

SFI SYSTEM PRECAUTION

SF1NS-01

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

HINT:

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

Therefore, if necessary, read the diagnostic trouble code(s) before removing the negative (-) terminal cable from the 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) Precaution when the connecting gauge.
Use battery as the power source for the timing light, etc.
- (b) In the event of engine misfire, these precautions should be taken.
 - (1) Check proper connection of battery terminals, etc.
 - (2) Handle high-tension cords carefully.
 - (3) After repair work, check that the ignition coil terminals and all other ignition system lines are reconnected securely.
 - (4) When cleaning the engine compartment, be especially careful to protect the electrical system from water.
- (c) Precautions when the handling heated oxygen sensors.
 - (1) Do not allow oxygen sensor to drop or hit against an object.
 - (2) Do not allow the sensor to come into 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 run 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 and cause the engine to run out of tune.

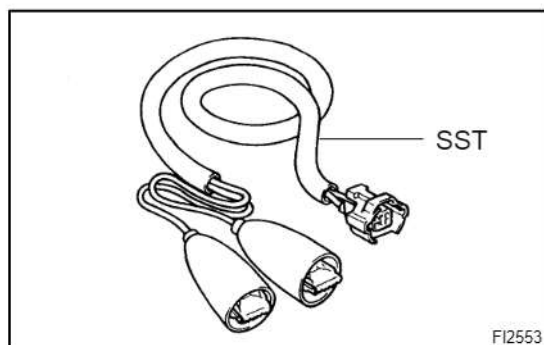
7. **ELECTRONIC CONTROL SYSTEM**

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

HINT:

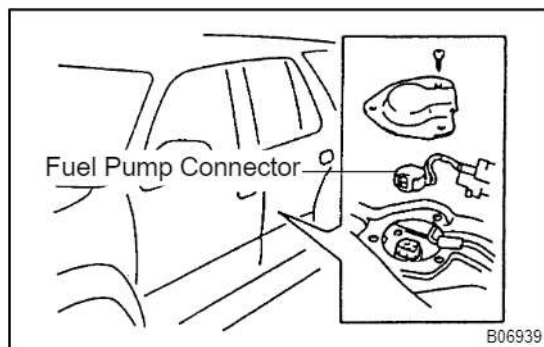
Always check the diagnostic trouble code before disconnecting the battery terminal cable.

- (b) When installing the battery, be especially careful not to incorrectly connect the positive (+) and negative (-) cable terminals.
- (c) Do not permit parts to receive a severe impact during removal or installation. Handle all SFI parts carefully, especially the ECM.
- (d) Do not be careless during troubleshooting as there are numerous transistor circuits and even slight terminal contact can 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 on the SFI parts and wiring connectors.
- (g) Parts should be replaced as an assembly.
- (h) Care is required when pulling out and inserting 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) When inspecting a connector with a volt/ohmmeter.
 - (1) Carefully take out the water-proofing rubber if it is a water-proof type connector.
 - (2) Insert the test probe into the connector from wiring side when checking the continuity, amperage or voltage.
 - (3) Do not apply unnecessary force to the terminal.
 - (4) After checking, install the water-proofing rubber on the connector securely.



- (5) Use SST for inspection or test of the injector or its wiring connector.

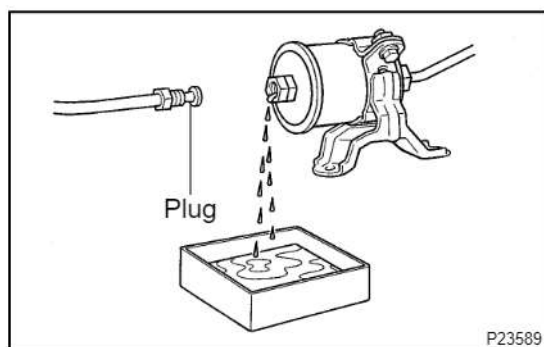
SST 09842-30070



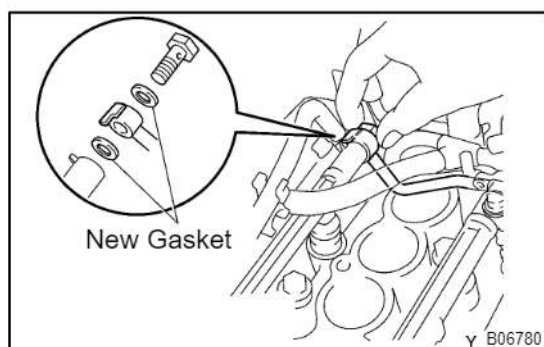
8. FUEL SYSTEM

- (a) When disconnecting the high pressure fuel line, a large amount of gasoline will spill out, so observe these procedures:

- (1) Disconnect the fuel pump connector.
- (2) Start the engine. After the engine has stopped on its own, turn the ignition switch OFF.



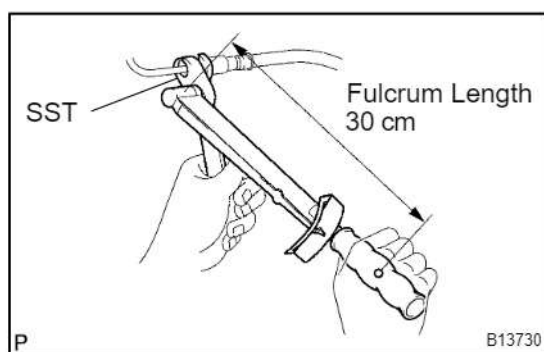
- (3) Put a container under the connection.
- (4) Slowly loosen the connection.
- (5) Disconnect the connection.
- (6) Plug the connection with a rubber plug.



- (b) When connecting the union bolt on the high pressure pipe union, observe these procedures:

- (1) Always use a new gasket.
- (2) Tighten the union bolt by hand.
- (3) Tighten the union bolt to the specified torque.

Torque: 34.3 N·m (350 kgf·cm, 25 ft·lbf)



- (c) When connecting the flare nut on the high pressure pipe union, observe these procedures:

- (1) Apply a light coat of engine oil to the flare and tighten the flare nut by hand.
- (2) Using SST, tighten the flare nut to the specified torque.

SST 09023-38400

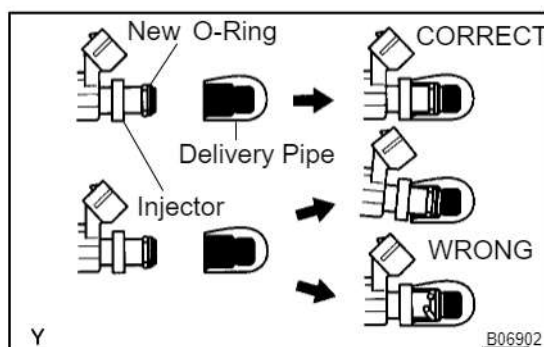
Torque: 24 N·m (245 kgf·cm, 18 ft·lbf)

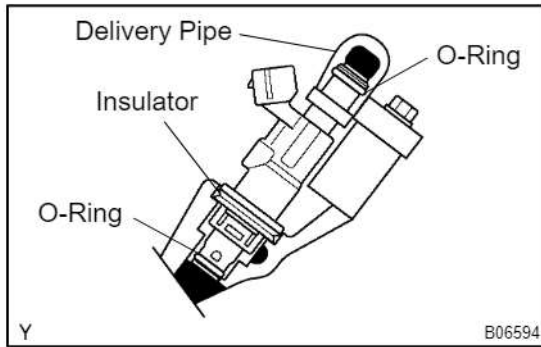
HINT:

Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).

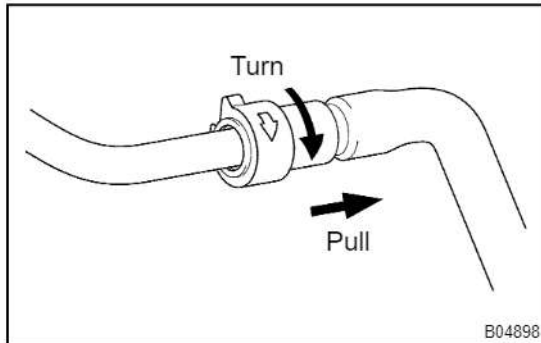
- (d) Observe these precautions when removing and installing the injectors.

- (1) Never reuse the O-ring.
- (2) When placing a new O-ring on the injector, take care not to damage it in any way.
- (3) Coat a new O-ring with spindle oil or gasoline before installing-never use engine, gear or brake oil.

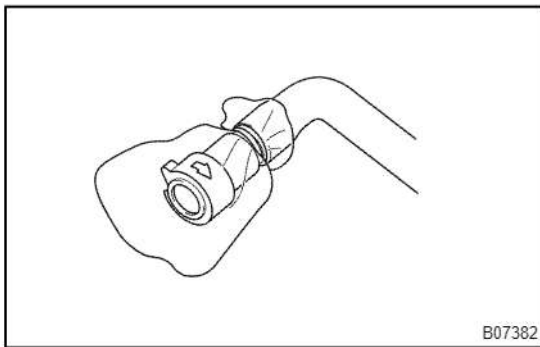




- (e) Install the injector to the delivery pipe and intake manifold as shown in the illustration.



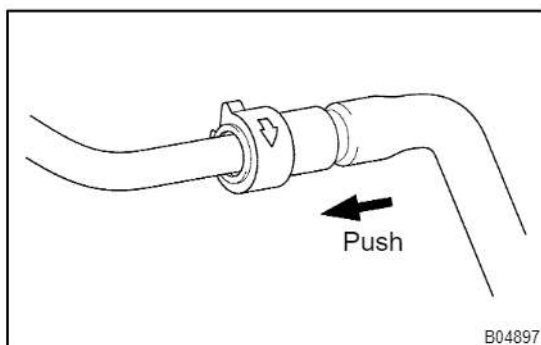
- (f) Observe these precautions when disconnecting the fuel tube connector (quick type):
- (1) Check that there is any dirt or the like on the pipe and around the connector before disconnecting them and clean the dirt away.
 - (2) Be sure to disconnect by hands.
 - (3) When the connector and the pipe are stuck, turn and pull the connector to free to disconnect and pull it out. Do not use any tools at this time.
 - (4) Inspect if there is any dirt or the like on the seal surface of the disconnected pipe and clean it away.

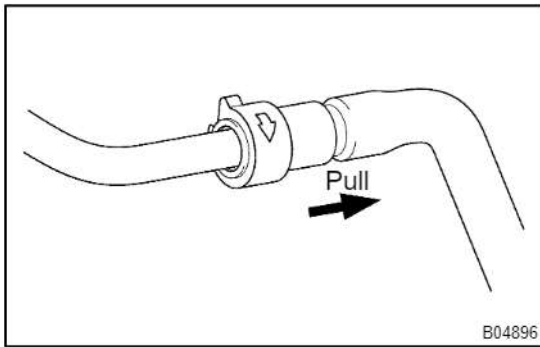


- (5) Prevent the disconnected pipe and connector from being damaged or mixed with foreign objects by covering them with a vinyl bag.

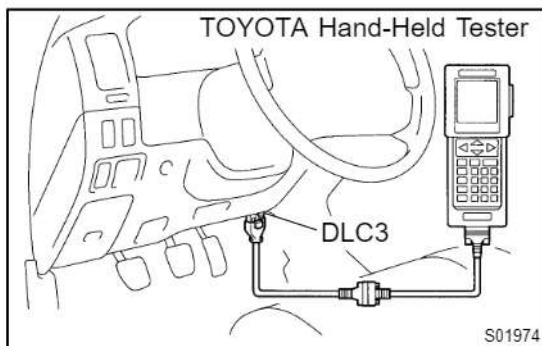
- (g) Observe these precautions when connecting the fuel tube connector (quick type):

- (1) Do not reuse the retainer removed from the pipe.
- (2) Must use hands to remove the retainer from the pipe.
- (3) Check that there is any damage or foreign objects on the connected part of the pipe.
- (4) Match the axis of the connector with axis of the pipe, and push in the connector until the connector makes a "click" sound. In case that the connections is tight, apply small amount of fresh engine oil on the tip of the pipe.





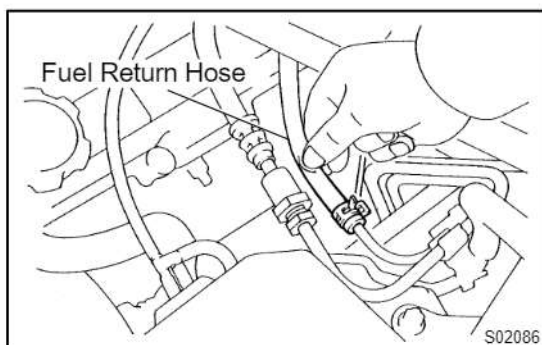
- (5) After having finished the connection, check if the pipe and the connector are securely connected by pulling them.
- (6) Check that there is any fuel leakage.
- (h) Observe these precautions when handling nylon tube.
 - (1) Pay attention not to turn the connected part of the nylon tube and the quick connector by force when connecting them.
 - (2) Pay attention not to kink the nylon tube.
 - (3) Do not remove the EPDM protector from the outside of the nylon tube.
 - (4) Must not close the piping with the nylon tube by bending it.



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

NOTICE:**Do not start the engine**

- (3) Select the active test mode on the TOYOTA hand-held tester.
- (4) Please refer to the TOYOTA hand-held tester operator's manual for further details.
- (5) If you have no TOYOTA hand-held tester, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector (See page [SF-7](#)).



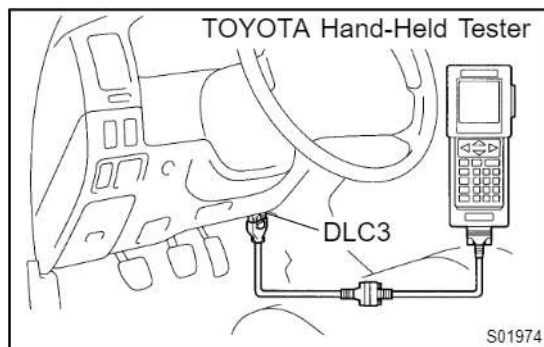
- (6) Pinch the fuel return hose. The pressure in high pressure line will rise to approx. 400 kPa (4 kgf/cm², 57 psi). In this state, check to see that there are no leaks from any part of the fuel system.

NOTICE:

Always pinch the hose. Avoid bending as it may cause to hose to crack.

- (7) Turn the ignition switch OFF.

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



FUEL PUMP

ON-VEHICLE INSPECTION

SF02D-02

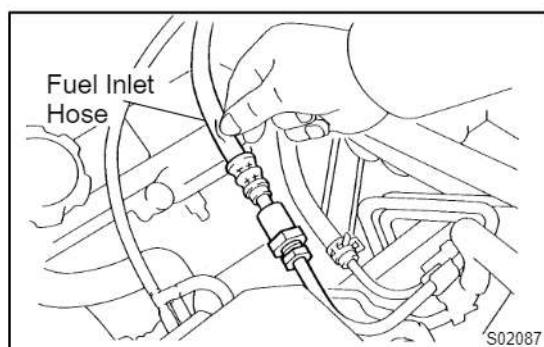
1. CHECK FUEL PUMP OPERATION

- (a) Connect a TOYOTA hand-held tester to the DLC3.
- (b) Turn the ignition switch ON and push TOYOTA hand-held tester main switch ON.

NOTICE:

Do not start the engine.

- (c) Select the ACTIVE TEST mode on the TOYOTA hand-held tester.
- (d) Please refer to the TOYOTA hand-held tester operator's manual for further details.
- (e) If you have no TOYOTA hand-held tester, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector.



- (f) Check that there is pressure in the fuel inlet hose from the fuel filter.

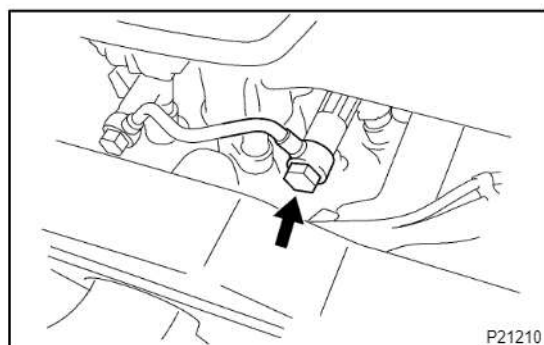
HINT:

If there is fuel pressure, you will hear the sound of fuel flowing. If there is no pressure, check the H-fuse, M-fuses, fuses, EFI main relay, circuit opening relay, fuel pump, ECM and wiring connections.

- (g) Turn the ignition switch OFF.
- (h) Disconnect the TOYOTA hand-held tester from the DLC3.

2. CHECK FUEL PRESSURE

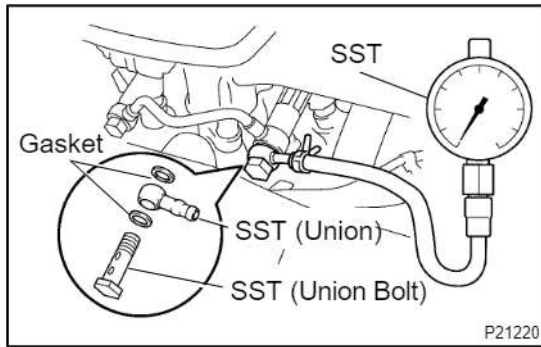
- (a) Check the battery positive voltage is above 12 V.
- (b) Disconnect the negative (-) terminal cable from the battery.
- (c) Remove the 6 bolts, and disconnect the No.2 timing belt cover.



- (d) Remove the union bolt holding the fuel pipe to the delivery pipe and gasket.

CAUTION:

- Put a shop towel under the delivery pipe.
- Slowly loosen the union bolt.



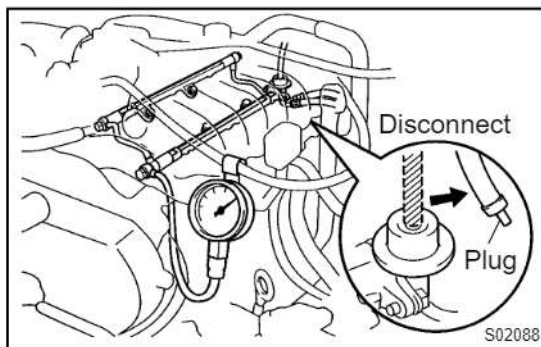
- (e) Install SST (pressure gauge) to the delivery pipe with the 2 gaskets and SST (union and union bolt).
SST 09268-45014
Torque: 34.3 N·m (350 kgf·cm, 25 ft·lbf)
- (f) Wipe off any splattered gasoline.
- (g) Connect a TOYOTA hand-held tester to the DLC3 (See step 1).
- (h) Reconnect the negative (-) terminal cable to the battery.
- (i) Turn the ignition switch ON.
- (j) Measure the fuel pressure.

Fuel pressure:**265 - 304 kPa (2.7 - 3.1 kgf/cm², 38 - 44 psi)**

If pressure is high, replace the fuel pressure regulator.

If pressure is low, check the fuel hoses, fuel hose connections, fuel pump, fuel filter, fuel pressure regulator and VSV for the fuel pressure control.

- (k) Disconnect the TOYOTA hand-held tester from the DLC3.
- (l) Reinstall the No.2 timing belt cover with the 6 bolts.
Torque: 9 N·m (90 kgf·cm, 80 in·lbf)
- (m) Start the engine.



- (n) Disconnect the vacuum sensing hose from the fuel pressure regulator, and plug the hose end.
- (o) Measure the fuel pressure at idle.
- (p) Reconnect the vacuum sensing hose to the fuel pressure regulator.
- (q) Measure the fuel pressure at idle.

Fuel pressure:**226 - 265 kPa (2.3 - 2.7 kgf/cm², 33 - 38 psi)**

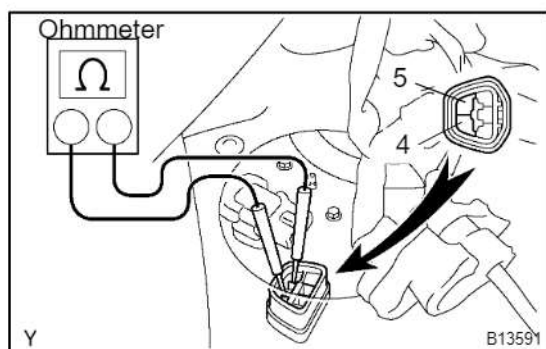
If pressure is not as specified, check the vacuum sensing hose and fuel pressure regulator.

- (r) Stop the engine.
- (s) 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 pressure is not as specified, check the fuel pump, pressure regulator and/or injectors.

- (t) After checking fuel pressure, disconnect the negative (-) terminal cable from the battery and carefully remove the SST to prevent gasoline from splashing.
SST 09268-45012
 - (u) Remove the other union bolt, 3 gaskets and fuel pipe from the delivery pipes.
 - (v) Reinstall the fuel pipe with 4 new gaskets and the 2 union bolts.
- Torque: 34.3 N·m (350 kgf·cm, 25 ft·lbf)**
- (w) Reconnect the negative (-) terminal cable to the battery.
 - (x) Check for fuel leaks (See page SF-1).

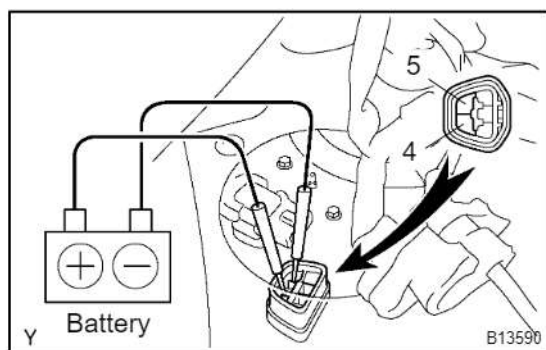


3. INSPECT FUEL PUMP RESISTANCE

- (a) Pull up the LH rear seat cushion.
- (b) Remove the floor service hole cover with the 3 screws.
- (c) Disconnect the fuel pump connector.
- (d) Using an ohmmeter, measure the resistance between terminals 4 and 5.

Resistance: 0.2 - 0.3 Ω at 20°C (68°F)

If the resistance is not specified, replace the fuel pump and/or set plate.



4. INSPECT FUEL PUMP OPERATION

- (a) Connect the positive (+) lead from the battery to terminal 4 of the connector, and the negative (-) lead to terminal 5. Check that the fuel pump operations.

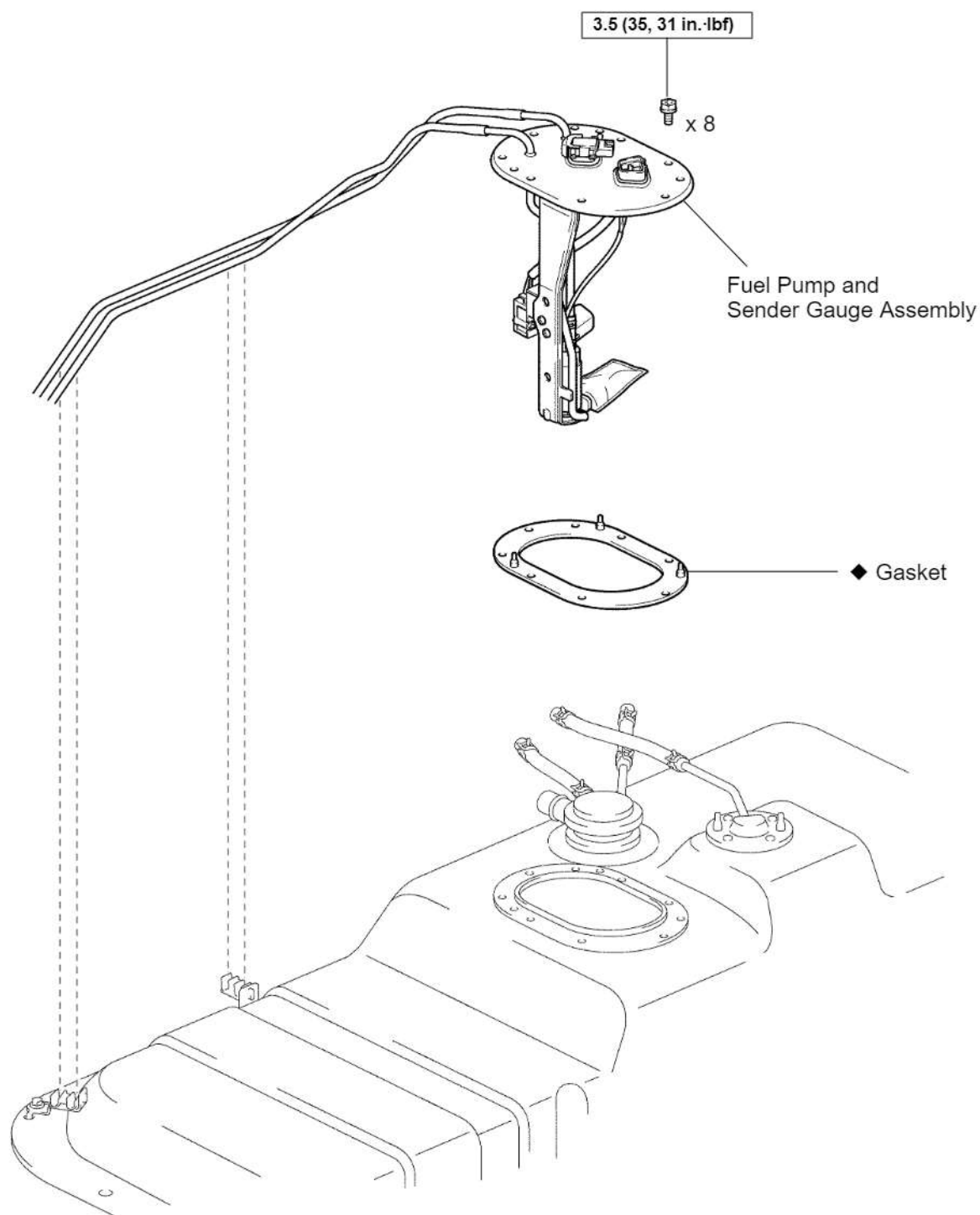
NOTICE:

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

If operation is as not specified, replace the fuel pump and/or set plate.

- (b) Connect the fuel pump connector.
- (c) Install the floor service hole cover with the 3 screws.
- (d) Connect the LH rear seat cushion.

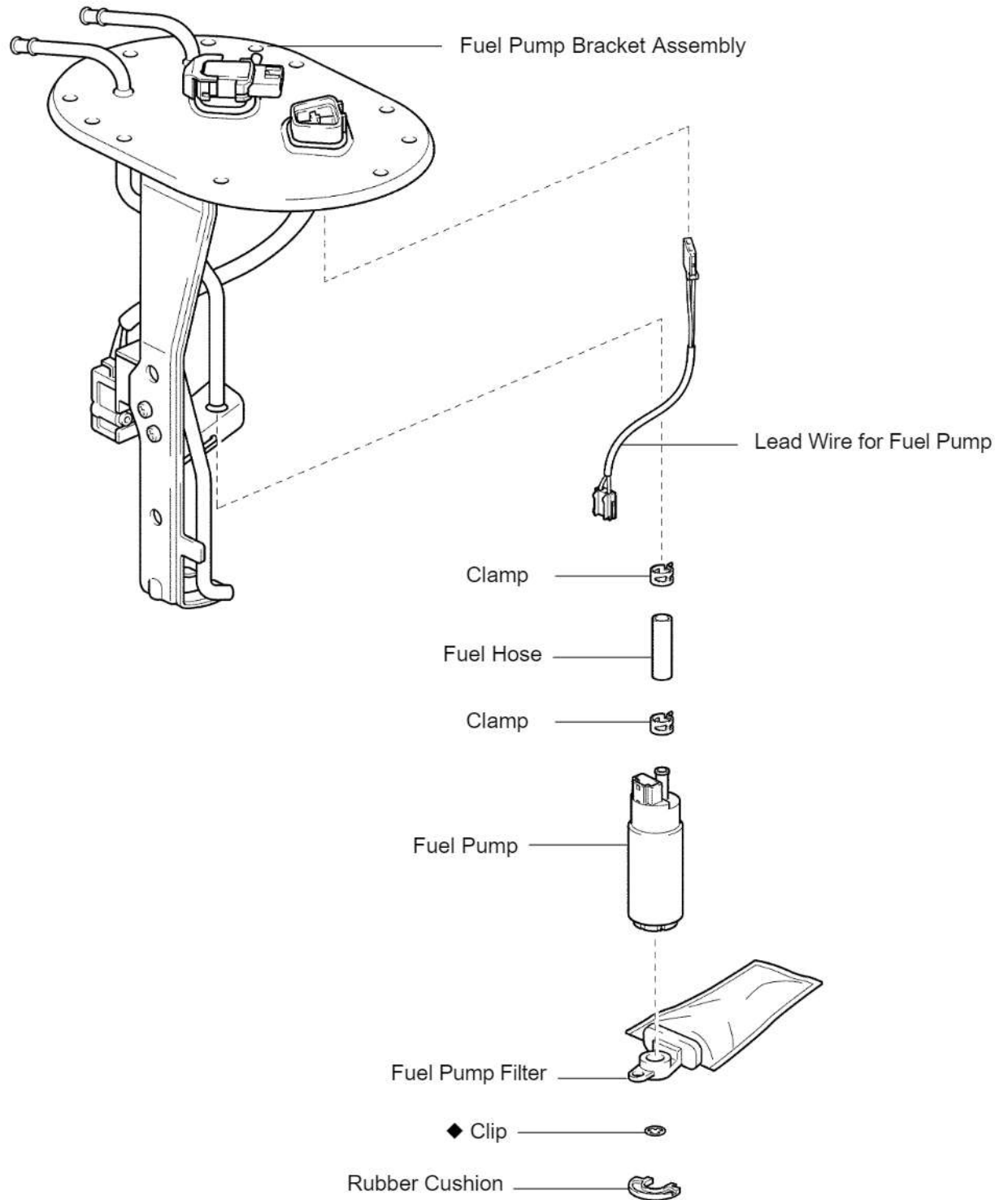
COMPONENTS



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

◆ Non-reusable part

B13289



P ◆ Non-reusable part

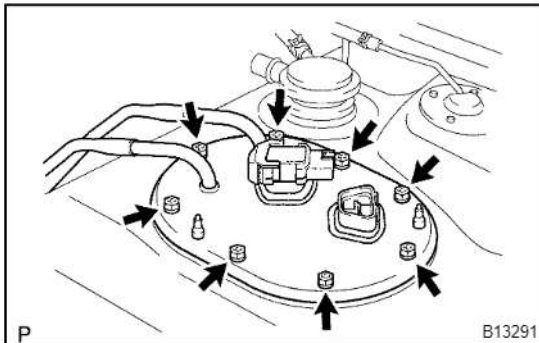
B13290

REMOVAL

CAUTION:

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

1. REMOVE FUEL TANK (See page [SF-25](#))
2. DISCONNECT FUEL MAIN TUBE AND RETURN TUBE FROM FUEL TANK

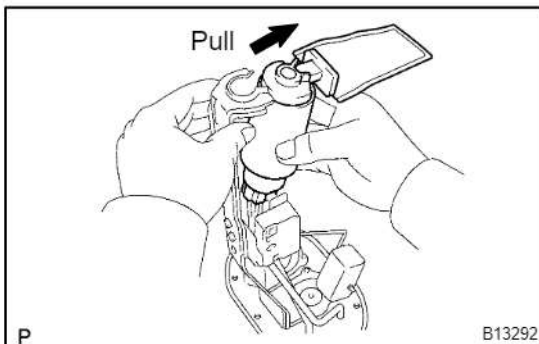


3. REMOVE FUEL PUMP AND SENDER GAUGE ASSEMBLY FROM FUEL TANK

- (a) Remove the 8 bolts.
- (b) Pull out the fuel pump and sender gauge assembly.

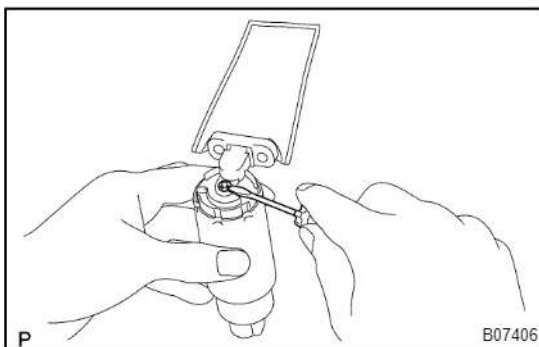
NOTICE:

- Do not damage the fuel pump filter.
 - Be careful not to bend the arm of the sender gauge.
- (c) Remove the gasket from the fuel section plate.



4. REMOVE FUEL PUMP FROM FUEL PUMP BRACKET

- (a) Disconnect the lead wire from the connector of the fuel suction plate.
- (b) Pull out the lower side of the fuel pump from the pump bracket.
- (c) Disconnect the fuel hose from the fuel pump, and remove the fuel pump.
- (d) Remove the rubber cushion from the fuel pump.



5. REMOVE FUEL PUMP FILTER FROM FUEL PUMP

- (a) Using a small screwdriver, remove the clip.
- (b) Pull out the pump filter.

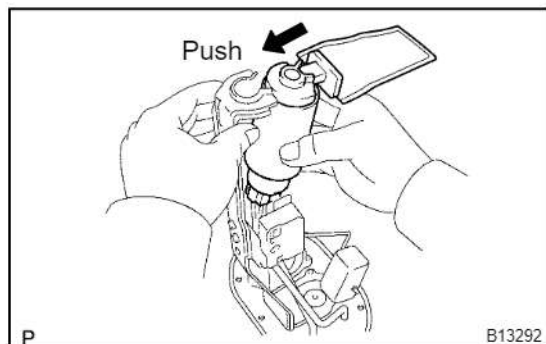
INSTALLATION

1. INSTALL FUEL PUMP FILTER TO FUEL PUMP

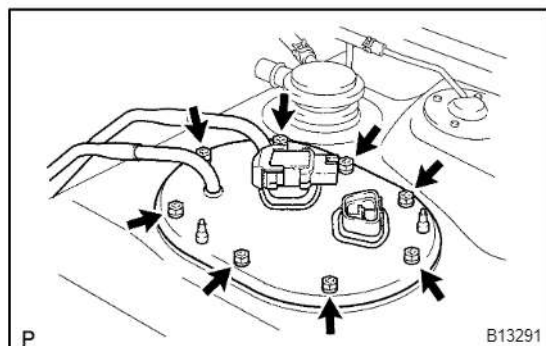
Install the pump filter with a new clip.

2. INSTALL FUEL PUMP TO FUEL PUMP BRACKET

- Install the rubber cushion to the fuel pump.
- Connect the fuel hose to the outlet port of the fuel pump.



- Install the fuel pump by pushing the lower side of the fuel pump.
- Install the lead wire to the fuel pump and connector of the fuel suction plate.



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

- Install a new gasket to the fuel suction plate.
- Insert the fuel pump and sender gauge assembly into the fuel tank.
- Install the fuel pump and sender gauge to the fuel tank with the 8 bolts.

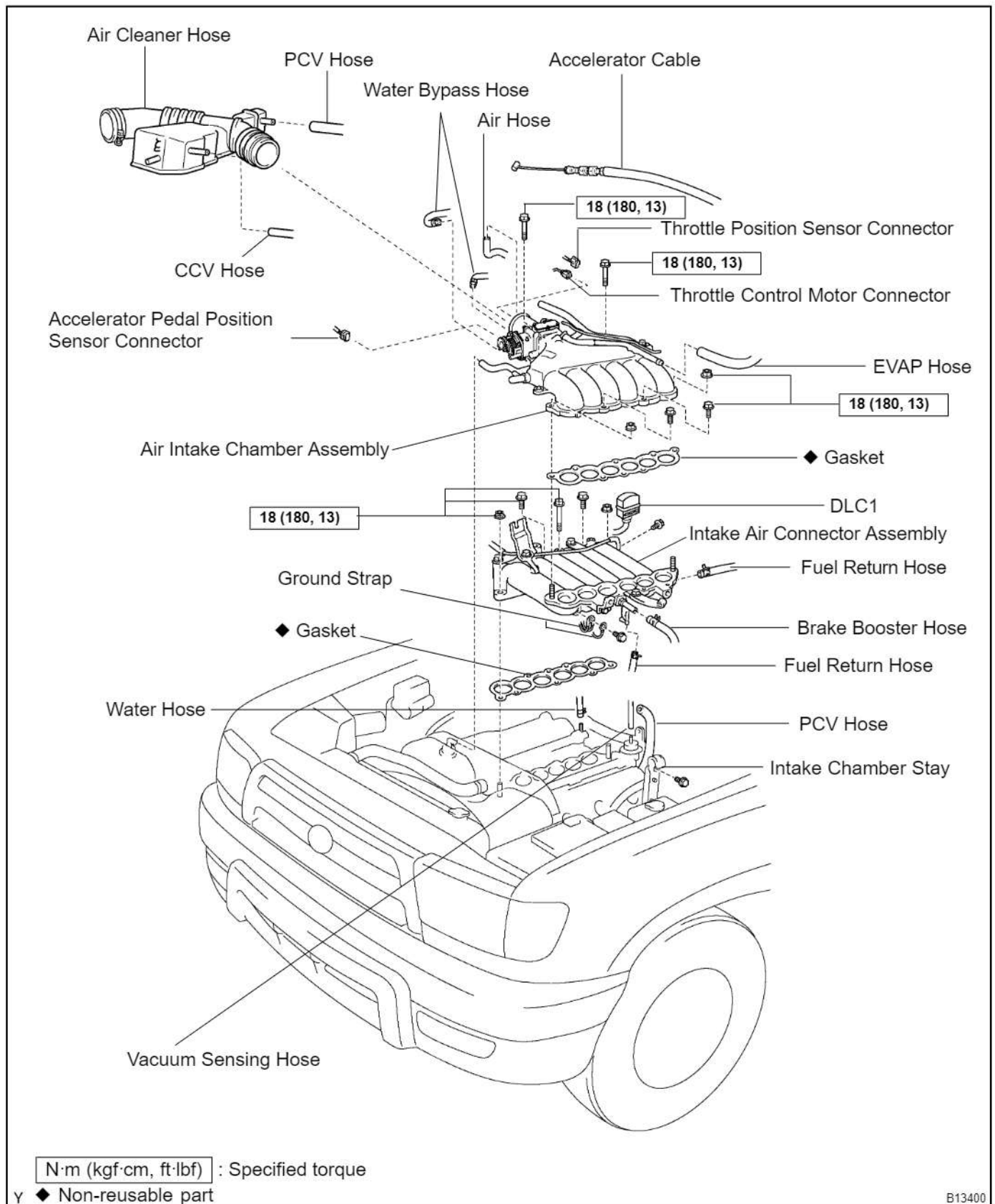
Torque: 3.5 N·m (35 kgf·cm, 31 in.·lbf)

4. CONNECT FUEL MAIN TUBE AND RETURN TUBE TO FUEL TANK

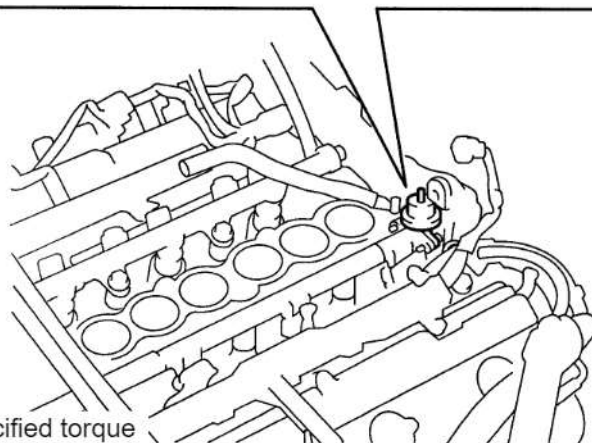
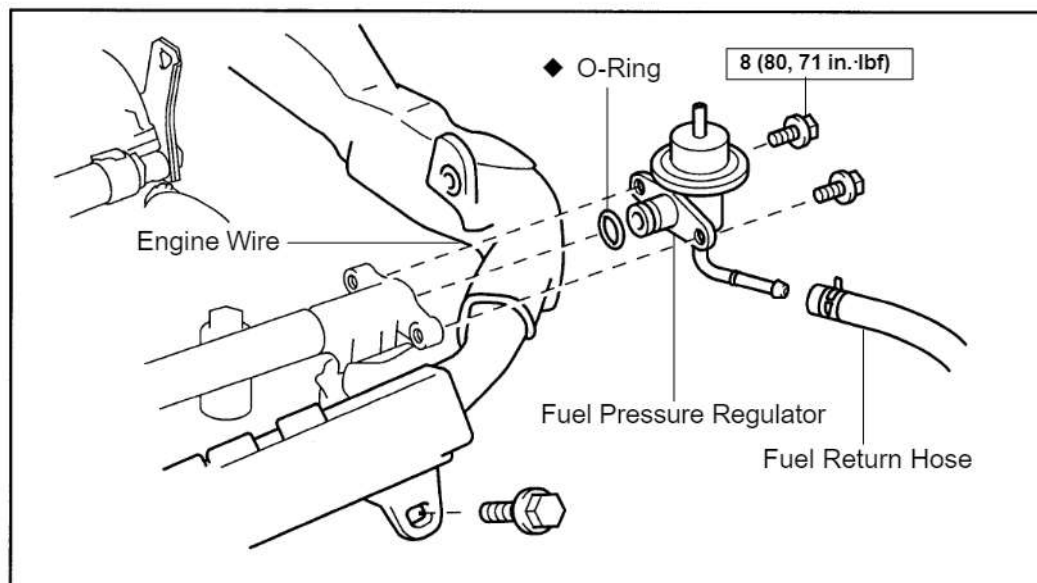
- CHECK FOR FUEL LEAKS (See page [SF-1](#))
- INSTALL FUEL TANK (See page [SF-25](#))

FUEL PRESSURE REGULATOR COMPONENTS

SF01Z-04



B13400



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

◆ Non-reusable part

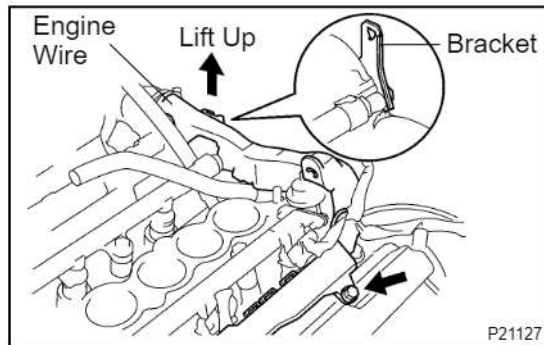
P21128

REMOVAL

1. REMOVE AIR CLEANER HOSE
2. REMOVE INTAKE AIR CONNECTOR ASSEMBLY (See page [EM-29](#))
3. DISCONNECT FUEL RETURN HOSE FROM FUEL PRESSURE REGULATOR

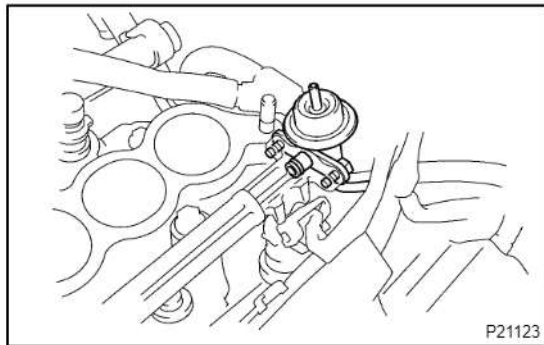
CAUTION:

Put a shop rag under the pressure regulator.

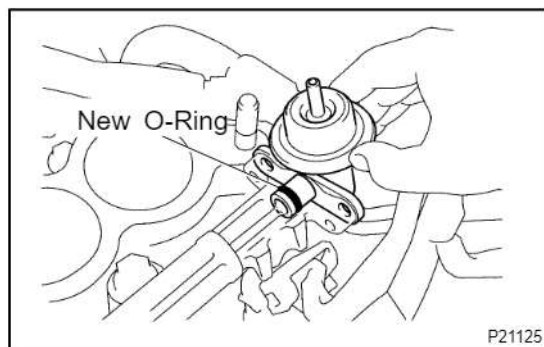


4. REMOVE FUEL PRESSURE REGULATOR

- (a) Remove holding bolt the engine wire to the LH cylinder head cover.
- (b) Disconnect the protector from the bracket on the RH cylinder head cover, and lift up the engine wire.



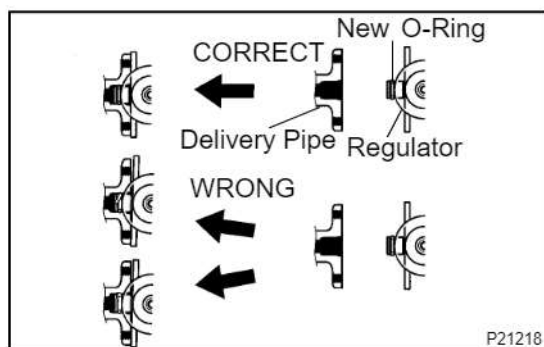
- (c) Remove the 2 bolts, and pull out the pressure regulator.
- (d) Remove the O-ring from the pressure regulator.



INSTALLATION

1. INSTALL FUEL PRESSURE REGULATOR

- Apply a light coat of gasoline to a new O-ring, and install it to the pressure regulator.
- Attach the pressure regulator to the LH delivery pipe.



- Check that the pressure regulator rotates smoothly.

NOTICE:

If it does not rotate smoothly, the O-ring may be pinched, so remove the pressure regulator and repeat steps (a) to (c) above.

- Install the pressure regulator with the 2 bolts.

Torque: 8 N·m (80 kgf·cm, 71 in.·lbf)

- Install the engine wire with the bolt.

2. CONNECT FUEL RETURN HOSE TO FUEL PRESSURE REGULATOR

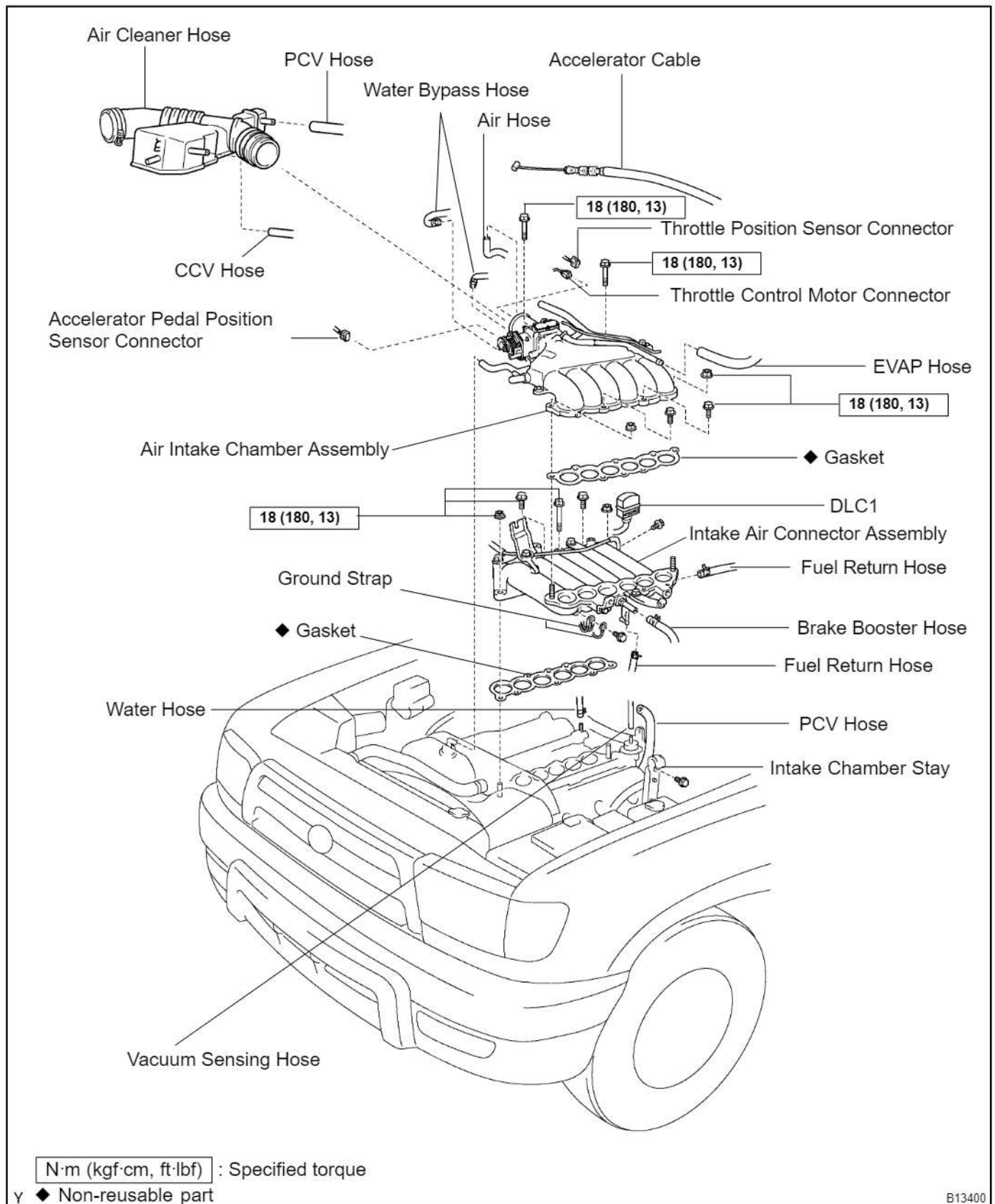
NOTICE:

Be sure to insert the hose up to the stopper and clip it.

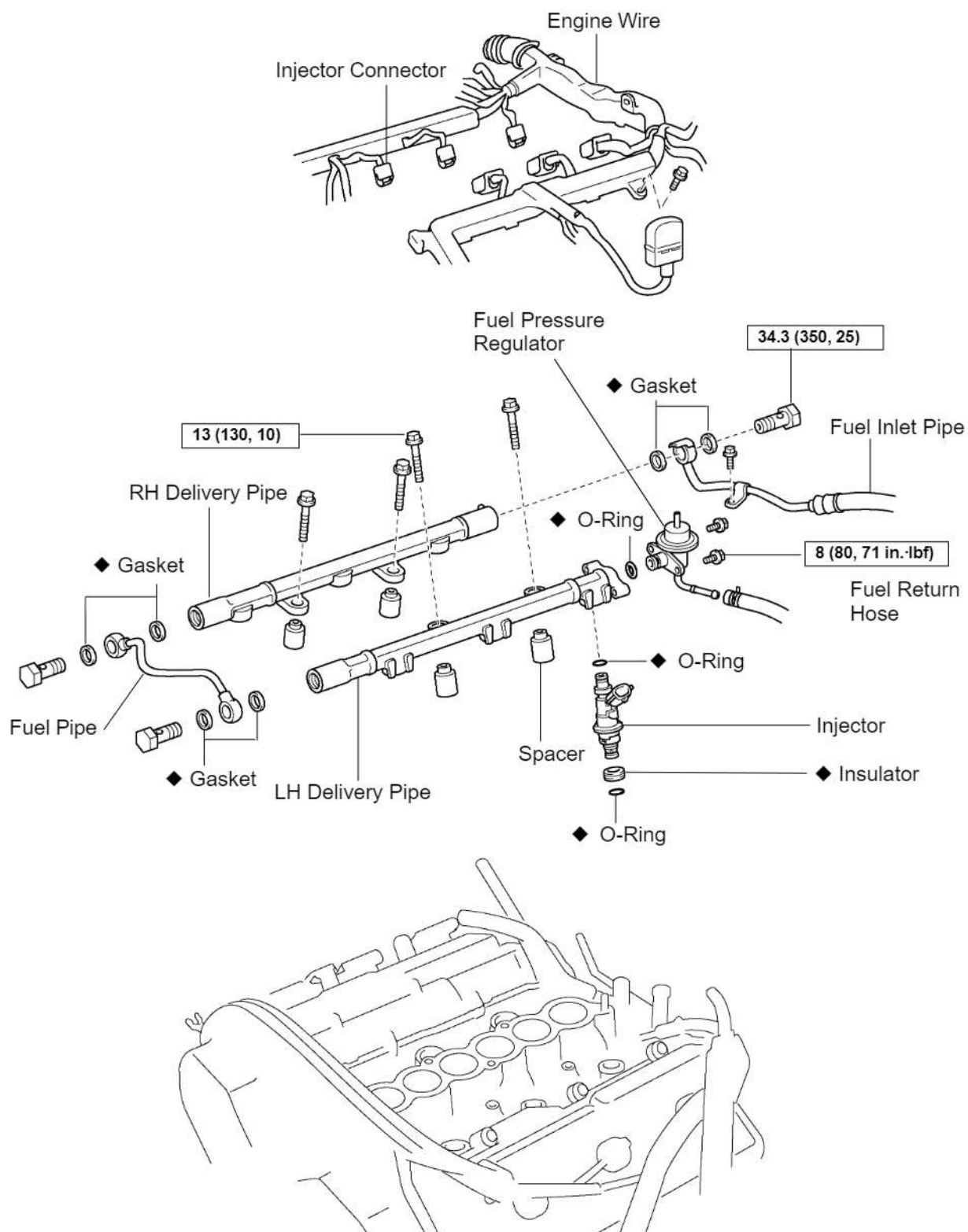
- INSTALL INTAKE AIR CONNECTOR ASSEMBLY (See page [EM-52](#))
- INSTALL AIR CLEANER HOSE
- CHECK FOR FUEL LEAKS (See page [SF-1](#))

INJECTOR COMPONENTS

SF022-04



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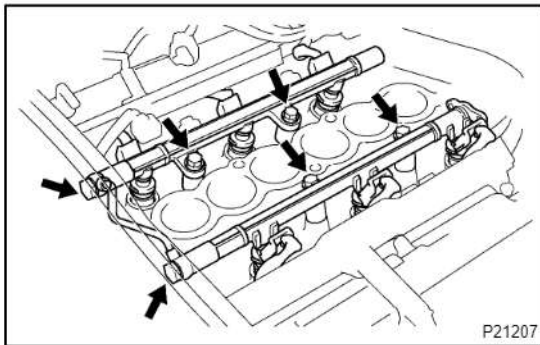
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

B06047

REMOVAL

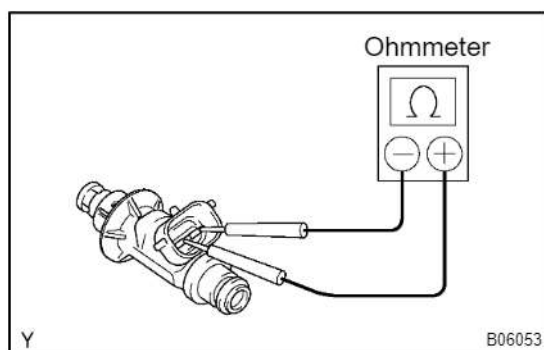
1. REMOVE AIR CLEANER HOSE
 2. REMOVE INTAKE AIR CONNECTOR ASSEMBLY (See page [EM-29](#))
 3. REMOVE FUEL PRESSURE REGULATOR (See page [SF-16](#))
 4. DISCONNECT FUEL INLET PIPE
- CAUTION:**
Catch leaking fuel in a container.
5. REMOVE FUEL PIPE
 6. DISCONNECT INJECTOR CONNECTORS



7. REMOVE DELIVERY PIPES AND INJECTORS

NOTICE:

- Be careful not to drop the injectors when removing the delivery pipes.
 - Pay attention to put any hung load on the injector to and from the side direction.
- (a) Remove the 4 bolts and delivery pipes together with the 6 injectors.
 - (b) Remove the 4 spacers from the intake manifold.
 - (c) Pull out the 6 injectors from the delivery pipes.
 - (d) Remove the 2 O-rings and insulator from each injector.



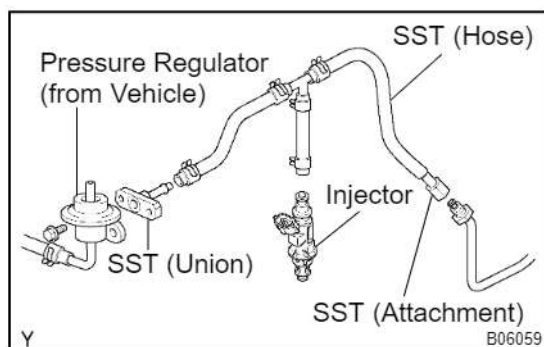
INSPECTION

1. INSPECT INJECTOR RESISTANCE

Using an ohmmeter, measure the resistance between the terminals.

Resistance: Approx. 13.8 Ω at 20°C (68°F)

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

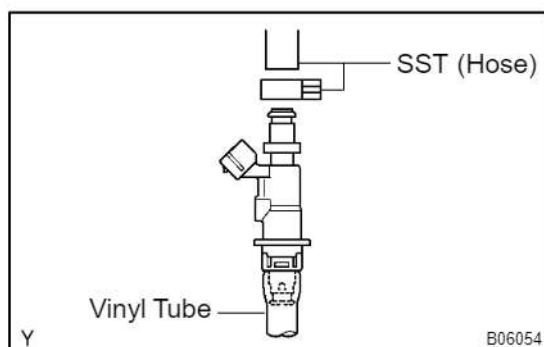


2. INSPECT INJECTOR INJECTION

CAUTION:

Keep injector clear of sparks during the test.

- Disconnect the fuel inlet pipe from the fuel tube.
- Connect SST (attachment and hose) to the fuel tube.
SST 09268-41047 (09268-52011)
- Connect the fuel return hose, SST (union) and SST (hose) to the fuel pressure regulator.
SST 09268-41047 (09268-41091)



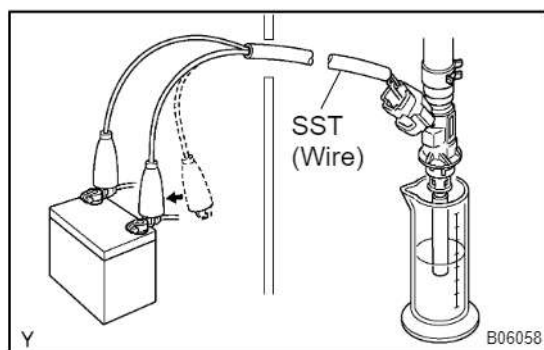
- Connect SST (hose) to the injector.
SST 09268-41047

- Put the injector into the graduated cylinder.

HINT:

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

- Connect a TOYOTA hand-held tester to the DLC3.
(See page [SF-7](#))



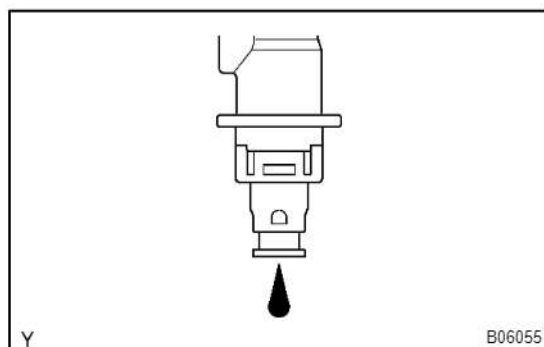
- Connect SST (wire) to the injector and battery for 15 seconds, and measure the injection volume with a graduated cylinder. Test each injector 2 or 3 times.
SST 09842-30070

Volume: 60 - 73 cm³ (3.4 - 4.5 cu in.) per 15 sec.

Difference between each injector:

13 cm³ (0.8 cu in.) or less

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



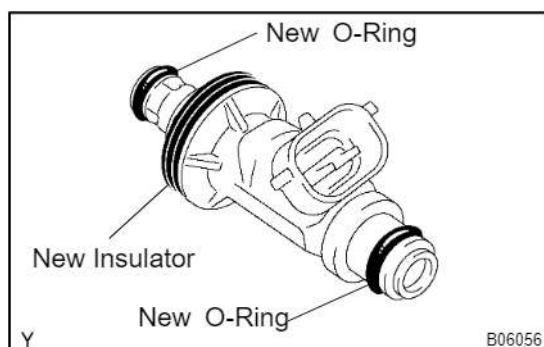
3. INSPECT LEAKAGE

- 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

- Turn the ignition switch OFF.
- Disconnect the negative (-) terminal cable from the battery.

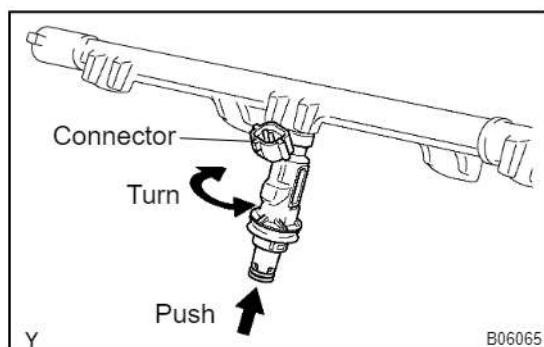
- (d) Remove the SST.
SST 09268-41047
- (e) Disconnect the TOYOTA hand-held tester from the DLC3.



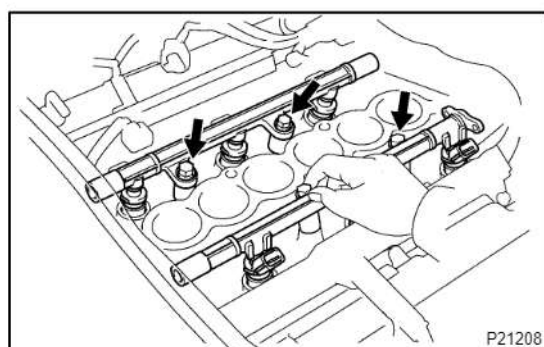
INSTALLATION

1. TEMPORARILY INSTALL INJECTORS AND DELIVERY PIPES

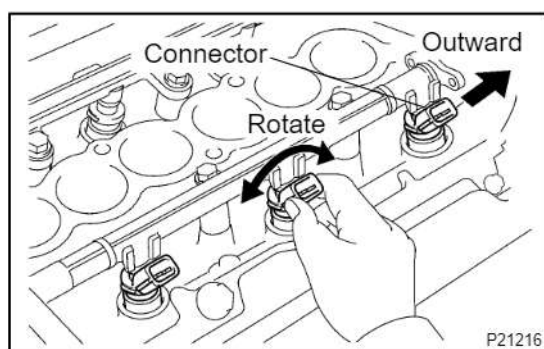
- Install a new insulator to each injector.
- Apply a light coat of spindle oil or gasoline to 2 new O-rings and install them to each injector.



- While turning the injector clockwise and counterclockwise, push it to the delivery pipes. Install the 6 injectors.
- Position the injector connector outward.



- Place the 4 spacers in position on the intake manifold.
- Place the delivery pipes with the 6 injectors in position on the intake manifold.
- Temporarily install the 4 bolts holding the delivery pipes to the intake manifold.

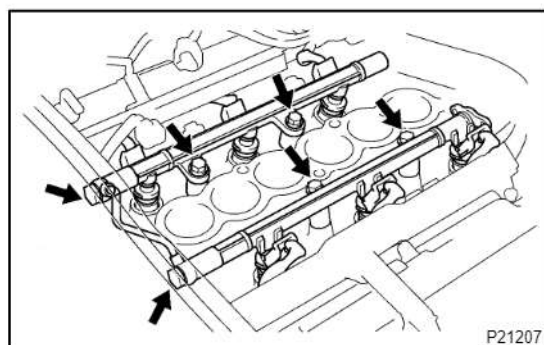


- Check that the injectors rotate smoothly.

HINT:

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

- Position the injector connector outward.



2. CONNECT INJECTOR CONNECTORS

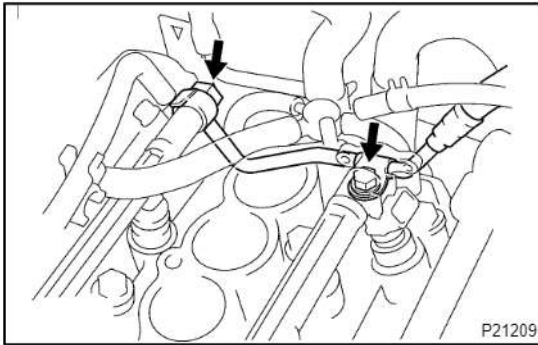
3. INSTALL FUEL PIPE AND TIGHTENING DELIVERY PIPE HOLDING BOLTS

- Install the fuel pipe with 4 new gaskets and the 2 union bolts.

Torque: 34.3 N·m (350 kgf·cm, 25 ft·lbf)

- Tighten the 4 bolts holding the delivery pipes to the intake manifold.

Torque: 13 N·m (130 kgf·cm, 10 ft·lbf)

**4. CONNECT FUEL INLET PIPE**

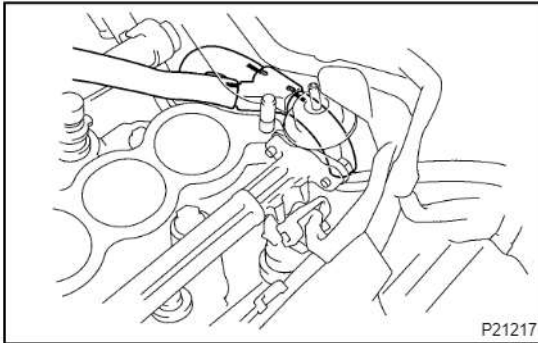
(a) Temporarily install the inlet pipe with 2 new gaskets, union bolt and bolt.

(b) Tighten the clamp bolt.

Torque: 8 N·m (80 kgf·cm, 71 in·lbf)

(c) Tighten the union bolt.

Torque: 34.3 N·m (350 kgf·cm, 25 ft·lbf)

5. INSTALL FUEL PRESSURE REGULATOR (See page [SF-17](#))**6. INSPECT AIR ASSIST LINES AND CONNECTIONS**

Visually check for loose connections, sharp bends or damage.

7. INSTALL INTAKE AIR CONNECTOR ASSEMBLY (See page [EM-52](#))**8. INSTALL AIR CLEANER HOSE****9. CHECK FOR FUEL LEAKS (See page [SF-1](#))**

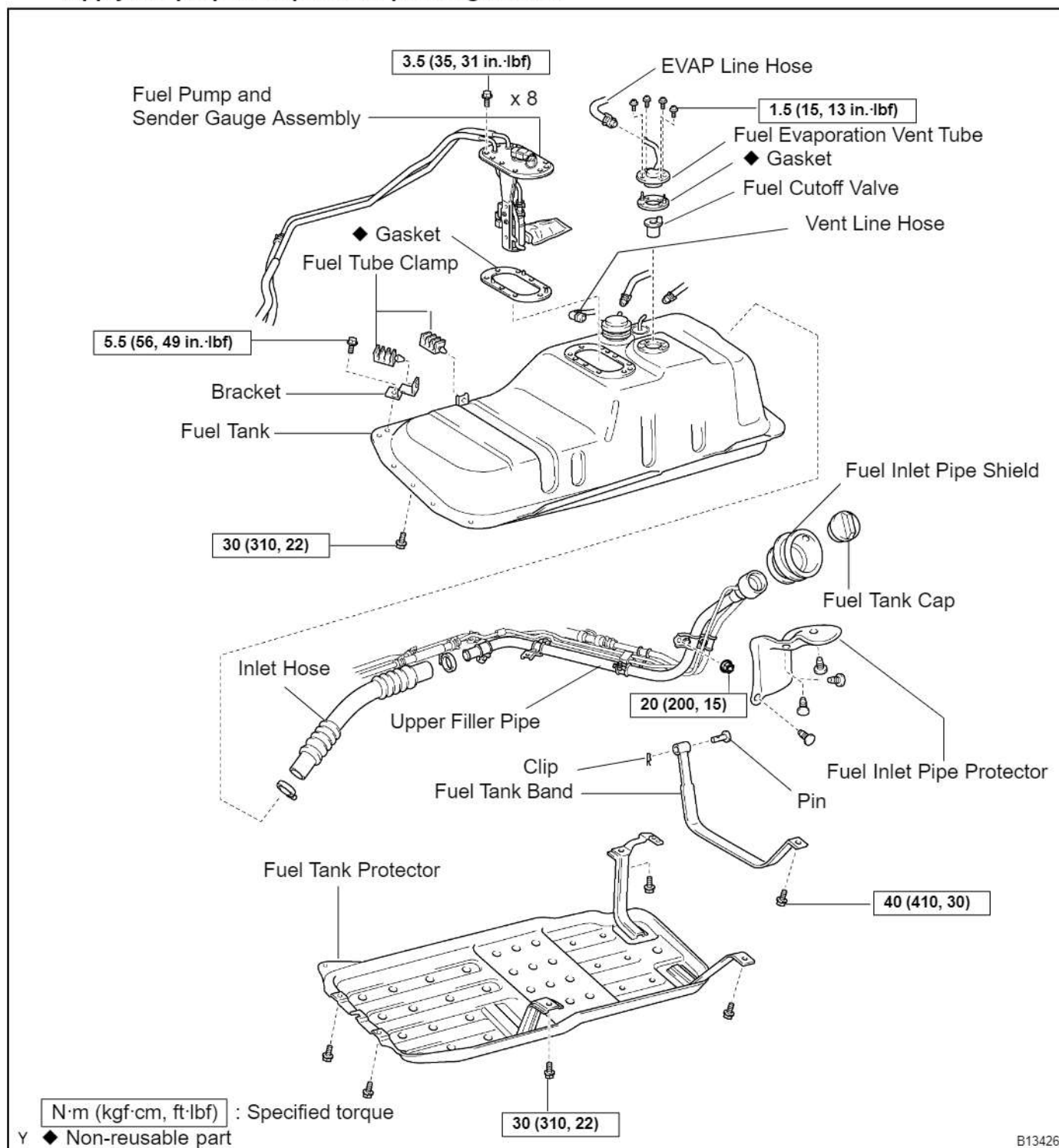
FUEL TANK AND LINE

COMPONENTS

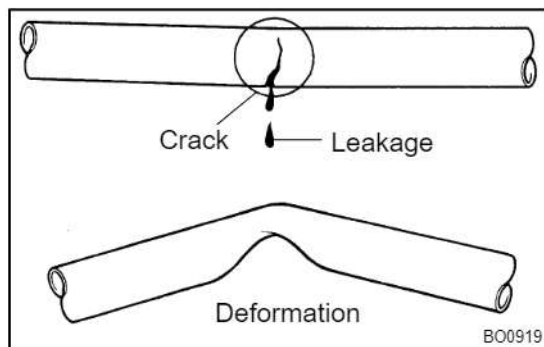
SF00V-05

CAUTION:

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



B13426

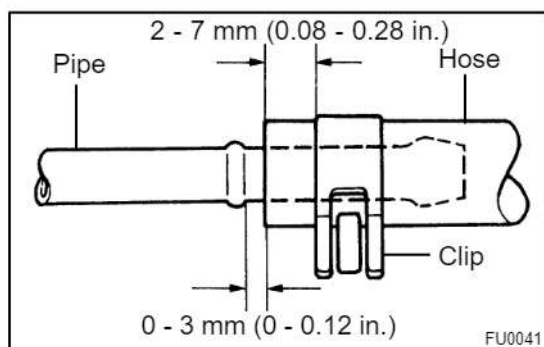
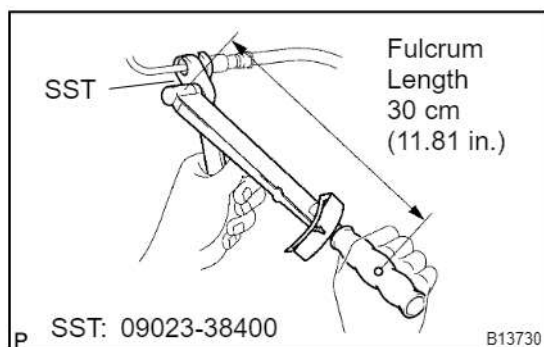


INSPECTION

INSPECT FUEL TANK AND LINE

- Check the fuel lines for cracks or leakage, and all connections for deformation.
- Check the fuel tank vapor vent system hoses and connections for looseness, sharp bends or damage.
- Check the fuel tank for deformation, cracks, fuel leakage or tank band looseness.
- Check the filler neck for damage or fuel leakage.
- Hose and tube connections are as shown in the illustration.

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

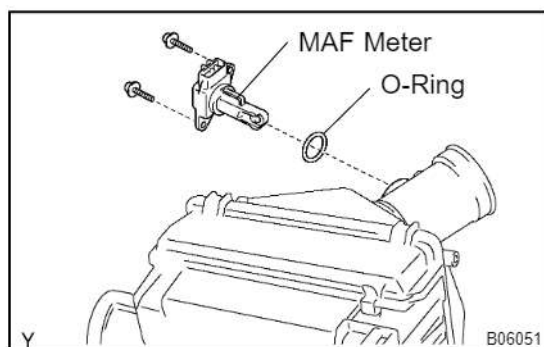


MASS AIR FLOW (MAF) METER REMOVAL

SF02G-02

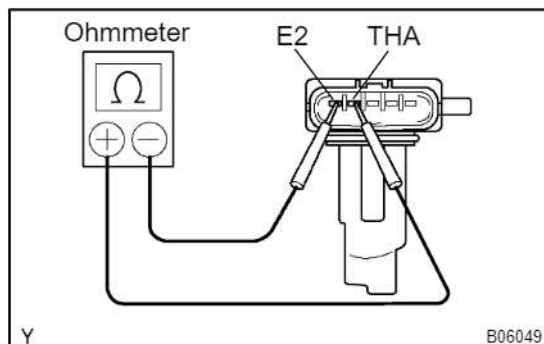
1. REMOVE AIR CLEANER CASE

- (a) Disconnect the air cleaner hose.
- (b) Disconnect the MAF meter connector.
- (c) Remove the 3 bolts and air cleaner case.



2. REMOVE MAF METER

- (a) Remove the 2 screws and MAF meter.
- (b) Remove the O-ring from the MAF meter.



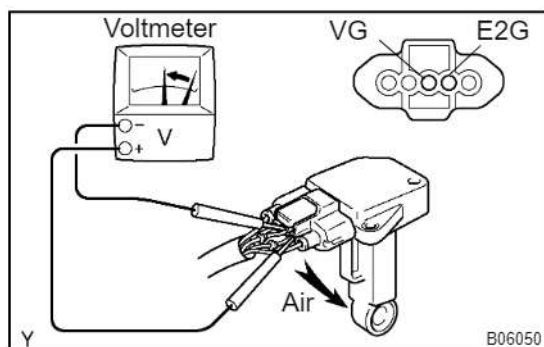
INSPECTION

1. INSPECT MAF METER RESISTANCE

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

Resistance	Temperature
13.6 - 18.4 kΩ	-20 °C (-4°F)
2.2 - 2.7 kΩ	20°C (68°F)
0.5 - 0.7 kΩ	60°C (140°F)

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

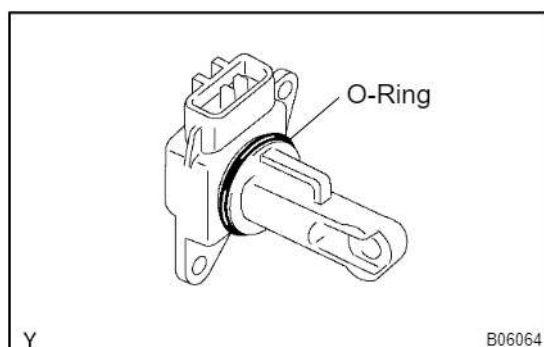


2. INSPECT MAF METER OPERATION

- Connect the MAF meter connector.
- Using a voltmeter, connect the positive (+) tester probe to terminal VG, and negative (-) tester probe to terminal E2G.
- Turn the ignition switch ON.
- Blow air into the MAF meter, and check that the voltage fluctuates.

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

- Turn the ignition switch OFF.
- Disconnect the MAF meter connector.



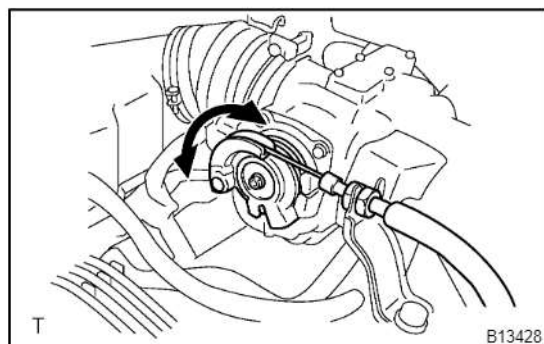
INSTALLATION

1. INSTALL MAF METER

- (a) Install the O-ring to the MAF meter.
- (b) Install the MAF meter with the 2 screws.

2. INSTALL AIR CLEANER CASE

- (a) Install the air cleaner case with the 3 bolts.
- (b) Connect the MAF meter connector.
- (c) Connect the air cleaner hose.

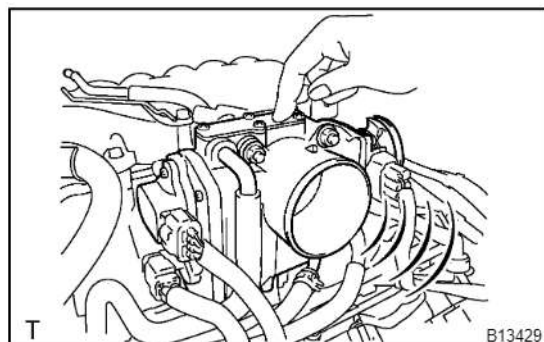


THROTTLE BODY ON-VEHICLE INSPECTION

SF029-04

1. INSPECT SYSTEM OPERATION

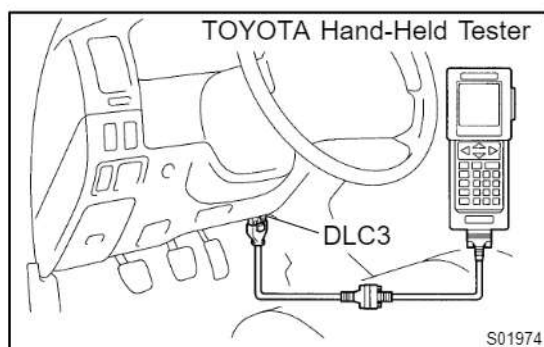
- (a) Check that the throttle linkage moves smoothly.



- (b) 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 2), wiring and ECM.



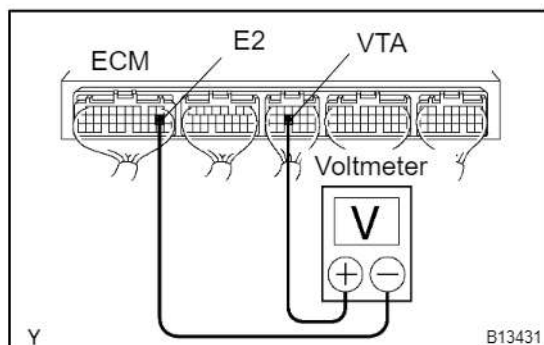
- (c) Inspect the accelerator pedal position sensor.

- (1) Connect the TOYOTA hand-held tester to the DLC3.
- (2) Check that the MIL does not light up.
- (3) When turning the accelerator pedal position sensor lever to the full-open position, check that the throttle valve opening percentage (THROTTLE POS) of the 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 step 5), wiring and ECM.



If you have no TOYOTA hand-held tester, measure voltage between terminals VTA and E2 of the ECM connector.

- (d) Inspect the idle speed.

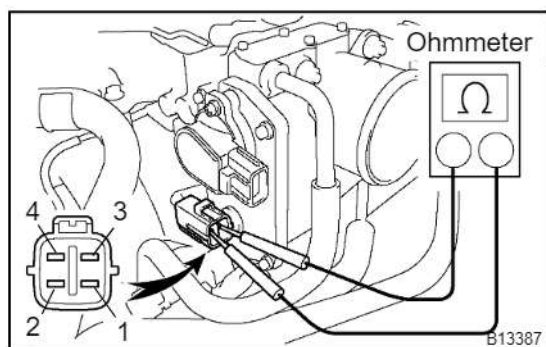
- (1) Start the engine and check that the MIL does not light up.
- (2) Allow the engine to warm up to normal operating temperature.
- (3) Turn the A/C compressor ON to OFF, and check the idle speed.

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

NOTICE:

Perform inspection under condition without electrical load.

- (e) After checking the above (b) to (d), perform the driving test and check that there is no sense of incongruity.

**2. INSPECT THROTTLE CONTROL MOTOR**

- (a) Disconnect the throttle control motor connector.
 (b) Using an ohmmeter, measure the motor resistance between terminal 4 (M+) and 3 (M-).

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

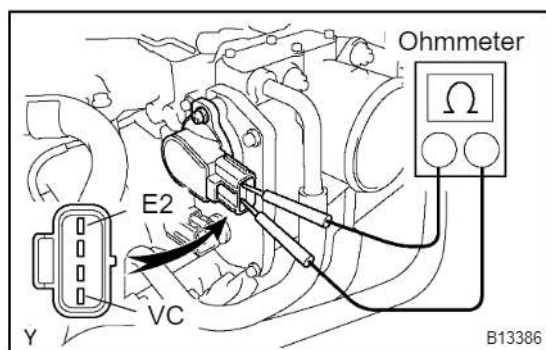
If the resistance is not as specified, replace the throttle body (See page [SF-33](#) and [SF-34](#)).

- (c) Using an ohmmeter, measure the clutch resistance between terminal 2 (CL-) and 1 (CL+).

Clutch resistance: 4.2 - 5.2 Ω at 20°C (68°F)

If the resistance is not as specified, replace the throttle body (See page [SF-33](#) and [SF-34](#)).

- (d) Reconnect the throttle control motor connector.

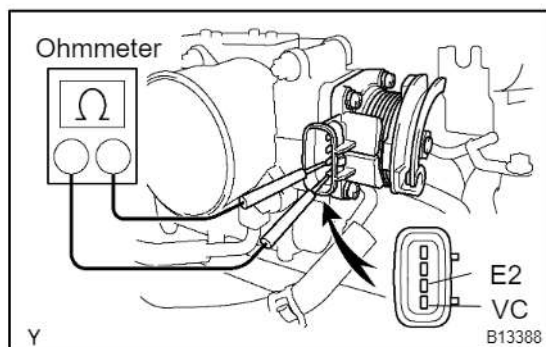
**3. INSPECT THROTTLE POSITION SENSOR**

- (a) Disconnect the throttle position sensor connector.
 (b) Using an ohmmeter, measure the resistance between terminals VC and E2.

Resistance: 1.2 - 3.2 k Ω at 20°C (68°F)

If the resistance is not as specified, replace the throttle body (See page [SF-33](#) and [SF-34](#)).

- (c) Reconnect the throttle position sensor connector.

**4. INSPECT ACCELERATOR PEDAL POSITION SENSOR**

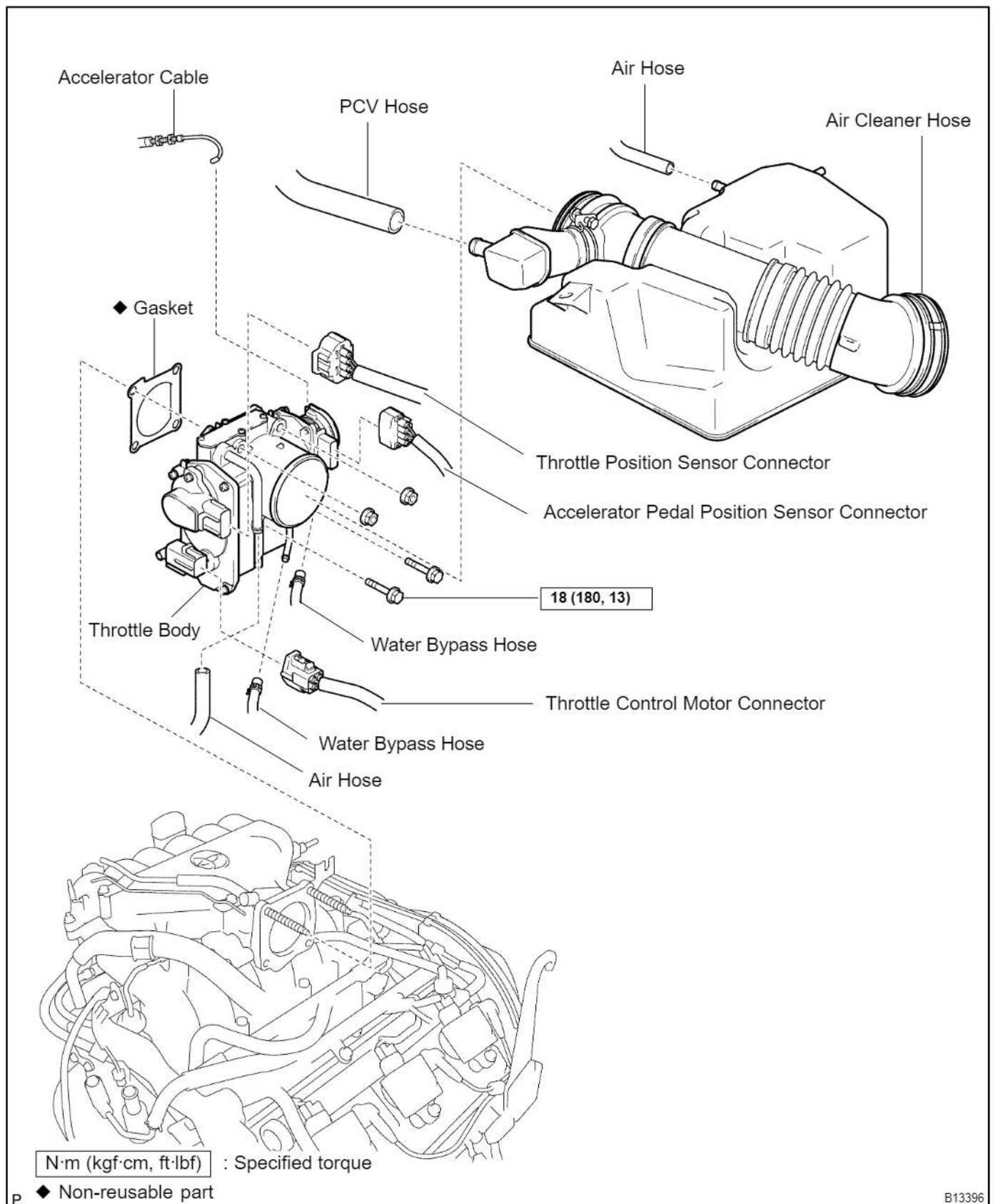
- (a) Disconnect the pedal position sensor connector.
 (b) Using an ohmmeter, measure the resistance between terminals VC and E2.

Resistance: 1.2 - 3.2 k Ω at 20°C (68°F)

If the resistance is not as specified, replace the throttle body (See page [SF-33](#) and [SF-34](#)).

- (c) Reconnect the pedal position sensor connector.

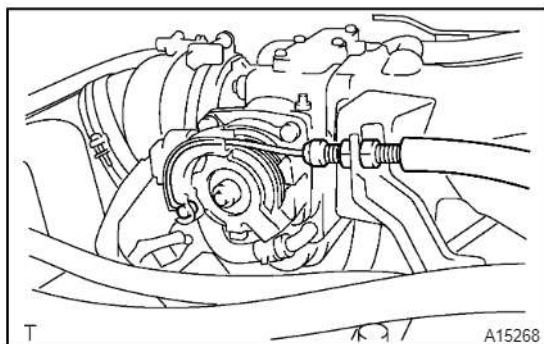
COMPONENTS



B13396

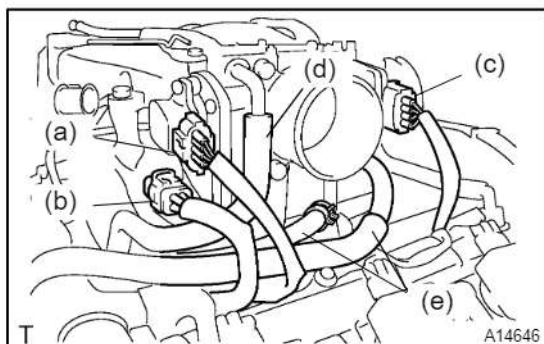
REMOVAL

1. DRAIN ENGINE COOLANT



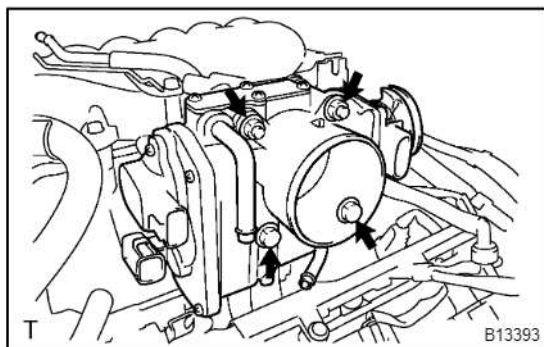
2. DISCONNECT ACCELERATOR CABLE FROM THROTTLE BODY

3. REMOVE AIR CLEANER HOSE

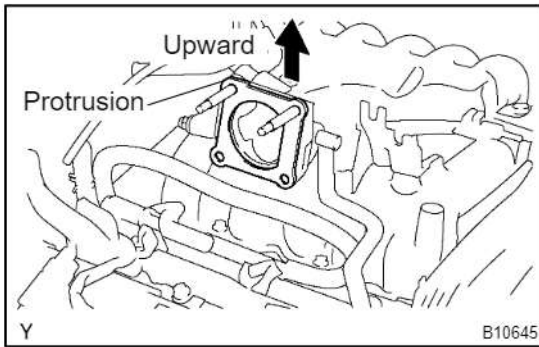


4. REMOVE THROTTLE BODY

- (a) Disconnect the throttle position sensor connector.
- (b) Disconnect the throttle control motor connector.
- (c) Disconnect the accelerator pedal position sensor connector.
- (d) Disconnect the air hose.
- (e) Disconnect the 2 water bypass hoses.



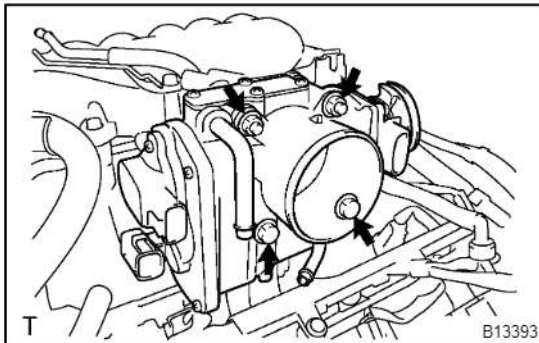
- (f) Remove the 2 bolts, 2 nuts, throttle body and gasket.



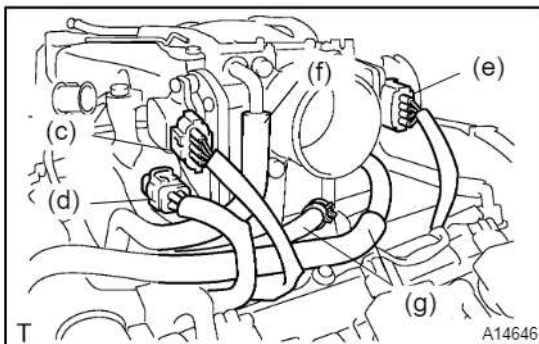
INSTALLATION

1. INSTALL THROTTLE BODY

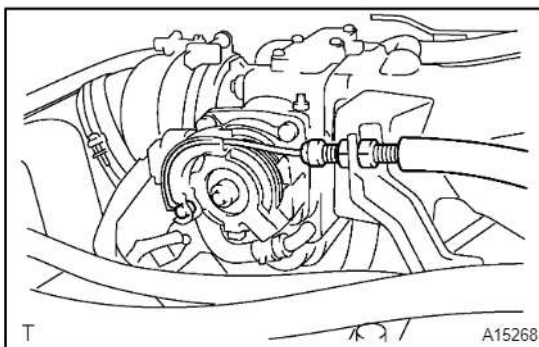
- (a) Place a new gasket on the air intake chamber facing the protrusion upward.



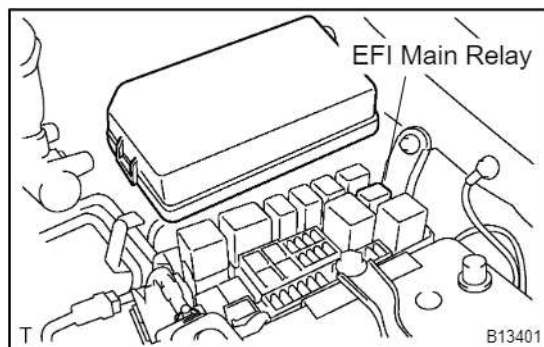
- (b) Install the throttle body with the 2 bolts and 2 nuts.
Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)



- (c) Connect the throttle position sensor connector.
- (d) Connect the throttle control motor connector.
- (e) Connect the accelerator pedal position sensor connector.
- (f) Connect the air hose.
- (g) Connect the 2 water bypass hoses.



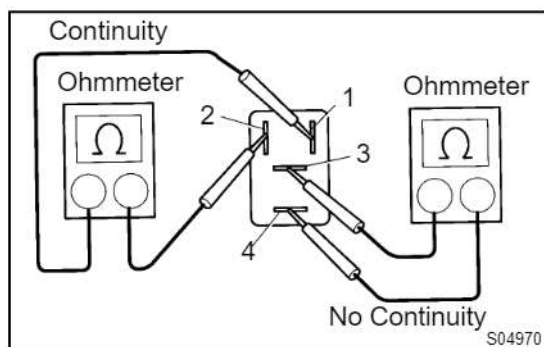
2. CONNECT ACCELERATOR CABLE TO THROTTLE BODY
3. INSTALL AIR CLEANER HOSE
4. FILL WITH ENGINE COOLANT
5. START ENGINE AND CHECK FOR COOLANT LEAKS



EFI MAIN RELAY INSPECTION

SF01B-05

1. REMOVE EFI MAIN RELAY (Marking: EFI)



2. INSPECT EFI MAIN RELAY

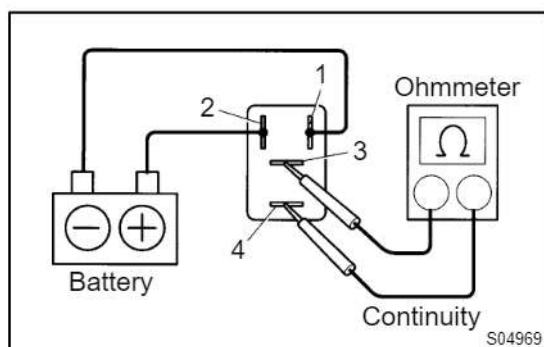
(a) Inspect the relay continuity.

- (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 4.

If there is continuity, replace the relay.



(b) Inspect the relay operation.

- (1) Apply battery positive voltage across terminals 1 and 2.

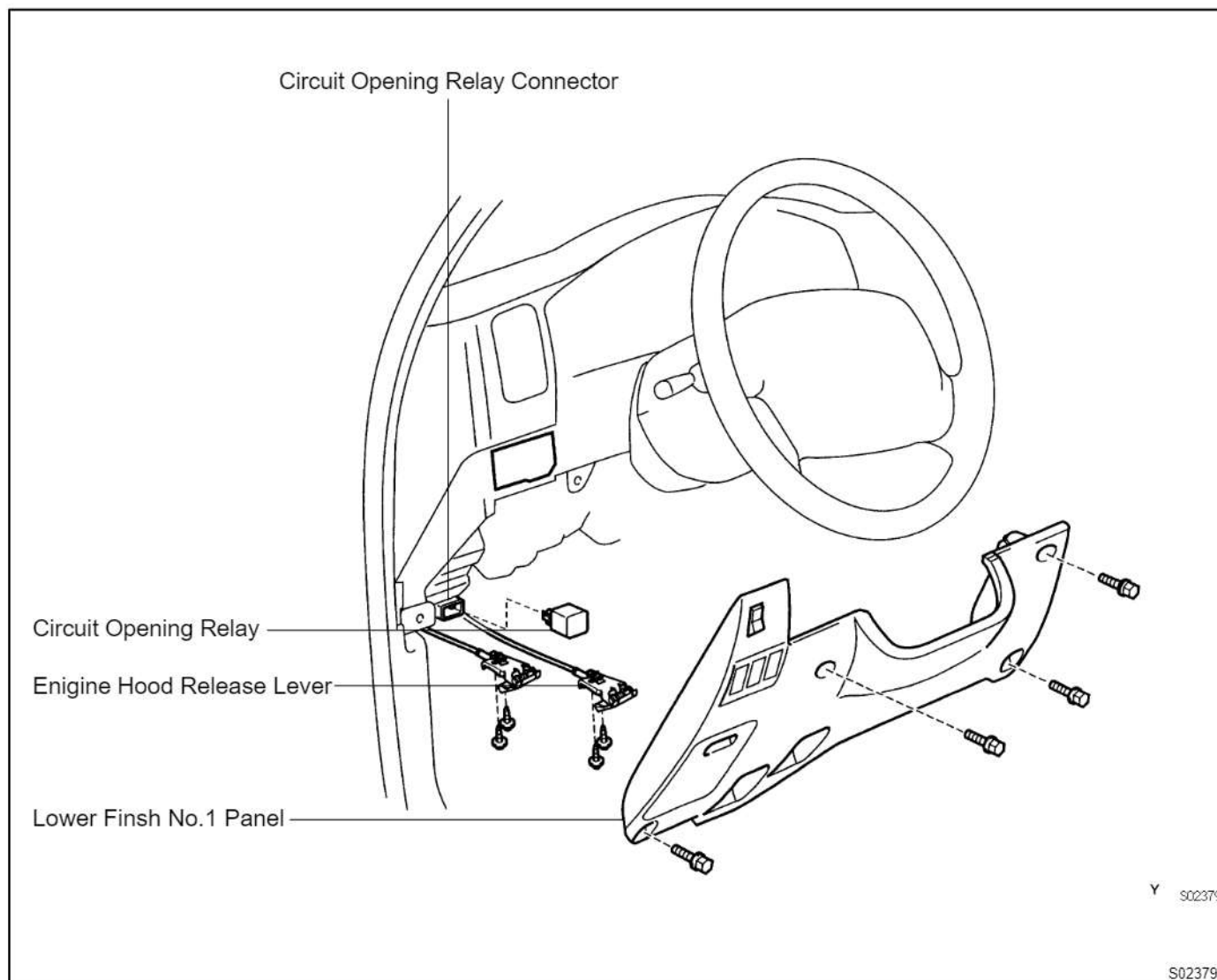
- (2) Using an ohmmeter, check that there is continuity between terminals 3 and 4.

If operation is not as specified, replace the relay.

3. REINSTALL EFI MAIN RELAY

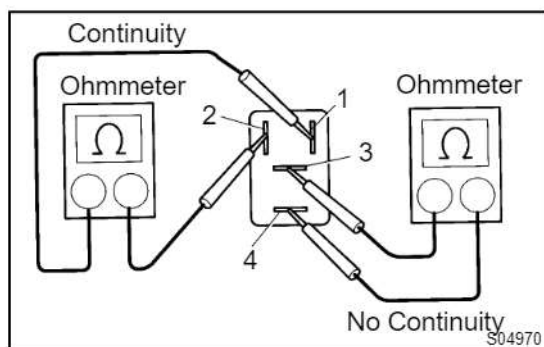
CIRCUIT OPENING RELAY COMPONENTS

SF01C-04



INSPECTION

1. REMOVE CIRCUIT OPENING RELAY



2. INSPECT CIRCUIT OPENING RELAY

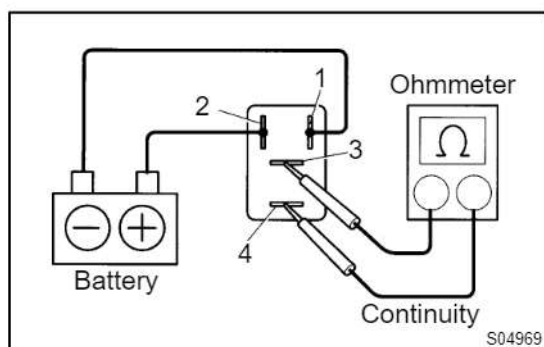
(a) Inspect the relay continuity.

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

If there no continuity, replace the relay.

- (2) Check that there is no continuity between terminals 3 and 4.

If there continuity, replace the relay.



(b) Inspect the relay operation.

- (1) Apply battery positive voltage across terminals 1 and 2.

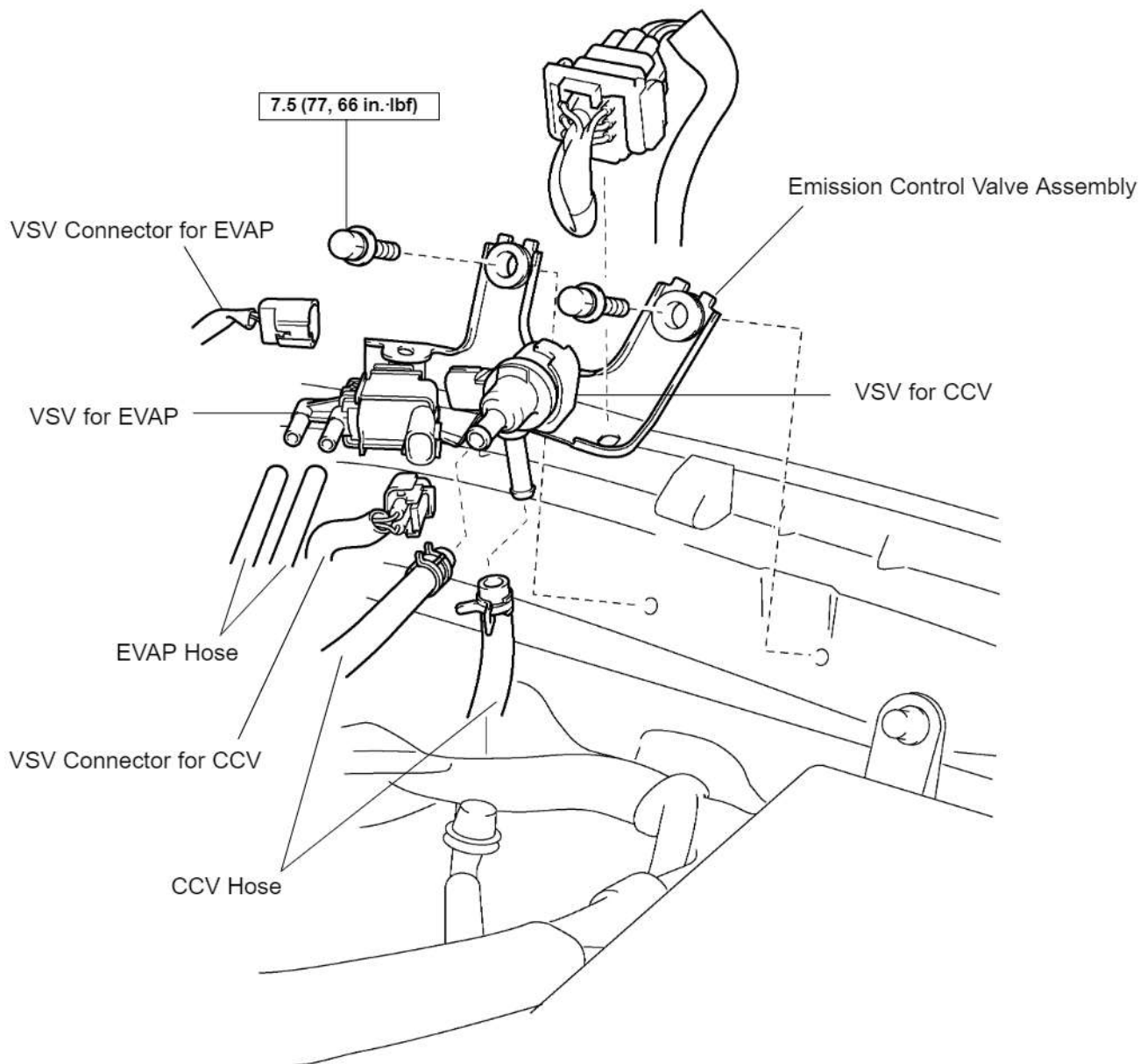
- (2) Using an ohmmeter, check that there is continuity between terminals 3 and 4.

If operation is not as specified, replace the relay.

3. REINSTALL CIRCUIT OPENING RELAY

VSV FOR EVAPORATIVE EMISSION (EVAP) COMPONENTS

SF1WY-01

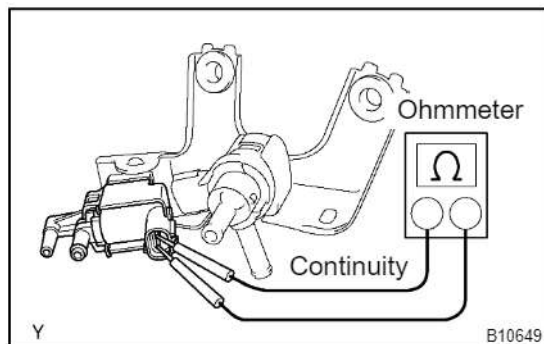


$\text{N}\cdot\text{m}$ (kgf·cm, ft·lbf) : Specified torque

B13435

INSPECTION

1. REMOVE VSV

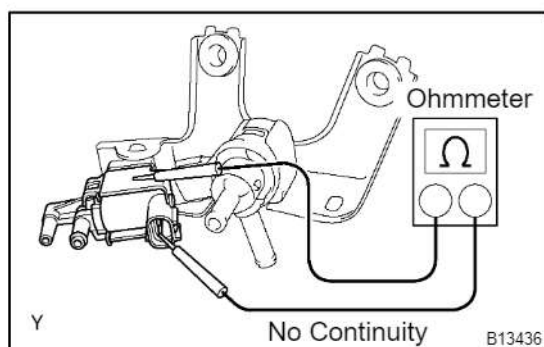


2. INSPECT VSV

- (a) Inspect the VSV for open circuit.
Using an ohmmeter, check that there is continuity between the terminals.

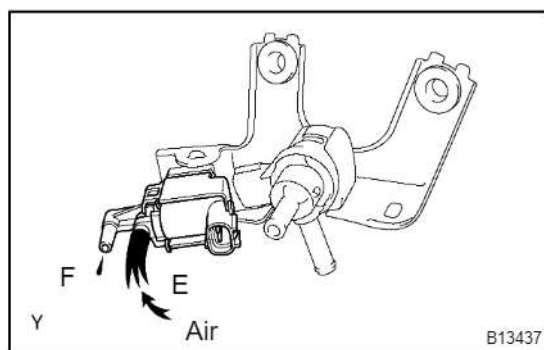
Resistance: 30 - 34 Ω at 20°C (68°F)

If there is no continuity, replace the VSV.

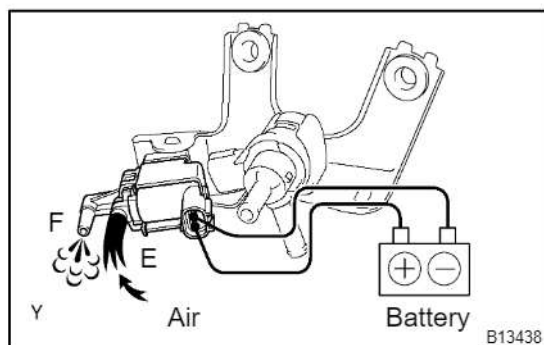


- (b) Inspect VSV for ground.
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



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



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

- (3) Check that air flows from port E to port F.

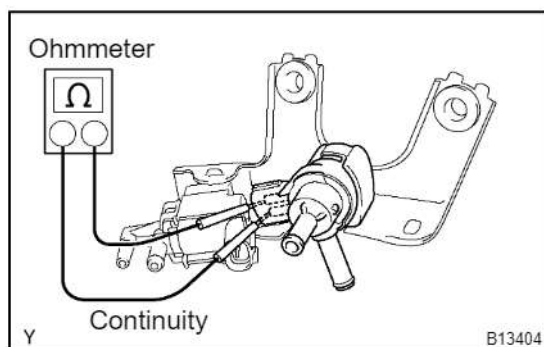
If operation is not as specified, replace the VSV.

3. REINSTALL VSV

VSV FOR CANISTER CLOSED VALVE (CCV) INSPECTION

SF14A-03

1. REMOVE VSV (See page SF-38)



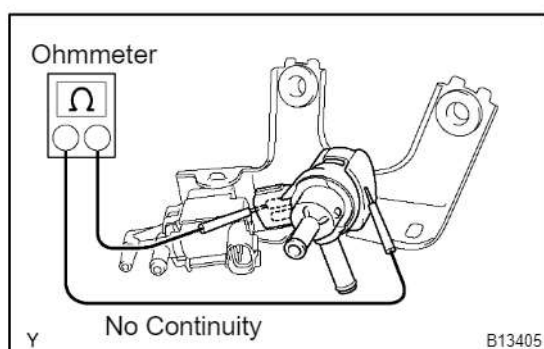
2. INSPECT VSV FOR OPEN CIRCUIT

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

Resistance:

At 20°C (68°F)	25 - 30 Ω
At 120°C (248°F)	33 - 42 Ω

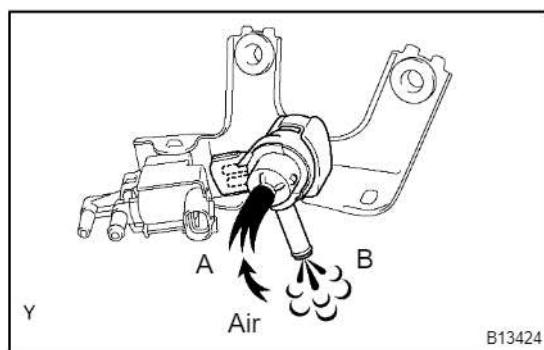
If there is no continuity, replace the VSV.



3. INSPECT VSV FOR GROUND

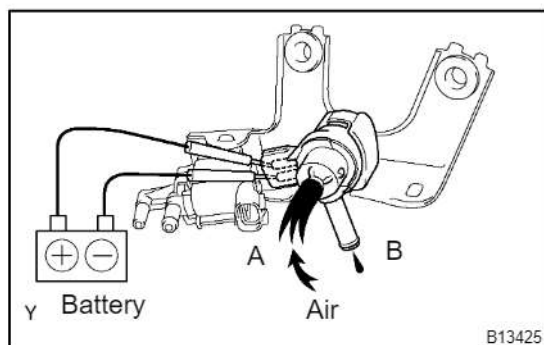
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



4. INSPECT VSV OPERATION

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



(b) Apply battery positive voltage across the terminals.

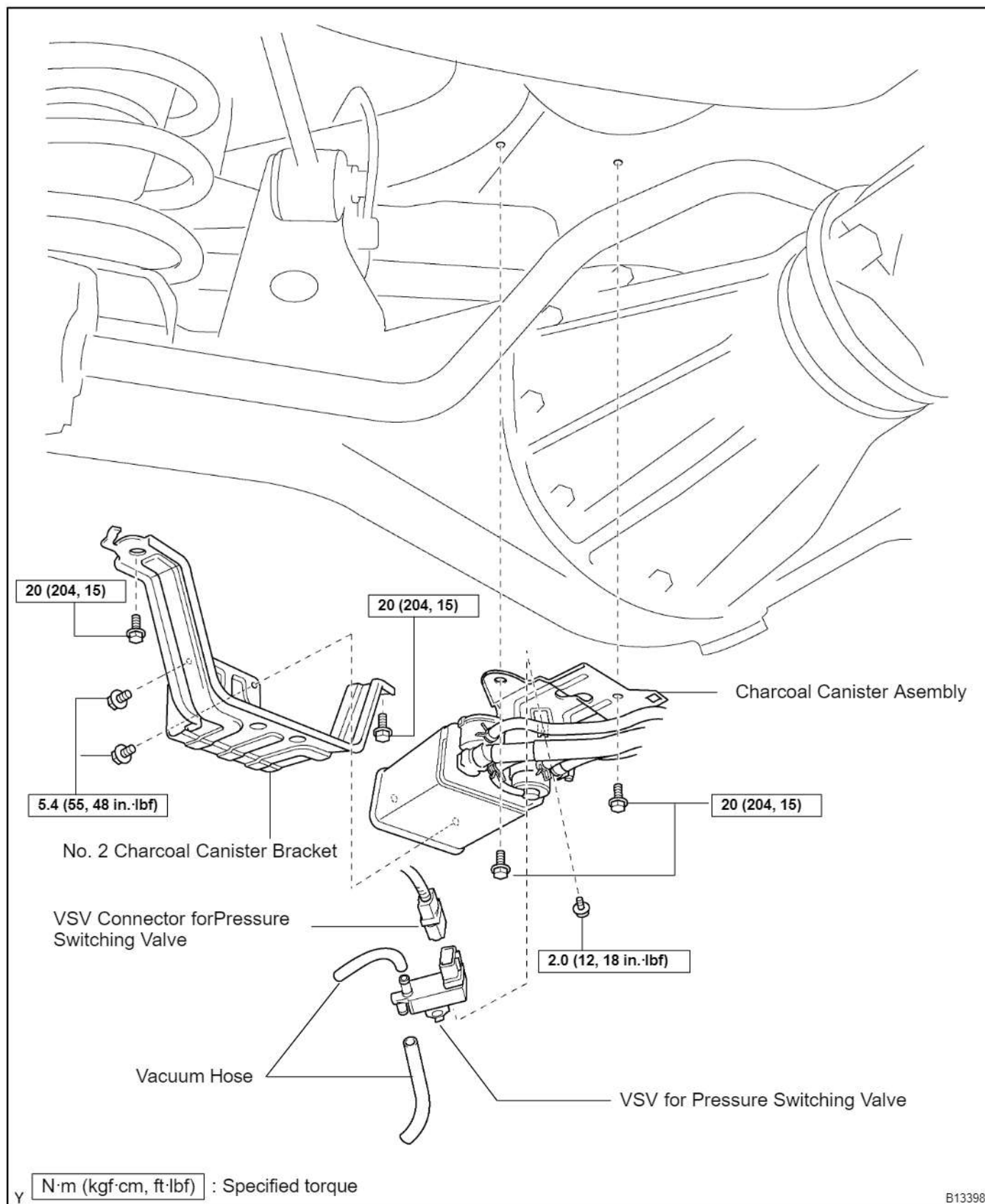
(c) Check that air does not flow from ports A to B.

If operation is not as specified, replace the VSV.

5. REINSTALL VSV

VSV FOR PRESSURE SWITCHING VALVE COMPONENTS

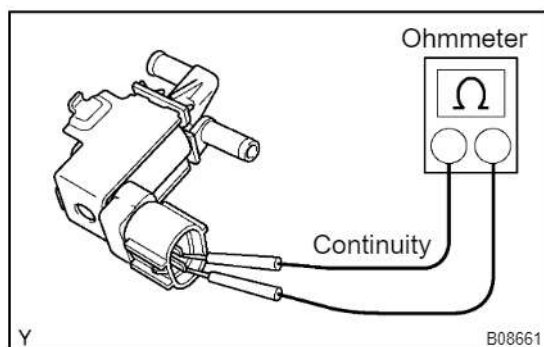
SF147-03



B13398

INSPECTION

1. REMOVE VSV



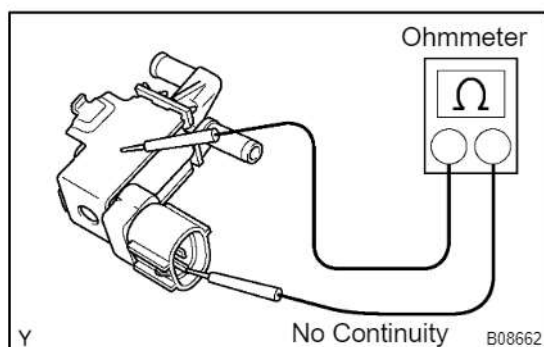
2. INSPECT VSV FOR OPEN CIRCUIT

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

Resistance:

At 20°C (68°F)	37 - 44 Ω
At 120°C (248°F)	51 - 62 Ω

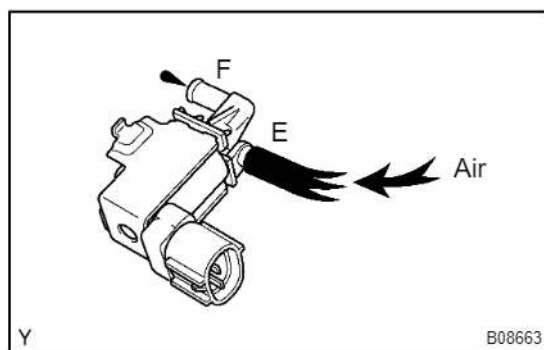
If there is no continuity, replace the VSV.



3. INSPECT VSV FOR GROUND

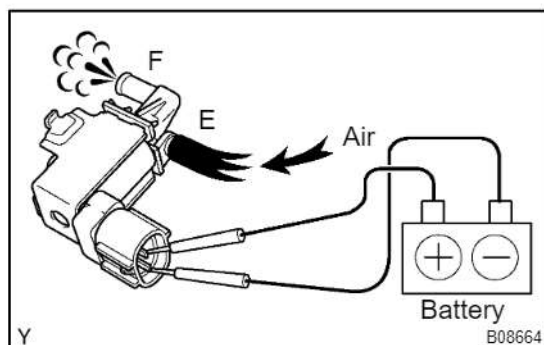
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



4. INSPECT VSV OPERATION

- (a) Check that air does not flow from ports E to F.



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

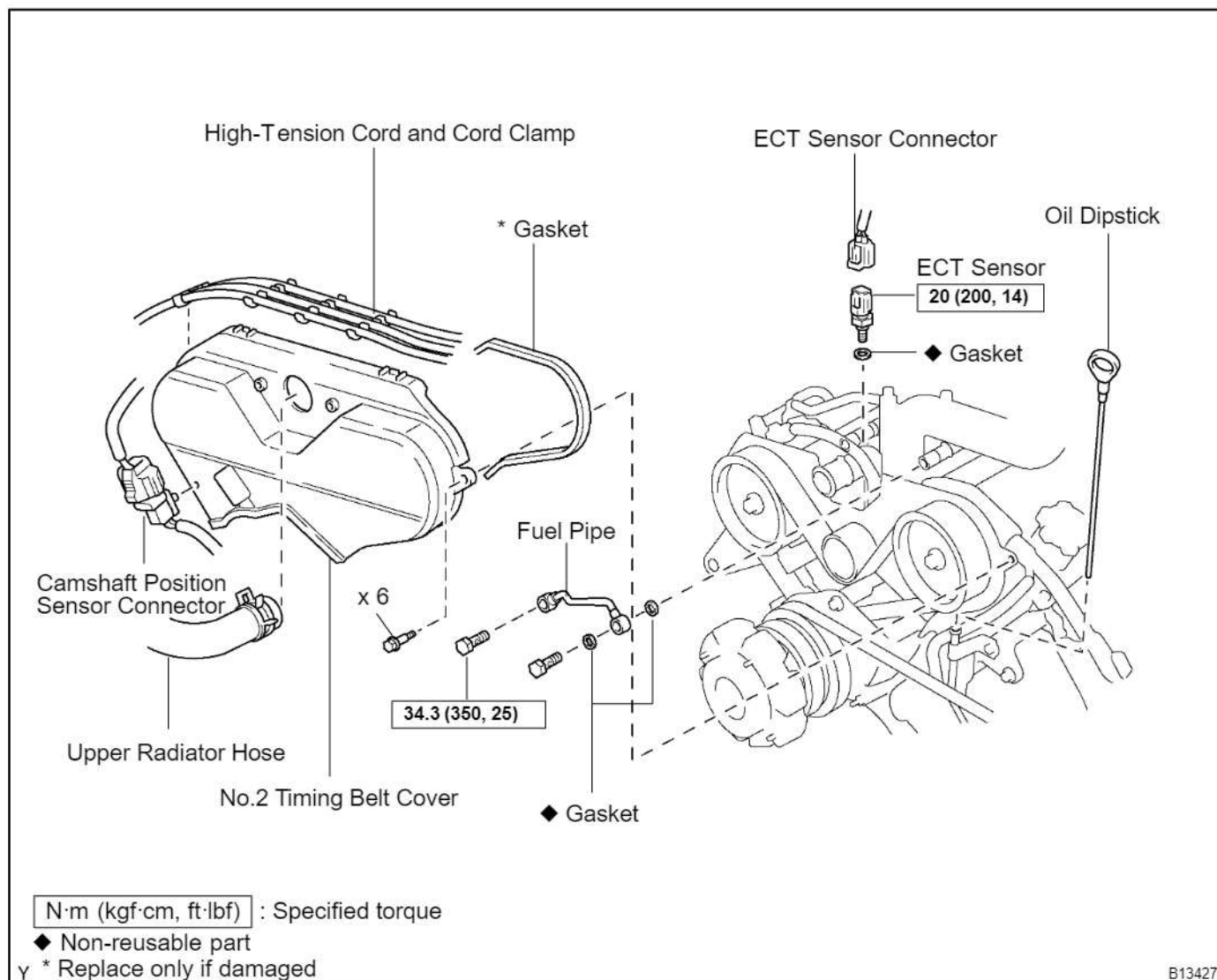
- (c) Check that air flows from ports E to F.

If operation is not as specified, replace the VSV.

5. REINSTALL VSV

ENGINE COOLANT TEMPERATURE (ECT) SENSOR COMPONENTS

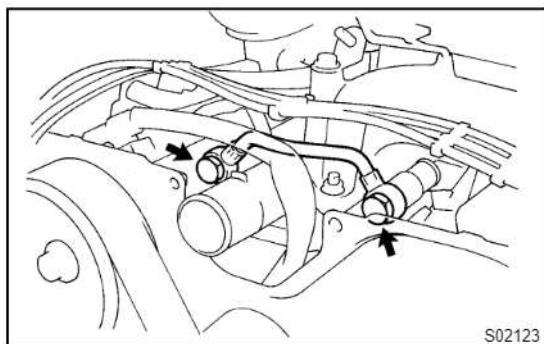
SF02M-05



B13427

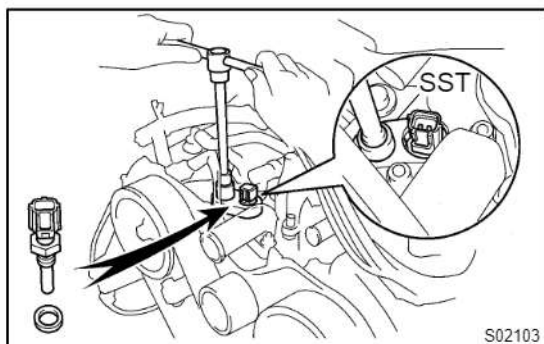
INSPECTION

1. DRAIN ENGINE COOLANT
2. DISCONNECT UPPER RADIATOR HOSE FROM WATER OUTLET
3. REMOVE NO.2 TIMING BELT COVER (See page [EM-13](#))



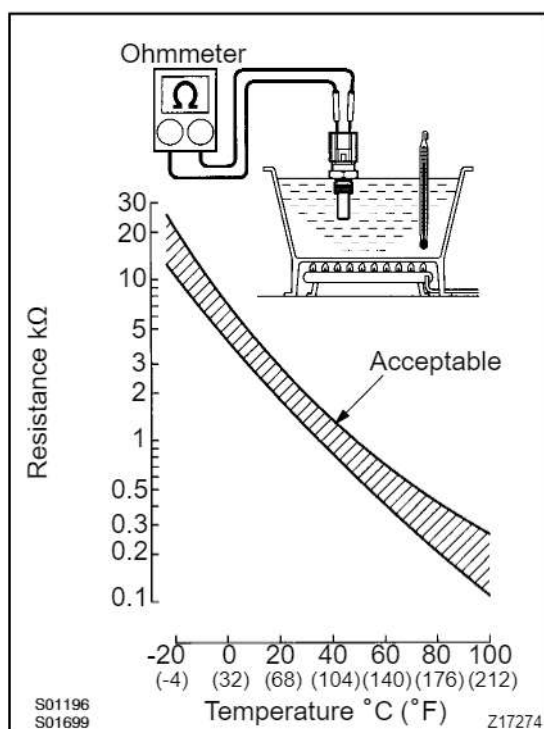
4. REMOVE FUEL PIPE

Remove the 2 union bolts, 4 gaskets and fuel pipe.



5. REMOVE ECT SENSOR

- (a) Disconnect the ECT sensor connector.
- (b) Using SST, remove the ECT sensor and gasket.
SST 09205-76030



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 to the ECT sensor.
- (b) Using SST, install the ECT sensor.
SST 09205-76030

Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

- (c) Connect the ECT sensor connector.

8. REINSTALL FUEL PIPE

Install the fuel pipe with 4 new gaskets and the 2 union bolts.

Torque: 34.3 N·m (350 kgf·cm, 25 ft·lbf)

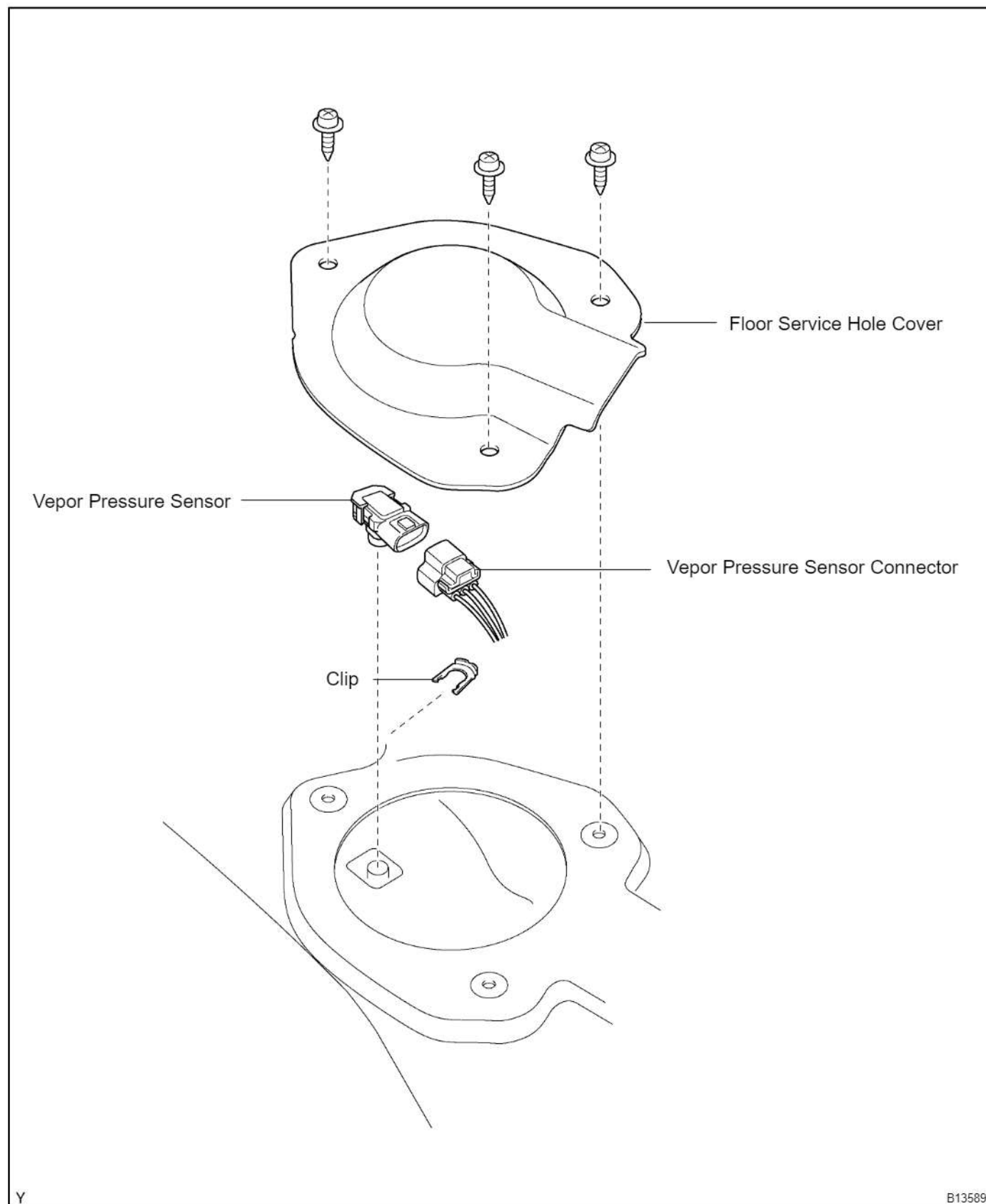
9. REINSTALL NO.2 TIMING BELT COVER (See page [EM-19](#))

10. RECONNECT UPPER RADIATOR HOSE TO WATER OUTLET

11. REFILL WITH ENGINE COOLANT

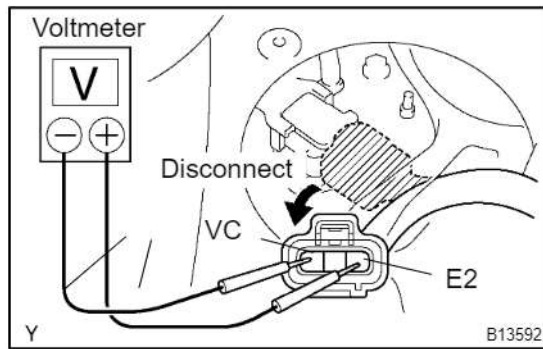
VAPOR PRESSURE SENSOR COMPONENTS

SF100-01



Y

B13589



INSPECTION

1. INSPECT POWER SOURCE VOLTAGE OF VAPOR PRESSURE SENSOR

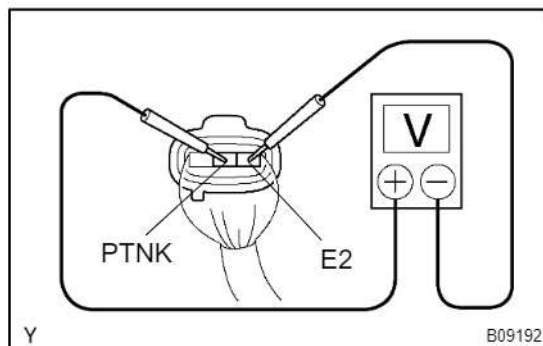
- Disconnect the vapor pressure sensor connector.
- Turn the ignition switch ON.
- Using a voltmeter, measure the voltage between connector terminals VC and E2 of the wiring harness side.

Voltage: 4.5 - 5.5 V

- Turn the ignition switch OFF.
- Reconnect the vapor pressure sensor connector.

2. INSPECT POWER OUTPUT OF VAPOR PRESSURE SENSOR

- Turn the ignition switch ON.
- Remove the fuel tank cap.



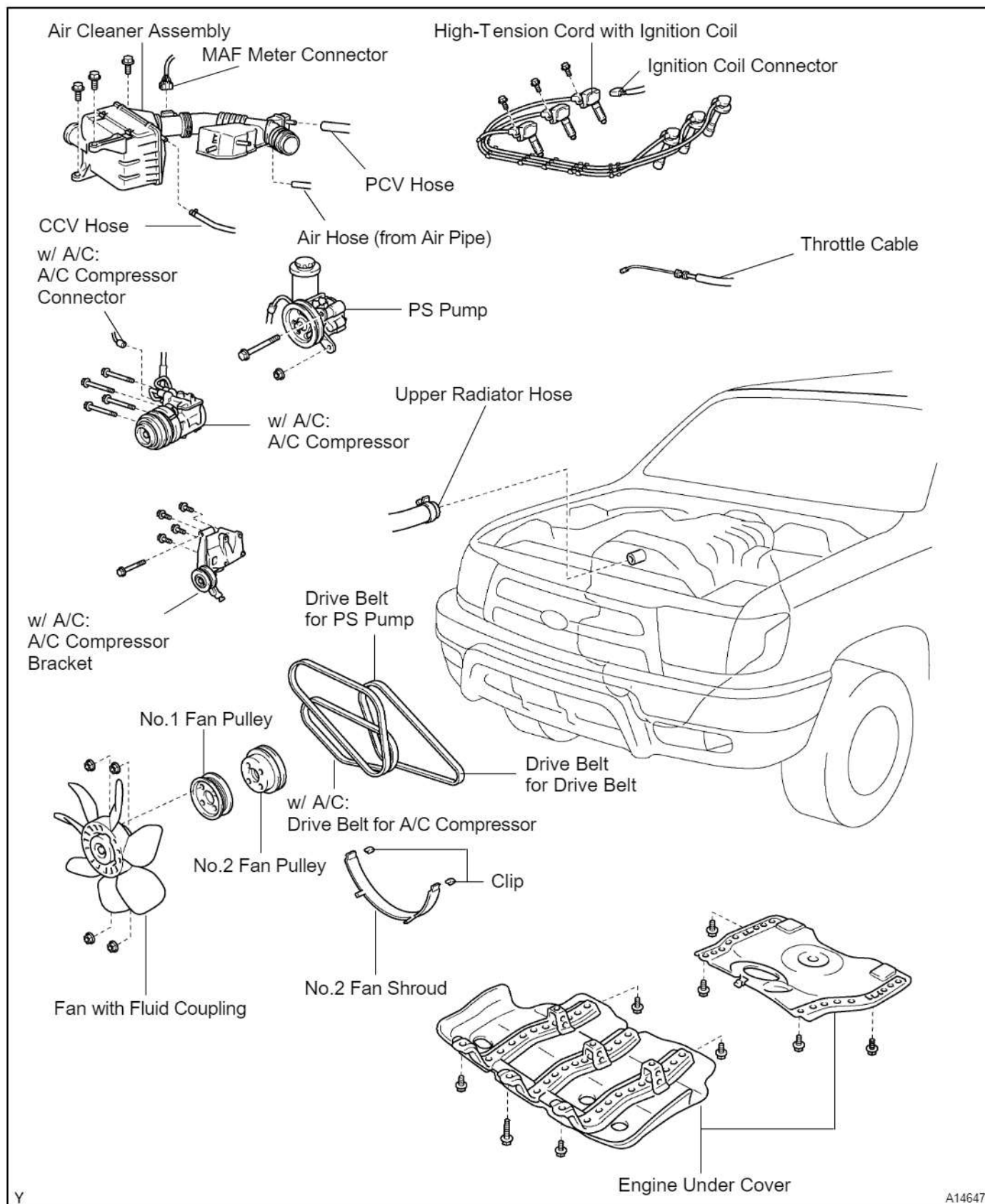
- Connect a voltmeter to terminals PTNK and E2, and measure the output voltage.

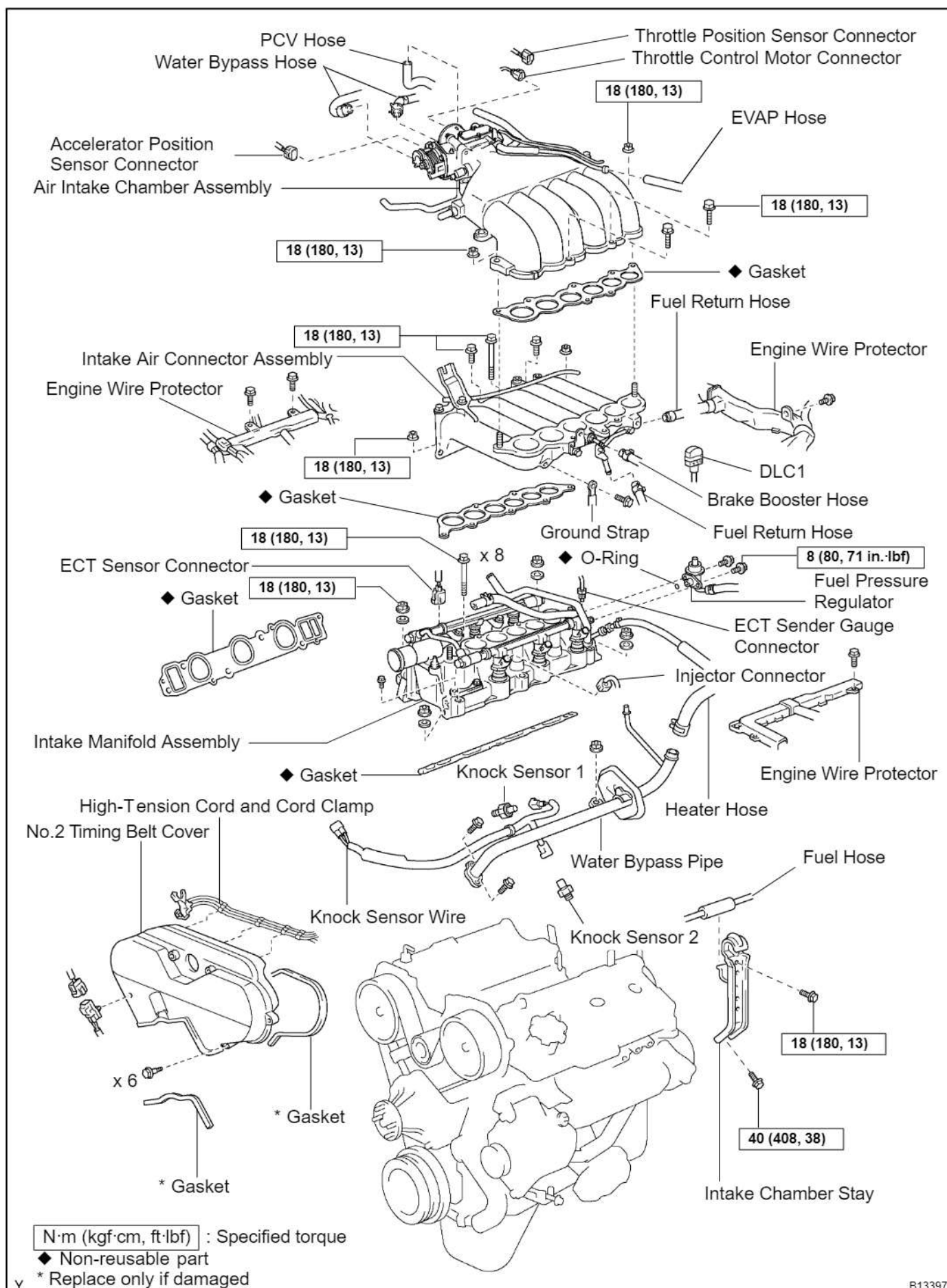
Voltage: 3.0 - 3.6 V

- Reinstall the fuel tank cap.

KNOCK SENSOR COMPONENTS

SF02P-04

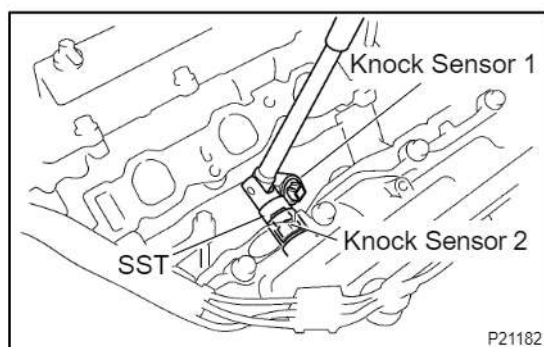




B13397

INSPECTION

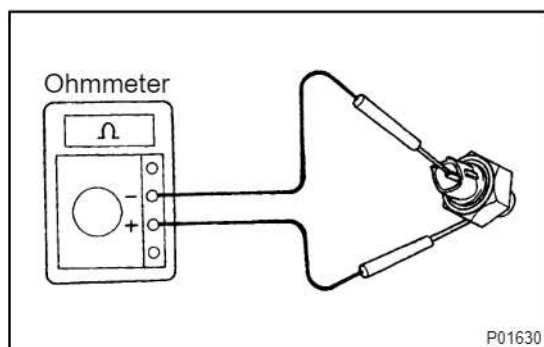
1. DRAIN ENGINE COOLANT
2. REMOVE AIR CLEANER HOSE
3. REMOVE NO.2 TIMING BELT COVER (See page [EM-13](#))
4. REMOVE INTAKE AIR CONNECTOR ASSEMBLY (See page [EM-65](#))
5. REMOVE FUEL PRESSURE REGULATOR (See page [SF-16](#))
6. REMOVE INTAKE MANIFOLD ASSEMBLY (See page [EM-29](#))
7. REMOVE WATER BYPASS PIPE AND KNOCK SENSOR WIRE (See page [EM-29](#))



8. REMOVE KNOCK SENSORS

Using SST, remove the knock sensor.

SST 09817-1601 1



9. INSPECT KNOCK SENSORS

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

If there is continuity, replace the sensor.

10. INSTALL KNOCK SENSORS

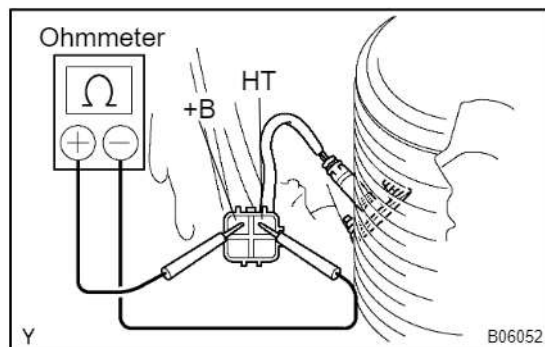
Using SST, install the knock sensor.

SST 09817-1601 1

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

11. REINSTALL WATER BYPASS PIPE AND KNOCK SENSOR WIRE (See page [EM-29](#))
12. REINSTALL INTAKE MANIFOLD ASSEMBLY (See page [EM-29](#))
13. REINSTALL FUEL PRESSURE REGULATOR (See page [SF-17](#))
14. REINSTALL INTAKE AIR CONNECTOR ASSEMBLY (See page [SF-17](#))
15. REINSTALL NO.2 TIMING BELT COVER (See page [EM-19](#))

16. REINSTALL AIR CLEANER HOSE
17. FILL WITH ENGINE COOLANT
18. CHECK ENGINE COOLANT LEVEL



AIR-FUEL RATIO (A/F) SENSOR INSPECTION

SF15E-03

1. INSPECT HEATER RESISTANCE OF A/F SENSOR

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

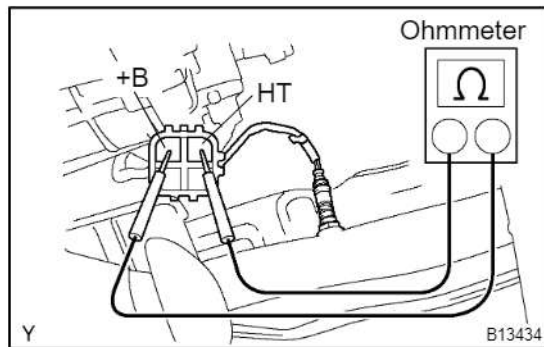
Resistance:

At 20°C (68°F)	0.8 - 1.4 Ω
At 800°C (1,472°F)	1.8 - 3.2 Ω

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

Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

- Reconnect the A/F sensor connector.
- ### 2. INSPECT OPERATION OF A/F SENSOR (See page [DI-122](#))



HEATED OXYGEN SENSOR (Bank 1 Sensor 2)

INSPECTION

SF15G-03

1. INSPECT HEATER RESISTANCE OF HEATED OXYGEN SENSOR

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

Resistance:

At 20°C (68°F)	11 - 16 Ω
At 800°C (1,472°F)	23 - 32 Ω

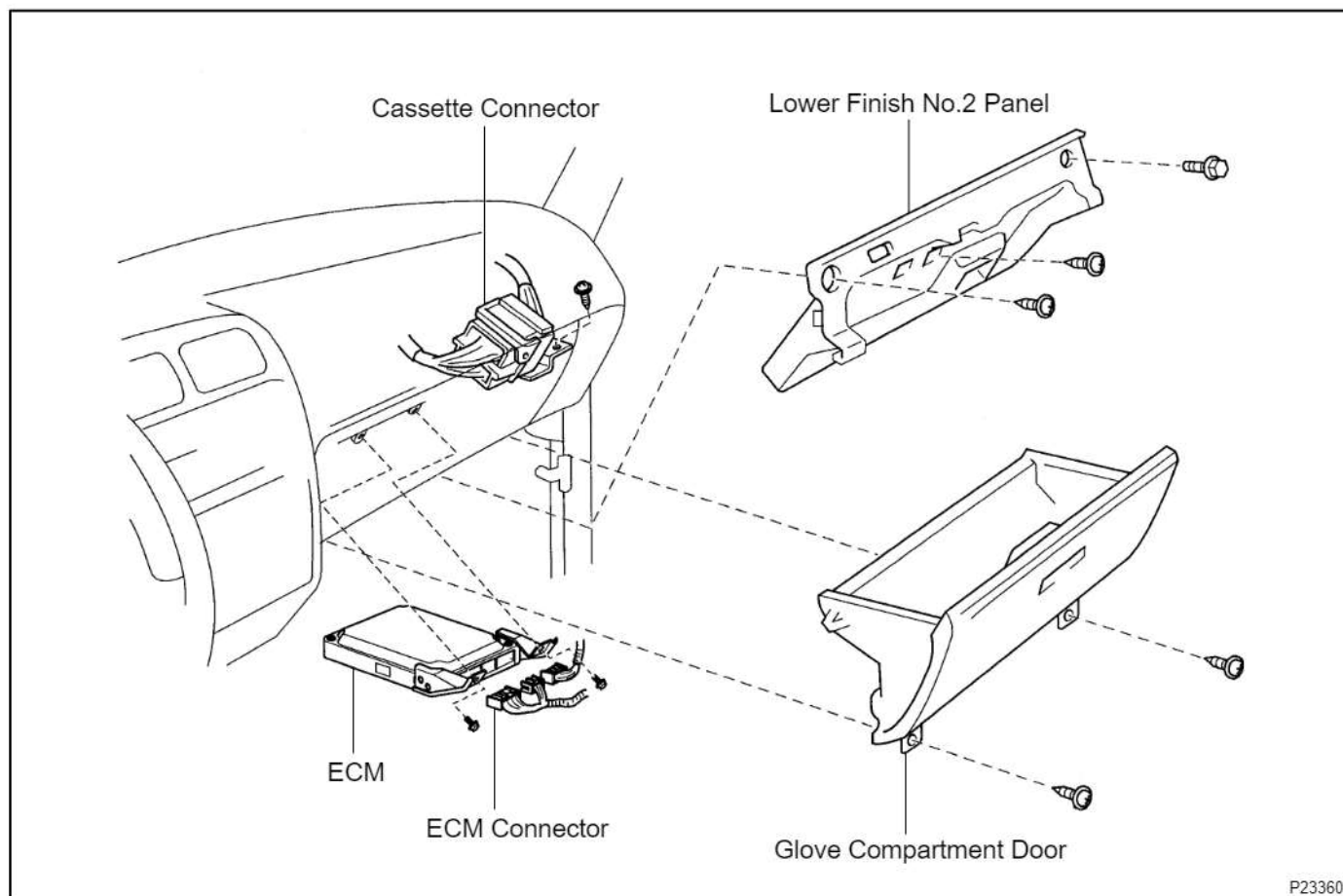
If the resistance is not as specified, replace the sensor.

Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

- Reconnect the oxygen sensor connector.
- #### 2. INSPECT OPERATION OF HEATED OXYGEN SENSOR (See page [DI-48](#))

ENGINE CONTROL MODULE (ECM) COMPONENTS

SF02S-03



INSPECTION

1. REMOVE ECM
2. INSPECT ECM (See page [DI-18](#))
3. REINSTALL ECM

FUEL CUT RPM INSPECTION

SF08X-03

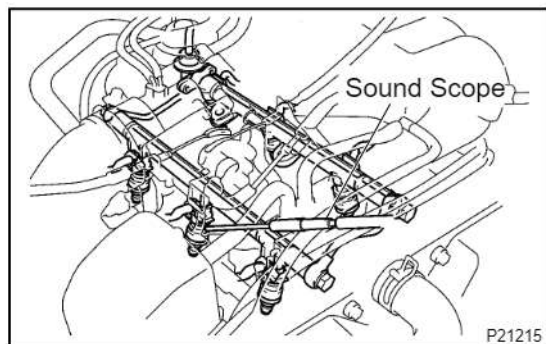
1. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

2. CONNECT TOYOTA HAND-HELD TESTER OR OBDII SCAN TOOL (See page SF-7)

3. INSPECT FUEL CUT OFF RPM

(a) Increase the engine speed to at least 3,500 rpm.



(b) Use a sound scope to check for injector operating noise.

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

HINT:

Measure with the A/C OFF.

Fuel return rpm: 1,500 rpm

(Vehicle speed less than 25 km/h (16 mph), with brake OFF)

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