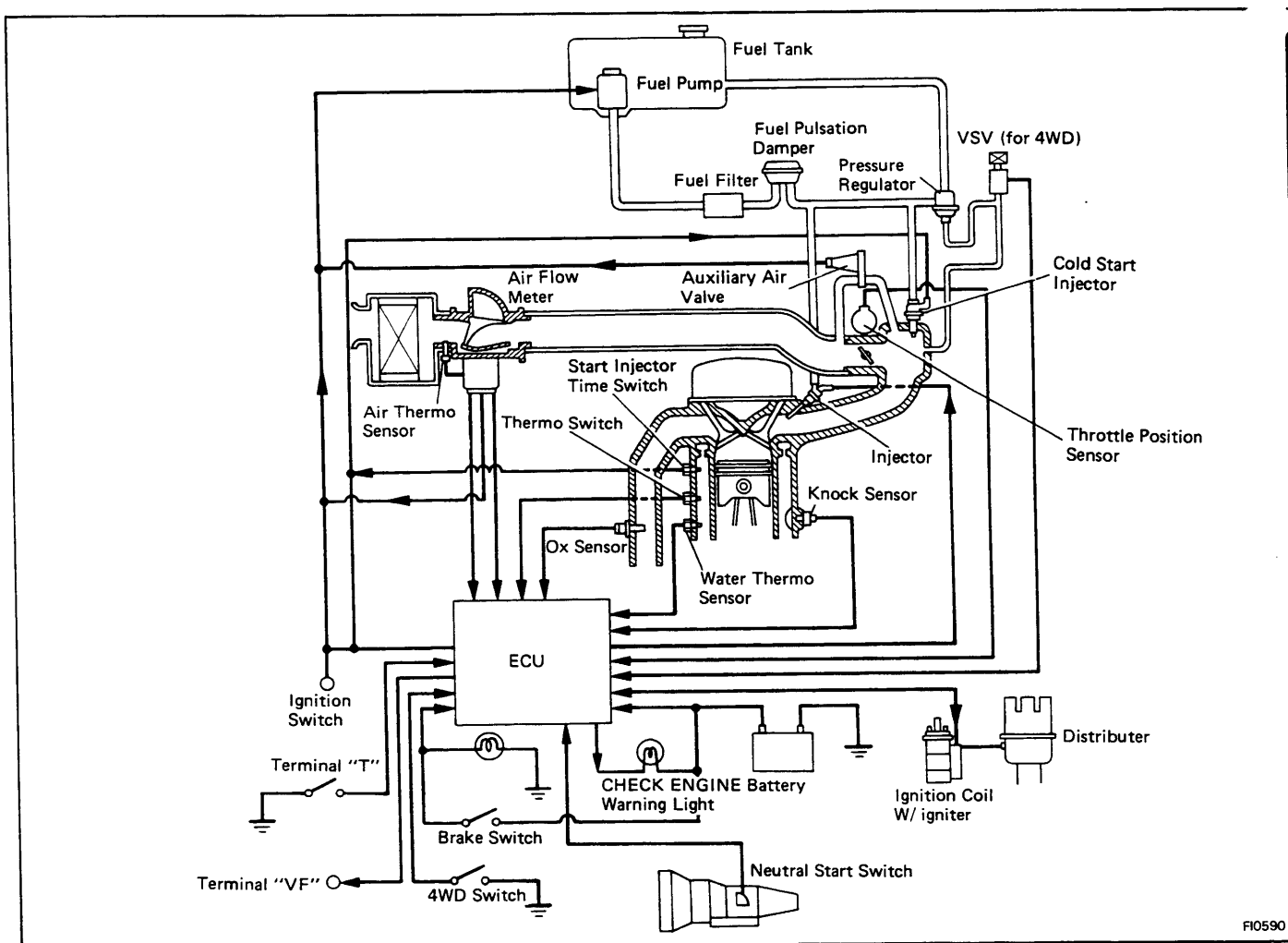


# EFI SYSTEM

	Page
SYSTEM DESCRIPTION.....	FI-2
PRECAUTIONS .....	FI-4
INSPECTION PRECAUTIONS.....	FI-4
TROUBLESHOOTING .....	FI-9
DIAGNOSIS SYSTEM .....	FI-22
TROUBLESHOOTING WITH VOLT/ OHMMETER .....	FI-27
TROUBLESHOOTING FOR EFI ELECTRONIC CIRCUIT WITH VOLT/OHMMETER.....	FI-28
FUEL SYSTEM .....	FI-42
Fuel Pump .....	FI-42
Cold Start Injector .....	FI-47
Pressure Regulator.....	FI-49
Injector .....	FI-50
Fuel Tank and Line .....	FI-55
AIR INTAKE SYSTEM .....	FI-56
Air Flow Meter .....	FI-56
Air Valve .....	FI-58
Throttle Body .....	FI-59
ELECTRONIC CONTROL SYSTEM.....	FI-63
Location of Electronic Control Parts.....	FI-63
Main Relay .....	FI-64
Circuit Opening Relay.....	FI-65
Solenoid Resistor .....	FI-66
Start Injector Time Switch.....	FI-67
Water Thermo Sensor .....	FI-68
Ox Sensor .....	FI-69
ECU .....	FI-72
Fuel Cut RPM.....	FI-74

**FI**

## SYSTEM DESCRIPTION



FI0590

The EFI used on Toyotas has three basic systems.

### FUEL SYSTEM

An electric fuel pump supplies sufficient fuel, under a constant pressure, to the EFI injectors. These injectors inject a metered quantity of fuel into the intake manifold in accordance with signals from the ECU. Each injector injects, at the same time, one half of the fuel required for ideal combustion with each engine revolution.

### AIR INDUCTION SYSTEM

The air induction system provides sufficient air for engine operation.

### ELECTRONIC CONTROL SYSTEM

The 22R-EC engine is equipped with a Toyota Computer Control System (TCCS) which centrally controls the EFI, ESA, Diagnosis systems, etc. by means of an Electronic Control Unit (ECU — formerly EFI computer) employing a microcomputer.

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

1. Electronic Fuel Injection (EFI)

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

- Intake air volume
- Intake air temperature
- Coolant temperature
- Engine rpm
- Acceleration/deceleration
- Exhaust O<sub>x</sub> content etc.

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

2. Electronic Spark Advance (ESA)

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

3. Diagnostics

The ECU detects any malfunctions or abnormalities in the sensor network and lights a "CHECK ENGINE" warning light on the instrument panel. At the same time, the trouble is identified and a diagnostic code is recorded by the ECU. There are 12 different diagnostic codes, including "normal operation" and these can be confirmed by use of an analog voltmeter.  
(See page FI-22)

4. Fail-Safe Function

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

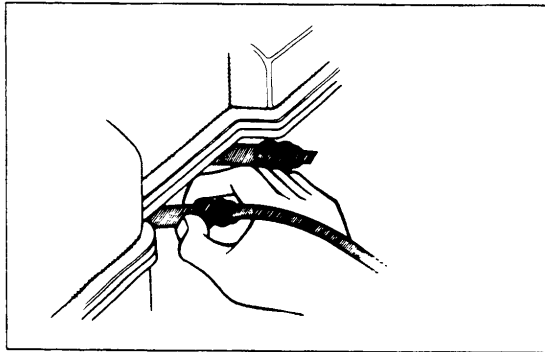
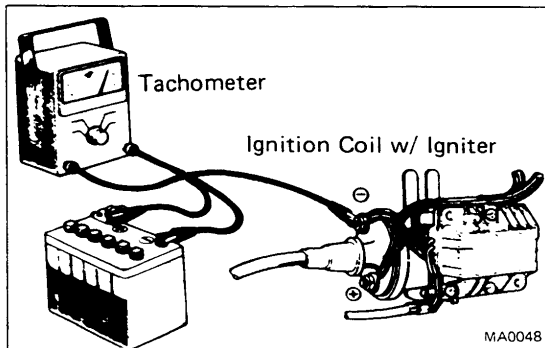
## PRECAUTIONS

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

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

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

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 (+) terminal to the ignition (+) terminal.
  - (b) Use the battery as the power source for the timing light, tachometer, etc.
3. IN EVENT OF ENGINE MISFIRE, THE CATALYTIC CONVERTER MAY OVERHEAT. THEREFORE, THE FOLLOWING PRECAUTIONS SHOULD BE TAKEN
  - (a) Insure correct drive belt adjustment.
  - (b) Insure proper connection of battery terminals, etc.
  - (c) Handle high-tension wires carefully.
  - (d) After repair work, insure that the ignition coil terminals and all other ignition system lines are reconnected securely.  
When cleaning the engine compartment, be especially careful to protect the electrical system from water.
4. PRECAUTIONS WHEN HANDLING O<sub>2</sub> SENSOR
  - (a) Do not allow O<sub>2</sub> sensor to receive an impact.
  - (b) Do not allow water to come into contact with the sensor or attempt to cool it.

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

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

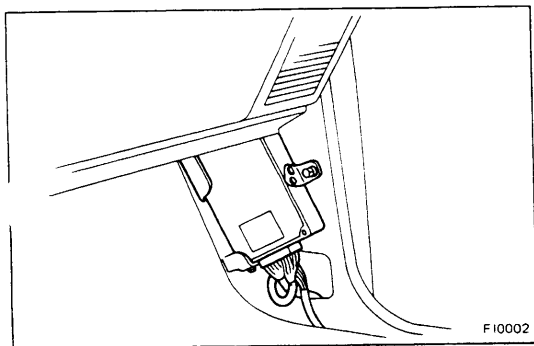
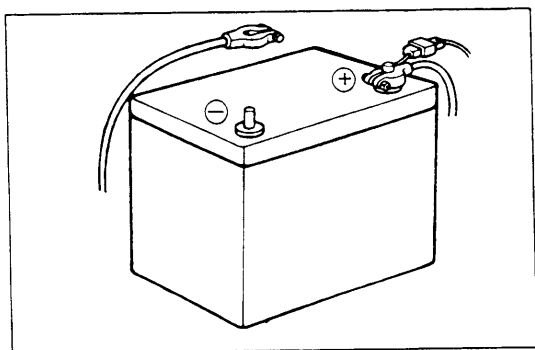
However, if your vehicle is equipped with an amateur radio transceiver, etc. (even one with about 10 W output), it may, at times, have an effect upon ECU operation, especially if the antenna and feeder are installed nearby.

Therefore, observe the following precautions.

- (a) Install the antenna as far as possible from the ECU. The ECU is located into the right side kick panel so the antenna should be installed at the rear, left side of the vehicle.  
If installing in the bumper, do so on the right side, if possible.
- (b) Keep the antenna feeder as far away as possible from the ECU wires — at least 20 cm (7.87 in.) — and, especially, do not wind them together.
- (c) Insure that the feeder and antenna are properly adjusted.
- (d) Do not equip your vehicle with a powerful mobile radio system.

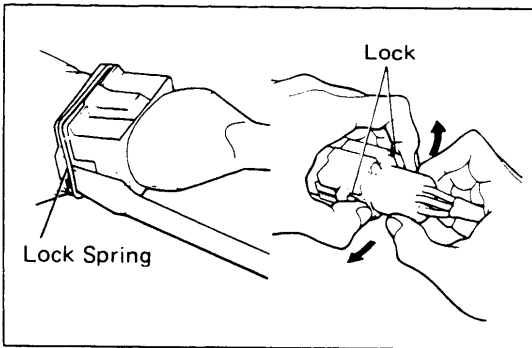
## INTAKE SYSTEM

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



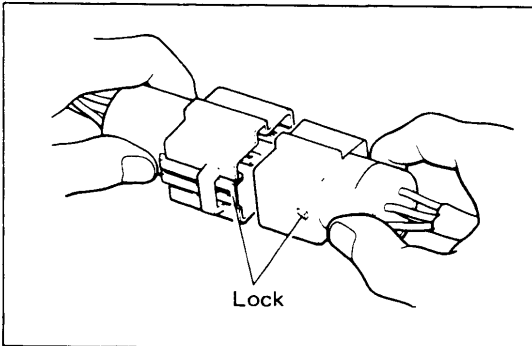
## ELECTRONIC PARTS

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

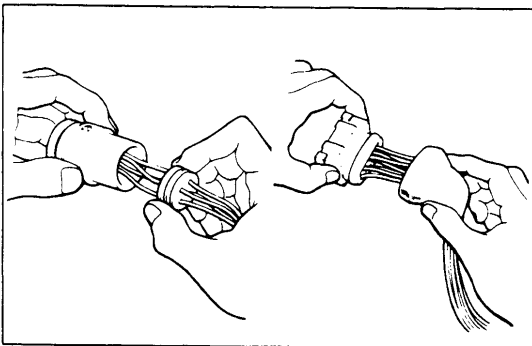


8. Sufficient care is required when pulling out and inserting wiring connectors.

- (a) Release the lock and pull out the connector, pull on the connectors.

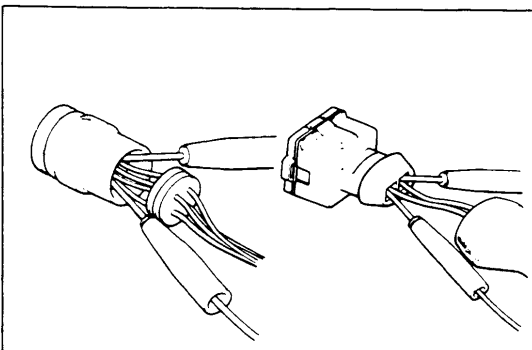


- (b) Fully insert the connector and insure that it is locked.



9. When inspecting a connector with a circuit tester.

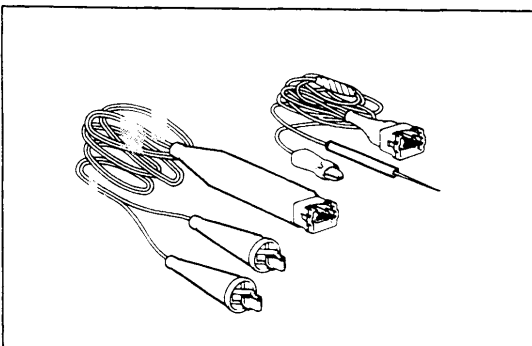
- (a) Carefully take out the water-proofing rubber if it is a water-proof type connector.



- (b) Insert the tester probe into the connector from the wiring side when checking the continuity, amperage or voltage.

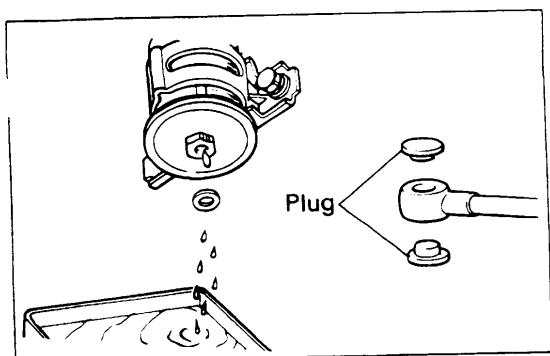
- (c) Do not apply unnecessary force to the terminal.

- (d) After checking, install the water-proofing rubber on the connector securely.



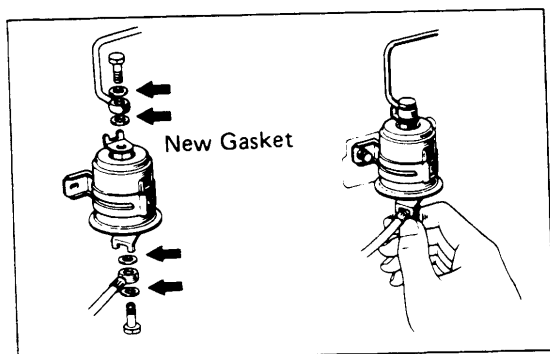
10. Use SST for inspection or test of the injector, cold start injector or its wiring connector.

SST 09842-30020 and 09842-30050



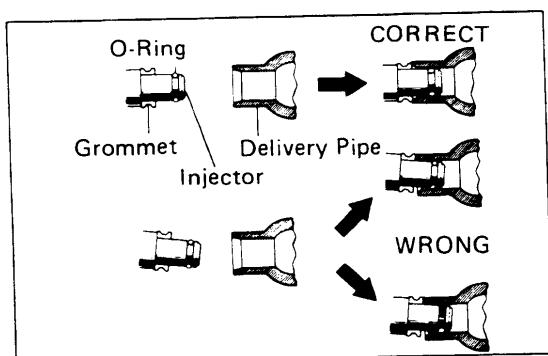
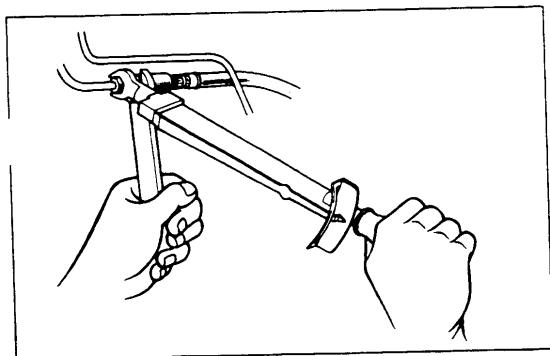
## FUEL SYSTEM

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

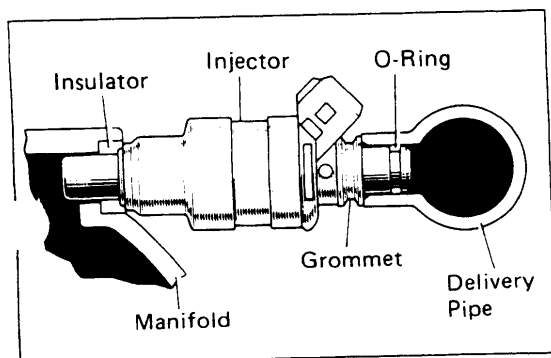


2. When connecting the flare nut on the high pressure pipe union, observe the following procedure.
  - (a) Always use a new gasket.
  - (b) Apply a thin coat of oil to the flare and first tighten the flare nut by hand.

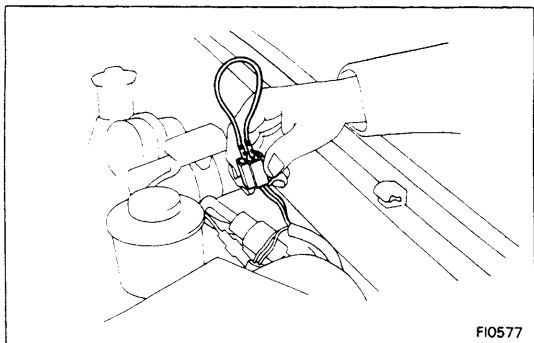
(c) Then tighten the nut to the specified torque.  
**Torque: 310 kg-cm (22 ft-lb, 30 N·m)**



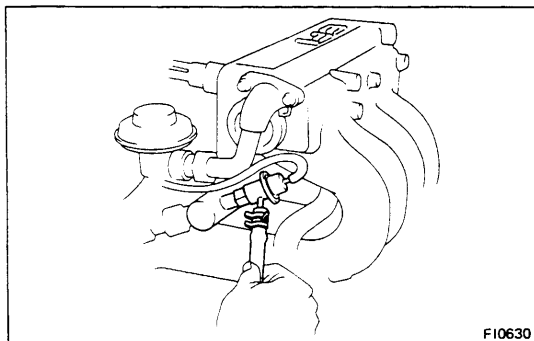
3. Take the following precautions when removing and installing the injectors.
  - (a) Never re-use an O-ring.
  - (b) When placing an O-ring on the injector, use care not to damage it in any way.
  - (c) Lubricate the O-ring with spindle oil or gasoline before installing — never use engine, gear or brake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



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



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



- (c) When the pressure regulator fuel return hose (shown in the figure at left), is pinched, the pressure within the high pressure line will rise to about 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.

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



## TROUBLESHOOTING

### TROUBLESHOOTING HINTS

1. Engine troubles are usually not caused by the EFI system. When troubleshooting, always first check the condition of the other systems.

- (a) Electronic source

- Battery
- Fusible links
- Fuses

- (b) Fuel supply

- Fuel leakage
- Fuel filter
- Fuel pump

- (c) Ignition system

- Spark plug
- High-tension cord
- Distributor
- Igniter and ignition coil

- (d) Air intake system

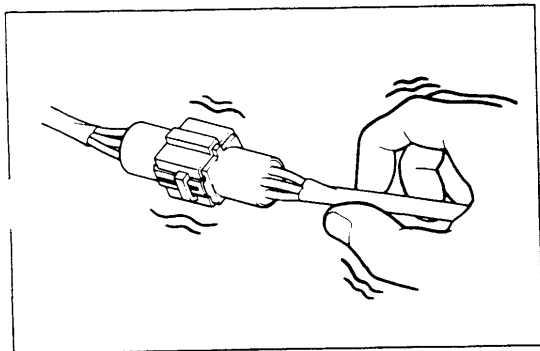
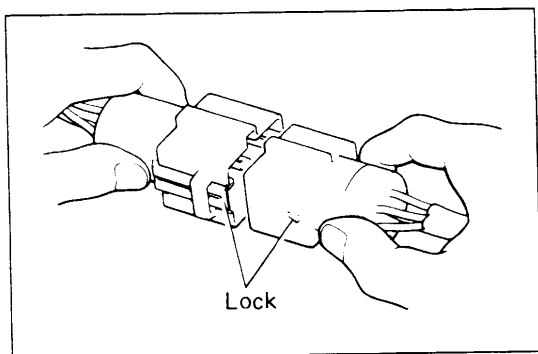
- Vacuum leaks

- (e) Emission control system

- EGR system
- PCV system

- (f) Others

- Ignition timing
- Idle speed
- etc.

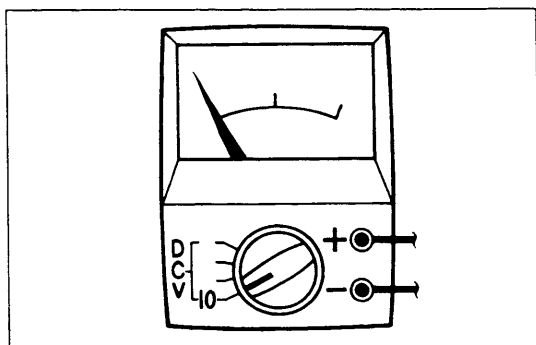


2. The most frequent cause of problems is simply a bad contact in wiring connectors. So always make sure that connections are secure.

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

- (a) Check to see that the terminals are not bent.
- (b) Check to see that the connector is pushed in completely and locked.
- (c) Check to see that there is no signal change when the connector is slightly tapped or wiggled.

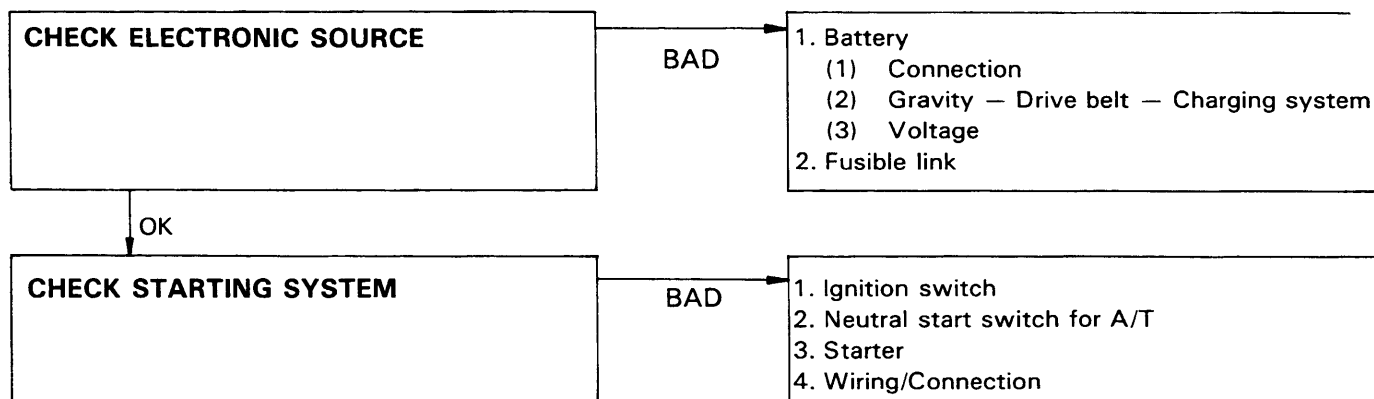
3. Sufficiently troubleshoot for other causes before replacing the ECU. The ECU is of high quality and it is expensive.

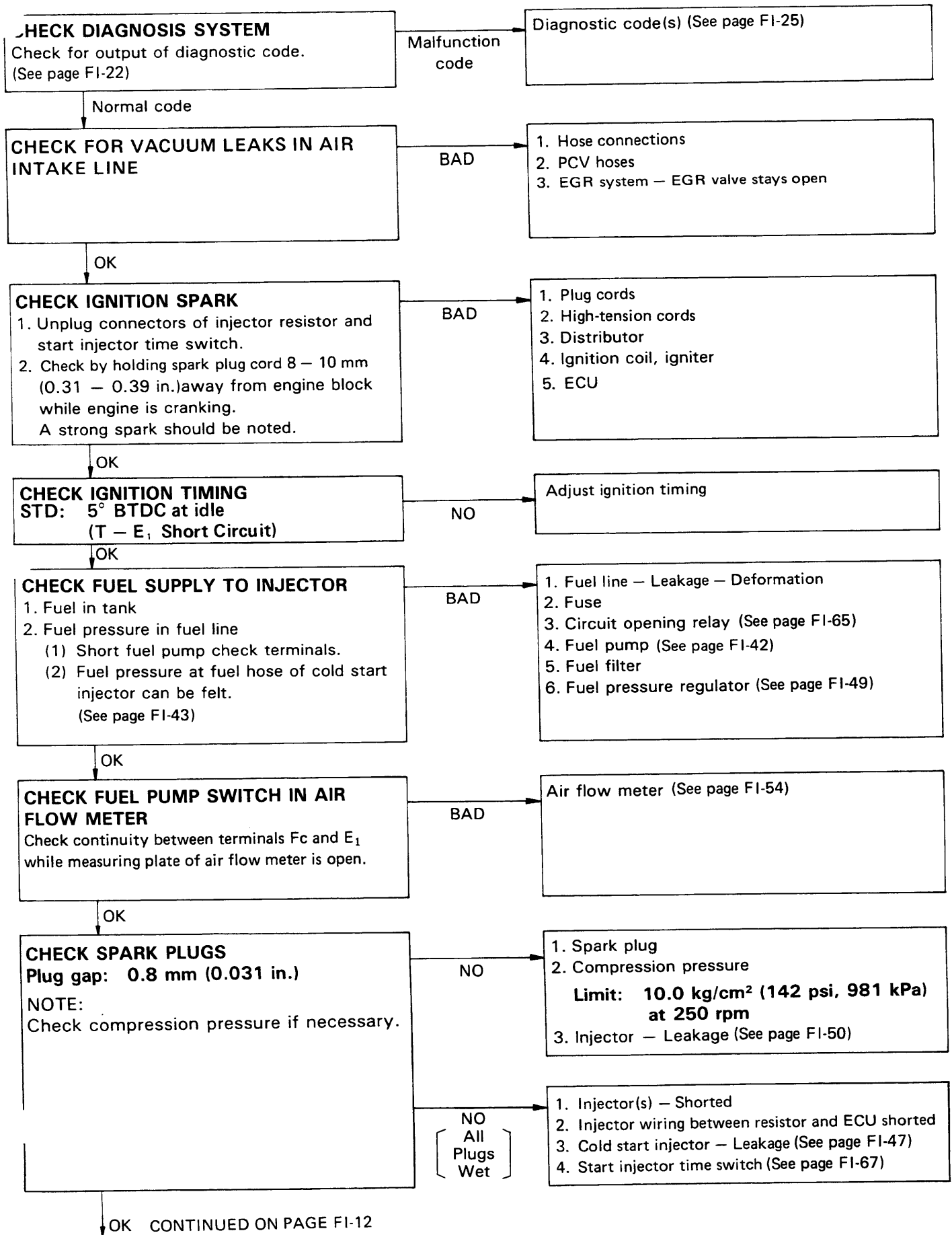


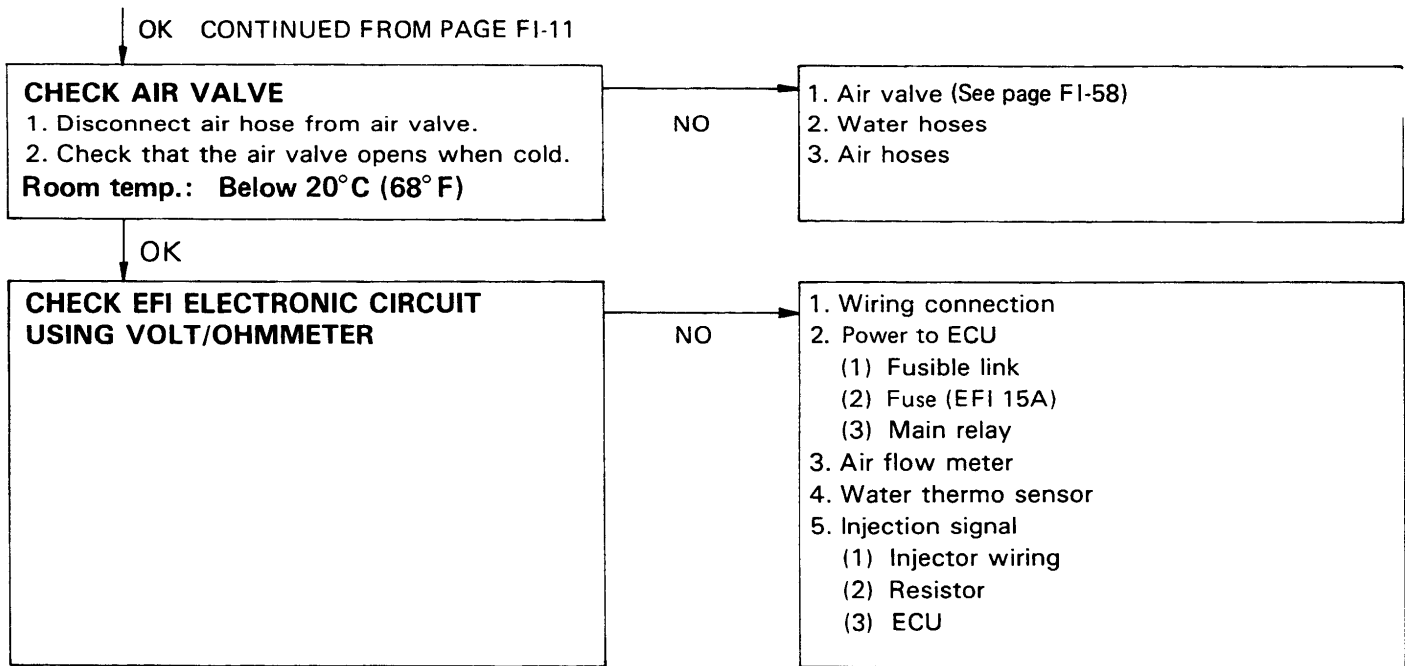
4. Use a volt/ohmmeter with a high impedance (10 k $\Omega$ /V minimum) for troubleshooting an electrical circuit.

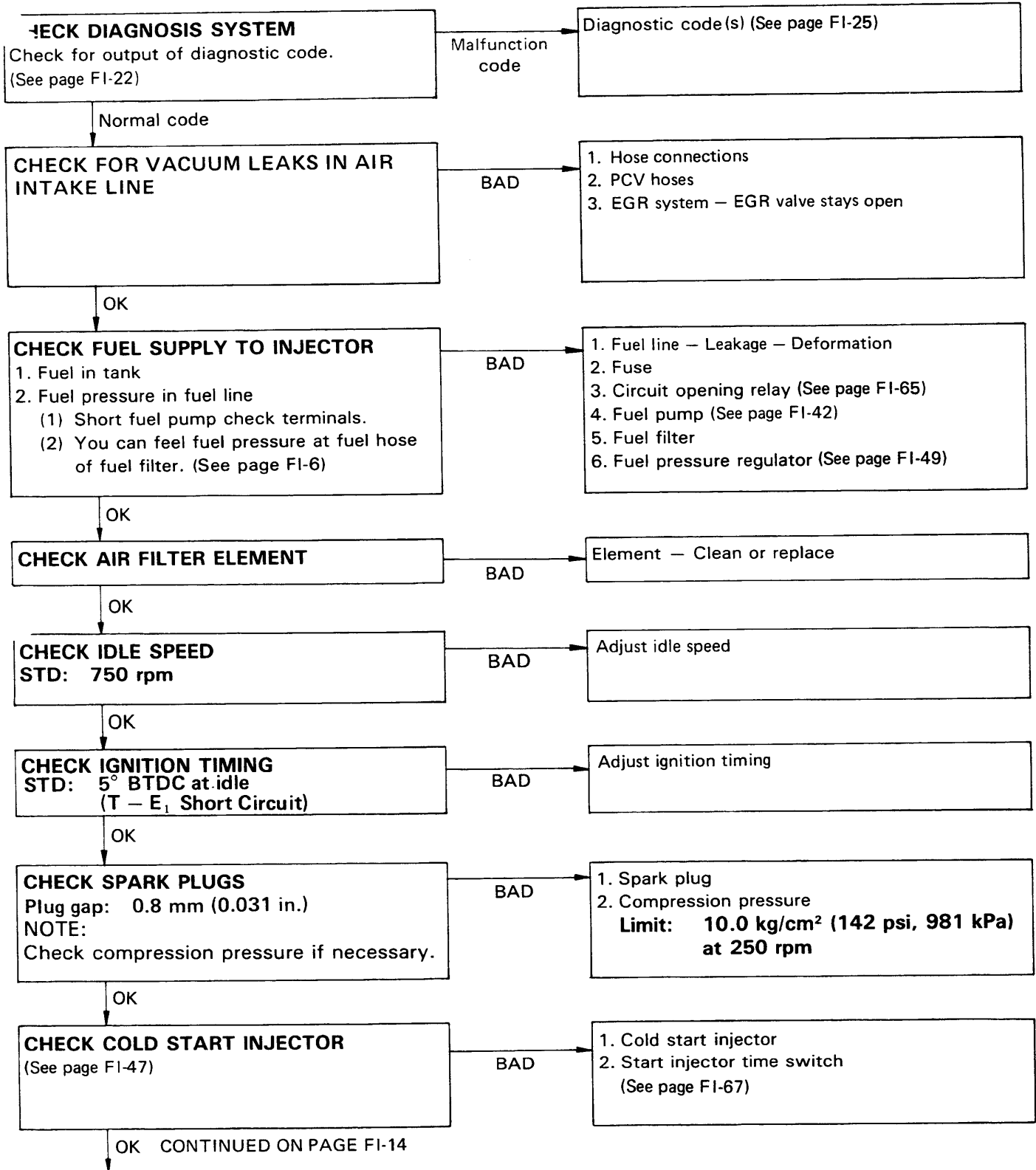
### TROUBLESHOOTING PROCEDURES

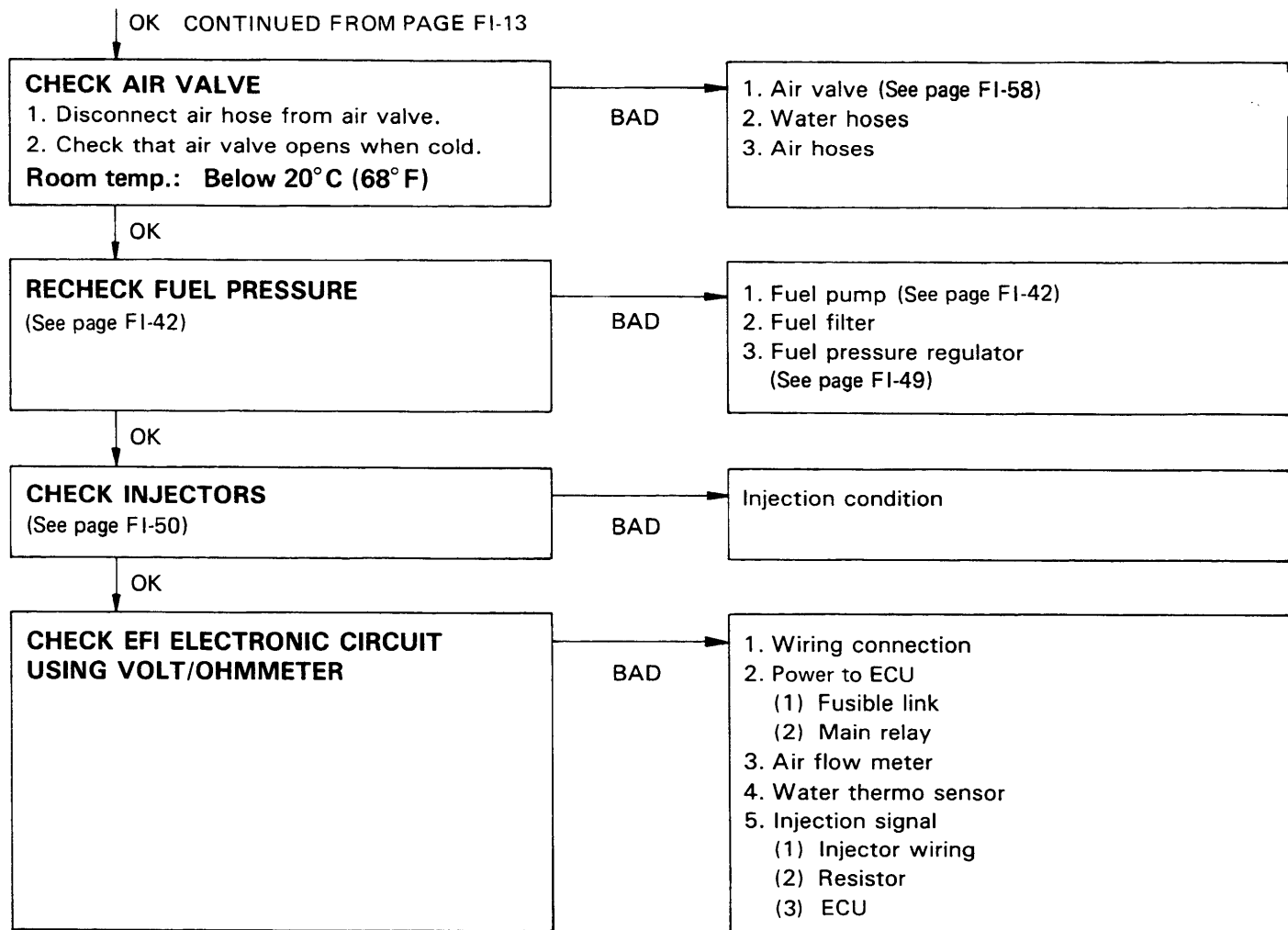
#### SYMPTOM—DIFFICULT TO START OR NO START (ENGINE WILL NOT CRANK OR CRANKS SLOWLY)



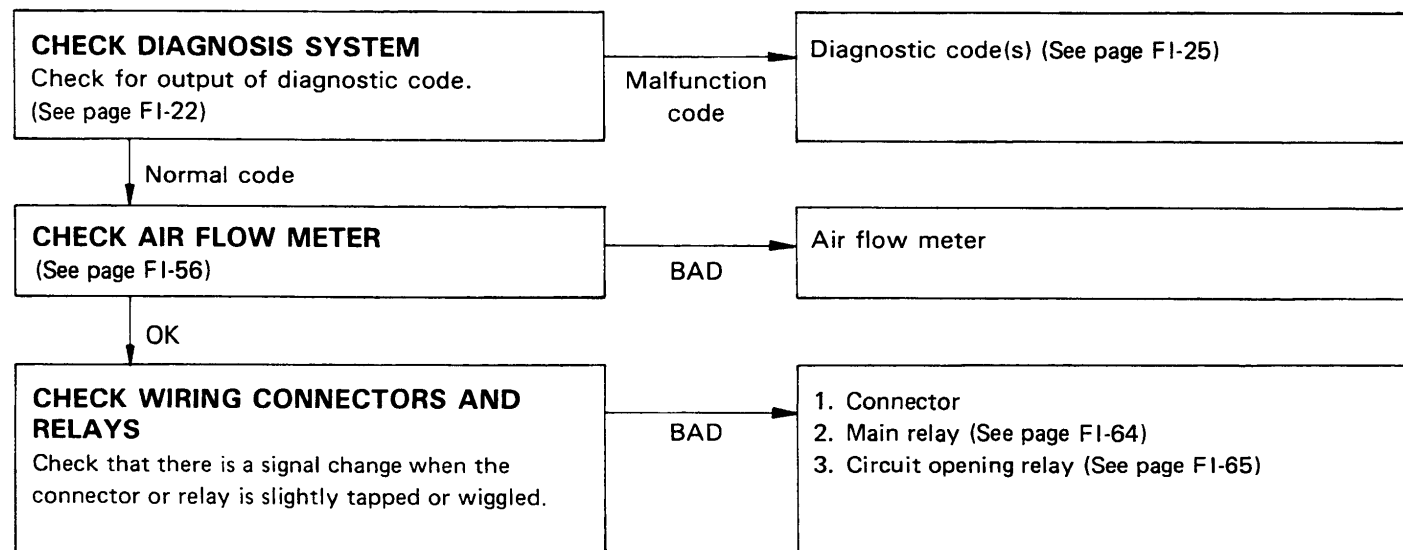
**SYMPTON — DIFFICULT TO START OR NO START (CRANKS OK)**

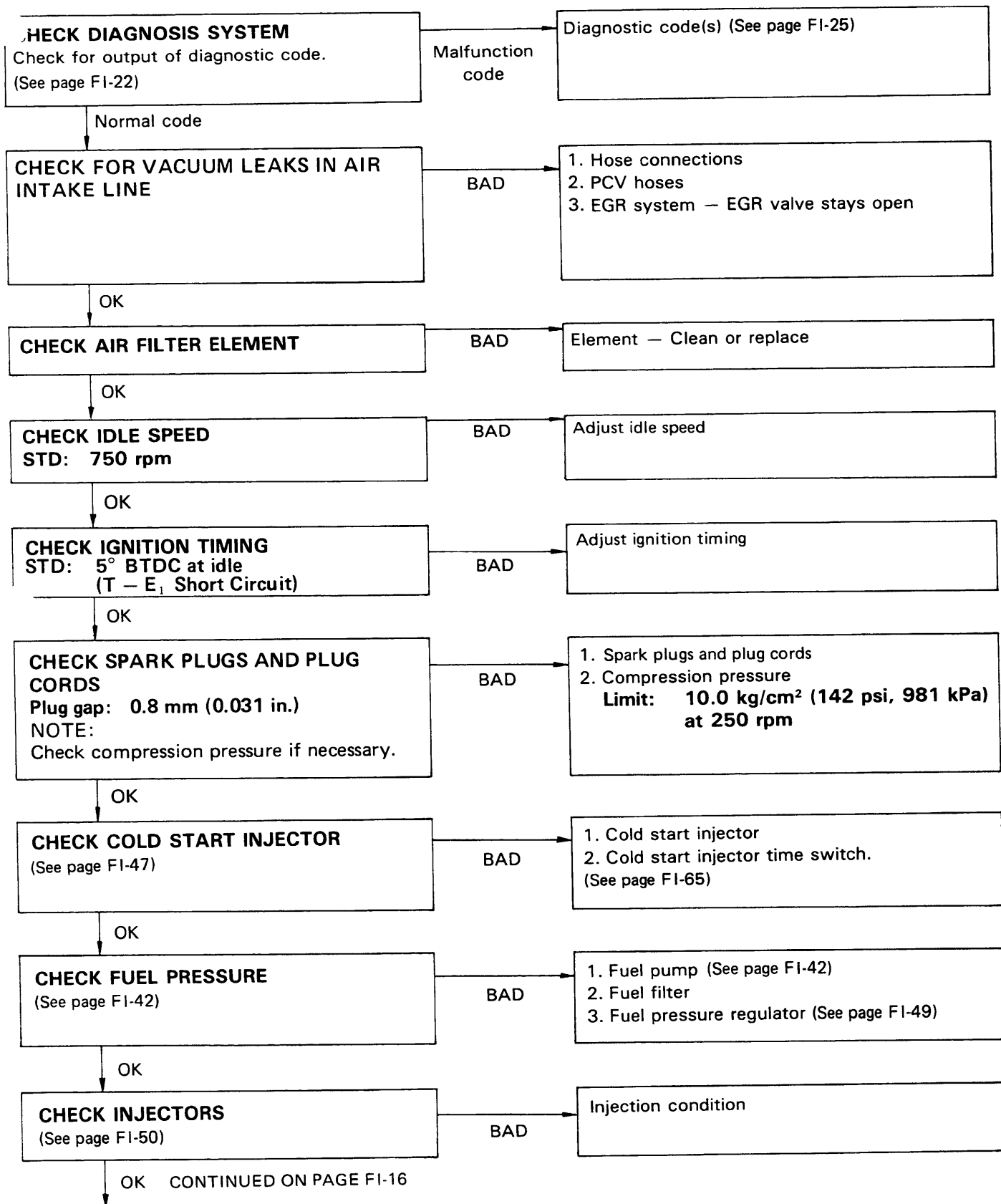


**SYMPTOM — ENGINE OFTEN STALLS**



### SYMPTOM — ENGINE SOMETIMES STALLS



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

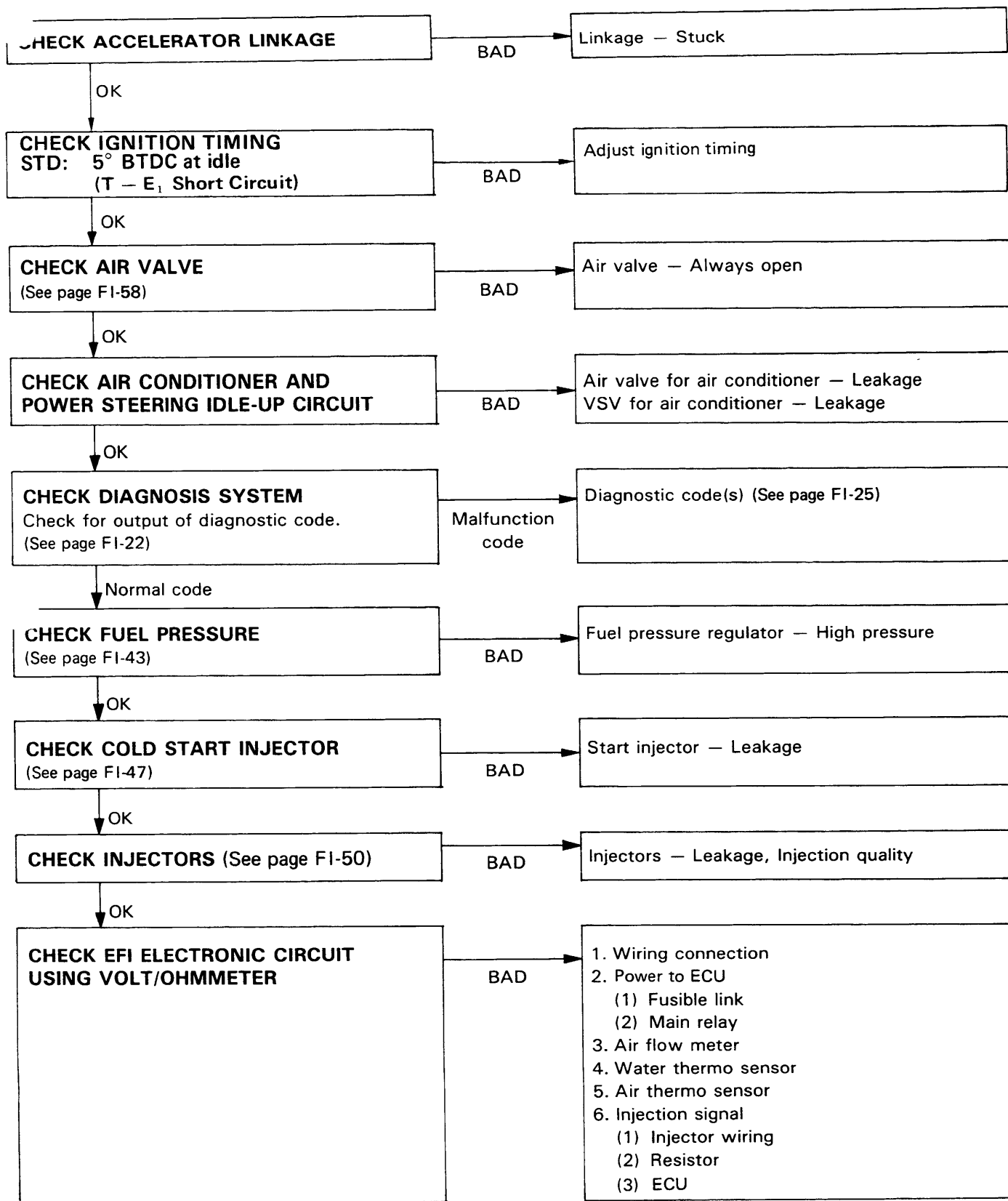
OK CONTINUED FROM PAGE FI-15

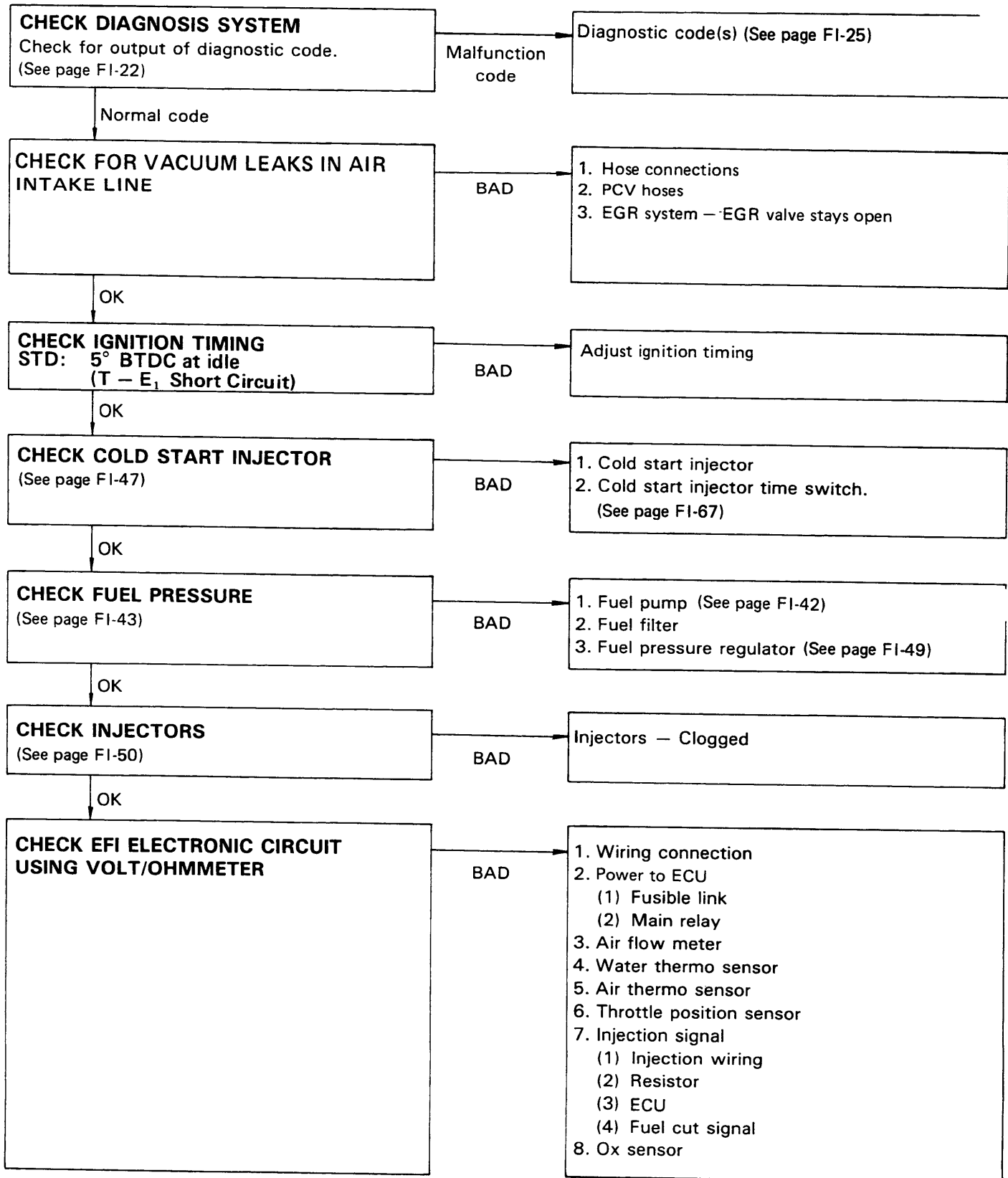
**CHECK EFI ELECTRONIC CIRCUIT  
USING VOLT/OHMMETER**

BAD

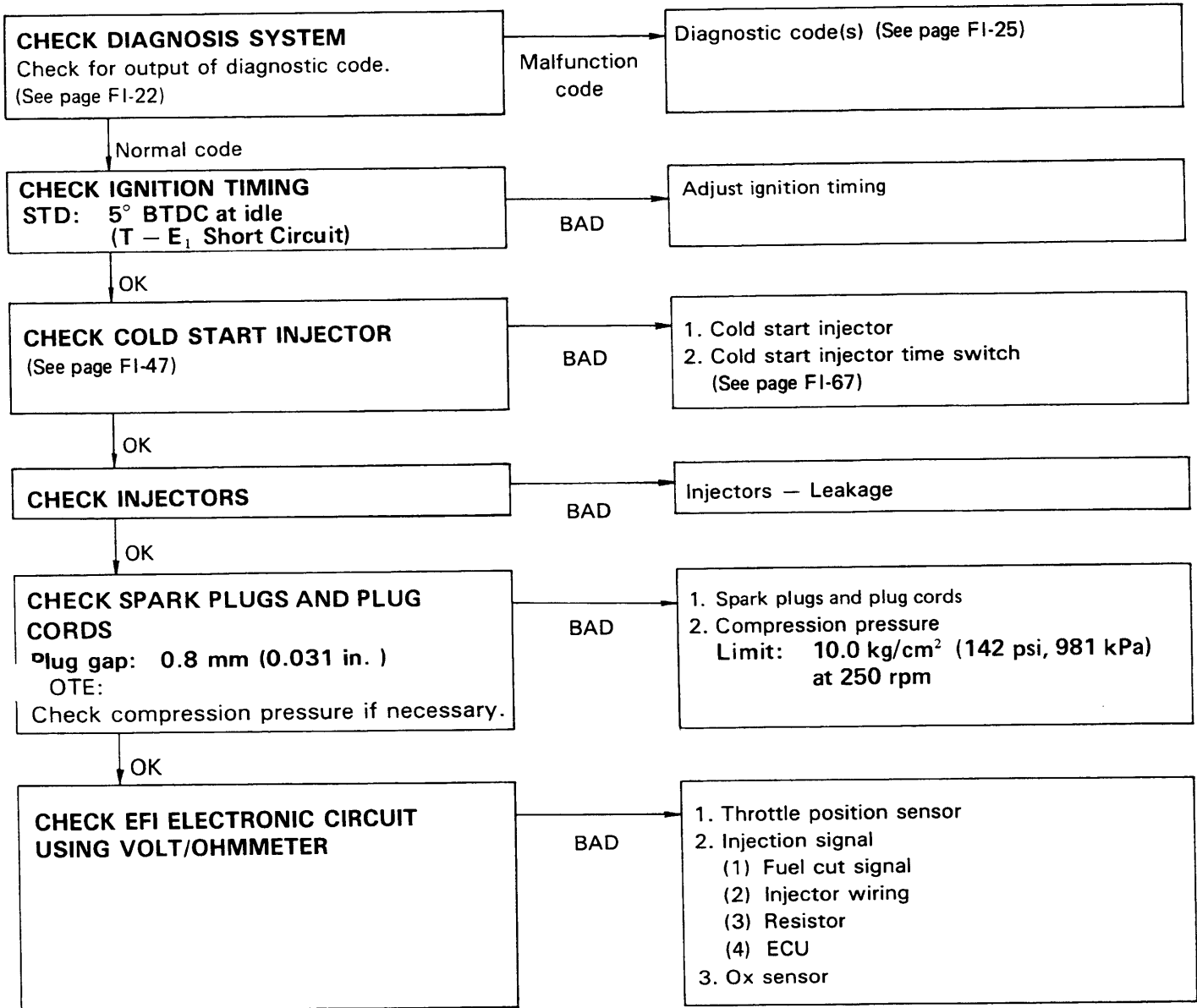
1. Wiring connection
2. Power to ECU
  - (1) Fusible link
  - (2) Main relay
3. Air flow meter
4. Water thermo sensor
5. Air thermo sensor
6. Throttle position sensor
7. Injection signal
  - (1) Injector wiring
  - (2) Resistor
  - (3) ECU
8. Ox sensor

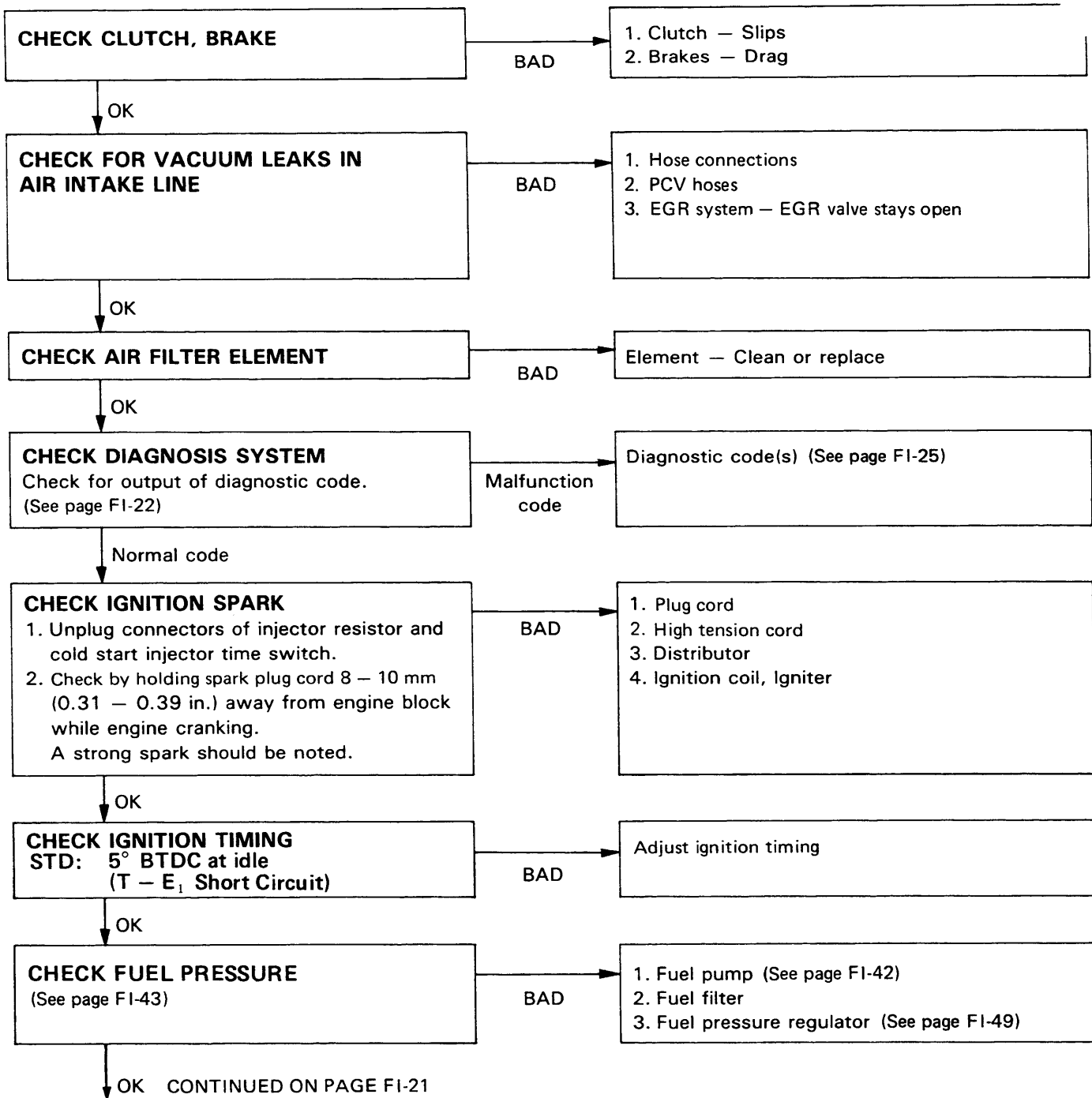


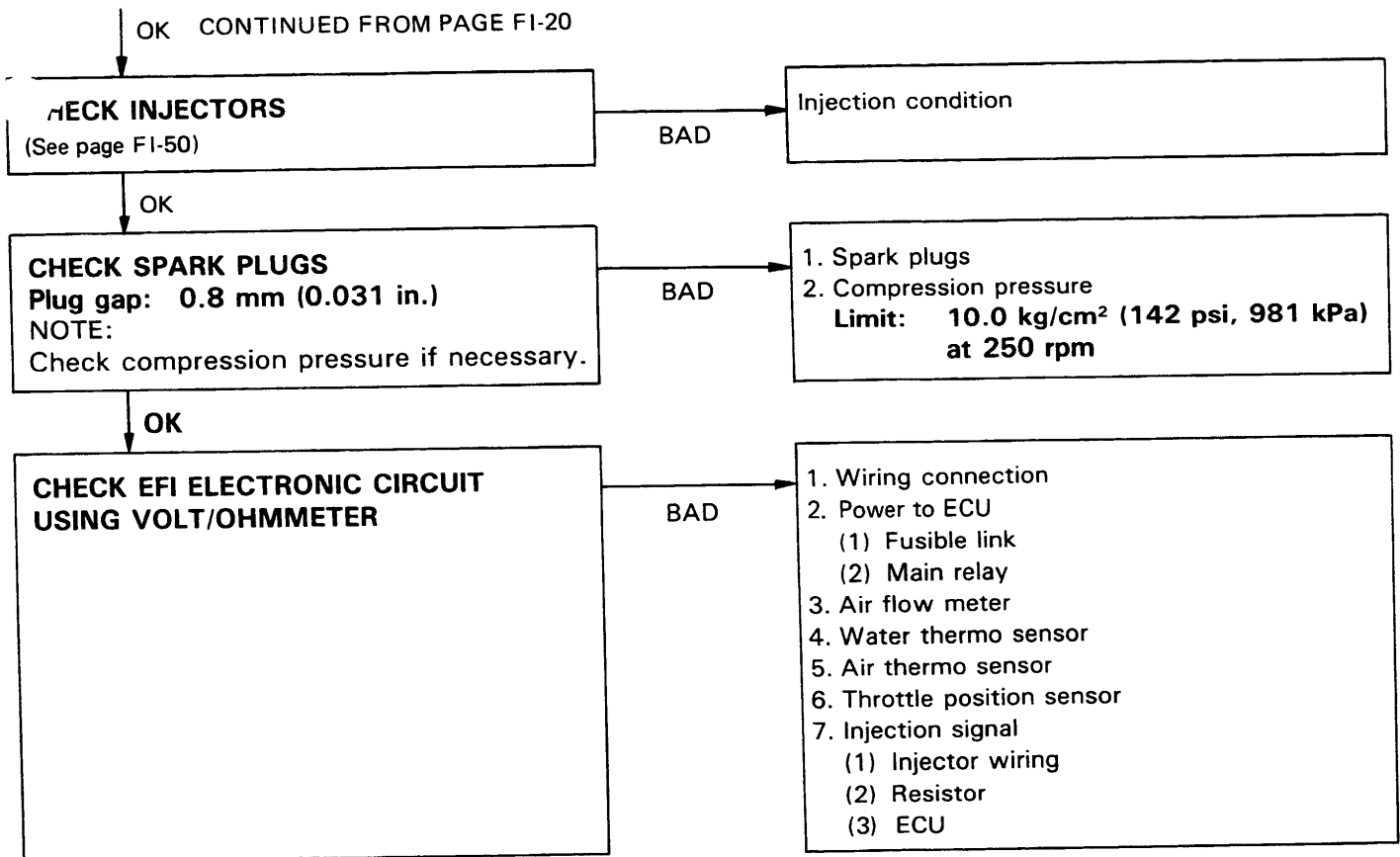
**SYMPTOM — HIGH ENGINE IDLE SPEED (NO DROP)**

**SYMPTOM — ENGINE BACKFIRES-Lean Air Fuel Mixture**

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



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



## DIAGNOSIS SYSTEM

### DESCRIPTION

By analyzing various signals as shown in the later table (page FI-25) the ECU detects system malfunctions which are related to the various operating parameter sensors or to the actuator. The ECU stores the failure code associated with the detected failure until the diagnostic system is cleared by removing the EFI fuse with 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**

### "CHECK ENGINE" LIGHT CHECK

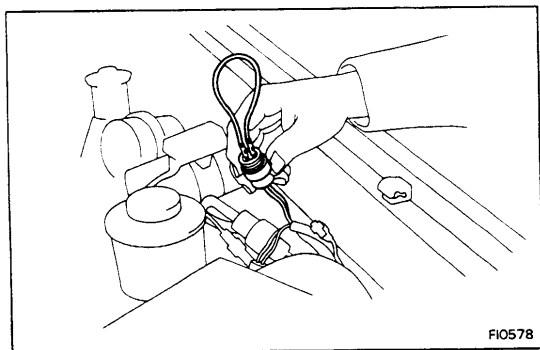
1. The "CHECK ENGINE" warning light will come on when the ignition switch is placed at ON and the engine is not running.
2. When the engine is started, the "CHECK ENGINE" warning light should go out.

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

### OUTPUT OF DIAGNOSTIC CODES

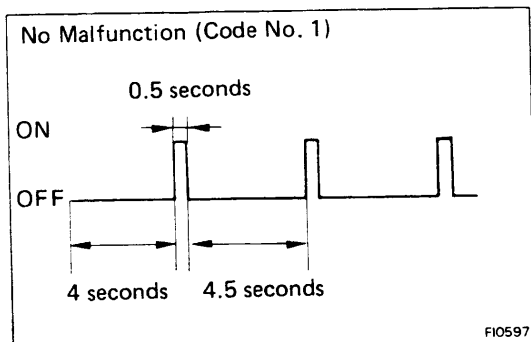
To obtain an output of diagnostic codes, proceed as follows:

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.
  - (e) Engine at normal operating temperature.
2. Turn the ignition switch to ON. Do not start the engine.
3. Using a sub-wire short terminals T—E<sub>1</sub> of the Check Engine Connector located near the ignition coil.



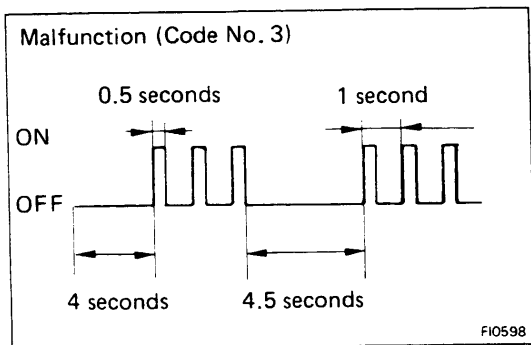
**A03835**

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



Diagnostic code (See page FI-25)

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

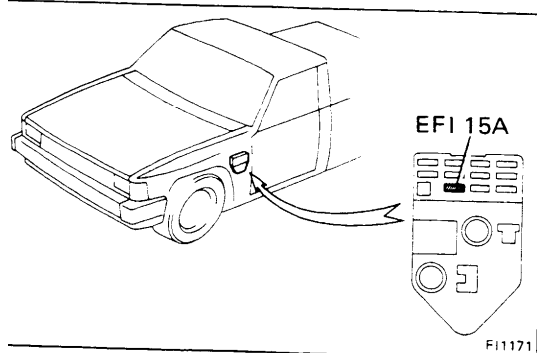


- (b) Malfunction Code Indication

The light will blink a number of times equal to the malfunction code indication every 4.5 seconds.

The diagnostic code series will be repeated as long as the check connector terminals (T and E<sub>1</sub>) are shorted.

5. After the diagnosis check, remove the sub-wire.



## CANCELLING OUT DIAGNOSTIC CODE

1. After repair of the trouble area, the diagnostic code retained in memory by the ECU must be cancelled out by removing the fuse EFI (15A) for 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.

### NOTE:

- Cancellation can also be done by removing the battery negative ( — ) terminal, but in this case other memory systems (radio ETR, 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 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, if necessary, confirm that a "normal" code (No. 1) is now read on the "CHECK ENGINE" warning light.

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


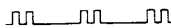



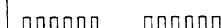






## DIAGNOSIS INDICATION

- (1) Including "normal", the ECU is programmed with the following 13 (22R-E), 14 (22R-TE) diagnostic codes.
- (2) When 2 or more codes are indicated, the lowest number (code) will appear first.
- (3) All detected diagnostic codes, except 11 and 13, will be retained in memory by the ECU from the time of detection until cancelled out.
- (4) Once the malfunction is cleared, the "CHECK ENGINE" warning light on the instrument panel will go out but the diagnostic code(s) remain stored in ECU memory (except for code 11 and 13).

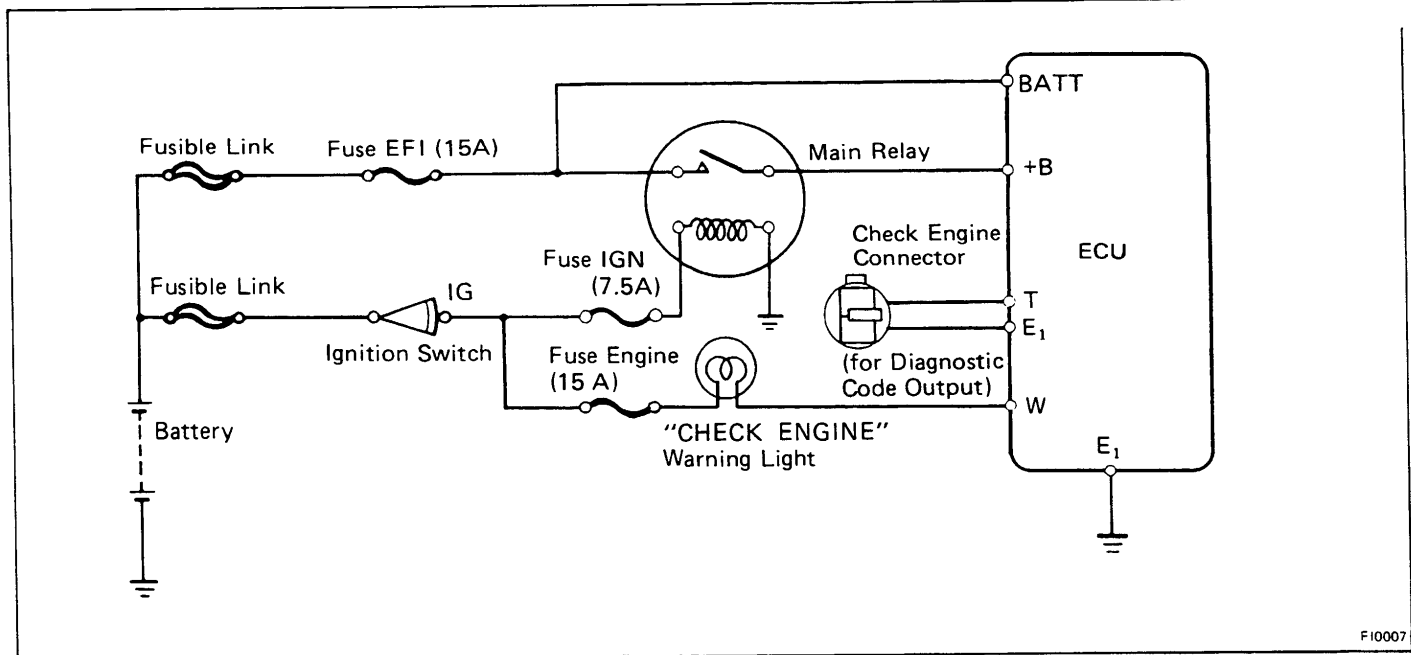
A03887



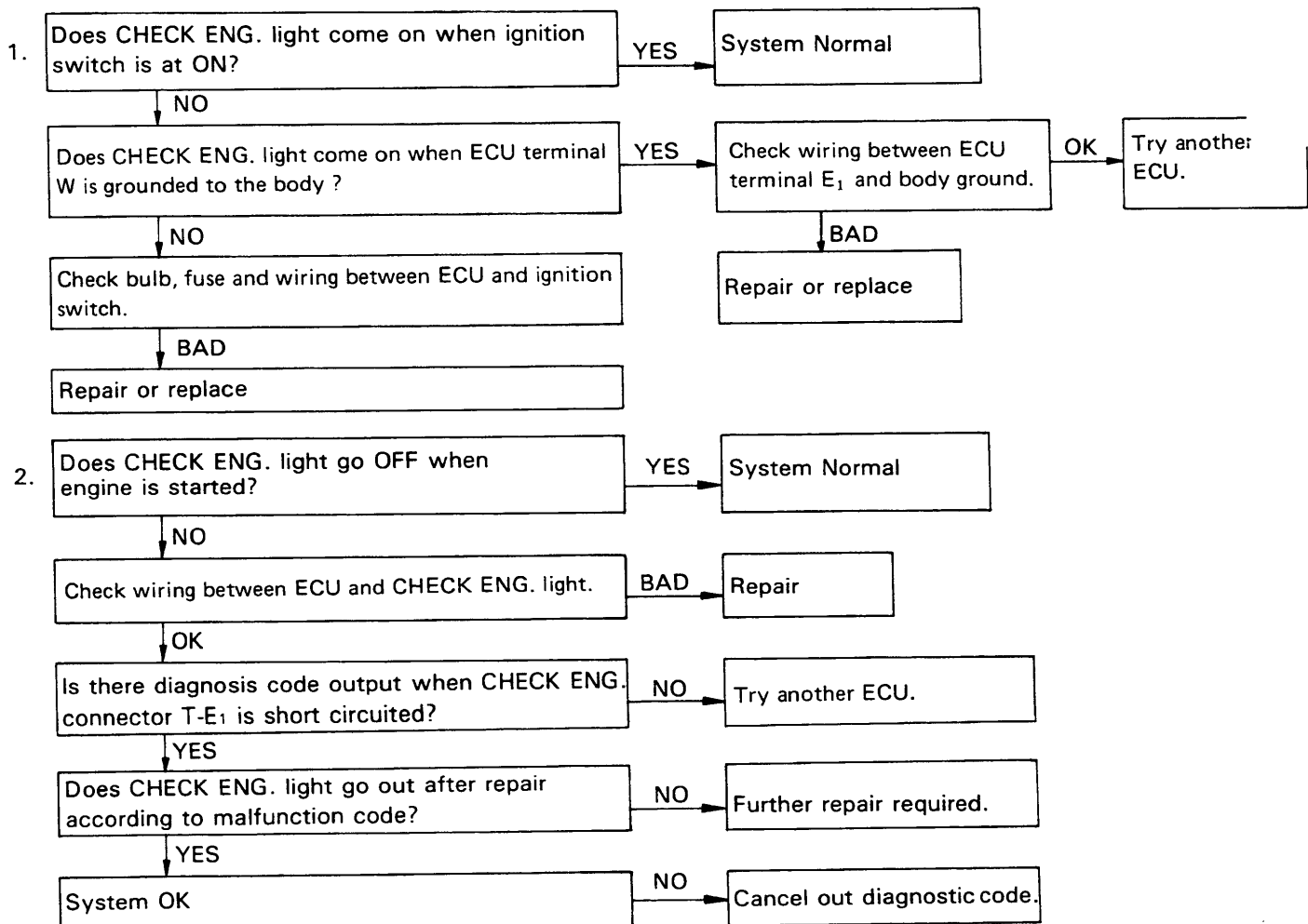
## DIAGNOSIS CODES

Code	Number of blinks "CHECK ENGINE"	System	Diagnosis	Trouble area	Page
1		Normal	This appears when none of other codes (2 thru 13) are identified.		
2		Air flow meter signal	<ul style="list-style-type: none"> <li>• Open circuit in <math>V_c</math>, or <math>V_s - E_2</math> short circuited.</li> <li>• Open circuit in <math>E_2</math>, or <math>V_c - V_s</math> short circuited.</li> </ul>	1. Air flow meter circuit 2. Air flow meter 3. ECU	FI-56 FI-56 FI-73
3		Ignition signal	No signal from IGF four times in succession	1. Igniter circuit (+B, IGT, IGF) 2. Igniter 3. ECU	FI-73
4		Water thermo sensor signal	Open or short circuit in water thermo sensor signal	1. Water thermo sensor circuit 2. Water thermo sensor 3. ECU	FI-68 FI-68 FI-73
5		Ox sensor signal	Sufficiented feed back condition but not changed Ox sensor signal	1. Ox sensor circuit 2. Ox sensor 3. ECU	FI-69 FI-69 FI-73
6		RPM signal (crank angle pulse)	No Ne signal to ECU within cranking, or Ne value being over 1,000 rpm in spite of no Ne signal to ECU	1. Igniter circuit 2. Igniter 3. Distributor 4. ECU	FI-73
7		Throttle position sensor signal	Open or short circuit in throttle position sensor signal	1. Throttle position sensor circuit 2. Throttle position sensor 3. ECU	FI-59 FI-59 FI-73
8		Intake air thermo sensor signal	Open or short circuit in intake air thermo sensor signal	1. Intake air thermo sensor circuit 2. Intake air thermo sensor 3. ECU	FI-73
10		Starter signal	No STA signal to ECU when vehicle speed 0 km/h and engine is running over 800 rpm	1. Speed sensor circuit 2. Main relay circuit 3. IG switch circuit (Starter) 4. IG switch 5. ECU	FI-64 FI-73
11		Switch signal	Short circuit in terminal T when air conditioner switch ON or IDL point OFF	1. Air conditioner switch 2. Throttle position sensor circuit 3. Throttle position sensor 4. ECU	FI-59 FI-59 FI-73
12		Knock control sensor signal	Knock control sensor signal is not reached judgement level in succession	1. Knock control sensor circuit 2. Knock control sensor 3. ECU	
13		Knock control CPU (ECU)	Knock CPU faulty	Knock control CPU (ECU)	

## INSPECTION OF DIAGNOSIS CIRCUIT



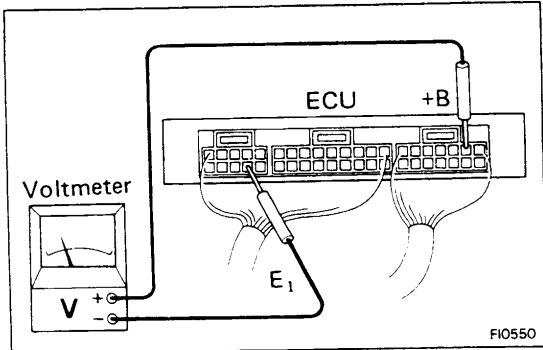
FI0007



# TROUBLESHOOTING WITH VOLT/OHMMETER

## PREPARATION FOR TROUBLESHOOTING

1. Remove the glove box.
2. Remove the ECU with the wire harness.



## EFI SYSTEM CHECK PROCEDURE

### NOTE:

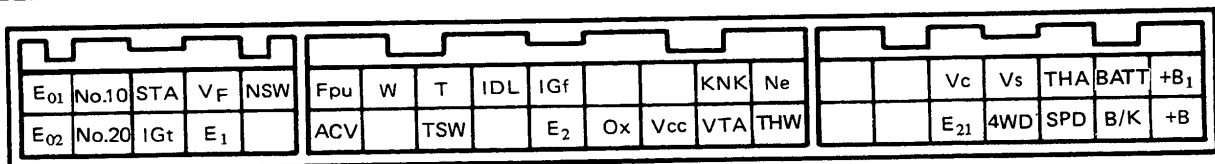
1. The EFI circuit can be checked by measuring the resistance and voltage at the wiring connectors of the ECU.
2. Perform all voltage measurement with the connectors connected.
3. Verify that the battery voltage is 11 V or above when the ignition switch is ON.

Using a voltmeter with high impedance (10 k $\Omega$ /V minimum) measure the voltage at each terminal of the wiring connector.

NOTE: If there is any problems, see TROUBLESHOOTING FOR EFI ELECTRONIC CIRCUIT WITH VOLT/OHMMETER.

### Connectors of ECU

Symbol	Terminal Name	Symbol	Terminal Name
+B <sub>1</sub>	MAIN RELAY	+B	MAIN RELAY
BATT	BATTERY +B	B/K	BRAKE SWITCH
THA	AIR THERMO SENSOR	SPD	SPEED SENSOR
V <sub>s</sub>	AIR FLOW METER	4WD	4WD SWITCH
V <sub>c</sub>	AIR FLOW METER	E <sub>21</sub>	SENSOR EARTH
Ne	ENGINE REVOLUTION SENSOR	THW	WATER THERMO SENSOR
KNK	KNOCK SENSOR	VTA	THROTTLE
IGf	IGNITER	Vcc	THROTTLE SWITCH +B
IDL	THROTTLE SWITCH	Ox	Ox SENSOR
T	CHECK CONNECTOR	E <sub>2</sub>	SENSOR EARTH
W	WARNING LIGHT	TSW	WATER THERMO SWITCH
Fpu	FUEL PRESSURE UP SWITCH	ACV	A/C IDLE UP
NSW	NEUTRAL START SWITCH	E <sub>1</sub>	ENGINE EARTH
VF	CHECK CONNECTOR	IGt	IGNITER
STA	STARTER SWITCH	No. 20	INJECTOR
No. 10	INJECTOR	E <sub>02</sub>	ENGINE GROUND
E <sub>01</sub>	ENGINE GROUND		



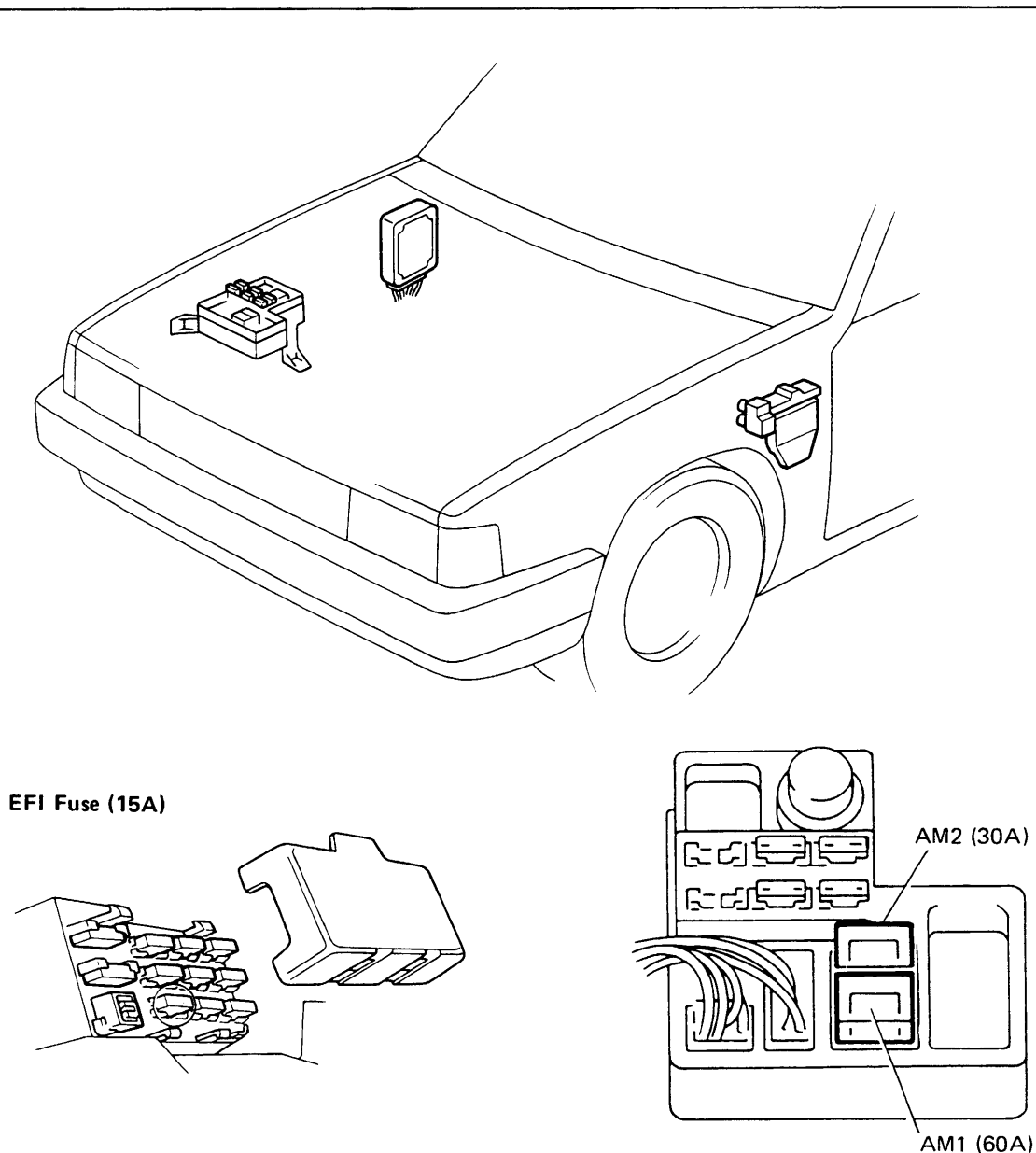
F10605

## TROUBLESHOOTING FOR EFI ELECTRONIC CIRCUIT WITH VOLT/OHMMETER

**NOTE:** Because the following troubleshooting procedures are designed for inspection of each separate system, the actual troubleshooting procedure may vary somewhat. However, please refer to these procedures and perform actual troubleshooting, conforming to the inspection methods described.

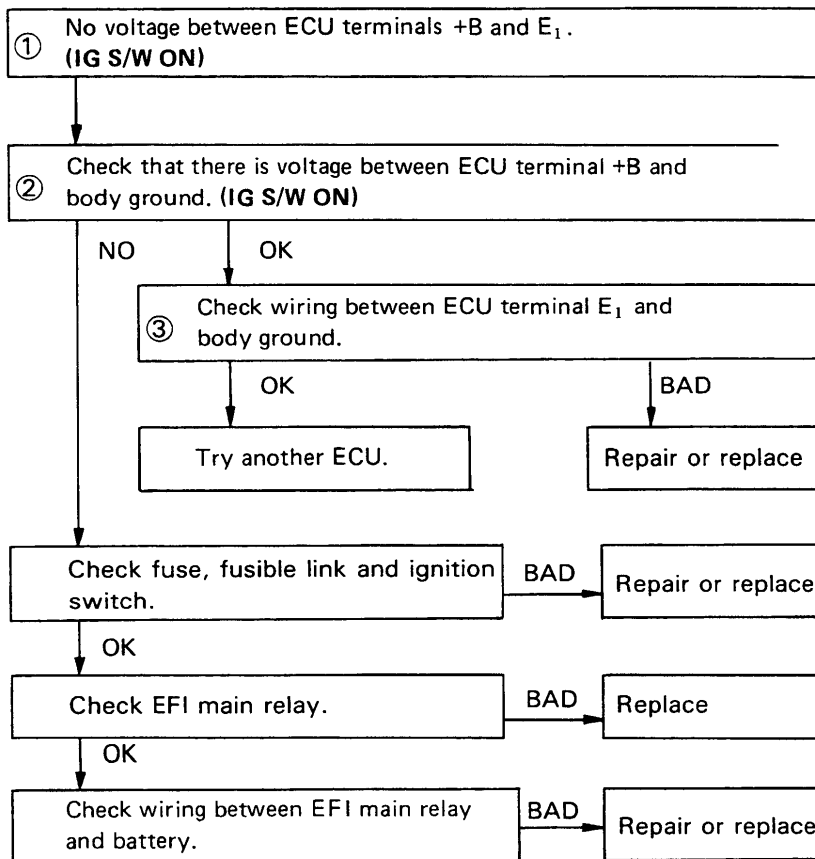
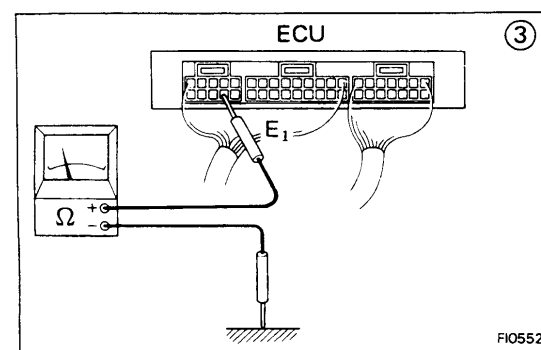
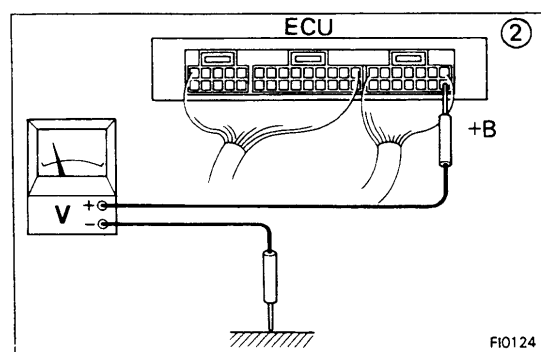
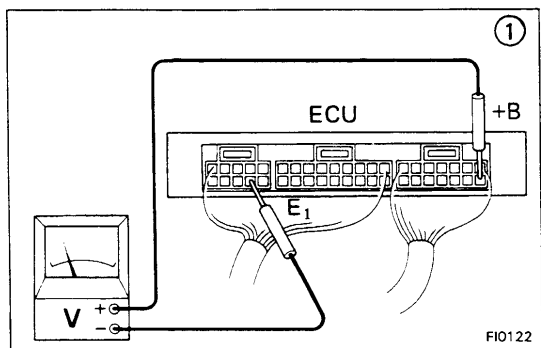
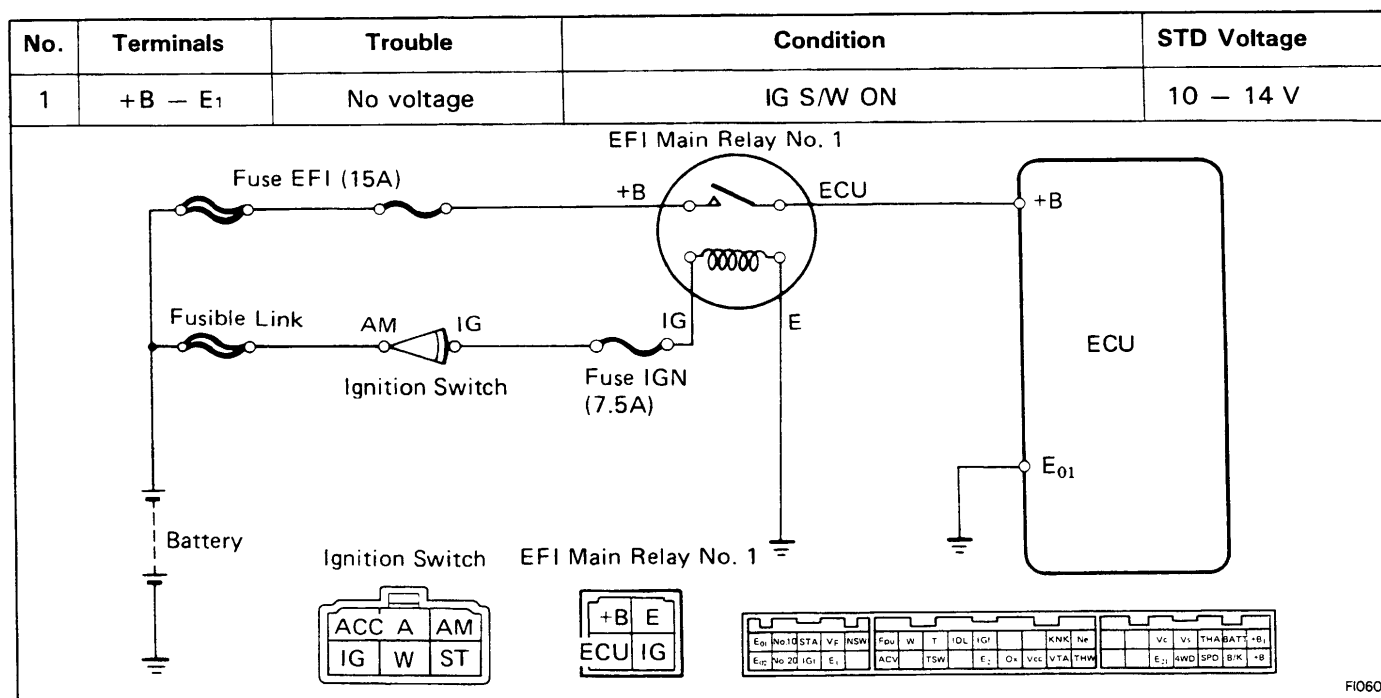
For example, it is better to first make a simple check of the fuses, fusible links and connecting condition of the connectors before making your inspection according to the procedures listed.

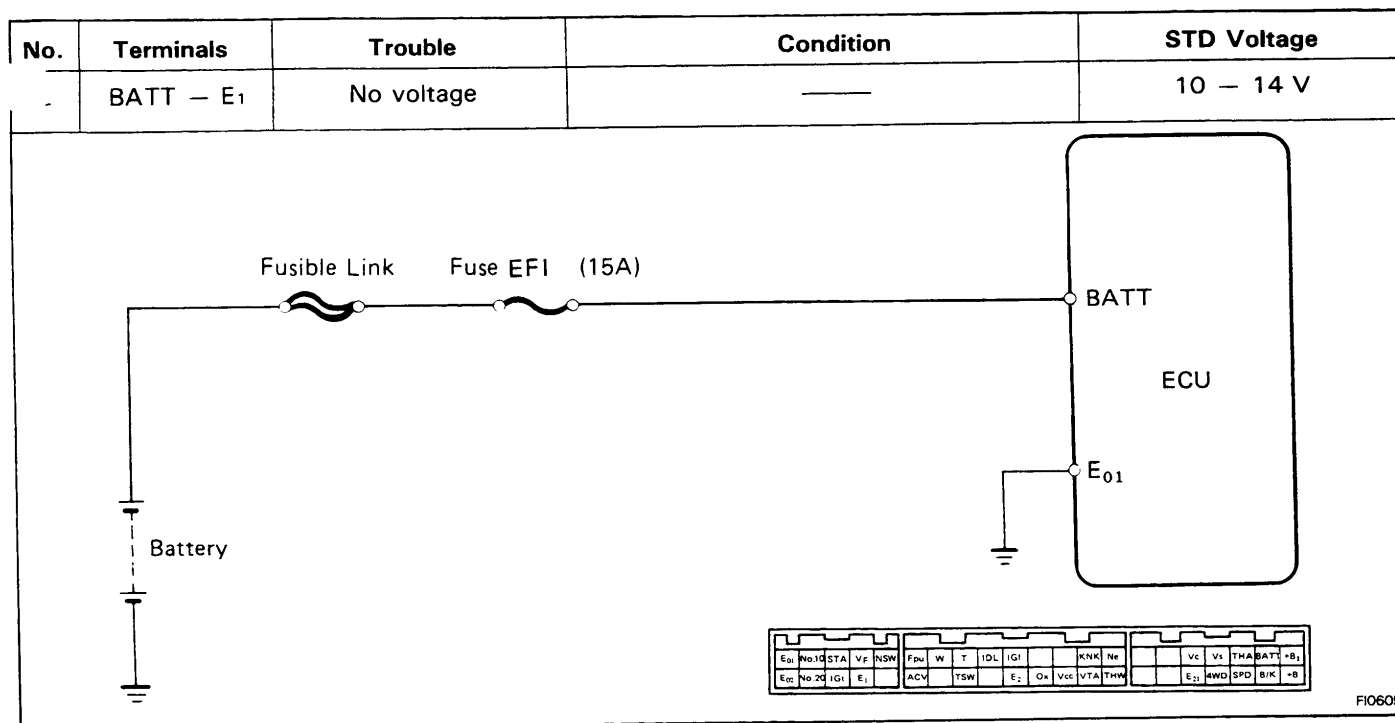
### LOCATION OF FUSE AND FUSIBLE LINK



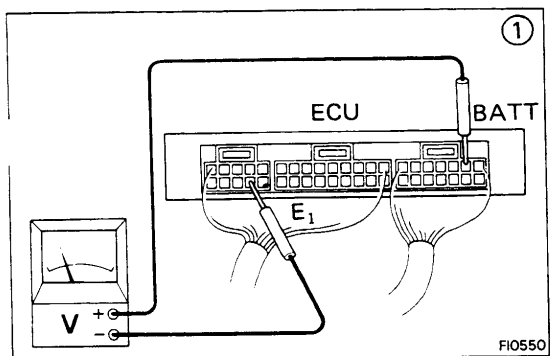
## VOLTAGE AT ECU WIRING CONNECTORS

No.	Terminals	Condition		STD Voltage	See page
1	+B — E <sub>1</sub>	Ignition switch ON		10 — 14	FI-30
2	BATT — E <sub>1</sub>	—		10 — 14	FI-31
3	IDL — E <sub>2</sub>	Ignition switch ON	Throttle valve open	4 — 10	FI-32
	VTA — E <sub>2</sub>		Throttle valve fully closed	0.1 — 1.0	FI-33
			Throttle valve fully open	4 — 5	
			Vcc — E <sub>2</sub>	—	
4	IGt — E <sub>1</sub>	Idling		0.7 — 1.0	FI-34
5	STA — E <sub>1</sub>	Ignition switch ST position		6 — 12	FI-35
6	No. 10 — E <sub>1</sub> No. 20 — E <sub>1</sub>	Ignition switch ON		9 — 14	FI-36
7	W — E <sub>1</sub>	No trouble (CHECK ENGINE light off) and engine running		8 — 14	FI-37
8	Vc — E <sub>2</sub>	Ignition switch ON	—	4 — 9	FI-38
	Vs — E <sub>2</sub>		Measuring plate fully closed	0.5 — 2.5	
			Measuring plate fully open	5 — 8	
			Idling		
9	THA — E <sub>2</sub>	Ignition switch ON	Intake air temperature 20°C (68°F)	2 — 6	FI-39
10	THW — E <sub>2</sub>	Ignition switch ON	Coolant temperature 80°C (176°F)	0.5 — 2.5	FI-40
11	B/K — E <sub>1</sub>	Stop light switch ON		8 — 14	FI-41

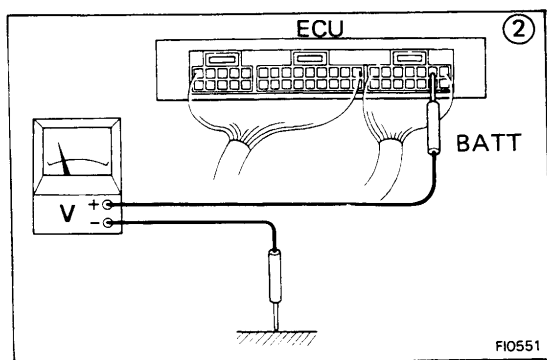




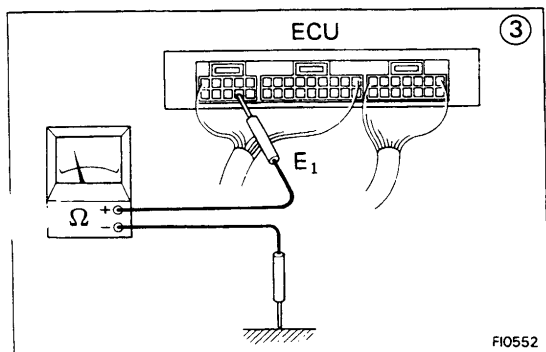
FI0605



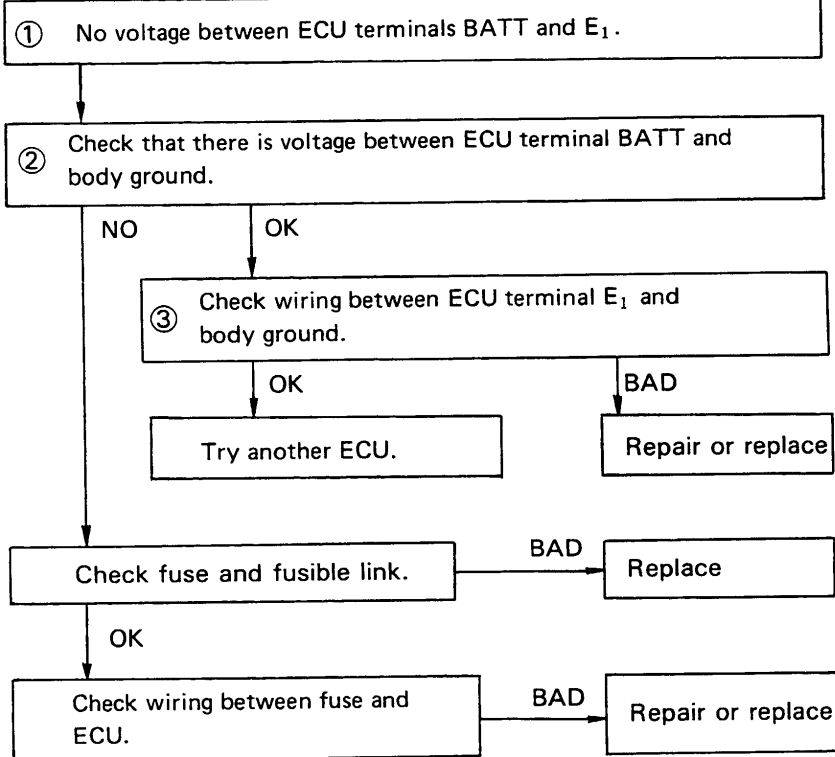
FI0550



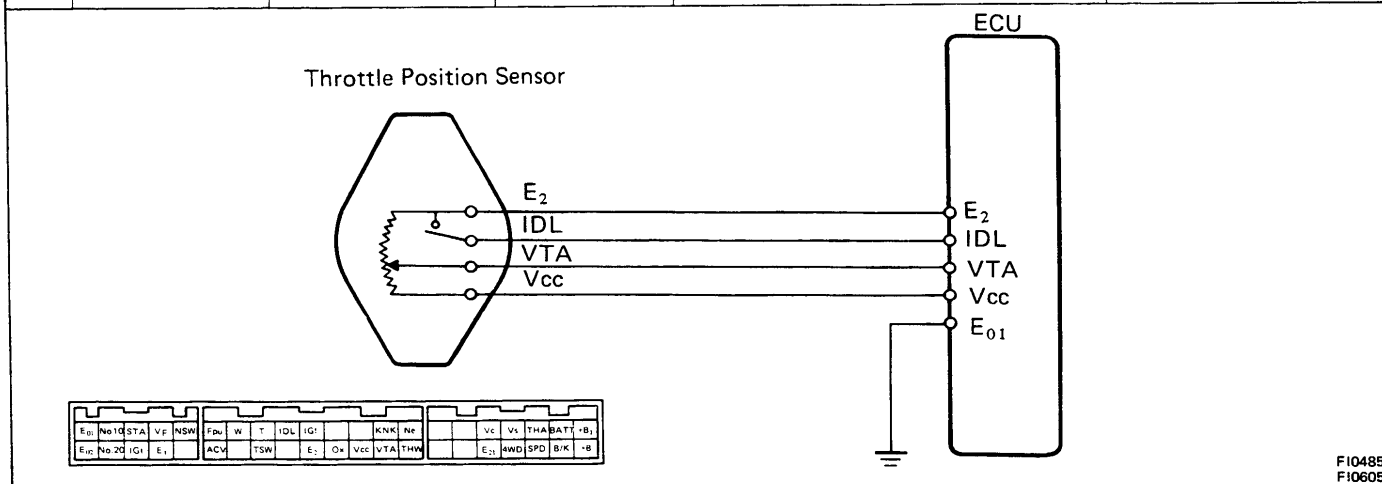
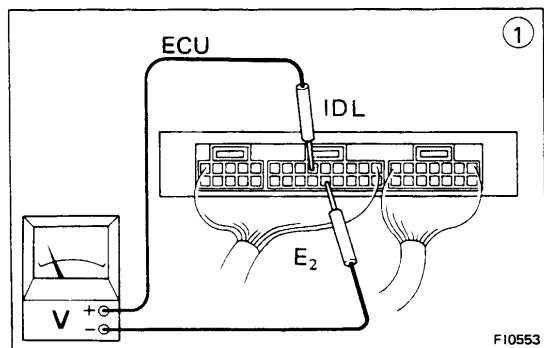
FI0551



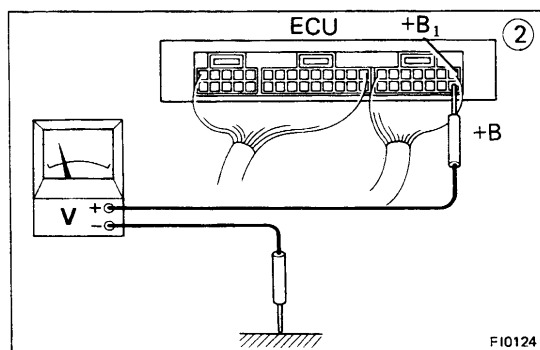
FI0552



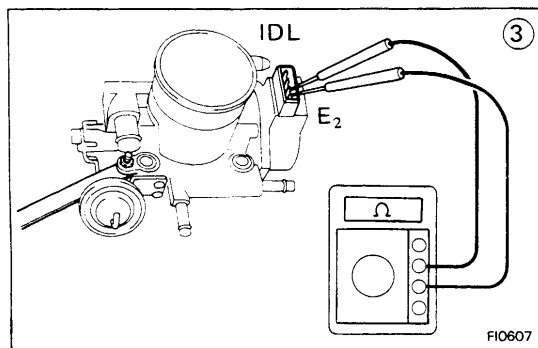
No.	Terminals	Trouble	Condition		STD Voltage
3	IDL – E <sub>2</sub>	No voltage	Ignition switch ON	Throttle valve open	4 – 10 V
	Throttle valve fully closed			0.1 – 1.0 V	
	Throttle valve fully open			4 – 5 V	
	—			4 – 6 V	
	Vcc – E <sub>2</sub>				

F10485  
F10605

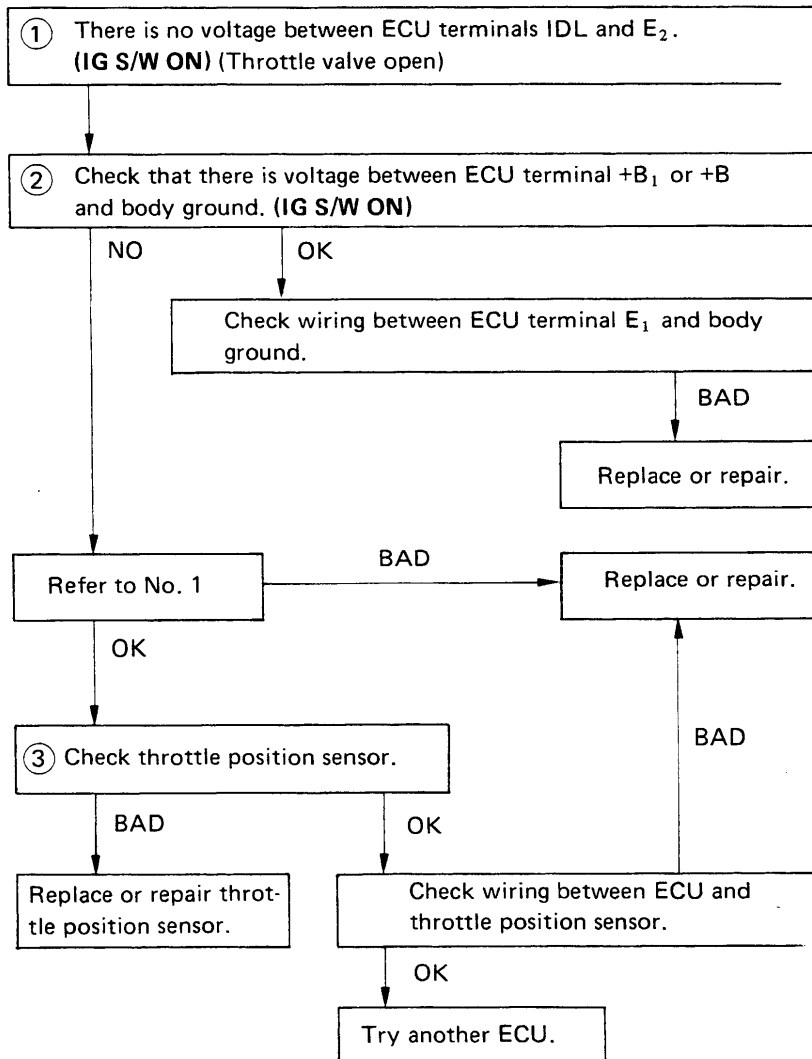
F10553



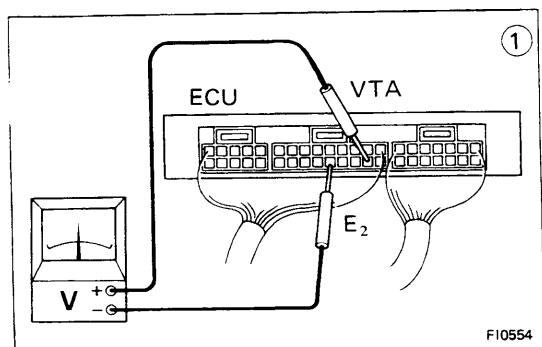
F10124



F10607

• IDL ↔ E<sub>2</sub>



• VTA ↔ E<sub>2</sub>

① There is no specified voltage at ECU terminals VTA and E<sub>2</sub>. (IG S/W ON)

② Check that there is voltage between ECU terminal +B<sub>1</sub> or +B and body ground. (IG S/W ON)

NO

OK

Check wiring between ECU terminal E<sub>1</sub> and body ground.

BAD

Replace or repair.

Refer to No. 1.

BAD

Repair or replace.

OK

③ Check throttle position sensor.

BAD

Repair or replace.

OK

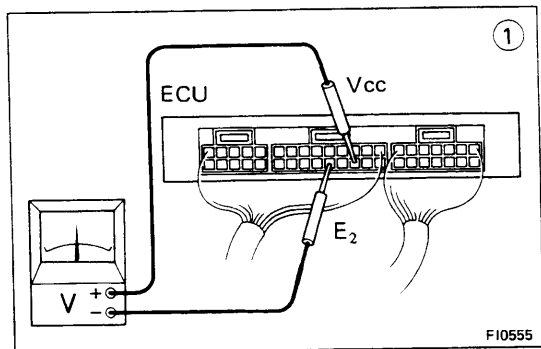
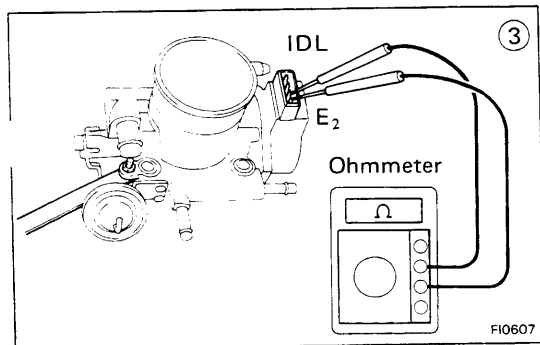
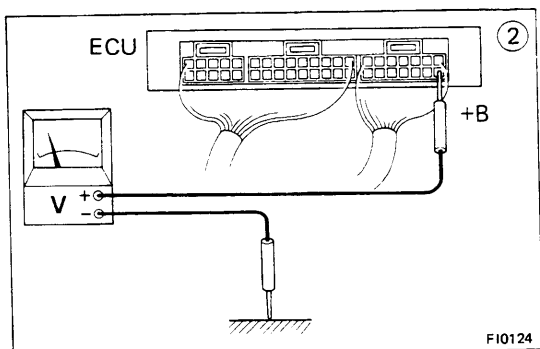
Check wiring between ECU and throttle position sensor.

BAD

Repair or replace.

OK

Try another ECU.

• Vcc ↔ E<sub>2</sub>

① There is no voltage between ECU terminals Vcc and E<sub>2</sub>. (IG S/W ON)

Check that there is voltage between ECU terminal +B<sub>1</sub> or +B and body ground. (IG S/W ON)

OK

NO

② Check throttle position sensor.

Refer to No. 1.

BAD

Repair or replace.

OK

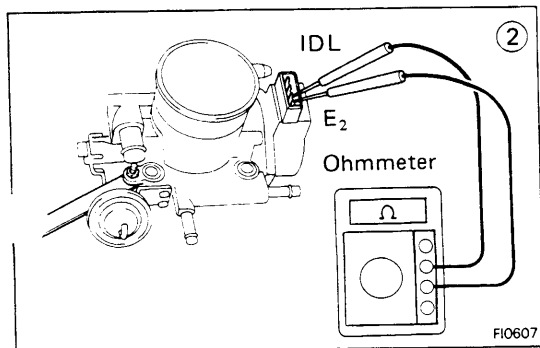
Check wiring between ECU and throttle position sensor.

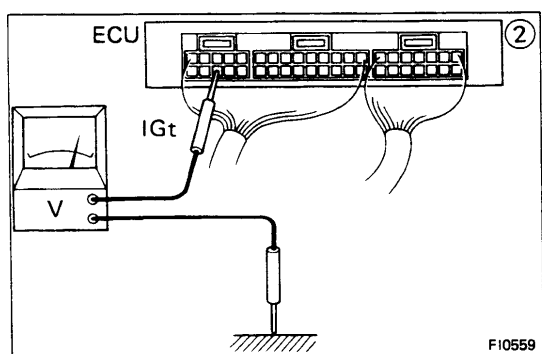
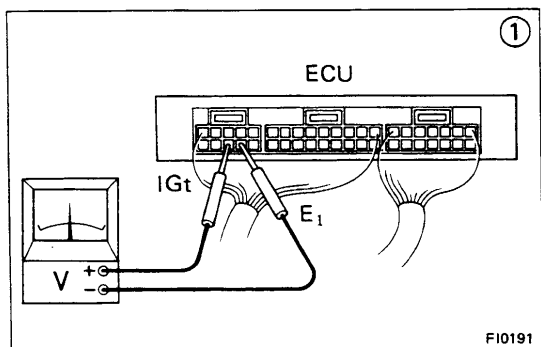
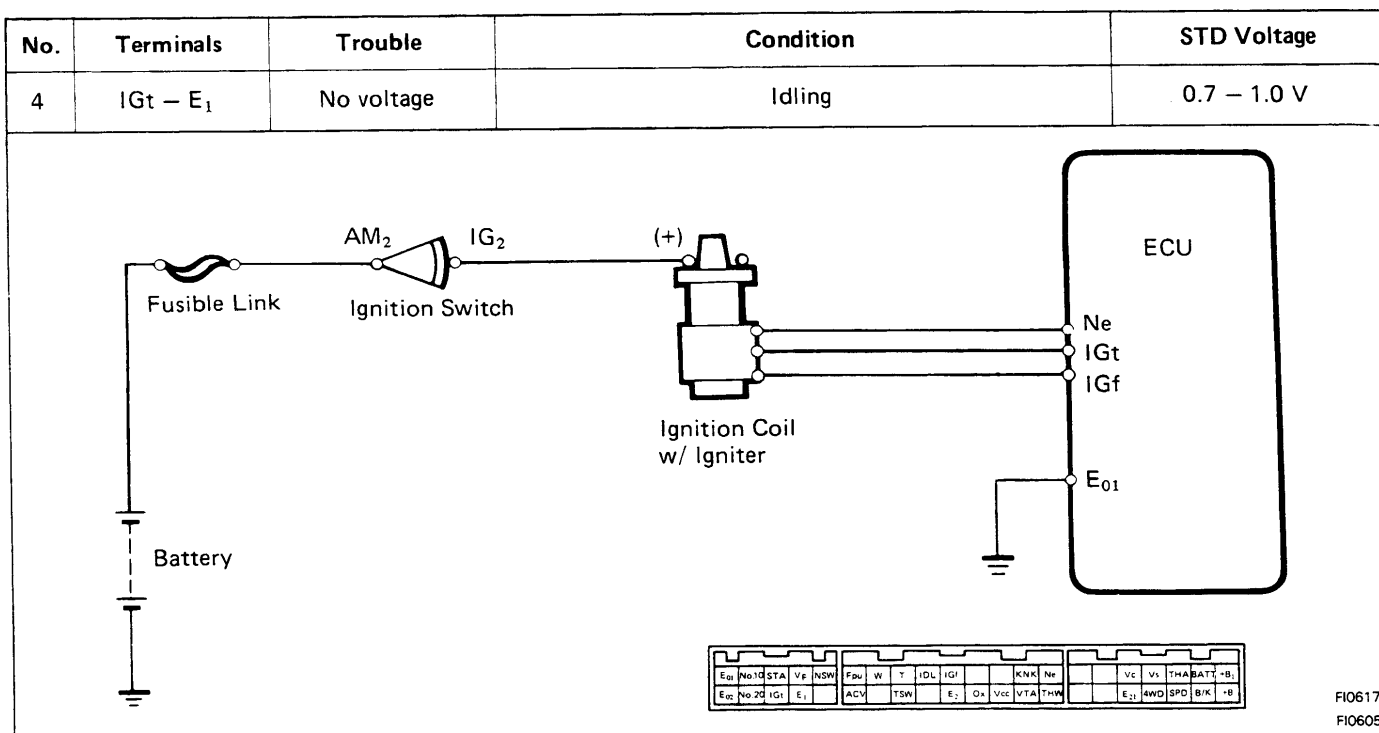
OK

Try another ECU.

BAD

Repair or replace wiring.





① There is no voltage between ECU terminals IGt and E<sub>1</sub>. (Idling)

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

OK  
Check wiring between ECU terminal E<sub>1</sub> and body ground.

Refer to No. 1.

BAD

Repair or replace.

OK

Check wiring between igniter and distributor.

BAD

Repair or replace.

OK

Check distributor.

BAD

Replace.

OK

Check wiring between ECU and igniter.

BAD

Repair or replace.

OK

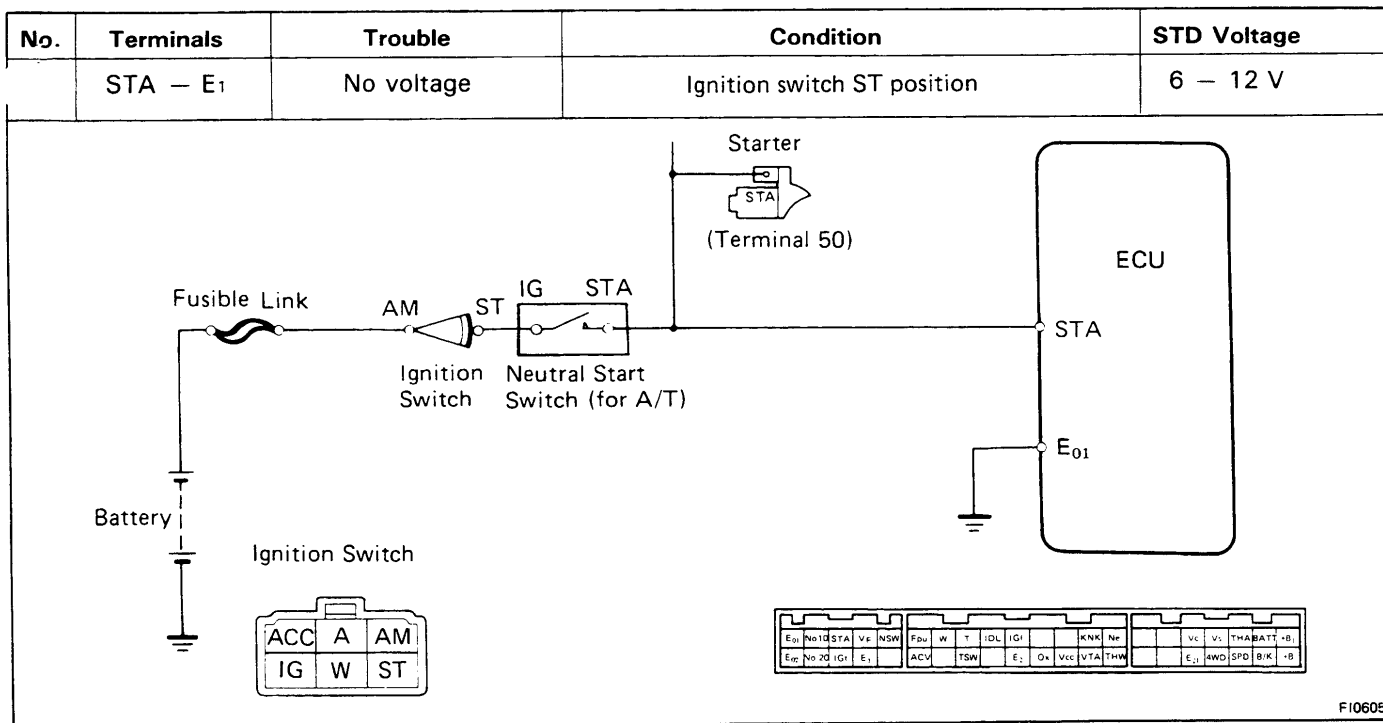
Check igniter. (See page IG-5)

BAD

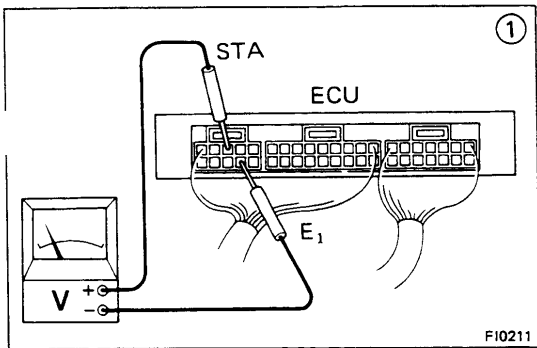
Repair or replace.

OK

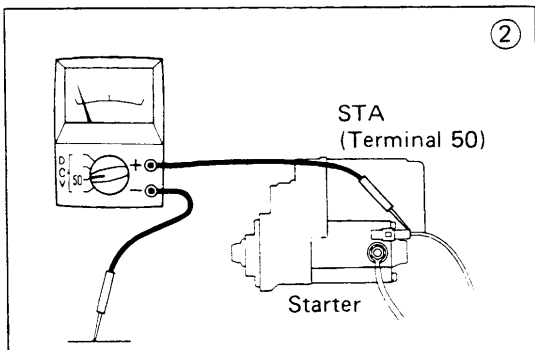
Try another ECU.



FI0605



FI0211



②

① No voltage between ECU terminals STA and E<sub>1</sub>.  
(IG S/W ST)

Check starter operation.

BAD

OK

Check wiring between ECU and ignition switch terminal ST.

OK

BAD

Repair or replace

Check wiring between ECU terminal E<sub>1</sub> and body ground.

OK

BAD

Try another ECU.

Repair or replace

Check fusible link, battery, wiring and ignition switch.

OK

BAD

Repair or replace

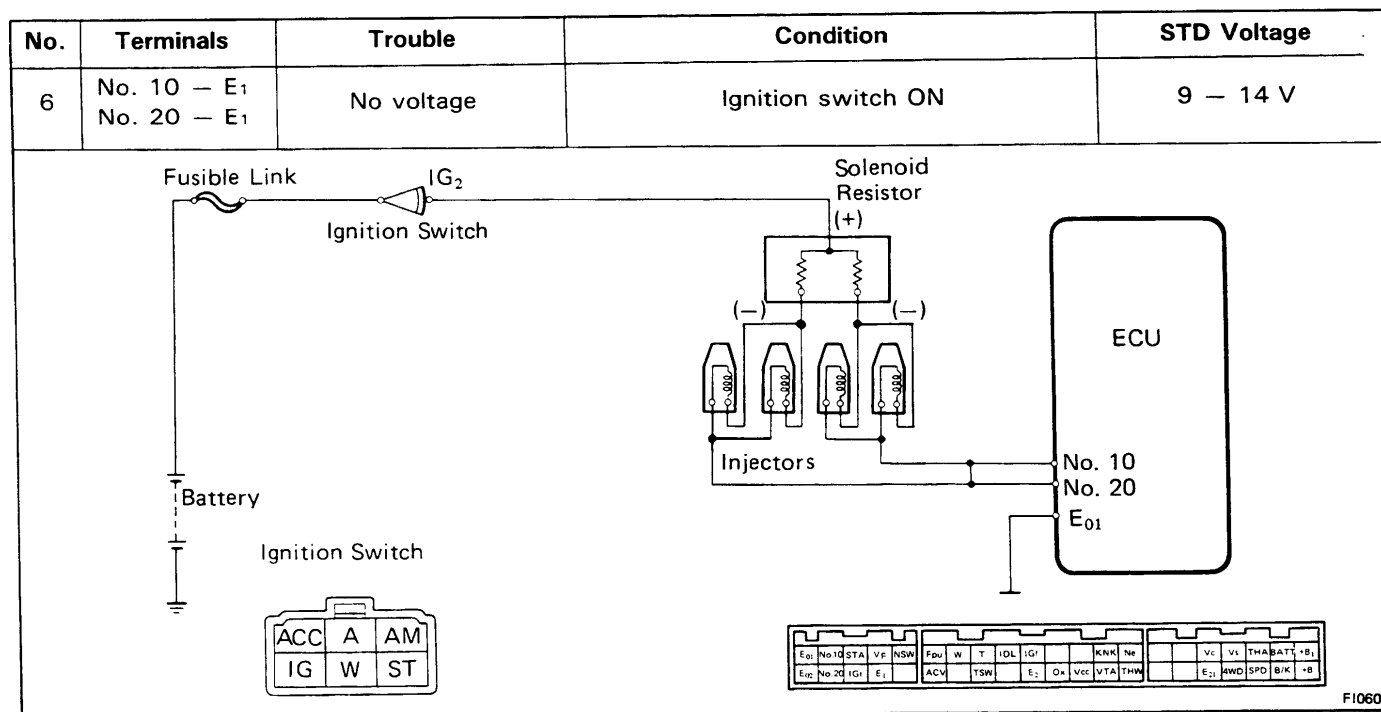
② Check that there is voltage at STA (50) terminal of starter.  
(IG S/W ST) STD voltage: 6 — 12 V

OK

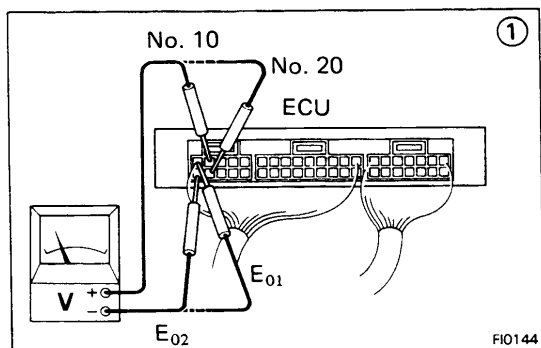
Check starter.  
(See page ST-3)

NO

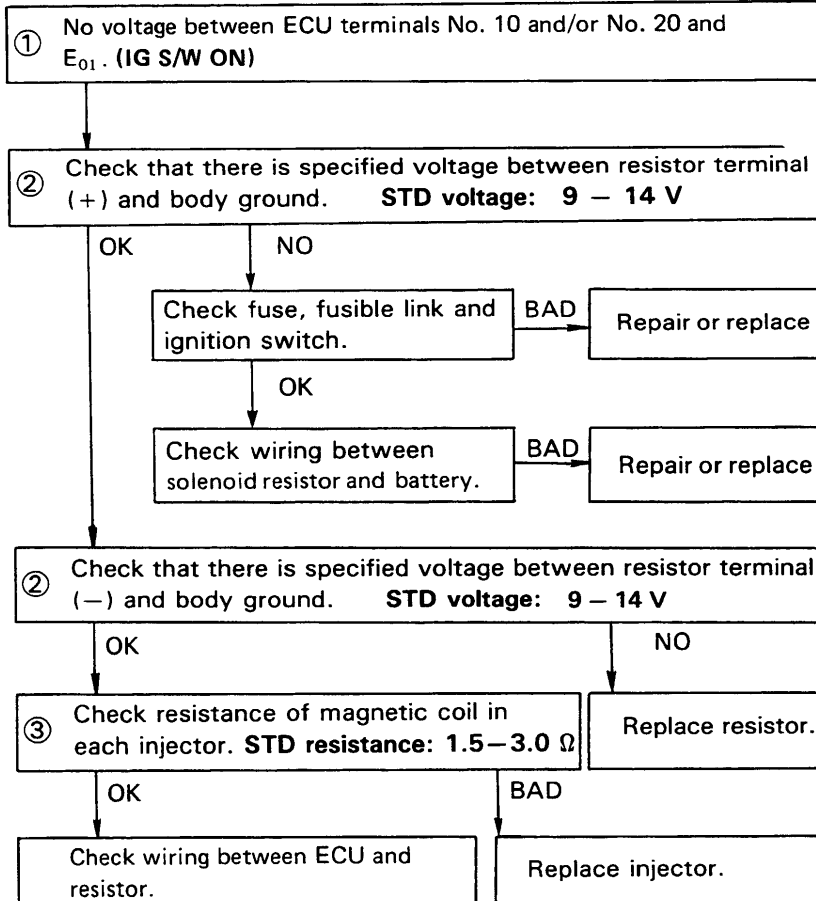
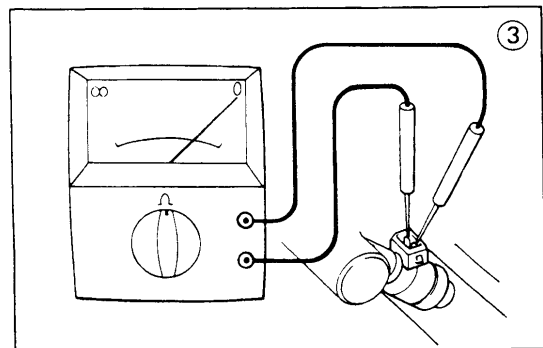
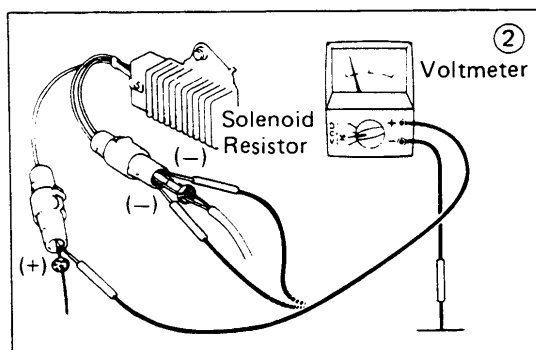
Check wiring between ignition switch ST terminal and starter STA (50) terminal.

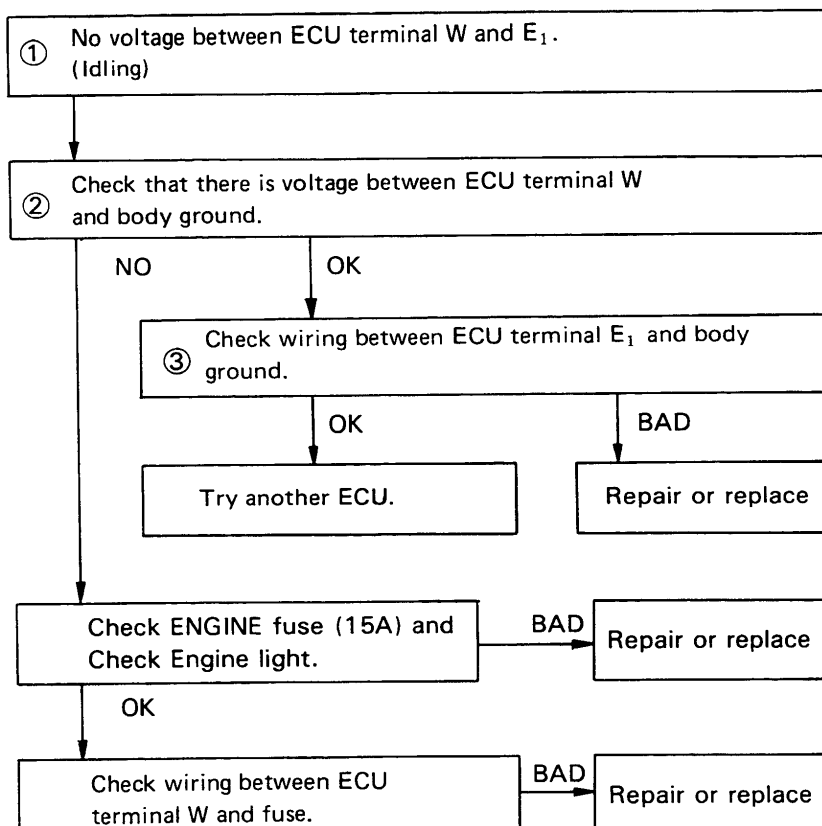
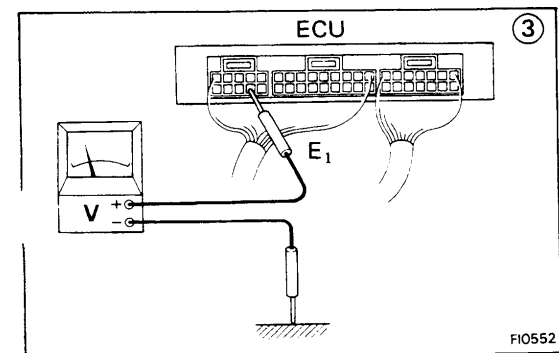
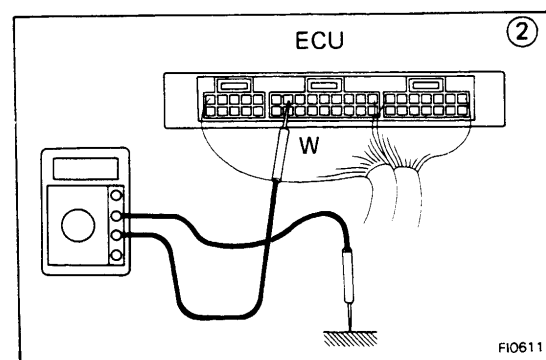
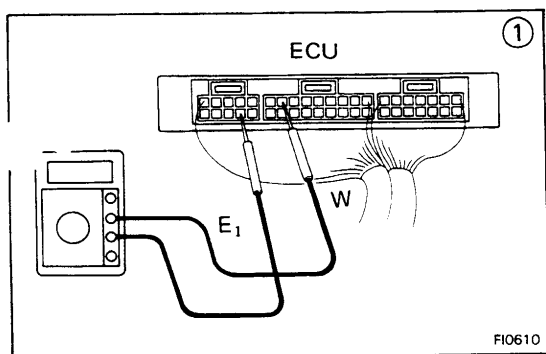
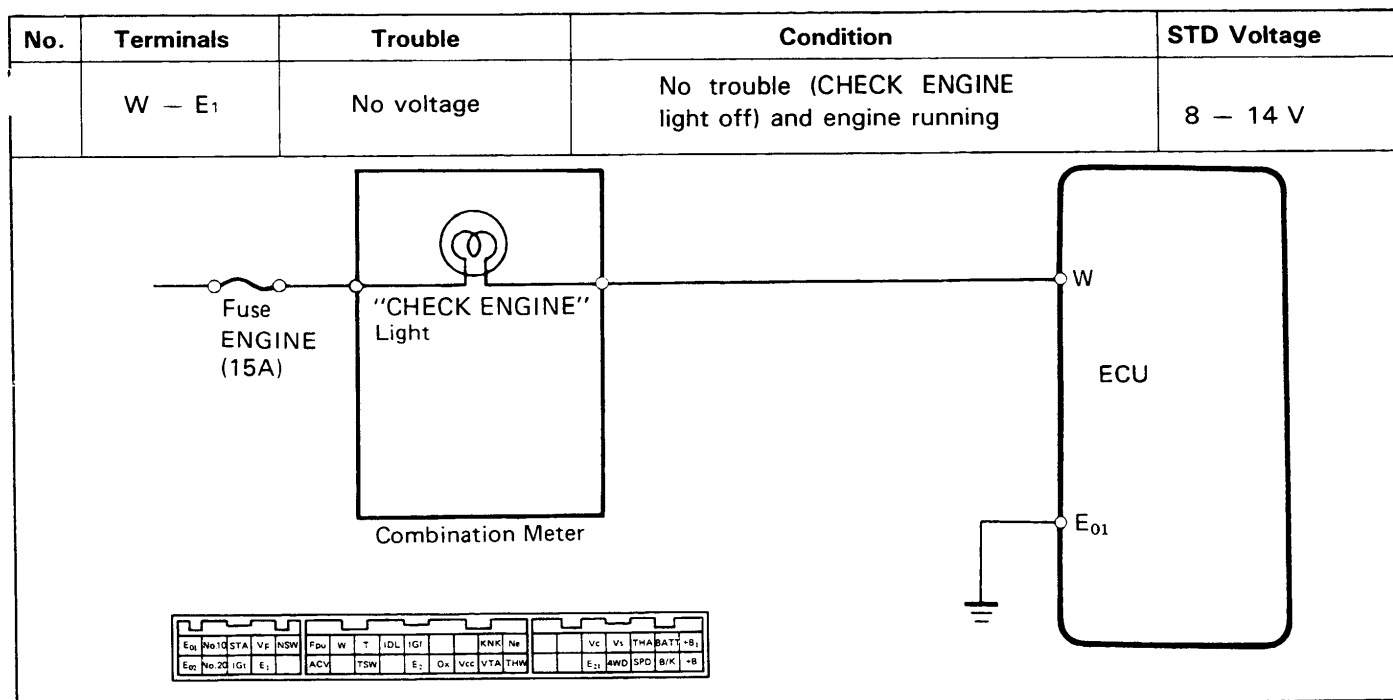


F10605



F10144





No.	Terminals	Trouble	Condition		STD Voltage
8	V <sub>c</sub> — E <sub>2</sub>	No voltage	Ignition switch ON	—	4 — 9 V
	V <sub>s</sub> — E <sub>2</sub>			Measuring plate fully closed	0.5 — 2.5 V
	V <sub>s</sub> — E <sub>2</sub>			Measuring plate fully open	5 — 8 V
	V <sub>s</sub> — E <sub>2</sub>		Idling	—	2.5 — 5.5 V

Air Flow Meter

Air Flow Meter

FC E<sub>1</sub> E<sub>2</sub> V<sub>B</sub> V<sub>c</sub> V<sub>s</sub> THA

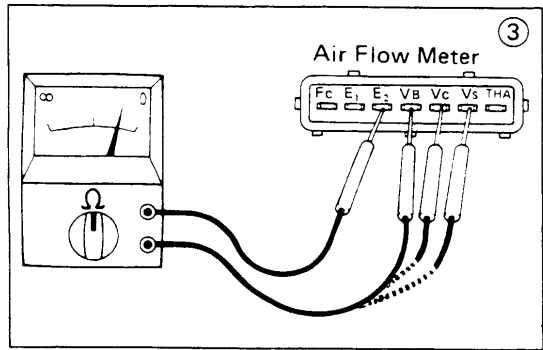
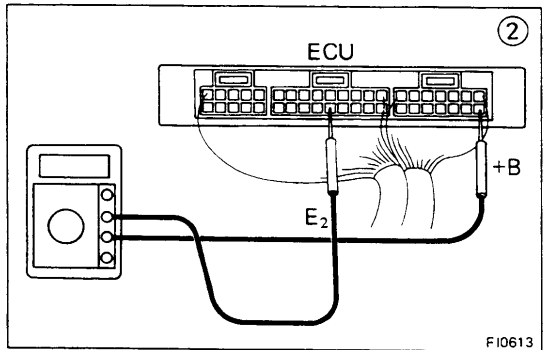
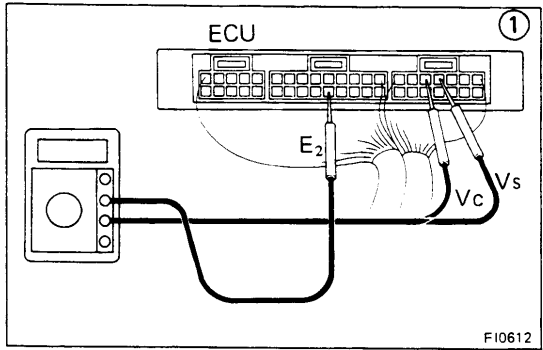
ECU

+B V<sub>c</sub> V<sub>s</sub> E<sub>2</sub> E<sub>01</sub>

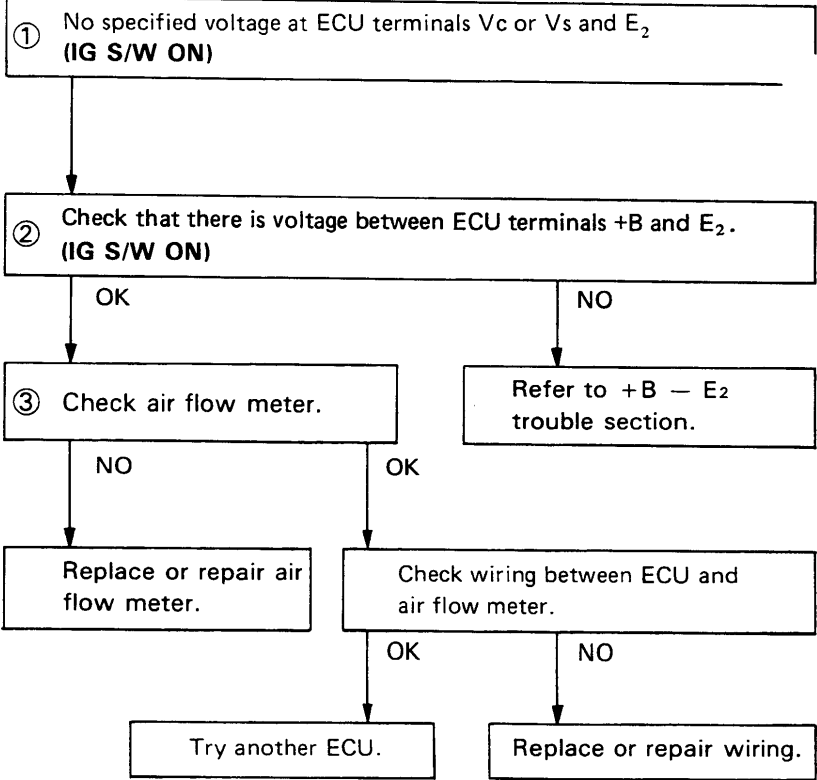
Terminal Block:

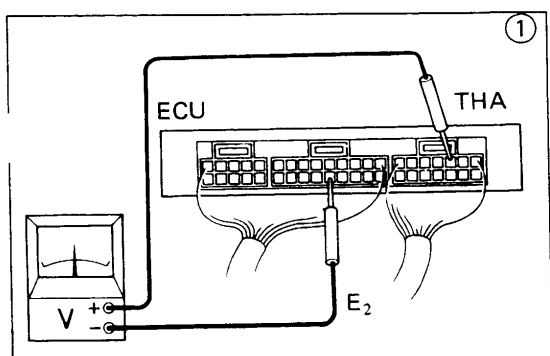
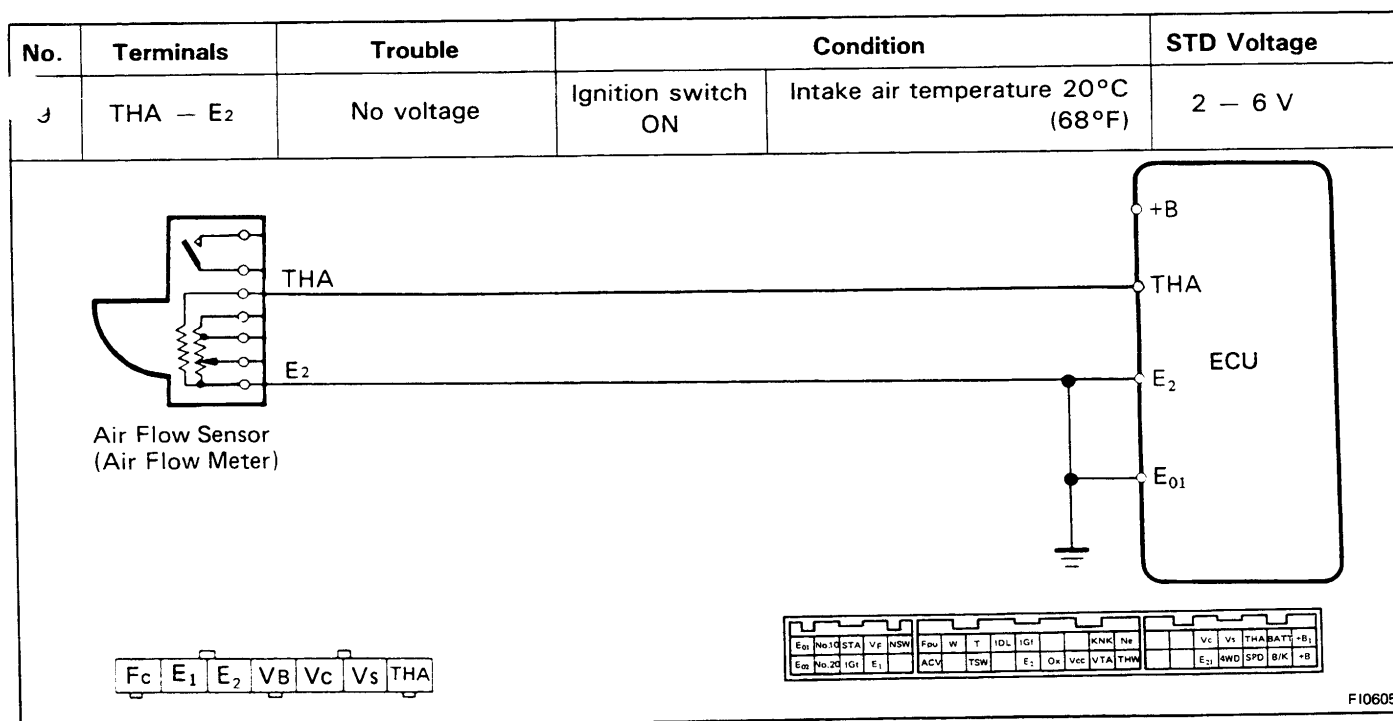
ECU	No.10	STA	V <sub>F</sub>	NSW	FRV	W	T	IDL	IGT			KNK	N+			V <sub>c</sub>	V <sub>s</sub>	THA	BATT	+B <sub>1</sub>
ECU	No.20	IGT	E <sub>1</sub>		ACV	TSW		E <sub>2</sub>	OK	V <sub>cc</sub>	VTA	THW				E <sub>2</sub>	AND	SPD	B/K	+B

FI0605

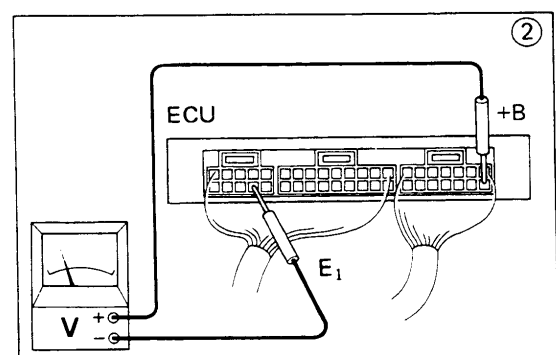


• V<sub>c</sub> — E<sub>2</sub>, V<sub>s</sub> — E<sub>2</sub>





① No voltage between ECU terminals THA and E<sub>2</sub>. (IG S/W ON)



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

OK

NO

③ Check air thermo sensor.

Refer to section 1.

BAD

OK

Replace air flow meter.

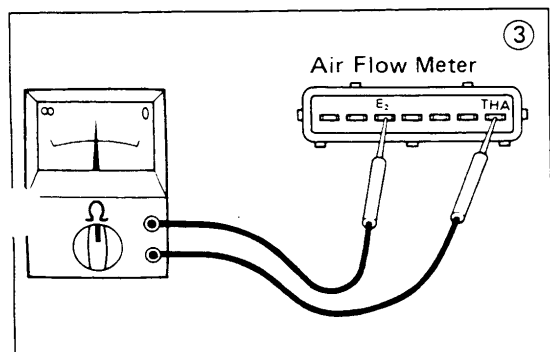
Check wiring between ECU and air thermo sensor.

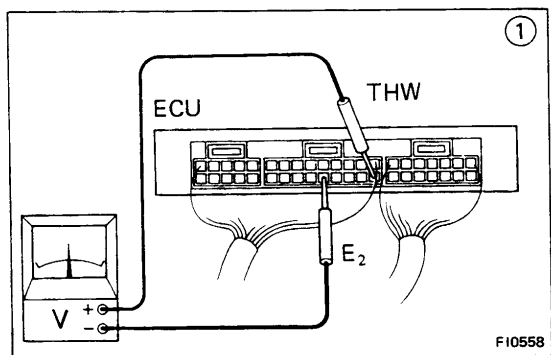
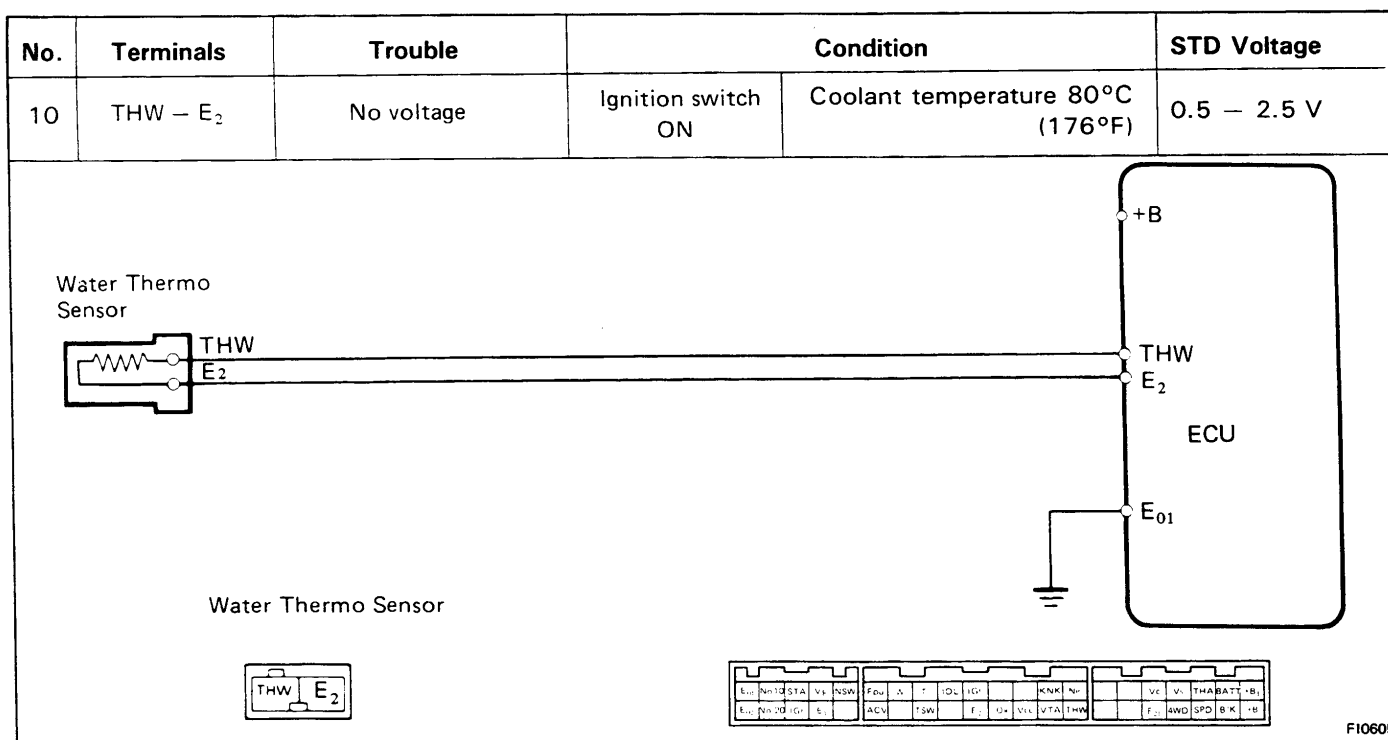
OK

BAD

Try another ECU.

Repair or replace wiring.





① No voltage between ECU terminals THW and E<sub>2</sub>.  
(IG S/W ON)

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

OK

NO

③ Check water thermo sensor.

BAD

OK

Replace water thermo sensor.

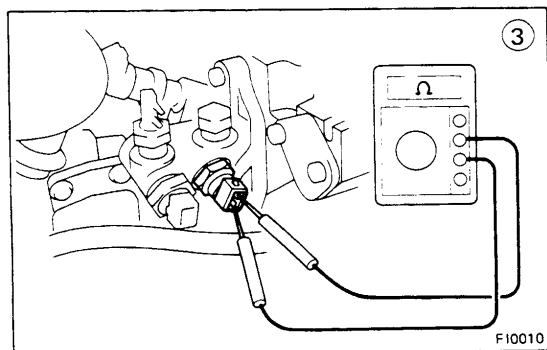
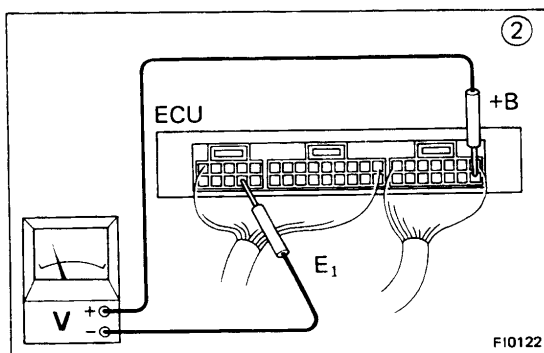
Check wiring between ECU and water thermo sensor.

OK

BAD

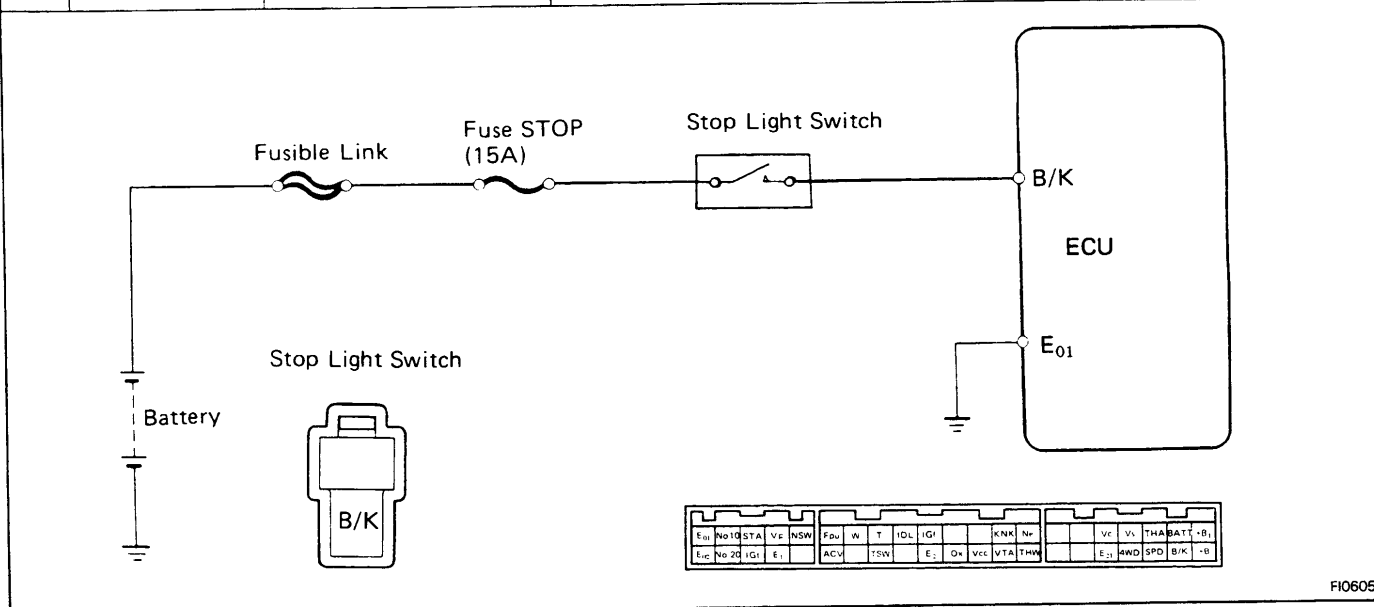
Try another ECU.

Repair or replace wiring

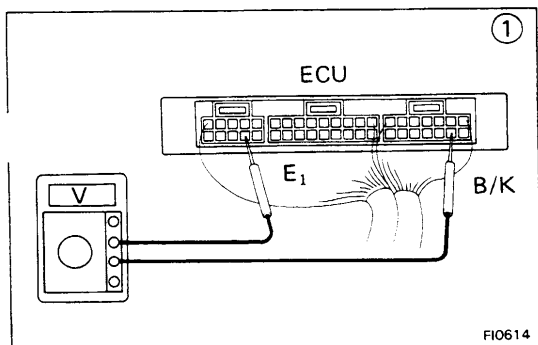




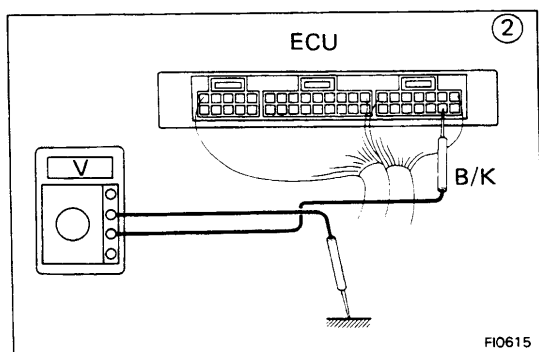
No.	Terminals	Trouble	Condition	STD Voltage
1	B/K — E <sub>1</sub>	No voltage	Stop light switch ON	8 — 14 V



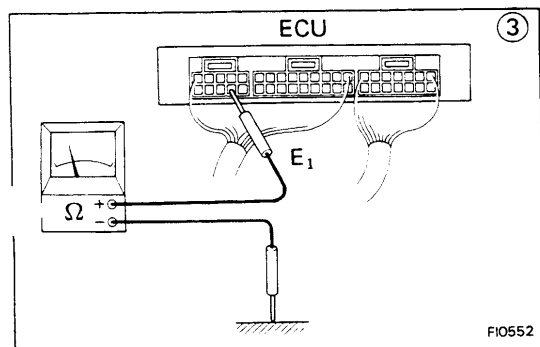
FI0605



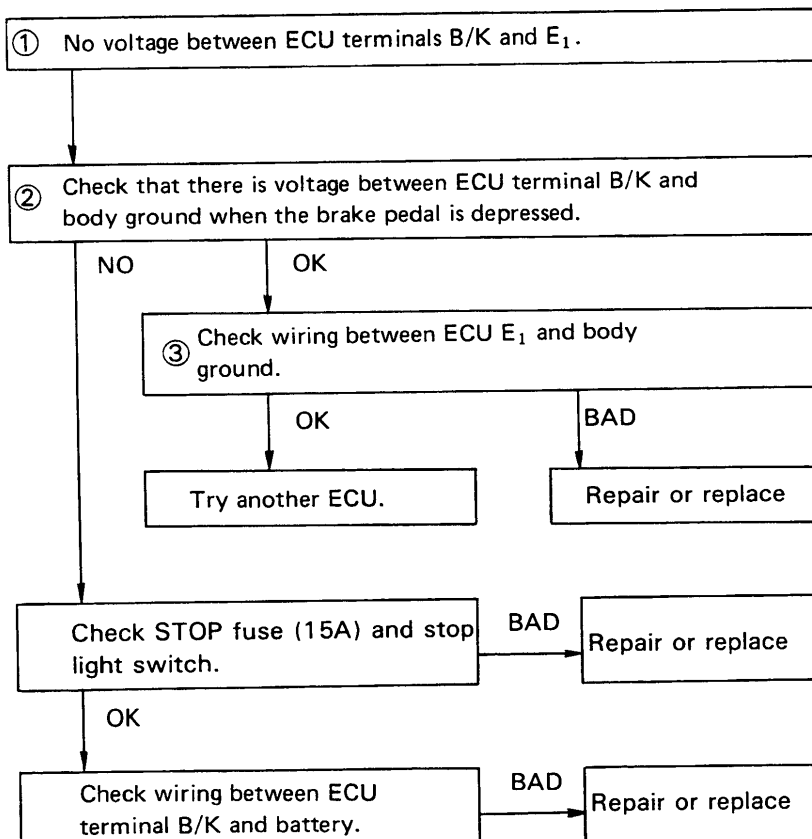
FI0614



FI0615

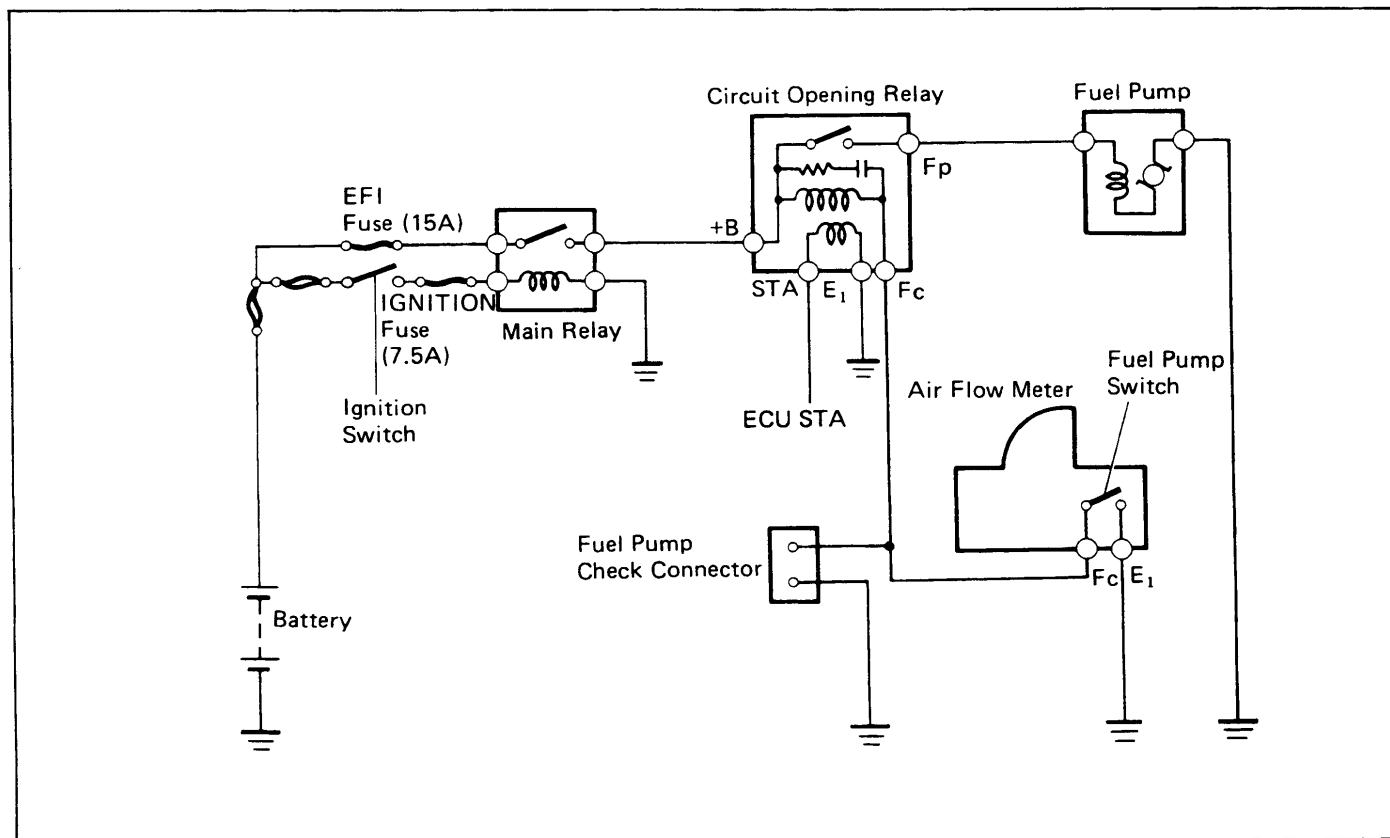
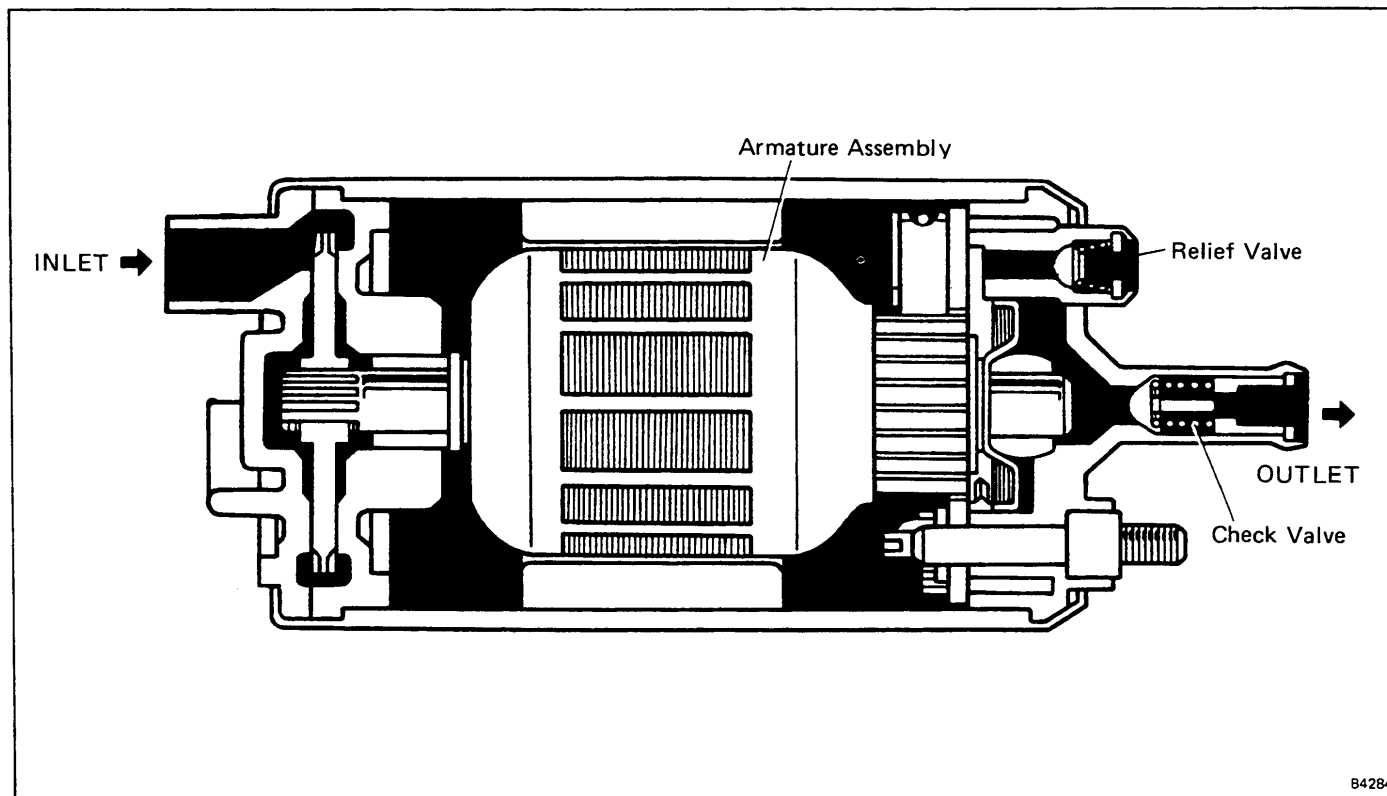


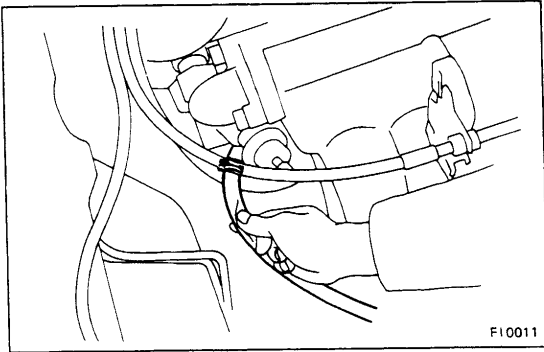
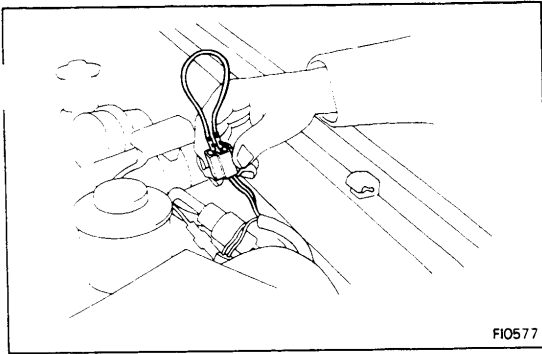
FI0552



## FUEL SYSTEM

### Fuel Pump





## ON-VEHICLE INSPECTION

### 1. CHECK FUEL PUMP OPERATION

(a) Turn on the ignition switch.

NOTE: Do not start the engine.

(b) Short the terminals Fp and +B of the check connector (diagnosis).

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

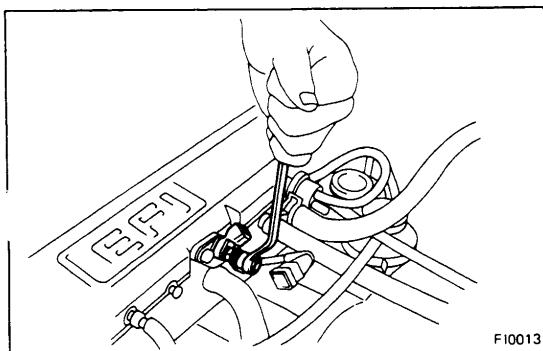
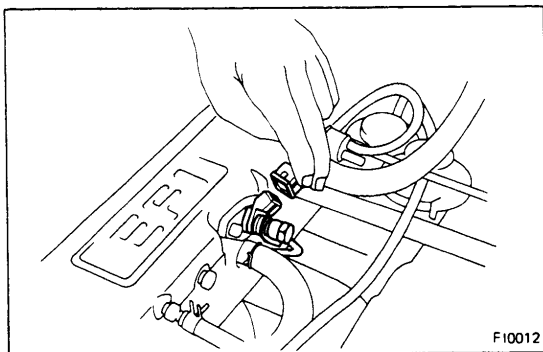
NOTE: At this time, you will hear fuel return noise from the pressure regulator.

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

(e) Turn off the ignition switch.

If there is no pressure, check the following parts.

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



### 2. CHECK FUEL PRESSURE

(a) Check the battery voltage above 12 volts.

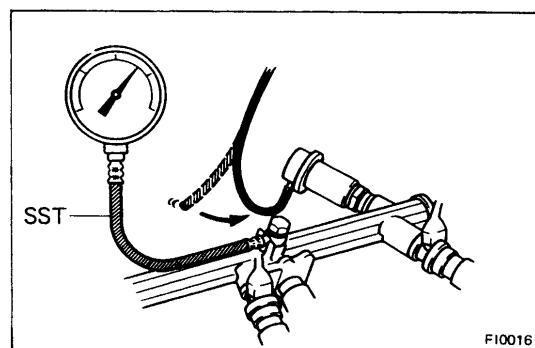
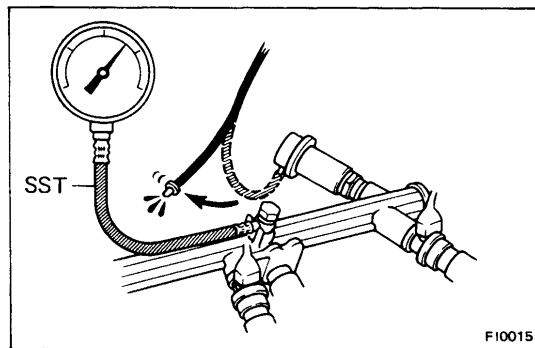
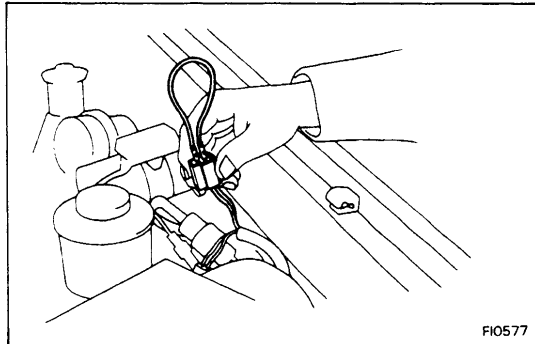
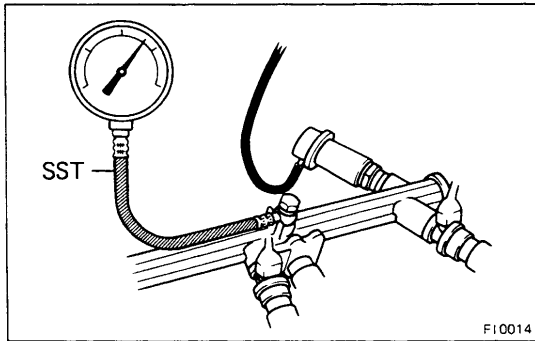
(b) Disconnect the cable from the negative terminal of the battery.

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

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

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

(f) Drain the fuel from the delivery pipe.



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

SST 09268-45011

- (h) Wipe off any splattered gasoline.  
(i) Reconnect the battery cable.

- (j) Short both terminals of the fuel pump check connector with a wire.

- (k) Turn on the ignition switch.

- (l) Measure the fuel pressure.

**Fuel pressure:** 2.3 — 2.7 kg/cm<sup>2</sup>  
(33 — 38 psi, 226 — 265 kPa)

If high pressure, replace the pressure regulator.

If low pressure, check the following parts.

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

- (m) Remove the service wire from the service connector

- (n) Start the engine.

- (o) Disconnect the vacuum sensing hose from the pressure regulator and plug it off.

- (p) Measure the fuel pressure at idling.

**Fuel pressure:** 2.3 — 2.7 kg/cm<sup>2</sup>  
(33 — 38 psi, 226 — 265 kPa)

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

- (r) Measure the fuel pressure at idling.

**Fuel pressure:** 1.9 — 2.2 kg/cm<sup>2</sup>  
(27 — 31 psi, 186 — 216 kPa)

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

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

If not within specification, check the fuel pump, pressure regulator and/or injectors.

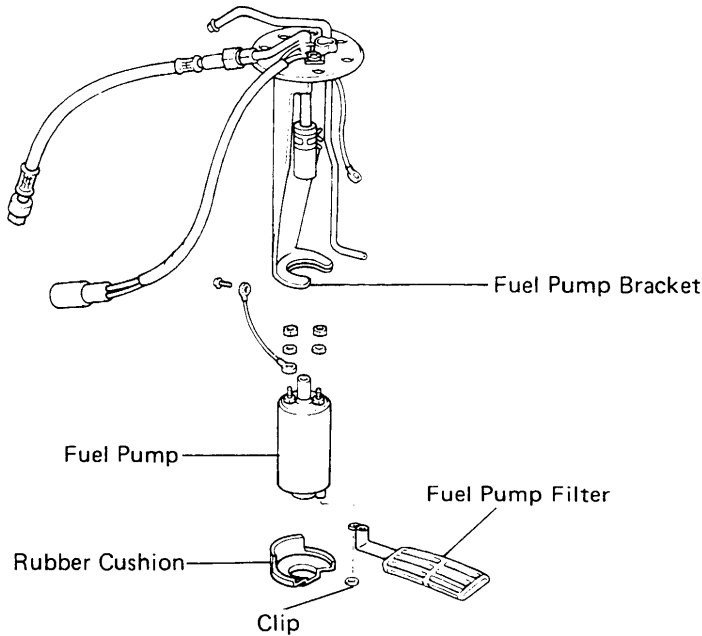
- (t) After checking fuel pressure, disconnect the battery ground cable and carefully remove the SST to prevent gasoline from splashing.

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

- (v) Connect the wiring connector to the cold start injector.

- (w) Check for fuel leakage.

## REMOVAL OF FUEL PUMP



FI0531

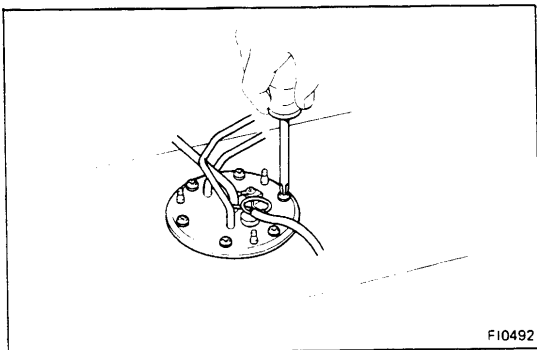
### 1. DRAIN FUEL FROM FUEL TANK

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

### 2. REMOVE FUEL TANK

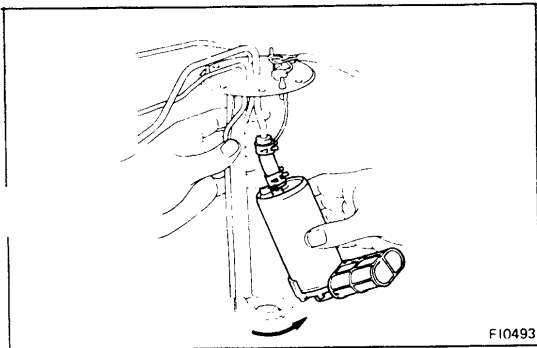
### 3. REMOVE FUEL PUMP BRACKET FROM FUEL TANK

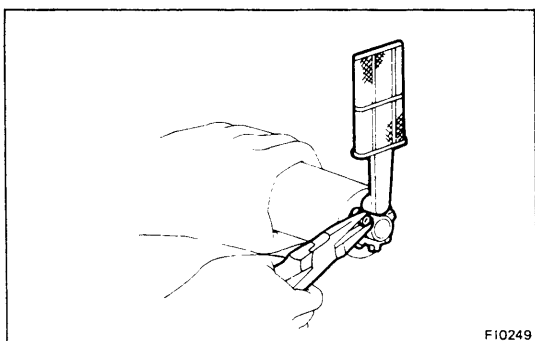
- (a) Remove the seven bolts.
- (b) Pull out the fuel pump bracket.



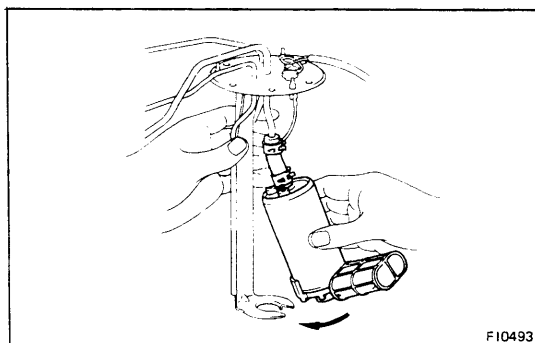
### 4. REMOVE FUEL PUMP FROM FUEL PUMP BRACKET

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



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

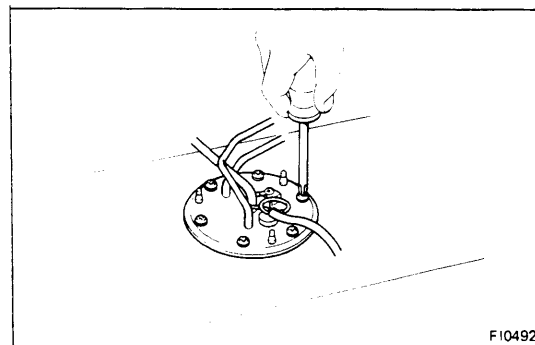
- (a) Remove the rubber cushion.
- (b) Remove the clip and pull out the filter.

**INSTALLATION OF FUEL PUMP**

(See page FI-45)

**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**

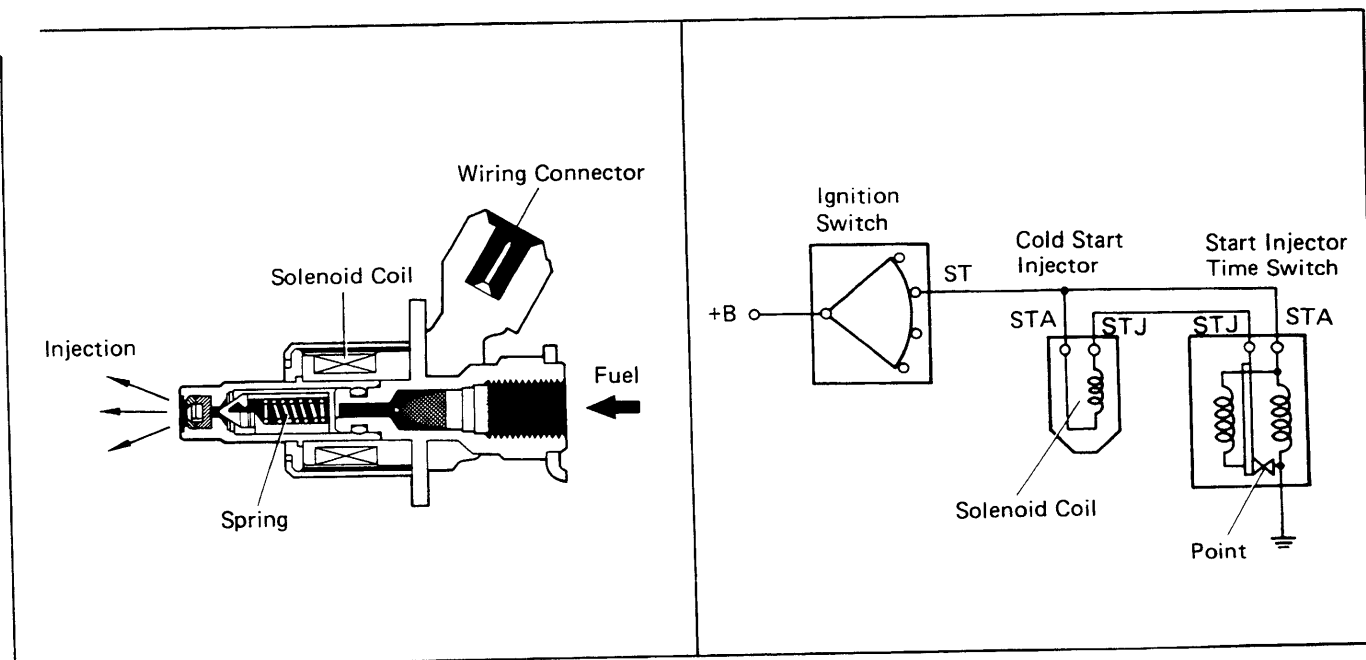
- (a) Place the bracket with a new gasket on the fuel tank.
- (b) Install the tighten the seven bolts.

**4. INSTALL FUEL TANK**

When installing the fuel tank, refer to FI-55 for the installation position of the protector and hose and the tightening torque.

After installation, check for leaks.

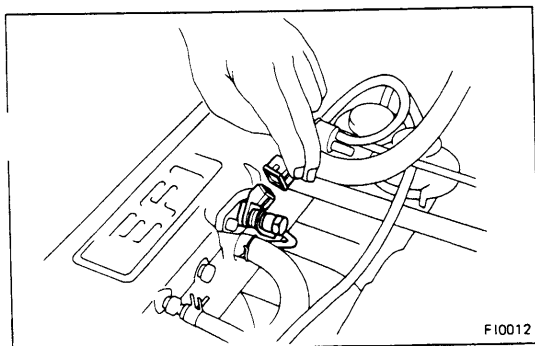
## Cold Start Injector



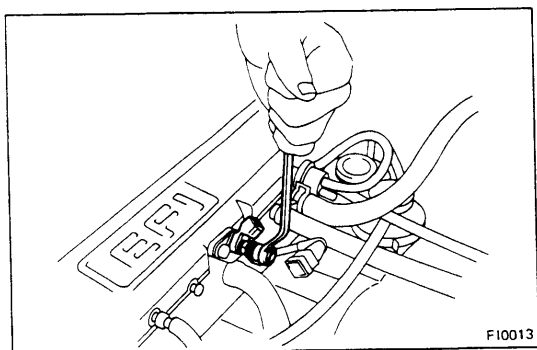
### REMOVAL OF COLD START INJECTOR

#### REMOVE COLD START INJECTOR

(a) Disconnect the cold start injector wire.



- (b) Remove the fuel pipe between the cold start injector and fuel delivery pipe.
- (c) Remove the cold start injector wire gasket.
- (d) Put a suitable container or shop towel under rear end of the delivery pipe.

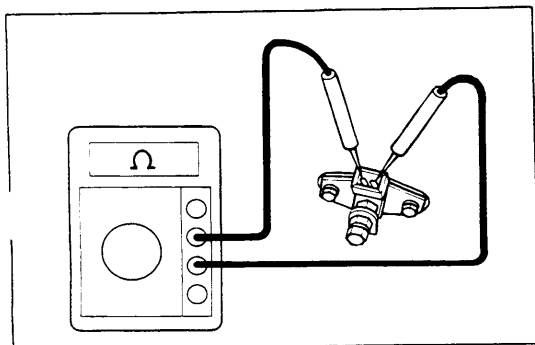


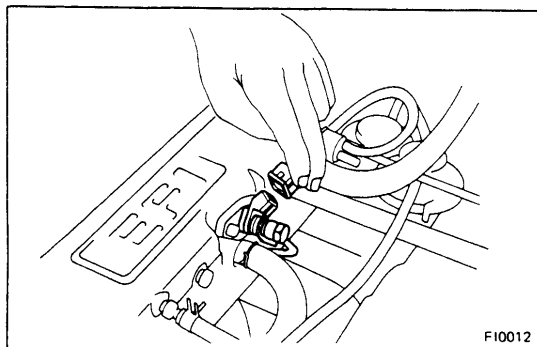
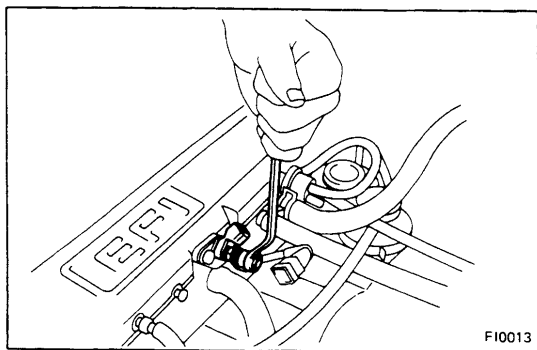
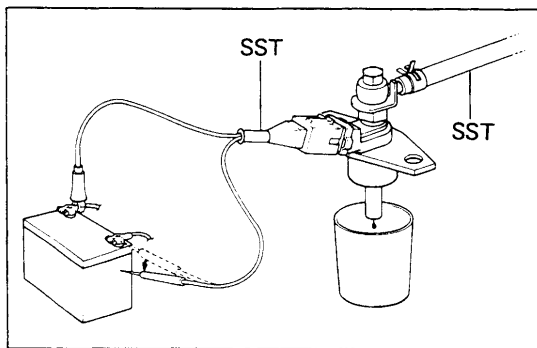
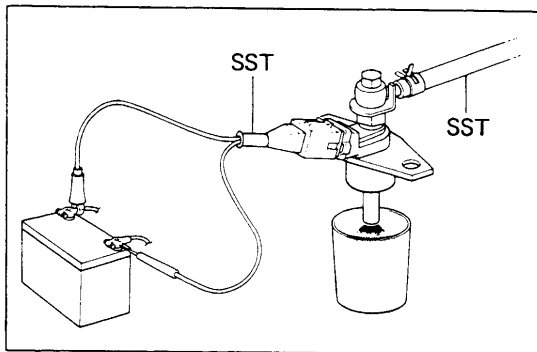
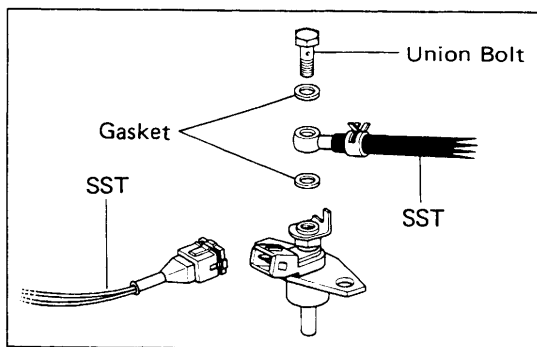
### INSPECTION OF COLD START INJECTOR

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

Using an ohmmeter, check the resistance of the injector.

Resistance: 2 — 4  $\Omega$





## 2. CHECK INJECTION OF COLD START INJECTOR

- Install the gasket, SST (two unions), another gasket and two union bolts to the delivery pipe and injector.
- Connect the SST (hose) from the unions.

SST 09268-41045

- Connect the SST (wire) to the injector.

SST 09842-30050

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

- Put a container under the injector.

- Turn on the ignition switch.

NOTE: Do not start the engine.

- Short both terminals of the fuel pump check connector with a service wire.

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

SST 09842-30050

NOTE: Perform this check within the shortest possible time.

- Disconnect the test probes from the battery and check that fuel does not leak from the injector.

**Fuel drop: Less than one drop of fuel per minute**

- After checking, restore the following to the previous state.
  - Fuel pump check connector
  - Ignition switch
  - SST
  - Cold Start injector
  - Injector wiring

## INSTALLATION OF COLD START INJECTOR

### INSTALL COLD START INJECTOR

- Using new gaskets, install the cold start injector and two bolts.
- Install the fuel pipe between the cold start injector and fuel delivery pipe with new gaskets.

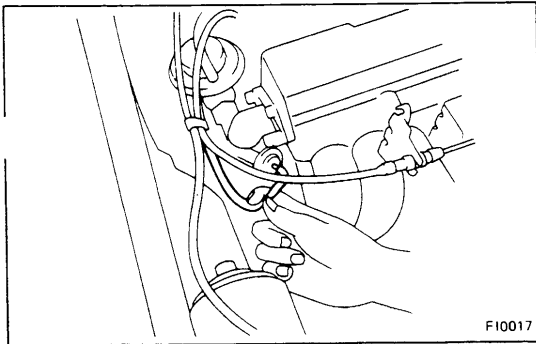
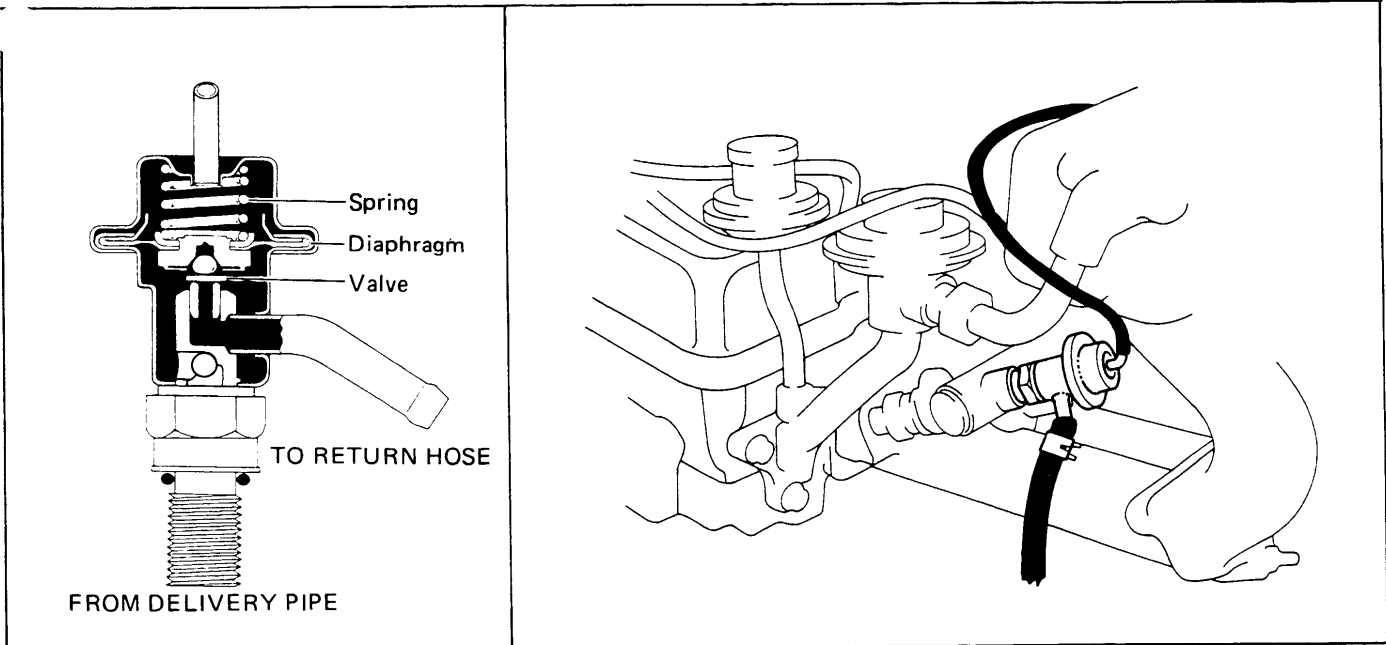
- Connect the cold start injector wire.

FI0013

FI0012



## Pressure Regulator



### ON-VEHICLE INSPECTION

**CHECK FUEL PRESSURE (See page FI-43)**

### REMOVAL OF PRESSURE REGULATOR

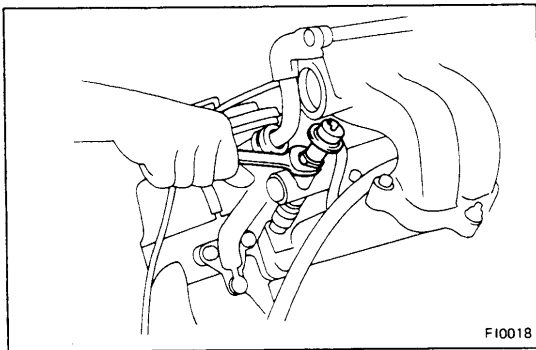
1. **DISCONNECT VACUUM SENSING HOSE**
2. **DISCONNECT FUEL HOSE**
  - (a) Put a suitable container or shop towel under the pressure regulator.
  - (b) Disconnect the fuel hose from the pressure regulator.
3. **REMOVE PRESSURE REGULATOR**

Remove the lock nut, and remove pressure regulator.

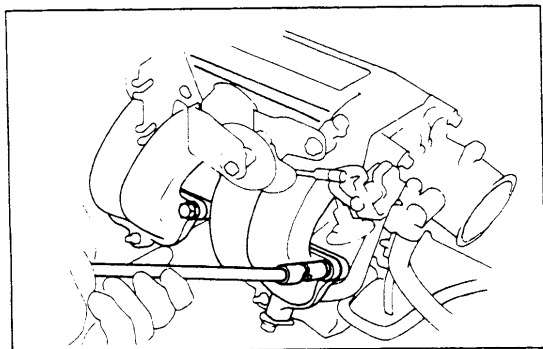
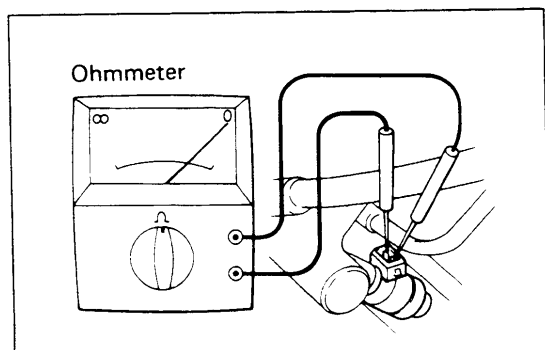
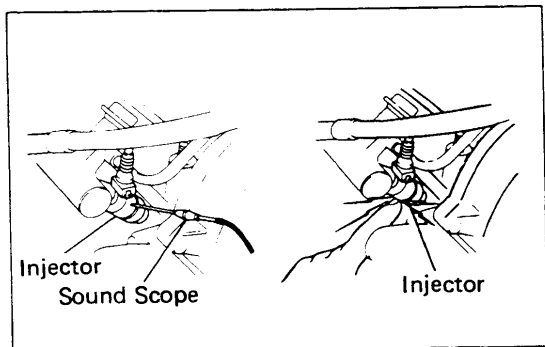
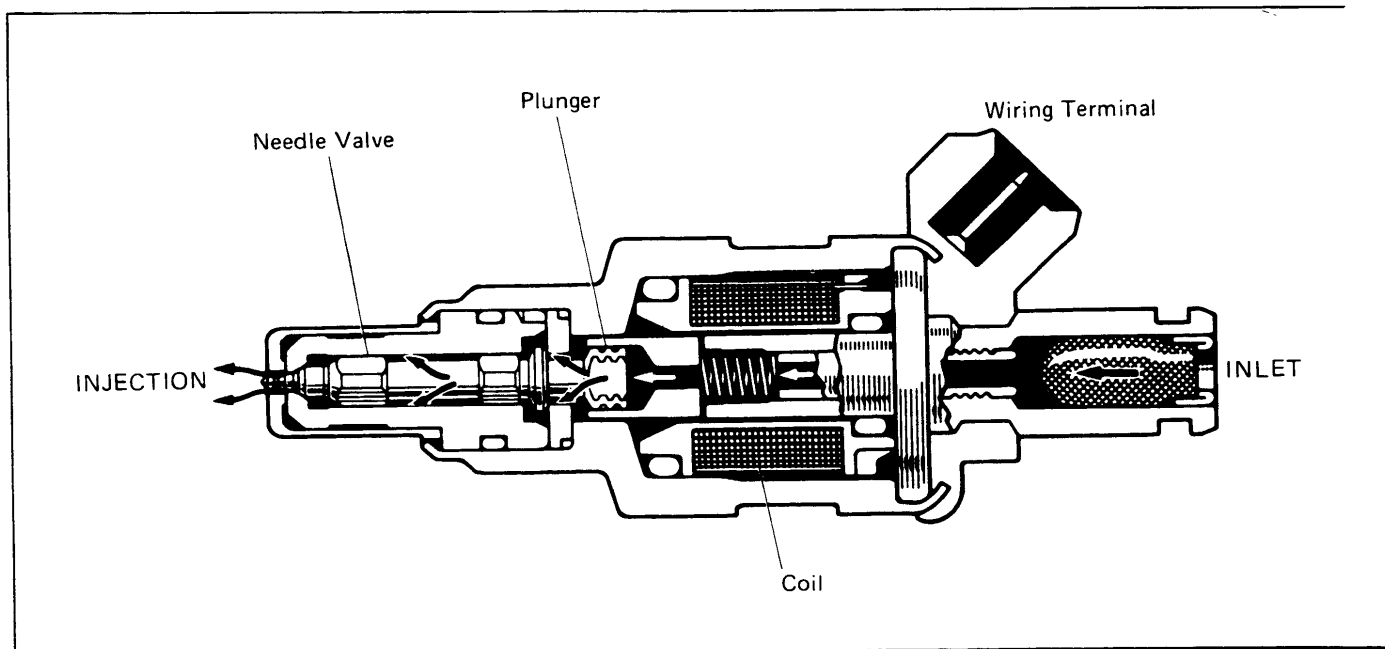
### INSTALLATION OF PRESSURE REGULATOR

1. **INSTALL PRESSURE REGULATOR**

Install the pressure regulator and lock nut.  
Torque the lock nut.  
Torque: 300 kg-cm (22 ft-lb, 29 N-m)
2. **CONNECT FUEL HOSE**
3. **CONNECT VACUUM SENSING HOSE**



## Injector



### ON-VEHICLE INSPECTION

#### 1. CHECK INJECTOR OPERATION

Check for operating sound from each injector.

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

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

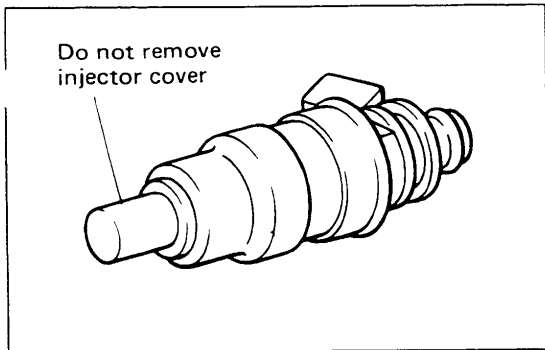
#### 2. MEASURE RESISTANCE OF INJECTOR

- Unplug the wiring connector from the injector.
- Using an ohmmeter, check the continuity of both terminals.

Resistance: 1.5 — 3.0  $\Omega$

### REMOVAL OF INJECTOR

- REMOVE CHAMBER WITH THROTTLE BODY  
(See steps 8 to 12 on page EM-13)
- DISCONNECT WIRES  
(See step 13 on page EM-13)
- DISCONNECT FUEL HOSE FROM DELIVERY PIPE  
(See step 14 on page EM-13)



#### 4. REMOVE DELIVERY PIPE WITH INJECTORS

Remove two bolts and then remove the delivery pipe with the injectors.

##### NOTE:

1. When removing the delivery pipe, be careful not to drop the injectors.
2. Do not remove the injector cover.

### INSPECTION OF INJECTOR

#### 1. TEST INJECTION OF INJECTORS

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

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

SST 09268-41045

- (b) Connect the SST to the pressure regulator and the injector.

SST 09268-41045

- (c) Hold the injector and hose with SST.

SST 09842-30020

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

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

- (e) Connect the ground cable to the battery.

- (f) Turn the ignition switch ON.

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

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

**NOTE:** Fuel pump will operate.

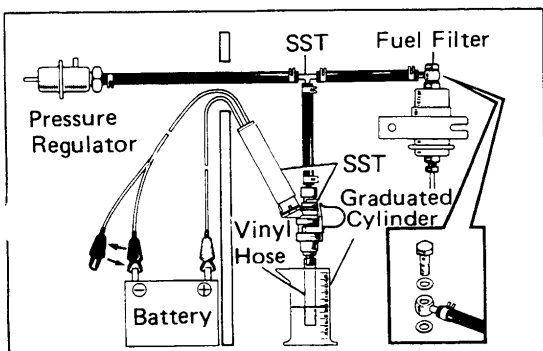
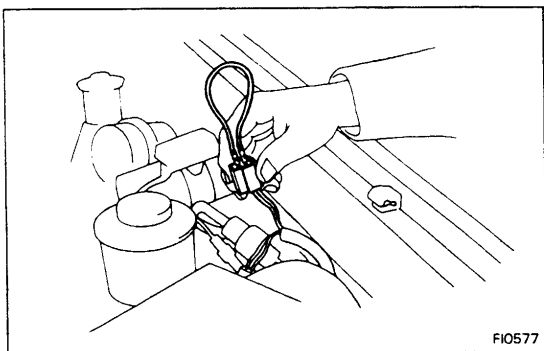
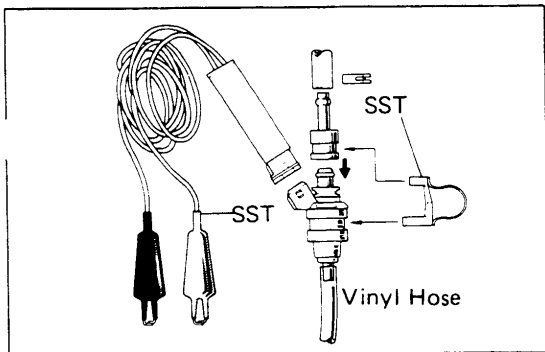
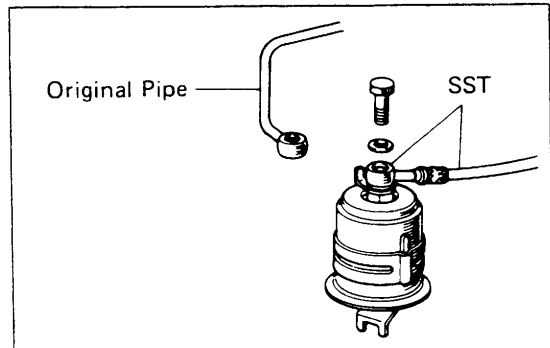
- (h) Connect the SST to the battery for 15 seconds and measure the injection volume with a graduated cylinder.

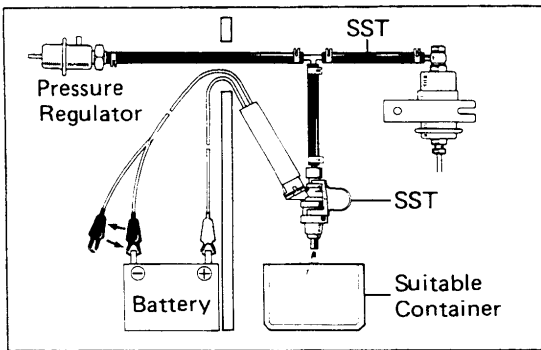
Test each injector two or three times. If not within specified volume, clean or replace.

SST 09842-30020

**Volume:** 40 — 50 cc/15 sec. (2.4 — 3.1 cu in.)

**Difference between each injector:** Less than 6 cc (0.37 cu in.)





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

- (i) Remove the vinyl hose.
- (j) Connect the SST to the battery, and test the injection spray pattern in a suitable container.

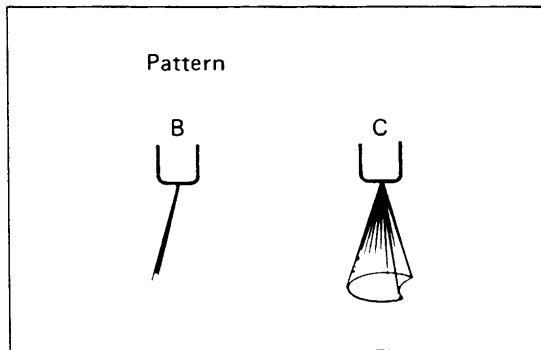
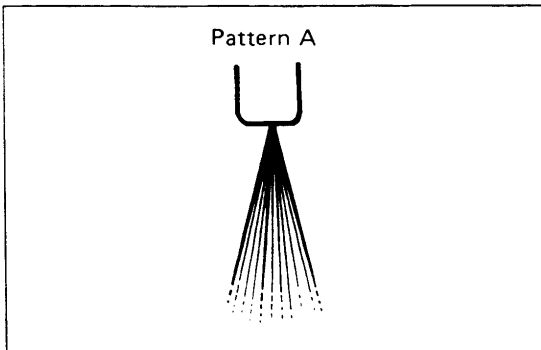
**WARNING:** Be careful to keep clear of sparks during the test.

Proper injection spray pattern:

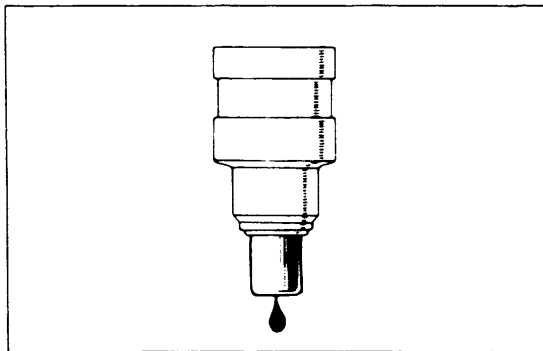
- A fine mist spreading out into a conical shape (pattern A).

Faulty injection spray pattern:

- Injection is in 1 or more streams, not forming into a conical shape (pattern B).
- Imperfect conical shape (pattern C).



**NOTE:** If injection spray pattern is not within specification, clean or replace the injector.



## 2. TEST LEAKAGE

- (a) From the previous condition, disconnect the SST from the battery and check the fuel leakage from the injection nozzle.

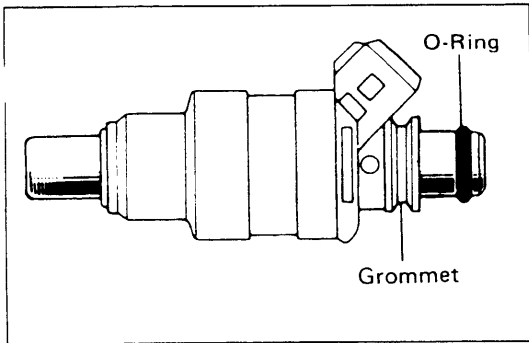
SST 09842-30020

**Fuel drop: Less than one fuel drop of fuel per minute**

- (b) Disconnect the battery ground cable.

Remove the SST and disconnect the service wire from the fuel pump service connector.

SST 09268-41045

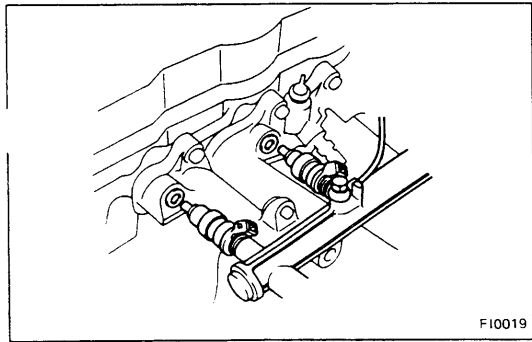
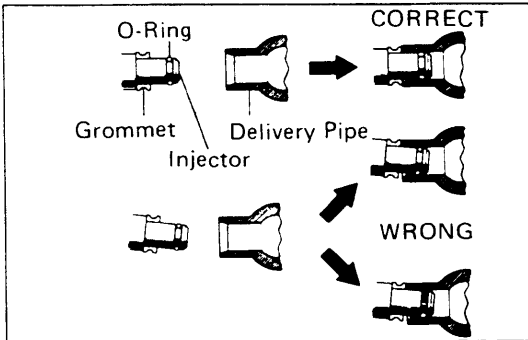


## INSTALLATION OF INJECTORS

### 1. INSTALL INJECTORS INTO DELIVERY PIPE

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

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



### 2. INSTALL DELIVERY PIPE WITH INJECTORS

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

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

- (c) Make sure that the injectors rotate smoothly.

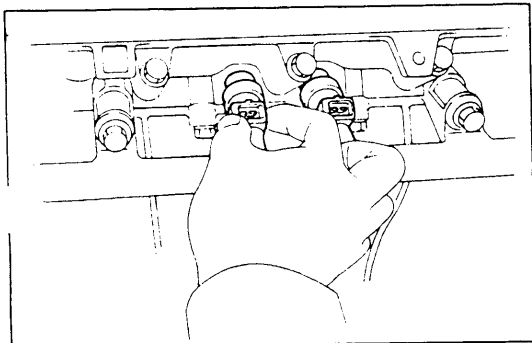
**NOTE:** If the injectors do not rotate smoothly, probable cause may be incorrect installation of O-rings. Replace O-rings again after removing the injectors.

- (d) Install and torque the bolts.

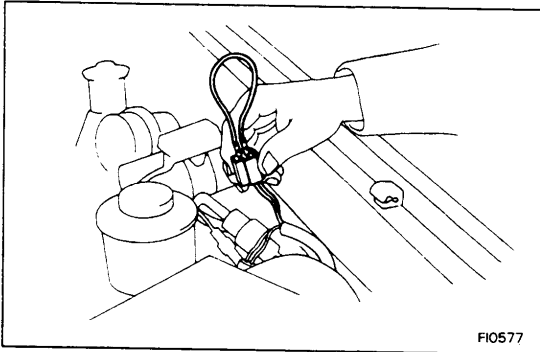
**Torque:** 195 kg-cm (14 ft-lb, 19 N-m)

### 3. CONNECT FUEL HOSE TO DELIVERY PIPE

(See step 5 on page EM-30)

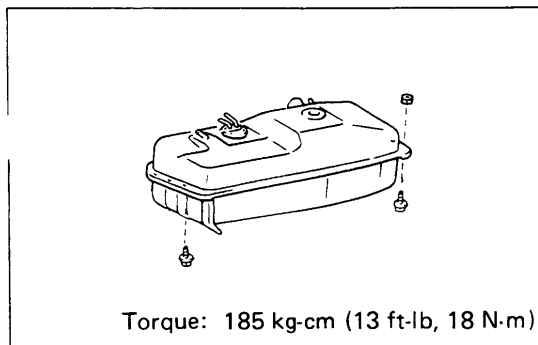
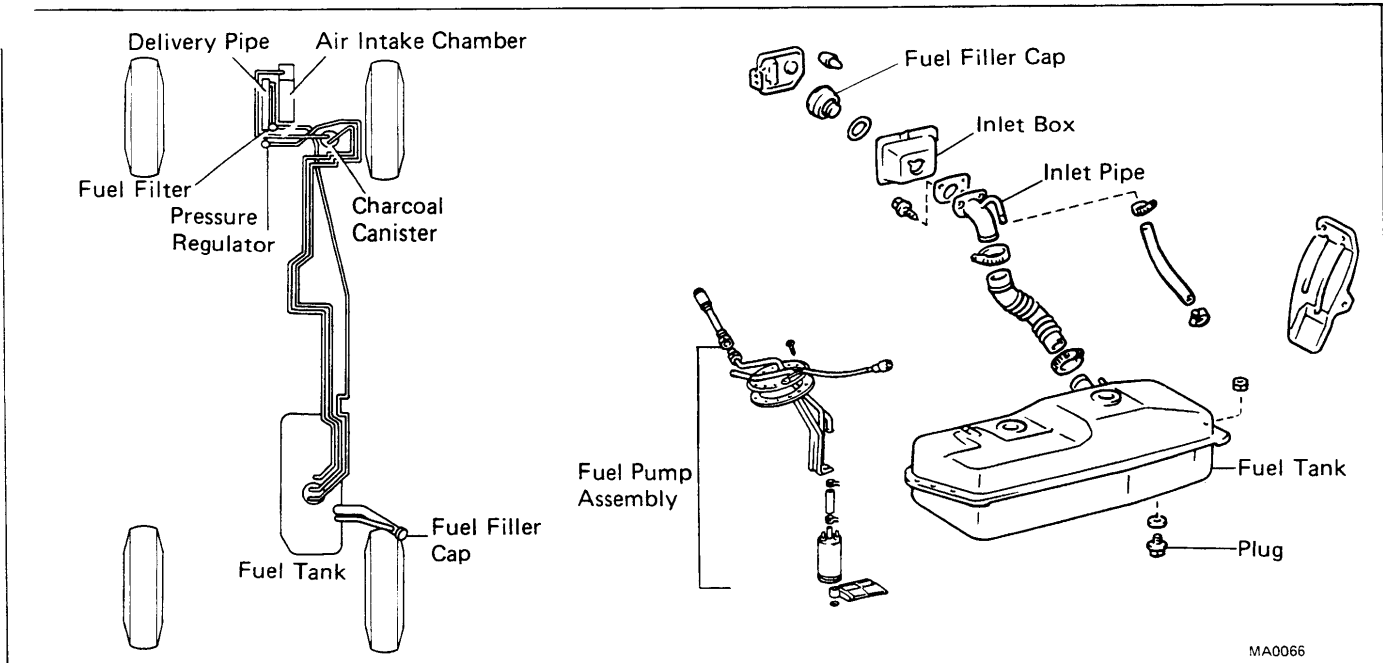


4. **CONNECT WIRES**  
(See step 5 on page EM-30)
5. **INSTALL CHAMBER WITH THROTTLE BODY**  
(See step 7 on page EM-30)
6. **CONNECT CABLES TO BRACKET**  
(See step 11 on page EM-31)



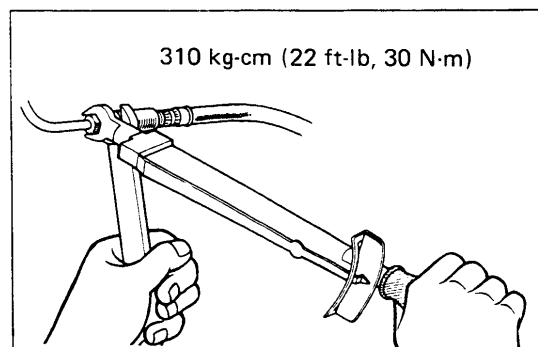
7. **CHECK FOR FUEL LEAKAGE**
  - (a) With the ignition switch ON, use a service wire to short both terminals of the fuel pump check connector.
  - (b) Check for fuel leakage.
  - (c) Remove the service wire from the fuel pump check connector.

## Fuel Tank and Line



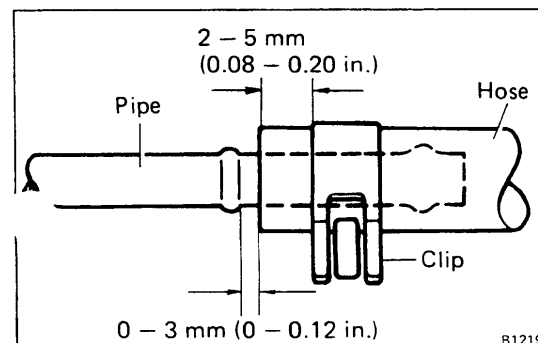
### PRECAUTIONS

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



### INSPECT FUEL LINES AND CONNECTIONS

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

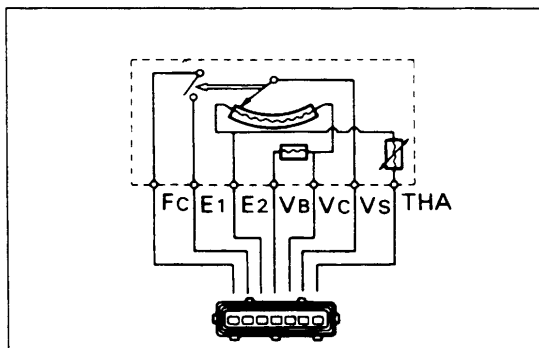
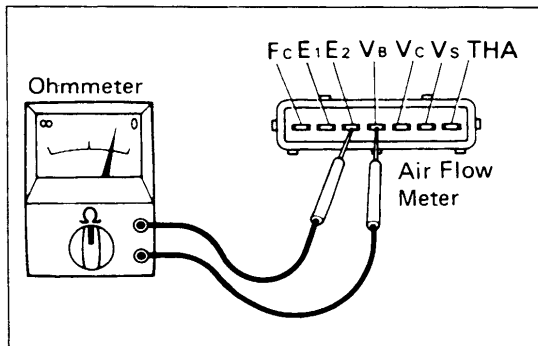
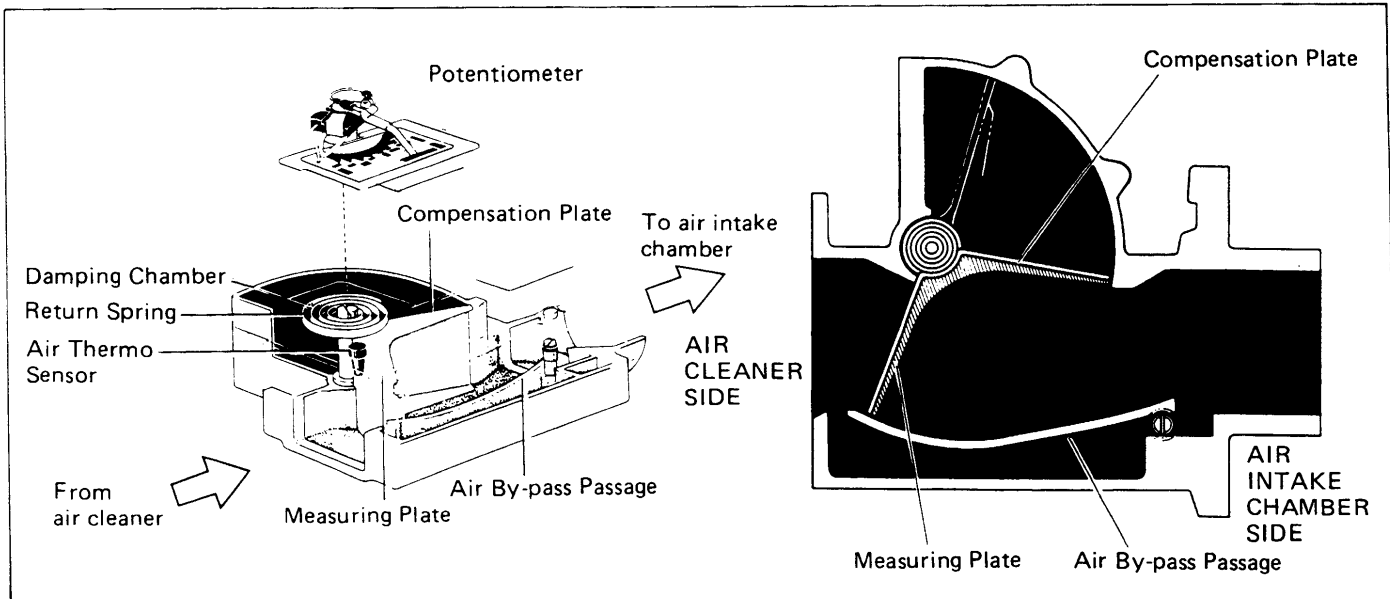


- (e) The hose and tube connections are as shown in the illustration.

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

## AIR INTAKE SYSTEM

### Air Flow Meter



### ON-VEHICLE INSPECTION

#### MEASURE RESISTANCE OF AIR FLOW METER

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

Between terminals	Resistance	Temperature
E <sub>2</sub> — V <sub>s</sub>	20 — 400 Ω	—
E <sub>2</sub> — V <sub>c</sub>	100 — 300 Ω	—
E <sub>2</sub> — V <sub>b</sub>	200 — 400 Ω	—
E <sub>2</sub> — THA	10 — 20 KΩ	−20°C (−4°F)
	4 — 7 KΩ	0°C (32°F)
	2 — 3 KΩ	20°C (68°F)
	0.9 — 1.3 KΩ	40°C (104°F)
	0.4 — 0.7 KΩ	60°C (140°F)
E <sub>1</sub> — F <sub>c</sub>	Infinity	—

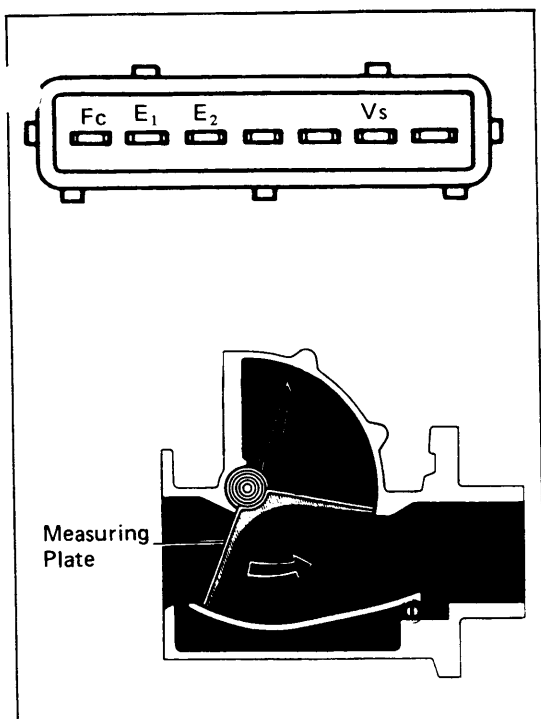
If not within specification, replace the air flow meter.

### REMOVAL OF AIR FLOW METER

- DISCONNECT AIR HOSES
- DISCONNECT AIR FLOW METER CONNECTOR
- REMOVE AIR FLOW METER

Remove the bolt and three nuts.





## INSPECTION OF AIR FLOW METER

### MEASURE RESISTANCE OF AIR FLOW METER

Move the measuring plate and, using ohmmeter, measure the resistance between each terminal.

Between terminals	Resistance ( $\Omega$ )	Measuring plate opening
E <sub>1</sub> — F <sub>c</sub>	Infinity	Fully closed
	Zero	Other than closed position
E <sub>2</sub> — V <sub>s</sub>	20 — 400	Fully closed
	20 — 1,000	Fully closed to fully open position

NOTE: Resistance between E<sub>2</sub> and V<sub>s</sub> will change in accordance with the measuring plate opening.

## INSTALLATION OF AIR FLOW METER

### 1. INSTALL AIR FLOW METER

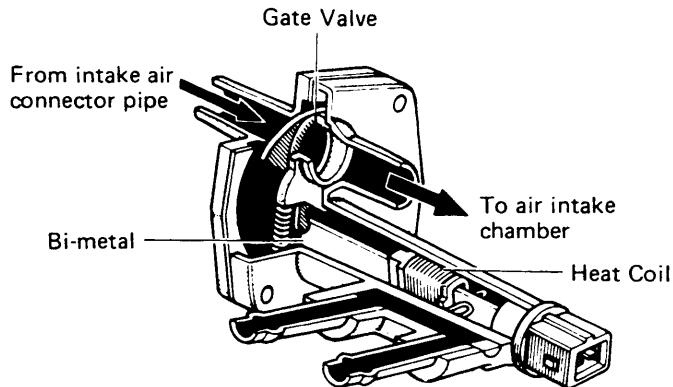
Install the three nuts and a bolt.

### 2. CONNECT AIR FLOW METER CONNECTOR

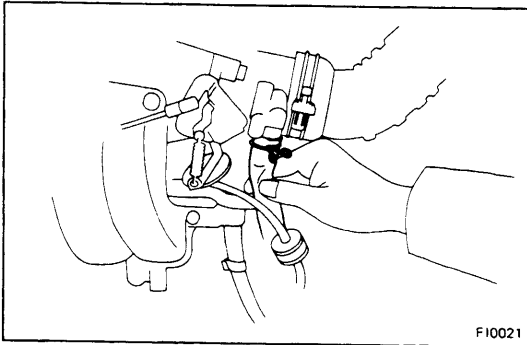
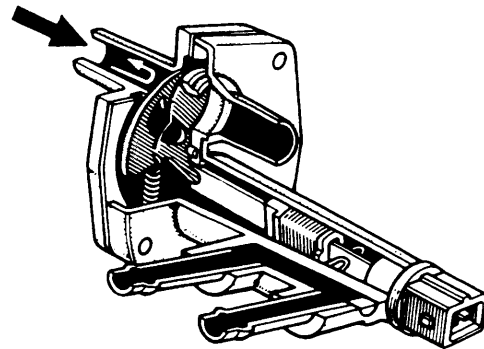
### 3. INSTALL AIR HOSE

## Air Valve

AT LOW TEMPERATURE



AFTER WARM-UP



### ON-VEHICLE CHECK

#### 1. CHECK OPERATION OF AIR VALVE

Check the engine RPM by pinching shut the air hose.

At Low Temp. (Coolant Temp. : below 60°C or 140°F)

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

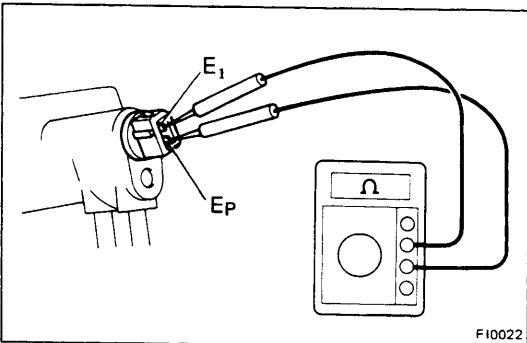
After warm-up

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

#### 2. MEASURE RESISTANCE OF AIR VALVE

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

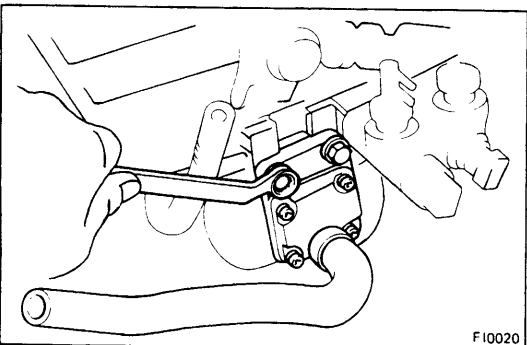
Resistance (Ep - E<sub>1</sub>): 39-59 Ω



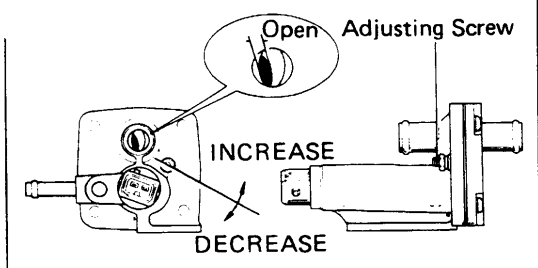
### REMOVAL OF AIR VALVE

1. DISCONNECT TWO AIR VALVE HOSES
2. DISCONNECT AIR VALVE CONNECTOR
3. DISCONNECT WATER BY-PASS HOSE
4. REMOVE AIR VALVE

Remove the two bolts and the air valve and gasket.



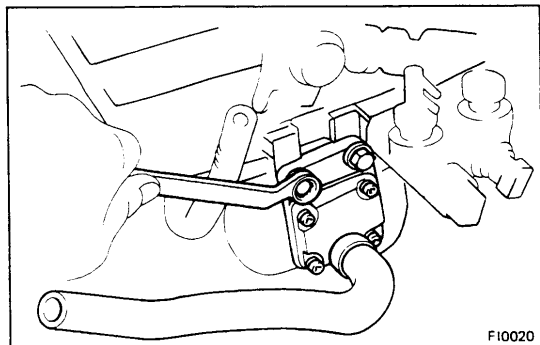
When the room temp. is approx. 20°C (68°F)



## INSPECTION OF AIR VALVE

### CHECK OPENING CONDITION OF AIR VALVE

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



## INSTALLATION OF AIR VALVE

### 1. INSTALL AIR VALVE

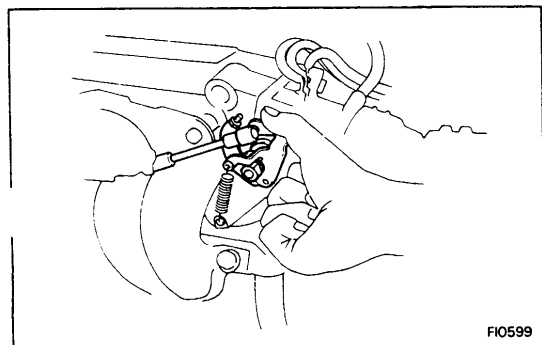
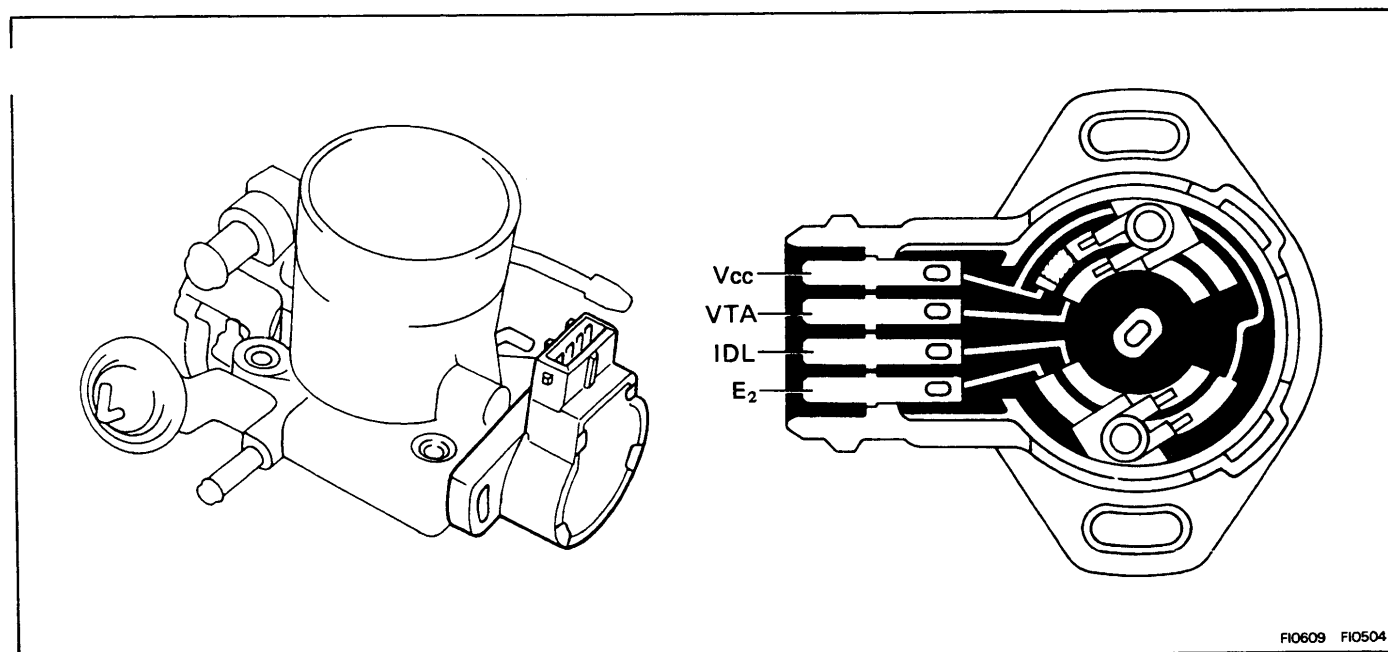
Use a new gasket and install the air valve and two bolts.

### 2. CONNECT WATER BY-PASS HOSE

### 3. CONNECT AIR VALVE CONNECTOR

### 4. CONNECT TWO AIR VALVE HOSES

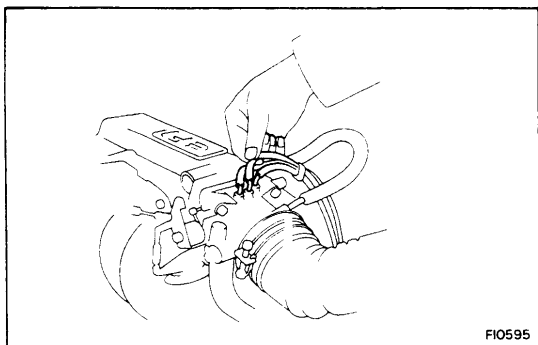
## Throttle Body



## ON-VEHICLE CHECK

### 1. CHECK THROTTLE BODY

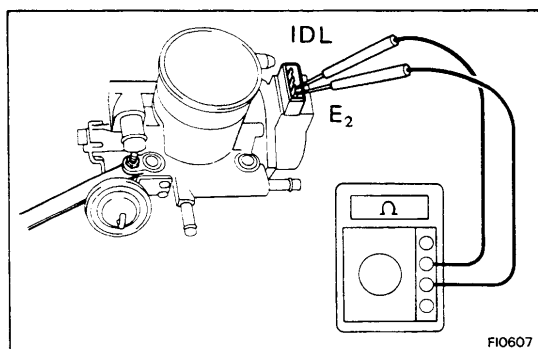
(a) Check that the throttle linkage moves smoothly.



FI0595

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

Port No.	At idling	At 3,000 rpm
E	No vacuum	Vacuum
R	No vacuum	Vacuum
P	No vacuum	Vacuum

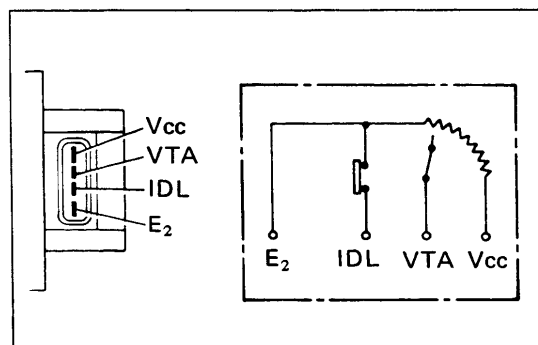


FI0607

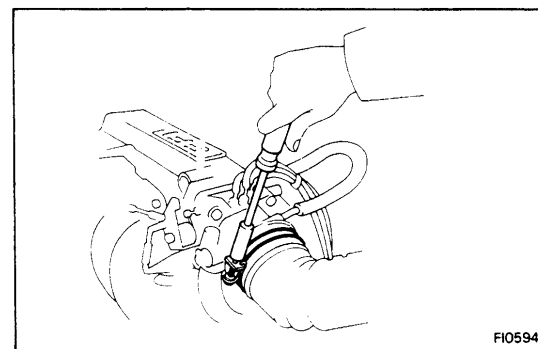
## 2. CHECK THROTTLE POSITION SENSOR

Check the resistance between the terminals.

- Unplug the connector from the sensor.
- Insert a thickness gauge between the throttle stop screw and stop lever.
- Using an ohmmeter, check the resistance between each terminal.



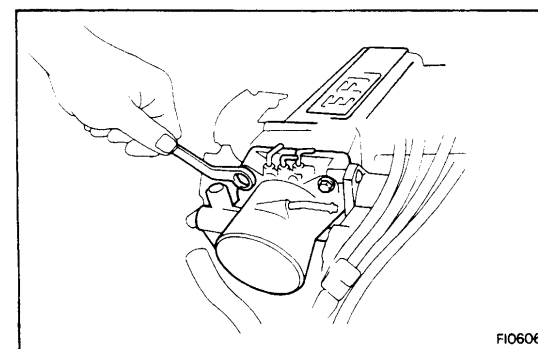
Clearance between lever and stop screw	Between terminals	Resistance
0 mm (0 in.)	VTA - E <sub>2</sub>	0.2 - 0.8 kΩ
0.57 mm (0.0224 in.)	IDL - E <sub>2</sub>	Less than 2.3 kΩ
0.85 mm (0.0335 in.)	IDL - E <sub>2</sub>	Infinity
Throttle valve fully opened position	VTA - E <sub>2</sub>	3.3 - 10 kΩ
—	Vcc - E <sub>2</sub>	3 - 7 kΩ



FI0594

## REMOVAL OF THROTTLE BODY

1. REMOVE AIR INTAKE CONNECTOR
2. DISCONNECT FOLLOWING HOSES:
  - (a) No. 1 and No. 2 water by-pass hoses
  - (b) PCV hose from the throttle body
  - (c) Label and disconnect the emission control hoses.

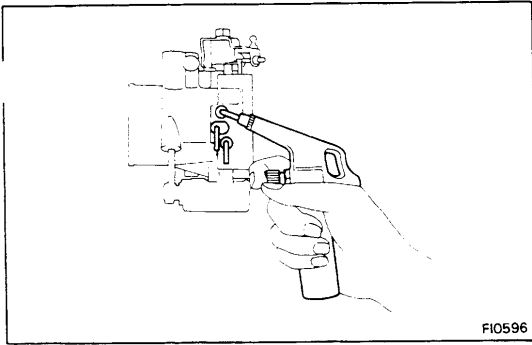


FI0606

## 3. DISCONNECT THROTTLE SENSOR CONNECTOR

## 4. REMOVE THROTTLE BODY

Remove the four bolts and remove the throttle body and gasket.

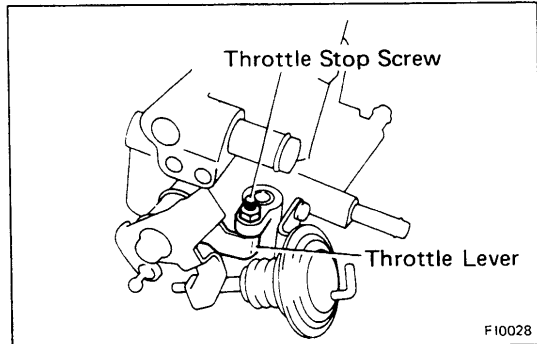


## INSPECTION OF THROTTLE BODY

### 1. CLEAN THROTTLE BODY BEFORE INSPECTION

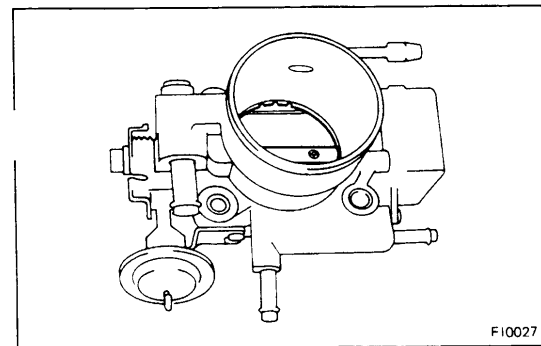
- (a) Wash and clean the cast parts with a soft brush in carburetor cleaner.
- (b) Using compressed air, blow all passages and apertures in the throttle body.

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



### 2. CHECK THROTTLE VALVE

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



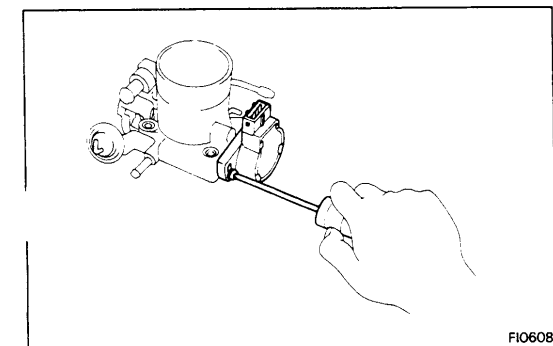
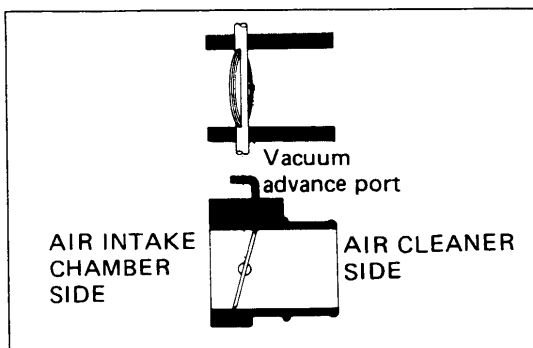
- (b) When the throttle valve is fully closed, check that advance port is located on the air cleaner side as shown in the figure.

If not, adjust the throttle valve closing angle.

**NOTE:** Do not adjust the throttle valve closing angle if unnecessary.

### 3. IF NECESSARY, ADJUST THROTTLE STOP SCREW

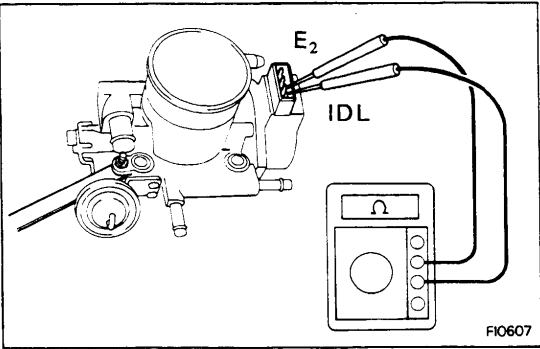
- (a) After loosening the lock nut of the throttle stop screw, loosen the stop screw until it is about to touch at the lever.
- (b) Have the throttle stopper screw touch the lever. Then screw it in 1/4 turns and lock it with the lock nut.
- (c) After installation of the throttle body, make sure that engine rpm.



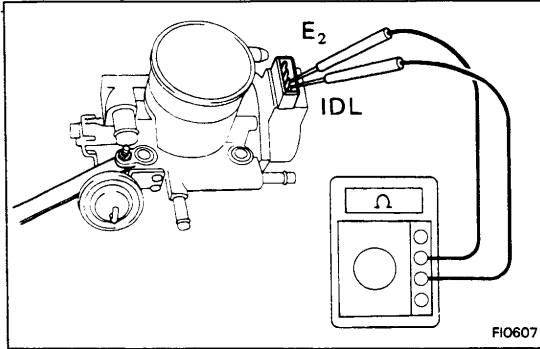
### 4. CHECK THROTTLE POSITION SENSOR (See step 2 on page FI-59)

### 5. IF NECESSARY, ADJUST THROTTLE POSITION SENSOR

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

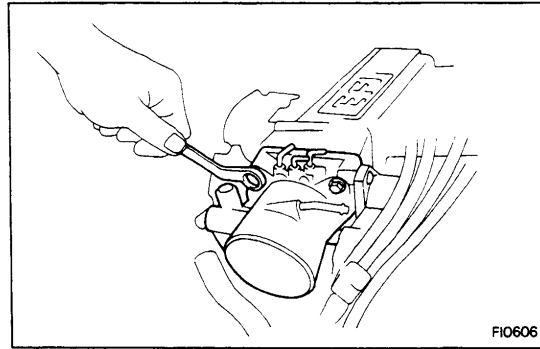


- (b) Insert a thickness gauge (0.47 mm or 0.0185 in.) between the throttle stop screw and lever, and connect the ohmmeter to terminals IDL and E<sub>2</sub>.
- Gradually turn the sensor clockwise until the ohmmeter deflects, and secure the sensor with two screws.



- (c) Using a thickness gauge, recheck the continuity between terminals IDL and E<sub>2</sub>.

Clearance between lever and stop screw	Continuity (IDL – E <sub>2</sub> )
0.57 mm (0.0224 in.)	Continuity
0.85 mm (0.0335 in.)	No continuity



**INSTALLATION OF THROTTLE BODY**

**1. INSTALL THROTTLE BODY**

Using new gaskets, install the throttle body and four bolts

**2. CONNECT THROTTLE SENSOR CONNECTOR**

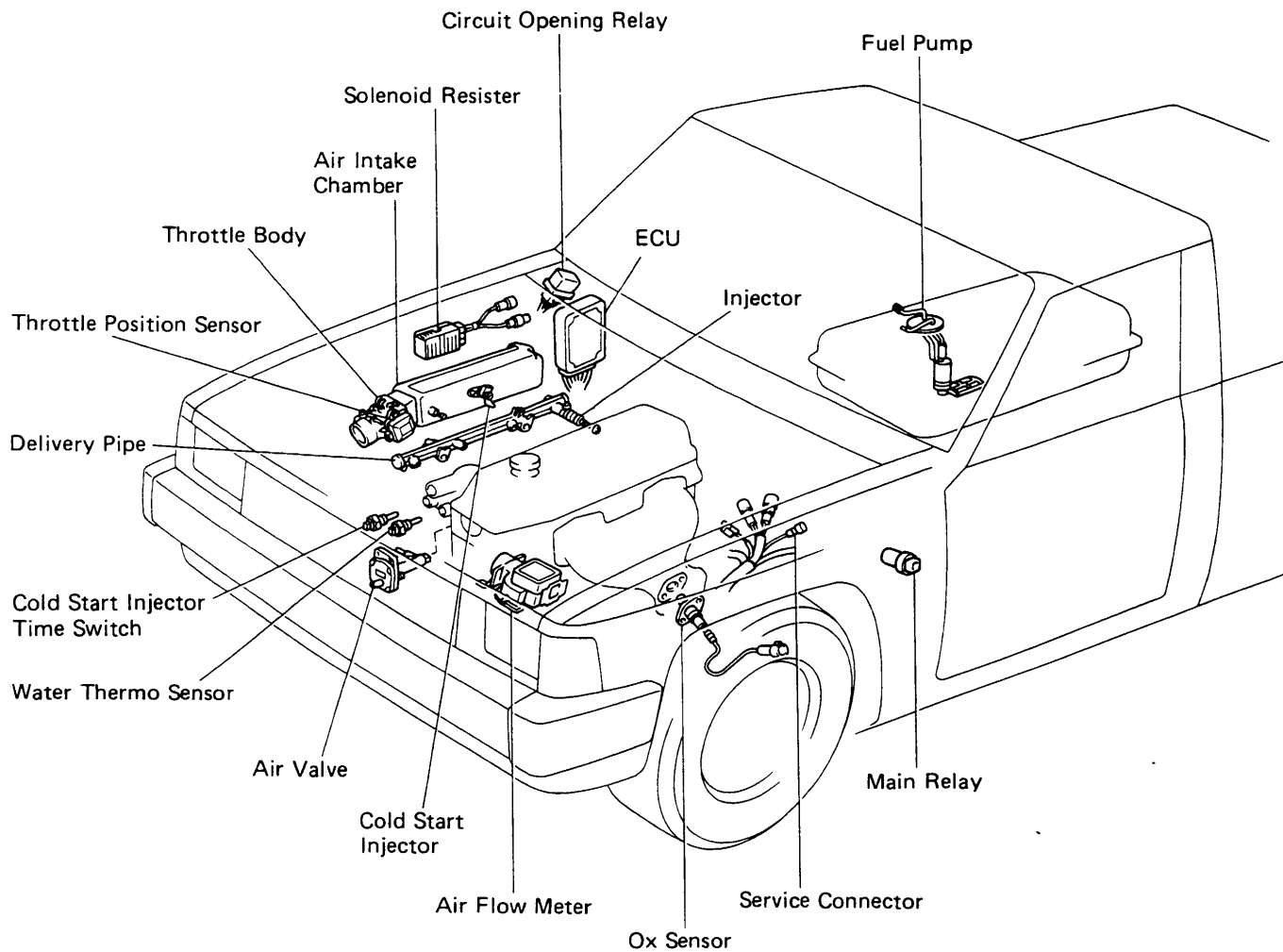
**3. CONNECT FOLLOWING HOSES:**

- (a) Emission control hoses
- (b) PCV hose to throttle body
- (c) No. 1 and No. 2 water by-pass hoses.

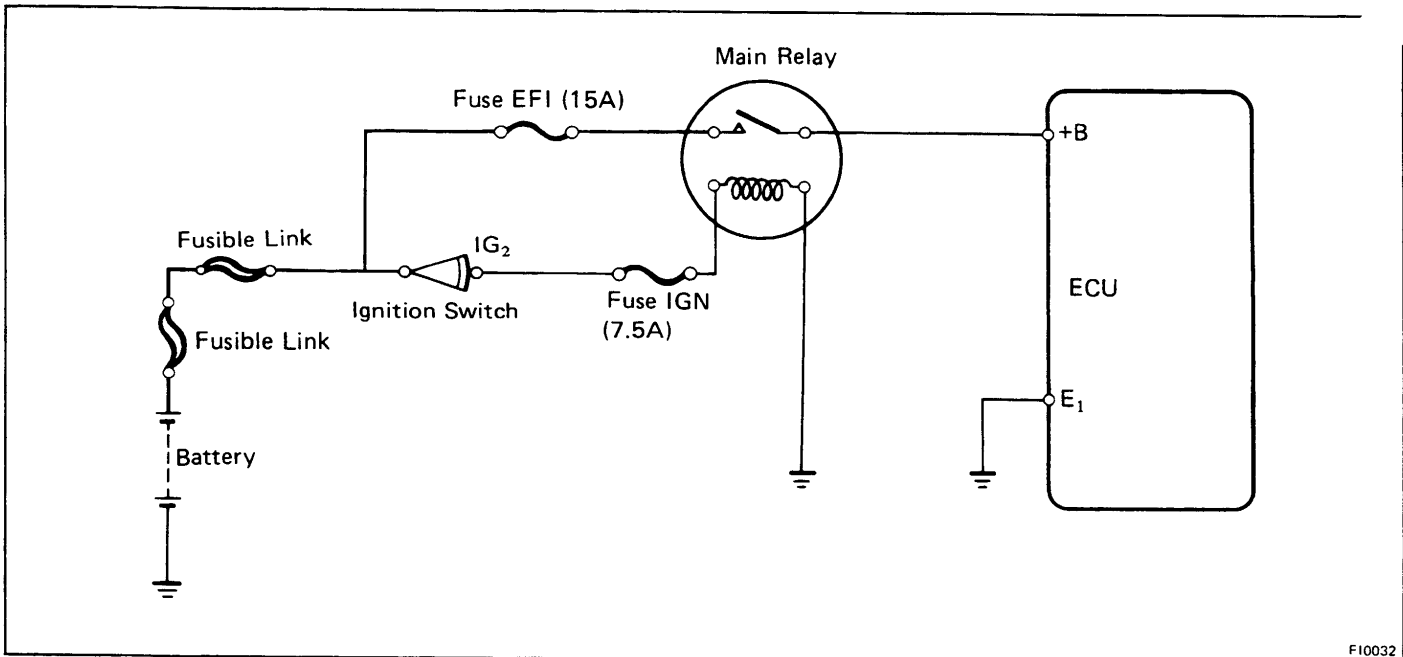
**4. INSTALL AIR INTAKE CONNECTOR**

## ELECTRONIC CONTROL SYSTEM

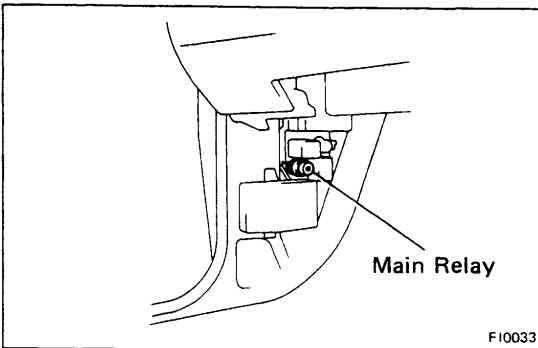
### Location of Electronic Control Parts

**A03956**

## Main Relay



FI0032



FI0033

### INSPECTION OF MAIN RELAY

#### 1. CHECK MAIN RELAY OPERATION

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

#### 2. MEASURE RESISTANCE OF MAIN RELAYS

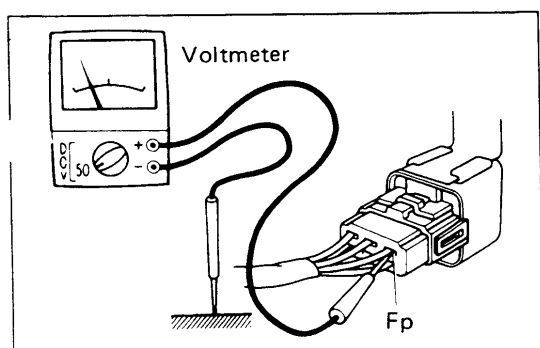
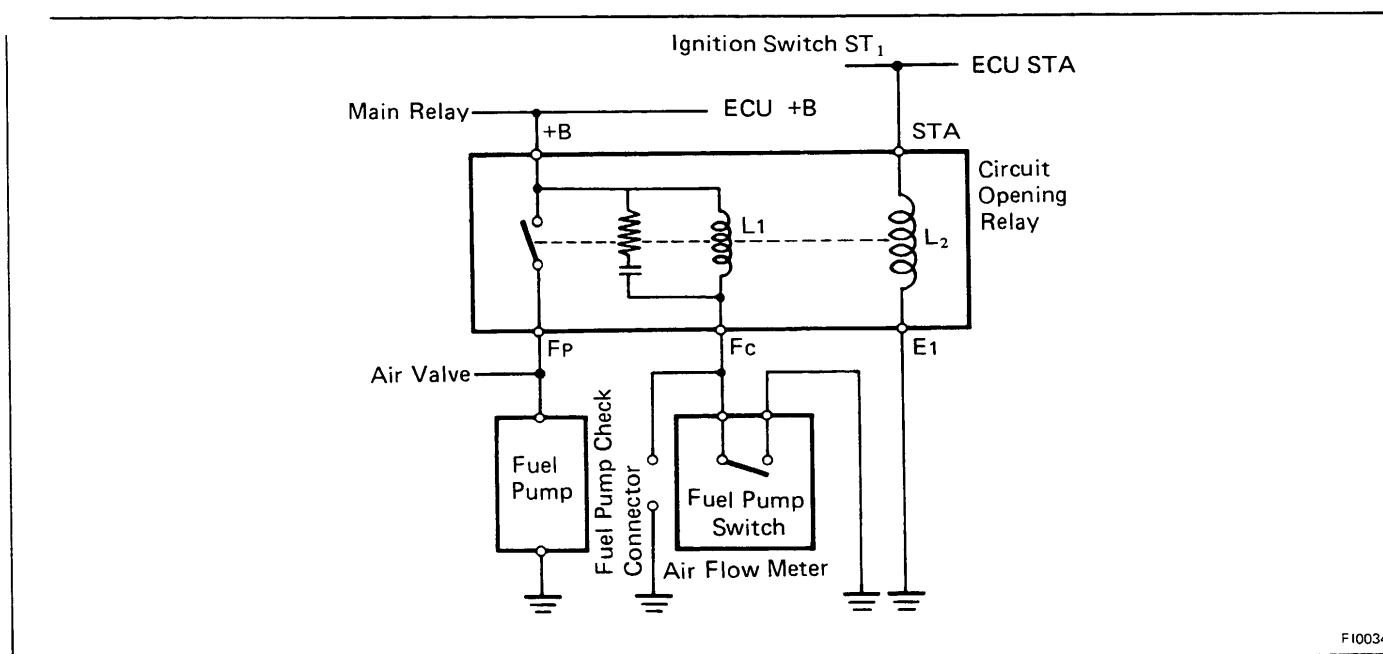
- Remove the main relay from the relay block.
- Measure the resistance between each terminal.

	Between terminals	Resistance ( $\Omega$ )
Main relay	1 - 2	60 - 80
	3 - 4	Infinity

A03958



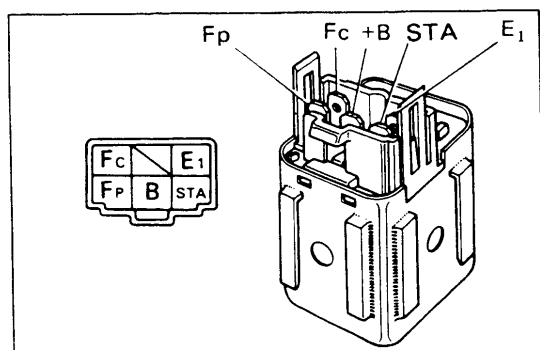
## Circuit Opening Relay



### INSPECTION OF CIRCUIT OPENING RELAY

#### 1. CHECK CIRCUIT OPENING RELAY OPERATION

- Remove the left kick panel.
- Using a voltmeter, check that the meter indicates voltage at Fp terminal during engine cranking and running.
- Stop the engine.

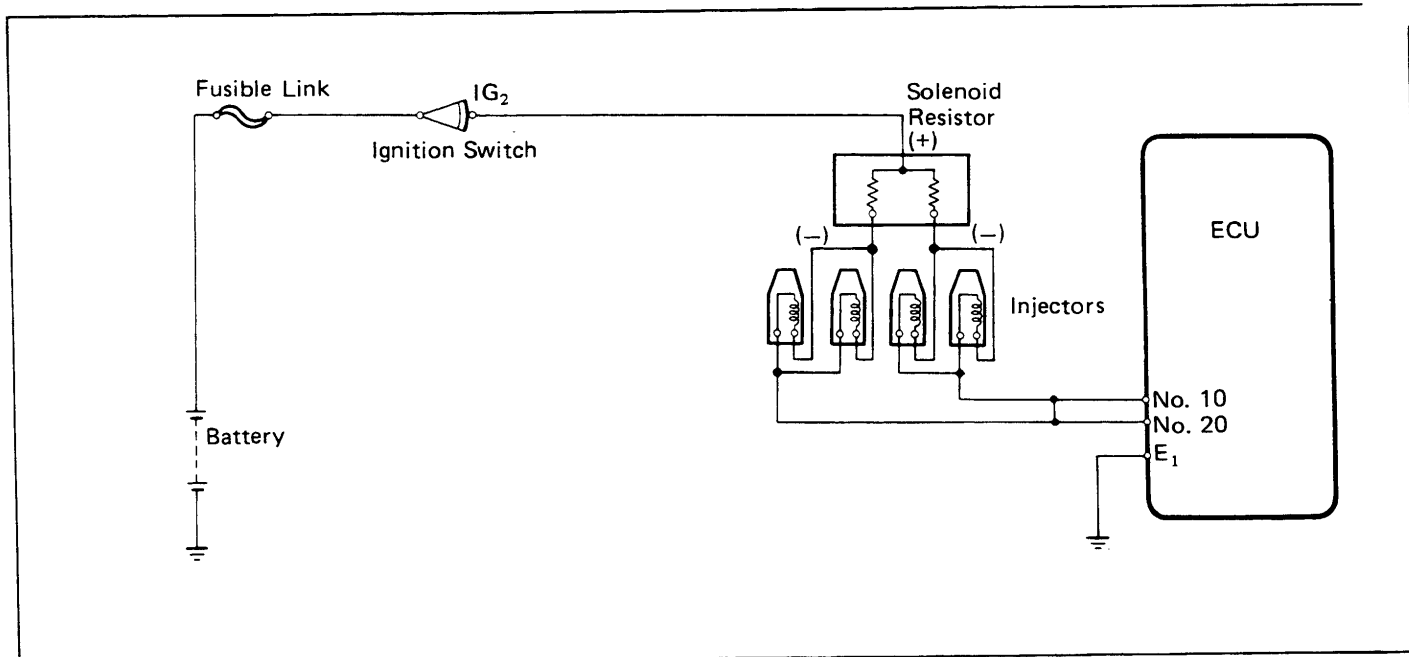


#### 2. MEASURE RESISTANCE OF CIRCUIT OPENING RELAY

- Disconnect the connector.
- Measure the resistance between each terminal.

Between terminals	Resistance ( $\Omega$ )
STA — E1	17 — 25
+B — Fc	88 — 132
+B — Fp	Infinity

## Solenoid Resistor

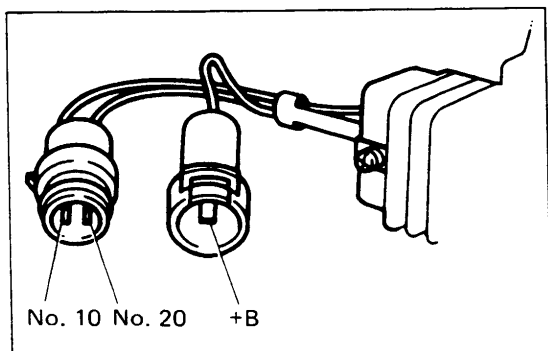


### INSPECTION OF SOLENOID RESISTOR

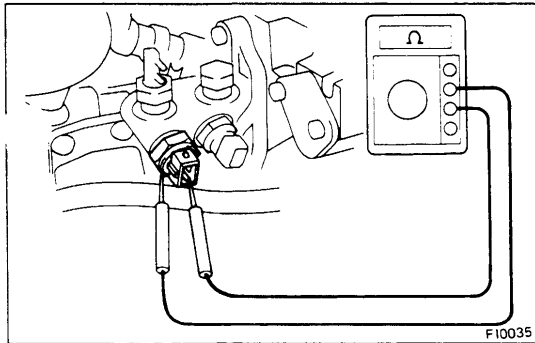
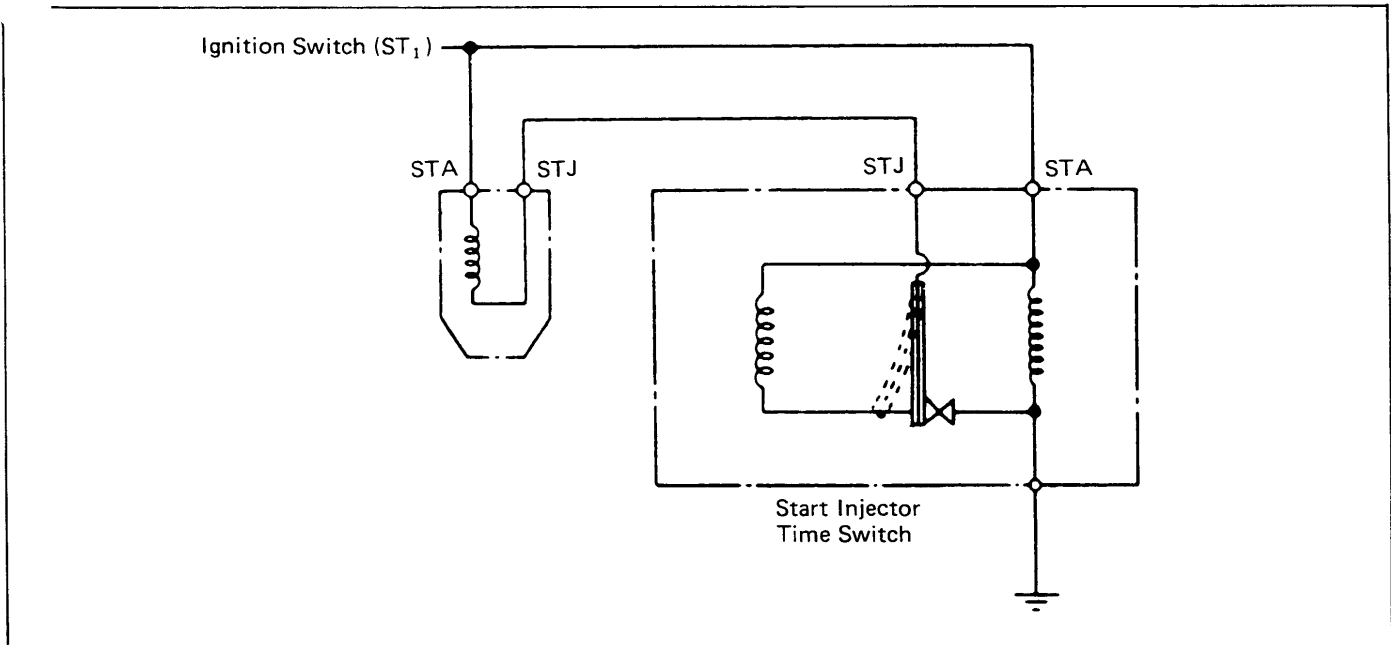
#### MEASURE RESISTANCE OF SOLENOID RESISTOR

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

Resistance: 2 — 3  $\Omega$  each



## Start Injector Time Switch



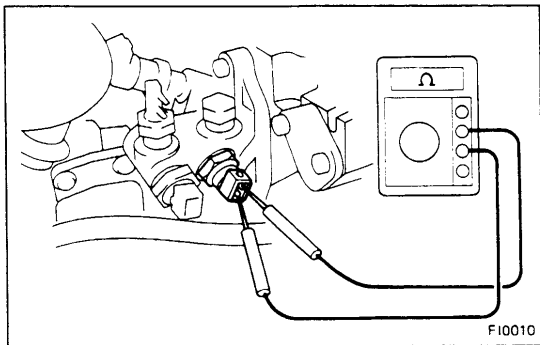
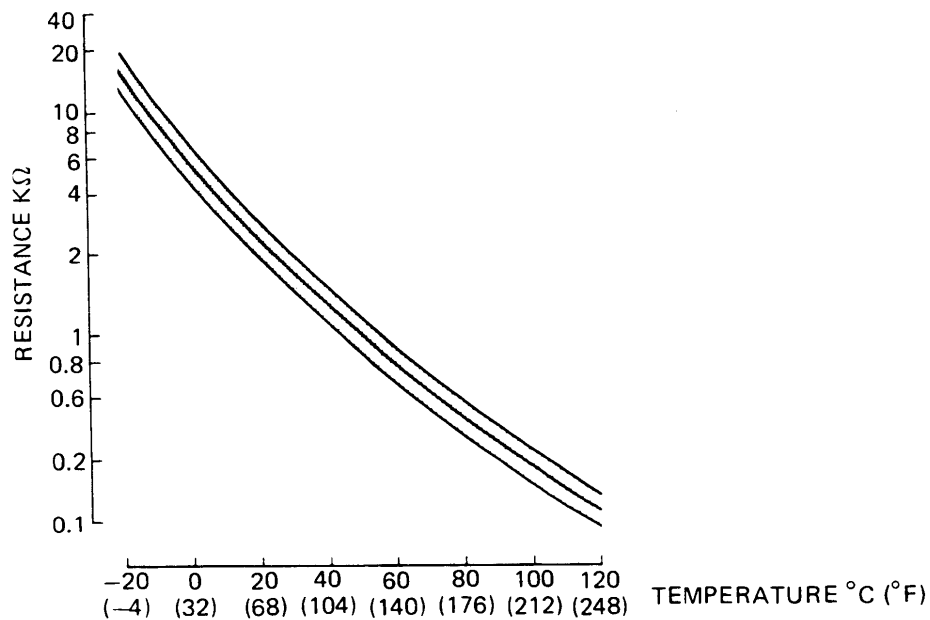
### INSPECTION OF START INJECTOR TIME SWITCH

#### MEASURE RESISTANCE OF START INJECTOR TIME SWITCH

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

Between terminals	Resistance ( $\Omega$ )	Coolant temp.
STA — STJ	20 — 40	below 30°C (86°F)
	40 — 60	above 40°C (104°F)
STA — Ground	20 — 80	—

## Water Thermo Sensor

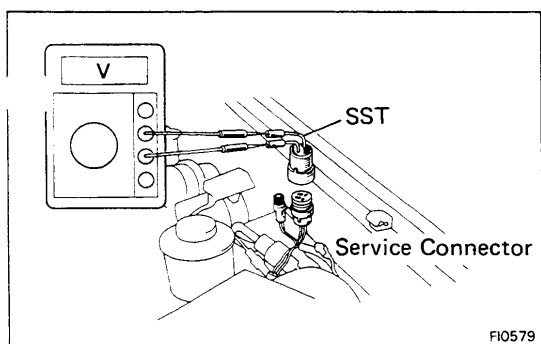


### INSPECTION OF WATER THERMO SENSOR

#### MEASURE RESISTANCE OF WATER THERMO SENSOR

- Disconnect the connector.
- Using an ohmmeter, measure the resistance between both terminals.

**Resistance:** Refer to the chart



## Ox Sensor

### INSPECTION OF FEED BACK CONTROL

#### 1. CONNECT SST AND ANALOG VOLTMETER

Connect SST to the service connector and connect a voltmeter to SST.

SST 09842-14010

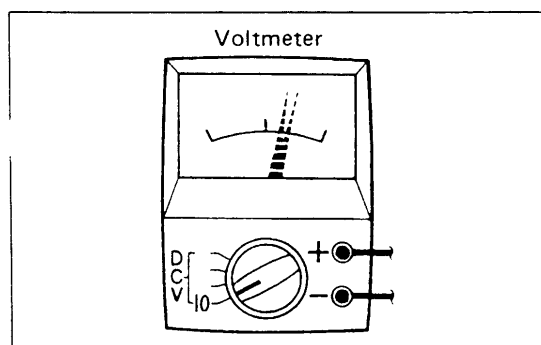
Connect the (+) testing probe to the red wire of the SST and (—) testing probe to the black wire.

#### 2. WARM-UP ENGINE TO NORMAL OPERATING TEMPERATURE

#### 3. CONNECT A TACHOMETER TO ENGINE

#### 4. RACE ENGINE AT 2,500 RPM FOR ABOUT 90 SECONDS

#### 5. MAINTAIN ENGINE SPEED AT 2,500 RPM



#### 6. CHECK THAT NEEDLE OF VOLTMETER FLUCTUATES 8 TIMES OR MORE IN 10 SECONDS

If not, inspect the EFI system and replace the Ox sensor, if necessary.

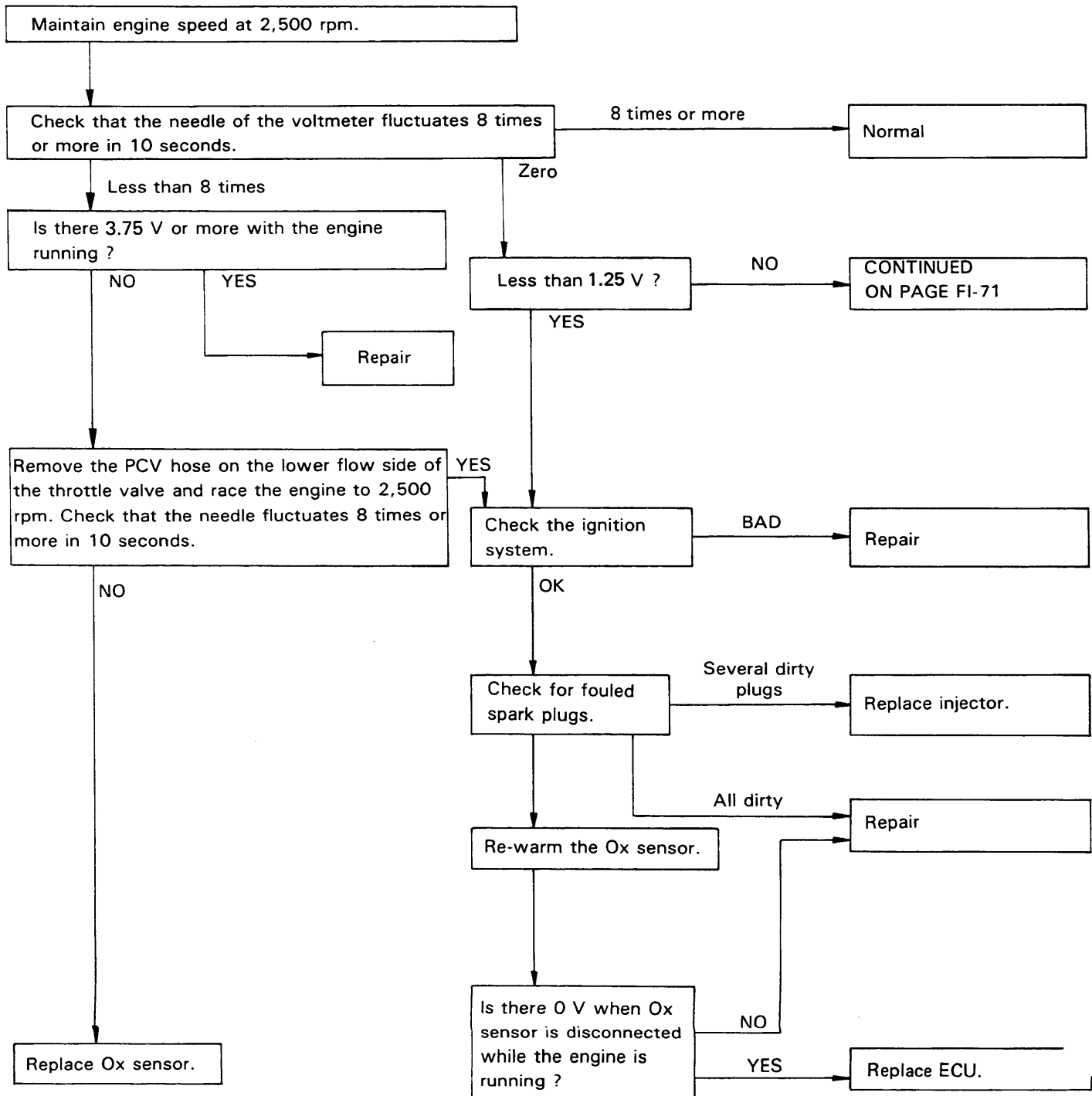
#### 7. STOP ENGINE

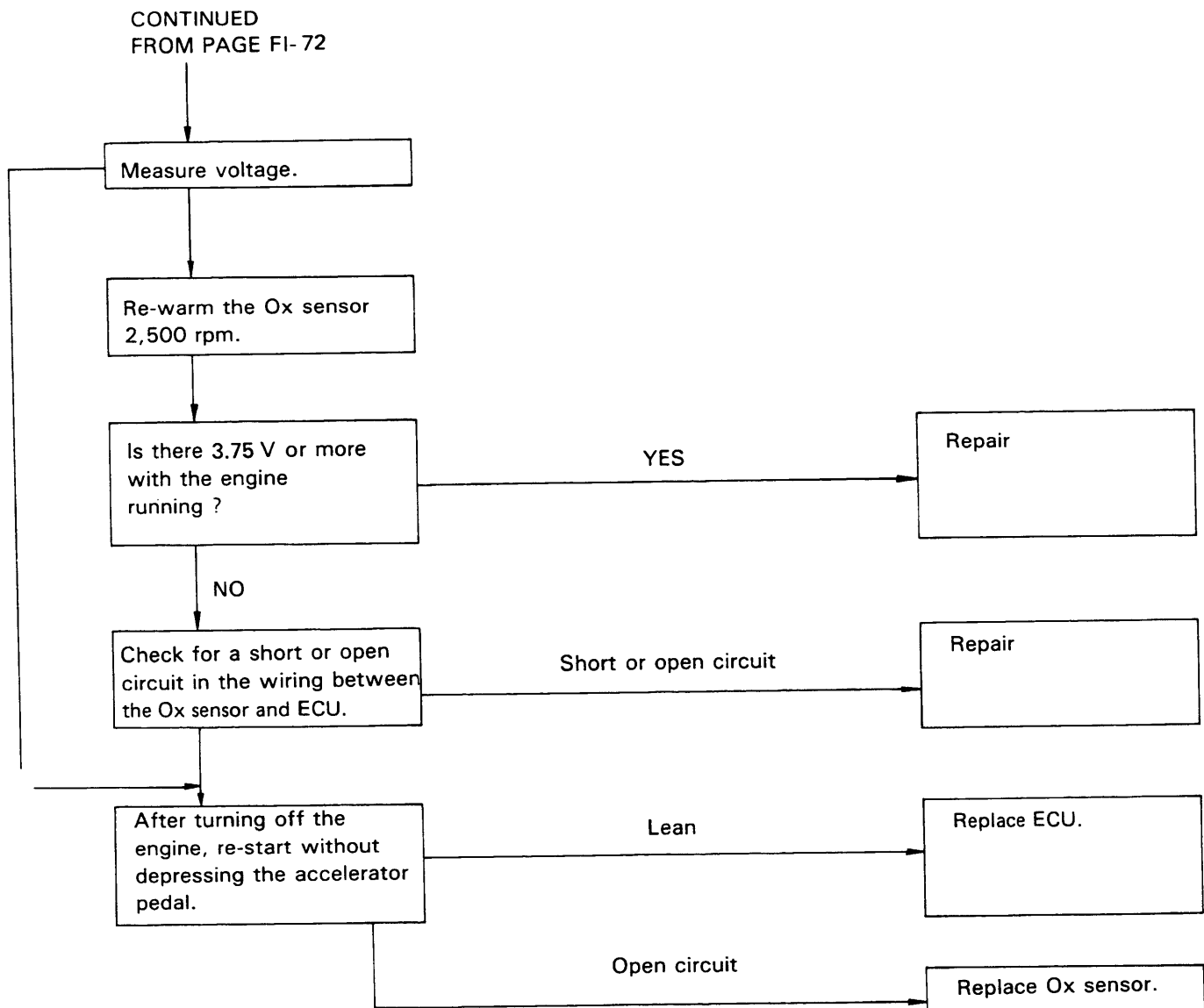
#### 8. REMOVE VOLTMETER AND SST 09842-14010

#### 9. INSTALL RUBBER CAP TO SERVICE CONNECTOR

## INSPECTION OF OX SENSOR

1. Warm-up the engine.
2. Connect a SST to the 4-terminal connector. SST 09842-14010
3. Using a voltmeter connect the positive probe to the red wire of the SST and negative testing probe to the block wire.
4. Warm up the Ox sensor with the engine at 2,500 rpm for about 90 seconds.





## ECU

### INSPECTION OF ECU

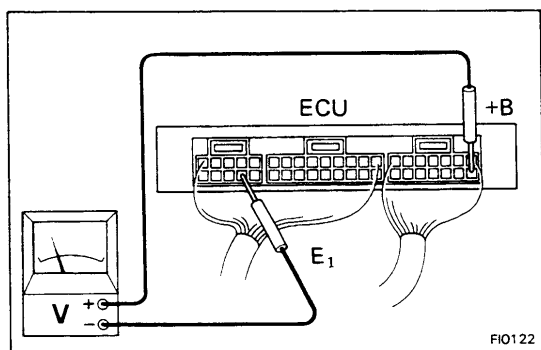
#### 1. MEASURE VOLTAGE OF ECU

##### NOTE:

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

Check the voltages at the wiring connectors.

- Remove the right kick panel.
- Turn the ignition switch ON.
- Measure the voltage at each terminal.



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

#### Voltage at ECU Wiring Connectors

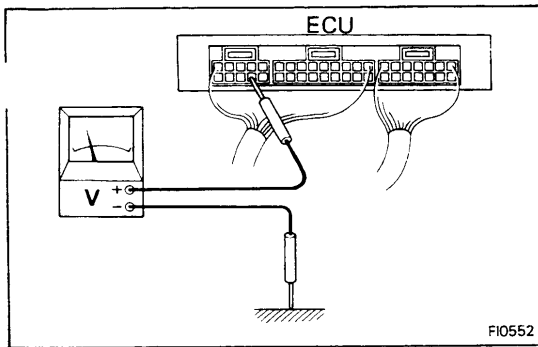
Terminals	Condition		STD voltage
+B – E <sub>1</sub>	Ignition switch ON		10 – 14
BATT – E <sub>1</sub>	–		10 – 14
IDL – E <sub>2</sub>	Ignition switch ON	Throttle valve open	4 – 10
VTA – E <sub>2</sub>		Throttle valve fully closed	0.1 – 1.0
		Throttle valve fully open	4 – 5
V <sub>cc</sub> – E <sub>2</sub>		–	4 – 6
IGt – E <sub>1</sub>	Idling		0.7 – 1.0
STA – E <sub>1</sub>	Ignition switch ST position		6 – 12
No. 10 – E <sub>1</sub> No. 20 – E <sub>1</sub>	Ignition switch ON		9 – 14
W – E <sub>1</sub>	No trouble (CHECK ENGINE light off) and engine running		8 – 14
V <sub>c</sub> – E <sub>2</sub>	Ignition switch ON	–	4 – 9
V <sub>s</sub> – E <sub>2</sub>		Measuring plate fully closed	0.5 – 2.5
		Measuring plate fully open	5 – 8
		Idling	
THA – E <sub>2</sub>	Ignition switch ON	Intake air temperature 20°C (68°F)	2 – 6
THW – E <sub>2</sub>	Ignition switch ON	Coolant temperature 80°C (176°F)	0.5 – 2.5
B/K – E <sub>1</sub>	Stop light switch ON		8 – 14

#### ECU Connectors

E <sub>01</sub>	No.10	STA	V <sub>F</sub>	NSW	Fpu	W	T	IDL	IGf			KNK	Ne			V <sub>c</sub>	V <sub>s</sub>	THA	BATT	+B <sub>1</sub>
E <sub>02</sub>	No.20	IGt	E <sub>1</sub>		ACV		TSW		E <sub>2</sub>	Ox	V <sub>cc</sub>	VTA	THW			E <sub>21</sub>	4WD	SPD	B/K	+B

FI0605





## 2. MEASURE RESISTANCE OF ECU

### CAUTION:

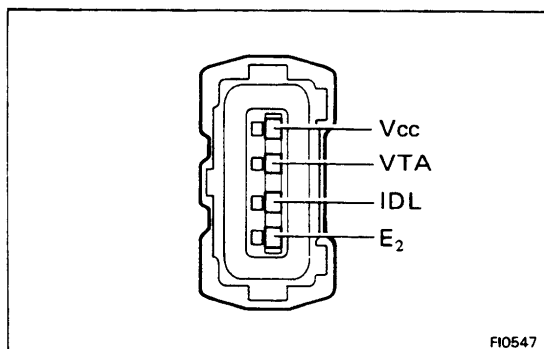
1. Do not touch the ECU terminals.
2. The tester probe should be inserted into wiring connector from the wiring side.

Check the resistance between each terminal of the wiring connector.

- Remove the right kick panel.
- Unplug the wiring connectors from the ECU.
- Measure the resistance between each terminal of the wiring connectors.

Resistance at ECU Wiring Connectors

Terminals	Condition	Resistance (k $\Omega$ )
IDL – E <sub>2</sub>	Throttle valve open	Infinity
	Throttle valve fully closed	0 – 0.1
VTA – E <sub>2</sub>	Throttle valve fully open	3.3 – 10
	Throttle valve fully closed	0.2 – 0.8
V <sub>cc</sub> – E <sub>2</sub>	—	3 – 7
THA – E <sub>2</sub>	Intake air temperature 20°C (68°F)	2 – 3
THW – E <sub>2</sub>	Coolant temperature 80°C (176°F)	0.2 – 0.4
+B – E <sub>2</sub>	—	0.2 – 0.4
V <sub>c</sub> – E <sub>2</sub>	—	0.1 – 0.3
V <sub>s</sub> – E <sub>2</sub>	Measuring plate fully closed	0.02 – 0.1
	Measuring plate fully open	0.02 – 1
Ne – E <sub>1</sub>	—	0.14 – 0.18

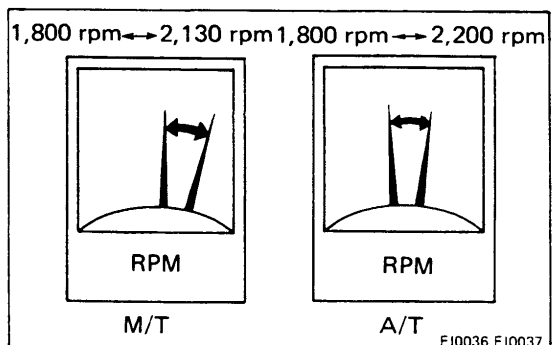


## Fuel Cut RPM

### INSPECTION OF FUEL CUT RPM

- Start and warm up the engine.
- Disconnect the throttle position sensor connector from the throttle position sensor.
- Short circuit terminals IDL and E<sub>2</sub> on wire connector side.
- Gradually raise the engine rpm and check that there is fluctuation between the fuel cut and fuel return points.

NOTE: The vehicle should be stopped.



	Fuel Cut rpm	Fuel Return rpm
M/T	2,130 rpm	1,800 rpm
A/T	2,200 rpm	1,800 rpm