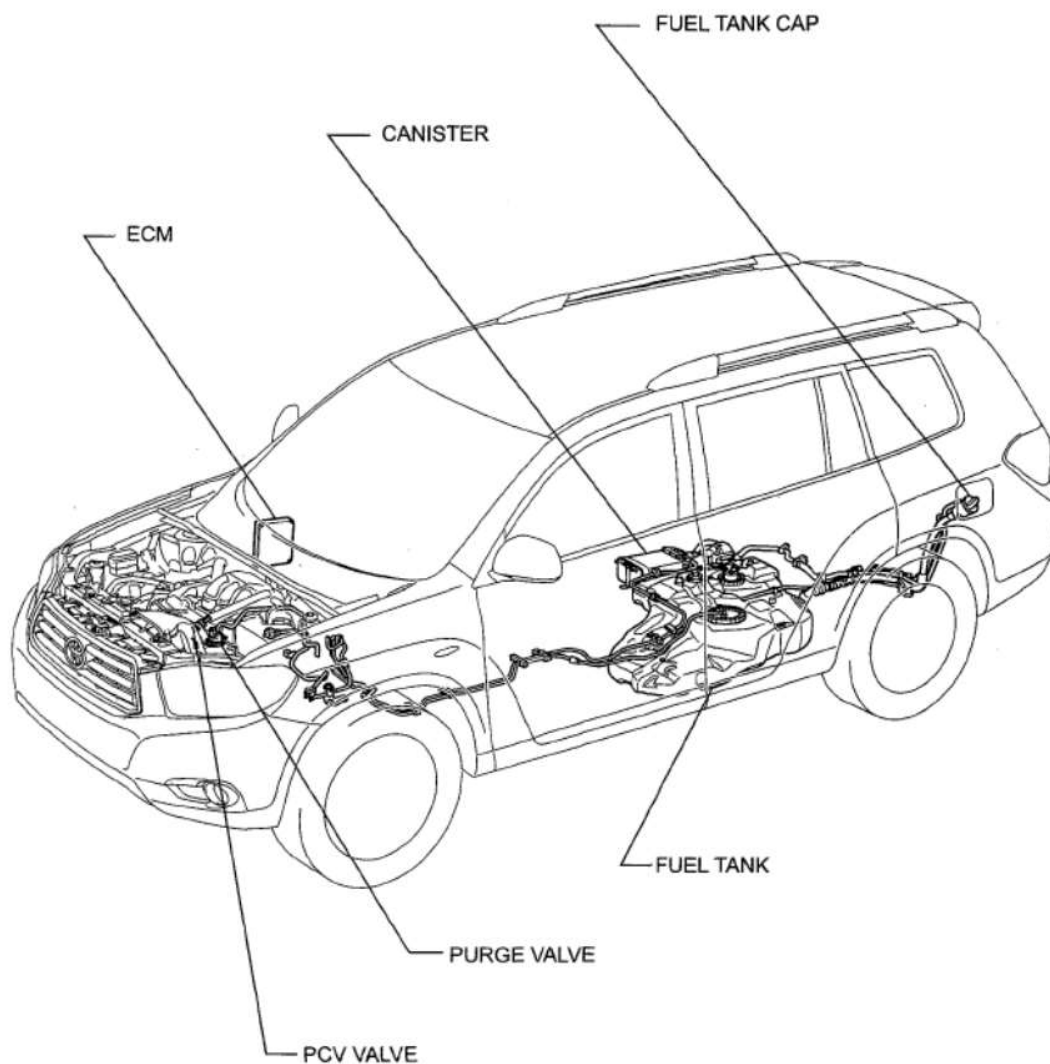


2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander

2009 ENGINE**Emission Control (2GR-FE) - Highlander****EMISSION CONTROL SYSTEM****PARTS LOCATION**

H

A170902E01

Fig. 1: Identifying Emission Control System Parts Location
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

SYSTEM DIAGRAM

Thursday, June 17, 2010 8:08:42 PM

Page 1

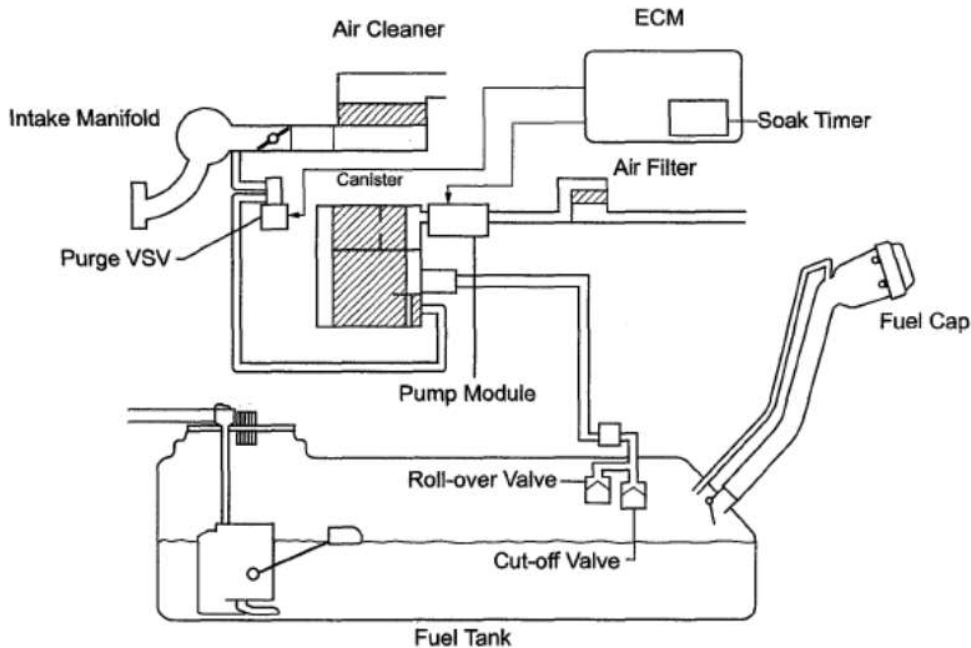
© 2006 Mitchell Repair Information Company, LLC.

2009 ENGINE Emission Control (2GR-FE) - Highlander



2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander



A196417E02

Fig. 3: Emission Control System Diagram (2 Of 2)

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

ON-VEHICLE INSPECTION

1. CHECK PURGE VSV

- a. Enter the following menus:
 1. Techstream - Select: Powertrain/Engine and ECT/Active test/Activate the VSV for Evap Control.

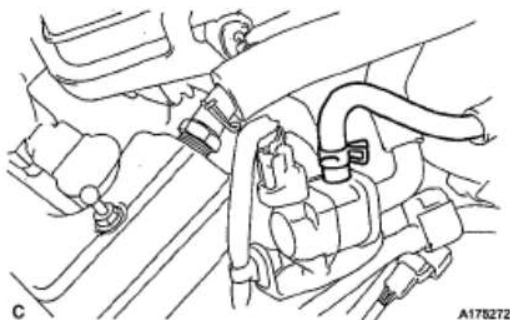


Fig. 4: Identifying Purge VSV Hose

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

- b. Disconnect the hose (connected to the canister) from the purge VSV.
- c. Start the engine.

2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander

- d. Using the tester, turn off the purge VSV (EVAP VSV: OFF).
- e. Use your finger to confirm that the purge VSV has no suction.
- f. Using the tester, turn on the purge VSV (EVAP VSV: ON).
- g. Use your finger to confirm that the purge VSV has suction.

2. INSPECT FUEL CUT OFF/RESTART RPM

- a. Increase the engine speed to at least 3500 rpm.
- b. Use a sound scope to check for injector operating sounds.
- c. Check that when the throttle lever is released, injector operation sound stops momentarily and then resumes (at 1400 rpm).

Standard

STANDARD RPM CHART

Item	Specified Condition
Fuel injector restart rpm	1400 rpm

3. VISUALLY INSPECT HOSE, CONNECTIONS AND GASKETS

- a. Check for cracks, leaks or damage.

HINT:

Separation of the engine oil dipstick, oil filler cap, PCV hose, etc. may cause the engine to run improperly. Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head will allow air suction and cause the engine to run improperly.

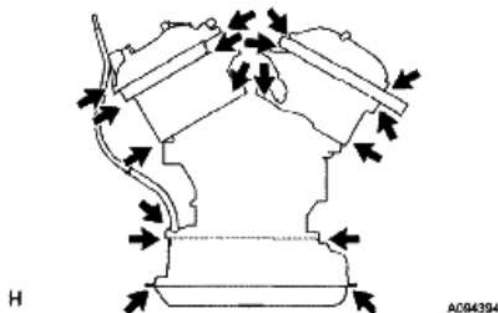


Fig. 5: Locating Hoses, Connections And Gaskets Leak Areas
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. CHECK AIR INLET LINE

- a. Disconnect the air inlet line hose from the charcoal canister.
- b. Check that air can flow freely into the air inlet line. If air cannot flow freely into the air inlet line, repair or replace it.
- c. Reconnect the air inlet line hose to the charcoal canister.

2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander

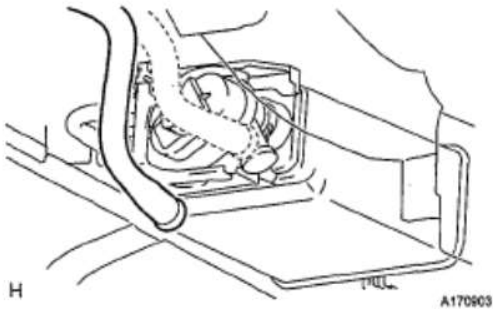


Fig. 6: Checking Air Inlet Line
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

CANISTER
COMPONENTS

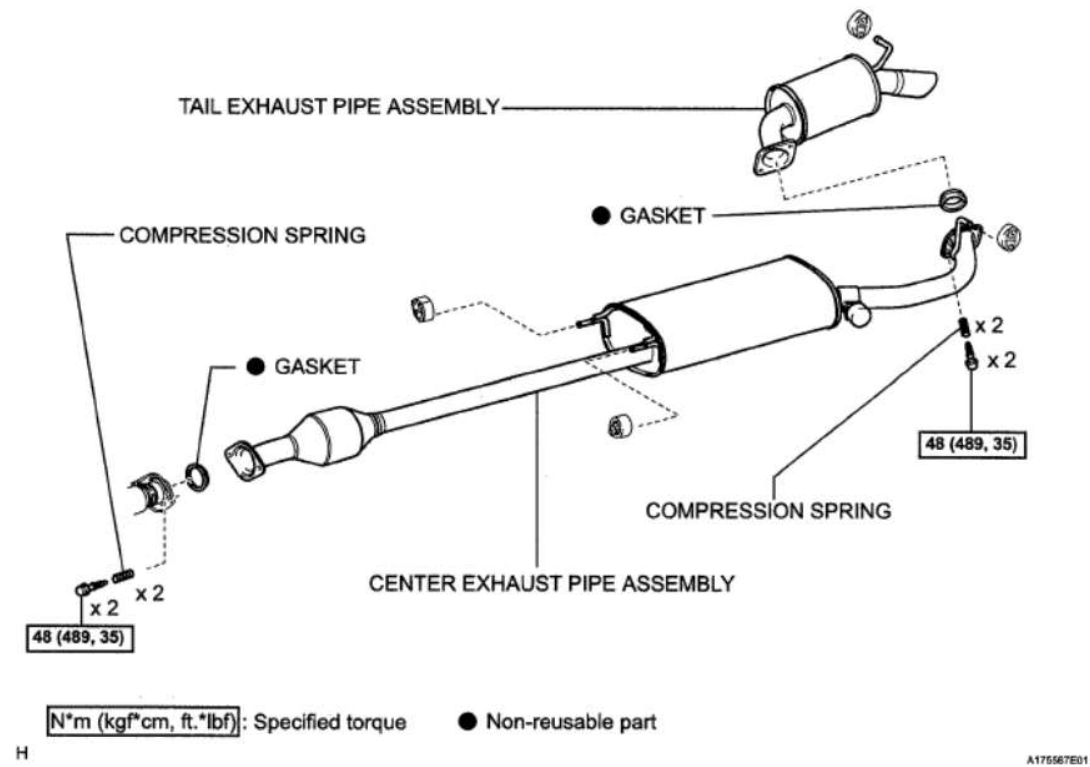


Fig. 7: Identifying Canister Replacement Components (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander

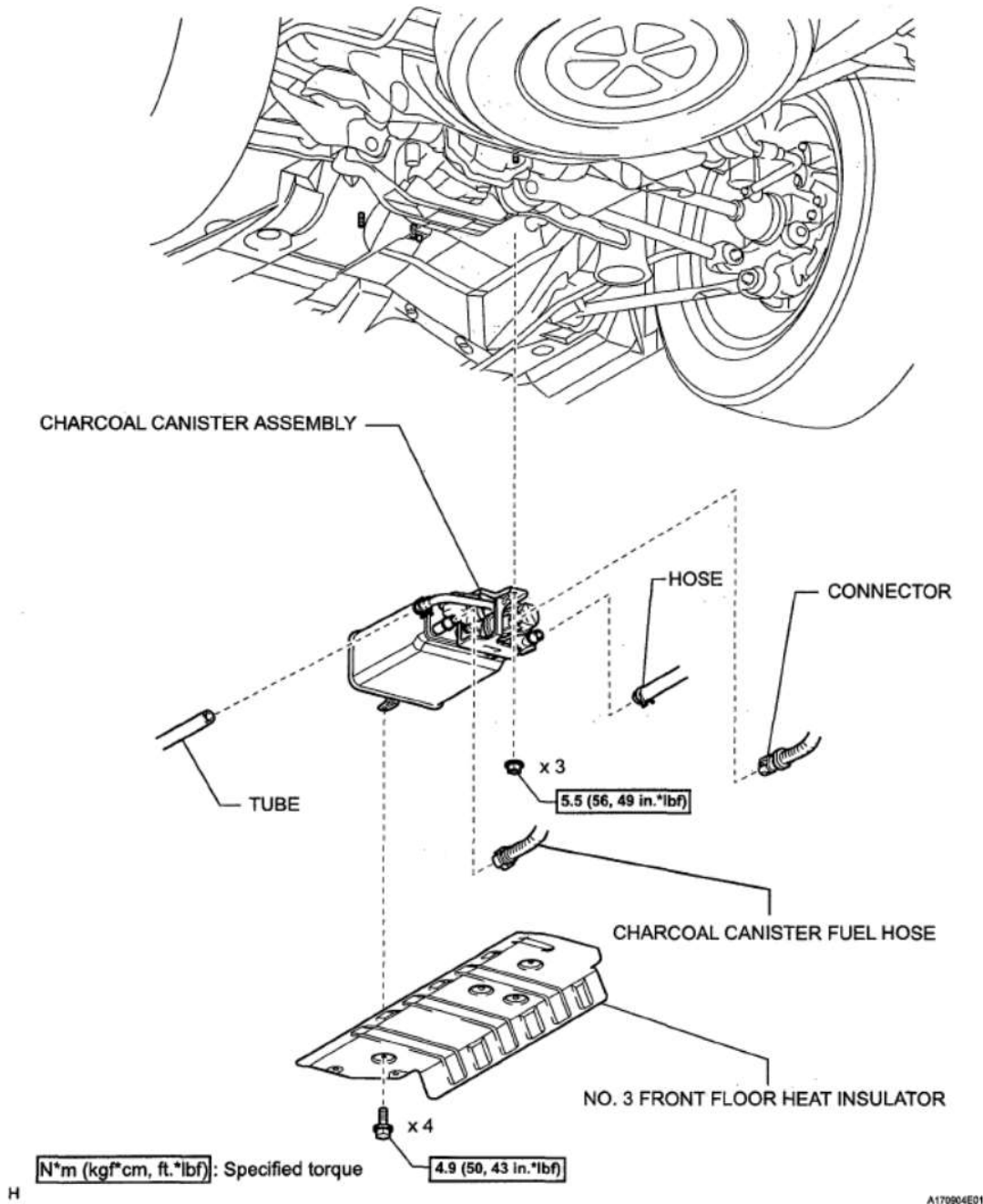


Fig. 8: Identifying Canister Replacement Components (2 Of 2)

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

REMOVAL

1. REMOVE TAIL EXHAUST PIPE ASSEMBLY (See **REMOVAL**)
2. REMOVE CENTER EXHAUST PIPE ASSEMBLY (See **REMOVAL**)
3. REMOVE NO. 3 FRONT FLOOR HEAT INSULATOR

2009 Toyota Highlander Limited**2009 ENGINE Emission Control (2GR-FE) - Highlander**

- a. Remove the 4 bolts and No. 3 front floor heat insulator.

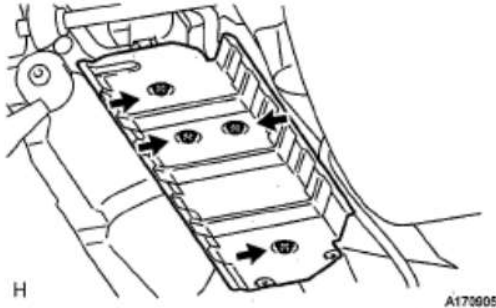


Fig. 9: Locating No. 3 Front Floor Heat Insulator Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. REMOVE CHARCOAL CANISTER ASSEMBLY

- a. Disconnect the hose and connector.



Fig. 10: Locating Hose And Charcoal Canister Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Disconnect the tube.

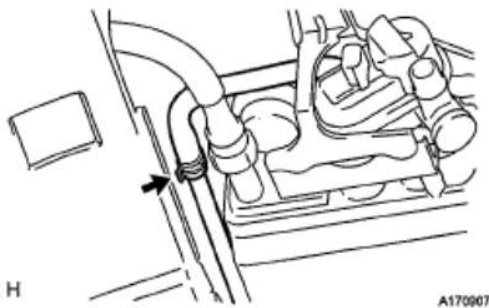


Fig. 11: Locating Charcoal Canister Assembly Tube
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Disconnect the charcoal canister fuel hose from the charcoal canister assembly.

2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander

1. Pinch the retainer and pull out the quick connector with the quick connector pushed to the pipe side to disconnect the charcoal canister fuel hose from the charcoal canister assembly.

NOTE:

- Remove dirt or foreign objects on the quick connector before this work.
- Do not allow any scratches or foreign objects on the parts when disconnecting as the fuel hose connector has the O-ring that seals the pipe.
- Perform this work by hand. Do not use any tools.
- Do not forcibly bend, twist or turn the nylon tube.
- Protect the connected part by covering it with a vinyl bag after disconnecting the charcoal canister fuel hose.
- If the quick connector and pipe are stuck, push and pull them to release.

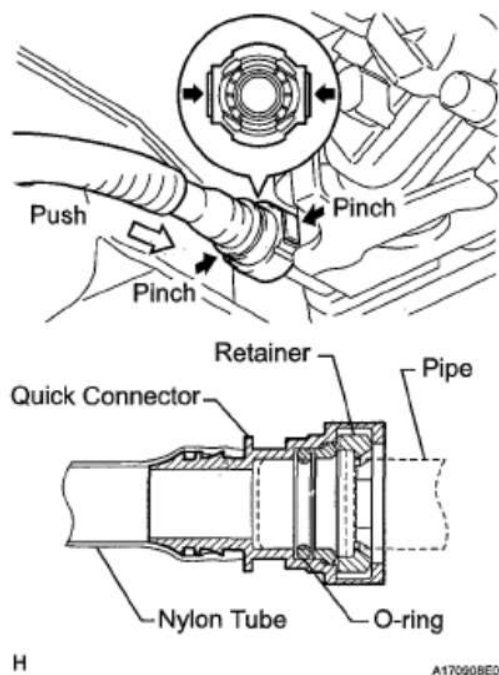


Fig. 12: Pinching Retainer And Pushed To Pipe Side To Disconnect Charcoal Canister Fuel Hose From Charcoal Canister Assembly

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

- d. Remove the 3 nuts and charcoal canister assembly.

2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander

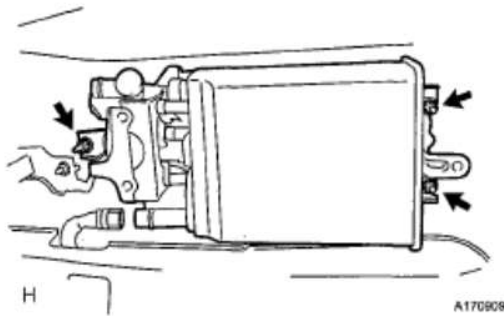


Fig. 13: Locating Charcoal Canister Assembly Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. INSPECT CHARCOAL CANISTER ASSEMBLY

- Visually check the charcoal canister for cracks or damage.

If cracks or damage are found, replace the charcoal canister assembly.

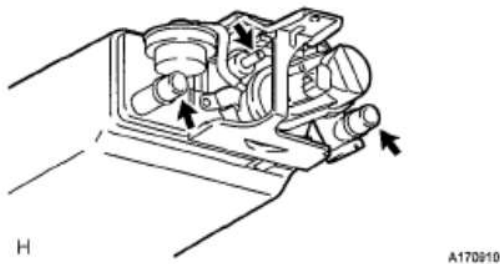
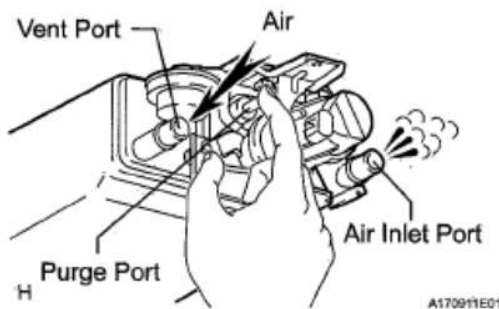


Fig. 14: Checking Charcoal Canister For Cracks Or Damage
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- Check charcoal canister operation.

- With the purge port closed, blow 1.10 kPa (11.2 gf/cm², 0.16 psi) of air into the vent port, and check that air flows from the air inlet port. If the result is not as specified, replace the charcoal canister assembly.



2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander

Fig. 15: Checking Charcoal Canister Operation - Purge Port Closed
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. With the vent port closed, blow 1.10 kPa (11.2 gf/cm², 0.16 psi) of air into the air inlet port, and check that air flows from the purge port. If the result is not as specified, replace the charcoal canister assembly.
- c. Check for air leakage.
 1. Remove the air hose between ports A and B.
 2. Connect the SST (pressure gauge) to the vent port of the charcoal canister assembly.

SST 09992-00242

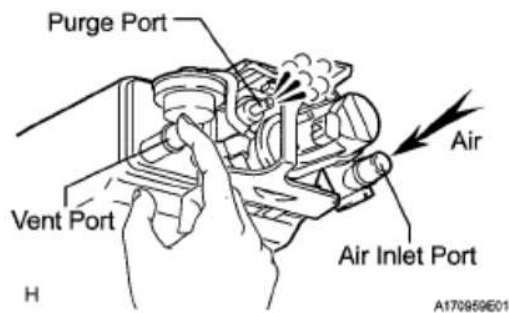


Fig. 16: Checking Charcoal Canister Operation - Vent Port Closed
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. With the purge port and air inlet port closed, apply 19.6 kPa (0.2 kgf/cm², 2.81 psi) of pressurized air into the vent port, then confirm that pressure is retained for 1 minute. If the result is not as specified, replace the charcoal canister assembly.

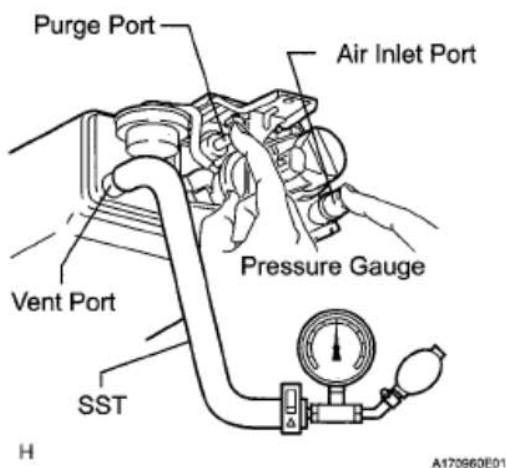


Fig. 17: Connecting SST (Pressure Gauge) To Vent Port Of Charcoal Canister Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander

INSTALLATION**1. INSTALL CHARCOAL CANISTER ASSEMBLY**

- a. Connect the charcoal canister assembly with the 3 nuts.

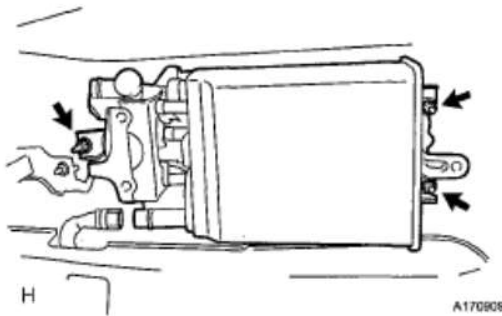
Torque:**5.5 N*m (56 kgf*cm, 49 in.*lbf)**

Fig. 18: Locating Charcoal Canister Assembly Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Align the quick connector with the pipe, then push in the quick connector until the retainer makes a "click" sound to connect the charcoal canister fuel hose to the charcoal canister assembly.

NOTE:

- Check that there are no scratches or foreign objects around the connected part of the quick connector and pipe before this work.
- After connecting the charcoal canister fuel hose, confirm that it is securely connected by pulling the quick connector.

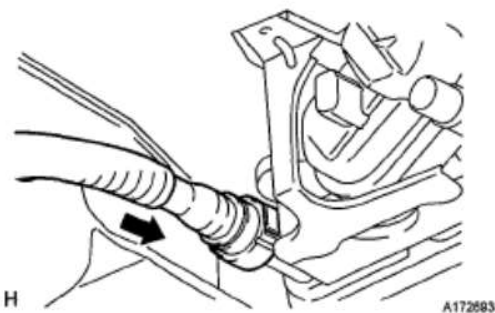


Fig. 19: Aligning Quick Connector With Pipe
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Connect the hose.

2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander

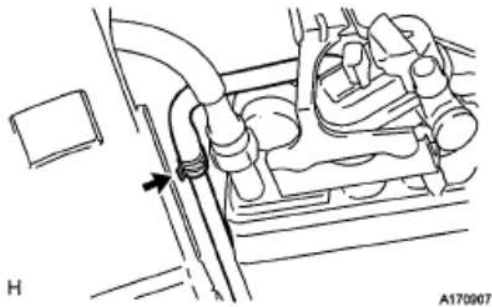


Fig. 20: Locating Charcoal Canister Assembly Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Connect the hose and connector.



Fig. 21: Locating Hose And Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSTALL NO. 3 FRONT FLOOR HEAT INSULATOR

- a. Install the No. 3 front floor heat insulator with the 4 bolts.

Torque: 4.9 N*m (50 kgf*cm, 43 in.*lbf)

3. INSTALL EXHAUST CENTER PIPE ASSEMBLY (See INSTALLATION)

4. INSTALL TAIL EXHAUST PIPE ASSEMBLY (See INSTALLATION)

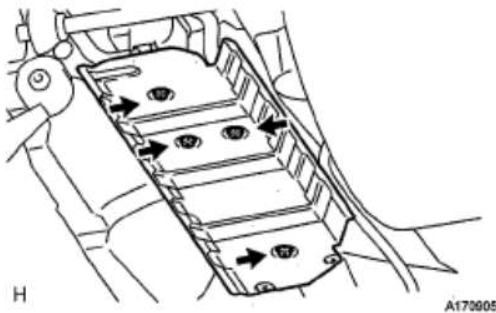


Fig. 22: Locating No. 3 Front Floor Heat Insulator Bolts

2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander

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

5. INSPECT EXHAUST GAS LEAK

- a. If exhaust gas is leaking, repair the leak. Replace damaged or worn parts as necessary.

PURGE VALVE

COMPONENTS

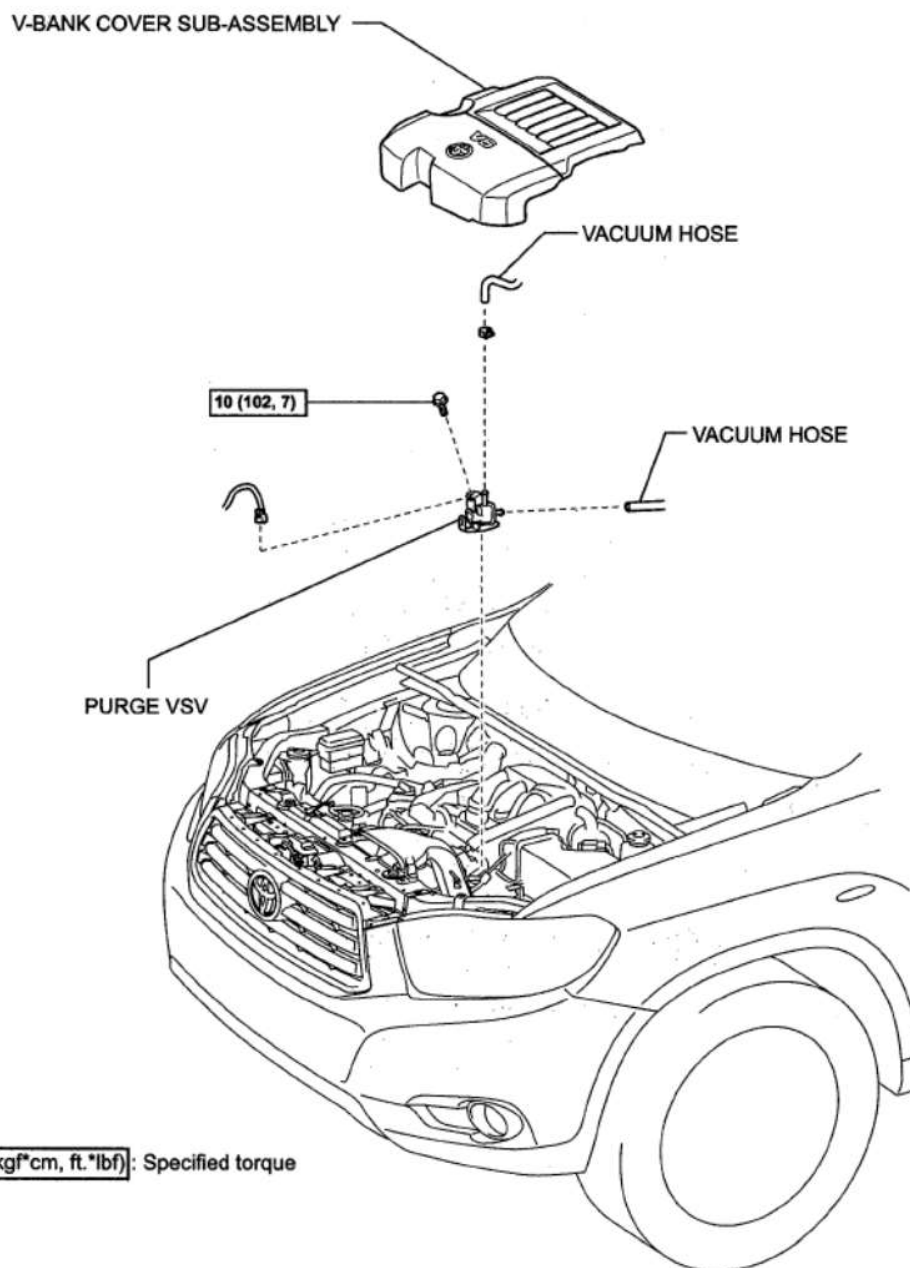


Fig. 23: Identifying Purge Valve Components

2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander

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

REMOVAL

1. **REMOVE V-BANK COVER SUB-ASSEMBLY** (See **REMOVAL**)
2. **REMOVE PURGE VSV**
 - a. Disconnect the 2 vacuum hoses and purge VSV connector.
 - b. Disconnect the wire harness clamp.

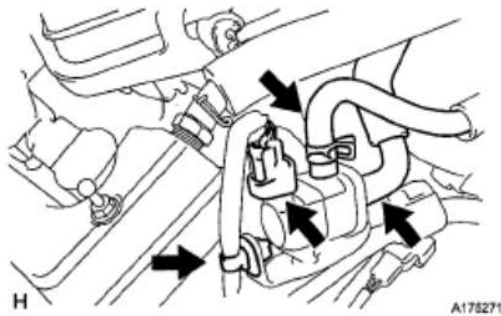


Fig. 24: Locating Vacuum Hoses And Purge VSV Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Remove the bolt and purge VSV.

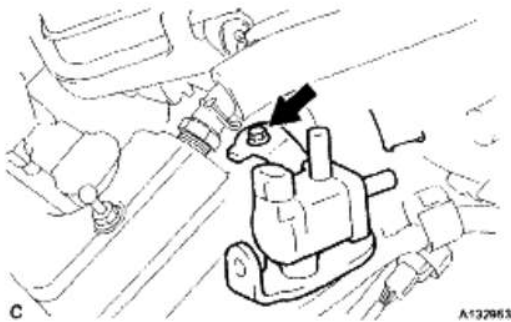


Fig. 25: Locating Purge VSV Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. **INSPECT PURGE VSV**
 - a. Check the VSV for an open circuit.
 1. Using an ohmmeter, measure the resistance between the terminals.

Standard resistance

STANDARD RESISTANCE CHART

2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander

Tester Connection	Specified Condition
1 - 2	23 to 26 ohms at 20°C (68°F)
1 - Body ground 2 - Body ground	10 Mohms or higher

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

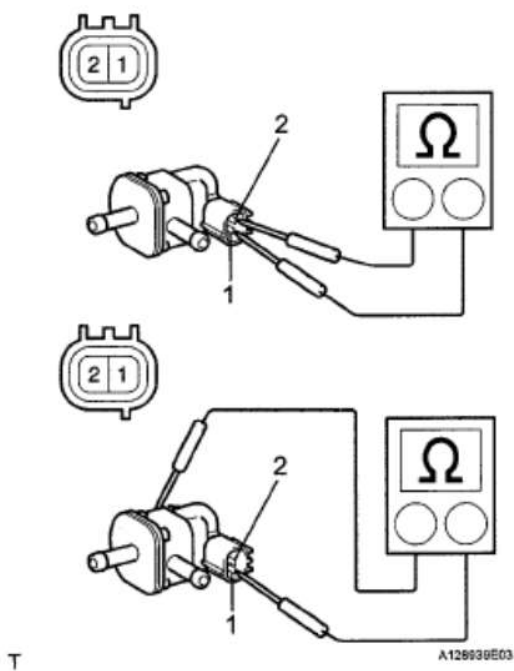


Fig. 26: Checking VSV For An Open Circuit
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Check operation of the VSV.
1. Check that air does not flow from the F port as shown in the illustration.

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

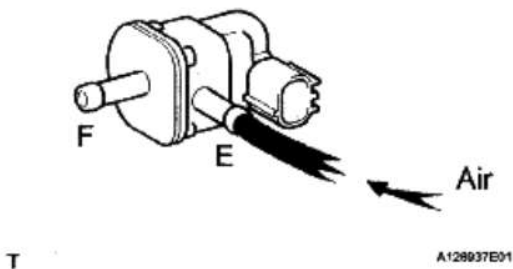


Fig. 27: Checking Air Does Not Flow From F Port
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Apply battery positive voltage across the terminals.

2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander

3. Check that air flows from the F port as shown in the illustration.

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

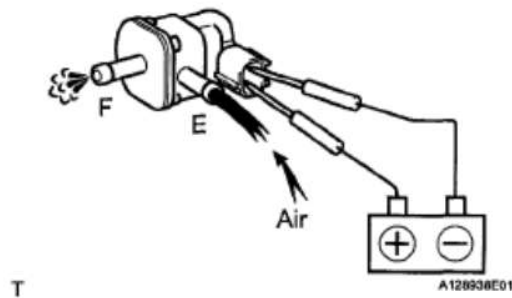


Fig. 28: Checking Air Flows From F Port
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. INSTALL PURGE VSV

- a. Install the purge VSV with the bolt.

Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

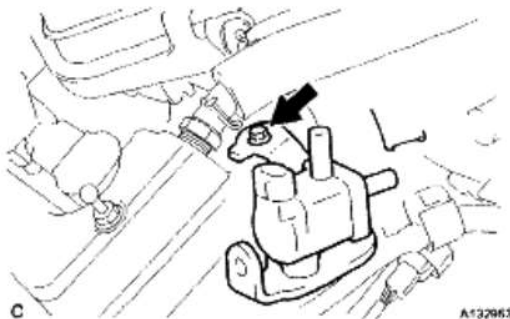


Fig. 29: Locating Purge VSV Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Connect the wire harness clamp.
- c. Connect the 2 vacuum hoses and purge VSV connector.

2. INSTALL V-BANK COVER SUB-ASSEMBLY (See INSTALLATION)

2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander

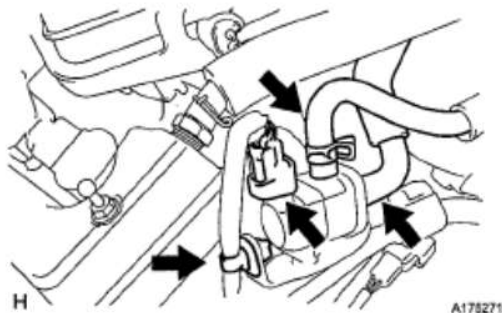


Fig. 30: Locating Vacuum Hoses And Purge VSV Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

FUEL TANK CAP

INSPECTION

1. INSPECT FUEL TANK CAP ASSEMBLY

- a. Visually check if the cap and gasket are deformed or damaged.

If necessary, replace the cap assembly or gasket.

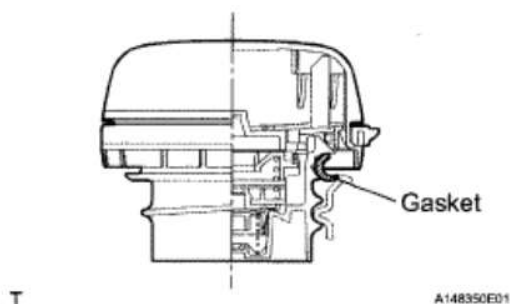


Fig. 31: Inspecting Fuel Tank Cap Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

PCV VALVE

COMPONENTS

2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander

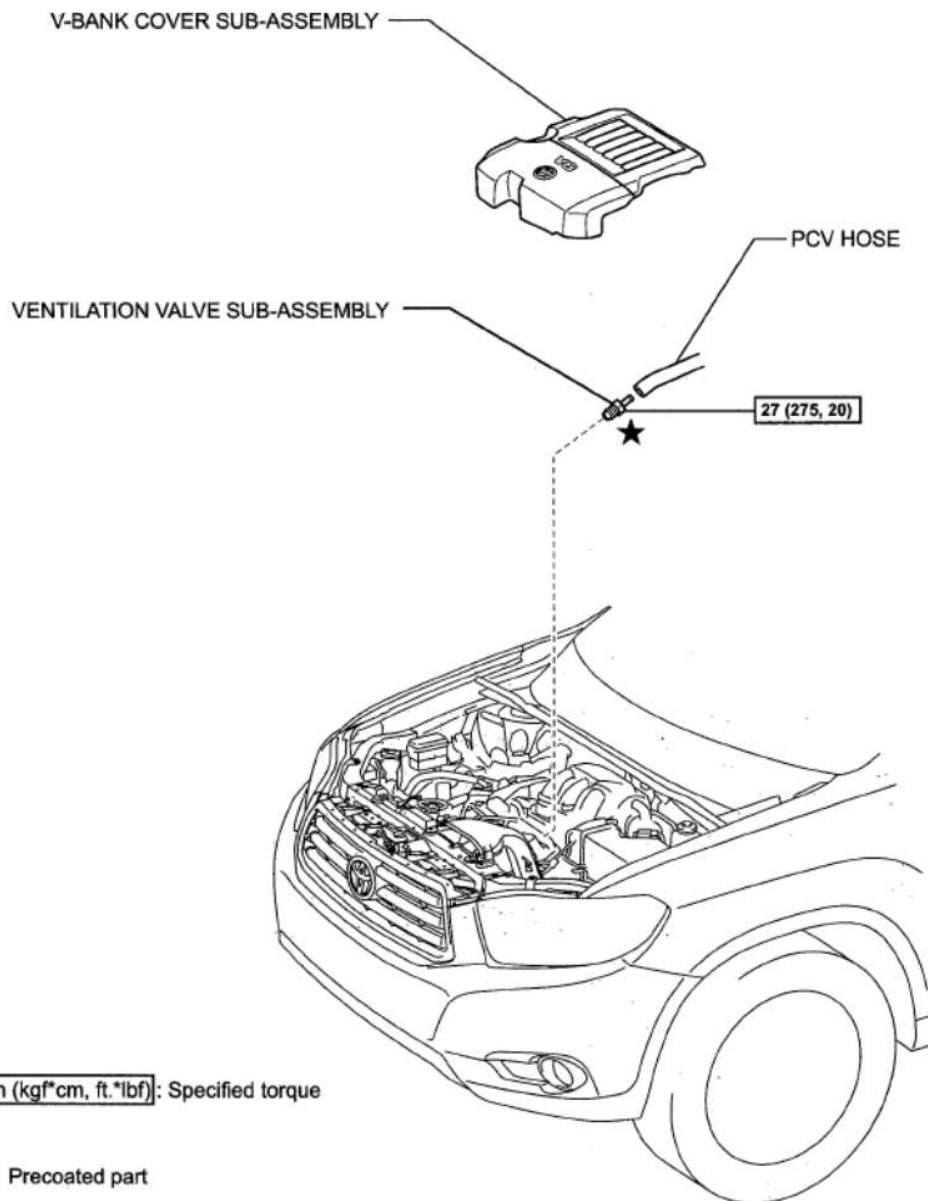


Fig. 32: Identifying PCV Valve Components
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **REMOVE V-BANK COVER SUB-ASSEMBLY** (See **REMOVAL**)
2. **REMOVE PCV HOSE**
 - a. Disconnect the PCV hose from the PCV valve.

2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander

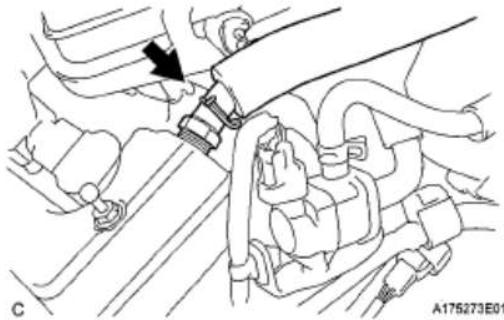


Fig. 33: Locating PCV Hose

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

3. REMOVE VENTILATION VALVE SUB-ASSEMBLY

- a. Remove the PCV valve.

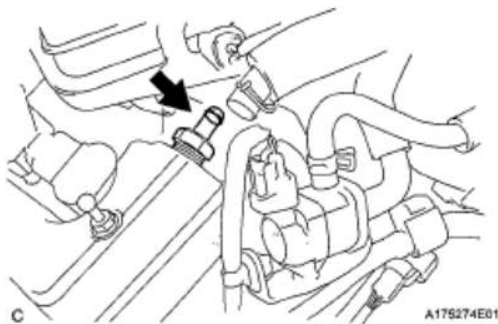


Fig. 34: Locating PCV Valve

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

INSPECTION

1. INSPECT VENTILATION VALVE SUB-ASSEMBLY

- a. Install a clean hose to the PCV valve.
- b. Inspect the PCV valve operation.
 1. Blow air into the cylinder head side, and check that air passes through easily.

NOTE: Do not suck air through the valve. Petroleum substances inside the valve are hazardous to your health.

2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander

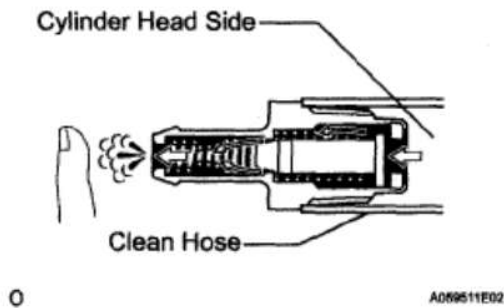


Fig. 35: Inspecting PCV Valve Operation - Blow Air Into Cylinder Head Side
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Blow air into the intake manifold side, and check that air passes through with difficulty. If the result is not as specified, replace the PCV valve.
- c. Remove the clean hose from the PCV valve.

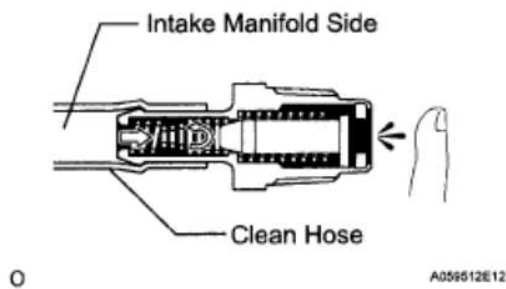


Fig. 36: Inspecting PCV Valve Operation - Blow Air Into Intake Manifold Side
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. INSTALL VENTILATION VALVE SUB-ASSEMBLY

- a. Install the PCV valve.
 1. Apply adhesive to 2 or 3 threads.

Adhesive:

Part No. 08833-00070, THREE BOND 1324 or equivalent.

2009 Toyota Highlander Limited

2009 ENGINE Emission Control (2GR-FE) - Highlander

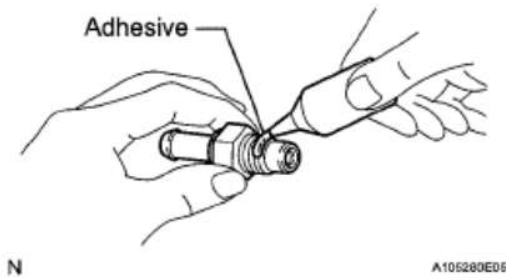


Fig. 37: Applying Adhesive To PCV Valve Threads
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Install the PCV valve.

Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)

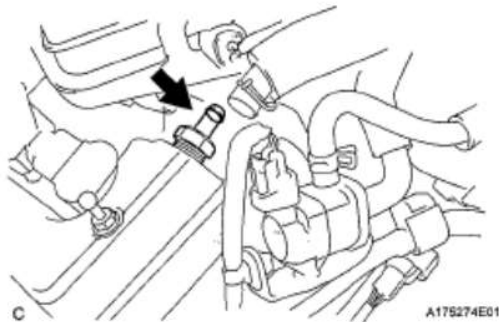


Fig. 38: Locating PCV Valve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSTALL PCV HOSE

- a. Connect the PCV hose to the PCV valve.

3. INSTALL V-BANK COVER SUB-ASSEMBLY (See INSTALLATION)

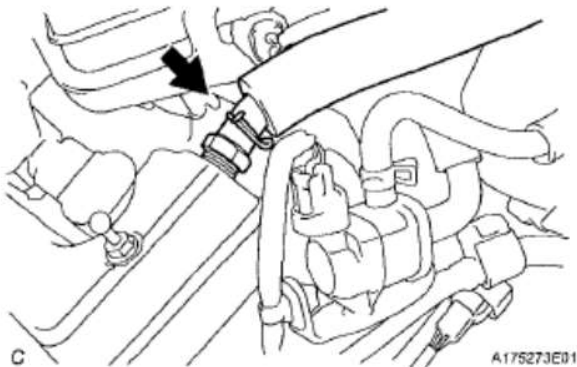


Fig. 39: Locating PCV Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.