

SFI SYSTEM PRECAUTION

SF004-03

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

HINT:

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

Therefore, if necessary, read the diagnosis before removing the terminal.

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) In event of engine misfire, these precautions should be taken.
 - (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) Precautions when handling oxygen sensor.
 - (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 allow air suction and cause the engine to run out of tune.

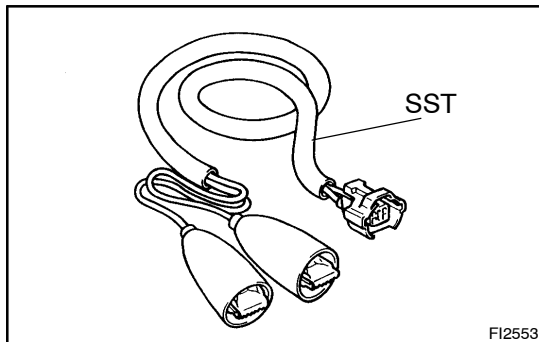
7. **ELECTRONIC CONTROL SYSTEM**

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

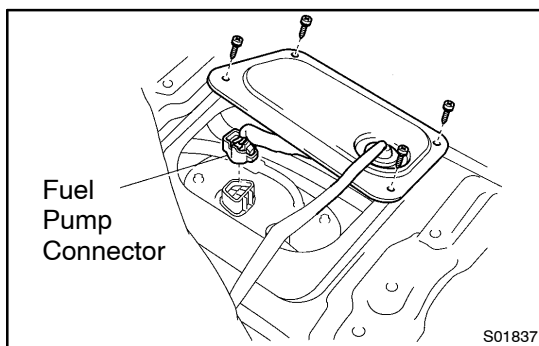
HINT:

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 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 cause further troubles.
- (e) Do not open the ECM cover.
- (f) When inspecting during rainy weather, take care to prevent entry of water. Also, when washing the engine compartment, prevent water from getting 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.
- (i) Release the lock and pull out the connector, pulling on the connectors.
- (j) Fully insert the connector and check that it is locked.



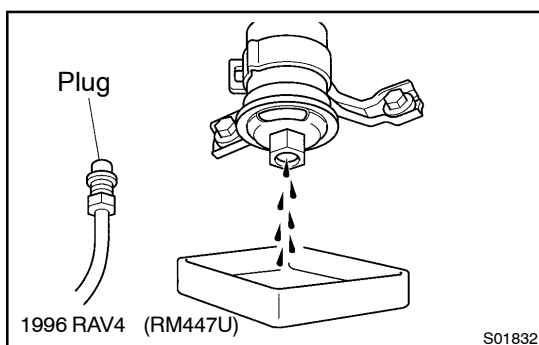
- (k) Use SST for inspection or test of the injector or its wiring connector.
SST 09842-30070



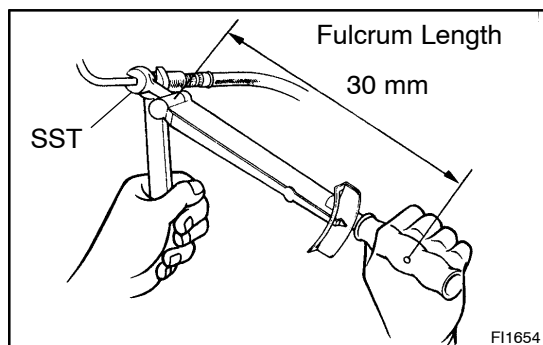
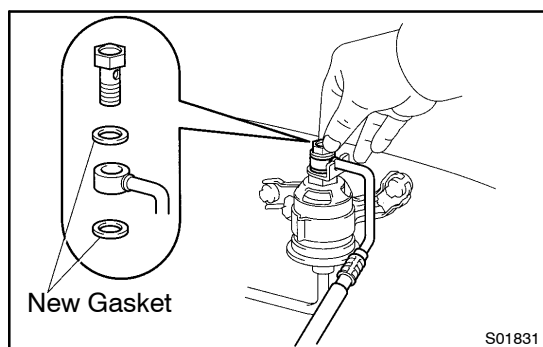
8. FUEL SYSTEM

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

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



- (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 flare nut or union bolt on the high pressure pipe union, observe the following procedures:

- (1) Union Bolt Type:
Always use 2 new gaskets.
- (2) Union Bolt Type:
Tighten the union bolt by hand.
- (3) Union Bolt Type:
Tighten the union bolt to the specified torque.

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

- (4) Flare Nut Type:
Apply a light coat of engine oil to the flare nut, and tighten the flare nut by hand.

- (5) Flare Nut Type:
Using SST, tighten the flare nut to specified torque.

SST 09631-22020

NOTICE:

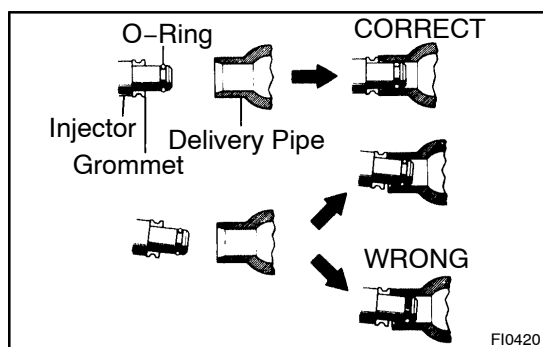
Do not rotate the fuel pipe, when tightening the flare nut.

Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

28 N·m (285 kgf·cm, 21 ft·lbf) for SST

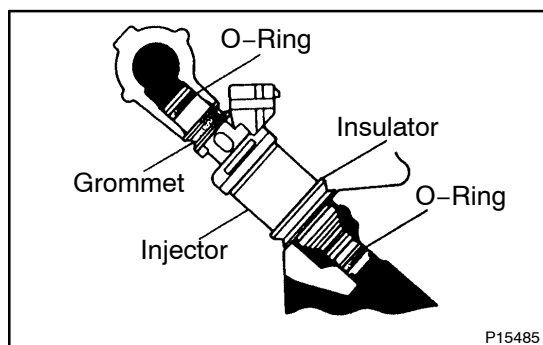
HINT:

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

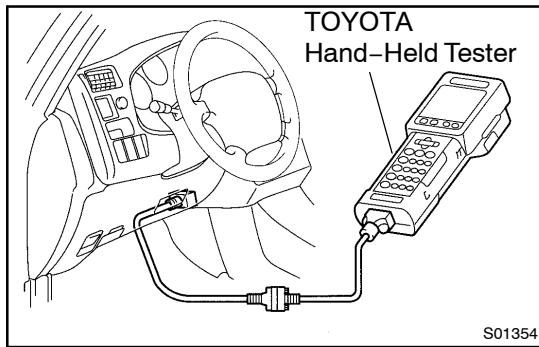


(c) Observe the following precautions when removing and installing the injectors.

- (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.



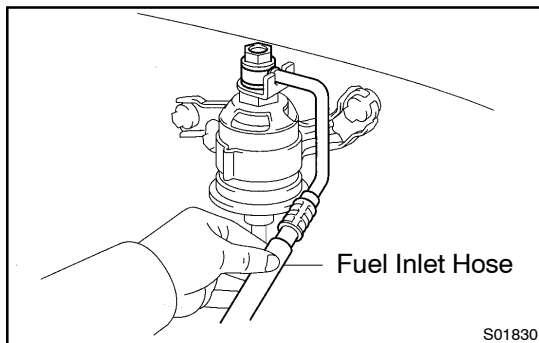
- (4) Install the injector to the delivery pipe and intake manifold as shown in the illustration.



- (d) Check that there are no fuel leaks after performing maintenance anywhere on the fuel system.
- (1) Connect the TOYOTA hand-held tester to the DLC3.
 - (2) Turn the 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-5](#)).



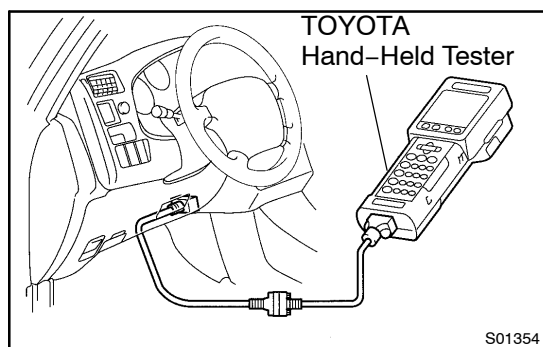
- (6) Pinch the fuel inlet hose.
The pressure in the high pressure line will rise to approx. 400 kPa (4 kgf/cm², 57 psi). In this state, check that there are no leaks from any part of the fuel system.

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

- (7) Turn the ignition switch to LOCK.
- (8) Disconnect the TOYOTA hand-held tester from the DLC3.
- (9) Start the engine.

NOTICE:**Keep cranking the engine until the air is removed from the fuel line.**

- (10) After the engine starts, check again that there are no fuel leaks.



FUEL PUMP

ON-VEHICLE INSPECTION

SF0Q5-03

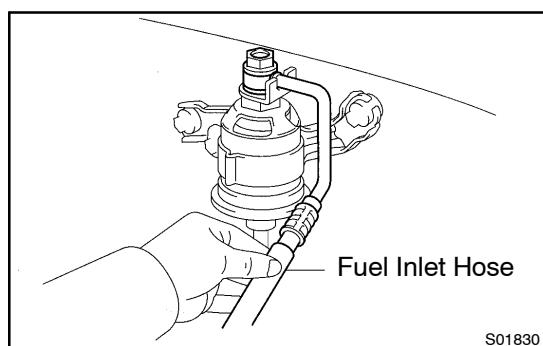
1. CHECK FUEL PUMP OPERATION

- Connect the TOYOTA hand-held tester to the DLC3.
- Turn the ignition switch ON and TOYOTA hand-held tester main switch ON.

NOTICE:

Do not start the engine.

- Select the active test mode on the TOYOTA hand-held tester.
- Please refer to the TOYOTA hand-held tester operator's manual for further details.
- 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-5](#)).



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

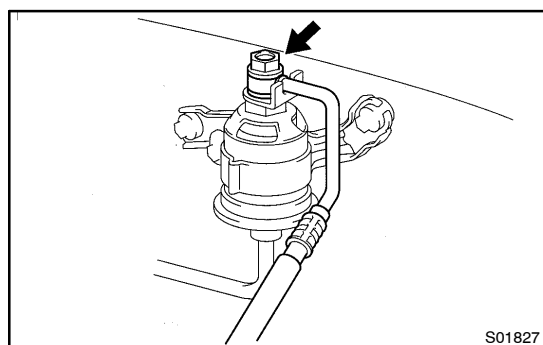
HINT:

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

- Turn the ignition switch to LOCK.
- Disconnect the TOYOTA hand-held tester from the DLC3.

2. CHECK FUEL PRESSURE

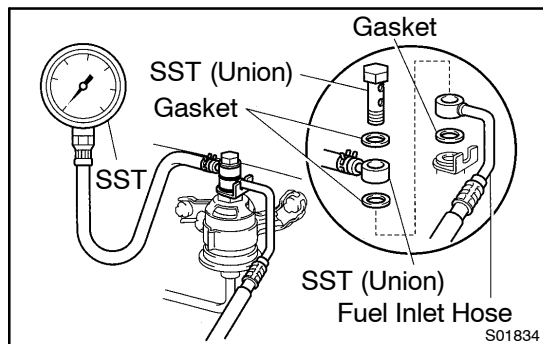
- Check the battery positive voltage is above 12 V.
- Disconnect the negative (-) terminal cable from the battery.
- Remove the air cleaner assembly (See page [ST-4](#)).
- Remove the 2 bolts, and disconnect the engine compartment R/B No.2 from the bracket on the body.



- Remove the union bolt and 2 gaskets, and disconnect the fuel inlet hose from the fuel filter outlet.

CAUTION:

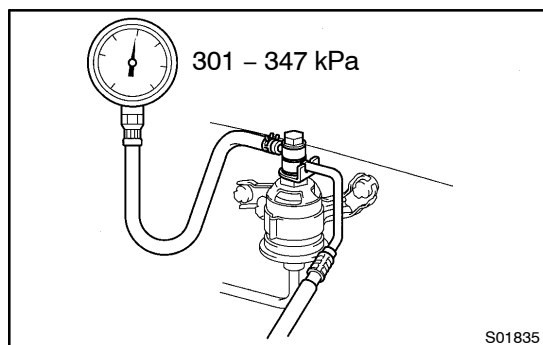
Put a shop towel under the fuel filter. Slowly loosen the union bolt.



- (f) Install the fuel inlet hose and SST (pressure gauge) to the fuel filter outlet with the 3 gaskets and SST (union bolt).
SST 09268-45012

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

- (g) Wipe off any splattered gasoline.
(h) Connect the TOYOTA hand-held tester to the DLC3.
(i) Reconnect the negative (-) terminal cable to the battery.
(j) Turn the ignition switch ON.



- (k) Measure the fuel pressure.

Fuel pressure:

301 - 347 kPa (3.1 - 3.5 kgf/cm², 44 - 50 psi)

If pressure is high, replace the fuel pressure regulator.

If pressure is low, check these parts:

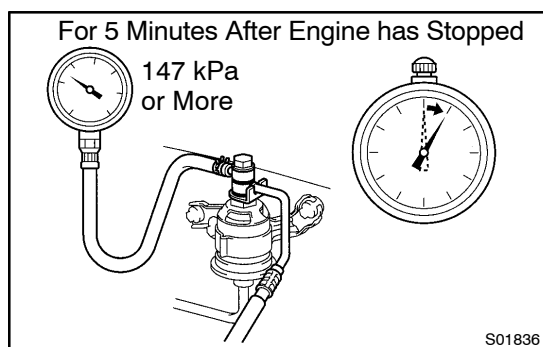
- Fuel hoses and connections
- Fuel pump
- Fuel filter
- Fuel pressure regulator

- (l) Remove the TOYOTA hand-held tester from the DLC3.
(m) Start the engine.
(n) Measure the fuel pressure at idle.

Fuel pressure:

301 - 347 kPa (3.1 - 3.5 kgf/cm², 44 - 50 psi)

- (o) Stop the engine.



- (p) 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.

- (q) 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

- (r) Reconnect the fuel inlet hose with 2 new gaskets and the union bolt.

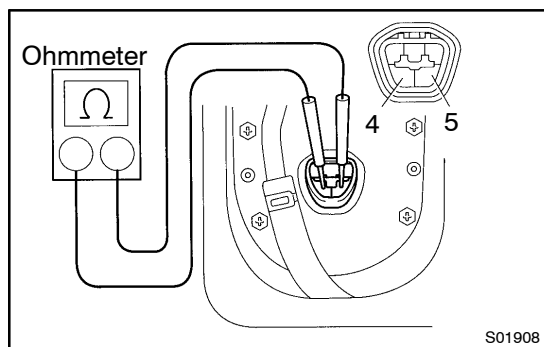
Torque: 29 N·m (300 kgf·cm, 21 ft·lbf)

- (s) Reconnect the negative (-) terminal cable to the battery.
(t) Check for fuel leakage (See page [SF-1](#)).
(u) Reinstall the engine compartment R/B No.2 and air cleaner assembly.

3. CHECK FUEL PUMP

- (a) Remove the LH rear seat assembly.
(b) Remove the floor service hole cover.

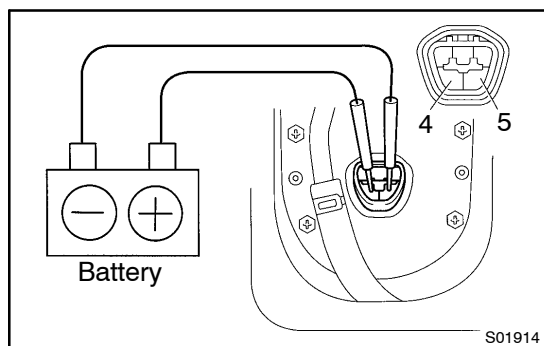
- (c) Disconnect the fuel pump and sender gauge connector.



- (d) Inspect the fuel pump resistance.
Using an ohmmeter, measure the resistance between terminals 4 and 5.

Resistance: At 20° C (68° F): 0.2 – 3.0 Ω

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



- (e) Inspect the fuel pump operation.
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 operates.

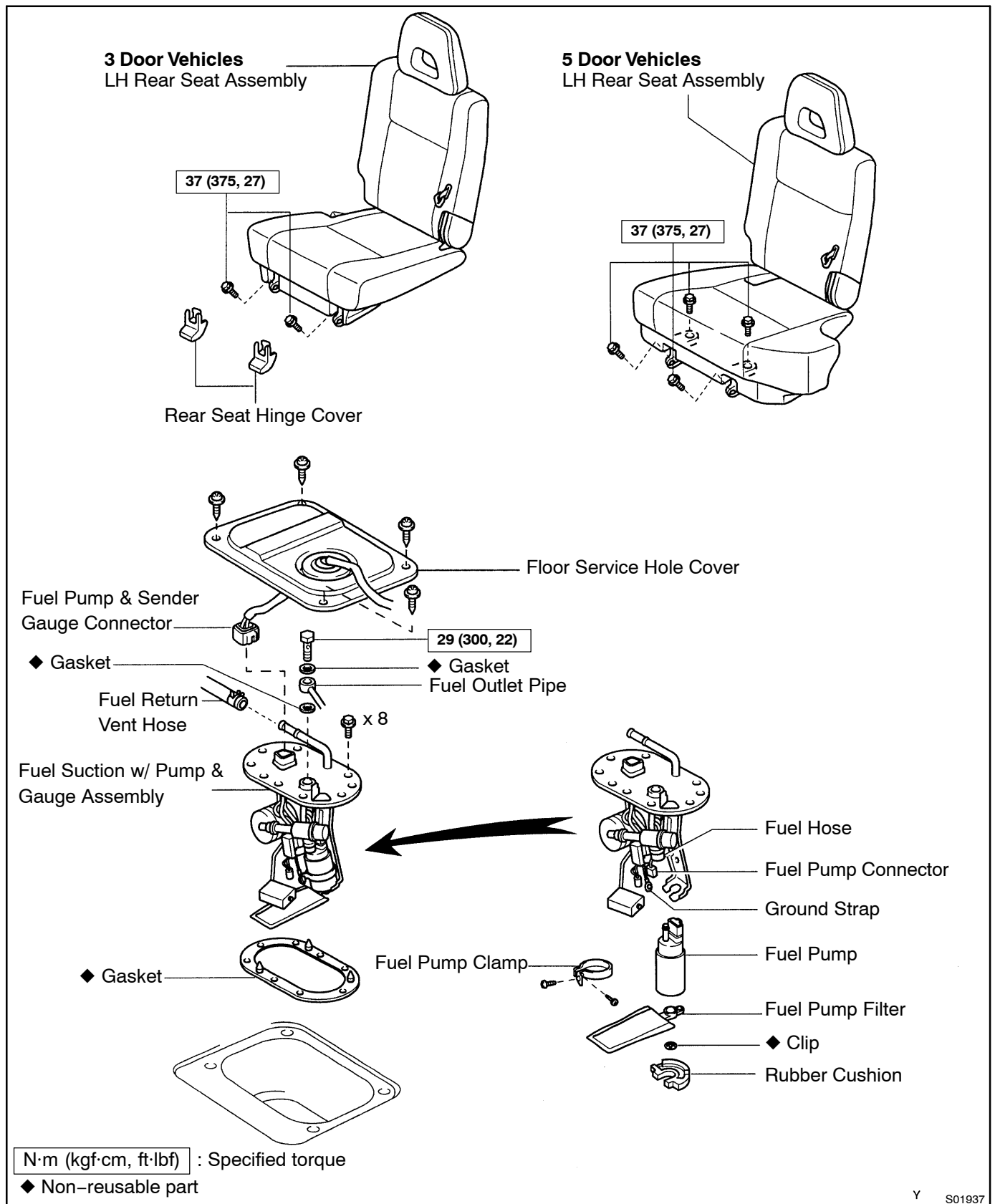
NOTICE:

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 do the switching at the battery side.

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

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

COMPONENTS



REMOVAL

CAUTION:

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

1. REMOVE LH REAR SEAT ASSEMBLY
2. REMOVE FLOOR SERVICE HOLE COVER
 - (a) Take out the floor carpet.
 - (b) Remove the 4 screws and service hole cover.

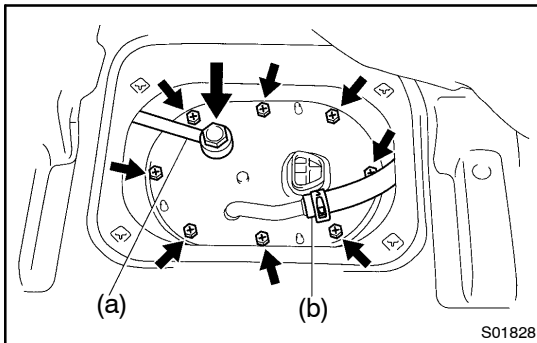
HINT:

At the time of installation, please refer to the following items. Check for fuel leakage (See page [SF-1](#)).

3. DISCONNECT FUEL PUMP & SENDER GAUGE CONNECTOR
4. DISCONNECT FUEL PIPE AND HOSE FROM FUEL SUCTION TUBE

CAUTION:

Remove the fuel filler cap to prevent the fuel from flowing out.



- (a) Remove the union bolt and 2 gaskets, and disconnect the outlet pipe from the suction tube.

HINT:

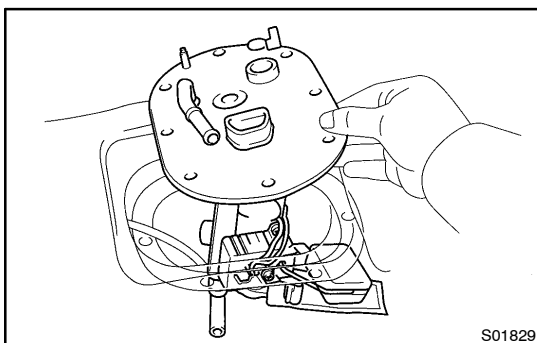
At the time of installation, please refer to the following items. Install the outlet pipe with 2 new gaskets and bolt.

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

- (b) Disconnect the return vent hose from the suction tube.
5. REMOVE FUEL SUCTION w/ PUMP & GAUGE TUBE ASSEMBLY

- (a) Remove the 8 bolts.

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



- (b) Pull out the suction w/ pump & gauge tube assembly.

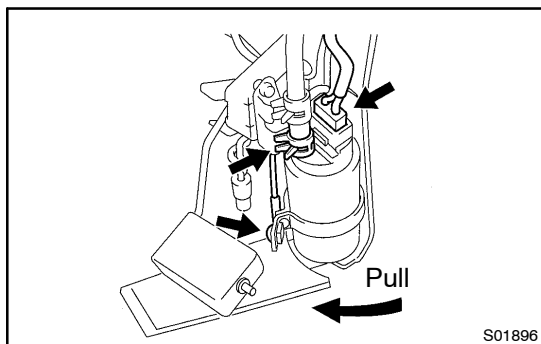
NOTICE:

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 set plate.

HINT:

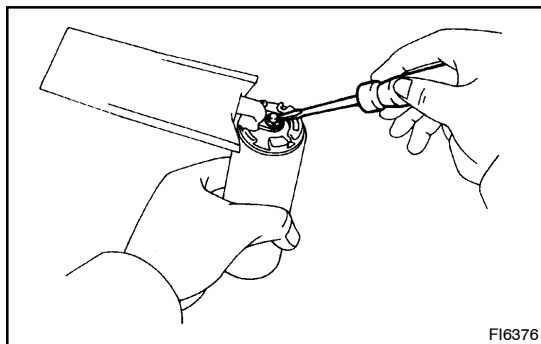
At the time of installation, please refer to the following items. Install a new gasket to the set plate.



S01896

DISASSEMBLY

1. **DISCONNECT FUEL PUMP CONNECTOR**
2. **REMOVE FUEL PUMP FROM FUEL PUMP BRACKET**
 - (a) Disconnect the ground strap from the fuel pump clamp.
 - (b) Pull off 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.



FI6376

3. **REMOVE FUEL PUMP CLAMP**
4. **REMOVE FUEL PUMP FILTER FROM FUEL PUMP**
 - (a) Using a small screwdriver, remove the clip.
 - (b) Pull out the pump filter.

HINT:

At the time of installation, please refer to the following items.
Install the pump filter with a new clip.

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page [SF-10](#)).

INSTALLATION

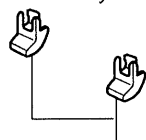
Installation is in the reverse order of removal (See page [SF-9](#)).

FUEL PRESSURE REGULATOR COMPONENTS

SF0QB-01

3 Door Vehicles
LH Rear Seat Assembly

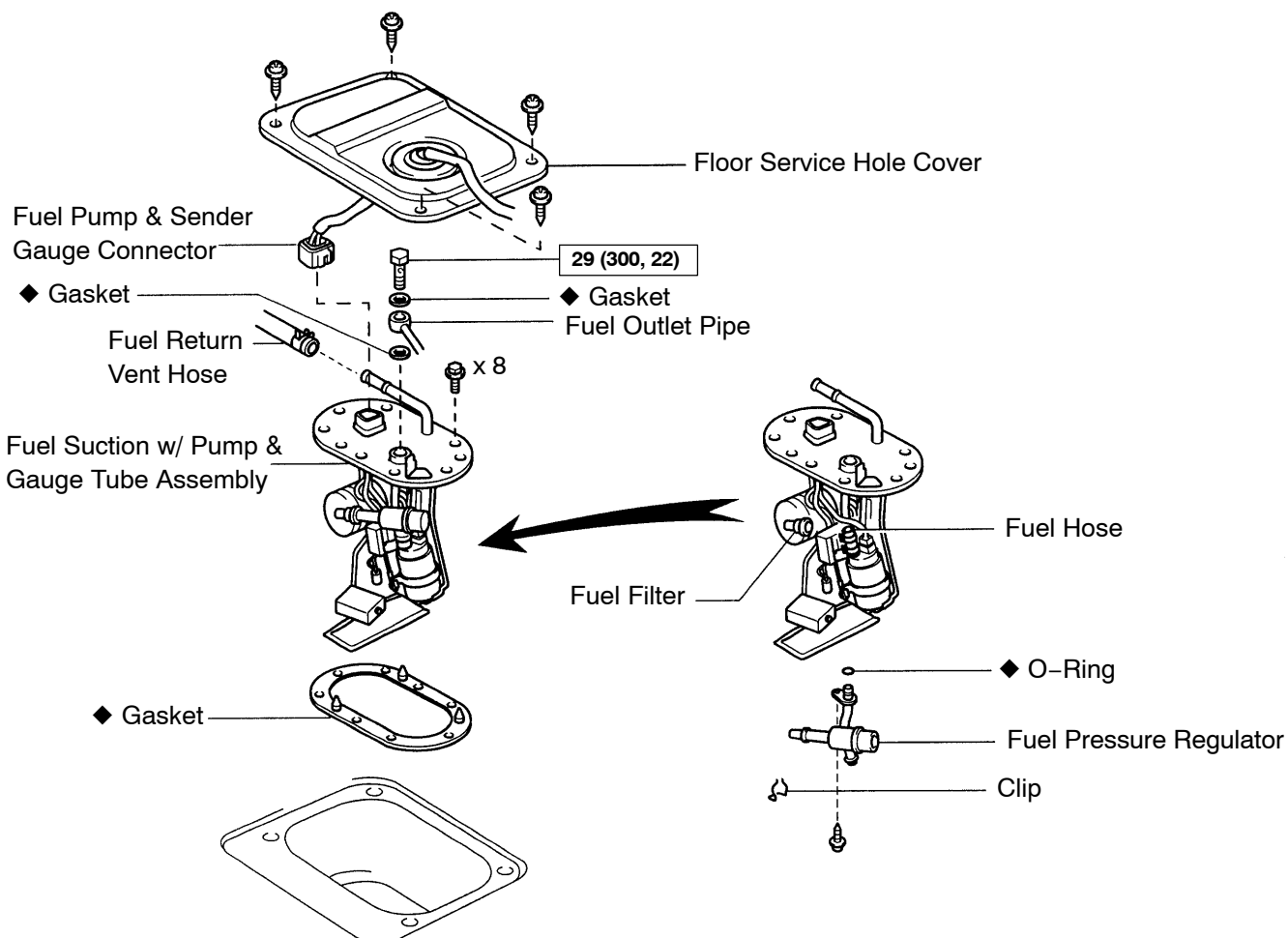
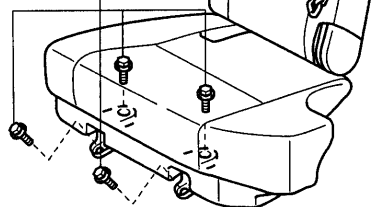
37 (375, 27)



Rear Seat Hinge Cover

5 Door Vehicles
LH Rear Seat Assembly

37 (375, 27)



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

◆ Non-reusable part

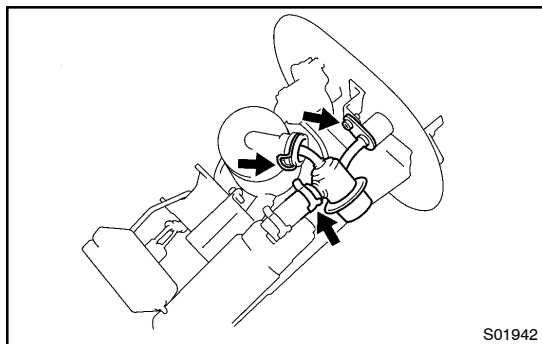
Y S01959

REMOVAL

CAUTION:

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

1. REMOVE FUEL SUCTION TUBE (See page [SF-9](#))

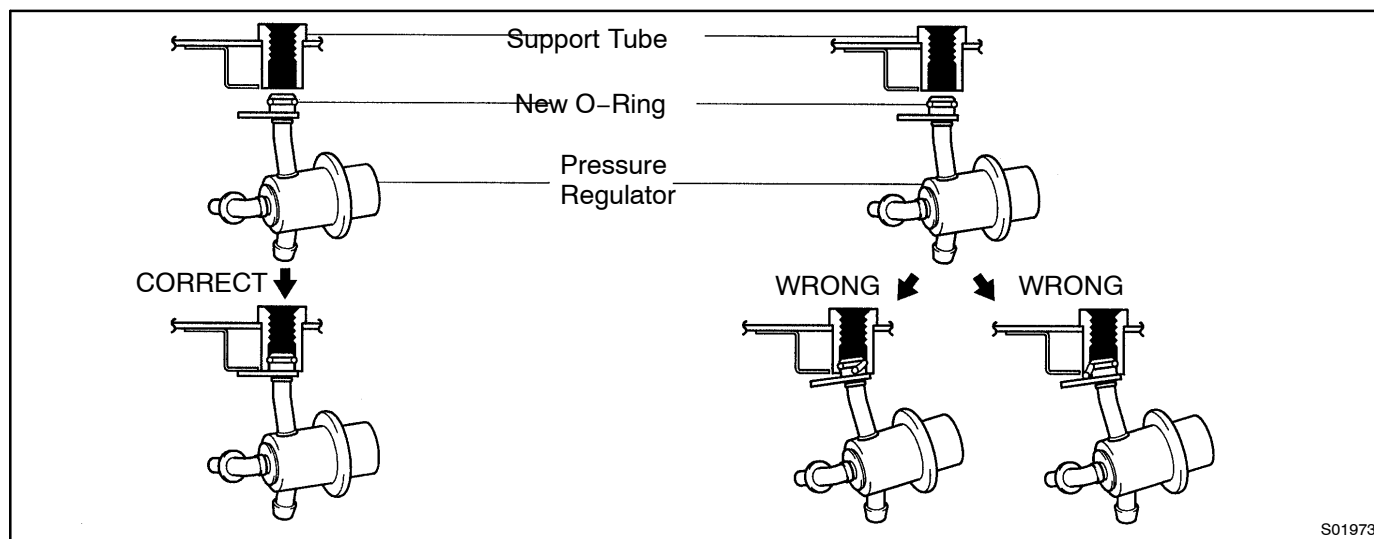


2. REMOVE FUEL PRESSURE REGULATOR

- (a) Remove the clip from the fuel filter.
- (b) Disconnect the fuel hose from the pressure regulator.
- (c) Remove the screw, and pull out the pressure regulator.
- (d) Remove the O-ring from the pressure regulator.

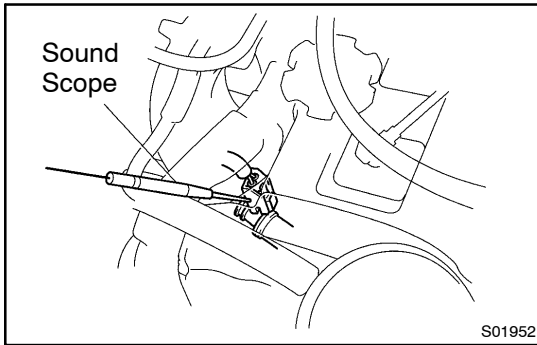
HINT:

At the time of installation, please refer to the following items. Apply a light coat of gasoline to a new O-ring, and install it to the pressure regulator.



INSTALLATION

Installation is in the reverse order of removal (See page [SF-14](#)).



INJECTOR ON-VEHICLE INSPECTION

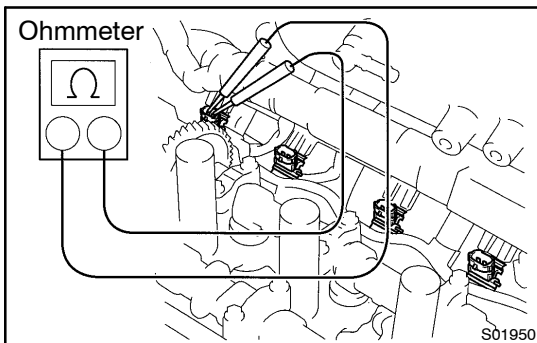
SF00G-02

1. INSPECT INJECTOR OPERATION

Check operation sound from each injector.

- (1) With the engine running or cranking, use a sound scope to check that there is normal operating noise in proportion to engine speed.
- (2) If you have no sound scope, you can check the injector transmission operation with your finger.

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



2. INSPECT INJECTOR RESISTANCE

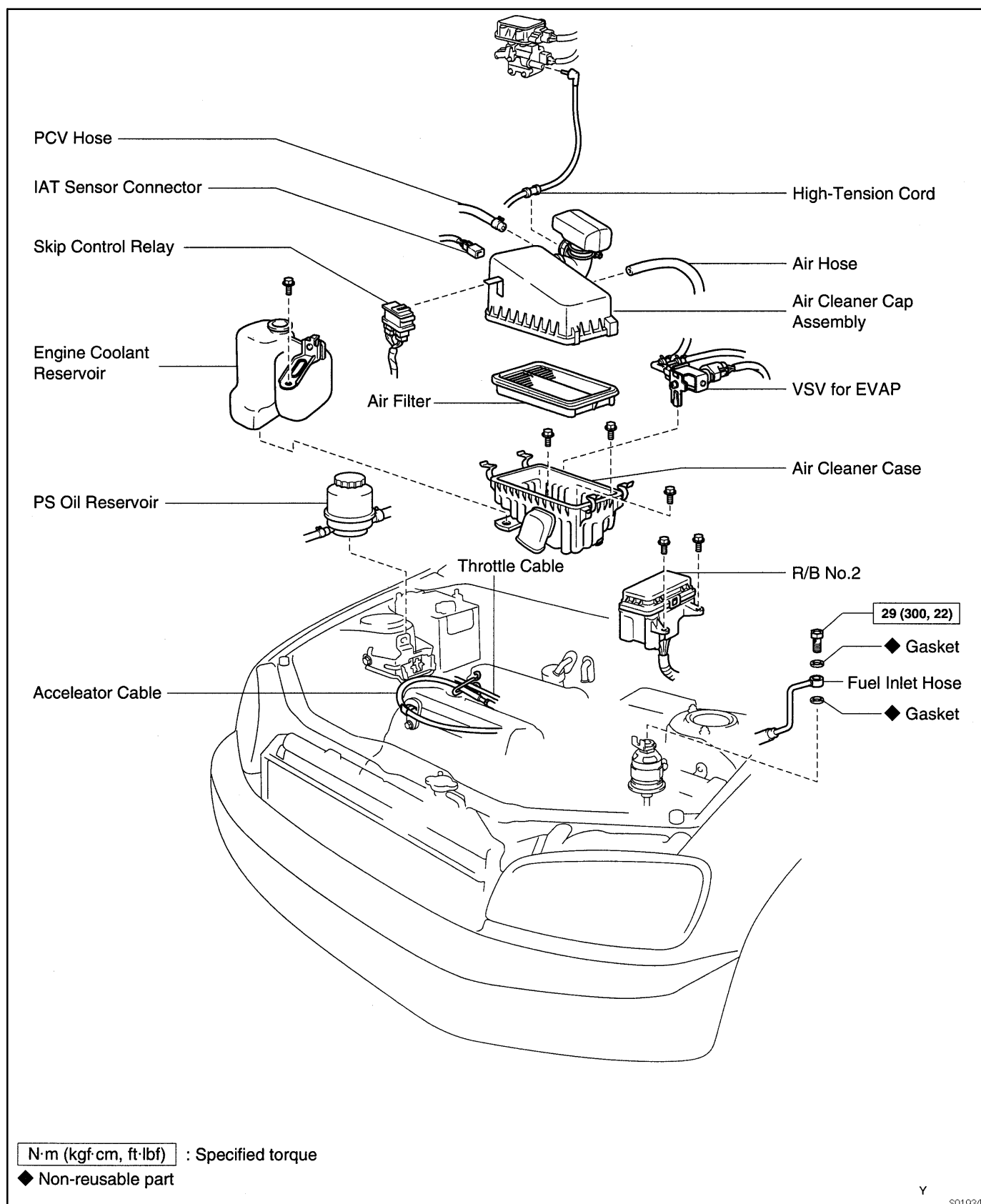
- (a) Remove the cylinder head cover (See page [EM-33](#)).
- (b) Disconnect the injector connectors.
- (c) Using an ohmmeter, measure the resistance between the terminals.

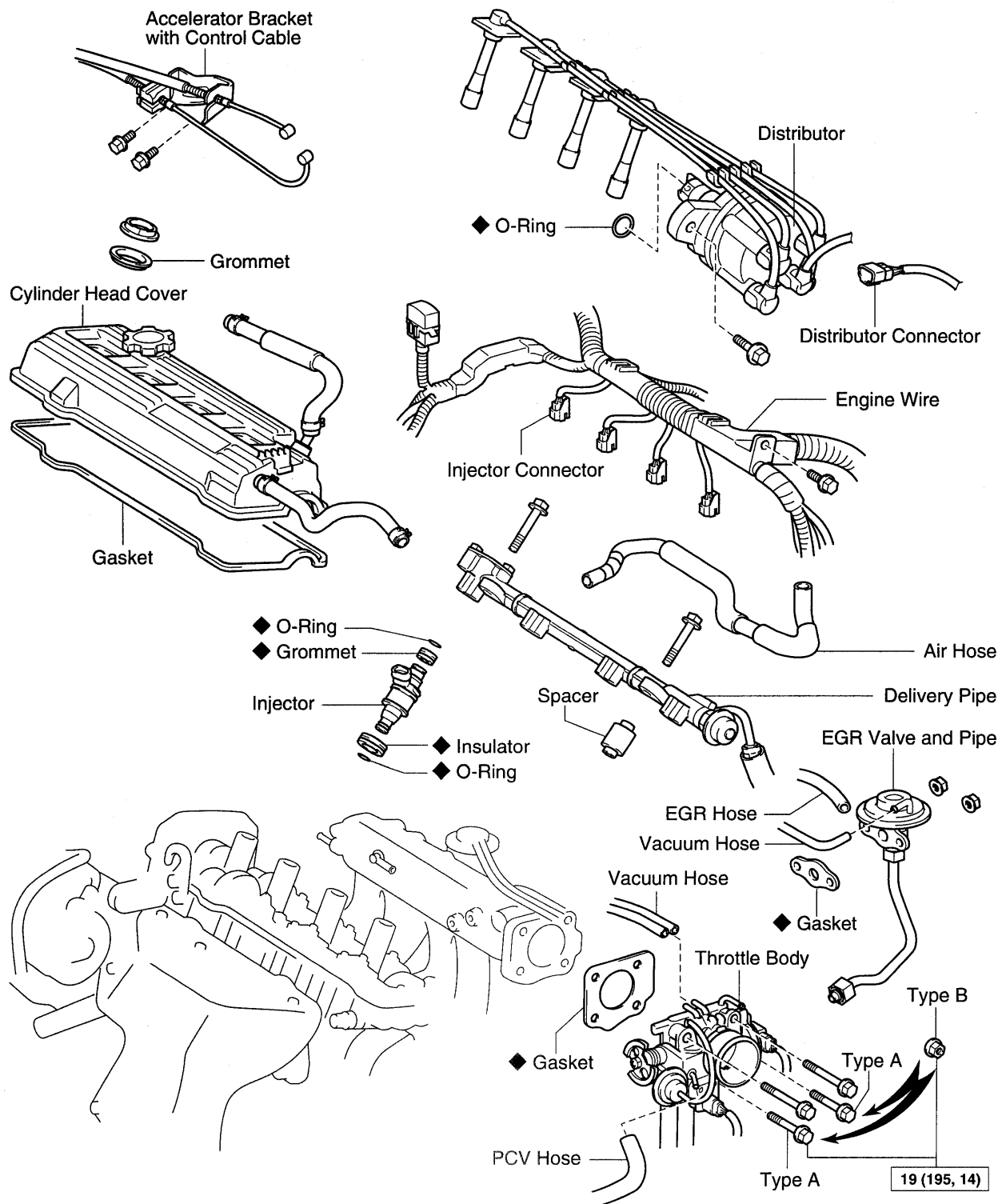
Resistance: Approx. 13.8 Ω

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

- (d) Reconnect the injector connectors.
- (e) Reinstall the cylinder head cover (See page [EM-55](#)).

COMPONENTS





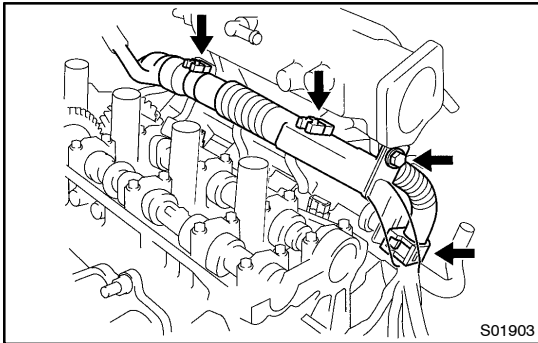
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

Y S01957

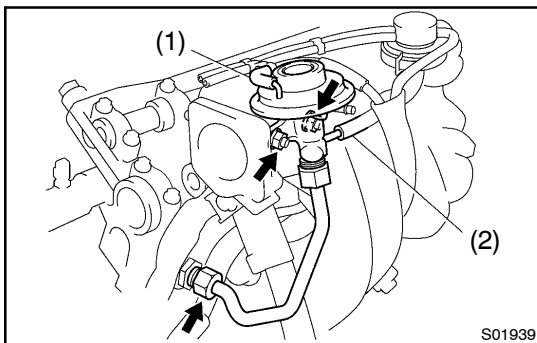
REMOVAL

1. REMOVE AIR CLEANER ASSEMBLY (See page [ST-4](#))
2. REMOVE CYLINDER HEAD COVER (See page [EM-33](#))
3. DISCONNECT THROTTLE BODY FROM INTAKE MANIFOLD (See page [SF-30](#))
4. REMOVE DISTRIBUTOR (See page [IG-9](#))



5. DISCONNECT ENGINE WIRE FROM INTAKE MANIFOLD

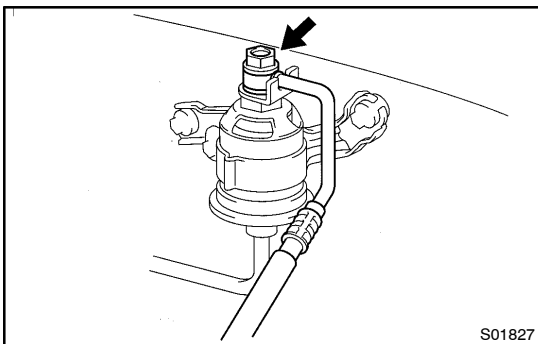
- (a) Disconnect the 4 injector connectors.
- (b) Disconnect the 2 clamps of the engine wire from the wire brackets on intake manifold.
- (c) Remove the bolt, and disconnect the engine wire protector from the RH side of the intake manifold.
- (d) Disconnect the clamp of the engine wire from the wire clamp.



6. REMOVE EGR VALVE AND PIPE

- (a) Disconnect these hoses from the EGR valve:
 - (1) Vacuum hose from port E of VSV
 - (2) EGR hose from vacuum modulator
- (b) Loosen the cylinder head side of the EGR pipe union nut.
- (c) Remove the 2 nuts, the EGR valve, pipe assembly and gasket.

7. DISCONNECT ENGINE COMPARTMENT R/B NO.2



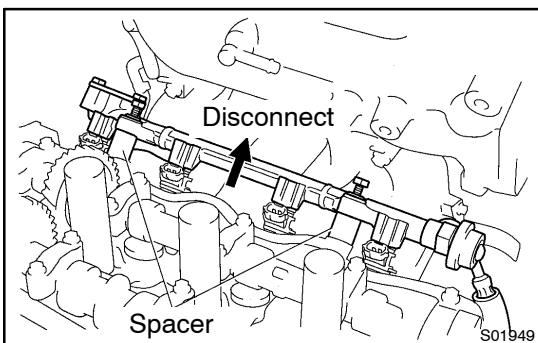
8. REMOVE FUEL INLET HOSE AND DELIVERY PIPE

- (a) Remove the union bolt and 2 gaskets, and disconnect the fuel inlet hose from the fuel filter outlet.

CAUTION:

Put a shop towel under the fuel filter. Slowly loosen the union bolt.

- (b) Disconnect the air hose for the air assist system from the intake manifold port, and remove the air hose.



- (c) Loosen the 2 bolts holding the delivery pipe to the cylinder head.
- (d) Disconnect the delivery pipe from the 4 injectors, and remove the delivery pipe and fuel inlet hose assembly.

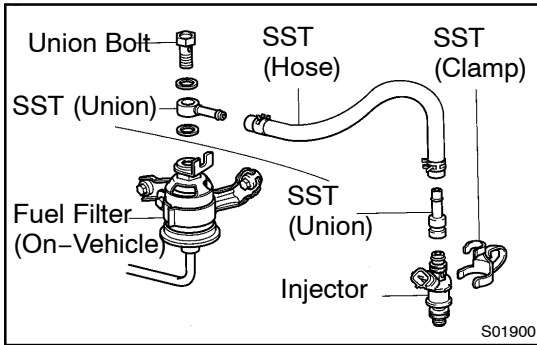
9. REMOVE INJECTORS AND SPACERS

- (a) Remove the 4 injectors and 2 spacers from the cylinder head.

NOTICE:

Be careful not to drop the injectors and spacers.

- (b) Remove the 2 O-rings, insulator and grommet from each injector.

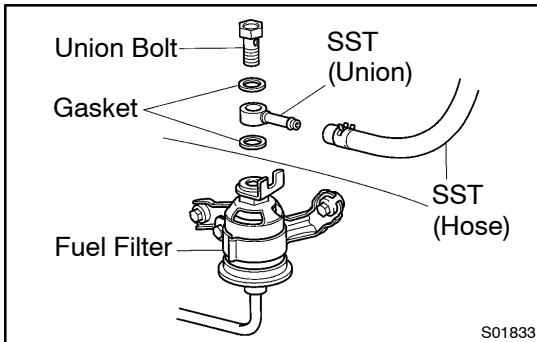


INSPECTION

1. INSPECT INJECTOR INJECTION

CAUTION:

Keep injector clear of sparks during the test.



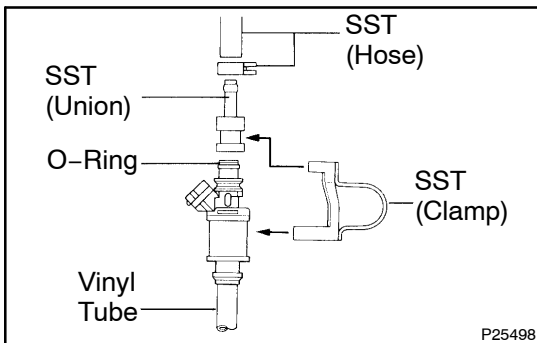
- (a) Connect SST (union and hose) to the fuel filter outlet with the 2 gaskets and union bolt.

SST 09268-41046 (90405-09015)

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

HINT:

Use the vehicle's fuel filter.



- (b) Install the grommet and O-ring to the injector.

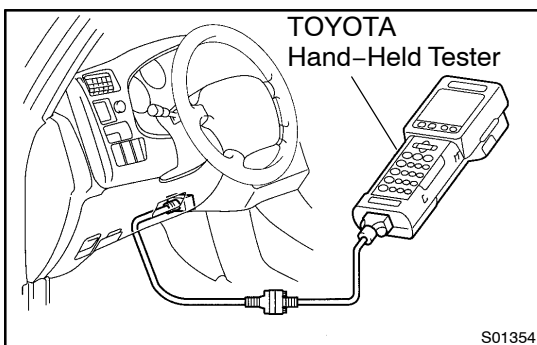
- (c) Connect SST (union and hose) to the injector, and hold the injector and union with SST (clamp).

SST 09268-41046

- (d) Put the injector into a graduated cylinder.

HINT:

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



- (e) Connect the TOYOTA hand-held tester to the DLC3.

- (f) Turn the ignition switch ON and TOYOTA hand-held tester main switch ON.

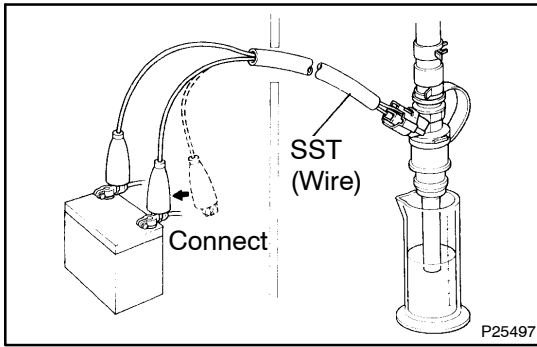
NOTICE:

Do not start the engine.

- (g) Select the active test mode on the TOYOTA hand-held tester.

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

- (i) 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-5](#)).



- (j) 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

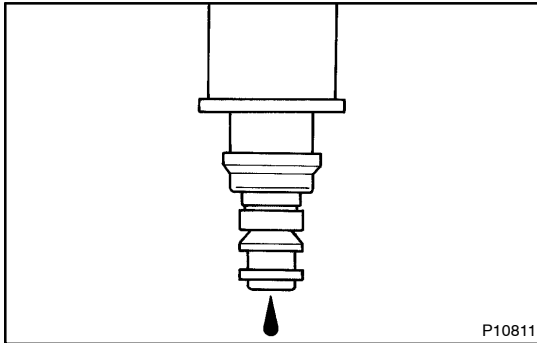
Volume:

54 – 69 cm³ (3.1 – 4.2 cu in.) per 15 sec.

Difference between each injector:

5 cm³ (0.8 cu in.) or less

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



2. INSPECT LEAKAGE

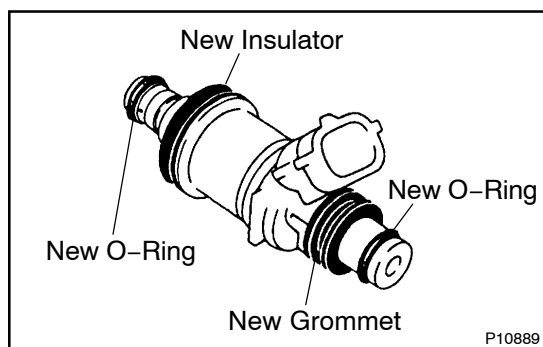
- (a) In the condition above, disconnect the test probes of SST (wire) from the battery and check the fuel leakage from the injector.

SST 09842-30070

Fuel drop:

One drop or less per minute

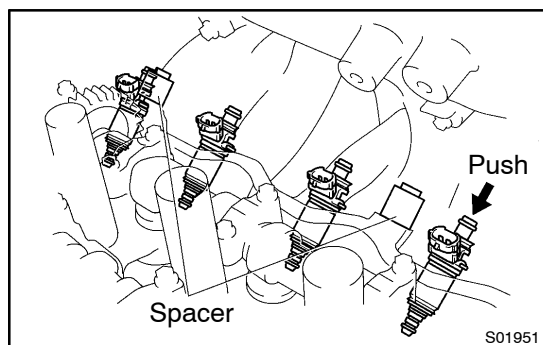
- (b) Turn the ignition switch to LOCK.
 (c) Disconnect the negative (-) terminal cable from the battery.
 (d) Remove the SST.
 SST 09268-41046, 09842-30070
 (e) Disconnect the TOYOTA hand-held tester from the DLC3.



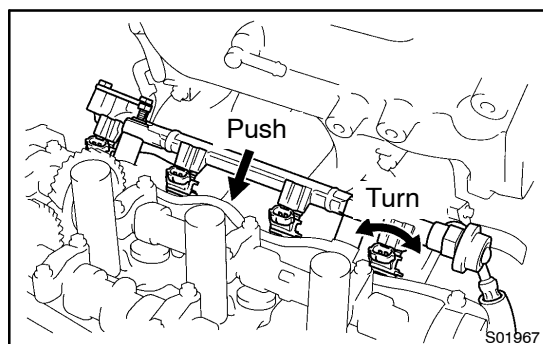
INSTALLATION

1. INSTALL INJECTORS AND SPACERS

- Install new insulator and grommet to each injector.
- Apply a light coat of gasoline onto 2 new O-rings, and install them to each injector.

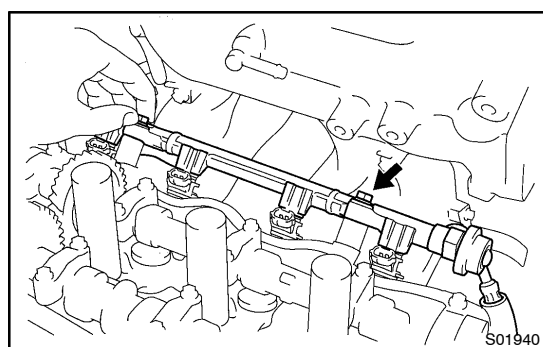


- Place the 2 spacers in position on the cylinder head.
- Push in the 4 injectors to the cylinder head.

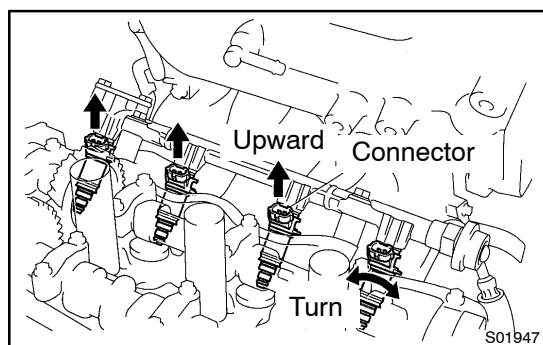


2. INSTALL DELIVERY PIPE AND FUEL INLET HOSE

- Place the delivery pipe together with the 2 bolts between the intake manifold and cylinder head.
- While turning the injector left and right, push it to the delivery pipe.



- Temporarily install the 2 bolts holding the delivery pipe to the cylinder head.

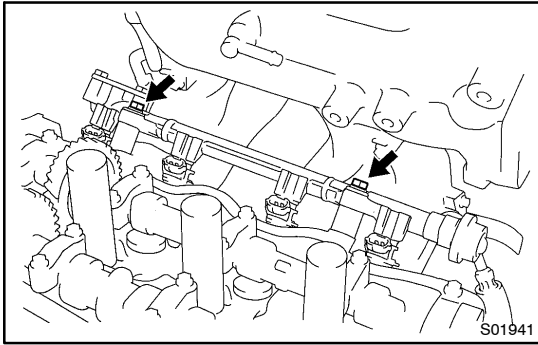


- Check that the injectors rotate smoothly.

HINT:

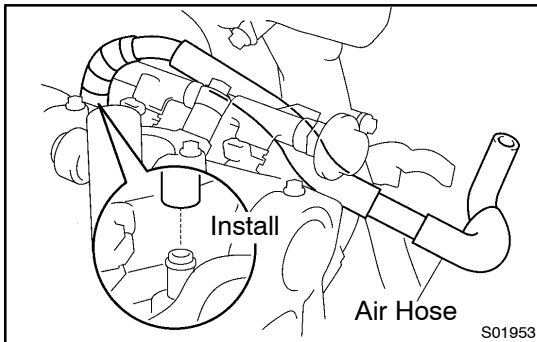
If injectors do not rotate smoothly, the probable cause is incorrect installation of O-rings. Replace the O-rings.

- Position the injector connector upward.



- (f) Tighten the 2 bolts holding the delivery pipe to the cylinder head.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)



- (g) Install the air hose for the air assist system to the intake manifold port.

- (h) Connect the fuel inlet hose to the fuel filter with 2 new gaskets and the union bolt.

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

3. INSTALL ENGINE COMPARTMENT R/B NO.2

4. INSTALL EGR VALVE AND PIPE

HINT:

Place a new gasket on the intake manifold.

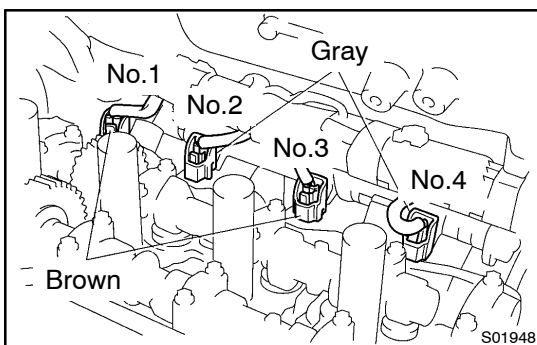
Torque:

Nut:

13 N·m (130 kgf·cm, 9 ft·lbf)

Union nut:

59 N·m (600 kgf·cm, 43 ft·lbf)



5. CONNECT ENGINE WIRE TO INTAKE MANIFOLD

HINT:

The No.1 and No.3 injector connectors are brown, and the No.2 and No.4 injector connectors are gray.

6. CONNECT THROTTLE BODY TO INTAKE MANIFOLD

7. INSTALL CYLINDER HEAD COVER (See page [EM-55](#))

8. INSTALL AIR CLEANER ASSEMBLY

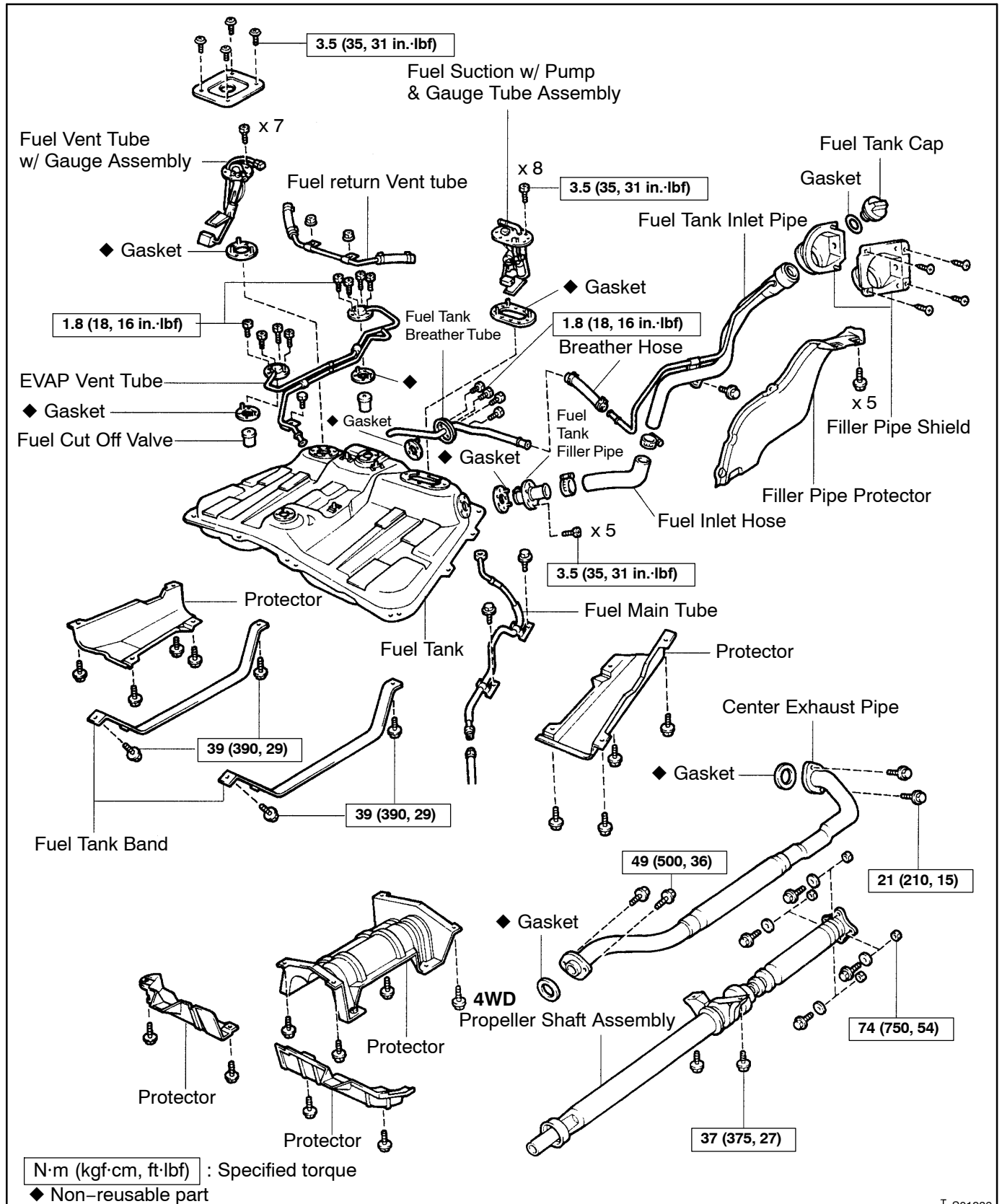
9. INSTALL DISTRIBUTOR (See page [IG-13](#))

FUEL TANK AND LINE COMPONENTS

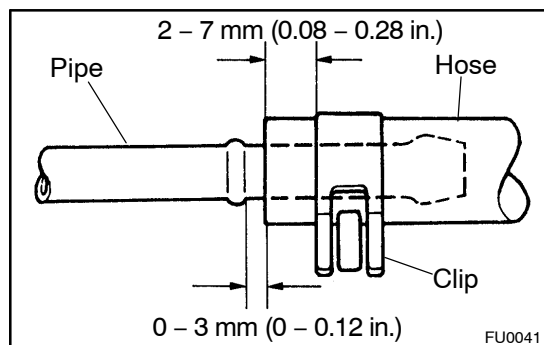
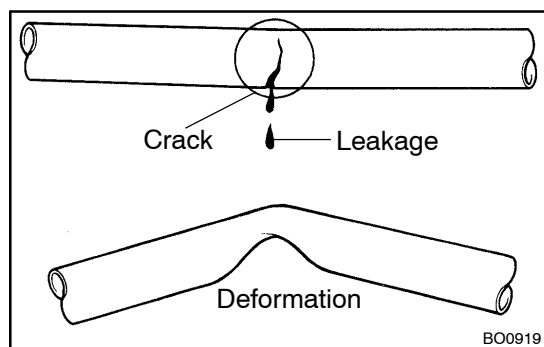
SFOQM-02

CAUTION:

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



T S01936

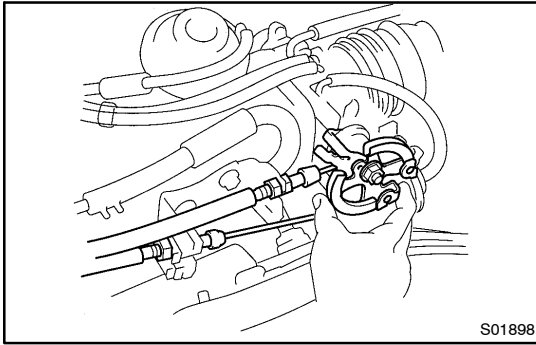


INSPECTION

INSPECT FUEL TANK AND LINE

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

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

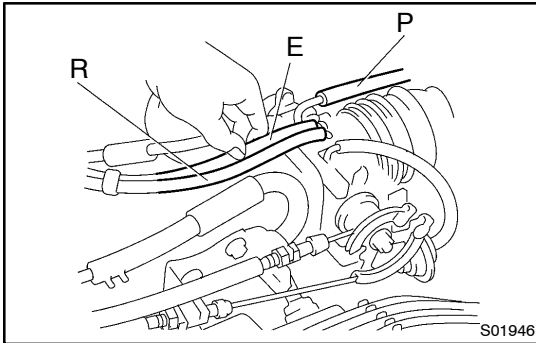


THROTTLE BODY ON-VEHICLE INSPECTION

SF00Q-03

1. INSPECT THROTTLE BODY

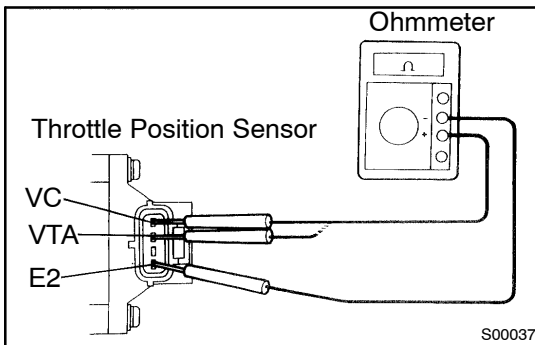
- (a) Check that the throttle linkage moves smoothly.



- (b) Check the vacuum at each port.

- Start the engine.
- Check the vacuum with your finger.

Port name	At idle	Other than idle
P	No vacuum	Vacuum
E	No vacuum	Vacuum
R	No vacuum	No vacuum



2. INSPECT THROTTLE POSITION SENSOR

- (a) Apply vacuum to the throttle opener.
 (b) Disconnect the sensor connector.
 (c) Using an ohmmeter, measure the resistance between each terminal.

Clearance between lever and stop screw	Between terminals	Resistance
0 mm (0 in.)	VTA - E2	0.2 - 5.7 kΩ
Throttle valve fully open	VTA - E2	2.0 - 10.2 kΩ
-	VC - E2	2.5 - 5.9 kΩ

- (d) Reconnect the sensor connector.

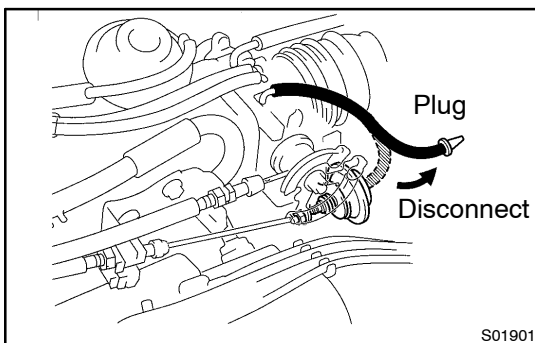
3. INSPECT AND ADJUST THROTTLE OPENER

4. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

5. CHECK IDLE SPEED

Idle speed: 700 ± 50 rpm

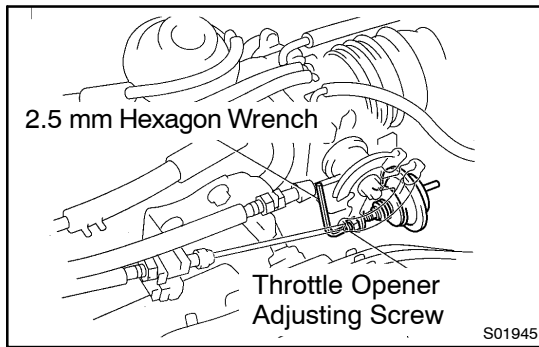


6. CHECK AND ADJUST THROTTLE OPENER SETTING SPEED

- (a) Disconnect the vacuum hose from the throttle opener, and plug the hose end.
 (b) Maintain the engine at 2,500 rpm.
 (c) Release the throttle valve.
 (d) Check that the throttle opener is set.

Throttle opener setting speed:

1,300 - 1,500 rpm (w/ cooling fan OFF)

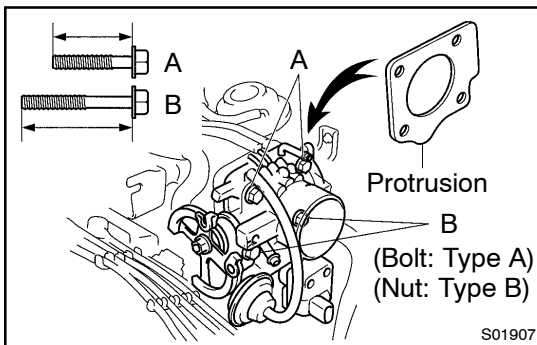
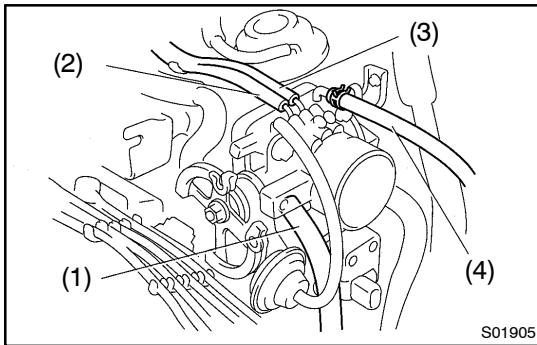


- (e) Adjust the throttle opener setting speed by turning the throttle opener adjusting screw.
- (f) Reconnect the vacuum hose to the throttle opener.

[illegible]

REMOVAL

1. DRAIN ENGINE COOLANT
2. A/T:
DISCONNECT THROTTLE CABLE FROM THROTTLE BODY
3. DISCONNECT ACCELERATOR CABLE FROM THROTTLE BODY
4. REMOVE AIR CLEANER CAP ASSEMBLY (See page [ST-4](#))



5. REMOVE THROTTLE BODY
 - (a) Disconnect the throttle position sensor connector.
 - (b) Disconnect the IAC valve connector.
 - (c) Disconnect these hoses from the throttle body:
 - (1) PCV hose from air tube
 - (2) Vacuum hose from port "R" of EGR vacuum modulator
 - (3) Vacuum hose from port "P" of EGR vacuum modulator
 - (4) EVAP hose from charcoal canister
 - (d) Remove the 4 bolts (Type A) or the 2 bolts, 2 nuts (Type B) and gasket, and disconnect the throttle body from the intake manifold.

Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)

HINT:

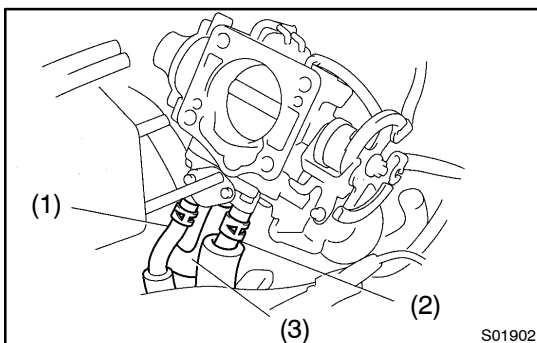
At the time of installation, please refer to the following items.

- Place a new gasket on the intake chamber, facing the protrusion downward.
- Each bolt is indicated in the illustration (Type A).

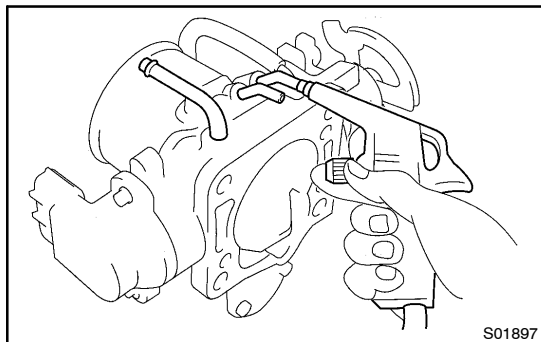
Bolt length:

A: 40 mm (1.57 in.)

B: 55 mm (2.17 in.)



- (e) Disconnect these hoses from the throttle body:
 - (1) Water bypass hose from water outlet
 - (2) Water bypass hose from water bypass pipe
 - (3) Air hose from intake manifold



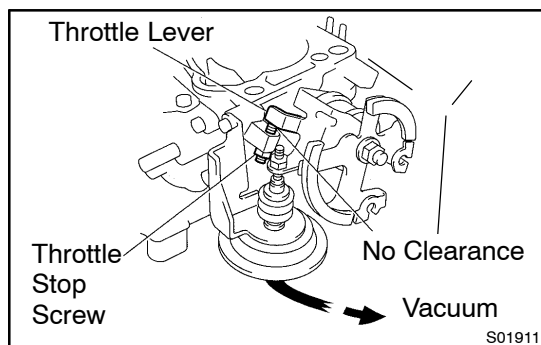
INSPECTION

1. CLEAN THROTTLE BODY

- Using a soft brush and carburetor cleaner, clean the cast parts.
- Using compressed air, clean all the passages and apertures.

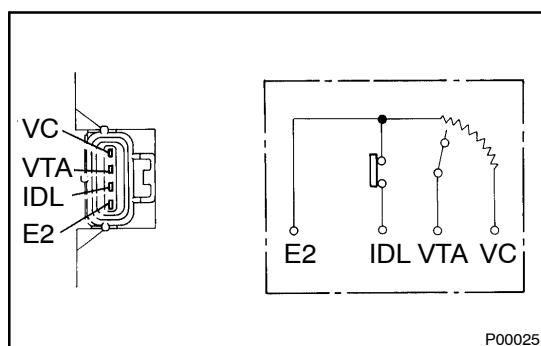
NOTICE:

To prevent deterioration, do not clean the throttle position sensor.



2. INSPECT THROTTLE VALVE

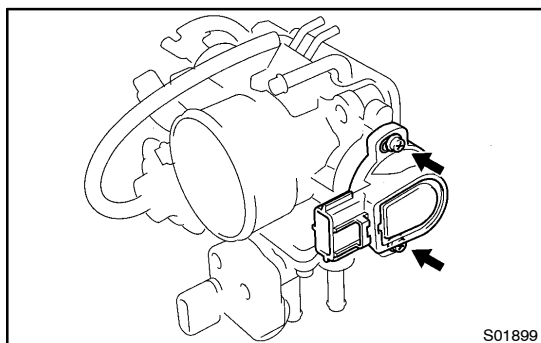
- Apply vacuum to the throttle opener.
- Check that there is no clearance between the throttle stop screw and throttle lever when the throttle valve is fully closed.



3. INSPECT THROTTLE POSITION SENSOR

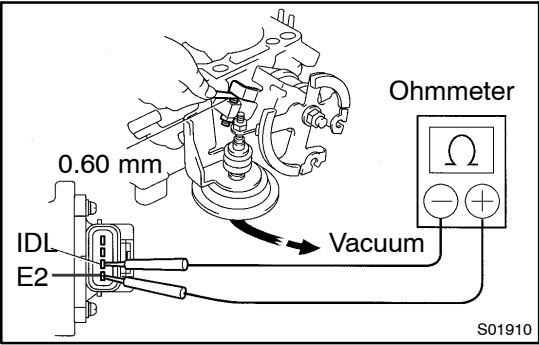
- Apply vacuum to the throttle opener.
- Using an ohmmeter, measure the resistance between each terminal.

Clearance between lever and stop screw	Between terminals	Resistance
0 mm (0 in.)	VTA - E2	0.2 - 5.7 k Ω
Throttle valve fully open	VTA - E2	2.0 - 10.2 k Ω
-	VC - E2	2.5 - 5.9 k Ω

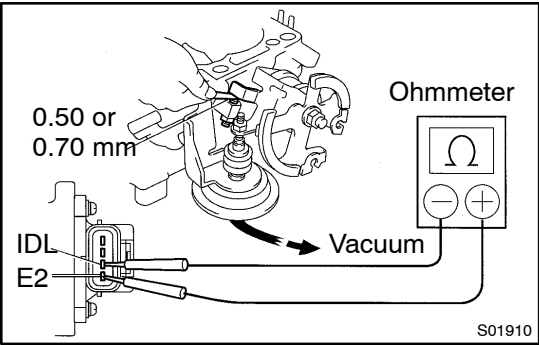


4. IF NECESSARY, ADJUST THROTTLE POSITION SENSOR

- Loosen the 2 set screws of the sensor.



- (b) Apply vacuum to the throttle opener.
- (c) Insert a 0.60 mm (0.024 in.) thickness gauge between the throttle stop screw and stop lever.
- (d) Connect the test probe of an ohmmeter to the terminals IDL and E2 of the sensor.
- (e) Gradually turn the sensor clockwise until the ohmmeter deflects, and secure it with the 2 set screws.



- (f) Recheck the continuity between terminals IDL and E2.

Clearance between lever and stop screw	Continuity (IDL - E2)
0.50 mm (0.020 in.)	Continuity
0.70 mm (0.028 in.)	No continuity

INSTALLATION

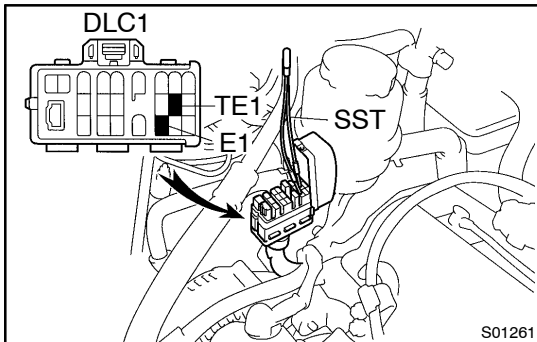
Installation is in the reverse order of removal (See page [SF-30](#)).

IDLE AIR CONTROL (IAC) VALVE ON-VEHICLE INSPECTION

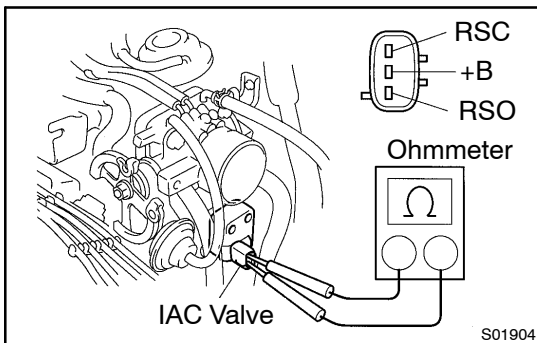
SFOQT-02

1. INSPECT IAC VALVE OPERATION

- (a) Initial conditions:
 - Engine at normal operating temperature
 - Idle speed check correctly
 - Transmission in neutral position



- (b) Using SST, connect terminals TE1 and E1 of the DLC1.
SST 09843-18020
- (c) Maintain engine speed in the range between 900 – 1,300 rpm for 5 seconds. Check that it returns to idle speed.
If the engine speed operation is not as specified, check the IAC valve, wiring and ECM.
- (d) Remove the SST.
SST 09843-18020



2. INSPECT IAC VALVE RESISTANCE

NOTICE:

"Cold" and "Hot" in these sentences express the temperature of the coils themselves. "Cold" is from -10°C (14°F) to 50°C (122°F) and "Hot" is from 50°C (122°F) to 100°C (212°F).

- (a) Disconnect the IAC valve connector.
- (b) Using an ohmmeter, measure the resistance between terminal +B and other terminals (RSC, RSO).

Resistance:

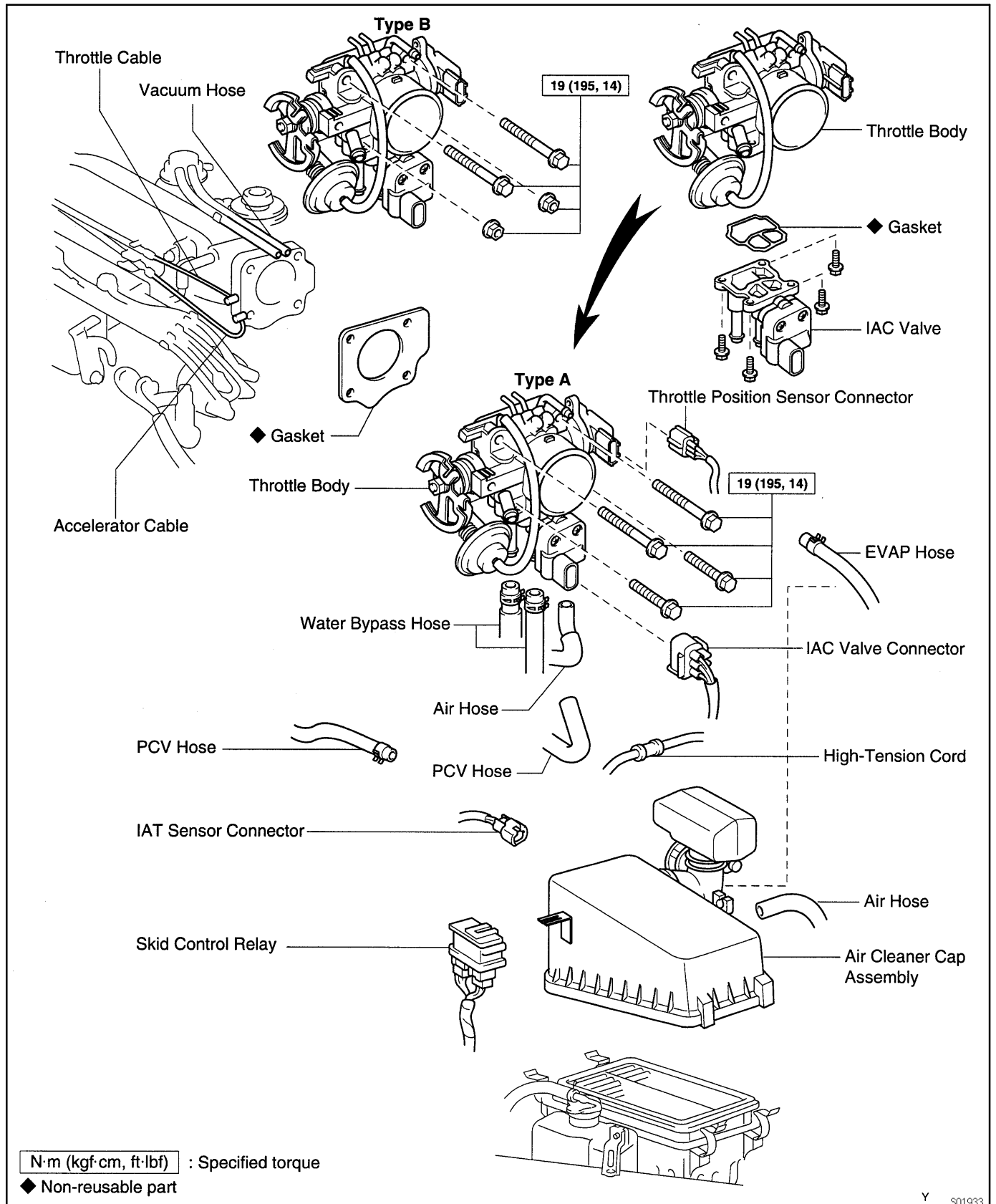
Cold: 17.0 – 24.5 Ω

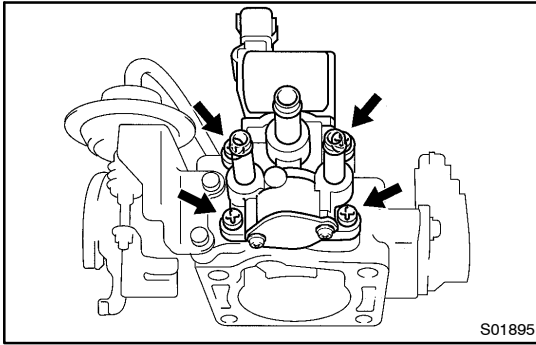
Hot: 21.5 – 28.5 Ω

If resistance is not as specified, replace the IAC valve.

- (c) Reconnect the IAC valve connector.

COMPONENTS





REMOVAL

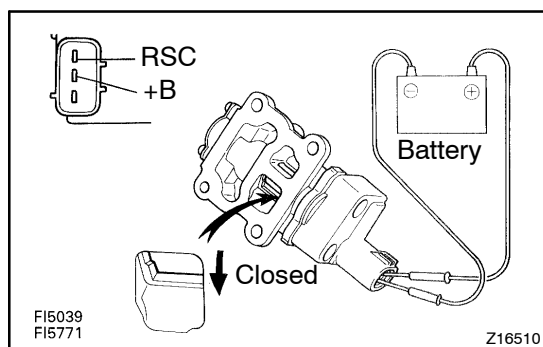
1. **REMOVE THROTTLE BODY** (See page [SF-30](#))

2. **REMOVE IAC VALVE**

Remove the 4 screws, IAC valve and gasket.

HINT:

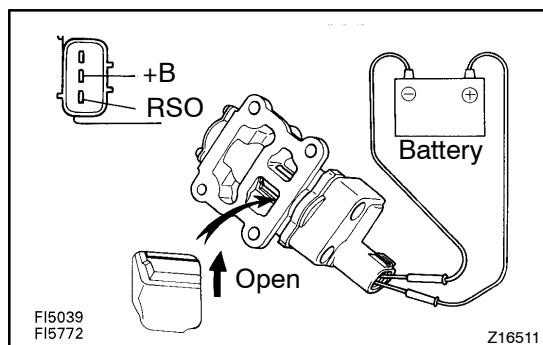
At the time of installation, please refer to the following items.
Place a new gasket on the throttle body.



INSPECTION

INSPECT IAC VALVE OPERATION

- (a) Connect the positive (+) lead from the battery to terminal +B and negative (-) lead to terminal RSC, and check that the valve is closed.



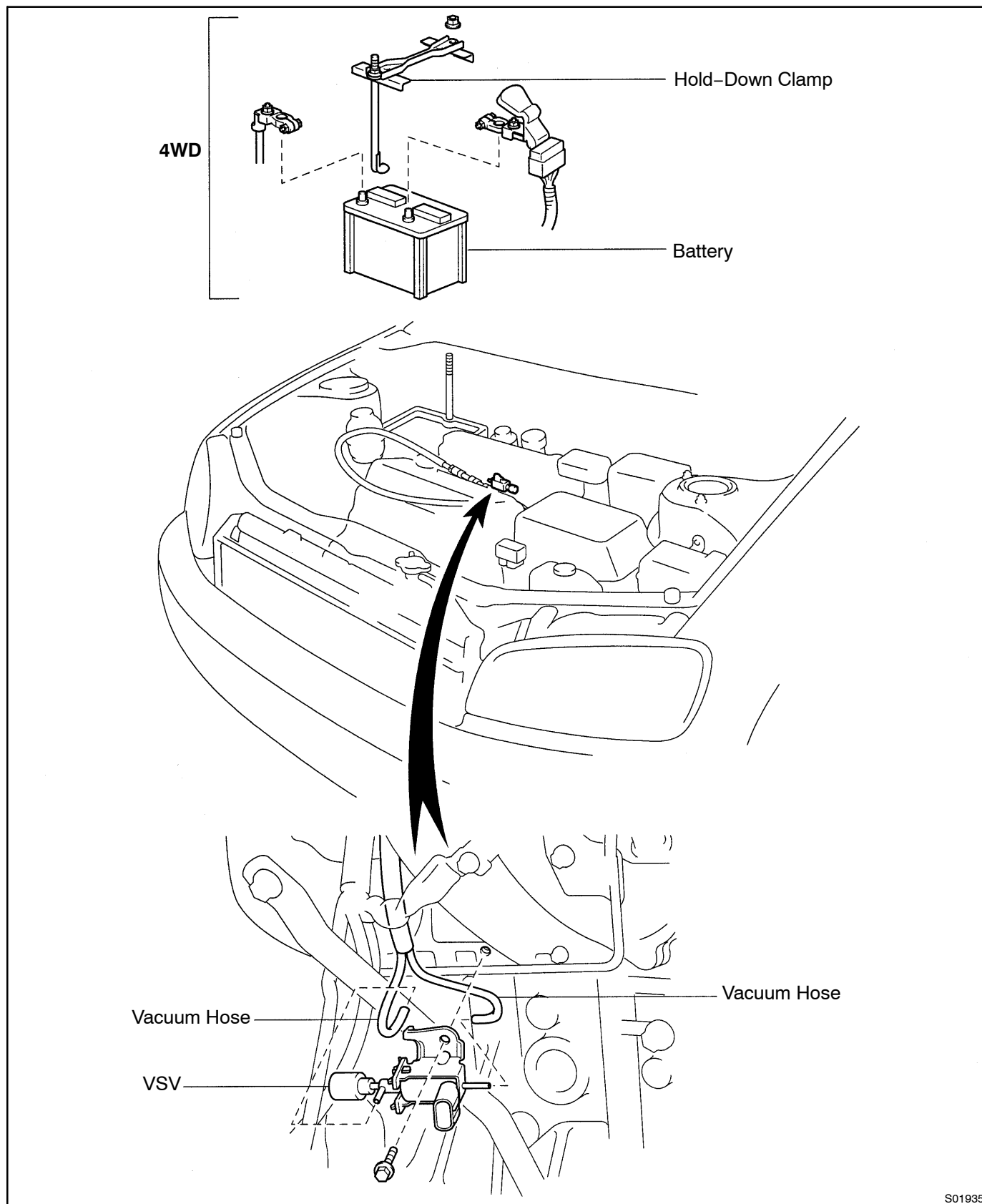
- (b) Connect the positive (+) lead from the battery to terminal +B and negative (-) lead to terminal RSO, and check that the valve is open.

INSTALLATION

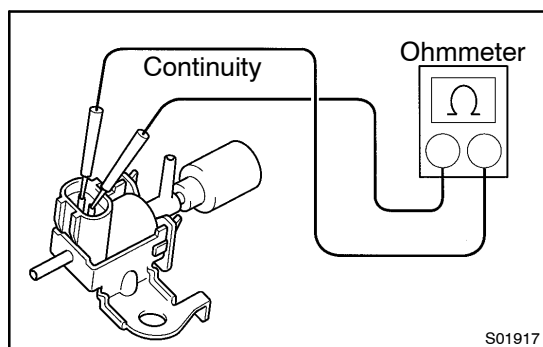
Installation is in the reverse order of removal (See page [SF-36](#)).

VSV FOR EXHAUST GAS RECIRCULATION (EGR) COMPONENTS

SF0R1-01



S01935



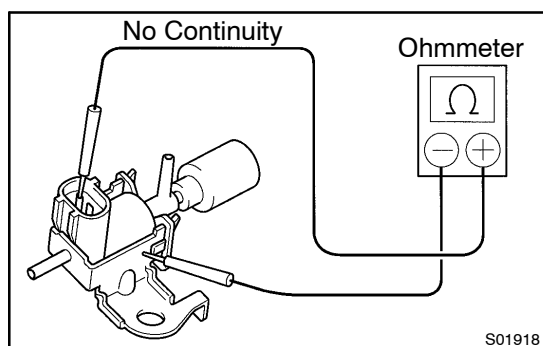
INSPECTION

1. **4WD:**
REMOVE BATTERY
2. **REMOVE VSV**
3. **INSPECT VSV**
4. **INSPECT VSV FOR OPEN CIRCUIT**

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

Resistance: At 20°C (68°F): 33 – 39 Ω

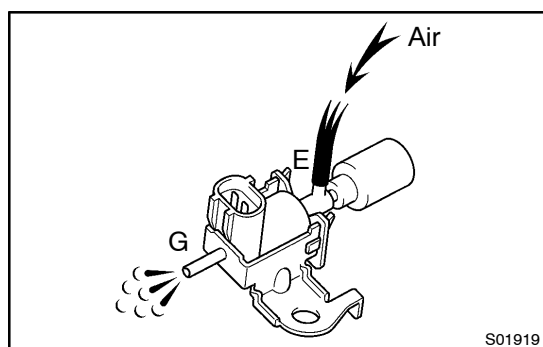
If there is no continuity, replace the VSV.



5. INSPECT VSV FOR GROUND

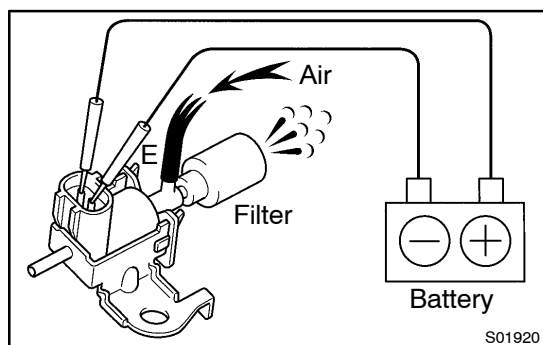
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



6. INSPECT VSV OPERATION

- (a) Check that air flows from ports E to G.



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

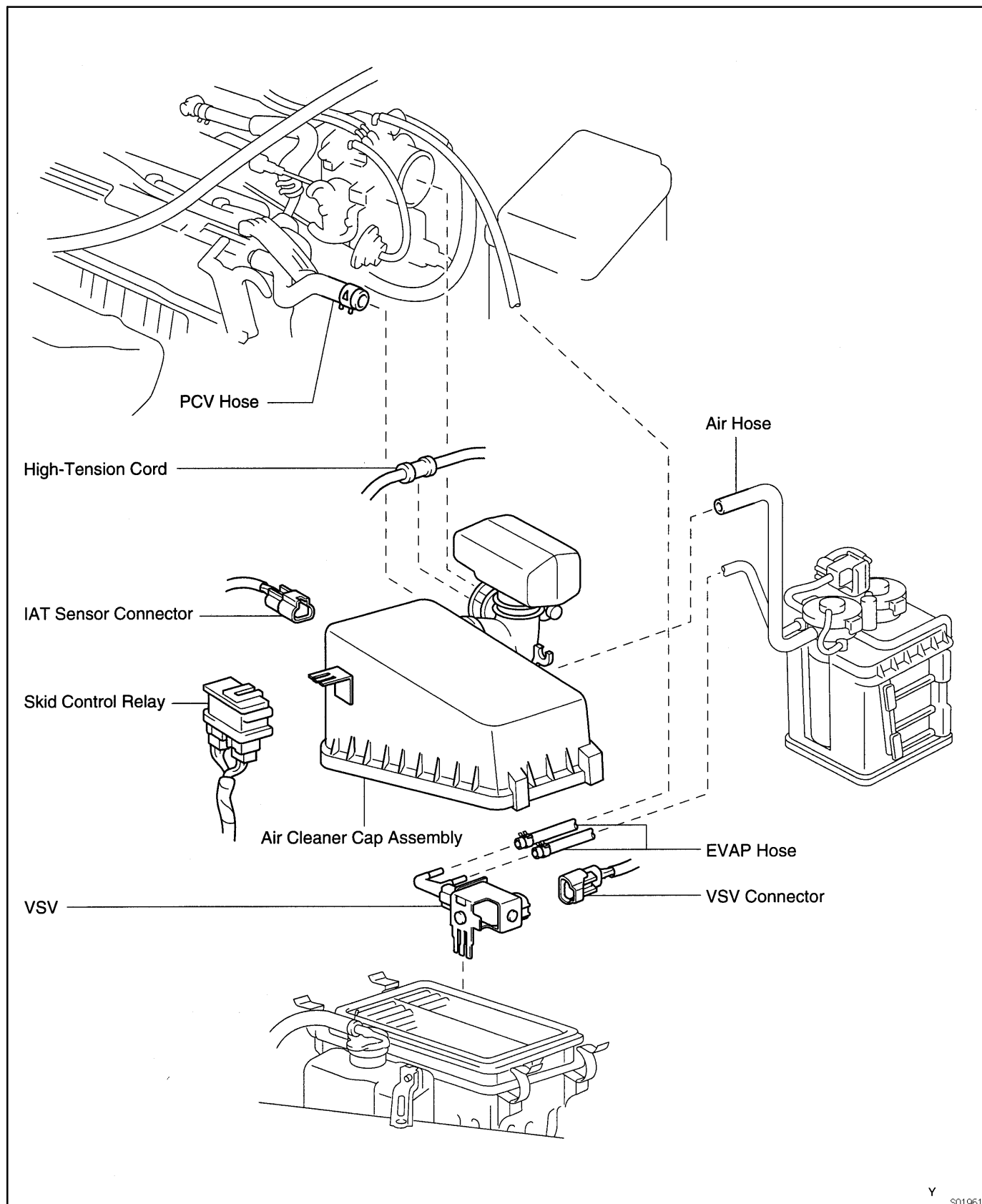
- (c) Check that air flows from port E to the filter.

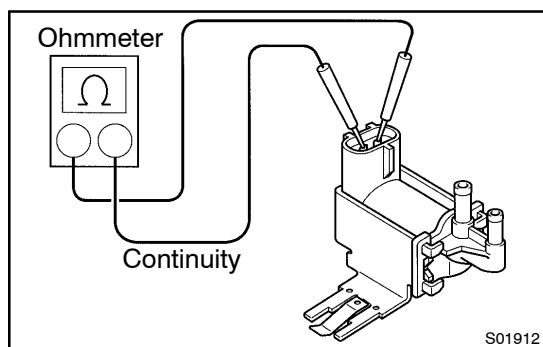
If operation is not as specified, replace the VSV.

7. **REINSTALL VSV**
8. **4WD:**
REINSTALL BATTERY

VSV FOR EVAPORATIVE EMISSION (EVAP) COMPONENTS

SF0R3-02

Y
S01961



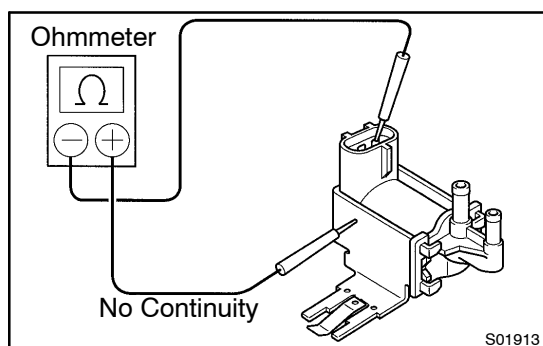
INSPECTION

1. REMOVE AIR CLEANER CAP ASSEMBLY (See page [ST-4](#))
2. REMOVE VSV
3. INSPECT VSV
4. INSPECT VSV FOR OPEN CIRCUIT

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

Resistance: At 20°C (68°F): 30 –34 Ω

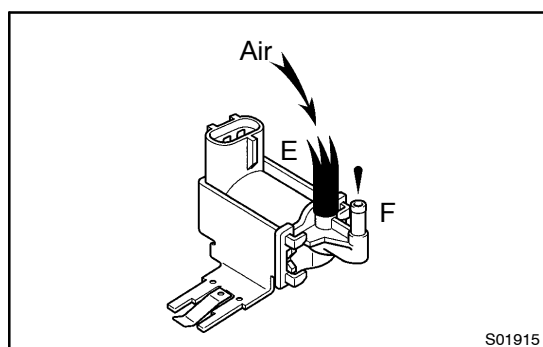
If there is no continuity, replace the VSV.



5. 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.

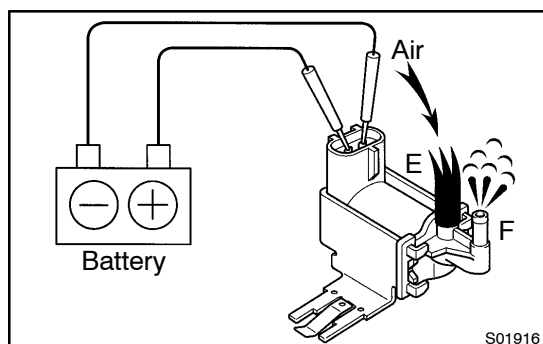


6. INSPECT VSV OPERATION

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

NOTICE:

Never apply more than 60 kPa (0.61 kgf/cm², 8.7 psi) of pressure compressed air to the VSV.



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

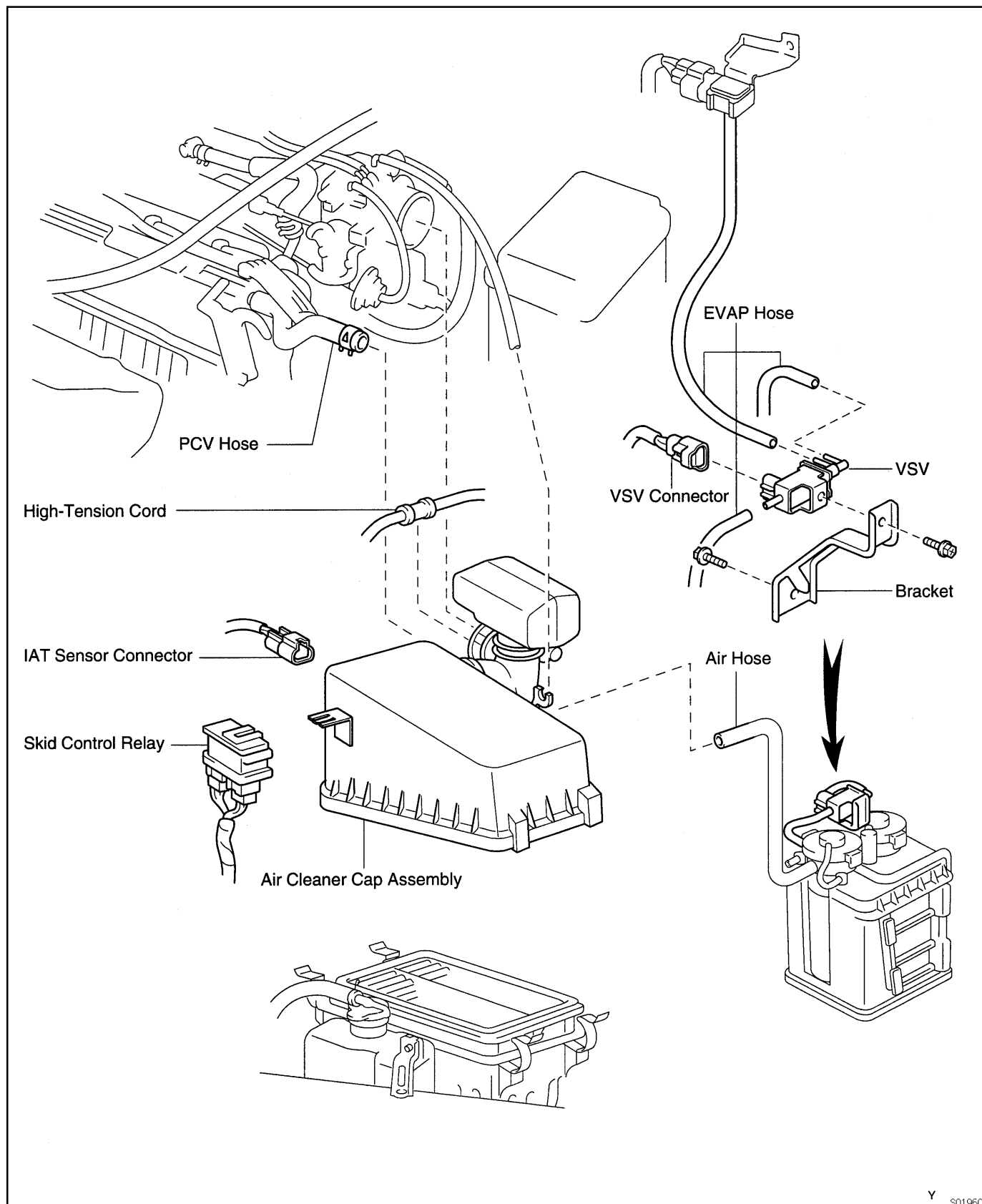
- (c) Check that air flows from ports E to F.

If operation is not as specified, replace the VSV.

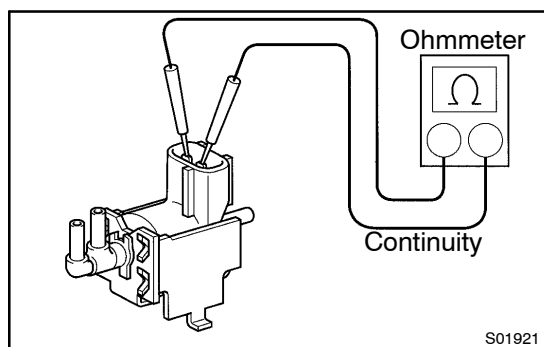
7. REINSTALL VSV
8. REINSTALL AIR CLEANER CAP ASSEMBLY

VSV FOR VAPOR PRESSURE SENSOR COMPONENTS

SF0R5-03



Y S01960



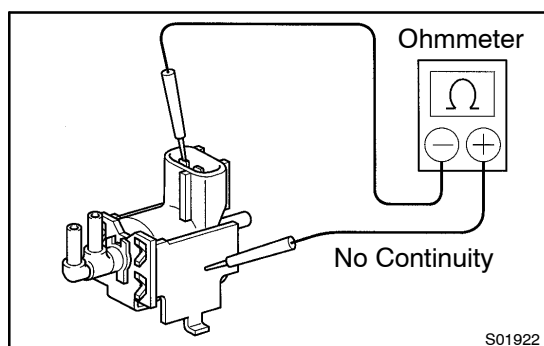
INSPECTION

1. REMOVE AIR CLEANER CAP ASSEMBLY (See page [ST-4](#))
2. REMOVE VSV
3. INSPECT VSV
4. INSPECT VSV FOR OPEN CIRCUIT

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

Resistance: At 20°C (68°F): 33 – 39 Ω

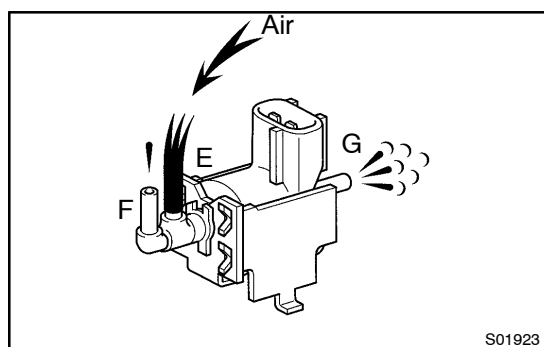
If there is no continuity, replace the VSV.



5. INSPECT VSV FOR GROUND

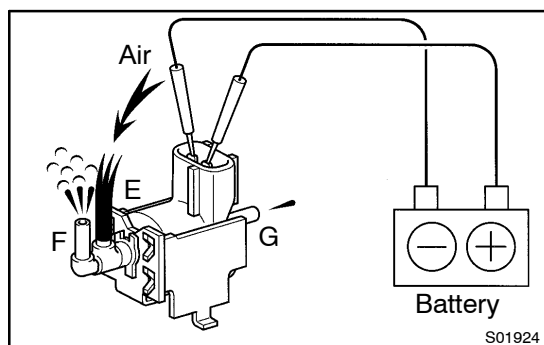
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



6. INSPECT VSV OPERATION

- (a) Check that the air flows from ports E to G.



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

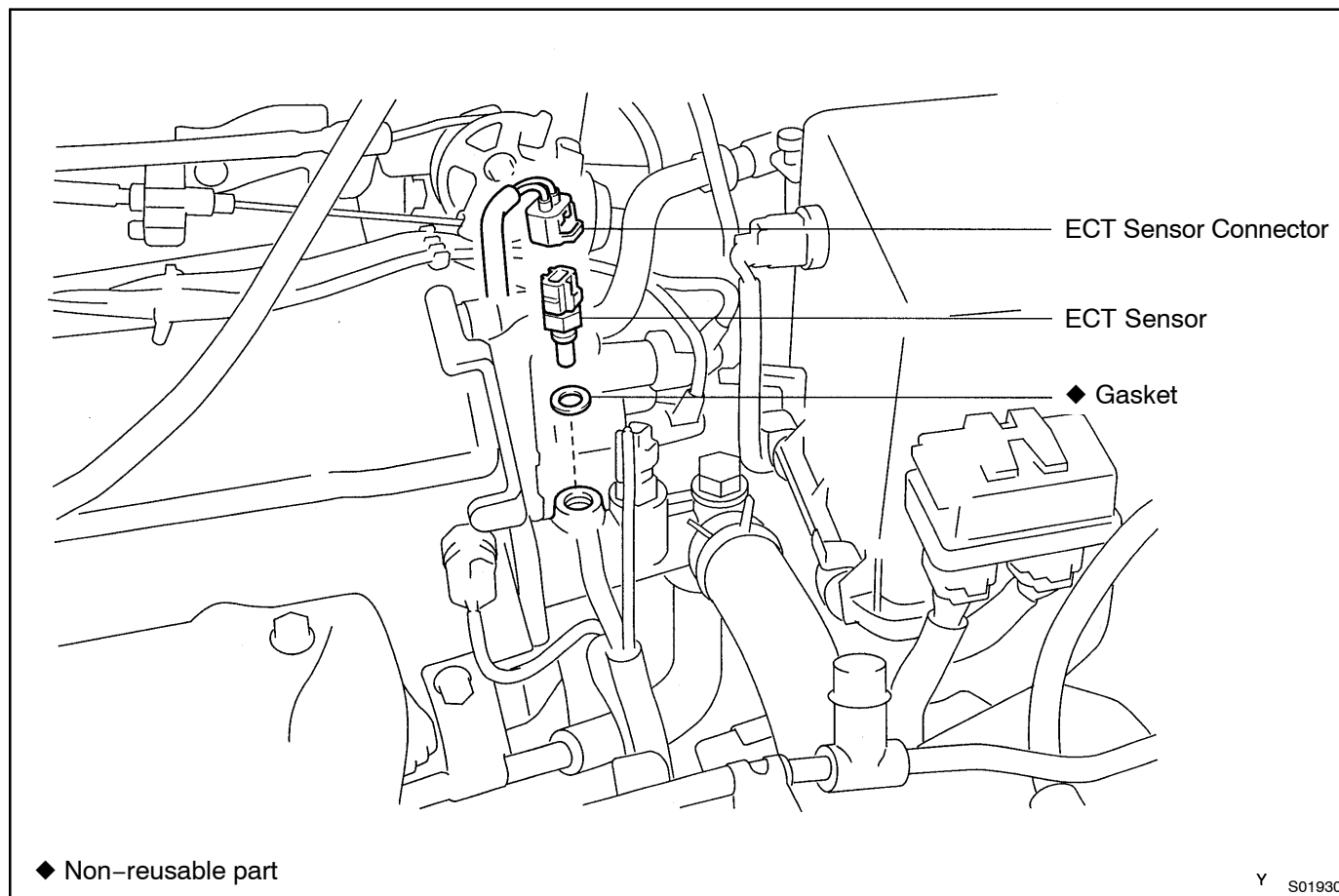
- (c) Check that the air flows from ports E to F.

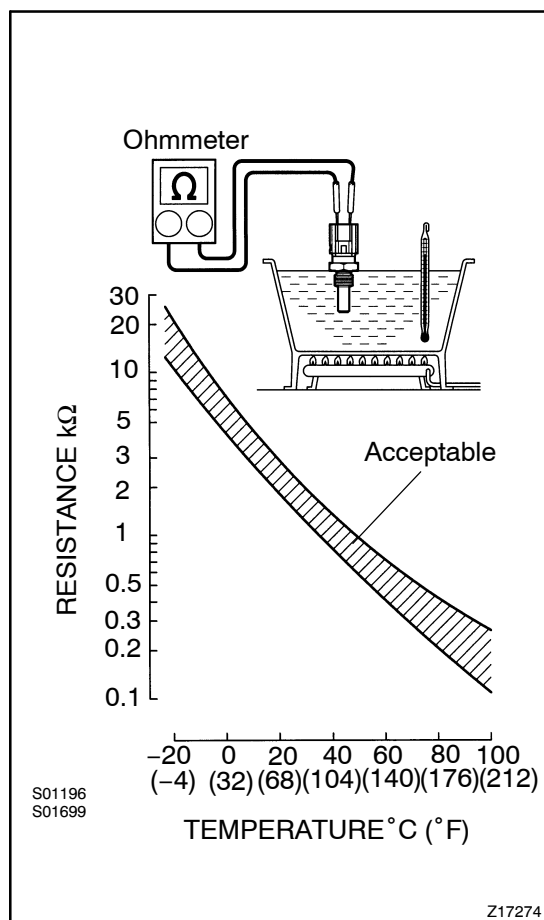
If operation is not as specified, replace the VSV.

7. REINSTALL VSV
8. REINSTALL AIR CLEANER CAP ASSEMBLY

ENGINE COOLANT TEMPERATURE (ECT) SENSOR COMPONENTS

SF0R7-01





INSPECTION

1. **DRAIN ENGINE COOLANT**
2. **REMOVE ECT SENSOR**
3. **INSPECT ECT SENSOR RESISTANCE**

Using an ohmmeter, measure the resistance between the terminals.

Resistance: Refer to the graph

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

4. **REINSTALL ECT SENSOR**

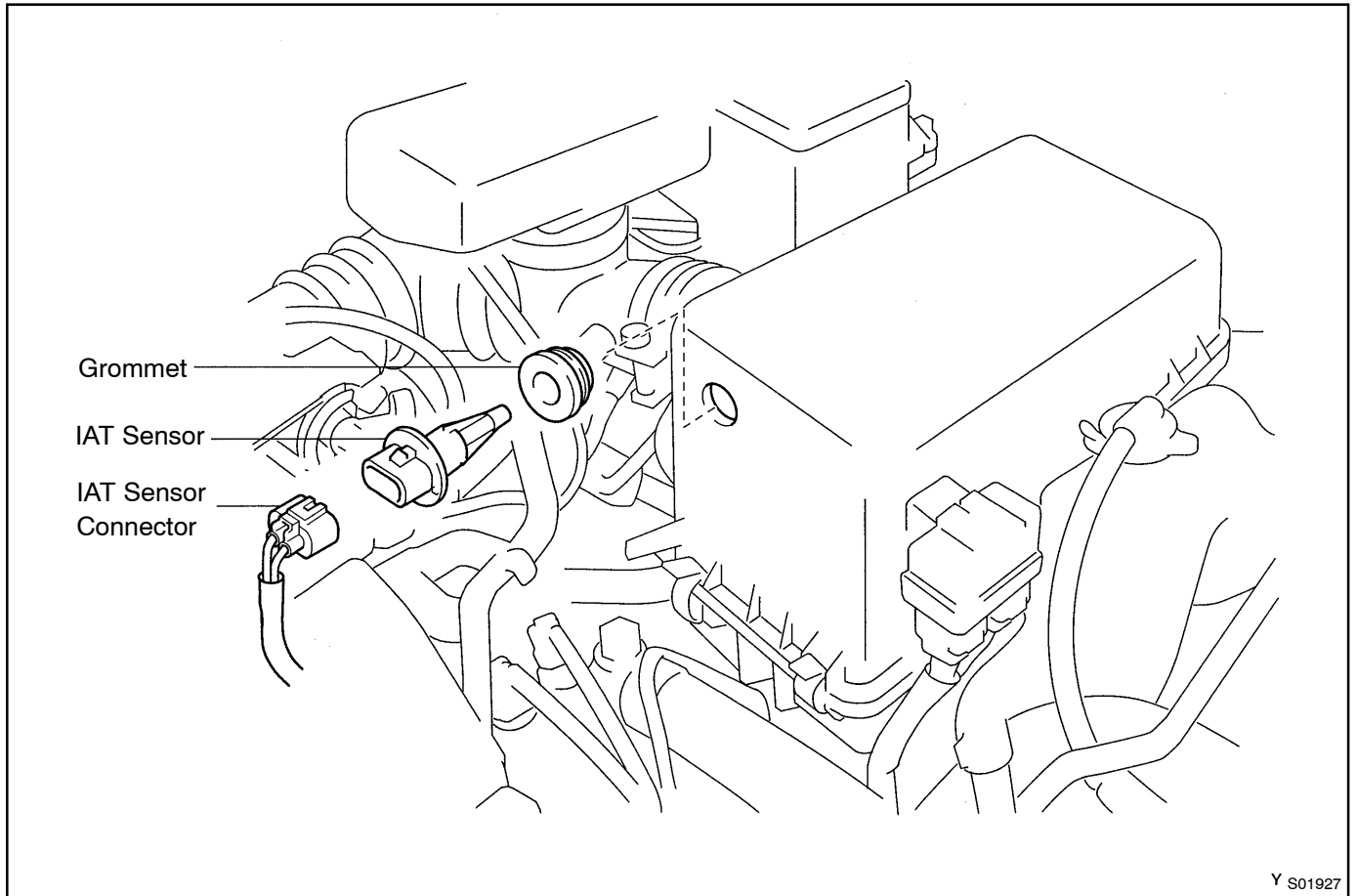
Install a new gasket to the ECT sensor.

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

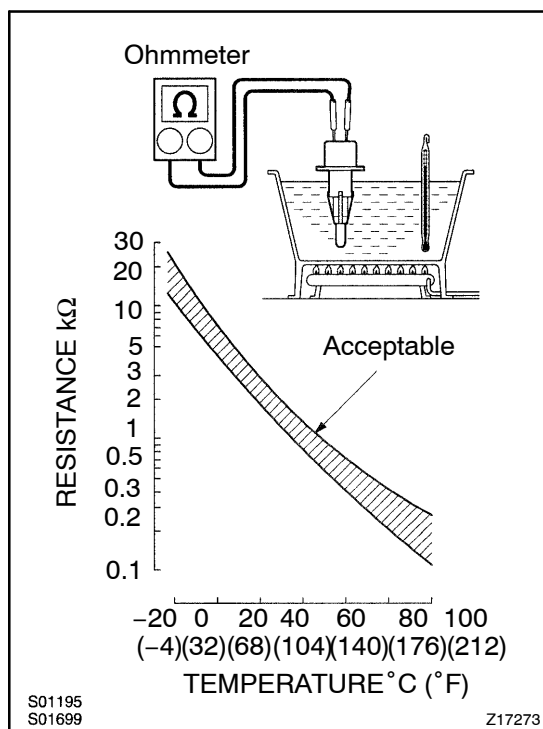
5. **FILL WITH ENGINE COOLANT**

INTAKE AIR TEMPERATURE (IAT) SENSOR COMPONENTS

SF0R9-01



Y S01927



INSPECTION

1. REMOVE IAT SENSOR
2. INSPECT IAT SENSOR RESISTANCE

Using an ohmmeter, measure the resistance between the terminals.

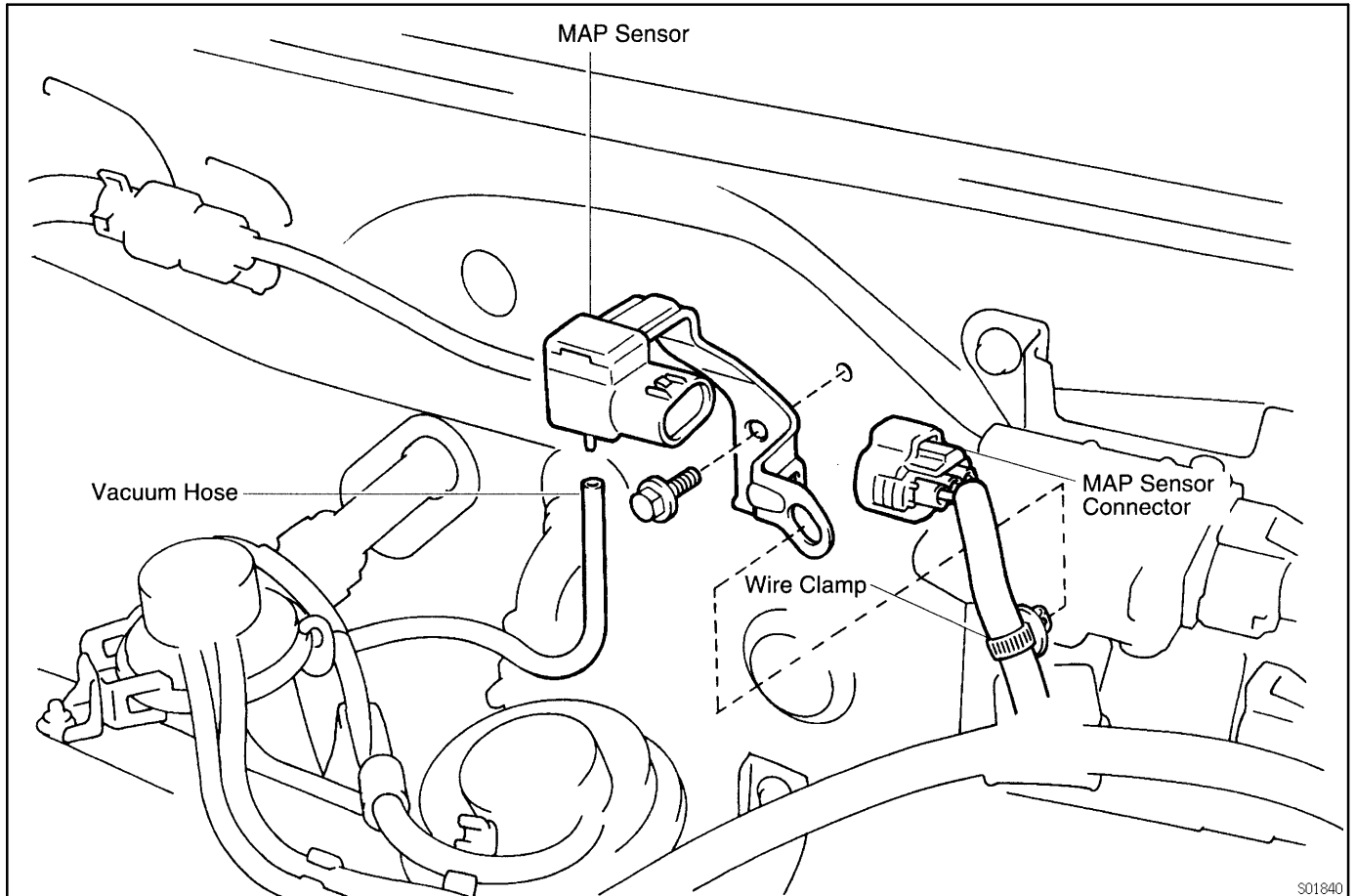
Resistance: Refer to the graph

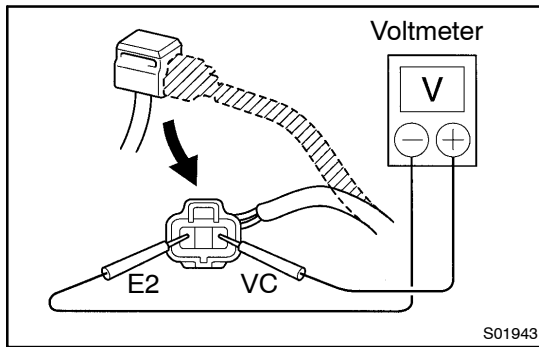
If the resistance is not as specified, replace the sensor.

3. REINSTALL IAT SENSOR

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR COMPONENTS

SF0RB-02





INSPECTION

1. INSPECT POWER SOURCE VOLTAGE OF MAP SENSOR

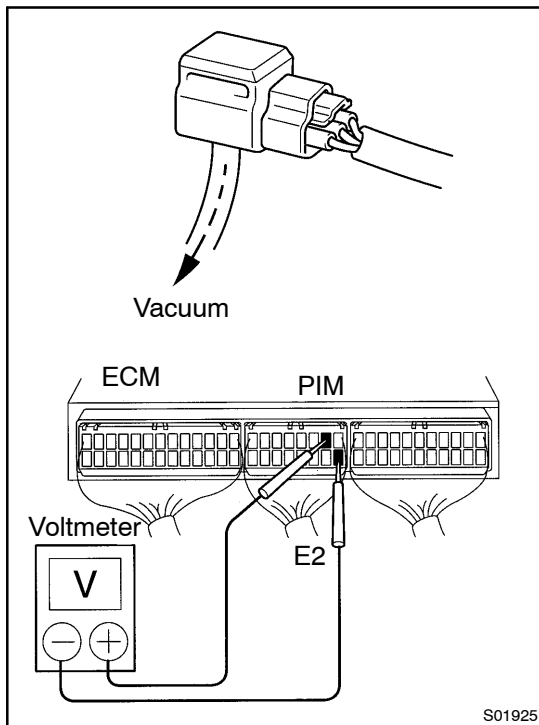
- Disconnect the MAP sensor connector.
- Turn the ignition switch ON.
- Using a voltmeter measure the voltage between connector terminals VC and E2 of the wiring harness side.

Voltage: 4.5 – 5.5 V

- Turn the ignition switch to LOCK.
- Reconnect the MAP sensor connector.

2. INSPECT POWER OUTPUT OF MAP SENSOR

- Turn the ignition switch ON.
- Disconnect the vacuum hose on the air intake chamber side.



- Connect a voltmeter to terminals PIM and E2 of the ECM, and measure the output voltage under ambient atmospheric pressure.
- Apply vacuum to the MAP sensor in 13.3 kPa (100 mmHg, 3.94 in.Hg) segments to 66.7 kPa (500 mmHg, 19.69 in.Hg).
- Measure the voltage drop from step (c) above for each segment.

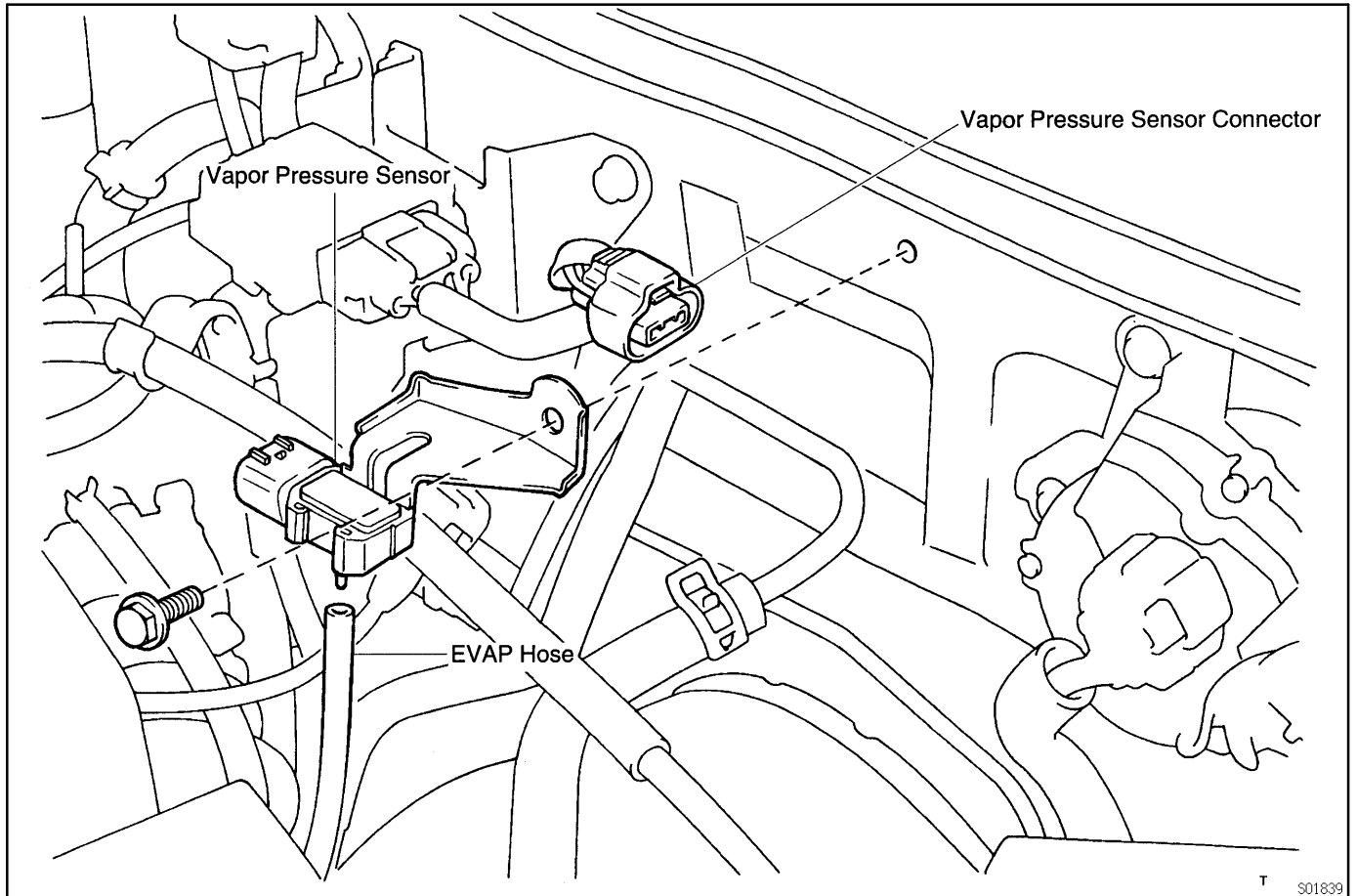
Voltage drop

Applied Vacuum kPa mmHg in.Hg	13.3 (100 3.94)	26.7 (200 7.87)	40.0 (300 11.81)	53.5 (400 15.75)	66.7 (500 19.69)
Voltage drop V	0.3 – 0.5	0.7 – 0.9	1.1 – 1.3	1.5 – 1.7	1.9 – 2.1

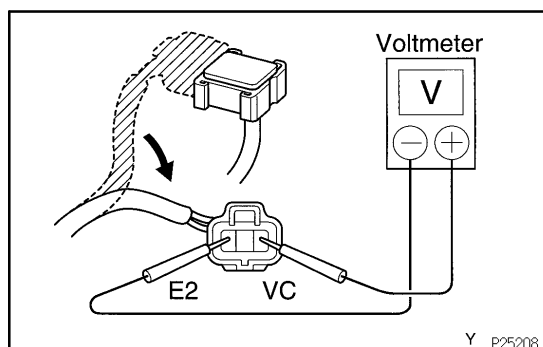
- Reconnect the vacuum hose to the air intake chamber.

VAPOR PRESSURE SENSOR COMPONENTS

SFORD-03



S01839



INSPECTION

1. INSPECT POWER SOURCE VOLTAGE OF VAPOR PRESSURE SENSOR

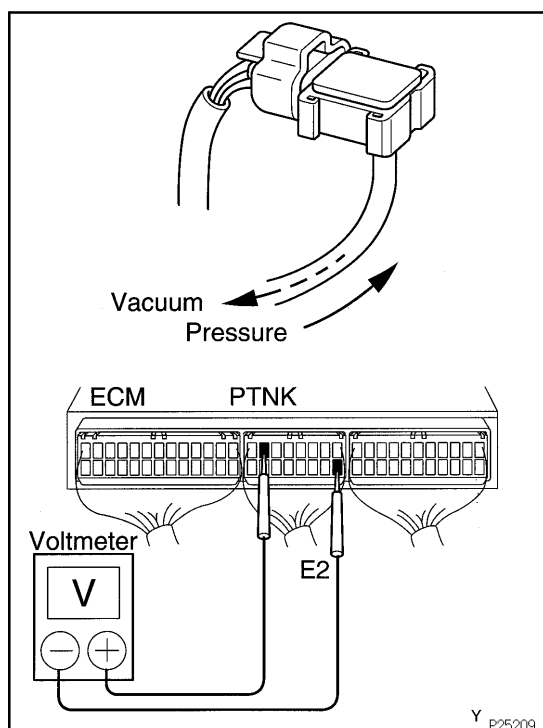
- Disconnect the vapor pressure sensor connector.
- Turn the ignition switch ON.
- Using a voltmeter, measure the voltage between connector terminals VC and E2 of the wiring harness side.

Voltage: 4.5 – 5.5 V

- Turn the ignition switch to LOCK.
- Reconnect the vapor pressure sensor connector.

2. INSPECT POWER OUTPUT OF VAPOR PRESSURE SENSOR

- Turn the ignition switch ON.
- Disconnect the EVAP hose from the vapor pressure sensor.



- Connect a voltmeter to terminals PTNK and E2 of the ECM, and measure the output voltage under the following conditions:

- Apply vacuum (2.0 kPa, 15 mmHg, 0.59 in.Hg) to the vapor pressure sensor.

Voltage: 1.3 – 2.1 V

- Release the vacuum from the vapor pressure sensor.

Voltage: 3.0 – 3.6 V

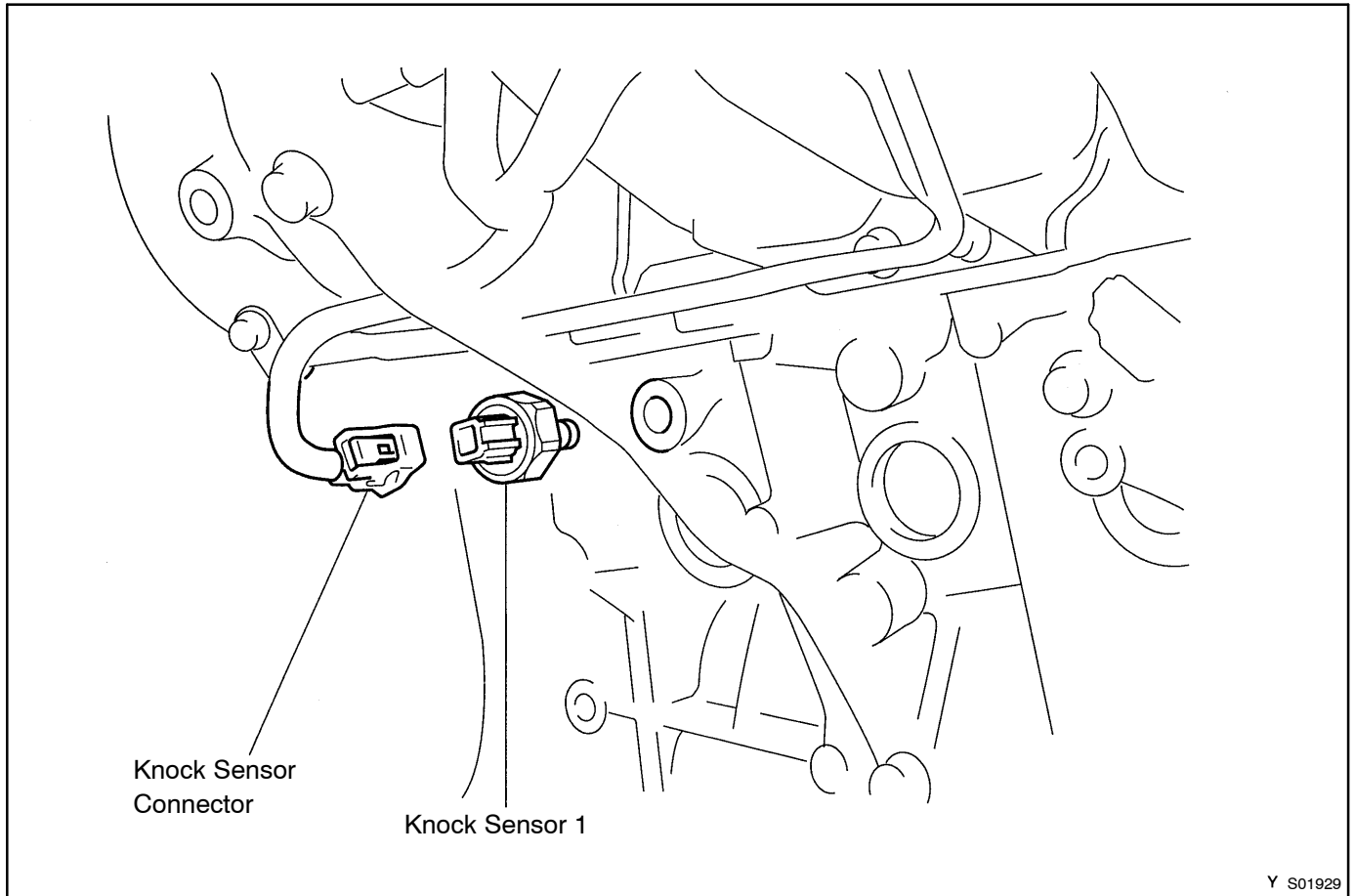
- Apply pressure (1.5 kPa, 15 gf/cm², 0.22 psi) to the vapor pressure sensor.

Voltage: 4.2 – 4.8 V

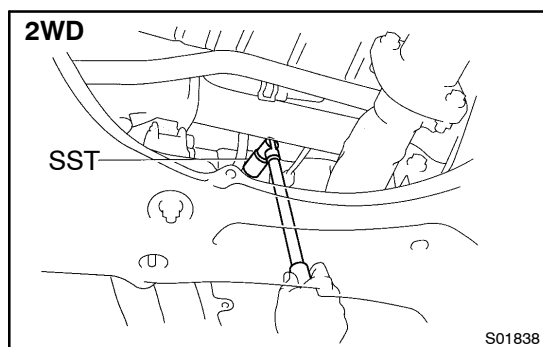
- Reconnect the EVAP hose to the vapor pressure sensor.

KNOCK SENSOR COMPONENTS

SF0RF-01



Y S01929



INSPECTION

1. **4WD:**
REMOVE ENGINE AND TRANSAXLE ASSEMBLY (See page [EM-68](#))

2. **REMOVE KNOCK SENSOR**

- (a) Disconnect the knock sensor connector.
 - (b) Using SST, remove the knock sensor.

SST 09816-30010

Torque: 44 N·m (450 kgf·cm, 33 ft·lbf)

3. **INSPECT KNOCK SENSOR**

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

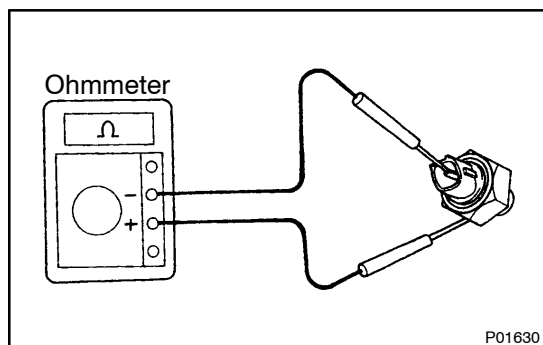
If there is continuity, replace the sensor.

4. **REINSTALL KNOCK SENSOR**

Installation is in the reverse order of removal.

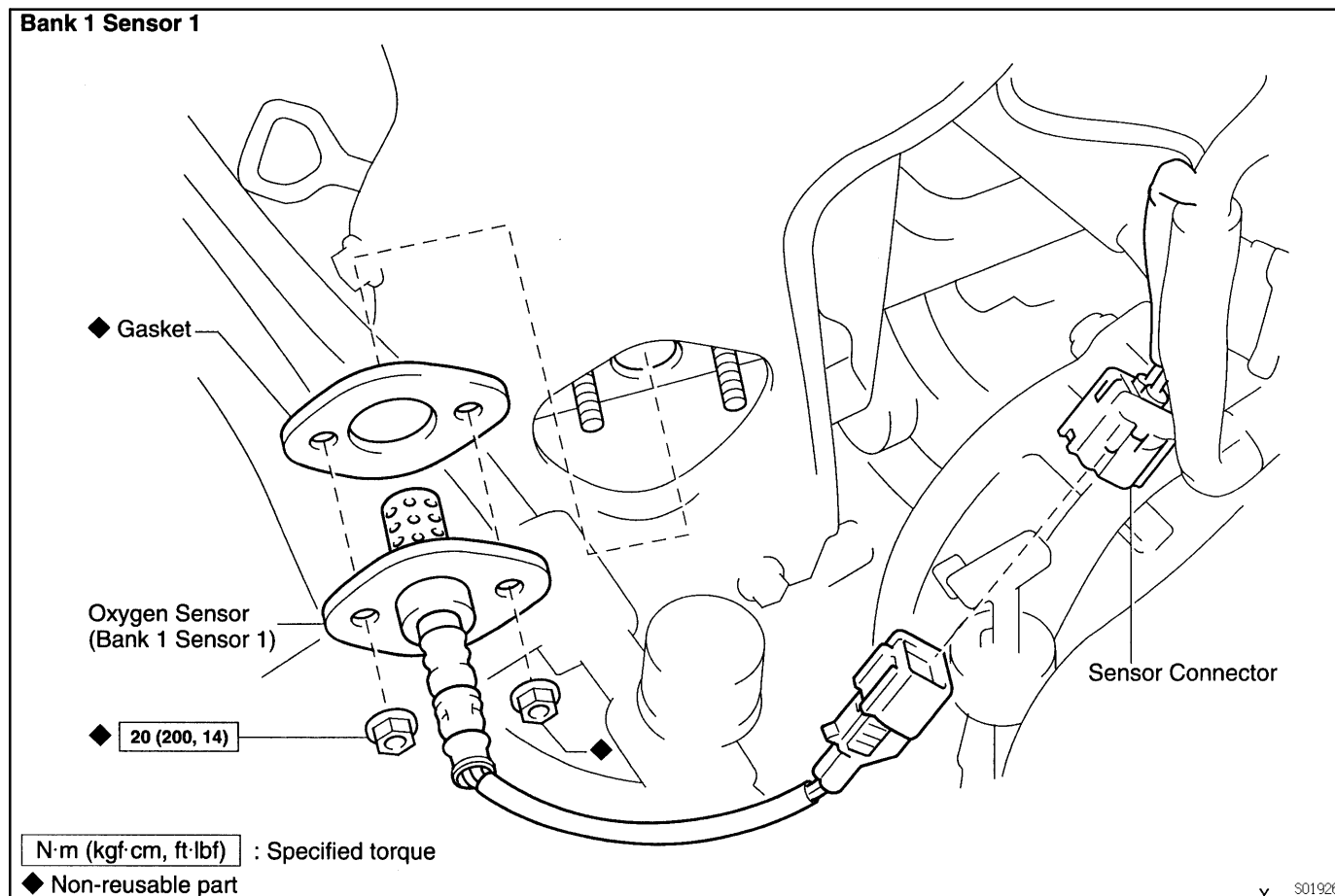
5. **4WD:**

REINSTALL ENGINE AND TRANSAXLE ASSEMBLY
(See page [EM-74](#))

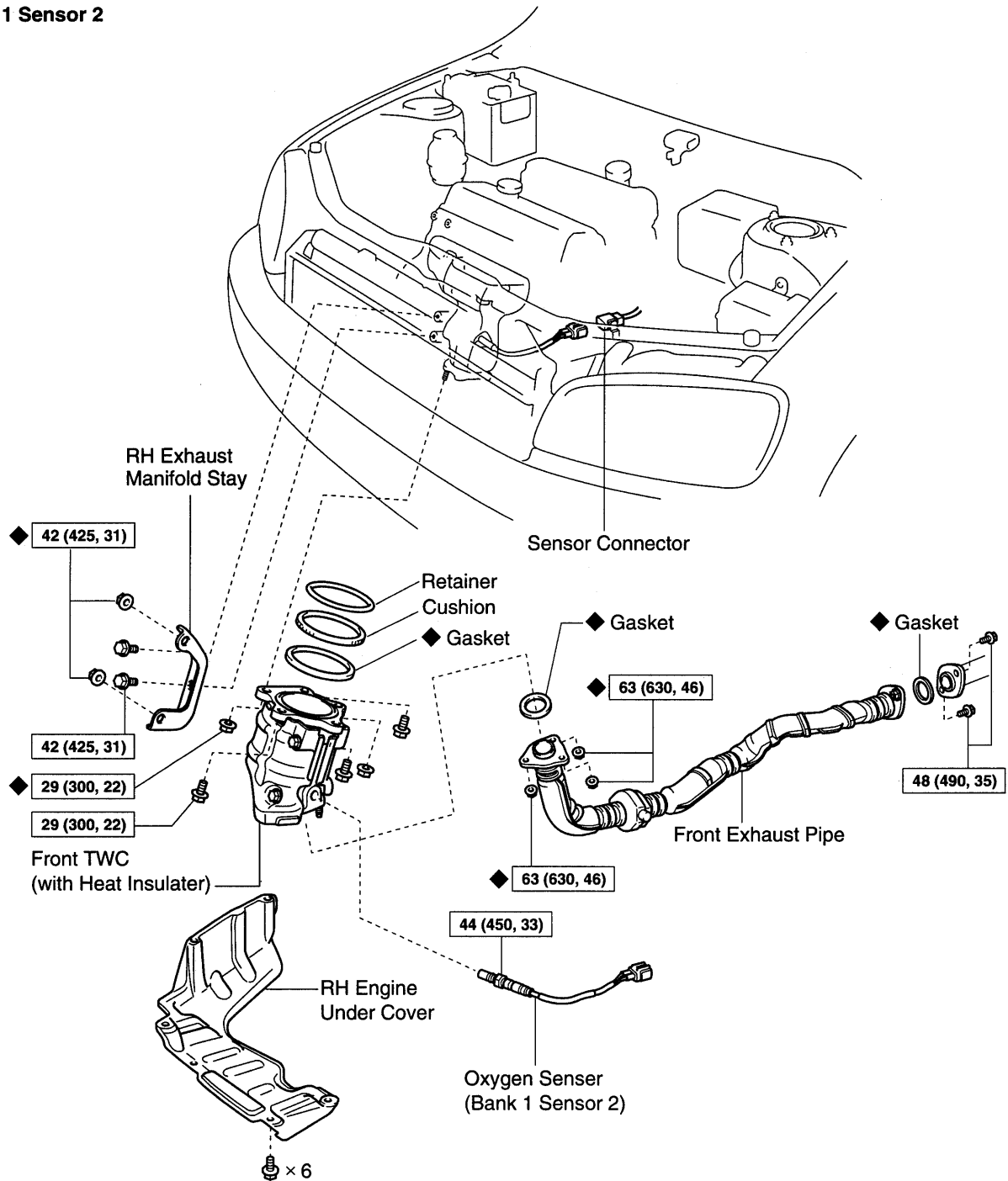


HEATED OXYGEN SENSOR COMPONENTS

SF1QB-01



Bank 1 Sensor 2



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

◆ Non-reusable part

Y S01931

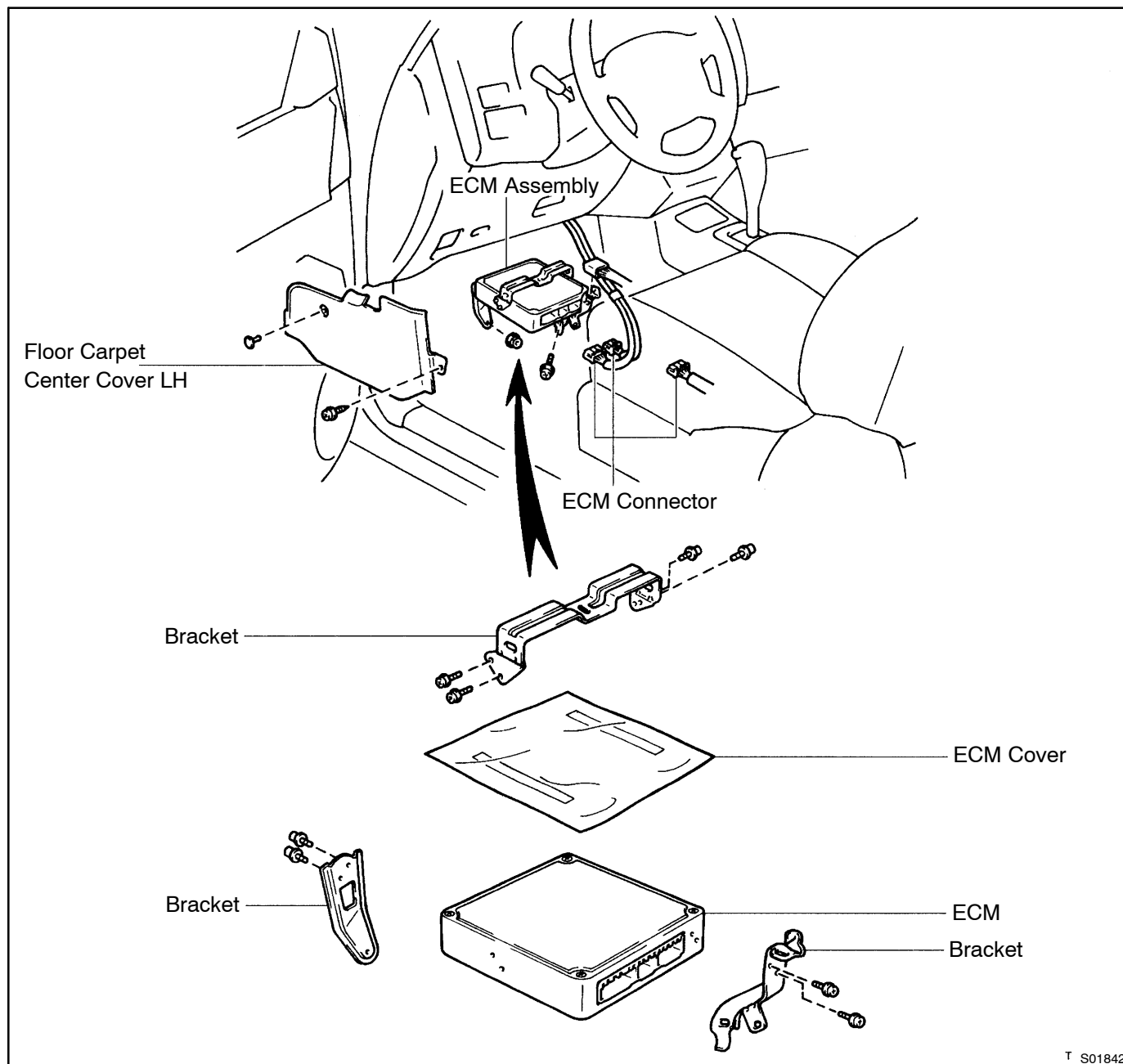
INSPECTION

Bank 1 sensor 1, 2:

INSPECT OPERATION OF OXYGEN SENSOR (See page [DI-42](#))

ENGINE CONTROL MODULE (ECM) COMPONENTS

SF0RK-01



T S01842

INSPECTION

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

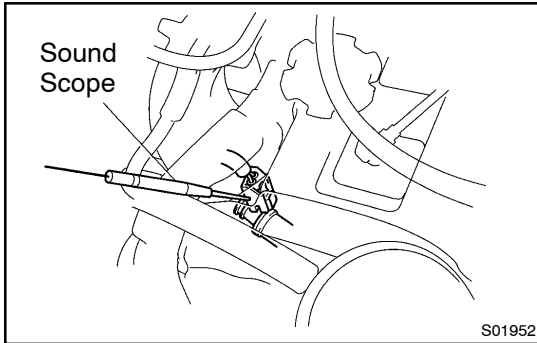
FUEL CUT RPM INSPECTION

SFORM-02

1. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

2. CONNECT TOYOTA HAND-HELD TESTER OR OBD II SCAN TOOL (See page [SF-1](#))



3. INSPECT FUEL CUT-OFF PRM

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

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