



FUEL SYSTEM

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SPECIFICATIONS

GENERAL SPECIFICATIONS

Fuel tank and filter	
Fuel tank capacity lit. (U.S. gals, Imp. gals.)	75 (19.8, 16.5)
Fuel filter	High pressure type
Fuel pump	
Type	Electric type
Injection mixer	
Identification model No.	46EID-603 * ¹ 46EID-605 * ²
Injector type and number	Electromagnetic type, 2
Injector identification mark	H * ¹ J * ²
Throttle bore mm (in.)	46 (1.811)
Fuel pressure regulator	
Regulated pressure kPa (psi)	245 (35.6)
Throttle position sensor (TPS)	Variable resistor type
Idle position switch	Contact point type
Electronic control unit (ECU)	
Identification model No.	MT: E2T13485 * ¹ AT: E2T13486 * ¹ MT: E2T13673 * ²
Air flow sensor (AFS)	
Intake air temperature sensor "A"	Karman vortex type
Identification model No.	Thermister type
Resistance	2.2 k Ω at 25°C (77°F)
Intake air temperature sensor "B" * ²	Thermister type
Identification model No.	E1T91173
Resistance	2.45 k Ω at 20°C (68°F)
Oxygen sensor	Zirconia sensor
Coolant temperature sensor	
Resistance	Thermistor 16,200 Ω at -20°C (-4°F) 2,450 Ω at 20°C (68°F) 296 Ω at 80°C (176°F)
Pressure sensor	
Identification model No.	E1T15271
Resistor	
Model No.	E8T00271
Resistance	6 Ω
Control relay	
Identification model No.	Contact point type E8T00571

*¹ Vehicles without an intercooler

*² Vehicles with an intercooler

SPECIFICATIONS



SERVICE SPECIFICATIONS

Standard value	
Basic ignition timing	10° BTDC ± 2° at curb idle speed
Idle speed	850 ± 100 rpm
Accelerator cable free play	0–1 mm (0–.04 in.)
Speed control cable free play	0–3 mm (0–.1 in.)

TORQUE SPECIFICATIONS

Nm (ft.lbs.)

Drain plug	15–25 (11–18)
Fuel tank to body	25–30 (18–22)
Eye bolt	25–35 (18–25)
Flare nut	32–42 (23–30)
Coolant temperature sensor	30–39 (22–28)
Accelerator cable adjusting nut	7.8–10.7 (5.8–7.9)

LUBRICANT

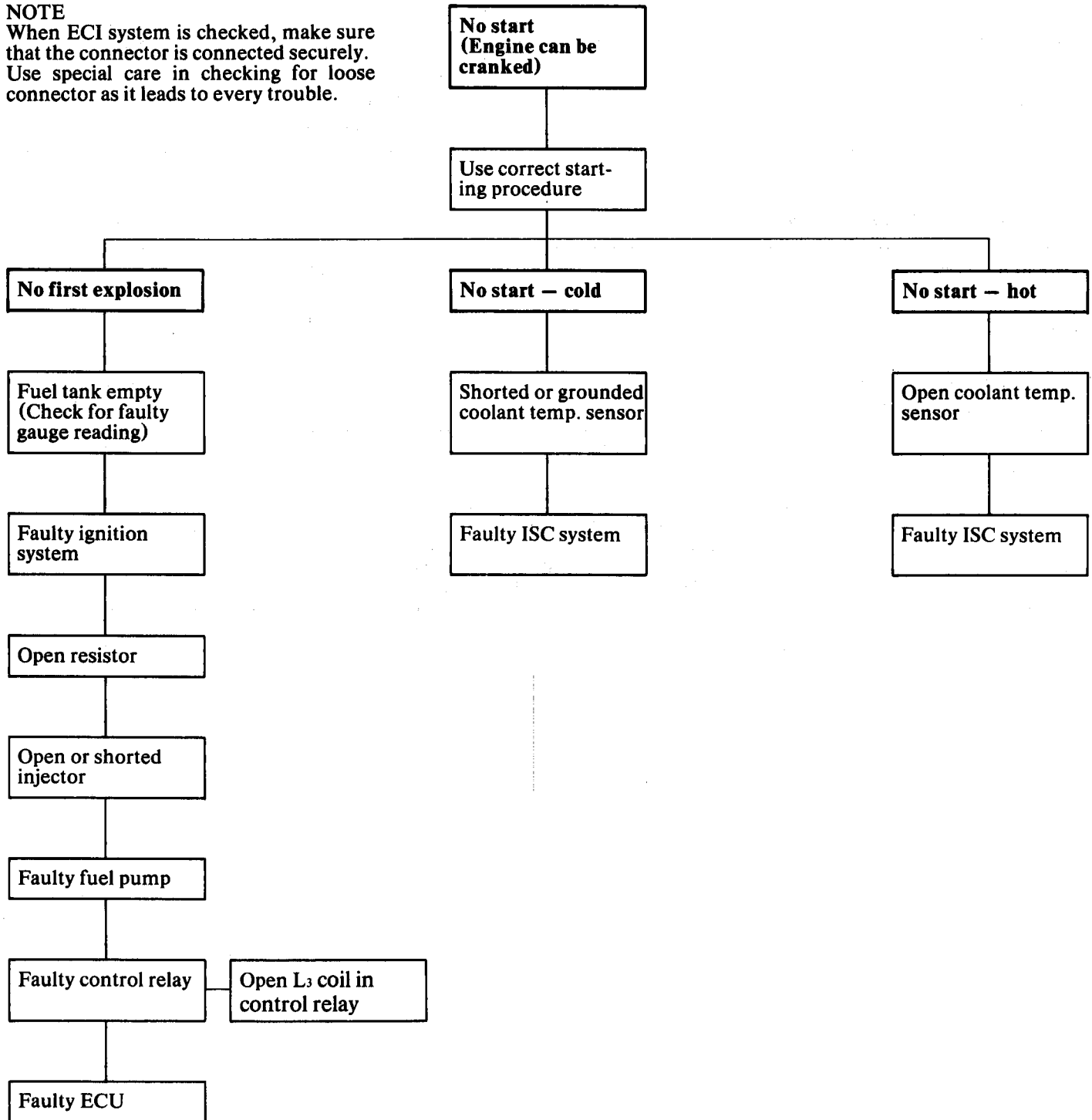
	Specified lubricant	Quantity
Grease for accelerator arm pin and return spring	MOPAR Multi-Mileage Lubricant Part Number 2525035 or equivalent	As required

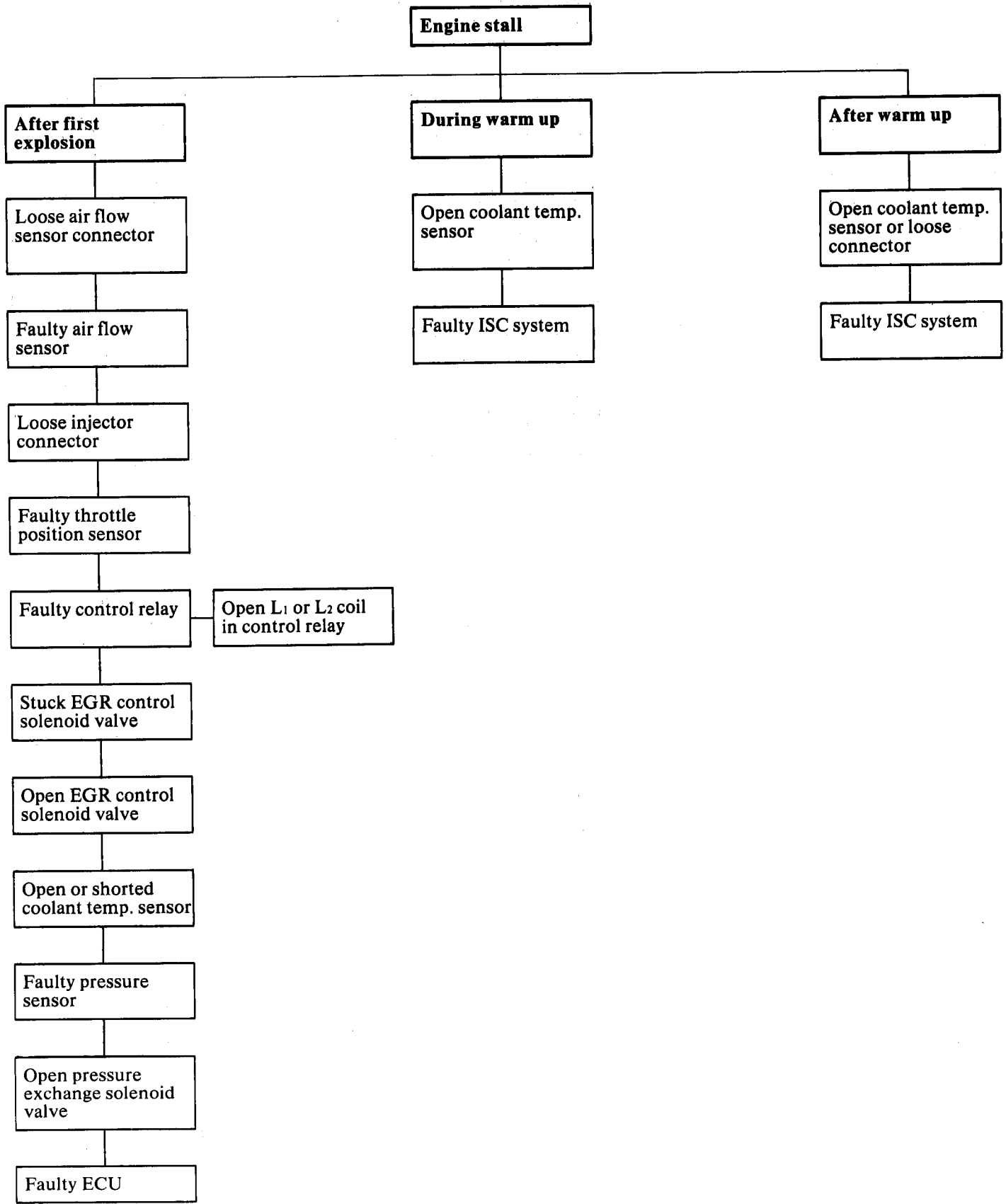


ECI SYSTEM DIAGNOSIS

NOTE

When ECI system is checked, make sure that the connector is connected securely. Use special care in checking for loose connector as it leads to every trouble.







Excessive CO (HC) during idle

Faulty ignition system

Faulty air flow sensor

Open or shorted intake air temp. sensor

Faulty coolant temp. sensor

Closed secondary air control solenoid

Faulty pressure exchange solenoid valve

Faulty pressure sensor

Open idle position switch

Shorted throttle position sensor

Faulty oxygen sensor

Faulty ECU

Poor acceleration

Faulty ignition system

Faulty air flow sensor

Shorted intake air temp. sensor

Open or shorted throttle position sensor

Faulty pressure exchange solenoid valve

Faulty pressure sensor

Stuck EGR control solenoid valve

Closed EGR control solenoid valve

Open or shorted coolant temp. sensor

Faulty ECU

Hesitation or surge

Faulty ignition system

Loose air flow sensor connector

Shorted throttle position sensor

Open oxygen sensor

Faulty pressure exchange solenoid valve

Faulty pressure sensor

Stuck EGR control solenoid valve

Closed EGR control solenoid valve

Open or shorted coolant temp. sensor

Faulty ECU

Car backing

Stuck or shorted idle position switch contact

Loose injector connector

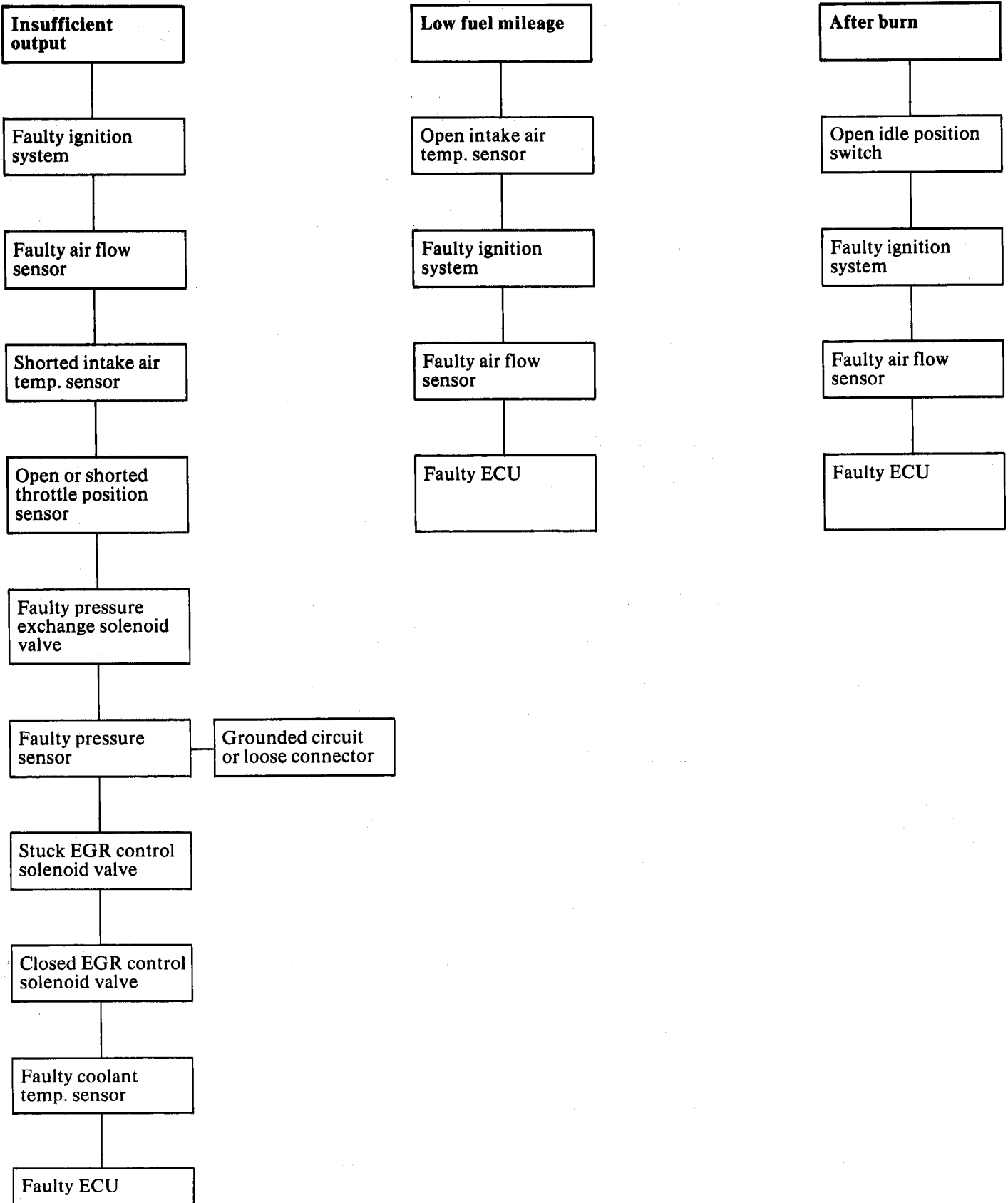
Faulty air flow sensor

Faulty ignition system

Faulty ECU



TROUBLESHOOTING



TROUBLESHOOTING



Symptom	Probable cause	Remedy
Fuel leaks	Loose clamp on fuel pipe or hose	Retighten
	Cracked or damaged fuel pipe, hose or fuel tank	Replace
Engine malfunctions due to insufficient fuel supply	Clogged fuel pipe or hose	Clean or replace
	Clogged fuel filter or in-tank fuel filter	Replace
	Water in fuel filter Dirty fuel in fuel tank	Replace the fuel filter or clean the fuel tank and fuel line
	Stained or rusted fuel tank interior	Clean or replace
	Malfunctioning fuel pump	Replace
Throttle valve does not fully open or close	Misadjusted	Adjust
	Failed return spring Failed throttle lever	Replace
Unsmooth operation of accelerator pedal (requiring excessive operating force)	Improperly installed pedal Improperly installed cable	Correct
	Insufficiently lubricated cable	Lubricate or replace



IDLE SPEED CHECK PROCEDURE

Checking condition:

Lights, electric cooling fan and all accessories are off, and transaxle in neutral.

1. Run the cold engine at first idle until the coolant temperature is raised to 85 to 95°C (185 to 205°F).
2. Run the engine at the specified idle speed.
3. Check the ignition timing. If necessary, adjust the ignition timing according to the procedure described in Group 8, Electrical.
4. Run the vehicle for five minutes at the vehicle speed of 48 km/h (30 mph), or run the engine for more than five seconds at the engine speed of 2,000 to 3,000 rpm.
5. Run the engine at idle for two minutes.
6. Using a tachometer, read idle speed. If outside specified limits, readjust the speed to the normal specification.

In case of engines with idle speed control (ISC) system, the idle speed adjustment is unnecessary since this system controls the idle speed. If necessary, check the ISC system.

Curb idle speed 850 ± 100 rpm

IDLE SPEED CONTROL (ISC) AND THROTTLE POSITION SENSOR (TPS) ADJUSTMENT

This adjustment is very important.

Driveability depends mainly on this adjustment.

When the ISC servo, throttle position sensor, mixing body or throttle body has been removed or replaced, be sure to make adjustment by the following procedure.

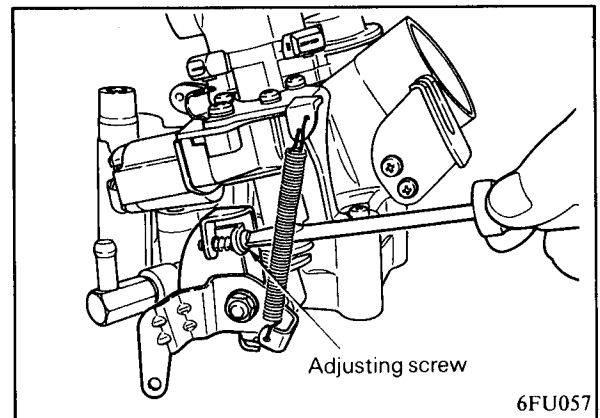
1. Run the cold engine at fast idle until the coolant temperature is raised to 85 to 90°C (185 to 205°F).
2. Stop the engine.
3. Disconnect the accelerator cable from throttle lever of injection mixer.
4. Loosen the two screws installing the throttle position sensor, turn the throttle position sensor fully clockwise and secure it with the screws.
5. Turn the ignition switch to "ON" position for more than 15 seconds, then turn the switch to "OFF".

This will set the ISC servo to the specified position.

6. Disconnect the ISC servo harness connector.
7. Start the engine.
8. Check the engine speed, and adjust to specification with adjusting screw. (6FU057)

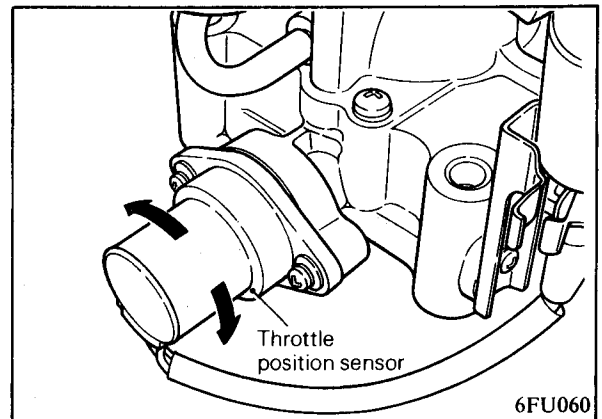
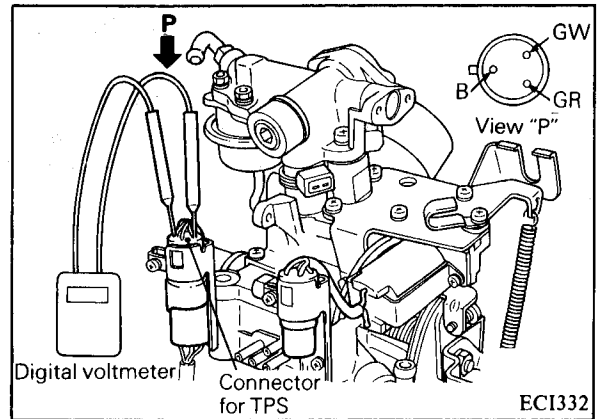
Engine speed 750 rpm

9. Stop the engine.



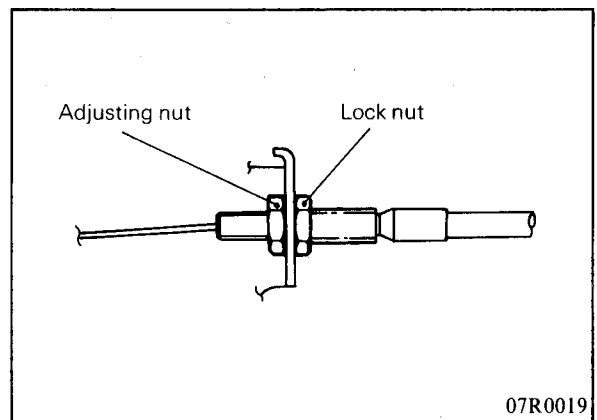


10. In order to read the output voltage of TPS, insert the digital voltmeter test probe from the rubber cap side of the TPS connector and bring it into contact with the pins in the connector. Insert the test probes along the "GW" lead (TPS output) and "B" lead (Ground) of the body side harness.
11. Ignition switch "ON". Do not start the engine.
12. Read the throttle position sensor output voltage.
13. If the measurement of the output voltage does not agree with $0.48 \pm 0.03V$, loosen the throttle position sensor mounting screws, and turn the sensor clockwise or counterclockwise until the output voltage is $0.48 \pm 0.03V$. And tighten the screws after applying sealant.
14. Fully open the throttle valve once, return it to its original position and check for proper output voltage. Make readjustment if necessary.
15. Remove the adapter and voltmeter and reconnect ISC servo harness connector.
16. Make sure that curb idle speed is normal, and then stop the engine.
17. Turn ignition switch from OFF to ON position, and after lapse of 15 seconds, return it to OFF position.
18. Connect the accelerator cable to the throttle lever of injection mixer and adjust the accelerator cable.



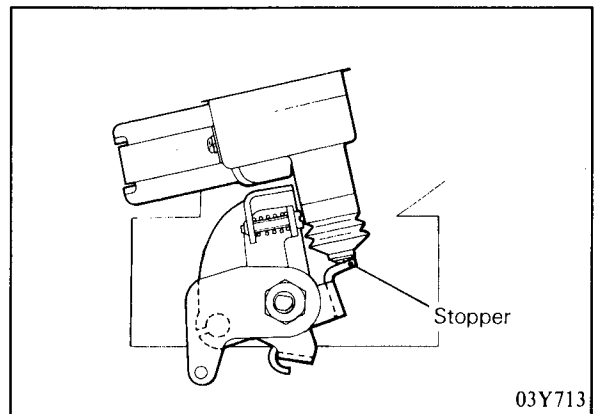
ADJUSTMENT OF ACCELERATOR CABLE PLAY

1. Do not run the engine but keep the ignition key at the "ON" position for 15 seconds before adjustment.
2. Confirm that the accelerator inner cable has no slackness.
3. If it shows slackness, adjust it as follows:
 - (1) Loosen the adjusting nut so that the throttle lever is free.
 - (2) Check the routing of the accelerator cable to confirm that there is no sharp twisting or bending.
 - (3) Use the adjusting nut to make the adjustment of the accelerator cable free play so that it is within the standard value.



Accelerator cable free play [Standard value]
 0-1 mm (0-.04 in.)

- (4) Confirm that the idle speed control switch touches the stopper after the idle speed control adjustment.





SERVICE ADJUSTMENT PROCEDURES

ADJUSTMENT OF SPEED CONTROL CABLE

1. Adjust the play of accelerator cable.
2. Slide the speed control cable in the direction of the arrow up to a point just before the accelerator pedal begins to move, and secure the speed control cable by inserting a clip.
3. Check to ensure that the play of speed control cable is up to standard value.

Speed control cable free play [Standard value]
0–3 mm (0–.1 in.)

NOTE

If the play adjustment is incorrect, either an increase of idle speed or lack of speed control in the high speed range will result.

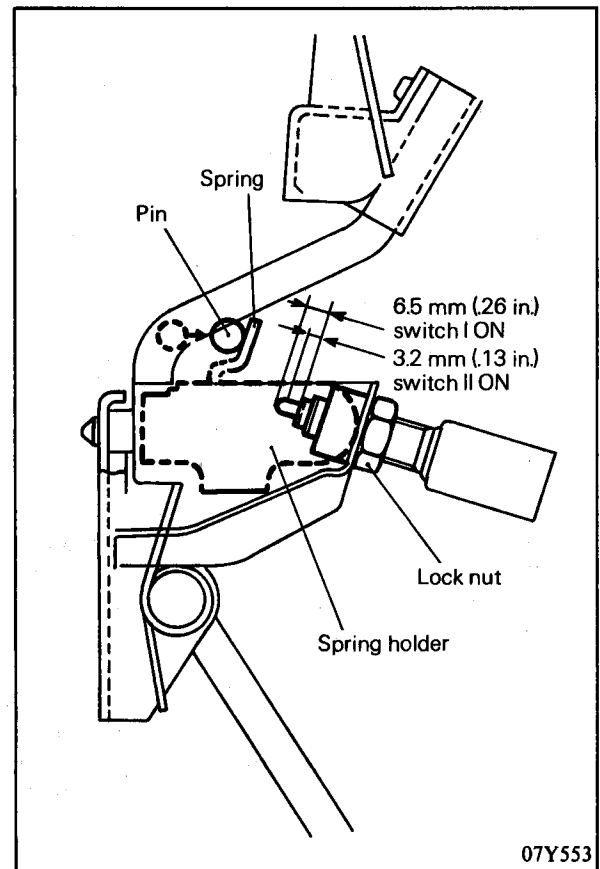
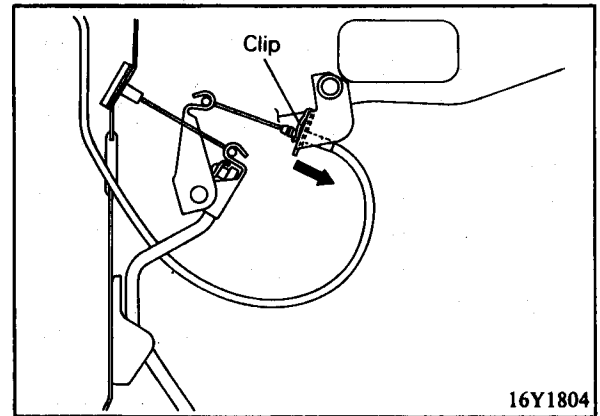
ADJUSTMENT OF KICKDOWN SWITCH

1. Loosen the lock nut.
2. Turn the kickdown switch to adjust it so that when pedal stroke is between 36 and 38 mm (1.4 and 1.5 in.), switch I is ON and when pedal stroke is between 45 and 49 mm (1.8 and 1.9 in.), switch II is ON.

NOTE

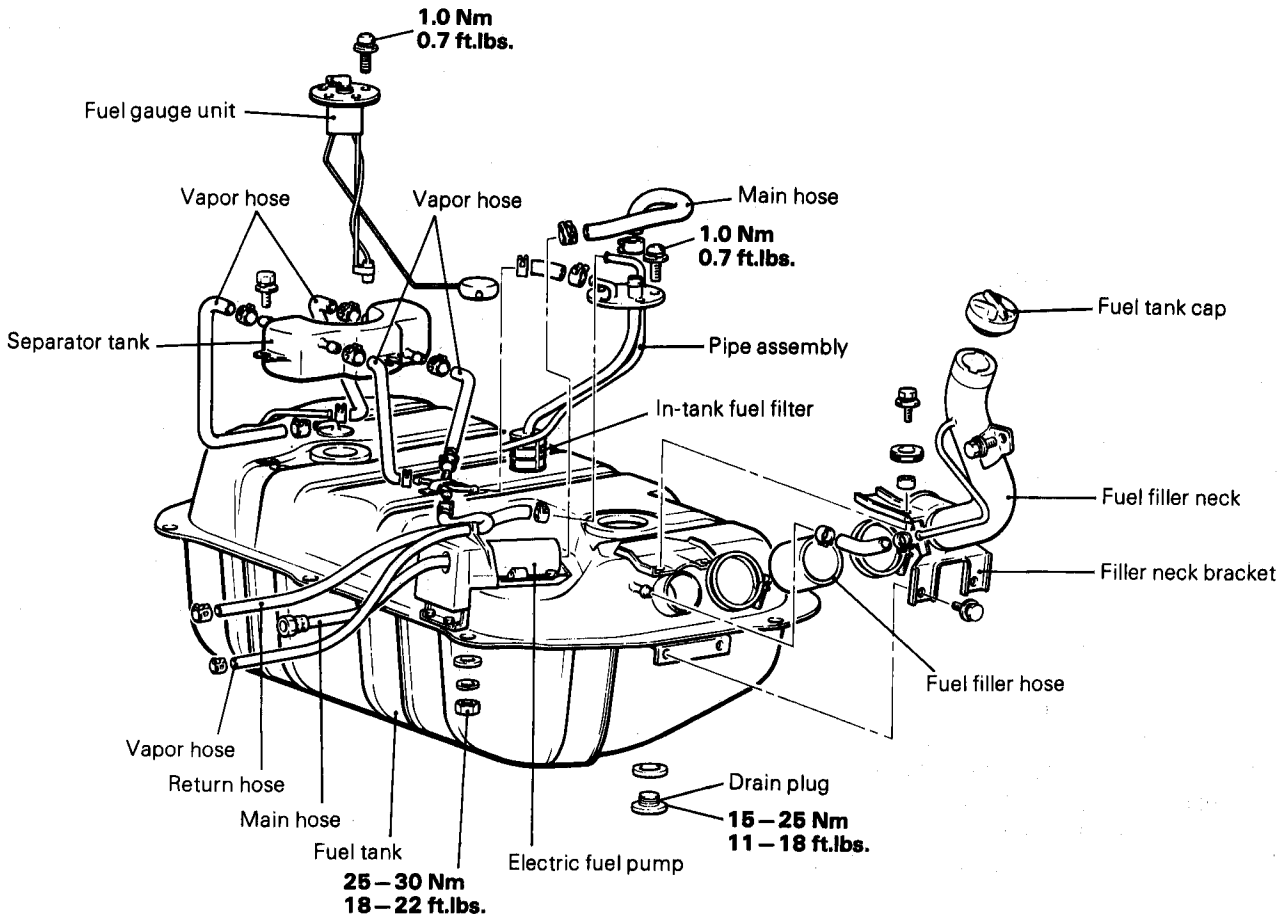
Make sure that overall pedal stroke is 57 mm (2.2 in.) or more.

3. After adjustment of kickdown switch, move the spring holder to make adjustment so that as soon as the switch I of kickdown switch is ON, the pin of accelerator arm may contact the spring.





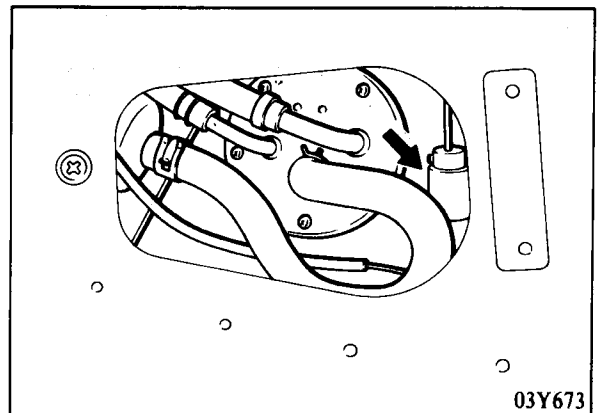
COMPONENTS



03Y688

REMOVAL

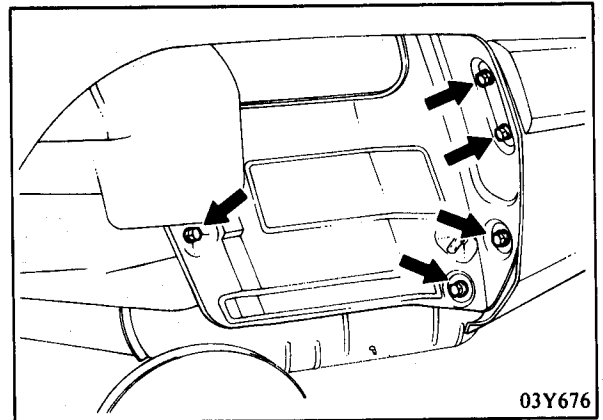
1. Reduce the internal pressure of the fuel main pipe. (Refer to P. 14-16.)
2. Remove the fuel tank cap.
3. Remove the drain plug in order to drain the fuel.
4. Remove the high floor side panel located in the boot floor.
5. Pry up and remove the lid.
6. Disconnect the fuel gauge unit connector, and the electric fuel pump connector. (Refer to GROUP 8.) (03Y673)





COMPONENT SERVICE — FUEL TANK

7. Remove the rear left wheel.
8. Remove the fuel pipe cover. (03Y676)
9. Disconnect the fuel hoses from the fuel pipes.
10. Disconnect the vapor hose from the vapor pipe.
11. Disconnect the fuel filler hose and breather hose from the fuel tank.

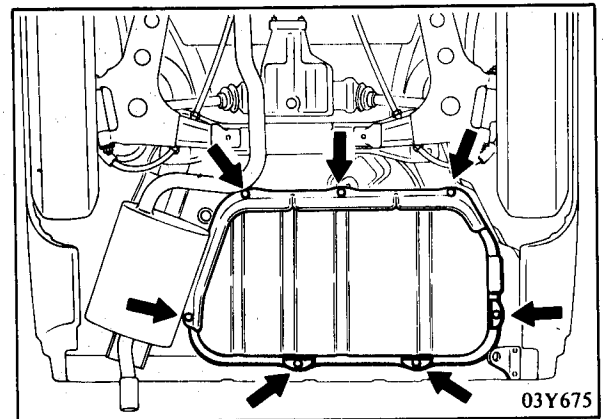


12. Remove the fuel tank.

NOTE

If the inside of the fuel tank is to be cleaned, use any one of the following:

- (1) Kerosene
- (2) Trichloroethylene
- (3) A neutral emulsion type detergent

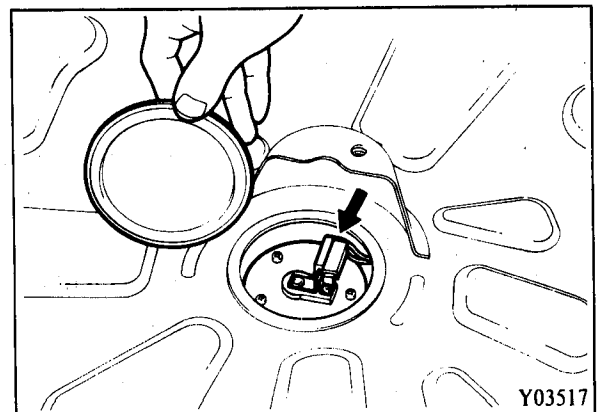


INSPECTION

1. Inspect the fuel tank cap for malfunction.
2. Check the fuel tank for cracks, corrosion or deformation.
3. Check the fuel tank for entry of foreign material.
4. Check the in-tank fuel filter for clogging.

FUEL GAUGE UNIT REPLACEMENT

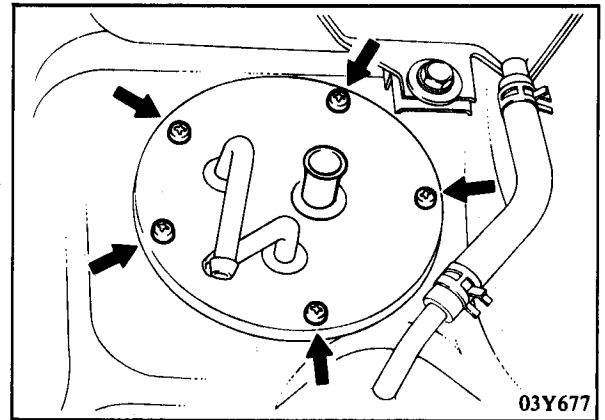
1. Pry up and remove the lid located in the boot floor.
2. Disconnect the fuel gauge unit connector. (Y03517)
3. Remove the fuel gauge unit. (Refer to GROUP 8.)





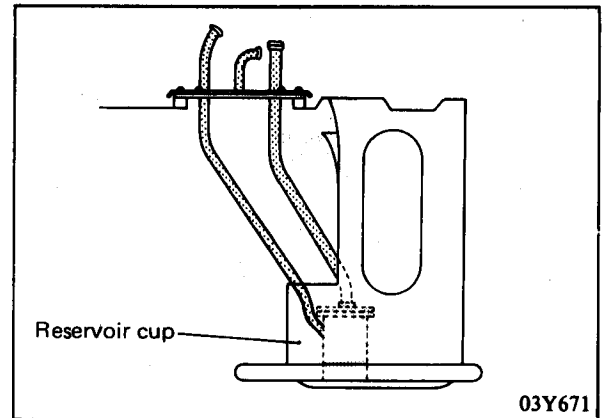
IN-TANK FUEL FILTER REPLACEMENT

1. Remove the high floor side panel located in the boot floor.
2. Pry up and remove the lid.
3. Disconnect the fuel hoses from the pipe assembly.
4. Remove the pipe assembly from the tank. (03Y677)
5. Press the tabs on the filter, and remove the in-tank fuel filter.



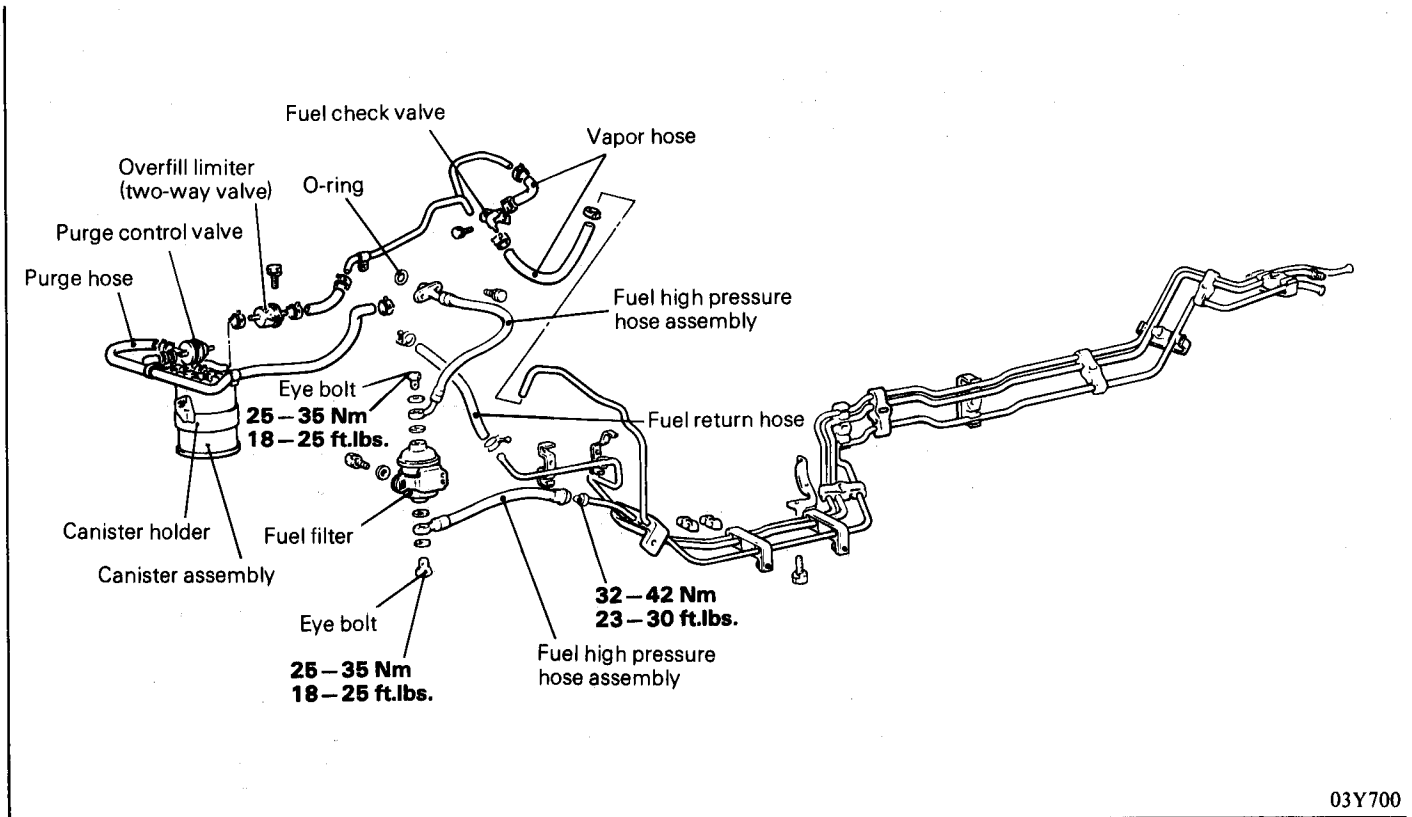
NOTE

When installing the in-tank fuel filter, the filter should be placed inside the reservoir cup located inside the fuel tank, and then the pipe assembly should be tightened to the fuel tank securely.





COMPONENTS



03Y700

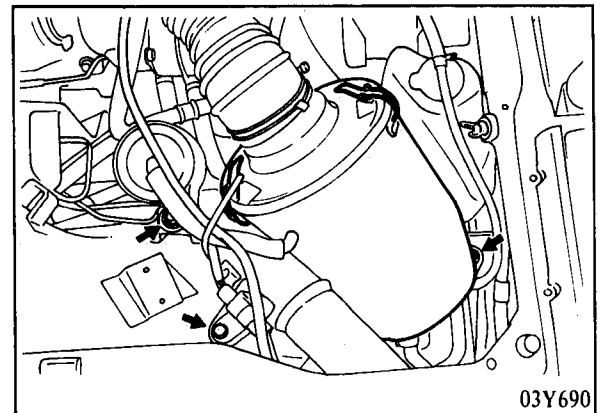
REMOVAL

Fuel Pipes and Hoses

1. Reduce the internal pressure of the fuel pipes and hoses by using the following procedure:
 - (1) Start the engine, and then disconnect the electric fuel pump connector.
 - (2) After the engine has been stopped, set the ignition key to the "OFF" position.
 - (3) Disconnect the battery cable from the negative terminal of the battery.
2. Remove the fuel pipes and hoses.

Canister Assembly

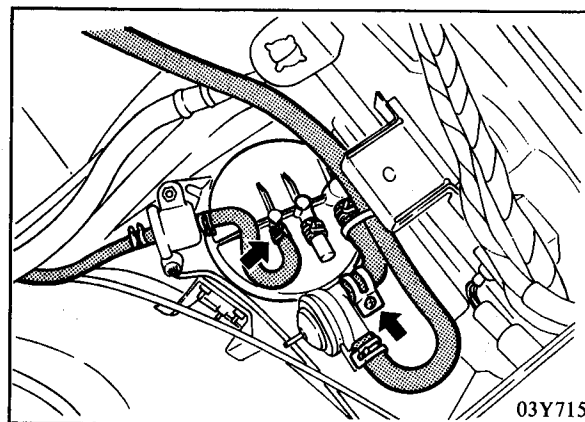
1. Remove the air cleaner box assembly.



03Y690

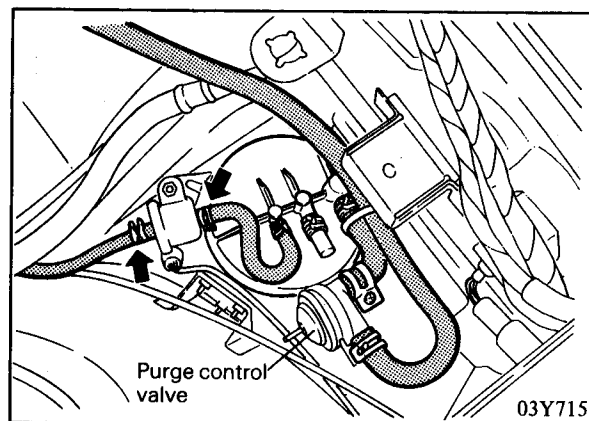


2. Disconnect the purge hoses.
3. Unclamp the canister holder clamp and take out the canister assembly.



Overfill Limiter (Two-Way Valve)

1. Remove the air cleaner box assembly.
2. Disconnect the purge hoses. (03Y715)
3. Remove the two-way valve from the canister assembly.

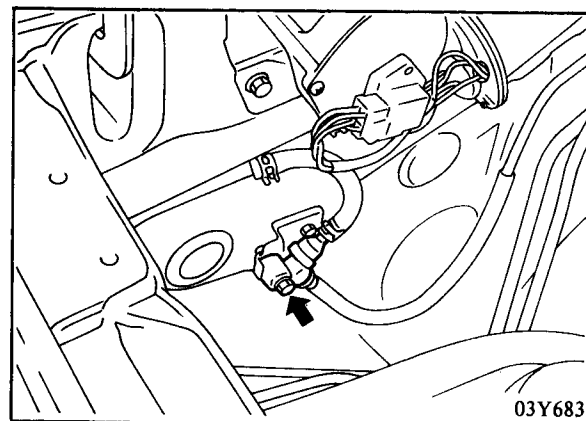


Fuel Check Valve

1. Disconnect the purge hoses.
2. Remove the fuel check valve. (03Y683)

Purge Control Valve

1. Disconnect the purge hose from purge control valve.
2. Remove purge control valve.

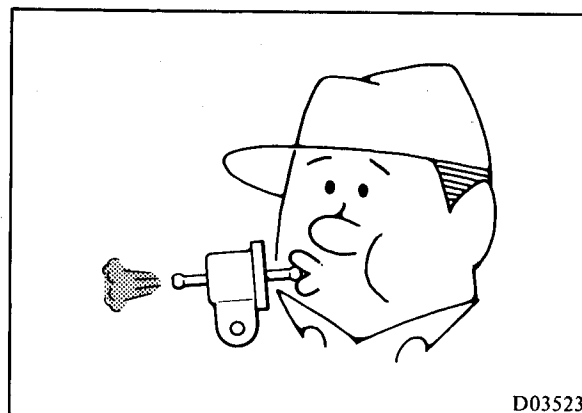


INSPECTION

1. Check the hoses and pipes for cracks, bend, deformation, deterioration and clogging.
2. Check the fuel filter for clogging and damage.
3. Check the canister for clogging.
4. Check the overfill limiter (two-way valve) and the fuel check valve for malfunction.

Overfill limiter simple test

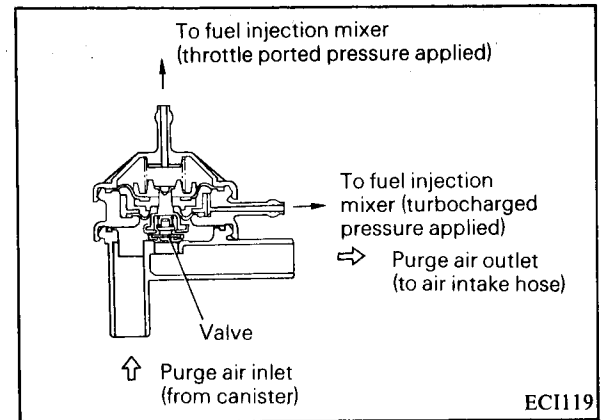
A simple way of inspection, however, may be adopted in which the overfill limiter is removed and then air is lightly blown into either the inlet or outlet by mouth. If the air passes after a slight resistance, overfill limiter is in good condition. (D03523)





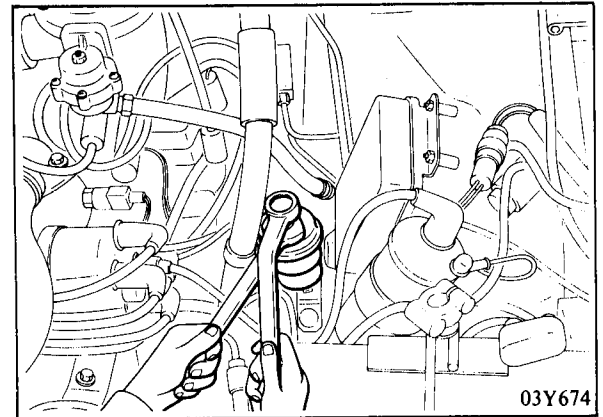
COMPONENT SERVICE — FUEL LINE AND VAPOR LINE

5. Check the purge control valve as follows: (ECI119)
 - (1) Make sure that the cooling water is at temperatures between 80 and 90°C (180 and 190°F).
 - (2) Disconnect the purge hose from the air cleaner and blow into the purge hose. If the valve is not open, it's operation is normal. Then start the engine and increase the engine speed to 1,500 to 2,000 rpm and blow into the purge hose. If the valve is open, it is normal. If the valve is not open, check for clogged or broken vacuum hose, or malfunctioning thermo valve.



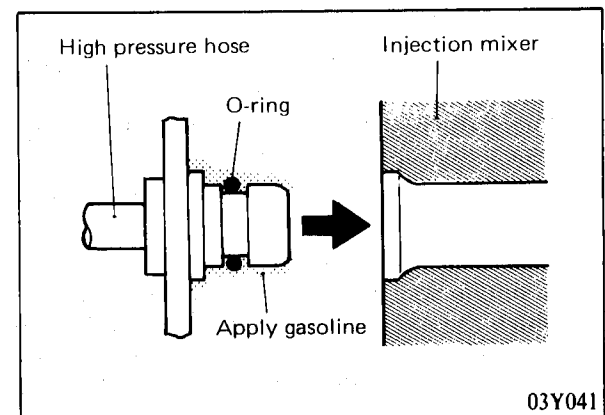
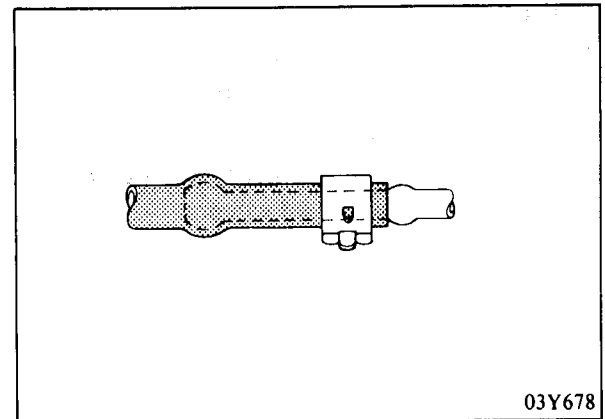
FUEL FILTER REPLACEMENT

1. Reduce the internal pressure of the fuel pipes and hoses.
2. Remove the eye bolts while holding the nut of the fuel filter side securely. (03Y674)
3. Remove the fuel filter assembly.



INSTALLATION

1. When attaching the fuel hose to the pipe, be sure that the hose is attached as shown in the illustration.
2. When connecting the high pressure hose to the injection mixer, apply gasoline to the hose union. Then insert the hose, being careful not to damage the O-ring, and tighten securely.





3. Tighten the flare nut by hand, and then tighten it to the specified torque, being careful that the fuel hose does not become twisted. (03Y043)

Tightening torque

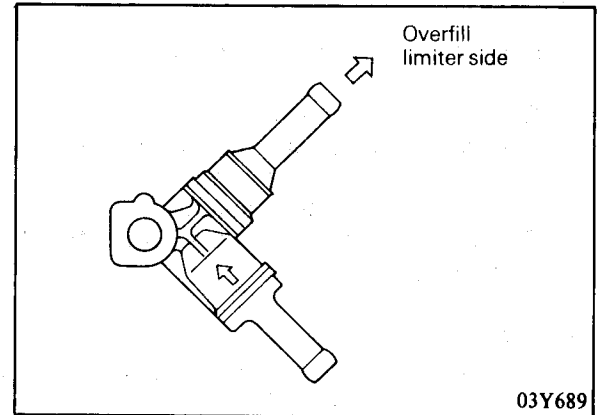
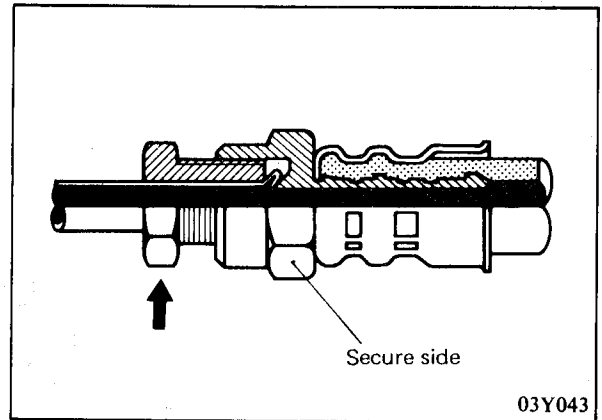
Flare nut 32–42 Nm (23–30 ft.lbs.)

4. After all of the fuel pipes and hoses have been connected, start the engine, and confirm that there is no fuel leakage from any of the connections.

Caution

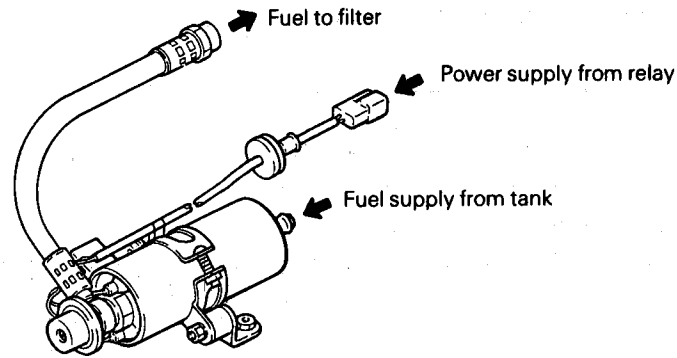
Because there is high pressure applied between the fuel pump and the injection mixer, be especially sure that there is no fuel leakage in this area.

5. Install the fuel check valve as illustrated.





COMPONENTS



ECI301

REMOVAL

1. Reduce the internal pressure of the main fuel pipe. (Refer to P.14-16.)
2. Remove the left rear wheel.
3. Loosen the fuel tank mounting band nut and slightly lower the fuel tank downward.
4. Remove the fuel pump support.
5. Disconnect the fuel hoses from the fuel pump and remove pump.

INSPECTION

There is the connector for checking the fuel pump function in the engine compartment.

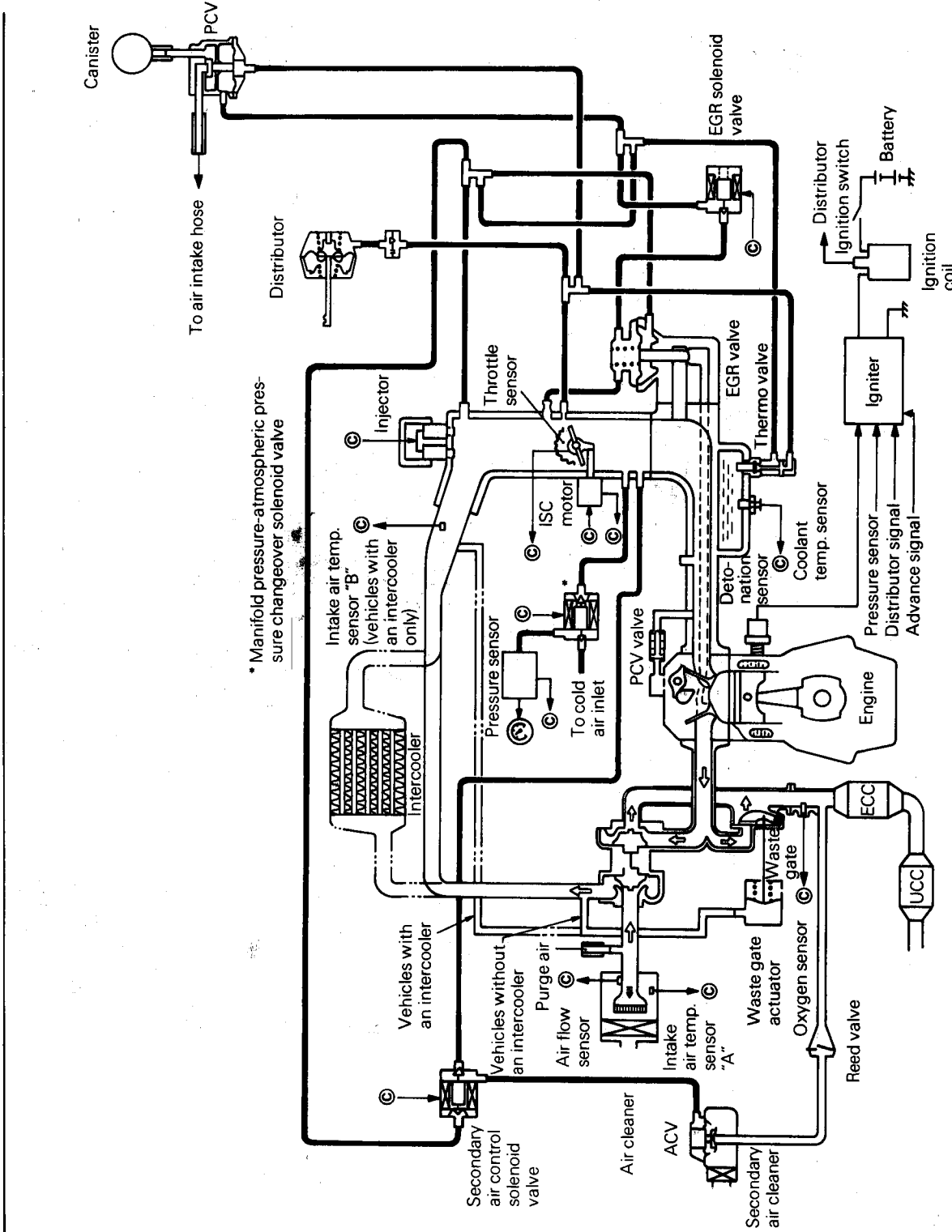
Fuel pump can be operated by connecting the terminals with jumper wires.

1. Connect jumper wires between fuel pump check connector and ground, and check to ensure that operating sound of fuel pump can be heard.
2. When no operating sound can be heard, check for defective connector, wiring, etc.
3. If there is nothing wrong with connector and wiring, disconnect the fuel pump connector at the pump and energize the pump. If pump still falls to operate, replace.



ELECTRONIC CONTROL INJECTION (ECI) SYSTEM

The ECI (Electronic Control Injection) system consists of various kinds of sensors and actuators as well as computer (Electronic Control Unit: ECU) as shown in the system diagram. This system is provided with self-diagnosis function. The ECI system wiring diagram is found at the end of this manual.



©: Electronic Control Unit

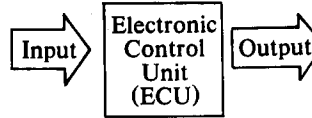
EC1426



COMPONENT SERVICE – ECI SYSTEM

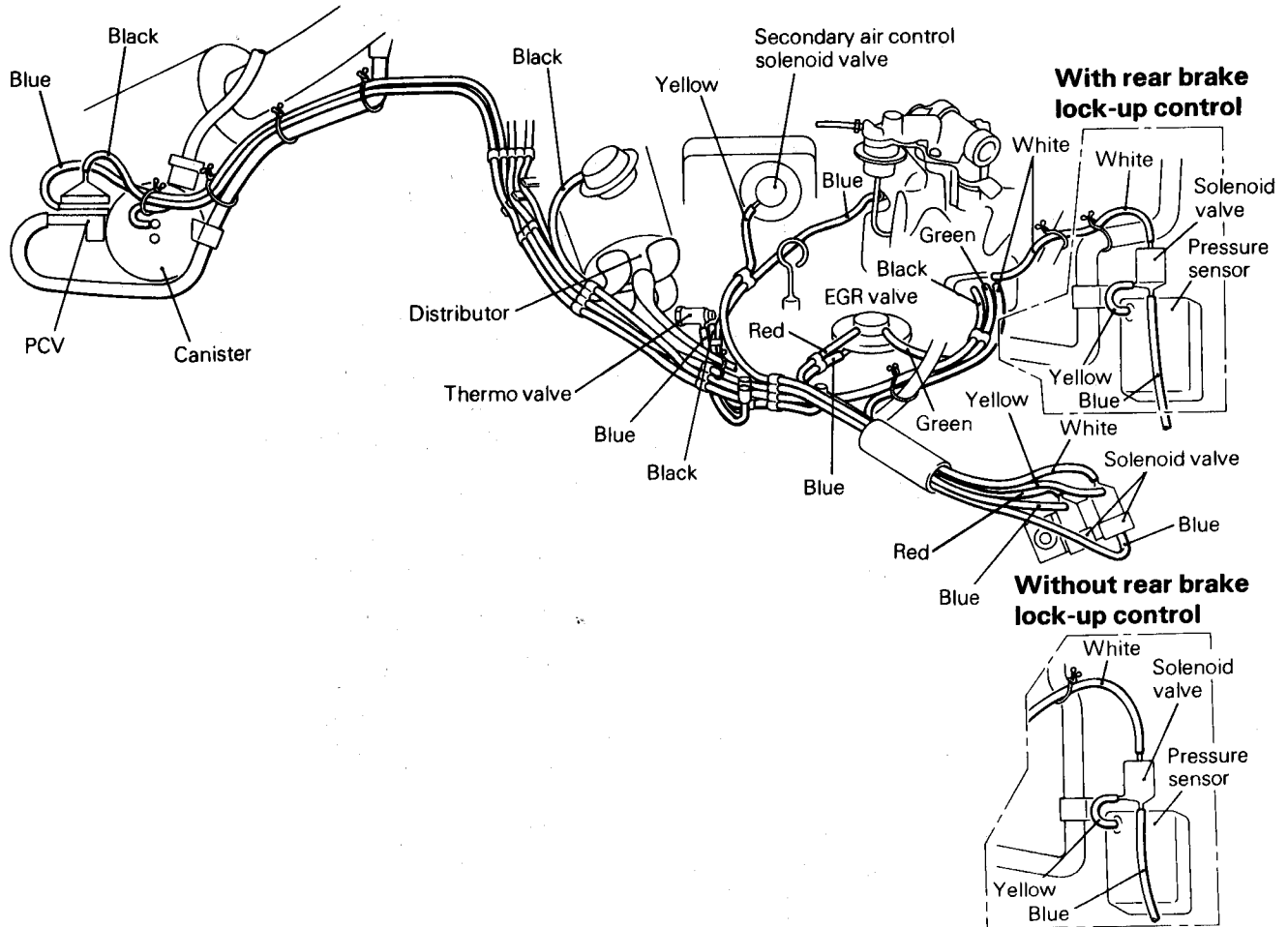
ECU (Electronic Control Unit) Chart

- | | |
|--|---|
| <ul style="list-style-type: none"> • Oxygen sensor • Air flow sensor • Intake air temperature sensor "A" • Coolant temperature sensor • Throttle sensor • Idle switch • Pressure sensor • Intake air temperature sensor "B" (Vehicles with an inter-cooler only) | <ul style="list-style-type: none"> • Engine rpm (⊖ terminal of ignition coil) • Starter S terminal • Power supply voltage • Vehicle speed sensor • Cooler load signal • Inhibitor switch (A/T only) |
|--|---|



- Injector
- EGR solenoid valve
- Secondary air control solenoid valve
- Manifold pressure-atmospheric pressure changeover solenoid valve
- Fuel pump control (Control relay)
- ISC motor
- Advance signals (High altitude/cold)

Vacuum Hose Arrangement



EC1427



SELF-DIAGNOSIS

Self-diagnosis is a system in which the input signal from each sensor is monitored by the computer (ECU) and, should any abnormality happen in the input signal, the abnormal item is memorized by the computer. The diagnosis items are 8 items including that for normal condition and can be confirmed using a voltmeter.

The abnormality-diagnosis memory is kept by direct power supply from the battery. Therefore, the memory of diagnosis result is not erased by turning off the ignition switch. However, it is erased if the back-up power supply is turned off by disconnection of battery cable or ECU connector.

NOTE

The memory is not erased if the power supply is turned on within 10 seconds after turning off the power supply of ECU.

Diagnosis Item

The abnormality-diagnosis items are the following 7 items. If there are two or more items found abnormal, they are indicated in the order of increasing code numbers.

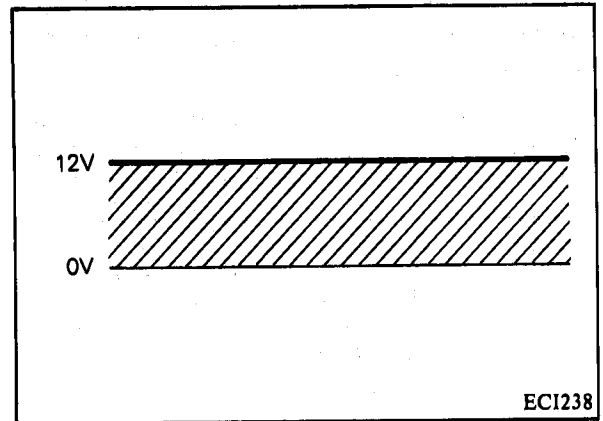
Code No.	Diagnosis item
1	Oxygen sensor & Computer
2	Ignition pulse
3	Air flow sensor
4	Pressure sensor
5	Throttle position sensor
6	ISC motor position switch
7	Coolant temp. sensor



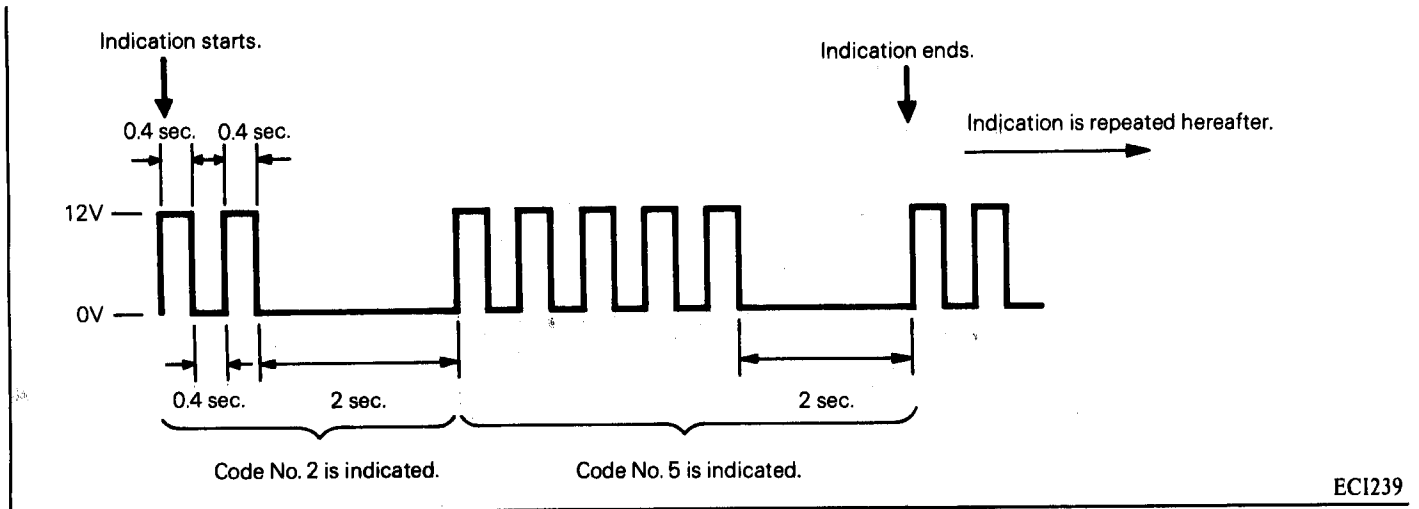
Indication Method

Indication is made by deflection of the pointer of voltmeter.
Connect voltmeter to connector exclusively for diagnosis and the following indication will be made.

1. When normal
Constantly 12V is indicated.



2. When abnormal
Indication alternates between 0V and 12V every 0.4 second.
Engine speed at 12V is indicated. When there are two or more abnormal items, the low-code-numbered item is first indicated. Then, after indication of 0V for 2 seconds, subsequent indication is made in the same manner as mentioned above.
The following diagram shows that codes No. 2 and No. 5 are abnormal.





3. Precautions for operation
 - (a) When battery voltage is low, no detection of abnormality is made. Be sure to check the battery for conditions before starting the test.
 - (b) Diagnosis item is erased if power supply from battery or the ECU connector is disconnected. Do not disconnect power supply from battery before the diagnosis result is completely read.
 - (c) Warm up engine and drive a good distance before oxygen sensor is diagnosed. Do not set ignition switch to OFF after driving. If ignition switch is set to OFF, the result detected by diagnosis is erased.
 - (d) After check and correction are over, disconnect ground cable for 15 seconds or more from negative terminal of battery and connect it again to make sure that abnormal code is erased.

PRECAUTIONS FOR INSTALLATION OF RADIO EQUIPMENT

Although special design considerations are incorporated in the ECU, installation of special radio equipment in the vehicle can affect the ECU. Pay attention to the following points.

1. ECU is located on cowl side (at leg area of front seat passenger). Radio equipment and antenna should be installed on vehicle, spaced as far as possible from ECU.
2. Since radio waves are radiated from coaxial cable of antenna, space coaxial cable as far as possible from ECU and harness. Where coaxial cable has to cross harness, make sure that they cross each other at right angles.
3. Carefully match the antenna and cable to ensure low SWR (Standing Wave Ratio) operation.
4. Do not install large output radio equipment (output of vehicle borne equipment must not exceed 10W).
5. After installation of radio equipment, run engine at idle and emit test radio waves to verify that they do not affect engine operation.



INSPECTION OF ECI SYSTEM

If ECI system components (sensors, ECU, injector, etc.) fail, interruption of fuel supply (injection) or failure to supply proper amount of fuel for engine operating conditions will result. Therefore, the following situations will be encountered.

- (1) Engine is hard to start or does not start at all.
- (2) Unstable idle
- (3) Poor driveability

If any of above conditions is noted, first perform inspection by self-diagnosis and subsequent basic engine checks (ignition system malfunctions, incorrect engine adjustment, etc.), and then inspect the ECI system components.

The ECI system can be checked by use of a voltmeter. Inspection procedure is as follows.

Service Precautions

1. Before battery terminals are disconnected, make sure that ignition switch is set to OFF. If battery terminals are disconnected while engine is running or when ignition switch is in ON position, malfunction of ECU or damage to semi-conductors could result.
2. Disconnect battery cables before charging battery.
3. When battery is reconnected, be sure not to reverse polarity.
4. Make sure that harness connectors are securely connected. Use care not to allow entry of water or oil into connectors.

Inspection Procedure by Self-Diagnosis

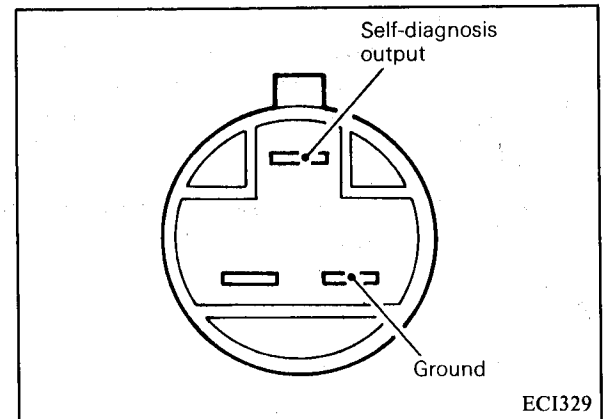
1. Turn ignition switch to OFF.
2. Connect voltmeter between terminals Self-diagnosis output and Ground of connector for diagnosis which is located in engine compartment. (ECI329)
3. Turn ignition switch to ON, and indication of ECU memory contents will immediately start. If the system is in normal condition, pointer of voltmeter constantly indicates 12V.

If any abnormality is in memory, the pointer of voltmeter will deflect, indicating abnormal item as described in "Indication Method". Abnormal item can be known from voltage waveform, that is, the number of pointer deflections shown in the "Diagnosis Chart."

After recording the abnormal item, check and repair each part according to the check items in "Diagnosis Chart."

4. Turn ignition switch to OFF.
5. If the defective parts have been repaired, disconnect ground cable for 15 seconds or more from negative terminal of battery and connect it again to make sure that abnormal code has been erased.

6
4





Diagnosis Chart

Code No.	Diagnosis item	Voltage waveform (abnormal code)	Contents of diagnosis	Check item
1	Oxygen sensor		When oxygen sensor signal dose not change for 20 seconds or more in feedback range of oxygen sensor .	<ul style="list-style-type: none"> ● Wire harness and connector ● Oxygen sensor ● ECU
2	Ignition signal		While cranking the engine, input of ignition signal is not applied to ECU for 3 seconds or more.	<ul style="list-style-type: none"> ● Wire harness and connector ● Igniter ● ECU
3	Air flow sensor		Air flow sensor output is 10 Hz or less while engine is idling, or it is 100 Hz or more when engine stalls.	<ul style="list-style-type: none"> ● Wire harness and connector ● Air flow sensor ● ECU
4	Pressure sensor		Pressure sensor output is 1,460 mmHg (4.5V) or more, or it is 65 mmHg (0.2V) or less.	<ul style="list-style-type: none"> ● Wire harness and connector ● Pressure sensor ● ECU
5	Throttle position sensor		Throttle position sensor output is 0.2V or less, or it is 4V or more while engine is idling (idle switch is ON).	<ul style="list-style-type: none"> ● Wire harness and connector ● Throttle position sensor ● ECU
6	ISC motor position switch		Throttle position sensor output is 0.4V with L switch OFF.	<ul style="list-style-type: none"> ● Wire harness and connector ● ISC servo ● ECU
7	Coolant temperature sensor		Coolant temperature sensor output is 4.5V or more, or it is 0.1V or less.	<ul style="list-style-type: none"> ● Wire harness and connector ● Coolant temperature sensor ● ECU



COMPONENT SERVICE – ECI SYSTEM

Inspection Procedure for ECI System (Vehicles without an intercooler)

With the voltmeter, use the diagram on page 14-32 (drawing ECI195) to identify the pin connectors (terminals). Check the voltage of each terminal as specified in the "Output Signals from Tester". Make sure the ignition switch, vehicle operation and conditions are observed as called out in the procedure.

Output Signals from Tester

Check item	Condition	Voltmeter reading when normal	Terminal location of computer	
Power supply	Ignition switch OFF → ON	11 – 13V	B-1	
Secondary air control solenoid valve	Ignition switch OFF → ST after warming up the engine	After 15 seconds 0 – 0.5V → 13 – 15V	A-10	
Throttle position switch	Ignition switch OFF → ON	Accelerator closed	A-1	
		Accelerator wide opened		4.5 – 5.0V
Coolant temperature sensor	Ignition switch OFF → ON	0°C (32°F)	A-3	
		20°C (68°F)		3.5V
		40°C (104°F)		2.6V
		80°C (176°F)		1.8V
Intake air temperature sensor	Ignition switch OFF → ON	0°C (32°F)	A-4	
		20°C (68°F)		3.5V
		40°C (104°F)		2.6V
		80°C (176°F)		1.8V
Idle position switch	Ignition switch OFF → ON	Accelerator closed	A-5	
		Accelerator wide opened		0 – 0.4V
ISC motor position switch	Ignition switch OFF → ON	11 – 13V *1	A-14	
–	–	–	–	
–	–	–	–	
A/C (Air conditioner) relay	Ignition switch OFF → ON	A/C switch OFF	B-12	
		A/C switch ON		0 – 0.5V
Lead switch for vehicle speed	Start engine, transmission in first and operate vehicle slowly	Flashing 0 – 0.5V ↔ Over 2V	A-15	
–	–	–	–	
Cranking signal	Ignition switch OFF → ST	Over 8V	A-13	
Control relay	Idling	0 – 0.5V	B-5	
–	–	–	–	



Check item	Condition		Voltmeter reading when normal	Terminal location of computer	
Ignition pulse	Idling		12–14V	A-8	
	3,000 rpm		11–13V		
Air flow sensor	Idling		2.7–3.2V	A-7	
	3,000 rpm				
Injector No. 1	Idling		13–15V	B-9	
	3,000 rpm		12–14V		
Injector No. 2	Idling		13–15V	B-10	
	3,000 rpm		12–14V		
Oxygen sensor	Keep 1,300 rpm after warming up the engine		Flashing 0.4–1V ↔ 2.7V	A-6	
EGR control solenoid valve	Keep idling after warming up the engine		13–15V	B-4	
	Raise the engine speed to 3,500 rpm		0–0.5V		
Pressure sensor	Ignition switch OFF → ON		1.5–2.6V	A-17	
	Idling		0.2–1.2V *2		
ISC motor for extension	Idling		0.2V	B-6	
	A/C switch OFF → ON		Momentarily over 6V		
ISC motor for retraction	Idling		0.2V	B-11	
	A/C switch ON → OFF		Momentarily over 6V		
Spark advance signal	Idling	Coolant temp. below 35°C (95°F)	Over 5V	A-12	
		Coolant temp. above 35°C (95°F)	Altitudes below 3,900 ft.		0–0.5V
			Altitudes above 3,900 ft.		Over 5V
Inhibitor switch	Ignition switch OFF → ON	Select lever in “P” or “N”	0–0.5V	A-11	
		Select lever in “D”	11–13V		

NOTE

*1: If ignition switch is turned to ON for 15 seconds or more, the reading drops below 5V momentarily.

*2: The reading rises to 1.5–2.6V every 2 minutes momentarily.

WITHOUT INTERCOOLER



COMPONENT SERVICE — ECI SYSTEM

Inspection Procedure for ECI System (Vehicles with an Intercooler)

With the voltmeter, use the diagram on page 14-33 (drawing ECI361) to identify the pin connectors (terminals). Check the voltage of each terminal as specified in the "Output Signals from Tester". Make sure the ignition switch, vehicle operation and conditions are observed as called out in the procedure.

Output Signals from Tester

Check item	Condition	Voltmeter reading when normal	Terminal location of computer	
Power supply	Ignition switch OFF → ON	11 – 13V <i>12.59</i>	B-1	
Secondary air control solenoid valve	Restart the engine after warming up	After 15 secs. 0 – 0.5V → 13 – 15V	A-23	
Throttle position sensor	Ignition switch OFF → ON	Accelerator closed	0.4 – 1.5V <i>.73 7.00V .33</i>	A-15
		Accelerator wide opened	4.5 – 5.0V <i>4.99</i>	
Coolant temperature sensor	Ignition switch OFF → ON	0°C (32°F)	3.5V	A-6
		20°C (68°F)	2.6V	
		40°C (104°F)	1.8V <i>1.44V</i>	
		80°C (176°F)	0.6V	
Intake air temperature sensor "A"	Ignition switch OFF → ON	0°C (32°F)	3.5V	A-5
		20°C (68°F)	2.6V <i>2.33V</i>	
		40°C (104°F)	1.8V	
		80°C (176°F)	0.6V	
Idle position switch	Ignition switch OFF → ON	Accelerator closed	0 – 0.5V <i>.03</i>	A-7
		Accelerator opened	11 – 13V <i>12.6</i>	
ISC motor position switch (MPS)	Ignition switch OFF → ON	11 – 13V *1 <i>12.3</i>	A-8	
–	–	–	–	
–	–	–	–	
A/C relay *2	Ignition switch OFF → ON	A/C switch OFF	0 – 0.5V <i>0</i>	B-6
		A/C switch ON	11 – 13V <i>10.92</i>	
Lead switch for vehicle speed	Start engine, transmission in first or D and operate vehicle slowly	0 – 0.5V ↑ Pulsates Over 2V	A-19	
–	–	–	–	

WITH INTERCOOLER

COMPONENT SERVICE — ECI SYSTEM



Check item	Condition		Voltmeter reading when normal	Terminal location of computer	
Cranking signal	Ignition switch OFF → ON		Over 8V ✓	B-5	
Control relay	Idling		0–0.5V .12	A-22	
–	–		–	–	
Ignition pulse	Idling		12–14V 12.78	A-1	
	3,000 rpm		11–13V 12.32		
Air flow sensor	Idling		2.7–3.2V 3.0	A-2	
	3,000 rpm		2.96		
Injector No. 1	Idling		13–15V 13.9	B-10	
	3,000 rpm		12–14V 13.55		
Injector No. 2	Idling		13–15V 13.9	B-12	
	3,000 rpm		12–14V 13.67		
Oxygen sensor	Keep 1,300 rpm after warming up the engine		0.4–1V ↑ Pulsates 2.7V .27 NO PULSE	A-11 <i>THE CHECK RE CHECKED</i>	
EGR control solenoid valve	Keep idling after warming up the engine		13–15V 13.82	B-4	
	Raise the engine speed 3,500 rpm		0–0.5V .14		
Pressure sensor	Ignition switch OFF → ON		1.5–2.6V 2.35	A-9	
	Idling		0.2–1.2V *3 .77 ✓		
ISC motor for extension	Idling		0–2V 13.72	B-9 ←	
	Idling A/C switch OFF → ON		Momentarily Over 6V		
ISC motor for retraction	Idling		0–2V 13.95	B-11 ←	
	Idling A/C switch ON → OFF		Momentarily Over 6V		
Spark advance signal	Idling	Coolant temp. below 35°C (95°F)	Over 5V	A-12	
		Coolant temp. above 35°C (95°F)	Altitudes below 3,900 ft.		0–0.5V .05
			Altitudes above 3,900 ft.		Over 5V
Intake air temperature sensor "B"	Ignition switch OFF → ON	0°C (32°F)	3.5V	A-17	
		20°C (68°F)	2.6V 1.93V		
		40°C (104°F)	1.8V		
		80°C (176°F)	0.6V		

NOTE

- *1: If ignition switch is turned to ON for 15 seconds or more, the reading drops below 5V momentarily.
- *2: A/C stands for air conditioner.
- *3: The reading rises to 1.5–2.6V every 2 minutes momentarily.



Electronic Control Unit (ECU)

If ECU appears defective, perform all ECI Checker tests and individual sensor tests. If everything is in order, replace ECU.

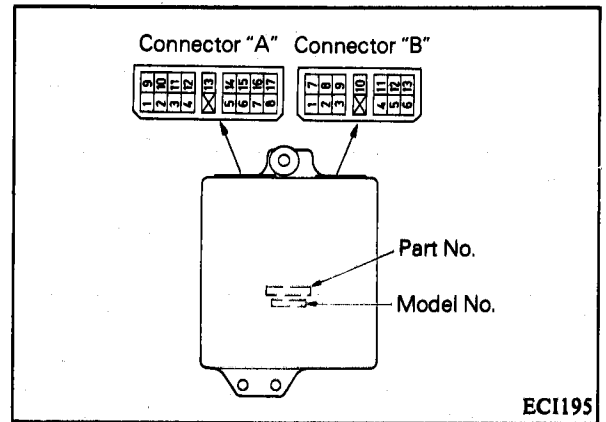
VEHICLES WITHOUT AN INTERCOOLER

Connector "A"

- A1: Throttle position sensor output
- A2: Sensor power supply (5V)
- A3: Coolant temperature sensor (+)
- A4: Intake air temperature sensor (+)
- A5: Idle position switch (+)
- A6: Oxygen sensor
- A7: Air flow sensor output
- A8: Ignition coil (-) terminal
- A9: Sensor ground
- A10: Secondary air control solenoid valve
- A11: Inhibitor switch (A/T only)
- A12: ESC igniter
- A13: Ignition switch (ST) terminal (cranking signal)
- A14: MPS1
- A15: Vehicle speed (0 km/h)
- A16: Diagnosis (output)
- A17: Pressure sensor output

Connector "B"

- B1: Battery
- B2: Ground
- B3: Ground
- B4: EGR control solenoid valve (-)
- B5: Fuel pump relay
- B6: ISC servo motor (Extension) (+)
- B7: Battery
- B8: Pressure sensor solenoid valve
- B9: Injector No. 1 (-)
- B10: Injector No. 2 (-)
- B11: ISC servo motor (Retraction) (+)
- B12: A/C relay
- B13: Battery backup





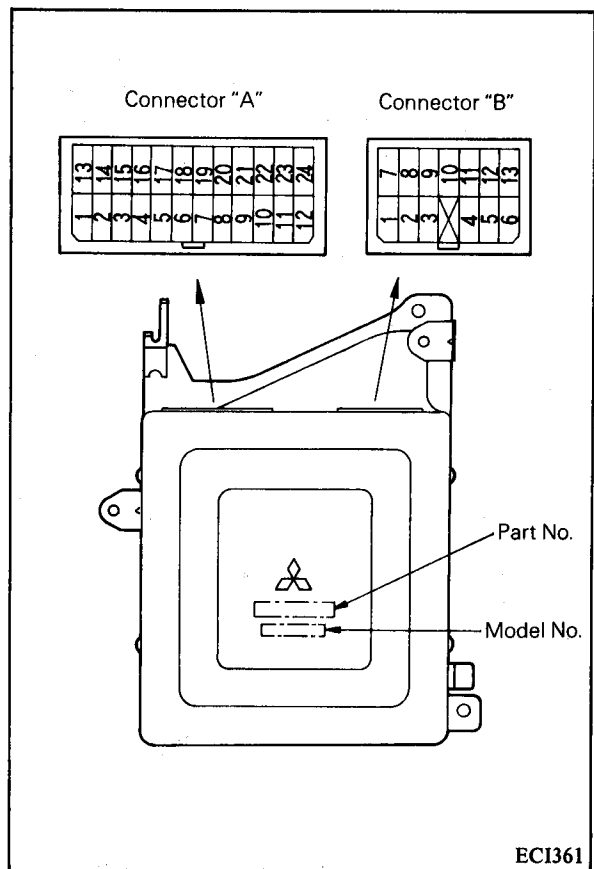
VEHICLES WITH AN INTERCOOLER

Connector "A"

- A1: Ignition coil (-) terminal
- A2: Air flow sensor output
- A3: -
- A4: Sensor ground
- A5: Intake air temperature sensor "A" (+)
- A6: Coolant temperature sensor (+)
- A7: Idle position switch (+)
- A8: MPS 1
- A9: Pressure sensor output
- A10: Sensor power supply (5V)
- A11: Oxygen sensor
- A12: Igniter output
- A13: -
- A14: -
- A15: Throttle position sensor output
- A16: -
- A17: Intake air temperature sensor "B" (+)
- A18: -
- A19: Vehicle speed (0 km/h)
- A20: -
- A21: Diagnosis (output)
- A22: Fuel pump relay
- A23: Secondary air control solenoid valve
- A24: Pressure sensor solenoid valve

Connector "B"

- B1: Battery
- B2: Ground
- B3: Ground
- B4: EGR control solenoid valve (-)
- B5: Ignition switch (ST) terminal (cranking signal)
- B6: A/C relay
- B7: Battery
- B8: Inhibitor switch
- B9: ISC servo motor (Extension) (+)
- B10: Injector No. 1 (-)
- B11: ISC servo motor (Retraction) (+)
- B12: Injector No. 2 (-)
- B13: Battery backup



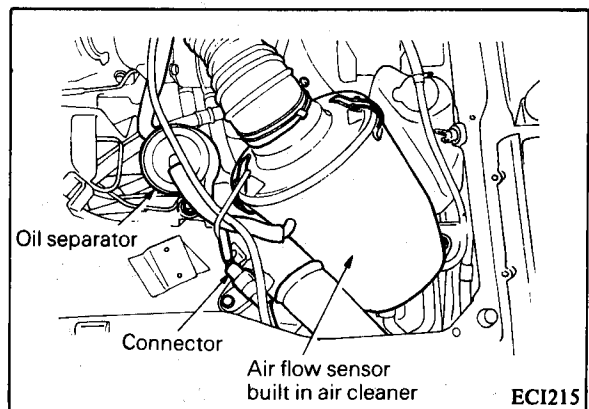
AIR FLOW SENSOR (AFS)

Removal

1. Disconnect air flow sensor connector.
2. Unsnap finger clip, and then remove air cleaner cover.
3. Remove filler from air cleaner body.
4. Remove air flow sensor.

Caution

Be sure to disconnect the air flow sensor connector before removing the air cleaner cover and air cleaner body.





Inspection

Check the following and replace if defective:

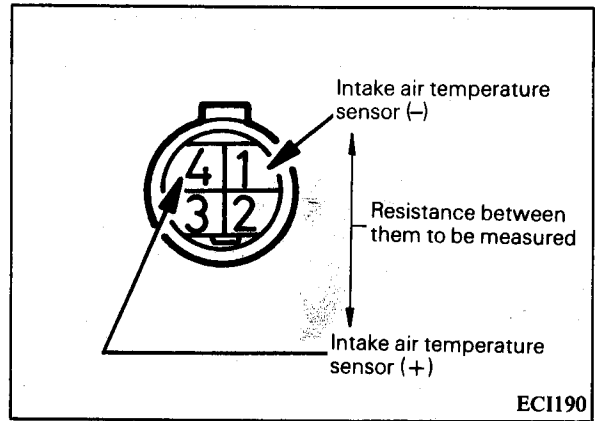
1. Check air cleaner element for contamination and damage.
2. Check air cleaner case and cover for damage and cracks.
3. For inspection of air flow sensor and intake air temperature sensor, refer to Section on "Inspection of ECI System"
4. Check the intake air temperature sensor by measuring the resistance.

Resistance 2.5 Ω at 20°C (68°F)

Installation

Reverse the removal procedure, paying attention to the following items.

1. Make sure that air flow sensor connector is securely connected.



X INTAKE AIR TEMPERATURE SENSOR "B"

The intake air temperature sensor "B" is mounted on the air intake pipe.

Inspection

1. Disconnect the harness connector of intake air temperature sensor.
2. Check resistance across terminals in connector of sensor.

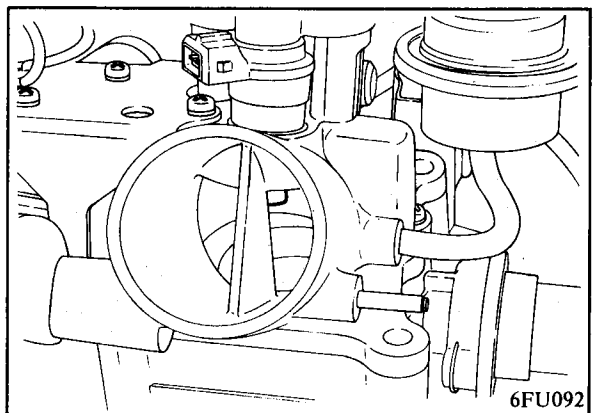
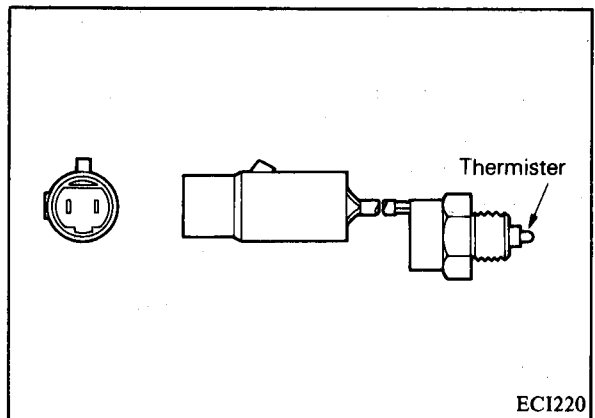
Resistance 2.45 kΩ at 20°C (68°F) ^{2,3}

3. If resistance is abnormally small or large, sensor is short- or open-circuited. Therefore, replace sensor.
4. Fasten harness connector of sensor firmly.

INSPECTION – ON VEHICLE

Fuel Injection Test

1. Set ignition switch to "OFF".
2. Disconnect high tension cable from ignition coil.
3. Remove air intake pipe from air intake port of injection mixer to make visual inspection of injection condition.
4. Check to ensure that when ignition switch is placed to "ST" position, injection from each injector is in good condition.
5. Check to ensure that after ignition switch has been set to "OFF", there is no fuel leakage from nozzle of injectors.
6. Reconnect high tension cable to ignition coil.





✕ **Continuity Test of Injector Coil**

1. Set ignition switch to "OFF".
2. Disconnect connectors from injectors.
3. Check injector coil for continuity with a circuit tester (ohm range).

If resistance is 0 Ω or abnormally large, short or open circuit is in coil. Therefore, replace injector.

Injector coil resistance 2–3 Ω

4. Reconnect connectors to injectors.

2.85
2.7

✕ **Idle Switch Test**

1. Set ignition switch to "OFF".
2. Disconnect connector of ISC servo.
3. Check for continuity with a circuit tester (ohm range) between pole "2" and injection mixer body.
4. If there is continuity when throttle valve is placed in idle position and if there is no continuity when throttle valve is opened (to the extent that lever leaves idle switch), then switch is good.

If there is continuity when throttle valve is in either condition, the contacts are bound together. If there is no continuity with throttle valve in either condition, grounding is defective. Therefore, replace ISC servo assembly.

5. Reconnect ISC servo connector.

✕ **ISC Servo Test** *SEEMS OK*

1. Connect voltmeter between terminal "3" and injection mixer body. Do not disconnect ISC servo connector.

NOTE

Use voltmeter which has good response.

2. Set ignition switch to "OFF" and then to "ON". While keeping it in "ON" position for more than 15 seconds, note the needle of voltmeter. If voltmeter needle indicates 11 to 13V with ignition switch set to "ON" and, after momentary indication of 1V or less, it returns to indicate about 6 to 13V, ISC servo and position switch are operating normally.
3. Turn ignition switch to "OFF" and remove voltmeter.

➔ **Continuity Test of ISC Servo Motor**

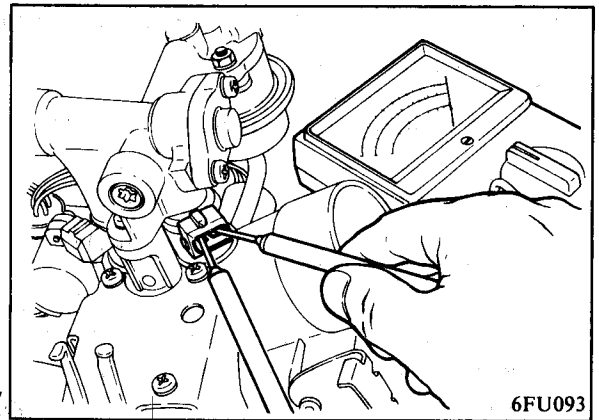
1. Set ignition switch to "OFF".
2. Disconnect connector of ISC servo.
3. Check motor coil for continuity with a circuit tester (ohm range) between terminals "1" and "4". (ECI303)

If resistance is 0 Ω or abnormally large, open or short circuit is in motor coil. Therefore, replace ISC servo assembly.

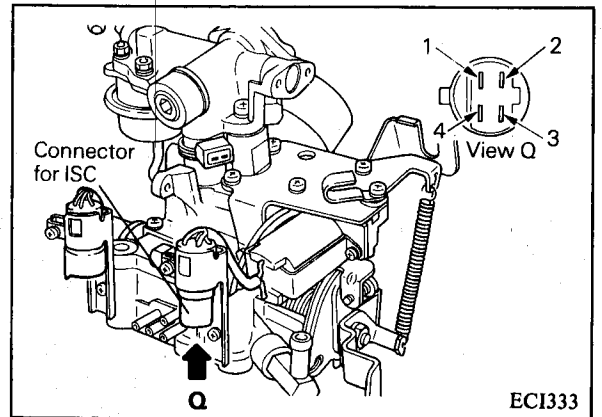
ISC servo motor resistance 7–10 Ω

20.4

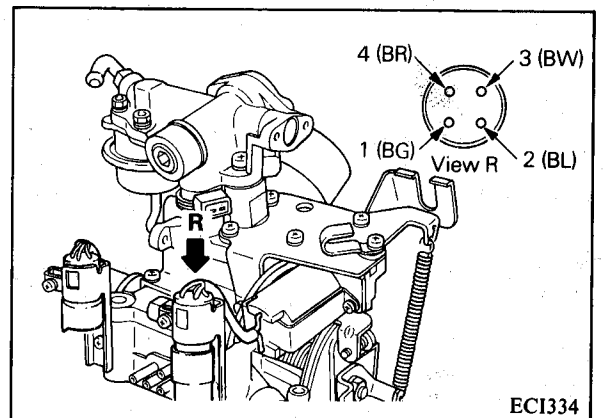
4. Make sure that there is no continuity between "1" or "4" and injection mixer body. If there is continuity, short circuit is in coil. Therefore, replace ISC servo assembly.



6FU093



ECI333

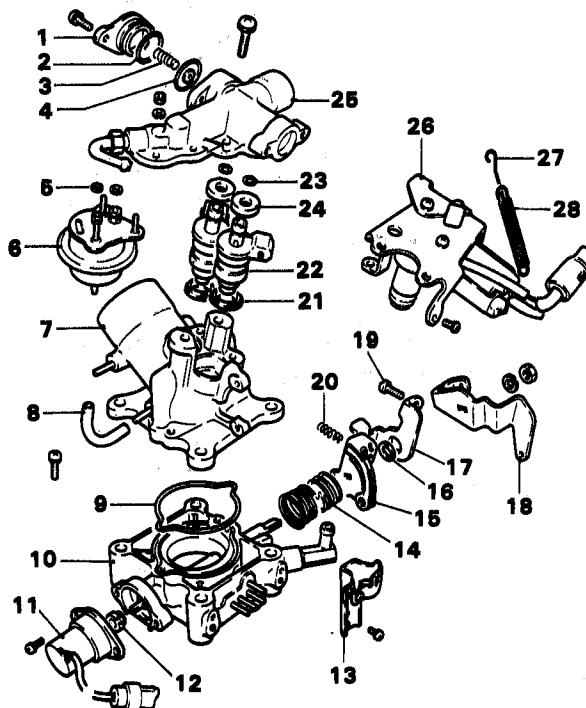


ECI334

*ISC SERVO
HIGH RESISTANCE*

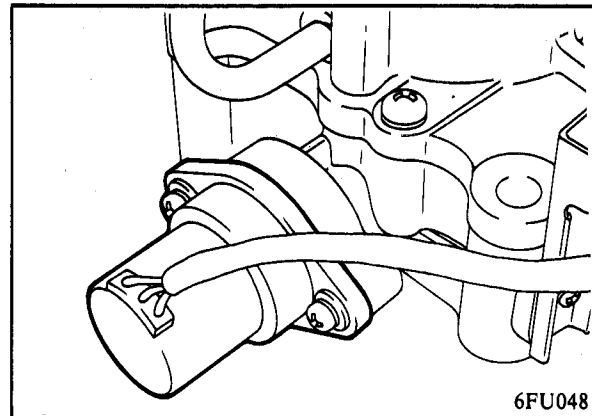


- | | |
|------------------------------|------------------------|
| 1. Pulsation damper cover | 21. Seal ring (2) |
| 2. O-ring | 22. Injector (2) |
| 3. Spring | 23. Collar (2) |
| 4. Pulsation damper | 24. O-ring (2) |
| 5. O-ring (2) | 25. Injector holder |
| 6. Fuel pressure regulator | 26. ISC servo assembly |
| 7. Mixing body | 27. Damper spring |
| 8. Hose | 28. Return spring |
| 9. Seal ring | |
| 10. Throttle body assembly | |
| 11. Throttle position sensor | |
| 12. Joint | |
| 13. Connector bracket | |
| 14. Return spring | |
| 15. Throttle lever | |
| 16. Ring | |
| 17. Free lever | |
| 18. Kickdown lever | |
| 19. Adjusting screw | |
| 20. Spring | |



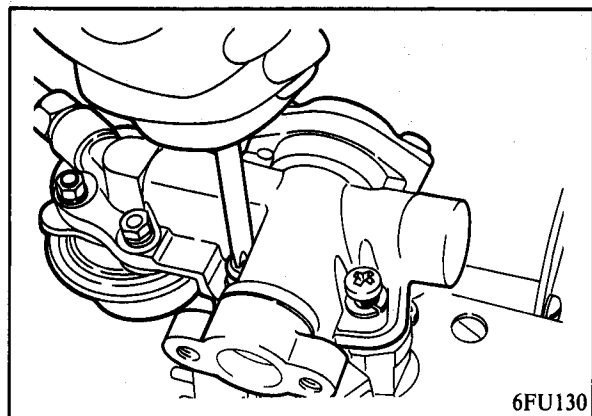
6FU074

1. Remove the throttle position sensor.
2. Disconnect the rubber hose from the fuel pressure regulator and the mixing body.



6FU048

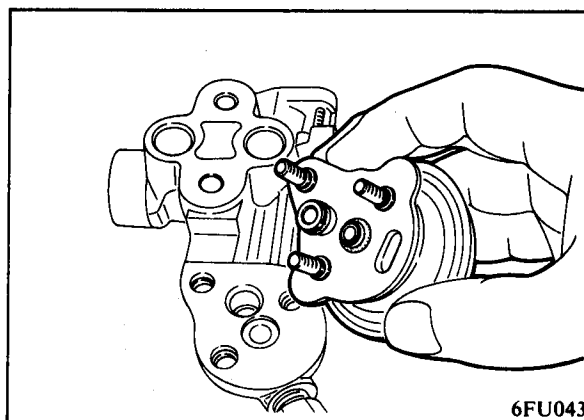
3. Remove the injector retainer screws and remove the retainer. (6FU130)



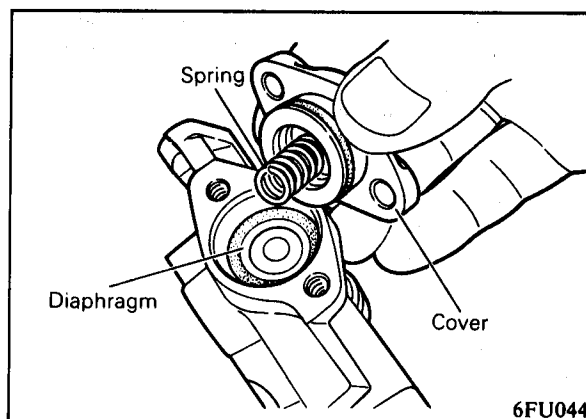
6FU130



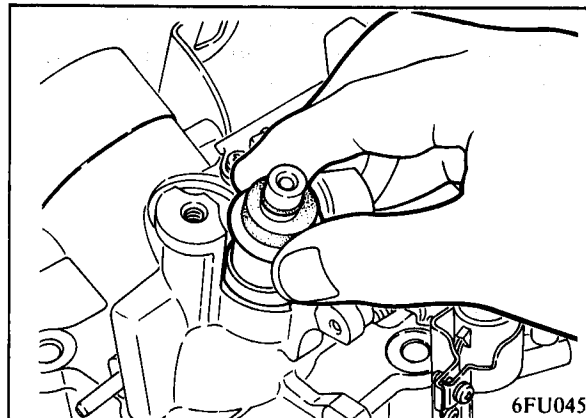
4. Remove the fuel pressure regulator from the retainer.



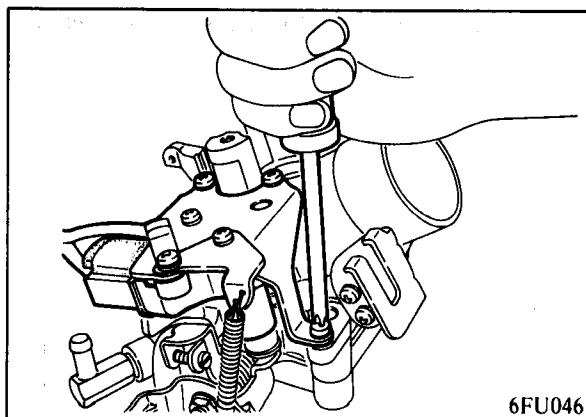
5. Remove the pulsation damper cover from the retainer, and then take out the spring and diaphragm.



6. Remove the injectors from mixing body. Do not grip the injectors with pliers. Then remove the gaskets from the body.

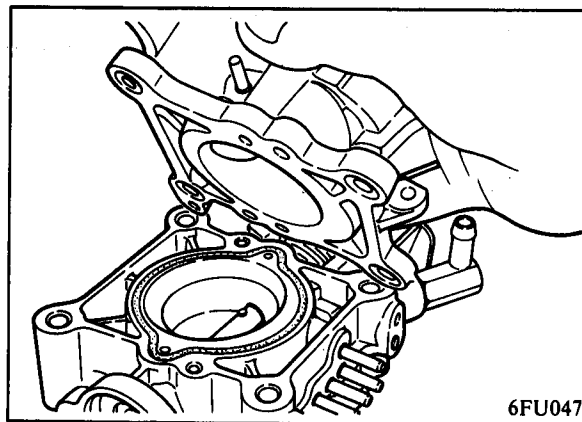


7. Remove the throttle return spring and the damper spring.
8. Remove the connector bracket.
9. Remove the ISC servo mounting bracket retaining bolts and remove ISC servo and bracket.





10. Remove the two screws and then remove the mixing body and seal ring from throttle body.



Reassembly

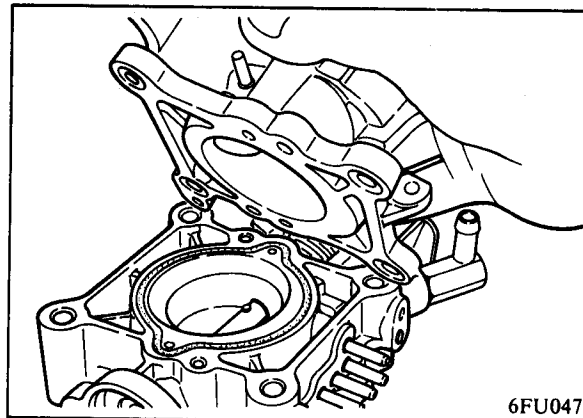
1. Clean all parts. Do not immerse following parts in cleaning solvent.
 - Throttle position sensor
 - Variable resistor
 - ISC servo

Immersing these parts will damage insulation. Wipe these parts with a cloth only.

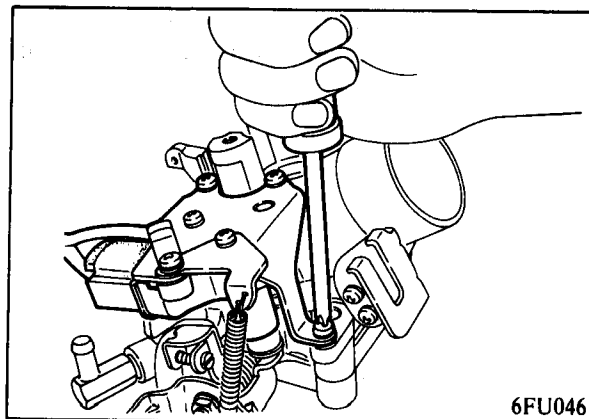
To clean injectors and fuel pressure regulator, seal up fuel inlet and outlet with sealing tape and clean in cleaning solvent.

Check vacuum port of passage for cloggage. Clean the vacuum passage and fuel passage with compressed air.

2. Install the new seal ring into the groove of the throttle body.
3. Install the mixing body onto the throttle body and tighten the screws securely.

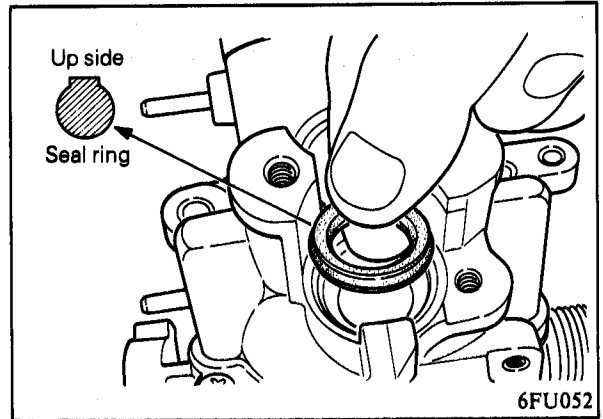


4. Install the ISC servo and bracket, and tighten the screws firmly.
5. Install the connector bracket to the throttle body, and clamp the ISC connector into the bracket.
6. Install the throttle return spring and damper spring.





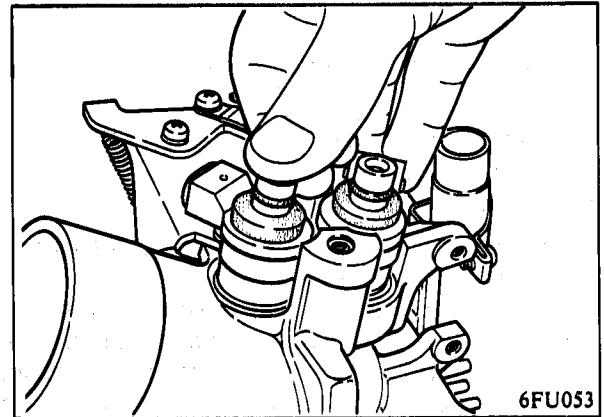
7. Insert the new seal rings into the mixing body. When installing the seal ring, be sure to install with the flat face side up.



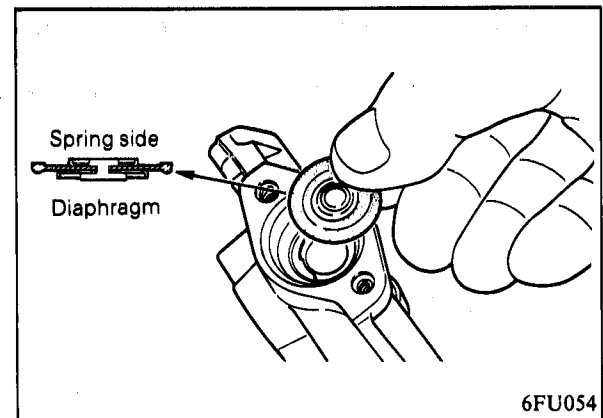
8. Install the new O-ring onto the injectors.
9. Install the injectors into mixing body. Push the injector down firmly with finger. The injector has its identification mark stamped on the body. For this injection mixer, use the injector with "H" mark.

Example:  H 4 1 - 1

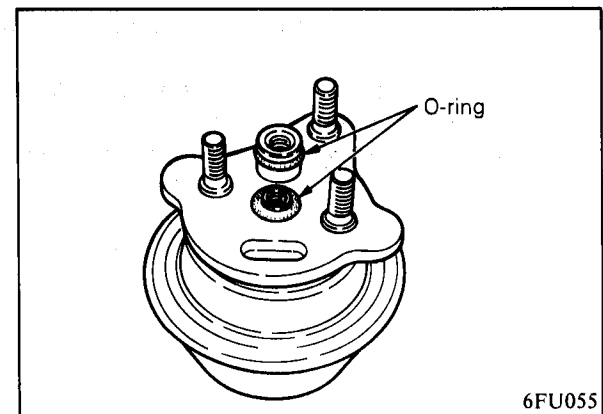
Identification mark



10. Insert the pulsation damper diaphragm into the injector retainer. (6FU054)
11. Install the pulsation damper spring and cover, and then tighten the screws. (6FU043)

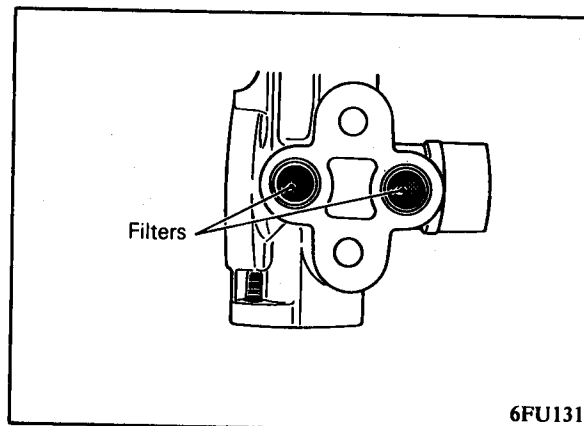


12. Install the new O-rings onto the regulator, and then install the fuel pressure regulator to the injector retainer.



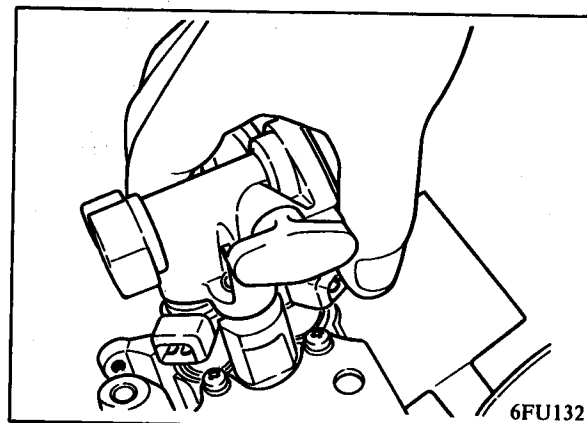


13. Check the filters in the retainer for obstructions or damage.
Replace as necessary.

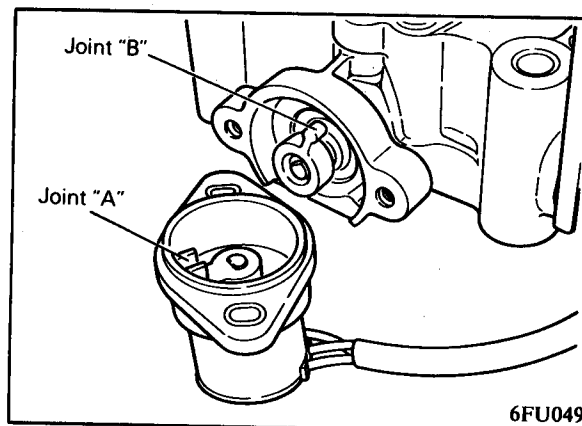


14. Install the injector retainer and push down firmly. (6FU132)
Gradually and alternately tighten the screws and finally tighten to the specified torque.

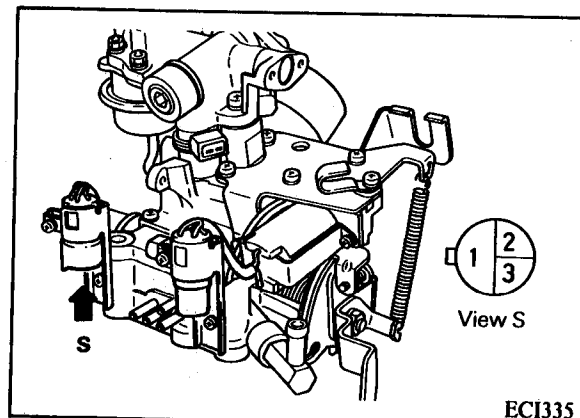
Injector holder tightening screws
4–5.5 Nm (3–4 ft.lbs.)



15. Insert joint “A” of throttle position sensor to joint “B” and install the throttle position sensor to the throttle body. Then temporarily tighten screws. After installing the injection mixer assembly to the engine, adjust the throttle position sensor.
16. Clamp the connector into the bracket.



17. Check for proper installation of the throttle position sensor. Measure the resistance value between terminals 1 and 2 or 2 and 3 while moving the throttle lever to open or close.
If the resistance value changes as the throttle lever is moved, the throttle position sensor is properly installed.





Installation

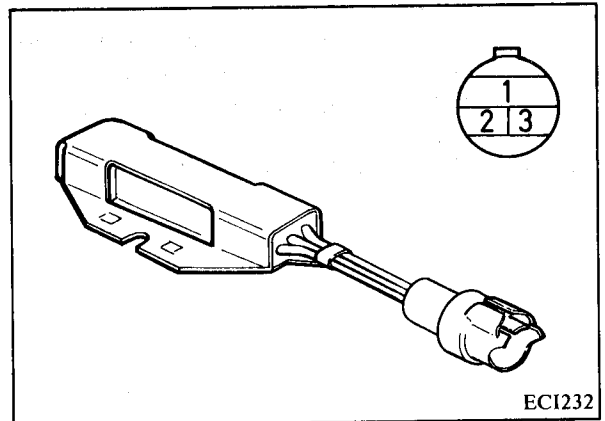
1. Clean both gasket surfaces of injection mixer and intake manifold.
2. Install new injection mixer gasket on intake manifold.
3. Install injection mixer assembly on intake manifold and tighten mounting bolts to specified torque.

Injection mixer mounting bolts
 15 – 19.5 Nm (11 – 14 ft.lbs.)

4. Install new O-ring into groove of high-pressure hose and connect high-pressure hose to injection mixer. Then tighten high-pressure hose mounting bolts firmly.
5. Connect fuel return hose to nipple of fuel pressure regulator and set hose clamp.
6. Connect all harness connectors to connectors of injectors, ISC servo and sensors.
7. Connect vacuum hoses to nipples “A”, “D”, “E” and “M” of injection mixer.
8. Connect water hose to nipple of injection mixer.
9. Install air intake pipe.
10. Refill cooling system.
11. Connect ground cable to battery.
12. Adjust the ISC servo and throttle position sensor setting.
13. Connect accelerator cable to throttle lever of injection mixer and adjust accelerator pedal free play.
14. Run engine and check for fuel and water leaks.

RESISTOR

The resistor is mounted on the left side of fireboard.



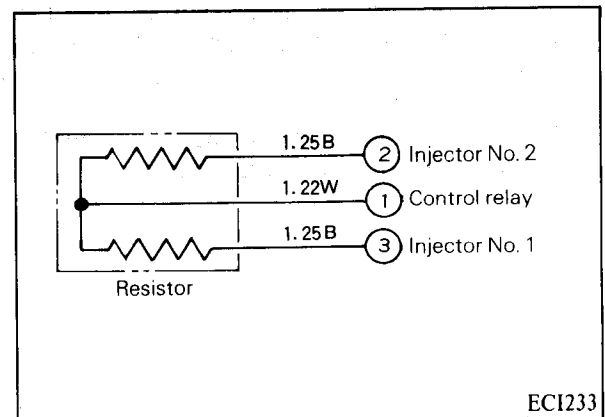
ECI232

Inspection

1. Disconnect resistor harness connector.
2. Measure resistance across terminals 1 and 2 and across terminals 1 and 3.

Resistance 6 Ω

3. If resistance is 0 Ω or abnormally large, resistor is short- or open-circuited. Therefore, replace resistor.
4. Fasten resistor connector firmly.



ECI233

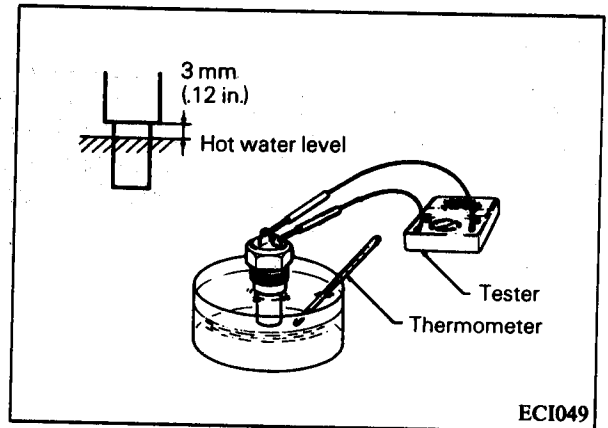


COOLANT TEMPERATURE SENSOR

Inspection

1. Remove coolant temperature sensor from the intake manifold.
2. With temperature sensing portion of coolant temperature sensor immersed in hot water, check resistance. The sensor should be held with its housing 3 mm (.12 in.) away from the surface of the hot water.

Resistance 0.69k 2.45 kΩ at 20°C (68°F)
 296 Ω at 80°C (176°F)



Installation

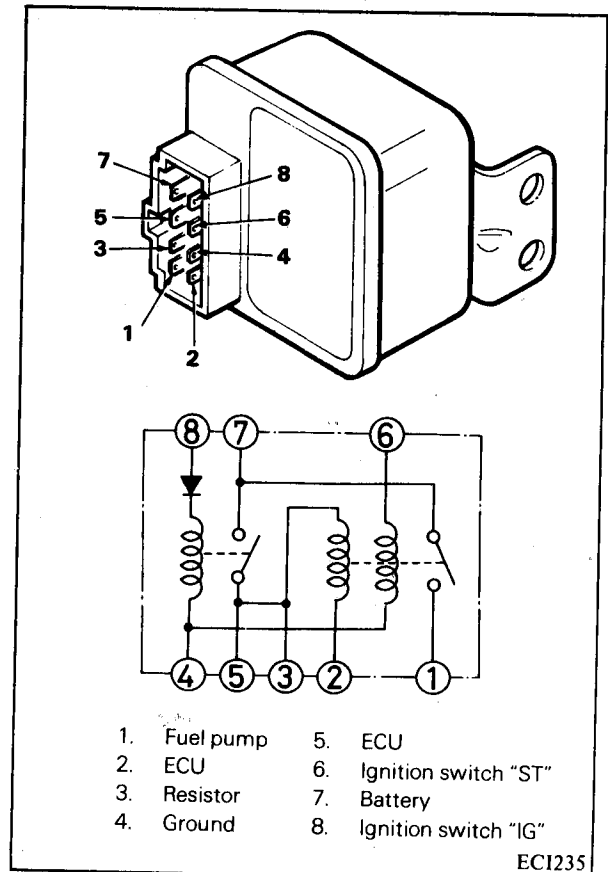
1. Apply sealant to threaded portion.
2. Install coolant temperature sensor and tighten it to specified torque.

Sensor tightening torque 30 Nm (21 ft.lbs.)

3. Fasten harness connectors securely.

CONTROL RELAY

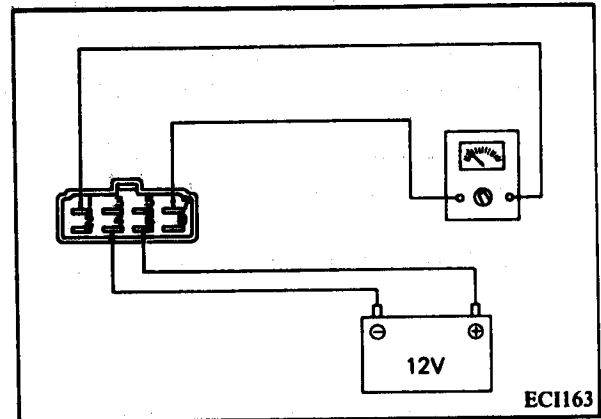
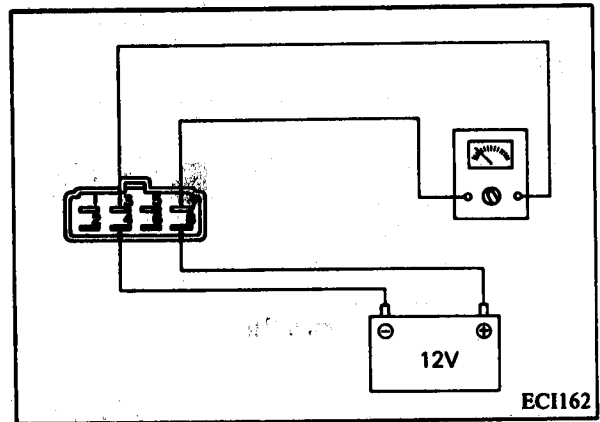
The control relay is mounted above the ECU (under air duct of instrument panel).





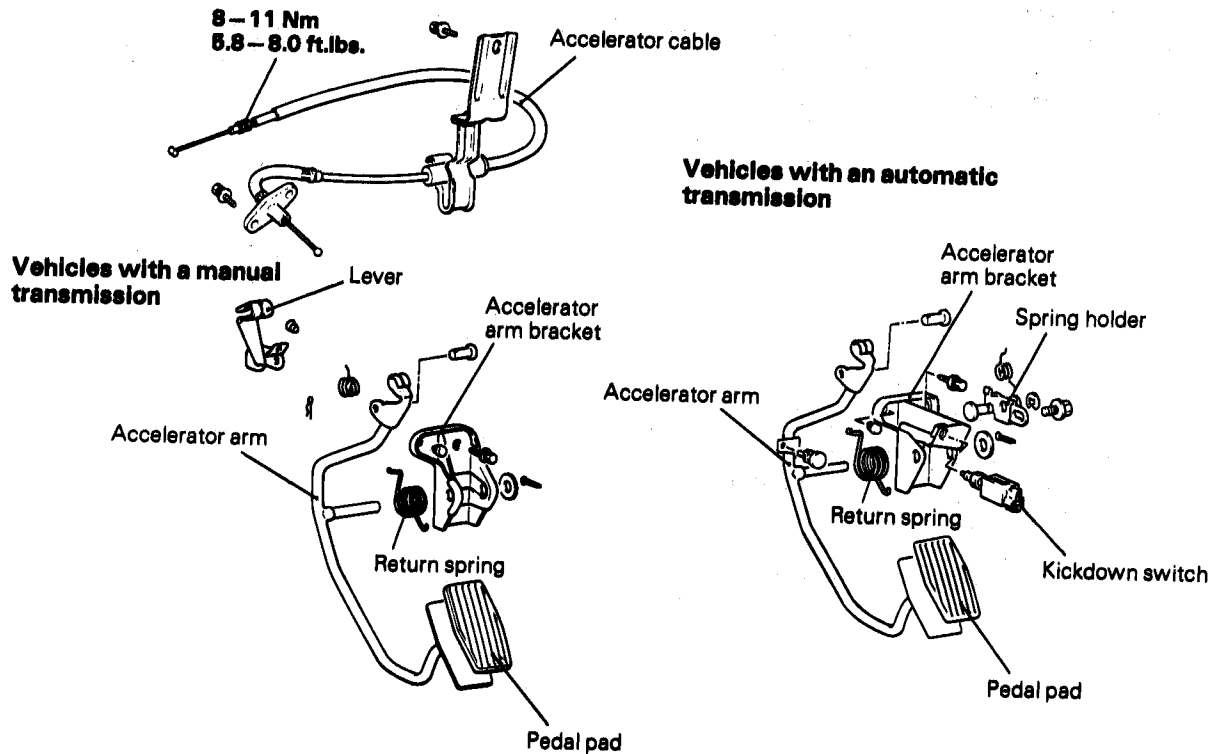
Inspection

1. Test continuity between terminals 1 and 7 and between terminals 3 and 7. If there is no continuity, control relay is good. If there is continuity, replace control relay.
2. Apply 12V across terminals 8 and 4 while testing continuity between terminals 3 and 7. If there is continuity, control relay is good.
3. Apply 12V across terminals 6 and 4 while testing continuity between terminals 1 and 7. If there is continuity, control relay is good. Similarly, apply 12V across terminals 5 and 2 while testing continuity between terminals 1 and 7. If there is continuity, control relay is good.





COMPONENTS

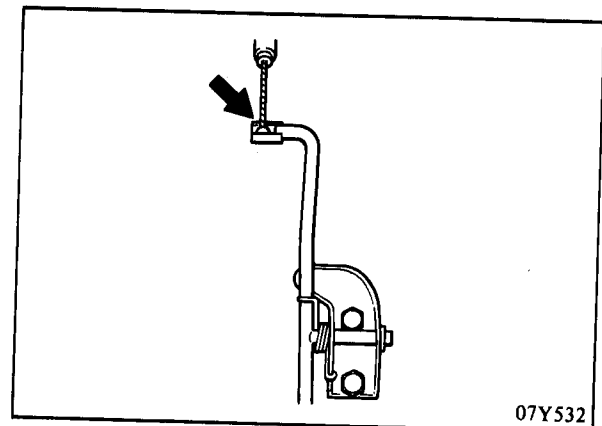
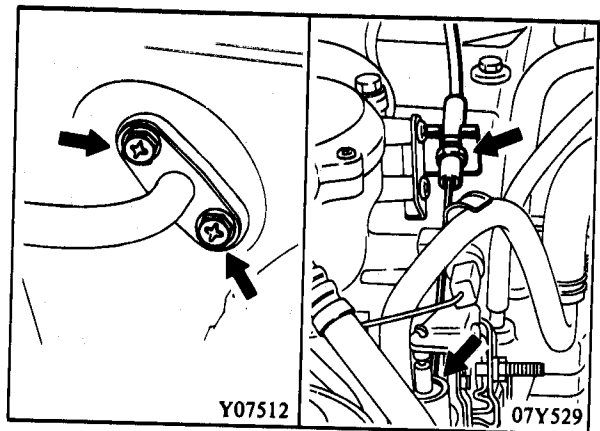


07Y554

REMOVAL

Accelerator Cable

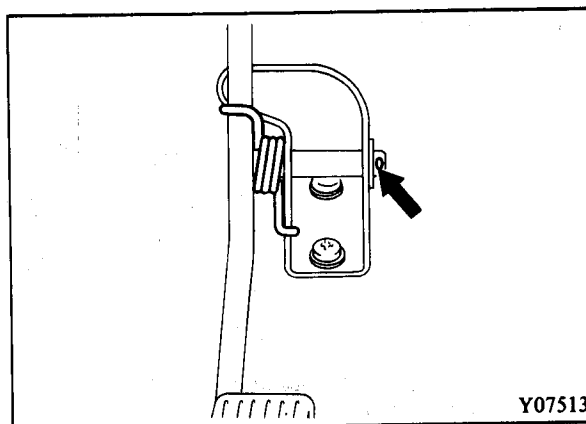
1. Remove the bolts which hold the accelerator cable guide to the toeboard within the engine compartment. (Y07512)
2. Loosen the adjusting nut, and then disconnect the accelerator cable from the injection mixer. (07Y529)
3. Disconnect the accelerator cable from the end of the accelerator arm, and then take the cable out toward the engine compartment.





Accelerator Pedal

1. Loosen the adjusting nut and disconnect the accelerator cable from the pedal.
2. Remove the return spring from the accelerator arm.
3. Remove the cotter pin from the accelerator pedal shaft, and remove the accelerator pedal assembly. (Y07513)



INSPECTION

1. Check the accelerator cable for damage.
2. Check the cable outer casing for damage.
3. Check the cable for roughness in movement.
4. Check the accelerator arm for bending.
5. Check the return spring for deterioration.
6. Check the kickdown switch for operation.

INSTALLATION

1. Apply specified multipurpose grease and drying-type sealant to the specified positions. (07Y552)

Specified grease
MOPAR Multi-Mileage Lubricant
Part Number 2525035 or equivalent

2. Eliminate sharp bends from the accelerator cable.
3. Adjust the free play of the accelerator cable. (Refer to P. 14-11.)

