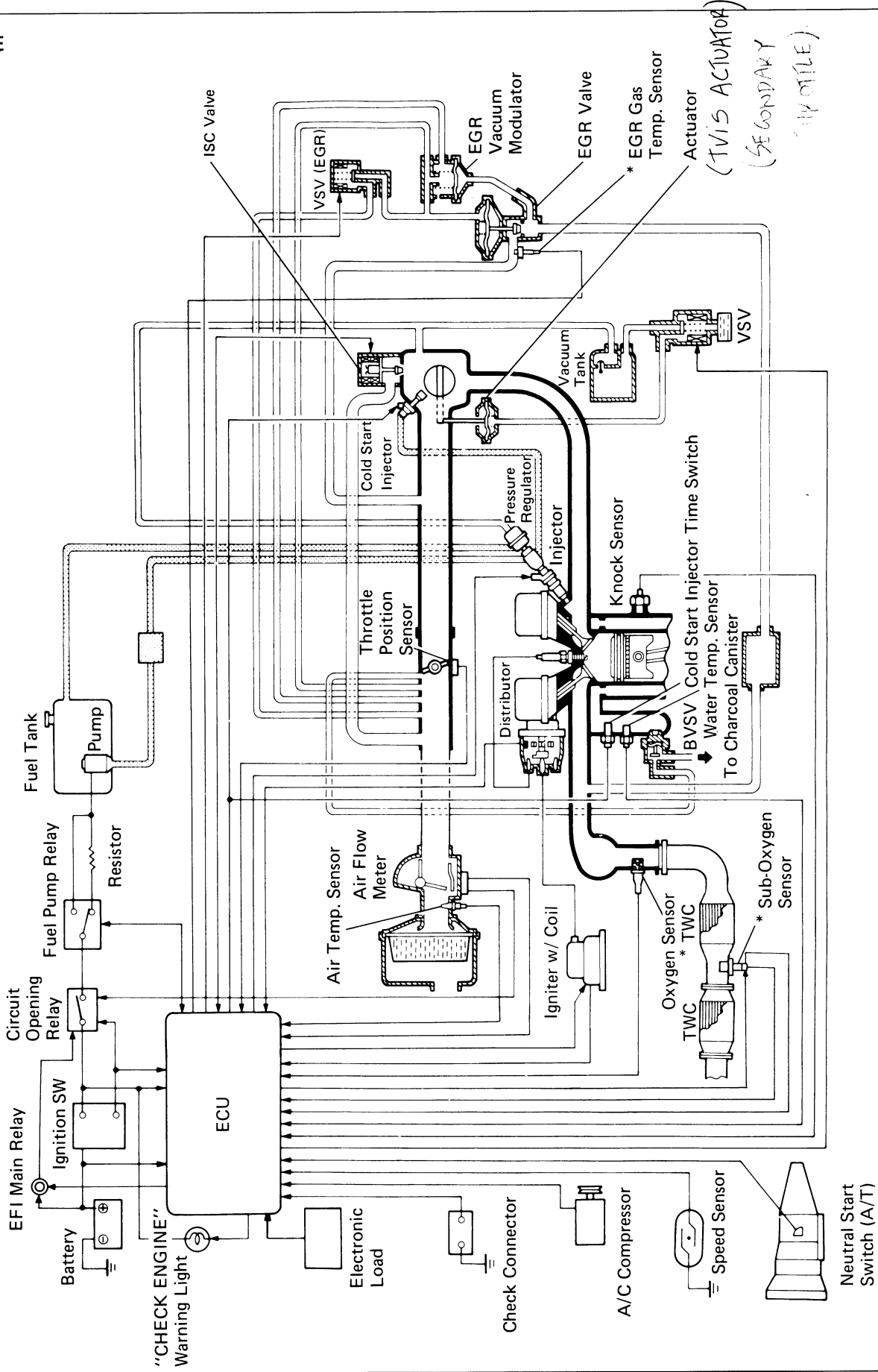


# EFI SYSTEM

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# SYSTEM DESCRIPTION

7M-GE



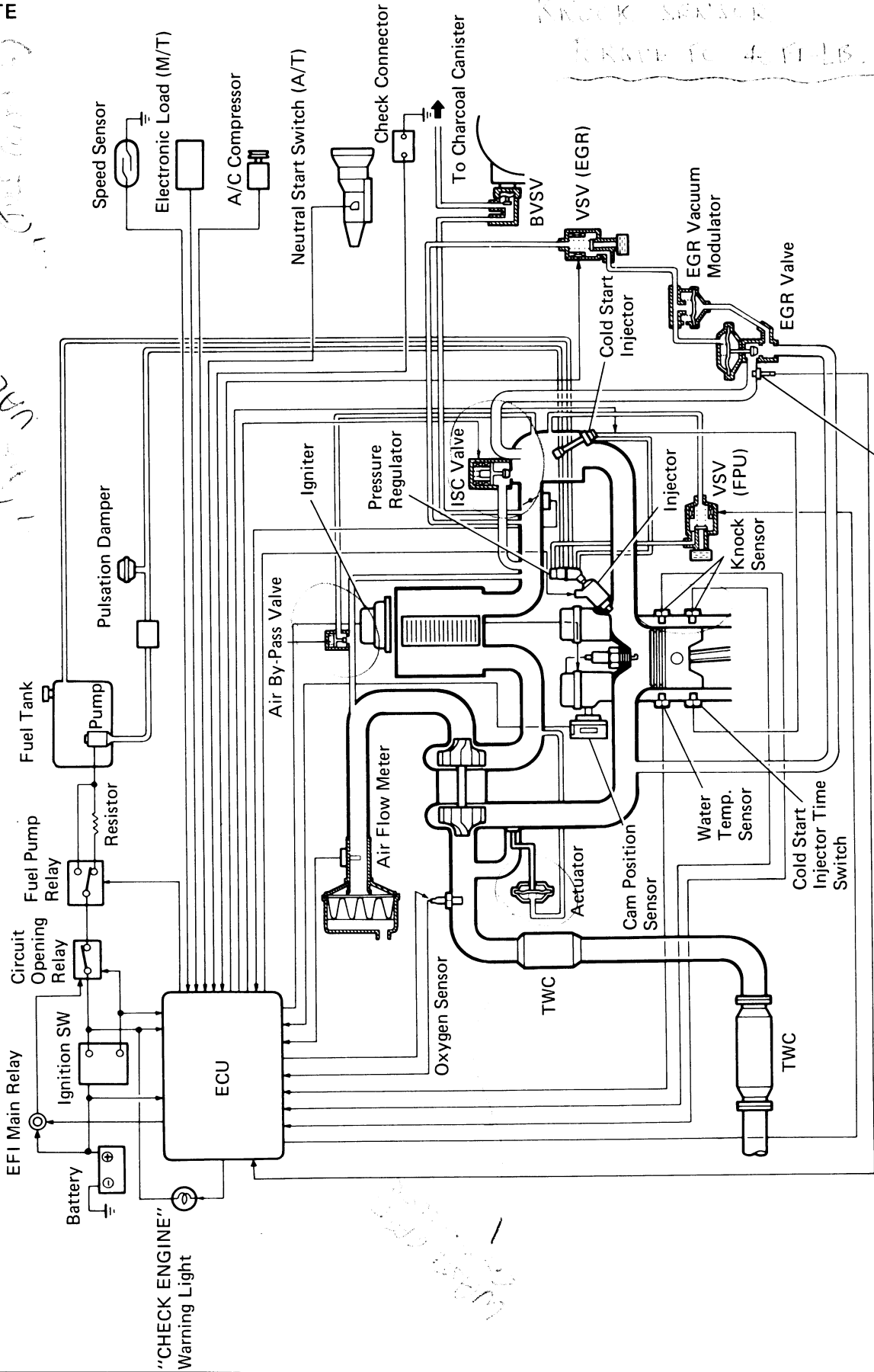
\* California vehicles only

# SYSTEM DESCRIPTION (Cont'd)

7M-GTE

*VALVE  
VALVE  
VALVE*

*KNOCK SENSOR  
KNIFE TO 4 FT LB.*



"CHECK ENGINE"  
Warning Light

EGR Gas Temp. Sensor  
(California vehicles only)

The EFI system is composed of 3 basic sub systems; Fuel, Air Induction and Electronic Control Systems.

## FUEL SYSTEM

An electric fuel pump supplies sufficient fuel, under a constant pressure, to the injectors. These injectors inject a measured quantity of fuel into the intake parts in accordance with signals from the ECU (Electronic Control Unit).

## AIR INDUCTION SYSTEM

The air induction system provides sufficient air for engine operation.

## ELECTRONIC CONTROL SYSTEM

The 7M-GE and 7M-GTE engines are equipped with a Toyota Computer Control System (TCCS) which centrally controls the EFI, ESA, Diagnosis systems, etc. by means of an Electronic Control Unit (ECU — formerly EFI computer) employing a microcomputer.

By 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:

- Exhaust oxygen content
- Intake air volume
- Intake air temperature
- Coolant temperature
- Engine rpm
- Acceleration/deceleration 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, A/C signal, 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 control the flow of air through the by-pass of the throttle valve and adjust idle speed to the target value.

(See pages FI-44, 65, 106)

### 4. Diagnosis

The ECU detects any malfunctions or abnormalities in the sensor network and lights the "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.

(See page FI-26)

### 5. Fail-Safe Function

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



## PRECAUTIONS

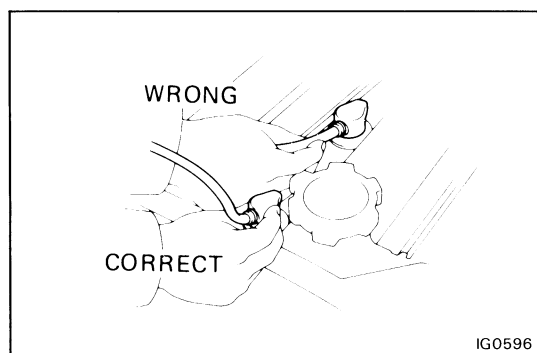
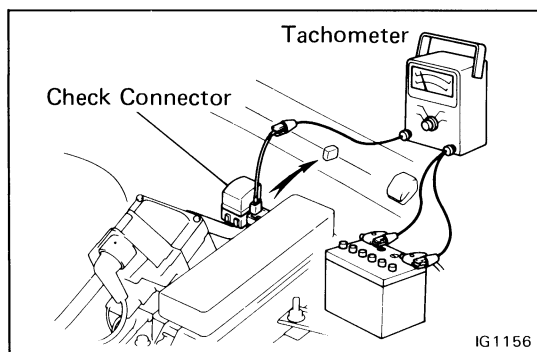
1. Before working on the fuel system, disconnect the negative terminal from the battery.

HINT: Any diagnostic code retained by the computer will be erased when the battery terminal is removed.

Therefore, if necessary, read the code before removing the battery terminal.

**CAUTION:** Work must be started after approx. 20 seconds or longer from the time the ignition switch is turned to the "LOCK" position and the negative (—) terminal cable is disconnected from the battery.

2. Do not smoke or work near an open flame when working on the fuel system.
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 test probe to the terminal IG ⊖ of check connector.
  - (b) Use the battery as the power source for the timing light, tachometer, etc.
3. IN EVENT OF ENGINE MISFIRE THE FOLLOWING PRECAUTIONS SHOULD BE TAKEN
  - (a) Insure proper connection of battery terminals, etc.
  - (b) Handle high-tension cords carefully.
  - (c) After repair work, insure that the ignition coil terminals and all other ignition system line are reconnected securely.
  - (d) When cleaning the engine compartment, be especially careful to protect the electrical system from water.
4. PRECAUTIONS WHEN HANDLING OXYGEN SENSOR(S)
  - (a) Do not allow oxygen sensor to drop or hit against an object.
  - (b) Do not allow water to come into contact with the sensor or attempt to cool it.

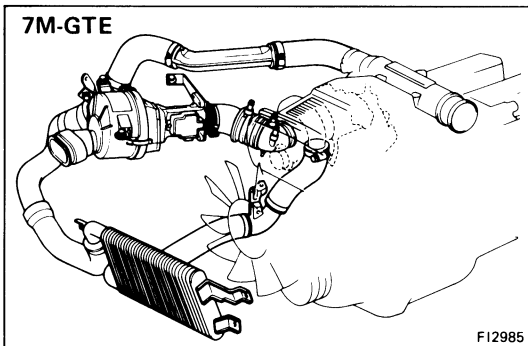
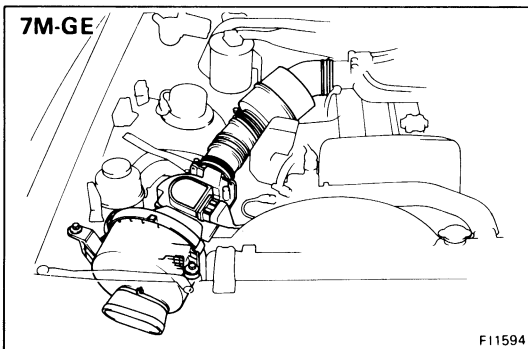
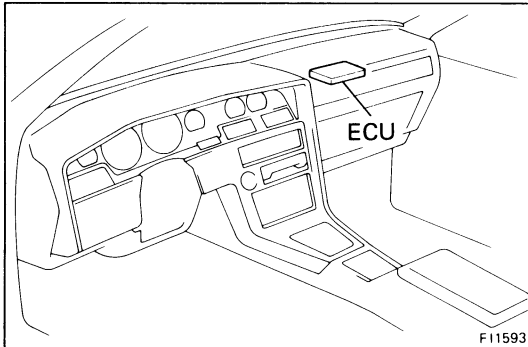
## IF VEHICLE IS EQUIPPED WITH MOBILE RADIO SYSTEM (HAM, CB, ETC)

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

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

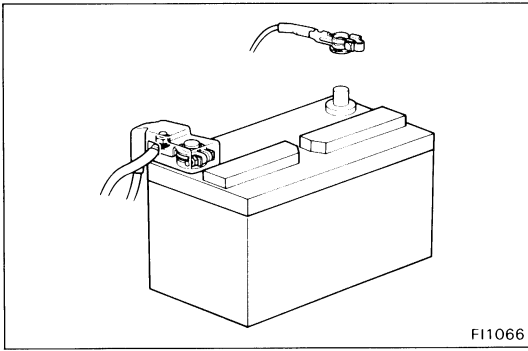
Therefore, observe the following precautions:

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



## AIR INDUCTION SYSTEM

1. Separation the engine dipstick, oil filler cap, PCV hose, etc., may cause the engine to run out of tune.
2. Disconnection, looseness or cracks in the parts of the air intake system between the air flow meter and cylinder head will allow air suction and cause the engine to run out of tune.

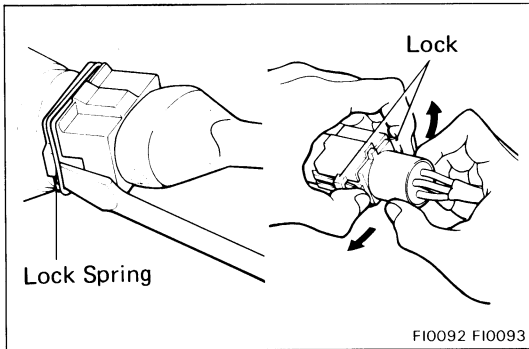


## ELECTRONIC CONTROL SYSTEM

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

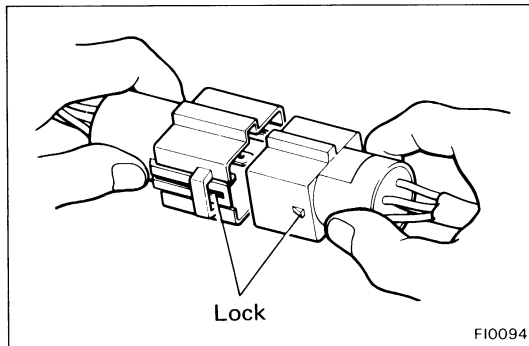
HINT: Always check the diagnosis code before disconnecting the battery terminal.

2. When installing the battery, be especially careful not to incorrectly connect the positive and negative cables.
3. Do not jolt parts during removal or installation. Handle all EFI parts carefully, especially the ECU.
4. Do not be careless during troubleshooting as there are numerous transistor circuits and contact with terminals can cause further trouble.
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 EFI parts and wiring connectors.
7. Parts should be replaced as an assembly.

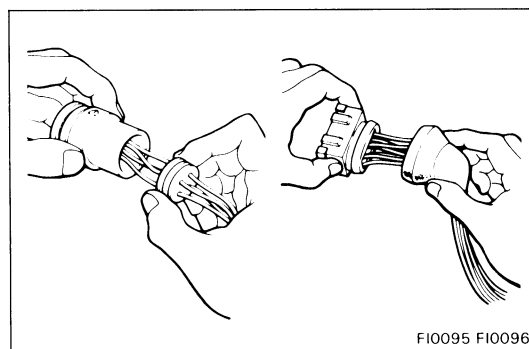


8. Care is required when pulling out the inserting wiring connectors.

(a) Release the lock and pull out the connector. Pull on the connectors, not the wiring.

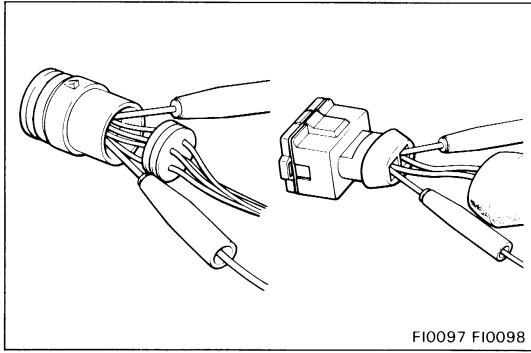


(b) Fully insert the connector and check that it is locked.

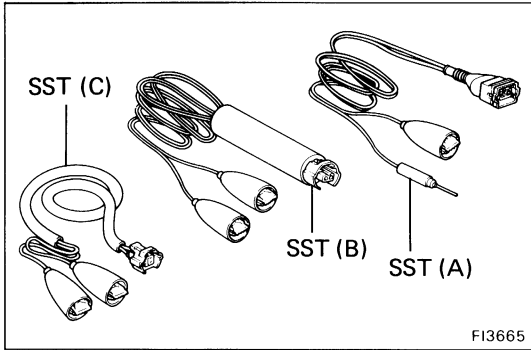


9. When inspecting a connector with a circuit tester.

(a) Carefully take out the water-proofing rubber if it is a water-proof type connector.

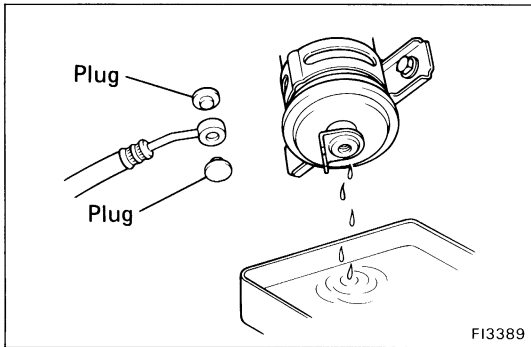


- (b) Insert the tester probe into the connector from the wiring side when checking continuity, amperage or voltage.
- (c) Do not apply unnecessary force to the terminal.
- (d) After checking, install the water-proofing rubber on the connector securely.



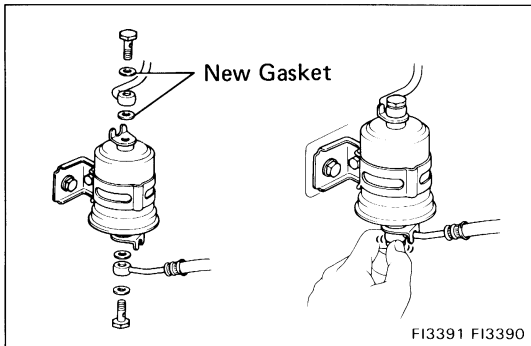
10. Use SST for inspection or testing of the injector, cold start injector or its wiring connector.

SST 7M-GE 09842-30050(A) and 09842-30070(C)  
 7M-GTE 09842-30050(A) and 09842-30060(B)



### FUEL SYSTEM

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

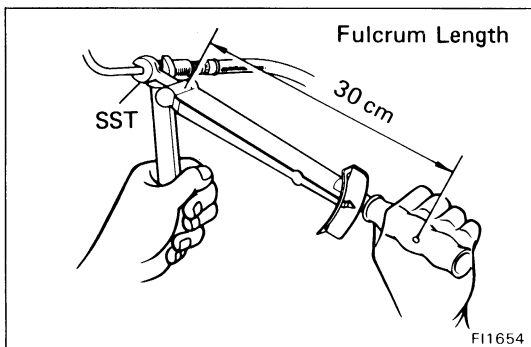


2. When connecting the flare nut or union bolt on the high pressure pipe union, observe the following procedure:
 

(Union bolt type)

  - (a) Always use a new gasket.
  - (b) Hand tighten the union bolt.
  - (c) Tighten the bolt to the specified torque.

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



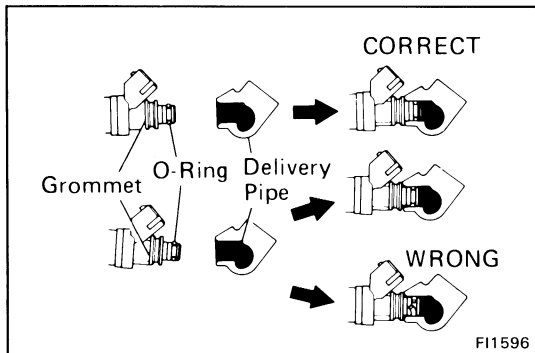
(Flare nut type)

- (a) Apply a thin coat of oil to the flare nut and tighten the flare nut.
- (b) Then using SST, tighten the nut to the specified torque.

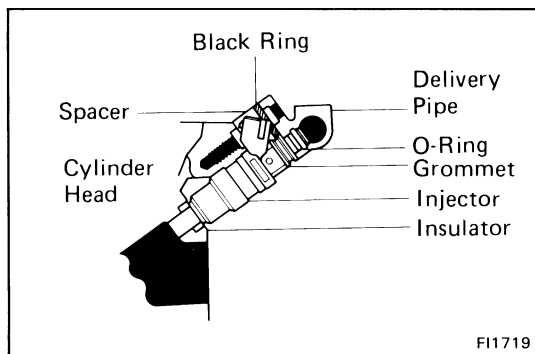
SST 09631-22020

**Torque: 310 kg-cm (22 ft-lb, 30 N·m)**

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

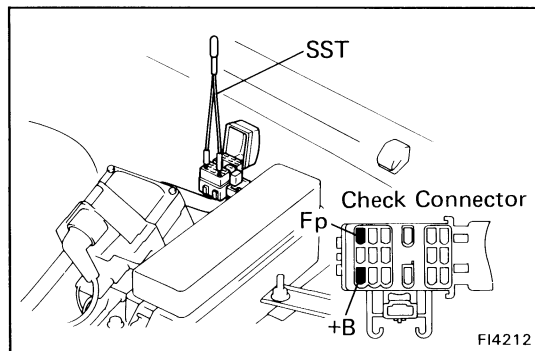


3. Observe the following precautions when removing and installing the injectors.
  - (a) Never reuse a O-ring.
  - (b) When placing a new O-ring on the injector, use care not to damage it in any way.
  - (c) Lubricate the new O-ring with spindle oil or gasoline before installing it - never use engine,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



4. Install the injector to the delivery pipe and cylinder head as shown in the illustration.
 

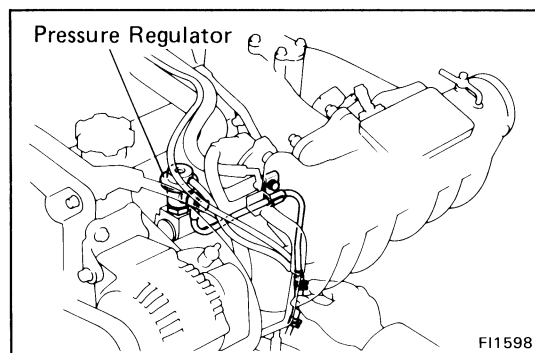
HINT: Install the spacer with the black ring side facing upward.



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

SST 09843-18020

HINT: The check connector is located near the No.2 junction block.



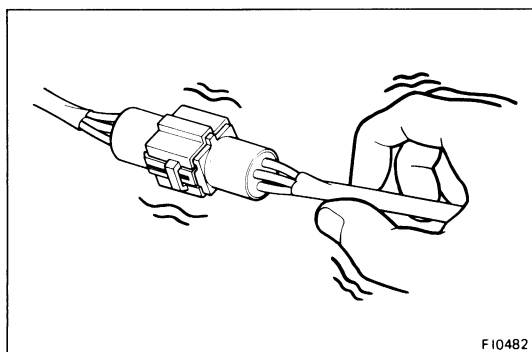
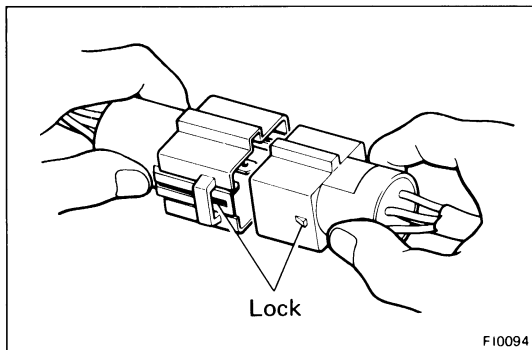
- (c) When the fuel return hose is pinched, the pressure within the high pressure line will rise to approx. 4 kg/cm<sup>2</sup> (57 psi, 392 kPa). In this state, check to see that there are no leaks from any part of the fuel system.

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

# TROUBLESHOOTING

## TROUBLESHOOTING HINTS

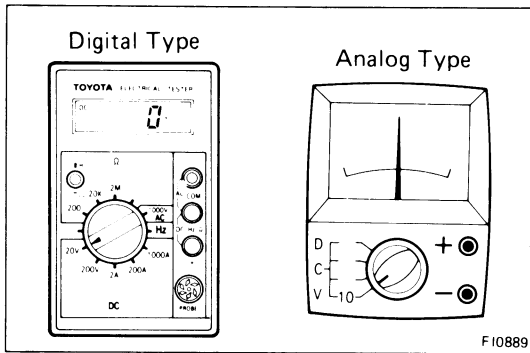
1. Engine troubles are usually not caused by the EFI system. When troubleshooting, always first check the condition of the other systems.
  - (a) Power source
    - Battery
    - Fusible links
    - Fuses
  - (b) Body ground
  - (c) Fuel supply
    - Fuel leakage
    - Fuel filter
    - Fuel pump
  - (d) Ignition system
    - Spark plug
    - High-tension cord
    - Distributor (7M-GE) or cam position sensor (7M-GTE)
    - Igniter and ignition coil
  - (e) Air induction system
    - Vacuum leaks
  - (f) Emission control system
    - PCV system
    - EGR system
  - (g) Others
    - Ignition timing (ESA system)
    - Idle speed (ISC system)



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

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

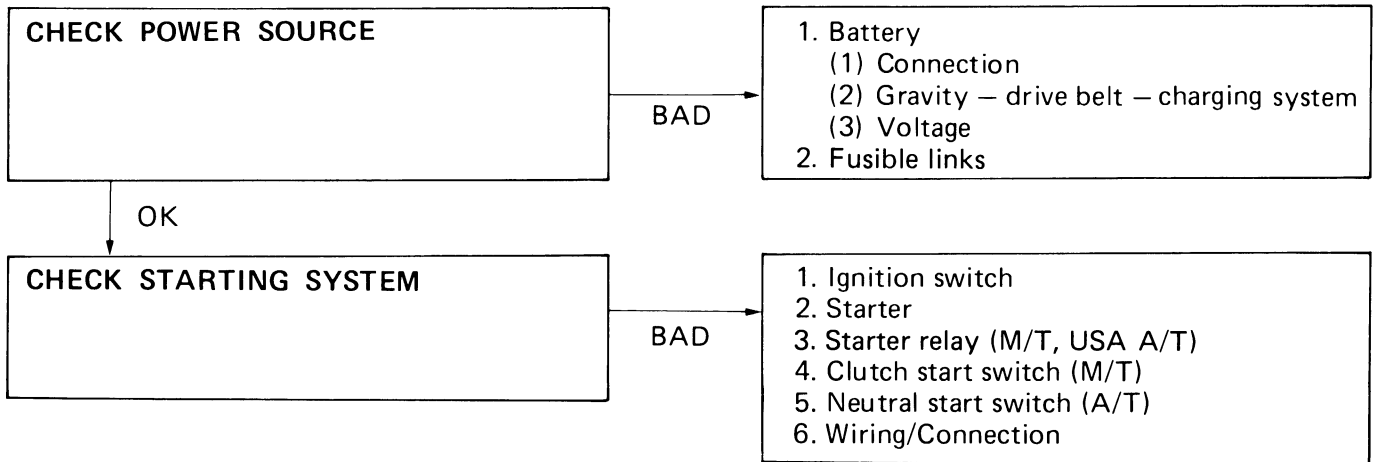
  - (a) Check to see that the terminals are not bent.
  - (b) Check to see that the connector is pushed in completely and locked.
  - (c) Check to see that there is no signal change when the connector is slightly tapped or wiggled.
3. Sufficiently troubleshoot for other causes before replacing the ECU. The ECU is of high quality and it is expensive.



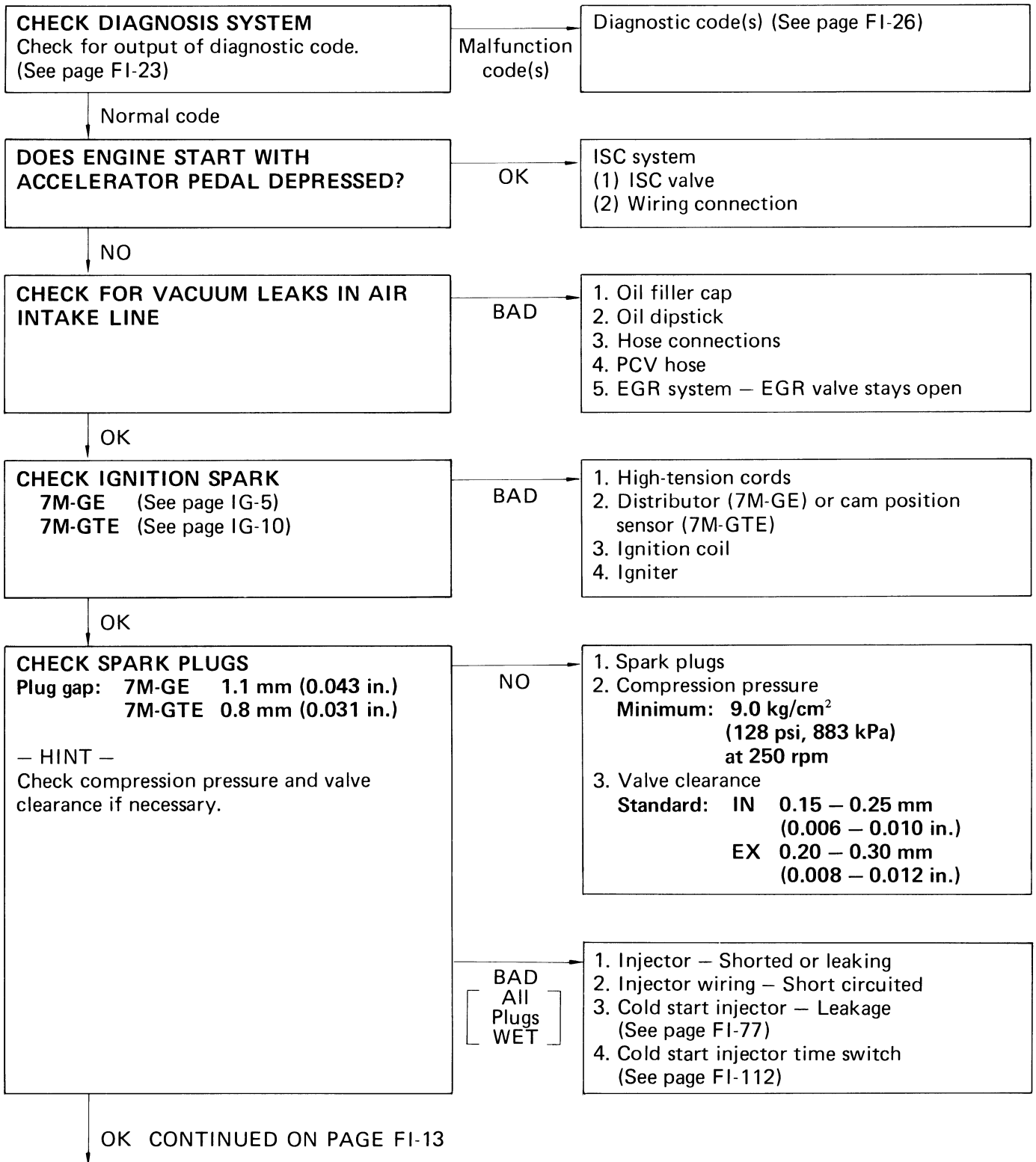
4. Use a volt/ohmmeter with high impedance (10 kΩ /V minimum) for troubleshooting of the electrical circuit. (See pages FI-30, 49)

**TROUBLESHOOTING PROCEDURES**

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

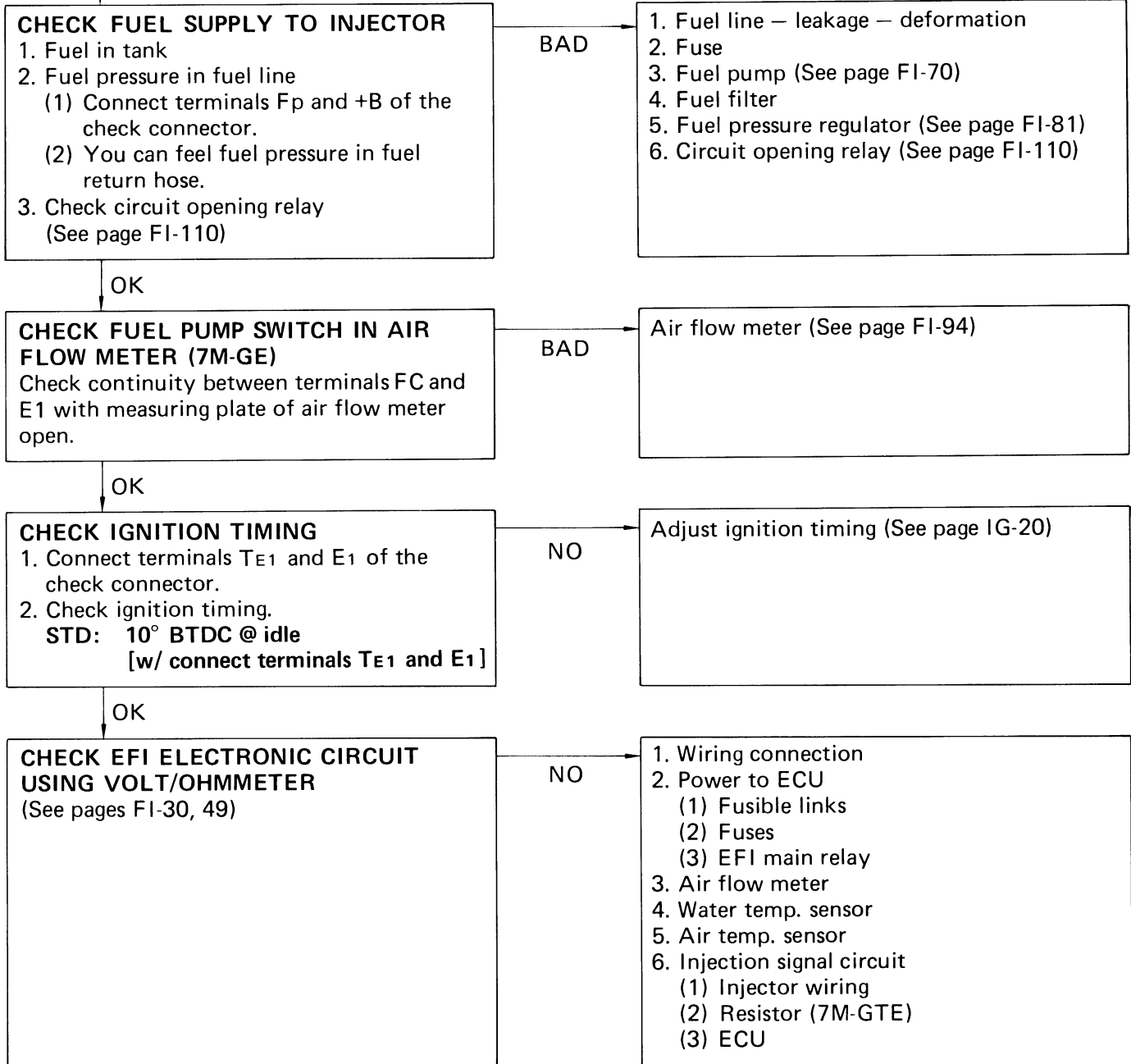


**SYMPTOM – DIFFICULT TO START OR NO START (CRANKS OK)**

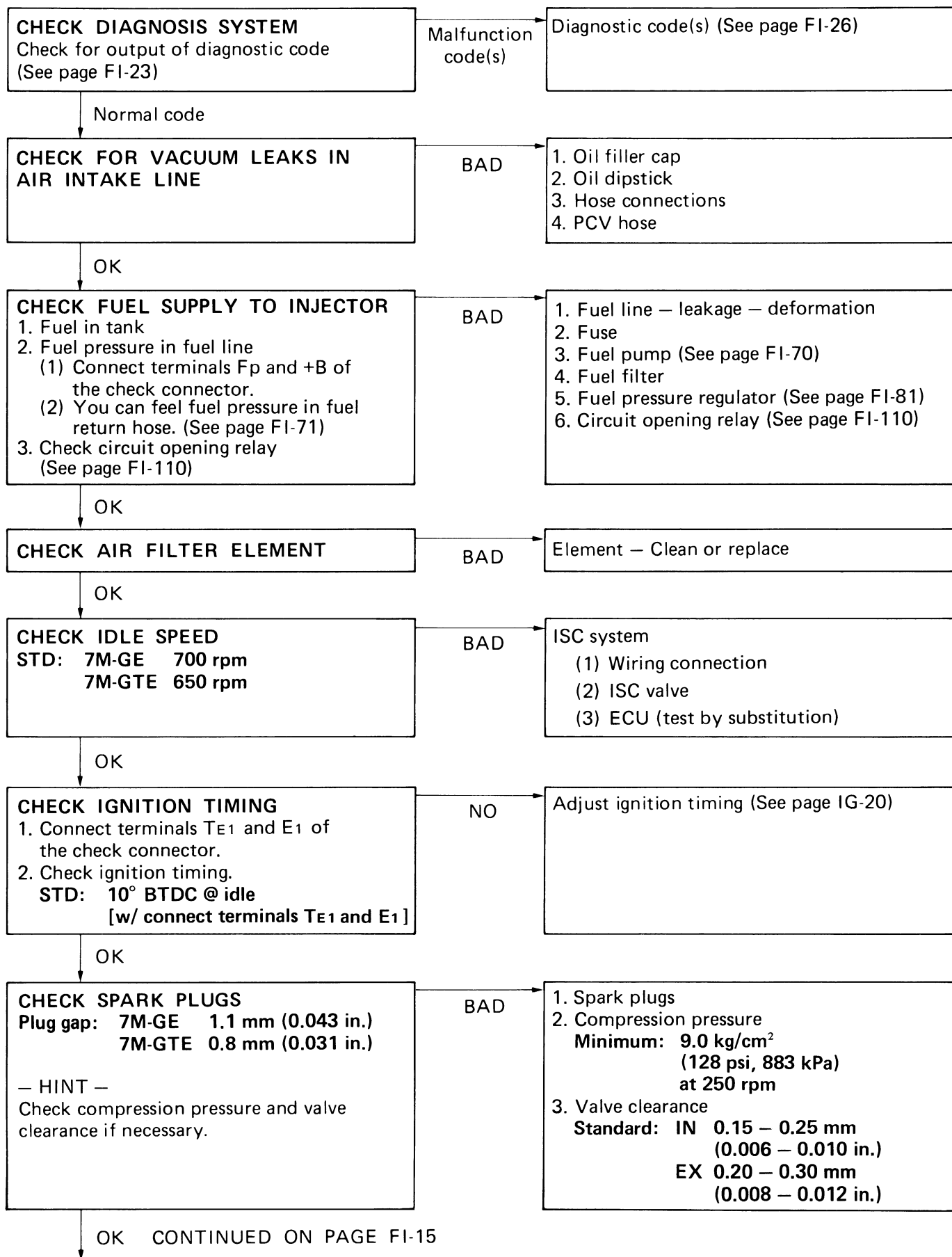


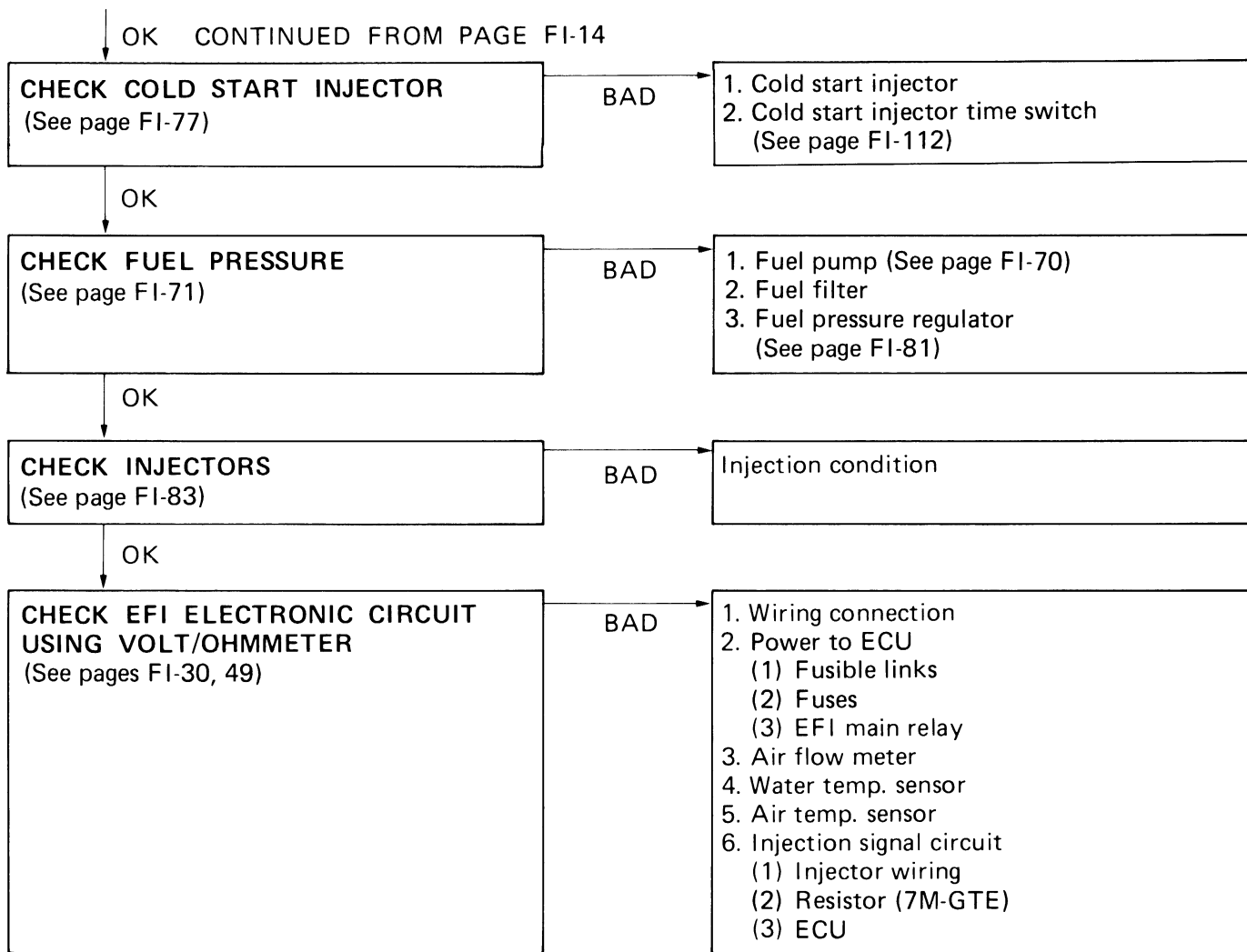


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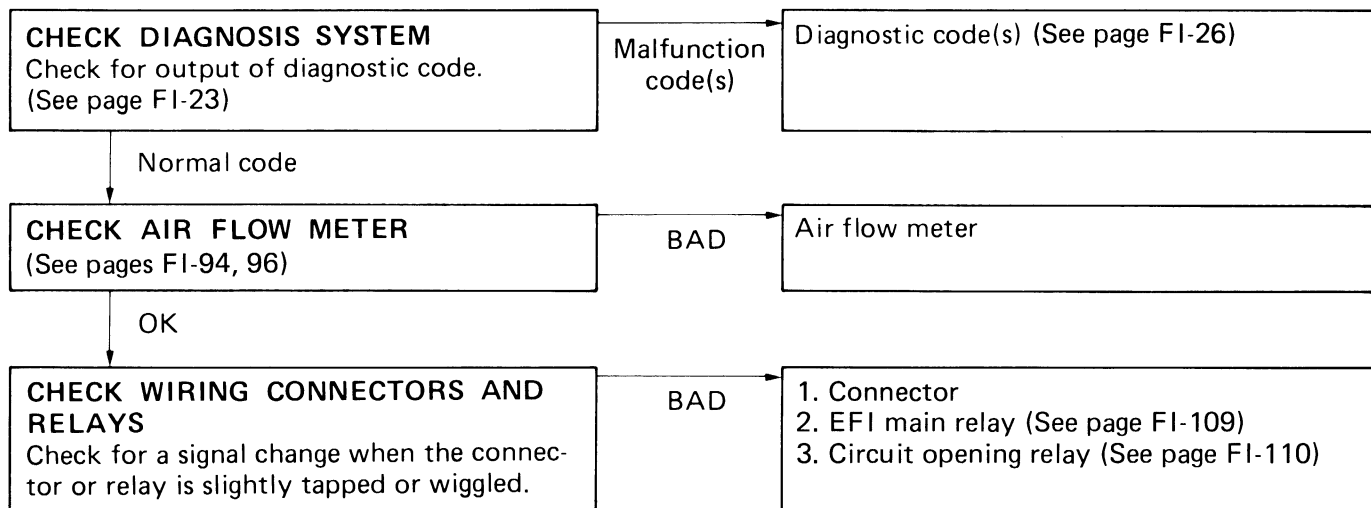


**SYMPTOM — ENGINE OFTEN STALLS**

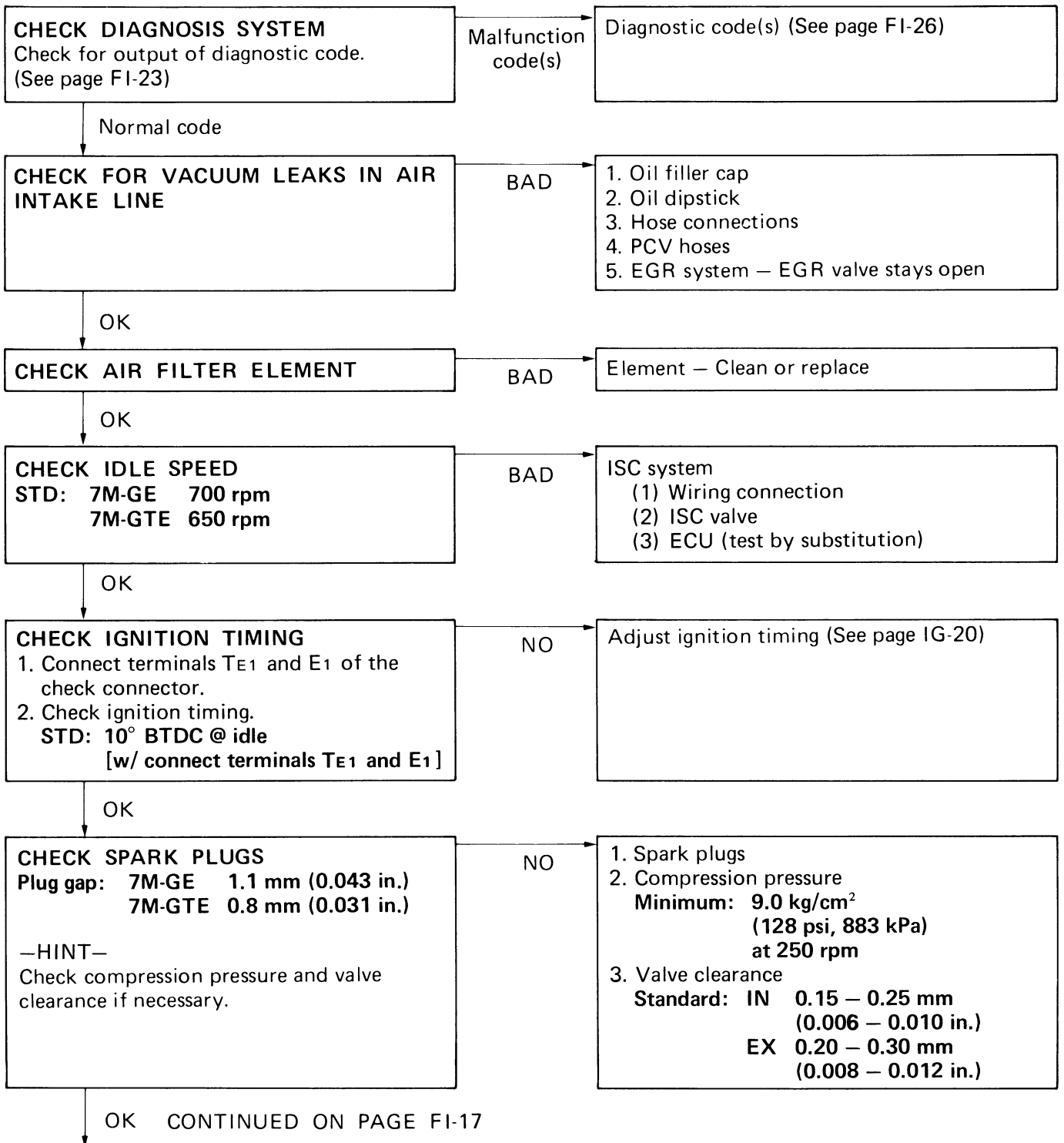




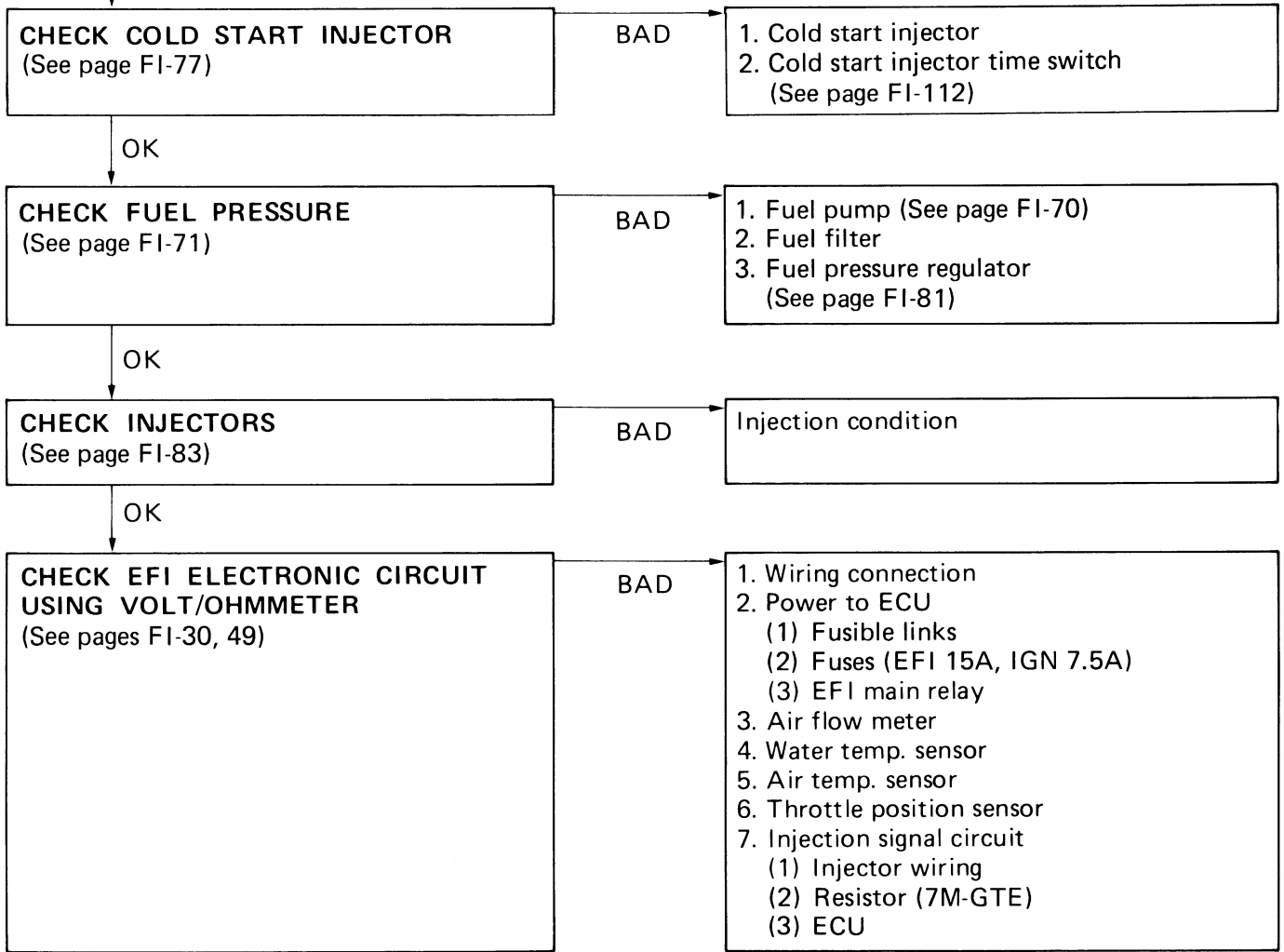
**SYMPTOM — ENGINE SOMETIMES STALLS**



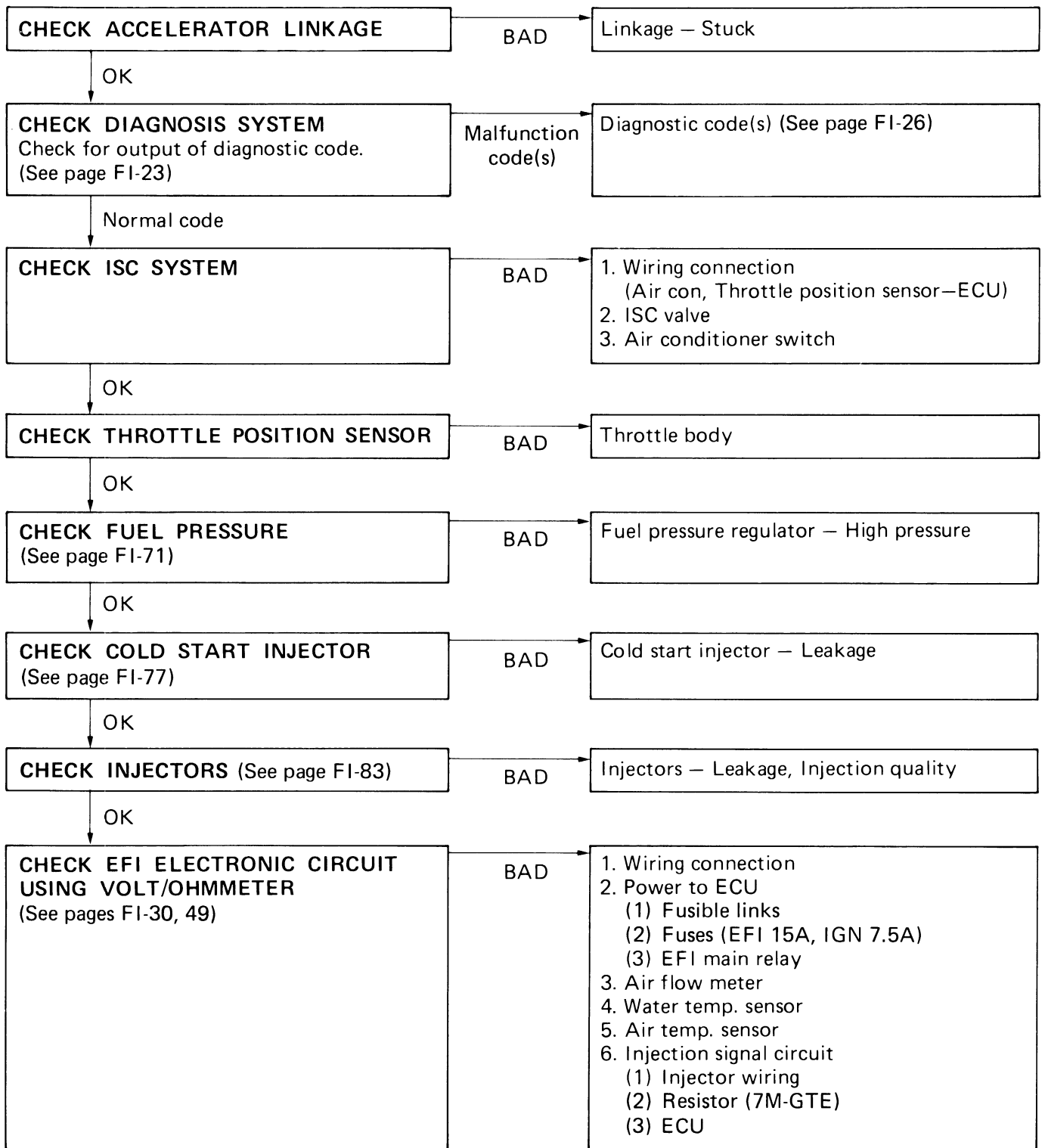
**SYMPTOM — ROUGH IDLING AND/OR MISSING**



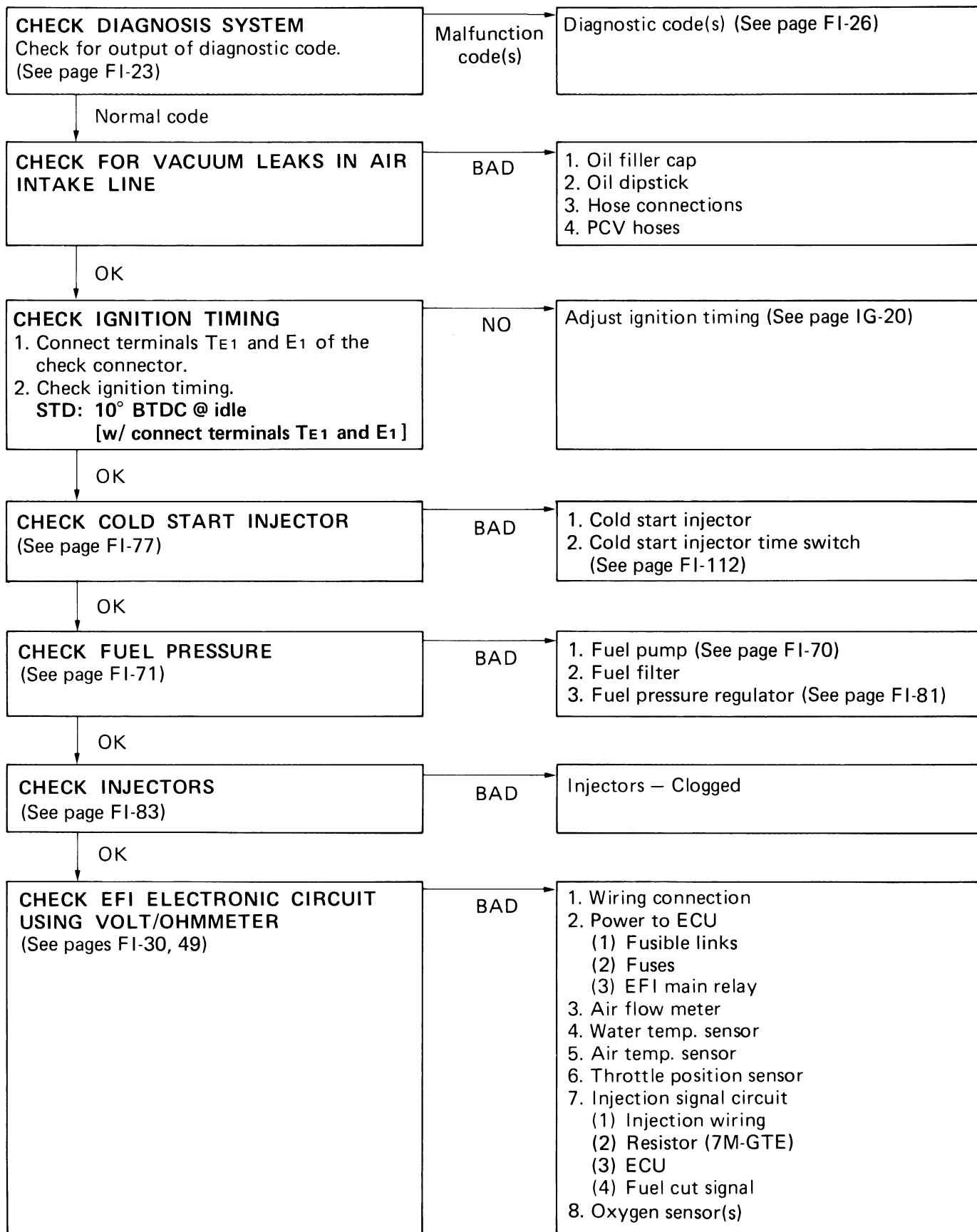
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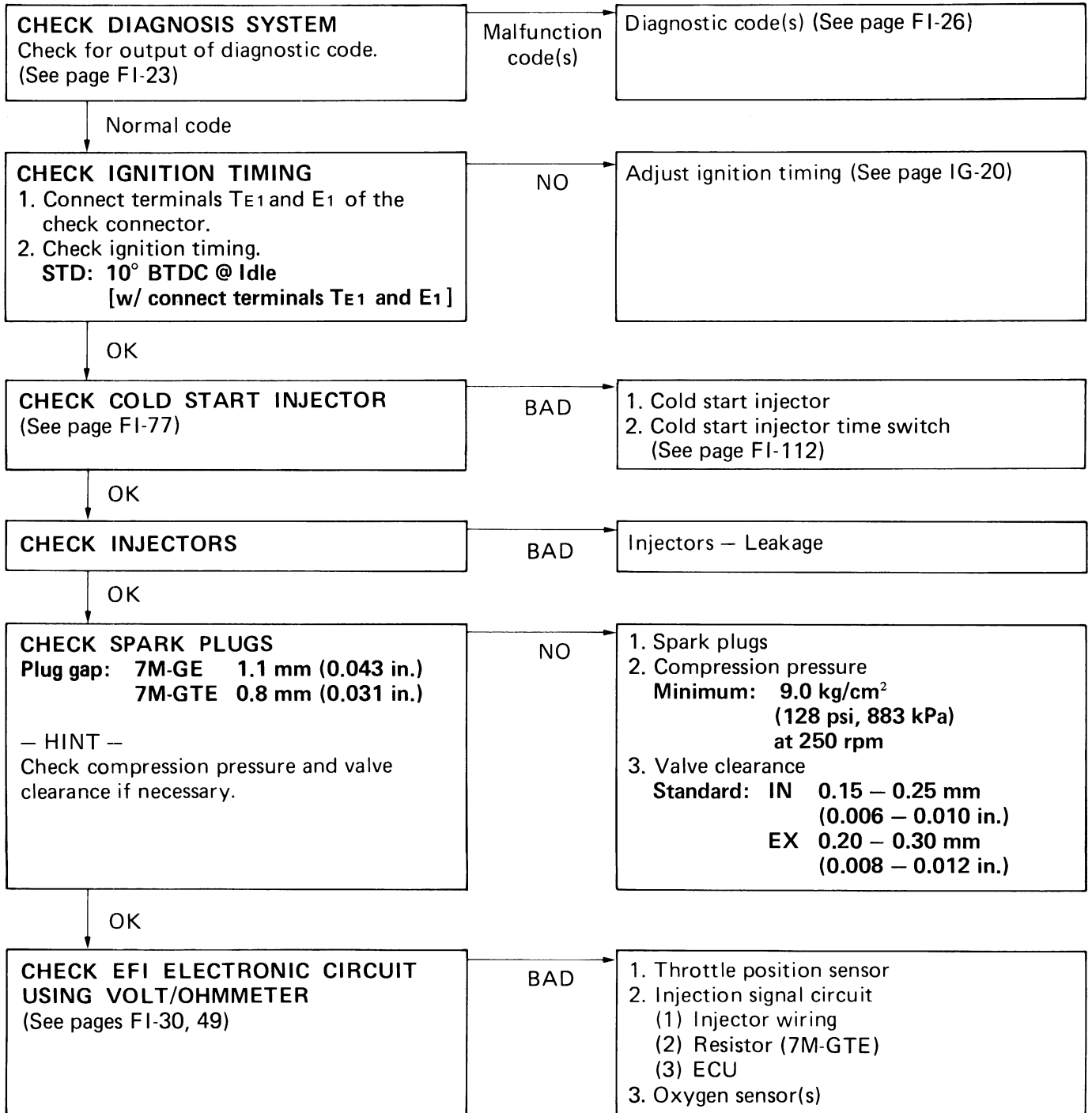
**SYMPTOM — HIGH ENGINE IDLE SPEED (NO DROP)**



**SYMPTOM – ENGINE BACKFIRES-Lean Fuel Mixture**

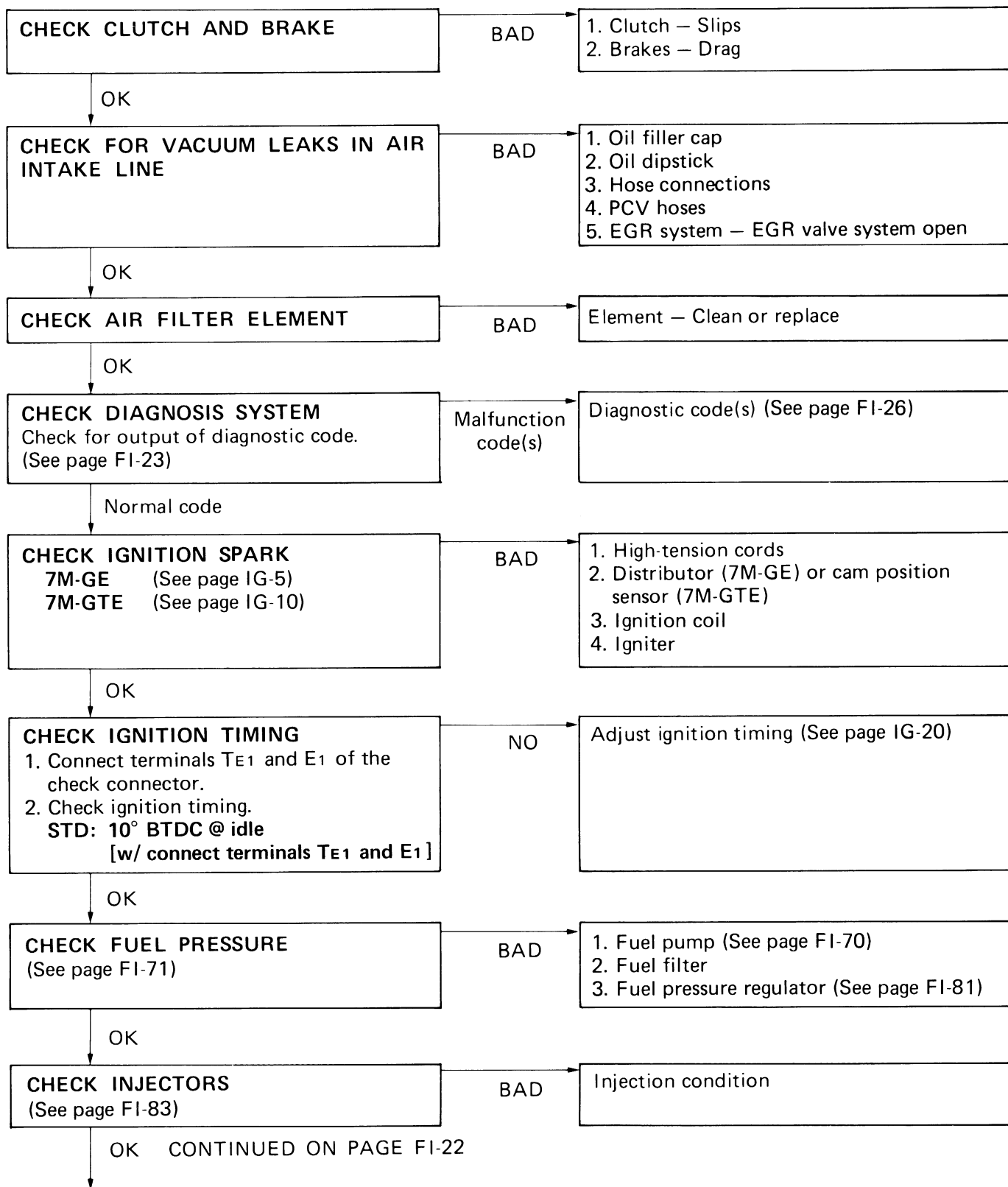


**SYMPTOM — MUFFLER EXPLOSION (AFTER FIRE)**  
**-Rich Fuel Mixture-Misfire**





**SYMPTOM — ENGINE HESITATES AND/OR POOR ACCELERATION**



OK CONTINUED FROM PAGE FI-21

**CHECK SPARK PLUGS**  
**Plug gap:** 7M-GE 1.1 mm (0.043 in.)  
 7M-GTE 0.8 mm (0.031 in.)

— HINT —  
 Check compression pressure and valve clearance if necessary.

NO

1. Spark plugs
2. Compression pressure  
**Minimum: 9.0 kg/cm<sup>2</sup>**  
**(128 psi, 883 kPa)**  
**at 250 rpm**
3. Valve clearance  
**Standard: IN 0.15 – 0.25 mm**  
**(0.006 – 0.010 in.)**  
**EX 0.20 – 0.30 mm**  
**(0.008 – 0.012 in.)**

OK

**CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHMMETER**  
 (See pages FI-30, 49)

BAD

1. Wiring connection
2. Power to ECU
  - (1) Fusible links
  - (2) Fuses
  - (3) EFI main relay
3. Air flow meter
4. Water temp. sensor
5. Air temp. sensor
6. Throttle position sensor
7. Injection signal circuit
  - (1) Injector wiring
  - (2) Resistor (7M-GTE)
  - (3) ECU

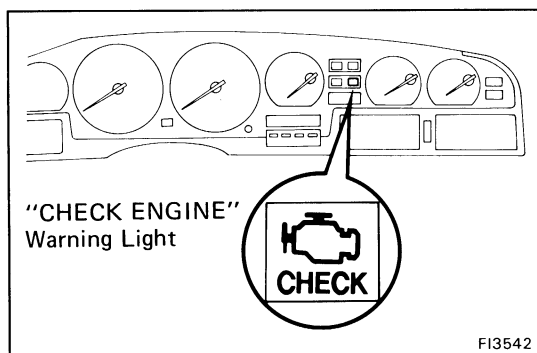
# DIAGNOSIS SYSTEM

## DESCRIPTION

The ECU contains a built-in self-diagnosis system by which troubles with the engine signal network are detected and a "CHECK ENGINE" warning light on the instrument panel flashes.

By analyzing various signals as shown in the later tables (See pages FI-26 to 28) the Electronic Control Unit (ECU) detects system malfunctions which are related to the various operating parameter sensors or to the actuator. The ECU stores the failure until the diagnosis system is cleared by removing the EFI fuse with the ignition switch off.

A "CHECK ENGINE" warning light on the instrument panel informs the driver that a malfunction has been detected. The light goes out automatically when the malfunction has been cleared.



## "CHECK ENGINE" WARNING LIGHT CHECK

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

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

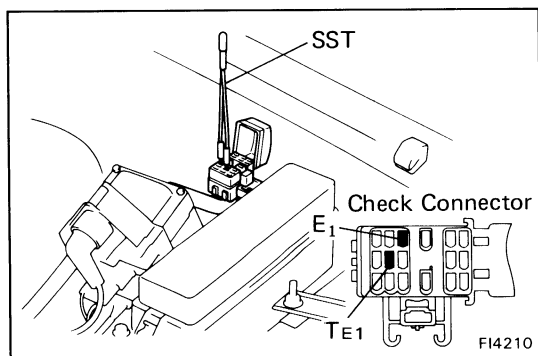
## OUTPUT OF DIAGNOSTIC CODES

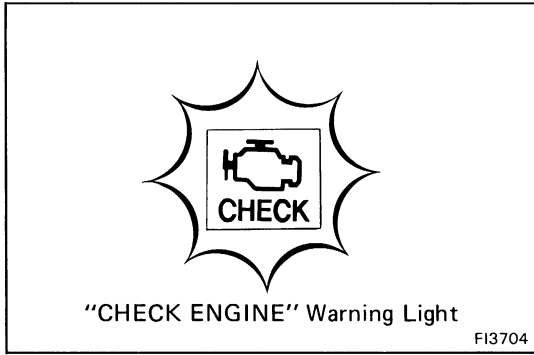
To obtain an output of diagnostic codes, proceed as follows:

1. Initial conditions
  - (a) Battery voltage above 11 volts
  - (b) Throttle valve fully closed (throttle position sensor IDL points closed)
  - (c) Transmission in neutral position
  - (d) Accessory switches OFF
2. Turn the ignition switch to ON. Do not start the engine.
3. Using SST, connect terminals  $T_{E1}$  and  $E_1$  of the check connector.

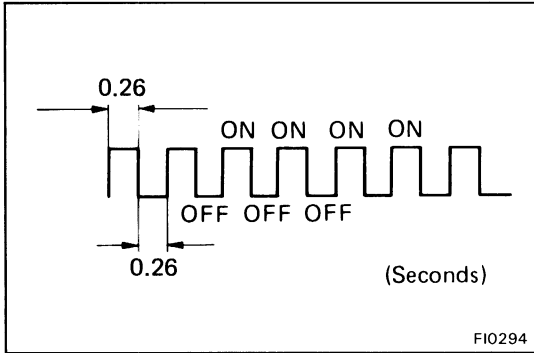
SST 09843-18020

HINT: The check connector is located near the ignition coil.





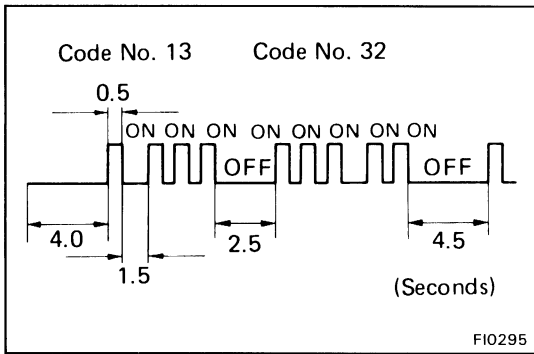
4. Read the diagnostic code as indicated by the number of flashes of the "CHECK ENGINE" warning light.



Diagnostic code (See page FI-26)

- (a) Normal System Operation (no malfunction)

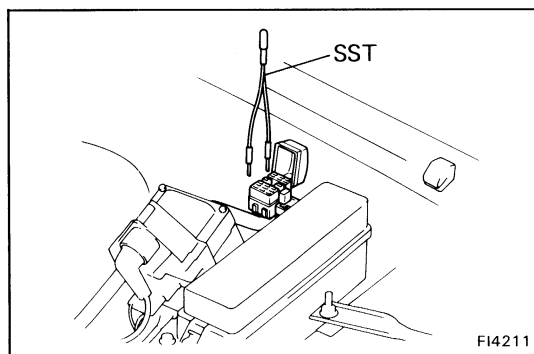
- The light will alternately blink on and off for 0.26 second intervals.



- (b) Malfunction Code Indication

- In the event of a malfunction, the light will blink every 0.52 seconds. The first number of blinks will equal the first digit of a 2-digit diagnostic code and, after a 1.5 second pause, the 2nd number of blinks will equal the 2nd. If there are two or more codes, there will be a 2.5 second pause between each.
- After all the codes have been signalled there will be a 4.5 second pause and they will all be repeated as long as the terminals T<sub>E1</sub> and E<sub>1</sub> of the check connector are connected.

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



5. After the diagnosis check, remove SST.  
SST 09843-18020

## CANCELLING OUT DIAGNOSTIC CODE

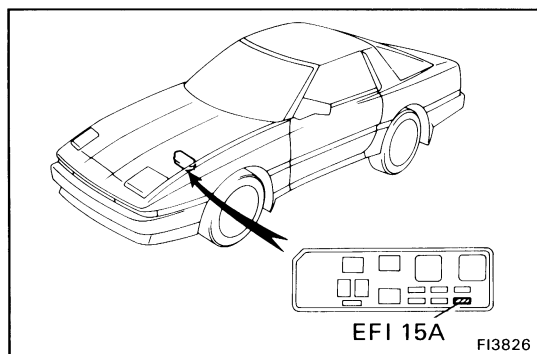
1. After repairing of the trouble, the diagnostic code retained in memory by the ECU must be cancelled out by removing the EFI fuse 15A for 30 seconds or more, depending on ambient temperature (the lower the temperature, the longer the fuse must be left out) with the ignition switch off.

### HINT:

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

2. After cancellation, road test the vehicle to confirm that the "normal" code is now displayed by the "CHECK ENGINE" warning light.








If the same diagnostic code is still indicated, it means that the trouble area has not been repaired thoroughly.








## DIAGNOSIS INDICATION

1. When 2 or more codes are indicated, the lowest number (code) will appear first.
2. All detected diagnostic codes, except code Nos.51 and 53, will be retained in memory by the ECU from the time of detection until cancellation.
3. Once the malfunction is cleared, the "CHECK ENGINE" warning light on the instrument panel will go out but the diagnostic code(s) remains stored in ECU memory (except for code Nos.51 and 53).








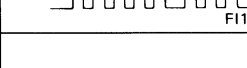

## DIAGNOSTIC CODES

Code No.	Number of "CHECK" engine blinks	System	Diagnosis	Trouble area	See page
—	 FI1604	Normal	This appears when none of the other codes are identified.	—	—
12	 FI1606	RPM Signal	No "NE" or "G" signal to ECU within 2 seconds after engine has been cranked.	<ul style="list-style-type: none"> <li>• Distributor (cam position sensor) circuit</li> <li>• Distributor (cam position sensor)</li> <li>• Starter signal circuit</li> <li>• ECU</li> </ul>	IG-3
13	 FI1607	RPM Signal	No "NE" signal to ECU when engine speed is above 1,000 rpm.	<ul style="list-style-type: none"> <li>• Distributor (cam position sensor) circuit</li> <li>• Distributor (cam position sensor)</li> <li>• ECU</li> </ul>	—
14	 FI1608	Ignition Signal	NO "IGF" signal to ECU "A" times in succession. "A" 7M-GE 6—8 7M-GTE 3	<ul style="list-style-type: none"> <li>• Ignition and ignition coil circuit</li> <li>• Igniter and ignition coil</li> <li>• ECU</li> </ul>	—
21	 FI1609	Oxygen Sensor Signal	During air-fuel ratio feedback correction, voltage output from the oxygen sensor does not exceed a set value on the lean side and the rich side continuously for a certain period.	<ul style="list-style-type: none"> <li>• Oxygen sensor circuit</li> <li>• Oxygen sensor</li> <li>• ECU</li> </ul>	—
		*1 Oxygen Sensor Heater Signal	Open or short circuit in oxygen sensor heater signal (HT).	<ul style="list-style-type: none"> <li>• Oxygen sensor heater circuit</li> <li>• Oxygen sensor heater</li> <li>• ECU</li> </ul>	—
22	 FI1610	Water Temp. Sensor Signal	Open or short circuit in water temp. sensor signal (THW).	<ul style="list-style-type: none"> <li>• Water temp. sensor circuit</li> <li>• Water temp. sensor</li> <li>• ECU</li> </ul>	—
24	 FI1611	Intake Air Temp. Sensor Signal	Open or short circuit in intake air temp. sensor signal (THA).	<ul style="list-style-type: none"> <li>• Intake air temp. sensor circuit</li> <li>• Intake air temp. sensor</li> <li>• ECU</li> </ul>	FI-40, 60

DIAGNOSTIC CODES (Cont'd)

Code No.	Number of "CHECK" engine blinks	System	Diagnosis	Trouble area	See page
25		Air-Fuel Ratio Lean Malfunction  FI2562	(Calif.) (1) When air-fuel ratio feedback compensation value or adaptive control value continues at the upper (lean) or lower (rich) limit renewed for a certain period of time. (2) When air-fuel ratio feedback compensation value of adaptive control value feedback frequency is abnormally high during feedback condition. (3) When marked variation is detected in engine revolutions for each cylinder during idle switch on and feedback condition.	<ul style="list-style-type: none"> <li>• Injector circuit</li> <li>• Injector</li> <li>• Fuel line pressure</li> <li>• Air flow meter</li> <li>• Air intake system</li> <li>• Oxygen sensor circuit</li> <li>• Oxygen sensor</li> <li>• Ignition system</li> <li>• Water temp. sensor</li> <li>• ECU</li> </ul>	—
26		Air-Fuel Ratio Rich Malfunction  FI2563	HINT: For conditions (2) and (3), since neither a lean (Code No.25) nor a rich (Code No.26) diagnosis displayed consecutively. (Others) When air-fuel ratio feedback correction value or adaptive control value continues at the upper (lean) or lower (rich) limit for a certain period of time or adaptive control value is not renewed for a certain period of time.	<ul style="list-style-type: none"> <li>• Injector circuit</li> <li>• Injector</li> <li>• Fuel line pressure</li> <li>• Air flow meter</li> <li>• Cold start injector</li> <li>• Oxygen sensor circuit</li> <li>• Oxygen sensor</li> <li>• Water temp. sensor</li> <li>• ECU</li> </ul>	—
*2 27		Sub-Oxygen Sensor Signal  FI2617	Open or short circuit in sub-oxygen sensor signal (OX2).	<ul style="list-style-type: none"> <li>• Sub-oxygen sensor circuit</li> <li>• Sub-oxygen sensor</li> <li>• ECU</li> </ul>	—
		Sub-Oxygen Sensor Heater	Open or short circuit in sub-oxygen sensor heater signal (HT).	<ul style="list-style-type: none"> <li>• Sub-oxygen sensor heater circuit</li> <li>• Sub-oxygen sensor heater circuit</li> <li>• ECU</li> </ul>	
31		Air Flow Meter Signal  FI1612	(7M-GE) Open circuit in VC signal or short circuit between VS and E2 when idle contacts are closed. (7M-GTE) Open or Short circuit in air flow meter signal.	<ul style="list-style-type: none"> <li>• Air flow meter circuit</li> <li>• Air flow meter</li> <li>• ECU</li> </ul>	FI-38
*3 32		Air Flow Meter Signal  FI1613	Open circuit in E2 or short circuit between VC and VS.	<ul style="list-style-type: none"> <li>• Air flow meter circuit</li> <li>• Air flow meter</li> <li>• ECU</li> </ul>	FI-57

## DIAGNOSTIC CODES (Cont'd)

Code No.	Number of "CHECK" engine blinks	System	Diagnosis	Trouble area	See page
*1 34	 FI2818	Turbocharger Pressure	*4 Turbocharger pressure is abnormal.	<ul style="list-style-type: none"> <li>• Turbocharger</li> <li>• Air flow meter</li> <li>• Intercooler system</li> <li>• ECU</li> </ul>	—
*1 35	 FI4549	HAC Sensor Signal	Open or short circuit in HAC sensor signal.	<ul style="list-style-type: none"> <li>• ECU</li> </ul>	—
41	 FI1614	Throttle Position Sensor Signal	Open or short circuit in throttle position sensor signal (VTA).	<ul style="list-style-type: none"> <li>• Throttle position sensor circuit</li> <li>• Throttle position sensor</li> <li>• ECU</li> </ul>	FI-36, 55
42	 FI1615	Vehicle Speed Sensor Signal	No "SPD" signal to ECU for 8 seconds when engine speed is between 2,500 rpm and 4,500 (7M-GE) or 4,000 (7M-GTE) rpm and coolant temp. is below 80°C (176°F) and neutral start switch is off.	<ul style="list-style-type: none"> <li>• Vehicle speed sensor circuit</li> <li>• Vehicle speed sensor</li> <li>• ECU</li> </ul>	—
43	 FI1616	Starter Signal	No "STA" signal to ECU until engine speed reaches 800 rpm with vehicle not moving.	<ul style="list-style-type: none"> <li>• Ignition switch circuit</li> <li>• Ignition switch</li> <li>• ECU</li> </ul>	FI-42, 62
52	 FI1618	Knock Sensor Signal	Open or short circuit in knock sensor signal.	<ul style="list-style-type: none"> <li>• Knock sensor circuit</li> <li>• Knock sensor</li> <li>• ECU</li> </ul>	—
53	 FI1619	Knock Control Signal in ECU	Knock control program faulty.	<ul style="list-style-type: none"> <li>• ECU</li> </ul>	—
*5 71	 FI2622	EGR System Malfunction	<ul style="list-style-type: none"> <li>• EGR gas temp. below predetermined level during EGR operation.</li> <li>• Open circuit in EGR gas temp. sensor signal (THG).</li> </ul>	<ul style="list-style-type: none"> <li>• EGR system (EGR valve, EGR hose etc.)</li> <li>• EGR gas temp. sensor circuit</li> <li>• EGR gas temp. sensor</li> <li>• VSV for EGR</li> <li>• VSV for EGR circuit</li> <li>• ECU</li> </ul>	FI-48, 69
51	 FI1617	Switch Condition Signal	No "IDL" signal, "NSW" signal or "A/C" signal to ECU, during diagnosis check.	<ul style="list-style-type: none"> <li>• A/C switch circuit</li> <li>• A/C switch</li> <li>• A/C amplifier</li> <li>• Throttle position sensor circuit</li> <li>• Throttle position sensor</li> <li>• ECU</li> </ul>	—

\*1 7M-GTE

\*2 7M-GE (California vehicles)

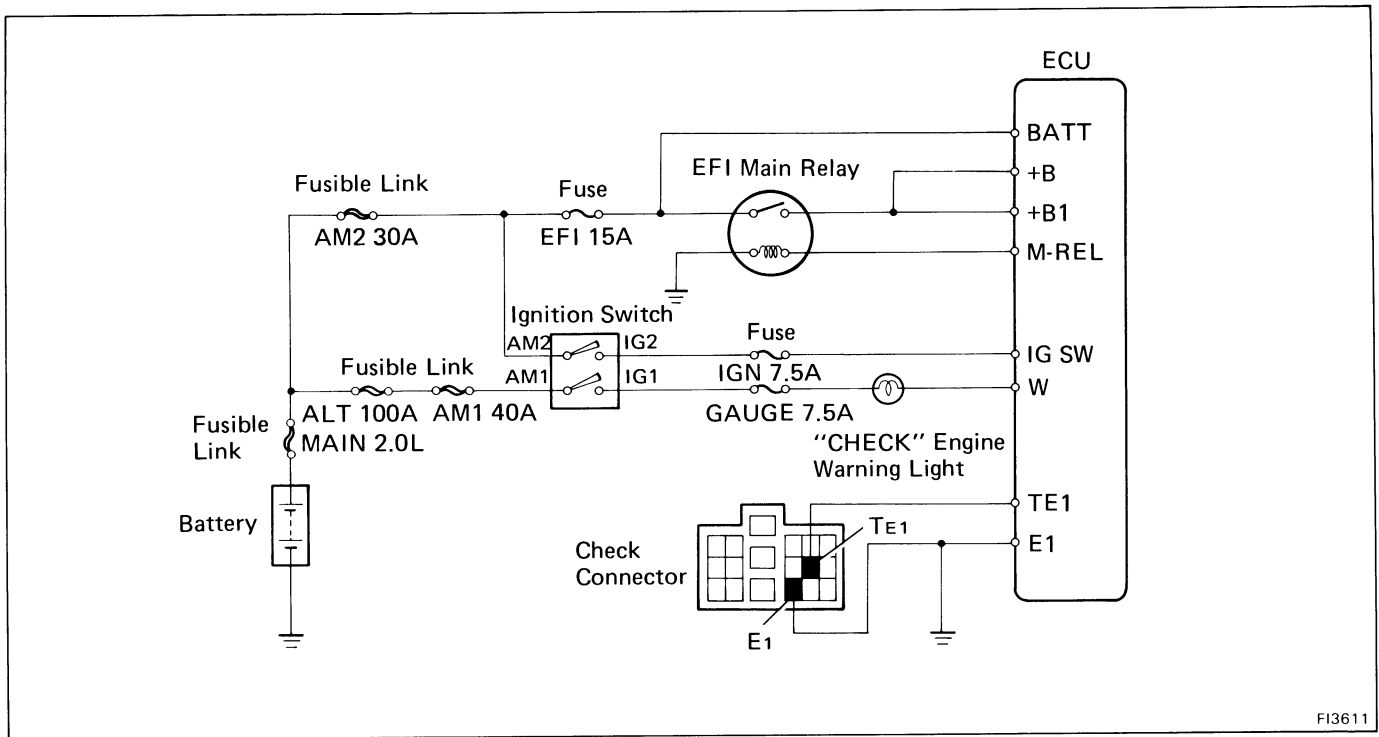
\*3 7M-GE

\*4 Abnormalities in the air flow meter may also be detected.

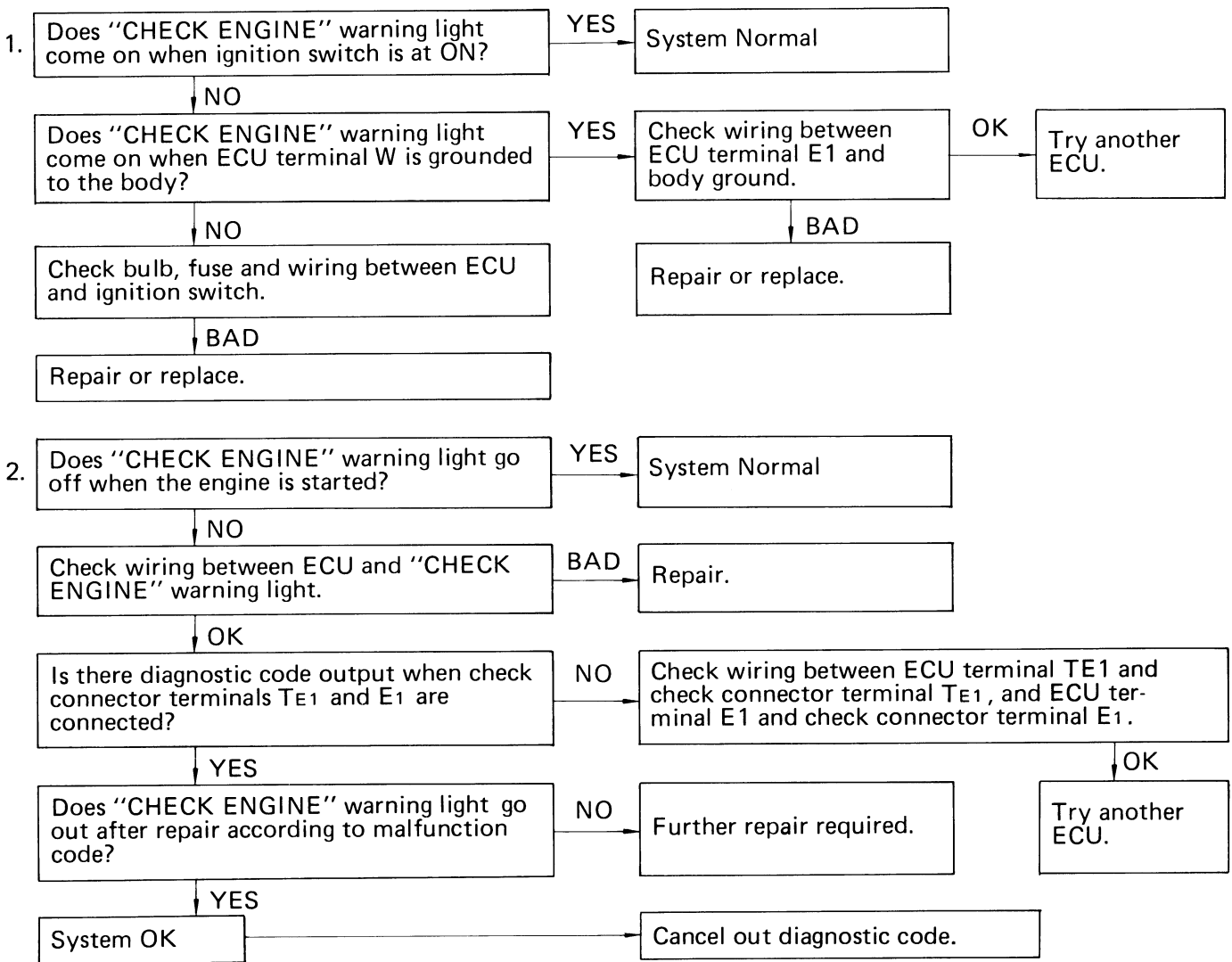
\*5 California vehicles



INSPECTION OF DIAGNOSIS CIRCUIT



FI3611



# TROUBLESHOOTING WITH VOLT/OHMMETER (7M-GE)

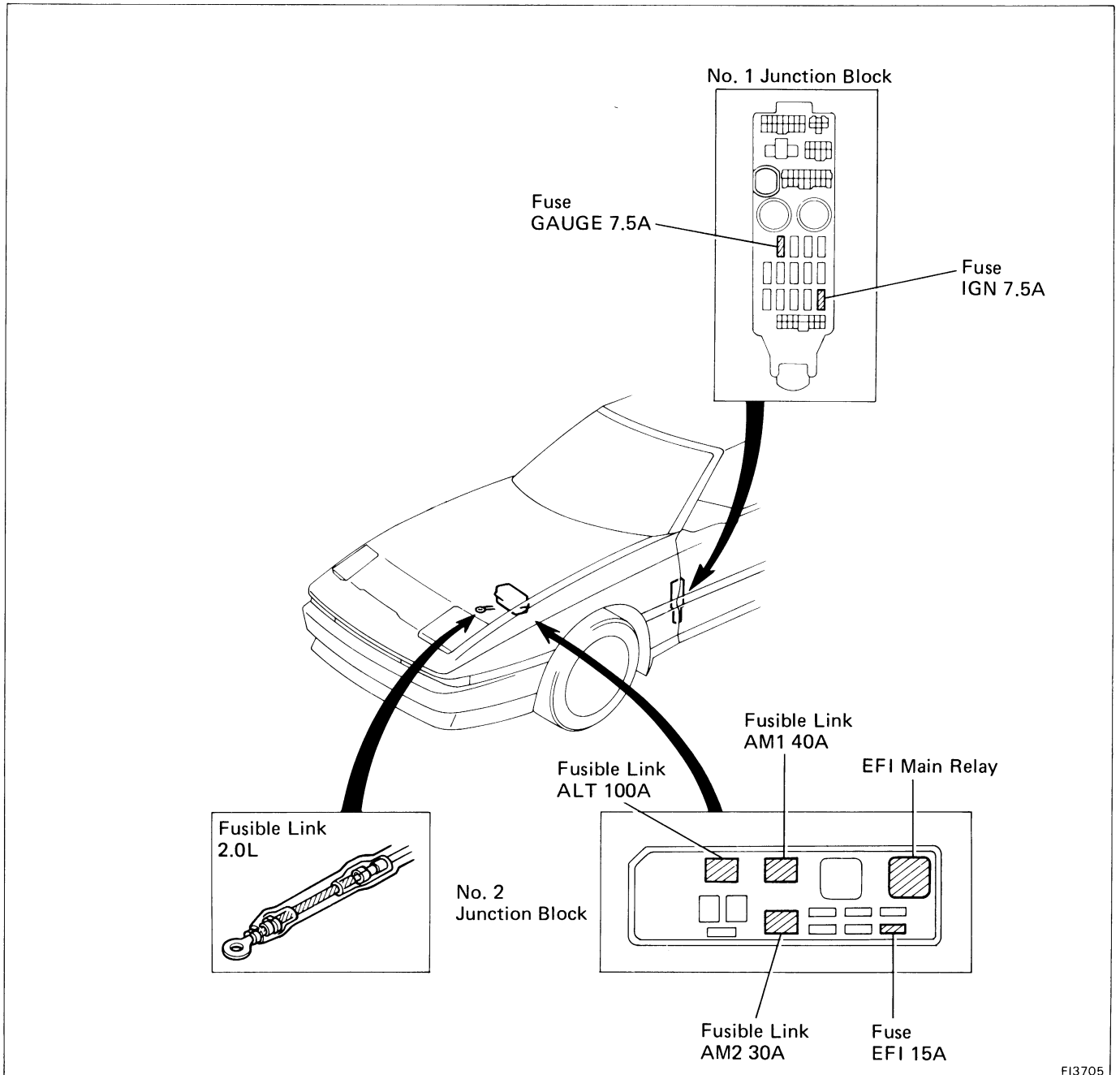
**HINT:** The following troubleshooting procedures are designed for inspection of each separate system, therefore the procedure may vary somewhat. However, troubleshooting should be performed referring to the inspection methods described in this manual.

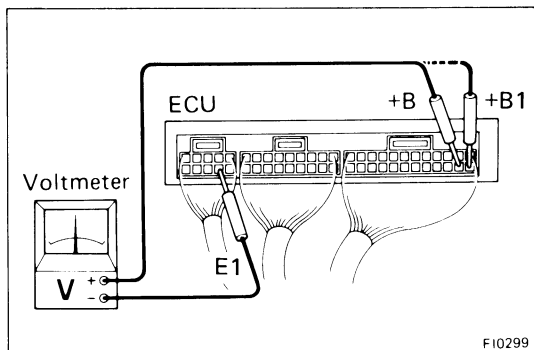
Before beginning inspection, it is best to first make a simple check of the fuses, fusible links and condition of the connectors.

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

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

## LOCATION OF FUSES AND FUSIBLE LINKS





### EFI SYSTEM CHECK PROCEDURE

**HINT:**

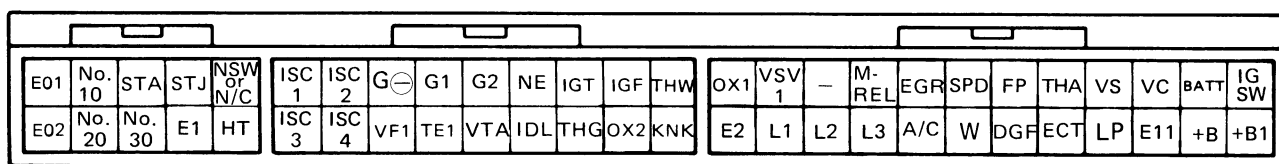
- Perform all voltage measurements with the connectors connected.
- Verify that the battery voltage is 11 V or above when the ignition switch is at ON.

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

### Terminals of ECU

Symbol	Terminal Name	Symbol	Terminal Name	Symbol	Terminal Name
E01	POWER GROUND	TE1	CHECK CONNECTOR	L3	TEMS (ECT) COMPUTER
E02	POWER GROUND	G2	DISTRIBUTOR	EGR	VSV (EGR)
No. 10	INJECTOR (No. 1 and 4)	VTA	THROTTLE POSITION SENSOR	A/C	A/C MAGNETIC SWITCH
No. 20	INJECTOR (No. 2 and 6)	NE	DISTRIBUTOR	SPD	SPEEDOMETER
STA	STARTER SWITCH	IDL	THROTTLE POSITION SENSOR	W	WARNING LIGHT
No. 30	INJECTOR (No. 3 and 5)	IGT	IGNITER	FP	FUEL PUMP RELAY
STJ	COLD START INJECTOR	*1 THG	EGR GAS TEMP. SENSOR	DFG	DEFOGGER RELAY
E1	COMPUTER GROUND	IGF	IGNITER	THA	AIR TEMP. SENSOR
NSW	NEUTRAL START SWITCH (A/T)	*1 OX2	SUB-OXYGEN SENSOR	*2 ECT	ECT COMPUTER
N/C	CLUTCH SWITCH (M/T)	THW	WATER TEMP. SENSOR	VS	AIR FLOW METER
*1 HT	OXYGEN SENSOR HEATER	KNK	KNOCK SENSOR	LP	HEADLIGHT RELAY
ISC1	ISC MOTOR NO. 1 COIL	OX1	OXYGEN SENSOR	VC	AIR FLOW METER
ISC3	ISC MOTOR NO. 3 COIL	E2	SENSOR GROUND	*1 E11	COMPUTER GROUND
ISC2	ISC MOTOR NO. 2 COIL	VSV1	VSV (AIR CONTROL)	BATT	BATTERY
ISC4	ISC MOTOR NO. 4 COIL	L1	TEMS (ECT) COMPUTER	+B	EFI MAIN RELAY
G⊖	DISTRIBUTOR	—	—	IG SW	IGNITION SWITCH
VF1	CHECK CONNECTOR	L2	TEMS (ECT) COMPUTER	+B1	EFI MAIN RELAY
G1	DISTRIBUTOR	M-REL	EFI MAIN RELAY (COIL)	—	—

**ECU Terminals**

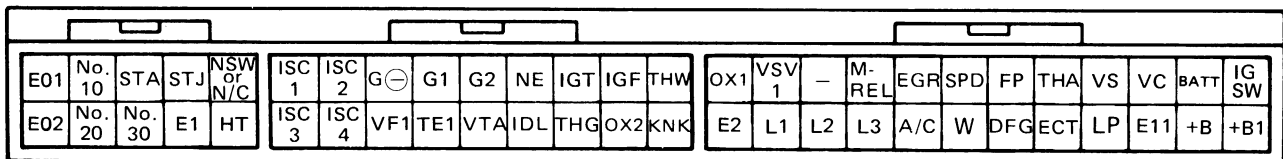


\*1 California vehicles only  
 \*2 A/T only

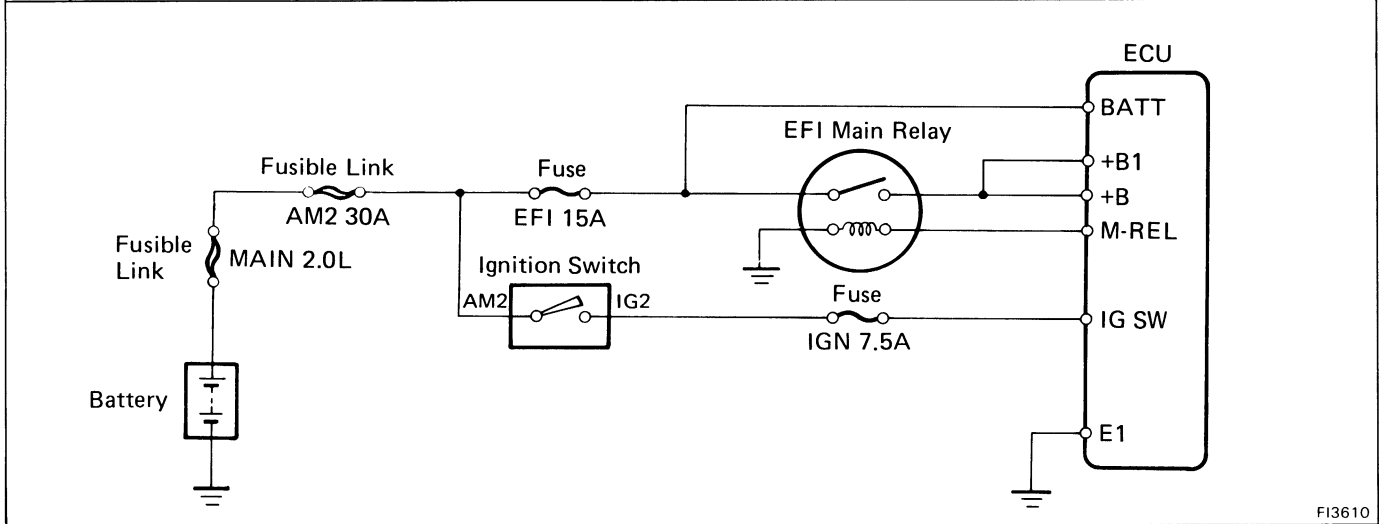
Voltage at ECU Wiring Connectors

No.	Terminals	Condition		STD Voltage	See Page
1	BATT — E1	—		10 — 14	FI-33
	IG SW — E1	Ignition SW ON		10 — 14	FI-34
	M-REL — E1				
	+B (+B1) — E1				
2	IDL — E2	Ignition SW ON	Throttle valve open	10 — 14	FI-36
	VC — E2		—	4 — 6	
	VTA — E2		Throttle valve fully closed	0.1 — 1.0	FI-37
			Throttle valve fully open	4 — 5	
3	VC — E2	Ignition SW ON	—	4 — 6	FI-38
	VS — E2		Measuring plate fully closed	3.7 — 4.3	
			Measuring plate fully open	0.2 — 0.5	
		Idling	2.3 — 2.8		
		3,000 rpm	1.0 — 2.0		
4	No. 10 E01 No. 20 — No. 30 E02	Ignition SW ON		10 — 14	FI-39
5	THA — E2	Ignition SW ON	Intake air temperature 20°C (68°F)	1 — 3	FI-40
6	THW — E2	Ignition SW ON	Coolant temperature 80°C (176°F)	0.1 — 1.0	FI-41
7	STA — E1	Cranking		6 — 14	FI-42
8	IGT — E1	Idling		0.7 — 1.0	FI-43
9	ISC1 ? — E1 ISC4	Ignition SW ON		9 — 14	FI-44
10	W — E1	No trouble ("CHECK ENGINE" warning light off) and engine running		8 — 14	FI-45
11	A/C — E1	Air conditioning ON		10 — 14	FI-46

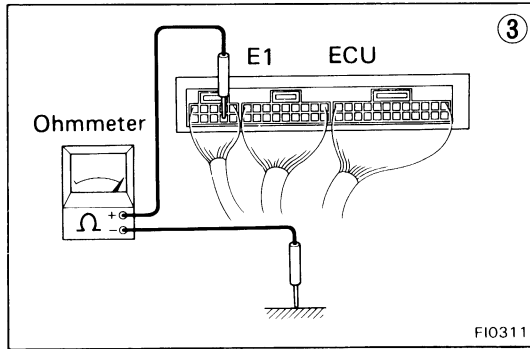
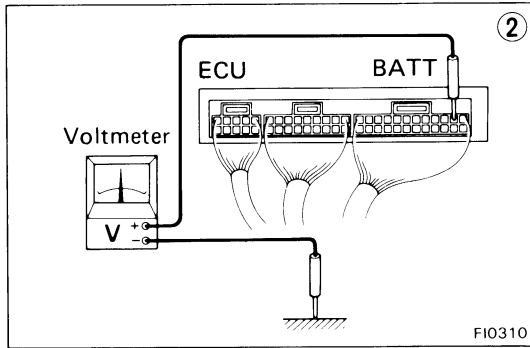
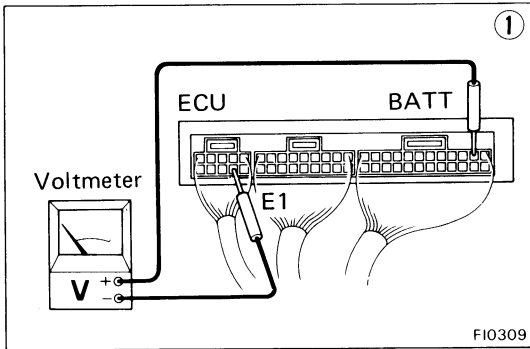
ECU Terminals



No.	Terminals	Trouble	Condition	STD Voltage
1	BATT – E1	No voltage	—	10 – 14 V
	IG SW – E1	No voltage	Ignition switch ON	10 – 14 V
	M-REL – E1	No voltage	Ignition switch ON	10 – 14 V
	+B (+B1) – E1	No voltage	Ignition switch ON	10 – 14 V



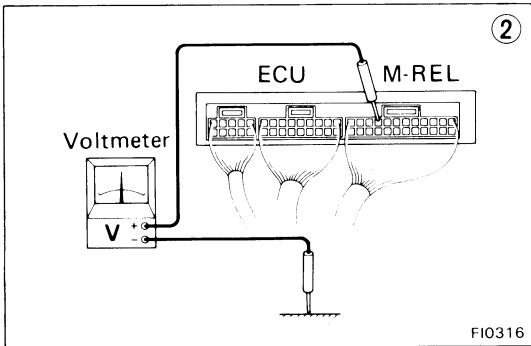
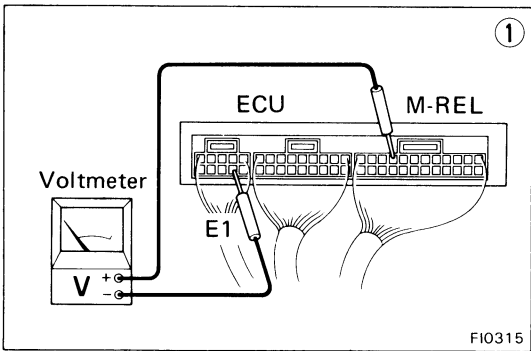
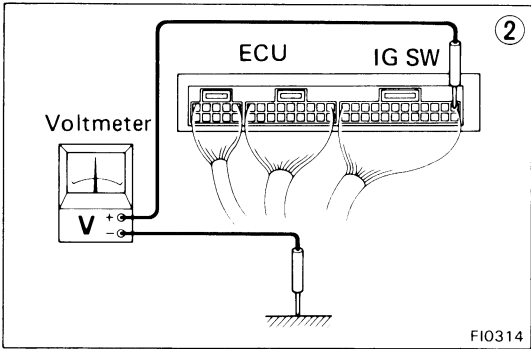
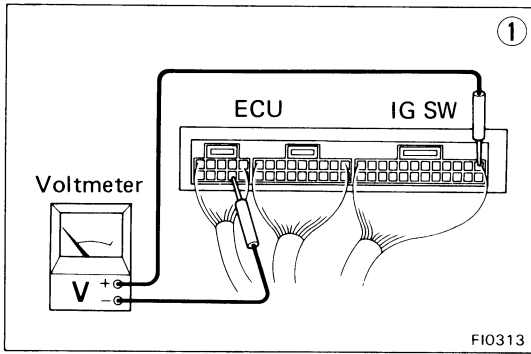
FI3610



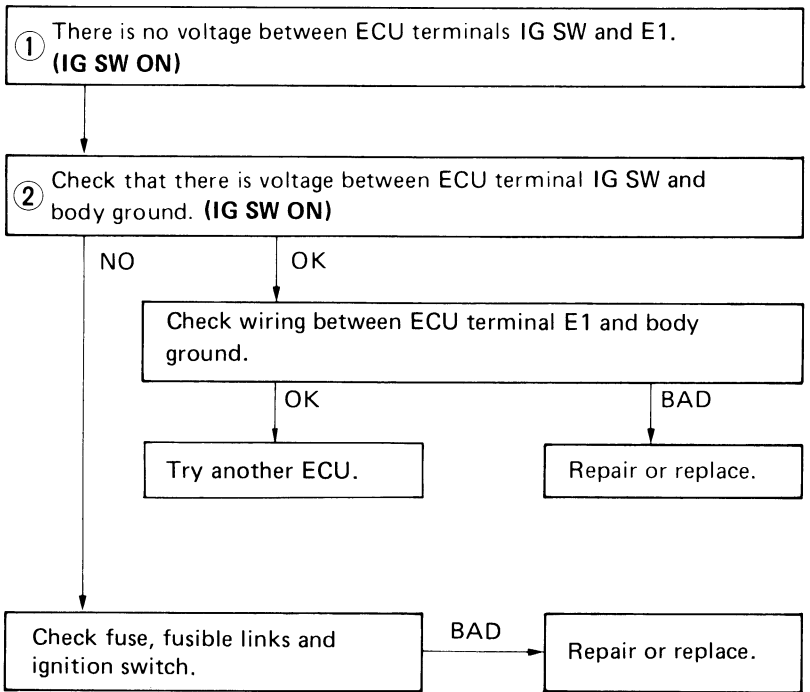
• BATT – E1

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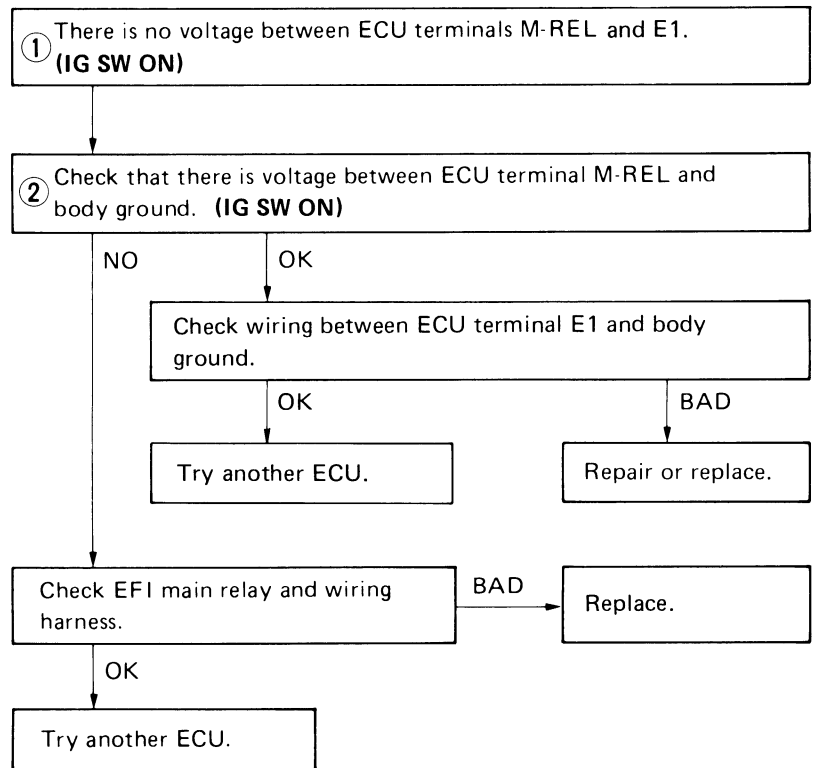
    graph TD
      Step1[① There is no voltage between ECU terminals BATT and E1.] --> Step2[② Check that there is voltage between ECU terminal BATT and body ground.]
      Step2 -- NO --> Step3[③ Check wiring between ECU terminal E1 and body ground.]
      Step2 -- OK --> Step4[Check fuse and fusible links.]
      Step3 -- OK --> TryECU[Try another ECU.]
      Step3 -- BAD --> RepairECU[Repair or replace.]
      Step4 -- BAD --> Replace[Replace.]
      Step4 -- OK --> Step5[Check wiring between ECU terminal and battery.]
      Step5 -- BAD --> RepairWiring[Repair or replace.]
  
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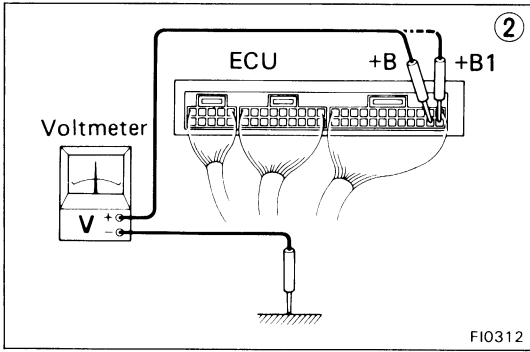
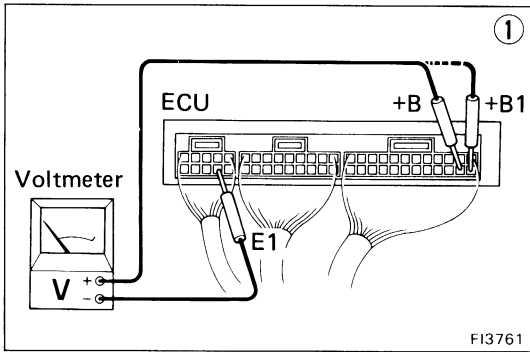


• IG SW – E1



• M-REL – E1



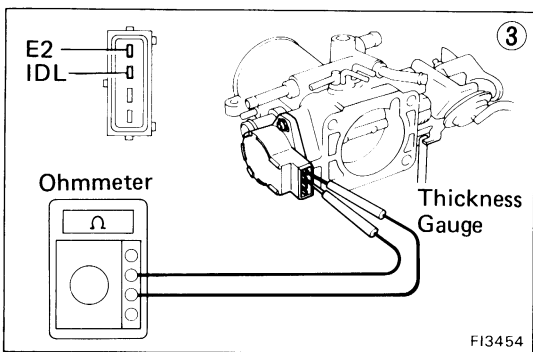
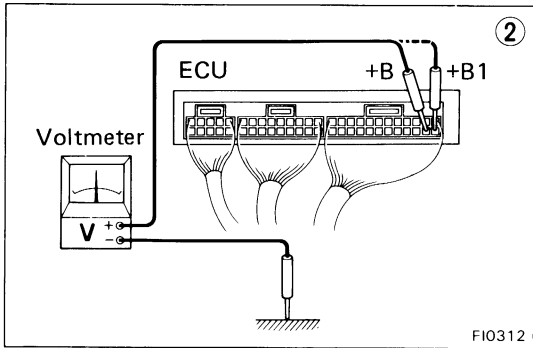
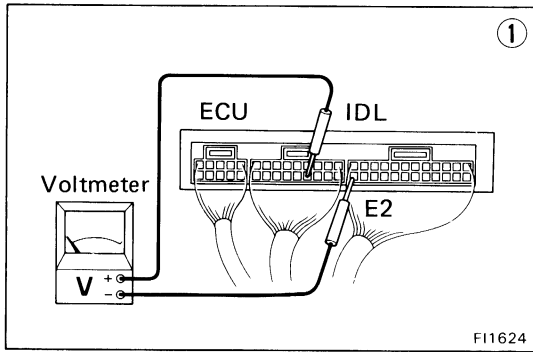
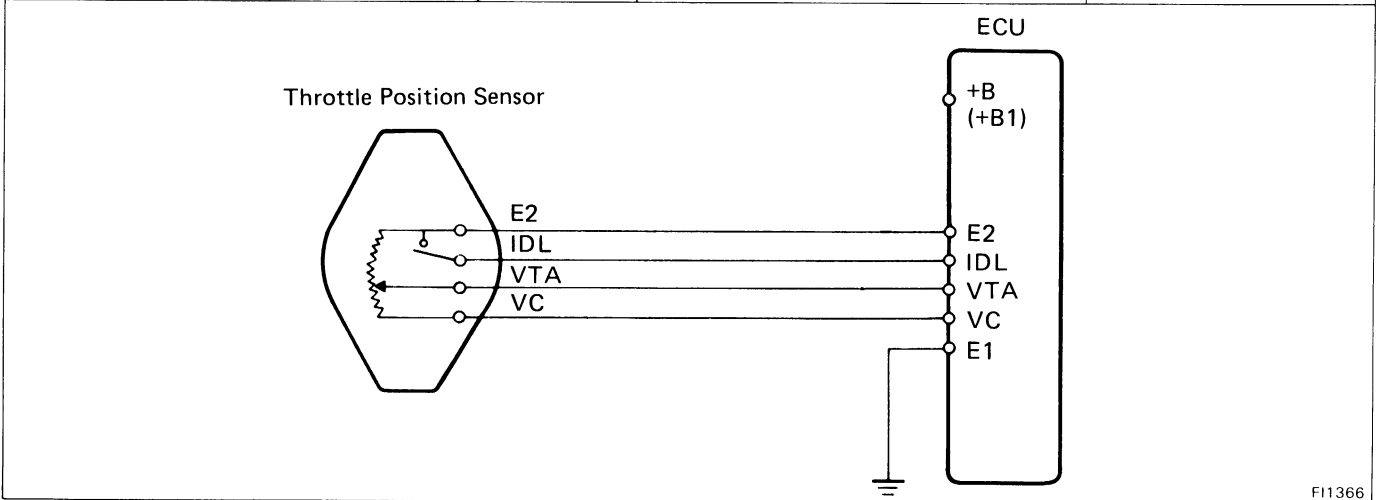


● +B (+B1) – E1

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    graph TD
        Start[① There is no voltage between ECU terminals +B (+B1) and E1. (IG SW ON)] --> Step2[② Check that there is voltage between ECU terminal +B (+B1) and body ground. (IG SW ON)]
        Step2 -- NO --> Fuse[Check fuse, fusible links and wiring harness.]
        Step2 -- OK --> E1Ground[Check wiring between ECU terminal E1 and body ground.]
        E1Ground -- OK --> ECU[Try another ECU.]
        E1Ground -- BAD --> RepairE1[Repair or replace.]
        Fuse -- BAD --> RepairFuse[Repair or replace.]
        Fuse -- OK --> Relay[Check EFI main relay. (See page FI-109)]
        Relay -- BAD --> ReplaceRelay[Replace.]
        Relay -- OK --> Refer[Refer to M-REL – E1 trouble section.]
    
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No.	Terminals	Trouble	Condition	STD voltage	
2	IDL — E2	No voltage	Ignition switch ON	Throttle valve open	10 — 14 V
	VC — E2			—	4 — 6 V
	VTA — E2			Throttle valve fully closed	0.1 — 1.0 V
				Throttle valve fully open	4 — 5 V

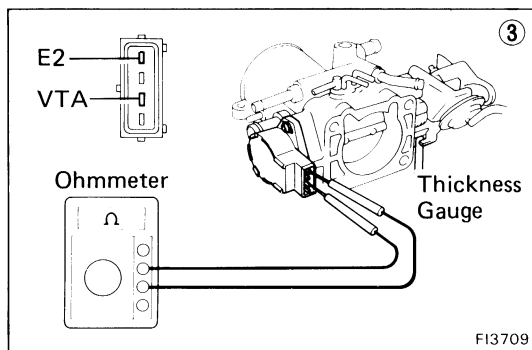
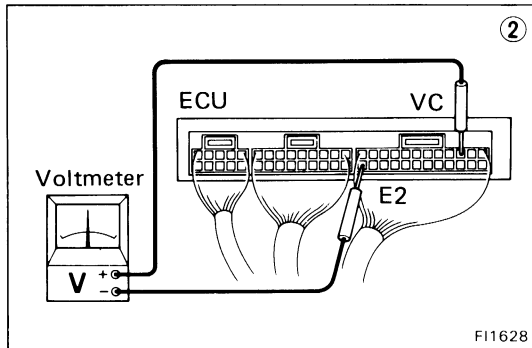
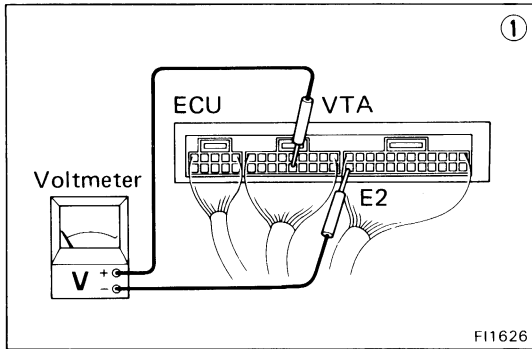
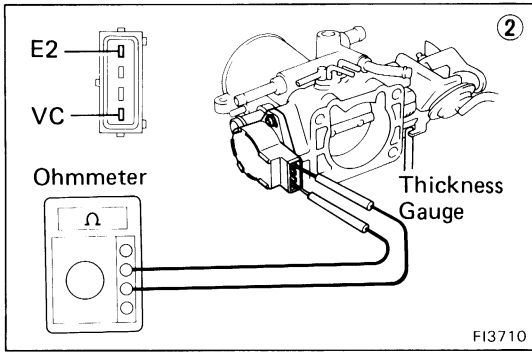
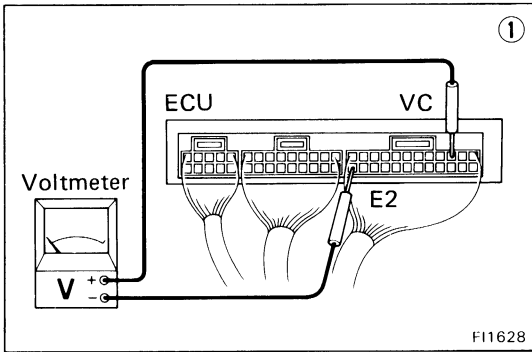


• IDL — E2

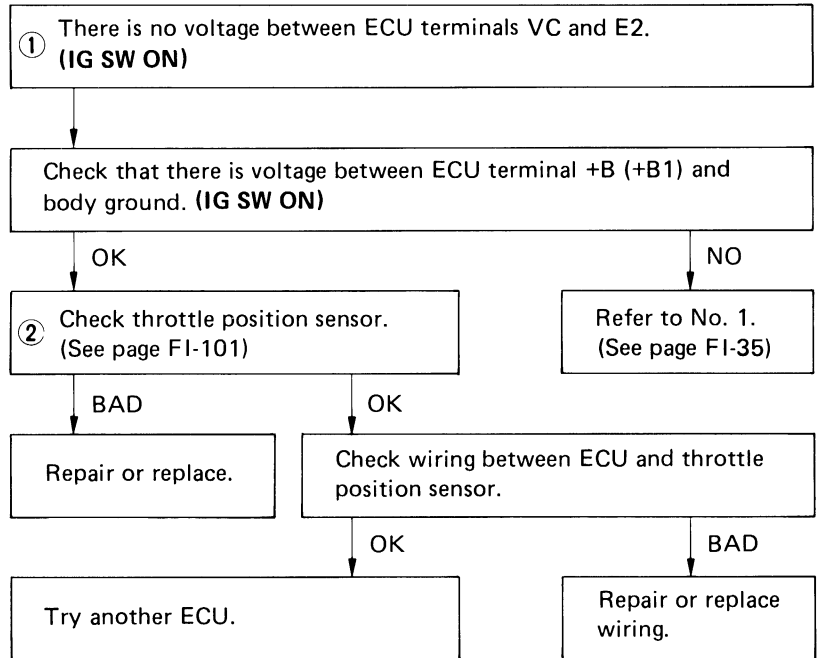
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    graph TD
      A["① There is no voltage between ECU terminals IDL and E2.  
(IG SW ON) (Throttle valve open)"] --> B["② Check that there is voltage between ECU terminal +B (+B1)  
and body ground. (IG SW ON)"]
      B -- NO --> C["Refer to No. 1.  
(See page FI-35)"]
      B -- OK --> D["Check wiring between ECU terminal E1 and body  
ground."]
      D -- OK --> E["Try another ECU."]
      D -- BAD --> F["Repair or replace."]
      C -- BAD --> F
      C -- OK --> G["③ Check throttle position  
sensor."]
      G -- BAD --> H["Repair or replace  
throttle position sensor."]
      G -- OK --> I["Check wiring between ECU and  
throttle position sensor."]
      I -- OK --> J["Try another ECU."]
      I -- BAD --> F
  
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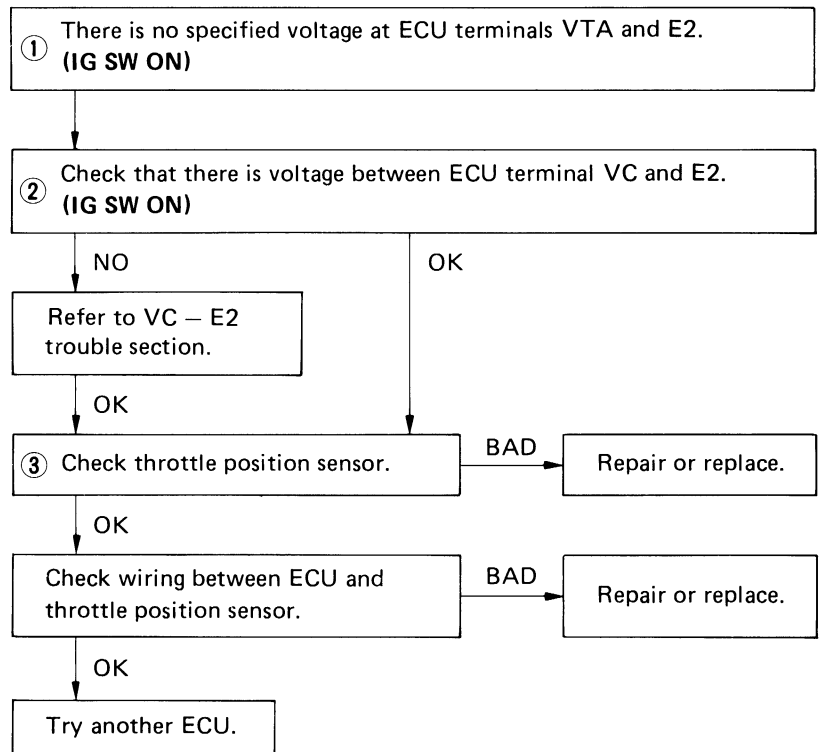




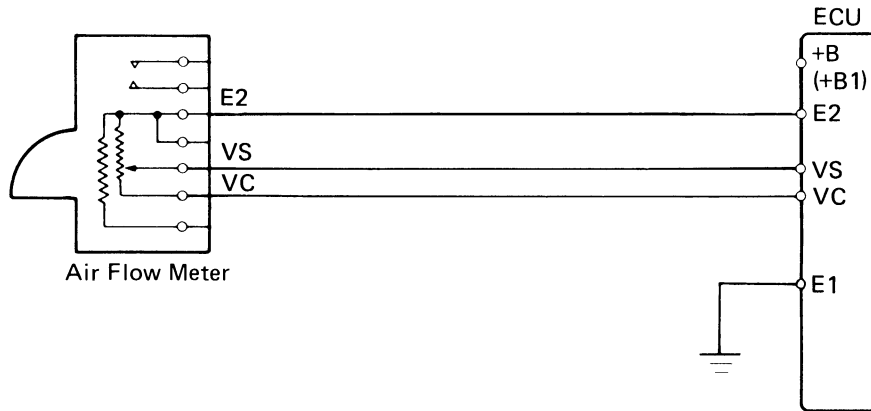
● VC – E2



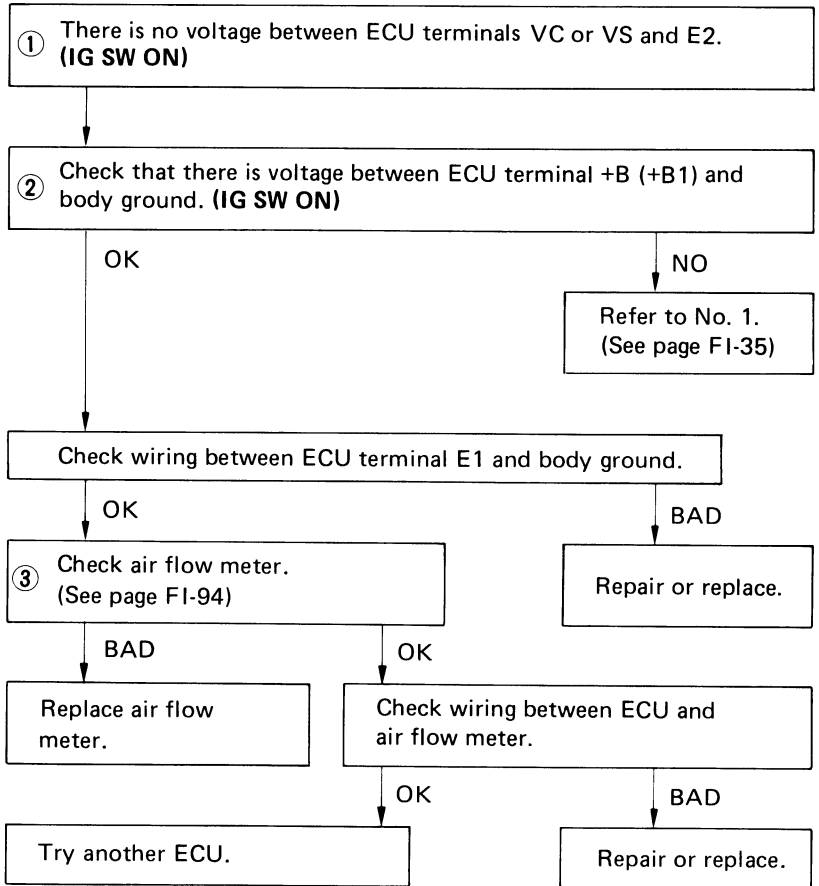
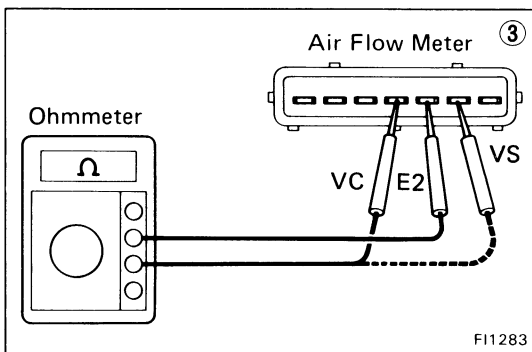
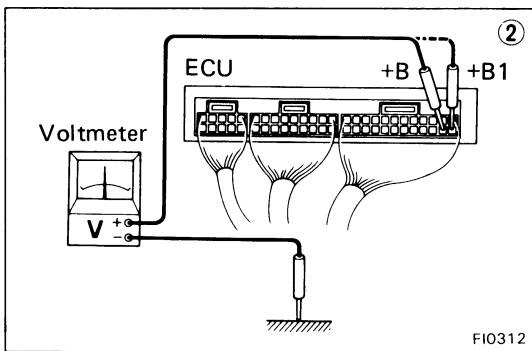
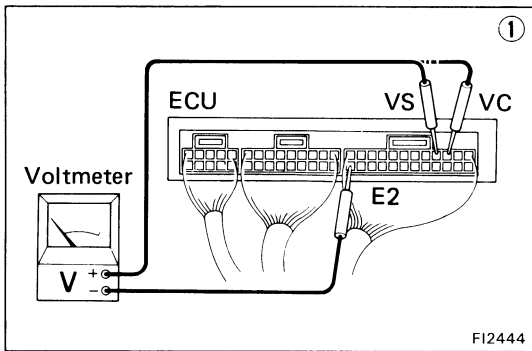
● VTA – E2



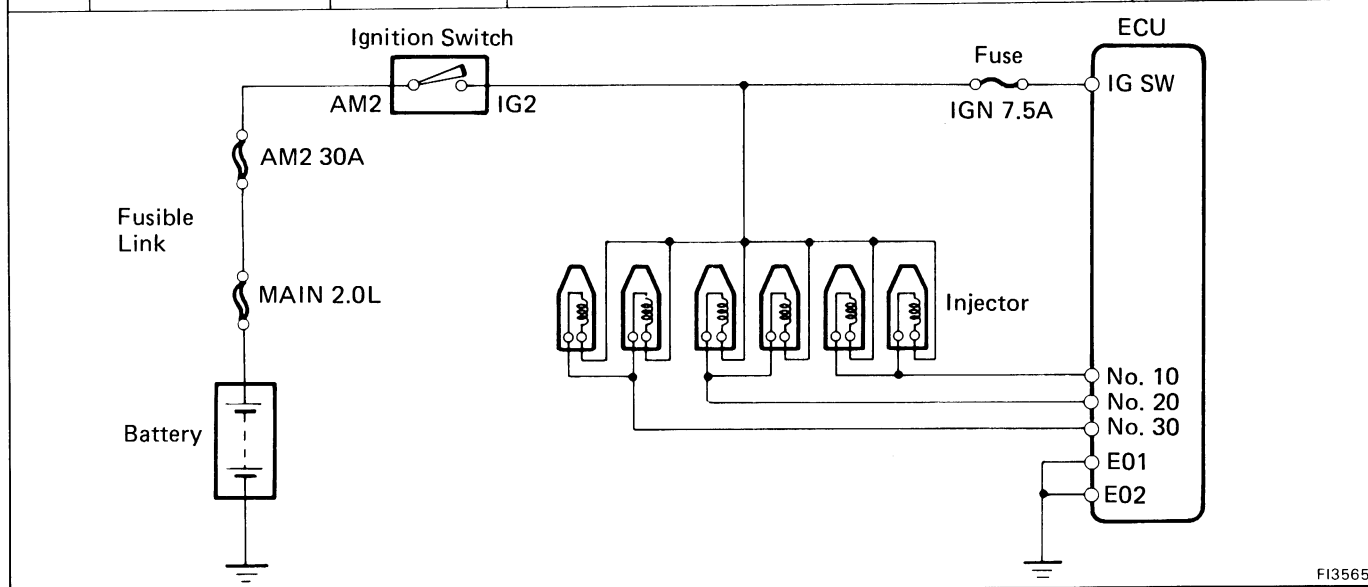
No.	Terminals	Trouble	Condition		STD Voltage
3	VC – E2	No voltage	Ignition SW ON	–	4 – 6 V
	VS – E2			Measuring plate fully closed	3.7 – 4.3 V
	VS – E2			Measuring plate fully open	0.2 – 0.5 V
	VS – E2		Idling	–	2.3 – 2.8 V
	VS – E2		3,000 rpm	–	1.0 – 2.0 V



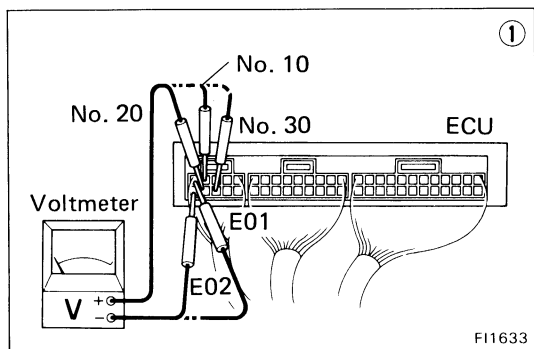
FI1269



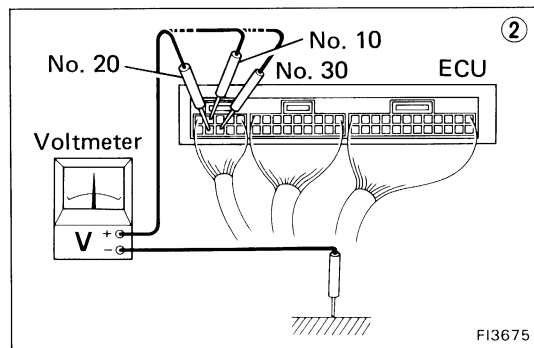
No.	Terminals	Trouble	Condition	STD Voltage
4	No. 10 E01 No. 20 – No. 30 E02	No voltage	Ignition switch ON	10 – 14 V



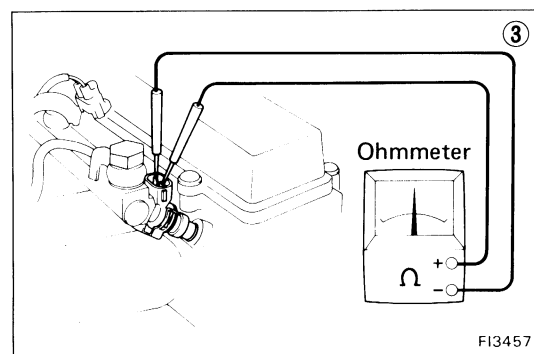
FI3565



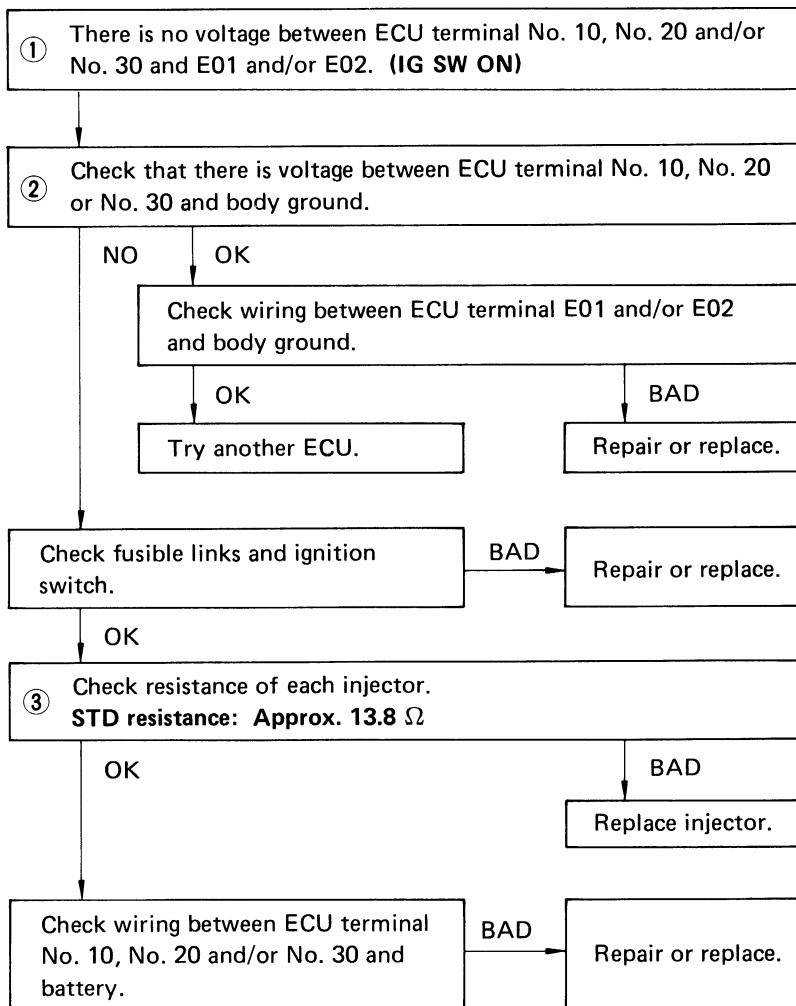
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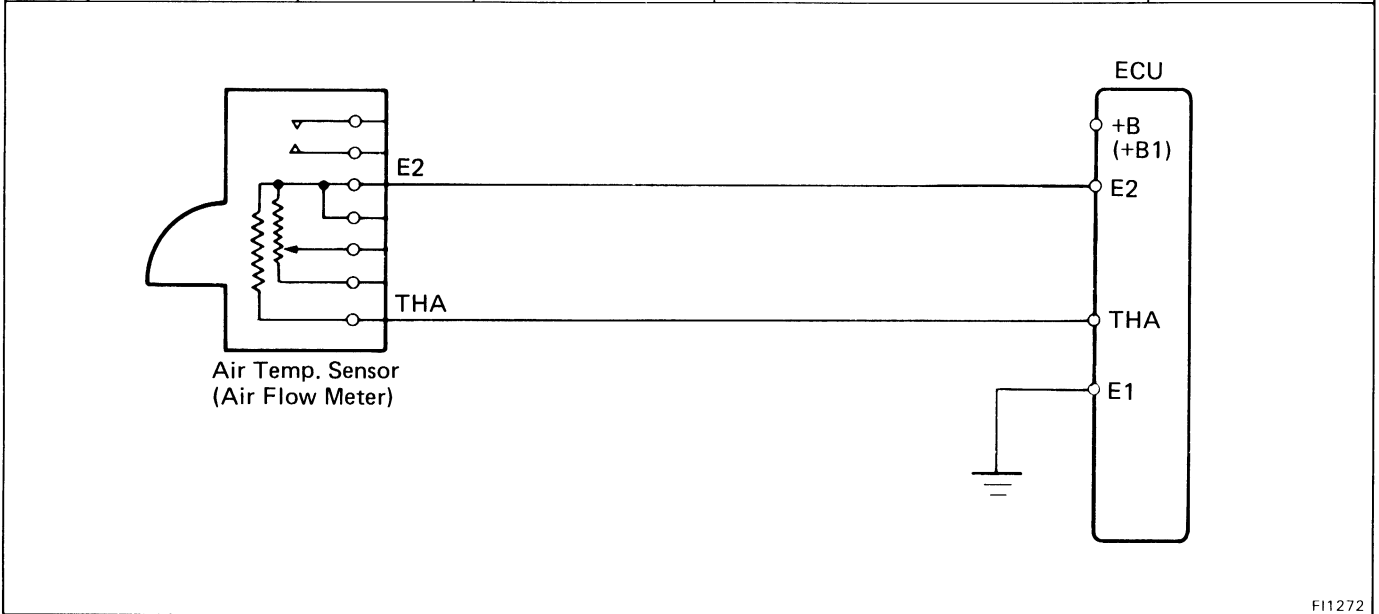
FI3675



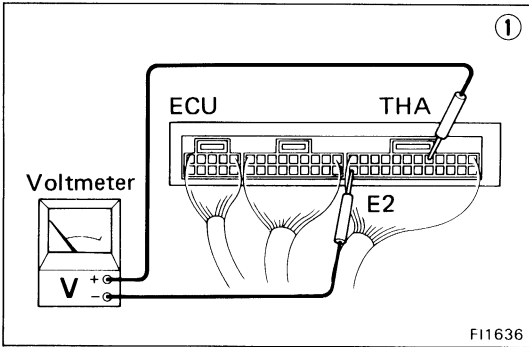
FI3457



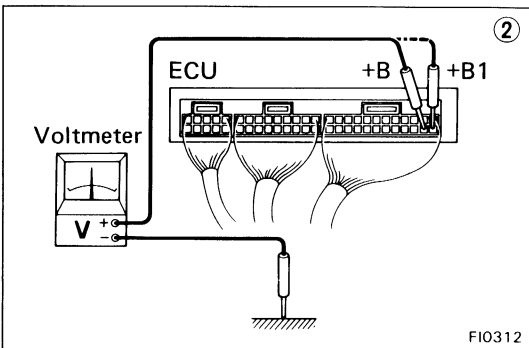
No.	Terminals	Trouble	Condition		STD Voltage
5	THA – E2	No voltage	Ignition switch ON	Intake air temperature 20°C (68°F)	1 – 3 V



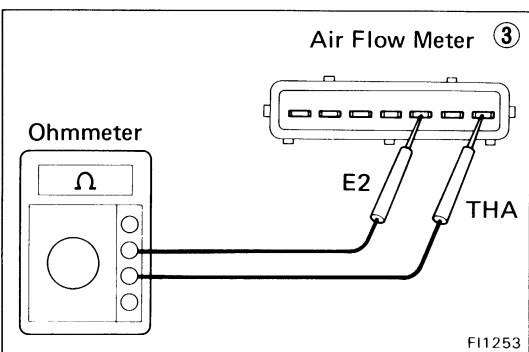
FI1272



FI1636



FI0312



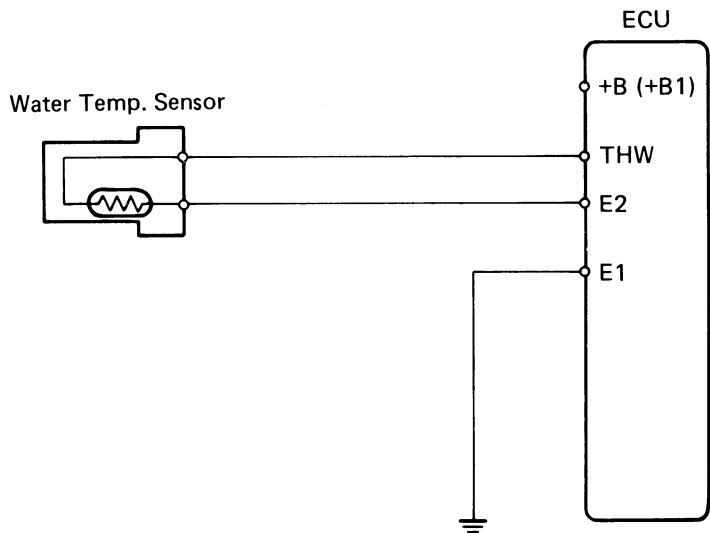
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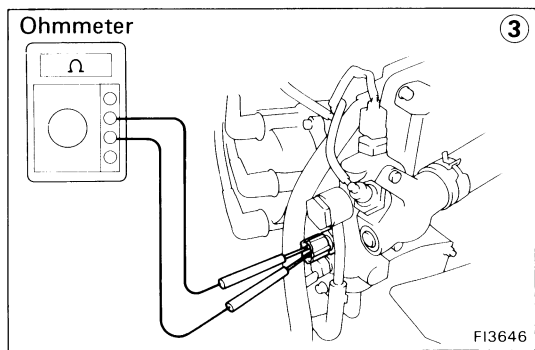
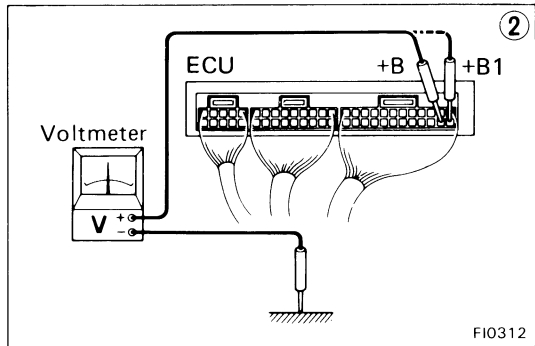
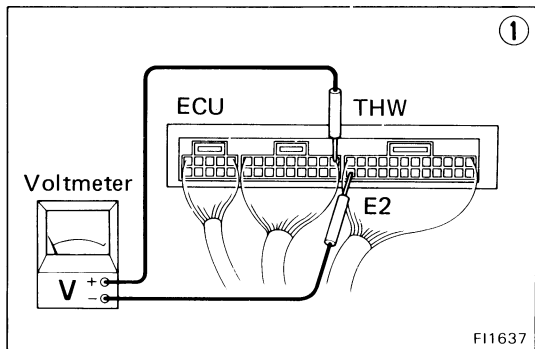
    graph TD
      Step1["① There is no voltage between ECU terminals THA and E2.  
(IG SW ON)"]
      Step2["② Check that there is voltage between ECU terminal +B (+B1) and  
body ground. (IG SW ON)"]
      Step3["③ Check air temp. sensor.  
(See page FI-94)"]
      Step4["Check wiring between ECU terminal E1 and body ground."]
      Step5["Check wiring between ECU and air  
temp. sensor."]
      Step6["Replace air flow  
meter."]
      Step7["Try another ECU."]
      Step8["Repair or replace."]
      Step9["Repair or replace."]

      Step1 --> Step2
      Step2 -- NO --> Step8
      Step2 -- OK --> Step4
      Step4 -- BAD --> Step8
      Step4 -- OK --> Step3
      Step3 -- BAD --> Step6
      Step3 -- OK --> Step5
      Step5 -- BAD --> Step9
      Step5 -- OK --> Step7
  
```

No.	Terminals	Trouble	Condition		STD Voltage
6	THW — E2	No voltage	Ignition switch ON	Coolant temperature 80°C (176°F)	0.1 — 1.0 V



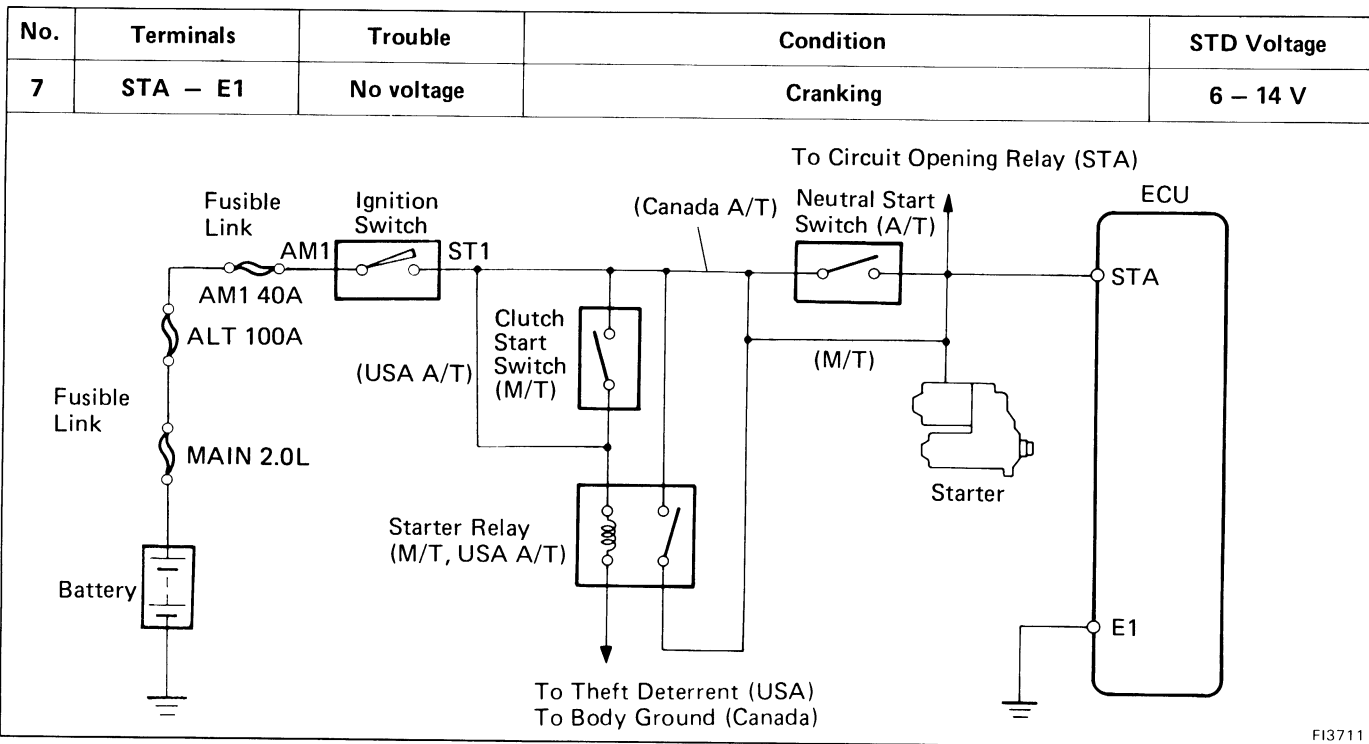
FI0487



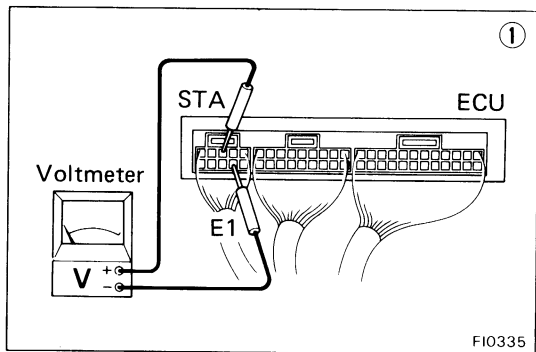
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    graph TD
      Step1["① There is no voltage between ECU terminals THW and E2.  
(IG SW ON)"]
      Step2["② Check that there is voltage between ECU terminal +B (+B1) and  
body ground. (IG SW ON)"]
      Step3["③ Check water temp. sensor.  
(See page FI-113)"]
      Step4["Check wiring between ECU terminal E1 and body ground."]
      Step5["Check wiring between ECU and  
water temp. sensor."]
      Step6["Try another ECU."]
      Step7["Repair or replace."]
      Step8["Repair or replace."]

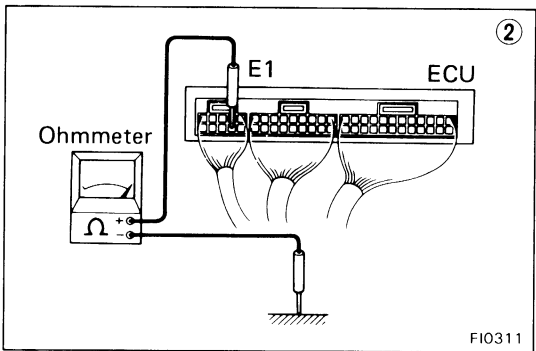
      Step1 --> Step2
      Step2 -- NO --> Step7
      Step2 -- OK --> Step4
      Step4 -- BAD --> Step7
      Step4 -- OK --> Step3
      Step3 -- BAD --> Step5
      Step3 -- OK --> Step5
      Step5 -- BAD --> Step7
      Step5 -- OK --> Step6
  
```



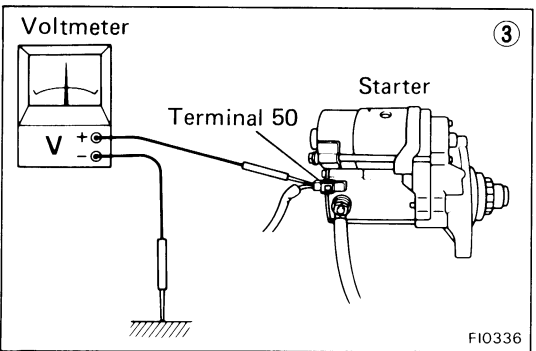
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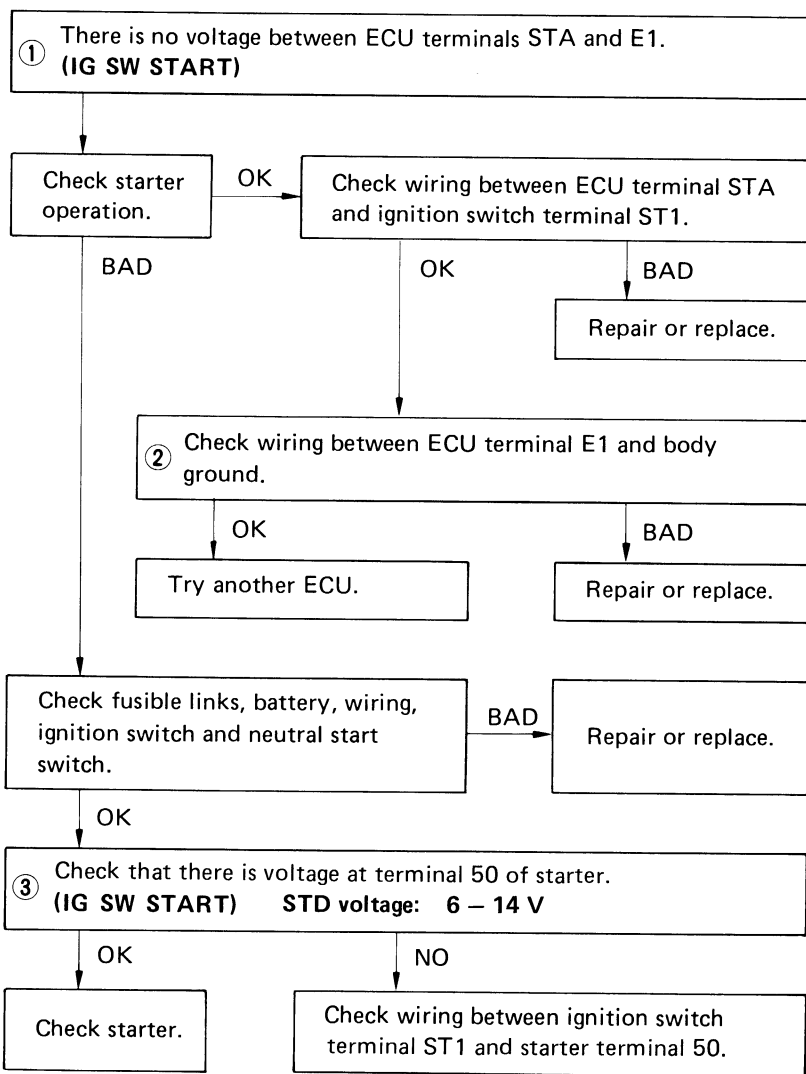
FI0335



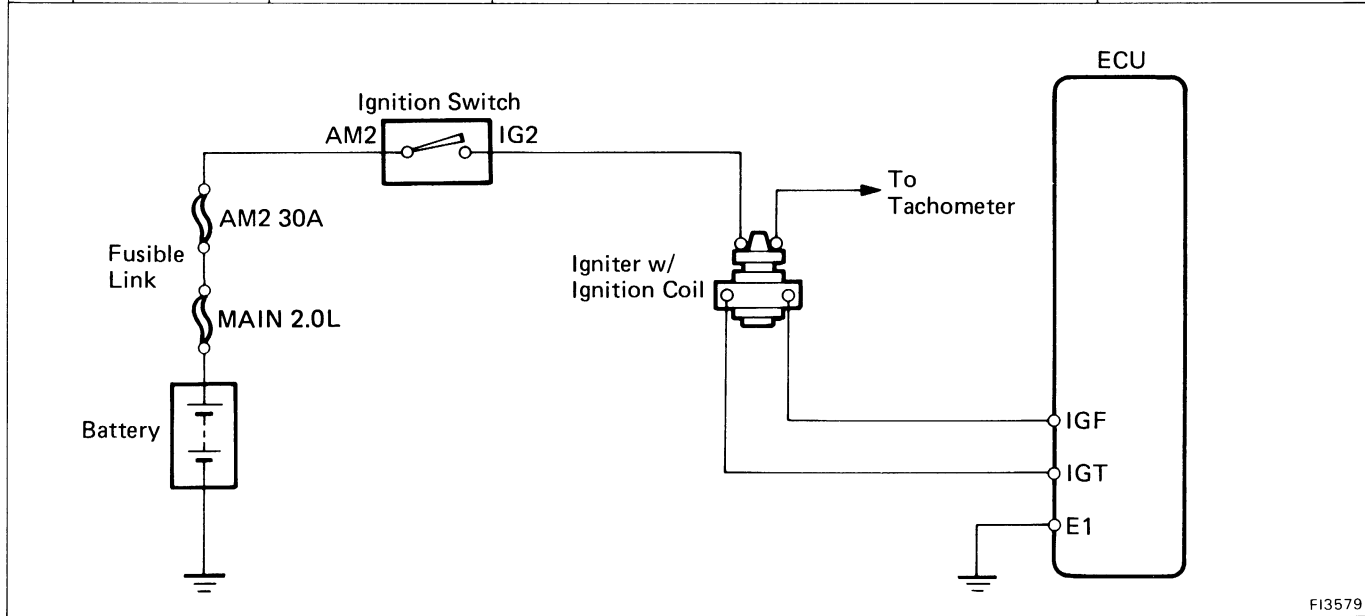
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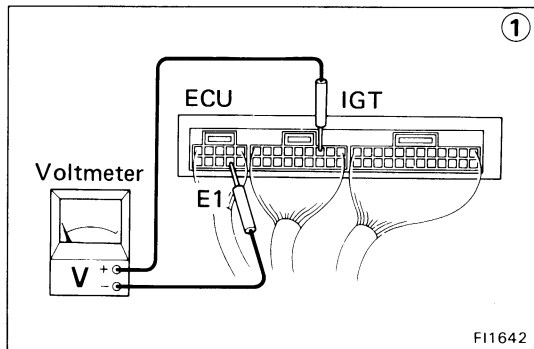
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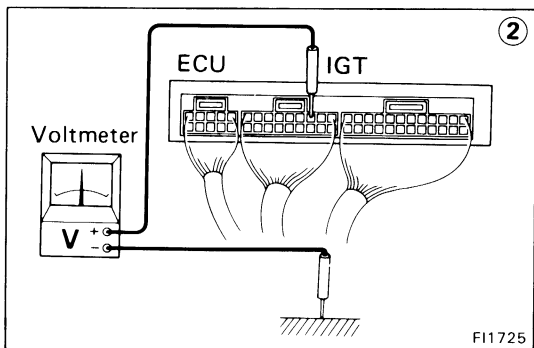
No.	Terminals	Trouble	Condition	STD Voltage
8	IGT – E1	No voltage	Idling	0.7 – 1.0 V



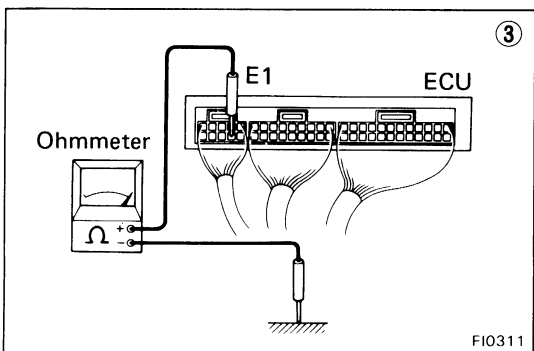
FI3579



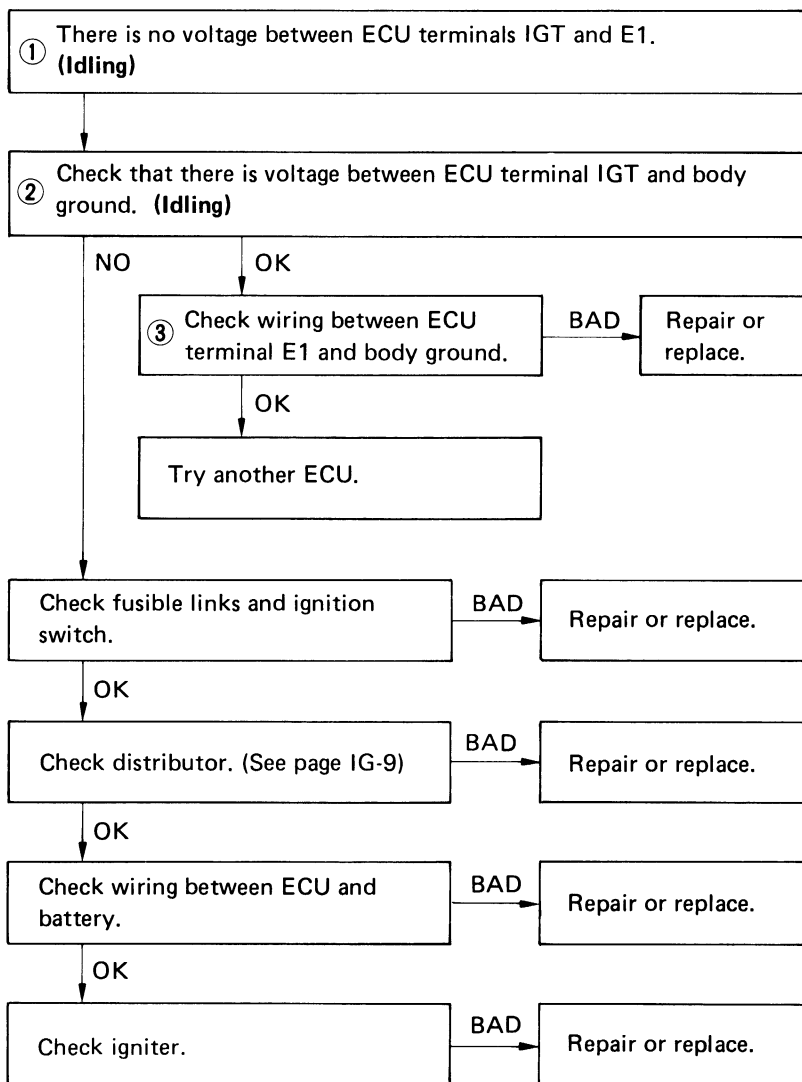
FI1642

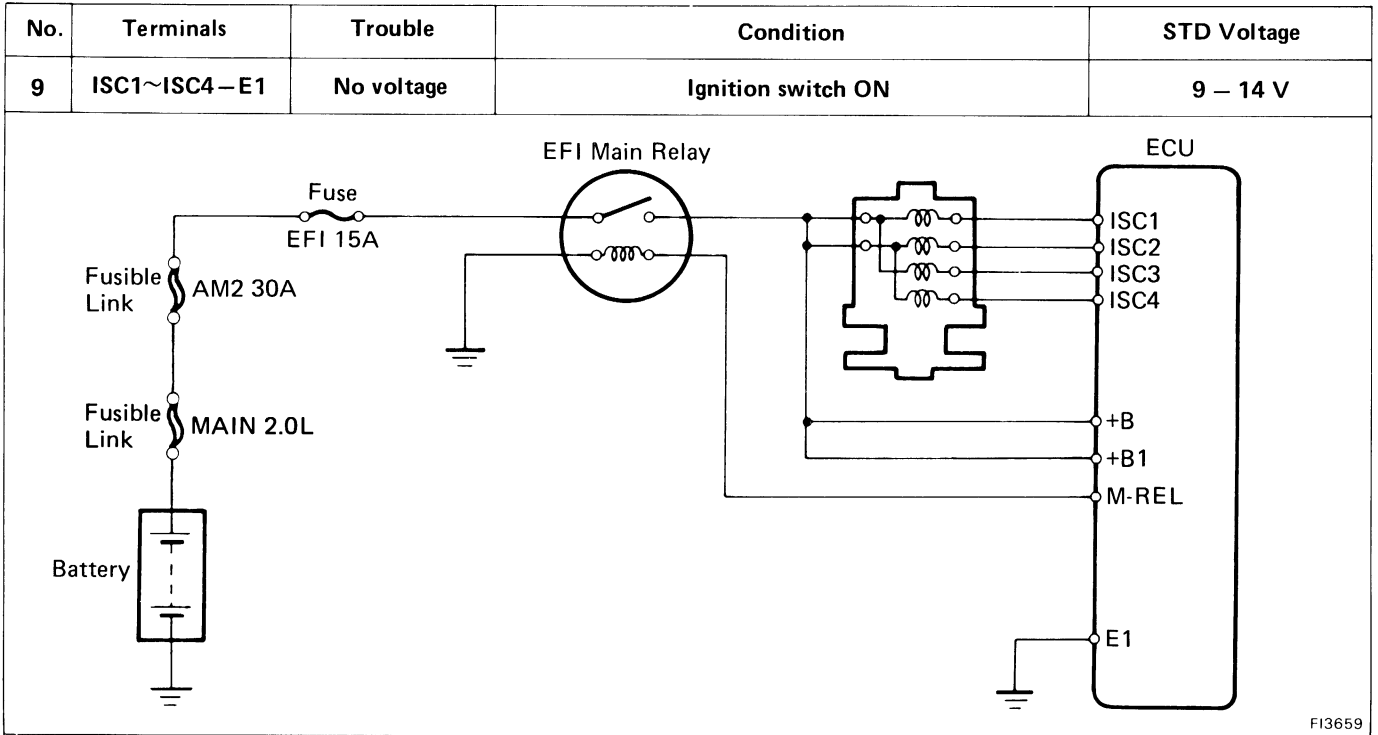


FI1725

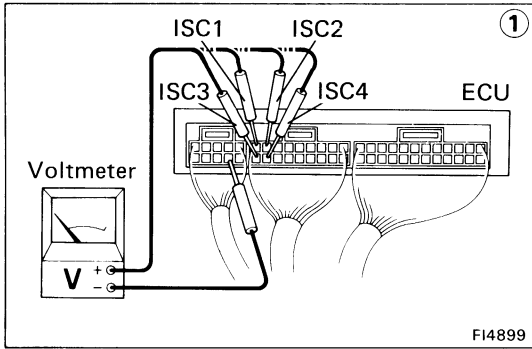


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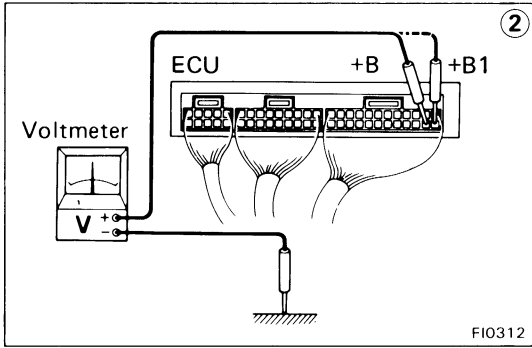




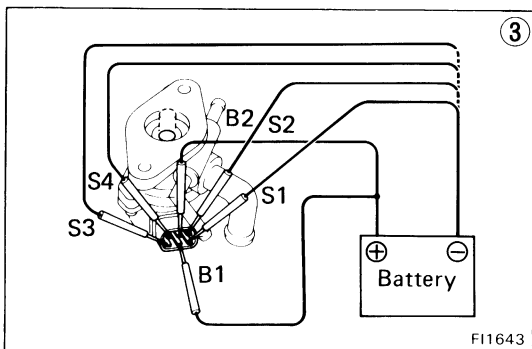
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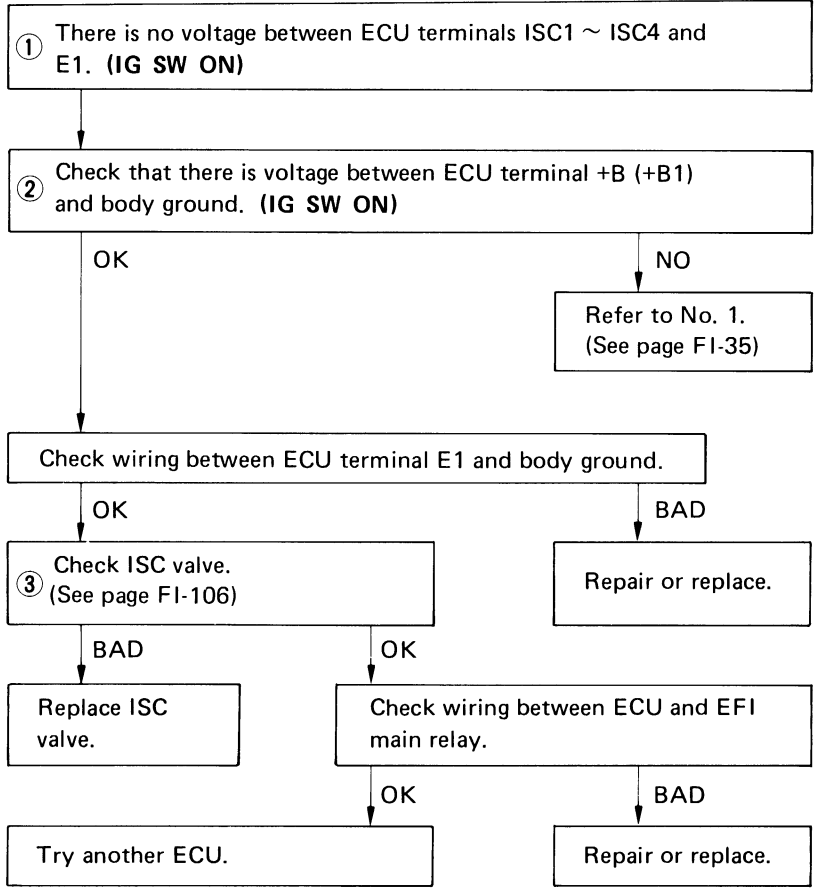
FI4899



FI0312

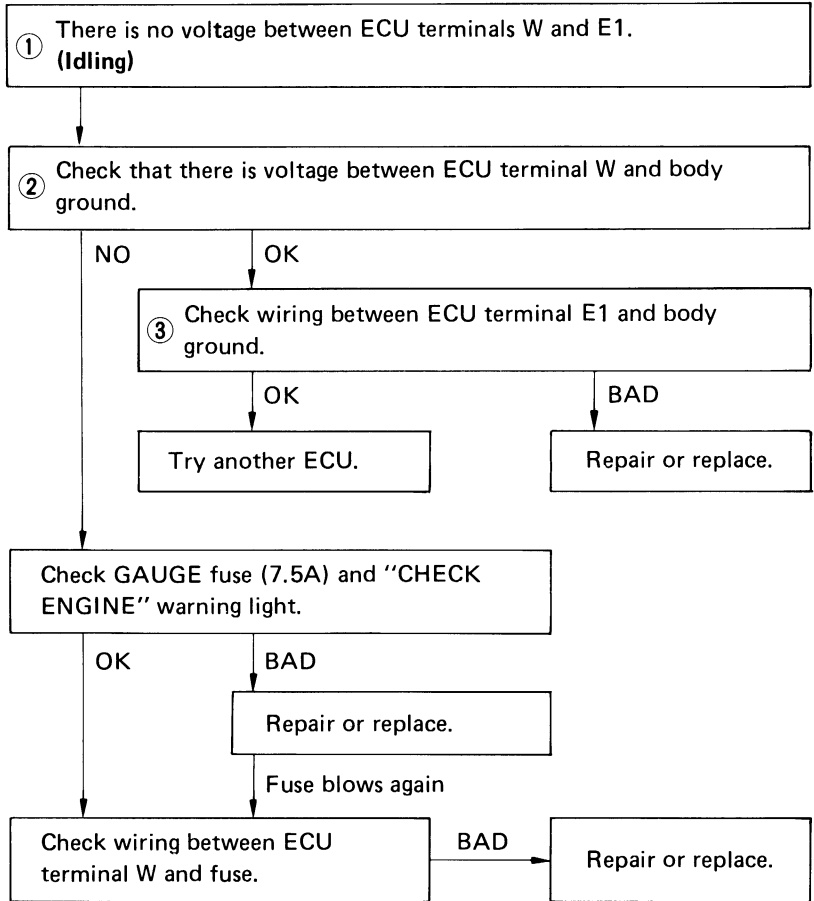
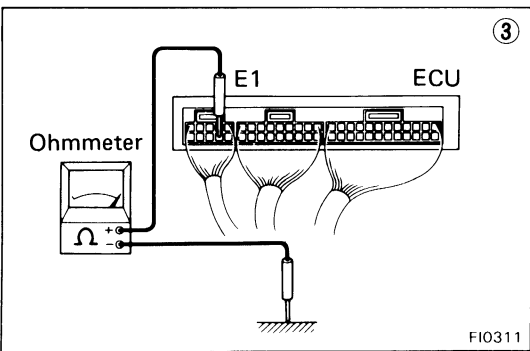
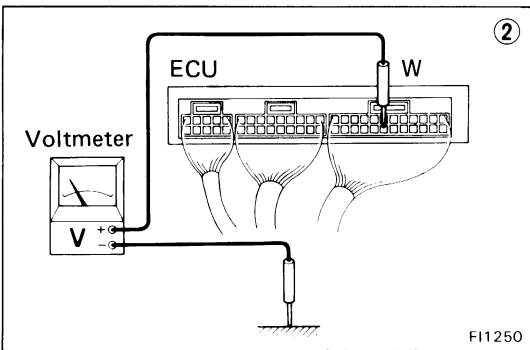
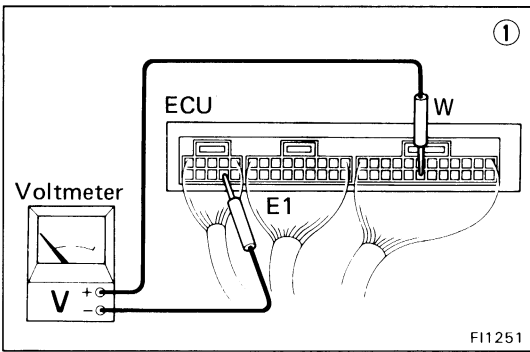
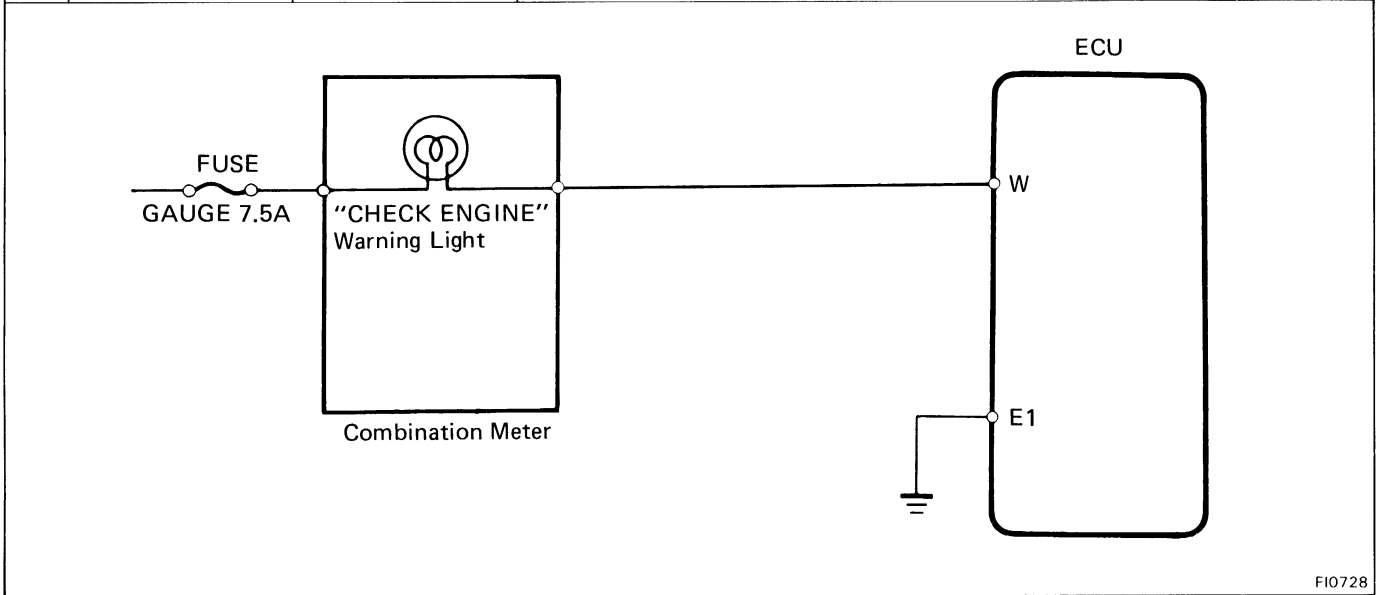


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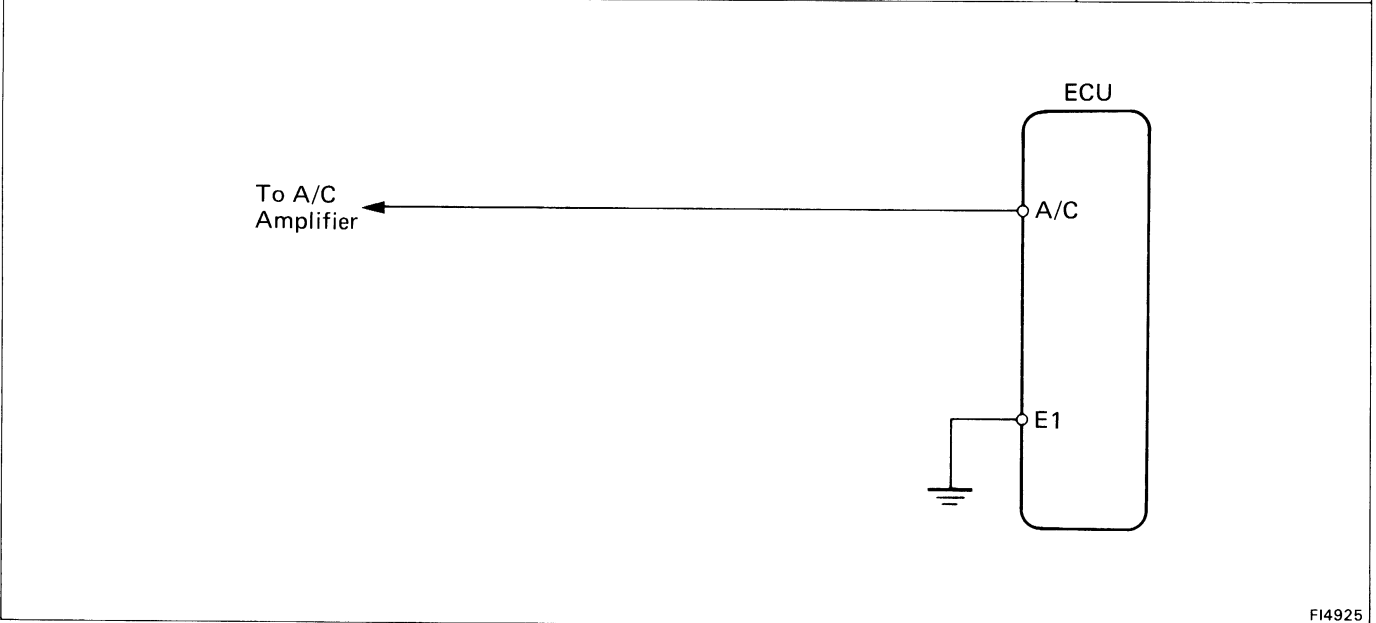




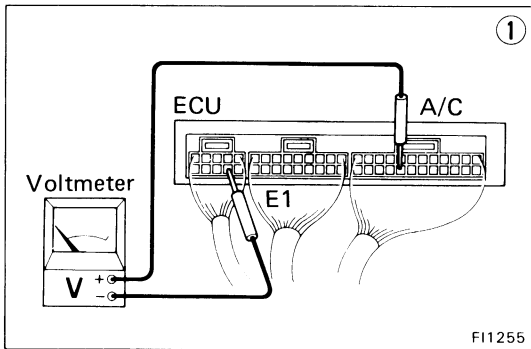
No.	Terminals	Trouble	Condition	STD Voltage
10	W – E1	No voltage	No. trouble ("CHECK ENGINE" warning light off) and engine running	8 – 14 V



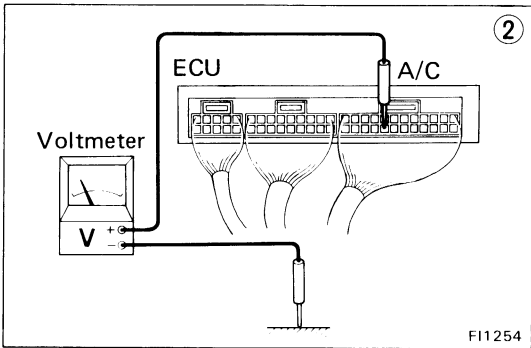
No.	Terminals	Trouble	Condition	STD Voltage
11	A/C – E1	No voltage	Air conditioning ON	10 – 14 V



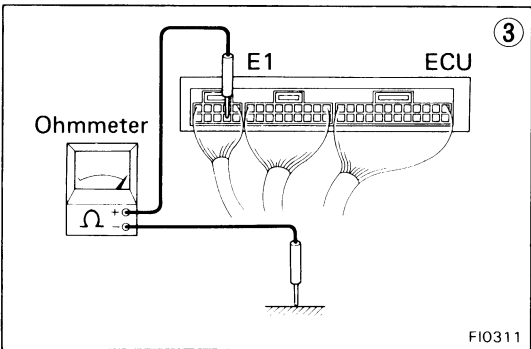
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FI1255



FI1254

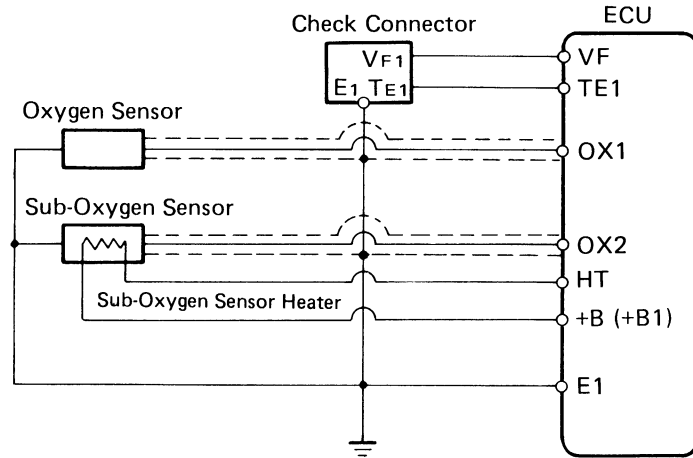


FI0311

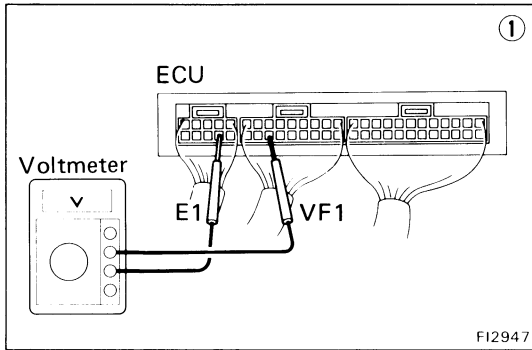
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    graph TD
      Step1["① There is no voltage between ECU terminals A/C and E1.  
(Air conditioning ON)"] --> Step2["② Check that there is voltage between ECU terminal A/C and  
body ground."]
      Step2 -- NO --> Step3["③ Check wiring between ECU terminal E1 and body  
ground."]
      Step2 -- OK --> Step4["Check that there is voltage between  
amplifier terminal and body ground."]
      Step3 -- OK --> TryECU["Try another ECU."]
      Step3 -- BAD --> RepairECU["Repair or replace."]
      Step4 -- BAD --> RepairAmp["Repair or replace."]
      Step4 -- OK --> Step5["Check wiring between amplifier and  
ECU terminal A/C."]
      Step5 -- BAD --> RepairWiring["Repair or replace."]
  
```

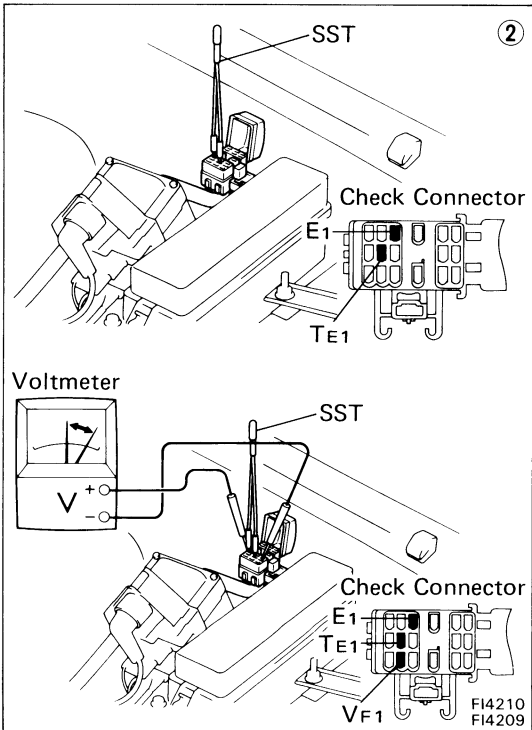
California vehicles only



FI3383



FI2947



FI4210  
FI4209

① There is no voltage between ECU terminals VF1 and E1.

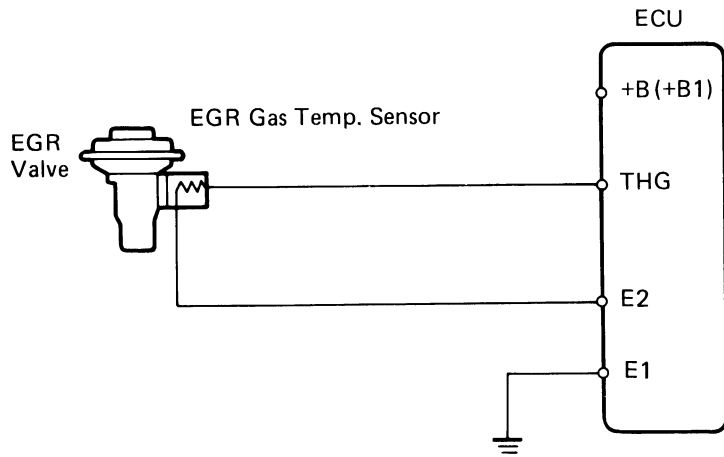
Check that there is specified voltage between ECU terminal VF1 and body ground.

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

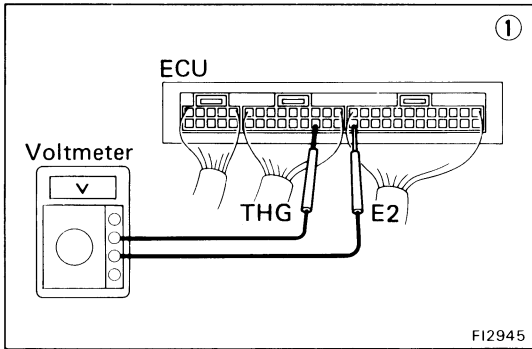
OK → Check for suction of air into exhaust system. → BAD → Repair air suction. → OK → Check for air leak from air intake system. → BAD → Repair air leak. → OK → Check spark plugs. → BAD → Repair or replace. → OK → Check distributor and ignition system. → BAD → Repair or replace. → OK → Check fuel pressure. → BAD → Repair or replace. → OK → Check injectors. → BAD → Repair or replace. → OK → Check cold start injector. \* → BAD → Repair or replace. → OK → Check air flow meter. → BAD → Repair or replace. → OK → ② Check operation of oxygen sensors. → OK → System normal. → BAD → Check wiring between oxygen sensors and ECU connectors. → BAD → Repair wiring. → OK → Replace oxygen sensors.

\* Rich malfunction only

California vehicles only

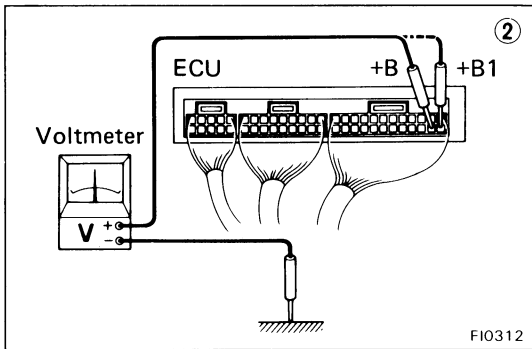


FI2680



① There is voltage between ECU terminals THG and E2. (IG SW ON)

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



Check wiring between ECU terminal E1 and body ground.

OK

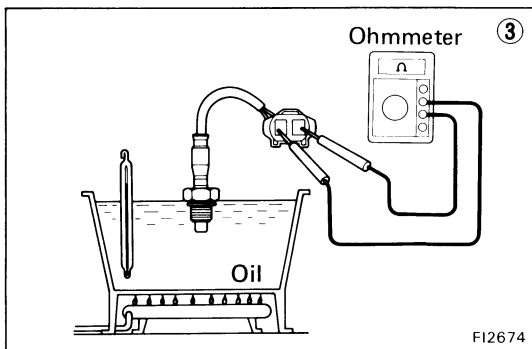
BAD

Repair or replace.

Check EGR system.

BAD

Repair or replace.



③ Check EGR gas temp. sensor. (See page FI-118)

BAD

Replace EGR gas temp. sensor.

OK

Check wiring between ECU and EGR gas temp. sensor.

OK

Try another ECU.

BAD

Repair or replace.

## TROUBLESHOOTING WITH VOLT/OHMMETER (7M-GTE)

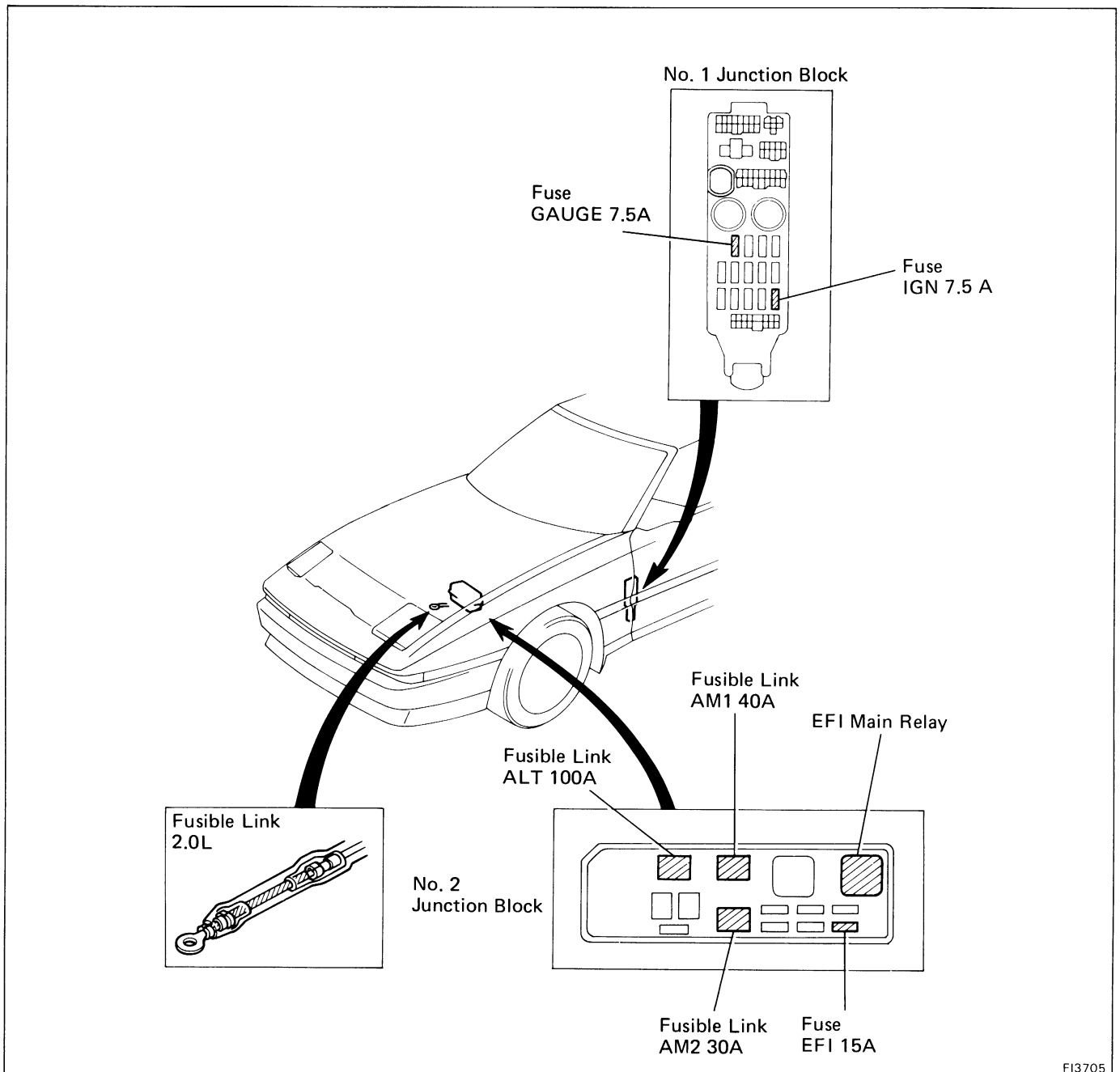
**HINT:** The following troubleshooting procedures are designed for inspection of each separate system, therefore the procedure may vary somewhat. However, troubleshooting should be performed referring to the inspection methods described in this manual.

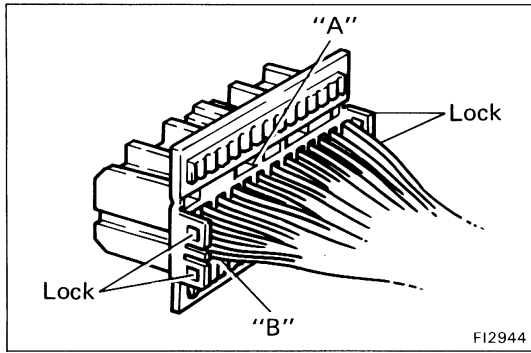
Before beginning inspection, it is best to first make a simple check of the fuses, fusible links and condition of the connectors.

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

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

### LOCATION OF FUSES AND FUSIBLE LINKS





## EFI SYSTEM CHECK PROCEDURE

### PREPARATION

- (a) Disconnect the connectors from the ECU.
- (b) Remove the locks as shown in the illustration so that the tester probe(s) can easily come in.

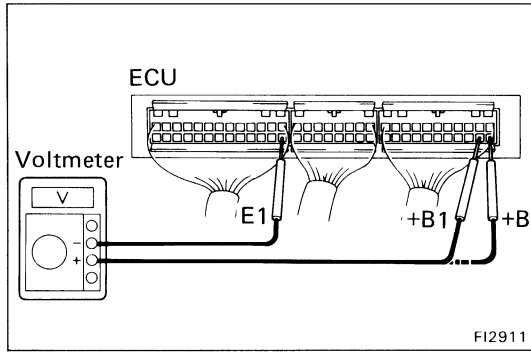
**NOTICE:** Pay attention to sections "A" and "B" in the illustration which can be easily broken.

- (c) Reconnect the connectors to the ECU.

### HINT:

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

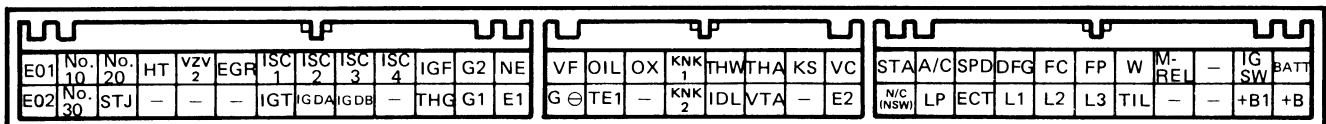
Using a voltmeter with high impedance (10 kΩ/V minimum), measure the voltage at each terminal of the wiring connectors.



### Terminals of ECU

Symbol	Terminal Name	Symbol	Terminal Name	Symbol	Terminal Name
E01	POWER GROUND	G2	CAM POSITION SENSOR	A/C	A/C COMPRESSOR
E02	POWER GROUND	G1	CAM POSITION SENSOR	*2 LP	HEADLIGHT RELAY
No. 10	INJECTOR (No. 1 and 6)	NE	CAM POSITION SENSOR	SPD	SPEED SENSOR
No. 30	INJECTOR (No. 4 and 5)	E1	COMPUTER GROUND	*3 ECT	ECT COMPUTER
No. 20	INJECTOR (No. 2 and 3)	VF	CHECK CONNECTOR	*2 DFG	DEFOGGER RELAY
STJ	COLD START INJECTOR	G ⊖	CAM POSITION SENSOR	L1	TEMS COMPUTER
HT	OXYGEN SENSOR HEATER	OIL	OIL PRESSURE SWITCH	FC	CIRCUIT OPENING RELAY
—	—	TE1	CHECK CONNECTOR	L2	TEMS ECU COMPUTER
VSV2	VSV (FPU)	OX	OXYGEN SENSOR	FP	FUEL PUMP RELAY
—	—	—	—	L3	TEMS COMPUTER
EGR	VSV (EGR)	KNK1	KNOCK SENSOR	W	WARNING LIGHT
—	—	KNK2	KNOCK SENSOR	TIL	TURBO INDICATOR
ISC1	ISC MOTOR NO. 1 COIL	THW	WATER TEMP. SENSOR	M-REL	EFI MAIN RELAY (COIL)
IGT	IGNITER	IDL	THROTTLE POSITION SENSOR	—	—
ISC2	ISC MOTOR NO. 2 COIL	THA	AIR TEMP. SENSOR	—	—
IGDA	IGNITER	VTA	THROTTLE POSITION SENSOR	—	—
ISC3	ISC MOTOR NO. 3 COIL	KS	AIR FLOW METER	IG SW	IGNITION SWITCH
IGDB	IGNITER	—	—	+B1	EFI MAIN RELAY
ISC4	ISC MOTOR NO. 4 COIL	VC	AIR FLOW METER THROTTLE POSITION SENSOR	BATT	BATTERY
—	—	E2	SENSOR GROUND	+B	EFI MAIN RELAY
IGF	IGNITER	STA	STARTER SWITCH	*1 California vehicles only *2 M/T only *3 A/T only	
*1 THG	EGR GAS TEMP. SENSOR	N/C (NSW)	CLUTCH SWITCH (M/T) NEUTRAL START SWITCH (A/T)		

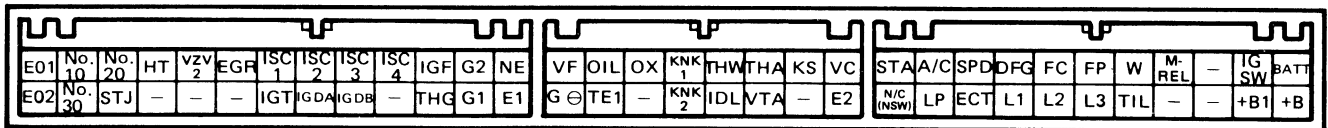
### ECU Terminals



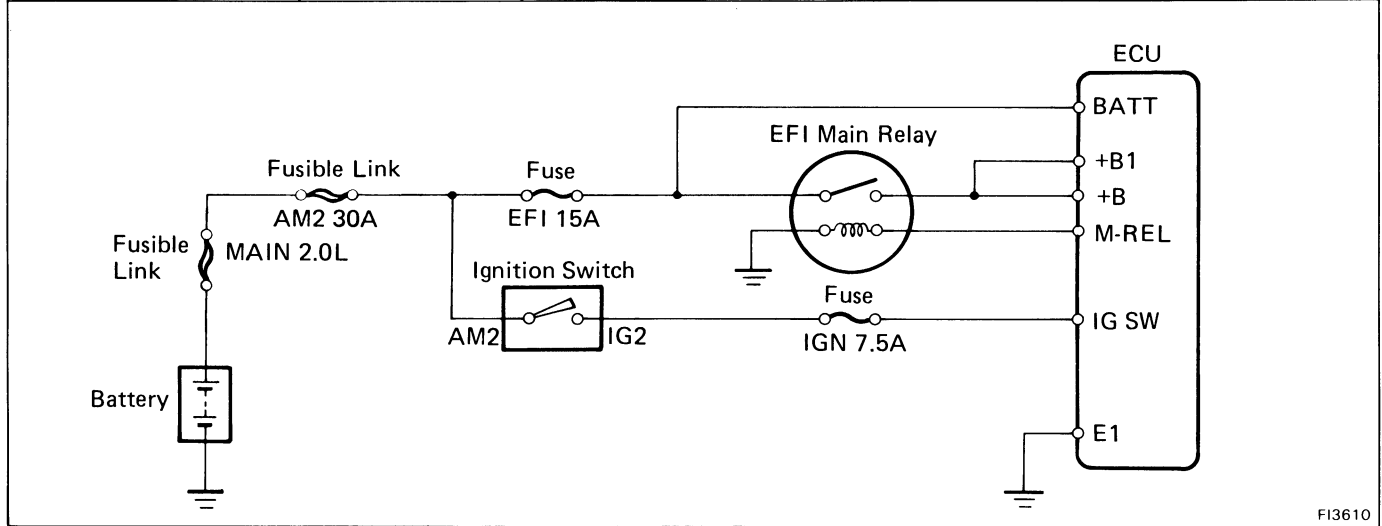
**Voltage at ECU Wiring Connectors**

No.	Terminals	Condition		STD Voltage	See Page
1	BATT – E1	–		10 – 14	FI-52
	IG SW – E1	Ignition SW ON		10 – 14	FI-53
	M-REL – E1				
	+B (+B1) – E1				
2	IDL – E2	Ignition SW ON	Throttle valve open	4 – 6	FI-55
	VC – E2		–	4 – 6	FI-56
	VTA – E2		Throttle valve fully closed	0.1 – 1.0	
			Throttle valve fully open	3.2 – 4.2	
3	KS – Body ground	Ignition SW ON		4 – 6	FI-57
		Cranking or running		2 – 4	
	VC – Body ground	Ignition SW ON		4 – 6	FI-58
4	No. 10 E01 No. 20 – No. 30 E02	Ignition SW ON		10 – 14	FI-59
5	THA – E2	Ignition SW ON	Intake air temperature 20°C (68°F)	1 – 3	FI-60
6	THW – E2	Ignition SW ON	Coolant temperature 80°C (176°F)	0.1 – 1.0	FI-61
7	STA – E1	Cranking		6 – 14	FI-62
8	IGT – E1	Idling		0.7 – 1.0	FI-63
9	IGDA IGDB – E1	Idling		1 – 3	FI-64
10	ISC1 ISC4 – E1	Ignition SW ON		9 – 14	FI-65
11	W – E1	No trouble ("CHECK ENGINE" warning light off) and engine running		8 – 14	FI-66
12	A/C – E1	Air conditioning ON		10 – 14	FI-67

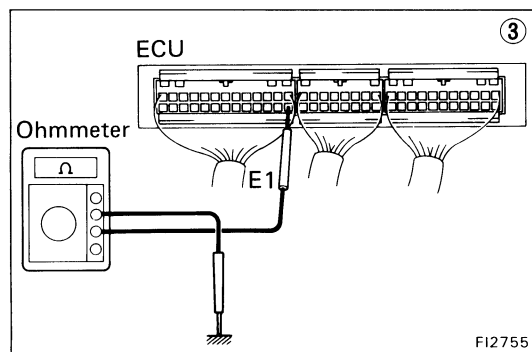
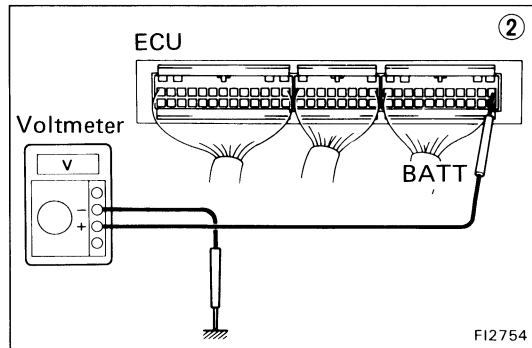
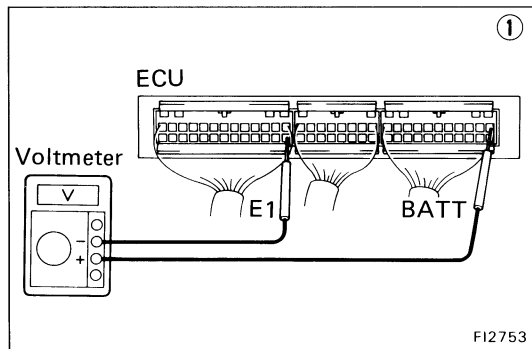
**ECU Terminals**



No.	Terminals	Trouble	Condition	STD Voltage
1	BATT – E1	No voltage	—	10 – 14 V
	IG SW – E1	No voltage	Ignition switch ON	10 – 14 V
	M-REL – E1	No voltage	Ignition switch ON	10 – 14 V
	+B(+B1) – E1	No voltage	Ignition switch ON	10 – 14 V



FI3610

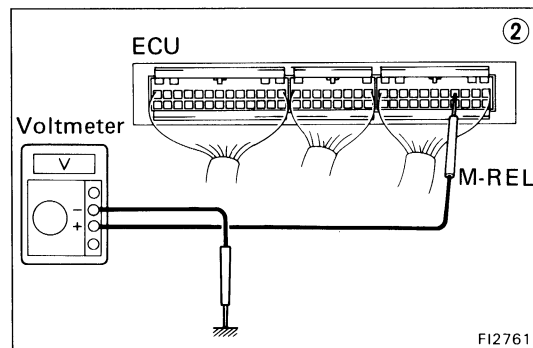
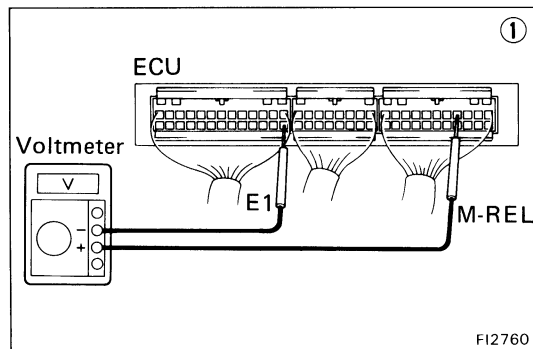
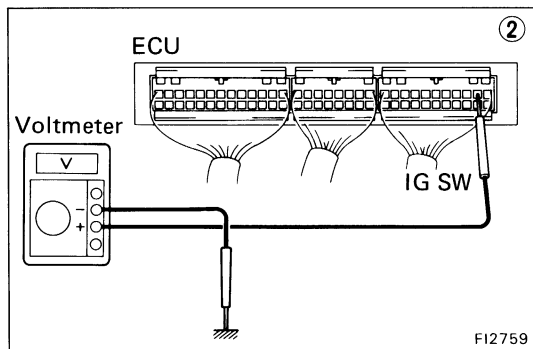
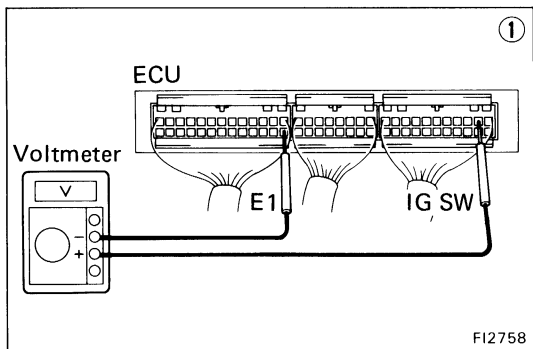


● BATT – E1

```

    graph TD
      Step1["① There is no voltage between ECU terminals BATT and E1."] --> Step2["② Check that there is voltage between ECU terminal BATT and body ground."]
      Step2 -- NO --> Step3["③ Check wiring between ECU terminal E1 and body ground."]
      Step2 -- OK --> Step4["Check fuse and fusible links."]
      Step3 -- OK --> TryECU["Try another ECU."]
      Step3 -- BAD --> RepairECU["Repair or replace."]
      Step4 -- BAD --> Replace["Replace."]
      Step4 -- OK --> Step5["Check wiring between ECU terminal and battery."]
      Step5 -- BAD --> RepairWiring["Repair or replace."]
  
```





● IG SW – E1

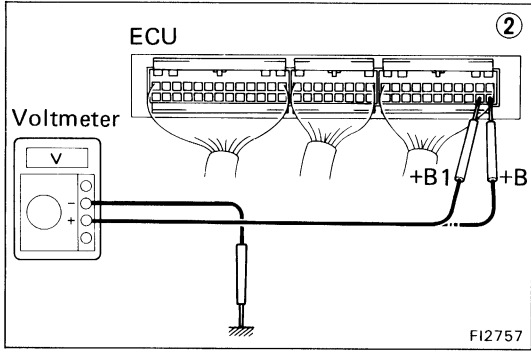
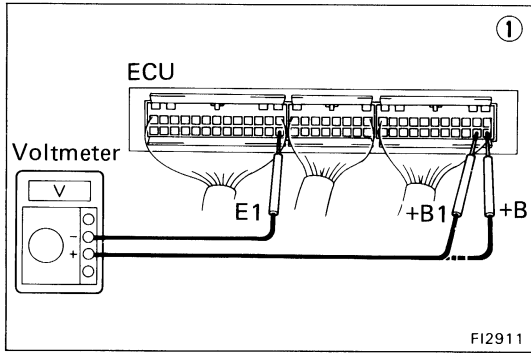
```

    graph TD
      A["① There is no voltage between ECU terminals IG SW and E1.  
(IG SW ON)"] --> B["② Check that there is voltage between ECU terminal IG SW and  
body ground. (IG SW ON)"]
      B -- NO --> C["Check fuse, fusible links and  
ignition switch."]
      C -- BAD --> D["Repair or replace."]
      B -- OK --> E["Check wiring between ECU terminal E1 and body  
ground."]
      E -- OK --> F["Try another ECU."]
      E -- BAD --> G["Repair or replace."]
    
```

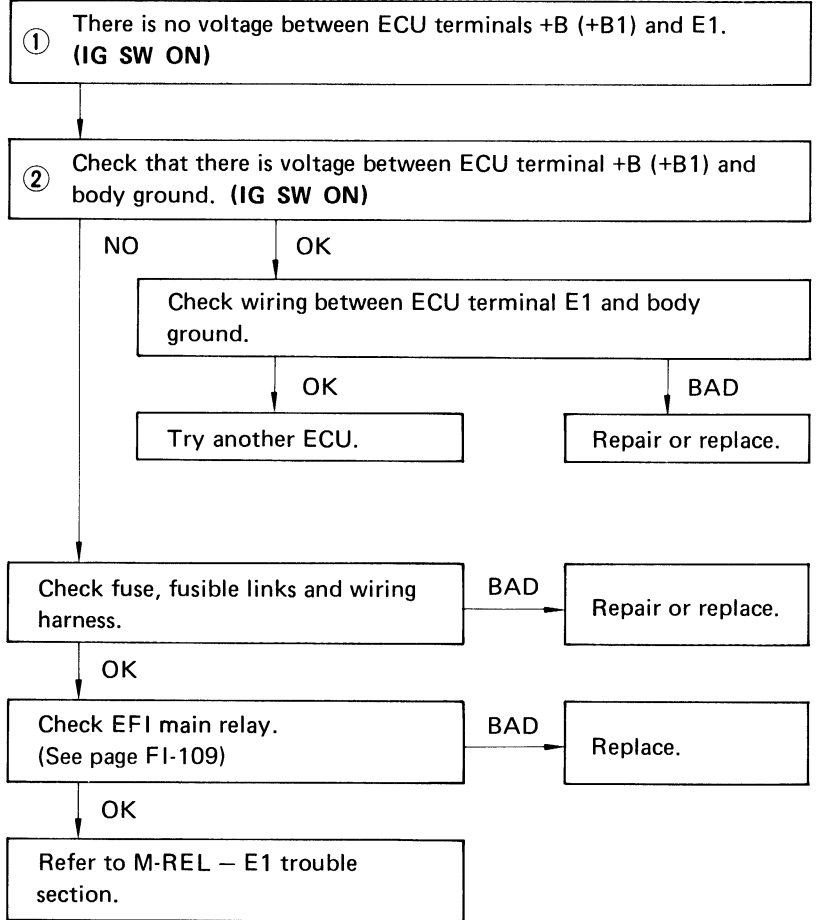
● M-REL – E1

```

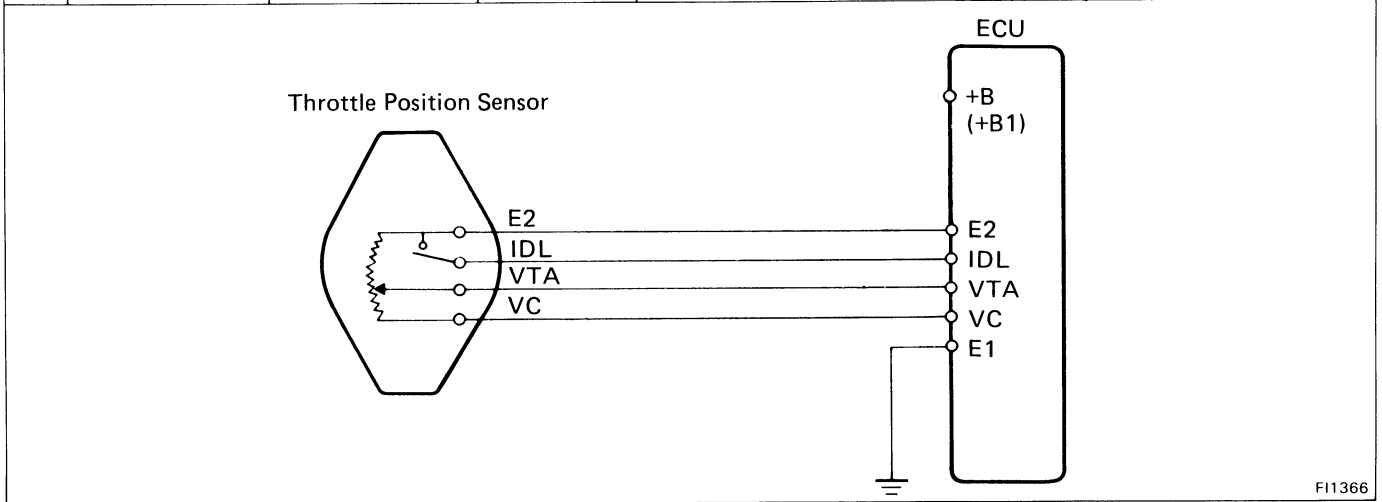
    graph TD
      A["① There is no voltage between ECU terminals M-REL and E1.  
(IG SW ON)"] --> B["② Check that there is voltage between ECU terminal M-REL and  
body ground. (IG SW ON)"]
      B -- NO --> C["Check EFI main relay and wiring  
harness."]
      C -- BAD --> D["Replace."]
      C -- OK --> E["Try another ECU."]
      B -- OK --> F["Check wiring between ECU terminal E1 and body  
ground."]
      F -- OK --> G["Try another ECU."]
      F -- BAD --> H["Repair or replace."]
    
```



• +B (+B1) – E1



No.	Terminals	Trouble	Condition	STD voltage	
2	IDL – E2	No voltage	Ignition switch ON	Throttle valve open	4 – 6 V
	VC – E2			–	4 – 6 V
	VTA – E2			Throttle valve fully closed	0.1 – 1.0 V
				Throttle valve fully open	3.2 – 4.2 V

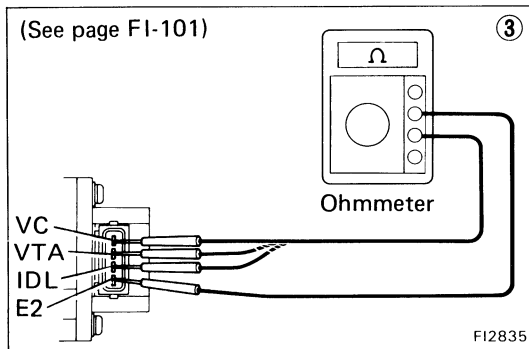
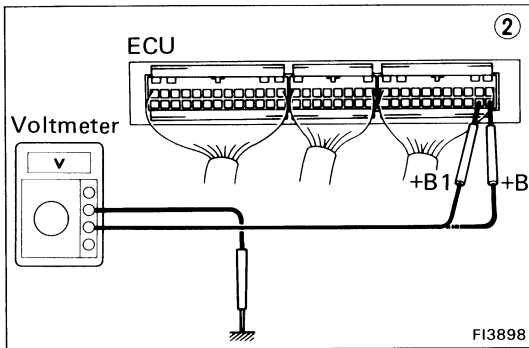
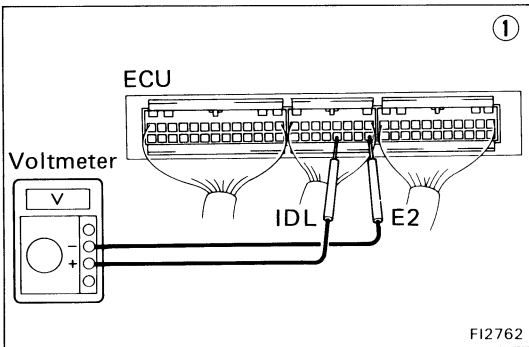


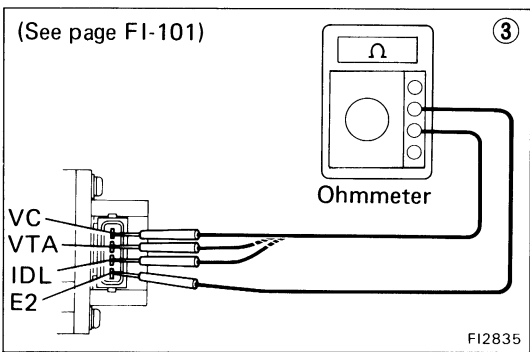
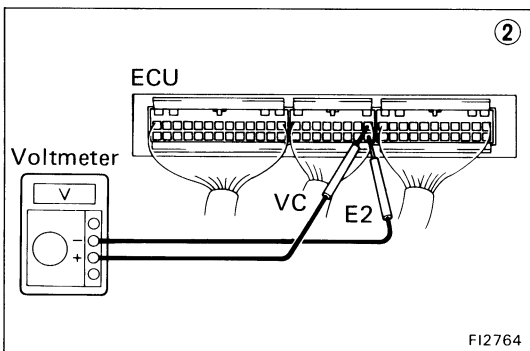
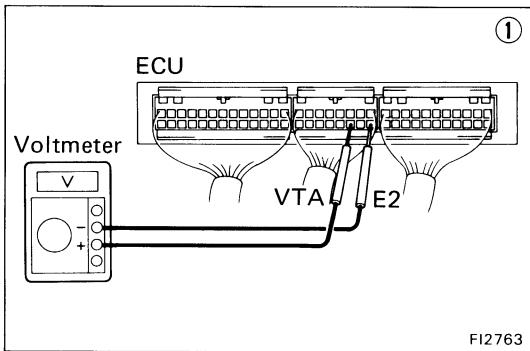
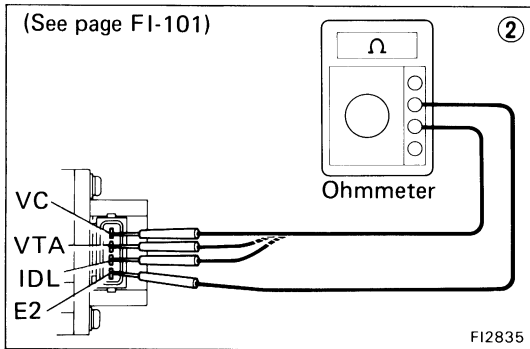
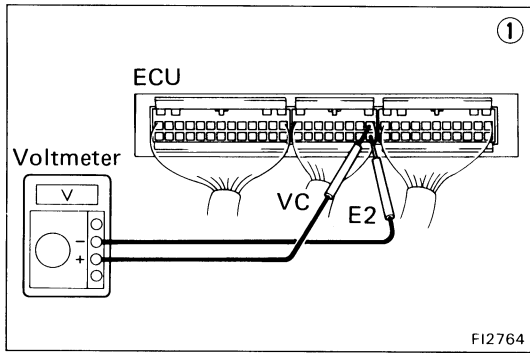
FI1366

• IDL – E2

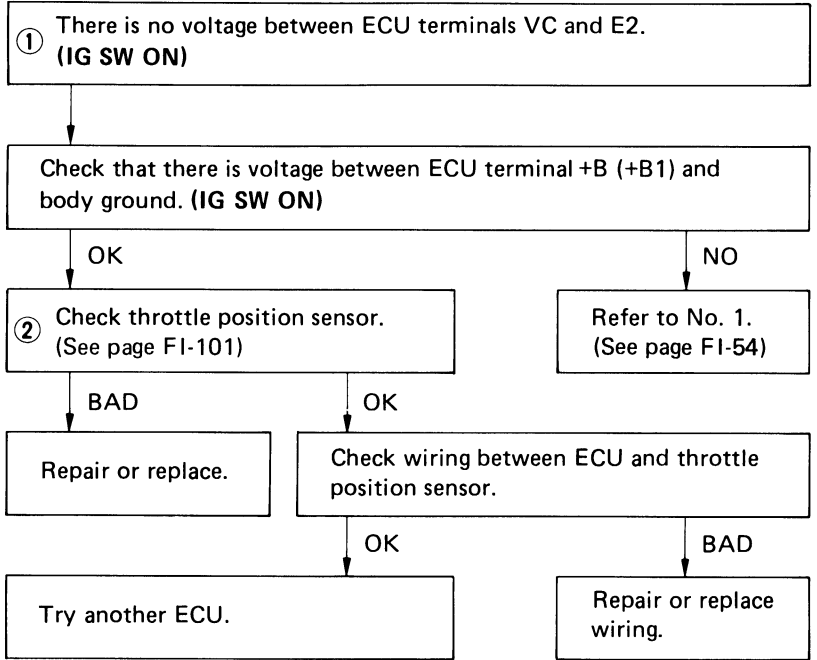
```

    graph TD
        Start[① There is no voltage between ECU terminals IDL and E2.  
(IG SW ON) (Throttle valve open)] --> Step2[② Check that there is voltage between ECU terminal +B (+B1)  
and body ground. (IG SW ON)]
        
        Step2 -- NO --> Refer1[Refer to No. 1.  
(See page FI-54)]
        Step2 -- OK --> CheckE1[Check wiring between ECU terminal E1 and body  
ground.]
        
        CheckE1 -- OK --> TryECU1[Try another ECU.]
        CheckE1 -- BAD --> RepairECU1[Repair or replace.]
        
        Refer1 -- BAD --> RepairECU2[Repair or replace.]
        Refer1 -- OK --> Step3[③ Check throttle position  
sensor.]
        
        Step3 -- BAD --> RepairTPS[Repair or replace  
throttle position sensor.]
        Step3 -- OK --> CheckWiring[Check wiring between ECU and  
throttle position sensor.]
        
        CheckWiring -- OK --> TryECU2[Try another ECU.]
        CheckWiring -- BAD --> RepairECU2
    
```

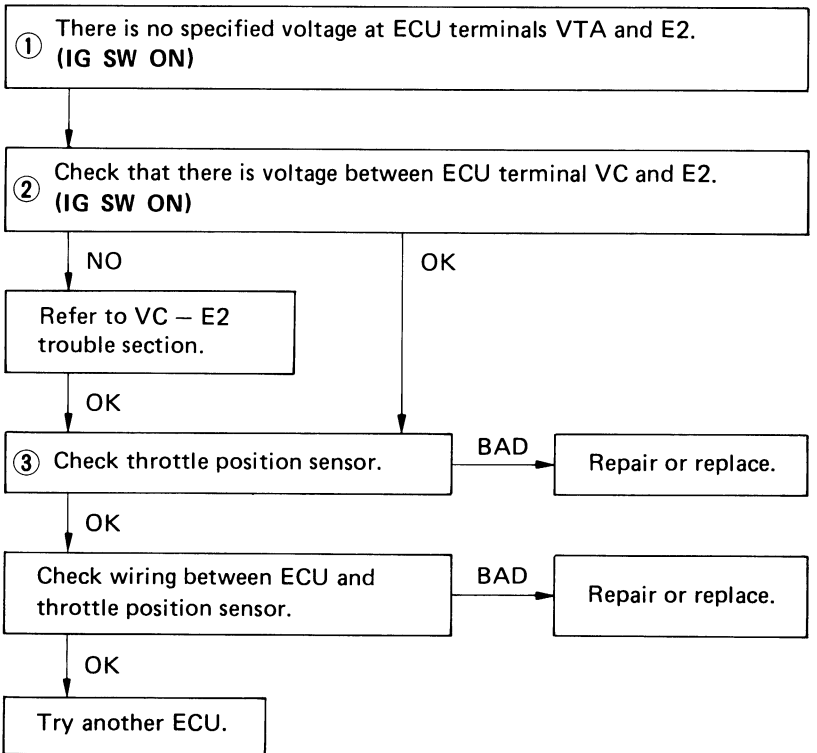




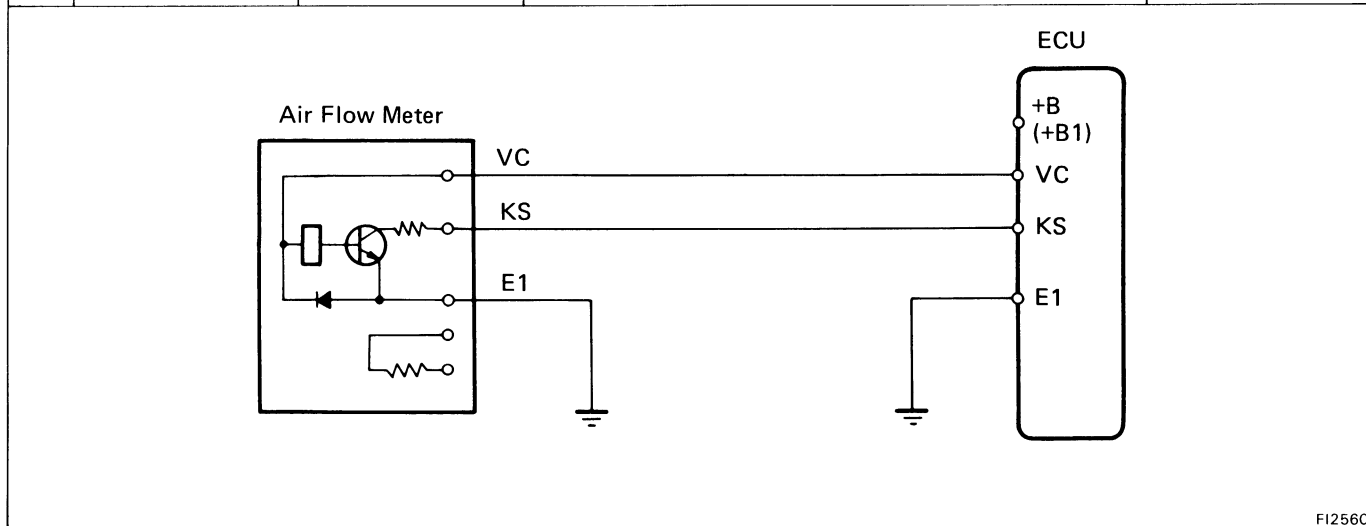
• VC – E2



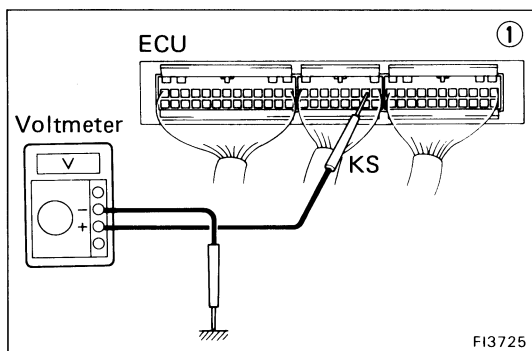
• VTA – E2



No.	Terminals	Trouble	Condition	STD Voltage
3	KS – Body ground	No voltage	Ignition SW ON	4 – 6 V
			Cranking or running	2 – 4 V
	VC – Body ground		Ignition SW ON	4 – 6 V



FI2560



● KS – Body ground

① There is no voltage between ECU terminals KS and body ground. (IG SW ON)

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

OK

NO

Refer to No. 1.  
(See page FI-54)

③ Check wiring between ECU terminal E1 and body ground.

OK

BAD

Check wiring between ECU and air flow meter.

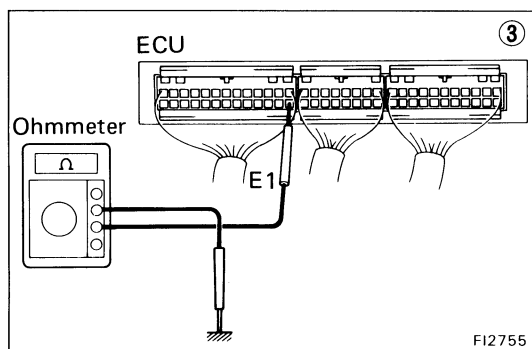
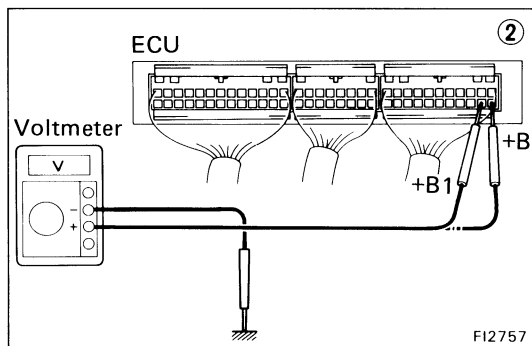
Repair or replace.

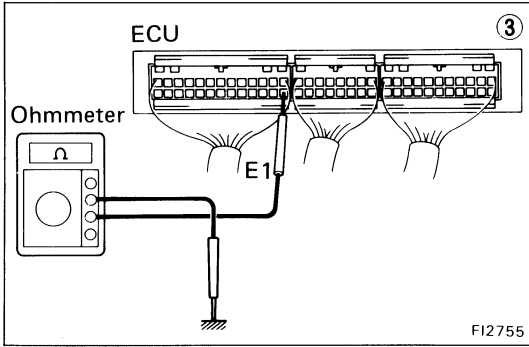
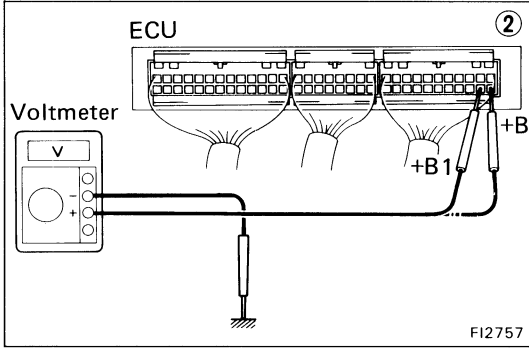
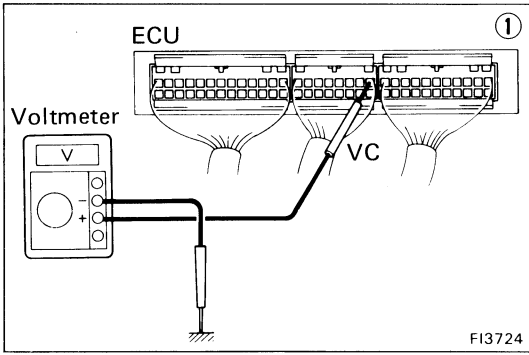
OK

BAD

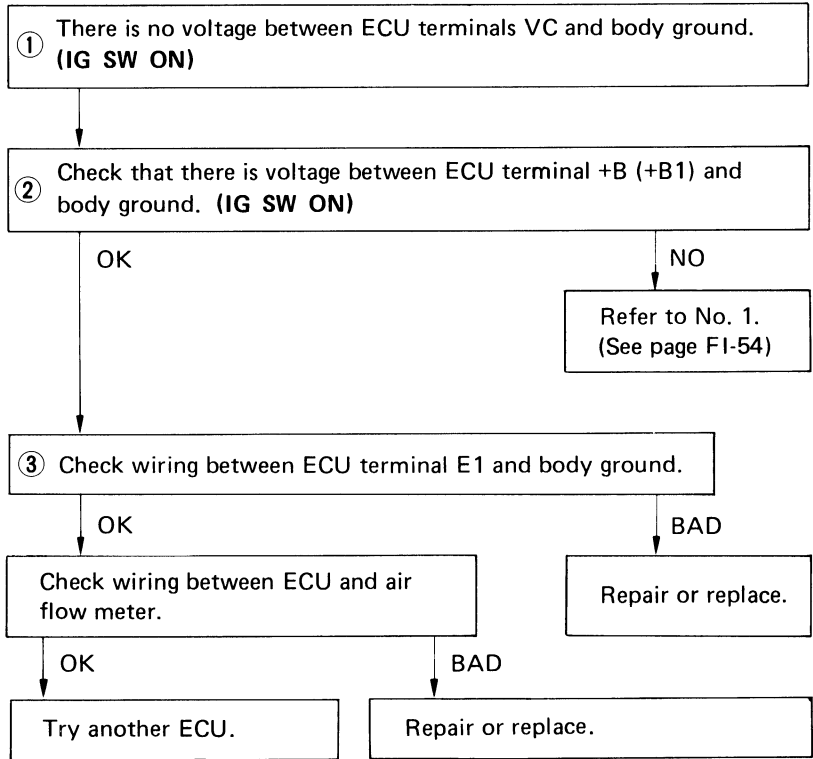
Try another ECU.

Repair or replace.

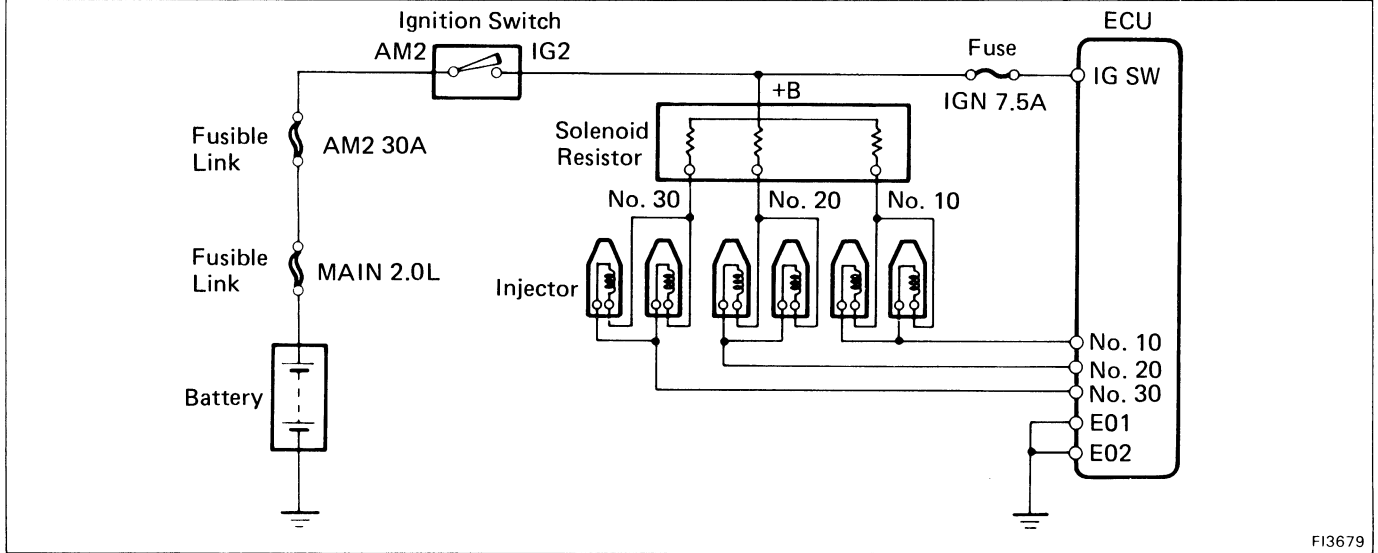




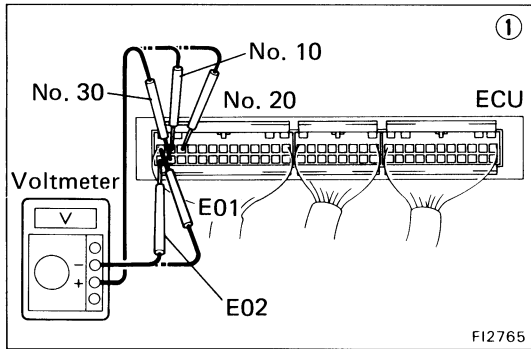
• VC – Body ground



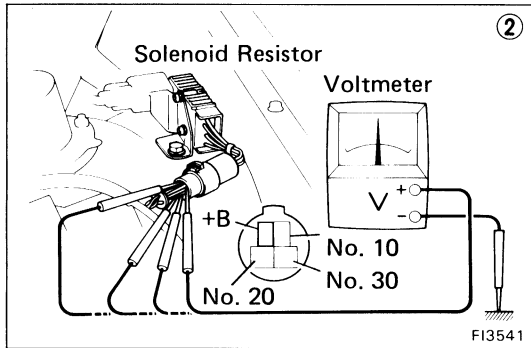
No.	Terminals	Trouble	Condition	STD Voltage
4	No. 10 No. 20 — E01 No. 30 — E02	No voltage	Ignition switch ON	10 – 14 V



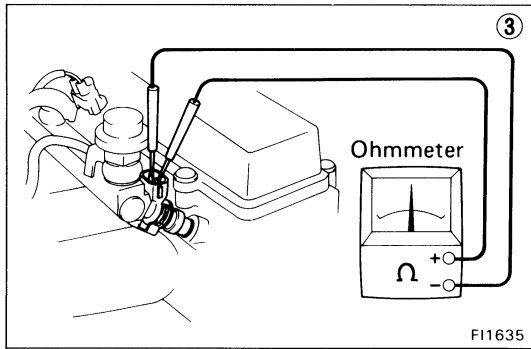
FI3679



FI2765



FI3541



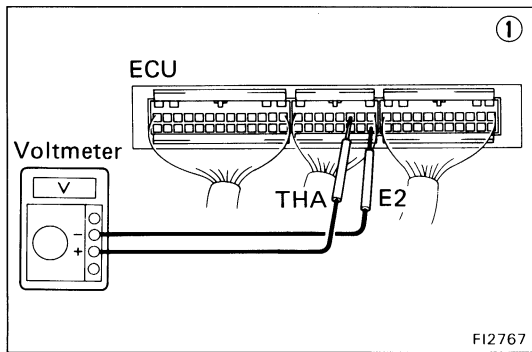
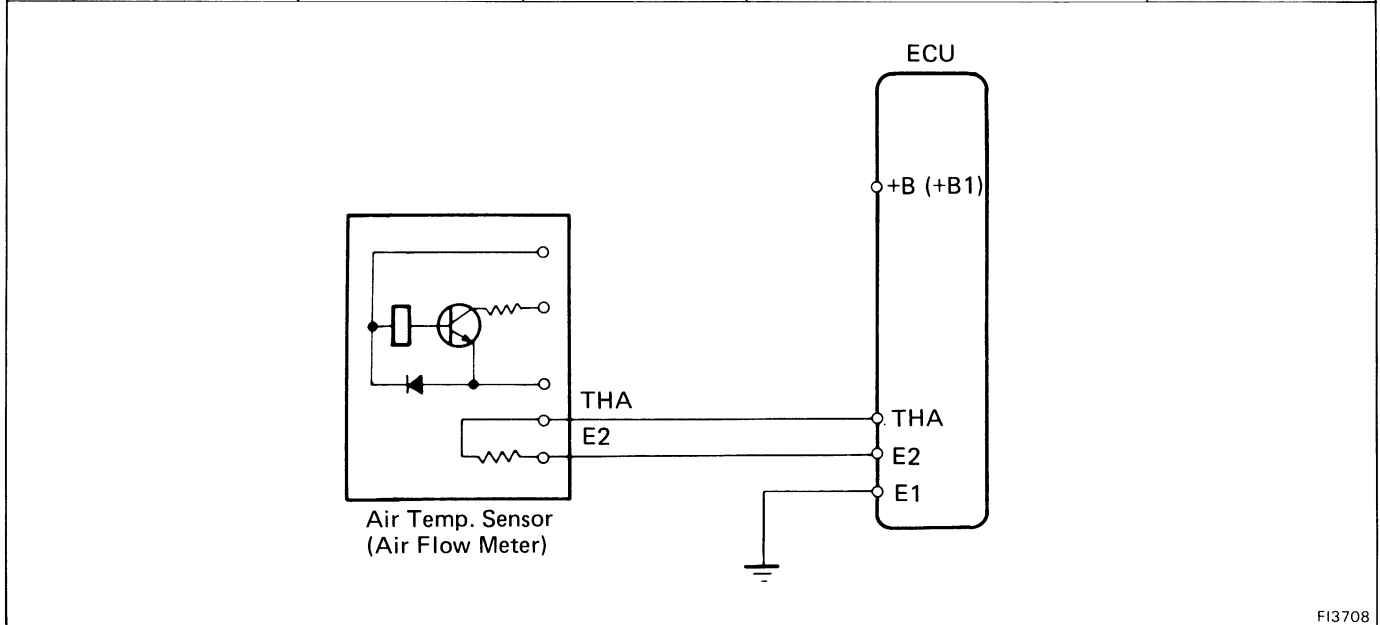
FI1635

```

    graph TD
      Step1["① There is no voltage between ECU terminal No. 10, No. 20 and/or No. 30 and E01 or E02. (IG SW ON)"]
      Step2["② Check that there is specified voltage between resistor terminal +B and body ground. STD voltage: 10 – 14 V"]
      Step3["③ Check resistance of each injector. STD resistance: 2.0 – 3.8 Ω"]
      Step4["Check wiring between ECU and injector."]
      Step5["Check fuse, fusible links and ignition switch."]
      Step6["Check wiring between resistor and battery."]
      Step7["Check that there is specified voltage between resistor terminal (No. 10, No. 20 or No. 30) and body ground. STD voltage: 10 – 14 V"]
      Step8["Try another ECU."]
      Step9["Replace injector."]
      Step10["Replace resistor."]
      Step11["Repair or replace."]

      Step1 --> Step2
      Step2 -- NO --> Step5
      Step2 -- OK --> Step6
      Step5 -- BAD --> Step11
      Step6 -- BAD --> Step11
      Step6 -- OK --> Step7
      Step7 -- BAD --> Step10
      Step7 -- OK --> Step3
      Step3 -- BAD --> Step9
      Step3 -- OK --> Step4
      Step4 -- BAD --> Step11
      Step4 -- OK --> Step8
  
```

No.	Terminals	Trouble	Condition		STD Voltage
			Ignition switch ON	Intake air temperature 20°C (68°F)	
5	THA – E2	No voltage	Ignition switch ON	Intake air temperature 20°C (68°F)	1 – 3 V



① There is no voltage between ECU terminals THA and E2. (IG SW ON)

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

OK

NO

Refer to No. 1. (See page FI-54)

Check wiring between ECU terminal E1 and body ground.

OK

BAD

Repair or replace.

③ Check air temp. sensor. (See page FI-96)

BAD

OK

Replace air flow meter.

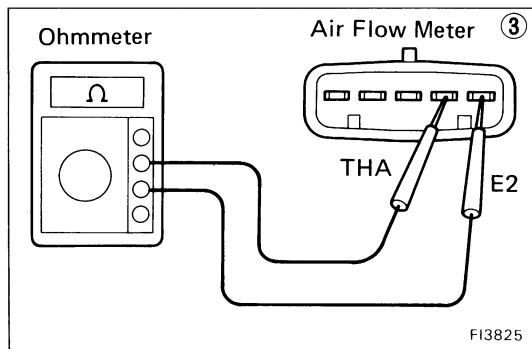
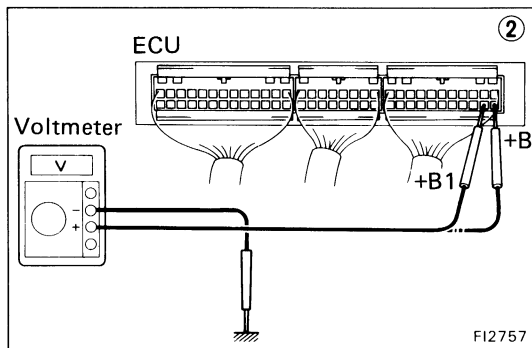
Check wiring between ECU and air temp. sensor.

OK

BAD

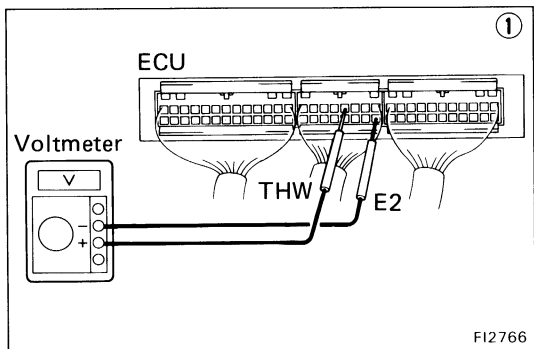
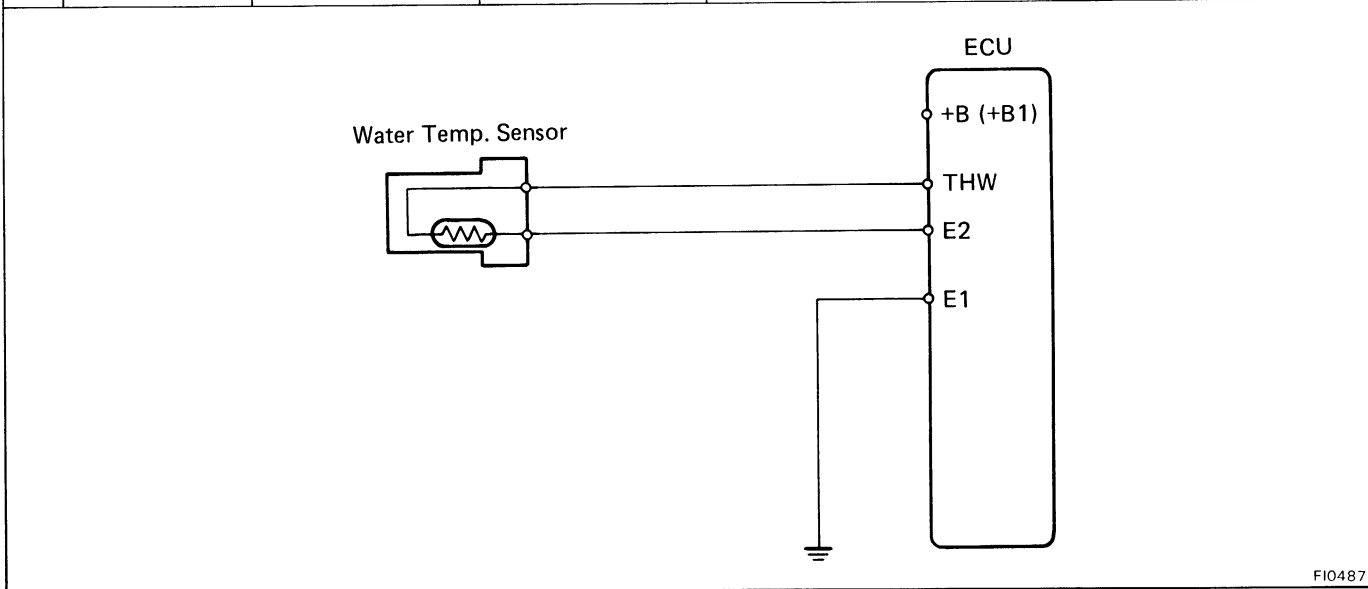
Try another ECU.

Repair or replace.





No.	Terminals	Trouble	Condition		STD Voltage
6	THW — E2	No voltage	Ignition switch ON	Coolant temperature 80°C (176°F)	0.1 — 1.0 V



① There is no voltage between ECU terminals THW and E2. (IG SW ON)

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

OK

NO

Refer to No. 1. (See page FI-54)

Check wiring between ECU terminal E1 and body ground.

OK

BAD

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

Repair or replace.

BAD

OK

Replace water temp. sensor.

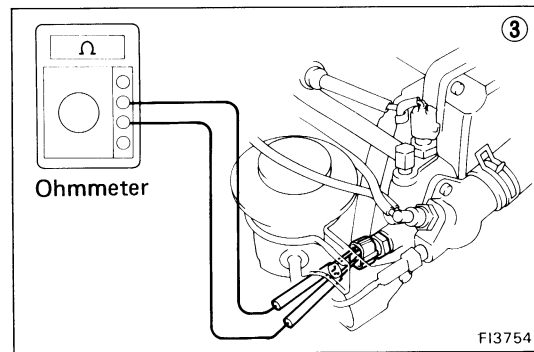
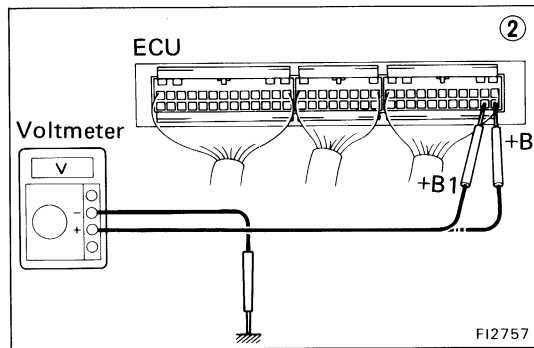
Check wiring between ECU and water temp. sensor.

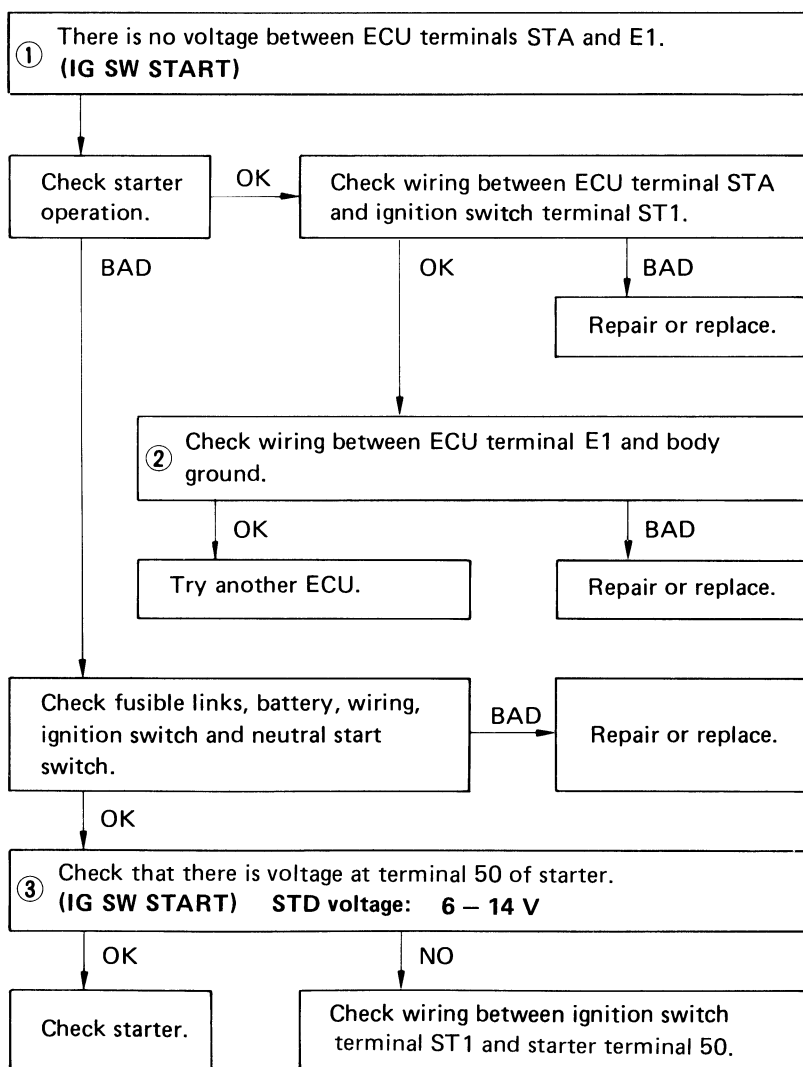
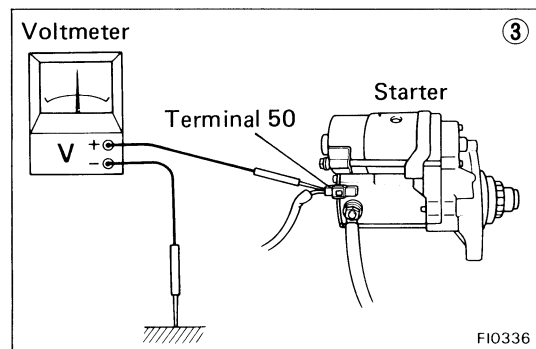
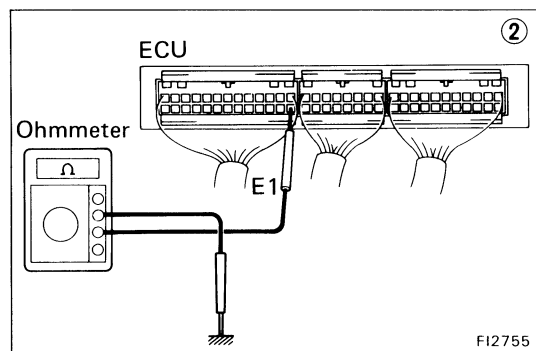
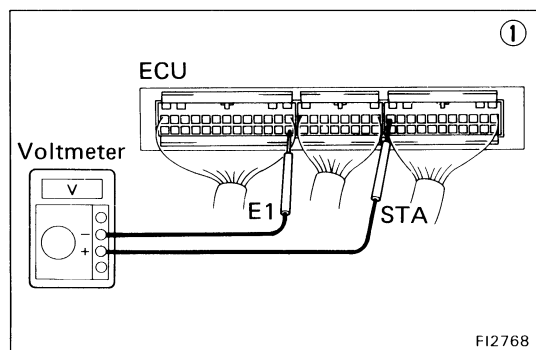
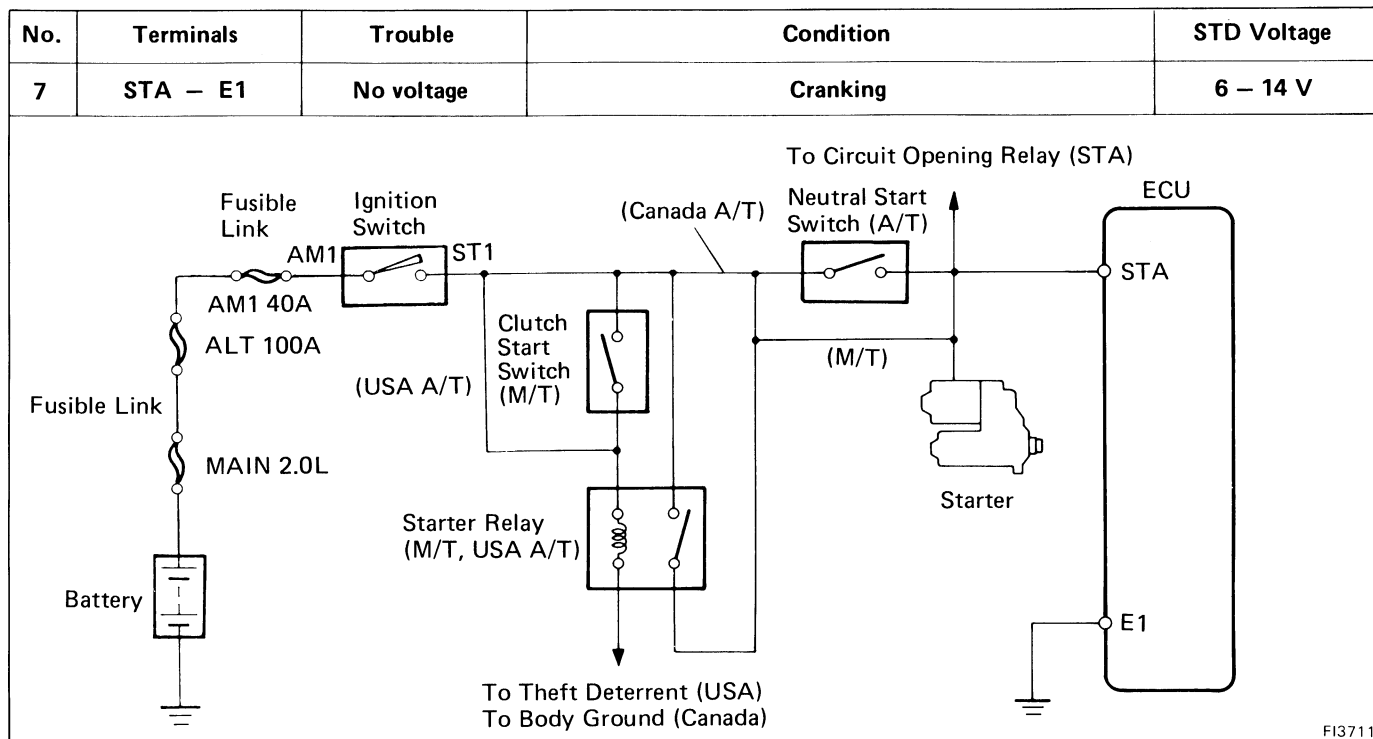
OK

BAD

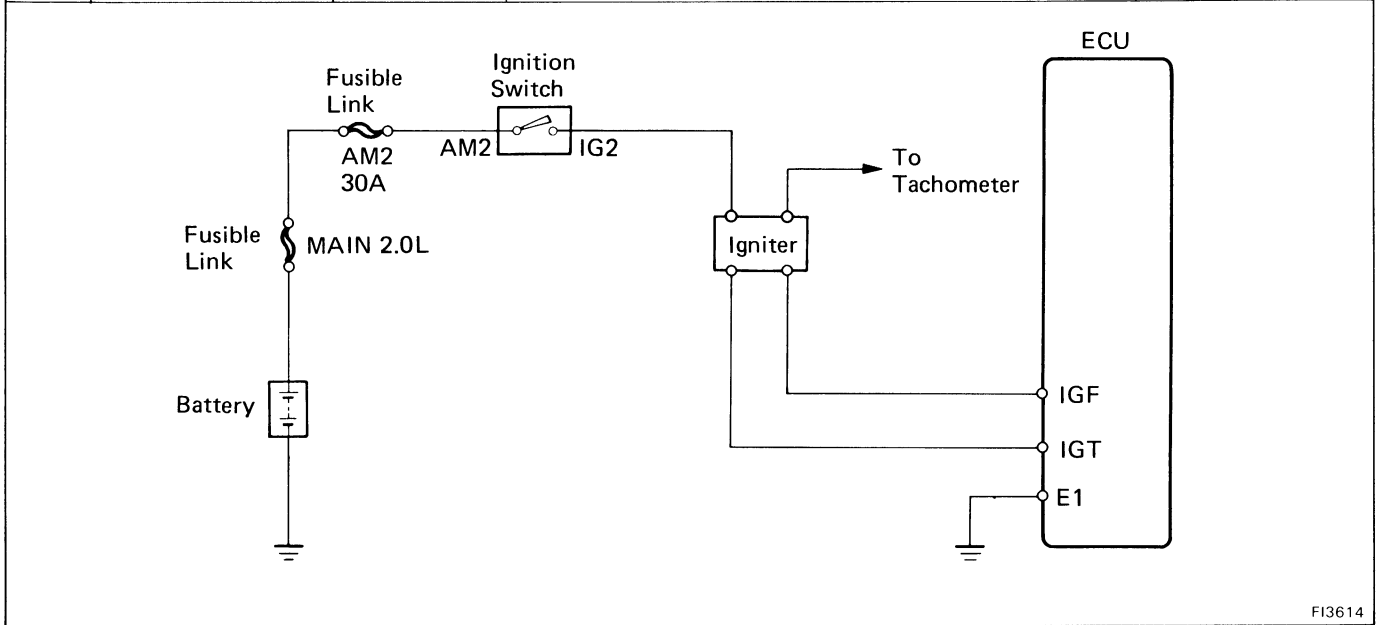
Try another ECU.

Repair or replace.

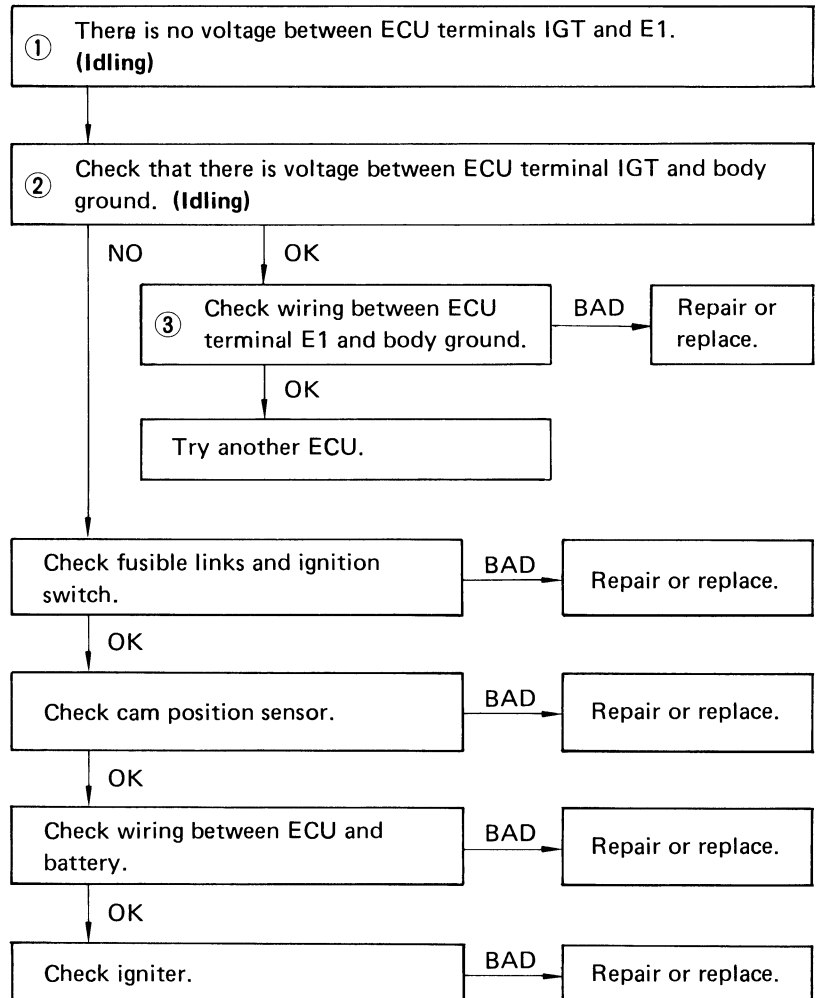
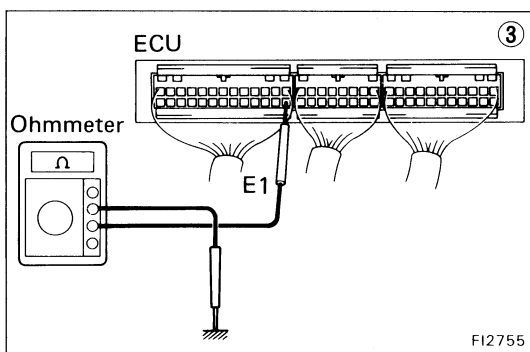
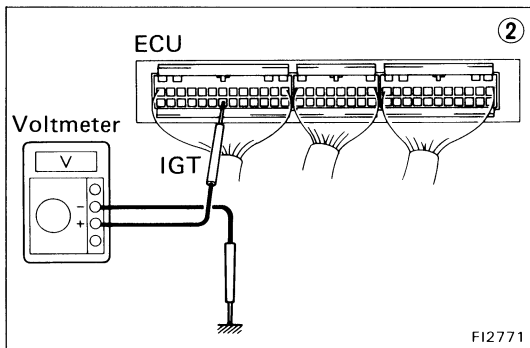
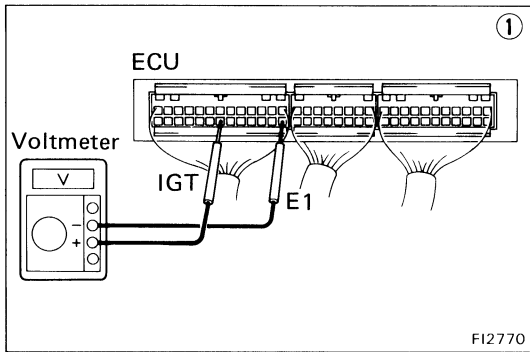




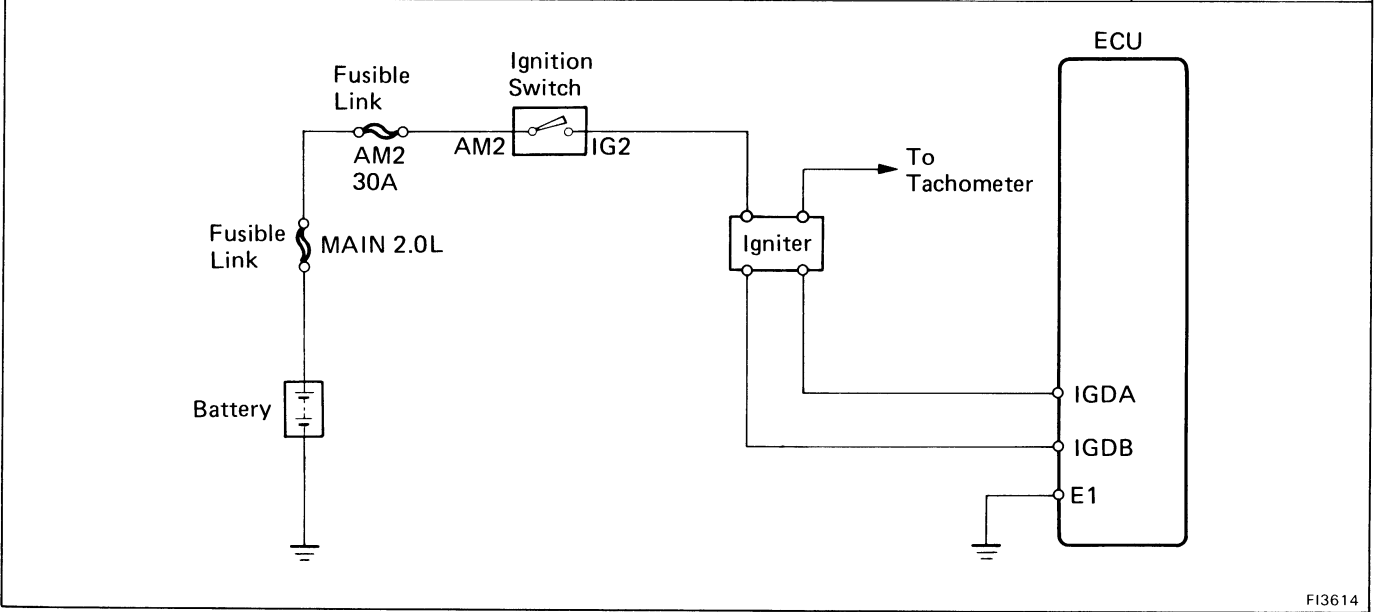
No.	Terminals	Trouble	Condition	STD Voltage
8	IGT — E1	No voltage	Idling	0.7 — 1.0 V



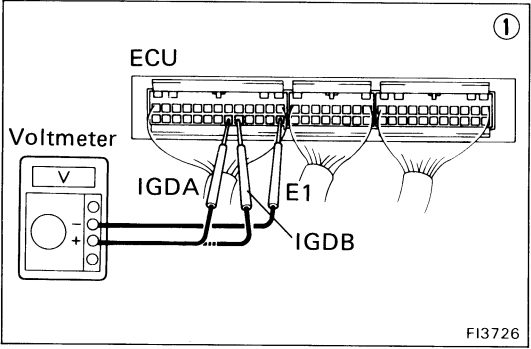
FI3614



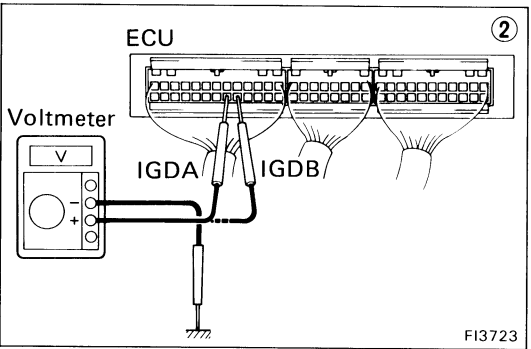
No.	Terminals	Trouble	Condition	STD Voltage
9	IGDA IGDB – E1	No voltage	Idling	1 – 3 V



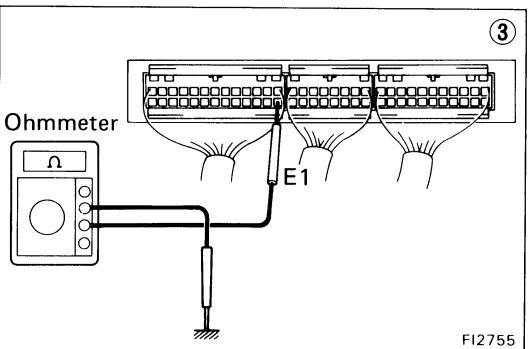
FI3614



FI3726



FI3723

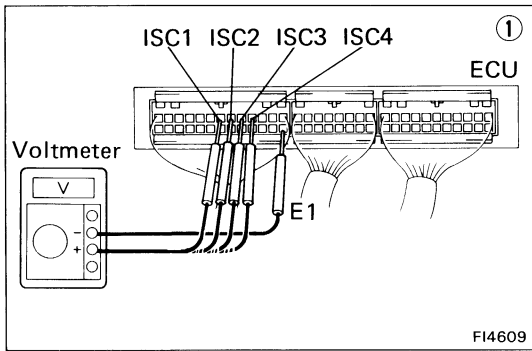
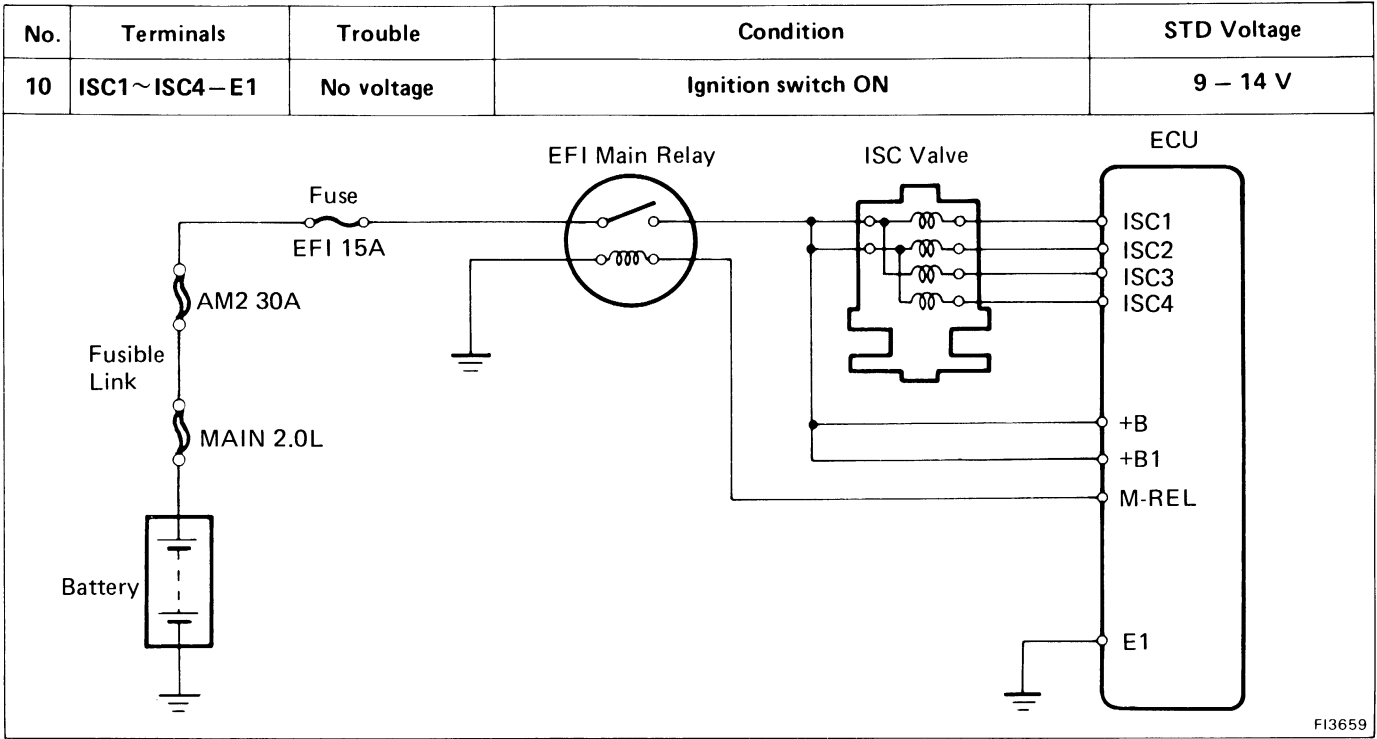


FI2755

```

    graph TD
      Step1["① There is no voltage between ECU terminals IGDA or IGDB and E1. (Idling)"]
      Step2["② Check that there is voltage between ECU terminal IGDA or IGDB and body ground. (Idling)"]
      Step3["③ Check wiring between ECU terminal E1 and body ground."]
      Step4["Check fusible links and ignition switch."]
      Step5["Check cam position sensor."]
      Step6["Check wiring between ECU and battery."]
      Step7["Check igniter."]
      Step8["Repair or replace."]
      Step9["Try another ECU"]

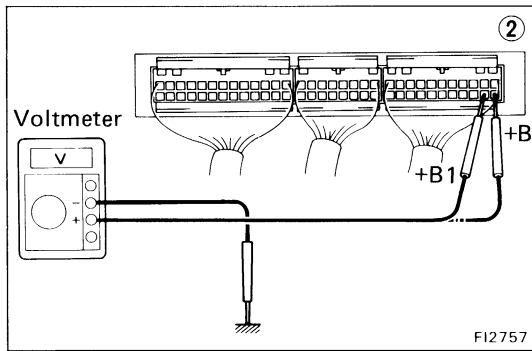
      Step1 --> Step2
      Step2 -- NO --> Step4
      Step2 -- OK --> Step3
      Step3 -- BAD --> Step8
      Step3 -- OK --> Step9
      Step4 -- BAD --> Step8
      Step4 -- OK --> Step5
      Step5 -- BAD --> Step8
      Step5 -- OK --> Step6
      Step6 -- BAD --> Step8
      Step6 -- OK --> Step7
      Step7 -- BAD --> Step8
      Step7 -- OK --> End
  
```



① There is no voltage between ECU terminals ISC1 ~ ISC4 and E1. (IG SW ON)

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

NO  
Refer to No. 1. (See page FI-54)



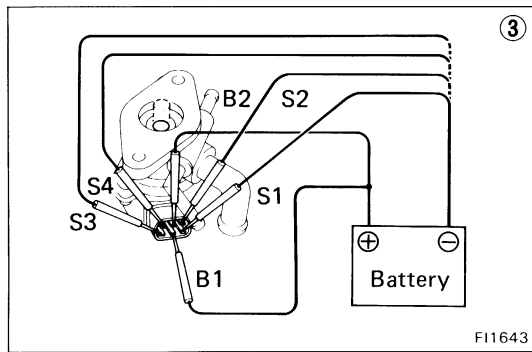
Check wiring between ECU terminal E1 and body ground.

OK  
③ Check ISV valve. (See page FI-106)

BAD  
Repair or replace.

BAD  
Replace ISC valve.

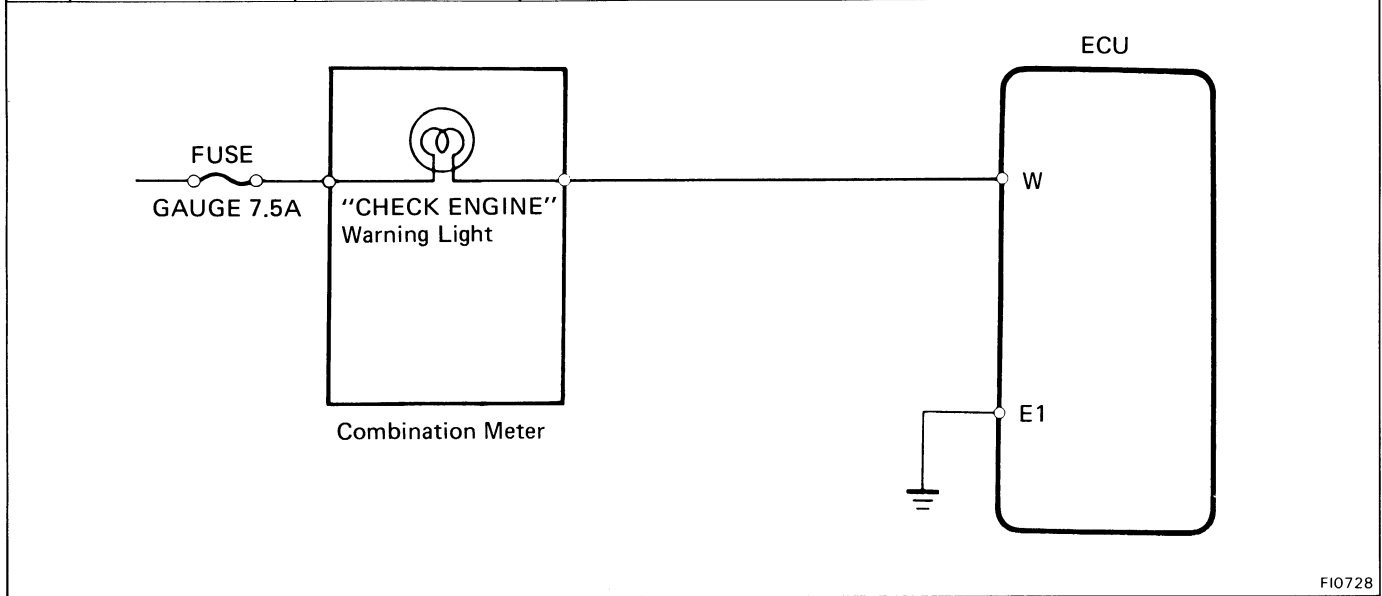
OK  
Check wiring between ECU and EFI main relay.



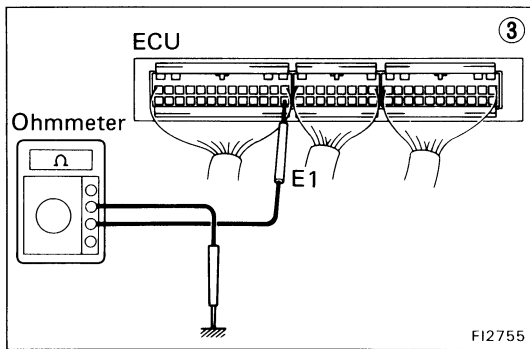
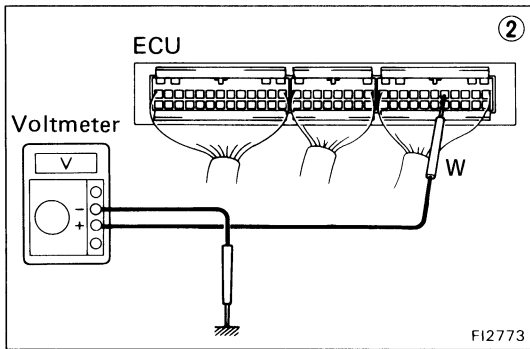
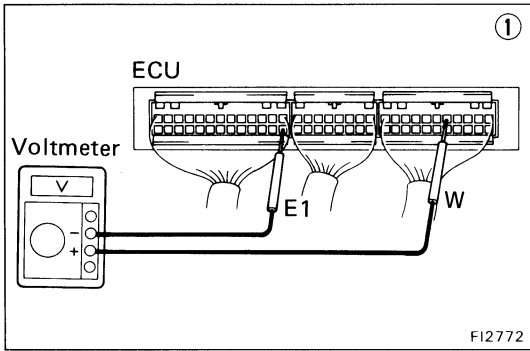
OK  
Try another ECU.

BAD  
Repair or replace.

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



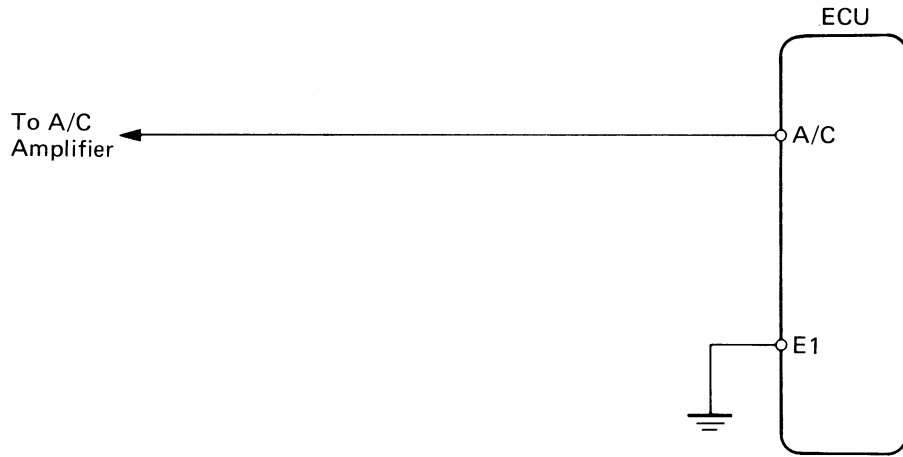
FI0728



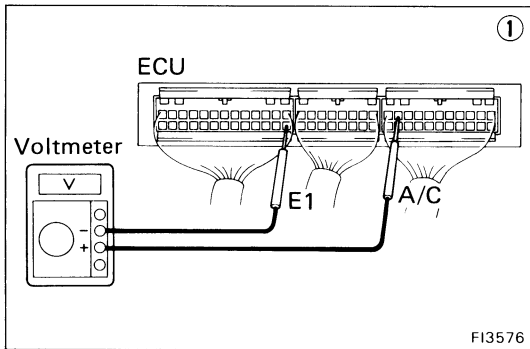
```

    graph TD
      Step1["① There is no voltage between ECU terminals W and E1. (Idling)"] --> Step2["② Check that there is voltage between ECU terminal W and body ground."]
      Step2 -- NO --> Step4["Check GAUGE fuse (7.5A) and 'CHECK ENGINE' warning light."]
      Step2 -- OK --> Step3["③ Check wiring between ECU terminal E1 and body ground."]
      Step3 -- OK --> TryECU["Try another ECU."]
      Step3 -- BAD --> RepairECU["Repair or replace."]
      Step4 -- OK --> Step5["Check wiring between ECU terminal W and fuse."]
      Step4 -- BAD --> RepairFuse["Repair or replace."]
      Step5 -- BAD --> RepairFuse
      Step5 -- OK --> End[" "]
  
```

No.	Terminals	Trouble	Condition		STD Voltage
12	A/C — E1	No voltage	Ignition switch ON	Air conditioning ON	10 — 14 V



FI4925



① There is no voltage between ECU terminals A/C and E1. (Air conditioning ON)

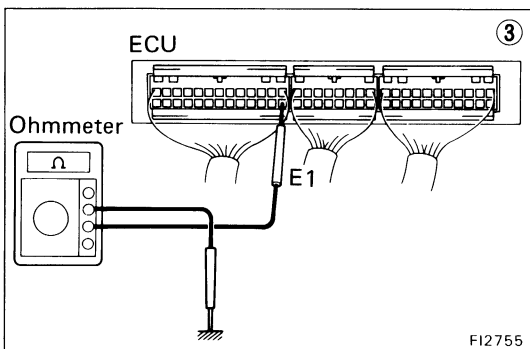
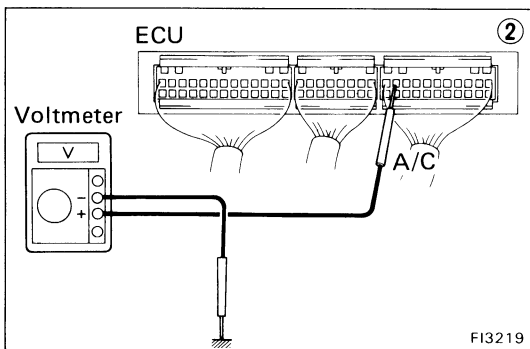
② Check that there is voltage between ECU terminal A/C and body ground.

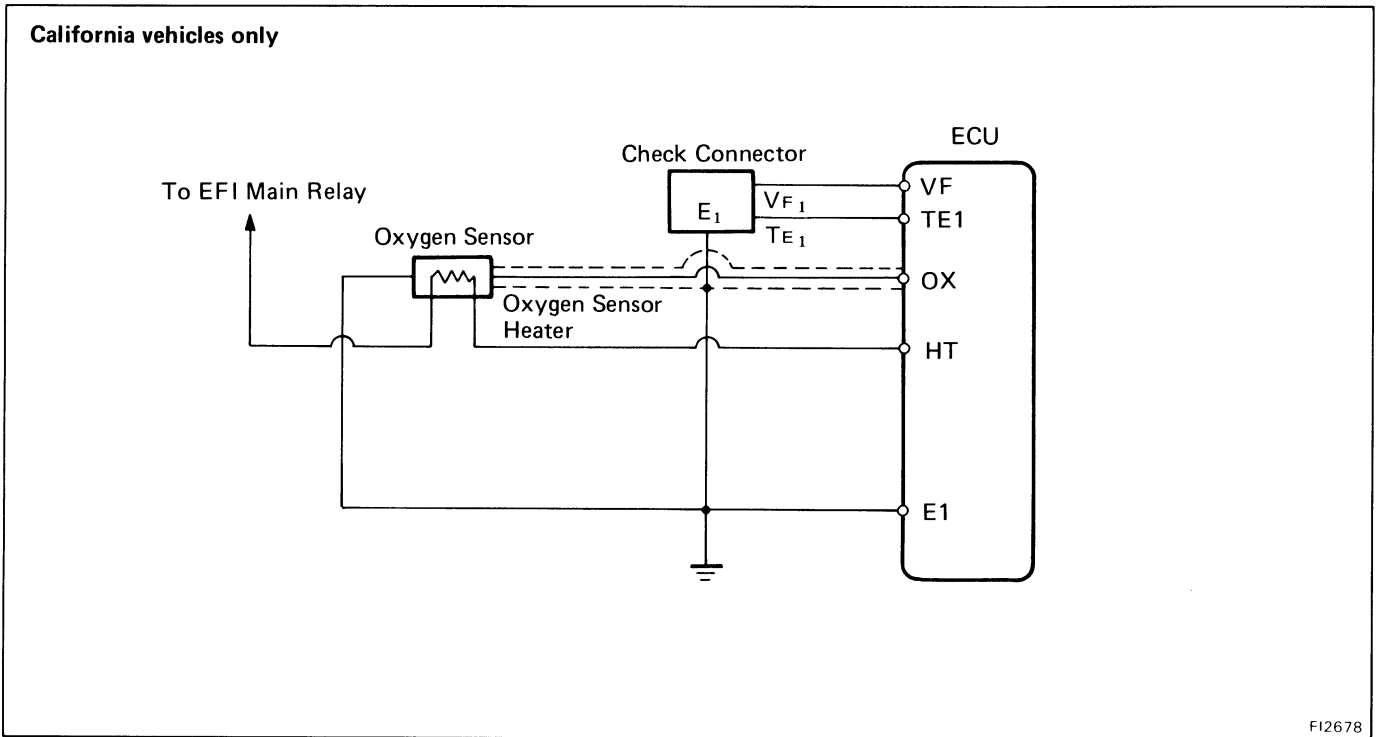
NO → Check that there is voltage between amplifier terminal and body ground.  
 OK → ③ Check wiring between ECU terminal E1 and body ground.

③ OK → Try another ECU.  
 BAD → Repair or replace.

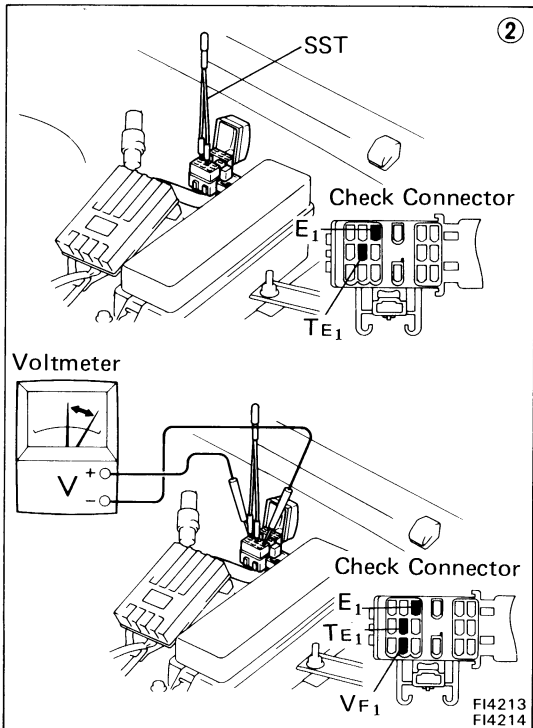
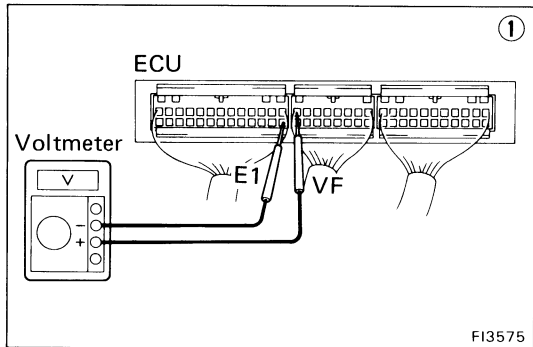
Check that there is voltage between amplifier terminal and body ground.  
 BAD → Repair or replace.  
 OK → Check wiring between amplifier and ECU terminal A/C.

Check wiring between amplifier and ECU terminal A/C.  
 BAD → Repair or replace.





FI2678



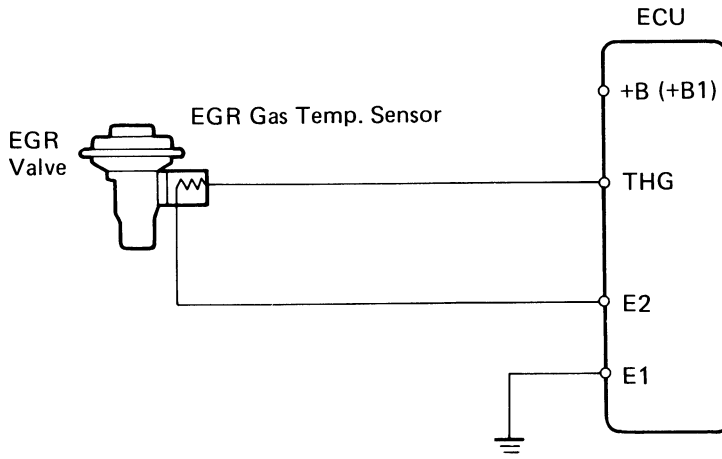
```

    graph TD
      A["① There is no voltage between ECU terminals VF and E1."] --> B["Check that there is specified voltage between ECU terminal VF and body ground."]
      B -- NO --> C["Check wiring between ECU terminal E1 and body ground."]
      B -- OK --> D["Check for suction of air into exhaust system."]
      C -- OK --> E["Try another ECU."]
      C -- BAD --> F["Repair or replace."]
      D -- BAD --> G["Repair air suction."]
      D -- OK --> H["Check for air leak from air intake system."]
      H -- BAD --> I["Repair air leak."]
      H -- OK --> J["Check spark plugs."]
      J -- BAD --> K["Repair or replace."]
      J -- OK --> L["Check cam position sensor and ignition system."]
      L -- BAD --> M["Repair or replace."]
      L -- OK --> N["Check fuel pressure."]
      N -- BAD --> O["Repair or replace."]
      N -- OK --> P["Check injectors."]
      P -- BAD --> Q["Repair or replace."]
      P -- OK --> R["Check cold start injector. *"]
      R -- BAD --> S["Repair or replace."]
      R -- OK --> T["Check air flow meter."]
      T -- BAD --> U["Repair or replace."]
      T -- OK --> V["② Check operation of oxygen sensor."]
      V -- OK --> W["System normal."]
      V -- BAD --> X["Check wiring between oxygen sensor and ECU connectors."]
      X -- BAD --> Y["Repair wiring."]
      X -- OK --> Z["Replace oxygen sensor."]
  
```

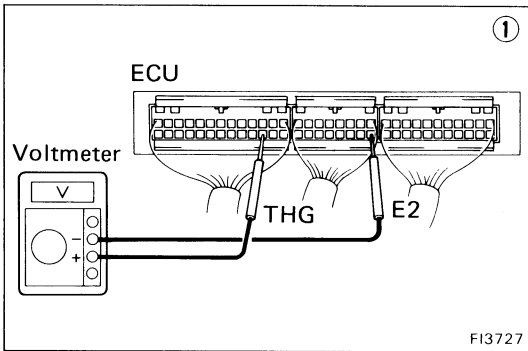
\* Rich malfunction only



California vehicles only

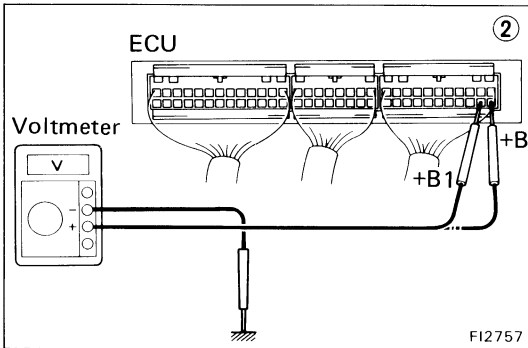


FI2680



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

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



Check wiring between ECU terminal E1 and body ground.

OK

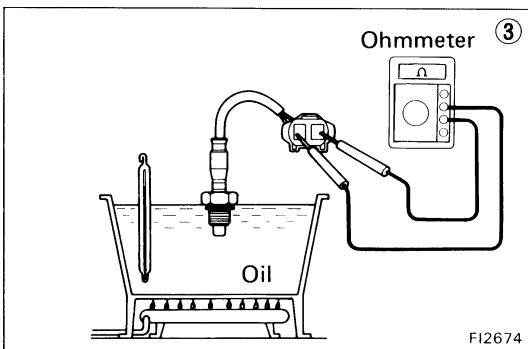
BAD

Repair or replace.

Check EGR system.

BAD

Repair or replace.



③ Check EGR gas temp. sensor. (See page FI-118)

BAD

Replace EGR gas temp. sensor.

OK

Check wiring between ECU and EGR gas temp. sensor.

OK

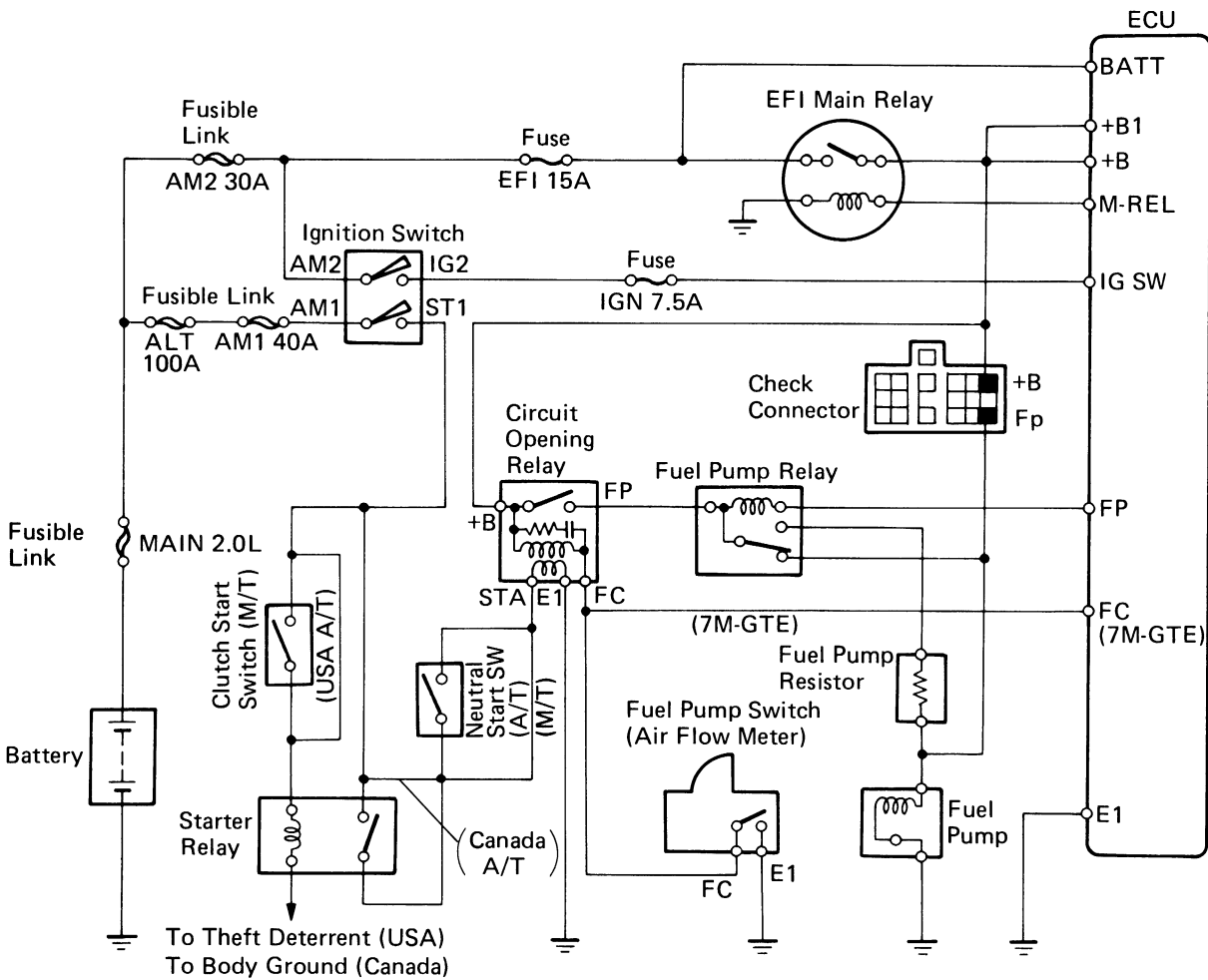
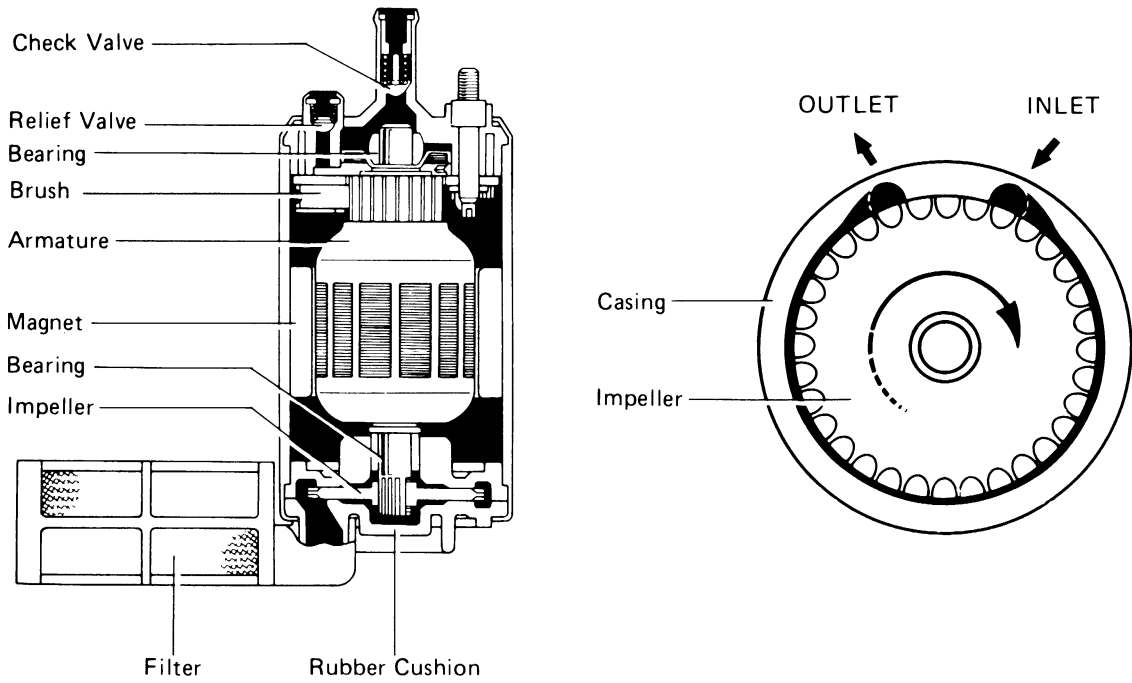
Try another ECU.

BAD

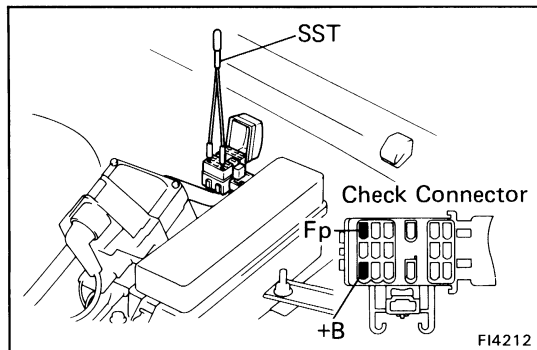
Repair or replace.

# FUEL SYSTEM

## Fuel Pump



To Theft Deterrent (USA)  
To Body Ground (Canada)



## ON-VEHICLE INSPECTION

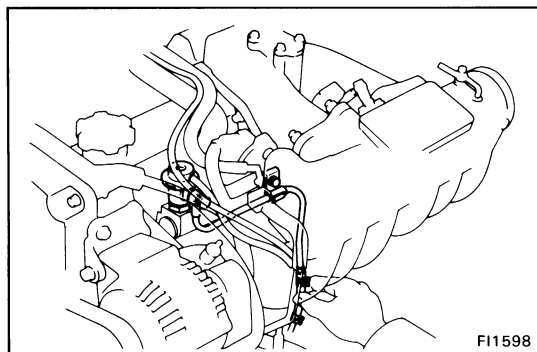
### 1. CHECK FUEL PUMP OPERATION

(a) Turn the ignition switch ON.

HINT: Do not start the engine.

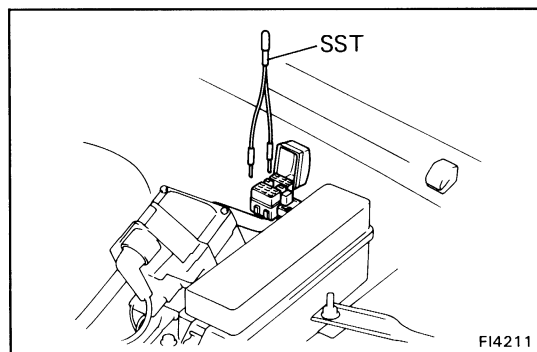
(b) Using SST, connect terminals +B and Fp of the check connector.

SST 09843-18020



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

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



(d) Remove SST.

SST 09843-18020

(e) Turn the ignition switch OFF.

If there is no pressure, check the following parts:

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

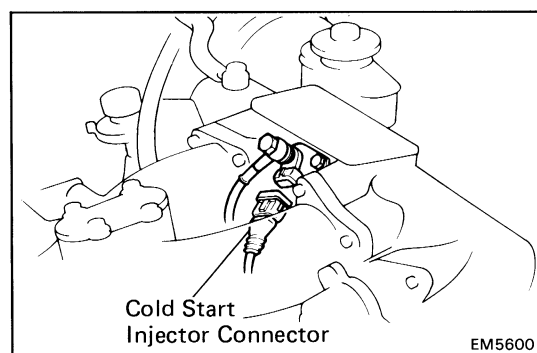
### 2. INSPECT FUEL PRESSURE

(a) Check the battery voltage above 11 volts.

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

(c) (7M-GE)

Disconnect the cold start injector connector.



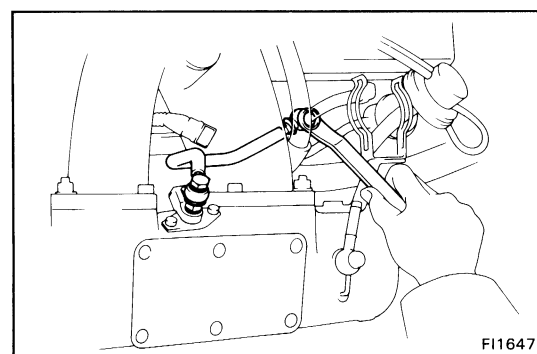
(d) (7M-GE)

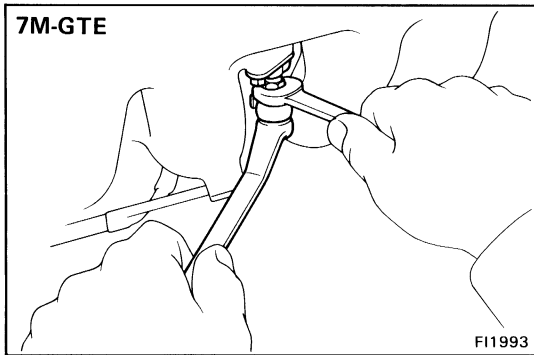
Disconnect the cold start injector tube.

- Place a suitable container or shop towel under the cold start injector tube.

- Remove the union bolt and two gaskets, and disconnect cold start injector tube.

HINT: Slowly loosen the union bolt.

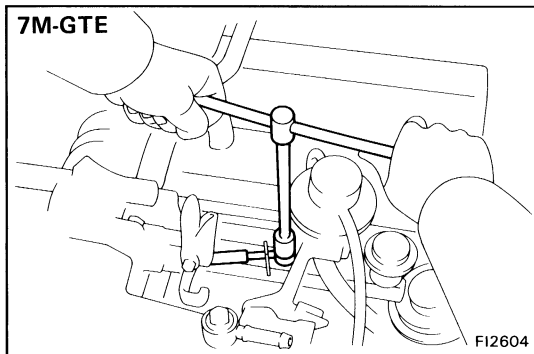




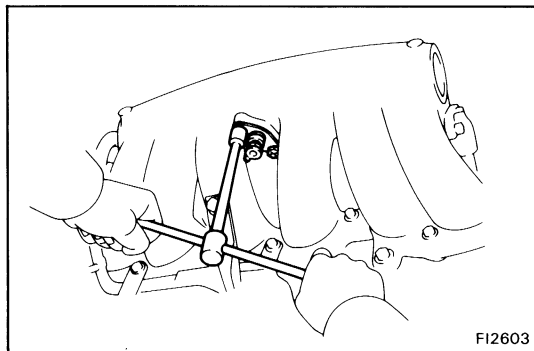
(e) (7M-GTE)

Remove the cold start injector tube.

- Place a suitable container or shop towel under the cold start injector.
- Slowly loosen the union bolt of the cold start injector tube and remove the bolt and two gaskets from the cold start injector.



- Remove the union bolt, fuel tube and two gaskets.



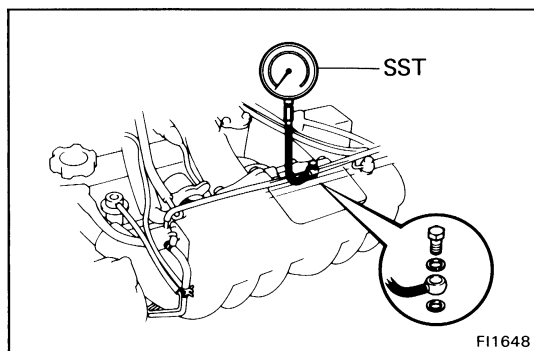
(f) (7M-GTE)

Remove the cold start injector.

(See page FI-78)

(g) (7M-GTE)

Install the gasket and cold start injector with the bolts without connecting the cold start injector connector.

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

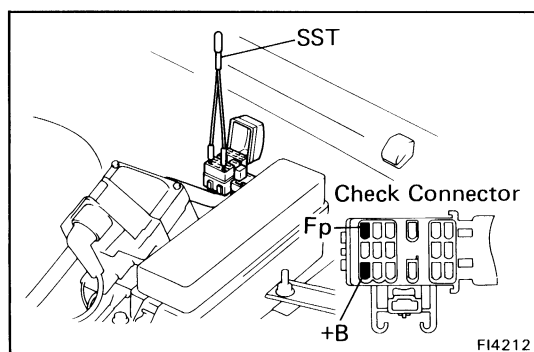
(h) Install SST (pressure gauge) to the delivery pipe with new two gaskets and union bolt.

SST 09268-45012

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

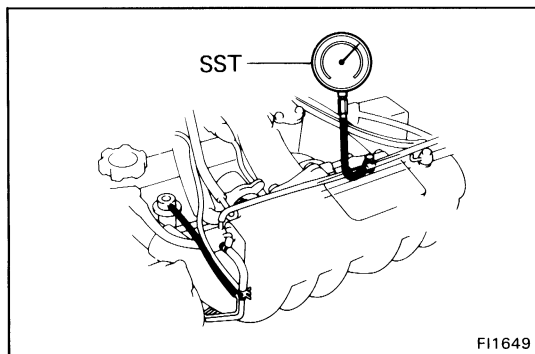
(i) Wipe off any splattered gasoline.

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

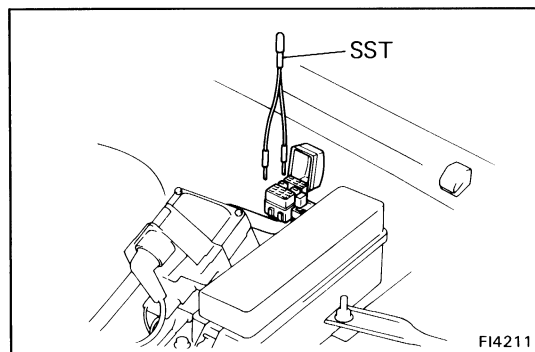


(k) Using SST, connect terminals +B and Fp of the check connector.

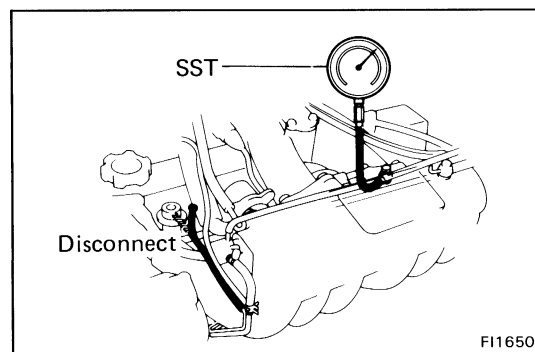
SST 09843-18020



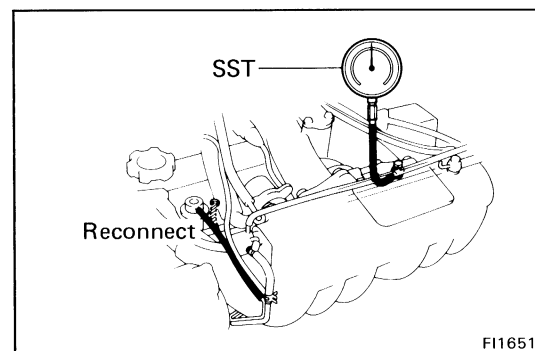
FI1649



FI4211



FI1650



FI1651

- (l) Turn the ignition switch ON.  
 (m) Measure the fuel pressure.

**Fuel pressure:****7M-GE**

2.7 — 3.1 kg/cm<sup>2</sup> (38 — 44 psi, 265 — 304 kPa)

**7M-GTE**

2.3 — 2.8 kg/cm<sup>2</sup> (33 — 40 psi, 226 — 275 kPa)

If pressure is high, replace the fuel pressure regulator.

If pressure is low, check the following parts:

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

- (n) Remove the SST.

SST 09843-18020

- (o) Start the engine.

- (p) Disconnect the vacuum sensing hose from the fuel pressure regulator and plug the hose end.

- (q) Measure the fuel pressure at idling.

**Fuel pressure:****7M-GE**

2.7 — 3.1 kg/cm<sup>2</sup> (38 — 44 psi, 265 — 304 kPa)

**7M-GTE**

2.3 — 2.8 kg/cm<sup>2</sup> (33 — 40 psi, 226 — 275 kPa)

- (r) Reconnect the vacuum sensing hose to the fuel pressure regulator.

- (s) Measure the fuel pressure at idling.

**Fuel pressure:****7M-GE**

2.1 — 2.6 kg/cm<sup>2</sup> (30 — 37 psi, 206 — 265 kPa)

**7M-GTE**

1.6 — 2.1 kg/cm<sup>2</sup> (23 — 30 psi, 157 — 206 kPa)

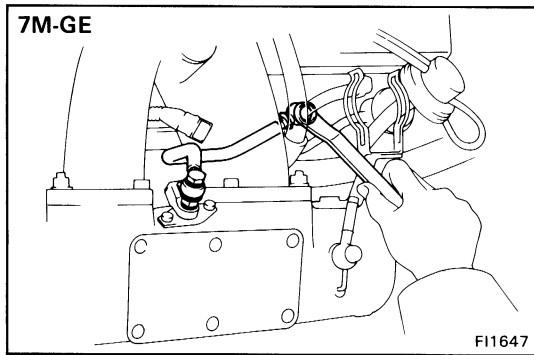
If pressure is not as specified, check the vacuum sensing hose and fuel pressure regulator.

- (t) Stop the engine. Check that the fuel pressure remains 1.5 kg/cm<sup>2</sup> (21 psi, 147 kPa) or more for 5 minutes after the engine is turned off.

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

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

SST 09268-45012



- (v) (7M-GE)  
Connect the cold start injector tube with new gaskets and the union bolt.

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

- (w) (7M-GE)  
Connect the cold start injector connector.

- (x) (7M-GTE)  
Remove the cold start injector.  
(See page FI-78)

- (y) (7M-GTE)  
Install the cold start injector.  
(See page FI-80)

- (z) (7M-GTE)  
Install the cold start injector tube.
- Install the cold start injector tube to the delivery pipe and cold start injector with new gaskets and the union bolts.

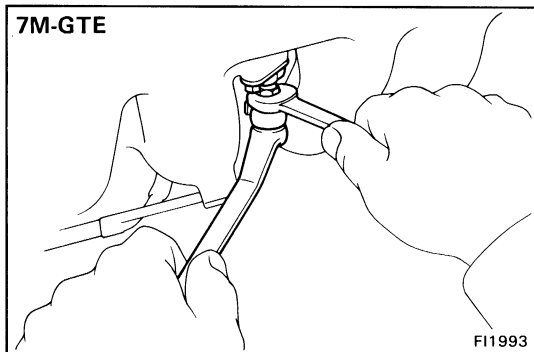
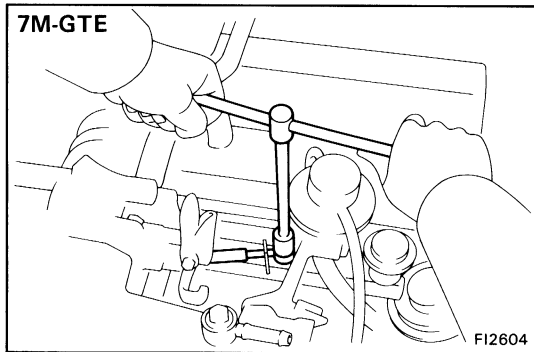
**Torque:**

**Delivery pipe side**

**300 kg-cm (22 ft-lb, 29 N·m)**

**Cold start injector side**

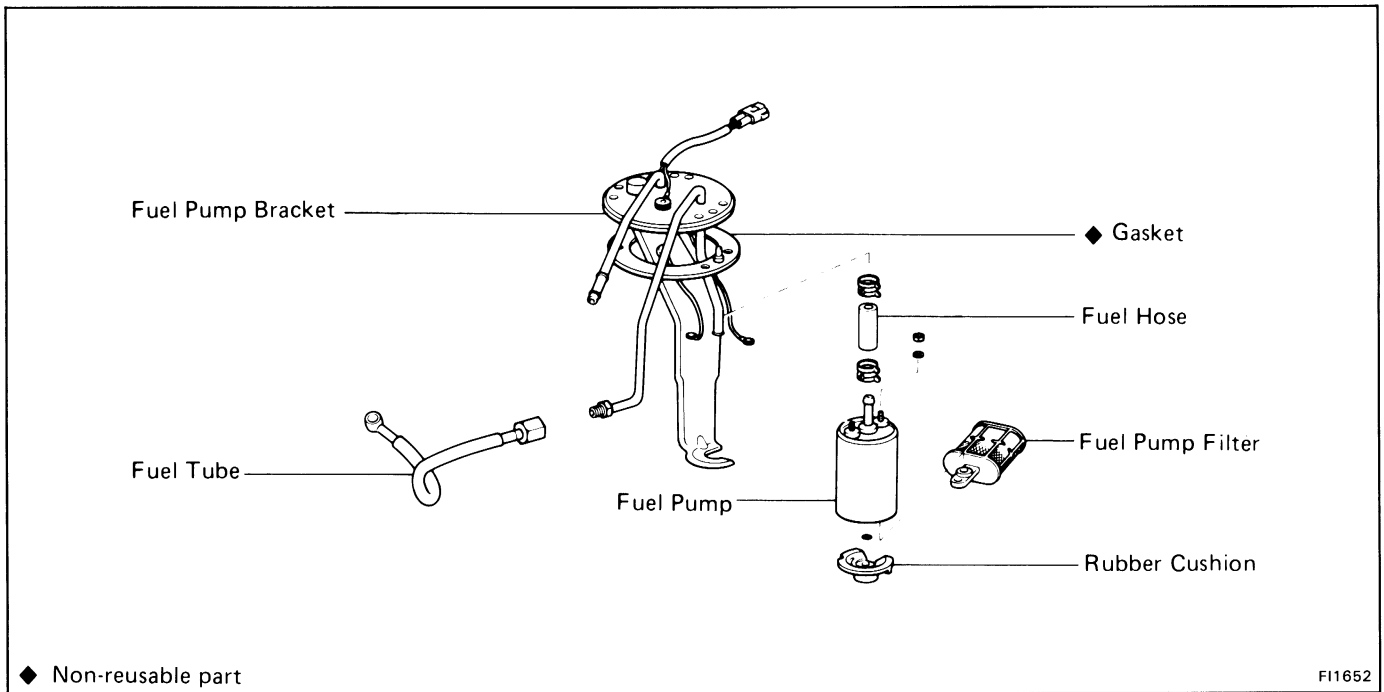
**180 kg-cm (13 ft-lb, 18 N·m)**



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

- (ab) Check for fuel leakage.

## COMPONENT



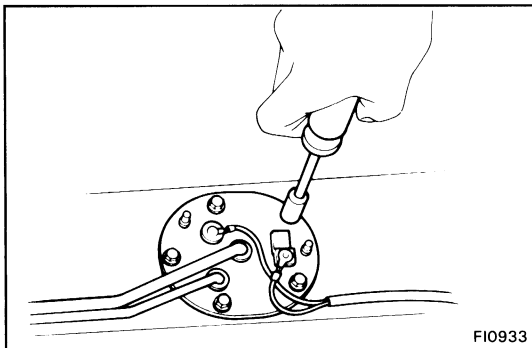
## REMOVAL OF FUEL PUMP

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

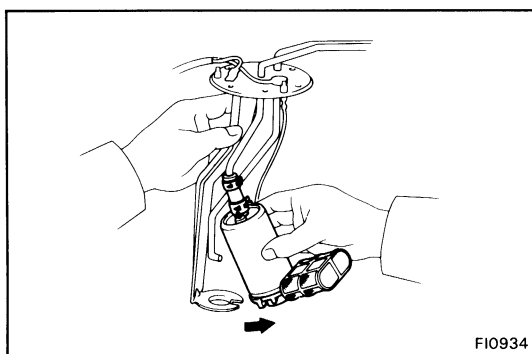
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

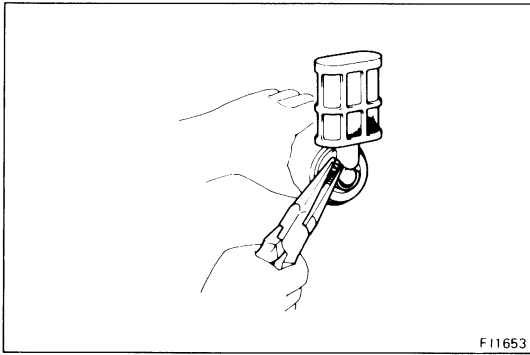
**CAUTION:** Work must be started after approx. 20 seconds or longer from the time the ignition switch is turned to the "LOCK" position and the negative (—) terminal cable is disconnected from the battery.

2. REMOVE FUEL TANK  
(See procedure FI-92)
3. REMOVE FUEL PUMP BRACKET FROM FUEL TANK
  - (a) Remove the six screws.
  - (b) Pull out the fuel pump bracket.



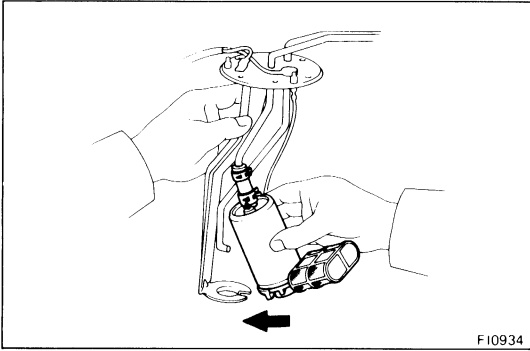
4. REMOVE FUEL PUMP FROM FUEL PUMP BRACKET
  - (a) Remove the two nuts and disconnect the wires from the fuel pump.
  - (b) Pull off the lower side of the fuel pump from the bracket.
  - (c) Remove the fuel pump from the fuel hose.





**5. REMOVE FUEL PUMP FILTER FROM FUEL PUMP**

- (a) Remove the rubber cushion.
- (b) Remove the clip and pull out the filter.



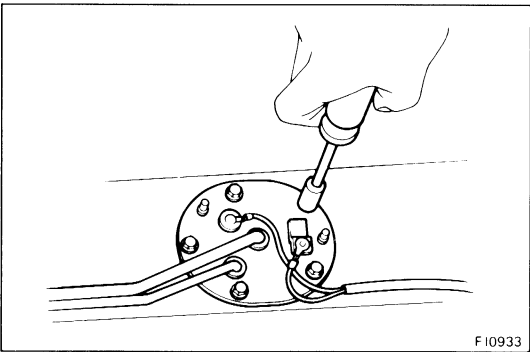
**INSTALLATION OF FUEL PUMP**

(See page FI-75)

**1. INSTALL FUEL PUMP FILTER TO FUEL PUMP**

**2. INSTALL FUEL PUMP TO FUEL PUMP BRACKET**

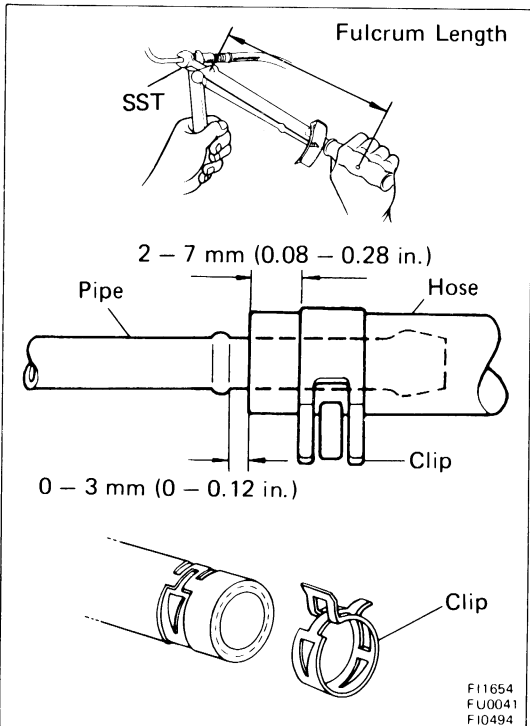
- (a) Insert the outlet port of the fuel pump into the fuel hose.
- (b) Install the rubber cushion to the lower side of the fuel pump.
- (c) Push the lower side of the fuel pump, together with the rubber cushion, into the fuel pump bracket.



**3. INSTALL FUEL PUMP BRACKET**

- (a) Place the bracket with a new gasket on the fuel tank.
- (b) Install and torque the six screws.

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



**4. INSTALL FUEL TANK**

- (a) Apply a thin coat of oil to the flare and tighten the flare nut.
- (b) Then using SST, tighten the nut to the specified torque.

SST 09631-22020

**Torque: 310 kg-cm (22 ft-lb, 30 N·m)**

**HINT:** Use a torque wrench with a fulcrum length 30 cm (11.81 in.).

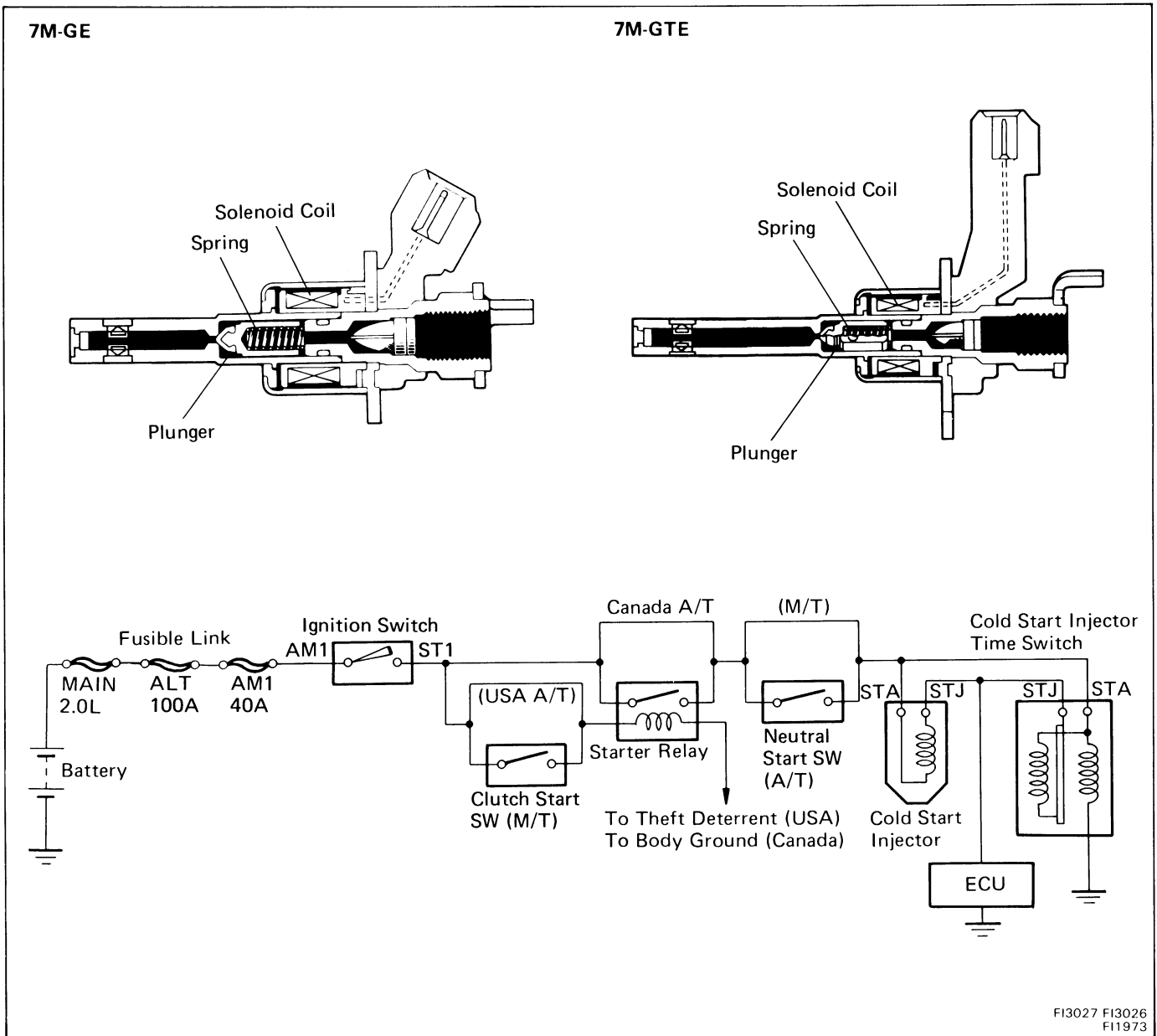
**NOTICE:**

- Tighten the fuel tank mounting bolts, etc. to the specified torque.
- Push in the pipe and insert-type hose to the specified position, and install the clip to the specified location.
- If reusing the hose, reinstall the clip at the original location.

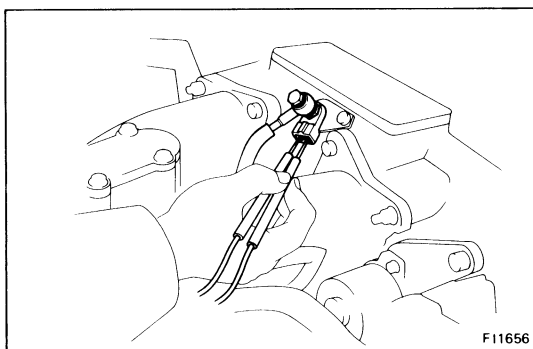
**5. REFILL GASOLINE**



# Cold Start Injector



FI3027 FI3026  
FI1973



F11656

## ON-VEHICLE INSPECTION (7M-GE Only)

### INSPECT RESISTANCE OF COLD START INJECTOR

- (a) Disconnect the cold start injector connector.
- (b) Using an ohmmeter, check the resistance of the injector.

**Resistance: 2 – 4 Ω**

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

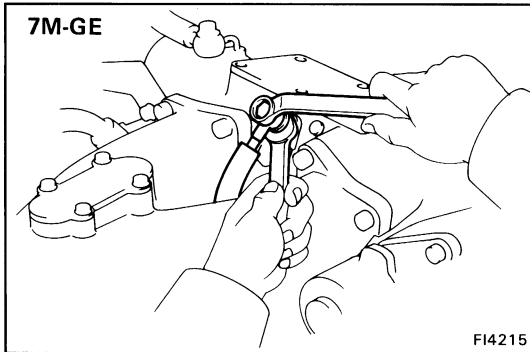
- (c) Connect the cold start injector connector.

## REMOVAL OF COLD START INJECTOR

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

**CAUTION:** Work must be started after approx. 20 seconds or longer from the time the ignition switch is turned to the "LOCK" position and the negative (—) terminal cable is disconnected from the battery.

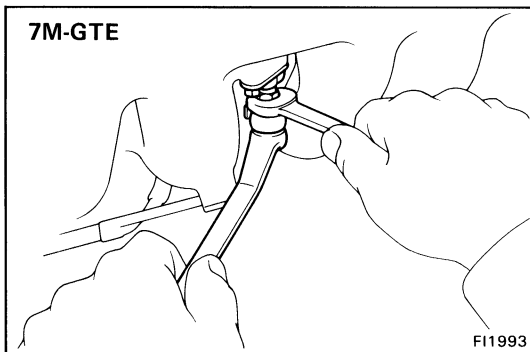
2. (7M-GE)  
DISCONNECT COLD START INJECTOR CONNECTOR



3. DISCONNECT COLD START INJECTOR TUBE

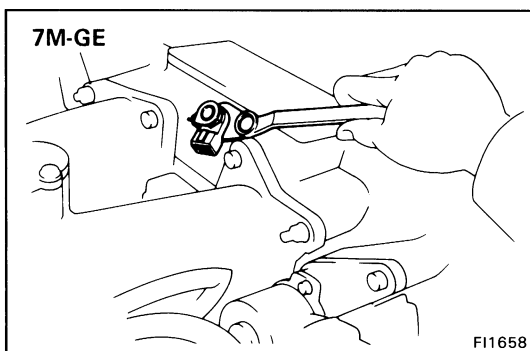
- (a) Put a suitable container of shop towel under the injector tube.
- (b) Remove the union bolt and two gaskets, and disconnect the injector tube from cold start injector.

**HINT:** Slowly loosen the union bolt.



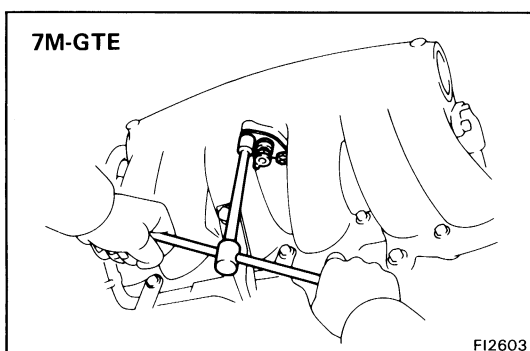
4. REMOVE COLD START INJECTOR  
(7M-GE)

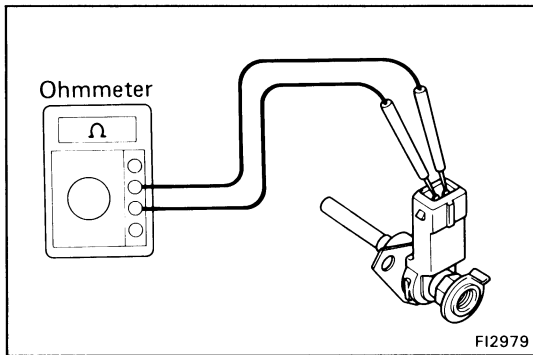
Remove the two bolts and cold start injector with the gasket.



- (7M-GTE)

Remove the two bolts and cold start injector with the gasket, and disconnect the cold start injector connector.





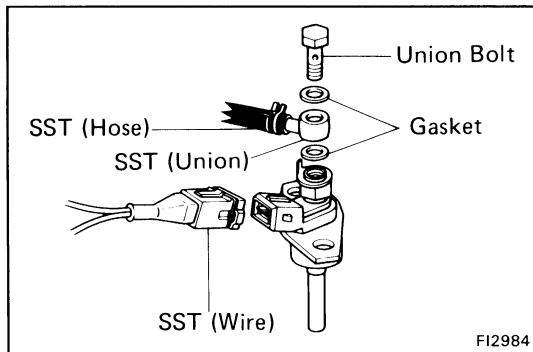
## INSPECTION OF COLD START INJECTOR

### 1. (7M-GTE) INSPECT RESISTANCE OF COLD START INJECTOR

Using an ohmmeter, check the resistance of the injector.

**Resistance:** 2 — 4  $\Omega$

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



### 2. INSPECT INJECTION OF COLD START INJECTOR

**CAUTION:** Keep clear of sparks during the test.

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

SST 09268-41045 (09268-41080, 90405-09015)

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

SST 09268-41045

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

SST 09842-30050

(d) Put a container under the injector.

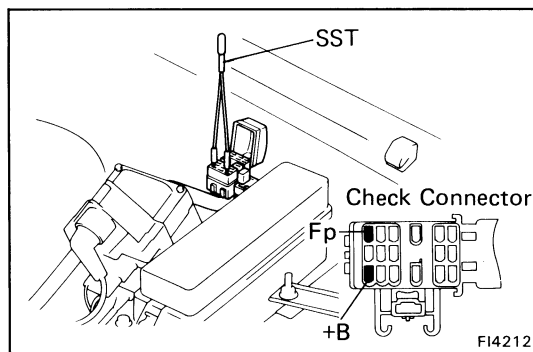
(e) Reconnect the battery negative (—) terminal.

(f) Turn the ignition switch ON.

**HINT:** Do not start the engine.

(g) Using SST, connect terminals +B and Fp of the check connector.

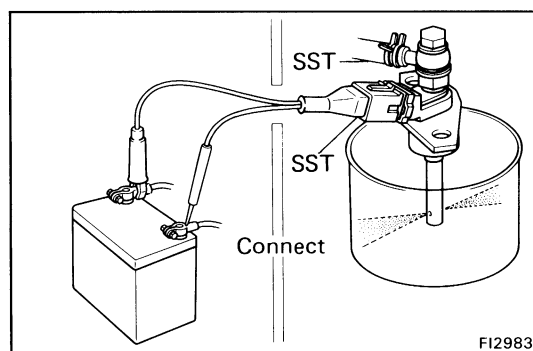
SST 09843-18020



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

SST 09842-30050

**NOTICE:** Perform this check within the shortest possible time.



### 3. INSPECT LEAKAGE

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

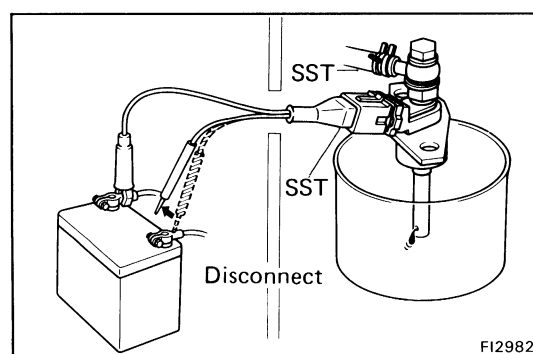
SST 09842-30050

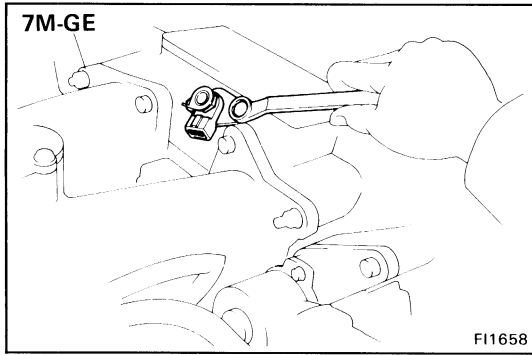
**Fuel drop:** One drop or less per minute

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

(c) Remove SST.

SST 09268-41045 (09268-41080, 90405-09015),  
09843-18020 and 09842-30050



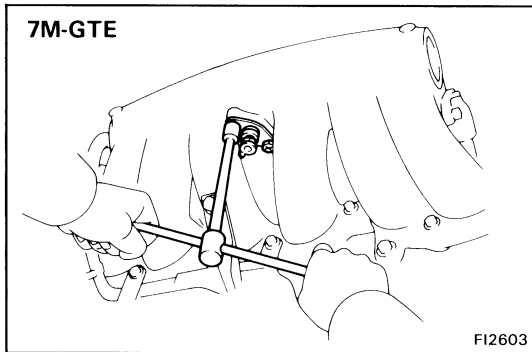


## INSTALLATION OF COLD START INJECTOR

### 1. INSTALL COLD START INJECTOR (7M-GE)

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

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

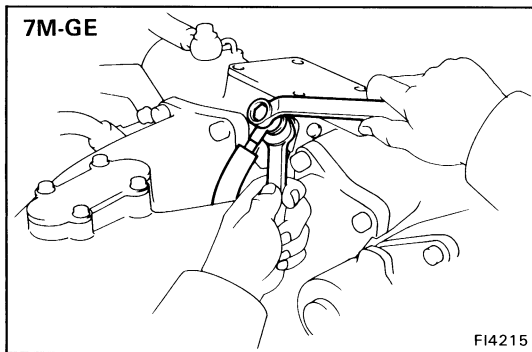


### (7M-GTE)

(a) Connect the cold start injector connector to the cold start injector.

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

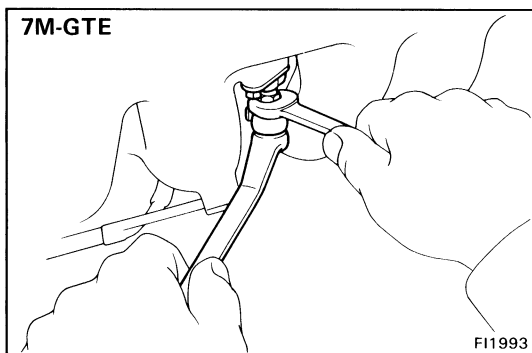
**Torque: 55 kg-cm (48 in.-lb, 5.4 N·m)**



### 2. CONNECT COLD START INJECTOR TUBE

Connect the cold start injector tube to the cold start injector with new gaskets and union bolt.

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

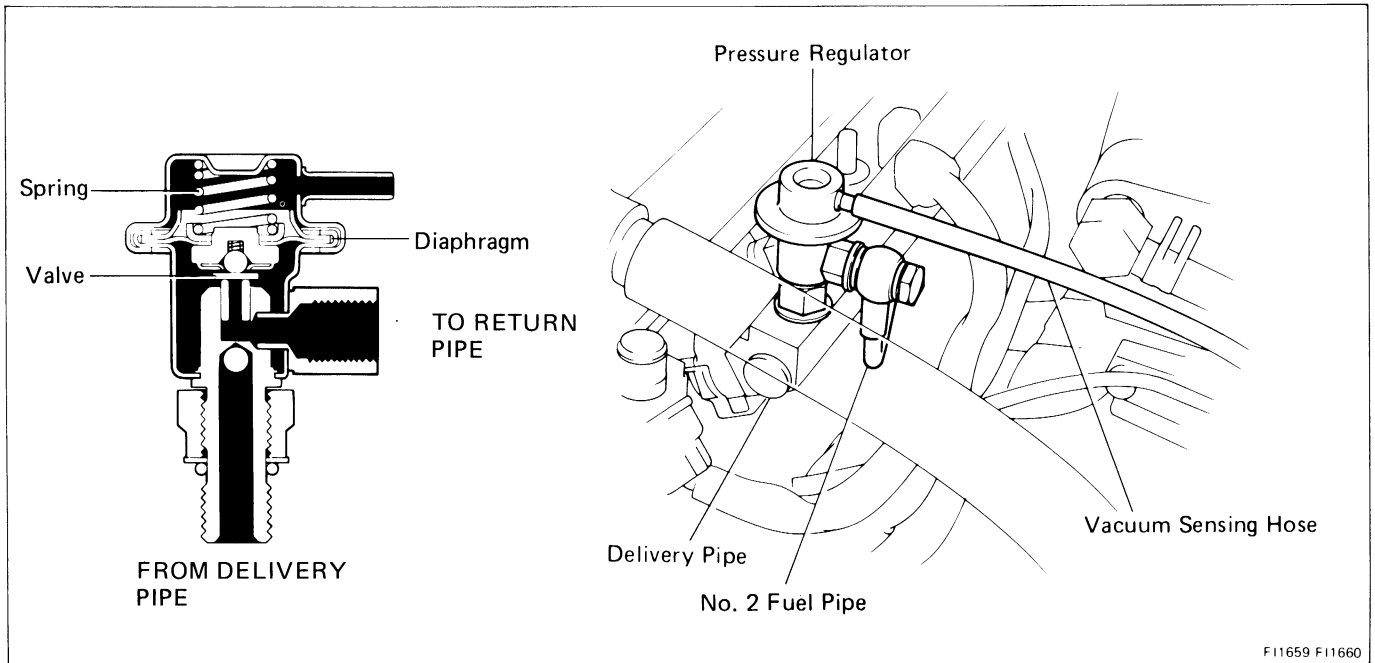


### 3. (7M-GE) CONNECT COLD START INJECTOR CONNECTOR

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

### 5. CHECK FOR FUEL LEAKAGE

## Fuel Pressure Regulator



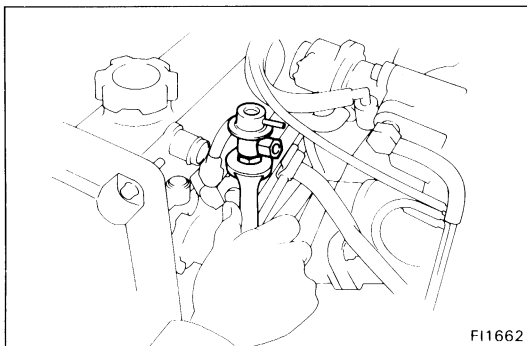
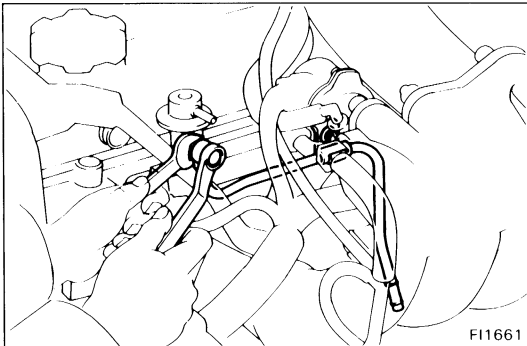
### ON-VEHICLE INSPECTION

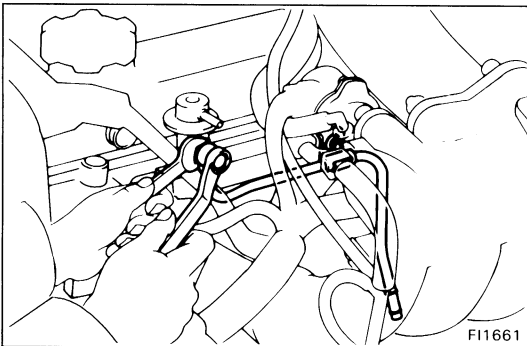
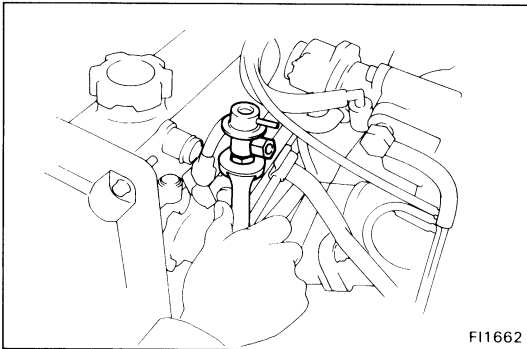
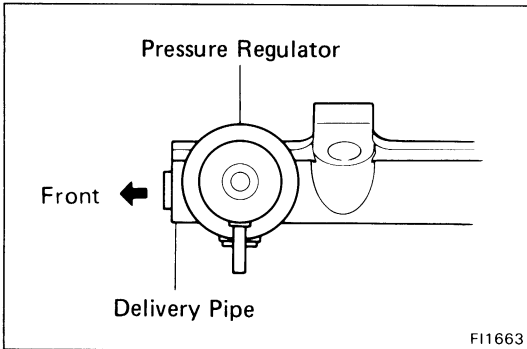
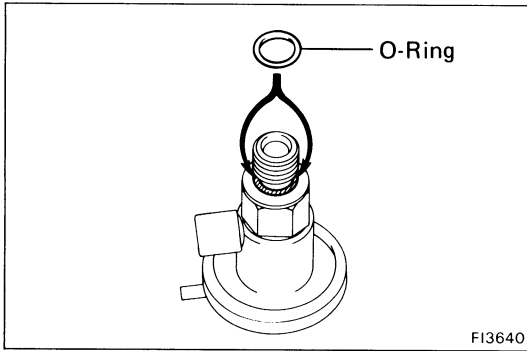
CHECK FUEL PRESSURE (See page FI-71)

### REMOVAL OF PRESSURE REGULATOR

1. DISCONNECT NO.3 PCV HOSE
2. DISCONNECT VACUUM SENSING HOSE
3. DISCONNECT NO.2 FUEL PIPE
  - (a) Place a suitable container or shop towel under the pressure regulator.
  - (b) Remove the union bolt and two gaskets.
  - (c) Remove the clamp bolt of the No.2 fuel pipe.
4. REMOVE PRESSURE REGULATOR
 

Loosen the lock nut, and remove the pressure regulator.





## INSTALLATION OF FUEL PRESSURE REGULATOR

### 1. INSTALL FUEL PRESSURE REGULATOR

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

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

- (e) Torque the lock nut.

**Torque: 250 kg-cm (18 ft-lb, 25 N·m)**

### 2. CONNECT NO.2 FUEL PIPE

Connect the No.2 fuel pipe to the pressure regulator with new gaskets and union bolt.

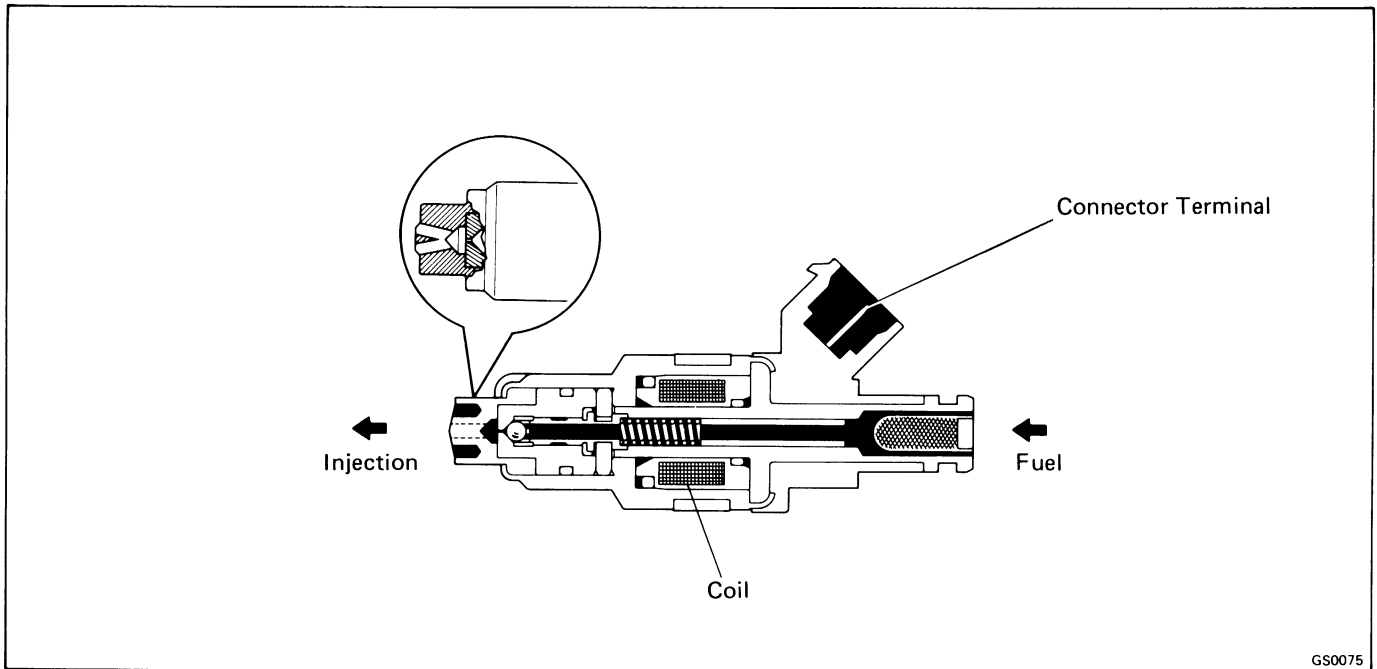
**Torque: 250 kg-cm (18 ft-lb, 25 N·m)**

### 3. CONNECT VACUUM SENSING HOSE

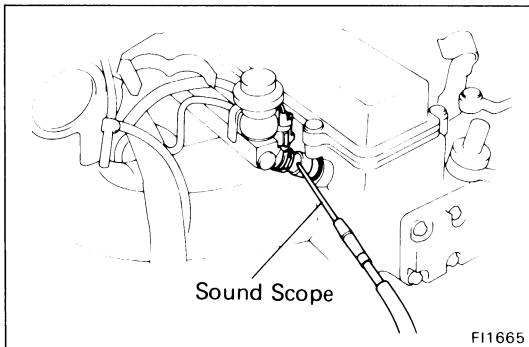
### 4. CONNECT NO.3 PCV HOSE

### 5. CHECK FOR FUEL LEAKAGE (See page FI-11)

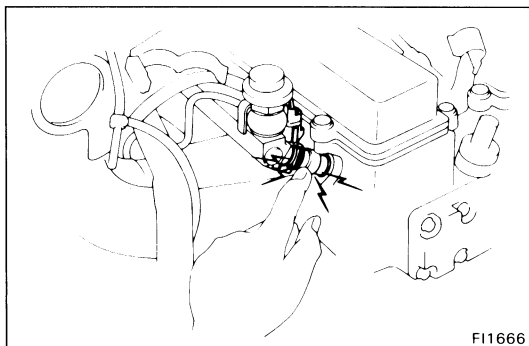
## Injectors



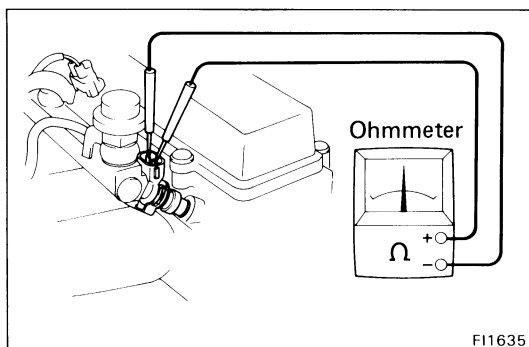
GS0075



F11665



F11666



F11635

### ON-VEHICLE INSPECTION

#### 1. CHECK INJECTOR OPERATION

Check the operating sound from each injector.

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

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

If no sound or an unusual sound is heard, check the wiring connector, injector, resistor (7M-GTE) or injection signal from the ECU.

#### 2. INSPECT RESISTANCE OF INJECTOR

- (a) Disconnect the injector connector.
- (b) Using an ohmmeter, check the resistance of both terminals.

**Resistance:**

**7M-GE**    **Approx. 13.8  $\Omega$**

**7M-GTE**    **2.0 — 3.8  $\Omega$**

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

- (c) Reconnect the injector connector.

## REMOVAL OF INJECTORS

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

**CAUTION:** Work must be started after approx. 20 seconds or longer from the time the ignition switch is turned to the "LOCK" position and the negative (—) terminal cable is disconnected from the battery.

2. **DRAIN COOLANT**

3. **DISCONNECT FOLLOWING HOSES:**

- Water hoses from throttle body (7M-GE) or water by-pass pipe (7M-GTE)
- Vacuum hoses from throttle body
- ISC valve hoses from throttle body
- Vacuum hose from pressure regulator

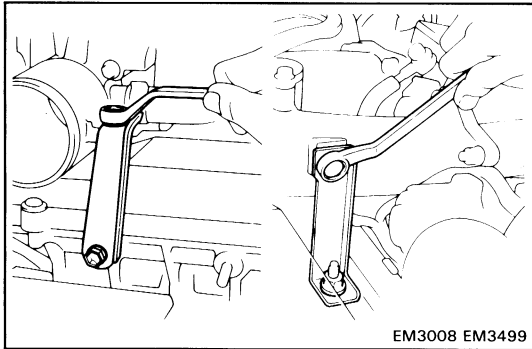
4. **DISCONNECT FOLLOWING CONNECTORS:**

- Throttle position sensor connector
- ISC valve connector
- (7M-GE)  
Cold start injector connector

5. **DISCONNECT ACCELERATOR CONNECTING ROD**

6. **REMOVE AIR INTAKE CONNECTOR (7M-GE)**

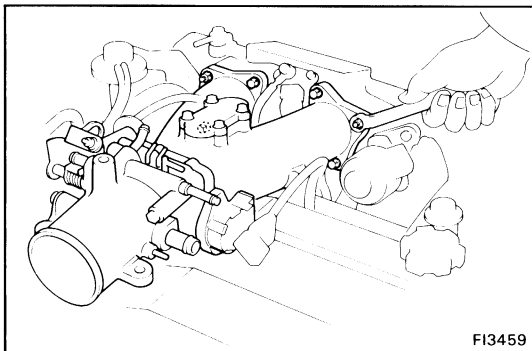
- (a) Disconnect the air cleaner hose from the throttle body.
- (b) Remove the throttle body and air intake connector brackets.



- (c) Remove the four bolts and two nuts, intake connector and gasket.

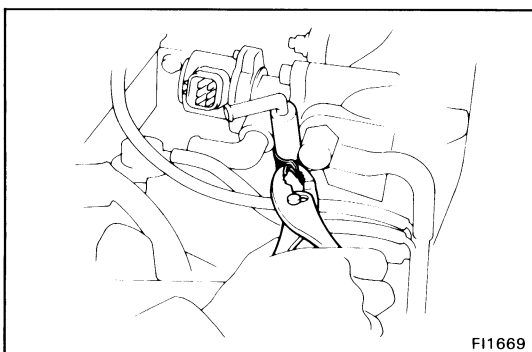
**(7M-GTE)**  
(See steps 1 to 5 on page EM-12)

7. **(7M-GTE)**  
**REMOVE THROTTLE BODY**  
(See step 6 on page FI-102)

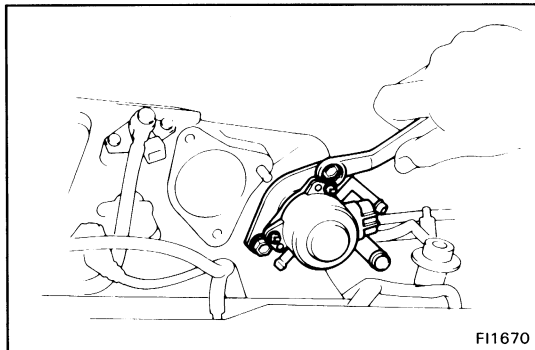


8. **REMOVE ISC VALVE**

- (a) Disconnect the No.1 water by-pass hose from the ISC valve.

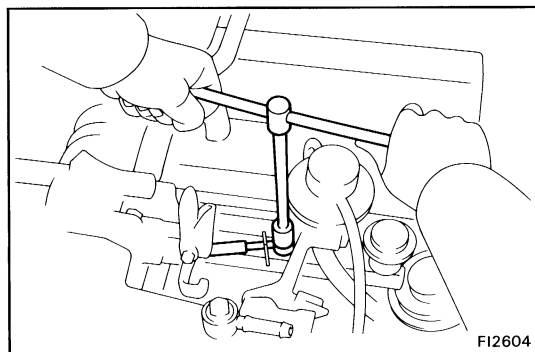






- (b) Remove the two bolts, ISC valve and gasket.

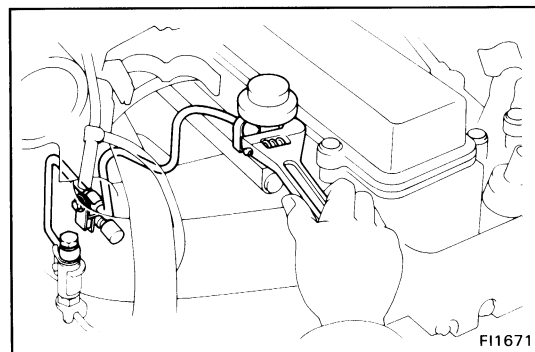
## 9. DISCONNECT INJECTOR CONNECTORS



## 10. DISCONNECT COLD START INJECTOR TUBE FROM DELIVERY PIPE

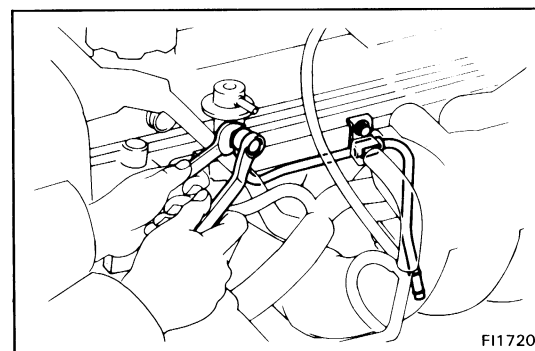
- (a) Put a suitable container or shop towel under the injector tube.  
 (b) Remove the union bolt and two gaskets, and disconnect the injector tube.

HINT: Slowly loosen the union bolt.



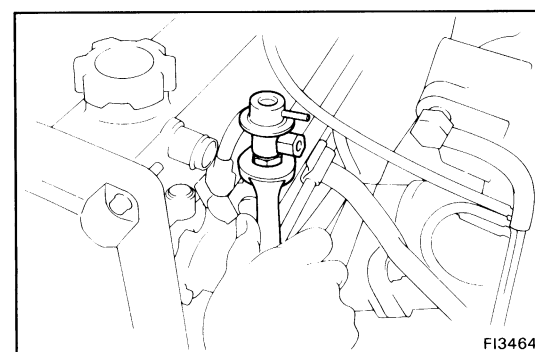
## 11. REMOVE NO.1 FUEL PIPE

- (a) Remove the union bolt (7M-GE) or pulsation damper (7M-GTE) and two gaskets from the delivery pipe.  
 (b) Remove the union bolt and two gaskets from the fuel support.  
 (c) Remove the clamp bolt and No.1 fuel pipe with VSV.



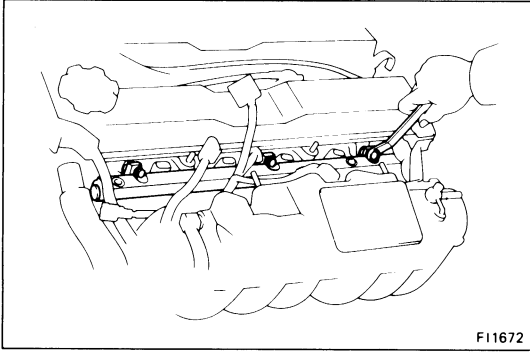
## 12. REMOVE NO.2 FUEL PIPE

- (a) Disconnect the fuel hose from the No.2 fuel pipe.  
 (b) Remove the union bolt and two gaskets from the pressure regulator.  
 (c) Remove the clamp bolt and No.2 fuel pipe.



## 13. REMOVE PRESSURE REGULATOR

Loosen the lock nut remove the pressure regulator.

**14. REMOVE DELIVERY PIPE**

- (a) Remove the three bolts, and then remove the delivery pipe with the injectors.

**NOTICE: Be careful not to drop the injectors.**

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

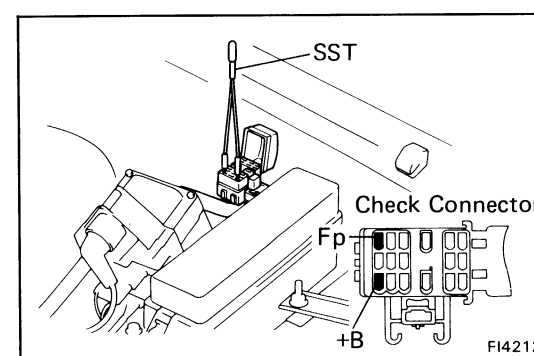
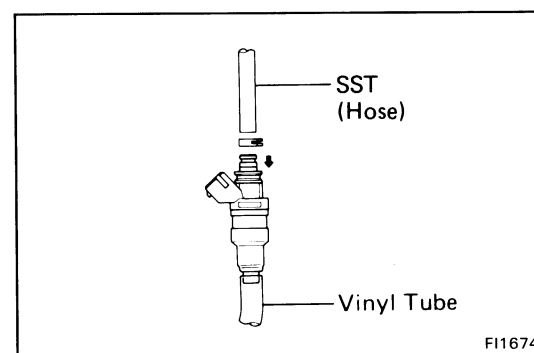
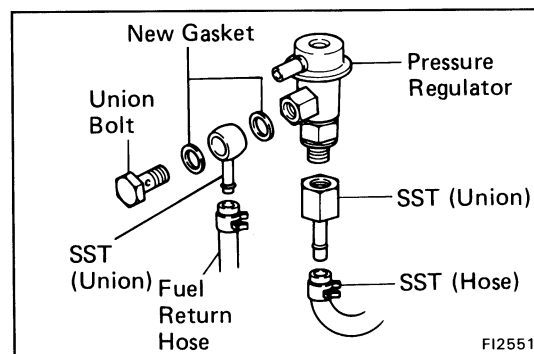
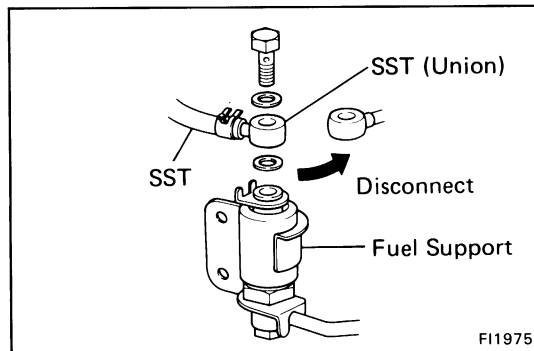
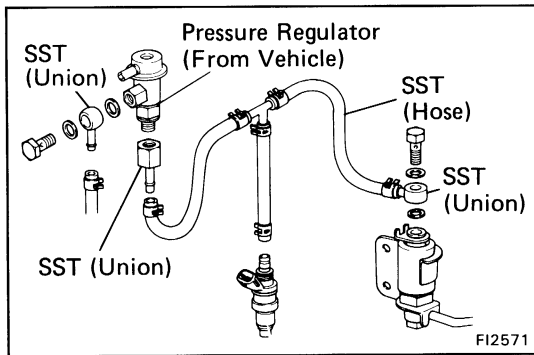
**15. REMOVE INJECTORS**

- (a) Pull out the injectors from the delivery pipe.
- (b) Remove the O-ring from the injector.

## INSPECTION OF INJECTORS

### 1. INSPECT INJECTOR INJECTION

**CAUTION:** Keep clear of sparks during the test.



(a) Disconnect the No.1 fuel pipe from the fuel return pipe support.

(b) Connect SST (union) to the fuel return pipe support.  
SST 09268-41045 (90405-09015)

HINT: Use the vehicle's fuel support.

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

SST 09268-41045 (09268-41080)

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

SST 09268-41045 (09268-52010)

(e) Connect SST (hose) to the injector.

SST 09268-41045

(f) Put the injector into the graduated cylinder.

HINT: Install a suitable vinyl tube onto the injector to prevent gasoline from splashing out.

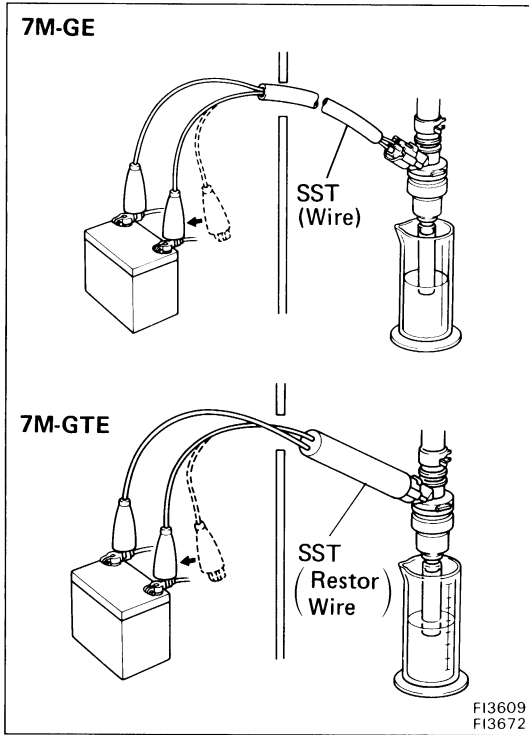
(g) Connect the battery cable.

(h) Turn the ignition switch ON.

HINT: Do not start the engine.

(i) Using SST, connect terminals +B and Fp of the check connector.

SST 09843-18020



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

SST 7M-GE 09842-30070  
7M-GTE 09842-30060

**Injection volume:**

**7M-GE**

69 — 85 cc (4.2 — 5.2 cu in.) per 15 sec.

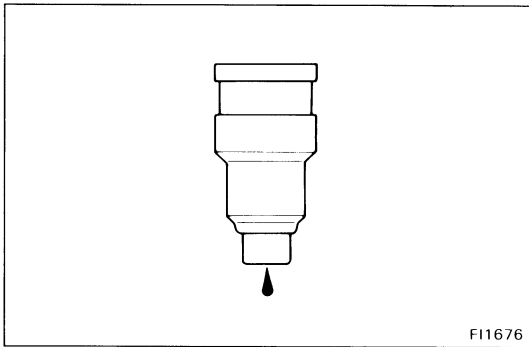
**7M-GTE**

101 — 114 cc (6.2 — 7.0 cu in.) per 15 sec.

**Difference between each injector:**

9 cc (0.5 cu in.) or less

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



**2. INSPECT LEAKAGE**

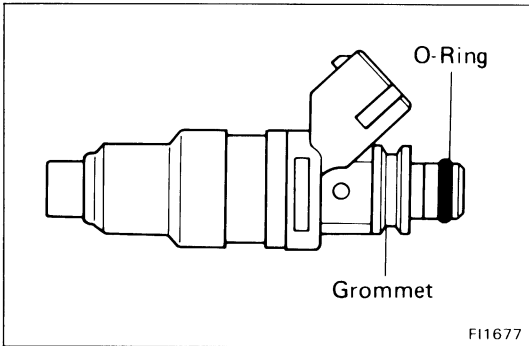
- (a) In the condition above, disconnect the test probes of SST (inspection wire) from the battery and check the fuel leakage from the injector.

SST 7M-GE 09842-30070  
7M-GTE 09842-30060

**Fuel drop: One drop or less per minute.**

- (b) Disconnect the battery negative (—) cable.
- (c) Remove SST.

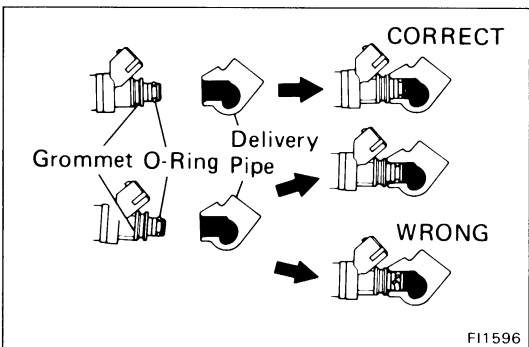
SST 09268-41045 (09268-41080, 09268-52010, 90405-09015) and 09843-18020



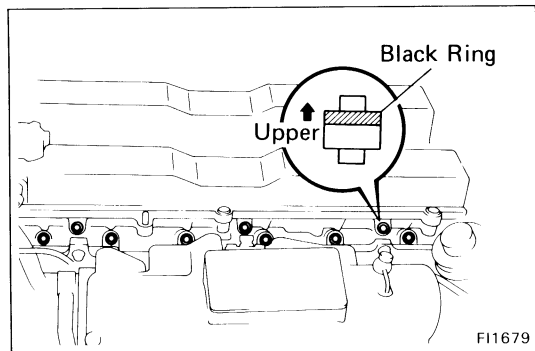
**INSTALLATION OF INJECTORS**

**1. INSTALL INJECTORS INTO DELIVERY PIPE**

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

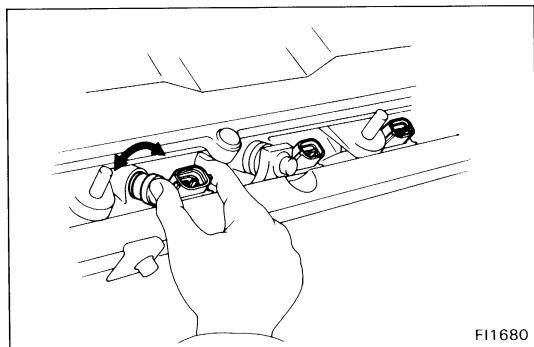


- (c) While turning the injector left and right, install it to the delivery pipe. Install the six injectors.



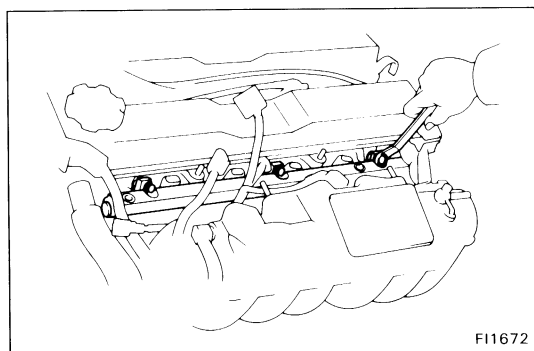
## 2. INSTALL DELIVERY PIPE WITH INJECTORS

- (a) Install the six insulators into the injector hole of the cylinder head.
- (b) Install the black rings on the upper portion of each of the three spacers. Then install the spacers on the delivery pipe mounting hole of the cylinder head.



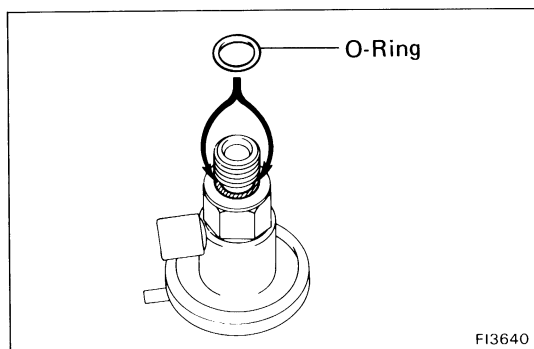
- (c) Place the injectors together with the delivery pipe on the cylinder head.
- (d) Check that the injectors rotate smoothly.

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



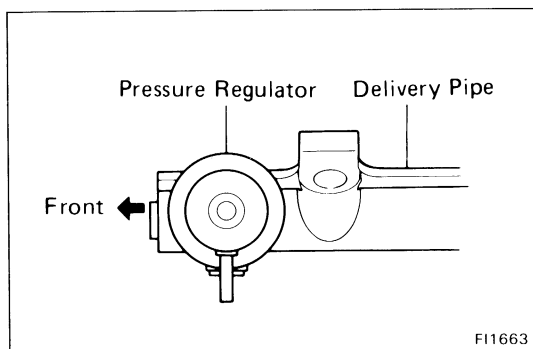
- (e) Install the three spacers and bolts.  
Torque the bolts.

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

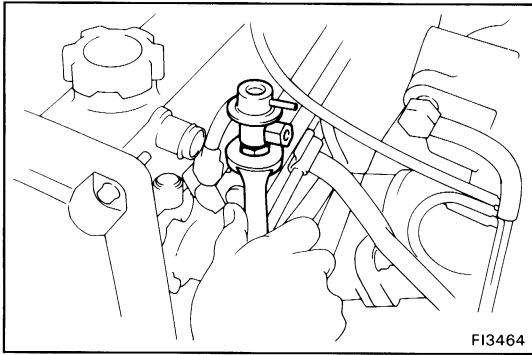


## 3. INSTALL PRESSURE REGULATOR

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

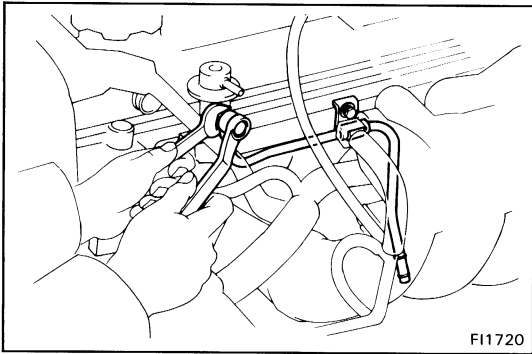


- (c) Thrust the pressure regulator completely into the delivery pipe by hand.
- (d) Turn the pressure regulator counterclockwise until the outlet faces in the direction indicated in the illustration.



(e) Torque the lock nut.

**Torque: 250 kg-cm (18 ft-lb, 25 N·m)**



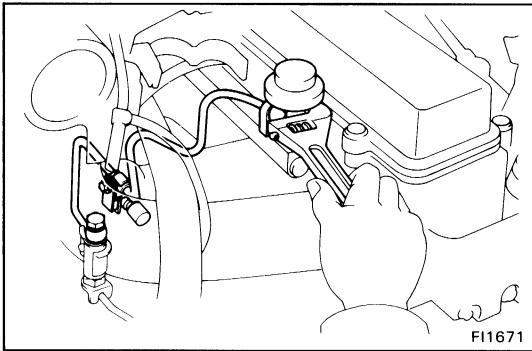
#### 4. INSTALL NO.2 FUEL PIPE

(a) Install the No.2 fuel pipe and clamp bolt.

(b) Install the union bolt and new two gaskets to the pressure regulator. Torque the union bolt.

**Torque: 250 kg-cm (18 ft-lb, 25 N·m)**

(c) Connect the fuel hose.



#### 5. INSTALL NO.1 FUEL PIPE

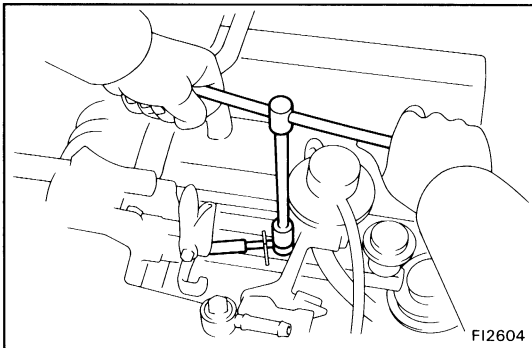
(a) Install the No.1 fuel pipe with VSV with the clamp bolt.

(b) Connect the pipe to the fuel pipe support with the union bolt and new gaskets. Torque the union bolts.

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

(c) Connect the pipe to the delivery pipe with the union bolt (7M-GE) or pulsation damper (7M-GTE) and new gaskets. Torque the union bolt or pulsation damper.

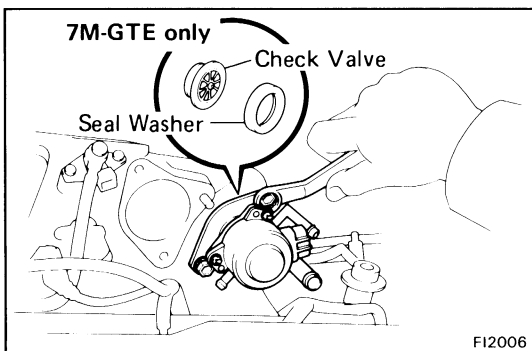
**Torque: 400 kg-cm (29 ft-lb, 39 N·m)**



#### 6. CONNECT INJECTOR CONNECTORS

#### 7. CONNECT COLD START INJECTOR TUBE TO DELIVERY PIPE

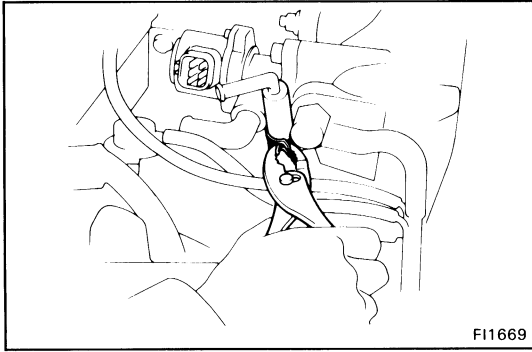
**Torque: 300 kg-cm (22 ft-lb, 29 N·m)**



#### 8. INSTALL ISC VALVE

(a) Install a new gasket and ISC valve with the two bolts.

**Torque: 130 kg-cm (9 ft-lb, 13 N·m)**

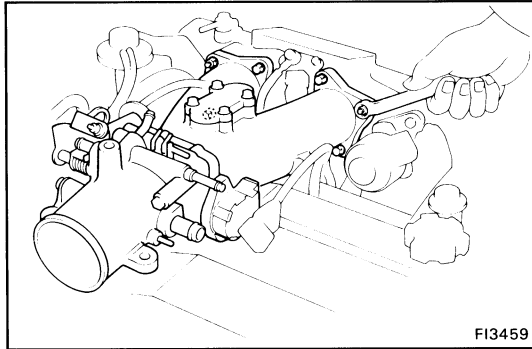


FI1669

(b) Connect No.1 water by-pass hose to the ISC valve.

## 9. (7M-GTE)

**INSTALL THROTTLE BODY**  
(See step 1 on page FI-104)



FI3459

## 10. INSTALL AIR INTAKE CONNECTOR (7M-GE)

(a) Install a new gasket and air intake connector with the four bolts and two nuts.

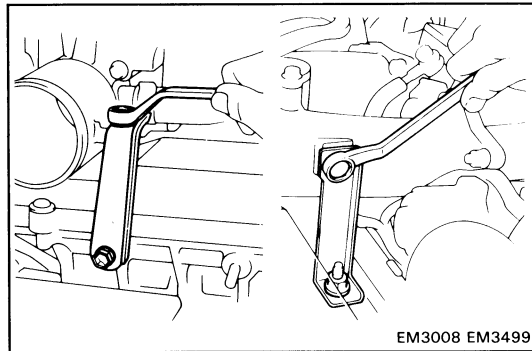
**Torque: 180 kg-cm (13 ft-lb, 18 N·m)**

(b) Install the air intake connector and throttle body bracket.

(c) Connect the air cleaner hose to the throttle body.

**(7M-GTE)**

**(See steps 15 to 19 on pages EM-14, 15)**



EM3008 EM3499

## 11. CONNECT ACCELERATOR CONNECTING ROD

## 12. CONNECT FOLLOWING CONNECTORS:

- Throttle position sensor connector
- ISC valve connector
- (7M-GE)  
Cold start injector connector

## 13. CONNECT FOLLOWING HOSES:

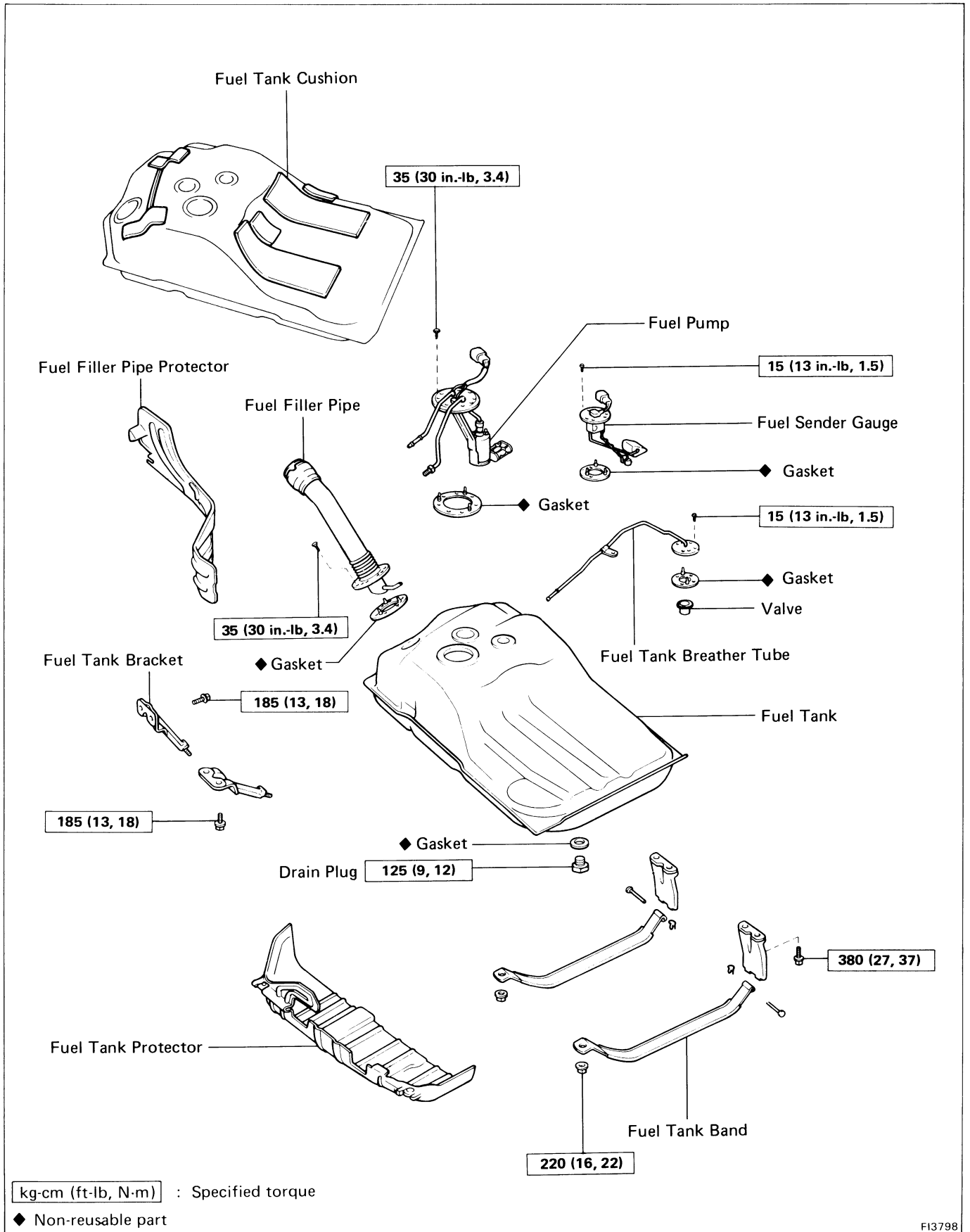
- Water hoses from throttle body (7M-GE) or water by-pass pipe (7M-GTE)
- Vacuum hoses from throttle body
- ISC valve hoses from throttle body
- Vacuum hose from pressure regulator

## 14. REFILL COOLANT (See page CO-5)

## 15. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

## 16. CHECK FOR FUEL LEAKAGE

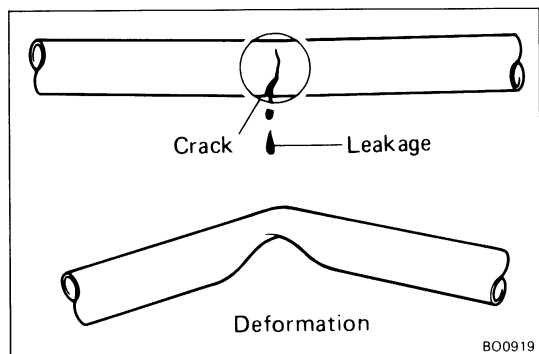
# Fuel Tank and Line COMPONENTS





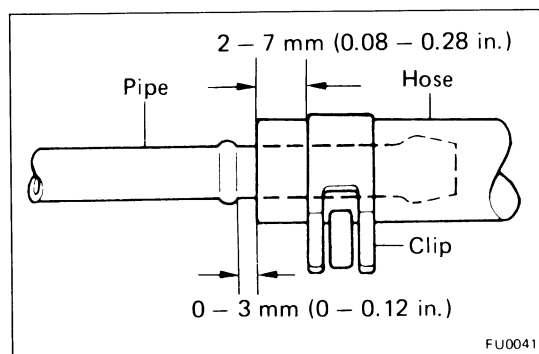
## PRECAUTIONS

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



## INSPECT FUEL LINES AND CONNECTIONS

- (a) Inspect the fuel lines for cracks or leakage, and all connections for deformations.
- (b) Inspect the fuel tank vapor vent system hoses and connections for looseness, sharp bends or damage.
- (c) Inspect the fuel tank for deformations, cracks fuel leakage or tank band looseness.
- (d) Inspect the filler neck for damage or fuel leakage.

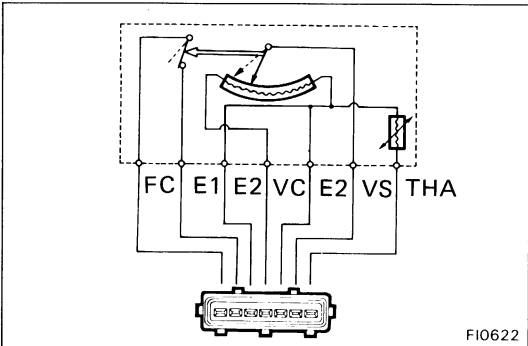
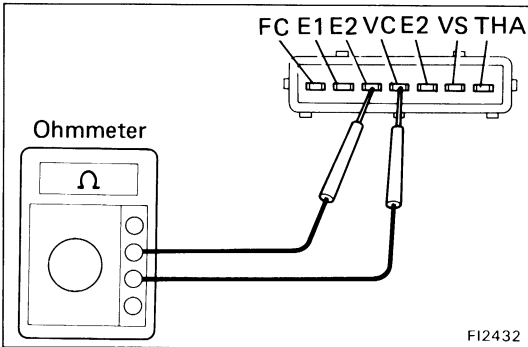
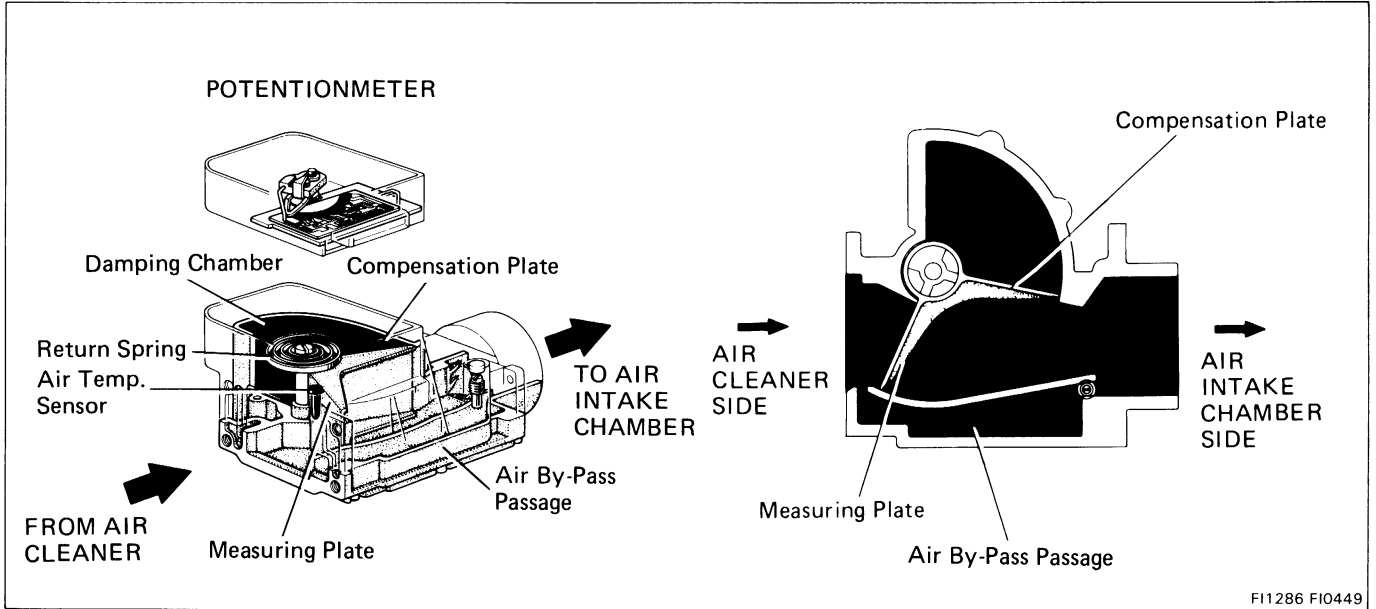


- (e) Hose and tube connections are as shown in the illustration.

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

# AIR INDUCTION SYSTEM

## Air Flow Meter (7M-GE)



### ON-VEHICLE INSPECTION

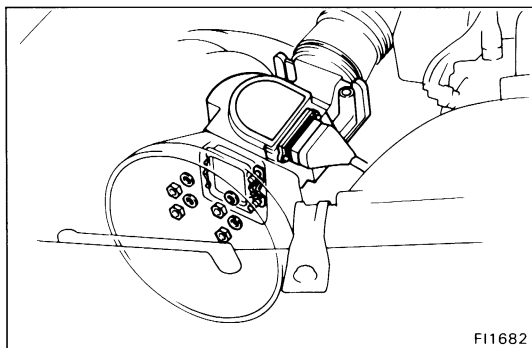
#### INSPECT RESISTANCE OF AIR FLOW METER

- Disconnect the air flow meter connector.
- Using an ohmmeter, measure the resistance between each terminal.

Between terminals	Resistance ( $\Omega$ )	Temp. °C (°F)
E2 – VS	200 – 600	–
E2 – VC	200 – 400	–
E2 – THA	10,000 – 20,000	–20 (–4)
	4,000 – 7,000	0 (32)
	2,000 – 3,000	20 (68)
	900 – 1,300	40 (104)
	400 – 700	60 (140)
E1 – FC	Infinity	–

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

- Reconnect the air flow meter connector.

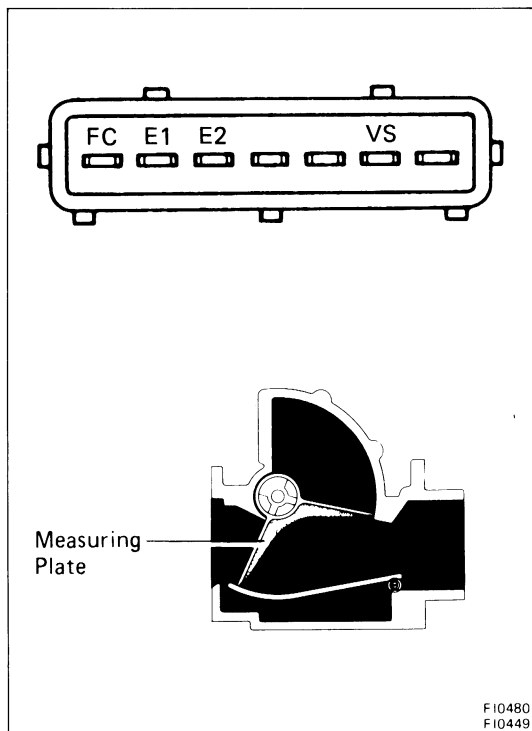


FI1682

### REMOVAL OF AIR FLOW METER

1. **DISCONNECT AIR FLOW METER CONNECTOR**
2. **DISCONNECT NO.2 AIR CLEANER HOSE**
3. **REMOVE AIR CLEANER CAP**  
Remove the two bolts and cap.
4. **REMOVE AIR FLOW METER**

Pry off the lock plates, and remove the four nuts, and air flow meter.



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### INSPECTION OF AIR FLOW METER

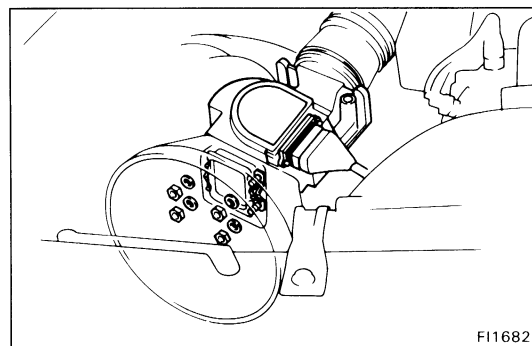
#### INSPECT RESISTANCE OF AIR FLOW METER

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

Terminals	Resistance $\Omega$	Measuring plate opening
FC – E1	Infinity	Fully closed
	Zero	Other than closed position
VS – E2	200 – 600	Fully closed
	20 – 1,200	Fully open

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

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

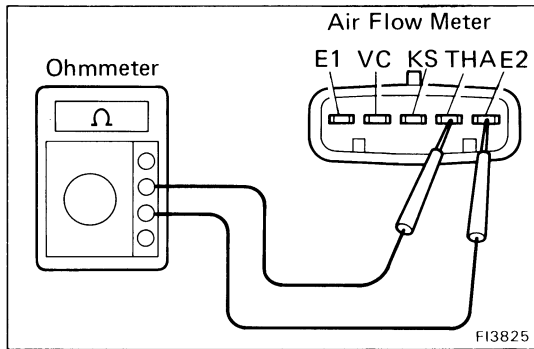
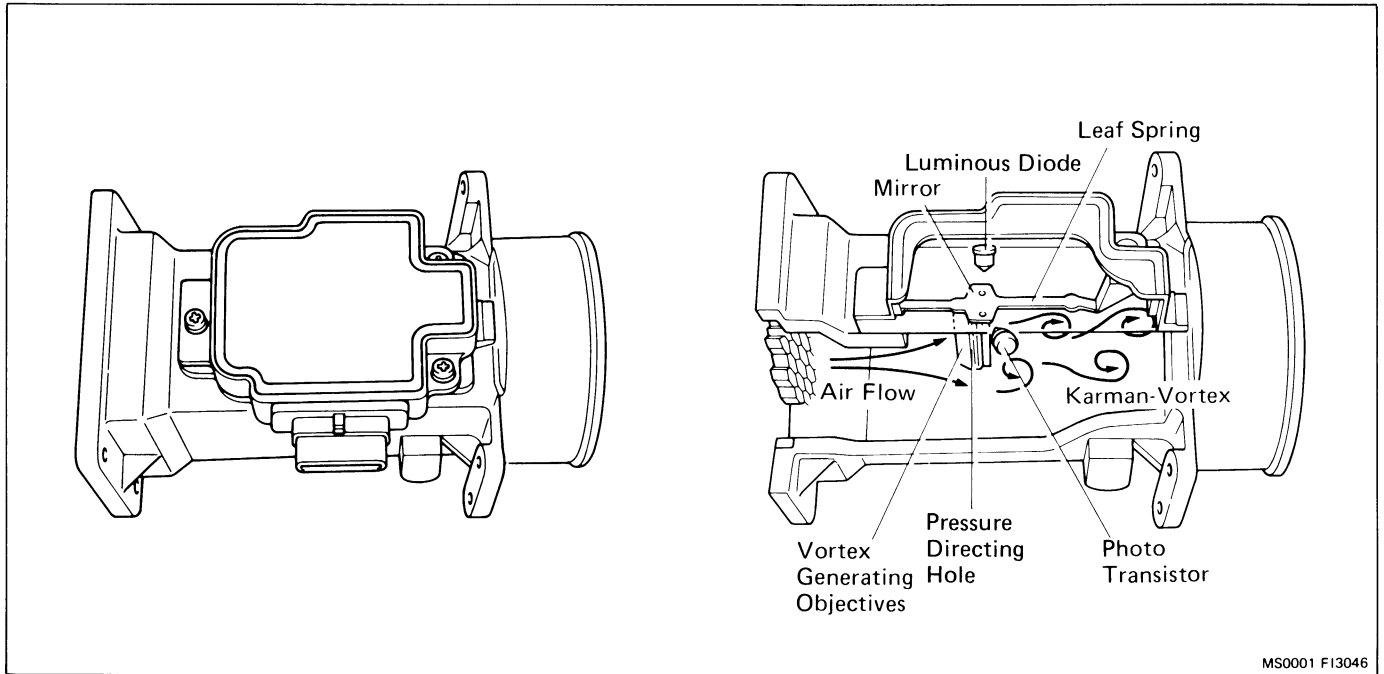


FI1682

### INSTALLATION OF AIR FLOW METER

1. **INSTALL AIR FLOW METER**  
Install the air flow meter with the two new lock plates and four nuts. Pry the lock plates on to the nuts.
2. **INSTALL AIR CLEANER CAP**  
Install the cap with two bolts.
3. **CONNECT NO.2 AIR CLEANER HOSE**
4. **INSTALL AIR FLOW METER CONNECTOR**

# Air Flow Meter (7M-GTE)



## ON-VEHICLE INSPECTION

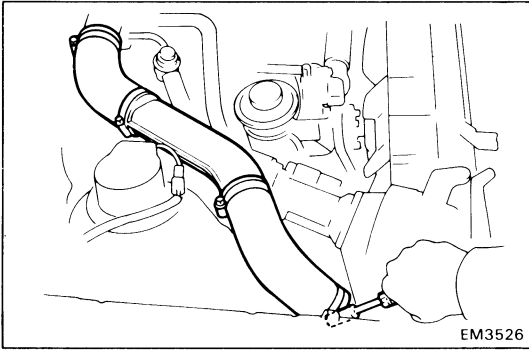
### INSPECT RESISTANCE OF AIR FLOW METER

- (a) Disconnect the air flow meter connector.
- (b) Using an ohmmeter (analog type), measure the resistance between each terminal.

Terminals	Resistance ( $\Omega$ )	Temp. $^{\circ}\text{C}$ ( $^{\circ}\text{F}$ )
THA — E2	10,000 — 20,000	-20 (-4)
	4,000 — 7,000	0 (32)
	2,000 — 3,000	20 (68)
	900 — 1,300	40 (104)
	400 — 700	60 (140)

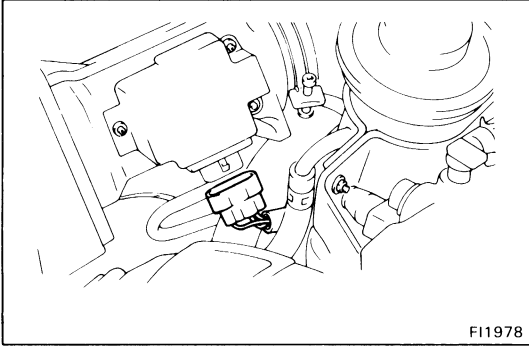
If the resistance is not as specified, replace the air flow meter.

- (c) Reconnect the air flow meter connector.



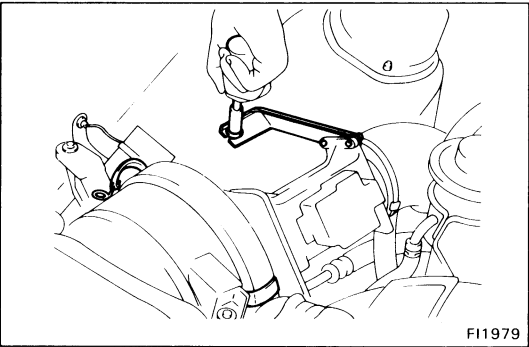
## REMOVAL OF AIR FLOW METER

1. REMOVE NO.4 AIR CLEANER PIPE WITH NO.1 AND NO.2 AIR CLEANER HOSES

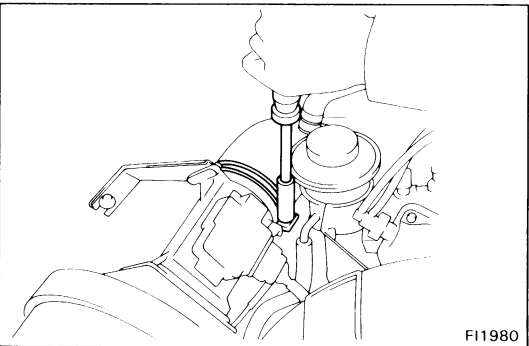


2. REMOVE AIR FLOW METER WITH AIR CLEANER CAP

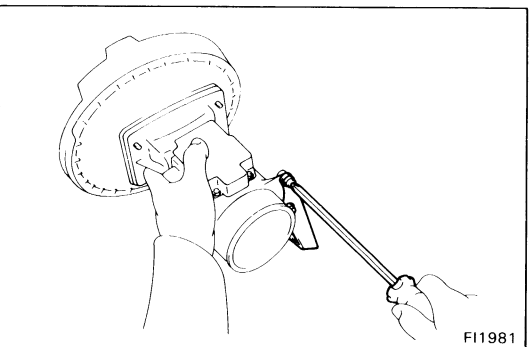
(a) Disconnect the connector.



(b) Remove the three clamps and bolt.

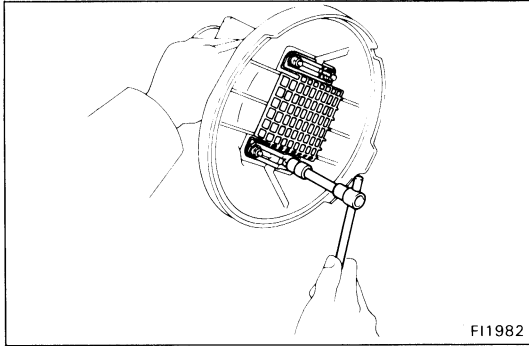


(c) Loosen the clamp and remove the air flow meter with air cleaner cap.

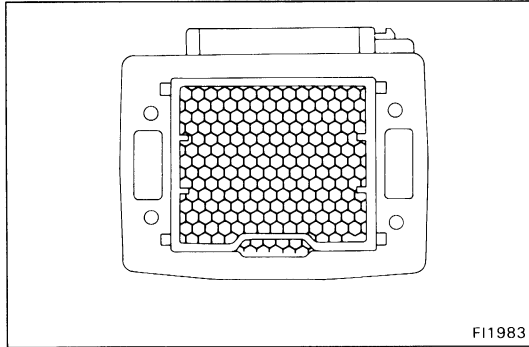


3. REMOVE AIR FLOW METER

(a) Remove the two screws and bracket.



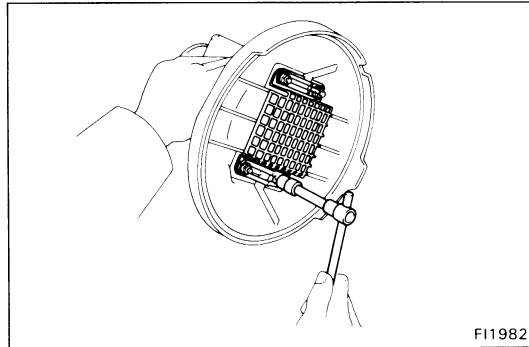
- (b) Pry off the lock plate.
- (c) Remove the four nuts, lock plates, No.1 air cleaner cover and air cleaner cap.



## INSPECTION OF AIR FLOW METER

Check that the honey-combed mesh is neither deformed nor damaged.

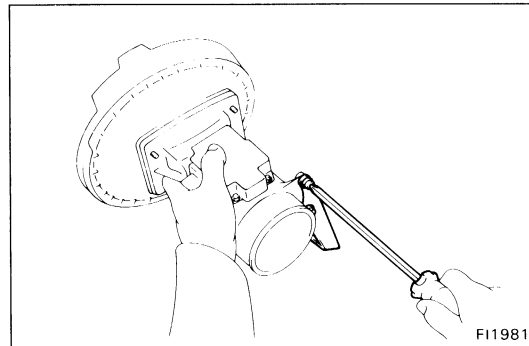
If necessary, replace the air flow meter.



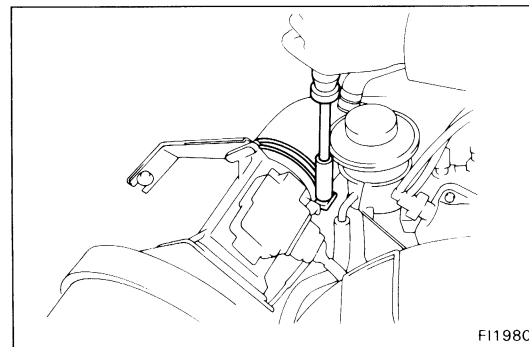
## INSTALLATION OF AIR FLOW METER

### 1. INSTALL AIR FLOW METER

- (a) Install the air cleaner cap, No.1 air cleaner cover and lock plates to the air flow meter with the four nuts.
- (b) Pry the lock plates on the nuts.

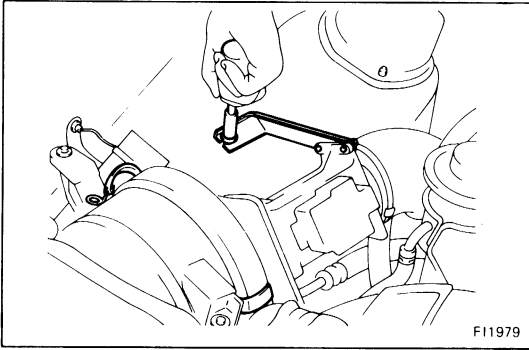


- (c) Install the bracket with the two screws.

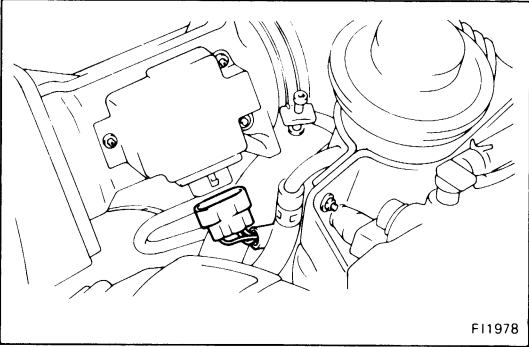


### 2. INSTALL AIR FLOW METER WITH AIR CLEANER CAP

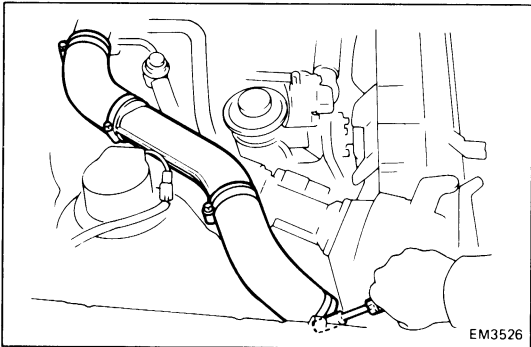
- (a) Install the air flow meter with air cleaner cap, and tighten the clamp.



(b) Install the bolt and clamps.

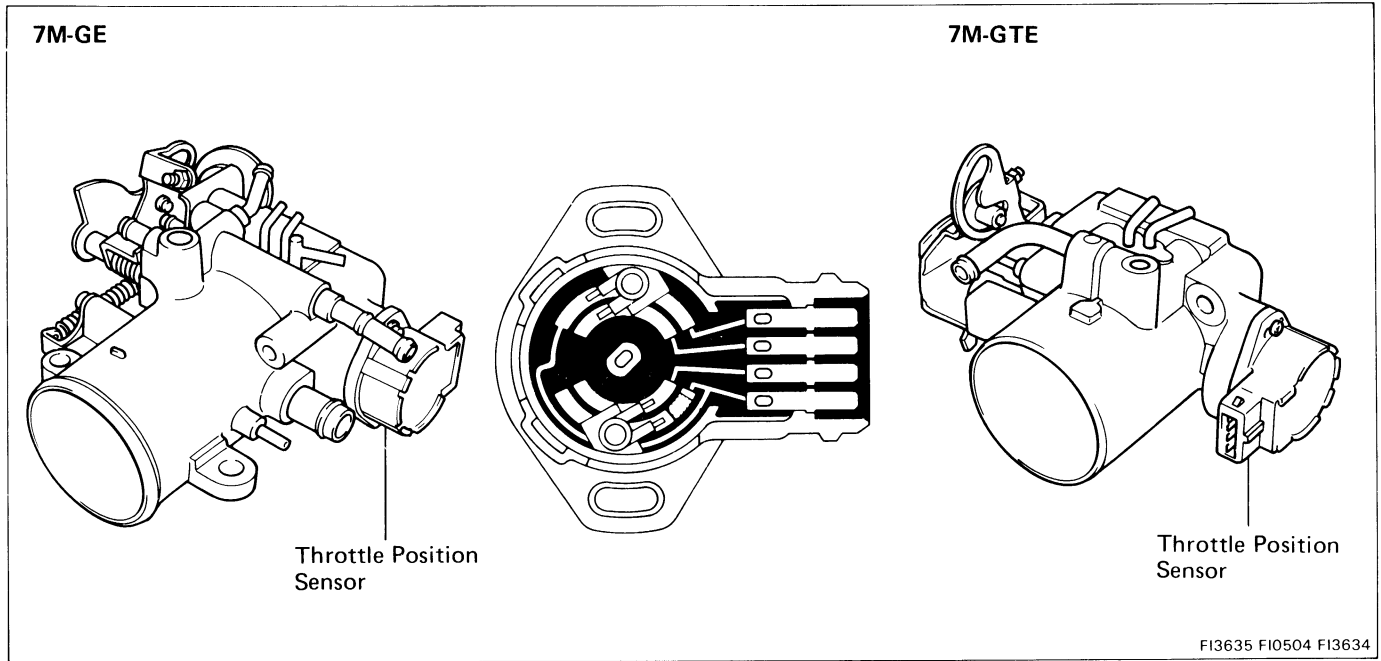


(c) Connect the connector.



**3. INSTALL NO. 4 AIR CLEANER PIPE WITH NO. 1 AND NO. 2 AIR CLEANER HOSES**

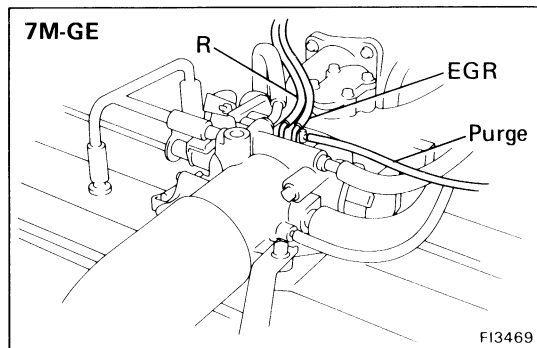
# Throttle Body



## ON-VEHICLE INSPECTION

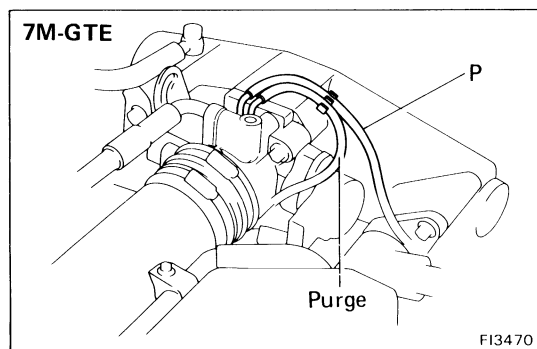
### 1. INSPECT THROTTLE BODY

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

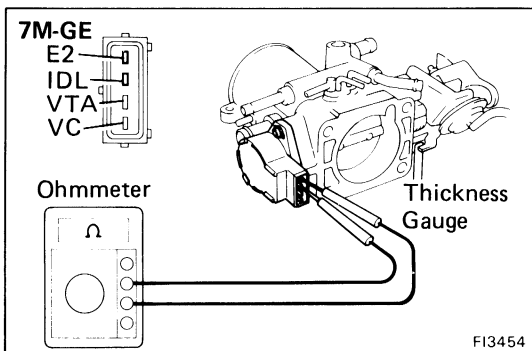


- (b) Check the vacuum at each port.
- Start the engine.
  - Check the vacuum with your finger.

Port Name	At idling	Other than idling
Purge	No vacuum	Vacuum
EGR	No vacuum	Vacuum
R	No vacuum	No vacuum
P	No vacuum	Vacuum



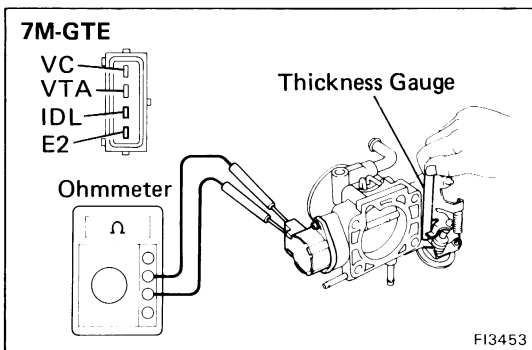




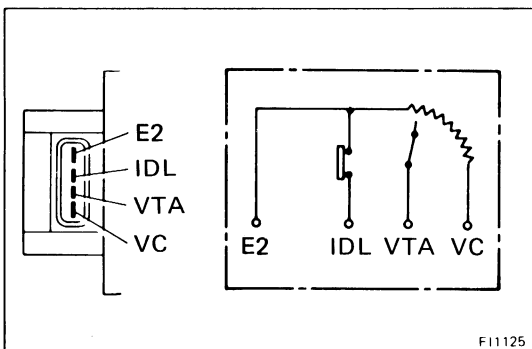
**2. INSPECT THROTTLE POSITION SENSOR**

- (a) Disconnect the connector from the sensor.
- (b) Insert a thickness gauge between the throttle stop screw and stop lever.
- (c) Using an ohmmeter, measure the resistance between each terminal.

Clearance between lever and stop screw		Between terminals	Resistance
7M-GE	7M-GTE		
0 mm (0 in.)		VTA – E2	0.2 – 1.2 kΩ
0.4 mm (0.0157 in.)	< 0.5 mm (0.0197 in.)	IDL – E2	2.3 kΩ or less
0.75 mm (0.0295 in.)	0.9 mm (0.0354 in.)	IDL – E2	∞
Throttle valve fully opened position		VTA – E2	3.5 – 10.3 kΩ
—		VC – E2	4.25 – 8.25 kΩ

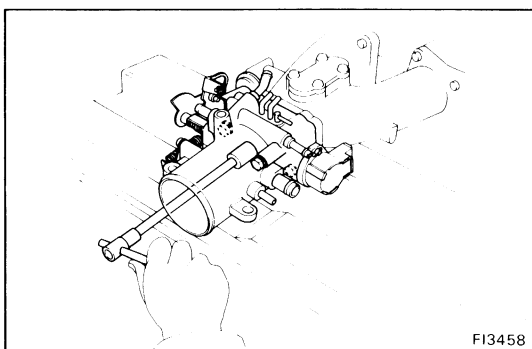


THROTTLE CLEARANCE WHEN AT STOP SPEED (0km/h)  
 ≈ .0015" ~ .002" MAX.



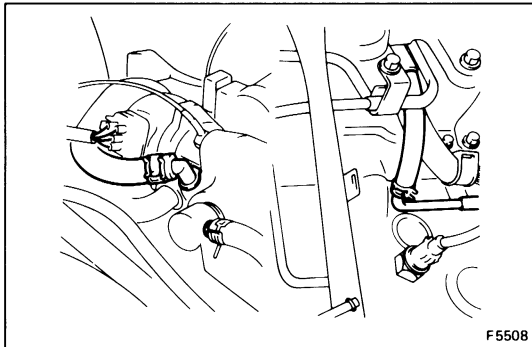
**REMOVAL OF THROTTLE BODY (7M-GE)**

1. DRAIN COOLANT FROM THROTTLE BODY
2. DISCONNECT ACCELERATOR CONNECTING ROD
3. DISCONNECT VACUUM HOSES
4. DISCONNECT NO.2 AND NO.3 WATER BY-PASS HOSES
5. DISCONNECT THROTTLE POSITION SENSOR CONNECTOR
6. DISCONNECT AIR CLEANER HOSE
7. REMOVE THROTTLE BODY BRACKET
8. REMOVE THROTTLE BODY
  - (a) Remove the four bolts, throttle body and gasket.
  - (b) Remove the VTV.

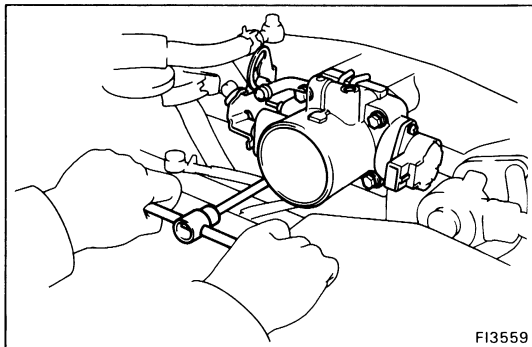


**(7M-GTE)**

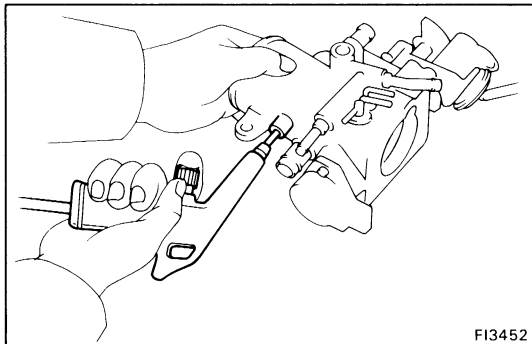
1. DRAIN COOLANT FROM THROTTLE BODY
2. DISCONNECT ACCELERATOR ROD
3. REMOVE AIR INTAKE CONNECTOR  
(See steps 3 to 5 on page EM-12)
4. DISCONNECT VACUUM HOSES
5. DISCONNECT THROTTLE POSITION SENSOR CONNECTOR



6. REMOVE THROTTLE BODY
  - (a) Disconnect the two water by-pass hoses from the ISC valve and water pipe.



- (b) Remove the four bolts, throttle body and gasket.
- (c) Remove the two water by-pass hoses.
- (d) Remove the VTV.

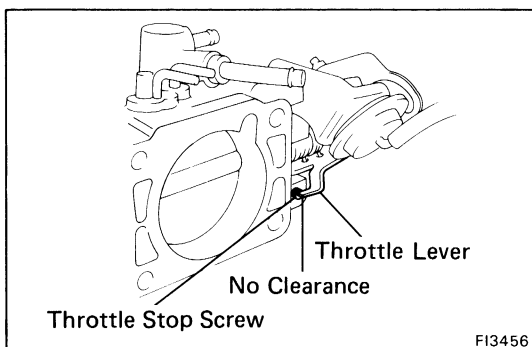
**INSPECTION OF THROTTLE BODY**

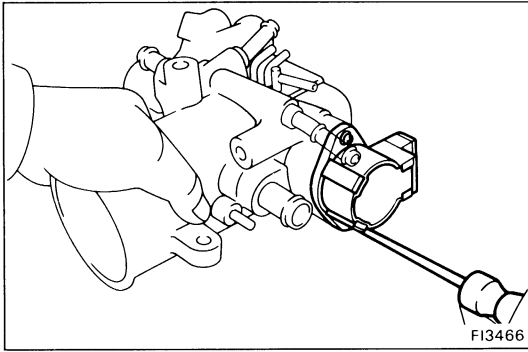
1. CLEAN THROTTLE BODY BEFORE INSPECTION
  - (a) Wash and clean the cast parts with a soft brush and carburetor cleaner.
  - (b) Using compressed air, blow all passages and apertures in the throttle body.

**CAUTION:** To prevent deterioration, do not clean the throttle position sensor and dash pot.

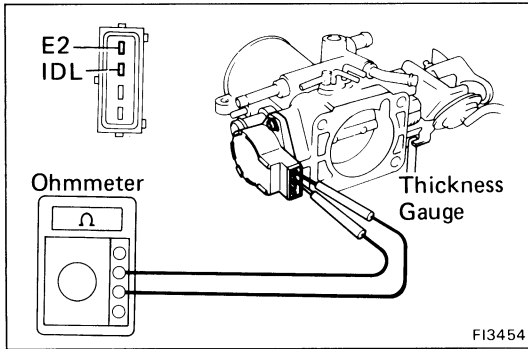
2. CHECK THROTTLE VALVE

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

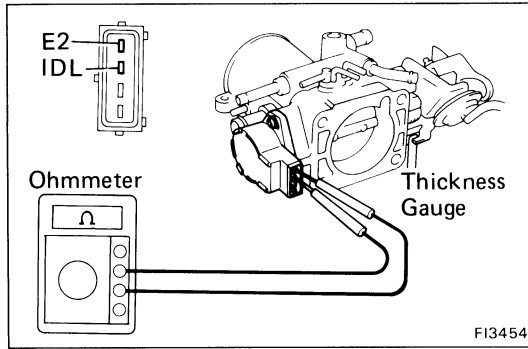




3. **CHECK THROTTLE POSITION SENSOR**  
(See step 2 on page FI-101)
4. **IF NECESSARY, ADJUST THROTTLE POSITION SENSOR**
  - (a) Loosen the two screws of the sensor.

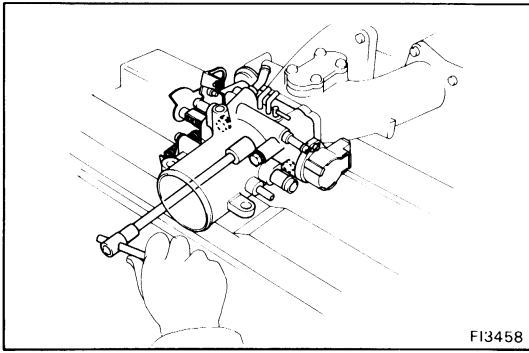


- (b) Insert a thickness gauge 0.58 mm (0.0228 in.) (7M-GE) or 0.70 mm (0.0276 in.) (7M-GTE) between the throttle stop screw and lever, and connect the ohmmeter to terminals IDL and E2.
- (c) Gradually turn the sensor clockwise until the ohmmeter indicator deflects, and secure the sensor with two screws.



- (d) Using a thickness gauge, recheck the continuity between terminals IDL and E2.

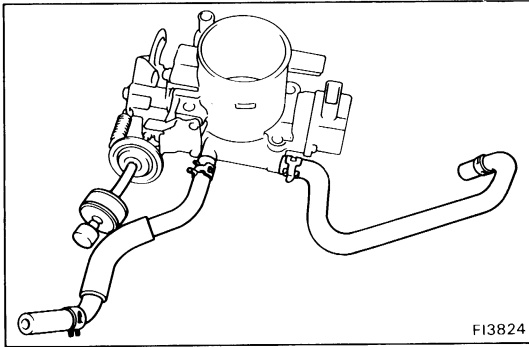
Clearance between lever and stop screw		Continuity (IDL – E2)
7M-GE	7M-GTE	
0.40 mm (0.0157 in.)	0.50 mm (0.0197 in.)	Continuity
0.75 mm (0.0295 in.)	0.90 mm (0.0354 in.)	No continuity



F13458

## INSTALLATION OF THROTTLE BODY (7M-GE)

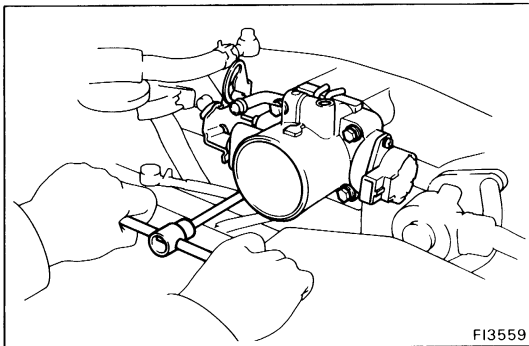
1. **INSTALL THROTTLE BODY**
  - (a) Install the VTV.
  - (b) Install the gasket and throttle body with the four bolts.  
**Torque: 130 kg-cm (9 ft-lb, 13 N·m)**
2. **CONNECT THROTTLE BODY BRACKET**
3. **CONNECT AIR CLEANER HOSE**
4. **CONNECT THROTTLE POSITION SENSOR CONNECTOR**
5. **CONNECT VACUUM HOSES**
6. **CONNECT WATER HOSES**
7. **CONNECT ACCELERATOR CONNECTING ROD**
8. **REFILL WITH COOLANT**



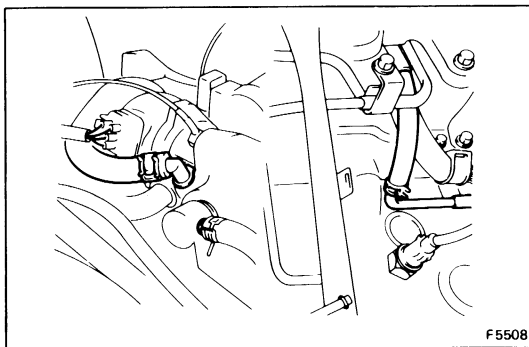
F13824

## (7M-GTE)

1. **INSTALL THROTTLE BODY**
  - (a) Install the VTV.
  - (b) Install the two water by-pass hoses.
- (c) Install a new gasket and throttle body with the four bolts.
- (d) Connect the two water by-pass hoses to the ISC valve and water pipe.



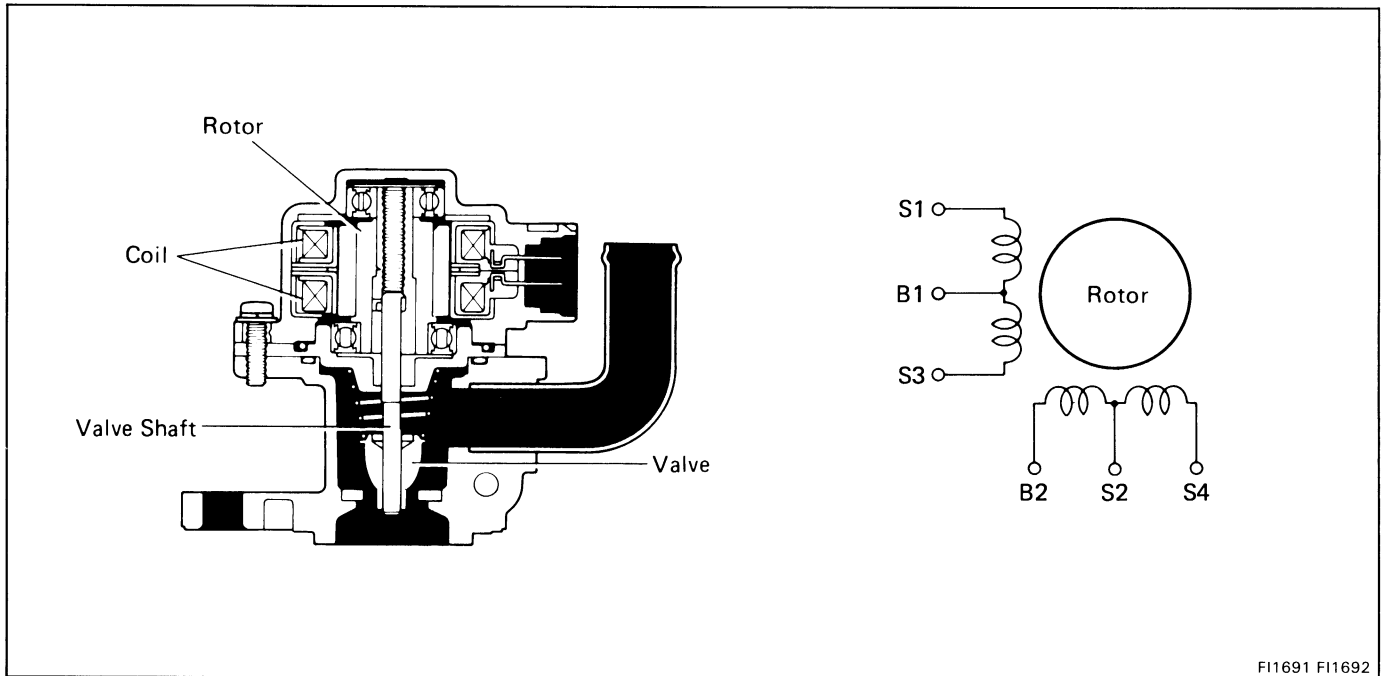
F13559



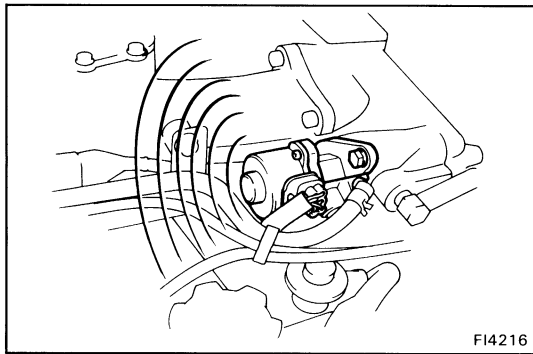
F5508

2. CONNECT THROTTLE POSITION SENSOR CONNECTOR
3. CONNECT VACUUM HOSES
4. INSTALL AIR INTAKE CONNECTOR  
(See steps 15 to 17 on page EM-14)
5. INSTALL ACCELERATOR ROD
6. REFILL WITH COOLANT

## Idle Speed Control (ISC) Valve

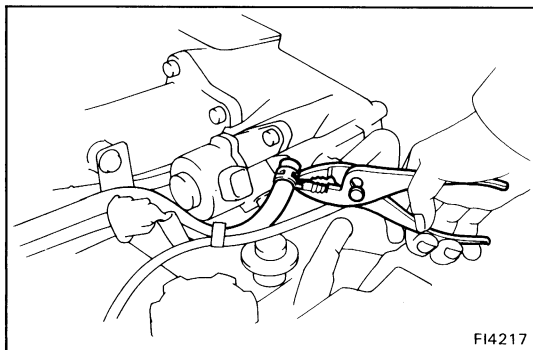


FI1691 FI1692



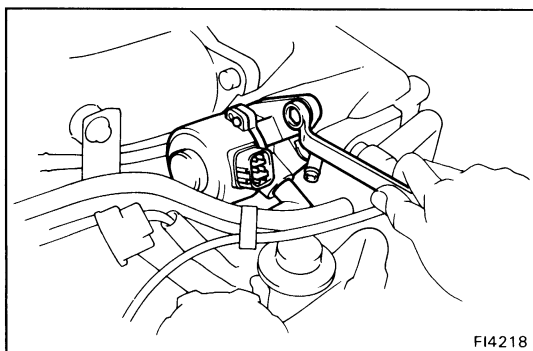
### CHECK FOR OPERATING SOUND FROM ISC VALVE

Check that there is a clicking sound immediately after stopping the engine.



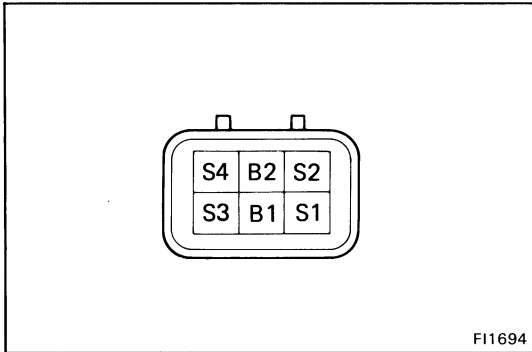
### REMOVAL OF ISC VALVE

1. DRAIN COOLANT
2. DISCONNECT ISC VALVE CONNECTOR
3. DISCONNECT NO.2 WATER BY-PASS HOSE AND AIR HOSE



### 4. REMOVE ISC VALVE

- (a) Remove the two bolts, ISC valve and gasket.
- (b) Disconnect the No.1 water by-pass hose from the ISC valve.
- (c) (7M-GTE)  
Remove the seal washer and check valve from the air intake chamber.



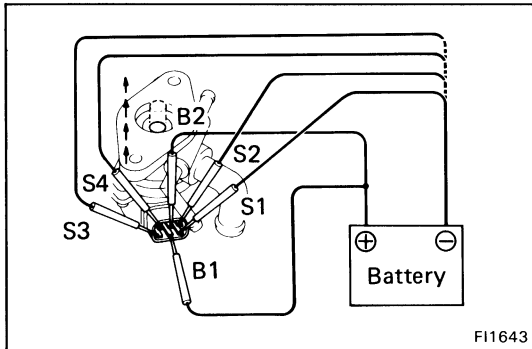
## INSPECTION OF ISC VALVE

### 1. INSPECT RESISTANCE OF ISC VALVE

Using an ohmmeter, measure the resistance between terminal B1 — S1 or S3 and B2 — S2 or S4.

**Resistance:** B1 — S1 or S3 10 — 30 Ω  
B2 — S2 or S4 10 — 30 Ω

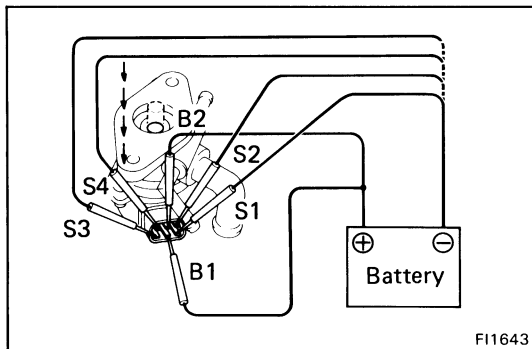
If resistance is not as specified, replace the ISC valve.



### 2. INSPECT OPERATION OF ISC VALVE

(a) Apply battery voltage to terminals B1 and B2 and while repeatedly grounding S1 — S2 — S3 — S4 — S1 in sequence, check that the valve moves toward the closed position.

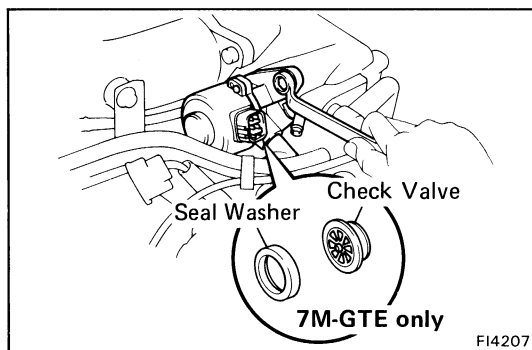
(b) Apply battery voltage to terminals B1 and B2 and while repeatedly grounding S4 — S3 — S2 — S1 — S4 in sequence, check that the valve moves toward the open position.



## INSPECTION OF CHECK VALVE (7M-GTE only)

Inspect the check valve for damage and the diaphragm for cracks.

If necessary, replace the check valve.



## INSTALLATION OF ISC VALVE

### 1. INSTALL ISC VALVE

(a) (7M-GTE)  
Install the check valve and seal washer as shown in the illustration, to the air intake chamber.

(b) Connect the No.1 water by-pass hose to the ISC valve.

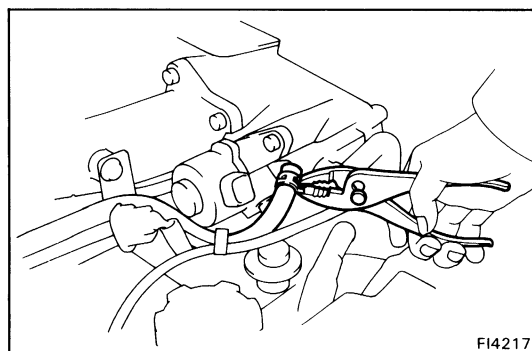
(c) Install a new gasket and ISC valve with the two bolts.

**Torque:** 130 kg-cm (9 ft-lb, 13 N·m)

### 2. CONNECT AIR HOSE AND AIR NO.2 WATER BY-PASS HOSE

### 3. CONNECT ISC VALVE CONNECTOR

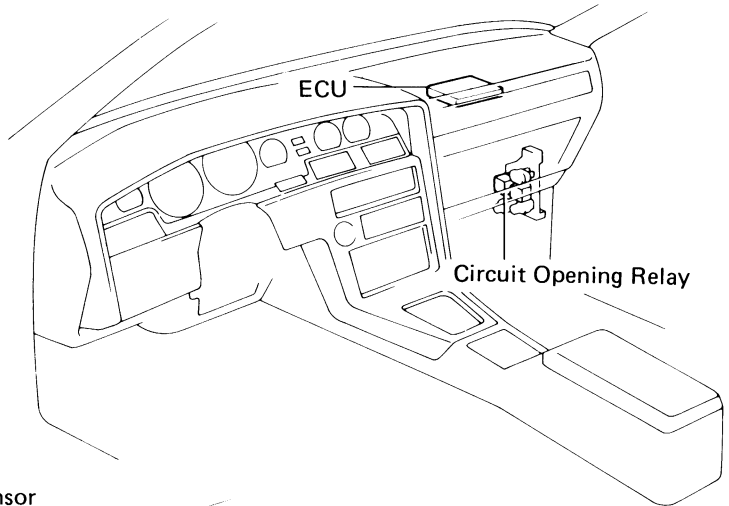
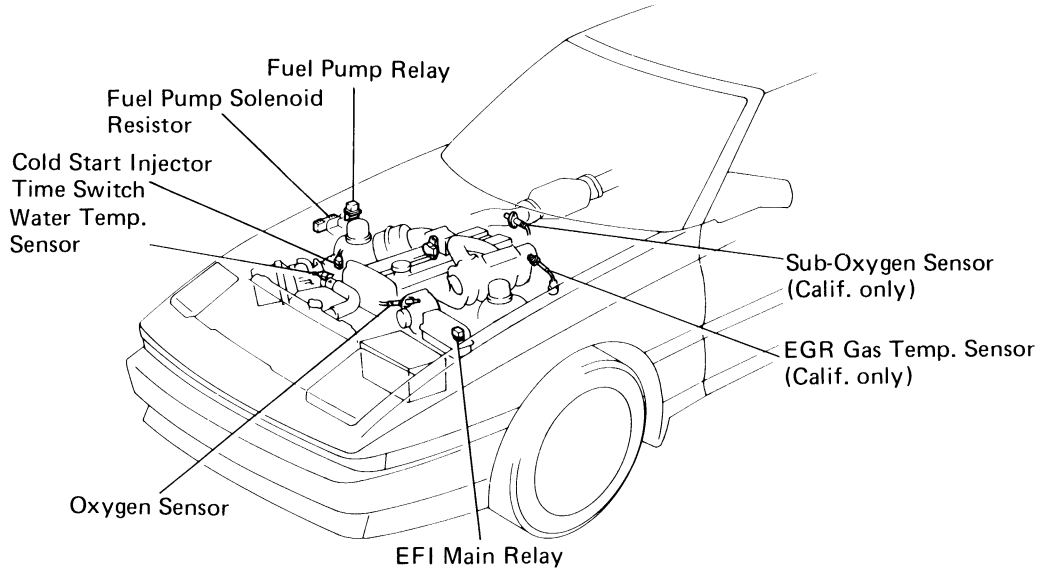
### 4. REFILL WITH COOLANT



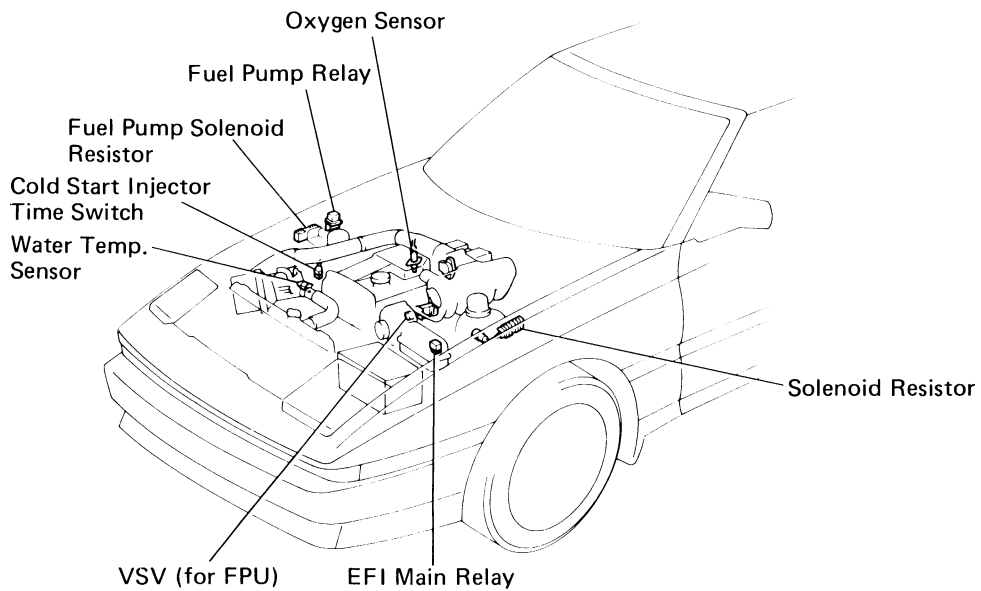
# ELECTRONIC CONTROL SYSTEM

## Location of Electronic Control Parts

### 7M-GE

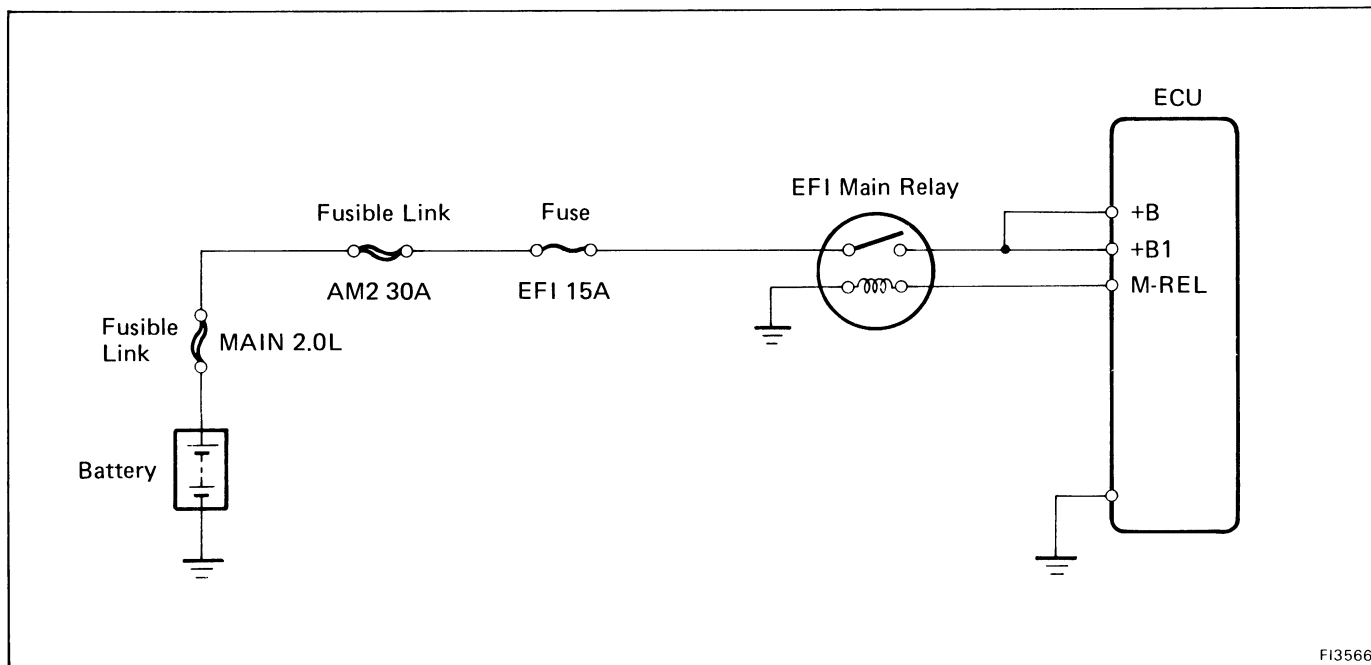


### 7M-GTE

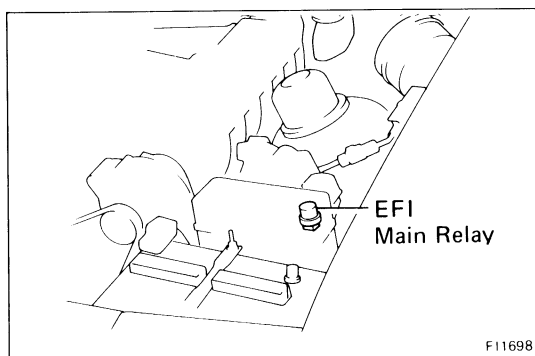




# EFI Main Relay



FI3566



F11698

## INSPECTION OF EFI MAIN RELAY

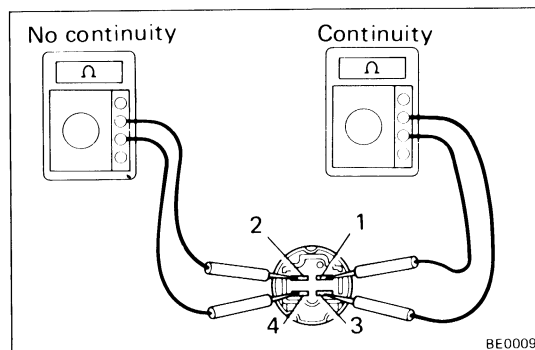
### 1. CHECK OPERATION OF MAIN RELAY

Turn the ignition switch ON. At this time an operation noise will occur from the relay.

### 2. INSPECT RELAY CONTINUITY

- (a) Using an ohmmeter, check that there is continuity between terminals 1 and 3.
- (b) Check that there is no continuity between terminals 2 and 4.

If continuity is not as specified, replace the relay.

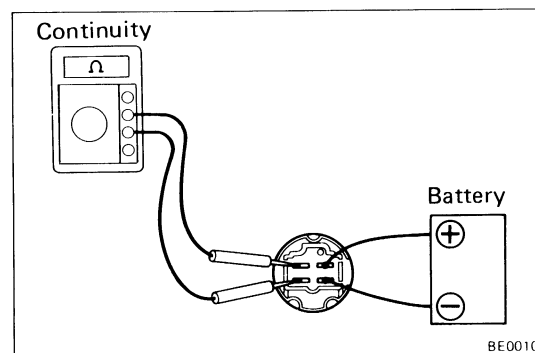


BE0009

### 3. INSPECT RELAY OPERATION

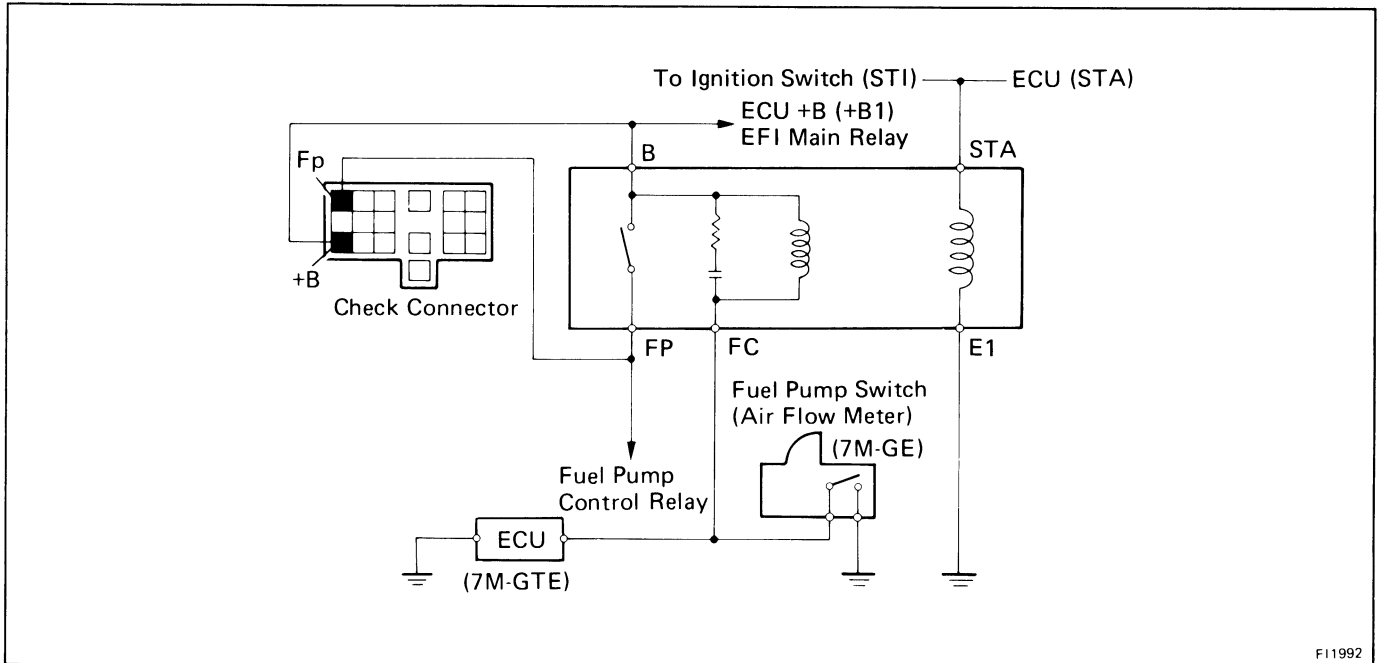
- (a) Apply battery voltage across terminals 1 and 3.
- (b) Check that there is continuity between terminals 2 and 4.

If operation is not as specified, replace the relay.

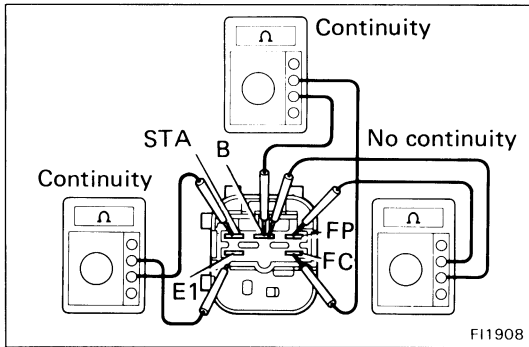


BE0010

## Circuit Opening Relay



FI1992



FI1908

### INSPECTION OF CIRCUIT OPENING RELAY

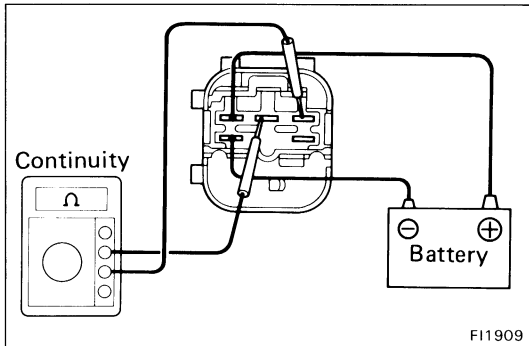
#### 1. INSPECT RELAY CONTINUITY

- (a) Using an ohmmeter, check that there is continuity between terminals STA and E1.
- (b) Check that there is continuity between terminals B and FC.
- (c) Check that there is no continuity between terminals B and FP.

If continuity is not as specified, replace the relay.

#### 2. INSPECT RELAY OPERATION

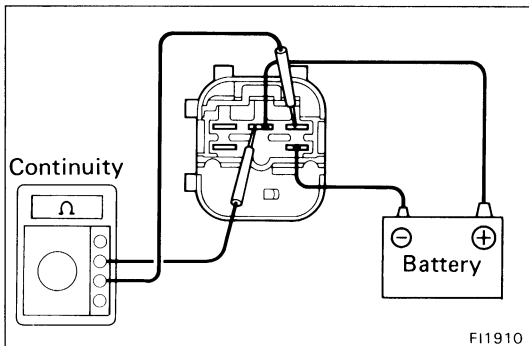
- (a) Apply battery voltage across terminals STA and E1.
- (b) Using an ohmmeter, check that there is continuity between terminals B and FP.



FI1909

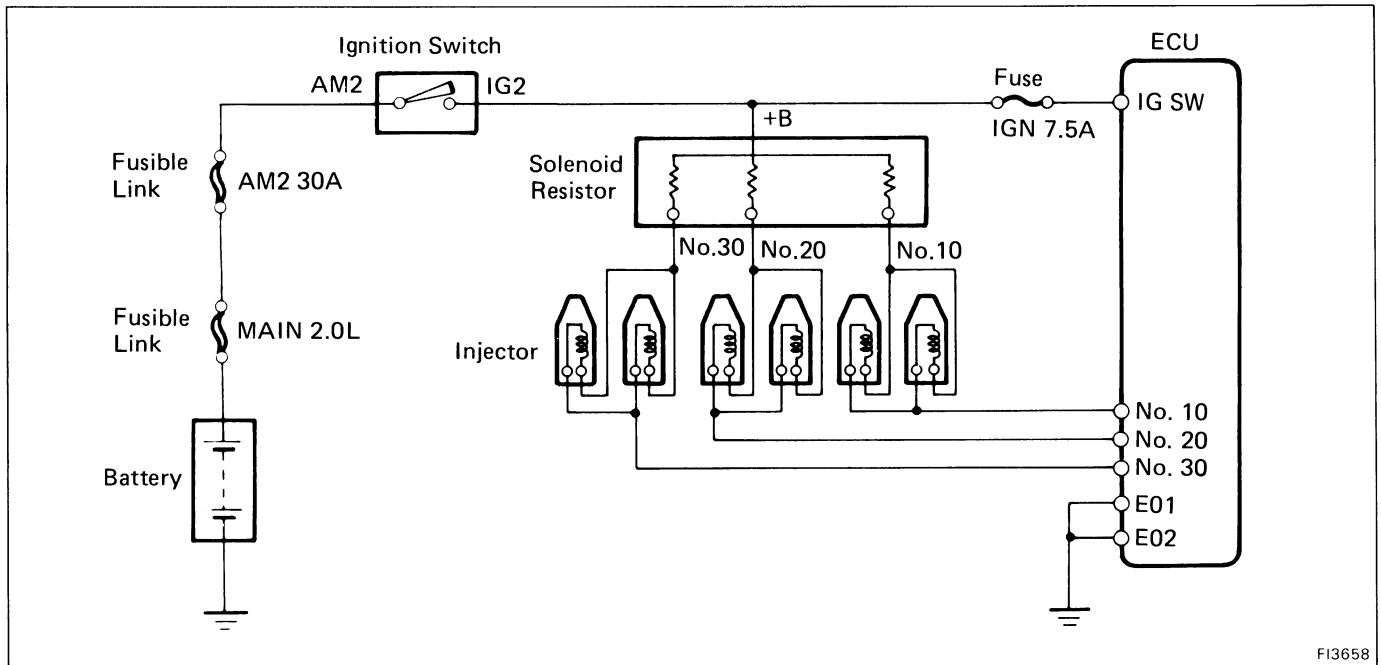
- (c) Apply battery voltage across terminals B and FC.
- (d) Check that there is continuity between terminals B and FP.

If operation is not as specified, replace the relay.

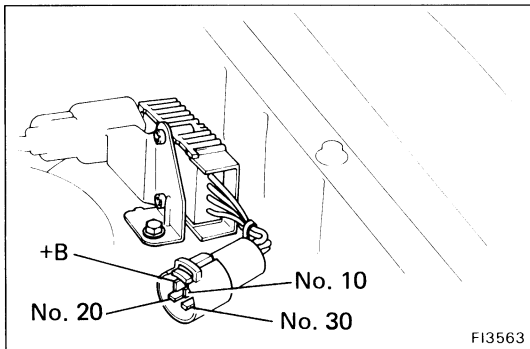


FI1910

## Solenoid Resistor (7M-GTE)



FI3658



FI3563

### INSPECTION OF SOLENOID RESISTOR

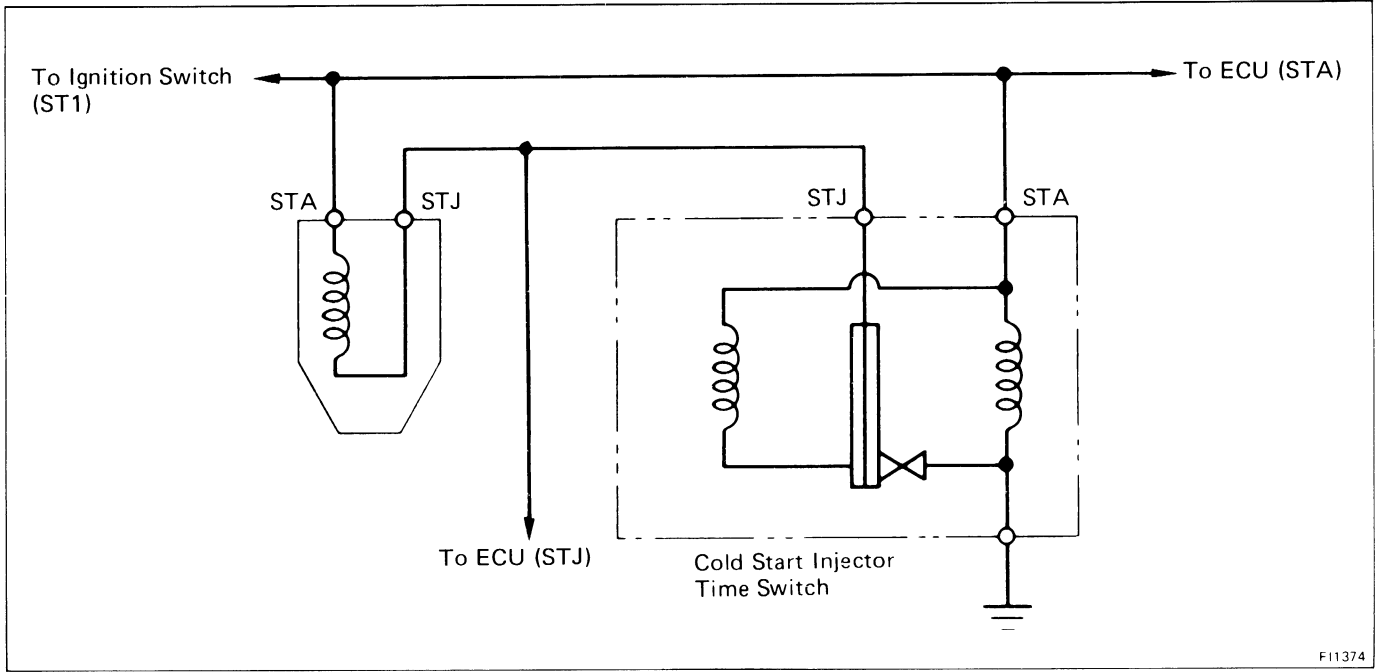
#### INSPECT RESISTANCE OF SOLENOID RESISTOR

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

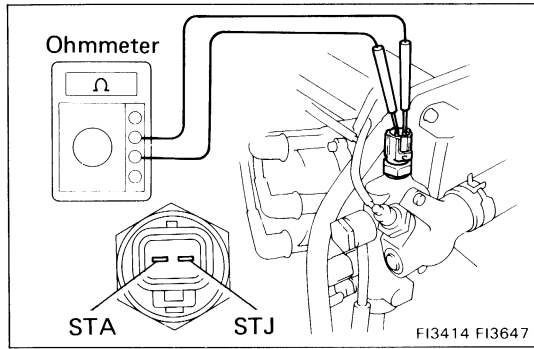
**Resistance: 3  $\Omega$  each**

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

# Cold Start Injector Time Switch



F11374



FI3414 FI3647

## INSPECTION OF COLD START INJECTOR TIME SWITCH

### INSPECT RESISTANCE OF COLD START INJECTOR TIME SWITCH

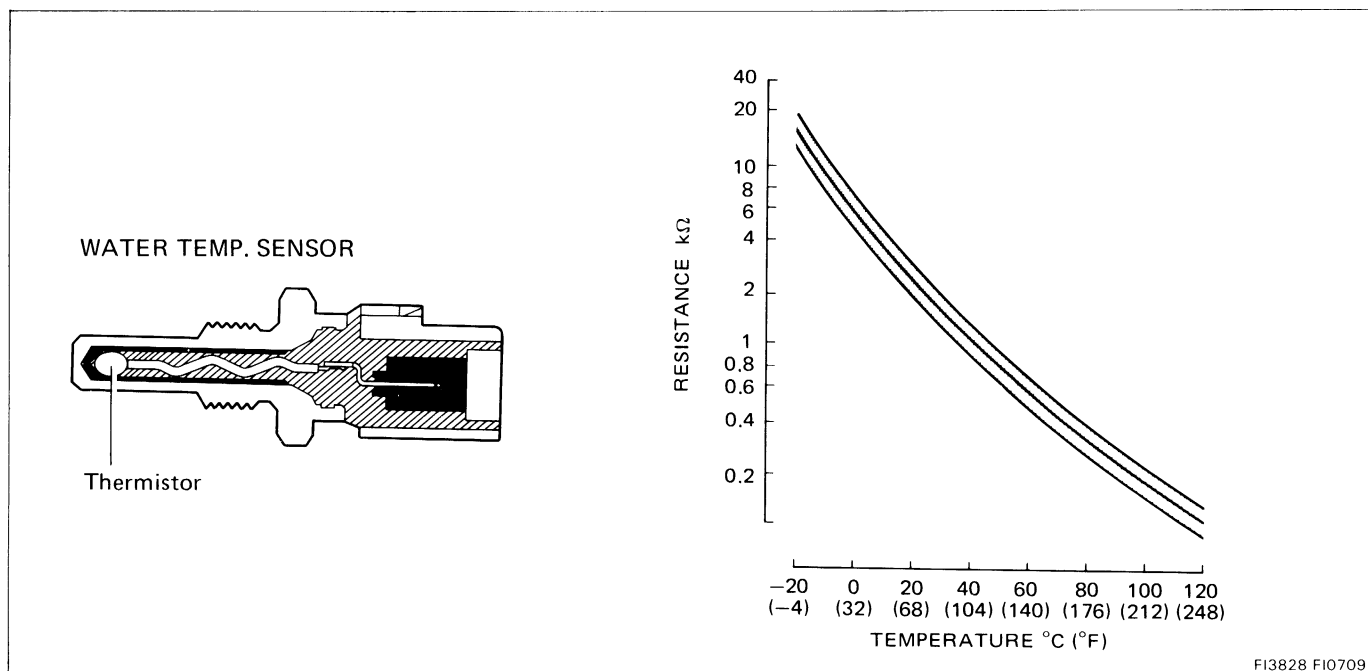
Using an ohmmeter, measure the resistance between each terminal.

**Resistance:**

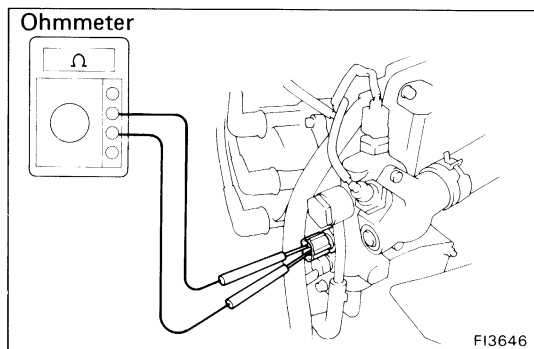
<b>STA — STJ</b>	<b>25 — 45 Ω</b>	<b>below 15°C (59°F)</b>
	<b>65 — 85 Ω</b>	<b>above 30°C (86°F)</b>
<b>STA — Ground</b>	<b>25 — 85 Ω</b>	

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

# Water Temp. Sensor



FI3828 FI0709



## INSPECTION OF WATER TEMP. SENSOR

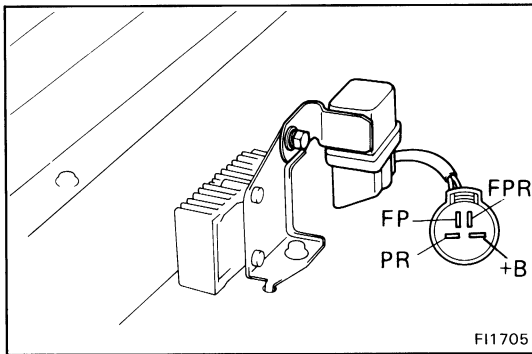
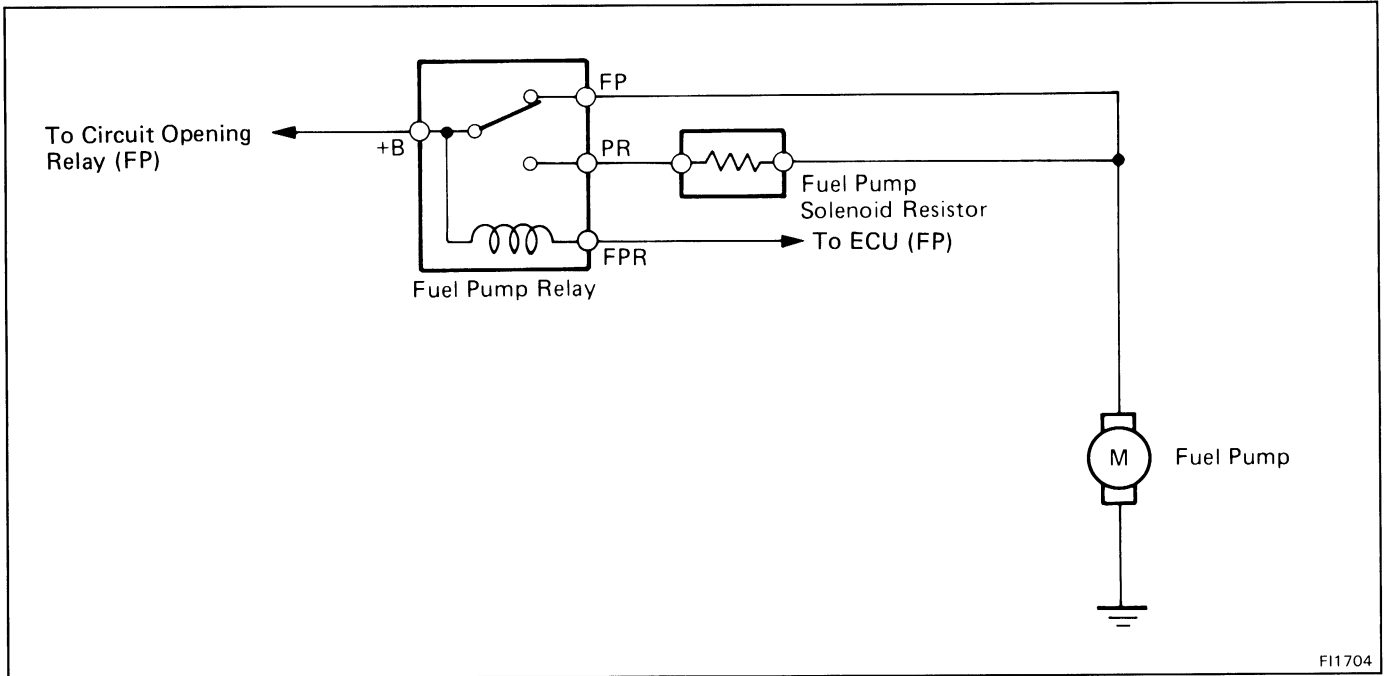
### INSPECT RESISTANCE OF WATER TEMP. SENSOR

- (a) Disconnect the connector.
- (b) Using an ohmmeter, measure the resistance between both terminals.

**Resistance: Refer to chart.**

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

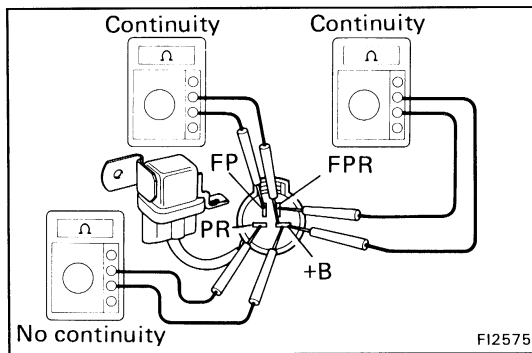
# Fuel Pump Relay and Resistor



## INSPECTION OF PUMP RELAY AND RESISTOR

### 1. INSPECT OF FUEL PUMP RELAY

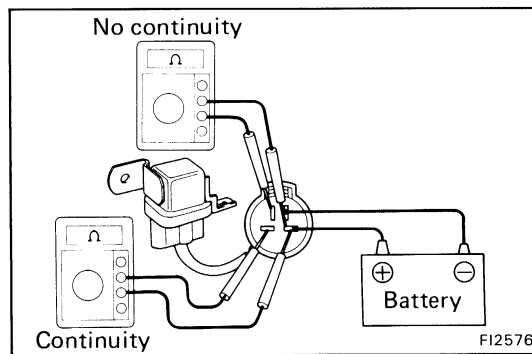
HINT: The relay is located in the left cowl side of engine compartment.



#### A. Inspect Relay Continuity

- Using an ohmmeter, check that there is continuity between terminals +B and FP.
- Check that there is continuity between terminals +B and FPR.
- Check that there is no continuity between terminals +B and PR.

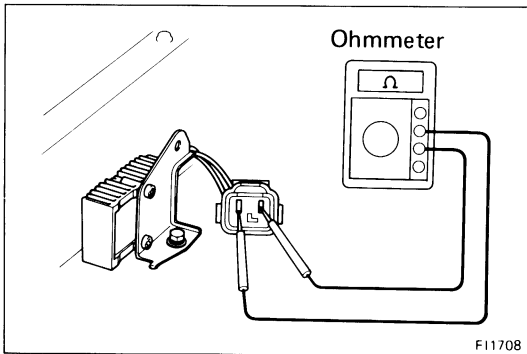
If continuity is not as specified, replace the relay.



#### B. Inspect Relay Operation

- Apply battery voltage across terminals +B and FPR.
- Using an ohmmeter, check that there is continuity between terminals +B and PR.
- Check that there is no continuity between terminals +B and FP.

If operation is not as described, replace the relay.



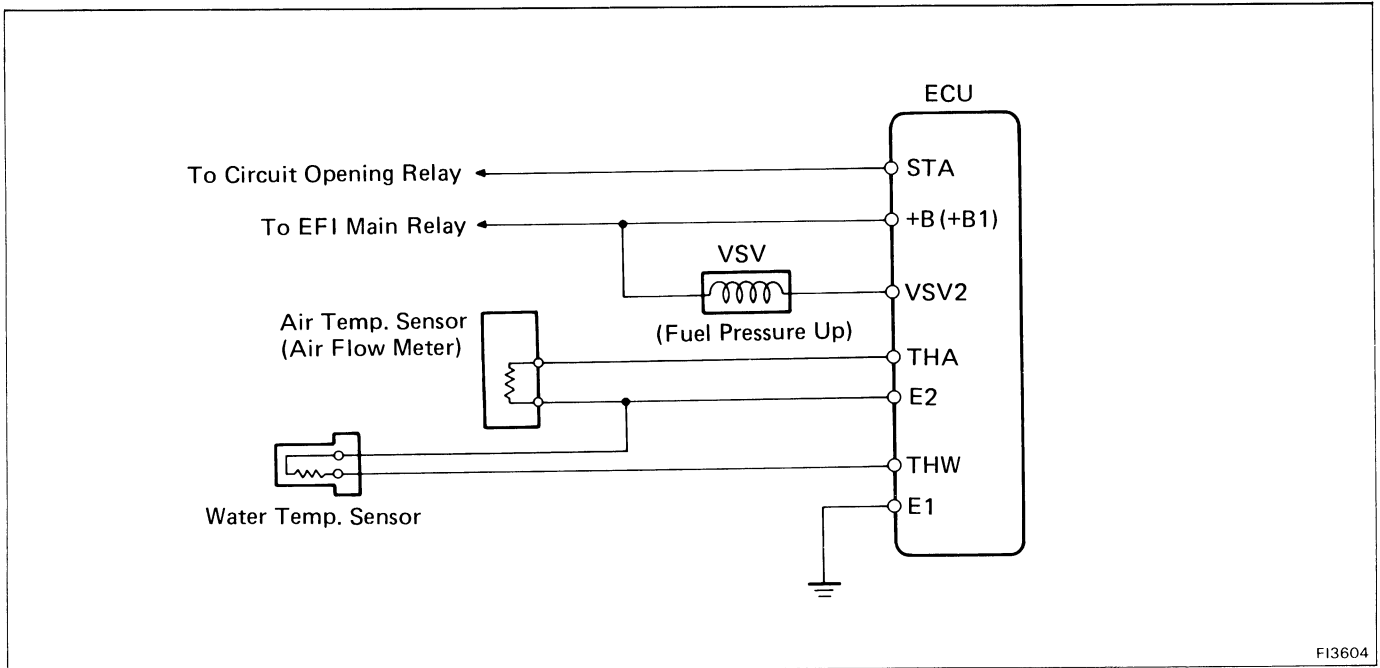
## 2. INSPECT OF FUEL PUMP RESISTOR

Using an ohmmeter, measure the resistance between both terminals.

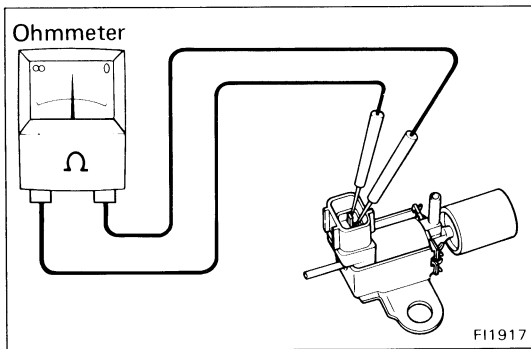
**Resistance: Approx. 0.7  $\Omega$**

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

# Fuel Pressure Control System (7M-GTE)



F13604



F11917

## INSPECTION OF FUEL PRESSURE CONTROL SYSTEM

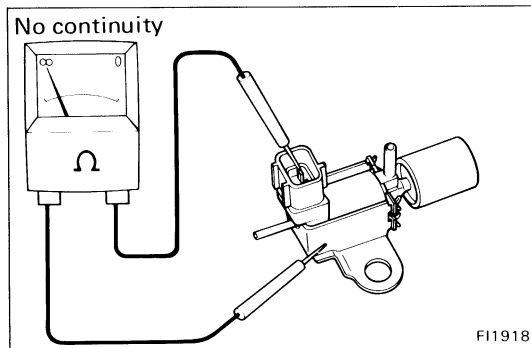
### INSPECT VSV

#### A. Inspect VSV for Open Circuit

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

**Resistance: 30 — 50 Ω**

If there is no continuity, replace the VSV.

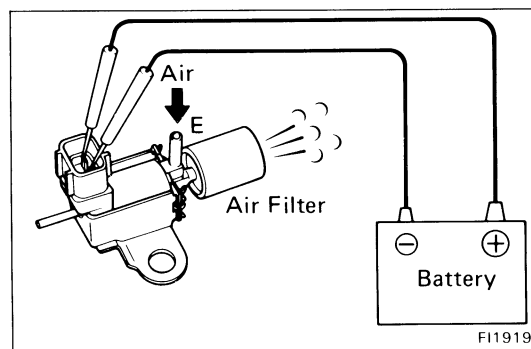


F11918

#### B. Inspect VSV for Short Circuit

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

If there is continuity, replace the VSV.

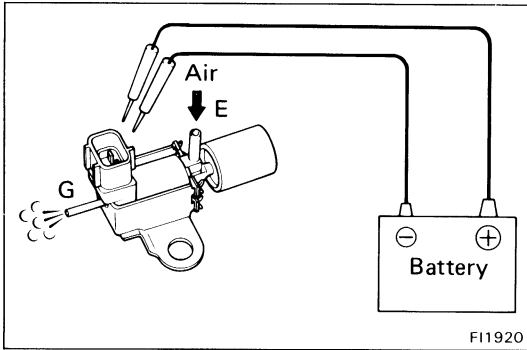


F11919

#### C. Inspect VSV Operation

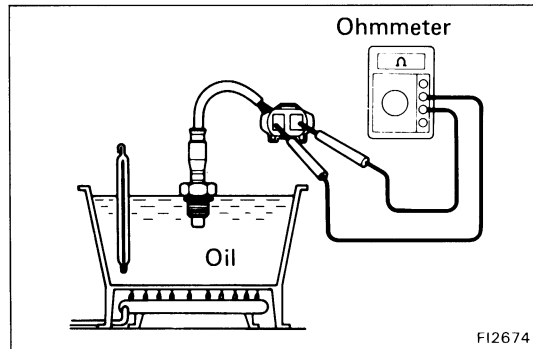
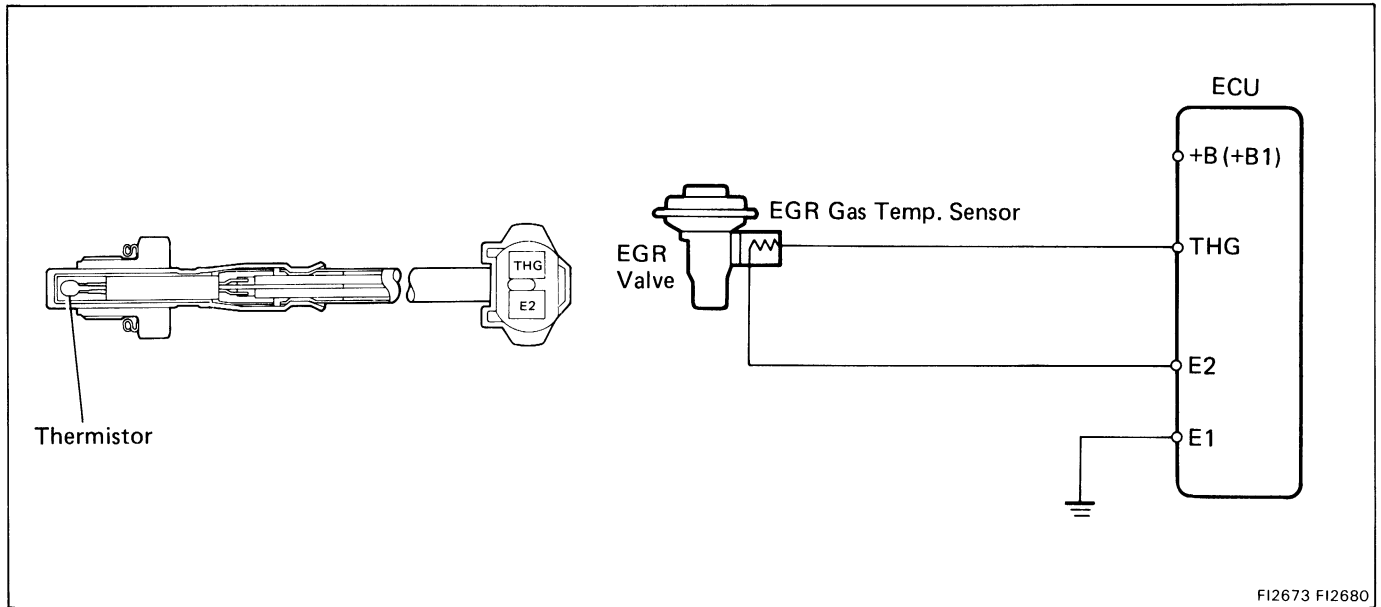
- (a) Apply battery voltage across the terminals.
- (b) Check that air flows from pipe E to air filter.





- (c) Disconnect the battery.
  - (d) Check that air flows from pipe E and pipe G.
- If operation is not as specified, replace the VSV.

## EGR Gas Temp. Sensor (California Vehicles only)



### INSPECTION OF EGR GAS TEMP. SENSOR

#### INSPECT RESISTANCE OF EGR GAS TEMP. SENSOR

Using an ohmmeter, measure the resistance between the terminals.

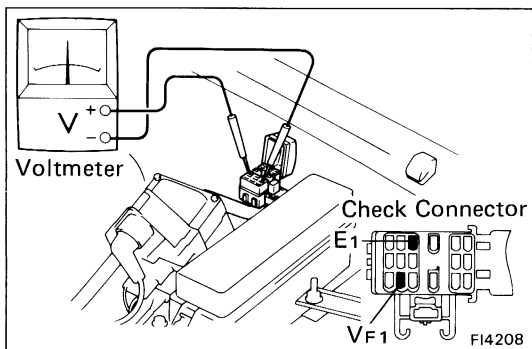
**Resistance:**

**69.40 — 88.50 kΩ at 50°C (112°F)**

**11.89 — 14.37 kΩ at 100°C (212°F)**

**2.79 — 3.59 kΩ at 150°C (302°F)**

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



# Oxygen Sensor

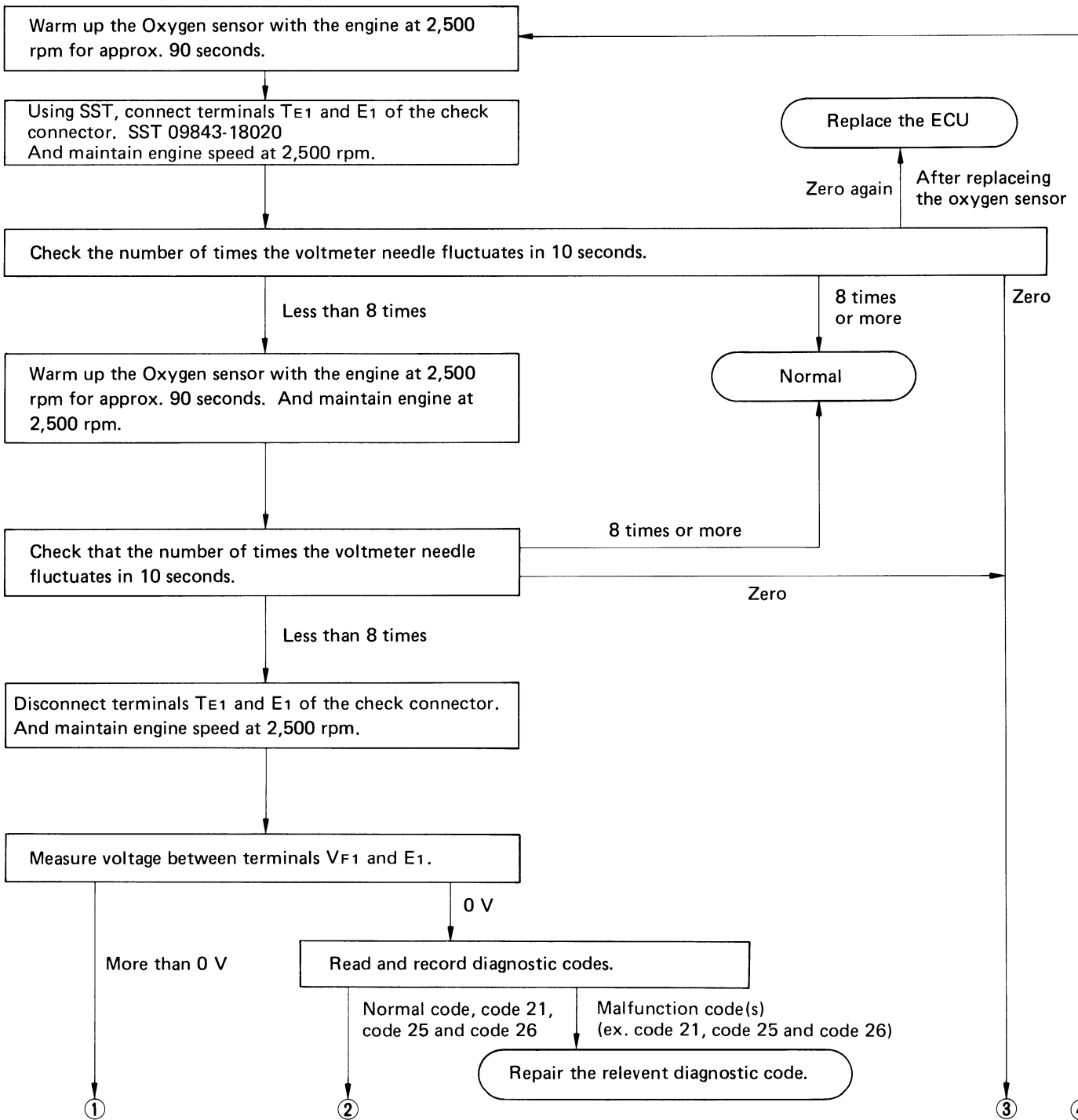
## INSPECTION OF OXYGEN SENSOR

### 1. WARM UP ENGINE

Allow the engine to reach normal operating temperature.

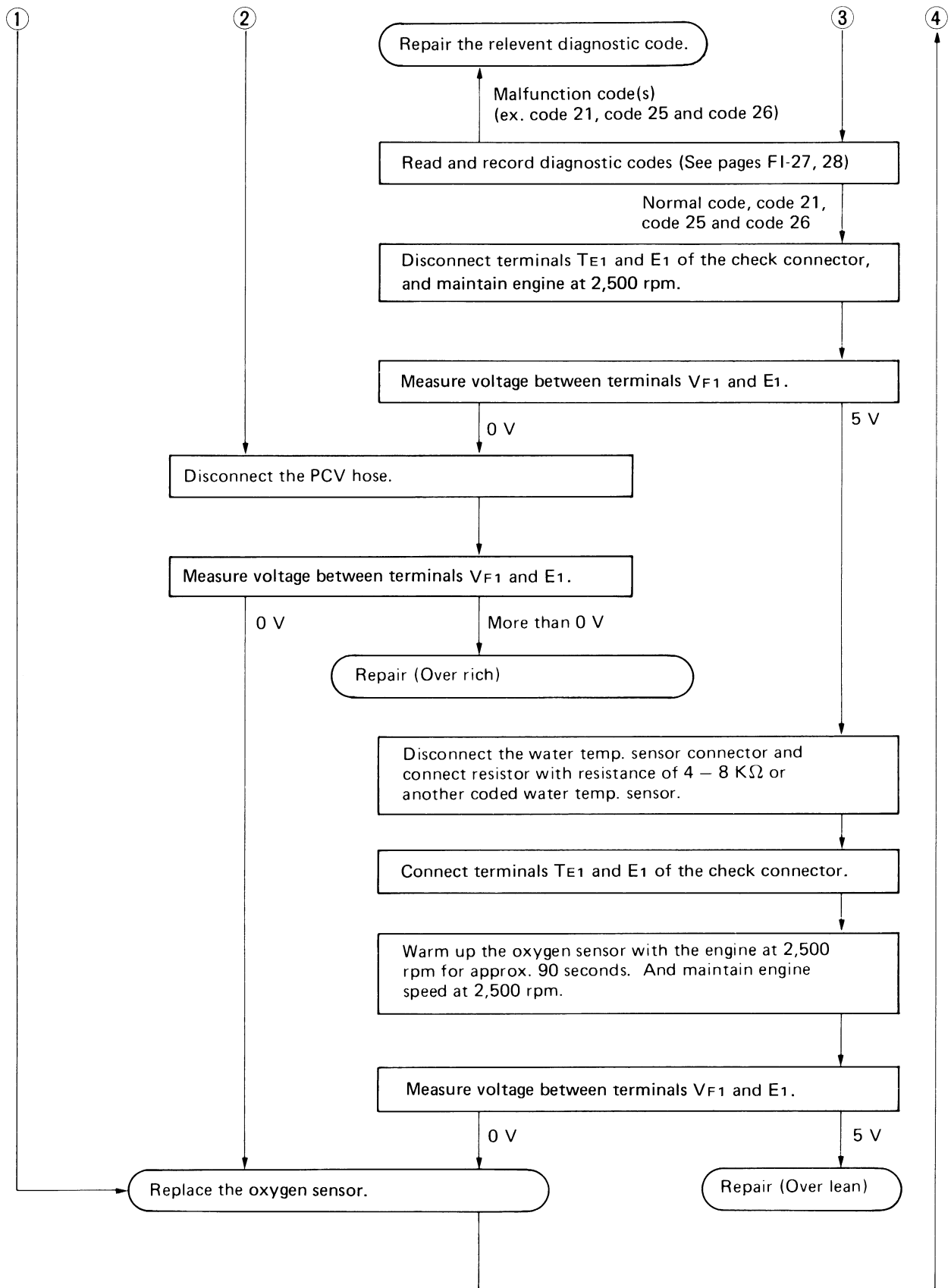
### 2. INSPECT FEEDBACK VOLTAGE

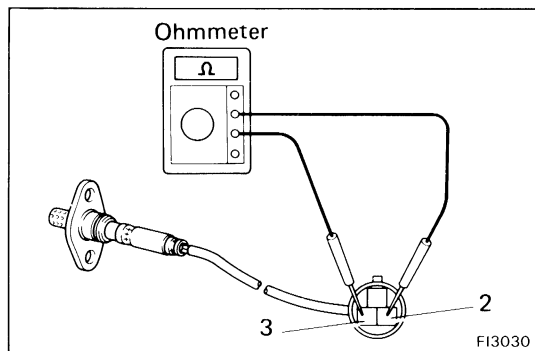
Connect the positive (+) probe of a voltmeter to terminals  $V_{F1}$  of the check connector, and negative (-) probe to terminal  $E_1$ . Perform the test as follows.



CONTINUED ON PAGE FI-120

CONTINUED FROM PAGE FI-119





### 3. (7M-GTE) INSPECT HEATER RESISTANCE OF OXYGEN SENSOR

Using an ohmmeter, measure the resistance between terminals 2 and 3.

**Resistance: 3.0 — 3.6 Ω**

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

## Sub-Oxygen Sensor [7M-GE (California Vehicles only)]

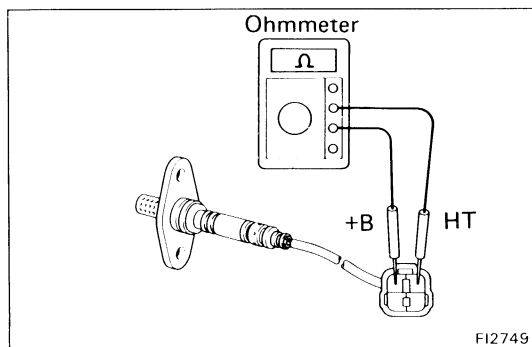
### INSPECTION OF SUB-OXYGEN SENSOR

#### 1. INSPECT SUB-OXYGEN SENSOR

**HINT:** Inspect only when code No.27 is displayed.

- (a) Diagnostic code cancellation. (See Page FI-25)
- (b) Warm up the engine until it reaches normal operating temperature.
- (c) (M/T)  
Drive for 5 minutes or more at less than 80 km/h (50 mph) in 4th or 5th gear.  
(A/T)  
Drive for 5 minutes or more at less than 80 km/h (50 mph) in "D" range.
- (d) Following the conditions in step (c), press fully on the accelerator pedal for 2 seconds or more.
- (e) Stop the vehicle and turn the ignition switch to OFF.
- (f) Carry out steps (b), (c) and (d) again to test acceleration.

If code No. 27 reappears again, check the sub-oxygen sensor circuit. If the circuit is normal, replace the sub-oxygen sensor.



#### 2. INSPECT HEATER RESISTANCE OF SUB-OXYGEN SENSOR

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

**Resistance: 5.1 — 6.3 Ω**

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

# Electronic Controlled Unit (ECU)

## INSPECTION OF ECU

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

1. (7M-GTE)  
**PREPARATION**  
(See page FI-50)

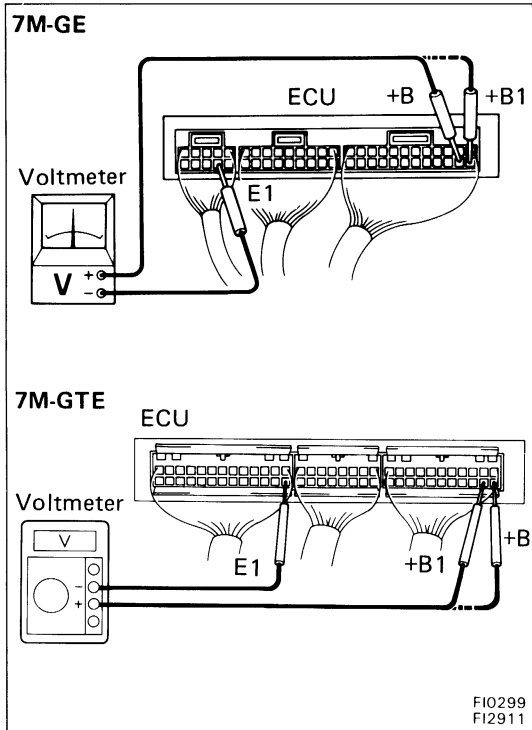
2. **INSPECT VOLTAGE OF ECU**

Check the voltage between each terminal of the wiring connectors.

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

HINT:

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



## Voltage at ECU Wiring Connectors

Terminals	STD Voltage	Condition	
BATT — E1	10 — 14	—	
IG SW — E1		Ignition SW ON	
M-REL — E1			
+B (+B1) — E1			
IDL — E2 (7M-GE)	10 — 14	Ignition SW ON	Throttle valve open
IDL — E2 (7M-GTE)	4 — 6		Throttle valve open
VC — E2	4 — 6		—
VTA — E2	0.1 — 1.0		Throttle valve fully closed
	4 — 5	Throttle valve fully open	
*1 VS — E2	3.7 — 4.3	Ignition SW ON	Measuring plate fully closed
	0.2 — 0.5		Measuring plate fully open
	2.3 — 2.8	Idling	
	1.0 — 2.0	3,000 rpm	
*2 KS — Body ground	4 — 6	Ignition SW ON	
	2 — 4	Cranking or running	
*2 VC — Body ground	4 — 6	Ignition SW ON	

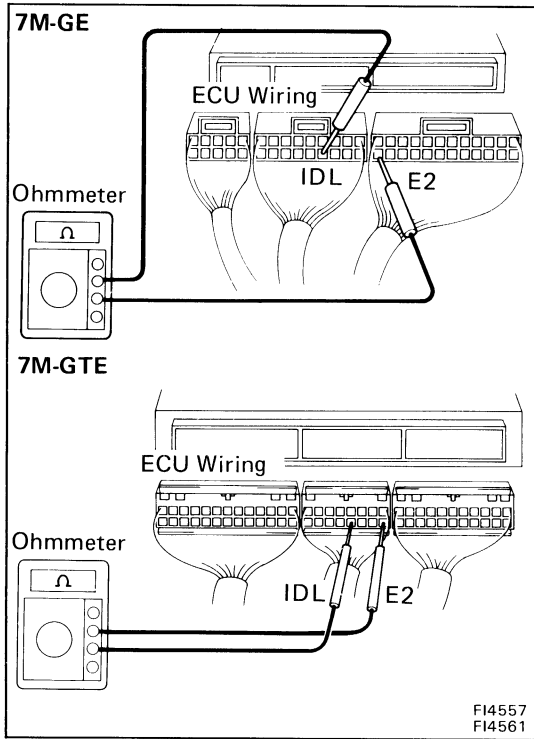
## Voltage at ECU Wiring Connectors (Cont'd)

Terminals	STD Voltage	Condition	
THA — E2	1 — 3	Ignition SW ON	Intake air temperature 20°C (68°F)
THW — E2	0.1 — 1.0	Ignition SW ON	Coolant temperature 80°C (176°F)
No. 10 E01 No. 20 — No. 30 E01	10 — 14	Ignition SW ON	
STA — E1	6 — 14	Cranking	
ISC1 } — E1 ISC4	9 — 14	Ignition SW ON	
IGT — E1	0.7 — 1.0	Idling	
*2 IGDA IGDB — E1	1 — 3	Idling	
W — E1	8 — 14	No trouble ("CHECK ENGINE" warning light off) and engine running.	
A/C — E1	10 — 14	Air conditioning ON	
TE1 — E1	4 — 6	Ignition SW ON	Check connector terminals TE1 — E1 not connect
	0		Check connector terminals TE1 — E1 connect
NSW (A/T) — E1	0	Ignition SW ON	Shift position P or N range
	10 — 14		Ex. P or N range
N/C (M/T) — E1	0	Ignition SW ON	Clutch pedal not depressed
	10 — 14		Clutch pedal depressed
*3 DFG — E1	10 — 14	Ignition SW ON	Defogger SW OFF
	0		Defogger SW ON
*3 LP — E1	10 — 14	Headlight SW OFF	
	0	Headlight SW ON	

\*1 7M-GE only

\*2 7M-GTE only

\*3 7M-GTE (M/T) only



3. INSPECT RESISTANCE OF ECU

NOTICE:

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

Check the resistance between each terminal of the wiring connectors.

- Disconnect the connectors from the ECU.
- Measure the resistance at each terminal.

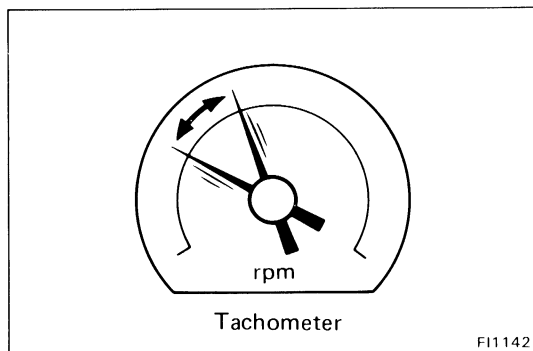
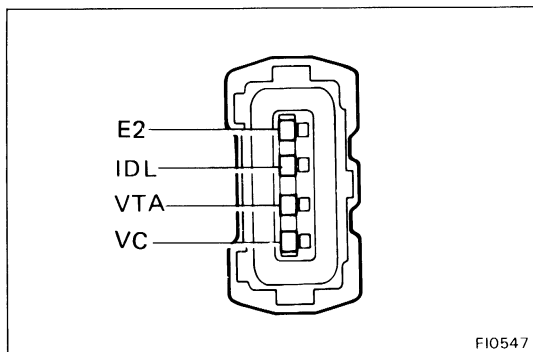
Resistance of ECU Wiring Connectors

Terminals	Condition	Resistance (Ω)
IDL — E2	Throttle valve open	∞
	Throttle valve fully closed	2,300 or less
VTA — E2	Throttle valve fully open	3,500 — 10,300
	Throttle valve fully closed	200 — 1,200
*1 VC — E2	—	4,250 — 8,250
*1 VS — E2	Measuring plate fully closed	200 — 600
	Measuring plate fully open	20 — 1,200
THW — E2	Coolant temperature 80°C (176°F)	200 — 400
G1, G2 — G ⊖	—	140 — 180
NE — G ⊖ (7M-GE)	—	180 — 220
NE — G ⊖ (7M-GTE)	—	140 — 180
ISC1, ISC2 ISC3, ISC4 — +B (+B1)	—	10 — 30

\*1 7M-GE only

\*2 7M-GTE only





## Fuel Cut RPM

### INSPECTION OF FUEL CUT RPM

#### INSPECT FUEL CUT RPM

- (a) Start and warm up the engine.
- (b) Disconnect the throttle position sensor connector from the throttle position sensor.
- (c) Connect circuit terminals IDL and E2 on the wire connector side.
- (d) Gradually raise the engine rpm and check by the fluctuation of the tachometer needle, that the fuel cut operation repeatedly goes on and off.

HINT: The vehicle should be stopped.

Fuel cut rpm:	7M-GE	1,800 rpm
	7M-GTE	1,600 rpm
Fuel return rpm:	7M-GE	1,200 rpm
	7M-GTE	1,200 rpm

