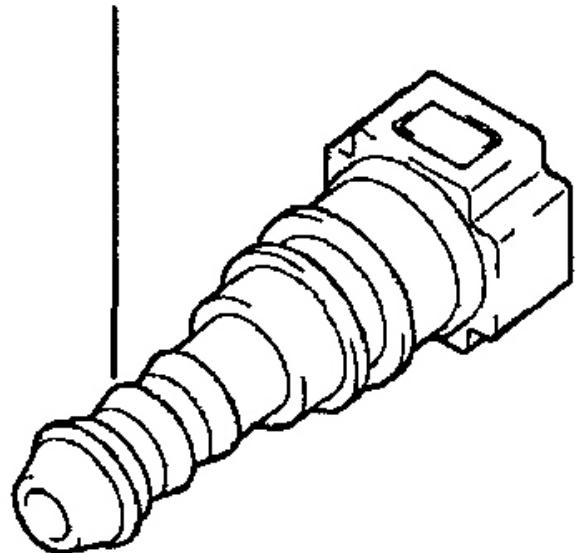
CAUTION:

- Disconnect the fuel tube connector (quick type) observing the precaution (see SFI SYSTEM).
- As there is retained pressure in the fuel line, prevent it from splashing inside the engine compartment.

- c. Purchase a new fuel tube. Remove the fuel tube connector from its pipe.

Fuel tube: Part No. 23901-22110

Fuel Tube Connector



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Fig. 64: Identifying Fuel Tube Connector

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Connect SST (hose) and fuel tube connector to the fuel pipe.

SST 09268-41047

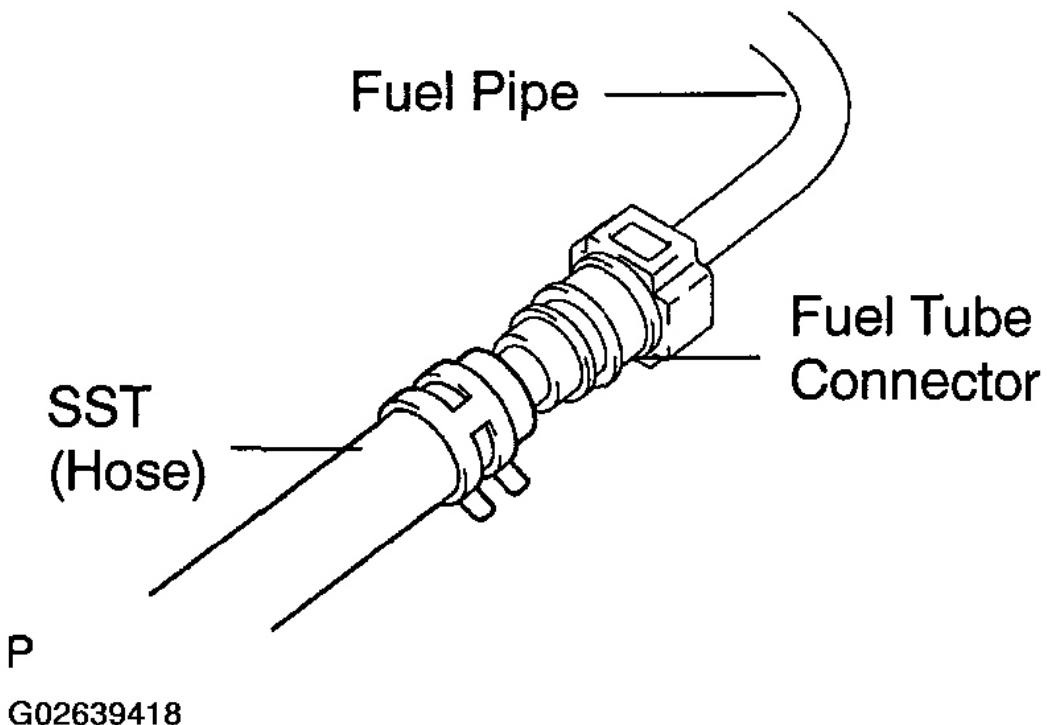


Fig. 65: Connecting SST (Hose) And Fuel Tube Connector To Fuel Pipe
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION: Disconnect the fuel tube connector (quick type) observing the precautions (see SFI SYSTEM).

- e. Install the grommet and O-ring to the injector.
- f. Connect SST (union and hose) to the injector.

SST 09268-41047 (09268-41110, 09268-41300)

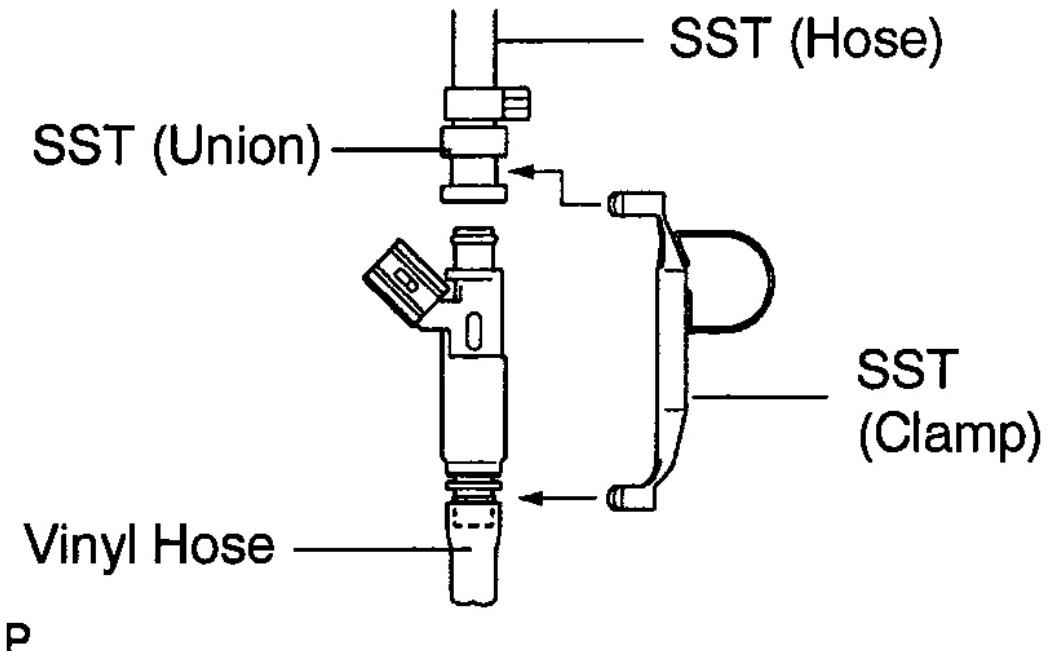


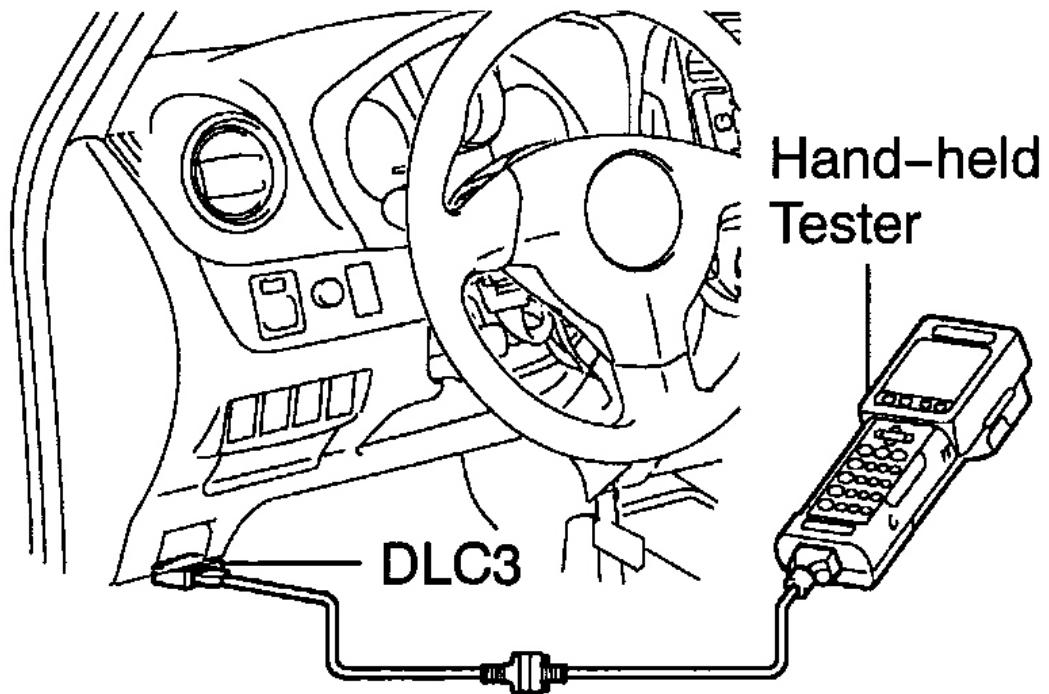
Fig. 66: Connecting SST (Union & Hose) To Injector

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- g. Put the injector into a graduated cylinder.

CAUTION: Install a suitable vinyl hose onto the injector to prevent gasoline from splashing out.

- h. Connect the hand-held tester to the DLC3.



G02639420

Fig. 67: Connecting Hand-Held Tester To DLC3

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. Connect the hand-held tester to the DLC3.
2. Connect the battery negative (-) terminal cable to the battery.
3. Turn the ignition switch ON and push the hand-held tester main switch ON.

NOTE: **Do not start the engine.**

4. Select the ACTIVE TEST mode on the hand-held tester.

HINT:

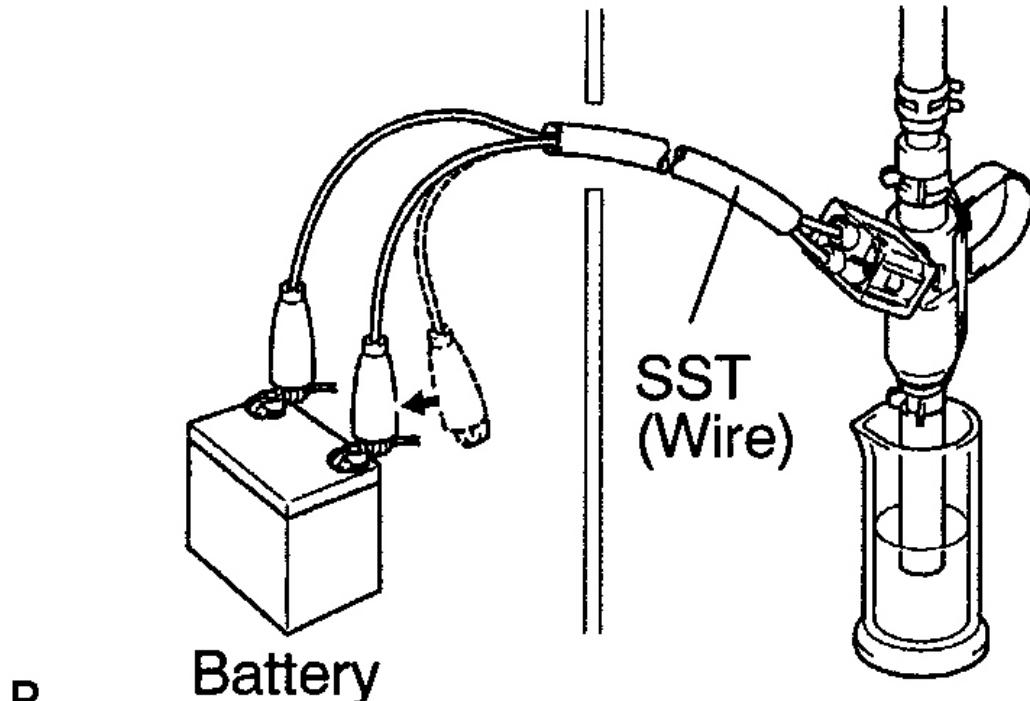
Please refer to the hand-held tester operator's manual for further details.

If you have no hand-held tester, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector (see **FUEL PUMP**).

- i. Connect the battery to the injector with SST (wire) for 15 seconds, and measure the injection

volume with a graduated cylinder. Test each injector 2 or 3 times.

SST 09842-30080



G02639421

Fig. 68: Connecting Battery To Injector With SST

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Injection volume:

76 to 92 cm³ (4.6 to 5.6 cu in.) per 15 seconds. Difference between each injector: 16 cm³ (1.0 cu in.) or less

If the injection volume is not as specified, replace the injector.

2. INSPECT LEAKAGE

- a. In the above condition, disconnect the tester probes of SST (wire) from the battery and check the fuel leak from the injector.

SST 09842-30080

2004 Toyota RAV4

2004 ENGINE PERFORMANCE SFI - RAV4



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G02639422

Fig. 69: Checking Fuel Leak From Injector

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Fuel drop: 1 drop or less per 12 minutes.

- b. Turn the ignition switch OFF.
- c. Disconnect the negative (-) terminal cable from the battery.
- d. Remove SST and fuel tube connector.

SST 09268-41047

- e. Disconnect the hand-held tester from the DLC3.
- f. Reconnect the fuel tube (fuel tube connector).

CAUTION: Disconnect the fuel tube connector (quick type) observing the precaution (see SFI SYSTEM).

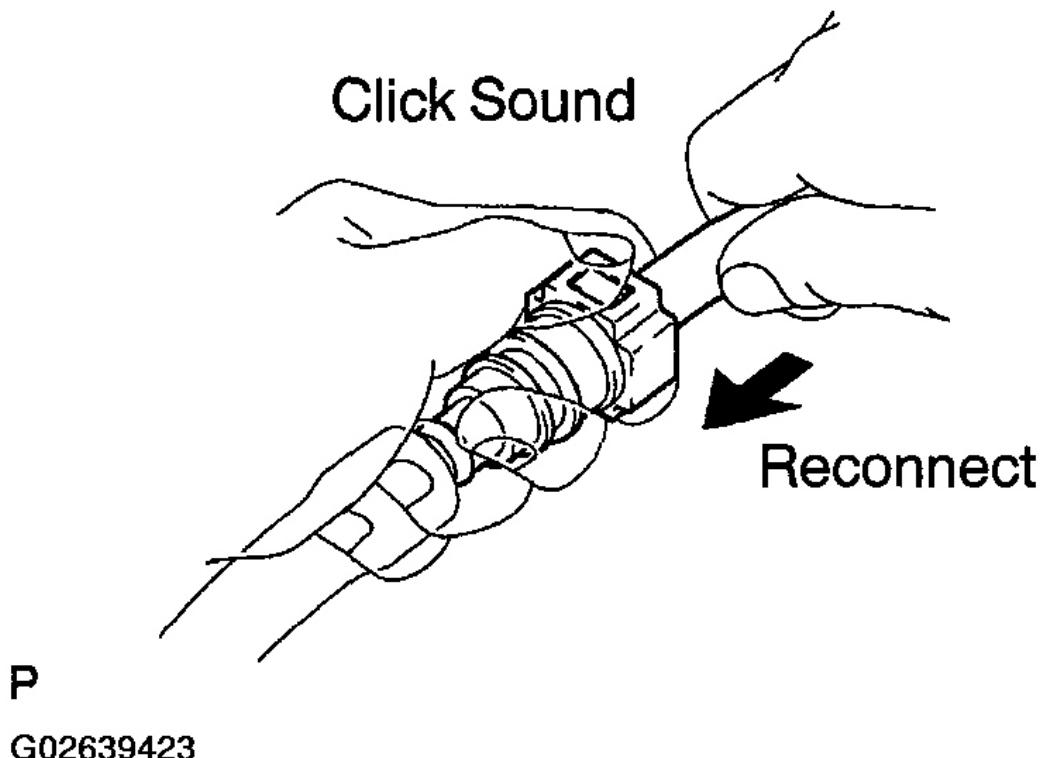


Fig. 70: Reconnecting Fuel Tube
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- g. Reconnect the fuel pipe clamp to the fuel tube connector.

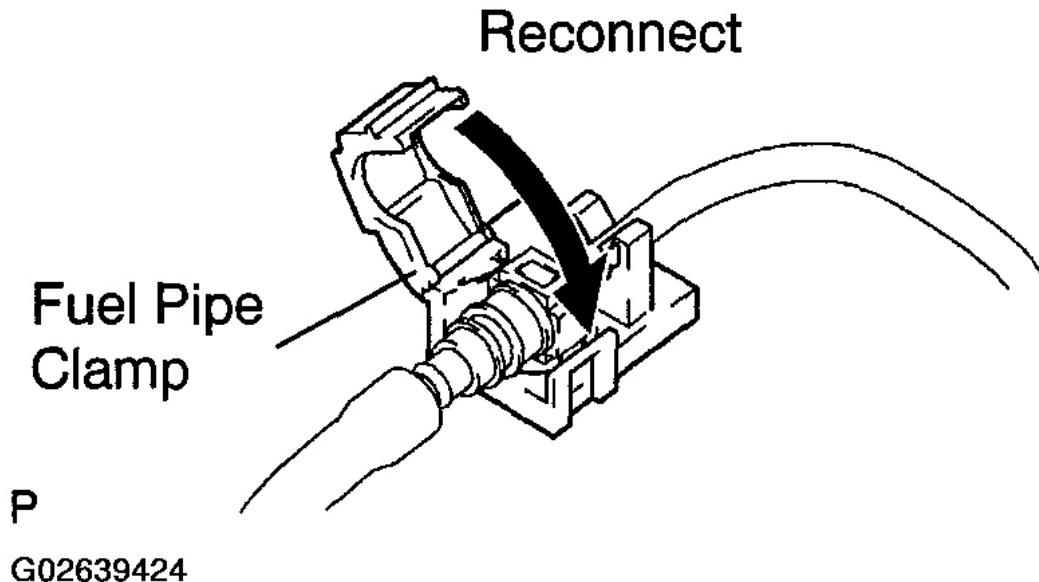
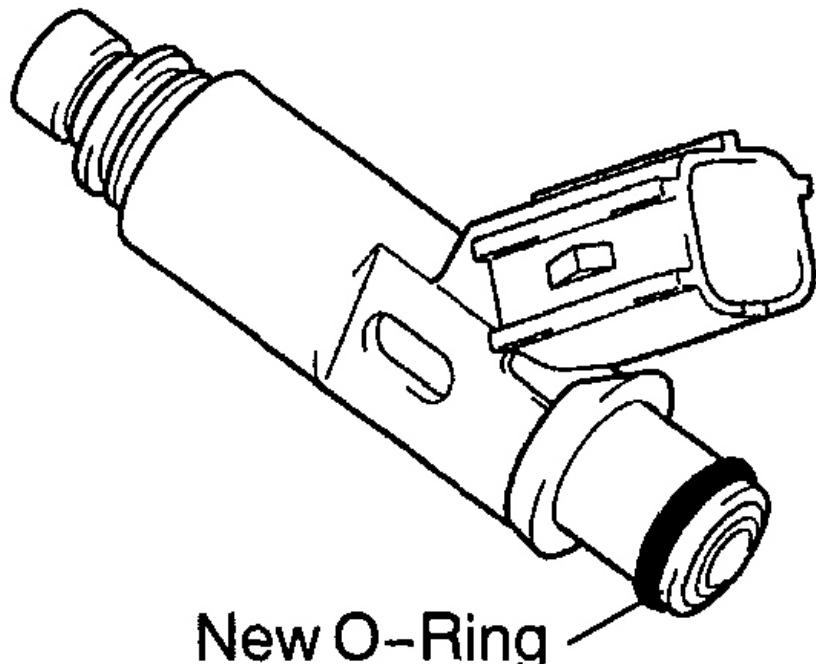


Fig. 71: Reconnecting Fuel Pipe Clamp To Fuel Tube Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. INSTALL INJECTORS AND DELIVERY PIPES

- a. Apply a light coat of spindle oil or gasoline to a new O-ring, and install it to each injector.



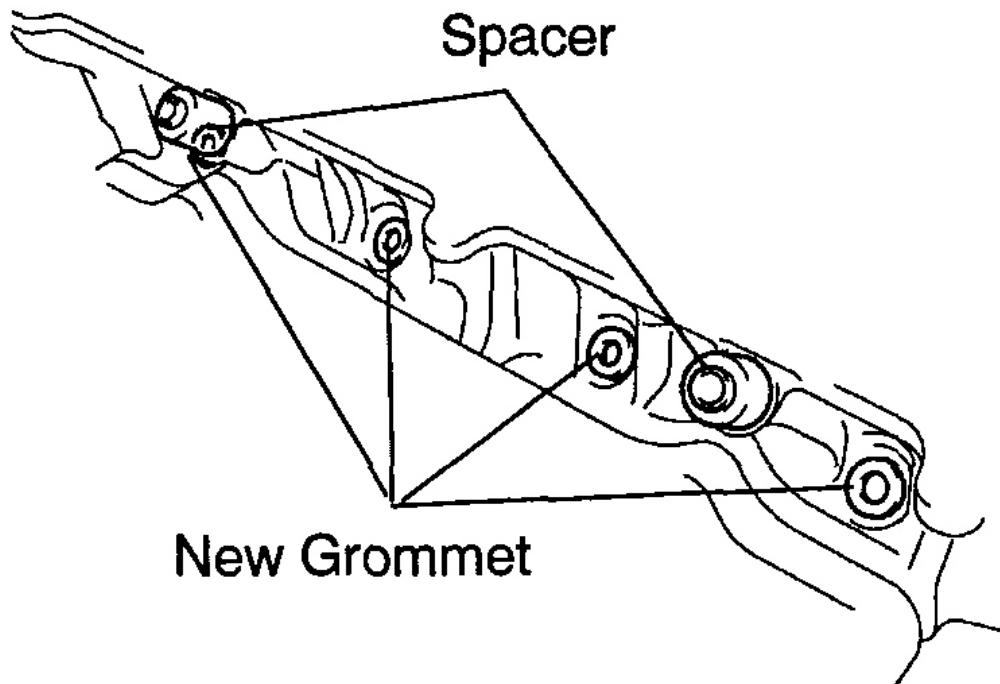
New O-Ring

P

G02639425

Fig. 72: Applying Light Coat Of Spindle Oil Or Gasoline To O-Ring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the 2 spacers and 4 new grommets to the cylinder head.

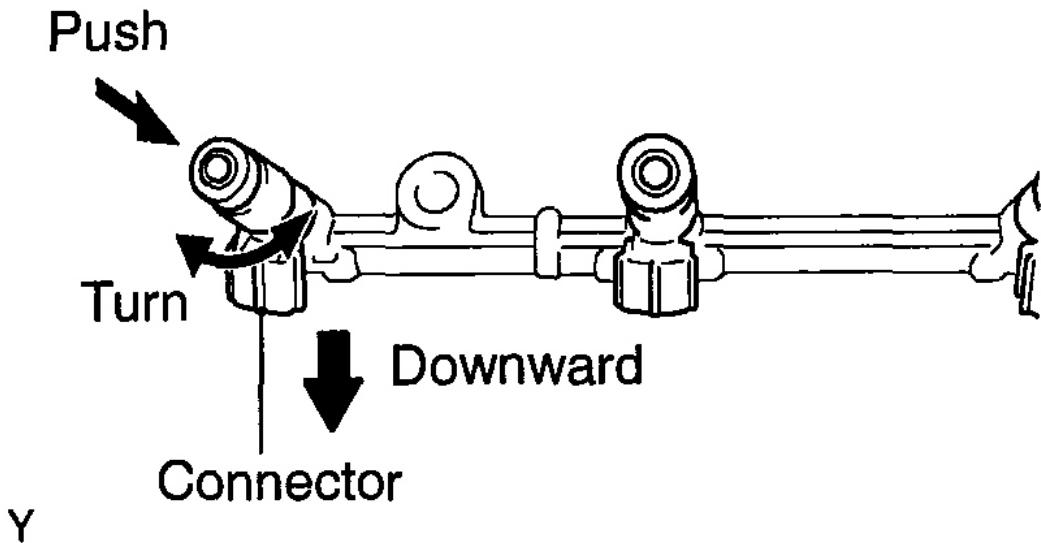


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Fig. 73: Installing Spacers And Grommets To Cylinder Head
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

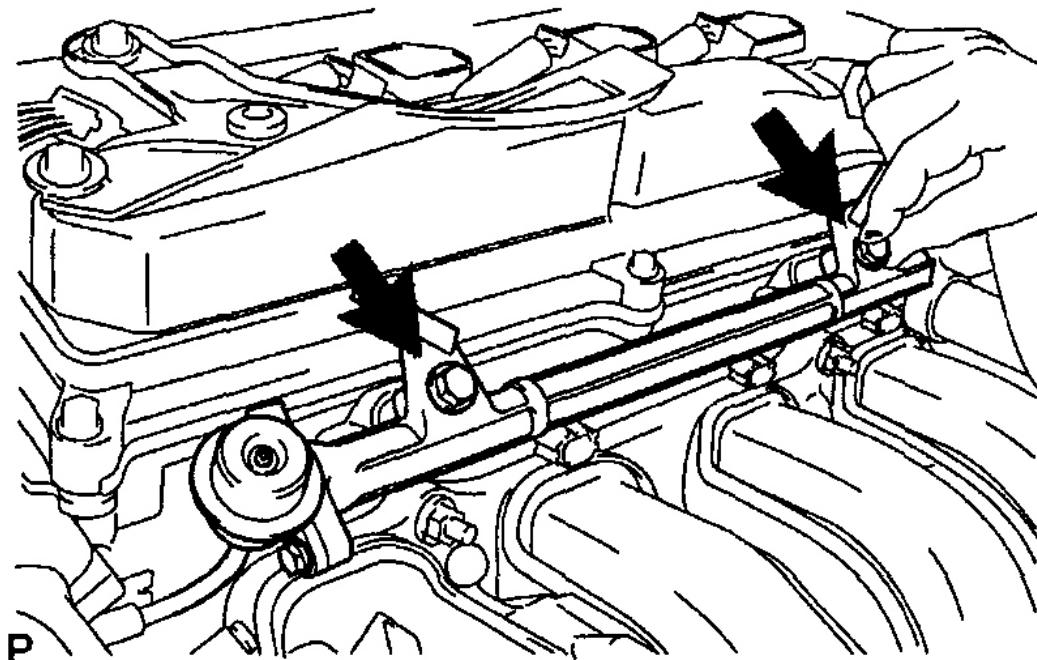
- c. Apply a light coat of spindle oil or gasoline to the place where a delivery pipe touches the O-ring.
- d. Push the injector to the delivery pipes turning the injector as shown in **Fig. 74**. Then install the 4 injectors.
- e. Position the injector connector downward.



G02639427

Fig. 74: Pushing Injector To Delivery Pipes & Positioning Injector Connector Downward
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- f. Attach the delivery pipe together with the 4 injectors to the cylinder head.
- g. Temporarily install the 2 bolts holding the delivery pipe to the cylinder head.



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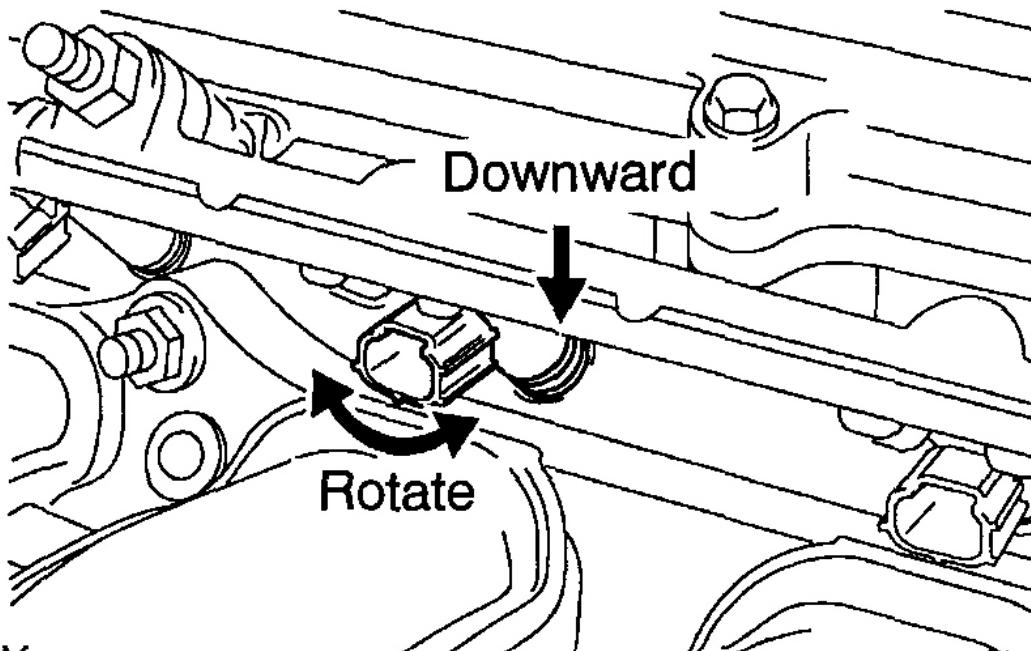
Fig. 75: Installing Bolts Holding Delivery Pipe To Cylinder Head
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- h. Check that the injectors rotate smoothly.

HINT:

If injectors do not rotate smoothly, the possible cause is incorrect installation of the O-ring. Replace the O-ring.

- i. Position the injector connector downward.

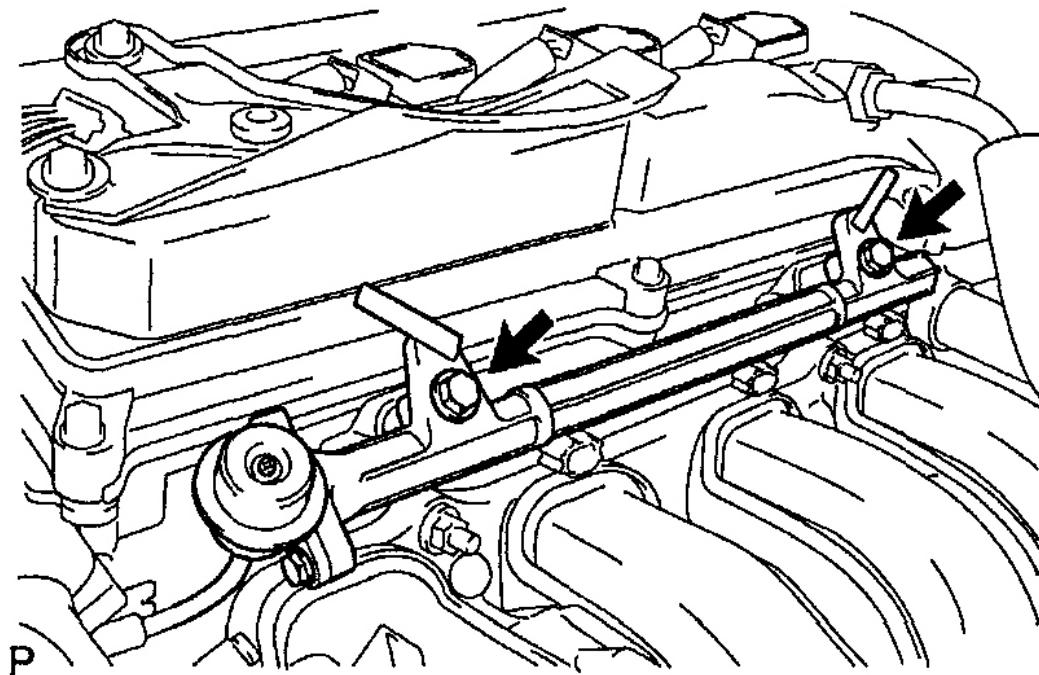


G02639429

Fig. 76: Checking Injectors Rotate Smoothly & Positioning Injector Connector Downward
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- j. Tighten the 2 bolts holding the delivery pipe to the cylinder head.

Torque: 20 N.m (205 kgf.cm, 15 ft.lbf)



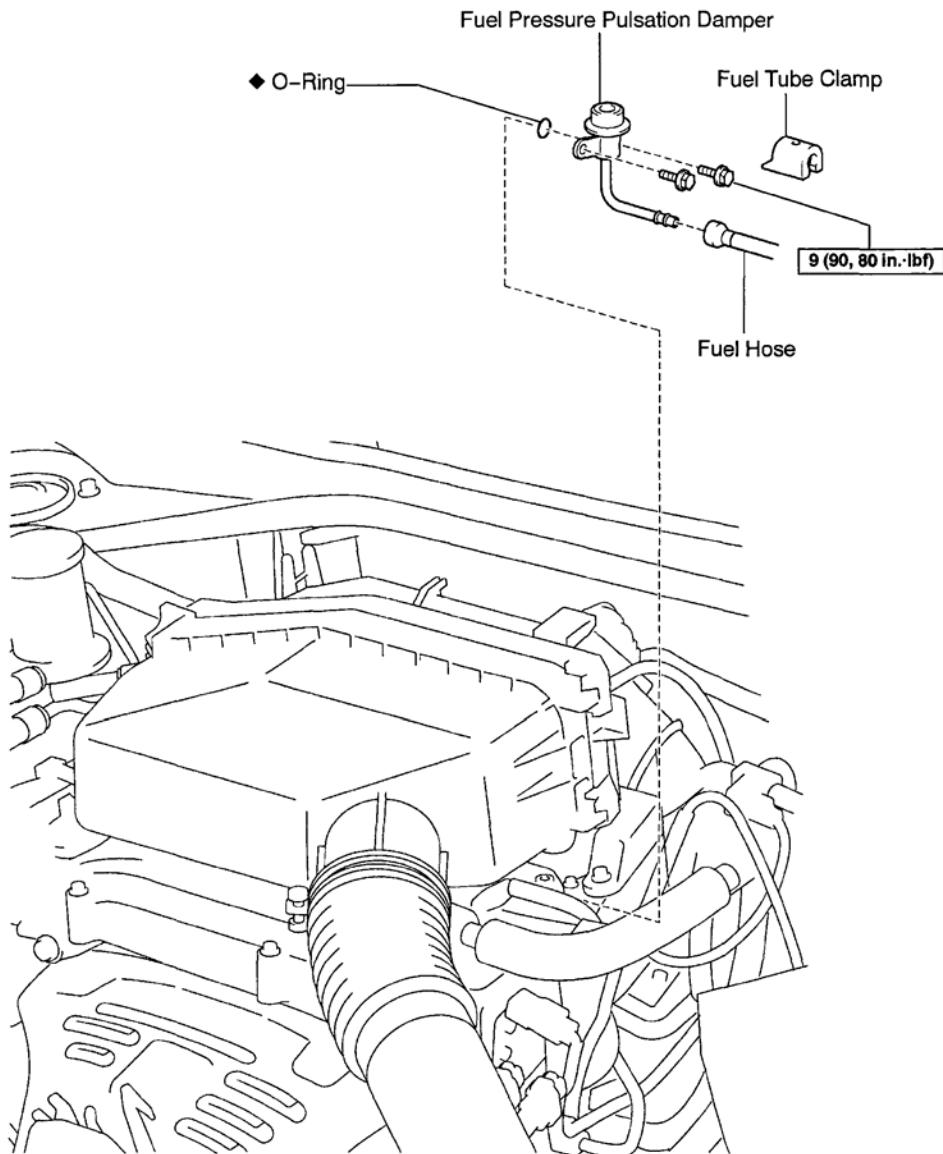
G02639430

Fig. 77: Tightening Bolts Holding Delivery Pipe To Cylinder Head
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- k. Connect the 4 injector connectors.
2. INSTALL AIR CLEANER ASSEMBLY WITH MAF METER
3. CONNECT PCV HOSE

FUEL PRESSURE PULSATION DAMPER

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque

P ◆ Non-reusable part

G02639431

Fig. 78: Identifying Fuel Pressure Pulsation Damper Components
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REPLACEMENT

1. REMOVE AIR CLEANER HOSE

2. DISCONNECT ACCELERATOR CABLE**3. REMOVE FUEL PRESSURE PULSATION DAMPER**

- Disconnect the fuel tube connector (metallic connector) (see **SFI SYSTEM**).

CAUTION:

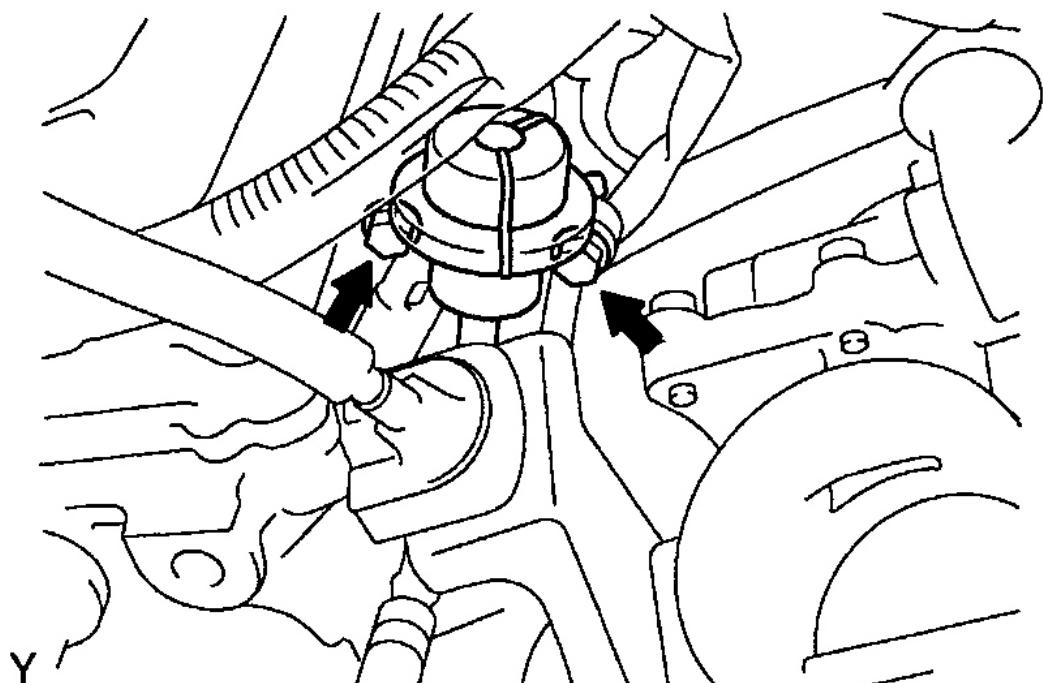
- Disconnect the fuel tube connector (metallic connector) after observing the precautions.
- As there is retained pressure in the fuel pipe line, prevent it from splashing inside the engine compartment.

- Remove the 2 bolts and pulsation damper.

4. REINSTALL FUEL PRESSURE PULSATION DAMPER

- Install the pulsation damper with the 2 bolts.

Torque: 9 N.m (90 kgf.cm, 80 in.lbf)



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Fig. 79: Removing/Installing Bolts & Pulsation Damper
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- Connect the fuel tube connector (metallic connector) (see **SFI SYSTEM**).

- 5. RECONNECT ACCELERATOR CABLE**
- 6. RECONNECT AIR CLEANER HOSE**

FUEL TANK AND LINE

COMPONENTS

- CAUTION:**
- Always use new gaskets when replacing the fuel tank or component parts.
 - Apply the proper torque to all the parts to be tightened.

2004 Toyota RAV4

2004 ENGINE PERFORMANCE SFI - RAV4

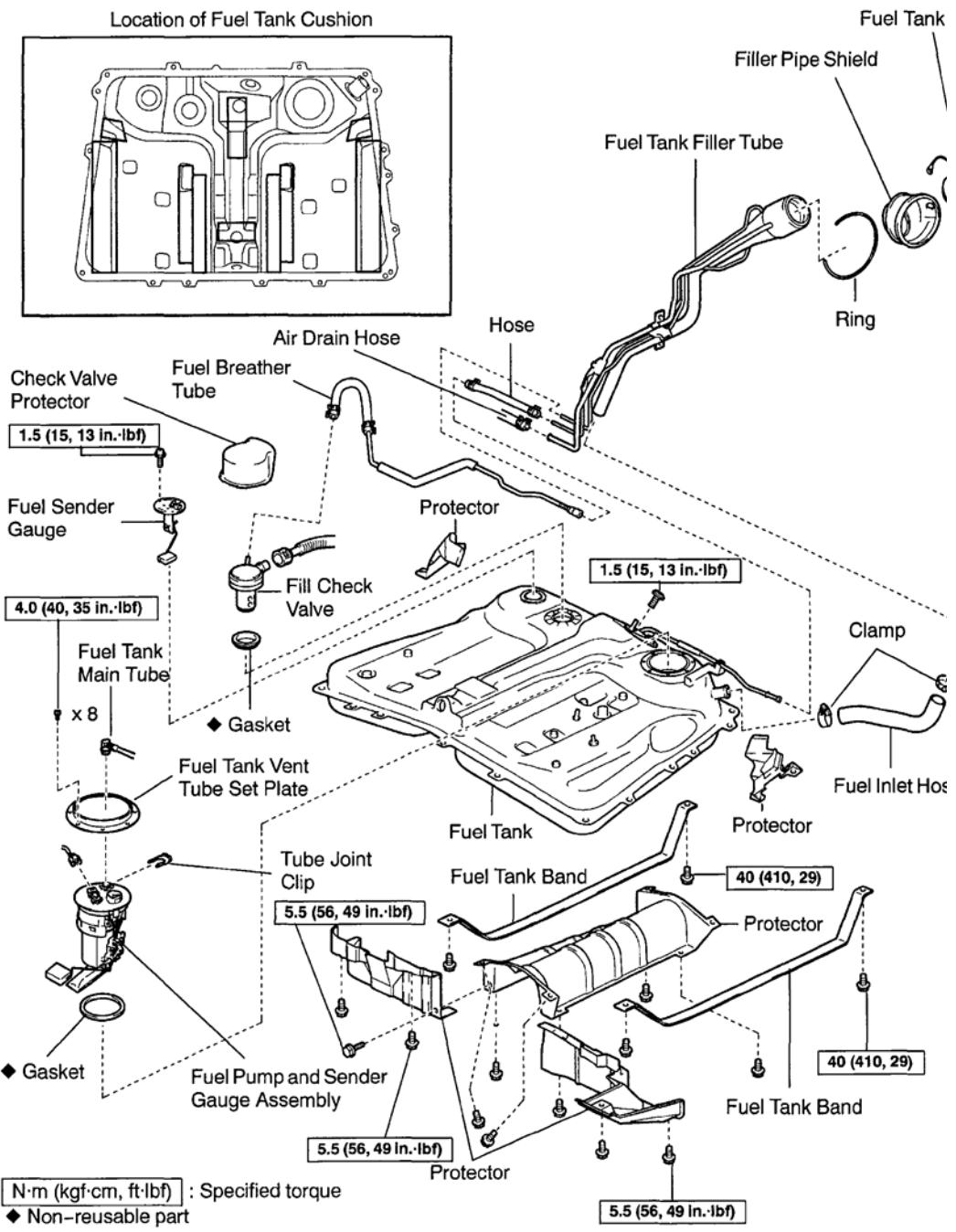
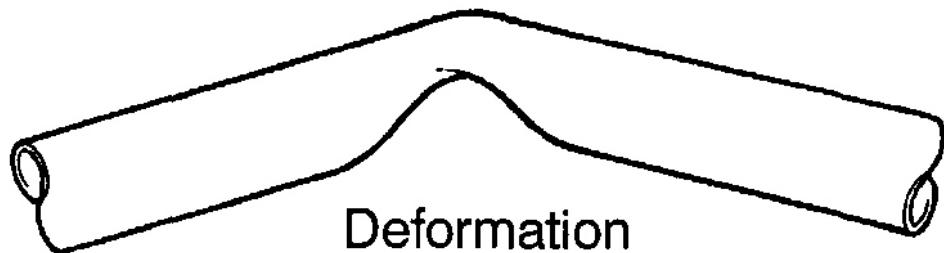
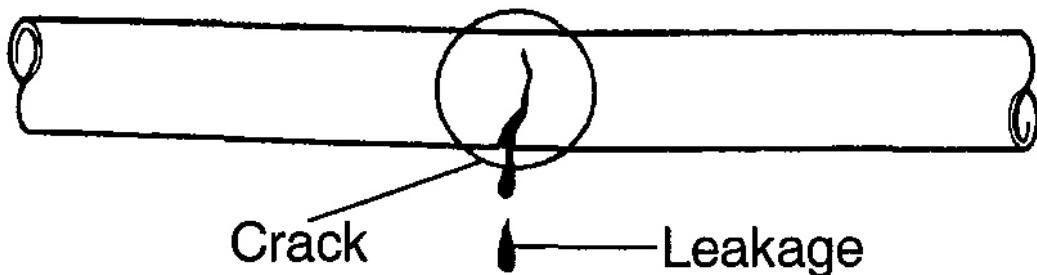


Fig. 80: Identifying Fuel Tank And Line Components
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

Inspect Fuel Tank And Line

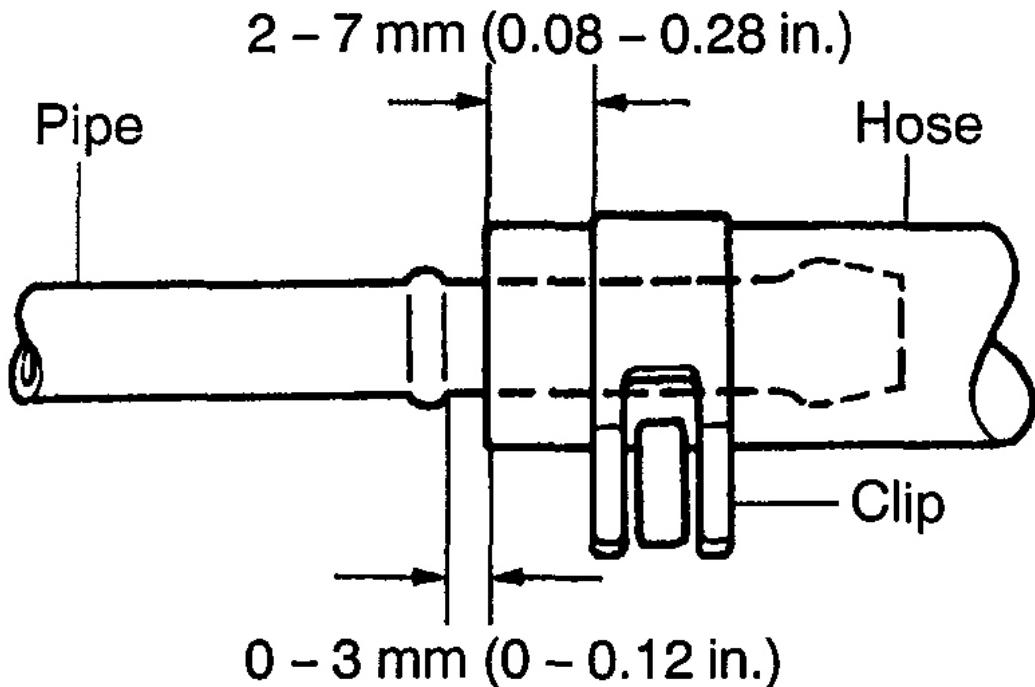
- a. Check the fuel lines for cracks or leak, and all connections for deformation.
- b. Check the fuel tank for deformation, cracks fuel leak or tank band looseness.
- c. Check the filter neck for damage or fuel leak.



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Fig. 81: Identifying Deformed, Damaged, Cracked Or Leaking Pipe
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Check that hose and tube connections are as shown in **Fig. 82**.



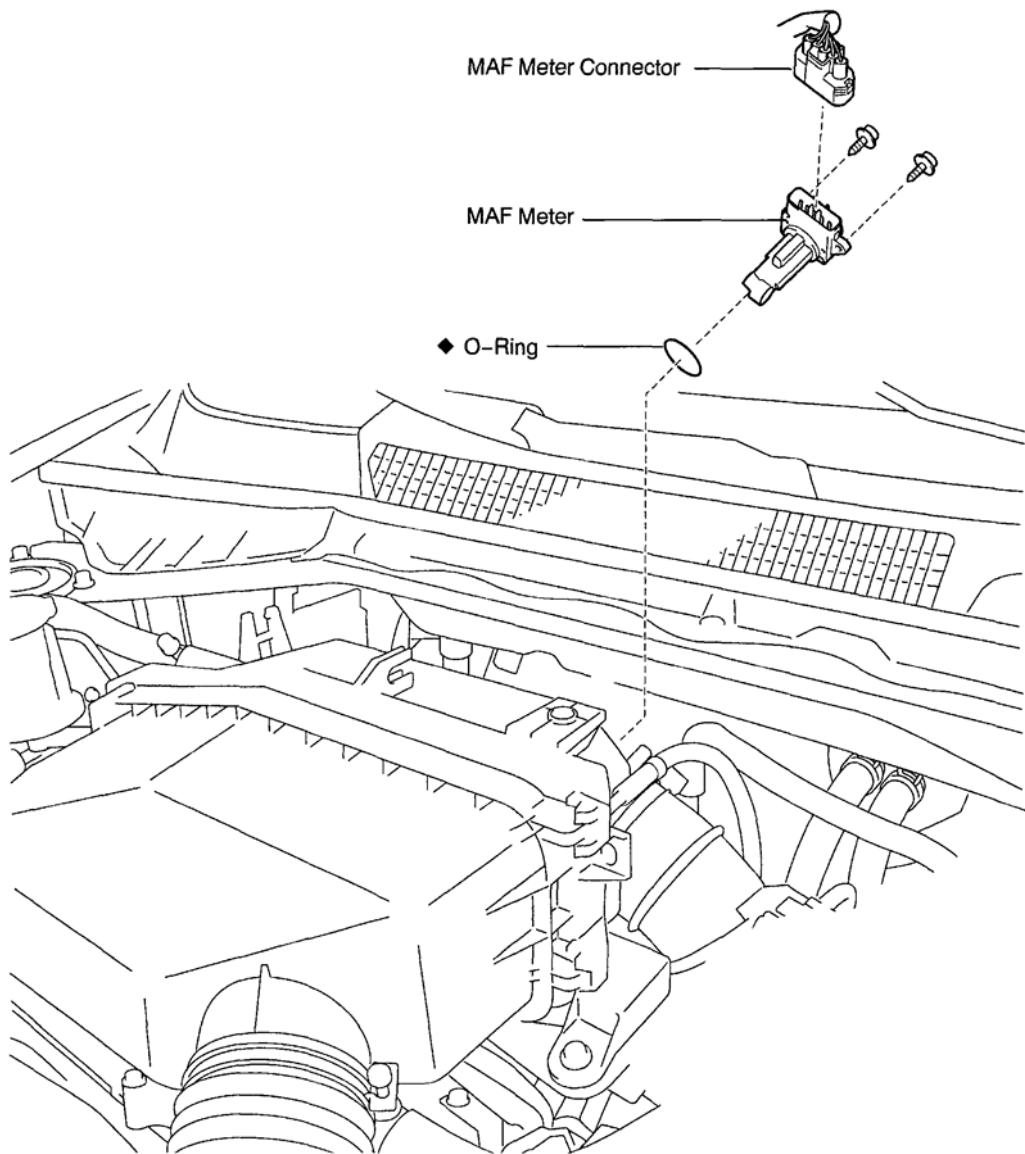
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Fig. 82: Checking Hose And Tube Connections
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If a problem is found, repair or replace the part as necessary.

MASS AIR FLOW (MAF) METER

COMPONENTS



◆ Non-reusable part

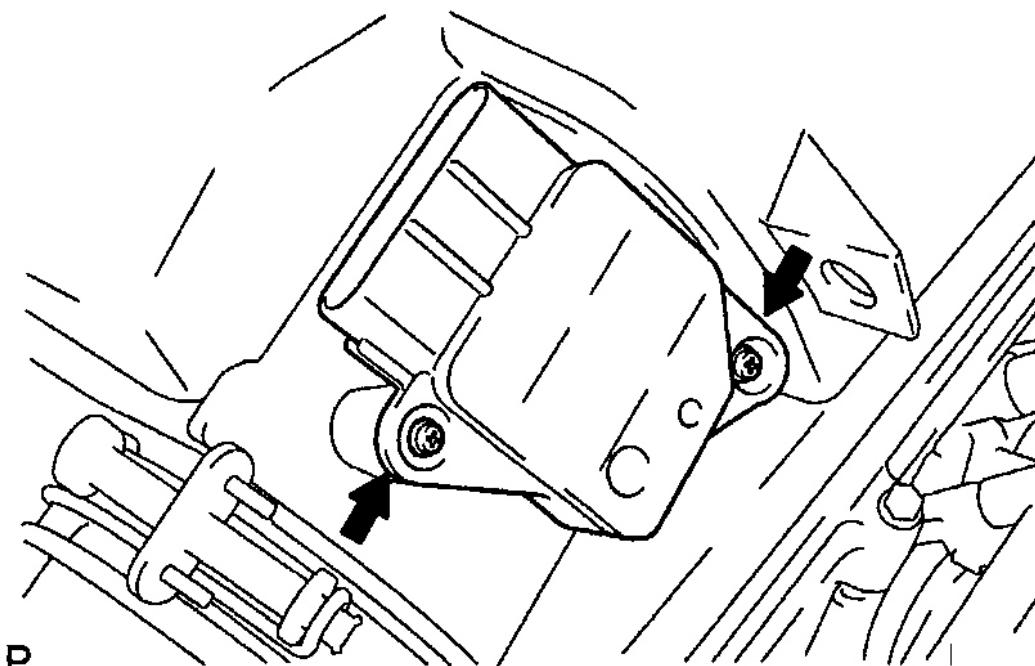
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Fig. 83: Identifying Mass Air Flow (MAF) Meter Components
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. DISCONNECT MAF METER CONNECTOR
2. REMOVE MAF METER

Remove the 2 screws and MAF meter.

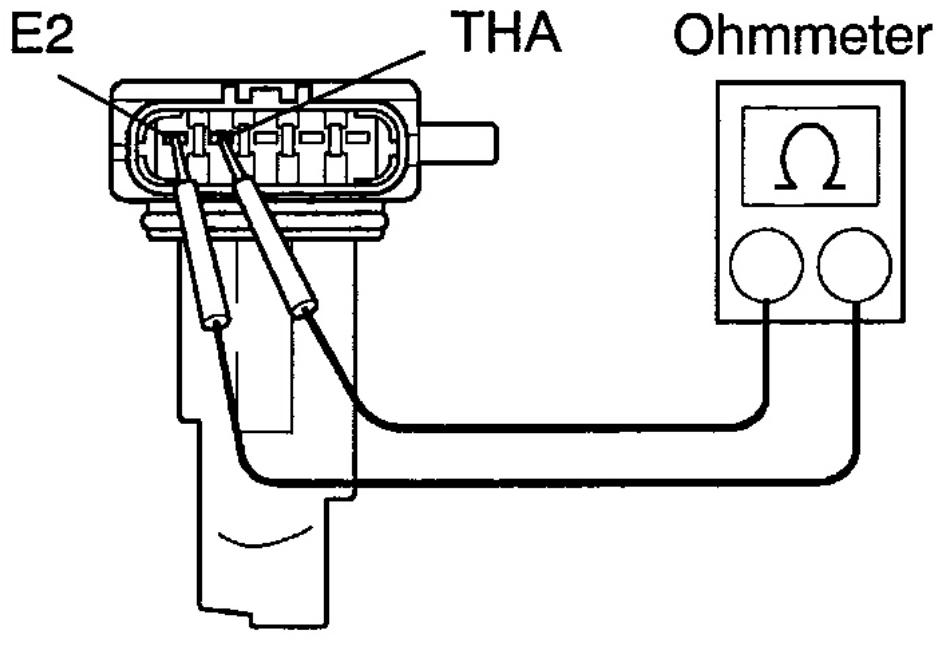


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Fig. 84: Removing Screws And MAF Meter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. INSPECT MAF METER

- a. Using an ohmmeter, measure the resistance between terminals THA and E2.



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Fig. 85: Measuring Resistance Between Terminals THA And E2 Using Ohmmeter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Resistance:

RESISTANCE SPECIFICATION

-20°C (-4°F)	13.6 to 18.4 ohm
20°C (68°F)	2.21 to 2.69 ohm
60°C (140°F)	0.49 to 0.67 ohm

If the resistance is not as specified, replace the MAF meter.

- b. Inspect operation.
 - a. Connect the MAF meter connector.
 - b. Connect the negative (-) terminal cable to the battery.
 - c. Turn the ignition switch ON.
 - d. Using a voltmeter, connect the positive (+) tester probe to terminal VG, and negative (-) tester probe to terminal E2G.

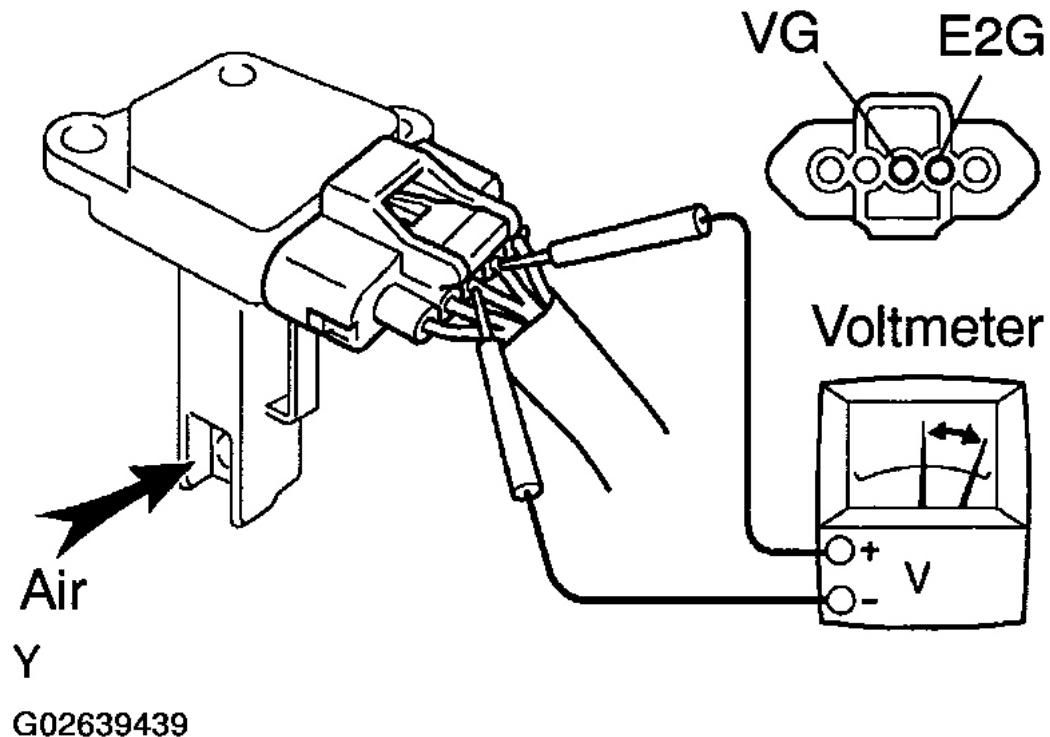


Fig. 86: Connecting Tester Probes To Terminals VG & E2G Using Voltmeter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Blow air into the MAF meter, and check that the voltage fluctuates.

If operation is not as specified, replace the MAF meter.

f. Turn the ignition switch OFF.

g. Disconnect the negative (-) terminal cable from the battery.

h. Disconnect the MAF meter connector.

4. REINSTALL MAF METER

Install the MAF meter with the 2 screws.

5. RECONNECT MAF METER CONNECTOR

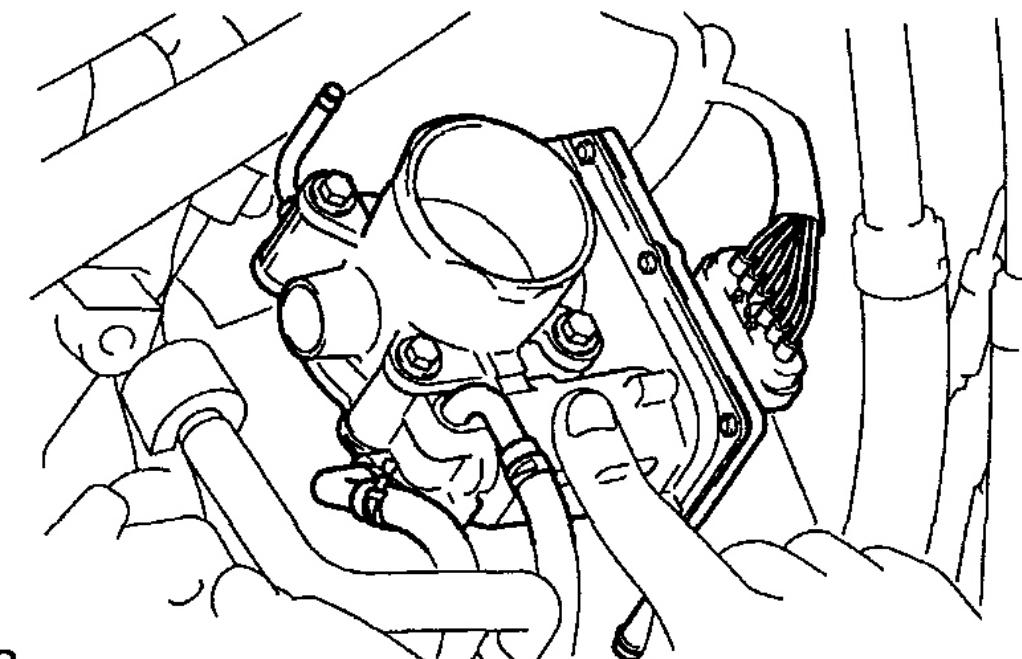
THROTTLE BODY

ON-VEHICLE INSPECTION

CAUTION: When removing deposits on the throttle body, be sure to remove the connector or remove the battery.

1. INSPECT SYSTEM OPERATION

- a. Inspect the throttle control motor operating sound.
 1. Turn the ignition switch ON.
 2. When turning the accelerator pedal position sensor lever, check the running sound of the motor. Also, check that there is no friction sound.

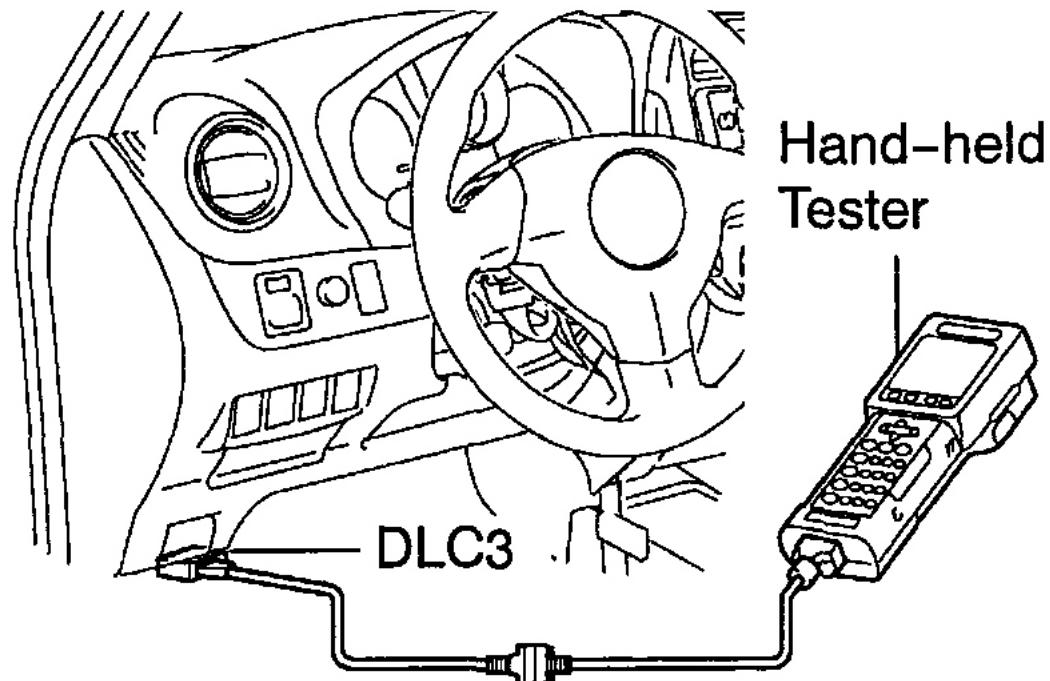


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Fig. 87: Inspecting Throttle Control Motor Operating Sound
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the result is not as specified, check the throttle control motor (see step 2), wiring and ECM.

- b. Inspect the accelerator pedal position sensor.
 1. Connect the hand-held tester or OBD II scan tool to the DLC3.



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Fig. 88: Connecting Hand-Held Tester To DLC3

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Turn the ignition switch ON.
3. Make sure that the check engine warning lamp (CHK ENG) does not illuminate.
4. When turning the accelerator pedal position sensor lever to the full-open position, make sure that the CURRENT DATA throttle valve opening percentage (THROTTLE POS) shows the standard value below.

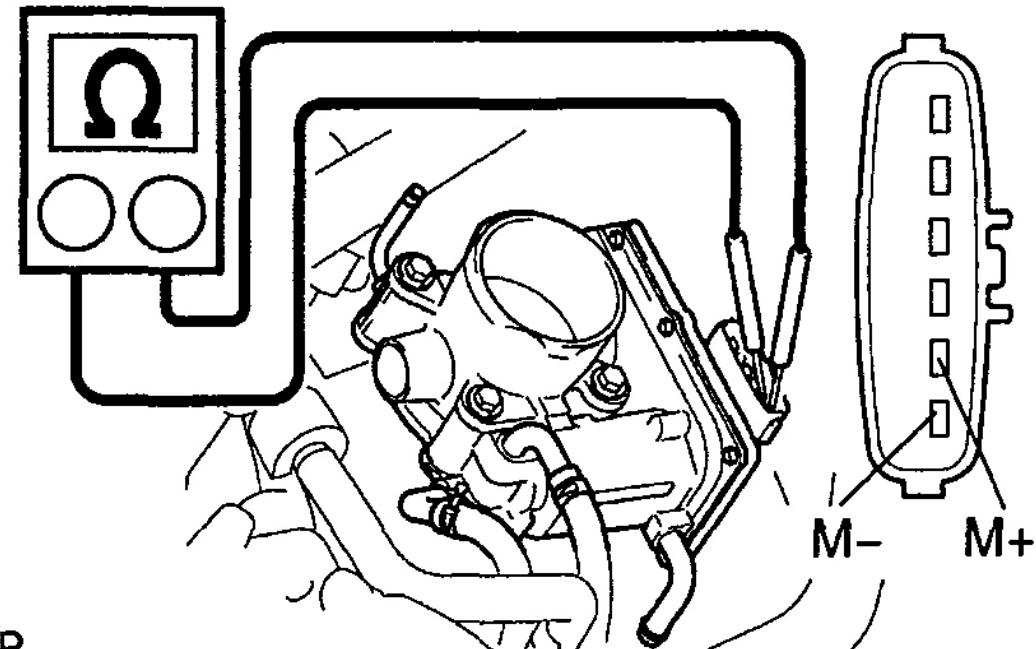
Standard throttle valve opening percentage: 60 % or more

If the result is not as specified, check that the accelerator pedal position sensor (see step 4), wiring and ECM.

2. INSPECT THROTTLE CONTROL MOTOR RESISTANCE

- a. Disconnect the connector.
- b. Using an ohmmeter, measure the resistance between the terminals.

Resistance: 0.3 to 100 ohm at 20°C (68°F)



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Fig. 89: Measuring Resistance Between Terminals Using Ohmmeter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the result is not as specified, replace the throttle body.

3. INSPECT THROTTLE POSITION SENSOR (See DTC P0120: THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT MALFUNCTION, DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW INPUT, DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH INPUT, DTC P0220 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT MALFUNCTION, DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT LOW INPUT, DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT HIGH INPUT, DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A"/"B" VOLTAGE CORRECTION)

If necessary, replace the throttle body assembly (see REMOVAL and INSTALLATION).

4. INSPECT ACCELERATOR PEDAL POSITION SENSOR (See INSPECT ACCELERATOR PEDAL POSITION SENSOR)

If necessary, replace the accelerator pedal assembly (see REMOVAL and INSTALLATION).

2004 Toyota RAV4

2004 ENGINE PERFORMANCE SFI - RAV4

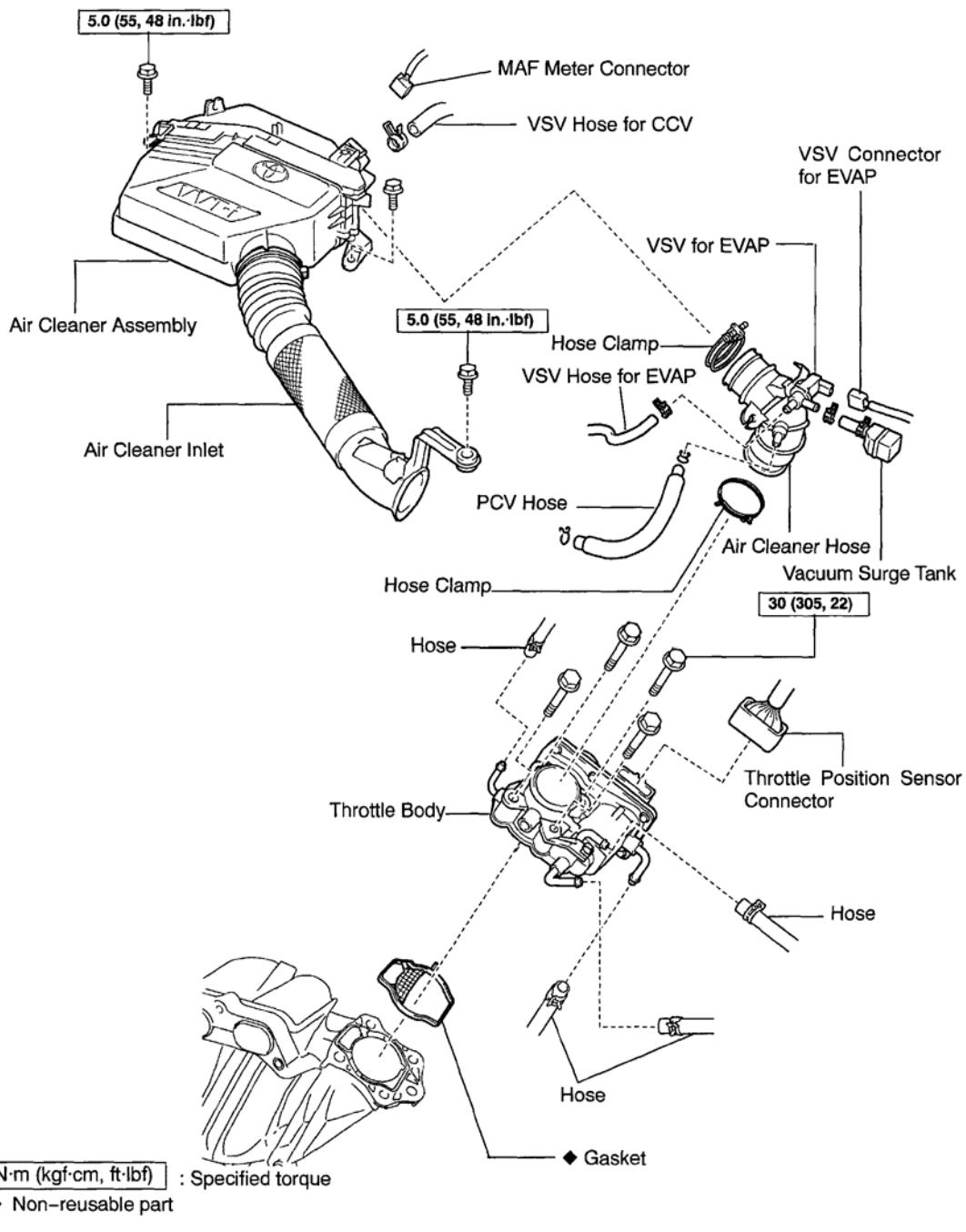


Fig. 90: Identifying SFI Throttle Body Components

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. DRAIN ENGINE COOLANT

2. REMOVE AIR CLEANER INLET AND AIR CLEANER ASSEMBLY WITH MAF METER

- a. Disconnect the MAF meter connector.
- b. Disconnect the VSV hose for CCV.
- c. Remove the 3 bolts and air cleaner inlet, air cleaner assembly and MAF meter together in one piece.

3. REMOVE AIR CLEANER HOSE AND PCV HOSE

- a. Disconnect the VSV connector for EVAP.
- b. Disconnect the VSV hose for EVAP.
- c. Disconnect the PCV hose.
- d. Remove the air cleaner hose.

4. REMOVE THROTTLE BODY

- a. Disconnect the throttle position sensor & control motor connector.

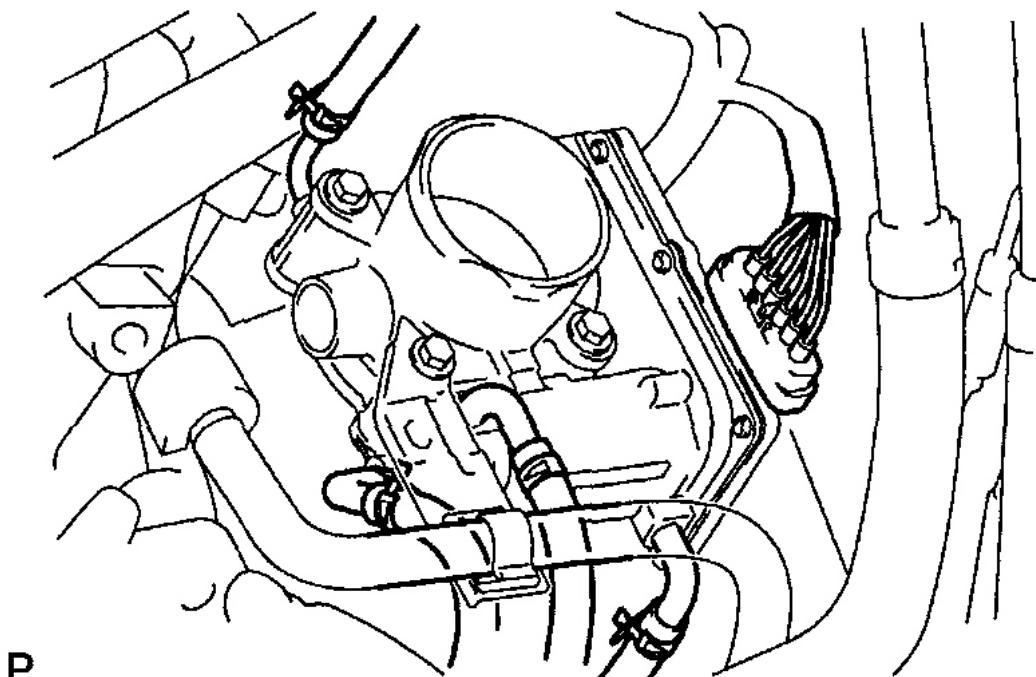
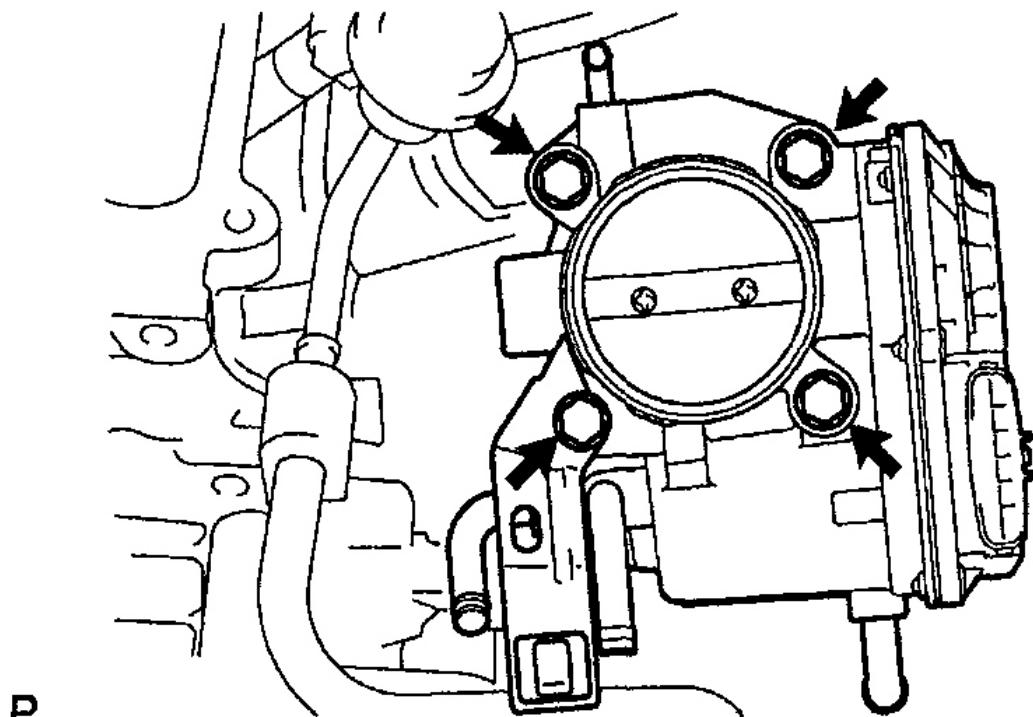


Fig. 91: Disconnecting Throttle Position Sensor & Control Motor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Disconnect the 5 hoses.
- c. Remove the 4 bolts, bracket and throttle body from the intake manifold.
- d. Remove the gasket.



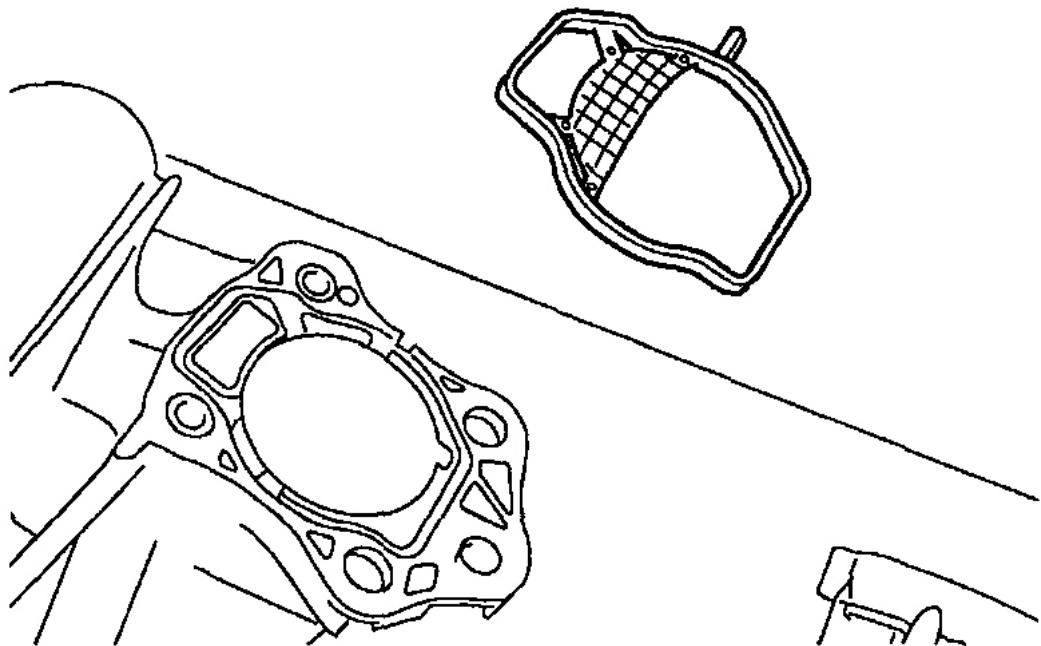
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Fig. 92: Removing Bolts, Bracket & Throttle Body From Intake Manifold
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. INSTALL THROTTLE BODY

- a. Install a new gasket on the intake manifold, as shown in **Fig. 93**.



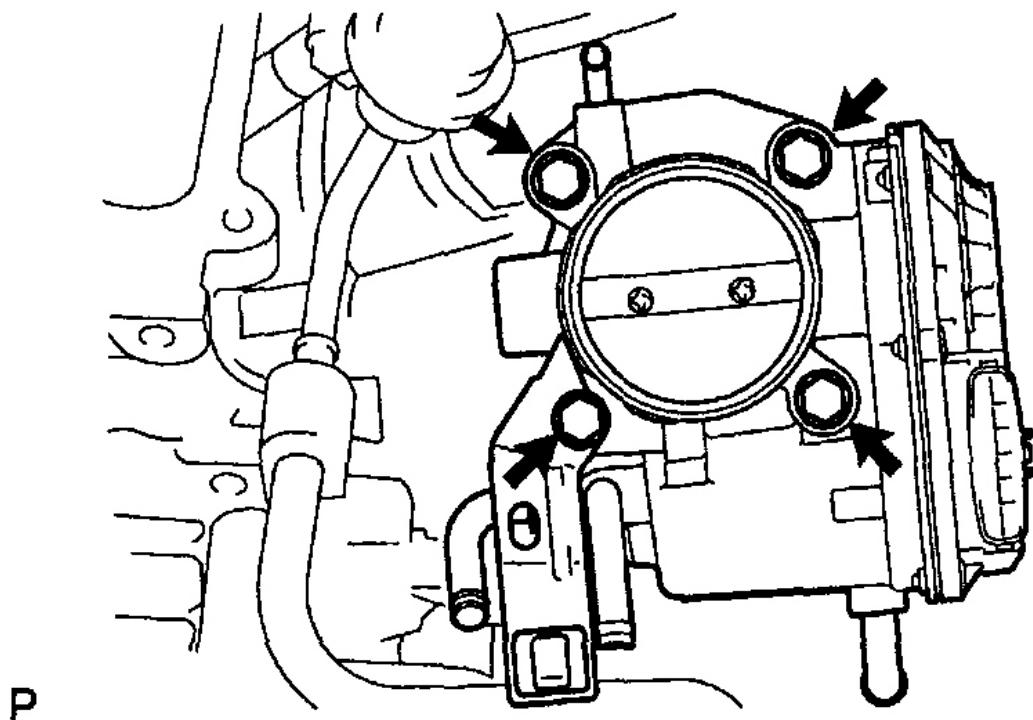
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Fig. 93: Installing Gasket On Intake Manifold

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the throttle body, bracket and fuel hose clamp with the 4 bolts.

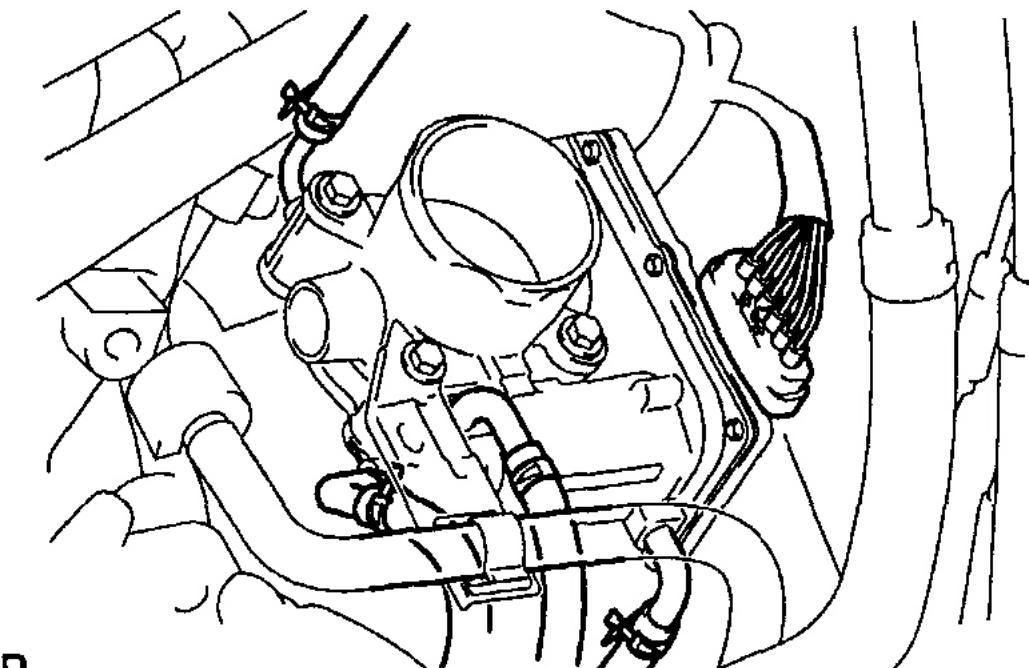
Torque: 30 N.m (305 kgf.cm, 22 ft.lbf)



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Fig. 94: Installing Throttle Body, Bracket & Fuel Hose Clamp With Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Connect the 5 hoses to the throttle body.
- d. Connect the throttle position sensor & control motor connector.



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Fig. 95: Connecting Throttle Position Sensor & Control Motor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSTALL AIR CLEANER HOSE
3. INSTALL AIR CLEANER ASSEMBLY WITH MAF METER AND BRACKET
4. FILL RADIATOR WITH ENGINE COOLANT

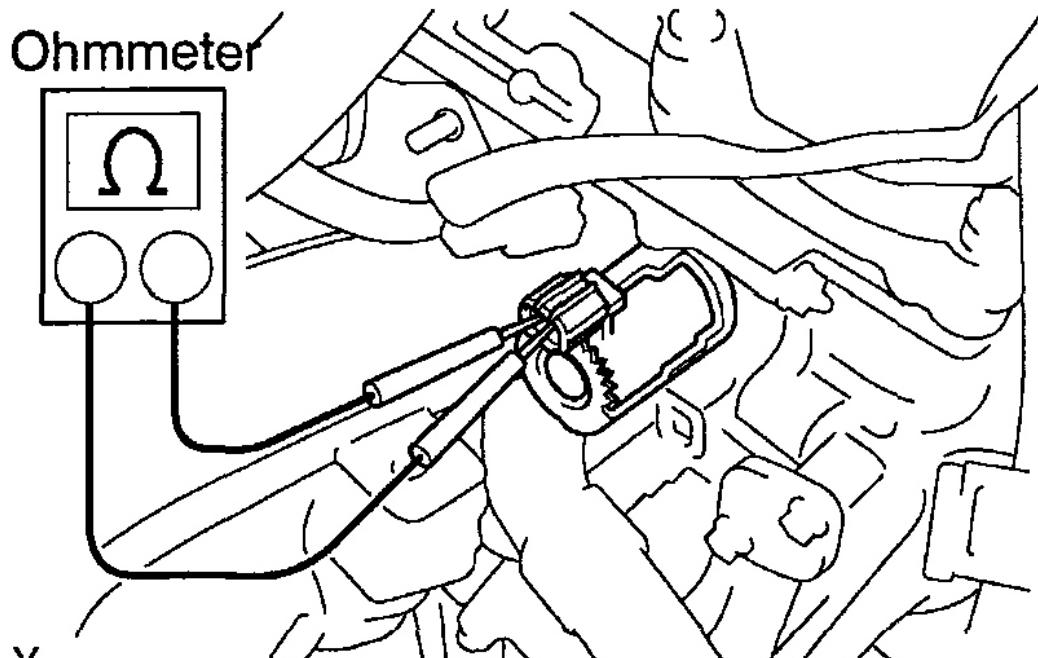
CAMSHAFT TIMING OIL CONTROL VALVE

ON-VEHICLE INSPECTION

Inspect Camshaft Timing Oil Control Valve (OCV) Resistance

- a. Disconnect the OCV connector.
- b. Using an ohmmeter, measure the resistance between the terminals.

Resistance: 6.9 to 7.9 ohm at 20°C (68°F)



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Fig. 96: Measuring Resistance Between Terminals Using Ohmmeter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the resistance is not as specified, replace the OCV.

- c. Reconnect the OCV connector.

COMPONENTS

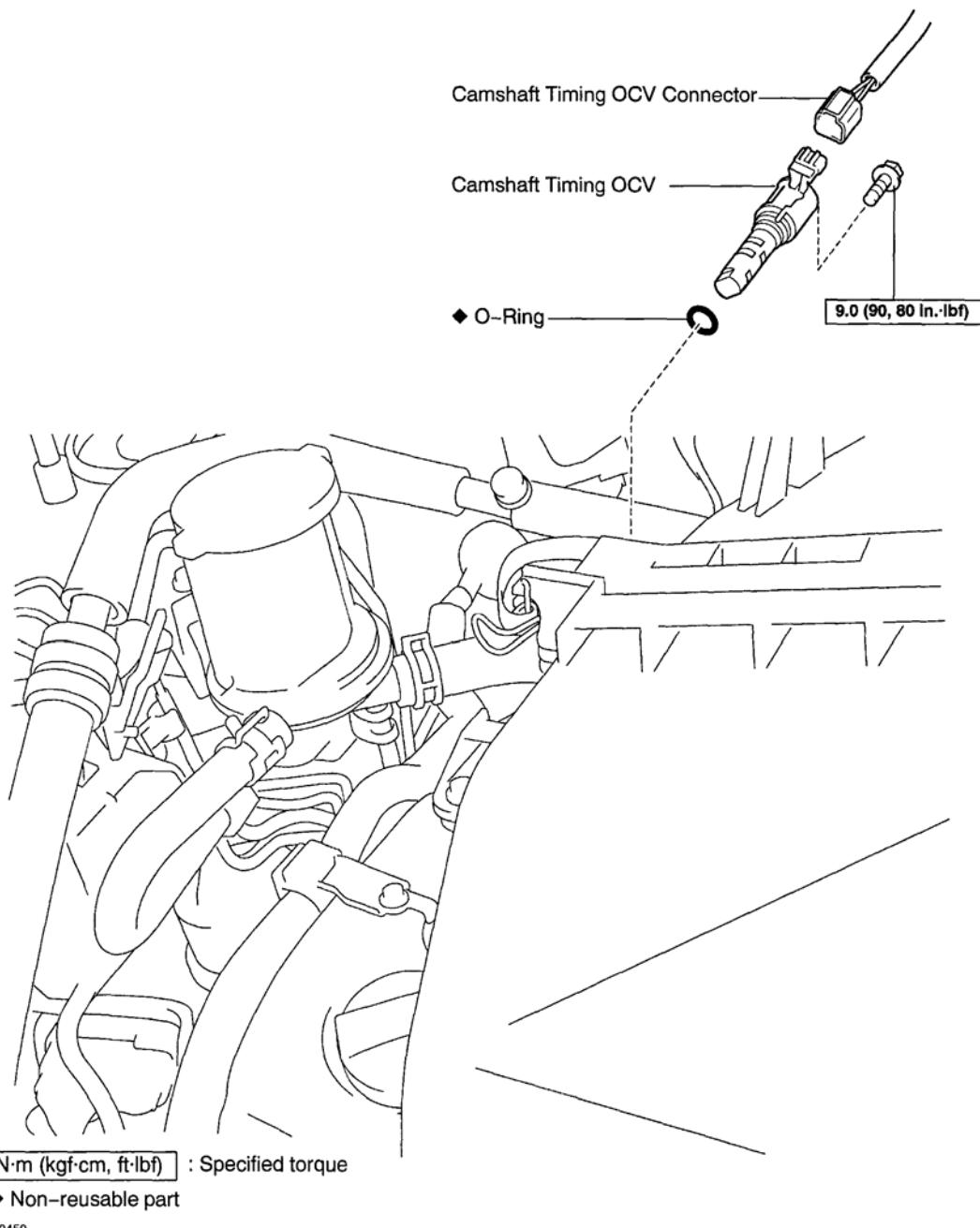


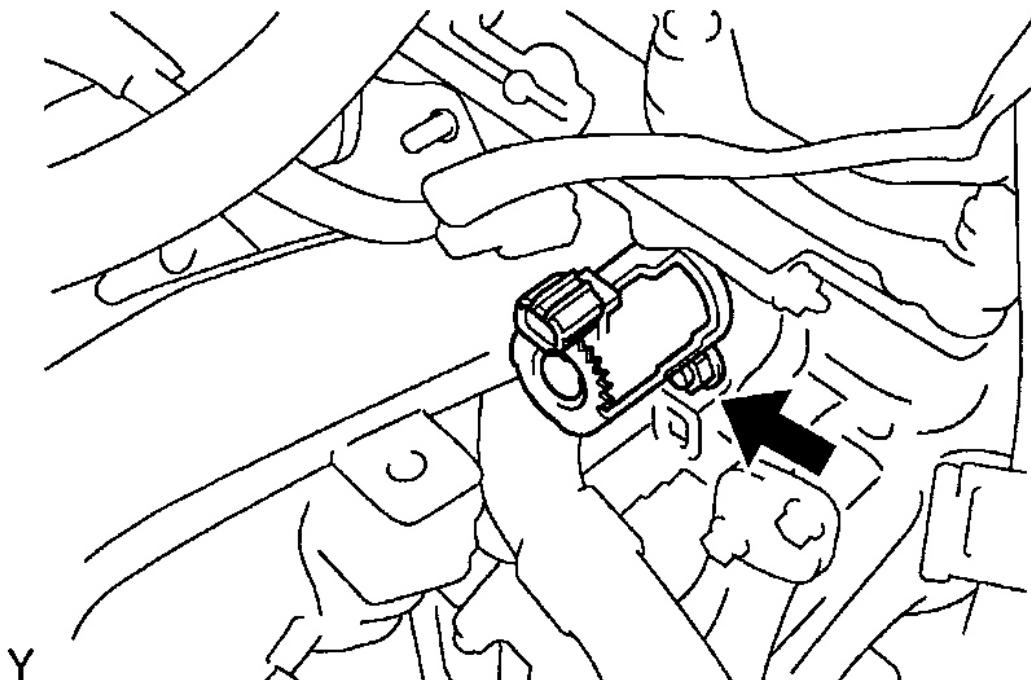
Fig. 97: Identifying Camshaft Timing Oil Control Valve Components
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE (OCV)

- a. Disconnect the OCV connector.
- b. Remove the bolt and OCV.

- c. Remove the O-ring from the OCV.

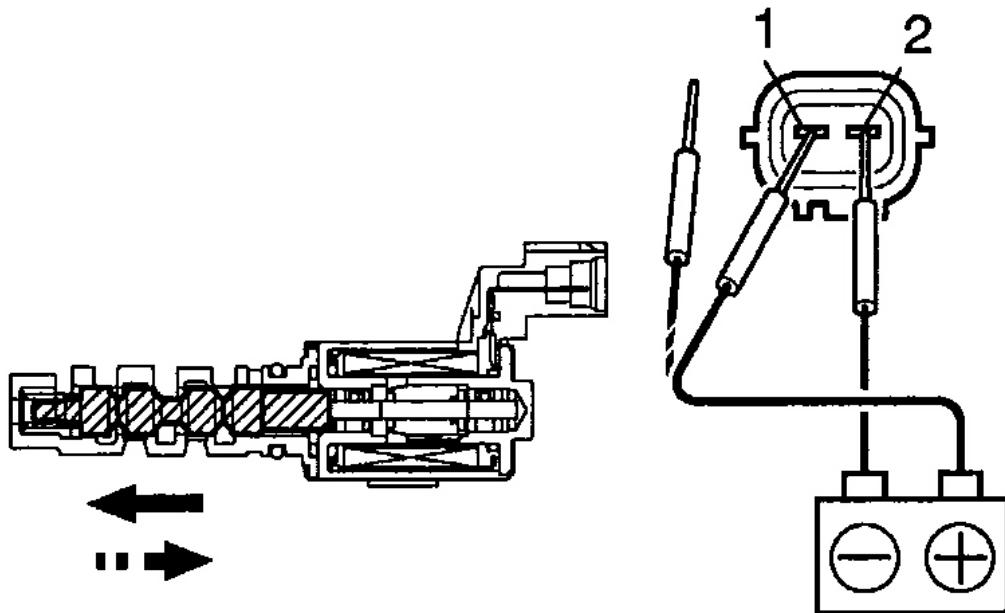


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Fig. 98: Removing Camshaft Timing Oil Control Valve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSPECT CAMSHAFT TIMING OIL CONTROL VALVE (OCV) OPERATION

Connect the battery's positive (+) lead to terminal 1 and negative (-) lead to terminal 2. Check the movement of the valve as shown in Fig. 99 and Fig. 100.



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Fig. 99: Connecting Battery Positive Lead To Terminal 1 And Negative Lead To Terminal 2
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Battery positive voltage is applied	Valve moves in direction
Battery positive voltage is cut off	Valve moves in direction

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Fig. 100: Battery Voltage Specification Table
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If operation is not as specified, replace the OCV.

3. REINSTALL CAMSHAFT OIL CONTROL VALVE (OCV)

- Install a new O-ring to the OCV.

- b. Install the OCV completely, and tighten the bolt.

Torque: 9.0 N.m (90 kgf.cm, 80 in.lbf)

- c. Connect the OCV connector.

EFI MAIN RELAY

INSPECTION

1. REMOVE RELAY BOX COVER
2. REMOVE EFI MAIN RELAY

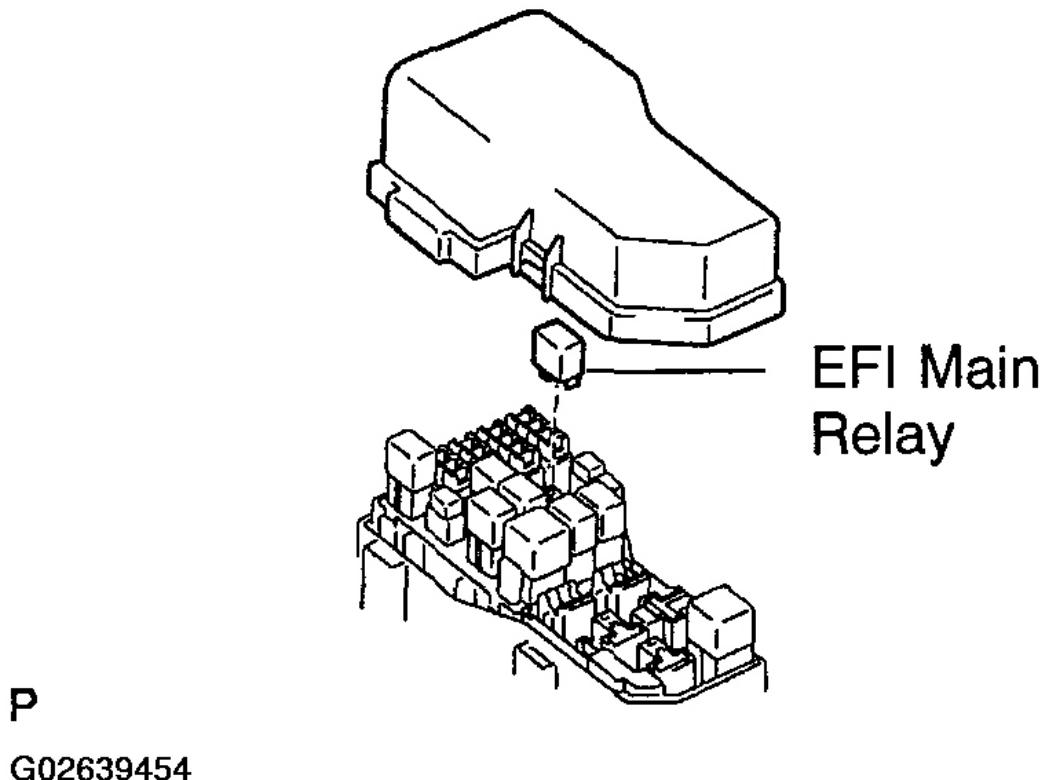


Fig. 101: Removing Relay Box Cover & EFI Main Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

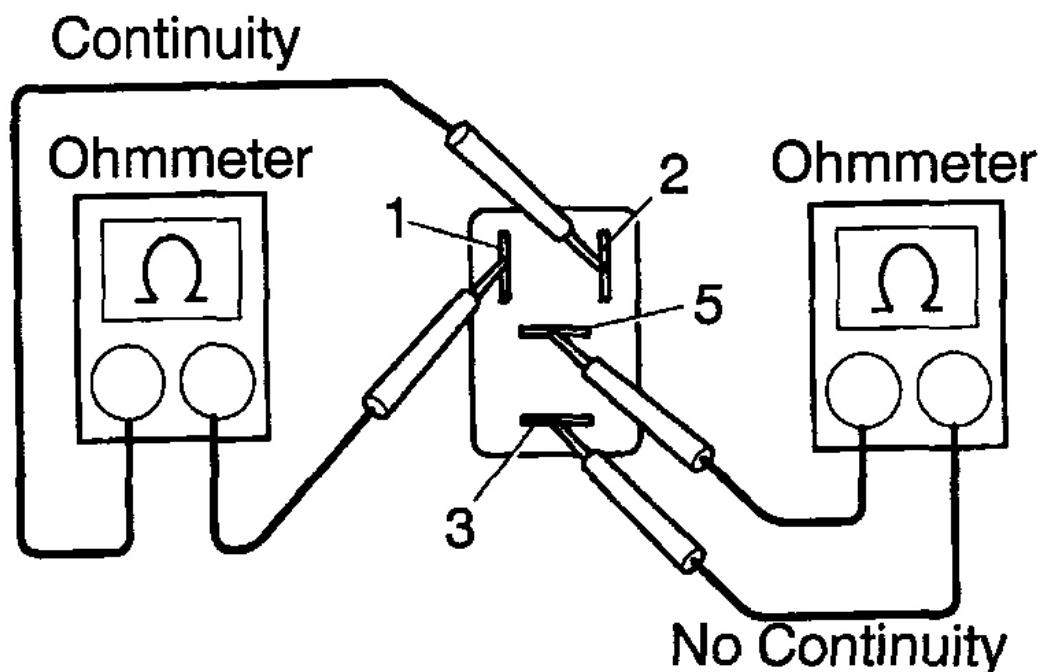
3. INSPECT EFI MAIN RELAY

- a. Inspect the relay continuity.

1. Using an ohmmeter, check that there is continuity between terminals 1 and 2.

If there is no continuity, replace the relay.

2. Check that there is no continuity between terminals 3 and 5.



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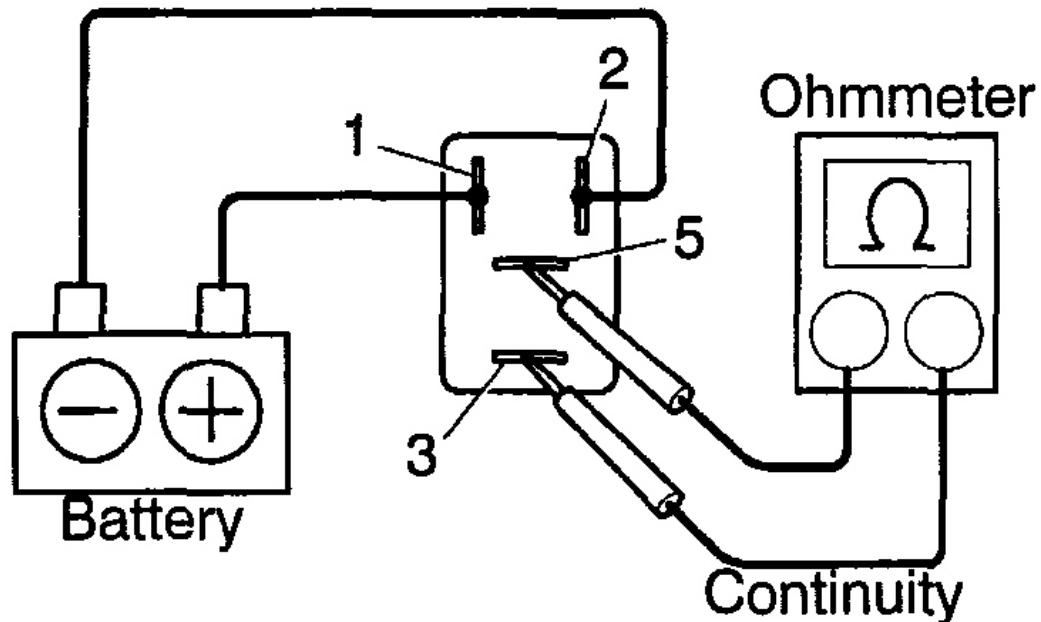
Fig. 102: Checking Continuity Between Terminals 1 + 2 & No Continuity Between Terminals 3 + 5 Using Ohmmeter

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If there is continuity, replace the relay.

- b. Inspect the relay operation.

1. Apply battery positive voltage to terminals 1 and 2.
2. Using an ohmmeter, check that there is continuity between terminals 3 and 5.



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Fig. 103: Checking Continuity Between Terminals 3 + 5 Using Ohmmeter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

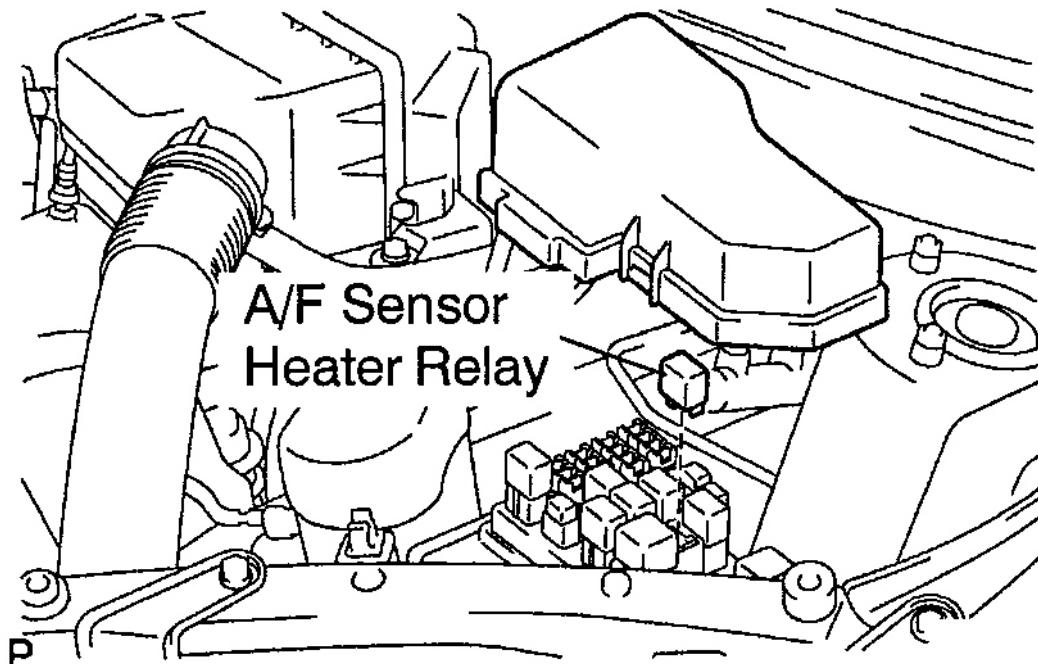
If there is no continuity, replace the relay.

4. REINSTALL EFI MAIN RELAY
5. REINSTALL RELAY BOX COVER

A/F SENSOR HEATER RELAY

INSPECTION

1. REMOVE RELAY BOX COVER
2. REMOVE A/F SENSOR HEATER RELAY (Marking: A/F)



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Fig. 104: Removing Relay Box Cover & A/F Sensor Heater Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. INSPECT A/F SENSOR HEATER RELAY

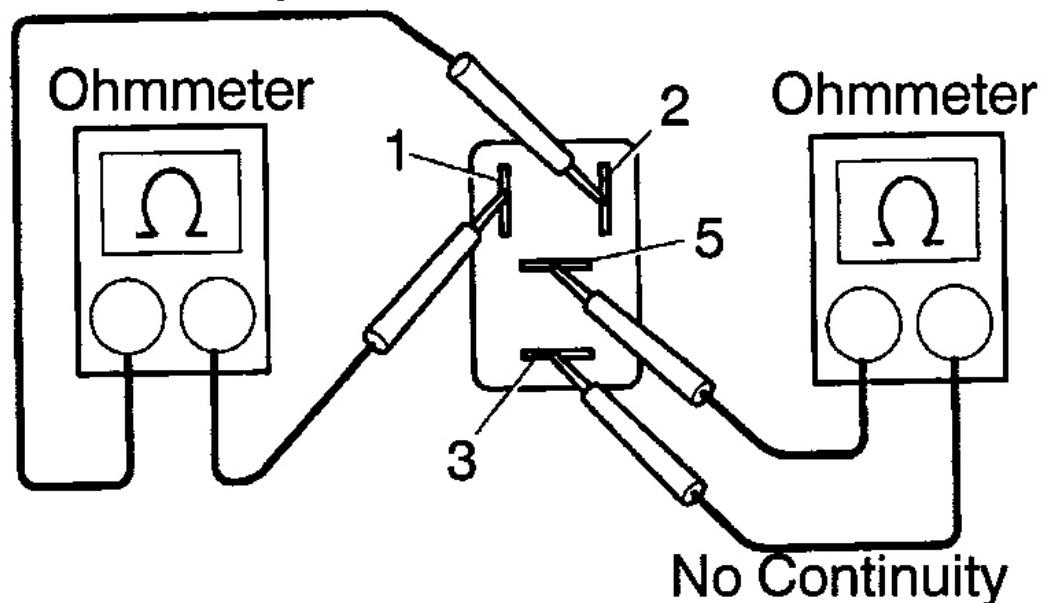
a. Inspect the relay continuity.

1. Using an ohmmeter, check that there is continuity between terminals 1 and 2.

If there is no continuity, replace the relay.

2. Check that there is no continuity between terminals 3 and 5.

Continuity

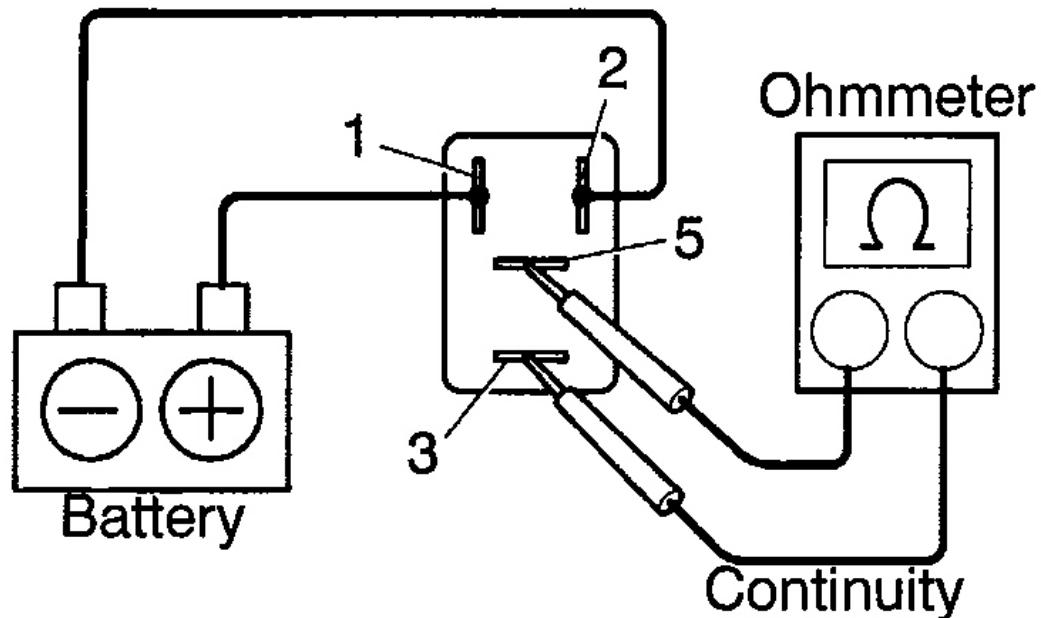


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Fig. 105: Checking Continuity Between Terminals 1 + 2 & No Continuity Between Terminals 3 + 5 Using Ohmmeter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If there is continuity, replace the relay.

- b. Inspect the relay operation.
 1. Apply battery positive voltage to terminals 1 and 2.
 2. Using an ohmmeter, check that there is continuity between terminals 3 and 5.



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Fig. 106: Checking Continuity Between Terminals 3 + 5 Using Ohmmeter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

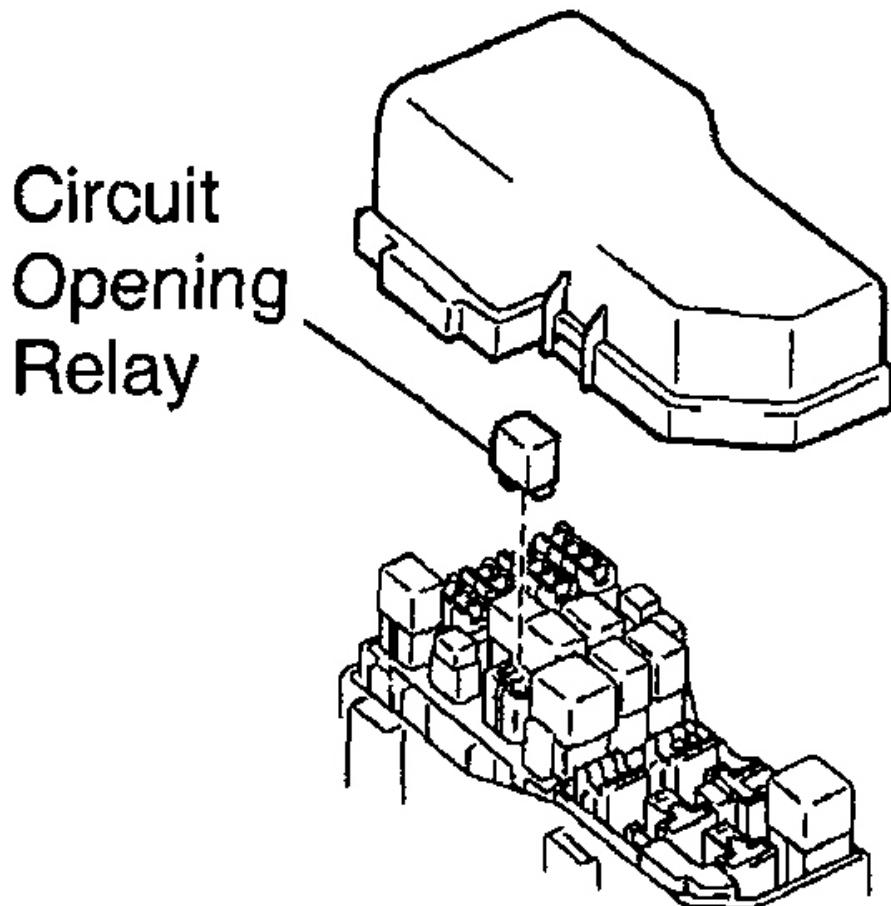
If there is no continuity, replace the relay.

4. REINSTALL A/F SENSOR HEATER RELAY
5. REINSTALL RELAY BOX COVER

CIRCUIT OPENING RELAY

INSPECTION

1. REMOVE RELAY BOX COVER
2. REMOVE CIRCUIT OPENING RELAY (Marking: C/OPN)



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Fig. 107: Removing Relay Box Cover & Circuit Opening Relay

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. INSPECT CIRCUIT OPENING RELAY

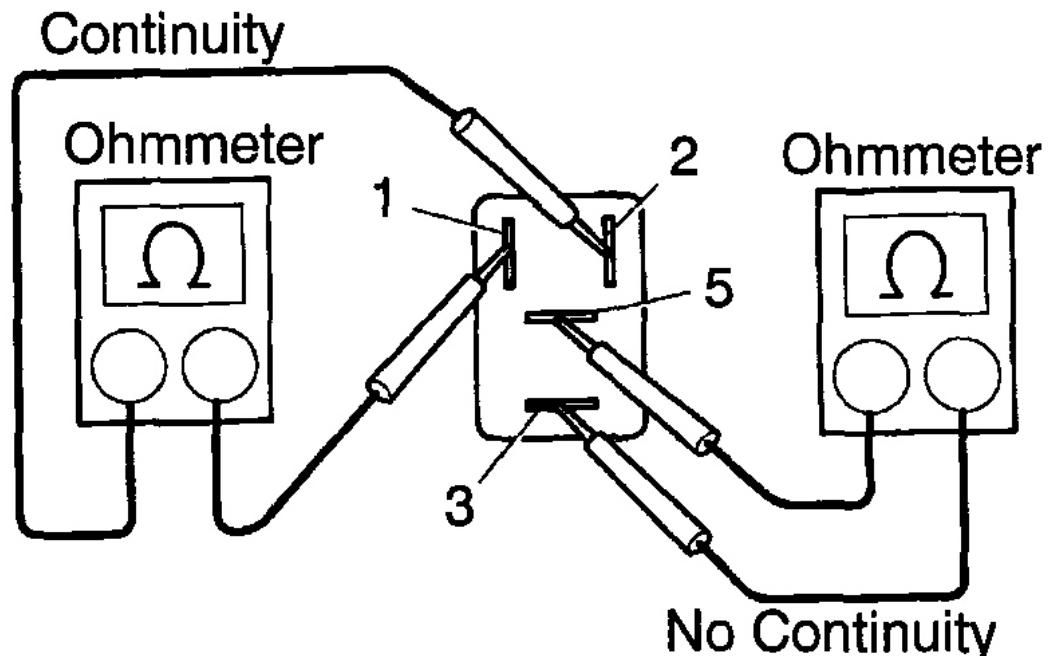
a. Inspect the relay continuity.

1. Using an ohmmeter, check that there is continuity between terminals 1 and 2.

If there is no continuity, replace the relay.

2. Check that there is no continuity between terminals 3 and 5.

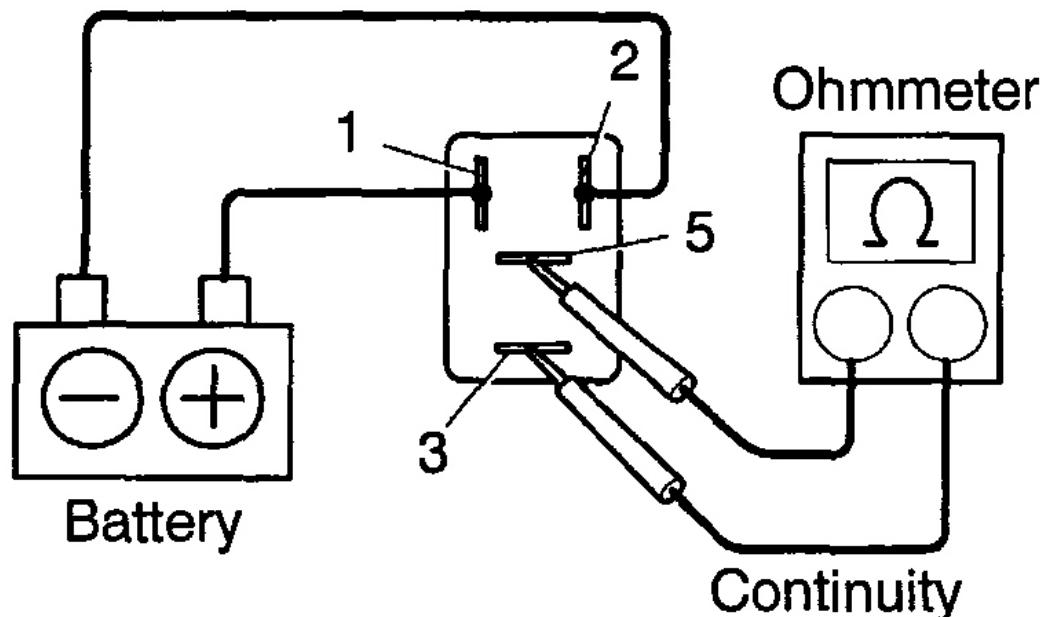
If there is continuity, replace the relay.



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Fig. 108: Checking Continuity Between Terminals 1 + 2 & No Continuity Between Terminals 3 + 5 Using Ohmmeter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Inspect the relay operation.
 1. Apply battery positive voltage to terminals 1 and 2.
 2. Using an ohmmeter, check that there is continuity between terminals 3 and 5.



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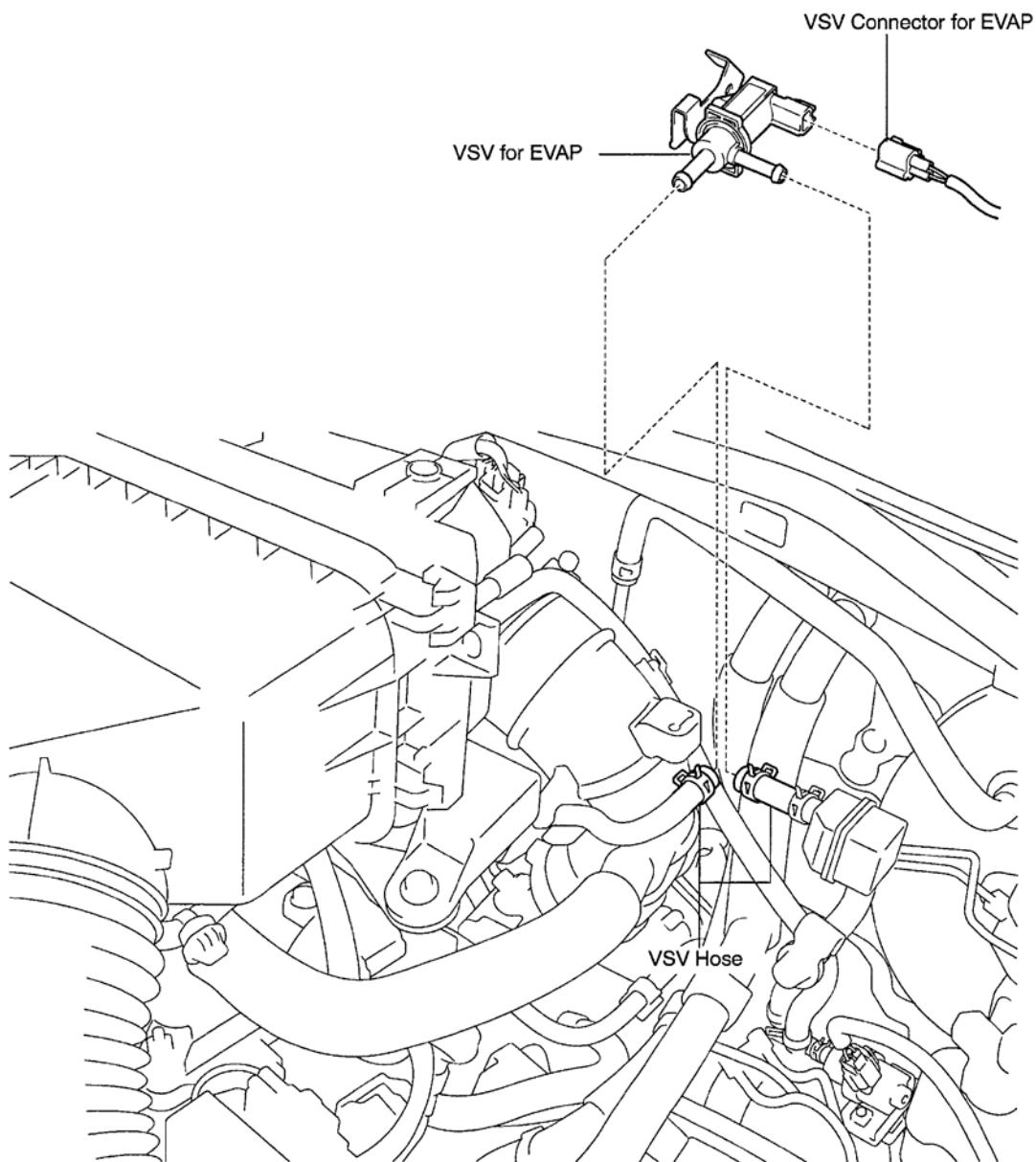
Fig. 109: Checking Continuity Between Terminals 3 + 5 Using Ohmmeter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If there is no continuity, replace the relay.

4. REINSTALL CIRCUIT OPENING RELAY
5. REINSTALL RELAY BOX COVER

VSV FOR EVAPORATIVE EMISSION (EVAP)

COMPONENTS



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Fig. 110: Identifying VSV For Evaporative Emission (EVAP) Components
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. REMOVE VSV
2. INSPECT VSV

- a. Inspect the VSV for open circuit.

Using an ohmmeter, check that there is continuity between the terminals.

Resistance: 30 to 34 ohm at 20°C (68°F)

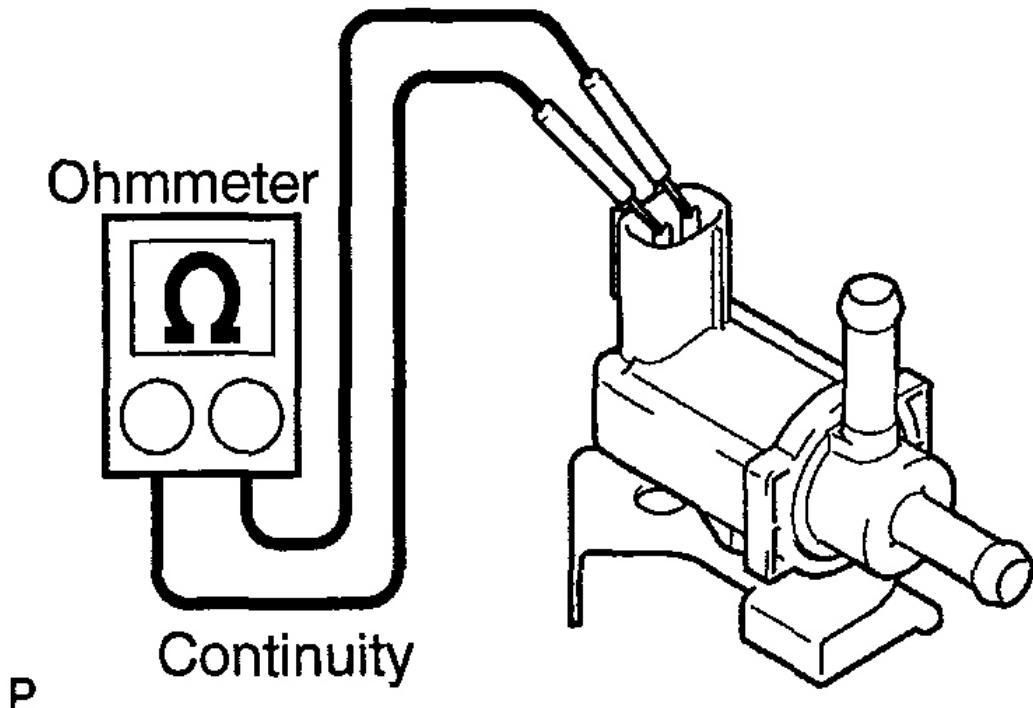
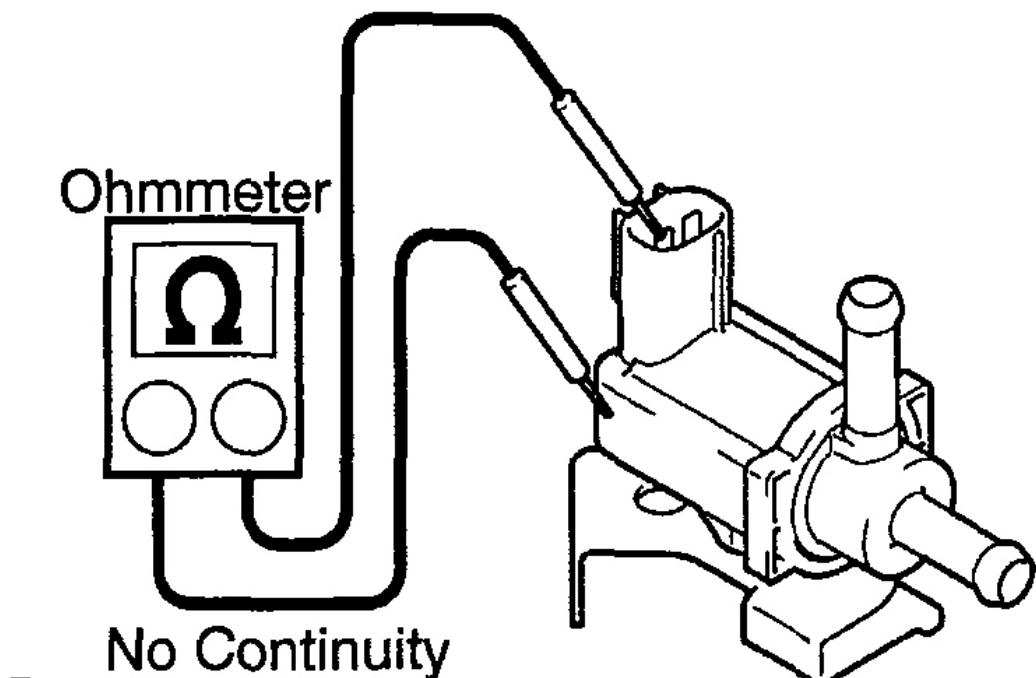


Fig. 111: Checking Continuity Between Terminals Using Ohmmeter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If there is no continuity, replace the VSV.

- b. Inspect the VSV for ground.

Using an ohmmeter, check that there is no continuity between each terminal and the VSV body.



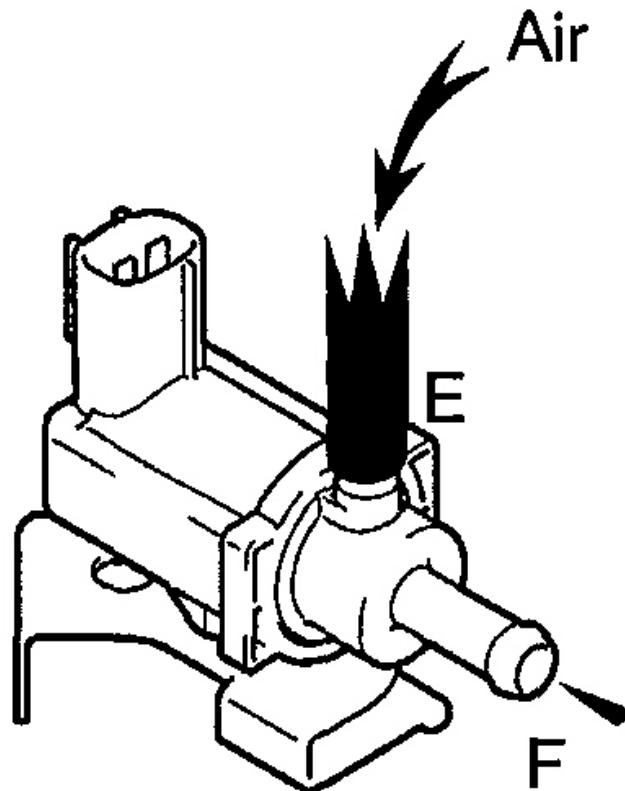
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Fig. 112: Checking For No Continuity Between Each Terminal And VSV Body Using Ohmmeter

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If there is continuity, replace the VSV.

- c. Inspect the VSV operation.
 1. Check that air flows with a little difficulty from ports E to F.



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Fig. 113: Checking Air Flows From Ports E To F

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Apply battery positive voltage to the terminals.
3. Check that air flows from ports E to F.

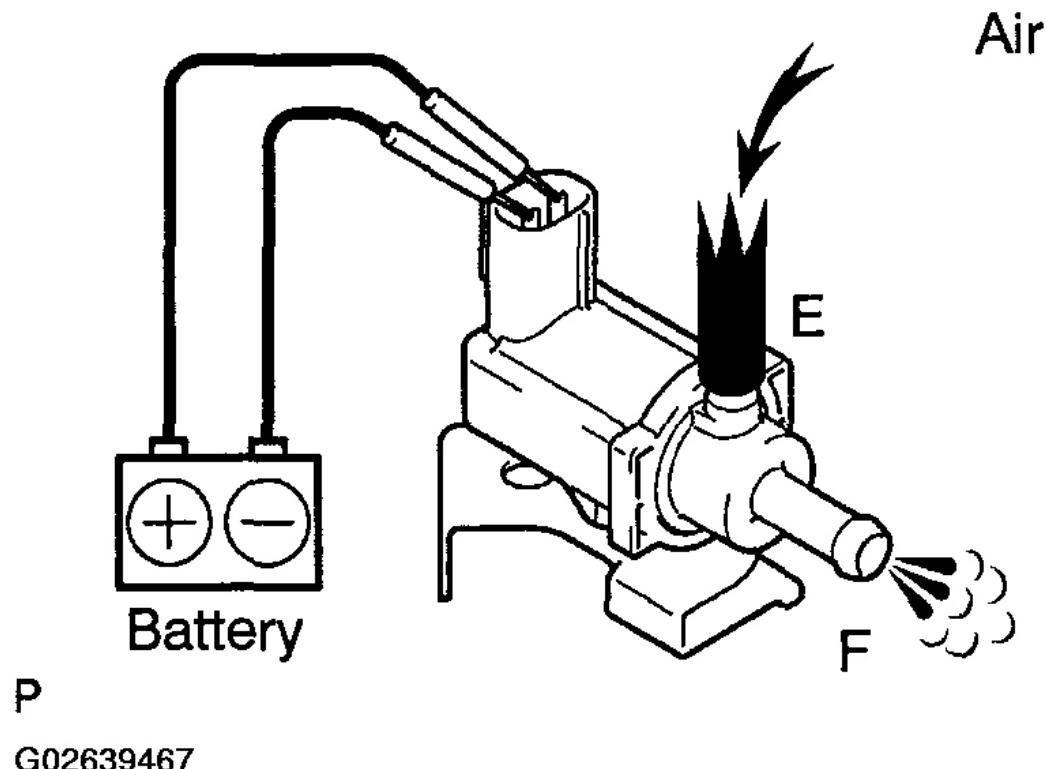


Fig. 114: Applying Battery Positive Voltage To Terminals & Checking Air Flows From Ports E To F

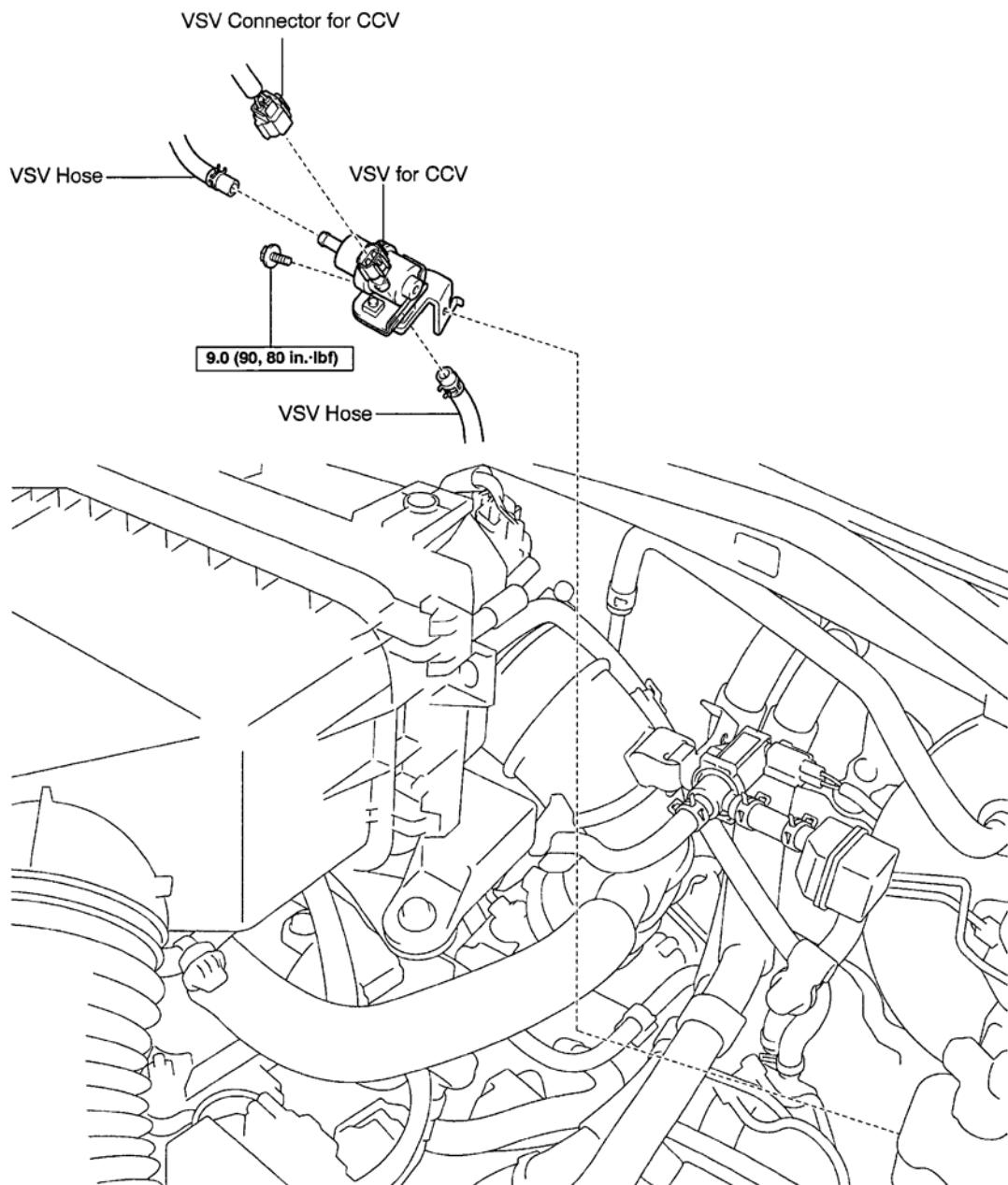
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the operation is not as specified, replace the VSV.

3. REINSTALL VSV

VSV FOR CANISTER CLOSED VALVE (CCV)

COMPONENTS



μ N·m (kgf·cm, ft-lbf) : Specified torque

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Fig. 115: Identifying VSV For Canister Closed Valve (CCV) Components
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. REMOVE VSV

2. INSPECT VSV

- Inspect the VSV for open circuit.

Using an ohmmeter, measure the resistance between the terminals.

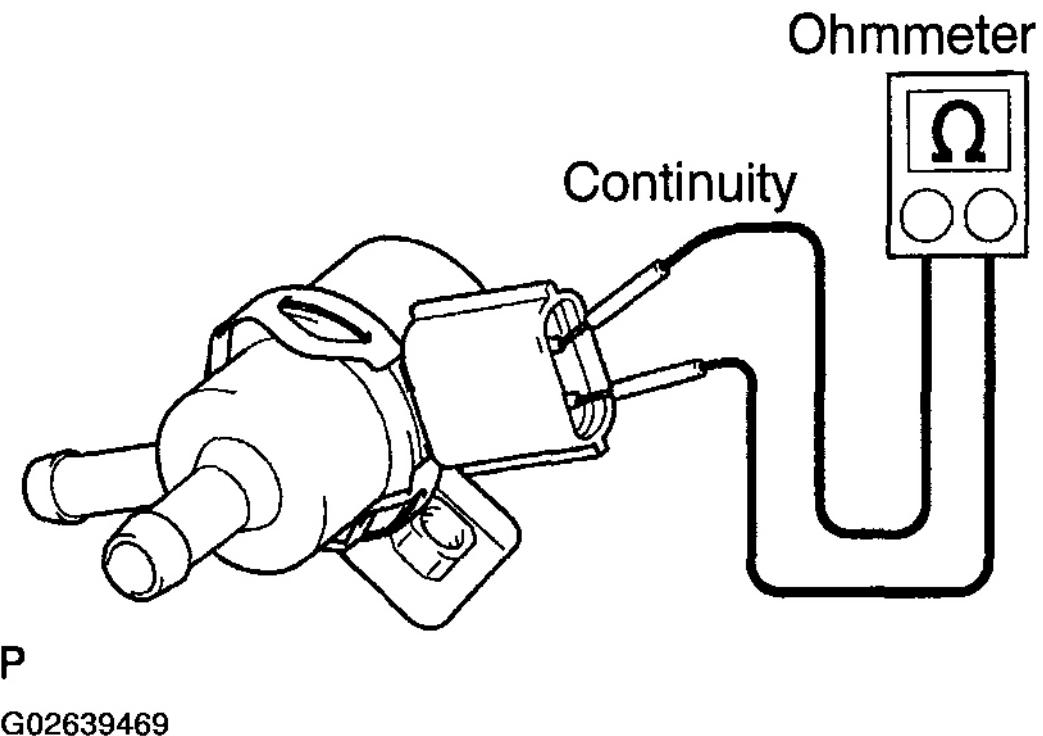


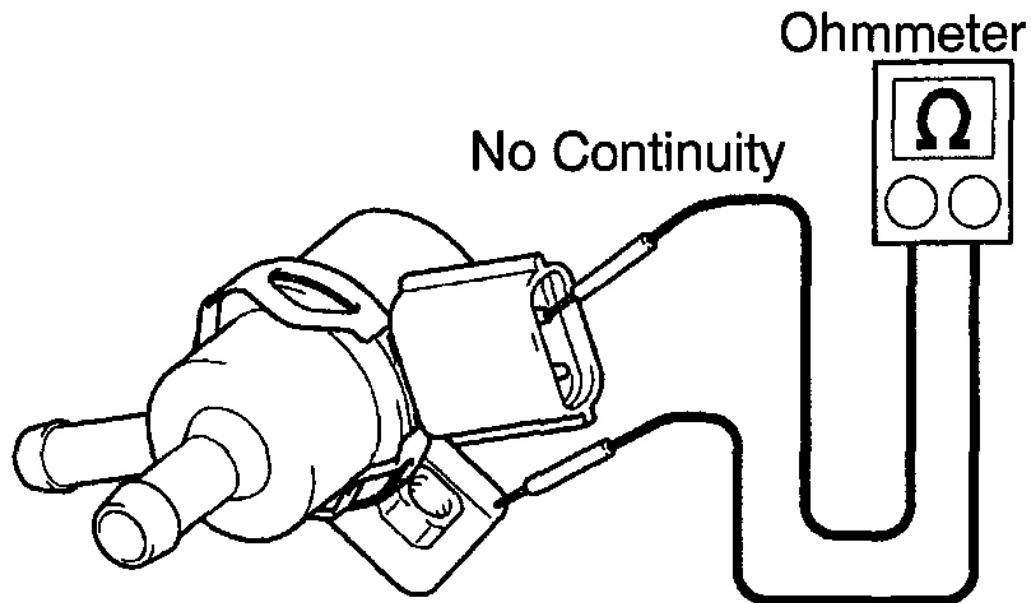
Fig. 116: Measuring Resistance Between Terminals Using Ohmmeter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Resistance: 25 to 30 ohm at 20°C (68°F)

If the result is not as specified, replace the VSV.

- Inspect the VSV for ground.

Using an ohmmeter, check that there is no continuity between each terminal and the VSV body.



P

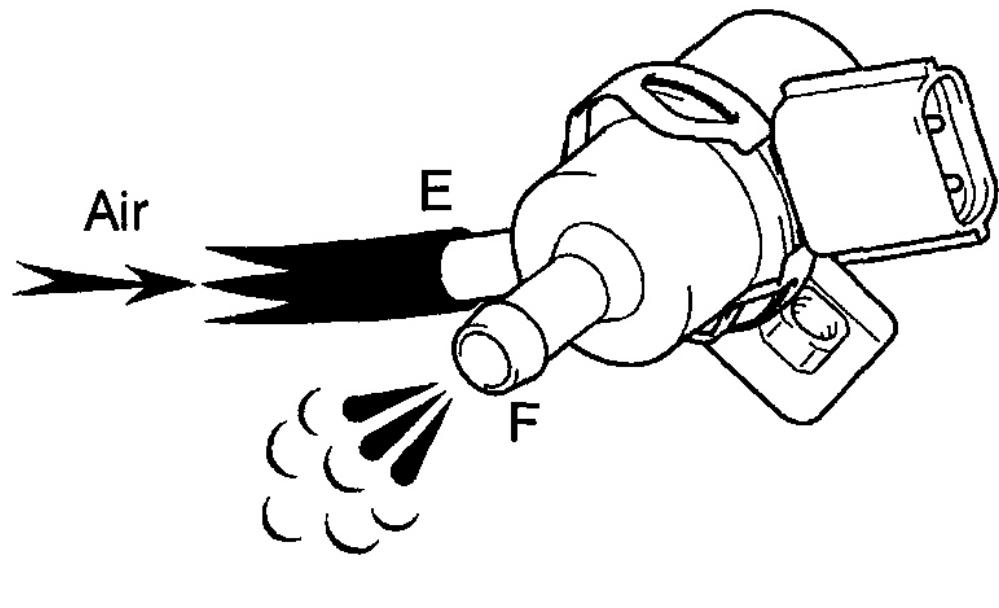
G02639470

Fig. 117: Checking For No Continuity Between Each Terminal And VSV Body Using Ohmmeter

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If there is continuity, replace the VSV.

- c. Inspect the VSV operation.
 1. Check that air flows from ports E to F.

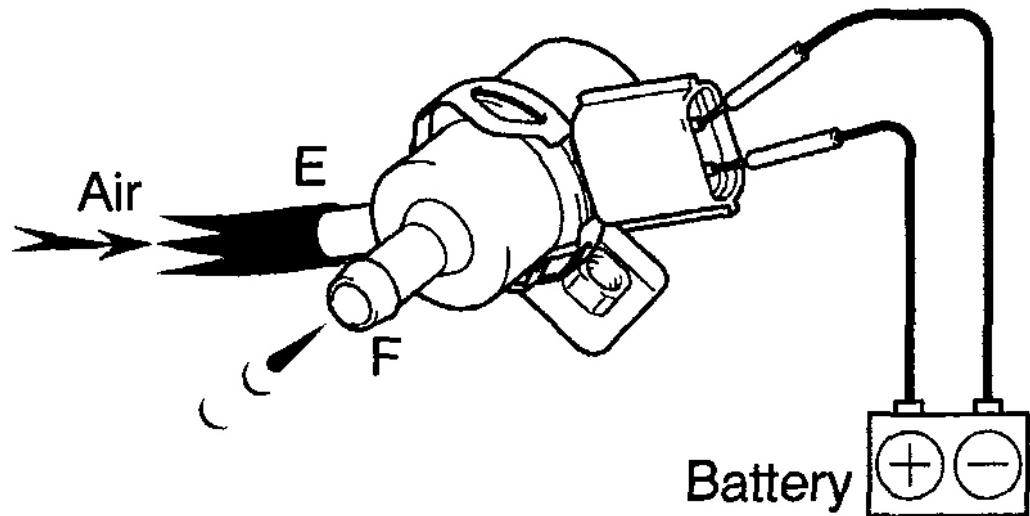


G02639471

Fig. 118: Checking Air Flows From Ports E To F

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Apply battery positive voltage to the terminals.
3. Check that air does not flow from ports E to F.



P

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Fig. 119: Applying Battery Positive Voltage To Terminals & Checking Air Flows From Ports E To F

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the operation is not as specified, replace the VSV.

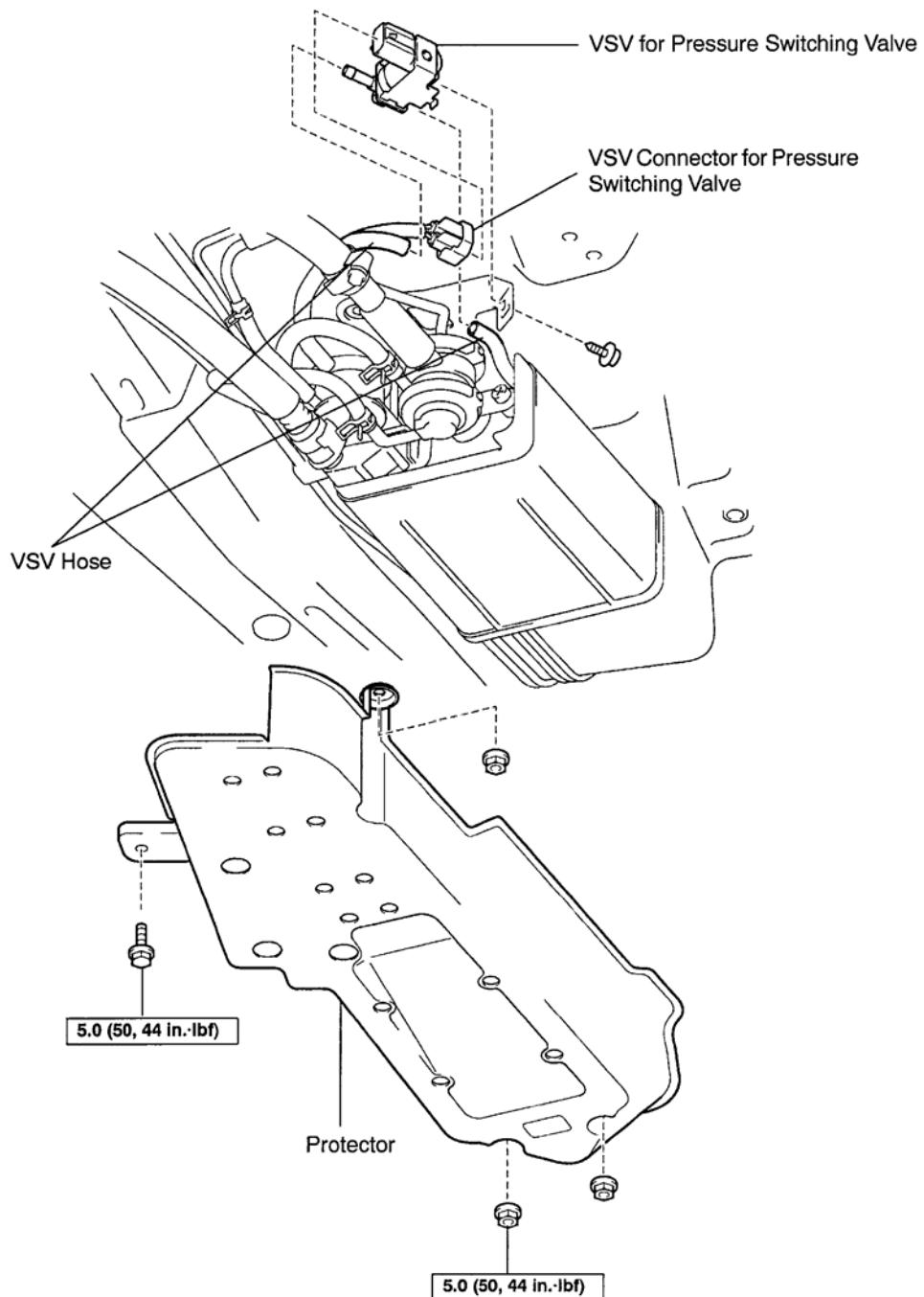
3. REINSTALL VSV

VSV FOR PRESSURE SWITCHING VALVE

COMPONENTS

2004 Toyota RAV4

2004 ENGINE PERFORMANCE SFI - RAV4



P N·m (kgf·cm, ft·lbf) : Specified torque

G02639473

Fig. 120: Identifying VSV For Pressure Switching Valve Components
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. REMOVE VSV**2. INSPECT VSV**

- a. Inspect the VSV for open circuit.

Using an ohmmeter, measure the resistance between the terminals.

Resistance: 30 to 36 ohm at 20°C (68°F)

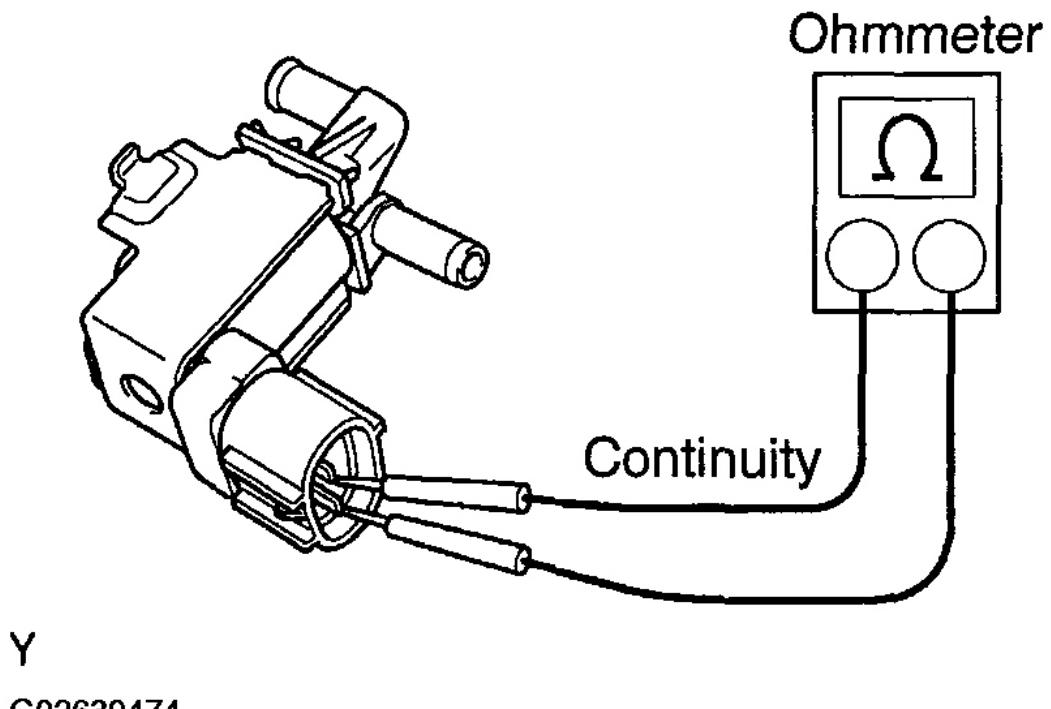
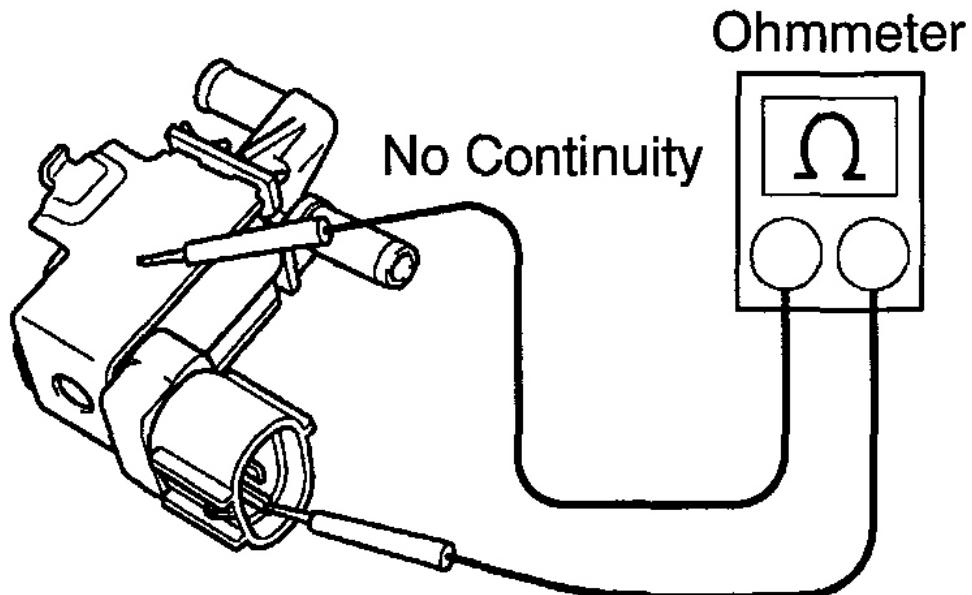


Fig. 121: Measuring Resistance Between Terminals Using Ohmmeter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the result is not as specified, replace the VSV.

- b. Inspect the VSV for ground.

Using an ohmmeter, check that there is no continuity between each terminal and the VSV body.



Y

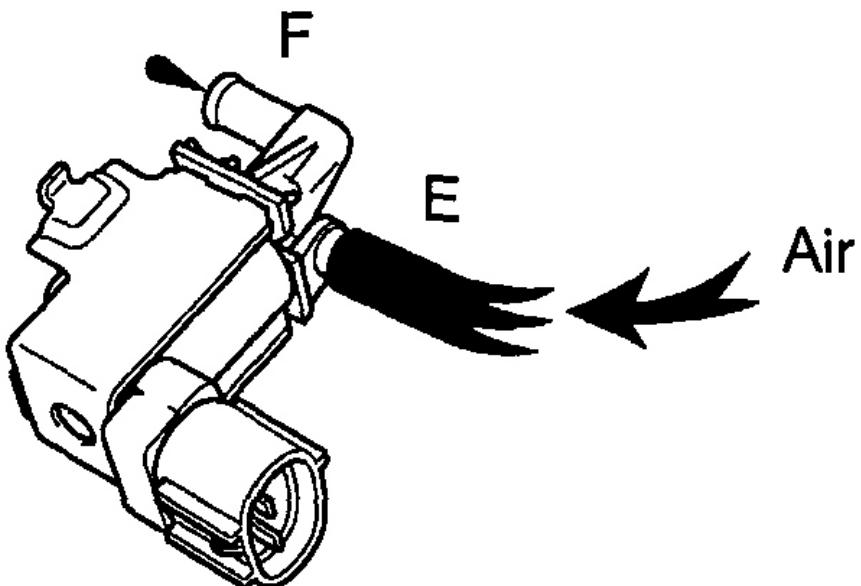
G02639475

Fig. 122: Checking For No Continuity Between Each Terminal And VSV Body Using Ohmmeter

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the result is not as specified, replace the VSV.

- c. Inspect the VSV operation.
 1. Check that air does not flow from ports E to F.

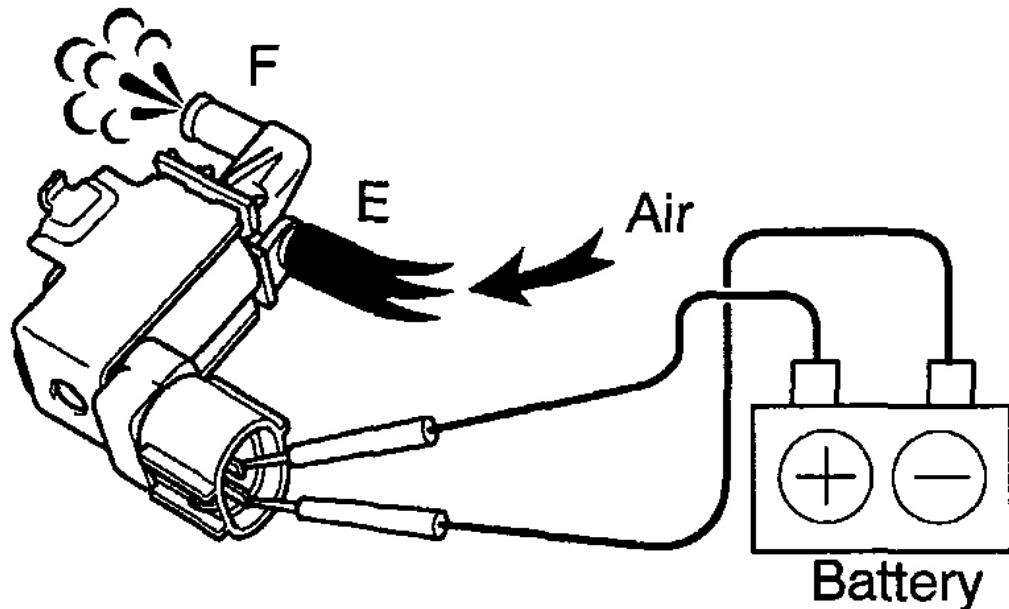


Y

G02639476

Fig. 123: Checking Air Does Not Flow From Ports E To F
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Apply battery positive voltage to the terminals.
3. Check that air flows from ports E to F.



Y

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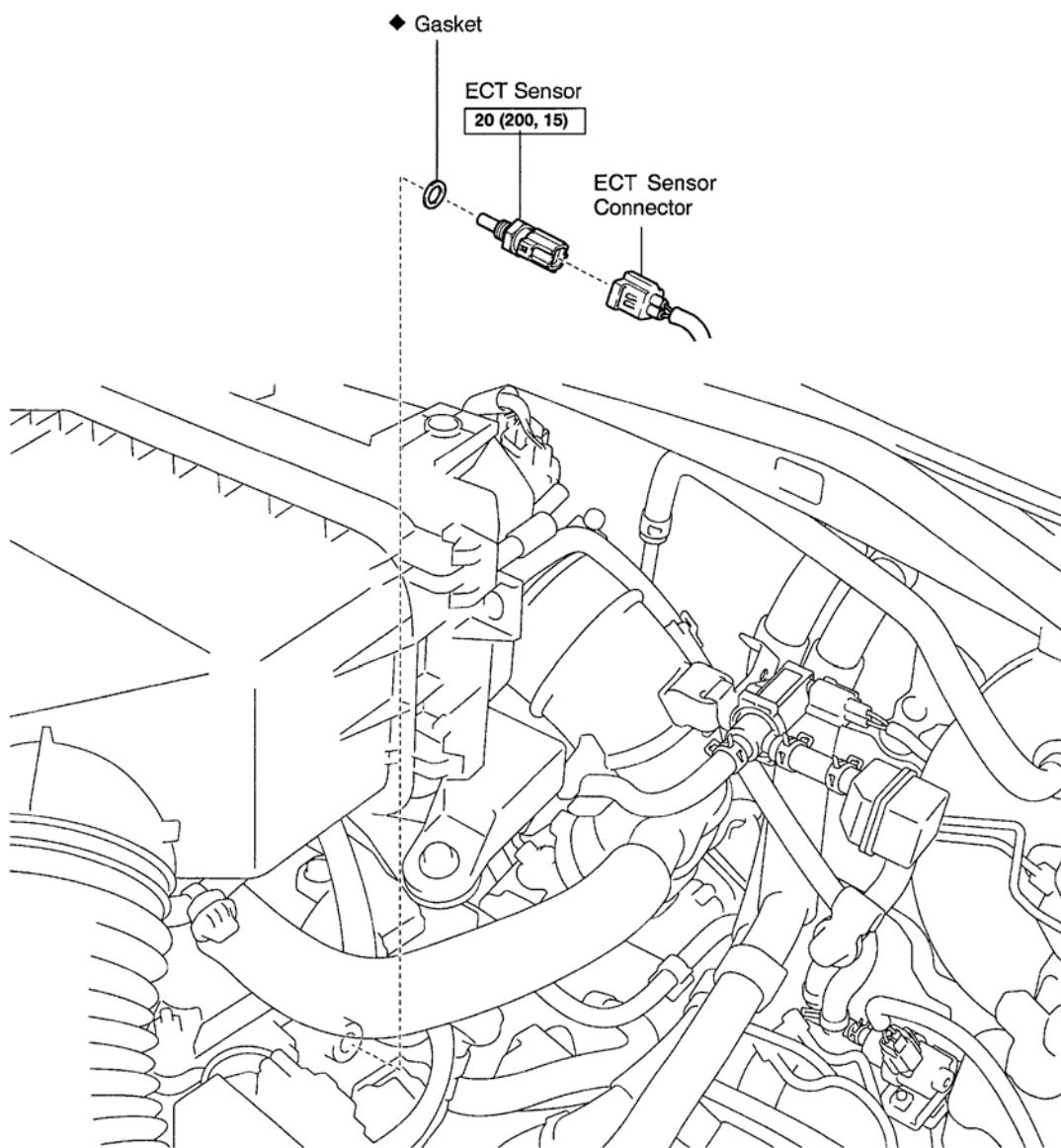
Fig. 124: Applying Battery Positive Voltage To Terminals & Checking Air Flows From Ports E To F
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the operation is not as specified, replace the VSV.

3. REINSTALL VSV

ENGINE COOLANT TEMPERATURE (ECT) SENSOR

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque

p ◆ Non-reusable part

G02639478

Fig. 125: Identifying Engine Coolant Temperature (ECT) Sensor Components
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. DRAIN ENGINE COOLANT
2. REMOVE ECT SENSOR
 - a. Disconnect the sensor connector.

- b. Using a 19 mm deep socket wrench, remove the sensor and gasket.

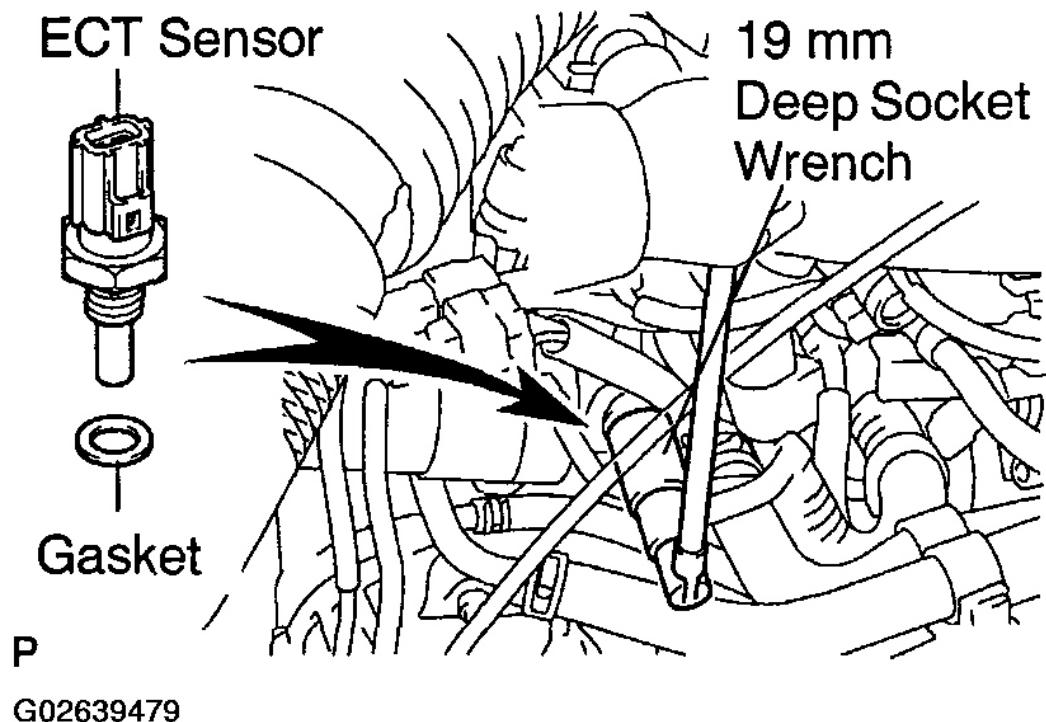


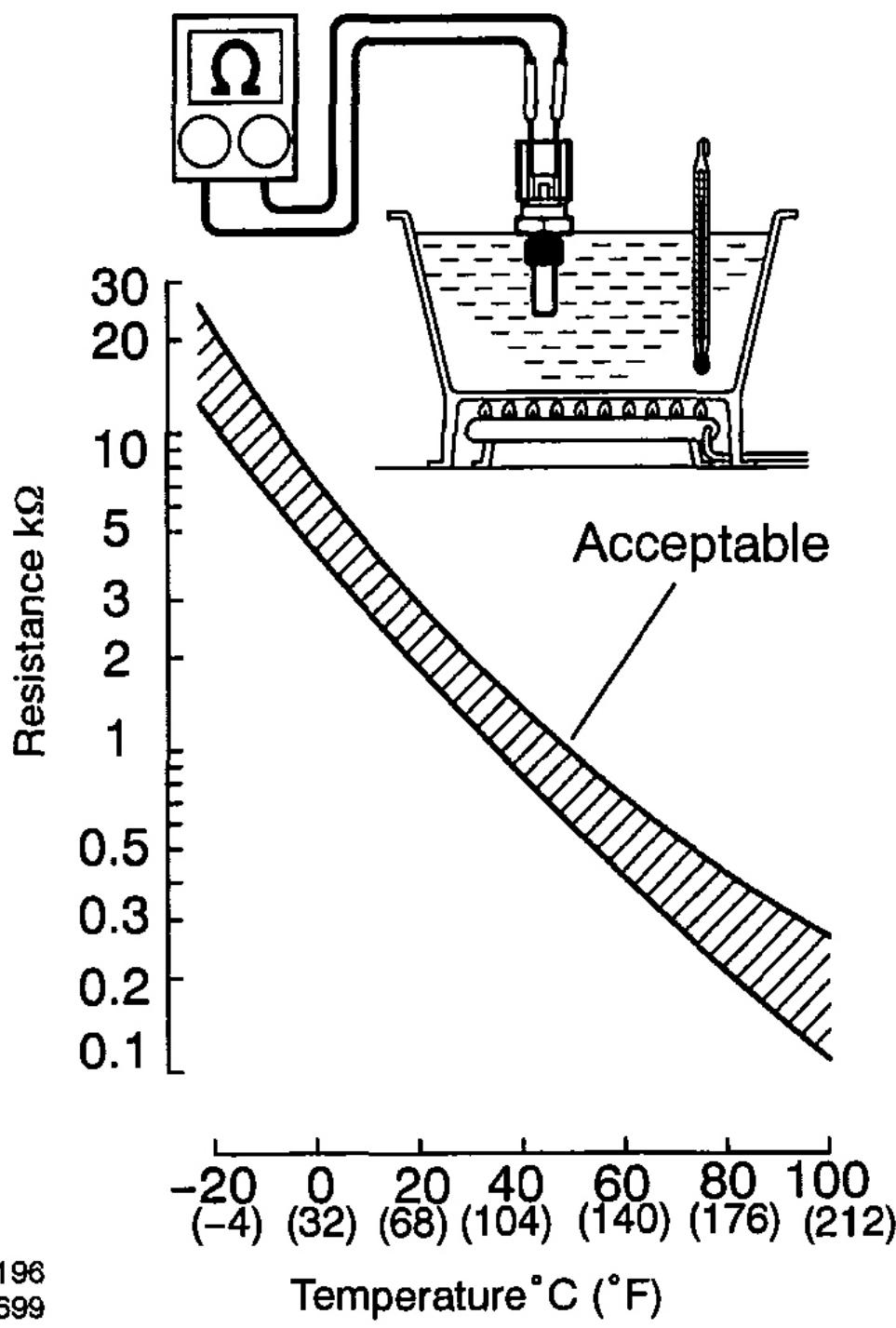
Fig. 126: Removing ECT Sensor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. INSPECT ECT SENSOR

Using an ohmmeter, measure the resistance between the terminals.

Resistance: Refer to Fig. 127

Ohmmeter



S01196
S01699

G02639480

Fig. 127: Measuring Resistance Between Terminals Using Ohmmeter & Graph
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the resistance is not as specified, replace the sensor.

4. REINSTALL ECT SENSOR

- a. Install a new gasket to the sensor.
- b. Using a 19 mm deep socket wrench, install the sensor.

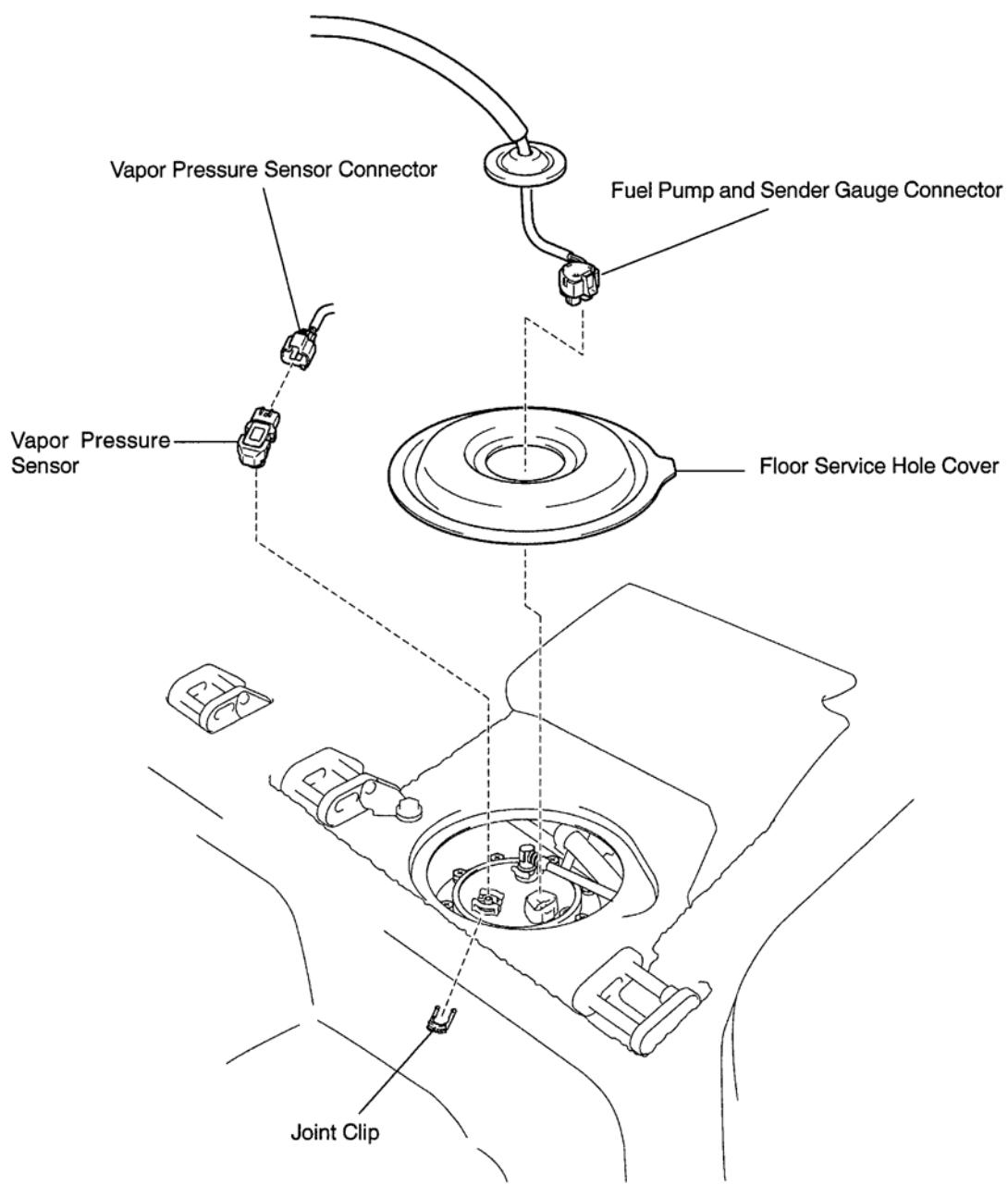
Torque: 20 N.m (200 kgf.cm, 15 ft.lbf)

- c. Connect the sensor connector.

5. REFILL WITH ENGINE COOLANT

VAPOR PRESSURE SENSOR

COMPONENTS



P
G02639481

Fig. 128: Identifying Vapor Pressure Sensor Components
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. REMOVE LUGGAGE COMPARTMENT BOX

2. REMOVE FLOOR SERVICE HOLE COVER
3. REMOVE VAPOR PRESSURE SENSOR
 - a. Remove the 2 bolts and No. 3 fuel tank protector.
 - b. Disconnect the vapor pressure sensor connector.
 - c. Remove the clip and vapor pressure sensor.
4. INSPECT VAPOR PRESSURE SENSOR
 - a. Turn the ignition switch ON.
 - b. Using a voltmeter, measure the voltage between terminals VC and E2 of the wiring harness side connector.

Voltage: 4.5 to 5.5 V

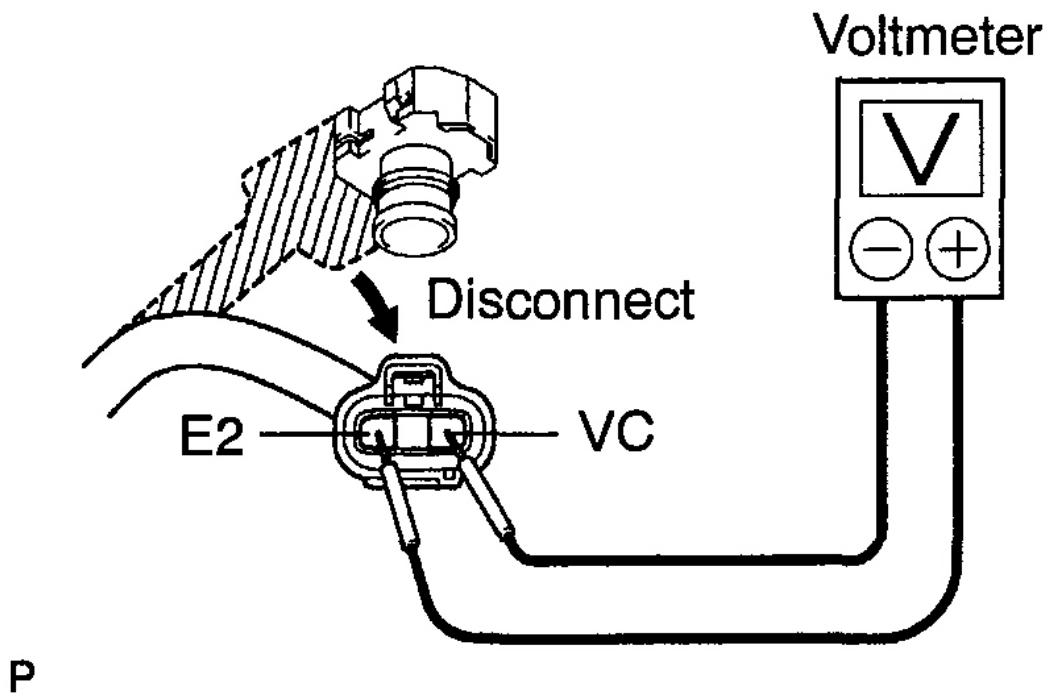


Fig. 129: Measuring Voltage Between Terminals VC And E2 Of Wiring Harness Side Connector Using Voltmeter

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Turn the ignition switch OFF.
5. INSPECT POWER OUTPUT OF VAPOR PRESSURE SENSOR

2004 Toyota RAV4

2004 ENGINE PERFORMANCE SFI - RAV4

- a. Connect the vapor pressure sensor connector.
- b. Turn the ignition switch ON.
- c. Connect a voltmeter to terminals PTNK and E2 of the ECM, and measure the output voltage under the following conditions:
 1. Apply vacuum (2.0 kPa (15 mmHg, 0.59 in.Hg)) to the vapor pressure sensor.

Voltage: 1.3 to 2.1 V

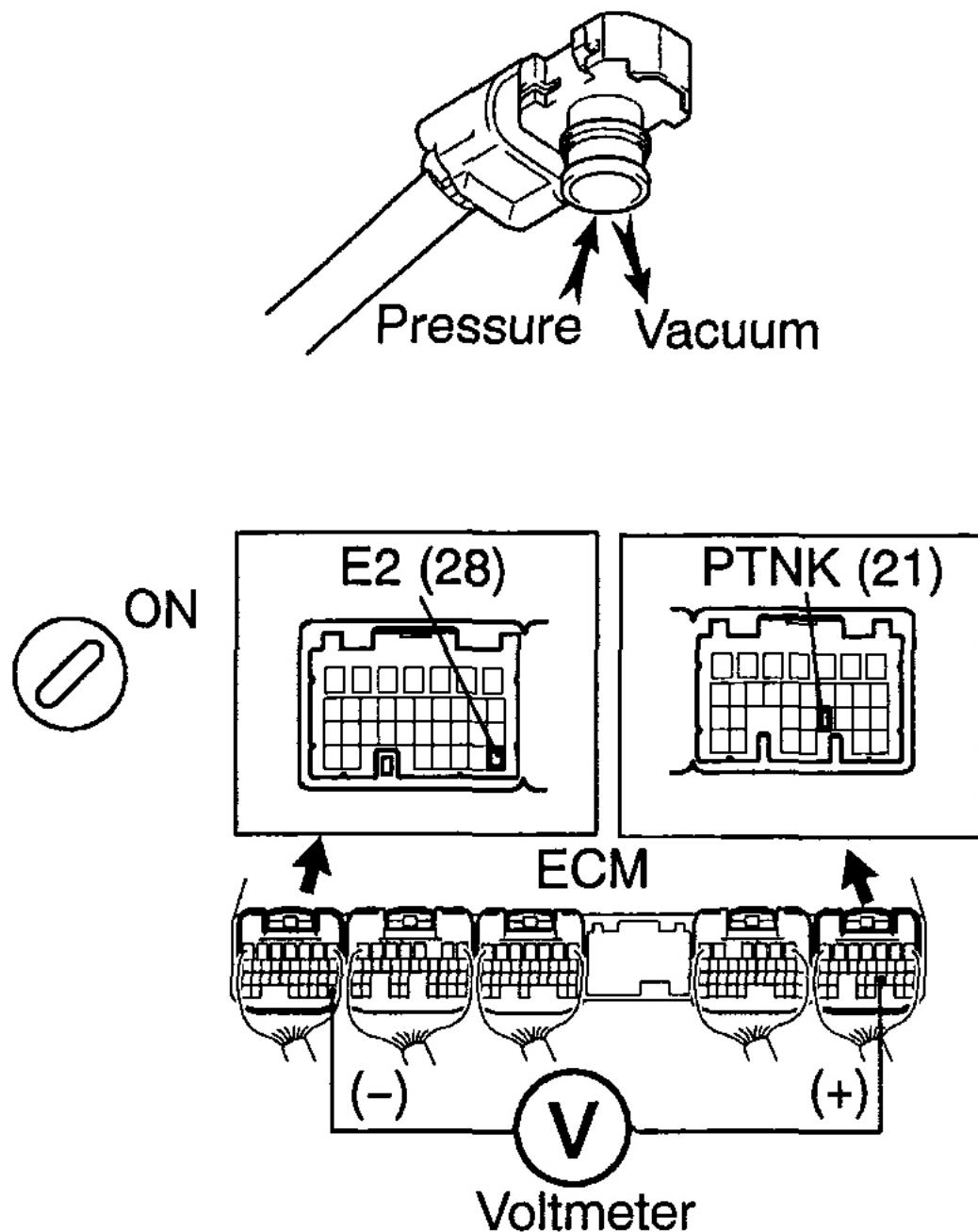
2. Release the vacuum from the vapor pressure sensor.

Voltage: 3.0 to 3.6 V

3. Apply pressure (1.5 kPa (15 gf/cm², 0.22 psi)) to the vapor pressure sensor.

Voltage: 4.2 to 4.8 V

- d. Turn the ignition switch OFF.



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Fig. 130: Inspecting Power Output Of Vapor Pressure Sensor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- a. Reinstall the vapor pressure sensor and clip.
- b. Reconnect the vapor pressure sensor connector.
- c. Reinstall the 2 bolts and No. 3 fuel tank protector.

7. REINSTALL FLOOR SERVICE HOLE COVER

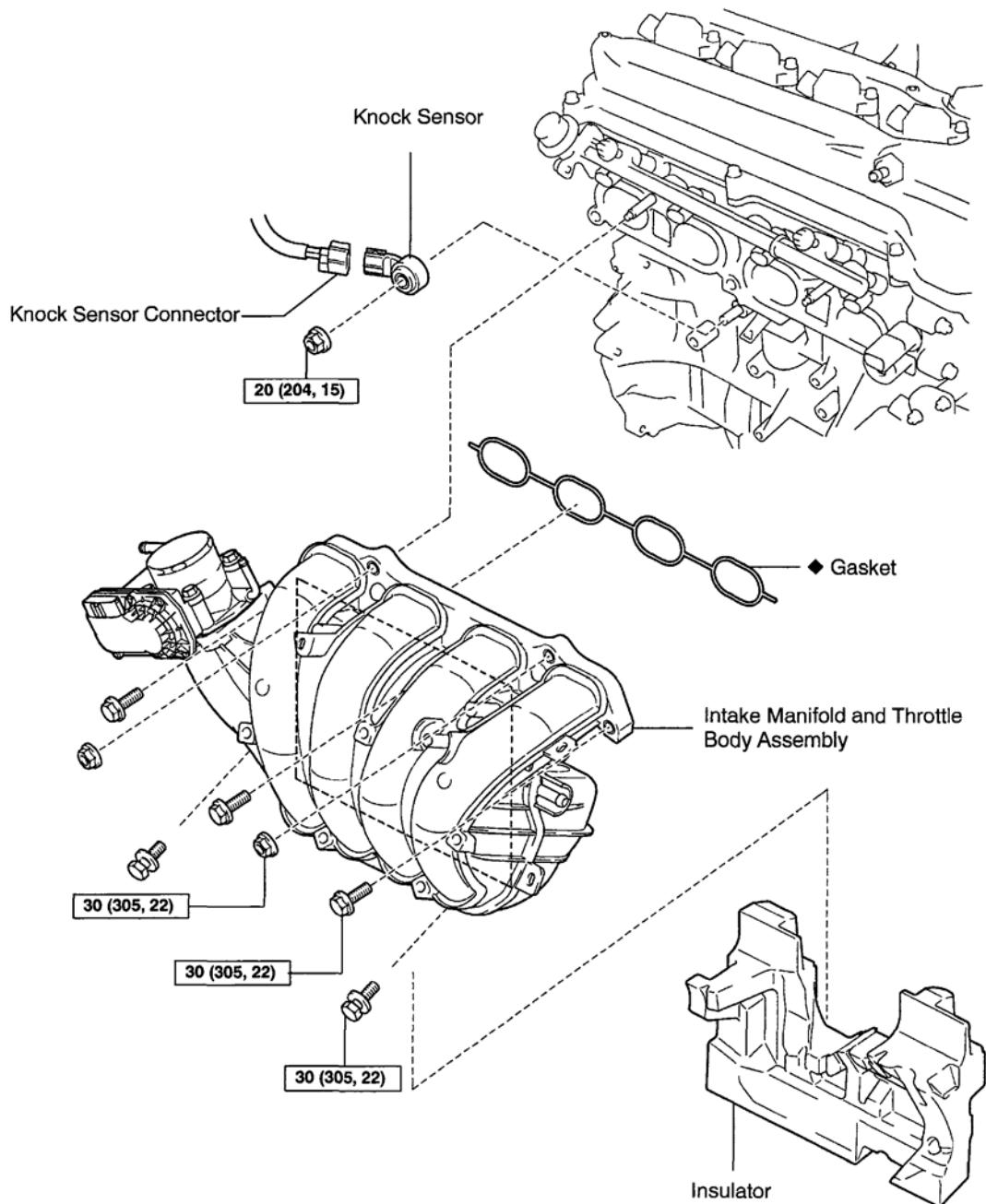
8. REINSTALL LUGGAGE COMPARTMENT BOX

KNOCK SENSOR

COMPONENTS

2004 Toyota RAV4

2004 ENGINE PERFORMANCE SFI - RAV4



N·m (kgf·cm, ft·lbf) : Specified torque

P ◆ Non-reusable part

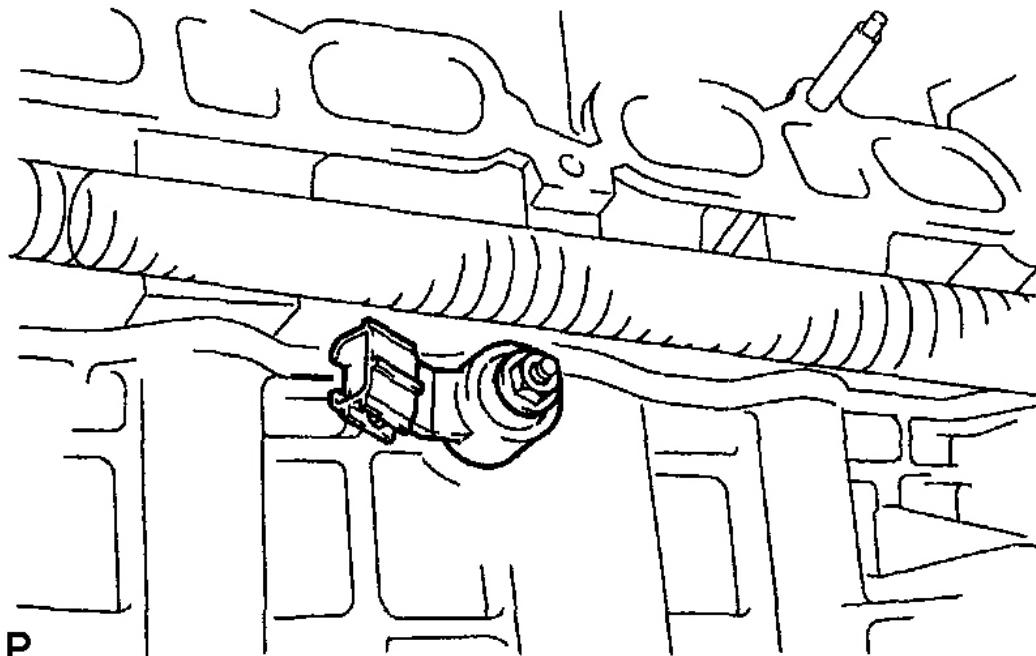
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Fig. 131: Identifying Knock Sensor Components

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. REMOVE ENGINE FROM VEHICLE (See REMOVAL)
2. REMOVE INTAKE MANIFOLD AND THROTTLE BODY ASSEMBLY (See REMOVAL)
3. REMOVE KNOCK SENSOR
 - a. Disconnect the knock sensor connector.
 - b. Remove the nut and knock sensor.



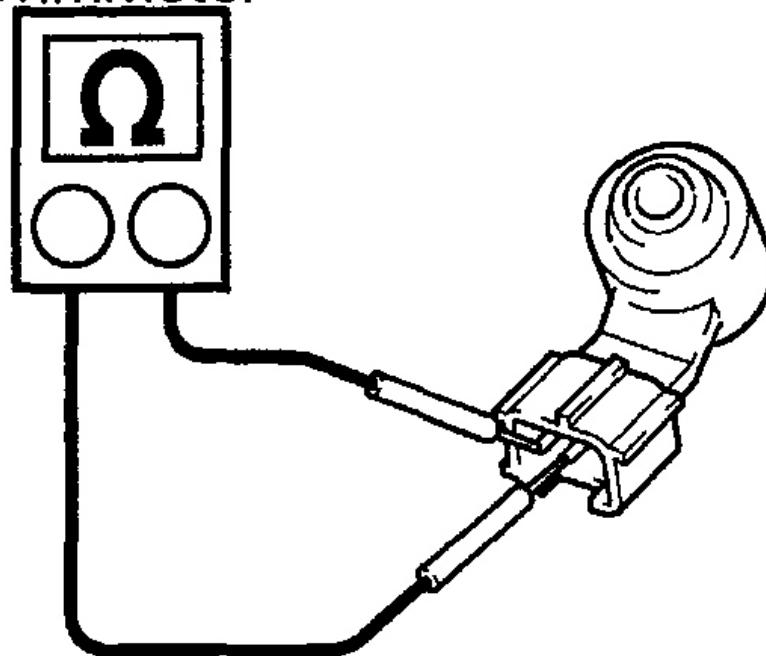
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Fig. 132: Removing Knock Sensor & Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. INSPECT KNOCK SENSOR

Using an ohmmeter, make sure there is continuity between the terminals.

Ohmmeter



P

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Fig. 133: Inspecting Knock Sensor

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If there is no continuity, replace the sensor.

5. REINSTALL KNOCK SENSOR

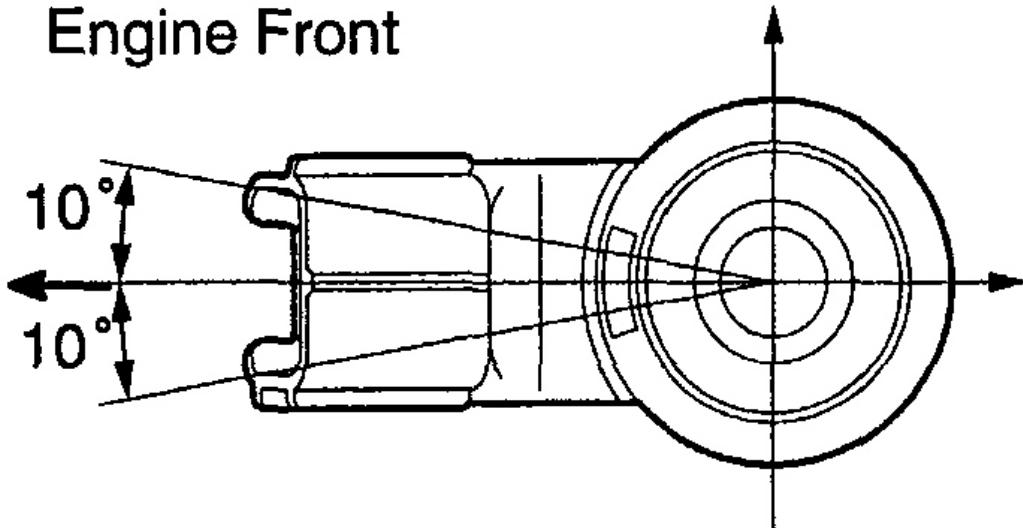
- Install the knock sensor with the nut.

Torque: 20 N.m (204 kgf.cm, 15 ft.lbf)

HINT:

Angling the knock sensor below the horizontal (below 0°) is recommended.

Engine Front



P

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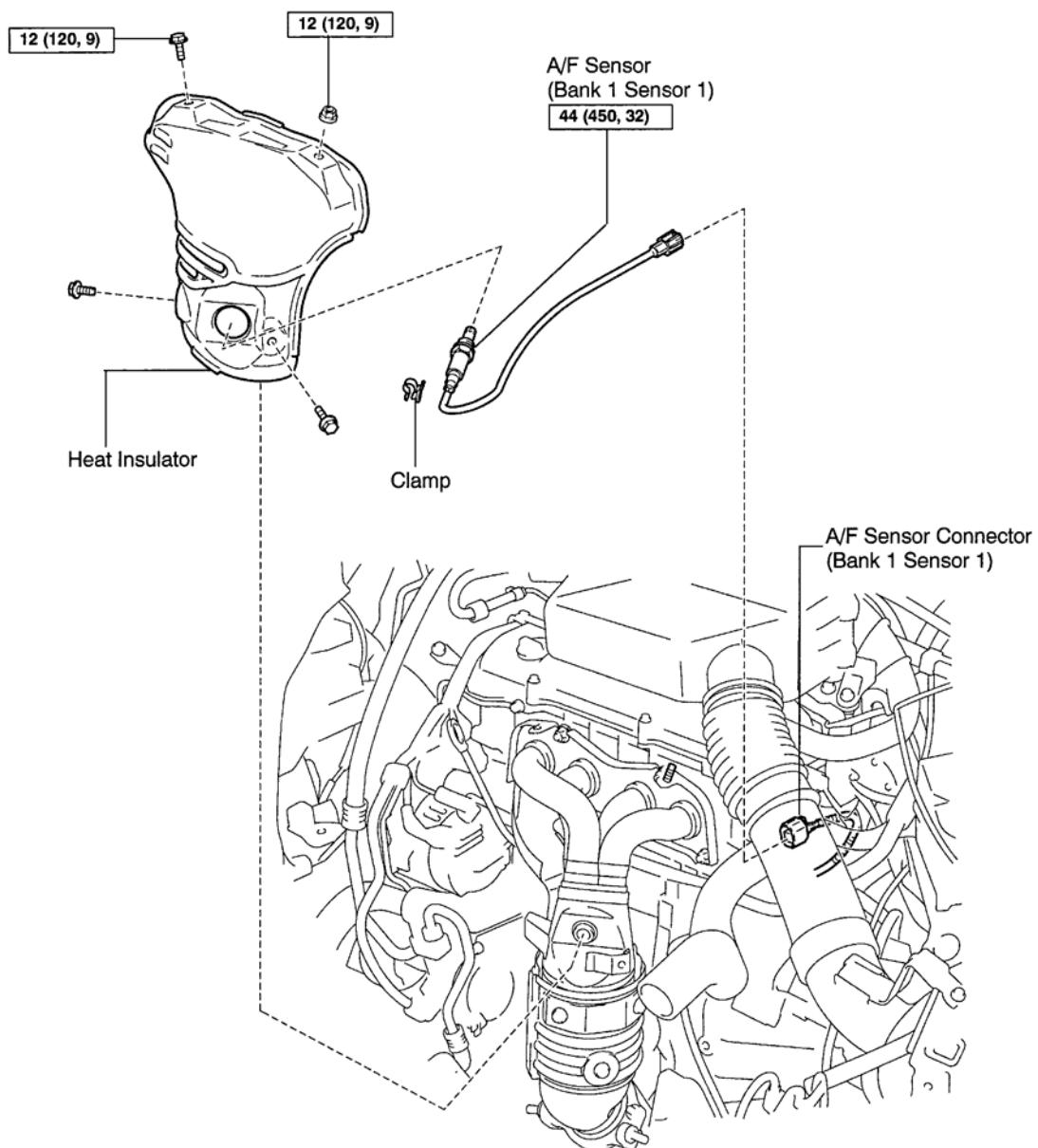
Fig. 134: Installing Knock Sensor To Proper Angle

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Connect the knock sensor connector.
6. REINSTALL INTAKE MANIFOLD AND THROTTLE BODY ASSEMBLY (See INSTALLATION)
7. INSTALL ENGINE TO VEHICLE (See INSTALLATION)

AIR-FUEL RATION (A/F) SENSOR

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque
P

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Fig. 135: Identifying Air-Fuel Ration (A/F) Sensor Components

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. INSPECT HEATER RESISTANCE OF A/F SENSOR

- Disconnect the sensor connector.

- b. Using an ohmmeter, measure the resistance between terminals +B and HT.

Resistance: 1.8 to 3.4 ohm at 20°C (68°F)

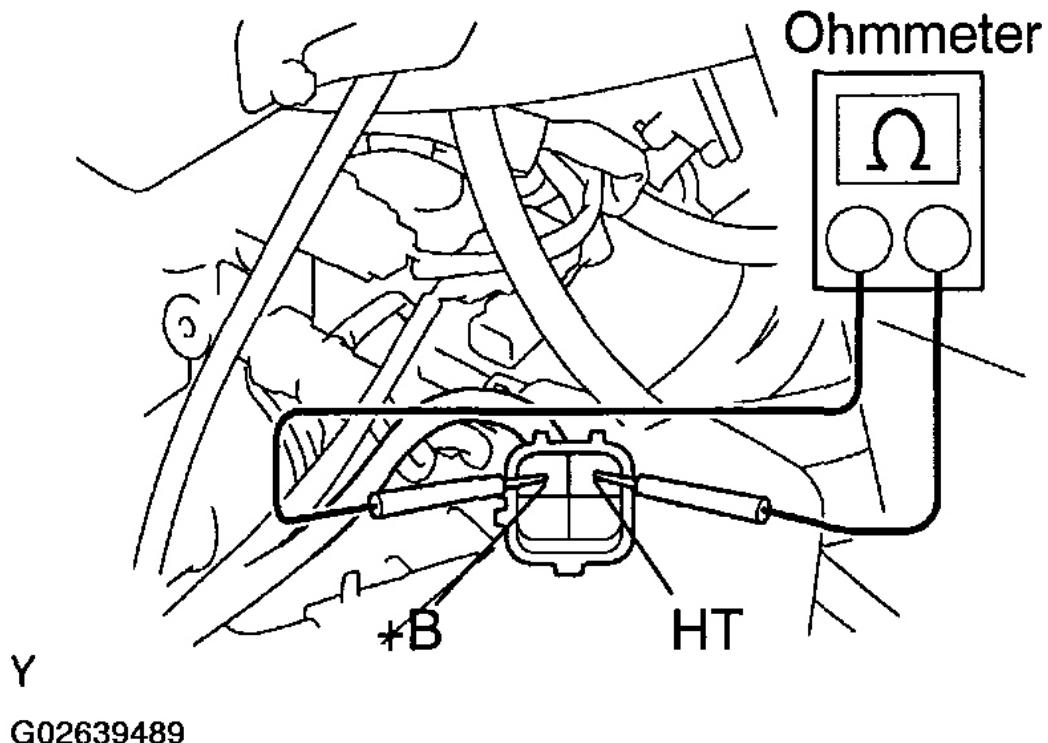


Fig. 136: Measuring Resistance Between Terminals +B And HT Using Ohmmeter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

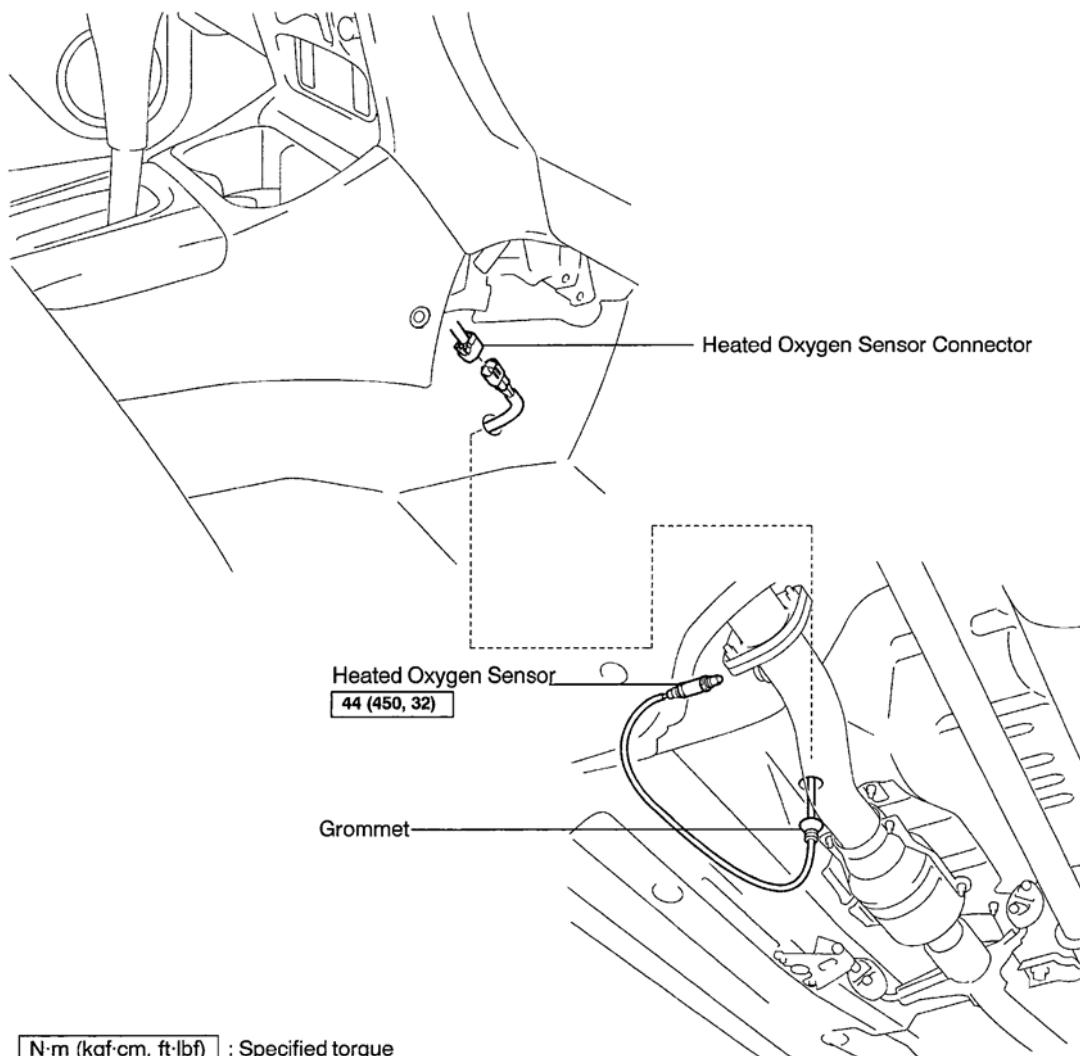
If the resistance is not as specified, replace the sensor.

Torque: 44 N.m (450 kgf.cm, 32 ft.lbf)

- c. Reconnect the sensor connector.
2. **INSPECT OPERATION OF A/F SENSOR (See DTC P2195: OXYGEN (A/F) SENSOR SIGNAL STUCK LEAN (BANK 1 SENSOR 1), DTC P2196: OXYGEN (A/F) SENSOR SIGNAL STUCK RICH (BANK 1 SENSOR 1))**

HEATED OXYGEN SENSOR

COMPONENTS



P N·m (kgf·cm, ft·lbf) : Specified torque

G02639490

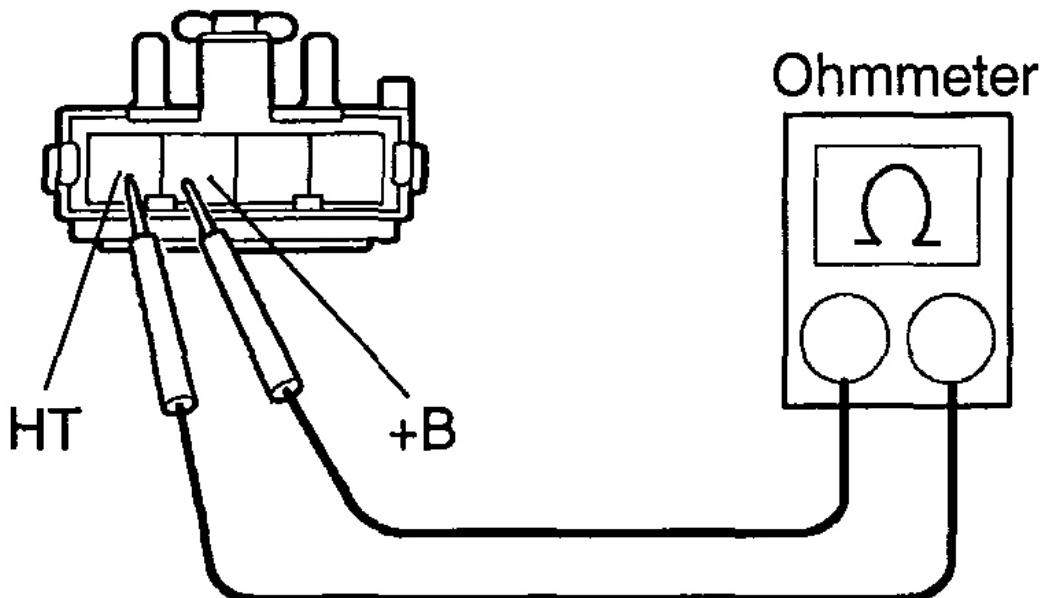
Fig. 137: Identifying Heated Oxygen Sensor Components
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. INSPECT HEATER RESISTANCE OF OXYGEN SENSOR

- Disconnect the sensor connector.
- Using an ohmmeter, measure the resistance between terminals +B and HT.

Resistance: 11 to 16 ohm at 20°C (68°F)



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Fig. 138: Measuring Resistance Between Terminals +B And HT Using Ohmmeter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

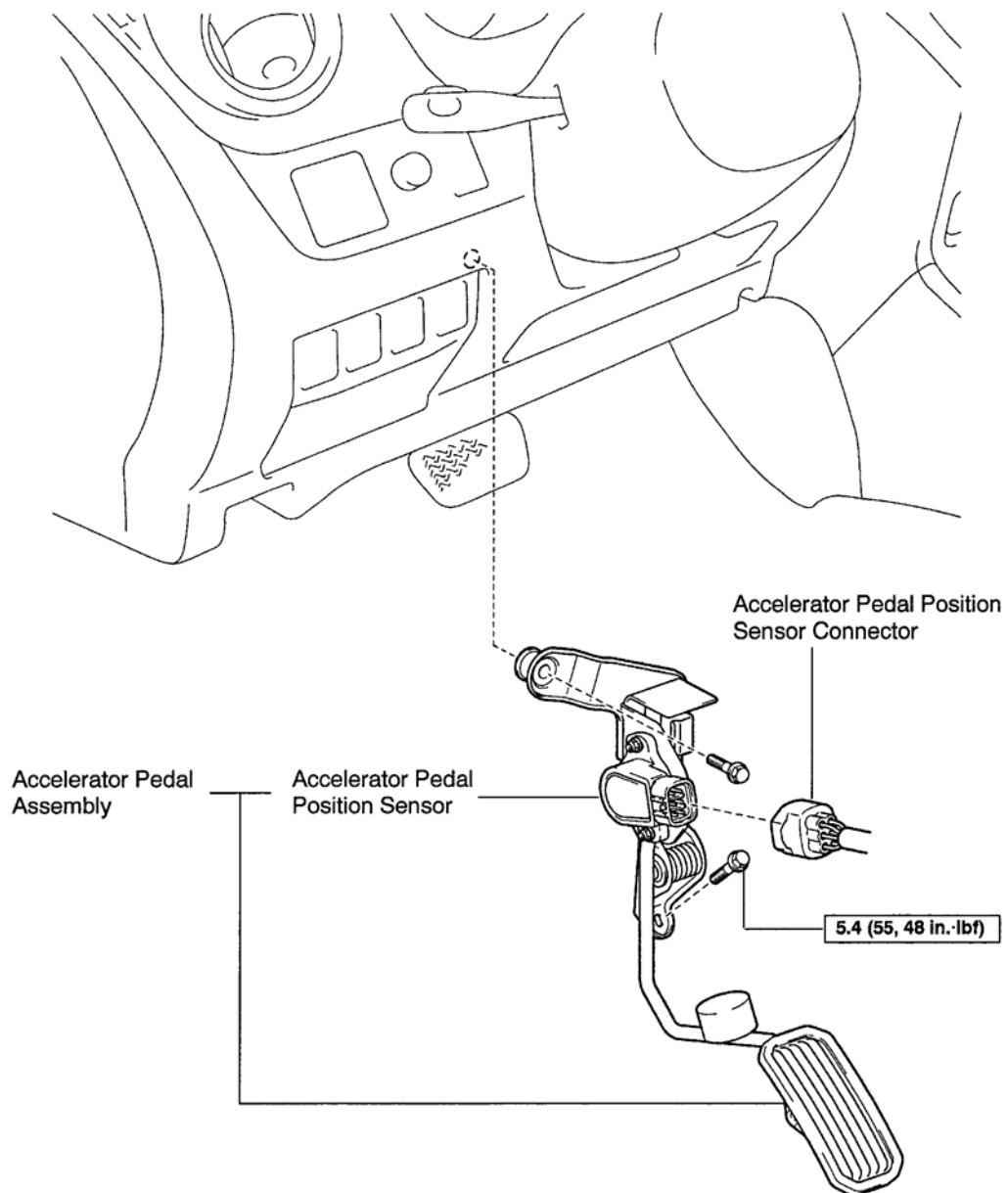
If the resistance is not as specified, replace the sensor.

Torque: 44 N.m (450 kgf.cm, 32 ft.lbf)

- c. Reconnect the sensor connector.
2. **INSPECT OPERATION OF HEATED OXYGEN SENSOR (See DTC P0136: OXYGEN SENSOR CIRCUIT MALFUNCTION (BANK 1 SENSOR 2))**

ACCELERATOR PEDAL POSITION SENSOR

COMPONENTS



P N·m (kgf·cm, ft·lbf) : Specified torque

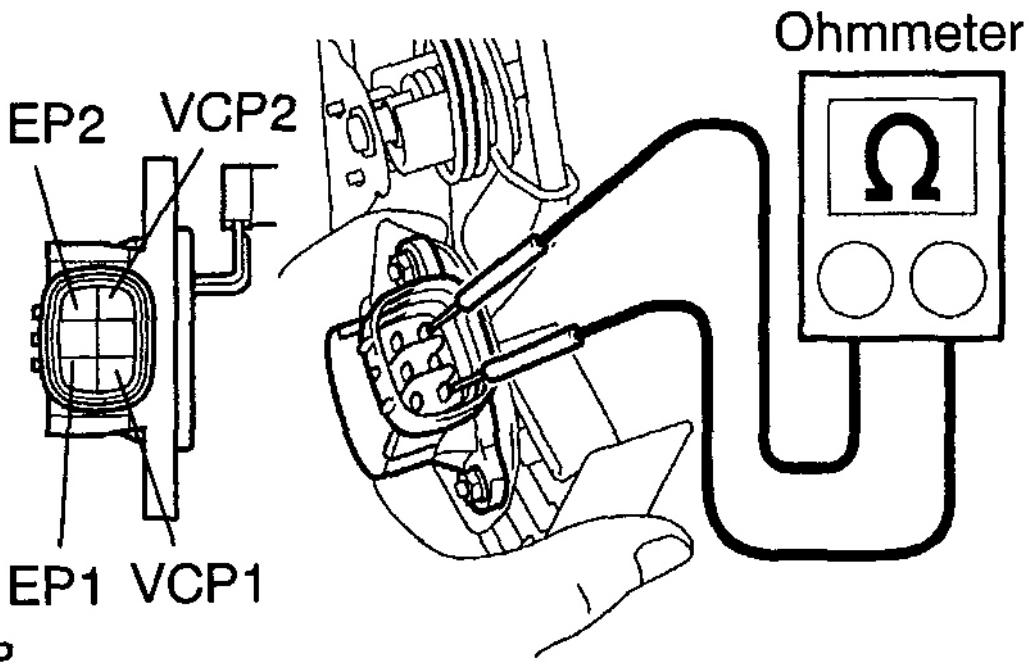
G02639492

Fig. 139: Identifying Accelerator Pedal Position Sensor Components
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

Inspect Accelerator Pedal Position Sensor

- a. Disconnect the sensor connector.
- b. Using an ohmmeter, measure the resistance between the each terminals.



P

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Fig. 140: Measuring Resistance Between Each Terminal Using Ohmmeter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Resistance:

TERMINAL RESISTANCE SPECIFICATION

Terminals	Resistance
VCP1 - EP1	2.25 to 4.75 kohm at 20°C (68°F)
VCP2 - EP2	

If the resistance is not as specified, replace the accelerator pedal assembly.

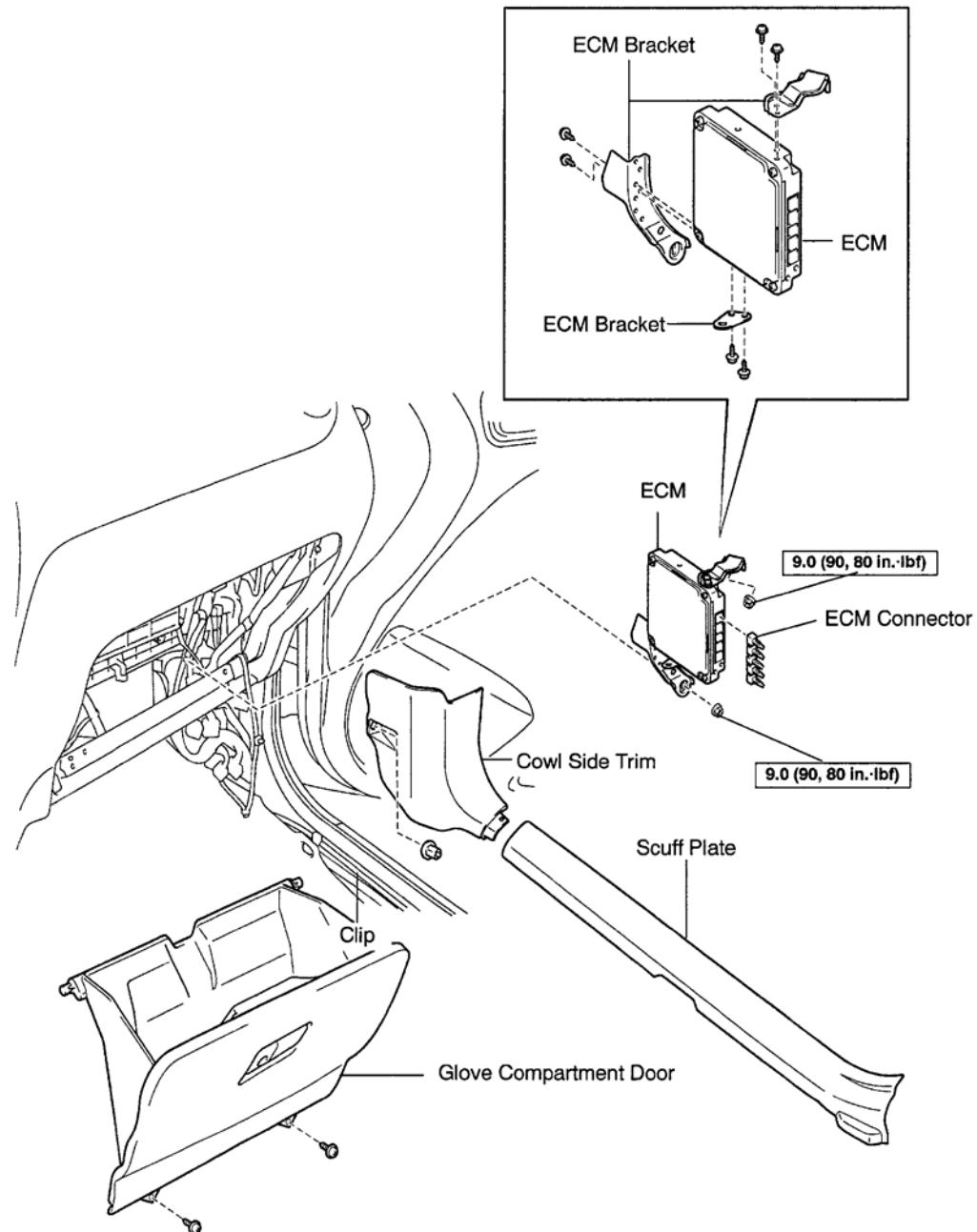
- c. Reconnect the sensor connector.

NOTE:

- Be careful not to give a shock to the accelerator pedal assembly.
- Be careful not to disassemble the accelerator pedal assembly.

ENGINE CONTROL MODULE (ECM)

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque

G02639494

Fig. 141: Identifying Engine Control Module (ECM) Components

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

INSPECTION ECM (See TERMINALS OF ECM)

FUEL CUT RPM

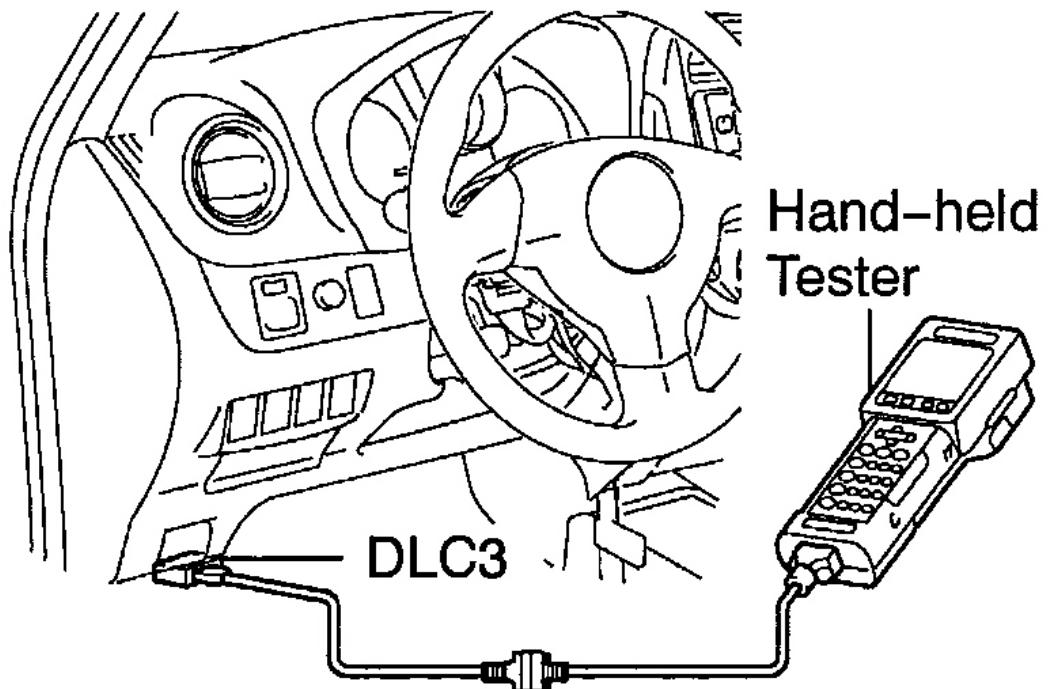
INSPECTION

1. WARM UP ENGINE

Warm up the engine to the normal operating temperature.

2. CONNECT HAND-HELD TESTER OR OBD II SCAN TOOL TO DLC3

- Connect the hand-held tester or OBD II scan tool to the DLC3.



G02639495

Fig. 142: Connecting Hand-Held Tester To DLC3
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

- Select the item "DIAGNOSIS/ENHANCED OBD II/DATA LIST/ALL/FC IDL".
- Please refer to the hand-held tester or OBD II scan tool operator's manual for further details.

3. INSPECT FUEL CUTOFF/RESTART RPM

- a. Increase the engine speed to at least 3,000 RPM.
- b. Use a sound scope to check for the injector operating noise.

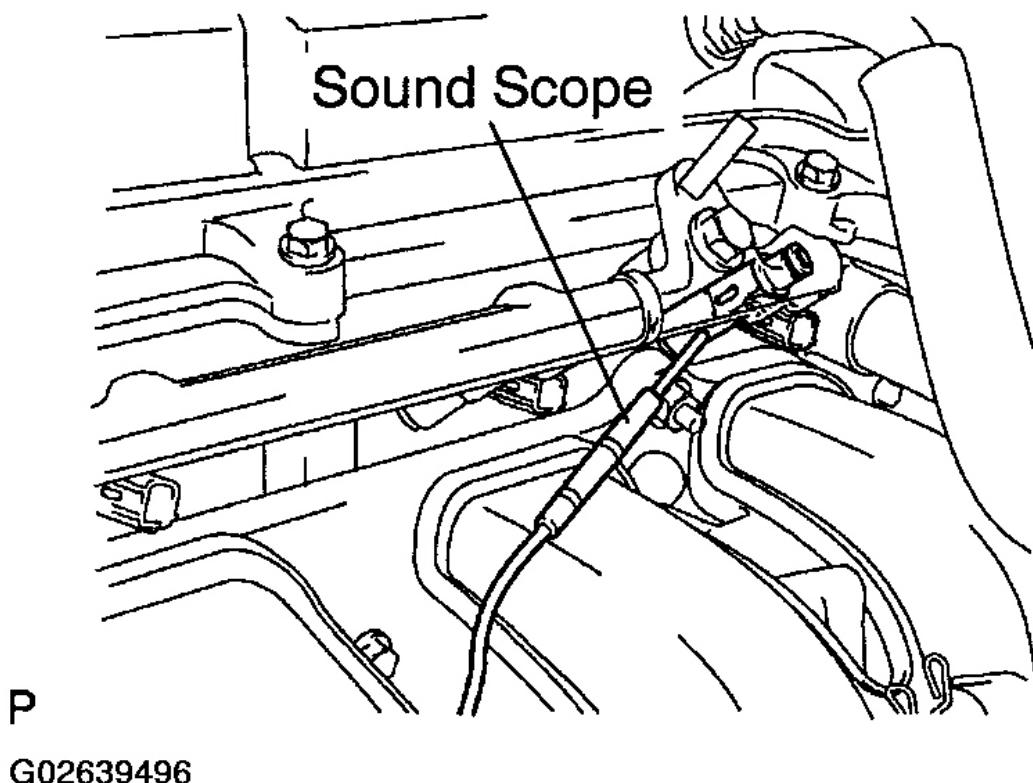


Fig. 143: Using Sound Scope To Check For Injector Operating Noise
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. When the accelerator pedal is released, injector operation sounds stop momentarily and then resumes.

HINT:

Measure with the A/C OFF.

Standard:

2004 Toyota RAV4

2004 ENGINE PERFORMANCE SFI - RAV4

RPM SPECIFIED CONDITION

Item	Specified Condition
Fuel cutoff RPM	1,050 to 1,150 RPM (M/T), 1,350 to 1,450 RPM (A/T)
Fuel injector restart RPM	850 to 950 RPM (M/T), 1,050 to 1,150 RPM (A/T)

If the result is not as specified, check for DTCs. If a DTC is present, follow the repair procedures according to the DTC.

4. DISCONNECT HAND-HELD TESTER OR OBD II SCAN TOOL FROM DLC3