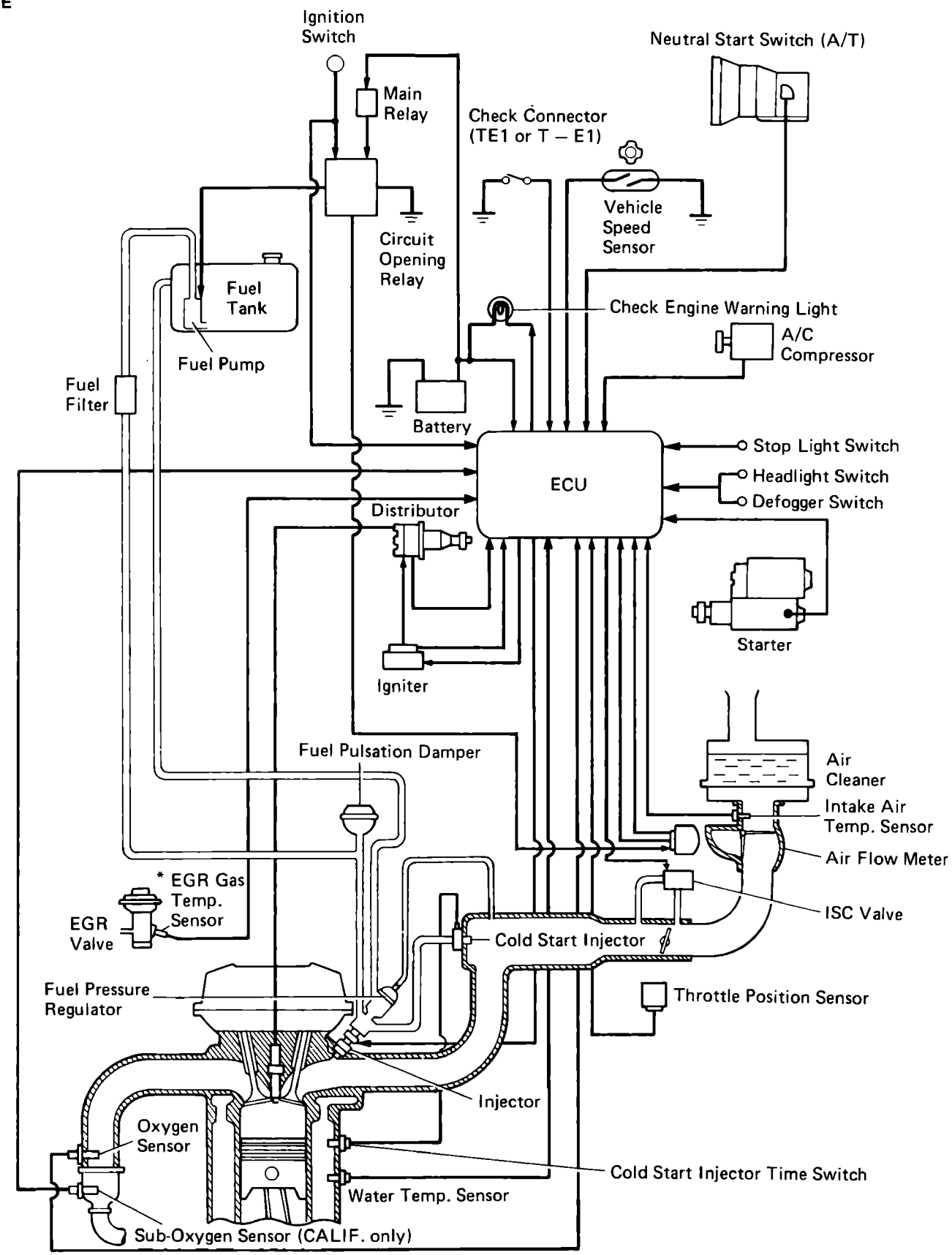
EFI SYSTEM

SYSTEM DESCRIPTION

3S-FE

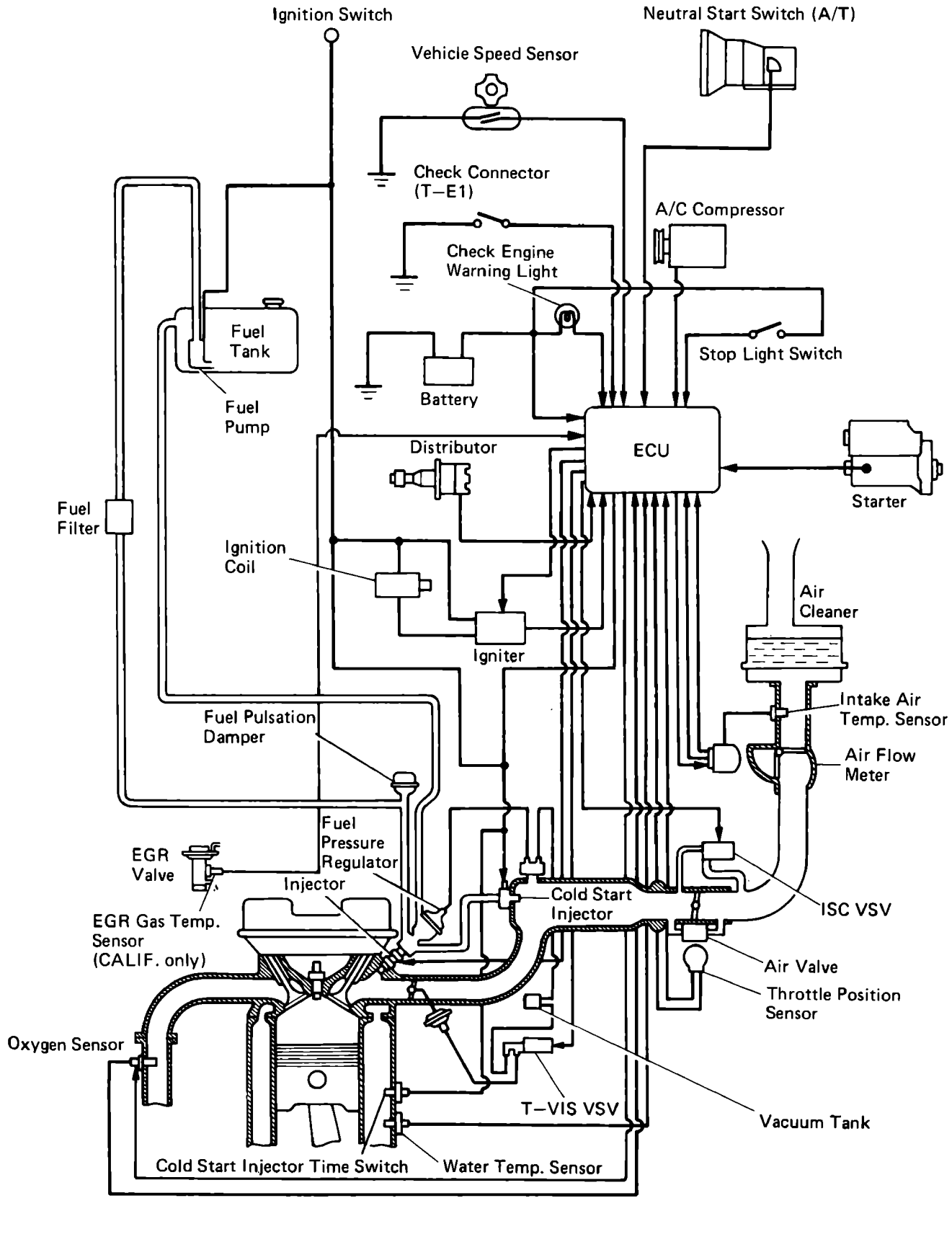


* CALIF. only

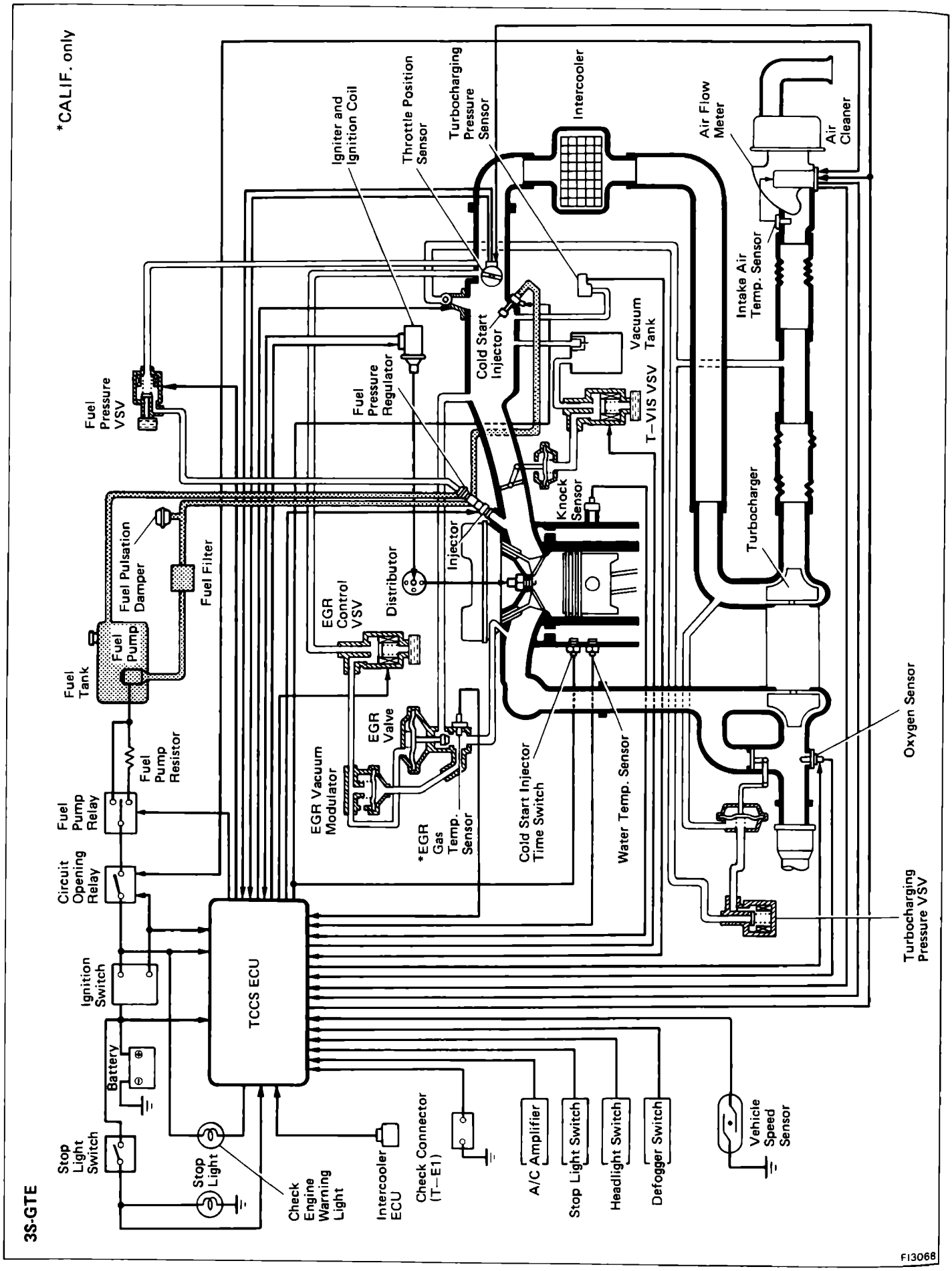
FI3850

SYSTEM DESCRIPTION (Cont'd)

3S-GE



SYSTEM DESCRIPTION (Cont'd)



The EFI system is composed of there basic sub-systems: Fuel, Air Induction and Electronic Control System.

FUEL SYSTEM

Fuel is supplied under constant pressure to the EFI injectors by an electric fuel pump. The injectors inject a metered quantity of fuel into the intake manifold in a accordance with signals from the ECU (Electronic Control Unit).

AIR INDUCTION SYSTEM

The air induction system provides sufficient air for engine operation.

ELECTRONIC CONTROL SYSTEM

The camry 3S-FE, 3S-GE and 3S-GTE engines are equipped with a Toyota Computor Control System (TCCS) which centrally controls the EFI, ESA, ISC, Diagnosis systems etc. by means of an Electronic Control Unit (ECU-formerly EFI computer) employing a microcomputer.

By means of the ECU, the TCCS controls the following functions:

1. Electronic Fuel Injection (EFI)

   The ECU receives signals from various sensors indicating changing engine operation conditions such as:
   - Intake air volume
   - Intake air temperature
   - Coolant temperature
   - Engine rpm
   - Acceleration/deceleration
   - Exhaust oxygen content etc.

   The signals are utilized by the ECU to determine the injection duration necessary for an optimum air-fuel ratio.

2. Electronic Spark Advance (ESA)

   The ECU is programmed with data for optimum ignition timing under any and all operating conditions. Using data provided by sensors which monitor various engine functions (rpm, coolant temperature, etc.), the microcomputer (ECU) triggers the spark at precisely the right instant. (See IG section)

3. Idle Speed Control (ISC) (3S-FE and 3S-GTE)

   The ECU is programmed with target idling speed values to respond to different engine conditions (coolant temperature, air conditioner ON/OFF, etc.). Sensors transmit signals to the ECU which control the flow of air through the by-pass of the throttle valve and adjust idle speed to the target value. (See page FI-44, 127 or 64, 129)

4. Diagnosis

   The ECU detects any malfunctions abnormalties in the sensor network and lights a check engine warning light on the instrument panel. At the same time, the trouble is identified and a diagnosis code is recorded by the ECU. The diagnosis code can be read by the number of blinks of the check engine warning light when terminals TE1 and E1 are connected. The diagnostic codes are refer to the later page. (See page FI-25 or 27)

5. Fail-safe Function

   In the event of the sensor malfunctioning, a back-up circuit will take over to provide minimal driveability, and the check engine warning light.

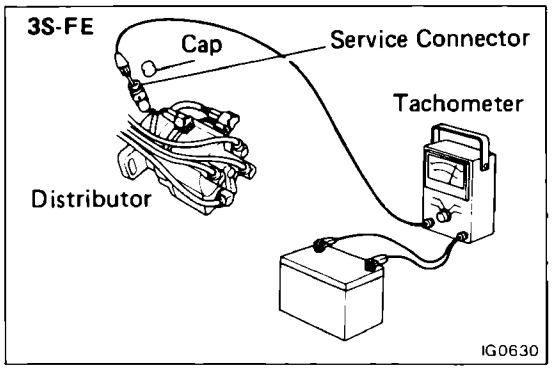
PRECAUTIONS

1. **Before working on the fuel system, disconnect the cable from negative (−) terminal of the battery.**

   NOTE: Any diagnostic code retained by the computer will be erased when the battery terminal is removed. Therefore, if necessary, read the diagnosis before removing the battery terminal.

2. **Do not smoke or work on open flame when working on the fuel system.**

3. **Keep gasoline off rubber or leather parts.**



INSPECTION PRECAUTIONS

MAINTENANCE PRECAUTIONS

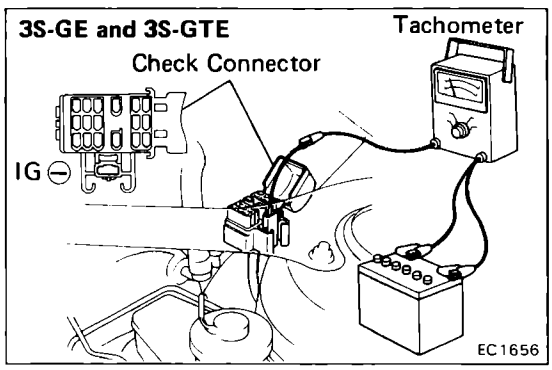
1. **CHECK CORRECT ENGINE TUNE-UP**
   (See page EM-11)

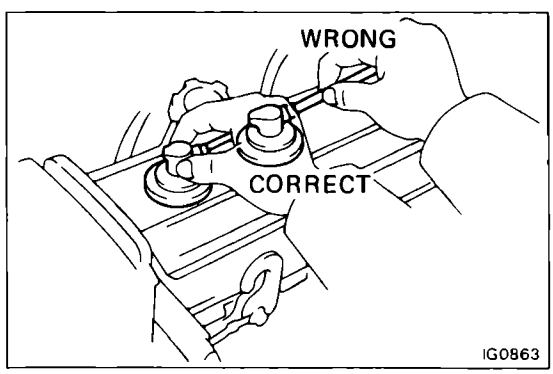
2. **PRECAUTIONS WHEN CONNECTING GAUGE**

   (a) Use the battery as the power source for the timing light, tachometer, etc.

   (b) (3S-FE)
   Connect the test probe of a tachometer to the service connector of the distributor.

   (c) (3S-GE and 3S-GTE)
   Connect the test probe of a tachometer to the terminal IG⊖ of the check connector.





3. **IN EVENT OF ENGINE MISFIRE THE FOLLOWING PRECAUTIONS SHOULD BE TAKEN**

   (a) Check proper connection of battery terminals, etc.

   (b) Handle high-tension cords carefully.

   (c) After repair work, check that the ignition coil terminals and all other ignition system lines are reconnected securely.

   (d) When cleaning the engine compartment, be especially careful to protect the electrical system from water.

4. **PRECAUTIONS WHEN HANDLING OXYGEN SENSOR(S)**

   (a) Do not allow oxygen sensor to drop or hit against an object.

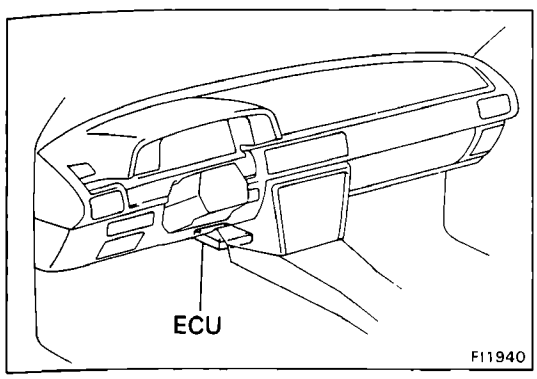
   (b) Do not allow the sensor to come into contact with water.

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

The ECU has been designed so that it will not be affected by outside interference.

However, if your vehicle is equipped with a CB radio transceiver, etc. (even one with about 10 W output), it may, at times, have an affect upon ECU operation, especially if the antenna and feeder are installed nearby.

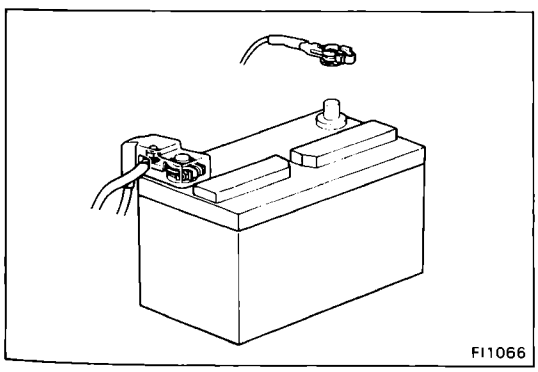
Therefore, observe the following precautions:



1. Install the antenna as far as possible from the ECU. The ECU is located under the radio so the antenna should be installed at the rear side of the vehicle.
2. Keep the antenna feeder as far away as possible from the ECU wires — at least 20 cm (7.87 in.) — and, especially, do not wind them together.
3. Check that the feeder and antenna are properly adjusted.
4. Do not equip your vehicle with a powerful mobile radio system.
5. Do not open the cover or the case of the ECU unless absolutely necessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)

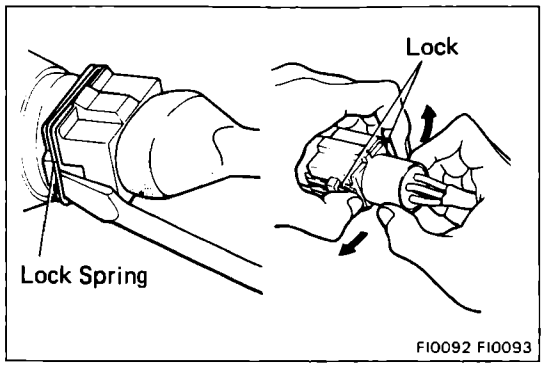
AIR INDUCTION SYSTEM

1. Separation of the engine oil dipstick, oil filler cap, PCV hose, etc. may cause the engine to run out of tune.
2. 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.

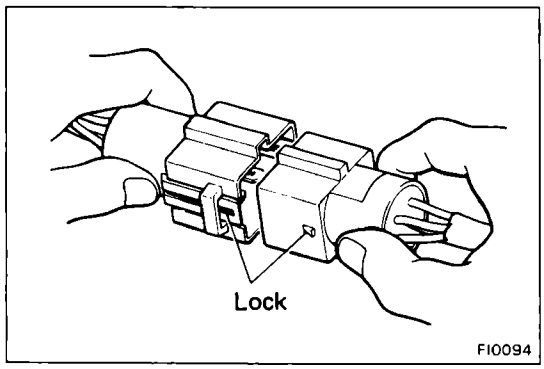


ELECTRONIC CONTROL SYSTEM

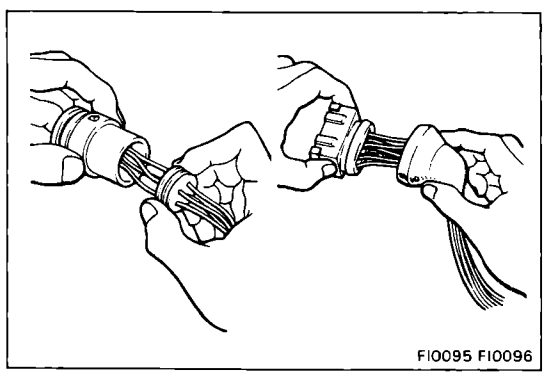
1. Before removing EFI wiring connectors, terminals, etc., first disconnect the power by either turning the ignition switch OFF or disconnecting the battery terminals.
2. When installing the battery, be especially careful not to incorrectly connect the positive (+) and negative (—) cables.
3. Do not permit parts to receive a severe impact during removal or installation. Handle all EFI parts carefully, especially the ECU.
4. Do not be careless during troubleshooting as there are numerous transistor circuits and even slight terminal contact can cause further troubles.
5. Do not open the ECU cover.
6. When inspecting during rainy weather, take care to prevent entry of water. Also, when washing the engine compartment, prevent water from getting on the EFI parts and wiring connectors.
7. Parts should be replaced as an assembly.



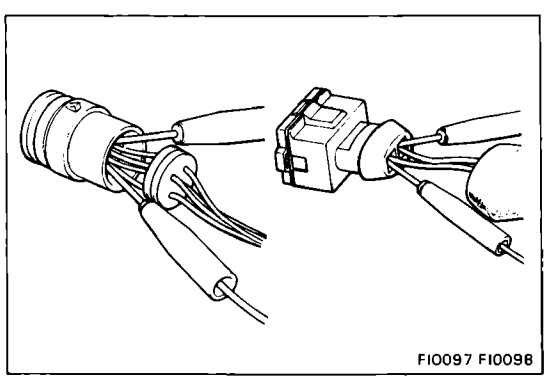
8. Care is required when pulling out and inserting wiring connectors.
   (a) Release the lock and pull out the connector, pulling on the connectors.



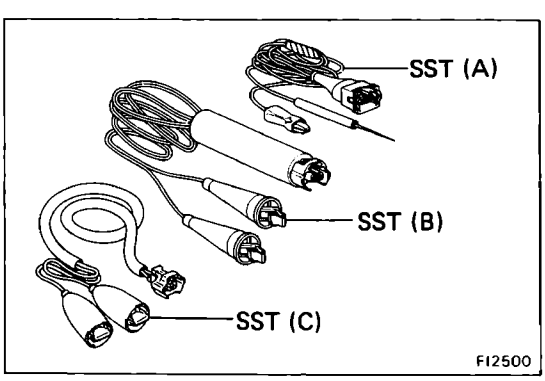
   (b) Fully insert the connector and check that it is locked.



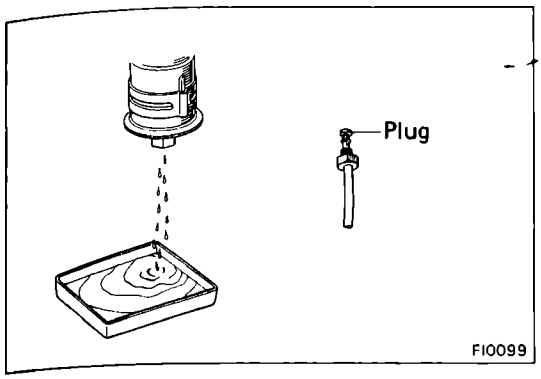
9. When inspecting a connector with a volt/ohmmeter.
   (a) Carefully take out the water-proofing rubber if it is a water-proof type connector.



   (b) Insert the test probe into the connector from wiring side when checking the continuity, amperage or voltage.
   (c) Do not apply unnecessary force to the terminal.
   (d) After checking, install the water-proofing rubber on the connector securely.

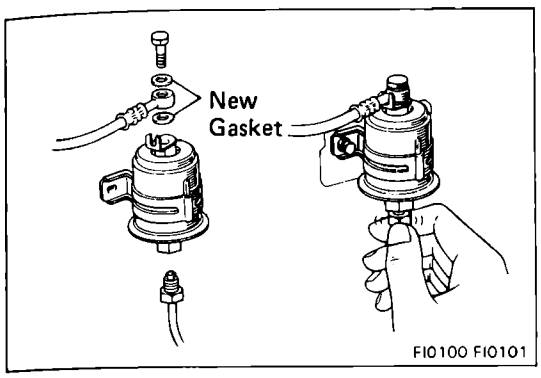


10. Use SST for inspection or test of the injector, cold start injector or its wiring connector.
    SST 3S-FE and 3S-GE
    09842-30050(A) and 09842-30070(B)
    3S-GTE 09842-30050(A) and 09842-30060(C)

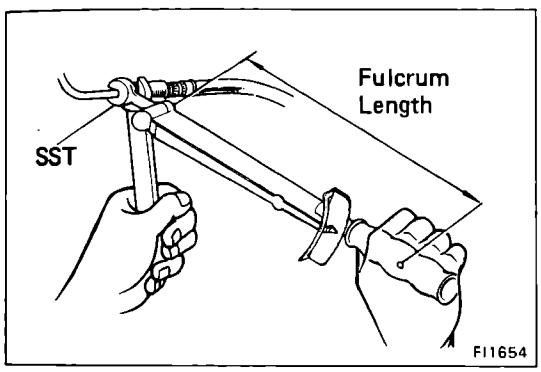


FUEL SYSTEM

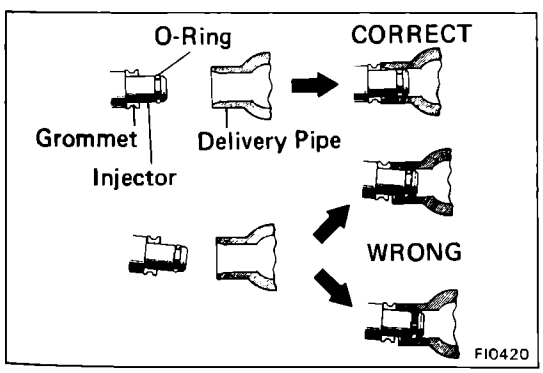
1. When disconnecting the high fuel pressure line, a large amount of gasoline will spill out, so observe the following procedure:
   (a) Put a a container under the connection.
   (b) Slowly loosen the connection.
   (c) Disconnect the connection.
   (d) Plug the connection with a rubber plug.



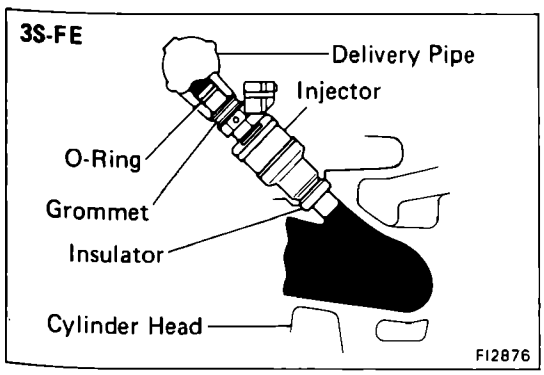
2. When connecting the flare nut or union bolt on the high pressure pipe union, observe the following procedure:
   (Union Bolt Type)
   (a) Always use a new gasket.
   (b) Tighten the union bolt by hand.
   (c) Tighten the union bolt to the specified torque.
   Torque: 300 kg-cm (22 ft-lb, 29 N·m)



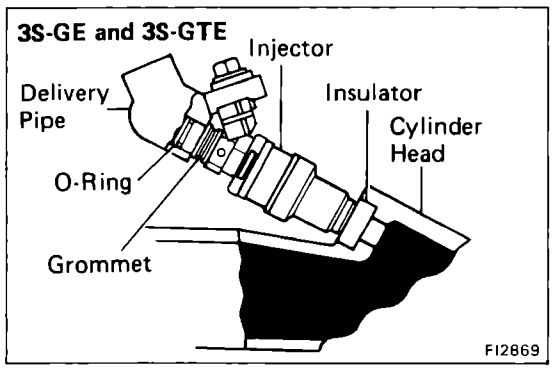
   (Flare Nut Type)
   (a) Apply a light coat of engine oil the flare and tighten the flare nut by hand.
   (b) Using SST, tighten the flare nut to specified torque.
   SST 09631-22020
   Torque: 310 kg-cm (22 ft-lb, 30 N·m)
   NOTE: Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).

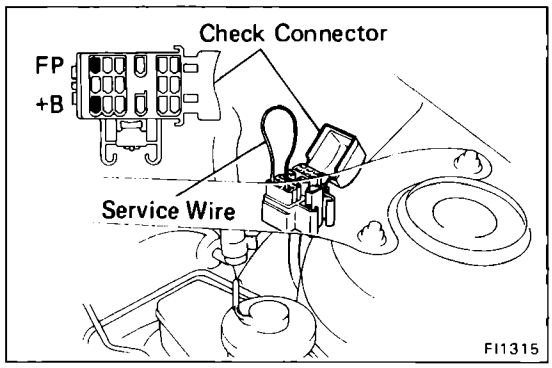


3. Observe the following precautions when removing and installing the injectors.
   (a) Never reuse the O-ring.
   (b) When placing a new O-ring on the injector, take care not to damage it in any way.
   (c) Coat a new O-ring with spindle oil or gasoline before installing — never use engine, gear or brake oil.

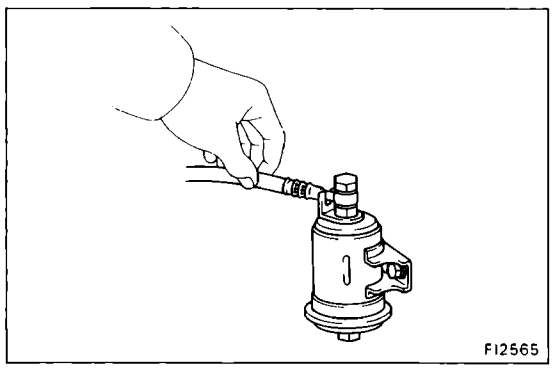


4. Install the injector to delivery pipe and intake manifold as shown in the figure.





5. Check that there are no fuel leaks after performing any maintenance on the fuel system.
   (a) With engine stopped, turn the ignition switch ON.
   (b) Using a service wire, connect terminals +B and FP of the check connector.



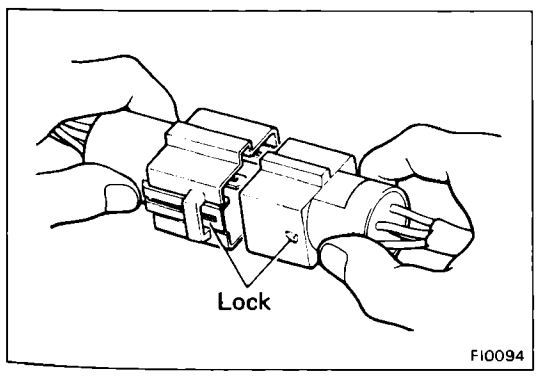
   (c) When the fuel return hose is pinched, the pressure within high pressure line will rise to approx. 4 kg/cm² (57 psi, 392 kPa). In this state, check to see that there are no leaks from any part of the fuel system.

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

TROUBLESHOOTING

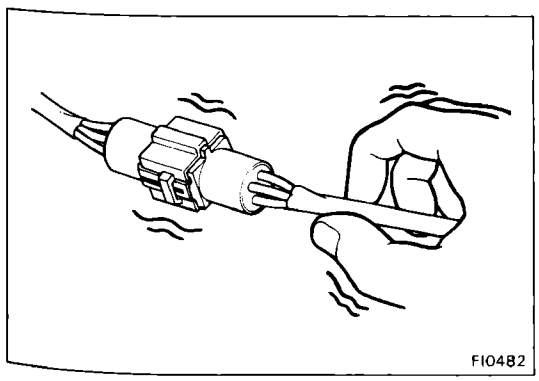
TROUBLESHOOTING HINTS

1. Engine troubles is usually not caused by the EFI system. When troubleshooting, always first check the condition of the other systems.
   (a) Electronic source
      • Battery
      • Fusible links
      • Fuses
   (b) Body ground
   (c) Fuel supply
      • Fuel leakage
      • Fuel filter
      • Fuel pump
   (d) Ignition system
      • Spark plugs
      • High-tension cords
      • Distributor
      • Ignition coil
      • Igniter
   (e) Air induction system
      • Vacuum leaks
   (f) Emission control system
      • PCV system
      • EGR system
   (g) Others
      • Ignition timing (ESA system)
      • Idle speed (ISC system)
      • etc.

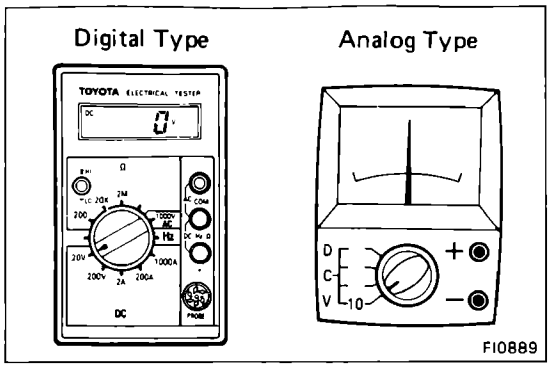


2. The most frequent cause of problems is simply a bad contact in wiring connectors. Always check that connections are secure.

   When inspecting the connector, pay particular attention to the following points:
   (a) Check to see that the terminals are not bent.
   (b) Check to see that the connector is pushed in completely and locked.
   (c) Check to see that there is no signal change when the connector is slightly tapped or wiggled.



3. Troubleshoot sufficiently for other causes before replacing the ECU, as the ECU is of high quality and it is expensive.



4. Use a volt/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting of the electrical circuit. (See page FI-32)

TROUBLESHOOTING PROCEDURES

SYMPTOM — DIFFICULT TO START OF NO START (ENGINE WILL NOT CRANK OR CRANKS SLOWLY)

CHECK ELECTRONIC SOURCE → BAD →
1. Battery
   (1) Connection
   (2) Gravity — Drive belt — Charging system
   (3) Voltage

OK ↓

CHECK STARTING SYSTEM → BAD →
1. Ignition switch
2. Neutral start switch (A/T)
3. Clutch start switch (M/T)
4. Starter relay (M/T)
5. Starter
6. Wiring/Connection

SYMPTOM — DIFFICULT TO START OR NO START (CRANKS OK)

CHECK DIAGNOSIS SYSTEM
Check for output of diagnosis code. (See page FI-24) → Malfunction code(s) →
Diagnostic code(s) (See page FI-27 or 29)

Normal code ↓

(3S-FE AND 3S-GTE) DOES ENGINE START WITH ACCELERATOR PEDAL DEPRESSED ? → OK →
ISC system
   (1) ISC valve
   (2) Wiring connection

NO ↓

CHECK FOR VACUUM LEAKS IN AIR INTAKE LINE → BAD →
1. Oil filler cap
2. Oil dipstick
3. Hose connection(s)
4. PCV hose(s)
5. EGR system — EGR valve stays open

OK ↓

CHECK IGNITION SPARK
(See page IG-5 or 9) → BAD →
1. High-tension cords
2. Distributor
3. Ignition coil
4. Igniter

OK CONTINUED ON PAGE FI-13

OK CONTINUED FROM PAGE FI-12

CHECK SPARK PLUGS

Standard:

3S-FE and 3S-GE
1.1 mm (0.043 in.)

3S-GTE 0.8 mm (0.031 in.)

NOTE: Check compression pressure and valve clearance if necessary.

NO →
1. Spark plugs
2. Compression pressure
   Minimum (at 250 rpm):
   3S-FE and 3S-GT
   10.0 kg/cm² (142 psi, 981 kPa)
   3S-GTE 9.0 kg/cm² (128 psi, 883 kPa)
3. Valve clearance (Cold)
   Standard:
   3S-FE IN 0.19 – 0.29 mm (0.007 – 0.011 in.)
   EX 0.28 – 0.38 mm (0.011 – 0.015 in.)
   3S-GE and 3S-GTE
   IN 0.15 – 0.25 mm (0.006 – 0.010 in.)
   EX 0.20 – 0.30 mm (0.008 – 0.012 in.)

BAD (All Plugs WET) →
1. Injector(s) – Shorted or leaking
2. Cold start injector – leakage (See page FI-80, 83 or 86)
3. Injector wiring – short circuited
4. Cold start injector time switch (See page FI-139)

OK

(3S-GE)
CHECK AIR VALVE
(See page FI-131)

BAD →
1. Air valve
2. Water by-pass hose(s)
3. Air hose(s)

OK

CHECK FUEL SUPPLY TO INJECTOR
1. Fuel tank
2. Fuel pressure in fuel line
   (1) Connect terminals +B and FP of the check connector.
   (2) Fuel pressure at fuel hose of fuel filter can be felt.
   (See page FI-72)

BAD →
1. Fuel line – leakage – deformation
2. Fuse(s)
3. Fuel pump (See page FI-70)
4. Fuel filter
5. Fuel pressure regulator (See page FI-89, 91 or 93)

OK

CHECK FUEL PUMP SWITCH IN AIR FLOW METER
Check continuity between terminals FC and E1 while measuring plate of air flow meter is open.

BAD → Air flow meter (See page FI-113)

OK CONTINUED TO PAGE FI-14

OK CONTINUED FROM PAGE FI-13

CHECK IGNITION TIMING
1. Connect terminals TE1 (3S-FE CALIF.) or T (others) and E1 of the check connector.
2. Check ignition timing.
   Standard: 10° BTDC @ idle

BAD → Ignition timing — Adjust (See page IG-17 or 20)

OK

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER
(See page FI-32)

BAD →
1. Wiring connection
2. Power to ECU
   (1) Fusible link(s)
   (2) Fuse(s)
   (3) EFI main relay (See page FI-135)
3. Air flow meter (See page FI-113)
4. Water temp. sensor (See page FI-140)
5. Air temp. sensor (See page FI-113)
6. Injection signal circuit
   (1) Injector wiring
   (2) ECU (See page FI-151)

SYMPTOM — ENGINE OFTEN STALLS

CHECK DIAGNOSIS SYSTEM
Check for output of diagnosis code.
(See page FI-24)

Malfunction code(s) → Diagnostic code(s) (See page FI-27 or 29)

Normal code

CHECK FOR VACUUM LEAKS IN AIR INTAKE LINE

BAD →
1. Oil filler cap
2. Oil dipstick
3. Hose connection(s)
4. PCV hose(s)
5. EGR system — EGR valve stays open

OK

CHECK FUEL SUPPLY TO INJECTOR
1. Fuel tank
2. Fuel pressure in fuel line
   (1) Short terminals +B and FP of the check connector.
   (2) Fuel pressure at fuel hose of fuel filter can be felt.
   (See page FI-72)

BAD →
1. Fuel line — leakage — deformation
2. Fuse(s)
3. Fuel pump (See page FI-70)
4. Fuel filter
5. Fuel pressure regulator
   (See page FI-89, 91 or 93)

OK

CHECK AIR FILTER

BAD → Element — Clean or replace

OK CONTINUED TO PAGE FI-15

OK CONTINUED FROM PAGE FI-14

CHECK IDLE SPEED
Standard: 3S-FE 700 ± 50 rpm
3S-GE 750 rpm
3S-GTE 750 ± 50 rpm

BAD →
1. ISC system
   (1) Wiring connection(s)
   (2) ISC valve (See page FI-127 or 129)
   (3) ECU (test by substitution)
2. (3S-FE and 3S-GE)
   Idle speed — Adjust
   (See page EM-20 or MA-7)

OK ↓

CHECK IGNITION TIMING
1. Connect terminals TE1 (3S-FE CALIF.) or T (others) and E1 of the check connector.
2. Check ignition timing.
   Standard: 10° BTDC @ idle

NO →
Ignition timing — Adjust
(See page IG-17 or 20)

OK ↓

CHECK SPARK PLUGS
Standard:
3S-FE and 3S-GE
1.1 mm (0.043 in.)
3S-GTE 0.8 mm (0.031 in.)
NOTE: Check compression pressure and valve clearance if necessary.

NO →
1. Spark plugs
2. Compression pressure
   Minimum (at 250 rpm):
   3S-FE and 3S-GE
   10.0 kg/cm² (142 psi, 981 kPa)
   3S-GTE 9.0 kg/cm² (128 psi, 883 kPa)
3. Valve clearance (Cold)
   Standard:
   3S-FE IN 0.19 — 0.29 mm (0.007 — 0.011 in.)
   EX 0.28 — 0.38 mm (0.011 — 0.015 in.)
   3S-GE and 3S-GTE
   IN 0.15 — 0.25 mm (0.006 — 0.009 in.)
   EX 0.20 — 0.30 mm (0.008 — 0.012 in.)

OK ↓

CHECK COLD START INJECTOR
(See page FI-80, 83 or 86)

BAD →
1. Cold start injector
   (See page FI-80, 83 or 86)
2. Cold start injector time switch
   (See page FI-139)

OK ↓

(3S-GE)
CHECK AIR VALVE
(See page FI-131)

BAD →
1. Air valve
2. Water by-pass hose(s)
3. Air hose(s)

OK ↓

CHECK FUEL PRESSURE
(See page FI-72)

BAD →
1. Fuel pump (See page FI-70)
2. Fuel filter
3. Fuel pressure regulator
   (See page FI-89, 91 or 93)

OK CONTINUED TO PAGE FI-16

OK CONTINUED FROM PAGE FI-15

CHECK INJECTORS
(See page FI-95, 100 or 105)
→ BAD → Injection condition

OK

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER
(See page FI-32)
→ BAD →
1. Wiring connection(s)
2. Power to ECU
   (1) Fusible link(s)
   (2) Fuse(s)
   (3) EFI main relay (See page FI-135)
3. Air flow meter (See page FI-113)
4. Water temp. sensor (See page FI-140)
5. Air temp. sensor (See page FI-113)
6. Injection signal circuit
   (1) Injector wiring
   (2) ECU (See page FI-151)

SYMPTOM — ENGINE SOMETIMES STALLS

CHECK DIAGNOSIS SYSTEM
Check for output of diagnosis code.
(See page FI-24)
→ Malfunction code(s) → Diagnostic code(s)
(See page FI-27 or 29)

Normal code

CHECK AIR FLOW METER
(See page FI-113)
→ BAD → Air flow meter

OK

CHECK WIRING CONNECTORS AND RELAYS
Check for signal change when the connector or relay is slightly tapped or wiggled.
→ BAD →
1. Connector(s)
2. EFI main relay (See page FI-135)
3. Circuit opening relay (See page FI-136)

SYMPTOM — ROUGH IDLING AND/MISSING

CHECK DIAGNOSIS SYSTEM
Check for output of diagnosis code.
(See page FI-24)
→ Malfunction code(s) → Diagnostic code(s)
(See page FI-27 or 29)

Normal code

CHECK FOR VACUUM LEAKS IN AIR INTAKE LINE
→ BAD →
1. Oil filler cap
2. Oil dipstick
3. Hose connection(s)
4. PCV hose(s)
5. EGR system — EGR valve stays open

OK

CHECK AIR FILTER
→ BAD → Element — Clean or replace

OK CONTINUED TO PAGE FI-17

OK CONTINUED FROM PAGE FI-16

CHECK IDLE SPEED
Standard: 3S-FE 700 ± 50 rpm
3S-GE 750 rpm
3S-GTE 750 ± 50 rpm

BAD →
1. ISC system
   (1) Wiring connection(s)
   (2) ISC valve (See page FI-127 or 129)
   (3) ECU (test by substitution)
2. (3S-FE and 3S-GE)
   Idle speed — Adjust
   (See page EM-20 or MA-7)

OK

CHECK IGNITION TIMING
1. Connect terminals TE1 (3S-FE CALIF.) or T (others) and E1 of the check connector.
2. Check ignition timing.
   Standard: 10° BTDC @ idle

NO →
Ignition timing — Adjust
(See page IG-17 or 20)

OK

CHECK SPARK PLUGS
Standard:
3S-FE and 3S-GE
1.1 mm (0.043 in.)
3S-GTE 0.8 mm (0.031 in.)
NOTE: Check compression pressure and valve clearance if necessary.

NO →
1. Spark plugs
2. Compression pressure
   Minimum (at 250 rpm):
   3S-FE and 3S-GE
   10.0 kg/cm² (142 psi, 981 kPa)
   3S-GTE 9.0 kg/cm² (128 psi, 883 kPa)
3. Valve clearance (Cold)
   Standard:
   3S-FE IN 0.19 — 0.29 mm (0.007 — 0.011 in.)
   EX 0.28 — 0.38 mm (0.011 — 0.015 in.)
   3S-GE and 3S-GTE
   IN 0.15 — 0.25 mm (0.006 — 0.010 in.)
   EX 0.20 — 0.30 mm (0.008 — 0.012 in.)

OK

(3S-GE AND 3S-GTE)
CHECK INTAKE AIR CONTROL VALVE

BAD →
1. VSV for intake air control valve
   (See page FI-141)
2. Vacuum leaks

OK

CHECK COLD START INJECTOR
(See page FI-80, 83 or 86)

BAD →
1. Cold start injector
   (See page FI-80, 83 or 86)
2. Cold start injector time switch
   (See page FI-139)

OK

CHECK FUEL PRESSURE
(See page FI-72)

BAD →
1. Fuel pump (See page FI-70)
2. Fuel filter
3. Fuel pressure regulator
   (See page FI-89, 91 or 93)

OK CONTINUED TO PAGE FI-18

OK CONTINUED FROM PAGE FI-17

CHECK INJECTORS
(See pages FI-95, 100 or 105)

BAD → Injection condition

OK

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER
(See page FI-32)

BAD →
1. Wiring connection(s)
2. Power to ECU
   (1) Fusible link(s)
   (2) Fuse(s)
   (3) EFI main relay (See page FI-135)
3. Air flow meter (See page FI-113)
4. Water temp. sensor (See page FI-140)
5. Air temp. sensor (See page FI-113)
6. Injection signal circuit
   (1) Injector wiring
   (2) ECU (See page FI-151)
7. Oxygen sensor(s)
   (See page FI-148 or 150)

SYMPTOM — HIGH ENGINE SPEED (NO DROP)

NOTE (3S-FE): Disconnecting the battery will cause the idling speed data in the ISC to be returned to the initial idling speed, causing the idling speed to rise above 700 rpm, Should this happen, either carry out a driving test, including stop-go several times at a speed above 10 km/h, or start the engine, idle for 30 seconds and then turn the engine off repeatedly. By doing this, idle data will be stored in the ISC and the idle rpm will be at specified value.

CHECK ACCELERATOR LINKAGE

BAD → Linkage — Struck

OK

CHECK AIR CONDITIONER IDLE-UP CIRCUIT

BAD → Air valve for air conditioner — Leakage

OK

CHECK DIAGNOSIS SYSTEM
Check for output of diagnosis code.
(See page FI-24)

Malfunction code(s) → Diagnostic code(s)
(See page FI-27 or 29)

Normal code

(3S-FE AND 3S-GTE)
CHECK ISC SYSTEM

BAD →
1. Wiring connection(s)
2. ISC valve (See page FI-127 or 129)
3. Air conditioner switch

OK

CHECK THROTTLE POSITION SENSOR
(See pages FI-115, 119 or 123)

BAD → Throttle body

OK CONTINUED TO PAGE FI-19

OK CONTINUED FROM PAGE FI-18

CHECK FUEL PRESSURE
(See page FI-72)

BAD → 1. Fuel pump (See page FI-70)
2. Fuel filter
3. Fuel pressure regulator
(See page FI-89, 91 or 93)

OK

CHECK COLD START INJECTOR
(See page FI-80, 83 or 86)

BAD → Cold start injector

OK

CHECK INJECTORS
(See page FI-95, 100 or 105)

BAD → Injector(s) — leakage, Injection quantity

OK

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER
(See page FI-32)

BAD → 1. Wiring connection(s)
2. Power to ECU
(1) Fusible link(s)
(2) Fuse(s)
(3) EFI main relay (See page FI-135)
3. Air flow meter (See pge FI-113)
4. Water temp. sensor (See page FI-140)
5. Air temp. sensor (See page FI-113)
6. Injection signal circuit
(1) Injector wiring
(2) ECU (See page FI-151)

SYMPTOM — ENGINE BACKFIRES-Lean Fuel Mixture

CHECK DIAGNOSIS SYSTEM
Check for output of diagnosis code.
(See page FI-24)

Malfunction code(s) → Diagnostic code(s)
(See page FI-27 or 29)

Normal code

CHECK FOR VACUUM LEAKS IN AIR INTAKE LINE

BAD → 1. Oil filler cap
2. Oil dipstick
3. Hose connection(s)
4. PCV hose(s)
5. EGR system — EGR valve stays open

OK

CHECK IGNITION TIMING
1. Connect terminals TE1 (3S-FE CALIF.) or T (others) and E1 of the check connector.
2. Check ignition timing.
Standard: 10° BTDC @ idle

NO → Ignition timing — Adjust
(See page IG-17 or 20)

OK CONTINUED TO PAGE FI-20

OK CONTINUED FROM PAGE FI-19

CHECK COLD START INJECTOR
(See page FI-80, 83 or 86)

BAD →
1. Cold start injector
   (See page FI-80, 83 or 86)
2. Cold start injector time switch
   (See page FI-139)

OK ↓

CHECK FUEL PRESSURE
(See page FI-72)

BAD →
1. Fuel pump (See page FI-70)
2. Fuel filter
3. Fuel pressure regulator
   (See page FI-89, 91 or 93)

OK ↓

CHECK INJECTORS
(See page FI-95, 100 or 105)

BAD → Injector — Clogged

OK ↓

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER
(See page FI-32)

BAD →
1. Wiring connection(s)
2. Power to ECU
   (1) Fusible link(s)
   (2) Fuse(s)
   (3) EFI main relay (See page FI-135)
3. Air flow meter (See page FI-113)
4. Water temp. sensor (See page FI-140)
5. Air temp. sensor (See page FI-113)
6. Injection signal circuit
   (1) Injector wiring
   (2) ECU (See page FI-151)
7. Oxygen sensor(s)
   (See pages FI-148 or 150)

SYMPTOM — MUFFLE EXPLOSION (AFTER FIRE)-Rich Fuel Misfire

CHECK DIAGNOSIS SYSTEM
Check for output of diagnosis code.
(See page FI-24)

Malfunction code(s) → Diagnostic code(s) (See pages FI-27 or 29)

Normal code ↓

CHECK IGNITION TIMING
1. Connect terminals TE1 (3S-FE CALIF.) or T (others) and E1 of the check connector.
2. Check ignition timing.
   Standard: 10° BTDC @ idle

NO → Ignition timing — Adjust
(See page IG-17 or 20)

OK ↓

CHECK COLD START INJECTOR
(See page FI-80, 83 or 86)

BAD →
1. Cold start injector
   (See page FI-80, 83 or 86)
2. Cold start injector time switch
   (See page FI-139)

OK CONTINUED TO PAGE FI-21

OK CONTINUED FROM PAGE FI-20

CHECK FUEL PRESSURE
(See page FI-72)

BAD → Fuel pressure regulator
(See page FI-89, 91 or 93)

OK

CHECK INJECTORS
(See page FI-95, 100 or 105)

BAD → Injector — Leakage

OK

CHECK SPARK PLUGS
Standard:
3S-FE and 3S-GE
1.1 mm (0.043 in.)
3S-GTE 0.8 mm (0.031 in.)
NOTE: Check compression pressure and valve clearance if necessary.

NO →
1. Spark plugs
2. Compression pressure
Minimum (at 250 rpm):
3S-FE and 3S-GE
10.0 kg/cm² (142 psi, 981 kPa)
3S-GTE 9.0 kg/cm² (128 psi, 883 kPa)
3. Valve clearance (Cold)
Standard:
3S-FE IN 0.19 — 0.29 mm (0.007 — 0.011 in.)
EX 0.28 — 0.38 mm (0.011 — 0.015 in.)
3S-GE and 3S-GTE
IN 0.15 — 0.25 mm (0.006 — 0.010 in.)
EX 0.20 — 0.30 mm (0.008 — 0.012 in.)

OK

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER
(See page FI-32)

BAD →
1. Throttle position sensor
(See page FI-115, 119 or 123)
2. Injection signal circuit
(1) Injector wiring
(2) Fuel cut RPM (See page FI-157)
(3) ECU (See page FI-151)
3. Oxygen sensor(s)
(See page FI-148 or 150)

SYMPTOM — ENGINE HESITATES AND/OR POOR ACCELERATION

CHECK CLUTCH OR BRAKES

BAD →
1. Clutch — Slips
2. Drakes — Drag

OK

CHECK FOR VACUUM LEAKS IN AIR INTAKE LINE

BAD →
1. Oil filler cap
2. Oil dipstick
3. Hose connection(s)
4. PCV hose(s)
5. EGR system — EGR valve stays open

OK

CHECK AIR FILTER

BAD → Element — Clean or replace

OK CONTINUED TO PAGE FI-22

OK CONTINUED FROM PAGE FI-21

CHECK DIAGNOSIS SYSTEM
Check for output of diagnosis code.
(See page FI-24)

Malfunction code(s) → Diagnostic code(s) (See page FI-27 or 29)

Normal code

CHECK IGNITION SPARK
(See page IG-5 or 9)

BAD →
1. High-tension cords
2. Distributor
3. Ignition coil
4. Igniter

OK

CHECK IGNITION TIMING
1. Connect terminals TE1 (3S-FE CALIF.) or T (others) and E1 of the check connector.
2. Check ignition timing.
   Standard: 10° BTDC @ idle

NO → Ignition timing – Adjust
(See page IG-17 or 20)

OK

CHECK FUEL PRESSURE
(See page FI-72)

BAD →
1. Fuel pump (See page FI-70)
2. Fuel filter
3. Fuel pressure regulator
   (See page FI-89, 91 or 93)

OK

CHECK INJECTORS
(See page FI-95, 100 or 105)

BAD → Injector – Clogged

OK

CHECK SPARK PLUGS
Standard:
3S-FE and 3S-GE
1.1 mm (0.043 in.)
3S-GTE 0.8 mm (0.031 in.)
NOTE: Check compression pressure and valve clearance if necessary.

NO →
1. Spark plugs
2. Compression pressure
   Minimum (at 250 rpm):
   3S-FE and 3S-GE
   10.0 kg/cm² (142 psi, 981 kPa)
   3S-GTE 9.0 kg/cm² (128 psi, 883 kPa)
3. Valve clearance (Cold)
   3S-FE IN 0.19 – 0.29 mm (0.007 – 0.011 in.)
   EX 0.28 – 0.38 mm (0.011 – 0.015 in.)
   3S-GE and 3S-GTE
   IN 0.15 – 0.25 mm (0.006 – 0.010 in.)
   EX 0.20 – 0.30 mm (0.008 – 0.012 in.)

OK CONTINUED TO PAGE FI-23

OK CONTINUED FROM PAGE FI-22

(3S-GE AND 3S-GTE)
CHECK INTAKE AIR CONTROL VALVE
(3S-GE)
Check if air control valve is open with engine running at 4,400 rpm above.
(3S-GTE (w/ Regular Gasoline))
Check if air control valve is open with throttle valve open.
(3S-GTE (w/ Premium Gasoline))
Check if air control valve is open with engine running at 4,200 rpm above.

BAD →
1. VSV for intake air control valve (See page FI-141)
2. Vacuum leaks

OK ↓

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER
(See page FI-32)

BAD →
1. Wiring connection(s)
2. Power to ECU
   (1) Fusible link(s)
   (2) Fuse(s)
   (3) EFI main relay (See page FI-135)
3. Air flow meter (See page FI-113)
4. Water temp. sensor (See page FI-140)
5. Air temp. sensor (See page FI-113)
6. Throttle position sensor (See page FI-115, 119 or 123)
7. Injection signal circuit
   (1) Injector wiring
   (2) ECU (See page FI-151)

DIAGNOSIS SYSTEM

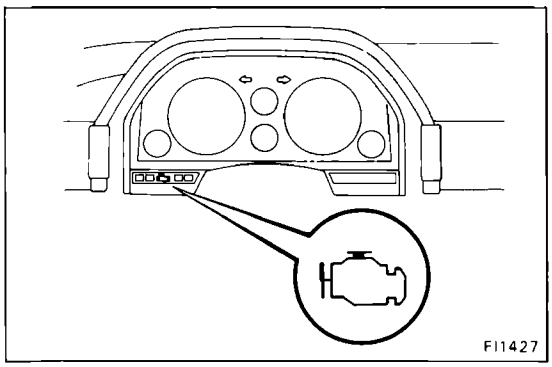
DESCRIPTION

The ECU contains a built-in, self-diagnosis system detects which troubles within the engine signal network and then flashed a warning on the check engine warning light on the instrument panel flashes.

By analyzing various signals shown in the tables (See page FI-27 or 29) the ECU detects system malfunctions which are related to the various operating parameter sensors or actuator. The ECU stores the failure code associated with the detected failure until the diagnosis system is cleared by removing the EFI fuse with the ignition switch OFF.

A check engine warning light on the instrument panel informs the driver that a malfunction has been detected.

The light goes off automatically when the malfunction has been cleared.



CHECK ENGINE WARNING LIGHT CHECK

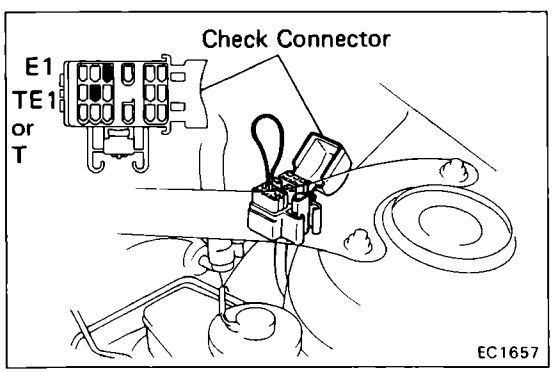
1. The check engine warning light will come on when the ignition switch is placed at ON and the engine is not running.
2. When the engine is started, the check engine warning light should go off.

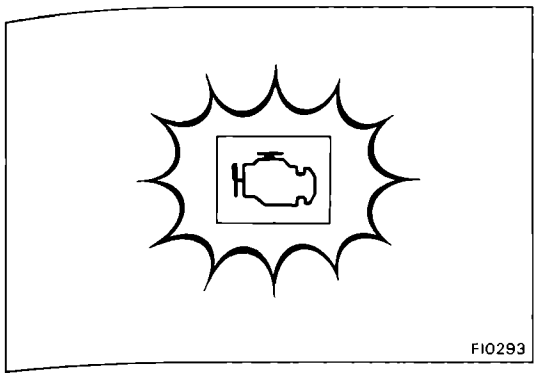
   If the light remains on, the diagnosis system has detected a malfunction or abnormality in the system.

OUTPUT OF DIAGNOSTIC CODES

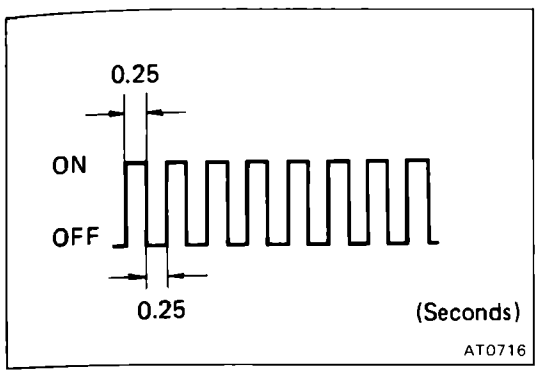
To obtain an output of diagnostic codes, proceed as follow:

1. Initial conditions
   (a) Battery voltage 11 V or more
   (b) Throttle valve fully closed (throttle position sensor IDL points closed)
   (c) Transmission in neutral position
   (d) Accessories switched OFF
   (e) Engine at normal operating temperature
2. Turn the ignition switch to ON. Do not start the engine.
3. Using a service wire, connect terminals TE1 (3S-FE CALIF.) or T (others) and E1 of the check connector.




FI0293

4. Read the diagnostic code as indicated by the number of flashes of the check engine warning light.

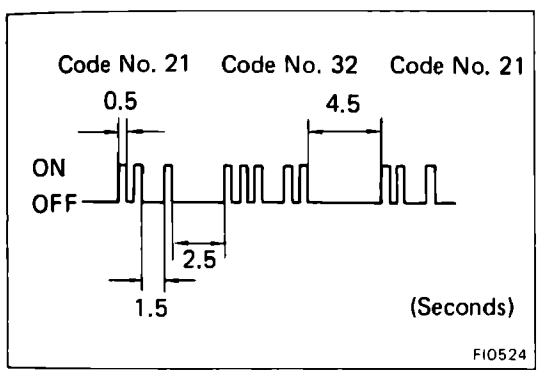


AT0716

Diagnostic Codes (See page FI-27 or 29)

(a) Normal System Operation (no malfunction)

- The light will alternately blink ON and OFF 2 times per second.

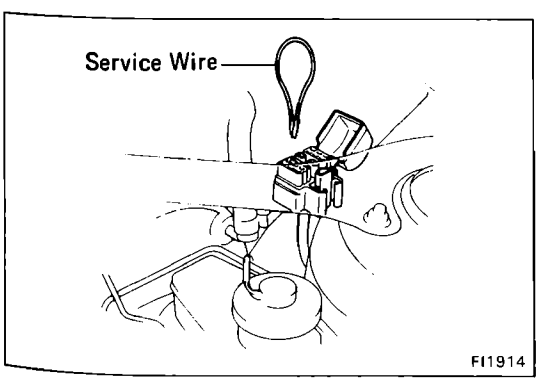


FI0524

(b) Malfunction Code Indication

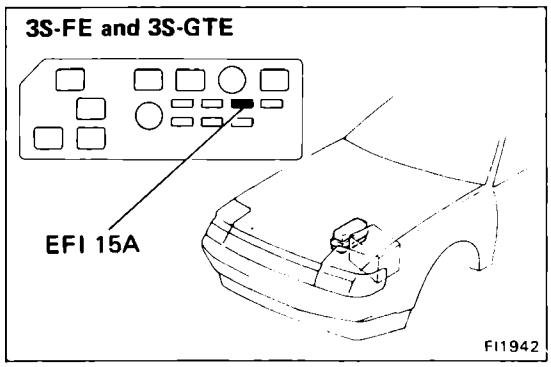
- In the event of a malfunction, the light will blink every 0.5 seconds. The first number of blinks will equal the first digit of a 2-digit diagnostic code and, after a 1.5 second pause, the 2nd number of blinks will equal the 2nd. If there are two or more codes, there will be a 2.5 second pause between each.
- After all the codes have been signalled there will be a 4.5 second pause and they will all be repeated as long as the terminals TE1 and E1 of the check connector are shorted.

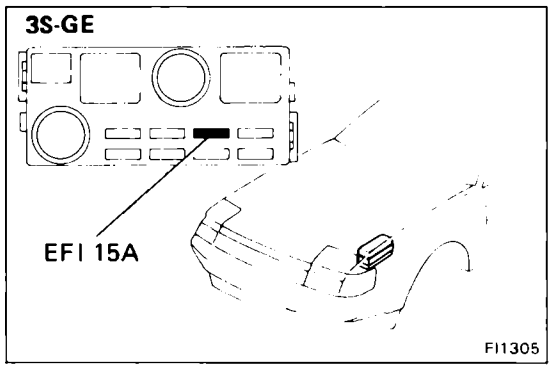
NOTE: In the event of a number of trouble codes, indication will begin from the smaller value and continue in order to the larger.



FI1914

5. After the diagnostic check, remove the service wire.





CANCELLING DIAGNOSTIC CODE

1. After repair of the trouble area, the diagnostic code retained in memory by the ECU must be cancelled out by removing the EFI fuse (15 A) for 10 seconds or more, depending on ambient temperature (the lower the temperature, the longer the fuse must be left out) with the ignition switch OFF.

   NOTE:

   - Cancellation can also be done by removing the battery negative (−) terminal, but in this case, other memory systems (clock, etc.) will also be cancelled out.
   - If the diagnostic code is not cancelled out, it will be retained by the ECU and appear along with a new code in the event of future trouble.
   - If it is necessary to work on engine components requiring removal of the battery terminal, a check must first be made to see if a diagnostic code has been recorded.

2. After cancellation, road test the vehicle to check that a normal code is now read on the check engine warning light.

   If the same diagnostic code appears, it indicates that the trouble area has not been repaired thoroughly.

DIAGNOSIS INDICATION

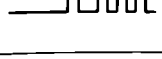
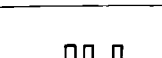
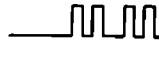
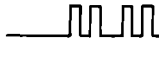
1. When 2 or more codes are indicated, the lowest number (code) will appear first.

   However, no other code will appear along with code No.11.

2. All detected diagnostic codes, except code No.51, will be retained in memory by the ECU from the time of detection until cancelled out.

3. Once the malfunction is cleared, the check engine warning light on the instrument panel will go off but the diagnostic code(s) remain stored in ECU memory (except for code No.51).

DIAGNOSTIC CODES (3S-FE)

Code No.	Number of check engine blinks	System	Diagnosis	Trouble area	See page
–	 ON OFF FI1401	Normal	This appears when none of the other codes are identified.	–	–
11	 FI1388	ECU (+B)	Momentary interruption in power supply to ECU.	• IG switch circuit • IG switch • Main relay circuit • Main relay • ECU	FI-35
12	 FI1389	RPM Signal	No NE or G signal to ECU within 2 seconds after engine has been cranked.	• Distributor circuit • Distributor • Starter signal circuit • ECU	IG-4
13	 FI1390	RPM Signal	No NE signal to ECU when engine speed is above 1,000 rpm.	• Distributor circuit • Distributor • ECU	–
14	 FI1391	Ignition Signal	No IGF signal to ECU 4 – 5 times in succession.	• Igniter and ignition coil circuit • Igniter and ignition coil • ECU	FI-43
21	 FI1400	Oxygen Sensor Signal	Open circuit in oxygen sensor signal (only lean indication).	• Oxygen sensor circuit • Oxygen sensor • ECU	FI-47
22	FI1392	Water Temp. Sensor Signal	Open or short circuit in water temp. sensor signal (THW).	• Water temp. sensor circuit • Water temp. sensor • ECU	FI-41
24	 FI1611	Intake Air Temp. Sensor Signal	Open or short circuit in intake air temp. sensor signal (THA).	• Intake air temp. sensor circuit • Intake air temp. sensor • ECU	FI-40
*25	FI2562	Air-fuel Ratio Lean Malfunction	When air-fuel ratio feedback compensation valve or adative control value continues at the upper (lean) or lower (rich) limit renewed for a certain priod of time.	• Injector circuit • Injector • Oxygen sensor circuit • Oxygen sensor • ECU • Fuel line pressure • Air-flow meter • Air intake system • Ignition system	–
*26	FI2563	Air-fuel Ratio Rich Malfunction		• Injector circuit • Injector • Fuel line pressure • Cold start injector • Air-flow meter • ECU	–
*27	FI3294	Sub-oxygen Sensor Signal	Open or short circuit in sub-oxygen sensor signal (OX2).	• Sub-oxygen sensor circuit • Sub-oxygen sensor • ECU	FI-47
31	 FI1394	Air-flow Meter Signal	Open circuit in VC signal or short circuit between VS and E2 when idle contacts are closed.	• Air flow meter circuit • Air flow meter • ECU	FI-38
32	FI1395	Air-flow Meter Signal	Open circuit in E2 or short circuit between VC and VS.	• Air flow meter circuit • Air flow meter • ECU	FI-38

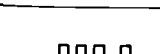
* CALIF. only

DIAGNOSTIC CODES (3S-FE) (Cont'd)

Code No.	Number of check engine blinks	System	Disgnosis	Trouble area	See page
41	 FI1396	Throttle Position Sensor Signal	IDL and PSW signals being output simultaneously for several seconds.	• Throttle position sensor circuit • Throttle position sensor • ECU	FI-37
42	 FI1397	Vehicle Speed Sensor Signal	No SPD signal for 8 seconds when engine speed is between 2,500 rpm and 5,500 rpm and coolant temp. is below 80°C (176°F) except when racing the engine.	• Vehicle speed sensor circuit • Vehicle speed sensor • ECU	–
43	 FI1398	Starter Signal	No STA signal to ECU until engine speed reaches 800 rpm with vehicle not moving.	• Ignition switch circuit • Ignition switch • ECU	–
*71	 FI2622	EGR System Malfunction	EGR gas temp. below predetermined level during EGR operation.	• EGR system (EGR valve, EGR hose etc.) • EGR gas temp. sensor circuit • EGR gas temp. sensor • VSV for EGR • VSV for EGR circuit • ECU	FI-48
51	 FI1399	Switch Signal	No. IDL signal or No NSW signal or A/C signal to ECU, with the check terminals TE1 (3S-FE CALIF.) or T (others).	• A/C switch circuit • A/C Amplifire • Throttle position sensor circuit • Throttle position sensor • Neutral start switch circuit • Neutral start switch • Accelerator pedal and cable • ECU	–

* CALIF. only

DIAGNOSTIC CODES (3S-GE and 3S-GTE)

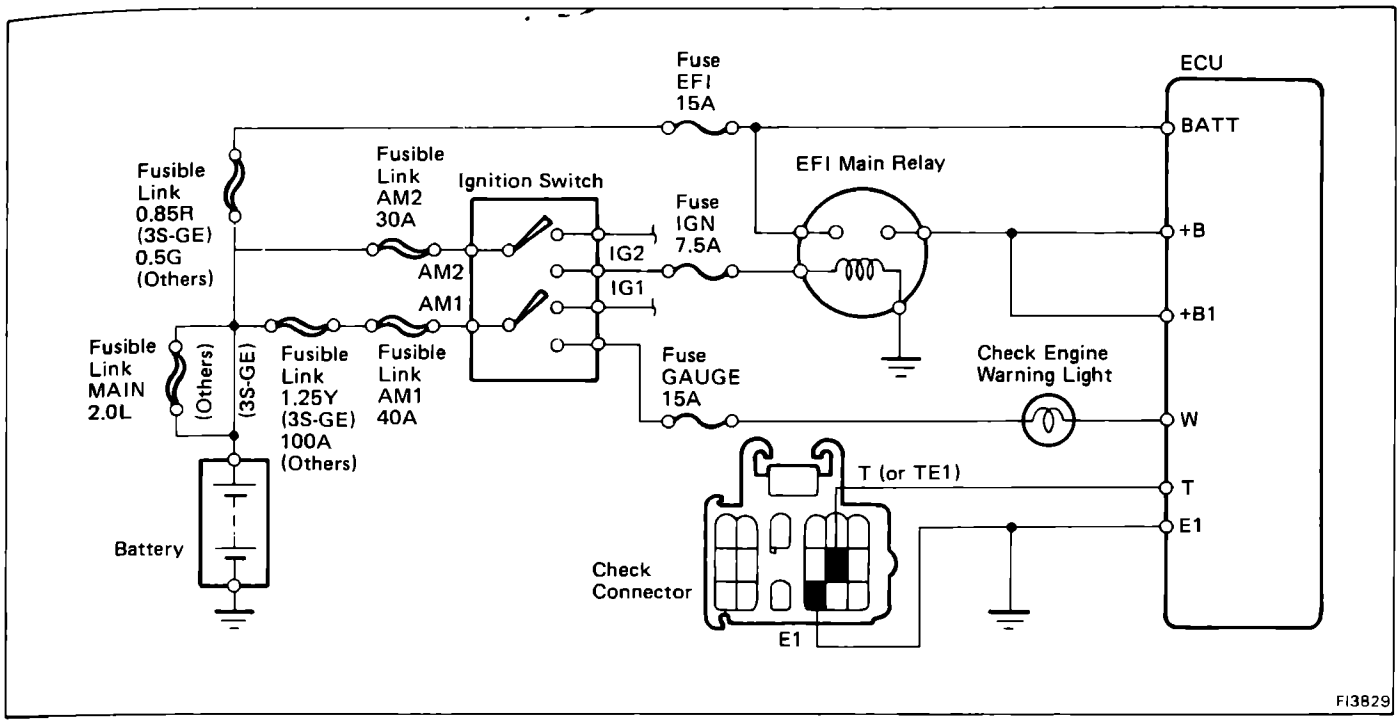
Code No.	Number of check engine blinks	System	Diagnosis	Trouble area	See page
–	 ON OFF FI1401	Normal	This appears when none of the other codes are identified.	–	–
11	 FI1388	ECU (+B)	Momentary interruption in power supply to ECU.	• IG switch circuit • IG switch • Main relay circuit • Main relay • ECU	FI-53
12	 FI1389	RPM Signal	No NE or G signal to ECU within 2 seconds after engine has been cranked.	• Distributor circuit • Distributor • Starter signal circuit • ECU	IG-4
13	 FI1390	RPM Signal	No NE signal to ECU when engine speed is above 1,000 rpm.	• Distributor circuit • Distributor • ECU	–
14	 FI1391	Ignition Signal	No IGF signal to ECU 8 – 11 times in succession.	• Igniter and ignition coil circuit • Igniter and ignition coil • ECU	FI-63
21	 FI1400	Oxygen Sensor Signal	Detection of oxygen sensor deterioration.	• Oxygen sensor circuit • Oxygen sensor • ECU	FI-68
		Oxygen Sensor Heater Circuit	Open or short circuit in oxygen sensor heater.	• Oxygen sensor heater circuit • Oxygen sensor heater • ECU	FI-68
22	 FI1392	Water Temp. Sensor Signal	Open or short circuit in water temp. sensor signal (THW).	• Water temp. sensor circuit • Water temp. sensor • ECU	FI-61
24	 FI1611	Intake Air Temp. Sensor Signal	Open or short circuit in intake air temp. sensor signal (THA).	• Intake air temp. sensor circuit • Intake air temp. sensor • ECU	FI-60
25	 FI2562	Air-fuel Ratio Lean Malfunction	(1) When oxygen sensor signal at the upper (rich) or lower (lean) limit for a certain period of time during feedback condition. (2) When air-fuel ratio feedback compensation value or adaptive control value continues at the upper (rich) or lower (rich) limit renewed for a certain period of time. (3) When air-fuel ratio feedback compensation value or adaptive control value feedback frequency is abnormally high during feedback condition. NOTE: For conditions (3), since neither a lean (code No. 25) nor a rich (code No. 26) diagnosis displayed consecutively.	• Injector circuit • Injector • Oxygen sensor circuit • Oxygen sensor • ECU • Fuel line pressure • Air flow meter • Air intake system • Ignition system	–
26	 FI2563	Air-fuel Ratio Rich Malfunction		• Injector circuit • Injector • Fuel line pressure • Cold start injector • Air flow meter • ECU	–
31	 FI1394	Air-flow Meter Signal	Open circuit in VC signal or short circuit between VC and E2 when idle contacts are closed.	• Air flow meter circuit • Air flow meter • ECU	FI-57
32	 FI1395	Air-flow Meter Signal	Open circuit in E2 or short circuit between VC and VS.	• Air flow meter circuit • Air flow meter • ECU	FI-57

DIAGNOSTIC CODES (3S-GE and 3S-GTE) (Cont'd)

Code No.	Number of check Engine blinks	System	Diagnosis	Trouble area	See page
34	 FI3047	Turbocharging Pressure Signal	When the fuel cut-off due to high turbocharging pressure is occured.	• Turbocharger • Turbocharging pressure sensor circuit • Turbocharging pressure sensor • ECU	–
*2 35	 FI3048	Turbocharging Pressure Sensor Signal	Open or short circuit in turbocharging sensor pressure sensor signal (PIM).	• Turbocharging pressure sensor circuit • Turbocharging pressure sensor • ECU	FI-67
41	 FI1396	Throttle Position Sensor Signal	Open or short circuit in throttle position sensor signal (VTA).	• Throttle position sensor circuit • Throttle position sensor • ECU	FI-55
42	 FI1397	Vehicle Speed Sensor Signal	No "SPD" signal for 8 seconds when engine speed is between 2,500 rpm and 6,000 rpm and coolant temp. is below 80°C (176°F) except when racing the engine.	• Vehicle speed sensor circuit • Vehicle speed sensor • ECU	–
43	 FI1398	Starter Signal	No "STA" signal to ECU unit engine speed reaches 800 rpm with vehicle not moving.	• Ignition switch circuit • Ignition switch • ECU	FI-62
*2 52	 FI1618	Knock Sensor Signal	Open or short circuit in knock sensor signal (KNK).	• Knock sensor circuit • Knock sensor • ECU	–
*2 53	 FI1619	Knock Control Signal in ECU	Knock control in ECU faulty	• ECU	–
*2 54	 FI3049	Intercooler ECU Signal	(1) When coolant level for intercooler is lower than standard. (2) When water pump motor for intercooler locked or opened.	• Intercooler coolant • Coolant level sensor circuit • Coolant level sensor • Intercooler water pump circuit • Intercooler water pump • Intercooler ECU circuit • Intercooler ECU • ECU	–
*1 71	 FI2622	EGR Malfunction	EGR gas temp. below predetermined level for during EGR control.	• EGR system (EGR valve, EGR hose etc.) • EGR gas temp. sensor circuit • EGR gas temp. sensor • EGR control VSV • EGR control VSV circuit • ECU	FI-69
51	 FI1399	Switch Signal	No IDL signal or A/C signal to ECU, with the check terminals T and E1 shorted.	• A/C switch circuit • A/C amplifire • Throttle position sensor circuit • Throttle position sensor • Accelerator pedal and cable • ECU	–

*1 CALIF. only
*2 3S-GTE

INSPECTION OF DIAGNOSIS CIRCUIT



1. Does check engine warning light come on when ignition switch is at ON?
   - YES → System Normal
   - NO → Does check engine warning light come on when ECU terminal W is grounded to the body.
     - YES → Check wiring between ECU terminal E1 and body ground.
       - OK → Try another ECU.
       - BAD → Repair or replace.
     - NO → Check bulb, fuse and wiring between ECU and ignition switch.
       - BAD → Repair or replace.

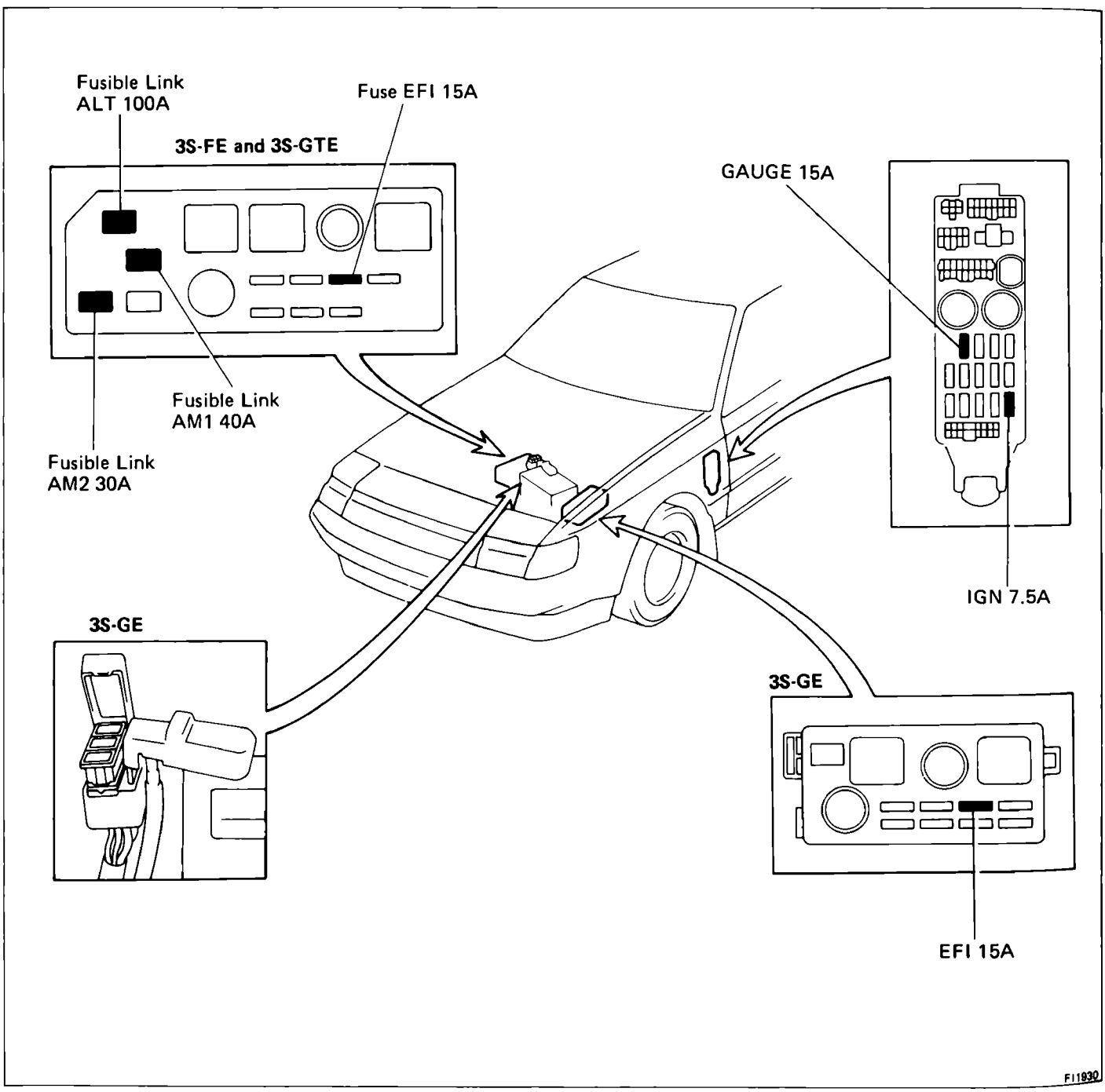
2. Does check engine warning light go off when the engine is started?
   - YES → System Normal
   - NO → Check wiring between ECU and check engine warning light.
     - BAD → Repair.
     - OK → Is there diagnostic code output when check connector terminal TE1 (3S-FE CALIF.) or T (others) and E1 are short circuited?
       - NO → Try another ECU.
       - YES → Does check engine warning light go out after repair according to malfunction code?
         - NO → Further repair required.
         - YES → System OK → Cancel out diagnostic code.

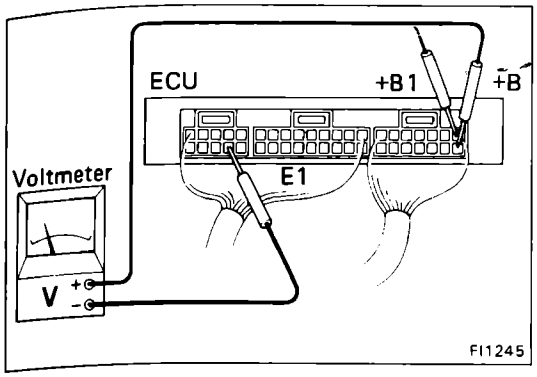
TROUBLESHOOTING WITH VOLT/OHMMETER

NOTE:

- The following troubleshooting procedures are designed for inspection of each separate system, and therefore the actual procedure may vary somewhat. However, troubleshooting should be performed while referring to the inspection methods described in this manual.
- Before beginning inspection, it is best to first make a simple check of the fuses, fusible links and the condition of the connectors.
- The following troubleshooting procedures are based on the supposition that the trouble lies in either a short or open circuit within the computer.
- If engine trouble occurs even though proper operating voltage is detected in the computer connector, then it can be assumed that the ECU is faulty and should be replaced.

LOCATION OF FUSES AND FUSIBLE LINKS





EFI SYSTEM CHECK PROCEDURE (3S-FE)

NOTE:

- Perform all voltage measurements with the connectors connected.
- Verify that the battery voltage is 11 V or more when the ignition switch is in "ON" position.

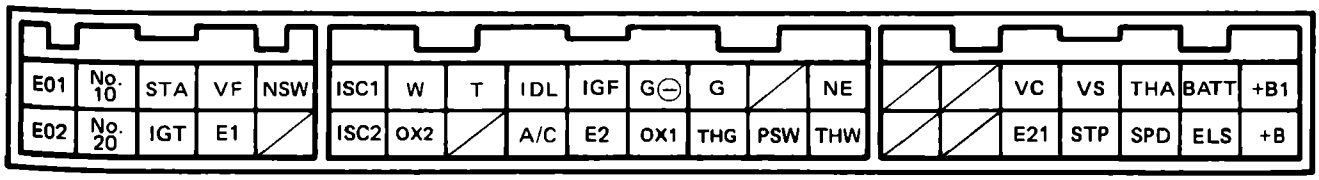
Using a voltmeter with high impedance (10 kΩ/V minimum), measure the voltage at each terminal of the wiring connectors.

Terminals of ECU

Symbol	Terminal name	Symbol	Terminal name	Symbol	Terminal name
E01	ENGINE GROUND	*1OX2	SUB-OXYGEN SENSOR	THW	WATER TEMP. SENSOR
E02	ENGINE GROUND	T	CHECK CONNECTOR	VC	AIR FLOW METER
No. 10	INJECTOR	IDL	THROTTLE POSITION SENSOR	E21	SENSOR GROUND
No. 20	INJECTOR	*2 A/C	A/C MAGNET SWITCH	VS	AIR FLOW METER
STA	STARTER SWITCH	IGF	IGNITER	STP	STOP LIGHT SWITCH
IGT	IGNITER	E2	SENSOR GROUND	THA	AIR TEMP. SENSOR
VF	CHECK CONNECTOR	G⊖	DISTRIBUTOR	SPD	SPEED SENSOR
E1	ENGINE GROUND	OX1	OXYGEN SENSOR	BATT	BATTERY
NSW	NEUTRAL START SWITCH	G	DISTRIBUTOR	ELS	HEADLIGHT AND DEFOGGER
ISC1	ISC VALVE	*1THG	EGR GAS TEMP. SENSOR	+B1	MAIN RELAY
ISC2	ISC VALVE	PSW	THROTTLE POSITION SENSOR	+B	MAIN RELAY
W	WARNING LIGHT	NE	DISTRIBUTOR		

*1 CALIF. only
*2 w/ A/C

ECU Terminals



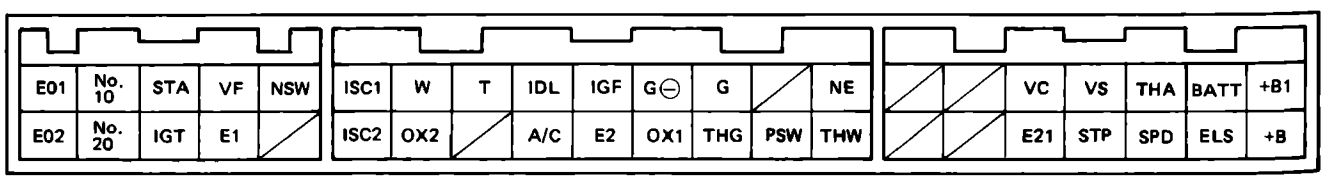
FI0605

Voltage at ECU Wiring Connectors (3S-FE)

No.	Terminals	Condition		STD voltage (V)	See page
1	+B, +B1 – E1	IG SW ON		10 – 14	FI-35
2	BATT – E1	–		10 – 14	FI-36
3	IDL – E1	IG SW ON	Throttle valve open	8 – 14	FI-37
	PSW – E1		Throttle valve fully closed	4 – 5	
4	VC – E2	IG SW ON	–	4 – 6	FI-38
	VS – E2		Measuring plate fully closed	3.7 – 4.3	
			Measuring plate fully open	0.2 – 0.5	
		Idling		2.3 – 3.8	
		3,000 rpm		1.0 – 2.0	
5	No. 10, No. 20 – E01, E02	IG SW ON		10 – 14	FI-39
6	THA – E2	IG SW ON	Intake air temp. 20°C (68°F)	1 – 3	FI-40
7	THW – E2		Coolant temp. 80°C (176°F)	0.1 – 1.0	FI-41
8	STA – E1	Cranking		6 – 14	FI-42
9	IGT – E1	Cranking or idling		0.7 – 1.0	FI-43
10	ISC1, ISC2 – E1	IG SW ON		9 – 14	FI-44
11	W – E1	No trouble (check engine warning light off) and engine running		10 – 14	FI-45
12	*A/C – E1	IG SW ON	Air conditioning ON	8 – 14	FI-46

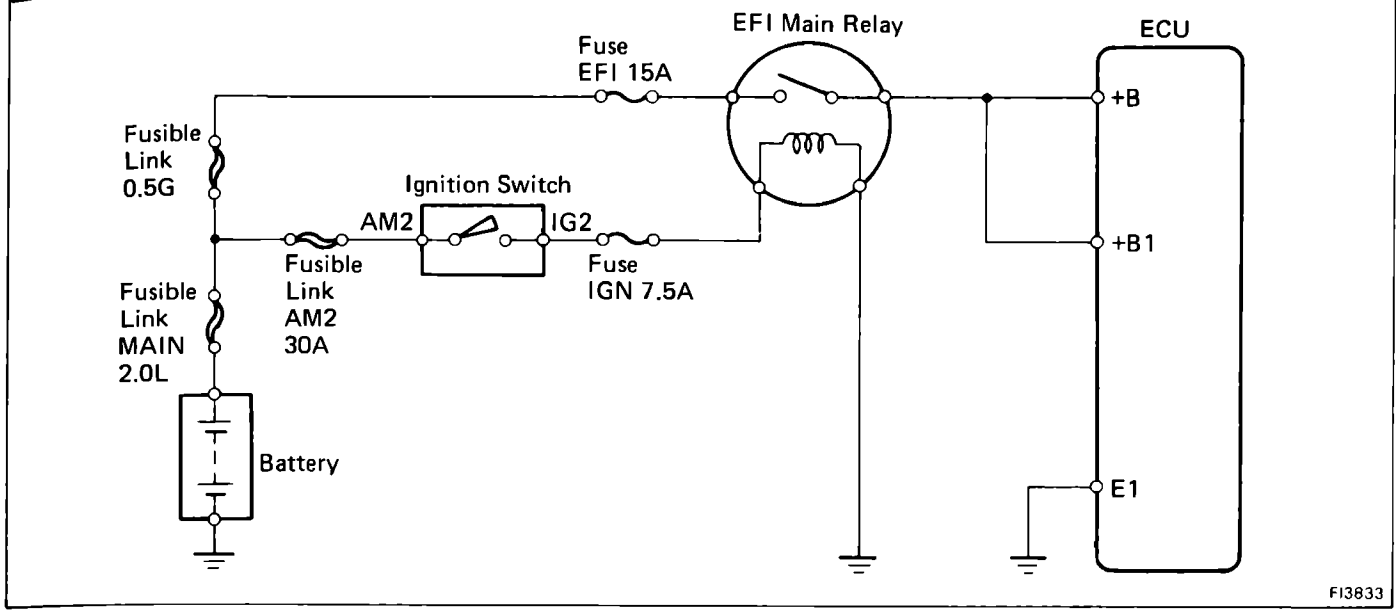
ECU Terminals

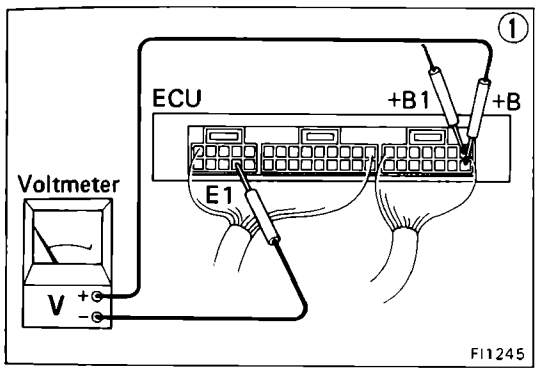
* w/ A/C

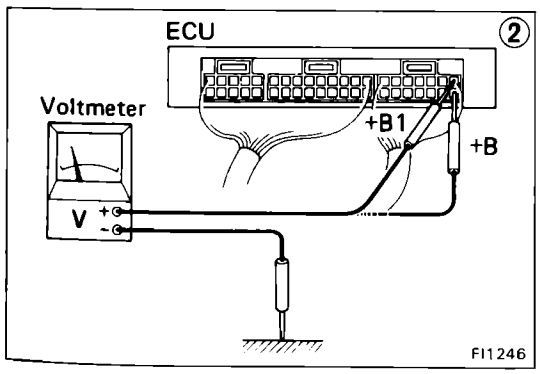


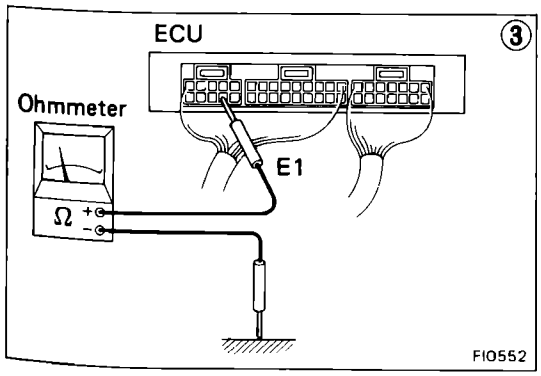
FI0605

No.	Terminals	Trouble	Condition	STD voltage
1	+B, +B1 — E1	No Voltage	IG SW ON	10 – 14 V









① No voltage between ECU terminals +B or +B1 and E1. **(IG SW ON)**

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG SW ON)**

NO → ③ Check wiring between ECU terminal E1 and body ground.

OK → Try another ECU.

BAD → Repair or replace.

OK → Check fuse, fusible link and ignition switch.

BAD → Repair or replace.

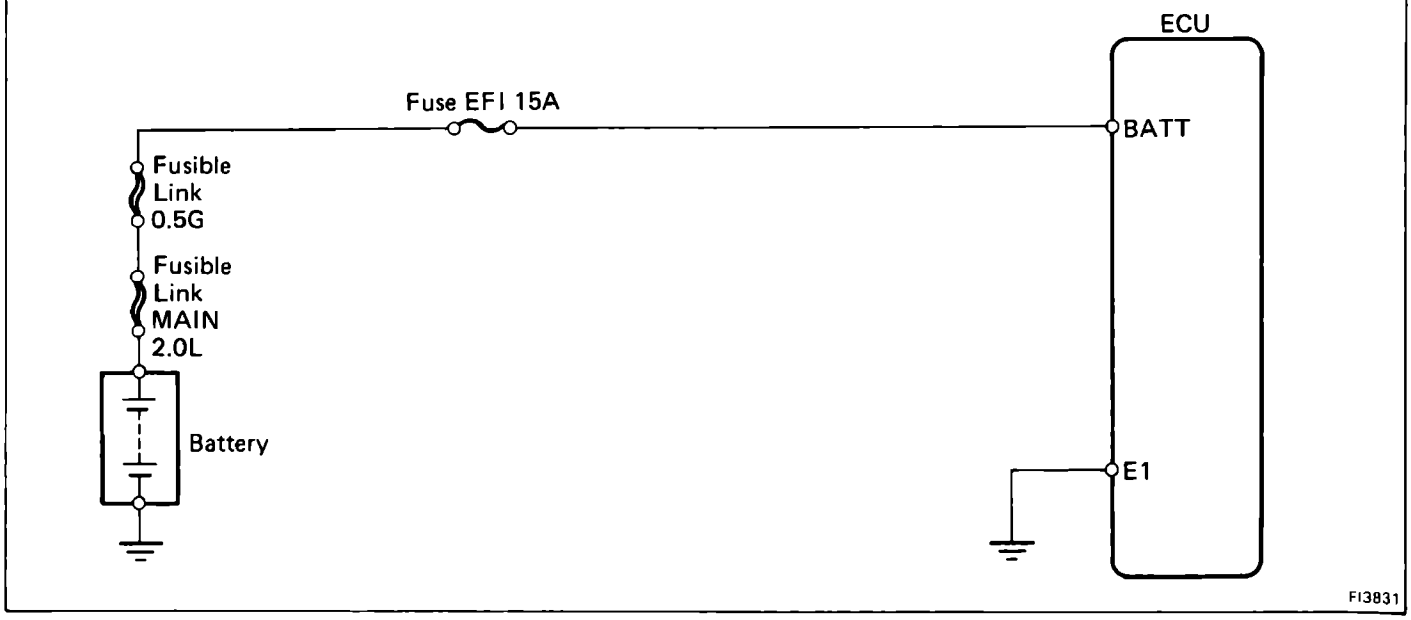
OK → Check EFI main relay.

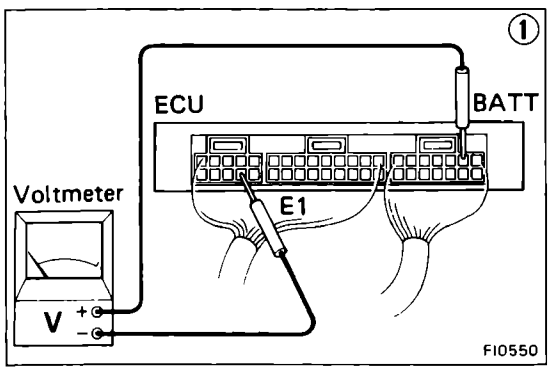
BAD → Replace.

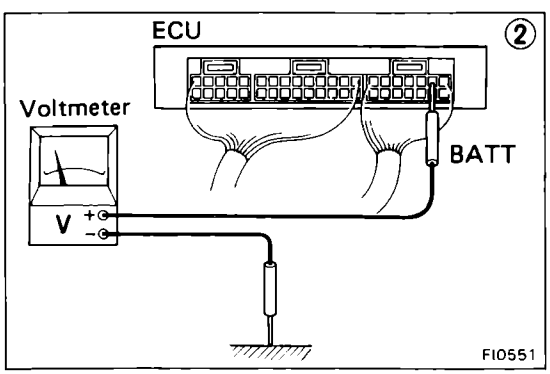
OK → Check wiring between EFI main relay and battery.

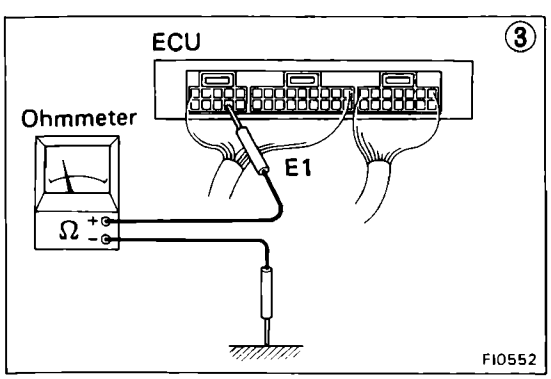
BAD → Repair or replace.

No.	Terminals	Trouble	Condition	STD voltage
2	BATT – E1	No voltage	–	10 – 14 V









① No voltage between ECU terminals BATT and E1.

② Check that there is voltage between ECU terminal BATT and body ground.

NO

OK

③ Check wiring between ECU terminal E1 and body ground.

OK

Try another ECU.

BAD

Repair or replace.

Check fuse and fusible link.

BAD

Replace.

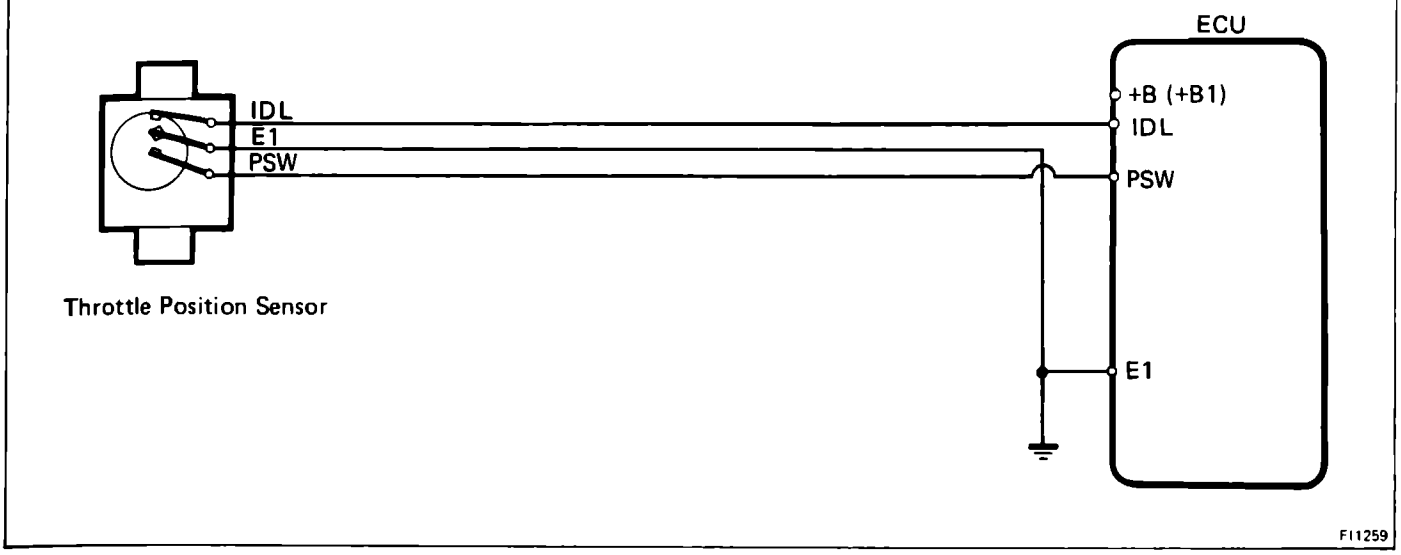
OK

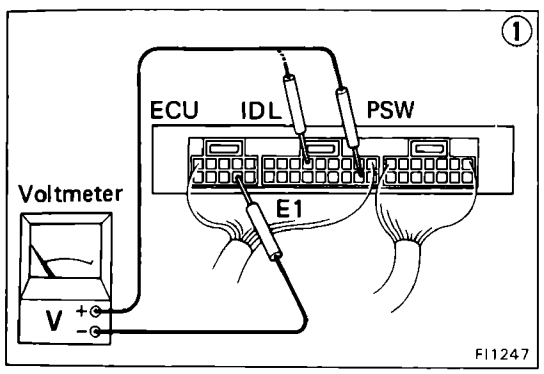
Check wiring between ECU terminal and battery.

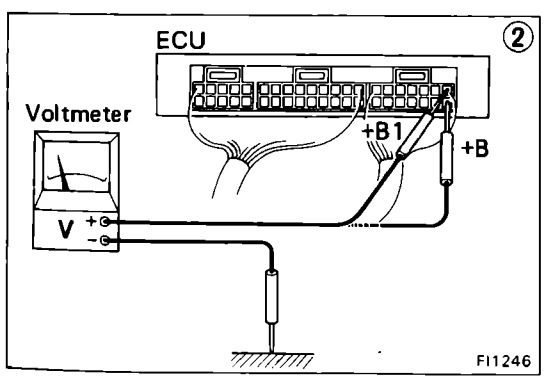
BAD

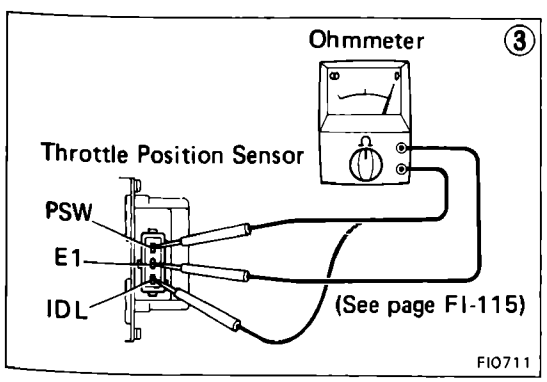
Repair or replace.

No.	Terminals	Trouble	Condition		STD voltage
3	IDL – E1	No voltage	IG SW ON	Throttle valve open	8 – 14 V
	PSW – E1			Throttle valve fully closed	4 – 5 V









① No voltage between ECU terminals IDL or PSW and E1. **(IG SW ON)**

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG SW ON)**

NO

OK

Check wiring between ECU terminal E1 and body ground.

BAD

Repair or replace.

Refer to No. 1. (See page FI-32)

BAD

Repair or replace.

OK

③ Check throttle position sensor. (See page FI-115)

BAD

OK

Replace or repair throttle position sensor.

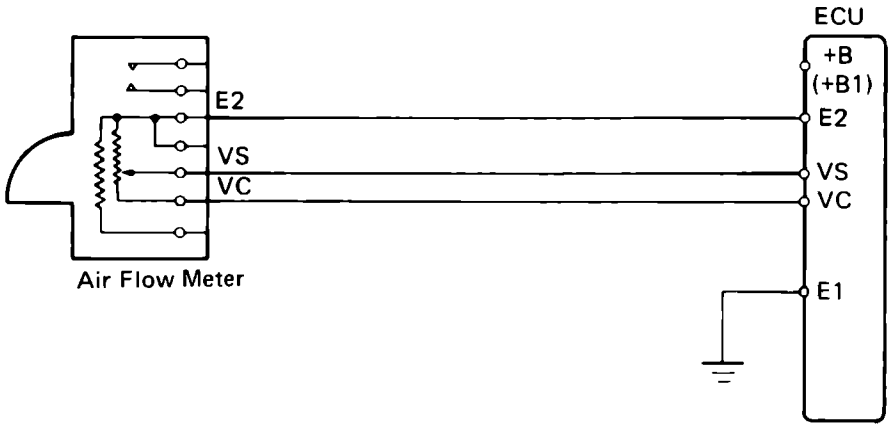
Check wiring between ECU and throttle position sensor.

BAD

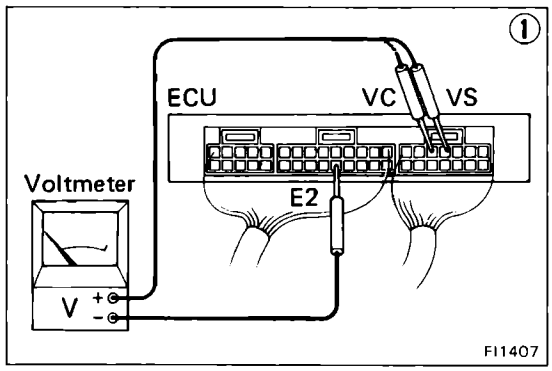
OK

Try another ECU.

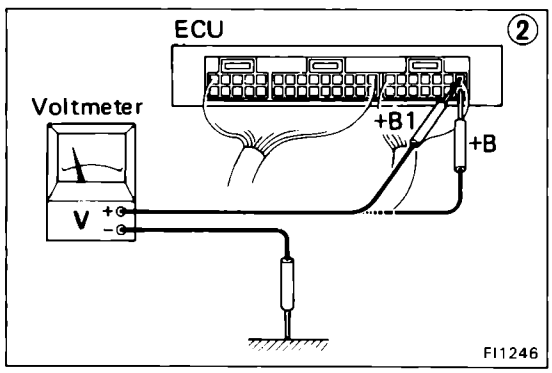
No.	Terminals	Trouble	Condition		STD voltage
4	VC – E2	No voltage	IG SW ON	–	4 – 6 V
	VS – E2			Measuring plate fully closed	3.7 – 4.3 V
				Measuring plate fully open	0.2 – 0.5 V
			Idling		2.3 – 3.8 V
			3,000 rpm		1.0 – 2.0 V



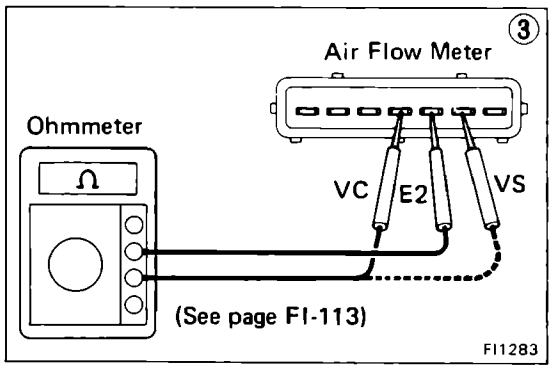
FI1269



FI1407



FI1246



FI1283

① No specified voltage at ECU terminals VC or VS and E2. **(IG SW ON)**

↓

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG SW ON)**

OK ↓ / NO → Refer to No. 1. (See page FI-35)

↓

Check wiring between ECU terminal E1 or E2 and body ground.

OK ↓ / BAD → Repair or replace.

↓

③ Check air flow meter. (See page FI-113)

BAD ↓ / OK →

Replace air flow meter.

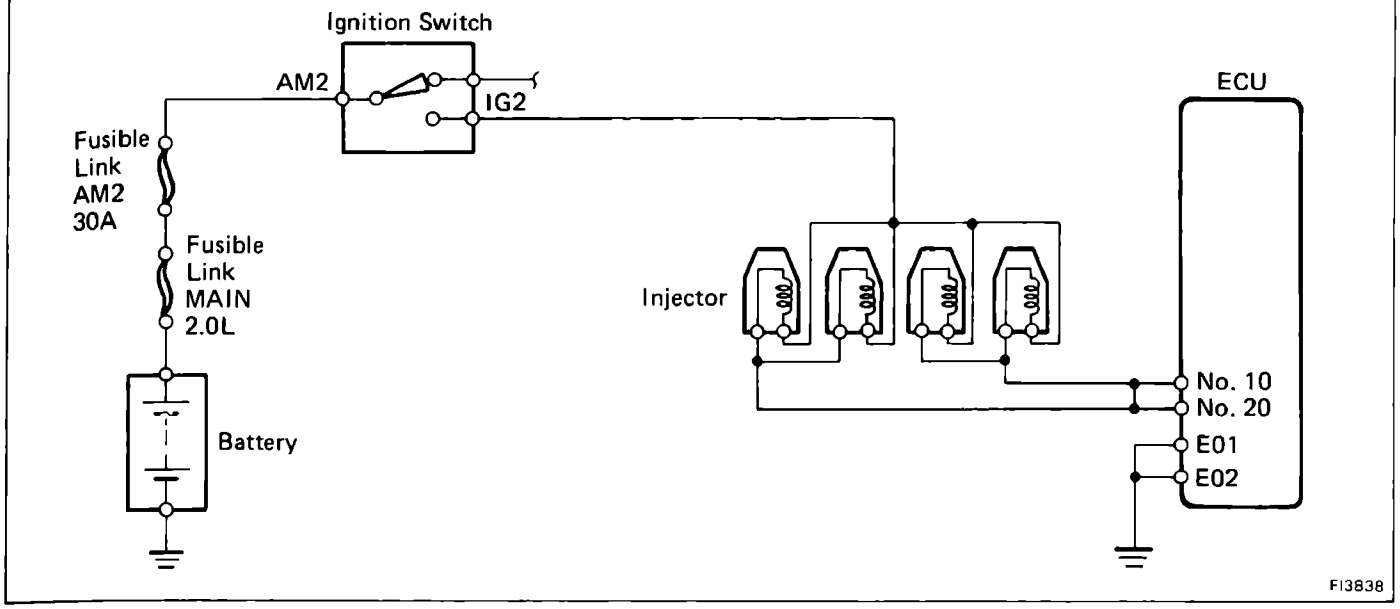
Check wiring between ECU and air flow meter.

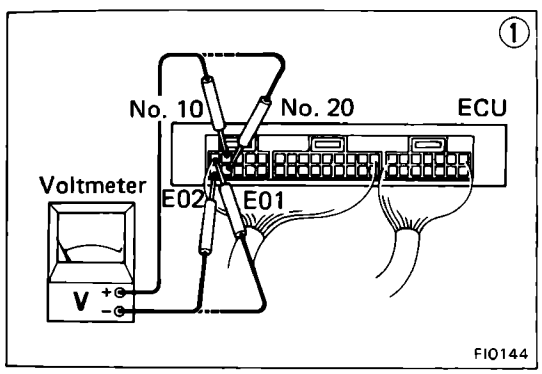
OK ↓ / BAD →

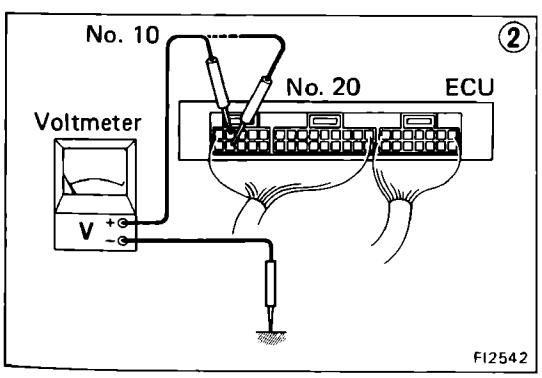
Try another ECU.

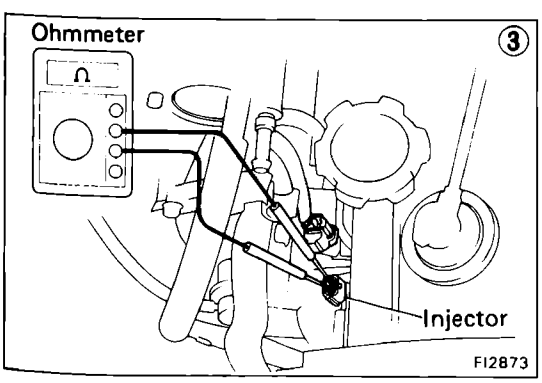
Repair or replace.

No.	Terminals	Trouble	Condition	STD voltage
5	No. 10 – E01 No. 20 – E02	No voltage	IG SW ON	10 – 14 V









① No voltage between ECU terminals No. 10 and/or No. 20 and E01 and/or E02. **(IG SW ON)**

② Check that there is voltage between ECU terminal No. 10 and/or No. 20 and body ground.

NO

OK

Check wiring between ECU terminal E01 and/or E02 and body ground.

OK

Try another ECU.

BAD

Repair or replace.

Check fuse, fusible link and ignition switch.

BAD

Repair or replace.

OK

③ Check resistance of each injector.
STD resistance: Approx. 13.8 Ω

OK

BAD

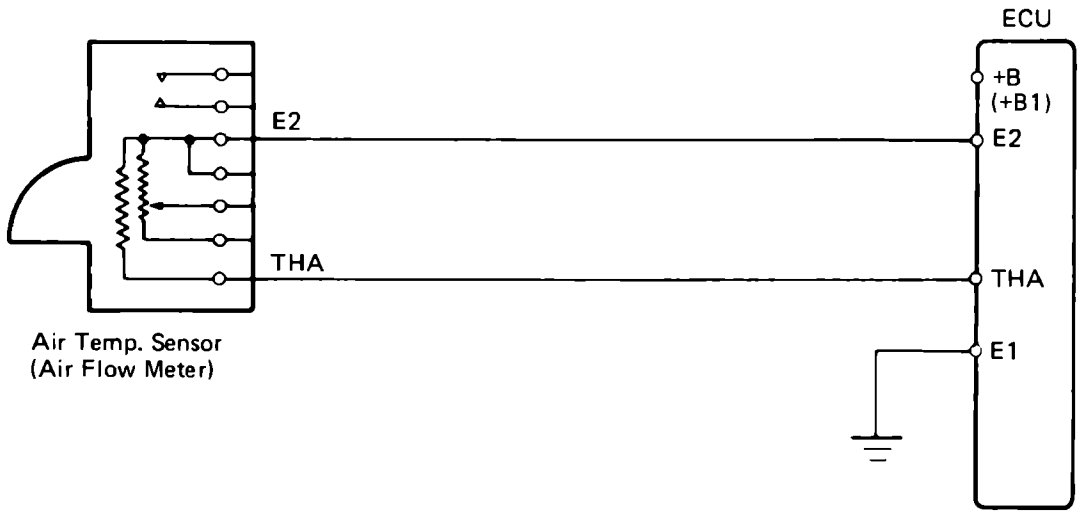
Replace injector.

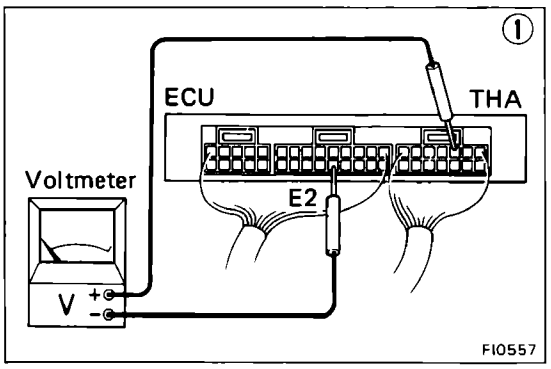
Check wiring between ECU terminal No. 10 and/or No. 20 and battery.

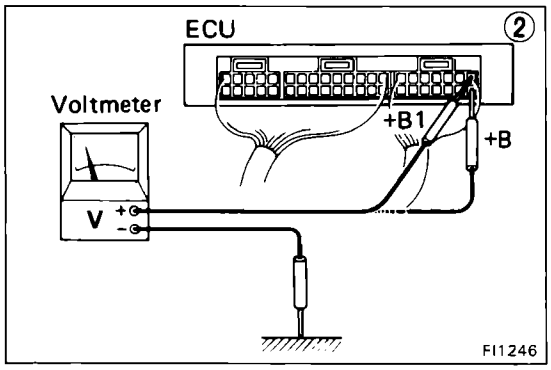
BAD

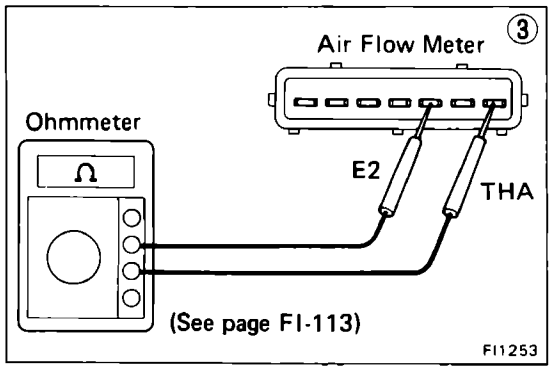
Repair or replace.

No.	Terminals	Trouble	Condition		STD voltage
6	THA – E2	No voltage	IG SW ON	Intake air temperature 20°C (68°F)	1 – 3 V









① No voltage between ECU terminals THA and E2. **(IG SW ON)**

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG SW ON)**

OK → Check wiring between ECU terminal E1 and body ground.

NO → Refer to No. 1. (See page FI-35)

Check wiring between ECU terminal E1 and body ground.

OK → ③ Check air temp. sensor. (See page FI-113)

BAD → Repair or replace.

③ Check air temp. sensor. (See page FI-113)

BAD → Replace air flow meter.

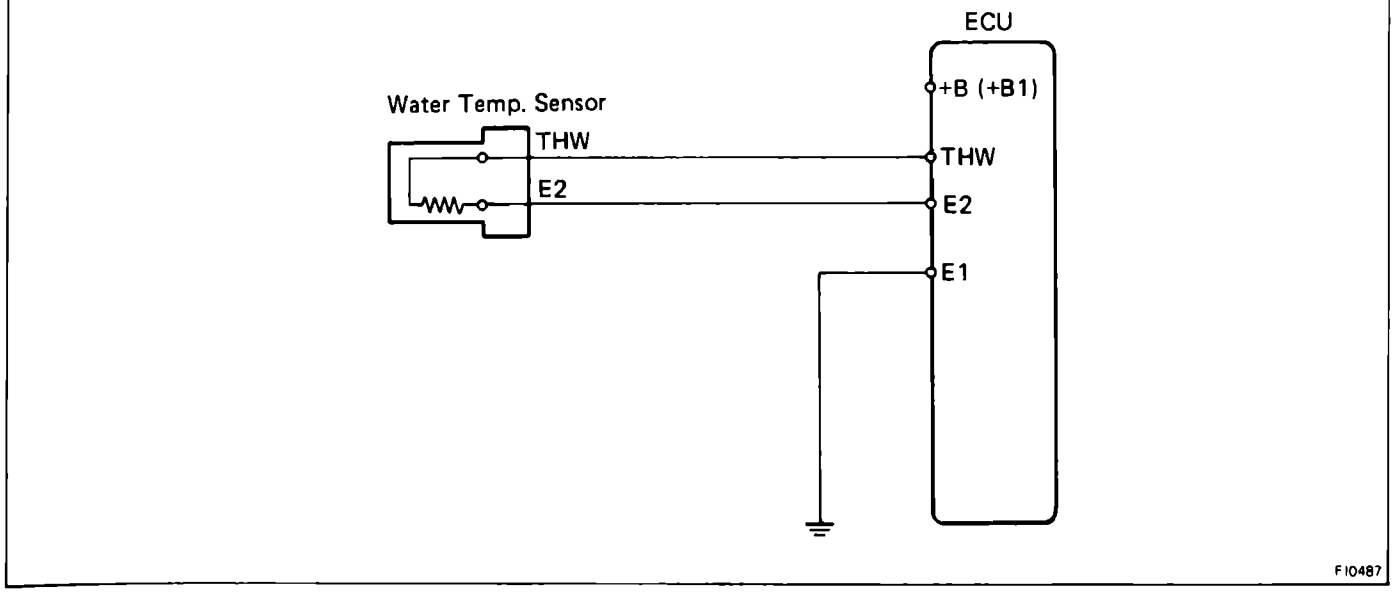
OK → Check wiring between ECU and air temp. sensor.

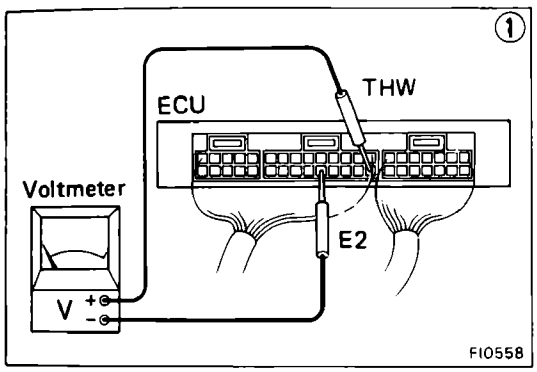
Check wiring between ECU and air temp. sensor.

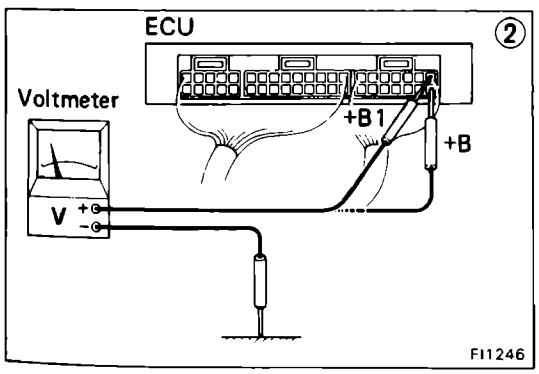
OK → Try another ECU.

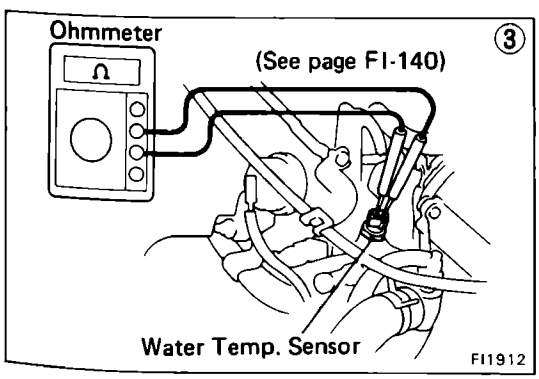
BAD → Repair or replace.

No.	Terminals	Trouble	Condition		STD voltage
7	THW – E2	No voltage	IG SW ON	Coolant temperature 80°C (176°F)	0.1 – 1.0 V









① No voltage between ECU terminals THW and E2. **(IG SW ON)**

↓

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG SW ON)**

OK → ↓

NO → Refer to No. 1. (See page FI-35)

↓

Check wiring between ECU terminal E1 and body ground.

OK → ↓

BAD → Repair or replace.

↓

③ Check water temp. sensor. (See page FI-140)

BAD → Replace water temp. sensor.

OK → ↓

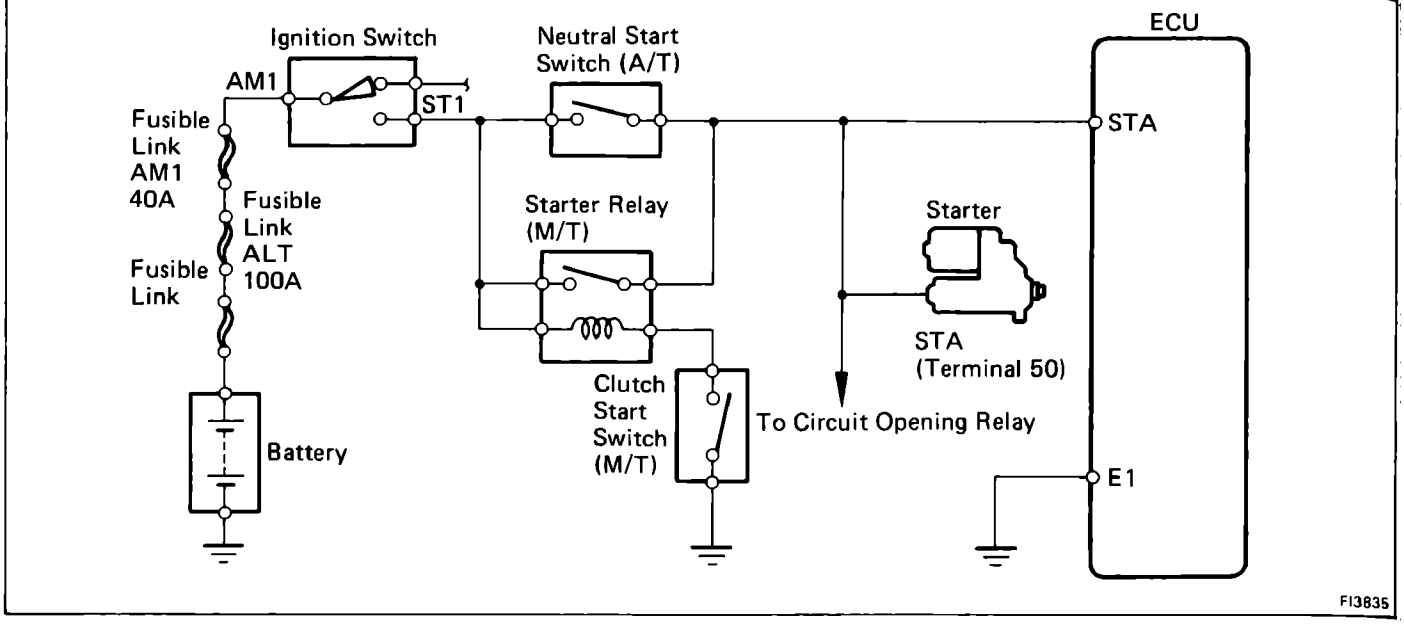
Check wiring between ECU and water temp. sensor.

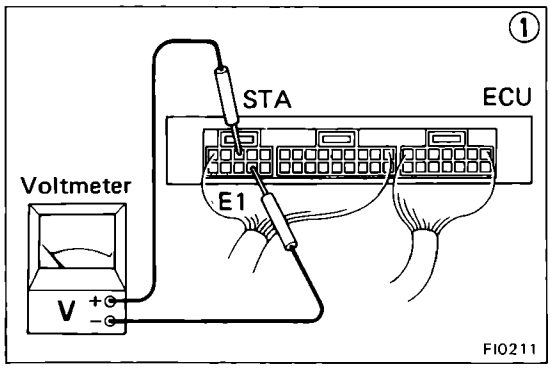
OK → ↓

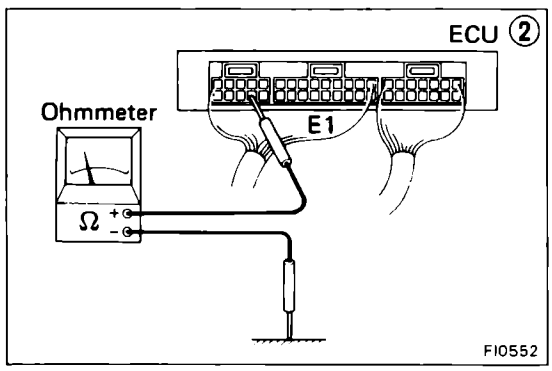
Try another ECU.

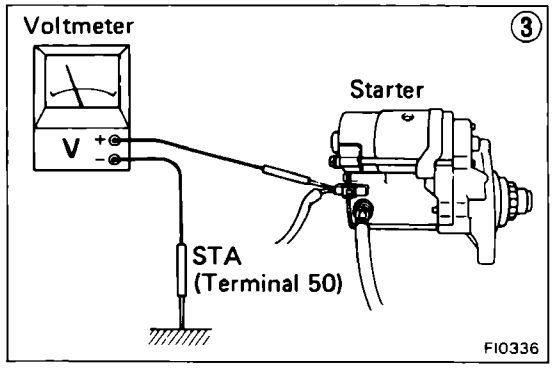
BAD → Repair or replace.

No.	Terminals	Trouble	Condition	STD voltage
8	STA – E1	No voltage	Cranking	6 – 14 V





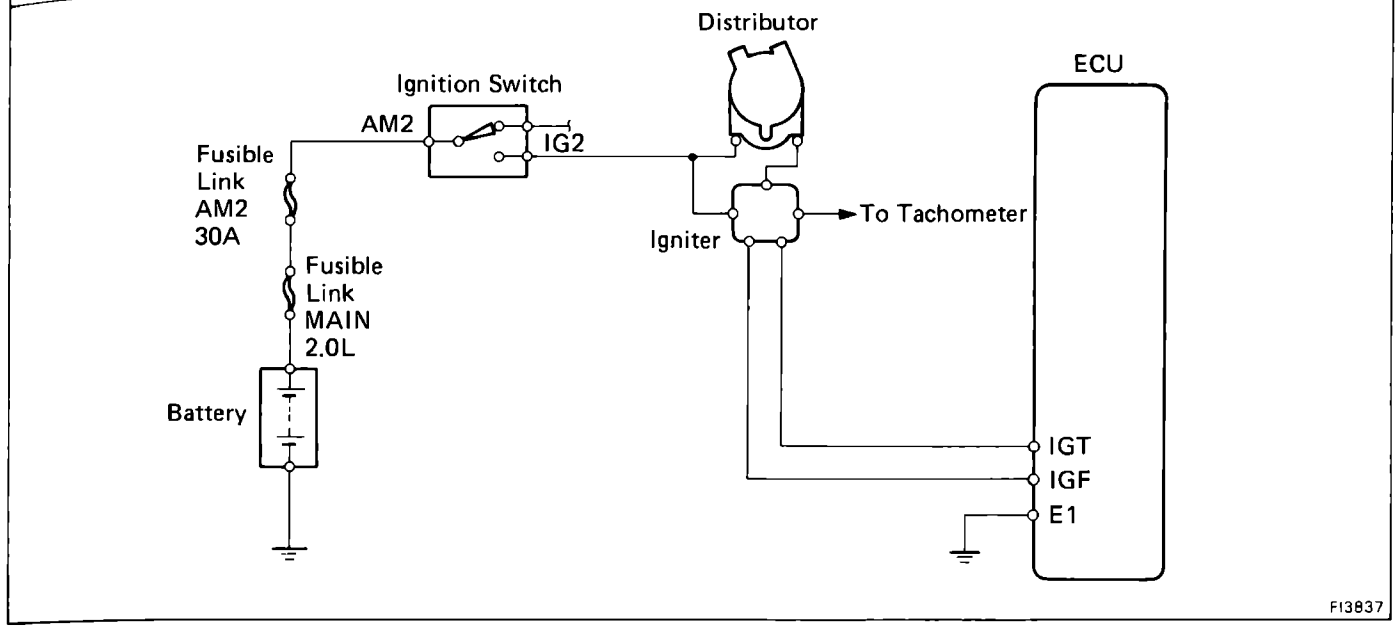


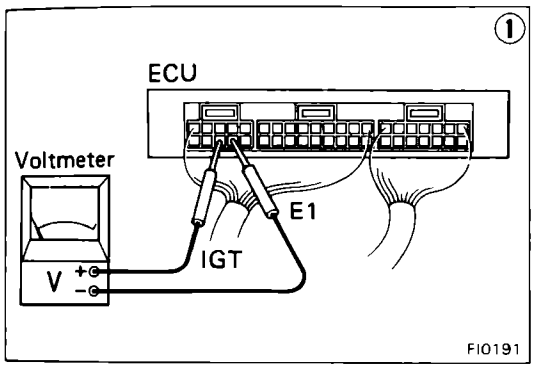


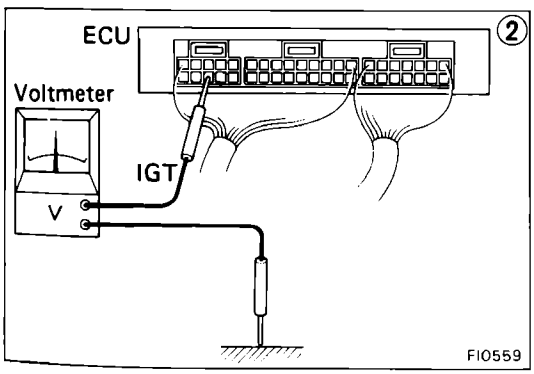
① No voltage between ECU terminals STA and E1. **(IG SW START)**

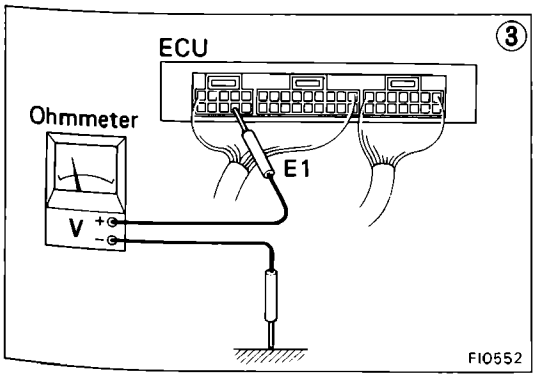
Check starter operation.
- OK → Check wiring between ECU terminal STA and ignition switch terminal ST1.
  - OK → ② Check wiring between ECU terminal E1 and body ground.
    - OK → Try another ECU.
    - BAD → Repair or replace.
  - BAD → Repair or replace.
- BAD → Check fusible link, battery, wiring, ignition switch clutch start switch, starter relay and neutral start switch.
  - BAD → Repair or replace.
  - OK → ③ Check that there is voltage at STA (50) terminal of starter. **(IG SW START)** **STD voltage: 6 – 14 V**
    - OK → Check starter.
    - NO → Check wiring between ignition switch terminal ST1 and starter terminal STA (50).

No.	Terminals	Trouble	Condition	STD voltage
9	IGT – E1	No voltage	Idling	0.7 – 1.0 V









① No voltage between ECU terminals IGT and E1. **(Idling)**

↓

② Check that there is voltage between ECU terminal IGT and body ground. **(Idling)**

NO → ↓ OK

OK → ③ Check wiring between ECU terminal E1 and body ground. → BAD → Repair or replace.

OK → ↓ Try another ECU.

↓

Check fusible link and ignition switch. → BAD → Repair or replace.

↓ OK

Check distributor. (See page IG-10) → BAD → Repair or replace.

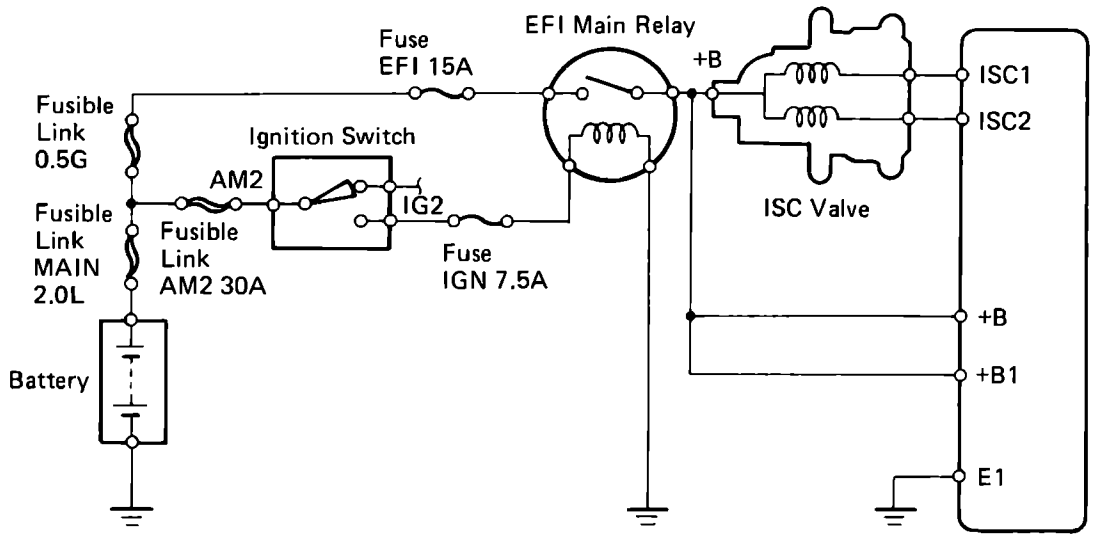
↓ OK

Check wiring between ECU and battery. → BAD → Repair or replace.

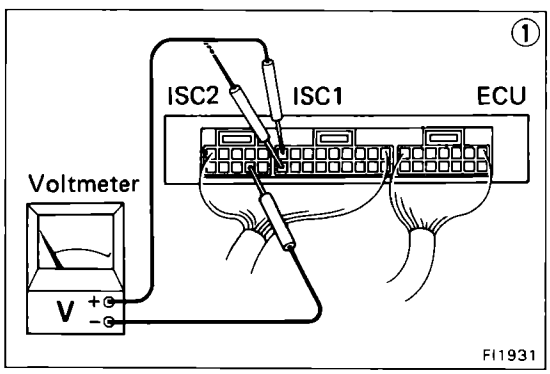
↓ OK

Check igniter. (See page IG-10) → BAD → Repair or replace.

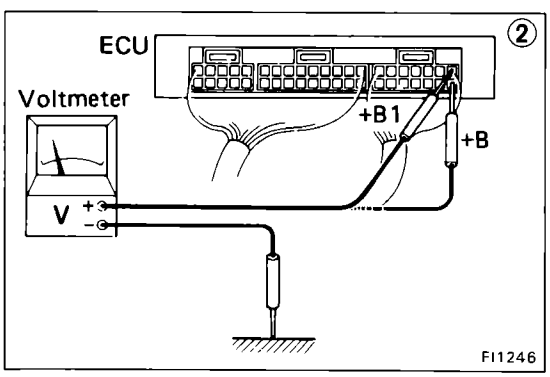
No.	Terminals	Trouble	Condition	STD voltage
10	ISC1 ISC2 – E1	No voltage	IG SW ON	9 – 14 V



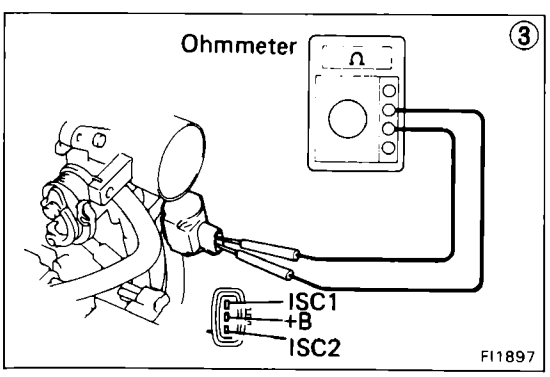
FI3834



FI1931



FI1246



FI1897

① There is no voltage between ECU terminals ISC1 or ISC2 and E1. **(IG SW ON)**

↓

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG SW ON)**

OK ↓

NO → Refer to No. 1. (See page FI-35)

③ Check resistance between ISC valve terminals +B and ISC1 or ISC2. **STD resistance: Approx. 16 Ω**

BAD → Replace ISC valve.

OK ↓

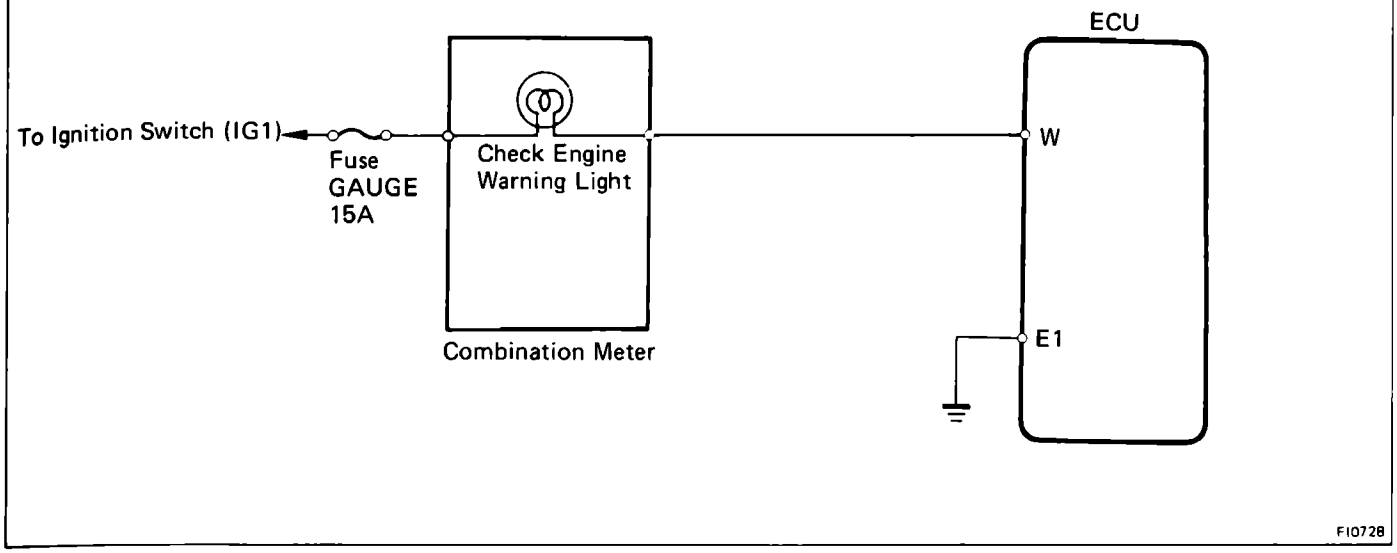
Check wiring between ECU and ISC valve.

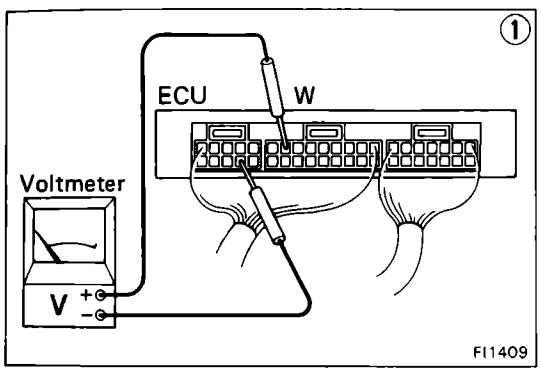
BAD → Repair or replace wiring.

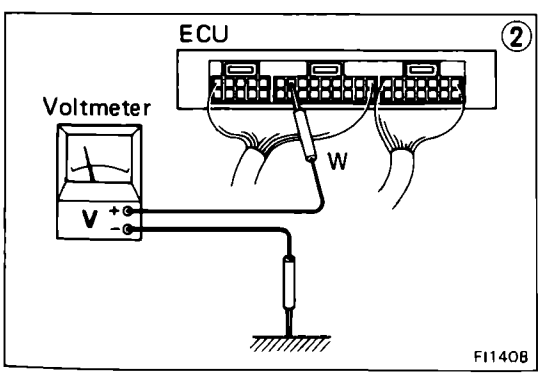
OK ↓

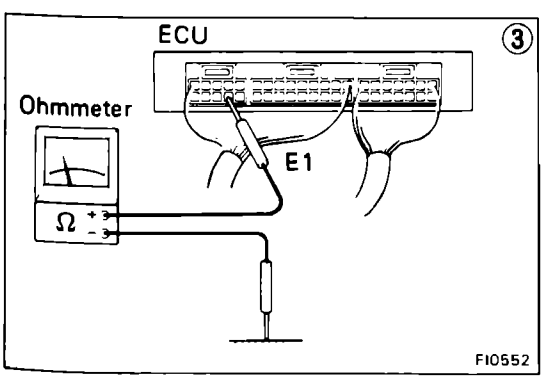
Try another ECU.

No.	Terminals	Trouble	Condition	STD voltage
11	W – E1	No voltage	No trouble (check engine warning light off) and engine running	10 – 14 V









① No voltage between ECU terminals W and E1. **(Idling)**

↓

② Check that there is voltage between ECU terminal W and body ground.

NO ↓ / OK →

③ Check wiring between ECU terminal E1 and body ground.

OK → Try another ECU.

BAD → Repair or replace.

↓

Check GAUGE fuse (15A) and check engine warning light.

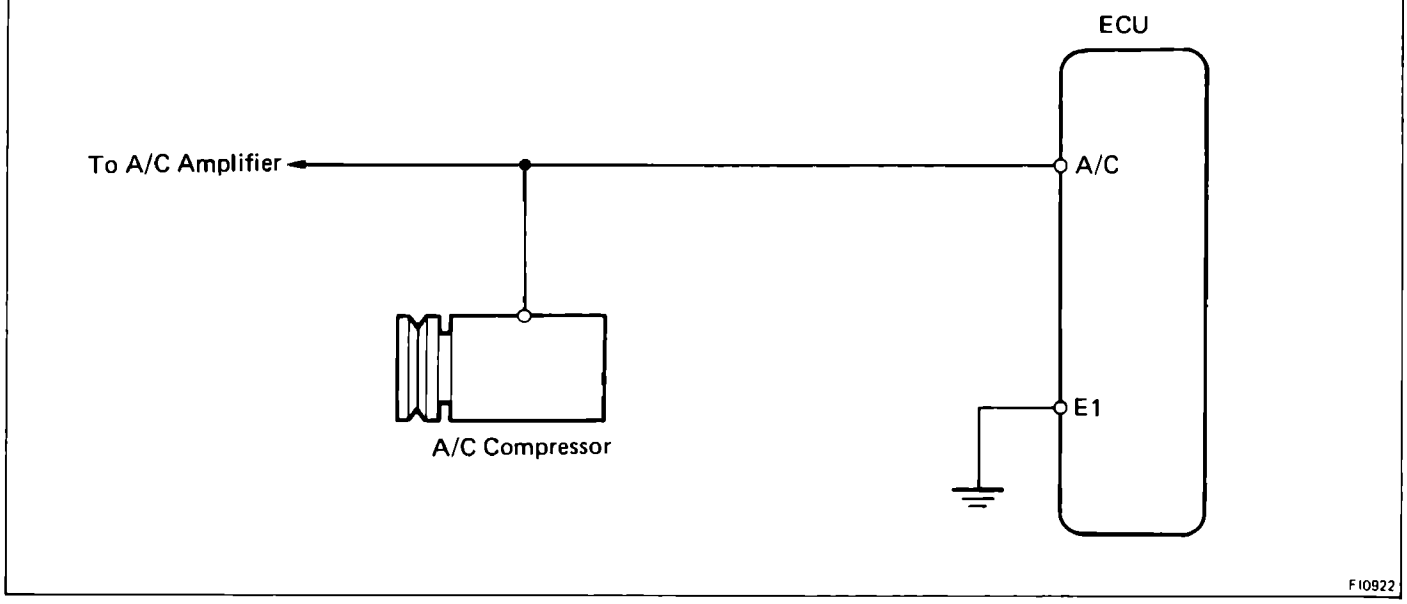
OK ↓ / BAD →

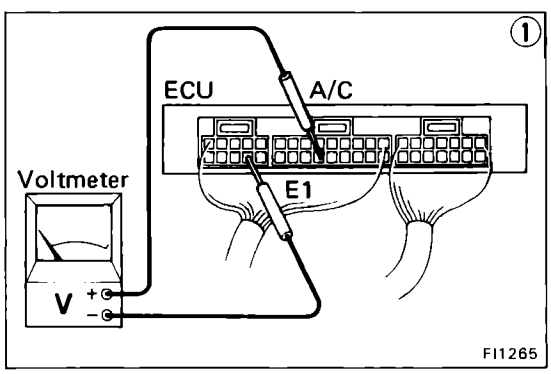
Repair or replace.

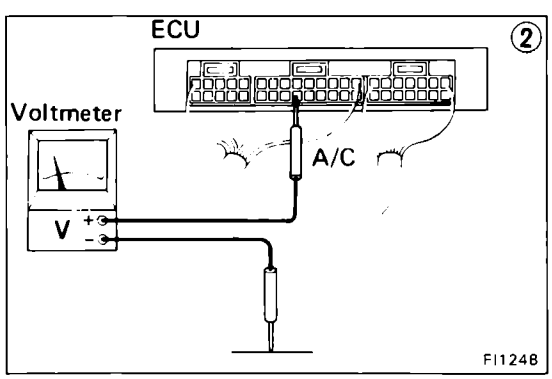
↓ Fuse blows again

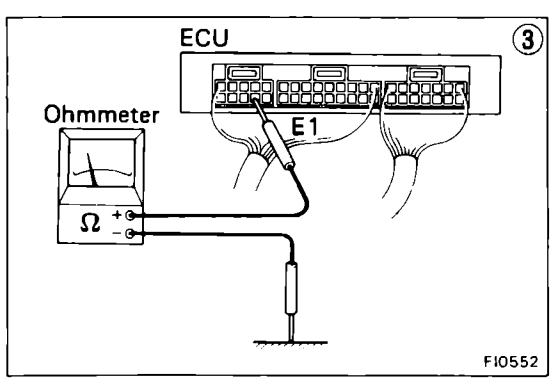
Check wiring between ECU terminal W and fuse. → BAD → Repair or replace.

No.	Terminals	Trouble	Condition	STD voltage
12	A/C – E1	No voltage	Air conditioning ON	8 – 14 V









① No voltage between ECU terminals A/C and E1. **(Air conditioning ON)**

② Check that there is voltage between ECU terminal A/C and body ground.

NO

OK

③ Check wiring between ECU terminal E1 and body ground.

OK

Try another ECU.

BAD

Repair or replace.

Check compressor running.

OK

Check wiring between ECU terminal A/C and amplifier.

BAD

Repair or replace.

BAD

Check that there is voltage between amplifier terminal and body ground.

BAD

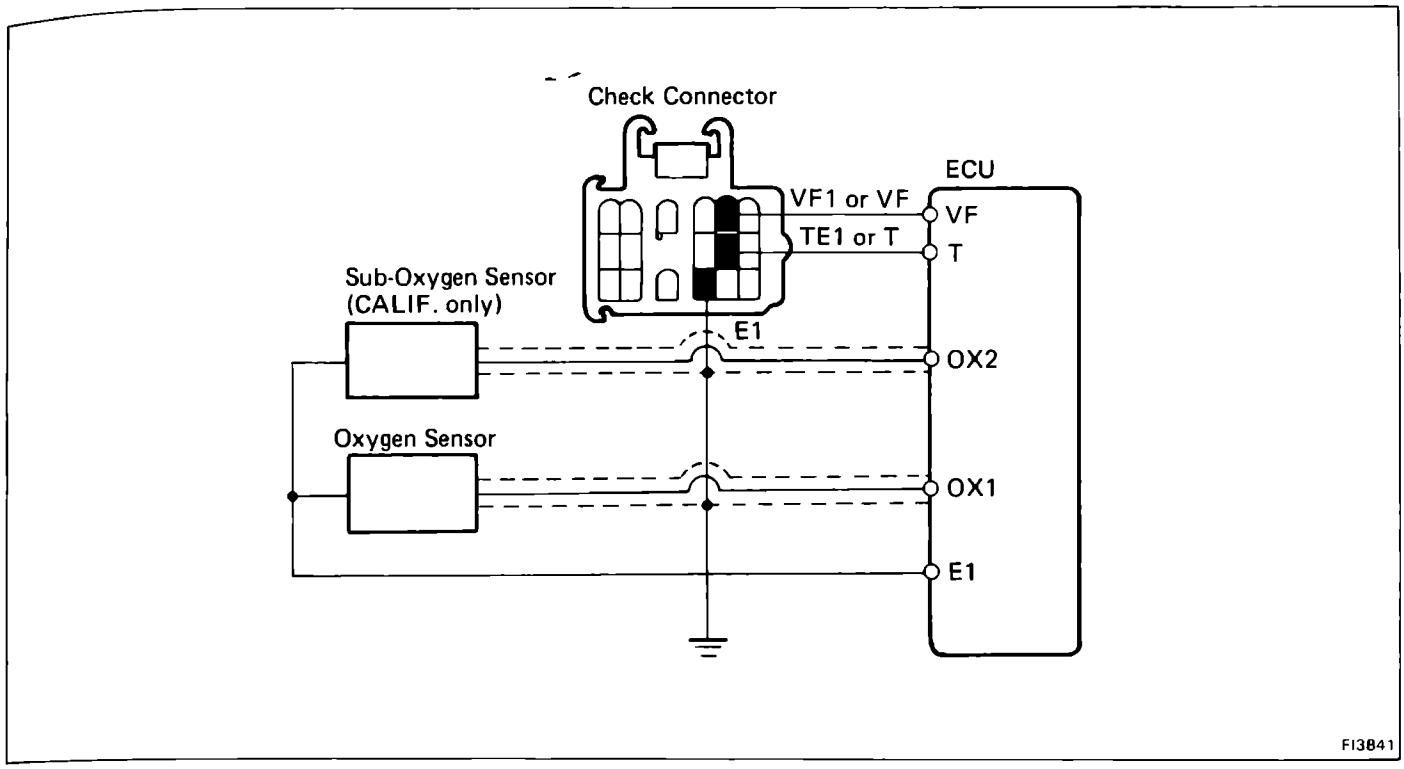
Repair or replace.

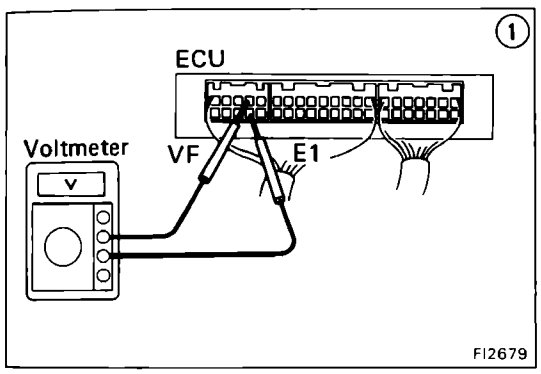
OK

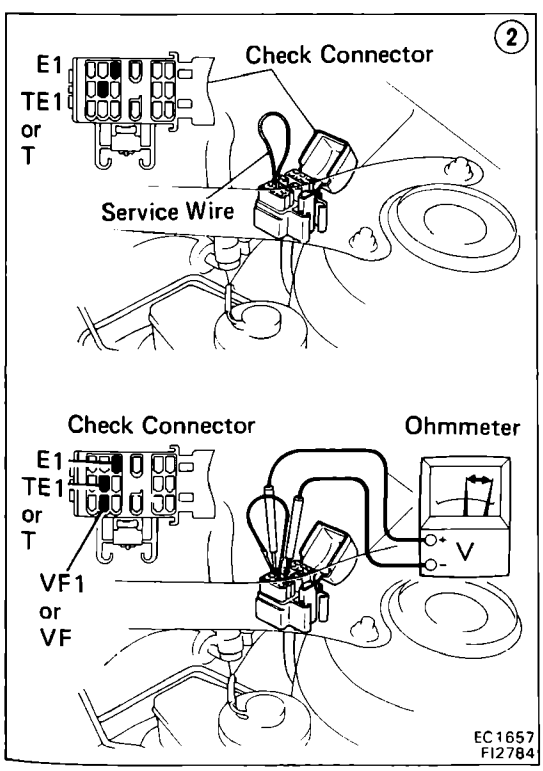
Check wiring between amplifier and ECU or compressor.

BAD

Repair or replace.







① There is no voltage between ECU terminals VF and E1.

Check that there is voltage between ECU terminal VF and body ground.

NO → OK

Check wiring between ECU terminal E1 and body ground.

OK → BAD

Try another ECU. → Repair or replace.

Is air leaking into air induction system? BAD → Repair air leak.

OK

Check spark plugs. (See page IG-6) BAD → Repair or replace.

OK

Check distributor and Ignition system. (See page IG-4) BAD → Repair or replace.

OK

Check fuel pressure. (See page FI-72) BAD → Repair or replace.

OK

Check injectors. (See page FI-95) BAD → Repair or replace.

OK

* Check cold start injector. (See page FI-80) BAD → Repair or replace.

OK

Check air flow meter. (See page FI-113) BAD → Repair or replace.

OK

② Check operation of oxygen sensors. (See pages FI-148 and 150) OK → System normal.

BAD

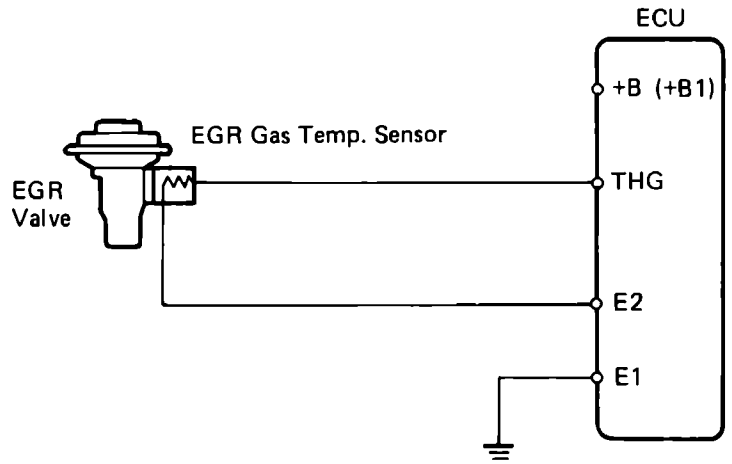
Check wiring between oxygen sensor and ECU. BAD → Repair wiring.

OK

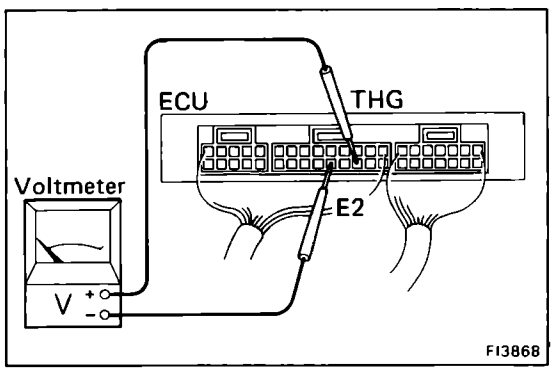
Replace oxygen sensors.

* Rich malfunction only

CALIF. only



FI2680



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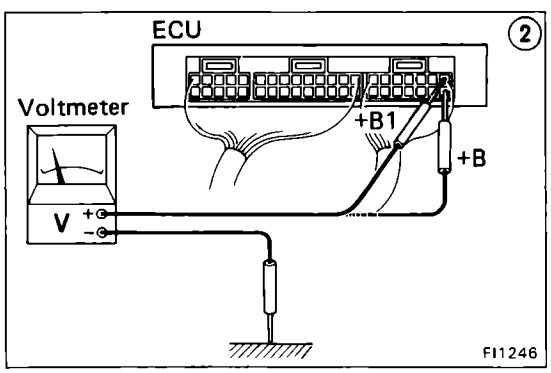
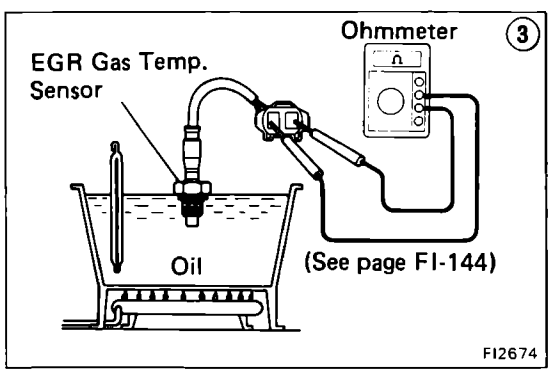


FI1246



FI2674

① No voltage between ECU terminals THG and E2. **(IG SW ON)**

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG SW ON)**

OK

NO → Refer to No. 1. (See page FI-35)

Check wiring between ECU terminal E1 and body ground.

OK

BAD → Repair or replace.

Check EGR system. (See page EC-8)

BAD → Repair or replace.

OK

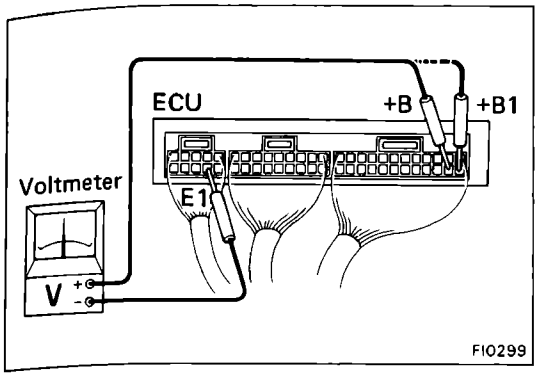
③ Check EGR gas temp. sensor. (See page FI-144)

BAD → Replace EGR gas temp. sensor.

OK → Check wiring between ECU and EGR gas temp. sensor.

OK → Try another ECU.

BAD → Repair or replace.



EFI SYSTEM CHECK PROCEDURE (3S-GE and 3S-GTE)

NOTE:

- Perform all voltage measurements with the connectors connected.
- Verify that the battery voltage is 11 V or more when the ignition switch is in "ON" position.

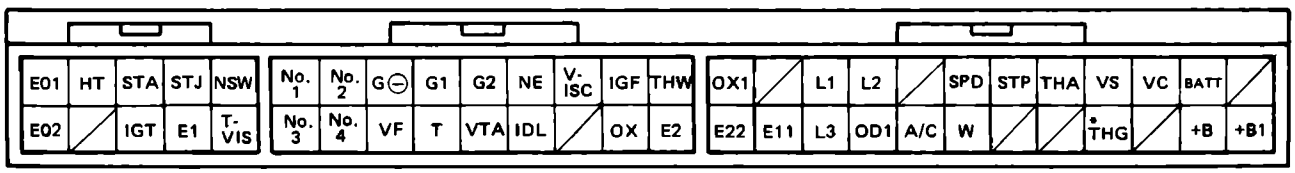
Using a voltmeter with high impedance (10 kΩ/V minimum), measure the voltage at each terminal of the wiring connectors.

Terminals of ECU (3S-GE)

Symbol	Terminal name	Symbol	Terminal name	Symbol	Terminal name
E01	ENGINE GROUND	G1	DISTRIBUTOR	L3	ECT ECU
E02	ENGINE GROUND	T	CHECK CONNECTOR	L2	ECT ECU
HT	OXYGEN SENSOR HEATER	G2	DISTRIBUTOR	OD1	ECT ECU
STA	STARTER SWITCH	VTA	THROTTLE POSITION SENSOR	*1 A/C	A/C MAGNET SWITCH
IGT	IGNITER	NE	DISTRIBUTOR	SPD	SPEED SENSOR
STJ	COLD START SWITCH	IDL	THROTTLE POSITION SENSOR	W	WARNING LIGHT
E1	ENGINE GROUND	V-ISC	IDLE-UP VSV	STP	STOP LIGHT SWITCH
NSW	NEUTRAL START SWITCH	IGF	IGNITER	THA	AIR TEMP. SWITCH
T-VIS	T-VIS VSV	OX	OXYGEN SENSOR	VS	AIR FLOW METER
No. 1	No. 1 INJECTOR	THW	WATER TEMP. SWITCH	*2 THG	EGR GAS TEMP. SENSOR
No. 2	No. 2 INJECTOR	E2	SENSOR GROUND	VC	AIR FLOW METER
No. 3	No. 3 INJECTOR	OX1	OXYGEN SENSOR	BATT	BATTERY
No. 4	No. 4 INJECTOR	E22	SENSOR GROUND	+B	MAIN RELAY
G⊖	DISTRIBUTOR	E11	ENGINE GROUND	+B1	MAIN RELAY
VF	CHECK CONNECTOR	L1	ECT ECU		

*1 w/ A/C
*2 CALIF. only

ECU Terminals



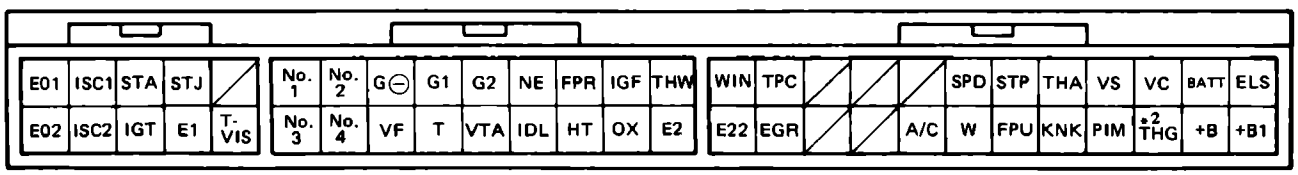
FI0574

Terminals of ECU (3S-GTE)

Symbol	Terminal name	Symbol	Terminal name	Symbol	Terminal name
E01	ENGINE GROUND	T	CHECK CONNECTOR	*1 A/C	A/C MAGNET SWITCH
E02	ENGINE GROUND	G2	DISTRIBUTOR	SPD	SPEED SENSOR
ISC1	ISC VALVE	VTA	THROTTLE POSITION SENSOR	W	WARNING LIGHT
ISC2	ISC VALVE	NE	DISTRIBUTOR	STP	STOP LIGHT SWITCH
STA	STARTER SWITCH	IDL	THROTTLE POSITION SENSOR	FPU	FUEL PRESSURE VSV
IGT	IGNITER	FPR	FUEL PUMP RELAY	THA	AIR TEMP. SWITCH
STJ	COLD START INJECTOR	*2 HT	OXYGEN SENSOR HEATER	KNK	KNOCK CONTROL SENSOR
E1	ENGINE GROUND	IGF	IGNITER	VS	AIR FLOW METER
T-VIS	T-VIS VSV	OX	OXYGEN SENSOR	PIM	TURBOCHARGING PRESSURE SENSOR
No. 1	No. 1 INJECTOR	THW	WATER TEMP. SENSOR	VC	AIR FLOW METER
No. 2	No. 2 INJECTOR	E2	SENSOR GROUND	*2 THG	EGR GAS TEMP. SENSOR
No. 3	No. 3 INJECTOR	WIN	INTERCOOLER ECU	BATT	BATTERY
No. 4	No. 4 INJECTOR	E22	SENSOR GROUND	+B	MAIN RELAY
G⊖	DISTRIBUTOR	TPC	TURBOCHARGING PRESSURE VSV	ELS	HEADLIGHT AND DEFOGGER
VF	CHECK CONNECTOR	EGR	EGR CONTROL VSV	+B1	MAIN RELAY
G1	DISTRIBUTOR				

*1 w/ A/C
*2 CALIF. only

ECU Terminals



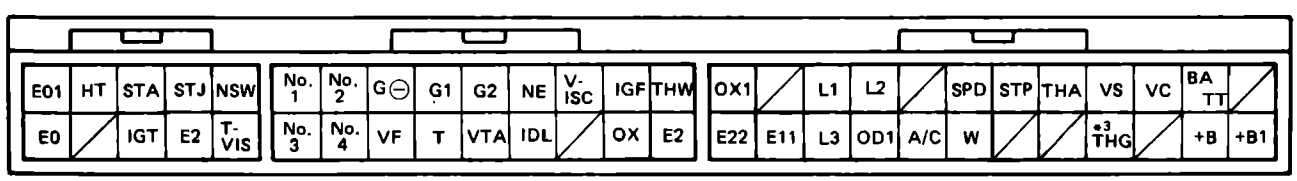
FI0574

Voltage at ECU Wiring Connectors (3S-GE)

No.	Terminals	Condition		STD voltage (V)	See page
1	+B, +B1 — E1	IG SW ON		10 – 14	FI-53
2	BATT — E1	—		10 – 14	FI-54
3	IDL — E2	IG SW ON	Throttle valve open	*2 4 – 6	FI-55
				*3 8 – 14	
	VC — E2		—	4 – 6	
	VTA — E2		Throttle valve fully closed	0.1 – 1.0	
			Throttle valve open	3 – 6	
4	VC — E2		—	4 – 6	FI-57
	VS — E2		Measuring plate fully closed	4 – 5	
			Measuring plate fully open	1.0 or less	
		Idling		2 – 4	
		3,000 rpm		1.0 – 2.0	
5	No. 1, No. 2, No. 3, No. 4 — E01, E02	IG SW ON		10 – 14	FI-58
7	THA — E2	IG SW ON	Intake air temp. 20°C (68°F)	1 – 3	FI-60
8	THW — E2		Coolant temp. 80°C (176°F)	0.1 – 1.0	FI-61
9	STA — E1	Cranking		6 – 14	FI-62
10	IGT — E1	Cranking or idling		0.7 – 1.0	FI-63
12	W — E1	No trouble (check engine warning light off) and engine running		10 – 14	FI-65
*1 14	A/C — E1	IG SW ON	Air conditioning ON	8 – 14	FI-67

ECU Terminals

*1 w/ A/C *2 w/o ECT *3 w/ ECT

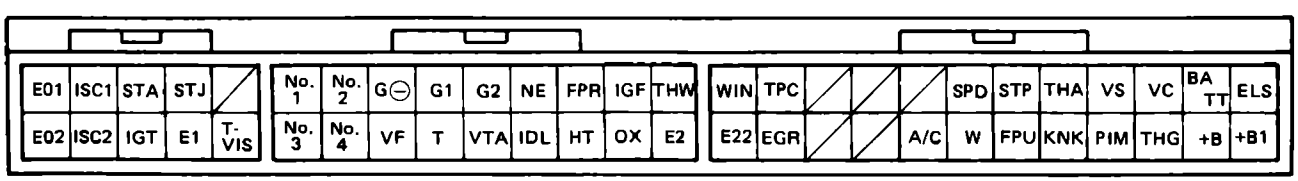


FI0574

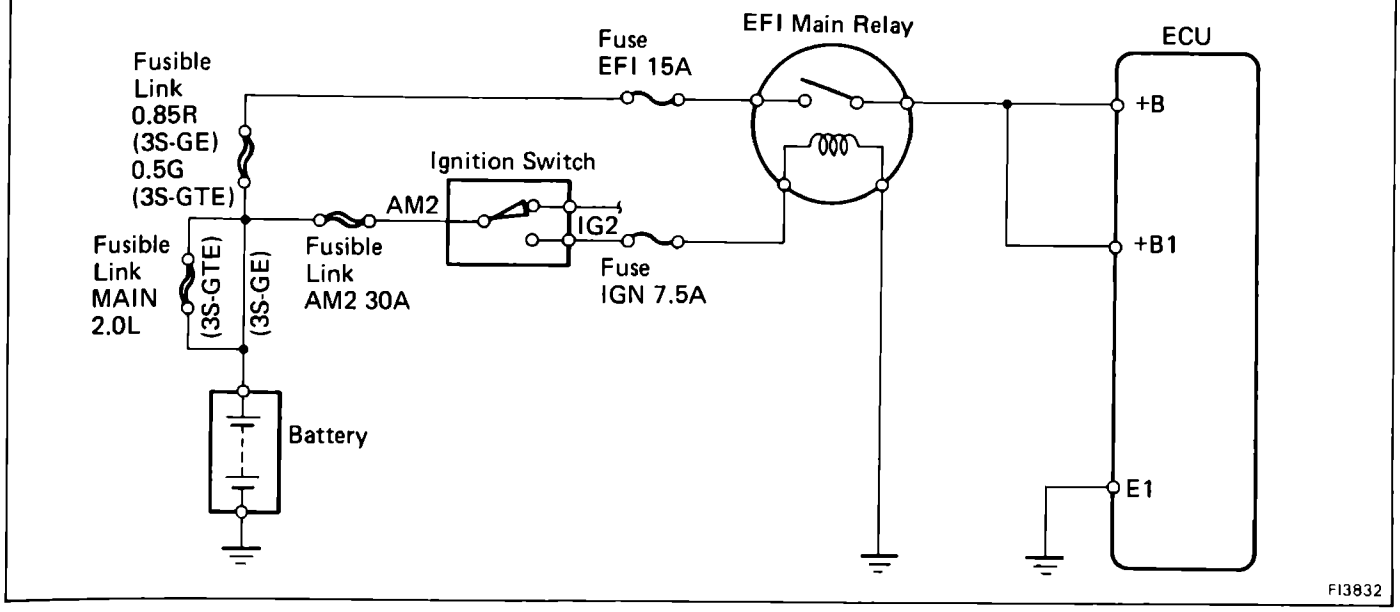
Voltage at ECU Wiring Connectors (3S-GTE)

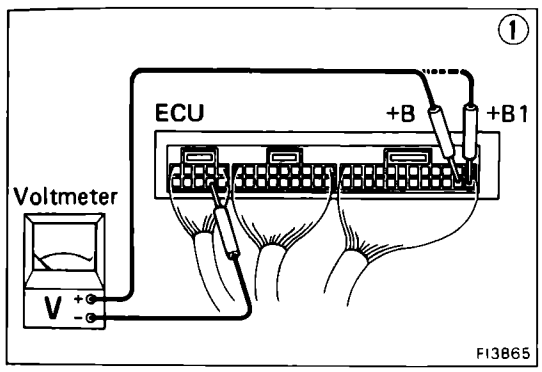
No.	Terminals	Condition		STD voltage (V)	See page
1	+B, +B1 – E1	IG SW ON		10 – 14	FI-53
2	BATT – E1	–		10 – 14	FI-54
3	IDL – E2	IG SW ON	Throttle valve open	4 – 6	FI-55
	VC – E2		–	4 – 6	
	VTA – E2		Throttle valve fully closed	0.1 – 1.0	
			Throttle valve open	3 – 6	
4	VC – E2		–	4 – 6	FI-57
	VS – E2		Measuring plate fully closed	4 – 5	
			Measuring plate fully open	1.0 or less	
		Idling		2 – 4	
		3,000 rpm		1.0 – 2.0	
5	No. 1, No. 2, No. 3, No. 4 – E01, E02	IG SW ON		10 – 14	FI-59
7	THA – E2	IG SW ON	Intake air temp. 20°C (68°F)	1 – 3	FI-60
8	THW – E2		Coolant temp. 80°C (176°F)	0.1 – 1.0	FI-61
9	STA – E1	Cranking		6 – 14	FI-62
10	IGT – E1	Cranking or idling		0.7 – 1.0	FI-63
11	ISC1, ISC2 – E1	IG SW ON		9 – 14	FI-44
12	W – E1	No trouble (check engine warning light off) and engine running		10 – 11	FI-65
13	PIM – E2	IG SW ON		2.5 – 4.5	FI-66
	VC – E2			4 – 6	
14	* A/C – E1	IG SW ON	Air conditioning ON	8 – 14	FI-67

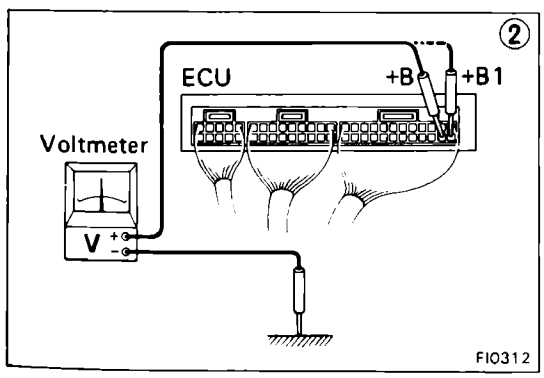
ECU Terminals * w/ A/C

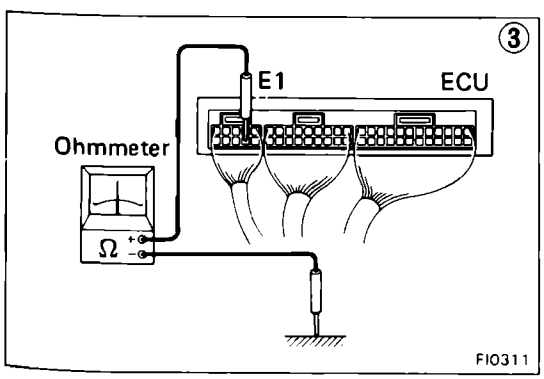


No.	Terminals	Trouble	Condition	STD voltage
1	+B, +B1 — E1	No voltage	Ignition SW ON	10 – 14 V









① No voltage between ECU terminals +B or +B1 and E1. **(IG SW ON)**

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG SW ON)**

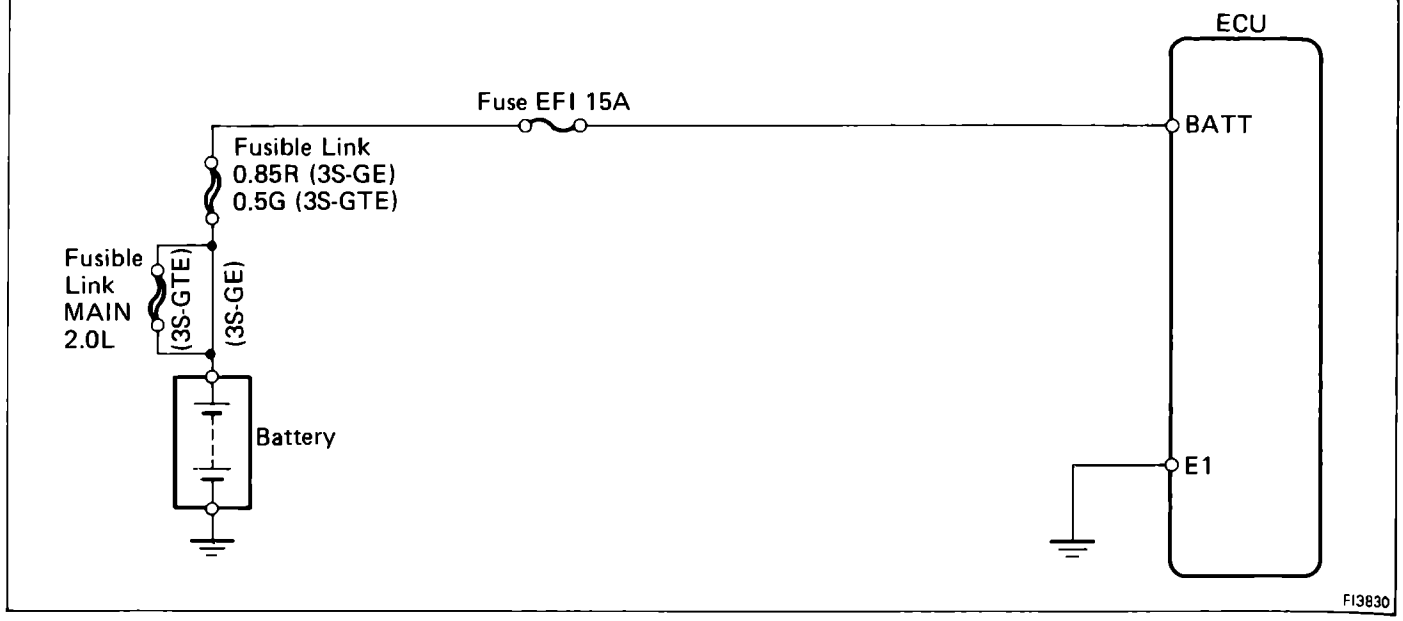
NO → ③ Check wiring between ECU terminal E1 and body ground.
- OK → Try another ECU.
- BAD → Repair or replace.

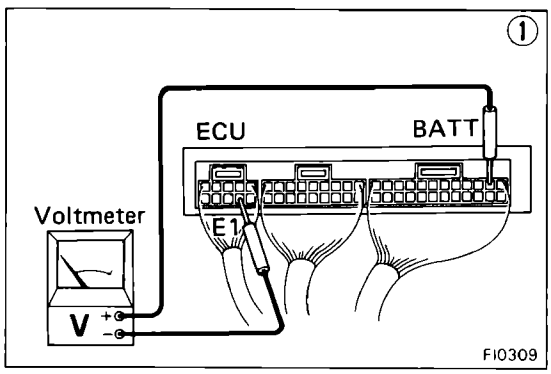
OK → Check fuse, fusible link and ignition switch.
- BAD → Repair or replace.

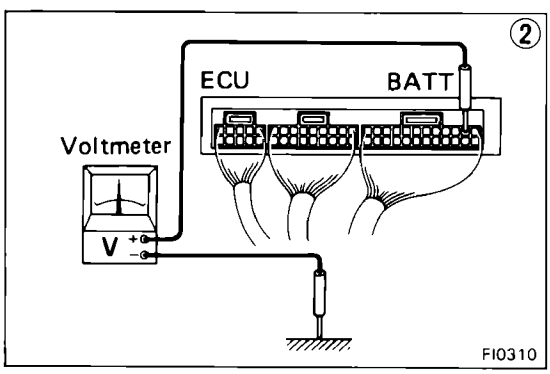
OK → Check EFI main relay.
- BAD → Replace.

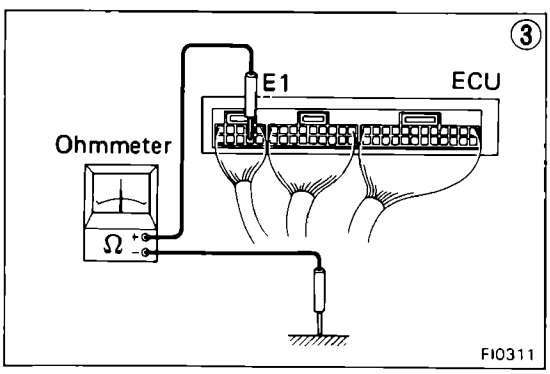
OK → Check wiring between EFI main relay and battery.
- BAD → Repair or replace.

No.	Terminals	Trouble	Condition	STD voltage
2	BATT – E1	No voltage	–	10 – 14 V









① No voltage between ECU terminals BATT and E1.

↓

② Check that there is voltage between ECU terminal BATT and body ground.

NO → ↓ OK

③ Check wiring between ECU terminal E1 and body ground.

OK → Try another ECU.

BAD → Repair or replace.

↓

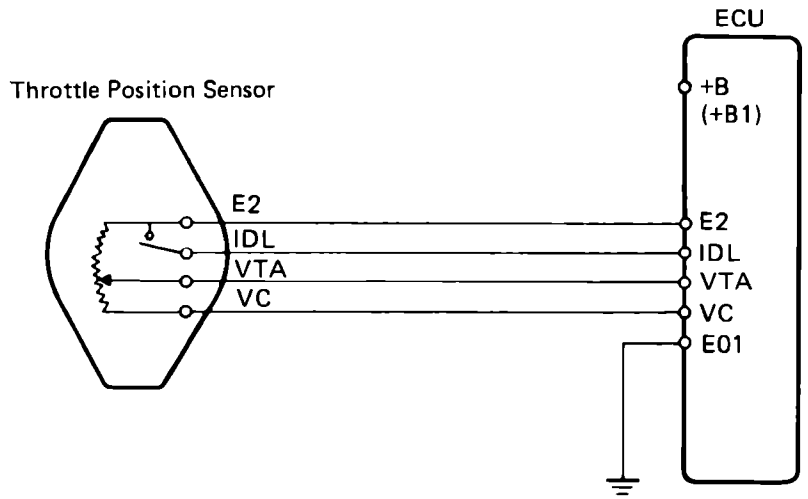
Check fuse and fusible link. → BAD → Replace.

↓ OK

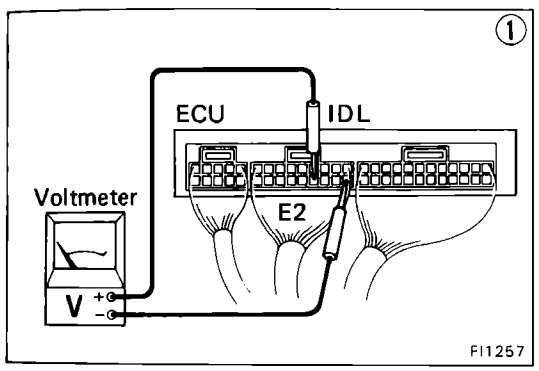
Check wiring between ECU terminal BATT and battery. → BAD → Repair or replace.

No.	Terminals	Trouble	Condition		STD voltage
3	IDL – E2	No voltage	IG SW ON	Throttle valve open	*1 4 – 6 V or *2 8 – 14 V
	VTA – E2			Throttle valve fully closed	0.1 – 1.0 V
				Throttle valve fully open	3 – 6 V
	VC – E2			–	4 – 6 V

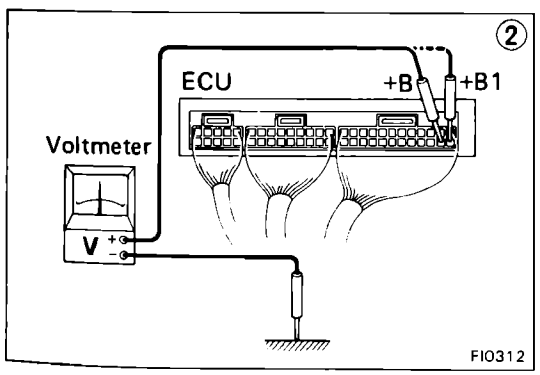
*1 w/o ECT
*2 w/ ECT



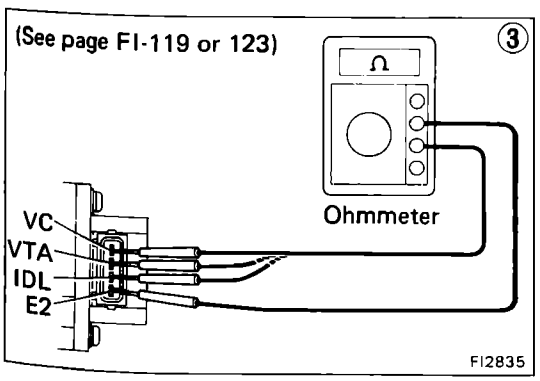
FI1366



FI1257



FI0312



FI2835

● **IDL – E2**

① No voltage between ECU terminals IDL and E2. **(IG SW ON)** (Throttle valve open)

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG SW ON)**

NO

OK

Check wiring between ECU terminal E1 and body ground.

BAD

Repair or replace.

Refer to No. 1. (See page FI-53)

BAD

Repair or replace.

OK

③ Check throttle position sensor. (See page FI-119 or 123)

BAD

OK

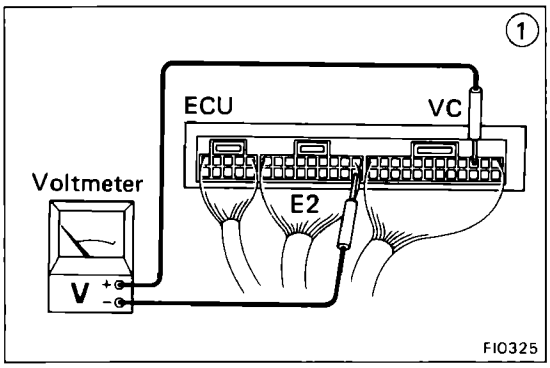
Repair or replace throttle position sensor.

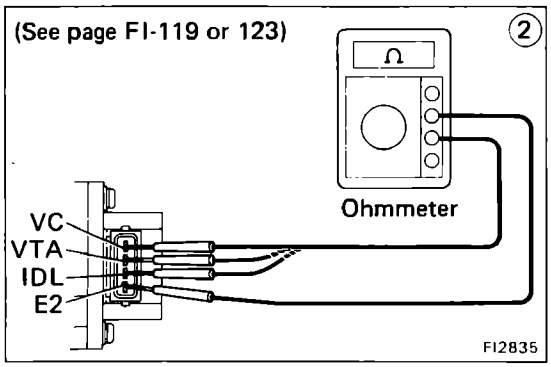
Check wiring between ECU and throttle position sensor.

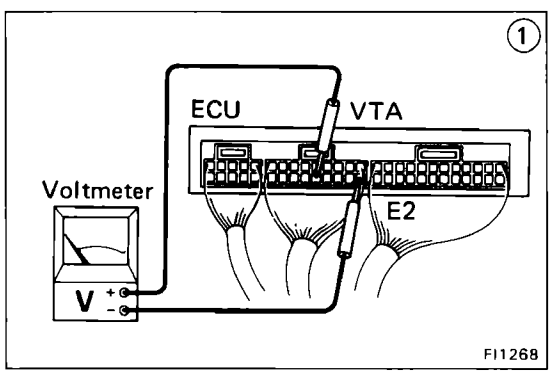
BAD

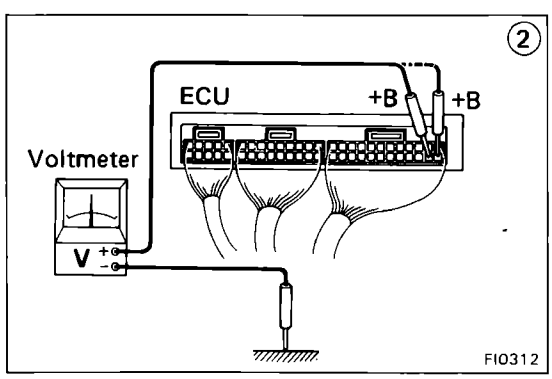
OK

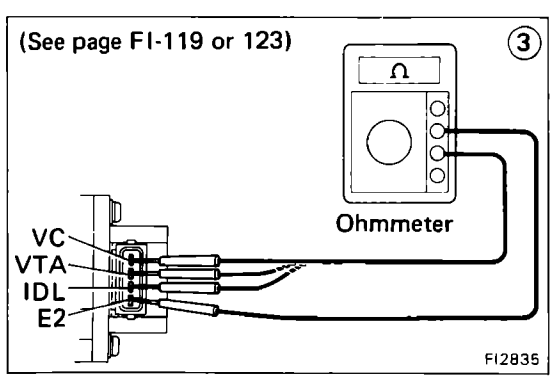
Try another ECU.











- **VC – E2**

① No voltage between ECU terminals VC and E2. **(IG SW ON)**

Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG SW ON)**

OK → ② Check throttle position sensor. (See page FI-119 or 123)

NO → Refer to No. 1. (See page FI-53)

BAD → Repair or replace.

OK → Check wiring between ECU and throttle position sensor.

OK → Try another ECU.

BAD → Repair or replace wiring.

- **VTA – E2**

① No specified voltage at ECU terminals VTA and E2. **(IG SW ON)**

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG SW ON)**

NO → OK → Check wiring between ECU terminal E2 and body ground.

BAD → Repair or replace.

Refer to No. 1. (See page FI-53)

BAD → Repair or replace.

OK

③ Check throttle position sensor. (See page FI-119 or 123)

BAD → Repair or replace.

OK

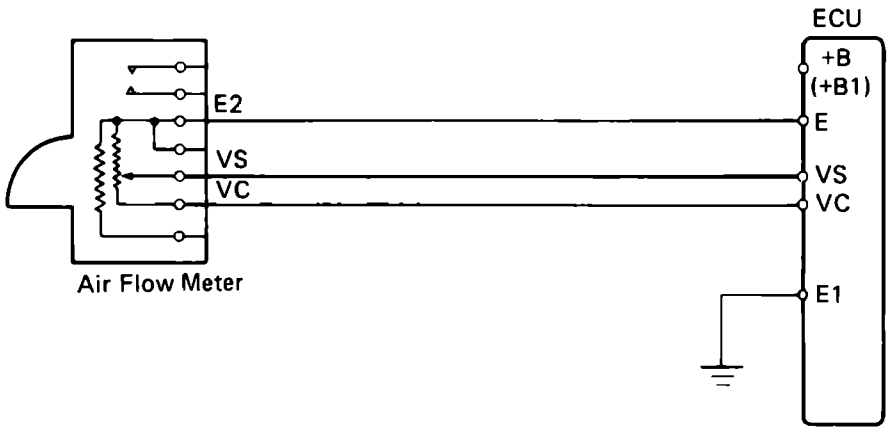
Check wiring between ECU and throttle position sensor.

BAD → Repair or replace.

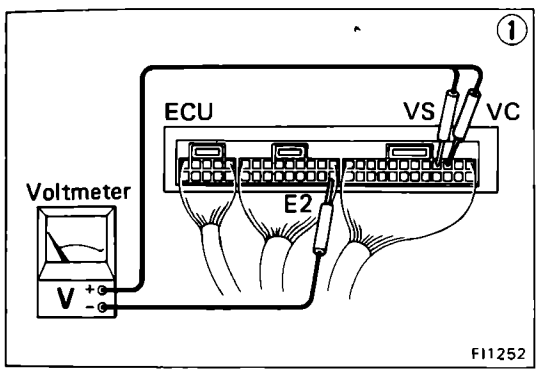
OK

Try another ECU.

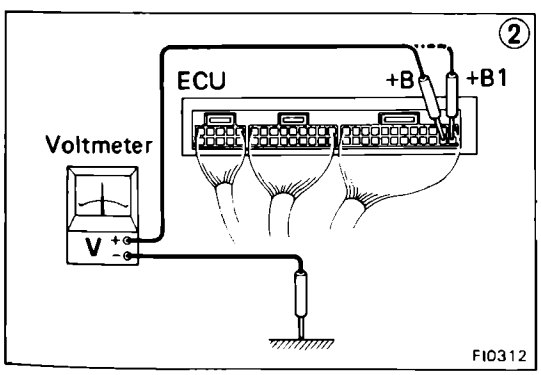
No.	Terminals	Trouble	Condition		STD voltage
4	VC – E2	No voltage	IG SW ON	–	4 – 6 V
	VS – E2			Measuring plate fully closed	4 – 5 V
				Measuring plate fully open	1.0 V or less
			Idling		2 – 4 V
			3,000 rpm		1.0 – 2.0 V



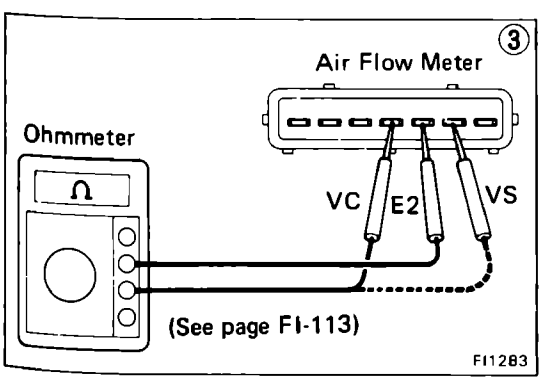
FI1269



FI1252



FI0312



FI1283

① No specified voltage at ECU terminals VC or VS and E2. **(IG SW ON)**

↓

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG SW ON)**

OK → ↓

NO → Refer to No. 1. (See page FI-53)

↓

Check wiring between ECU terminal E1 and body ground.

OK → ↓

BAD → Repair or replace.

↓

③ Check air flow meter. (See page FI-113)

BAD → Repair or replace air flow meter.

OK → ↓

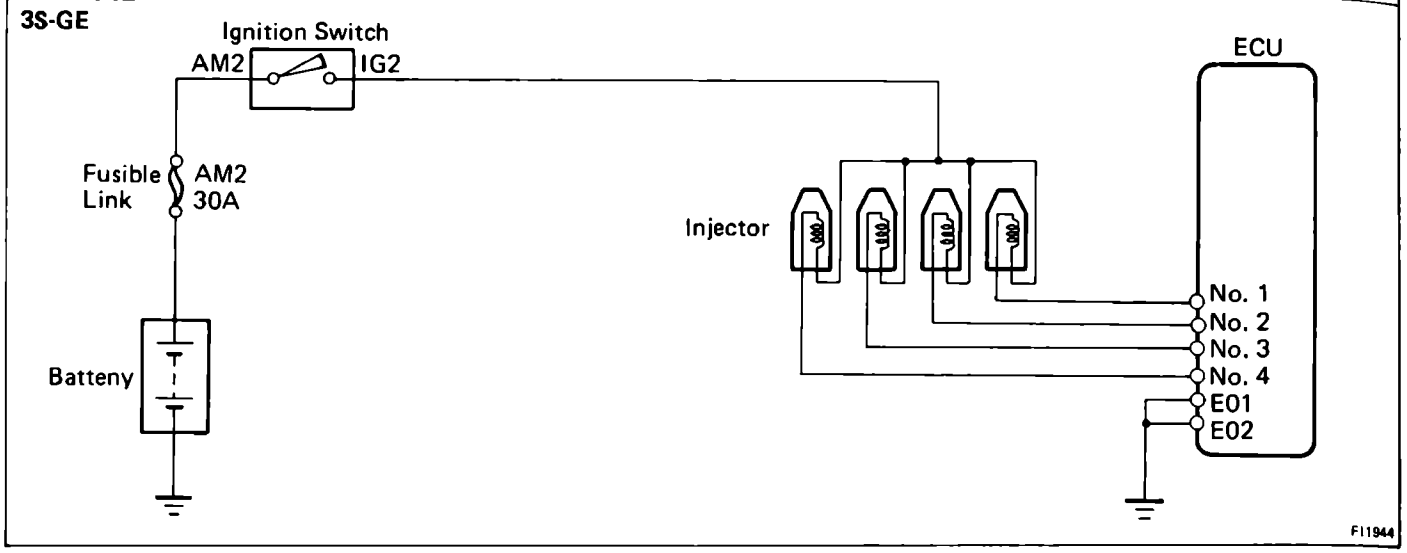
Check wiring between ECU and air flow meter.

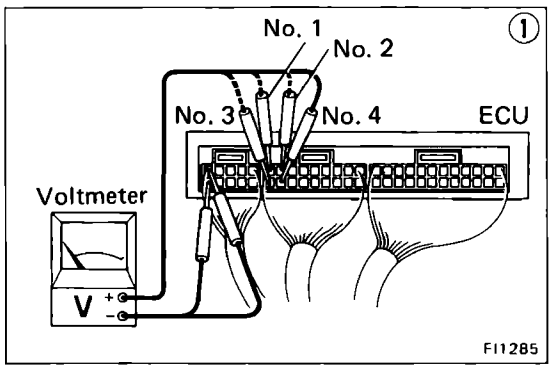
OK → ↓

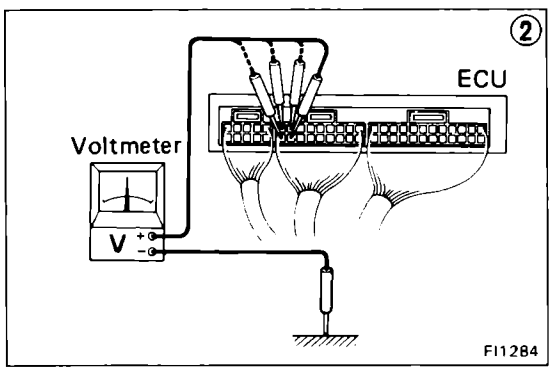
Try another ECU.

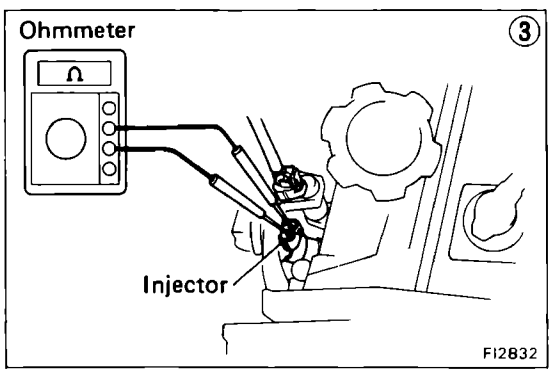
BAD → Repair or replace.

No.	Terminals	Trouble	Condition	STD voltage
5	No.1, No.2, No.3, No.4 — E01, E02	No voltage	IG SW ON	10 – 14 V









① No voltage between ECU terminals No. 1, No. 2, No. 3 and/or No. 4 and E01 and/or E02. **(IG SW ON)**

② Check that there is voltage between ECU terminal No. 1, No. 2, No. 3 and/or No. 4 and body ground.

NO — Check wiring between ECU terminal E01 and/or E02 and body ground.
- OK → Try another ECU.
- BAD → Repair or replace.

OK — Check fusible link and ignition switch.
- BAD → Repair or replace.

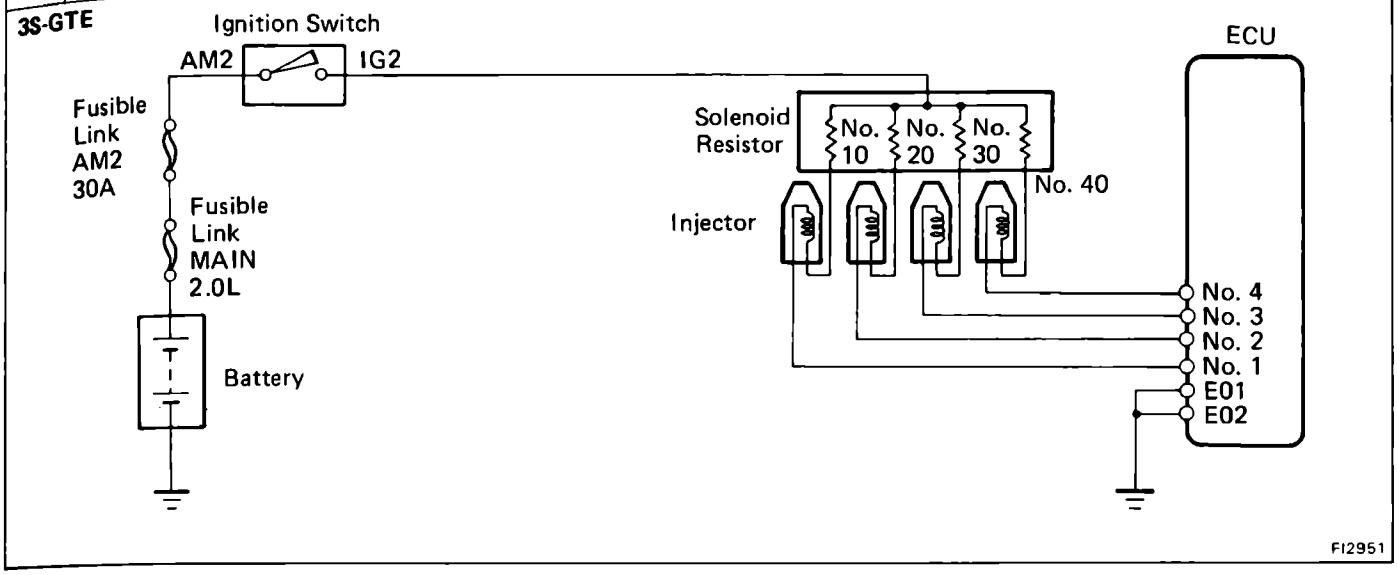
OK

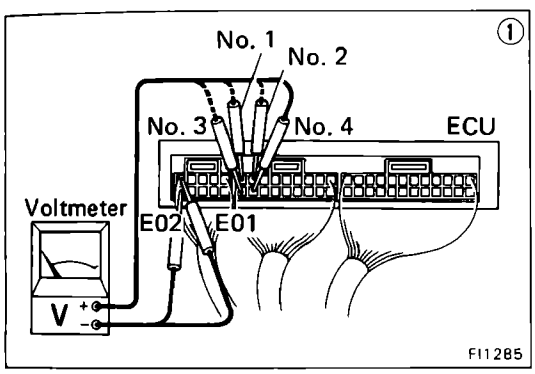
③ Check resistance of each injector.
STD resistance: Approx. 13.8 Ω

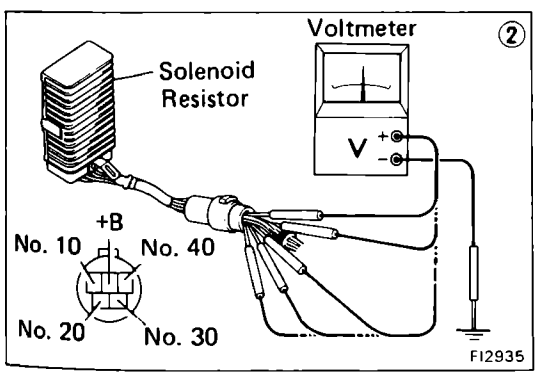
OK — Check wiring between ECU terminal No. 1, No. 2, No. 3 and/or No. 4 and battery.
- BAD → Repair or replace.

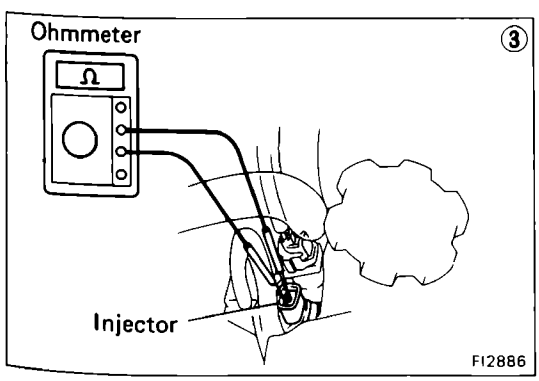
BAD → Replace injector.

No.	Terminals	Trouble	Condition	STD voltage
6	No. 1, No. 2, No. 3, No. 4 — E01, E02	No voltage	IG SW ON	10 – 14 V









① No voltage between ECU terminals No. 1, No. 2, No. 3 and/or No. 4 and E01 and/or E02. **(IG SW ON)**

② Check that there is specified voltage between solenoid resistor terminal +B and body ground. **STD voltage: 10 – 14 V**

OK

NO → Check fusible link, wiring and ignition switch. → BAD → Repair or replace.

② Check that there is specified voltage between resistor terminals (No. 10, No. 20, No. 30 or No. 40) and body ground. **STD voltage: 10 – 14 V**

OK

NO → Replace resistor.

③ Check resistance of each injector. **STD resistance: 2 – 4 Ω**

OK

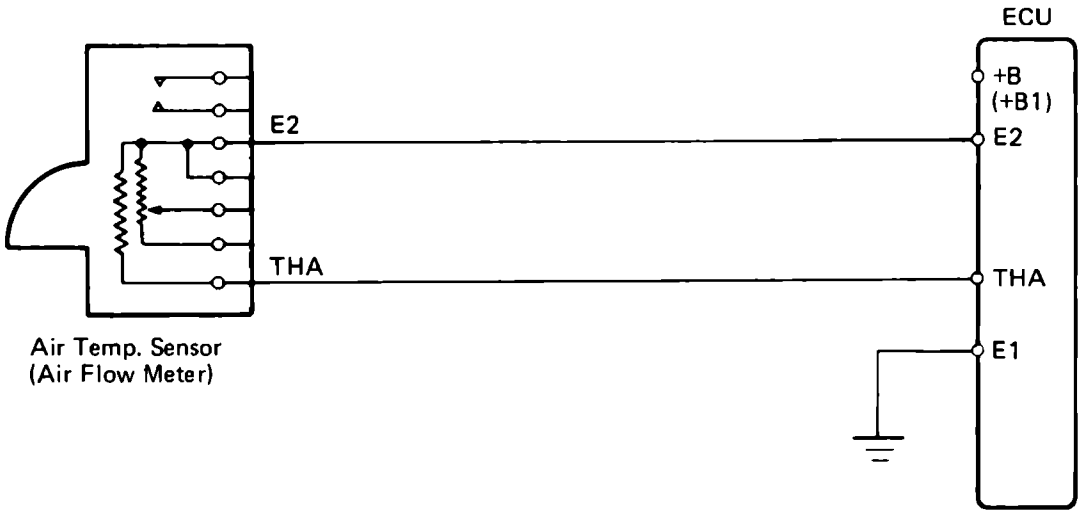
BAD → Replace injector.

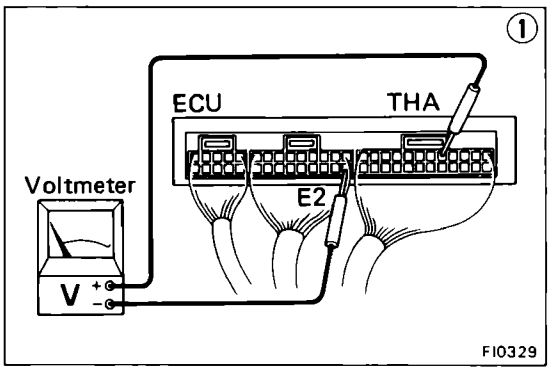
Check wiring between ECU and resistor. → BAD → Repair or replace wiring.

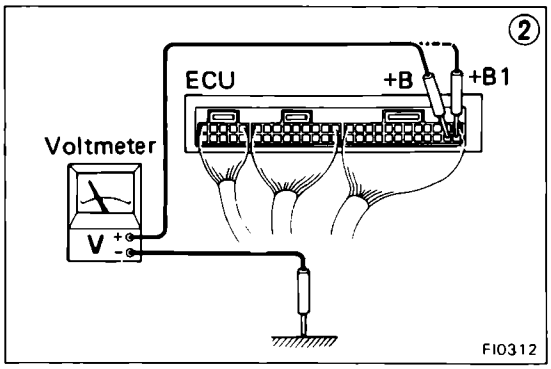
OK

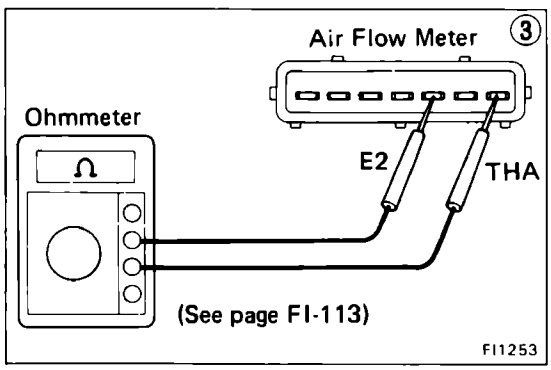
Try another ECU.

No.	Terminals	Trouble	Condition		STD voltage
7	THA – E2	No voltage	IG SW ON	Intake air temperature 20°C (68°F)	1 – 3 V









① No voltage between ECU terminals THA and E2. **(IG SW ON)**

↓

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG SW ON)**

OK → ↓

NO → Refer to No. 1. (See page FI-53)

↓

Check wiring between ECU terminal E1 and body ground.

OK → ↓

BAD → Repair or replace.

↓

③ Check air temp. sensor. (See page FI-113)

BAD → Replace air flow meter.

OK → ↓

Check wiring between ECU and air temp. sensor.

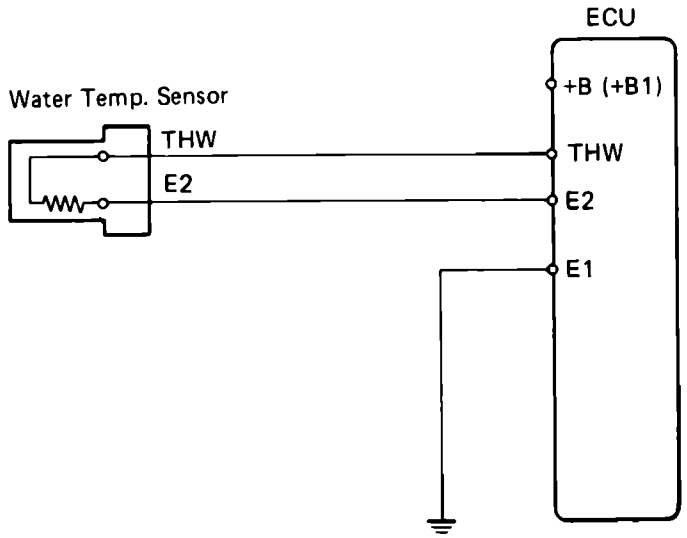
OK → ↓

BAD → Repair or replace.

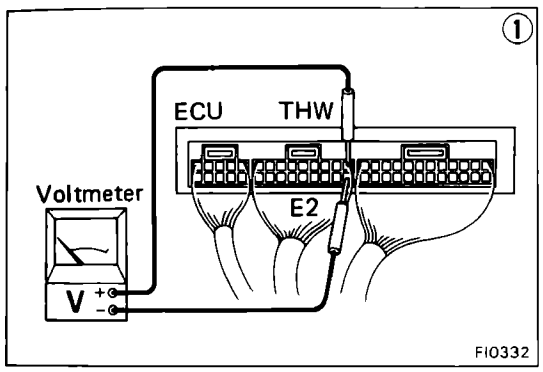
↓

Try another ECU.

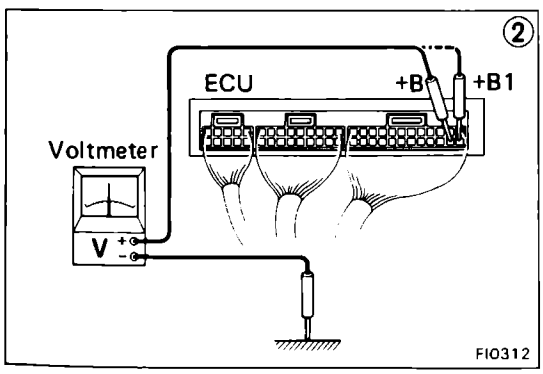
No.	Terminals	Trouble	Condition		STD voltage
8	THW – E2	No voltage	IG SW ON	Coolant temperature 80°C (176°F)	0.1 – 1.0 V



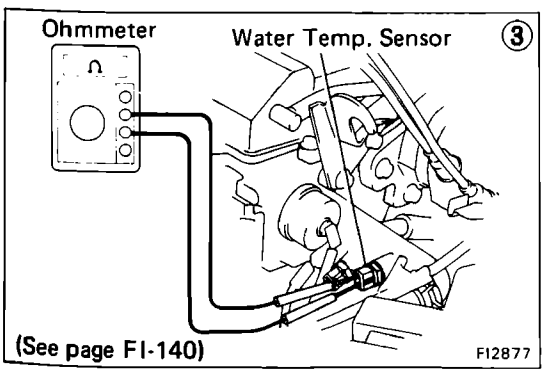
FI0487



FI0332



FI0312



FI2877

① No voltage between ECU terminals THW and E2. **(IG SW ON)**

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG SW ON)**

OK → Check wiring between ECU terminal E2 and body ground.

NO → Refer to No. 1. (See page FI-53)

OK → ③ Check water temp. sensor. (See page FI-140)

BAD → Repair or replace.

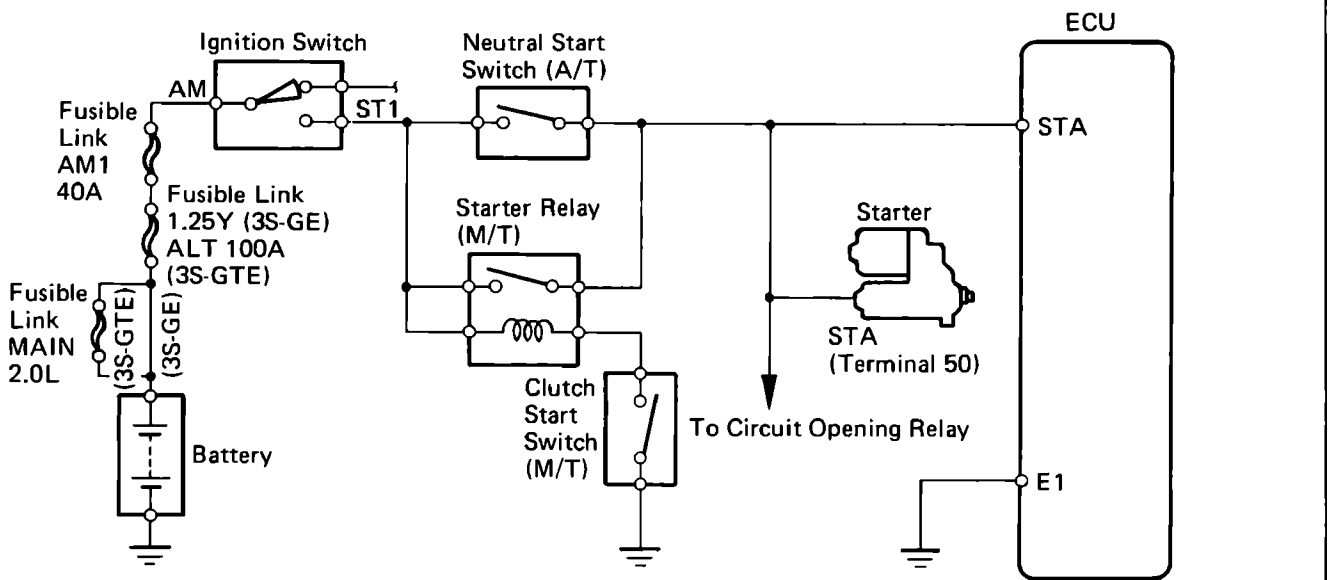
BAD → Replace water temp. sensor.

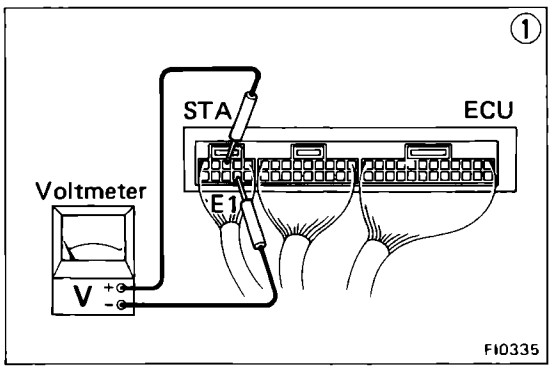
OK → Check wiring between ECU and water temp. sensor.

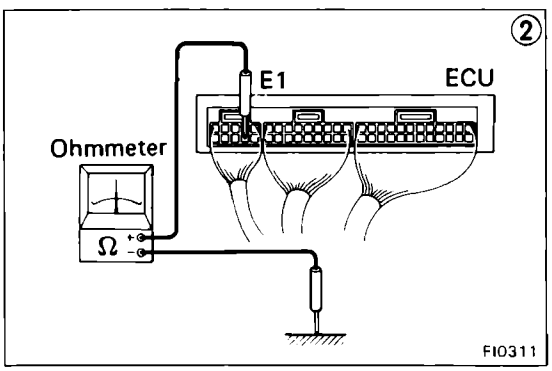
OK → Try another ECU.

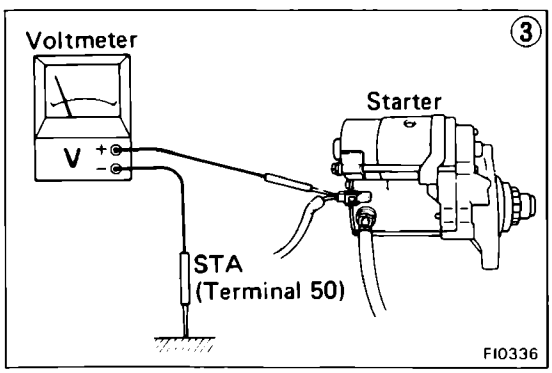
BAD → Repair or replace.

No.	Terminals	Trouble	Condition	STD voltage
9	STA – E1	No voltage	Cranking	6 – 14 V





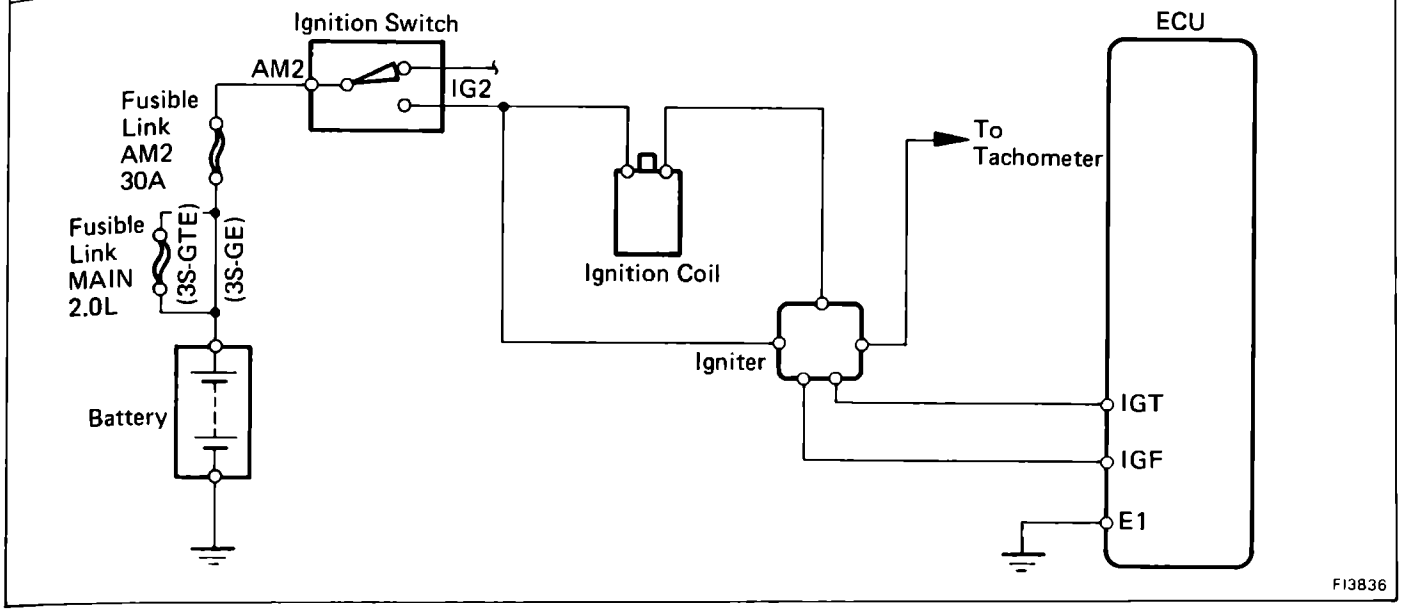


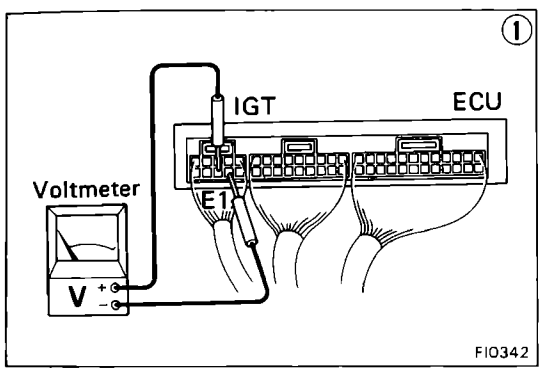


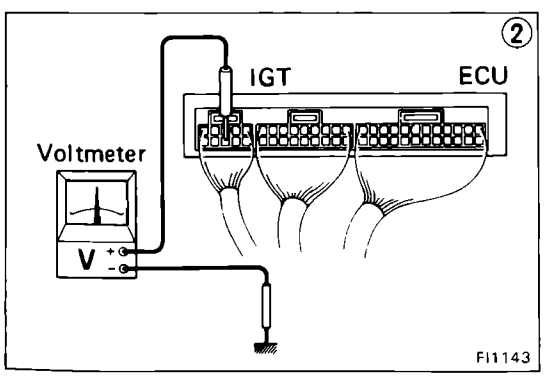
① No voltage between ECU terminals STA and E1.
(IG SW START)

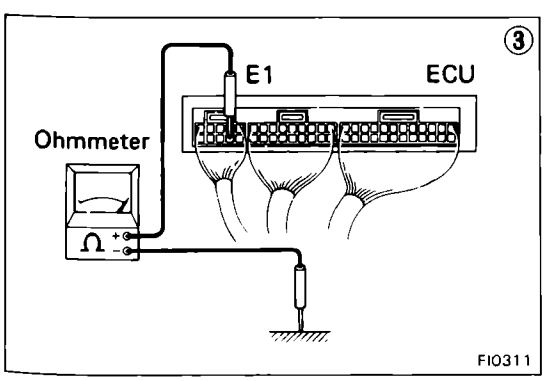
Check starter operation.
- OK → Check wiring between ECU terminal STA and ignition switch terminal ST1.
  - OK → ② Check wiring between ECU terminal E1 and body ground.
    - OK → Try another ECU.
    - BAD → Repair or replace.
  - BAD → Repair or replace.
- BAD → Check fusible link, battery, wiring, ignition switch clutch start switch, starter relay and neutral start switch.
  - BAD → Repair or replace.
  - OK → ③ Check that there is voltage at STA (50) terminal of starter.
    (IG SW START) **STD voltage: 6 – 14 V**
    - OK → Check starter.
    - NO → Check wiring between ignition switch terminal ST1 and starter terminal STA (50).

No.	Terminals	Trouble	Condition	STD voltage
10	IGT – E1	No voltage	Cranking or idling	0.7 – 1.0 V









① No voltage between ECU terminals IGT and E1. **(Cranking or Idling)**

↓

② Check that there is voltage between ECU terminal IGT and body ground. **(Idling)**

NO → ↓ OK

↓ OK → ③ Check wiring between ECU terminal E1 and body ground. → BAD → Repair or replace.

↓ OK

Try another ECU.

↓

Check fuse, fusible link and ignition switch. → BAD → Repair or replace.

↓ OK

Check distributor. (See page IG-10) → BAD → Repair or replace.

↓ OK

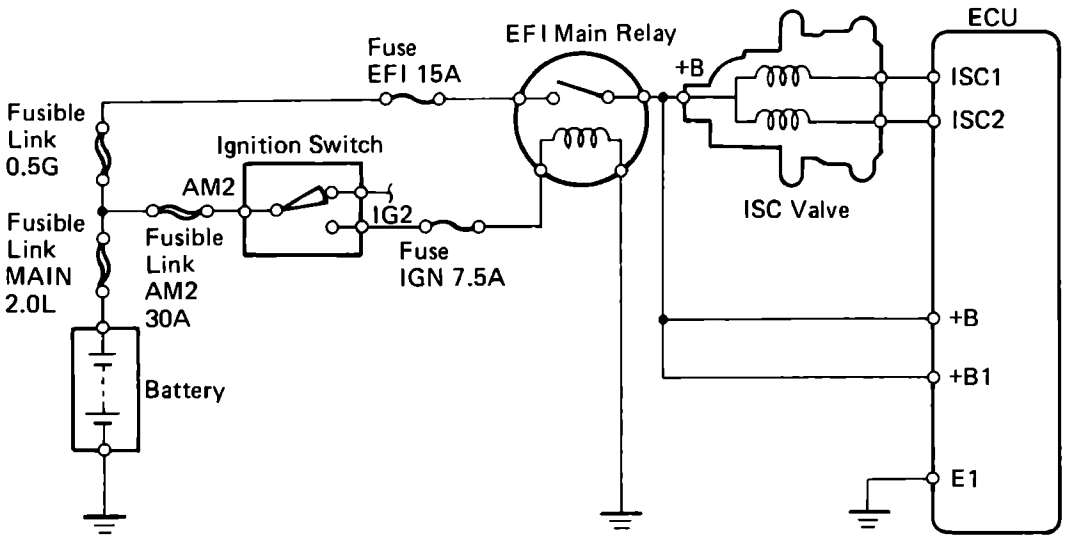
Check wiring between ECU and battery. → BAD → Repair or replace.

↓ OK

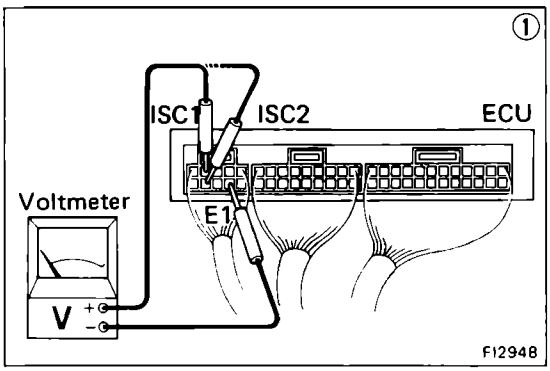
Check igniter. (See page IG-10) → BAD → Repair or replace.

No.	Terminals	Trouble	Condition	STD voltage
11	ISC1 ISC2 – E1	No voltage	IG SW ON	9 – 14 V

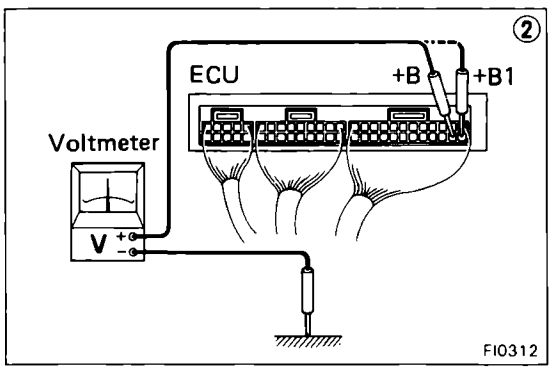
3S-GTE



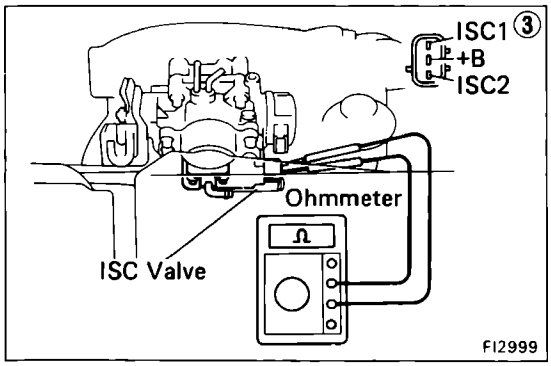
FI3834



FI2948



FI0312



FI2999

① There is no voltage between ECU terminals ISC1 or ISC2 and E1. **(IG SW ON)**

↓

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG SW ON)**

OK ↓

NO → Refer to No. 1. (See page FI-53)

↓

③ Check resistance between ISC valve terminals +B and ISC1 or ISC2. **STD resistance: 16.0 – 17.0 Ω**

BAD → Replace ISC valve.

OK ↓

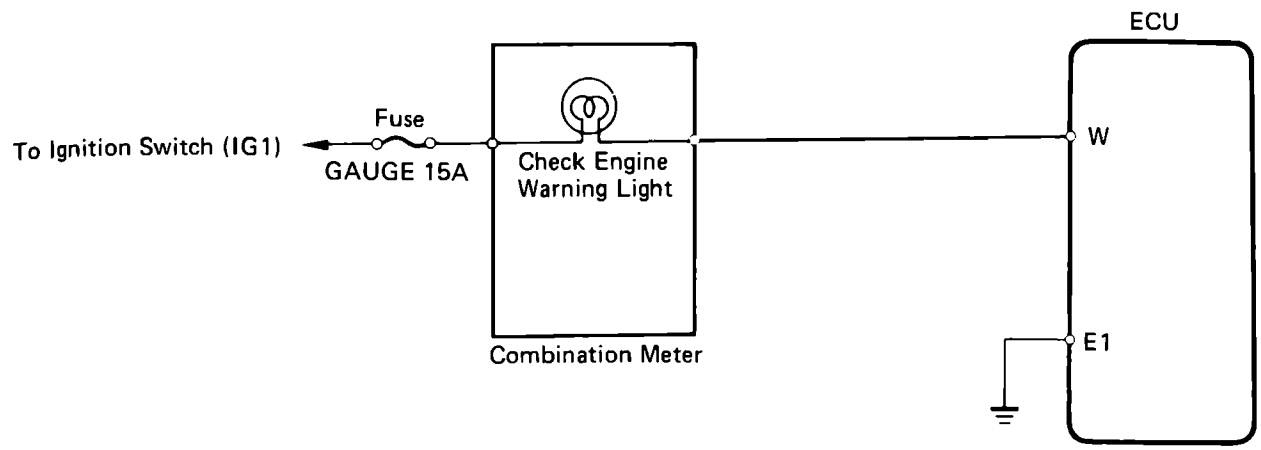
Check wiring between ECU and ISC valve.

BAD → Repair or replace wiring.

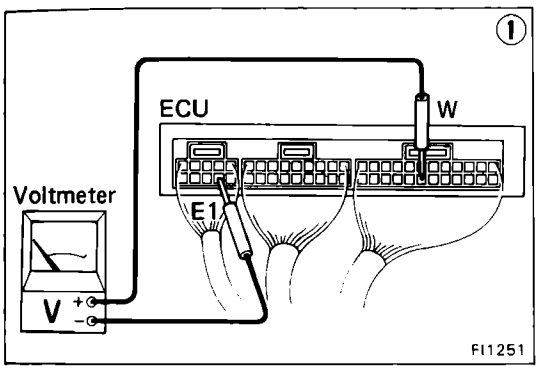
OK ↓

Try another ECU.

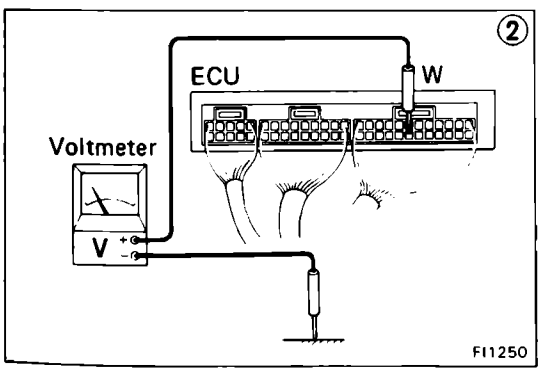
No.	Terminals	Trouble	Condition	STD voltage
12	W – E1	No voltage	No trouble (check engine warning light off) and engine running	10 – 14 V



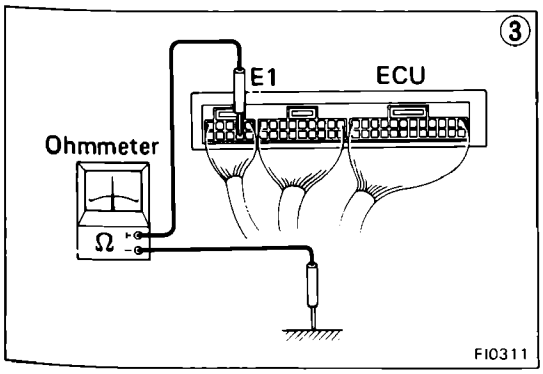
FI0728



FI1251



FI1250



FI0311

① No voltage between ECU terminals W and E1. **(Idling)**

↓

② Check that there is voltage between ECU terminal W and body ground.

NO ← ② → OK

OK → ③ Check wiring between ECU terminal E1 and body ground.

③ → OK → Try another ECU.

③ → BAD → Repair or replace.

NO → Check GAUGE fuse (15A) and check engine warning light.

Check GAUGE fuse (15A) and check engine warning light. → OK → Check wiring between ECU terminal W and fuse.

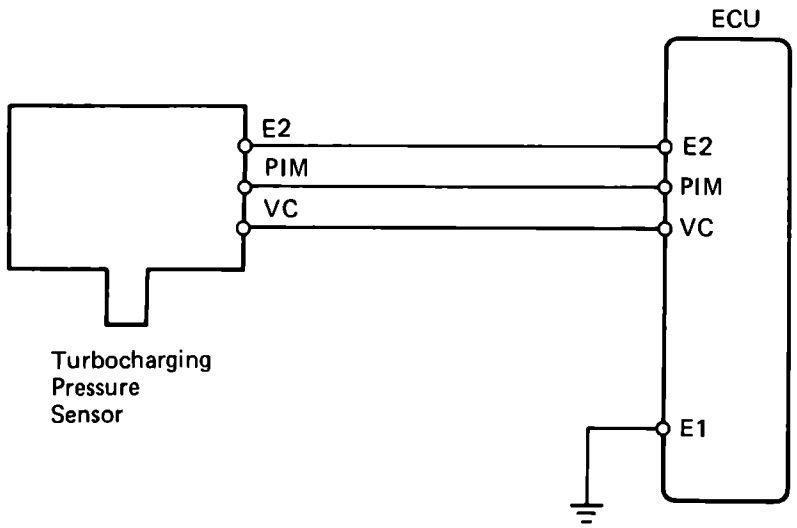
Check GAUGE fuse (15A) and check engine warning light. → BAD → Repair or replace.

Repair or replace. → Fuse blows again → Check wiring between ECU terminal W and fuse.

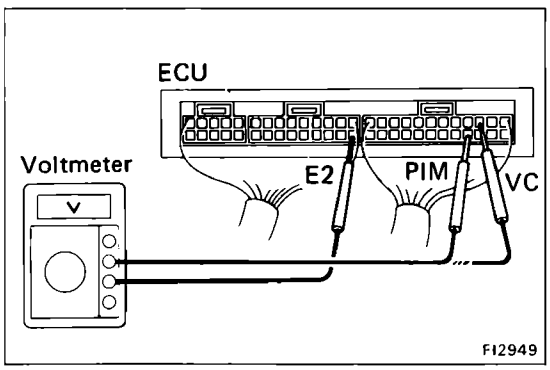
Check wiring between ECU terminal W and fuse. → BAD → Repair or replace.

No.	Terminals	Trouble	Condition	STD voltage
13	PIM – E2	No voltage	IG SW ON	2.5 – 4.5 V
	VC – E2			4 – 6 V

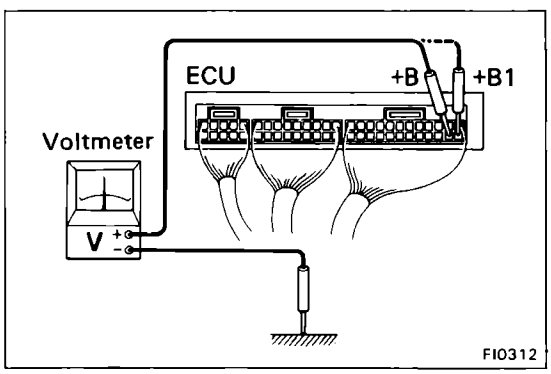
3S-GTE



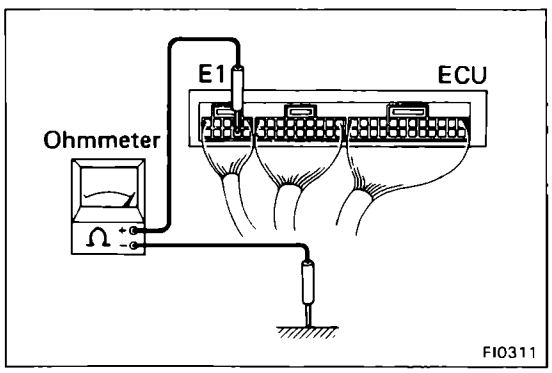
FI1226



FI2949



FI0312



FI0311

① No voltage at ECU terminals PIM or VC and E2. **(IG SW ON)**

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG SW ON)**

NO

OK

③ Check wiring between ECU terminal E1 and body ground.

BAD

Repair or replace.

Check turbocharging pressure sensor. (See page FI-145)

BAD

Repair or replace.

OK

Check wiring between ECU and vacuum sensor.

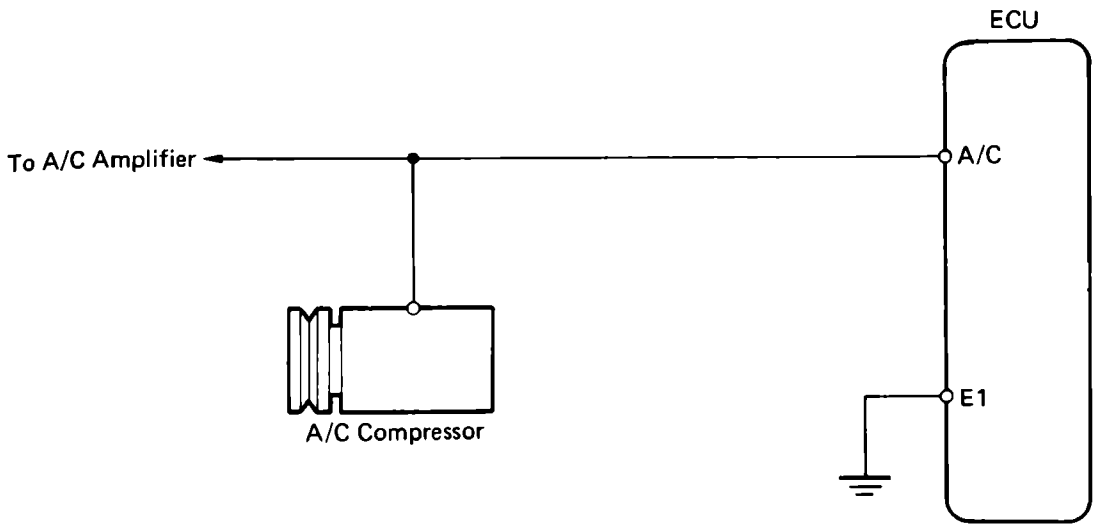
BAD

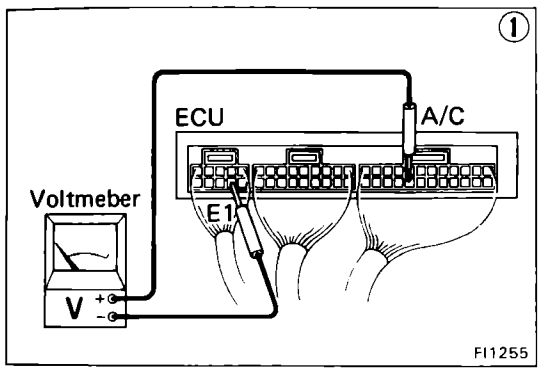
Repair or replace.

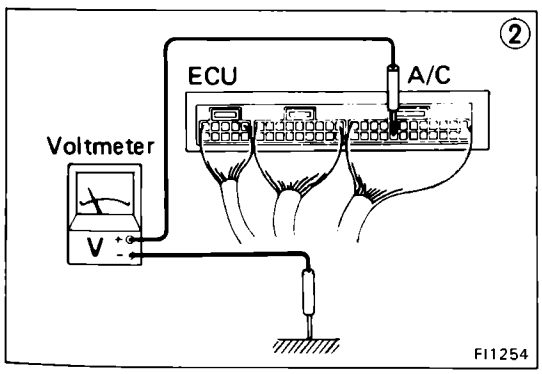
OK

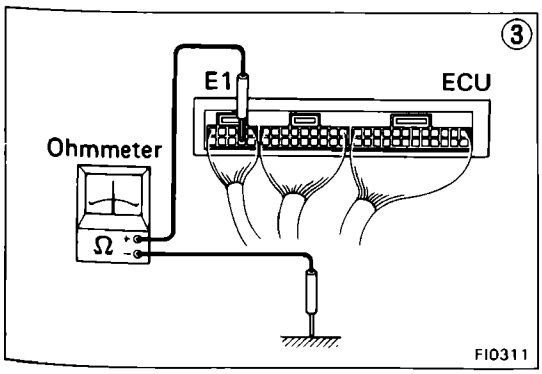
Try another ECU.

No	Terminal	Trouble	Condition	STD voltage
14	A/C – E1	No voltage	Air conditioning ON	8 – 14 V









① No voltage between ECU terminals A/C and E1. **(Air conditioning ON)**

② Check that there is voltage between ECU terminal A/C and body ground.

NO

OK

③ Check wiring between ECU terminal E1 and body ground.

OK

Try another ECU.

BAD

Repair or replace.

Check compressor running.

OK

Check wiring between ECU terminal A/C and amplifier.

BAD

Repair or replace.

BAD

Check that there is voltage between amplifier terminal and body ground.

BAD

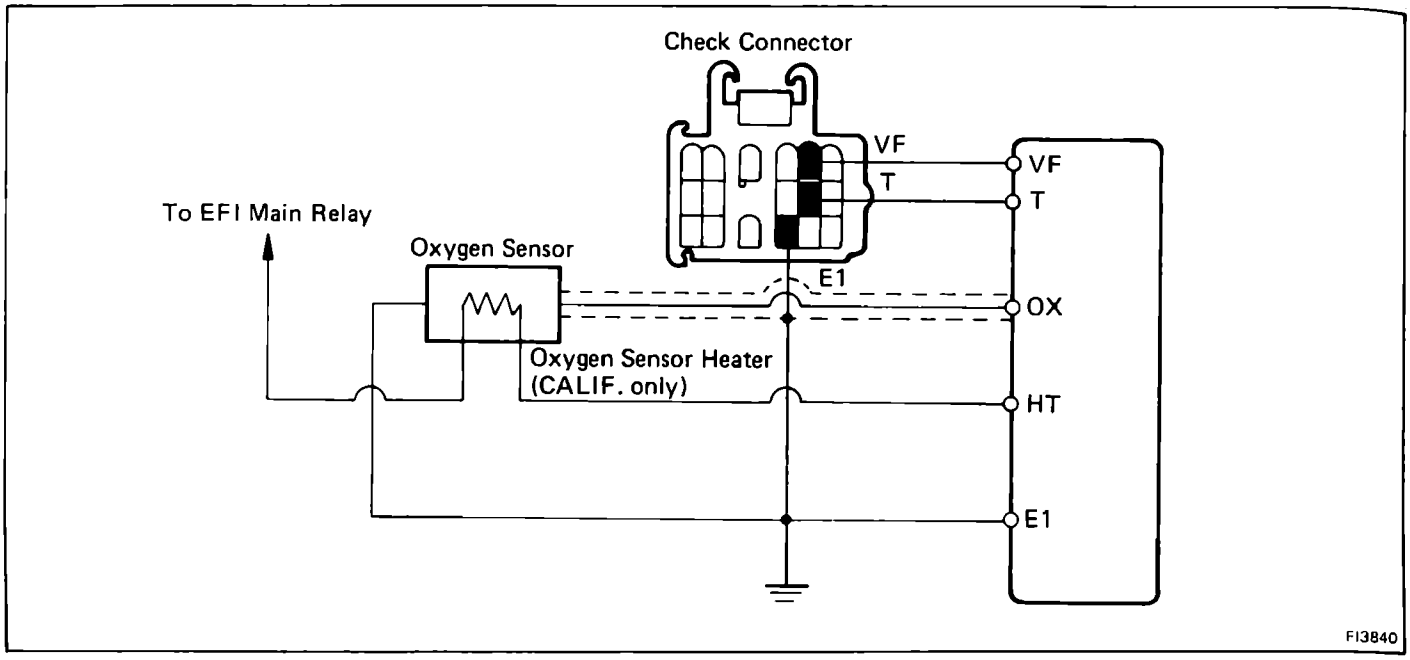
Repair or replace.

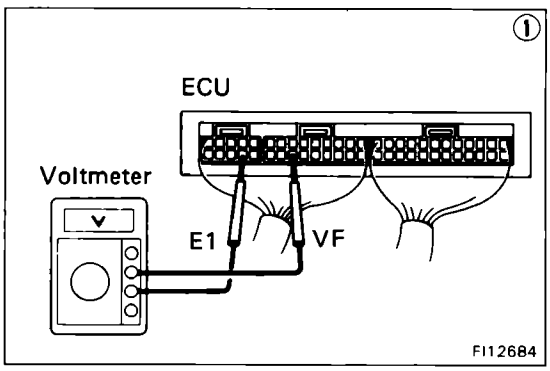
OK

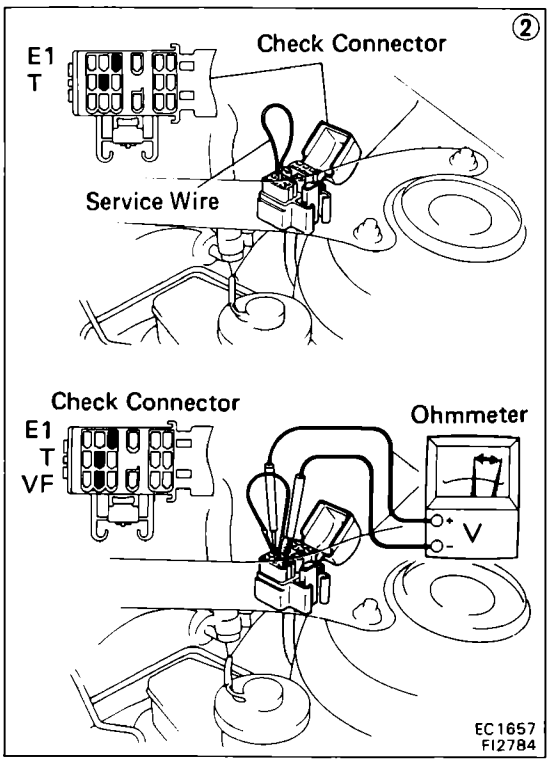
Check wiring between amplifier and ECU or compressor.

BAD

Repair or replace.







① There is no voltage between ECU terminals VF and E1.

Check that there is voltage between ECU terminal VF and body ground.

NO → OK: Check wiring between ECU terminal E1 and body ground.
- OK → Try another ECU.
- BAD → Repair or replace.

Is air leaking into air induction system?
- BAD → Repair air leak.
- OK ↓

Check spark plugs. (See page IG-10)
- BAD → Repair or replace.
- OK ↓

Check distributor and Ignition system. (See page IG-4)
- BAD → Repair or replace.
- OK ↓

Check fuel pressure. (See page FI-72)
- BAD → Repair or replace.
- OK ↓

Check injectors. (See page FI-100 or 105)
- BAD → Repair or replace.
- OK ↓

* Check cold start injector. (See page FI-83 or 86)
- BAD → Repair or replace.
- OK ↓

Check air flow meter. (See page FI-113)
- BAD → Repair or replace.
- OK ↓

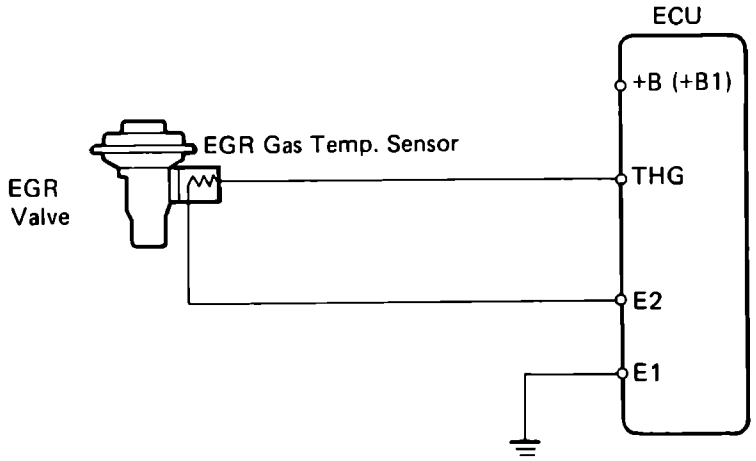
② Check operation of oxygen sensor. (See page FI-148)
- OK → System normal.
- BAD ↓

Check wiring between oxygen sensor and ECU.
- BAD → Repair wiring.
- OK ↓

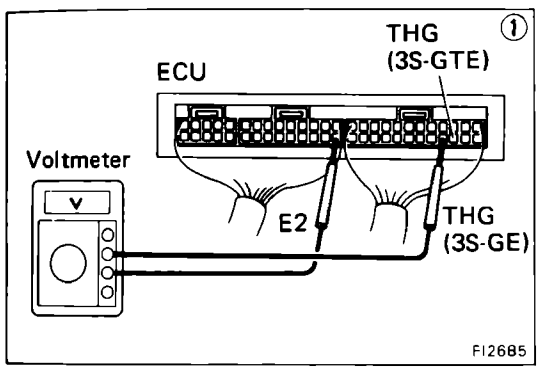
Replace oxygen sensor.

* Rich malfunction only

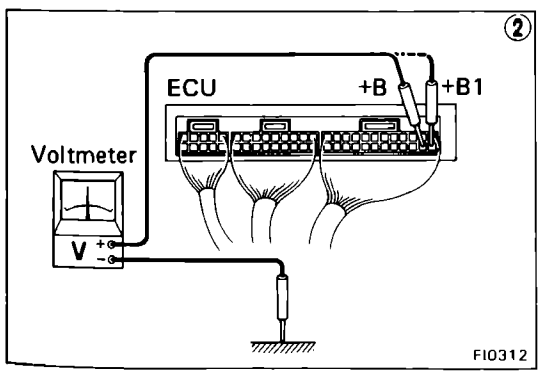
CALIF. only



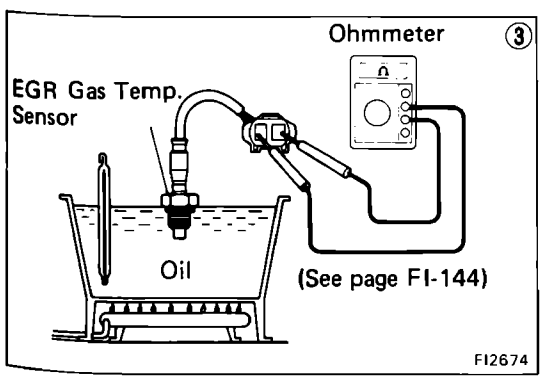
FI2680



FI2685



FI0312



FI2674

① No voltage between ECU terminals THG and E2. **(IG SW ON)**

② Check that there is voltage between ECU terminal +B or +B1 and body ground. **(IG SW ON)**

OK → Check wiring between ECU terminal E1 and body ground.

NO → Refer to No. 1. (See page FI-53)

Check wiring between ECU terminal E1 and body ground.

OK → Check EGR system. (See page EC-19 or 30)

BAD → Repair or replace.

Check EGR system. (See page EC-19 or 30)

BAD → Repair or replace.

OK → ③ Check EGR gas temp. sensor. (See page FI-144)

③ Check EGR gas temp. sensor. (See page FI-144)

BAD → Replace EGR gas temp. sensor.

OK → Check wiring between ECU and EGR gas temp. sensor.

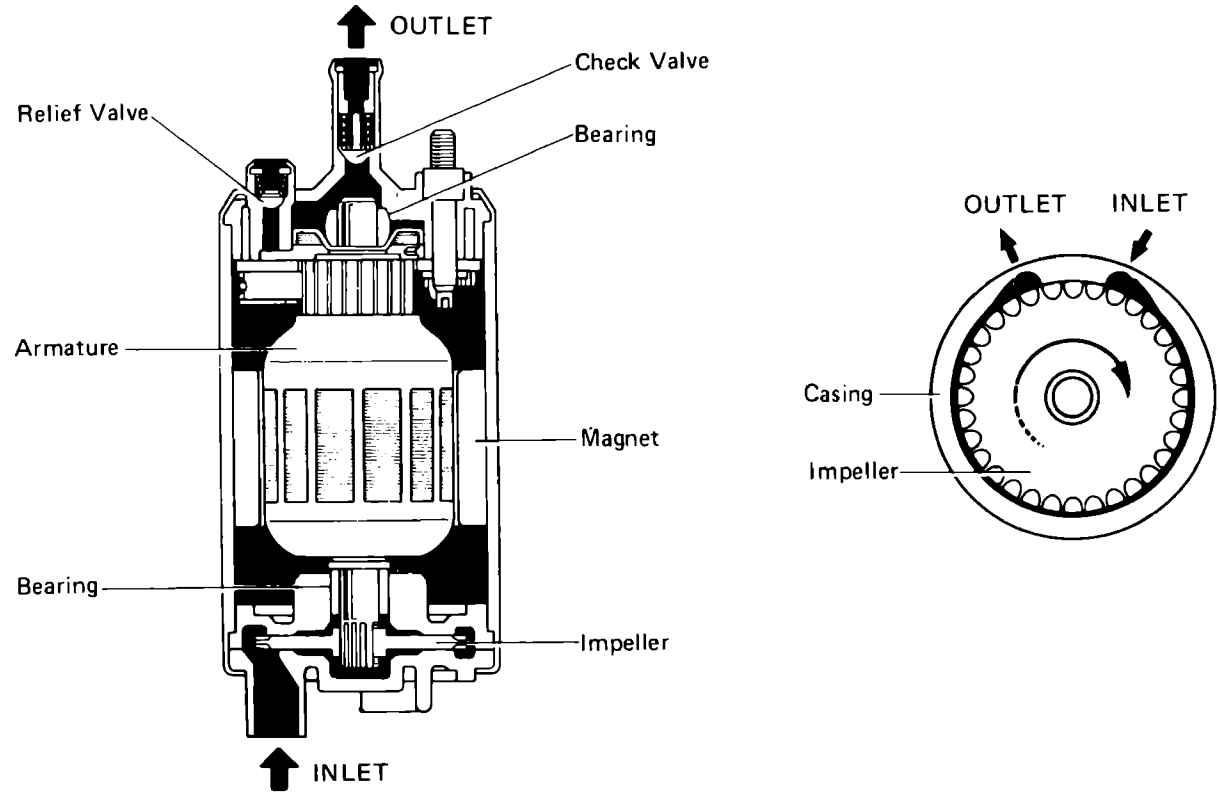
Check wiring between ECU and EGR gas temp. sensor.

OK → Try another ECU.

BAD → Repair or replace.

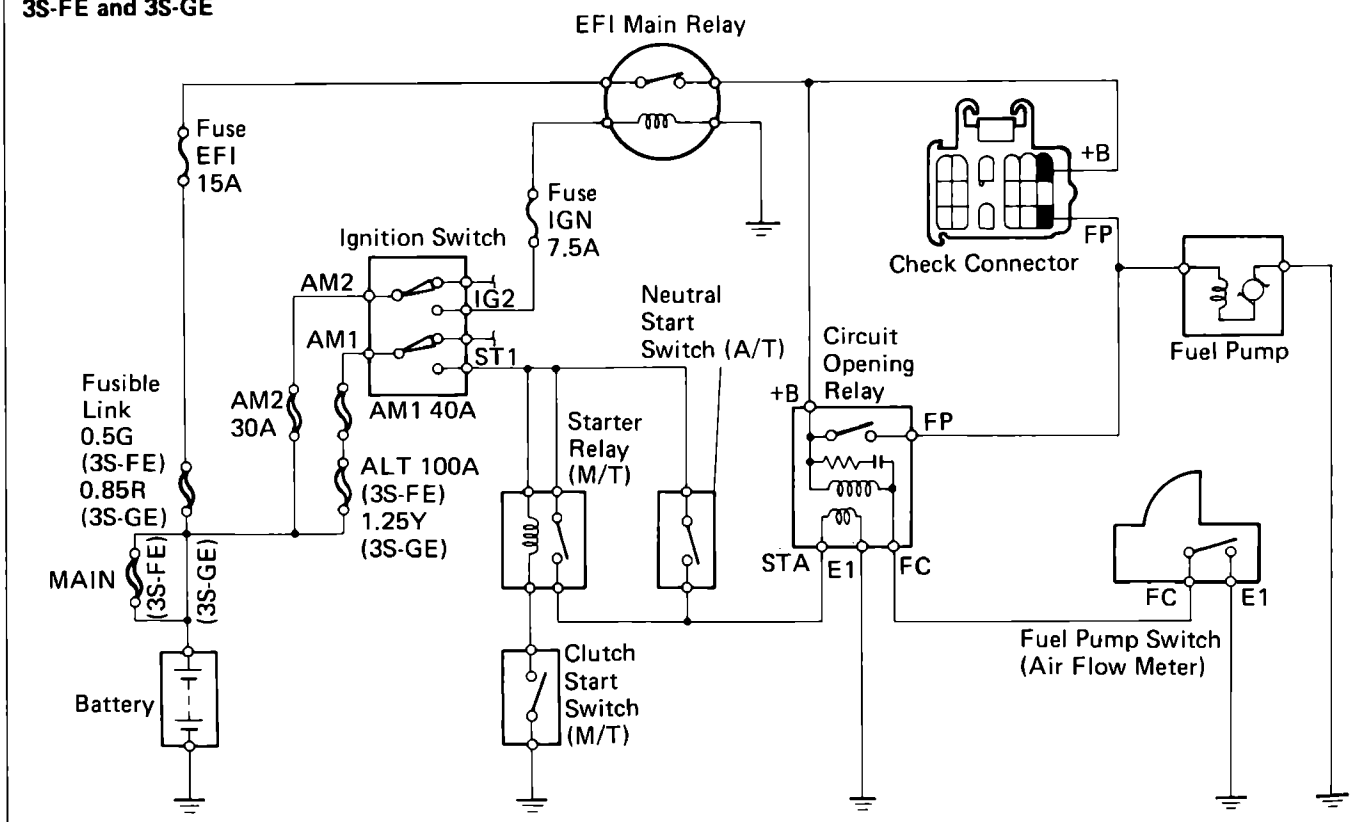
FUEL SYSTEM

Fuel Pump



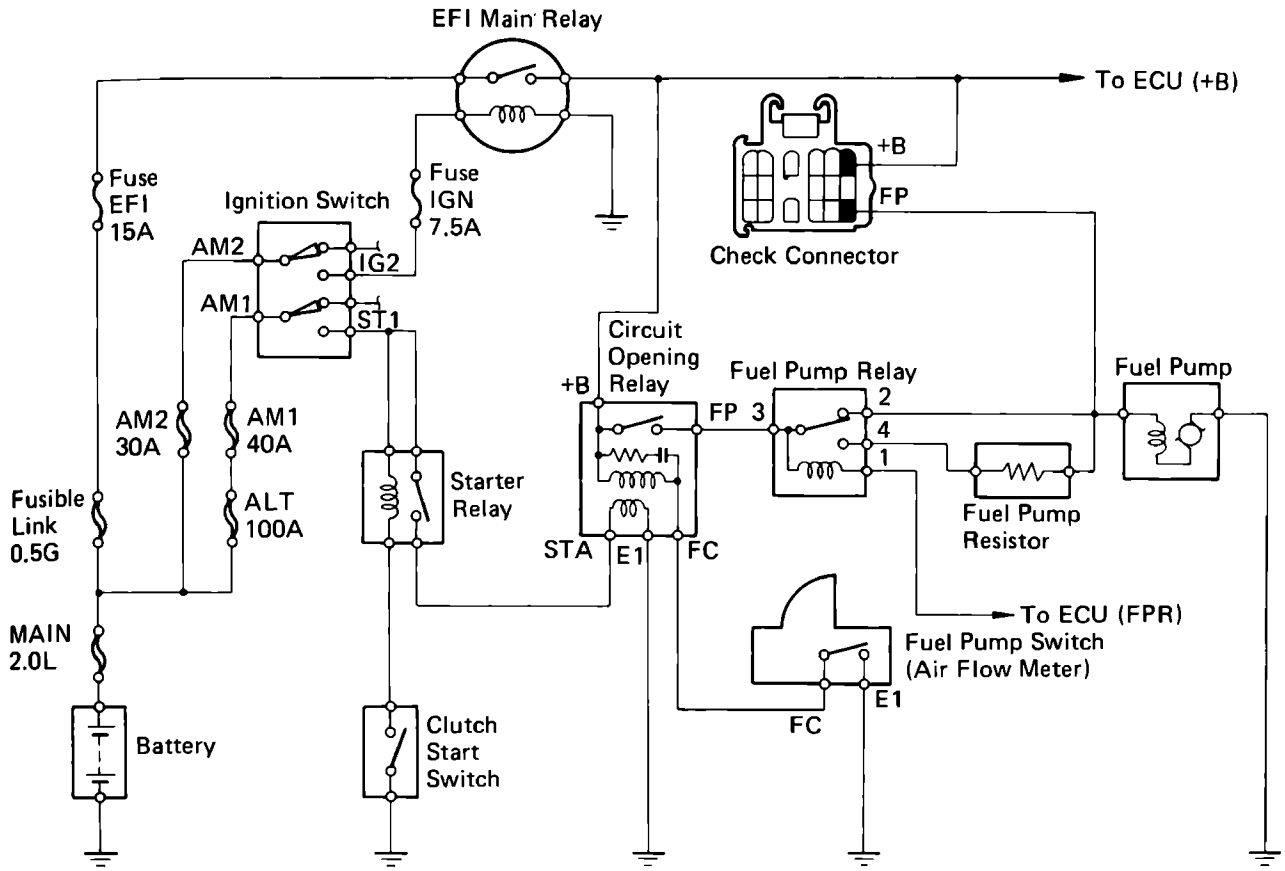
FI0530 FI1479

3S-FE and 3S-GE

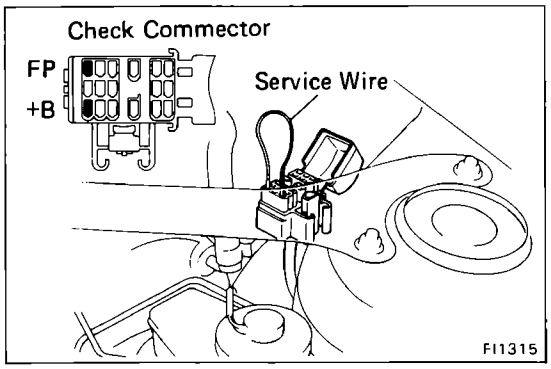


FI3843

3S-GTE



FI3842



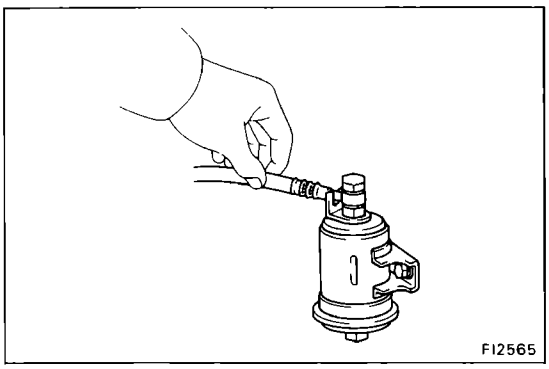
ON-VEHICLE INSPECTION

1. CHECK FUEL PUMP OPERATION

(a) Turn the ignition switch ON.

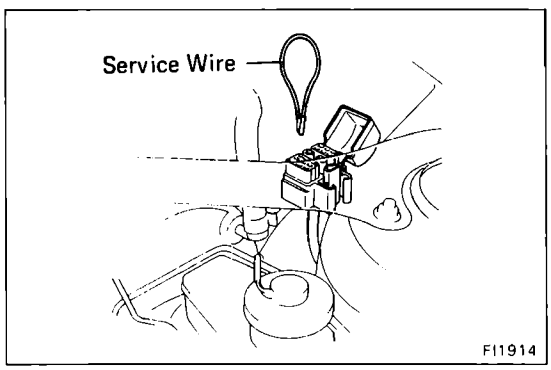
NOTE: Do not start the engine.

(b) Using a service wire, connect terminals +B and FP of the check connector.



(c) Check that there is pressure in the hose from the fuel filter.

NOTE: At this time, you will hear fuel return noise.



(d) Remove the service wire.

(e) Turn the ignition switch OFF.

If there is no pressure, check the following parts:

- Fusible links
- Fuses (EFI 15 A, IGN 7.5 A)
- EFI main relay
- Fuel pump
- ECU
- Wiring connections

2. CHECK FUEL PRESSURE

(a) Check the battery voltage above 12 volts.

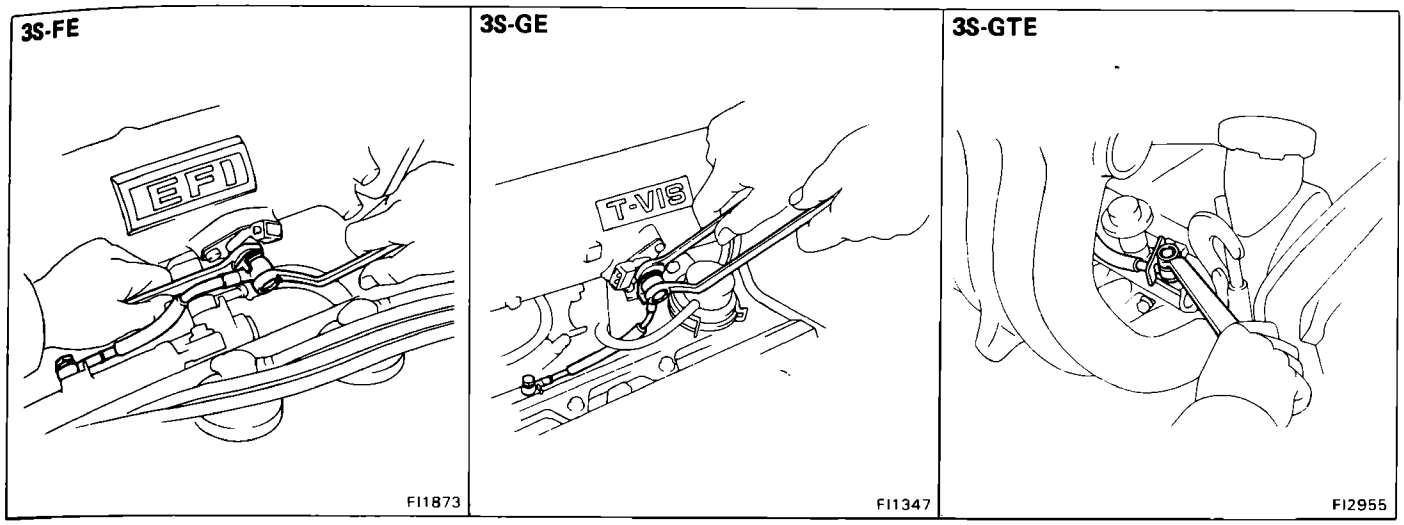
(b) Disconnect the cable from the negative (−) terminal of the battery.

(c) Disconnect the cold start injector connector.

(d) Put a suitable container or shop towel under the cold start injector pipe.

(e) Remove the union bolt and two gaskets, and disconnect the cold start injector pipe from the delivery pipe.

NOTE: Slowly loosen the union bolt.



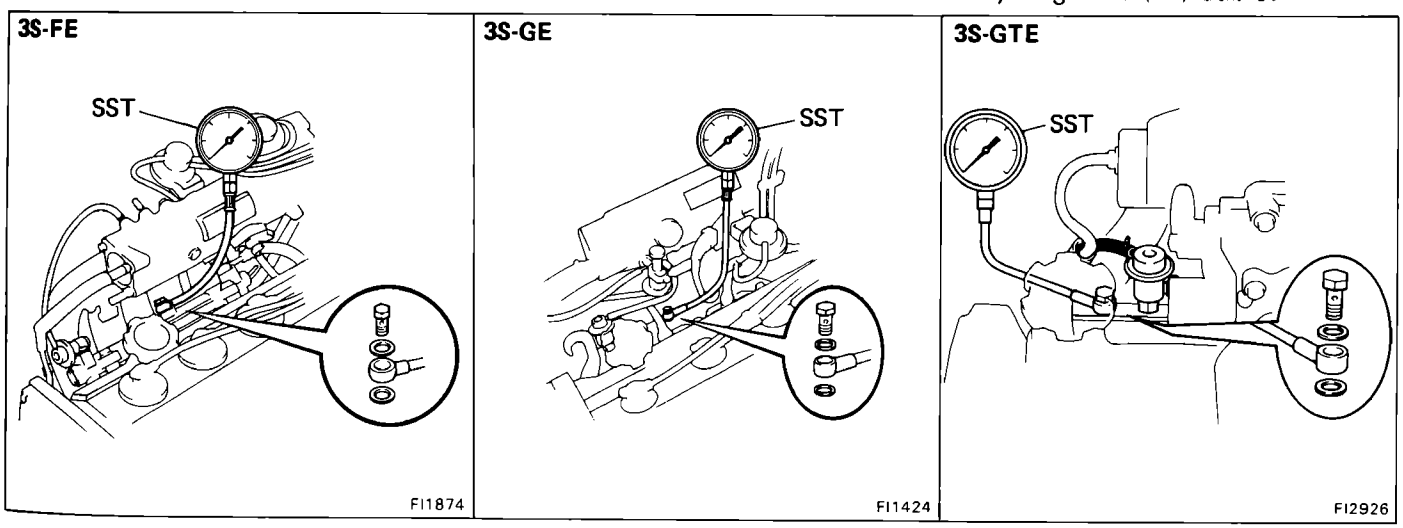
(f) Install SST (pressure gauge) to the delivery pipe with new two gaskets and the union bolt.

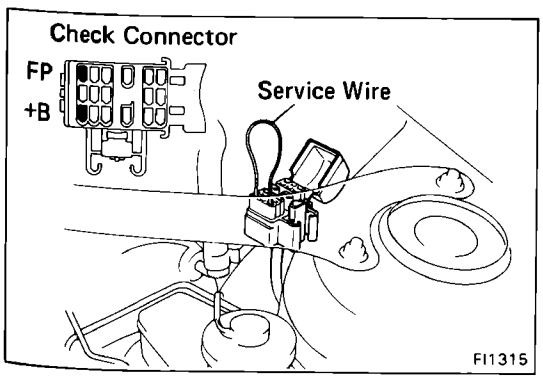
SST 09268-45012

Torque: 180 kg-cm (13 ft-lb, 18 N·m)

(g) Wipe off any splattered gasoline

(h) Reconnect the battery negative (−) cable.





(i) Using a service wire, connect terminals +B and FP of the check connector.

(j) Turn the ignition switch ON.

(k) Measure the fuel pressure.

Fuel pressure:

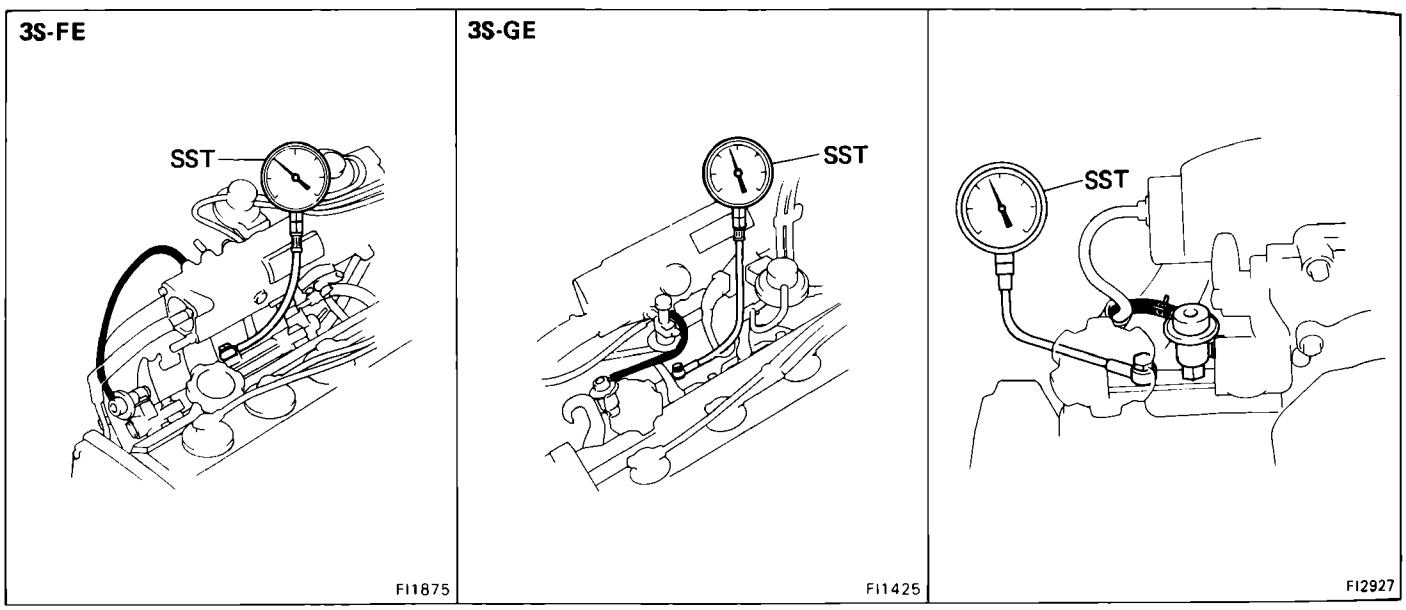
3S-FE 2.7 — 3.1 kg/cm² (38 — 44 psi, 265 — 304 kPa)

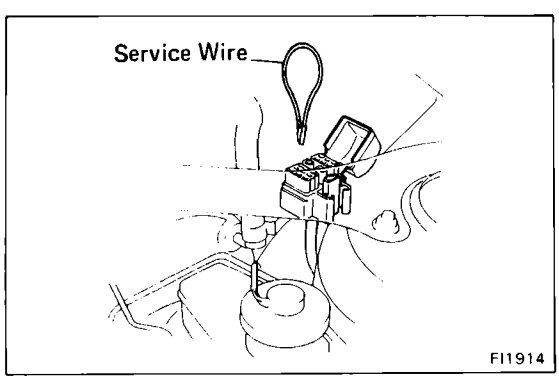
3S-GE and 3S-GTE 2.3 — 2.7 kg/cm² (33 — 38 psi, 226 — 265 kPa)

If pressure is high, replace the fuel pressure regulator.

If pressure is low, check the following parts:

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





(l) Remove the service wire.

(m) Start the engine.

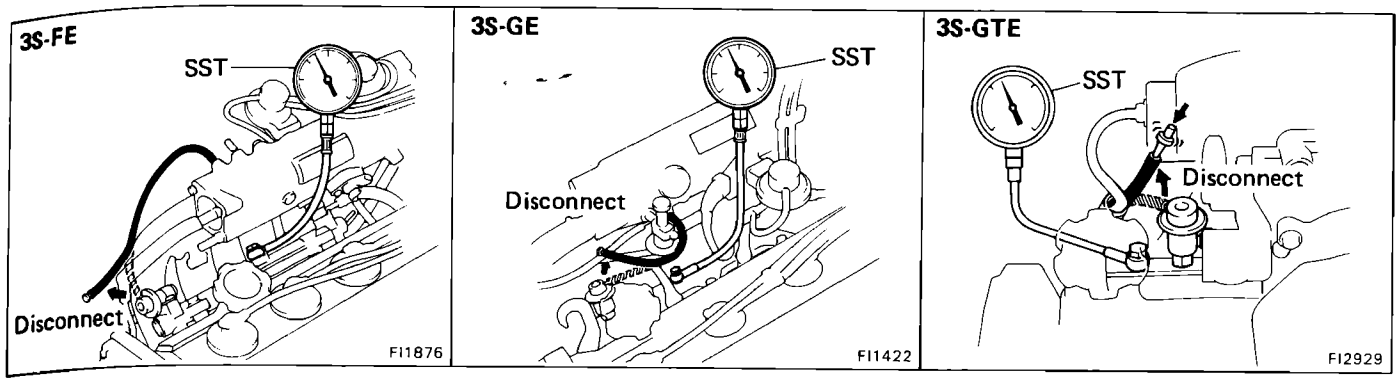
(n) Disconnect the vacuum sensing hose from the fuel pressure regulator.

(o) Measure the fuel pressure at idling.

Fuel pressure:

3S-FE 2.7 — 3.1 kg/cm² (38 — 44 psi, 265 — 304 kPa)

3S-GE and 3S-GTE 2.3 — 2.7 kg/cm² (33 — 38 psi, 226 — 265 kPa)



(p) Reconnect the vacuum sensing hose to the fuel pressure regulator, and plug the hose end.

(q) Measure the fuel pressure at idling.

Fuel pressure:

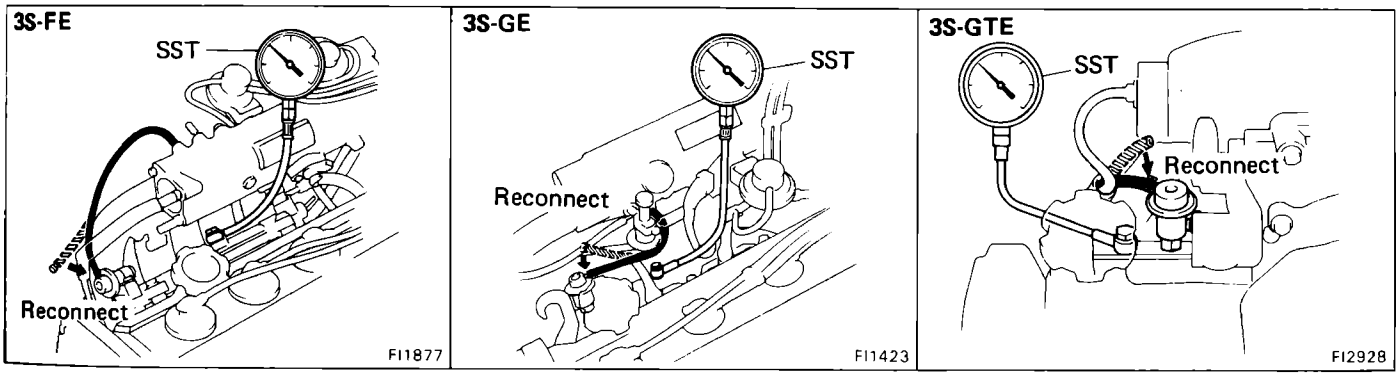
3S-FE 2.3 — 2.6 kg/cm² (33 — 37 psi, 226 — 255 kPa)

3S-GE and 3S-GTE 1.9 — 2.2 kg/cm² (27 — 31 psi, 186 — 216 kPa)

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

(r) Stop the engine. Check that the fuel pressure remains 1.5 kg/cm² (21 psi, 147 kPa) or more for 5 minutes after the engine is turned off.

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



(s) After checking fuel pressure, disconnect the battery negative (—) cable and carefully remove the SST to prevent gasoline from splashing.

SST 09268-45012

(t) Install the cold start injector pipe with new two gaskets and the union bolt.

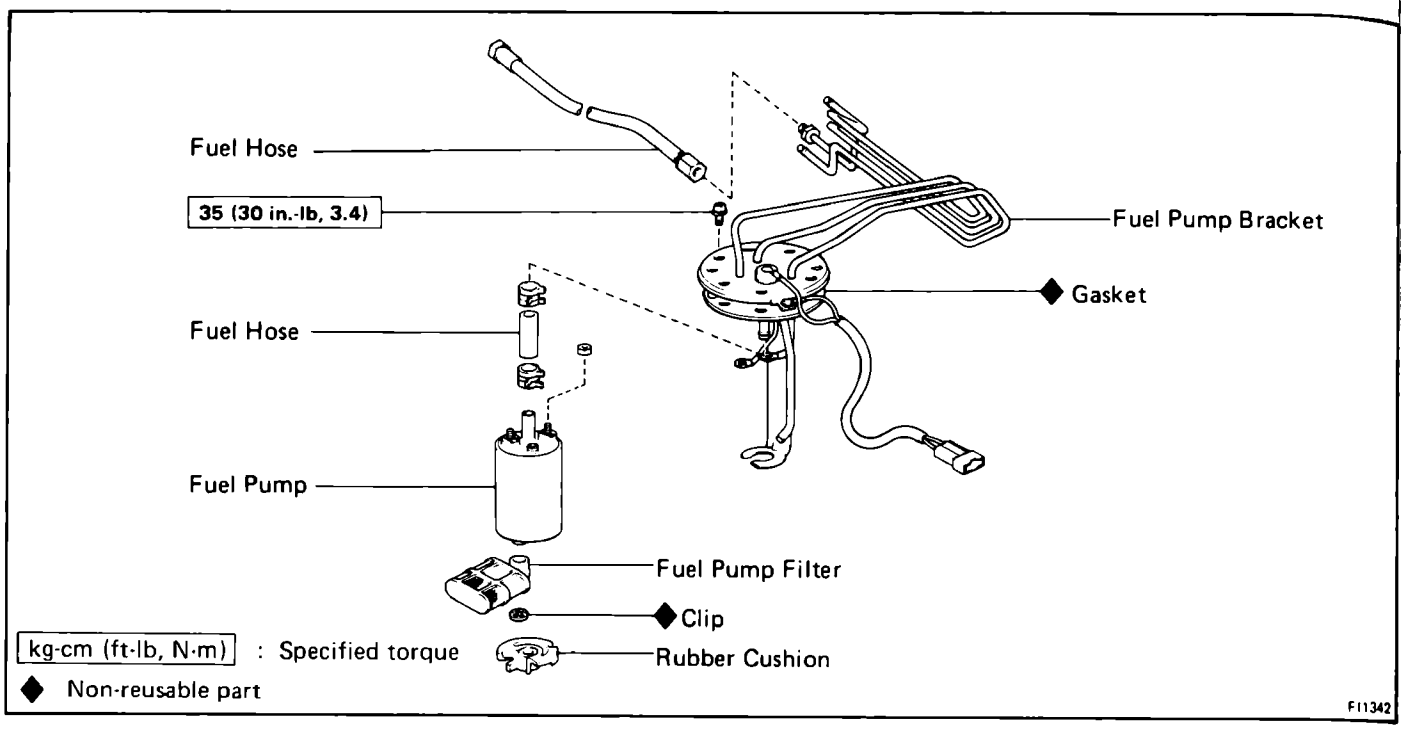
Torque: 180 kg-cm (13 ft-lb, 18 N·m)

(u) Reconnect the cold start injector connector.

(v) Reconnect the cable to the negative (—) terminal of the battery.

(w) Check for fuel leakage.

COMPONENTS (2WD)

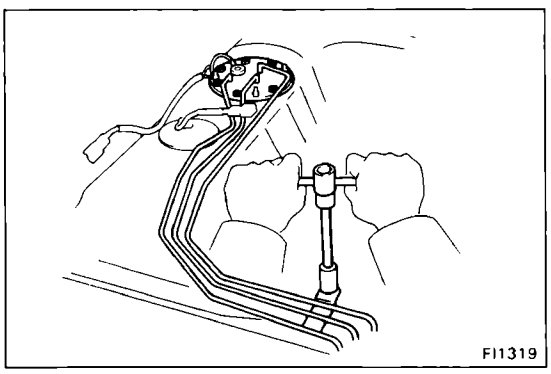


REMOVAL OF FUEL PUMP

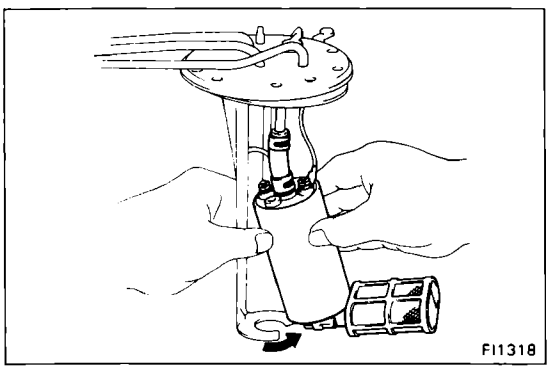
WARNING: Do not smoke or work near an open flame when working on the fuel pump.

1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**

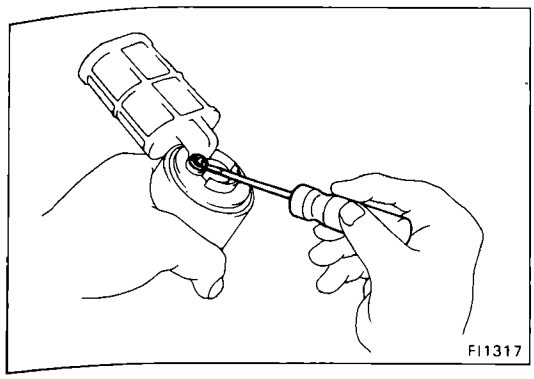
2. **REMOVE FUEL TANK**



3. **REMOVE FUEL PUMP BRACKET FROM FUEL TANK**
   (a) Remove the bolt of the bracket.
   (b) Remove the six screws, pull out the pump bracket.



4. **REMOVE FUEL PUMP FROM FUEL PUMP BRACKET**
   (a) Pull off the lower side of the fuel pump from the bracket.
   (b) Remove the two nuts, and disconnect the wires from the fuel pump.
   (c) Disconnect the fuel hose from the fuel pump.

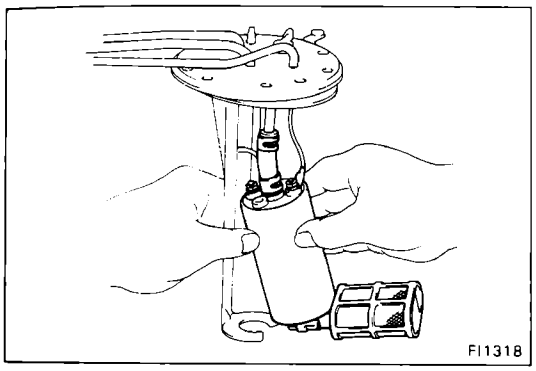


5. **REMOVE FUEL PUMP FILTER FROM FUEL PUMP**
   (a) Remove the rubber cushion.
   (b) Using a small screwdriver, remove the clip.
   (c) Pull out the pump filter.

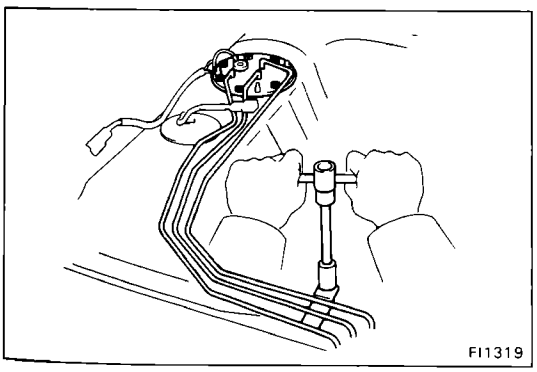
INSTALLATION OF FUEL PUMP

(See page FI-76)

1. **INSTALL FUEL PUMP FILTER TO FUEL PUMP**
   (a) Install the pump filter with a new clip.
   (b) Install the rubber cushion.



2. **INSTALL FUEL PUMP TO FUEL PUMP BRACKET**
   (a) Connect the fuel hose to the outlet port of the fuel pump.
   (b) Connect the wires to the fuel pump with the two nuts.
   (c) Push the lower side of the fuel pump, and install the fuel pump.



3. **INSTALL FUEL PUMP BRACKET TO FUEL TANK**
   (a) Install a new gasket and the pump bracket with the six screws.

   Torque: 35 kg-cm (30 in.-lb, 3.4 N·m)

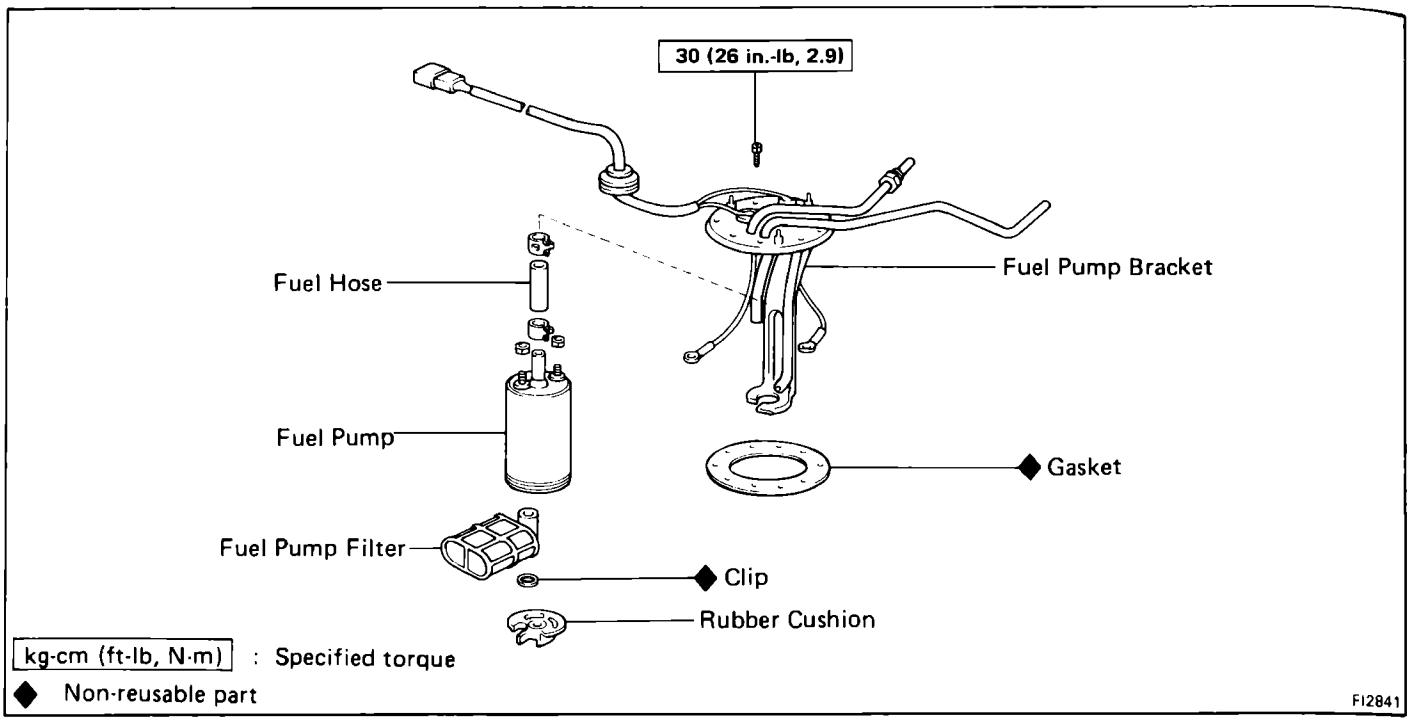
   (b) Install the bolt of the bracket.

4. **INSTALL FUEL TANK**

   When installing the fuel tank, refer to FI-110 for the installation position of the cushion and the tightening torque.

5. **CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY**

COMPONENTS (4WD)

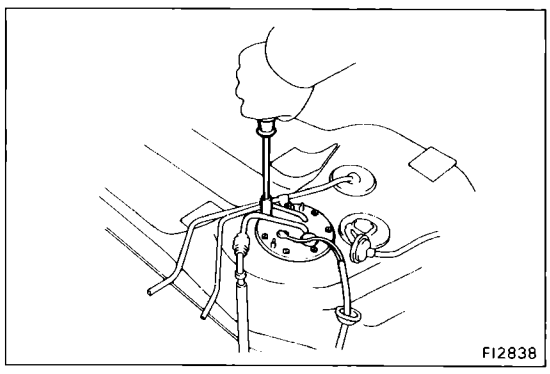


REMOVAL OF FUEL PUMP

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

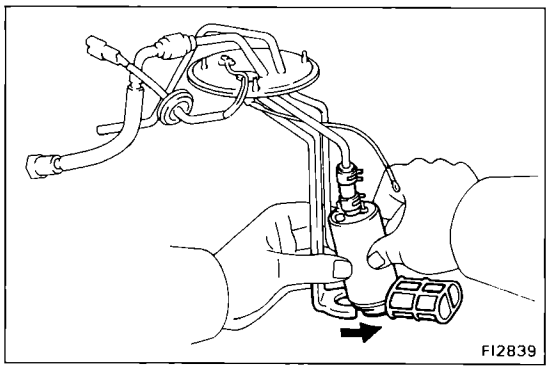
1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**

2. **REMOVE FUEL TANK**



3. **REMOVE FUEL PUMP BRACKET FROM FUEL TANK**

   Remove the seven bolts, pull out the pump bracket.

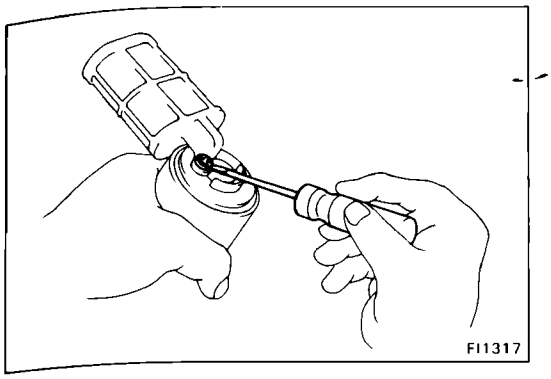


4. **REMOVE FUEL PUMP FROM FUEL PUMP BRACKET**

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

   (b) Remove the two nuts, and disconnect the wires from the fuel pump.

   (c) Disconnect the fuel hose from the fuel pump.

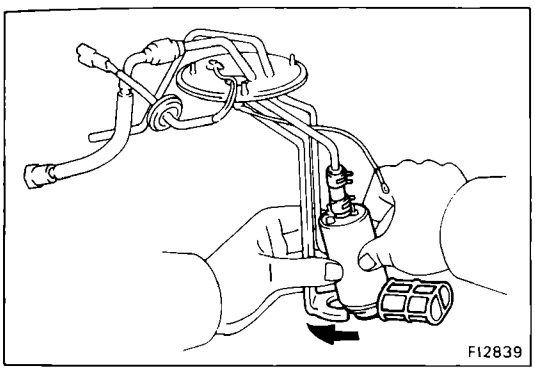


5. **REMOVE FUEL PUMP FILTER FROM FUEL PUMP**
   (a) Remove the rubber cushion.
   (b) Using a small screwdriver, remove the clip.
   (c) Pull out the pump filter.

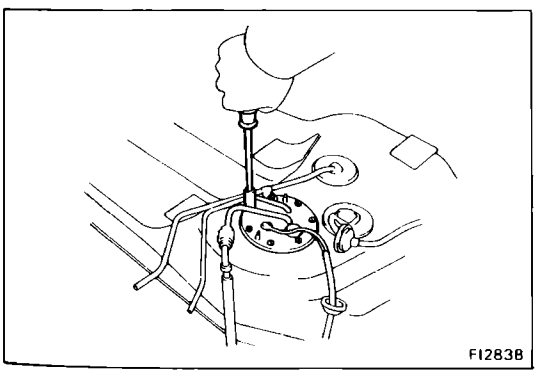
INSTALLATION OF FUEL PUMP

(See page FI-78)

1. **INSTALL FUEL PUMP FILTER TO FUEL PUMP**
   (a) Install the pump filter with a new clip.
   (b) Install the rubber cushion.



2. **INSTALL FUEL PUMP TO FUEL PUMP BRACKET**
   (a) Connect the fuel hose to the outlet port of the fuel pump.
   (b) Connect the wires to the fuel pump with the two nuts.
   (c) Push the lower side of the fuel pump, and install the fuel pump.

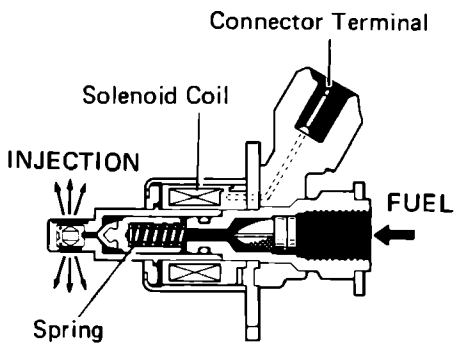


3. **INSTALL FUEL PUMP BRACKET TO FUEL TANK**
   Install a new gasket and the pump bracket with the seven bolts.
   Torque: 30 kg-cm (26 in.-lb, 2.9 N·m)

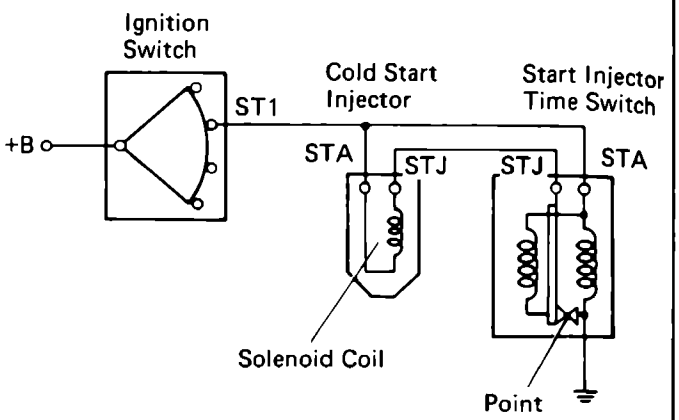
4. **INSTALL FUEL TANK**
   When installing the fuel tank, refer to FI-111 for the installation position of the cushion and the tightening torque.

5. **CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY**

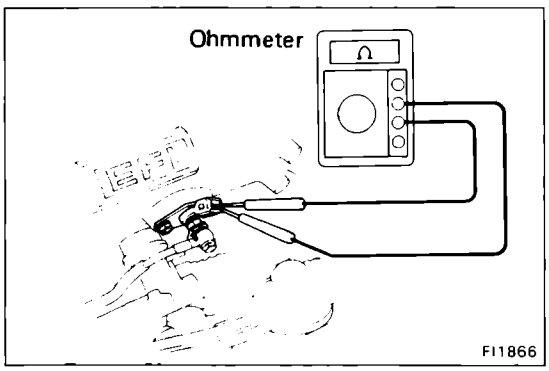
Cold Start Injector (3S-FE)



FI1862



FI0496



FI1866

ON-VEHICLE INSPECTION

INSPECT RESISTANCE OF COLD START INJECTOR

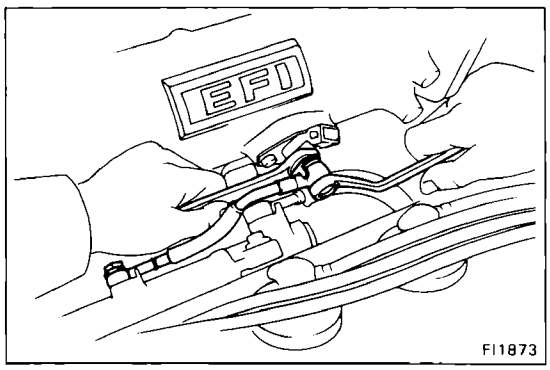
(a) Disconnect the cold start injector connector.

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

Resistance: 2 – 4 Ω

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

(c) Reconnect the cold start injector connector.



FI1873

REMOVAL OF COLD START INJECTOR

1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**

2. **DISCONNECT COLD START INJECTOR CONNECTOR**

3. **DISCONNECT COLD START INJECTOR PIPE**

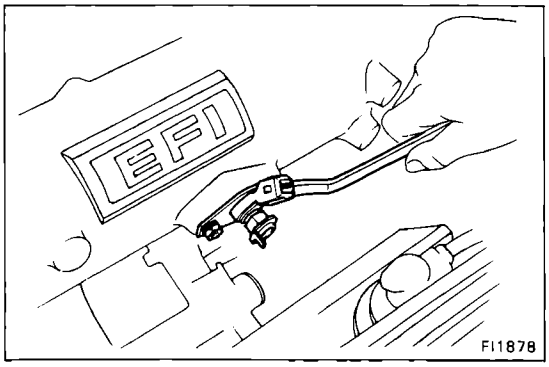
(a) Put a suitable container or shop towel under the injector tube.

(b) Remove the two union bolts and four gaskets and injector pipe.

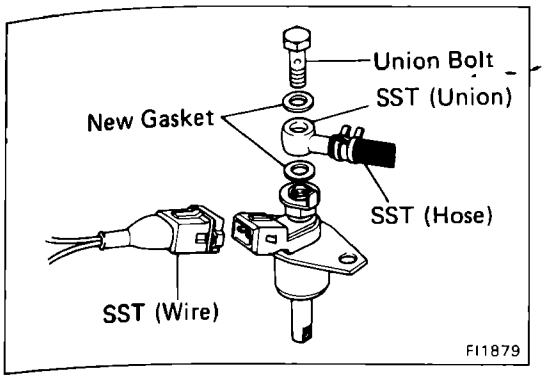
NOTE: Slowly loosen the union bolt.

4. **REMOVE COLD START INJECTOR**

Remove the two bolts, cold start injector and gasket.



FI1878



INSPECTION OF COLD START INJECTOR

1. INSPECT INJECTION OF COLD START INJECTOR

WARNING: Keep clear of sparks during the test.

(a) Install SST (two unions) to the injector and delivery pipe with new gaskets and the union bolts.

SST 09268-41045 (09268-41080)

(b) Connect SST (hose) to the unions.

SST 09268-41045

(c) Connect SST (wire) to the injector.

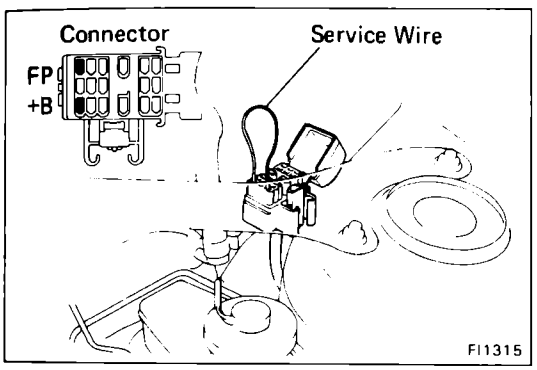
SST 09842-30050

(d) Put a container under the injector.

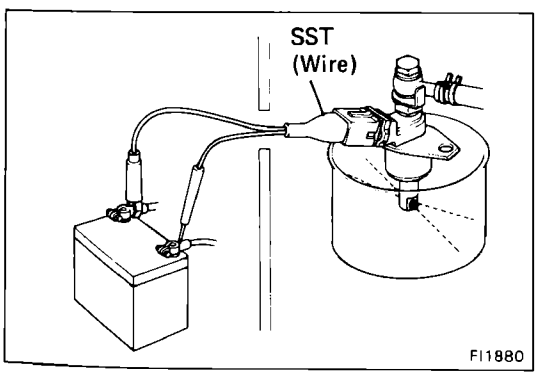
(e) Reconnect the battery negative (−) cable.

(f) Turn the ignition switch ON.

NOTE: Do not start the engine.



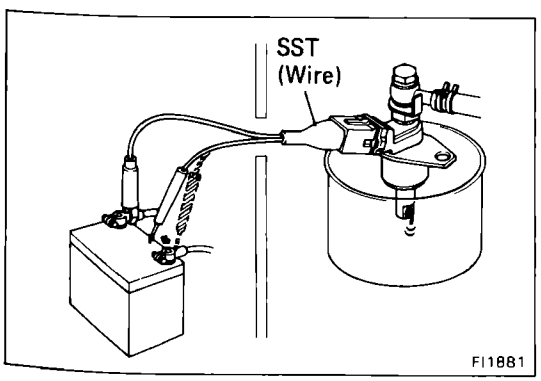
(g) Using a service wire, connect terminals +B and FP of the check connector.



(h) Connect the test probes of the SST (wire) to the battery, and check that the fuel spray is as shown.

SST 09842-30050

CAUTION: Perform this check within the shortest possible time.



2. INSPECT LEAKAGE

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

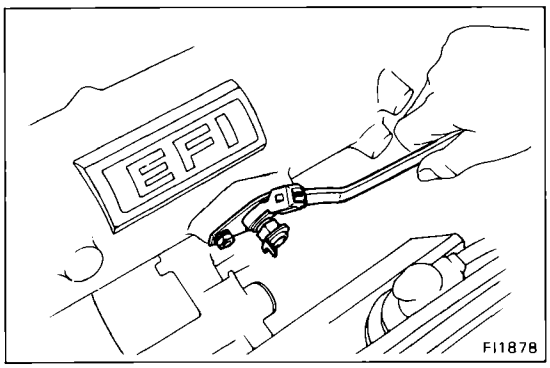
SST 09842-30050

Fuel drop: One drop or less per minute

(b) Disconnect the battery negative (−) cable.

(c) Remove SST and the service wire.

SST 09268-41045 and 09842-30050

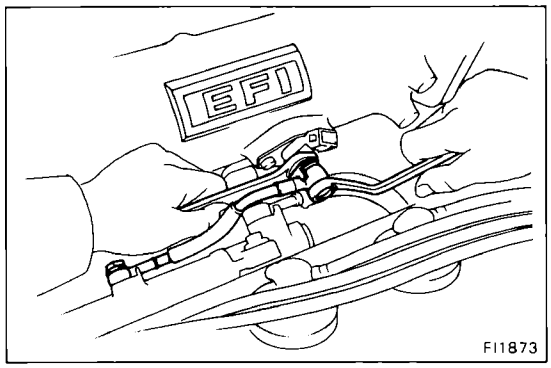


INSTALLATION OF COLD START INJECTOR

1. **INSTALL COLD START INJECTOR**

   Install a new gasket and the injector with the two bolts.

   Torque: 95 kg-cm (82 in.-lb, 9.3 N·m)



2. **CONNECT COLD START INJECTOR PIPE**

   Install the injector pipe with new four gaskets and the two union bolts.

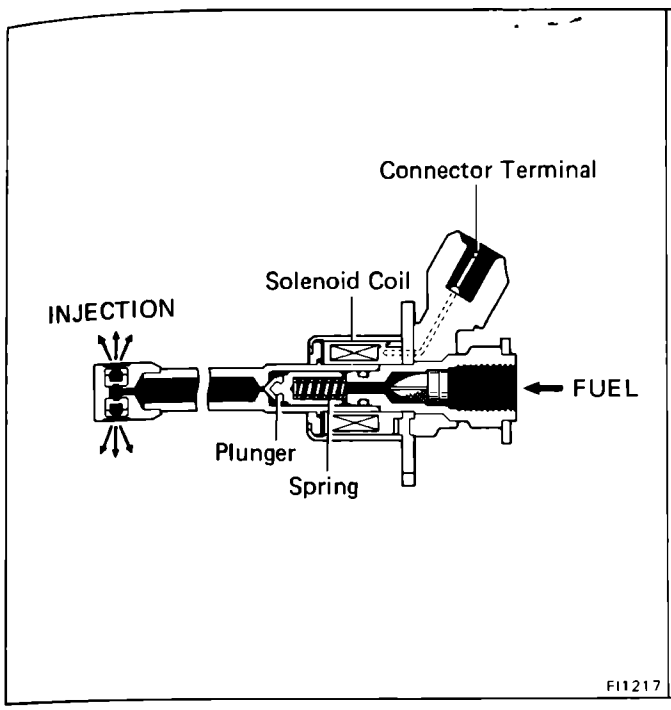
   Torque: 180 kg-cm (13 ft-lb, 18 N·m)

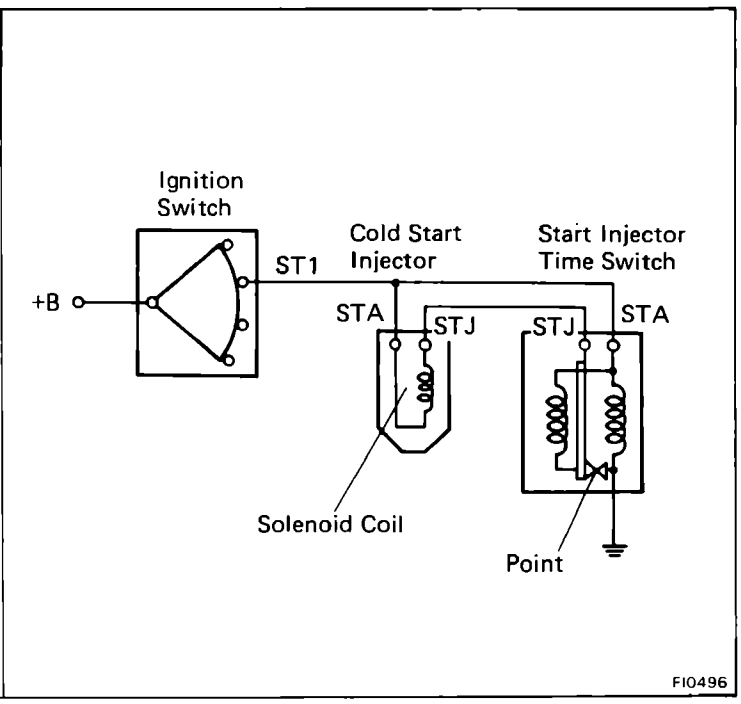
3. **CONNECT COLD START INJECTOR CONNECTOR**

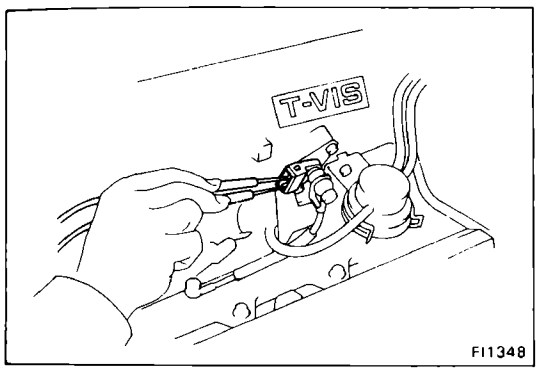
4. **CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY**

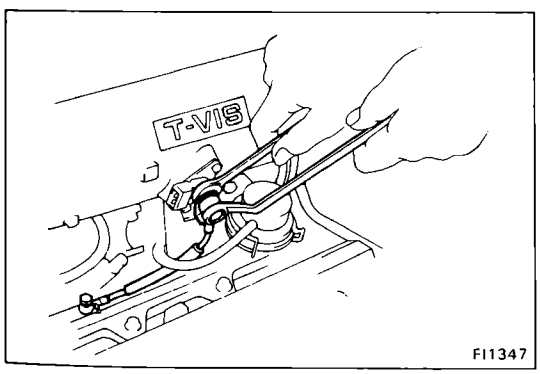
5. **CHECK FOR FUEL LEAKAGE (See page FI-10)**

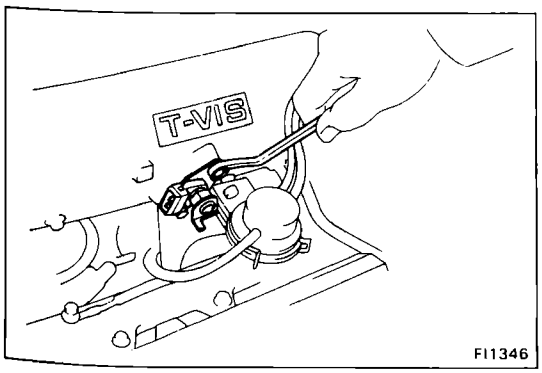
Cold Start Injector (3S-GE)











ON-VEHICLE INSPECTION

INSPECT RESISTANCE OF COLD START INJECTOR

(a) Disconnect the cold start injector connector.

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

Resistance: 3 — 5 Ω

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

(c) Reconnect the cold start injector connector.

REMOVAL OF COLD START INJECTOR

1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**

2. **DISCONNECT COLD START INJECTOR CONNECTOR**

3. **DISCONNECT COLD START INJECTOR PIPE**

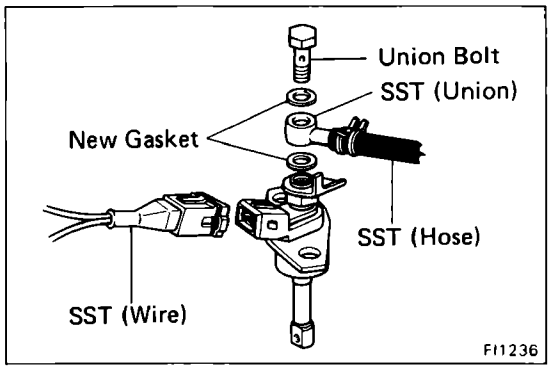
   (a) Put a suitable container or shop towel under the injector tube.

   (b) Remove the two union bolts and four gaskets and injector pipe.

   NOTE: Slowly loosen the union bolt.

4. **REMOVE COLD START INJECTOR**

   Remove the two bolts, cold start injector and gasket.



INSPECTION OF COLD START INJECTOR

1. INSPECT INJECTION OF COLD START INJECTOR

WARNING: Keep clear of sparks during the test.

(a) Install SST (two unions) to the injector and delivery pipe with new gaskets and the union bolts.

SST 09268-41045 (09268-41080)

(b) Connect SST (hose) to the unions.

SST 09268-41045

(c) Connect SST (wire) to the injector.

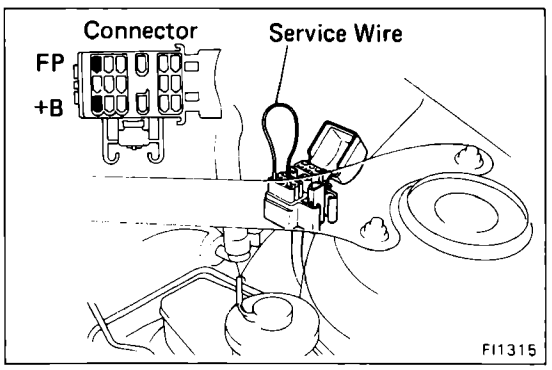
SST 09842-30050

(d) Put a container under the injector.

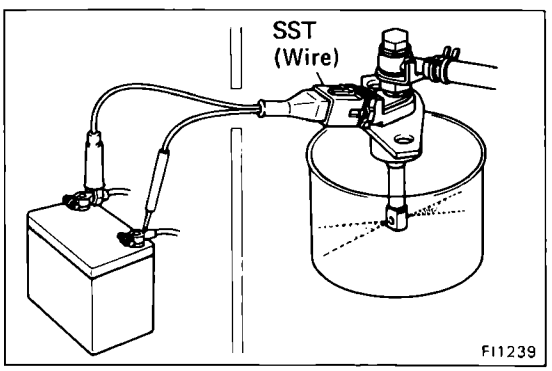
(e) Reconnect the battery negative (−) cable.

(f) Turn the ignition switch ON.

NOTE: Do not start the engine.



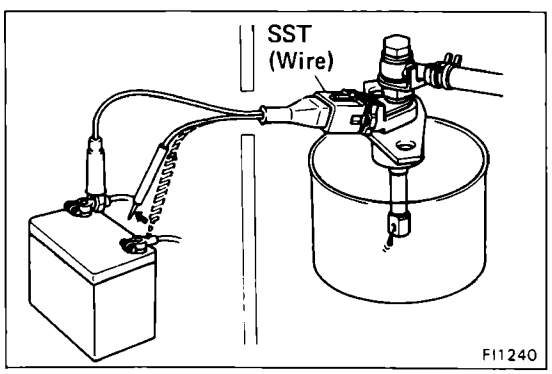
(g) Using a service wire, connect terminals +B and FP of the check connector.



(h) Connect the test probes of the SST (wire) to the battery, and check that the fuel spray is as shown.

SST 09842-30050

CAUTION: Perform this check within the shortest possible time.



2. INSPECT LEAKAGE

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

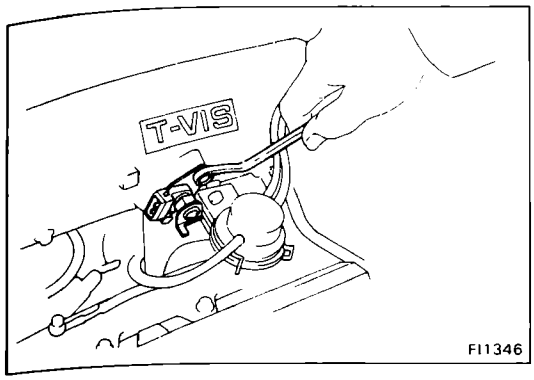
SST 09842-30050

Fuel drop: One drop or less per minute

(b) Disconnect the battery negative (−) cable.

(c) Remove SST and the service wire.

SST 09268-41045 and 09842-30050

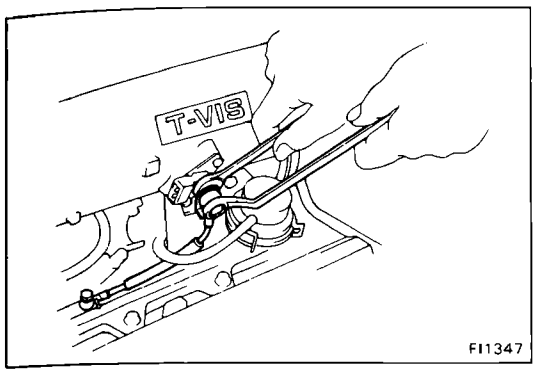


INSTALLATION OF COLD START INJECTOR

1. **INSTALL COLD START INJECTOR**

   Install a new gasket and the injector with the two bolts.

   Torque: 55 kg-cm (48 in.-lb, 5.4 N·m)



2. **CONNECT COLD START INJECTOR PIPE**

   Install the injector pipe with new four gaskets and the two union bolts.

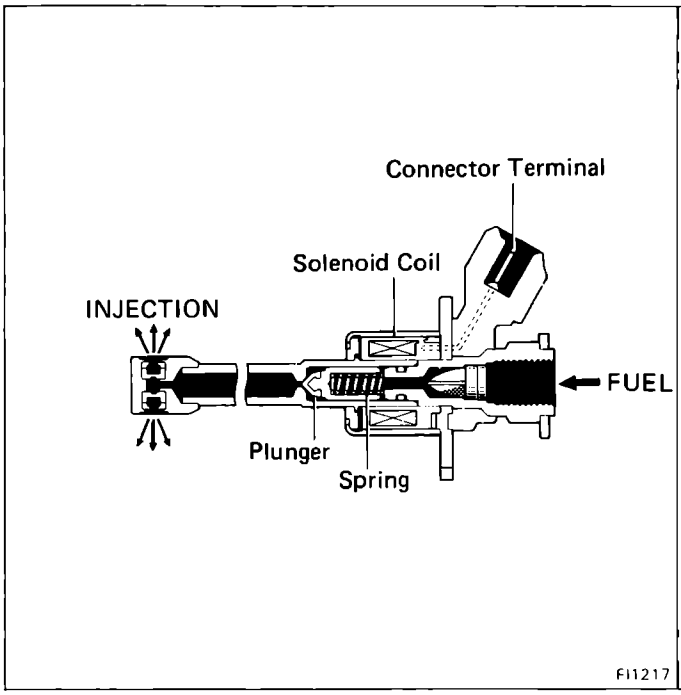
   Torque: 180 kg-cm (13 ft-lb, 18 N·m)

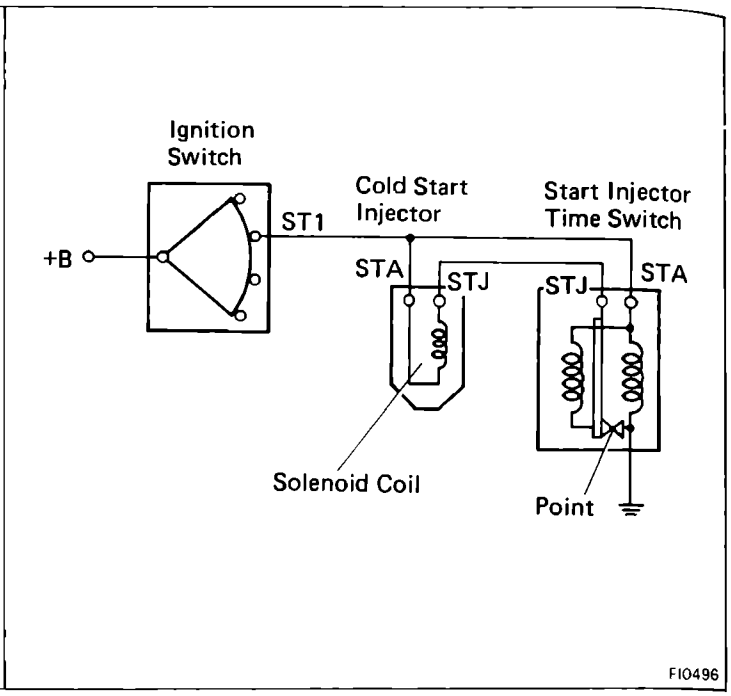
3. **CONNECT COLD START INJECTOR CONNECTOR**

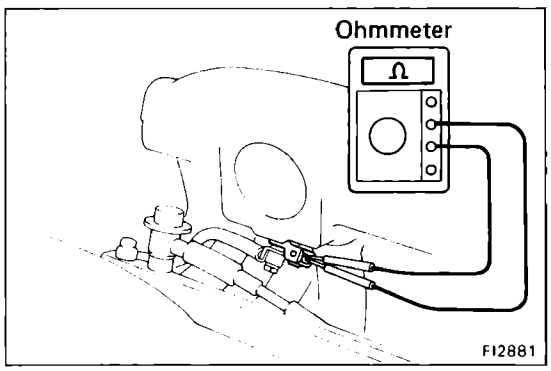
4. **CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY**

5. **CHECK FOR FUEL LEAKAGE (See page FI-10)**

Cold Start Injector (3S-GTE)







ON-VEHICLE INSPECTION

INSPECT RESISTANCE OF COLD START INJECTOR

(a) Remove the throttle body.
(See steps 1 to 10 on page FI-124)

(b) Disconnect the cold start injector connector.

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

Resistance: 2 — 4 Ω

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

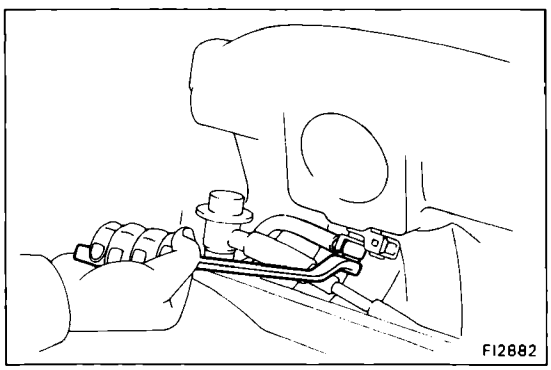
(d) Reconnect the cold start injector connector.

(e) Reinstall the throttle body.
(See steps 2 to 12 on page FI-126)

REMOVAL OF COLD START INJECTOR

1. **REMOVE THROTTLE BODY**
(See steps 1 to 10 on page FI-124)

2. **DISCONNECT COLD START INJECTOR CONNECTOR**

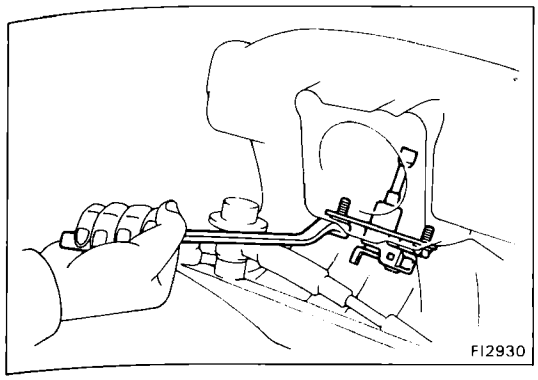


3. **DISCONNECT COLD START INJECTOR PIPE**

(a) Put a suitable container or shop towel under the injector tube.

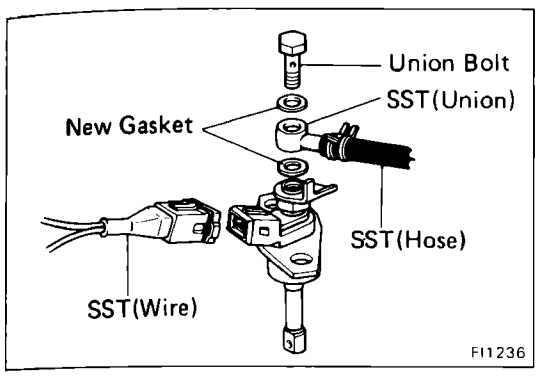
(b) Remove the two union bolts and four gaskets and injector pipe.

NOTE: Slowly loosen the union bolt.



4. REMOVE COLD START INJECTOR

Remove the two bolts, cold start injector and gasket.



INSPECTION OF COLD START INJECTOR

1. INSPECT INJECTION OF COLD START INJECTOR

WARNING: Keep clear of sparks during the test.

(a) Install SST (two unions) to the injector and delivery pipe with new gaskets and the union bolts.

SST 09268-41045 (09268-41080)

(b) Connect SST (hose) to the unions.

SST 09268-41045

(c) Connect SST (wire) to the injector.

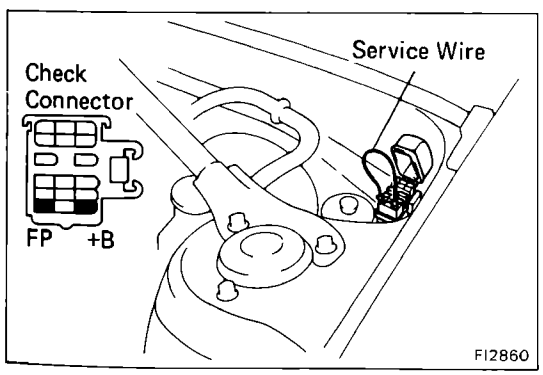
SST 09842-30050

(d) Put a container under the injector.

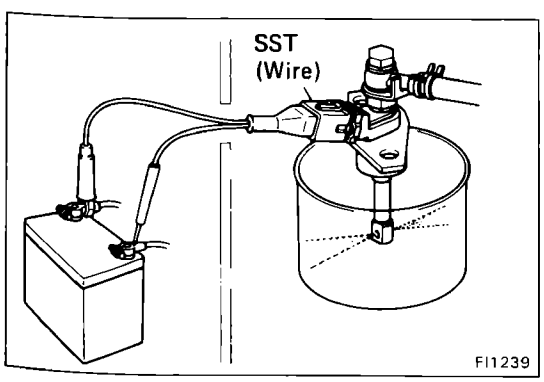
(e) Reconnect the battery negative (−) cable.

(f) Turn the ignition switch ON.

NOTE: Do not start the engine.



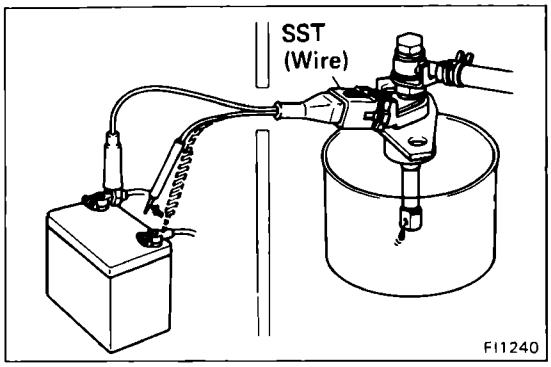
(g) Using a service wire, connect terminals +B and FP of the check connector.



(h) Connect the test probes of the SST (wire) to the battery, and check that the fuel spray is as shown.

SST 09842-30050

CAUTION: Perform this check within the shortest possible time.



2. **INSPECT LEAKAGE**

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

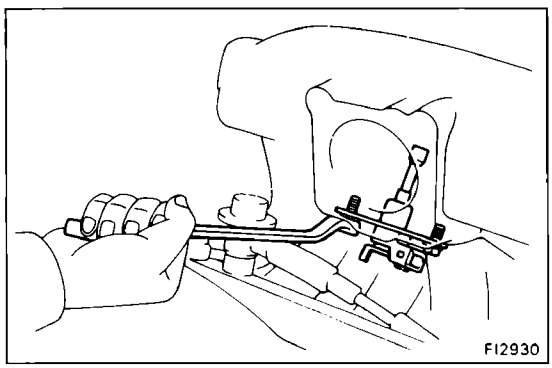
SST 09842-30050

Fuel drop: One drop or less per minute

(b) Disconnect the battery negative (−) cable.

(c) Remove SST and the service wire.

SST 09268-41045 and 09842-30050

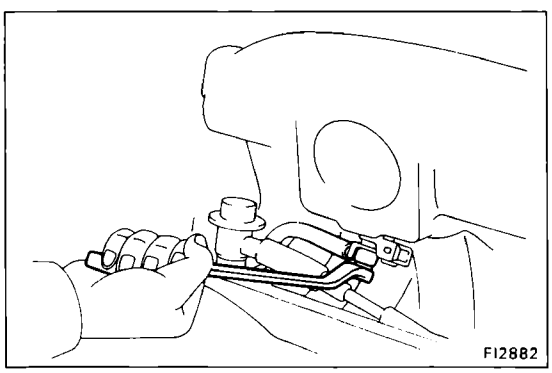


INSTALLATION OF COLD START INJECTOR

1. **INSTALL COLD START INJECTOR**

Install a new gasket and the injector with the two bolts.

Torque: 60 kg-cm (52 in.-lb, 5.9 N·m)



2. **CONNECT COLD START INJECTOR PIPE**

Install the injector pipe with new four gaskets and the two union bolts.

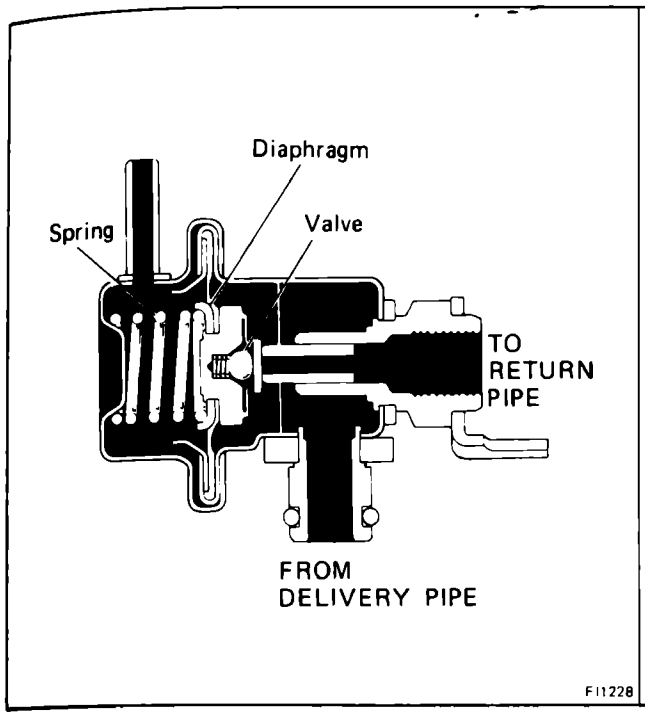
Torque: 180 kg-cm (13 ft-lb, 18 N·m)

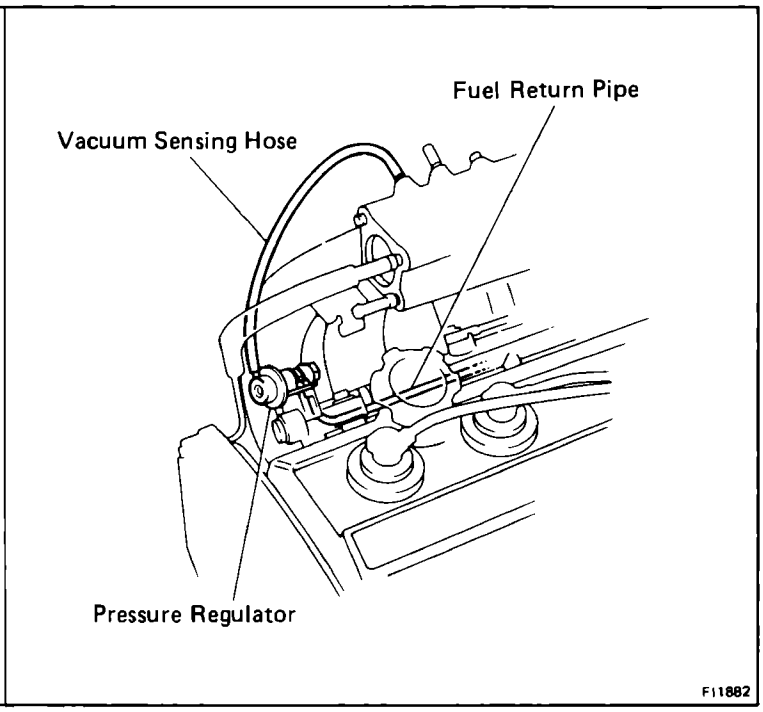
3. **CONNECT COLD START INJECTOR CONNECTOR**

4. **INSTALL THROTTLE BODY**

(See steps 2 to 12 on page FI-126)

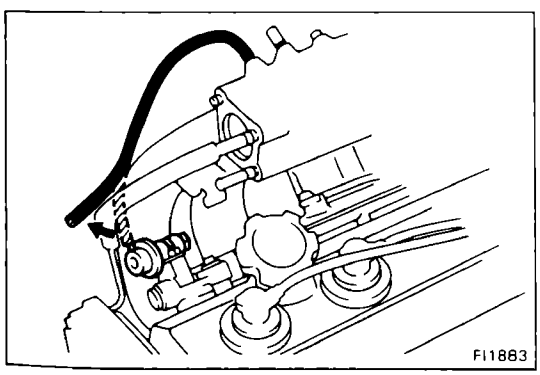
Fuel Pressure Regulator (3S-FE)





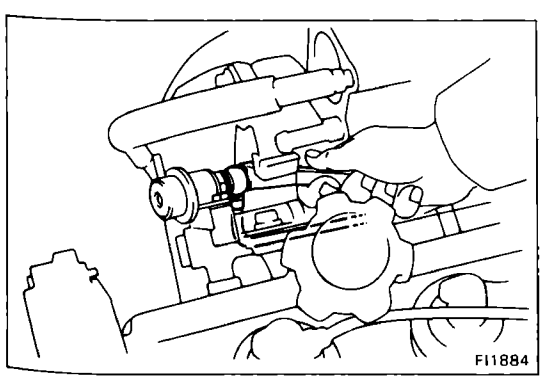
ON-VEHICLE INSPECTION

INSPECT FUEL PRESSURE (See page FI-72)



REMOVAL OF FUEL PRESSURE REGULATOR

1. DISCONNECT VACUUM SENSING HOSE

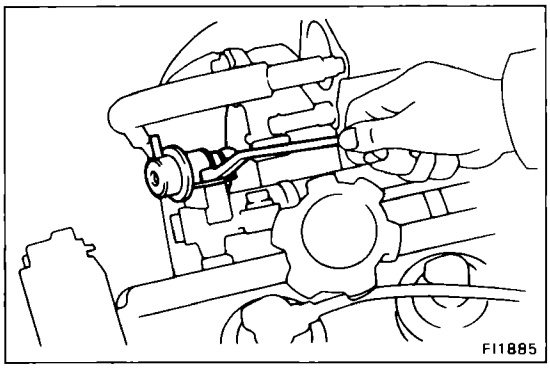


2. DISCONNECT FUEL RETURN PIPE

(a) Put a suitable container or shop towel under the pressure regulator.

(b) Remove the union bolt and two gasket, and disconnect the return pipe from the pressure regulator.

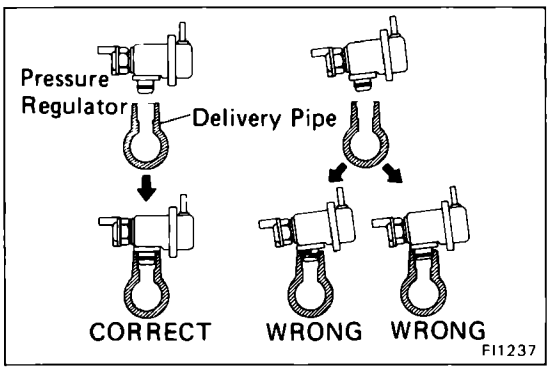
NOTE: Slowly loosen the union bolt.



3. **REMOVE FUEL PRESSURE REGULATOR**

(a) Remove the two bolts, and pull out the pressure regulator.

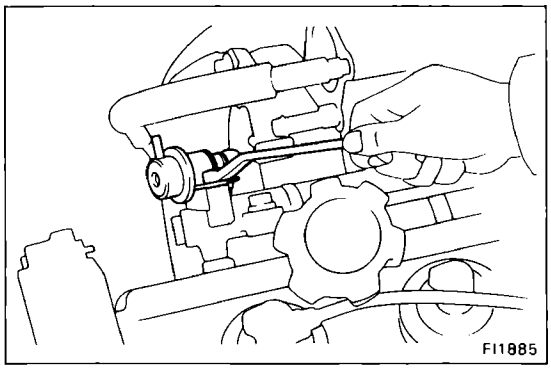
(b) Remove the O-ring from the pressure regulator.



INSTALLATION OF FUEL PRESSURE REGULATOR

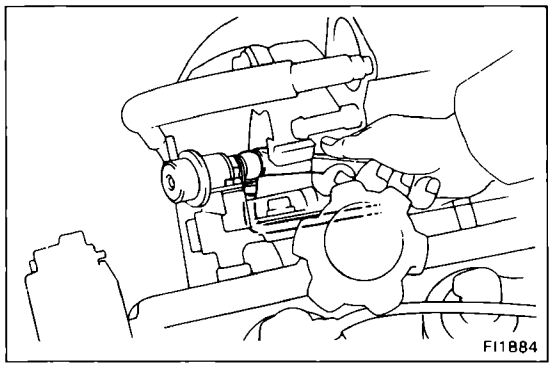
1. **INSTALL FUEL PRESSURE REGULATOR**

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



(b) Install the pressure regulator with the two bolts.

Torque: 55 kg-cm (48 in.-lb, 5.4 N·m)



2. **CONNECT FUEL RETURN PIPE**

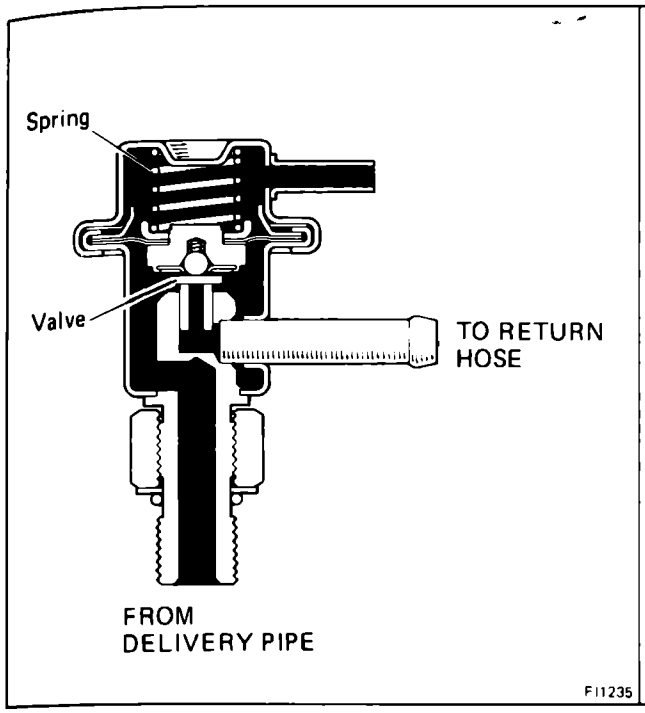
Install the return pipe with new two gasket and the union bolt.

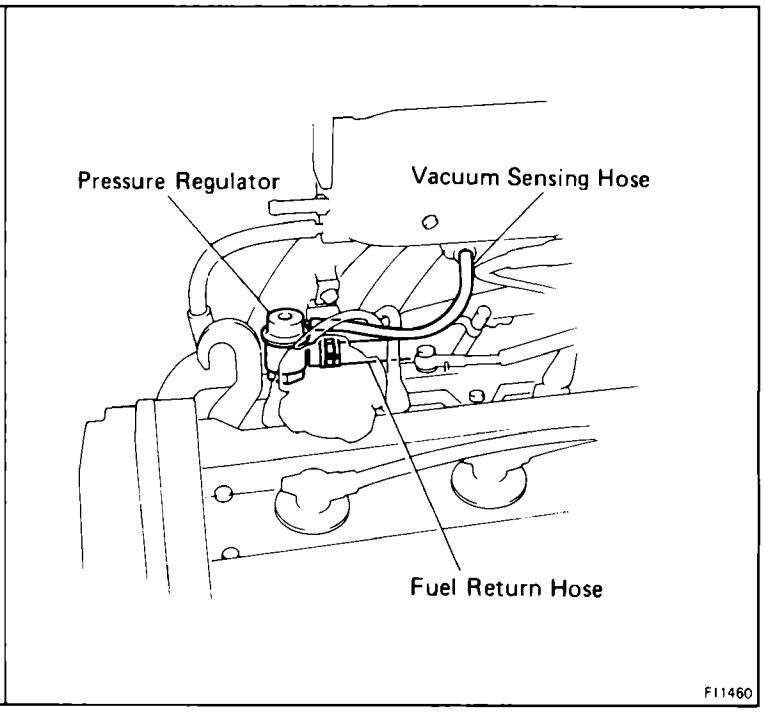
Torque: 180 kg-cm (13 ft-lb, 18 N·m)

3. **CONNECT VACUUM SENSING HOSE**

4. **CHECK FOR FUEL LEAKAGE (See page FI-10)**

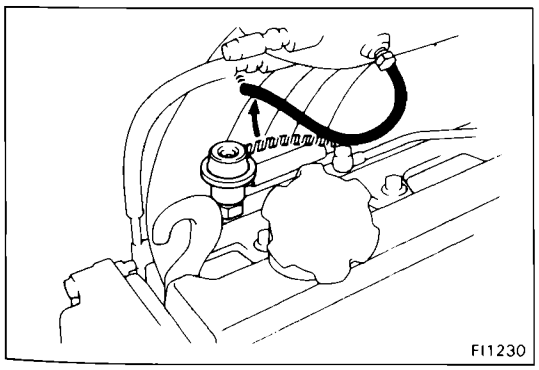
Fuel Pressure Regulator (3S-GE)





ON-VEHICLE INSPECTION

INSPECT FUEL PRESSURE (See page FI-72)



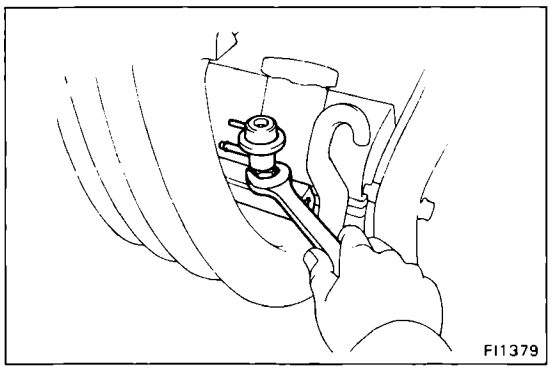
REMOVAL OF FUEL PRESSURE REGULATOR

1. DISCONNECT VACUUM SENSING HOSE

2. DISCONNECT FUEL RETURN HOSE

(a) Put a suitable container or shop towel under the pressure regulator.

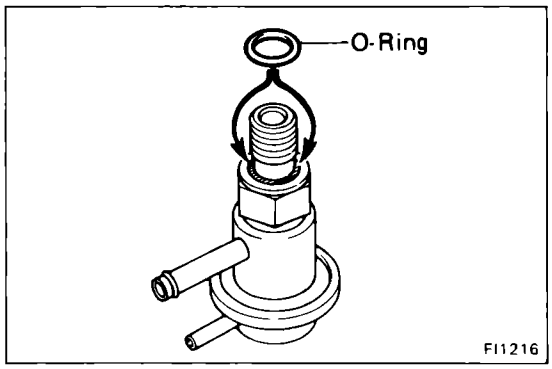
(b) Disconnect the return hose from the pressure regulator.



3. **REMOVE FUEL PRESSURE REGULATOR**

(a) Loosen the lock nut, and remove the pressure regulator.

(b) Remove the O-ring from the pressure regulator.

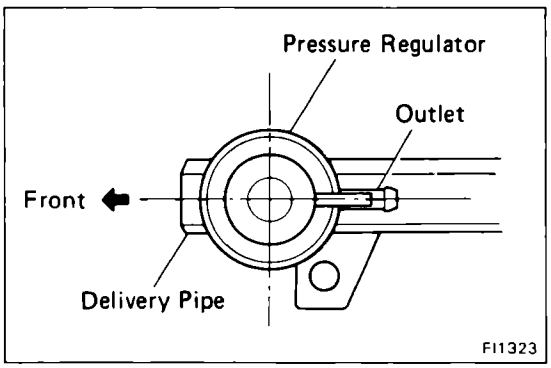


INSTALLATION OF FUEL PRESSURE REGULATOR

1. **INSTALL FUEL PRESSURE REGULATOR**

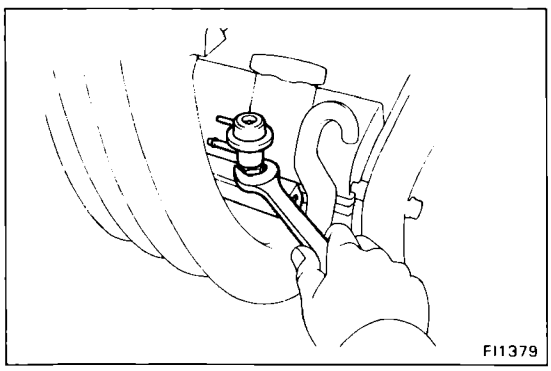
(a) Fully loosen the lock nut of the pressure regulator.

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



(c) Thrust the pressure regulator completely into the delivery pipe by hand.

(d) Turn the pressure regulator counterclockwise until the vacuum pipe faces in the direction indicated in the figure.



(e) Tighten the lock nut.

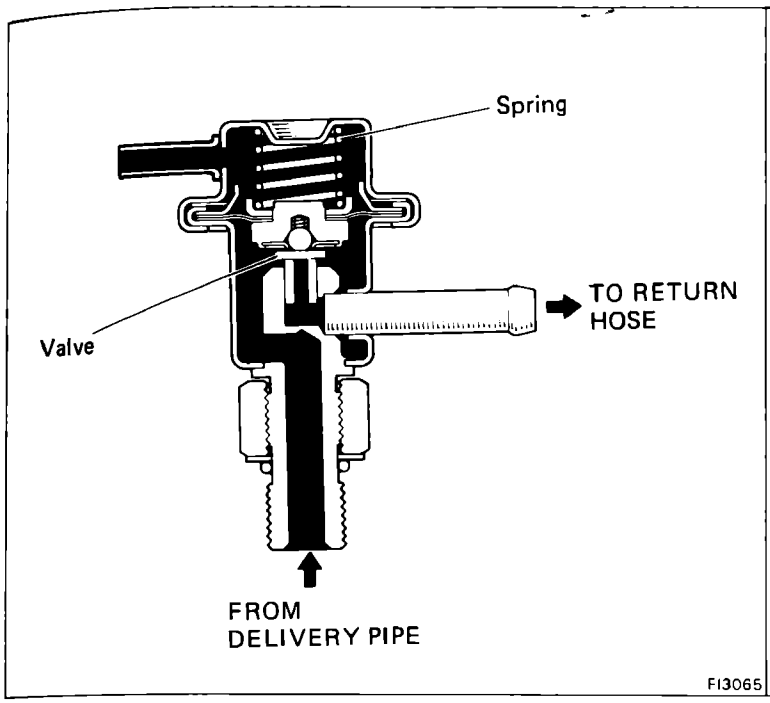
Torque: 300 kg-cm (22 ft-lb, 29 N·m)

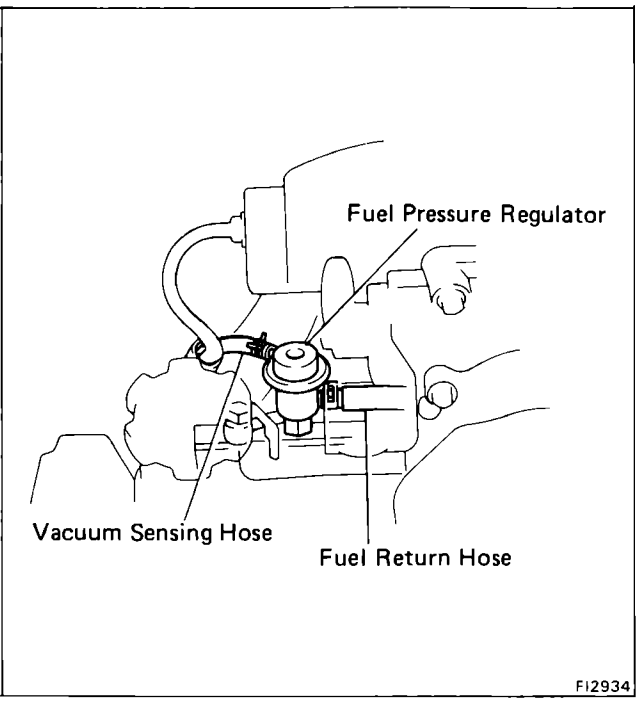
2. **CONNECT FUEL RETURN HOSE**

3. **CONNECT VACUUM SENSING HOSE**

4. **CHECK FOR FUEL LEAKAGE (See page FI-10)**

Fuel Pressure Regulator (3S-GTE)





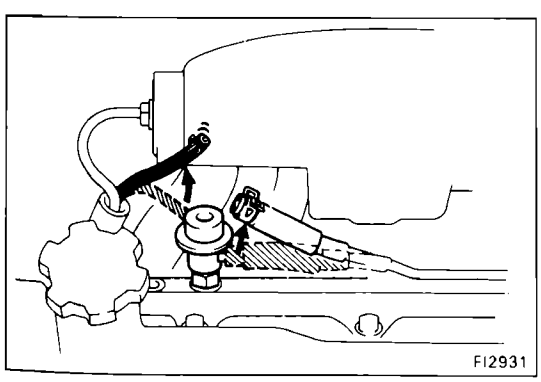
ON-VEHICLE INSPECTION

INSPECT FUEL PRESSURE (See page FI-72)

REMOVAL OF FUEL PRESSURE REGULATOR

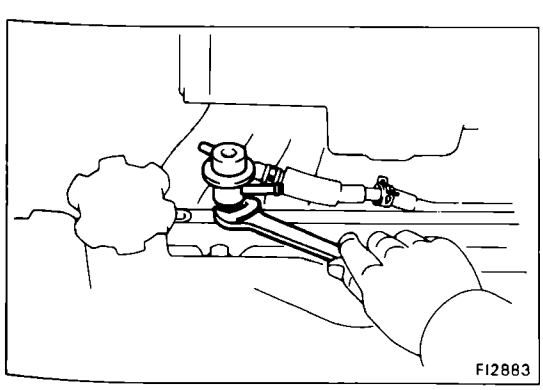
1. **REMOVE THROTTLE BODY**
   (See steps 2 to 10 on page FI-124)

2. **DISCONNECT COLD START INJECTOR PIPE**
   (See step 3 on page FI-86)

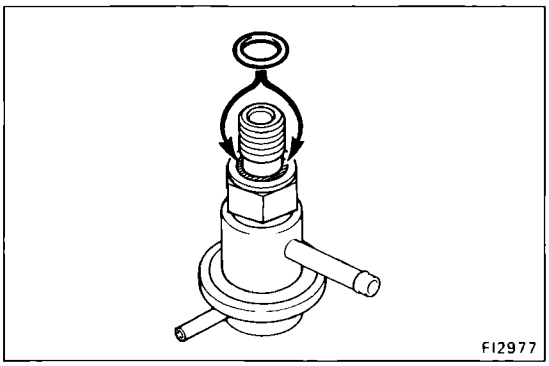


3. **DISCONNECT VACUUM SENSING HOSE**

4. **DISCONNECT FUEL RETURN HOSE**
   (a) Put a suitable container or shop towel under the pressure regulator.
   (b) Disconnect the return hose from the pressure regulator.

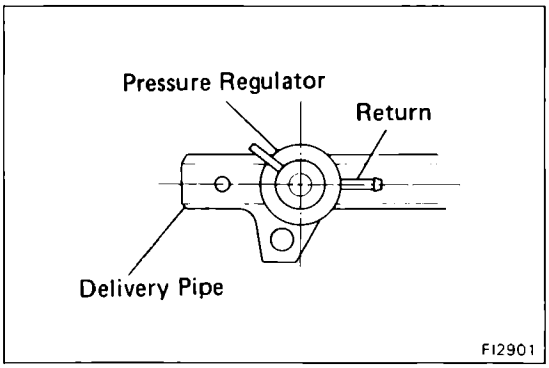


5. **REMOVE FUEL PRESSURE REGULATOR**
   (a) Loosen the lock nut, and remove the pressure regulator.
   (b) Remove the O-ring from the pressure regulator.


FI2977

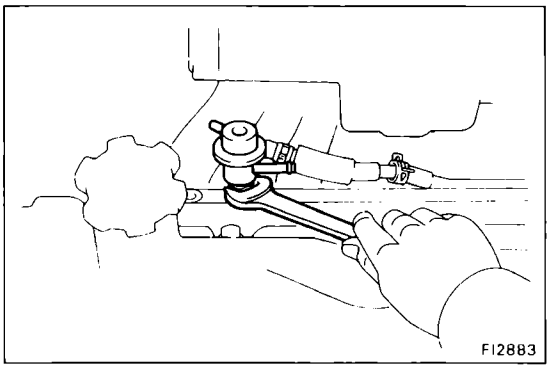
INSTALLATION OF FUEL PRESSURE REGULATOR

1. **INSTALL FUEL PRESSURE REGULATOR**
   (a) Fully loosen the lock nut of the pressure regulator.
   (b) Apply a light coat of gasoline to a new O-ring, and install it to the pressure regulator.

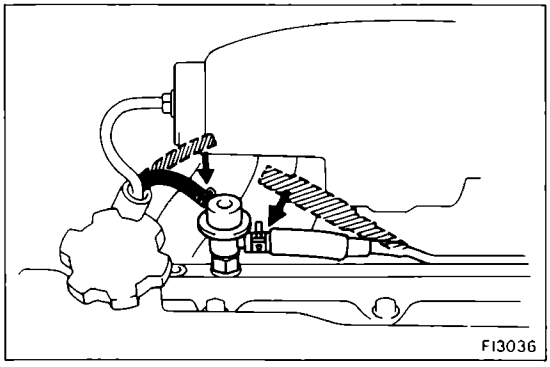


FI2901

   (c) Thrust the pressure regulator completely into the delivery pipe by hand.
   (d) Turn the pressure regulator counterclockwise until the vacuum pipe faces in the direction indicated in the figure.

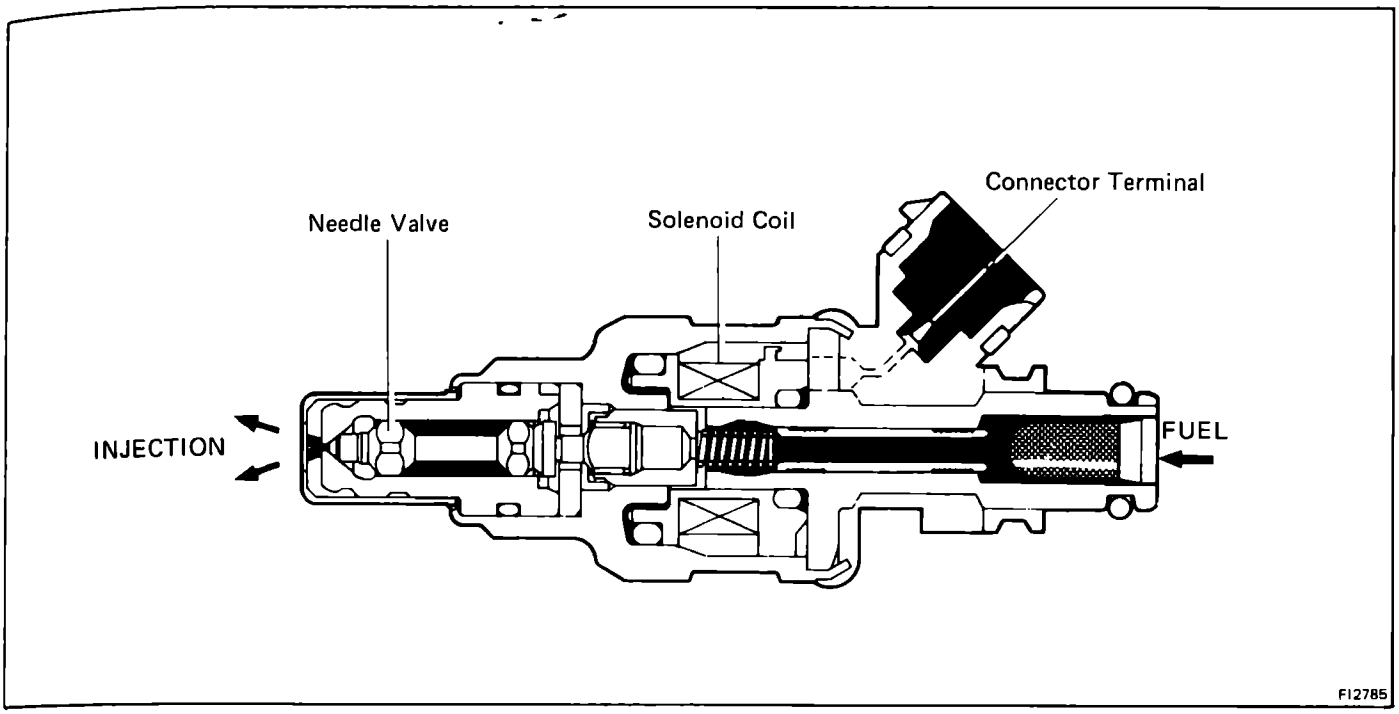

FI2883

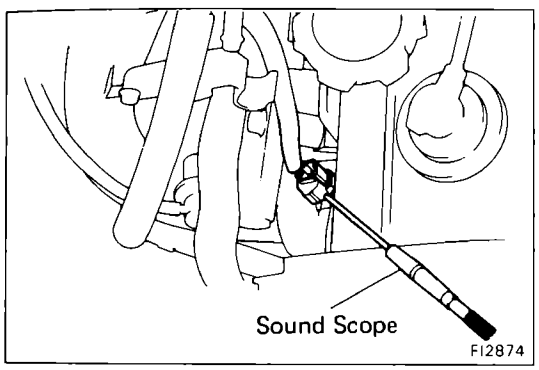
   (e) Tighten the lock nut.
   Torque: 300 kg-cm (22 ft-lb, 29 N·m)


FI3036

2. **CONNECT FUEL RETURN HOSE**
3. **CONNECT VACUUM SENSING HOSE**
4. **CONNECT COLD START INJECTOR PIPE**
   (See step 2 on page FI-88)
5. **INSTALL THROTTLE BODY**
   (See steps 2 to 12 on page FI-126)

Injectors (3S-FE)



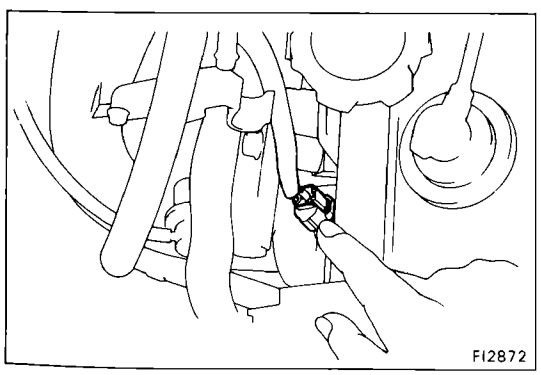


ON-VEHICLE INSPECTION

1. INSPECT INJECTOR OPERATION

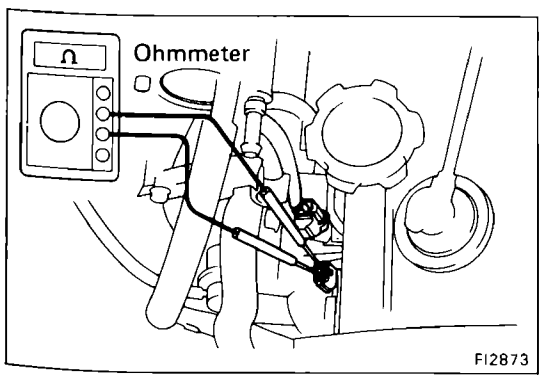
Check operation sound from each injector.

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



(b) If you have no sound scope, you can check the injector transmission operation with your finger.

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



2. INSPECT INJECTOR RESISTANCE

(a) Disconnect the injector connector.

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

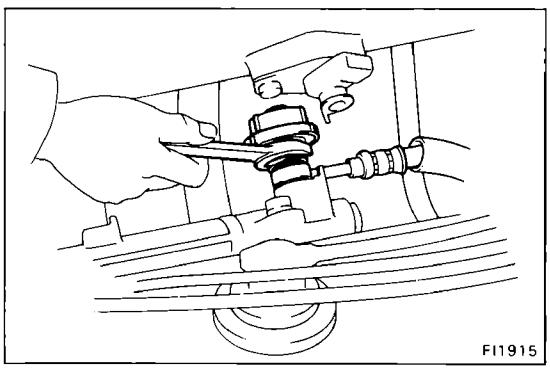
Resistance: Approx. 13.8 Ω

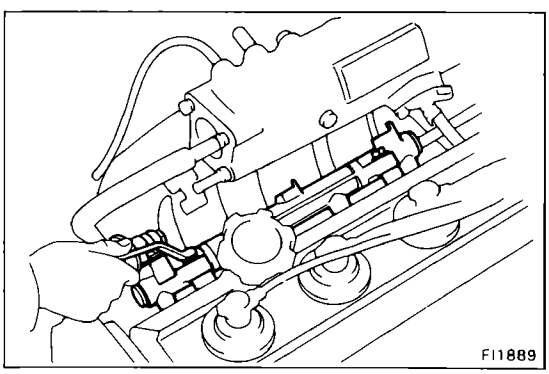
If the resistance is not as specified, replace the injector.

(c) Reconnect the injector connector.

REMOVAL OF INJECTORS

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY
2. DISCONNECT COLD START INJECTOR PIPE
   (See steps 2 and 3 on page FI-80)
3. DISCONNECT VACUUM SENSING HOSE FROM FUEL PRESSURE REGULATOR (See step 1 on page FI-89)
4. DISCONNECT INJECTOR CONNECTORS
5. DISCONNECT FUEL INLET HOSE FROM DELIVERY HOSE
   Remove the pulsation damper and two gaskets.
6. DISCONNECT FUEL HOSE FROM RETURN PIPE

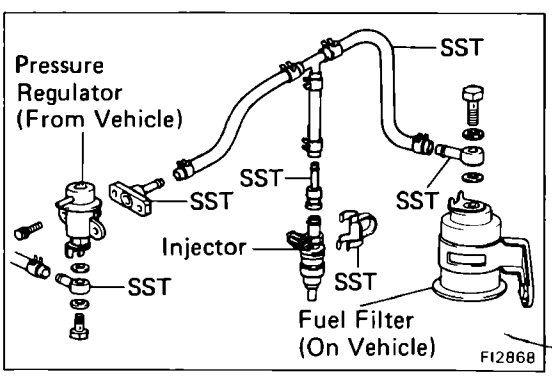




7. REMOVE DELIVERY PIPE AND INJECTORS
   (a) Remove the two bolts and delivery pipe together with four injectors.

   CAUTION: Be careful not to drop the injectors, when removing the delivery pipe.

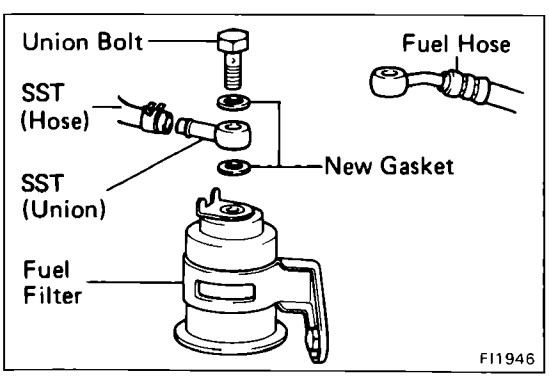
   (b) Remove the four insulators and two spacers from the cylinder head.
   (c) Pull out the four injectors from the delivery pipe.
   (d) Remove the O-ring and grommet from each injector.



INSPECTION OF INJECTORS

1. INSPECT INJECTOR INJECTION

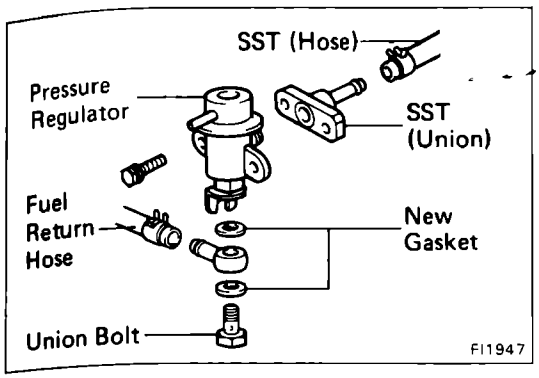
   WARNING: Keep clear of sparks during the test.



   (a) Disconnect the fuel hose from the fuel filter outlet.
   (b) Connect SST (union and hose) to the fuel filter outlet with new two gaskets and the union bolt.

   SST 09268-41045 (90405-09015)

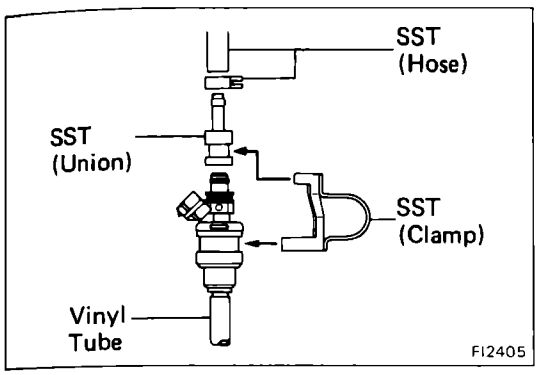
   NOTE: Use the vehicle's fuel filter.



(c) Remove the pressure regulator. (See page FI-89)

(d) Connect the fuel return hose and SST (hose) to the pressure regulator with SST (union), new two gaskets and union bolt.

SST 09268-41045 (09268-41080, 09268-41090)



(e) Install a new O-ring to the injector.

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

SST 09268-41045

(g) Put the injector into the graduated cylinder.

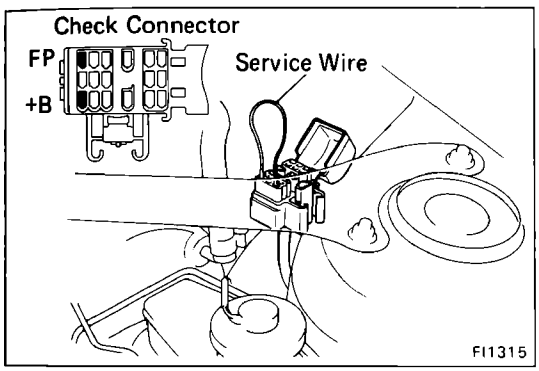
NOTE: Install the a suitable vinyl hose onto the injector to prevent gasoline from splashing out.

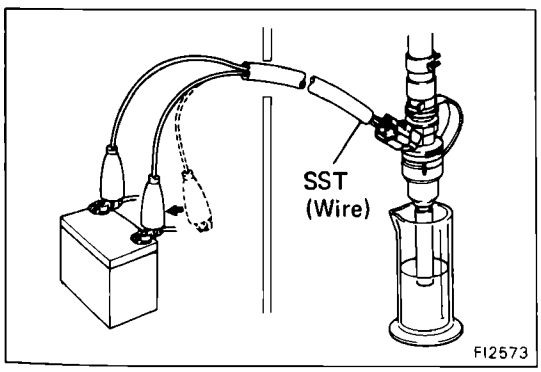
(h) Reconnect the battery negative (−) cable.

(i) Turn the ignition switch ON.

NOTE: Do not start the engine.

(j) Using a service wire, connect terminals +B and FP of the check connector.





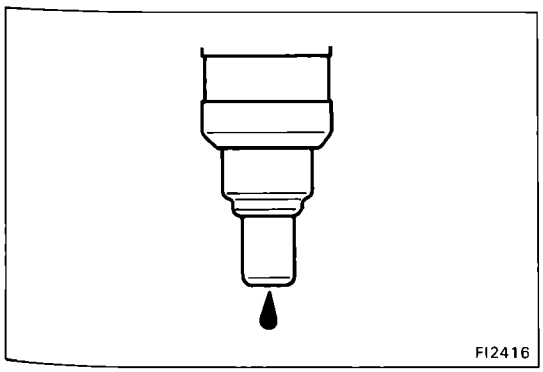
(k) Connect SST (wire) to the injector and battery for 15 seconds, and measure the injection volume with a graduated cylinder. Test each injector two or three times.

SST 09842-30070

Volume: 45 — 55 cc (2.7 — 3.4 cu in.) per 15 sec.

Difference between each injector:
5 cc (0.3 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.

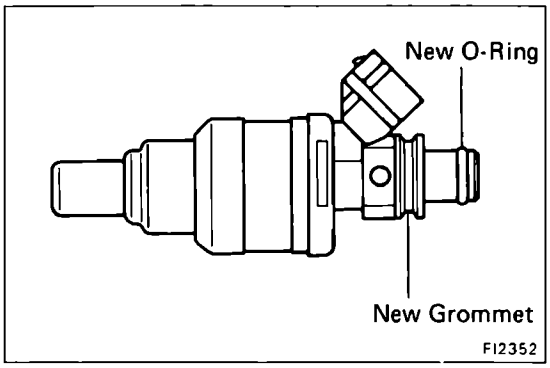
SST 09842-30070

Fuel drop: One drop or less per minute

(b) Disconnect the battery negative (−) cable.

(c) Remove SST and the service wire.

SST 09268-41045

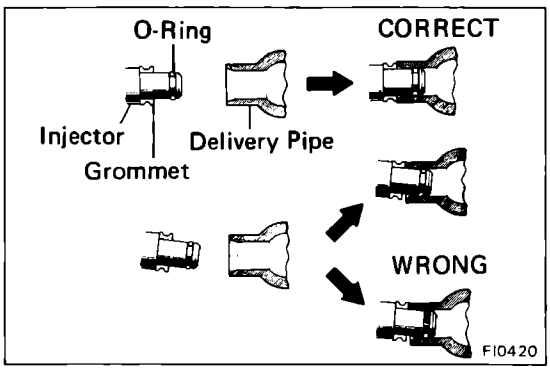


INSTALLATION OF INJECTORS

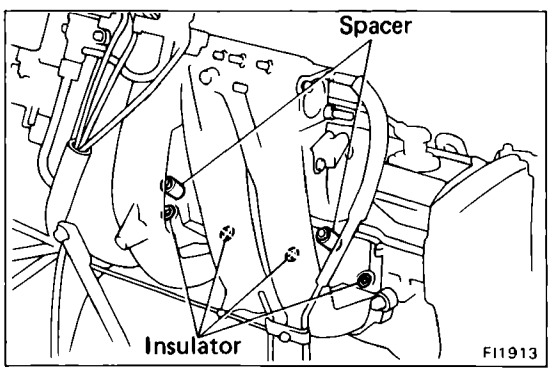
1. INSTALL INJECTORS AND DELIVERY PIPE

(a) Install a new grommet to the injector.

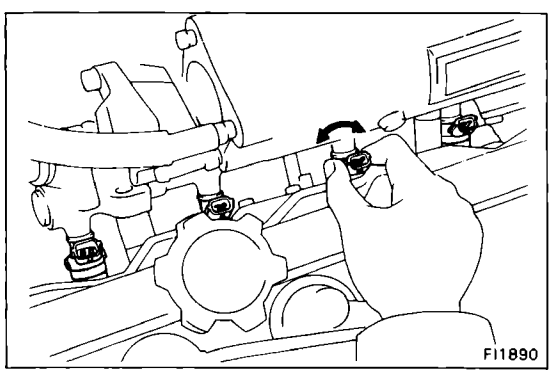
(b) Apply a light coat of gasoline to a new O-ring and install it to the injector.



(c) While turning the injector left and right, install it to the delivery pipes. Install the four injectors.



(d) Place the four insulators and two spacers in position on the cylinder head.

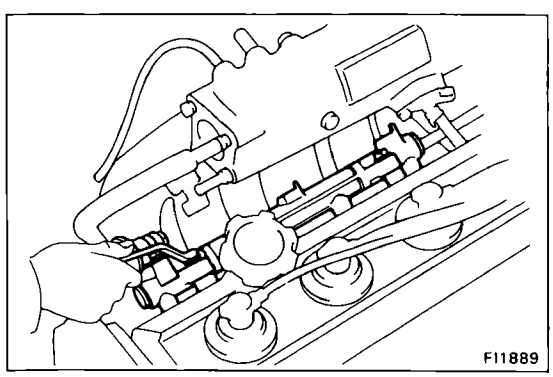


(e) Place the four injectors together with the delivery pipe in position on the cylinder head.

(f) Check that the injectors rotate smoothly.

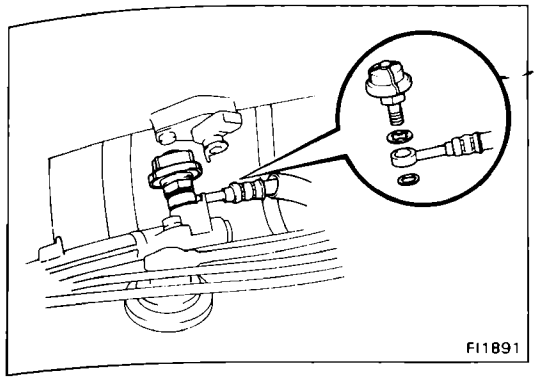
NOTE: If injectors do not rotate smoothly, the probable cause is incorrect installation of O-rings. Replace the O-rings.

(g) Position the injector connector upward.



(h) Install the two bolts.

Torque: 130 kg-cm (9 ft-lb, 13 N·m)



2. **CONNECT FUEL INLET HOSE TO DELIVERY PIPE**

   Connect the inlet hose with new two gaskets and the pulsation damper.

   Torque: 350 kg-cm (25 ft-lb, 34 N·m)

3. **CONNECT FUEL RETURN HOSE TO RETURN PIPE**

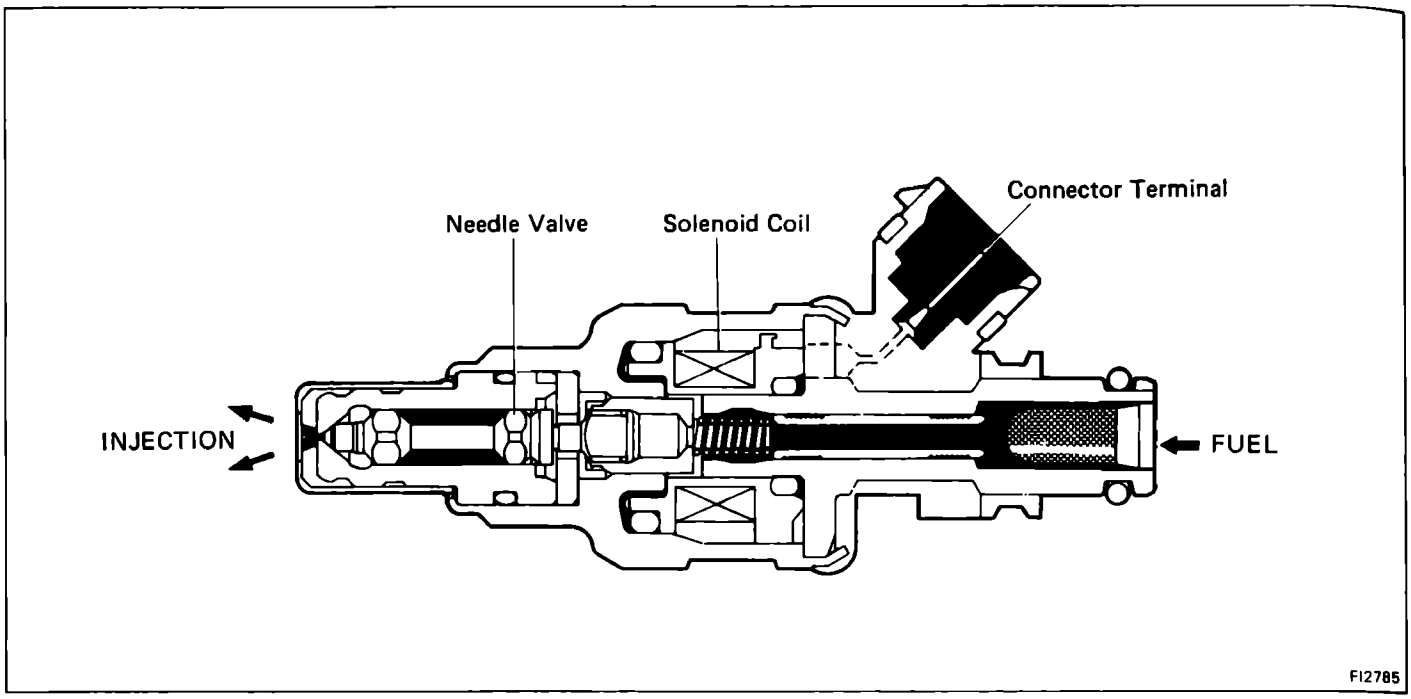
4. **CONNECT INJECTOR CONNECTORS**

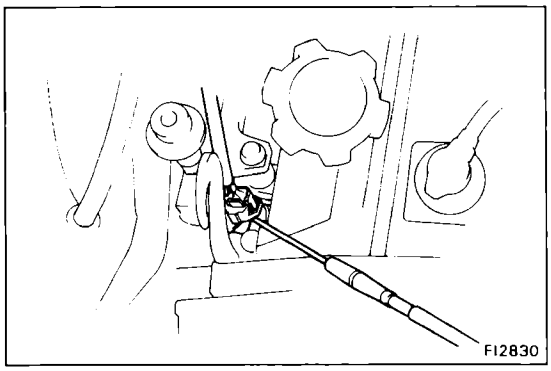
5. **CONNECT VACUUM SENSING HOSE**

6. **CONNECT COLD START INJECTOR PIPE**
   (See steps 2 and 3 on page FI-82)

7. **CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY**

Injectors (3S-GE)



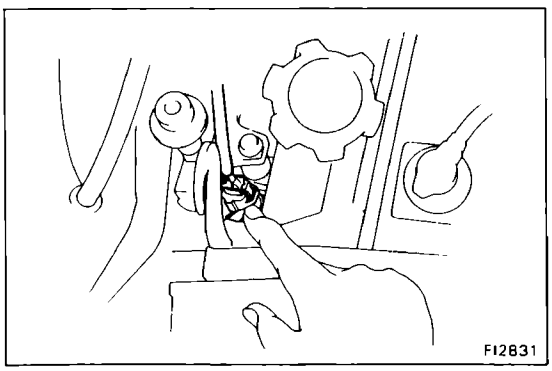


ON-VEHICLE INSPECTION

1. INSPECT INJECTOR OPERATION

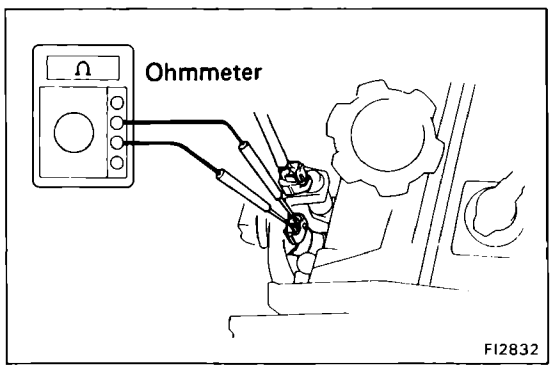
Check operation sound from each injector.

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



(b) If you have no sound scope, you can check the injector transmission operation with your finger.

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



2. INSPECT INJECTOR RESISTANCE

(a) Disconnect the injector connector.

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

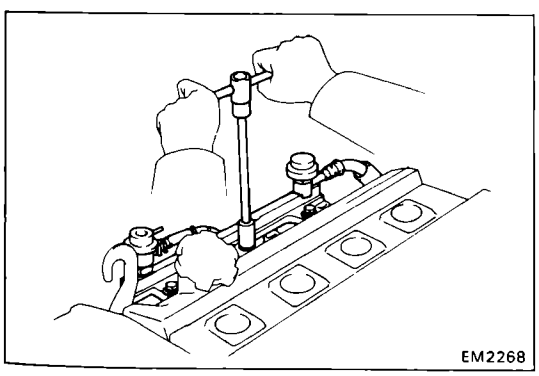
Resistance: Approx. 13.8 Ω

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

(c) Reconnect the injector connector.

REMOVAL OF INJECTORS

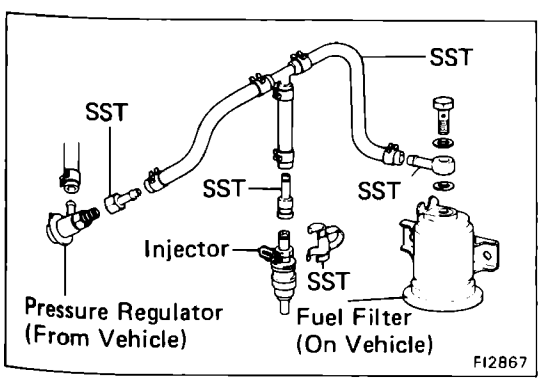
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY
2. DRAIN ENGINE COOLANT (See page CO-6)
3. (A/T)
   DISCONNECT THROTTLE CABLE FROM THROTTLE LINKAGE
4. DISCONNECT ACCELERATOR CABLE FROM THROTTLE LINKAGE
5. REMOVE SUSPENSION UPPER BRACE
   (See step 10 on page EM-122)
6. DISCONNECT AIR CLEANER HOSE
7. REMOVE IGNITER
8. REMOVE SUSPENSION LOWER CROSSMEMBER
   (See step 26 on page EM-124)
9. REMOVE THROTTLE BODY
   (See steps 5 and 6 on page FI-120)
10. REMOVE INTAKE MANIFOLD
    (See steps 24 to 35 on pages EM-85 and 86)



11. REMOVE DELIVERY PIPE AND INJECTORS
    (a) Remove the three bolts and delivery pipe together with four injectors.

    CAUTION: Be careful not to drop the injectors, when removing the delivery pipe.

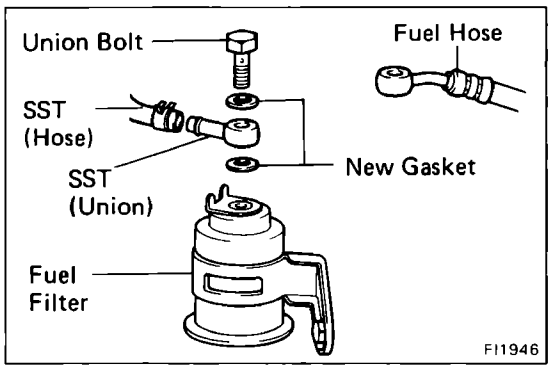
    (b) Remove the four insulators and three spacers from the cylinder head.
    (c) Pull out the four injectors from the delivery pipe.



INSPECTION OF INJECTORS

1. INSPECT INJECTOR INJECTION

   WARNING: Keep clear of sparks during the test.

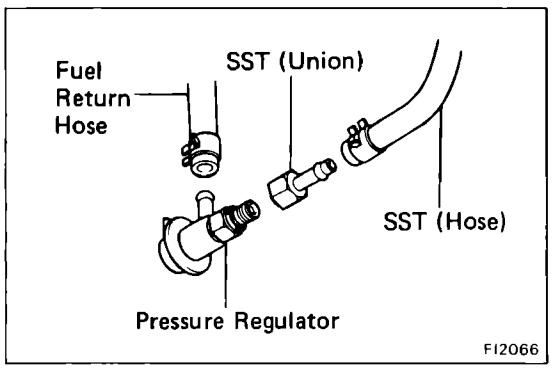


(a) Disconnect the fuel hose from the fuel filter outlet.

(b) Connect SST (union and hose) to the fuel filter outlet with new two gaskets and the union bolt.

SST 09268-41045 (90405-09015)

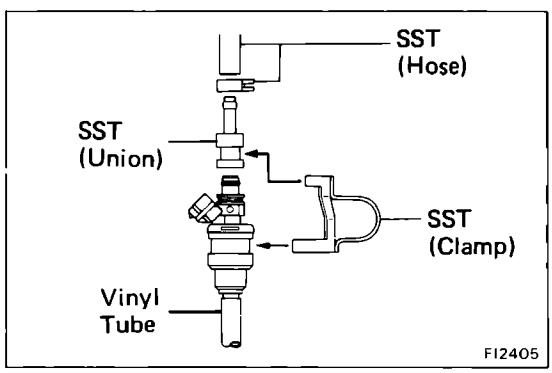
NOTE: Use the vehicle's fuel filter.



(c) Remove the pressure regulator. (See page FI-89)

(d) Connect the fuel return hose and SST (hose) to the pressure regulator with SST (union).

SST 09268-41045 (09268-41060)



(e) Install a new O-ring to the injector.

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

SST 09268-41045

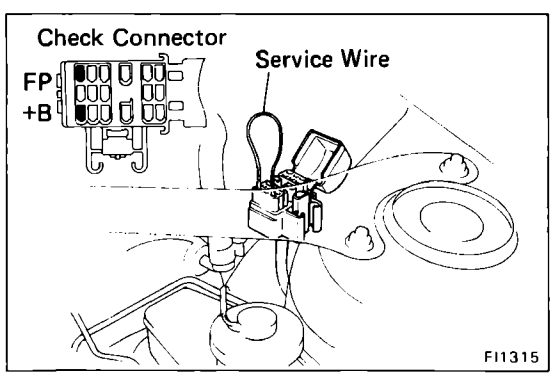
(g) Put the injector into the graduated cylinder.

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

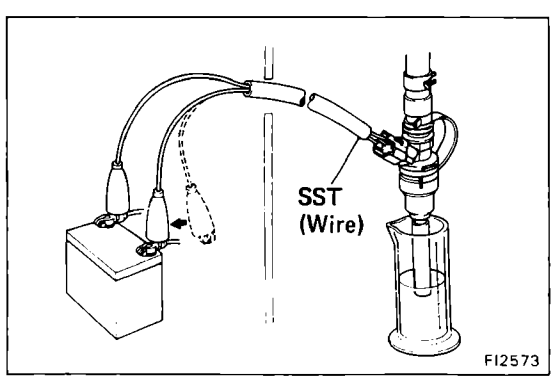
(h) Reconnect the battery negative (−) cable.

(i) Turn the ignition switch ON.

NOTE: Do not start the engine.



(j) Using a service wire, connect terminals +B and FP of the check connector.



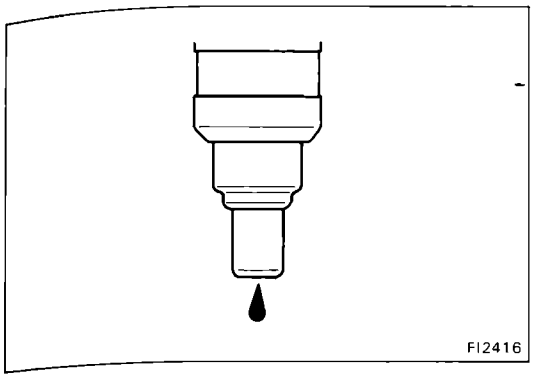
(k) Connect SST (wire) to the injector and battery for 15 seconds, and measure the injection volume with a graduated cylinder. Test each injector two or three times.

SST 09842-30070

Volume: 66 — 82 cc (4.0 — 5.0 cu in.) per 15 sec.

Difference between each injector:
5 cc (0.3 cu in.) or less

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


FI2416

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) Disconnect the battery negative (−) cable.

(c) Remove SST and the service wire.

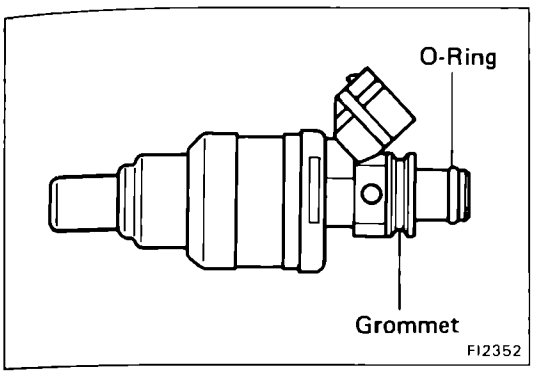
SST 09268-41045

INSTALLATION OF INJECTORS

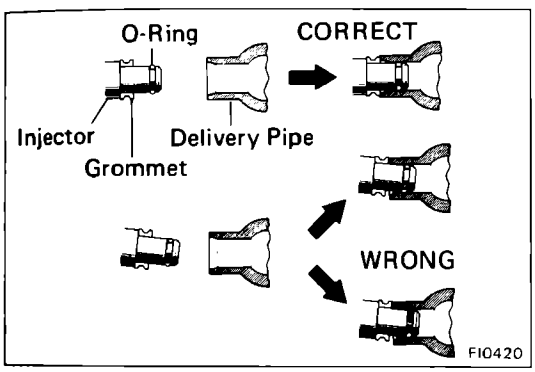
1. INSTALL INJECTORS AND DELIVERY PIPE

(a) Install a new grommet to the injector.

(b) Apply a light coat of gasoline to a new O-ring and install it to the injector.

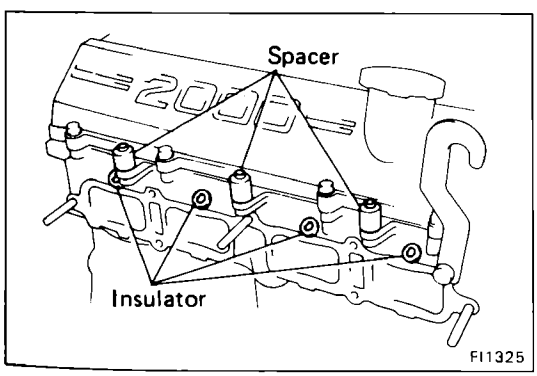


FI2352



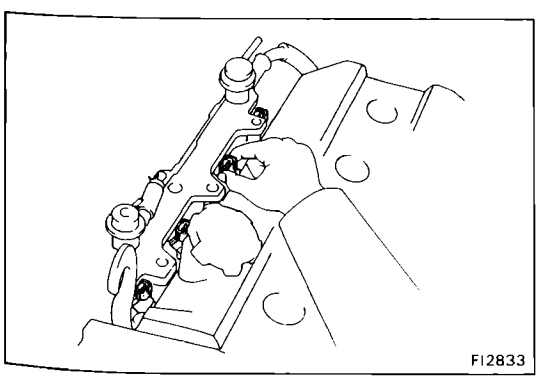
FI0420

(c) While turning the injector left and right, install it to the delivery pipes. Install the four injectors.



FI1325

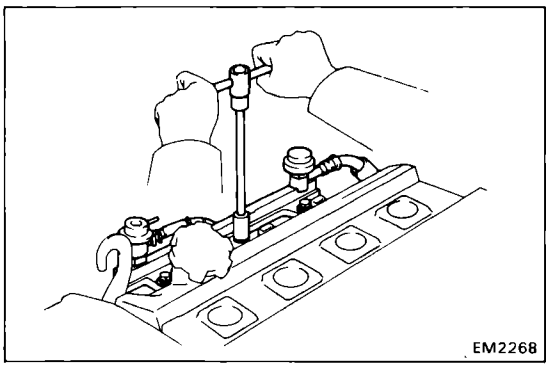
(d) Place the four insulators and three spacers in position on the cylinder head.


FI2833

(e) Place the four injectors together with the delivery pipe in position on the cylinder head.

(f) Check that the injectors rotate smoothly.

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

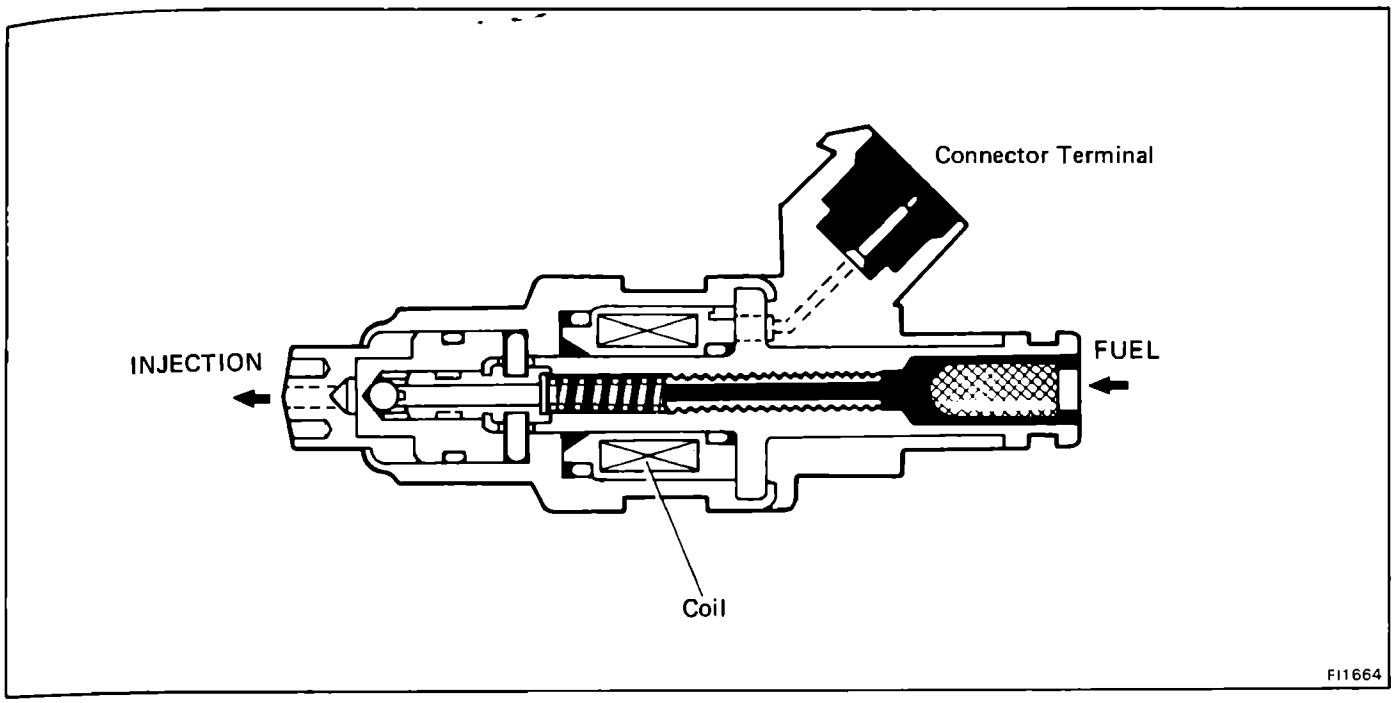


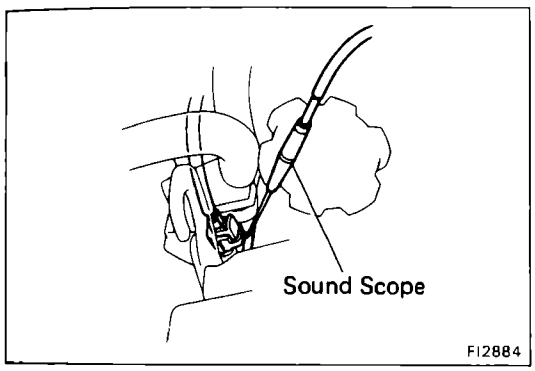
(g) Install the three bolts.

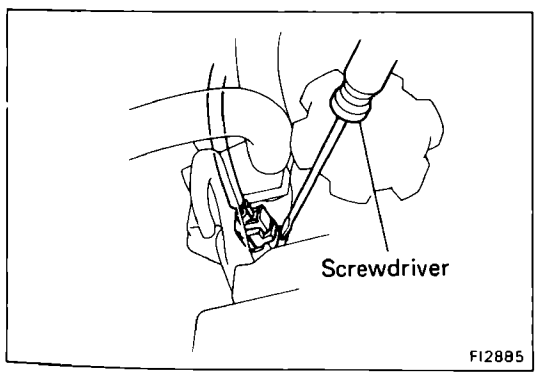
Torque: 195 kg-cm (14 ft-lb, 19 N·m)

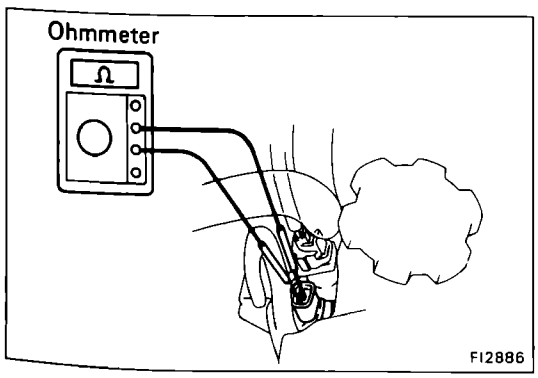
2. **INSTALL INTAKE MANIFOLD**
   (See steps 11 to 21 on pages EM-109 or 110)
3. **INSTALL THROTTLE BODY**
   (See steps 2 to 3 on page FI-122)
4. **INSTALL SUSPENSION LOWER CROSSMEMBER**
   (See step 15 on page EM-153)
5. **INSTALL IGNITER**
6. **CONNECT AIR CLEANER HOSE**
7. **INSTALL SUSPENSION UPPER BRACE**
   (See step 31 on page EM-155)
8. **(A/T)**
   CONNECT THROTTLE CABLE, AND ADJUST IT
9. **CONNECT ACCELERATOR CABLE, AND ADJUST IT**
10. **FILL WITH ENGINE COOLANT (See page CO-6)**
11. **CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY**

Injectors (3S-GTE)









ON-VEHICLE INSPECTION

1. INSPECT INJECTOR OPERATION

Check operation sound from each injector.

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

(b) If you have no sound scope, you can check the injector transmission operation with a screwdriver.

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

2. INSPECT INJECTOR RESISTANCE

(a) Remove the throttle body.
(See steps 1 to 10 on page FI-124)

(b) Disconnect the injector connector.

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

Resistance: 2 — 4 Ω

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

(d) Reconnect the injector connector.

(e) Reinstall the throttle body.
(See steps 2 to 12 on page FI-126)

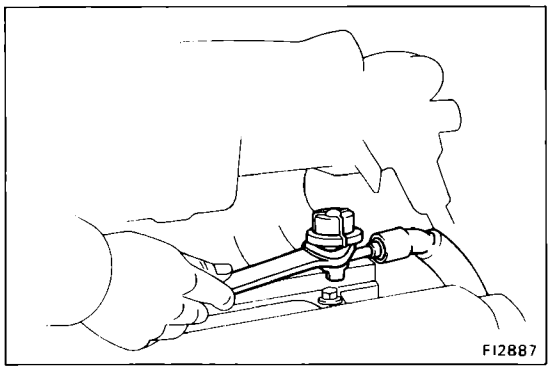
REMOVAL OF INJECTORS

1. REMOVE THROTTLE BODY
(See steps 1 to 10 on page FI-124)

2. REMOVE FUEL PRESSURE REGULATOR
(See steps 3 to 5 on page FI-93)

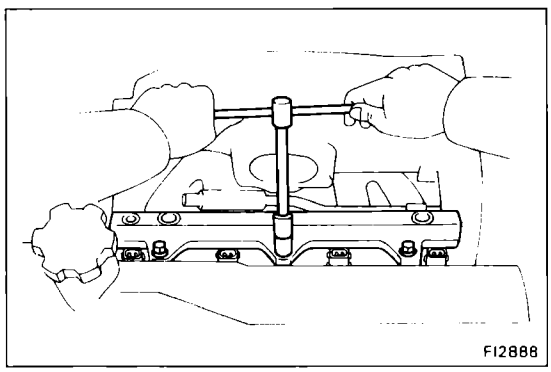
3. REMOVE EGR VACUUM MODULATOR

4. DISCONNECT INJECTOR CONNECTORS



5. DISCONNECT FUEL INLET HOSE FROM DELIVERY PIPE
Remove the pulsation damper and two gasket.

6. DISCONNECT FUEL RETURN HOSE FROM RETURN PIPE



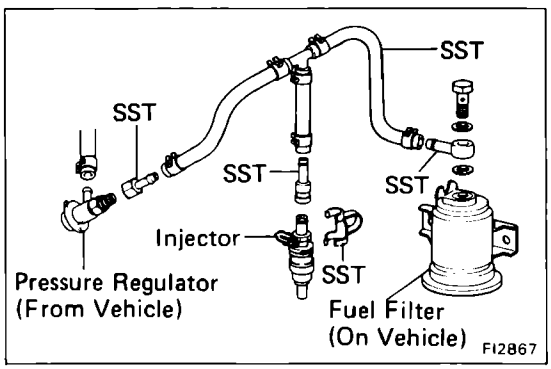
7. REMOVE DELIVERY PIPE AND INJECTORS
(a) Remove the three bolts and delivery pipe together with four injectors.

CAUTION: Be careful not to drop the injectors, when removing the delivery pipe.

(b) Remove the four insulators and three spacers from the cylinder head.

(c) Pull out the four injectors from the delivery pipe.

(d) Remove the O-ring and grommet from each injector.

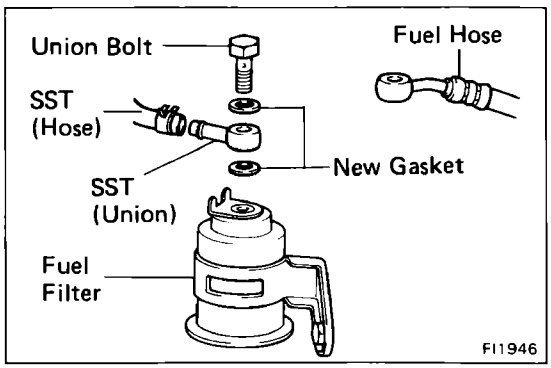


8. REMOVE FUEL RETURN PIPE FROM DELIVERY PIPE

INSPECTION OF INJECTORS

1. INSPECT INJECTOR INJECTION

WARNING: Keep clear of sparks during the test.

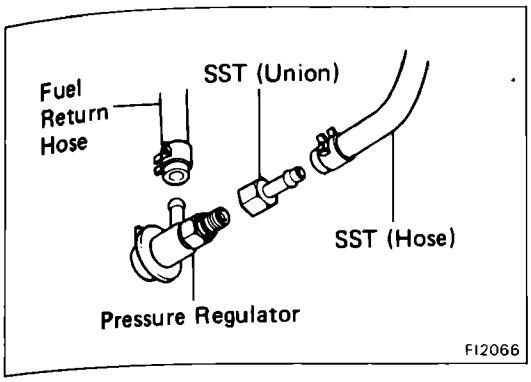


(a) Disconnect the fuel hose from the fuel filter outlet.

(b) Connect SST (union and hose) to the fuel filter outlet with new two gaskets and the union bolt.

SST 09268-41045 (90405-09015)

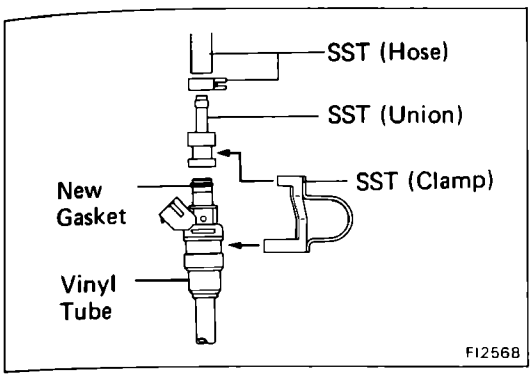
NOTE: Use the vehicle's fuel filter.



(c) Remove the pressure regulator. (See page FI-89)

(d) Connect the fuel return hose and SST (hose) to the pressure regulator with SST (union).

SST 09268-41045 (09268-41060)



(e) Install a new O-ring to the injector.

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

SST 09268-41045

(g) Put the injector into the graduated cylinder.

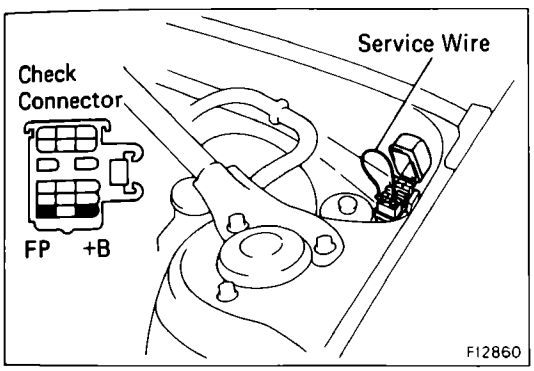
NOTE: Install the a suitable vinyl hose onto the injector to prevent gasoline from splashing out.

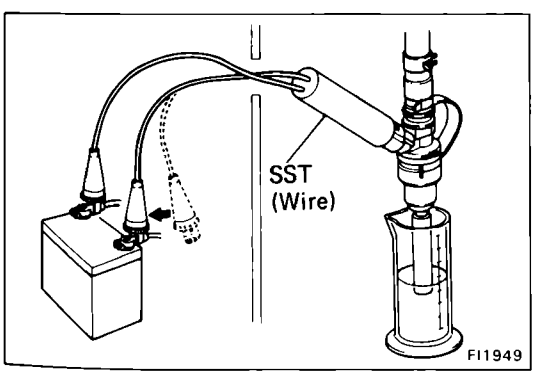
(h) Reconnect the battery negative (−) cable.

(i) Turn the ignition switch ON.

NOTE: Do not start the engine.

(j) Using a service wire, connect terminals +B and FP of the check connector.





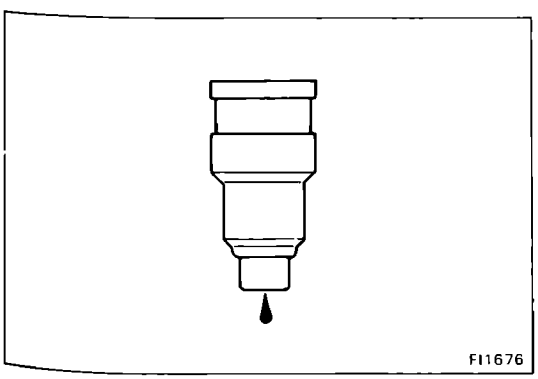
(k) Connect SST (wire) to the injector and battery for 15 seconds, and measure the injection volume with a graduated cylinder. Test each injector two or three times.

SST 09842-30060

Volume: 104 — 110 cc (6.3 — 6.7 cu in.) per 15 sec.

Difference between each injector:
5 cc (0.3 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.

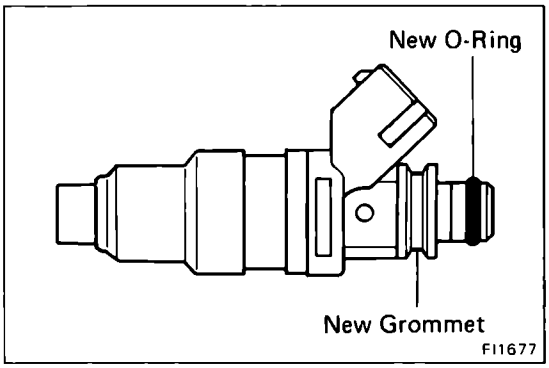
SST 09842-30060

Fuel drop: One drop or less per minute

(b) Disconnect the battery negative (−) cable.

(c) Remove SST and the service wire.

SST 09268-41045



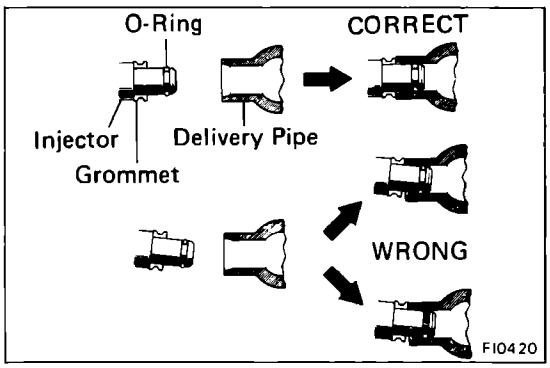
INSTALLATION OF INJECTORS

1. INSTALL FUEL RETURN PIPE TO DELIVERY PIPE

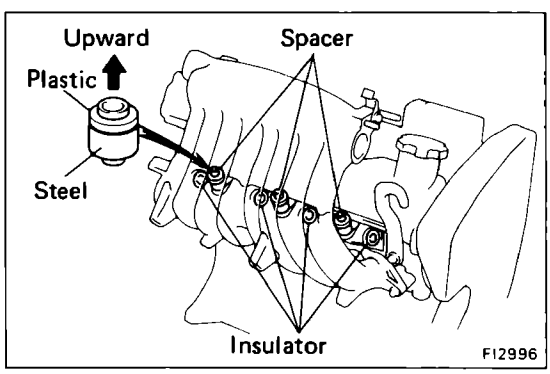
2. INSTALL INJECTORS AND DELIVERY PIPE

(a) Install a new grommet to the injector.

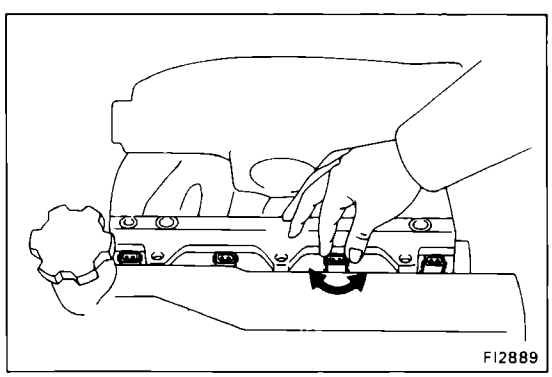
(b) Apply a light coat of gasoline to a new O-ring and install it to the injector.



(c) While turning the injector left and right, install it to the delivery pipes. Install the four injectors.



(d) Place the four insulators and three spacers in position on the cylinder head.

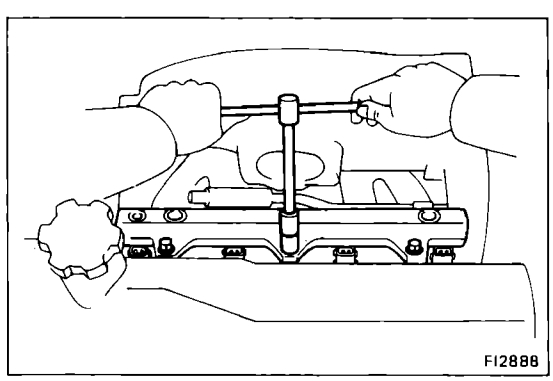


(e) Place the four injectors together with the delivery pipe in position on the cylinder head.

(f) Check that the injectors rotate smoothly.

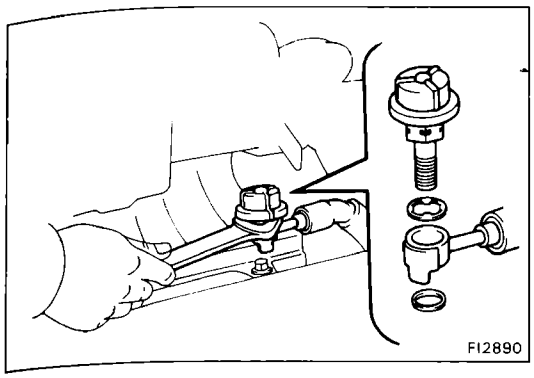
NOTE: If injectors do not rotate smoothly, the probable cause is incorrect installation of O-rings. Replace the O-rings.

(g) Position the injector connector upward.



(h) Install the three bolts.

Torque: 195 kg-cm (14 ft-lb, 19 N·m)



3. **CONNECT FUEL INLET HOSE TO DELIVERY PIPE**

   Connect the inlet hose with new two gaskets and the pulsation damper.

   Torque: 300 kg-cm (22 ft-lb, 29 N·m)

4. **CONNECT FUEL RETURN HOSE TO RETURN PIPE**

5. **CONNECT INJECTOR CONNECTORS**

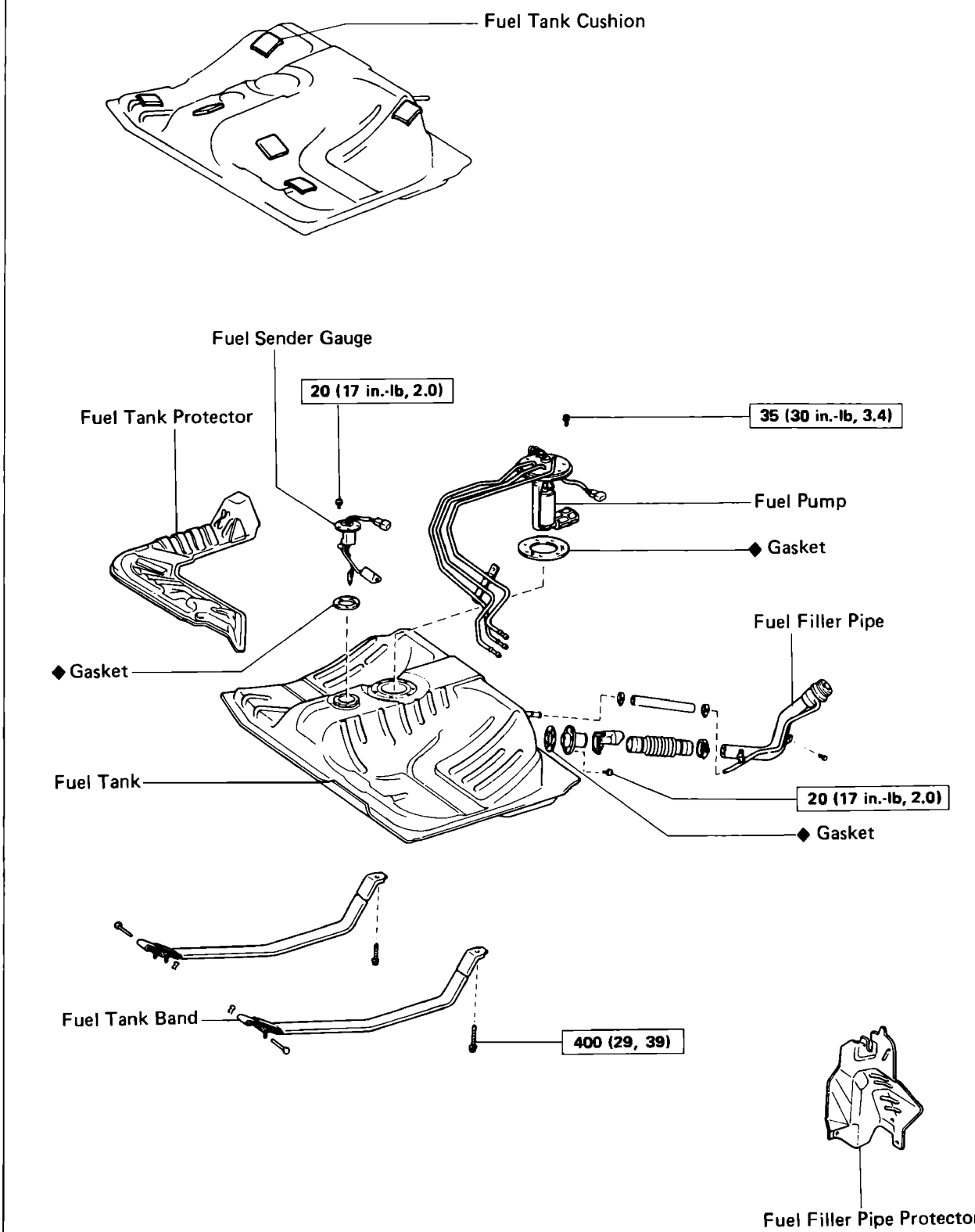
6. **INSTALL EGR VACUUM MODULATOR**

7. **INSTALL FUEL PRESSURE REGULATOR**
   (See steps 1 to 3 on page FI-94)

8. **INSTALL THROTTLE BODY**
   (See steps 2 to 12 on page FI-126)

Fuel Tank and Lines

COMPONENTS (2WD)

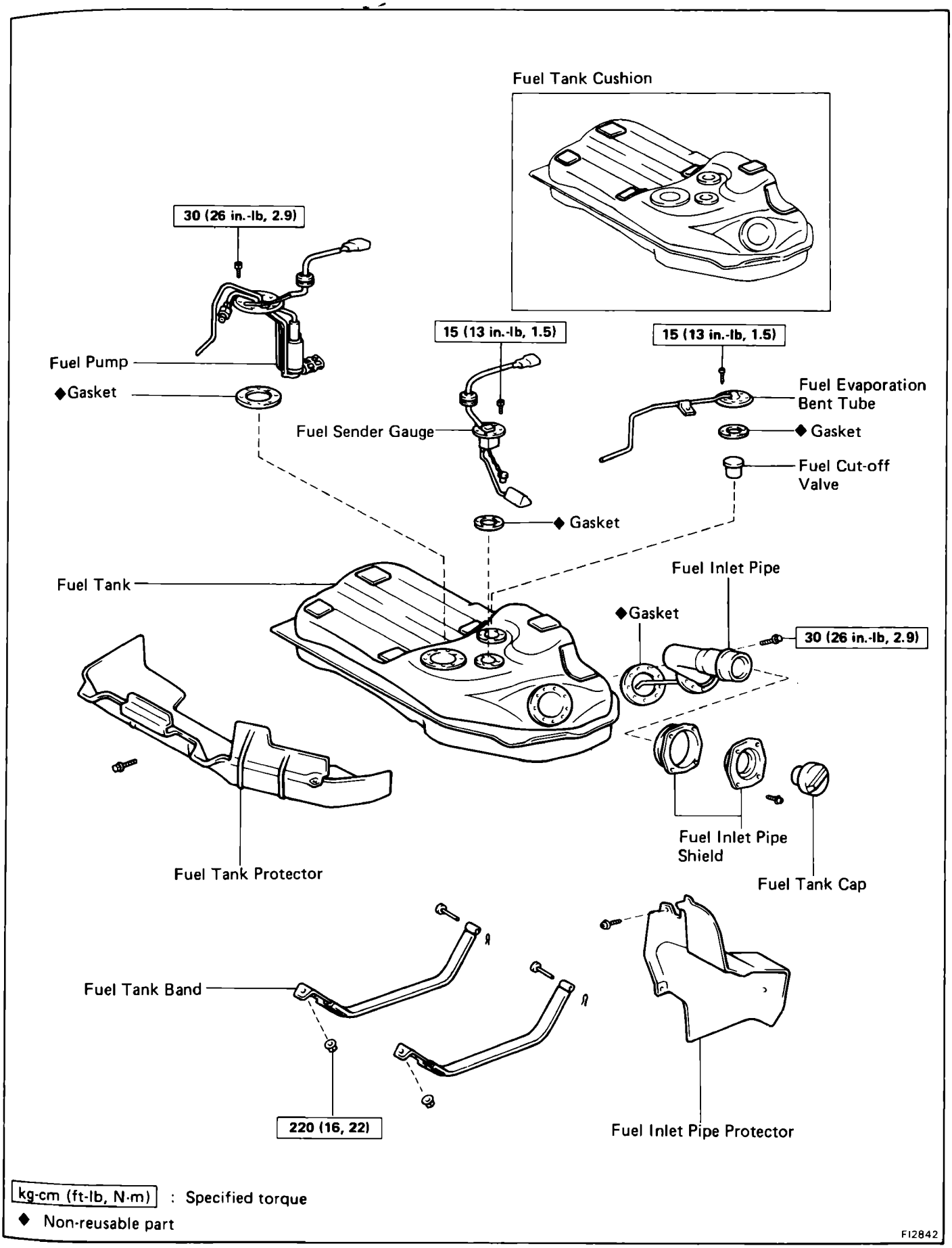


kg-cm (ft-lb, N·m) : Specified torque

◆ Non-reusable part

FI1477

COMPONENTS (4WD)



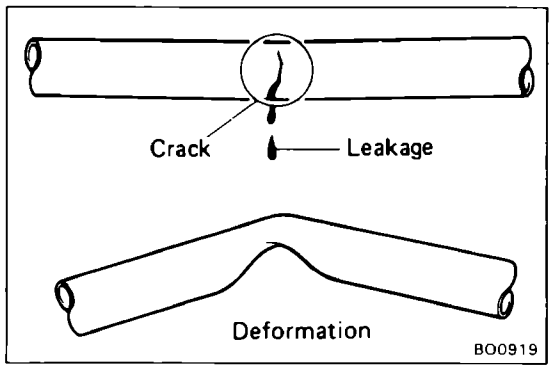
kg-cm (ft-lb, N·m) : Specified torque

◆ Non-reusable part

FI2842

PRECAUTIONS

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



INSPECT FUEL LINES AND CONNECTIONS

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

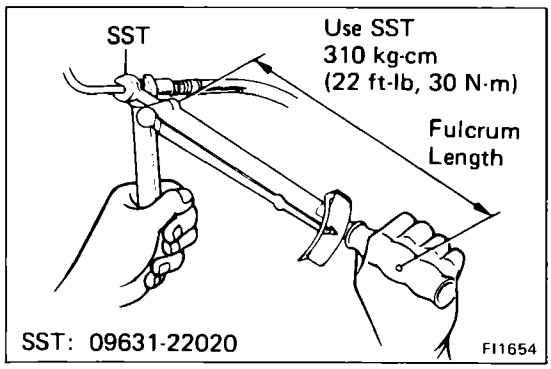
(b) Check the fuel tank vapor vent system hoses and connections for looseness, sharp bends or damage.

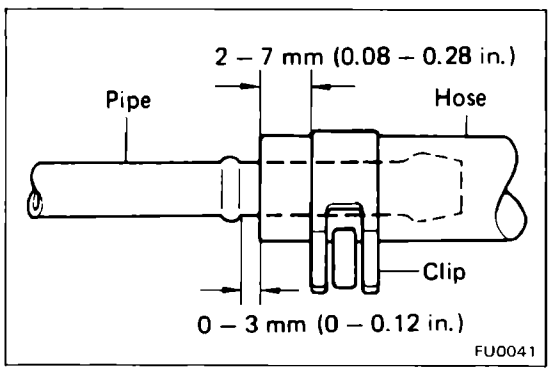
(c) Check the fuel tank for deformation, cracks, fuel leakage or tank band looseness.

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

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

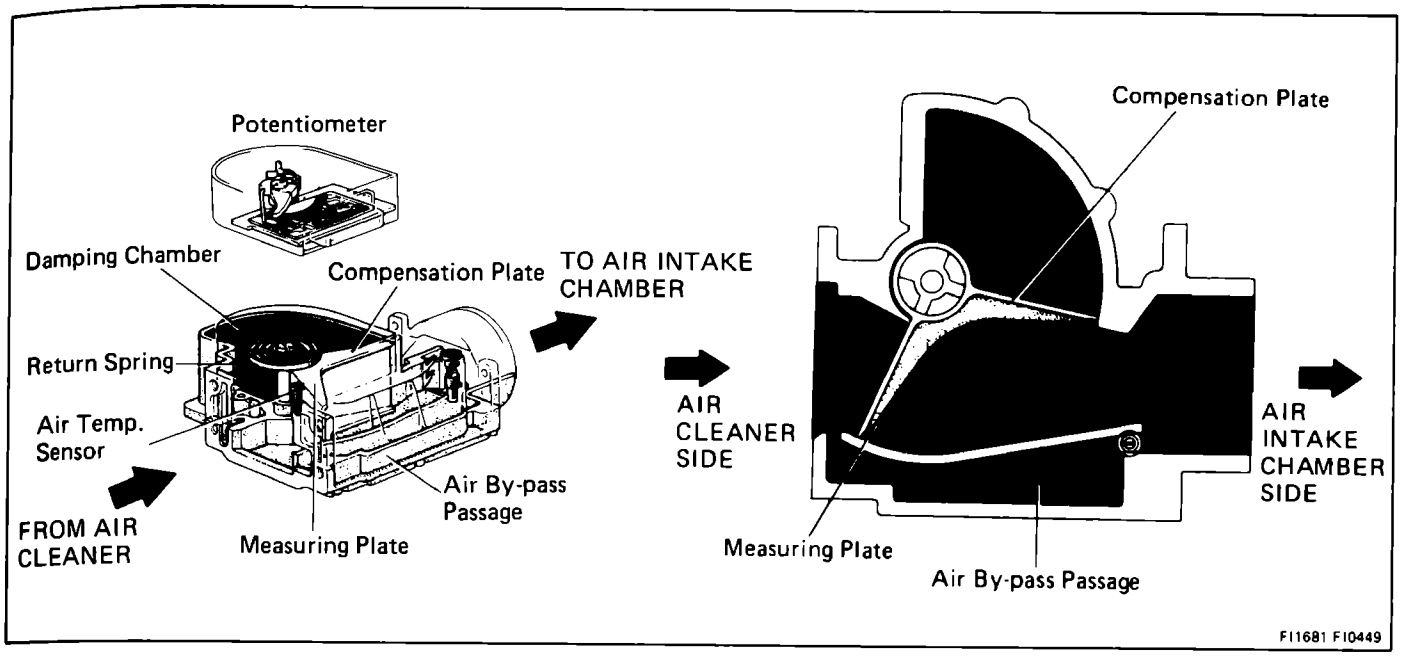
If a problem is found, repair or replace the parts as necessary.

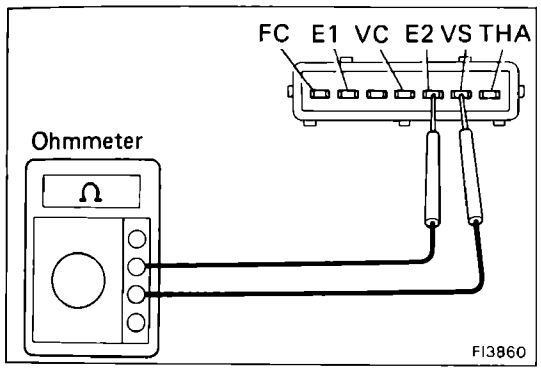


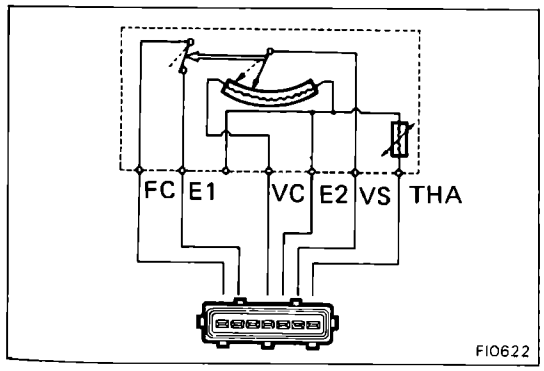


AIR INDUCTION SYSTEM

Air Flow Meter







ON-VEHICLE INSPECTION

INSPECT RESISTANCE OF AIR FLOW METER

(a) Disconnect the air flow meter connector.

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

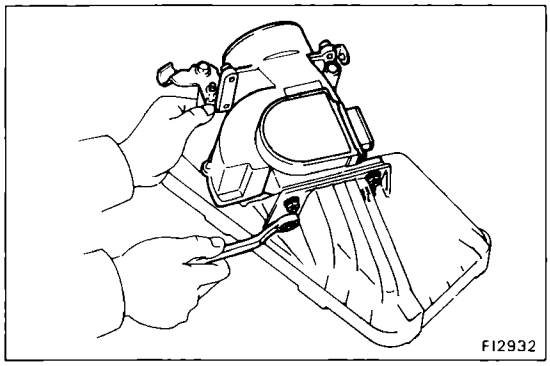
Between terminals	Resistance	Temperature
VS – E2	200 – 600 Ω	–
VC – E2	200 – 400 Ω	–
THA – E2	10 – 20 kΩ 4 – 7 kΩ 2 – 3 kΩ 0.9 – 1.3 kΩ 0.4 – 0.7 kΩ	–20°C (–4°F) 0°C (32°F) 20°C (68°F) 40°C ((104°F) 60°C (140°F)
FC – E1	Infinity	–

If the resistance is not as specified, replace the air flow meter.

(c) Reconnect the air flow meter connector.

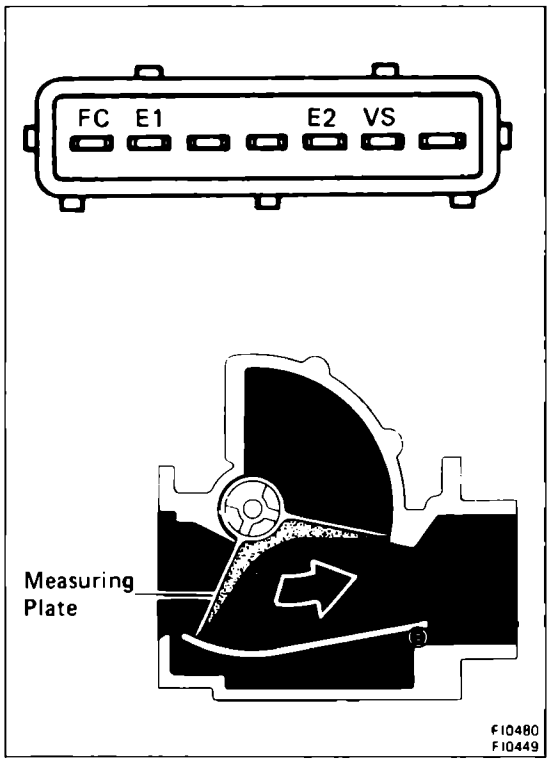
REMOVAL OF AIR FLOW METER

1. **DISCONNECT AIR FLOW METER CONNECTOR**
2. **DISCONNECT AIR CLEANER HOSE**
3. **REMOVE AIR CLEANER CAP AND AIR FLOW METER ASSEMBLY**



4. **REMOVE AIR FLOW METER FROM AIR CLEANER CAP**

Remove the bolt, four nuts and air flow meter and gasket.



INSPECTION OF AIR FLOW METER

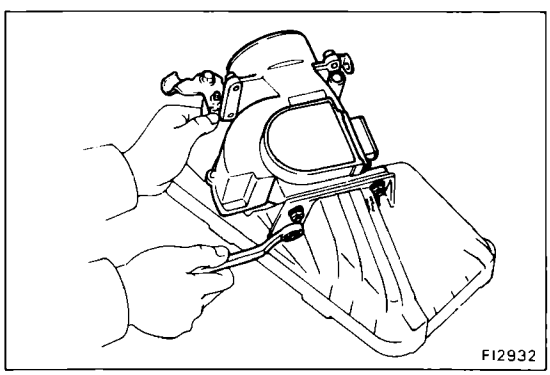
INSPECT RESISTANCE OF AIR FLOW METER

Using an ohmmeter, measure the resistance between each terminal by moving the measuring plate.

Between terminals	Resistance Ω	Measuring plate opening
E1 – FC	Infinity	Fully closed
	Zero	Other than closed
E2 – VS	200 – 600	Fully closed
	20 – 1,200	Fully open

NOTE: Resistance between terminals E2 and VS will change in a wave pattern as the measuring plate slowly opens.

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



INSTALLATION OF AIR FLOW METER

1. **INSTALL AIR FLOW METER TO AIR CLEANER CAP**

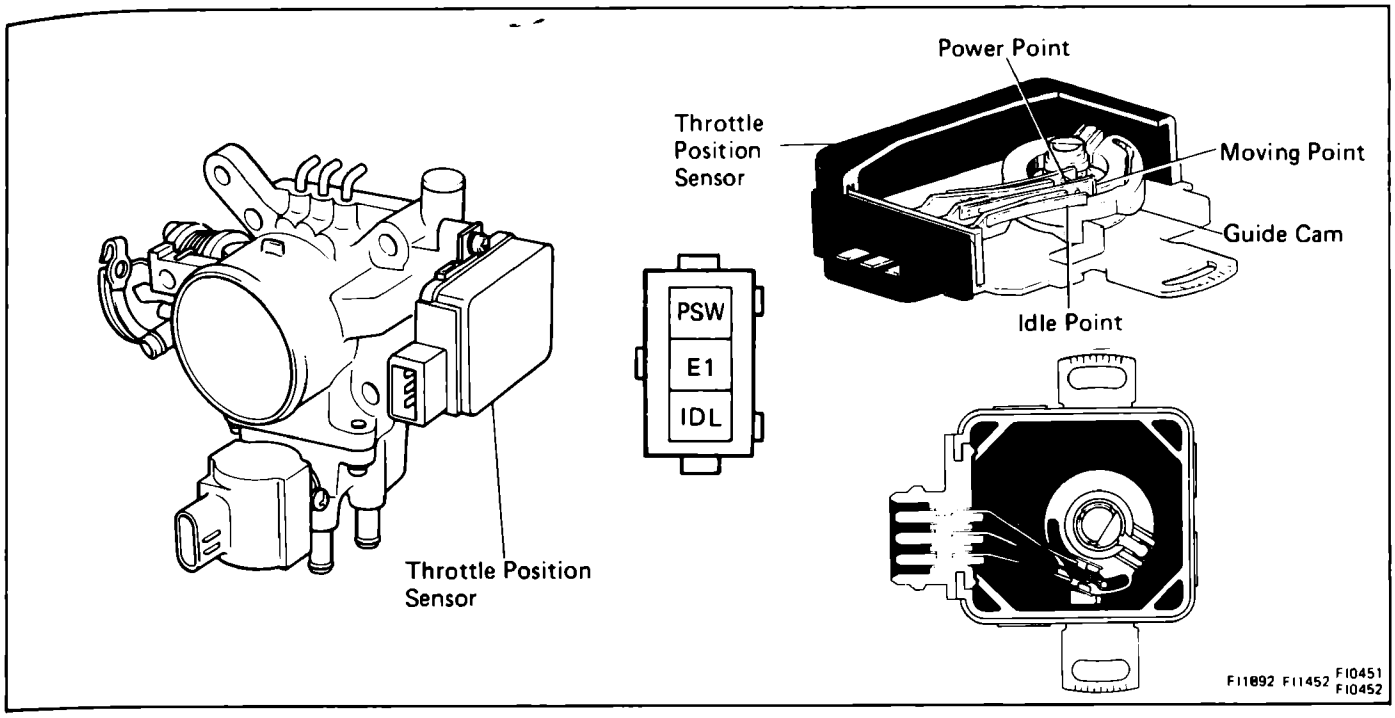
Install a new gasket and the air flow meter with the bolt and four nuts.

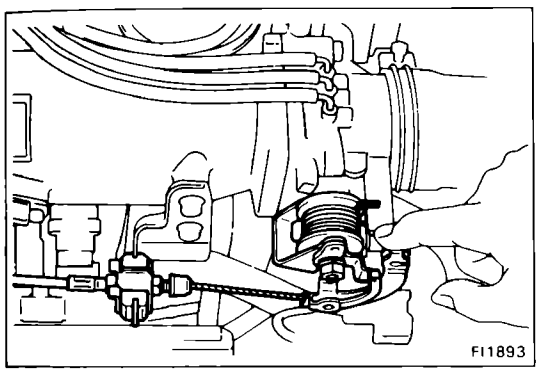
2. **INSTALL AIR CLEANER CAP AND AIR FLOW METER ASSEMBLY**

3. **CONNECT AIR CLEANER HOSE**

4. **CONNECT AIR AIR FLOW METER CONNECTOR**

Throttle Body (3S-FE)

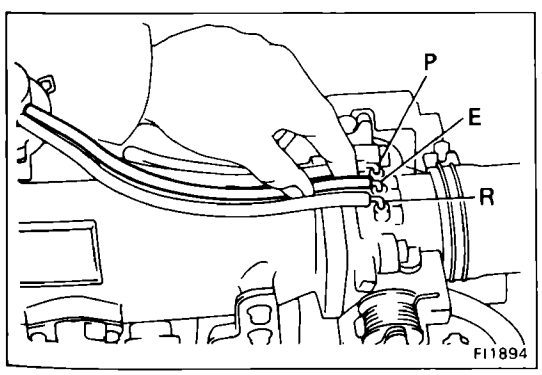




ON-VEHICLE INSPECTION

1. INSPECT THROTTLE BODY

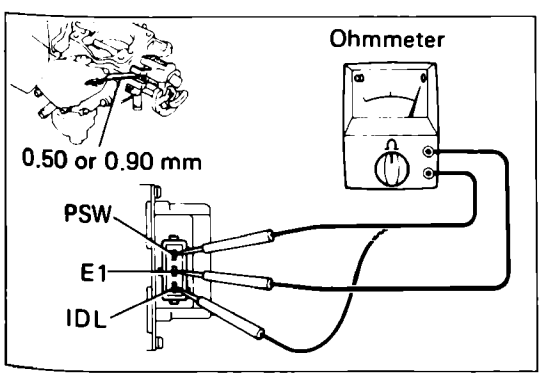
(a) Check that the throttle linkage moves smoothly.



(b) Check the vacuum at each port.

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

Port Name	At idling	Other than idling
P	No vacuum	Vacuum
E	No vacuum	Vacuum
R	No vacuum	Vacuum



2. INSPECT THROTTLE POSITION SENSOR

(a) Disconnect the sensor connector.

(b) Insert a feeler gauge between the throttle stop screw and stop lever.

(c) Using an ohmmeter, measure the resistance between each terminal.

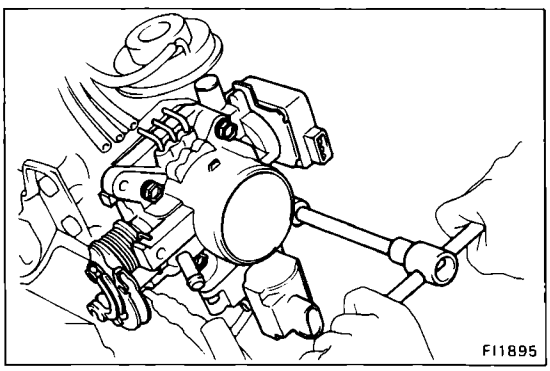
Clearance between lever and stop screw	Continuity between terminals	
	IDL – E1	PSW – E1
0.50 mm (0.020 in.)	Continuity	No continuity
0.90 mm (0.035 in.)	No continuity	No continuity
Throttle valve fully opened	No continuity	Continuity

(d) Reconnect the sensor connector.

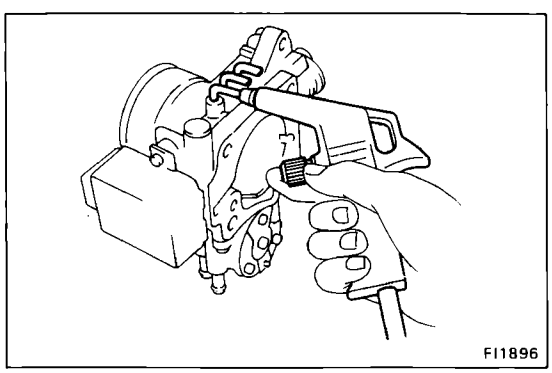
REMOVAL OF THROTTLE BODY

1. **DRAIN ENGINE COOLANT (See page CO-6)**
2. **(A/T)**
   DISCONNECT THROTTLE CABLE FROM THROTTLE LINKAGE
3. **DISCONNECT ACCELERATOR CABLE FROM THROTTLE LINKAGE**
4. **DISCONNECT AIR CLEANER HOSE**
5. **DISCONNECT THROTTLE POSITION SENSOR CONNECTOR**
6. **DISCONNECT ISC VALVE CONNECTOR**
7. **REMOVE THROTTLE BODY**
   (a) Disconnect the following hoses:
   - PCV hose
   - Water by-pass hoses
   - Air tube hose
   - Emission control vacuum hoses

   (b) Remove the four bolts, throttle body and gasket.


FI1895

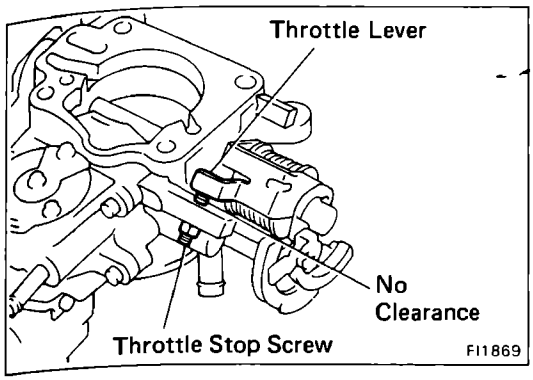
8. **IF NECESSARY, REMOVE ISC VALVE FROM THROTTLE BODY**
   (See step 2 on page FI-128)


FI1896

INSPECTION OF THROTTLE BODY

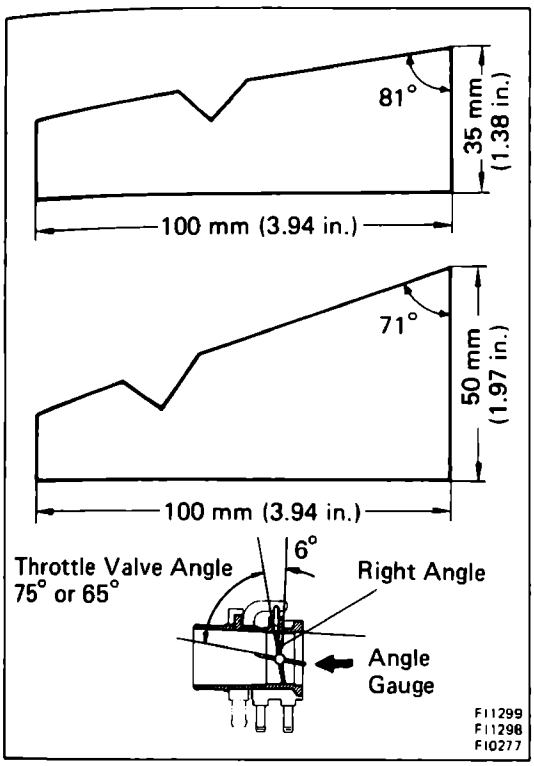
1. **CLEAN THROTTLE BODY**
   (a) Using a soft brush and carburetor cleaner, clean the cast parts.
   (b) Using compressed air, clean all the passages and apertures.

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



2. INSPECT THROTTLE VALVE

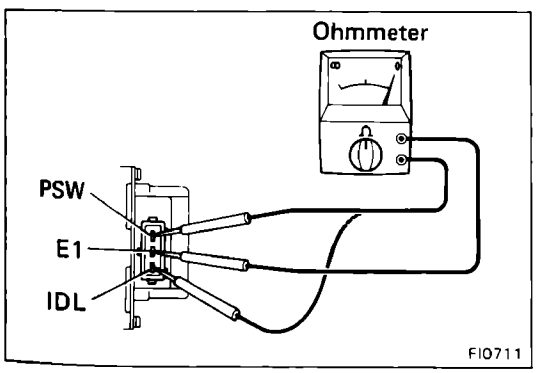
Check that there is no clearance between the throttle stop screw and throttle lever when the throttle valve is fully closed.



3. INSPECT THROTTLE POSITION SENSOR

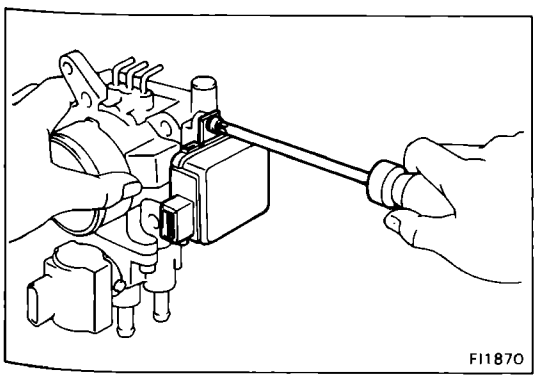
(a) Make an angle gauge as shown in the figure.

(b) Set the throttle valve opening to 81° or 71° from the vertical position (incl. throttle valve fully closed angle 6°).



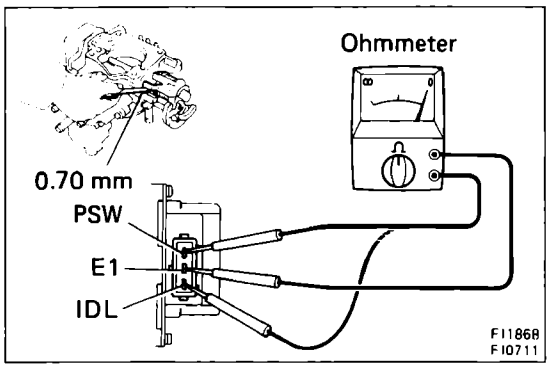
(c) Using an ohmmeter, check the continuity between each terminal.

Throttle valve opening angle	Continuity	
	IDL – E1	PSW – E1
71° from vertical	No continuity	No continuity
81° from vertical	No continuity	Continuity
Less than 7.5° from vertical	Continuity	No continuity



4. IF NECESSARY, ADJUST THROTTLE POSITION SENSOR

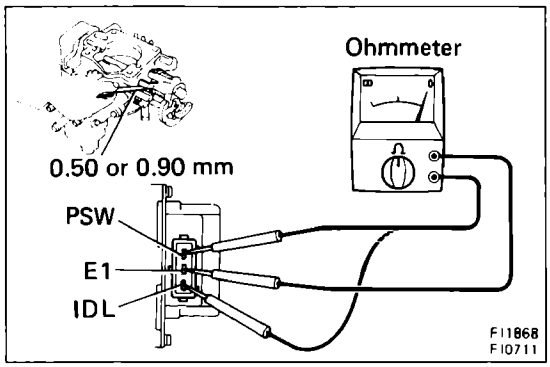
(a) Loosen the two set screws of the sensor.



(b) Insert a 0.70 mm (0.028 in.) feeler gauge, between the throttle stop screw and stop lever.

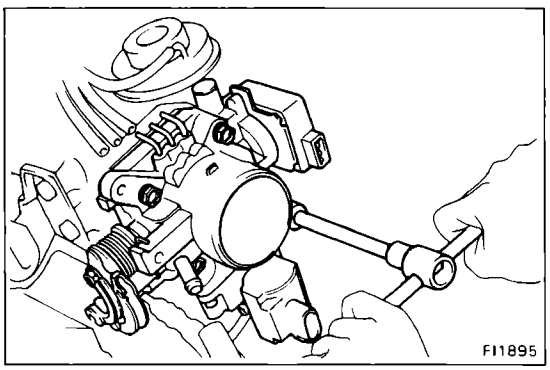
(c) Connect the test probe of an ohmmeter to the terminals IDL and E1 of the sensor.

(d) Gradually turn the sensor clockwise until the ohmmeter deflects, and secure it with the two set screws.



(e) Recheck the continuity between terminals IDL and E1.

Clearance between lever and stop screw	Continuity (IDL – E1)
0.50 mm (0.020 in.)	Continuity
0.90 mm (0.035 in.)	No continuity



INSTALLATION OF THROTTLE BODY

1. **INSTALL ISC VALVE TO THROTTLE BODY**
(See step 1 on page FI-128)

2. **INSTALL THROTTLE BODY**

(a) Install a new gasket and the throttle body with the four bolts.

Torque: 195 kg-cm (14 ft-lb, 19 N·m)

(b) Connect the following hoses:
- PCV hose
- Water by-pass hoses
- Air tube hose
- Emission control vacuum hoses

3. **CONNECT ISC VALVE CONNECTOR**

4. **CONNECT THROTTLE POSITION SENSOR CONNECTOR**

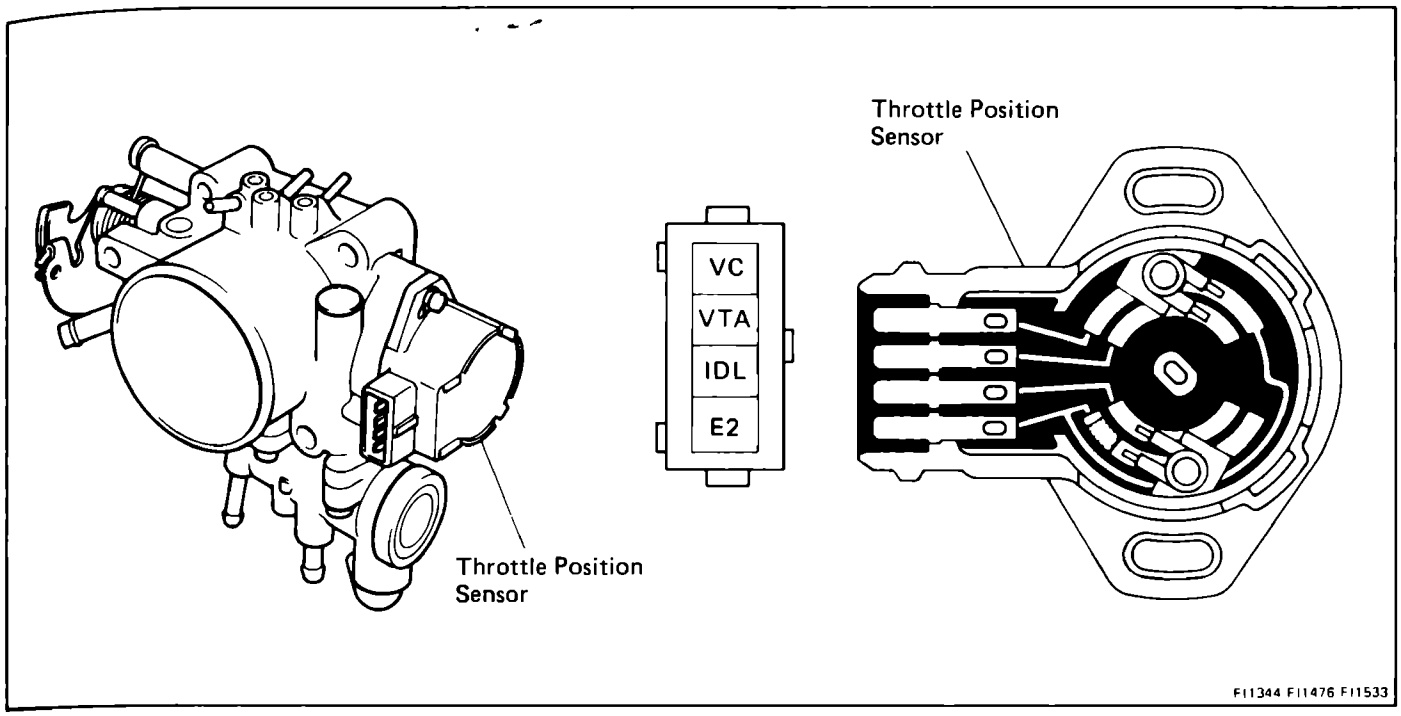
5. **CONNECT AIR CLEANER HOSE**

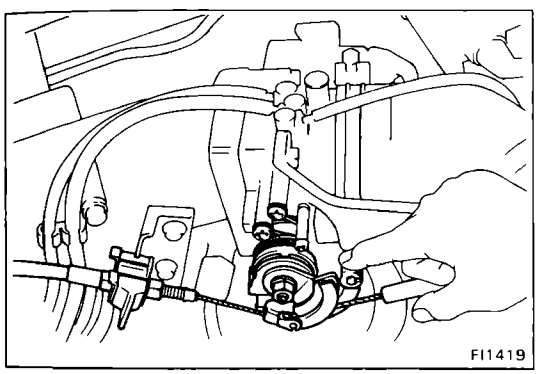
6. **CONNECT ACCELERATOR CABLE, AND ADJUST IT**

7. **(A/T)**
CONNECT THROTTLE CABLE, AND ADJUST IT

8. **FILL WITH ENGINE COOLANT (See page CO-6)**

Throttle Body (3S-GE)

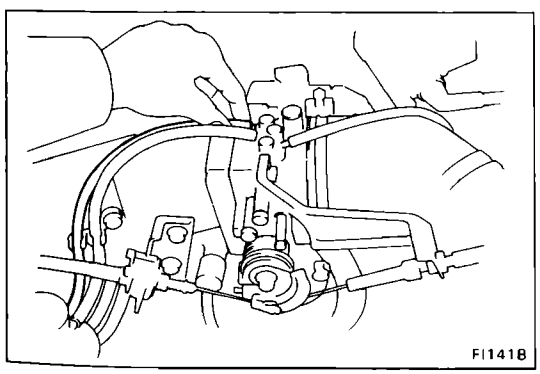




ON-VEHICLE INSPECTION

1. INSPECT THROTTLE BODY

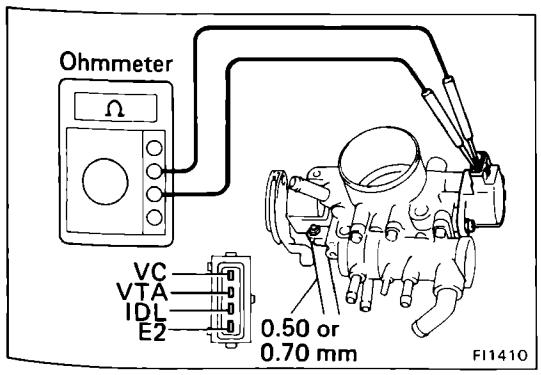
(a) Check that the throttle linkage moves smoothly.



(b) Check the vacuum at each port.

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

Port No.	At idling	Other than idling
E	No vacuum	Vacuum
P	No vacuum	Vacuum
R	No vacuum	No vacuum

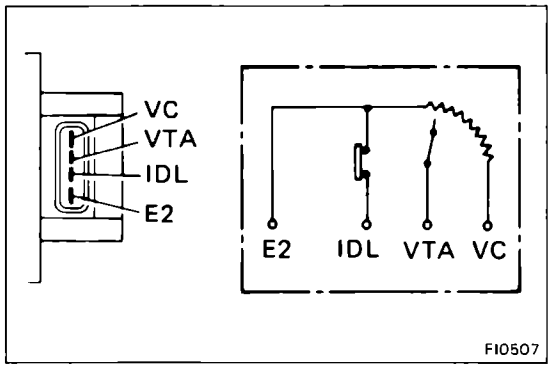


2. INSPECT THROTTLE POSITION SENSOR

(a) Disconnect the sensor connector.

(b) Insert a feeler gauge between the throttle stop screw and stop lever.

(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 – 0.8 kΩ
0.50 mm (0.020 in.)	IDL – E2	2.3 kΩ or less
0.70 mm (0.028 in.)	IDL – E2	Infinity
Throttle valve fully opened	VTA – E2	3.3 – 10 kΩ
–	VC – E2	3 – 7 kΩ

(d) Reconnect the sensor connector.

REMOVAL OF THROTTLE BODY

1. **DRAIN ENGINE COOLANT (See page CO-6)**

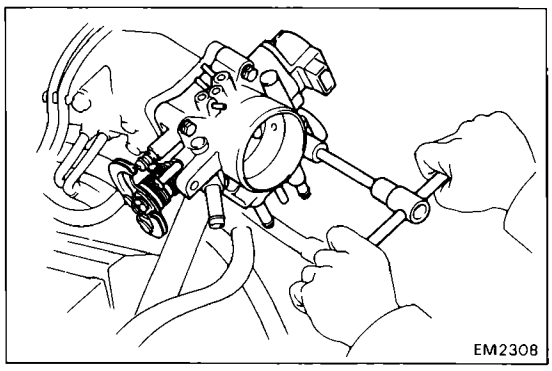
2. **(A/T)**
DISCONNECT THROTTLE CABLE FROM THROTTLE LINKAGE

3. **DISCONNECT ACCELERATOR CABLE FROM THROTTLE LINKAGE**

4. **REMOVE AIR CLEANER HOSE**

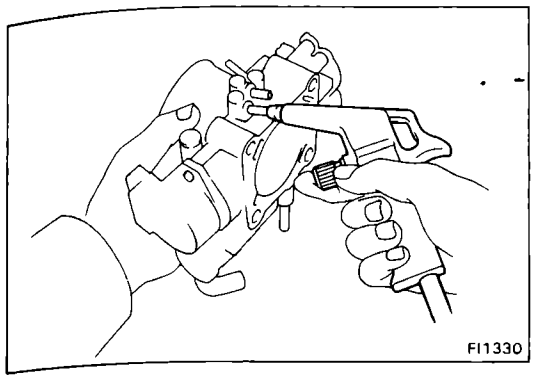
5. **DISCONNECT THROTTLE POSITION SENSOR CONNECTOR**

6. **REMOVE THROTTLE BODY**
   (a) Disconnect the following hoses:
   - PCV hose
   - Water by-pass hoses
   - Air tube hose
   - Emission control vacuum hoses



(c) Remove the four bolts, throttle body and gasket.

7. **IF NECESSARY, REMOVE AIR VALVE FROM THROTTLE BODY**
(See step 2 on page FI-131)



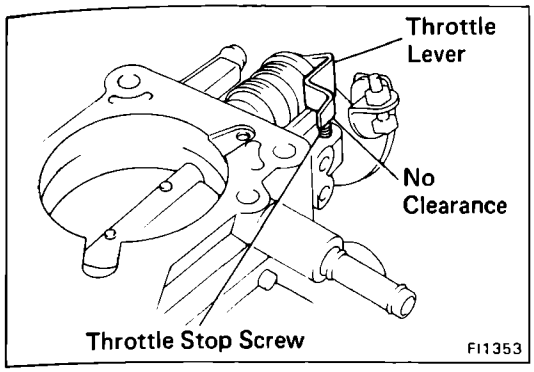
INSPECTION OF THROTTLE BODY

1. CLEAN THROTTLE BODY

(a) Using a soft brush and carburetor cleaner, clean the cast parts.

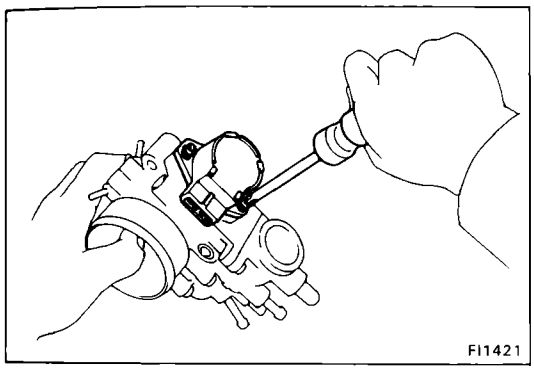
(b) Using compressed air, clean all the passages and apertures.

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



2. INSPECT THROTTLE VALVE

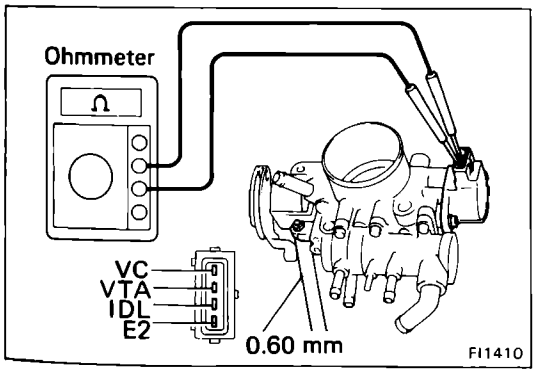
Check that there is no clearance between the throttle stop screw and throttle lever when the throttle valve is fully closed.



3. INSPECT THROTTLE POSITION SENSOR
(See step 2 on page FI-119)

4. IF NECESSARY, ADJUST THROTTLE POSITION SENSOR

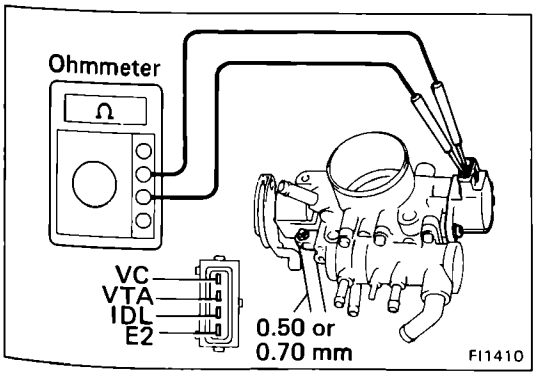
(a) Loosen the two set screws of the sensor.



(b) Insert a 0.60 mm (0.024 in.) feeler gauge, between the throttle stop screw and stop lever.

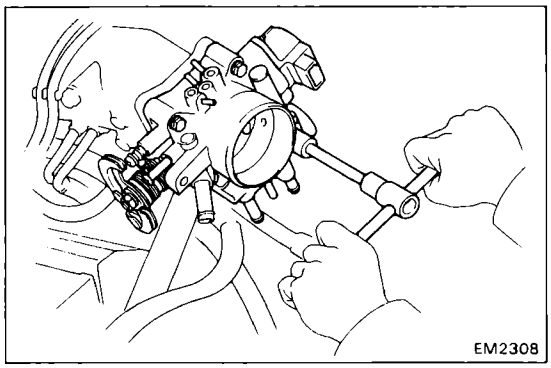
(c) Connect the test probe of an ohmmeter to the terminals IDL and E2 of the sensor.

(d) Gradually turn the sensor clockwise until the ohmmeter deflects, and secure it with the two set screws.



(e) 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 OF THROTTLE BODY

1. **INSTALL AIR VALVE TO THROTTLE BODY**
   (See step 1 on page FI-131)

2. **INSTALL THROTTLE BODY**
   (a) Install a new gasket and the throttle body with the four bolts.
   Torque: 195 kg-cm (14 ft-lb, 19 N·m)

   (b) Connect the following hoses:
   - PCV hose
   - Water by-pass hoses
   - Air tube hose
   - Emission control vacuum hoses

3. **CONNECT THROTTLE POSITION SENSOR CONNECTOR**

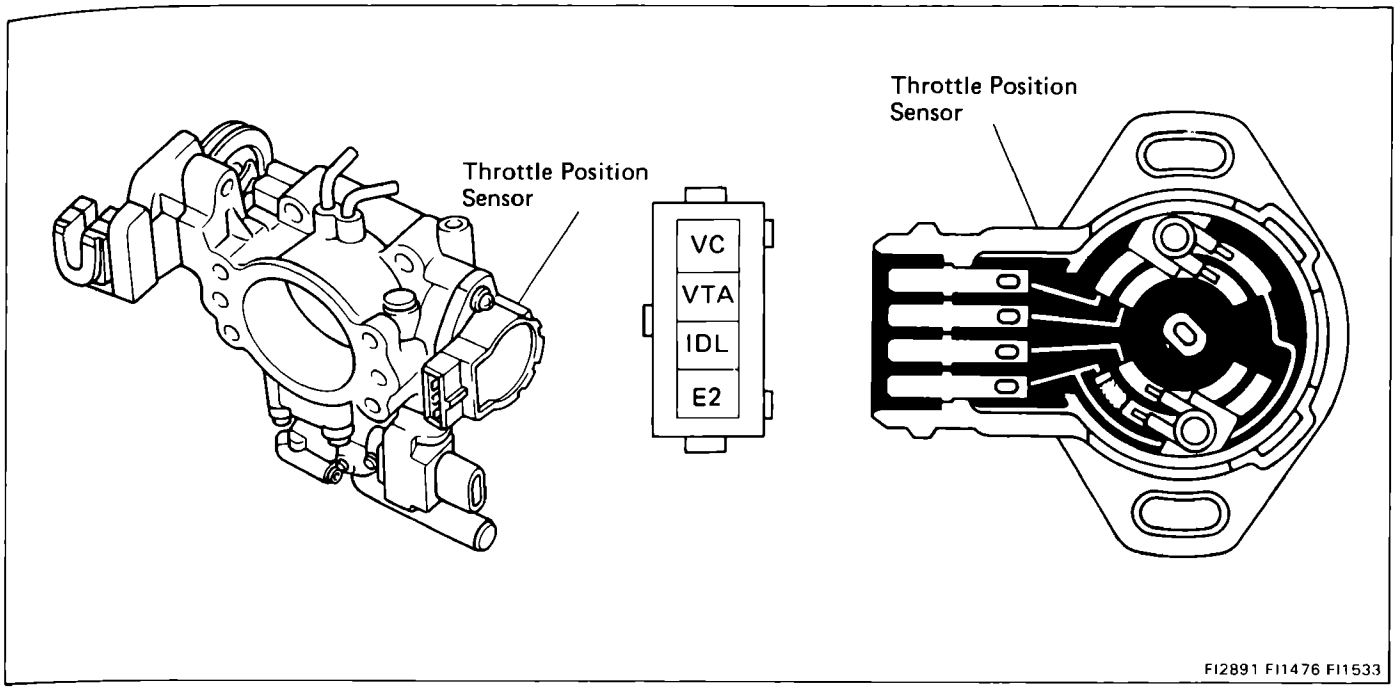
4. **INSTALL AIR CLEANER HOSE**

5. **CONNECT ACCELERATOR CABLE, AND ADJUST IT**

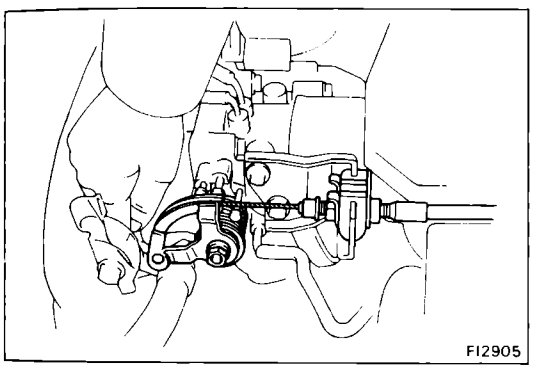
6. **(A/T)**
   CONNECT THROTTLE CABLE, AND ADJUST IT

7. **FILL WITH ENGINE COOLANT (See page CO-6)**

Throttle Body (3S-GTE)



FI2891 FI1476 FI1533

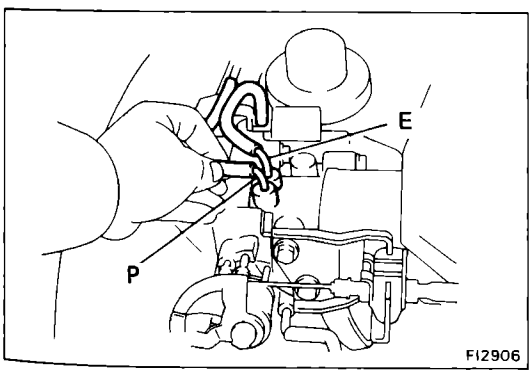


FI2905

ON-VEHICLE INSPECTION

1. INSPECT THROTTLE BODY

(a) Check that the throttle linkage moves smoothly.

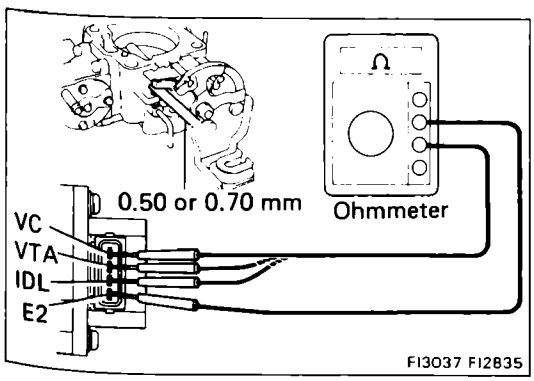


FI2906

(b) Check the vacuum at each port.

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

Port No.	At idling	Other than idling
E	No vacuum	Vacuum
P	No vacuum	Vacuum



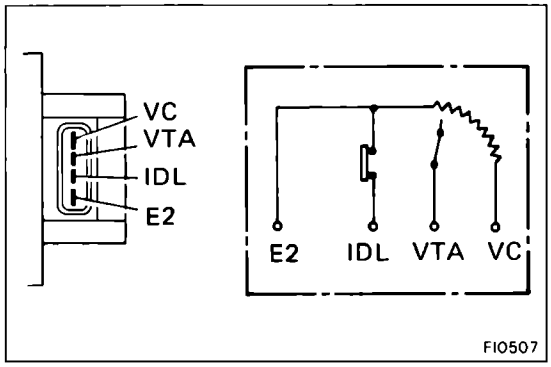
FI3037 FI2835

2. INSPECT THROTTLE POSITION SENSOR

(a) Disconnect the sensor connector.

(b) Insert a feeler gauge between the throttle stop screw and stop lever.

(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 – 0.8 kΩ
0.50 mm (0.020 in.)	IDL – E2	2.3 kΩ or less
0.70 mm (0.028 in.)	IDL – E2	Infinity
Throttle valve fully opened	VTA – E2	3.3 – 10.3 kΩ
–	VC – E2	3 – 8.3 kΩ

(d) Reconnect the sensor connector.

REMOVAL OF THROTTLE BODY

1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**

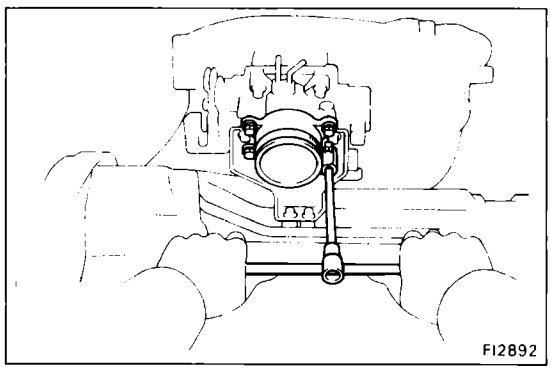
2. **DRAIN ENGINE COOLANT (See page CO-6)**

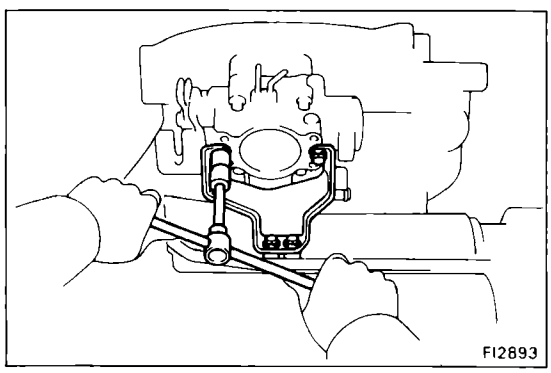
3. **DRAIN INTERCOOLER COOLANT (See page TC-7)**

4. **DISCONNECT ACCELERATOR CABLE FROM THROTTLE LINKAGE**

5. **REMOVE INTERCOOLER**
(See step 7 on page TC-10)

6. **REMOVE AIR CONNECTOR**
Remove the four bolts and air connector.





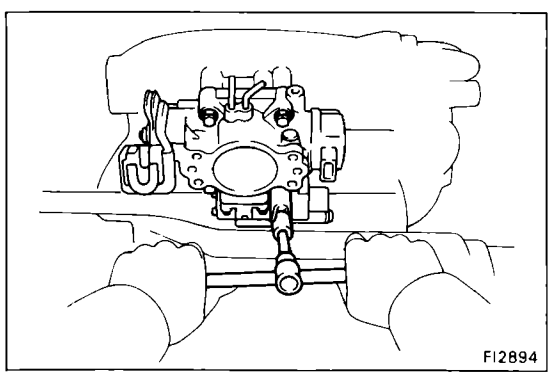
7. **REMOVE AIR CONNECTOR STAY**
Remove the four bolts, air connector stay and two spacers.

8. **DISCONNECT THROTTLE POSITION SENSOR CONNECTOR**

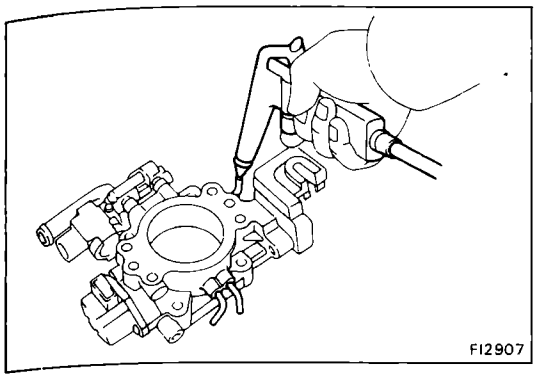
9. **DISCONNECT ISC VALVE CONNECTOR**

10. **REMOVE THROTTLE BODY**
(a) Remove the following hoses:
- Water hoses
- Air hose
- Emission control vacuum hoses

(b) Remove the four bolts, throttle body and gasket.



11. **IF NECESSARY, REMOVE ISC VALVE FROM THROTTLE BODY**
(See step 2 on page FI-130)


FI2907

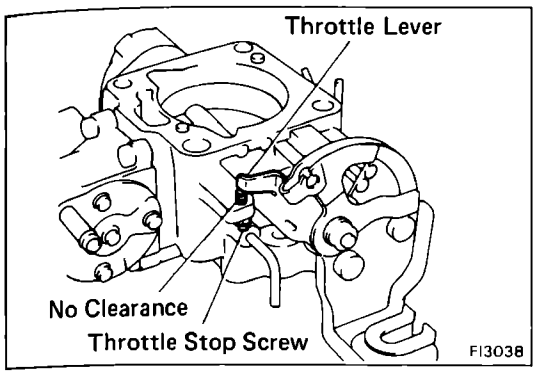
INSPECTION OF THROTTLE BODY

1. CLEAN THROTTLE BODY

(a) Using a soft brush and carburetor cleaner, clean the cast parts.

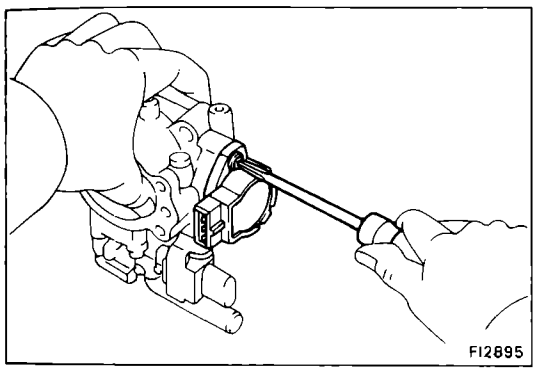
(b) Using compressed air, clean all the passages and apertures.

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



2. INSPECT THROTTLE VALVE

Check that there is no clearance between the throttle stop screw and throttle lever when the throttle valve is fully closed.

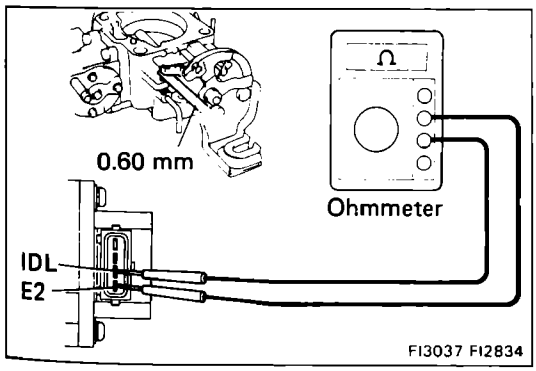

FI2895

3. INSPECT THROTTLE POSITION SENSOR

(See step 2 on page FI-123)

4. IF NECESSARY, ADJUST THROTTLE POSITION SENSOR

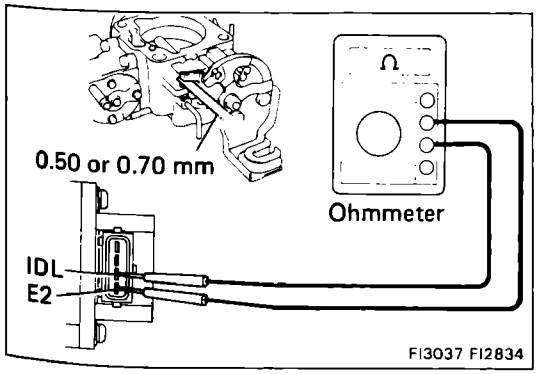
(a) Loosen the two mount screws of the sensor.



(b) Insert a feeler gauge 0.60 mm (0.024 in.) between the throttle stop screw and throttle lever.

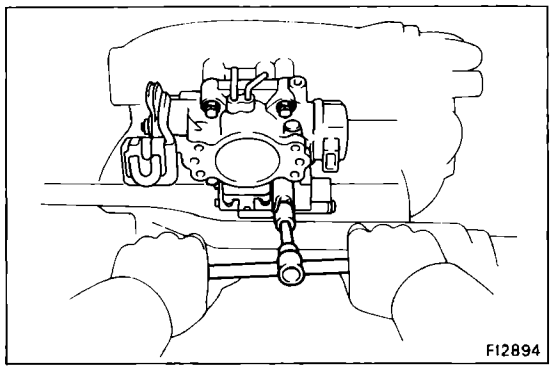
(c) Connect the test probe of an ohmmeter to the terminals IDL and E2 of the sensor.

(d) Gradually turn the sensor clockwise until the ohmmeter deflects, and secure it with the screws.



(e) Recheck the continuity between terminals IDL and E2.

Clearance between lever and stop screw	Continuity (IDL – E2)
0.50 mm (0.020 in.)	Continuity (2.3 kΩ or less)
0.70 mm (0.028 in.)	No continuity



INSTALLATION OF THROTTLE BODY

1. **INSTALL ISC VALVE TO THROTTLE BODY**
   (See step 1 on page FI-130)

2. **INSTALL THROTTLE BODY**

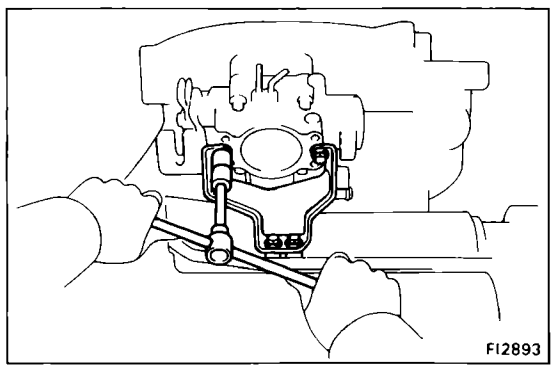
   (a) Install a new gasket and the throttle body with the four bolts.

   Torque: 195 kg-cm (14 ft-lb, 19 N·m)

   (b) Connect the following hoses:
   - Water hoses
   - Air tube hose
   - Emission control vacuum hoses

3. **CONNECT ISC VALVE CONNECTOR**

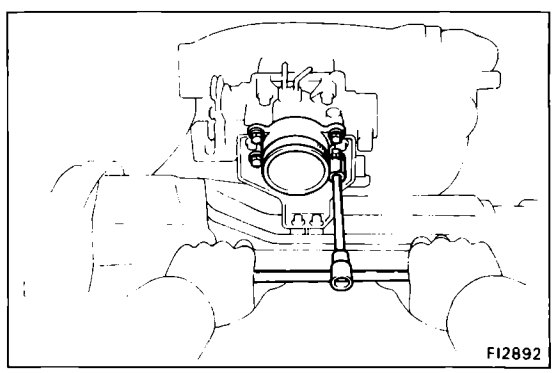
4. **CONNECT THROTTLE POSITION SENSOR CONNECTOR**



5. **INSTALL AIR CONNECTOR STAY**

   Install the air connector stay with the two spacers and four bolts.

   Torque:
   10 mm head bolt 80 kg-cm (69 ft-lb, 7.8 N·m)
   12 mm head bolt 195 kg-cm (14 ft-lb, 19 N·m)



6. **INSTALL AIR CONNECTOR**

   Install the air connector with the four bolts.

   Torque: 195 kg-cm (14 ft-lb, 19 N·m)

7. **INSTALL INTERCOOLER**
   (See step 11 on page TC-14)

8. **CONNECT ACCELERATOR CABLE, AND ADJUST IT**

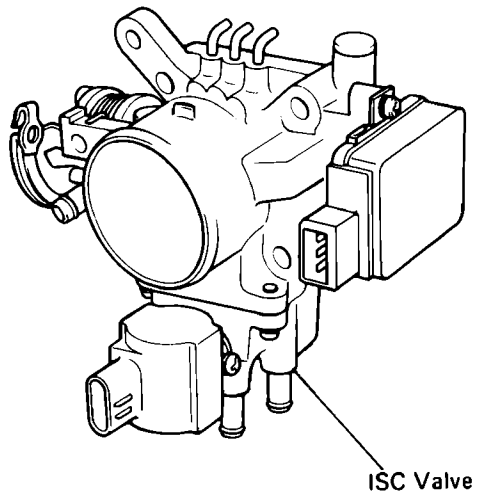
9. **CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY**

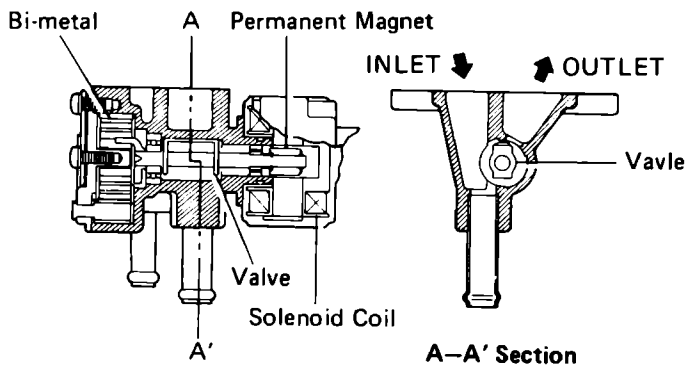
10. **FILL ENGINE WITH COOLANT (See page CO-6)**

11. **FILL INTERCOOLER WITH COOLANT (See page TC-7)**

12. **CHECK FOR FUEL LEAKAGE (See page FI-10)**

Idle Speed Control (ISC) Valve (3S-FE)





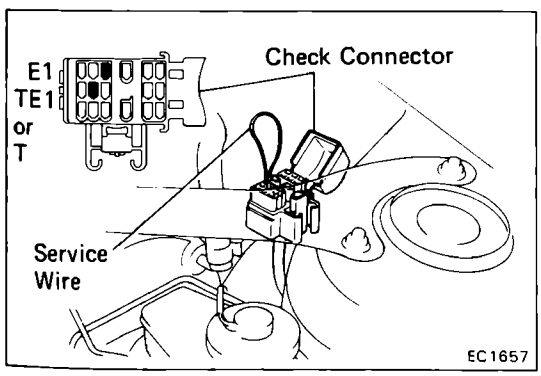
FI1892 FI1860

ON-VEHICLE INSPECTION

1. INSPECT ISC VALVE OPERATION

(a) Initial conditions:

- Engine at nornal operating temperature
- Idle speed set correctly
- Transmission in N range

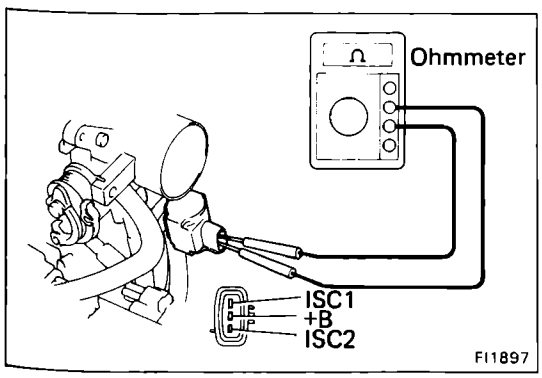


(b) Using a service wire, connect terminals TE1 (CALIF.) or T (others) and E1 of the check connector.

(c) After engine rpm are kept at 1,000 — 1,300 rpm for 5 seconds, check that they return to idle speed.

If the rpm operation is not as specified, check the ISC valve, wiring and ECU.

(d) Remove the service wire.



2. INSPECT ISC VALVE RESISTANCE

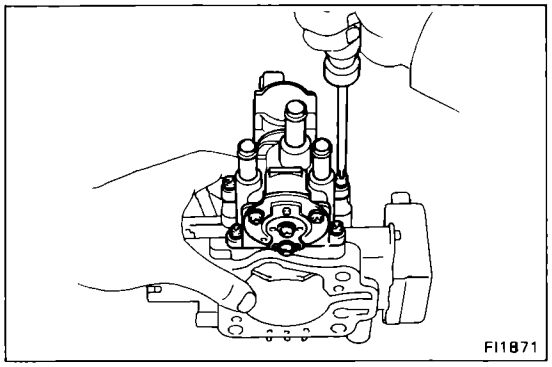
(a) Disconnect the ISC valve connector.

(b) Using an ohmmeter, measure the resistance between terminal +B and other terminals (ISC1, ISC2).

Resistance: 16.0 — 17.0 Ω

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

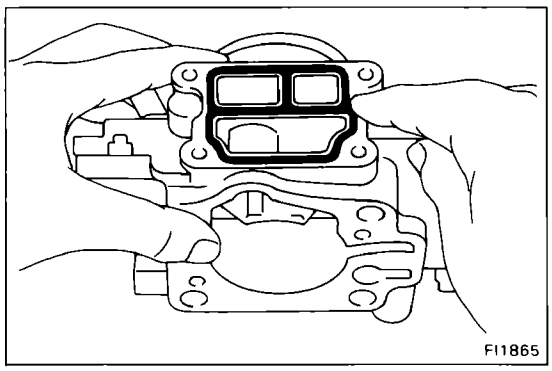
(c) Reconnect the ISC valve connector.



REMOVAL OF ISC VALVE

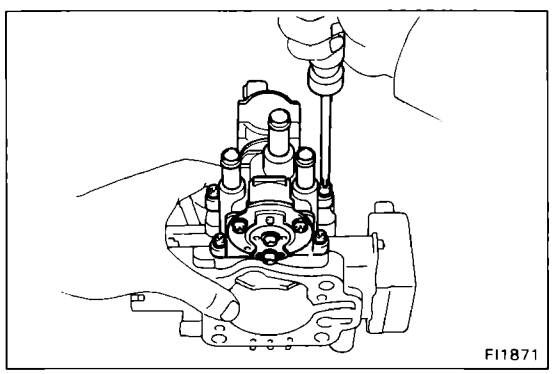
1. **REMOVE THROTTLE BODY**
   (See steps 1 to 7 on page FI-116)

2. **REMOVE ISC VALVE**
   Remove the four screws, ISC valve and gasket.



INSTALLATION OF ISC VALVE

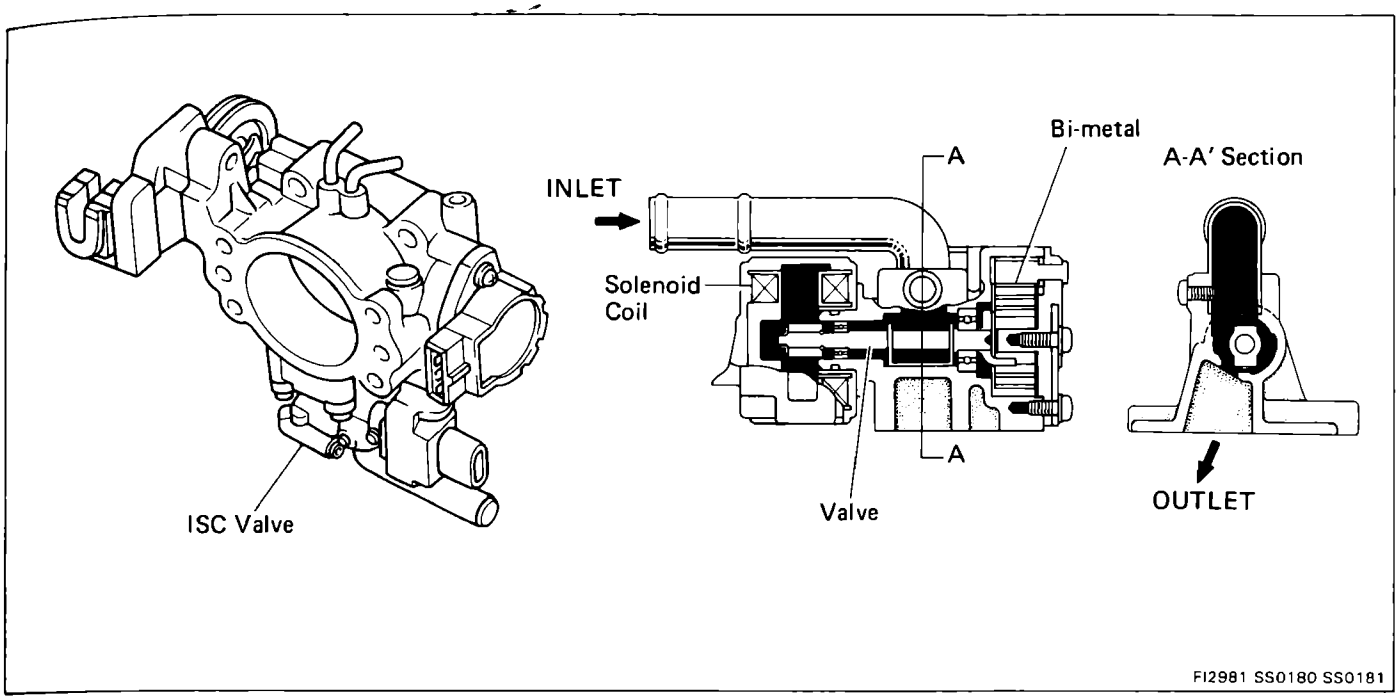
1. **INSTALL ISC VALVE**
   (a) Place a new gasket on the throttle body.



   (b) Install the ISC valve with the four screws.

2. **INSTALL THROTTLE BODY**
   (See steps 2 to 8 on page FI-118)

Idle Speed Control (ISC) Valve (3S-GTE)

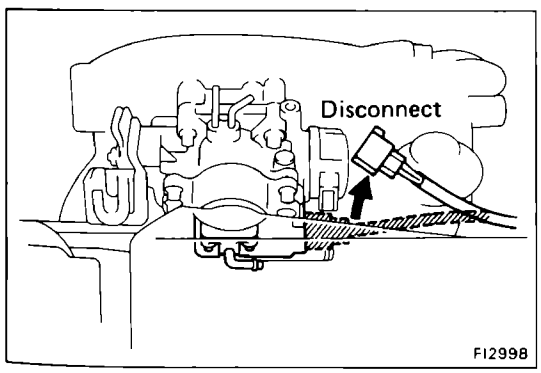


ON-VEHICLE INSPECTION

1. INSPECT ISC VALVE OPERATION

(a) Initial conditions:

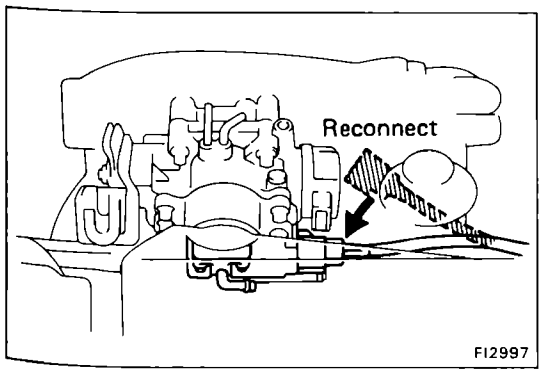
- Engine at reach normal operating temperature
- Idle speed set correctly
- Transmission in N range



(b) Disconnect the ISC valve connector.

(c) Check the engine rpm.

Engine rpm: 1,000 rpm or more

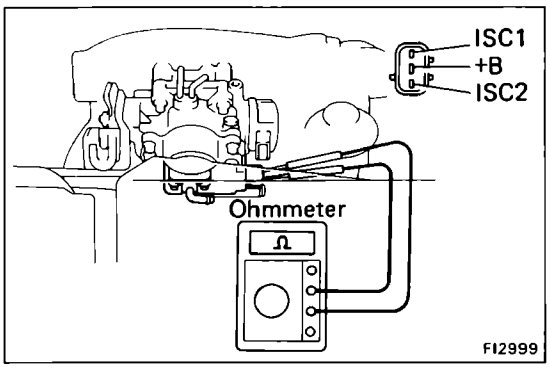


(d) Reconnect the ISC valve connector.

(e) Check that they return to the idle speed.

Idle speed: 750 ± 50 rpm

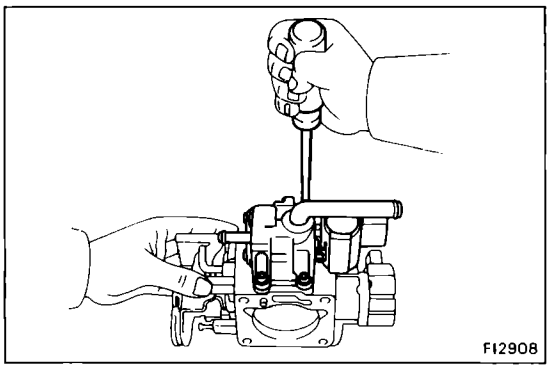
If the rpm operation is not as specified, check the ISC valve, wiring and ECU.



2. **INSPECT ISC VALVE RESISTANCE**
   (a) Disconnect the ISC valve connector.
   (b) Measure the resistance between the terminal +B and other terminals (ISC1, ISC2)

   Resistance: 16.0 – 17.0 Ω

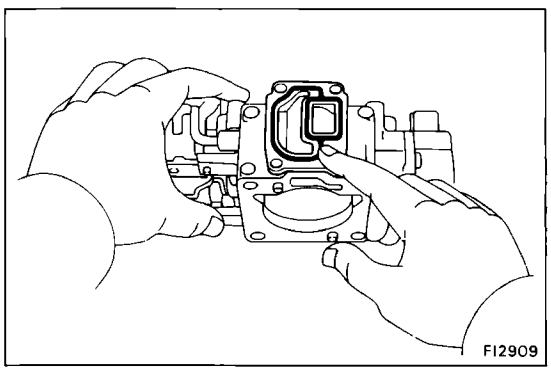
   If the resistance is not as specified, replace the valve.
   (c) Reconnect the ISC valve connector.



REMOVAL OF ISC VALVE

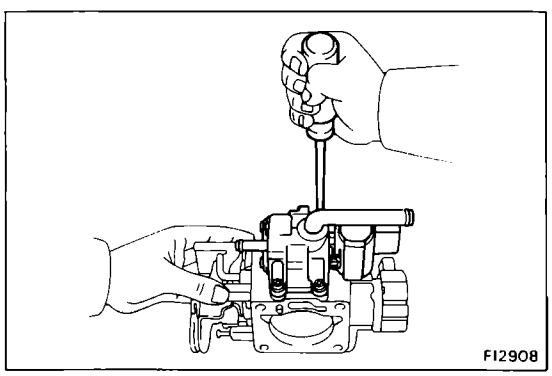
1. **REMOVE THROTTLE BODY**
   (See steps 1 to 10 on page FI-124)

2. **REMOVE ISC VALVE FROM THROTTLE BODY**
   Remove the four screws, ISC valve and gasket.



INSTALLATION OF ISC VALVE

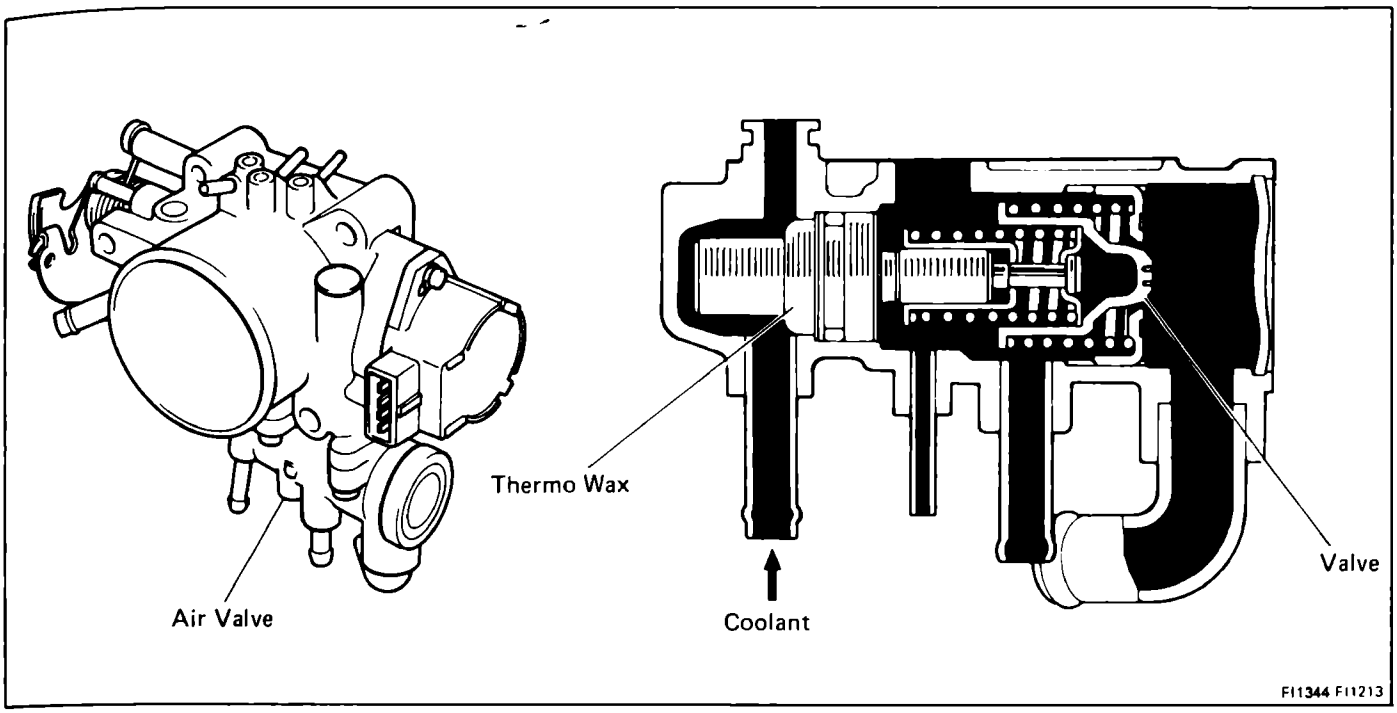
1. **INSTALL ISC VALVE TO THROTTLE BODY**
   (a) Place a new gasket on the throttle body.

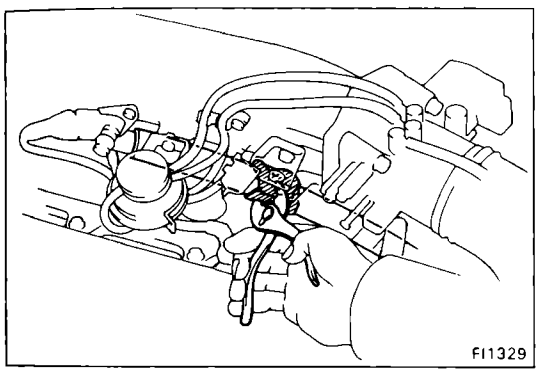


   (b) Install the ISC valve with the four screws.

2. **INSTALL THROTTLE BODY**
   (See steps 2 to 12 on page FI-126)

Air Valve (3S-GE)





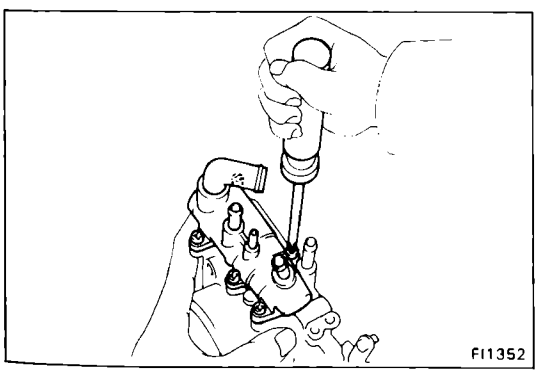
ON-VEHICLE INSPECTION

INSPECT AIR VALVE OPERATION

Check the engine RPM while pinching the air hose.

At low temp. (Coolant temp.: below 80°C (176°F))
- When the idle speed adjusting screw is in, the engine RPM should drop.

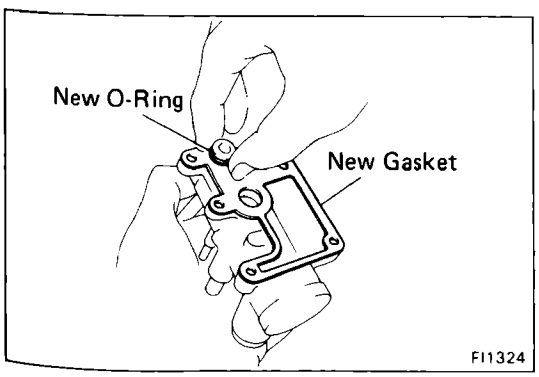
After warm up
- When the hose is pinched, engine RPM should not drop more than 100 rpm.



REMOVAL OF AIR VALVE

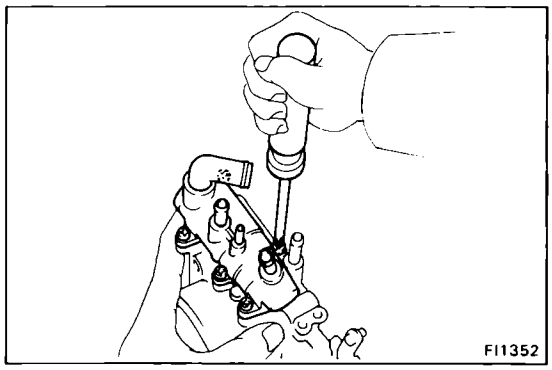
1. **REMOVE THROTTLE BODY**
   (See steps 1 to 6 on page FI-120)

2. **REMOVE AIR VALVE**
   Remove the five screws, air valve, gasket and O-ring.



INSTALLATION OF AIR VALVE

1. **INSTALL AIR VALVE**
   (a) Place a new gasket and O-ring on the throttle body.



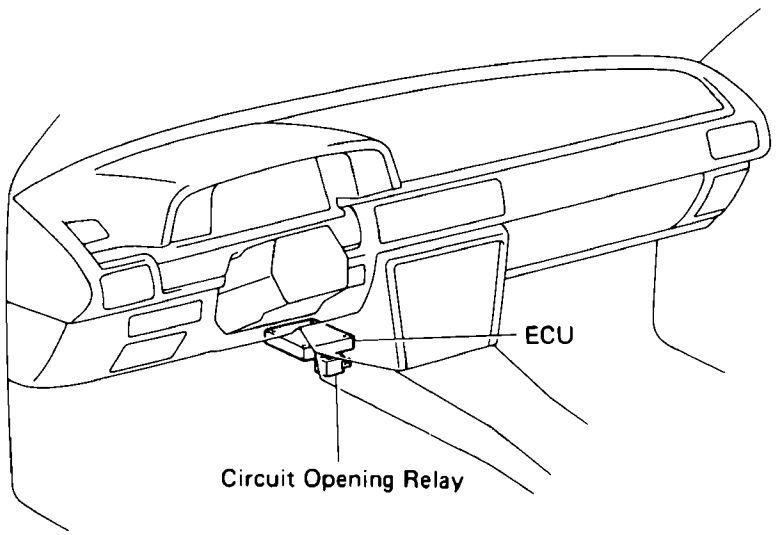
(b) Install the air valve with the five screws.

2. **INSTALL THROTTLE BODY**
(See steps 2 to 7 on page FI-122)

ELECTRONIC CONTROL SYSTEM

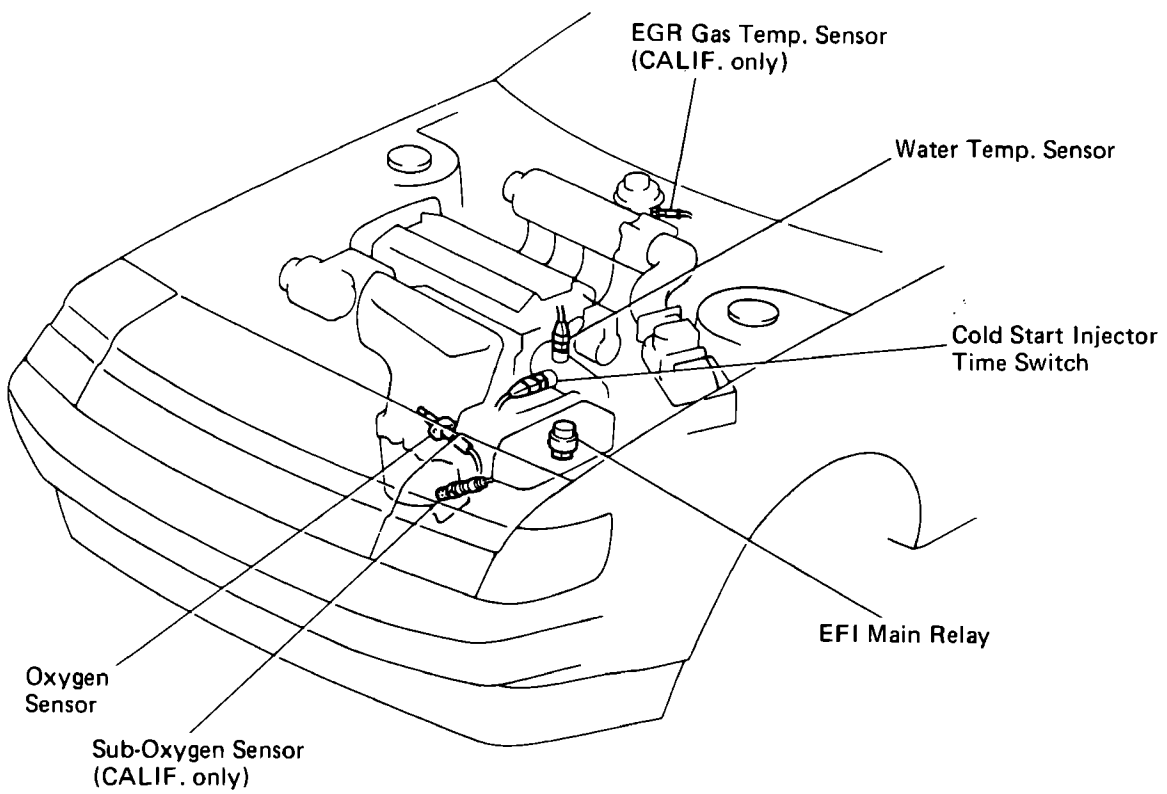
Location of Electronic Control Parts

3S-FE, 3S-GE and 3S-GTE
(ECU and Circuit Opening Relay)



FI1969

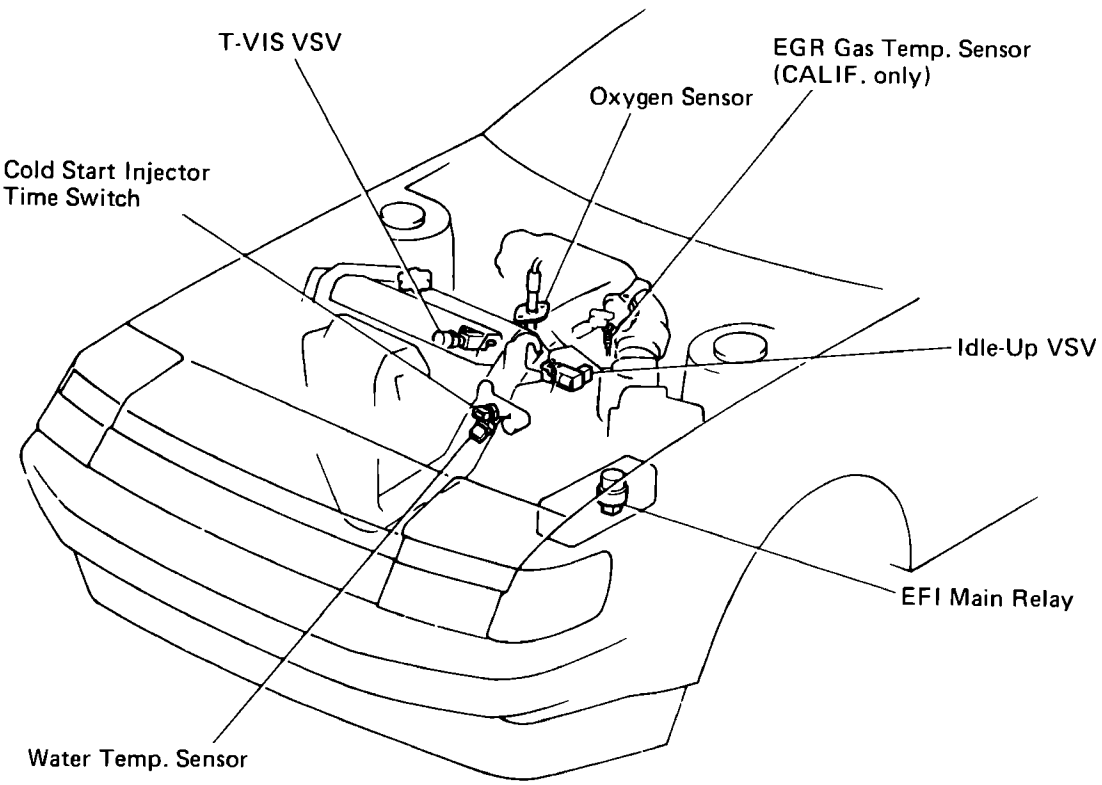
3S-FE
(Other Control Parts)



FI3862

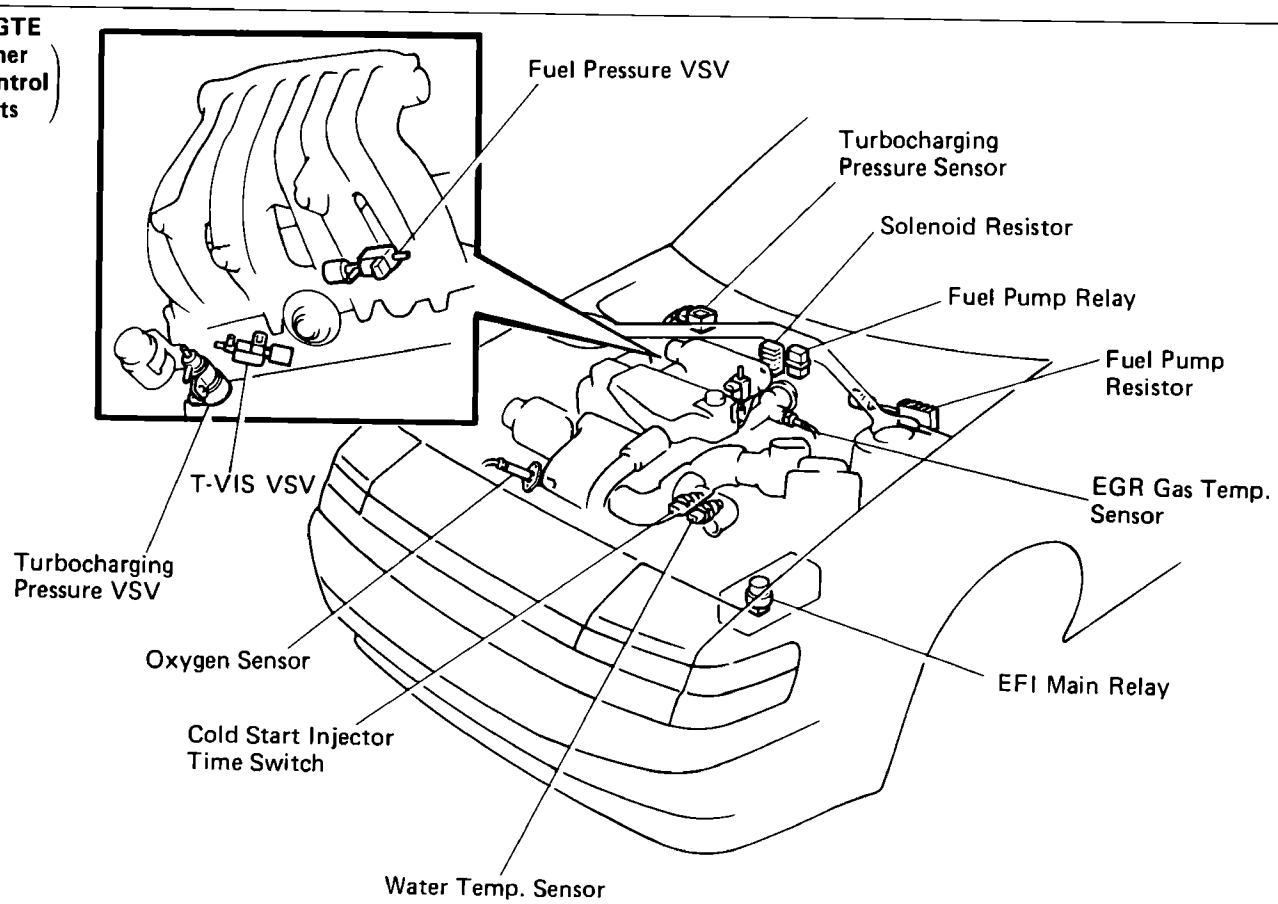
Location of Electronic Control Parts (Cont'd)

3S-GE
(Other Control Parts)



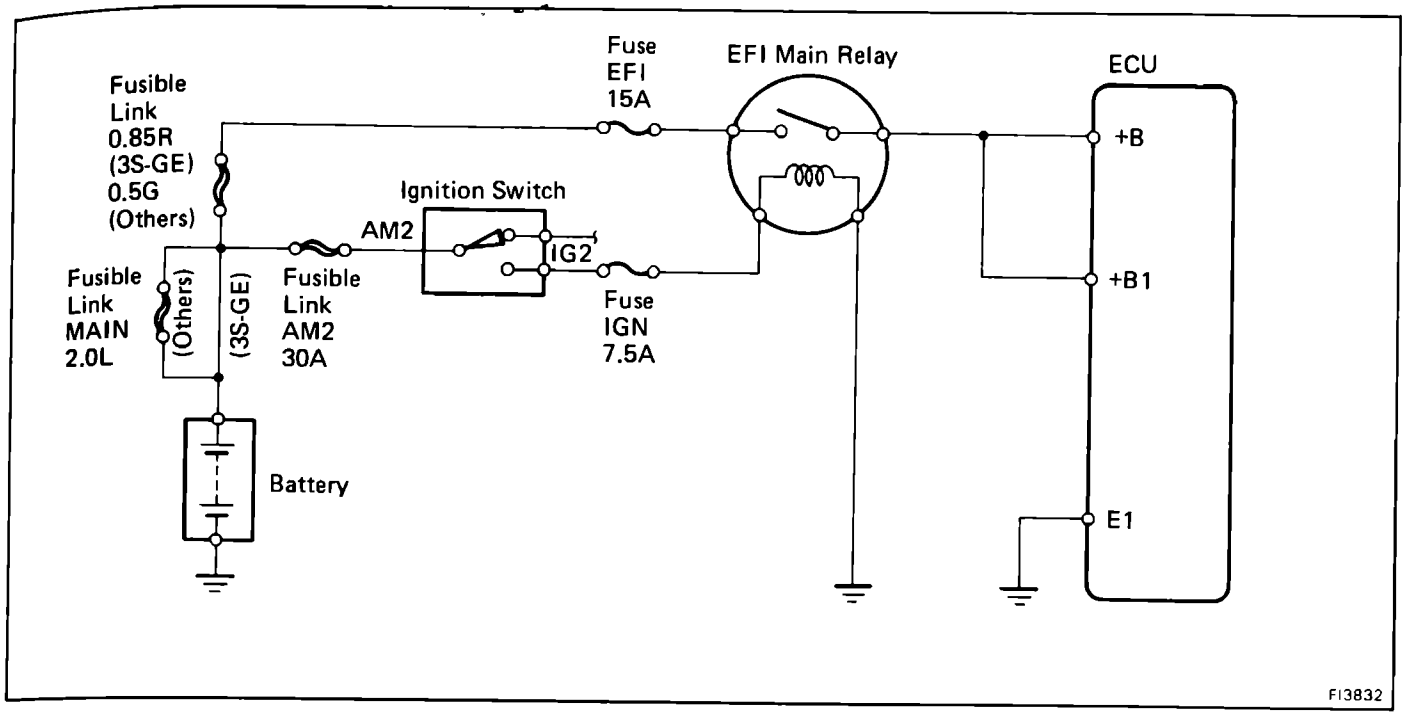
FI3861

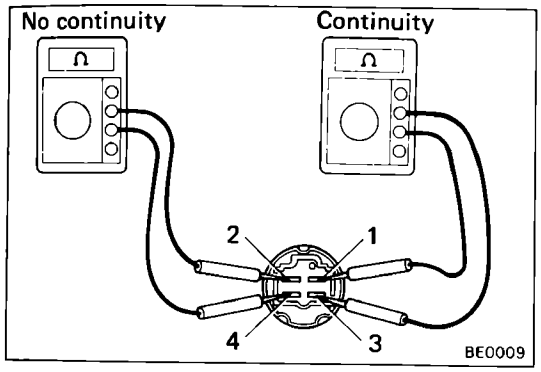
3S-GTE (Other Control Parts)

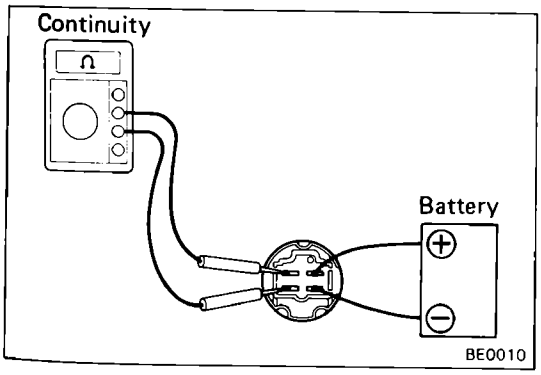


FI3000

EFI Main Relay







INSPECTION OF EFI MAIN RELAY

1. INSPECT RELAY CONTINUITY

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

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

If continuity is not as specified, replace the relay.

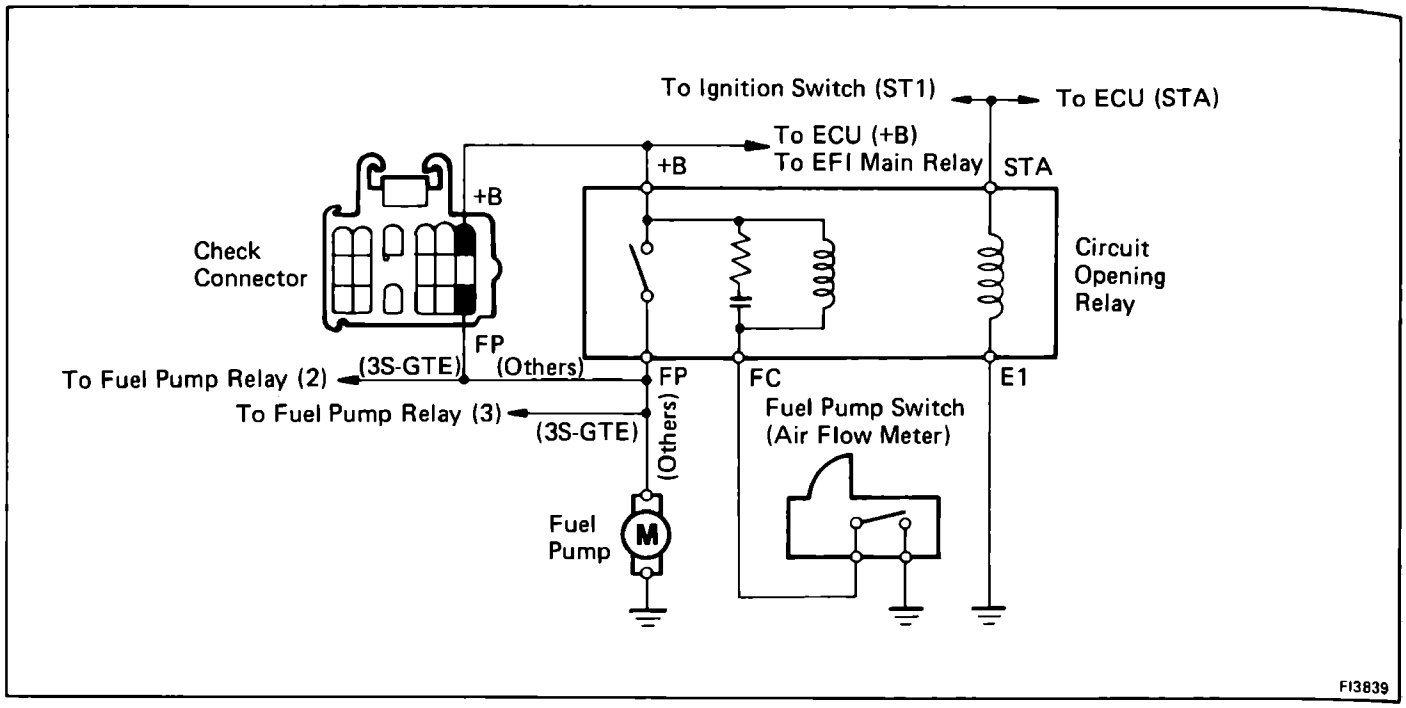
2. INSPECT RELAY OPERATION

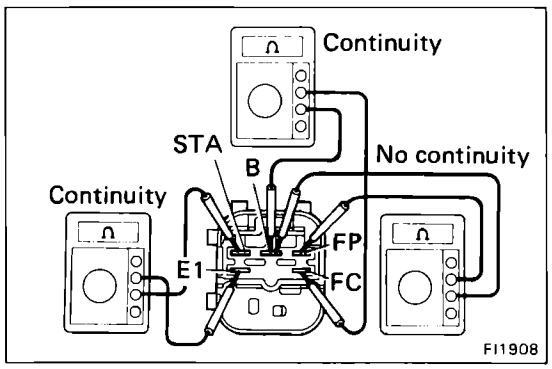
(a) Apply battery voltage across terminals 1 and 3.

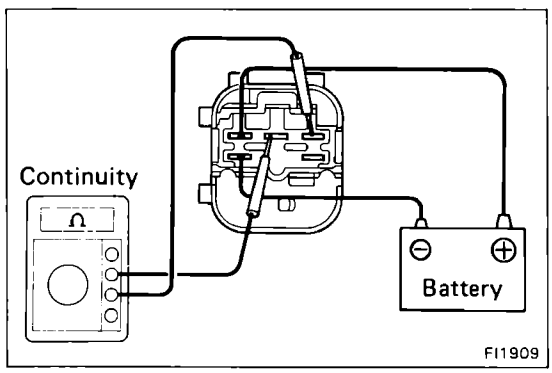
(b) Using an ohmmeter, check that there is continuity between terminals 2 and 4.

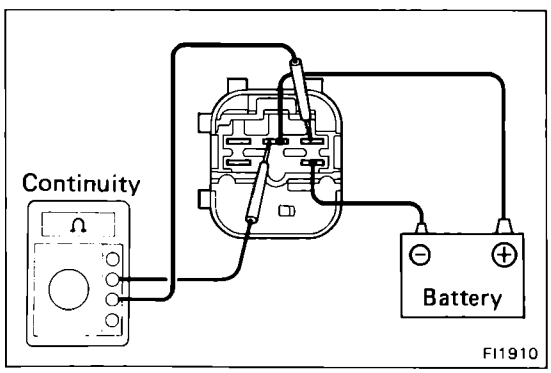
If operation is not as specified, replace the relay.

Circuit Opening Relay









INSPECTION OF CIRCUIT OPENING RELAY

1. INSPECT RELAY CONTINUITY

(a) Using an ohmmeter, check that there is continuity between terminals STA and E1.

(b) Check that there is continuity between terminals B and FC.

(c) Check that there is no continuity between terminals B and FP.

If continuity is not as specified, replace the relay.

2. INSPECT RELAY OPERATION

(a) Apply battery voltage across terminals STA and E1.

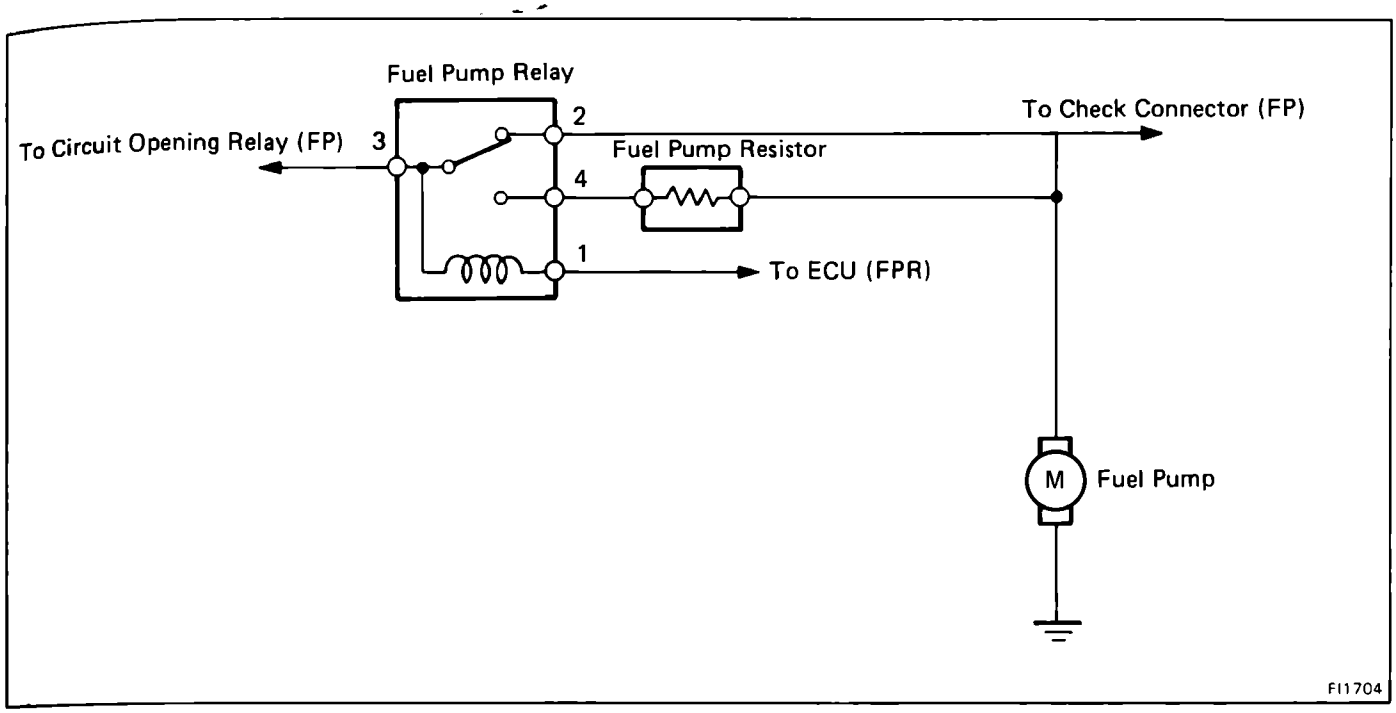
(b) Using an ohmmeter, check that there is continuity between terminals B and FP.

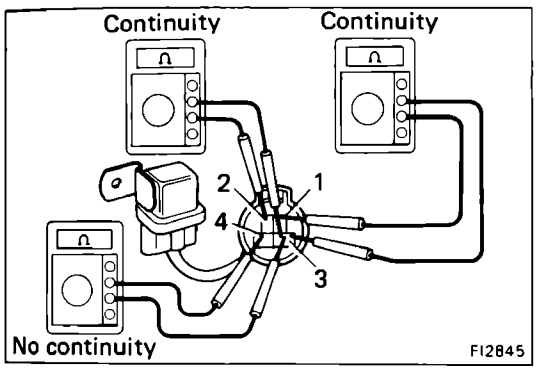
(c) Apply battery voltage across terminals B and FC.

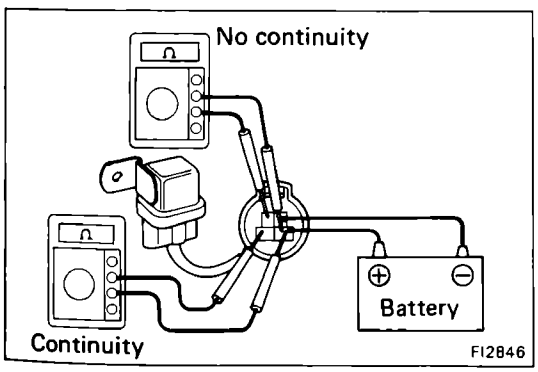
(d) Check that there is continuity between terminals B and FP.

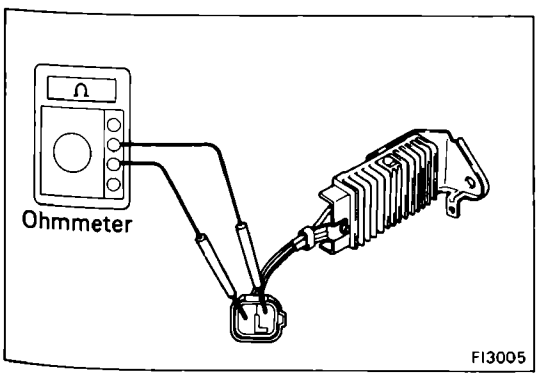
If operation is not as specified, replace the relay.

Fuel Pump Relay and Resistor (3S-GTE)









INSPECTION OF FUEL PUMP RELAY AND RESISTOR

1. INSPECT FUEL PUMP RELAY

A. Inspect relay continuity

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

(b) Check that there is continuity between terminals 2 and 3.

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

If continuity is not as specified, replace the relay.

B. Inspect relay operation

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

(b) Using an ohmmeter, check that there is no continuity between terminals 2 and 3.

(c) Check that there is continuity between terminals 3 and 4.

If operation is not as specified, replace the relay.

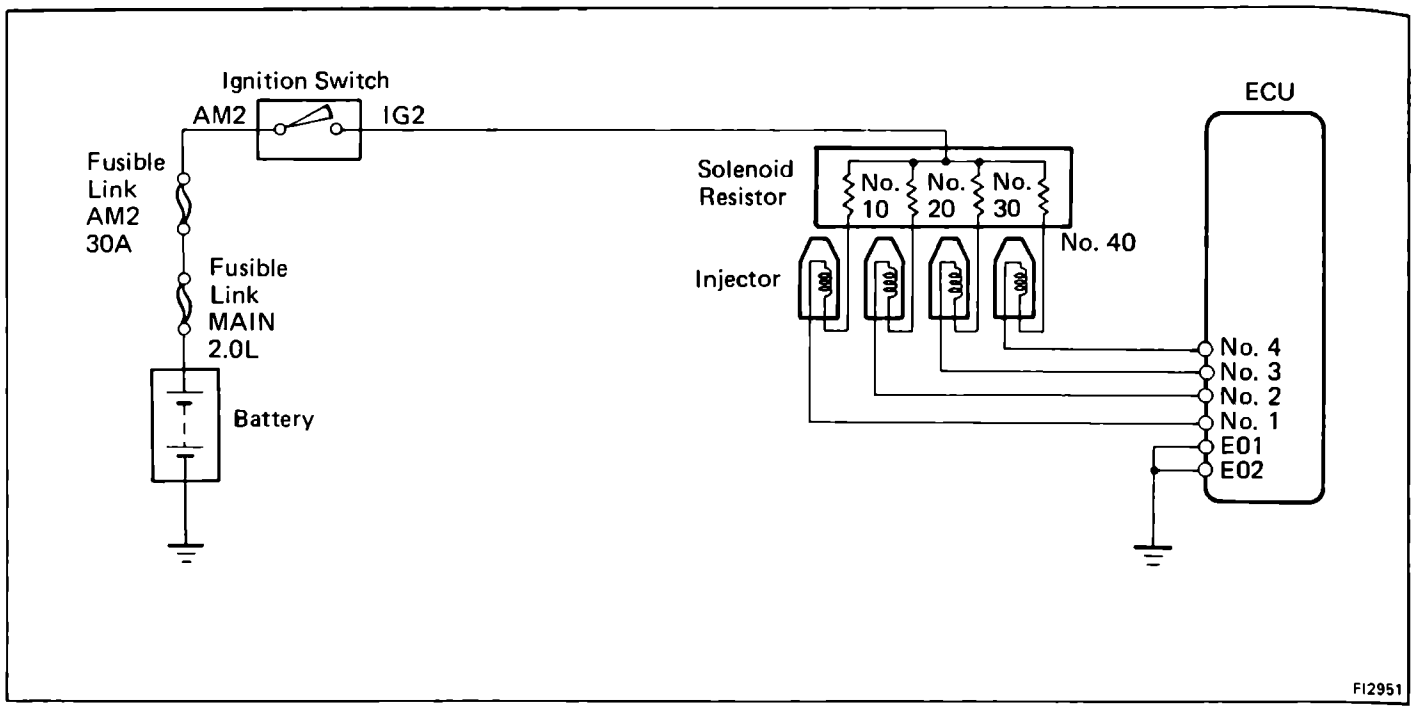
2. INSPECT FUEL PUMP RESISTOR

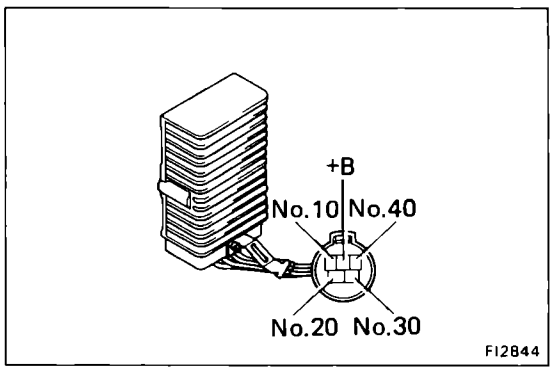
Using an ohmmeter, measure the resistance between terminals.

Resistance: Approx. 0.73 Ω

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

Solenoid Resistor (3S-GTE)





INSPECTION OF SOLENOID RESISTOR

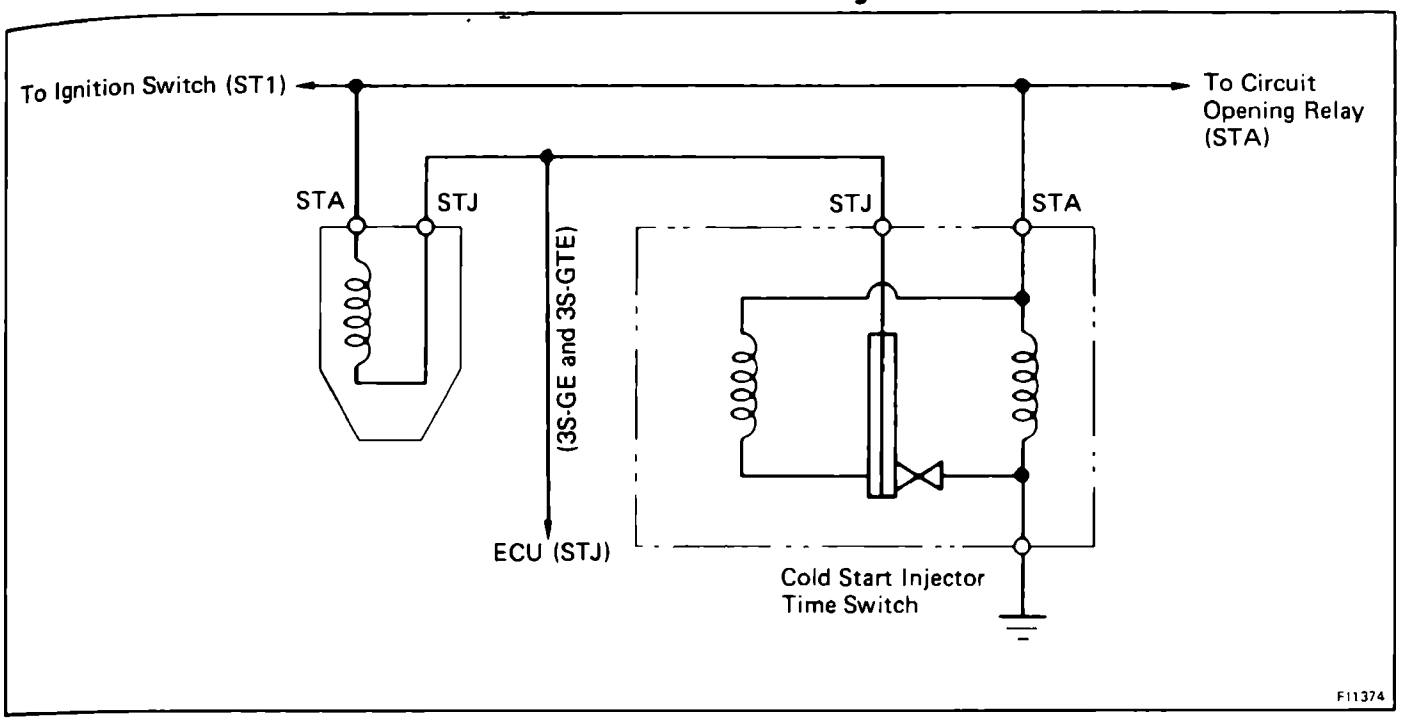
INSPECT SOLENOID RESISTOR

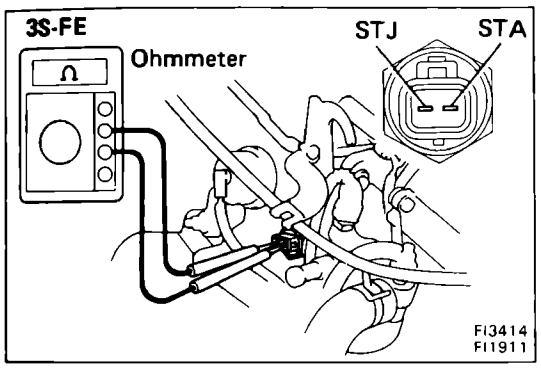
Using an ohmmeter, measure the resistance between terminal +B and other terminals.

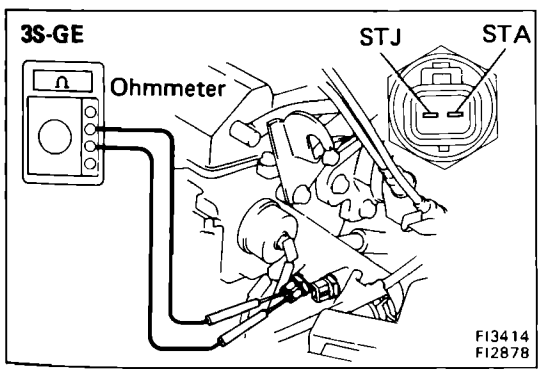
Resistance: 4 — 6 Ω each

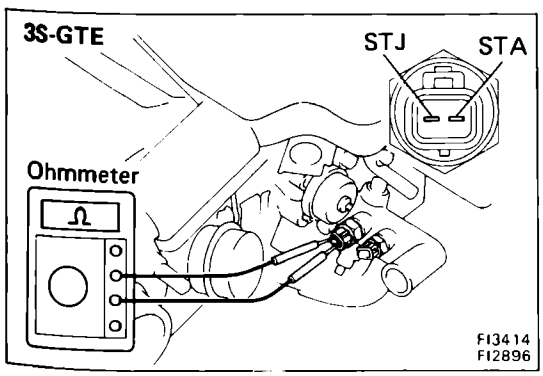
If the resistance is not as specified, replace the resistor.

Cold Start Injector Time Switch









INSPECTION OF COLD START INJECTOR TIME SWITCH

INSPECT RESISTANCE OF COLD START INJECTOR TIME SWITCH

Using an ohmmeter, measure the resistance between each terminal.

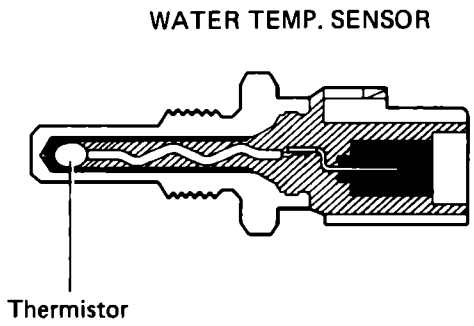
Resistance:

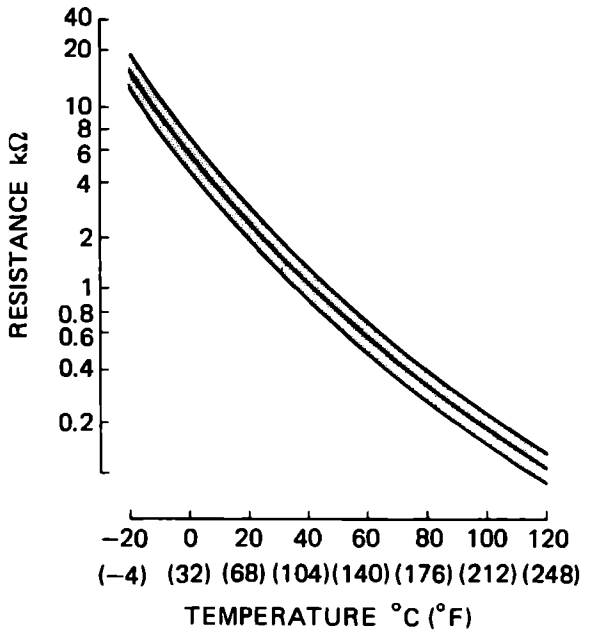
3S-FE STA — STJ
20 — 40 Ω below 30°C (86°F)
40 — 60 Ω above 40°C (104°F)
STA — Ground
20 — 80 Ω

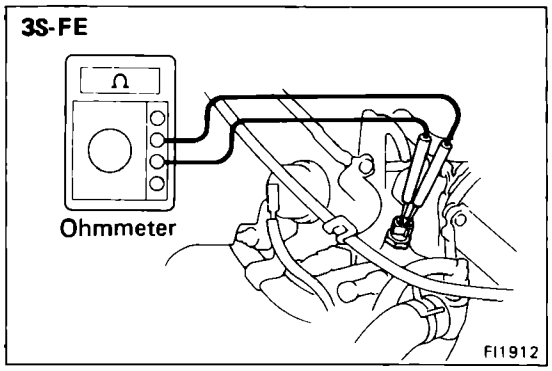
3S-GE and 3S-GTE
STA — STJ
30 — 50 Ω below 10°C (50°F)
70 — 90 Ω above 25°C (77°F)
STA — Ground
30 — 90 Ω

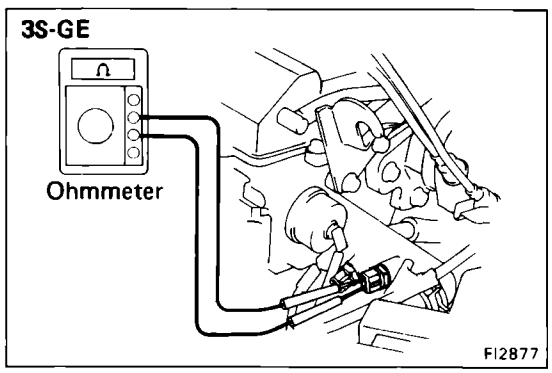
If the resistance is not as specified, replace the switch.

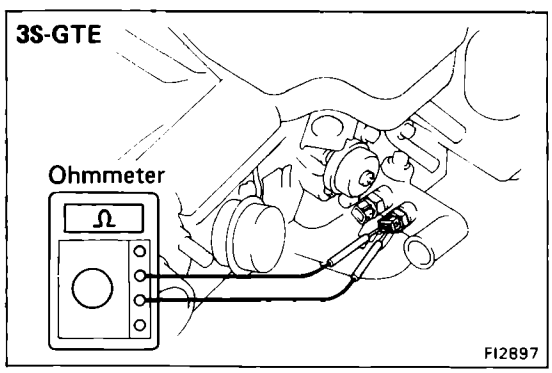
Water Temperature Sensor











INSPECTION OF WATER TEMPERATURE SENSOR

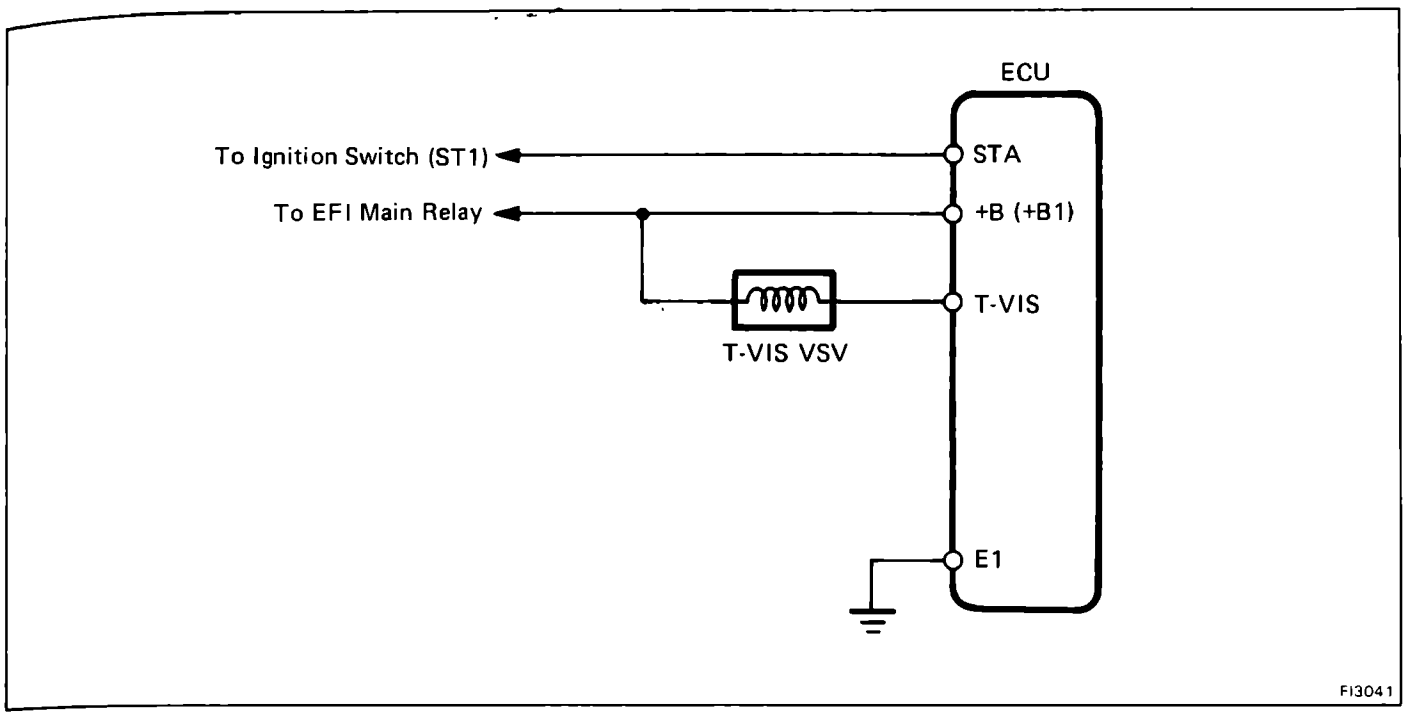
INSPECT RESISTANCE OF WATER TEMPERATURE SENSOR

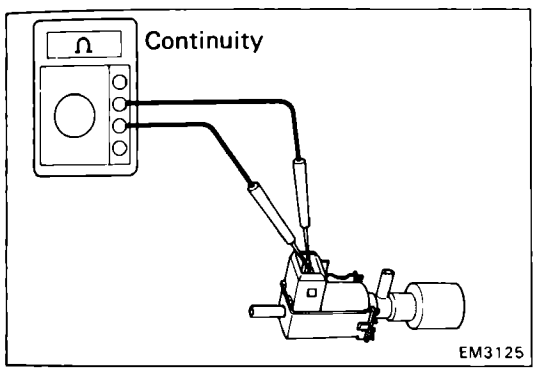
Using an ohmmeter, measure the resistance between the terminals.

Resistance: Refer to chart

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

T-VIS VSV (3S-GE and 3S-GTE)





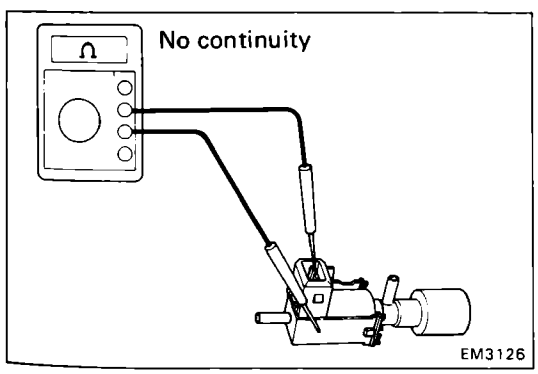
INSPECTION OF T-VIS VSV (3S-GE)

1. INSPECT VSV FOR OPEN CIRCUIT

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

Resistance (Cold): 33 — 39 Ω

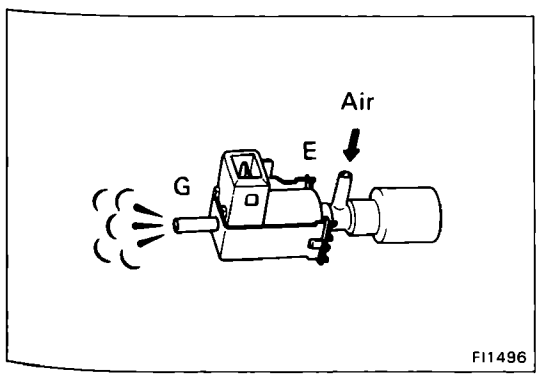
If there is no continuity, replace the VSV.



2. INSPECT VSV FOR GROUND

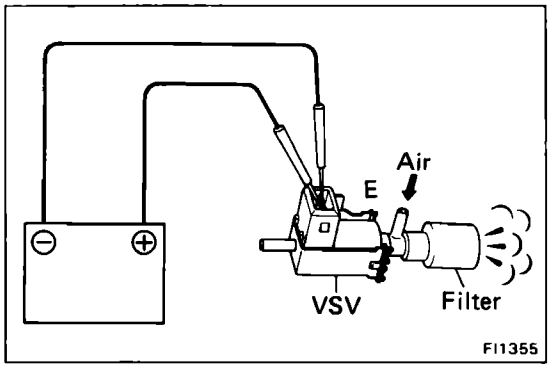
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



3. INSPECT VSV OPERATION

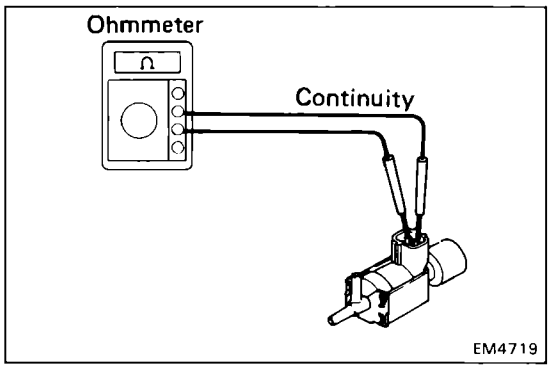
(a) Check that air flow from pipes E to G.



(b) Apply battery voltage across the terminals.

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

If operation is not as specified, replace the VSV.



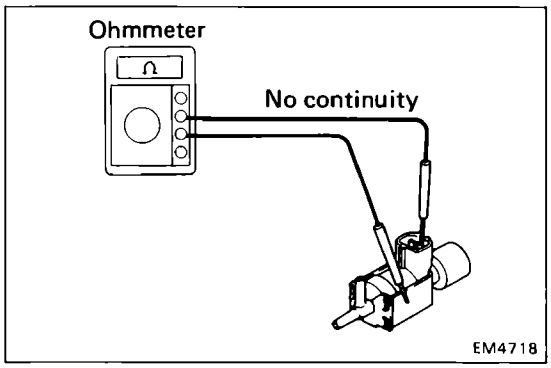
INSPECTION OF T-VIS VSV (3S-GTE)

1. INSPECT VSV FOR OPEN CIRCUIT

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

Resistance (Cold): 33 — 39 Ω

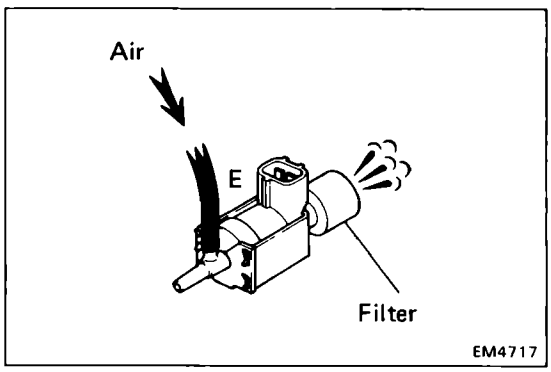
If there is no continuity, replace the VSV.



2. INSPECT VSV FOR GROUND

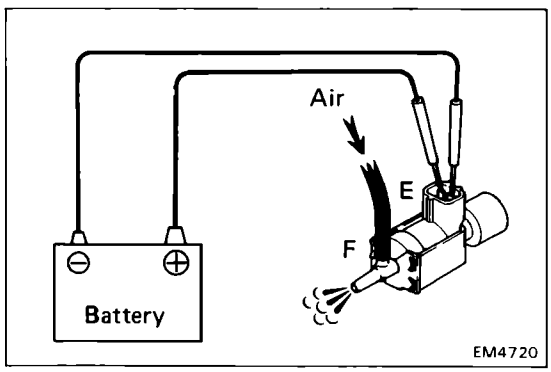
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



3. INSPECT VSV OPERATION

(a) Check that air flow from pipe E to the filter.

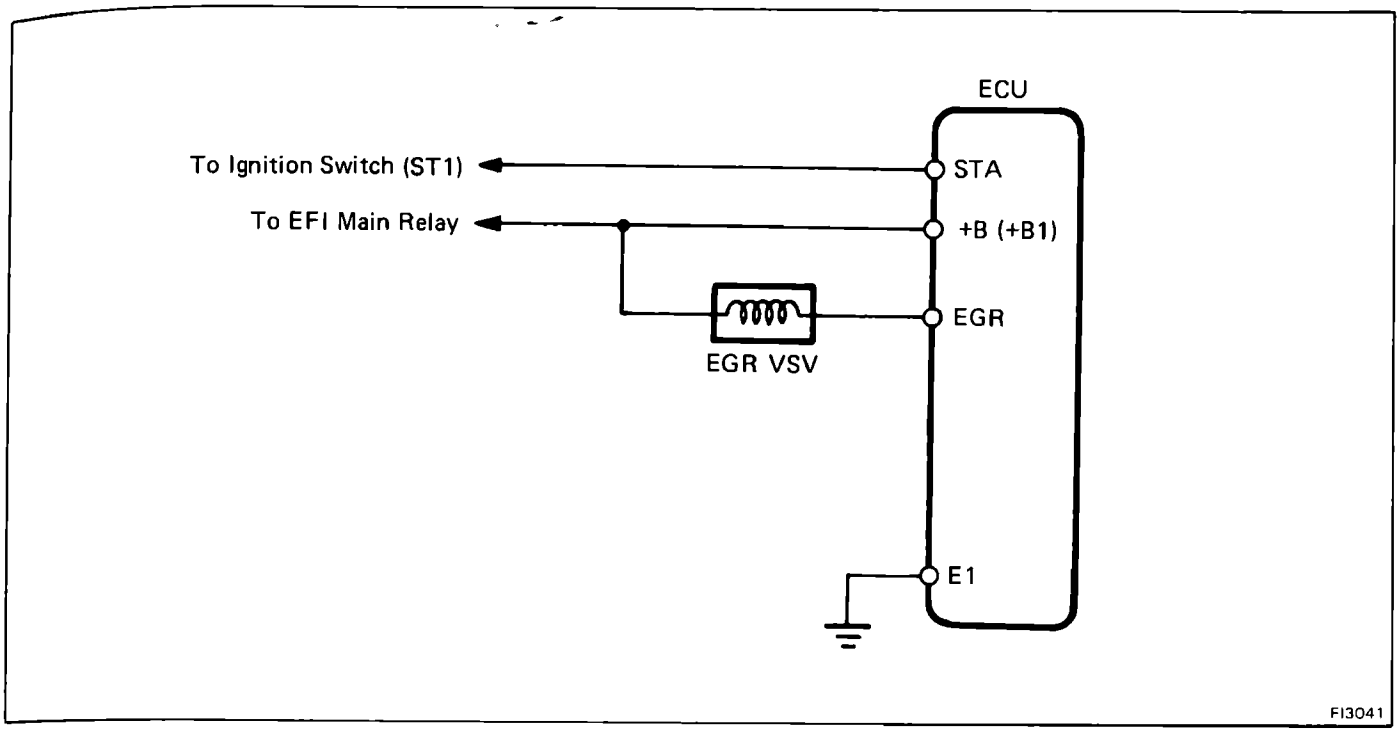


(b) Apply battery voltage across the terminals.

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

If operation is not as specified, replace the VSV.

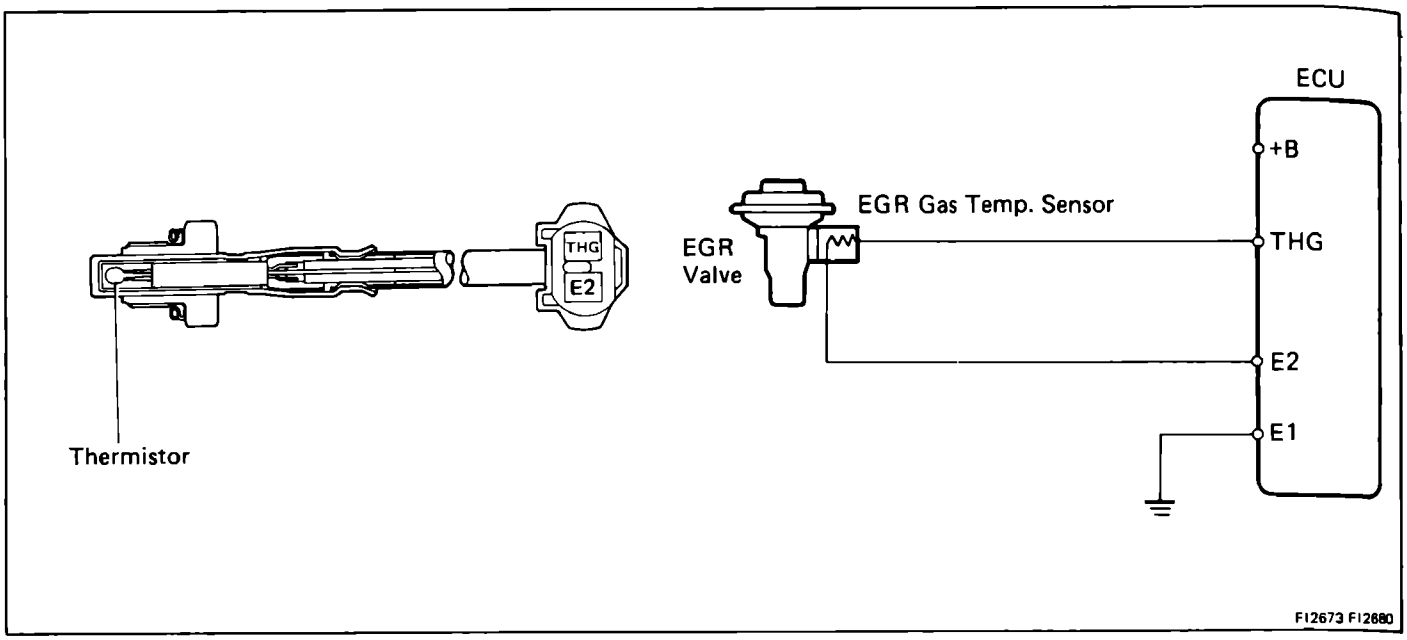
EGR Control VSV (3S-GTE)

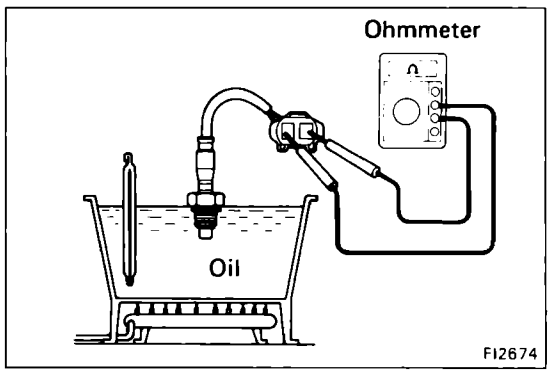


INSPECTION OF EGR VSV

(See page EC-32)

EGR Gas Temperature Sensor (CALIF. only)





INSPECTION OF EGR GAS TEMPERATURE SENSOR

INSPECT EGR GAS TEMPERATURE SENSOR

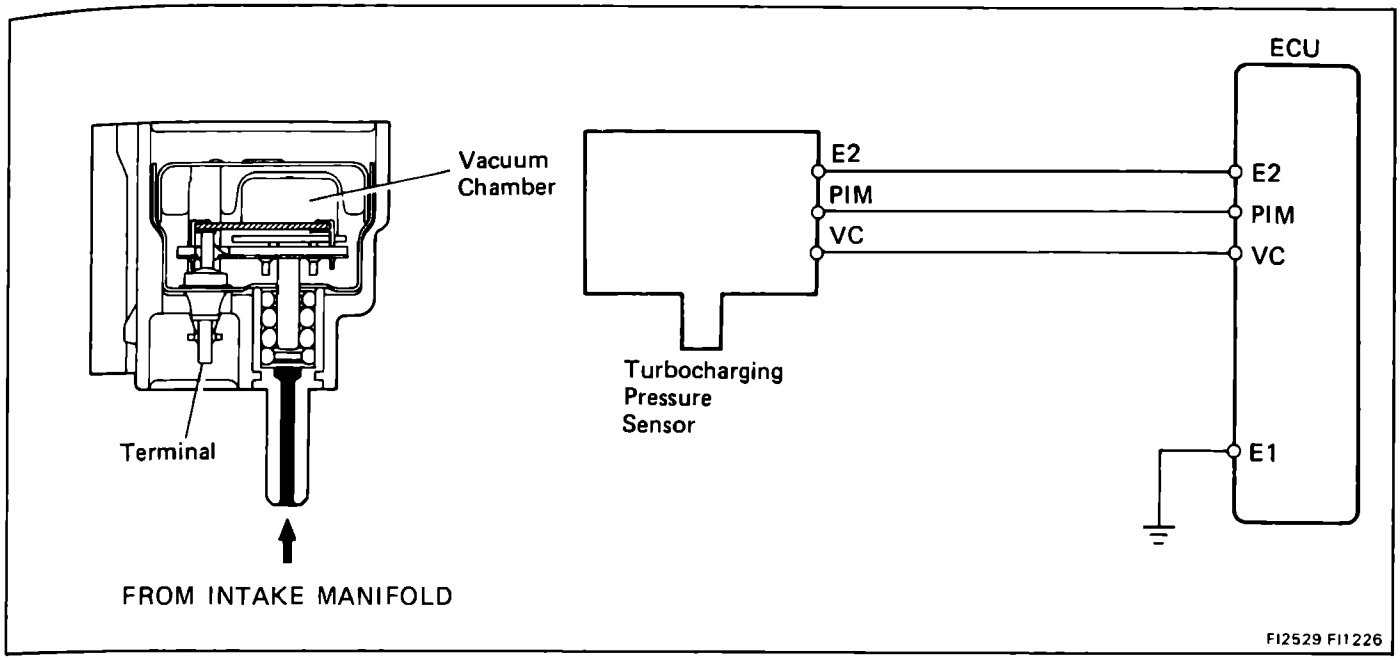
Using an ohmmeter, measure the resistance between the terminals.

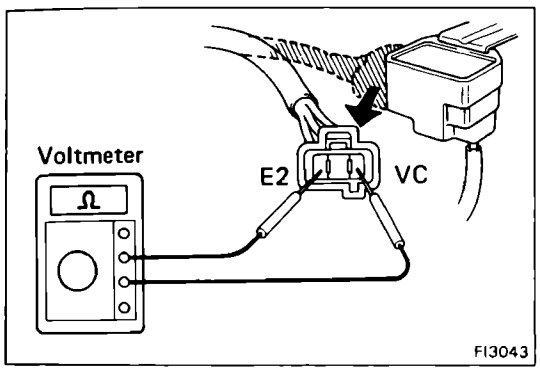
Resistance:

69.40 — 88.50 kΩ at 50°C (112°F)
11.89 — 14.37 kΩ at 100°C (212°F)
2.79 — 3.59 kΩ at 150°C (302°F)

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

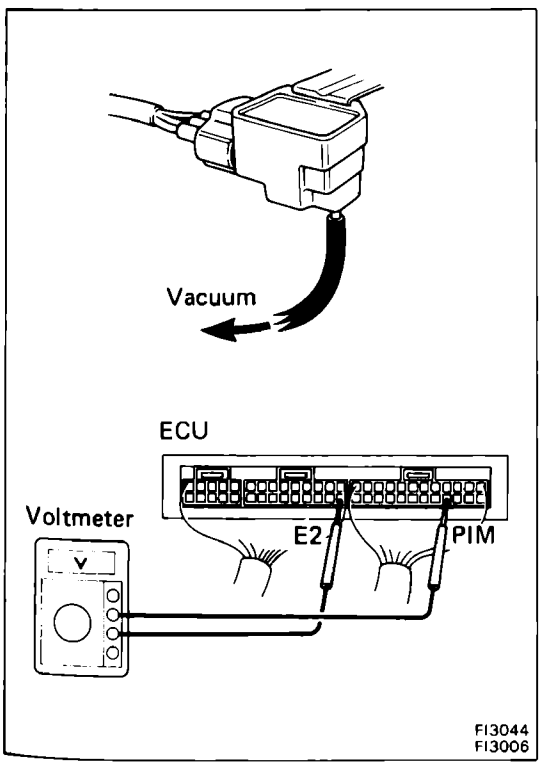
Turbocharging Pressure Sensor (3S-GTE)





INSPECTION OF TURBOCHARGING PRESSURE SENSOR

1. **INSPECT POWER SOURCE VOLTAGE OF TURBOCHARGING PRESSURE SENSOR**
   (a) Turn the ignition switch ON.
   (b) Using a voltmeter, measure the voltage between terminals VC and E2.
   Voltage: 4 — 6 V

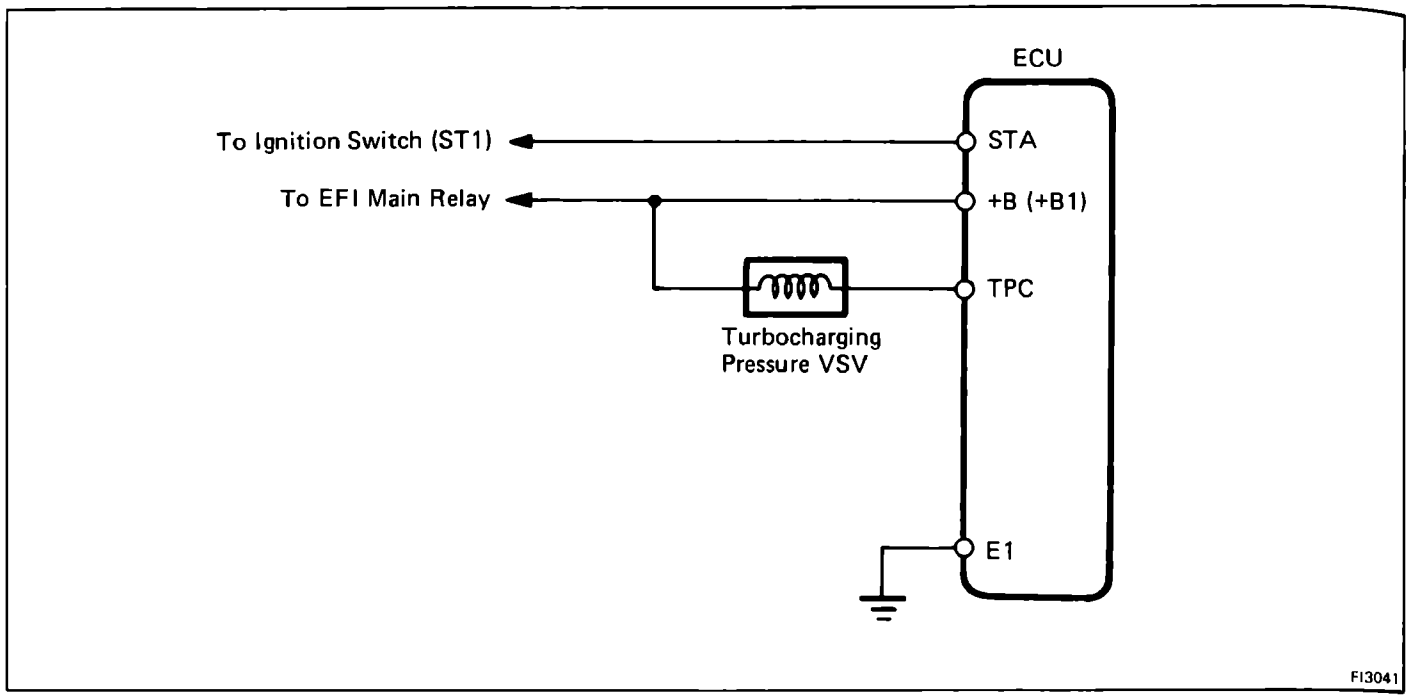


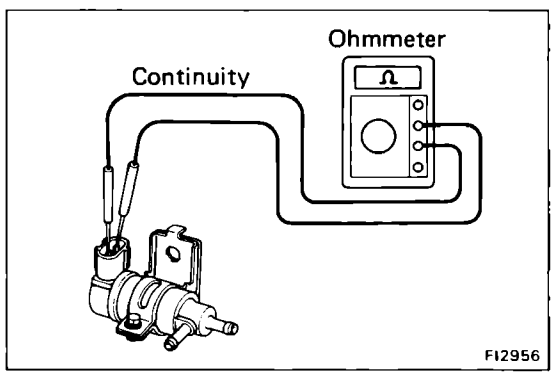
2. **INSPECT POWER OUTPUT OF TURBOCHARGING PRESSURE SENSOR**
   (a) Turn the ignition switch ON.
   (b) Disconnect the vacuum hose of the intake manifold (chamber) side.
   (c) Connect a voltmeter to terminals PIM and E2 of the pressure sensor, and measure and record the output voltage under ambient atmospheric pressure.
   (d) Apply vacuum to the pressur sensor in 100 mmHg (3.94 in.Hg, 13.3 kPa) segments to 500 mmHg (19.69 in.Hg, 66.7 kPa).
   (e) Measure voltage drop from step (c) above for each segment.

Voltage drop

Applied Vacuum mmHg (in.Hg, kPa)	100 (3.94 13.3)	200 (7.87 26.7)	300 (11.81 40.0)	400 (15.75 53.3)	500 (19.69 66.7)
Voltage drop V	0.15— 0.35	0.4— 0.6	0.65— 0.85	0.9— 1.1	1.15— 1.35

Turbocharging pressure VSV (3S-GTE)





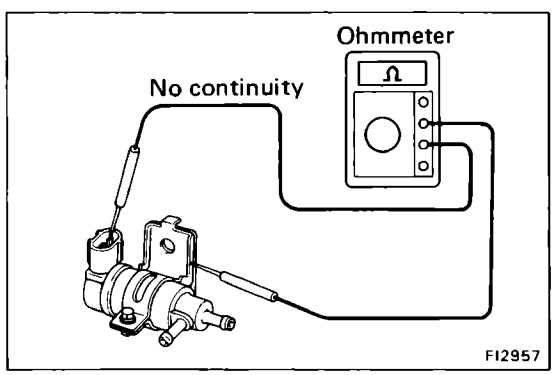
INSPECTION OF TURBOCHARGING PRESSURE VSV

1. INSPECT VSV FOR OPEN CIRCUIT

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

Resistance (Cold): 24 — 30 Ω

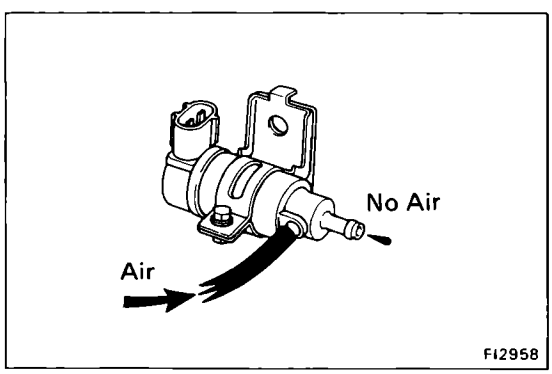
If there is no continuity, replace the VSV.



2. INSPECT VSV FOR GROUND

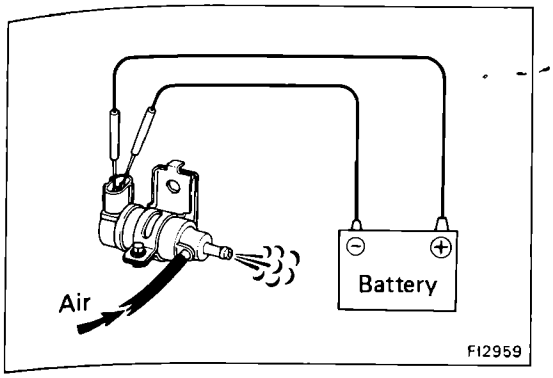
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



3. INSPECT VSV OPERATION

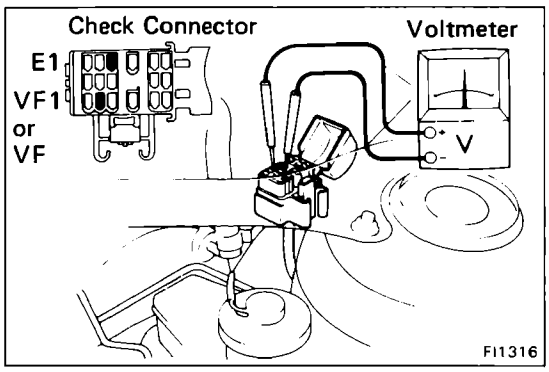
(a) Check that air does not flow from pipes E to F.



(b) Apply battery voltage across the terminals.

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

If operation is not as specified, replace the VSV.



Oxygen Sensor

INSPECTION OF OXYGEN SENSOR

1. WARM UP ENGINE

Allow the engine to reach normal operating temperature.

2. INSPECT FEEDBACK VOLTAGE

Connect the positive (+) probe of a voltmeter to terminal VF1 (3S-FE CALIF.) or VF (others) of the check connector, and negative (−) probe to terminal E1. Perform the test as follows:

Warm up the Oxygen sensor with the engine at 2,500 rpm for approx. 90 seconds.

Connect terminals TE1 (3S-FE CALIF.) or T (others) and E1 of the check connector.
And maintain engine speed at 2,500 rpm.

Check the number of times the voltmeter needle fluctuates in 10 seconds.

Less than 8 times

Warm up the oxygen sensor with the engine at 2,500 rpm for approx. 90 seconds. And maintain engine at 2,500 rpm.

Check that the number of times the voltmeter needle fluctuates in 10 seconds.

Less than 8 times

Disconnect terminals TE1 (3S-FE CALIF.) or T (others) and E1 of the check connector.
And maintain engine speed at 2,500 rpm.

Measure voltage between terminals VF1 (3S-FE CALIF.) or VF (others) and E1.

0 V

Read and record diagnostic codes. (See page FI-27 or 29)

Normal code, code 21, code 25 and code 26

Malfunction code(s) (Ex. code 21, code 25 and code 26)

Repair the relevent diagnostic code.

More than 0 V

8 times or more

Normal

Zero

Replace the ECU.

Zero again

After replaceing the oxygen sensor

8 times or more

Zero

① ② ③ ④

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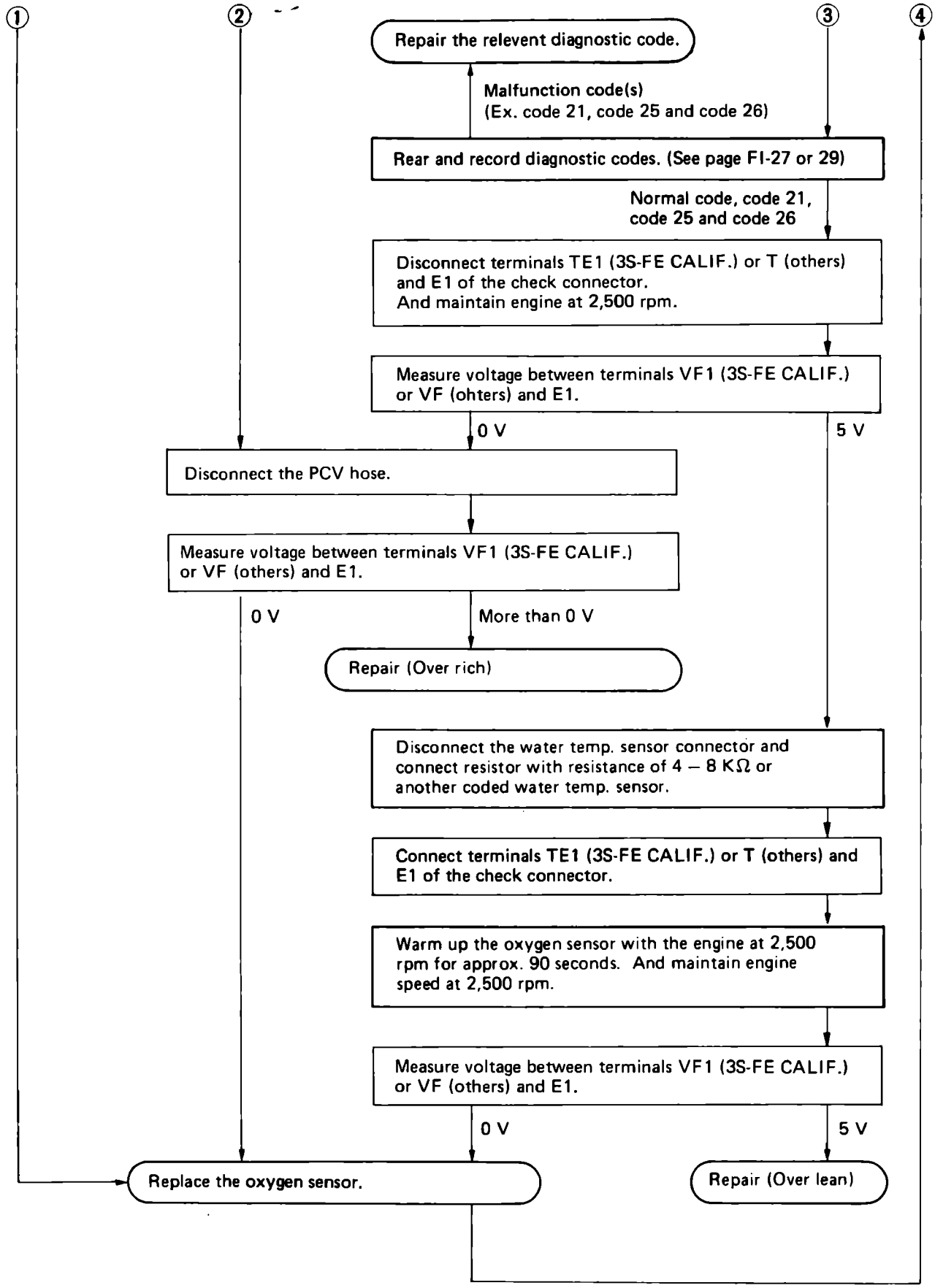
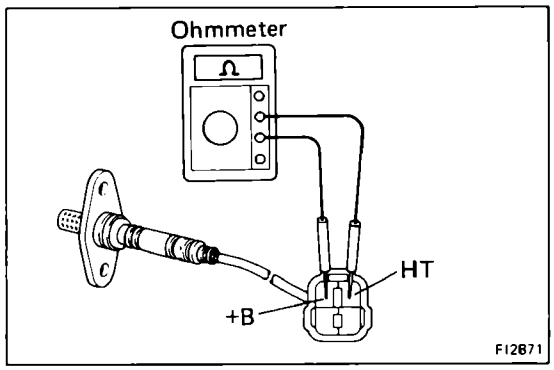
CONTINUED FROM PAGE FI-148





3. **(3S-GE AND 3S-GTE (CALIF only.))**
INSPECT HEATER RESISTANCE OF OXYGEN SENSOR

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

Resistance (Cold): 5.1 – 6.3 Ω at 20°C (68°F)

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

Sub-Oxygen Sensor (3S-FE (CALIF. only))

INSPECTION OF SUB-OXYGEN SENSOR

INSPECT SUB-OXYGEN SENSOR

NOTE: Inspect only when code No.27 is displayed.

(a) Diagnostic code cancellation.
(See page FI-26)

(b) Warm up the engine until it reaches normal operating temperature.

(c) (M/T)
Drive for 5 minutes or more between 80 km/h (50 mph) and 100 km/h in 4th or 5th gear.

(A/T)
Drive for 5 minutes or more between 80 km/h (50 mph) and 100 km/h (62 mph) in "D" range.

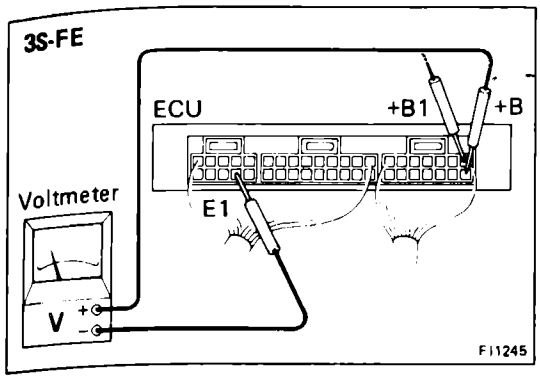
(d) Following the conditions in step (c), press fully on the accelerator pedal for 2 seconds or more.

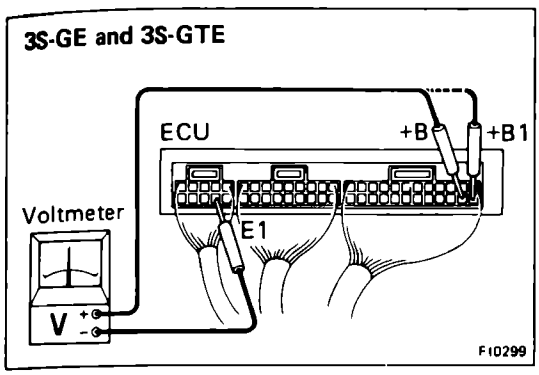
NOTE: Do not exceed 100 km/h (62 mph), or diagnostic code will be cancelled.

(e) Stop the vehicle and turn the ignition switch to OFF.

(f) Carry out steps (b), (c) and (d) again to test acceleration.

If code No. 27 reappears again, check the sub- oxygen sensor circuit. If the circuit is normal, replace the sub-oxygen sensor.





Electronic Controlled Unit (ECU)

INSPECTION OF ECU

NOTE: The EFI circuit can be checked by measuring the resistance and voltage at the wiring connectors of the ECU.

1. INSPECT VOLTAGE OF ECU

Check the voltage between each terminal of the wiring connectors.

- Turn the ignition switch ON.
- Measure the voltage at each terminal.

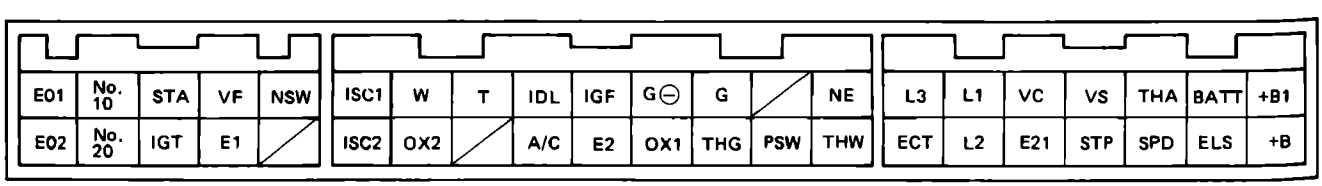
NOTE:

- Perform all voltage measurements with the connectors connected.
- Verify that the battery voltage is 11 V or more when the ignition switch is ON.

Voltage at ECU Wiring Connectors (3S-FE)

Terminals	Condition		STD voltage (V)
+B, +B1 – E1	IG SW ON		10 – 14
BATT – E1	–		10 – 14
IDL – E1	IG SW ON	Throttle valve open	8 – 14
PSW – E1		Throttle valve fully closed	4 – 5
VC – E2		–	4 – 6
VS – E2		Measuring plate fully closed	3.7 – 4.3
		Measuring plate fully open	0.2 – 0.5
	Idling		2.3 – 3.8
	3,000 rpm		1.0 – 2.0
No. 10, No. 20 – E01, E02	IG SW ON		10 – 14
THA – E2	IG SW ON	Intake air temp. 20°C (68°F)	1 – 3
THW – E2		Coolant temp. 80°C (176°F)	0.1 – 1.0
STA – E1	Cranking		6 – 14
IGT – E1	Cranking or idling		0.7 – 1.0
ISC1, ISC2 – E1	IG SW ON		9 – 14
W – E1	No trouble (check engine warning light off) and engine running		10 – 14
* A/C – E1	IG SW ON	Air conditioning ON	8 – 14
T – E1		Check connector TE1 – E1 not connect	10 – 14
		Check connector TE1 – E1 connect	0.5 or less
NSW – E1		Shift position P or N range	0 – 2
		Ex. shift position P or N range	6 – 14
STP – E1	Stop light SW ON (Brake peadl depressed) or defogger SW ON		10 – 14

ECU Terminals * w/ A/C



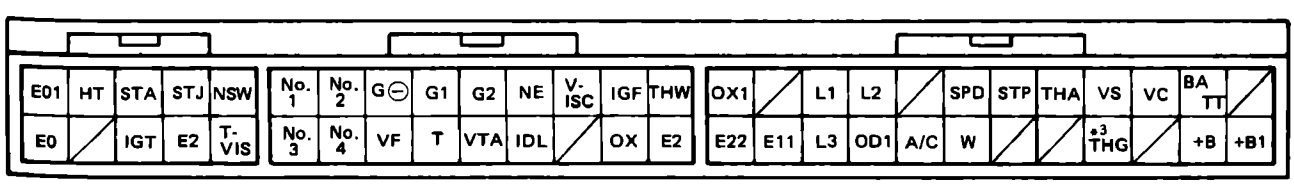
FI0605

Voltage at ECU Wiring Connectors (3S-GE)

Terminals	Condition		STD voltage (V)
+B, +B1 — E1	IG SW ON		10 – 14
BATT — E1	–		10 – 14
IDL — E2	IG SW ON	Throttle valve open	*2 4 – 6
			*3 8 – 14
VTA — E2		Throttle valve fully closed	0.1 – 1.0
		Throttle valve open	3 – 6
VC — E2		–	4 – 6
VS — E2		Measuring plate fully closed	4 – 5
		Measuring plate fully open	1.0 or less
	Idling		2 – 4
	3,000 rpm		1.0 – 2.0
No. 1, No. 2, No. 3, No. 4 — E01, E02	IG SW ON		10 – 14
THA — E2	IG SW ON	Intake air temp. 20°C (68°F)	1 – 3
THW — E2		Coolant temp. 80°C (176°F)	0.1 – 1.0
STA — E1	Cranking		6 – 14
IGT — E1	Cranking or idling		0.7 – 1.0
W — E1	No trouble (check engine warning light off) and engine running		10 – 14
*1 A/C — E1	IG SW ON	Air conditioning ON	8 – 14
T-VIS — E1	Idling		10 – 14
	4,400 rpm or more		2.0 or less
T — E1	IG SW ON	Check connector TE1 – E1 not connect	10 – 14
		Check connector TE1 – E1 connect	0.5 or less
NSW — E1		Shift position P or N range	0 – 2
		Ex. shift position P or N range	6 – 14

ECU Terminals

*1 w/ A/C *2 w/o ECT *3 w/ ECT

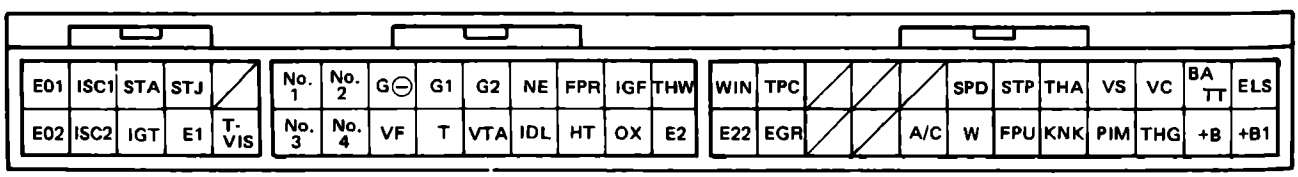


FI0574

Voltage at ECU Wiring Connectors (3S-GTE)

Terminals	Condition		STD voltage (V)
+B, +B1 – E1	IG SW ON		10 – 14
BATT – E1	–		10 – 14
IDL – E2	IG SW ON	Throttle valve open	4 – 6
VTA – E2		Throttle valve fully closed	0.1 – 1.0
		Throttle valve open	3 – 6
VC – E2		–	4 – 6
VS – E2		Measuring plate fully closed	4 – 5
		Measuring plate fully open	1.0 or less
	Idling		2 – 4
	3,000 rpm		1.0 – 2.0
No. 1, No. 2, No. 3, No. 4 – E01, E02	IG SW ON		10 – 14
THA – E2	IG SW ON	Intake air temp. 20°C (68°F)	1 – 3
THW – E2		Coolant temp. 80°C (176°F)	0.1 – 1.0
STA – E1	Cranking		6 – 14
IGT – E1	Cranking or idling		0.7 – 1.0
ISC1, ISC2 – E1	IG SW ON		9 – 14
W – E1	No trouble (check engine warning light off) and engine running		10 – 14
PIM – E2	IG SW ON		2.5 – 4.5
*1 A/C – E1	IG SW ON	Air conditioning ON	8 – 14
*2 T-VIS – E1		Throttle valve fully closed	2.0 or less
		Throttle valve open	10 – 14
*2 T-VIS – E1	Idling		2.0 or less
	4,200 rpm or more		10 – 14
T – E1	IG SW ON	Check connector TE1 – E1 not connect	10 – 14
		Check connector TE1 – E1 connect	0.5 or less

ECU Terminals *1 w/ A/C *2 w/ Regular Gasoline *3 w/ Premium Gasoline



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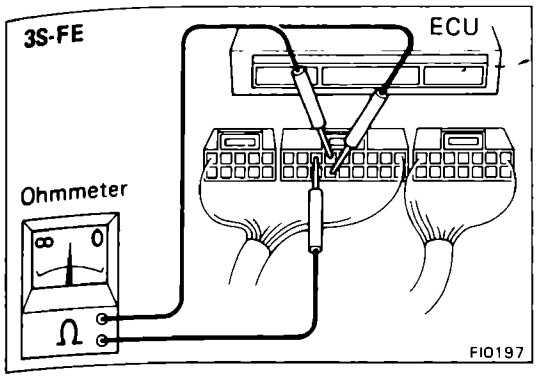
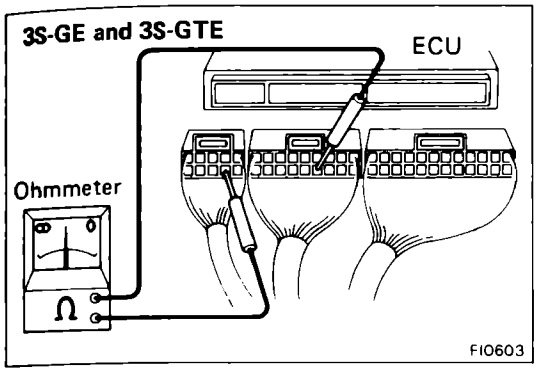




2. **INSPECT RESISTANCE OF ECU**

CAUTION:

- **Do not touch the ECU terminals.**
- **The tester probe should be inserted into the wiring connector from the wiring side.**

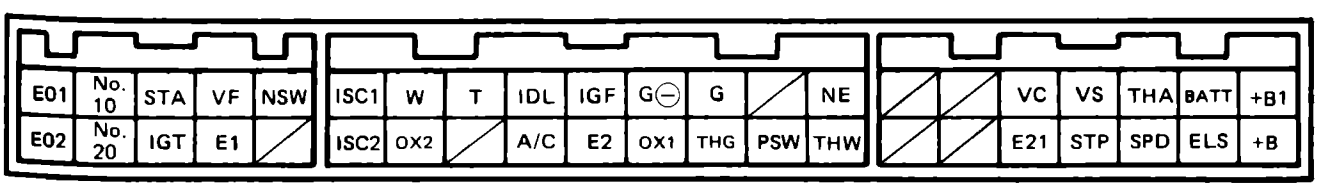
Check the resistance between each terminal of the wiring connectors.

- Disconnect the connectors from the ECU.
- Measure the resistance at each terminal.

Resistance of ECU Wiring Connectors (3S-FE)

Terminals	Condition	STD resistance (Ω)
IDL – E1	Throttle valve open	Infinity
	Throttle valve fully closed	0
PSW – E1	Throttle valve fully open	0
	Throttle valve fully closed	Infinity
VC – E2	–	200 – 400
VS – E2	Measuring plate fully closed	200 – 600
	Measuring plate fully open	20 – 1,200
THA – E2	Intake air temp. 20°C (68°F)	2,000 – 3,000
THW – E2	Coolant temp. 80°C (176°F)	200 – 400
G, NE – G⊖	–	140 – 180
ISC1, ISC2 – +B, +B1	–	16.0 – 17.0

ECU Terminals

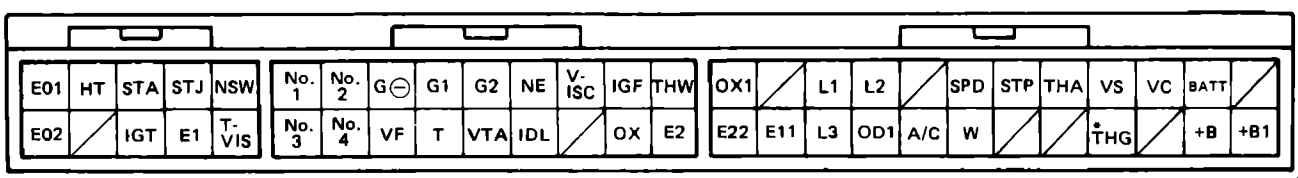


FI0605

Resistance of ECU Wiring Connectors (3S-GE)

Terminals	Condition	STD resistance (Ω)
IDL – E2	Throttle valve open	Infinity
	Throttle valve fully closed	2,300 or less
VTA – E2	Throttle valve fully open	3,500 – 10,000
	Throttle valve fully closed	200 – 800
VC – E2	–	200 – 400
VS – E2	Measuring plate fully closed	200 – 600
	Measuring plate fully open	20 – 1,200
THA – E2	Intake air temp. 20°C (68°F)	2,000 – 3,000
THW – E2	Coolant temp. 80°C (176°F)	200 – 400
G1, G2, NE – G⊖	–	140 – 180

ECU Terminals



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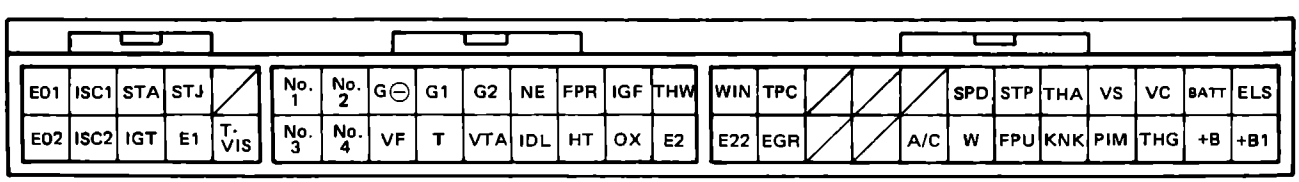
Resistance of ECU Wiring Connectors (3S-GTE)

Terminals	Condition	STD resistance (Ω)
IDL – E2	Throttle valve open	Infinity
	Throttle valve fully closed	2,300 or less
VTA – E2	Throttle valve fully open	3,500 – 10,000
	Throttle valve fully closed	200 – 800
VC – E2	–	200 – 400
VS – E2	Measuring plate fully closed	200 – 600
	Measuring plate fully open	20 – 1,200
THA – E2	Intake air temp. 20°C (68°F)	2,000 – 3,000
THW – E2	Coolant temp. 80°C (176°F)	200 – 400
G1, G2, NE – G⊖	–	140 – 180
ISC1, ISC2 – +B, +B1	–	16.0 – 17.0

ECU Terminals



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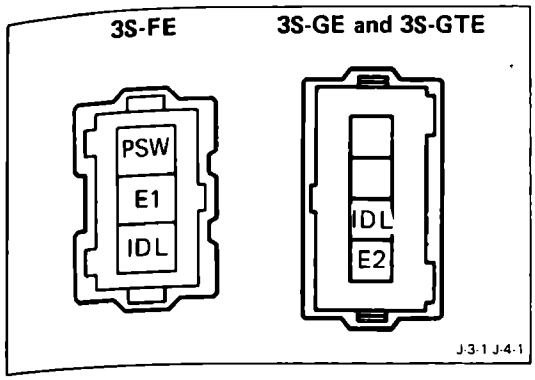
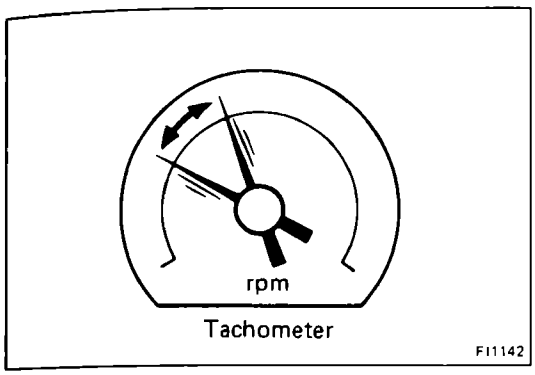




Fuel Cut RPM

INSPECTION OF FUEL CUT RPM

1. WARM UP ENGINE

Allow the engine to reach normal operating temperature.

2. INSPECT FUEL CUT RPM

(a) Disconnect the connector from the throttle position sensor.

(b) Connect terminals IDL and E1 (3S-FE) or E2 (3S-GE and 3S-GTE) of the wiring connector.

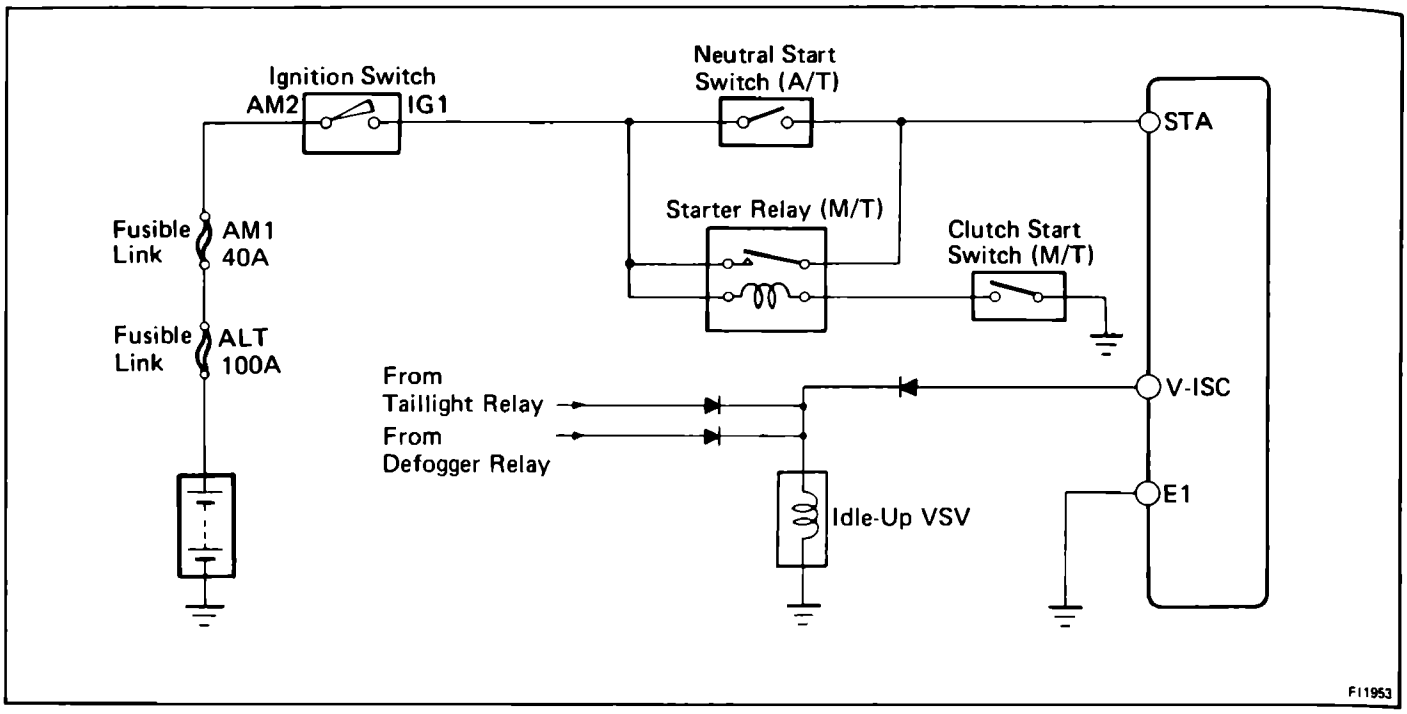
(c) Gradually raise the engine rpm and check that there is fluctuation between the fuel cut and fuel return points.

NOTE:

- The vehicle should be stopped.
- Measure with the A/C OFF.

Fuel cut rpm:	**3S-FE**	**1,700 rpm**
	3S-GE and 3S-GTE	**2.000 rpm**
Fuel return rpm:	**3S-FE**	**1,300 rpm**
	3S-GE and 3S-GTE	**1,600 rpm**

Idle-Up System (3S-GE)

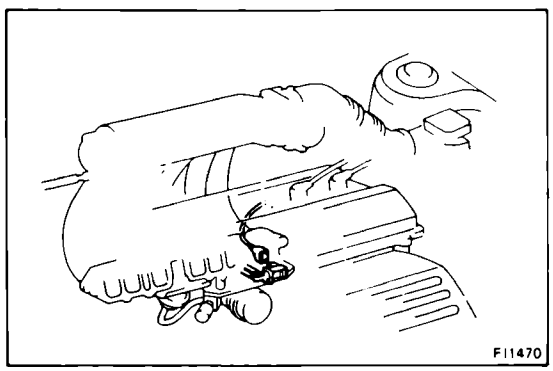


INSPECTION OF IDLE-UP SYSTEM

1. **WARM UP ENGINE**

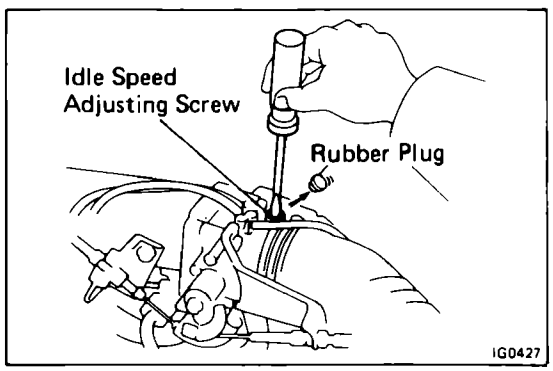
   Allow the engine to normal operating temperature.

2. **CONNECT TACHOMETER**

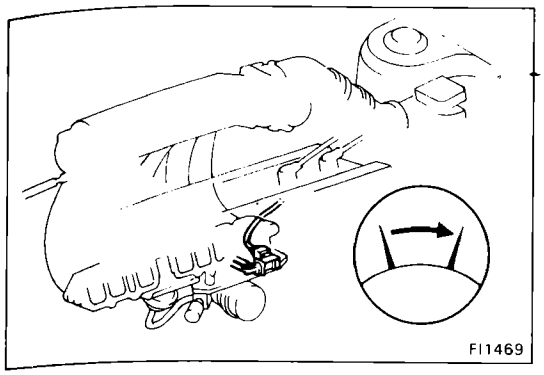


3. **INSPECT IDLE-UP SYSTEM**

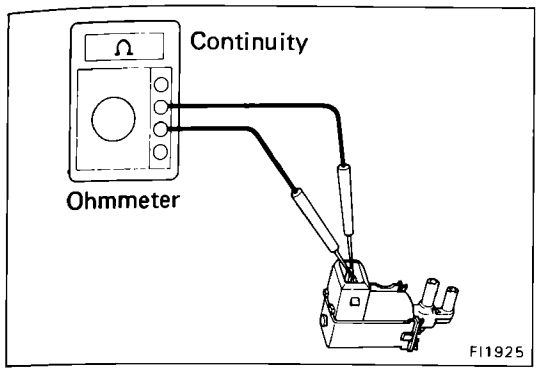
   (a) Disconnect the VSV connector for idle-up.



   (b) Turn the idle speed adjusting screw until the engine rpm falls to 500 rpm.



(c) Connect the VSV connector.
(d) Check that rises above 100 rpm.
(e) Adjust the idle speed. (See page MA-7)



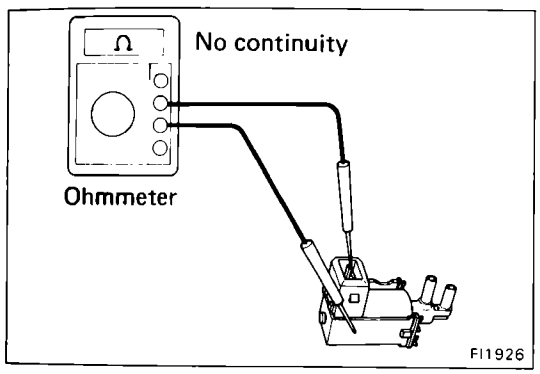
2. INSPECT IDLE-UP VSV

A. Inspect VSV for open circuit

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

Resistance (Cold): 33 – 39 Ω

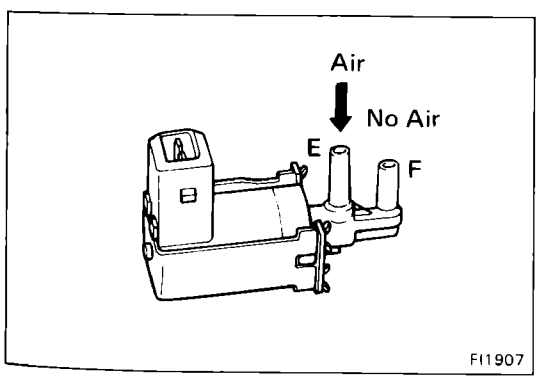
If there is no continuity, replace the VSV.



B. Inspect VSV for ground

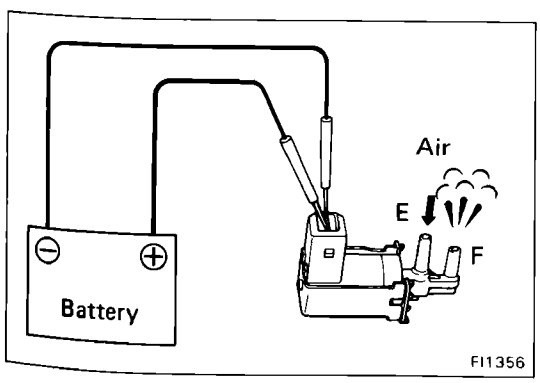
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



C. Inspect VSV operation

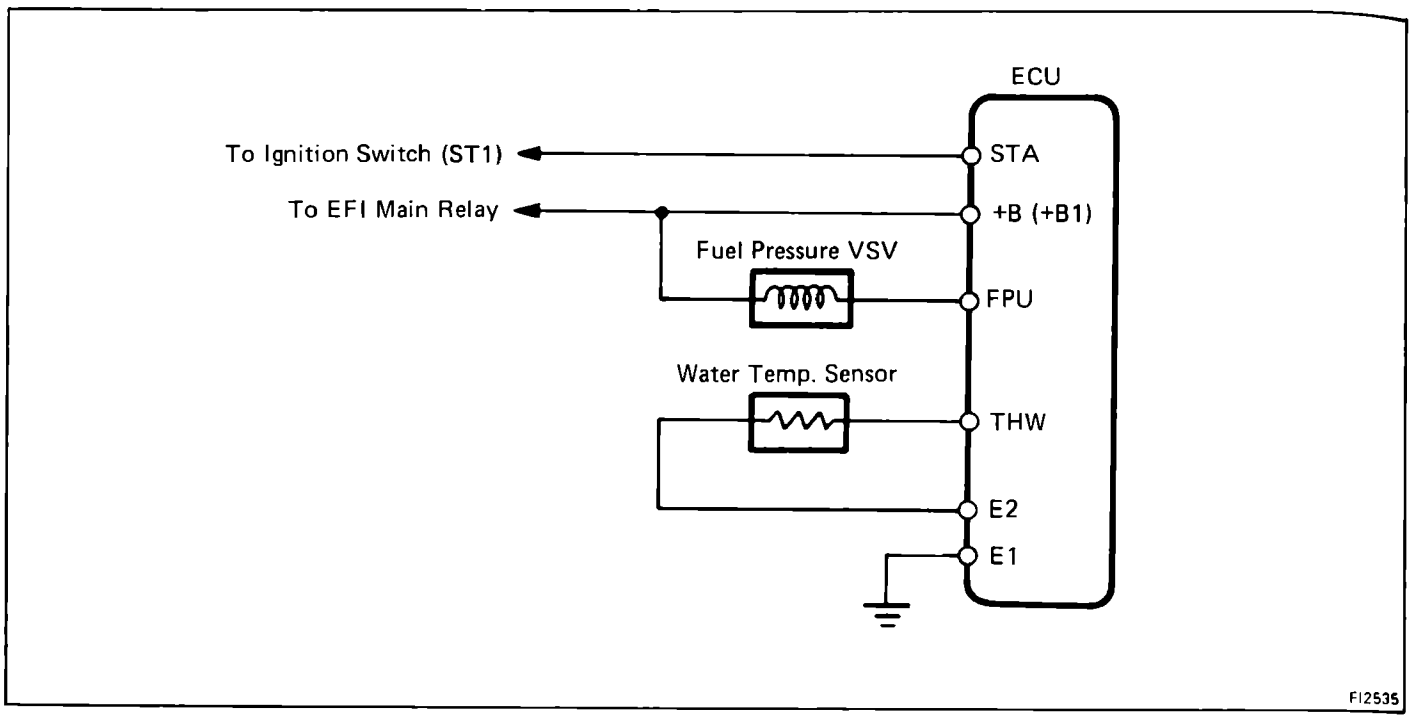
(a) Check that air flows from pipes E to F.



(b) Apply battery voltage across the terminals.
(c) Check that air flows from pipes E to F.

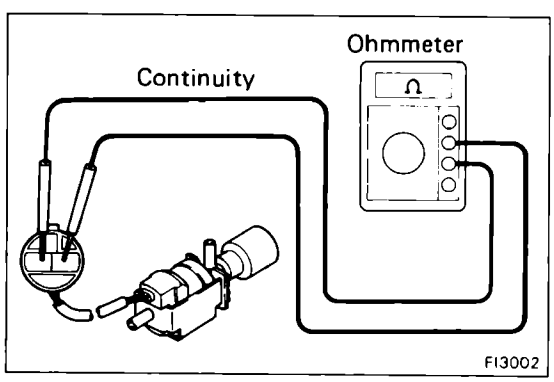
If operation is not as specified, replace the VSV.

High-Temperature Line Pressure-Up System (3S-GTE)



INSPECTION OF HIGH-TEMPERATURE LINE PRESSURE-UP SYSTEM

1. **INSPECT WATER TEMPERATURE SENSOR**
(See page FI-140)



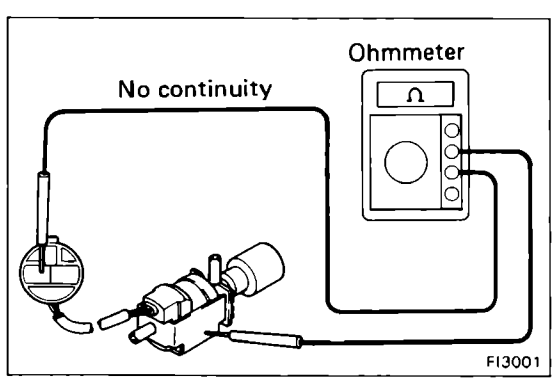
2. **INSPECT FUEL PRESSURE VSV**

A. Inspect VSV for open circuit

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

Resistance (Cold): 33 – 39 Ω

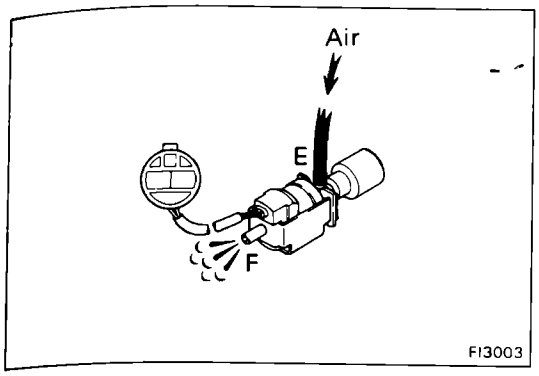
If there is no continuity, replace the VSV.



B. Inspect VSV for ground

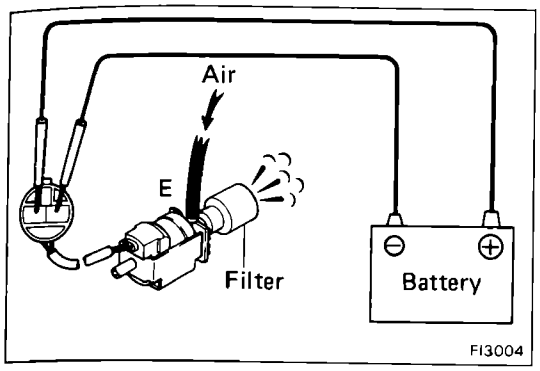
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



C. Inspect VSV operation

(a) Check that air flows from pipes E to F.



(b) Apply battery voltage across the terminals.

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

If operation is not as specified, replace the VSV.