

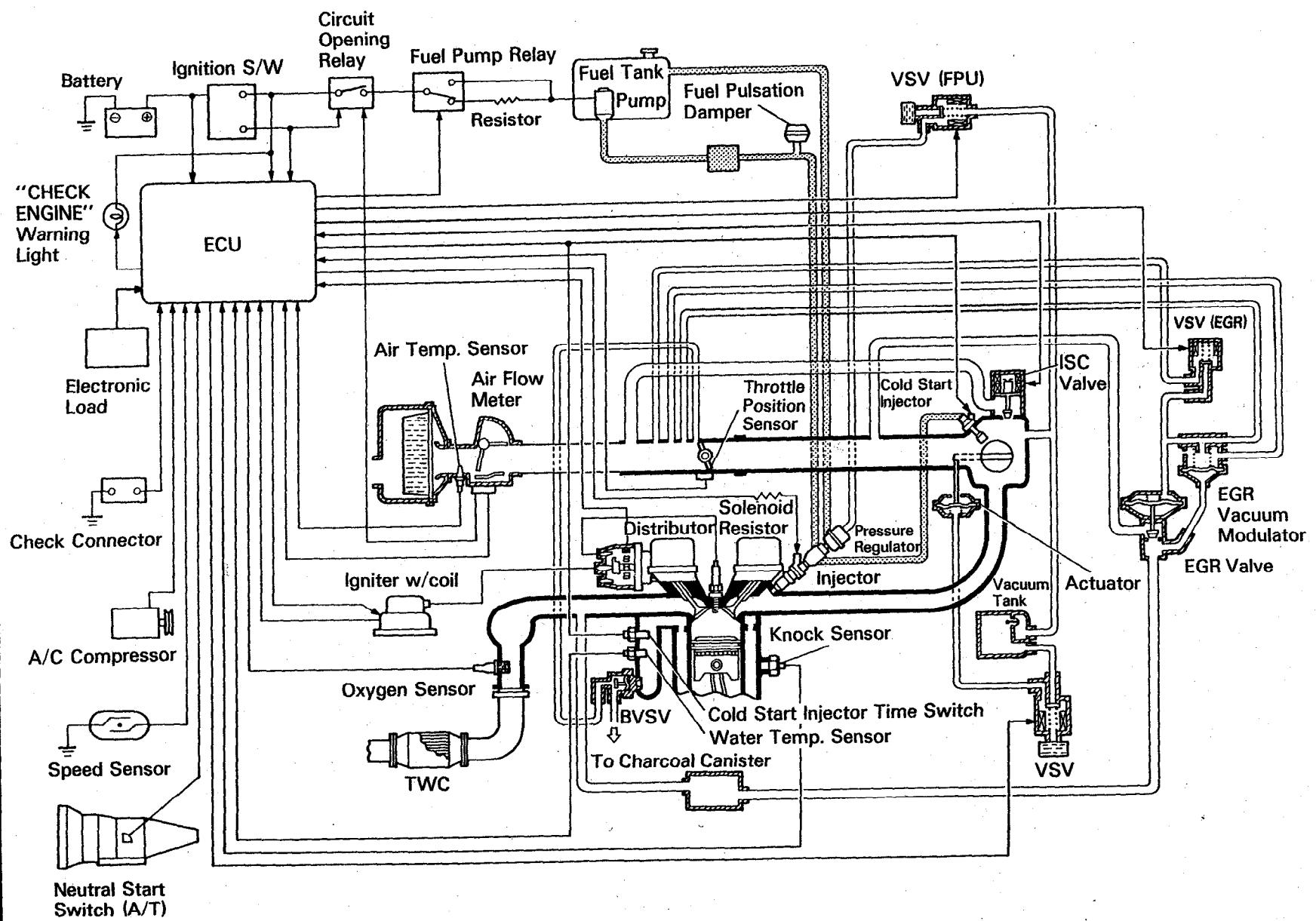
EFI SYSTEM

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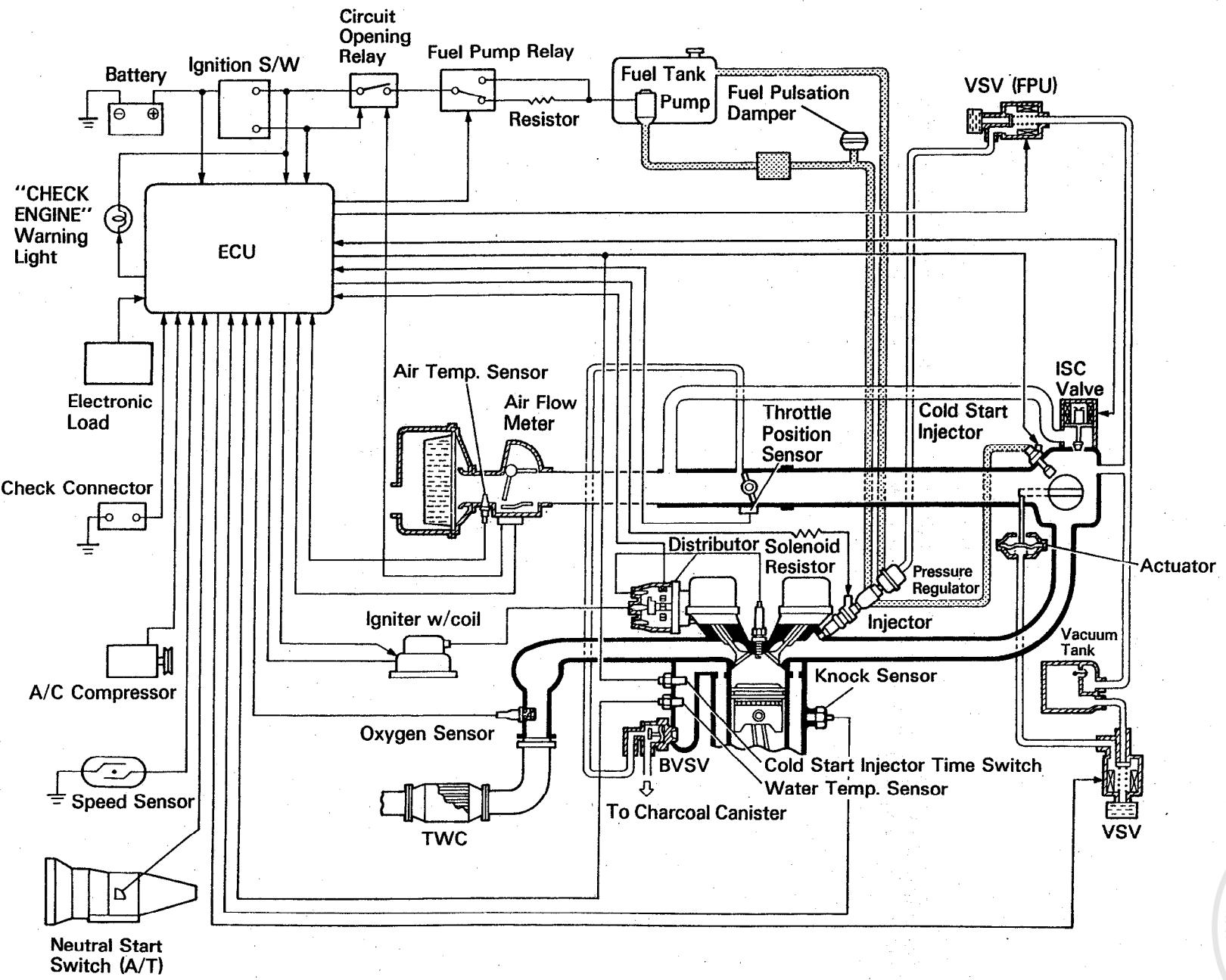
7M-GE (Switzerland and Austria)

SYSTEM DESCRIPTION



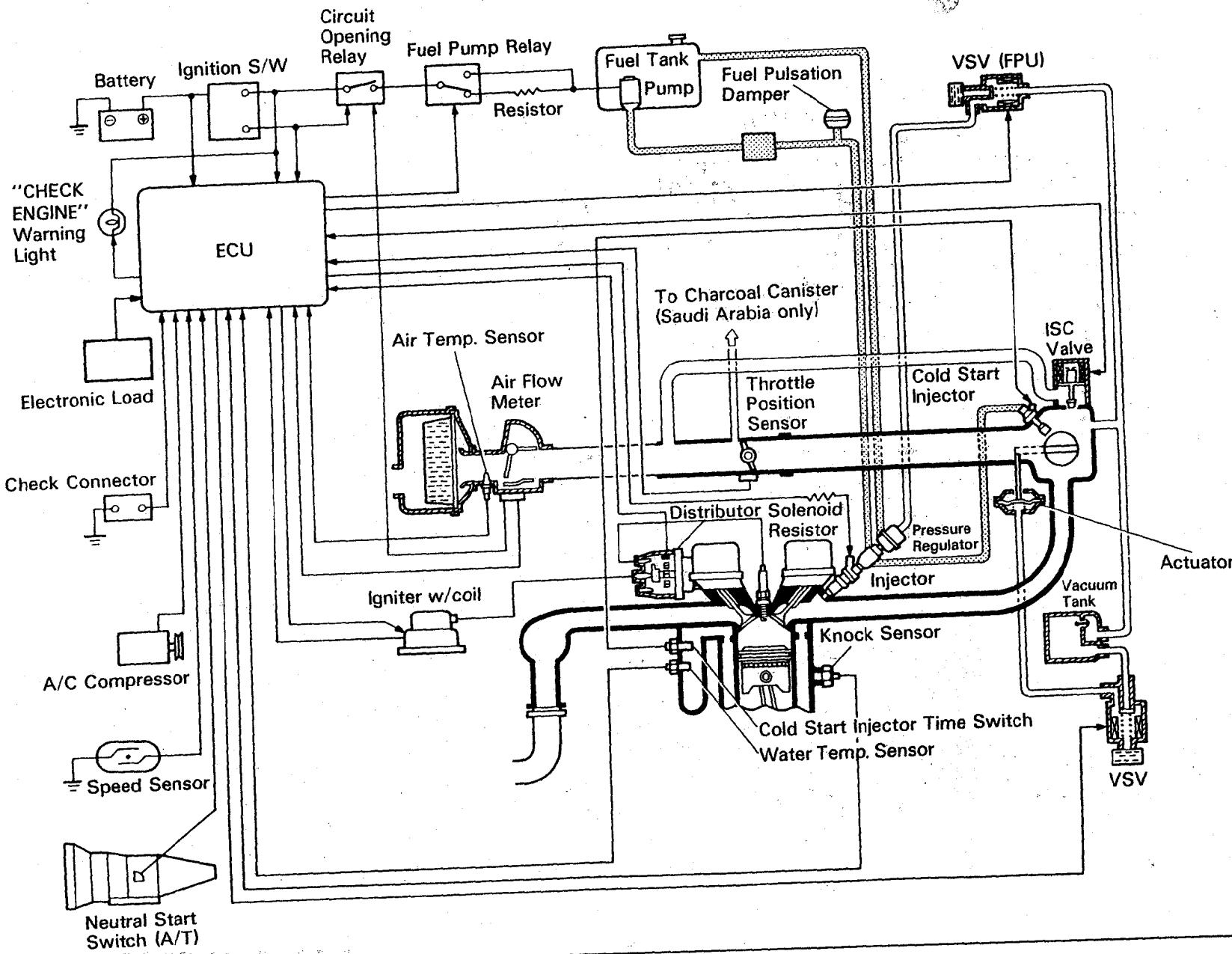
SYSTEM DESCRIPTION (Cont'd)

7M-GE (Australia)



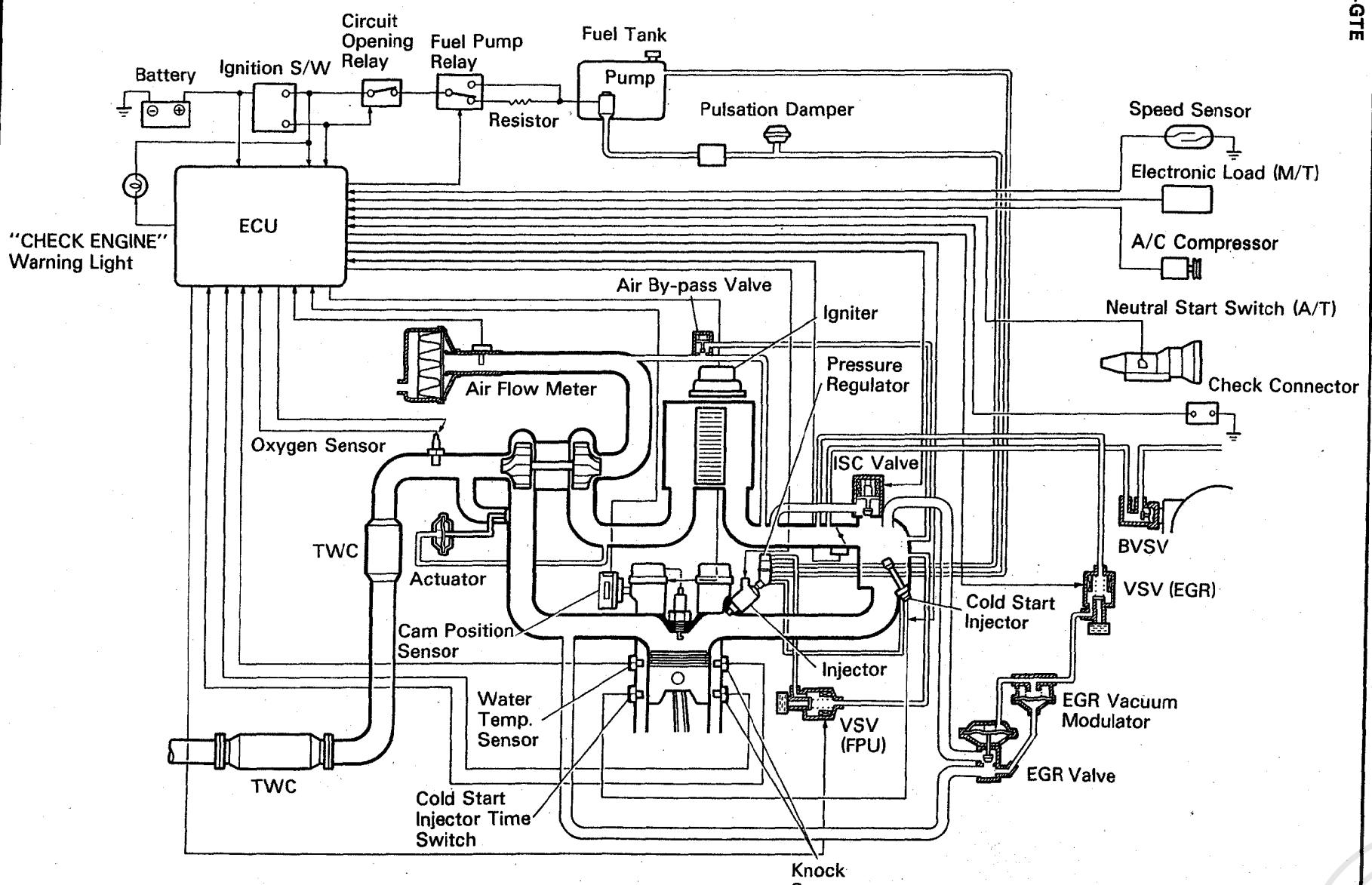
SYSTEM DESCRIPTION (Cont'd)

= (Others)



SYSTEM DESCRIPTION (Cont'd)

7M-GTE

www.cscode.com
www.cscode.com

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

FUEL SYSTEM

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

AIR INDUCTION SYSTEM

The air induction system provides sufficient air for engine operation.

ELECTRONIC CONTROL SYSTEM

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

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

1. Electronic Fuel Injection (EFI)

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

- Exhaust oxygen content (w/ TWC)
- Intake air volume
- Intake air temperature
- Coolant temperature
- Engine rpm
- Vehicle speed
- Acceleration/deceleration etc.

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

2. Electronic Spark Advance (ESA)

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

3. Idle Speed Control (ISC)

The ECU is programmed with target idling speed values to respond to different engine conditions (coolant temperature, air conditioner on/off, etc.). Sensors transmit signals to the ECU which control the flow of air through the bypass of the throttle valve and adjust idle speed to the target value. (See pages FI-53, 71, 108)

4. Diagnosis

The ECU detects any malfunctions or abnormalities in the sensor network and lights the "CHECK ENGINE" warning light on the instrument panel. At the same time, the trouble is identified and a diagnostic code is recorded by the ECU.

5. Fail-Safe Function

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



PRECAUTIONS

1. Before working on the fuel system, disconnect the negative terminal from the battery.
NOTE: Any diagnosis code retained by the computer will be erased when the battery terminal is removed.
Therefore, if necessary, read the diagnosis before removing the battery terminal.
2. Do not smoke or work near an open flame when working on the fuel system.
3. Keep gasoline off rubber or leather parts.

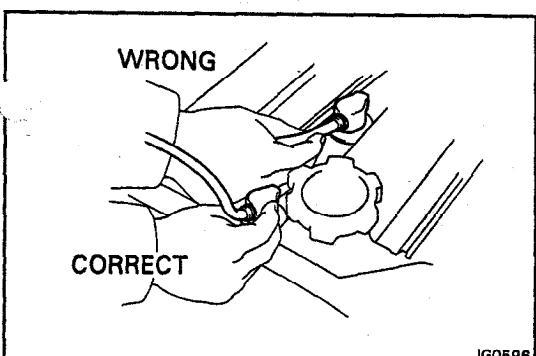
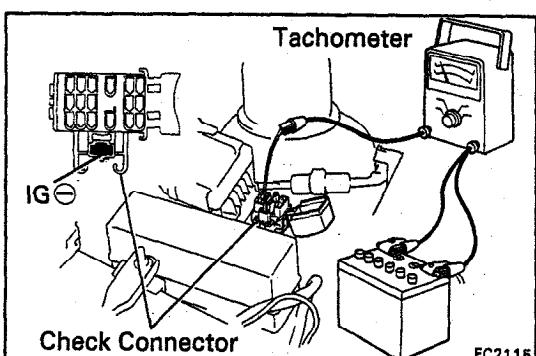
INSPECTION PRECAUTIONS

MAINTENANCE PRECAUTIONS

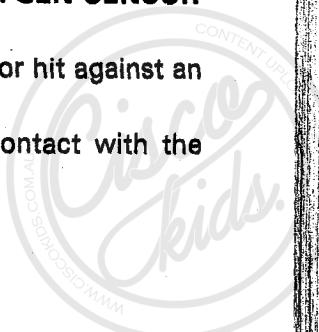
1. INSURE CORRECT ENGINE TUNE-UP
2. PRECAUTIONS WHEN CONNECTING GAUGE
 - (a) Connect the tachometer test probe to the terminal $IG\ominus$ of check connector.

CHECK CONNECTOR LOCATION:
See pages FI-110, 111

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



3. IN EVENT OF ENGINE MISFIRE FOLLOWING PRECAUTIONS SHOULD BE TAKEN
 - (a) Insure proper connection of battery terminals, etc.
 - (b) Handle high tension cords carefully.
 - (c) After repair work, insure that the ignition coil terminals and all other ignition system lines are reconnected securely.
 - (d) When cleaning the engine compartment, be especially careful to protect the electrical system from water.
4. PRECAUTIONS WHEN HANDLING OXYGEN SENSOR (w/ TWC)
 - (a) Do not allow oxygen sensor to drop or hit against an object.
 - (b) Do not allow water to come into contact with the sensor or attempt to cool it.



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

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

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

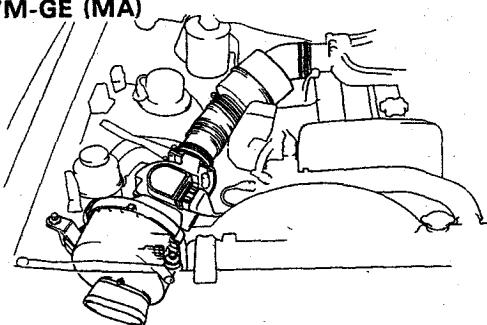
Therefore, observe the following precautions:

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

AIR INDUCTION SYSTEM

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

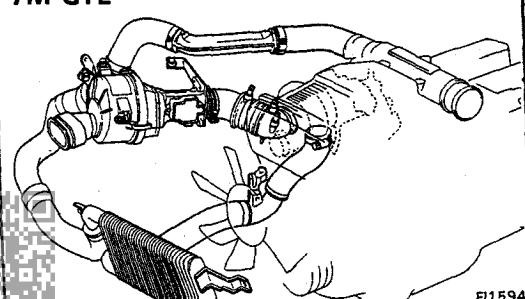
7M-GE (MA)



7M-GE (MS)



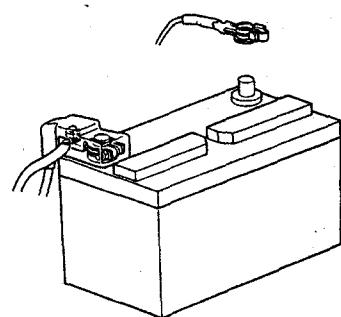
7M-GTE



FI1594



ELECTRONIC CONTROL SYSTEM

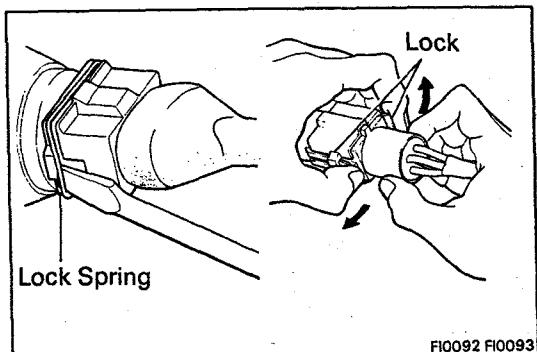


F11066

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

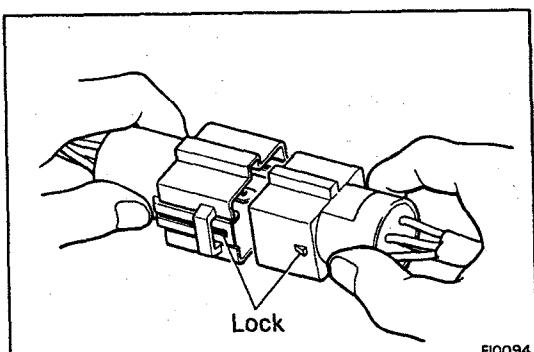
8. Care is required when pulling out the inserting wiring connectors.

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



F10092 F10093

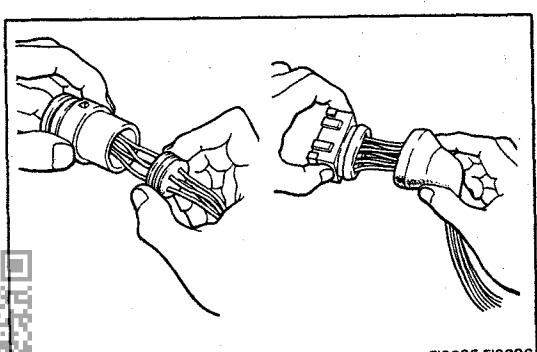
(b) Fully insert the connector and insure that it is locked.



F10094

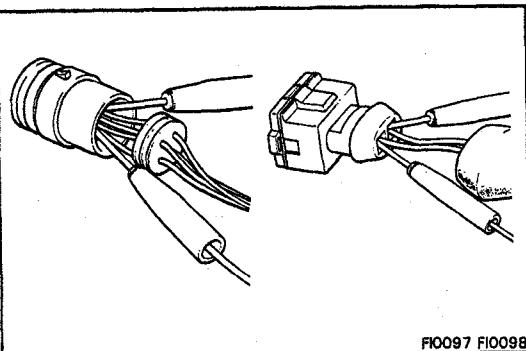
9. When inspecting a connector with a circuit tester.

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

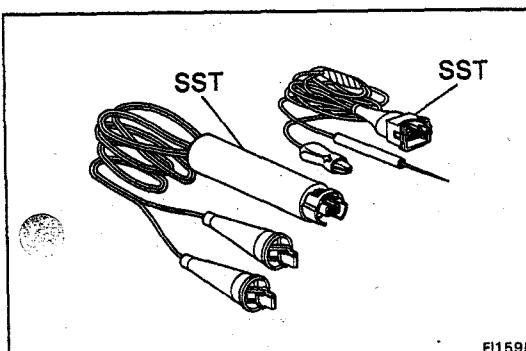


F10095 F10096



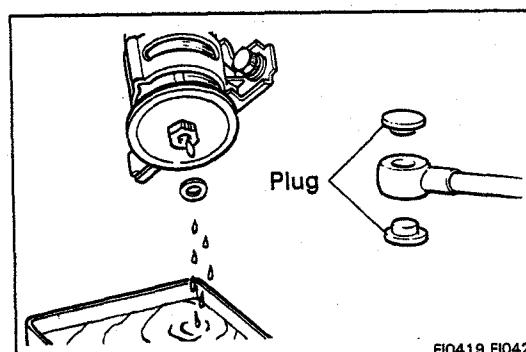


- (b) Insert the tester probe into the connector from the wiring side when checking the continuity, amperage or voltage.
- (c) Do not apply unnecessary force to the terminal.
- (d) After checking, install the water-proofing rubber on the connector securely.



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

SST 09842-30050 and 09842-30060



FUEL SYSTEM

1. When disconnecting the high fuel pressure line, a large amount of gasoline will spill out, so observe the following procedure.

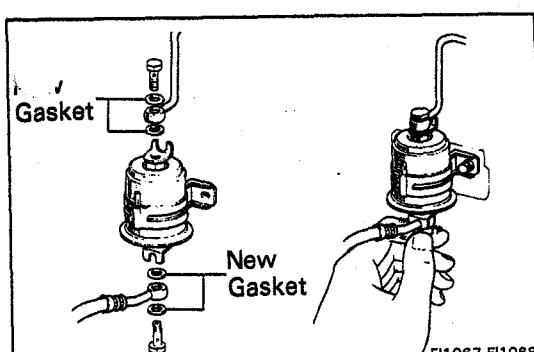
- (a) Put a container under the connection.
- (b) Slowly loosen the connection.
- (c) Disconnect the connection.
- (d) Plug the connection with a rubber plug.

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

(Union bolt type)

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

Torque: 300 kg-cm (22 ft-lb, 29 N·m)



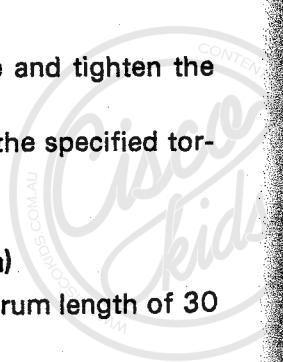
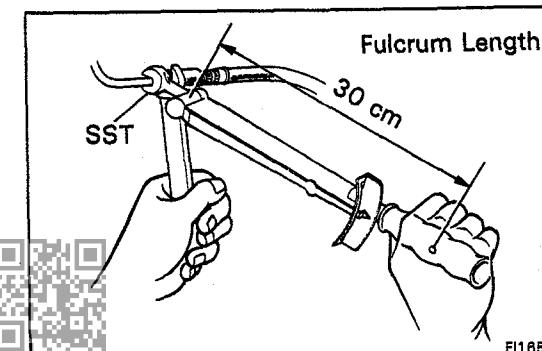
(Flare nut type)

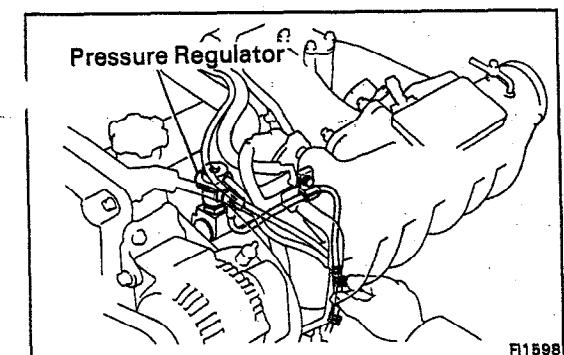
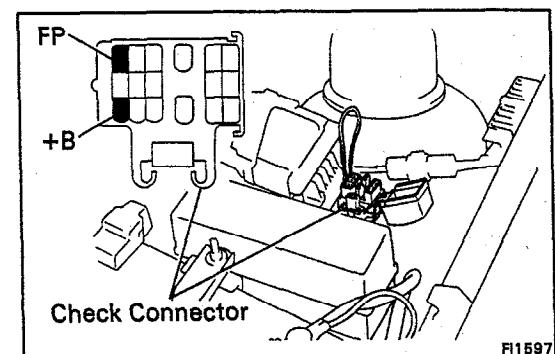
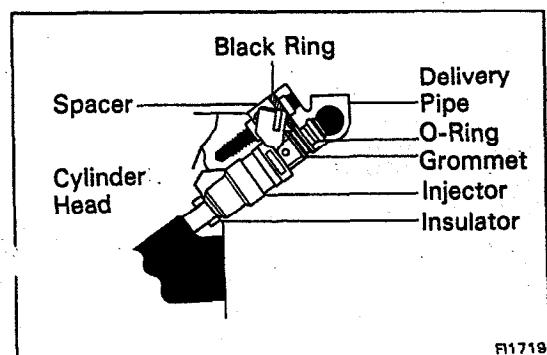
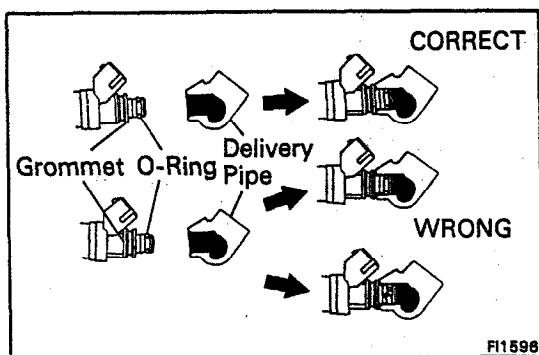
- (a) Apply a thin coat of oil to the flare and tighten the flare nut.
- (b) Then using SST, tighten the nut to the specified torque.

SST 09631-22020

Torque: 310 kg-cm (22 ft-lb, 30 N·m)

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





3. Observe the following precautions when removing and installing the injectors.

- Never reuse a O-ring.
- When placing an O-ring on the injector, use care not to damage it in any way.
- 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 cylinder head as shown in the figure.

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

5. Check that there are no fuel leaks after performing any maintenance on the fuel system.

- With engine stopped, turn the ignition switch ON.
- Short circuit the fuel pump check terminal +B and FP of the check connector with the service wire.

CHECK CONNECTOR LOCATION:

See pages FI-110, 111

- When the fuel return hose is pinched, the pressure within the high pressure line will rise to about 4 kg/cm (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

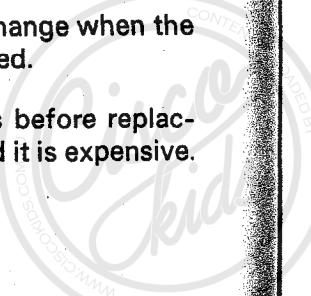
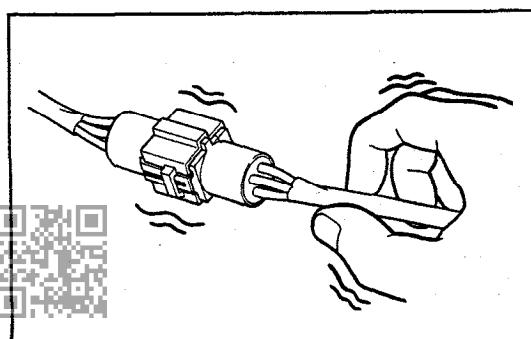
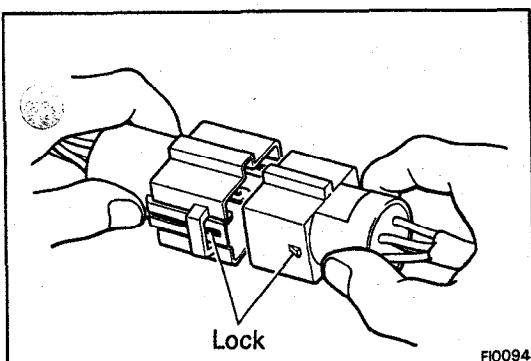
1. Engine troubles are usually not caused by the EFI system. When troubleshooting, always first check the condition of the other systems.
 - (a) Electronic source
 - Battery
 - Fusible links
 - Fuses
 - (b) Body ground
 - (c) Fuel supply
 - Fuel leakage
 - Fuel filter
 - Fuel pump
 - (d) Ignition system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

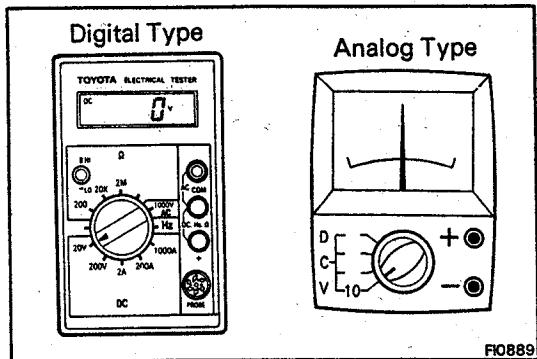
2. The most frequent cause of problems is simply a bad contact in wiring connectors. Always make sure that connections are secure.

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

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

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

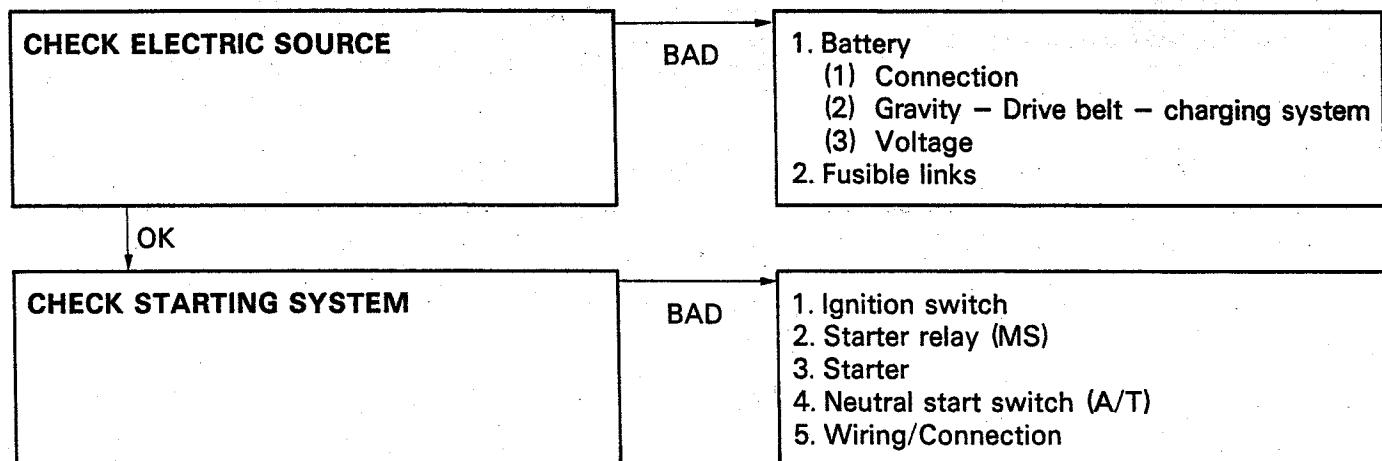




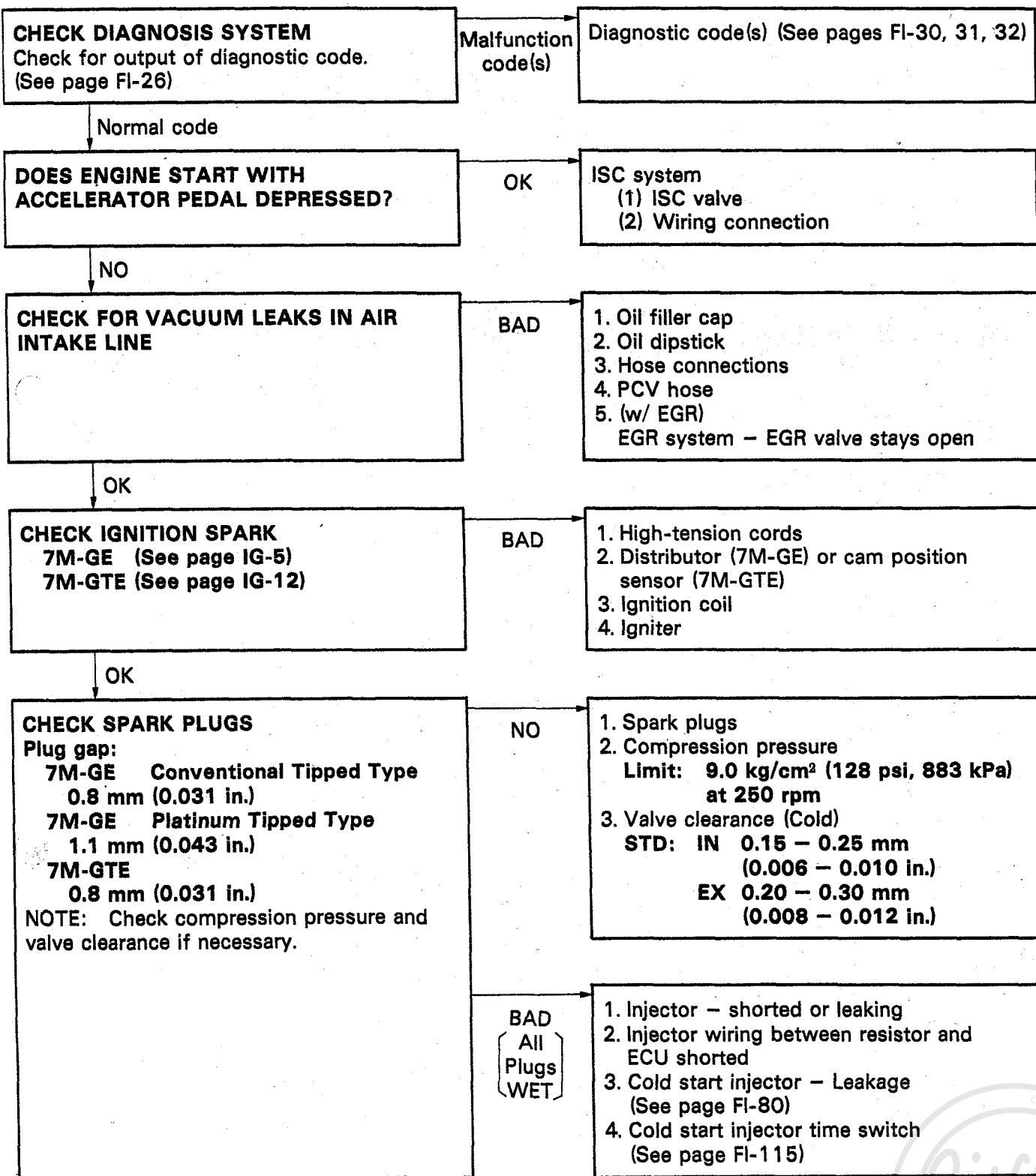
4. Use a volt/ohmmeter with high impedance (10 k Ω /V minimum) for troubleshooting of the electrical circuit. (See pages FI-34, 57)

TROUBLESHOOTING PROCEDURES

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

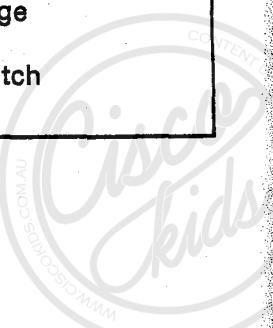


SYMPTOM — DIFFICULT TO START OR NO START (CRANKS OK)



OK

CONTINUED ON PAGE FI-15



OK CONTINUED FROM PAGE FI-14

CHECK FUEL SUPPLY TO INJECTOR

1. Fuel in tank
2. Fuel pressure in fuel line
 - (1) Short terminals +B and FP of the check connector.
 - (2) You can feel fuel pressure in fuel return hose.
3. Check circuit opening relay
(See page FI-113)

BAD

1. Fuel line — leakage — deformation
2. Fuse
3. Fuel pump (See page FI-73)
4. Fuel filter
5. Fuel pressure regulator (See page FI-84)
6. Circuit opening relay (See page FI-113)

OK

CHECK FUEL PUMP SWITCH IN AIR FLOW METER (7M-GE)

Check continuity between terminals FP and E1 with measuring plate of air flow meter open.

BAD

Air flow meter (See page FI-96)

OK

CHECK IGNITION TIMING

1. Short terminals T(MA) or TE1(MS) and E1 of the check connector.
2. Check ignition timing.
STD: 10° BTDC @ Idle
[w/ short circuited T(MA) or TE1(MS) — E1]

NO

Adjust ignition timing (See page EM-17)

OK

CHECK EFI ELECTRONIC CIRCUIT USING VOLT/OHM METER

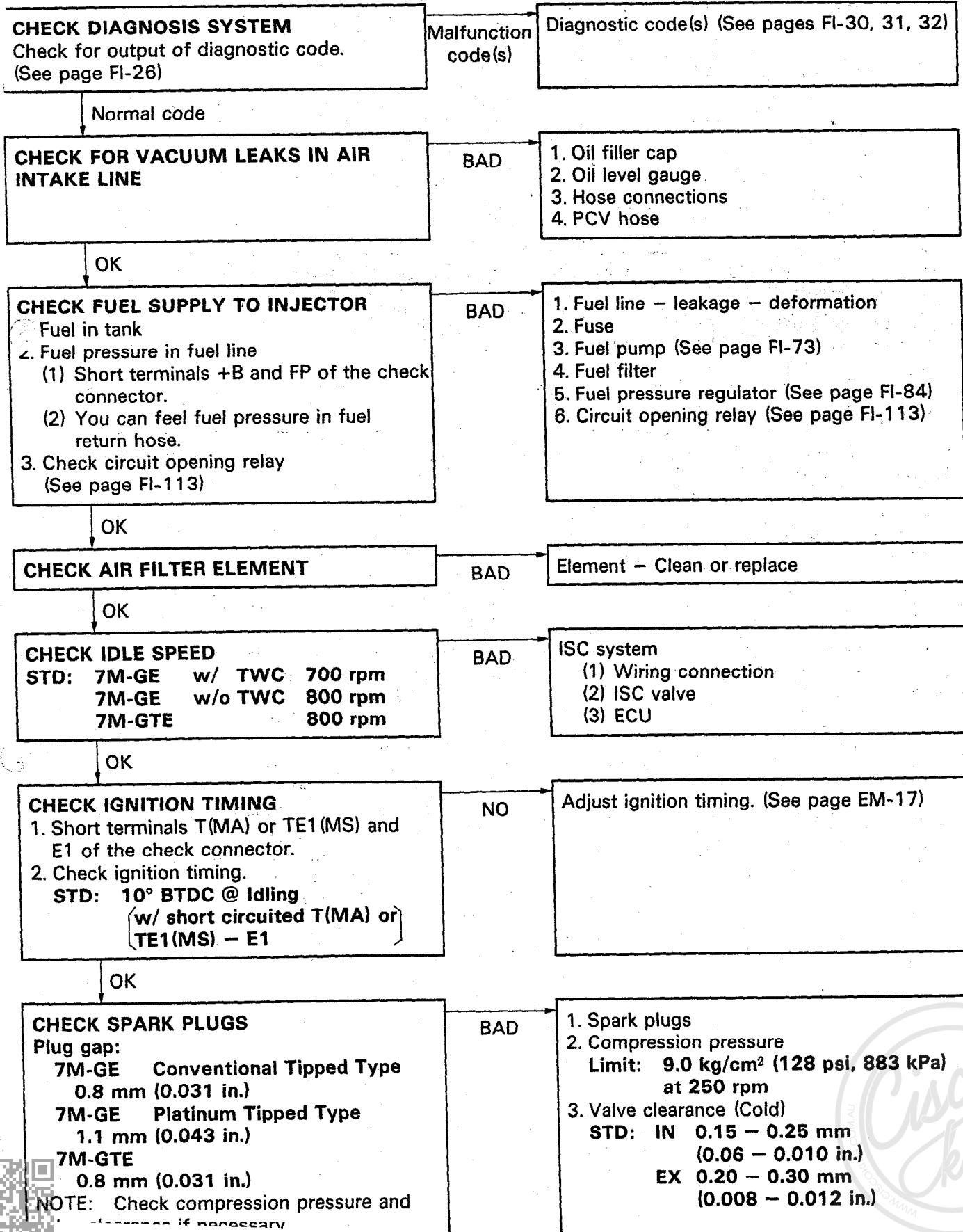
(See pages FI-34, 57)

BAD

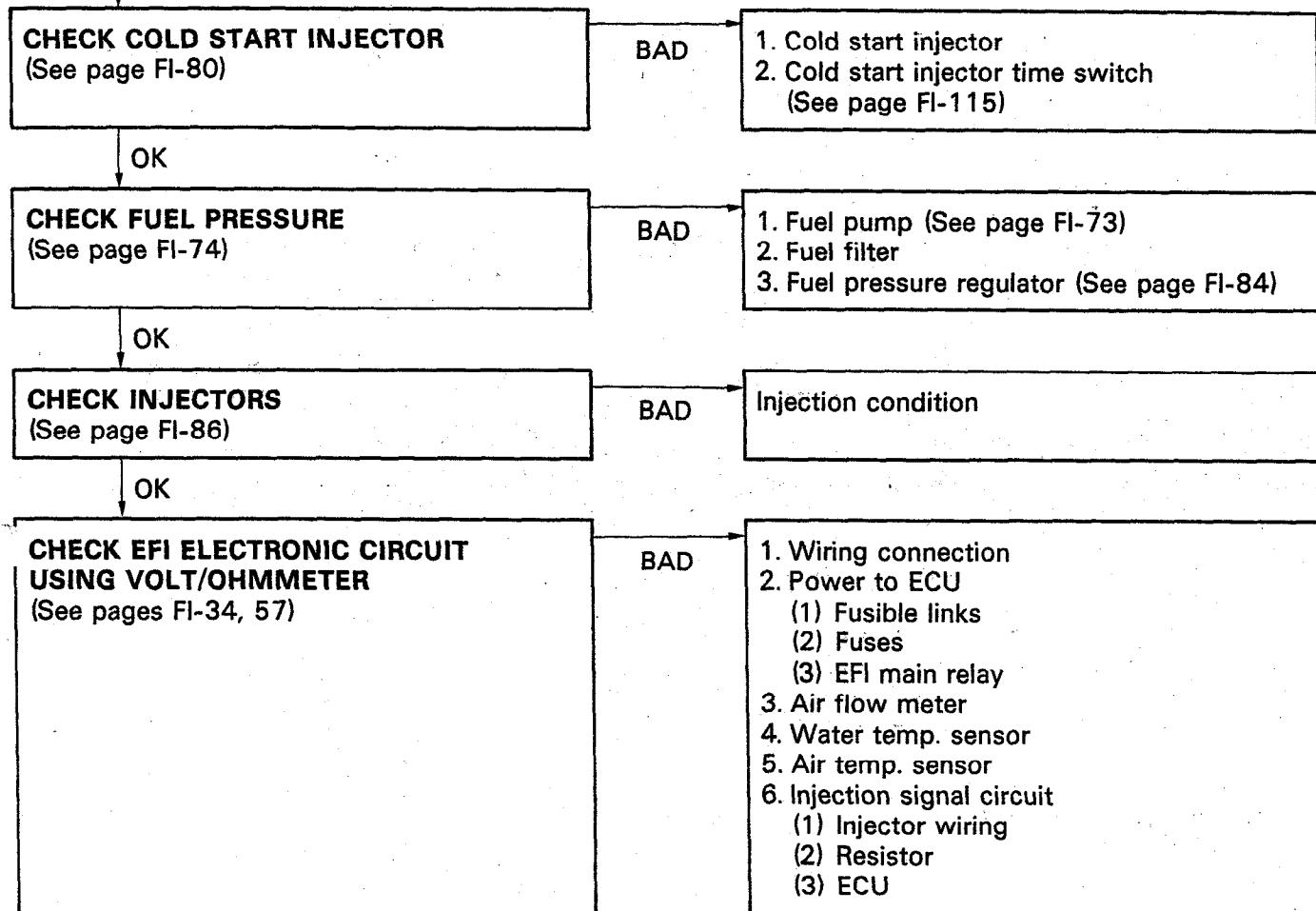
1. Wiring connection
2. Power to ECU
 - (1) Fusible links
 - (2) Fuses
 - (3) EFI main relay
3. Air flow meter
4. Water temp. sensor
5. Air temp. sensor
6. Injection signal circuit
 - (1) Injector wiring
 - (2) Resistor
 - (3) ECU



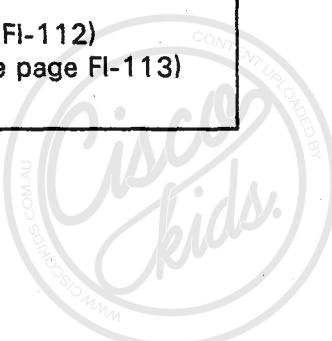
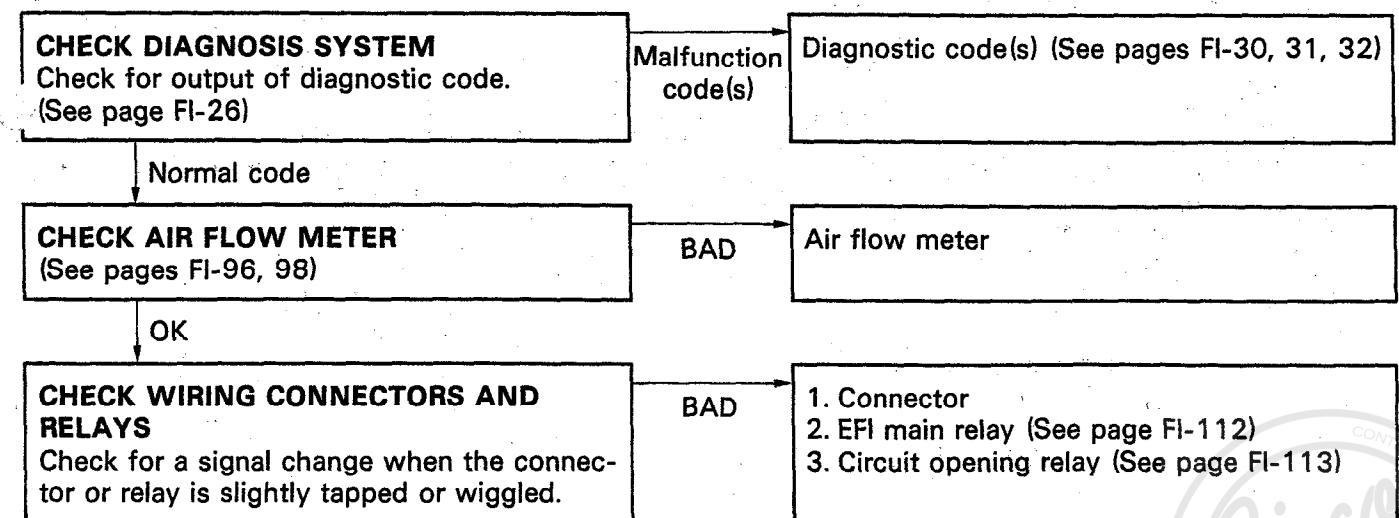
SYMPTOM — ENGINE OFTEN STALLS



OK CONTINUED FROM PAGE FI-16

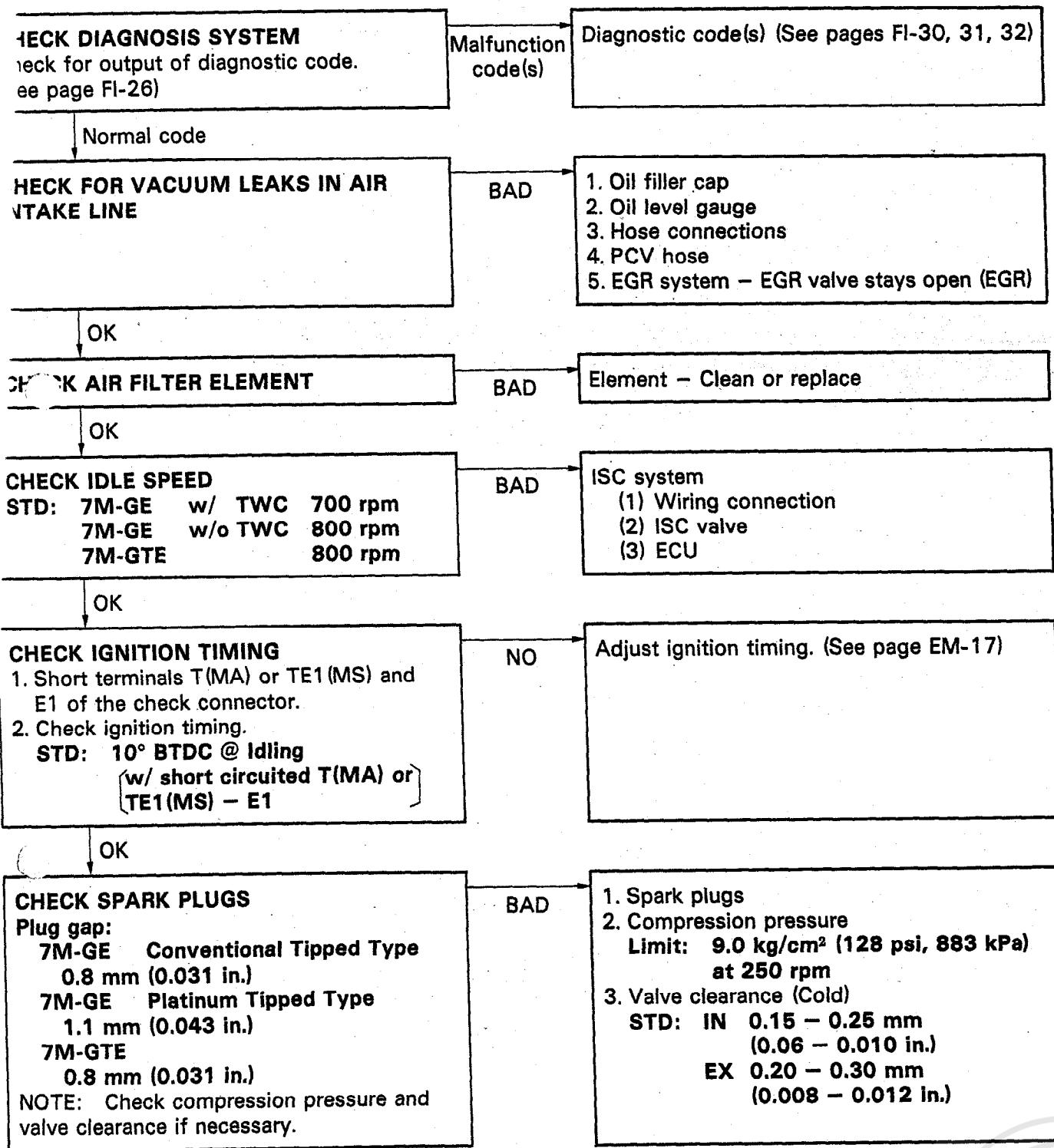


SYMPTOM — ENGINE SOMETIMES STALLS

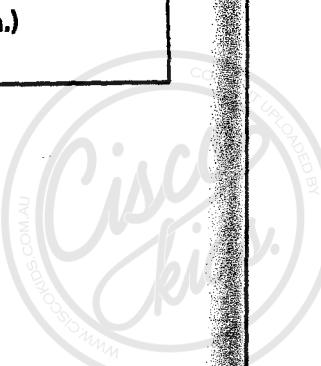


EFI SYSTEM — Troubleshooting

SYMPTOM — ROUGH IDLING AND/OR MISSING



OK CONTINUED ON PAGE FI-19



OK CONTINUED FROM PAGE FI-18

CHECK COLD START INJECTOR
(See page FI-80)

BAD

1. Cold start injector
2. Cold start injector time switch
(See page FI-115)

OK

CHECK FUEL PRESSURE
(See page FI-74)

BAD

1. Fuel pump (See page FI-73)
2. Fuel filter
3. Fuel pressure regulator (See page FI-84)

OK

CHECK INJECTORS
(See page FI-86)

BAD

Injection condition

OK

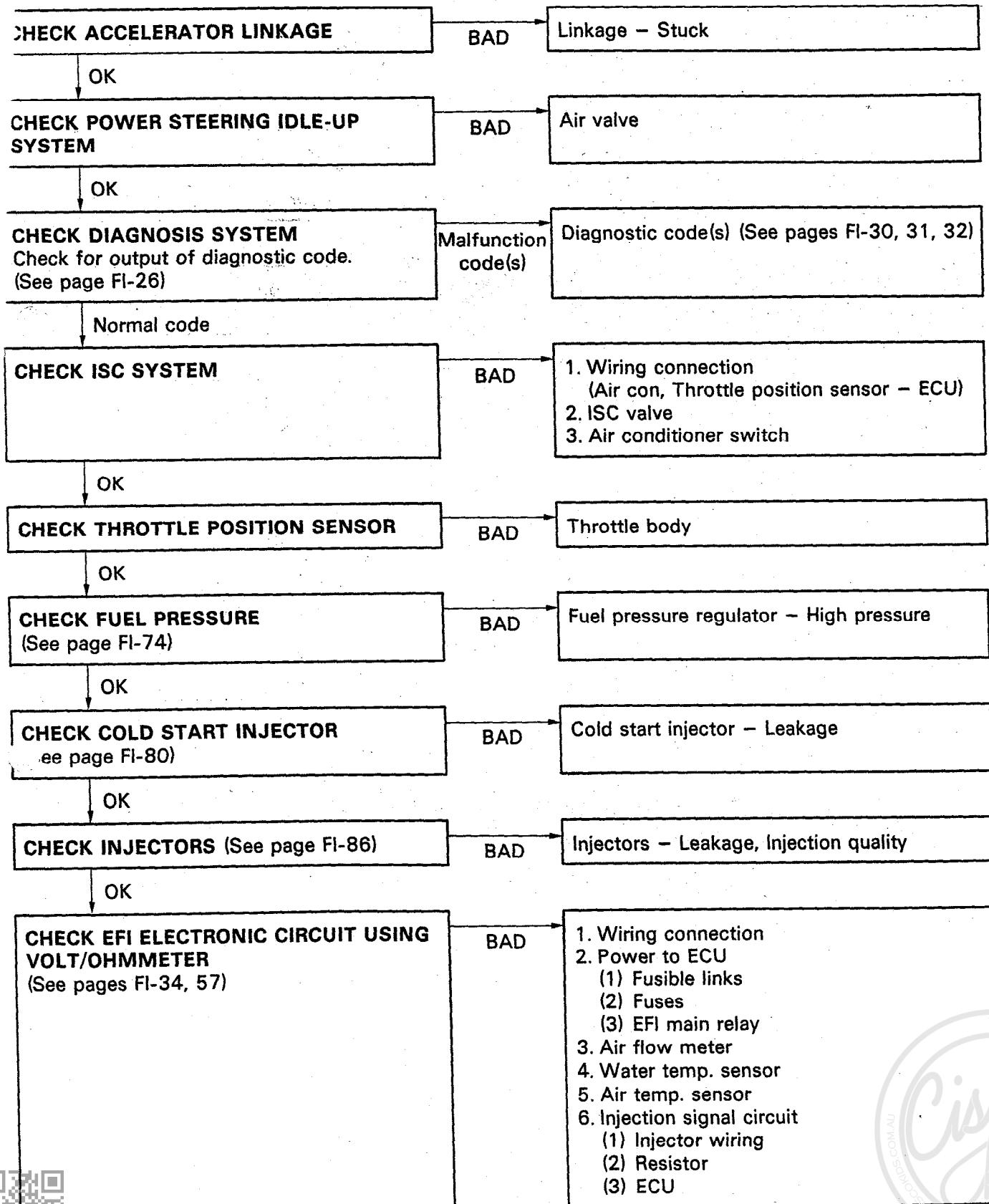
**CHECK EFI ELECTRONIC CIRCUIT
USING VOLT/OHM METER**
(See pages FI-34, 57)

BAD

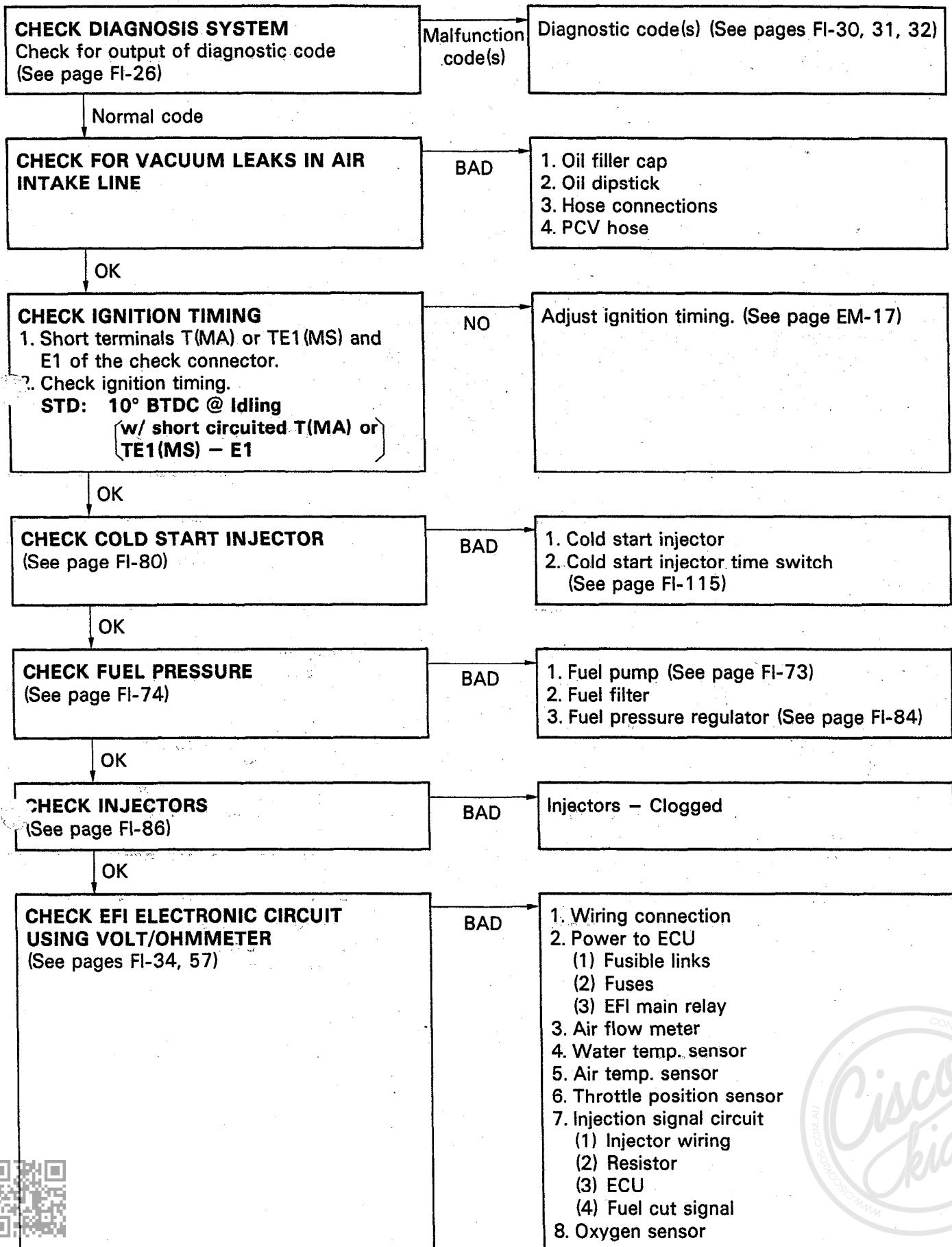
1. Wiring connection
2. Power to ECU
 - (1) Fusible links
 - (2) Fuses
 - (3) EFI main relay
3. Air flow meter
4. Water temp. sensor
5. Air temp. sensor
6. Throttle position sensor
7. Injection signal circuit
 - (1) Injector wiring
 - (2) Resistor
 - (3) ECU



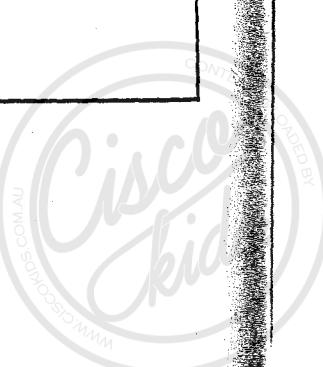
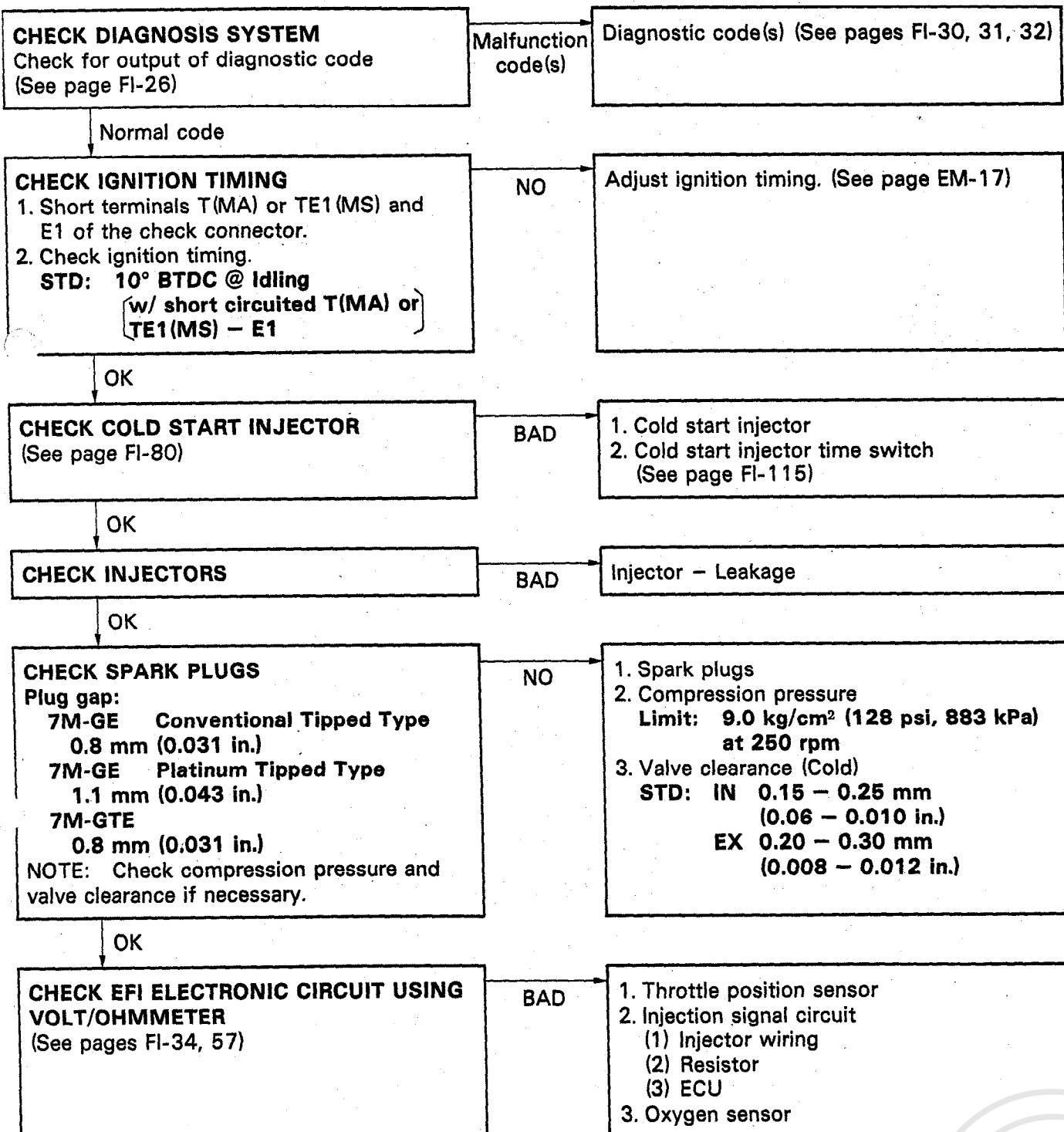
SYMPTOM — HIGH ENGINE IDLE SPEED (NO DROP)



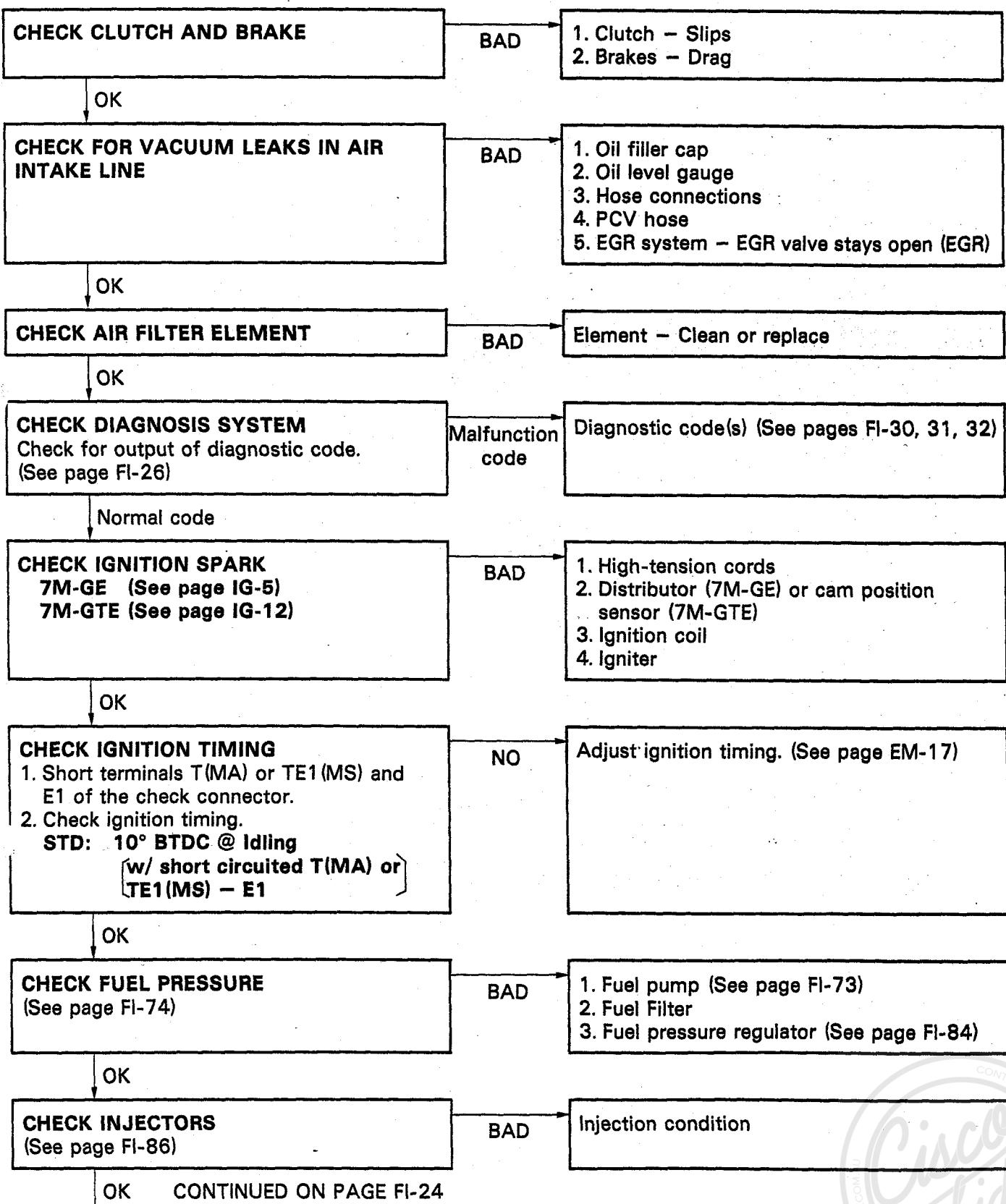
SYMPTOM — ENGINE BACKFIRES-Lean Fuel Mixture



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



SYMPTOM — ENGINE HESITATES AND/OR POOR ACCELERATION



OK CONTINUED FROM PAGE FI-23

CHECK SPARK PLUGS

Plug gap:

7M-GE Conventional Tipped Type

0.8 mm (0.031 in.)

7M-GE Platinum Tipped Type

1.1 mm (0.043 in.)

7M-GTE

0.8 mm (0.031 in.)

NOTE: Check compression pressure and valve clearance if necessary.

BAD

1. Spark plugs
2. Compression pressure
Limit: 9.0 kg/cm² (128 psi, 883 kPa)
at 250 rpm
3. Valve clearance (Cold)
STD: IN 0.15 — 0.25 mm
(0.06 — 0.010 in.)
EX 0.20 — 0.30 mm
(0.008 — 0.012 in.)

OK

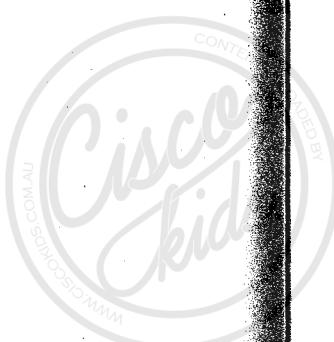
CHECK EFI ELECTRONIC CIRCUIT

SING VOLT/OMMETER

(See pages FI-34, 57)

BAD

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



DIAGNOSIS SYSTEM

DESCRIPTION

(MA)

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

By analyzing various signals as shown in the later table (See pages FI-30, 31) the Electronic Control Unit (ECU) detects system malfunctions which are related to the various operating parameter sensors or to the actuator. The ECU stores the failure until the diagnosis system is cleared by removing the EFI fuse with the ignition switch off.

A "CHECK ENGINE" warning light on the instrument panel informs the driver that a malfunction has been detected.

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

The diagnostic code can be read by the number of the blinks of the "CHECK ENGINE" warning light when T and E1 are short-circuited.

(MS)

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

By analyzing various signals as shown in the later table (See page FI-32) the Electronic Control Unit (ECU) detects system malfunctions which are related to the various operating parameter sensors or to the actuator. The ECU stores the failure until the diagnosis system is cleared by removing the EFI fuse with the ignition switch off.

In the ECU, a test mode function has been added to the functions of the self-diagnosis system of the previous diagnosis mode (normal mode) for the purpose of detecting malfunctions such as poor contact which are difficult to detect in the normal mode. This function fills up the self-diagnosis system. The test mode can be implemented by the technician to follow the procedures of appropriate check terminal connection and operation described in later (See page FI-28).

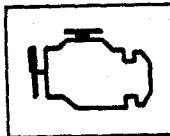
In the normal mode, the self-diagnosis system monitors 14 items, indicated by the codes except for code No. 51 as shown in FI-32. A "CHECK ENGINE" warning light on the instrument panel informs the driver that a malfunction has been detected. The light goes out automatically when the malfunction has been cleared.

The diagnostic code can be read by the number of the blinks of the "CHECK ENGINE" warning light when TE1 and E1 are short-circuited.



In the test mode, seven items, indicated by code Nos. 13, 22, 24, 41, 42, 43, and 51, as shown in FI-32 are monitored. If a malfunction is detected in any one of the systems indicated by code Nos. 13, 22, 24, and 41 the ECU lights the "CHECK ENGINE" warning light to warn the technician that the malfunction has been detected. In this case, TE2 and E1 terminals on the check connector should be connected as shown later (See page FI-28)

In the test mode, for all seven conditions shown above in code Nos. 13 – 51, even if the malfunction is corrected, the malfunction is stored in the ECU memory while the ignition switch remains on. Also, when a malfunction occurs for the four conditions from code Nos. 13 – 41, the "CHECK ENGINE" warning light remains on. However, once the ignition switch is turned to OFF, the ECU erases all of the malfunctions in the memory. The diagnostic mode (normal or test) and the output of the "CHECK ENGINE" warning light can be selected by the TE1, TE2 and E1 terminal connections on the check connector, as shown in the later.



"CHECK ENGINE" Warning Light

FI2552

"CHECK ENGINE" WARNING LIGHT CHECK

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

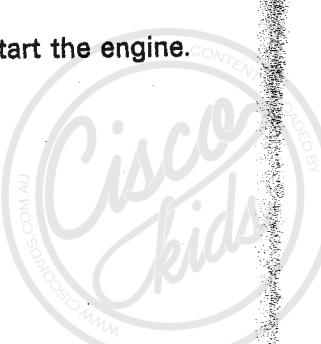
If the light remains on, the diagnosis system has detected a malfunction or abnormality in the system.

OUTPUT OF DIAGNOSIS CODES

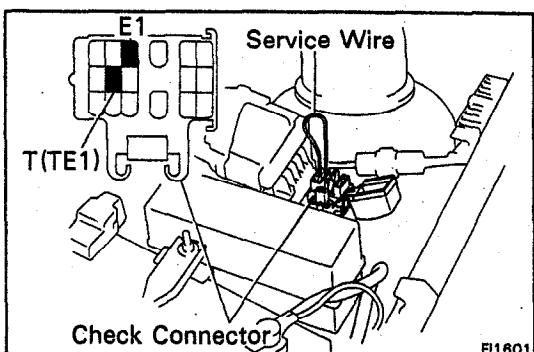
(MA)

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

1. Initial conditions
 - (a) Battery voltage about 11 volts
 - (b) Throttle valve fully closed (throttle position sensor IDL points closed)
 - (c) Transmission in neutral position
 - (d) Accessory switches OFF
2. Turn the ignition switch to ON. Do not start the engine.

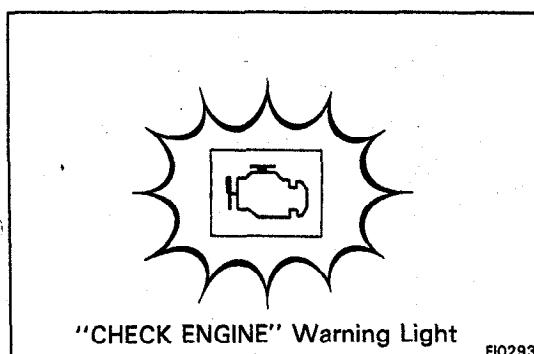


* Use this method

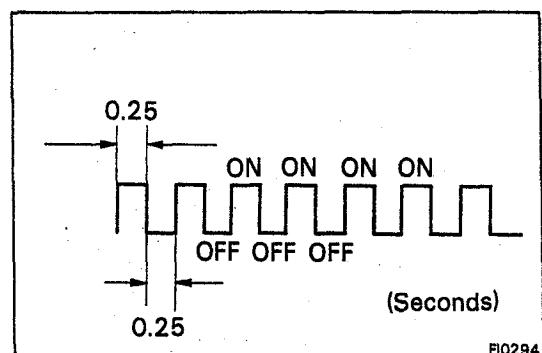


3. Using a service wire, short terminals T(MA) or TE1(MS) and E1 of the check connector.

CHECK CONNECTOR LOCATION:
See pages FI-110, 111



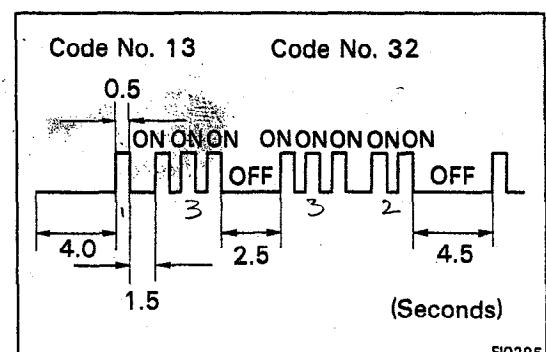
4. Read the diagnosis code as indicated by the number of flashes of the "CHECK ENGINE" warning light.



Diagnosis code (See pages FI-30, 31, 32)

(a) Normal System Operation

- The light will alternately blink on and off for 0.25 second intervals.



(b) Malfunction Code Indication

- The light will blink the number of times equal to the malfunction code indication with pauses as follows:
 1. Between the first digit and second digit, 1.5 seconds.
 2. Between code and code, 2.5 seconds.
 3. Before repeating all malfunction codes, 4.5 seconds.
- The diagnostic code series will be repeated as long as the "CHECK ENGINE" connector terminals T(TE1) and E1 are shorted.

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

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



(MS)

Normal mode
(See procedure MA)

Car has to be driven

Test mode

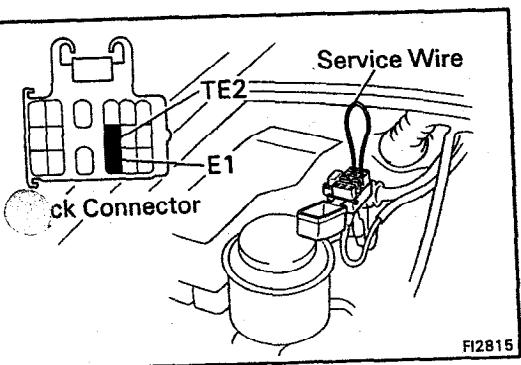
To obtain an output of diagnostic codes, proceed as follows:

1. Initial conditions
 - (a) Battery voltage about 11 volts
 - (b) Throttle valve fully closed (throttle position sensor IDL points closed)
 - (c) Transmission in neutral position
 - (d) Accessory switches OFF
2. Using a service wire, short terminals TE2 and E1 of the check connector.
3. Start the engine and run the vehicle at a speed of 10 km/h (6 mph) or higher.
4. Simulate the conditions of the malfunction described by the user.
5. Using a service wire, short terminals TE1 and E1 of the check connector.

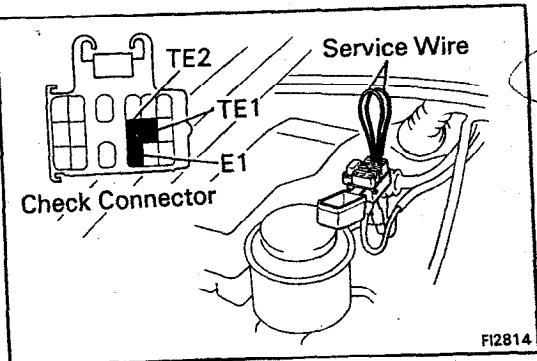
NOTE:

- The test mode will not start if terminals TE2 and E1 are connected after the ignition switch is turned on, or terminals TE2 and E1 are connected after terminals TE1 and E1 are connected.
- The starter signal and vehicle speed signal will be diagnosed by the ECU as malfunctions, and codes No. 42, and 43 will be output, if the operation in 3. above is not performed.

6. Read the diagnosis code as indicated by the number of flashes of the "CHECK ENGINE" warning light.
(See page FI-27)
7. After the diagnosis check, remove the service wires.

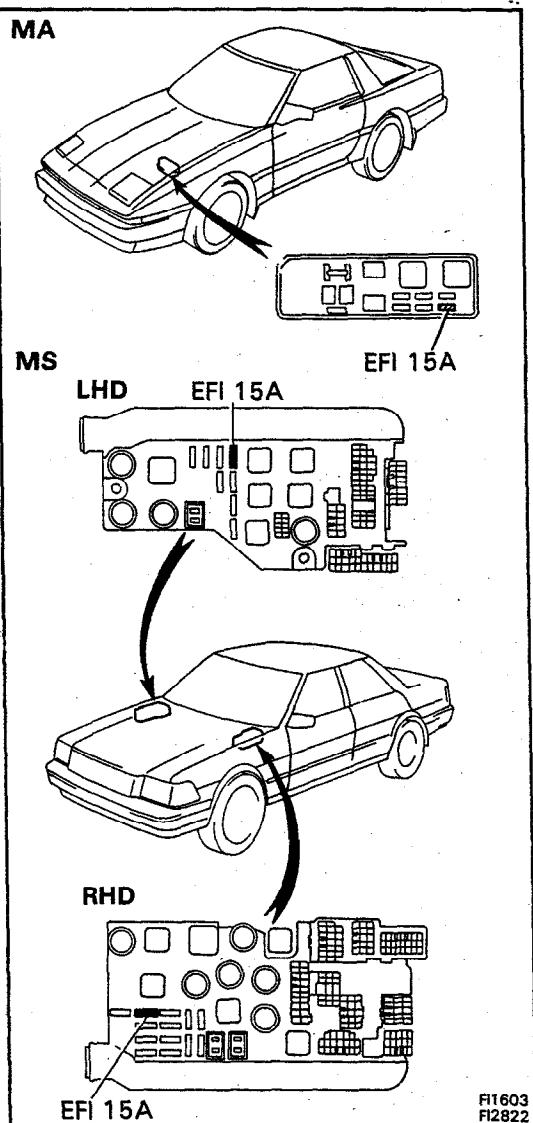


FI2815



FI2814





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 EFI fuse 15A for 30 seconds or more, depending on ambient temperature (the lower the temperature, the longer the fuse must be left out) with the ignition switch off.

NOTE:

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

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

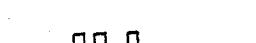
If the same diagnostic code is still indicated, it means that the trouble area has not been repaired thoroughly.

DIAGNOSIS INDICATION

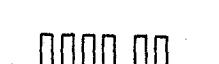
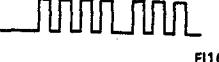
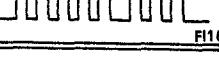
- (1) When 2 or more codes are indicated, the lowest number (code) will appear first.
However, no other code will appear along with code No. 11.
- (2) All detected diagnostic codes, except 51 and 53, will be retained in memory by the ECU from the time of detection until cancelled out.
- (3) Once the malfunction is cleared, the "CHECK ENGINE" warning light on the instrument panel will go out but the diagnostic code(s) remain stored in ECU memory (except for codes 51 and 53).



DIAGNOSTIC CODES (MA)

Code No.	Number of Check engine blinks	System	Diagnosis	Trouble area	See page
—	 FI1604	Normal	This appears when none of the other codes are identified.	—	—
11	 FI1605	ECU (+B)	Momentary interruption in power supply to ECU.	<ul style="list-style-type: none"> ● Ignition switch circuit ● Ignition switch ● Main relay circuit ● Main relay ● ECU 	FI-41
12	 FI1606	RPM Signal	No "NE" or "G" signal to ECU within 2 seconds after engine has been cranked.	<ul style="list-style-type: none"> ● Distributor circuit ● Distributor ● Starter signal circuit ● ECU 	IG-3
13	 FI1607	RPM Signal	No "NE" signal to ECU when engine speed is above 1,000 rpm.	<ul style="list-style-type: none"> ● Distributor circuit ● Distributor ● ECU 	IG-3
14	 FI1608	Ignition Signal	No "IGF" signal to ECU 6 – 8 times in succession.	<ul style="list-style-type: none"> ● Ignition and ignition coil circuit ● Igniter and ignition coil ● ECU 	FI-51
*1 21	 FI1609	Oxygen Sensor Signal	Detection of oxygen sensor deterioration.	<ul style="list-style-type: none"> ● Oxygen sensor circuit ● Oxygen sensor ● ECU 	FI-122
22	 FI1610	Water Temp. Sensor Signal	Open or short circuit in water temp. sensor signal.	<ul style="list-style-type: none"> ● Water temp. sensor circuit ● Water temp. sensor ● ECU 	FI-49
24	 FI1611	Intake Air Temp. Sensor Signal	Open or short circuit in intake air temp. sensor signal.	<ul style="list-style-type: none"> ● Intake air temp. sensor circuit ● Intake air temp. sensor ● ECU 	FI-48
31	 FI1612	Air-flow Meter Signal	(7M-GE) Open circuit in VC signal or short circuit between VS and E2 when idle contacts are closed. (7M-GTE) Open or Short circuit in air flow meter signal.	<ul style="list-style-type: none"> ● Air flow meter circuit ● Air flow meter ● ECU 	FI-44
32	 FI1613	(7M-GE) Air Flow Meter Signal	(7M-GE) Open circuit in E2 or short circuit between VC and VS.	<ul style="list-style-type: none"> ● Air flow meter circuit ● Air flow meter ● ECU 	FI-44
		(7M-GTE) HAC Sensor Signal	(7M-GTE) Open or short circuit in HAC sensor signal	<ul style="list-style-type: none"> ● HAC sensor circuit ● HAC sensor ● ECU 	FI-56
*2 34	 FI2818	Turbocharger Pressure	*3 Turbocharger pressure is abnormal.	<ul style="list-style-type: none"> ● Turbocharger ● Air flow meter ● Intercooler system ● ECU 	—
41	 FI1614	Throttle Position Sensor Signal	Open or short circuit in throttle position sensor signal.	<ul style="list-style-type: none"> ● Throttle position sensor circuit ● Throttle position sensor ● ECU 	FI-42

DIAGNOSTIC CODES (MA) (Cont'd)

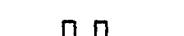
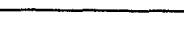
Code No.	Number of Check engine blinks	System	Diagnosis	Trouble area	See page
42	 FI1616	Vehicle Speed Sensor Signal	No "SPD" signal for 5 seconds when engine speed is between 2,500 rpm and 4,500 rpm and coolant temp. is below 80°C (176°F) except when racing the engine.	<ul style="list-style-type: none"> • Vehicle speed sensor circuit • Vehicle speed sensor • ECU 	—
43	 FI1616	Starter Signal	No "STA" signal to ECU until engine speed reaches 800 rpm with vehicle not moving.	<ul style="list-style-type: none"> • Ignition switch circuit • Ignition switch • ECU 	FI-50
52	 FI1618	Knock Sensor Signal	Open or short circuit in knock sensor signal.	<ul style="list-style-type: none"> • Knock sensor circuit • Knock sensor • ECU 	—
53	 FI1619	Knock Control signal in ECU	Knock control in ECU faulty.	<ul style="list-style-type: none"> • ECU 	—
51	 FI1617	Switch Signal	No "IDL" signal, "NSW" signal or "A/C" signal to ECU, with check terminals E1 and T shorted.	<ul style="list-style-type: none"> • A/C switch circuit • A/C switch • A/C amplifire • Neutral start switch circuit • Neutral start switch • Throttle position sensor circuit • Throttle position sensor • ECU 	—

*1 w/ TWC vehicles only

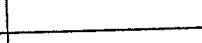
*2 7M-GTE only

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

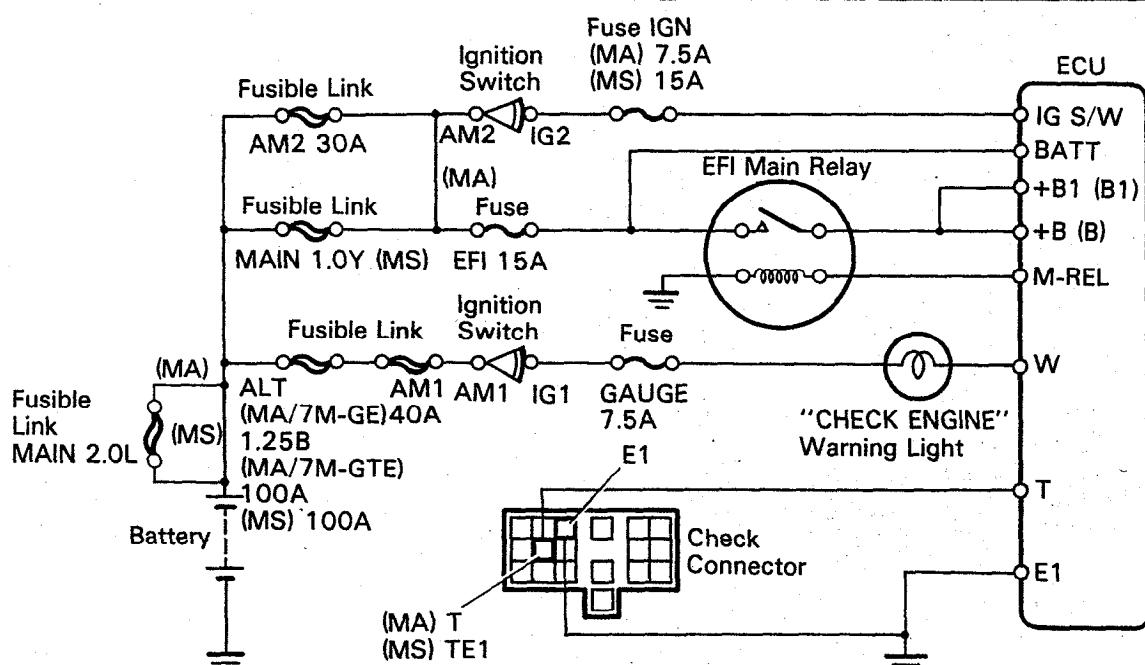
DIAGNOSTIC CODES (MS)

Code No.	Number of Check engine blinks	System	Diagnosis	Trouble area	See page
-	 FI1804	Normal	This appears when none of the other codes are identified.	-	-
11	 FI1805	ECU (B)	Momentary interruption in power supply to ECU.	<ul style="list-style-type: none"> ● Ignition switch circuit ● Ignition switch ● Main relay circuit ● Main relay ● ECU 	FI-62
12	 FI1806	RPM Signal	No "NE" or "G" signal to ECU within 2 seconds after engine has been cranked.	<ul style="list-style-type: none"> ● Distributor circuit ● Distributor ● Starter signal circuit ● ECU 	IG-3
13	 FI1807	RPM Signal	No "NE" signal to ECU when engine speed is above 1,000 rpm.	<ul style="list-style-type: none"> ● Distributor circuit ● Distributor ● ECU 	IG-3
14	 FI1808	Ignition Signal	No. "IGF" signal to ECU 6 - 8 times in succession.	<ul style="list-style-type: none"> ● Igniter and ignition coil circuit ● Igniter and ignition coil ● ECU 	FI-70

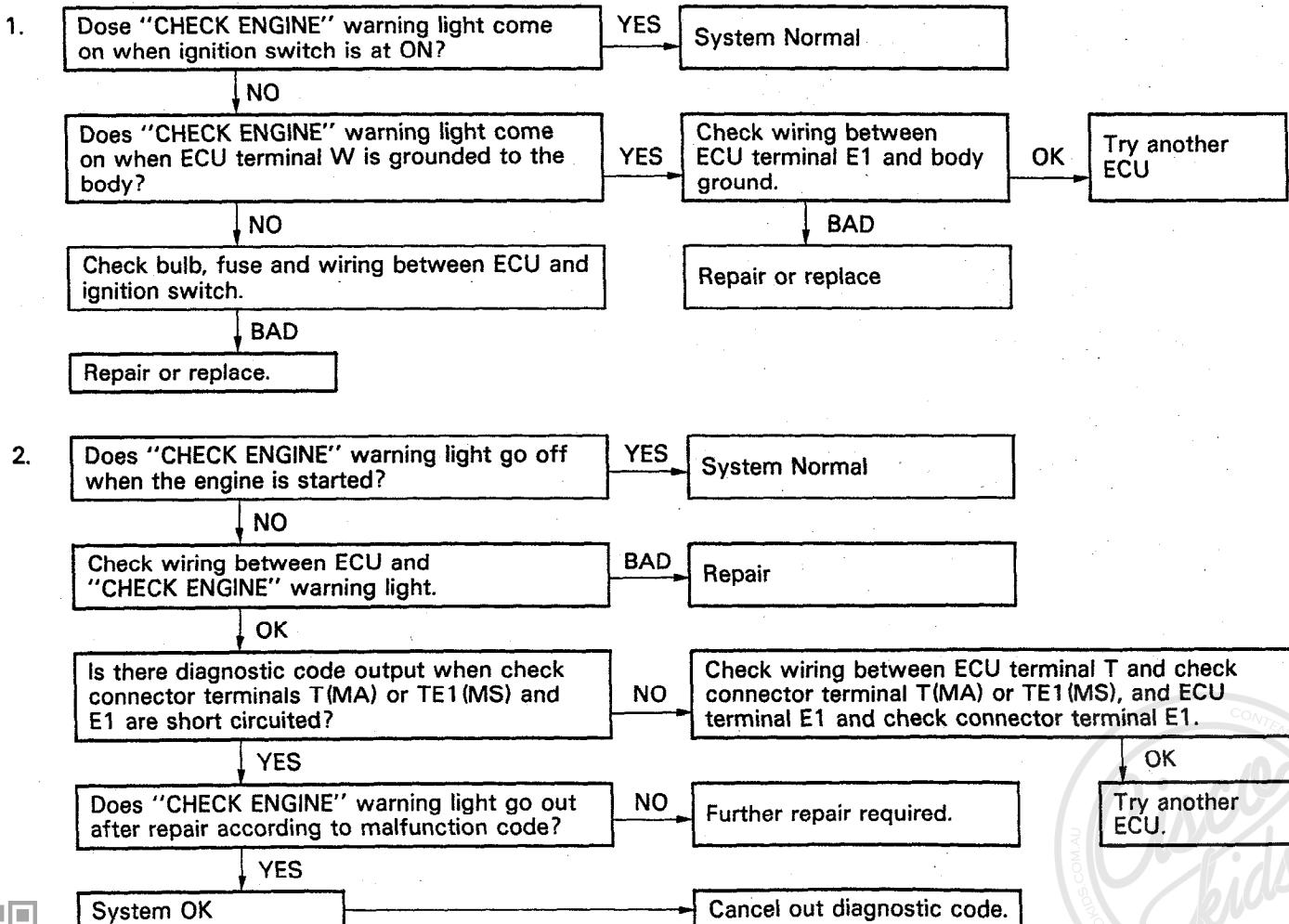
DIAGNOSTIC CODES (MS) (Cont'd)

Code No.	Number of Check engine blinks	System	Diagnosis	Trouble area	See page
22		Water Temp. Sensor Signal	Open or short circuit in water temp. sensor signal.	● Water temp. sensor circuit ● Water temp. sensor ● ECU	FI-68
24		Intake Air Temp. Sensor Signal	Open or short circuit in intake air temp. sensor signal.	● Intake air temp. sensor circuit ● Intake air temp. sensor ● ECU	FI-67
31		Air-flow Meter Signal	Open circuit in VC signal or short circuit between VS and E2 when idle contacts are closed.	● Air flow meter circuit ● Air flow meter ● ECU	FI-65
32		Air-flow Meter Signal	Open circuit in E2 or short circuit between VC and VS.	● Air flow meter circuit ● Air flow meter ● ECU	FI-65
41		Throttle Position Sensor Signal	Open or short circuit in throttle position sensor signal.	● Throttle position sensor circuit ● Throttle position sensor ● ECU	FI-63
42		Vehicle Speed Sensor Signal	No "SPD" signal for 5 seconds when engine speed is between 2,500 rpm and 4,500 rpm and coolant temp. is below 80°C (176°F) except when racing the engine.	● Vehicle speed sensor circuit ● Vehicle speed sensor	—
43		Starter Signal	No "STA" signal to ECU until engine speed reaches 800 rpm with vehicle not moving.	● Ignition switch circuit ● Ignition switch ● ECU	FI-69
52		Knock Sensor Signal	Open or short circuit in knock sensor signal.	● Knock sensor circuit ● Knock sensor ● ECU	—
53		Knock Control signal in ECU	Knock control in ECU faulty.	● ECU	—
72		A/C Compressor Relay Signal	Open or short circuit in A/C compressor relay signal.	● A/C compressor relay circuit ● A/C compressor relay ● ECU	—
51		Switch Signal	No "IDL" signal, "NSW" signal or "A/C" signal to ECU, with check terminals E1 and TE1 shorted.	● A/C switch circuit ● A/C switch ● A/C amplifire ● Neutral start switch circuit ● Neutral start switch ● Throttle position sensor circuit ● Throttle position sensor	—

INSPECTION OF DIAGNOSIS CIRCUIT



FI2915



TROUBLESHOOTING WITH VOLT/OHMmeter (MA)

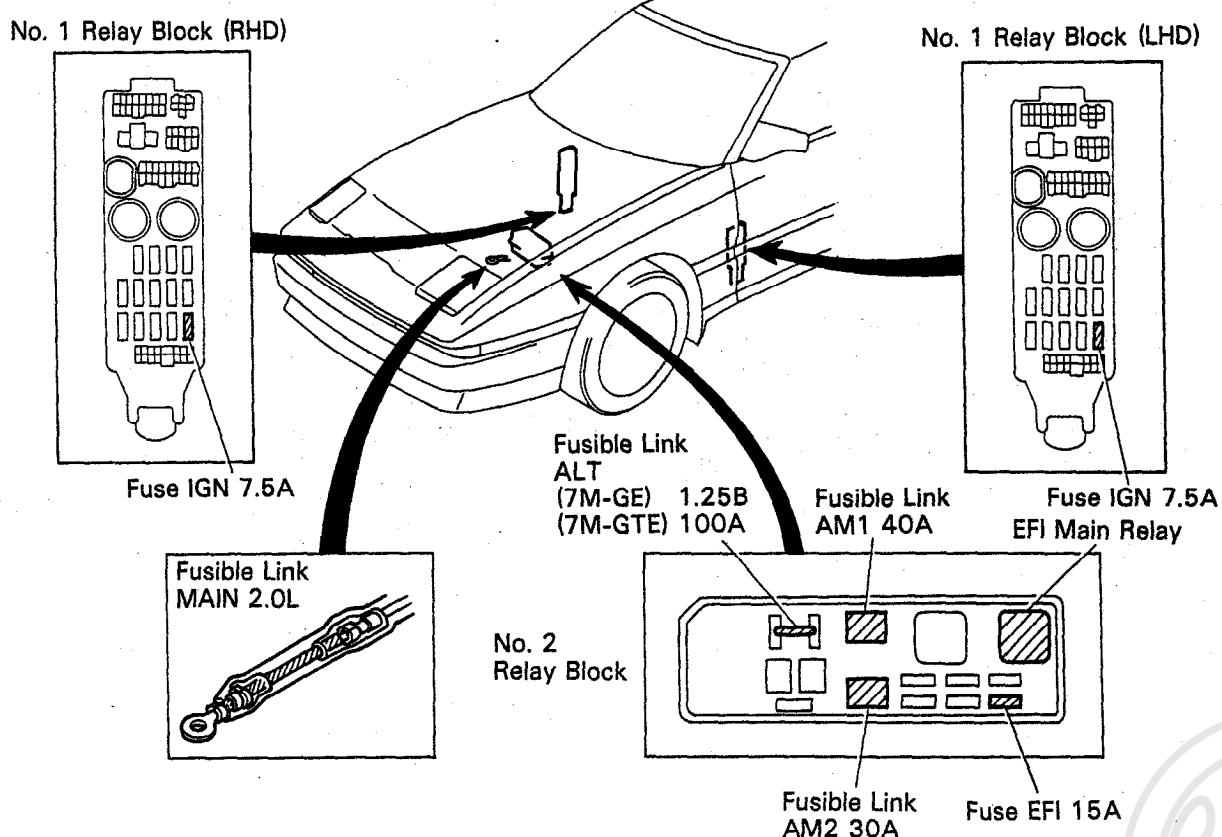
OTE: The following troubleshooting procedures are designed for inspection of each separate system, and therefore the actual procedure may vary somewhat. However, troubleshooting should be performed referring to the inspection methods described in this manual.

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

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

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

LOCATION OF FUSES AND FUSIBLE LINKS

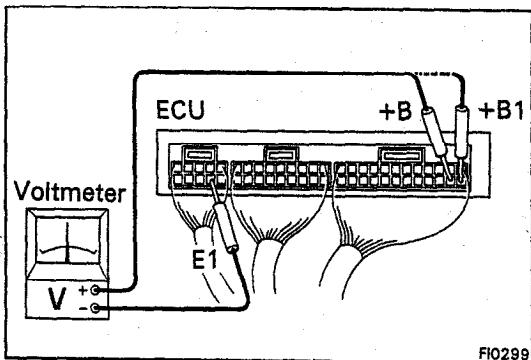


EFI SYSTEM CHECK PROCEDURE

NOTE:

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

Using a voltmeter with high-impedance ($10 \text{ k}\Omega/\text{V}$ minimum), measure the voltage at each terminal of the wiring connectors.



Terminals of ECU (7M-GE)

Symbol	Terminal Name	Symbol	Terminal Name	Symbol	Terminal Name
E01	POWER GROUND	T	CHECK CONNECTOR	L3	ECT COMPUTER
E02	POWER GROUND	G2	DISTRIBUTOR	EGR	VSV (EGR)
No. 10	INJECTOR (No. 1 and 4)	VTA	THROTTLE POSITION SENSOR	A/C	A/C MAGNET SWITCH
No. 20	INJECTOR (No. 2 and 6)	NE	DISTRIBUTOR	SPD	SPEEDOMETER
STA	STARTER SWITCH	IDL	THROTTLE POSITION SENSOR	W	WARNING LIGHT
No. 30	INJECTOR (No. 3 and 5)	IGT	IGNITER	FPR	FUEL PUMP RELAY
STJ	COLD START INJECTOR			DFG	DEFOGGER RELAY
E1	COMPUTER GROUND	IGF	IGNITER	THA	AIR TEMP. SENSOR
NSW	NEUTRAL START SWITCH (A/T)			ECT	ECT COMPUTER
N/C	*CLUTCH SWITCH (M/T)	THW	WATER TEMP. SENSOR	VS	AIR FLOW METER
		KNK	KNOCK SENSOR	LP	HEADLIGHT RELAY
ISC 1	ISC MOTOR NO. 1 COIL	OX	OXYGEN SENSOR	VC	THROTTLE POSITION SENSOR AIR FLOW METER
ISC 3	ISC MOTOR NO. 3 COIL	E2	SENSOR GROUND		
ISC 2	ISC MOTOR NO. 2 COIL	VSV 1	VSV (AIR CONTROL)	BATT	BATTERY
ISC 4	ISC MOTOR NO. 4 COIL	L1	ECT COMPUTER	+B	EFI MAIN RELAY
G \ominus	DISTRIBUTOR	VSV2	VSV (FPU)	IG S/W	IGNITION SWITCH
VF	CHECK CONNECTOR	L2	ECT COMPUTER	+B1	EFI MAIN RELAY
G1	DISTRIBUTOR	M-REL	EFI MAIN RELAY (COIL)		

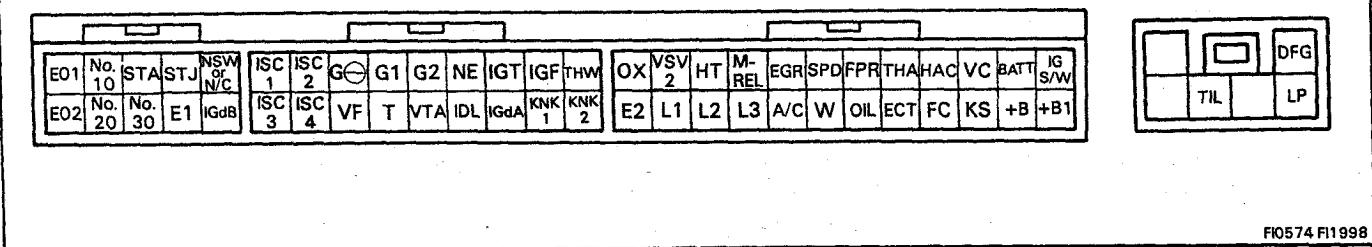
ECU Terminals

	No. 10	STA	STJ	NSW or N/C	ISC 1	ISC 2	G \ominus	G1	G2	NE	IGT	IGF	THW	OX	VSV 1	VSV 2	M-REL	EGR	SPD	FPR	THA	VS	VC	BATT	IG S/W
E01	No. 10	STA	STJ	NSW or N/C	ISC 3	ISC 4	VF	T	VTA	IDL			KNK	E2				A/C	W	DFG		LP		+B	+B1
E02	No. 20	No. 30	E1		ISC 3	ISC 4																			

Terminals of ECU (7M-GTE)

Symbol	Terminal Name	Symbol	Terminal Name	Symbol	Terminal Name
E01	POWER GROUND	G2	CAM POSITION SENSOR	A/C	A/C MAGNETIC SWITCH
E02	POWER GROUND	VTA	THROTTLE POSITION SENSOR	SPD	SPEEDOMETER
No. 10	INJECTOR (No. 1 and 4)	NE	CAM POSITION SENSOR	W	WARNING LIGHT
No. 20	INJECTOR (No. 2 and 6)	IDL	THROTTLE POSITION SENSOR	FPR	FUEL PUMP RELAY
STA	STARTER SWITCH	IGT	IGNITER	OIL	OIL PRESSURE SWITCH
No. 30	INJECTOR (No. 3 and 5)	IGdA	IGNITER	THA	AIR TEMP. SENSOR
STJ	COLD START INJECTOR	IGF	IGNITER	ECT	ECT COMPUTER
E1	COMPUTER GROUND	KNK1	KNOCK SENSOR	HAC	ALTITUDE COMPENSATION SENSOR
NSW	NEUTRAL START SWITCH (A/T)	THW	WATER TEMP. SENSOR	FC	CIRCUIT OPENING RELAY
N/C	*CLUTCH SWITCH (M/T)	KNK2	KNOCK SENSOR	VC	THROTTLE POSITION SENSOR AIR FLOW METER
IGdB	IGNITER	OX	OXYGEN SENSOR	KS	AIR FLOW METER
ISC 1	ISC MOTOR NO. 1 COIL	E2	SENSOR GROUND	BATT	BATTERY
ISC 3	ISC MOTOR NO. 3 COIL	VSV	VSV (FPU)	+B	EFI MAIN RELAY
ISC 2	ISC MOTOR NO. 2 COIL	L1	ECT COMPUTER	IG S/W	IGNITION SWITCH
ISC 4	ISC MOTOR NO. 4 COIL	HT	OXYGEN SENSOR	+B1	EFI MAIN RELAY
G \ominus	CAM POSITION SENSOR	L2	ECT COMPUTER	TIL	TURBO INDICATOR
VF	CHECK CONNECTOR	M-REL	EFI MAIN RELAY (COIL)	DFG	DEFOGGER RELAY
G1	CAM POSITION SENSOR	L3	ECT COMPUTER	LP	HEADLIGHT RELAY
T	CHECK CONNECTOR	EGR	VSV (EGR)		

ECU Terminals



FI0574 FI1998

*For cruise control



Voltage at ECU Wiring Connectors (7M-GE)

No.	Terminals	Condition	STD Voltage	See page	
1	BATT — E1	Ignition S/W ON	—	10 — 14	
	IG S/W — E1		—	FI-40	
	M-REL — E1		—		
	+B (+B1) — E1		—	FI-41	
2	IDL — E2	Ignition S/W ON	Throttle valve open	10 — 14	
	VC — E2		—	4 — 6	
	VTA — E2		Throttle valve fully closed	0.1 — 1.0	
			Throttle valve fully open	4 — 5	
3	VC — E2	Ignition S/W ON	—	4 — 6	
	VS — E2		Measuring plate fully closed	4 — 5	
			Measuring plate fully open	0.02 — 0.08	
			Idling	2 — 4	
			3,000 rpm	0.3 — 1.0	
	No. 10 E01 No. 20 — No. 30 E02		Ignition S/W ON	9 — 14	
5	THA — E2	Ignition S/W ON	Intake air temperature 20°C (68°F)	1 — 3	
6	THW — E2	Ignition S/W ON	Coolant temperature 80°C (176°F)	0.1 — 1.0	
8	STA — E1	Cranking			
9	IGF, IGT — E1	Idling			
11	ISC1 ISC4 — E1	Ignition S/W ON			
12	W — E1	No trouble ("CHECK ENGINE" warning light off) and engine running			
13	A/C — E1	Air conditioning ON			
ECU Terminals					

EO1	No. 10	STA	STJ	NSW or N/C	ISC 1	ISC 2	G(—)	G1	G2	NE	IGT	IGF	THW	OX	VSV 1	VSV 2	M-REL	EGR	SPD	FPR	THA	VS	VC	BATT	IG S/W
EO2	No. 20	No. 30	E1		ISC 3	ISC 4	VF	T	VTA	IDL			KNK	E2			A/C	W	DFG		LP		+B	+B1	

Voltage at ECU Wiring Connectors (7M-GTE)

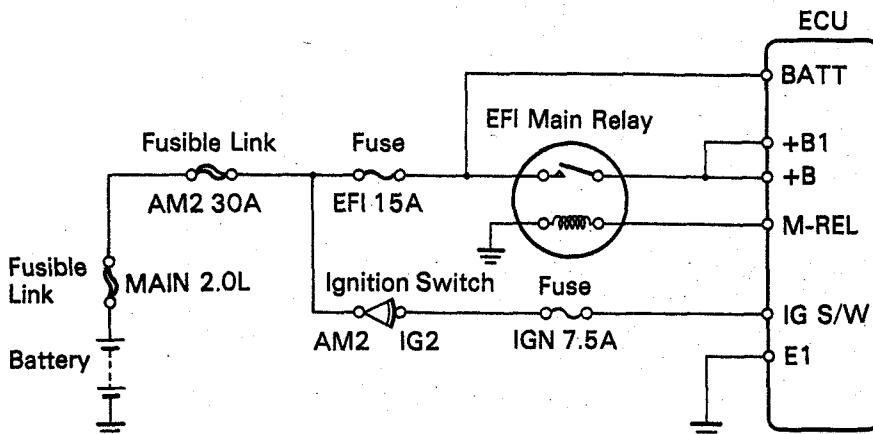
No.	Terminals	Condition		STD Voltage	See page	
1	BATT – E1	—		10 – 14	FI-39	
	IG S/W – E1	Ignition S/W ON		10 – 14	FI-40	
	M-REL – E1	Ignition S/W ON				
	+B (+B1) – E1	Ignition S/W ON			FI-41	
2	IDL – E2	Ignition S/W ON	Throttle valve open	10 – 14	FI-42	
	VC – E2		—	4 – 6	FI-43	
	VTA – E2		Throttle valve fully closed	0.1 – 1.0		
			Throttle valve fully open	4 – 5		
4	KS – Body ground	Ignition S/W ON		4 – 6	FI-45	
		Cranking or running		2 – 4		
	VC – Body ground	Ignition S/W ON		4 – 6	FI-46	
5	No. 10 E01 No. 20 – No. 30 E02	Ignition S/W ON		9 – 14	FI-47	
6	THA – E2	Ignition S/W ON	Intake air temperature 20°C (68°F)	1 – 3	FI-48	
7	THW – E2	Ignition S/W ON	Coolant temperature 80°C (176°F)	0.1 – 1.0	FI-49	
8	STA – E1	Cranking		6 – 14	FI-50	
9	IGF, IGT – E1	Idling		0.7 – 1.0	FI-51	
10	IGdA, IGdB – E1	Idling		1 – 3	FI-52	
11	ISC1 – E1 ISC4 – E1	Ignition S/W ON		9 – 14	FI-53	
12	W – E1	No trouble ("CHECK ENGINE" warning light off) and engine running		8 – 14	FI-54	
13	A/C – E1	Air conditioning ON		10 – 14	FI-55	
14	HAC – E2	Ignition S/W ON	540 mmHg (21.26 in.Hg. 72.0 kPa)	Approx. 2.8	FI-56	
			750 mmHg (29.53 in.Hg, 100.0 kPa)	Approx. 3.6		

ECU Terminals

EO1	No. 10	STA	STJ	NSW or N/C	ISC 1	ISC 2	G \ominus	G1	G2	NE	IGT	IGF	THW	OX	VSV 2	HT	M- REL	EGR	SPD	FPR	THA	HAC	VC	BATT	IG S/W	
EO2	No. 20	No. 30	E1	IGdB	ISC 3	ISC 4	VF	T	VTA	IDL	IGdA	KNK 1	KNK 2		E2	L1	L2	L3	A/C	W	OIL	ECT	FC	KS	+B	+B1

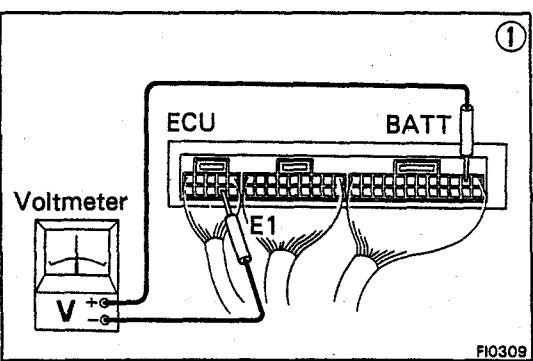
		DFG
TIL		LP

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



FI1823

• BATT — E1



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

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

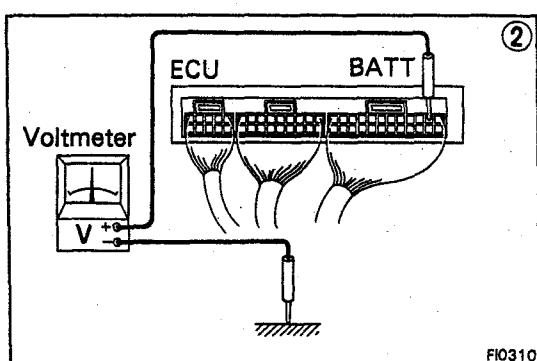
NO

OK

③ Check wiring between ECU terminal E1 and body ground.

OK

BAD Replace or repair.



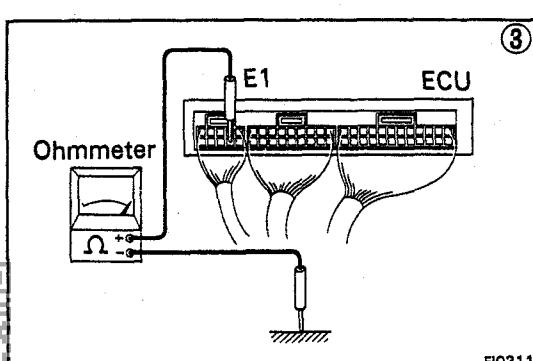
Check fuse and fusible link.

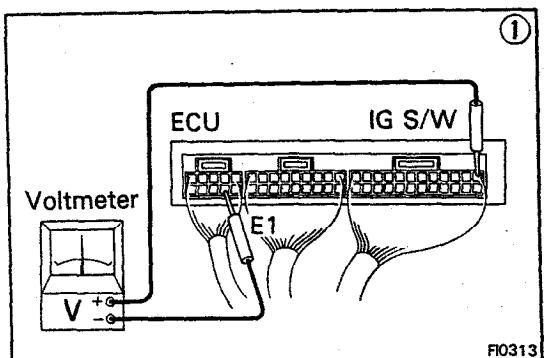
BAD Replace.

OK

Check wiring between ECU terminal E1 and battery.

BAD Repair or replace.





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

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

NO | OK

Check wiring between ECU terminal E1 and body ground.

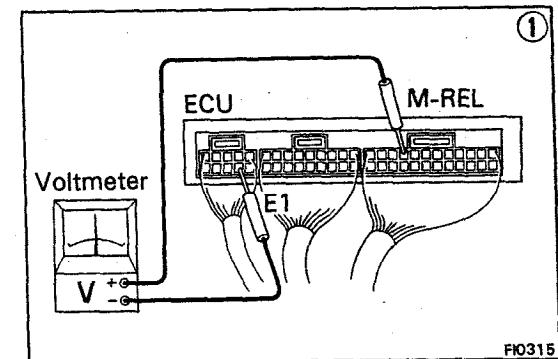
OK

Try another ECU.

BAD

Check fuse, fusible links and ignition switch.

Repair or replace.



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

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

NO | OK

Check wiring between ECU terminal E1 and body ground.

OK

Try another ECU.

BAD

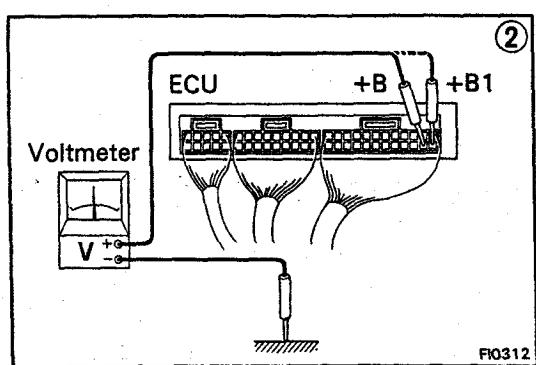
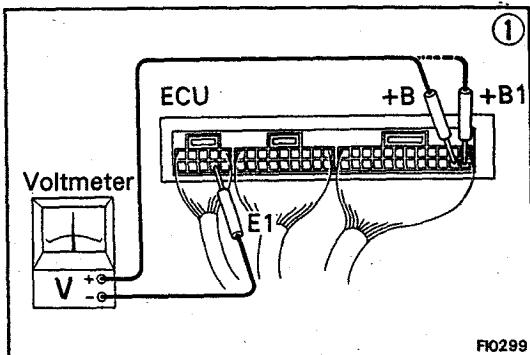
Check EFI main relay and wiring harness.

BAD

1

Try another ECU.





● +B (+B1) - E1

① There is no voltage between ECU terminals +B (+B1) and E1. (IG S/W ON)

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

NO OK

Check wiring between ECU terminal E1 and body ground.

OK

Try another ECU.

BAD

Check fuse, fusible links and wiring harness.

BAD

P. 1. 1

**Check EFI main relay.
(See page FI-112)**

BAD

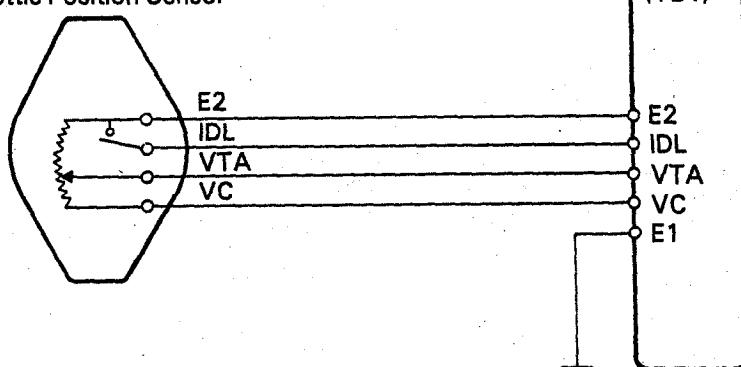
1

Refer to M-REL - E1 trouble section.



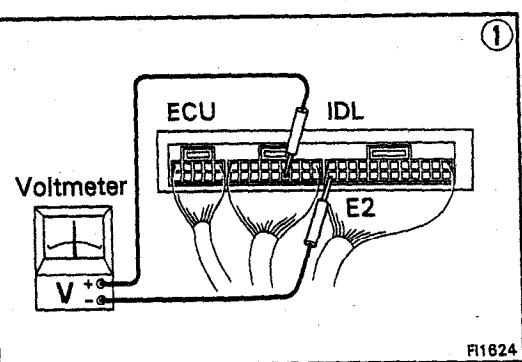
No.	Terminals	Trouble	Condition	STD Voltage
2	IDL — E2	No voltage	Throttle valve open	10 — 14 V
	VC — E2		—	4 — 6 V
	VTA — E2		Throttle valve fully closed	0.1 — 1.0 V
			Throttle valve fully open	4 — 5 V

Throttle Position Sensor



FI1366

• IDL — E2



① There is no voltage between ECU terminals IDL and E2.
(IG S/W ON) (Throttle valve open)

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

NO

OK

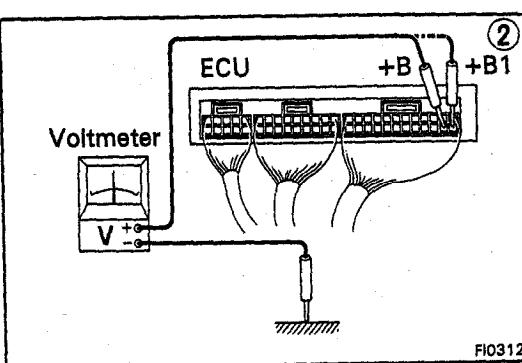
Check wiring between ECU terminal E1 and body ground.

OK

BAD

Try another ECU.

Repair or replace.



Refer to No. 1.
(See page FI-41)

BAD

Replace or repair.

OK

③ Check throttle position sensor.

BAD

Replace or repair.

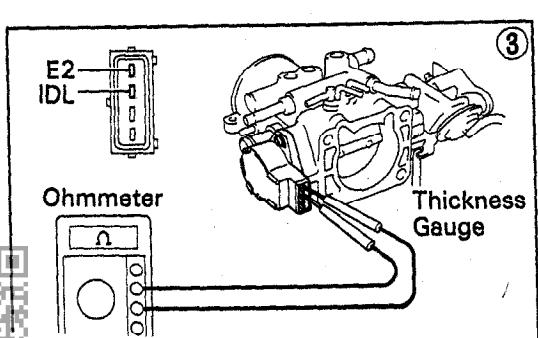
Replace or repair
throttle position sensor.

OK

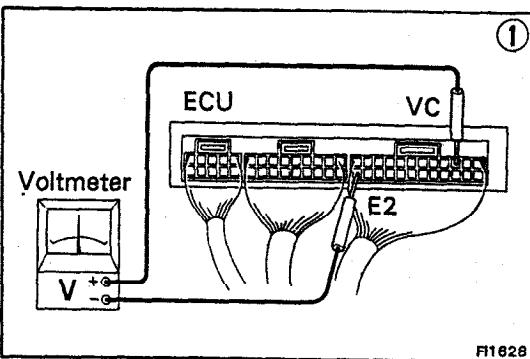
Check wiring between ECU and
throttle position sensor.

OK

Try another ECU.



CONTENTS
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• VC - E2

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

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

OK

② Check throttle position sensor.
(See page FI-102)

NO

Refer to No. 1.
(See page FI-41)

BAD

OK

Repair or replace.

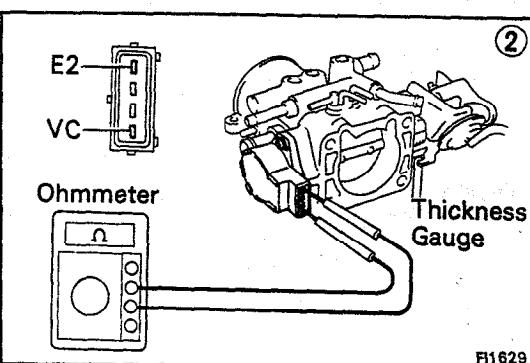
Check wiring between ECU and throttle position sensor.

OK

Try another ECU.

BAD

Repair or replace wiring.



• VTA - E2

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

② Check that there is voltage between ECU terminal VC and E2.
(IG S/W ON)

NO

OK

Refer to VC - E2 trouble section.

OK

③ Check throttle position sensor.

BAD

Repair or replace.

OK

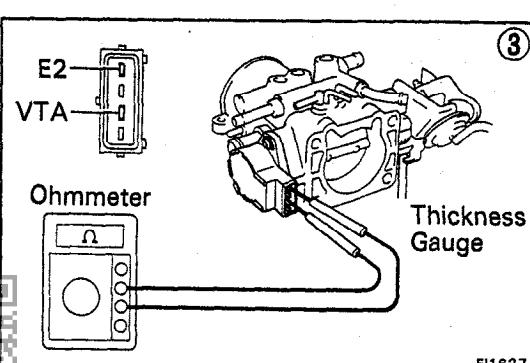
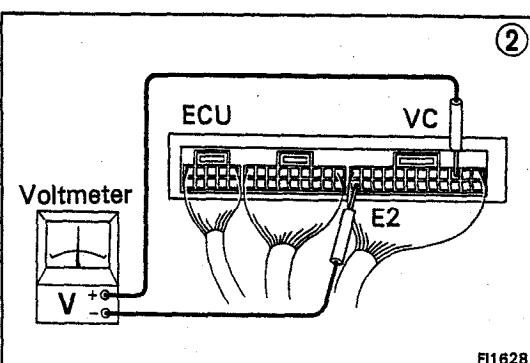
Check wiring between ECU and throttle position sensor.

BAD

Repair or replace.

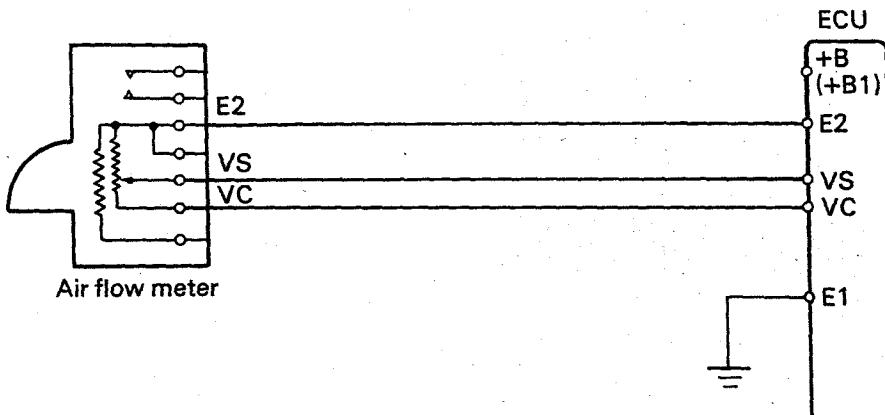
OK

Try another ECU.

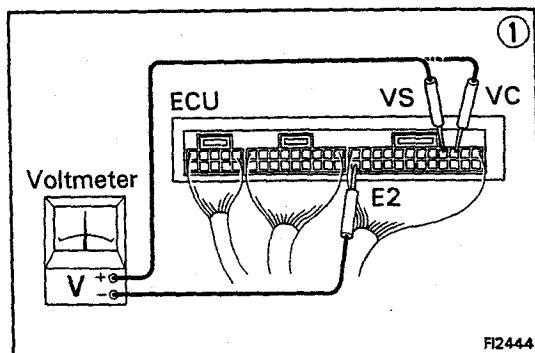


No.	Terminals	Trouble	Condition	STD Voltage
*3	VC — E2	No voltage	Ignition S/W ON	—
	VS — E2		Measuring plate fully closed	4 — 5 V
	VS — E2		Measuring plate fully open	0.02 — 0.08 V
	VS — E2		Idling	—
	VS — E2		3,000 rpm	—
				0.3 — 1.0 V

*7M-GE only



FI1269

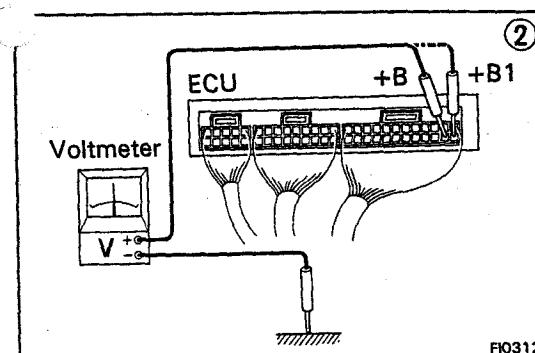


① There is no voltage between ECU terminals VC or VS and E2. (IG S/W ON)

OK

NO

Refer to No. 1.
(See page FI-41)



Check wiring between ECU terminal E1 and body ground.

OK

BAD

③ Check air flow meter.
(See page FI-96)

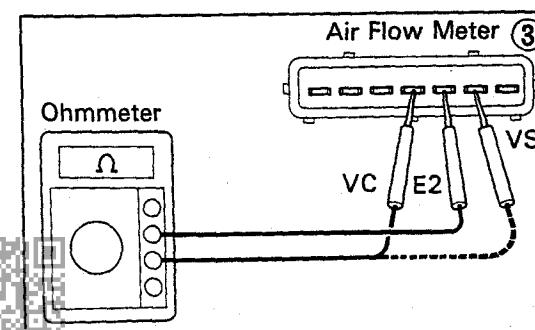
Repair or replace.

BAD

Replace air flow meter.

OK

Check wiring between ECU and air flow meter.



Try another ECU.

OK

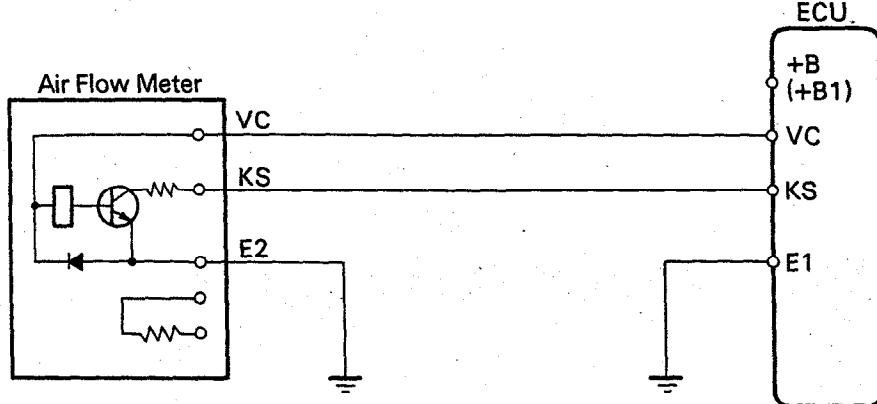
Repair or replace.

BAD

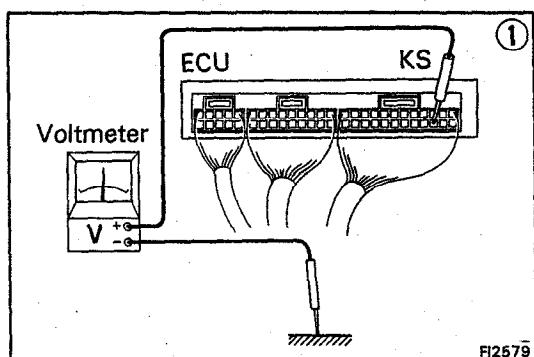
BAD

No.	Terminals	Trouble	Condition	STD Voltage
*4	KS — Body ground	No voltage	Ignition S/W ON	4 — 6 V
	VC — Body ground		Cranking or running	2 — 4 V
	VC — Body ground		Ignition S/W ON	4 — 6 V

*7M-GTE only



FI2560



• KS — Body ground

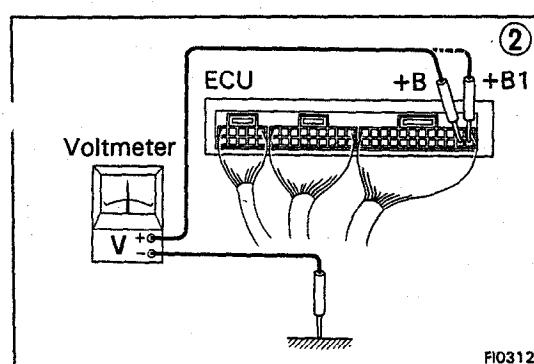
① There is no voltage between ECU terminals KS and body ground. (IG S/W ON)

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

OK

NO

Refer to No. 1.
(See page FI-41)



③ Check wiring between ECU terminal E1 and body ground.

OK

BAD

Check air flow meter.
(See page FI-98)

Repair or replace.

BAD

Replace air flow meter.

OK

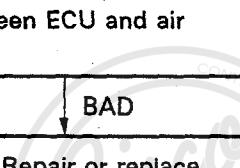
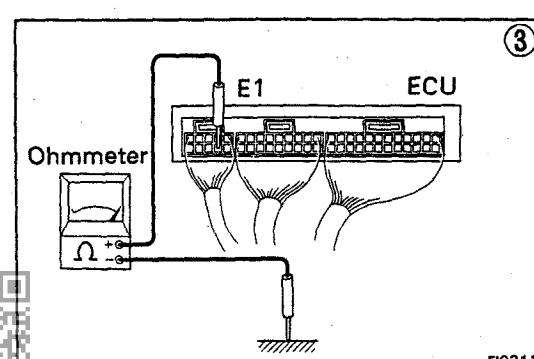
Check wiring between ECU and air flow meter.

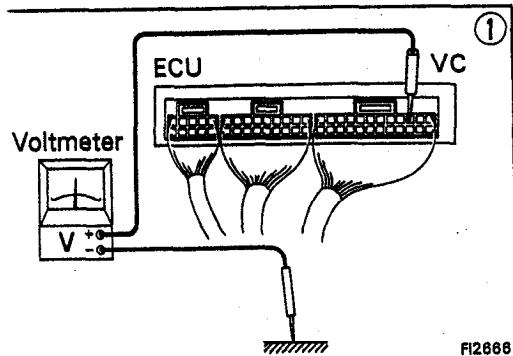
OK

BAD

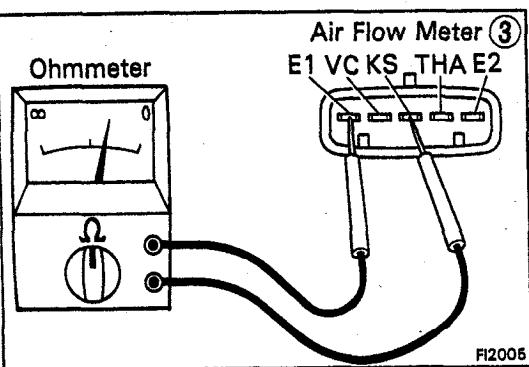
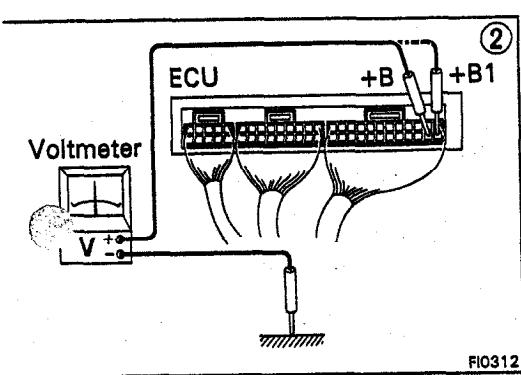
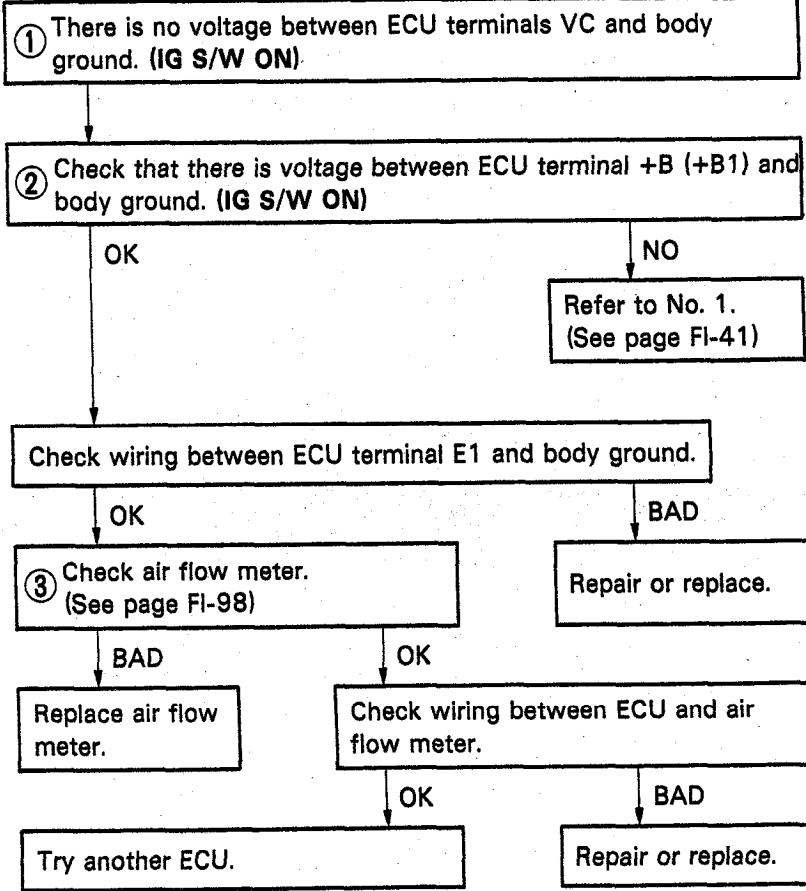
Try another ECU.

Repair or replace.

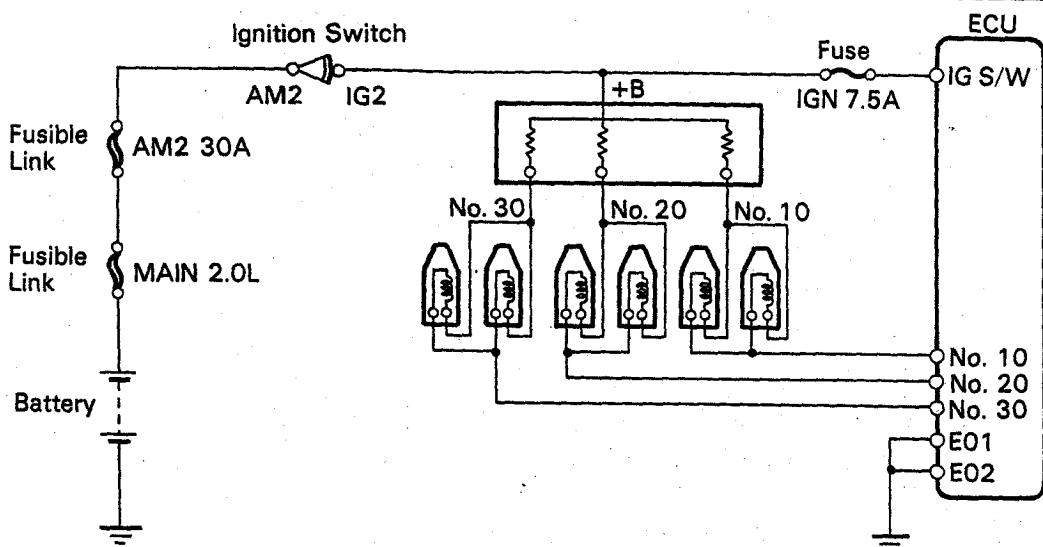




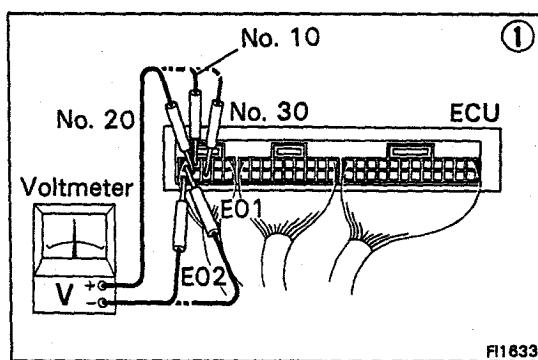
• VC — Body ground



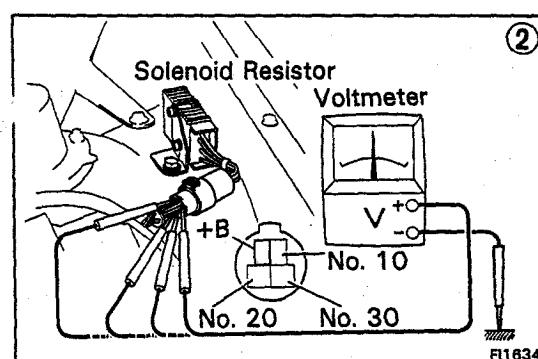
No.	Terminals	Trouble	Condition	STD Voltage	
5	No. 10 No. 20 No. 30	E01 — E02	No voltage	Ignition switch ON	9 – 14 V



FL2995



① There is no voltage between ECU terminal No. 10, No. 20 and/or No. 30 and E01 or E02. (IG S/W ON)



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

OK

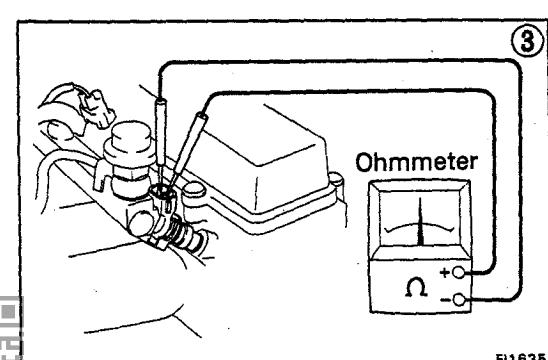
**Check fuse, fusible links
and ignition switch.**

BAD

Repair or replace.

OK

— 10 —



Check that there is specified voltage between resistor terminal
② (No. 10, No. 20 or No. 30) and body ground.
STD voltage: 9 - 14 V

OK

③ Check resistance of magnetic coil in each injector.

Replace resistor.

Check wiring between ECU and
injector.

BAD

Replace injector.

OK

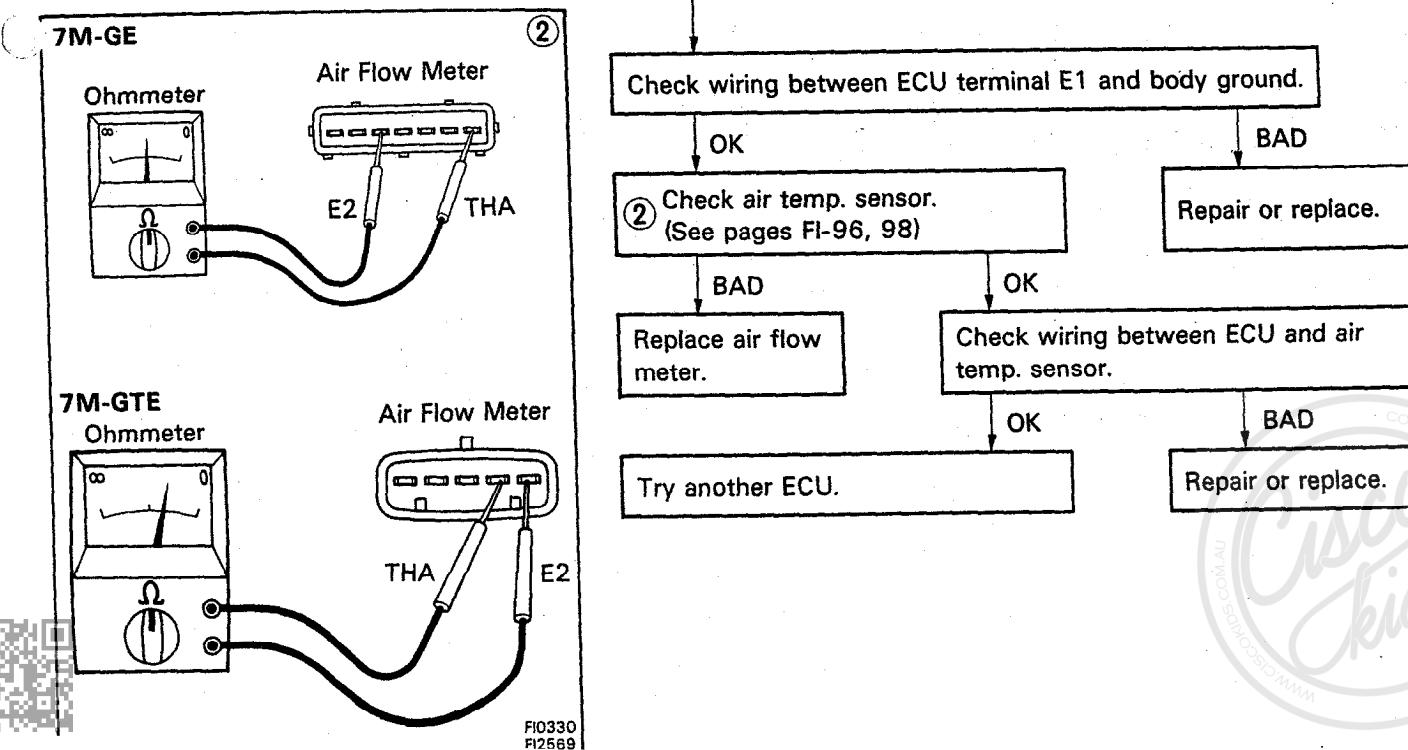
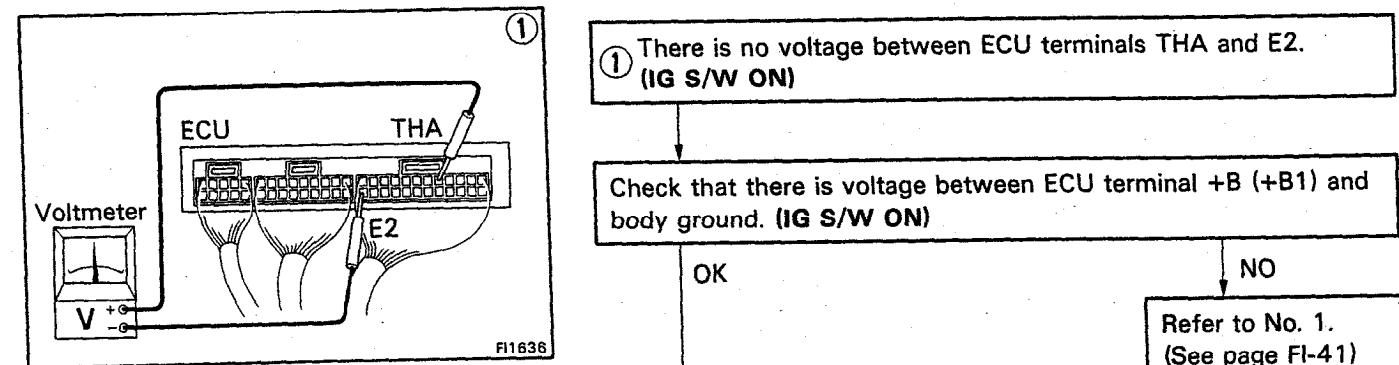
BAD

Replace or repair.

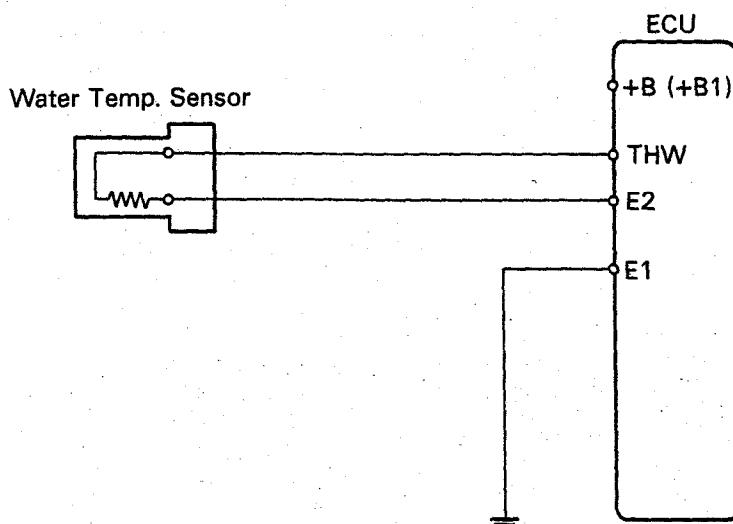
No.	Terminals	Trouble	Condition	STD Voltage
6	THA — E2	No voltage	IG S/W ON Intake air temperature 20°C (68°F)	1 — 3 V

7M-GE **7M-GTE**

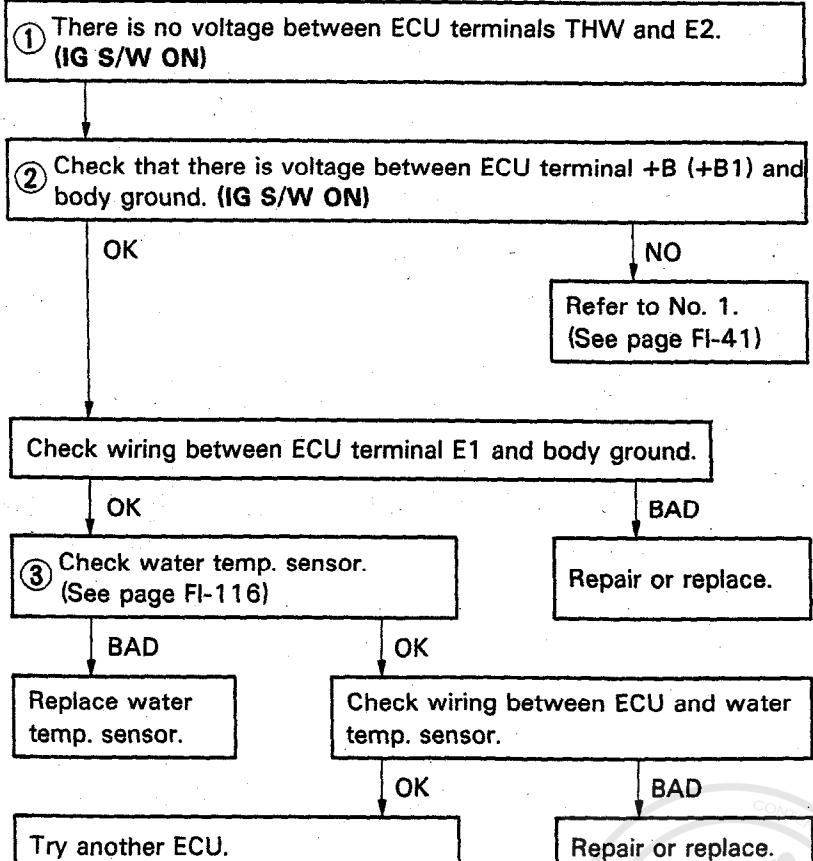
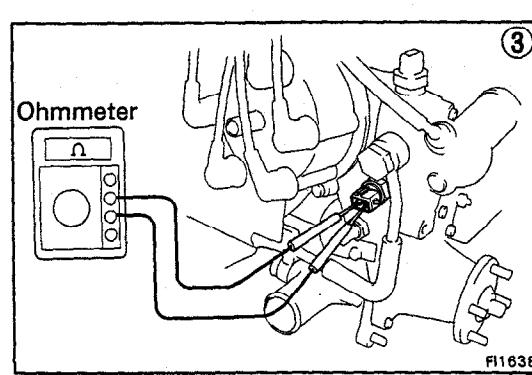
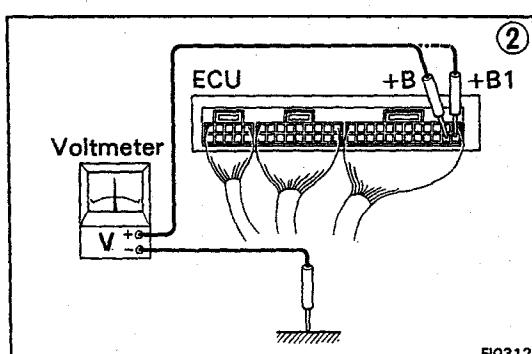
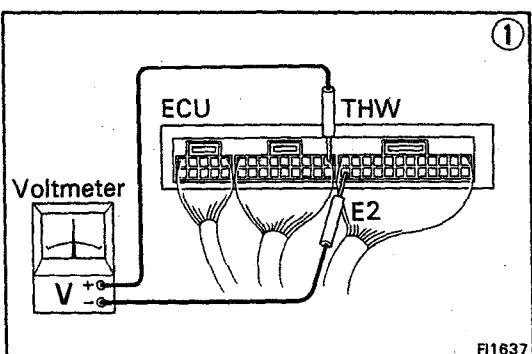
FI2685



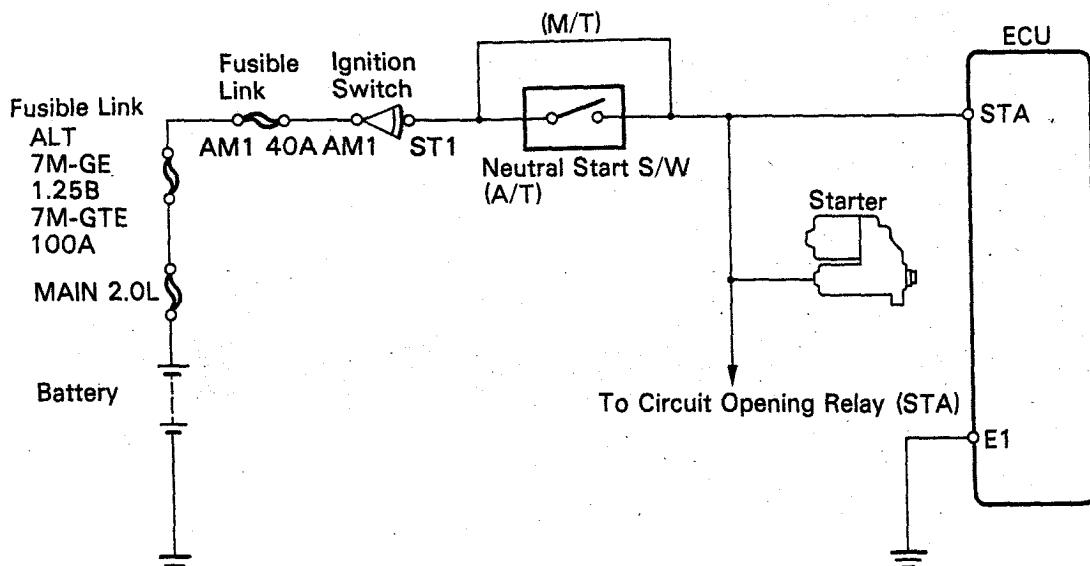
No.	Terminals	Trouble	Condition		STD Voltage
7	THW — E2	No voltage	Ignition switch ON	Coolant temperature 80°C (176°F)	0.1 — 1.0 V



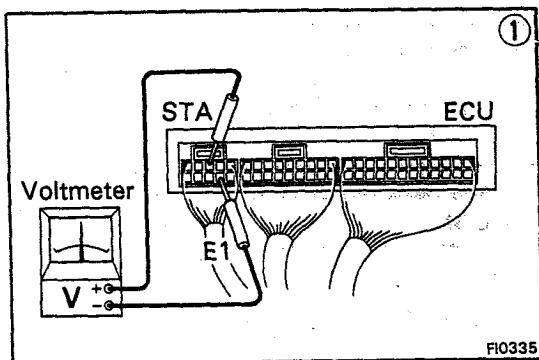
FI0487



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



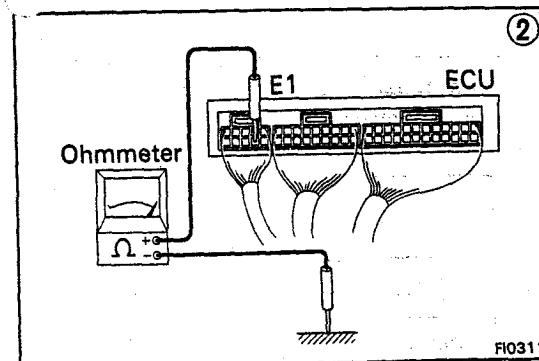
FI1639



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

Check starter operation. OK → Check wiring between ECU terminal STA and ignition switch terminal ST1.

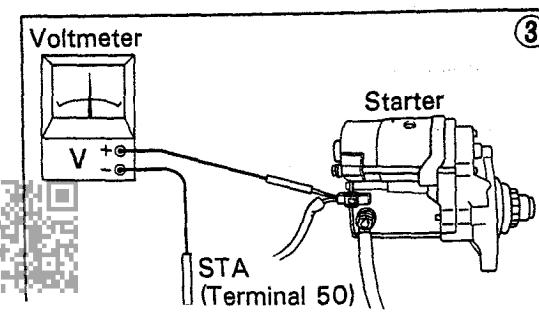
BAD → Repair or replace.



② Check wiring between ECU terminal E1 and body ground.

OK → Try another ECU.

BAD → Repair or replace.



Check fusible links, battery, wiring, ignition switch and neutral start switch.

BAD → Repair or replace.

OK →

③ Check that there is voltage at STA (50) terminal of starter.
(IG S/W START) STD voltage: 6 — 14 V

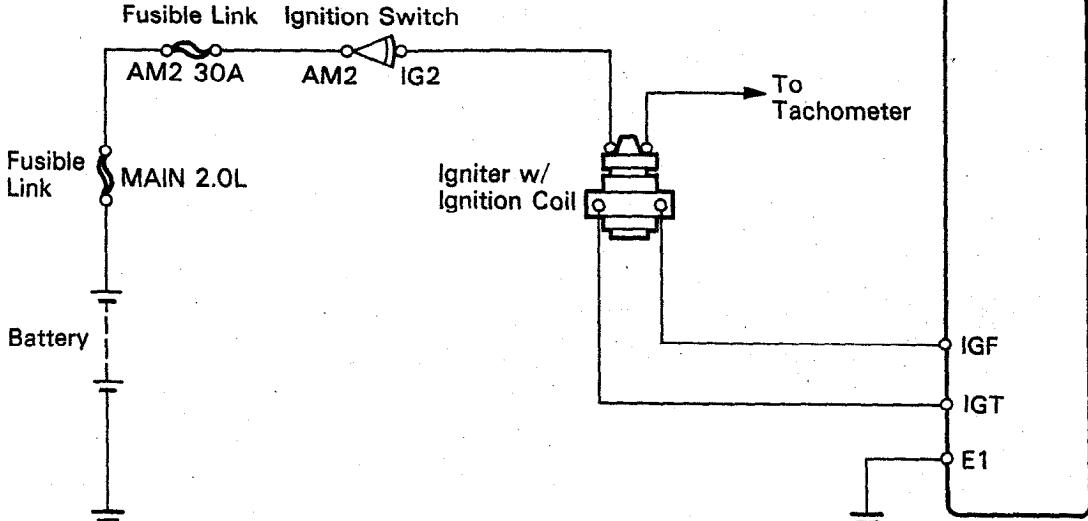
OK →

Check starter.

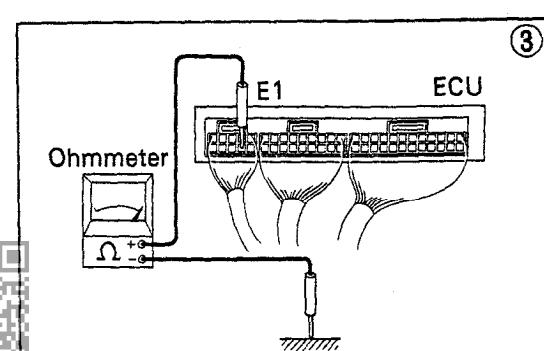
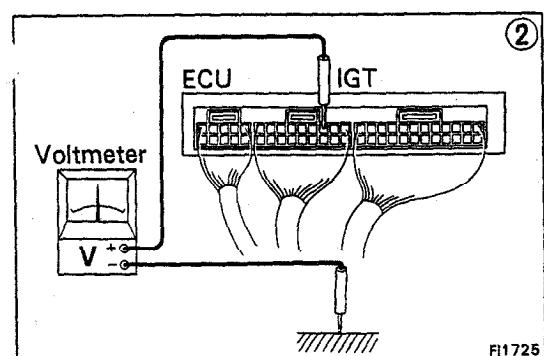
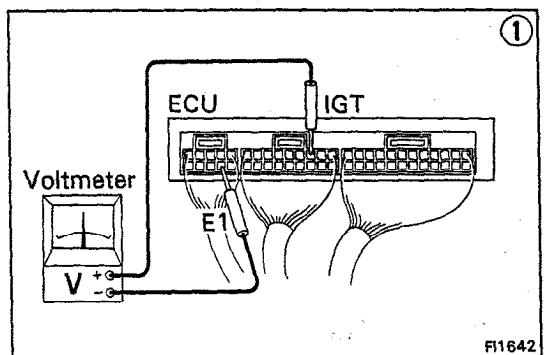
NO →

Check wiring between ignition switch terminal ST1 and starter terminal STA (50).

No.	Terminals	Trouble	Condition	STD Voltage
9	IGT, IGF — E1	No voltage	Idling	0.7 — 1.0 V



FI1641



① There is no voltage between ECU terminals IGT and E1.
(Idling)

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

NO OK

③ Check wiring between ECU terminal E1 and body ground.

BAD Repair or replace.

Try another ECU.

Check fusible links and ignition switch.

BAD Repair or replace.

Check distributor or cam position sensor. (See pages IG-11, 18)

BAD Repair or replace.

OK

Check wiring between ECU and battery.

BAD Repair or replace.

OK

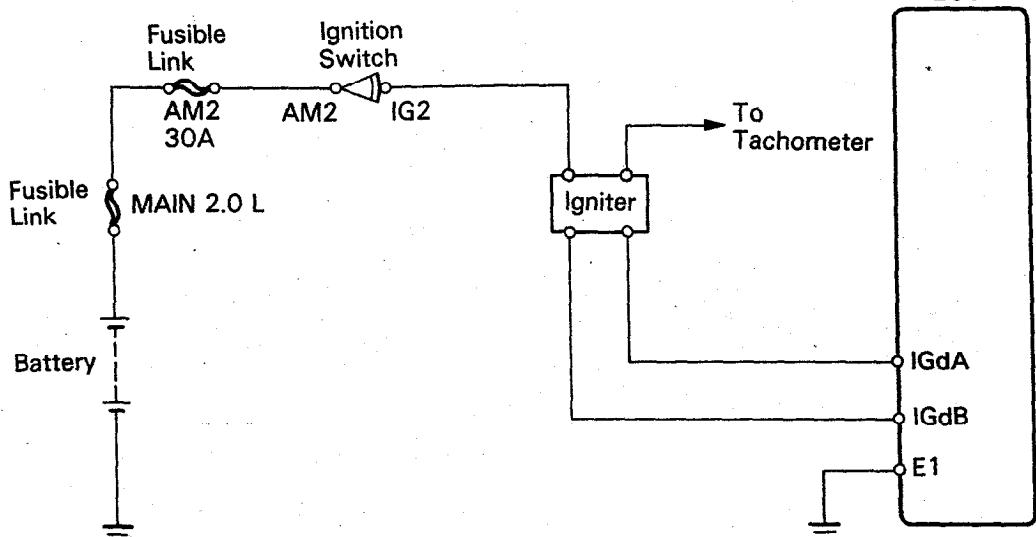
Check igniter.

BAD Repair or replace.

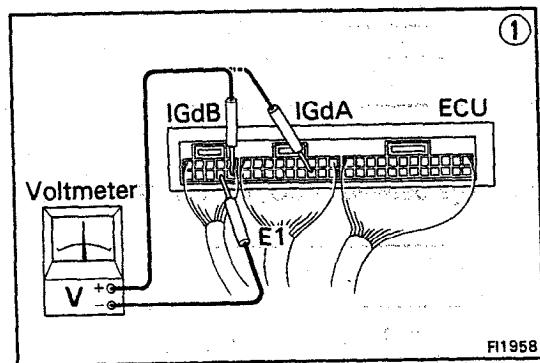
CONTENT UPLOADED BY
www.4wheelskids.com

No.	Terminals	Trouble	Condition	STD Voltage
*10	IGdA IGdB	No voltage	Idling	1 – 3 V

*7M-GTE only



FI1991



① ① There is no voltage between ECU terminals IGdA or IGdB and E1. (Idling)

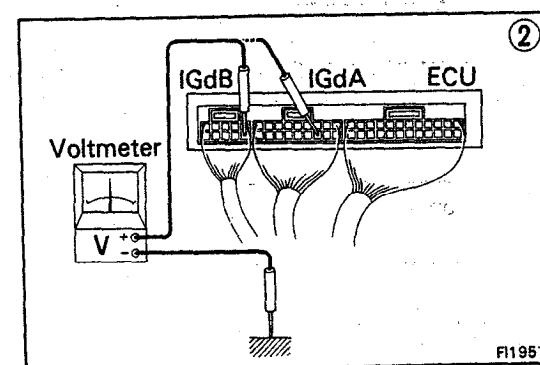
② ② Check that there is voltage between ECU terminal IGdA or IGdB and body ground. (Idling)

NO OK

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

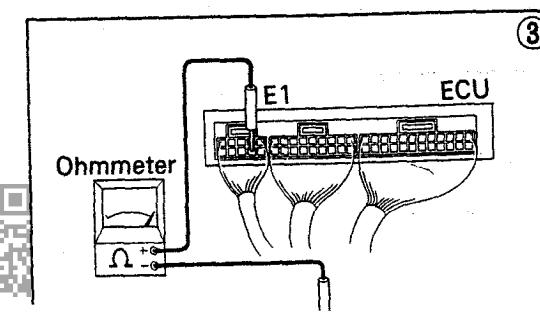
OK

Try another ECU.



Check fusible links and ignition switch. BAD Repair or replace.

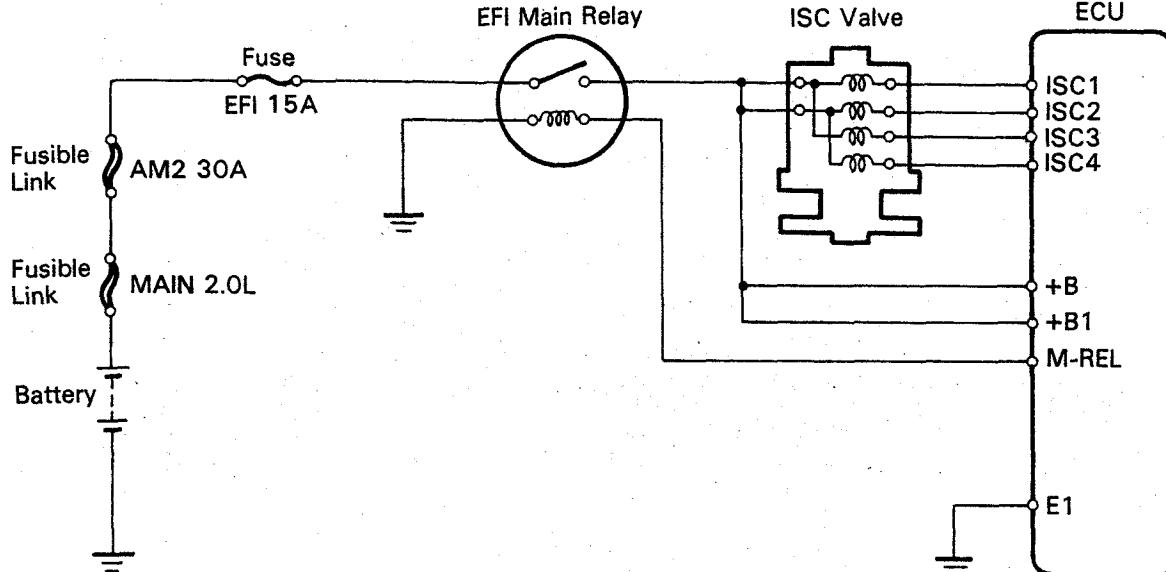
Check cam position sensor. (See page IG-18) BAD Repair or replace.



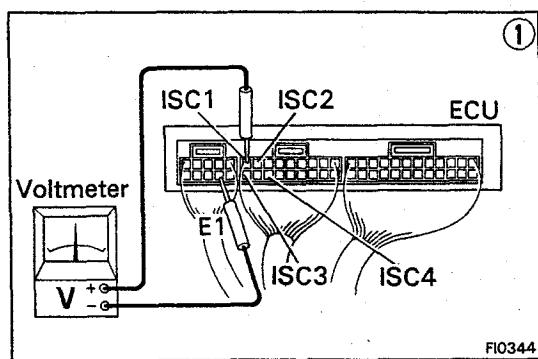
Check wiring between ECU and battery. BAD Repair or replace.

Check igniter. (See page IG-17) BAD Repair or replace.

No.	Terminals	Trouble	Condition	STD Voltage
11	ISC1 ~ ISC4 — E1	No voltage	Ignition switch ON	9 — 14 V



FI2994



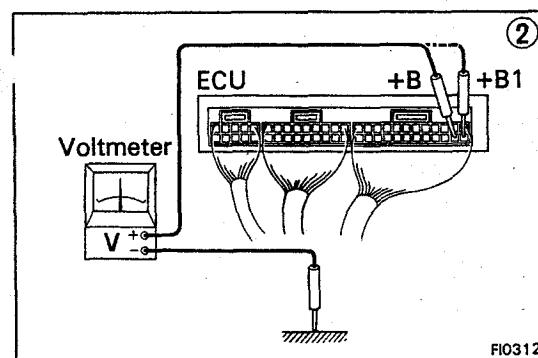
① There is no voltage between ECU terminals ISC1 ~ ISC4 and E1. (IG S/W ON)

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

OK

NO

Refer to No. 1.
(See page FI-41)



Check wiring between ECU terminal E1 and body ground.

OK

BAD

③ Check ISC valve.
(See page FI-108)

BAD

Repair or replace.

Replace ISC valve.

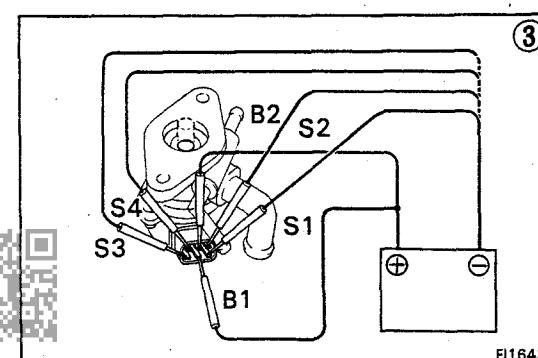
OK

Check wiring between ECU and EFI main relay.

OK

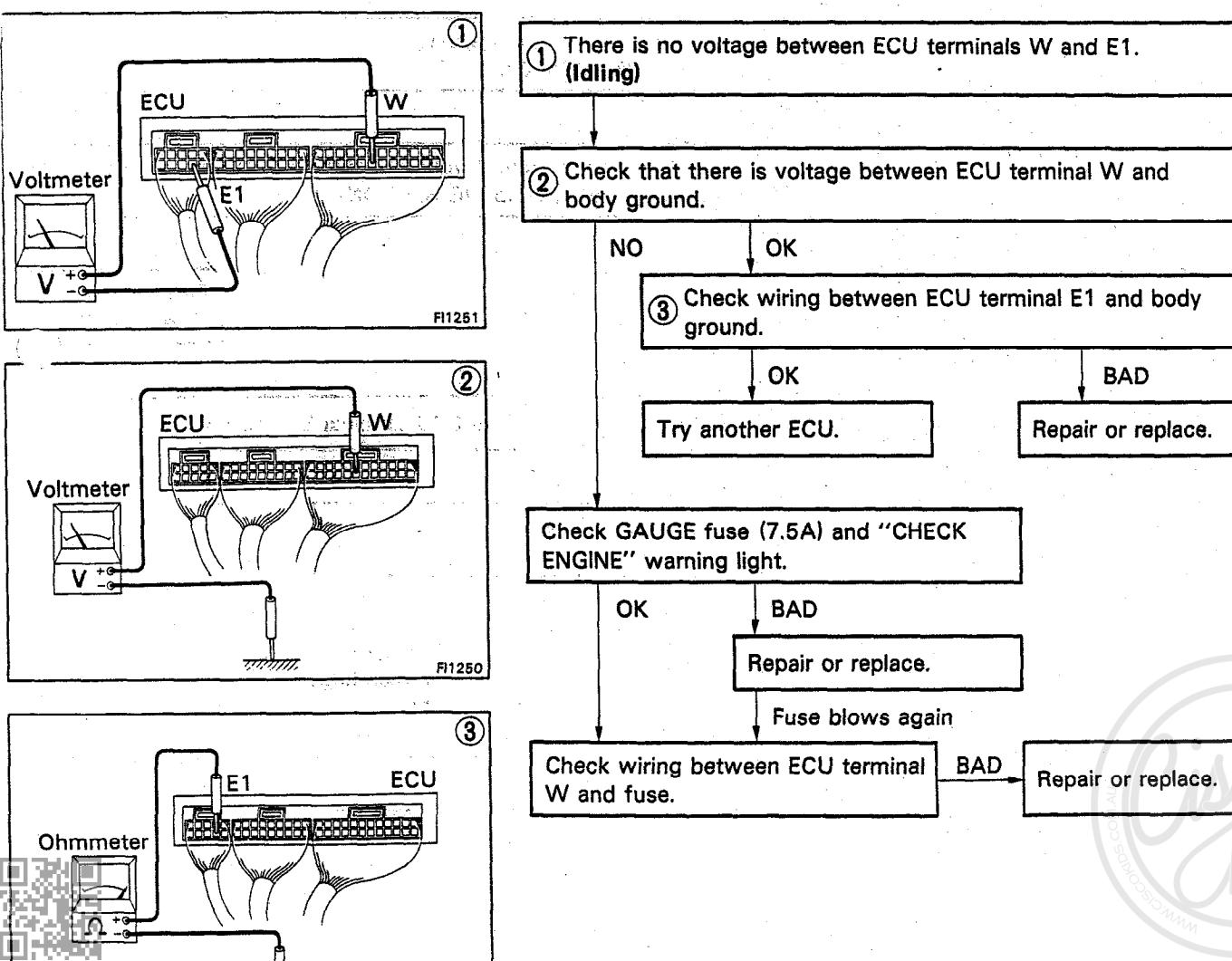
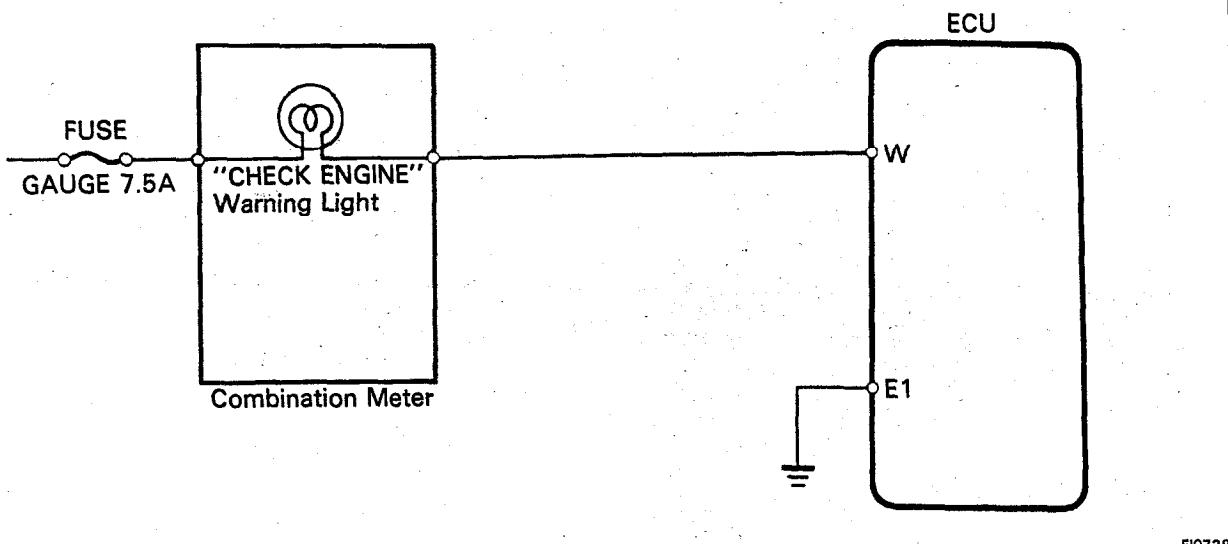
Repair or replace.

Try another ECU.

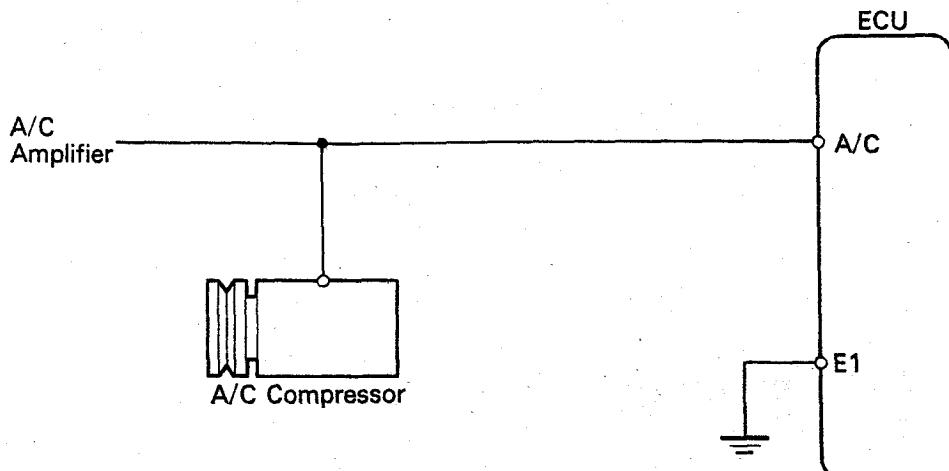


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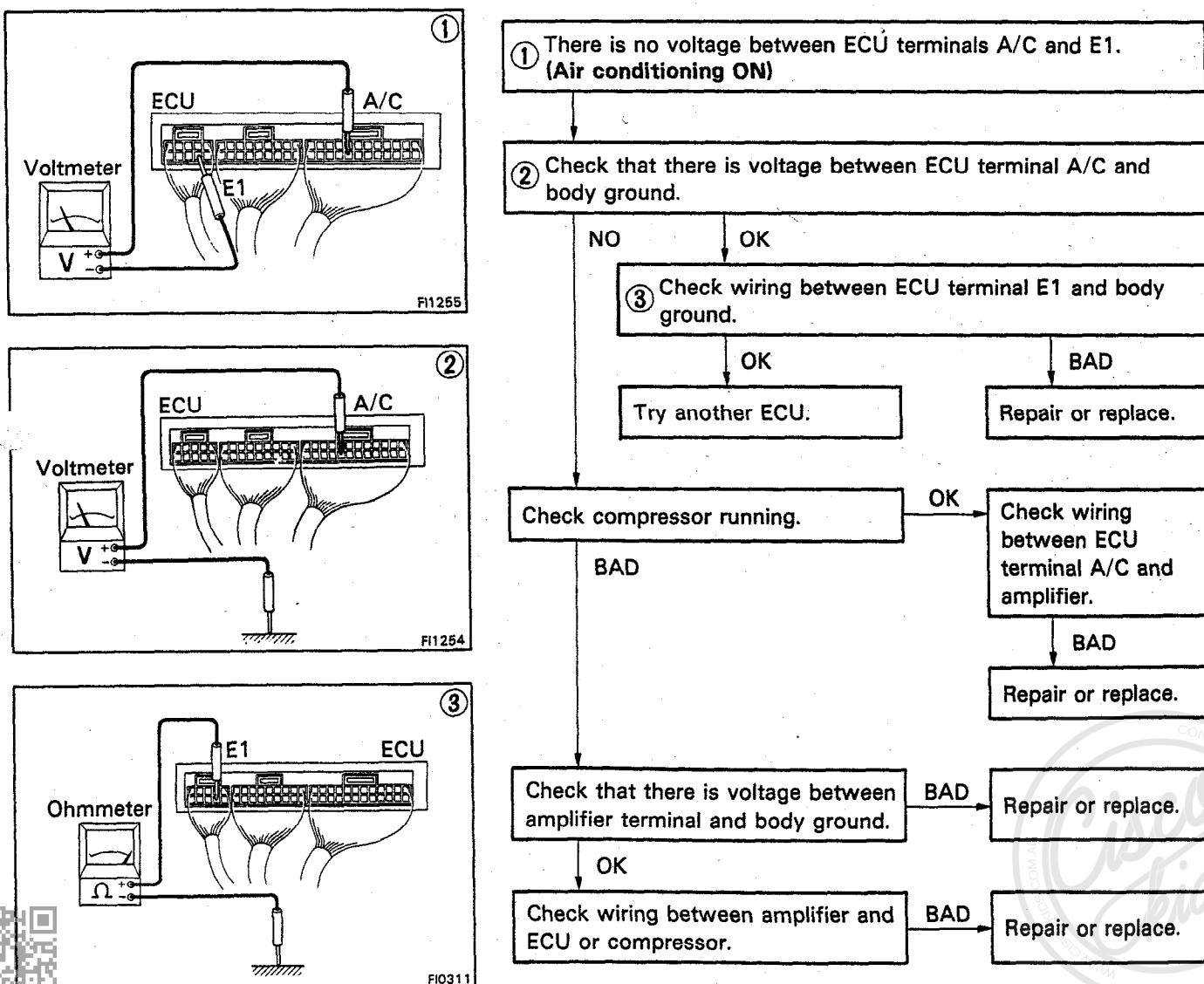
Job.	Terminals	Trouble	Condition	STD Voltage
12	W — E1	No voltage	No trouble ("CHECK" engine warning light off) and engine running	8 — 14 V



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

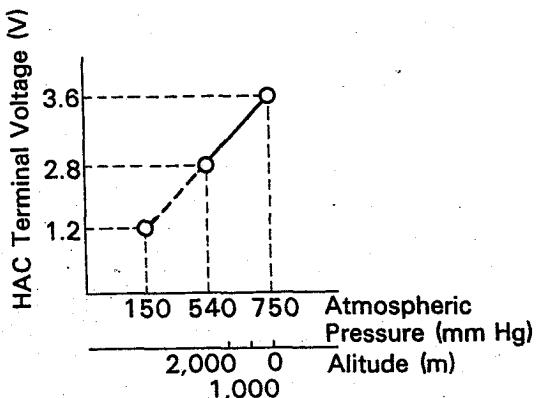
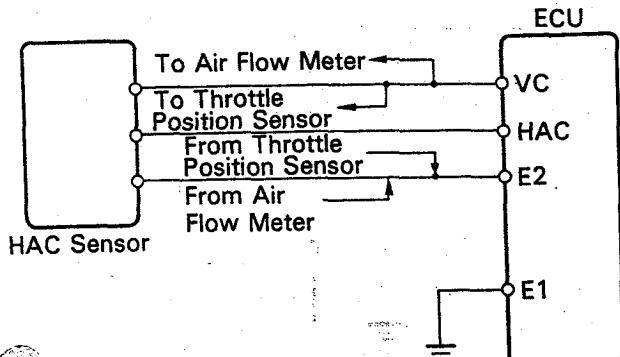


FI0822

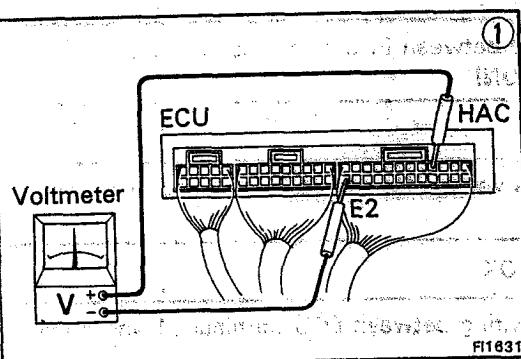


No.	Terminals	Trouble	Condition		STD Voltage
			Ignition S/W ON	540 mmHg (21.26 in.Hg, 72.0 kPa) 750 mmHg (29.53 in.Hg, 100.0 kPa)	
4	HAC — E2	No voltage			Approx. 2.8 V Approx. 3.6 V

7M-GTE only



FI1995 FI1996



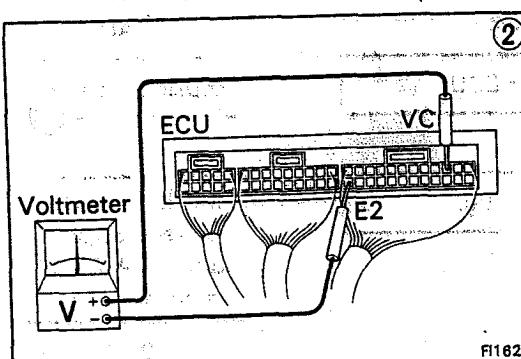
① There is no voltage between ECU terminal HAC and E2.
(IG S/W ON)

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

OK

NO

Refer to No. 2.
(See page FI-43)



Check wiring between ECU terminal E1 and body ground.

OK

BAD

Repair or replace.

③ Check HAC sensor.
(See page FI-121)

BAD

Replace HAC
sensor.

OK

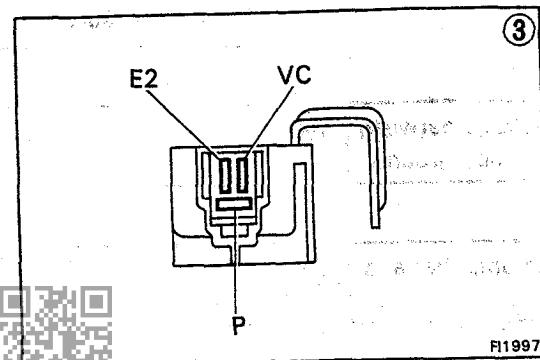
Check wiring between ECU and HAC
sensor.

OK

Try another ECU.

BAD

Repair or replace.



FI1997

TROUBLESHOOTING WITH VOLT/OHMmeter (MS)

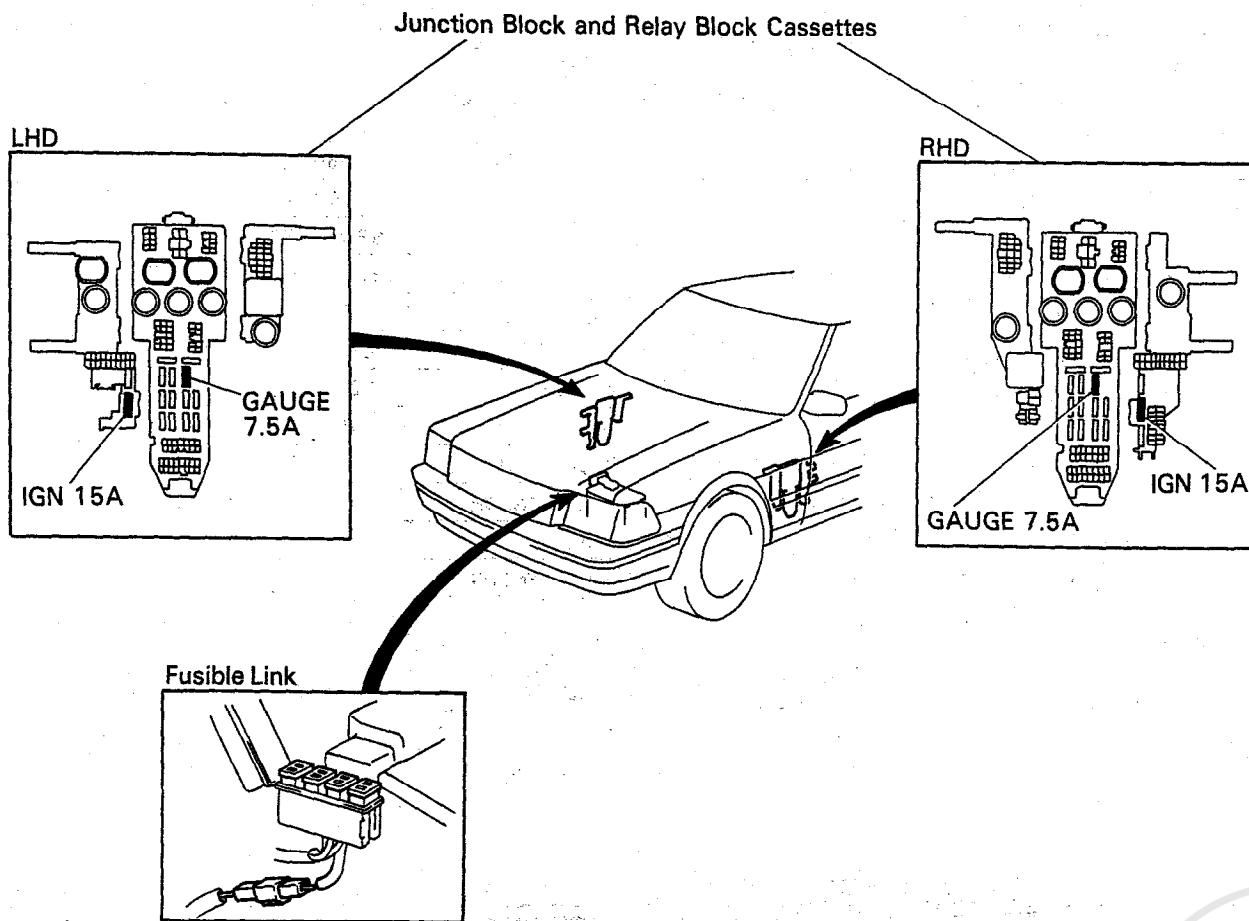
NOTE: The following troubleshooting procedures are designed for inspection of each separate system, and therefore the actual procedure may vary somewhat. However, troubleshooting should be performed referring to the inspection methods described in this manual.

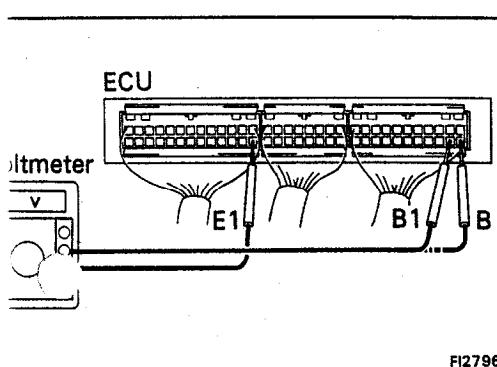
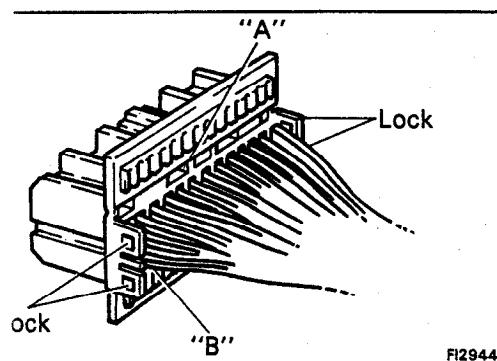
Before beginning inspection, it is best to first make a simple check of the fuses, fusible links and the condition of the connectors.

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

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

LOCATION OF FUSES AND FUSIBLE LINKS





EFI SYSTEM CHECK PROCEDURE

PREPARATION

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

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

- Reconnect the connectors to the ECU.

NOTE:

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

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

Terminals of ECU

Symbol	Terminal Name	Symbol	Terminal Name	Symbol	Terminal Name
E01	POWER GROUND	NE	DISTRIBUTOR	ACPS	A/C PRESSURE SWITCH
E02	POWER GROUND	E1	COMPUTER GROUND	SPD	SPEEDOMETER
o. 10	INJECTOR (No. 1 and 4)	VF	CHECK CONNECTOR	ECT	ECT COMPUTER
o. 30	INJECTOR (No. 3 and 5)	G \ominus	DISTRIBUTOR	ACR	A/C COMPRESSOR
o. 20	INJECTOR (No. 2 and 6)	TE2	CHECK CONNECTOR	L1	ECT COMPUTER
ELS	DEFOGGER SWITCH HEADLIGHT SWITCH	TE1	CHECK CONNECTOR	L2	ECT COMPUTER
FPU	VSV (FPU)	KNK	KNOCK SENSOR	FPR	FUEL PUMP RELAY
ACV	VSV (A/R CONTROL)	THW	WATER TEMP. SENSOR	L3	ECT COMPUTER
SC 1	ISC MOTOR NO. 1 COIL	IDL	THROTTLE POSITION SENSOR	W	WARNING LIGHT
IGT	IGNITER	THA	AIR TEMP. SENSOR	M-REL	EFI MAIN RELAY (COIL)
ISC2	ISC MOTOR NO. 2 COIL	VTA	THROTTLE POSITION SENSOR	IG S/W	IGNITION SWITCH
ISC3	ISC MOTOR NO. 3 COIL	VS	AIR FLOW METER	B1	EFI MAIN RELAY
ISC4	ISC MOTOR NO. 4 COIL	VCC	AIR FLOW METER THROTTLE POSITION SENSOR	BATT	BATTERY
IGF	IGNITER	E2	SENSOR GROUND	B	EFI MAIN RELAY
G2	DISTRIBUTOR	STA	STARTER SWITCH		
G1	DISTRIBUTOR	NSW	NEUTRAL START SWITCH		

CU Terminals

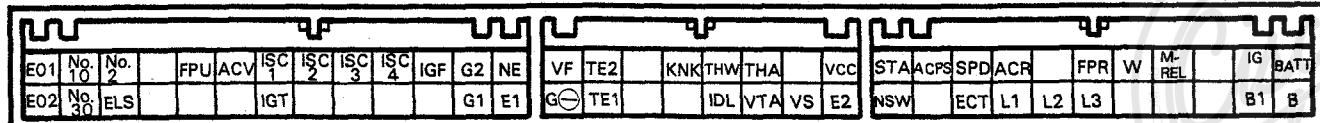
CU	Terminals	Diagram																									
E01	No. 10	No. 20	FPU	ACV	ISC ₁	ISC ₂	ISC ₃	ISC ₄	IGF	G2	NE	VF	TE2	KNK	THW	THA	VCC	STA	ACPS	SPD	ARC	FPR	W	M-REL	IG S/W	BATT	
E02	No. 30	ELS			IGT					G1	E1	G \ominus	TE1		IDL	VTA	VS	E2	NSW	ECT	L1	L2	L3			B1	B



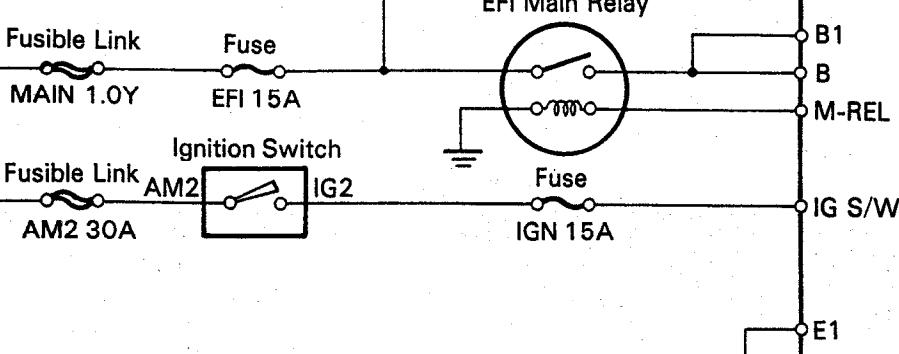
Voltage at ECU Wiring Connectors

No.	Terminals	Condition	STD Voltage	See page	
1	BATT — E1	Ignition S/W ON	—	10 — 14	
	IG S/W — E1		—	FI-60	
	M-REL — E1		—	FI-61	
	B (B1) — E1		—	FI-62	
2	IDL — E2	Ignition S/W ON	Throttle valve open	10 — 14	
	VCC — E2		—	4 — 6	
	VTA — E2		Throttle valve fully closed	0.1 — 1.0	
			Throttle valve fully open	4 — 5	
3	VCC — E2	Ignition S/W ON	—	4 — 6	
	VS — E2		Measuring plate fully closed	4 — 5	
			Measuring plate fully open	0.02 — 0.08	
			Idling	2 — 4	
			3,000 rpm	0.3 — 1.0	
4	No. 10 E01 No. 20 — No. 30 E02	Ignition S/W ON	9 — 14	FI-66	
5	THA — E2				
6	THW — E2	Ignition S/W ON	0.1 — 1.0	FI-68	
7	STA — E1	Cranking	6 — 14	FI-69	
8	IGF, IGT — E1	Idling	0.7 — 1.0	FI-70	
9	ISC1 — E1 ISC4	Ignition S/W ON	9 — 14	FI-71	
10	W — E1	No trouble ("CHECK-ENGINE" warning light off) and engine running	8 — 14	FI-72	

ECU Terminals

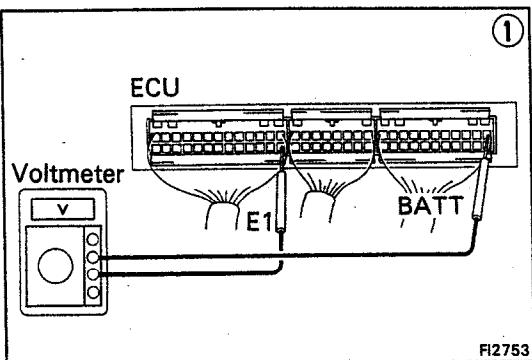


No.	Terminals	Trouble	Condition	STD Voltage
1	BATT – E1	No voltage	—	10 – 14 V
	IG S/W – E1	No voltage	Ignition switch ON	10 – 14 V
	M-REL – E1	No voltage	Ignition switch ON	10 – 14 V
	B (B1) – E1	No voltage	Ignition switch ON	10 – 14 V

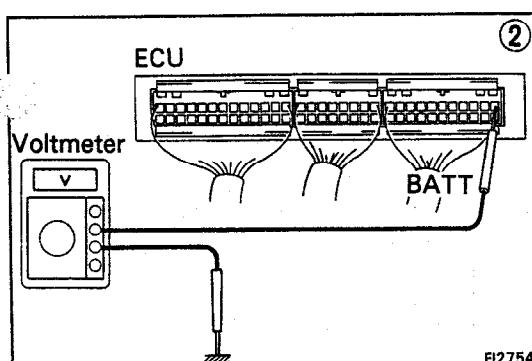


FI2916

• BATT – E1



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



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

NO

OK

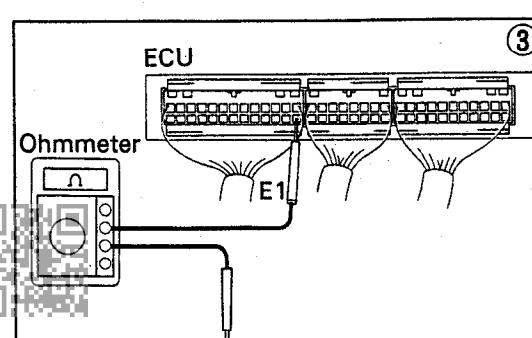
③ Check wiring between ECU terminal E1 and body ground.

OK

BAD

Try another ECU.

Replace or repair.



Check fuse and fusible link.

BAD

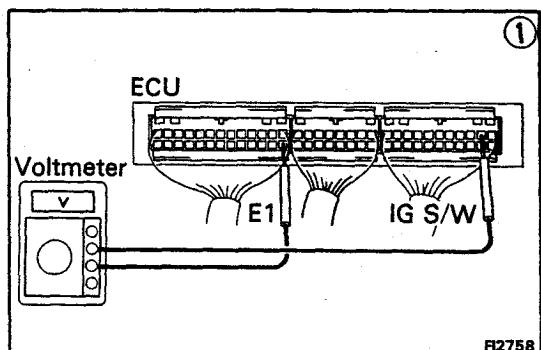
Replace.

OK

Check wiring between ECU terminal and battery.

BAD

Repair or replace.



• IG S/W — E1

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

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

NO OK

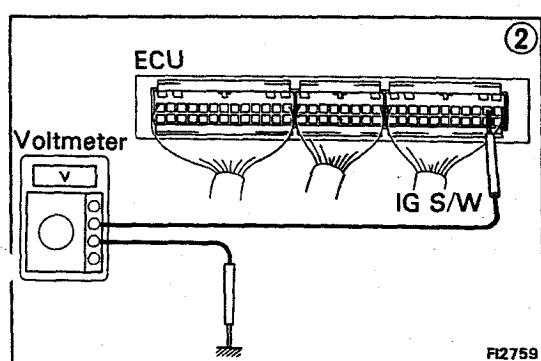
Check wiring between ECU terminal E1 and body ground.

OK

BAD

Try another ECU.

Replace or repair.



• M-REL — E1

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

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

NO OK

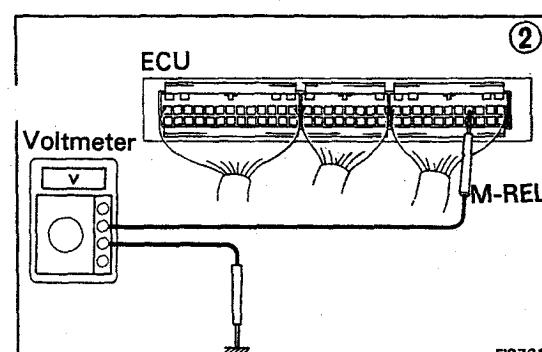
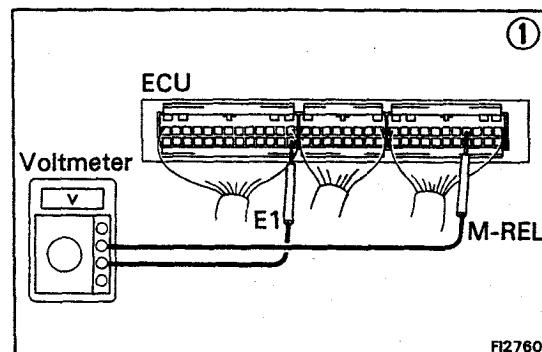
Check wiring between ECU terminal E1 and body ground.

OK

BAD

Try another ECU.

Replace or repair.



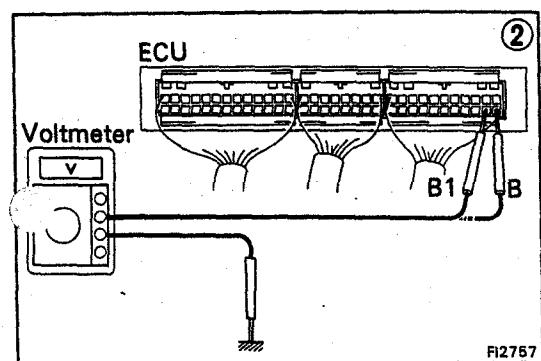
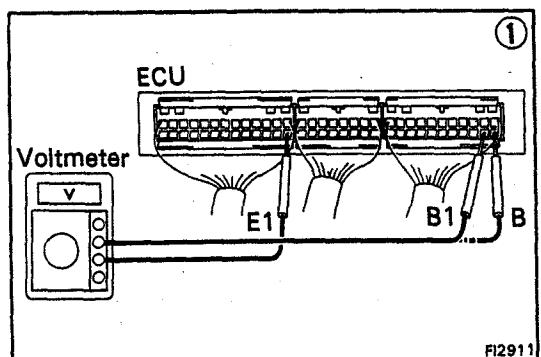
Check EFI main relay and wiring harness.

BAD → Replace.

OK

Try another ECU.





● B (B1) – E1

① There is no voltage between ECU terminals B (B1) and E1. (IG S/W ON)

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

NO OK

Check wiring between ECU terminal E1 and body ground.

OK

Try another ECU.

BAD

Check fuse, fusible link and wiring harness.

OK

Check EFI main relay.
(See page FI-112)

Replace or repair.

OK

Refer to M-REL - E1 trouble section.

BAD

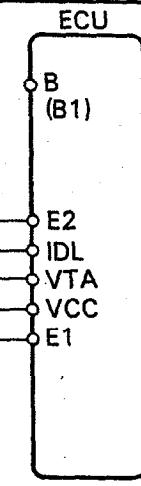
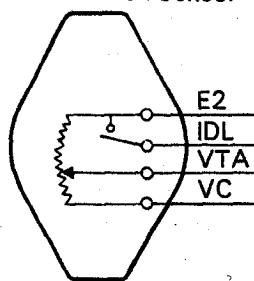
1000 J. Neurosci., November 1, 1990, 10(11):999-1000

Resources

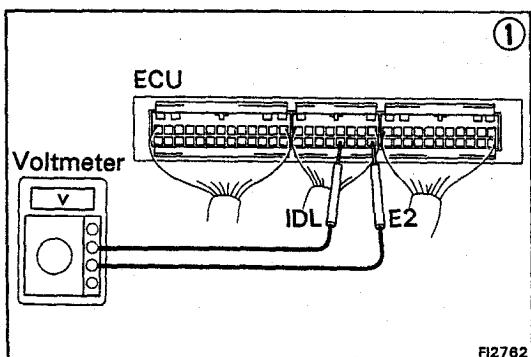


No.	Terminals	Trouble	Condition	STD Voltage
2	IDL — E2	No voltage	Throttle valve open	10 — 14 V
	VCC — E2		—	4 — 6 V
	VTA — E2		Throttle valve fully closed	0.1 — 1.0 V
			Throttle valve fully open	4 — 5 V

Throttle Position Sensor



FI1368



• IDL — E2

① There is no voltage between ECU terminals IDL and E2. (IG S/W ON) (Throttle valve open)

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

NO

OK

Check wiring between ECU terminal E1 and body ground.

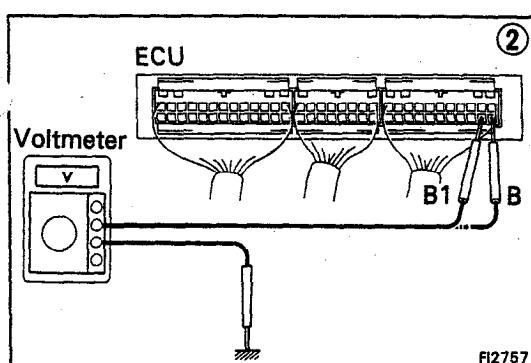
OK

BAD

Try another ECU.

BAD

Repair or replace.



Refer to No. 1.
(See page FI-62)

BAD

Replace or repair.

OK

③ Check throttle position sensor.

BAD

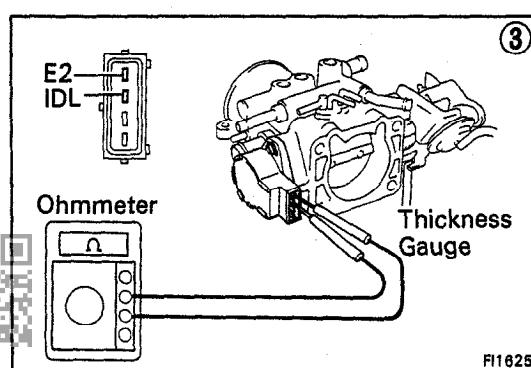
Replace or repair
throttle position sensor.

OK

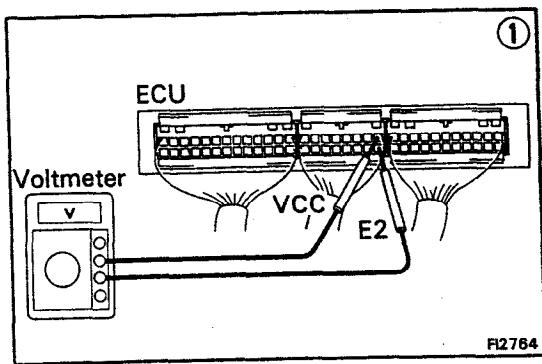
Check wiring between ECU and
throttle position sensor.

OK

Try another ECU.



CONTENT UPLOADED BY
SUSPENDED KIDS



• VCC — E2

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

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

OK

NO

② Check throttle position sensor.
(See page FI-102)

Refer to No. 1.
(See page FI-62)

BAD

OK

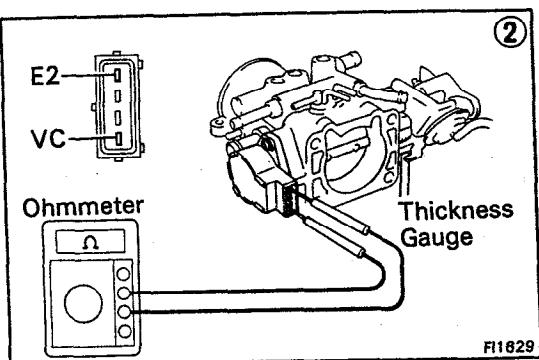
Repair or replace.

Check wiring between ECU and throttle position sensor.

Try another ECU.

BAD

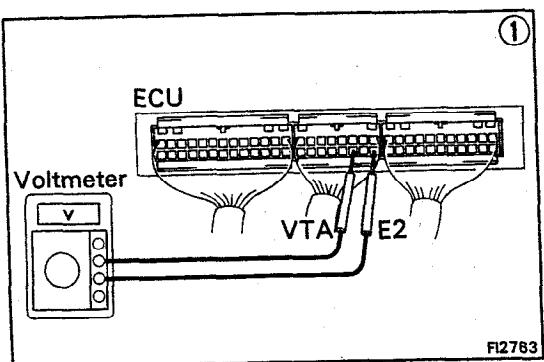
Repair or replace wiring.



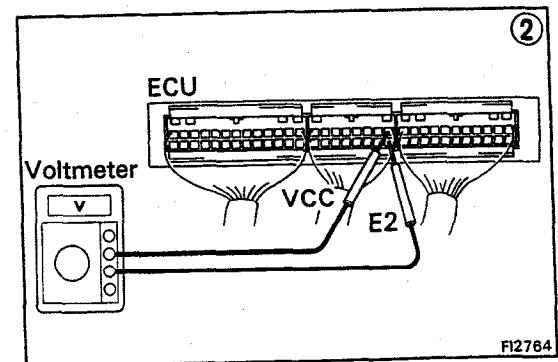
• VTA — E2

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

② Check that there is voltage between ECU terminal VCC and E2.
(IG S/W ON)



OK



Refer to VCC — E2 trouble section.

OK

③ Check throttle position sensor.

BAD

Repair or replace.

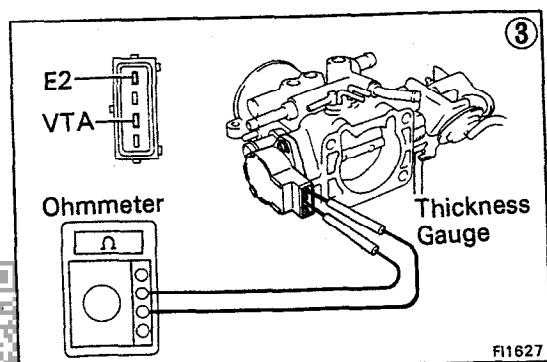
OK

Check wiring between ECU and throttle position sensor.

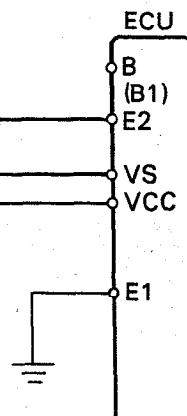
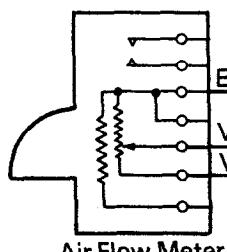
BAD

Repair or replace.

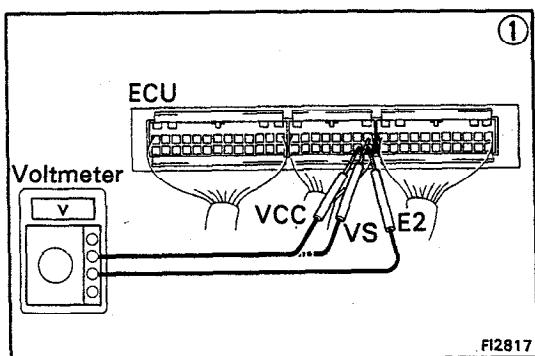
Try another ECU.



No.	Terminals	Trouble	Condition	STD Voltage
3	VCC — E2	No voltage	—	4 — 6 V
	VS — E2		Ignition S/W ON Measuring plate fully closed	4 — 6 V
	VS — E2		Measuring plate fully open	0.02 — 0.08 V
	VS — E2		Idling	— 2 — 4 V
	VS — E2		3,000 rpm	— 0.3 — 1.0 V



FI1269



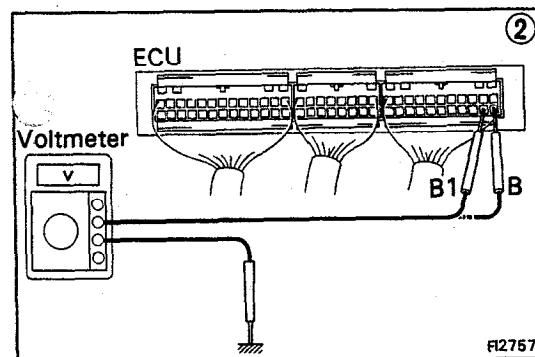
① There is no voltage between ECU terminals VCC or VS and E2. (IG S/W ON)

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

OK

NO

Refer to No. 1.
(See page FI-62)



Check wiring between ECU terminal E1 and body ground.

OK

BAD

③ Check air flow meter.
(See page FI-96)

BAD

Repair or replace.

Replace air flow meter.

OK

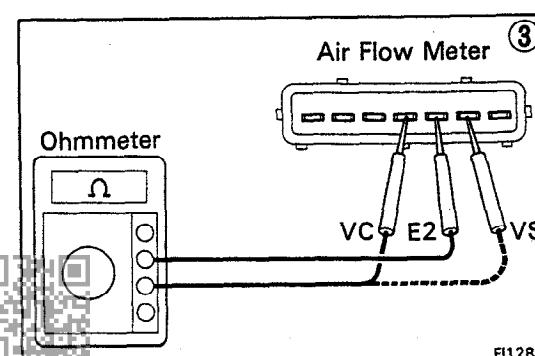
Check wiring between ECU and air flow meter.

OK

BAD

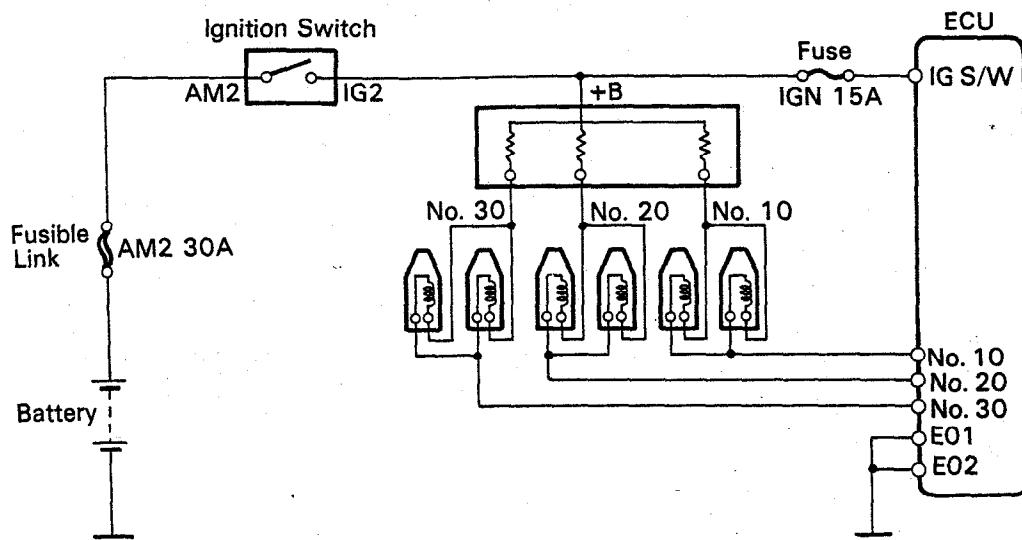
Try another ECU.

Repair or replace.

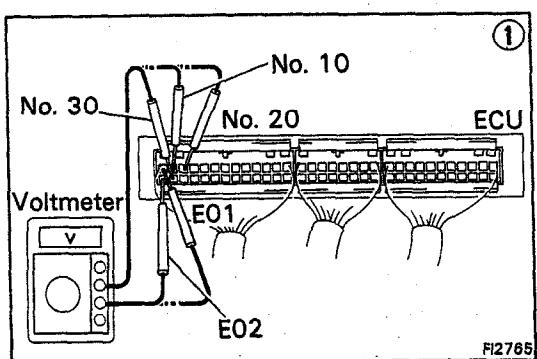


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No.	Terminals	Trouble	Condition	STD Voltage
4	No. 10 No. 20 — E01 No. 30	No voltage	Ignition switch ON	9 — 14 V



FI2941



① There is no voltage between ECU terminal No. 10, No. 20 and/or No. 30 and E01 or E02. (IG S/W ON)

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

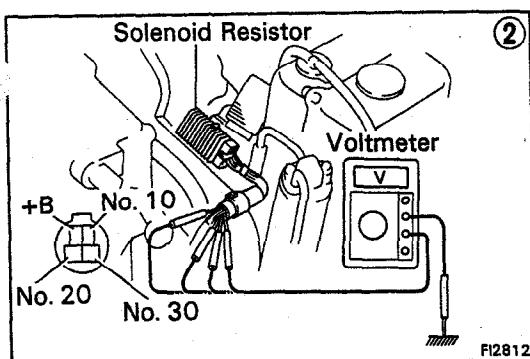
OK

NO

Check wiring between resistor and battery.

BAD

Repair or replace.



Check that there is specified voltage between resistor terminal (No. 10, No. 20 or No. 30) and body ground.
STD voltage: 9 — 14 V

OK

BAD

③ Check resistance of magnetic coil in each injector.

Replace resistor.

OK

BAD

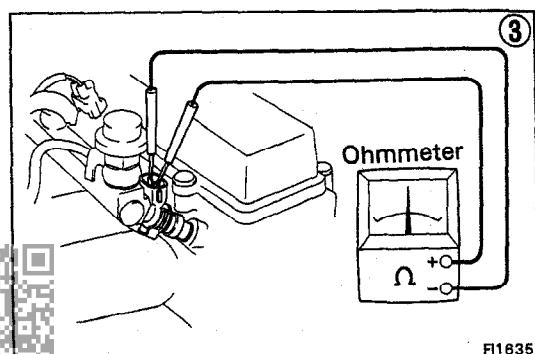
Check wiring between ECU and injector.

Replace injector.

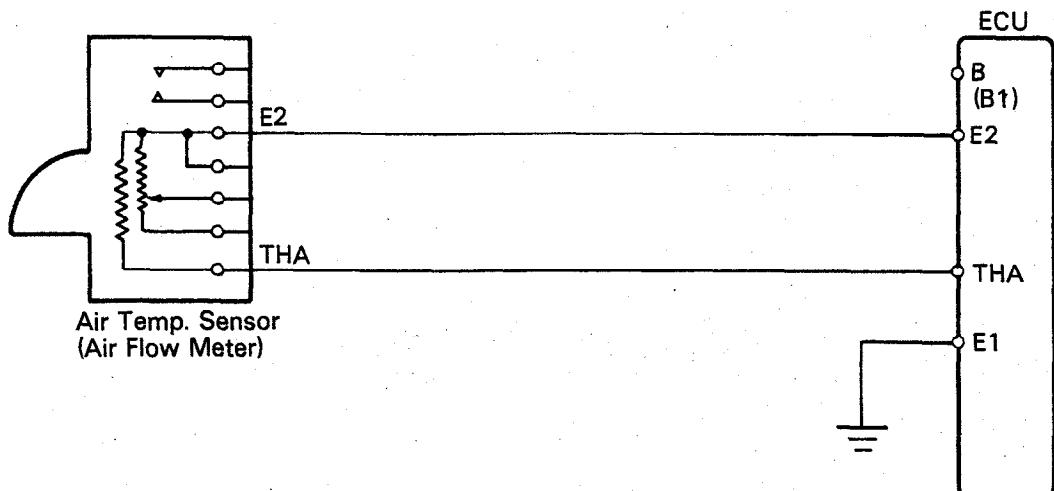
OK

Try another ECU.

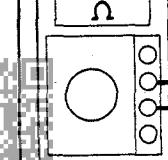
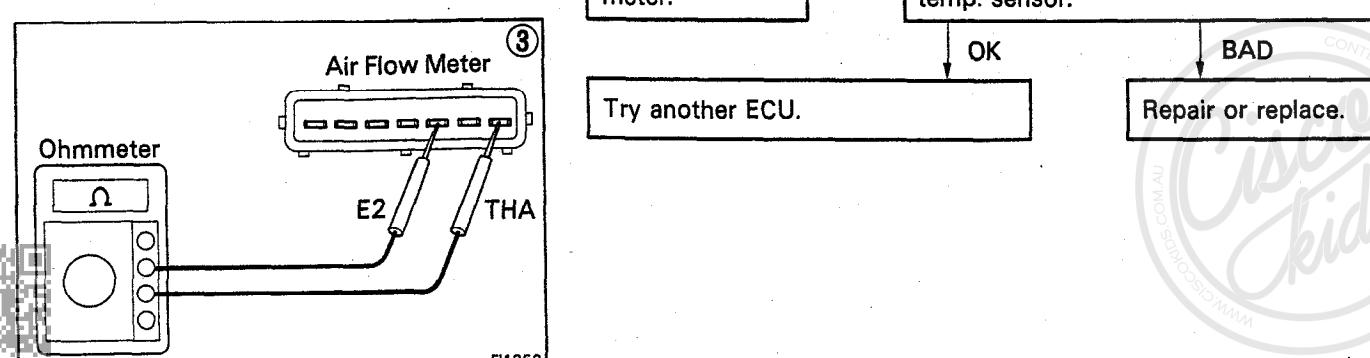
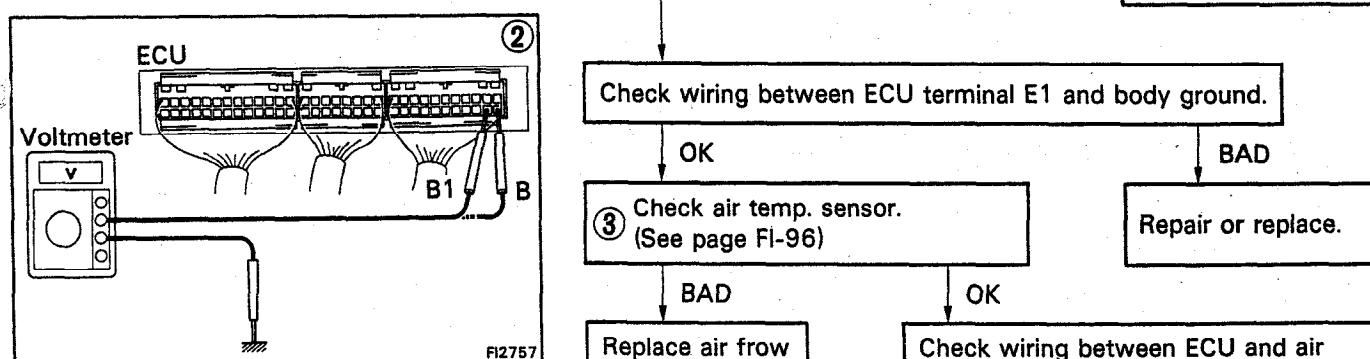
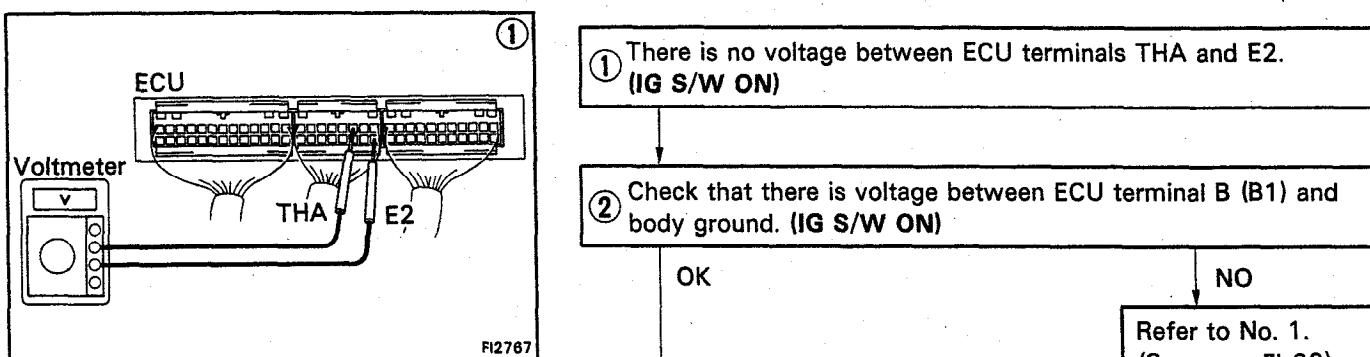
Replace or repair.



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

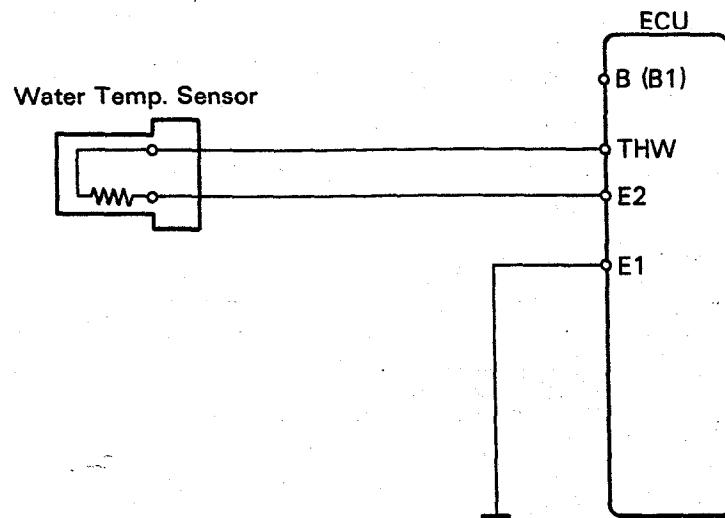


FI1272

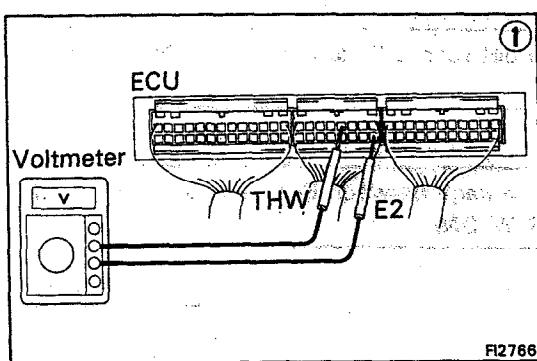


FI1253

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



FI0487



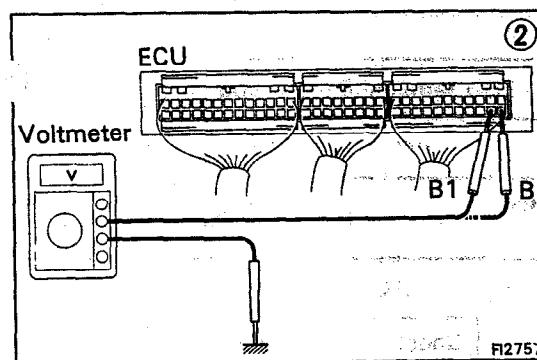
① There is no voltage between ECU terminals THW and E2.
(IG S/W ON)

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

OK

NO

Refer to No. 1.
(See page FI-62)



Check wiring between ECU terminal E1 and body ground.

OK

BAD

Repair or replace.

③ Check water temp. sensor.
(See page FI-116)

BAD

Replace water temp. sensor.

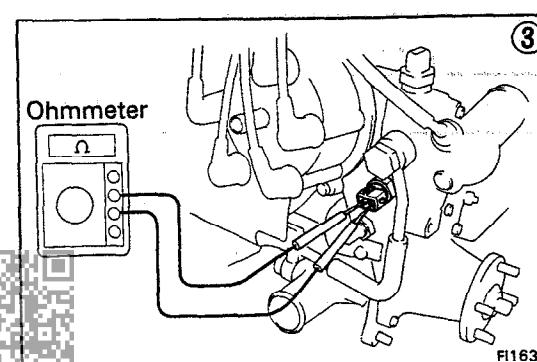
Check wiring between ECU and water temp. sensor.

OK

Try another ECU.

BAD

Repair or replace.

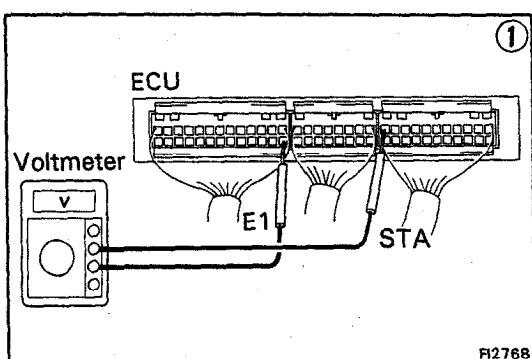


Try another ECU.

Repair or replace.

No.	Terminals	Trouble	Condition	STD Voltage
7	STA — E1	No voltage	Cranking	6 — 14 V

FI2943



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

Check starter operation.

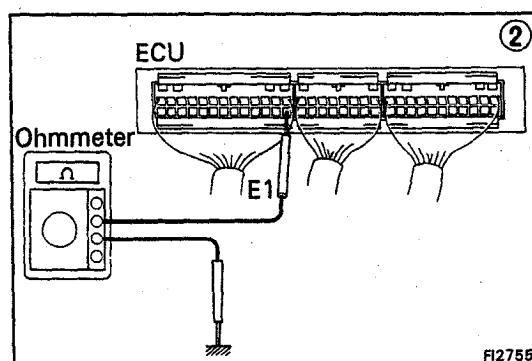
OK

Check wiring between ECU terminal STA and ignition switch terminal ST1.

BAD

BAD

Repair or replace.



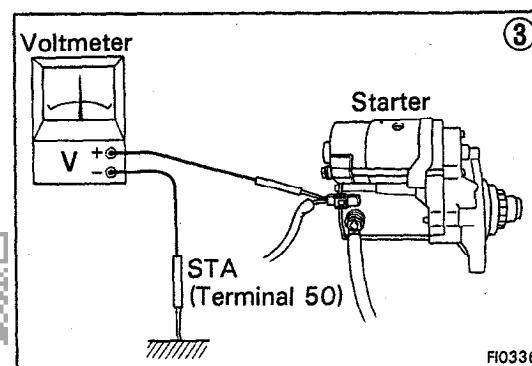
② Check wiring between ECU terminal E1 and body ground.

OK

Try another ECU.

BAD

Repair or replace.



Check fusible links, battery, wiring, ignition switch and neutral start switch.

BAD

Repair or replace.

③ Check that there is voltage at STA (50) terminal of starter.
(IG S/W START) STD voltage: 6 — 14 V

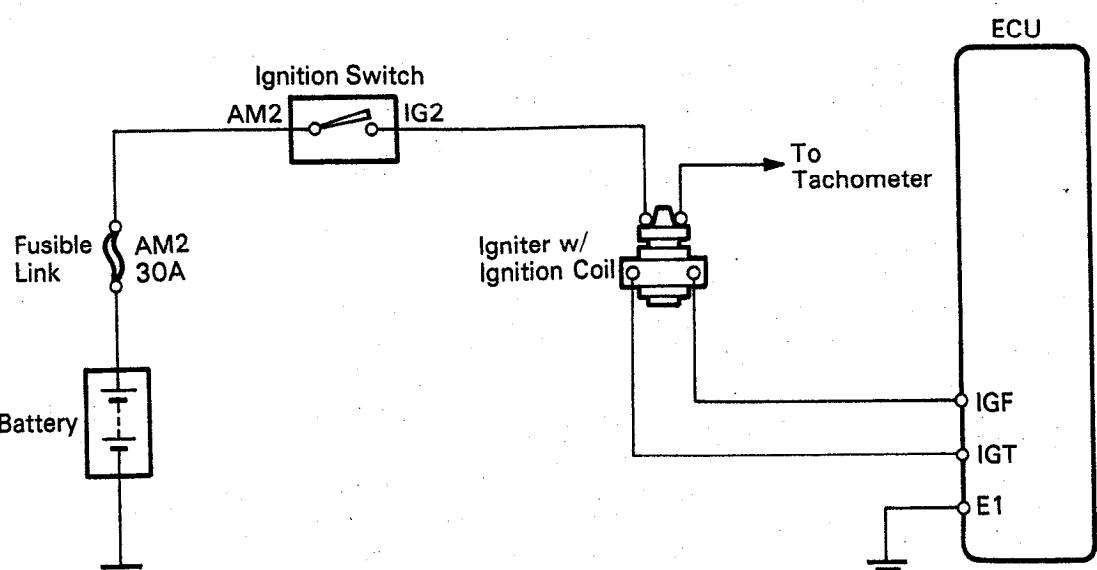
OK

Check starter.

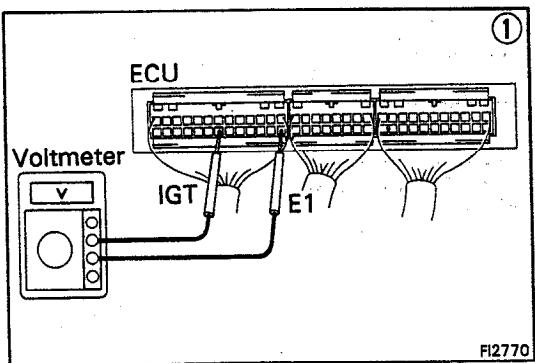
NO

Check wiring between ignition switch terminal ST1 and starter terminal STA (50).

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



FI2438

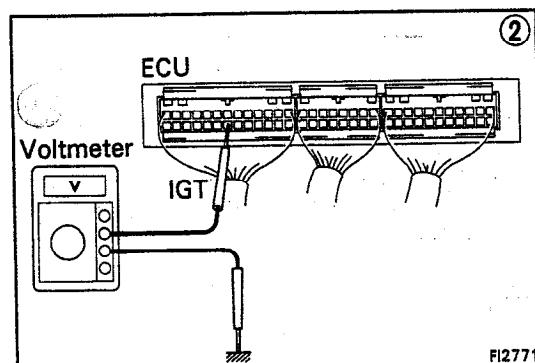


① There is no voltage between ECU terminals IGT and E1.
(Idling)

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

NO OK

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



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

OK

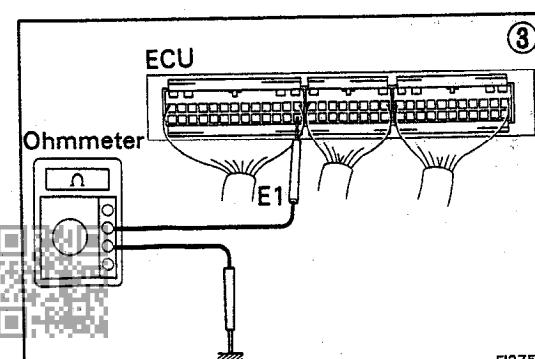
Check distributor. (See page IG-11) BAD → Repair or replace.

OK

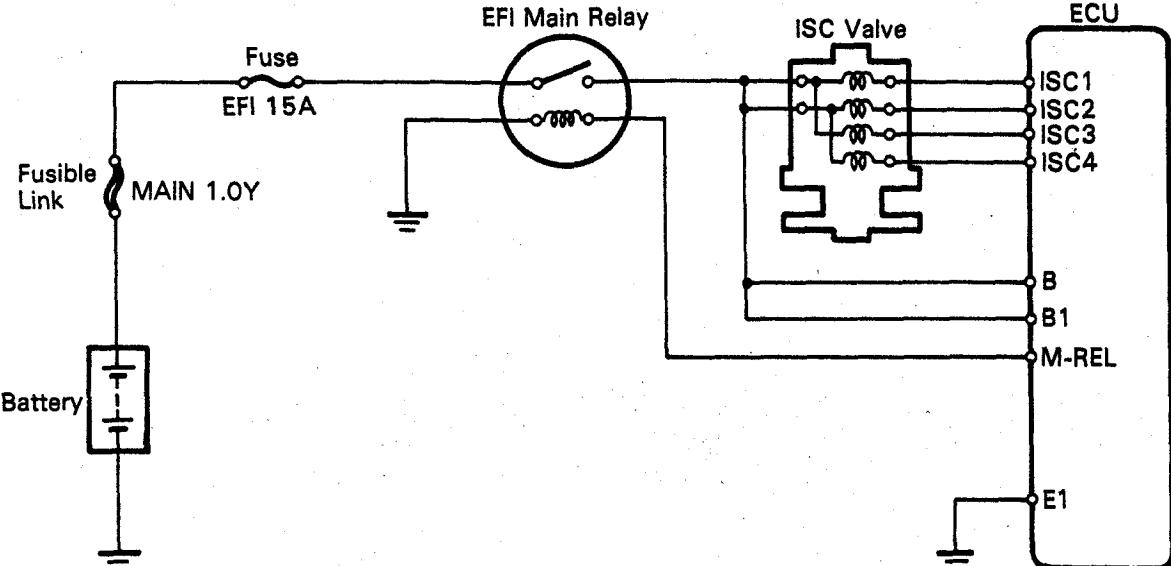
Check wiring between ECU and battery. BAD → Repair or replace.

OK

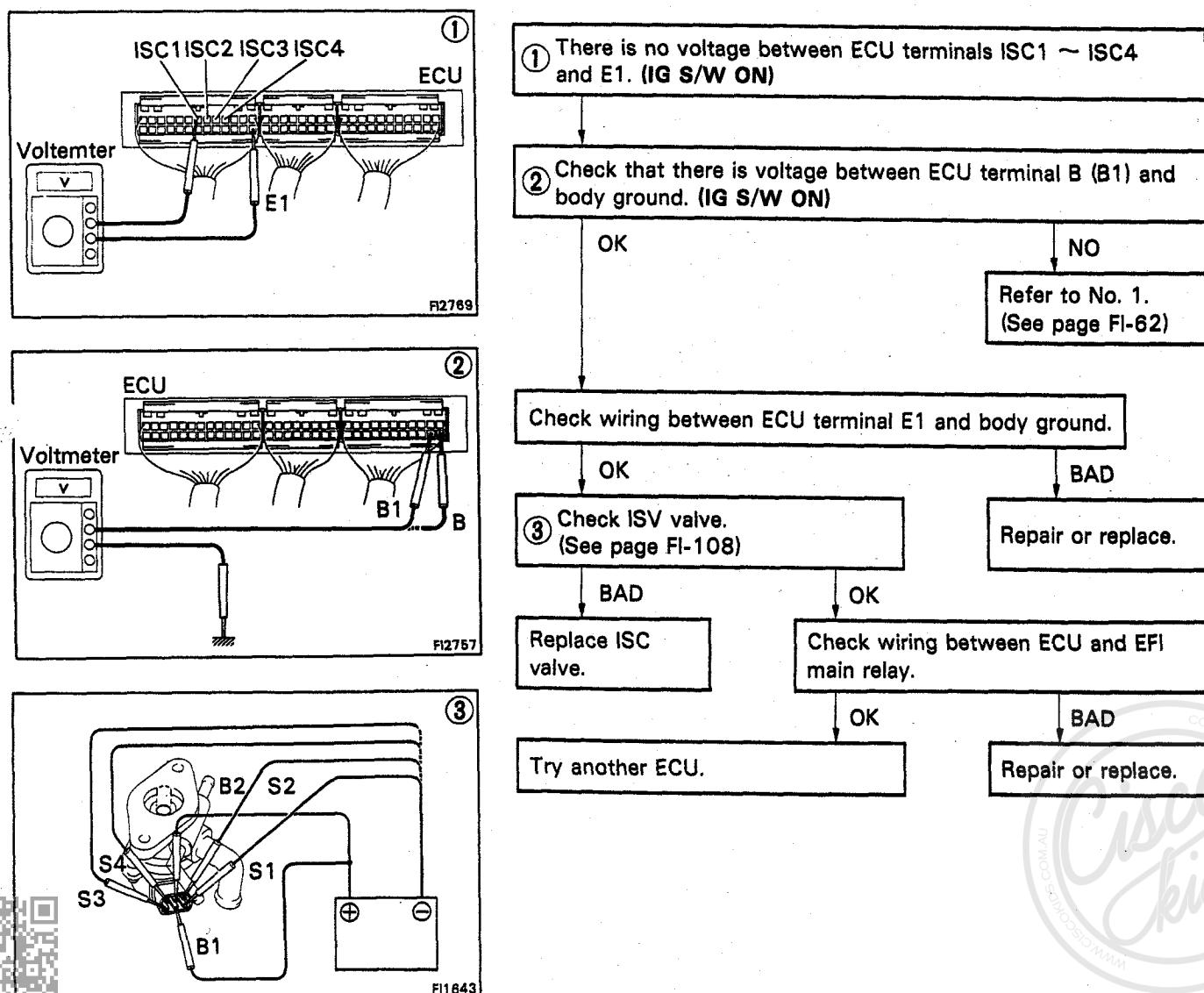
Check igniter. BAD → Repair or replace.



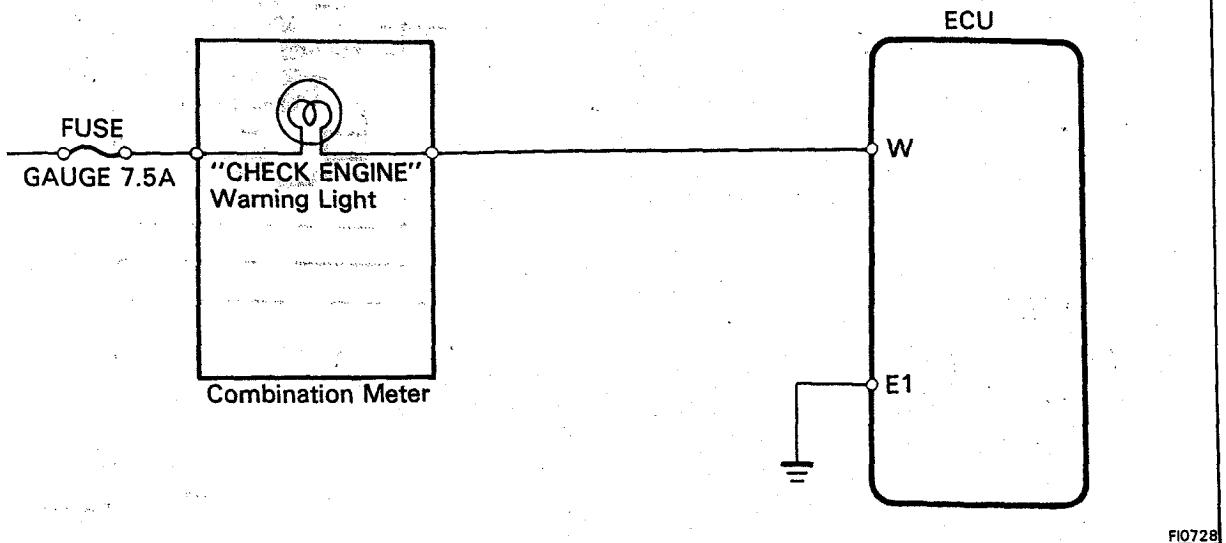
No.	Terminals	Trouble	Condition	STD Voltage
9	ISC1~ISC4 — E1	No voltage	Ignition switch ON	9 — 14 V



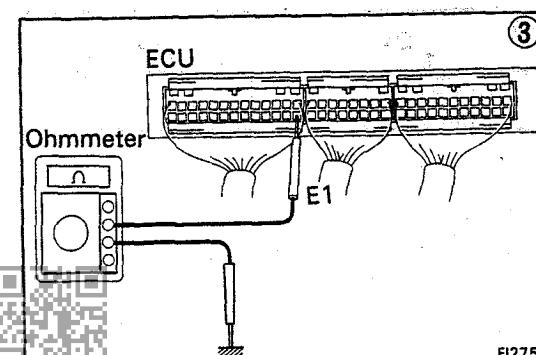
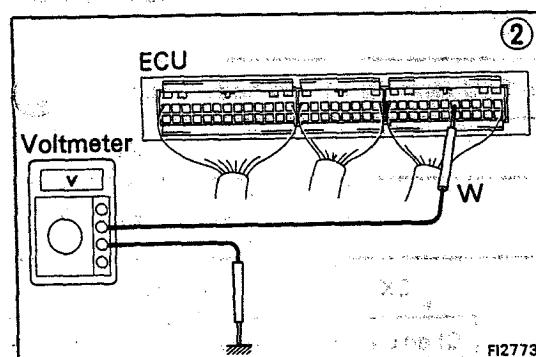
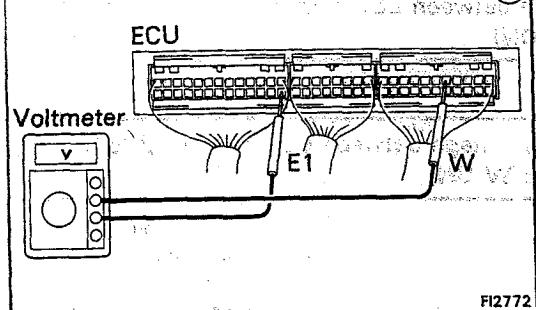
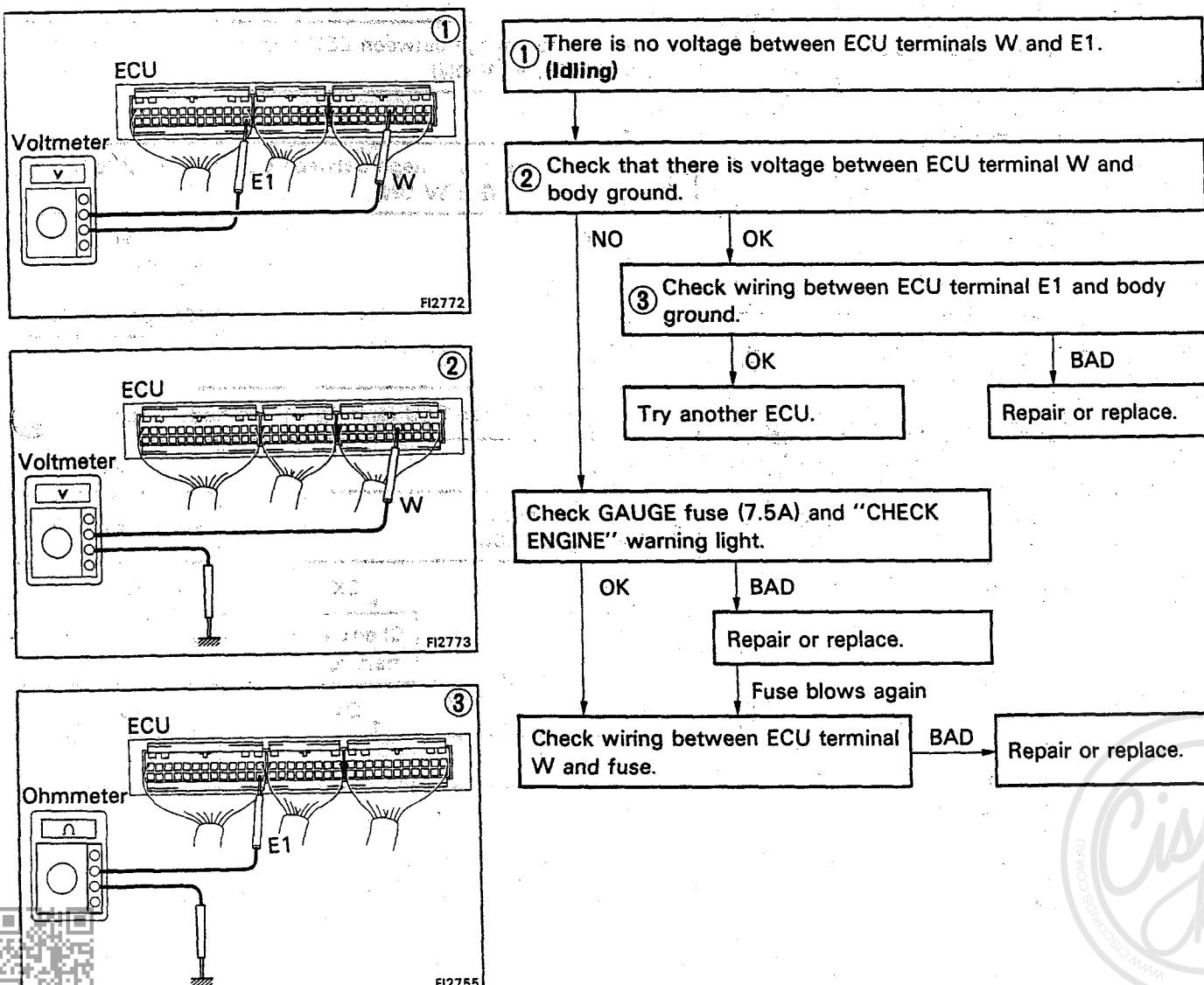
FI2913



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



FI0728



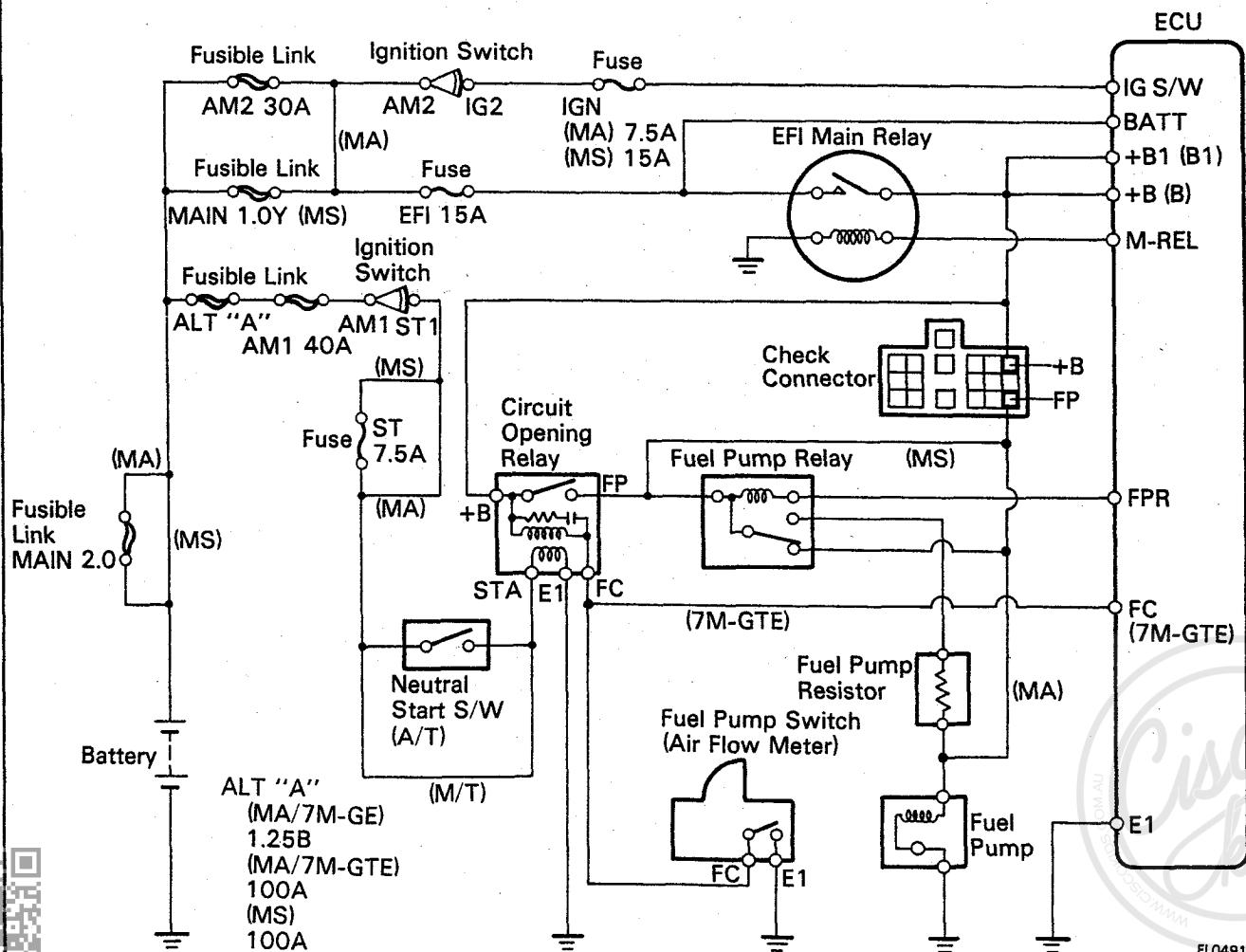
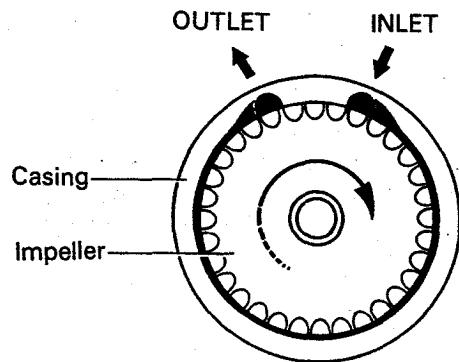
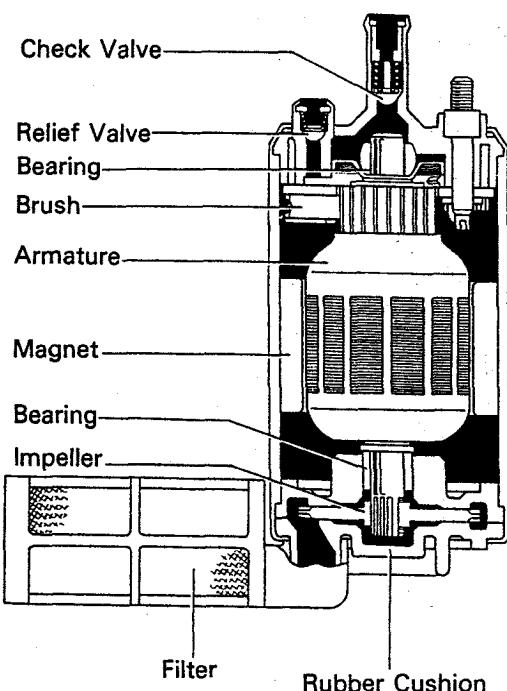
FI2772

FI2773

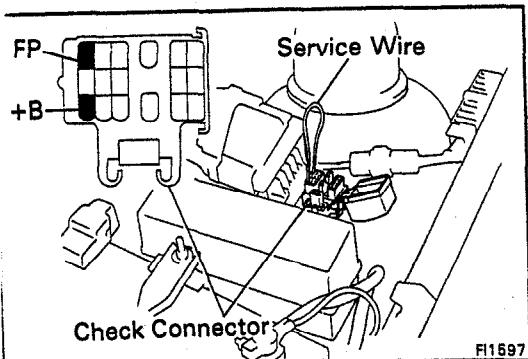
FI2755

FUEL SYSTEM

Fuel Pump



CON
TENT UPLOADED BY
Visco Biday
www.visco-biday.com



ON-VEHICLE INSPECTION

1. INSPECT FUEL PUMP OPERATION

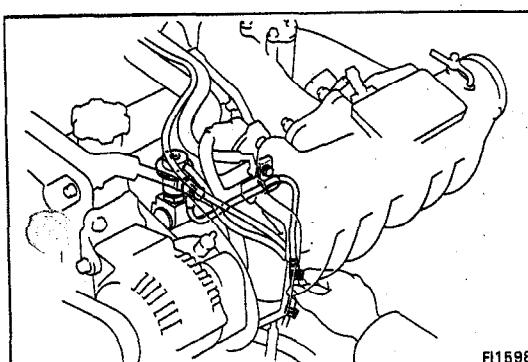
- Turn the ignition switch to ON.

NOTE: Do not start the engine.

- Using a service wire, short circuit the fuel pump check terminals +B and FP of the check connector.

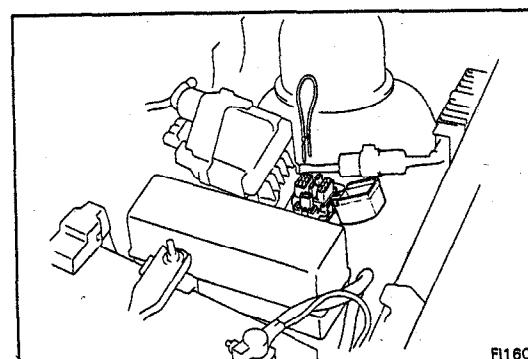
CHECK CONNECTOR LOCATION:

See pages FI-110, 111



- Check that there is pressure in the fuel return hose.

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



- Remove the service wire.

- Turn the ignition switch OFF.

If there is no pressure, check the following parts.

- Fusible links
- Fuse
- EFI main relay
- Fuel pump
- Wiring connections

2. INSPECT FUEL PRESSURE

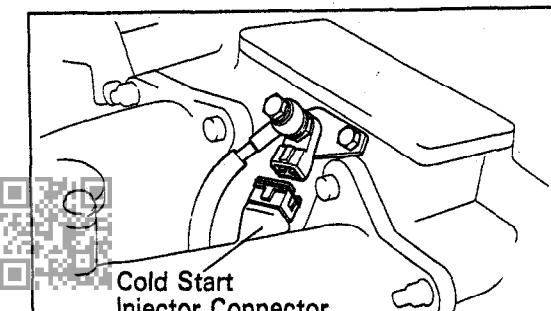
- Check that battery voltage is above 11 volts.

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

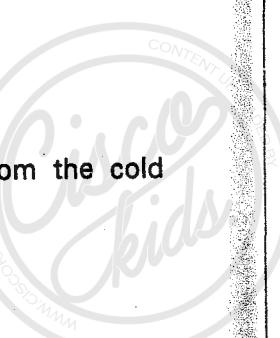
- Remove the cold start injector tube.

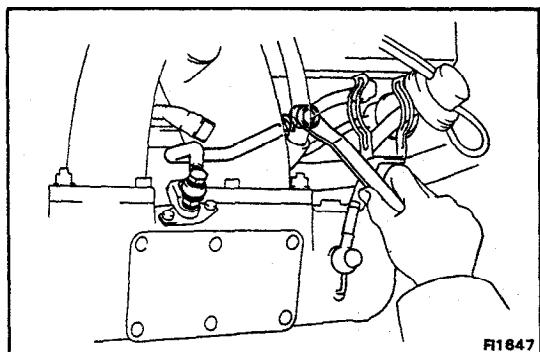
(7M-GE)

- Disconnect the wiring connector from the cold start injector.

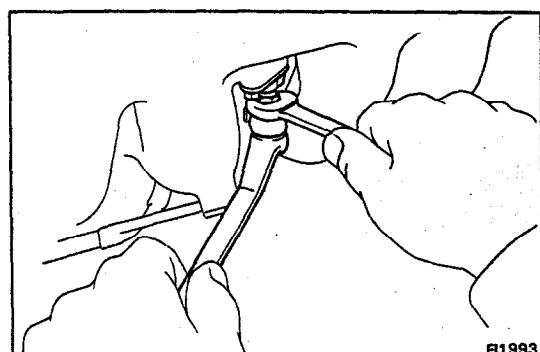


Cold Start
Injector Connector



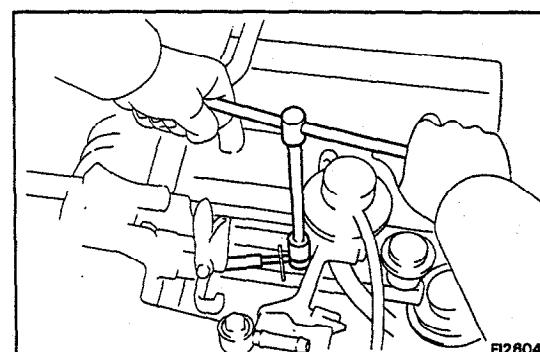


- Place a suitable container or shop towel under the cold start injector tube.
- Slowly loosen the union bolt of the cold start injector tube and remove the bolt and two gaskets from the delivery pipe.

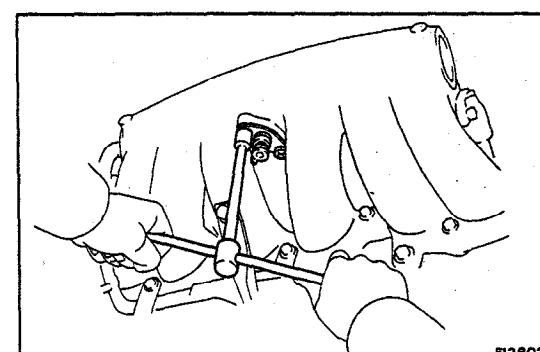


(7M-GTE)

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

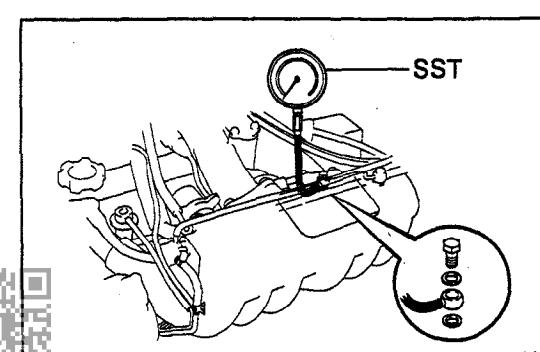


- Remove the union bolt, fuel tube and two gaskets.



- Remove the two bolts and disconnect the cold start injector with gasket.
- Disconnect the cold start injector connector.
- Install the gasket and cold start injector with the bolts.

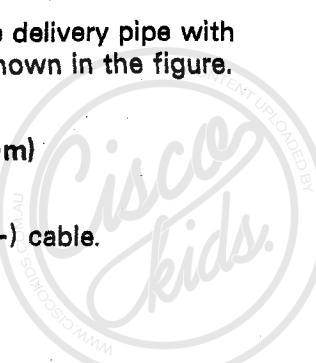
Torque: 55 kg-cm (48 in.-lb, 5.4 N·m)

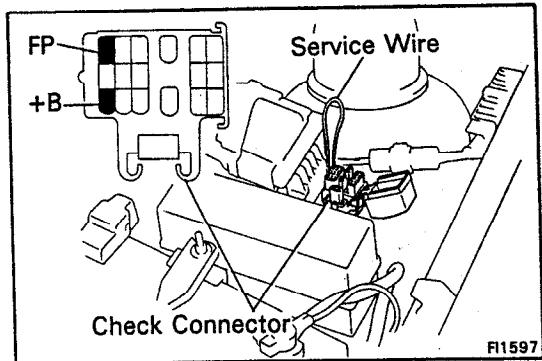


- Install SST (pressure gauge) to the delivery pipe with new gaskets and union bolt, as shown in the figure.
SST 09268-45012

Torque: 300 kg-cm (22 ft-lb, 29 N·m)

- Wipe off any splattered gasoline.
- Reconnect the battery negative (−) cable.

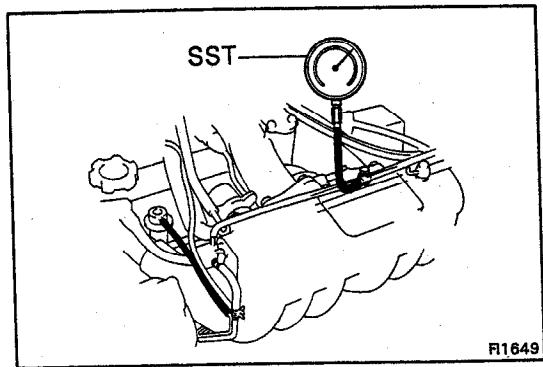




(g) Using a service wire, short circuit the fuel pump check terminals FP and +B of the check connector.

CHECK CONNECTOR LOCATION:

See pages FI-110, 111



(h) Turn the ignition switch ON.

(i) Measure the fuel pressure.

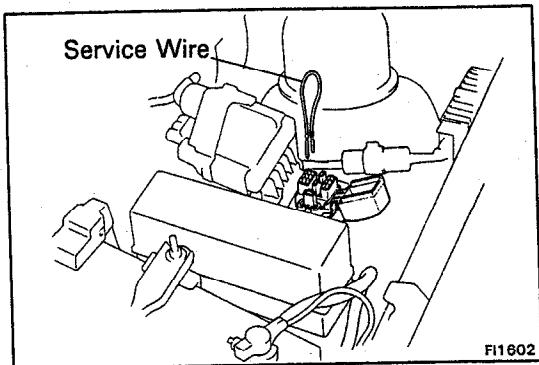
**Fuel pressure: 2.3 — 2.8 kg/cm²
(33 — 40 psi, 226 — 275 kPa)**

If pressure is high, replace the pressure regulator.

If pressure is low, check the following parts:

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

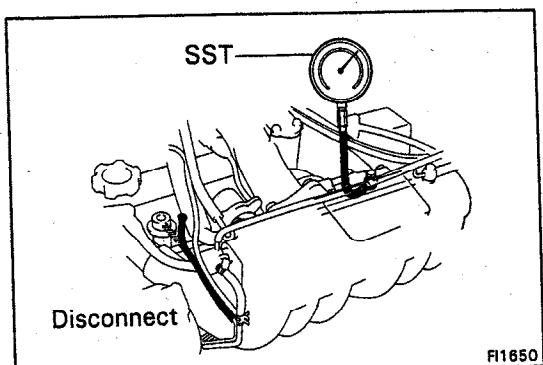
(j) Remove the service wire from the check connector.
(k) Start the engine.



(l) Disconnect the vacuum sensing hose from the pressure regulator and plug hose end.

(m) Measure the fuel pressure at idling.

**Fuel pressure: 2.3 — 2.8 kg/cm²
(33 — 40 psi, 226 — 275 kPa)**

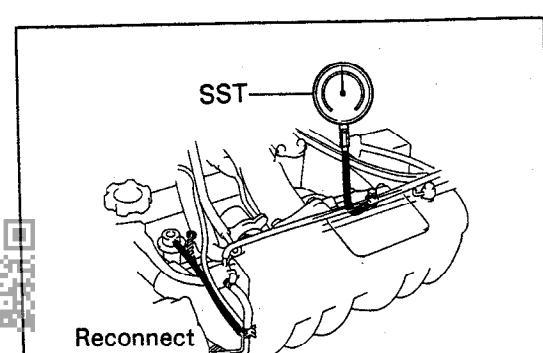


(n) Reconnect the vacuum sensing hose to the pressure regulator.

(o) Measure the fuel pressure at idling.

**Fuel pressure: 1.6 — 2.1 kg/cm²
(23 — 30 psi, 157 — 206 kPa)**

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

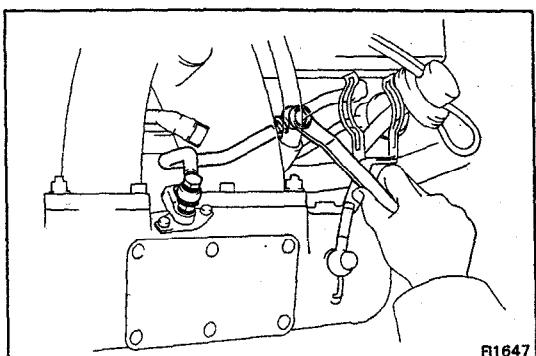


(p) Stop the engine. Check that the fuel pressure remains above 1.5 kg/cm² (21 psi, 147 kPa) for 5 minutes after the engine is turned off.

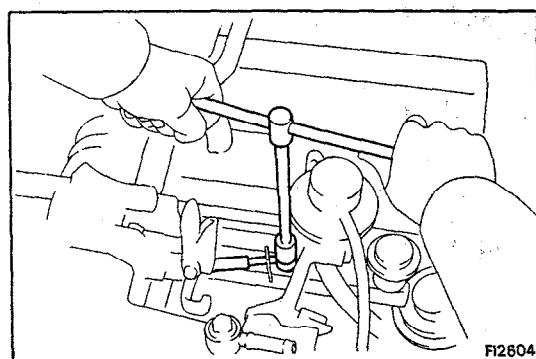
If pressure is not as specified, check the fuel pump, pressure regulator and/or injectors.

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

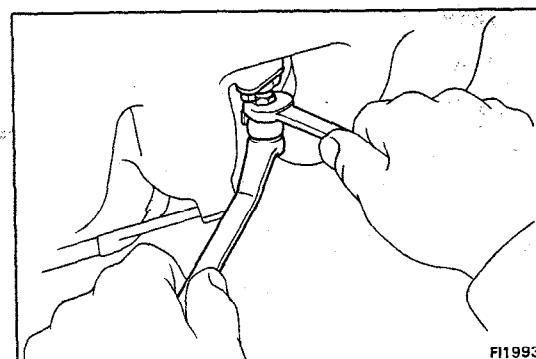
SST 09268-45012



R1647



FI2604



FI1993

(r) Install cold start injector tube.

(7M-GE)

- Reconnect the cold start injector tube with new gaskets and union bolt to the delivery pipe.

Torque: 300 kg-cm (22 ft-lb, 29 N·m)

- Connect the wiring connector to the cold start injector.

(7M-GTE)

- Remove the two bolts and cold start injector with gasket.
- Connect the cold start injector connector.
- Install the cold start injector tube with new four gaskets and two union bolts.

Torque:

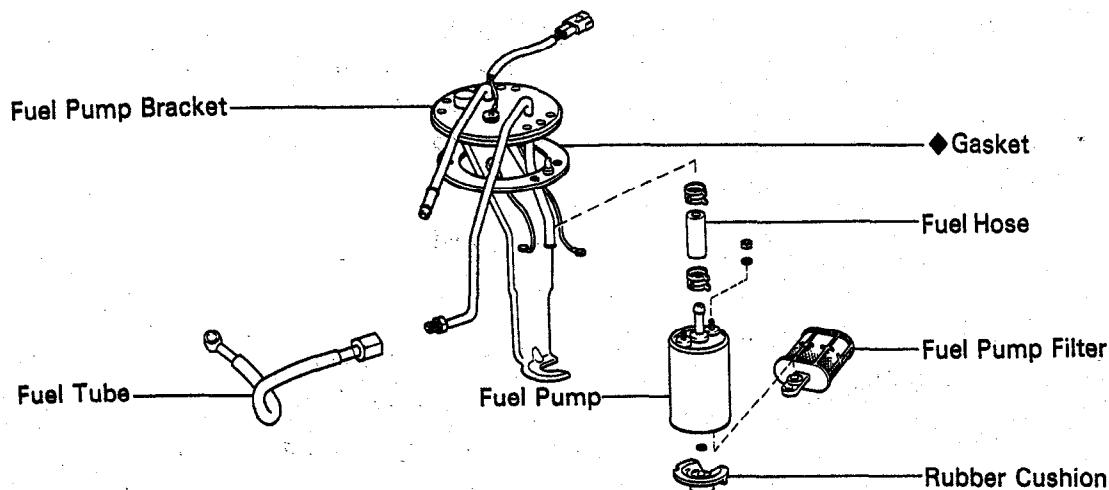
Delivery pipe side	300 kg-cm (22 ft-lb, 29 N·m)
Cold start injector side	180 kg-cm (13 ft-lb, 18 N·m)

(s) Check for fuel leakage.



REMOVAL OF FUEL PUMP

MA



FI1652

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

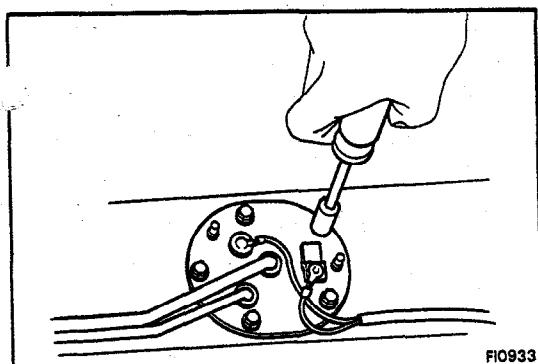
2. DRAIN GASOLINE FROM FUEL TANK

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

3. REMOVE FUEL TANK

4. REMOVE FUEL PUMP BRACKET FROM FUEL TANK

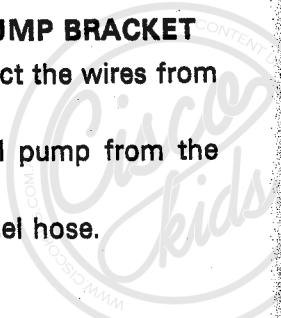
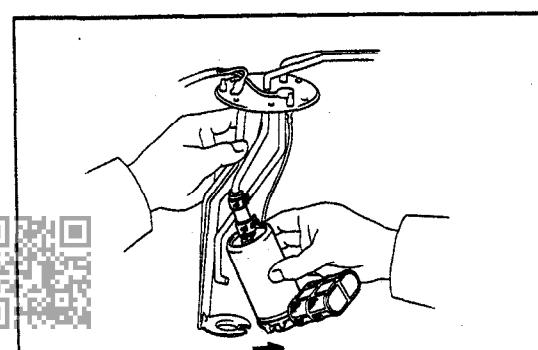
- Remove the screws.
- Pull out the fuel pump bracket.

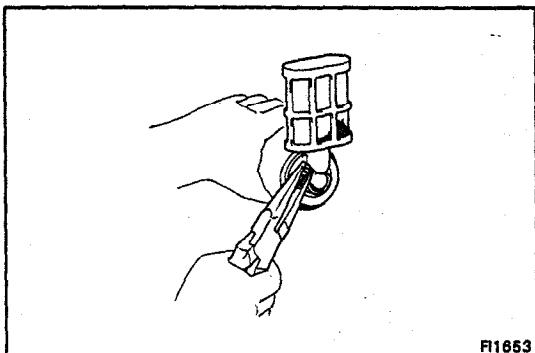


FI0933

5. REMOVE FUEL PUMP FROM FUEL PUMP BRACKET

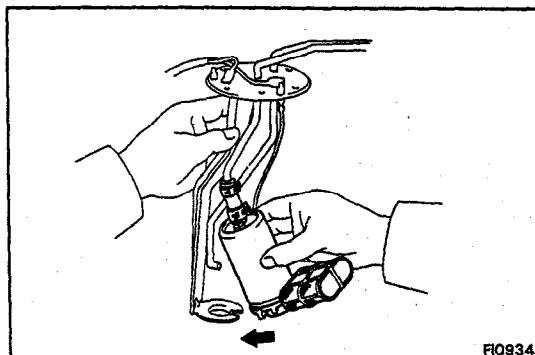
- Remove the two nuts and disconnect the wires from the fuel pump.
- Pull off the lower side of the fuel pump from the bracket.
- Remove the fuel pump from the fuel hose.





6. REMOVE FUEL PUMP FILTER FROM FUEL PUMP

- Remove the rubber cushion.
- Using a small screwdriver, remove the clip.
- Pull out the pump filter.



INSTALLATION OF FUEL PUMP

(See page FI-78)

1. INSTALL FUEL PUMP FILTER TO FUEL PUMP

- Install the pump filter with the clip.
- Install the rubber cushion.

2. INSTALL FUEL PUMP TO FUEL PUMP BRACKET

- Insert the outlet port of the fuel pump into the fuel hose.
- Push the lower side of the fuel pump and install the fuel pump.

3. INSTALL FUEL PUMP BRACKET

Install a new gasket and the pump bracket with the screws.

Torque: 35 kg-cm (30 in.-lb, 3.4 N·m)

4. INSTALL FUEL TANK

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

SST 09631-22020

Torque: 310 kg-cm (22 ft-lb, 30 N·m)

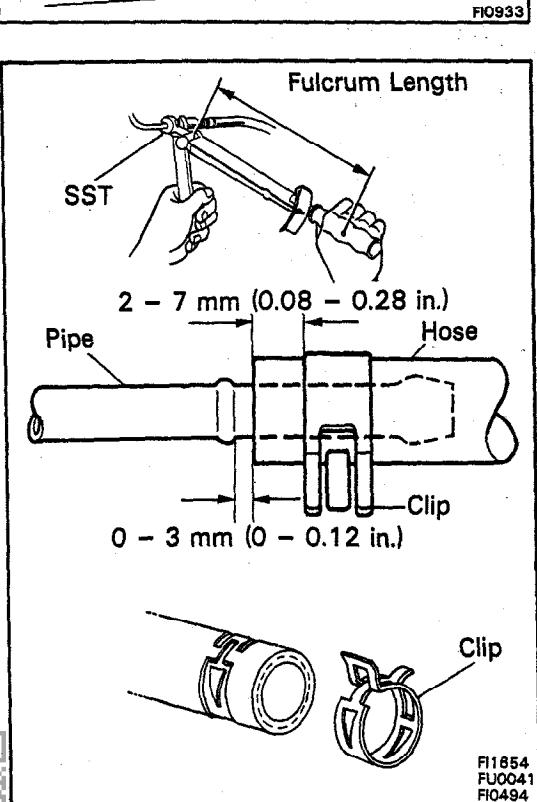
NOTE: Use a torque wrench with a fulcrum length 30 cm (11.181 in.).

CAUTION:

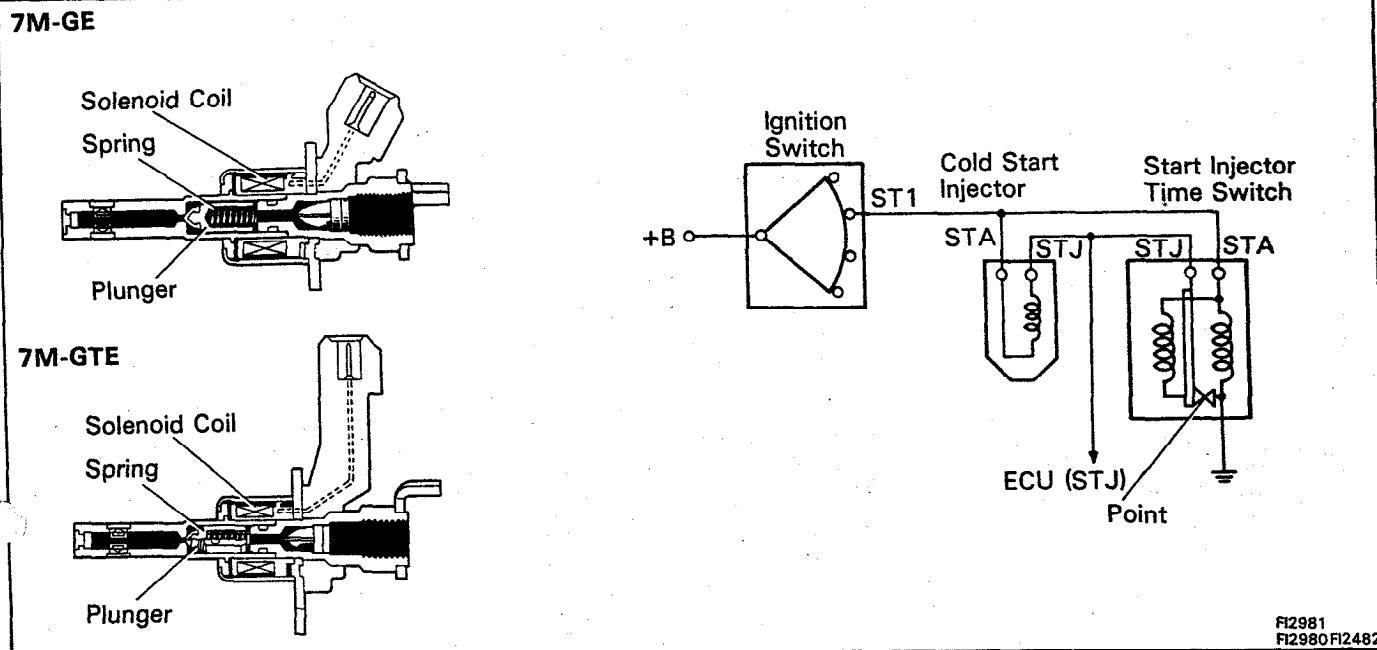
- Tighten the fuel tank mounting bolts, etc. to the specified torque.
- Tighten the pipe union and flare nut (hose) to the specified torque.
- Push in the pipe and insert-type hose to the specified position, and install the clip to the specified location.
- If reusing the hose, reinstall the clip at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

5. REFILL GASOLINE

6. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY



Cold Start Injector



ON-VEHICLE INSPECTION (7M-GE Only)

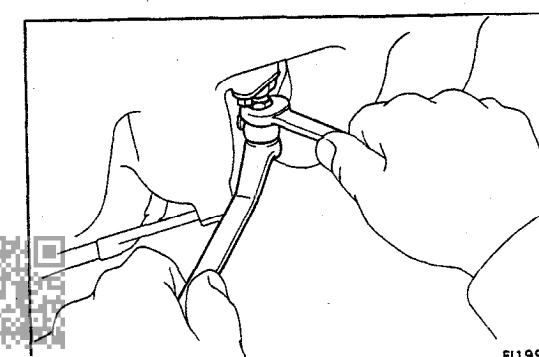
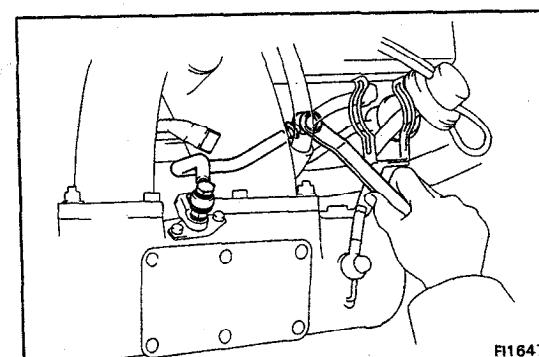
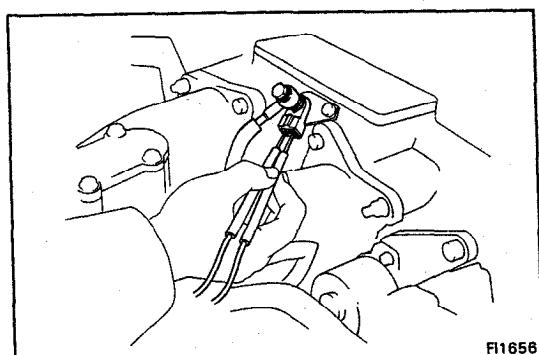
INSPECT RESISTANCE OF COLD START INJECTOR

- Disconnect the cold start injector connector.
- Using an ohmmeter, measure the resistance of the injector.

Resistance: 2 – 4 Ω

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

- Connect the cold start injector connector.



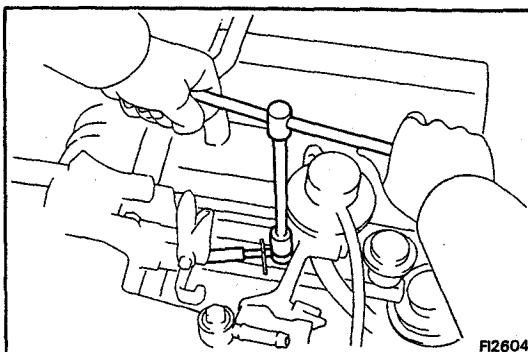
REMOVAL OF COLD START INJECTOR

- DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**
- (7M-GE)**
DISCONNECT COLD START INJECTOR CONNECTOR
- REMOVE COLD START INJECTOR TUBE**
(7M-GE)

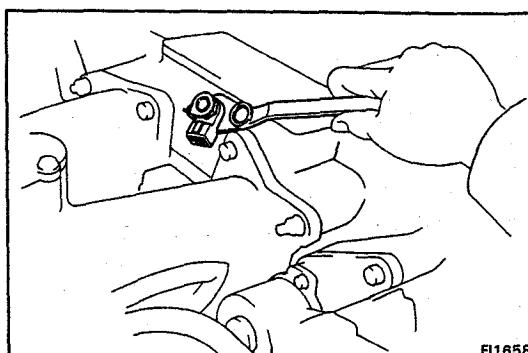
- Place a suitable container or shop towel under the cold start injector tube.
- Slowly loosen the two union bolts of the cold start injector tube and remove the bolts, four gaskets and injector tube.

(7M-GTE)

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

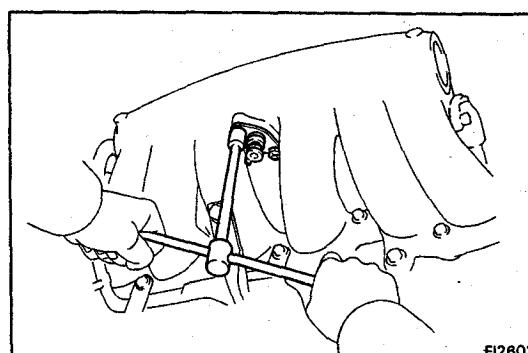


(c) Remove the union bolt, fuel tube and two gaskets.



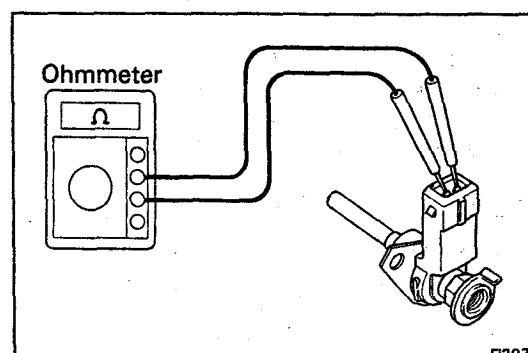
4. REMOVE COLD START INJECTOR (7M-GE)

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



(7M-GTE)

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



INSPECTION OF COLD START INJECTOR

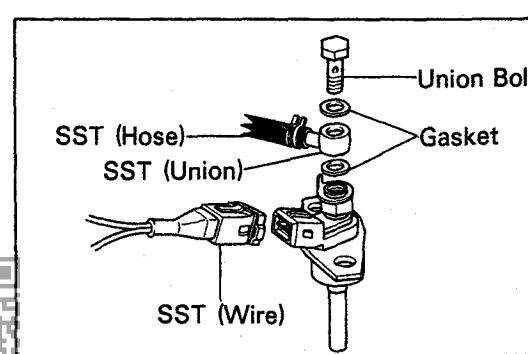
1. (7M-GTE)

INSPECT RESISTANCE OF COLD START INJECTOR

Using an ohmmeter, check the resistance of the injector.

Resistance: 2 – 4 Ω

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



2. INSPECT INJECTION OF COLD START INJECTOR

WARNING: Keep clear of sparks during the test.

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

SST 09268-41045

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

SST 09268-41045

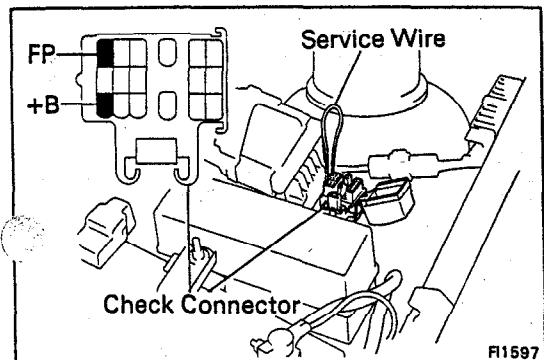
(c) Connect the SST (wire) to the injector.

SST 09842-30050

CONTENT UPLOADED BY
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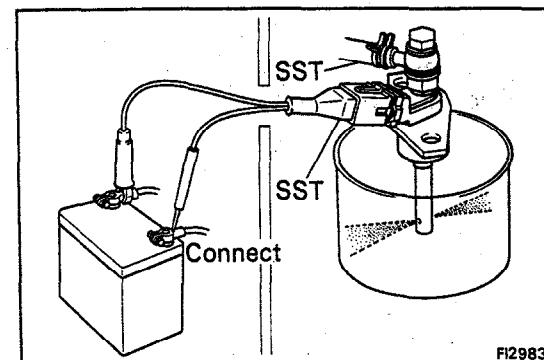
- (d) Put a container under the injector.
- (e) Reconnect the battery negative (-) terminal.
- (f) Turn the ignition switch ON.

NOTE: Do not start the engine.



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

CHECK CONNECTOR LOCATION:
See pages FI-110, 111



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

SST 09842-30050

CAUTION: Perform this check within the shortest possible time.

2. INSPECT LEAKAGE

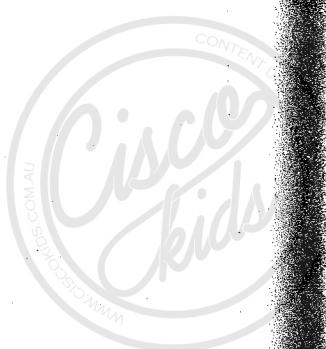
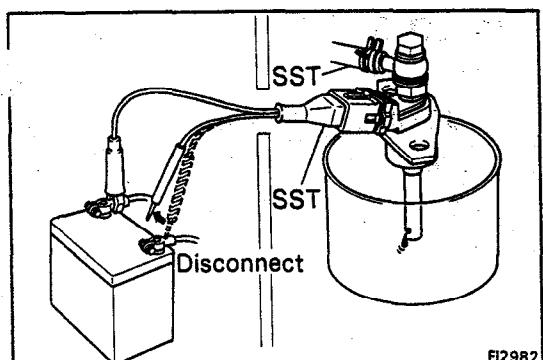
- (a) In the condition above, disconnect the test probes of SST (wire) from the battery and check fuel leakage from the injector.

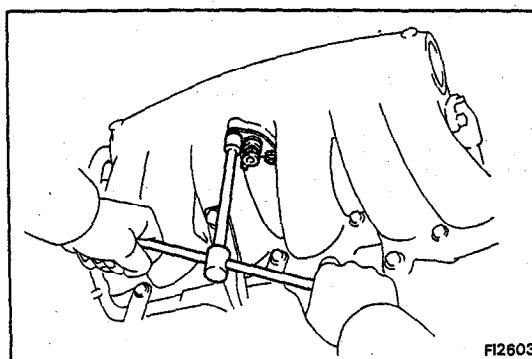
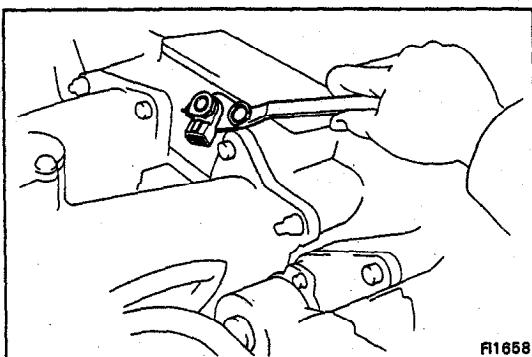
SST 09842-30050

Fuel drop: One drop or less per minute

- (b) Disconnect the battery negative (-) cable.
- (c) Remove SST and the service wire.

SST 09268-41045 and 09842-30050





INSTALLATION OF COLD START INJECTOR

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

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

Torque: 55 kg-cm (48 in.-lb, 5.4 N·m)

(7M-GTE)

- Connect the connector to the cold start injector.
- Install a new gasket and the the cold start injector with the two bolts.

Torque: 55 kg-cm (48 in.-lb, 5.4 N·m)

2. INSTALL COLD START INJECTOR TUBE

Using new gaskets, connect the cold start injector tube to the delivery pipe and cold start injector. Install the union bolts.

Torque:

Delivery pipe side	300 kg-cm (22 ft-lb, 29 N·m)
--------------------	---------------------------------

Cold start injector side	180 kg-cm (13 ft-lb, 18 N·m)
--------------------------	---------------------------------

3. (7M-GE)

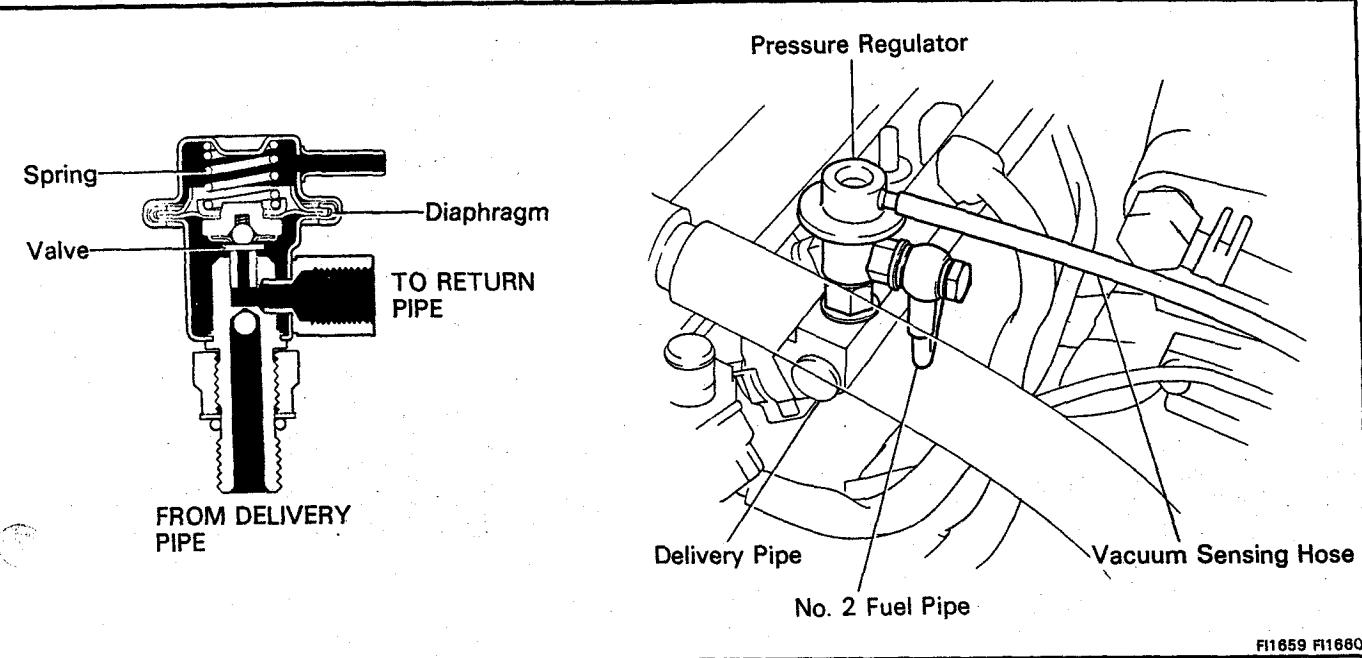
CONNECT COLD START INJECTOR CONNECTOR

4. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

5. CHECK FOR FUEL LEAKAGE



Pressure Regulator



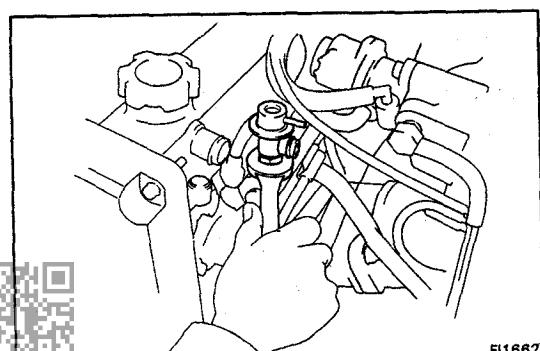
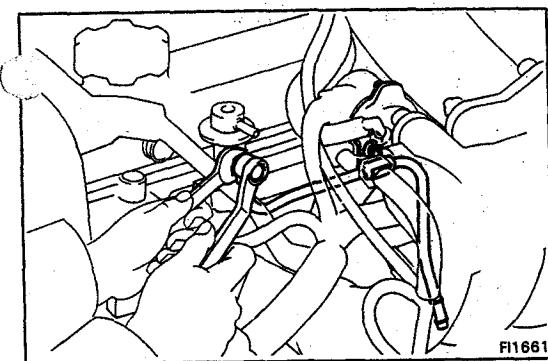
ON-VEHICLE INSPECTION

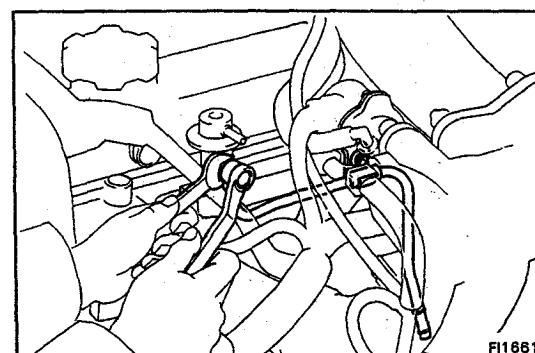
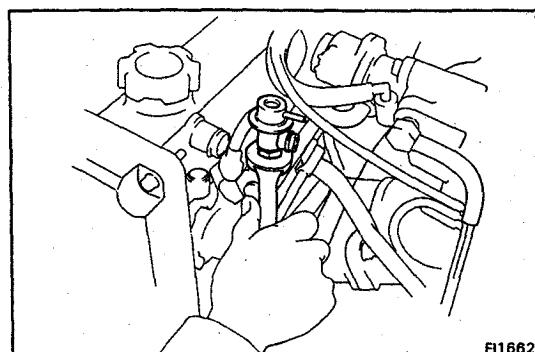
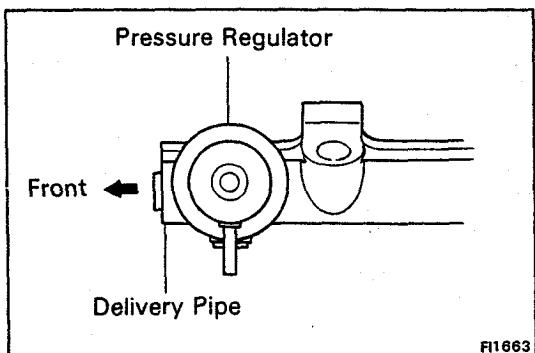
INSPECT FUEL PRESSURE (See page FI-74)

REMOVAL OF PRESSURE REGULATOR

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

Loosen the lock nut, and remove the pressure regulator.





INSTALLATION OF PRESSURE REGULATOR

1. INSTALL PRESSURE REGULATOR

- Fully loosen the lock nut of the pressure regulator.
- Thrust the pressure regulator completely into the delivery pipe by hand.
- Turn the pressure regulator counterclockwise until the outlet faces in the direction indicated in the figure.
- Torque the lock nut.

Torque: 250 kg-cm (18 ft-lb, 25 N·m)

2. CONNECT NO. 2 FUEL PIPE

- Using new gaskets, connect the No. 2 fuel pipe to the pressure regulator. Install the union bolt.

Torque: 250 kg-cm (18 ft-lb, 25 N·m)

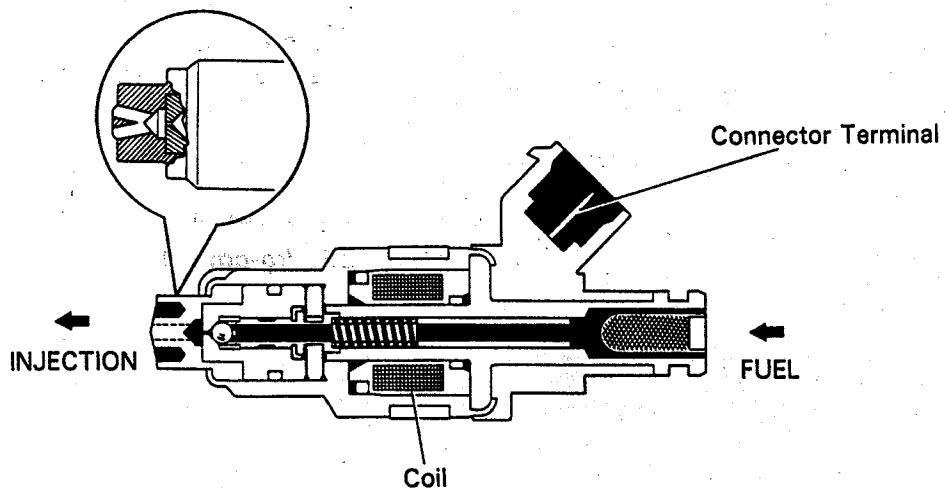
- Install the clamp bolt.

3. CONNECT VACUUM SENSING HOSE

4. CONNECT PCV HOSE



Injectors



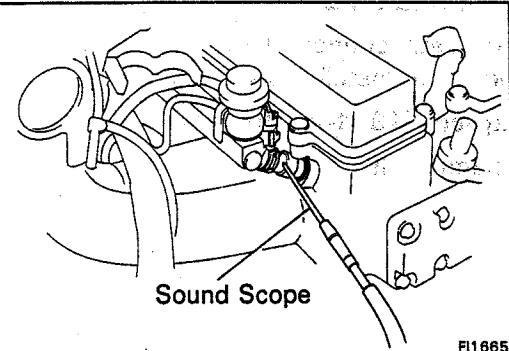
FI2561

ON-VEHICLE INSPECTION

1. CHECK INJECTOR OPERATION

Check operation sound from each injector.

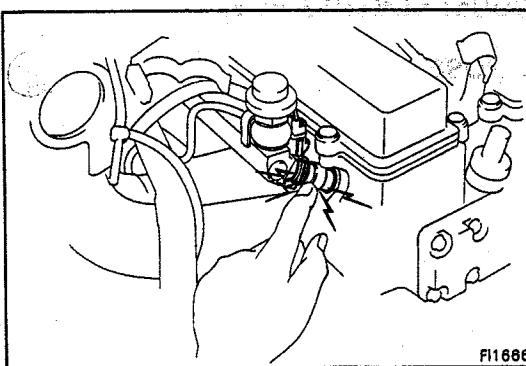
- (a) With the engine running or cranking, use a sound scope to check that there is normal operating noise in proportion to engine rpm.



FI1665

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

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



FI1666

2. INSPECT RESISTANCE OF INJECTOR

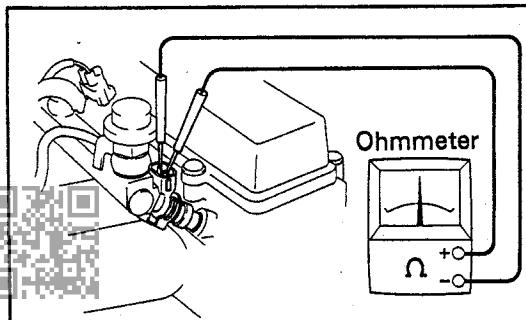
- (a) Disconnect the injector connector.
- (b) Using an ohmmeter, measure the resistance of both terminals.

Resistance:

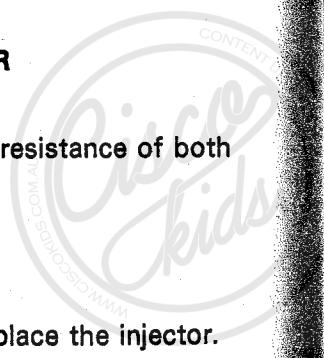
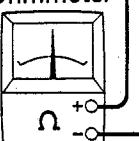
7M-GE 1.8 – 3.4 Ω

7M-GTE 2.0 – 3.8 Ω

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

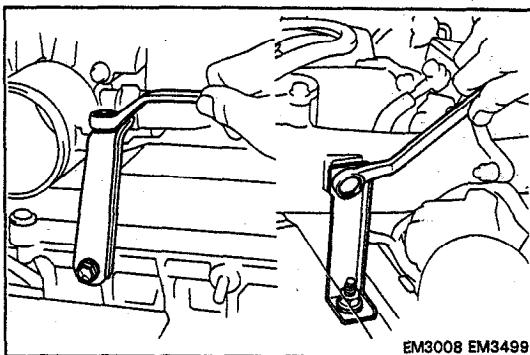


Ohmmeter

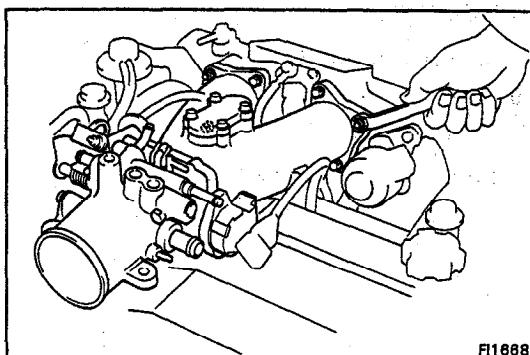


REMOVAL OF INJECTOR

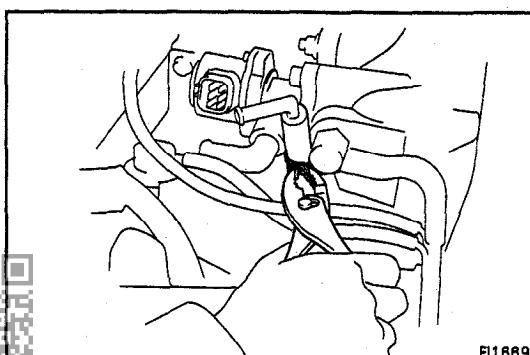
1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**
2. **DRAIN COOLANT**
3. **DISCONNECT FOLLOWING HOSES:**
 - Water hoses from throttle body (7M-GE) or water by-pass pipe (7M-GTE)
 - Vacuum hoses from throttle body
 - ISC valve hoses from throttle body
 - Vacuum sensing hose from pressure regulator
4. **DISCONNECT FOLLOWING CONNECTORS:**
 - Throttle position sensor connector
 - ISC valve connector
 - (7M-GE)
Cold start injector connector
5. **REMOVE AIR INTAKE CONNECTOR (7M-GE)**
 - (a) Disconnect the air cleaner hose from the throttle body.
 - (b) Remove the throttle body and air intake connector brackets.
 - (c) Remove the four bolts and two nuts, intake connector and gasket.
(7M-GTE)
(See steps 1 to 3 on page EM-12)
6. **(7M-GTE)**
REMOVE THROTTLE BODY (See page FI-104)



EM3008 EM3499



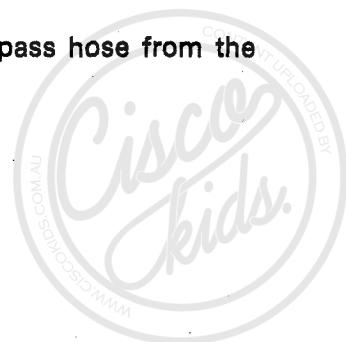
FI1668

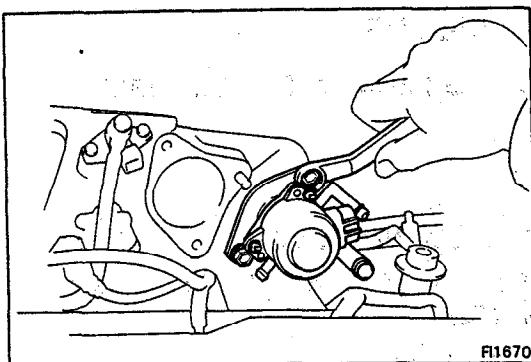


FI1669

7. REMOVE ISC VALVE

- (a) Disconnect the No. 2 water by-pass hose from the ISC valve.





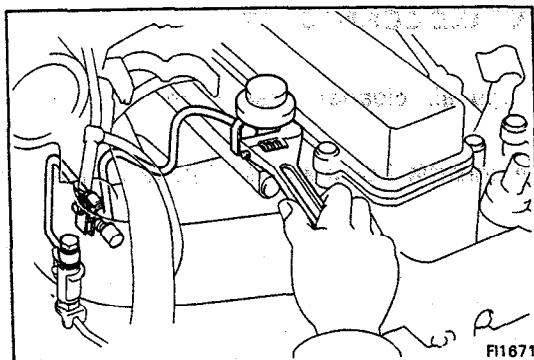
(b) Remove the two bolts, ISC valve and gasket.

8. DISCONNECT INJECTOR CONNECTORS

9. DISCONNECT COLD START INJECTOR TUBE FROM DELIVERY PIPE (See page FI-80)

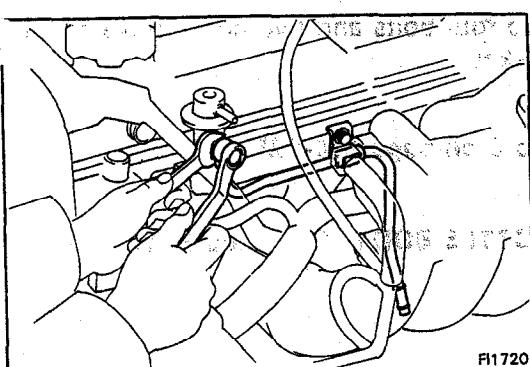
10. REMOVE NO.1 FUEL PIPE

- Remove the pulsation damper and two gaskets.
- Remove the union bolts and two gaskets from the fuel pipe support (MA) or fuel filter (MS).
- Remove the clamp bolt, No.1 fuel pipe and VSV (w/ EGR).



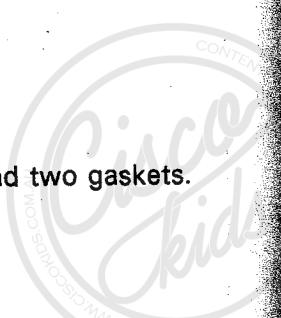
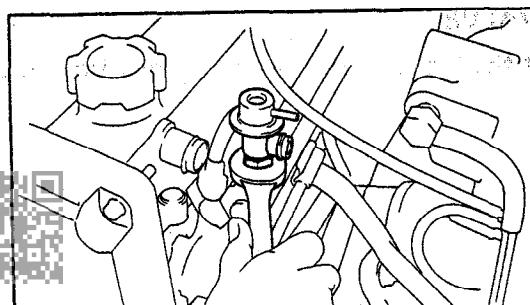
11. REMOVE NO.2 FUEL PIPE

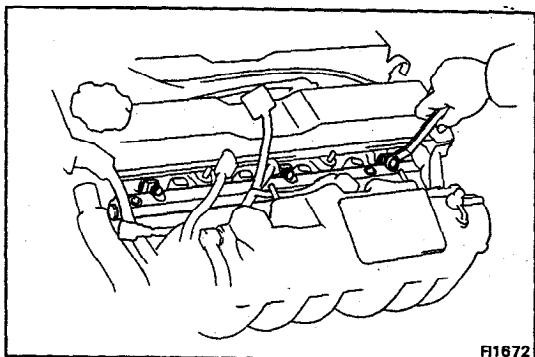
- Remove the union bolt and two gaskets from the pressure regulator.
- Disconnect the fuel hose from the No.2 fuel pipe.
- Remove the clamp bolt and No.2 fuel pipe.



12. REMOVE PRESSURE REGULATOR

- Loosen the lock nut.
- Remove the pressure regulator and two gaskets.





13. REMOVE DELIVERY PIPE

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

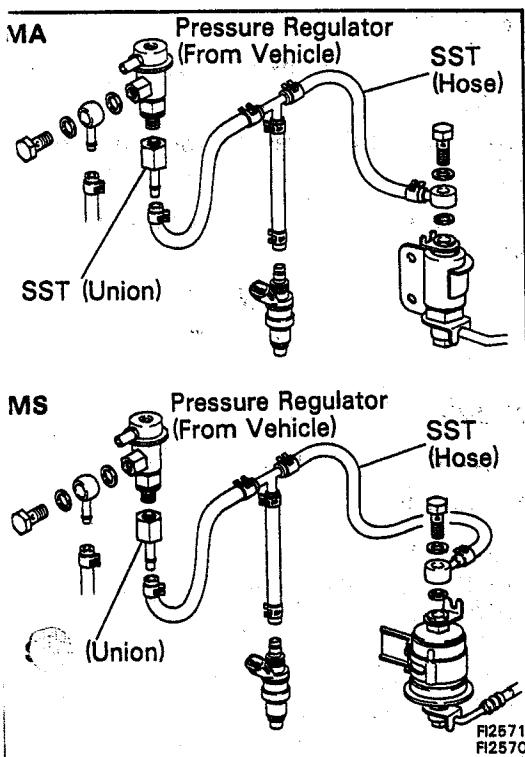
CAUTION: Be careful not to drop the injectors, when removing the delivery pipe.

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

14. REMOVE INJECTORS

- Pull out the injectors from the delivery pipe.
- Remove the O-ring from the injector.

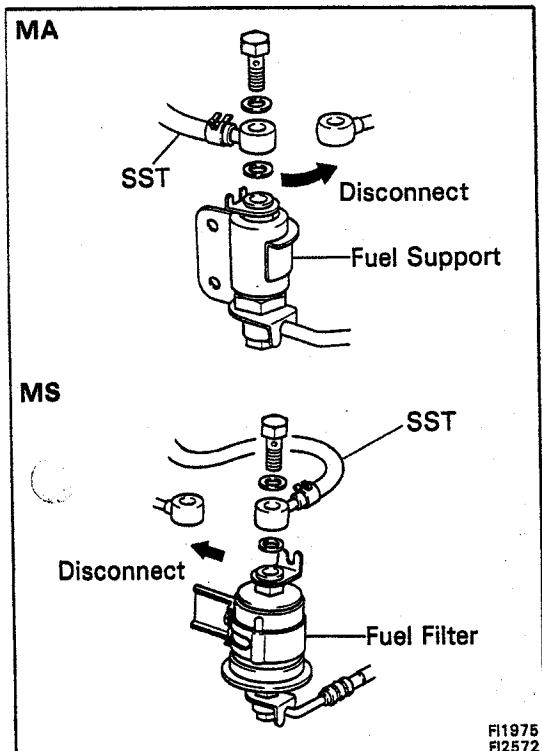




INSPECTION OF INJECTOR

1. TEST INJECTION OF INJECTORS

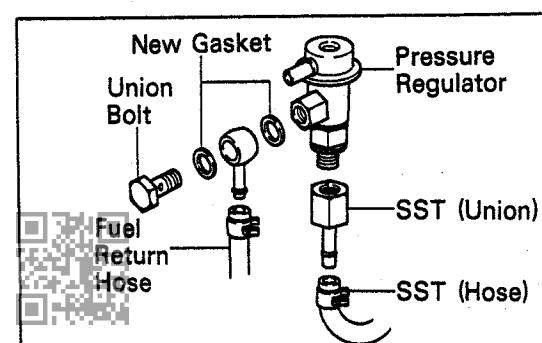
WARNING: Keep clear of sparks during the test.



- Disconnect the No. 1 fuel pipe from the fuel return pipe support (MA) or fuel filter (MS).
- Connect SST (hose) to the fuel pipe support (MA) or fuel filter (MS) outlet with SST (union), new gaskets and union bolt.

SST 09268-41045

NOTE: Use the vehicle's fuel support (MA) or fuel filter (MS).

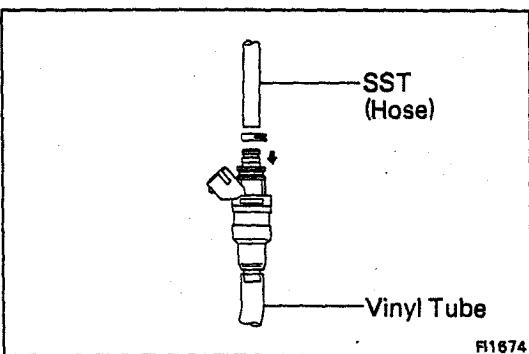


- Remove the pressure regulator (See page FI-84).
- Connect the fuel return hose to the pressure regulator with SST (union), new gasket and union bolt.

SST 09268-41045

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

SST 09268-41045



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

SST 09268-41045

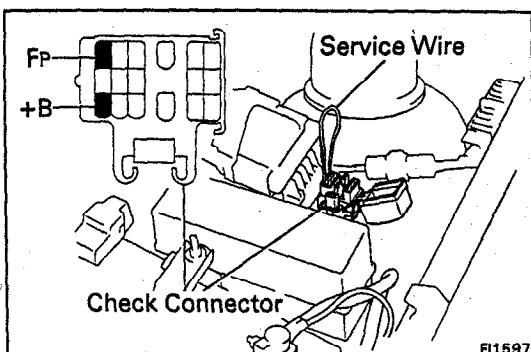
(g) Put the injector into the graduated cylinder.

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

(h) Connect the battery cable.

(i) Turn the ignition switch ON.

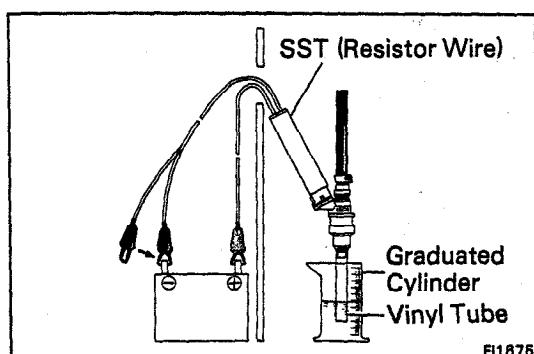
NOTE: Do not start the engine.



(j) Using a service wire, short circuit the fuel pump check terminals +B and FP of the service connector.

CHECK CONNECTOR LOCATION:

See pages FI-110, 111



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

SST 09842-30060

Volume:

7M-GE

65 — 80 cc (4.0 — 4.9 cu in.) per 15 sec.

7M-GTE

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

Difference between each injector:

9 cc (0.5 cu in.) or less

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

2. INSPECT LEAKAGE

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

SST 09842-30060

Fuel drop: One drop or less per minute

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

(c) Remove the SST and service wire.

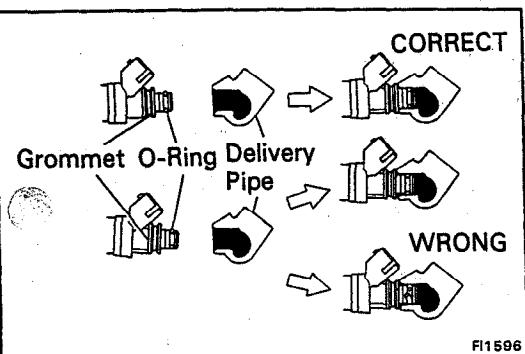
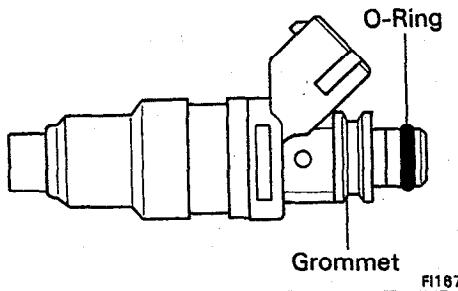
SST 09268-41045



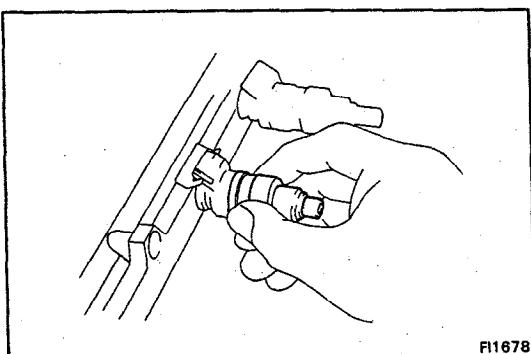
INSTALLATION OF INJECTORS

1. INSTALL INJECTORS INTO DELIVERY PIPE

(a) Install a new grommet to the injector.



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

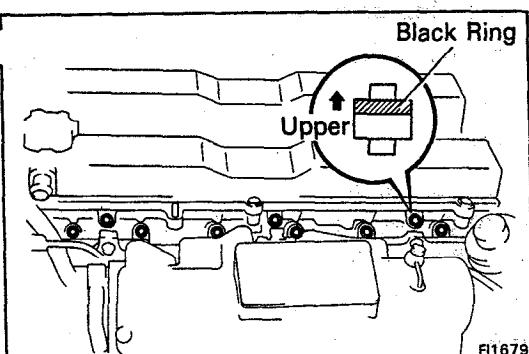


(c) While turning the injector left and right, install it to the delivery pipe. Install the six injectors.

2. INSTALL DELIVERY PIPE WITH INJECTORS

(a) Install the six insulators into the injector hole of the cylinder head.

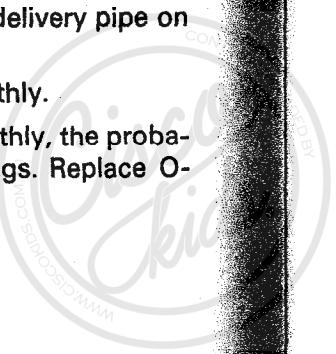
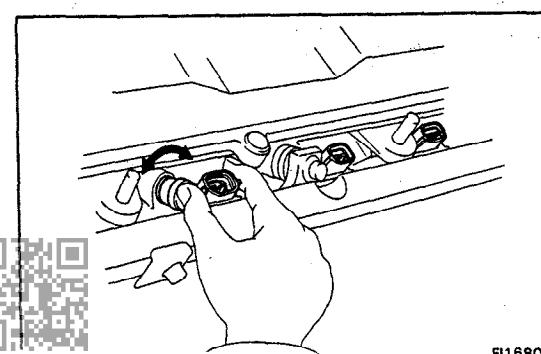
(b) Install the black rings on the upper portion of each of the three spacers. Then install the spacers on the delivery pipe mounting hole of the cylinder head.

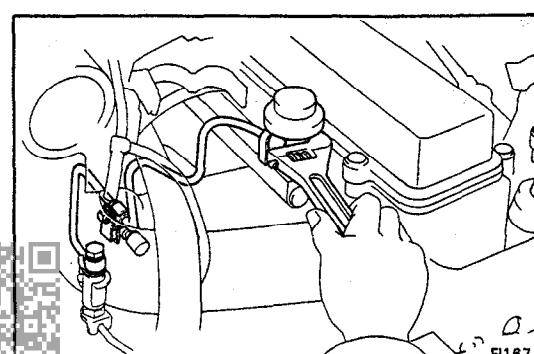
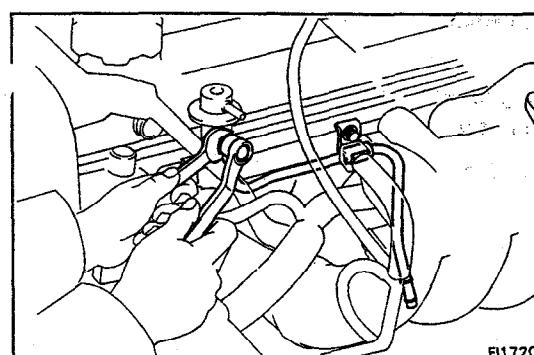
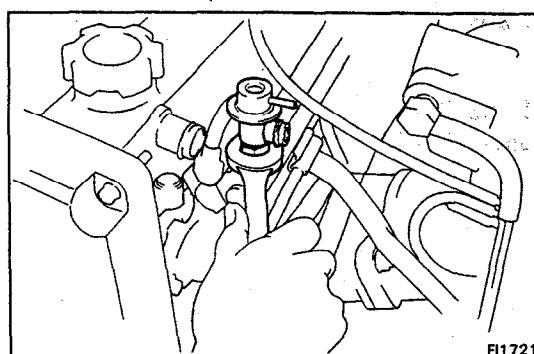
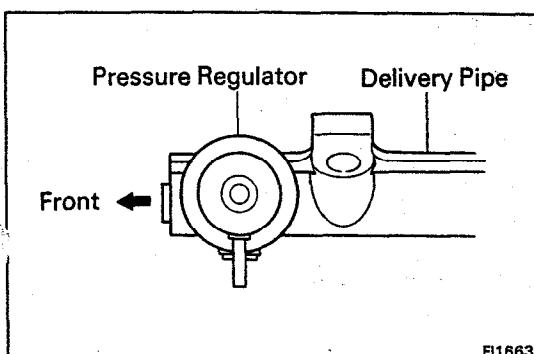
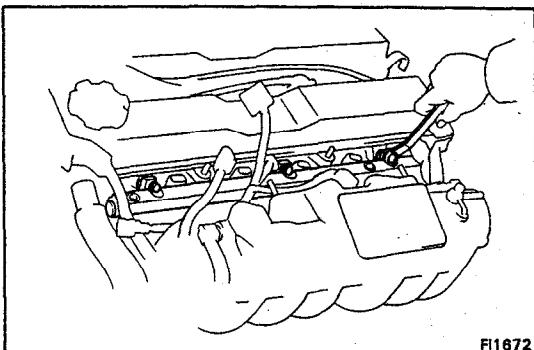


(c) Place the injectors together with the delivery pipe on the cylinder head.

(d) Check that the injectors rotate smoothly.

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





(e) Install the three spacers and bolts.

Torque the bolts.

Torque: 180 kg-cm (13 ft-lb, 18 N·m)

3. INSTALL PRESSURE REGULATOR

- Fully loosen the lock nut of the pressure regulator.
- Thrust the pressure regulator completely into the delivery pipe by hand.
- Turn the pressure regulator counterclockwise until the outlet faces in the direction indicated in the figure.

(d) Torque the lock nut.

Torque: 250 kg-cm (18 ft-lb, 25 N·m)

4. INSTALL NO. 2 FUEL PIPE

- Install the No. 2 fuel pipe and clamp bolt.
- Connect the fuel hose.
- Install the union bolt and new two gaskets to the pressure regulator. Torque the union bolt.

Torque: 250 kg-cm (18 ft-lb, 25 N·m)

5. INSTALL NO. 1 FUEL PIPE

- Install the No. 1 fuel pipe, VSV (w/ EGR) and clamp bolt.
- Install the union bolt and two new gaskets to the fuel pipe support. Torque the union bolts.

Torque: 300 kg-cm (22 ft-lb, 29 N·m)

- Install the pulsation damper and two new gaskets. Torque the pulsation damper.

Torque: 400 kg-cm (29 ft-lb, 39 N·m)

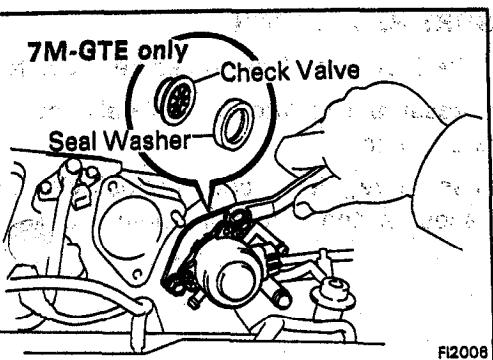
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6. CONNECT INJECTOR CONNECTORS

7. CONNECT COLD START INJECTOR TUBE TO
DELIVERY PIPE
(See page FI-83)

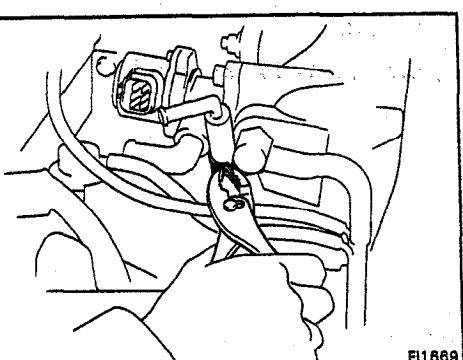
8. INSTALL ISC VALVE

(a) Install a new gasket and ISC valve with the two bolts.
Torque: 130 kg-cm (9 ft-lb, 13 N·m)



(b) Connect No. 2 water by-pass hose to the ISC valve.

9. (7M-GTE)
INSTALL THROTTLE BODY
(See step 1 on page FI-106)

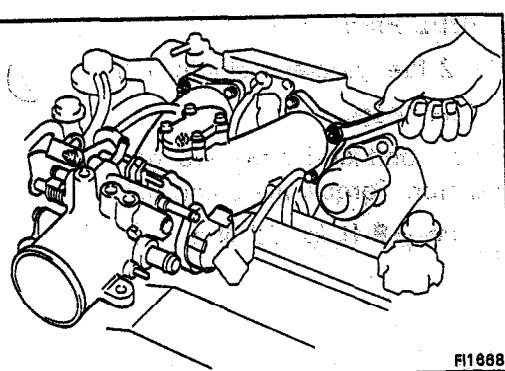


10. INSTALL AIR INTAKE CONNECTOR

(7M-GE)

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

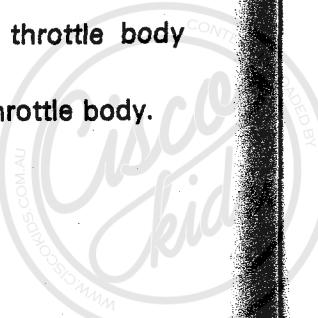
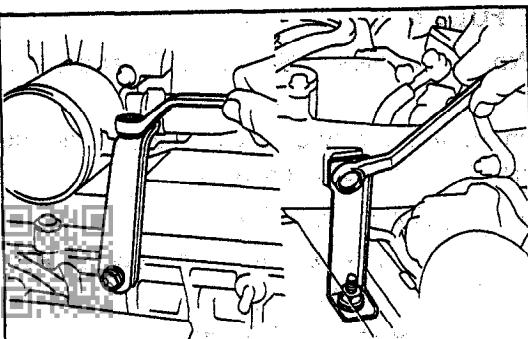
Torque: 180 kg-cm (13 ft-lb, 18 N·m)



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

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

(7M-GTE)
(See page EM-14)



11. CONNECT FOLLOWING CONNECTORS:

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

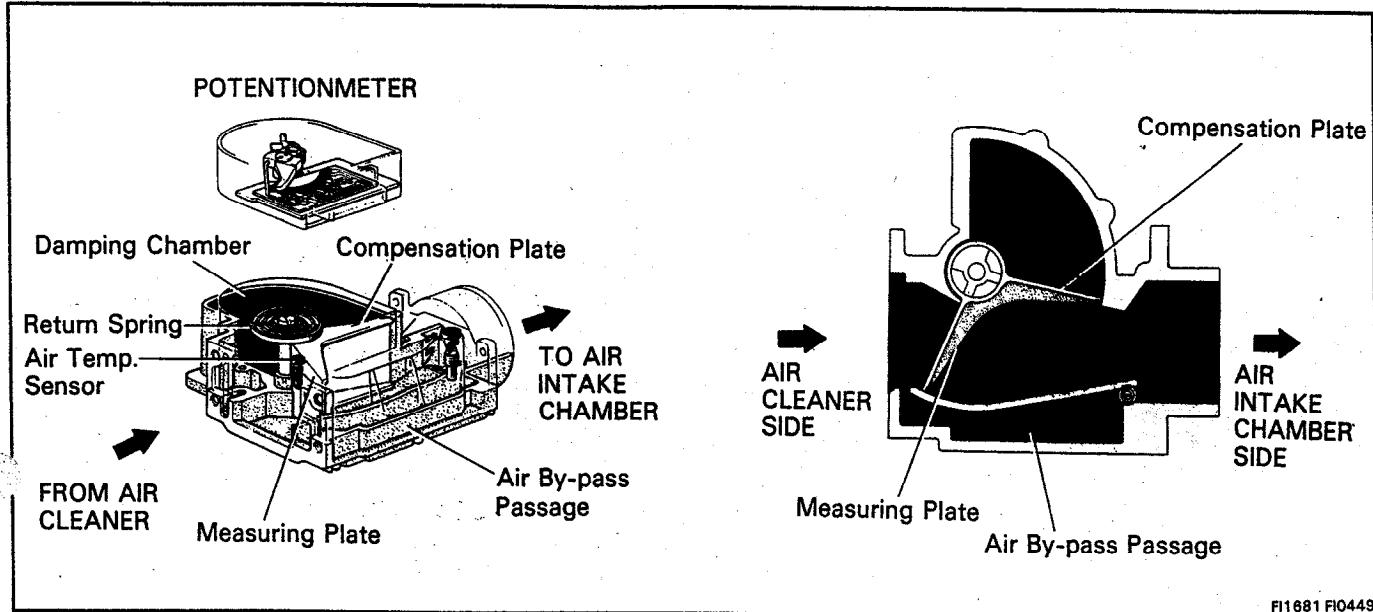
12. CONNECT FOLLOWING HOSES:

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

13. REFILL COOLANT (See page CO-5)**14. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY****15. CHECK FOR FUEL LEAKAGE (See page FI-11)**

AIR INDUCTION SYSTEM

Air Flow Meter (7M-GE)



FI1681 FI0449

ON-VEHICLE INSPECTION

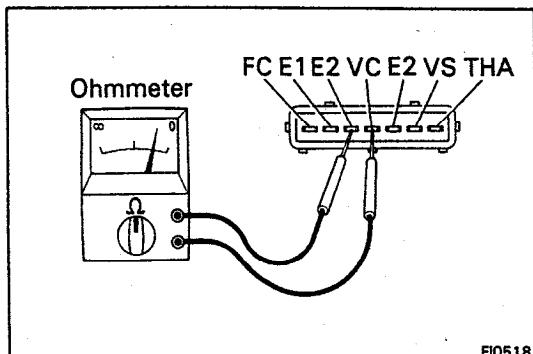
INSPECT RESISTANCE OF AIR FLOW METER

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

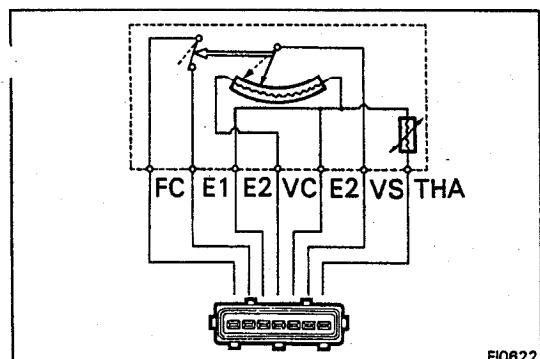
Terminals	Resistance	Temperature
VS – E2	20 – 600 Ω	–
VC – E2	200 – 400 Ω	–
THA – E2	10 – 20 K Ω 4 – 7 K Ω 2 – 3 K Ω 0.9 – 1.3 K Ω 0.4 – 0.7 K Ω	-20°C (-4°F) 0°C (32°F) 20°C (68°F) 40°C (104°F) 60°C (140°F)
FC – E1	Infinity	–

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

- Reconnect the air flow meter connector.

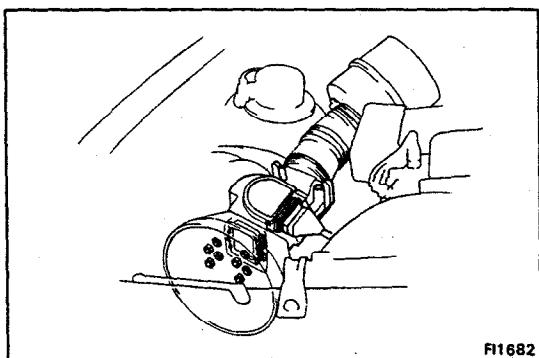


FI0518



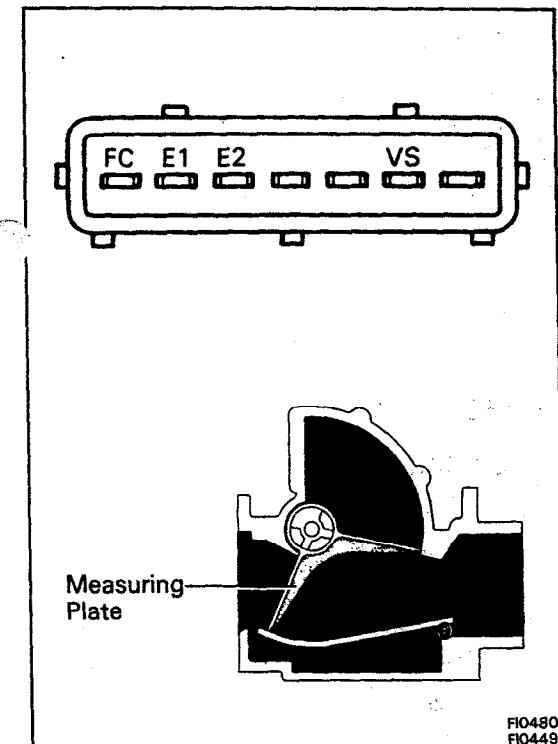
FI0622





REMOVAL OF AIR FLOW METER

1. DISCONNECT AIR FLOW METER CONNECTOR
2. DISCONNECT NO. 2 AIR CONNECTOR HOSE
3. REMOVE AIR CLEANER CAP
Remove the two bolts and cap.
4. REMOVE AIR FLOW METER
Pry off the lock plates, and remove the four nuts, and air flow meter.



INSPECTION OF AIR FLOW METER

INSPECT RESISTANCE OF AIR FLOW METER

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

Terminals	Resistance (Ω)	Measuring plate opening
FC – E1	Infinity	Fully closed
	Zero	Other than closed position
VS – E2	20 – 600	Fully closed
	20 – 1,200	Fully open

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

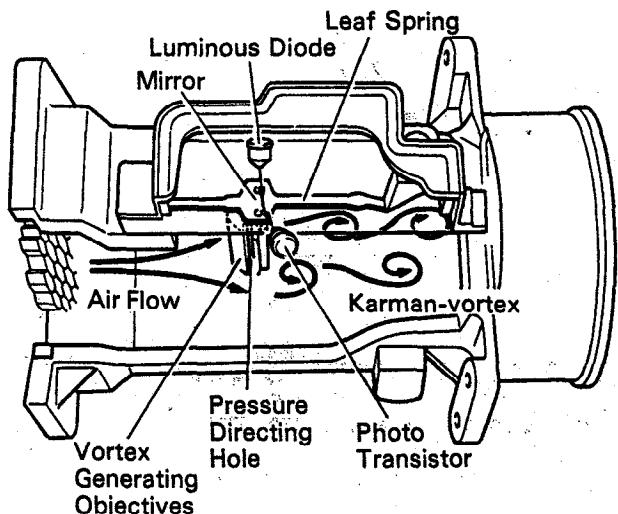
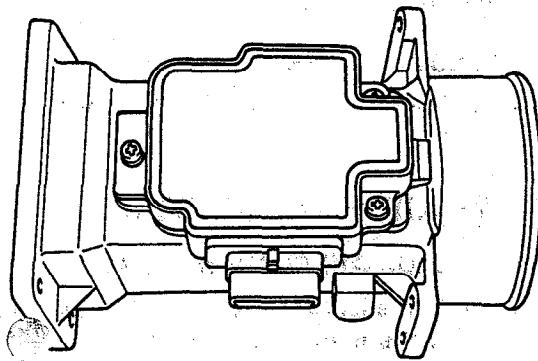
If the resistance is not as specified, replace the air flow meter.

INSTALLATION OF AIR FLOW METER

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



Air Flow Meter (7M-GTE)

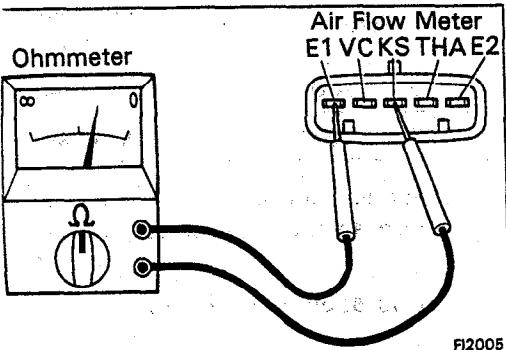


MS0001 FI1977

ON-VEHICLE INSPECTION

INSPECT RESISTANCE OF AIR FLOW METER

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

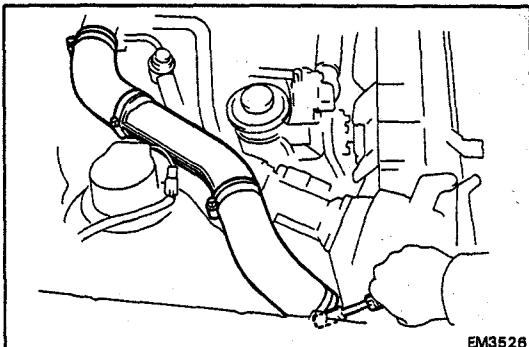


Terminals	Resistance	Temperature
KS → E1	$\infty \Omega$	
E1 → KS	5 – 10 k Ω	
VS → E1	10 – 15 k Ω	
E1 → VC	5 – 10 k Ω	
THA – E2	10 – 20 k Ω 4 – 7 k Ω 2 – 3 k Ω 0.9 – 1.3 k Ω 0.4 – 0.7 k Ω	-20°C (-4°F) 0°C (32°F) 20°C (68°F) 40°C (104°F) 60°C (140°F)

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

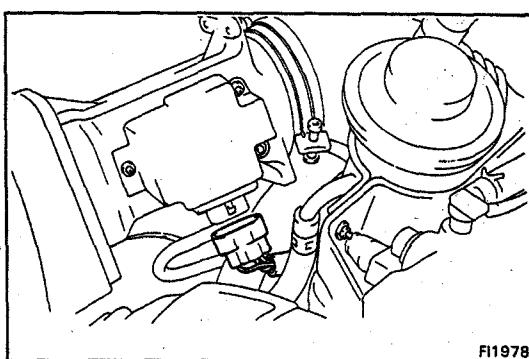
- Reconnect the air flow meter connector.





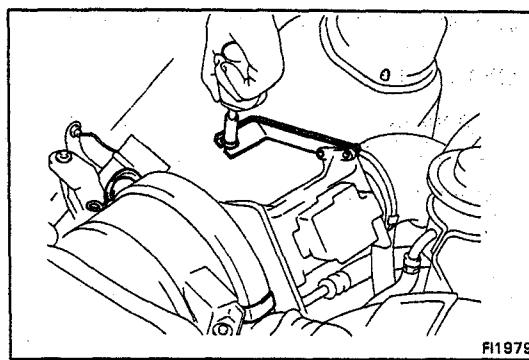
REMOVAL OF AIR FLOW METER

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

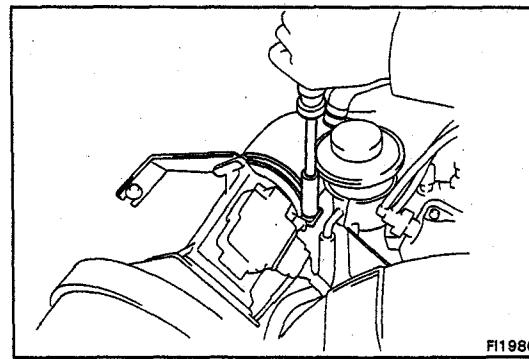


2. REMOVE AIR FLOW METER WITH AIR CLEANER CAP

(a) Disconnect the connector.



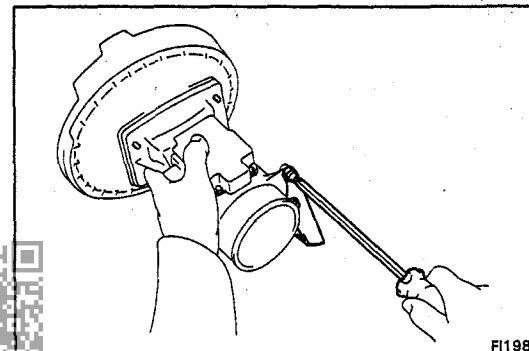
(b) Remove the three clamps and bolt.

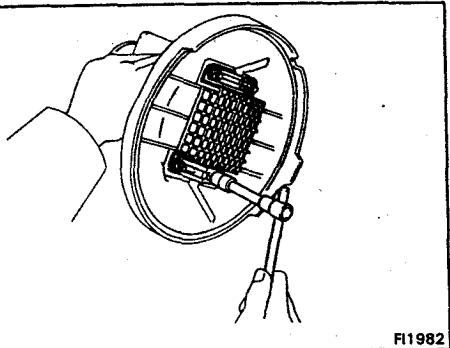


(c) Loosen the clamp and remove the air flow meter with air cleaner cap.

3. REMOVE AIR FLOW METER

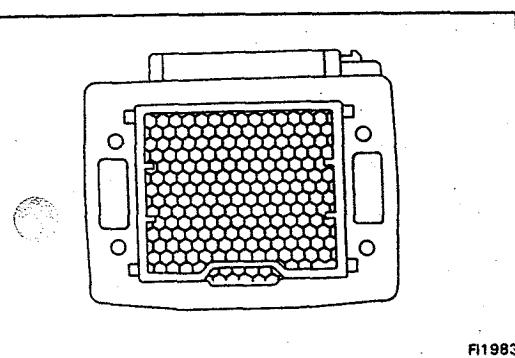
(a) Remove the two screws and bracket.





FI1982

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



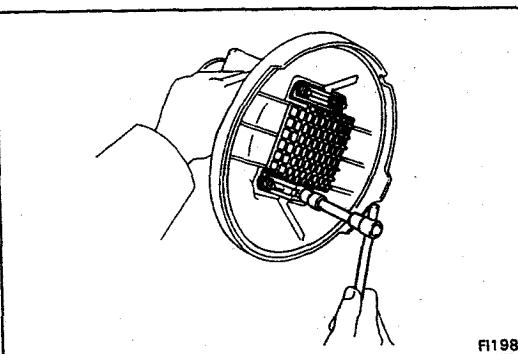
FI1983

INSPECTION OF AIR FLOW METER

INSPECT AIR FLOW METER

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

If necessary, replace the air flow meter.

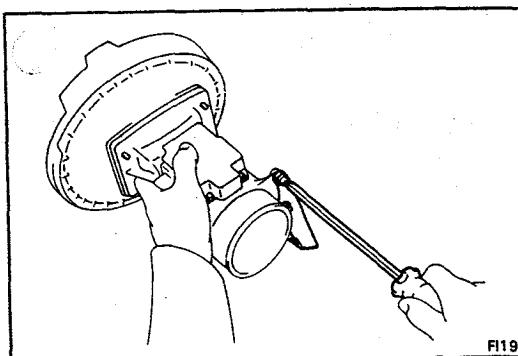


FI1982

INSTALLATION OF AIR FLOW METER

1. INSTALL AIR FLOW METER

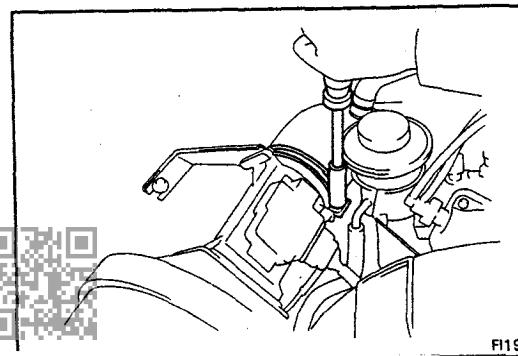
- (a) Install the air cleaner cap, No. 1 air cleaner cover and lock plates to the air flow meter with the four nuts.
- (b) Pry the lock plates on the nuts.
- (c) Install the bracket with the two screws.



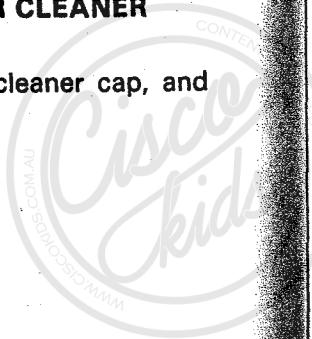
FI1981

2. INSTALL AIR FLOW METER WITH AIR CLEANER CAP

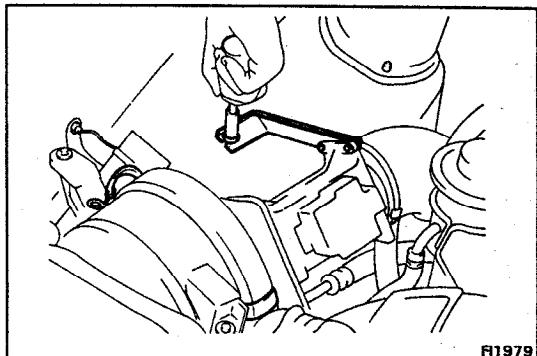
- (a) Install the air flow meter with air cleaner cap, and tighten the clamp.



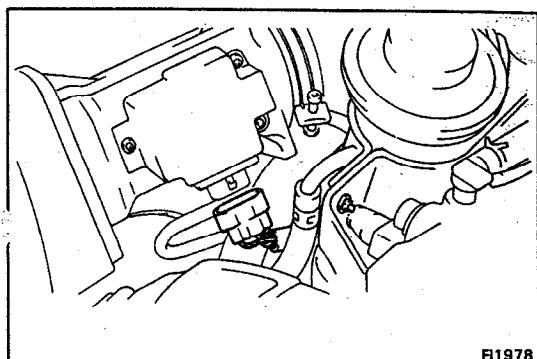
FI1980



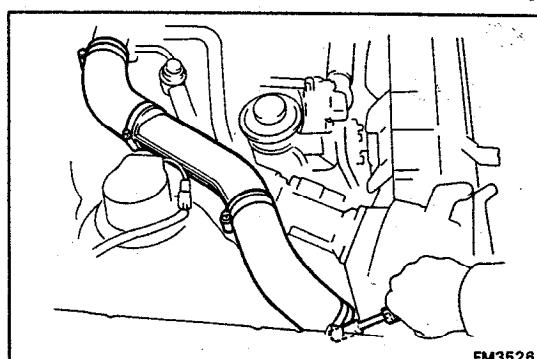
(b) Install the bolt and clamps.



(c) Connect the connector.

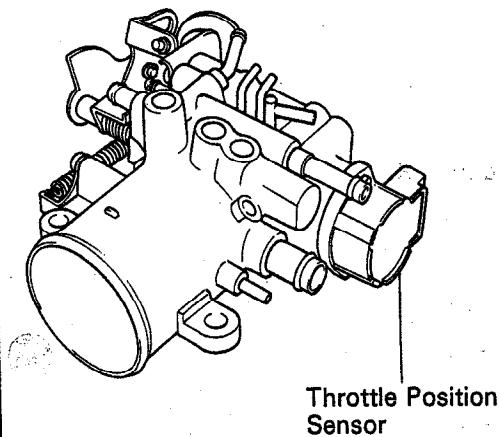


3. INSTALL NO. 4 AIR CLEANER PIPE WITH NO. 1 AND NO. 2 AIR CLEANER HOSES



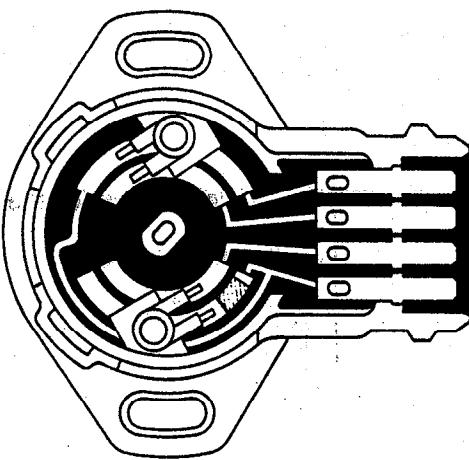
Throttle Body

7M-GE



Throttle Position Sensor

7M-GTE



Throttle Position Sensor

FI1683 FI0504 FI1984

ON-VEHICLE INSPECTION

1. INSPECT THROTTLE BODY

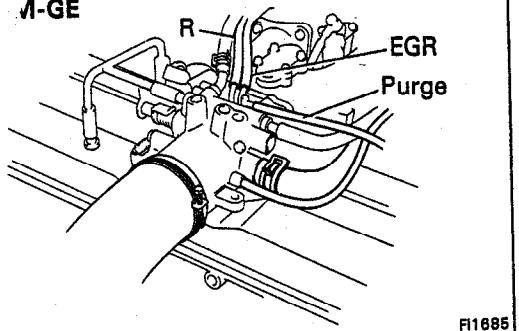
(a) Check that the throttle linkage moves smoothly.

(b) Check the vacuum at each port.

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

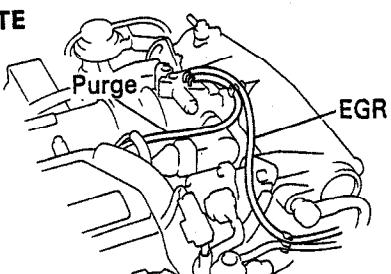
Port	At Idling	Other than idling
Purge	No vacuum	Vacuum
EGR	No vacuum	Vacuum
R	No vacuum	No vacuum

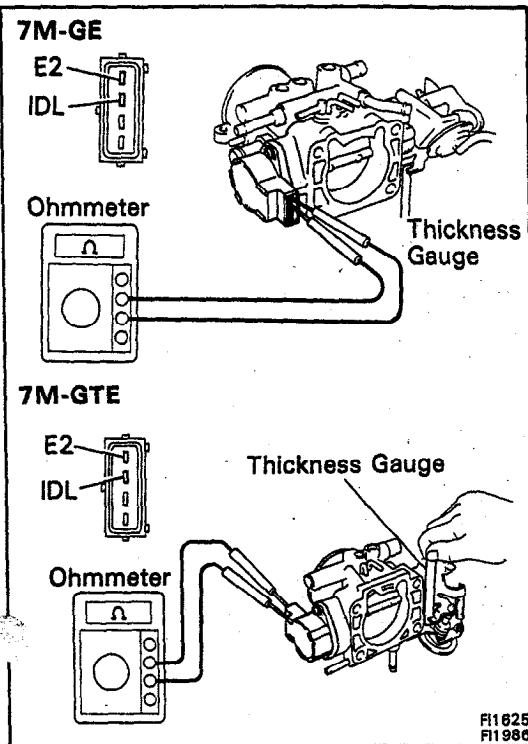
7M-GE



FI1685

7M-GTE



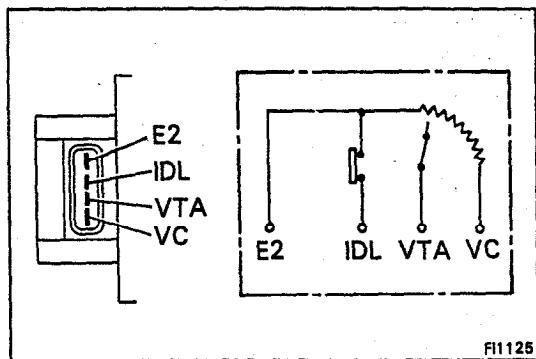


2. INSPECT THROTTLE POSITION SENSOR

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

Clearance between lever and stop screw		Between terminals	Resistance
7M-GE	7M-GTE		
0 mm (0 in.)		VTA — E2	0.3 — 6.3 kΩ
0.4 mm (0.0157 in.)	0.5 mm (0.0197 in.)	IDL — E2	Less than 2.3 kΩ
0.75 mm (0.0295 in.)	0.9 mm (0.0354 in.)	IDL — E2	∞
Throttle valve fully opened position		VTA — E2	3.5 — 10.3 kΩ
—		VC — E2	4.25 — 8.25 kΩ

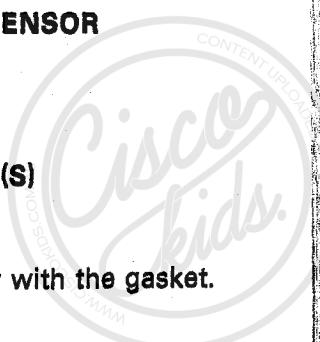
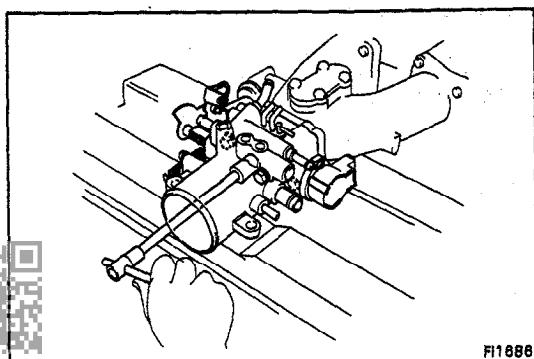
- Reconnect the sensor connector.



REMOVAL OF THROTTLE BODY (7M-GE)

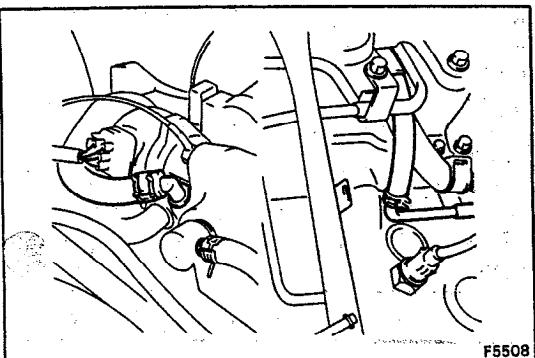
1. DRAIN COOLANT FROM THROTTLE BODY
2. REMOVE ACCELERATOR CONNECTING ROD
3. DISCONNECT VACUUM HOSES
4. DISCONNECT NO. 2 AND NO. 3 WATER BY-PASS HOSES
5. DISCONNECT THROTTLE POSITION SENSOR CONNECTOR
6. DISCONNECT AIR CLEANER HOSE
7. REMOVE THROTTLE BODY BRACKET(S)
8. REMOVE THROTTLE BODY

Remove the four bolts and throttle body with the gasket.



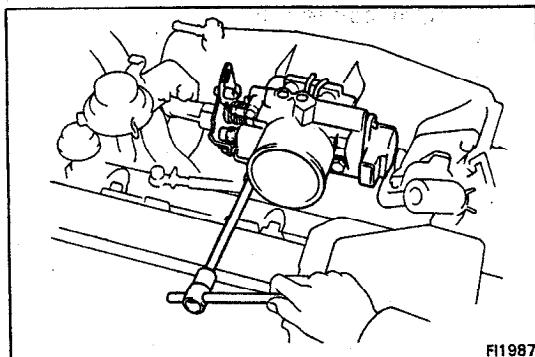
(7M-GTE)

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



F5508

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



FI1987

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

(c) Remove the two water by-pass hoses.

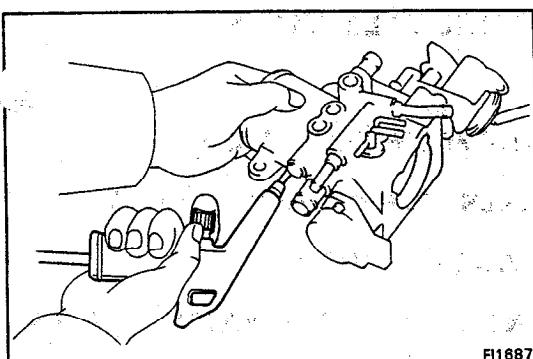
INSPECTION OF THROTTLE BODY**1. CLEAN THROTTLE BODY**

- (a) Using a soft brush and carburetor cleaner, clean the cast parts.
- (d) Using compressed air, clean all passages and apertures.

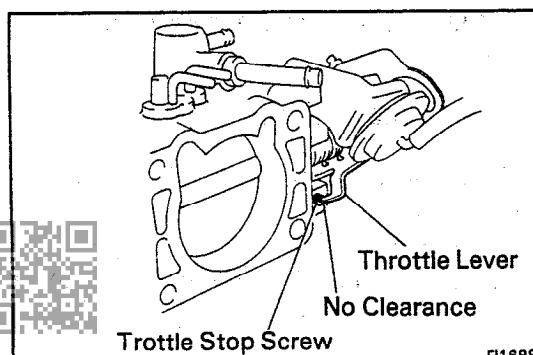
CAUTION: To prevent deterioration, do not clean the throttle position sensor and dash pot.

2. INSPECT THROTTLE VALVE

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



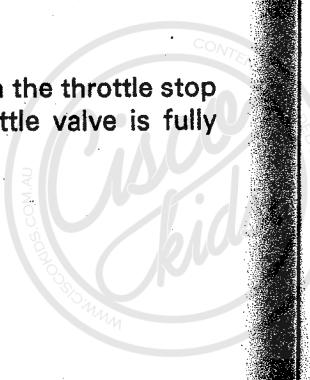
FI1887

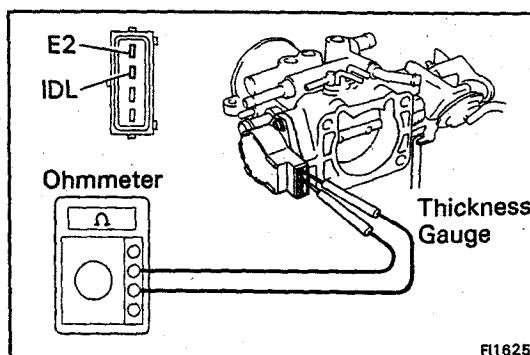
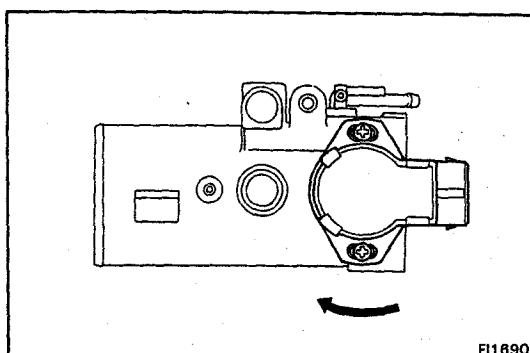
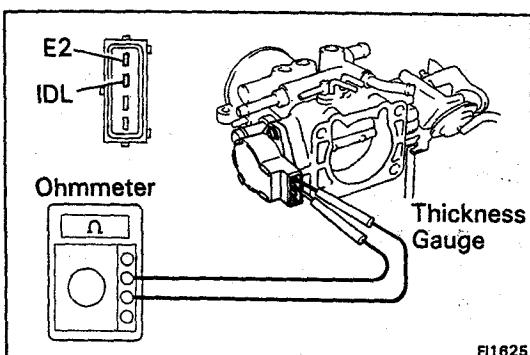
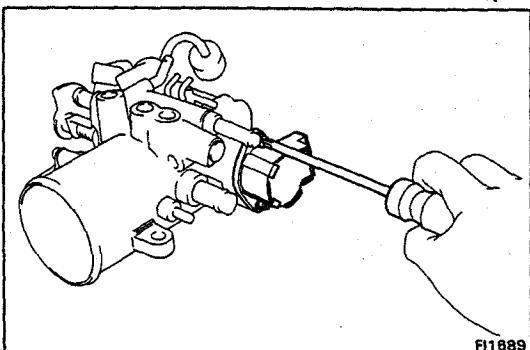


Trottle Stop Screw

Throttle Lever
No Clearance

FI1887





3. **INSPECT THROTTLE POSITION SENSOR**
(See step 2 on page FI-103)
4. **IF NECESSARY, ADJUST THROTTLE POSITION SENSOR**

(a) Loosen the two screws of the sensor.

(b) Insert a 0.58 mm (0.0228 in.) (7M-GE) or 0.70 mm (0.0276 in.) (7M-GTE) thickness gauge, between the throttle stop screw and lever.

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

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

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

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



INSTALLATION OF THROTTLE BODY

(7M-GE)

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

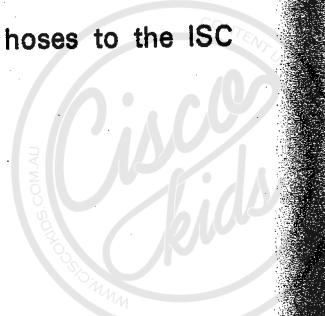
(7M-GTE)

1. **INSTALL THROTTLE BODY**

- (a) Install the two water by-pass hoses.

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

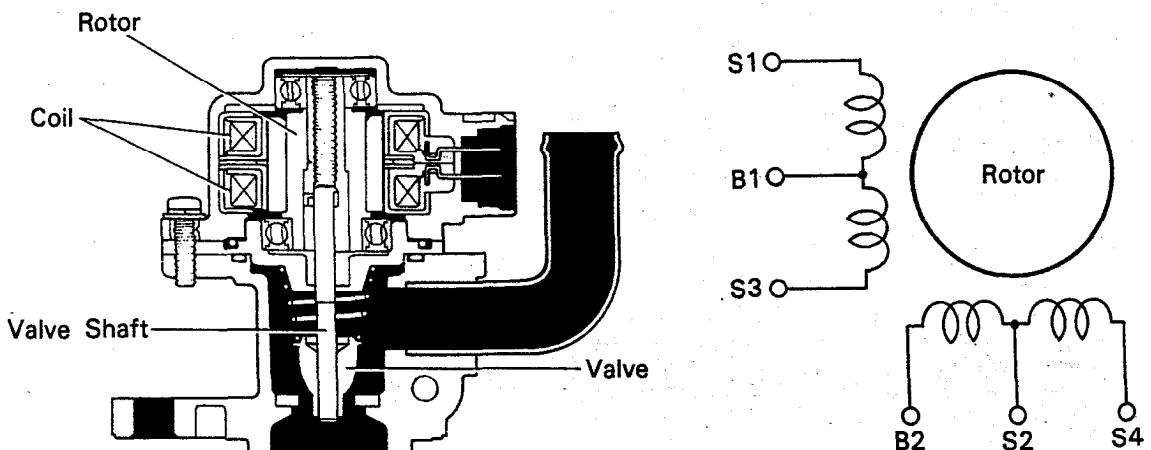
- (c) Connect the two water by-pass hoses to the ISC valve and water pipe.



2. CONNECT THROTTLE POSITION SENSOR CONNECTOR
3. CONNECT VACUUM HOSES
4. INSTALL AIR INTAKE CONNECTOR
(See steps 13 to 15 on page EM-14)
5. INSTALL ACCELERATOR CONNECTING ROD
6. REFILL WITH COOLANT



Idle Speed Control (ISC) Valve

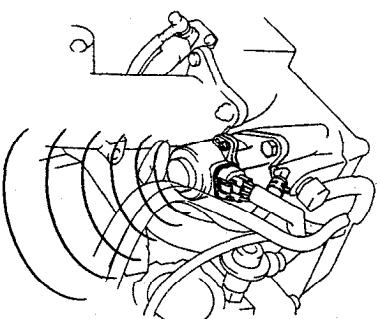


FI1691 FI1692

ON-VEHICLE INSPECTION

CHECK FOR OPERATING SOUND FROM ISC VALVE

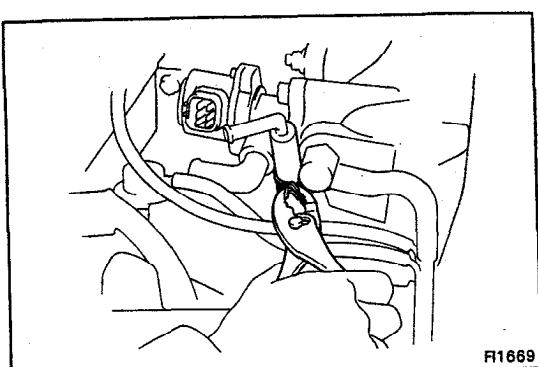
Check that there is a clicking sound immediately after stopping the engine.



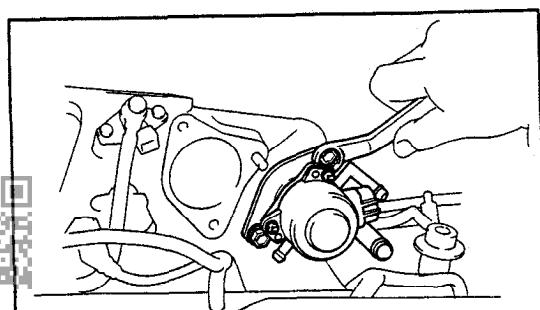
FI1693

REMOVAL OF ISC VALVE

1. DRAIN COOLANT
2. DISCONNECT ISC VALVE CONNECTOR
3. DISCONNECT TWO WATER BY-PASS AND AIR HOSES FROM ISC VALVE
4. REMOVE ISC VALVE
 - (a) Remove the two bolts.
 - (b) Remove ISC valve and gasket.
 - (c) (7M-GTE)
Remove the seal washer and check valve from the intake chamber.



FI1669



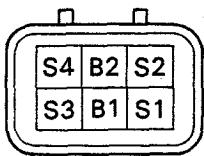
INSPECTION OF ISC VALVE

1. INSPECT RESISTANCE OF ISC VALVE

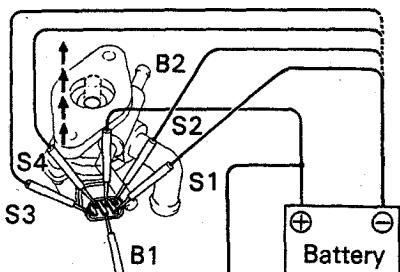
Using an ohmmeter, measure the resistance between terminal B1 — S1 or S3 and B2 — S2 or S4.

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

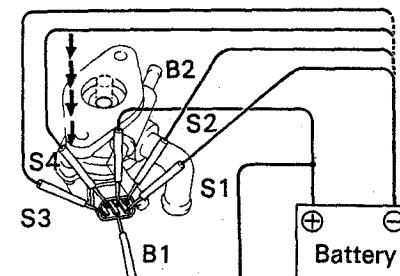
If resistance is not as specified, replace the ISC valve.



FI1694



FI1643



FI1643

2. INSPECT OPERATION OF ISC VALVE

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

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

INSPECTION OF CHECK VALVE (7M-GTE only)

INSPECT CHECK VALVE

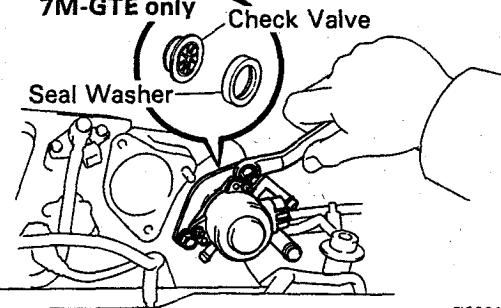
Inspect the check valve for damage and the diaphragm for cracks.

If necessary, replace the check valve.

7M-GTE only

Check Valve

Seal Washer



FI2006

INSTALLATION OF ISC VALVE

1. INSTALL ISC VALVE

(a) (7M-GTE)

Install the check valve and the seal washer as shown in the illustration, to the intake chamber.

(b) Install a new gasket to the intake manifold.

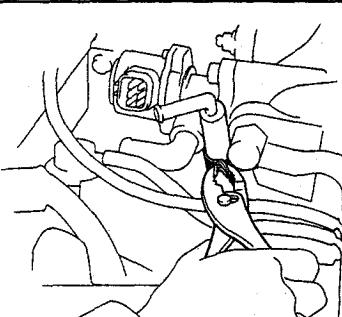
(c) Install the ISC valve with the two bolts and one nut.

Torque: 130 kg-cm (9 ft-lb, 13 N·m)

2. INSTALL AIR AND TWO WATER BY-PASS HOSES TO ISC VALVE

3. CONNECT ISC VALVE CONNECTOR

4. REFILL WITH COOLANT



FI1669

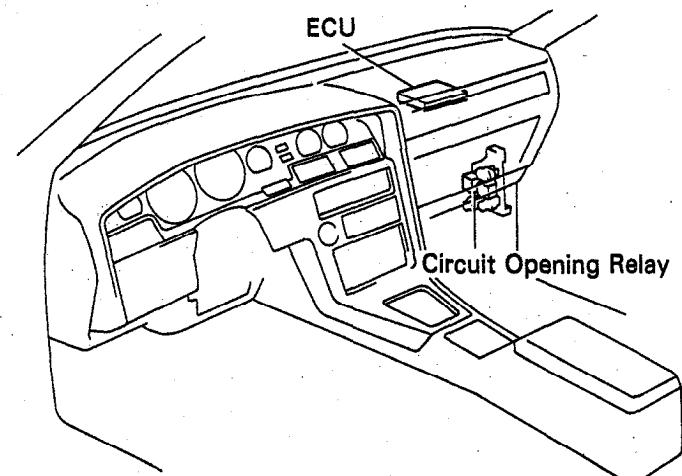
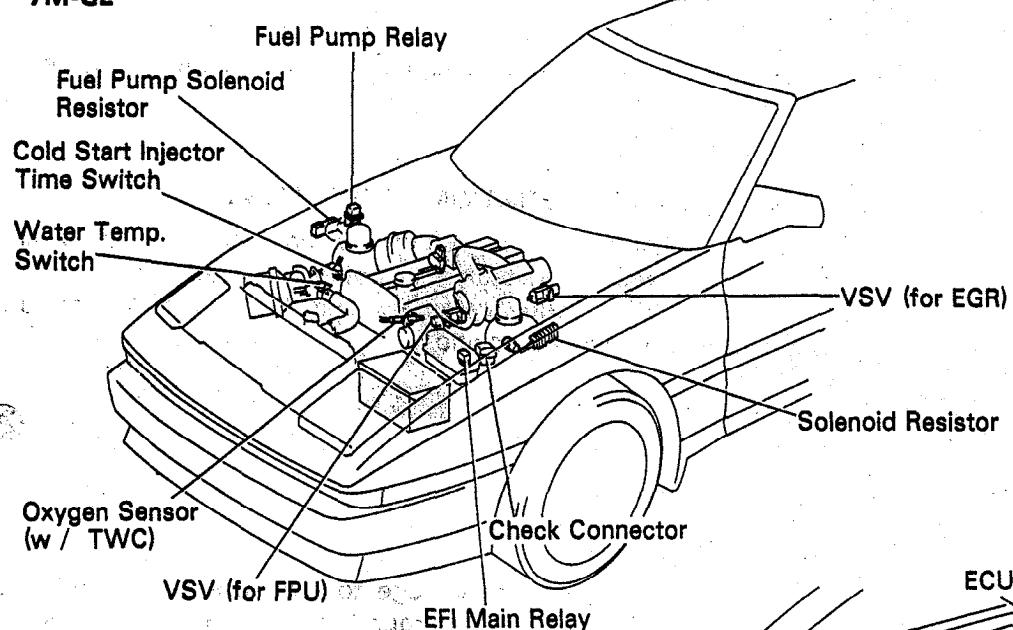


ELECTRONIC CONTROL SYSTEM

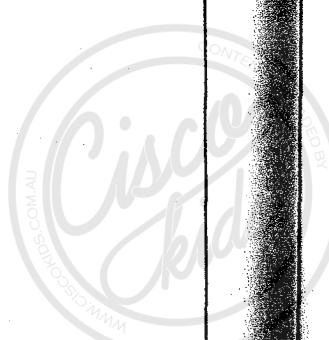
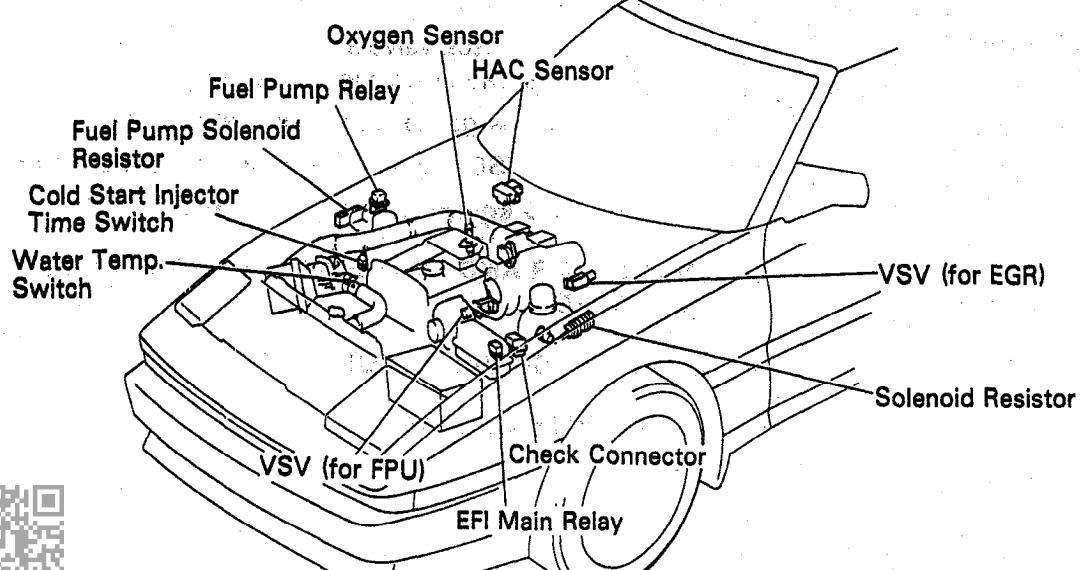
Location of Electronic Control Parts

MA

7M-GE



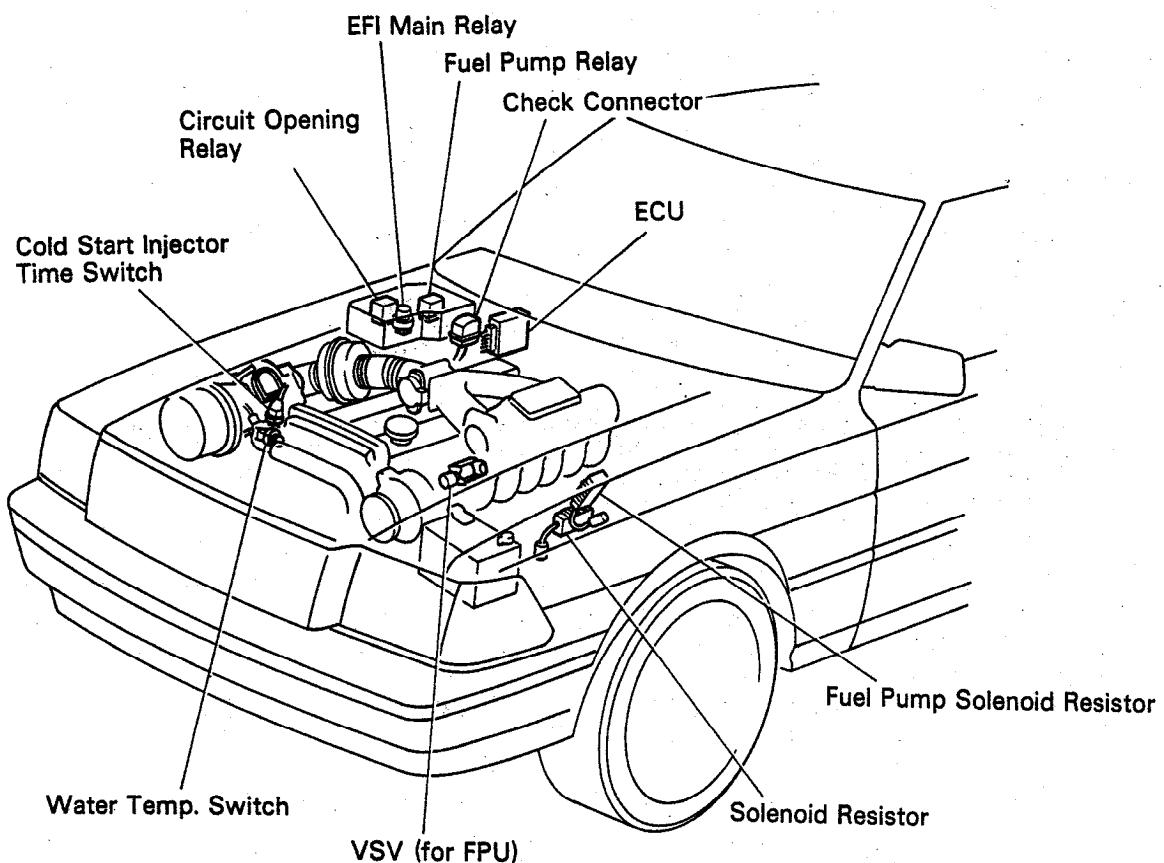
7M-GTE



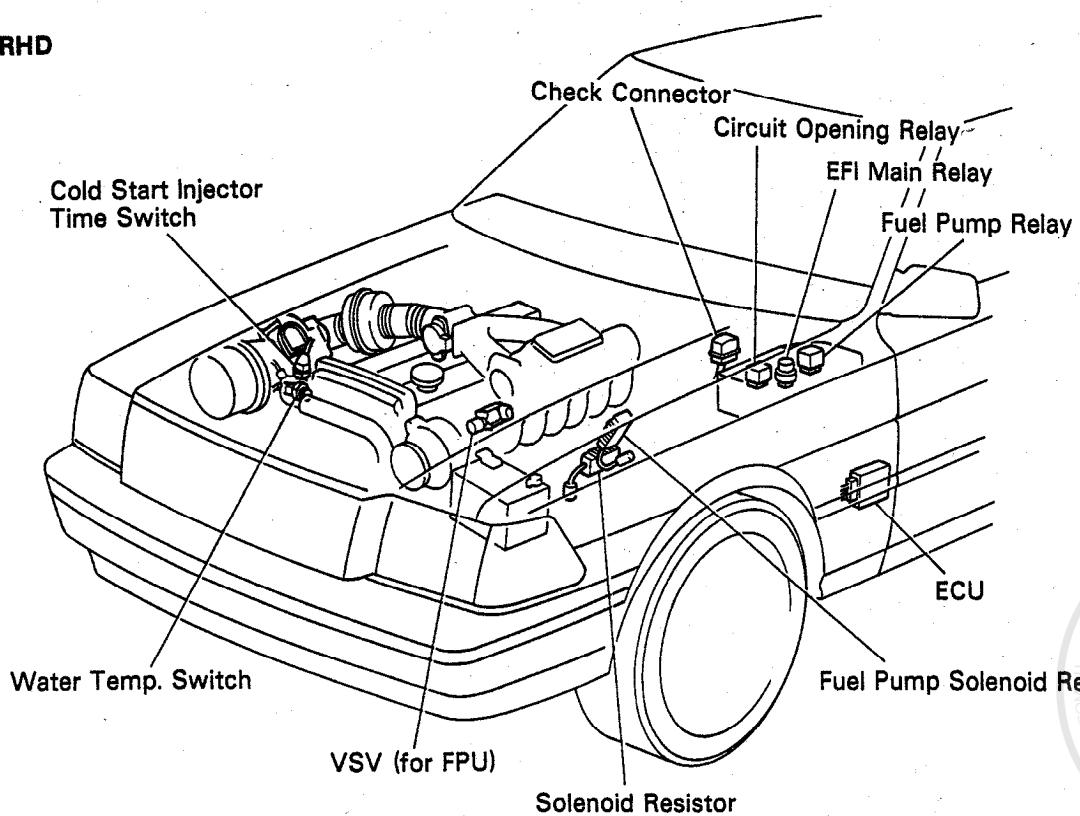
Location of Electronic Control Parts (Cont'd)

MS

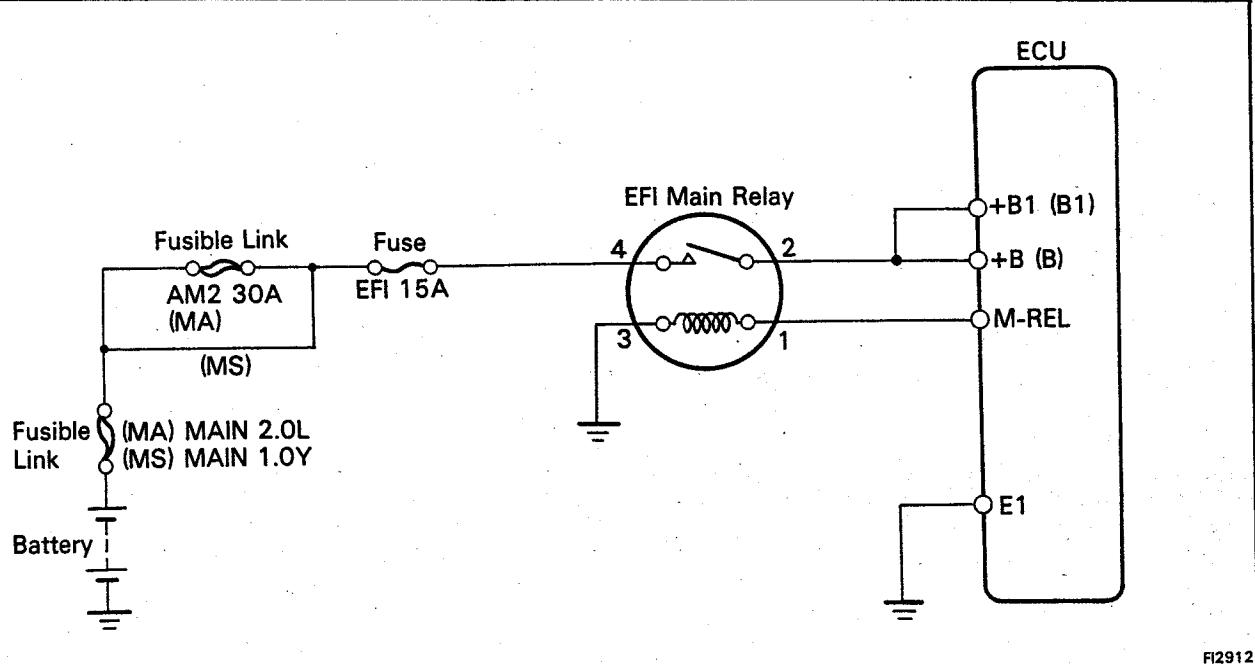
LHD



RHD



EFI Main Relay



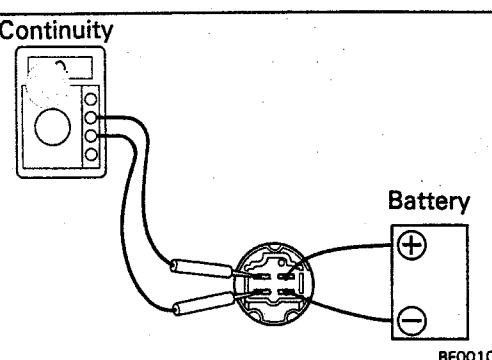
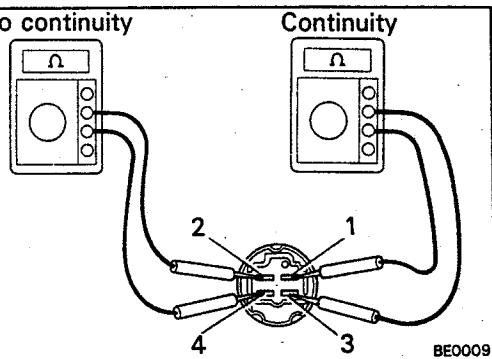
FI2912

INSPECTION OF EFI MAIN RELAY

1. INSPECT RELAY CONTINUITY

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

If continuity is not as specified, replace the relay.



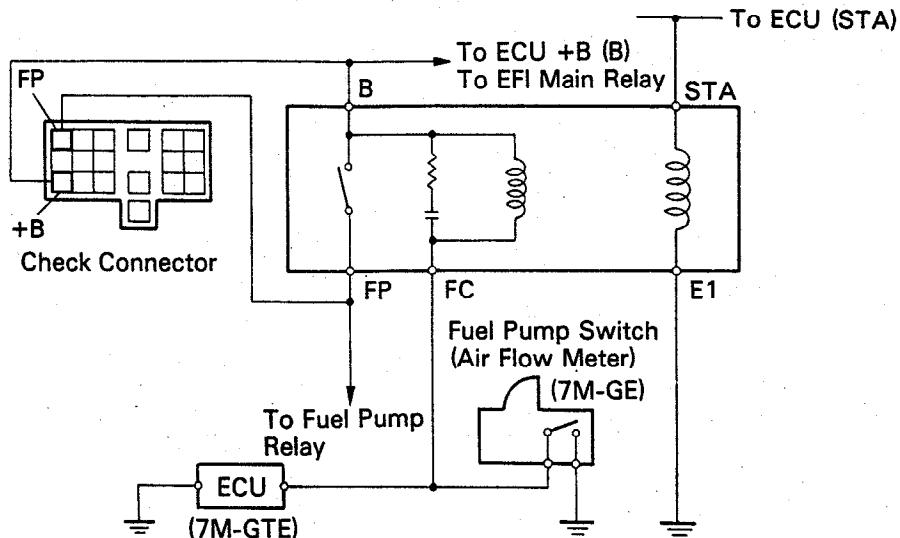
2. INSPECT RELAY OPERATION

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

If operation is not as specified, replace the relay.



Circuit Opening Relay



FI1992

INSPECTION OF CIRCUIT OPENING RELAY

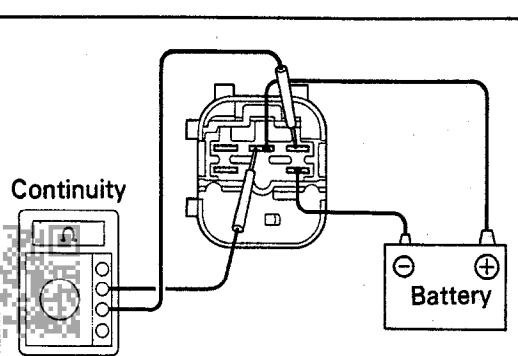
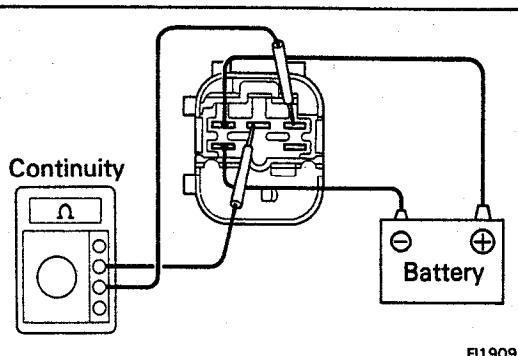
1. INSPECT RELAY CONTINUITY

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

If continuity is not as specified, replace the relay.

2. INSPECT RELAY OPERATION

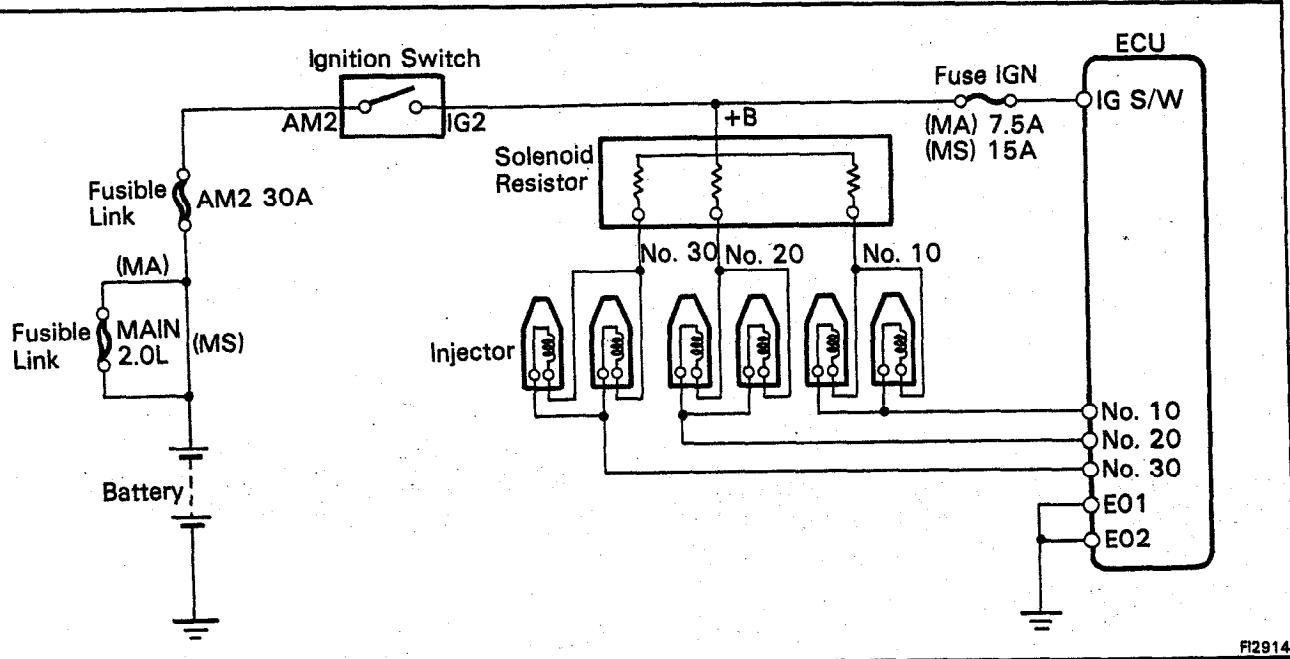
- Apply battery voltage across terminals STA and E1.
- Using an ohmmeter, check that there is continuity between terminals B and FP.



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

If operation is not as specified, replace the relay.

Solenoid Resistor



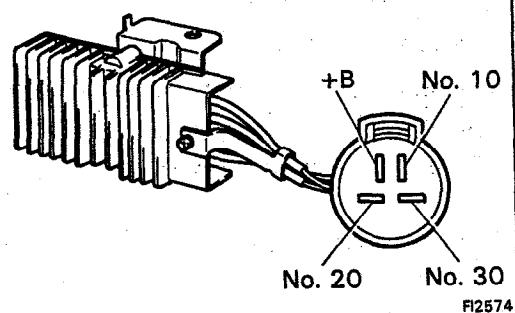
INSPECTION OF SOLENOID RESISTOR

INSPECT RESISTANCE OF SOLENOID RESISTOR

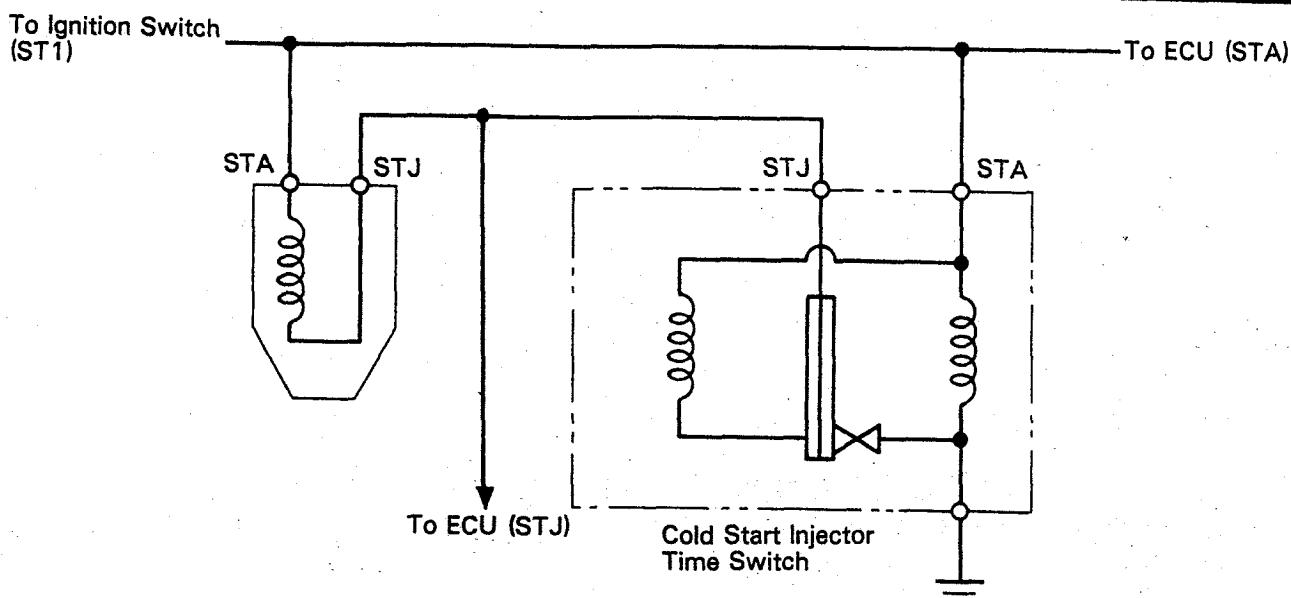
Using an ohmmeter, measure the resistance between +B and other terminals.

Resistance: 3 Ω each

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



Cold Start Injector Time Switch



FI1374

INSPECTION OF COLD START INJECTOR TIME SWITCH

1. INSPECT RESISTANCE OF COLD START INJECTOR TIME SWITCH

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

Resistance:

w/ TWC

STA — STJ 25 — 50 Ω below

15°C (59°F)

60 — 85 Ω above

30°C (86°F)

STA — Ground 25 — 85 Ω

w/o TWC

STA — STJ 20 — 40 Ω below

30°C (86°F)

40 — 60 Ω above

40°C (104°F)

STA — Ground 20 — 80 Ω

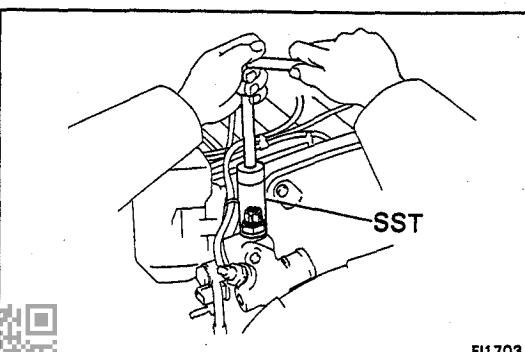
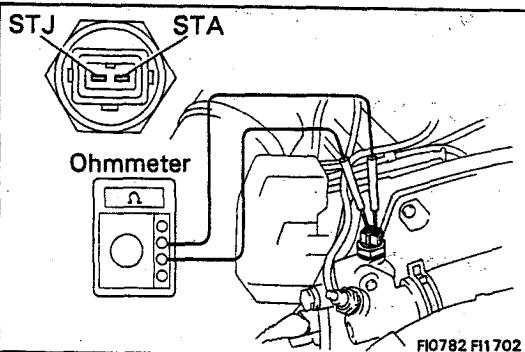
If the resistance is not as specified, replace the switch.

2. IF NECESSARY, REPLACE COLD START INJECTION TIME SWITCH

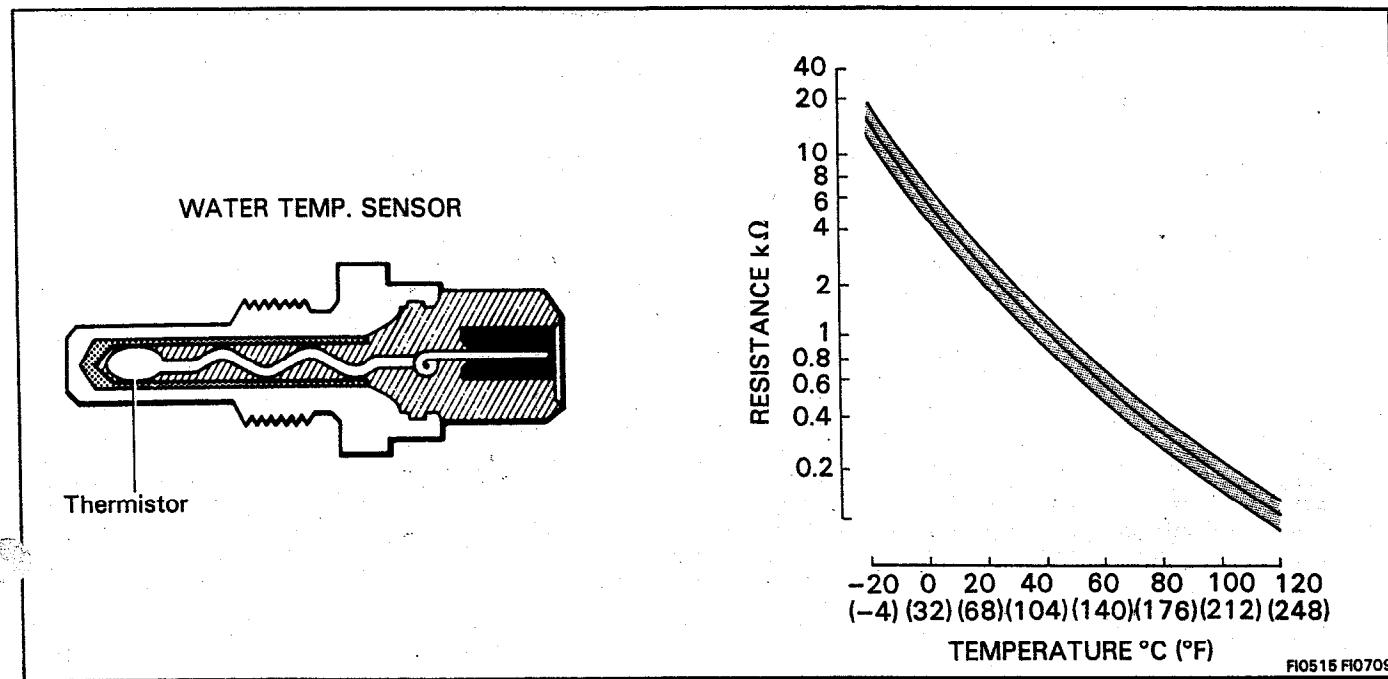
- Drain the coolant.
- Using SST, replace the switch with a new gasket. SST 09814-20010

Torque: 300 kg-cm (22 ft-lb, 29 N·m)

- Refill with coolant.



Water Temperature Sensor



FI0515 FI0709

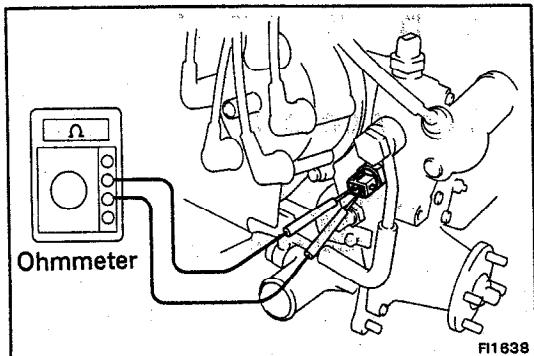
INSPECTION OF WATER TEMPERATURE SENSOR

INSPECT RESISTANCE OF WATER TEMPERATURE SENSOR

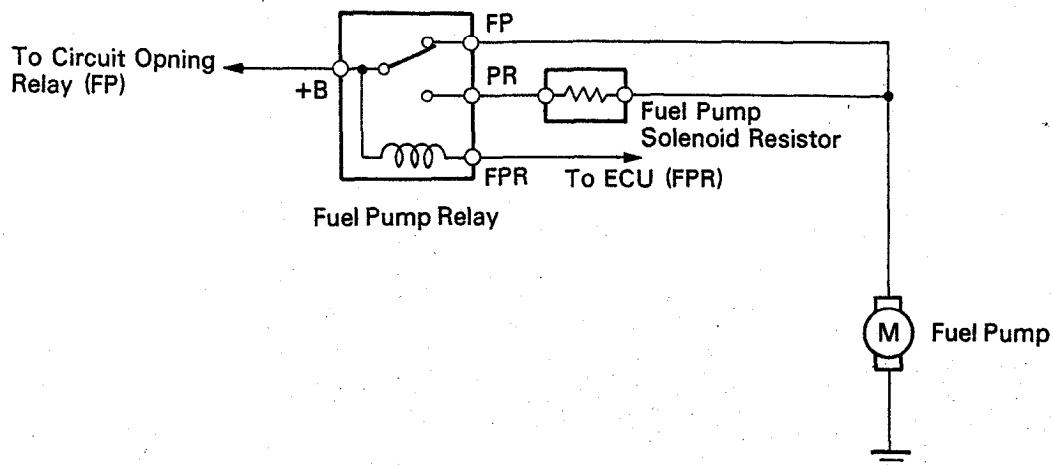
Using an ohmmeter, measure the resistance between both terminals.

Resistance: Refer to chart.

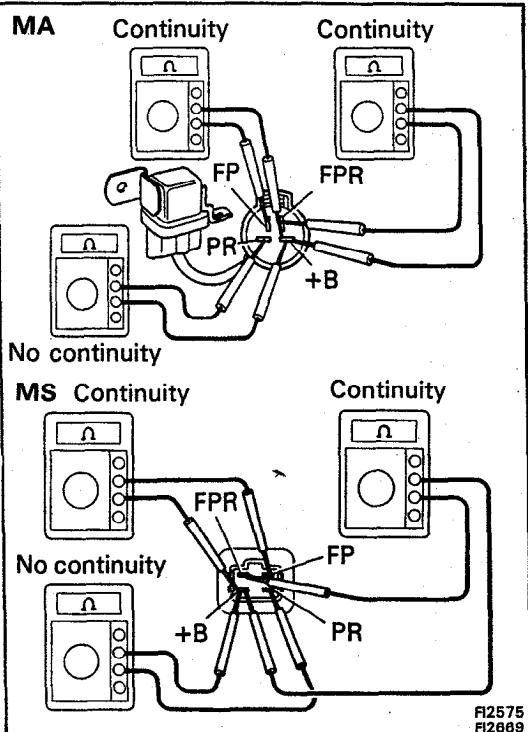
If the resistance is not as specified, replace the water temperature sensor.



Fuel Pump Relay and Resistor



FI1704



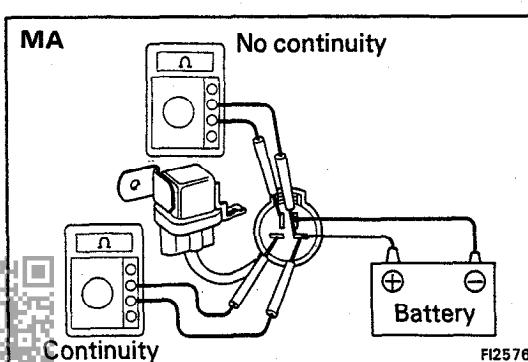
INSPECTION OF PUMP RELAY AND RESISTOR

1. INSPECT FUEL PUMP RELAY

A. Inspect Relay Continuity

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

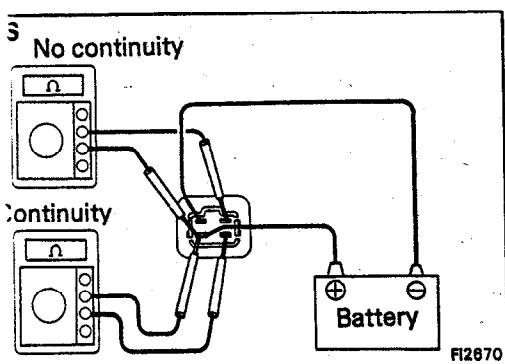
If continuity is not as specified, replace the relay.



B. Inspect Relay Operation

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

If operation is not as described, replace the relay.



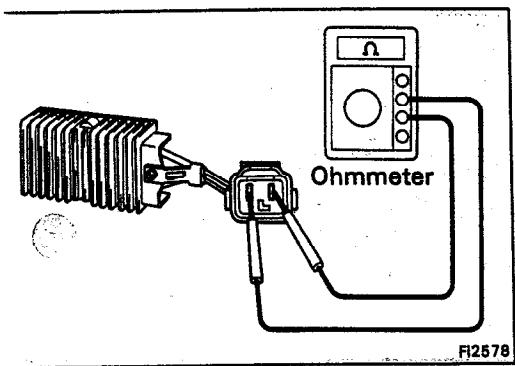
2. INSPECT FUEL PUMP RESISTOR

Inspect Resistance of Fuel Pump Resistor

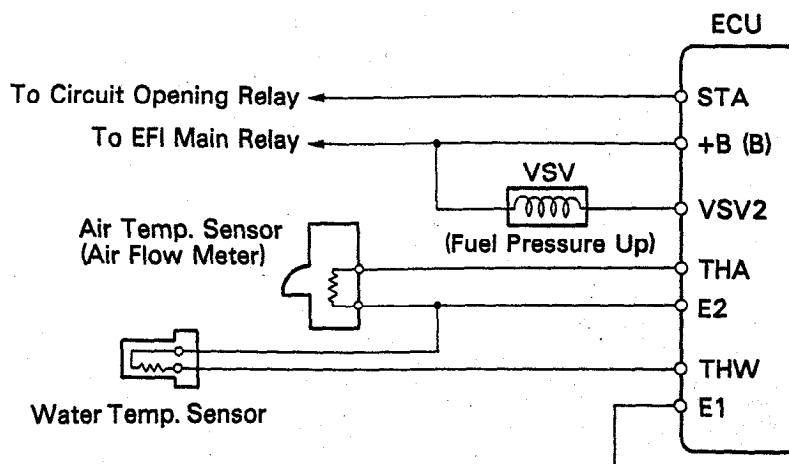
Using an ohmmeter, measure the resistance between both terminals.

Resistance: Approx. 0.7Ω

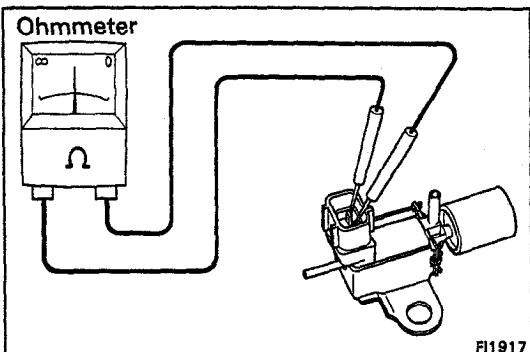
If the resistance is not as specified, replace the fuel pump resistor.



High Temperature Line Pressure Up System



FI1709



INSPECTION OF HIGH TEMPERATURE LINE PRESSURE UP SYSTEM

INSPECT VSV

A. Inspect VSV for Open Circuit

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

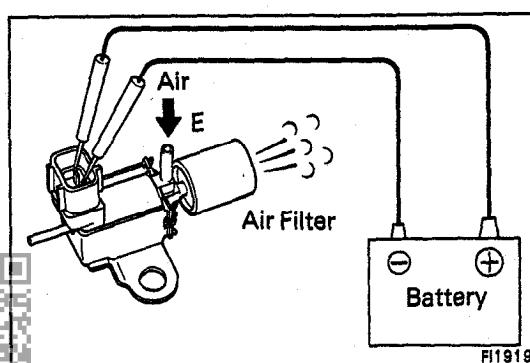
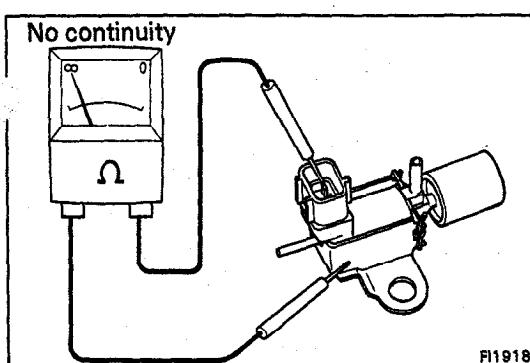
Resistance: 30 – 50 Ω

If there is no continuity, replace the VSV.

B. Inspect VSV for Short Circuit

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

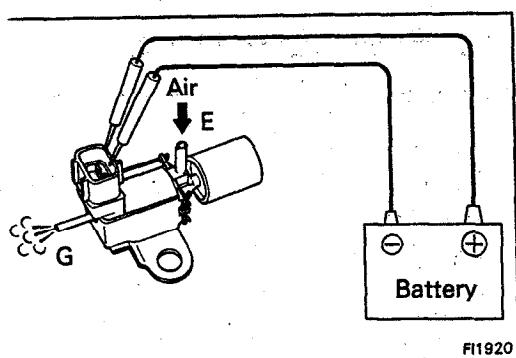
If there is continuity, replace the VSV.



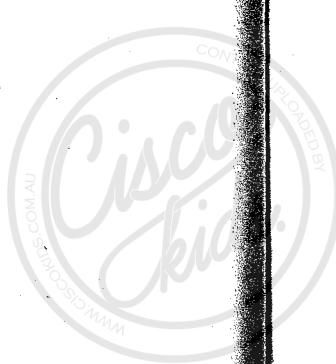
C. Inspect VSV Operation

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

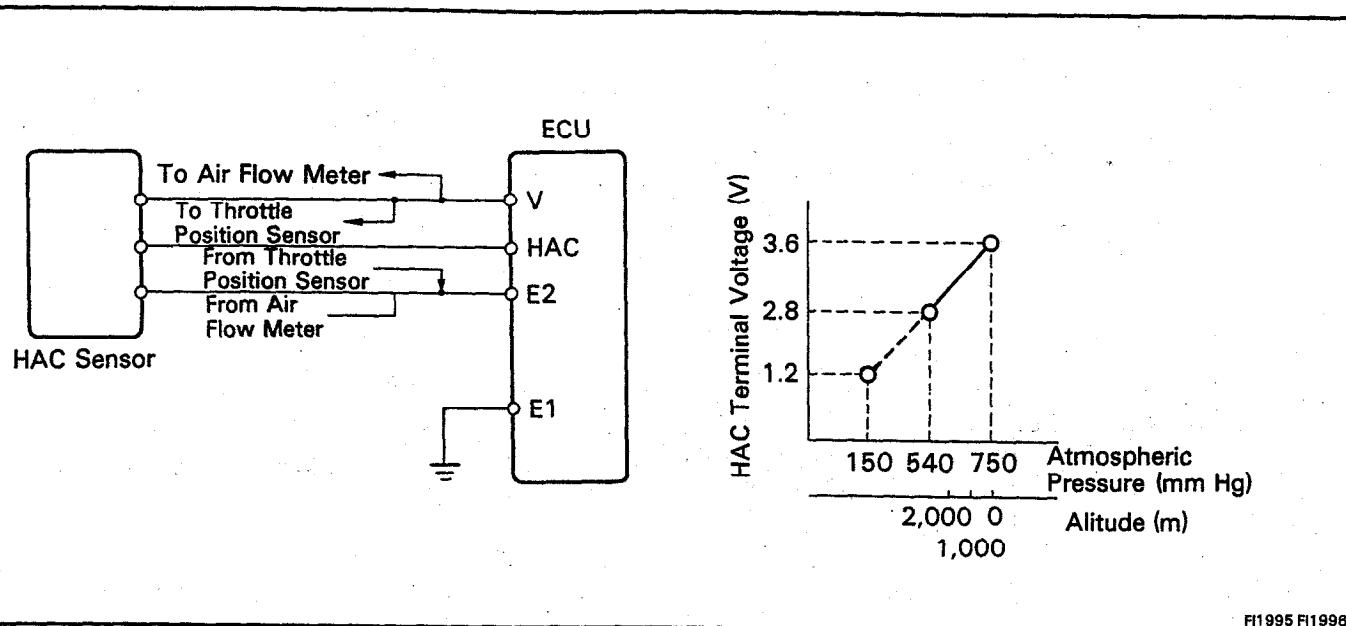




- (c) Disconnect the battery.
- (d) Check that air flows from the pipe E and pipe G.
If operation is not as specified, replace the VSV.



High Altitude Compensation (HAC) System (7M-GTE)



FI1995 FI1996

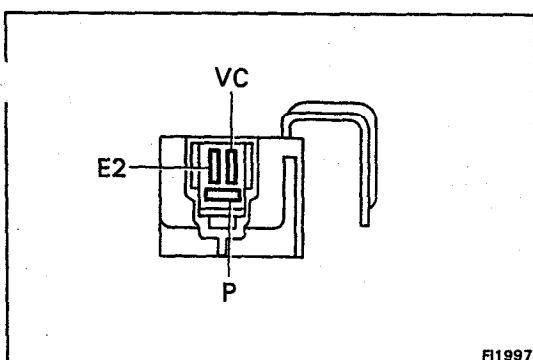
INSPECTION OF HAC SENSOR

INSPECT RESISTANCE OF HAC SENSOR

- Remove the glove box.
- Using an ohmmeter, measure the resistance between each terminal.

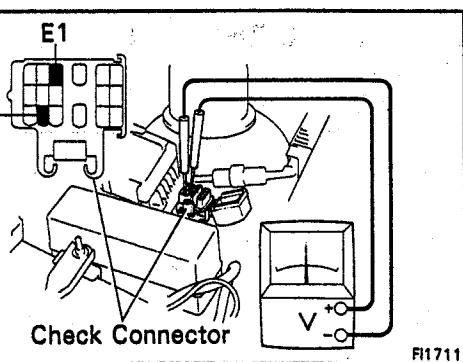
Terminals	Resistance
VC – P	700 – 860 Ω
VC – E2	2.2 – 3.3 Ω
P – E2	2.9 – 4.2 Ω

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



FI1997





Oxygen Sensor (w/ TWC)

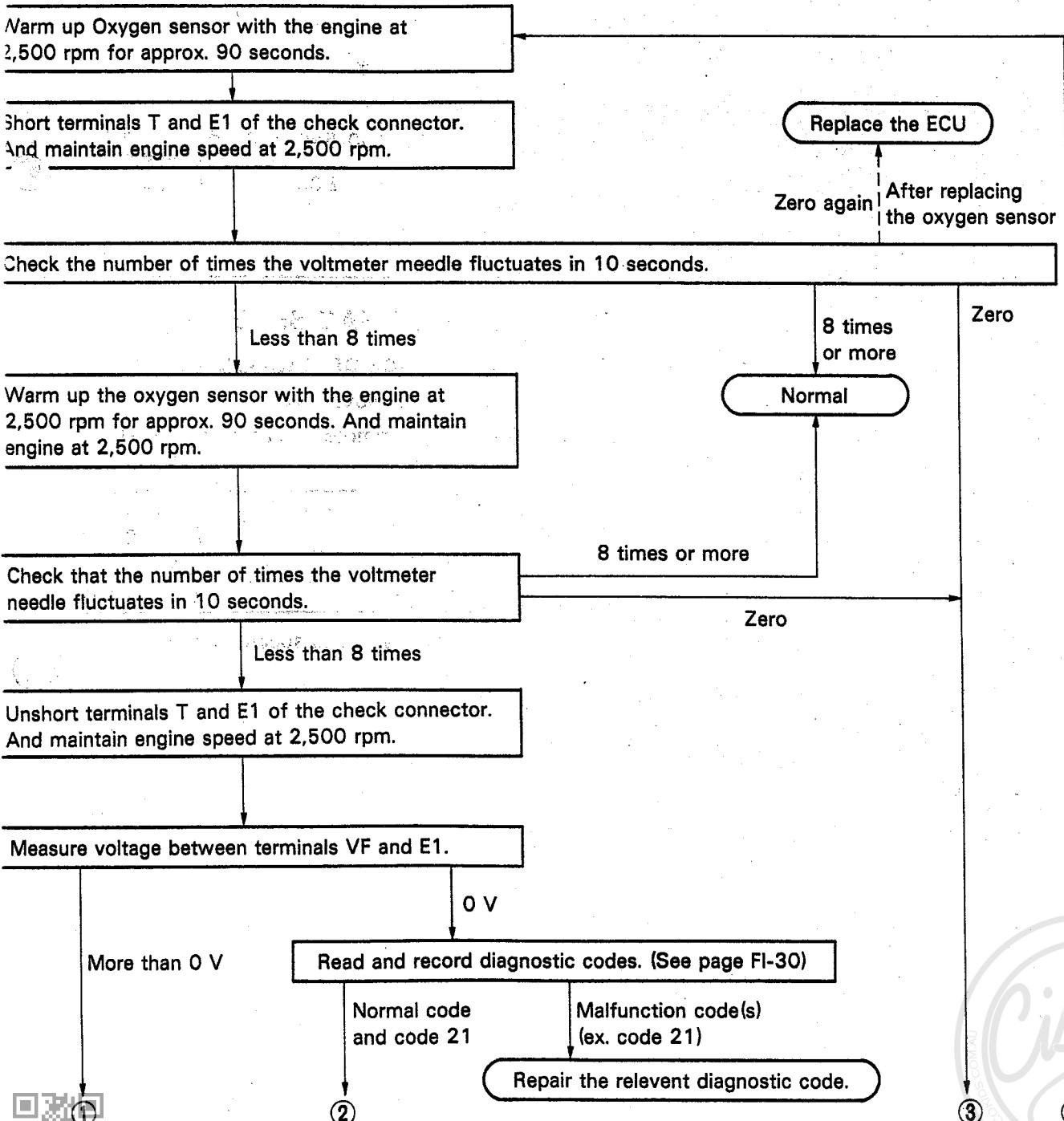
INSPECTION OF OXYGEN SENSOR

1. WARM UP ENGINE

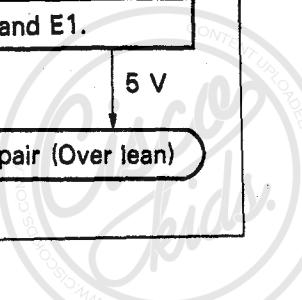
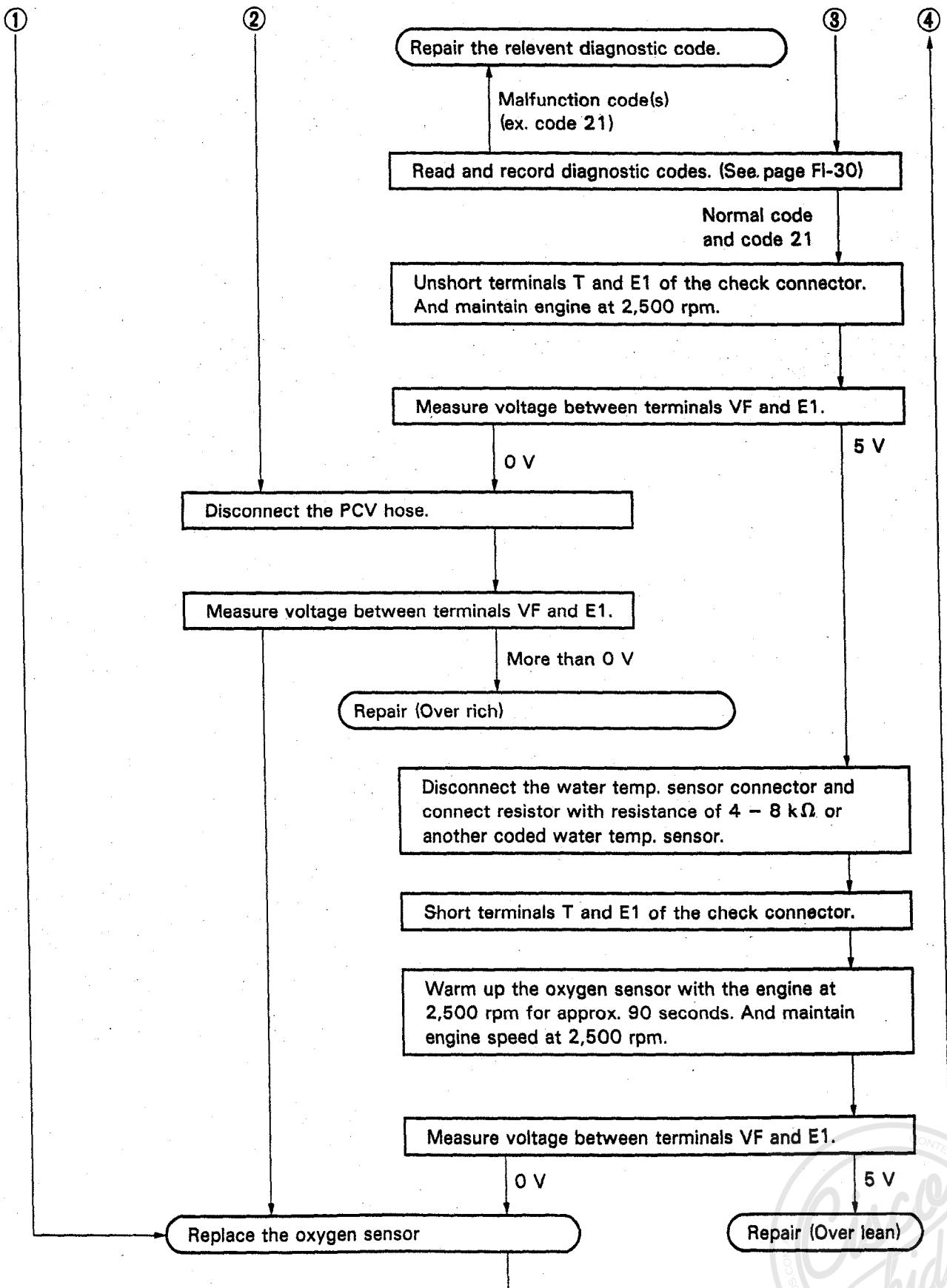
Allow the engine to reach normal operating temperature.

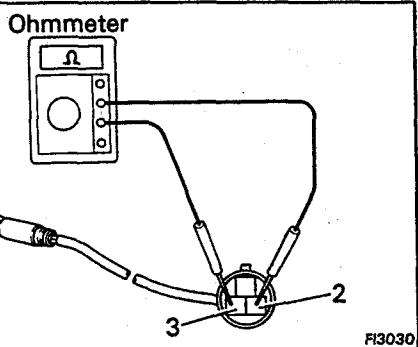
2. INSPECT FEEDBACK VOLTAGE (VF)

Connect the positive (+) probe of a voltmeter to terminals VF of the check connector, and negative (-) probe to terminal E1. Perform the test as follows.



CONTINUED FROM PAGE FI-122





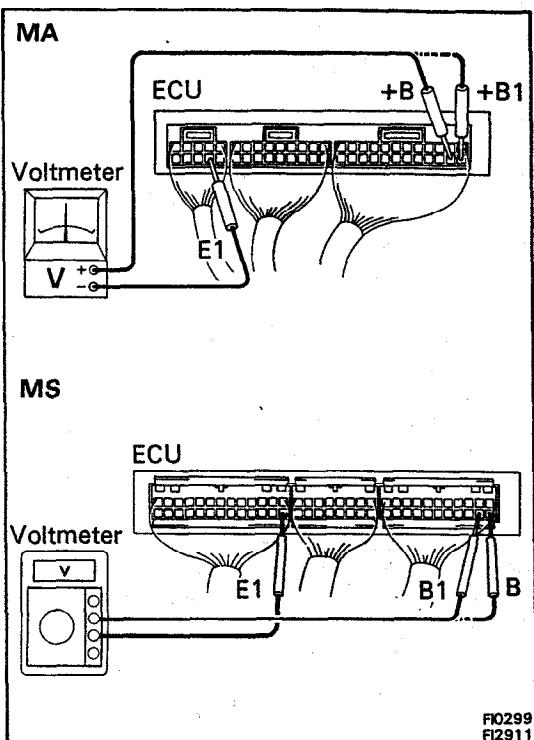
**3. (7M-GTE)
INSPECT HEATER RESISTANCE OF OXYGEN
SENSOR**

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

Resistance: 3.0 — 3.6 Ω

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





Electronic Controlled Unit (ECU)

INSPECTION OF ECU

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

1. **(MS)**
PREPARATION
(See page FI-58)

2. **INSPECT VOLTAGE OF ECU**

Check the voltage between each terminal of the wiring connectors.

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

NOTE:

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

Voltage at ECU Wiring Connectors

Terminals	STD Voltage	Condition	
BATT - E1	10 - 14	—	Ignition S/W ON
IG S/W - E1		—	
M-REL - E1		—	
+B (+B1) - E1		—	
IDL - E2	4 - 6	Throttle valve open	Ignition S/W ON
VC (VCC) - E2	4 - 6		
VTA - E2	0.1 - 1.0		Throttle valve fully closed
	4 - 5		Throttle valve fully open
*1VS - E2	4 - 5	Measuring plate fully closed	Ignition S/W ON
	0.02 - 0.08		
	2 - 4	Idling	
	0.3 - 1.0	3,000 rpm	
*2KS - E2	4 - 6	Ignition S/W ON	Cranking or running
	2 - 4	—	
VC - E2	4 - 6	Ignition S/W ON	
THA - E2	1 - 3	Ignition S/W ON	Intake air temperature 20°C (68°F)
THW - E2	0.1 - 1.0	Ignition S/W ON	Coolant temperature 80°C (176°F)

Voltage at ECU Wiring Connectors (Cont'd)

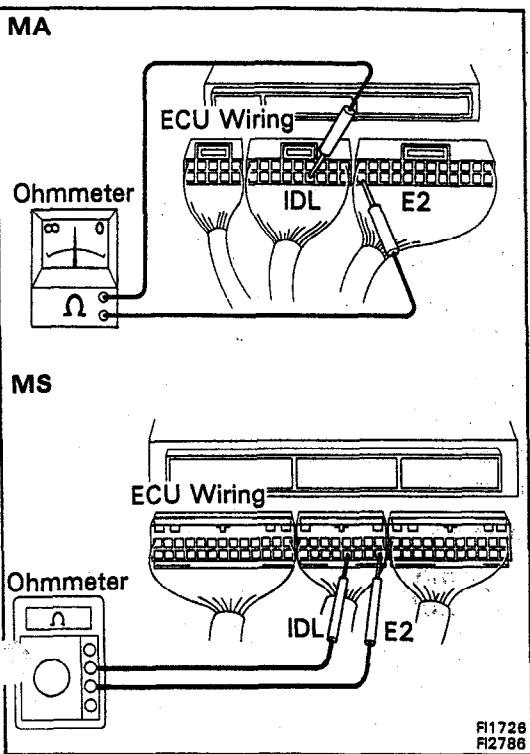
Terminals	STD Voltage	Condition	
No. 10 E01 No. 20 — No. 30 E2	9 - 14		Ignition S/W ON
STA - E1	6 - 14		Cranking
ISC1 — E1 ISC4	9 - 14		Ignition S/W ON
IGF, IGT - E1	0.7 - 1.0		Idling
* ² IGdA, IGdB - E1	1 - 3		Idling
* ² HAC - E2	Approx. 2.8	Ignition S/W ON	540 mm Hg (21.26 in.Hg, 72.0 kPa)
	Approx. 3.6		750 mm Hg (129.53 in.Hg, 100.0 kPa)
W - E1	9 - 14	No trouble ("CHECK ENGINE" warning light off) and engine running.	
* ³ A/C - E1	10 - 14	Air conditioning ON	
T - E1	4 - 6	Ignition S/W ON	Check connector T(TE1) - E1 not short
	0		Check connector T(TE1) - E1 short
* ³ NSW (A/T) - E1	0	Ignition S/W ON	Shift position P or N range
	10 - 14		Ex. P or N range
* ³ N/C (M/T) - E1	0	Ignition S/W ON	Clutch pedal not depressed
	10 - 14		Clutch pedal depressed
* ³ DFG - E1	10 - 14	Ignition S/W ON	Defogger S/W OFF
	0		Defogger S/W ON
* ³ LP - E1	10 - 14	Headlight S/W OFF	
	0	Headlight S/W ON	

*1 7M-GE only

*2 7M-GTE only

*3 MA only





3. INSPECT RESISTANCE OF ECU

CAUTION:

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

Check the resistance between each terminal of the wiring connectors.

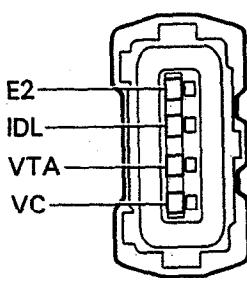
- Disconnect the wiring connectors from the ECU.
- Measure the resistance each terminal.

Resistance of ECU Wiring Connectors

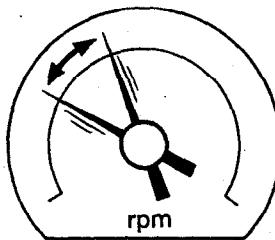
Terminals	Condition	Resistance (Ω)
IDL — E2	Throttle valve open	∞
	Throttle valve fully closed	Less than 2,300
VTA — E2	Throttle valve fully open	3,500 — 10,300
	Throttle valve fully closed	300 — 6,300
VC (VCC) — E2	—	200 — 400
* ¹ VS — E2	Measuring plate fully closed	20 — 600
	Measuring plate fully open	20 — 1,200
* ² KS → E2	—	∞
* ² E2 → KS	—	5,000 — 10,000
* ² VC → E2	—	10,000 — 15,000
* ² E2 → VC	—	5,000 — 10,000
THA — E2	Intake air temperature 20°C (68°F)	2,000 — 3,000
THW — E2	Coolant temperature 80°C (176°F)	200 — 400
G1, G2 — G \ominus	—	140 — 180
NE — G \ominus	—	
ISC1, ISC2 — +B (B) ISC3, ISC4	—	10 — 30
* ² HAC — E2	—	2,900 — 4,200

*¹ 7M-GE only

*² 7M-GTE only



FI0547



Tachometer

FI1142

Fuel Cut RPM

INSPECTION OF FUEL CUT RPM

1. WARM UP ENGINE

Allow the engine to reach normal operating temperature.

2. INSPECT FUEL CUT RPM

- Disconnect the connector from the throttle position sensor.
- Short circuit terminals IDL and E1 on the wire connector side.
- Gradually raise the engine rpm and check that there is fluctuation the fuel cut and fuel return points.

NOTE: The vehicle should be stopped.

Fuel cut rpm: 1,800 rpm

Fuel return rpm: 1,200 rpm

