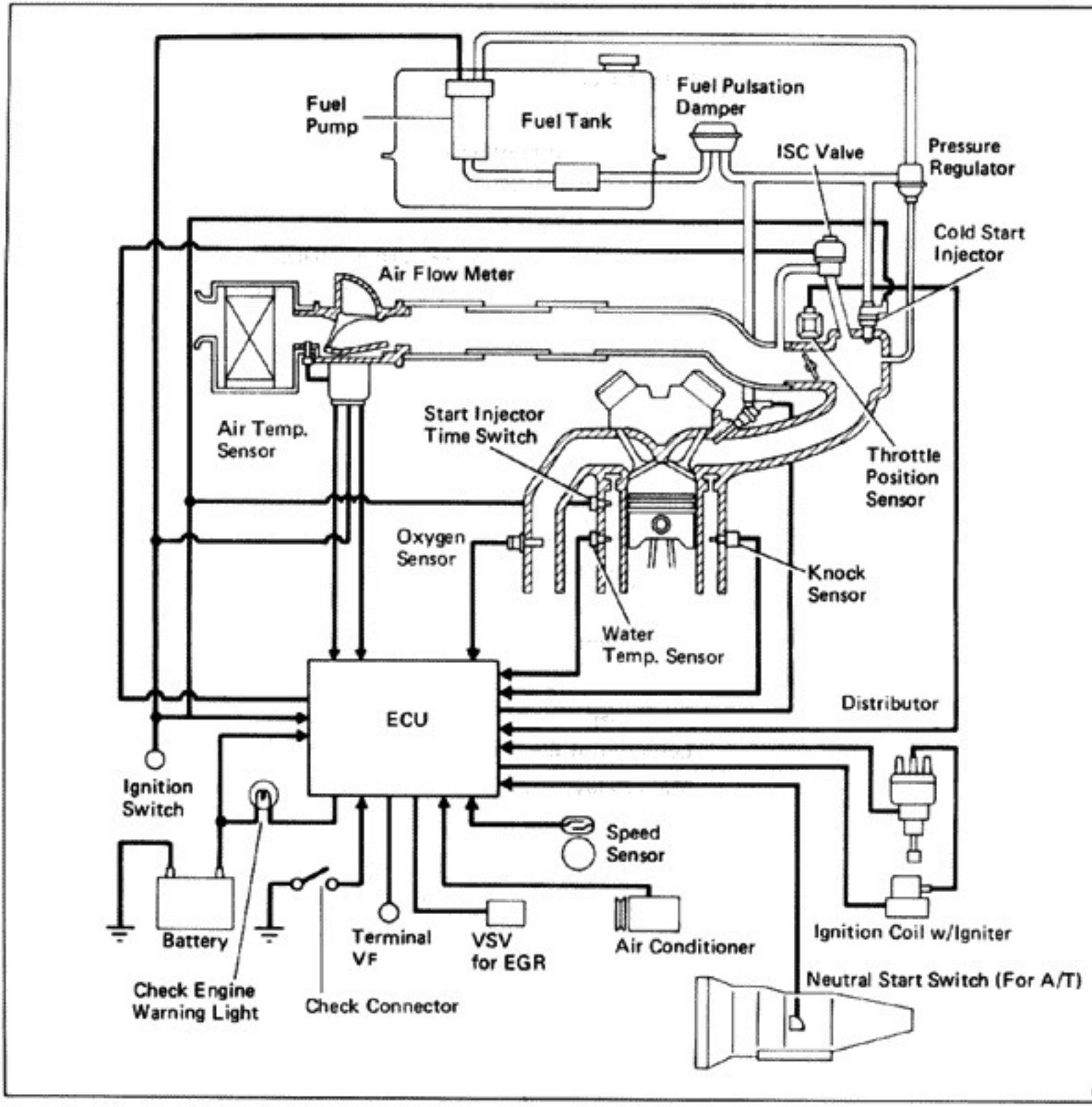
EFI SYSTEM

SYSTEM DESCRIPTION



The EFI used on Toyotas has three basic systems.

FUEL SYSTEM

An electric fuel pump supplies sufficient fuel, under a constant pressure, to the EFI injectors. These injectors inject a metered quantity of fuel into the intake manifold in accordance with signals from

ELECTRONIC CONTROL SYSTEM

The 5M-GE engine is equipped with a Toyota C puter Control System (TCCS) which centrally trols the EFI, ESA, EGR, Diagnosis systems, by means of an Electronic Control Unit (ECU

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

1. Electronic Fuel Injection (EFI)

   The ECU receives signals from various sensors indicating changing engine 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, intake air volume, coolant temperature, etc.), the microcomputer (ECU) triggers the spark at precisely the right instant.
   (See IG section)

3. Idle Speed Control (ISC)

   The ECU is programmed with target engine speed values to respond to different engine conditions (coolant temperature, air conditioner on/off, etc.). Sensors transmit signals to the ECU which controls the flow of air through the by-pass of the throttle valve and adjusts idle speed to the target value.
   (See pages FI-43,60)

4. Exhaust Gas Recirculation (EGR)

   The ECU detects the coolant temp. and controls EGR function accordingly.
   (See page EC-10)

5. Electronic Controlled Transmission (ECT) (Automatic Trans. only)

   A serial signal is transmitted to the ECT computer to prevent shift up to 3rd or overdrive during cold engine operation.
   (See AT section)

6. Diagnostics

   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 check connector are short-circuited.
   (See page FI-22)

7. Fail-Safe Function

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

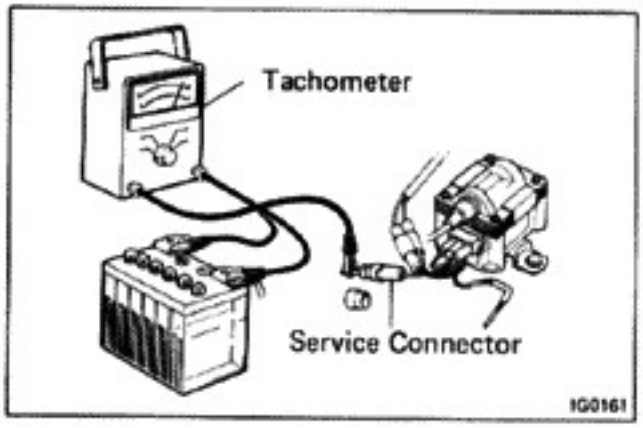
PRECAUTIONS

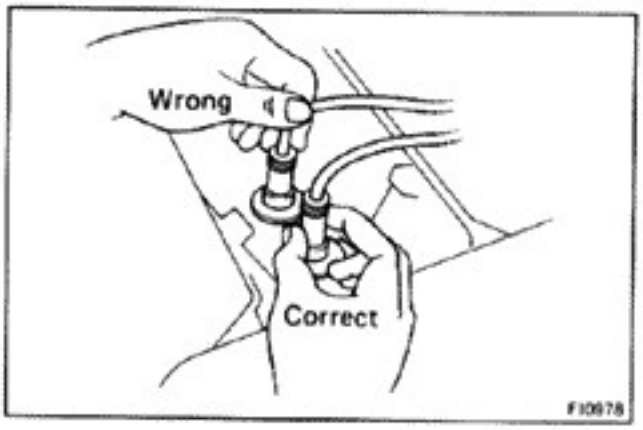
1. **Before working on the fuel system, disconnect the n tive terminal from the battery.**

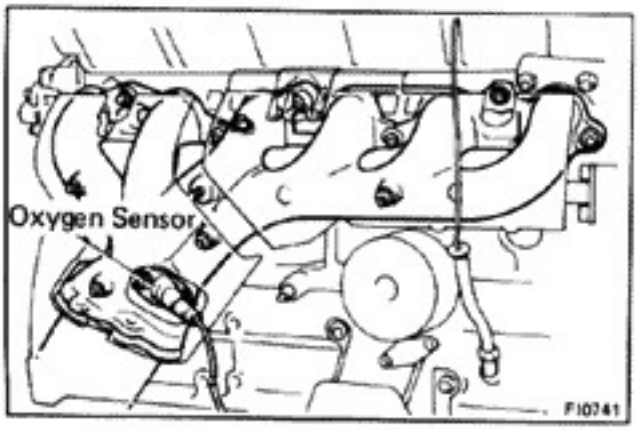
   NOTE: Any diagnosis code retained by the computer be cleared when the battery terminal is removed. Th fore, if necessary, read the diagnosis before removing battery terminal.

2. **When working on the fuel system, do not smoke or w near any fire.**

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







INSPECTION PRECAUTIONS

MAINTENANCE PRECAUTIONS

1. **INSURE CORRECT ENGINE TUNE-UP**

2. **PRECAUTIONS WHEN CONNECTING GAUGE**
   (a) Connect the tachometer to the service connect
   (b) Use the battery as the power source for the tim light, tachometer, etc.

3. **IN EVENT OF ENGINE MISFIRE, THE CATALYTIC CONVERTER MAY OVERHEAT. THEREFORE, THE FOLLOWING PRECAUTIONS SHOULD BE TAKEN**
   (a) Insure correct drive belt adjustment.
   (b) Insure proper connection of battery terminals, e
   (c) Handle resistor cords carefully.
   (d) After repair work, insure that the ignition coil ter nals and all other ignition system lines are reconnec securely.
   When cleaning the engine compartment, be especi careful to protect the electrical system from wat

4. **PRECAUTIONS WHEN HANDLING OXYGEN SENSOR**
   (a) Do not allow oxygen sensor to drop or hit against object.
   (b) Do not allow water to come into contact with the s sor or attempt to cool it.

WHEN CAR IS EQUIPPED WITH A MOBILE RADIO SYSTEM (HAM, CB, ETC.)

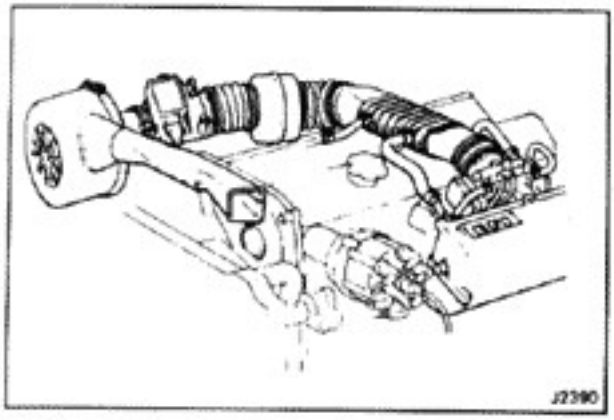
The ECU has been designed so that it will not be affected by outside interference.
However, if your vehicle is equipped with an amateur radio transceiver, etc.
You must be observe the following precautions.

(a) Install the antenna as far as possible from the ECU. The ECU is located behind the glove box so the antenna should be installed at the rear, left side of the vehicle.
If installing in the bumper, do so on the left side, if possible.

(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.

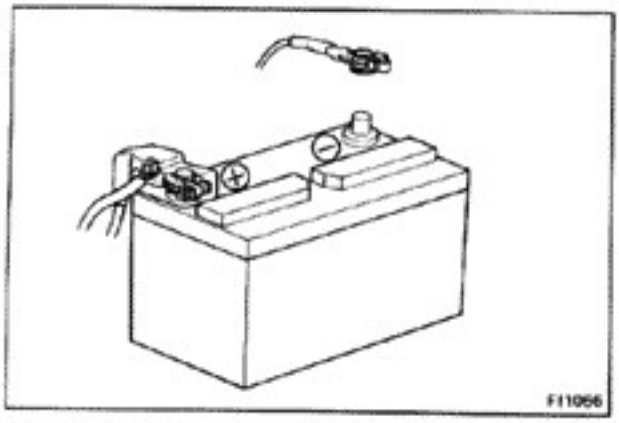
(d) Do not equip your vehicle with a powerful mobile radio system.



AIR INDUCTION SYSTEM

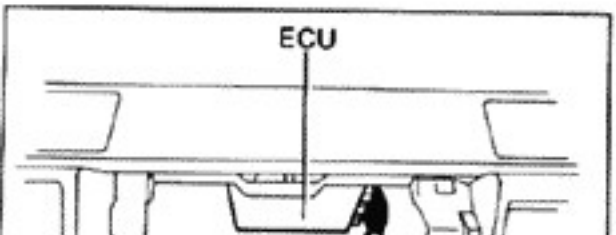
1. Separation of the engine oil level gauge, oil filler cap. PCV hose, etc. may cause the engine to run out of tune.

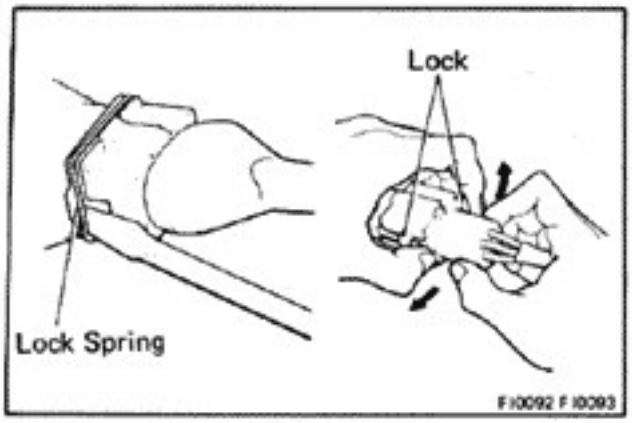
2. Disconnection, looseness or cracks in the parts of the air intake system between the air flow meter and cylinder head will allow air suction and cause bad engine tune.



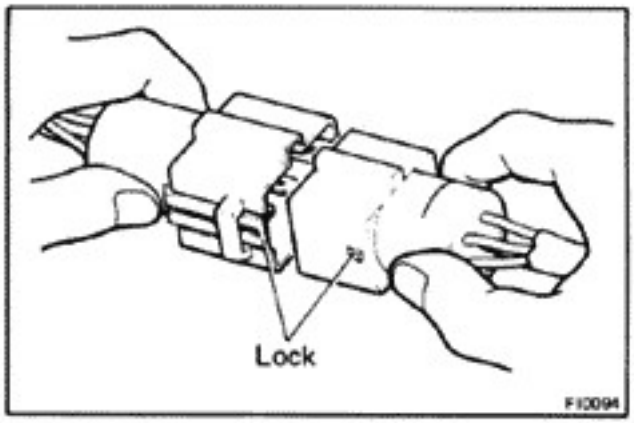
ELECTRONIC CONTROL SYSTEM

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 and, in particular, the ECU.
4. Do not be careless during troubleshooting as there are numerous transistor circuits and even slight terminal contact can cause further troubles.
5. Do not open the ECU cover.
6. When inspecting during rainy weather, take care to prevent entry of water. Also, when washing the engine compartment, prevent water from getting on the EFI parts and

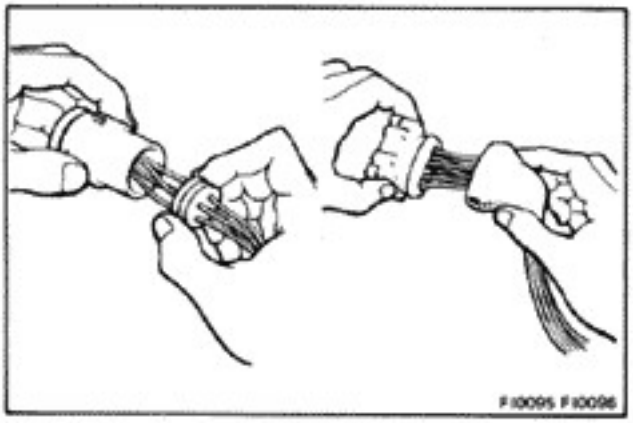




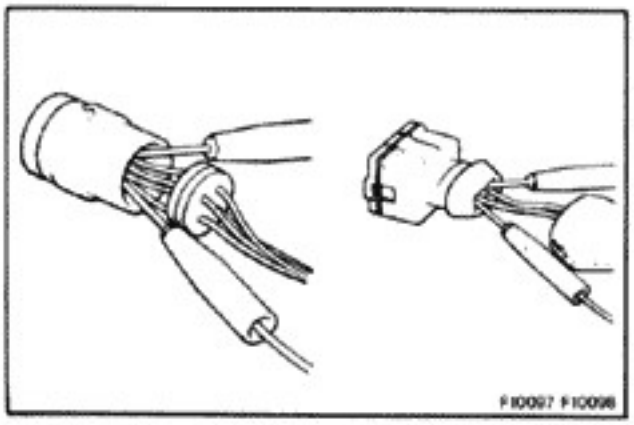
8. Sufficient care is required when pulling out and insert wiring connectors.
   (a) Release the lock and pull out the connector, pull on the connectors.



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

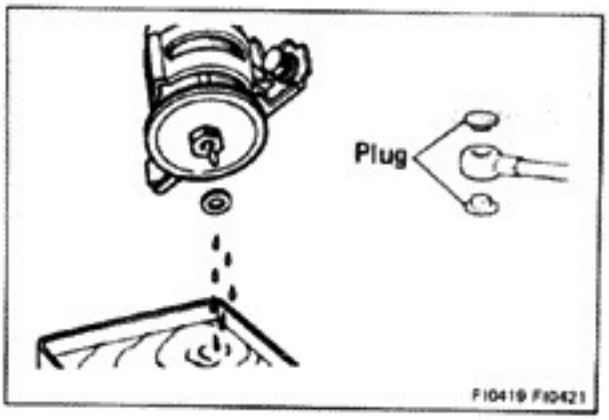


9. When inspecting a connector with a volt/ohmmeter.
   (a) Carefully take out the water-proofing rubber if it i water-proof type connector.



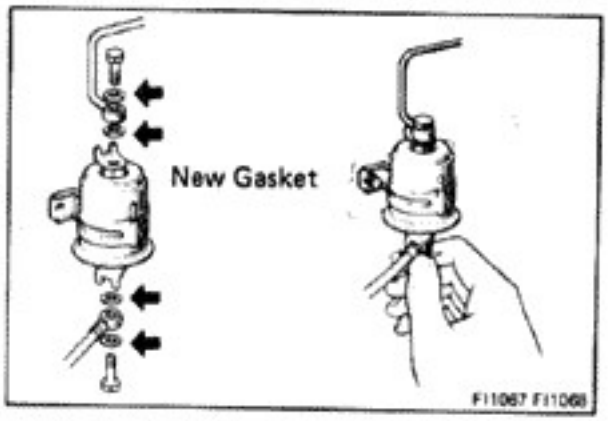
   (b) Insert the tester probe into the connector from the w ing side when checking the continuity, amperage voltage.
   (c) Do not apply unnecessary force to the terminal.
   (d) After checking, install the water-proofing rubber the connector securely.

10. Use SST for inspection or test of the injector, cold st injector or its wiring connector.
    SST 09842-30020 and 09842-30050

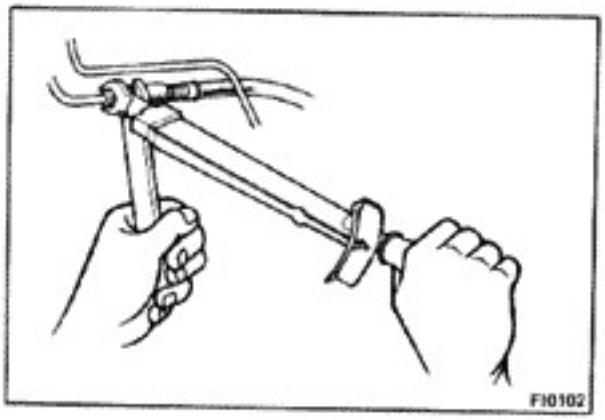


FUEL SYSTEM

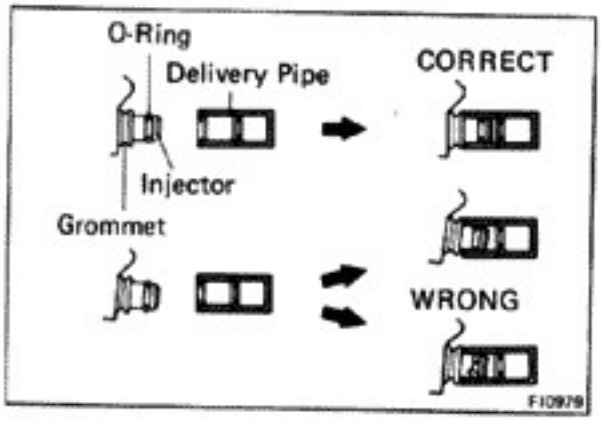
1. When disconnecting high fuel pressure line the connection, a large amount of gasoline will come out, so observe the following procedure.
   (a) Put a container under the connection.
   (b) Slowly loosen the connection.
   (c) Disconnect the connection.
   (d) Plug the connection with a rubber plug.



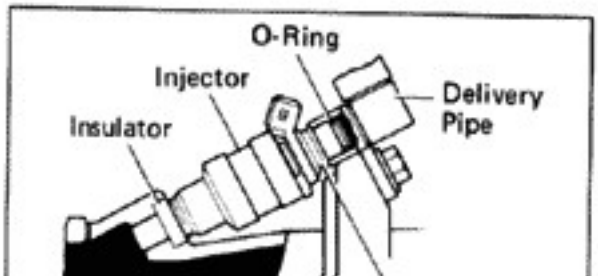
2. When connecting the flare nut or union bolt on the high pressure pipe union, observe the following procedure.
   [Union bolt type]
   (a) Always use a new gasket.
   (b) First tighten the union bolt by hand.
   (c) Then tighten the bolt to the specified torque.
   Torque: 300 kg-cm (22 ft-lb, 29 N·m)



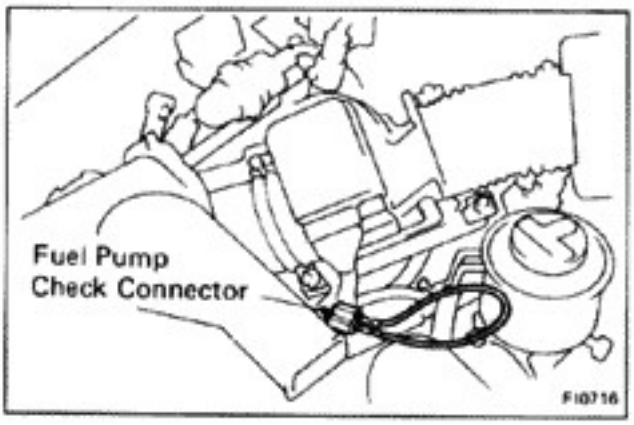
   [Flare nut type]
   (a) Apply a thin coat of oil to the flare and first tighten the flare nut by hand.
   (b) Then tighten the nut to the specified torque.
   Torque: 350 kg-cm (25 ft-lb, 34 N·m)



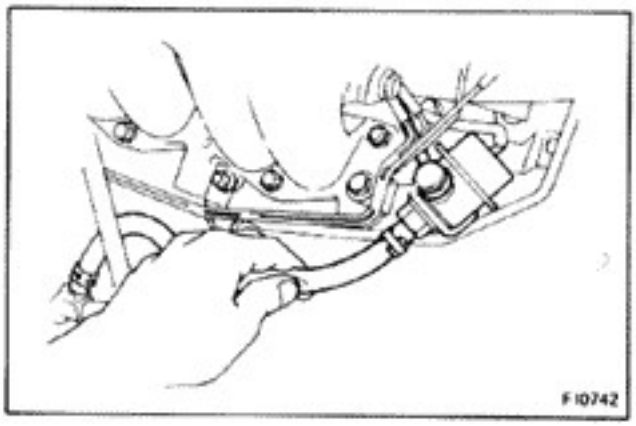
3. Take the following precautions when removing and installing the injectors.
   (a) Never re-use an O-ring.
   (b) When placing an O-ring on the injector, use care not to damage it in any way.
   (c) Lubricate the O-ring with spindle oil or gasoline before installing — never use engine, gear or brake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



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



5. Confirm that there are no fuel leaks after performing m
tenance on the fuel system.
   (a) With engine stopped, turn the ignition switch
   (b) Short circuit terminals of the fuel pump check
nector.



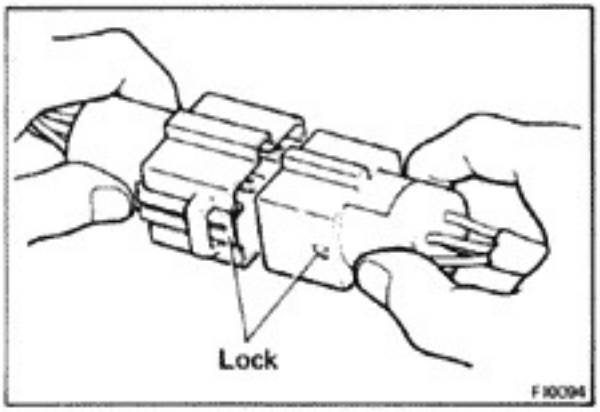
   (c) When the pressure regulator fuel return hose (sh
in the figure at left), is pinched, the pressure w
the high pressure line will rise to about 4 kg/cm
psi, 392 kPa). In this state, check to see that t
are no leaks from any part of the fuel system.

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

TROUBLESHOOTING

TROUBLESHOOTING HINTS

1. Engine troubles are usually not caused by the EFI sys
When troubleshooting, always first check the conditi
the other systems.
   (a) Electronic source
      - Battery
      - Fusible links
      - Fuses
   (b) Body ground
   (c) Fuel supply
      - Fuel leakage
      - Fuel filter
      - Fuel pump
   (d) Ignition system
      - Spark plug
      - High-tension cord
      - Distributor
      - Igniter and ignition coil
   (e) Air intake system
      - Vacuum leaks
   (f) Emission control system
      - EGR system
      - PCV system

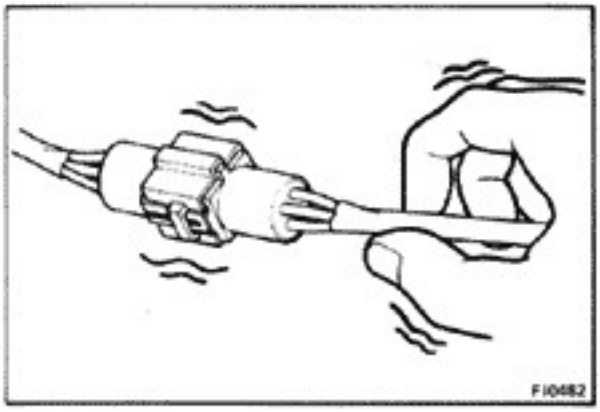


2. The most frequent cause of problems is simply a bad contact in wiring connectors. So always make sure that connections are secure.

   When inspecting the connector, pay particular attention to the following points:

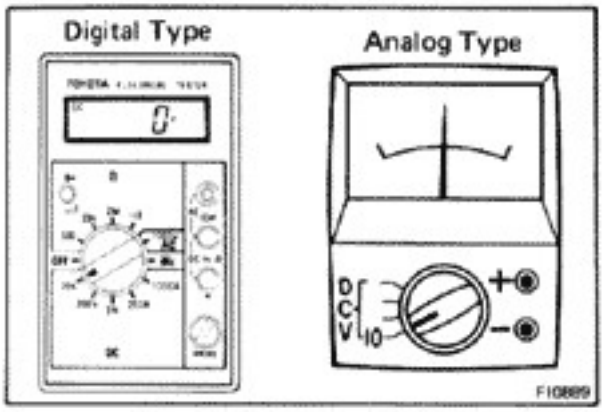
   (a) Check to see that the terminals are not bent.

   (b) Check to see that the connector is pushed in completely and locked.



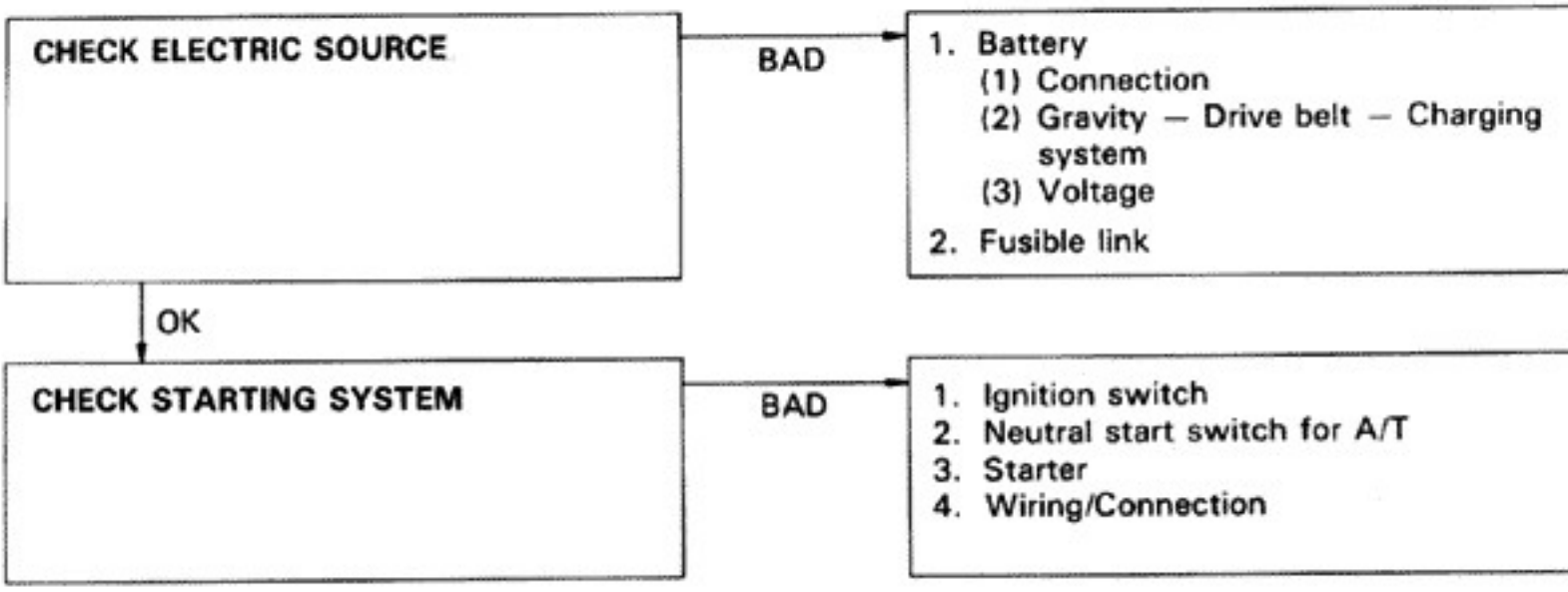
   (c) Check to see that there is no signal change when the connector is slightly tapped or wiggled.

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



4. Use volt/ohmmeter with high-impedance (10 kΩ/V minimum).

TROUBLESHOOTING PROCEDURE
SYMPTOM — DIFFICULT TO START OR NO STAR
(ENGINE WILL NOT CRANK OR CRANKS SLOWL



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

CHECK DIAGNOSIS SYSTEM
Check for output of diagnostic code.
(See page FI-22)

Malfunction code(s) → Diagnostic code(s) (See page FI-25)

Normal code ↓

DOES ENGINE START WITH ACCELERATOR PEDAL DEPRESSED?

OK → ISC system
(1) ISC valve
(2) Wiring connection (+B ISC valve ECU)

NO ↓

CHECK FOR VACUUM LEAKS IN AIR INTAKE LINE

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

OK ↓

CHECK IGNITION SPARK
1. Unplug connectors of injector resistor and start injector time switch.
2. Check by holding spark plug wire 8 — 10 mm (0.31 — 0.39 in.) away from engine block while engine is cranking. A strong spark should be noted.

BAD →
1. Plug wires
2. High-tension cords
3. Distributor
4. Ignition coil, igniter

OK ↓

CHECK IGNITION TIMING
1. Short both terminals of the check connector.
2. Check ignition timing.
   STD: 10° BTDC
   (w/short terminals of the check connector)

NO → Adjust ignition timing. (See page IG-9)

OK ↓

CHECK FUEL SUPPLY TO INJECTOR
1. Fuel in tank bad
2. Fuel pressure in fuel line
   (1) Short fuel pump check terminals.
   (2) Fuel pressure at fuel hose of fuel filter can be felt.
   (See page FI-45)

BAD →
1. Fuel line — leakage — deformation
2. Fuse
3. Circuit opening relay (See page FI-69)
4. Fuel pump (See page FI-44)
5. Fuel filter
6. Fuel pressure regulator (See page FI-52)

OK ↓

CHECK FUEL PUMP SWITCH IN AIR

→ Air flow meter (See page FI-58)

OK CONTINUED FROM PAGE FI-11

CHECK SPARK PLUGS

Max. allowable gap: 1.4 mm (0.055 in.)

Correct insulation resistance:
10 MΩ or more

Precaution: Never attempt to adjust gap on used platinum tipped spark plug.

— Note —

Check compression pressure if necessary. (See page EM-6)

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

NO (All Plugs WET) →
1. Injector(s) — shorted or leaking
2. Injector wiring(s) between resistor an ECU shorted
3. Cold start injector — leakage (See page FI-49)
4. Start injector time switch (See page FI-71)

OK ↓

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER

NO →
1. Wiring connection
2. Power to ECU
   (1) Fusible link
   (2) Fuse
   (3) No. 1 and No. 2 main relay
3. Air flow meter
4. Water temp. sensor
5. Injection signal circuit
   (1) Injector wiring
   (2) Resistor
   (3) ECU

SYMPTOM — ENGINE OFTEN STALLS

CHECK DIAGNOSIS SYSTEM
Check for output of diagnostic code
(See page FI-22)

Malfunction code(s) → Diagnostic code(s) (See page FI-25)

Normal code ↓

CHECK FOR VACUUM LEAKS IN AIR INTAKE LINE

BAD →
1. Oil filler cap
2. Oil level gauge
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 fuel pump check terminals.
   (2) You can feel fuel pressure at fuel hose.
   (See page FI-45)

BAD →
1. Fuel line — leakage — deformation
2. Fuse
3. Circuit opening relay (See page FI-69)
4. Fuel pump (See page FI-44)
5. Fuel filter
6. Fuel pressure regulator (See page FI-52)

OK ↓

CHECK AIR FILTER ELEMENT

BAD → Element — clean or replace

OK ↓

CHECK IDLE SPEED
STD: 650 rpm

BAD →
ISC system
(1) Wiring connection
(2) ISC valve
(3) ECU (test by substitution)

OK ↓

CHECK IGNITION TIMING
1. Short both terminals of the check connector.
2. Check ignition timing.
   STD: 10° BTDC
   (w/short terminals of the check connector)

NO → Adjust ignition timing

OK ↓

CHECK SPARK PLUGS
Max. allowable gap: 1.4 mm (0.055 in.)
Precaution: Never attempt to adjust gap on used platinum tipped spark plug.
— Note —
Check compression pressure if necessary.
(See page EM-6)

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

OK ↓

OK CONTINUED FROM PAGE FI-13

CHECK FUEL PRESSURE
(See page FI-45)

BAD →
1. Fuel pump (See page FI-44)
2. Fuel filter
3. Fuel pressure regulator (See page FI-52)

OK

CHECK INJECTORS
(See page FI-53)

BAD → Injection condition

OK

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER

BAD →
1. Wiring connection
2. Power to ECU
   (1) Fusible link
   (2) No. 1 and No. 2 main relay
3. Air flow meter
4. Water temp. sensor
5. Injection signal circuit
   (1) Injector wiring
   (2) Resistor
   (3) ECU

SYMPTOM — ENGINE SOMETIMES STALL

CHECK DIAGNOSIS SYSTEM
Check for output of diagnostic code.
(See page FI-22)

Malfunction code(s) → Diagnostic code(s) (See page FI-25)

Normal code

CHECK AIR FLOW METER
(See page FI-58)

BAD → Air flow meter

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. No.1 and No. 2 main relay (See page FI-68)
3. Circuit opening relay (See page FI-69)

SYMPTOM — ROUGH IDLING AND/OR MISSING

CHECK DIAGNOSIS SYSTEM
Check for output of diagnostic code.
(See page FI-22)

→ Malfunction code(s) → Diagnostic code(s) (See page FI-25)

↓ Normal code

CHECK FOR VACUUM LEAKS IN AIR INTAKE LINE

→ BAD →
1. Oil filler cap
2. Oil level gauge
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
STD: 650 rpm

→ BAD →
ISC system
(1) Wiring connection
(2) ISC valve
(3) ECU (test by substitution)

↓ OK

CHECK IGNITION TIMING
1. Short both terminals of the check connector.
2. Check ignition timing.
   STD: 10° BTDC
   (w/short terminals of the check connector)

→ NO → Ignition system

↓ OK

CHECK SPARK PLUGS
Max. allowable gap: 1.4 mm (0.055 in.)
Precaution: Never attempt to adjust gap on used platinum tipped spark plug.
— Note —
Check compression pressure if necessary.
(See page EM-6)

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

↓ OK

CHECK COLD START INJECTOR
(See page FI-49)

→ BAD →
1. Cold start injector
2. Start injector time switch
   (See page FI-71)

OK CONTINUED FROM PAGE FI-15

CHECK FUEL PRESSURE
(See page FI-45)

BAD →
1. Fuel pump (See page FI-44)
2. Fuel filter
3. Fuel pressure regulator (See page FI-52)

OK ↓

CHECK INJECTORS
(See page FI-53)

BAD → Injection condition

OK ↓

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER

BAD →
1. Wiring connection
2. Power to ECU
   (1) Fusible link
   (2) No. 1 and No. 2 main relay
3. Air flow meter
4. Water temp. sensor
5. Injection signal circuit
   (1) Injector wiring
   (2) Resistor
   (3) ECU

SYMPTOM — HIGH ENGINE IDLE SPEED (NO DROP)

CHECK ACCELERATOR LINKAGE → BAD → Linkage — stuck dash pot system

OK ↓

CHECK DIAGNOSIS SYSTEM
Check for output of diagnostic code.
(See page FI-22)
→ Malfunction code(s) → Diagnostic code(s) (See page FI-25)

Normal code ↓

CHECK ISC SYSTEM → BAD →
1. Wiring connection
   (Air con, Throttle position sensor — ECU)
2. ISC valve
3. Air conditioner switch

OK ↓

CHECK THROTTLE POSITION SENSOR → BAD → Throttle body

OK ↓

CHECK FUEL PRESSURE
(See page FI-45)
→ BAD → Fuel pressure regulator — high pressure

OK ↓

CHECK COLD START INJECTOR
(See page FI-49)
→ BAD → Cold start injector — leakage

OK ↓

CHECK INJECTORS (See page FI-53) → BAD → Injectors — leakage, injection quantity

OK ↓

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER → BAD →
1. Wiring connection
2. Power to ECU
   (1) Fusible link
   (2) No. 1 and No. 2 main relay
3. Air flow meter
4. Water temp. sensor
5. Air temp. sensor
6. Injection signal circuit
   (1) Injector wirings
   (2) Resistor
   (3) ECU

SYMPTOM – ENGINE BACKFIRES-Lean Fuel Mixtu

CHECK DIAGNOSIS SYSTEM
Check for output of diagnostic code.
(See page FI-22)

Malfunction code(s) → Diagnostic code(s) (See page FI-25)

Normal code ↓

CHECK FOR VACUUM LEAKS IN AIR INTAKE LINE

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

OK ↓

CHECK IGNITION TIMING
1. Short both terminals of the check connector.
2. Check ignition timing.
   STD: 10° BTDC (w/short terminals of the check connector)

BAD → Ignition system (See page IG-2)

OK ↓

CHECK COLD START INJECTOR
(See page FI-49)

BAD →
1. Cold start injector
2. Start injector time switch (See page FI-71)

OK ↓

CHECK FUEL PRESSURE
(See page FI-45)

BAD →
1. Fuel pump (See page FI-44)
2. Fuel filter
3. Fuel pressure regulator (See page FI-5

OK ↓

CHECK INJECTORS
(See page FI-53)

BAD → Injectors – clogged

OK ↓

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER

BAD →
1. Wiring connection
2. Power to ECU
   (1) Fusible link
   (2) No.1 and No. 2 main relay
3. Air flow meter
4. Water temp. sensor
5. Air temp. sensor
6. Throttle position sensor
7. Injection signal circuit
   (1) Injection wirings

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

CHECK DIAGNOSIS SYSTEM
Check for output of diagnostic code.
(See page FI-22)

→ Malfunction code(s) → Diagnostic code(s) (See page FI-25)

↓ Normal code

CHECK IGNITION TIMING
1. Short both terminals of the check connector.
2. Check ignition timing.
   STD: 10° BTDC
   (w/short terminals of the check connector)

→ NO → Ignition system (See page IG-2)

↓ OK

CHECK COLD START INJECTOR
(See page FI-49)

→ BAD →
1. Cold start injector
2. Start injector time switch (See page FI-71)

↓ OK

CHECK INJECTORS

→ BAD → Injectors — leakage

↓ OK

CHECK SPARK PLUGS
Max. allowable gap: 1.4 mm (0.055 in.)
Precaution: Never attempt to adjust gap on used platinum tipped spark plug.
— Note —
Check compression pressure if necessary.
(See page EM-6)

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

↓ OK

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER

→ BAD →
1. Throttle position sensor
2. Injection signal
   (1) Injector wiring
   (2) Resistor
   (3) ECU
3. Oxygen sensor

SYMPTOM — ENGINE HESITATES AND/OR POOR ACCELERATI

CHECK CLUTCH AND BRAKE

BAD →
1. Clutch — slips
2. Brakes — drag

OK ↓

CHECK FOR VACUUM LEAKS IN AIR INTAKE LINE

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

OK ↓

CHECK AIR FILTER ELEMENT

BAD → Clean or replace

OK ↓

CHECK DIAGNOSIS SYSTEM
Check for output of diagnostic code.
(See page FI-22)

Malfunction code(s) → Diagnostic code(s) (See page FI-25)

Normal code ↓

CHECK IGNITION SPARK
1. Unplug connectors of injector resistor and start injection time switch.
2. Check by holding spark plug wire 8 — 10 mm (0.31 — 0.39 in.) away from engine block while engine cranking. A strong spark should be noted.

BAD →
1. Plug wires
2. High-tension cords
3. Distributor
4. Ignition coil, igniter

OK ↓

CHECK IGNITION TIMING
1. Short both terminals of the check connector.
2. Check ignition timing.
   STD: 10° BTDC (w/short terminals of the check connector)

NO → Ignition system (See page IG-2)

OK CONTINUED ON PAGE FI-21

OK CONTINUED FROM PAGE FI-20

CHECK FUEL PRESSURE
(See page FI-45)

BAD →
1. Fuel pump (See page FI-44)
2. Fuel filter
3. Fuel pressure regulator (See page FI-52)

OK ↓

CHECK INJECTORS
(See page FI-53)

BAD → Injection condition

OK ↓

CHECK SPARK PLUGS
Max. allowable gap: 1.4 mm (0.055 in.)
Precaution: Never attempt to adjust gap on used platinum tipped spark plug.
— Note —
Check compression pressure if necessary.
(See page EM-6)

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

OK ↓

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER

BAD →
1. Wiring connection
2. Power to ECU
   (1) Fusible link
   (2) No. 1 and No. 2 main relay
3. Air flow meter
4. Water temp. sensor
5. Air temp. sensor
6. Throttle position sensor
7. Injection signal circuit
   (1) Injector wirings
   (2) Resistor
   (3) ECU

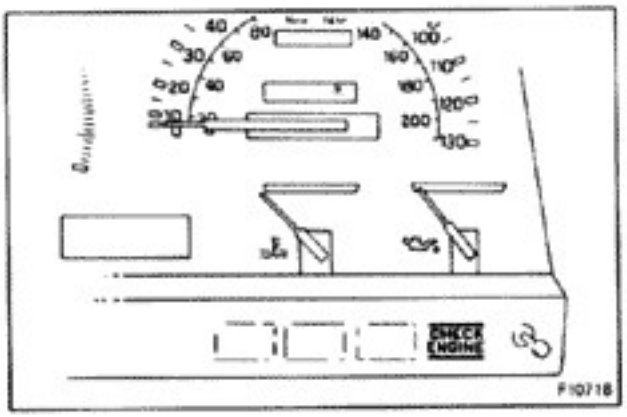
DIAGNOSIS SYSTEM

Description

The ECU contains a built-in self-diagnosis system by which trou
bles with the engine signal network are detected and a "CHEC
ENGINE" warning light on the instrument panel flashes (Cod
Nos. 12, 13, 14, 21, 22, 31, 32, 42, 52 and 53).

A "CHECK ENGINE" warning light on the instrument panel i
forms the driver that a malfunction has been detected. The lig
goes out automatically when the malfunction has been cleare

The diagnostic code can be read by the number of blinks of th
"CHECK ENGINE" warning light when terminals T and E_1 a
short-circuited.



"CHECK ENGINE" WARNING LIGHT CHECK

1. The "CHECK ENGINE" warning light will come on whe
the ignition switch is placed at ON and the engine is n
running.

2. When the engine is started, the "CHECK ENGINE" war
ing light should go out.

   If the light remains on, the diagnosis system has detect
a malfunction in the system.

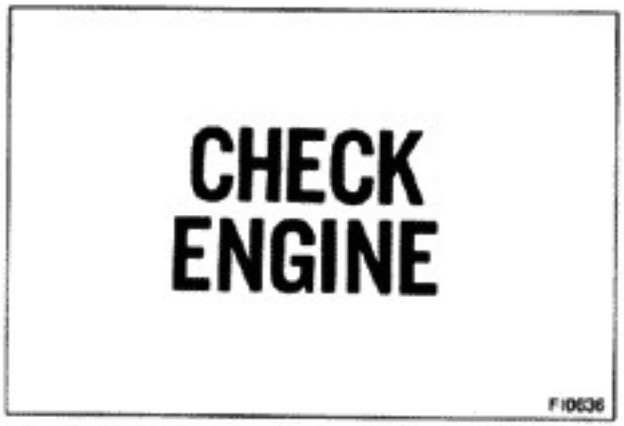
OUTPUT OF DIAGNOSTIC CODES

Initial Conditions

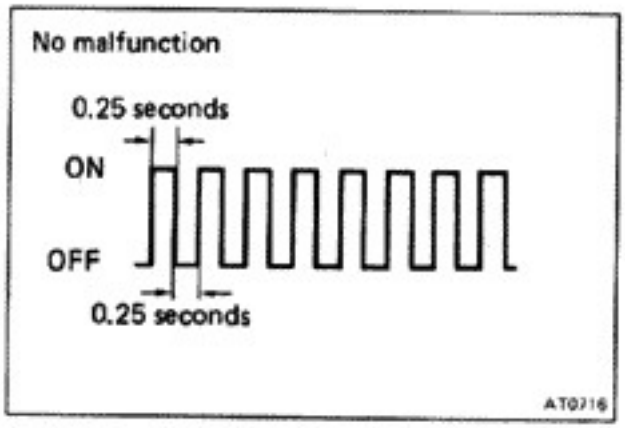
- Battery voltage above 11 volts.
- Throttle valve fully closed (throttle position sensor ID
points closed).
- Transmission in P or N range.
- Air conditioner switch OFF.
- Engine at normal operating temperature.

1. Turn the ignition switch to ON. Do not start the engi

2. Using a sub-wire, short terminals of the check connect

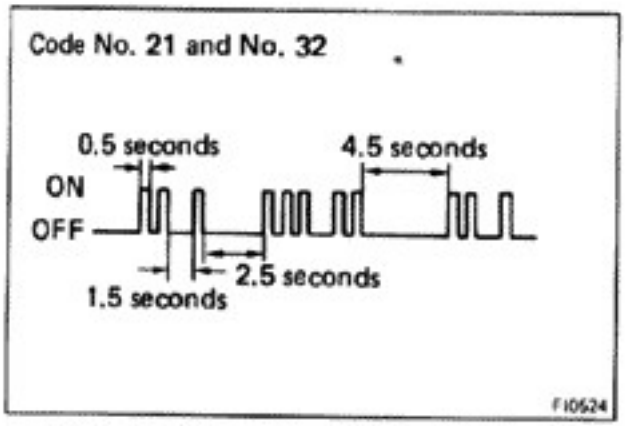


3. Read the diagnostic code as indicated by the number o flashes of the "CHECK ENGINE" warning light.



Diagnostic code

(a) If system is operating normally (no malfunction), th light will blink once every 0.25 seconds.



(b) In event of a malfunction, the light will blink once ev ery 0.5 seconds. The first number of blinks will equa the first digit of a 2-digit diagnostic code. After a 1. second pause, the 2nd number of blinks will equal th 2nd number of a 2-digit diagnostic code. If there ar two or more codes, there will be a 2.5 seconds paus between each.

NOTE : In event of a number of troubles codes, indica tion will begin from the smaller value and continue to th larger in order.

4. After the diagnosis check, remove the sub-wire from th check connector.

Cancelling out diagnostic code

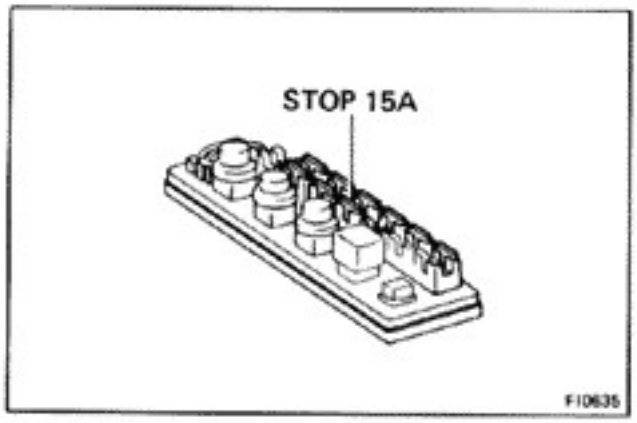
(a) After repair of the trouble area, the diagnostic co
retained in memory by the ECU must be cancelled
by removing the STOP fuse (15A) for 30 seconds
more, depending on ambient temperature (the lov
the temperature, the longer the fuse must be left o
with the ignition switch off.

NOTE:

- Cancellation can also be done by removing the batt
negative (—) terminal, but in this case other memory s
tems (radio ETR, clock, etc.) will also be cancelled o
- If the diagnostic code is not cancelled out, it will be
tained by the ECU and appear along with a new co
in event of future trouble.
- If it is necessary to work on engine components requ
ing removal of the battery terminal, a check must fi
be made to see if a diagnostic code is detected.

(b) After cancellation, perform a road test, if necessa
confirm that a "normal" code is now read on
"CHECK ENGINE" warning light.

If the same diagnostic code is still indicated, it in
cates that the trouble area has not been repai
thoroughly.



DIAGNOSIS INDICATION

(1) Including "Normal", the ECU is programmed with the f
lowing 16 diagnostic codes.

(2) When 2 or more codes are indicated, the lowest numb
(code) will appear first.
However, no other code will apear along with code No. 1

(3) All detected diagnostic codes, except 51 and 53, will
retained in memory by the ECU from the time of detecti
until cancelled out.

(4) Once the malfunction is cleared, the "CHECK ENGINE
warning light on the instrument panel will go out but t
diagnostic code(s) remain stored in ECU memory (exce
for code 51).

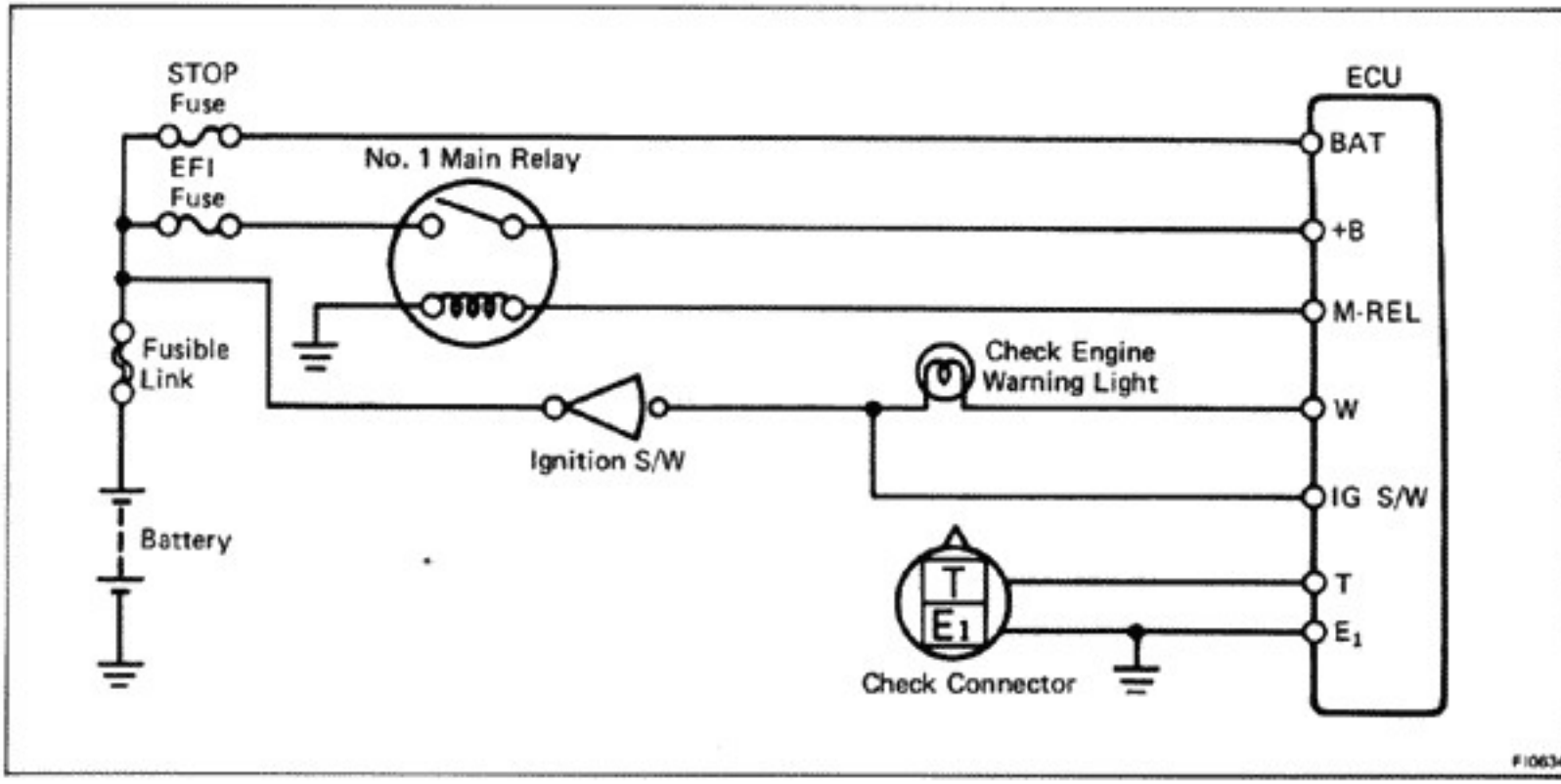
Code No.	Light Pattern	Code No.	Light Pattern
–	ON / OFF 	31	
11		32	
12		41	
13		42	
14		43	
21		51	
22		52	
23		53	

DIAGNOSTIC CODES

Code No.	System	Diagnosis	Trouble Area	See page
	Normal	This appears when none of the other codes (11 thru 51) are identified.		
11	ECU (+ B)	Wire severence, however slight, in + B (ECU).	1. Main relay circuit 2. Main relay 3. ECU	FI-32
12	RPM Signal	No Ne, G signal to ECU within several seconds after engine is cranked.	1. Distributor circuit 2. Distributor 3. Starter signal circuit 4. ECU	IG-7
13	RPM Signal	No Ne signal to ECU within several seconds after engine reaches 1,000 rpm.	Same as 12, above.	
14	Ignition Signal	No signal from igniter six times in succession	1. Igniter circuit (+B, IGt, IGf) 2. Igniter 3. ECU	FI-42
21	Oxygen Sensor Signal	Oxygen sensor gives a lean signal for several seconds even when coolant temperature is above 50°C (122°F) and engine is running under high load conditions above 1,500 rpm.	1. Oxygen sensor circuit 2. Oxygen sensor 3. ECU	FI-73

Code No.	System	Diagnosis	Trouble Area	See pa
22	Water Temp. Sensor Signal	Open or short circuit in coolant temp. sensor signal.	1. Water temp. sensor circuit 2. Water temp. sensor 3. ECU	FI-72
23	Intake Air Temp. Sensor Signal	Open or short circuit in intake air temp. sensor.	1. Intake air temp. sensor circuit 2. Intake air temp. sensor 3. ECU	FI-38
31	Air Flow Meter Signal	Open circuit in V_C signal or V_S and E_2 short circuited when idle points are closed.	1. Air flow meter circuit 2. Air flow meter 3. ECU	FI-37
32	Air Flow Meter Signal	Open circuit in E_2 or V_C and V_S short circuited.	Same as 31, above.	FI-37
41	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-35
42	Vehicle Speed Sensor Signal	(A/T): Signal informing ECU that vehicle speed is 2.0 km/h or less has been input ECU for 5 seconds with engine running at 2,500 rpm or more and shift lever is in other than N or P range. (M/T): Signal informing ECU that vehicle speed is 2.0 km/h or less has been input ECU for 5 seconds with engine running at 2,500 rpm or more.	1. Vehicle speed sensor circuit 2. Vehicle speed sensor 3. Torque converter slipping 4. ECU	
43	Starter Signal (+ B)	No STA signal to ECU when engine is running over 800 rpm.	1. Main relay circuit 2. IG switch circuit (starter) 3. IG switch 4. ECU	FI-40
51	Switch Signal	Neutral start switch OFF or air conditioner switch ON during diagnostic check.	1. Neutral start S/W 2. Air con. S/W 3. ECU	
52	Knock Sensor Signal	Open or short circuit in knock sensor.	1. Knock sensor circuit 2. Knock sensor 3. ECU	
53	Knock Sensor Signal	Faulty ECU. (KNOCK CPU)	ECU	

INSPECTION OF DIAGNOSIS CIRCUIT



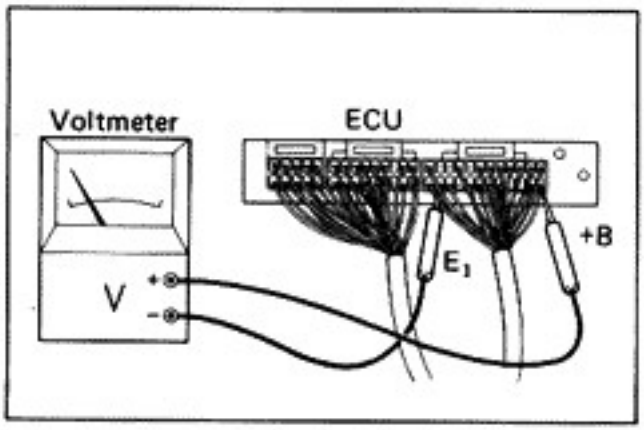
1. Does CHECK ENG. warning light come on when ignition switch is at ON?
   - YES → System Normal
   - NO → Does CHECK ENG. light come on when ECU terminal W is grounded to the body?
     - YES → Check wiring between ECU terminal E_1 and body ground
       - OK → Try another ECU
       - BAD → Repair or replace
     - NO → Check bulb, fuse and wiring between ECU and ignition switch.
       - BAD → Repair or replace

2. Does CHECK ENG. warning light go OFF when engine is started?
   - YES → System Normal
   - NO → Check wiring between ECU and CHECK ENG. warning light.
     - BAD → Repair
     - OK → Is there diagnosis code output when service. connector is short circuited?
       - NO → Try another ECU
       - YES → Does CHECK ENG. warning light go out after repair according to malfunction code?
         - NO → Further repair required

TROUBLESHOOTING WITH VOLT/OHMMET

PREPARATION FOR TROUBLESHOOTING

1. **Remove the glove box door and glove box.**
2. **Remove the ECU with wire harness.**



EFI SYSTEM CHECK PROCEDURE

NOTE:

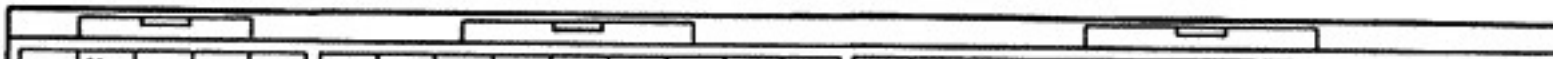
1. The EFI circuit can be checked by measuring resistance and voltage at the wiring connectors of ECU.
2. Perform all voltage measurement with the connec connected.
3. Verify that the battery voltage is 11V or above w the ignition switch is ON.

Using a voltmeter, measure the voltage at each term of the wiring connector.

NOTE: If there is any problem, see TROUBLESHOOT FOR EFI ELECTRONIC CIRCUIT WITH VOLT/ OHMMET

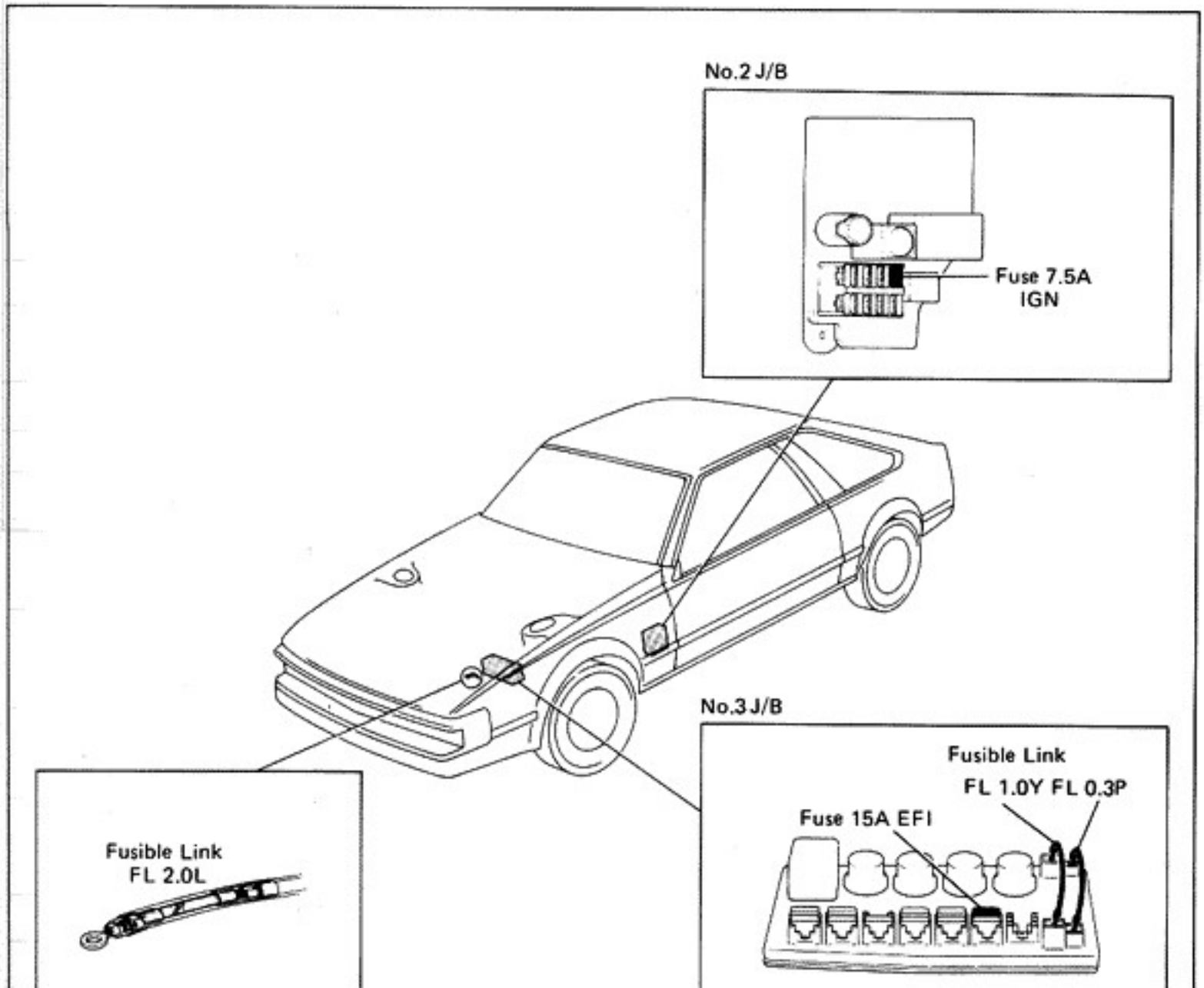
Connectors of ECU

Symbol	Terminal Name	Symbol	Terminal Name	Symbol	Terminal Name
E_{01}	ENGINE GROUND	G⊖	ENGINE REVOLUTION SENSOR	A/C	A/C MAGNET SWITC
E_{02}	ENGINE GROUND	V_F	CHECK CONNECTOR	SPD	SPEEDOMETER
No.10	INJECTOR	G	ENGINE REVOLUTION SENSOR	W	WARNING LIGHT
No.20	INJECTOR	T	CHECK CONNECTOR	THA	AIR TEMP. SENSOR
STA	STARTER SWITCH	VTA	THROTTLE SWITCH	V_S	AIR FLOW METER
IGt	IGNITER	Ne	ENGINE REVOLUTION SENSOR	V_C	AIR FLOW METER
EGR	EGR VSV	IDL	THROTTLE SWITCH	BAT	BATTERY +B
E_1	ENGINE GROUND	KNK	KNOCK SENSOR	IG S/W	IGNITION SWITCH
N/C	NEUTRAL START SWITCH (A/T)	IGf	IGNITER	+B	MAIN RELAY
	CLUTCH SWITCH (M/T)	Ox	OXYGEN SENSOR	TCD	ECT COMPUTER
ISC_1	ISC MOTOR NO.1 COIL	THW	WATER TEMP. SENSOR	OIL	OIL PRESSURE SWITC
ISC_2	ISC MOTOR NO.2 COIL	E_2	SENSOR EARTH	L_1	ECT COMPUTER
ISC_3	ISC MOTOR NO.3 COIL	E_1	ENGINE GROUND	L_2	ECT COMPUTER
ISC_4	ISC MOTOR NO.4 COIL	M-REL	MAIN RELAY COIL	L_3	ECT COMPUTER



TROUBLESHOOTING FOR EFI ELECTRONIC CIRCUIT WITH VOLT/OHMMETER

NOTE: Because the following troubleshooting procedures are designed for inspection of each separate system, the actual troubleshooting procedure may vary somewhat. However, please refer to these procedures and perform actual troubleshooting, conforming to the inspection methods described in this manual.
For example, it is better to first make a simple check of the fuses, fusible links and connecting condition of the connectors before making your inspection according to the procedures listed.



VOLTAGES AT ECU WIRING CONNECTO

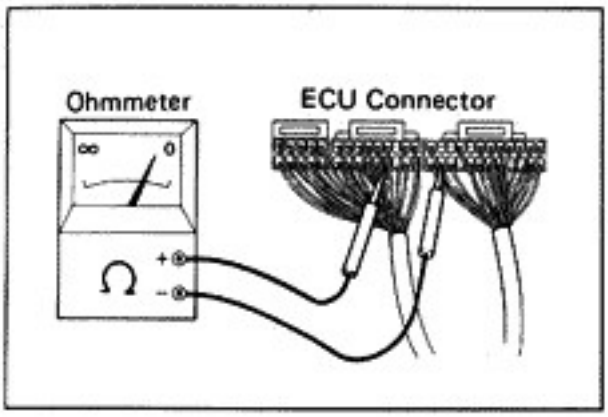
No.	Terminals	Condition		STD Voltage	See page
1	BAT — E1	—		10 — 14	FI-32
	+B — E1		—		FI-33
	IG S/W — E1				
	M-REL — E1				FI-34
2	IDL — E2	IG S/W ON	Throttle valve open	4 — 6	FI-35
	Vc — E2		—	4 — 6	FI-36
	VTA — E2		Throttle valve fully closed	0.1 — 1.0	
			Throttle valve fully opened	4 — 5	
3	Vc — E2		—	4 — 6	FI-37
	Vs — E2		Measuring plate fully closed	4 — 5	FI-38
			Measuring plate fully open	0.02 — 0.08	
		Idling		2 — 4	
		3,000 rpm		0.3 — 1.0	
	THA — E2	IG S/W ON	Intake air temperature 20°C (68°F)	1 — 2	FI-38
4	THW — E2		Coolant temperature 80°C (176°F)	0.1 — 0.5	FI-39
5	STA — E1	IG S/W ST position		6 — 12	FI-40
6	No. 10 No. 20 — E1	IG S/W ON	—	9 — 14	FI-41
7	IGt — E1	Cranking or Idling		0.7 — 1.0	FI-42
8	ISC1 ~ ISC4 — E1	IG S/W ON	—	9 — 14	FI-43
		2 — 3 secs, after engine off		9 — 14	

INSPECTION OF WIRING CONNECTOR LINE

MEASURE 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.**



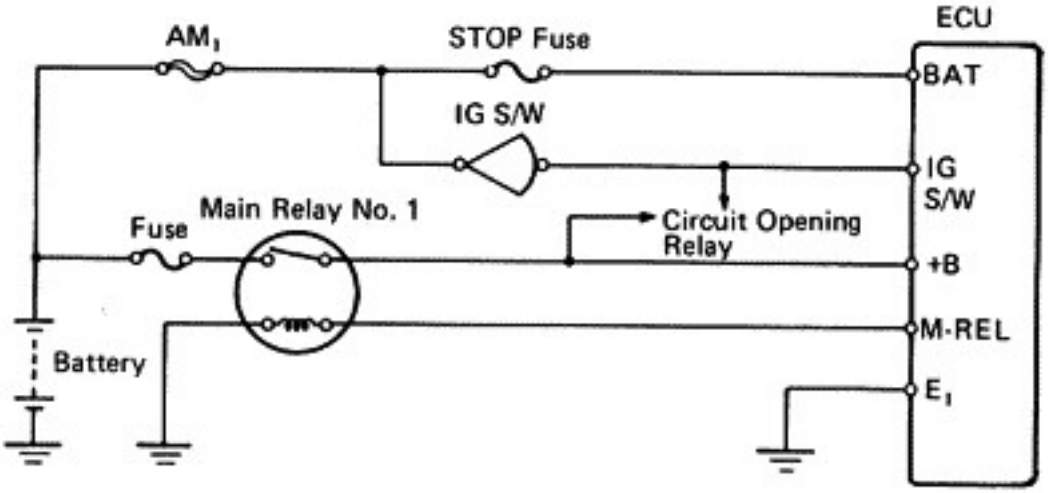
Using an ohmmeter, check the resistance between each terminal of the wiring connector.

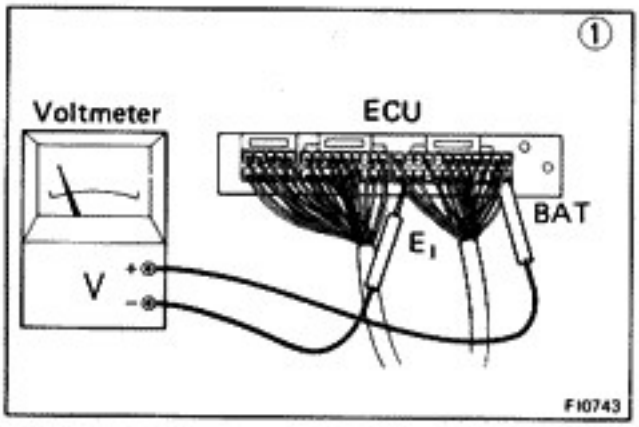
- Remove the glove box.
- Disconnect the wiring connectors from the ECU.
- Measure the resistance between each terminal of the wiring connectors.

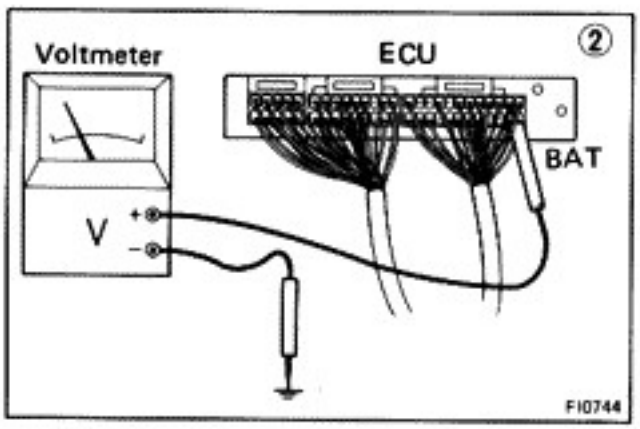
Resistances at ECU Wiring Connectors

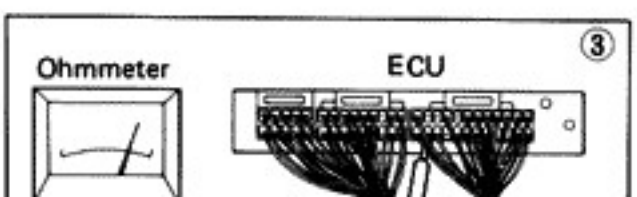
Terminals	Condition	Resistance (Ω)
IDL — E_2	Throttle valve open	∞
	Throttle valve fully closed	0 — 100 Ω
VTA — E_2	Throttle valve fully opened	3,300 — 10,000
	Throttle valve fully closed	200 — 800
Vc — E_2	Disconnect air flow meter connector	3,000 — 7,000
	Disconnect throttle position sensor connector	200 — 400
Vs — E_2	Measuring plate fully closed	20 — 400
	Measuring plate fully opened	20 — 1,000
THA — E_2	Intake air temperature 20°C (68°F)	2,000 — 3,000
G — G⊖	—	140 — 180

No.	Terminals	Trouble	Condition	STD Voltage
1	BAT — E_1	No voltage	—	10 — 14
	+B — E_1	No voltage	Ignition switch ON	10 — 14
	IG S/W — E_1	No voltage	Ignition switch ON	10 — 14
	M-REL — E_1	No voltage	Ignition switch ON	10 — 14









• **BAT ↔ E_1**

① There is no voltage between ECU terminals BAT and E_1.

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

NO

OK

③ Check wiring between ECU terminal E_1 and body ground.

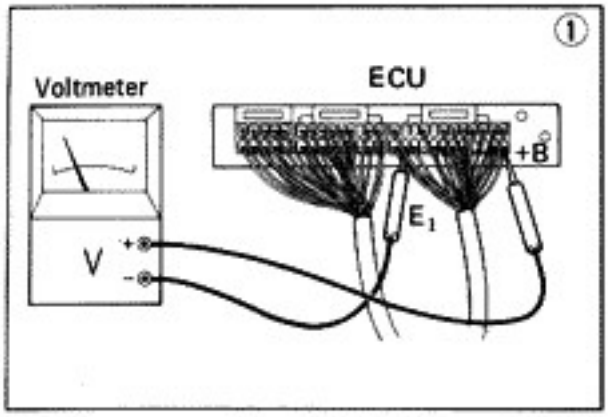
BAD

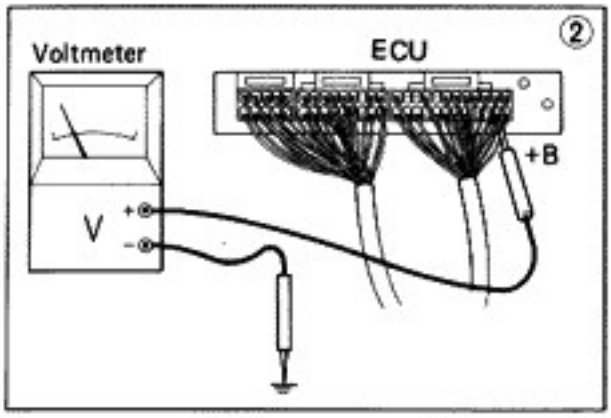
Repair or replace

Check fuse, fusible links and wiring harness.

NO

Repair





• **+B ↔ E1**

① There is no voltage between ECU terminals +B and E1. **(IG S/W ON)**

↓

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

NO → ↓

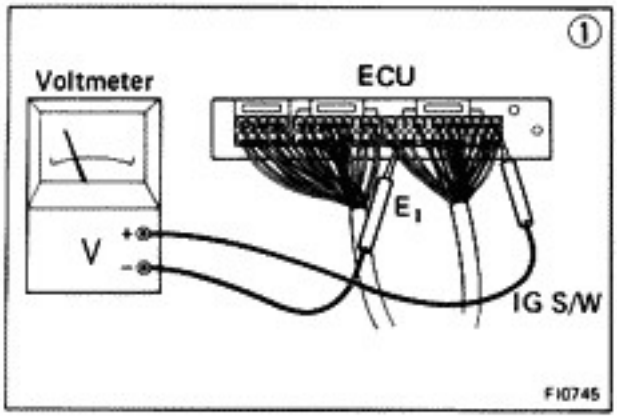
OK → Check wiring between ECU terminal E1 and body ground. → BAD → Repair or replace

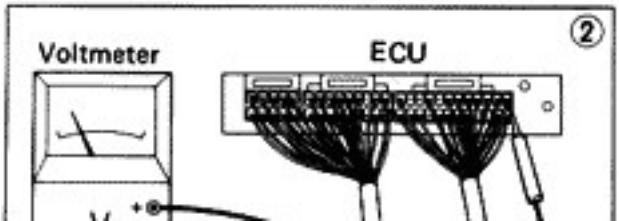
↓

Check fuse and wiring harness. → BAD → Repair or replace

↓ OK

Check NO. 1 main relay. → BAD → Replace





• **IG S/W ↔ E1**

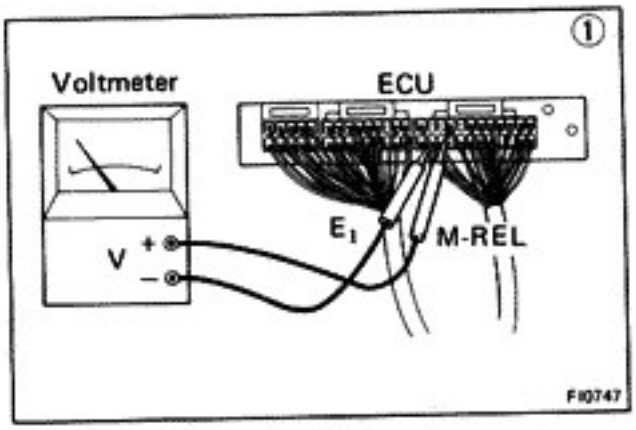
① There is no voltage between ECU terminals IG S/W and E1. **(IG S/W ON)**

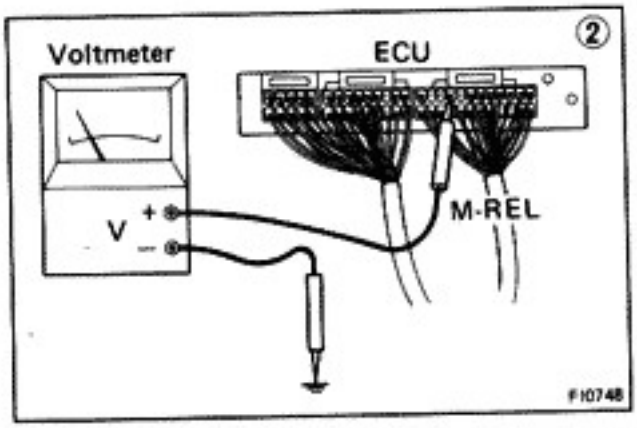
↓

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

NO → ↓

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





- **M-REL ↔ E_1**

① There is no voltage between ECU terminals M-REL and E_1. **(IG S/W ON)**

↓

② Check that there is voltage between ECU terminal M-REL and body ground. **(IG S/W ON)**

NO ↓ / OK ↓

Check wiring between ECU terminal E_1 and body ground.

BAD ↓

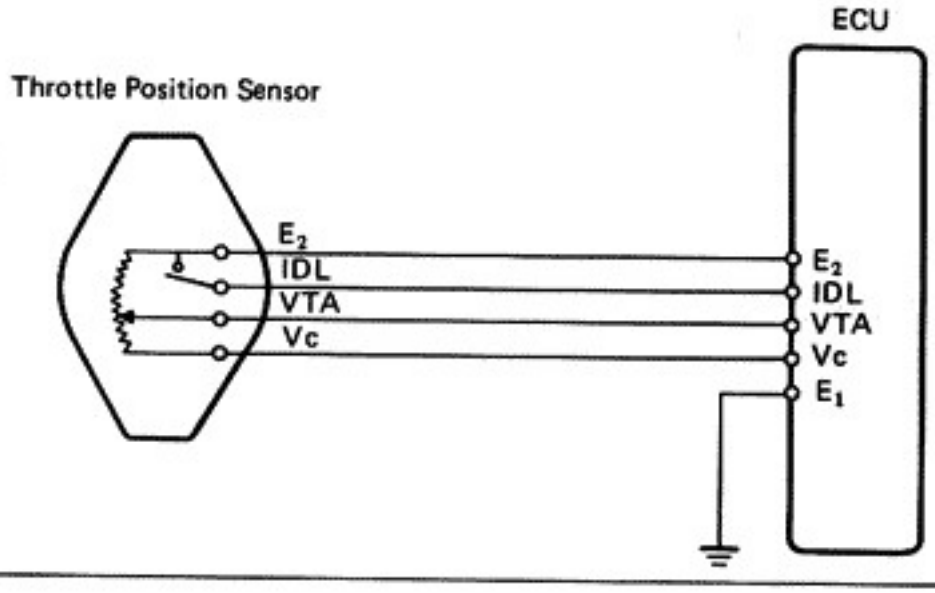
Repair or replac

Check NO. 1 main relay and wiring harness. — BAD → Replace

OK ↓

Try another ECU.

No.	Terminals	Trouble	Condition		STD voltage
2	IDL — E_2	No voltage	Ignition switch ON	Throttle valve open	4 — 6
	VTA — E_2			Throttle valve fully closed	0.1 — 1.0
				Throttle valve fully open	4 — 5
	Vc — E_2			—	4 — 6



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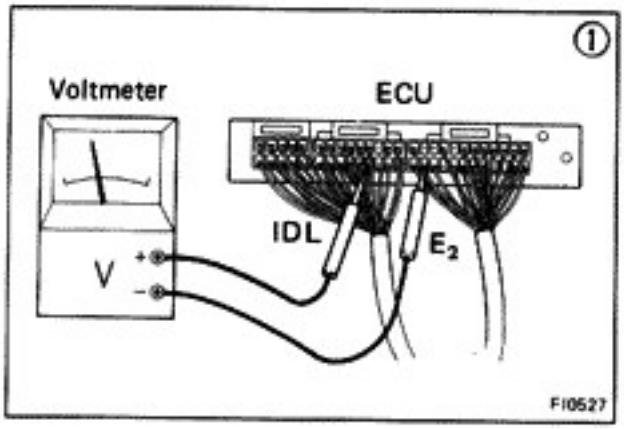
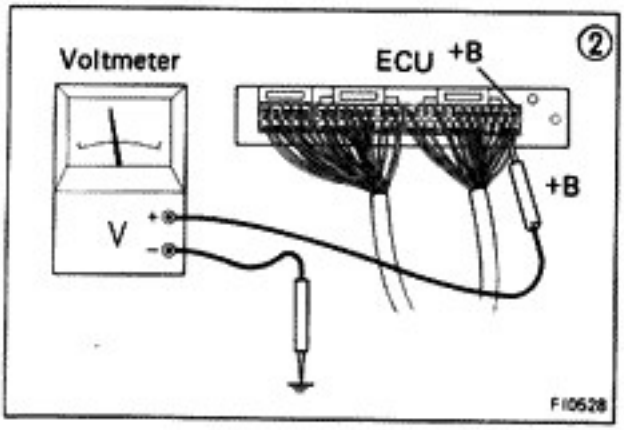
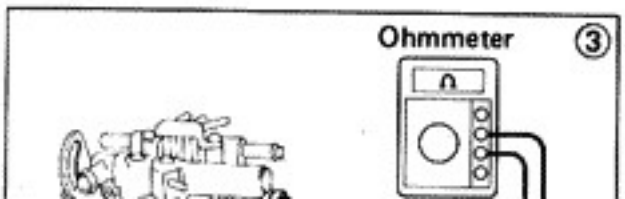






- **IDL ↔ E_2**

① There is no voltage between ECU terminals IDL and E_2. **(IG S/W ON)** (Throttle valve open)

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

NO

OK

Check wiring between ECU terminal E_1 and body ground.

BAD

Repair or replace

Refer to No. 1.

BAD

Repair or replace

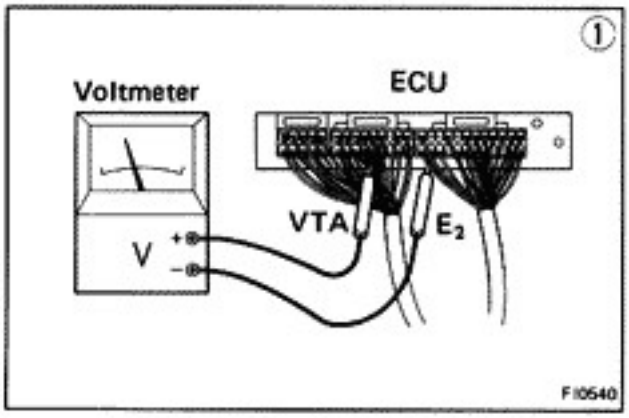
OK

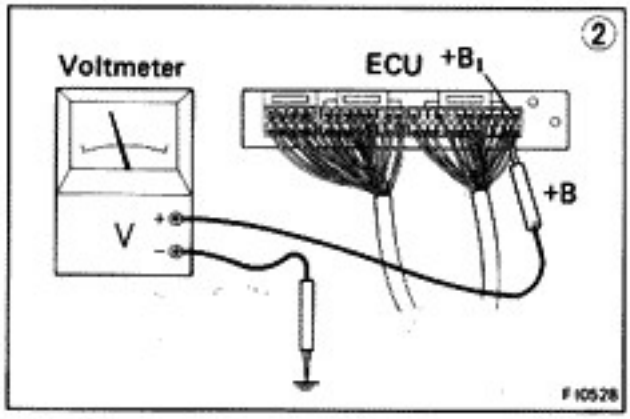
③ Check throttle position sensor.

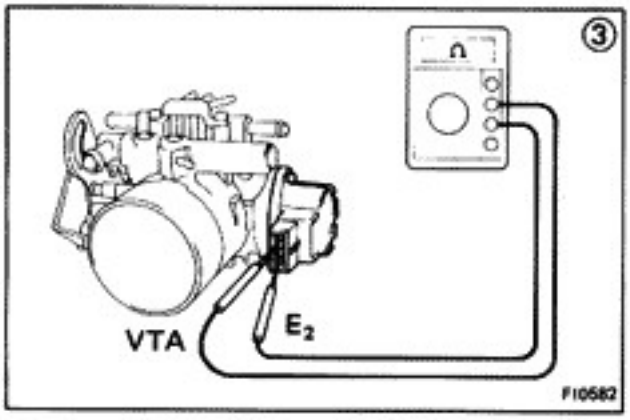
BAD

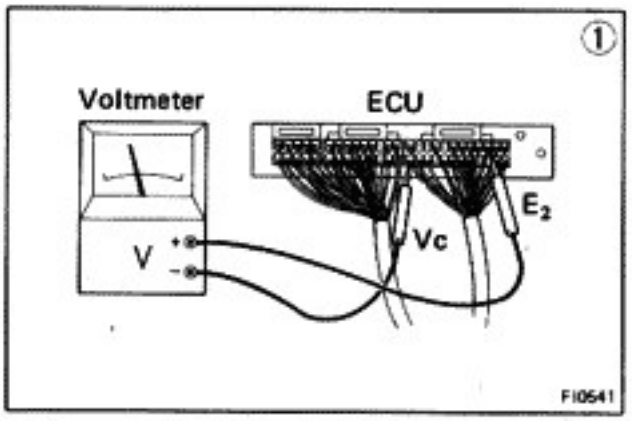
OK

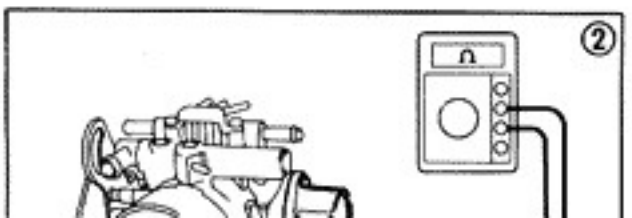
BAD











- **VTA ↔ E2**

① There is no specified voltage at ECU terminals VTA and E2. **(IG S/W ON)**

↓

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

NO → Check wiring between ECU terminal E1 and body ground. → BAD → Repair or replace

OK ↓

Refer to No. 1. → BAD → Repair or replace

OK ↓

③ Check throttle position sensor. → BAD → Repair or replace

OK ↓

Check wiring between ECU and throttle position sensor. → BAD → Repair or replace

OK ↓

Try another ECU.

- **Vc ↔ E2**

① There is no voltage between ECU terminals Vc and E2. **(IG S/W ON)**

↓

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

NO → Refer to No. 1.

OK ↓

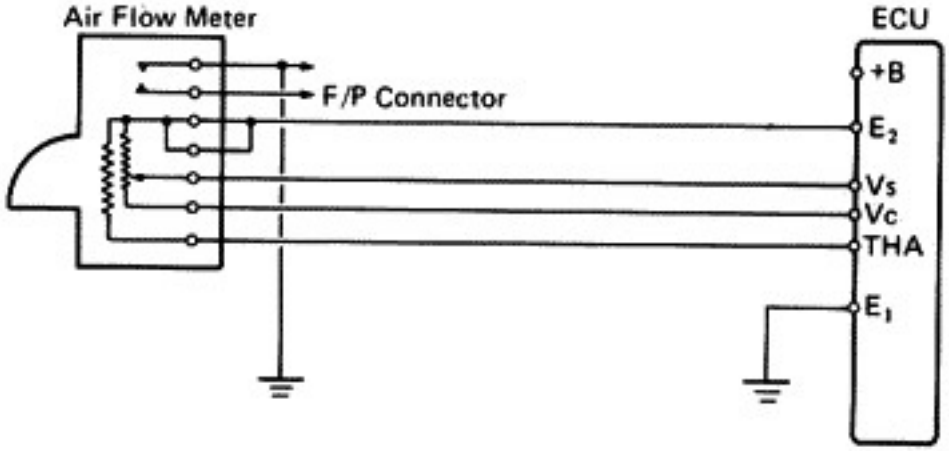
② Check throttle position sensor.

BAD → Repair or replace

OK → Check wiring between ECU and throttle position sensor.

OK → BAD → Repair or replace

No.	Terminal	Trouble	Condition		STD Voltage
3	Vc — E2	No voltage	Ignition S/W ON	—	4 — 6 V
	Vs — E2			Measuring plate fully closed	4 — 5 V
	Vs — E2			Measuring plate fully open	0.02 — 0.08 V
	Vs — E2		Idling	—	2 — 4 V
	Vs — E2		3,000 rpm	—	0.3 — 1.0 V
	THA — E2		IG S/W ON	Intake air temperature 20°C (68°F)	1 — 2 V



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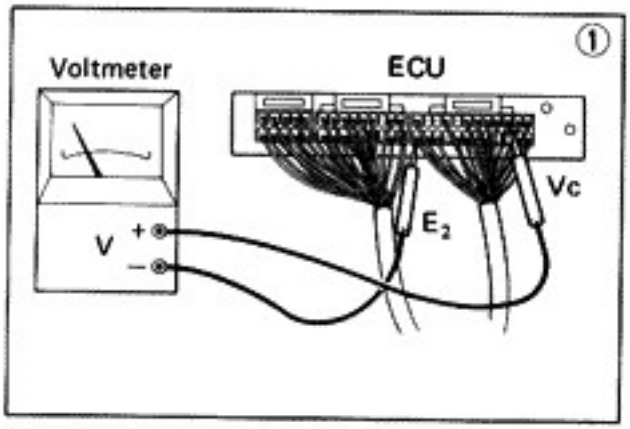
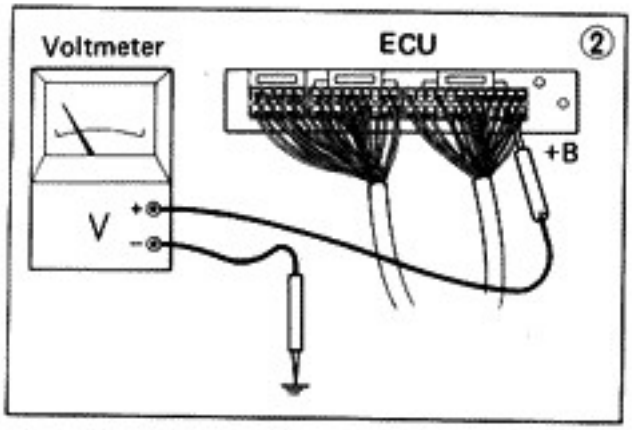
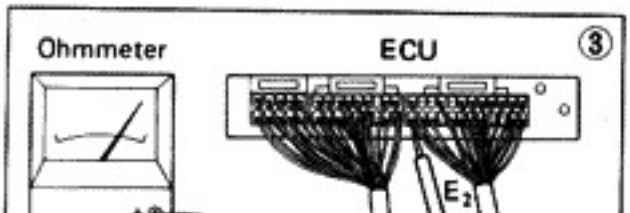






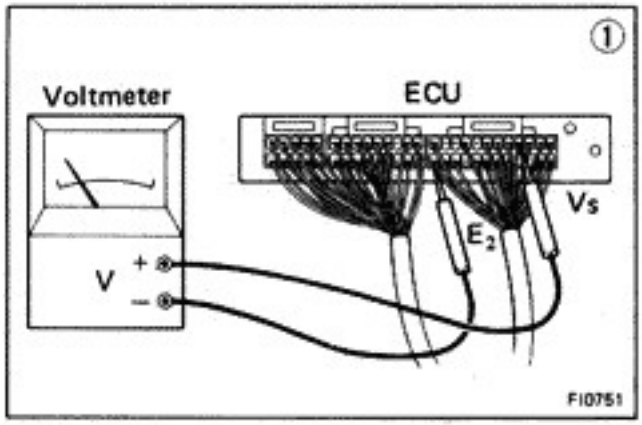
• Vc ↔ E2

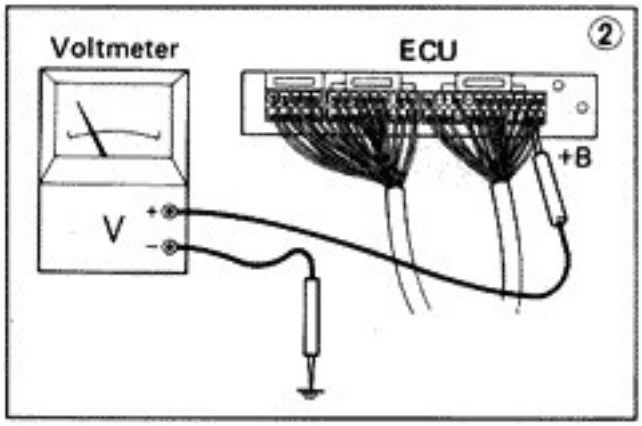
① There is no voltage between ECU terminals Vc and E2. **(IG S/W ON)**

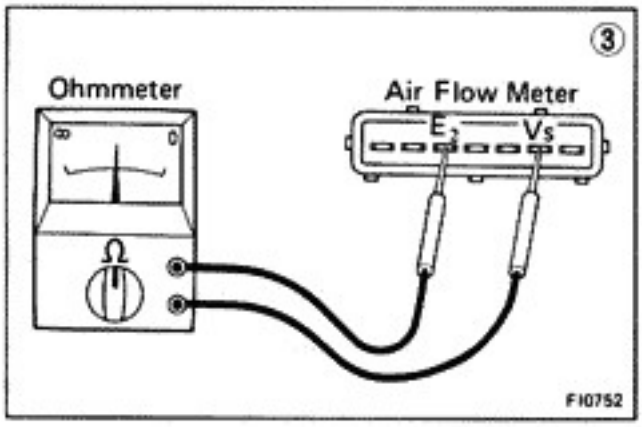
② Check that there is voltage between ECU terminal +B and body ground. **(IG S/W ON)**

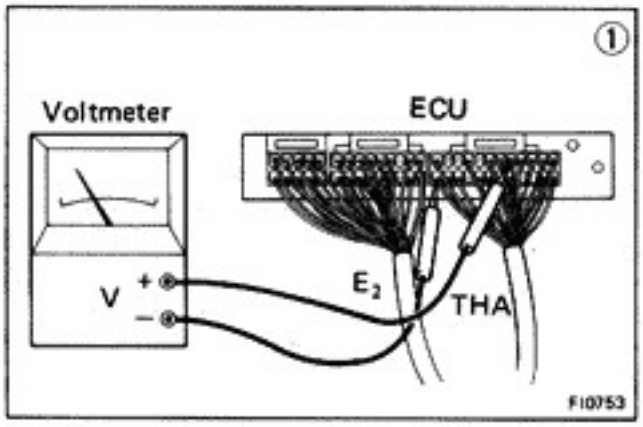
NO → ③ Check wiring between ECU terminal E2 and body ground.
- BAD → Repair or replace

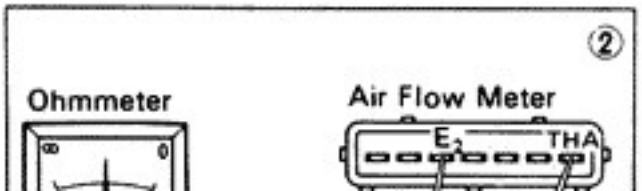
OK →
- Refer to No. 1. — BAD → Repair or replace
- OK →
- Check air flow meter. — BAD → Repair or replace
- OK →
- Check wiring between ECU and air flow meter. — BAD → Repair or replace











- **$Vs \leftrightarrow E_2$**

① There is no specified voltage at ECU terminals Vs and E_2. **(IG S/W ON)**

↓

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

NO → Check wiring between ECU terminal E_2 and body ground. → BAD → Repair or replace

OK →

Refer to No. 1. → BAD → Repair or replace

↓ OK

③ Check air flow meter. → BAD → Repair or replace

↓ OK

Check wiring between ECU and air flow meter. → BAD → Repair or replace

↓ OK

Try another ECU.

- **$THA \leftrightarrow E_2$**

① There is no voltage between ECU terminals THA and E_2. **(IG S/W ON)**

↓

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

OK ↓

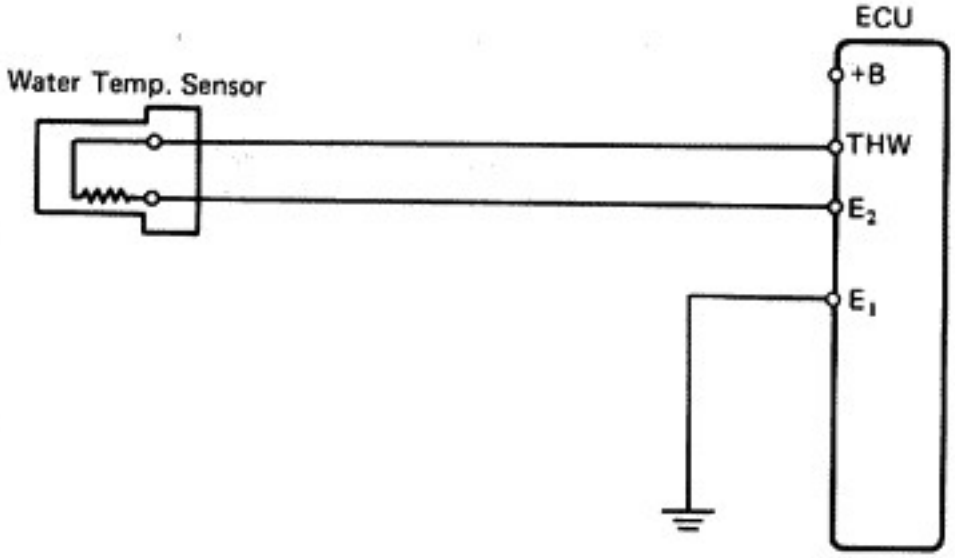
② Check air temp. sensor.

BAD → Replace air temp. sensor.

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

NO → Refer to No. 1.

No.	Terminals	Trouble	Condition		STD Voltage
4	THW — E_2	No voltage	Ignition switch ON	Coolant temperature 80°C (176°F)	0.1 — 0.5 V



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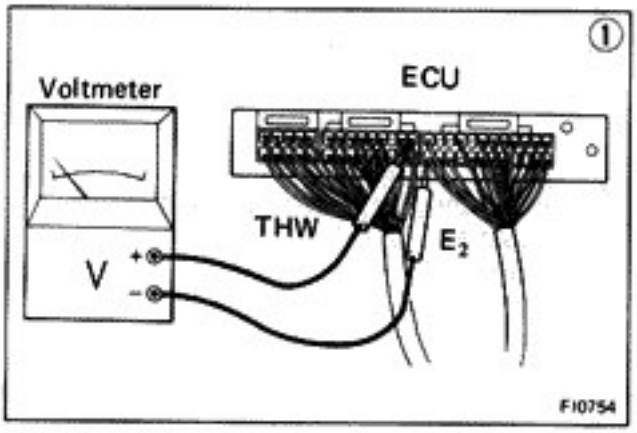
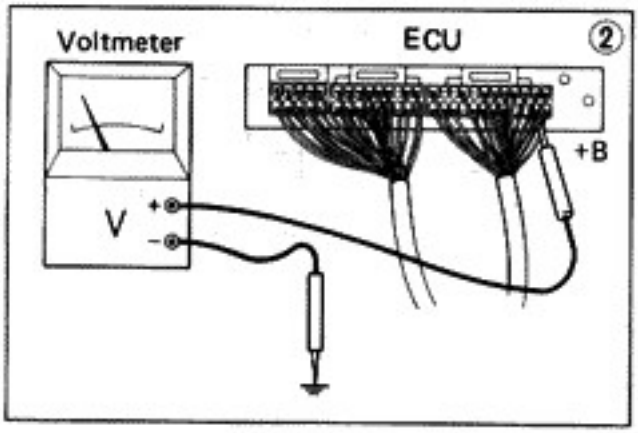




① There is no voltage between ECU terminals THW and E_2. **(IG S/W ON)**

↓

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

OK ↓

NO → Refer to No. 1.

③ Check water temp. sensor.

BAD ↓

Replace water temp. sensor.

OK →

Check wiring between ECU and water temp. sensor.

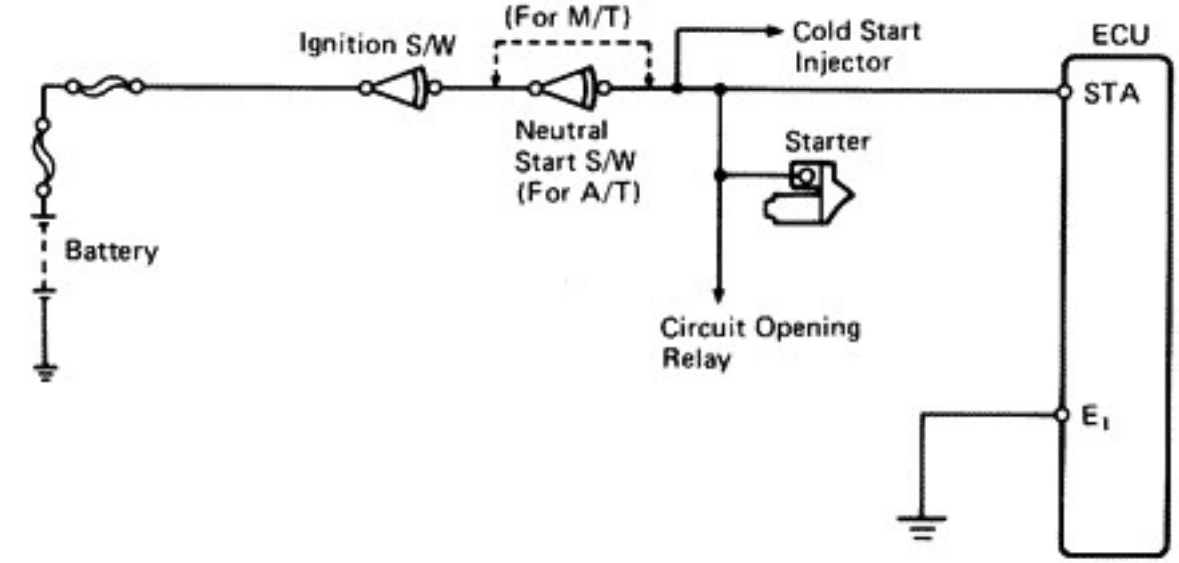
OK ↓

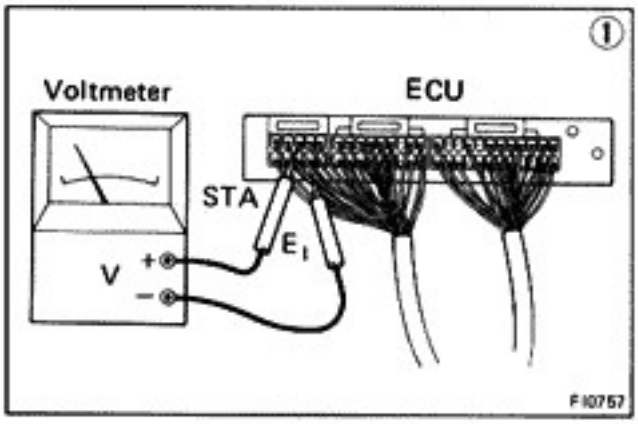
Try another ECU.

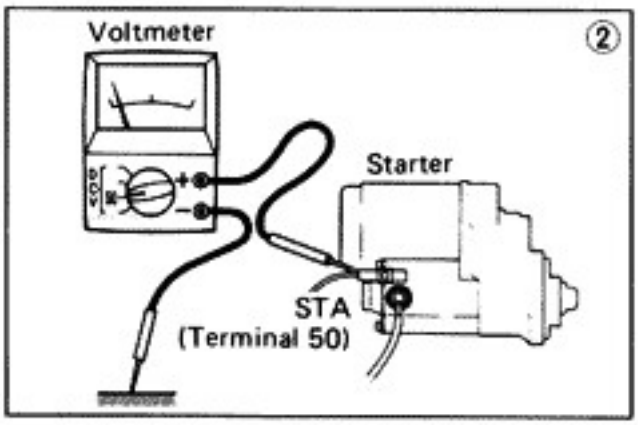
BAD →

Repair or replace wiring.

No.	Terminals	Trouble	Condition	STD Voltage
5	STA — E_1	No voltage	Ignition switch ST position	6 — 12 V



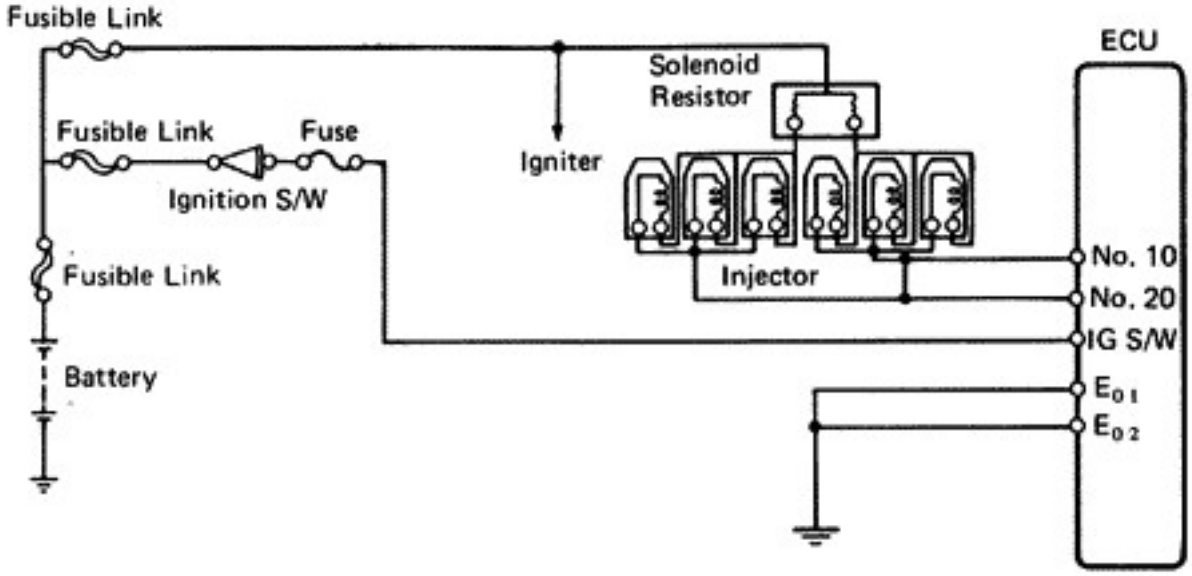




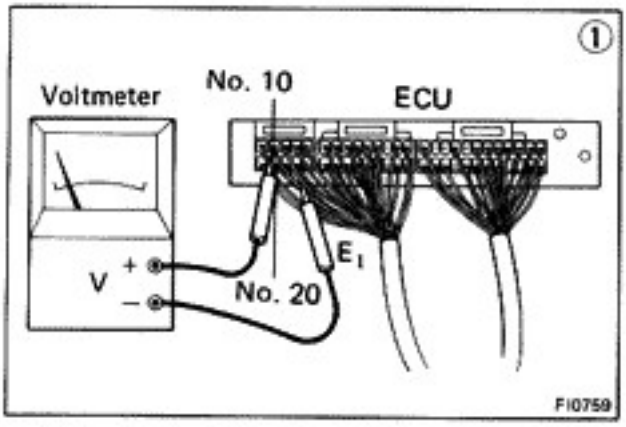
① There is no voltage between ECU terminals STA and E_1.
(IG S/W ST)

Check starter operation.
- OK → Check wiring between ECU and starter terminal 50.
  - OK → Check wiring between ECU terminal E_1 and body ground.
    - BAD → Repair or replac
  - BAD → Repair or replac
- BAD → Check fusible link, battery, wiring and ignition switch.
  - BAD → Repair or replace
  - OK → ② Check that there is voltage at STA (50) terminal of starter.
    (IG S/W ST) **STD voltage: 9 — 11 V**
    - OK
    - NO → Check wiring between ignition switch S

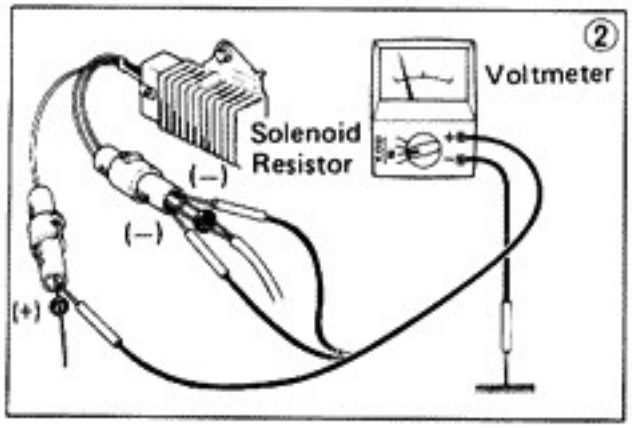
No.	Terminals	Trouble	Condition	STD Voltage
6	No. 10 — E_1 No. 20 — E_1	No voltage	Ignition switch ON	9 — 14V



FI0758



FI0759



① There is no voltage between ECU terminal No. 10 and/or No. 20 and E_{01} or E_{02}. **(IG S/W ON)**

② Check that there is specified voltage between resistor terminal (+) and body ground. **STD voltage: 10 — 13V**

OK → ② Check that there is specified voltage between resistor terminal (−) and body ground. **STD voltage: 10 — 13V**

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

OK → Check main relay No. 2. BAD → Replace

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

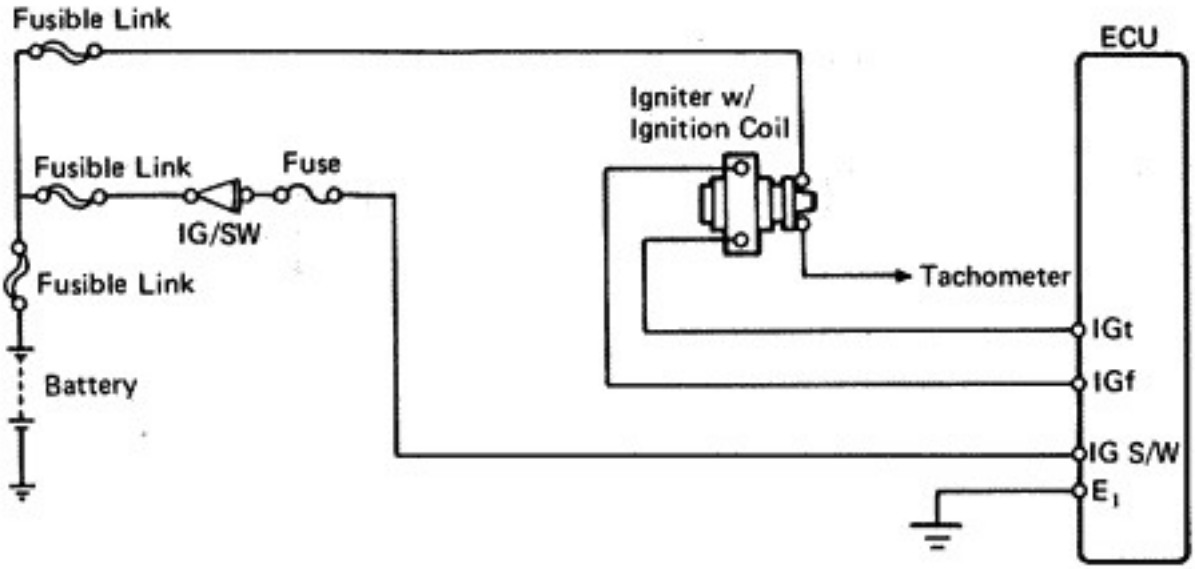
② OK → ③ Check resistance of magnetic coil in the each injector. **STD resistance: 1.5 — 3.0Ω**

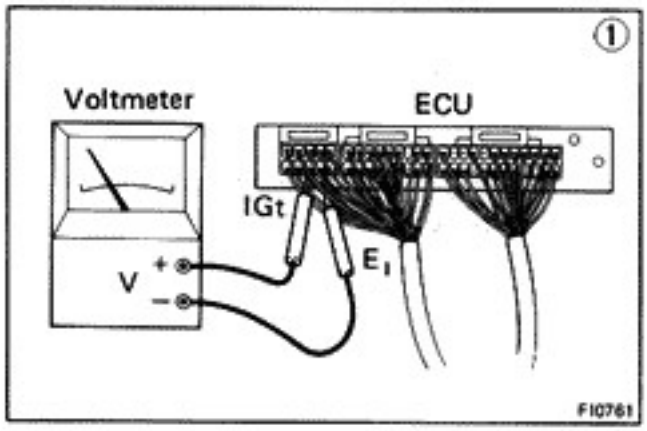
② BAD → Replace resistor.

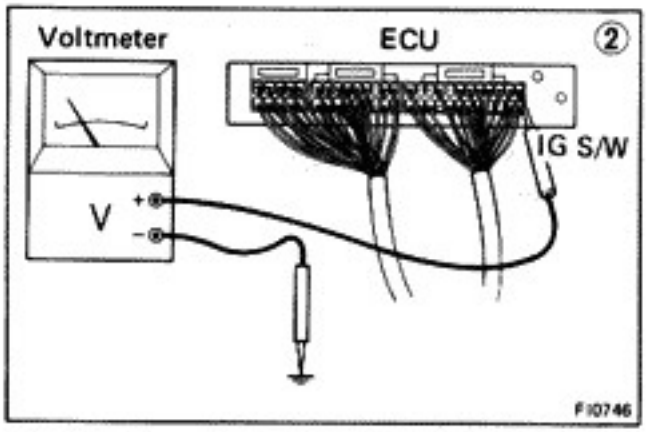
③ OK → Check wiring between ECU and

③ BAD → Replace injector.

No.	Terminals	Trouble	Condition	STD Voltage
7	IGt — E_1	No voltage	Cranking or Idling	0.7 — 1.0V







① There is no voltage between ECU terminal IGt and E_1. (Idling)

↓

② Check that there is voltage between ECU terminal IG S/W and body ground. (Idling)

↓ OK

Check wiring between ECU terminal E_1 and body ground.

↓ BAD

Repair or replace

② → Refer to No. 1. → BAD → Repair or replace

↓ OK

Check fuse and wiring harness. → BAD → Repair or replace

↓ OK

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

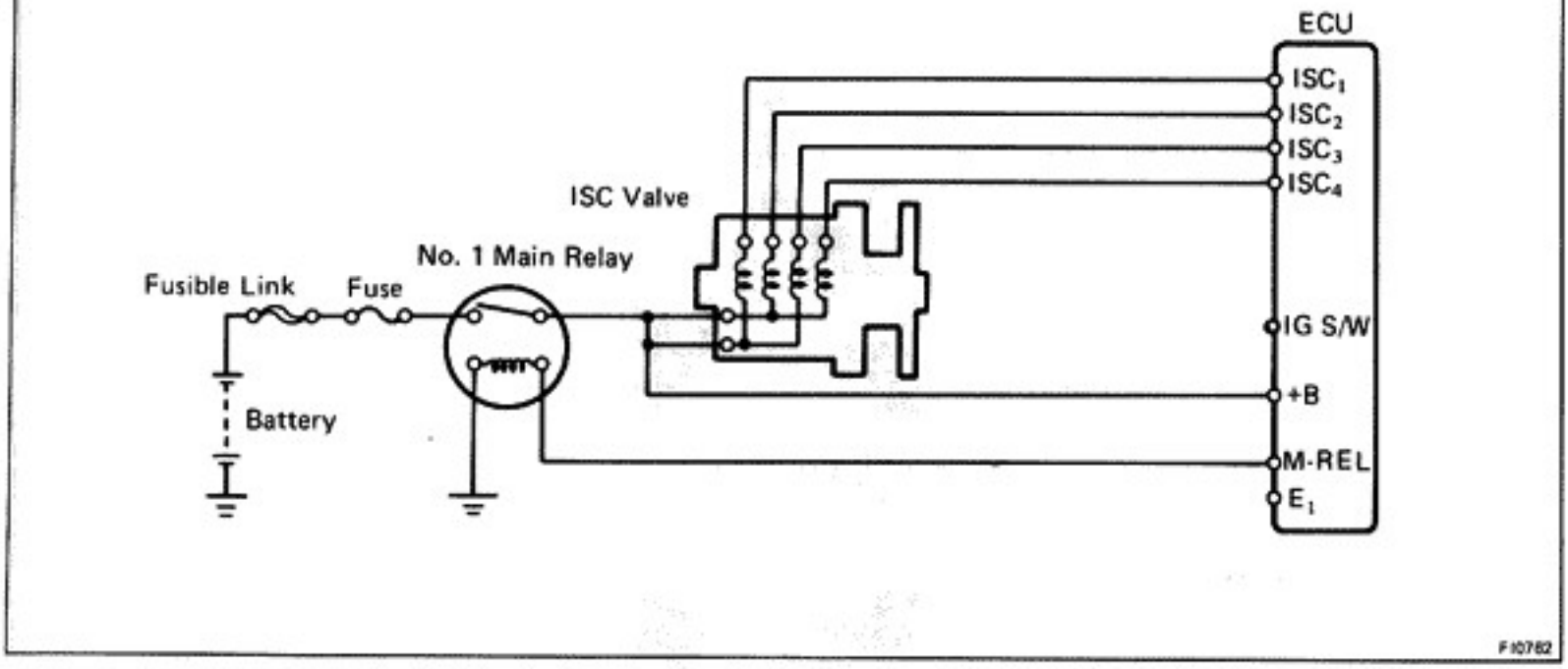
↓ OK

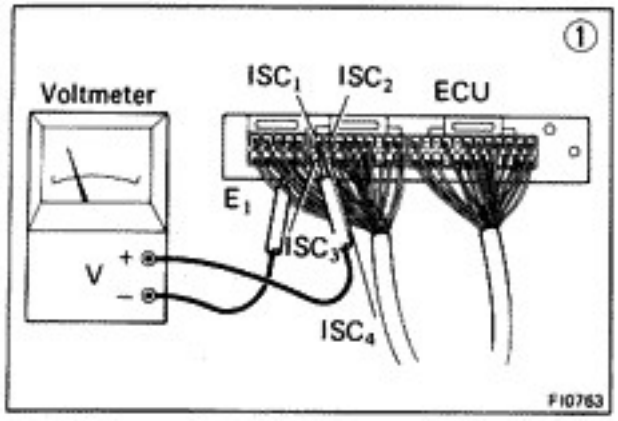
Check distributor. → BAD → Replace

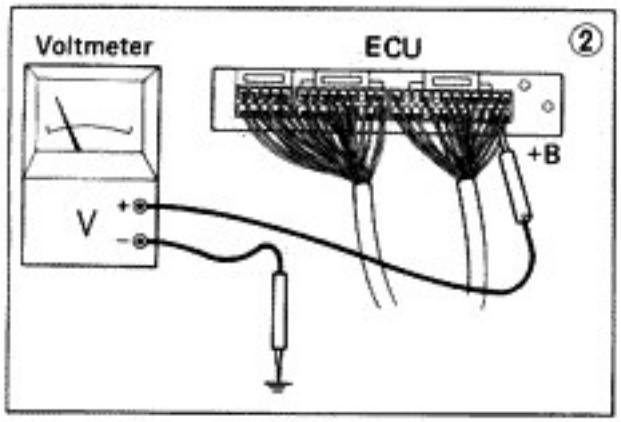
↓ OK

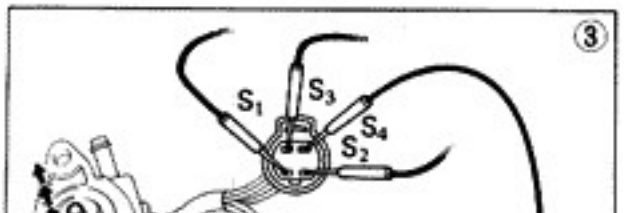
Check wiring between ECU and igniter. → BAD → Repair or replace

No.	Terminal	Trouble	Condition	STD Voltage
8	$ISC_1 - ISC_4 - E_1$	No voltage	Ignition switch ON	9 – 14V









① There is no voltage between ECU terminals ISC_1 – ISC_4 and E_1. **(IG S/W ON)**

↓

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

NO → OK

OK → Check wiring between computer terminal E_1 and body ground.

OK → Try another ECU.

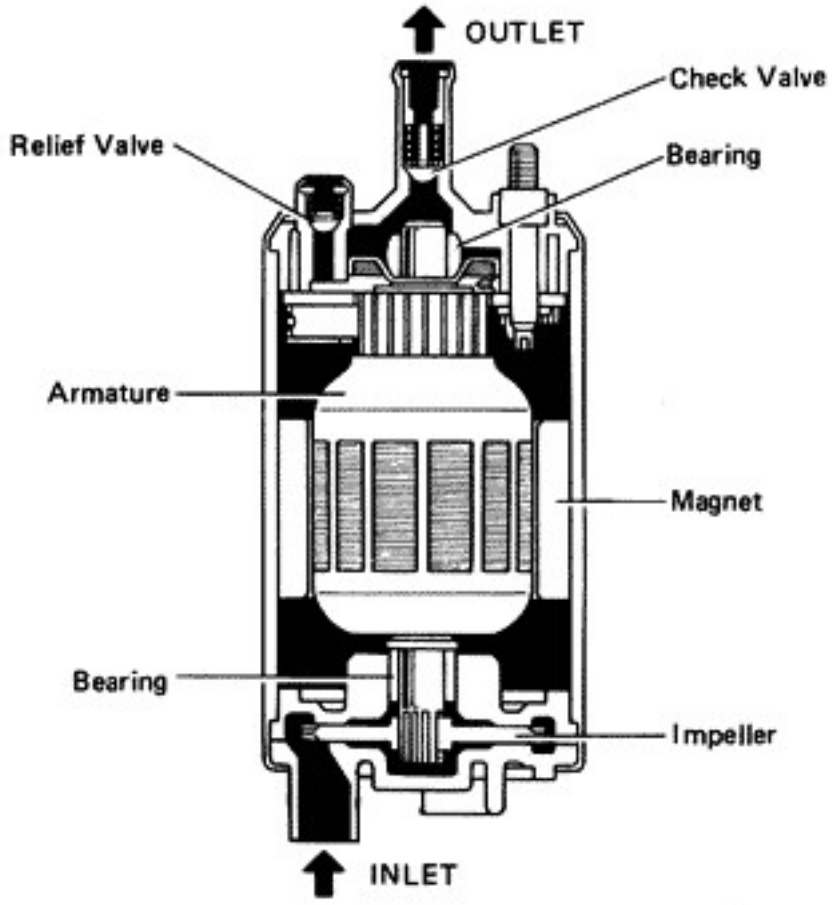
BAD → Repair or replace

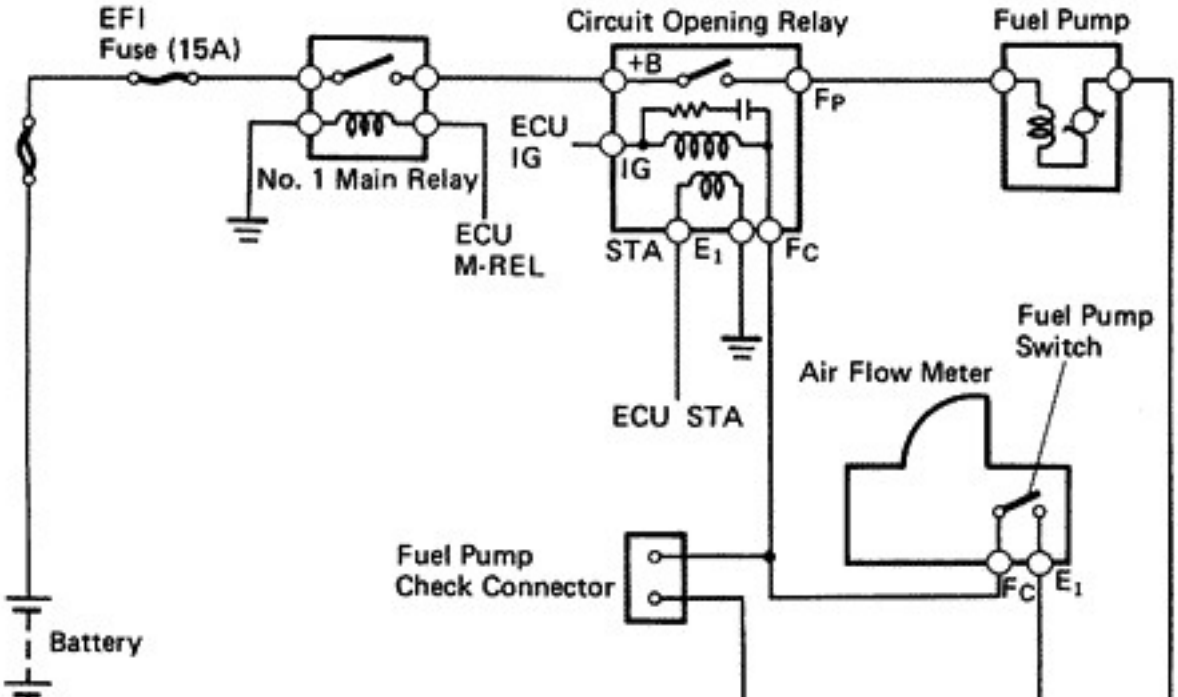
NO → Refer to No. 1. → NO → Repair or replace

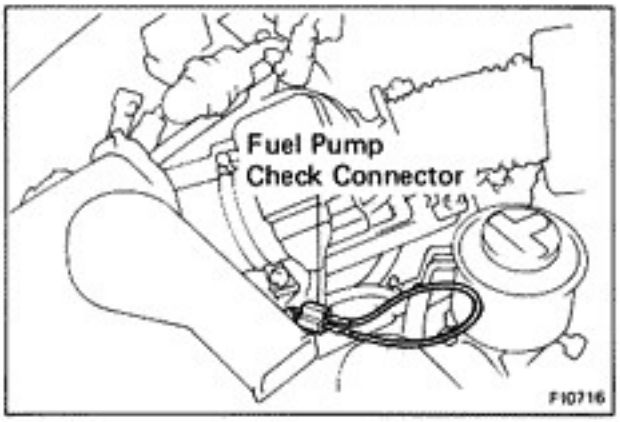
OK → Check wiring between NO. 1 main relay and battery. → BAD → Repair or replace

OK → ③ Check ISC valve.

FUEL SYSTEM
Fuel Pump







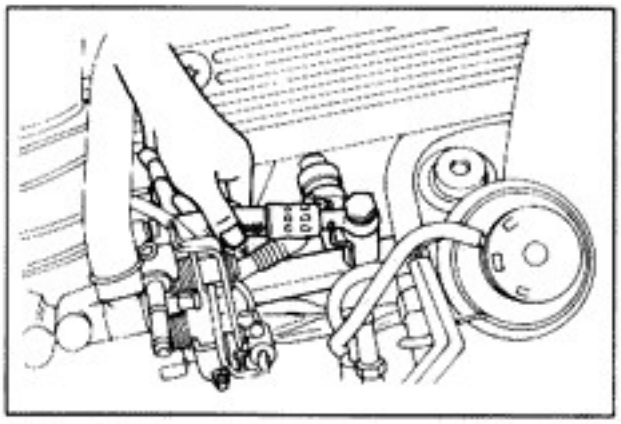
ON-VEHICLE INSPECTION

1. CHECK FUEL PUMP OPERATION

(a) Turn on the ignition switch.

NOTE: Do not start the engine.

(b) Short both terminals of the fuel pump check connector.



(c) Check that there is a pressure in the hose to the cold start injector.

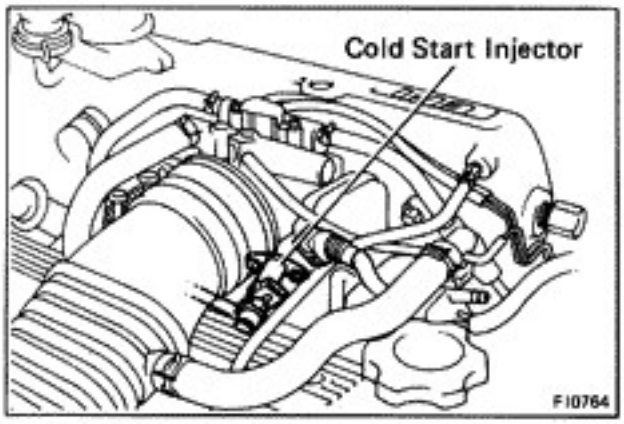
NOTE: At this time, you will hear fuel return noise from the pressure regulator.

(d) Remove service wire and install the rubber cap to the check terminal.

(e) Turn off the ignition switch.

If there is no pressure, check the following parts.

- Fusible link
- Fuse (EFI. 15A, IGNITION 7.5A)
- Circuit opening relay
- Fuel pump
- Wiring connections

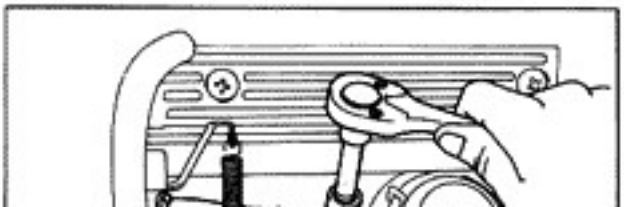


2. CHECK FUEL PRESSURE

(a) Check the battery voltage above 12 volts.

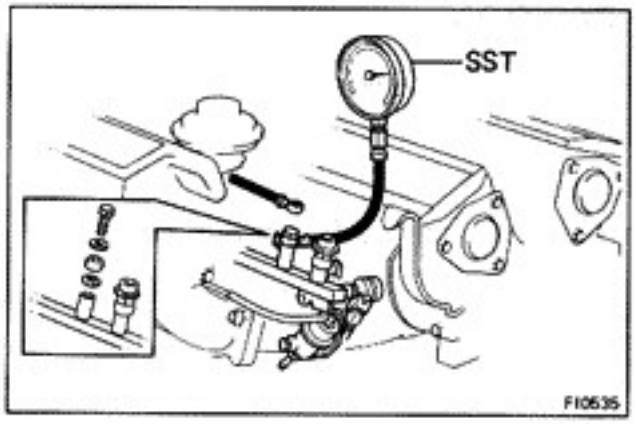
(b) Disconnect the battery ground cable.

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



(d) Put a suitable container or shop towel under rear end of the delivery pipe.

(e) Slowly loosen the union bolt of the cold start injector hose and remove the bolt and two gaskets from the delivery pipe.

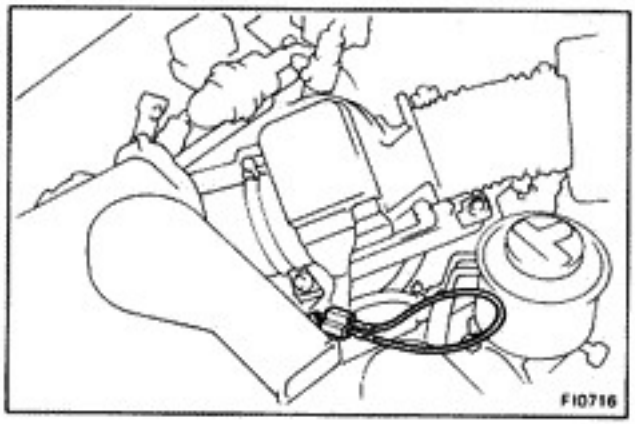


(g) Install a gasket, SST, another gasket and union b to the delivery pipe as shown in the figure.

SST 09268-45011

(h) Wipe off any splattered gasoline.

(i) Reconnect the battery cable.



(j) Short both terminals of the fuel pump check c nector.

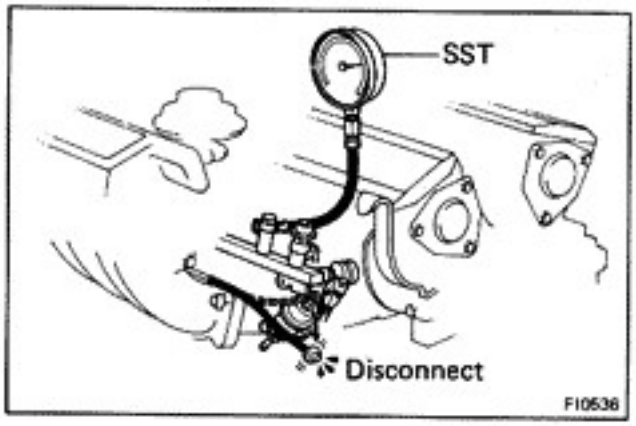
(k) Turn on the ignition switch.

(l) Measure the fuel pressure.

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

If high pressure, replace the pressure regulator.
If low pressure, check the following parts.

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



(m) Remove the service wire from the service connect

(n) Start the engine.

(o) Disconnect the vacuum sensing hose from the pr sure regulator and pinch it off.

(p) Measure the fuel pressure at idling.

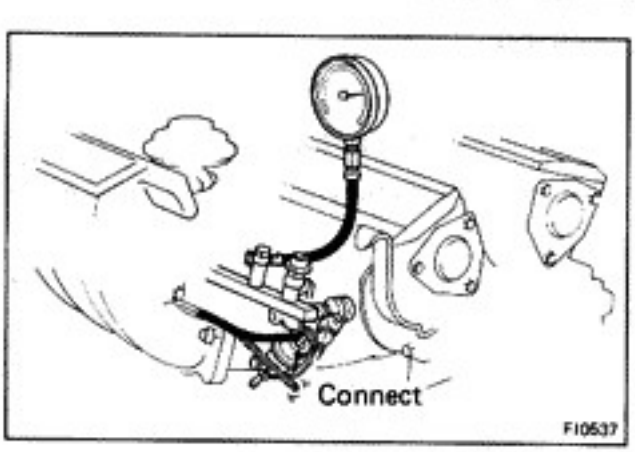
Fuel pressure: 2.3 — 2.7 kg/cm² (33 — 38 psi, 226 — 265 kPa)

(q) Reconnect the vacuum sensing hose to the pressu regulator.

(r) Measure the fuel pressure at idling.

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

If not pressure, check the vacuum sensing hose and pr sure regulator.

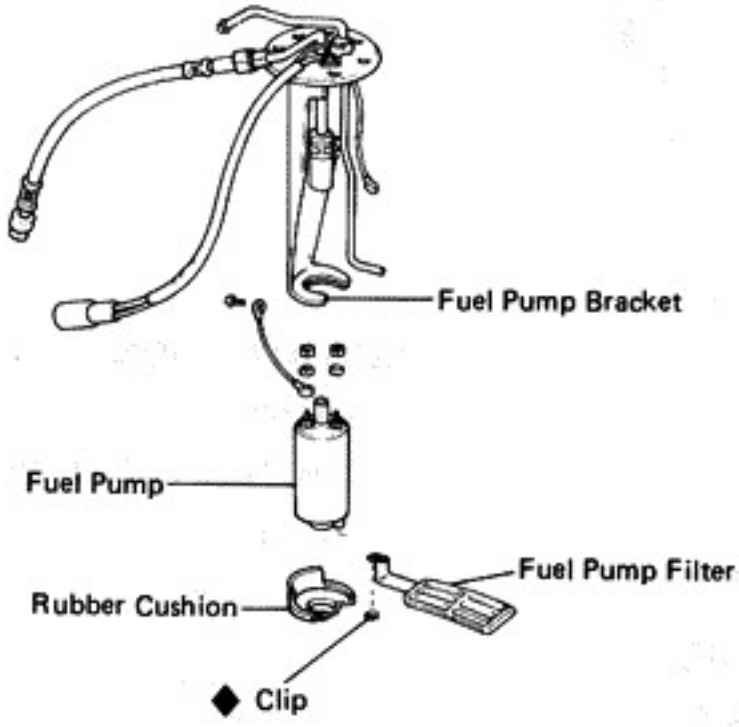


(s) Stop the engine. Check that the fuel pressure rema above 1.5 kg/cm² (21 psi, 147 kPa) for 5 minut after the engine is turned off.
If not within specification, check the fuel pump, pr sure regulator and/or injectors.

(t) After checking fuel pressure, disconnect the batte ground cable and carefully remove the SST to preve gasoline from splashing.

(u) Using new gaskets, reconnect the cold start injec hose to the delivery pipe.

REMOVAL OF FUEL PUMP



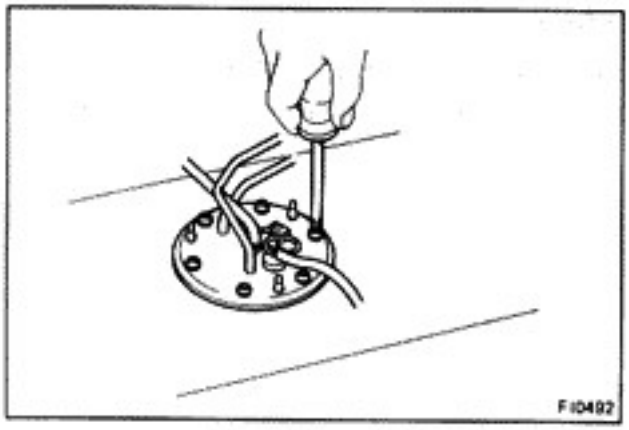
◆ Non-reusable part

F105

1. **DRAIN FUEL FROM FUEL TANK**

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

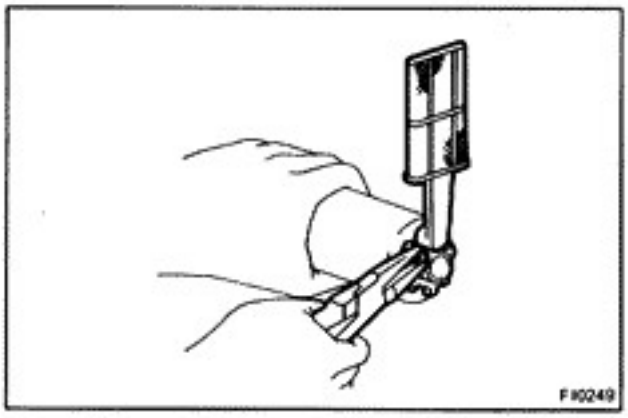
2. **REMOVE FUEL TANK**



F10492

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

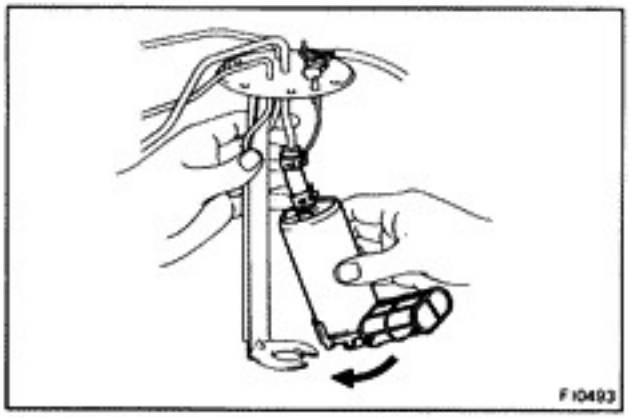
4. **REMOVE FUEL PUMP FROM FUEL PUMP BRACKET**
   (a) Remove the two nuts and disconnect the wires fro the fuel pump.
   (b) Pull off the bracket from the lower side of the fu



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-47)

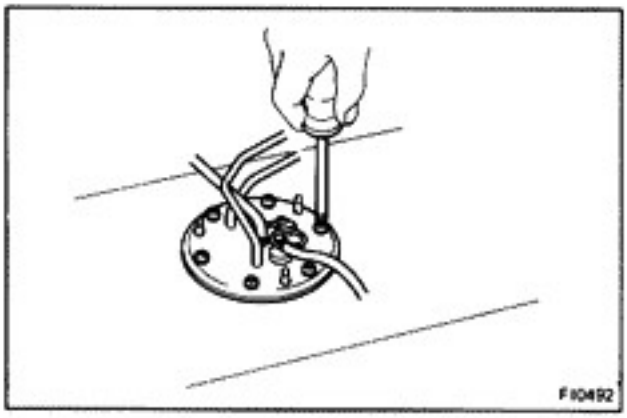
1. INSTALL FUEL PUMP FILTER TO FUEL PUMP

2. INSTALL FUEL PUMP TO FUEL PUMP BRACKET

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

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

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



3. INSTALL FUEL PUMP BRACKET

(a) Place the bracket with a new gasket on the fuel tan

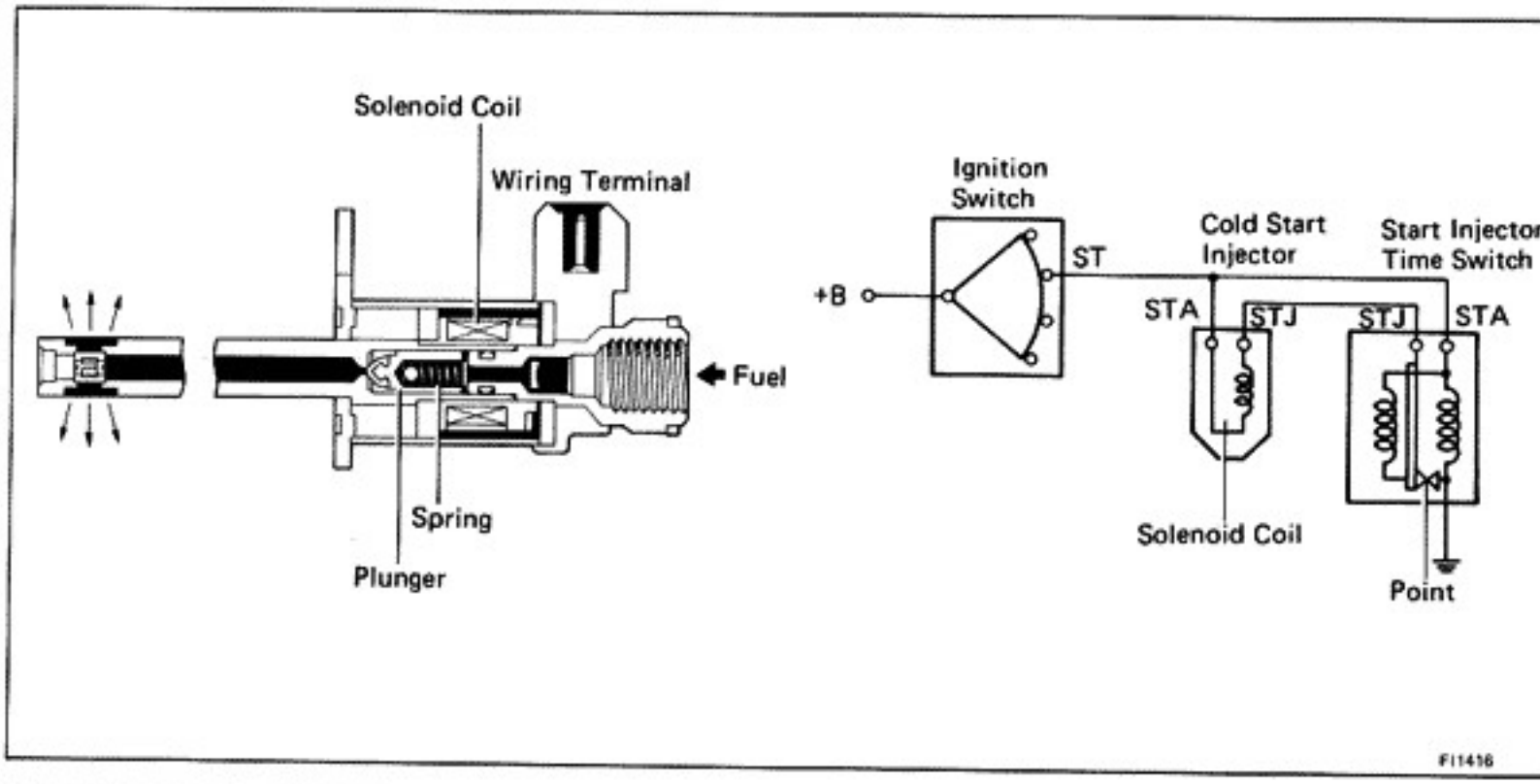
(b) Install and tighten the screws.

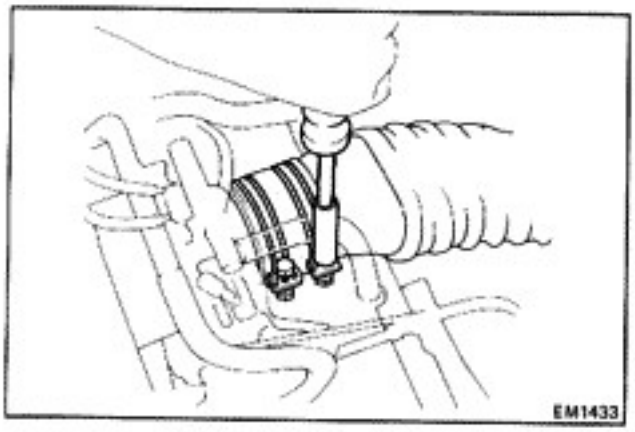
4. INSTALL FUEL TANK

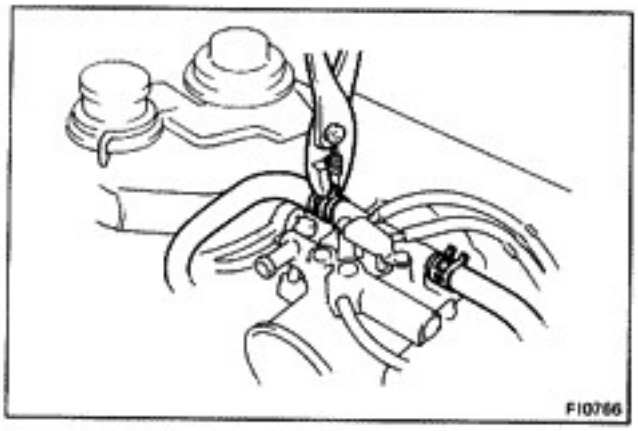
When installing the fuel tank, refer to FI-58 for the insta
lation position of the protector and hose and the tighte
ing torque.

After installation, check for leaks.

Cold Start Injector

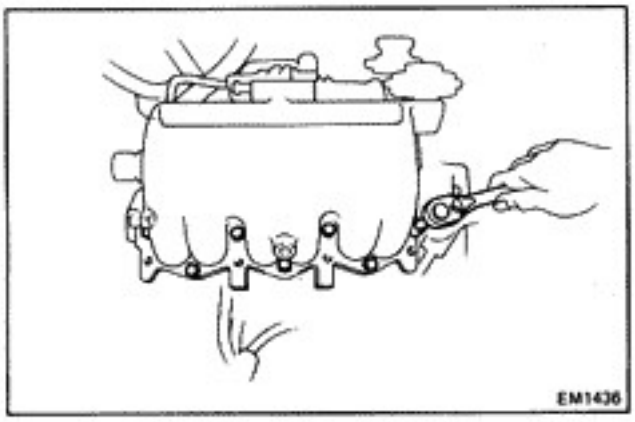






REMOVAL OF COLD START INJECTOR

1. **DRAIN COOLANT**
2. **REMOVE AIR INTAKE CONNECTOR**
3. **DISCONNECT FOLLOWING HOSES:**
   (a) No. 1 water by-pass hose from the ISC valve bod
   (b) No. 2 water by-pass hose from the throttle body
   (c) Air valve hose from ISC valve body.
   (d) PCV hose from the throttle body.
   (e) Brake booster vacuum hose from the air intak chamber.
   (f) Actuator vacuum hose from the air intake chambe
   (g) Label and disconnect emission control hoses from th throttle body and air intake chamber that allo removal of vacuum pipe subassembly.
4. **DISCONNECT ACCELERATOR LINKAGE AND CABLE FROM THROTTLE BODY**
5. **DISCONNECT FOLLOWING WIRES:**
   (a) Cold start injector wire
   (b) Throttle position sensor wire
   (c) Two ISC valve connectors

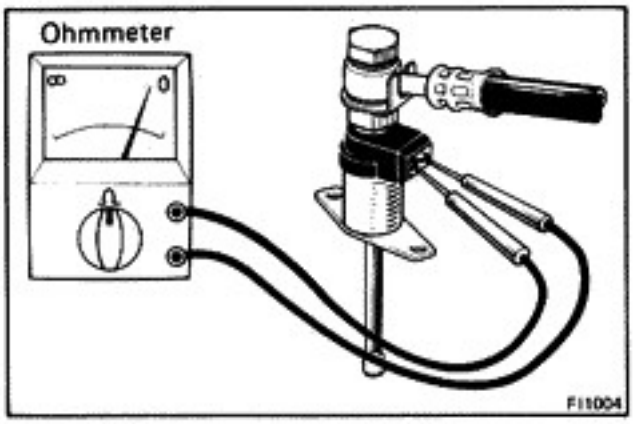


8. **LOOSEN EGR PIPE CONNECTING NUT**

9. **DISCONNECT COLD START FUEL HOSE FROM DELIVER PIPE**

10. **REMOVE AIR INTAKE CHAMBER**

11. **REMOVE COLD START INJECTOR FROM AIR INTAI CHAMBER**



INSPECTION OF COLD START INJECTOR

1. **MEASURE RESISTANCE OF COLD START INJECTOR**

Using an ohmmeter, check the resistance of the injecto

Resistance: 3 – 5 Ω

2. **CHECK INJECTION OF COLD START INJECTOR**

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

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

SST 09268-41045

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

SST 09842-30050

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

(d) Put a container under the injector.

(e) Turn on the ignition switch.

NOTE: Do not start the engine.

(f) Short both terminals of the fuel pump check conne tor with a service wire.

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

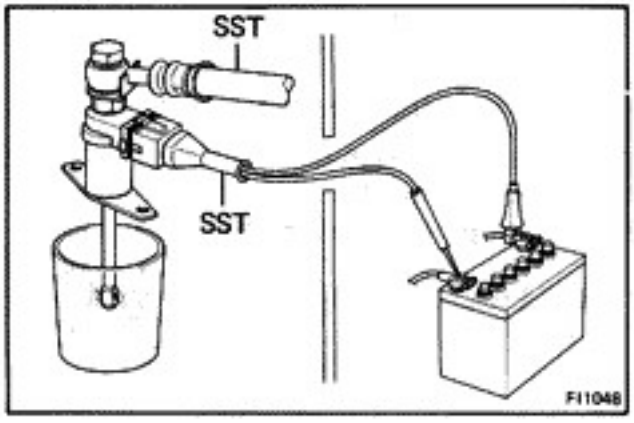
SST 09842-30050

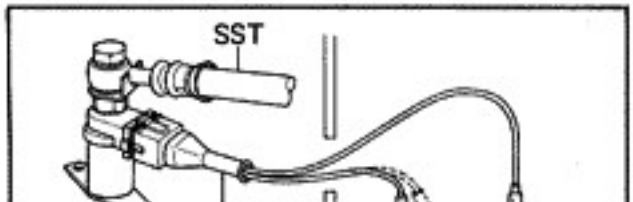
NOTE: Perform this check within the shortest possib time.

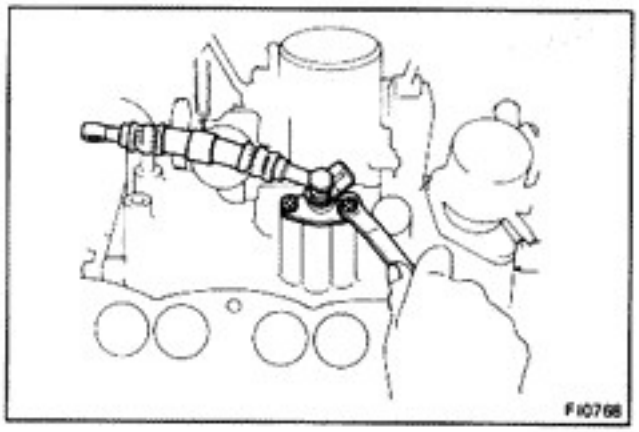
(h) Disconnect the test probes from the battery and che that fuel does not leak from the injector.

Fuel drop: Less than one drop of fuel per minute

(i) After checking, restore the following to the previo state.







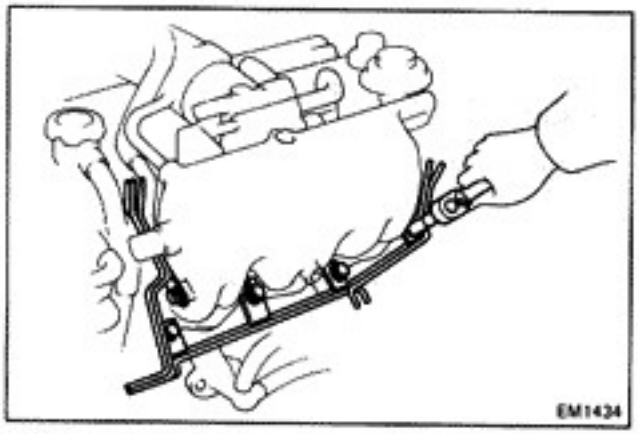
INSTALLATION OF COLD START INJECTOR

1. **INSTALL COLD START INJECTOR**

   Place the new gasket and install the cold start injector a two bolts.

2. **INSTALL AIR INTAKE CHAMBER**

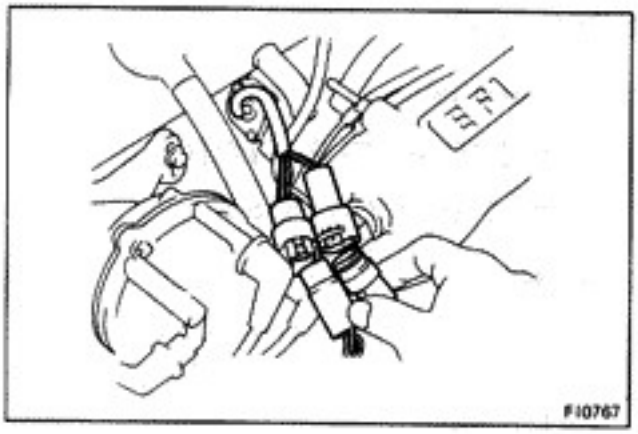
3. **CONNECT COLD START FUEL HOSE TO DELIVERY P**



4. **TIGHTEN EGR PIPE CONNECTING NUT**

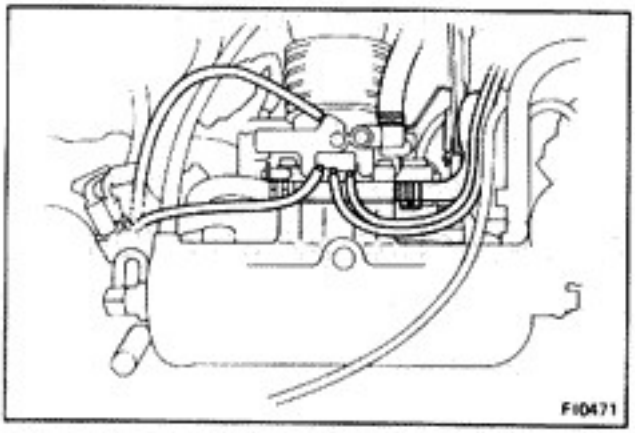
5. **INSTALL VACUUM PIPE SUBASSEMBLY**

6. **INSTALL AIR INTAKE CHAMBER STAY**



7. **CONNECT FOLLOWING WIRES:**
   (a) VSV wire connector
   (b) Two ISV valve connectors
   (c) Throttle position sensor wire
   (d) Cold start injector wire

8. **CONNECT ACCELERATOR LINKAGE AND CABLE FRO THROTTLE BODY**

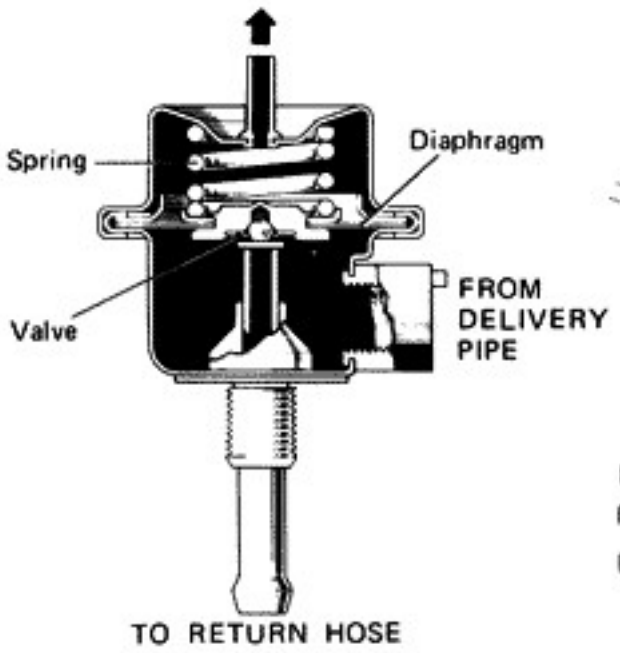


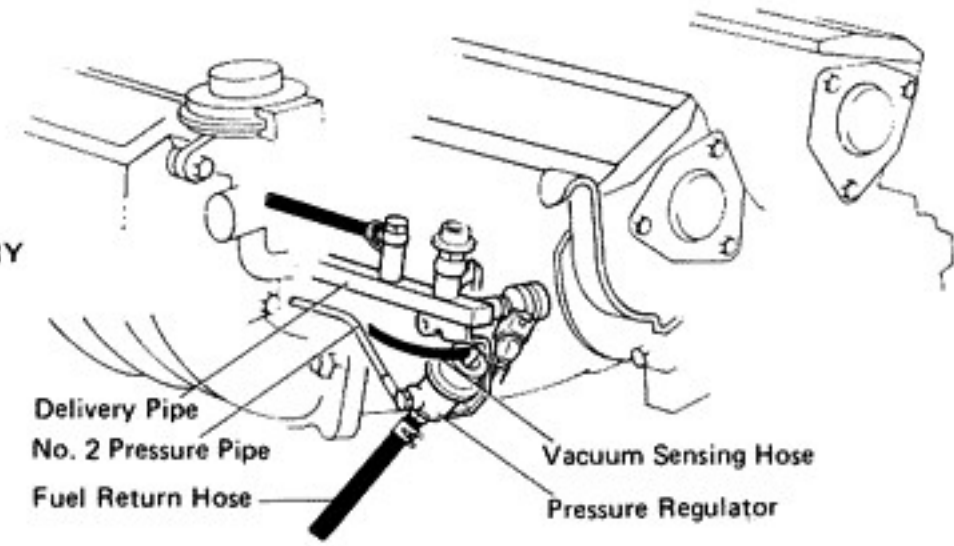
9. **CONNECT FOLLOWING HOSES:**
   (a) Connect the emission control hoses to the throt body and air intake chamber etc.
   (b) Actuator vacuum hose to the air intake chamber
   (c) Brake booster vacuum hose to the air intake chamb
   (d) PCV hose to the throttle body
   (e) Air valve hose to the ISC valve body
   (f) No. 1 water by-pass hose to the ISC valve body
   (g) No. 2 water by-pass hose to the throttle body

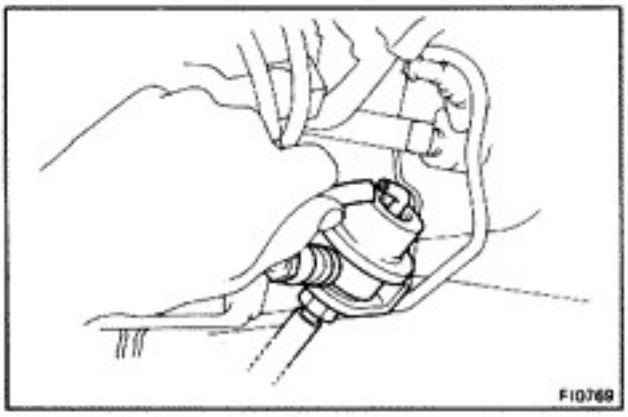
10. **INSTALL AIR INTAKE CONNECTOR**

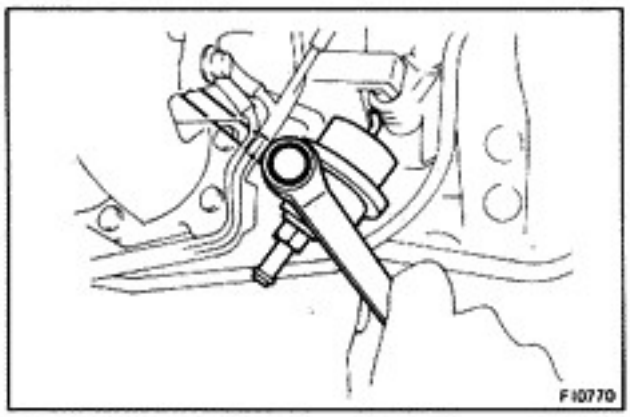
11. **FILL WITH COOLANT**

Pressure Regulator









ON-VEHICLE INSPECTION

CHECK FUEL PRESSURE (See page FI-45)

REMOVAL OF PRESSURE REGULATOR

1. **DISCONNECT VACUUM SENSING HOSE**

2. **DISCONNECT FUEL HOSE**

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

   (b) Disconnect the fuel hose from the pressure regulat

3. **DISCONNECT NO. 2 FUEL PIPE FROM PRESSURE REGULATOR**

4. **REMOVE PRESSURE REGULATOR**

   Remove the lock nut, and remove the pressure regulat

INSTALLATION OF PRESSURE REGULATOR

1. **INSTALL PRESSURE REGULATOR**

   Install the pressure regulator and lock nut.
   Torque the lock nut.

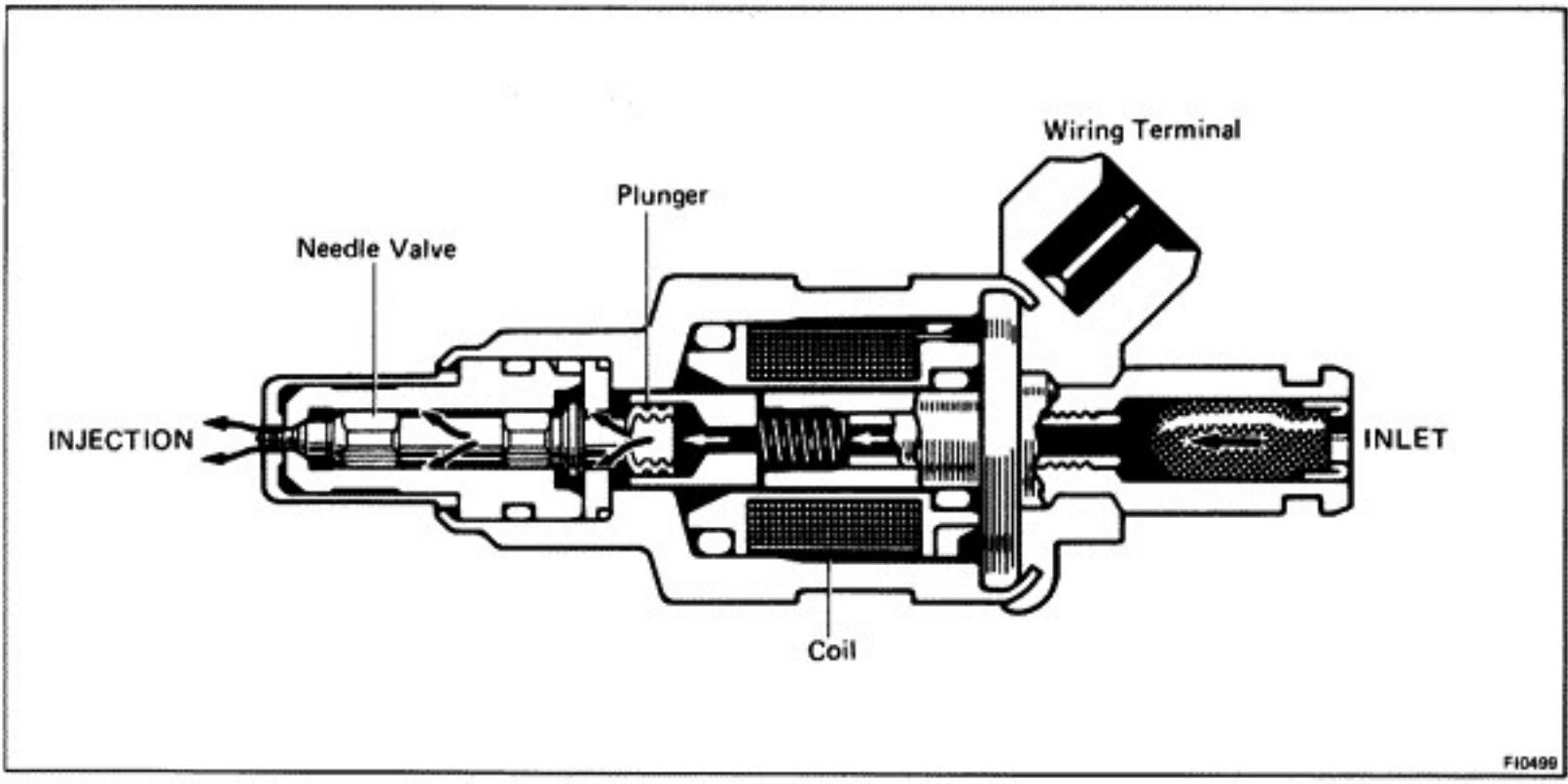
   Torque: 400 kg-cm (29 ft-lb, 39 N·m)

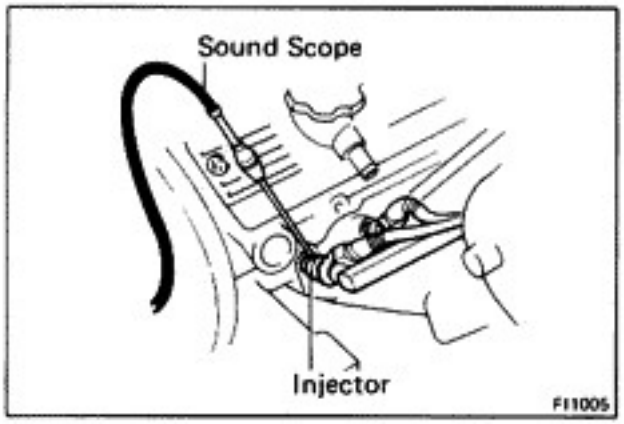
2. **CONNECT NO. 2 FUEL PIPE**

   Install a new gasket, pipe, another gasket and union b
   to the pressure regulator. Torque the union bolt.

   Torque: 300 kg-cm (22 ft-lb, 30 N·m)

Injector



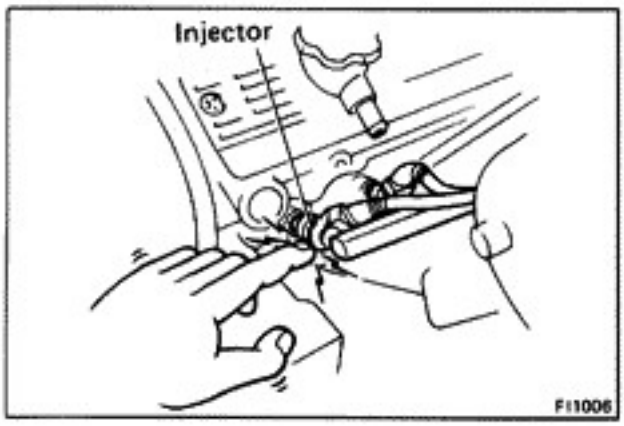


ON-VEHICLE INSPECTION

1. CHECK INJECTOR OPERATION

Check operating sound from the 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 computer.

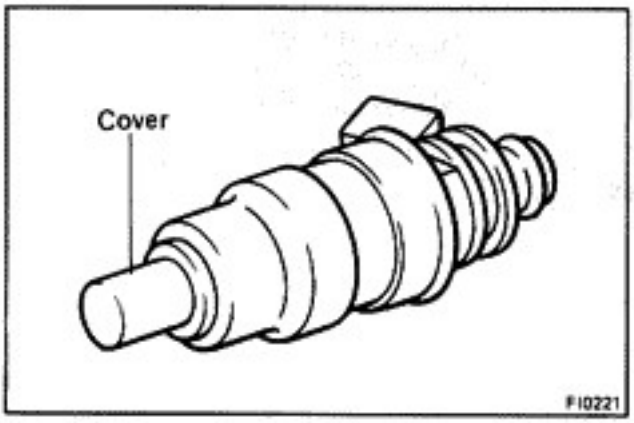
2. MEASURE RESISTANCE OF INJECTOR

(a) Disconnect the wiring connector from the injector.

(b) Using an ohmmeter, check the continuity of both terminals.

REMOVAL OF INJECTOR

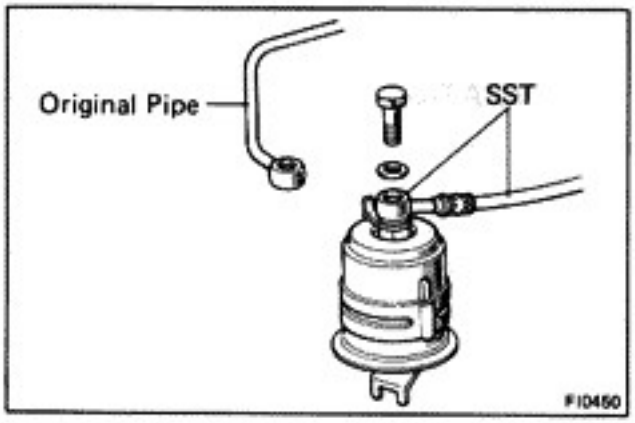
1. **REMOVE AIR INTAKE CHAMBER**
   (See steps 1 to 10 on pages FI-49 to 50)
2. **REMOVE DISTRIBUTOR**
3. **REMOVE NO.1 FUEL PIPE**
4. **DISCONNECT AND REMOVE WIRING HARNESS**



5. **REMOVE DELIVERY PIPE WITH INJECTORS**
   (a) Remove the four bolts, and then remove the deliv pipe with injectors.

NOTE:
- When removing the delivery pipe, be careful not drop the injectors.
- Do not remove the injector cover.

(b) Remove the six insulators from the intake manif



INSPECTION OF INJECTOR

1. **TEST INJECTION OF INJECTORS**

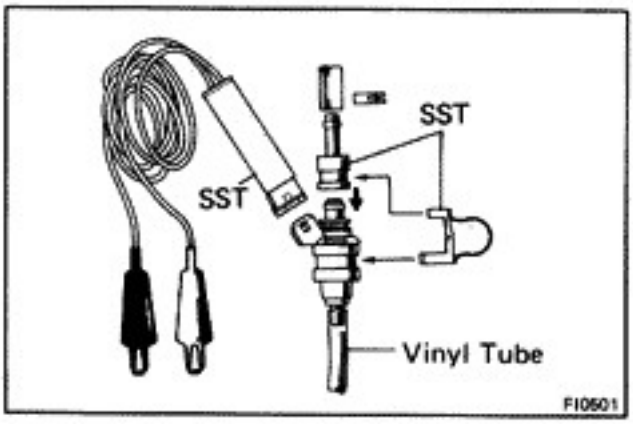
CAUTION: Keep clear of sparks during the test.

(a) Connect the SST to the fuel filter outlet.

SST 09268-41045

(b) Connect the SST to the pressure regulator and the jector.

SST 09268-41045



(c) Hold the injector and hose with SST.

SST 09842-30020

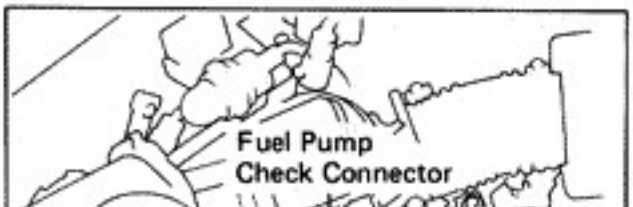
(d) Put the injector into the graduated cylinder.

NOTE: Install a suitable vinyl tube onto the injector to p vent gasoline from splashing out.

(e) Connect the ground cable to the battery.

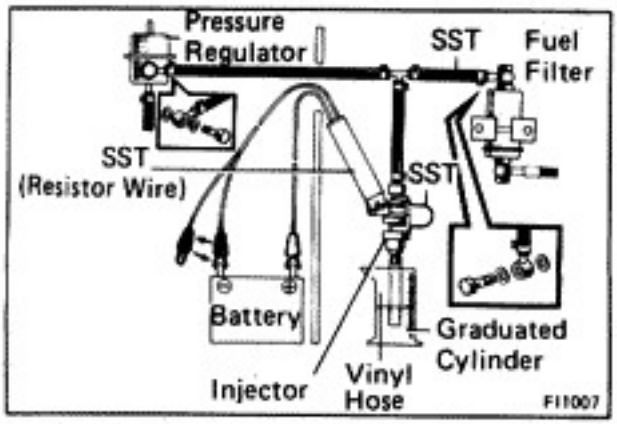
(f) Turn the ignition switch ON.

NOTE: Do not start the engine.



(g) Using a service wire, short both terminals of the f pump check connector.

NOTE: The fuel pump will operate.

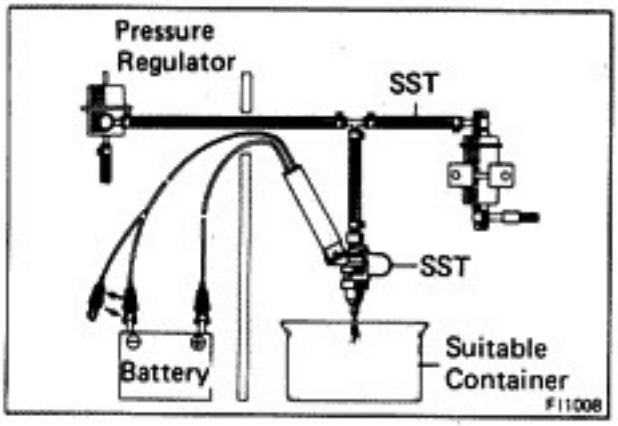


(h) Connect the SST to the battery for 15 seconds and measure the injection volume with a graduated cylinder.

Test each injector two or three times. If not within specified volume, clean or replace.

SST 09842-30020

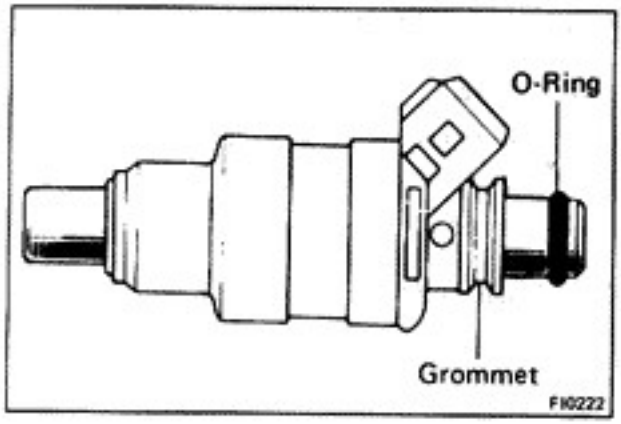
Volume: 40 — 50 cc/15 sec. (2.4 — 3.1 cu in.)
Difference between each injector: Less than 6 cc (0.37 cu in.)



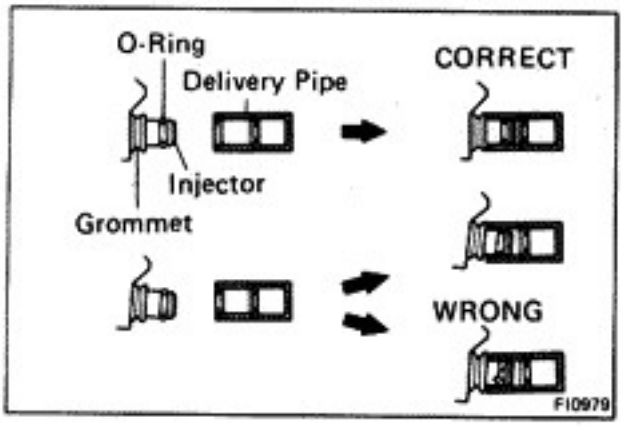
NOTE: If not within specified volume, clean or replace the injector.

INSTALL OF INJECTORS

1. INSTALL INJECTORS INTO DELIVERY PIPE

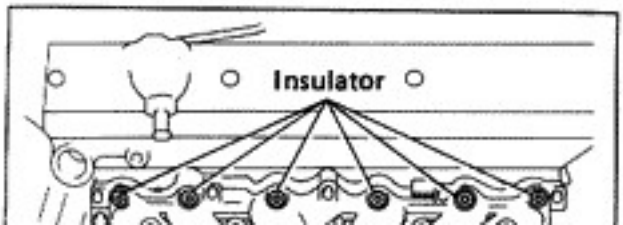


(a) Install the grommet and a new O-ring to the injector.

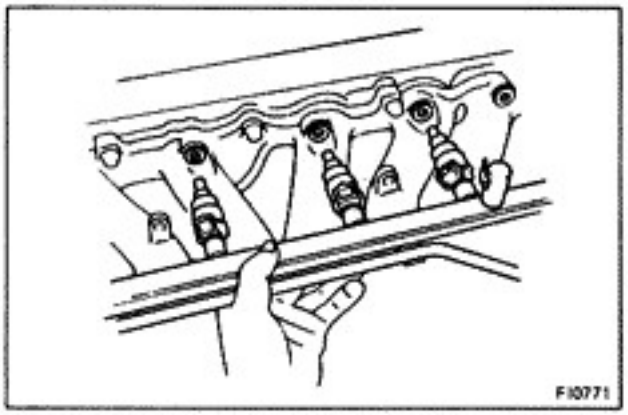


(b) Apply a thin coat of gasoline to the O-rings and install the injectors into the delivery pipe.

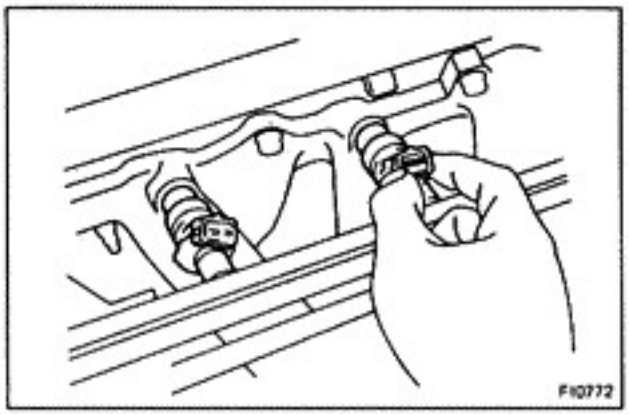
2. INSTALL DELIVERY PIPE WITH INJECTORS



(a) Install the six insulators into the injector hole of the intake manifold.



(b) Install the injectors together with the delivery pipe the manifold.

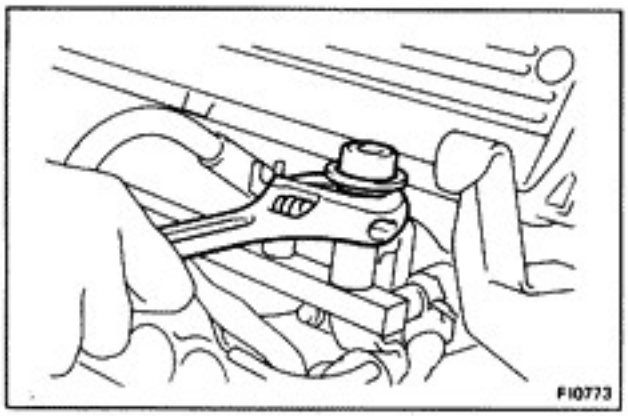


(c) Make sure that the injectors rotate smoothly.

NOTE: If the injectors do not rotate smoothly, the pro able cause may be incorrect installation of O-rings. Repla the O-rings.

(d) Install four bolts, torque the bolts.

Torque: 140 kg-cm (10 ft-lb, 14 N·m)



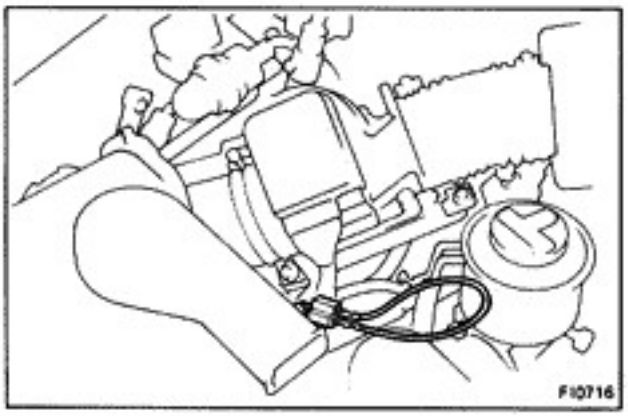
3. CONNECT AND INSTALL WIRING HARNESS

4. INSTALL NO.1 FUEL PIPE

(a) Finger tighten the pulsation damper and union b with new gaskets on the fuel pipe.

(b) Tighten then being careful not to bend the fuel pip

5. INSTALL DISTRIBUTOR AND SET TIMING
(See page IG-9, 10)



6. INSTALL AIR INTAKE CHAMBER
(See steps 2 to 11 on page FI-51)

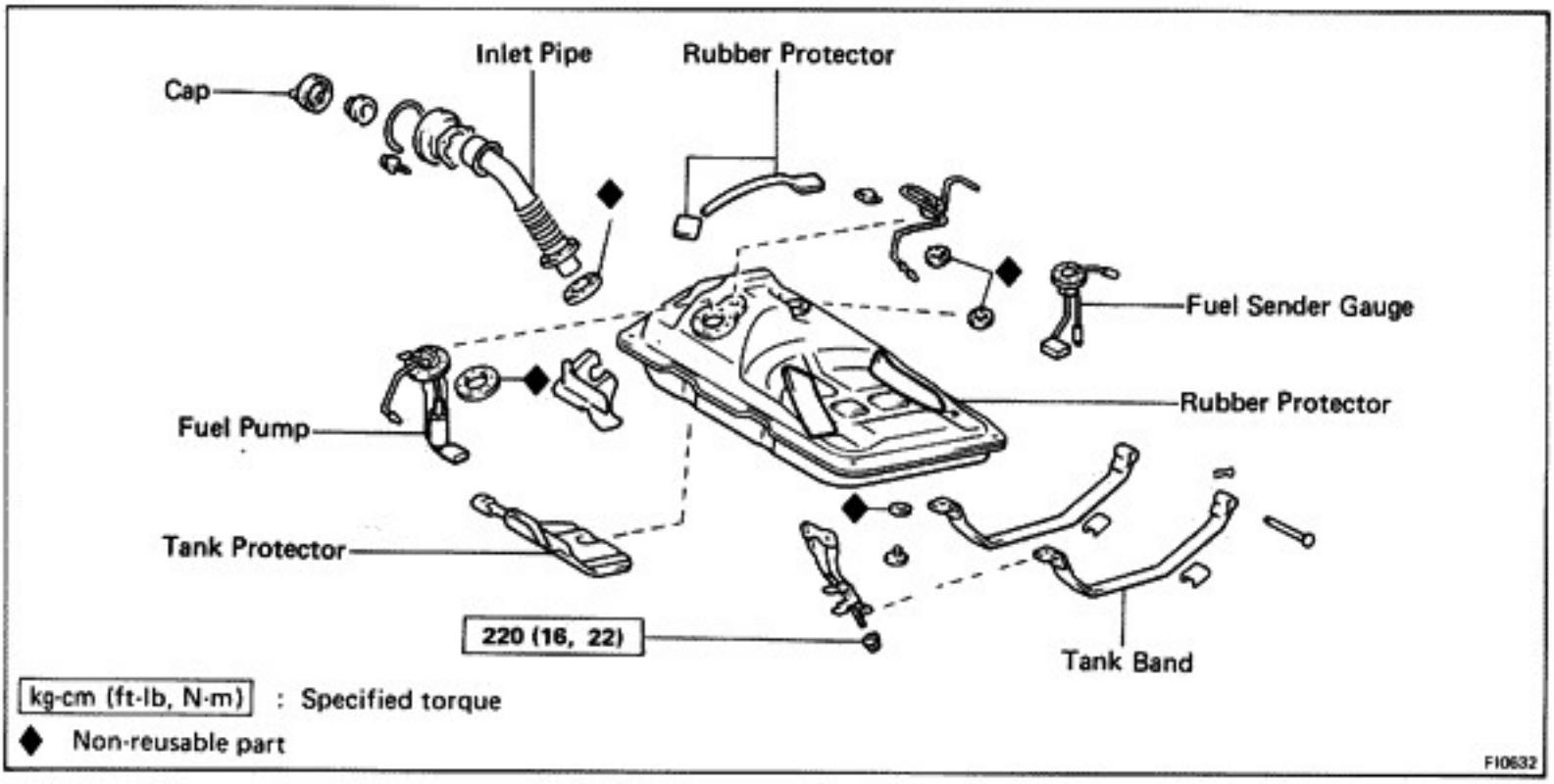
7. CHECK FOR FUEL LEAKAGE

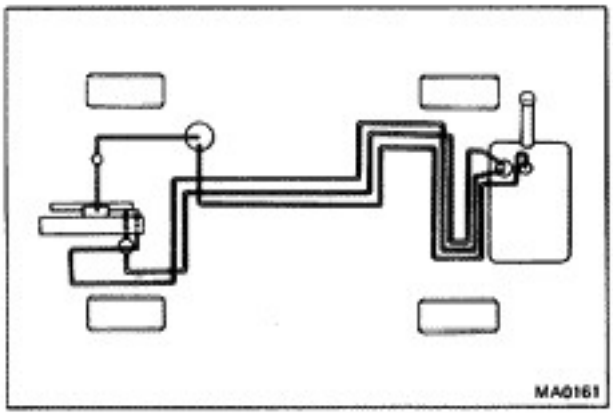
(a) With the ignition switch ON, use a service wire short both terminals of the fuel pump check co nector.

(b) Check for fuel leakage.

(c) Remove the service wire from the fuel pump che connector.

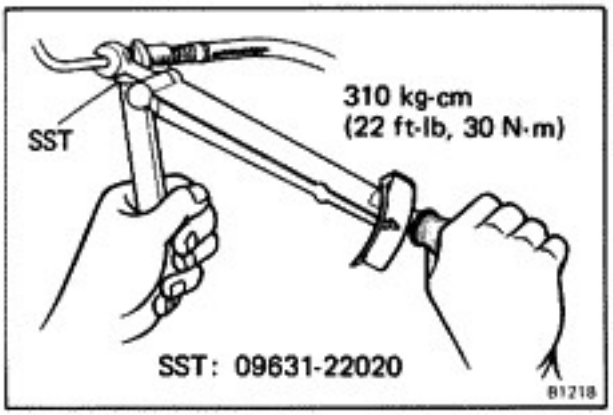
Fuel Tank and Line





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 tightening parts.**



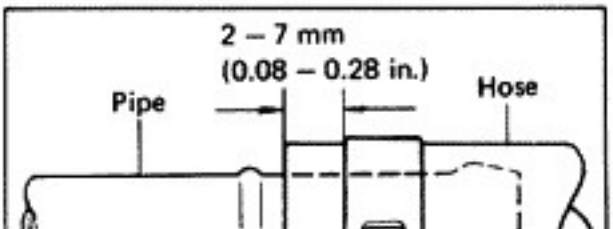
INSPECT FUEL LINES AND CONNECTIONS

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

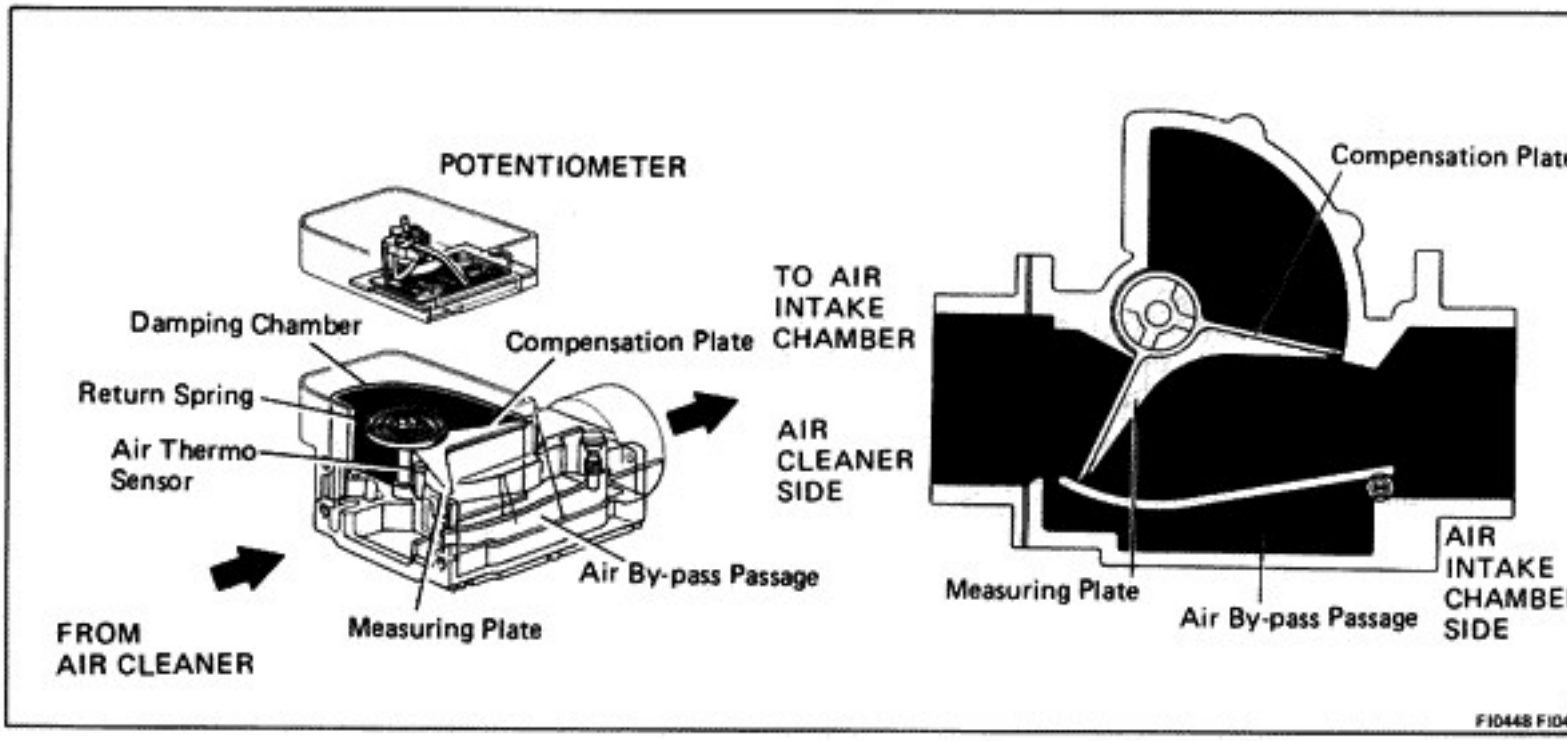


(e) Hose and tube connections are as shown in the illustration.

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

AIR INDUCTION SYSTEM

Air Flow Meter



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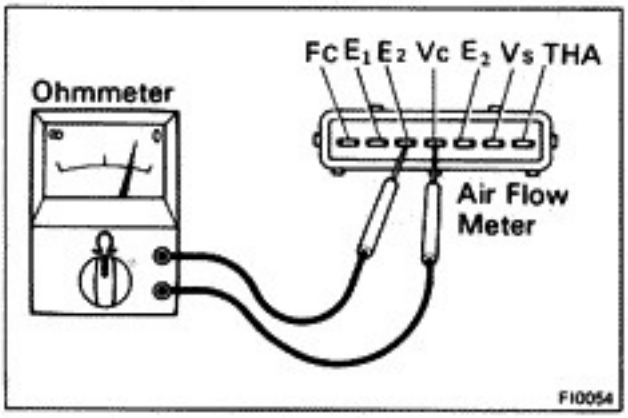
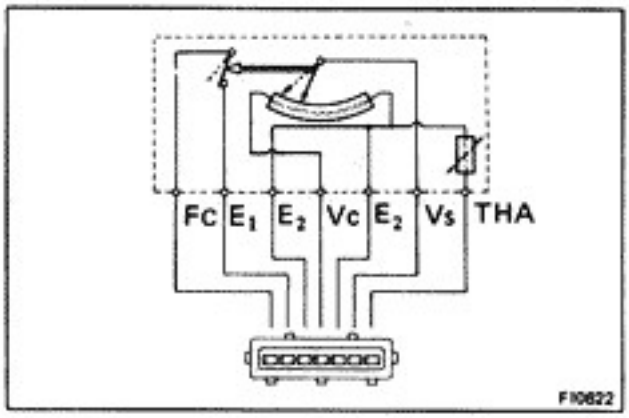




ON-VEHICLE INSPECTION

MEASURE RESISTANCE OF AIR FLOW METER

(a) Unplug the wiring connector from the air flow met

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

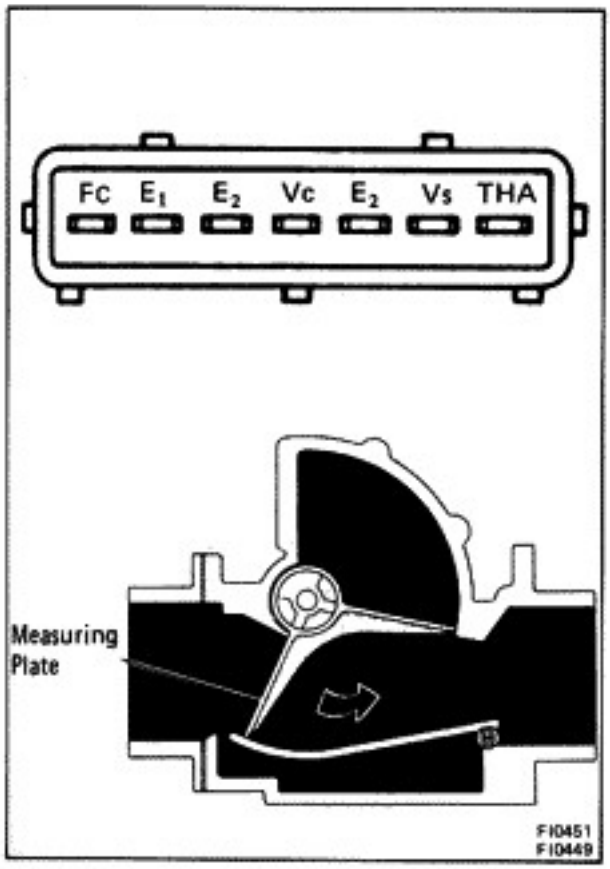
Between terminals	Resistance	Temperature
E_2 — V_s	20 — 400 Ω	—
E_2 — V_c	200 — 400 Ω	—
E_2 — THA	10 — 20 kΩ	−20°C (−4°F)
	4 — 7 kΩ	0°C (32°F)
	2 — 3 kΩ	20°C (68°F)
	0.9 — 1.3 kΩ	40°C (104°F)
	0.4 — 0.7 kΩ	60°C (140°F)
E_1 — Fc	Infinity	—

If not within specification, replace the air flow meter.

REMOVAL OF AIR FLOW METER

1. **DISCONNECT NO. 2 AND NO. 3 AIR CLEANER HOSES**

2. **DISCONNECT AIR FLOW METER CONNECTOR**



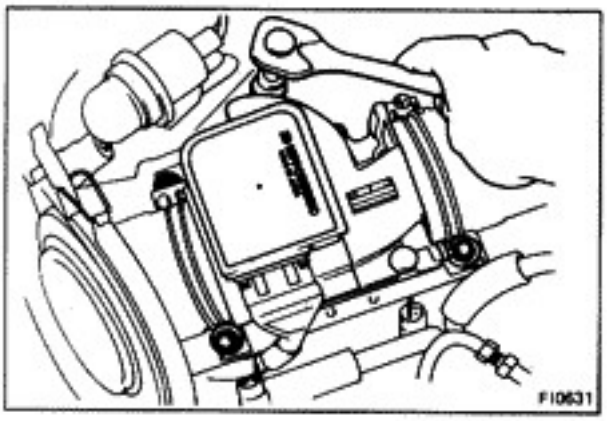
INSPECTION OF AIR FLOW METER

MEASURE RESISTANCE OF AIR FLOW METER

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

Between terminals	Resistance Ω	Measuring plate Opening
E_1 — Fc	Infinity	Fully closed
	Zero	Other than closed position
E_2 — Vs	20 — 400	Fully closed
	20 — 1000	Fully closed to fully open position

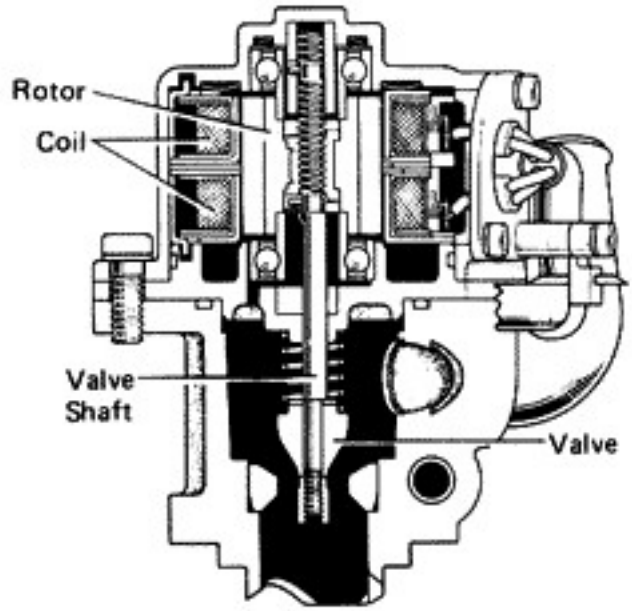
NOTE: Resistance between E_2 and Vs will change in accordance with the measuring plate opening.

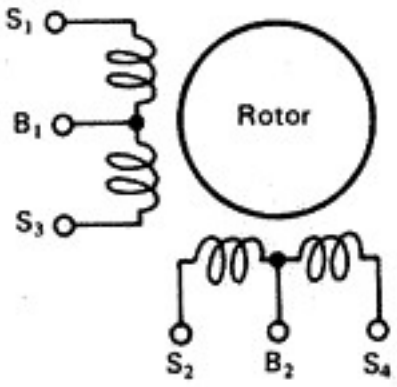


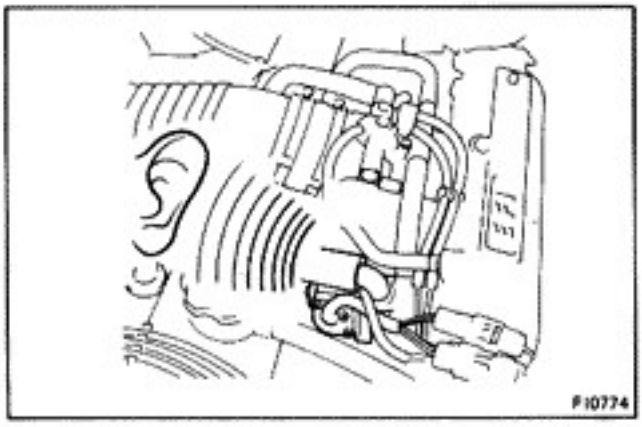
INSTALLATION OF AIR FLOW METER

1. **INSTALL AIR FLOW METER**
   Install air flow meter with four nuts and one bolts.
2. **CONNECT AIR FLOW METER CONNECTOR**
3. **INSTALL NO. 2 AND NO. 3 AIR CLEANER HOSES**

Idle Speed Control (ISC) Valve

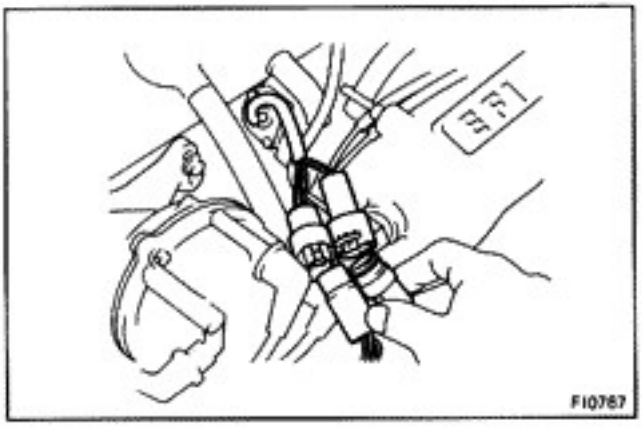






CHECK OPERATING SOUND FROM ISC VALV

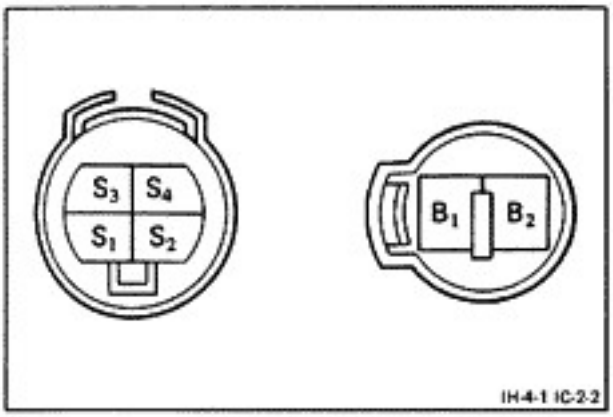
Confirm that there is a clicking sound immediately a
stopping the engine.



REMOVAL OF ISC VALVE

1. **DRAIN COOLANT**
2. **DISCONNECT TWO ISC VALVE CONNECTORS**

3. **DISCONNECT FOLLOWING HOSES FROM ISC VALV BODY:**
   (a) Two water by-pass hoses
   (b) Air hoses

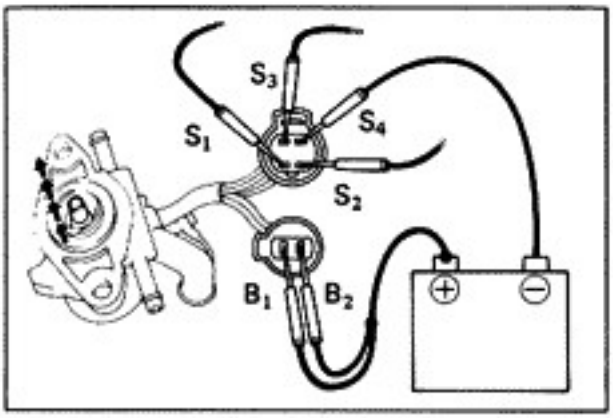


INSPECTION OF ISC VALVE

1. CHECK RESISTANCE OF ISC VALVE

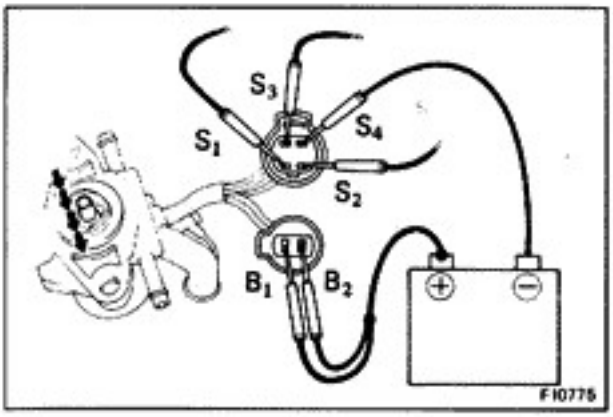
Using an ohmmeter, measure the resistance between terminals B_1 — S_1 or S_3 and B_2 — S_2 or S_4.

Resistance: **B_1 — S_1 or S_3 10 — 30 Ω**
B_2 — S_2 or S_4 10 — 30 Ω

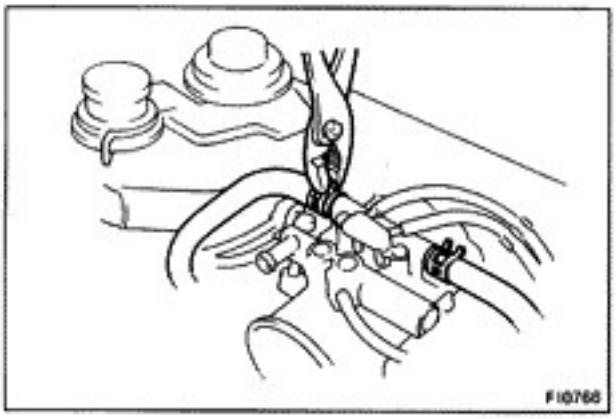


2. INSPECT OPERATION OF ISC VALVE

(a) Apply battery voltage to terminals B_1 and B_2 and while repeatedly grounding S_1 — S_2 — S_3 — S_4 — S_1 in sequence, check that the valve moves toward the closed position.



(b) Apply battery voltage to terminals B_1 and B_2 and while repeatedly grounding S_4 — S_3 — S_2 — S_1 — S_4 in sequence, check that the valve moves toward the open position.



INSTALLATION OF ISC VALVE

1. INSTALL ISC VALVE BODY AND TWO BOLTS

2. CONNECT FOLLOWING HOSES TO ISC VALVE BODY:

(a) Two air hoses

(b) Two water by-pass hoses

3. CONNECT TWO ISC VALVE CONNECTORS

4. FILL WITH COOLANT

INSPECTION OF IDLE SPEED

1. INITIAL CONDITIONS

(a) Air cleaner installed

(b) Normal engine operating temperature

(c) All pipes and hoses of air intake system connect

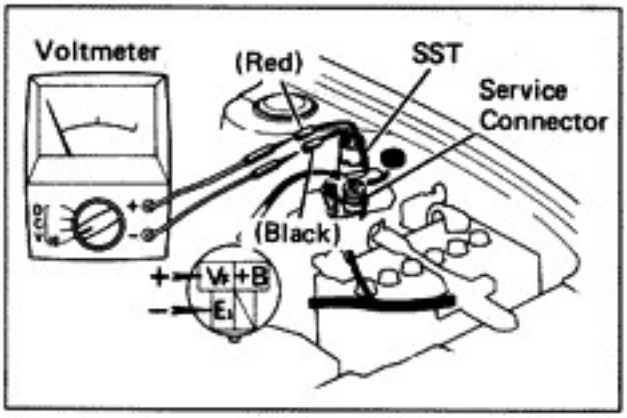
(d) All accessories switched off

(e) All vacuum lines properly connected (i.e., EGR sy tems, etc.)

(f) EFI system wiring connectors fully plugged

(g) Ignition timing set correctly

(h) Transmission in N range



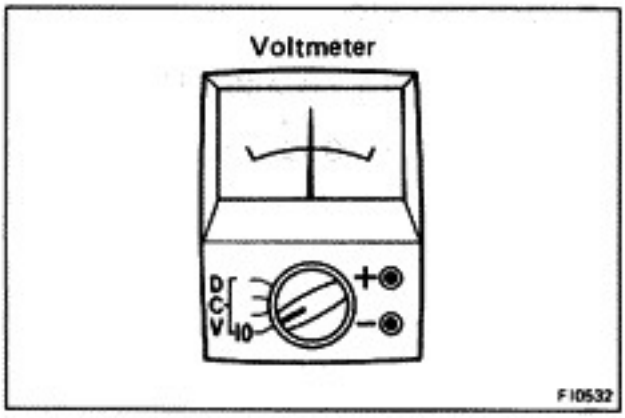
2. CHECK IDLE SPEED

(a) Remove the rubber cap from the 4-terminal servi connector (yellow) and connect an EFI idle adjusti wiring harness (SST) to it.

SST 09842-14010

(b) Connect positive testing probe to the red wire of t SST and negative testing probe to the black wire

(c) Warm up the Ox sensor with the engine at 2,500 rp for about 2 minutes.



(d) Maintain the engine speed at 2,500 rpm.

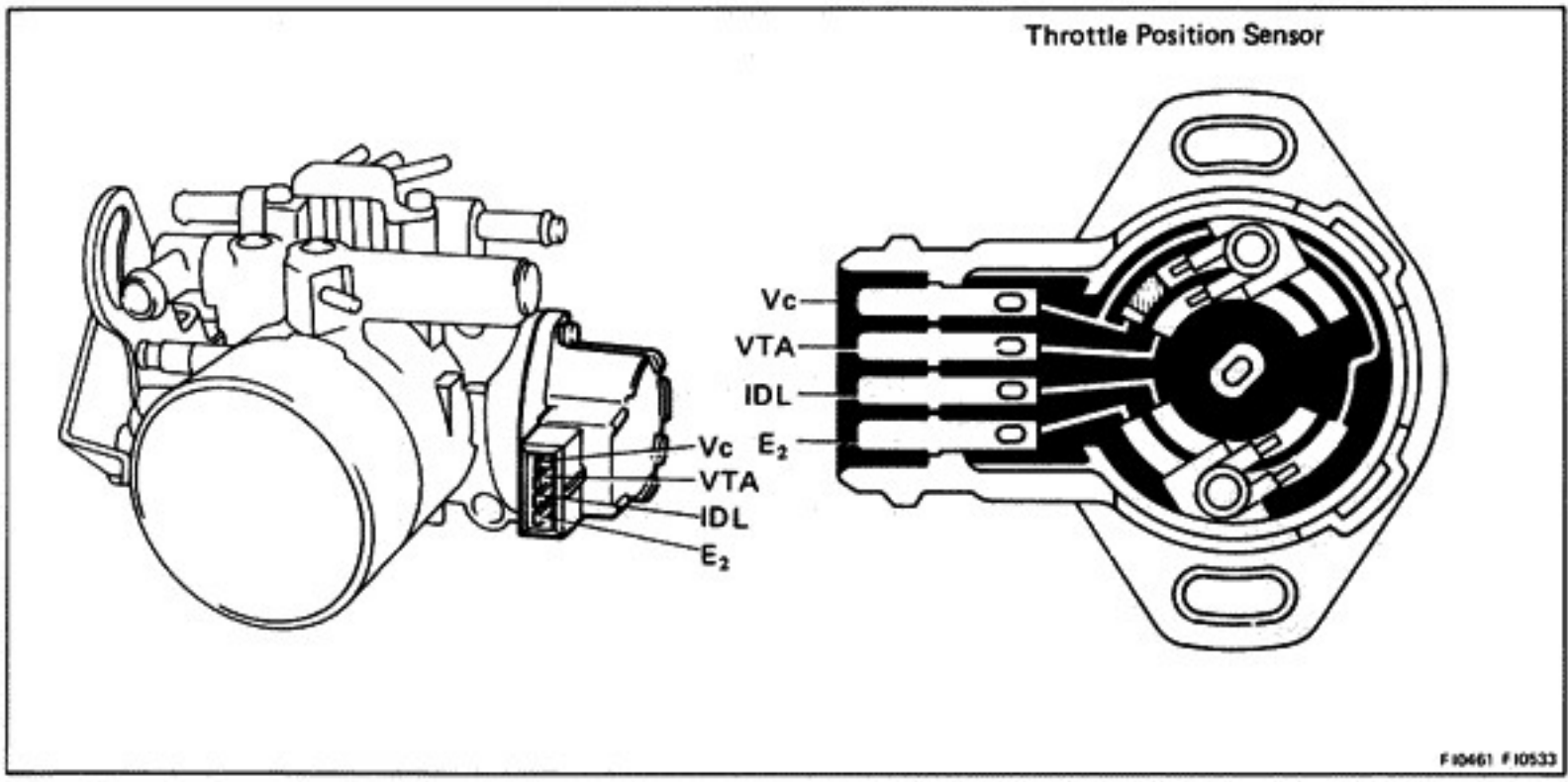
(e) Check that the needle of the voltmeter fluctuates times or more in 10 seconds.
If not, inspect the EFI system and replace the Ox gen sensor, if necessary.

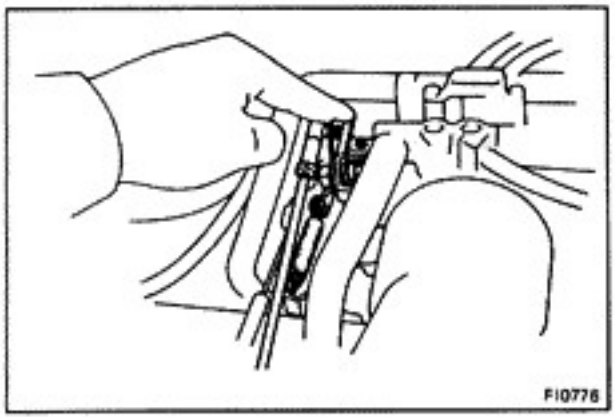
A/C S/W	N range	D range
OFF	650 rpm	600 rpm

(f) With the engine idling, check that the idle rpm standard.

(g) With the engine idling, check that the V_F voltage 2.5 ± 1.25 V. If not, check the intake system for lea age. If no leakage, investigate other areas.

Throttle Body

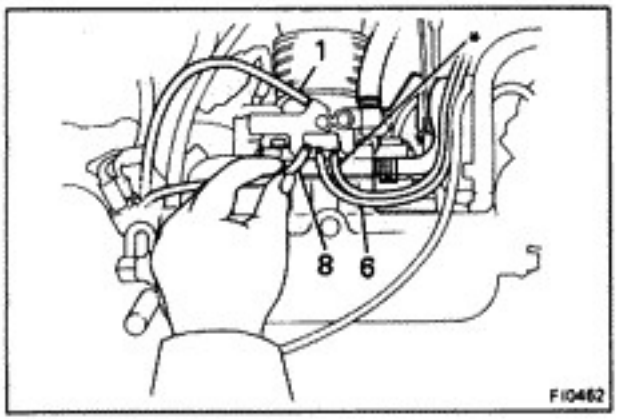




ON-VEHICLE CHECK

1. CHECK THROTTLE BODY

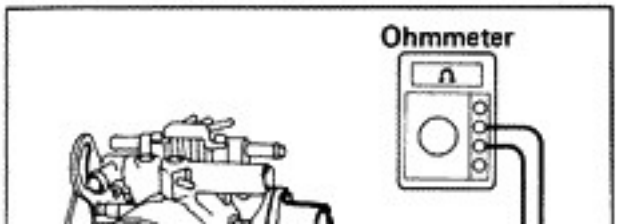
(a) Check that the throttle linkage moves smoothly.



(b) Check the vacuum at each port.

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

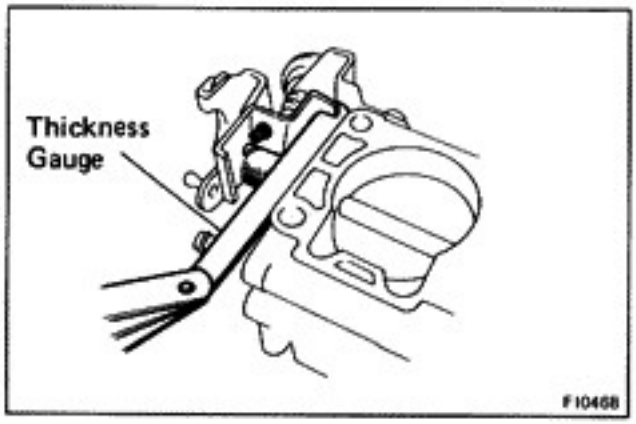
Part No.	At idling	Other than idling
8	No vacuum	Vacuum
*	No vacuum	Vacuum
1	No vacuum	No vacuum
6	No vacuum	Vacuum



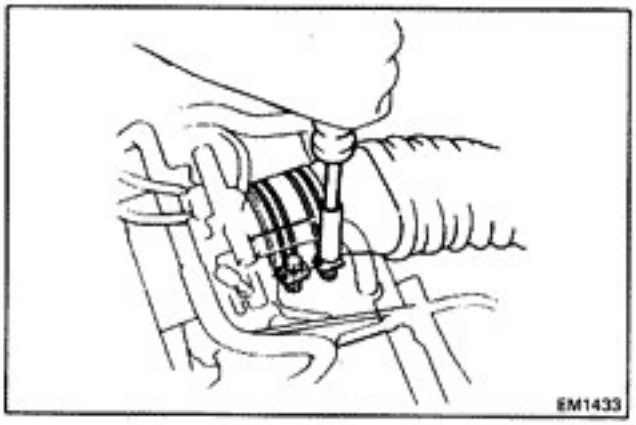
2. CHECK THROTTLE POSITION SENSOR

(a) Check the resistance between the terminals.

- Unplug the connector from the sensor.
- Insert a thickness gauge between the throttle stop screw and stop lever.

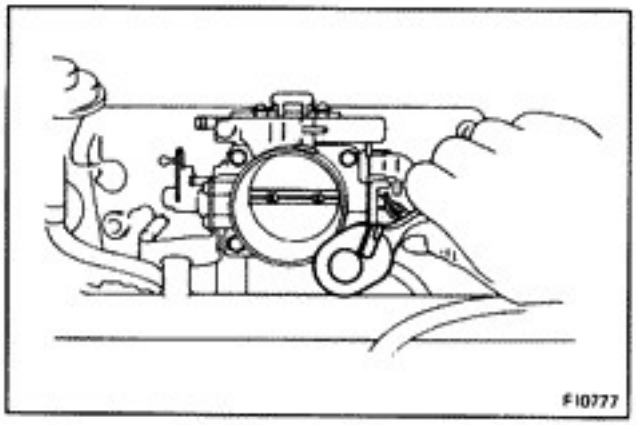


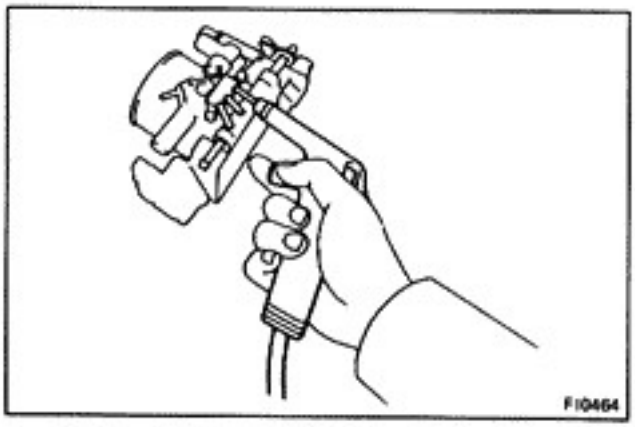
Clearance between lever and stop screw	Between terminals	Resistance
0 mm (0 in.)	VTA — E_2	0.2 — 0.8 kΩ
0.50 mm (0.0197 in.)	IDL — E_2	0 — 100 Ω
0.90 mm (0.0354 in.)	IDL — E_2	Infinity
Throttle valve fully opened position	VTA — E_2	3.3 — 10 kΩ
—	V_C — E_2	3 — 7 kΩ



REMOVAL OF THROTTLE BODY

1. **REMOVE AIR INTAKE CONNECTOR**
2. **DRAIN COOLANT FROM THROTTLE BODY**
3. **DISCONNECT FOLLOWING HOSES:**
   (a) No. 1 and No. 2 water by-pass hoses
   (b) PCV hose from the throttle body
   (c) Label and disconnect emission control hoses
4. **DISCONNECT THROTTLE SENSOR CONNECTOR**
5. **REMOVE THROTTLE BODY**
   Remove the four bolts and remove the throttle body gasket.

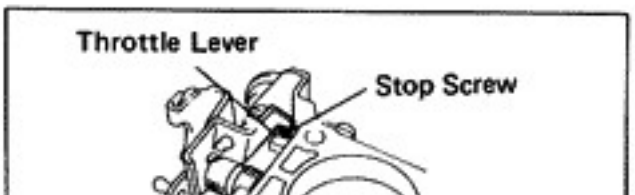




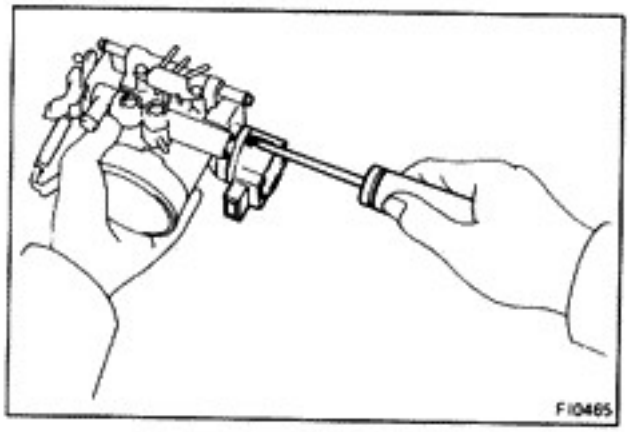
INSPECTION OF THROTTLE BODY

1. **CLEAN THROTTLE BODY BEFORE INSPECTION**
   (a) Wash and clean the cast parts with a soft brus carburetor cleaner.
   (b) Using compressed air, blow all passages and apertu in the throttle body.

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

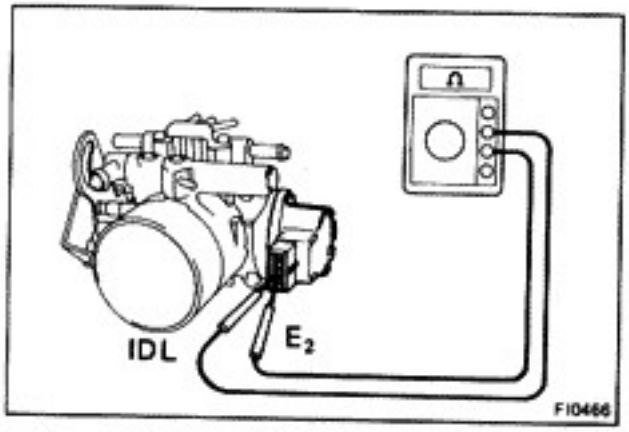


2. **CHECK THROTTLE VALVE**
   Check that there is no clearance between the throttle s screw and throttle lever when the throttle valve is f closed.



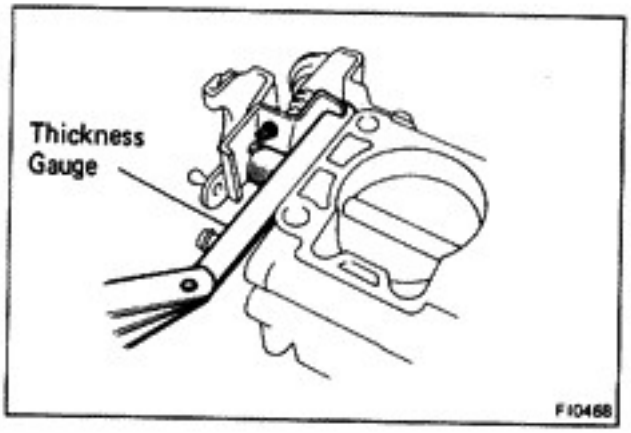
3. ADJUST THROTTLE POSITION SENSOR

(a) Loosen the two sensor screws.



(b) Connect the ohmmeter to the throttle position se
sor terminals IDL and E_2.

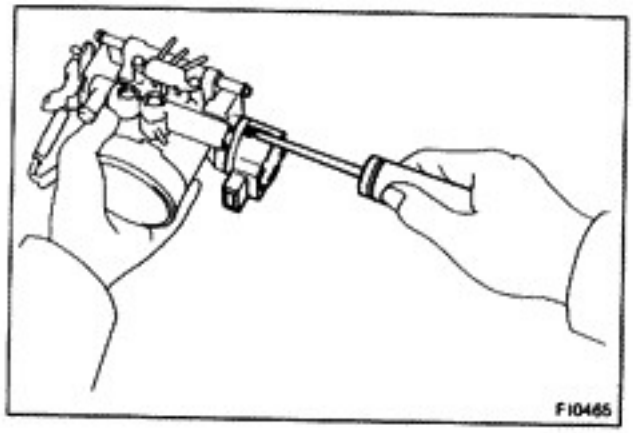
(c) Insert a thickness gauge (0.50 mm or 0.0197 in.) b
tween the throttle stop screw and lever.
Gradually turn the sensor clockwise until the oh
meter deflects, and secure the sensor with tw
screws.



(d) Using a thickness gauge, recheck the continuity b
tween terminals IDL and E_2.

Clearance between lever and stop screw	Continuity (IDL — E_2)
0.50 mm (0.0197 in.)	Continuity
0.90 mm (0.0354 in.)	No continuity

REPLACEMENT OF THROTTLE POSITION SENSO



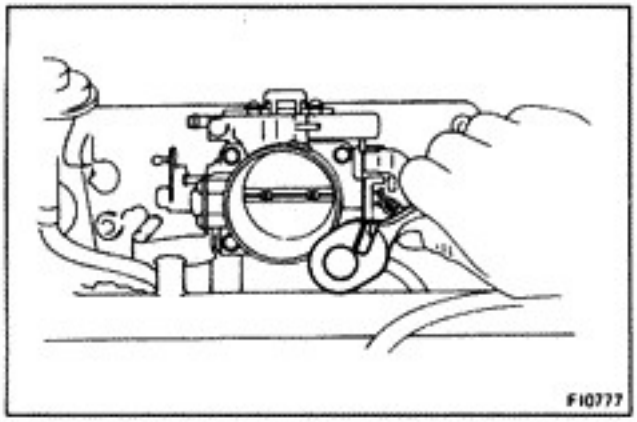
1. REMOVE THROTTLE POSITION SENSOR

Remove two screws and the sensor from the throttle bod

2. INSTALL THROTTLE POSITION SENSOR

(a) Check that the throttle valve is fully closed.

(b) Place the sensor on the throttle body as shown in th
figure.

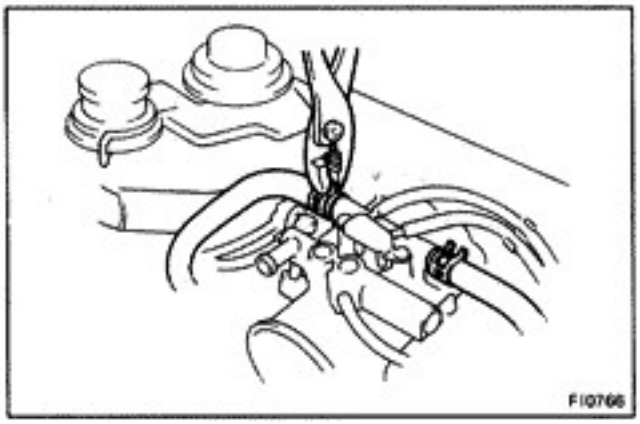


INSTALLATION OF THROTTLE BODY

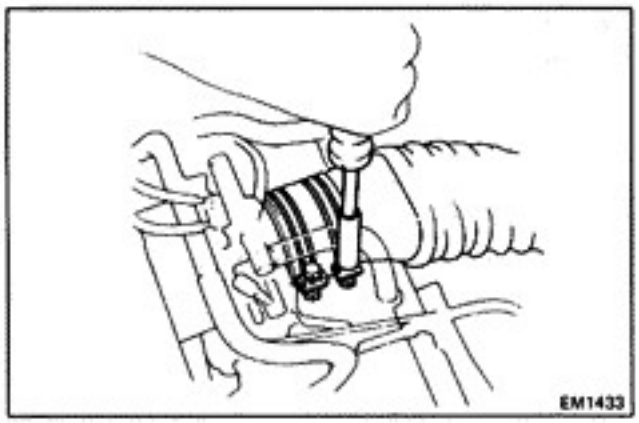
1. **INSTALL THROTTLE BODY**

   Place a new gasket and install the throttle body and
   bolts.

2. **CONNECT THROTTLE SENSOR CONNECTOR**



3. **CONNECT FOLLOWING HOSES:**
   (a) Emission control hoses
   (b) PCV hose to throttle body
   (c) No. 1 and No. 2 water by-pass hoses

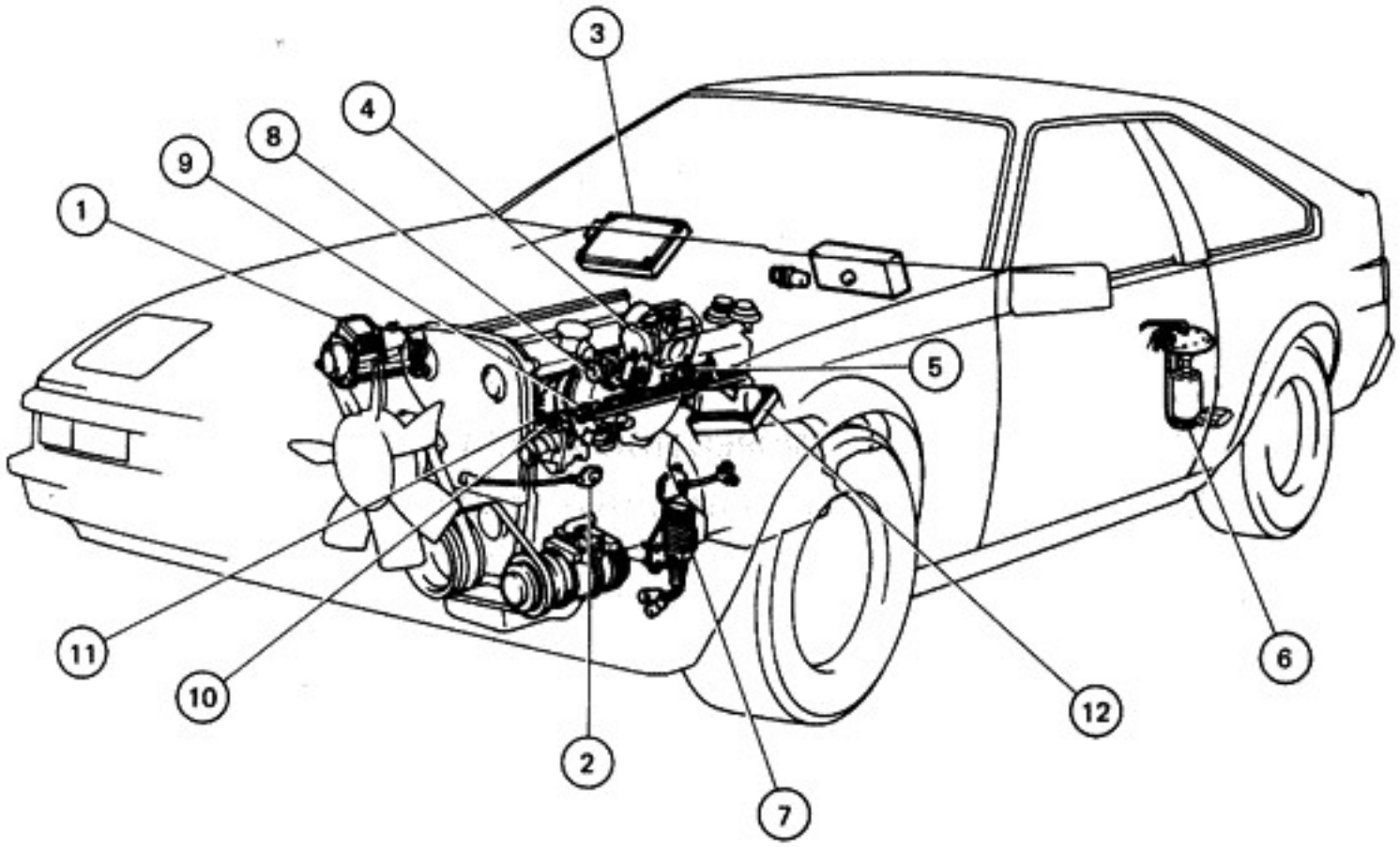


4. **INSTALL AIR INTAKE CONNECTOR**

5. **FILL WITH COOLANT**

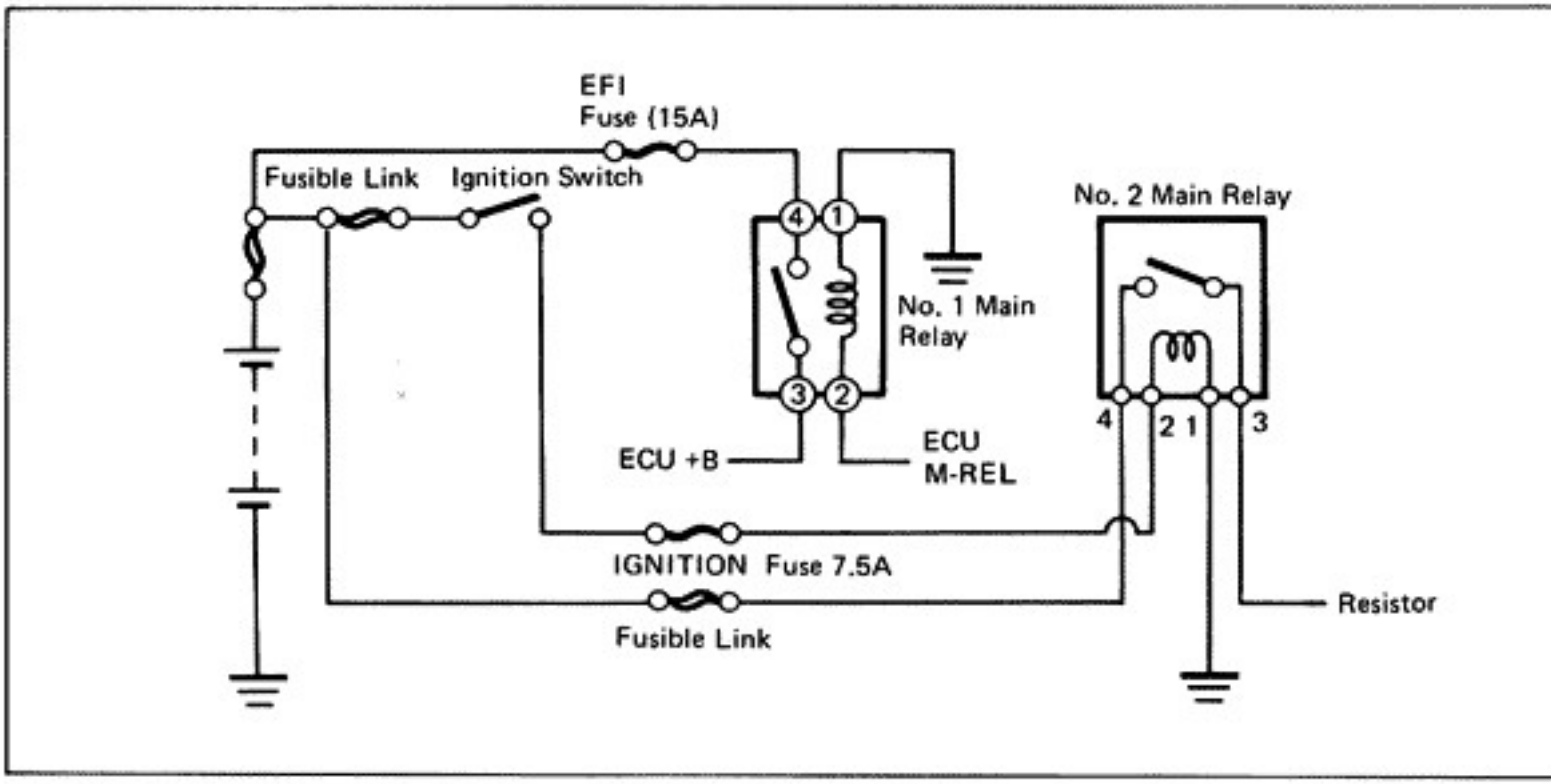
ELECTRONIC CONTROL SYSTEM

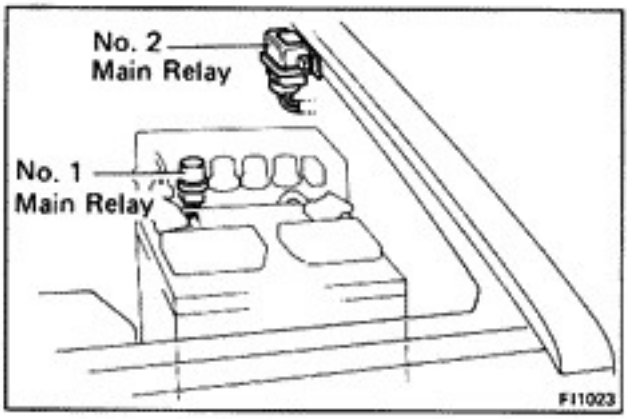
Location of Electronic Control Parts

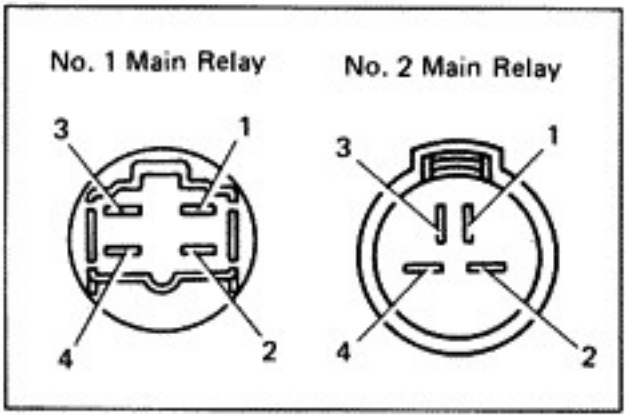


1. Air Flow Meter
2. Oxygen Sensor
3. ECU
4. Throttle Position Sensor
5. Cold Start Injector
6. Fuel Pump
7. Resistor
8. ISC Valve
9. Injector
10. Water Temp. Sensor
11. Cold Start Injector Time Switch
12. Igniter w/Ignition Coil

Main Relay







INSPECTION OF MAIN RELAYS

1. CHECK MAIN RELAYS OPERATION

(a) Turn on the ignition switch.

(b) At this time an operation noise will occur from relay.

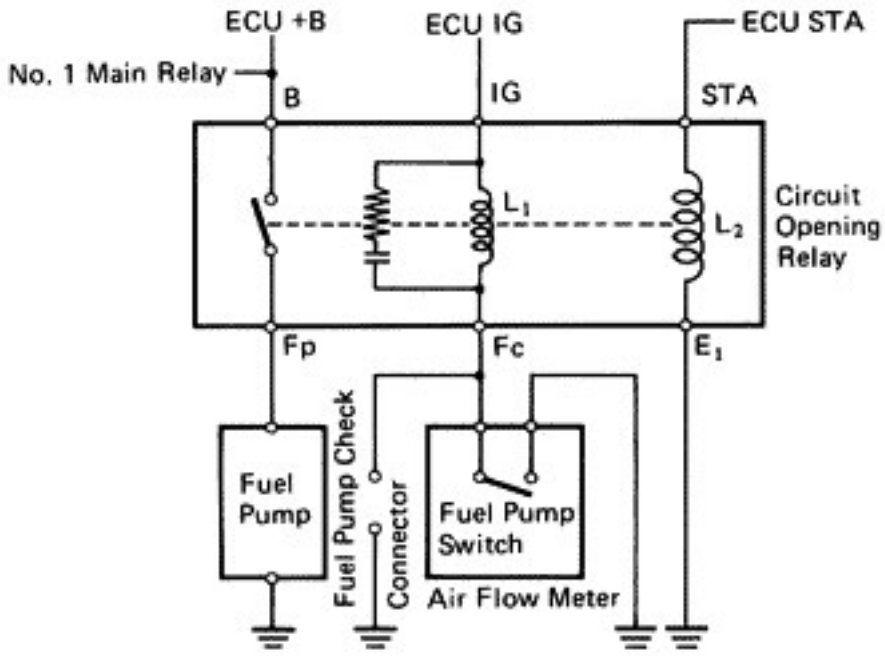
2. MEASURE RESISTANCE OF MAIN RELAYS

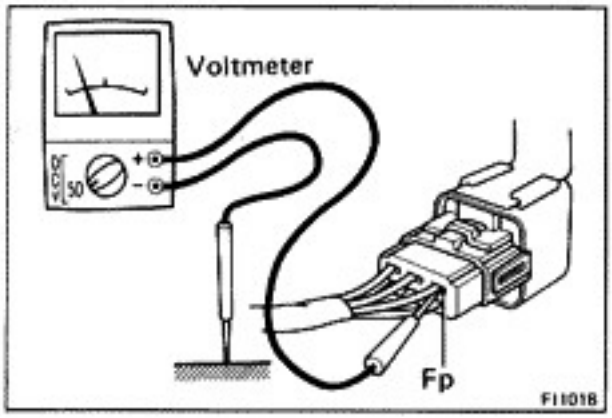
(a) Remove the No. 1 main relay from the relay blo
Unplug the connector from the No. 2 main rela

(b) Measure the resistance between each terminal.

	Between terminals	Resistance Ω
No. 1 Main Relay	1 — 2	40 — 60
	3 — 4	Infinity
No. 2 Main Relay	1 — 2	60 — 120
	3 — 4	Infinity

Circuit Opening Relay





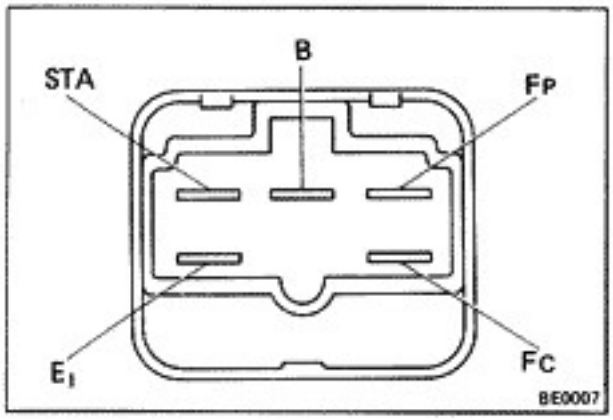
INSPECTION OF CIRCUIT OPENING RELAY

1. CHECK CIRCUIT OPENING RELAY OPERATION

(a) Remove the left kick panel.

(b) Using a voltmeter, check that the meter indicates voltage at F_P terminal during engine cranking and running.

(c) Stop the engine.



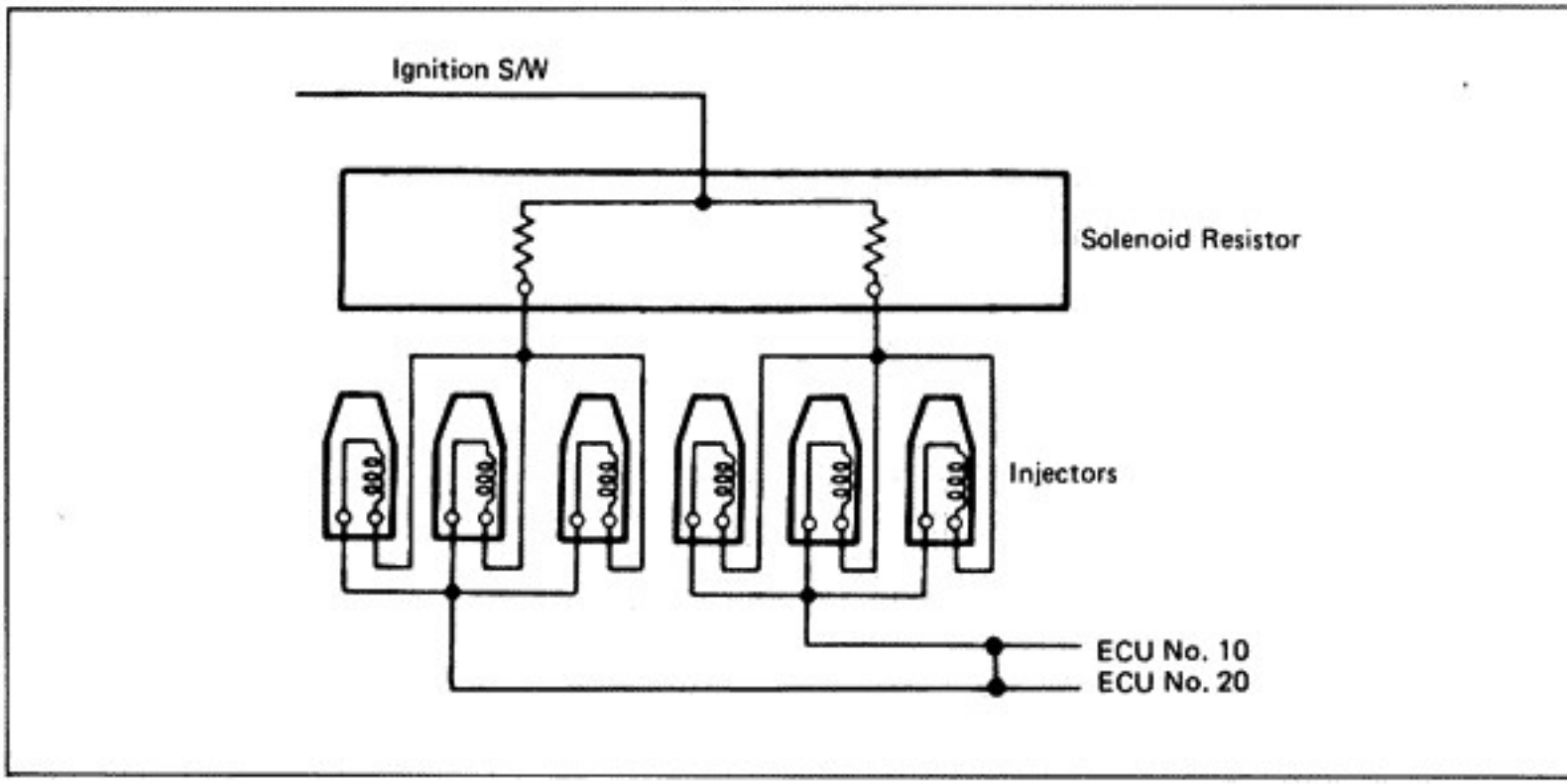
2. MEASURE RESISTANCE OF CIRCUIT OPENING RELAY

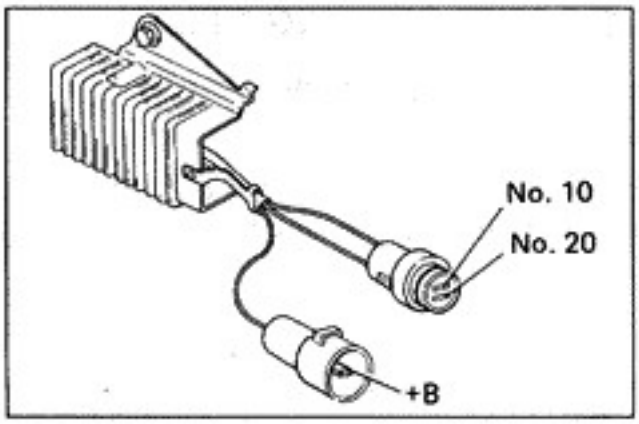
(a) Disconnect the connector.

(b) Measure the resistance between each terminal.

Between terminals	Resistance (Ω)
STA — E_1	17 — 25
IG — F_C	88 — 132
+B — F_P	Infinity

Solenoid Resistor





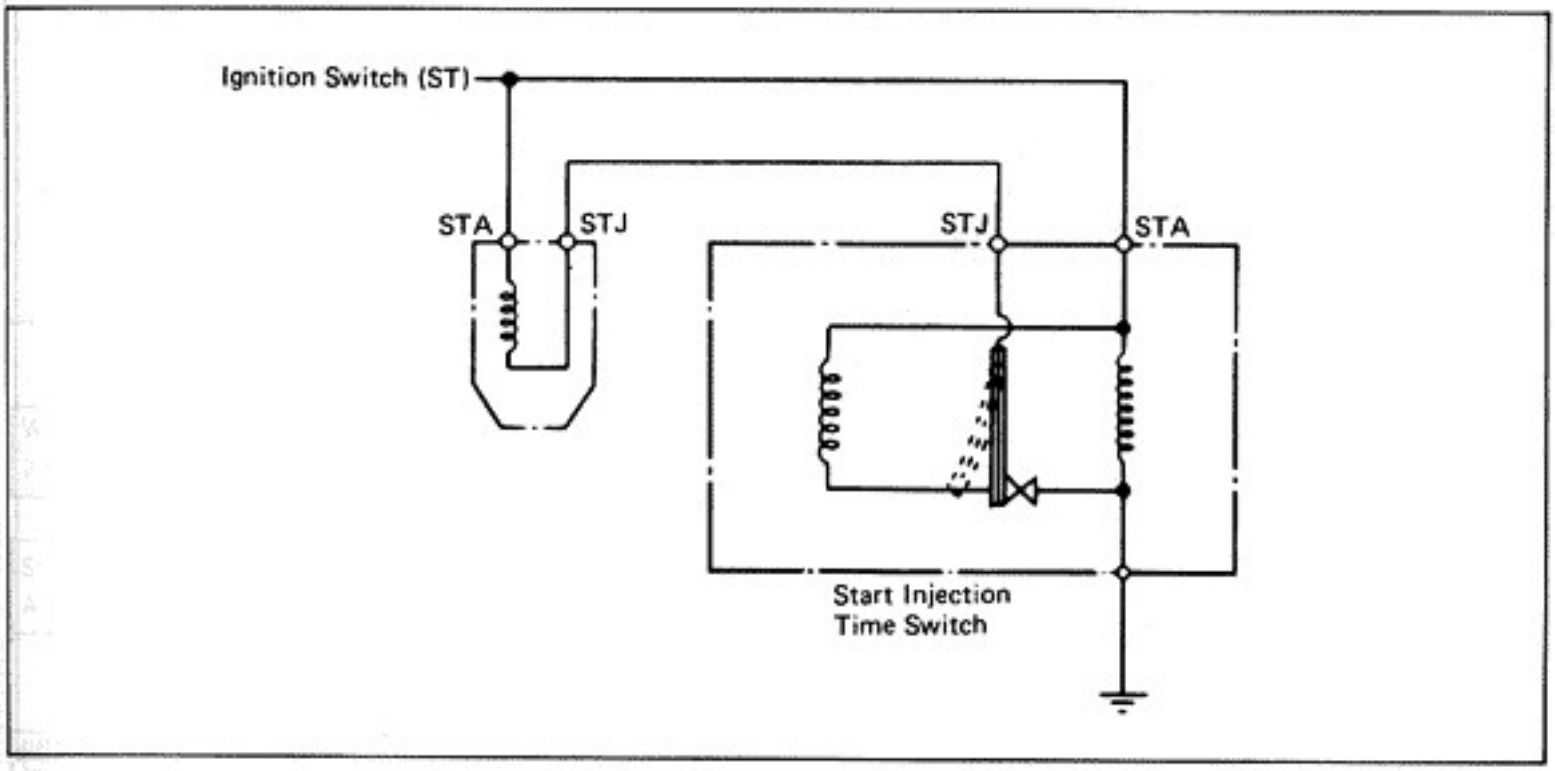
INSPECTION OF SOLENOID RESISTOR

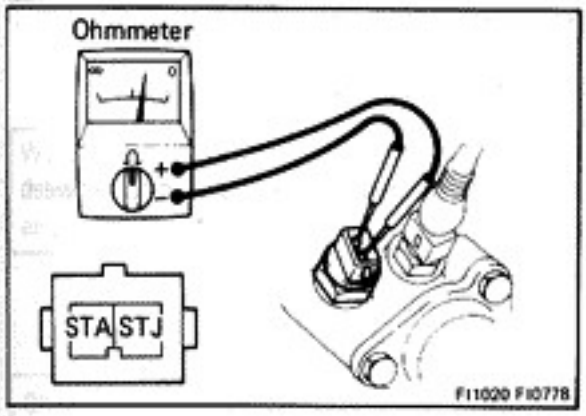
MEASURE RESISTANCE OF SOLENOID RESISTOR

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

Resistance: 2 Ω each

Start Injector Time Switch





INSPECTION OF START INJECTOR TIME SWITCH

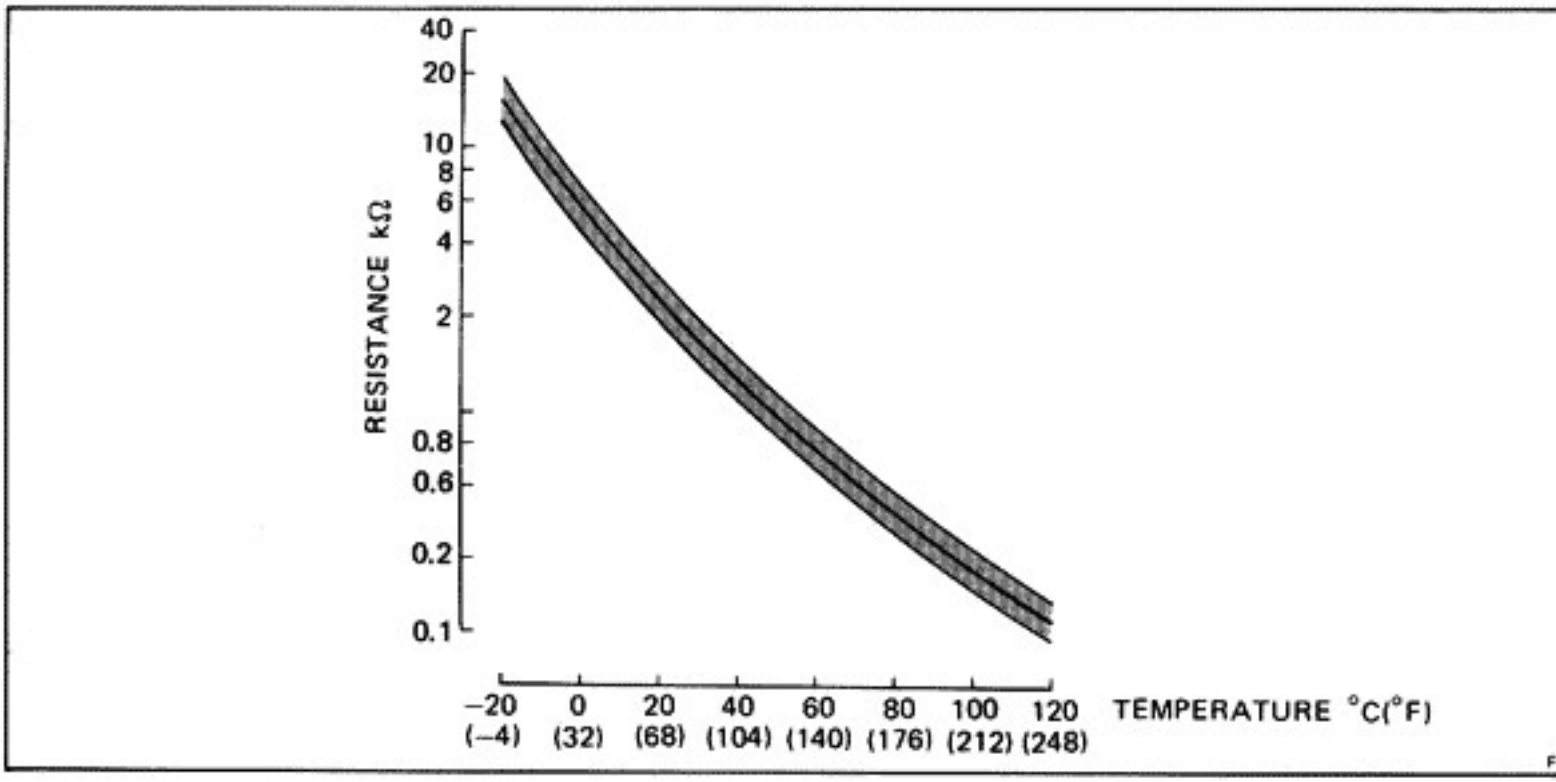
MEASURE RESISTANCE OF START INJECTOR TIME SWITCH

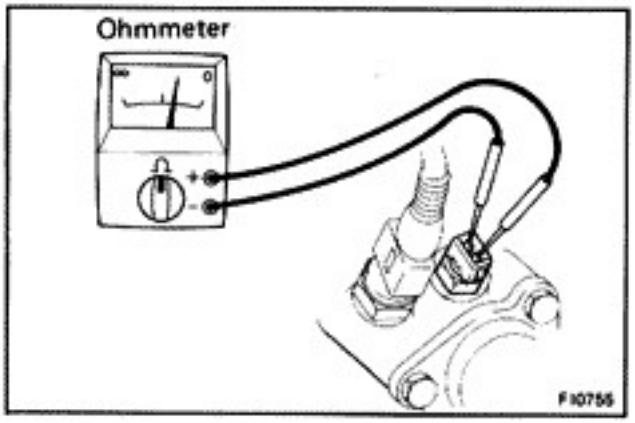
(a) Disconnect the connector.

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

Between terminals	Resistance (Ω)	Coolant temperature
STA – STJ	24 – 40	below 30°C (86°F)
	40 – 60	above 40°C (104°F)
STA – Ground	20 – 80	–

Water Temp. Sensor





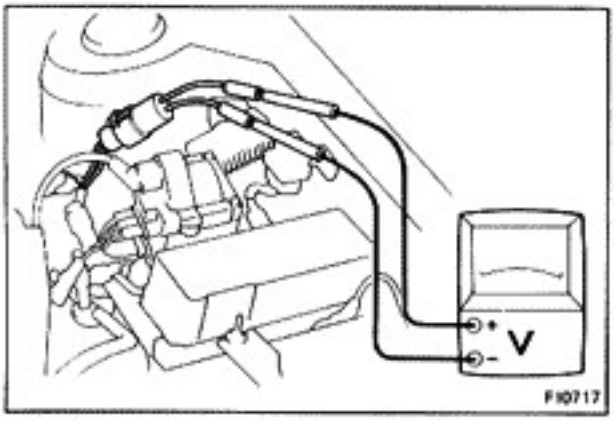
INSPECTION OF WATER TEMP. SENSOR

MEASURE RESISTANCE OF WATER TEMP. SENSOR

(a) Disconnect the connector.

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

Resistance: Refer to chart.



Oxygen Sensor

INSPECTION OF FEEDBACK VOLTAGE (V_F)

1. Warm up the engine.
2. Connect SST to the engine service connector.
   SST 09842-14010
3. Connect the voltmeter to the SST.
4. Warm up the Oxygen sensor with the engine at 2,500 rpm for about 2 minutes.

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

Short terminals T and E_1 of the service connector. And maintain engine speed at 2,500 rpm.

Replace the ECU

After replacing the oxygen sensor

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

Less than 8 times

8 times or more

Zero

Normal

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

Zero

Less than 8 times

Unshort terminals T and E_1 of the service connector. And maintain engine speed at 2,500 rpm.

Measure voltage between terminals V_F and E_1.

0V

More than 0V

Read and record diagnostic codes

Normal code and code 21

Malfunction code(s) (ex. code 21)

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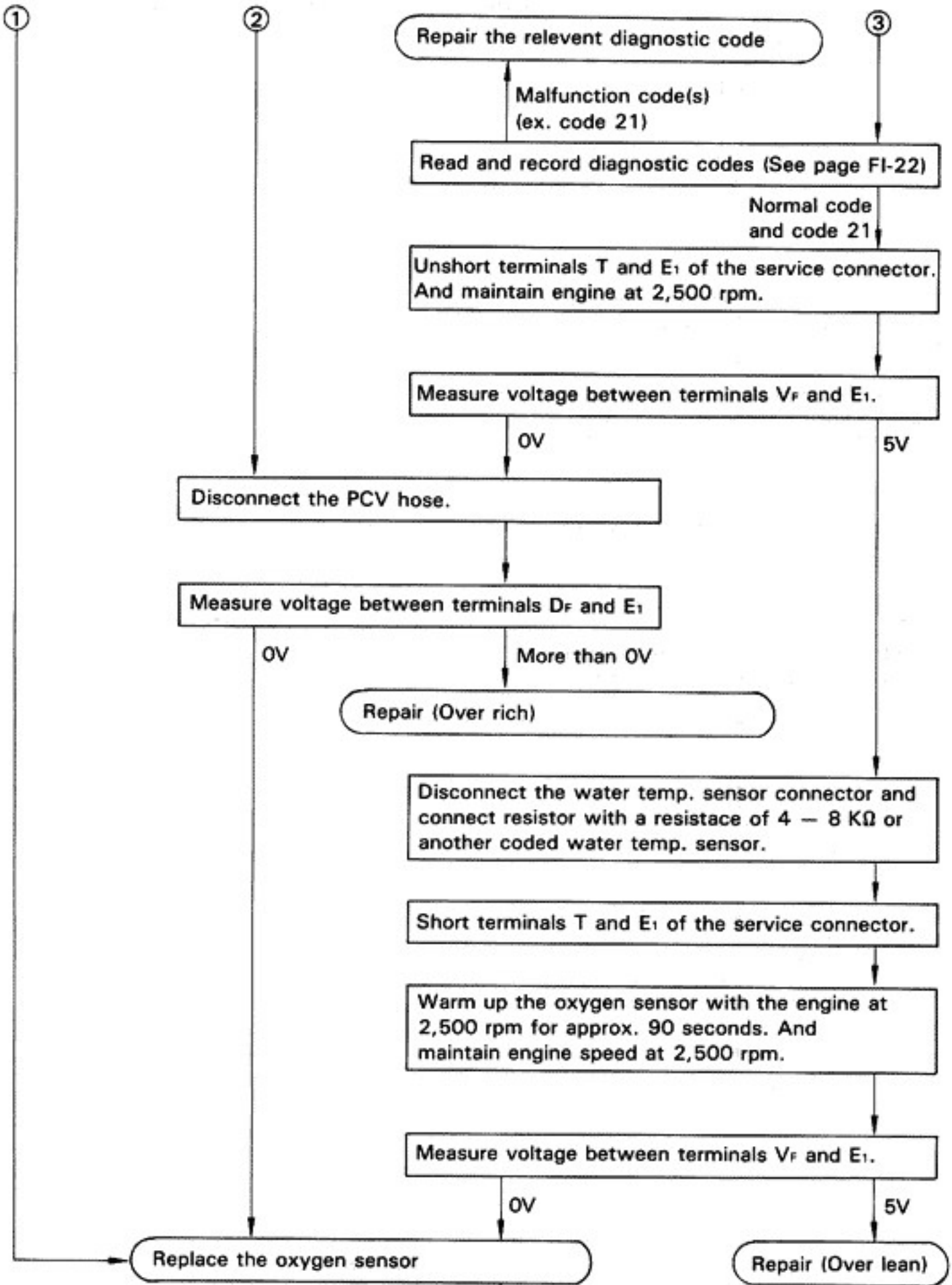


Electronic Controlled Unit (ECU)

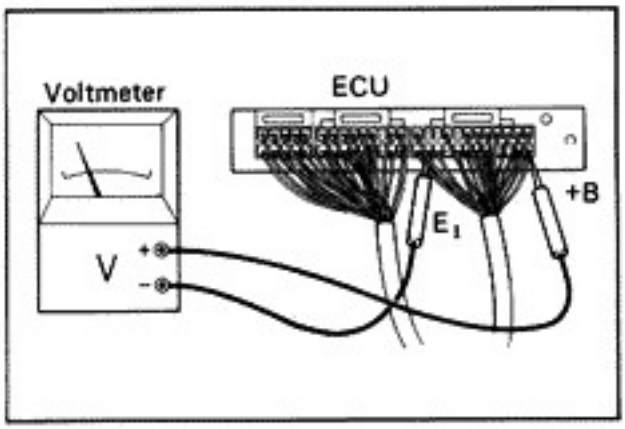
INSPECTION OF ECU

1. MEASURE VOLTAGE OF ECU

NOTE: The EFI circuit can be checked by measuring the resistance and voltage at the wiring connectors of the ECU.

Check the voltages at the wiring connectors.

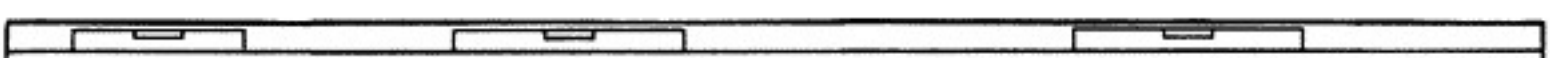
- Remove the glove box.
- Turn on the ignition switch.
- Measure the voltage at each terminal.



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

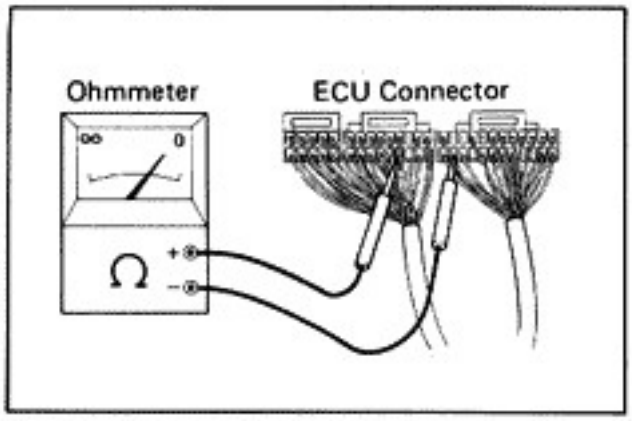
Connectors of ECU

Symbol	Terminal Name	Symbol	Terminal Name	Symbol	Terminal Name
E_{01}	ENGINE GROUND	G⊖	ENGINE REVOLUTION SENSOR	A/C	A/C MAGNET SWITCH
E_{02}	ENGINE GROUND	V_F	CHECK CONNECTOR	SPD	SPEEDOMETER
No. 10	INJECTOR	G	ENGINE REVOLUTION SENSOR	W	WARNING LIGHT
No. 20	INJECTOR	T	CHECK CONNECTOR	THA	AIR TEMP. SENSOR
STA	STARTER SWITCH	VTA	THROTTLE SWITCH	V_S	AIR FLOW METER
IGt	IGNITER	Ne	ENGINE REVOLUTION SENSOR	V_C	AIR FLOW METER
EGR	EGR VSV	IDL	THROTTLE SWITCH	BAT	BATTERY +B
E_1	ENGINE GROUND	KNK	KNOCK SENSOR	IG S/W	IGNITION SWITCH
N/C	NEUTRAL START SWITCH (A/T)	IGf	IGNITER	+B	MAIN RELAY
	CLUTCH SWITCH (M/T)	Ox	OXYGEN SENSOR	TCD	ECT COMPUTER
ISC_1	ISC MOTOR NO. 1 COIL	THW	WATER TEMP. SENSOR	OIL	OIL PRESSURE SWITCH
ISC_2	ISC MOTOR NO. 2 COIL	E_2	SENSOR EARTH	L_1	ECT COMPUTER
ISC_3	ISC MOTOR NO. 3 COIL	E_1	ENGINE GROUND	L_2	ECT COMPUTER
ISC_4	ISC MOTOR NO. 4 COIL	M-REL	MAIN RELAY COIL	L_3	ECT COMPUTER



Terminals	STD Voltage	Condition	
BAT — E_1	10 — 14	—	
+B — E_1		IG S/W ON	—
IG S/W — E_1			
M-REL — E_1			
IDL — E_2	4 — 6	IG S/W ON	Throttle valve open
VTA — E_2	0.1 — 1.0		Throttle valve fully closed
	4 — 5		Throttle valve fully opened
V_C — E_2	4 — 6		—
V_S — E_2	4 — 5		Measuring plate fully closed
	0.02 — 0.08		Measuring plate fully open
	2 — 4	Idling	
	0.3 — 1.0	3,000 rpm	
THA — E_2	1 — 2	IG S/W ON	Intake air temperature 20°C (68°F)
THW — E_1	0.1 — 0.5		Coolant temperature 80°C (176°F)
STA — E_1	6 — 12	IG S/W ST position	
No. 10 / No. 20 — E_1	9 — 14	IG S/W ON	—
IGt — E_1	0.7 — 1.0	Cranking or Idling	
ISC_1 ∫ ISC_4 — E_1	9 — 14	IG S/W ON	—
	9 — 14	2 — 3 secs, after engine off	
+B — EGR	10 — 13	IG S/W ON	—
	0	Start engine and warm up oxygen sensor	
N/C — E_1	0	IG S/W ON	Shift position P or N range (for A/T)
	10 — 14		Ex. P or N range (for A/T)
	0		Clutch pedal not depressed (for M/T)

OIL — E_1	4 — 6	IG S/W ON (Warning light on)	
	0	Start engine (Warning light out)	
A/C — E_1	10 — 13	IG S/W ON	A/C S/W ON
	0		A/C S/W OFF
V_F — E_1	0 — 5	Start engine (Throttle valve open)	
W — E_1	0	IG S/W ON	—
	10 — 13	Start engine	
TCD — E_1	2 — 3	IG S/W ON	Coolant temperature Less than 35°C (95°F)
	0		Coolant temperature 35 — 60°C (95 — 140°F)
	4 — 6		Coolant temperature More than 60°C (140°F)



2. MEASURE RESISTANCE OF ECU

CAUTION:

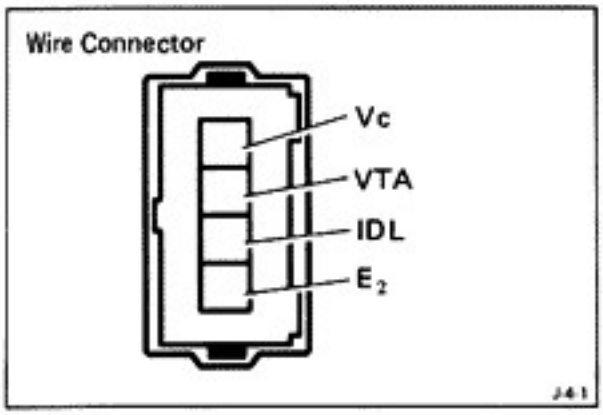
1. **Do not touch the ECU terminals.**
2. **The tester probe should be inserted into wiring connector from wiring side.**

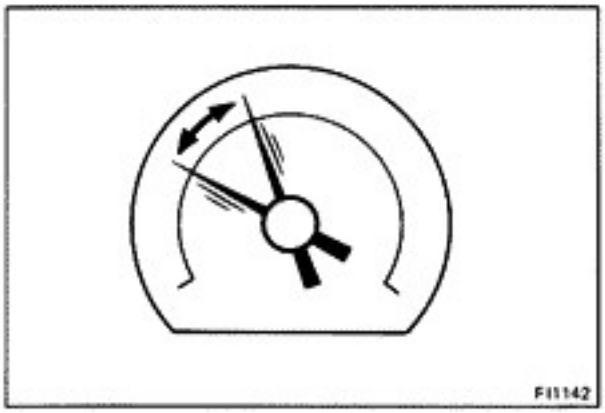
Check the resistance between each terminal of the w ing connector.

- Remove the glove box.
- Unplug the wiring connectors from the ECU.
- Measure the resistance between each terminal of the w ing connectors.

Resistances at ECU Wiring Connectors

Terminals	Condition	Resistance (Ω)
IDL — E_2	Throttle valve open	∞
	Throttle valve fully closed	0
VTA — E_2	Throttle valve fully opened	3,300 — 10,000
	Throttle valve fully closed	200 — 800
V_C — E_2	Disconnect air flow meter connector	3,000 — 7,000
	Disconnect throttle position sensor connector	200 — 400
V_S — E_2	Measuring plate fully closed	20 — 400
	Measuring plate fully open	20 — 1000
THA — E_2	Intake air temperature 20°C (68°F)	2,000 — 3,000
G — G⊖	—	140 — 180
Ne — G⊖	—	
ISC_1, ISC_2 ISC_3, ISC_4 — +B	—	10 — 30





Fuel Cut RPM

INSPECTION OF FUEL CUT RPM

(a) Start and warm up the engine.

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

(c) Short circuit terminals E_2 and IDL on wire connector side.

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

NOTE: The vehicle should be stopped.

Fuel Cut rpm	Fuel Return rpm
1,800 rpm	1,200 rpm