EFI SYSTEM

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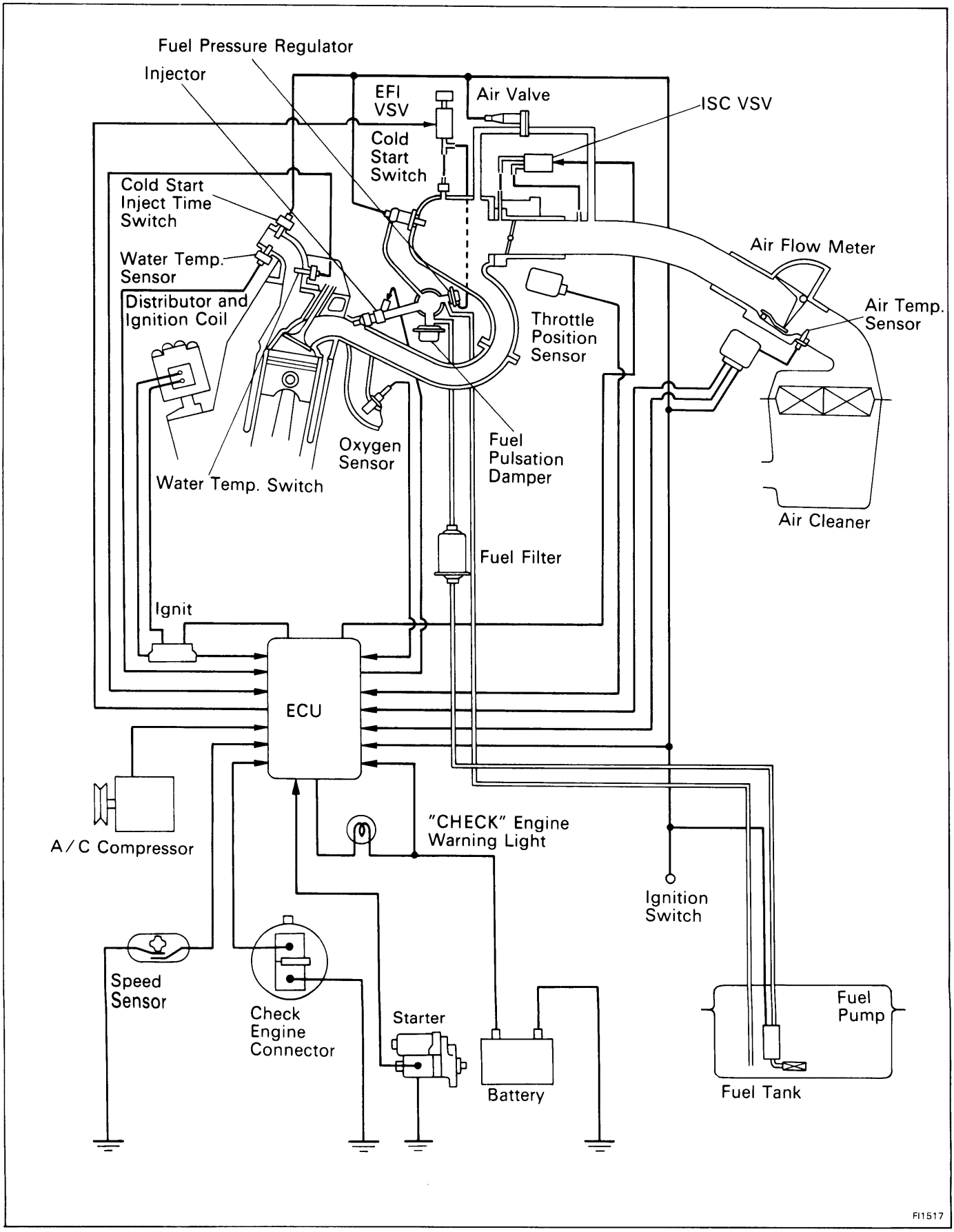
SYSTEM DESCRIPTION



The EFI system is composed of three basic subsystems: Fuel Induction, Air Induction and Electronic Control Systems.

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 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 4Y-E engine is equipped with a Toyota Computer Control System (TCCS) which centrally controls the EFI, ESA. Diagnosis systems, etc. by means of an Electronic Control Unit (ECU – formerly EFI computer) employing a microcomputer. By the ECU, the TCCS controls the following functions:

1. Electronic Fuel Injection (EFI)

   The ECU receives signals from various sensors indicating changing engine operating conditions such as:

   Intake air volume
   Intake air temperature
   Coolant temperature
   Engine rpm
   Acceleration/deceleration
   Exhaust oxygen content etc.

   These 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. Diagnosis

   The ECU detects any malfunctions or 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 diagnostic code is recorded by the ECU. The diagnostic code can be read by the number of blinks of the "CHECK" engine warning light when terminals T and E1 are short-circuited.
   (See page FI-21)

4. Fail-Safe Function

   In the event of computer malfunction, a back-up circuit will take over to provide minimal drivability. Simultaneously, the "CHECK" engine warning light is activated.

PRECAUTIONS

1. **Before working on the fuel system, disconnect the negative cable from the battery.**

   NOTE: Any diagnostic code retained by the ECU will be cleared when the battery negative (−) terminal is removed. Therefore, if necessary, read the diagnosis before removing the battery terminal.

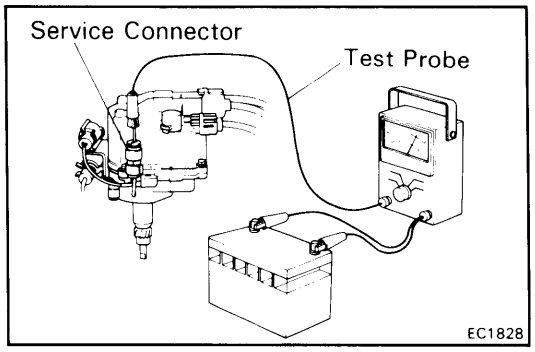
2. **Do not smoke or work on the fuel system near an open flame.**

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

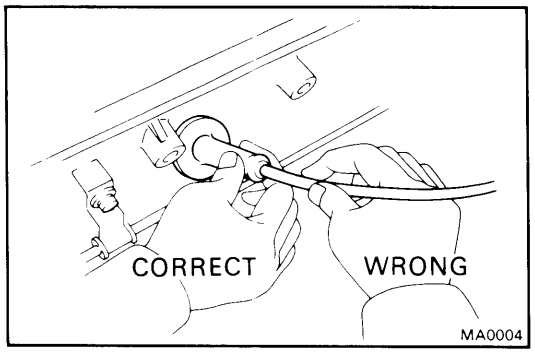
INSPECTION PRECAUTIONS

MAINTENANCE PRECAUTIONS

1. **CHECK CORRECT ENGINE TUNE-UP**
   (See page EM-5)

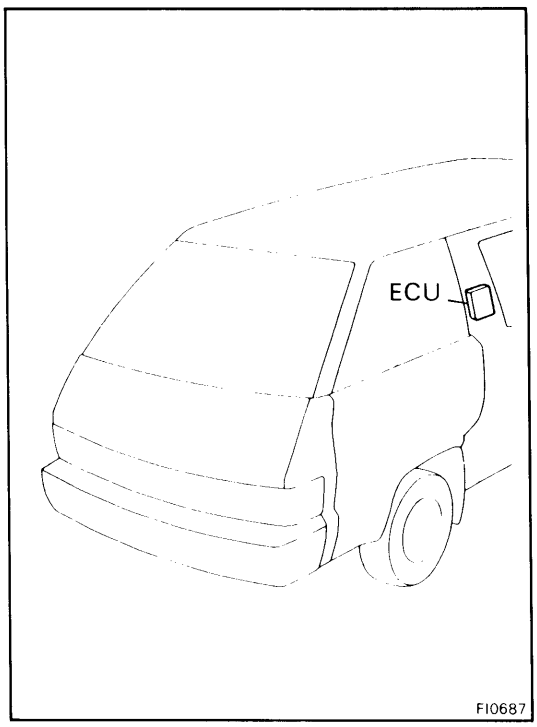


2. **PRECAUTIONS WHEN CONNECTING GAUGE**
   (a) Remove the cap of, and connect the test probe of a tachometer to the service connector of the distributor.
   (b) Use the battery as the power source for the timing light, tachometer, etc.



3. **IN EVENT OF ENGINE MISFIRE, CATALYTIC CONVERTER MAY OVERHEAT. THEREFORE, PRECAUTIONS SHOULD BE TAKEN.**
   (a) Insure correct drive belt adjustment.
   (b) Insure proper connection of battery terminals, etc.
   (c) Handle high-tension cords carefully.
   (d) After repair work, insure that the ignition coil terminals and all other ignition system lines are re-connected securely.
   When cleaning the engine compartment, be especially careful to protect the electrical system from water.

4. **PRECAUTIONS WHEN HANDLING OXYGEN SENSOR**
   (a) Do not allow the 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.)

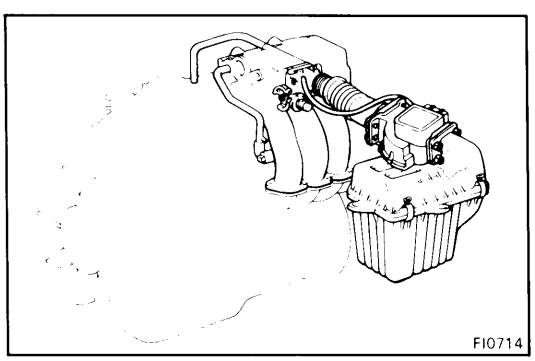
The ECU has been designed so that it will not be affected by outside interference.
However, if your vehicle is equipped with a CB radio transceiver, etc. (even one with about 10 W output), it may, at times, have an affect upon ECU operation, especially if the antenna and feeder are installed nearby. Therefore, observe the following precautions.

(a) Install the antenna as far as possible from the ECU. The ECU is located inside the left Center Pillar so the antenna should be installed on the rear side of the vehicle.

(b) 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.

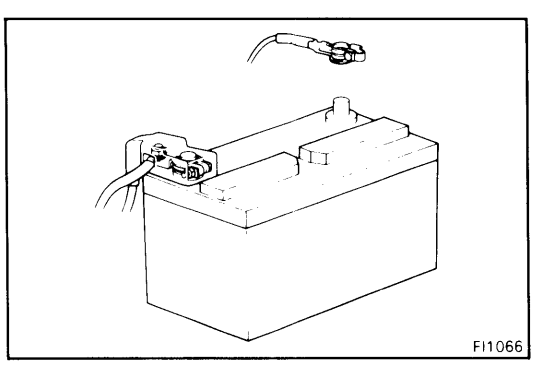
(c) Insure that the feeder and antenna are properly adjusted.

(d) Do not equip your vehicle with a powerful mobile radio system.



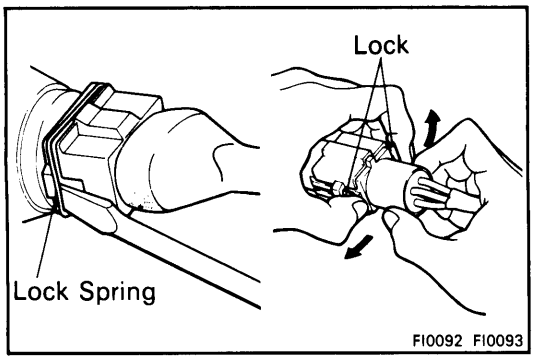
INTAKE SYSTEM

1. Separation of the engine oil level gauge, 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 intake system between the air flow meter and cylinder head will allow air suction and cause the engine to run out of tune.



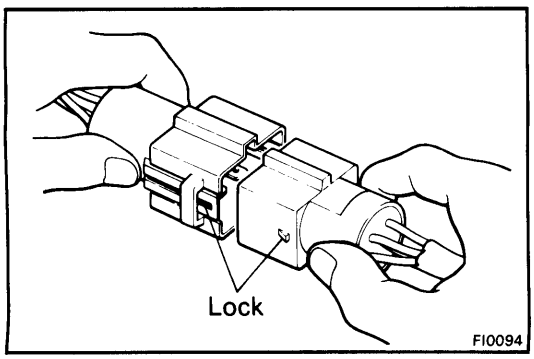
ELECTRONIC PARTS

1. Before removing EFI wiring connectors, terminals, etc., first disconnect power by either turning OFF the ignition switch or disconnecting the battery terminals.
2. When installing a 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 damage.
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.

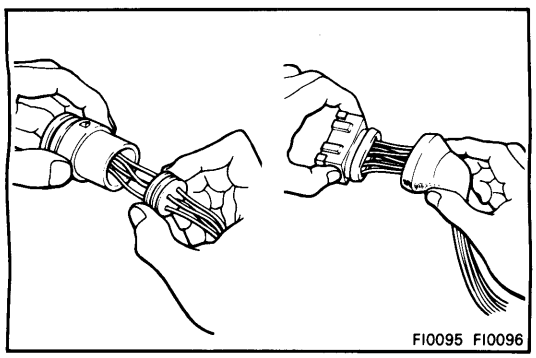


8. Take care when pulling out and inserting wiring connectors.
   (a) Release the lock and pull out the connector.

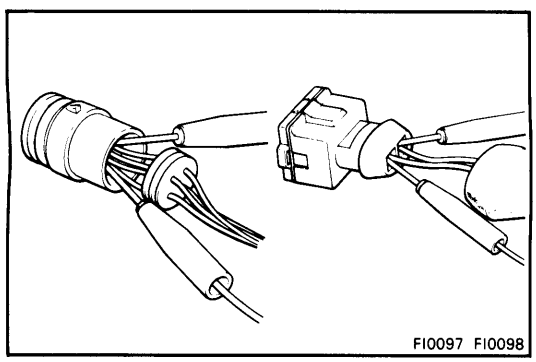
   NOTE: Grasp the connector, not the wire.



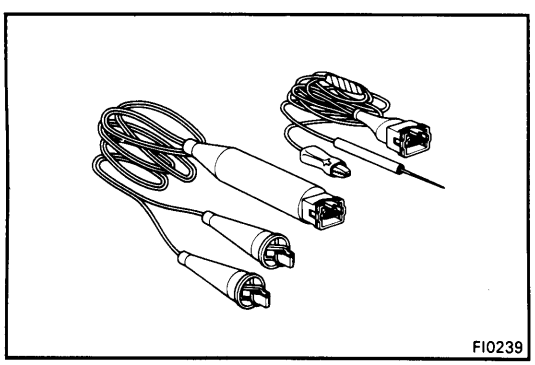
   (b) Fully insert the connector and insure that it is locked.



9. When inspecting a connector with a circuit tester.
   (a) For water-proof type connectors, carefully take out the water-proofing rubber.

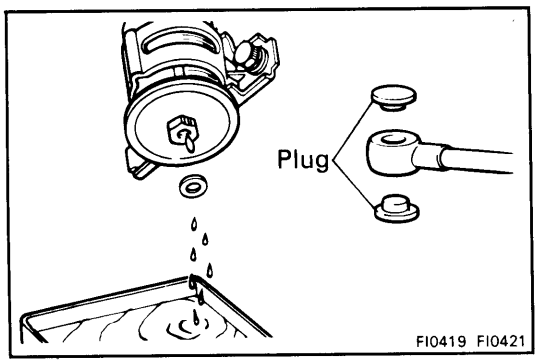


   (b) When checking continuity, amperage or voltage, always insert tester probe into the connector from the wiring side.
   (c) Do not apply unnecessary force to the terminal.
   (d) After checking, install the water-proofing rubber on the connector securely.



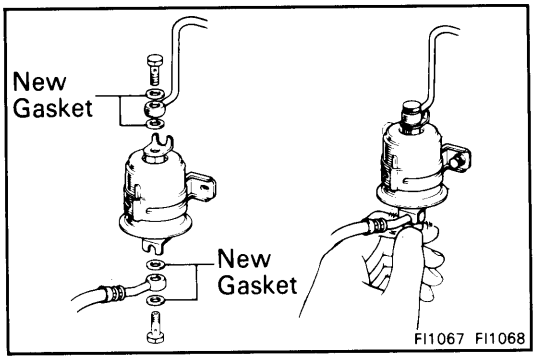
10. Use SST for inspection or test of the injector, cold start injector or its wiring connector.

    SST 09842-30020 and 09842-30050



FUEL SYSTEM

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

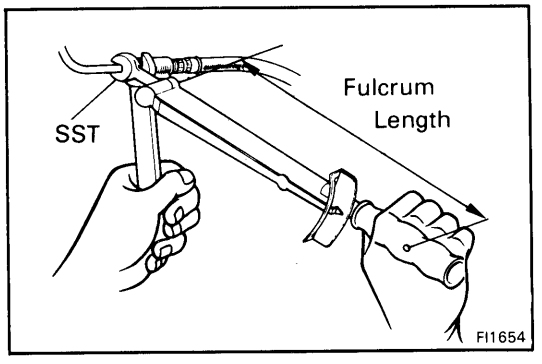


2. When connecting the flare nut or union bolt on the high pressure pipe union, observe the following procedure:

[Union bolt type]

(a) Always use a new gasket.
(b) First tighten the union bolt by hand.
(c) Then tighten the bolt to the specified torque.

Torque: 300 kg-cm (22 ft-lb, 29 N·m)



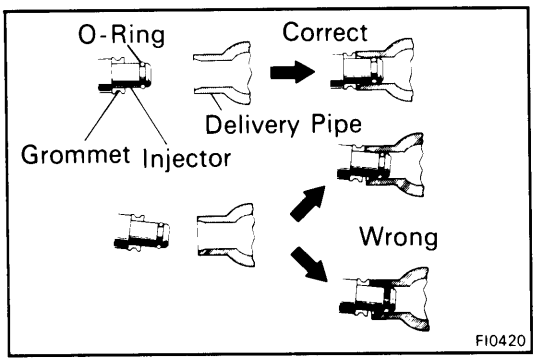
[Flare nut type]

(a) Apply a thin coat of oil to the flare and first tighten the flare nut by hand.
(b) Using SST, tighten the nut to the specified torque.

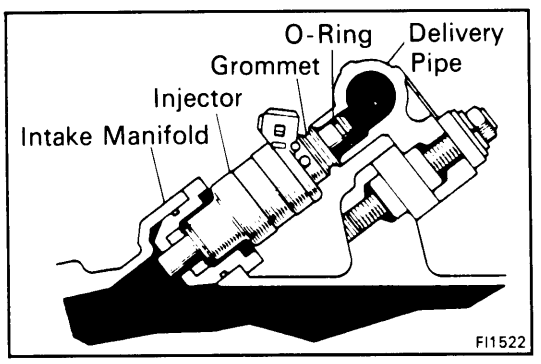
SST 09631-22020

Torque: 390 kg-cm (28 ft-lb, 38 N·m)

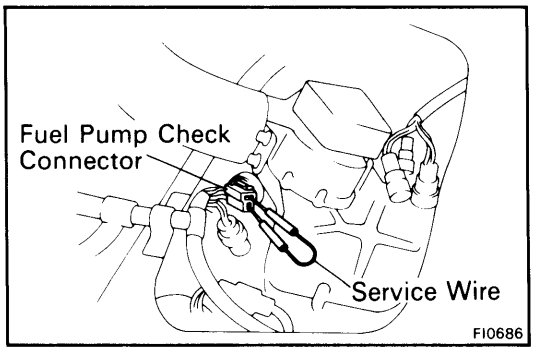
NOTE: Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).



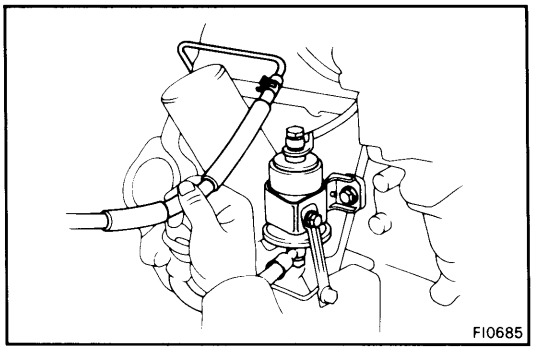
3. Take the following precautions when removing and installing the injectors.
   (a) Never reuse an O-ring.
   (b) When placing an O-ring on the injector, take care not to damage it in any way.
   (c) Lubricate the O-ring with spindle oil or gasoline before installing never use engine, gear or brake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



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



5. Check that there are no fuel leaks after performing maintenance on the fuel system.
   (a) With engine stopped, turn the ignition switch ON.
   (b) Short circuit the terminals of the fuel pump check connector with a service wire.



   (c) When the fuel return hose is pinched, the pressure within the high pressure line will rise to about 3.1 – 3.2 kg/cm^2 (44 – 46 psi, 304 – 314 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 are usually not caused by the EFI system. When troubleshooting, first check the condition of the following systems:
   (a) Electronic source
      - Battery
      - Fusible links
      - Fuses

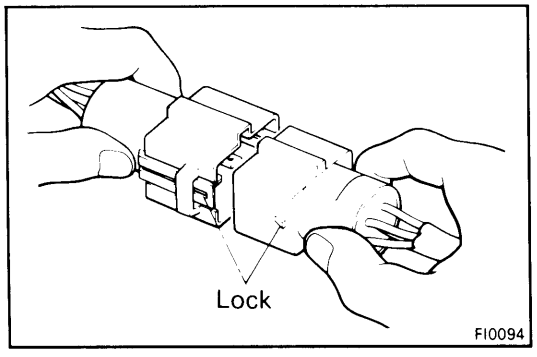
   (b) Body ground
   (c) Fuel supply
      - Fuel leakage
      - Fuel filter
      - Fuel pump

   (d) Ignition system
      - Spark plugs
      - High-tension cords
      - Distributor
      - Ignition coil
      - Igniter

   (e) Air induction system
      - Vacuum leaks

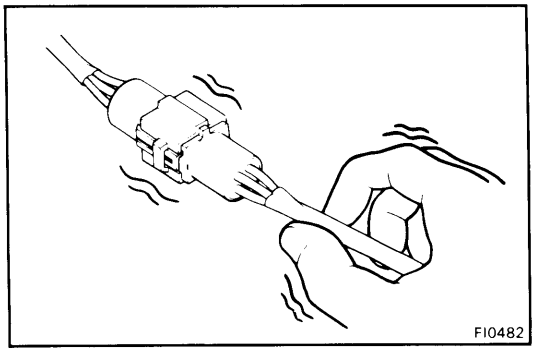
   (f) Emission control system
      - PCV system
      - EGR system

   (g) Others
      - Ignition timing
      - Idle speed
      - etc.

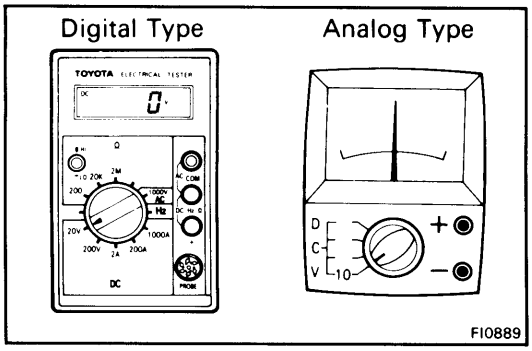


2. The most frequent cause of problems is simply a bad contact in wiring connectors. Always make sure that connections are secure.

   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. Sufficiently troubleshoot for other causes before replacing the ECU. The ECU is of high quality and expensive.



4. Use a volt/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting of an electrical circuit.

TROUBLESHOOTING PROCEDURES

SYMPTOM — DIFFICULT TO START OR 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
2. Fusible link

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 diagnostic code.
(See page FI-24)
→ Malfunction code →
Diagnostic code(s) (See page FI-24)

Normal Code ↓

CHECK VACUUM LEAKS IN AIR INTAKE LINE → BAD →
1. Oil filler cap
2. Oil dipstick
3. Hose connections
4. PCV hoses
5. EGR system — EGR valve stays open

OK ↓

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

OK ↓ CONTINUED ON PAGE FI-11

OK

CONTINUED FROM PAGE FI-10

CHECK IGNITION TIMING
1. Short terminals (T–E1) of check engine connector.
2. Check ignition timing.

Standard: 12° BTDC @ idle

NO → Ignition system

OK

CHECK FUEL SUPPLY TO INJECTOR
1. Fuel in tank
2. Fuel pressure in fuel line
   (1) Short terminals of fuel pump check connector.
   (2) Fuel pressure at fuel hose of fuel filter can be felt. (See page FI-41)

BAD →
1. Fuel line – Leakage – Deformation
2. Fuses
3. Circuit opening relay (See page FI-66)
4. Fuel pump (See page FI-41)
5. Fuel filter
6. Fuel pressure regulator (See page FI-49)

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-57)

OK

CHECK SPARK PLUGS
Maximum: 1.3 mm (0.051 in.)
NOTE: Check compression pressure if necessary.

NO →
1. Spark plugs
2. Compression pressure
   Minimum: 9.0 kg/cm² (128 psi, 883 kPa) at 250 rpm

NO (All Plugs WET) →
1. Injector(s) – Short circuited
2. Injector wiring between solenoid resistor and ECU short circuited
3. Cold start injector – Leakage (See page FI-46)
4. Cold start injector time switch (See page FI-68)
5. Injector – Leakage (See page FI-54)

OK

CHECK AIR VALVE
1. Disconnect air hose from air valve.
2. Check that the air valve opens when cold.

Air valve temp.: Below 20°C (68°F)

NO →
1. Air valve (See page FI-59)
2. Water hoses
3. Air hoses

OK

CHECK EFI ELECTRONIC CIRCUIT
Use VOLT/OHMMETER (See page FI-26)

NO →
1. Wiring connection
2. Power to ECU
   (1) Fusible links
   (2) Fuses
   (3) EFI main relay (See page FI-65)
3. Air flow meter (See page FI-57)
4. Water temp. sensor (See page FI-69)
5. Injection signal circuit
   (1) Injector wiring
   (2) Solenoid resistor (See page FI-67)
   (3) ECU (See page FI-72)

SYMPTOM – ENGINE OFTEN STALLS

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

→ Malfunction code(s) → Diagnostic code(s) (See page FI-24)

↓ Normal code

CHECK VACUUM LEAKS IN AIR INTAKE LINE

→ BAD →
1. Oil filler cap
2. Oil dipstick
3. Hose connections
4. PCV hoses
5. EGR system – EGR valve stays open

↓ OK

CHECK FUEL SUPPLY TO INJECTOR
1. Fuel in tank
2. Fuel pressure in fuel line
   (1) Short terminals of fuel pump check connector.
   (2) Feel pressure at fuel hose of fuel filter. (See page FI-41)

→ BAD →
1. Fuel line – Leakage – Deformation
2. Fuses
3. Circuit opening relay (See page FI-66)
4. Fuel pump (See page FI-41)
5. Fuel filter
6. Fuel pressure regulator (See page FI-49)

↓ OK

CHECK AIR FILTER ELEMENT

→ BAD → Element – Clean or replace

↓ OK

CHECK IDLE SPEED
1. Disconnect ISC VSV connector.
2. Check idle speed.

Standard: **M/T 700 rpm**
A/T 750 rpm

→ BAD → Idle speed – Adjust

↓ OK

CHECK IGNITION TIMING
1. Short terminals (T–E1) of check engine connector.
2. Check ignition timing.

Standard: **12° BTDC @ idle**

→ BAD → Ignition system

↓ OK

CHECK SPARK PLUGS
Maximum: 1.3 mm (0.051 in.)
NOTE: Check compression pressure if necessary.

→ NO →
1. Spark plugs
2. Compression pressure
   Minimum: 9.0 kg/cm² (128 psi, 883 kPa) at 250 rpm
3. Injector – Leakage (See page FI-54)

↓ OK

CONTINUED ON PAGE FI-13

OK CONTINUED FROM PAGE FI-12

CHECK COLD START INJECTOR
(See page FI-46)

BAD →
1. Cold start injector (See page FI-46)
2. Cold start injector time switch (See page FI-68)

OK

CHECK AIR VALVE (See page FI-59)
1. Disconnect air hose from air valve.
2. Check that the air valve opens when cold.
   Air valve temp.: Below 20°C (68°F)

BAD →
1. Air valve (See page FI-59)
2. Water hoses
3. Air hoses

OK

RECHECK FUEL PRESSURE
(See page FI-41)

BAD →
1. Fuel pump (See page FI-41)
2. Fuel filter
3. Fuel pressure regulator (See page FI-49)

OK

CHECK INJECTORS
(See page FI-51)

BAD → Injection condition (See page FI-51)

OK

CHECK EFI ELECTRONIC CIRCUIT
Use VOLT/OHMMETER (See page FI-26)

BAD →
1. Wiring connection
2. Power to ECU
   (1) Fusible links
   (2) Fuses
   (3) EFI main relay (See page FI-65)
   (4) Circuit opening relay (See page FI-66)
3. Air flow meter (See page FI-57)
4. Water temp. sensor (See page FI-69)
5. Injection signal circuit
   (1) Injector wiring
   (2) Solenoid resistor (See page FI-67)
   (3) ECU (See page FI-72)

SYMPTOM – ENGINE SOMETIMES STALLS

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

Malfunction code → Diagnostic code(s) (See page FI-24)

Normal code ↓

CHECK AIR FLOW METER
(See page FI-57)

BAD → Air flow meter (See page FI-57)

OK ↓

CHECK WIRING CONNECTORS AND RELAYS
Check that there is a signal change when the connector or relay is slightly tapped or wiggled.

BAD →
1. Connector
2. EFI main relay (See page FI-65)
3. Circuit opening relay (See page FI-66)

SYMPTOM – ROUGH IDLING AND/OR MISSING

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

Malfunction code → Diagnostic code(s) (See page FI-66)

Normal code ↓

CHECK VACUUM LEAKS IN AIR INTAKE LINE

BAD →
1. Oil filler cap
2. Oil dipstick
3. Hose connections
4. PCV hoses
5. EGR system – EGR valve stays open

OK ↓

CHECK AIR FILTER ELEMENT

BAD → Element – Clean or replace

OK ↓

CHECK IDLE SPEED
1. Disconnect ISC VSV connector.
2. Check idle speed.

STD: M/T 700 rpm
A/T 750 rpm

BAD → Idle speed – Adjust

OK ↓

CHECK IGNITION TIMING
1. Short terminals (T–E1) of check engine connector.
2. Check ignition timing.

STD: 12° BTDC @ idle

BAD → Ignition system

OK ↓ CONTINUED ON PAGE FI-15

OK CONTINUED FROM PAGE FI-14

CHECK SPARK PLUGS
Maximum: 1.3 mm (0.051 in.)
NOTE: Check compression pressure if necessary.

BAD →
1. Spark plugs
2. Compression pressure
   Minimum: 9.0 kg/cm² (128 psi, 883 kPa) at 250 rpm

OK

CHECK COLD START INJECTOR
(See page FI-46)

BAD →
1. Cold start injector (See page FI-46)
2. Cold start injector time switch. (See page FI-68)

OK

CHECK FUEL PRESSURE
(See page FI-41)

BAD →
1. Fuel pump (See page FI-41)
2. Fuel filter
3. Fuel pressure regulator (See page FI-49)

OK

CHECK INJECTORS
(See page FI-51)

BAD → Injection condition (See page FI-51)

OK

CHECK EFI ELECTRONIC CIRCUIT
Use VOLT/OHMMETER
(See page FI-26)

BAD →
1. Wiring connection
2. Power to ECU
   (1) Fusible links
   (2) Fuses
   (3) EFI main relay (See page FI-65)
3. Air flow meter (See page FI-57)
4. Water temp. sensor (See page FI-69)
5. Air temp. sensor (See page FI-57)
6. Throttle position sensor (See page FI-63)
7. Injection signal circuit
   (1) Injector wiring
   (2) Solenoid resistor (See page FI-67)
   (3) ECU (See page FI-72)
8. Oxygen sensor (See page FI-70)

SYMPTOM — HIGH ENGINE IDLE SPEED (NO DROP)

CHECK ACCELERATOR LINKAGE → BAD → Linkage — Stuck

OK

CHECK AIR VALVE
(See page FI-58) → BAD → Air valve — Always open

OK

CHECK AIR CONDITIONER IDLE-UP CIRCUIT → BAD → Air valve for air conditioner — Leakage
VSV for A/C — Leakage
Water temperature switch — Short

OK

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

Normal code

CHECK FUEL PRESSURE
(See page FI-41) → BAD → Fuel pressure regulator — High pressure

OK

CHECK COLD START INJECTOR
(See page FI-46) → BAD → Cold start injector — Leakage
(See page FI-46)

OK

CHECK INJECTORS (See page FI-51) → BAD → Injectors — Leakage (See page FI-51)

OK

CHECK EFI ELECTRONIC CIRCUIT
Use VOLT/OHMMETER
(See page FI-26) → BAD →

1. Wiring connection
2. Power to ECU
   (1) Fusible links
   (2) Fuses
   (3) EFI main relay (See page FI-65)
3. Air flow meter (See page FI-57)
4. Water temp. sensor (See page FI-69)
5. Air temp. sensor (See page FI-57)
6. Injection signal circuit
   (1) Injector wiring
   (2) Solenoid resistor (See page FI-67)
   (3) ECU (See page FI-72)

SYMPTOM — ENGINE BACKFIRES-Lean Fuel Mixture

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

Malfunction code → Diagnostic code(s) (See page FI-24)

Normal code ↓

CHECK VACUUM LEAKS IN AIR INTAKE LINE

BAD → 1. Oil filler cap
2. Oil dipstick
3. Hose connections
4. PCV hoses
5. EGR system – EGR valve stays open

OK ↓

CHECK IDLE SPEED
1. Disconnect ISC VSV connector.
2. Check idle speed.

Standard: M/T 700 rpm
A/T 750 rpm

BAD → Idle speed – Adjust

OK ↓

CHECK IGNITION TIMING
1. Short terminals (T–E1) of check engine connector.
2. Check ignition timing.

Standard: 12° BTDC @ idle

BAD → Ignition system

OK ↓

CHECK COLD START INJECTOR
(See page FI-46)

BAD → 1. Cold start injector (See page FI-46)
2. Cold start injector time switch (See page FI-68)

OK ↓

CHECK FUEL PRESSURE
(See page FI-41)

BAD → 1. Fuel pump (See page FI-41)
2. Fuel filter
3. Fuel pressure regulator (See page FI-49)

OK ↓

CHECK INJECTORS
(See page FI-51)

BAD → Injectors – Clogged

OK ↓

CONTINUED ON PAGE FI-18

OK CONTINUED FROM PAGE FI-17

CHECK EFI ELECTRONIC CIRCUIT
Use VOLT/OHMMETER
(See page FI-26)

BAD →
1. Wiring connection
2. Power to ECU
   (1) Fusible links
   (2) Fuses
   (3) EFI main relay (See page FI-65)
3. Air flow meter (See page FI-57)
4. Water temp. sensor (See page FI-69)
5. Air temp. sensor (See page FI-57)
6. Throttle position sensor (See page FI-63)
7. Injection signal circuit
   (1) Injection wiring
   (2) Solenoid resistor (See page FI-67)
   (3) ECU (See page FI-72)
   (4) Fuel cut RPM (See page FI-74)
8. Oxygen sensor (See page FI-70)

SYMPTOM — MUFFLER EXPLOSION (AFTER FIRE)- Rich Fuel Mixture-Misfire

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

Malfunction code → Diagnostic codes (See page FI-24)

Normal code

CHECK IDLE SPEED
1. Disconnect the ISC VSV connector.
2. Check idle speed.

Standard: **M/T 700 rpm**
A/T 750 rpm

BAD → Idle speed – Adjust

OK

CHECK IGNITION TIMING
1. Short terminals (T–E1) of check engine connector.
2. Check ignition timing.

Standard: **12° BTDC @ idle**

BAD → Ignition system

OK

CHECK COLD START INJECTOR
(See page FI-46)

BAD →
1. Cold start injector (See page FI-46)
2. Cold start injector time switch (See page FI-68)

OK

CHECK INJECTORS
(See page FI-51)

BAD → Injectors – Leakage (See page FI-51)

OK CONTINUED ON PAGE FI-19

OK CONTINUED FROM PAGE FI-18

CHECK SPARK PLUGS
Maximum: 1.3 mm (0.051 in.)
NOTE: Check compression pressure if necessary.

NO →
1. Spark plug
2. Compression pressure
   Minimum: 9.0 kg/cm² (128 psi, 883 kPa) at 250 rpm

OK

CHECK EFI ELECTRONIC CIRCUIT
Use VOLT/OHMMETER
(See page FI-26)

BAD →
1. Throttle position sensor (See page FI-63)
2. Injection signal circuit
   (1) Fuel cut RPM (See page FI-74)
   (2) Injector wiring
   (3) Solenoid resistor (See page FI-67)
   (4) ECU (See page FI-72)
3. Oxygen sensor (See page FI-70)

SYMPTOM — ENGINE HESITATES AND/OR POOR ACCELERATION

CHECK CLUTCH, BRAKE

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

OK

CHECK FOR VACUUM LEAKS IN AIR INTAKE LINE

BAD →
1. Oil filler cap
2. Oil dipstick
3. Hose connections
4. PCV hoses
5. EGR system — EGR valve stays open

OK

CHECK AIR FILTER ELEMENT

BAD → Element — Clean or replace

OK

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

Malfunction code → Diagnostic codes (See page FI-24)

OK

CHECK IGNITION SPARK
(See page IG-4)

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

OK CONTINUED ON PAGE FI-20

OK CONTINUED FROM PAGE FI-19

CHECK IGNITION TIMING
1. Short terminals (T−E1) of check engine connector.
2. Check ignition timing.
Standard: 12° BTDC @ idling

BAD → Ignition system

OK

CHECK FUEL PRESSURE
(See page FI-41)

BAD →
1. Fuel pump (See page FI-41)
2. Fuel filter
3. Fuel pressure regulator (See page FI-49)

OK

CHECK INJECTORS
(See page FI-51)

BAD → Injection condition (See page FI-51)

OK

CHECK SPARK PLUGS
Maximum: 1.3 mm (0.051 in.)
NOTE: Check compression pressure if necessary.

BAD →
1. Spark plugs
2. Compression pressure
Minimum: 9.0 kg/cm² (128 psi, 883 kPa) at 250 rpm

OK

CHECK EFI ELECTRONIC CIRCUIT
Use VOLT/OHMMETER
(See page FI-26)

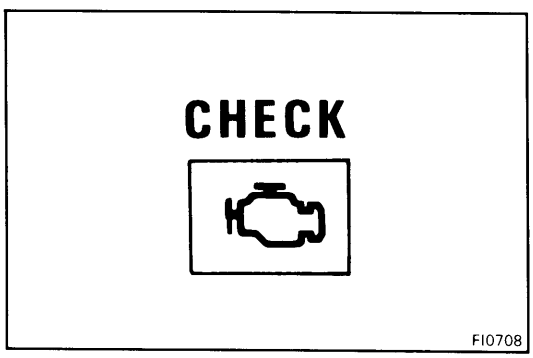
BAD →
1. Wiring connection
2. Power to ECU
   (1) Fusible links
   (2) Fuses
   (3) EFI main relay (See page FI-65)
3. Air flow meter (See page FI-57)
4. Water temp. sensor (See page FI-69)
5. Air temp. sensor (See page FI-57)
6. Throttle position sensor (See page FI-63)
7. Injection signal circuit
   (1) Injector wiring
   (2) Solenoid resistor (See page FI-67)
   (3) ECU (See page FI-72)

DIAGNOSIS SYSTEM

Description

By analyzing various signals as shown in the later table (See page FI-24) the ECU detects system malfunctions which are related to the various operating parameter sensors or to the actuator. The ECU stores the failure code associated with the detected failure until the diagnostic 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 out automatically when the malfunction has been cleared.



"CHECK" ENGINE WARNING LIGHT CHECK

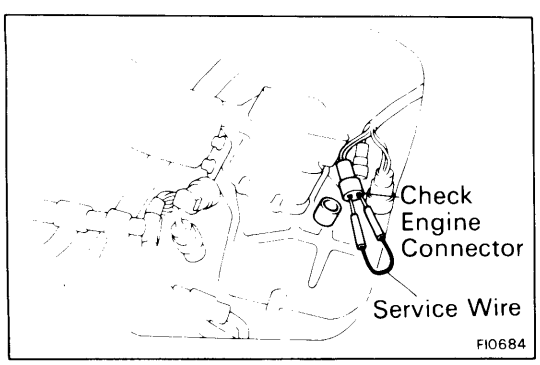
1. The "CHECK" engine warning light will come on when the ignition switch is placed at ON and the engine is not running.
2. When the engine is started, the "CHECK" engine warning light should go out.

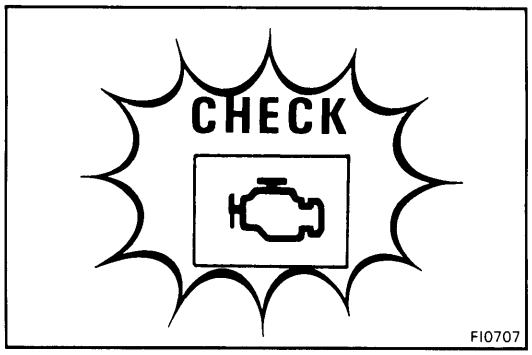
   If the light remains on, the diagnosis system has detected a malfunction or abnormality in the system.

OUTPUT OF DIAGNOSTIC CODES

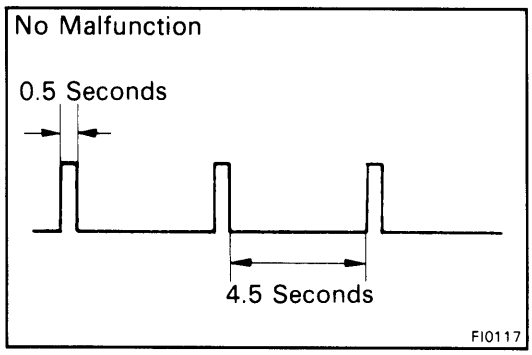
To obtain an output of diagnostic codes, proceed as follows:

1. Initial conditions:
   (a) Battery voltage above 11 volts
   (b) Throttle valve fully closed (throttle position sensor IDL points closed)
   (c) Accessory switches OFF
   (d) Engine at normal operating temperature
   (e) A/C switch OFF
2. Turn the ignition switch to ON. Do not start the engine.
3. Short terminals (T–E1) of the check engine connector with a service wire.



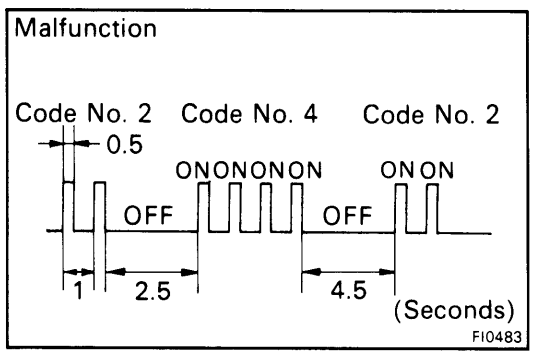


4. Read the diagnostic code as indicated by the number of flashes of the "CHECK" engine warning light.



Diagnostic code (See page FI-24)

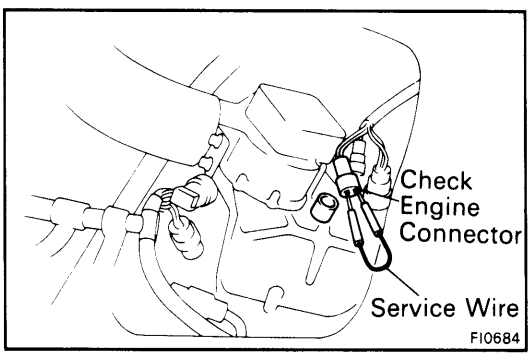
(a) Normal System Operation (code No. 1) (no malfunction)
The light will blink once every 4.5 seconds.



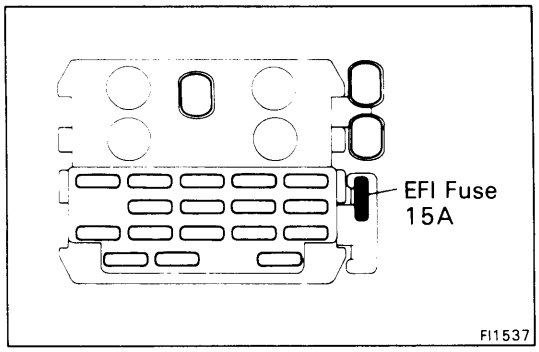
(b) Malfunction Code Indication
The light will blink a number of times equal to the malfunction code indication with a 2.5 second interval between each indication.

The diagnostic code series will be repeated as long as the check engine connector terminals (T−E1) are shorted.

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



5. After the diagnosis check, remove the service wire and install the cap to the check engine connector.



CANCELLING DIAGNOSTIC CODE

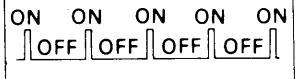
1. After repair of the trouble area, the diagnostic code retained in memory by the ECU must be cancelled out by removing the Fuse EFI (15A) for 10 seconds or more, depending on ambient temperature (the lower the temperature, the longer the fuse must be left out) with the ignition switch off.

NOTE:
- Cancellation can also be done by removing the battery negative (−) terminal, but in this case other memory systems (radio ETR, 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.

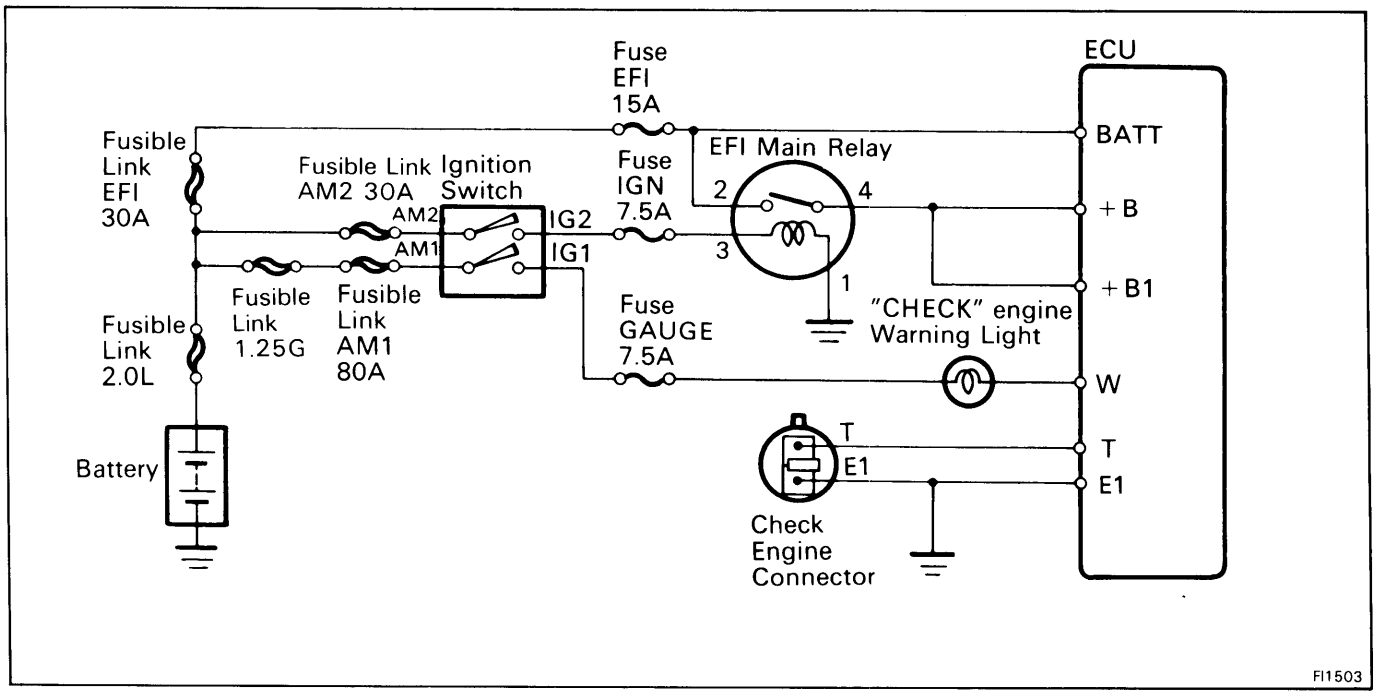
2. After cancellation road test the vehicle, to check that the "normal" code (No. 1) appears on the "CHECK" engine warning light.

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

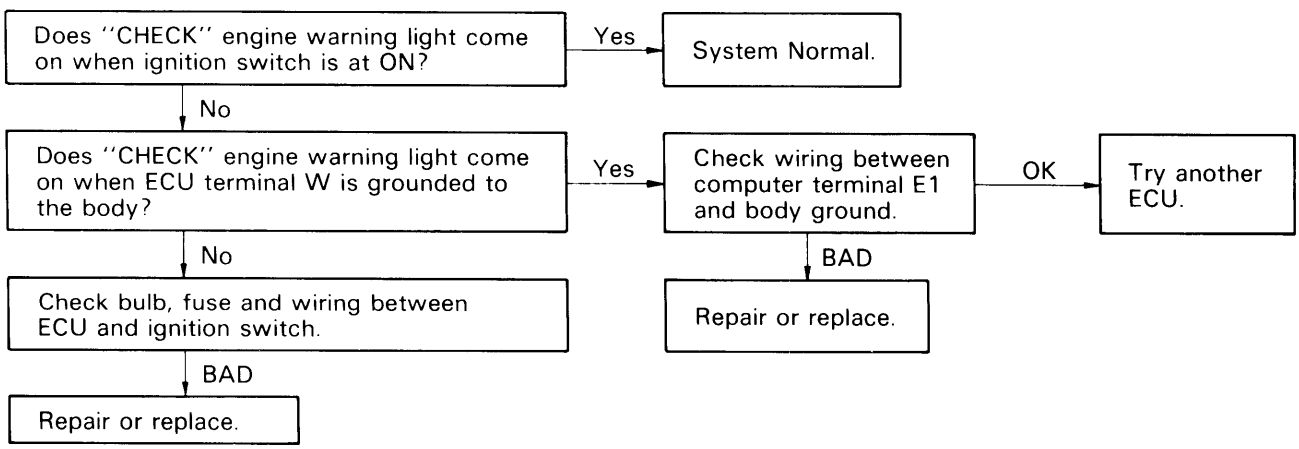
DIAGNOSTIC CODES

Code No.	Number of CHECK ENGINE blinks	System	Diagnosis	Trouble area	See Page
1	 FI0840	Normal	This appears when none of the other codes (2 thru 11) are identified.	—	—
2	 FI0841	Air flow meter signal	• VC circuit open or VS–E2 short circuited. • E2 circuit open or VC–VS short circuited.	1. Air flow meter circuit 2. Air flow meter 3. ECU	FI-36
3	 FI0842	Ignition signal	No signal from igniter four times in succession.	1. Ignition circuit (+B, IGF, IGT) 2. Igniter 3. ECU	FI-32
4	 FI0843	Water temp. sensor signal	Open or short circuit in water temp. sensor signal.	1. Water temp. sensor circuit 2. Water temp. sensor 3. ECU	FI-38
5	 FI0844	Oxygen sensor signal	Open circuit in oxygen sensor signal (only lean indication).	1. Oxygen sensor circuit 2. Oxygen sensor 3. ECU	—
6	FI0845	RPM signal	No Ne signal to ECU while cranking, or Ne value over 1,500 rpm in spite of no Ne signal to ECU.	1. Distributor circuit 2. Distributor 3. Igniter 4. Starter signal circuit 5. ECU	FI-32
7	 FI0846	Throttle position sensor signal	Open or short circuit in throttle position sensor signal.	1. Throttle position sensor circuit 2. Throttle position sensor 3. ECU	FI-31
8	 FI0847	Intake air temp. sensor signal	Open or short circuit in intake air temperature sensor.	1. Air temp. sensor circuit 2. ECU	FI-37
9	 FI0848	Vehicle speed sensor signal	No signal for over 8 seconds when vehicle is travelling 0 km/h and engine running between 2,800 — 4,500 rpm	1. Vehicle speed sensor circuit 2. Vehicle sensor 3. ECU	—
10	 FI0849	Starter signal	No STA signal to ECU when vehicle stopped and engine running over.	1. Starter relay circuit 2. IG switch circuit (starter) 3. IG Switch 4. ECU	FI-33
11	 FI0850	Switch signal	Air conditioner switch ON, idle switch OFF.	1. Air conditioner switch 2. Throttle position sensor circuit 3. Throttle position sensor 4. Neutral start switch 5. ECU	—

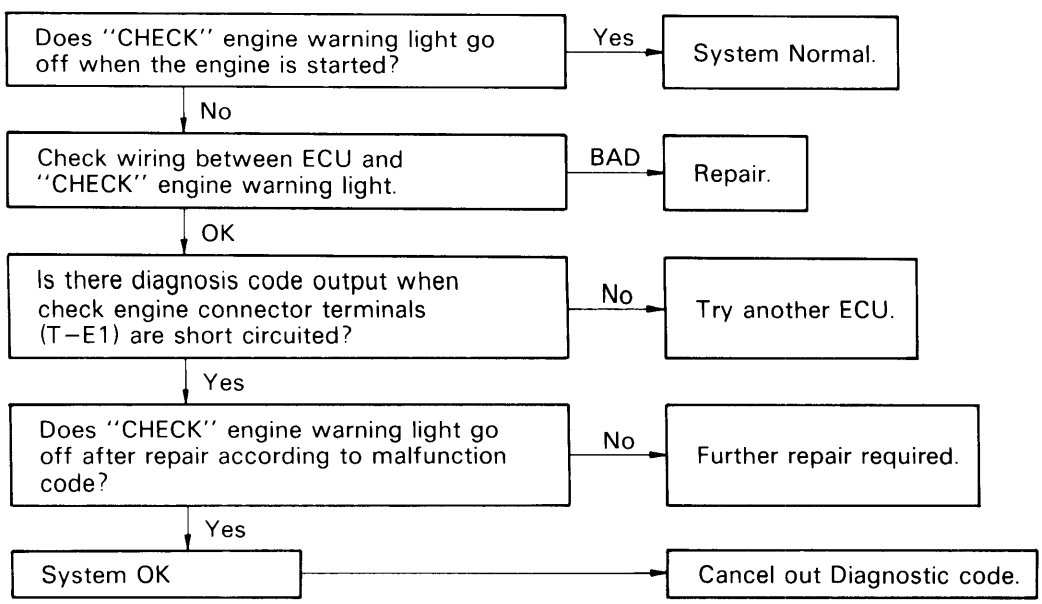
INSPECTION OF DIAGNOSIS CIRCUIT



1.



2.



TROUBLESHOOTING WITH VOLT/OHMMETER

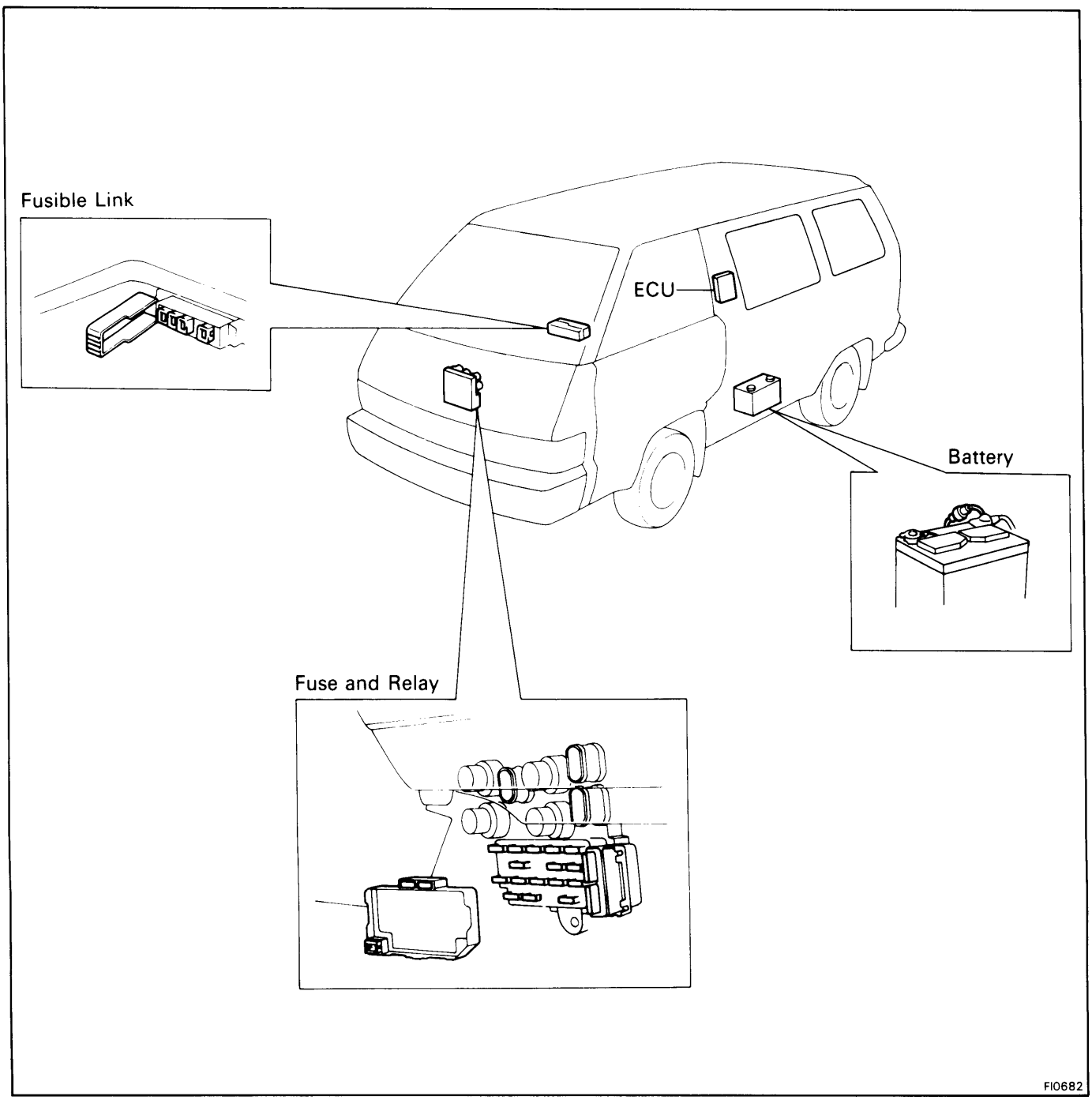
NOTE: The following troubleshooting procedures are designed for inspection of each separate system, and therefore the actual procedure may vary somewhat. However, troubleshooting should be performed referring to the inspection methods described in this manual.

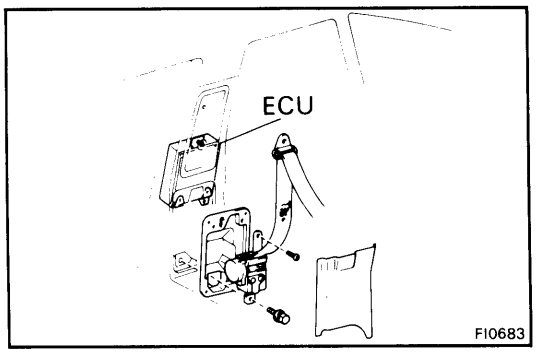
Before beginning inspection, it is best to first make a simple check of the fuses, fusible links and the condition of the connectors.

The following troubleshooting procedures are based on the supposition that the trouble lies in either a short or open circuit in a component outside the computer or a short circuit within the computer.

If engine trouble occurs even though proper operating voltage is detected in the computer connector, then that the ECU is faulty and should be replaced.

LOCATION OF FUSES AND FUSIBLE LINKS

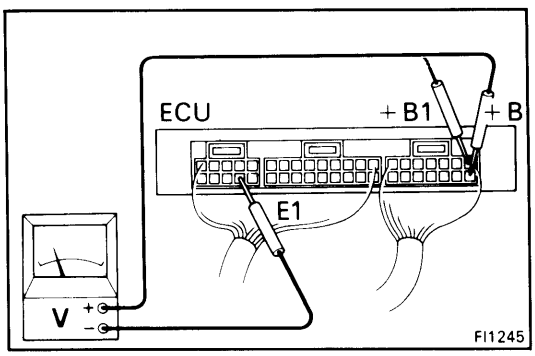




PREPARATION

(a) Remove the center pillar garnish.

(b) Remove the seat belt retractor.



EFI SYSTEM CHECK PROCEDURE

NOTE:

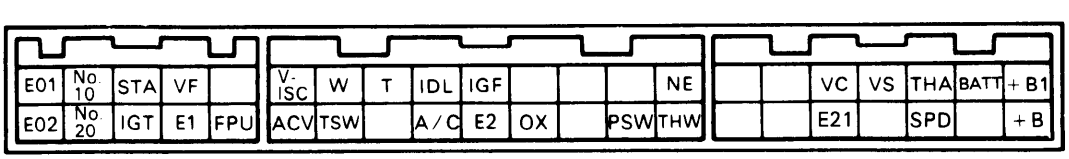
- Perform all voltage measurements with the connectors connected.
- Verify that the battery voltage is 11V or above when the ignition switch is at ON.

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

Terminals of ECU

Symbol	Terminal Name	Symbol	Terminal Name
E01	ENGINE GROUND	A/C	A/C MAGNET CLUTCH
E02	ENGINE GROUND	IGF	IGNITER
No. 10	INJECTOR	E2	SENSOR GROUND
No. 20	INJECTOR	OX	OXYGEN SENSOR
STA	STARTER SWITCH	PSW	THROTTLE POSITION SENSOR
IGT	IGNITER	NE	ENGINE REVOLUTION SENSOR
VF	EFI CHECK CONNECTOR	THW	WATER TEMP. SENSOR
E1	ENGINE GROUND	VC	AIR FLOW METER
FPU	EFI VSV	E21	SENSOR GROUND
V-ISC	ISC VSV	VS	AIR FLOW METER
ACV	A/C VSV	THA	AIR TEMP. SENSOR
W	CHECK ENGINE WARNING LIGHT	SPD	SPEED SENSOR
TSW	WATER TEMP. SWITCH	BATT	BATTERY
T	CHECK ENGINE CONNECTOR	+B1	MAIN RELAY
IDL	THROTTLE POSITION SENSOR	+B	MAIN RELAY

ECU Terminals

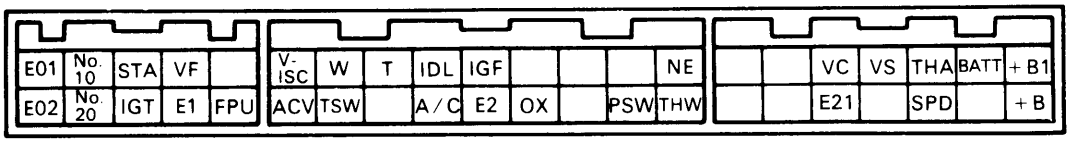


Voltage at ECU Wiring Connectors

[USA]

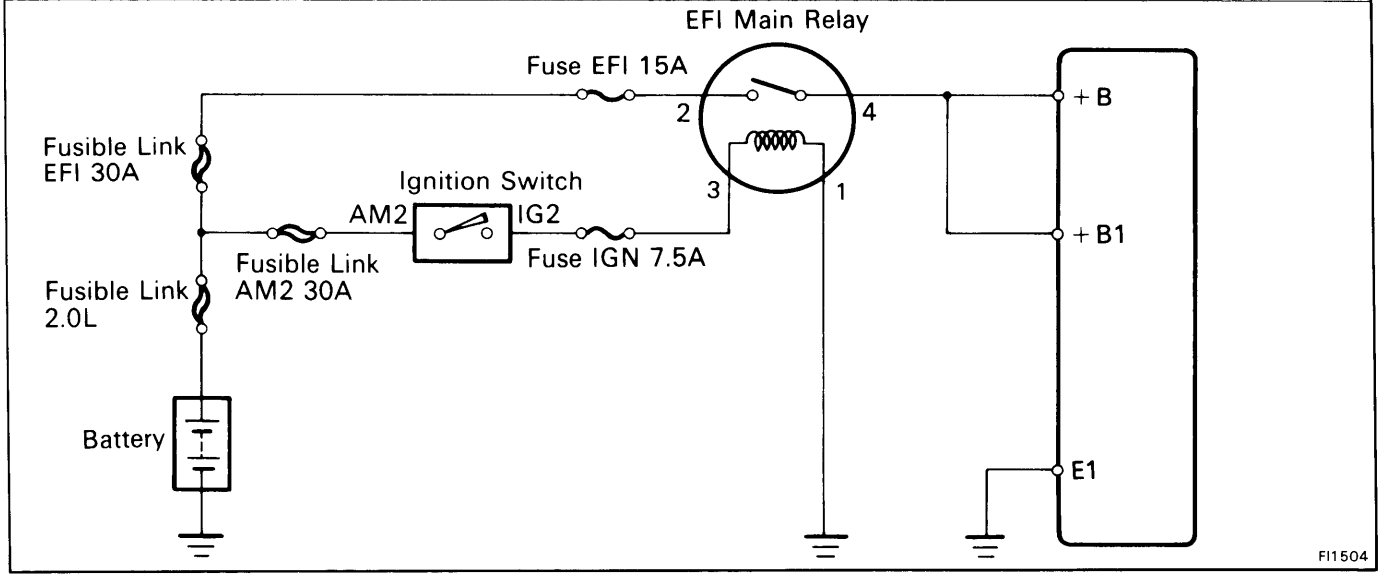
No.	Terminals	STD voltage	Condition		See page
1	+B, +B1 – E1	10 – 14	Ignition switch ON		FI-29
2	BATT – E1	10 – 14	——		FI-30
3	IDL – E1	8 – 14	Ignition switch ON	Throttle valve open	FI-31
	PSW – E1	8 – 14		Throttle valve fully closed	
4	IGT – E1	0.7 – 1.0	Idling		FI-32
5	STA – E1	6 – 12	Cranking		FI-33
6	No. 10, No. 20 – E01, E02	9 – 14	Ignition switch ON		FI-34
7	W – E1	8 – 14	No trouble ("CHECK" engine warning light off) and engine running		FI-35
8	VC – E2	6 – 10	Ignition switch ON	——	FI-36
	VS – E2	0.5 – 2.5		Measuring plate fully closed	
		5 – 10		Measuring plate fully open	
		2 – 8			
9	THA – E2	1 – 3	Ignition switch ON	Intake air temperature 20°C (68°F)	FI-37
10	THW – E2	0.5 – 2.5	Ignition switch ON	Coolant temperature 80°C (176°F)	FI-38
11	A/C – E1	8 – 14	Ignition switch ON	A/C ON	FI-39

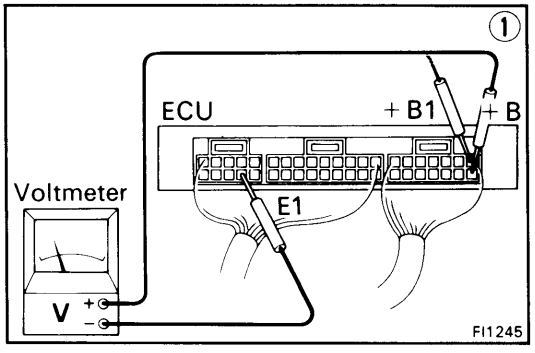
ECU Terminals

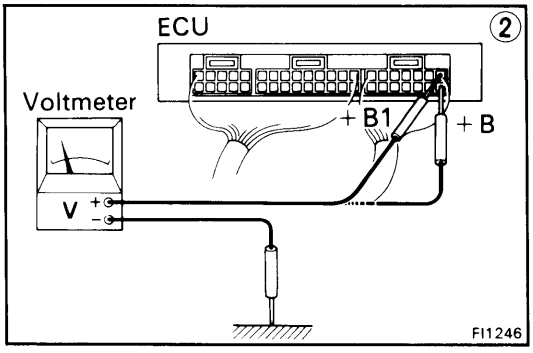


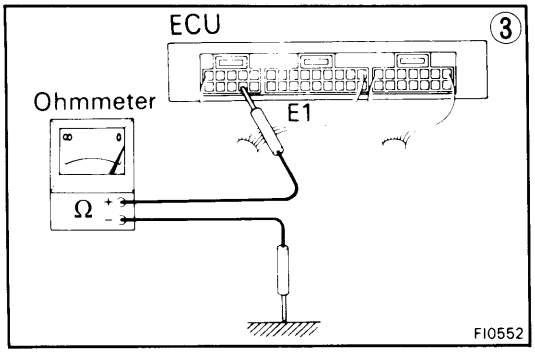
FI0605

No.	Terminals	Trouble	Condition	STD Voltage
1	+B +B1 — E1	No voltage	Ignition S/W ON	19 – 14 V









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

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

NO → OK

③ Check wiring between ECU terminal E1 and body ground.

OK → Try another ECU.

BAD → Repair or replace.

Check fuses, fusible links and ignition switch. BAD → Repair or replace.

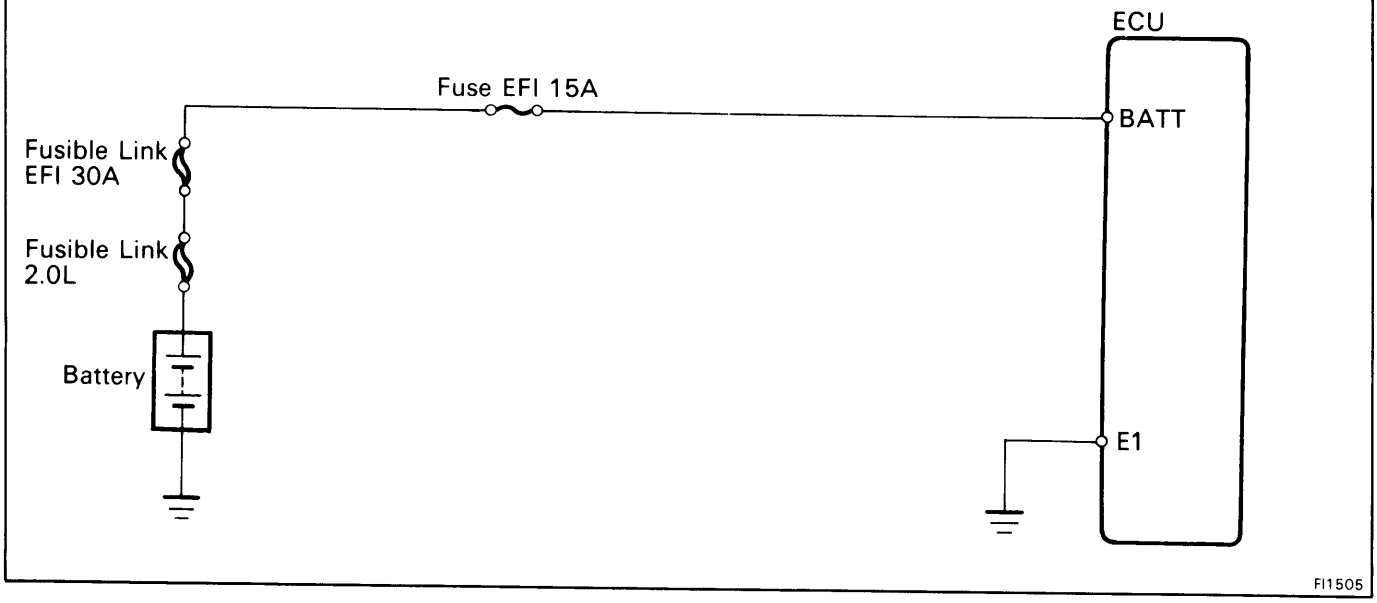
OK

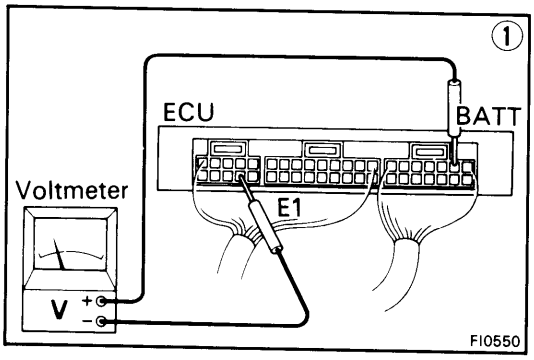
Check EFI main relay. BAD → Replace.

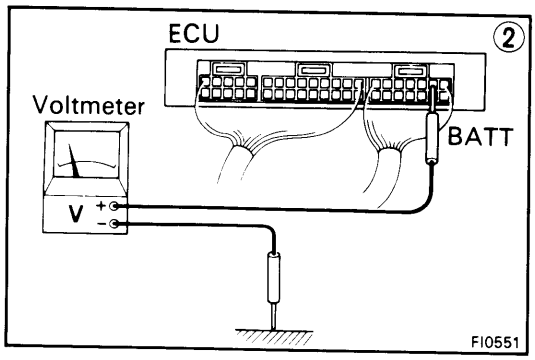
OK

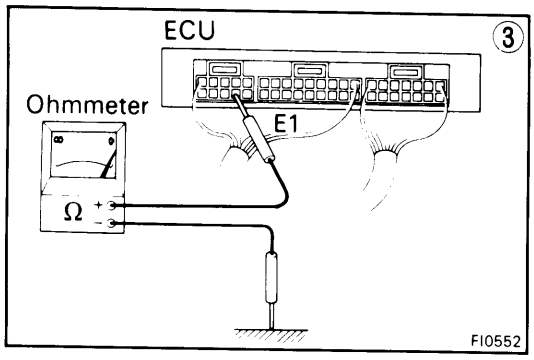
Check wiring between EFI main and relay and battery. BAD → Repair or replace.

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 links.

BAD

Replace.

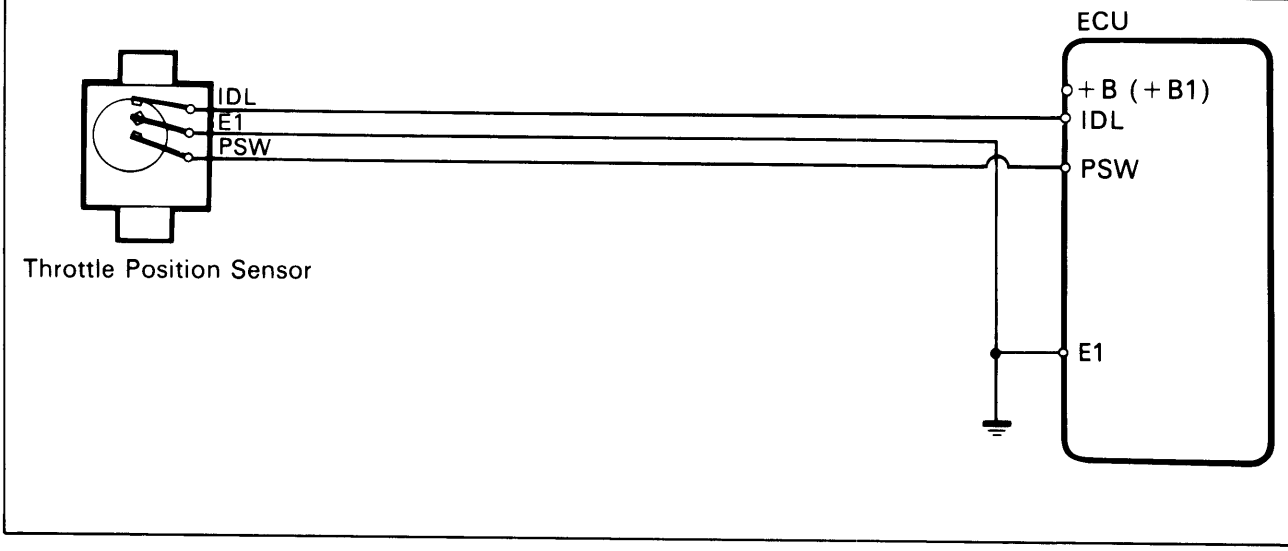
OK

Check wiring between ECU terminal and battery.

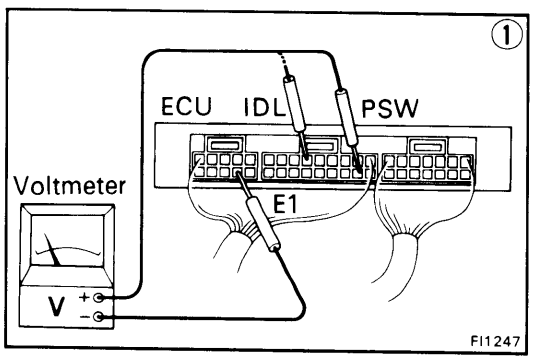
BAD

Repair or replace.

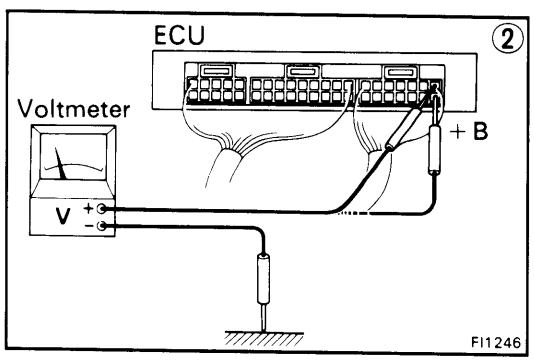
No.	Terminals	Trouble	Condition		STD Voltage
3	IDL – E1	No voltage	IG S/W ON	Throttle valve open	8 – 14 V
	PSW – E1			Throttle valve fully closed	8 – 14 V



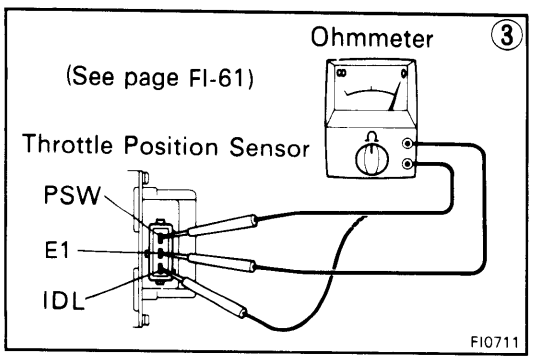
FI1259



FI1247



FI1246



FI0711

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

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

NO

OK

Check wiring between ECU terminal E1 and body ground.

BAD

Repair or replace.

Refer to No. 1. (See page FI-29)

BAD

Repair or replace.

OK

③ Check throttle position sensor

BAD

OK

BAD

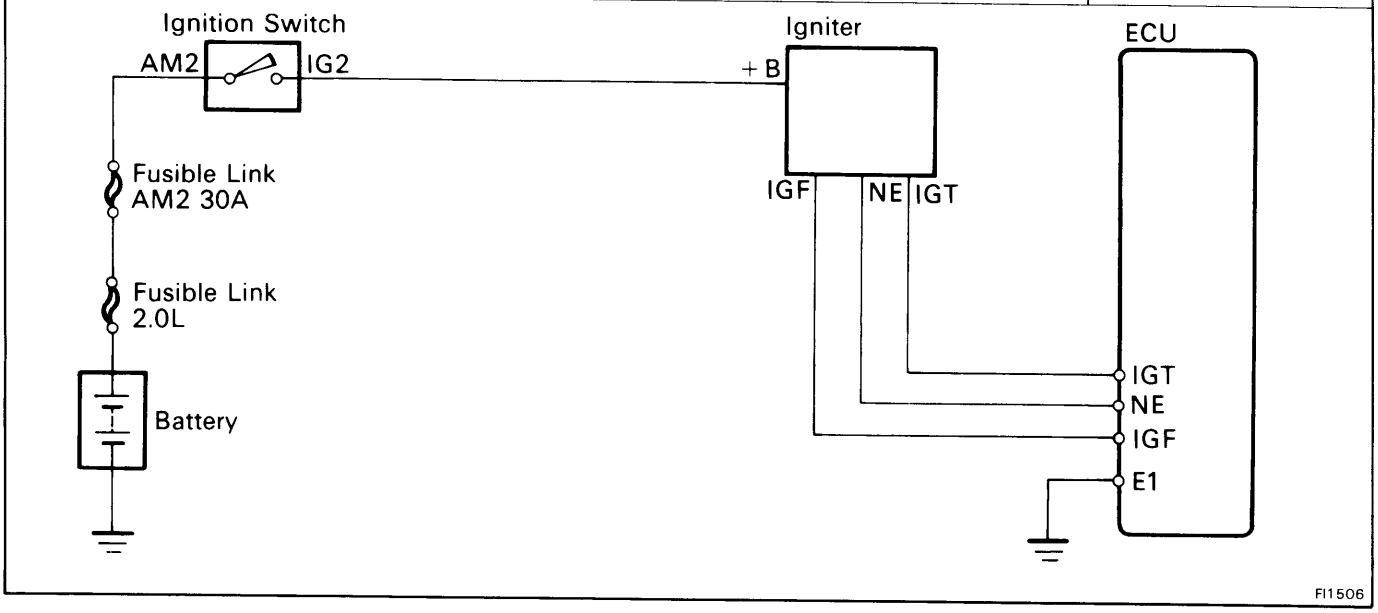
Replace throttle position sensor and throttle body assembly.

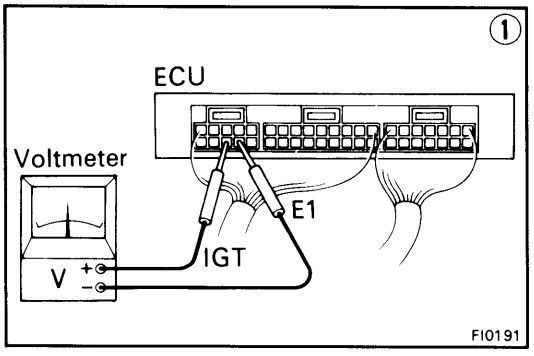
Check wiring between ECU and throttle position sensor.

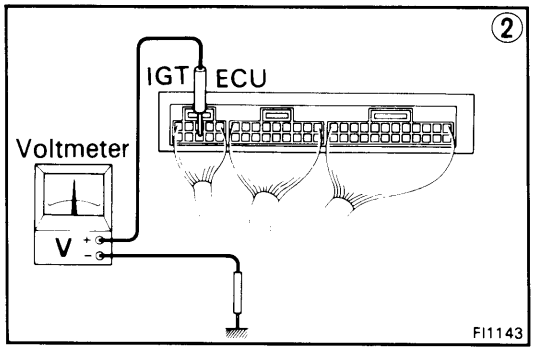
OK

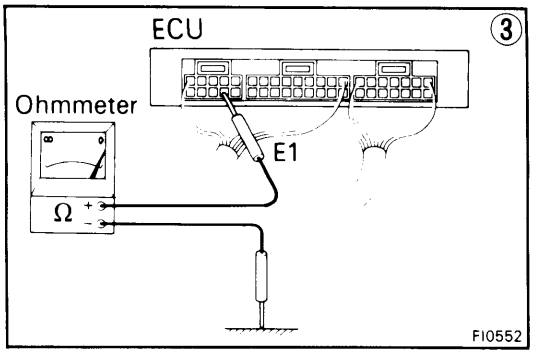
Try another ECU.

No.	Terminals	Trouble	Condition	STD Voltage
4	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

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-7) — BAD → Repair or replace.

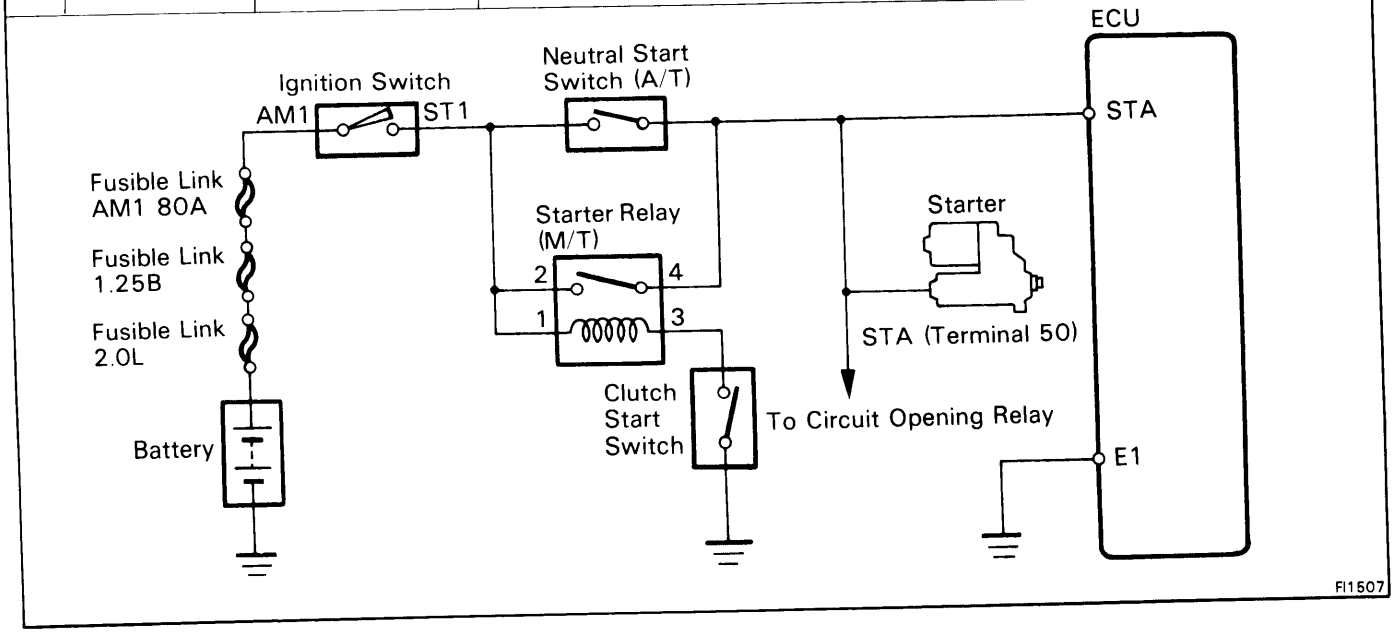
OK

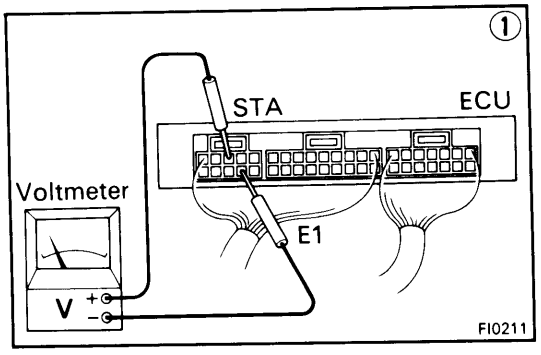
Check wiring between ECU and battery. — BAD → Repair or replace.

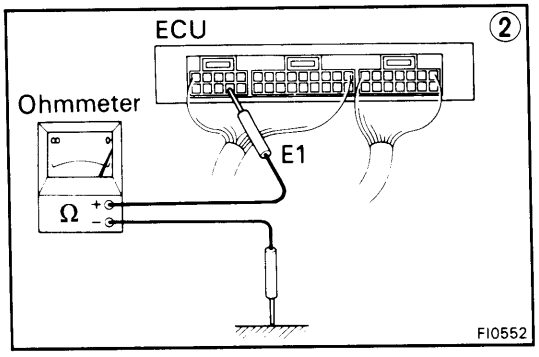
OK

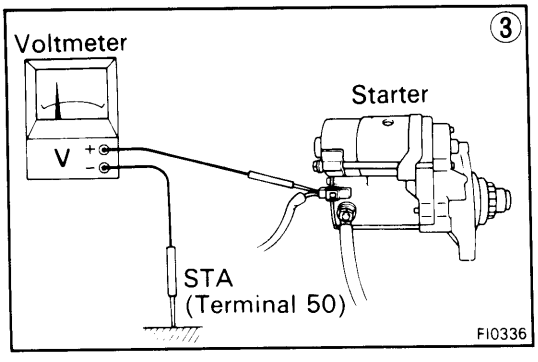
Check igniter. (See page IG-7) — BAD → Repair or replace.

No.	Terminals	Trouble	Condition	STD Voltage
5	STA – E1	No voltage	Cranking	6 – 12 V





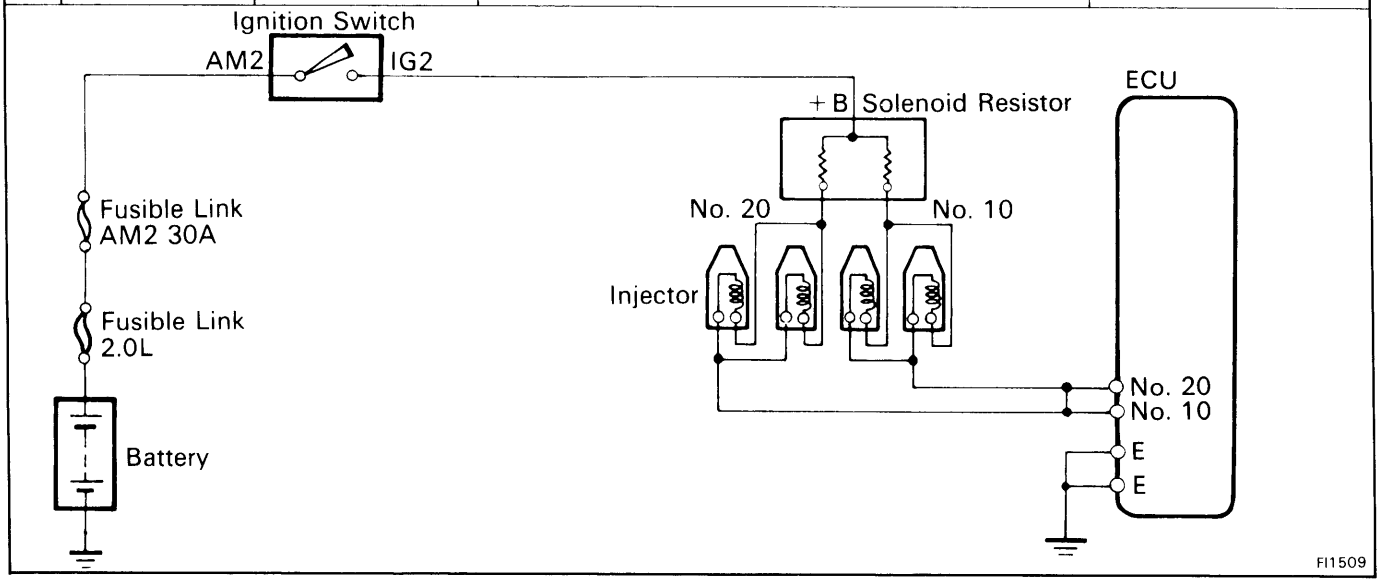


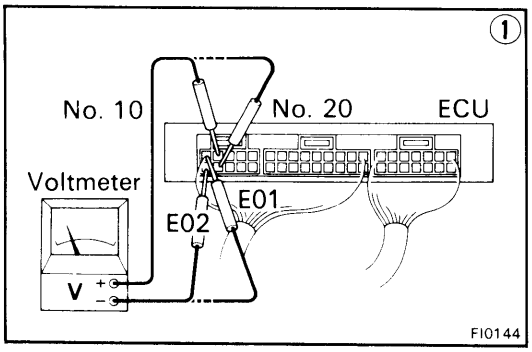


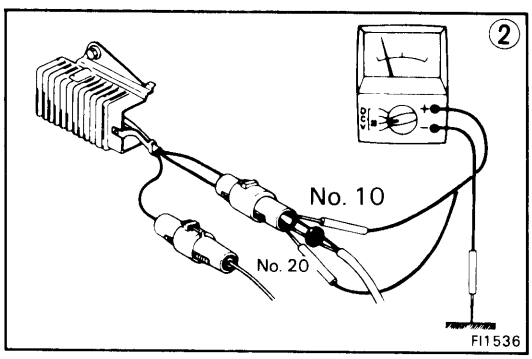
① There is no voltage between ECU terminals STA and E1. **(IG S/W START)**

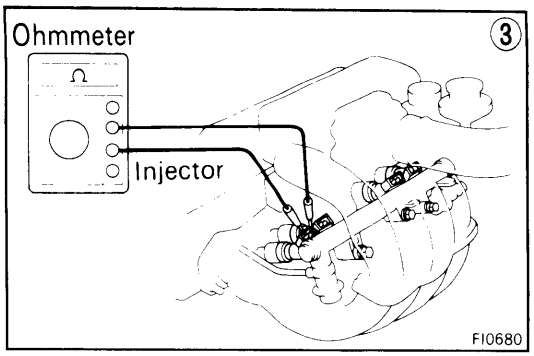
Check starter operation.
- OK → Check wiring between ECU terminal STA and ignition switch terminal ST1.
  - OK → ② Check wiring between ECU terminal E1 and body ground.
    - OK → Try another ECU.
    - BAD → Repair or replace.
  - BAD → Repair or replace.
- BAD → Check fusible link, battery, wiring, 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 S/W START)** **STD voltage: 6 – 12 V**
    - OK → Check starter.
    - NO → Check wiring between ignition switch terminal ST1 and starter terminal STA (50).

No.	Terminals	Trouble	Condition	STD Voltage
6	No.10 – E01 No.20 – E02	No voltage	IG S/W ON	9 – 14 V









① No voltage between ECU terminal No. 10 and/or No. 20 and E01 and/or E02. **(IG S/W ON)**

② Check that there is specified voltage between solenoid resistor terminal +B and body ground. **STD voltage: 9–14 V**

OK → ② Check that there is specified voltage between resistor terminal (No.10 or No.20) and body ground. **STD voltage: 9–14 V**

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

② OK → ③ Check resistance of magnetic coil in each injector. **STD resistance: 1.5–3.0 Ω**

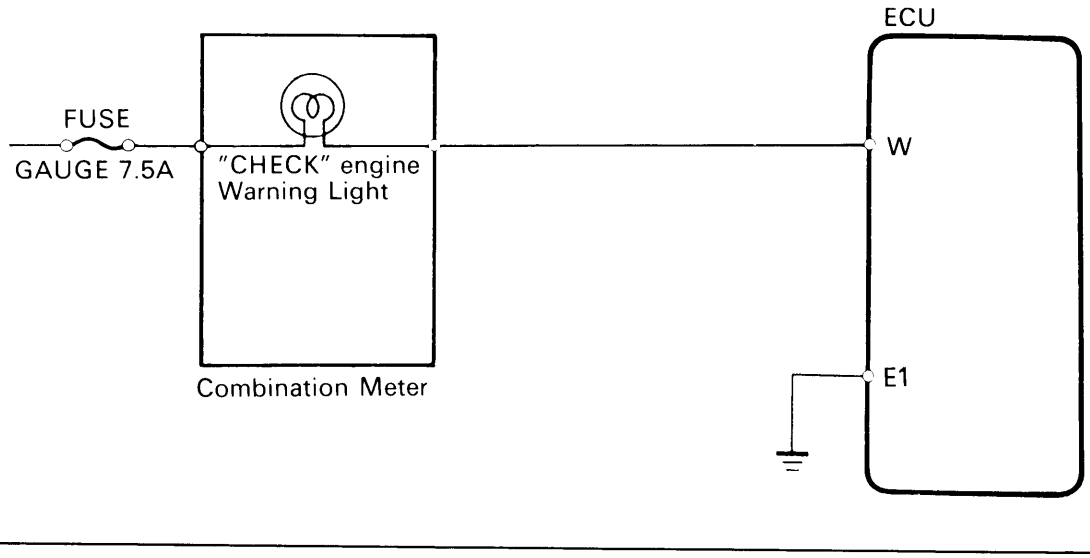
② NO → Replace resistor.

③ OK → Check wiring between ECU and resistor. BAD → Repair or replace wiring.

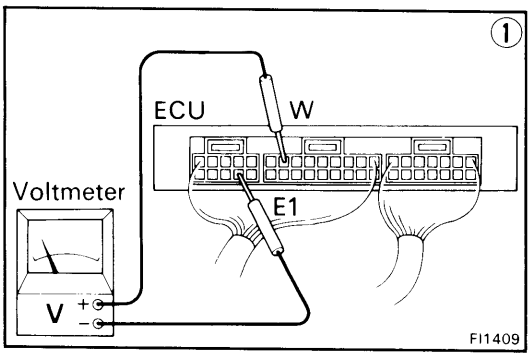
③ BAD → Replace injector.

Check wiring between ECU and resistor. OK → Try another ECU.

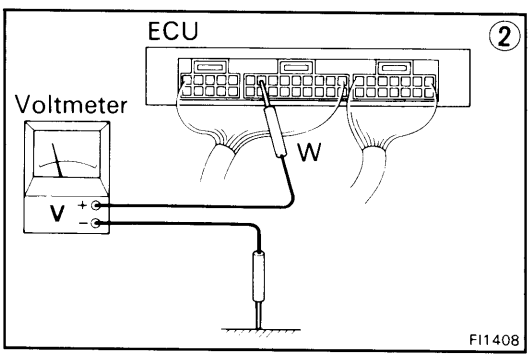
No.	Terminals	Trouble	Condition	STD Voltage
7	W – E1	No voltage	No trouble ("CHECK" engine warning light off) and Engine running	8 – 14 V



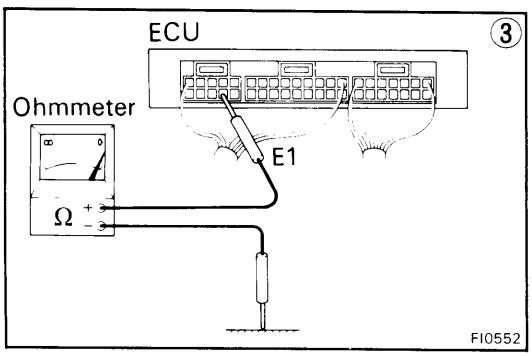
FI0728



FI1409



FI1408



FI0552

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 (7.5A) and "CHECK" engine warning light.

OK → ↓

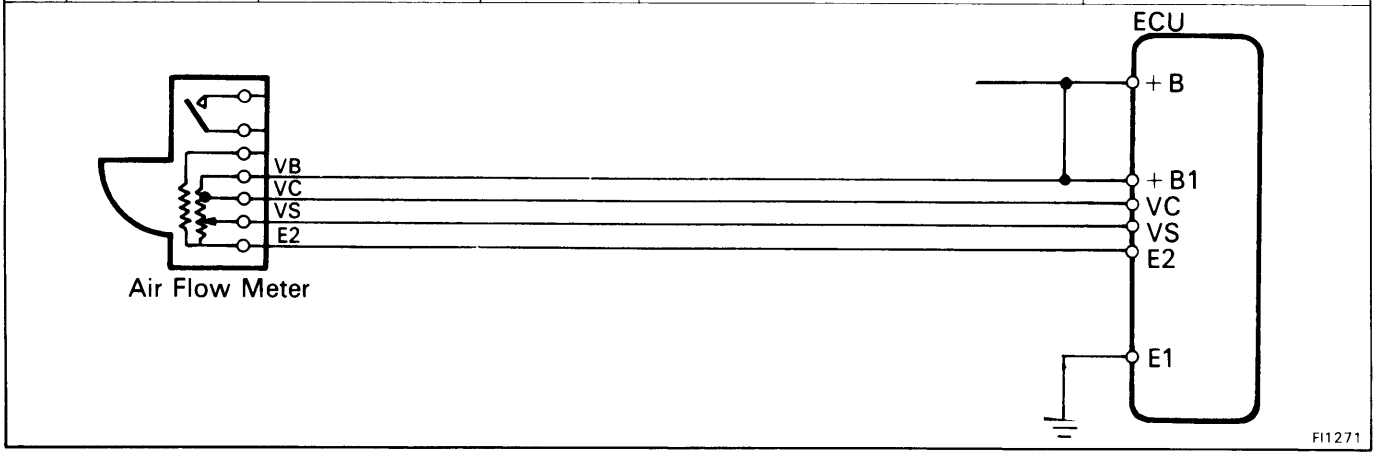
BAD → Repair or replace.

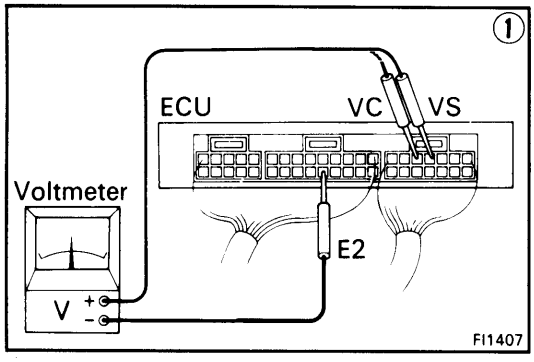
Fuse blows again → ↓

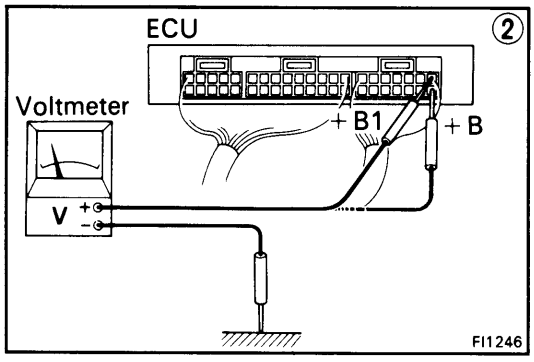
Check wiring between ECU terminal W and fuse.

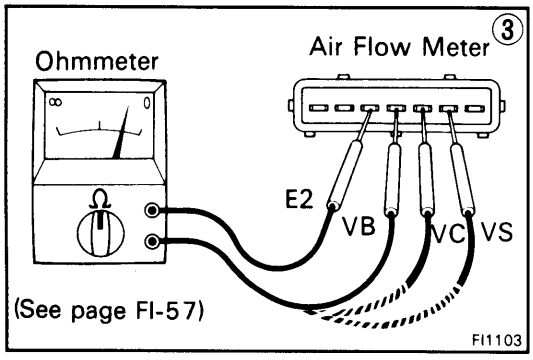
BAD → Repair or replace.

No.	Terminals	Trouble	Condition		STD Voltage
8	VC – E2	No voltage	IG S/W ON	—	6 – 10 V
	VS – E2			Measuring plate fully closed	0.5 – 2.5 V
	VS – E2			Measuring plate fully open	5 – 10 V
	VS – E2		Idling	—	2 – 8 V









① No specified voltage at ECU terminals VC and VS and E2. **(IG S/W ON)**

② Check that there is voltage between ECU terminals +B or +B1 and body ground. **(IG S/W ON)**

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

NO → Refer to No. 1 (See page FI-29)

OK → ③ Check air flow meter.

BAD → Replace or repair.

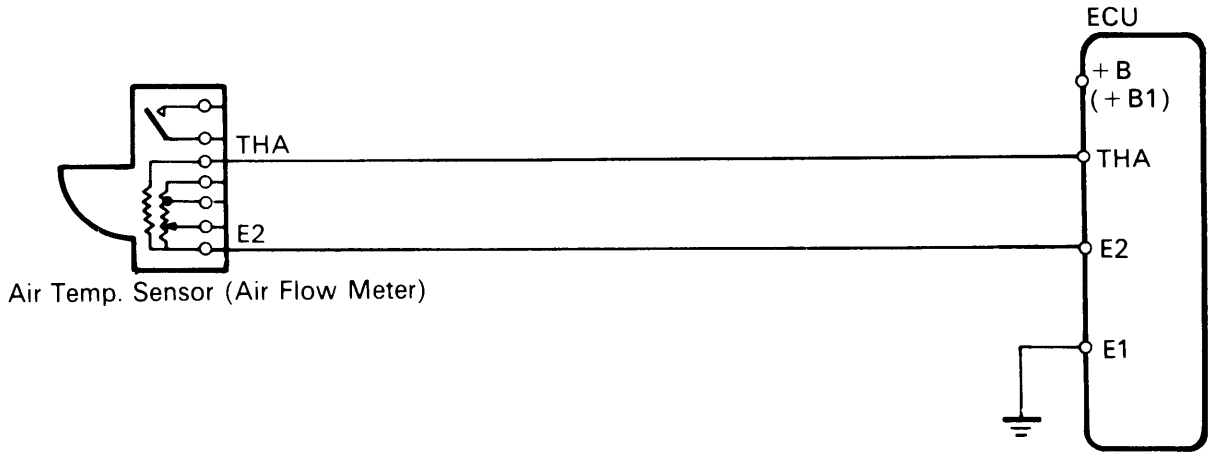
BAD → Replace air flow meter.

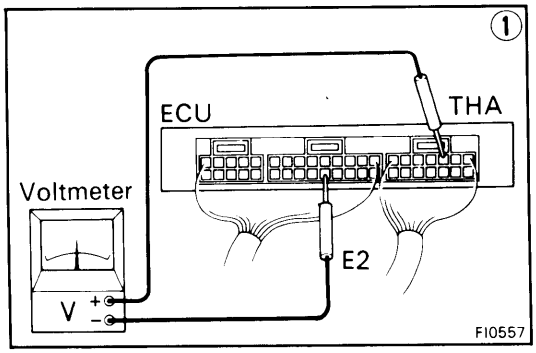
OK → Check wiring between ECU and air flow meter.

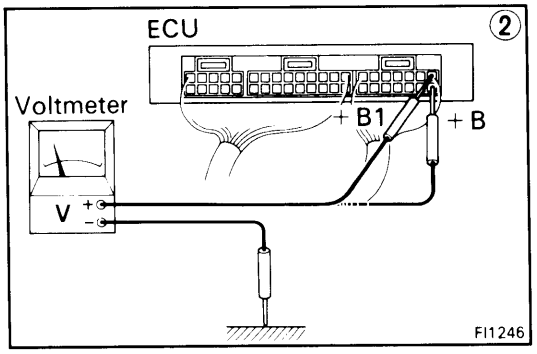
OK → Try another ECU

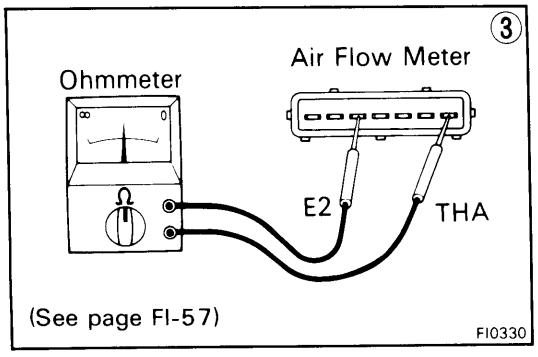
BAD → Replace or repair.

No.	Terminals	Trouble	Condition		STD Voltage
9	THA – E2	No voltage	IG S/W ON	Intake air temp. 20°C (68°F)	1 – 3 V









① No voltage between ECU terminals THA and E2. **(IG S/W ON)**

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

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

NO → Refer to No. 1 (See page FI-29)

OK → ③ Check air temp. sensor.

BAD → Replace or repair.

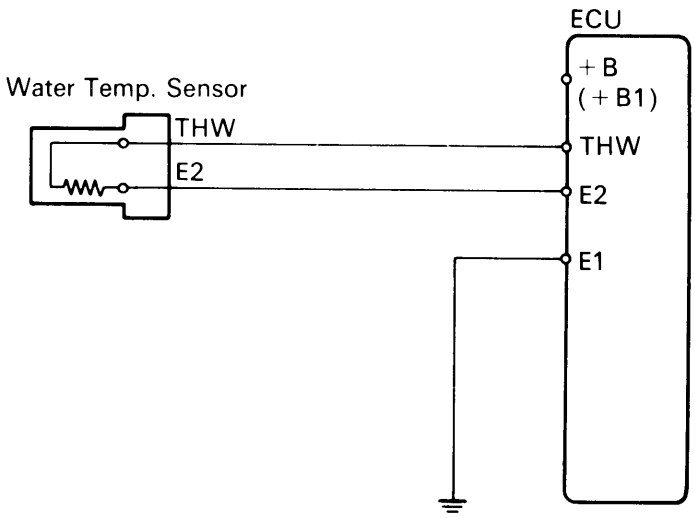
BAD → Replace air flow meter.

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

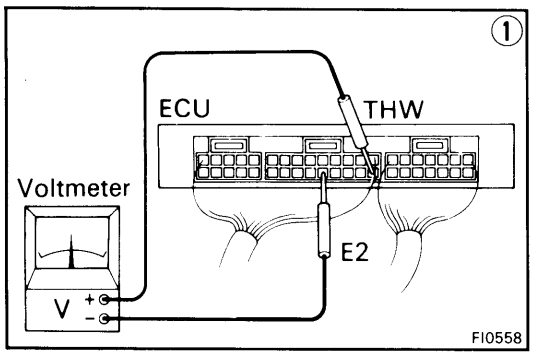
OK → Try another ECU.

BAD → Repair or replace.

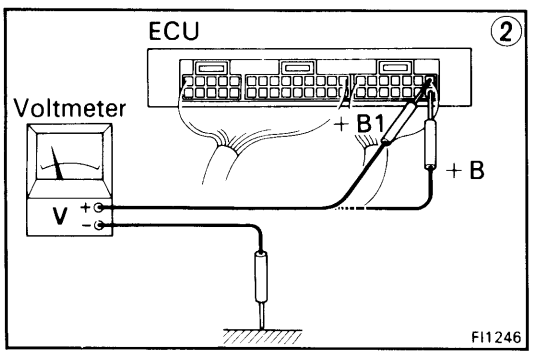
No.	Terminals	Trouble	Condition		STD Voltage
10	THW – E2	No voltage	IG S/W ON	Coolant temp. 80°C (176°F)	0.5 – 2.5 V



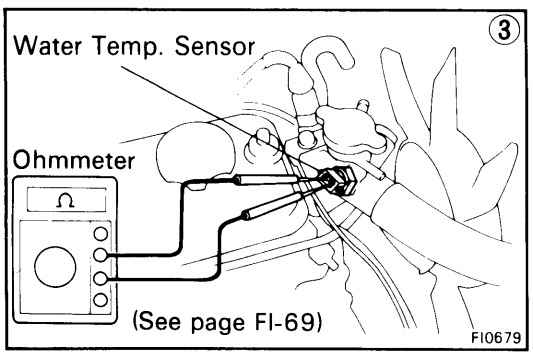
FI0487



FI0558



FI1246



FI0679

① No voltage between ECU terminals THW and E2. **(IG S/W ON)**

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

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

NO → Refer to No. 1. (See page FI-29)

OK → ③ Check water temp. sensor.

BAD → Repair or replace.

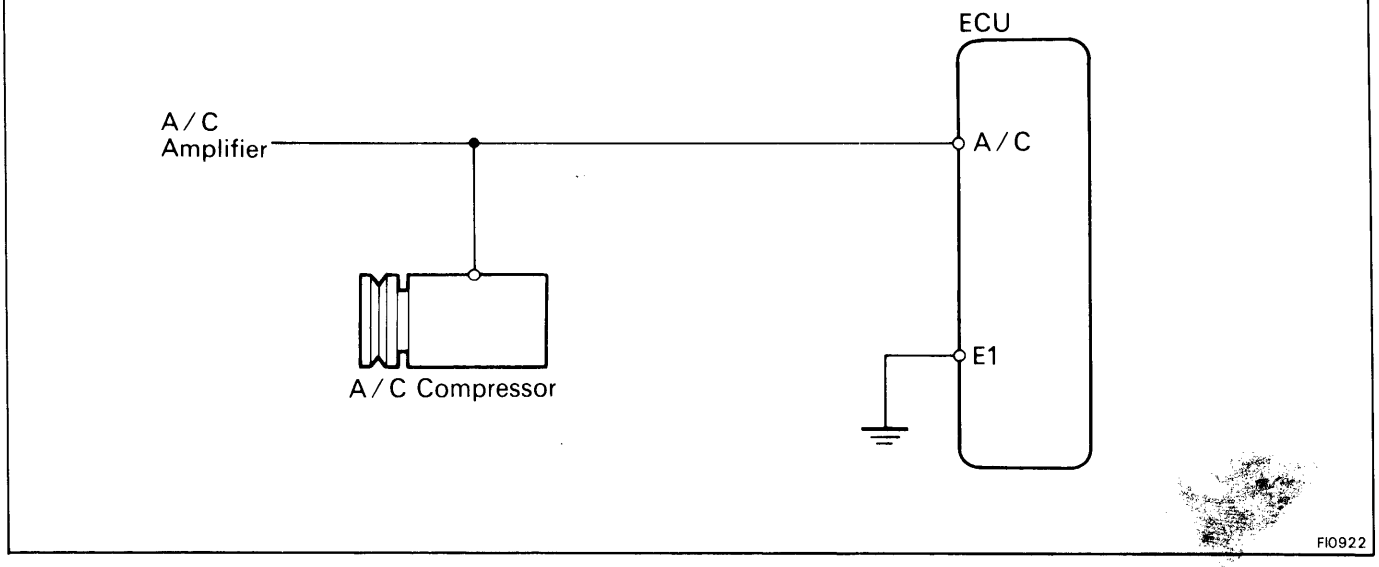
③ BAD → Replace water temp. sensor.

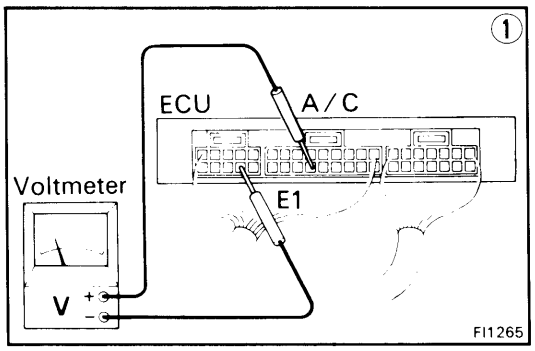
③ OK → Check wiring between ECU and water temp. sensor.

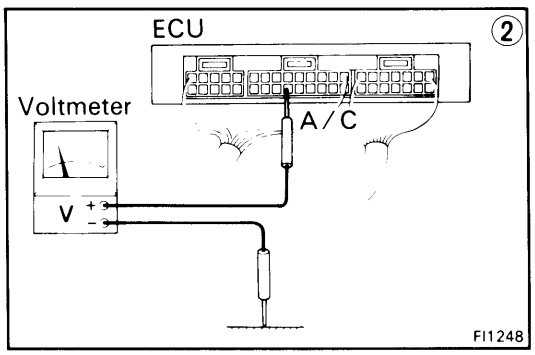
OK → Try another ECU.

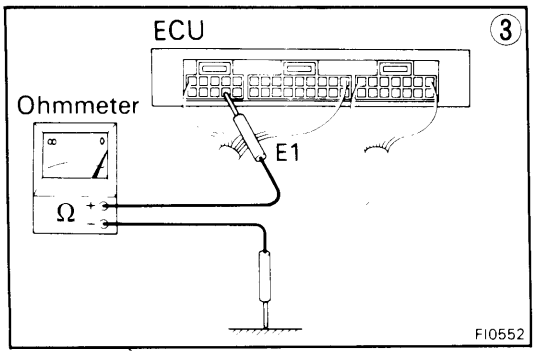
BAD → Repair or replace.

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









① No voltage between ECU terminals A/C and E1. **(A/C 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 that compressor is 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

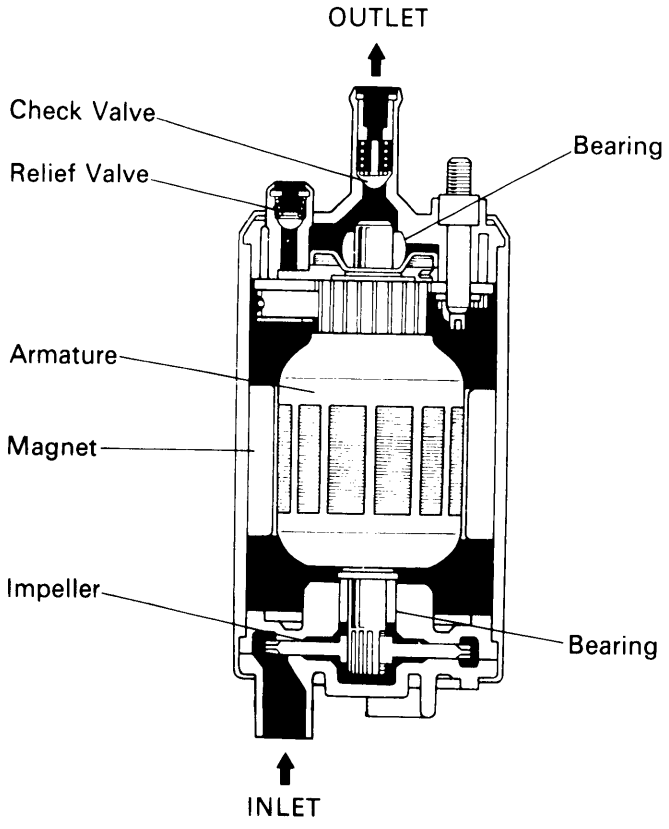
Check wiring between amplifier and ECU or compressor.

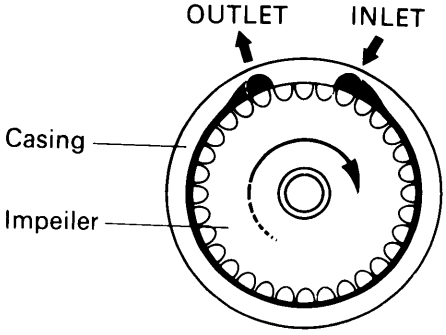
BAD

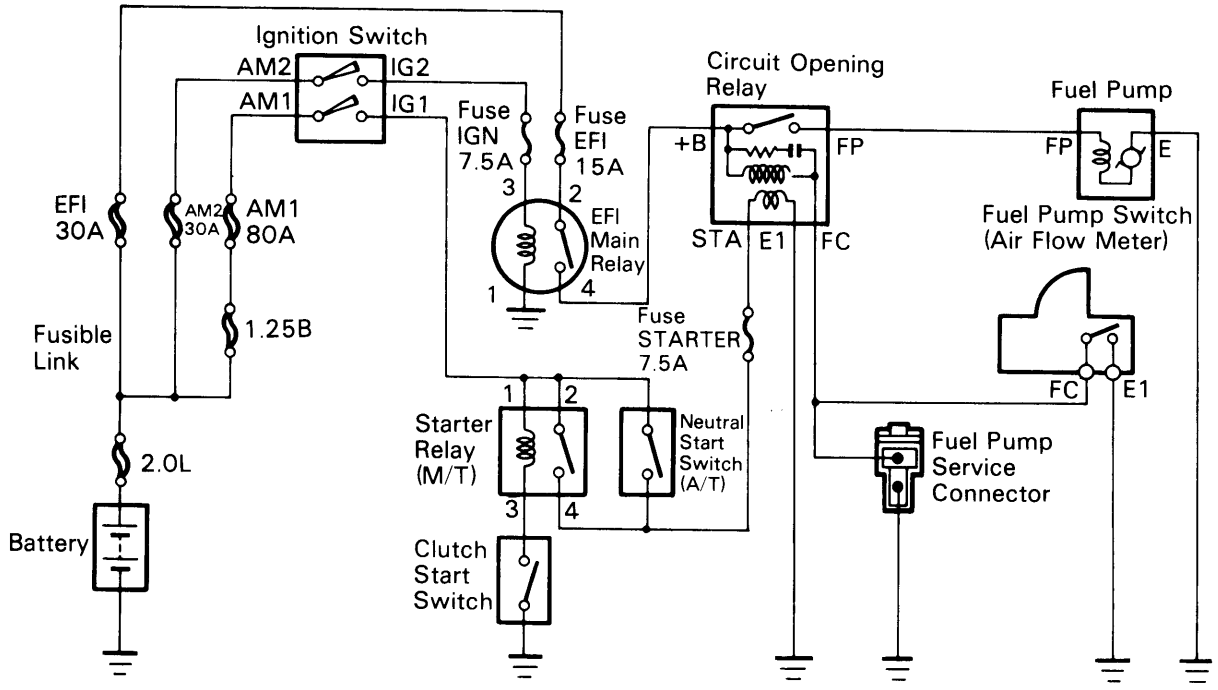
Repair or replace.

FUEL SYSTEM

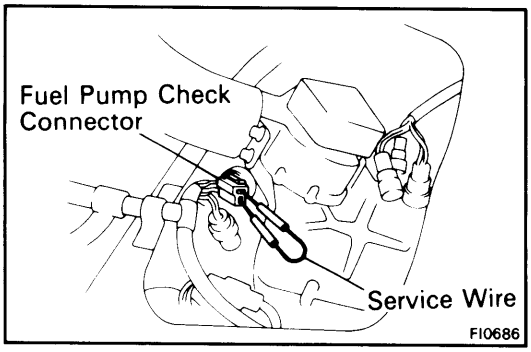
Fuel Pump

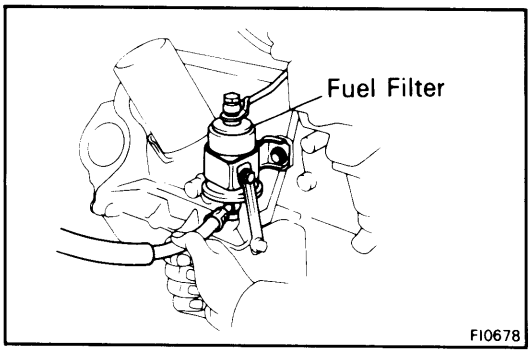






FI0530 FI1479 FI1508





ON-VEHICLE INSPECTION

1. INSPECT FUEL PUMP OPERATION

(a) Turn the ignition switch ON.

NOTE: Do not start the engine.

(b) Short the terminals of the fuel pump check connector with a service wire.

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

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 link
- Fuse (EFI 15A, IGN 7.5A)
- EFI main relay
- Circuit opening relay
- Fuel pump
- Wiring connections

2. INSPECT FUEL PRESSURE

(a) Check the battery voltage above 12 volts.

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

(c) Disconnect the wiring connector from the cold start injector.

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

(e) Disconnect the cold start injector pipe.

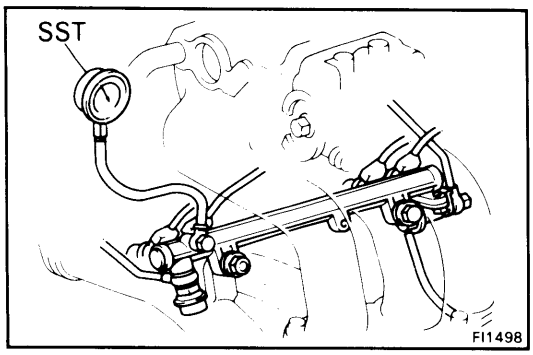
NOTE: Slowly loosen the union bolt.

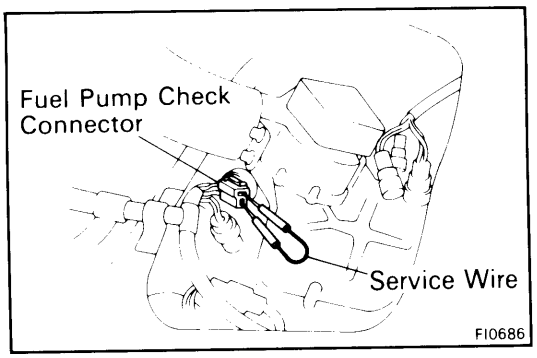
(f) Install a gasket, SST, another gasket and union bolt to the delivery pipe as shown in the figure.

SST 09268-45011

(g) Wipe off any splattered gasoline.

(h) Reconnect the battery cable.





(i) Short the terminals of the fuel pump check connector with a service wire.

(j) Turn on the ignition switch.

(k) Measure the fuel pressure

Fuel pressure: 2.3 – 2.7 kg/cm² (33 – 38 psi, 226 – 265 kPa)

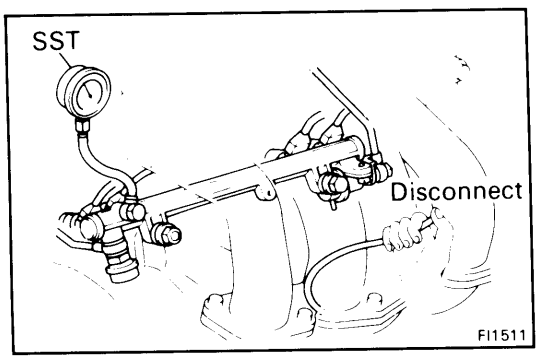
If high, replace the pressure regulator.

If low, check the following parts:

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

(l) Remove the service wire.

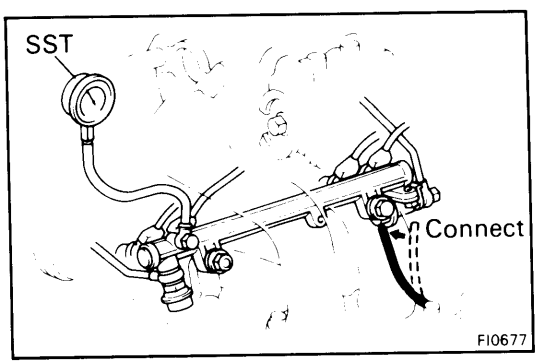
(m) Start the engine.



(n) Disconnect the vacuum sensing hose from the pressure regulator and pinch it off.

(o) Measure the fuel pressure at idling.

Fuel pressure: 2.3 – 2.7 kg/cm² (33 – 38 psi, 226 – 265 kPa)



(p) Reconnect the vacuum sensing hose to the pressure regulator.

(q) Measure the fuel pressure at idling.

Fuel pressure: 1.9 – 2.2 kg/cm² (27 – 31 psi, 186 – 216 kPa)

If no pressure, check the vacuum sensing hose and pressure regulator.

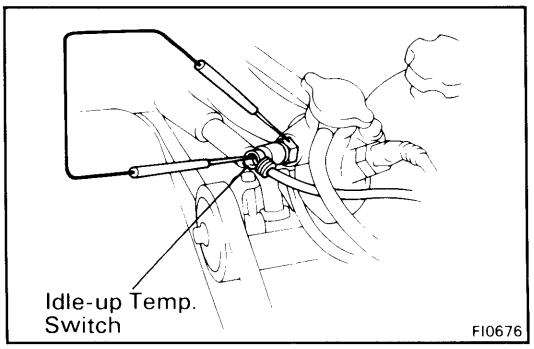
(r) Stop the engine. Check that the fuel pressure remains above 1.5 kg/cm² (21 psi, 147 kPa) for 5 minutes after the engine is turned off.
If not within specification, check the fuel pump, pressure regulator and/or injectors.

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

(t) Using new gaskets, reconnect the cold start injector pipe to the delivery pipe.

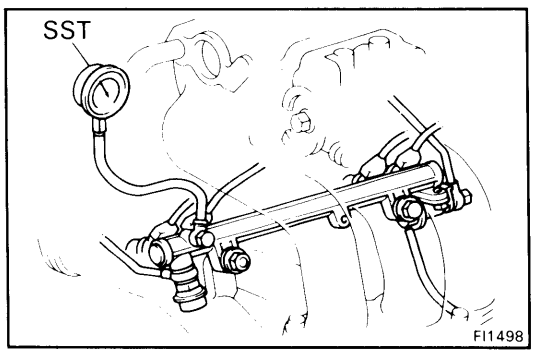
(u) Connect the wiring connector to the cold start injector.

(v) Check for fuel leakage. (See step 5 on page FI-8)



3. [w/ A/C]
INSPECT HIGH-TEMPERATURE LINE PRESSURE

(a) Ground the idle-up temperature switch terminal.



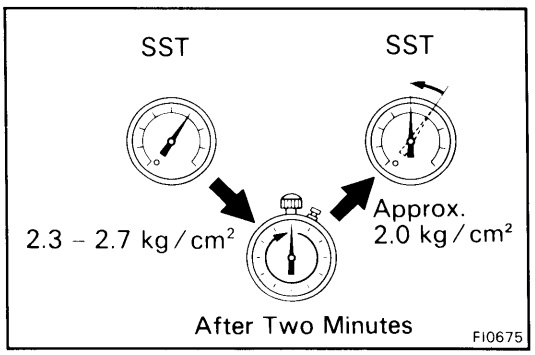
(b) Start the engine.

(c) Measure the fuel pressure.

Fuel pressure: 2.3 – 2.7 kg/cm² (33 – 38 psi, 226 – 265 kPa)

If pressure is low, check the following parts:

- ECU
- EFI VSV
- Wiring



(d) Measure the fuel pressure at idle two minutes later.

Fuel pressure: 1.9 – 2.2 kg/cm² (27 – 31 psi, 186 – 216 kPa)

(e) Stop the engine.

If the pressure drops quickly, check the fuel pump, pressure regulator and/or injectors.

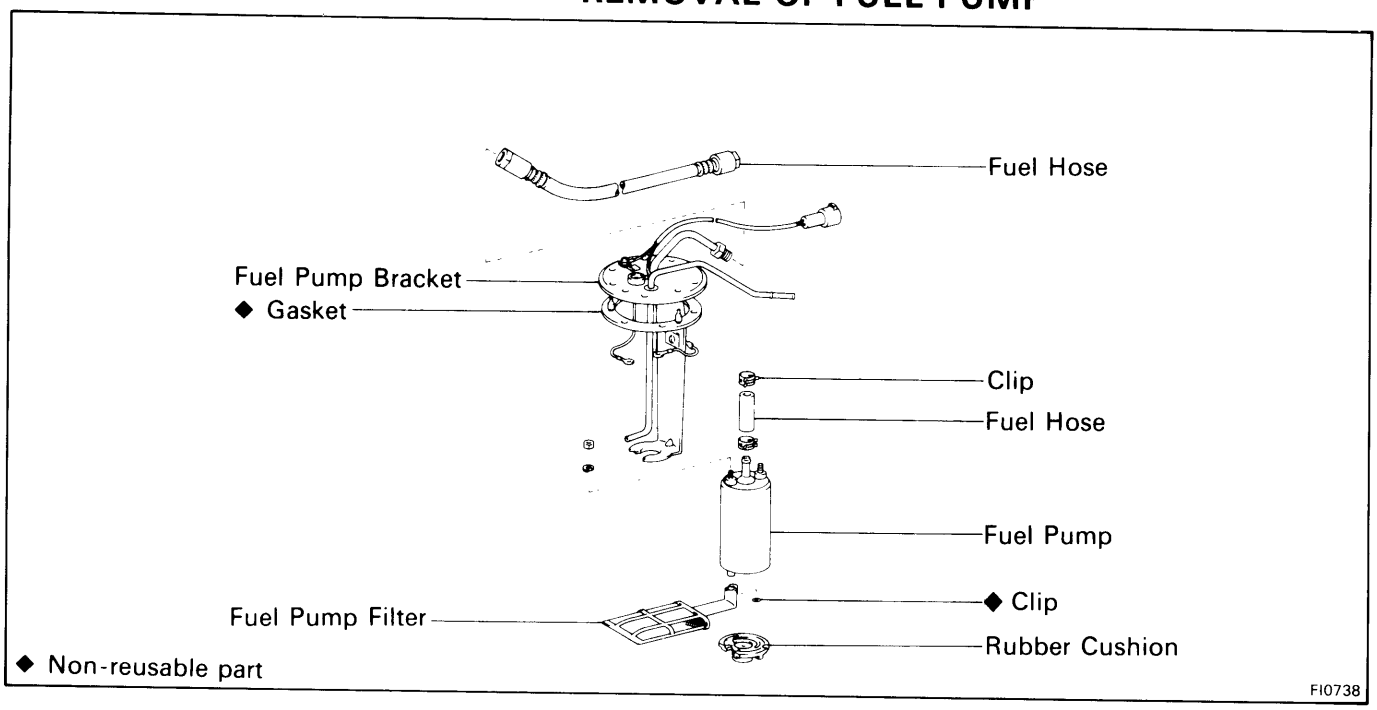
(f) After checking fuel pressure, disconnect the battery ground cable and carefully remove the SST to prevent gasoline from splashing.

(g) Using new gaskets, reconnect the cold start injector pipe to the delivery pipe.

(h) Reconnect the wiring connector to the cold start injector.

(i) Check for fuel leakage. (See step 5 on page FI-8)

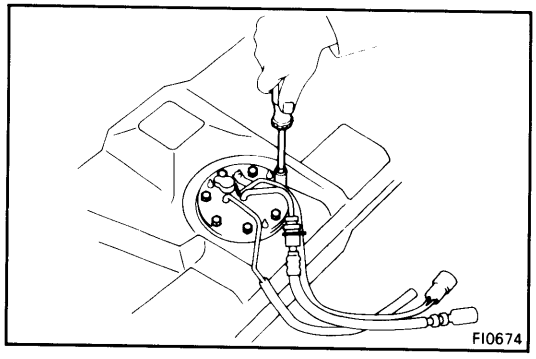
REMOVAL OF FUEL PUMP



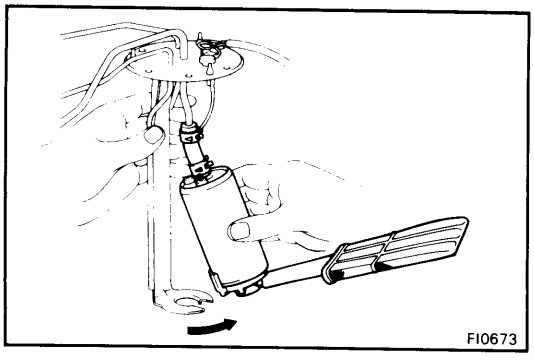
1. **DRAIN FUEL FROM FUEL TANK**

   WARNING: Avoid smoking and open flame when working on the fuel pump.

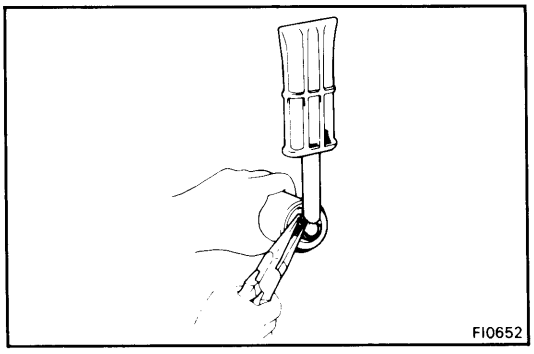
2. **REMOVE FUEL TANK**



3. **REMOVE FUEL PUMP BRACKET FROM FUEL TANK**
   (a) Remove the seven bolts.
   (b) Pull out the fuel pump bracket.



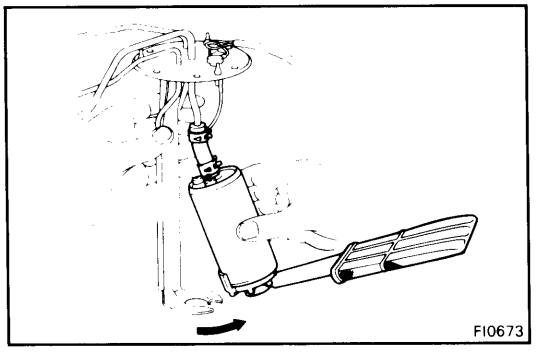
4. **REMOVE FUEL PUMP FROM FUEL PUMP BRACKET**
   (a) Remove the two nuts, and disconnect the wires from the fuel pump.
   (b) Pull off the bracket from the lower side of the fuel pump.
   (c) Remove the fuel pump from the fuel hose.



5. REMOVE FUEL PUMP FILTER FROM FUEL PUMP

(a) Remove the rubber cushion.

(b) Remove the clip and pull out the filter.



INSTALLATION OF FUEL PUMP

(See page FI-44)

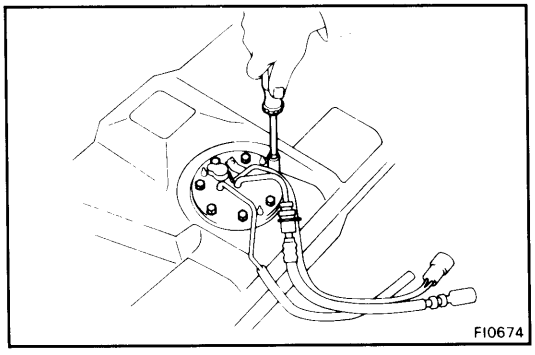
1. INSTALL FUEL PUMP FILTER TO FUEL PUMP

2. INSTALL FUEL PUMP TO FUEL PUMP BRACKET

(a) Insert the outlet port of the fuel pump into the fuel hose.

(b) Install the rubber cushion to the lower side of the fuel pump.

(c) Push the lower side of the fuel pump, together with the rubber cushion into the fuel pump bracket.



3. INSTALL FUEL PUMP BRACKET

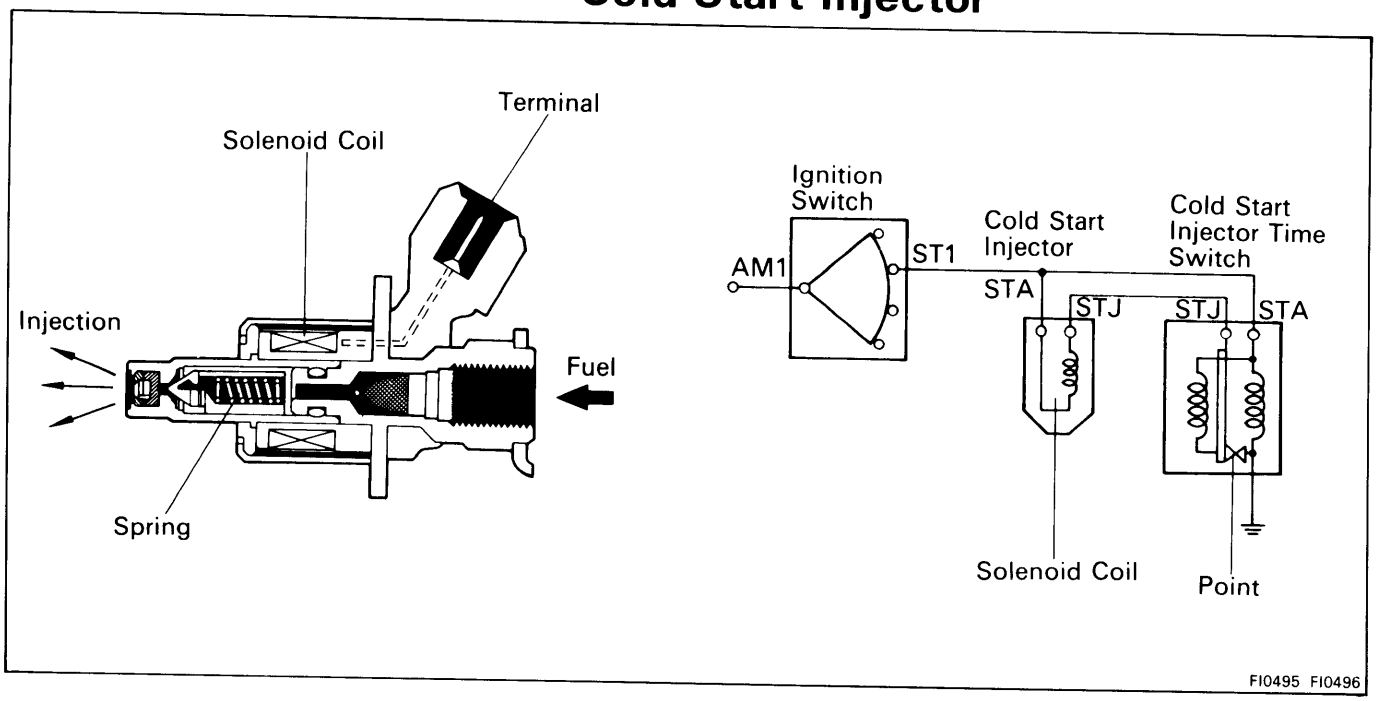
(a) Place the bracket with a new gasket on the fuel tank.

(b) Install and tighten the seven bolts.

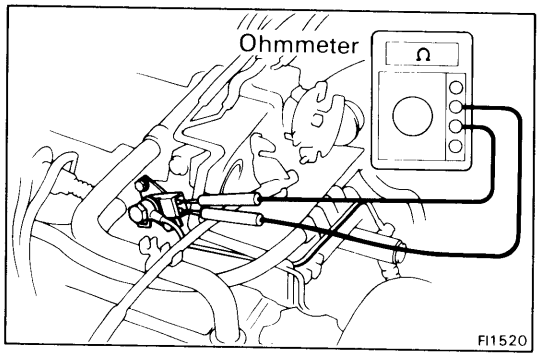
Torque: 50 kg-cm (43 in.-lb, 4.9 N·m)

4. INSTALL FUEL TANK

Cold Start Injector



FI0495 FI0496



FI1520

ON-VEHICLE INSPECTION

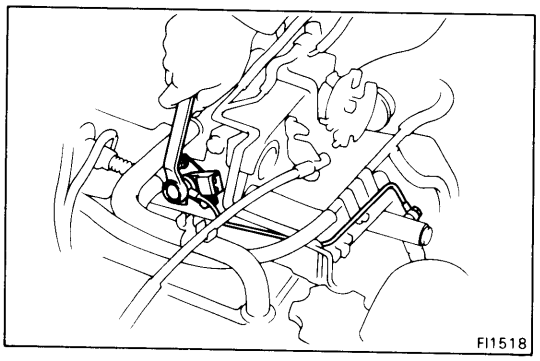
INSPECT RESISTANCE OF COLD START INJECTOR

(a) Disconnect the cold start injector connector.

(b) Using an ohmmeter, measure the injector resistance.

Resistance: 3 – 5 Ω

(c) Connect the cold start injector connector.



FI1518

REMOVAL OF COLD START INJECTOR

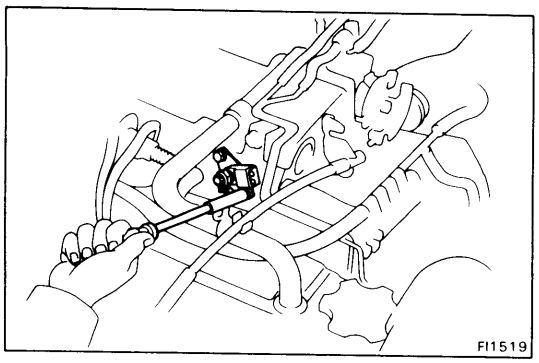
1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**

2. **DISCONNECT COLD START INJECTOR CONNECTOR**

3. **REMOVE COLD START INJECTOR PIPE**

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

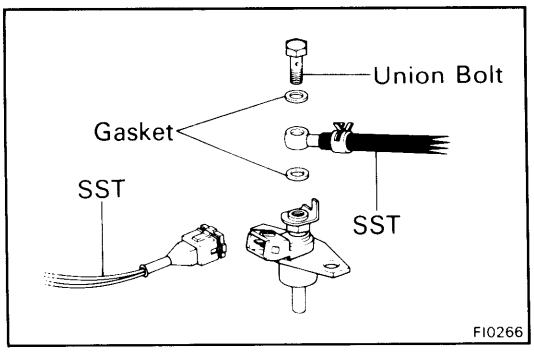
   (b) Remove the two union bolts, cold start injector and gaskets.



FI1519

4. **REMOVE COLD START INJECTOR**

   Remove the two bolts, cold start injector and gasket.



INSPECTION OF COLD START INJECTOR

INSPECT INJECTION OF COLD START INJECTOR

(a) Install the gasket, SST (two unions), another gasket and two union bolts to the delivery pipe and injector.

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

SST 09268-41045

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

SST 09842-30050

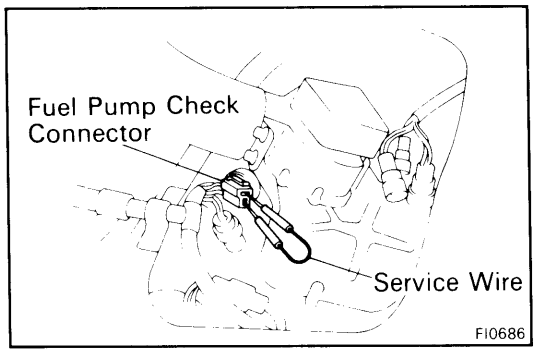
NOTE: Position the injector as far away from battery as possible.

(d) Put a container under the injector.

(e) Turn on the ignition switch ON.

NOTE: Do not start the engine.

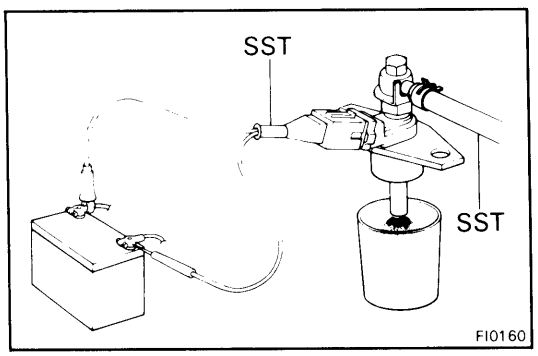
(f) Short the terminals of the fuel pump check connector with a service wire.



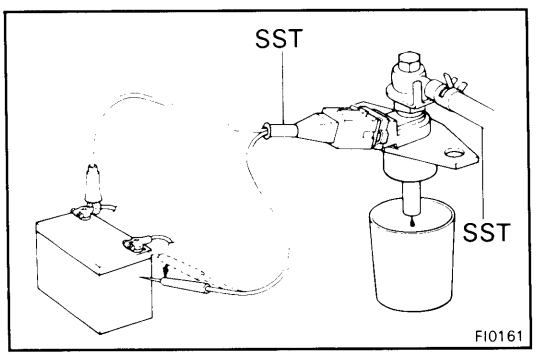
(g) Connect the test probes of the SST to the battery and check that the fuel spray is as shown.

SST 09842-30050

CAUTION: Perform this check within the shortest possible time.

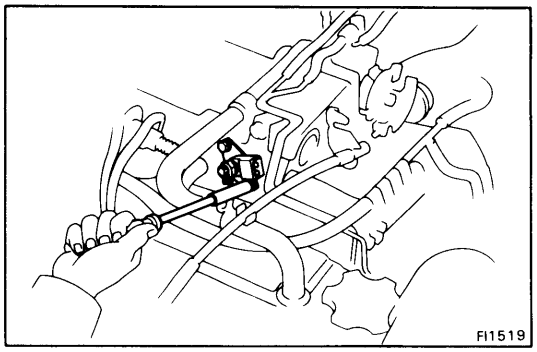


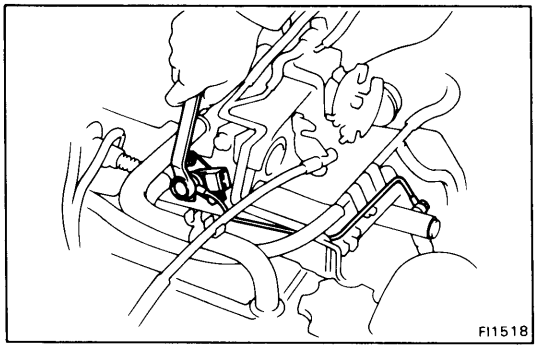
(h) Disconnect the test probes from the battery and check that fuel drops one drop or less of fuel per minute from the injector nozzle.



(i) After checking, restore the following parts to their original condition:

- Fuel pump check connector
- Ignition switch
- SST
- Cold start injector
- Injector wiring





INSTALLATION OF COLD START INJECTOR

1. **INSTALL COLD START INJECTOR**

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

   Torque: 60 kg-cm (52 in.-lb, 5.9 N·m)

2. **CONNECT COLD START INJECTOR PIPE**

   Using new gaskets, reconnect the cold start injector pipe to the delivery pipe and cold start injector with the union bolts.

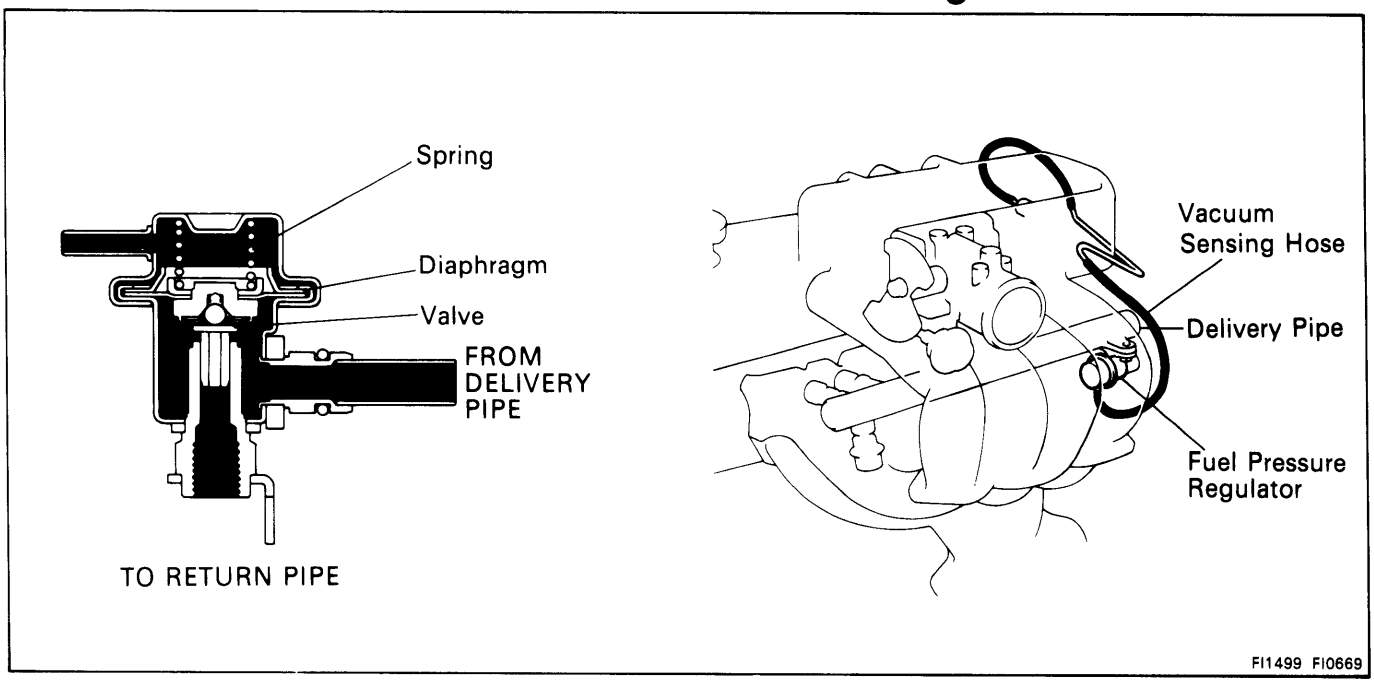
   Torque: 200 kg-cm (14 ft-lb, 20 N·m)

3. **CONNECT COLD START INJECTOR CONNECTOR**

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

5. **CHECK FOR FUEL LEAKAGE**
   (See step 5 on page FI-8)

Fuel Pressure Regulator



ON-VEHICLE INSPECTION

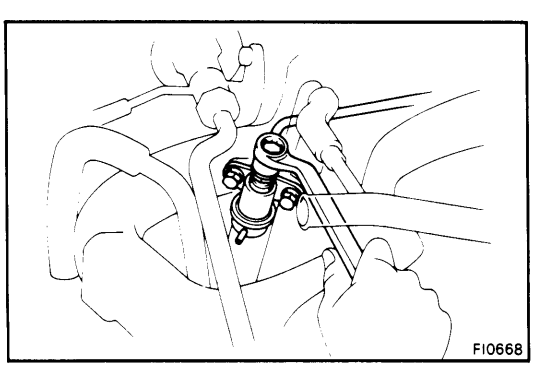
CHECK FUEL PRESSURE (See page FI-41)

REMOVAL OF FUEL PRESSURE REGULATOR

1. **RAISE VEHICLE**

   CAUTION: Be sure the vehicle is securely supported.

2. **DISCONNECT VACUUM SENSING HOSE**

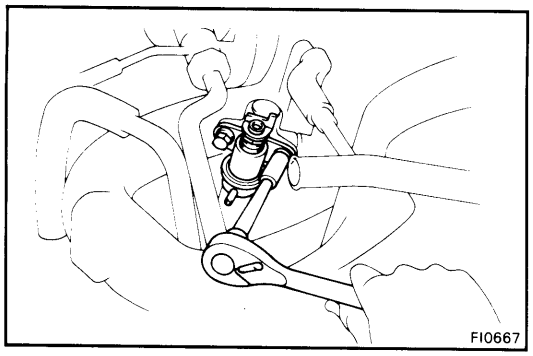


3. **DISCONNECT FUEL RETURN HOSE**

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

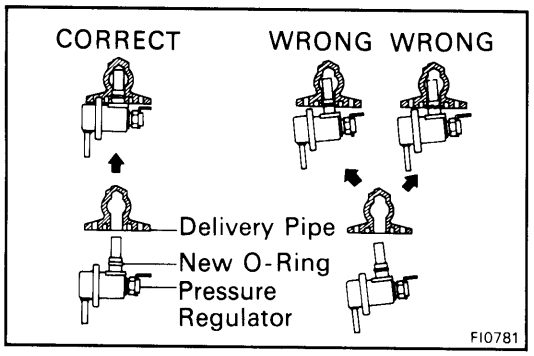
   (b) Disconnect the fuel return pipe from the pressure regulator.

   NOTE: Slowly loosen the fuel return pipe.



4. **REMOVE FUEL PRESSURE REGULATOR**

Remove the two bolts and pull out the pressure regulator from the delivery pipe.



INSTALLATION OF FUEL PRESSURE REGULATOR

1. **INSTALL FUEL PRESSURE REGULATOR**

Install the pressure regulator with the two bolts.

Torque: 60 kg-cm (52 in.-lb, 5.9 N·m)

2. **CONNECT FUEL RETURN PIPE**

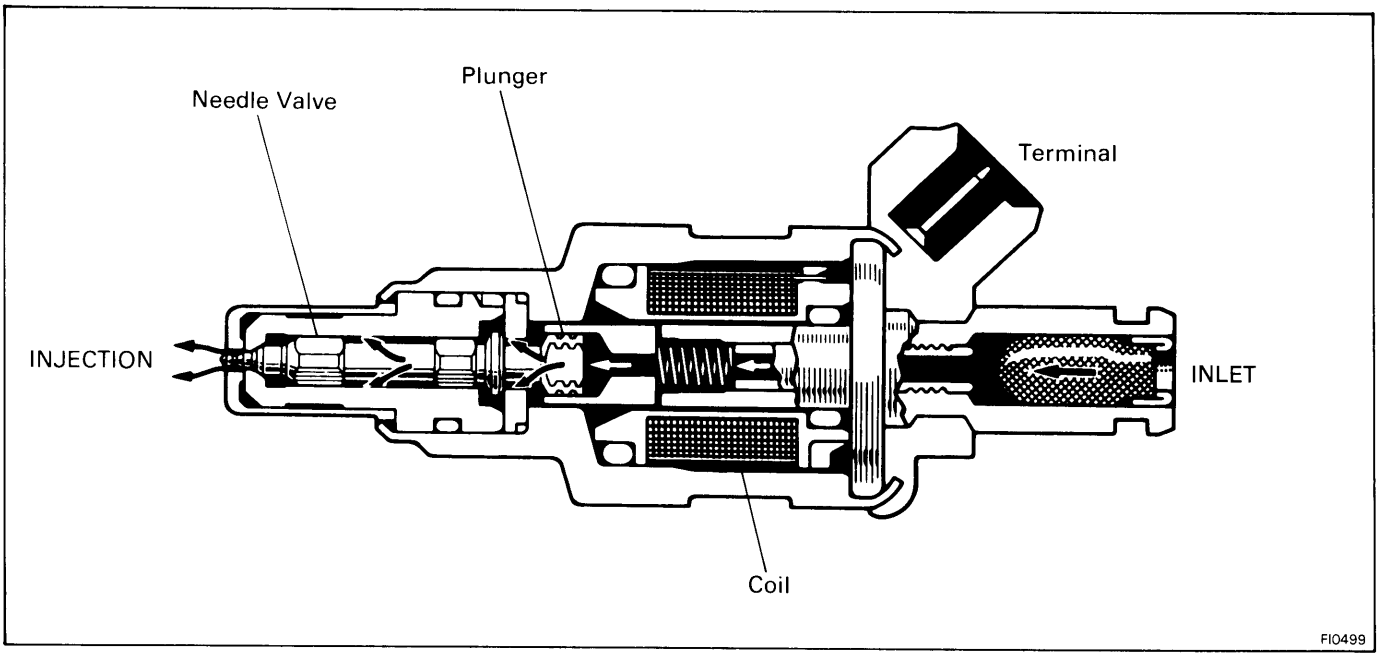
Torque: 200 kg-cm (14 ft-lb, 20 N·m)

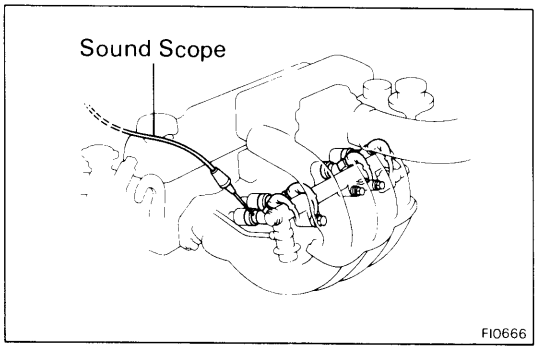
3. **CONNECT VACUUM SENSING HOSE**

4. **CHECK FOR FUEL LEAKAGE (See step 5 on page FI-8)**

5. **LOWER VEHICLE**

Injectors



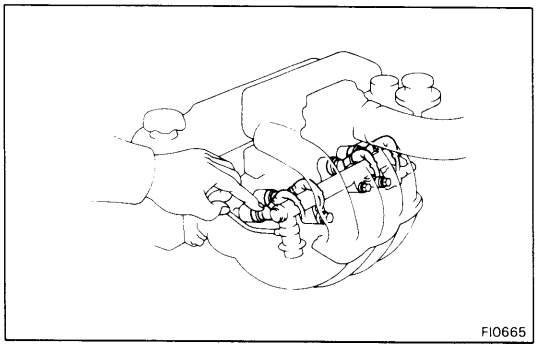


ON-VEHICLE INSPECTION

1. INSPECT INJECTOR OPERATION

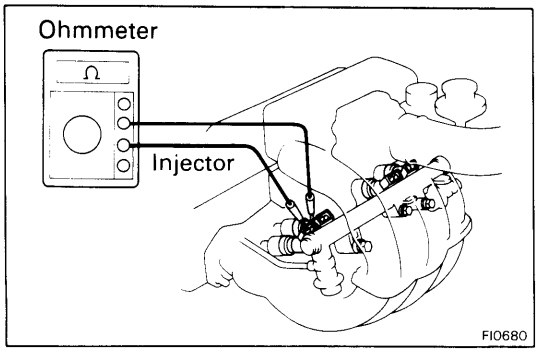
Check operation sound from each injector.

(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, resistor, or injection signal from ECU.



2. INSPECT INJECTOR RESISTANCE

(a) Disconnect the injector connector.

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

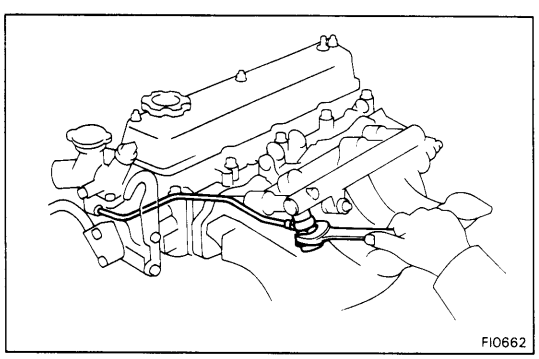
Resistance: 1.5 — 3.0 Ω

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

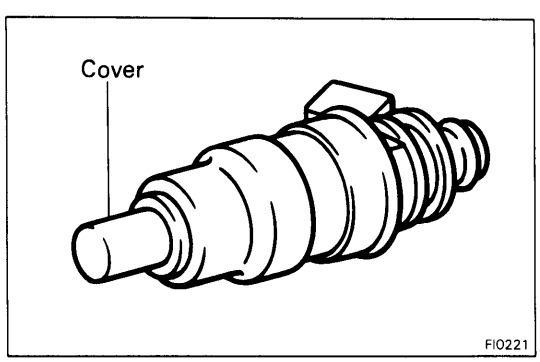
(c) Reconnect the injector connector.

REMOVAL OF INJECTORS

1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**
2. **DRAIN ENGINE COOLANT (See page CO-4)**
3. **DISCONNECT ACCELERATOR CABLE FROM THROTTLE LINKAGE**
4. **(A/T)**
   DISCONNECT THROTTLE CABLE FROM THROTTLE LINKAGE
5. **REMOVE AIR CLEANER HOSE**
6. **DISCONNECT HOSES AND CONNECTORS**
   (a) Cold start injector connector
   (b) Air valve connector
   (c) (2WD M/T)
   Oxygen sensor connector
   (d) PCV hoses
   (e) Brake booster vacuum hose
   (f) Charcoal canister hose
   (g) Emission control hoses
7. **REMOVE AIR INTAKE CHAMBER**
   (See steps 15 to 17 on page EM-11)


FI0662

8. **DISCONNECT FUEL INLET PIPE**
   Remove the pulsation damper and two gaskets.
9. **DISCONNECT FUEL OUTLET PIPE**
   Remove the union bolt and two gaskets.

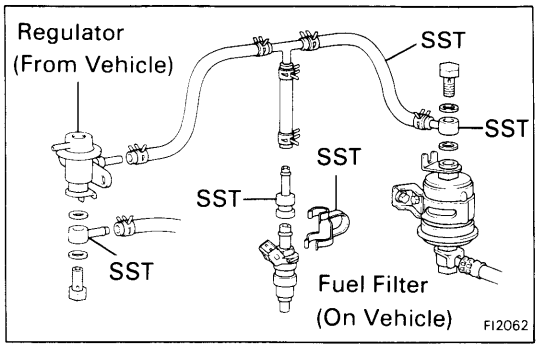


FI0221

10. **REMOVE DELIVERY PIPE AND INJECTORS**
    (a) Disconnect the fuel inlet and outlet pipes from the delivery pipe.
    (b) Remove the bolt, nut and delivery pipe together with the four injectors.

    CAUTION:
    - **Be careful not drop the injectors, when removing the delivery pipe.**
    - **Do not remove the injector cover.**

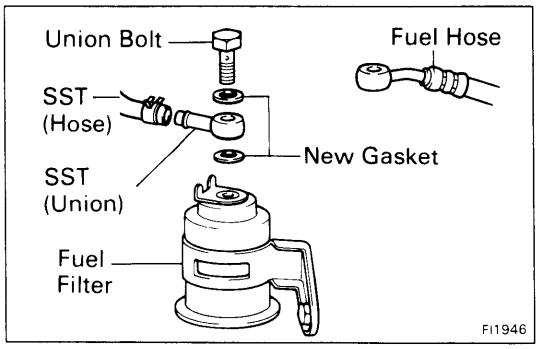
    (c) Pull out the four injectors from the delivery pipe.



INSPECTION OF INJECTORS

1. INSPECT INJECTOR INJECTION

WARNING: Keep clear of sparks during the test.

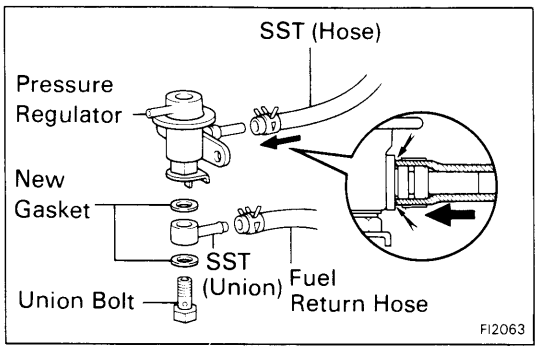


(a) Disconnect the fuel hose from the fuel filter outlet.

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

SST 09268-41045

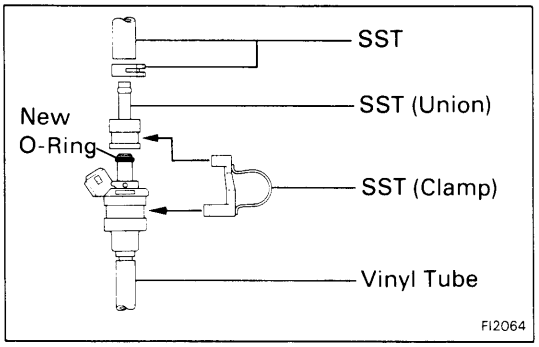
NOTE: Use the vehicle's fuel filter.



(c) Remove the pressure regulator.
(See pages FI-49 and 50)

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

SST 09268-41045



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

SST 09268-41045

(f) Put the injector into the graduated cylinder.

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

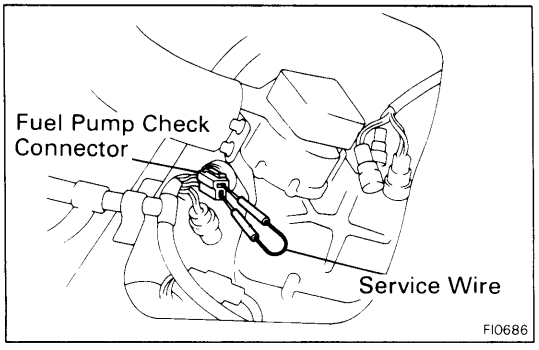
(g) Reconnect the battery negative (–) cable.

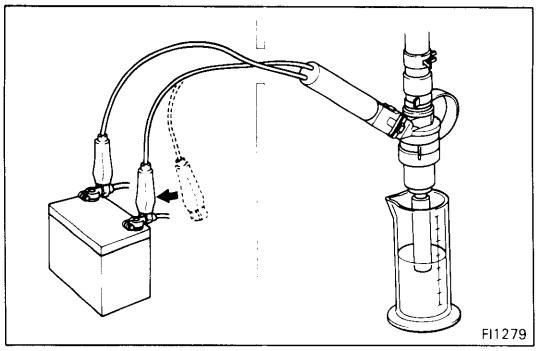
(h) Turn the ignition switch ON.

NOTE: Do not start the engine.

(i) Using a service wire, short the terminals of the fuel pump check connector.

NOTE: Fuel pump will operate.





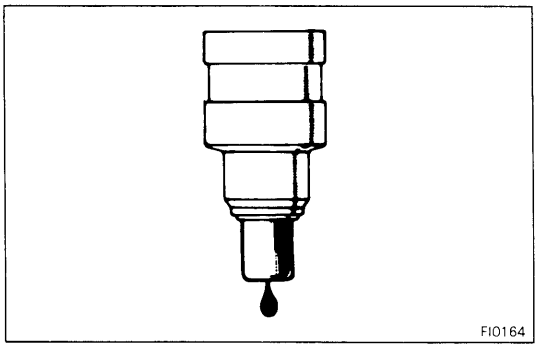
(j) Connect SST (wire) to the injector and battery for 15 seconds, and measure the injection volume with a graduated cylinder.
Test each injector two or three times.

SST 09842-30020

Volume: 40 — 50 cc (2.4 — 3.1 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.

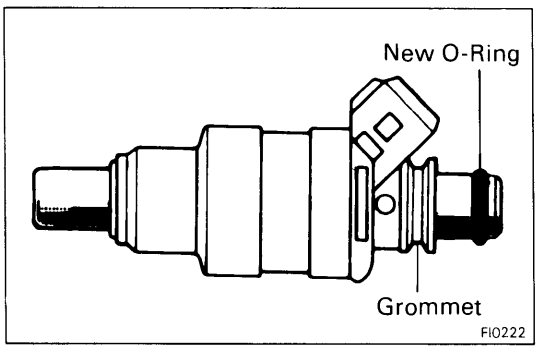
SST 09842-30020

Fuel drop: One drop or less per minute

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

(c) Remove SST and the service wire.

SST 09268-41045

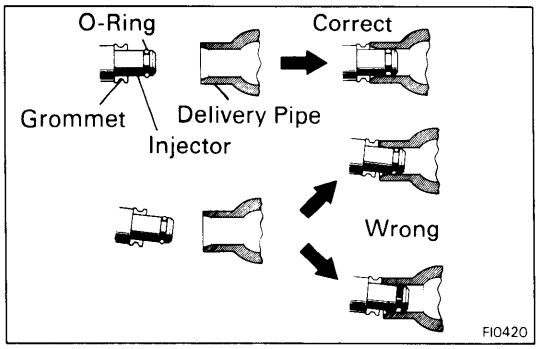


INSTALLATION OF INJECTORS

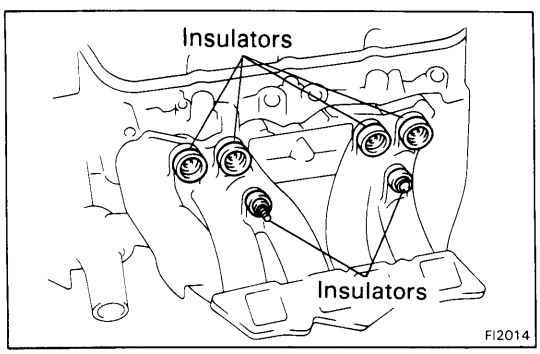
1. INSTALL INJECTORS AND DELIVERY PIPE

(a) Install a new grommet to the injector.

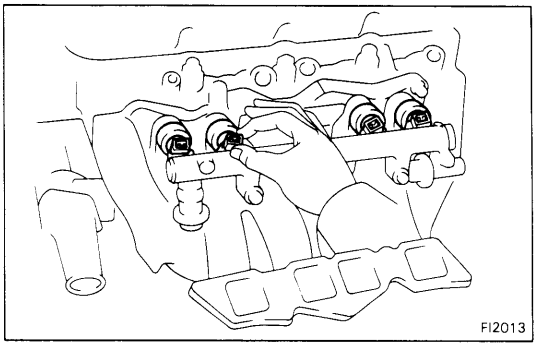
(b) Install a light coat of gasoline to a new O-ring and install it the injector.



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



(d) Place the four insulators and two spacers in position on the intake manifold.

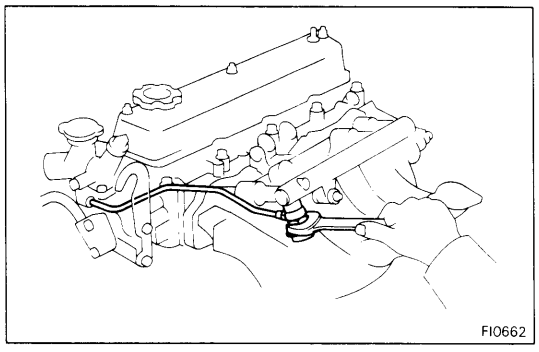


(e) Place the injectors together with the delivery pipe in position on the intake manifold.

(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-ring.

(g) Install the delivery pipe with the bolt and nut.



2. **CONNECT FUEL INLET PIPE**

Connect the inlet pipe with the pulsation damper and new two gaskets. Torque the pulsation damper.

Torque: 300 kg-cm (22 ft-lb, 29 N·m)

3. **CONNECT FUEL OUTLET PIPE**

Connect the outlet pipe with the union bolt and new two gaskets. Torque the union bolt.

Torque: 200 kg-cm (14 ft-lb, 20 N·m)

4. **INSTALL AIR INTAKE CHAMBER**
(See steps 3 to 5 on page EM-24)

5. **CONNECT HOSES (See steps 7 to 9 on page EM-25)**
   (a) Brake booster vacuum hose
   (b) Charcoal canister hose
   (c) Emission control hoses
   (d) PCV hoses
   (e) Water by-pass hoses
   (f) Cold start injector connector
   (g) Air valve connector
   (h) (2WD M/T)
   Oxygen sensor connector

6. **INSTALL AIR CLEANER HOSE**

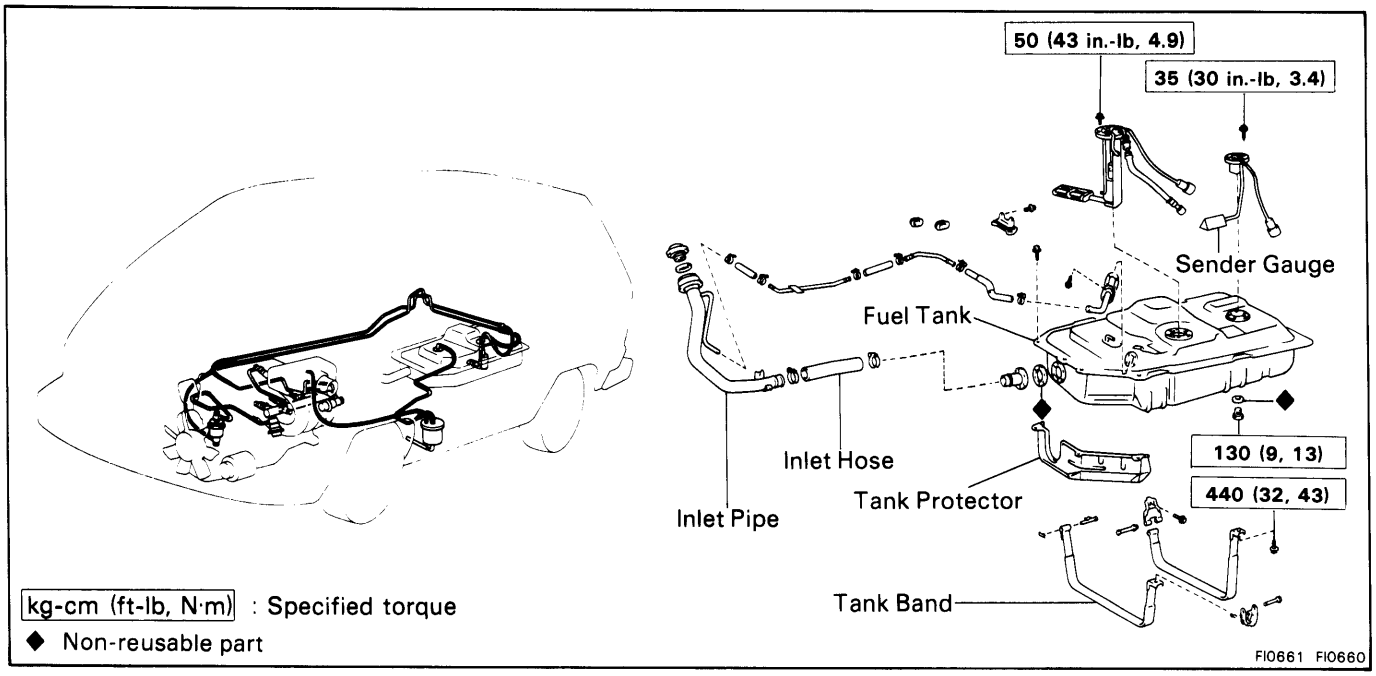
7. **CONNECT ACCELERATOR CABLE, AND ADJUST IT**

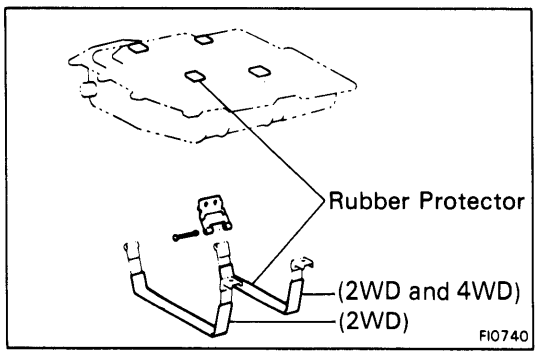
8. **(A/T)**
CONNECT THROTTLE CABLE, AND ADJUST IT

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

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

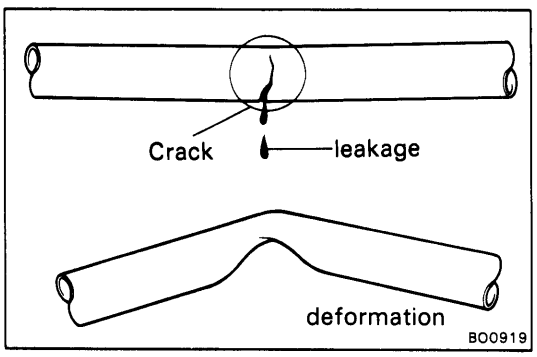
Fuel Tank and Line





PRECAUTIONS

1. **Always use new gaskets when replacing the fuel tank or component parts.**
2. **When re-installing, be sure to include the rubber protectors on the upper surfaces of the fuel tank and tank band.**
3. **Apply the proper torque to all parts tightened.**



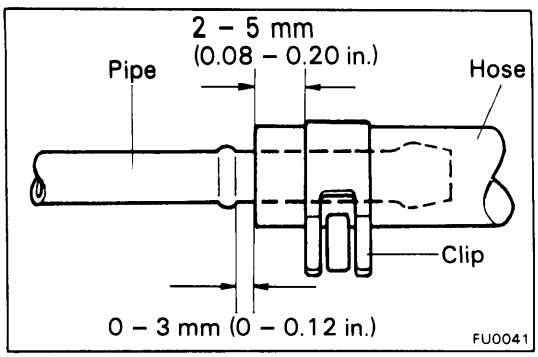
INSPECT FUEL LINES AND CONNECTIONS

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

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

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

(d) Inspect the inlet pipe for damage or fuel leakage.

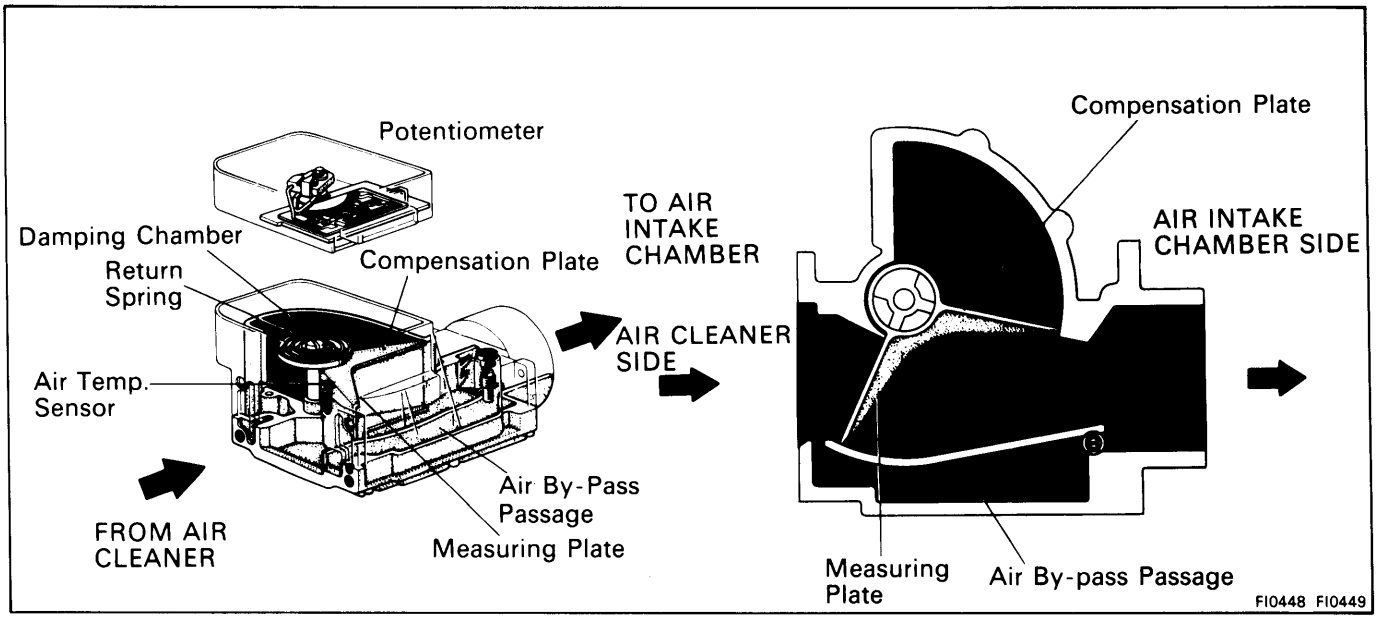


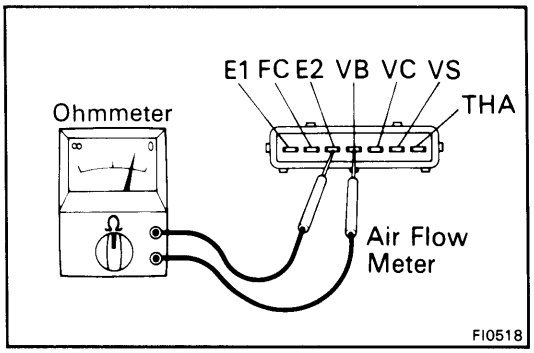
(e) The hose and tube connections are as shown in the illustration.

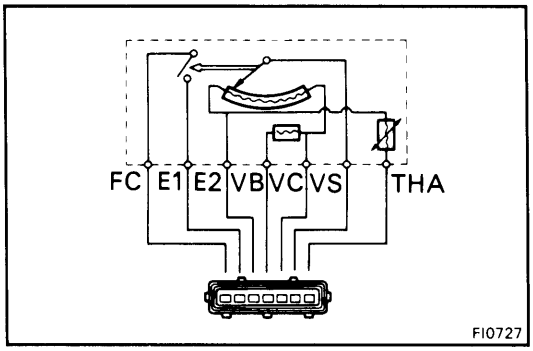
If problem is found, repair or replace the parts as necessary.

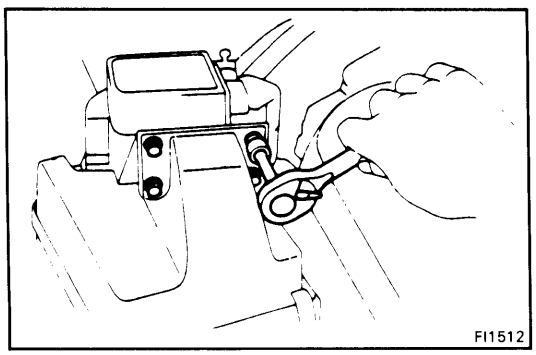
AIR INDUCTION SYSTEM

Air Flow Meter









ON-VEHICLE INSPECTION

INSPECT RESISTANCE OF AIR FLOW METER

(a) Disconnect the wiring connector from the air flow meter.

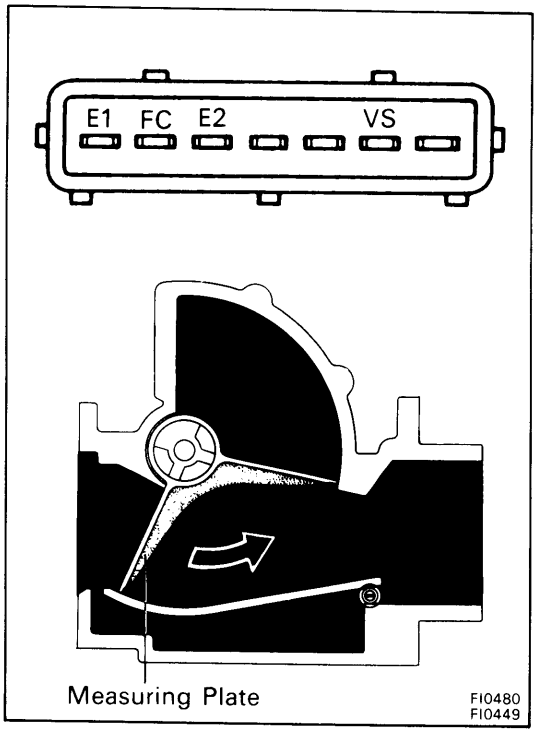
(b) Using an ohmmeter, measure the resistance between each terminal.

Between terminals	Resistance	Temperature
E2 – VS	20 – 400 Ω	–
E2 – VC	100 – 300 Ω	–
E2 – VB	200 – 400 Ω	–
E2 – THA	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)
E1 – FC	Infinity	–

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

REMOVAL OF AIR FLOW METER

1. **DISCONNECT AIR FLOW METER CONNECTOR**
2. **DISCONNECT AIR CLEANER HOSE**
3. **REMOVE AIR FLOW METER**
   (a) Remove the bracket bolt.
   (b) Remove the four nuts, 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 at different measuring plate positions.

Between Terminals	Resistance Ω	Measuring plate Opening
E1 – FC	Infinity	Fully closed
	Zero	Other than closed position
E2 – VS	20 – 400	Fully closed
	20 – 1,000	Fully closed to fully open position

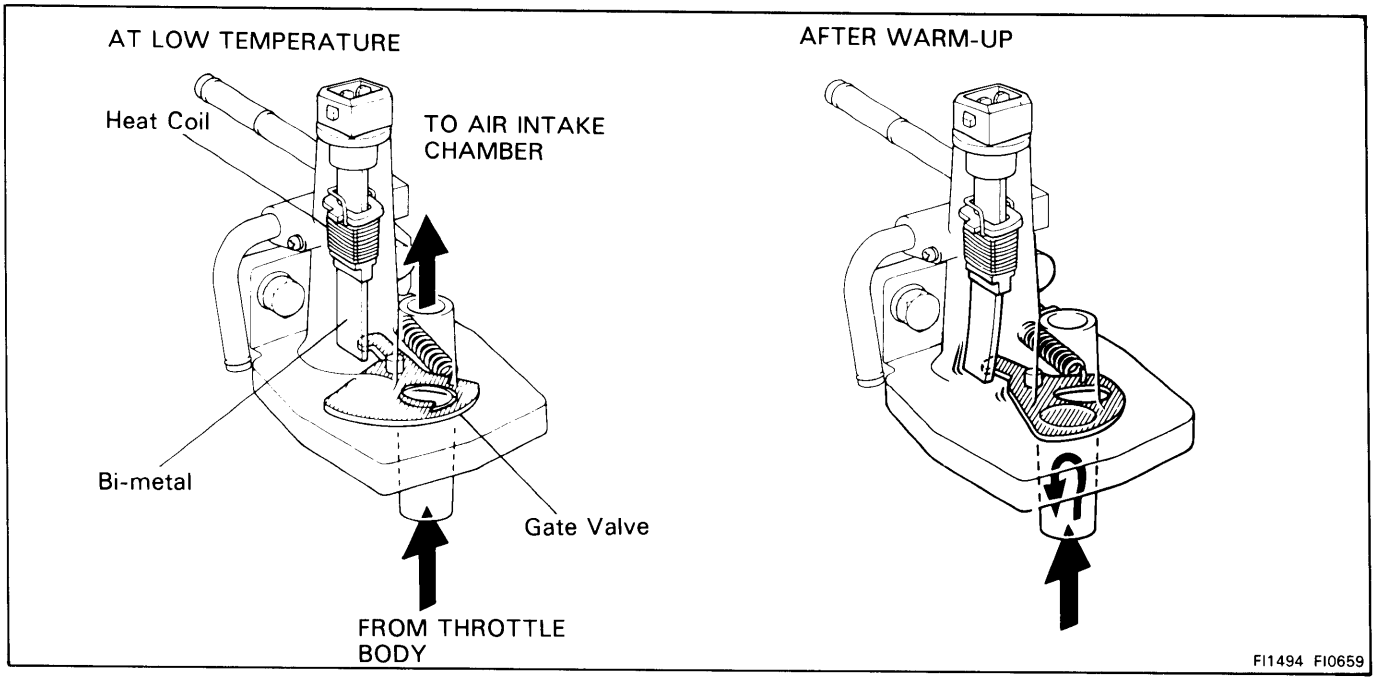
NOTE: Resistance between E2 and VS will change in accordance with the measuring plate opening.

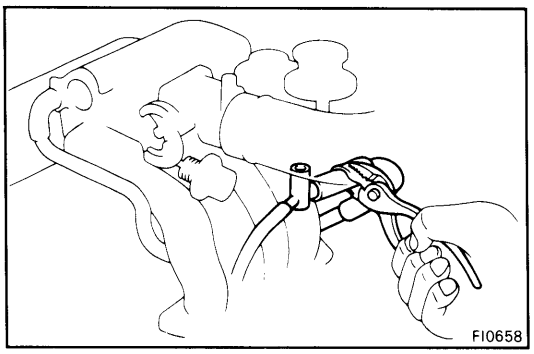
If resistance is not as specified, replace the air flow meter.

INSTALLATION OF AIR FLOW METER

1. **INSTALL AIR FLOW METER**
   (a) Install a new gasket, the air flow meter with the four nuts.
   (b) Install the bracket bolt.
2. **CONNECT AIR CLEANER HOSE**
3. **CONNECT AIR FLOW METER CONNECTOR**

Air Valve





ON-VEHICLE INSPECTION

1. INSPECT AIR VALVE OPERATION

Check the engine speed while pinching the air hose.

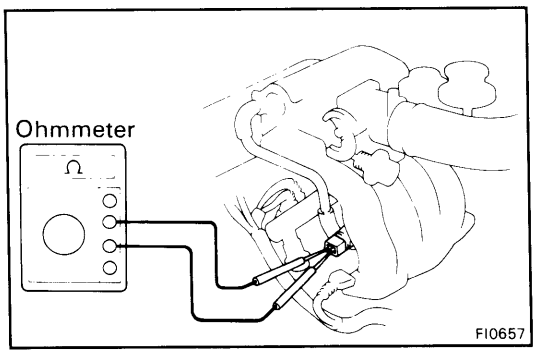
At low temp. (Coolant temp.: below 60°C (140°F)).

- When the hose is pinched, engine speed should drop.

After warm-up

- When the hose is pinched, check that engine speed does not drop more than 50 rpm.

If operation is not as specified, replace the air valve.

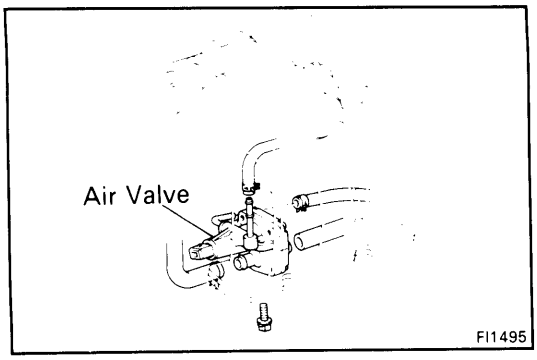


2. INSPECT AIR VALVE RESISTANCE

Using an ohmmeter, measure the heat coil resistance of the air valve.

Resistance (EP — E1): 40 — 60 Ω
at coolant temp. 80°C (176°F)
and air valve closed.

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



REMOVAL OF AIR VALVE

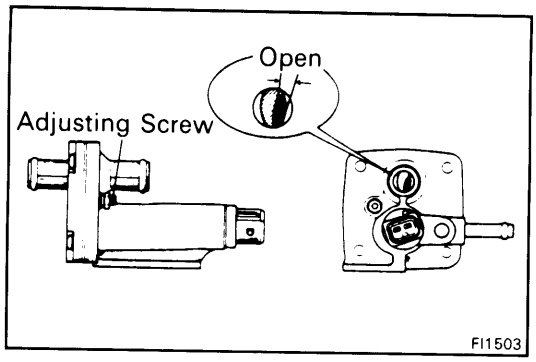
1. REMOVE AIR INTAKE CHAMBER
(See steps 1 to 11 on pages FI-51 and 52)

2. DISCONNECT AIR VALVE INLET AND OUTLET HOSES

3. DISCONNECT AIR VALVE BY-PASS HOSES

4. REMOVE AIR VALVE

Remove the two bolts air valve.



INSPECTION OF AIR VALVE

INSPECT OPENING CONDITION OF AIR VALVE

Check that the valve opens slightly, as illustrated, when room temperature is about 20°C (68°F).

INSTALLATION OF AIR VALVE

1. **INSTALL AIR VALVE**

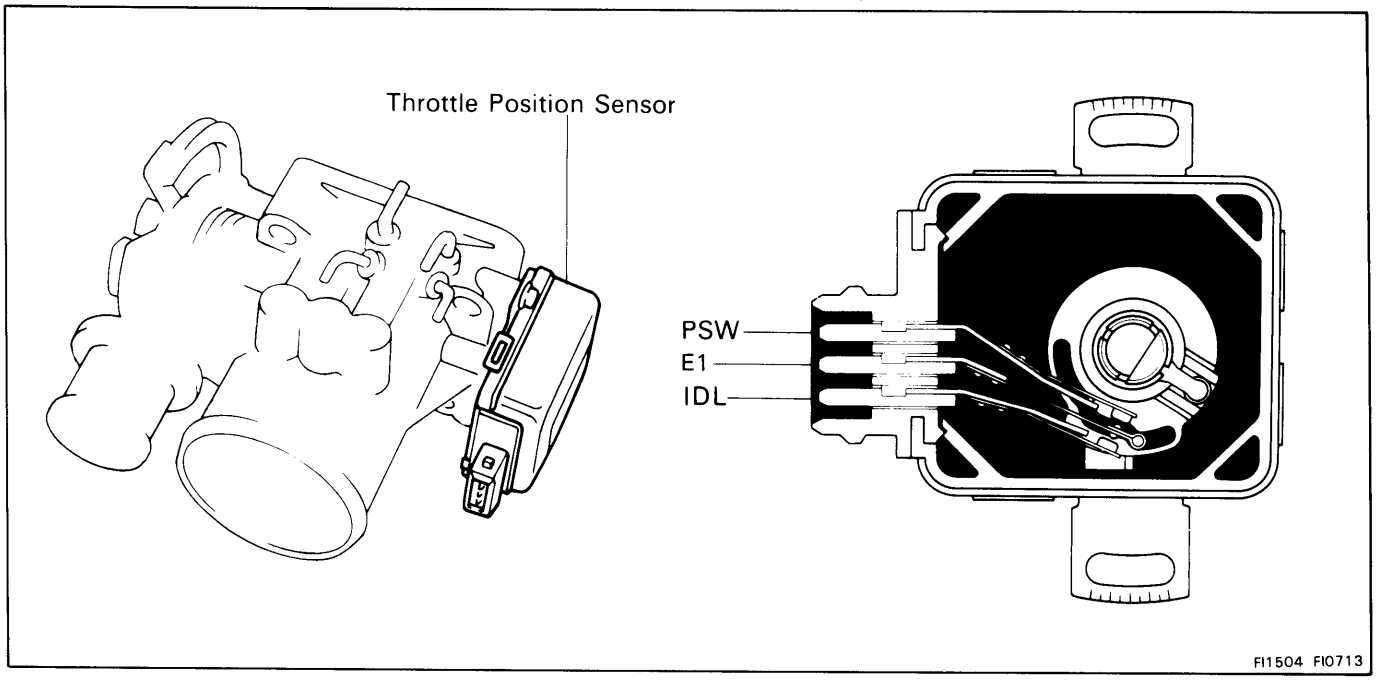
   Install the air valve with the two bolts.

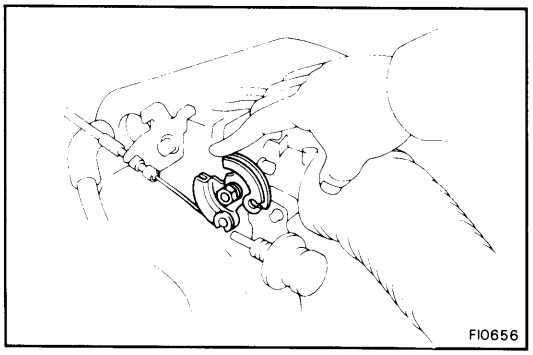
2. **CONNECT AIR VALVE INLET AND OUTLET HOSES**

3. **CONNECT AIR VALVE BY-PASS HOSES**

4. **INSTALL AIR INTAKE CHAMBER**
   (See steps 5 to 16 on page FI-55)

Throttle Body

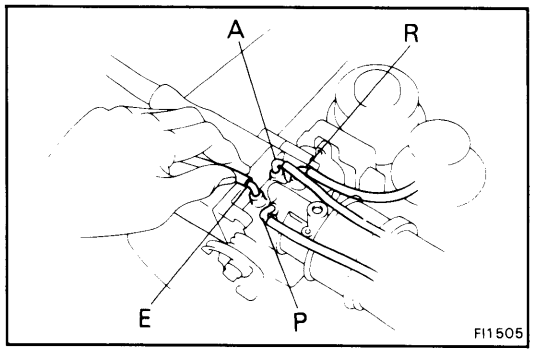




ON-VEHICLE INSPECTION

1. INSPECT THROTTLE BODY

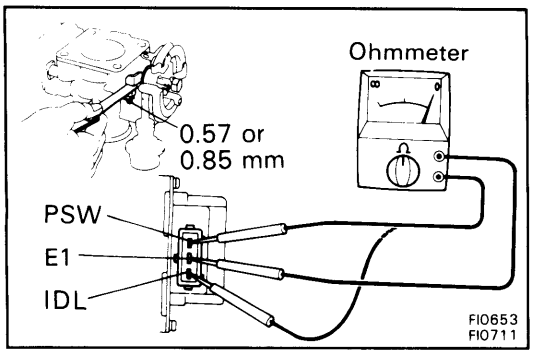
(a) Check that the throttle linkage moves smoothly.



(b) Check the vacuum at each port.

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

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



2. INSPECT THROTTLE POSITION SENSOR

Check the continuity between the terminals.

(a) Disconnect the sensor connector.

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

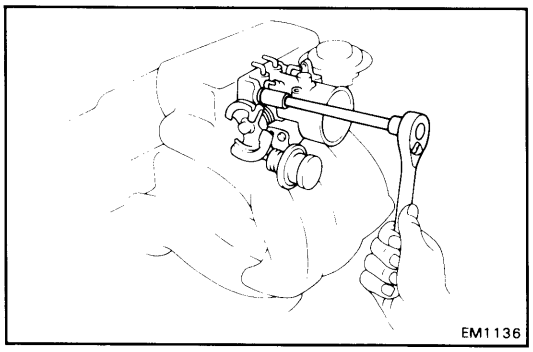
(c) Using an ohmmeter, check the continuity between each terminal.

Clearance between lever and stop screw	Continuity between terminals		
	IDL — E1	PSW — E1	IDL – PSW
0.57 mm (0.0224 in.)	Continuity	No continuity	No continuity
0.85 mm (0.0335 in.)	No continuity	No continuity	No continuity
Throttle valve fully opened position	No continuity	Continuity	No continuity

If continuity is not as specified, replace the sensor and throttle body as a set.

REMOVAL OF THROTTLE BODY

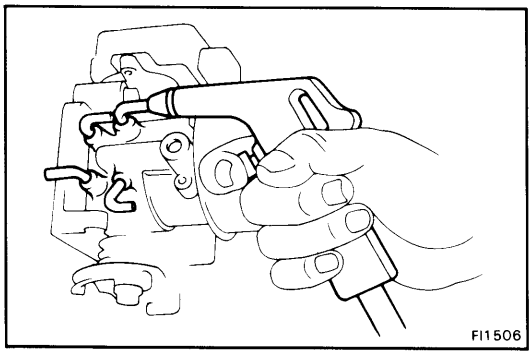
1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**
2. **DRAIN COOLANT (See page CO-4)**
3. **DISCONNECT ACCELERATOR CABLE FROM THROTTLE BODY**
4. **REMOVE AIR CLEANER HOSE**
5. **REMOVE THROTTLE BODY**
   (a) Disconnect the throttle position sensor connector.
   (b) Remove the two by-pass hoses.
   (c) Disconnect the vacuum hoses from the throttle body.
   (d) Remove four nuts, throttle body and gasket.



INSPECTION OF THROTTLE BODY

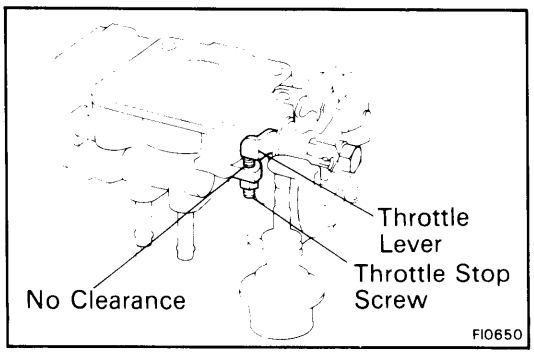
1. **CLEAN THROTTLE BODY BEFORE INSPECTION**
   (a) Clean the cast parts with a soft brush and carburetor cleaner.
   (b) Using compressed air, blow through all passages and apertures in the throttle body.

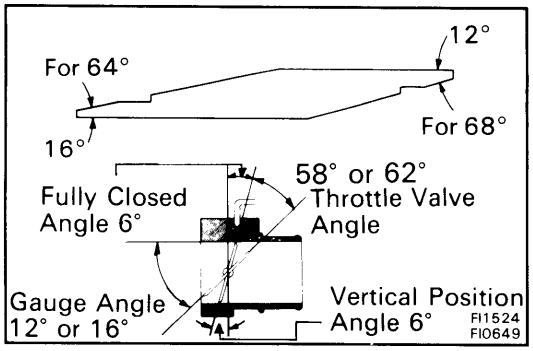
   CAUTION: To prevent deterioration, do not clean the throttle position sensor.



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.

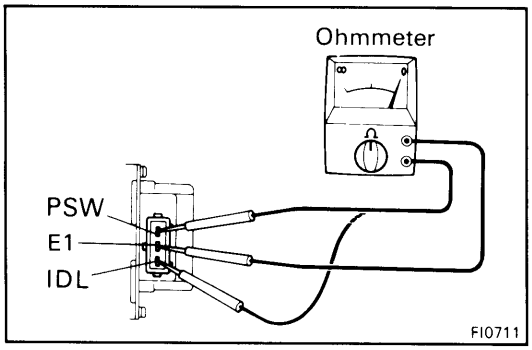




3. INSPECT THROTTLE POSITION SENSOR

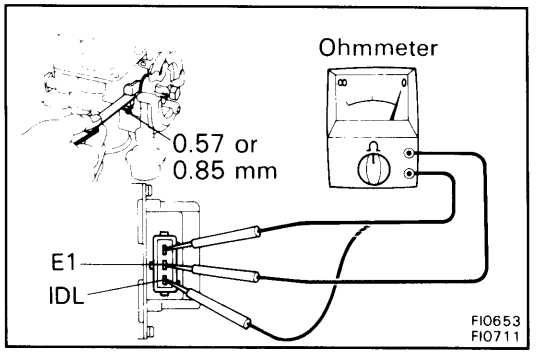
(a) Prepare an angle gauge as shown in figure.

(b) Set the throttle valve opening angle to 64° or 68° from the vertical position (incl. throttle valve fully closed angle 6°).



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

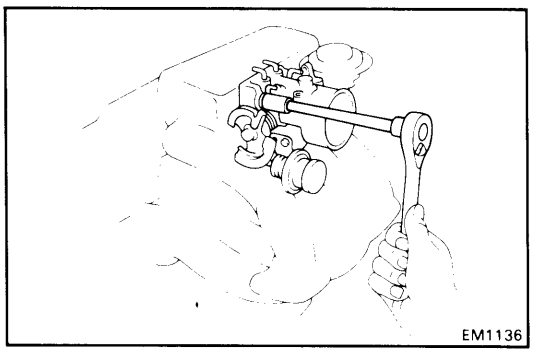
Throttle valve opening angle	Continuity		
	IDL — E1	PSW — E1	IDL – PSW
64° from vertical	No continuity	No continuity	No continuity
68° from vertical	No continuity	Continuity	No continuity



(d) Using a feeler gauge, check the continuity between terminals IDL and E1.

Clearance between lever and stop screw	Continuity (IDL — E1)
0.57 mm (0.0224 in.)	Continuity
0.85 mm (0.0335 in.)	No continuity

If continuity is not as specified, replace the sensor and throttle body as a set.



INSTALLATION OF THROTTLE BODY

1. INSTALL THROTTLE BODY

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

Torque: 120 kg-cm (9 ft-lb, 12 N·m)

(b) Connect the vacuum hoses to the throttle body.

(c) Install the two by-pass hoses.

(d) Connect the throttle position sensor connector.

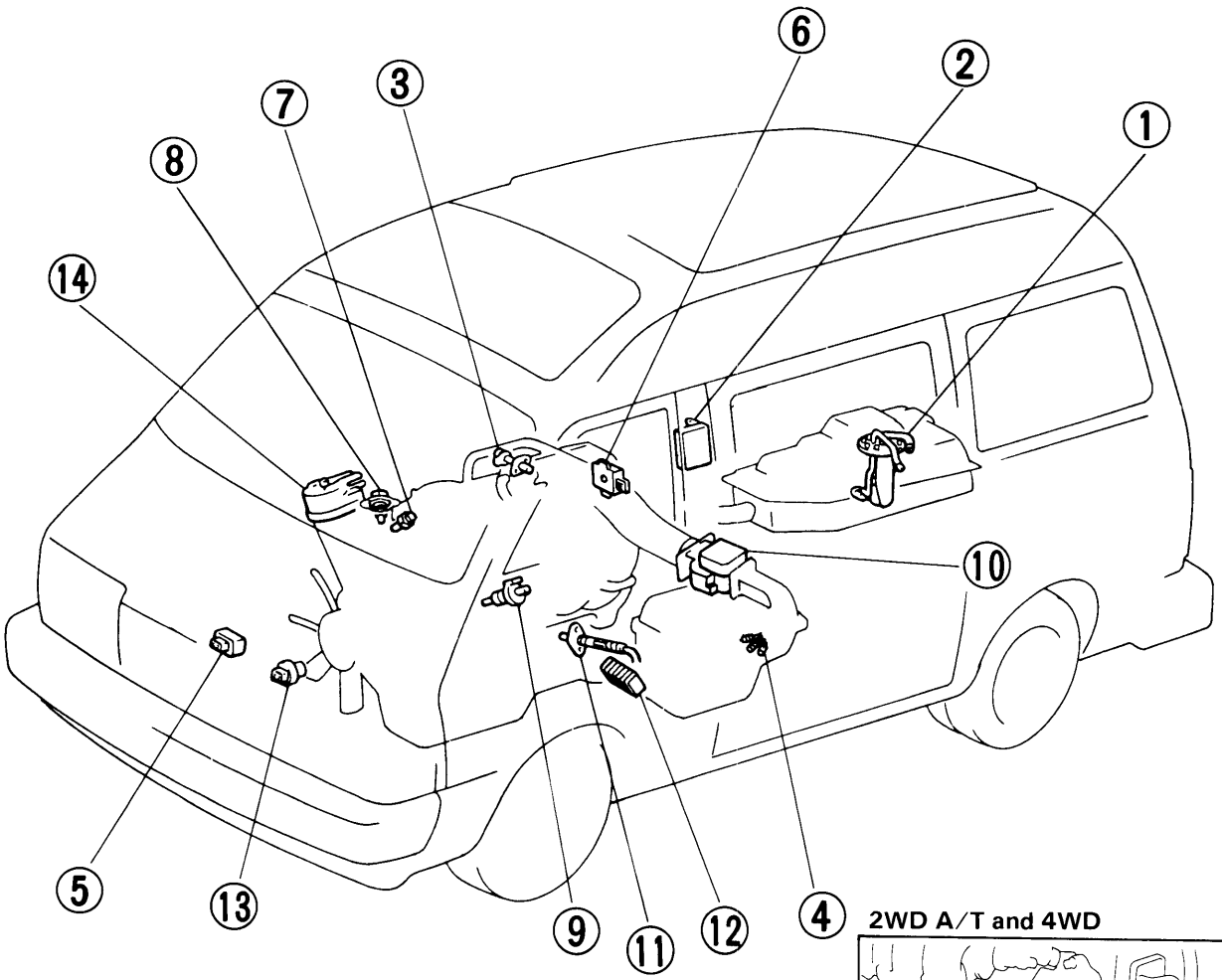
2. INSTALL AIR CLEANER HOSE

3. CONNECT ACCELERATOR CABLE TO THROTTLE BODY

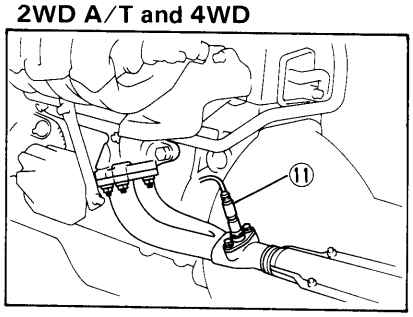
4. REFILL WITH COOLANT

5. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

ELECTRONIC CONTROL SYSTEM
Location of Electronic Control Parts



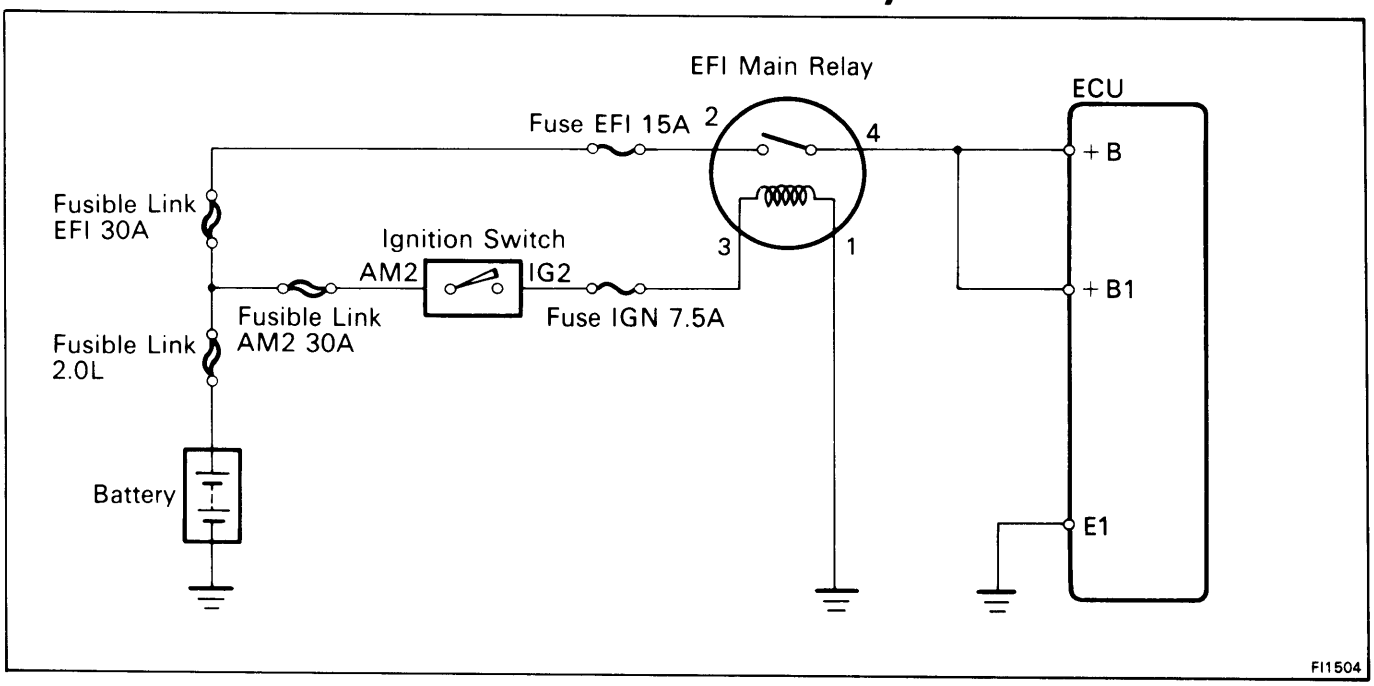
2WD A/T and 4WD

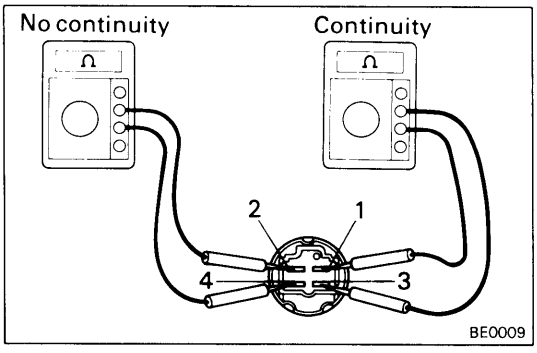


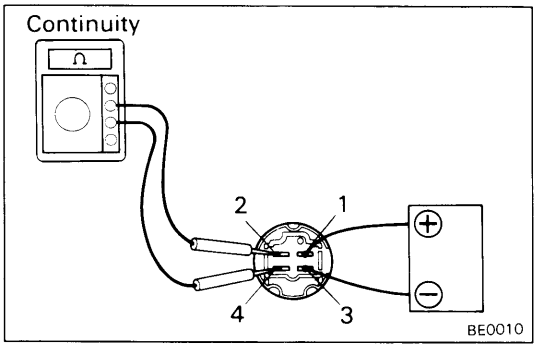
1. Fuel Pump
2. ECU
3. Cold Start Injector
4. ENGINE Service Connector
5. Circuit Opening Relay
6. Throttle Position Sensor
7. Cold Start Injector Time Switch
8. Water Temperature Sensor
9. Injector
10. Air Flow Meter
11. Oxygen Sensor
12. Solenoid Resistor
13. EFI Main Relay
14. Distributor (with Ignition Coil)

FI0648
MA0445

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.

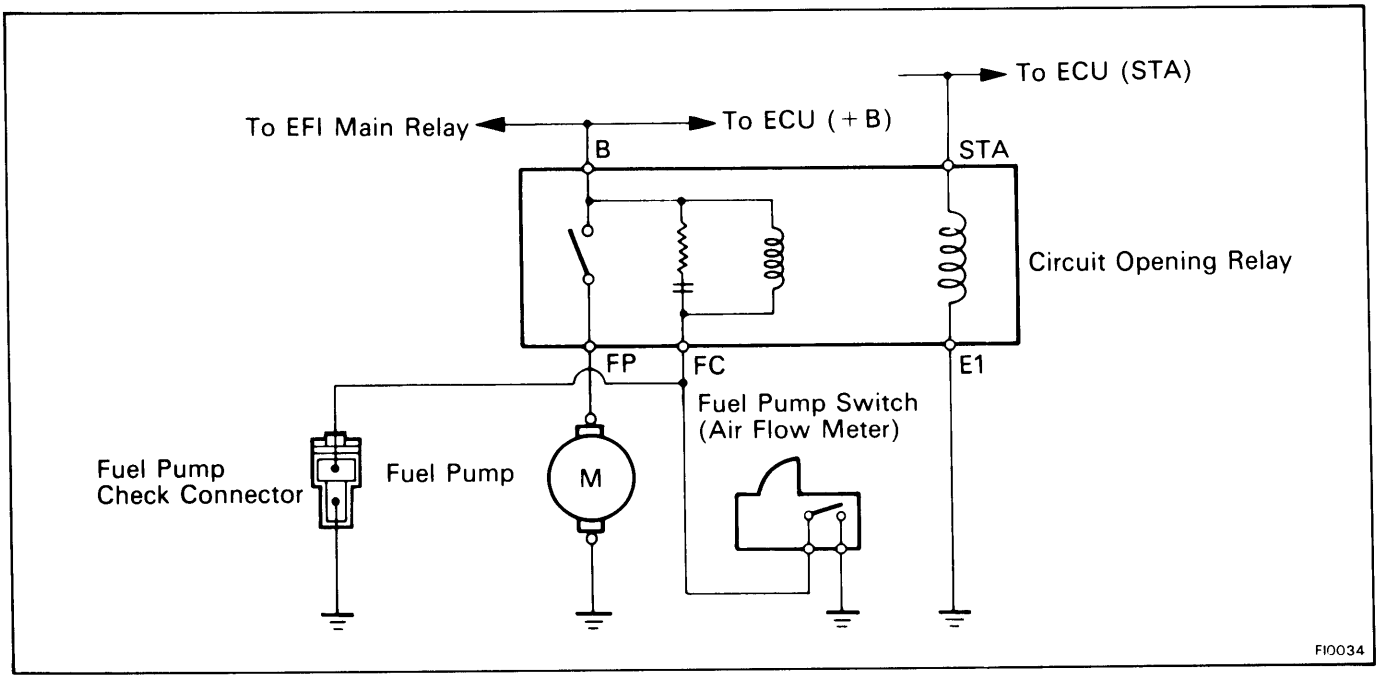
2. INSPECT RELAY OPERATION

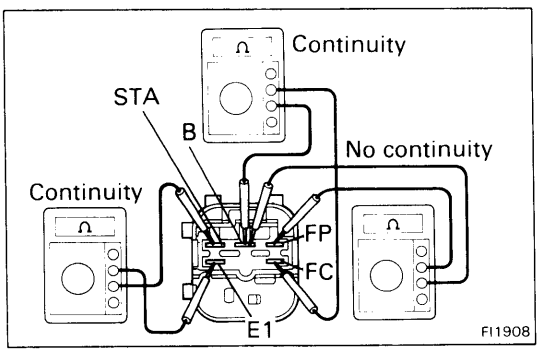
(a) Apply battery voltage across terminals 1 and 3.

(b) Using 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

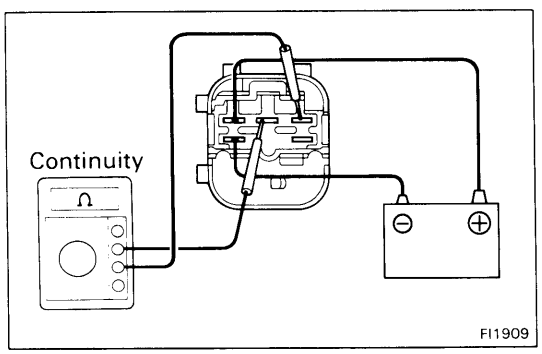
1. INSPECT RELAY CONTINUITY

(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.

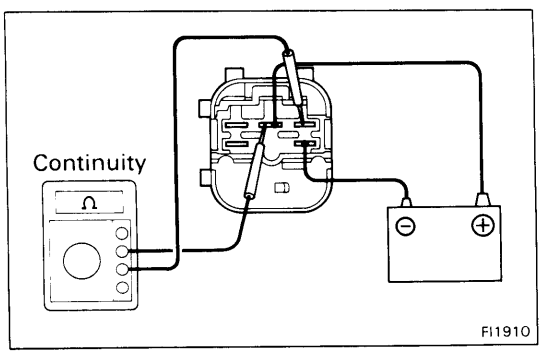
If continuity is not as specified, replace the relay.



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.

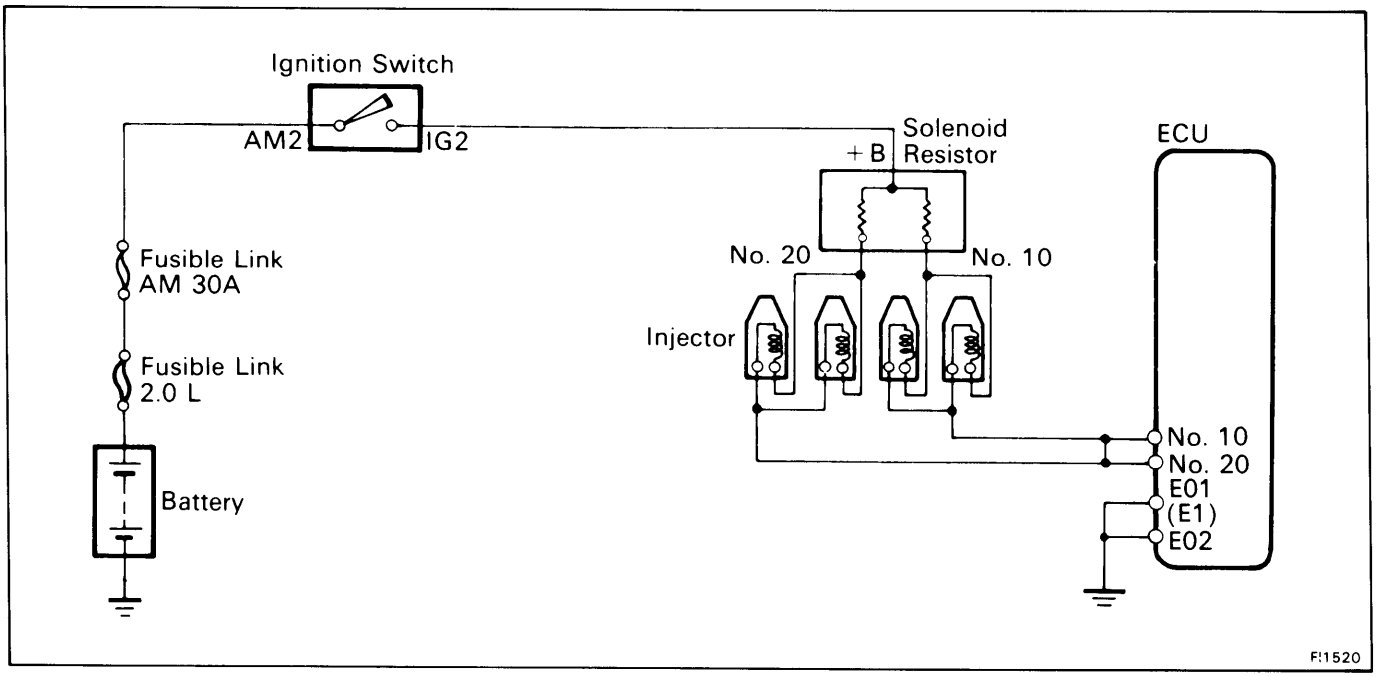


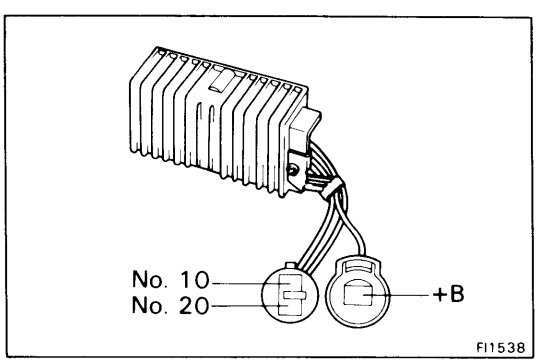
(c) Apply battery voltage across terminals B and FC.

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

If operation is not as specified, replace the relay.

Solenoid Resistor





INSPECTION OF SOLENOID RESISTOR

INSPECT SOLENOID RESISTOR

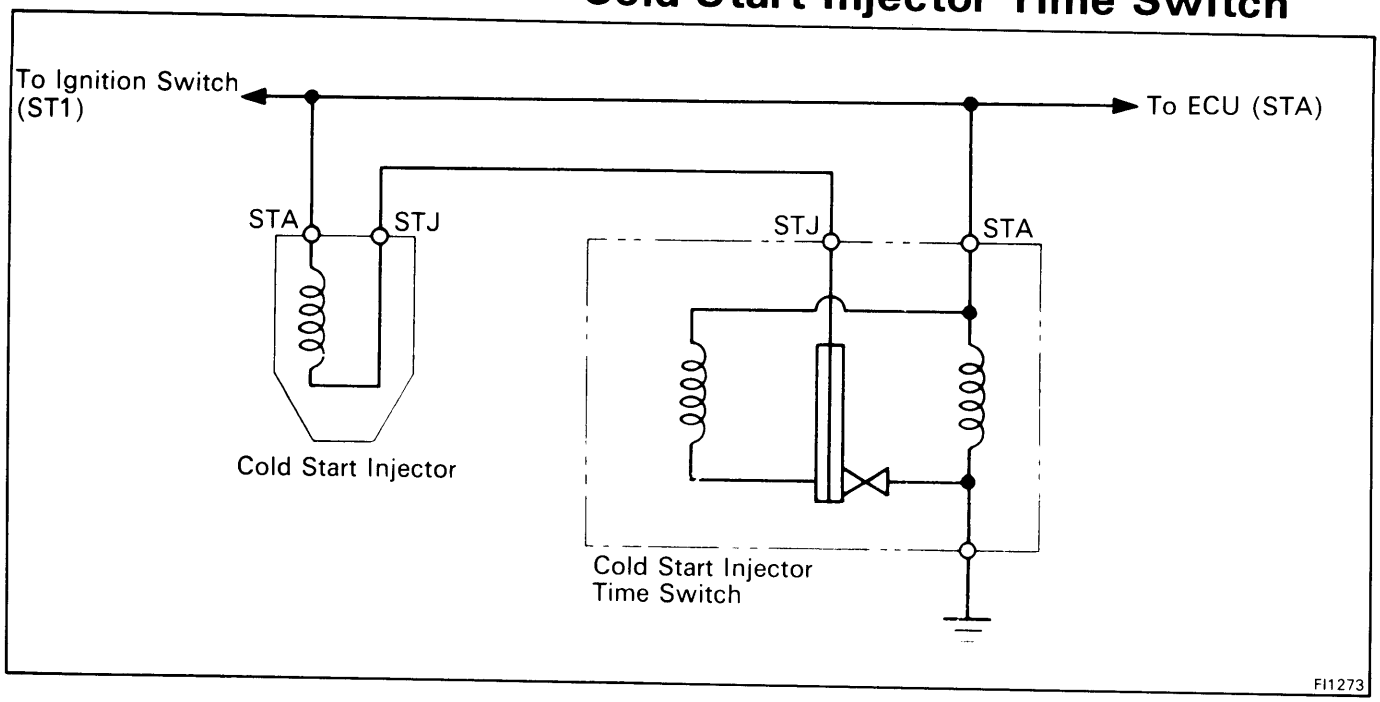
(a) Disconnect the connectors.

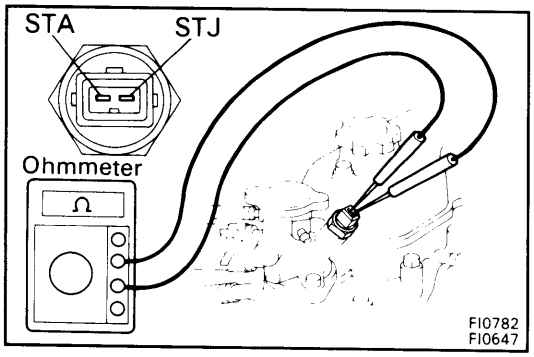
(b) Using an ohmmeter, measure the resistance between terminal +B and other terminals.

Resistance: 2 — 3 Ω each

If the resistance is not within specification, replace the resistor.

Cold Start Injector Time Switch





INSPECTION OF COLD START INJECTOR TIME SWITCH

INSPECT COLD START INJECTOR TIME SWITCH

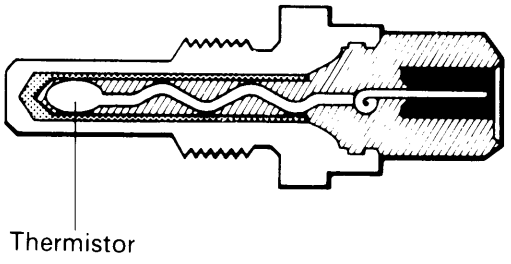
(a) Disconnect the connector.

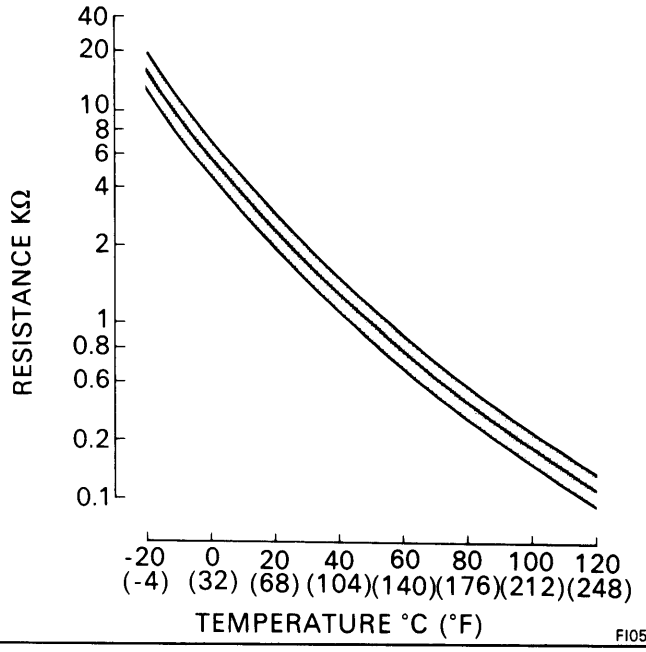
(b) Using an ohmmeter, measure the resistance between each terminal.

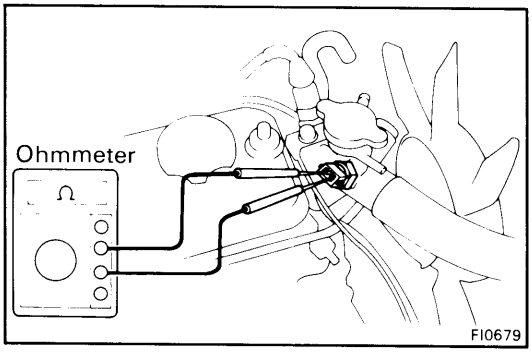
Terminals	Resistance (Ω)	Coolant temp.
STA – STJ	20 – 40	below 30°C (86°F)
	40 – 60	above 40°C (104°F)
STA – Ground	20 – 40	below 30°C (86°F)
	20 – 80	above 40°C (104°F)

If the resistance is not within specification, replace the switch.

Water Temperature Sensor







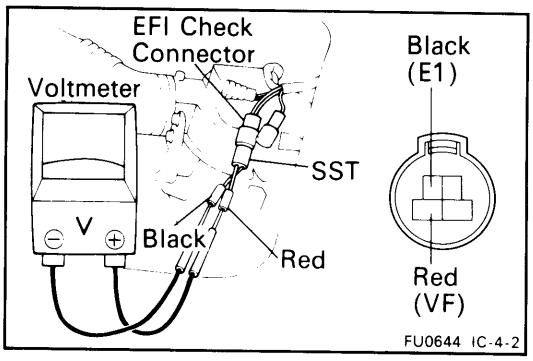
INSPECTION OF WATER TEMPERATURE SENSOR

INSPECT WATER TEMPERATURE SENSOR

(a) Disconnect the connector.

(b) Using an ohmmeter, measure the resistance between both terminals (THW – E2).

Resistance: Refer to the chart.



Oxygen Sensor

INSPECTION OF FEEDBACK VOLTAGE (VF)

1. CONNECT SST AND VOLTMETER

Connect SST to the EFI check connector and connect a voltmeter to SST.

SST 09842-14010

Connect the positive (+) probe to the red wire of the SST and negative (−) probe to the black wire.

2. WARM UP ENGINE TO NORMAL OPERATING TEMPERATURE

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

Short terminals T and E1 of the check engine 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 the number of times the voltmeter needle fluctuates in 10 seconds.
    - 8 times or more → Normal
    - Zero → ③
    - Less than 8 times → Unshort terminals T and E1 of the check engine connector and maintain engine speed at 2,500 prm.
      - Within 120 seconds, after unshorting terminal T, measure voltage between terminals VF and E1 of the EFI check connector.
        - More than OV → ①
        - OV → Read and record diagnostic codes
          - Normal code and code 5 → ②
          - Malfunction code(s) (ex. code 5) → Repair the relevent diagnostic code.
- 8 times or more → Normal
- Less than 8 times → Replace the ECU. → After replacing the oxygen sensor → ④

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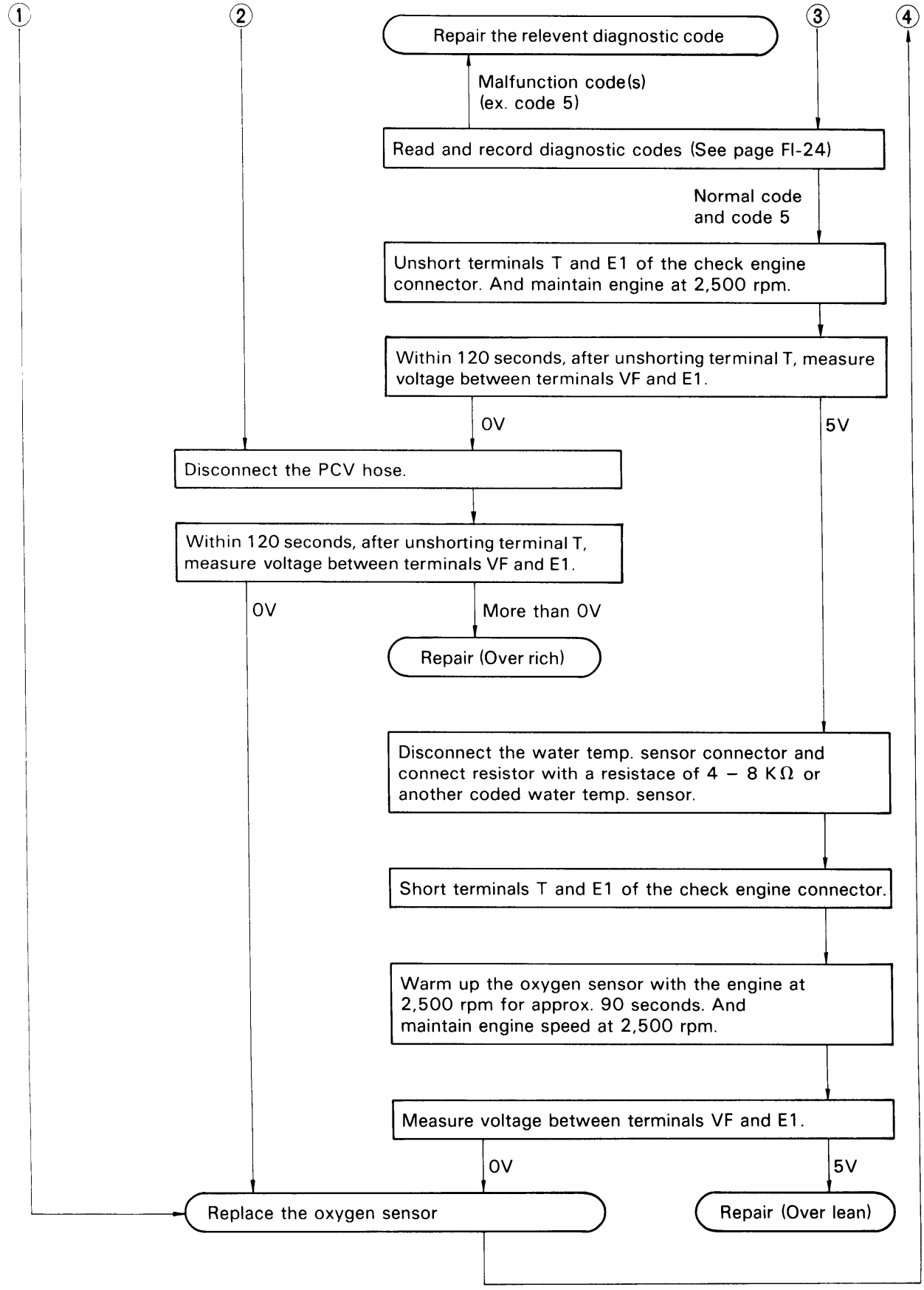
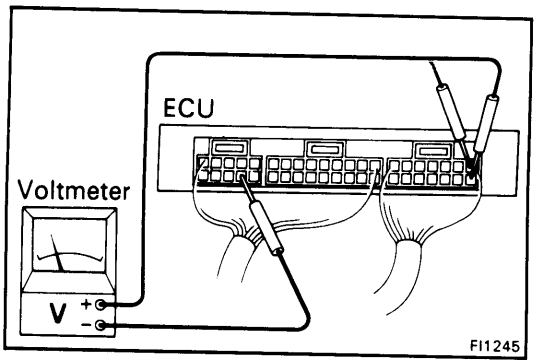
CONTINUED FROM PAGE FI-70





Electronic Controlled Unit (ECU)

INSPECTION OF ECU

1. INSPECT VOLTAGE OF ECU

NOTE:

1. The ECU, itself, cannot be checked directly.
2. The EFI circuit can be checked by measuring the resistance and voltage at the wiring connectors of the ECU.

Check the voltage at the wiring connectors.

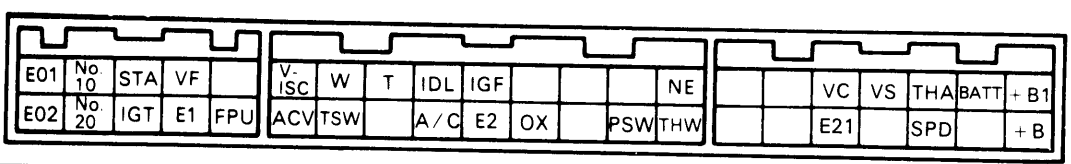
- Turn the ignition switch ON.
- Measure the voltage at each terminal.

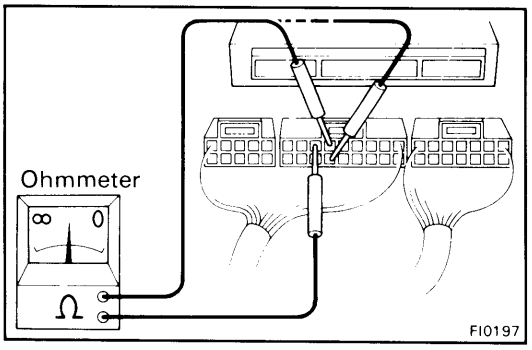
NOTE: 1. Perform all voltage measurements with the connectors connected.
2. Verify that the battery voltage is 11V or more when the ignition switch is ON.

Voltages at ECU Wiring Connectors

Terminals	Condition		Voltage (V)
+B, +B1 – E1	Ignition switch ON		10 – 14
BATT – E1	—		10 – 14
IDL – E1	Ignition switch ON	Throttle valve open	8 – 14
PSW – E1	Ignition switch ON	Throttle valve closed	8 – 14
IGT – E1	Idling		0.7 – 1.0
STA – E1	Cranking		6 – 12
No. 10, No. 20 – E1	Ignition switch ON		9 – 14
W – E1	No trouble ("CHECK" engine warning light off) and engine running		8 – 12
VC – E2	Ignition switch ON		6 – 10
VS – E2, E21	Ignition switch ON	Measuring plate fully closed	0.5 – 2.5
		Measuring plate fully open	5 – 10
	Idling		2 – 8
THA – E2	Ignition switch ON	Intake temperature 20°C (68°F)	1 – 3
THW – E2	Ignition switch ON	Coolant temperature 80°C (176°F)	0.5 – 2.5
A/C – E1	Ignition switch ON	Air conditioning ON	10 – 14
T – E1	Ignition switch ON	Check engine connector (T – E1) not short	10 – 14
		Check connector (T – E1) short	0

ECU Terminals





2. INSPECT RESISTANCE OF ECU

CAUTION:

1. **Do not touch the ECU terminals.**
2. **The tester probe should be inserted into the wiring connector from the wiring side.**

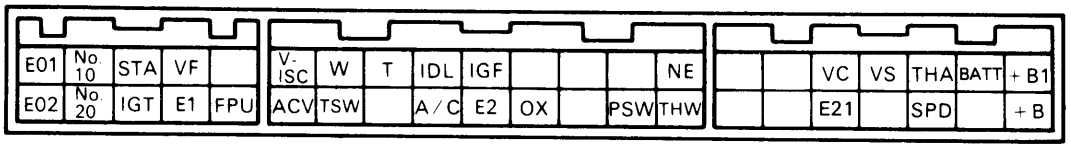
Check the resistance between each terminal of the wiring connectors.

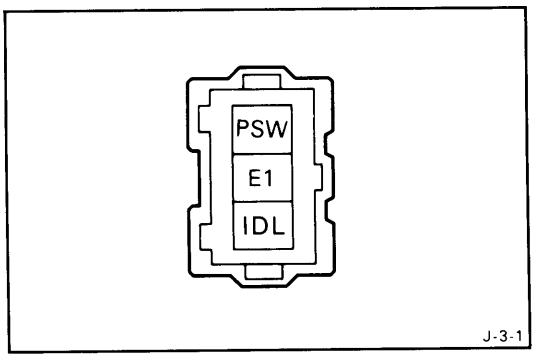
- Disconnect the ECU wiring connectors.
- Measure the resistance between each terminal of the wiring connectors.

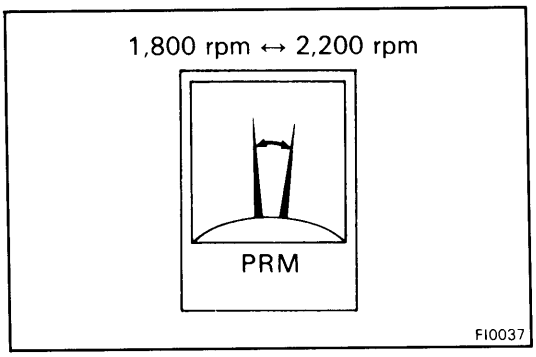
Resistance at ECU Wiring Connectors

Terminals	Condition	Resistance (Ω)
IDL – E1	Throttle valve open	∞
	Throttle valve fully closed	0
PSW – E1	Throttle valve open	0
	Throttle valve fully closed	∞
+B – E2	——	200 – 400
VC – E2	——	100 – 300
VS – E2	Measuring plate fully closed	20 – 400
	Measuring plate fully open	20 – 1,000
THA – E2	Intake air temperature 20°C (68°F)	2,000 – 3,000
THW – E2	Coolant temperature 80°C (176°F)	200 – 400

ECU Terminals







Fuel Cut RPM

INSPECTION OF FUEL CUT RPM

INSPECT FUEL CUT RPM

(a) Start and warm up the engine.

(b) Disconnect the connector from the sensor throttle position sensor.

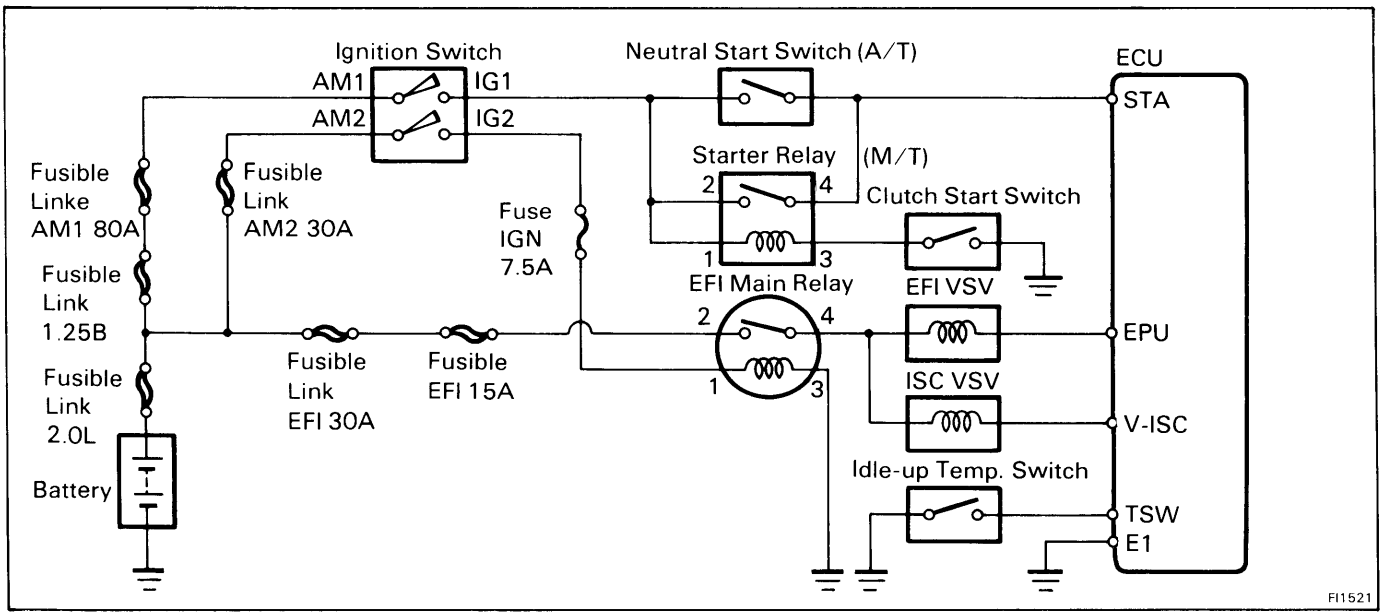
(c) Short circuit terminals IDL and E1 on the wire connector side.

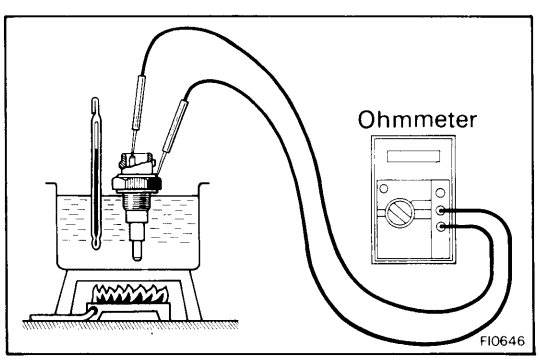
(d) Gradually raise the engine rpm and check that there is fluctuation between the fuel cut and fuel return points.

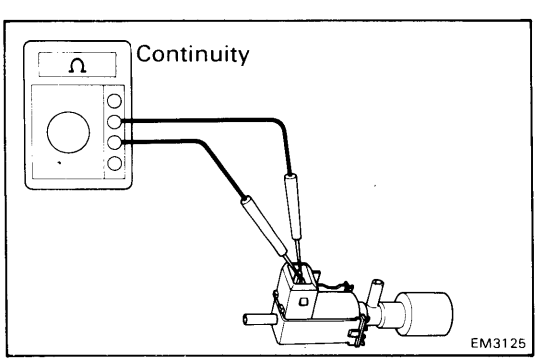
NOTE: The vehicle should be stopped.

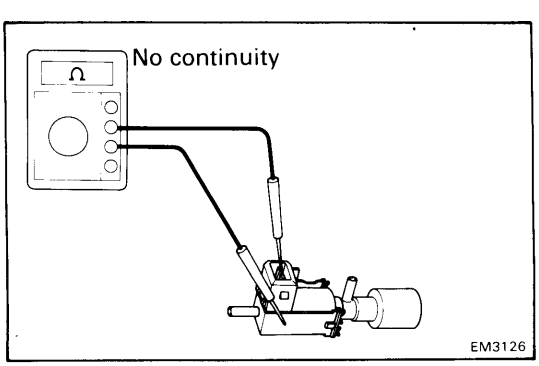
Fuel cut rpm: 2,200 rpm
Fuel return rpm: 1,800 rpm

Idle-up and High-temperature Line Pressure Up (w/ A/C) Systems









INSPECTION OF IDLE-UP AND FUEL PRESSURE UP SYSTEMS

1. INSPECT IDLE-UP TEMPERATURE SWITCH

(a) Using an ohmmeter, check that there is no continuity between the terminal and body when the oil temperature is below 103°C (217°F).

(b) Check that there is continuity between the terminal and body when the oil temperature is above 110°C (230°F).

If operation is not as specified, replace the switch.

2. INSPECT EFI VSV

A. Inspect VSV for open circuit

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

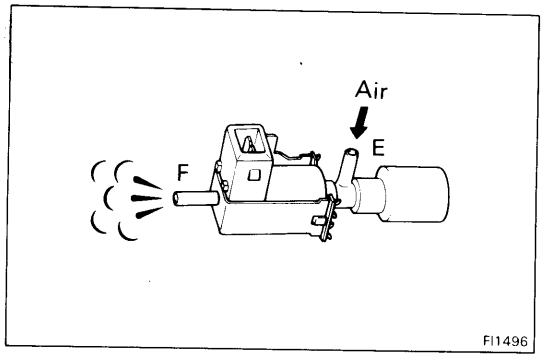
Resistance (Cold): 37 — 44 Ω

If there is no continuity, replace the VSV.

B. Inspect VSV for ground

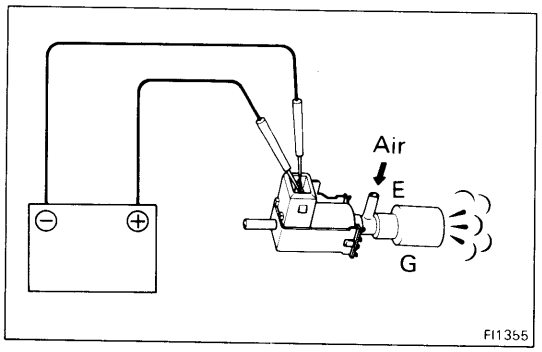
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



C. Inspect VSV operation

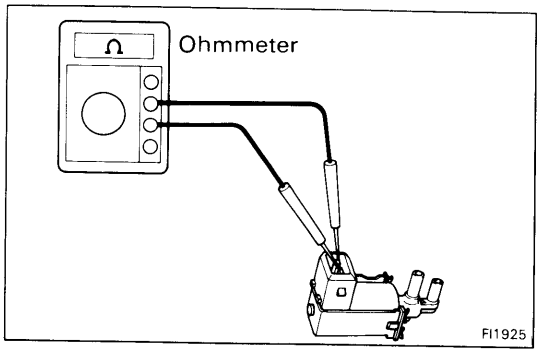
(a) Check taht air flows from pipe E to pipe F.



(b) Apply battery voltage across the terminals.

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

If operation is not as specified, replace the VSV.



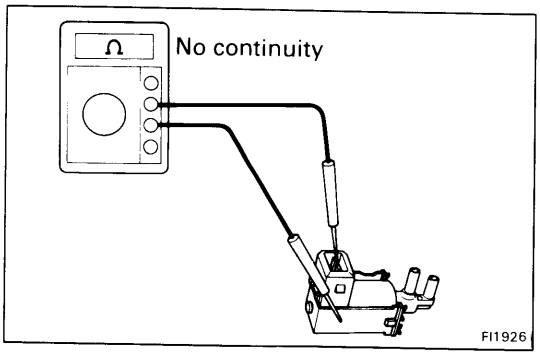
3. INSPECT ISC VSV

A. Inspect VSV for open circuit

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

Resistance (Cold): 37 — 44 Ω

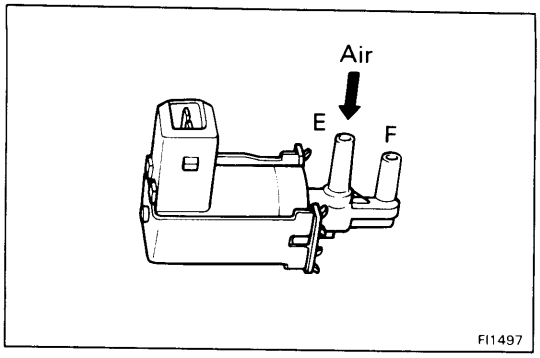
If there is no continuity, replace the VSV.



B. Inspect VSV for ground

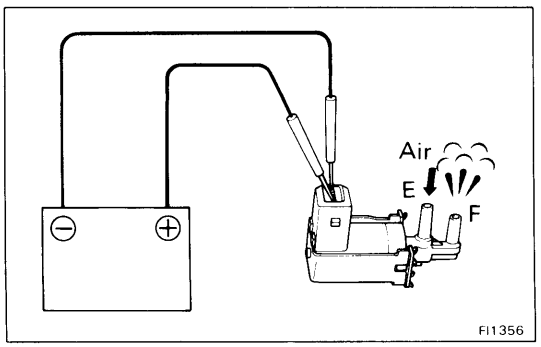
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



C. Inspect VSV operation

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



(b) Apply battery voltage across the terminals.

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

If operation is not as specified, replace the VSV.