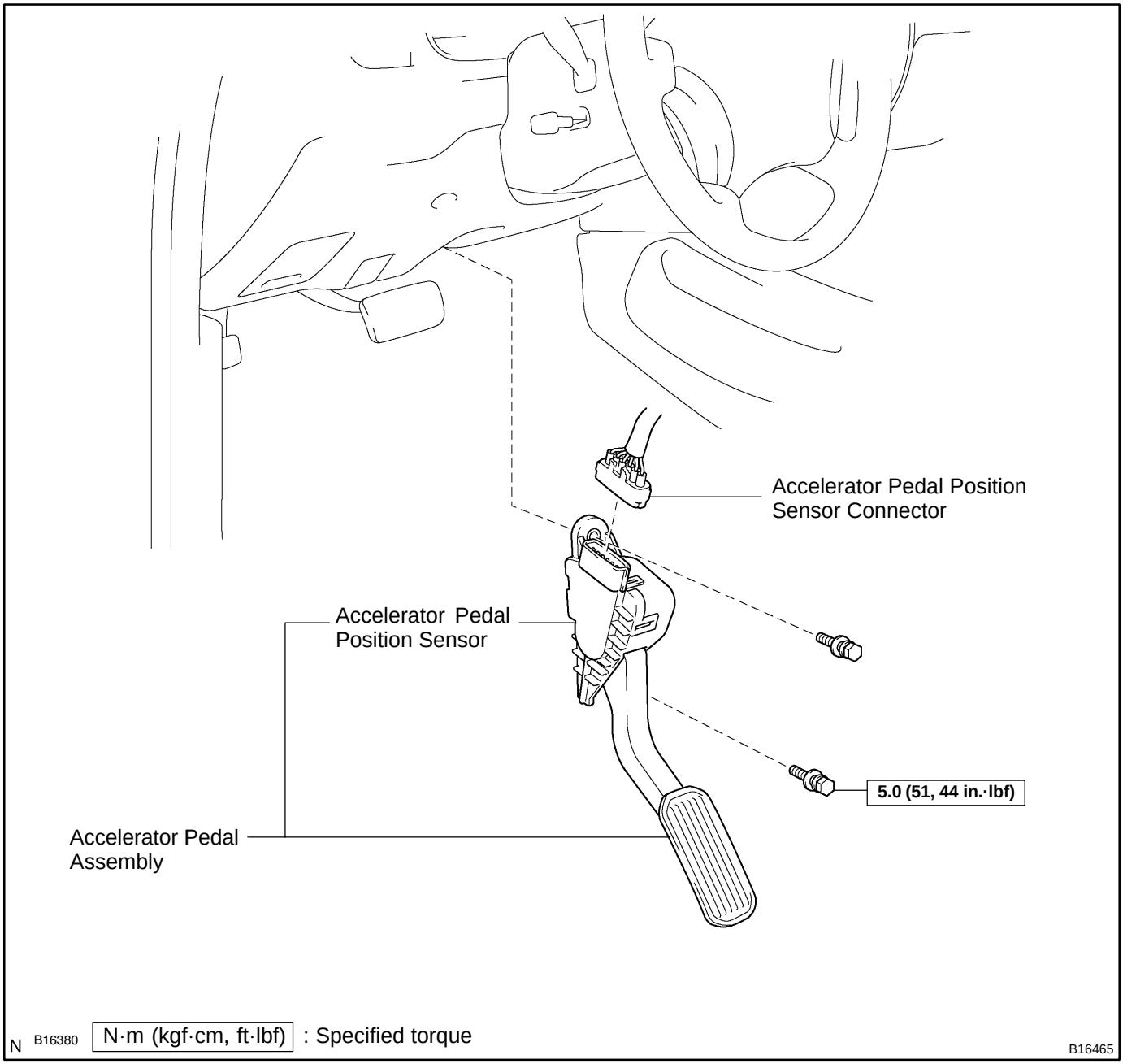
ACCELERATOR PEDAL POSITION SENSOR

COMPONENTS

SF1UM-03



SF1UN-03

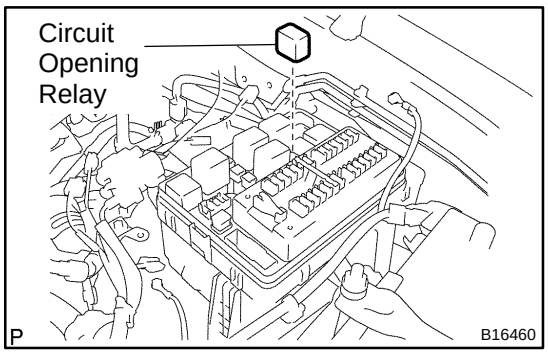
INSPECTION

INSPECT ACCELERATOR PEDAL POSITION SENSOR (See page DI-318)

If necessary, replace the accelerator pedal assembly.

NOTICE:

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



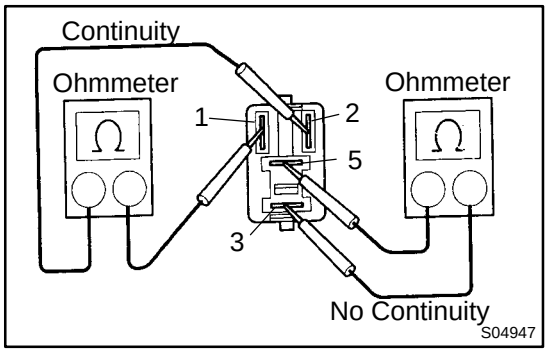
CIRCUIT OPENING RELAY

SF136-06

INSPECTION

1. REMOVE RELAY BOX COVER

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



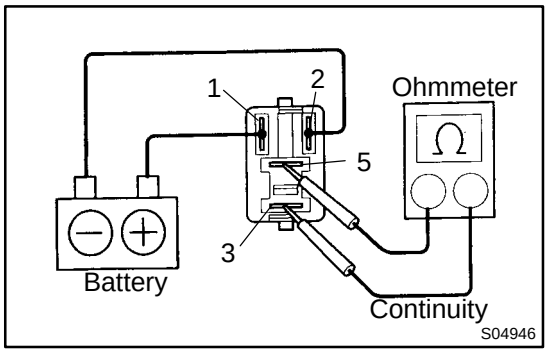
3. INSPECT CIRCUIT OPENING RELAY CONTINUITY

(a) Using an ohmmeter, check that there is a continuity between terminal 1 and 2.

If there is no continuity, replace the relay.

(b) Check that there is no continuity between terminal 3 and 5.

If there is a continuity, replace the relay.



4. INSPECT CIRCUIT OPENING RELAY OPERATION

(a) Apply the battery positive voltage across terminal 1 and 2.

(b) Using an ohmmeter, check that there is a continuity between terminal 3 and 5.

If there is no continuity, replace the relay.

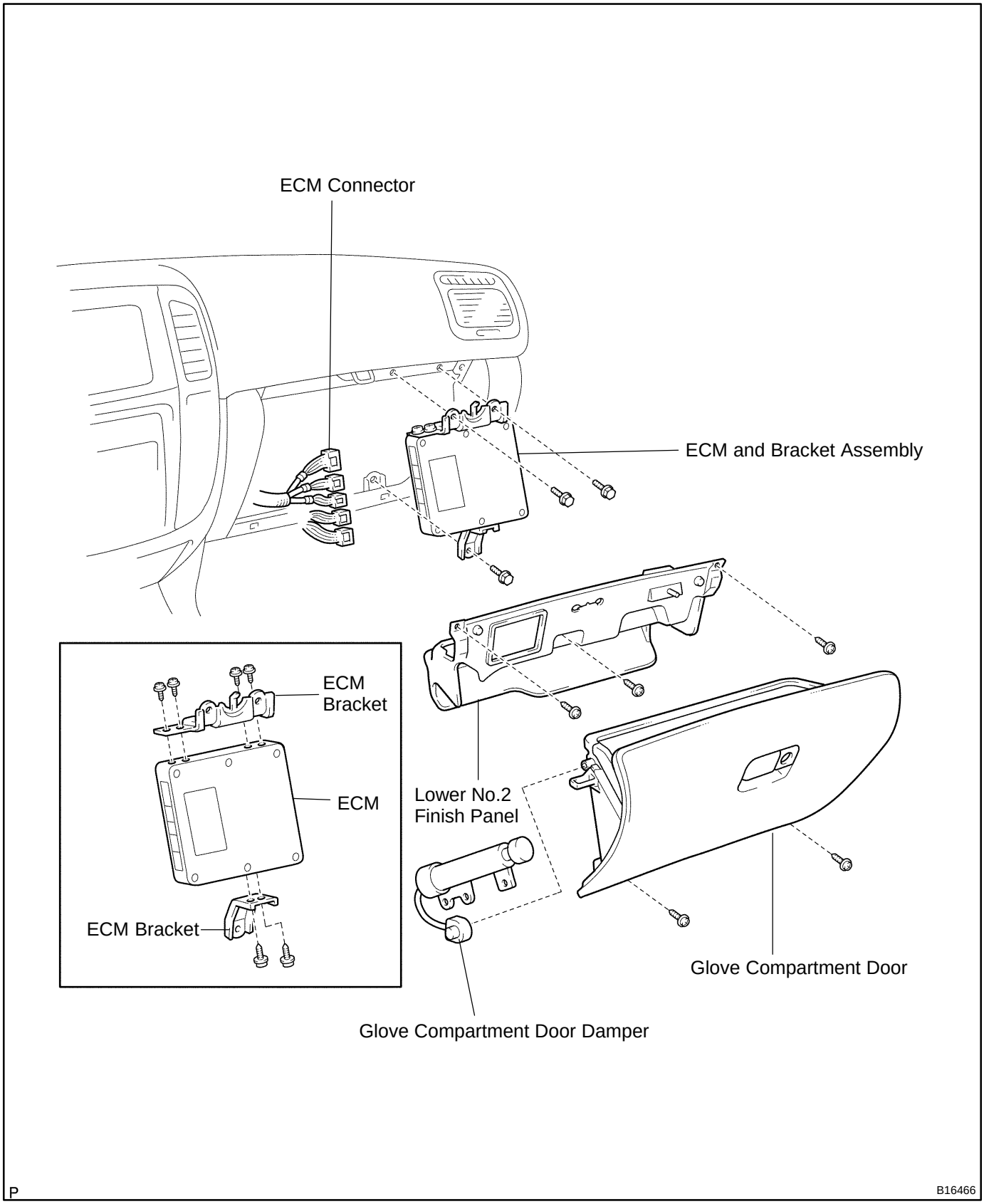
5. REINSTALL CIRCUIT OPENING RELAY

6. REINSTALL RELAY BOX COVER

ENGINE CONTROL MODULE (ECM)

COMPONENTS

SF0Q0-12



SF0Q1-02

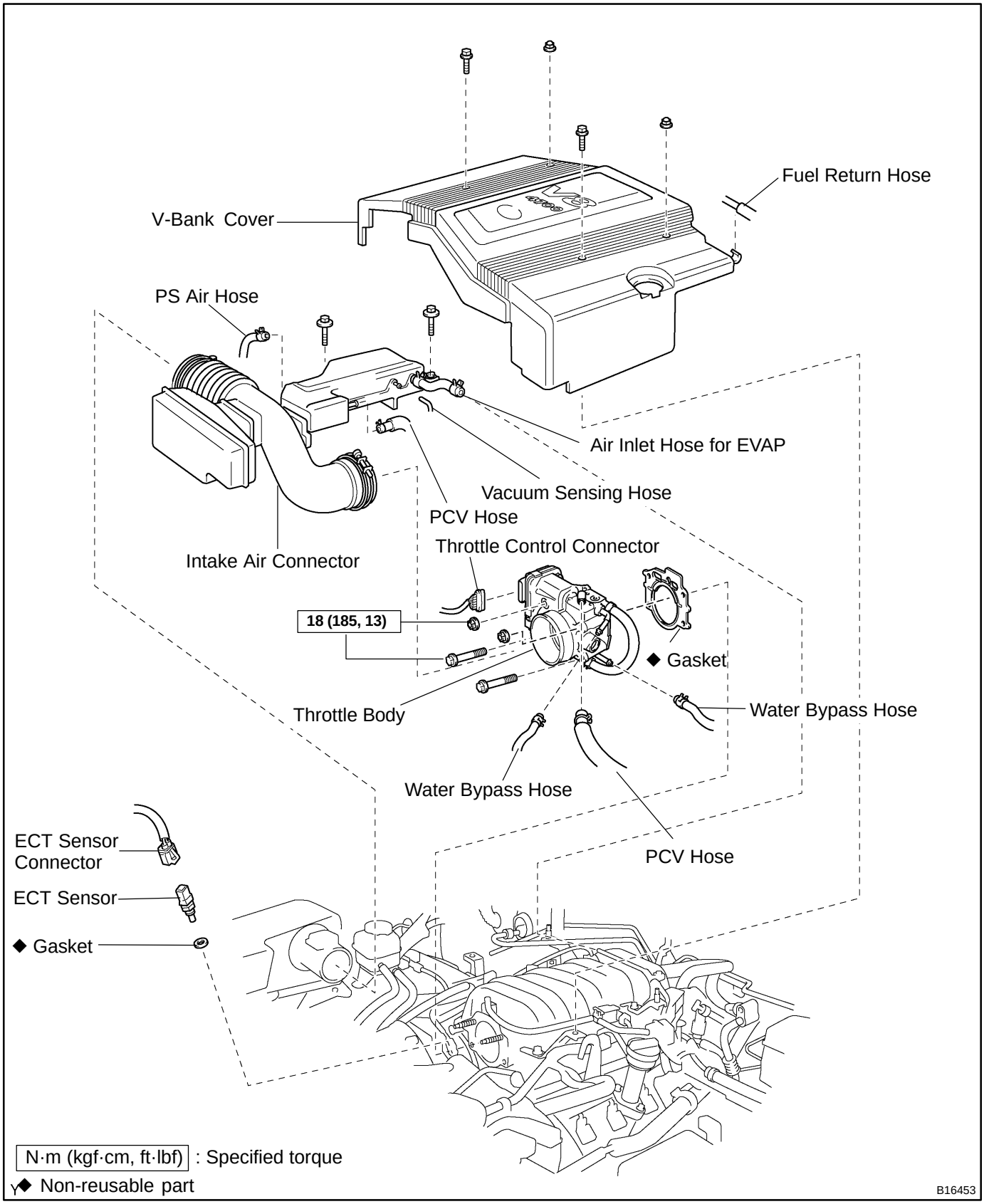
INSPECTION

1. **REMOVE ECM**
2. **INSPECT ECM (See page DI-46)**
3. **REINSTALL ECM**

ENGINE COOLANT TEMPERATURE (ECT) SENSOR

SF0PN-11

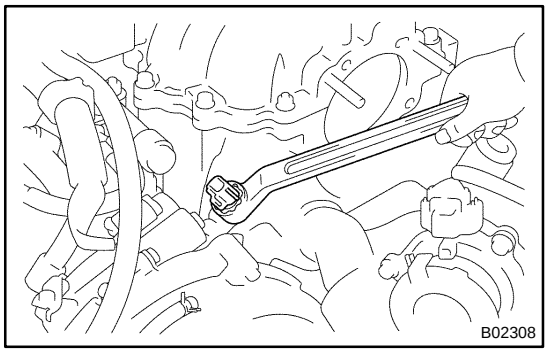
COMPONENTS



SF0PO-17

INSPECTION

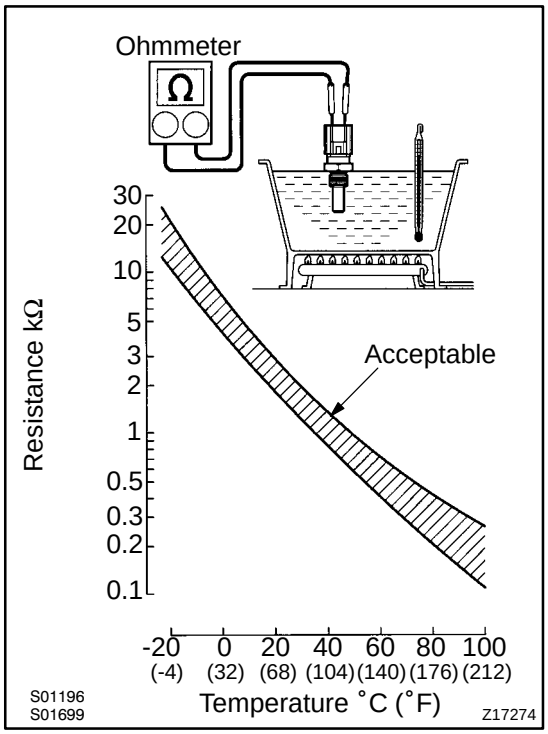
1. **DRAIN ENGINE COOLANT**
2. **REMOVE V-BANK COVER**
3. **REMOVE INTAKE AIR CONNECTOR**
4. **DISCONNECT THROTTLE BODY FROM INTAKE MANIFOLDS (See page SF-36)**



5. **REMOVE ECT SENSOR**

(a) Disconnect the ECT sensor connector.

(b) Remove the ECT sensor and the gasket.



6. **INSPECT ECT SENSOR**

Using an ohmmeter, measure the resistance between the terminals.

Resistance: Refer to the graph

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

7. **REINSTALL ECT SENSOR**

(a) Install a new gasket and the ECT sensor.

Torque: 20.4 N·m (208 kgf·cm, 15 ft·lbf)

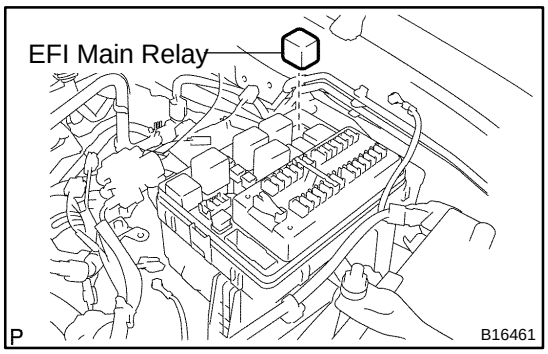
(b) Connect the ECT sensor connector.

8. **REINSTALL THROTTLE BODY TO INTAKE MANIFOLDS**

Install a new gasket and the throttle body with the 2 bolts and 2 nuts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

9. **REINSTALL INTAKE AIR CONNECTOR**
10. **REFILL WITH ENGINE COOLANT (See page CO-2)**
11. **REINSTALL V-BANK COVER**



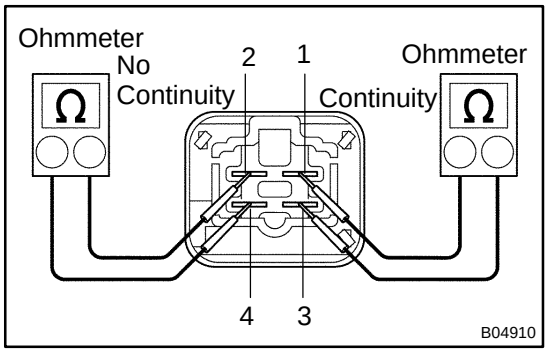
EFI MAIN RELAY

SF06G-18

INSPECTION

1. REMOVE RELAY BOX COVER

2. REMOVE EFI MAIN RELAY (Marking: EFI)



3. INSPECT EFI MAIN RELAY

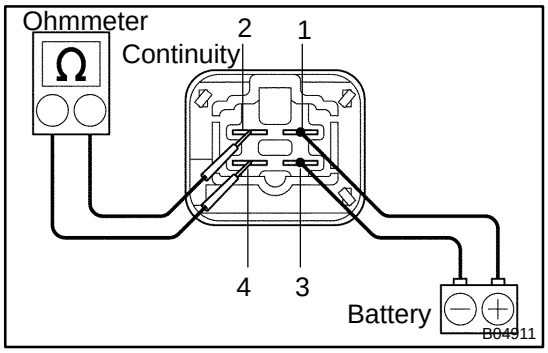
(a) Inspect the relay continuity.

(1) Using an ohmmeter, check that there is a continuity between terminal 1 and 3.

If there is no continuity, replace the relay.

(2) Check that there is no continuity between terminals 2 and 4.

If there is a continuity, replace the relay.



(b) Inspect the relay operation.

(1) Apply battery positive voltage across terminals 1 and 3.

(2) Using an ohmmeter, check that there is a continuity between terminal 2 and 4.

If there is no continuity, replace the relay.

4. REINSTALL EFI MAIN RELAY

5. REINSTALL RELAY BOX COVER

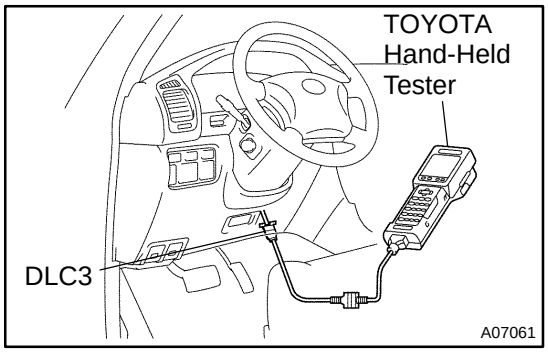
FUEL CUT RPM

SF0Q2-14

INSPECTION

1. WARM UP ENGINE

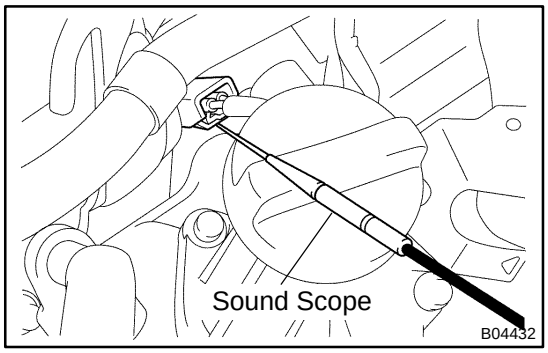
Allow the engine to warm up to normal operating temperature.



2. CONNECT TOYOTA HAND-HELD TESTER OR OBDII SCAN TOOL

(a) Connect the TOYOTA hand-held tester or OBDII scan tool to the DLC3.

(b) Please refer to the TOYOTA hand-held tester or OBDII scan tool operator's manual for further details.



3. INSPECT FUEL CUTOFF RPM OPERATION

(a) Increase the engine speed to at least 2,500 rpm.

(b) Check the injector for operating noise.

(c) Check that when the throttle lever is released, injector operation noise stops momentarily and then resumes.

HINT:

- The vehicle should be at at rest during the inspection.
- Inspection with the A/C OFF.

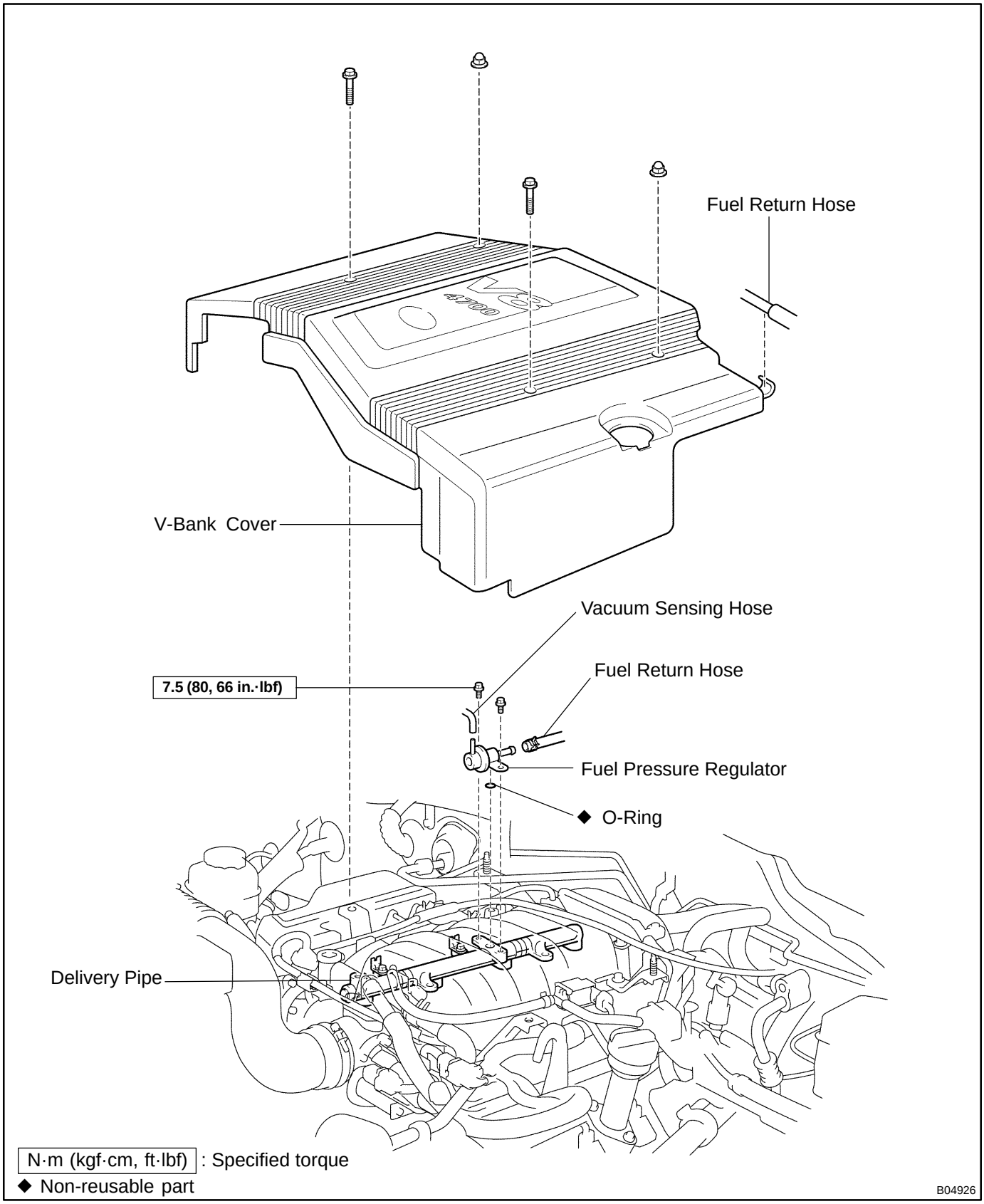
Fuel return speed: 1,000 rpm

4. DISCONNECT TOYOTA HAND- HELD TESTER OR OBDII SCAN TOOL

FUEL PRESSURE REGULATOR

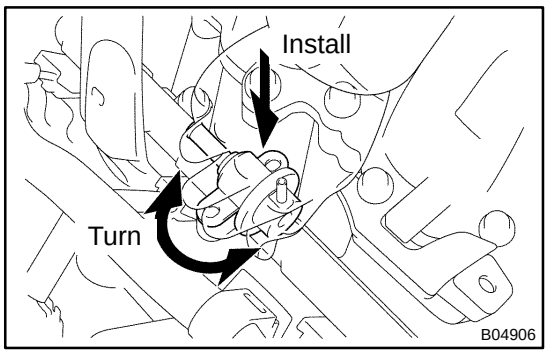
COMPONENTS

SF0XZ-11



SF0Y1-11

INSTALLATION



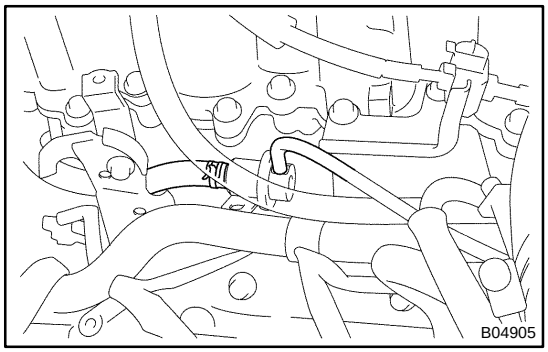
1. INSTALL FUEL PRESSURE REGULATOR

(a) Apply a light coat of gasoline to a new O-ring, and install it to the fuel pressure regulator.

(b) While turning the fuel pressure regulator left and right, install it to the delivery pipe.

(c) Install the fuel pressure regulator with the 2 bolts.

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)



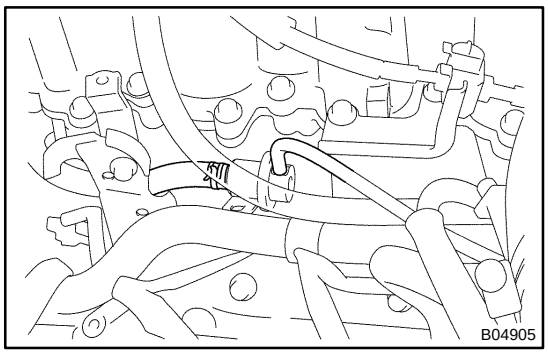
(d) Connect the vacuum sensing hose to the fuel pressure regulator.

(e) Connect the fuel return hose to the pressure regulator.

2. CHECK FOR FUEL LEAKS (See page SF-1)

3. INSTALL V-BANK COVER

SF0Y0-08



REMOVAL

1. REMOVE V-BANK COVER

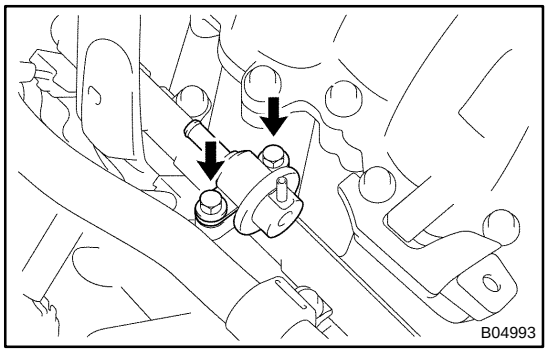
2. REMOVE FUEL PRESSURE REGULATOR

(a) Disconnect the vacuum sensing hose from the fuel pressure regulator.

(b) Disconnect the fuel return hose from the fuel pressure regulator.

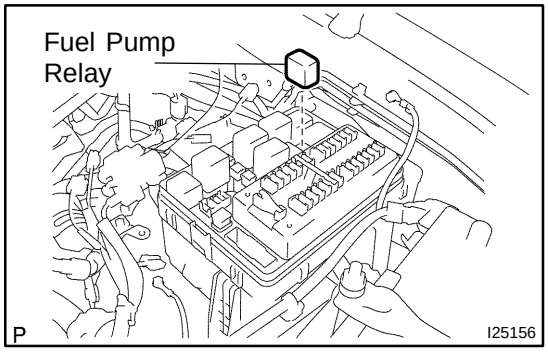
CAUTION:

Put a shop rag under the fuel pressure regulator.



(c) Remove the 2 bolts, and pull out the pressure regulator.

(d) Remove the O-ring from the fuel pressure regulator.



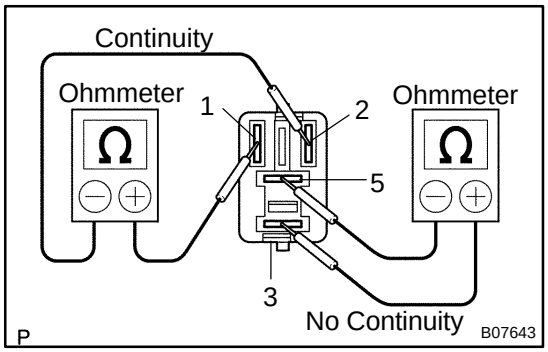
FUEL PUMP RELAY

SF137-06

INSPECTION

1. REMOVE RELAY BOX COVER

2. REMOVE FUEL PUMP RELAY (Marking: F/PUMP)



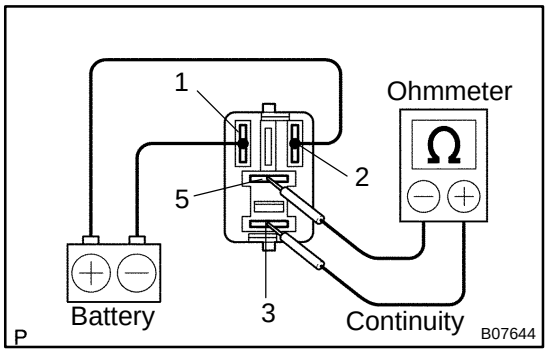
3. INSPECT FUEL PUMP RELAY CONTINUITY

(a) Using an ohmmeter, check that there is a continuity between terminal 1 and 2.

If there is no continuity, replace the relay.

(b) Check that there is no continuity between terminals 3 and 5.

If there is a continuity, replace the relay.



4. INSPECT FUEL PUMP RELAY OPERATION

(a) Apply the battery positive voltage across terminal 1 and 2.

(b) Using an ohmmeter, check that there is a continuity between terminal 3 and 5.

If there is no continuity, replace the relay.

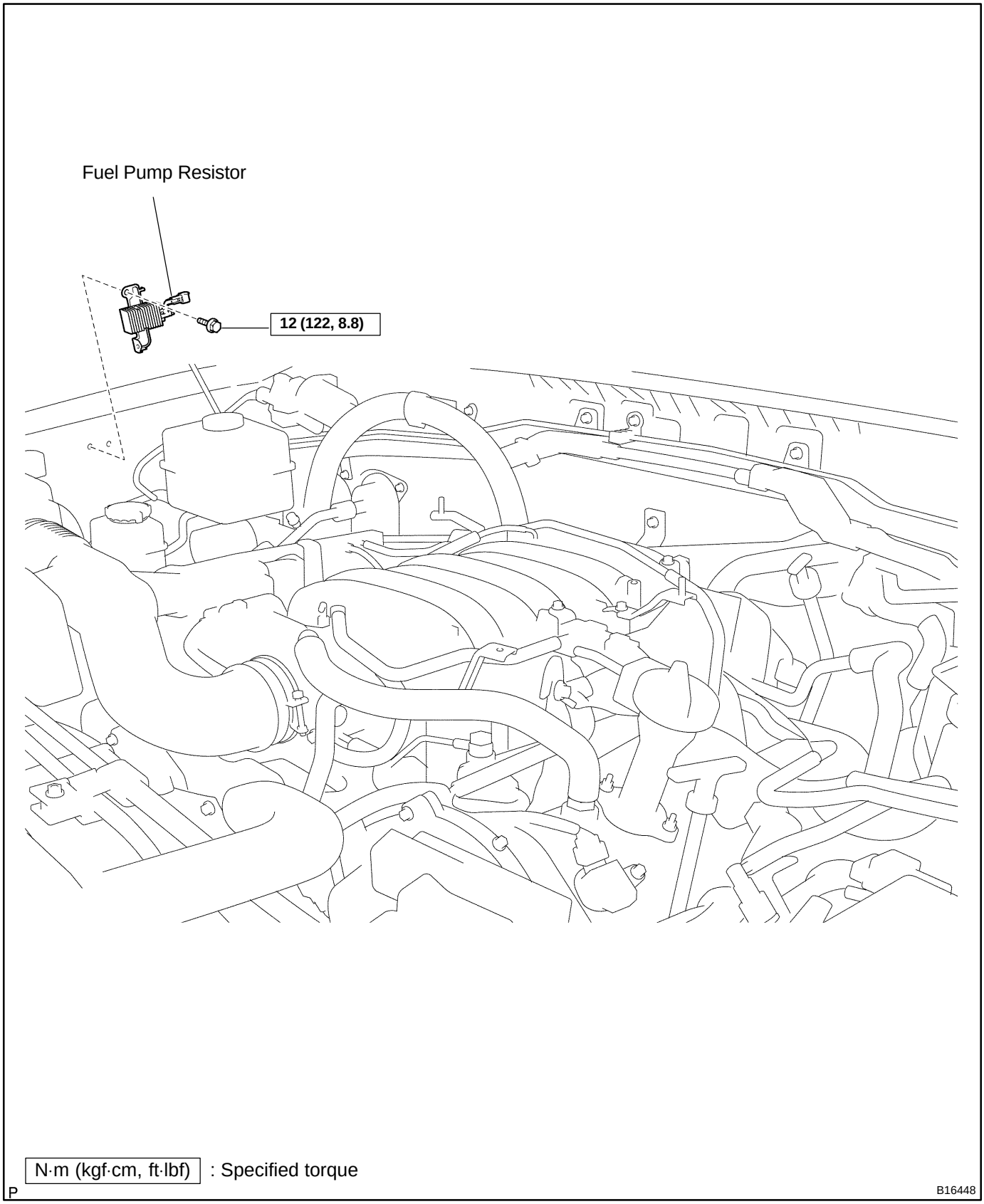
5. REINSTALL FUEL PUMP RELAY

6. REINSTALL RELAY BOX COVER

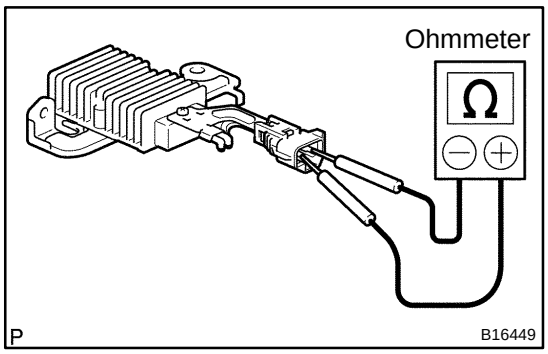
FUEL PUMP RESISTOR

COMPONENTS

SF138-04



SF139-04



INSPECTION

1. REMOVE FUEL PUMP RESISTOR

2. INSPECT FUEL PUMP RESISTOR

Using an ohmmeter, measure the resistance between the terminals.

Resistance: 0.70 - 0.76 Ω at 20˚C (68˚F)

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

3. REINSTALL FUEL PUMP RESISTOR

Torque: 12 N·m (122 kgf·cm, 8.8 ft·lbf)

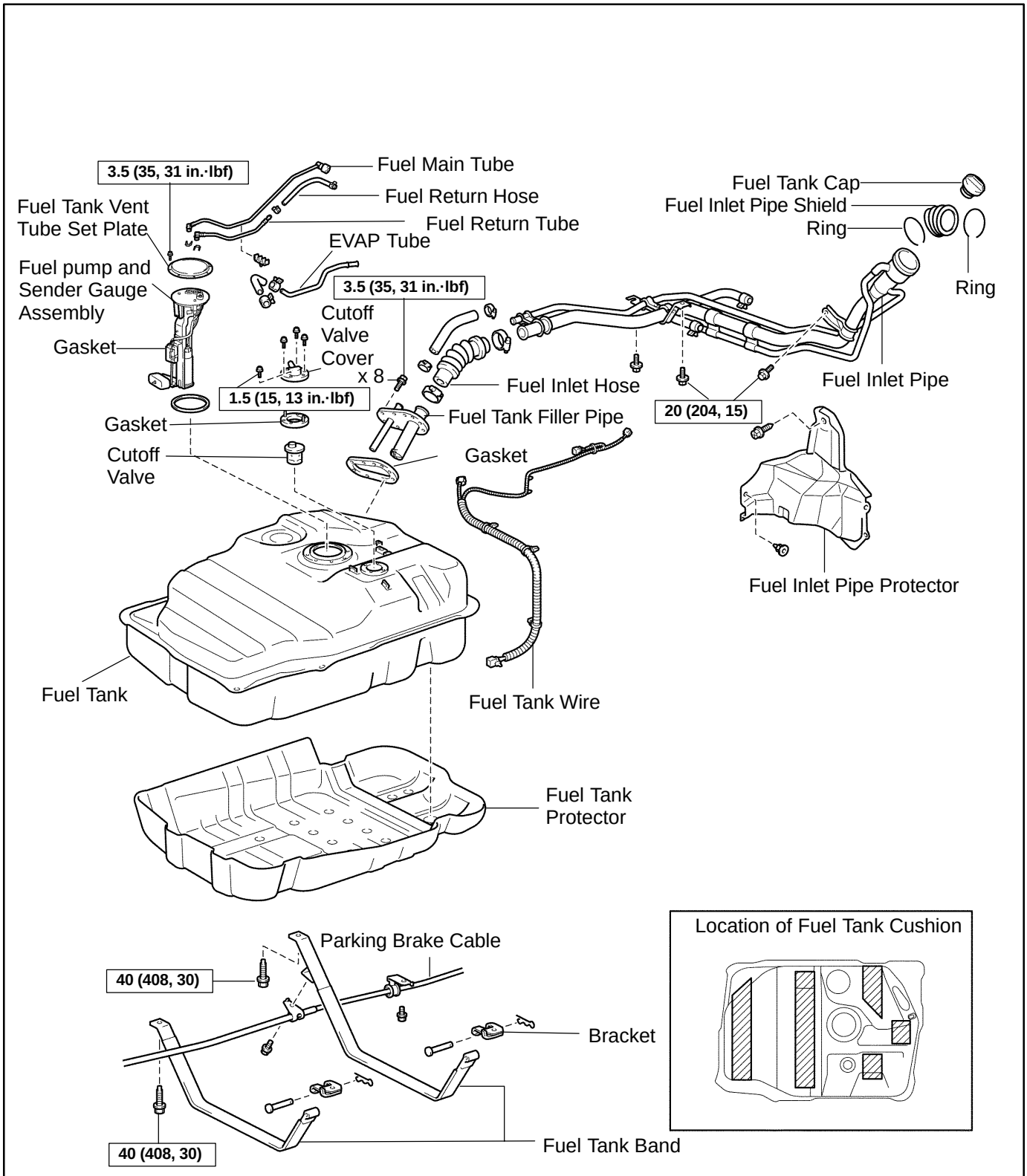
FUEL TANK AND LINE

SF0OZ-15

COMPONENTS

CAUTION:

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



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

P Non-reusable part

B16457

SF0P0-12

INSPECTION

INSPECT FUEL TANK AND LINE

(a) Check the fuel lines from cracks or leakage, and all connections for deformation.

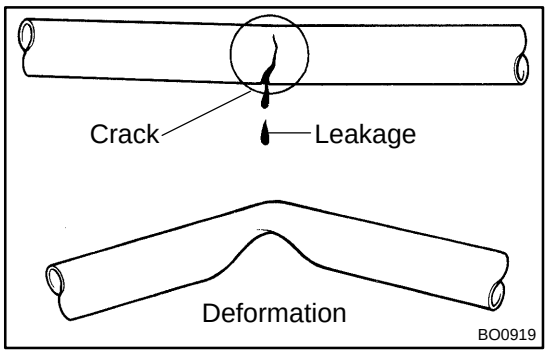
(b) Check the fuel tank vapor vent system hoses and all connections for looseness, sharp bends or damage.

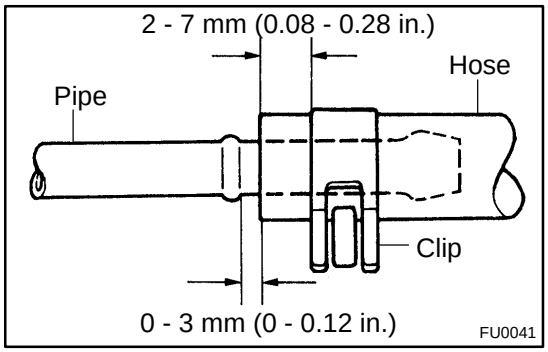
(c) Check the fuel tank for deformation, cracks, fuel leakage or tank band looseness.

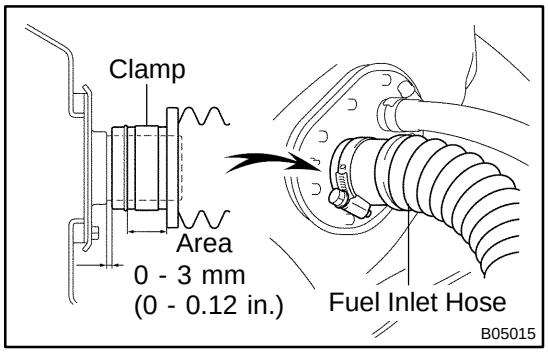
(d) Check the filler neck for damage or fuel leakage.

(e) Hose and pipe connections are as shown in the illustration.

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

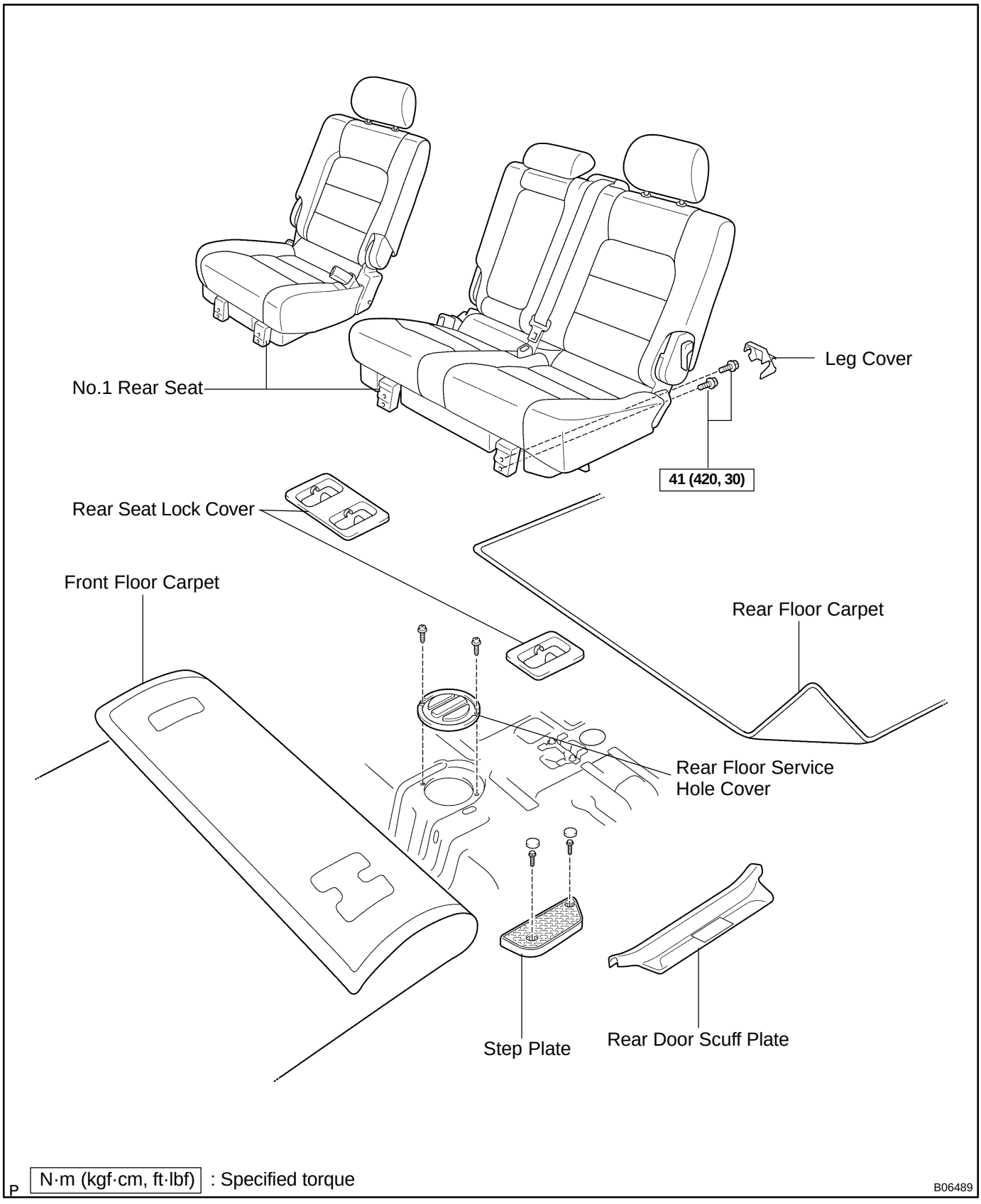


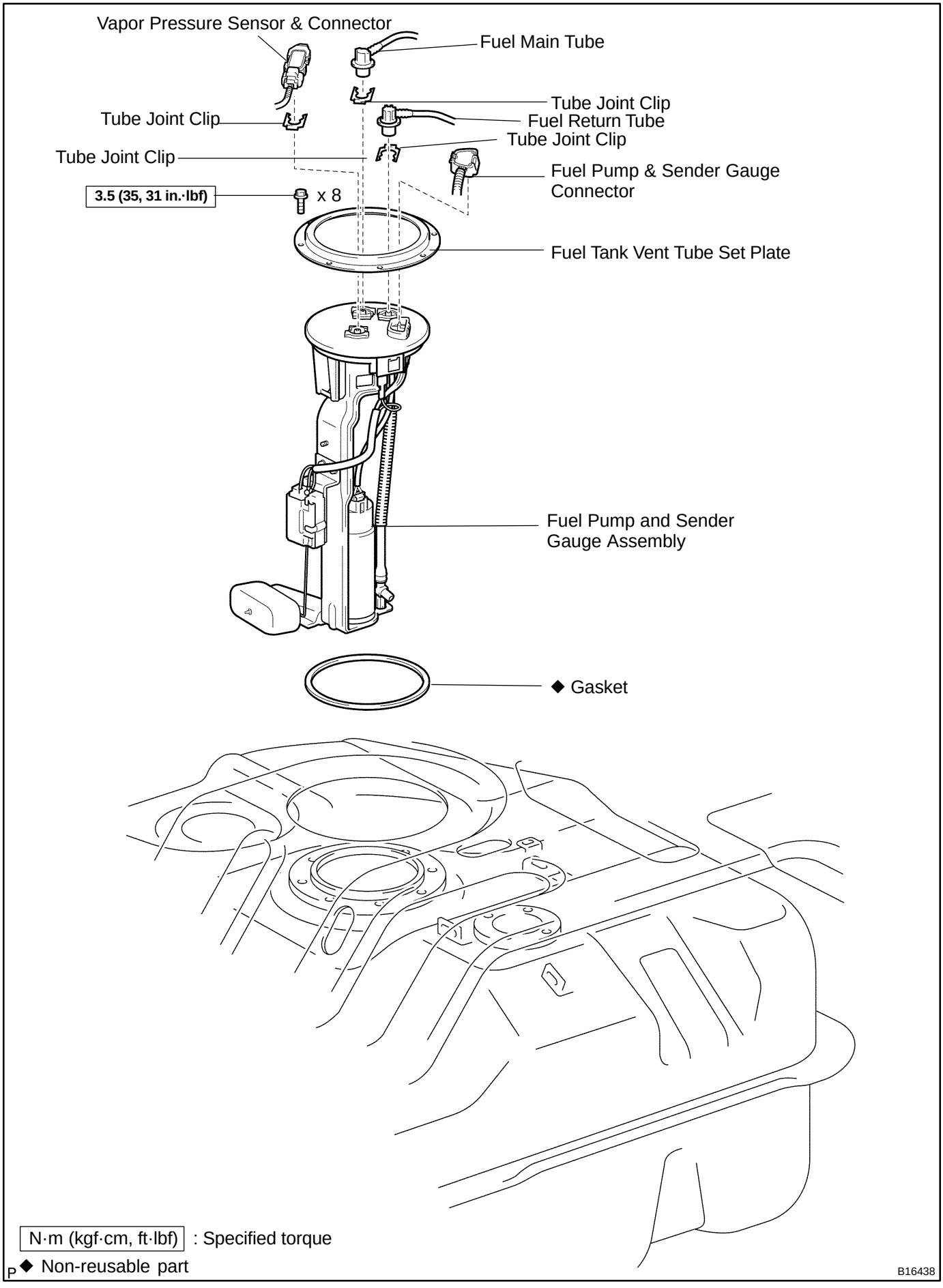


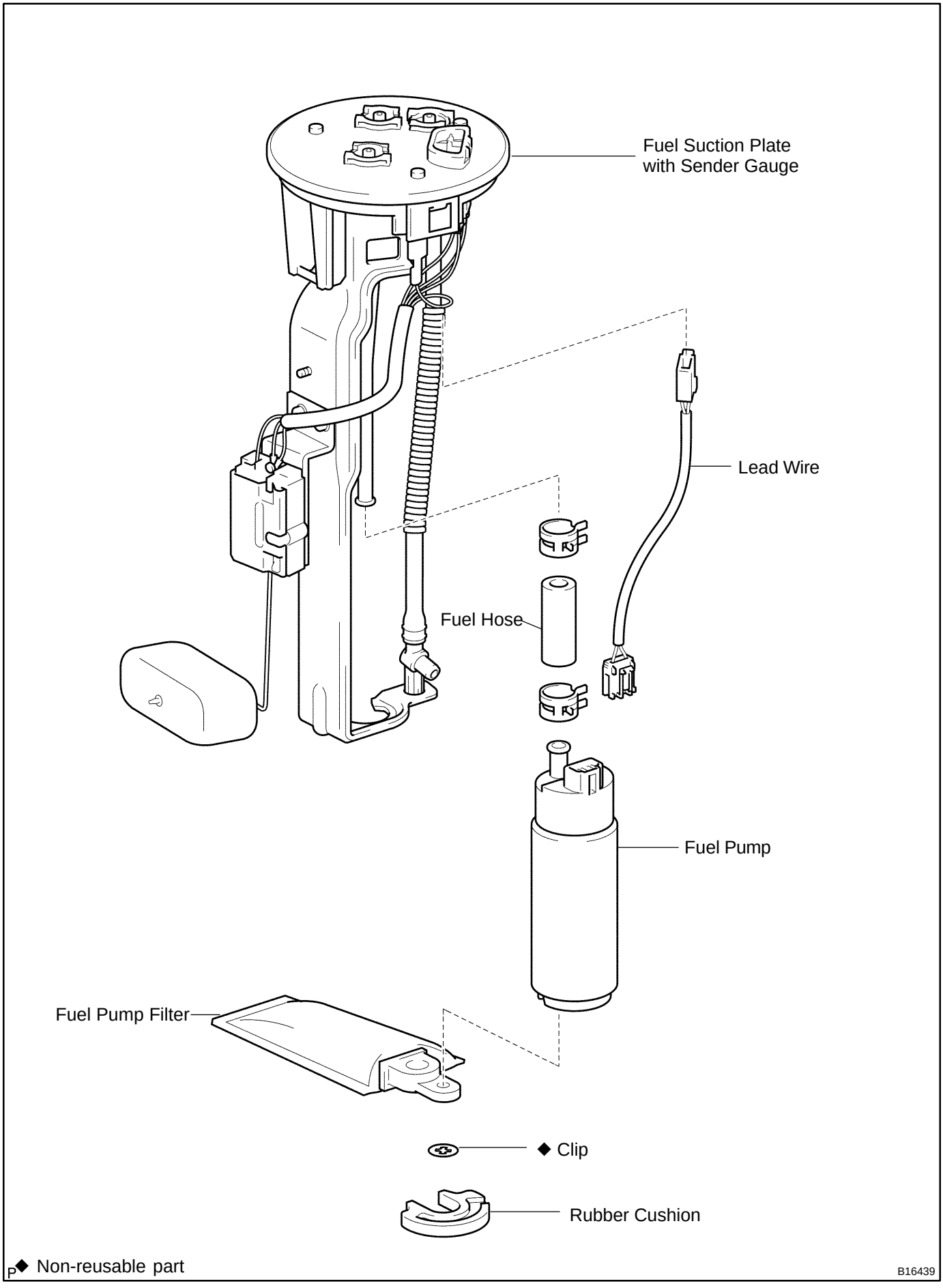


SF0XW-05

COMPONENTS

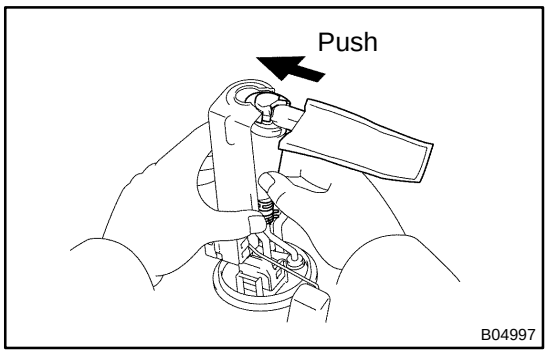



Vapor Pressure Sensor & Connector
Fuel Main Tube
Tube Joint Clip
Tube Joint Clip
Fuel Return Tube
Tube Joint Clip
Tube Joint Clip
Fuel Pump & Sender Gauge Connector
3.5 (35, 31 in.·lbf)
x 8
Fuel Tank Vent Tube Set Plate
Fuel Pump and Sender Gauge Assembly
◆ Gasket
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
B16438


Fuel Suction Plate
with Sender Gauge
Lead Wire
Fuel Hose
Fuel Pump
Fuel Pump Filter
◆ Clip
Rubber Cushion
P◆ Non-reusable part
B16439

SF0XY-04

INSTALLATION



1. INSTALL FUEL PUMP FILTER TO FUEL PUMP

Install the pump filter with a new clip.

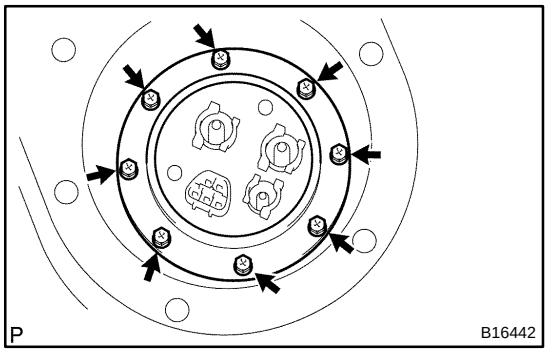
2. INSTALL FUEL PUMP TO FUEL PUMP BRACKET

(a) Install the rubber cushion to the fuel pump.

(b) Connect the fuel hose to the outlet port of the fuel pump.

(c) Install the fuel pump by pushing the lower side of the fuel pump.

3. INSTALL LEAD WIRE TO FUEL PUMP



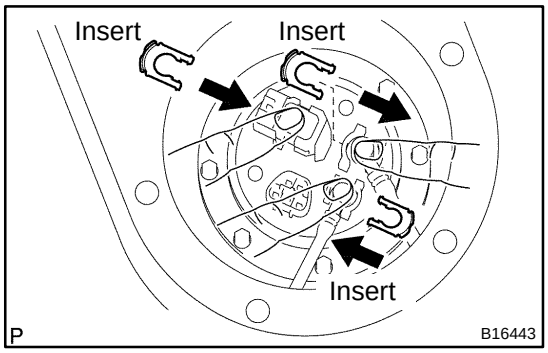
4. INSTALL FUEL PUMP AND SENDER GAUGE ASSEMBLY TO FUEL TANK

(a) Install a new gasket to the fuel suction plate.

(b) Insert the fuel pump and the sender gauge assembly into the fuel tank.

(c) Install the fuel tank vent tube set plate with the 8 bolts.

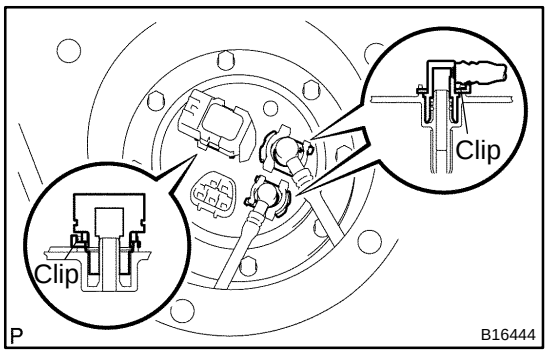
Torque: 3.5 N·m (35 kgf·cm, 31 in.·lbf)



5. CONNECT FUEL MAIN TUBE AND RETURN TUBE (FUEL TUBE CONNECTORS) TO FUEL SUCTION PLATE

(a) Before installing the tube connectors, check foreign matters on the connection between the nylon tube and the suction plate.

(b) Attach the fuel tube connectors to the ports of the fuel suction plate and insert the clips until you hear a click.



(c) After the connection, pull out the clips to check to see that they are installed securely.

6. CONNECT FUEL PUMP & SENDER GAUGE CONNECTOR

7. CHECK FOR FUEL LEAKS (See page SF-1)

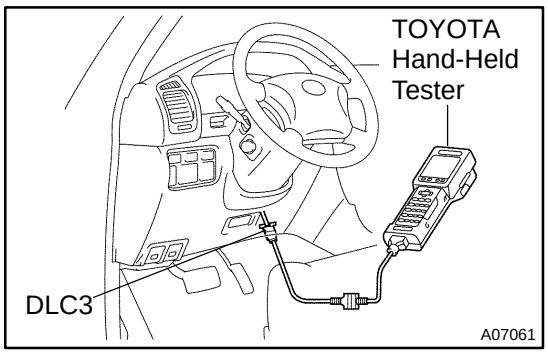
8. INSTALL REAR FLOOR SERVICE HOLE COVER

(a) Install the rear service hole cover with the 2 screws.

(b) Cover the rear and front floor carpets.

9. INSTALL REAR DOOR SCUFF PLATES, STEP PLATES AND REAR SEAT LOCK COVERS

10. INSTALL NO.1 REAR SEATS



FUEL PUMP

SF10V-02

ON-VEHICLE INSPECTION

1. CHECK FUEL PUMP OPERATION

(a) Connect a TOYOTA hand-held tester or OBD II scan tool to the DLC3.

(b) Turn the ignition switch ON, and press the TOYOTA hand-held tester or OBD II scan tool main switch ON.

NOTICE:

Do not start the engine.

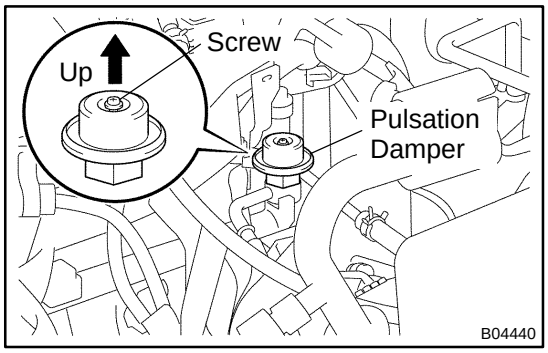
(c) Select the ACTIVE TEST mode on the TOYOTA hand-held tester or OBD II scan tool.

(d) Please refer to the TOYOTA hand-held tester or OBD II scan tool operator's manual for further details.

(e) If you have no TOYOTA hand-held tester or OBD II scan tool, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector. (See step 3)

(f) Disconnect the fuel return hose from the clamp on the V-bank cover.

(g) Remove the 2 bolts, nuts and V-bank cover.



(h) Check that the pulsation damper screw pop up when the fuel pump operates.

If operation is not as specified, check following parts:

- Fusible link
- Fuses
- EFI main relay
- Fuel pump
- ECM
- Wiring connections

(i) Turn the ignition switch OFF.

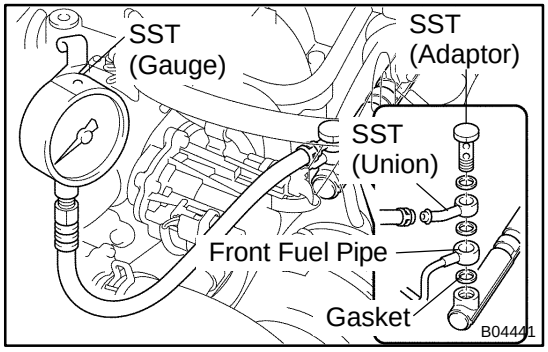
(j) Disconnect the TOYOTA hand-held tester or OBD II scan tool from the DLC3.

2. CHECK FUEL PRESSURE

(a) Check the battery positive voltage is above 12 V.

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

(c) Remove the front fuel pipe from the LH delivery pipe (See page SF-22).



(d) Install the front fuel pipe and SST (pressure gauge) to the delivery pipe with the 3 lower gaskets and SST (adaptor).
SST 09268-45014 (09268-41190, 90405-06167)
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(e) Wipe off any splattered gasoline.

(f) Reconnect the negative (-) terminal cable to the battery.

(g) Connect a TOYOTA hand-held tester or OBD II scan tool to the DLC3 (See (a) to (e) in step 1 on the check fuel pump operation).

(h) Measure the fuel pressure.

Fuel pressure:
265 - 304 kPa (2.7 - 3.1 kgf/cm^2, 38 - 44 psi)

If pressure is higher than the specification, replace the fuel pressure regulator.

If pressure is lower than the specification, check these parts:

- Fuel hoses and connections
- Fuel pump
- Fuel filter
- Fuel pressure regulator

(i) Disconnect the TOYOTA hand- held tester from the DLC3.

(j) Start the engine.

(k) Measure the fuel pressure at idle.

Fuel pressure:
265 - 304 kPa (2.7 - 3.1 kgf/cm^2, 38 - 44 psi)

(l) Stop the engine.

(m) Check that the fuel pressure remains in the specification below for 5 minutes after the engine stop.

Fuel pressure:
147 kPa (1.5 kgf/cm^2, 21 psi) or more

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

(n) After checking the fuel pressure, disconnect the negative (-) terminal cable from the battery and carefully remove the SST to prevent gasoline from splashing.
SST 09268-45014

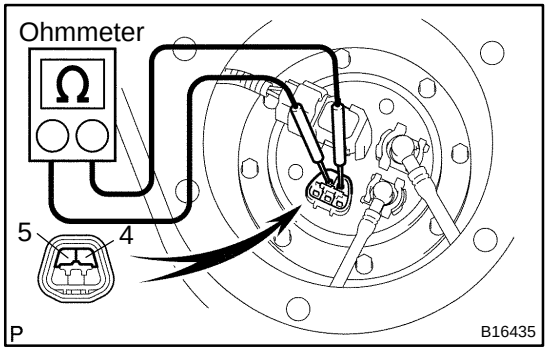
(o) Reinstall the front fuel pipe to the LH delivery pipe (See page SF-27).

(p) Reconnect the negative (-) terminal cable to the battery.

(q) Check for fuel leaks (See page SF-1).

(r) Reinstall the V-bank cover with the 2 bolts and nuts.

(s) Reconnect the fuel return hose to the clamp on the V-bank cover.



3. INSPECT FUEL PUMP

(a) Remove the No.1 rear seats.

(b) Remove the 2 rear door scuff plates, the step plates and the rear seat lock covers.

(c) Pull off the front and rear floor carpets.

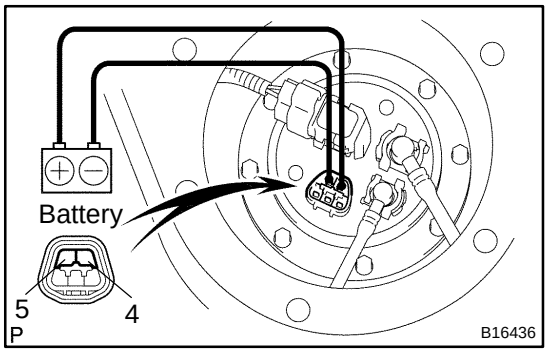
(d) Remove the 2 screws and the rear floor service hole cover.

(e) Disconnect the fuel pump & sender gauge connector.

(f) Using an ohmmeter, measure the resistance between terminal 4 and 5.

Resistance: 0.2 - 3.0 Ω at 20˚C (68˚F)

If the resistance is not as specified, replace the fuel pump and/or the lead wire.



(g) Inspect the fuel pump operation.
Connect the battery positive (+) lead to terminal 4 of the connector, and the battery negative (-) lead to terminal 5.
Check that the fuel pump operates.

NOTICE:

- **These tests must be done quickly (within 10 seconds) to prevent the coil burning out.**
- **Keep the fuel pump as far away from the battery as possible.**
- **Always change the connection on the battery side.**

If operation is not as specified, replace the fuel pump and/or lead wire.

(h) Reconnect the fuel pump & sender gauge connector.

(i) Reinstall the rear floor service hole cover with the 2 screws.

(j) Reinstall the front and rear floor carpets.

(k) Remove the 2 rear door scuff plates, the step plates and the rear sear lock covers.

(l) Reinstall the No.1 rear seats.

SF0XX-04

REMOVAL

CAUTION:

Do not smoke or work near an open frame when working the fuel pump.

1. **REMOVE NO.1 REAR SEATS**
2. **REMOVE REAR DOOR SCUFF PLATES, STEP PLATES AND REAR SEAT LOCK COVERS**
3. **REMOVE REAR FLOOR SERVICE HOLE COVER**

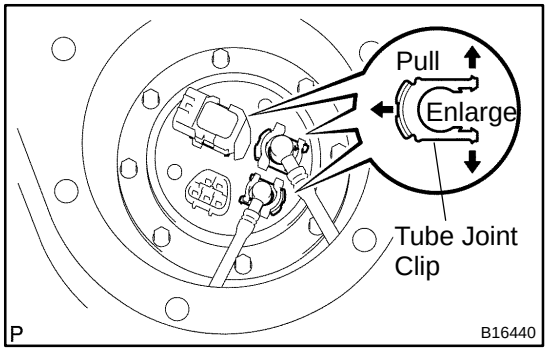
(a) Take off the front and rear floor carpets.

(b) Remove the 2 screws and rear floor service hole cover.

4. **DISCONNECT FUEL PUMP & SENDER GAUGE CONNECTOR**
5. **DISCONNECT FUEL MAIN TUBE AND RETURN TUBE (FUEL TUBE CONNECTORS) FROM FUEL SUCTION PLATE**

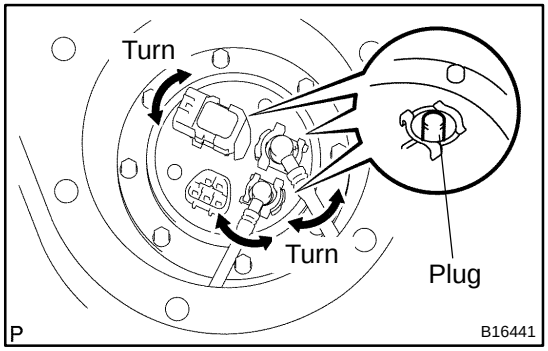
CAUTION:

- **Perform disconnecting operation of the fuel tube connector (quick type) after reading the precautions. (See page SF-1)**
- **Prevent the retained pressure in the fuel line from splashing inside the vehicle compartment.**
- **Be careful not to damage the contact surface or let the foreign matters on there when sealing the tube and the suction plates with the quick connectors through O-ring.**
- **Be sure to perform the disconnection by hand. Do not use tools.**
- **Do not bend or turn the nylon tube by force.**



(a) Before the operation, remove foreign matters or dirt sticking to the tube joint clips.

(b) Enlarge the tip of the clips with fingers and pull them out for disconnection.



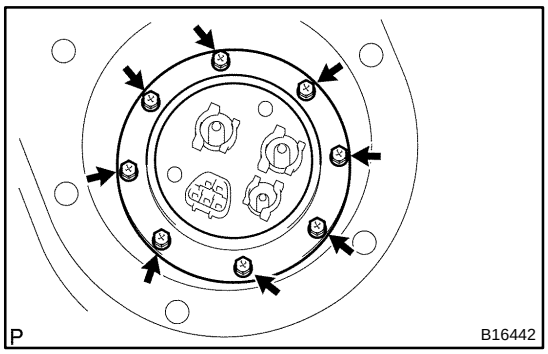
(c) Pull out the fuel main tube and the return tube.

If the nylon tube and the suction plate stick together, ease the connection by turning the nylon tube with fingers and pull it out for disconnection.

NOTICE:

Plug the port of the fuel suction plate with a clean rubber cap.

(d) After the disconnection, protect the connector with a plastic bag.



6. REMOVE FUEL PUMP AND SENDER GAUGE ASSEMBLY FROM FUEL TANK

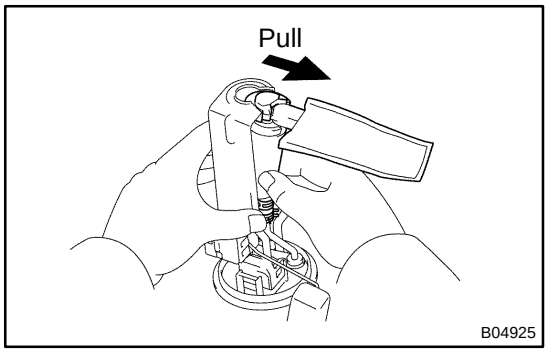
(a) Remove the 8 bolts.

(b) Pull out the fuel pump and the sender gauge assembly.

NOTICE:

- **Do not damage the fuel pump filter.**
- **Be careful that the arm of the sender gauge should not bent.**

(c) Remove the gasket from the fuel section plate.



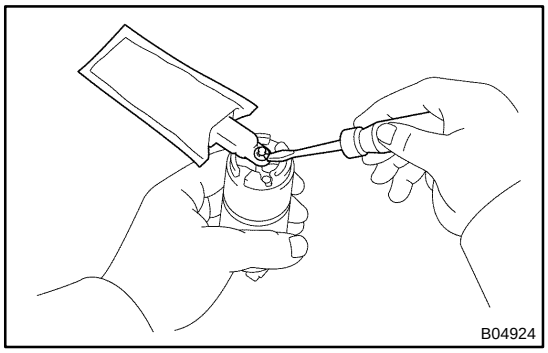
7. REMOVE LEAD WIRE FROM FUEL PUMP

8. REMOVE FUEL PUMP FROM FUEL PUMP BRACKET

(a) Pull out the lower side of the fuel pump from the pump bracket.

(b) Disconnect the fuel hose from the fuel pump, and remove the fuel pump.

(c) Remove the rubber cushion from the fuel pump.



9. REMOVE FUEL PUMP FILTER FROM FUEL PUMP

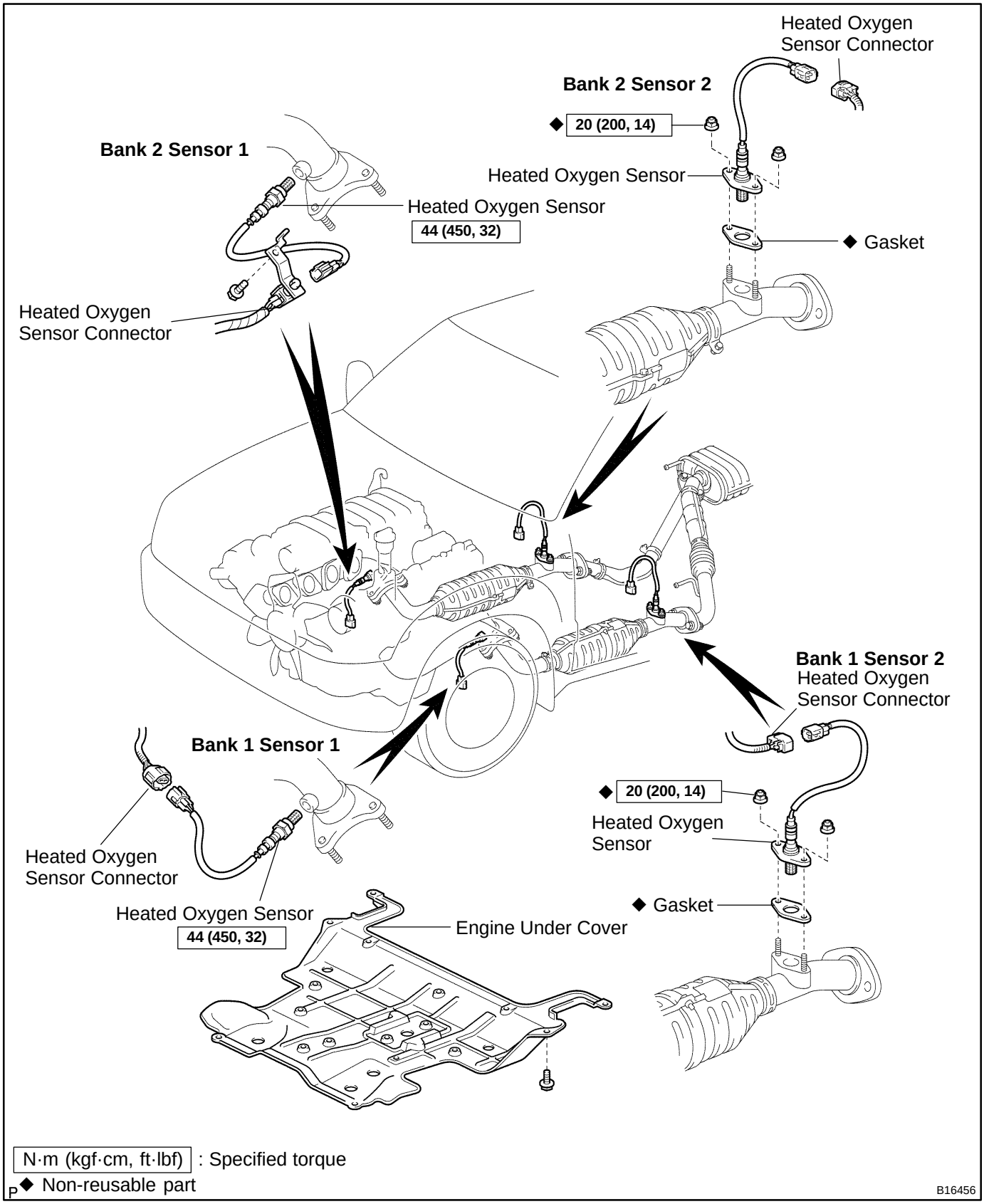
(a) Using a small screwdriver, remove the clip.

(b) Pull out the pump filter.

HEATED OXYGEN SENSOR

COMPONENTS

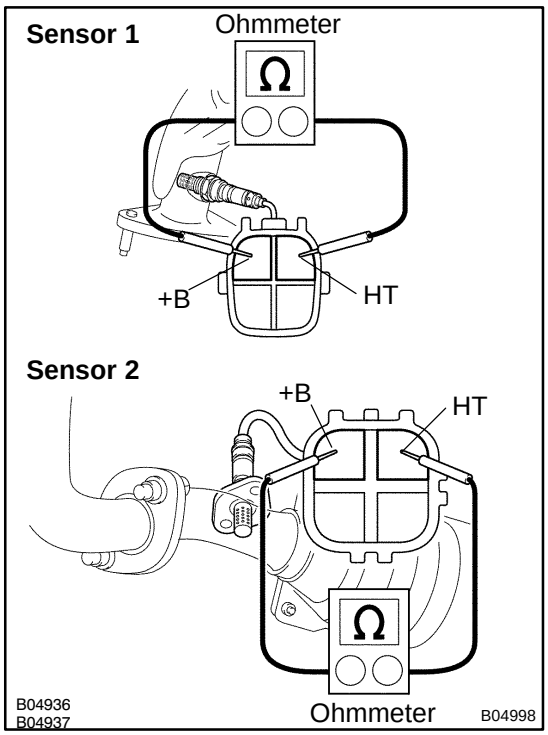
SF0Y9-09



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

P◆ Non-reusable part

B16456



SF0YA-12

INSPECTION

1. INSPECT HEATER RESISTANCE OF HEATED OXYGEN SENSORS

(a) Disconnect the oxygen sensor connector.

(b) Using an ohmmeter, measure the resistance between terminal +B and HT.

Resistance: 11 - 16 Ω at 20˚C (68˚F)

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

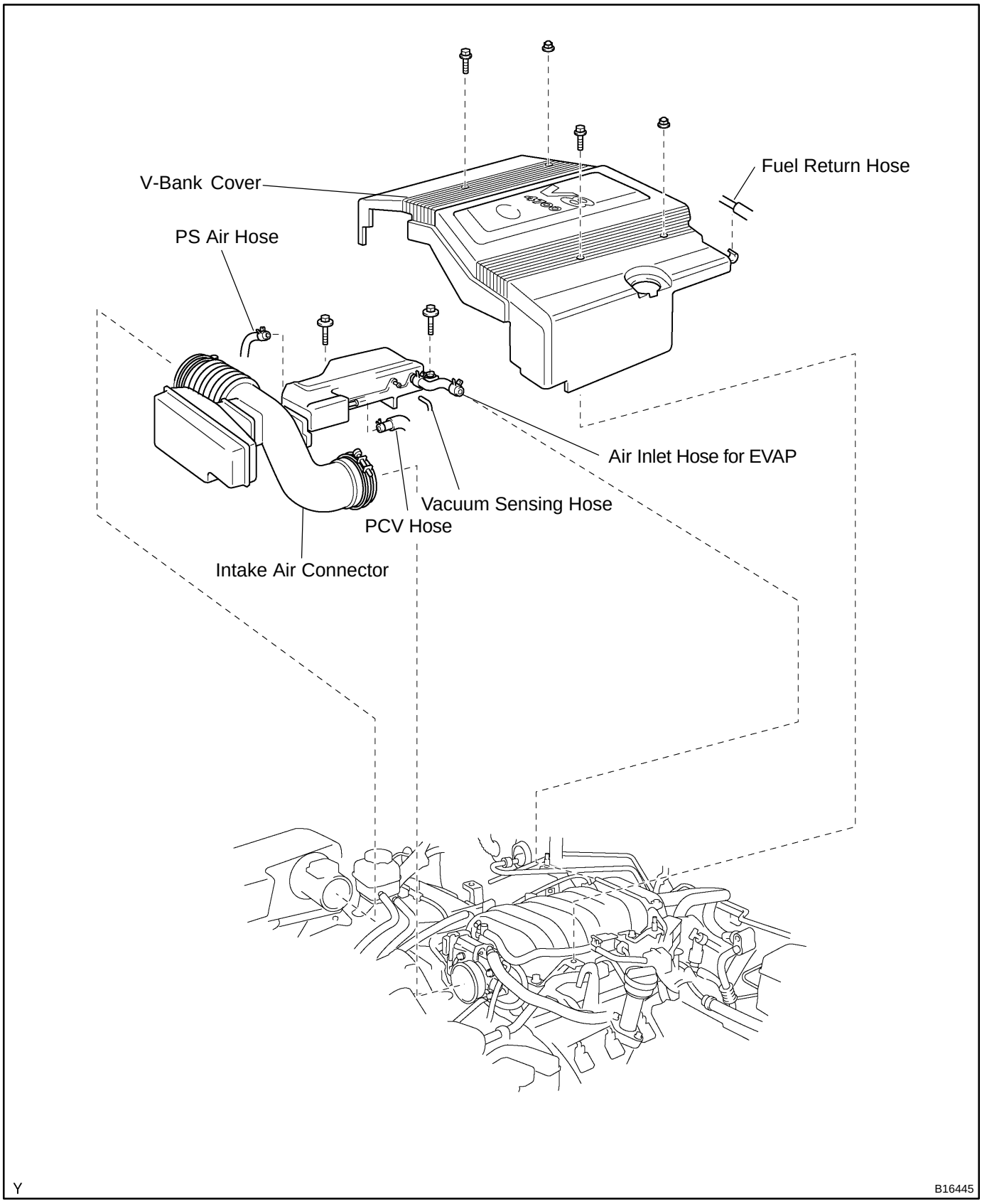
Torque:
44 N·m (450 kgf·cm, 32 ft·lbf) for sensor 1
20 N·m (200 kgf·cm, 14 ft·lbf) for sensor 2

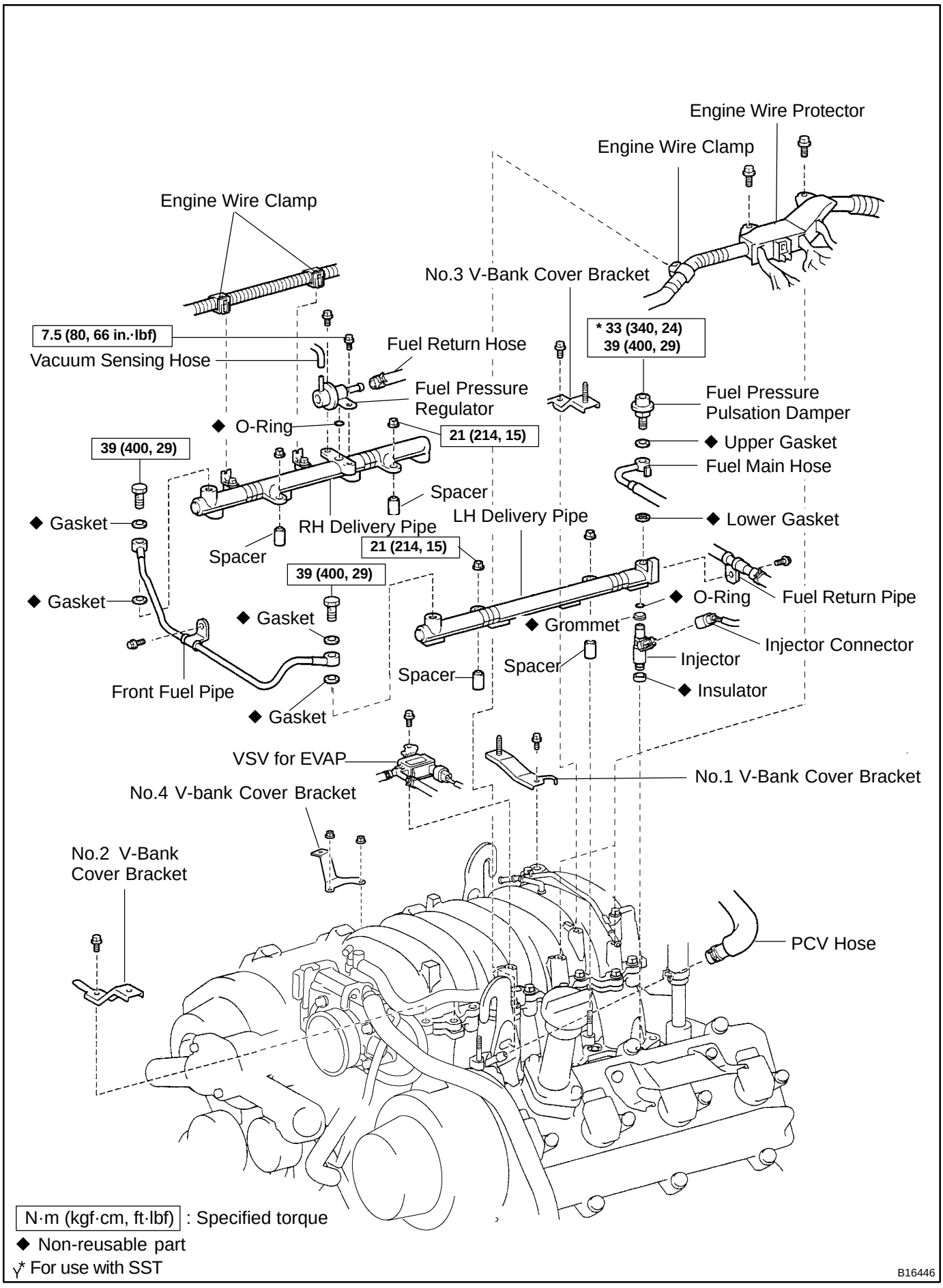
(c) Reconnect the oxygen sensor connector.

2. INSPECT OPERATION OF HEATED OXYGEN SENSORS (See pages DI-106 and DI-138)

SF0OS-13

COMPONENTS




Engine Wire Protector
Engine Wire Clamp
Engine Wire Clamp
No.3 V-Bank Cover Bracket
7.5 (80, 66 in.·lbf)
Vacuum Sensing Hose
Fuel Return Hose
* 33 (340, 24)
39 (400, 29)
Fuel Pressure Regulator
Fuel Pressure Pulsation Damper
◆ O-Ring
21 (214, 15)
◆ Upper Gasket
39 (400, 29)
Fuel Main Hose
Spacer
◆ Gasket
RH Delivery Pipe
LH Delivery Pipe
◆ Lower Gasket
Spacer
21 (214, 15)
39 (400, 29)
◆ Gasket
◆ O-Ring
Fuel Return Pipe
◆ Gasket
◆ Grommet
Injector Connector
Injector
Spacer
Spacer
Front Fuel Pipe
◆ Insulator
◆ Gasket
VSV for EVAP
No.1 V-Bank Cover Bracket
No.4 V-bank Cover Bracket
No.2 V-Bank Cover Bracket
PCV Hose
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
√* For use with SST
B16446

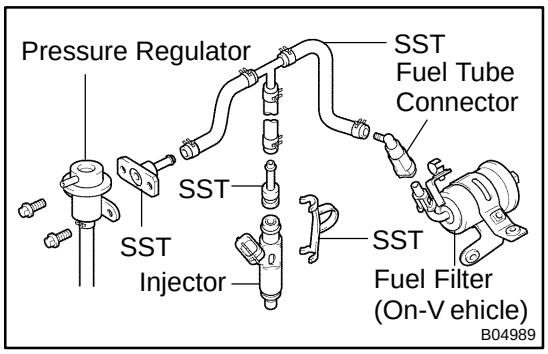
SF0Y3-06

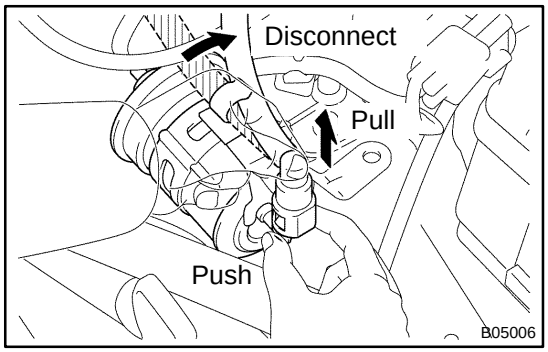
INSPECTION

1. INSPECT INJECTOR INJECTION

CAUTION:

Keep injector clean of sparks during the test.

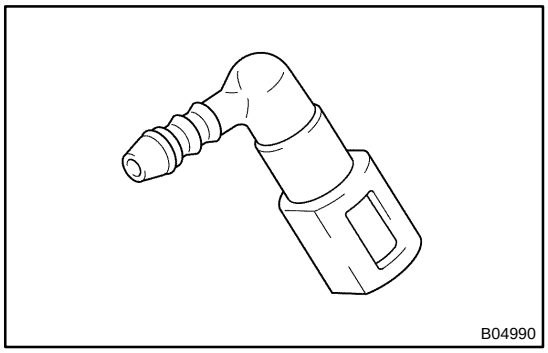




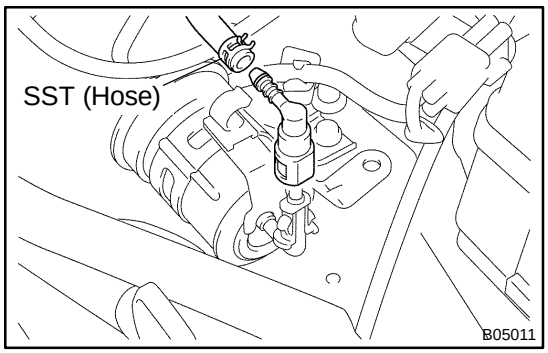
(a) Disconnect the fuel inlet hose (fuel tube connector) from the fuel filter.

CAUTION:

- **Perform disconnecting operations of the fuel tube connector (quick type) after reading the precautions (See page SF-1).**
- **Prevent the retained pressure in the fuel pipe line from splashing inside the engine compartment.**



(b) Use a new fuel main hose and take out the fuel tube connector from its hose.
Part No. 23271-50150



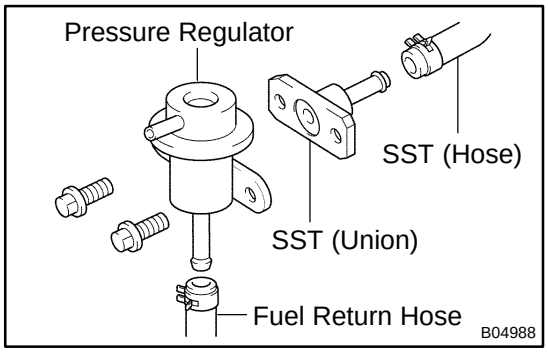
(c) Connect SST (hose) and fuel tube connector to the fuel filter outlet.
SST 09268-41047

CAUTION:

Perform connecting operations of the fuel tube connector (quick type) after reading the precautions (See page SF-1).

HINT:

Use the vehicle's fuel filter.

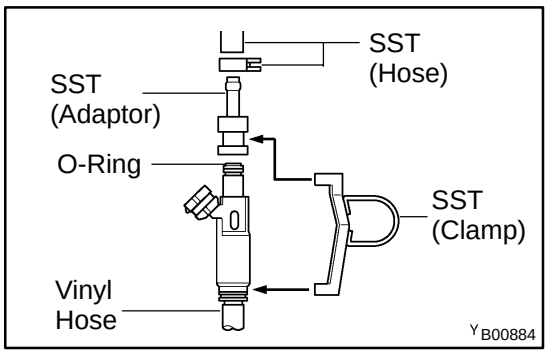


(d) Remove the pressure regulator from the delivery pipe.

(e) Install the O-ring to the fuel inlet of the pressure regulator.

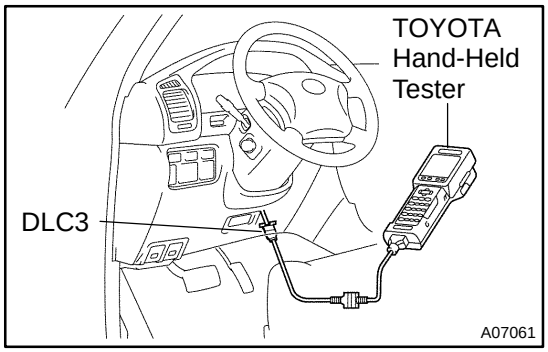
(f) Connect SST (hose) to the fuel inlet of the pressure regulator with SST (union) and the 2 bolts.
SST 09268-41047 (09268-41091)
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

(g) Connect the fuel return hose to the fuel outlet of the pressure regulator.



(h) Install the O-ring to the injector.
(i) Connect SST (adaptor and hose) to the injector, and hold the injector and union with SST (clamp).
SST 09268-41047 (09268-41110, 09268-41300)
(j) Put the injector into the graduated cylinder.

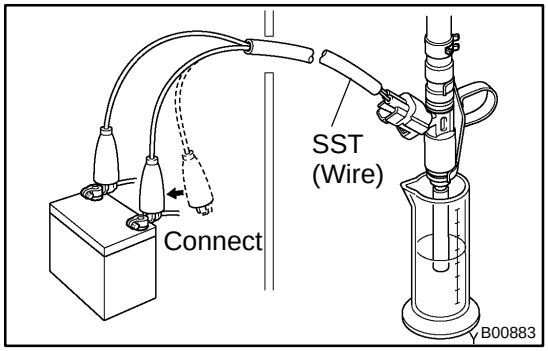
CAUTION:
Install a suitable vinyl hose onto the injector to prevent gasoline from splashing out.



(k) Connect the TOYOTA hand-held tester or OBD II scan tool to the DLC3.
(l) Connect the battery negative (-) cable to the battery.
(m) Turn the ignition switch ON, and press the TOYOTA hand-held tester or OBD II scan tool main switch ON.

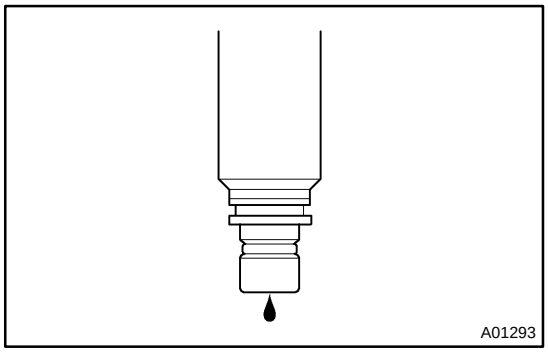
NOTICE:
Do not start the engine.

(n) Select ACTIVE TEST mode on the TOYOTA hand-held tester or OBD II scan tool.
(o) Please refer to the TOYOTA hand-held tester or OBD II scan tool operator's manual for further details.
(p) If you have no TOYOTA hand-held tester or OBD II scan tool, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector
(See page SF-7).



(q) Connect SST (wire) to the injector and the battery for 15 seconds, and measure the injection volume with a graduated cylinder. Test each injector 2 or 3 times.
SST 09842-30070
Volume: 56 - 69 cm^3 (3.4 - 4.2 cu in.) per 15 seconds
Difference between each injector:
13 cm^3 (0.8 cu in.) or less

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



2. INSPECT LEAKAGE

(a) In the condition above, disconnect the tester probes of SST (wire) from the battery and check the fuel leakage from the injector.
SST 09842-30070
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, 09842-30070

(e) Disconnect the TOYOTA hand-held tester or OBD II scan tool from the DLC3.

(f) Reconnect the fuel inlet pipe (fuel tube connector) to the fuel filter.

CAUTION:

Perform connecting operations of the fuel tube connector (quick type) after observing the precautions (See page SF-1).

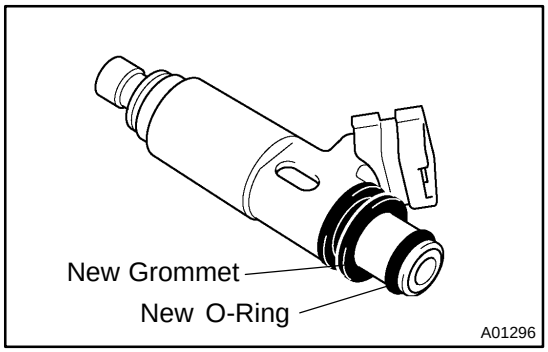
SF0Y4-06

INSTALLATION

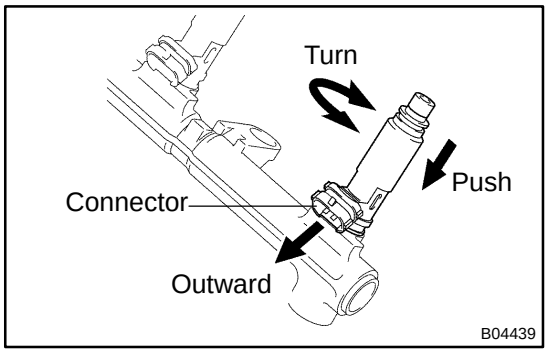
1. INSTALL INJECTORS AND DELIVERY PIPES

NOTICE:

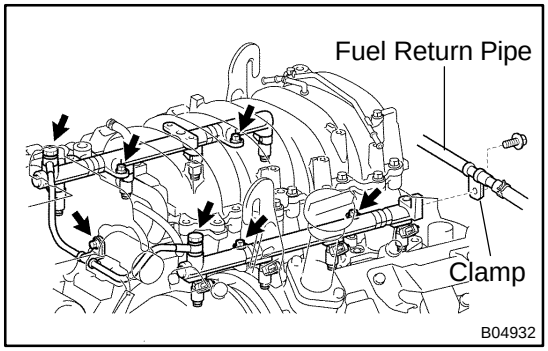
- **Be careful not to drop the injectors when installing the delivery pipes.**
- **Since the O-ring may be stuck to the injector, do not put a side load on it at the removal.**



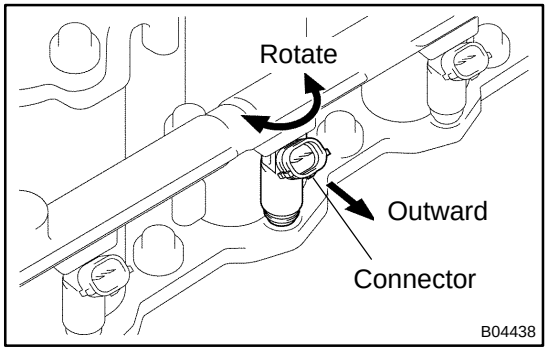
(a) Install a new grommet to each injector.
(b) Apply a light coat of gasoline to new O-rings and install them to each injector.



(c) While turning the injector clockwise and counterclockwise, push it to the delivery pipes. Install the 8 injectors.
(d) Position injector connector outward.
(e) Place the 4 spacers and 8 new insulators on the intake manifold.
(f) Place the 2 delivery pipes and the injectors assemblies on the lower intake manifold.
(g) Temporarily install the 4 nuts.
(h) Install the front fuel pipe with the bolt, the 4 new gaskets and the 2 union bolts.
Torque:
39 N·m (400 kgf·cm, 29 ft·lbf) for union bolts
7.5 N·m (80 kgf·cm, 66 in.·lbf) for bolt



(i) Install the bolt holding the clamp on the fuel return pipe to the LH delivery pipe.
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

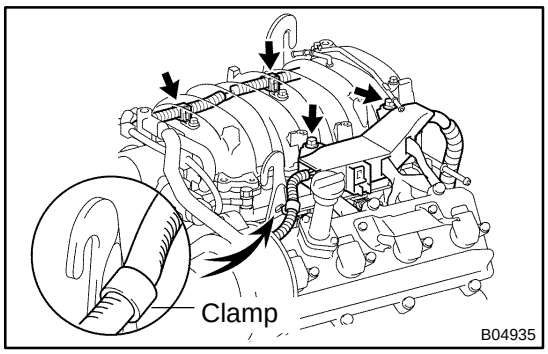


(j) Check that the injectors rotate smoothly.

HINT:

If injectors do not rotate smoothly, the probable cause is incorrect installation of O-rings. Replace the O-rings in that case.

(k) Position the injector connector outward.
(l) Tighten the 4 nuts holding the delivery pipes to the lower intake manifold.
Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)
(m) Connect the 8 injectors connectors.



2. INSTALL ENGINE WIRE TO LH DELIVERY PIPE

Install the 2 wire clamps on the engine wire to the brackets on the delivery pipe.

3. INSTALL ENGINE WIRE PROTECTOR

(a) Connect the engine wire clamp to the No.1 engine hanger.

(b) Install the engine wire protector with the 2 bolts.

(c) Connect the PCV hose to the PCV valve.

(d) Connect VSV EVAP to the upper intake manifold.

(e) Install the No.1 V-bank cover bracket to the upper intake manifold.

(f) Install the No.2 V-bank cover bracket to the upper intake manifold.

(g) Install the No.3 V-bank cover bracket to the upper intake manifold.

(h) Install the No.4 V-bank cover bracket to the upper intake manifold.

4. INSTALL FUEL PRESSURE PULSATION DAMPER (See page SF-1)

5. INSTALL INTAKE AIR CONNECTOR

6. INSTALL V-BANK COVER

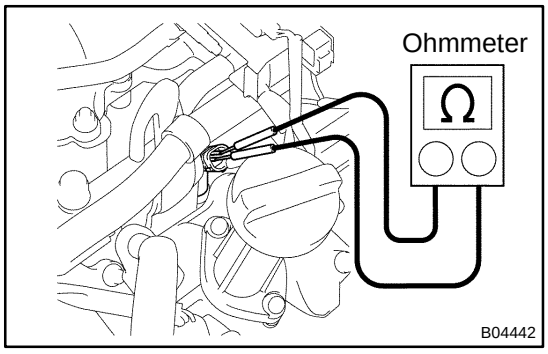
INJECTOR

SF0OR-10

ON-VEHICLE INSPECTION

1. REMOVE V-BANK COVER

2. REMOVE INTAKE AIR CONNECTOR



3. INSPECT INJECTOR RESISTANCE

(a) Disconnect the 8 injector connectors.

(b) Using an ohmmeter, measure the resistance between the terminals.

Resistance: 13.4 - 14.2 Ω at 20˚C (68˚F)

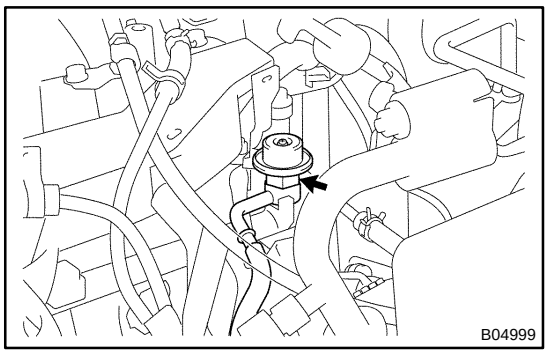
If the resistance is not as specified, replace the injector.

(c) Reconnect the 8 injector connectors.

4. REINSTALL INTAKE AIR CONNECTOR

5. REINSTALL V-BANK COVER

SF0Y2-05



REMOVAL

1. REMOVE V-BANK COVER

2. REMOVE INTAKE AIR CONNECTOR

3. REMOVE FUEL PRESSURE PULSATION DAMPER

Remove the pulsation damper, the upper gasket, the fuel main hose and the lower gasket.

CAUTION:

- **Put a shop rag under the delivery pipe.**
- **Slowly loosen the pulsation damper.**

4. DISCONNECT ENGINE WIRE PROTECTOR FROM UPPER INTAKE MANIFOLD

(a) Disconnect the PCV hose from the PCV valve.

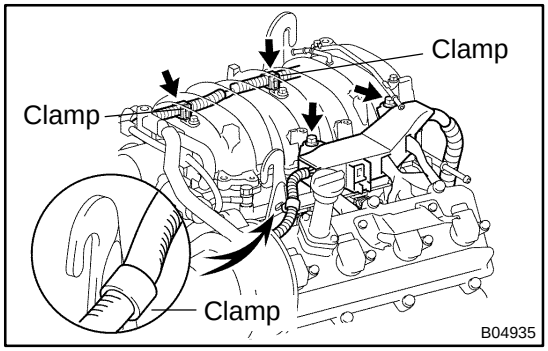
(b) Disconnect the VSV for EVAP from the upper intake manifold.

(c) Remove the No.1 V-bank cover bracket from the upper intake manifold.

(d) Remove the No.2 V-bank cover bracket from the upper intake manifold.

(e) Remove the No.3 V-bank cover bracket from the upper intake manifold.

(f) Remove the No.4 V-bank cover bracket from the upper intake manifold.



(g) Remove the 2 bolts, and disconnect the engine wire protector from the upper intake manifold.

(h) Disconnect the engine wire clamp from the No.1 engine hanger.

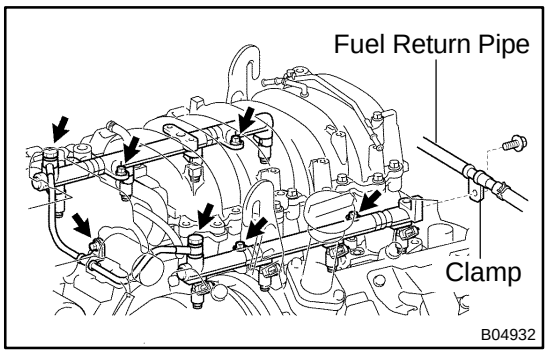
5. DISCONNECT ENGINE WIRE FROM RH DELIVERY PIPE

Disconnect the 2 wire clamps on the engine wire from the brackets on the delivery pipe.

6. REMOVE DELIVERY PIPES AND INJECTORS

NOTICE:

- **Be careful not to drop the injectors when removing the delivery pipes.**
- **Since the O-ring may be stuck to the injector, do not put a side load on it at the removal.**

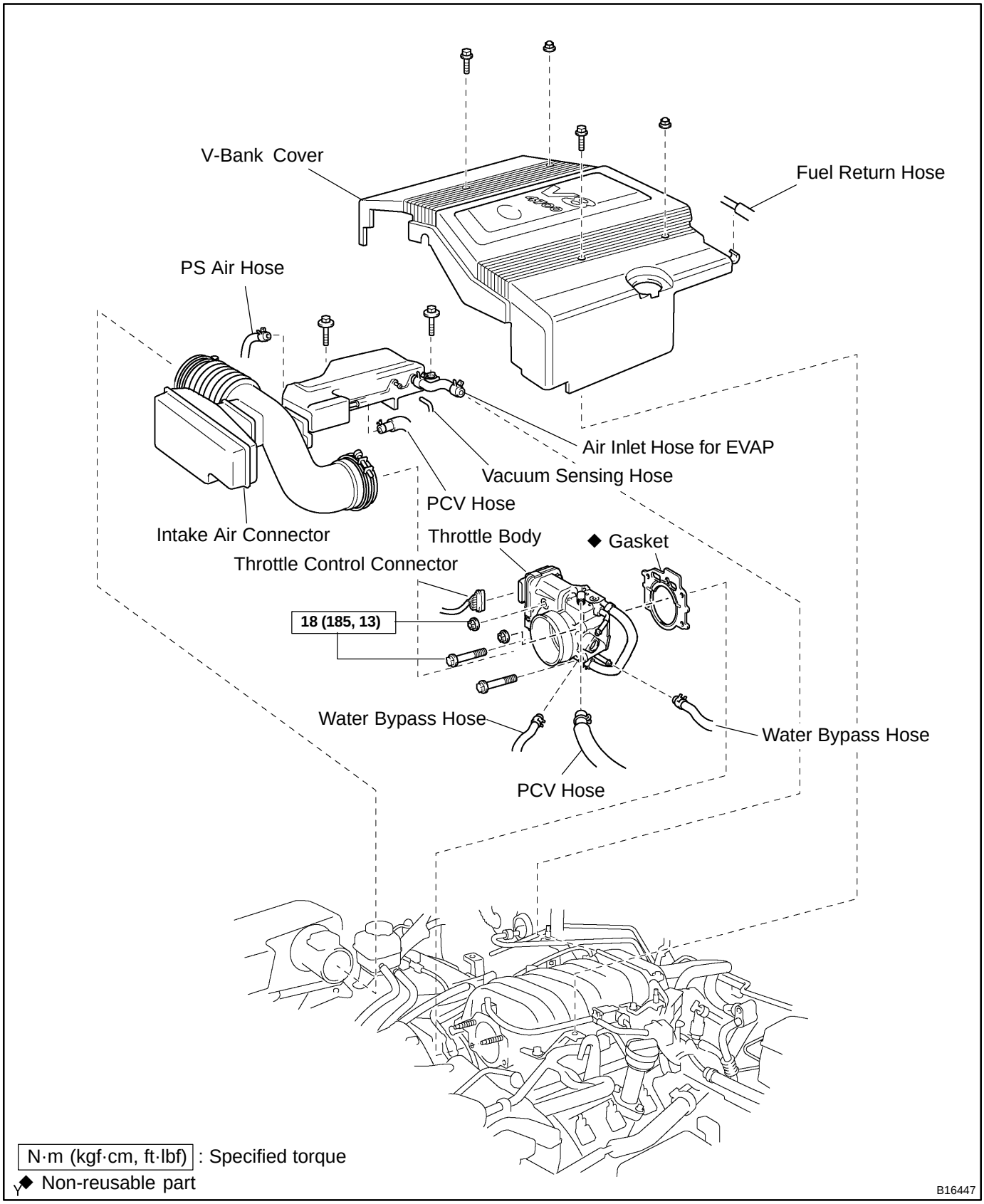


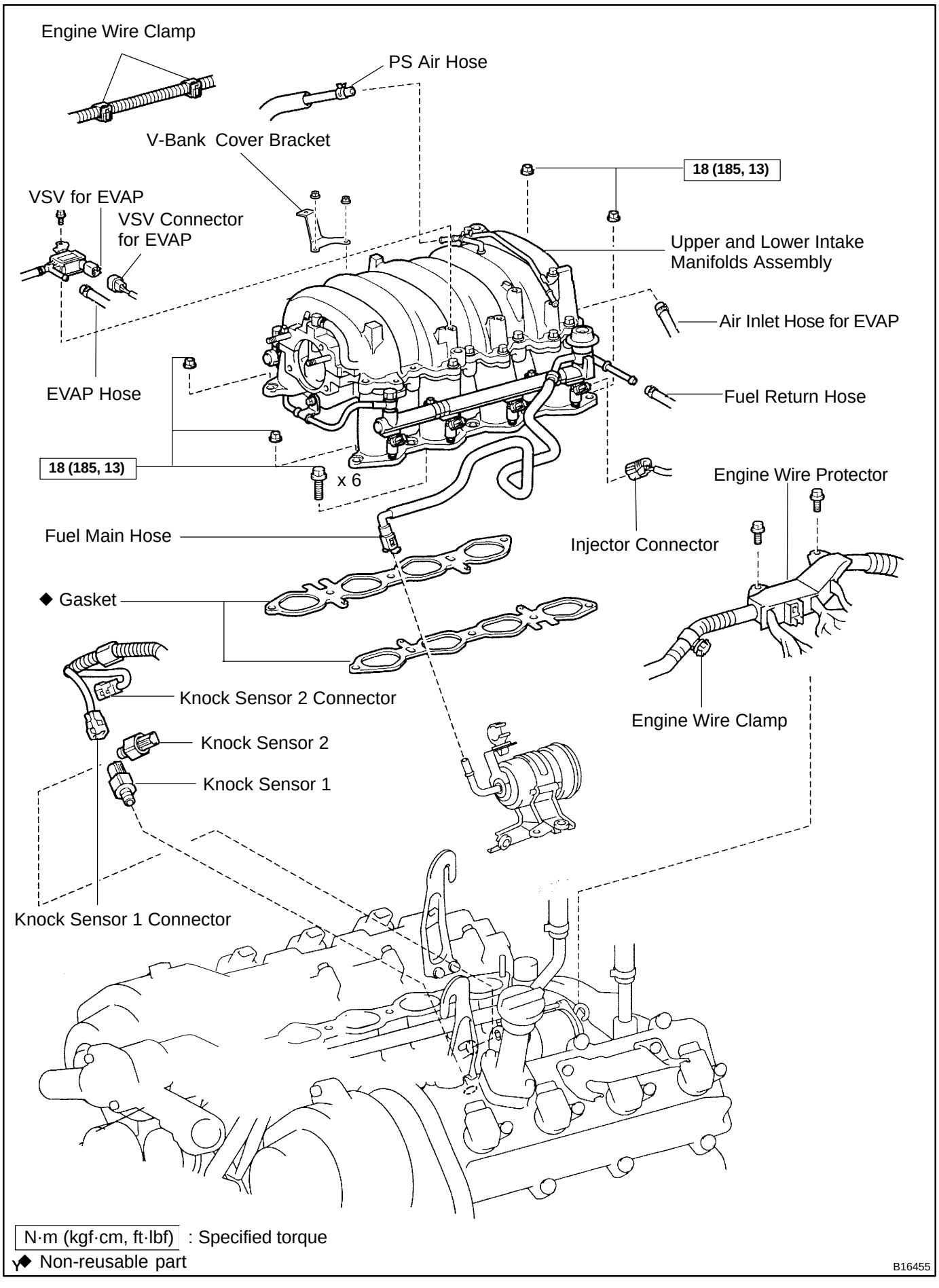
(a) Remove the bolt holding the clamp on the fuel return pipe to the LH delivery pipe.
(b) Remove the bolt, the 2 union bolts, the 4 gaskets and the front fuel pipe.
(c) Disconnect the 8 injector connectors.
(d) Remove the 4 nuts holding the delivery pipes to the lower intake manifold.
(e) Remove the 2 delivery pipes, the 8 injectors, the 4 spacers and the 8 insulators.
(f) Remove the O-ring and the grommet from each injector.

KNOCK SENSOR

COMPONENTS

SF0PR-14

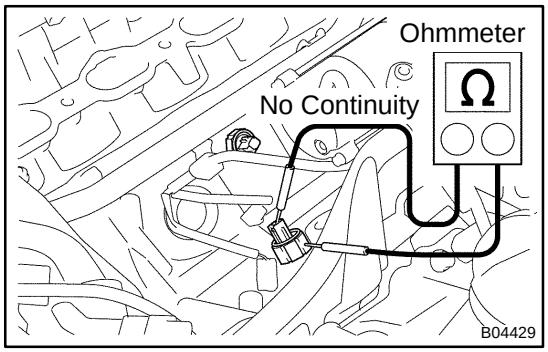



Engine Wire Clamp
PS Air Hose
V-Bank Cover Bracket
18 (185, 13)
VSV for EVAP
VSV Connector for EVAP
Upper and Lower Intake Manifolds Assembly
Air Inlet Hose for EVAP
EVAP Hose
Fuel Return Hose
18 (185, 13)
x 6
Engine Wire Protector
Fuel Main Hose
Injector Connector
◆ Gasket
Knock Sensor 2 Connector
Engine Wire Clamp
Knock Sensor 2
Knock Sensor 1
Knock Sensor 1 Connector
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
B16455

SF0PS-10

INSPECTION

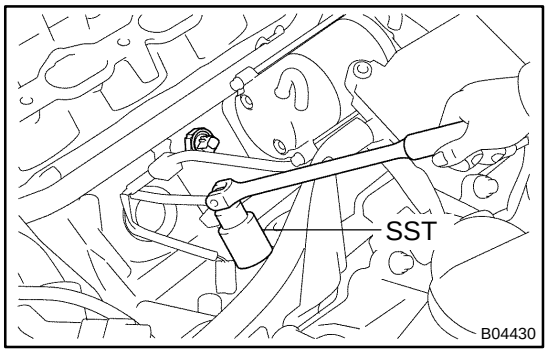
1. REMOVE V-BANK COVER
2. REMOVE INTAKE AIR CONNECTOR
3. DISCONNECT THROTTLE BODY FROM INTAKE MANIFOLDS (See page SF-50)
4. REMOVE UPPER AND LOWER INTAKE MANIFOLDS ASSEMBLY (See page EM-35)



5. INSPECT KNOCK SENSOR 1, 2

(a) Disconnect the knock sensor connectors.

(b) Using an ohmmeter, check that there is no continuity between the terminal and body.



If there is a continuity, replace the sensor with SST.

SST 09816-30010

Torque: 45 N·m (450 kgf·cm, 33 ft·lbf)

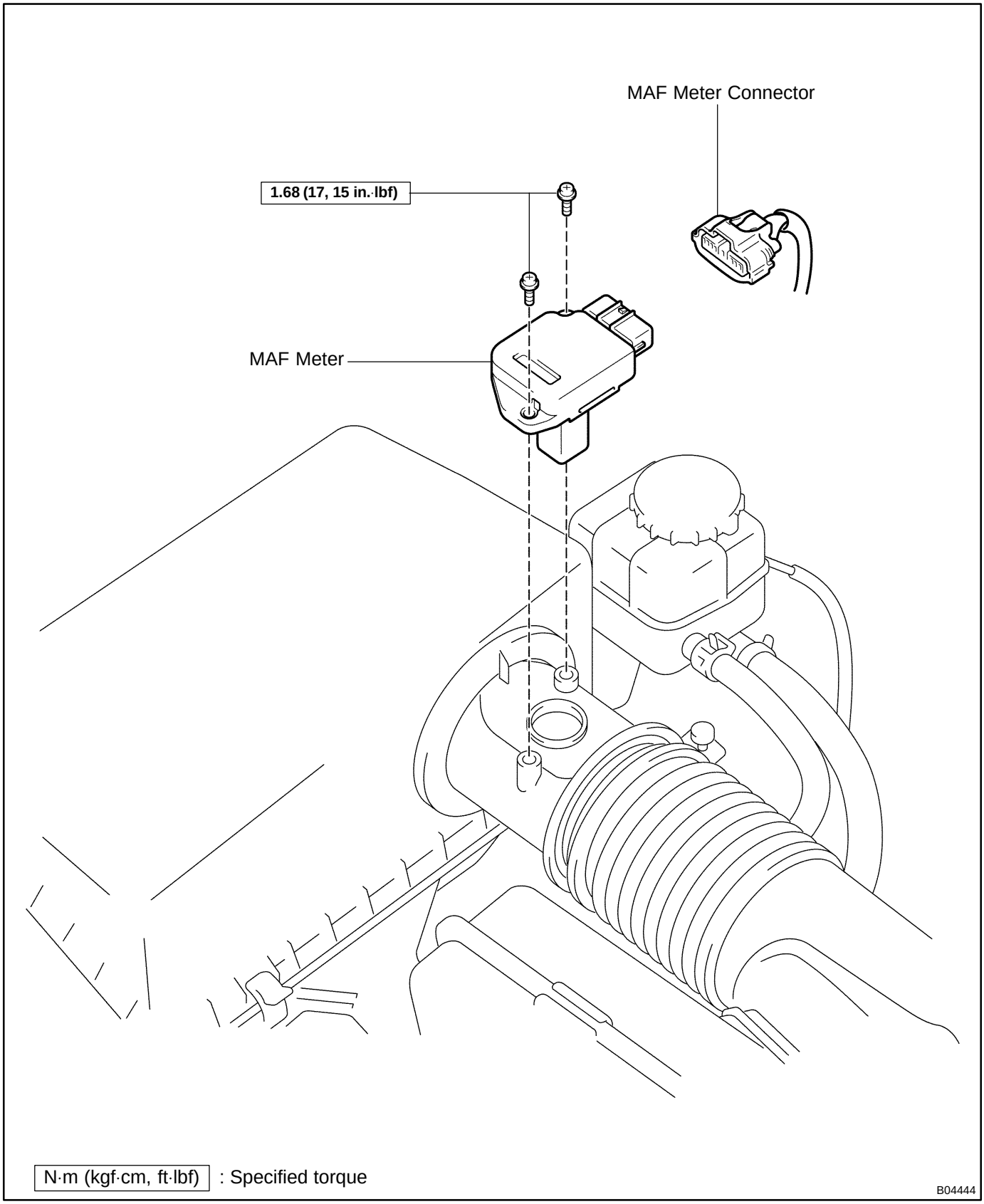
(c) Reconnect the knock sensor connectors.

6. REINSTALL UPPER AND LOWER INTAKE MANIFOLDS ASSEMBLY (See page EM-59)
7. REINSTALL THROTTLE BODY TO INTAKE MANIFOLDS (See page SF-50)
8. REINSTALL INTAKE AIR CONNECTOR
9. REINSTALL V-BANK COVER

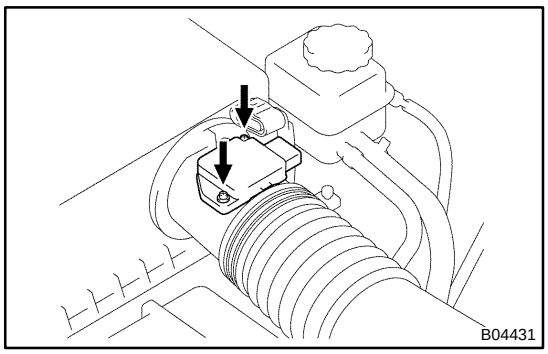
MASS AIR FLOW (MAF) METER

COMPONENTS

SF0P1-10



SF0P2-07

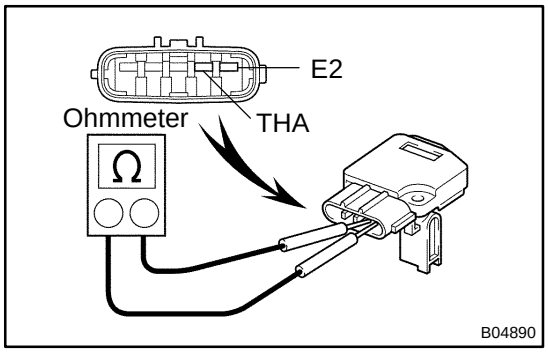


INSPECTION

1. DISCONNECT MAF METER CONNECTOR

2. REMOVE MAF METER

Remove the 2 screws and MAF meter.

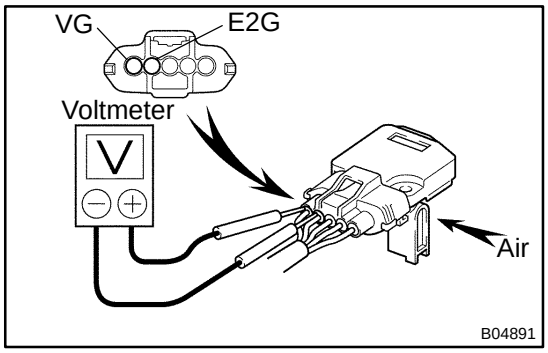


3. INSPECT MAF METER

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

Terminals	Resistance	Temperature
THA - E2	12.5 - 16.9 kΩ	-20 ˚C (-4 ˚F)
THA - E2	2.19 - 2.67 kΩ	20 ˚C (68 ˚F)
THA - E2	0.50 - 0.68 kΩ	60 ˚C (140 ˚F)

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



(b) Inspect for operation.

(1) Connect the MAF meter connector.

(2) Connect the negative (-) terminal cable to the battery.

(3) Turn the ignition switch ON.

(4) Using a voltmeter, connect the positive (+) tester probe to terminal VG and negative (-) tester probe to terminal E2G.

(5) Blow air into the MAF meter, and check that the voltage fluctuates.

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

(6) Turn the ignition switch OFF.

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

(8) Disconnect the MAF meter connector.

4. REINSTALL MAF METER

Install the MAF meter with the 2 screws.

Torque: 1.68 N·m (17 kgf·cm, 15 in.·lbf)

5. RECONNECT MAF METER CONNECTOR

SFI SYSTEM

SF0XU-11

PRECAUTION

1. BEFORE WORKING ON FUEL SYSTEM, DISCONNECT NEGATIVE (-) TERMINAL CABLE FROM BATTERY

HINT:

Any diagnostic trouble code retained by the computer will be erased when the negative (-) terminal cable is removed from the battery.

Therefore, if necessary, read the diagnosis before removing the negative (-) terminal cable from the battery.

2. DO NOT SMOKE OR WORK NEAR AN OPEN FLAME WHEN WORKING ON THE FUEL SYSTEM

3. KEEP GASOLINE AWAY FROM RUBBER OR LEATHER PARTS

4. MAINTENANCE PRECAUTIONS

(a) Take following precautions to prevent the engine misfire.
  (1) Check proper connection to battery terminals, etc.
  (2) After repair work, 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) Take following precautions to handle the oxygen sensor.
  (1) Do not drop the oxygen sensor or hit against an object.
  (2) Do not allow the sensor to contact with water.

5. IF VEHICLE IS EQUIPPED WITH MOBILE RADIO SYSTEM (HAM, CB, ETC.)

If the vehicle is equipped with a mobile communication system, refer to the precaution in the IN section.

6. AIR INDUCTION SYSTEM

(a) Separation of the engine oil dipstick, oil filler cap, PCV hose, etc. may cause the engine to be out of tune.

(b) Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head will cause air suction, which makes the engine out of tune.

7. ELECTRONIC CONTROL SYSTEM

(a) Disconnect the power by either turning the ignition switch OFF or disconnecting the negative (-) terminal cable from the battery before removing SFI wiring connectors, terminals, etc.

HINT:

Always check the diagnostic trouble code 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 a severe impact during removal or installation. Handle all SFI parts carefully, especially the ECM.

(d) Be careful during the troubleshooting as there are numerous transistor circuit, and even slight terminal contact can cause further troubles.

(e) Do not open the ECM cover.

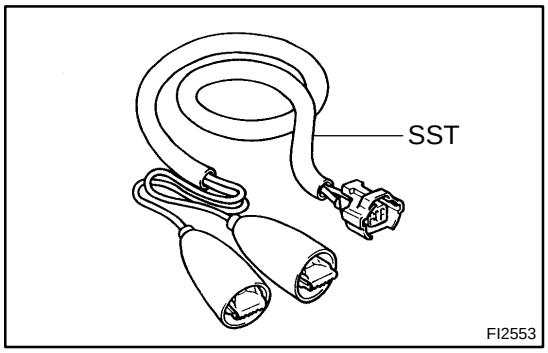
(f) When inspecting in rainy weather, take care to prevent entry of water. Also, when washing the engine compartment, prevent water from getting on the SFI parts and the wiring connectors.

(g) Parts should be replaced as the original assembly.

(h) Care should be taken when pulling out and inserting the wiring connectors.

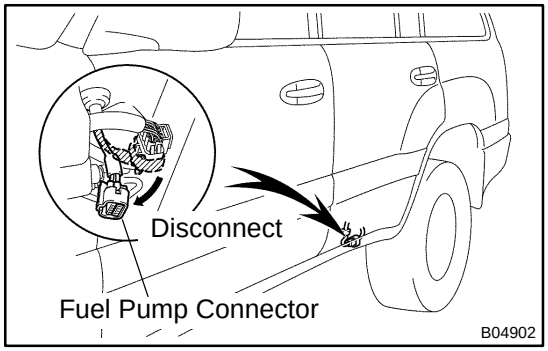
(1) Release the lock and pull out the connector.

(2) Fully insert the connector and check that it is locked.



(i) Use SST for the inspection, the injector and the wiring connector test.

SST 09842-30070



8. FUEL SYSTEM

(a) When disconnecting the high fuel pressure line, a large amount of gasoline may be spilled:

(1) Disconnect the fuel pump connector.

(2) Start the engine. After the engine has stopped on its own, turn the ignition switch OFF.

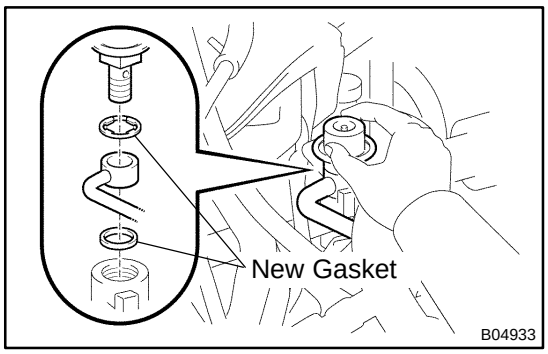
(3) Put a container under the connection.

(4) Slowly loosen the connection.

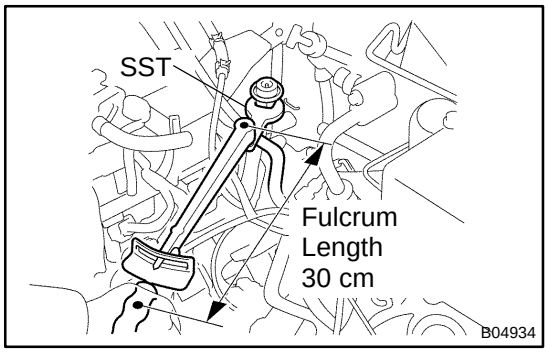
(5) Disconnect the connection.

(6) Plug the connection with a rubber plug.

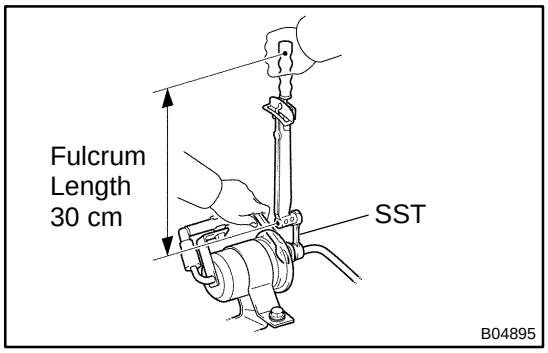
(7) Reconnect the fuel pump connector.



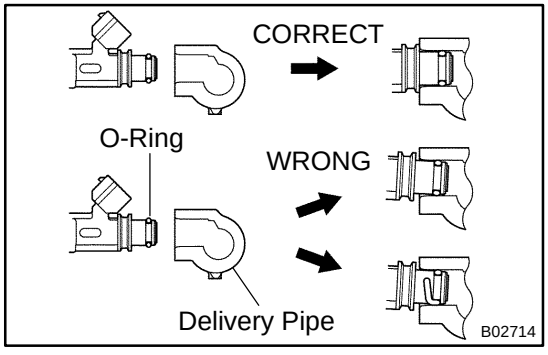
(b) When connecting the union bolt (fuel pressure pulsation damper) on the high pressure pipe union, follow the procedure below:
(1) Always use 2 new gaskets.
(2) Tighten the union bolt by hand.



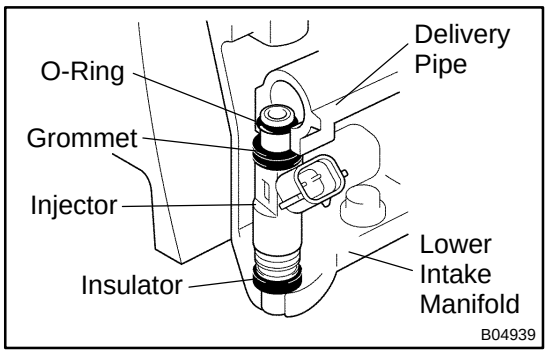
(3) Using SST, tighten the union bolt to the specified torque.
SST 09612-24014 (09617-24011)
Torque:
33 N·m (340 kgf·cm, 24 ft·lbf) for use with SST
39 N·m (400 kgf·cm, 29 ft·lbf)
HINT:
Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).



(c) When connecting the flare nut on the high pressure pipe union, follow the procedure below:
(1) Apply a light coat of engine oil to the flare nut, and tighten the flare nut by hand.
(2) Using SST, tighten the flare nut to the specified torque.
SST 09023-12700
NOTICE:
Do not rotate the fuel filter outlet when tightening the flare nut.
Torque:
34 N·m (345 kgf·cm, 25 ft·lbf) for use with SST
38 N·m (380 kgf·cm, 28 ft·lbf)
HINT:
Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).

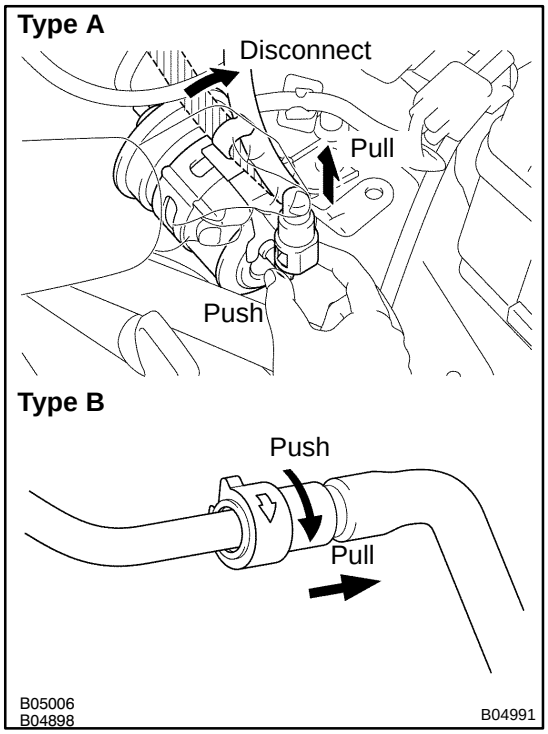


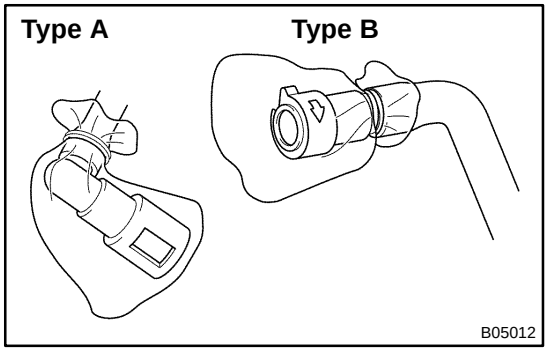
(d) Take following precautions to remove and install the injectors.
(1) Never reuse the O-ring.
(2) When placing a new O-ring on the injector, take care not to damage it.
(3) Coat a new O-ring with spindle oil or gasoline before installing; never use engine, gear or brake oil.



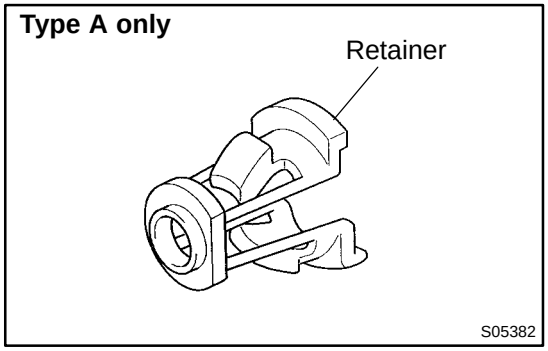
(e) Install the injector to the delivery pipe and lower intake manifold as shown in the illustration.
Before installing the injector, spindle oil or gasoline must be applied on the place where the delivery pipe or the intake manifold touches the O-ring of the injector.

(f) Take following precautions to disconnect the fuel tube connector (quick type):
(1) Check that there is no dirt on the pipe and around the connector before disconnecting them. If there is, clean the dirt away.
(2) Be sure to disconnect it with hands.
(3) Type A:
When the connector and the pipe are stuck, push the clicks of the retainer and pull the connector to free to disconnect and pull it out. Do not use any tool at this time.
Type B:
When the connector and the pipe are stuck, turn and pull the connector to disconnect. Do not use any tool at this time.
(4) Inspect if there is any dirt or the likes on the seal surface of the disconnected pipe and clean it away.

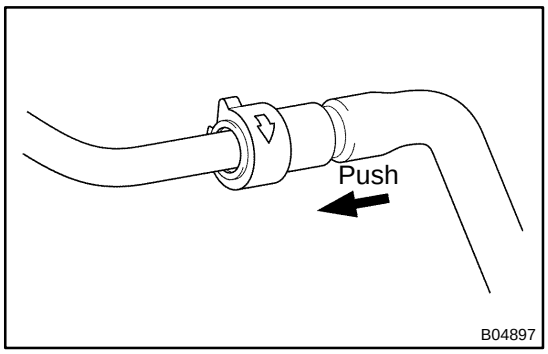




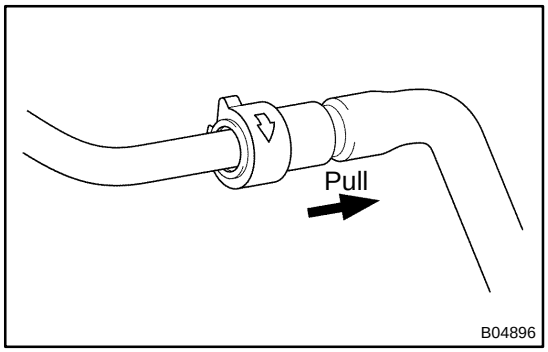
(5) Prevent the disconnected pipe and connector from damaging and getting foreign objects by covering them with a vinyl bag.



(g) Take following precautions to connect the fuel tube connector (quick type):
(1) Do not reuse the retainer removed from the pipe.
(2) Do not use any tool. Use hands to connect the retainer to the pipe.
(3) Check if there is any damage or foreign objects on the connected part of the pipe.

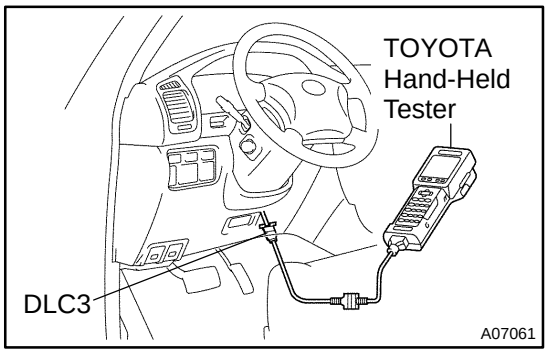


(4) Match the axis of the connector with that of the pipe, and push in the connector until the connector makes a ”click” sound. In the joint part is too tight to connect them, apply a little new engine oil on the tip of the pipe.



(5) After finishing the connection, check if the pipe and the connector are securely connected by pulling them.
(6) Check if there is any fuel leakage.

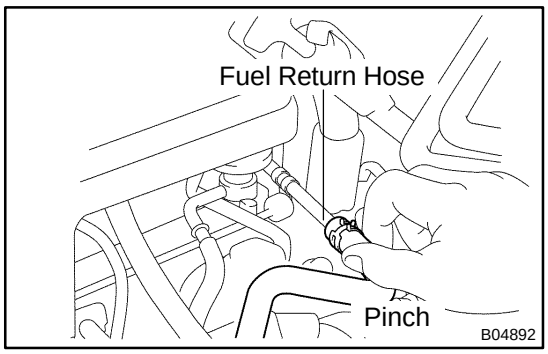
(h) Take following precautions to handle the nylon tube.
(1) Pay attention not to turn the joint part of the nylon tube and the quick connector by force when connecting them.
(2) Pay attention not to twist the nylon tube.
(3) Do not remove the EPDM protector on the outside of the nylon tube.
(4) Do not connect them by bending the nylon tube.



(i) Check that there are no fuel leaks on the fuel system after doing the maintenance.
(1) Connect the TOYOTA hand-held tester or OBD II scan tool to the DLC3.
(2) Turn the ignition switch ON and press the TOYOTA hand-held or OBD II scan tool tester main switch ON.

NOTICE:
Do not start the engine.

(3) Select the ACTIVE TEST mode on the TOYOTA hand-held tester or OBD II scan tool .
(4) Please refer to the TOYOTA hand-held tester or OBD II scan tool operator’s manual for further details.
(5) If you have no TOYOTA hand-held tester or OBD II scan tool, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector (See page SF-7).



(6) Pinch the fuel return hose.
The pressure in the high pressure line will rise to approx. 392 kPa (4 kgf/cm^2, 57 psi). In this state, check to see that there is no leak on any part of the fuel system.

NOTICE:

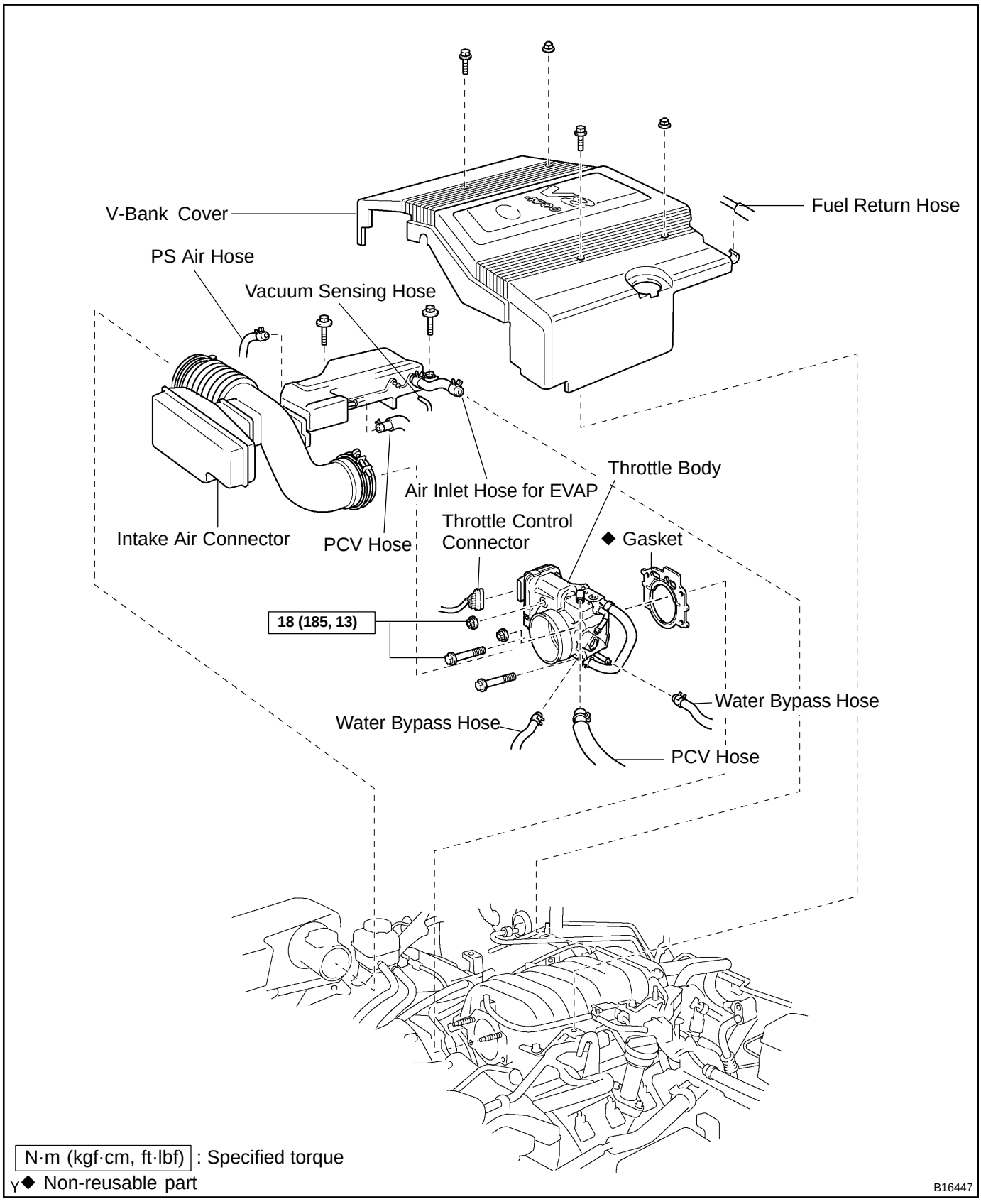
Always pinch the hose. Do not bend as it may cause the hose to crack.

(7) Turn the ignition switch OFF.

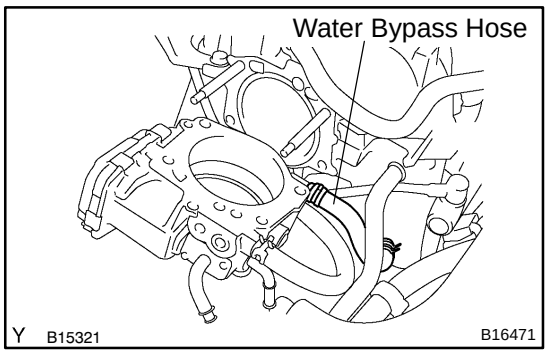
(8) Disconnect the TOYOTA hand-held tester from the DLC3.

SF1UW-01

COMPONENTS



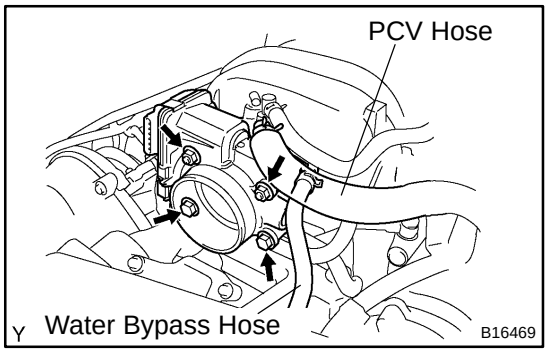
SF0P7-13



INSTALLATION

1. INSTALL THROTTLE BODY

(a) Connect the water bypass hose to the manifold thermostat on the throttle body.



(b) Install a new gasket and the throttle body with the 2 bolts and the 2 nuts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(c) Connect the water bypass hose and the PCV hose to the throttle body.

(d) Connect the throttle control connector.

2. INSTALL INTAKE AIR CONNECTOR

3. FILL WITH ENGINE COOLANT (See page CO-2)

4. START ENGINE AND CHECK FOR ENGINE COOLANT LEAKS

5. INSTALL V-BANK COVER

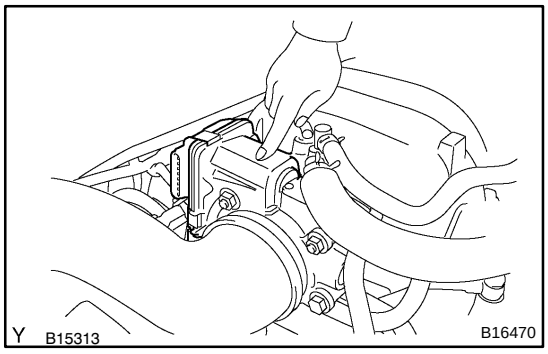
THROTTLE BODY

SF1UV-01

ON-VEHICLE INSPECTION

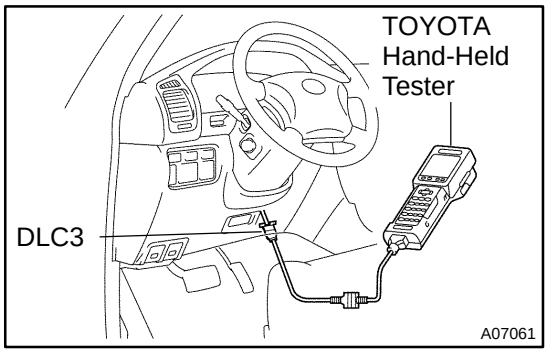
1. REMOVE V-BANK COVER

2. INSPECT SYSTEM OPERATION



(a) Inspect the throttle control motor for 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.

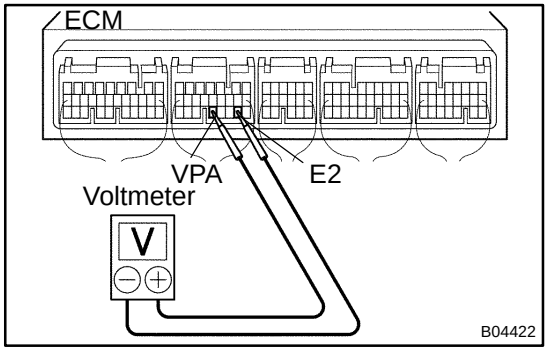
If operation is not as specified, check the throttle control motor (See step 3), wiring and ECM.



(b) Inspect the accelerator pedal position sensor.
  (1) Connect the TOYOTA hand-held tester or OBD II scan tool to the DLC3.
  (2) Check that the MIL does not come on.
  (3) When turning the accelerator pedal position sensor lever to the full- open position, check that the throttle valve opening percentage (THROTTLE POS) of CURRENT DATA shows the standard value.

  Standard throttle valve opening percentage:
  60 % or more

If operation is not as specified, check that the accelerator pedal position sensor (See page DI-318), wiring and ECM.



If you have no TOYOTA hand-held tester or OBD II scan tool, measure the voltage between terminal VPA and E2 of the ECM connector.

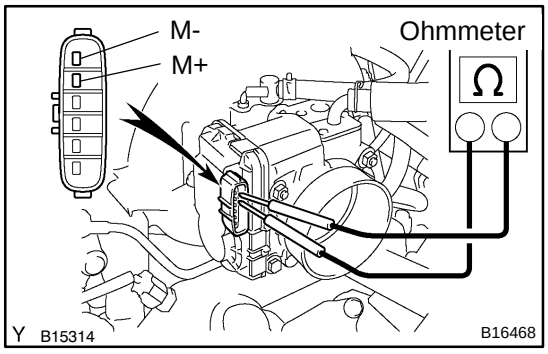
(c) Inspect the air assist system.
  (1) Start the engine and check that the MIL does not come on.
  (2) Allow the engine to warm up to normal operating temperature.
  (3) Turn the A/C compressor ON to OFF, and check the idle speed.

Idle speed (Transmission in neutral): 700 ± 50 rpm

NOTICE:

Perform inspection under the condition with no electrical load.

(d) After checking the above (b) to (d), perform the running test and check that there is no incongruity.



3. INSPECT THROTTLE CONTROL MOTOR

(a) Disconnect the throttle connector.

(b) Using an ohmmeter, measure the motor resistance between terminal M+ and M-.

Motor resistance: 0.3 - 100 Ω at 20˚C (68˚F)

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

(c) Reconnect the throttle body connector.

4. INSPECT THROTTLE POSITION SENSOR (See page DI-84)

If necessary, replace the throttle body.

NOTICE:

Be careful not to give a shock to the throttle body.

Be careful not to disassemble the throttle body.

5. REINSTALL V-BANK COVER

SF0P5-13

REMOVAL

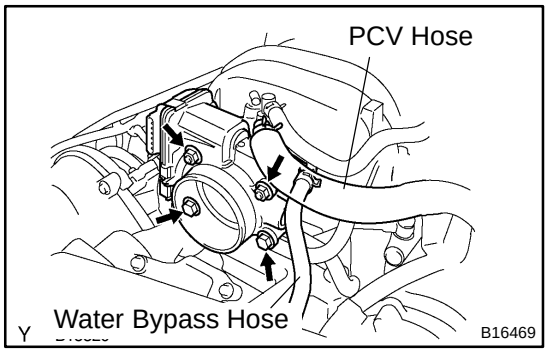
1. REMOVE V-BANK COVER

2. DRAIN ENGINE COOLANT

3. REMOVE INTAKE AIR CONNECTOR

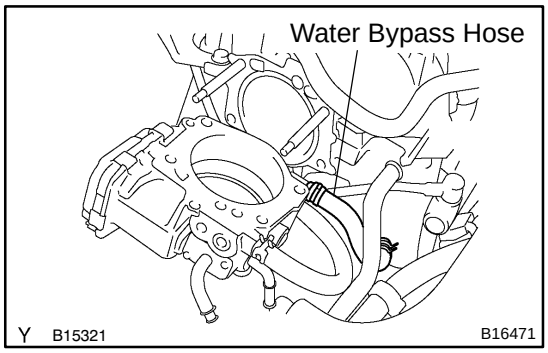
4. REMOVE THROTTLE BODY

(a) Disconnect the throttle control connector.



(b) Disconnect the PCV hose and the water bypass hose from the throttle body.

(c) Remove the 2 bolts and 2 nuts, and disconnect the throttle body from the intake manifold.



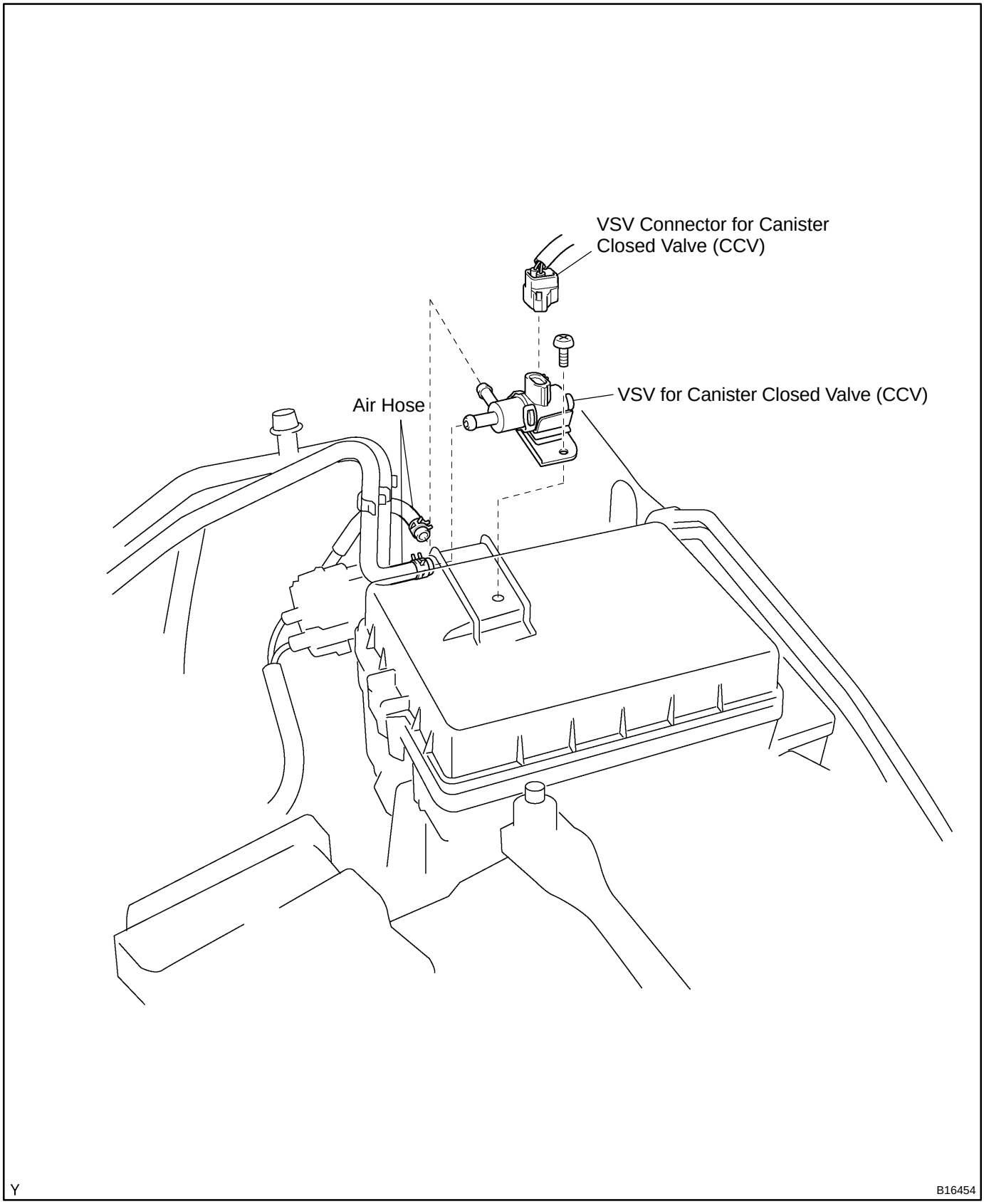
(d) Disconnect the water bypass hose from the manifold thermostat on the throttle body, and remove the throttle body.

(e) Remove the gasket.

VSV FOR CANISTER CLOSED VALVE (CCV)

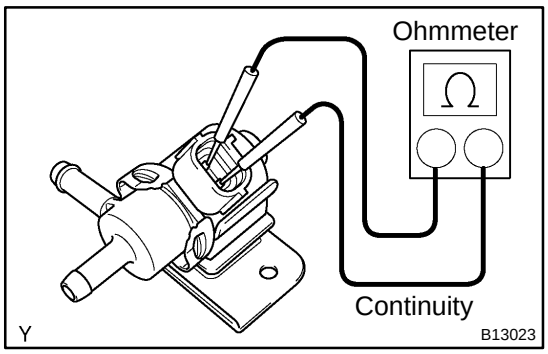
SF149-05

COMPONENTS



SF14A-06

INSPECTION



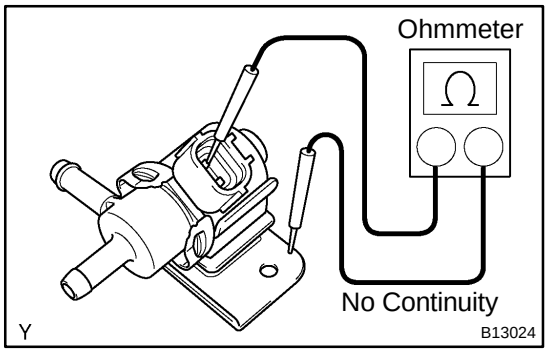
1. REMOVE VSV

2. INSPECT VSV FOR OPEN CIRCUIT

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

Resistance: 24 - 30 Ω at 20˚C (68˚F)

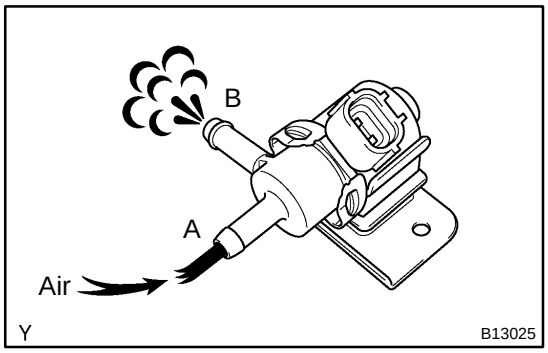
If there is no continuity, replace VSV.



3. INSPECT VSV FOR GROUND

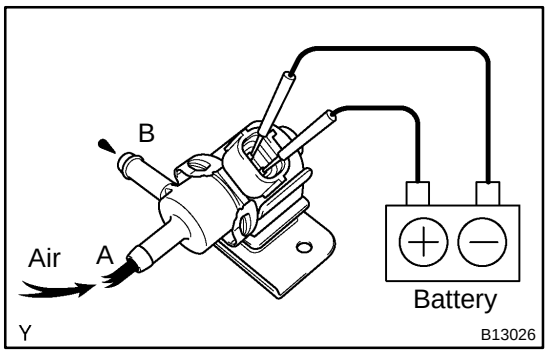
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is a continuity, replace VSV.



4. INSPECT VSV OPERATION

(a) Check that air flows from the ports A to B.



(b) Apply the battery positive voltage across the terminals.

(c) Check that air does not flow from the ports A to B.

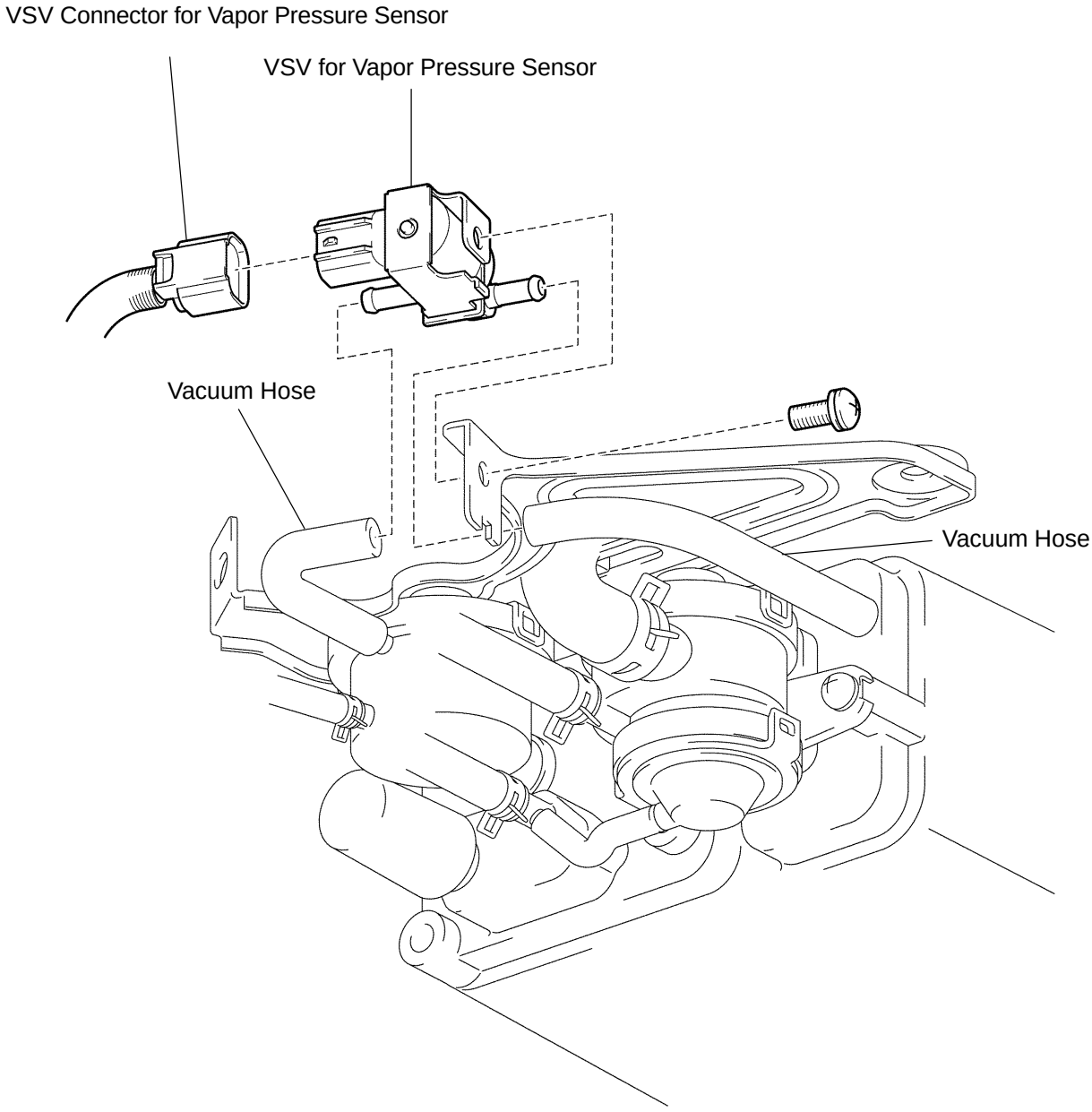
If operation is not as specified, replace VSV.

5. REINSTALL VSV

VSV FOR VAPOR PRESSURE SENSOR

COMPONENTS

SF0Y8-09



SF0PM-11

INSPECTION

1. REMOVE VSV

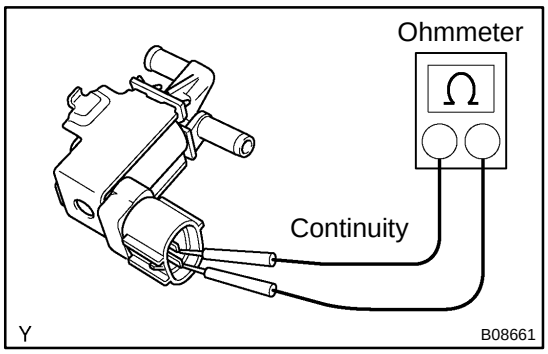
2. INSPECT VSV

(a) Inspect VSV for open circuit.

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

Resistance: 30 - 36 Ω at 20˚C (68˚F)

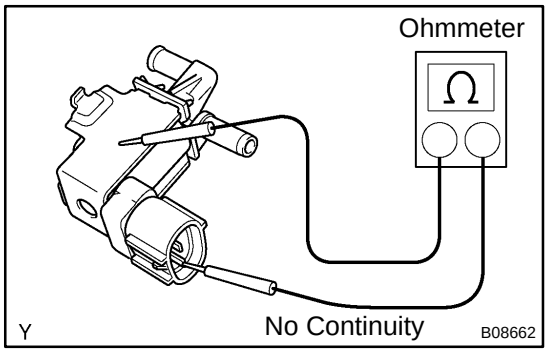
If there is no continuity, replace the VSV.



(b) Inspect the VSV for ground.

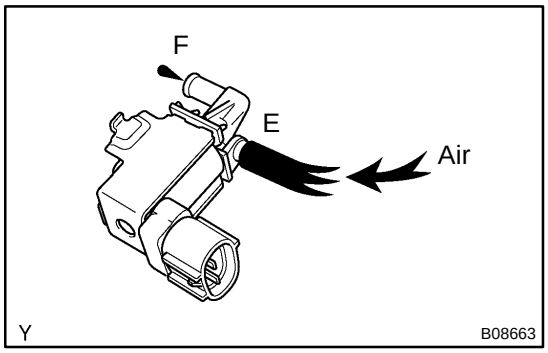
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is a continuity, replace the VSV.



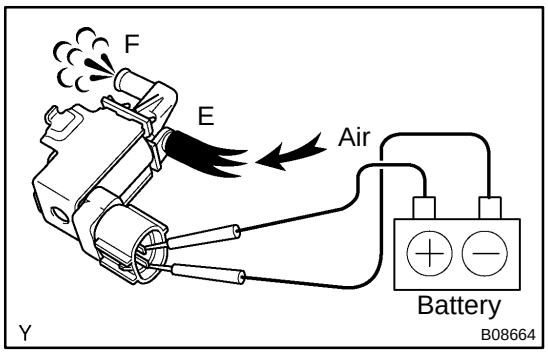
(c) Inspect the VSV operation.

(1) Check that air flows from the ports E to F.



(2) Apply the battery positive voltage across the terminals.

(3) Check that air flows from the ports E to F.



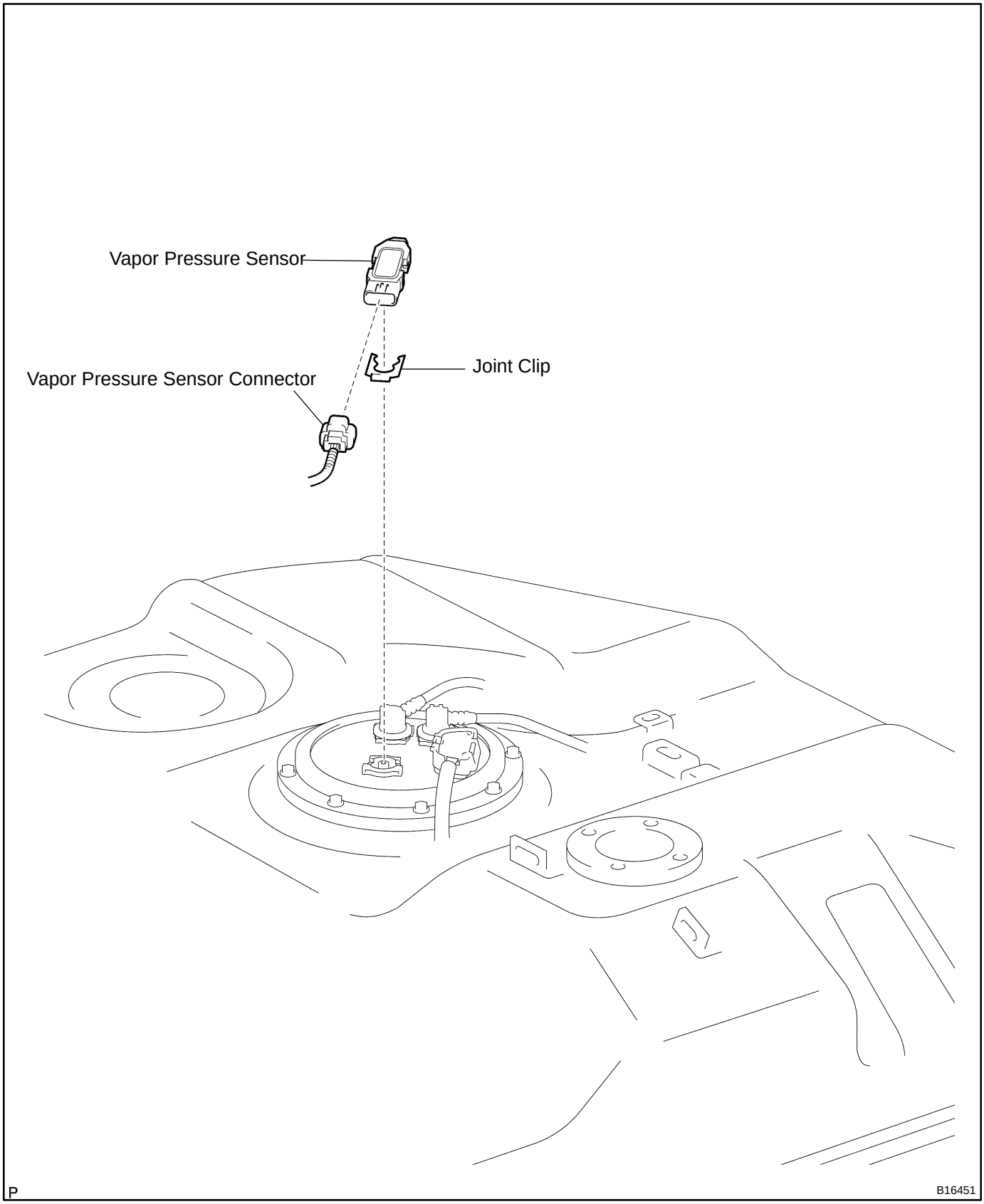
If operation is not as specified, replace VSV.

3. REINSTALL VSV

VAPOR PRESSURE SENSOR

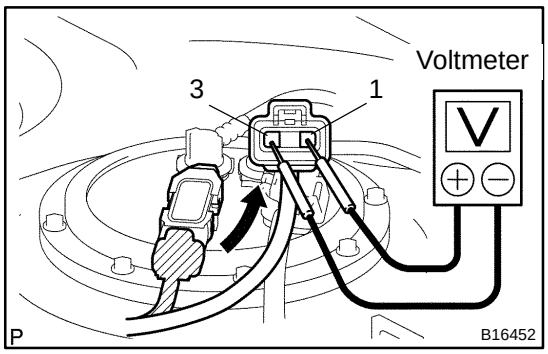
COMPONENTS

SF0PP-10



SF0PQ-10

INSPECTION



1. INSPECT POWER SOURCE VOLTAGE OF VAPOR PRESSURE SENSOR

(a) Disconnect the vapor pressure sensor connector.

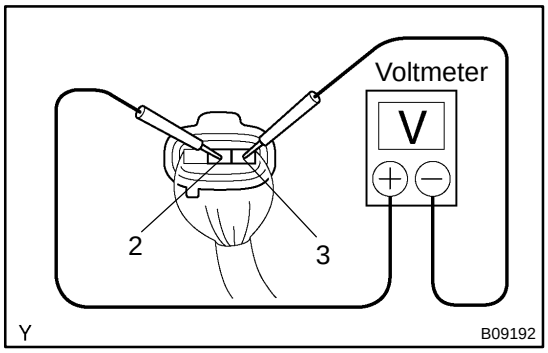
(b) Turn the ignition switch ON.

(c) Using a voltmeter, measure the voltage between connector terminal 1 and 3 of the wiring harness side.

Voltage: 4.5 - 5.5 V

(d) Turn the ignition switch OFF.

(e) Reconnect the vapor pressure sensor connector.



2. INSPECT POWER OUTPUT OF VAPOR PRESSURE SENSOR

(a) Turn the ignition switch ON.

(b) Remove the fuel tank cap.

(c) Connect a voltmeter to terminal 2 and 3, and measure the output voltage.

Voltage: 3.0 - 3.6 V

(d) Reinstall the fuel tank cap.

(e) Turn the ignition switch OFF.