FUEL INJECTION SYSTEM

2-7

SUBARU

1988

MECHANISM AND FUNCTION

General

The Multi Point Fuel Injection (MPFI) system is a system that supplies the optimum air-fuel mixture to the engine for all the various operating conditions through the use of the latest electronic technology.

With this system fuel, which is pressurized at a constant pressure, is injected into the intake air passage of the cylinder head. The injection quantity of fuel is controlled by an intermittent injection system where the electro-magnetic injection valve (fuel injector) opens only for a short period of time, depending on the quantity of air required for one cycle of operation. In actual operation, the injection quantity is determined by the duration of an electric pulse applied to the fuel injector and this permits simple, yet highly precise metering of the fuel.

Further, all the operating conditions of the engine are converted into electric signals, and this results in additional features of the system, such as large improved adaptability, easier addition of compensating element, etc. The MPFI system also has the following features:

1) Reduced emission of harmful exhaust gases.
2) Reduced in fuel consumption.
3) Increased engine output.
4) Superior acceleration and deceleration.
5) Superior startability and warm-up performance in cold weather since compensation is made for coolant and intake air temperature.

Air Flow Meter

The MPFI system employs a hot-wire type air flow meter.

This air flow meter converts the amount of air taken into the engine into an electric signal by utilizing the heat transfer phenomenon between the incoming air and a heating resistor (hot wire) located in the air intake.

The features of this flow meter type are as follows:

1) High-altitude compensation is made automatically.
2) Quick response.
3) There are no moving parts.
4) It is compact.

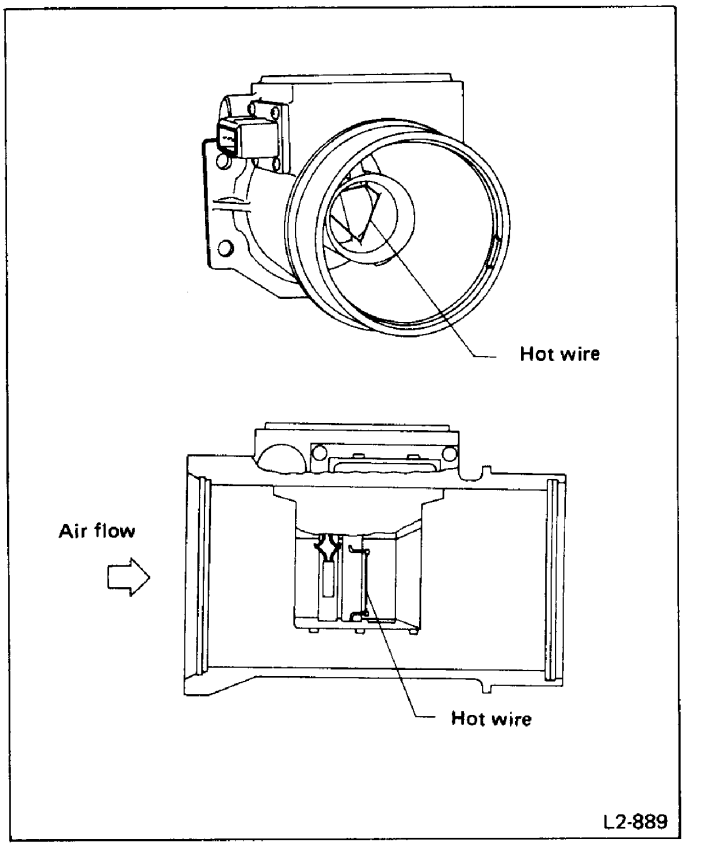


Fig. 1

Throttle Body

In response to the depressing stroke of the throttle pedal, the throttle body opens/closes its valve to regulate the air volume to be taken in the combustion chamber. Negative pressure (positive pressure at supercharging) generated according to the opening of the throttle valve is applied to the pressure port for canister purge. This pressure is used for controlling canister purge.

1800 cc model

During idling, the throttle valve is almost fully closed and the air flow through the throttle body is less than that passing through the carburetor. More than half of the air necessary for idling is supplied to the intake manifold via the idle bypass passage.

Turning the idle adjust screw on the idle bypass passage can change the air flow to adjust the number of revolutions in idling. Further, to prevent the number of revolutions from decreasing while the air conditioner is turned on, the fast idle bypass passage is provided which has the valve operated by the fast idle solenoid.

The fast idle engine rpm can be adjusted by turning the fast idle adjusting screw.

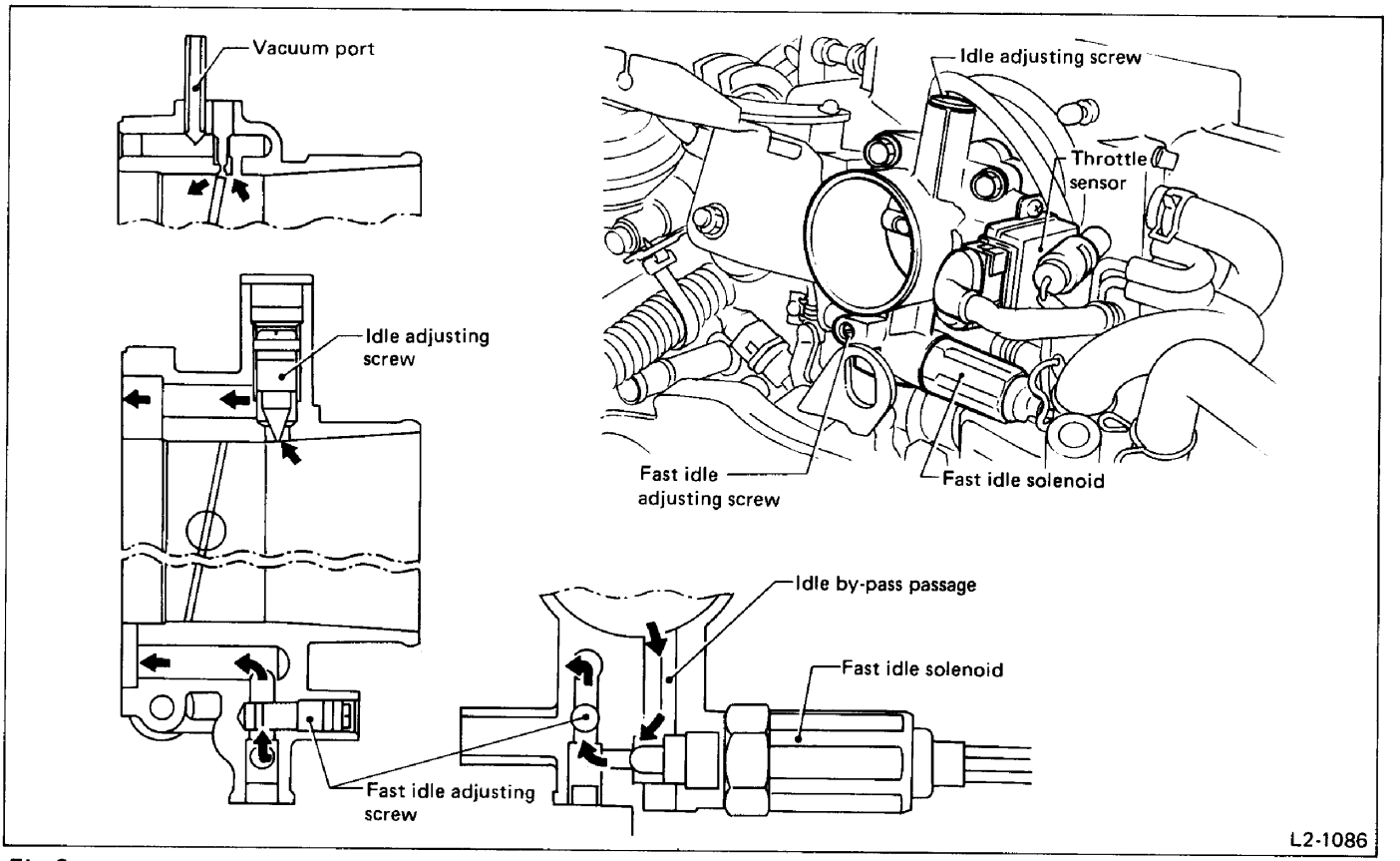


Fig. 2

2700 cc model

During idling, the throttle valve is almost fully closed and the air flow through the throttle body is less than that passing through the carburetor.
More than half of the air necessary for idling is supplied to the intake manifold via the by-pass air control valve.
And the by-pass air control valve properly controls the number of revolutions in idling, so it does not need to be adjusted.

THROTTLE SENSOR SYSTEM

A throttle position sensor is provided with a potentiometer and idle switch interlocked with the throttle valve shaft is utilized.

This throttle position sensor sends the MPFI control unit a potentiometer output signal corresponding to the opening of the throttle valve and an idle switch signal that turns ON only when the throttle is opened nearly to the idle position.

Using these signals, the MPFI control unit precisely controls the air-fuel ratio during acceleration and deceleration as well as idling.

1800 cc model

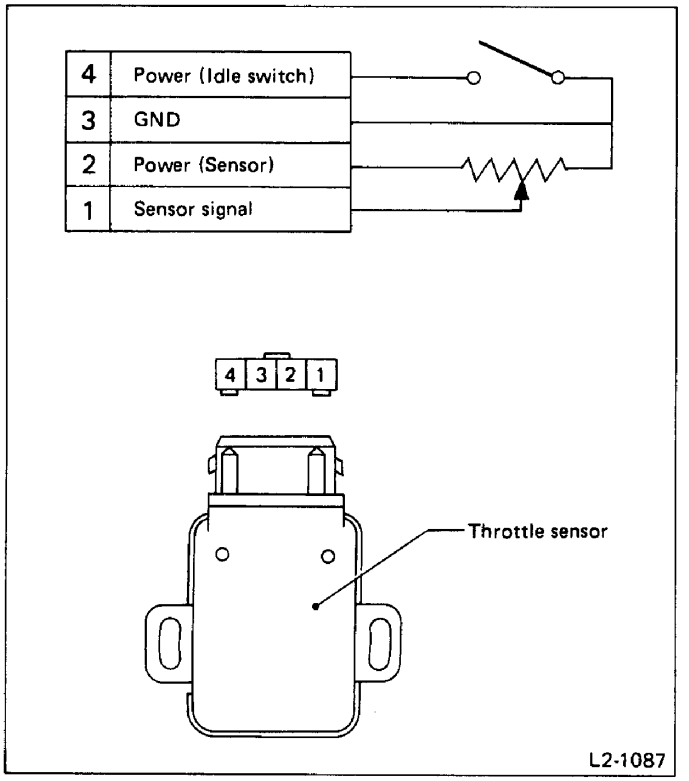


Fig. 3

2700 cc model

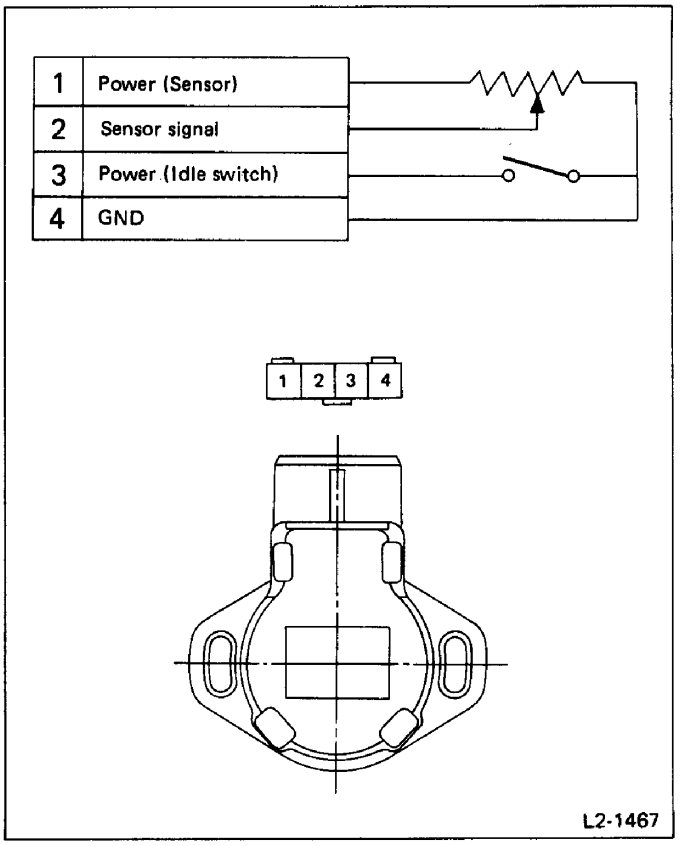


Fig. 4

By-pass Air Control Valve

(2700 cc model only)

The by-pass air control valve is regulated by a signal transmitted from the MPFI control unit. It finely controls the flowrate of air passing through the by-pass passage, allowing the engine to run at optimum speed under various conditions. This in turn results in stabilized exhaust gas emission, improved fuel economy and better performance.

1) The by-pass passage opens partially while the engine idles. When the engine is loaded (the air conditioner is turned ON, for example), the by-pass passage opens wider to let more air pass through. This maintains specified engine idling rpm.

2) When the engine is cold, the by-pass passage opens widely to allow more air to pass through. This speeds engine warm-up.

3) Variations in engine idling rpm over time and/or among products (= engines) are compensated for.

4) When the throttle valve closes (= dashpot function), a sudden drop in engine rpm is prevented to improve driving performance.

a. When battery voltage drops momentarily, the by-pass valve sometimes activates to increase idling speed to 900 rpm. This is not a problem.

b. Before the engine is warmed up [coolant temperature: above 80°C (176°F)], idling speed between the N or P range and the D range sometimes differs. However, this is not a problem because it assists in rapidly warming up the engine.

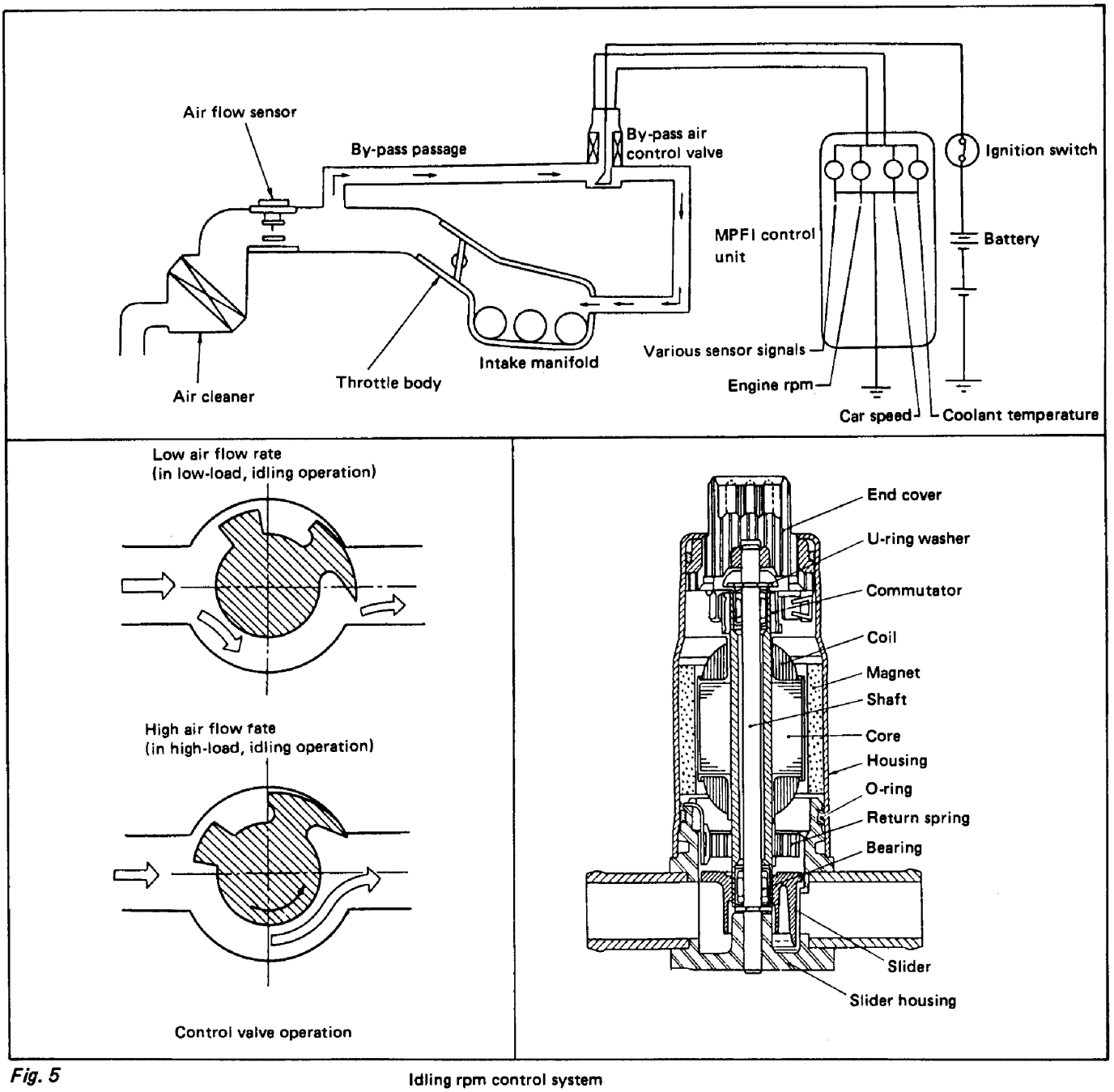


Fig. 5 Idling rpm control system

Auxiliary Air Valve

(1800 cc model only)

The auxiliary air valve is used to increase air flow when the engine is started up at a low temperature and the following warmup is performed. It consists of the coiled bimetal, the bimetal-operated shutter valve, and the electric heater element for bimetal. The passing air flow (at start-up) is increased as the temperature becomes lower. After start-up of the engine, the heating is performed by the heater to which current is supplied from the fuel pump relay circuit. Thereby, the shutter valve turns gradually to decrease the air flow. After a certain elapsed time, the shutter valve is closed.

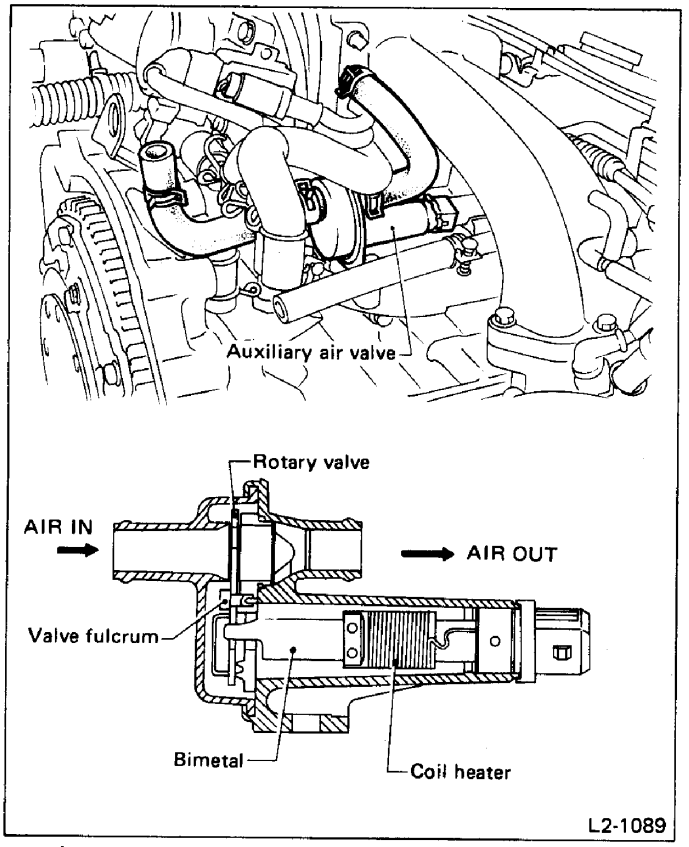


Fig. 6

Ignition System

The ignition system is composed of a battery, an ignition coil, a distributor, spark plugs, knock sensor, MPFI control unit and wires.

The crank angle sensor built-in distributor detects the reference crank angle and the positioned crank angle. Electronic signal of both angles is transmitted to MPFI control unit which is used in common by fuel injection system.

The MPFI control unit calculates the spark advance angle and determines the spark timing.

The electronic signal of spark timing determined by control unit is transmitted to the power transistor where it makes the primary circuit to ignition coil, whereby high voltage current is generated in the secondary circuit.

The high voltage of secondary circuit is distributed to the spark plug of each cylinder and discharged there.

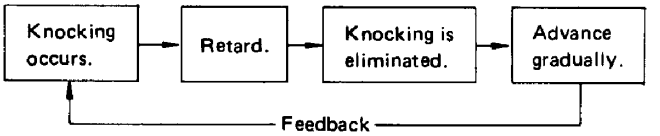
UNDER NORMAL OPERATING CONDITIONS

The spark advance angle is calculated from the following three factors.

1) Engine speed compensation.
2) Advance when starting the engine.
3) Advance in all driving conditions except starting the engine, after engine speed exceeds the present value.

WHEN KNOCKING OCCURS (2700 cc model only)

A signal is transmitted from the knock sensor to the MPFI control unit. The MPFI control unit then retards spark timing to prevent engine knocking.



1800 cc model

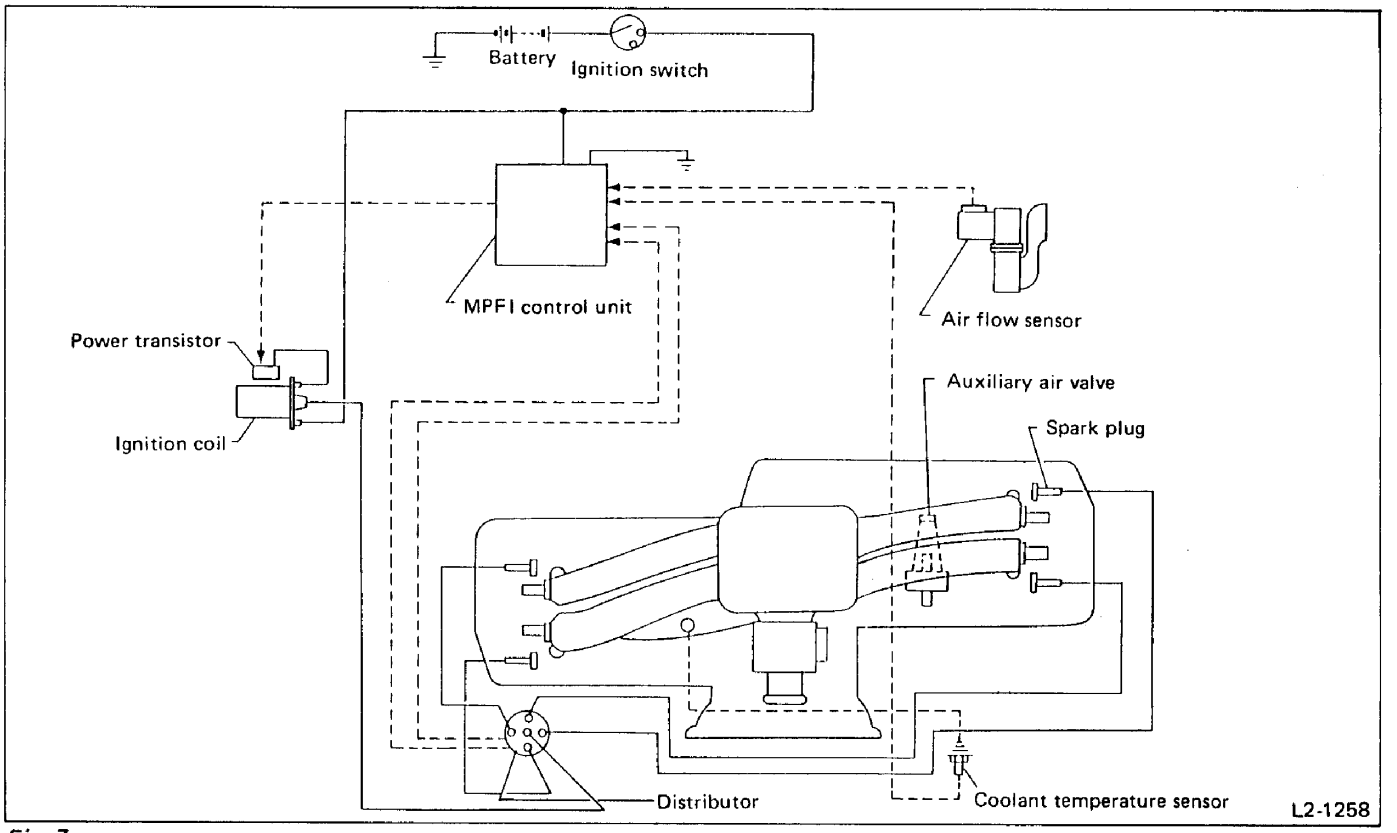


Fig. 7

2700 cc model

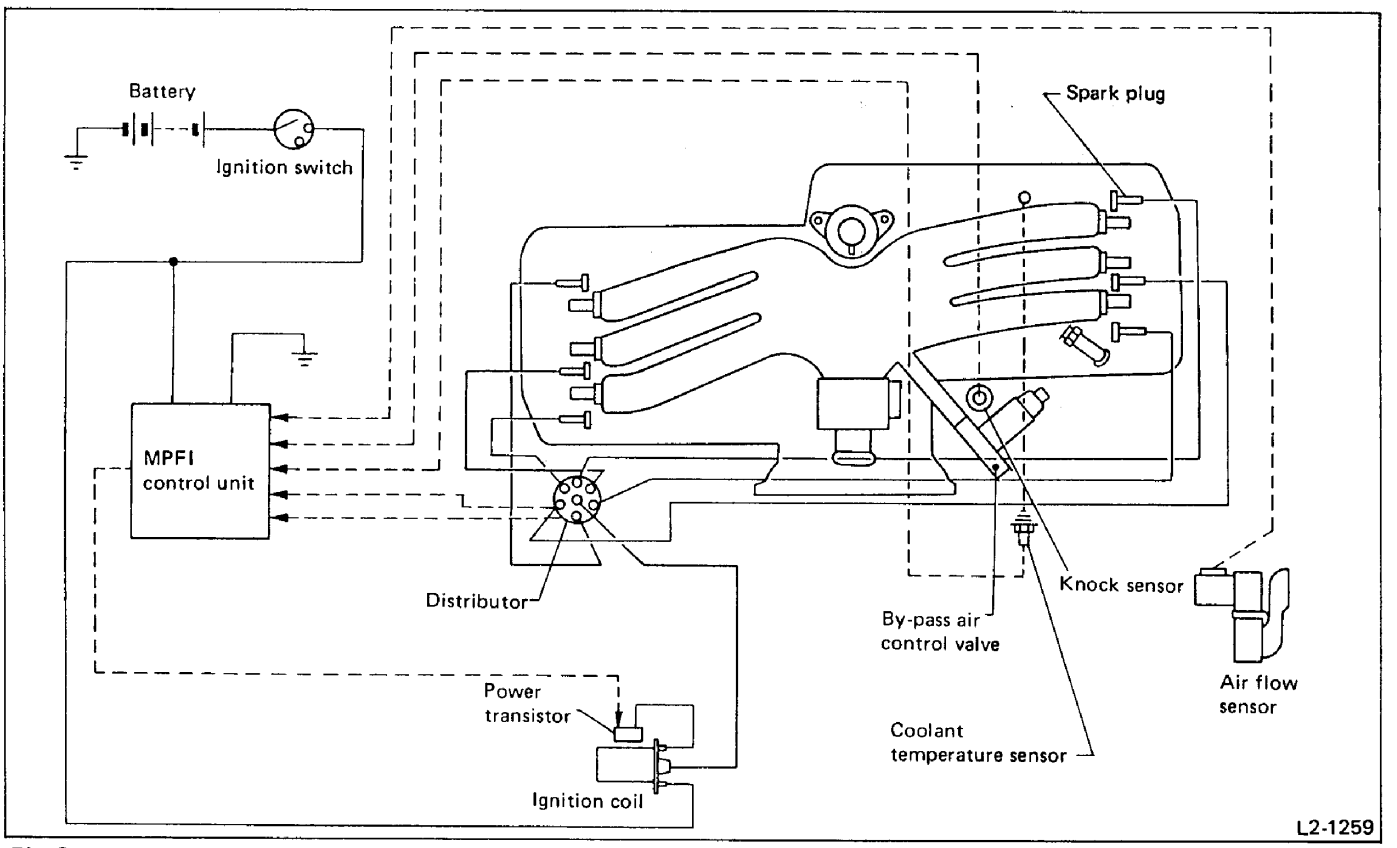


Fig. 8

KNOCK SENSOR (2700 cc model only)

The knock sensor is installed on the cylinder block, and senses knocking signals from each cylinder.
This knock sensor is a piezo-electric type which converts knocking vibrations into electric signals.
It consists of a piezo-electric element, weight, and case.
If knocking occurs in the engine, the weight in the case moves causing the piezo-electric element to generate a voltage.

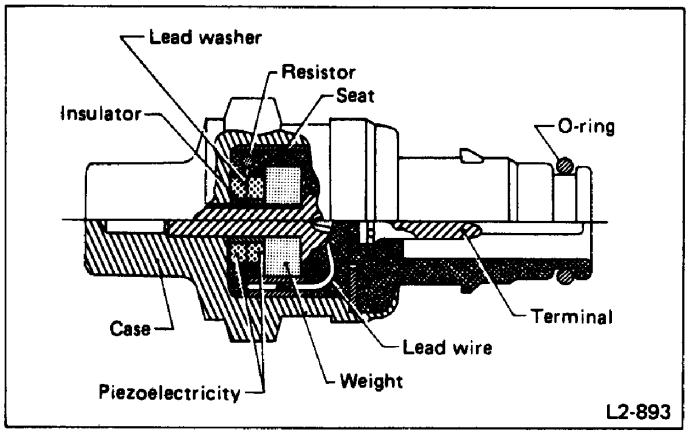


Fig. 9

Air-Fuel Ratio Learning Control System

This system has been developed to stabilize the quality of the hot-wire type air flow meter and fuel injector and to maintain their original performance by correcting their qualitative variation and aging.
By learning the feedback control amount of the O_2 sensor, the system controls the control unit to automatically set a coefficient of correction; thereby, the fuel injector always achieves fuel injection under the optimum condition.

O_2 Sensor

The O_2 sensor is mounted on the center exhaust pipe between the turbocharger and the rear exhaust pipe. It is used to sense oxygen concentration in the exhaust gas. If the fuel ratio is leaner than the stoichiometric ratio in the mixture (i.e. excessive amount of air), the exhaust gas contains more oxygen. To the contrary, if the fuel ratio is richer than the stoichiometric ratio, the exhaust gas hardly contains oxygen.
Therefore, examination of the oxygen concentration in exhaust gas makes it possible to show whether the air/fuel ratio is leaner or richer than the stoichiometric ratio.
The O_2 sensor has a zirconia tube (ceramic) which generates voltage if there is a difference in oxygen concentration between the inside and outside of the tube. Platinum is coated on the inside and outside of the zirconia tube for the purpose of catalysis and electrode provision. The hexagon screw on the outside is grounded to the exhaust pipe, and the inside is connected to the MPFI control unit through the harness.

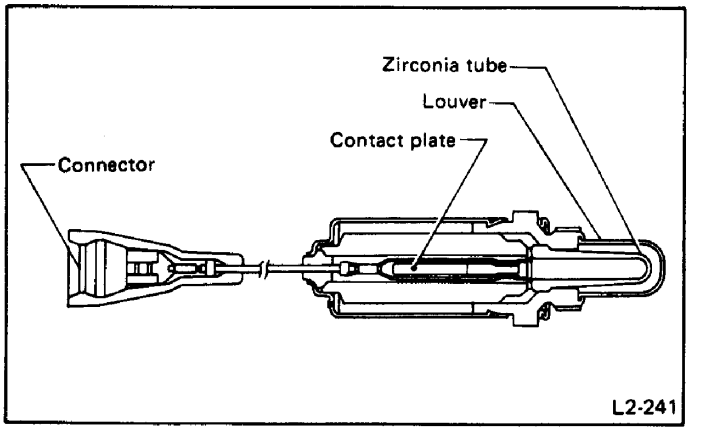


Fig. 10

When rich air-fuel mixture is burnt in the cylinder, the oxygen in the exhaust gases reacts almost completely through the catalytic action of the platinum coating on the surface of the zirconia tube. This results in very large difference in the oxygen concentration between the inside and outside, and the electromotive force generated is large.
When a lean air-fuel mixture is burnt in the cylinder, oxygen remains in the exhaust gases even after the catalytic action, and this results in small difference in the oxygen concentration. The electromotive force is very small.

The difference in oxygen concentration changes greatly in the vicinity of the optimum air-fuel ratio, and hence the change in the electromotive force is also large. By inputting this information into the MPFI control unit, the air-fuel ratio of the supplied mixture can be determined easily. The O_2 sensor does not generate much electromotive force when the temperature is low. The characteristics of the electromotive force stabilize at temperatures of approximately 300 to 400°C (572 to 752°F).

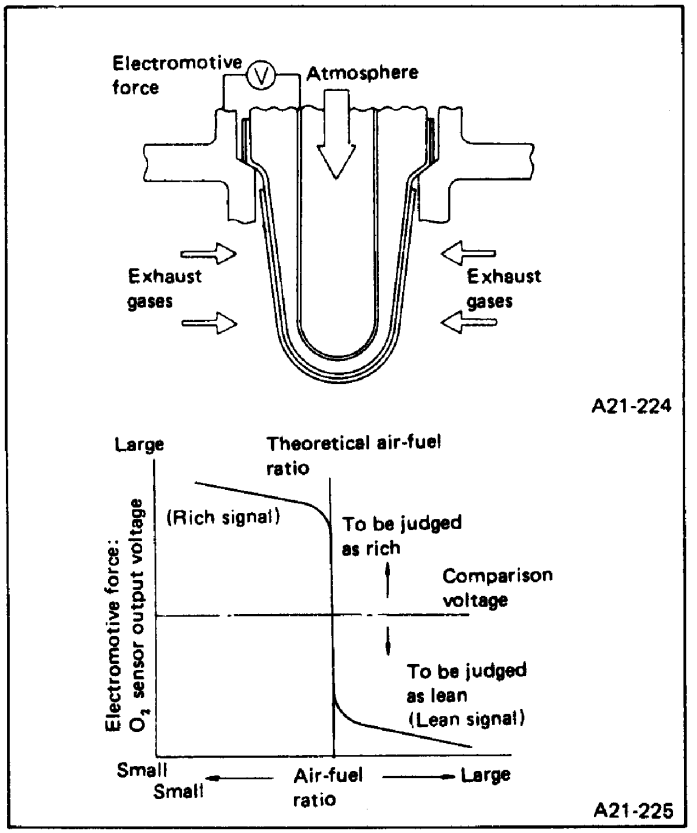


Fig. 11

1800 cc model

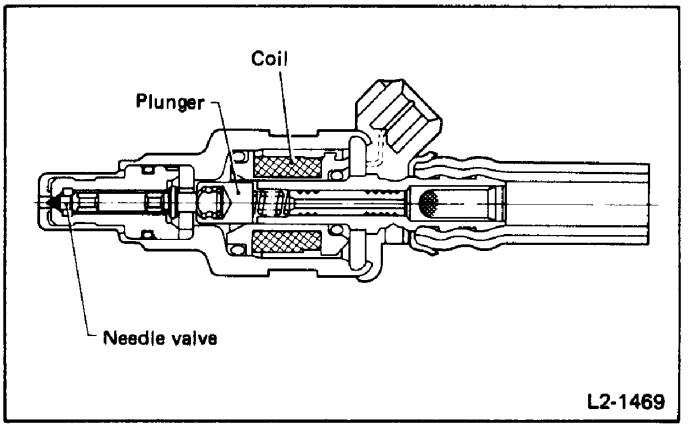


Fig. 12

2700 cc model

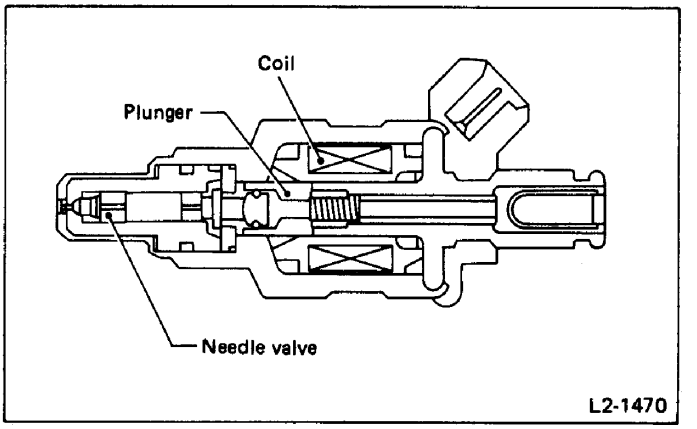


Fig. 13

Fuel Injector

The fuel injector injects fuel according to the valve open signal received from the MPFI control unit.

The nozzle is attached on the top of the fuel injector. The needle valve is lifted by the solenoid coil through the plunger on arrival of the valve open signal.

Since the injection opening, the lifted level of needle valve and the regulator-controlled fuel pressure are kept constant, the amount of fuel to be injected can be controlled only by the valve open signal from the MPFI control unit.

At the fuel inlet of the injector, the filter is mounted to prevent dust from entering.

On the 2700 cc model, a high resistor is built into the fuel injector to eliminate a separate dropping resistor.

Dropping Resistor

(1800 cc model only)

The dropping resistor serves as a voltage control to maintain optimum injector driving current.

Coolant Thermosensor

The coolant thermosensor is equipped on the waterpipe which is made of aluminum alloy. Its thermistor changes resistance with respect to temperature.
To the MPFI control unit, the thermosensor sends the coolant temperature signal which is decisive for the fuel volume to be injected.

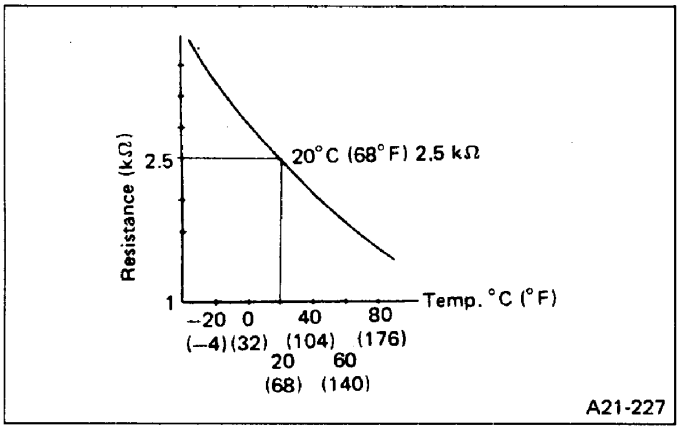


Fig. 14

Pressure Regulator

The pressure regulator is divided into the fuel chamber and the spring chamber by the diaphragm as illustrated below. Fuel is fed to the fuel chamber through the fuel inlet connected with the injector. A difference in pressure between the fuel chamber and the spring chamber connected with the intake manifold causes the diaphragm to be pushed down, and fuel is fed back to the fuel tank through the return line.
By returning fuel so as to balance the above pressure difference and the spring force, the fuel pressure is kept at a constant level 250.1 kPa (2.55 kg/cm^2, 36.3 psi) against the intake manifold pressure.

(1800 cc model)

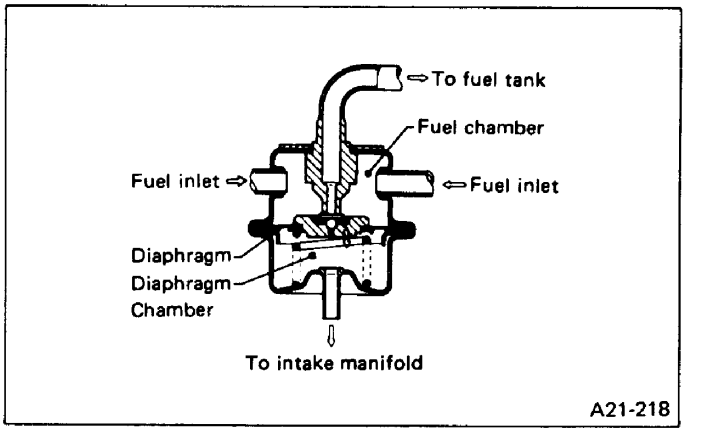


Fig. 15

(2700 cc model)

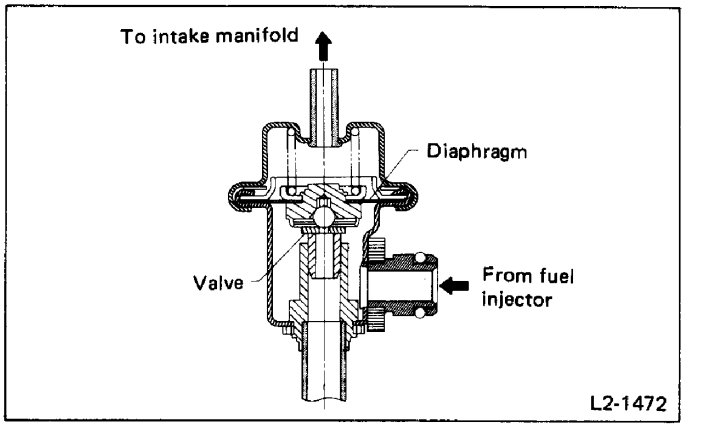


Fig. 16

SCHEMATIC DRAWING

1800cc model

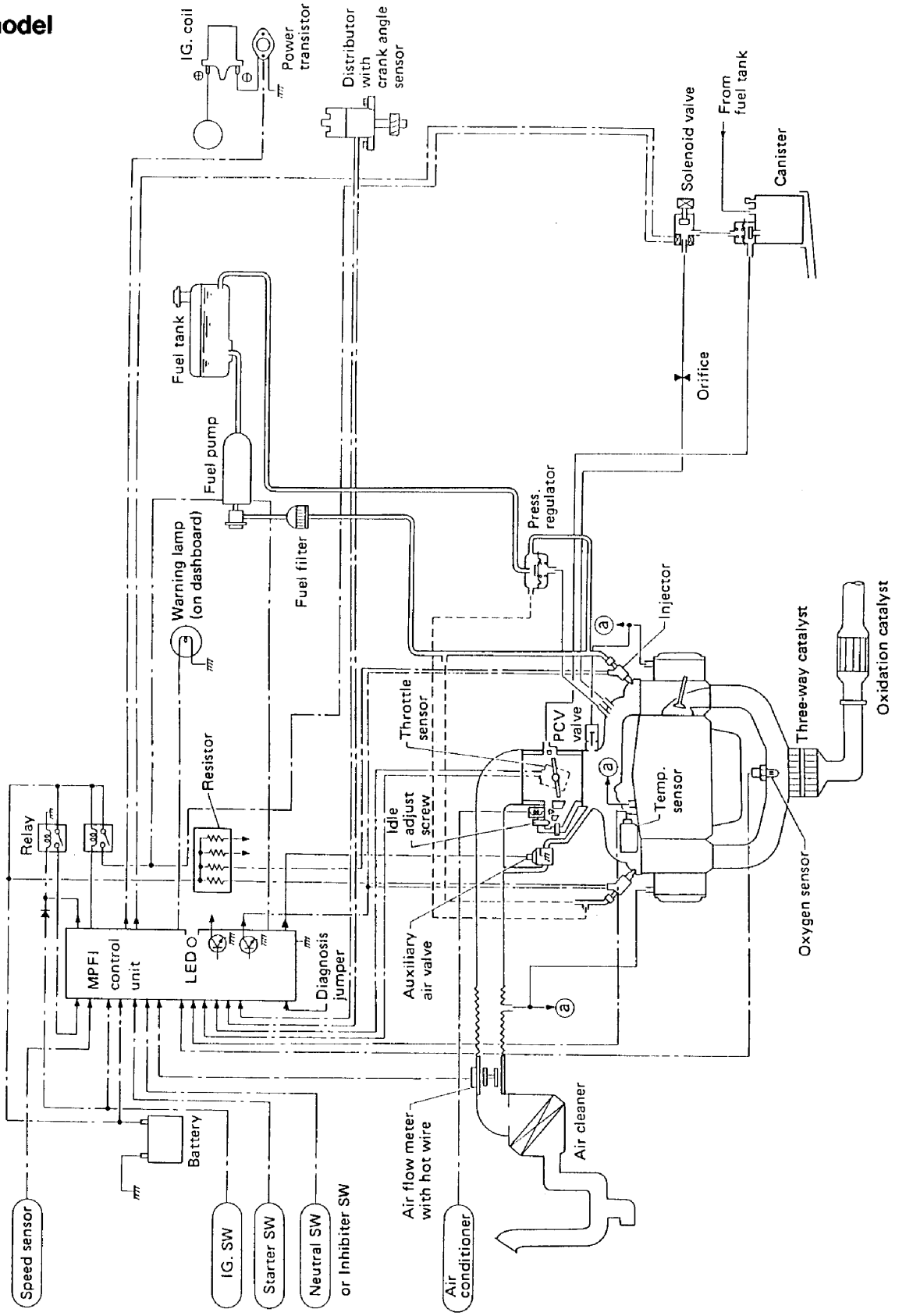


Fig. 17

L2-1255

2700cc model

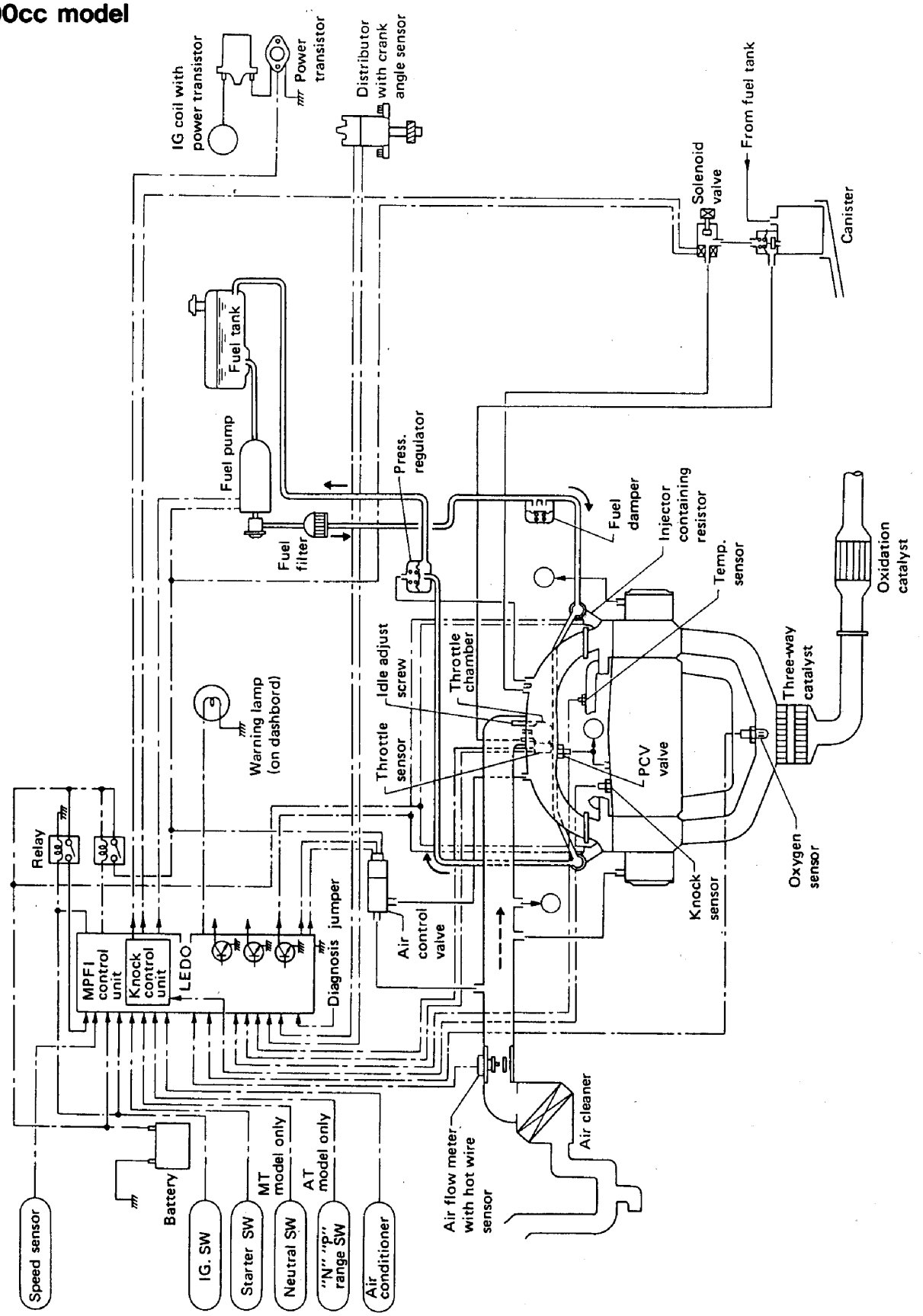


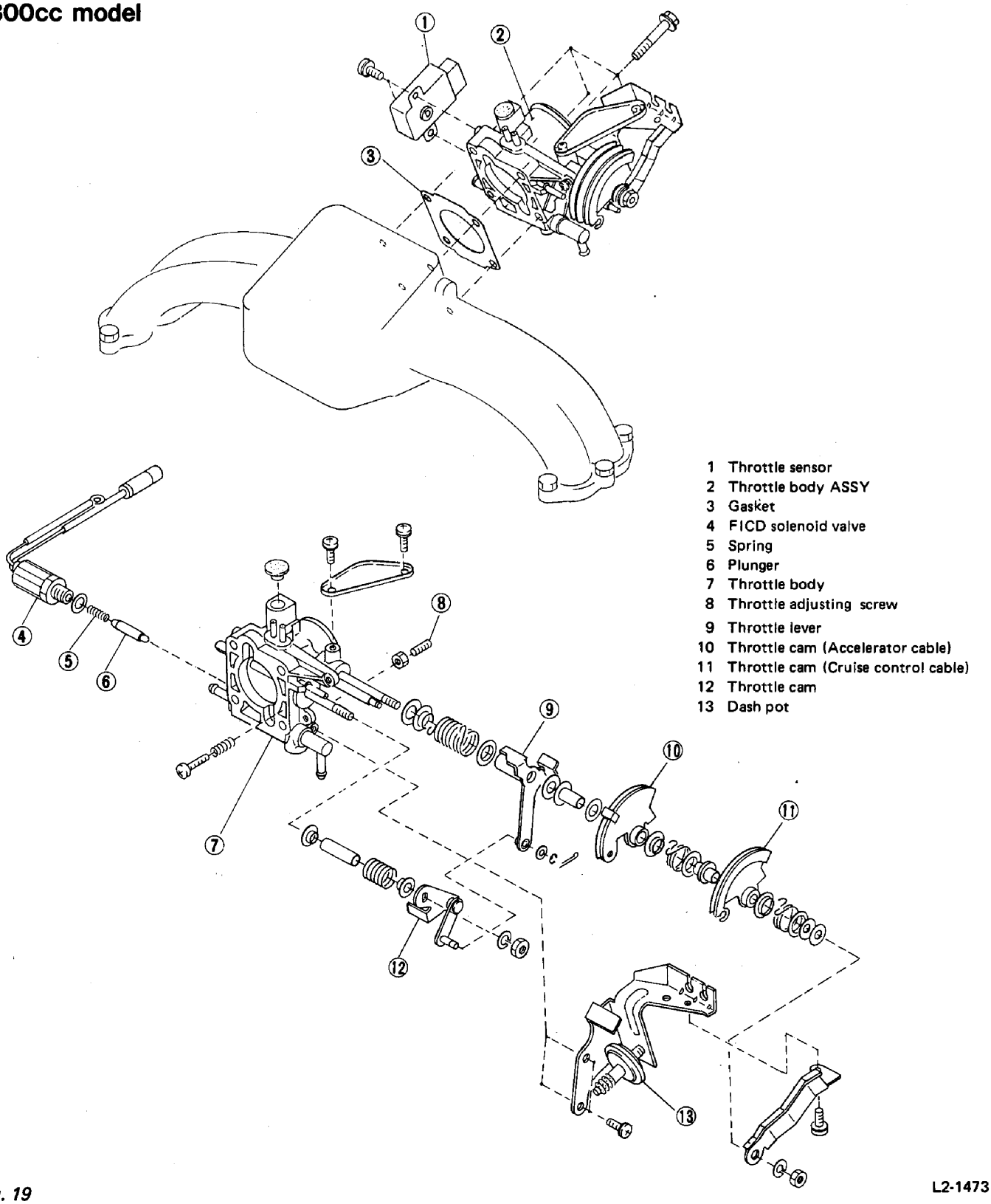
Fig. 18

L2-1256

COMPONENT PARTS

Throttle Body and EGR Valve

1800cc model



1 Throttle sensor
2 Throttle body ASSY
3 Gasket
4 FICD solenoid valve
5 Spring
6 Plunger
7 Throttle body
8 Throttle adjusting screw
9 Throttle lever
10 Throttle cam (Accelerator cable)
11 Throttle cam (Cruise control cable)
12 Throttle cam
13 Dash pot

Fig. 19

L2-1473

2700cc model

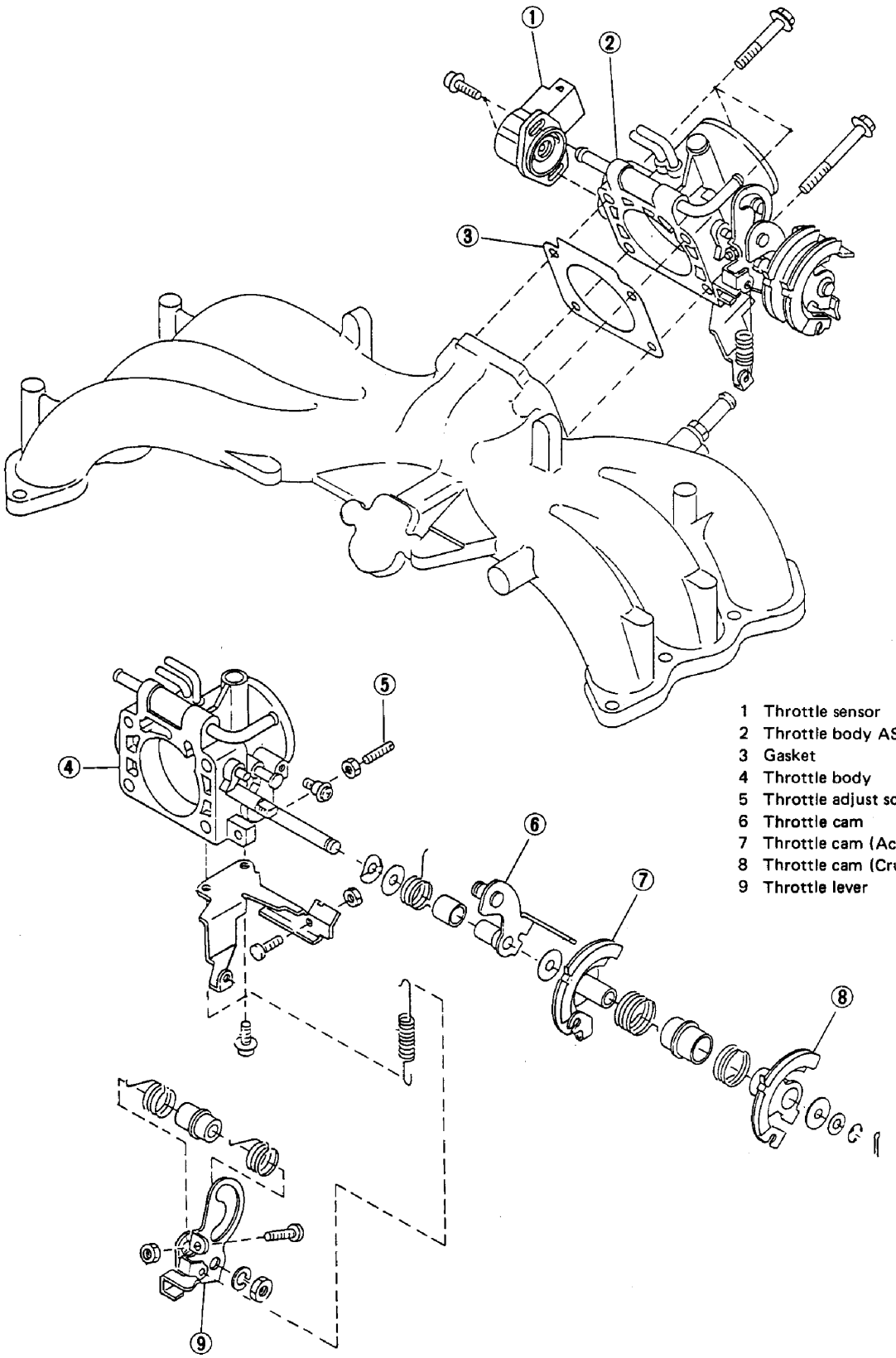
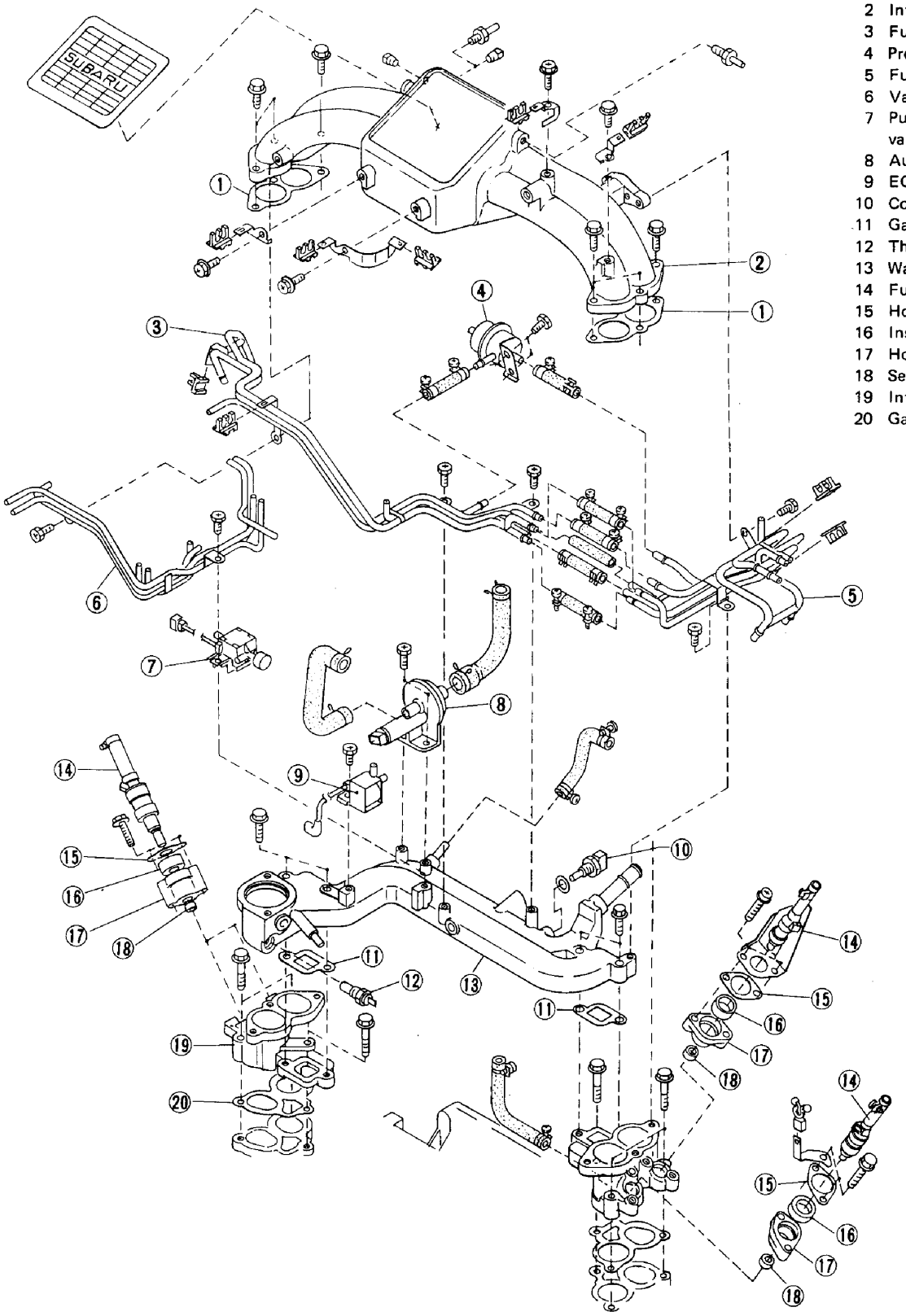


Fig. 20

L2-1474

Intake Manifold

1800cc model

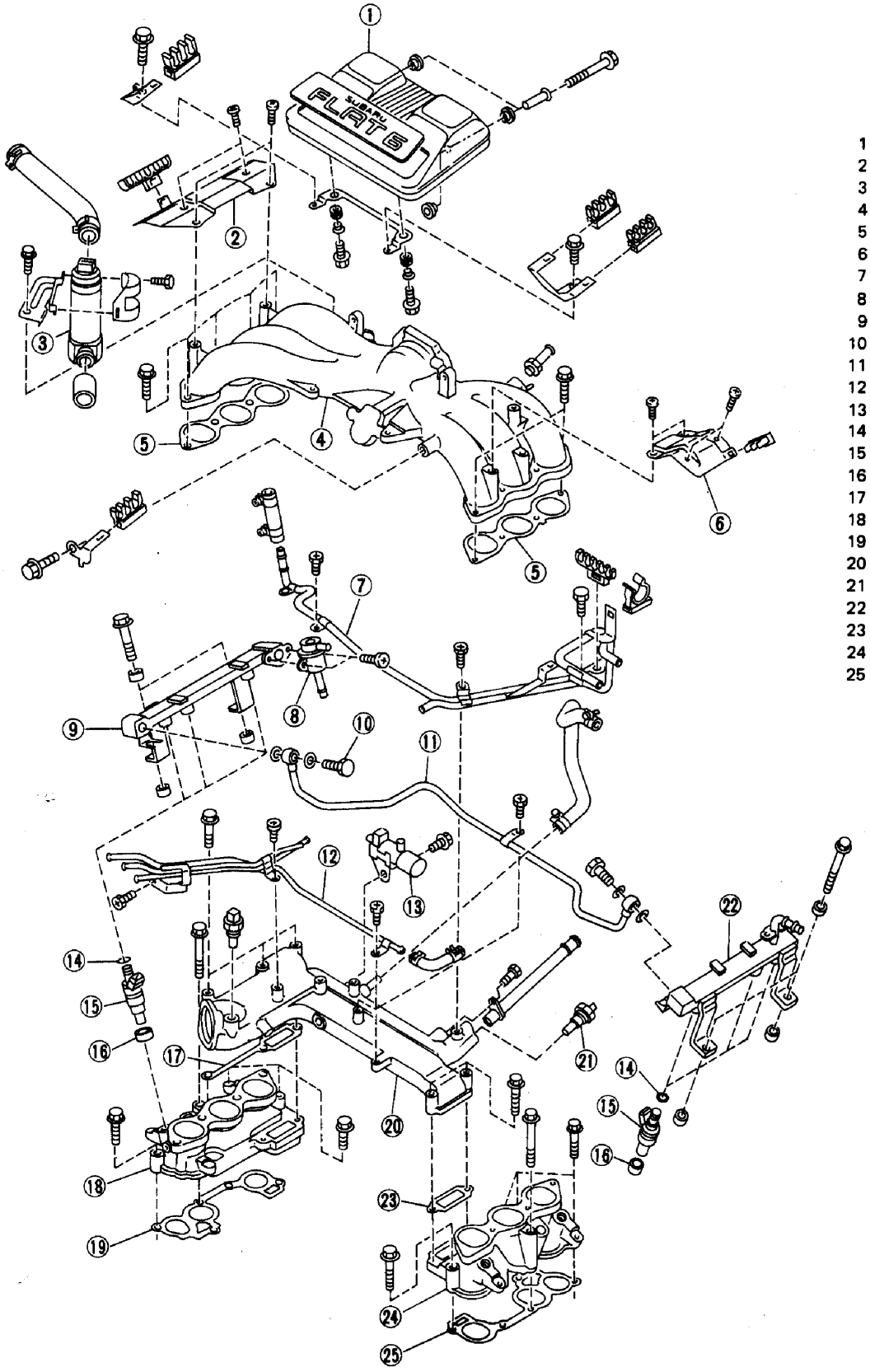


1 Gasket
2 Intake manifold collector
3 Fuel pipe ASSY RH
4 Pressure regulator
5 Fuel pipe ASSY LH
6 Vacuum pipe ASSY
7 Purge control solenoid valve
8 Auxiliary air valve
9 EGR solenoid valve
10 Coolant thermosensor
11 Gasket
12 Thermometer
13 Water pipe
14 Fuel injector
15 Holder plate
16 Insulator
17 Holder
18 Seal
19 Intake manifold
20 Gasket

Fig. 21

L2-1475

2700cc model

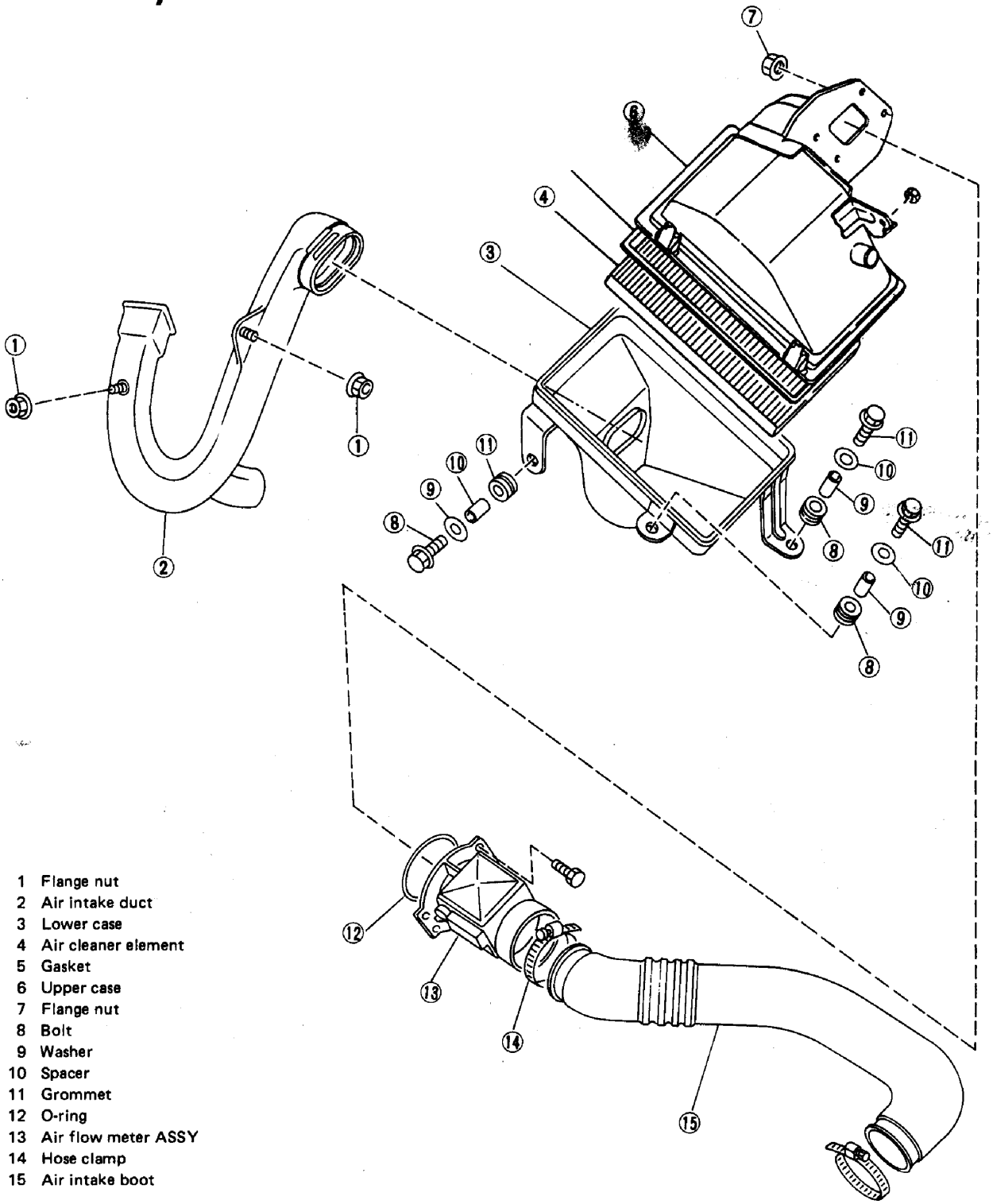


1 Intake manifold cover
2 Fuel pipe cover RH
3 By-pass air control valve
4 Intake manifold collector
5 Gasket
6 Fuel pipe cover LH
7 Fuel pipe ASSY
8 Pressure regulator
9 Fuel pipe RH
10 Union bolt
11 Fuel pipe
12 Fuel pipe ASSY
13 Purge control solenoid valve
14 O-ring
15 Fuel injector
16 Insulator
17 Gasket
18 Intake manifold RH
19 Gasket
20 Water pipe
21 Coolant thermosensor
22 Fuel pipe LH
23 Gasket
24 Intake manifold LH
25 Gasket

Fig. 22

L2-1476

Air Intake System



1 Flange nut
2 Air intake duct
3 Lower case
4 Air cleaner element
5 Gasket
6 Upper case
7 Flange nut
8 Bolt
9 Washer
10 Spacer
11 Grommet
12 O-ring
13 Air flow meter ASSY
14 Hose clamp
15 Air intake boot

Fig. 23 L2-1477

SERVICE PROCEDURE

Precautions in Servicing

1) Never connect the battery in reverse polarity.
- The MPFI control unit will be destroyed instantly.
- The fuel injector and other part will be damaged in just a few minutes more.

2) Do not disconnect the battery terminals while the engine is running.
- A large counter electromotive force will be generated in the alternator, and this voltage may damage the electronic parts such as MPFI control unit, etc.

3) Before disconnecting the connectors of each sensor and the MPFI control unit, be sure to turn off the ignition switch.
- Otherwise, the MPFI control unit may be damaged.

4) The connectors to each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. However, it is still necessary to take care not to allow water to get into the connectors when washing the vehicle, or when servicing the vehicle on a rainy day.

5) Every MPFI-related part is a precision part. Do not drop them.

6) Observe the following cautions when installing a radio in MPFI equipped models.

a. The antenna must be kept as far apart as possible from the control unit.

b. The antenna feeder must be placed as far apart as possible from the MPFI control unit and MPFI harness.

c. Carefully adjust the antenna for correct matching.

d. When mounting a large power type radio, pay special attention to items a. thru c. above.

- Incorrect installation of the radio may affect the operation of the MPFI control unit.

7) Before disconnecting the fuel hose, disconnect the fuel pump connector and crank the engine for more than five seconds to release pressure in the fuel system. If engine starts during this operation, run it until it stops.

Air Flow Meter

INSPECTION

1) Check for leaks or damage in the connection between the air intake boot and air flow meter. Repair any defect noted.

2) Remove the connectors from the air flow meter, the air intake boot, and the air flow meter for the air cleaner case in the order stated.

3) Check the exterior of the air flow meter for damage.

4) Check for foreign matter, water, or oil in the air passages, especially in the by-pass. If any abnormality is noticed, replace the air flow sensor.

5) If no defect is found in the visual checks above, conduct the following inspections.

(1) Turn the ignition switch OFF (engine off).

(2) Attach the air flow meter to the air cleaner.

(3) Disconnect the air flow meter connector, and remove the rubber cover from the connector.

Conduct the following checks by attaching the tester check pins to the connector terminals on the side from which the rubber cover has been removed.

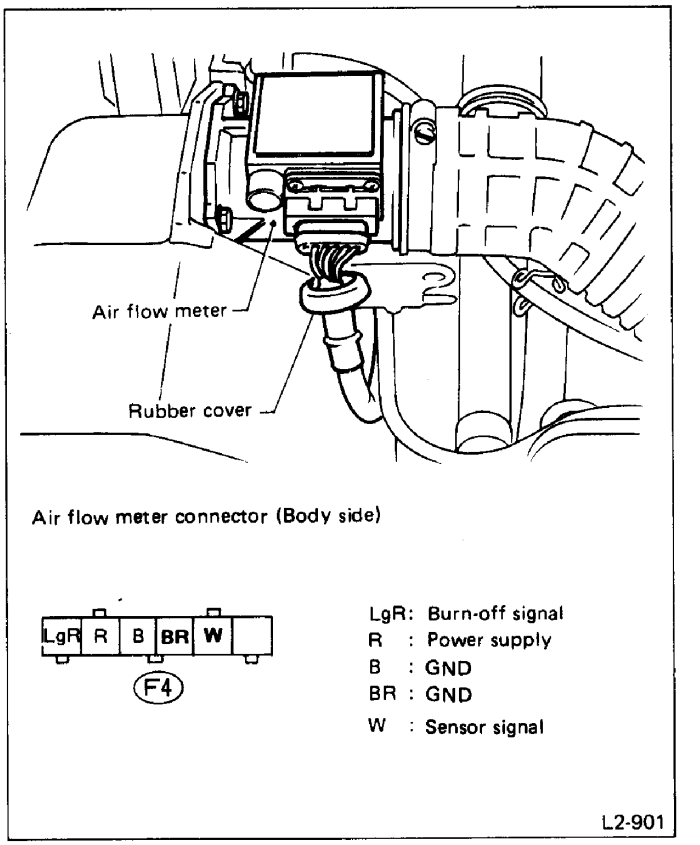


Fig. 24

(4) Measure resistance between the body and ground terminals (B) and (BR).

Specified resistance:
10Ω, max.

If resistance is greater than 10Ω, check the harness and internal circuits of the control unit for discontinuity, and the ground terminal on the intake manifold for poor contact.

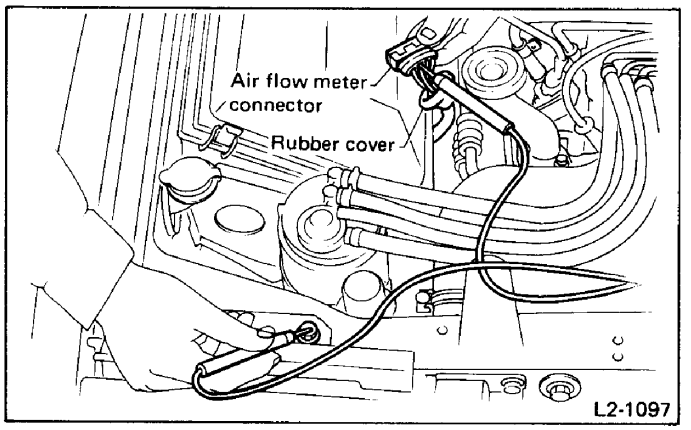


Fig. 25

(5) Turn the ignition switch ON (engine off).
(6) Connect the air flow meter connector.
(7) Measure voltage across power terminal (R) and the body.

Specified voltage:
10V, min.

If voltage is outside specifications, check the condition of the parts (battery, fuse, control unit harness, connector, etc.) in the power line.

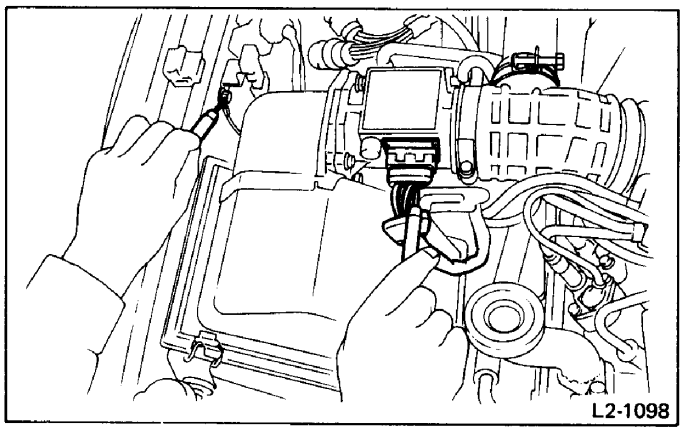


Fig. 26

(8) Attach the positive lead of a tester to signal terminal (W) and the negative lead to the ground terminal (BR). Measure the voltage across the two terminals.

Specified voltage:
1 – 2V

If voltage is outside specifications, replace the air flow meter.

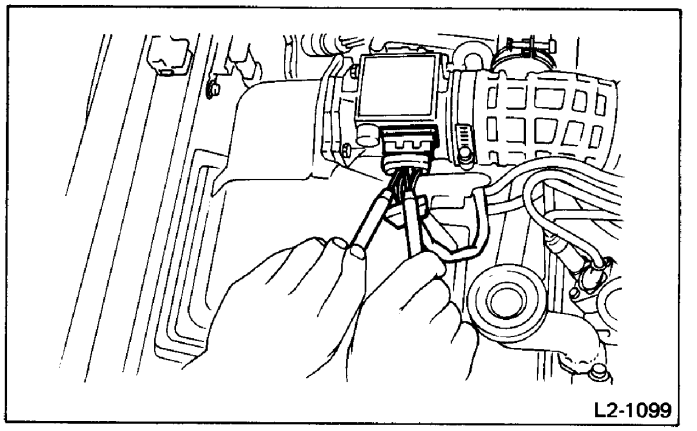


Fig. 27

(9) Remove the air flow meter from the air cleaner. (The air intake boot need not be removed.)
(10) Blow air from the air cleaner side to check if voltage across terminals (W) and (BR) is greater than that measured in step (8) above. If not, replace the air flow meter.

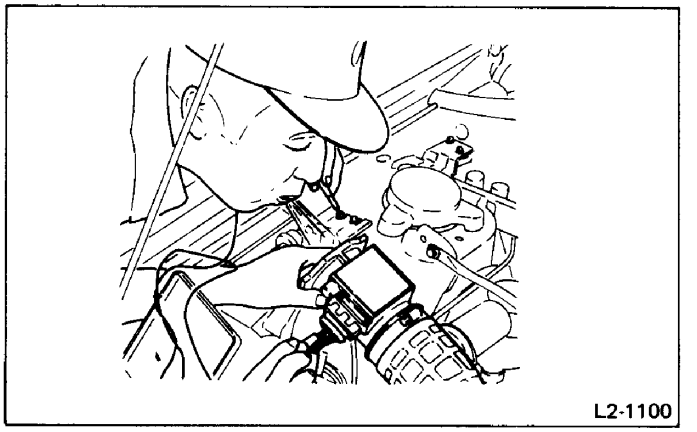


Fig. 28

(11) Install the air flow meter on the air cleaner.
(12) Start the engine.
(13) Warm up the engine until the coolant temperature reaches approximately 80°C (176°F).
(14) Drive at speed greater than 24 km/h (15 MPH) for at least one minute.

(15) Race engine above 2,000 rpm.
(16) While idling the engine, monitor voltage across terminal (LgR) of the air flow meter connector and the body. (0 V under normal operating conditions is OK.)

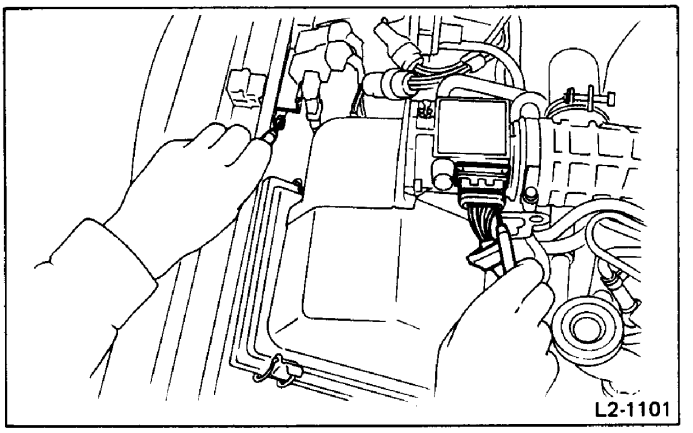


Fig. 29

(17) Turn the ignition switch OFF. Check if 12 volts are present across the terminal LgR and the body for one second shortly after the ignition switch has been turned OFF. If not, check the harness from the control unit to the air flow meter for discontinuity.

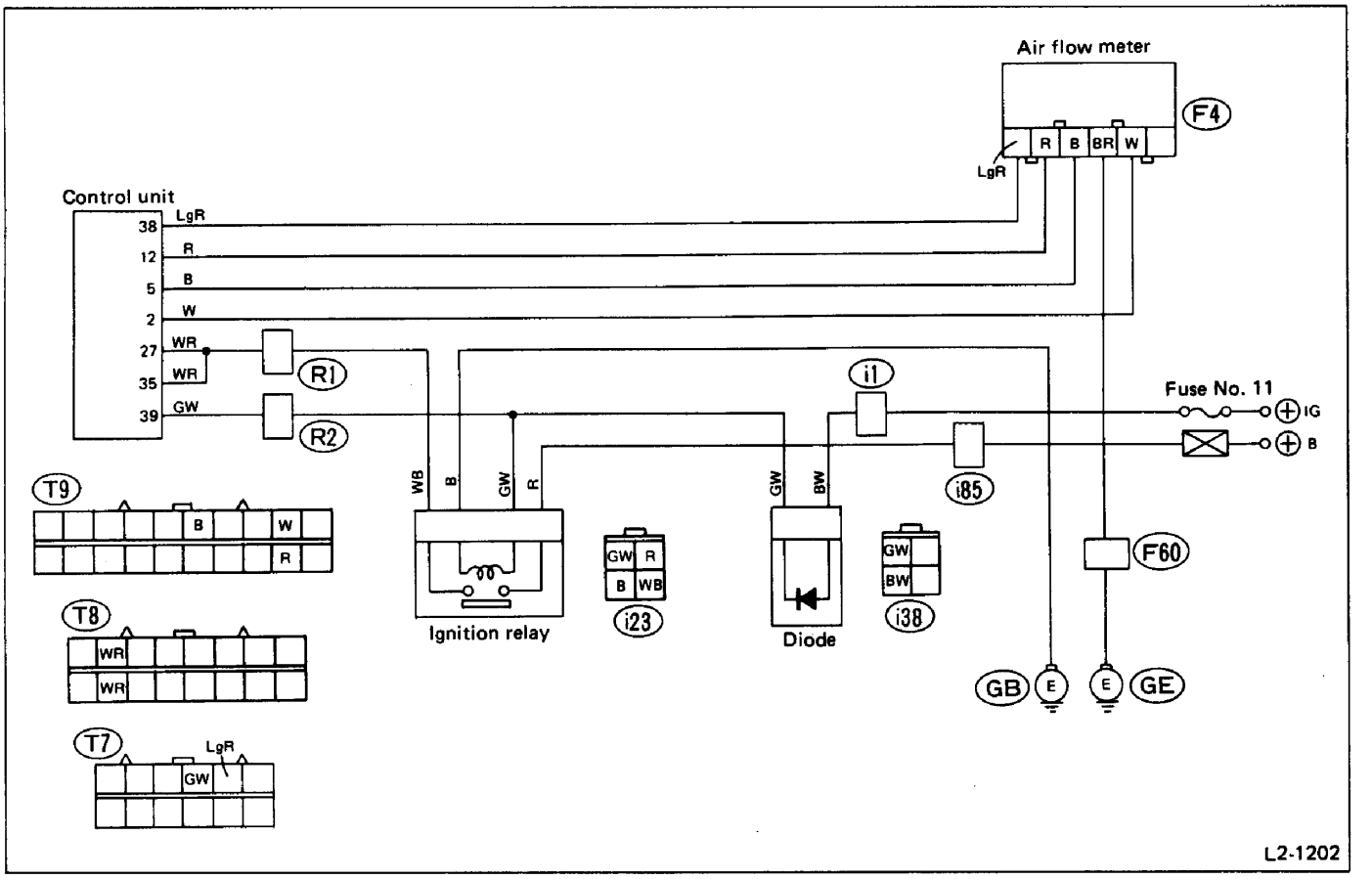


Fig. 30

Throttle Body

1800cc model

INSPECTION AND ADJUSTMENT

THROTTLE SENSOR

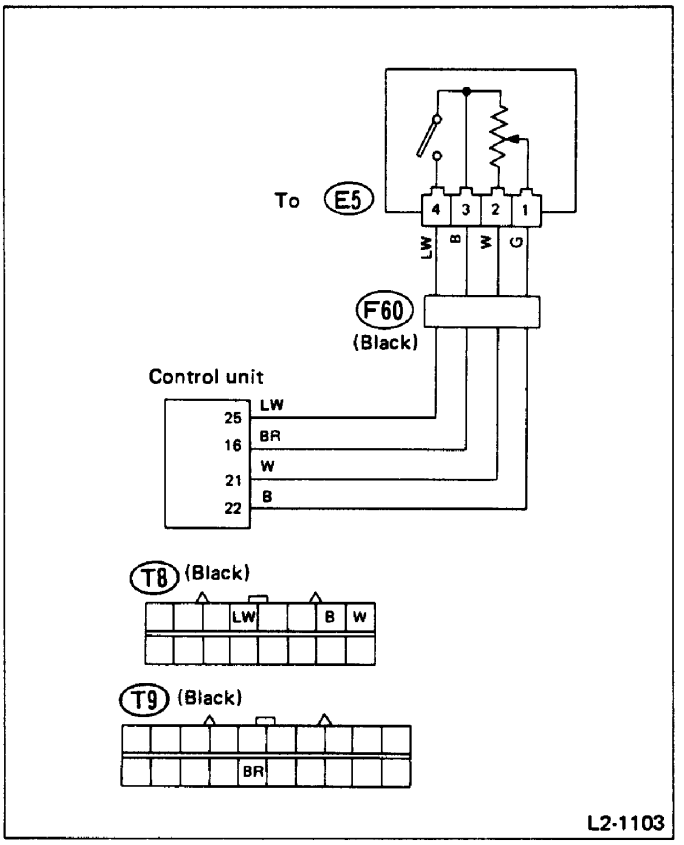


Fig. 31

Idle contact

Before checking the idle contact, remove the intake duct.

Insert a thickness gauge between the stopper screw of the throttle body and the stopper (portion Ⓖ), and check for continuity between (④ and ③).

1) Make sure that ④ and ③ are conducting when the throttle is closed fully.

2) Make sure that ④ and ③ are conducting when the thickness of gauge is 0.55 mm (0.0217 in) (this corresponds to throttle opening of 1.5°).

3) Make sure that ④ and ③ are not conducting when the thickness is 0.92 mm (0.0362 in) (this corresponds to a throttle opening of 2.5°).

4) If the above standards are not satisfied, loosen the screws (two) securing the throttle switch to the throttle body, and turn the throttle switch main body until the correct adjustment is obtained.

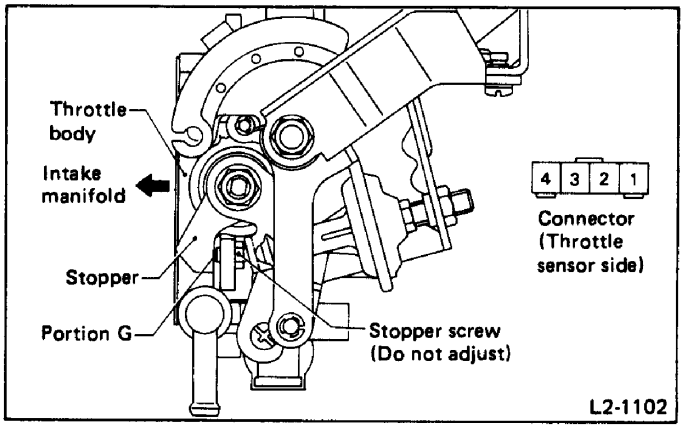


Fig. 32

Throttle opening signal

1) Measure resistance between terminals ③ and ②.

Specified resistance:
6 – 18 kΩ

If resistance is outside specifications, replace the sensor.

2) Measure resistance between terminals ③ and ①.

Specified resistance:
5.8 – 17.8 kΩ (Throttle valve fully closed)
1.5 – 5.1 kΩ (Throttle valve fully opened)

Ensure that resistance changes smoothly between the fully-closed and fully-opened throttle positions. If resistance is outside specifications, replace the sensor.

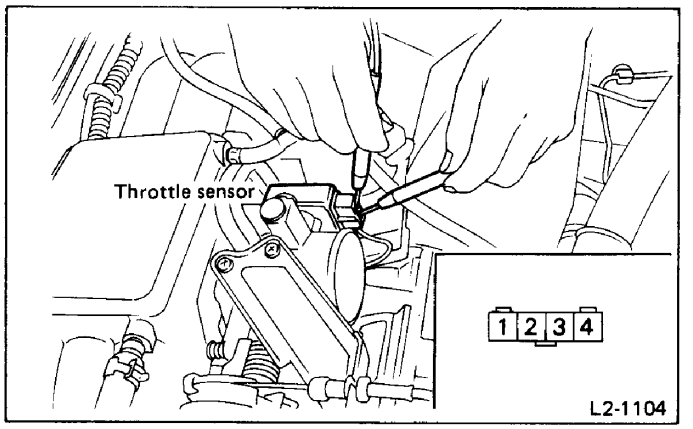


Fig. 33

DASH POT

1) Warm-up the engine sufficiently, and check that the idle speed is as specified.
2) Under the non-loaded state, turn the throttle lever by hand and increase engine speed until the end of the dash pot is off the throttle cam.
3) Gradually return the throttle lever, and read the engine rpm when the throttle cam contacts the end of the dash pot.

Engine rpm	2,800 – 3,400 rpm

4) If the engine rpm is not within this range, loosen the lock nut of the dash pot, and turn the dash pot until this specification is satisfied. After adjustment, tighten the lock nut securely.
5) After adjustment, race the engine and make sure the idle speed returns correctly to the idle speed as the throttle is released.

2700cc model

INSPECTION AND ADJUSTMENT

THROTTLE SENSOR

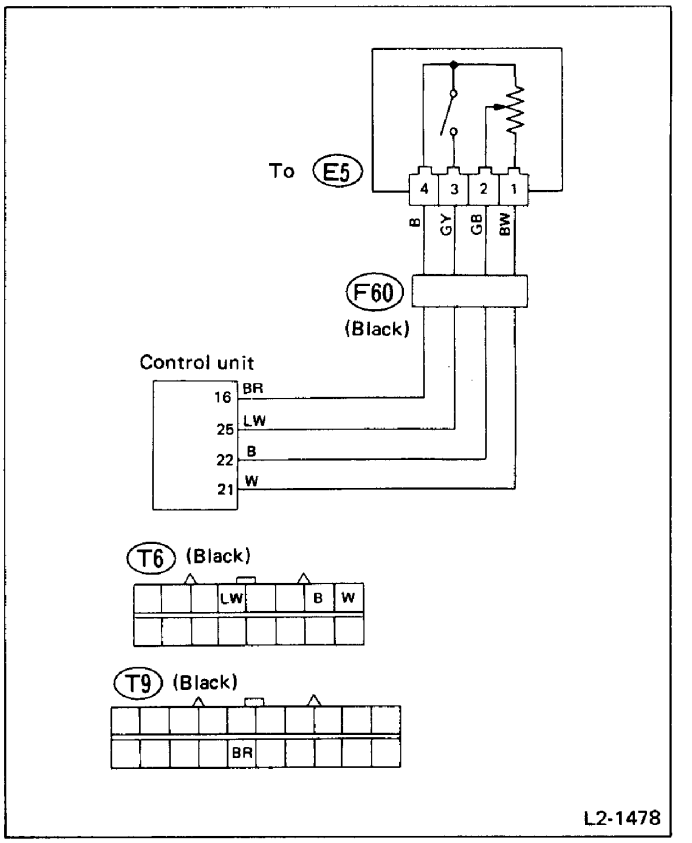


Fig. 34

1) Disconnect the throttle sensor connector.
2) Insert a thickness gauge [0.35 mm (0.0138 in), 0.75 mm (0.0295 in)] between the stopper screw and throttle lever [portion G], and measure resistance between terminals (3) and (4) of throttle sensor.

Specified resistance:
5 kΩ, max
[When gauge thickness is 0.35 mm (0.0138 in)]
1 MΩ, min
[When gauge thickness is 0.75 mm (0.0295 in)]

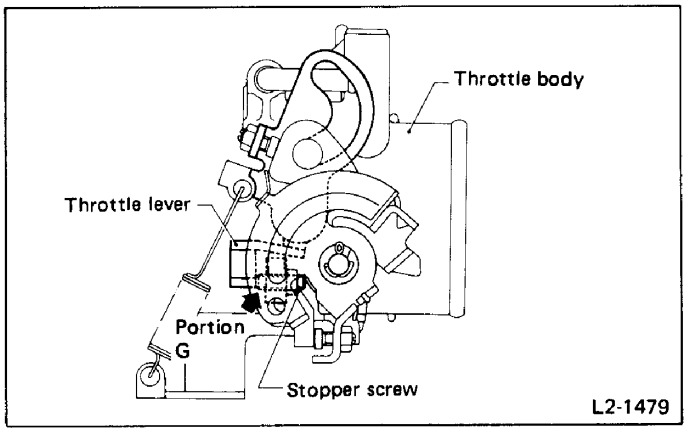


Fig. 35

3) Measure resistance between terminals (1) and (4 .

Specified resistance:
3 – 7 kΩ

4) Measure resistance between terminals (2) and (4 .

Specified resistance:
4.2 – 15 kΩ (Throttle valve fully closed)
0.1 – 11 kΩ (Throttle valve fully opened)
[Differential: 4 kΩ]

Ensure that resistance changes smoothly between the fully closed and fully opened throttle positions. If resistance is outside of specifications, replace the sensor.

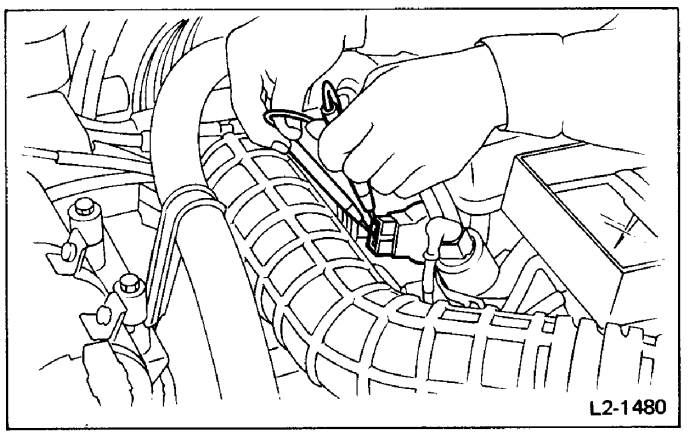


Fig. 36

By-pass Air Control Valve

[2700cc model only]

INSPECTION

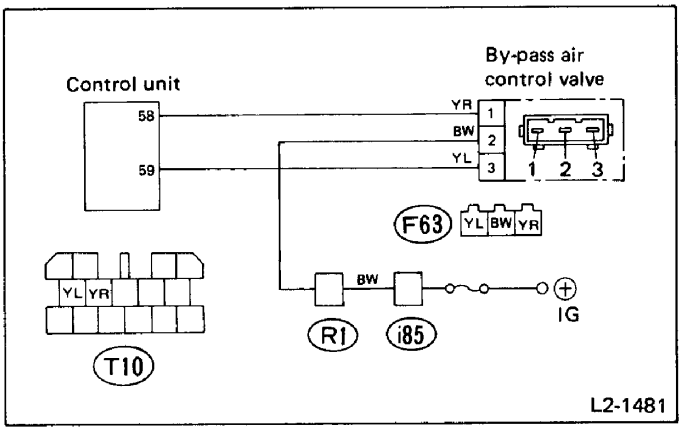


Fig. 37

1) Disconnect the connector from the by-pass air control valve.
Measure resistance between terminals (1) and (2) of by-pass air control valve.

Specified resistance:
9.5 – 11.5 Ω

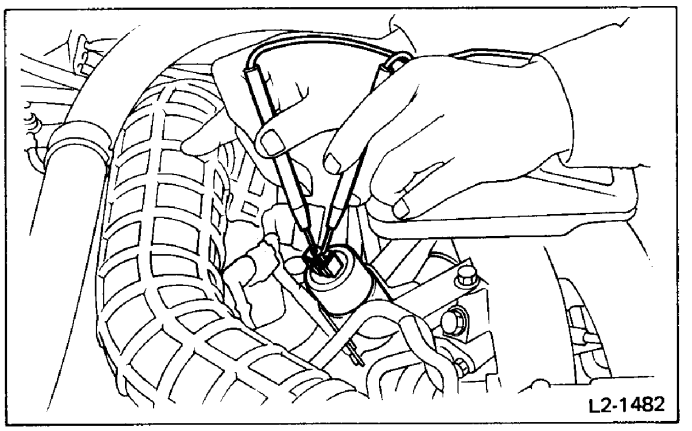


Fig. 38

2) Measure resistance between terminals (2) and (3) of by-pass air control valve.

Specified resistance:
8.5 – 10.5 Ω

3) Measure resistance between terminal (2) and valve body, and between terminal (3) and valve body.

Specified resistance:
Infinity (∞) Ω

If resistance is outside of specifications, replace the by-pass air control valve.

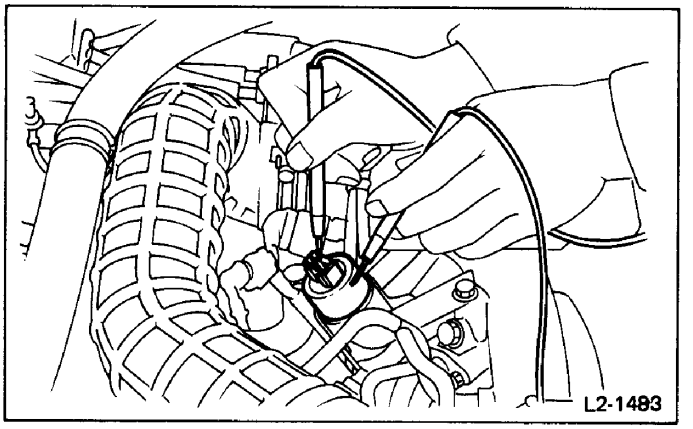


Fig. 39

Auxiliary Air Valve

[1800cc model only]

INSPECTION

1) Pinch the hose connecting the air intake duct and auxiliary air valve and observe how the engine speed changes.

State of engine	Engine speed
When engine is cold	Engine idle speed drops as the hose is pinched.
When engine is hot	Reduction in engine speed is within 100 rpm.

When pinching the hose, cover it with a rubber plate or the like for protection.

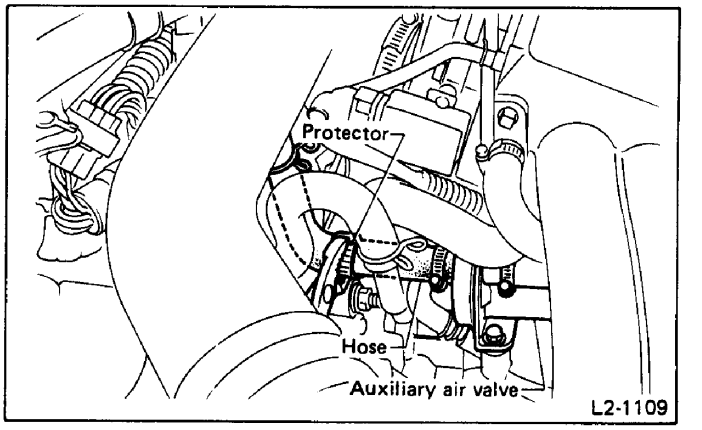


Fig. 40

2) As the engine is started, the auxiliary air valve is heated by the built-in heater and its shutter valve closes gradually. This causes the engine rpm to be lowered gradually until the specified idling rpm is reached.
If the engine speed will not drop to the idling rpm smoothly, the heater circuit or the heater power supply circuit may be faulty. In this case, perform the following checks;

(1) Check the resistance value of the auxiliary air valve.
Disconnect the connector of the auxiliary air valve and measure the resistance between the two terminals, using a circuit tester.

Resistance value must be other than zero (0) and infinity (∞).

If the resistance is zero (0) or infinity (∞), replace the auxiliary air valve with a new one.

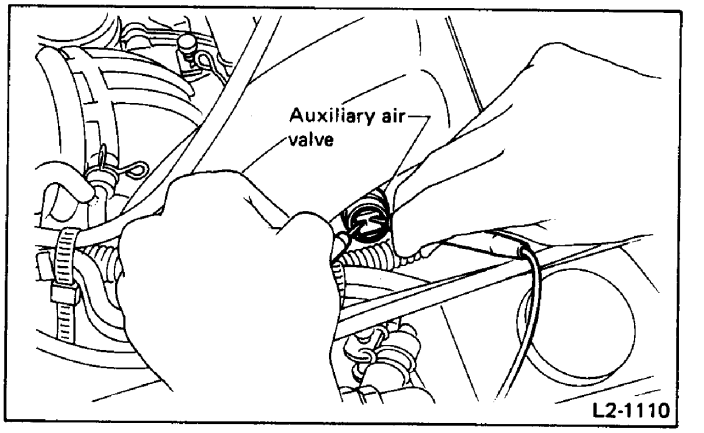


Fig. 41

(2) Check source voltage.
Disconnect the connector of the auxiliary air valve, and check voltage on the harness side.

Voltage (when engine is running):
Over 12V

If the voltage is 0V or lower than 12V, check the harness and connector for condition.

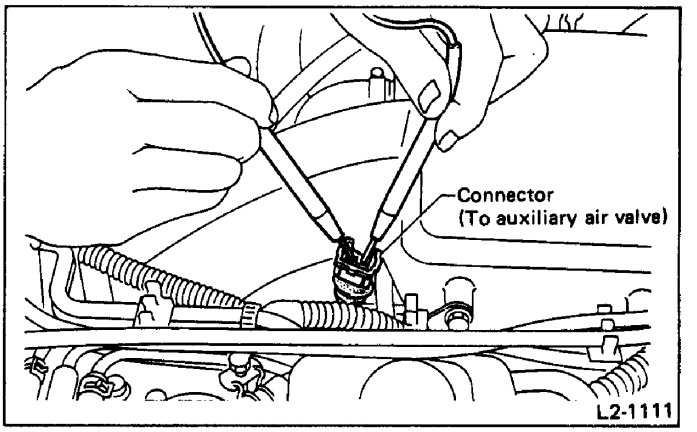


Fig. 42

3) If item 2) above is normal but only item 1) is faulty, the cause may be as follows:

	Cause of trouble	Symptom	Remedy
1	Sticking of shutter valve of auxiliary air valve. (Sticking in closed direction)	• Engine stalls easily when engine is cold.	Replace auxiliary air valve.
2	Sticking of shutter valve of auxiliary air valve. (Sticking in open direction)	• Engine rpm does not lower smoothly during warm-up operation. • Engine rpm remains high.	
3	Clogged air passage.	Same as ①	Check air passage, such as hose, etc. and clean.

Fuel Injector and Resistor

1800cc model

INSPECTION

Using a stethoscope or a long-type screwdriver, make sure of operating noise (clicking sound) of each injector (when idling or cranking engine). If this operating noise cannot be heard on any injector:

1) Disconnect the control unit connector.

Measure voltage across the body and terminals 49 (W), 50 (W), 51 (WL) and 52 (WL) of control unit connector (body side), respectively.

Specified voltage:
12V

If voltage is below 10V in any line, the affected harness from the battery to the control unit through the resistor and injector is broken or shorted.

2) Disconnect each fuel injector connector.

Measure resistance between the terminals of each injector.

Specified resistance:
2 – 3Ω

If resistance is greater than 1 MΩ, the affected circuit is broken. If 0 Ω, the circuit is shorted. Replace the injector.

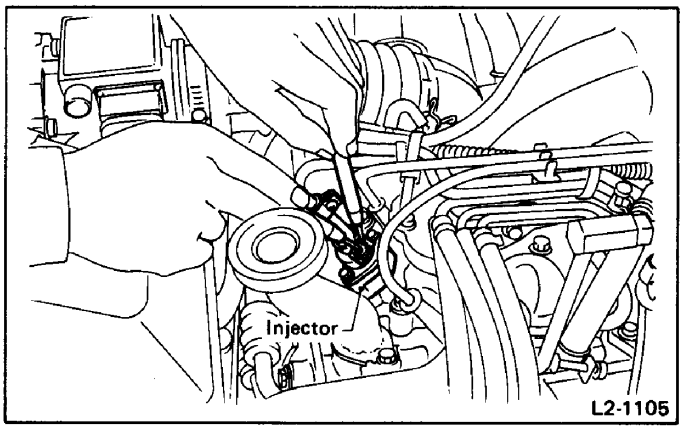


Fig. 43

3) Measure voltage across power terminals of each injector connector and the body.

Specified voltage:
12 V

If voltage is less than 10 V, the harness from the battery to the injector through the resistor is discontinued or shorted.

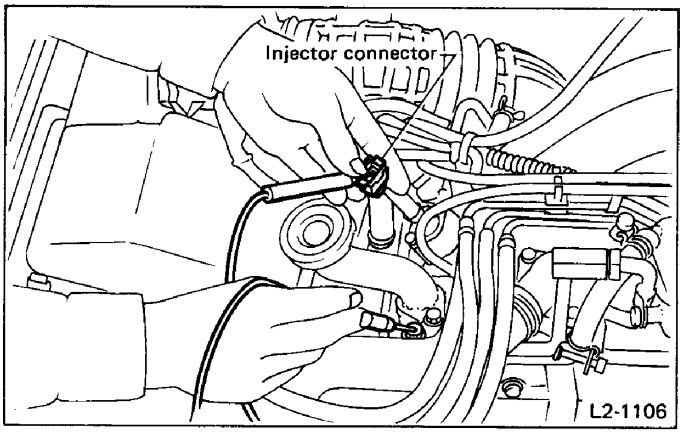


Fig. 44

4) Disconnect the connector from the resistor.
Measure resistance between terminals W and B of the resistor.

Specified resistance:
5.8 – 6.5Ω

If resistance is outside specifications, replace the resistor.

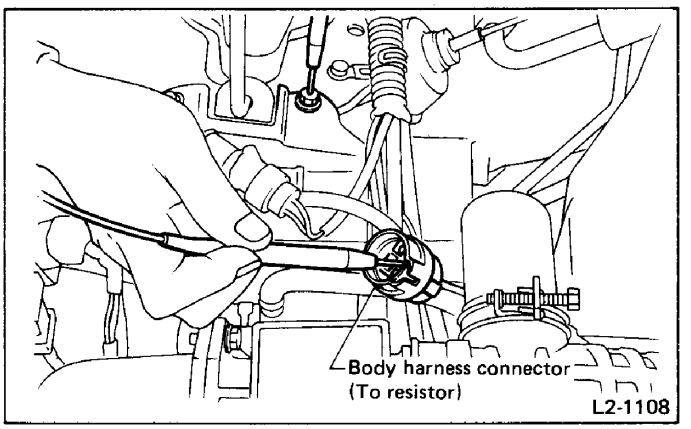


Fig. 45

5) Measure voltage across terminal 5 (R) of body harness connector and the body.

Specified voltage:
12 V

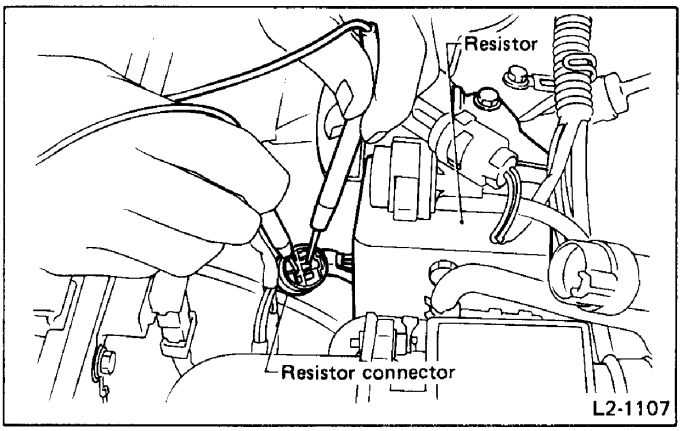


Fig. 46

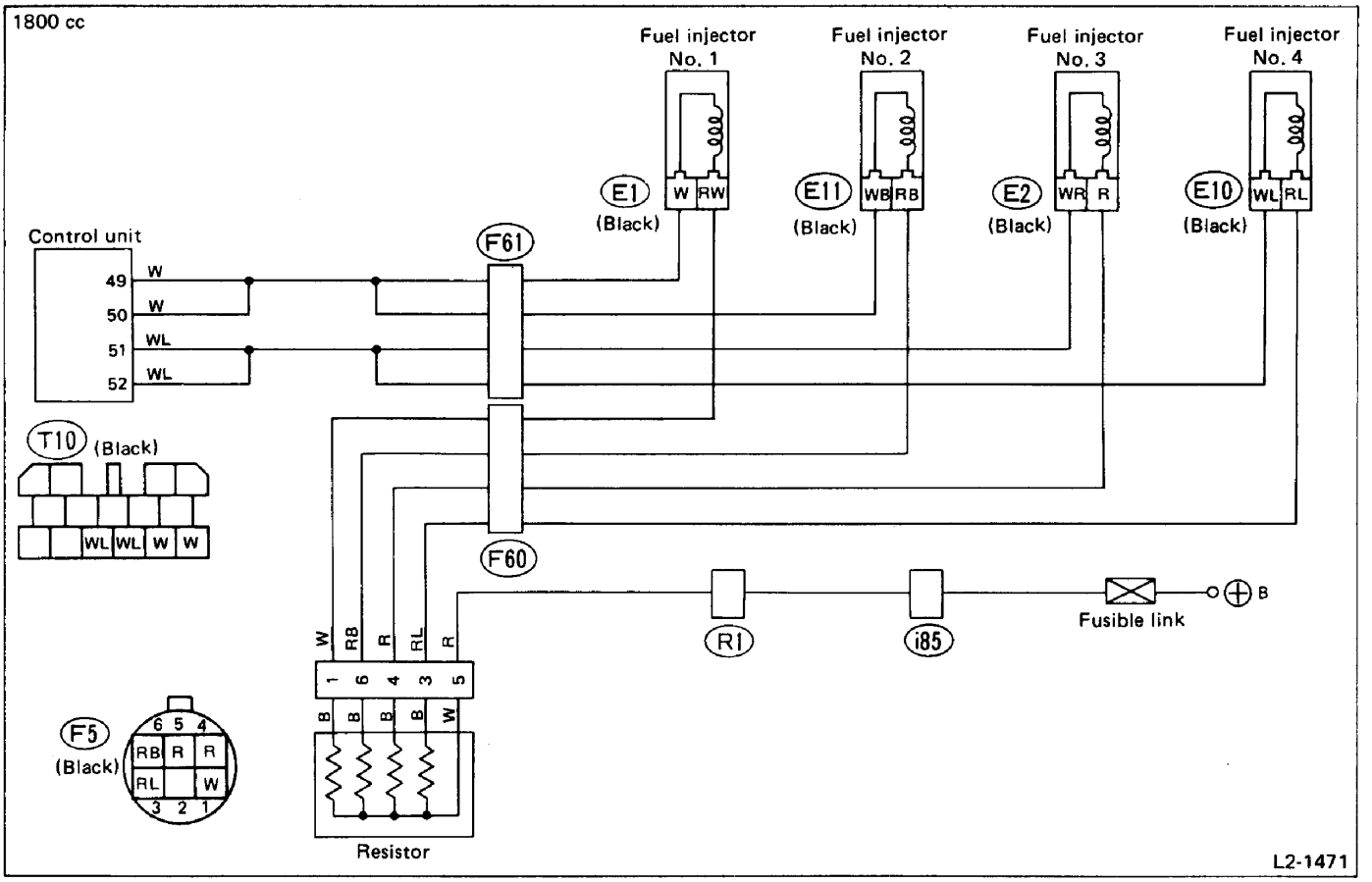


Fig. 47

2700cc model

INSPECTION

Using a stethoscope or a long-type screwdriver, make sure of operating noise (clicking sound) of each injector.

If this operating noise cannot be heard on any injector:

1) Disconnect the control unit connector.

Measure voltage across the body and terminals 49 (W), 50 (W), 51 (WR), 52 (WR), 53 (WY) and 54 (WY) of control unit connector (body side), respectively.

Specified voltage:
12 V

If voltage is below 10 V in any line, the affected harness from the battery to the control unit through the resistor and injector is broken or shorted.

2) Disconnect each fuel injector connector.

Measure resistance between the terminals of each injector.

Specified resistance:
Approx. 13.8 Ω

If resistance is greater than 1 MΩ, the affected circuit is broken. If 0 Ω, the circuit is shorted. Replace the injector.

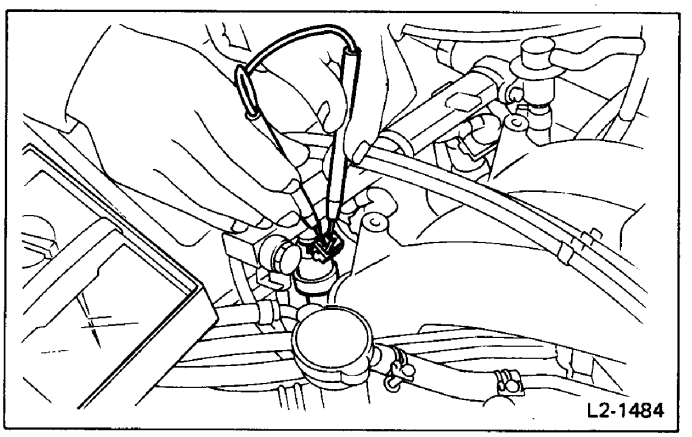


Fig. 48

3) Measure voltage across power terminals of each injector connector and the body.

Specified voltage:
12 V

If voltage is less than 10 V, the harness from the battery to the injector is discontinued or shorted.

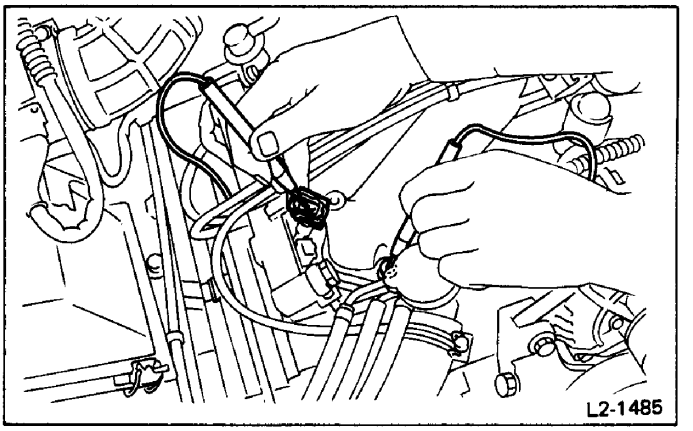


Fig. 49

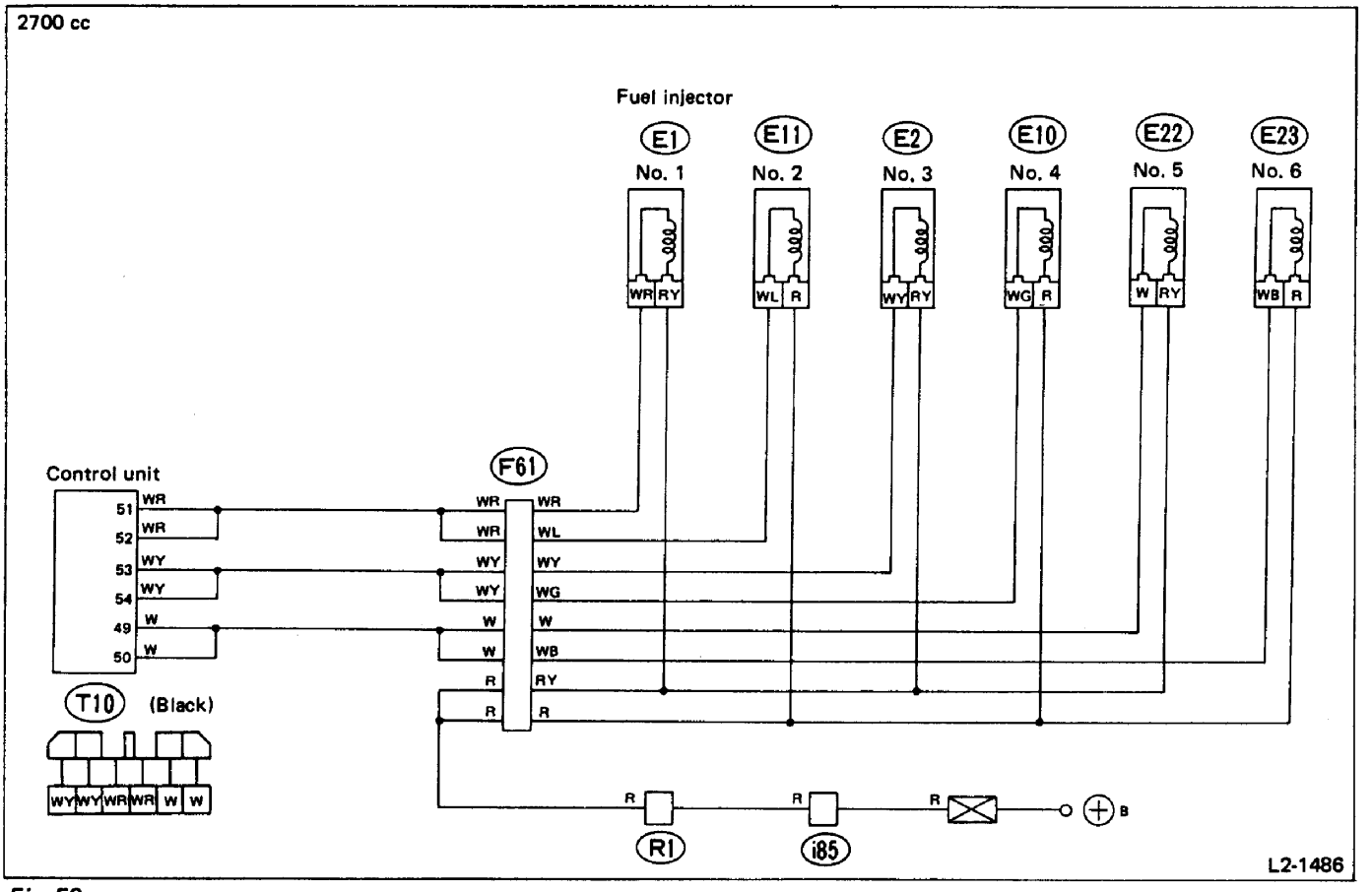


Fig. 50

Coolant Thermosensor

INSPECTION

Put the thermosensor in water of various temperatures and measure the resistance between terminals using a circuit tester.
If the resistance value is too much out of these ranges, replace the thermosensor with a new one.

Water temperature °C (°F)	Resistance value
−10 (14)	7 – 11.5 kΩ
20 (68)	2 – 3 kΩ
50 (122)	700 – 1,000Ω

Pressure Regulator

The pressure regulator adjusts the fuel pressure to 250.1 kPa (2.55 kg/cm^2, 36.3 psi) compared to the intake manifold pressure.

INSPECTION

Disconnect the fuel hose at the pressure regulator connecting portion and install a fuel gauge.

a. Before disconnecting the fuel hose, first disconnect the fuel pump connector and crank the engine (more than five seconds) to release the pressure in the fuel system. If the engine is started by this cranking, run it until it stops.
b. Be sure to clamp the hose at the connecting portion.

1) When checking with the engine running
(1) Measure the fuel pressure when the engine is at idle speed.

Standard:
177 – 206 kPa (1.8 - 2.1 kg/cm^2, 26 – 30 psi)

(2) Race the engine, and make sure the fuel pressure increases correspondingly.

2) When checking with the engine stopped
Set the diagnosis jumper for checking the MPFI system to ON, and then turn ON the key switch. This will cause the fuel pump to operate intermittently. Measure the fuel pressure in this state.

Standard:
Fuel pump ON
Approx. 255 kPa (2.6 kg/cm^2, 37 psi)
Fuel pump OFF
Approx. 226 kPa (2.3 kg/cm^2, 33 psi)

Air Intake System

Air Cleaner Assembly

REMOVAL AND INSTALLATION

1) Disconnect connector from air flow meter.
2) Remove engine harness from clip.
3) Loosen hose clamps securing air intake boot, and remove air intake boot connecting with air flow meter.
4) Remove air cleaner ASSY mounting bolts.
5) Move air cleaner ASSY toward engine, and take it out from body.

Installation is in the reverse order of removal procedure.

Chamber Assembly

REMOVAL AND INSTALLATION

1) Remove mud guard.
2) Remove washer tank.
3) Remove nuts, and remove chamber ASSY from body.

Installation is in the reverse order of removal procedure.

TROUBLESHOOTING

General Troubleshooting Table

***: The CHECK ENGINE light blinks.**
***1: The CHECK ENGINE light blinks when contact is resumed during inspection (although poor contact is present in the D-check).**
***2: The CHECK ENGINE light lights when the mixture is leaner than that specified and does not light (U-check) or blink (D-check) when the mixture is richer.**
***3: The CHECK ENGINE light lights when abnormality is detected in the D-check mode if the idle switch persistently remains off with the acclerator pedal released.**

Symbols shown in the table refer to the degree of possibility of the reason for the trouble ("Very often" to "Rarely").
◎ : Very often
○ : Sometimes
△ : Rarely
☆ : Occurs only in extremely low temperatures

TROUBLE		
1	Engine will not start	No initial combustion
2		Initial combustion occurs.
3		Engine stalls after initial combustion.
4	Rough idle and engine stall	
5	Inability to drive at constant speed	
6	Inability to accelerate and decelerate	
7	Engine does not return to idle.	
8	Afterburning in exhaust system	
9	Knocking	
10	Excessive fuel consumption	
11		
U	CHECK ENGINE light operation	U-check mode & read memory mode
D		D-check mode

TROUBLE No.										#		POSSIBLE CAUSE
1	2	3	4	5	6	7	8	9	10	U	D	
												AIR FLOW METER
		☆	◎				△	△	○	ON	ON	• Connector not connected
		△	◎	◎	◎		◎	○	△	ON	*1	• Poor contact of terminal
		☆	◎				△	○	△	ON	ON	• Short circuit
		☆	◎				△	△	○	ON	ON	• Discontinuity of wiring harness
		○	○	○	○		△	◎	○	*2	*2	• Performance characteristics unusual
												COOLANT THERMOSENSOR
	☆	○	☆		○		○	○	○	ON	ON	• Connector not connected
	△	△	◎	○	○		◎	△	○	ON	*1	• Poor contact of terminal
	☆	○	☆		○		○	○	○	ON	ON	• Short circuit
	☆	○	☆		○		○	○	○	ON	ON	• Discontinuity of wiring harness
	☆	○	☆		○		◎	◎	◎	*2	*2	• Performance characteristics unusual
												IDLE SWITCH OF THROTTLE SENSOR
				○	◎		◎			OFF	ON	• Connector not connected
				○			○			ON	*1	• Poor contact of terminal
				○	△		○			ON	ON	• Short circuit
					△		○			OFF	ON	• Discontinuity of wiring harness
							○			OFF	*3	• Improper adjustment
1	2	3	4	5	6	7	8	9	10	U	D	

#: CHECK ENGINE light

TROUBLE No.											#		POSSIBLE CAUSE
1	2	3	4	5	6	7	8	9	10		U	D	
													THROTTLE SENSOR
					◎		◎				ON	ON	• Connector not connected
				◎	◎		◎				ON	*1	• Poor contact of terminal
△					◎		◎				ON	ON	• Short circuit
					◎		◎				ON	ON	• Discontinuity of wiring harness
	○	○	△	○	◎		◎				OFF	*	• Performance characteristics unusual
													PRESSURE REGULATOR
	○	○	◎	◎	◎	○		△			*2	*2	• Sensing hose not connected
	△				○		○		◎		OFF	*	• Fuel pressure too high
○	○	○	◎	◎	◎		◎				*2	*2	• Fuel pressure too low
													FUEL INJECTOR
	◎	◎	○	○	○		○	○			ON	*1	• Connector not connected
	○	○	○	◎	◎		○				ON	ON	• Poor contact of terminal
	◎	◎	○	○	○		○				ON	ON	• Short circuit
	◎	◎	○	○	○		○	○			ON	ON	• Discontinuity of wiring harness
	△	○	○	△	○		○	△	○		*2	*2	• Performance characteristics unusual
	△	○	△	△	○		○	△			*2	*2	• Clogged filter
	△	○	○	○	○		○	△			*2	*2	• Clogged nozzle
○											OFF	*	• Stuck open
			○				○		○		OFF	*	• Slight leakage from seat
													CRANK ANGLE SENSOR
◎											ON	ON	• Connector disconnected
	○	○	◎	◎	◎		○	○			ON	*1	• Poor contact of terminal
◎											ON	ON	• Short circuit
◎											ON	ON	• Discontinuity of wiring harness
													POWER TRANSISTOR OF IGNITION COIL
◎											OFF	*	• Connector not connected
	○	○	◎	◎	◎		○				OFF	*	• Poor contact of terminal
◎											OFF	*	• Short circuit
◎											OFF	*	• Discontinuity of wiring harness
													AIR REGULATOR [1800 cc model only]
						◎					OFF	*	• Connector not connected
	○	◎	○								OFF	*	• Short circuit
						◎					OFF	*	• Discontinuity of wiring harness
													KNOCK SENSOR [2700 cc model only]
								◎			ON	ON	• Connector not connected
				○	○						ON	ON	• Short circuit
								◎			ON	ON	• Discontinuity of wiring harness
1	2	3	4	5	6	7	8	9	10		U	D	

#: CHECK ENGINE light

TROUBLE No.											#		POSSIBLE CAUSE
1	2	3	4	5	6	7	8	9	10	11	U	D	
													AIR CONTROL VALVE [2700 cc model only]
	○	△	◎								ON	ON	• Connector not connected
	△	○	◎								ON	*1	• Poor contact of terminal
			○				○				ON	ON	• Short circuit
	○	△	◎								ON	ON	• Discontinuity of wiring harness
			◎			◎					OFF	*	• IAS improperly adjusted
					◎	◎					ON	*	• Stuck open
	○	○	◎								OFF	*	• Stuck closed
													ENGINE GROUNDING
○											ON		• Disconnecting of engine grounding terminal at intake manifold
◎	◎	○	◎	◎	◎						ON	*1	• Poor contact of engine grounding terminal
○											ON		• Discontinuity of wiring harness for engine grounding
1	2	3	4	5	6	7	8	9	10	11	U	D	

#: CHECK ENGINE light

Self-diagnosis System

General

The self-diagnosis system detects and indicates a fault in various inputs and outputs of the complex electronic control. The warning lamp (CHECK ENGINE light) on the instrument panel indicates occurrence of a fault or trouble, and also the light emitting diode (LED) in the control unit indicates a trouble code.

Further, against such a failure of sensors as may disable the drive, the fail-safe function is provided to ensure the minimal driveability.

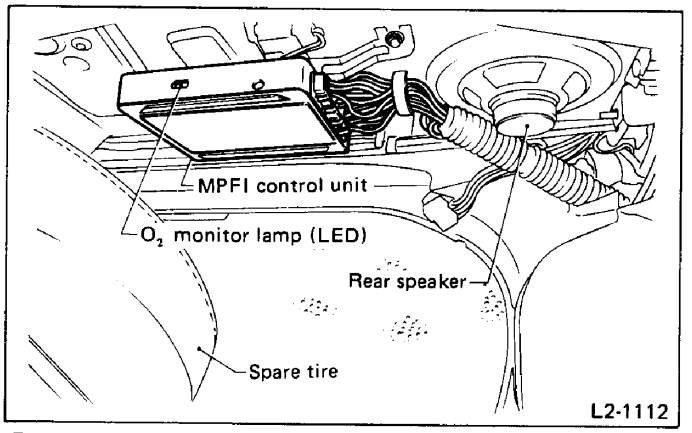


Fig. 51

SELF-DIAGNOSIS FUNCTION

The MPFI control unit executes the computational processing on the input information received from various sensors and produces the output information for driving the fuel injector, fuel pump, etc.

Along with this computational processing, it reads out all the input/output information to examine matching with the predetermined levels (proper values or ranges). If a predetermined level is not satisfied, i.e., a fault is found, the warning lamp is signaled to a driver. In this fashion, the self-diagnosis function is performed.

FAIL-SAFE FUNCTION

For the part which has been judged faulty in the self-diagnosis, the MPFI control unit generates the associated pseudo signal (only when convertible to electric signal) and carries out the computational processing. In this fashion, the fail-safe function is performed.

Function of Self-diagnosis

The self-diagnosis function has four modes: U-check mode, Read memory mode, D-check mode and Clear memory mode. Two connectors (Read memory and Test mode) and two lamps (CHECK ENGINE light and O_2 monitor) are used. The connectors are for mode selection and the lamps monitor the type of problem.

RELATIONSHIP BETWEEN MODES AND CONNECTORS

Mode	Engine	Read memory connector	Test mode connector
U-check	Ignition ON	DISCONNECT	DISCONNECT
Read memory	Ignition ON	CONNECT	DISCONNECT
D-check	Ignition ON	DISCONNECT	CONNECT
Clear memory	Ignition ON (engine on)	CONNECT	CONNECT

U-CHECK MODE

The U-check is a user-oriented mode in which only the MPFI components necessary for start-up and drive are diagnosed. On occurrence of a fault, the warning lamp (CHECK ENGINE light) is lighted to indicate to the user that the dealer's inspection is necessary. The diagnosis of other parts which do not give significant adverse effect to start-up and drive are excluded from this mode in order to avoid unnecessary uneasiness to be taken by the user.

READ MEMORY MODE

This mode is used by the dealer to read past problems (even when the vehicle's monitor lamps are off). It is most effective in detecting poor contact or loose connections of connectors, harnesses, etc.

D-CHECK MODE

This mode is used by the dealer to check the entire MPFI system and detect faulty parts.

CLEAR MEMORY MODE

This mode is used by the dealer to clear the trouble code from the memory after the affected part is repaired.

Basic Operation of Self-diagnosis System

NO TROUBLE

○ : CONNECT X : DISCONNECT

	Engine	Read memory connector	Test mode connector	CHECK ENGINE light	O_2 monitor lamp	Remarks
1	ON	X	X	OFF	O_2 monitor	
2	ON	○	X	OFF	O_2 monitor	
*3	ON	X	○	** OFF → Blink	OFF	Vehicle specification code is outputted when CHECK ENGINE light is OFF.
*4	ON	○	○	OFF → Blink	OFF	All memory stored in control unit is cleared after CHECK ENGINE light blinks.
5	OFF (Ignition switch ON)	○	X	ON	Vehicle specification code	Before starting the engine, the self-diagnosis system assumes the engine to be in NO TROUBLE condition.
6	OFF (Ignition switch ON)	X	X	ON	Vehicle specification code	
7	OFF (Ignition switch ON)	X	○	ON	Vehicle specification code	
8	OFF (Ignition switch ON)	○	○	ON	Vehicle specification code	

TROUBLE

	Engine	Read memory connector	Test mode connector	CHECK ENGINE light	O_2 monitor lamp	Remarks
9	ON	X	X	ON	Trouble code	
10	ON	○	X	ON	Trouble code (memory)	
*11	ON	X	○	** OFF → ON	Trouble code	Vehicle specification code is outputted when CHECK ENGINE light is OFF.
*12	ON	○	○	** OFF → ON	Trouble code	
13	OFF (Ignition switch ON)	○	X	ON	Trouble code (memory)	
14	STALL (Ignition switch ON)	X	X	ON	Trouble code	
15	STALL (Ignition switch ON)	X	○	ON	Trouble code	
16	STALL (Ignition switch ON)	○	○	ON	Trouble code	

***: Ignition timing is set to 20° BTDC (when the engine is on, test mode connector is connected, and idle switch is ON).**

****: CHECK ENGINE light remains off until engine is operated at speed greater than 2,000 rpm for at least 40 seconds.**

List of Trouble Codes

Trouble code	Item	U-check	D-check	Page
11	Crank angle sensor (No reference pulse)	O	O	71
12	Starter switch (Continuously in ON position or continuously in OFF position while cranking)	O	O	73
13	Crank angle sensor (No position pulse)	O	O	74
14	Fuel injectors *#1 and #2, **#5 and #6 (Abnormal injector output)	O	O	*76 **77
15	Fuel injectors *#3 and #4, **#1 and #2 (Abnormal injector output)	O	O	*78 **79
21	Water temperature sensor (Open or shorted circuit)	O	O	80
**22	Knock sensor (Open or shorted circuit)	O	O	81
23	Air flow meter (Open or shorted circuit)	O	O	82
**24	By-pass air control valve (Open or shorted circuit)	O	O	83
**25	Fuel injectors #3 and #4 (Abnormal injector output)	O	O	84
31	Throttle sensor (Open or shorted circuit)	O	O	*85 **86
32	O_2 sensor (Abnormal sensor signal)	O	O	87
33	Car-speed sensor (No signal is present during operation)	O	O	88
35	Purge control solenoid valve (Solenoid switch continuously in ON or OFF position)	–	O	89
41	System too lean	O	O	90
42	Idle switch (Abnormal idle switch signal in relation to throttle sensor output)	–	O	91
51	Neutral switch (No signal is present)	–	O	92

*: 1800 cc model **: 2700 cc model

List of Specification Codes

		1800 cc model	2700 cc model
MT	49-state and Canada	05	01
	California	06	02
AT	49-state and Canada	07	03
	California	08	04

How to Read Trouble Codes (Flashing)

The O_2 monitor lamp flashes the code corresponding to the faulty part.
The long segment (1.2 sec on) indicates a "ten", and the short segment (0.2 sec on) signifies a "one".

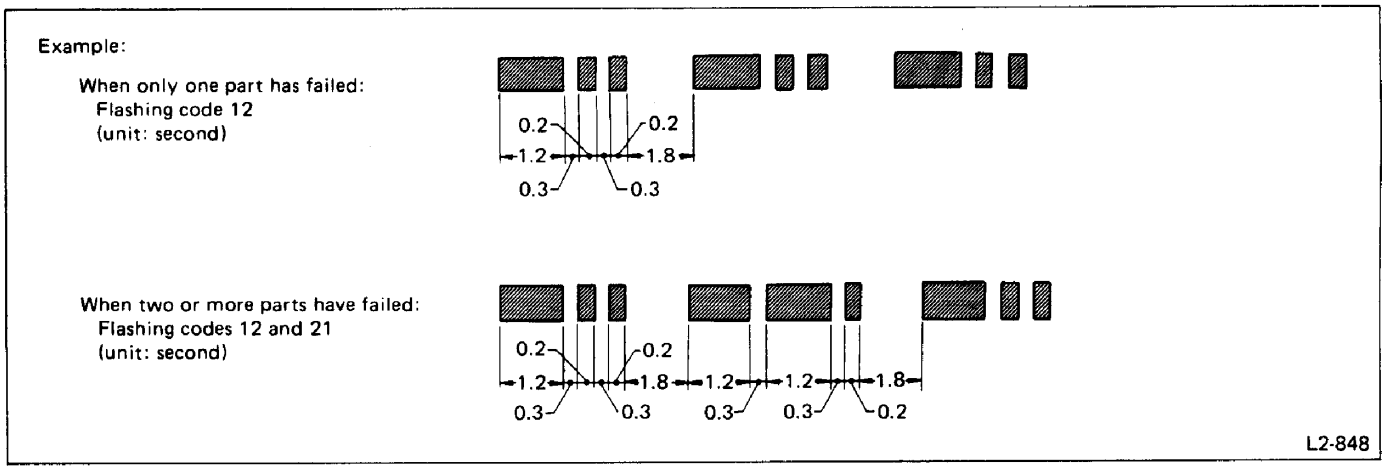


Fig. 52

MPFI System Layout

1800 cc model

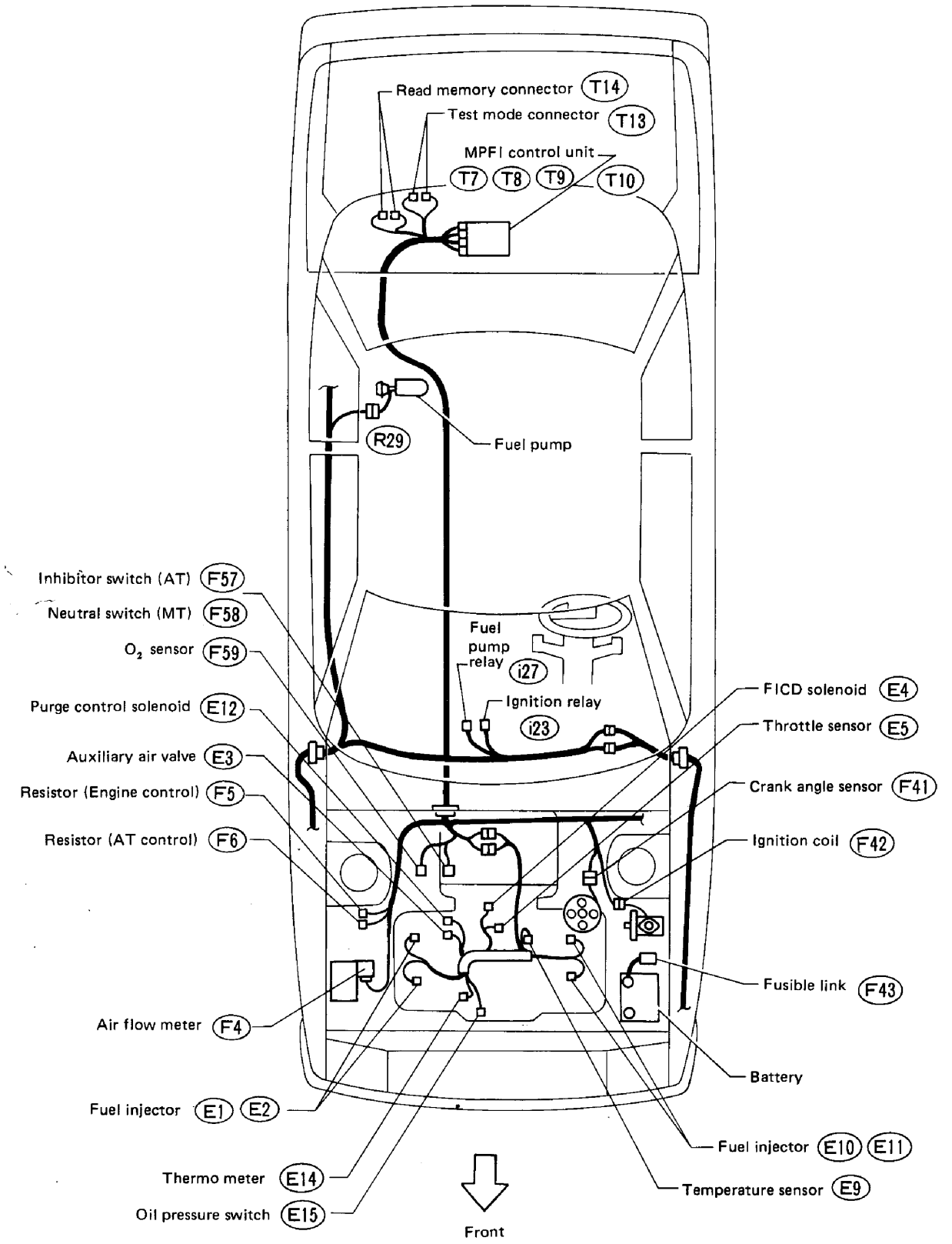


Fig. 55

L2-1489

2700 cc model

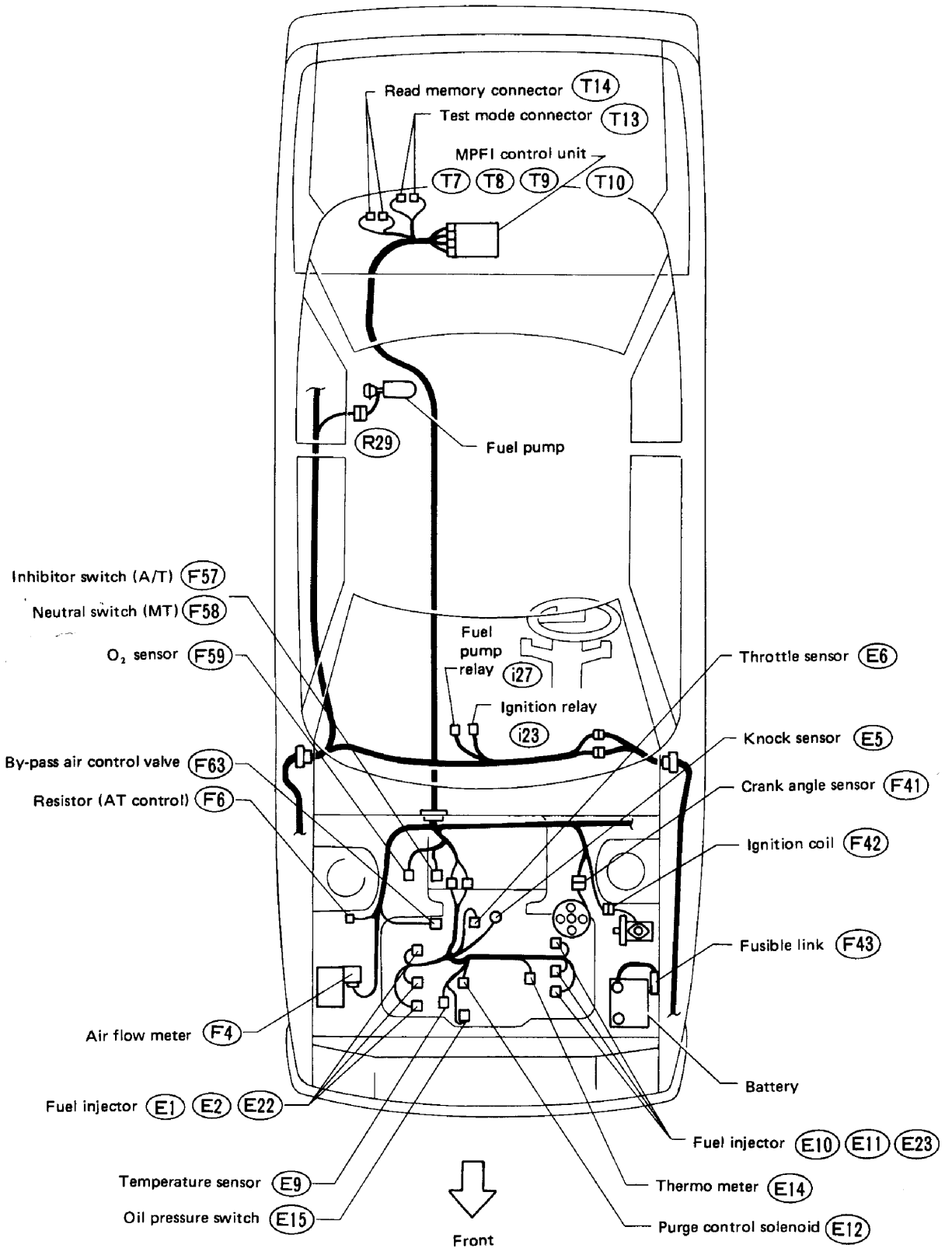


Fig. 56

L2-1490

Connector Terminal

CONTROL UNIT CONNECTOR [1800 cc model]

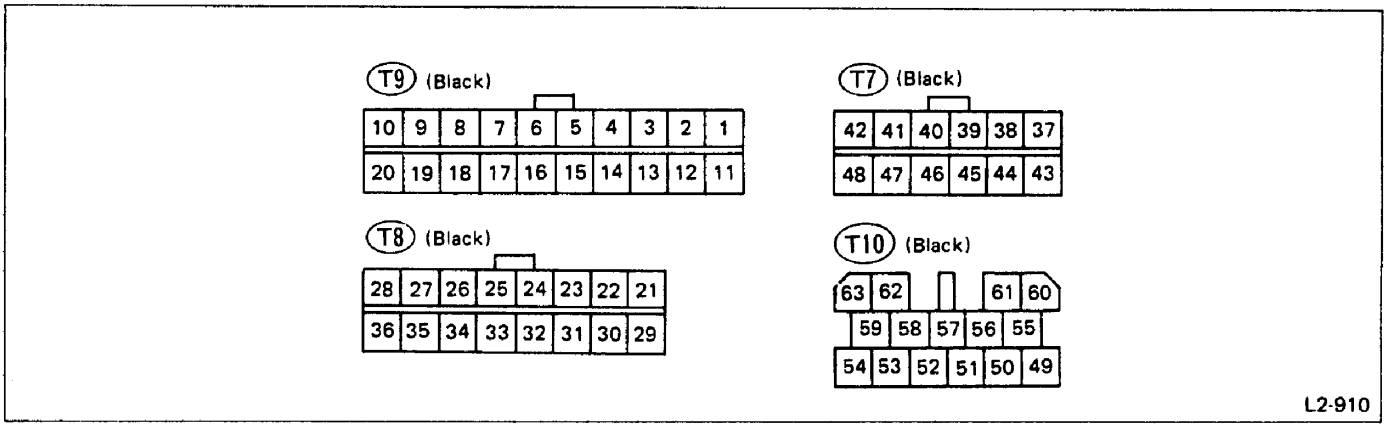


Fig. 57

1	YR	Check connector	32	Br	Test mode connector
2	W	Air flow meter (signal)	33	LgW	Read-memory connector
3	GL	Purge control solenoid	34	–	–
4	GY	Neutral switch (MT)	35	WR	Control unit power (input)
	YL	Inhibitor switch (AT)	36	–	–
5	B	Air flow meter (ground)	37	WY	Ignition output (power transistor)
6	LB	Fuel pump relay	38	LgR	Air flow meter (burn-off output)
7	R	Crank angle sensor (power)	39	GW	Self-shutoff output
8	B	Crank angle sensor (reference)	40	RY	CHECK ENGINE light
9	WB	Water temperature sensor	41	–	–
10	BR	Ground	42	RB	A/C cut control
11	–	–	43	WY	Ignition output (power transistor)
12	W	Air flow meter (power)	44	RL	Check connector
13	–	–	45	GB	Check connector
14	YW	Inhibitor switch (AT)	46	L	Check connector
15	Lg	Inhibitor switch (AT)	47	R	Trouble code output
16	BR	Throttle sensor (ground)	48	W	O_2 sensor
17	W	Crank angle sensor (position signal)	49	W	Fuel injector #1, #2
18	–	–	50	W	Fuel injector #1, #2
19	BW	Ignition switch signal	51	WL	Fuel injector #3, #4
20	BR	Ground	52	WL	Fuel injector #3, #4
21	W	Throttle sensor (power supply)	53	–	–
22	B	Throttle sensor (signal)	54	–	–
23	L	Air conditioner signal	55	W	Fuel pump control
24	BW (MT) BY (AT)	Starter signal	56	B	Ground (ignition)
25	LW	Idle switch signal	57	B	Ground (ignition)
26	–	–	58	–	–
27	WR	Control unit power (input)	59	G	Auxiliary air valve control
28	BY	Specification code	60	BR	Ground (fuel injector)
29	YR	Car-speed sensor	61	BR	Ground (fuel injector)
30	BR	Identification of AT and MT	62	R	Power (fuel injector)
31	–	–	63	–	–

CONTROL UNIT CONNECTOR [2700 cc model]

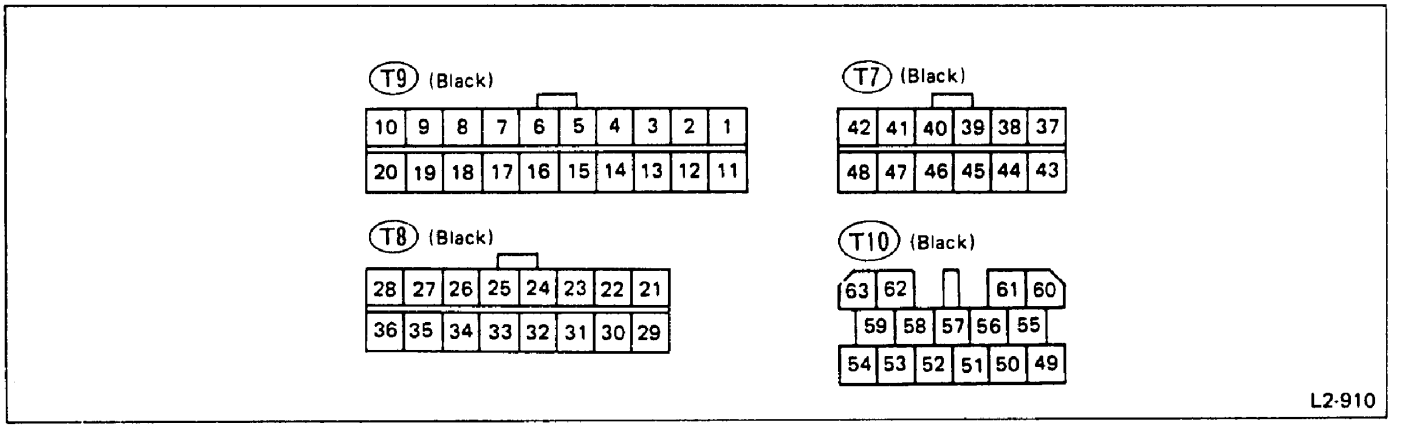
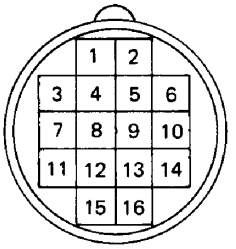


Fig. 58

1	YR	Check connector	32	Br	Test mode connector
2	W	Air flow meter (signal)	33	LgW	Read-memory connector
3	GL	Purge control solenoid	34	–	–
4	GY	Neutral switch (MT)	35	WR	Control unit power (input)
	YL	Inhibitor switch (AT)	36	R	Knock sensor
5	B	Air flow meter (ground)	37	WY	Ignition output (power transistor)
6	LB	Fuel pump relay	38	LgR	Air flow meter (burn-off output)
7	R	Crank angle sensor (power)	39	GW	Self-shutoff output
8	G	Crank angle sensor (position signal)	40	RY	CHECK ENGINE light
9	WB	Water temperature sensor	41	–	–
10	BR	Ground	42	RB	A/C cut control
11	–	–	43	WY	Ignition output (power transistor)
12	R	Air flow meter (power)	44	RL	Check connector
13	–	–	45	GB	Check connector
14	YW	Inhibitor switch (AT)	46	L	Check connector
15	Lg	Inhibitor switch (AT)	47	R	Trouble code output
16	BR	Throttle sensor (ground)	48	W	O_2 sensor
17	W	Crank angle sensor (reference)	49	W	Fuel injector #5, #6
18	–	–	50	W	Fuel injector #5, #6
19	BW	Ignition switch signal	51	WR	Fuel injector #1, #2
20	BR	Ground	52	WR	Fuel injector #1, #2
21	W	Throttle sensor (power supply)	53	WY	Fuel injector #3, #4
22	B	Throttle sensor (signal)	54	WY	Fuel injector #3, #4
23	L	Air conditioner signal	55	B	Fuel pump control
24	BW (MT) BY (AT)	Starter signal	56	B	Ground (ignition)
25	LW	Idle switch signal	57	B	Ground (ignition)
26	–	–	58	YR	By-pass air control
27	WR	Control unit power (input)	59	YL	By-pass air control
28	–	–	60	BR	Ground (fuel injector)
29	YR	Car-speed sensor	61	BR	Ground (fuel injector)
30	BR	Identification of AT and MT	62	R	Power (fuel injector)
31	LB	Specification code	63	Br	Power steering control

Engine-to-body harness connector (body side) . . . (F61) [1800 cc model]

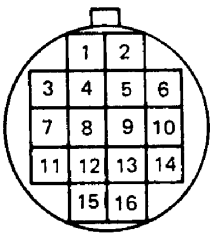


L2-1491

Fig. 59

1	WB	Water temperature sensor
2	BR	Ground
3	–	–
4	W	Fuel injector #2
5	BR	Ground
6	W	Fuel injector #1
7	WL	Fuel injector #4
8	–	–
9	WL	Fuel injector #3
10	–	Shield
11	B	Ground
12	G	Auxiliary air valve
13	GL	Purge control solenoid
14	–	–
15	BR	Ground
16	BY	Specification code signal

Engine-to-body harness connector (body side) . . . (F60) (Black) [1800 cc model]

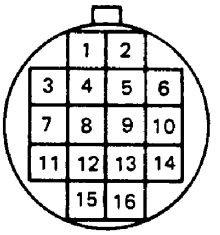


L2-912

Fig. 60

1	BR	Ground
2	YB	Oil pressure
3	W	Fuel injector #1 (power)
4	YG	Water temperature gauge
5	RB	Fuel injector #2 (power)
6	L	Air conditioner signal
7	LW	Idle switch (signal)
8	R	Fuel injector #3 (power)
9	W	Throttle sensor (power)
10	RL	Fuel injector #4 (power)
11	L	Auxiliary air valve
12	B	Throttle sensor
13	BR	Throttle sensor (ground)
14	B	Ground
15	BW	Solenoid (power)
16	BR	Ground

Engine-to-body harness connector (body side) . . . (F60) (Black)
[2700 cc model]

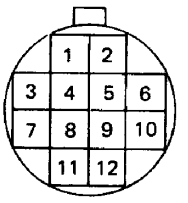


L2-912

Fig. 61

1	BR	Ground
2	BR	Ground
3	W	Fuel injector #5
4	WR	Fuel injector #1
5	W	Fuel injector #6
6	WR	Fuel injector #2
7	WY	Fuel injector #3
8	B	Ground
9	B	Ground
10	WY	Fuel injector #4 (signal)
11	R	Fuel injector (power)
12	R	Fuel injector (power)
13	YG	Water temperature gauge
14	YB	Oil pressure
15	R	Knock sensor
16	–	Shield

Engine-to-body harness connector (body side) . . . (F61)
[2700 cc model]

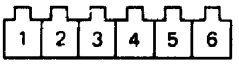


L2-1492

Fig. 62

1	BR	Ground
2	BR	Ground
3	WB	Water temperature sensor
4	–	–
5	GL	Purge control solenoid
6	BW	Purge control solenoid
7	BR	Throttle sensor (ground)
8	W	Throttle sensor (power)
9	B	Throttle sensor (signal)
10	LW	Idle switch (signal)
11	–	–
12	BR	Ground

Air flow meter connector . . . (F4) (Black)



L2-913

Fig. 63

1	LgR	Control unit (burn-off output)
2	*W **R	Control unit (power)
3	B	Ground (control unit)
4	BR	Ground (intake manifold)
5	W	Control unit (sensor signal)
6	–	———

*: 1800 cc model **: 2700 cc model

Ignition coil (power transistor) . . . (F42) (Black)

L2-860

Fig. 64

1	BW	Power supply
2	WY	Control unit (ignition control signal)

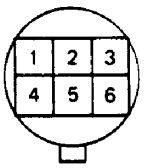
Crank angle sensor . . . (F41) (Black)

Fig. 65

1	BR	Control unit (ground)
2	*B **G	Control unit (position signal)
3	W	Control unit (reference signal)
4	R	Control unit (power supply)

*: 1800 cc model **: 2700 cc model

Dropping resistor . . . (F5) (Black)
[1800 cc model only]



L2-917

Fig. 66

1	W	Fuel injector #1
2	—	———
3	RL	Fuel injector #2
4	R	Fuel injector #3
5	R	Power
6	RB	Fuel injector #4

Fuel injector . . . (E1) (E11) (E2) (E10) (E22) (E23)

L2-918

Fig. 67

[1800 cc model]

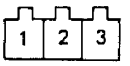
	#1	#2	#3	#4	
1	W	WB	WR	WL	Control unit (fuel injector control)
2	RW	RB	R	RL	Power (dropping resistor)

[2700 cc model]

	#1	#2	#3	#4	#5	#6	
1	WR	WL	WY	WG	W	WR	Control unit (fuel injector control)
2	RY	R	RY	R	RY	R	Power

By-pass air control valve . . . (F63)
[2700 cc model only]

1	YL	Control unit (Close signal)
2	BW	Power
3	YR	Control unit (Open signal)



L2-1493

Fig. 68

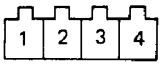
Auxiliary air valve . . . (E3) **(Sky blue)**
[1800 cc model only]

1	B	Control unit (Auxiliary air control)
2	L	Power

L2-918

Fig. 69

Throttle sensor . . . (E5) (Black)



L2-1115

Fig. 70

[1800 cc model]

1	G	Control unit (sensor signal)
2	W	Control unit (power)
3	B	Control unit (ground)
4	LW	Control unit (idle switch)

[2700 cc model]

1	BW	Control unit (power)
2	GB	Control unit (sensor signal)
3	GY	Control unit (idle switch)
4	B	Control unit (ground)

Purge control solenoid valve . . . (E12)

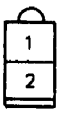


Fig. 71

L2-856

1	GL	Control unit (purge control)
2	BW	Power

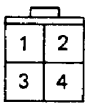
Water temperature sensor . . . (E9)

L2-918

Fig. 72

1	WB	Control unit (sensor signal)
2	BR	Ground

Fuel pump relay . . . (i27) (Brown)

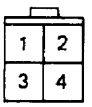


L2-859

Fig. 73

1	BW	Power (ignition)
2	R	Power
3	LB	Control unit
4	L	Fuel pump and auxiliary air valve

Ignition relay . . . (i23) (Black)



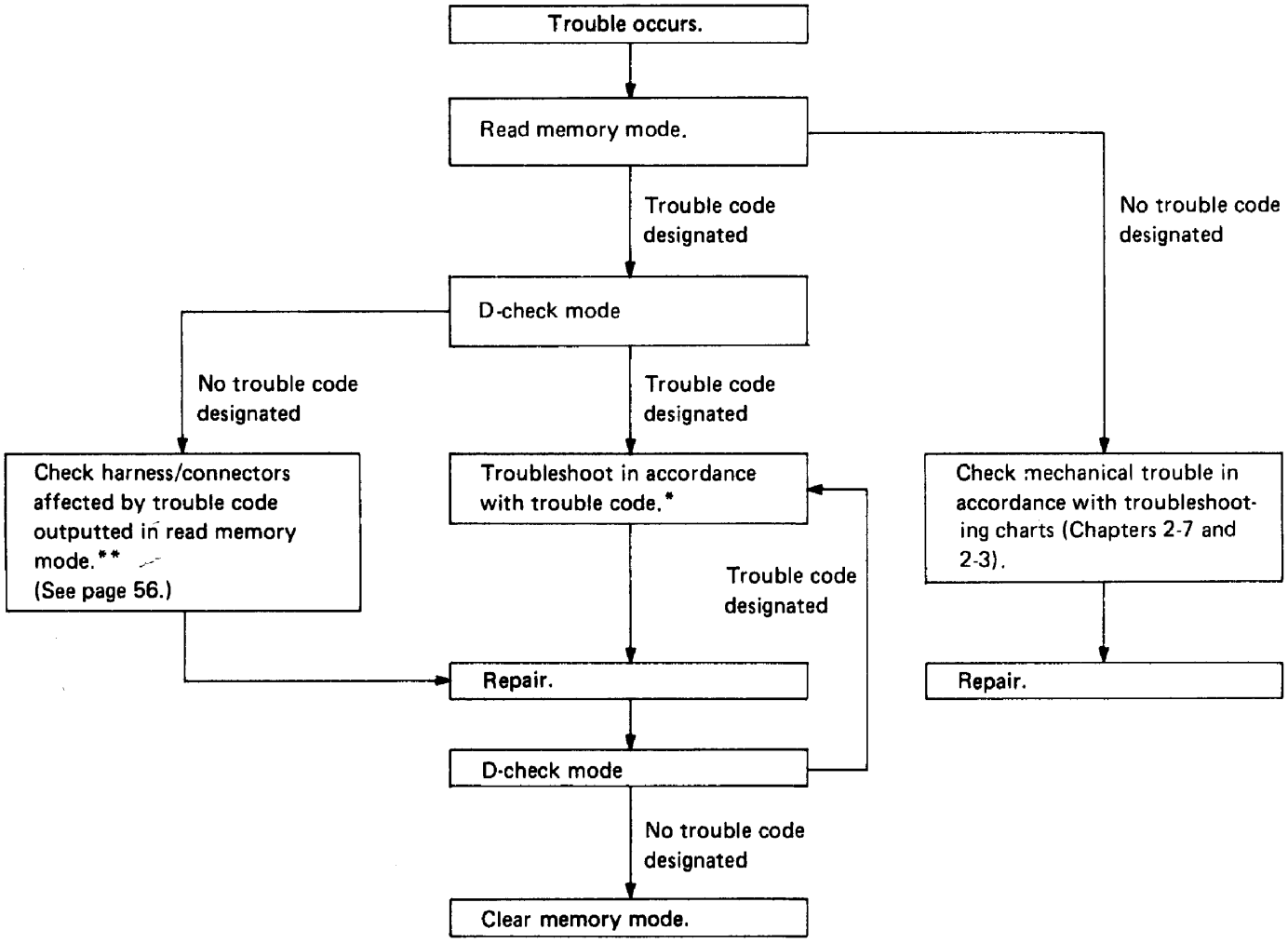
L2-859

Fig. 74

1	GW	Power (ignition)
2	R	Power
3	B	Ground
4	WB	Control unit

Troubleshooting Chart for Self-diagnosis System

Basic Troubleshooting Procedures

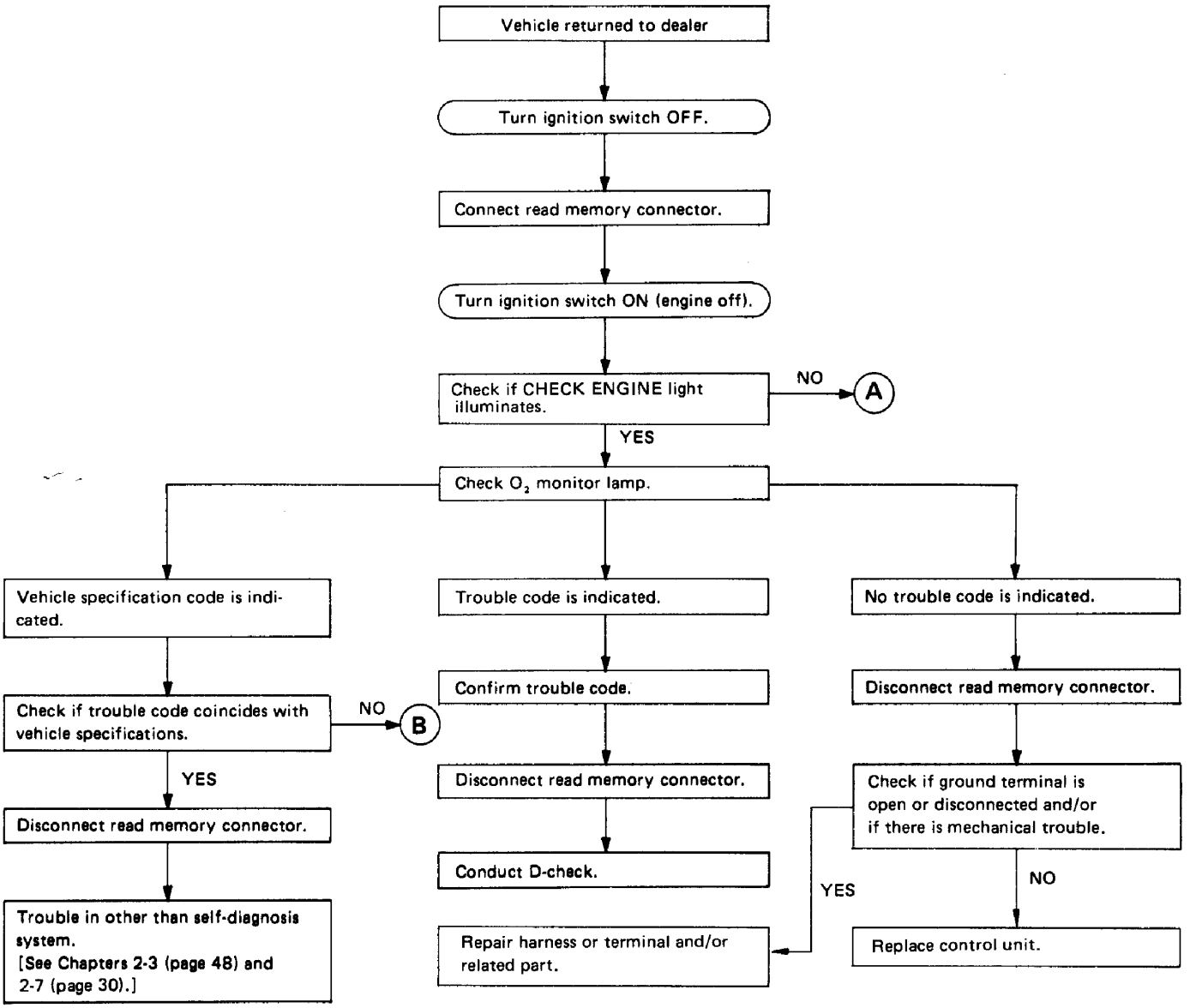


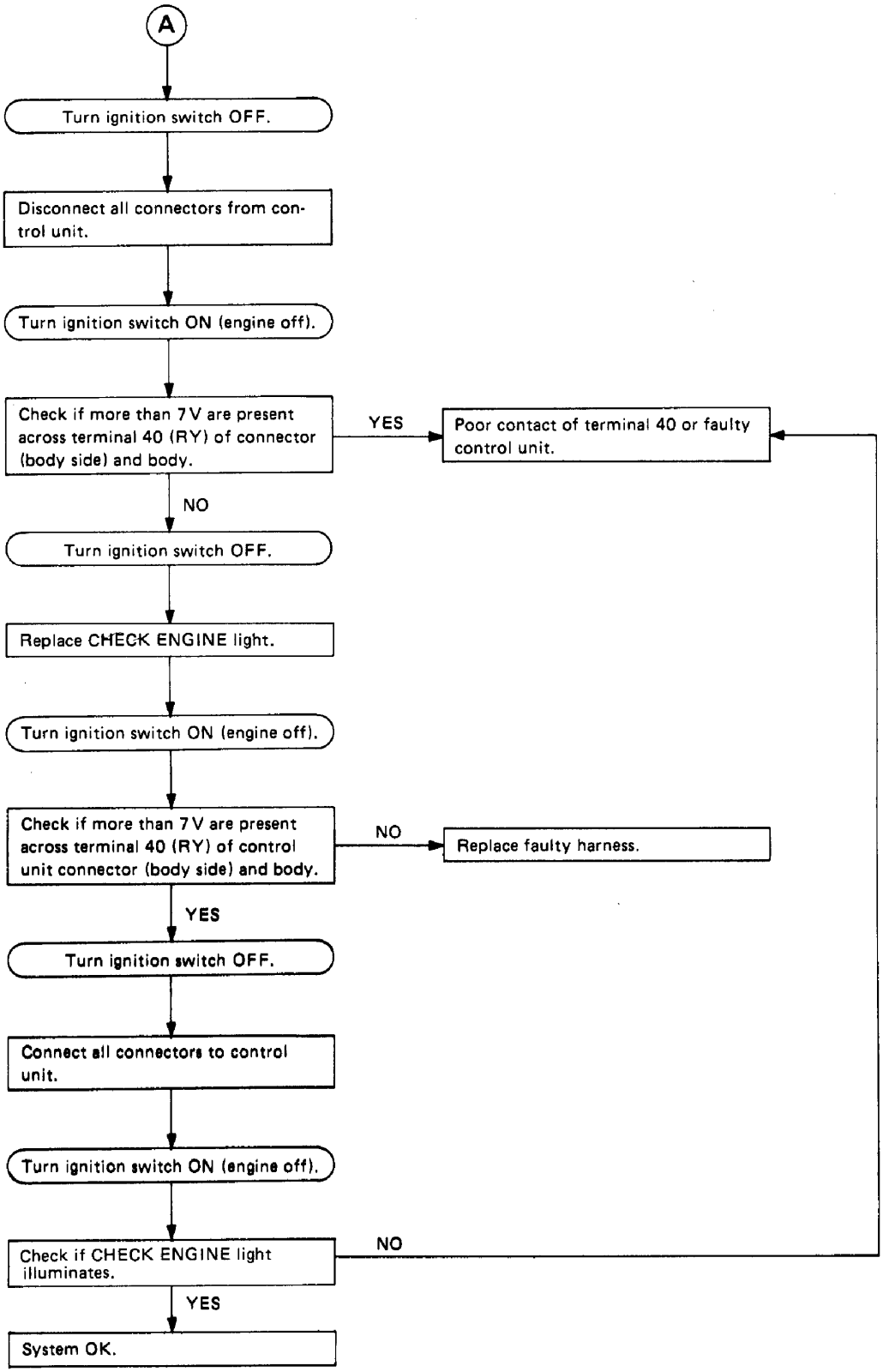
***: When more than one trouble code is outputted, begin troubleshooting with the smallest trouble code number and proceed to the next higher code.**
After correcting each problem, conduct the D-check and ensure that the corresponding trouble code no longer appears.

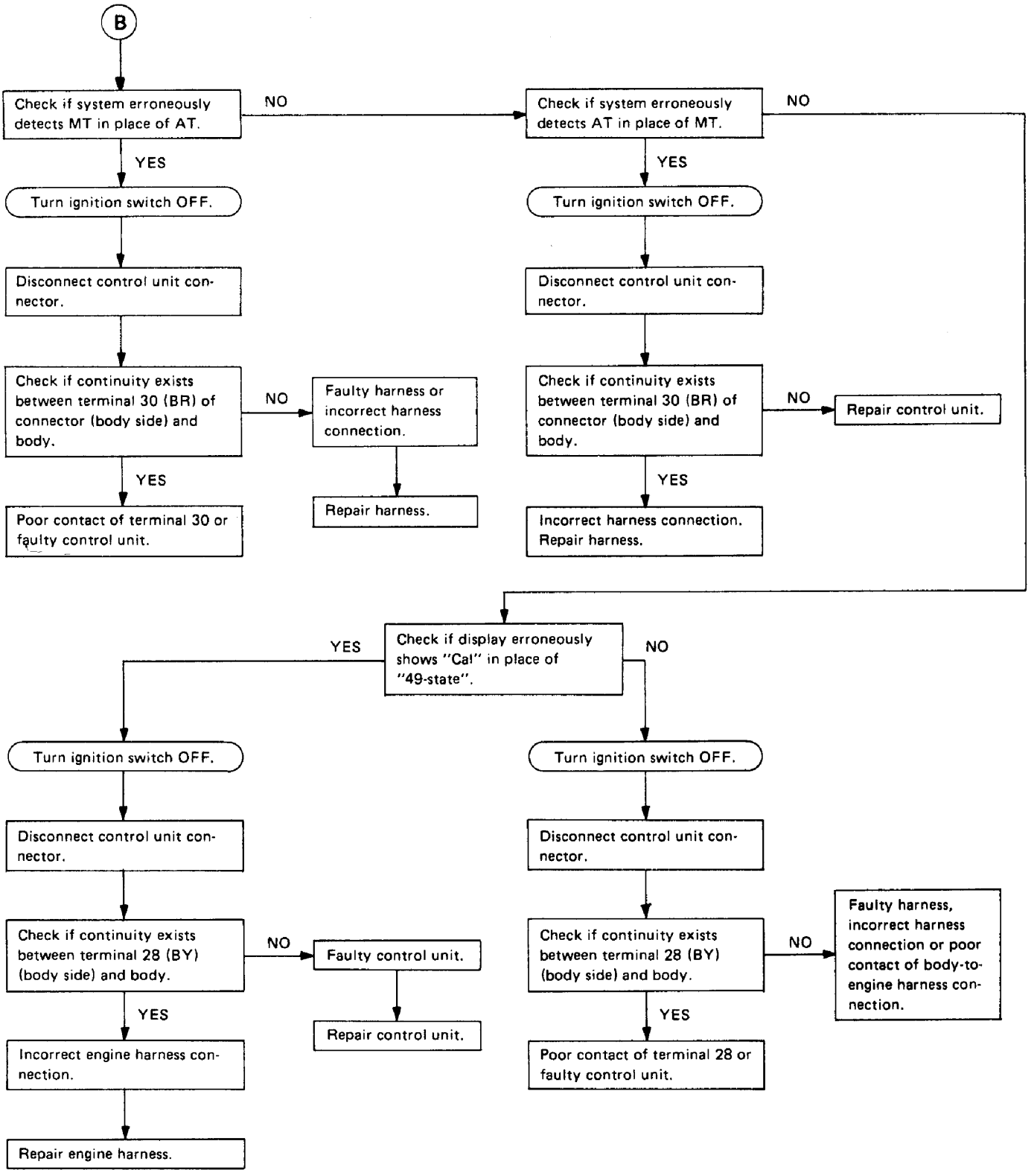
****: When more than one trouble code is outputted, check all related harness connectors, starting with that corresponding to the smallest trouble code number and proceeding to the next higher code.**

READ MEMORY MODE

WHEN VEHICLE IS RETURNED TO DEALER BECAUSE ECS LAMP LIGHTS

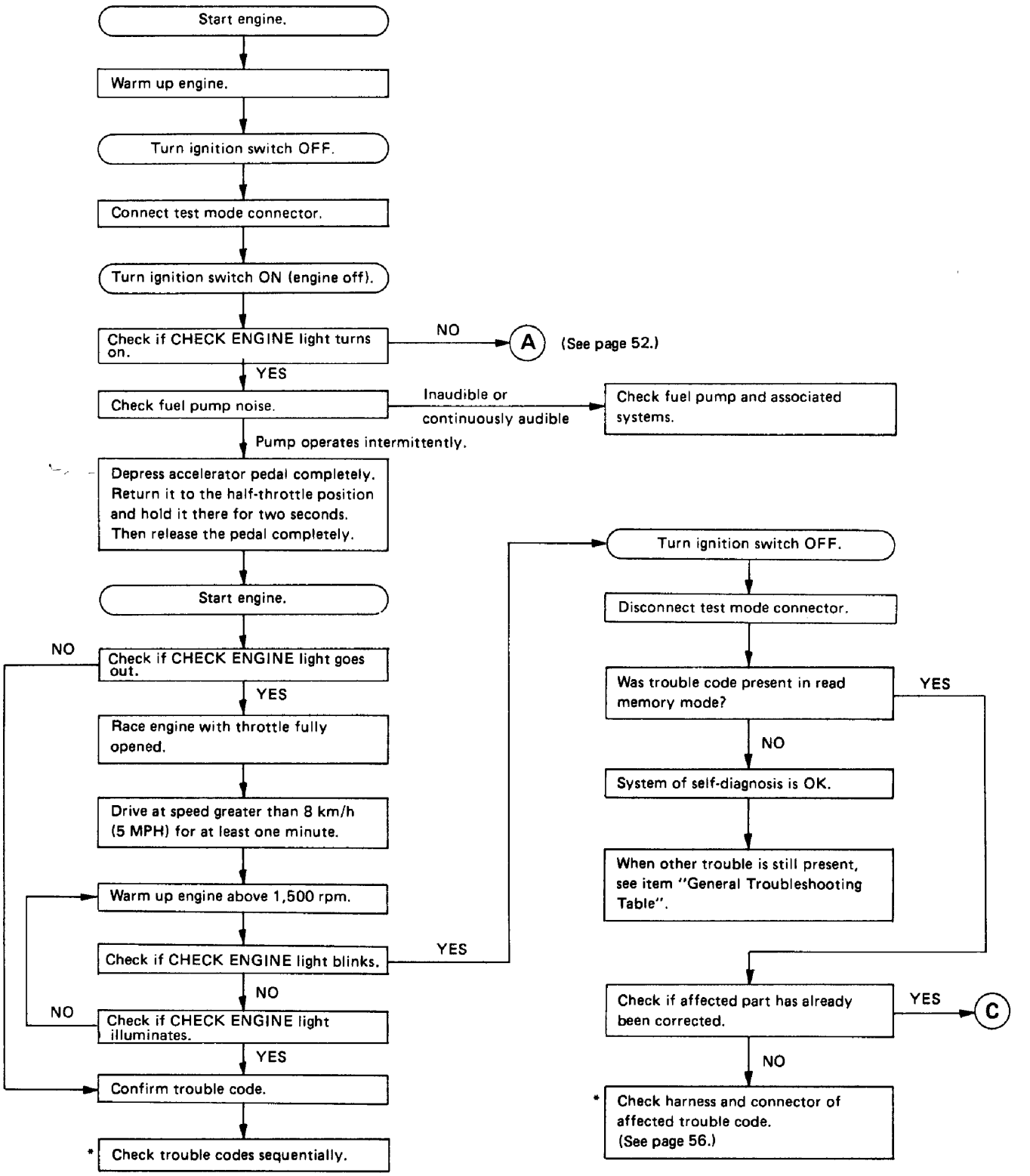



A
Turn ignition switch OFF.
Disconnect all connectors from control unit.
Turn ignition switch ON (engine off).
Check if more than 7 V are present across terminal 40 (RY) of connector (body side) and body.
YES
Poor contact of terminal 40 or faulty control unit.
NO
Turn ignition switch OFF.
Replace CHECK ENGINE light.
Turn ignition switch ON (engine off).
Check if more than 7 V are present across terminal 40 (RY) of control unit connector (body side) and body.
NO
Replace faulty harness.
YES
Turn ignition switch OFF.
Connect all connectors to control unit.
Turn ignition switch ON (engine off).
Check if CHECK ENGINE light illuminates.
NO
YES
System OK.


B
Check if system erroneously detects MT in place of AT.
NO
YES
Turn ignition switch OFF.
Disconnect control unit connector.
Check if continuity exists between terminal 30 (BR) of connector (body side) and body.
NO
Faulty harness or incorrect harness connection.
Repair harness.
YES
Poor contact of terminal 30 or faulty control unit.
Check if system erroneously detects AT in place of MT.
NO
YES
Turn ignition switch OFF.
Disconnect control unit connector.
Check if continuity exists between terminal 30 (BR) of connector (body side) and body.
NO
Repair control unit.
YES
Incorrect harness connection. Repair harness.
Check if display erroneously shows "Ca!" in place of "49-state".
YES
NO
Turn ignition switch OFF.
Disconnect control unit connector.
Check if continuity exists between terminal 28 (BY) (body side) and body.
NO
Faulty control unit.
Repair control unit.
YES
Incorrect engine harness connection.
Repair engine harness.
Turn ignition switch OFF.
Disconnect control unit connector.
Check if continuity exists between terminal 28 (BY) (body side) and body.
NO
Faulty harness, incorrect harness connection or poor contact of body-to-engine harness connection.
YES
Poor contact of terminal 28 or faulty control unit.

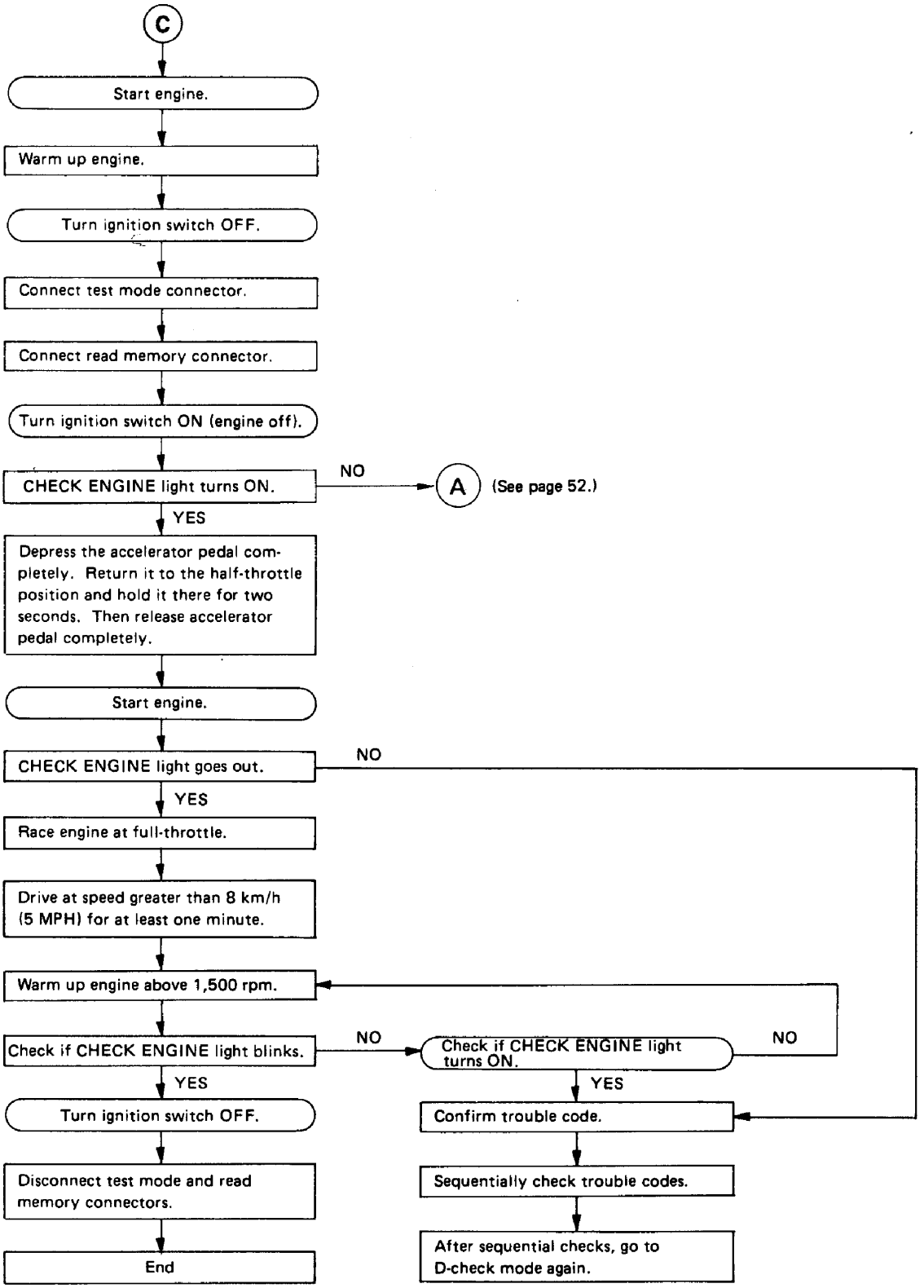
D-CHECK MODE

35



***: When more than one trouble code is outputted, sequentially check the trouble codes, starting with the smallest code number. After correcting each trouble, reconduct D-check and make sure the corresponding trouble code is no longer present. If another trouble code is outputted, carry out troubleshooting again.**

CLEAR MEMORY MODE



Checking Harnesses and Connectors Related to Trouble Codes

When a trouble code is outputted in the read memory mode but not in the D-check mode, check the affected harness and connector terminal as described below.

CHECKING TERMINALS OF CONTROL UNIT CONNECTOR (BODY SIDE)

1) When terminals are not locked securely, insert into connectors until they lock.

2) When terminals are considered to be open:
   (1) Method of determining "OK" or "Faulty":
   a. Pull out the terminal from the connector (body side).
   b. Insert this terminal (female) into the terminal (male) of the connector (control unit).
   c. Check "pull" force required to disconnect the female terminal from the male terminal.
   If the terminal is loose, it is "faulty".
   (2) When terminals are faulty:
   Pinch the terminal using a pair of nose pliers. If the terminal is still loose, replace it or the harness ASSY.

SYMPTOMS RESULTING FROM POOR CONTACT OF CONTROL UNIT CONNECTOR TERMINALS AND RELATED TROUBLE CODES

Terminal No.	Lead color	Trouble code	Symptom resulting from poor terminal contact
1	YR	–	No change occurs.
2	W	23	Engine stalls during idle. It can be restarted. Problems do not occur while driving.
3	GL	35	No change occurs.
4	YL or GY	–	No change occurs.
5	B	–	Engine runs at low speed and sometimes stalls during idle. It can be started but idle speed is low.
6	LB	–	Engine stalls during idle. It cannot be restarted if affected circuit remains opened. Engine lacks power while driving.
7	R	11	Engine stalls during idle. Shock is felt. Engine lacks power (poor acceleration) while driving.
8	*B **G	*11 **13	Engine stalls during idle. Shock is felt. Engine lacks power while driving.
9	WB	21	Slight shock is felt while engine is cold but is not felt after warm-up. Driving performance is affected while engine is cold but is not affected after warm-up.
10	BR	–	No change occurs.
11	–	–	———————
12	*W **R	23	Engine stalls during idle. It can be restarted. Problems do not occur while driving.
13	–	–	–
14	YW	–	No change occurs.
15	GY	–	No change occurs.
16	BR	–	No change occurs.

*: 1800 cc model only
**: 2700 cc model only

Terminal No.	Lead color	Trouble code	Symptom resulting from poor terminal contact
17	W	*13 **11	Engine stalls during idle. Shock is felt. Engine power while driving.
18	–	–	–
19	BW	–	Engine stalls during idle. It cannot be restarted. Shock is felt if poor intermittent contact occurs while driving.
20	BR	–	No change occurs.
21	W	31	Shock is not felt. Engine acceleration is poor.
22	B	31	Shock is not felt. Engine acceleration is poor.
23	L	–	No change occurs.
24	BW (MT) BY (AT)	12	CHECK ENGINE light comes on and soon goes out when starting engine. There is no problem.
25	LW	–	No change occurs.
26	–	–	————
27	WR	–	No change occurs.
*28	BY	–	No change occurs.
29	YR	33	No change occurs.
30	BR	–	No change occurs.
**31	LB	–	No change occurs.
32	Br	–	No change occurs.
33	LgW	–	No change occurs.
34	–	–	————
35	WR	–	————
**36	R	22	Change rarely occurs. Engine sometimes knocks.
37	WY	–	No change occurs.
38	LgR	–	No change occurs.
39	GW	–	No change occurs.
40	RY	–	No change occurs.
41	–	–	————
42	RB	–	No change occurs.
43	WY	–	No change occurs.
44	RL	–	No change occurs.

*: 1800 cc model only
**: 2700 cc model only

Terminal No.	Lead color	Trouble code	Symptom resulting from poor terminal contact
45	GB	–	No change occurs.
46	L	–	No change occurs.
47	R	–	No change occurs.
48	W	–	No change occurs.
49	W	*14 **25	Engine stalls during idle. It cannot be restarted if there is poor contact of affected connection. Shock is felt if poor intermittent contact occurs while driving.
50	W	*14 **25	Engine stalls during idle. It cannot be restarted if there is poor contact of affected connection. Shock is felt if poor intermittent contact occurs while driving.
51	*WL **WR	*15 **14	Engine stalls during idle. It cannot be restarted if there is poor contact of affected connection. Shock is felt if poor intermittent contact occurs while driving.
52	*WL **WR	*15 **14	Engine stalls during idle. It cannot be restarted if there is poor contact of affected connection. Shock is felt if poor intermittent contact occurs while driving.
**53	WY	15	Engine stalls during idle. It cannot be restarted if there is poor contact of affected connection. Shock is felt if poor intermittent contact occurs while driving.
**54	WY	15	Engine stalls during idle. If cannot be restarted if there is poor contact of affected connection. Shock is felt if poor intermittent contact occurs while driving.
55	W	–	Engine stalls during idle. It cannot be restarted if there is poor contact of affected connection. Shock is felt if poor intermittent contact occurs while driving.
56	B	–	No change occurs.
57	B	–	No change occurs.
**58	YR	24	No change occurs.
**59	YL	24	Engine stalls occasionally.
60	BR	–	No change occurs.
61	BR	–	No change occurs.
62	R	–	No change occurs.
**63	Br	–	Difficulty in engine starting while engine is cold.

*: 1800 cc model only
**: 2700 cc model only

Troubleshooting for Engine Starting Failure

1. GROUND & CONTROL UNIT POWER SUPPLY

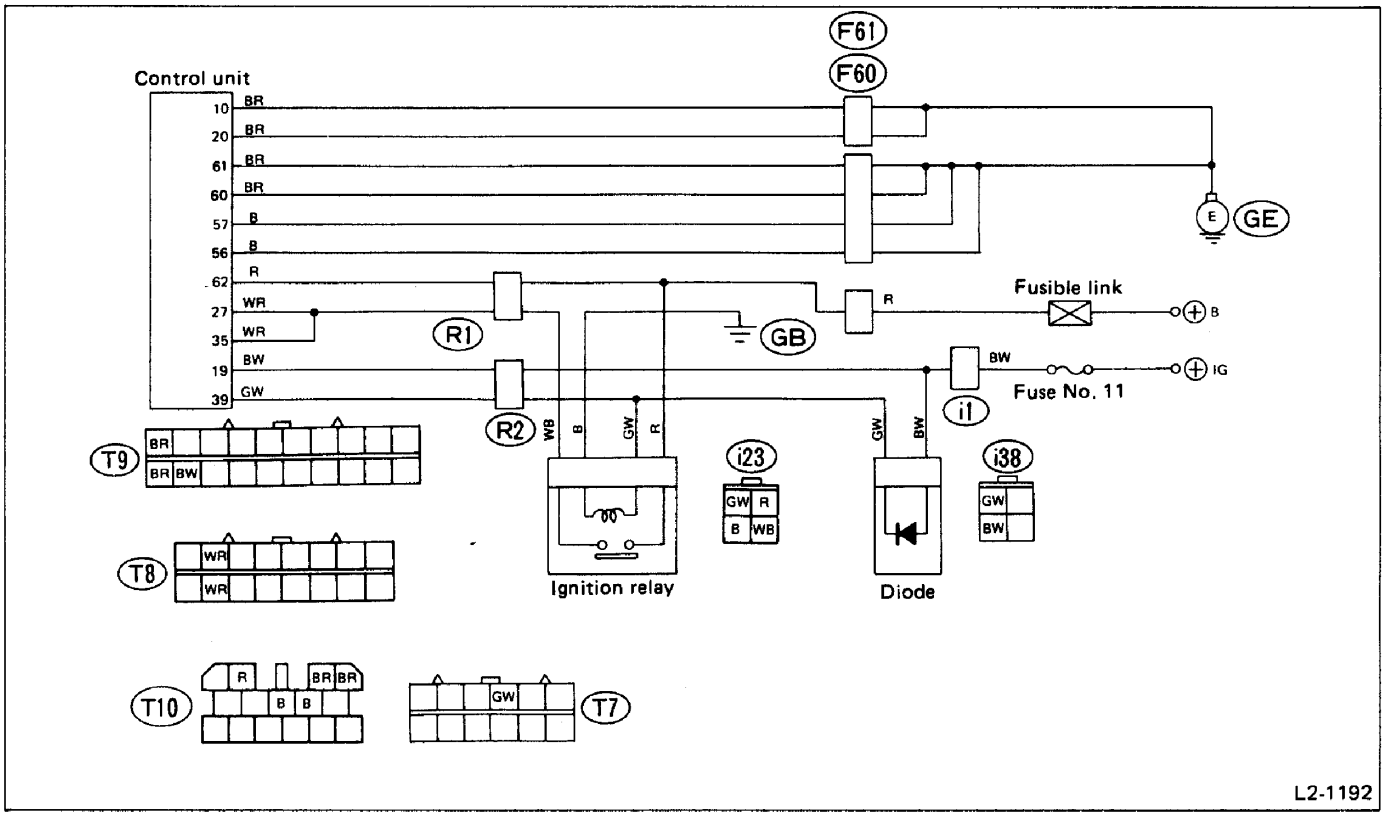
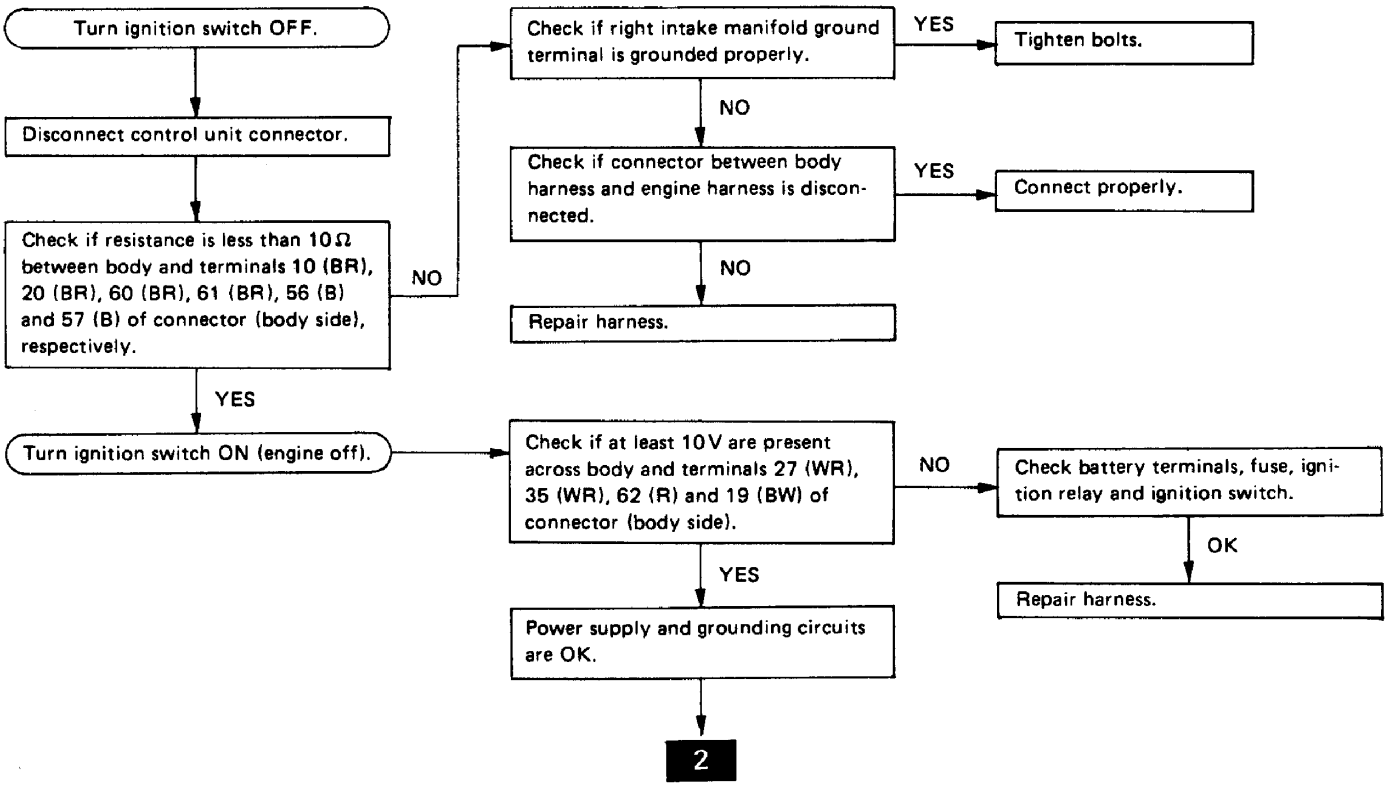


Fig. 75



2. IGNITION CONTROL SYSTEM

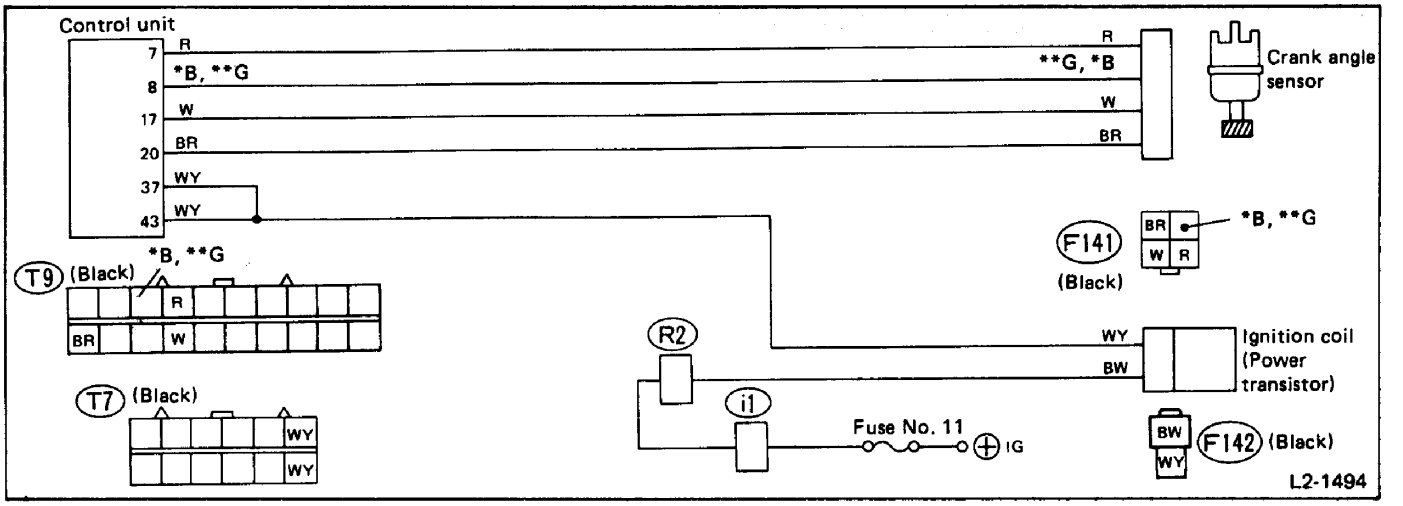
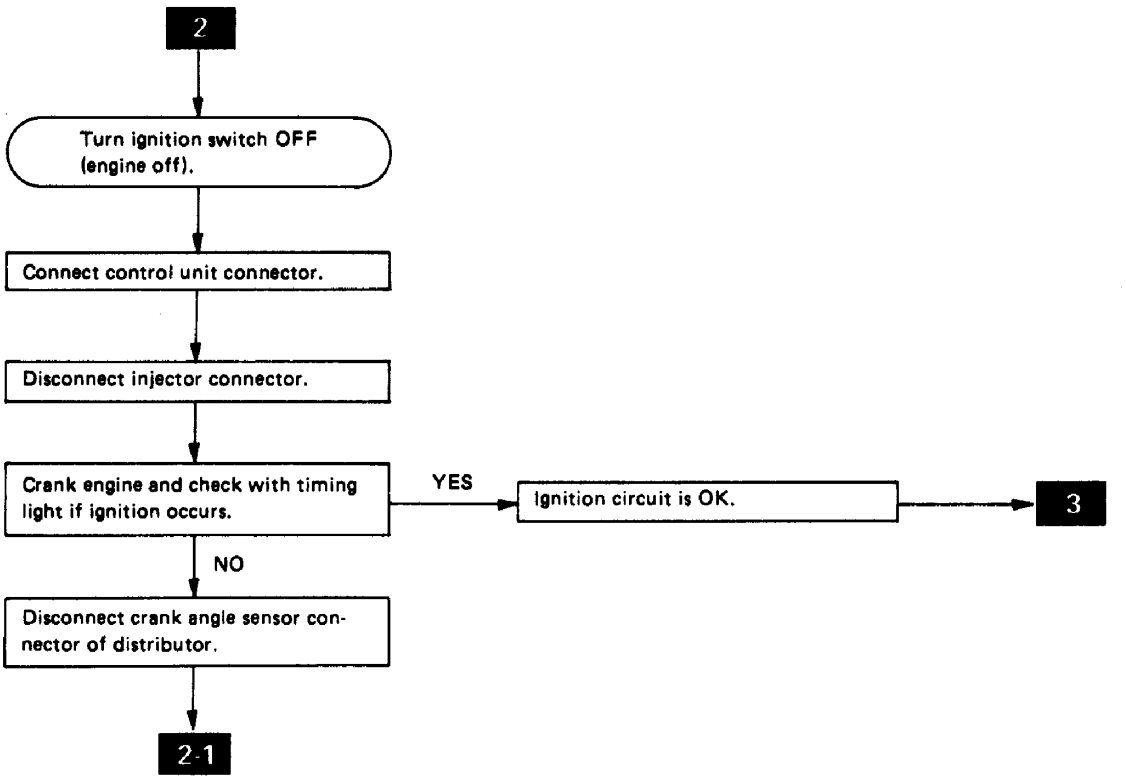
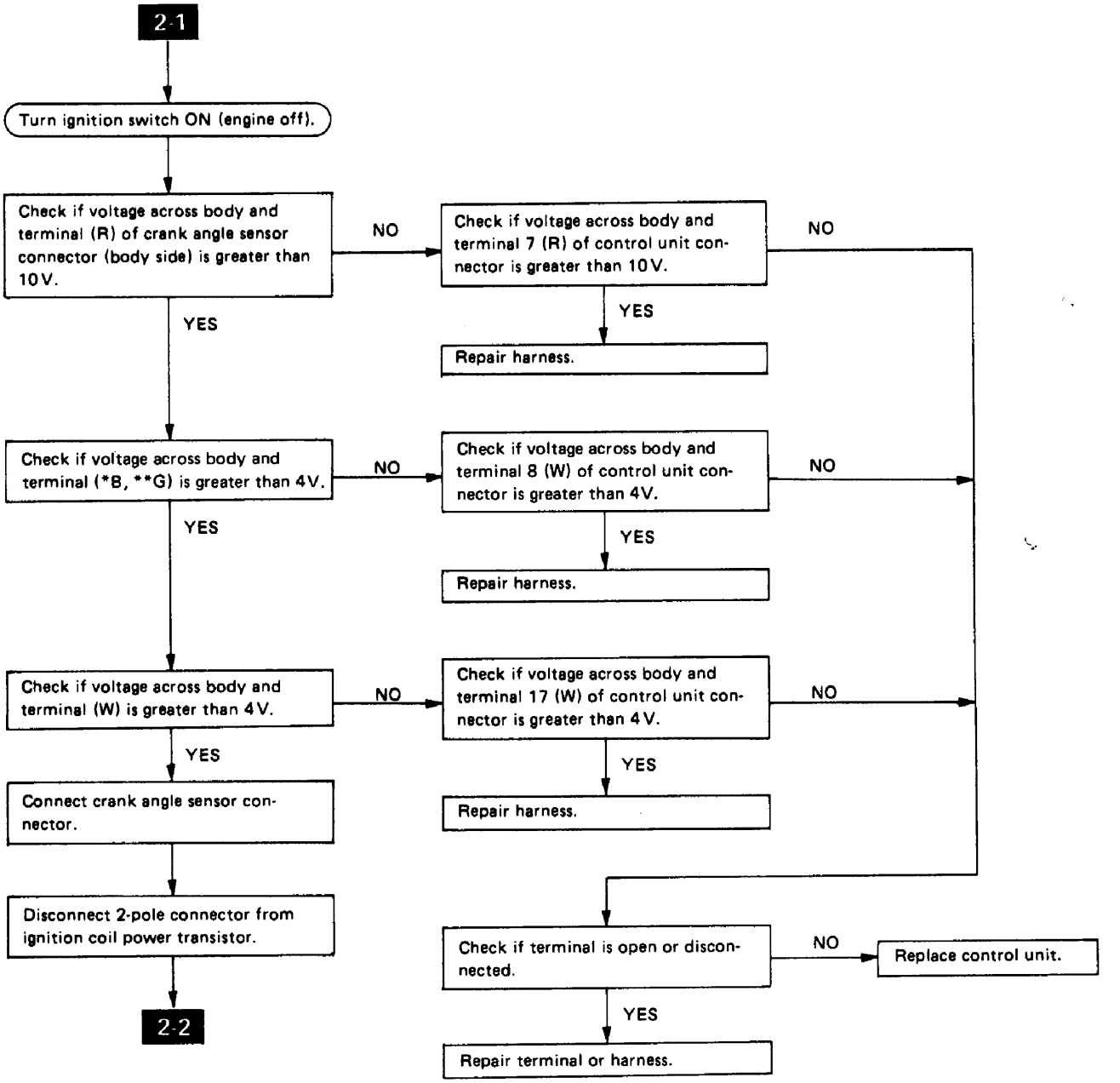


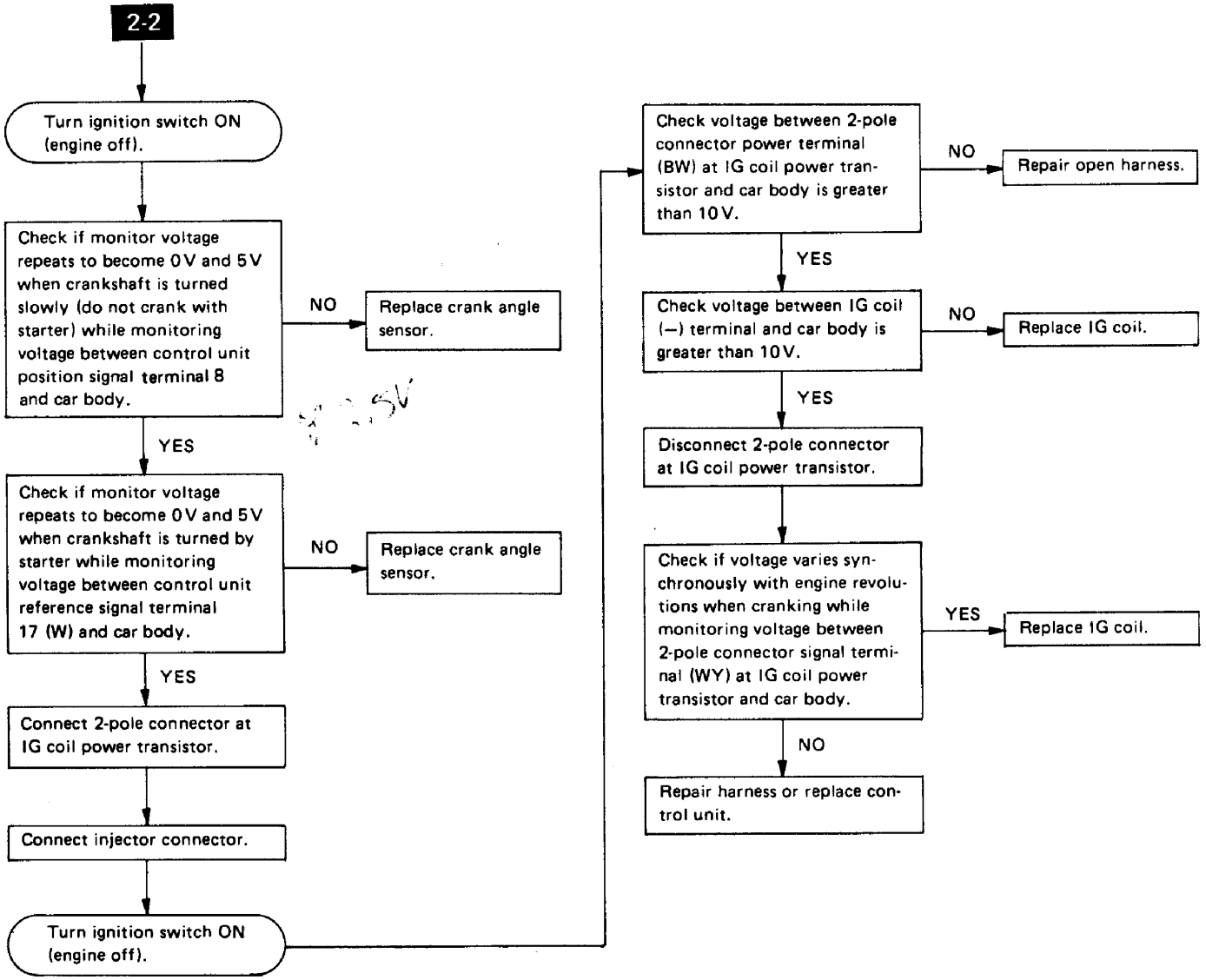
Fig. 76

*: 1800 cc model **: 2700 cc model





*: 1800 cc model **: 2700 cc model


2-2
Turn ignition switch ON (engine off).
Check if monitor voltage repeats to become 0V and 5V when crankshaft is turned slowly (do not crank with starter) while monitoring voltage between control unit position signal terminal 8 and car body.
NO
Replace crank angle sensor.
YES
Check if monitor voltage repeats to become 0V and 5V when crankshaft is turned by starter while monitoring voltage between control unit reference signal terminal 17 (W) and car body.
NO
Replace crank angle sensor.
YES
Connect 2-pole connector at IG coil power transistor.
Connect injector connector.
Turn ignition switch ON (engine off).
Check voltage between 2-pole connector power terminal (BW) at IG coil power transistor and car body is greater than 10V.
NO
Repair open harness.
YES
Check voltage between IG coil (—) terminal and car body is greater than 10V.
NO
Replace IG coil.
YES
Disconnect 2-pole connector at IG coil power transistor.
Check if voltage varies synchronously with engine revolutions when cranking while monitoring voltage between 2-pole connector signal terminal (WY) at IG coil power transistor and car body.
YES
Replace IG coil.
NO
Repair harness or replace control unit.

3. FUEL PUMP CIRCUIT

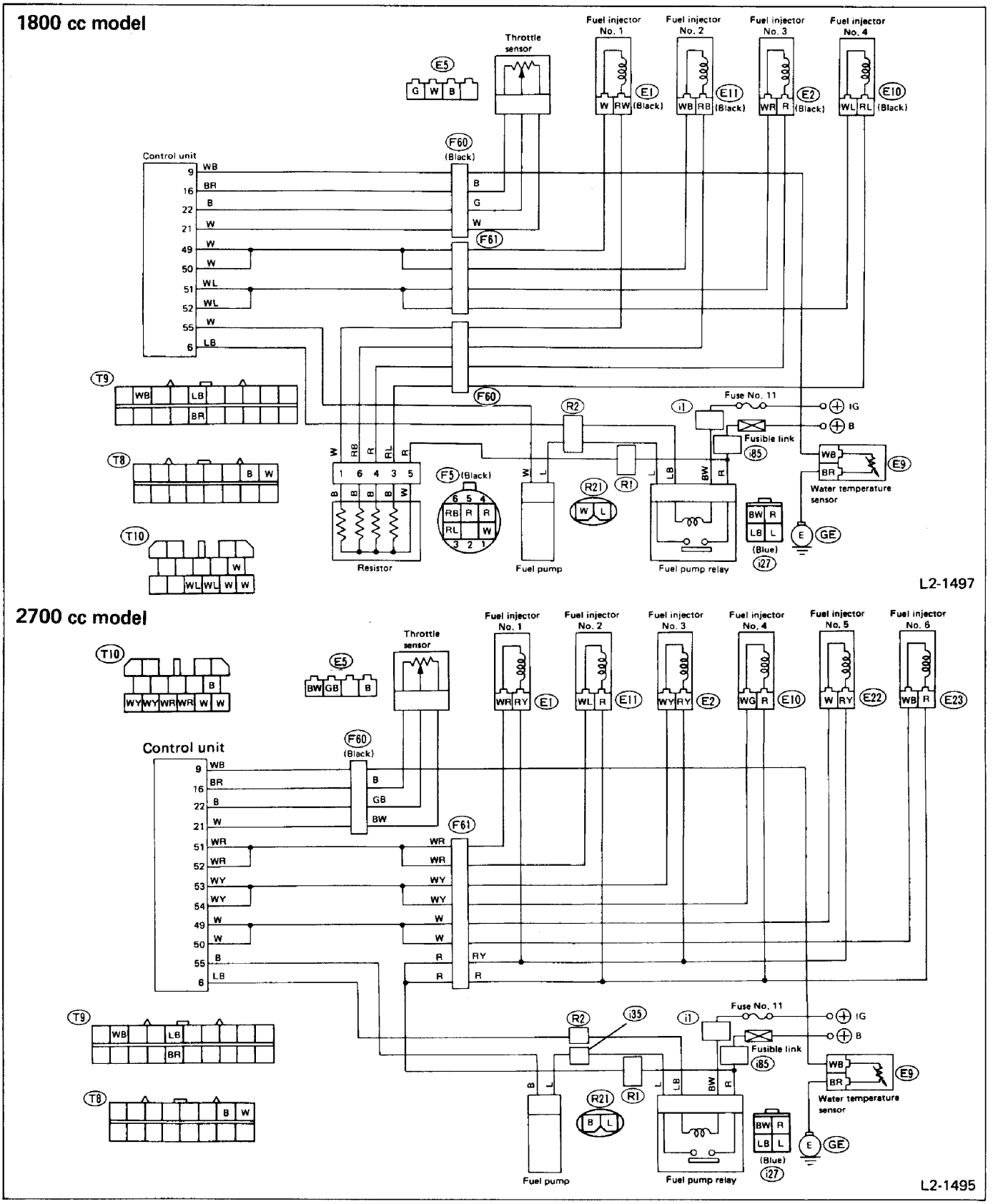
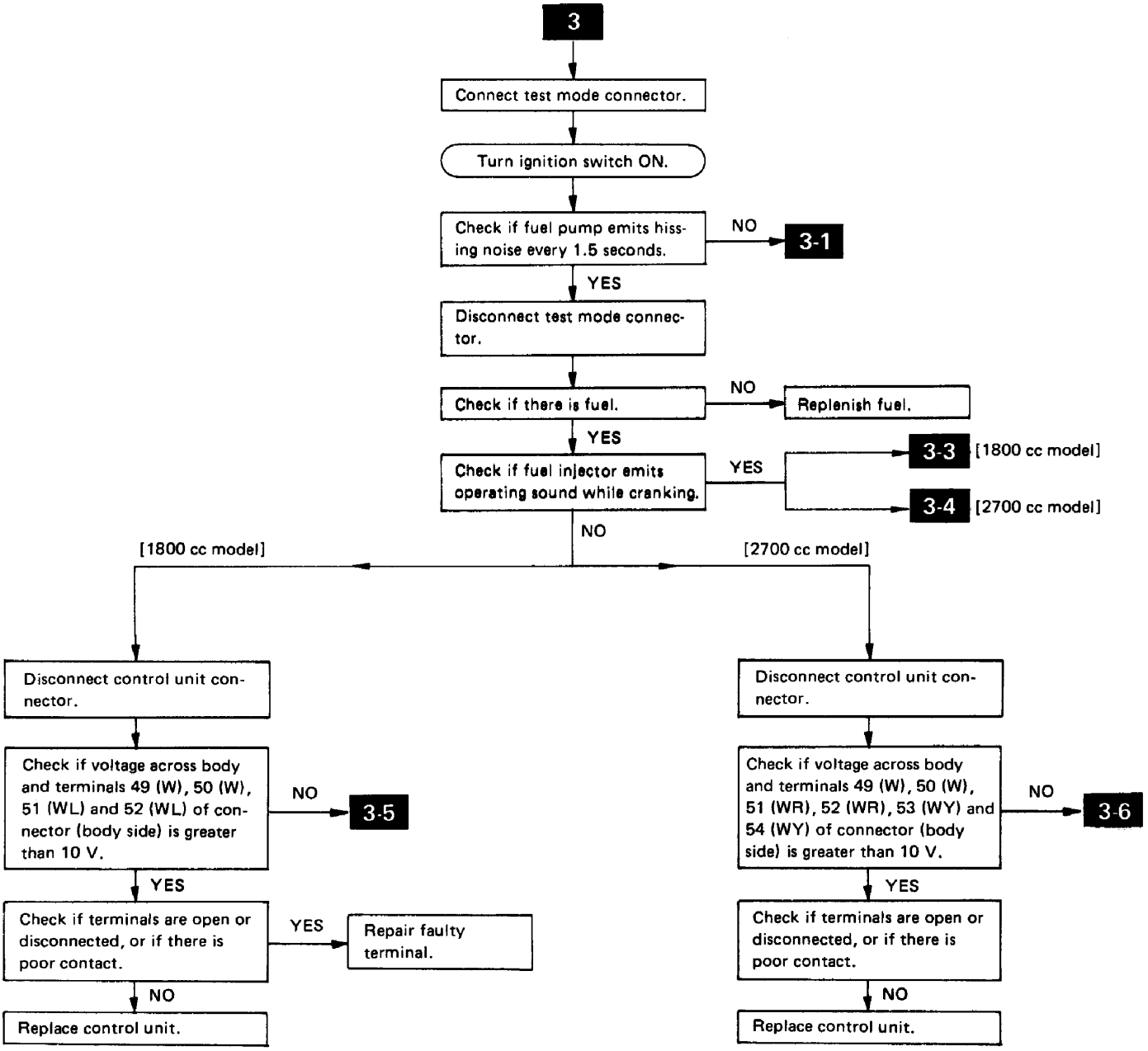
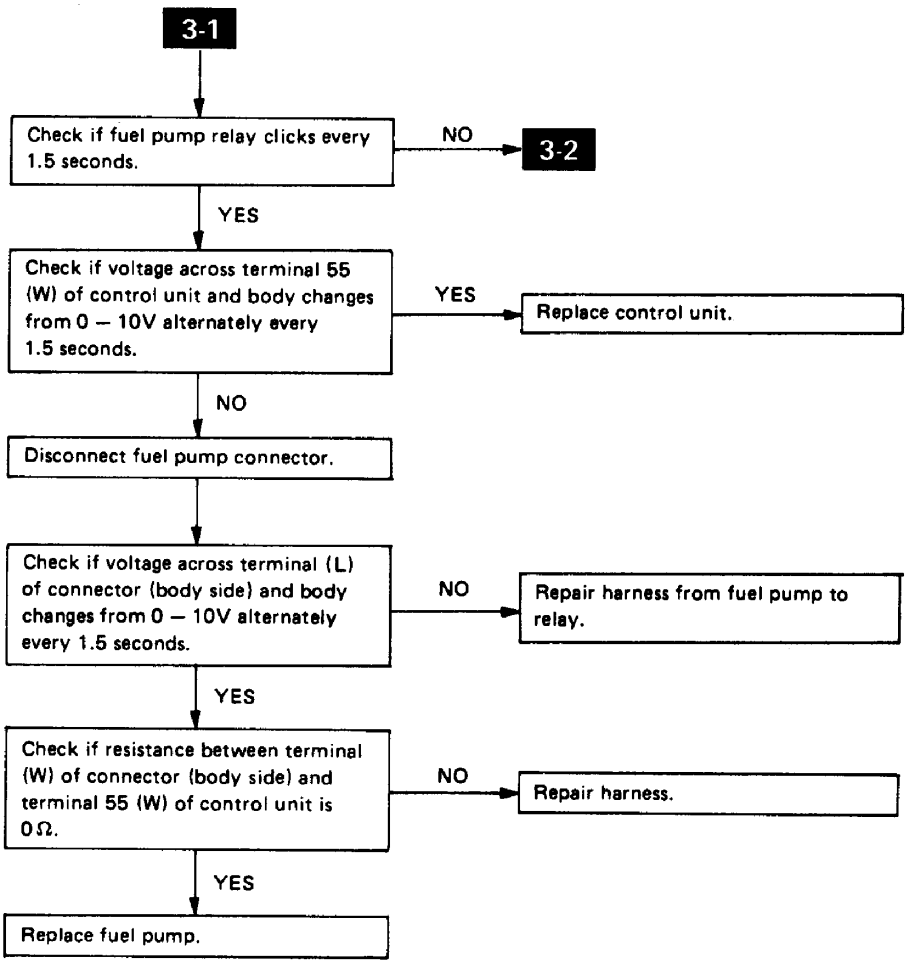
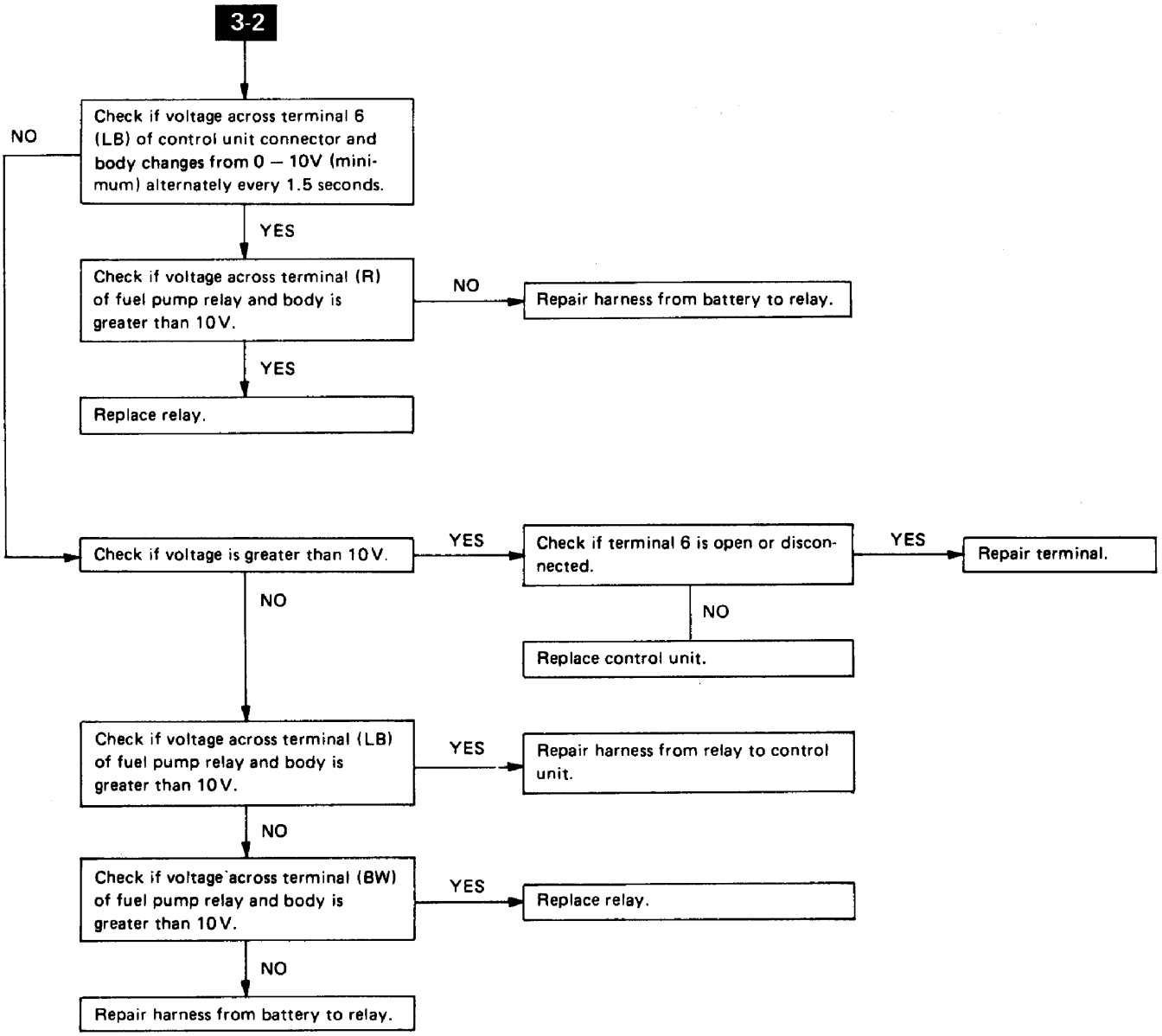
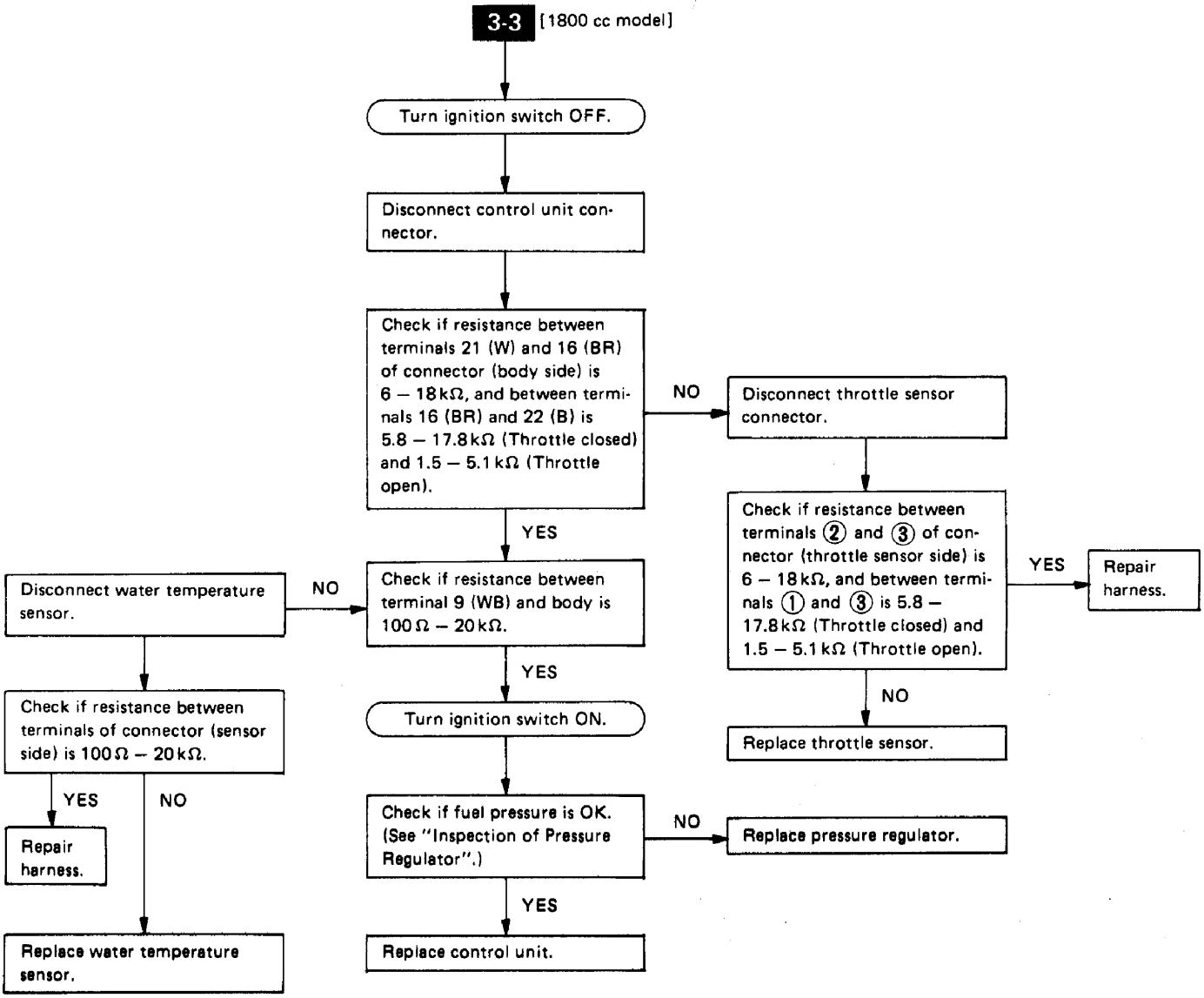


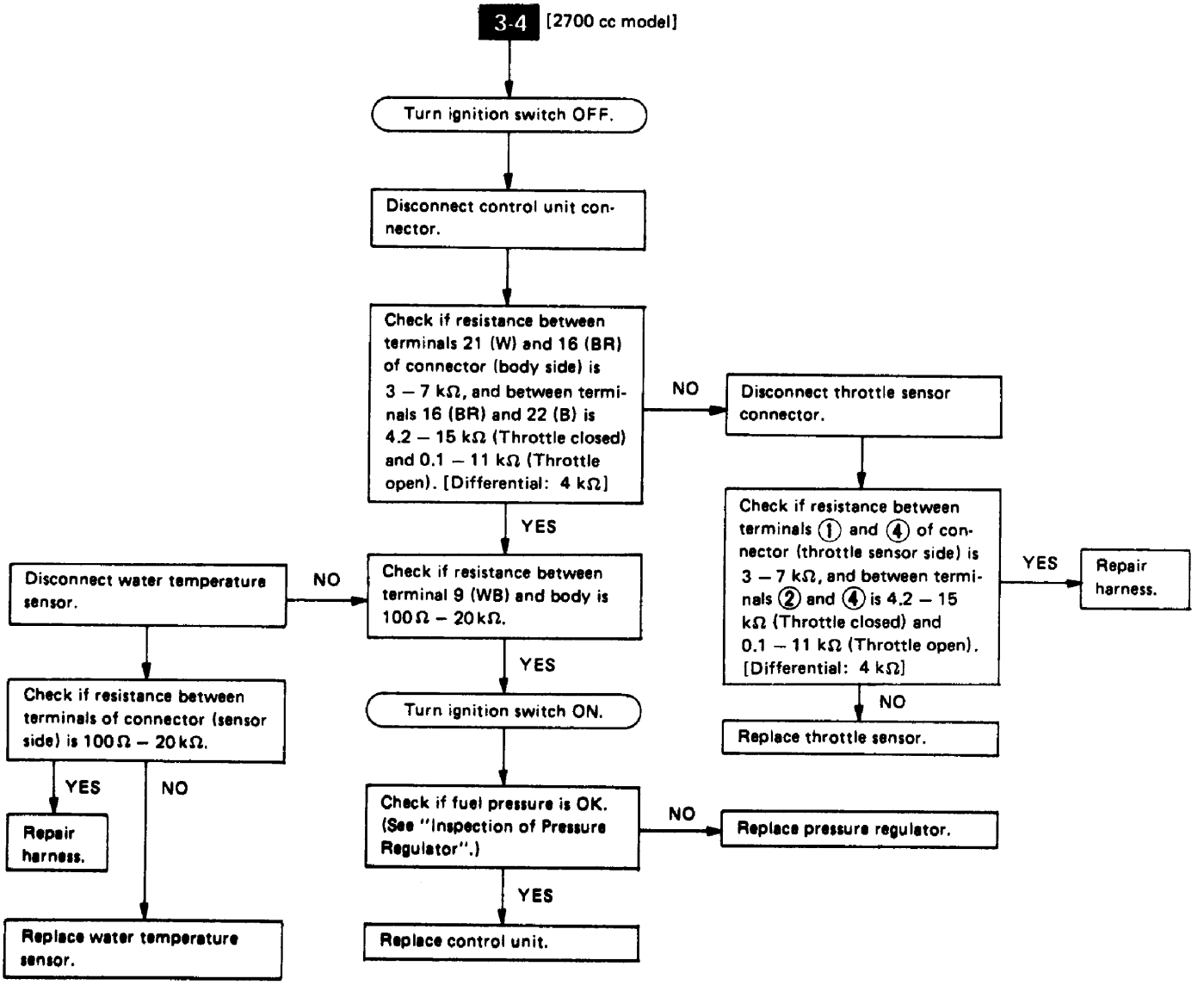
Fig. 77

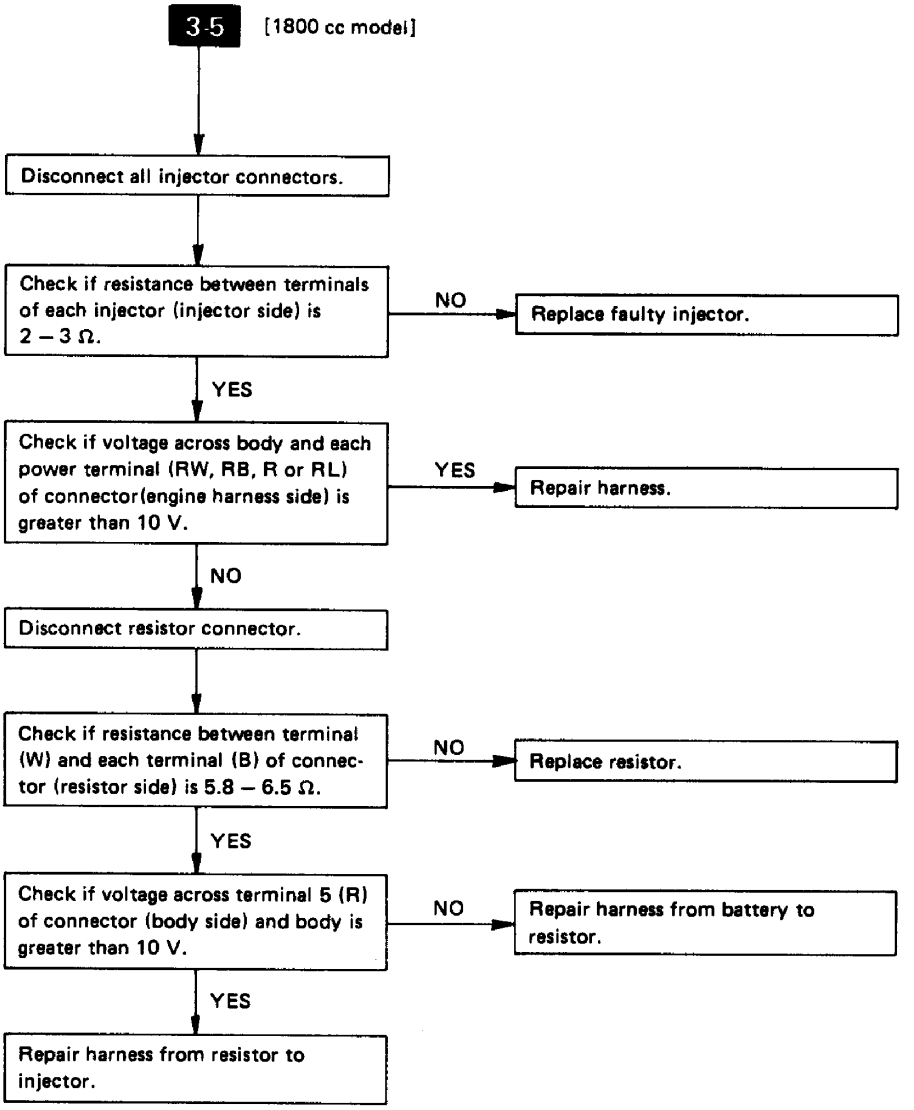

3
Connect test mode connector.
Turn ignition switch ON.
Check if fuel pump emits hissing noise every 1.5 seconds.
NO
3-1
YES
Disconnect test mode connector.
Check if there is fuel.
NO
Replenish fuel.
YES
Check if fuel injector emits operating sound while cranking.
YES
3-3 [1800 cc model]
3-4 [2700 cc model]
NO
[1800 cc model]
[2700 cc model]
Disconnect control unit connector.
Check if voltage across body and terminals 49 (W), 50 (W), 51 (WL) and 52 (WL) of connector (body side) is greater than 10 V.
NO
3-5
YES
Check if terminals are open or disconnected, or if there is poor contact.
YES
Repair faulty terminal.
NO
Replace control unit.
Disconnect control unit connector.
Check if voltage across body and terminals 49 (W), 50 (W), 51 (WR), 52 (WR), 53 (WY) and 54 (WY) of connector (body side) is greater than 10 V.
NO
3-6
YES
Check if terminals are open or disconnected, or if there is poor contact.
NO
Replace control unit.

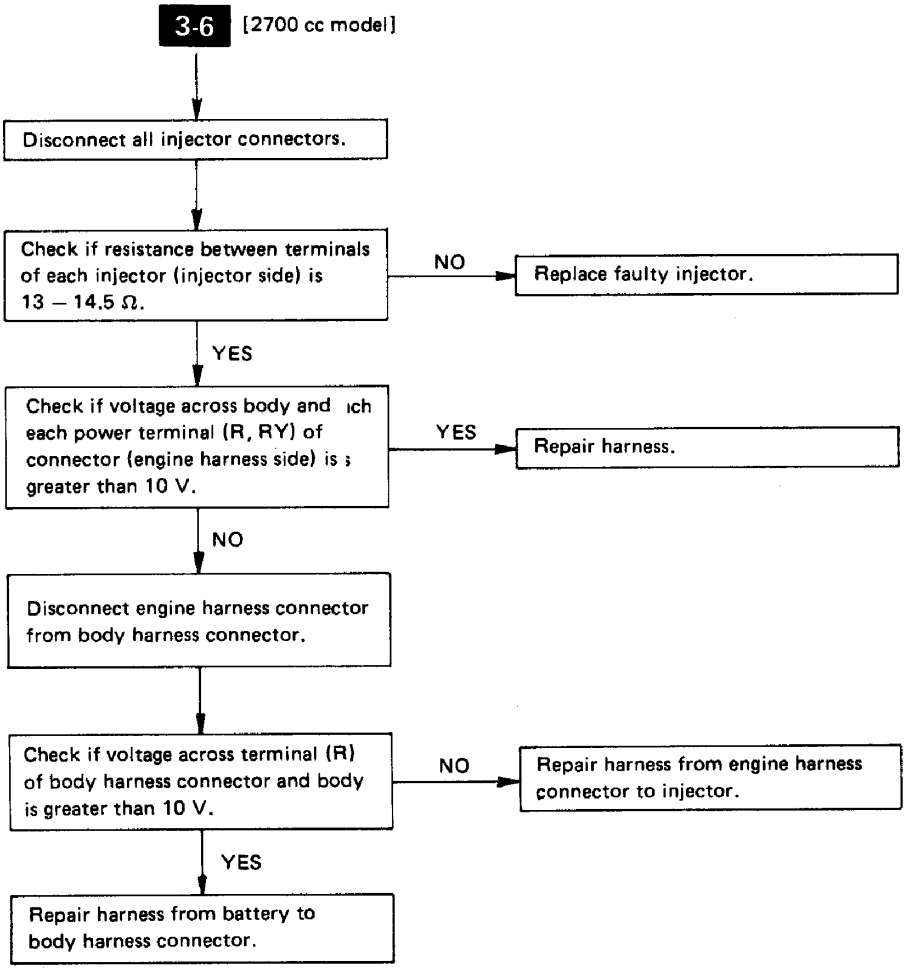

3-1
Check if fuel pump relay clicks every 1.5 seconds.
NO
3-2
YES
Check if voltage across terminal 55 (W) of control unit and body changes from 0 — 10V alternately every 1.5 seconds.
YES
Replace control unit.
NO
Disconnect fuel pump connector.
Check if voltage across terminal (L) of connector (body side) and body changes from 0 — 10V alternately every 1.5 seconds.
NO
Repair harness from fuel pump to relay.
YES
Check if resistance between terminal (W) of connector (body side) and terminal 55 (W) of control unit is 0Ω.
NO
Repair harness.
YES
Replace fuel pump.


3-2
Check if voltage across terminal 6 (LB) of control unit connector and body changes from 0 – 10V (minimum) alternately every 1.5 seconds.
NO
YES
Check if voltage across terminal (R) of fuel pump relay and body is greater than 10V.
NO
Repair harness from battery to relay.
YES
Replace relay.
Check if voltage is greater than 10V.
YES
Check if terminal 6 is open or disconnected.
YES
Repair terminal.
NO
Replace control unit.
NO
Check if voltage across terminal (LB) of fuel pump relay and body is greater than 10V.
YES
Repair harness from relay to control unit.
NO
Check if voltage across terminal (BW) of fuel pump relay and body is greater than 10V.
YES
Replace relay.
NO
Repair harness from battery to relay.


3-3 [1800 cc model]
Turn ignition switch OFF.
Disconnect control unit connector.
Check if resistance between terminals 21 (W) and 16 (BR) of connector (body side) is 6 – 18 kΩ, and between terminals 16 (BR) and 22 (B) is 5.8 – 17.8 kΩ (Throttle closed) and 1.5 – 5.1 kΩ (Throttle open).
NO
Disconnect throttle sensor connector.
Check if resistance between terminals ② and ③ of connector (throttle sensor side) is 6 – 18 kΩ, and between terminals ① and ③ is 5.8 – 17.8 kΩ (Throttle closed) and 1.5 – 5.1 kΩ (Throttle open).
YES
Repair harness.
NO
Replace throttle sensor.
YES
Disconnect water temperature sensor.
NO
Check if resistance between terminal 9 (WB) and body is 100 Ω – 20 kΩ.
YES
Check if resistance between terminals of connector (sensor side) is 100 Ω – 20 kΩ.
YES
NO
Repair harness.
Replace water temperature sensor.
Turn ignition switch ON.
Check if fuel pressure is OK. (See "Inspection of Pressure Regulator".)
NO
Replace pressure regulator.
YES
Replace control unit.


3-4 [2700 cc model]
Turn ignition switch OFF.
Disconnect control unit connector.
Check if resistance between terminals 21 (W) and 16 (BR) of connector (body side) is 3 – 7 kΩ, and between terminals 16 (BR) and 22 (B) is 4.2 – 15 kΩ (Throttle closed) and 0.1 – 11 kΩ (Throttle open). [Differential: 4 kΩ]
NO
Disconnect throttle sensor connector.
Check if resistance between terminals ① and ④ of connector (throttle sensor side) is 3 – 7 kΩ, and between terminals ② and ④ is 4.2 – 15 kΩ (Throttle closed) and 0.1 – 11 kΩ (Throttle open). [Differential: 4 kΩ]
YES
Repair harness.
NO
Replace throttle sensor.
YES
Disconnect water temperature sensor.
NO
Check if resistance between terminal 9 (WB) and body is 100 Ω – 20 kΩ.
YES
Turn ignition switch ON.
Check if resistance between terminals of connector (sensor side) is 100 Ω – 20 kΩ.
YES
Repair harness.
NO
Replace water temperature sensor.
Check if fuel pressure is OK. (See "Inspection of Pressure Regulator".)
NO
Replace pressure regulator.
YES
Replace control unit.


3-5 [1800 cc model]
Disconnect all injector connectors.
Check if resistance between terminals of each injector (injector side) is 2 – 3 Ω.
NO
Replace faulty injector.
YES
Check if voltage across body and each power terminal (RW, RB, R or RL) of connector(engine harness side) is greater than 10 V.
YES
Repair harness.
NO
Disconnect resistor connector.
Check if resistance between terminal (W) and each terminal (B) of connector (resistor side) is 5.8 – 6.5 Ω.
NO
Replace resistor.
YES
Check if voltage across terminal 5 (R) of connector (body side) and body is greater than 10 V.
NO
Repair harness from battery to resistor.
YES
Repair harness from resistor to injector.


3-6 [2700 cc model]
Disconnect all injector connectors.
Check if resistance between terminals of each injector (injector side) is 13 – 14.5 Ω.
NO
Replace faulty injector.
YES
Check if voltage across body and ıch each power terminal (R, RY) of connector (engine harness side) is ; greater than 10 V.
YES
Repair harness.
NO
Disconnect engine harness connector from body harness connector.
Check if voltage across terminal (R) of body harness connector and body is greater than 10 V.
NO
Repair harness from engine harness connector to injector.
YES
Repair harness from battery to body harness connector.

TROUBLE CODE (11): CRANK ANGLE SENSOR

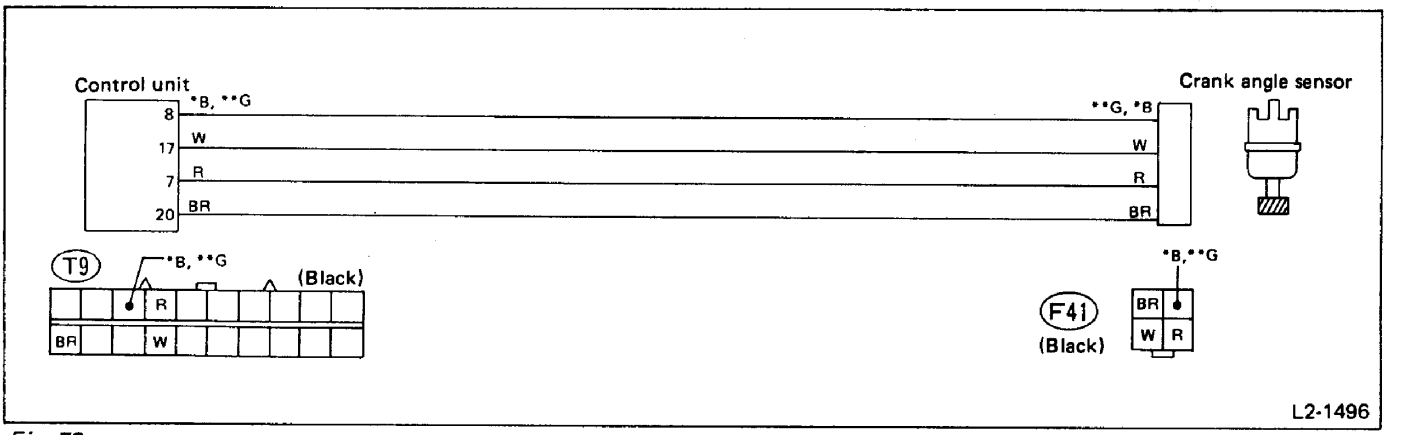
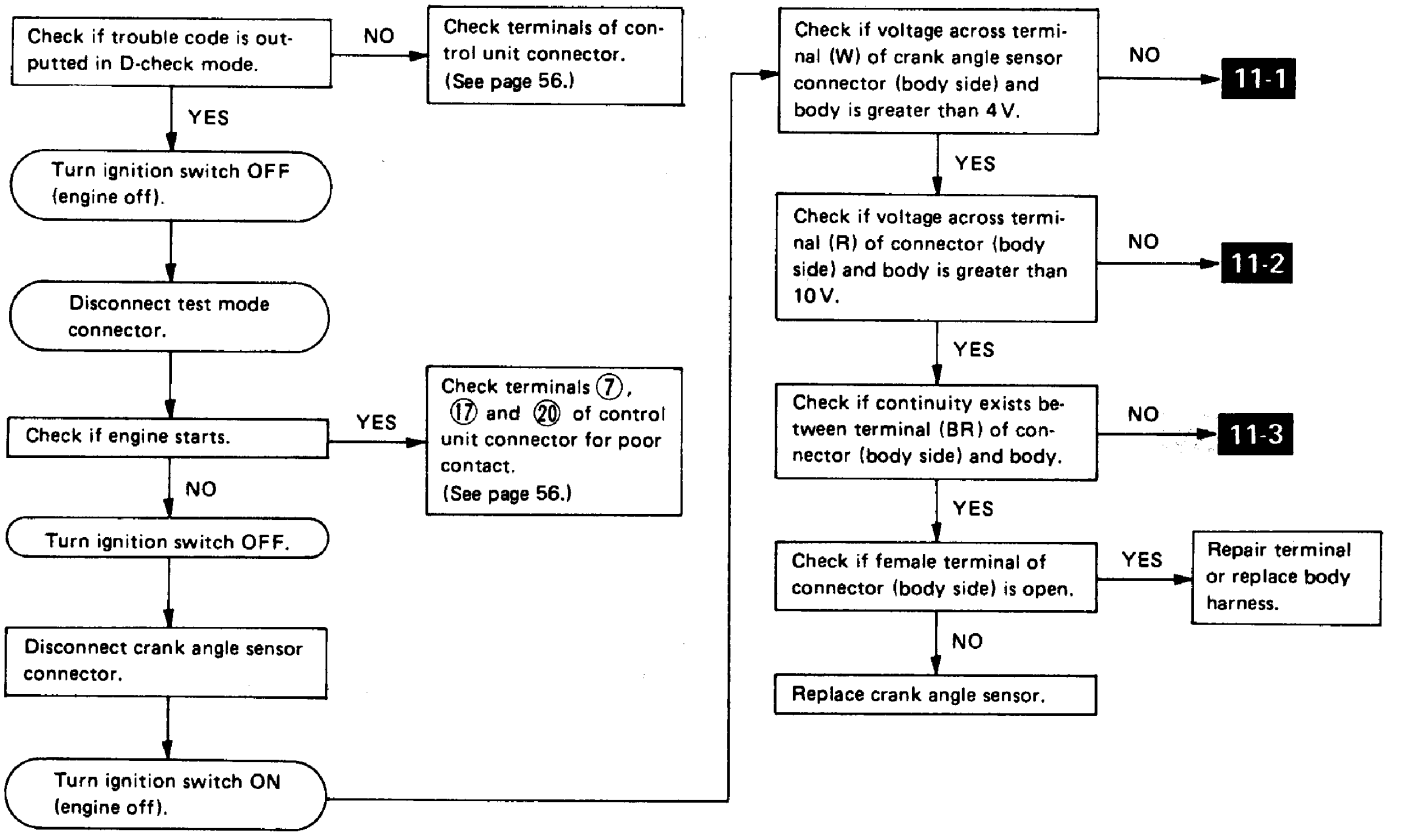
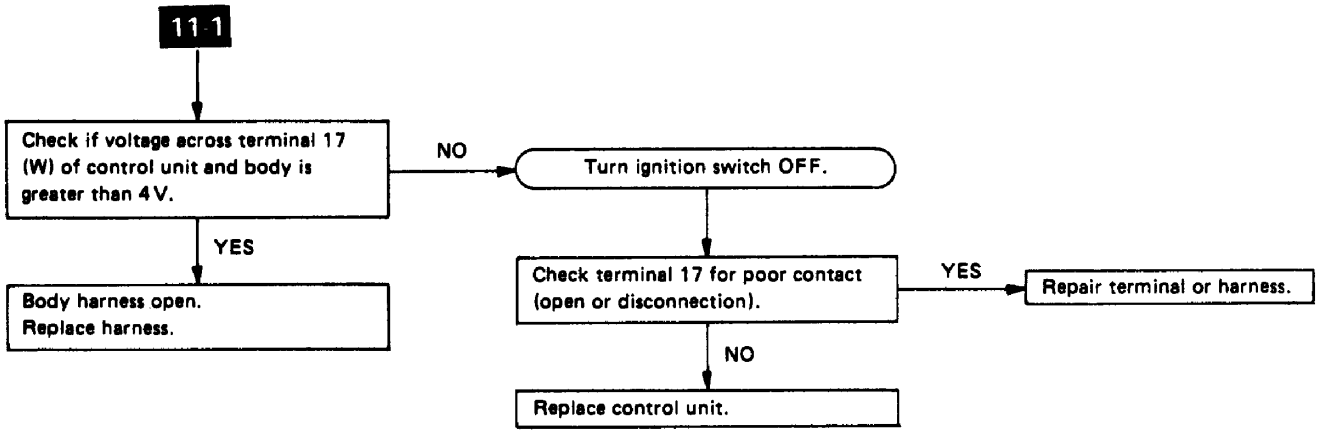
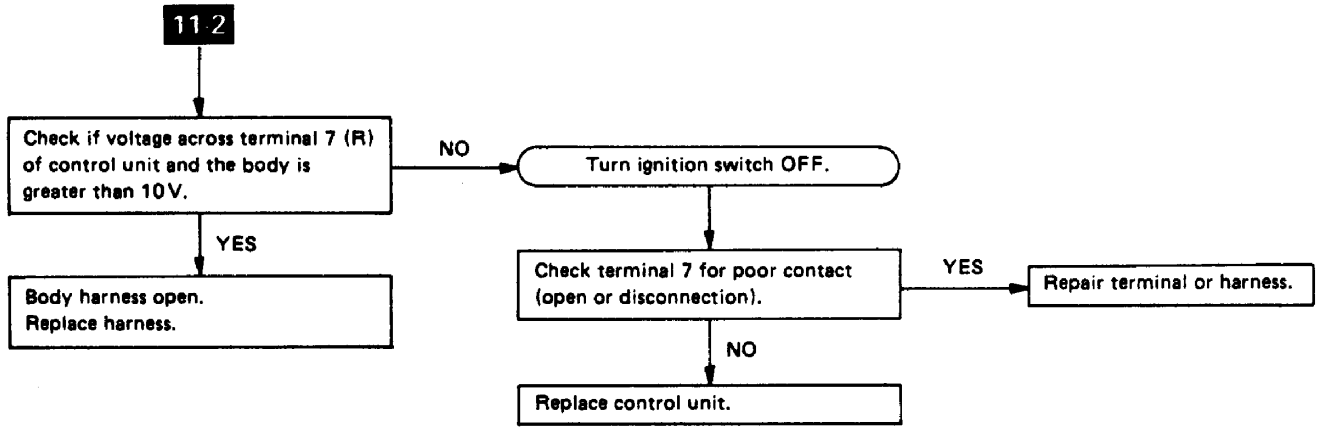


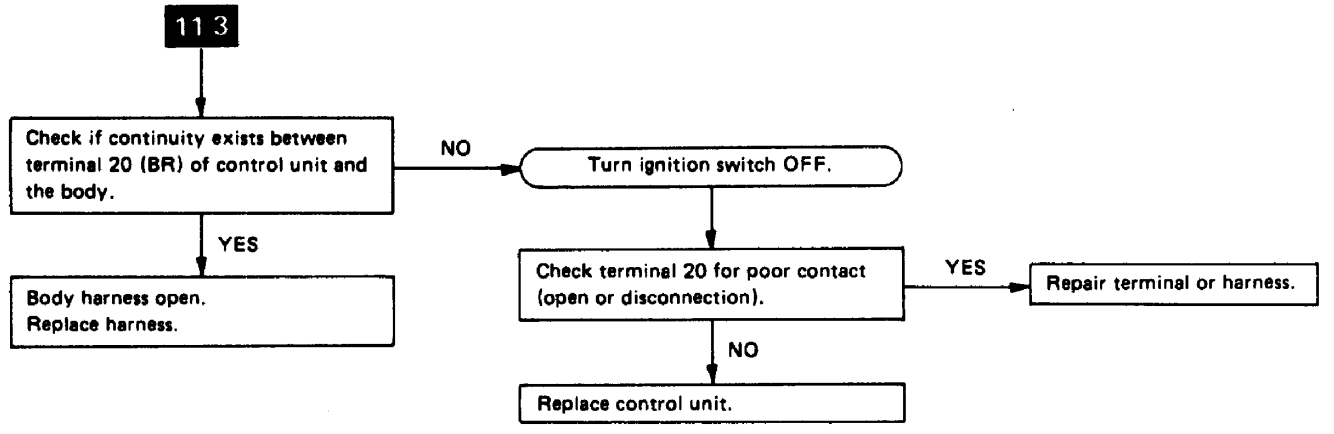
Fig. 78

*: 1800 cc model **: 2700 cc model




11-1
Check if voltage across terminal 17 (W) of control unit and body is greater than 4 V.
NO
Turn ignition switch OFF.
YES
Body harness open. Replace harness.
Check terminal 17 for poor contact (open or disconnection).
YES
Repair terminal or harness.
NO
Replace control unit.


11-2
Check if voltage across terminal 7 (R) of control unit and the body is greater than 10 V.
NO
Turn ignition switch OFF.
YES
Body harness open. Replace harness.
Check terminal 7 for poor contact (open or disconnection).
YES
Repair terminal or harness.
NO
Replace control unit.


11-3
Check if continuity exists between terminal 20 (BR) of control unit and the body.
NO
Turn ignition switch OFF.
YES
Body harness open. Replace harness.
Check terminal 20 for poor contact (open or disconnection).
YES
Repair terminal or harness.
NO
Replace control unit.

TROUBLE CODE (12): STARTER SWITCH

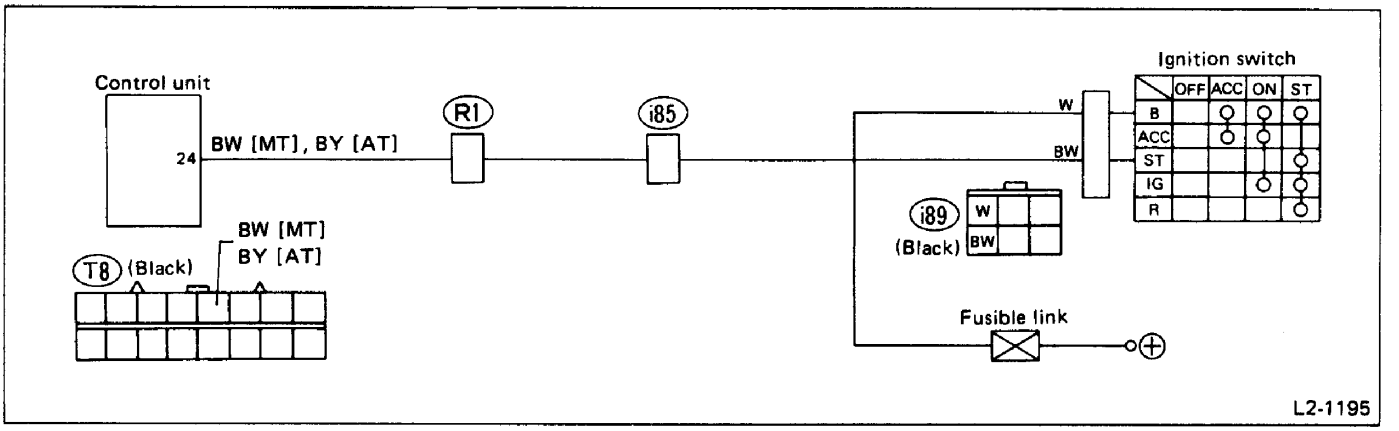
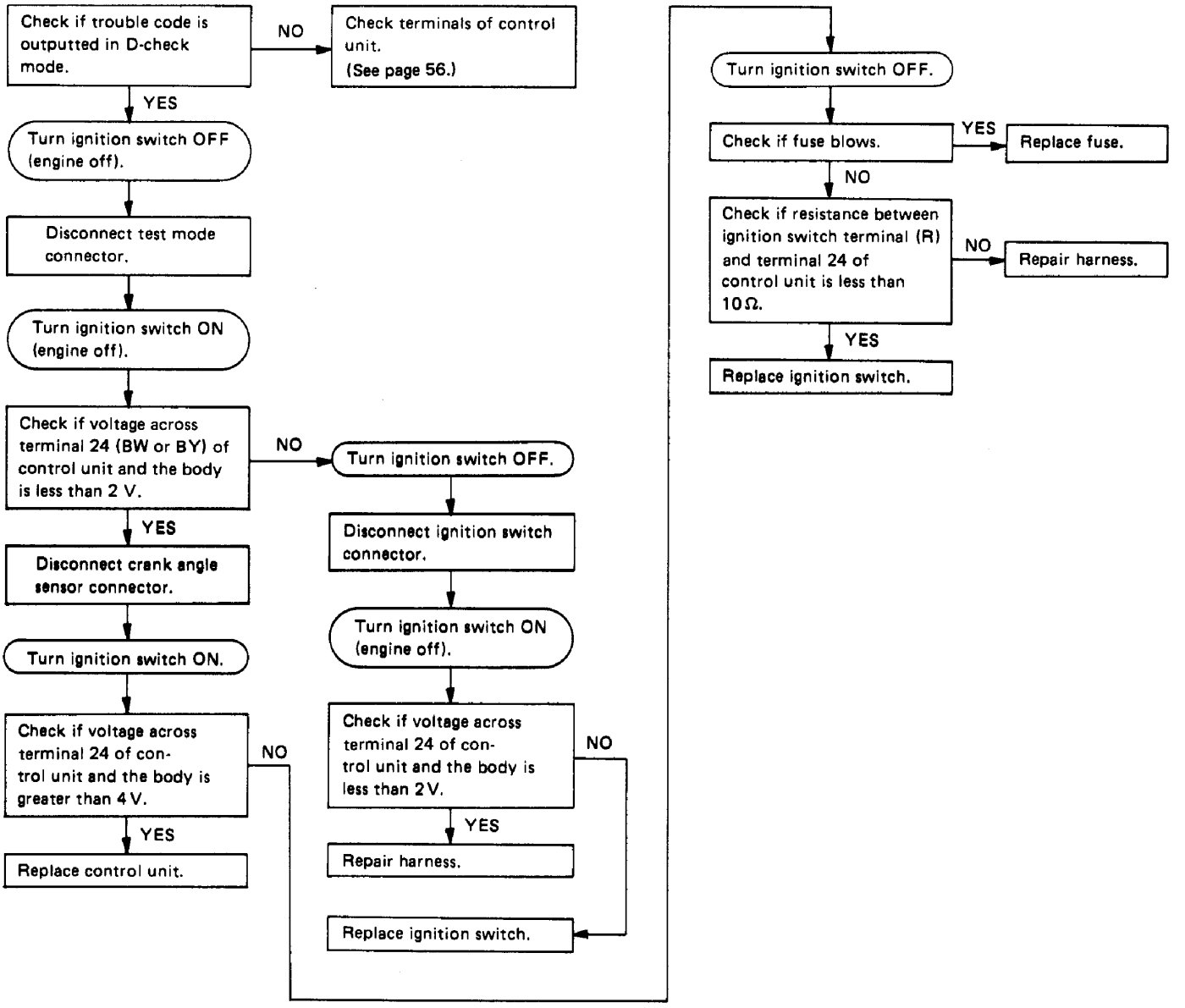


Fig. 79



TROUBLE CODE (13): CRANK ANGLE SENSOR

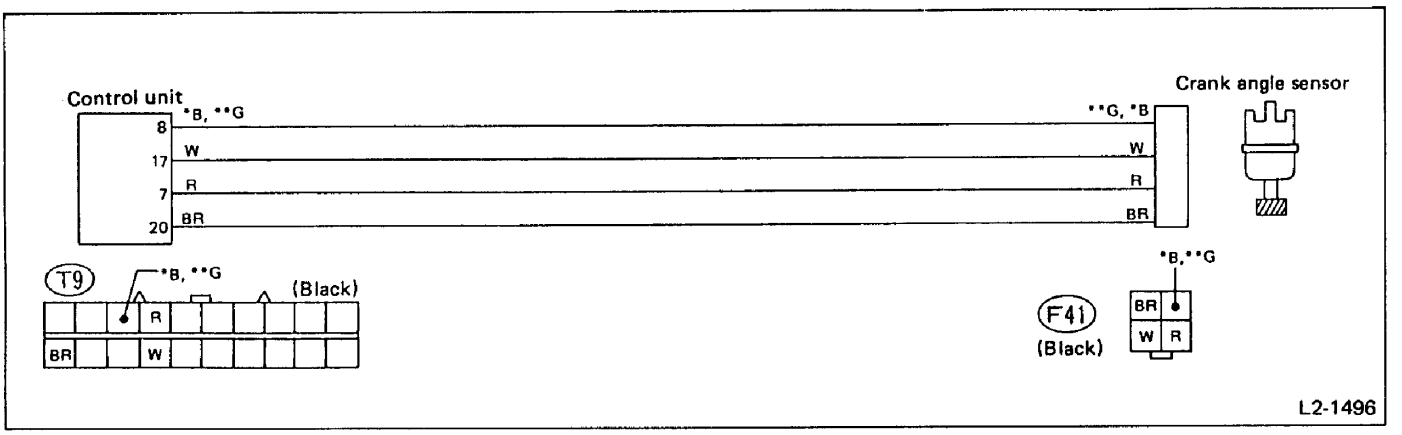
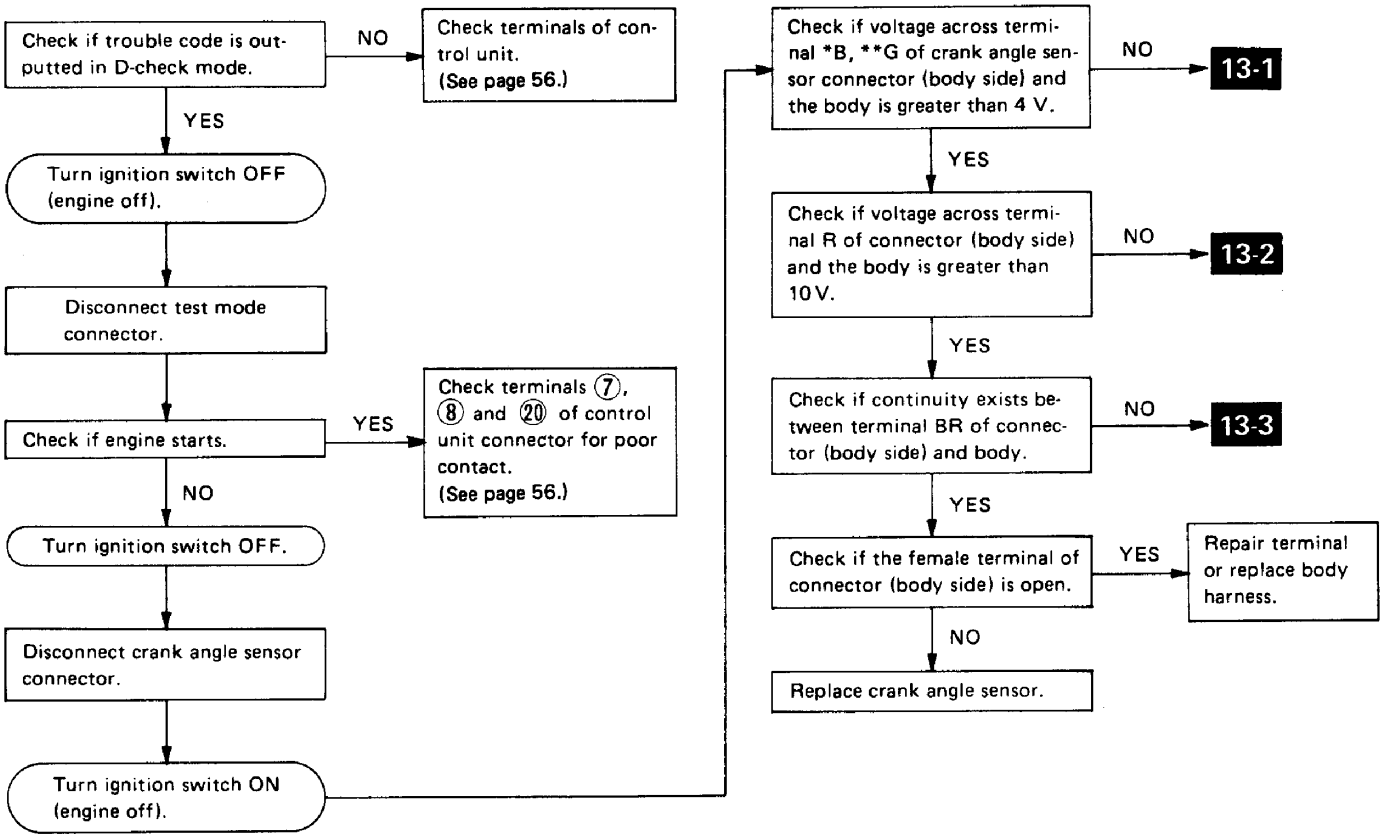
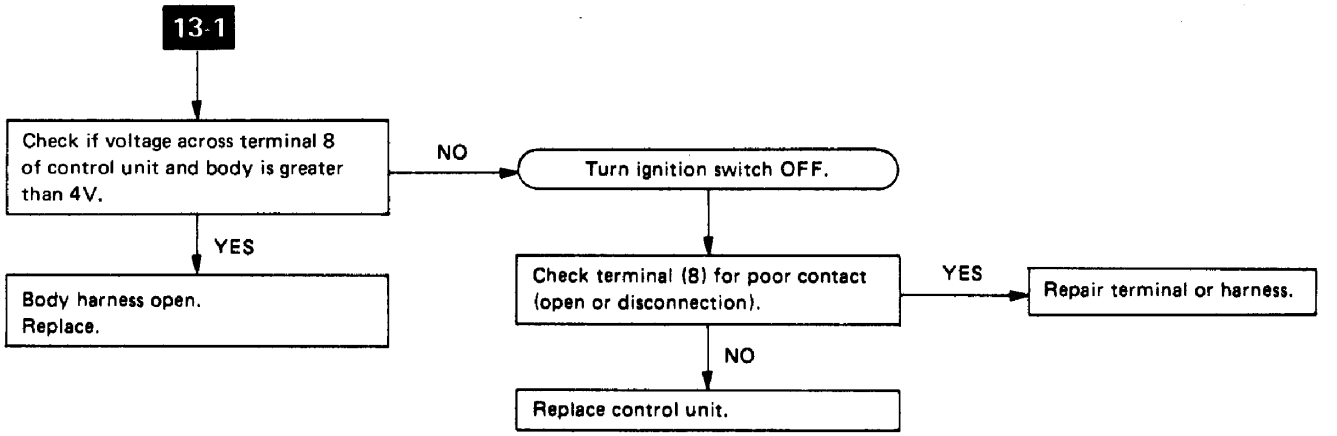
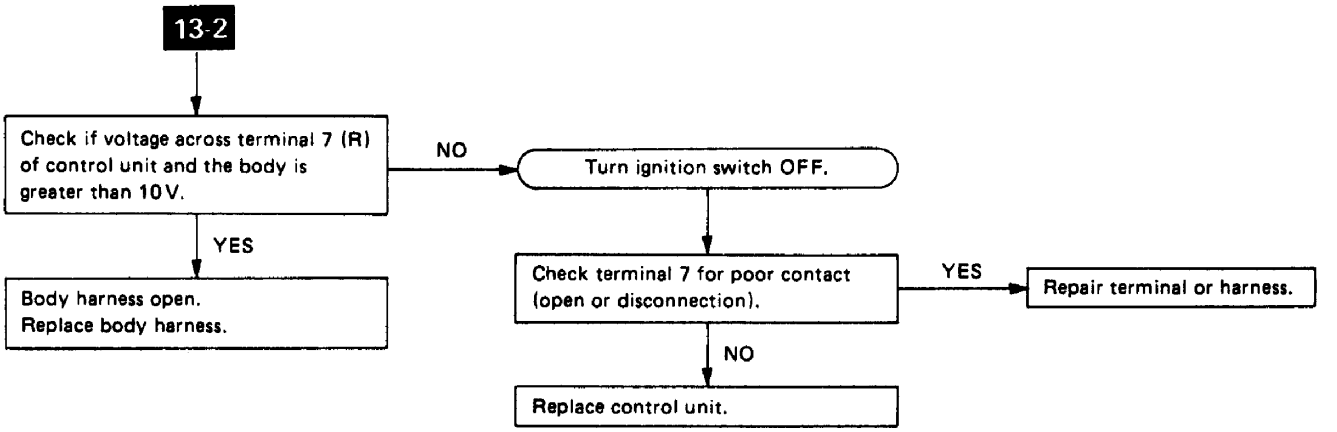


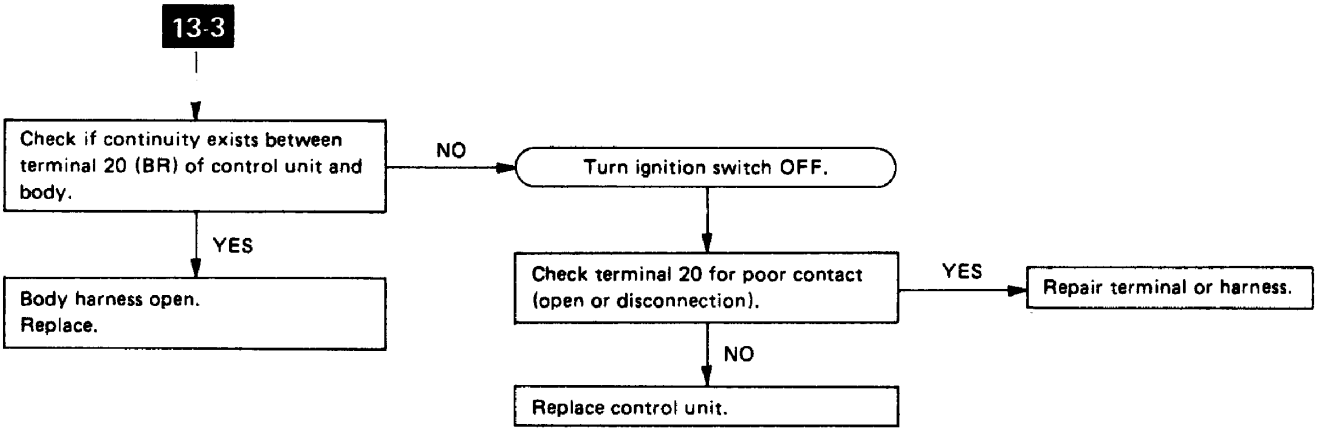
Fig. 80

*: 1800 cc model **: 2700 cc model




13-1
Check if voltage across terminal 8 of control unit and body is greater than 4V.
NO
Turn ignition switch OFF.
YES
Body harness open. Replace.
Check terminal (8) for poor contact (open or disconnection).
YES
Repair terminal or harness.
NO
Replace control unit.


13-2
Check if voltage across terminal 7 (R) of control unit and the body is greater than 10V.
NO
Turn ignition switch OFF.
YES
Body harness open. Replace body harness.
Check terminal 7 for poor contact (open or disconnection).
YES
Repair terminal or harness.
NO
Replace control unit.


13-3
Check if continuity exists between terminal 20 (BR) of control unit and body.
NO
Turn ignition switch OFF.
YES
Body harness open. Replace.
Check terminal 20 for poor contact (open or disconnection).
YES
Repair terminal or harness.
NO
Replace control unit.

TROUBLE CODE (14): FUEL INJECTOR [1800cc model]

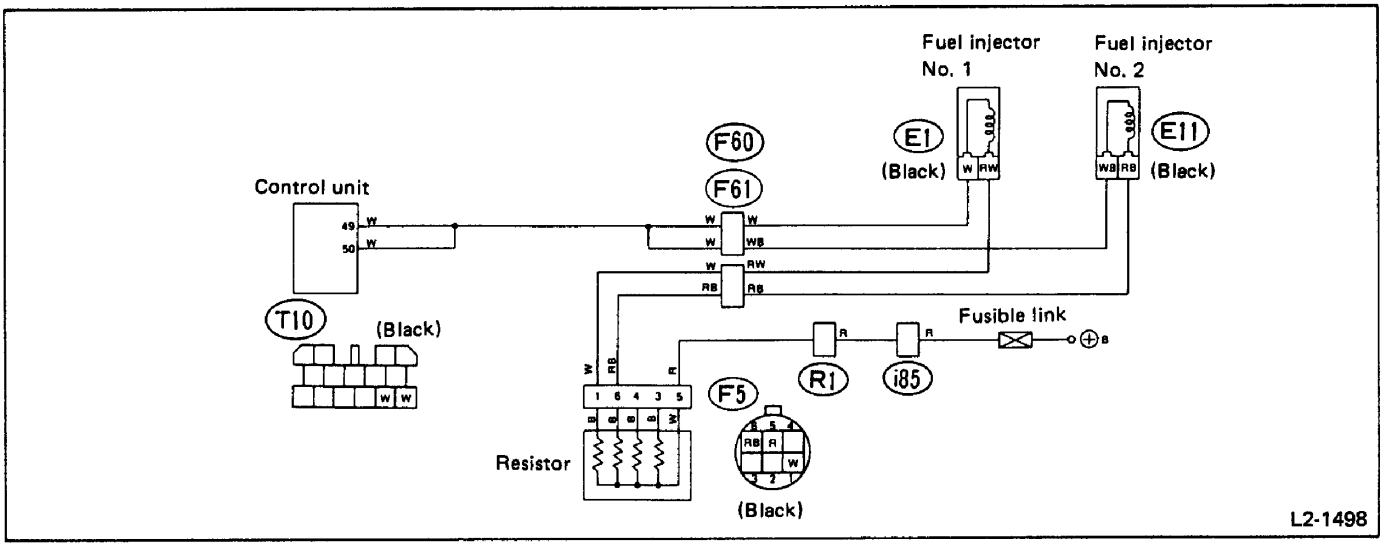
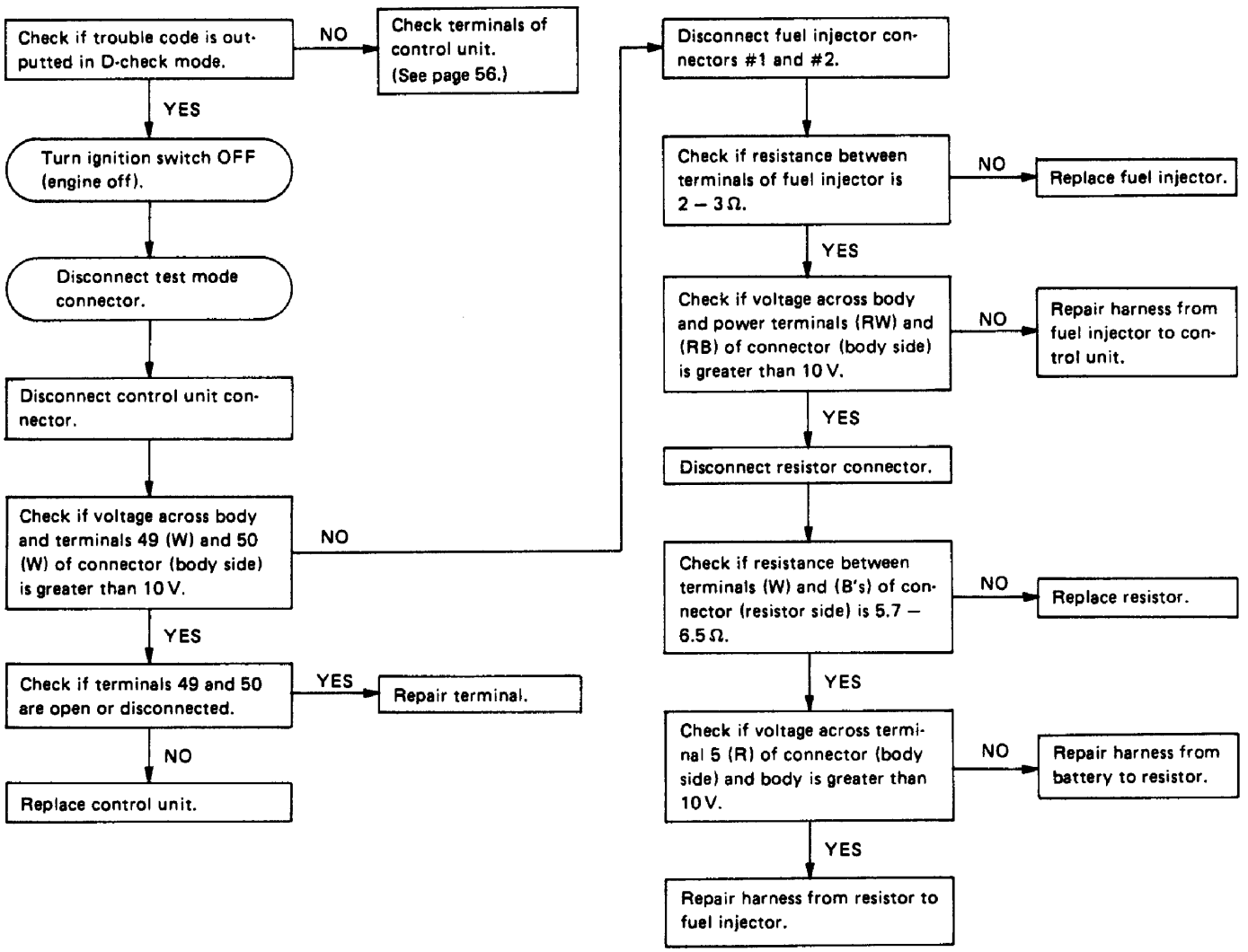


Fig. 81



TROUBLE CODE (14): FUEL INJECTOR [2700cc model]

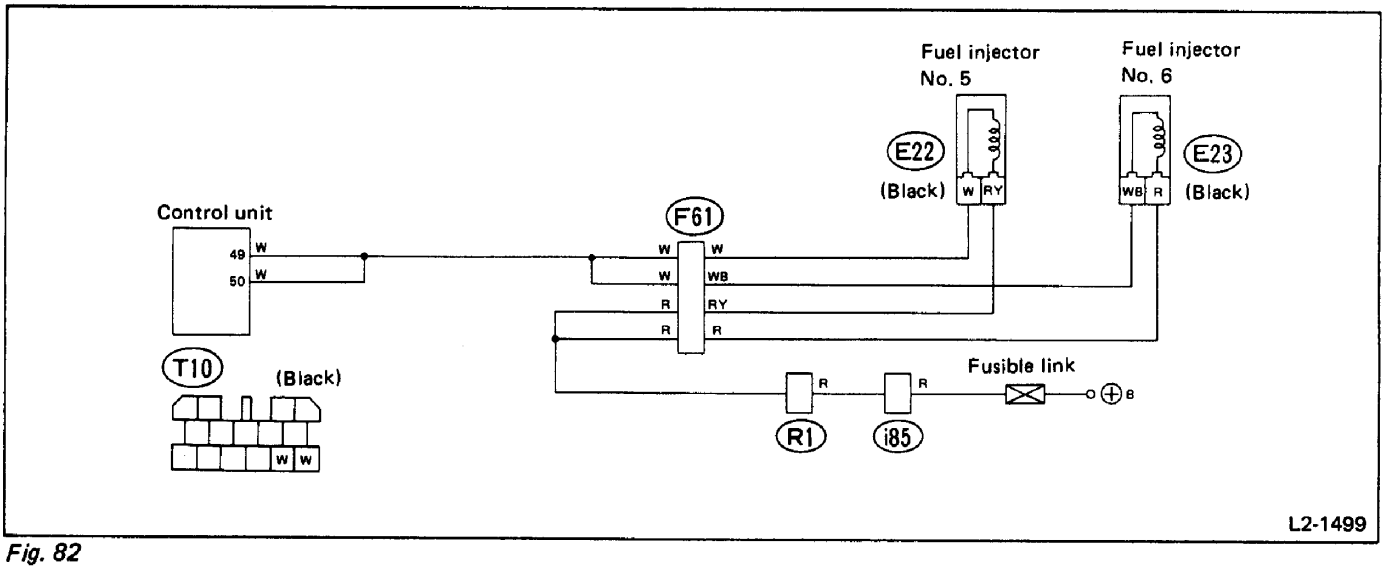
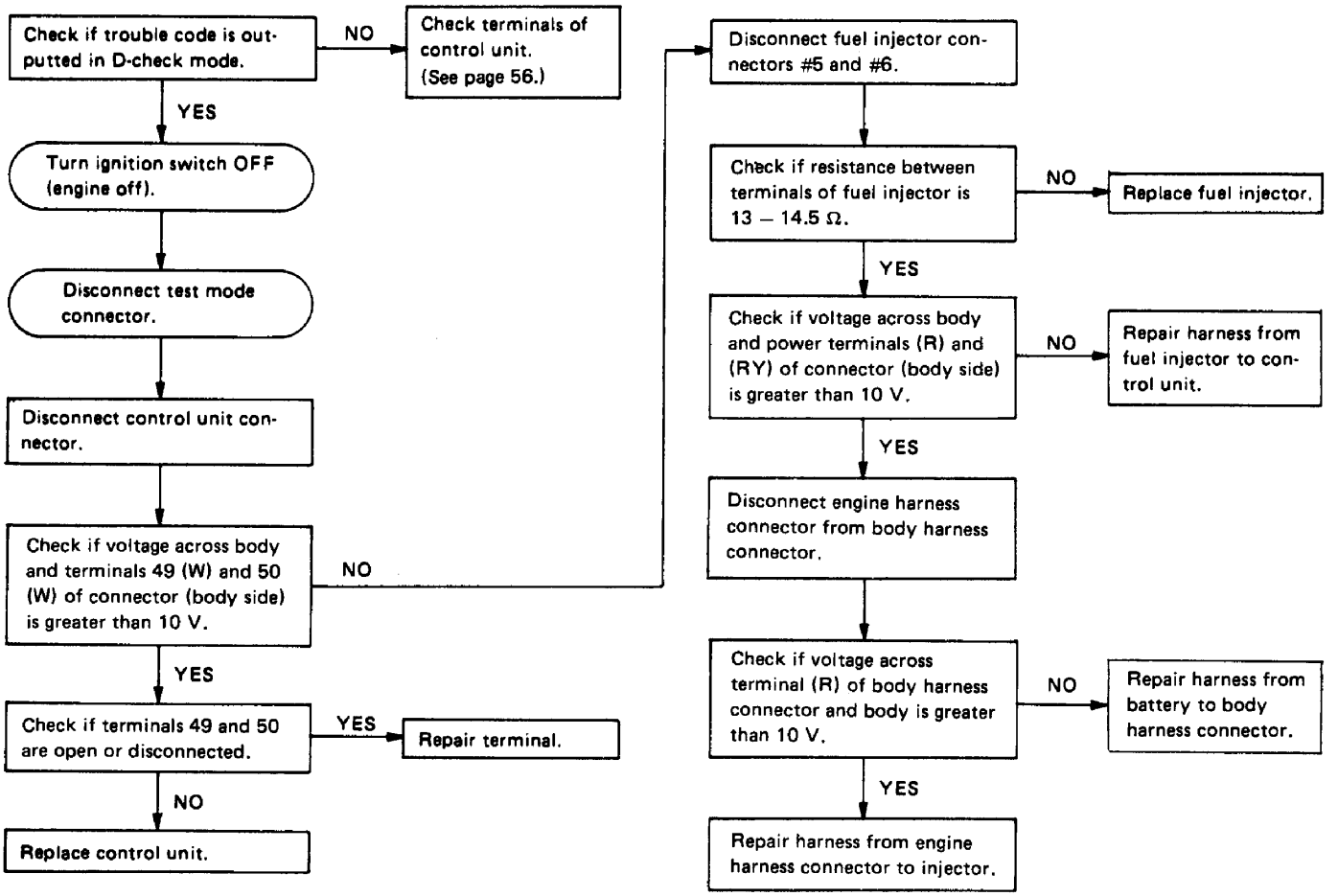


Fig. 82



TROUBLE CODE (15): FUEL INJECTOR [1800cc model]

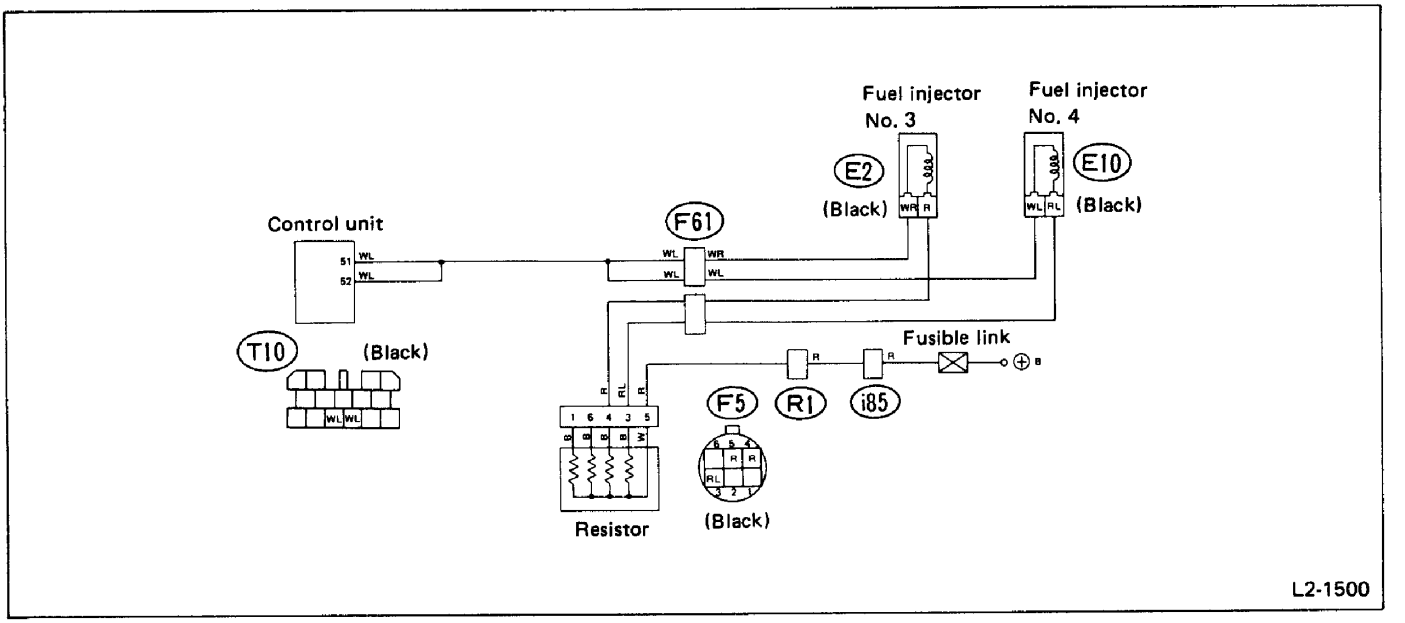


Fig. 83

Check if trouble code is outputted in D-check mode.
NO → Check terminals of control unit. (See page 56.)
YES
Turn ignition switch OFF (engine off).
Disconnect test mode connector.
Disconnect control unit connector.
Check if voltage across body and terminals 51 (WL) and 52 (WL) of connector (body side) is greater than 10 V.
NO → Disconnect injector connectors #3 and #4.
YES
Check if terminals 51 and 52 are open or disconnect.
YES → Repair terminal.
NO
Replace control unit.

Disconnect injector connectors #3 and #4.
Check if resistance between terminals of each injector is 2 – 3 Ω.
NO → Replace fuel injector.
YES
Check if voltage across body and power terminals (R) and (RL) of connector (body side) is greater than 10 V.
NO → Repair harness from fuel injector and control unit.
YES
Disconnect resistor connector.
Check if resistance between terminals (W) and (B's) of connector (resistor side) is 5.7 – 6.5 Ω.
NO → Replace resistor.
YES
Check if voltage across terminal 5 (R) of connector (body side) and body is greater than 10 V.
NO → Repair harness from battery to resistor.
YES
Repair harness from resistor to fuel injector.

TROUBLE CODE (15): FUEL INJECTOR [2700cc model]

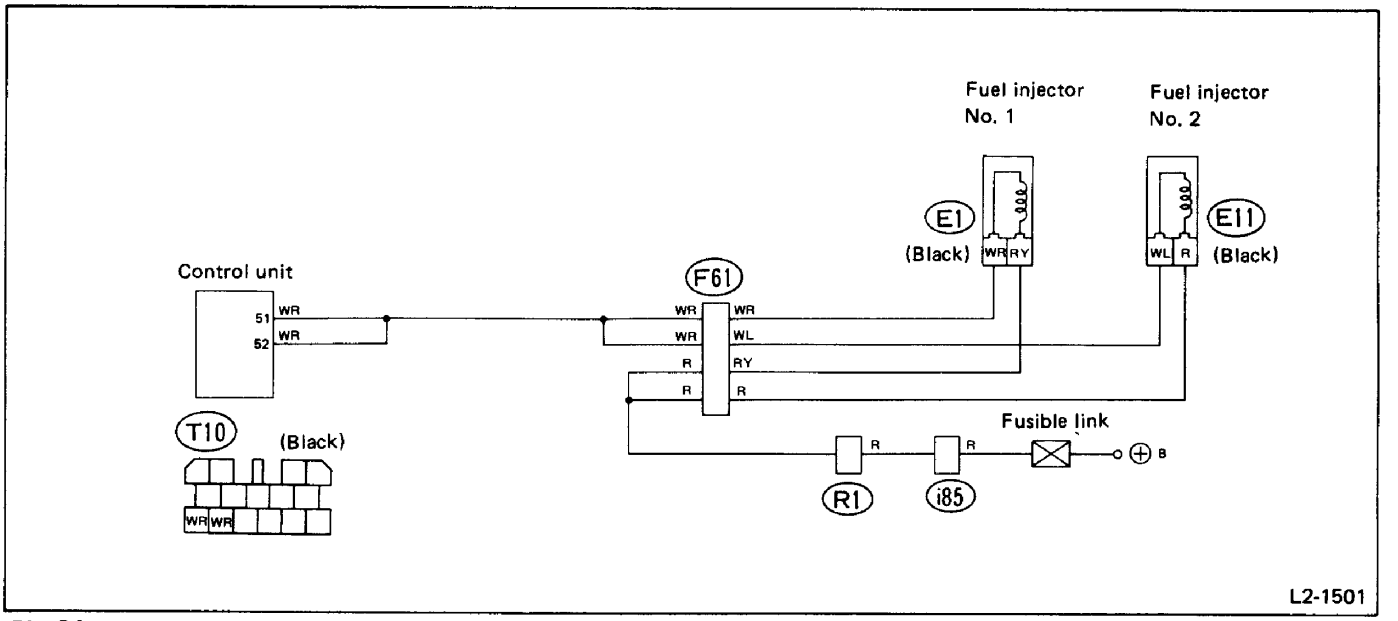
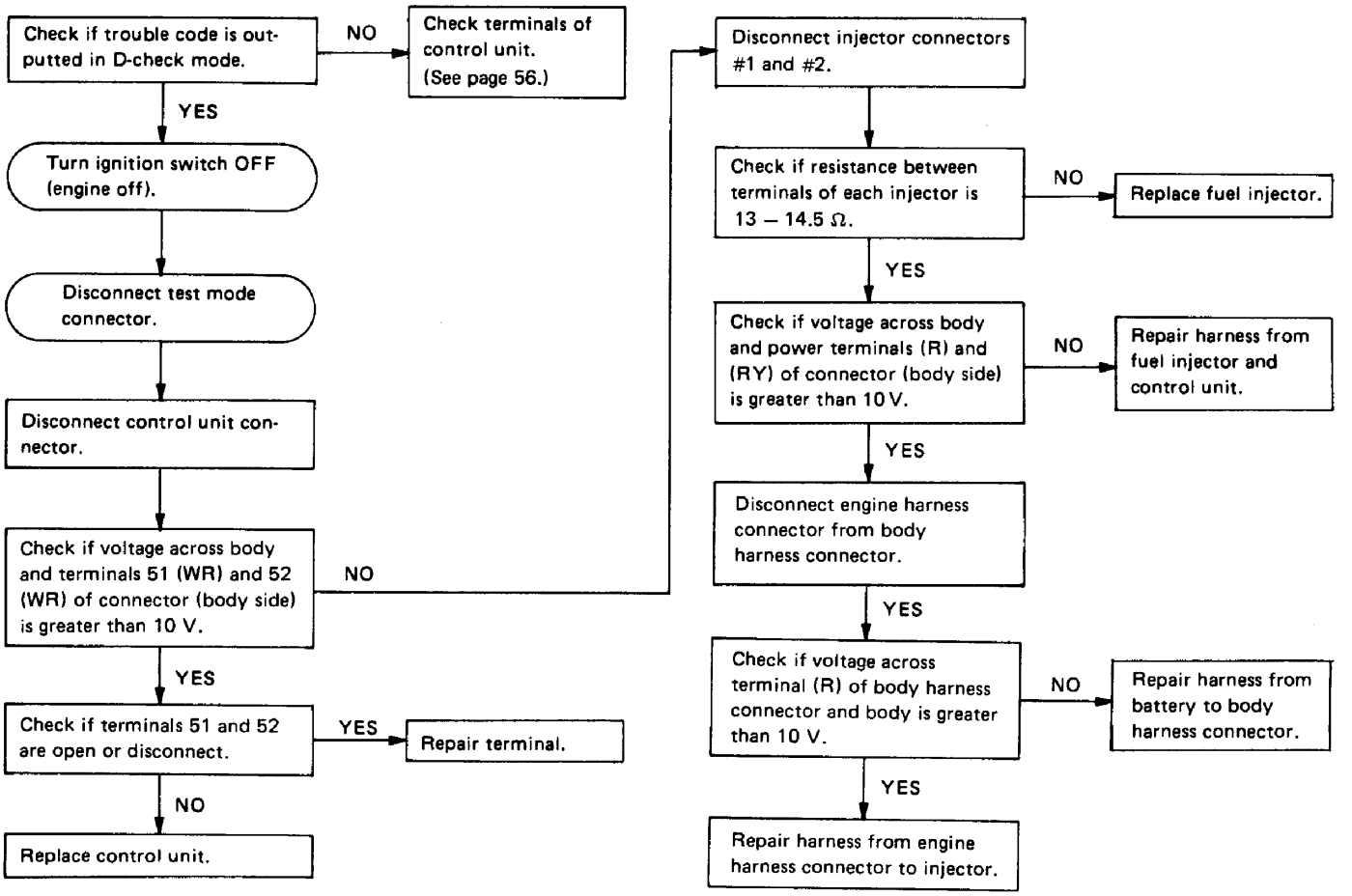


Fig. 84



TROUBLE CODE (21): WATER TEMPERATURE SENSOR

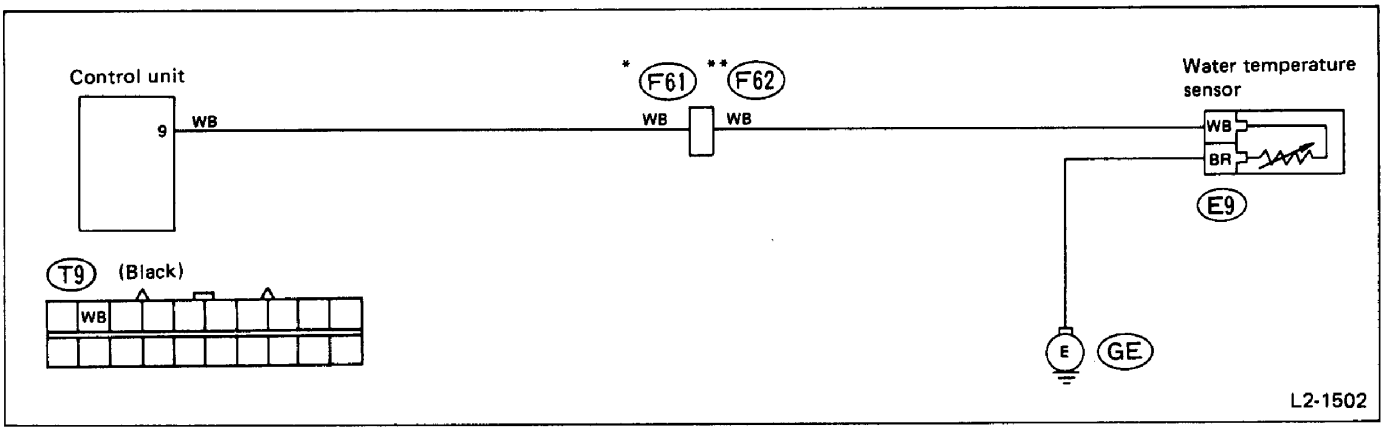
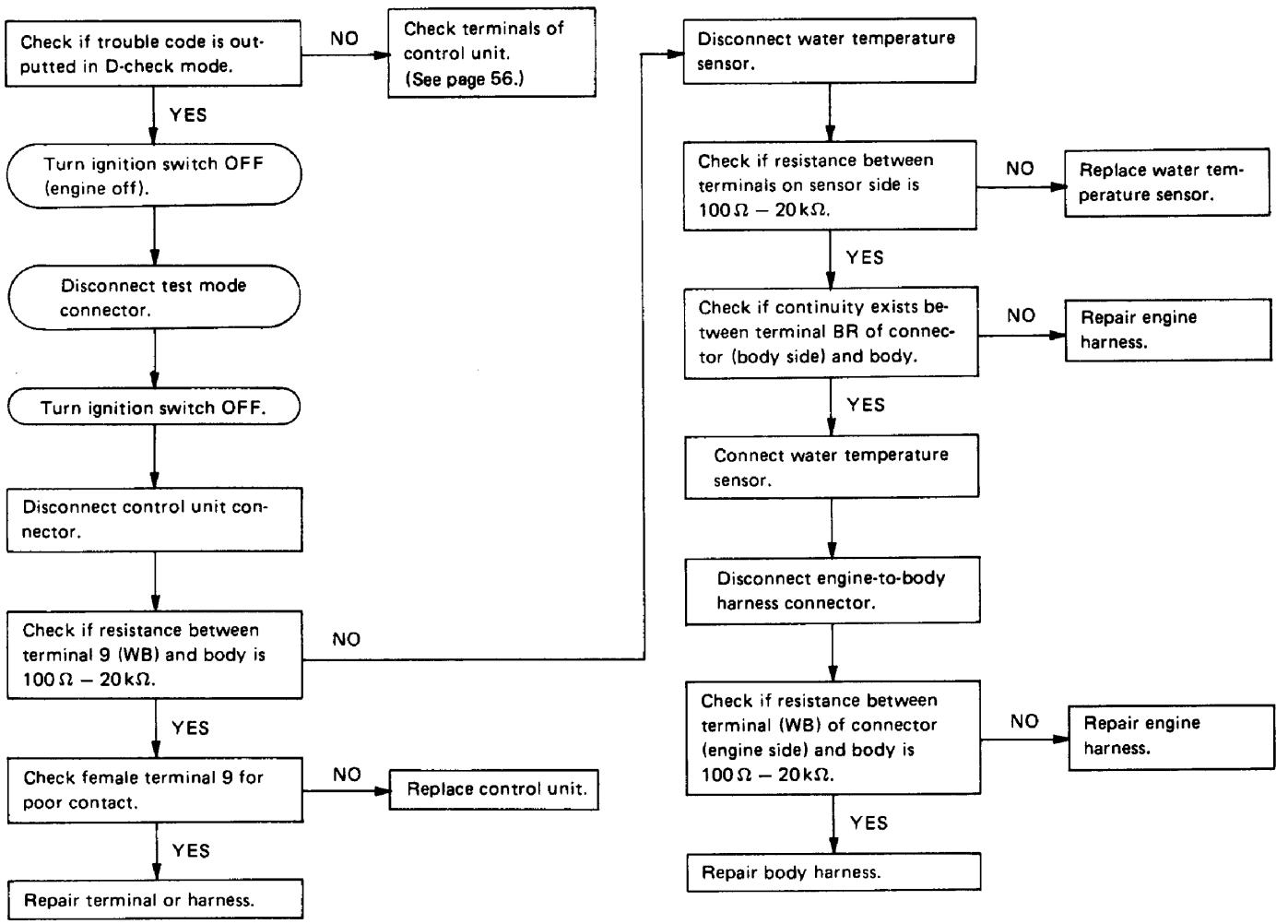


Fig. 85

*: 1800 cc model **: 2700 cc model



TROUBLE CODE (22): KNOCK SENSOR [2700cc model]

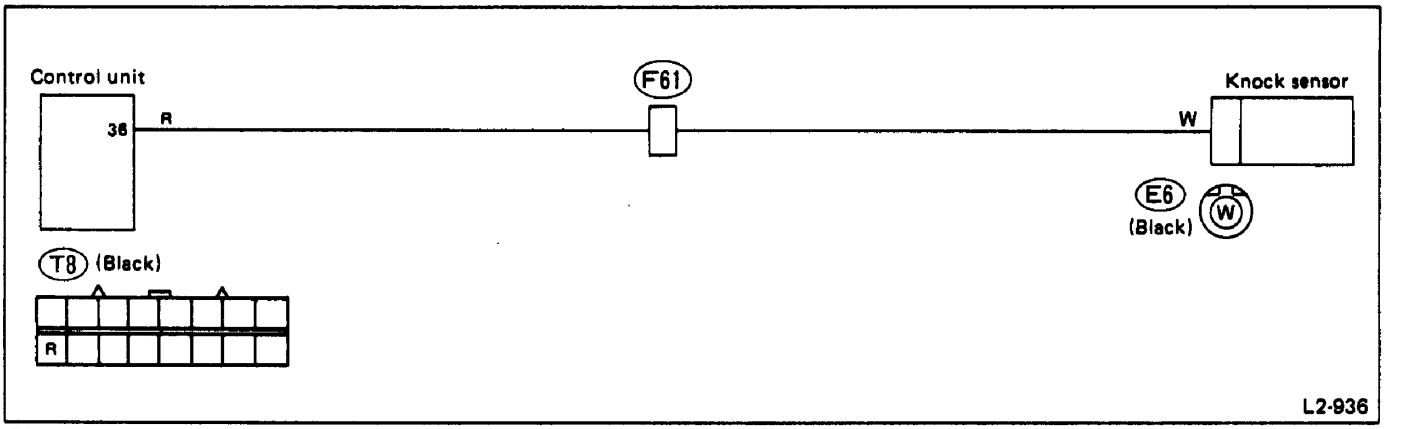
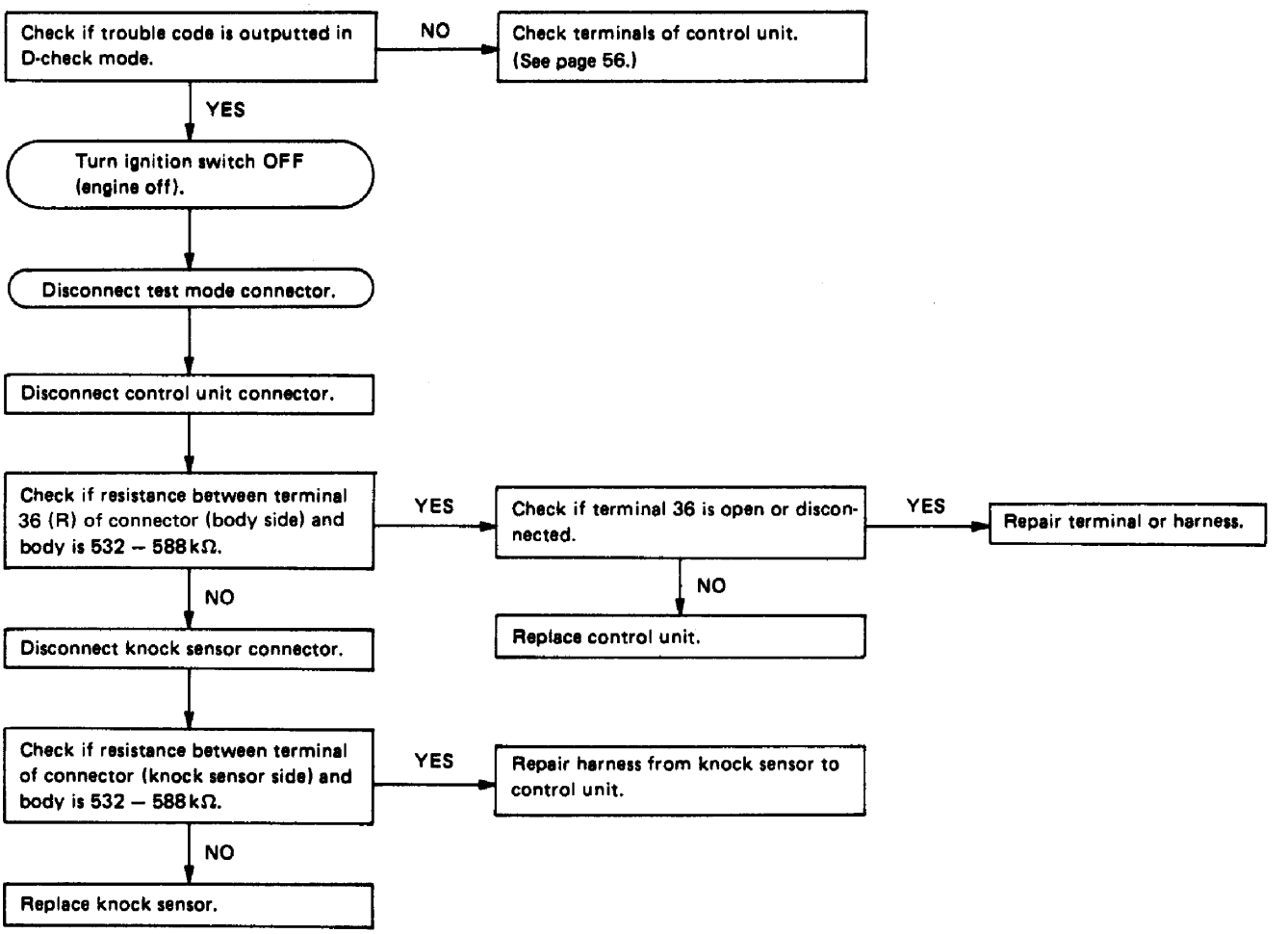


Fig. 86



TROUBLE CODE (23): AIR FLOW METER

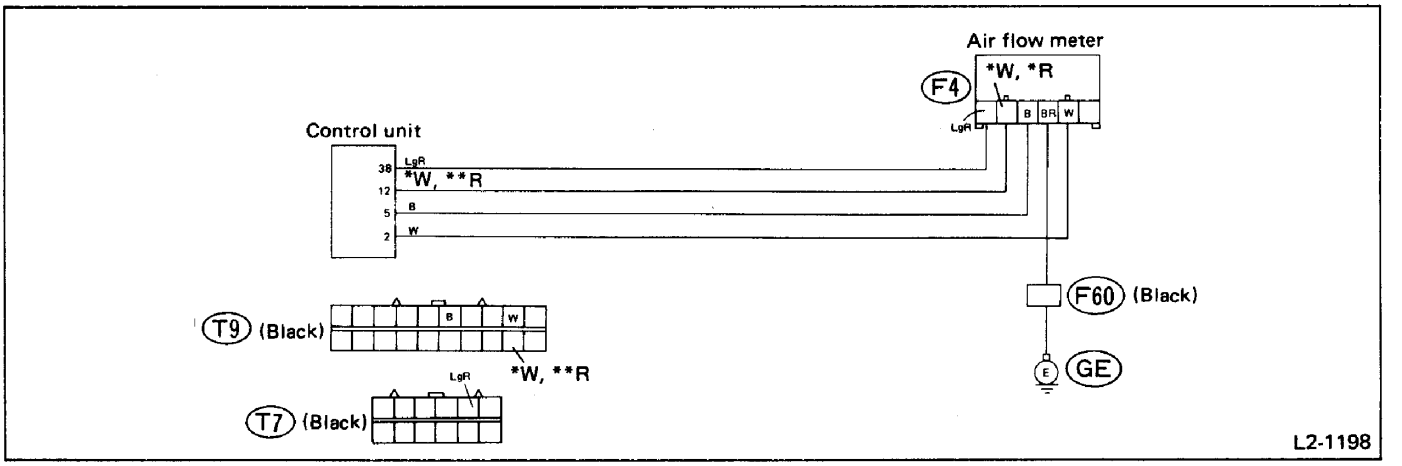


Fig. 87

*: 1800 cc model **: 2700 cc model

Check if trouble code is outputted in D-check mode.
NO → Check terminals of control unit. (See page 56.)
YES
Turn ignition switch OFF (engine off).
Disconnect test mode connector.

Disconnect air flow meter connector.
Remove rubber cover from air flow meter connector.
Check if resistance between terminal B of air flow meter connector and body is less than 10 Ω.
NO → Check if resistance between terminal 5 of control unit and body is less than 10 Ω.
NO → Check if terminal 5 is open or disconnected.
YES → Repair terminal or harness.
NO → Replace control unit.
YES → Repair harness.
YES

Check if resistance between terminal (BR) of connector and body is less than 10 Ω.
NO → Check if ground terminal at intake manifold is grounded properly.
NO → Repair harness.
YES → Tighten bolt.
YES

Turn ignition switch ON (engine off).
Check if voltage across terminal (*W, **R) and body is greater than 10 V.
NO → Check if voltage across terminal 12 of control unit and body is greater than 10 V.
YES → Repair harness.
NO → Check if terminal 12 is open or disconnected.
YES → Repair terminal or harness.
NO → Replace control unit.
YES

Connect air flow meter connector.
Check if voltage across terminals (W) and (BR) of air flow meter is 1 – 2 V.
NO → Replace air flow meter.
YES

Disconnect air flow meter from air cleaner. Blow air into air flow meter to check if voltage between terminals (W) and (BR) changes.
NO → Replace air flow meter.
YES

Check if voltage across terminal 2 (W) of control unit connector and body is 1 – 2 V.
YES → Check if terminal 2 is open or disconnected.
YES → Repair terminal or harness.
NO → Replace control unit.
NO
Repair harness.

TROUBLE CODE (24): BY-PASS AIR CONTROL VALVE

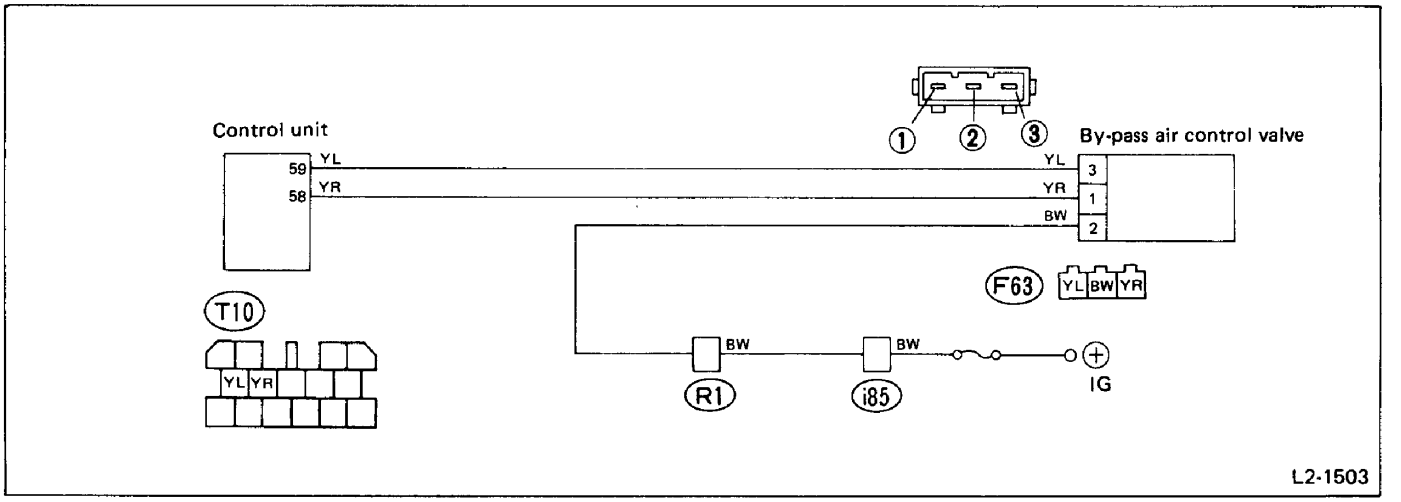


Fig. 88

Check if trouble code is outputted in D-check mode.
NO → Check terminals of control unit. (See page 56.)
YES ↓
Turn ignition switch OFF (engine off).
↓
Disconnect test mode connector.
↓
Disconnect control unit connector.
↓
Turn ignition switch ON (engine off).
↓
Check if voltage between control unit connector (body side) by-pass air terminal (YR) and car body, and by-pass air terminal (YL) and car body is greater than 10 V.
NO → Disconnect by-pass air control valve connector.
→ Check if voltage between terminal (BW) of control valve connector (body side) and car body is greater than 10 V.
NO → Repair harness from battery to control valve.
YES ↓
→ Check if resistance between terminals ① and ② of control valve is 9.5 – 11.5 Ω and between terminal ② and ③ is 8.5 – 10.5 Ω.
NO → Replace by-pass air control valve.
YES ↓
Repair terminals.
YES ↓
Disconnect by-pass air control valve connector.
↓
Check if resistance between terminals ① and ② of control valve is 9.5 – 11.5 Ω, and between terminals ② and ③ is 8.5 – 10.5 Ω.
NO → Replace by-pass air control valve.
YES ↓
Remove by-pass air control valve from engine, and disconnect hoses.
↓
Connect control valve connector.
↓
Make sure the valve moves when ignition switch is turned ON and OFF.
NO → Replace by-pass air control valve.
YES ↓
Replace control unit.

TROUBLE CODE (25): FUEL INJECTOR [2700cc model]

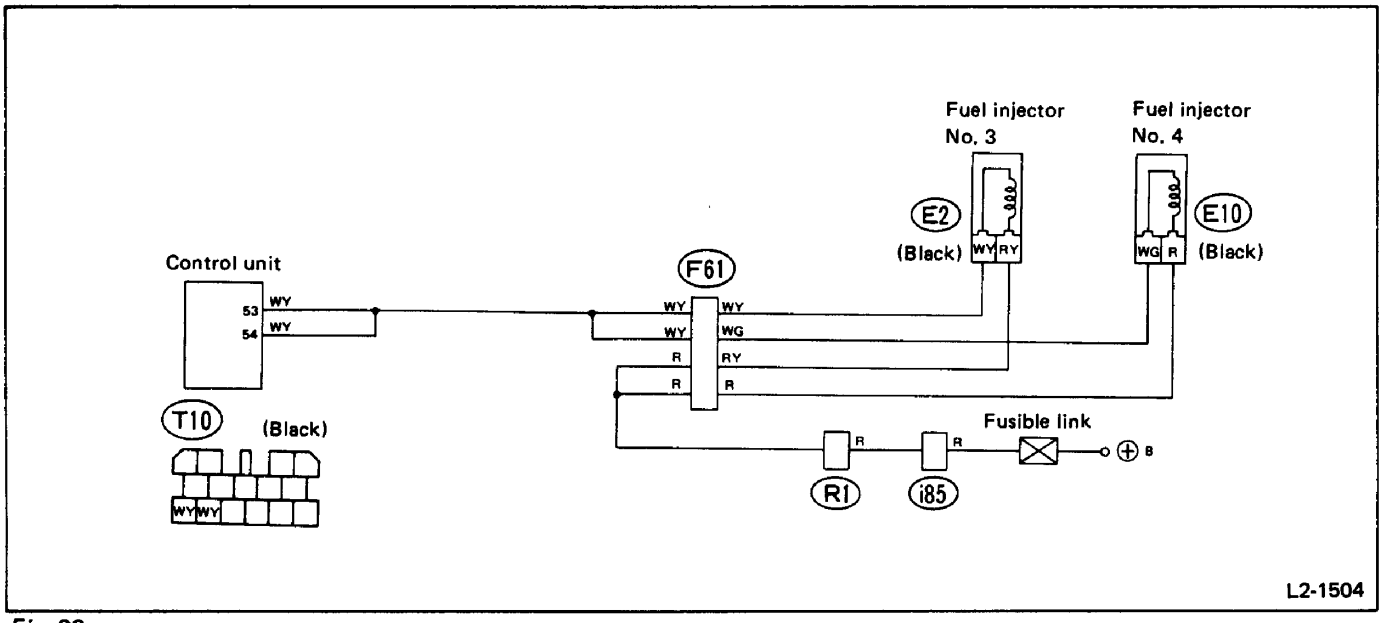
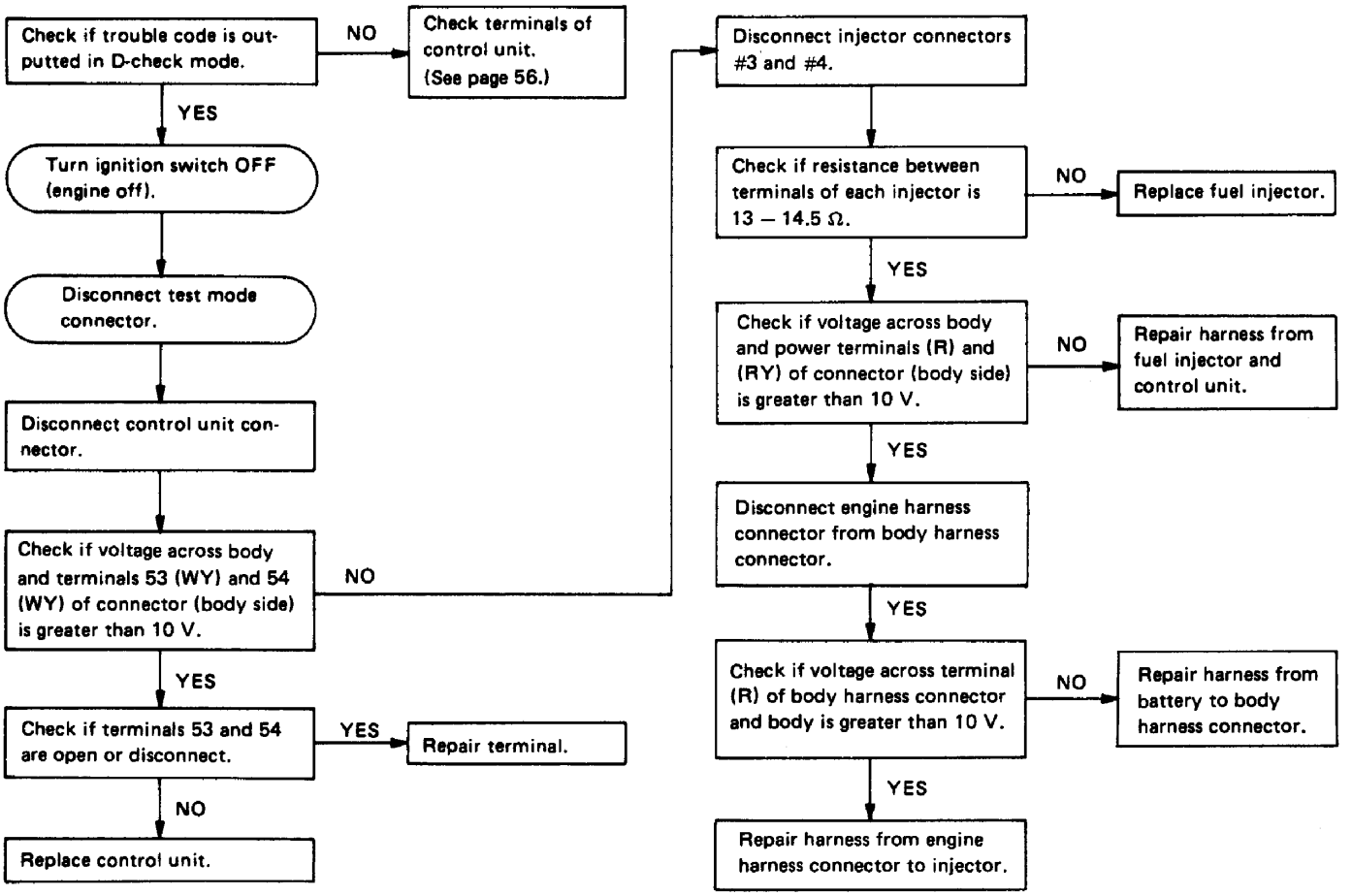


Fig. 89



TROUBLE CODE (31): THROTTLE SENSOR [1800cc model]

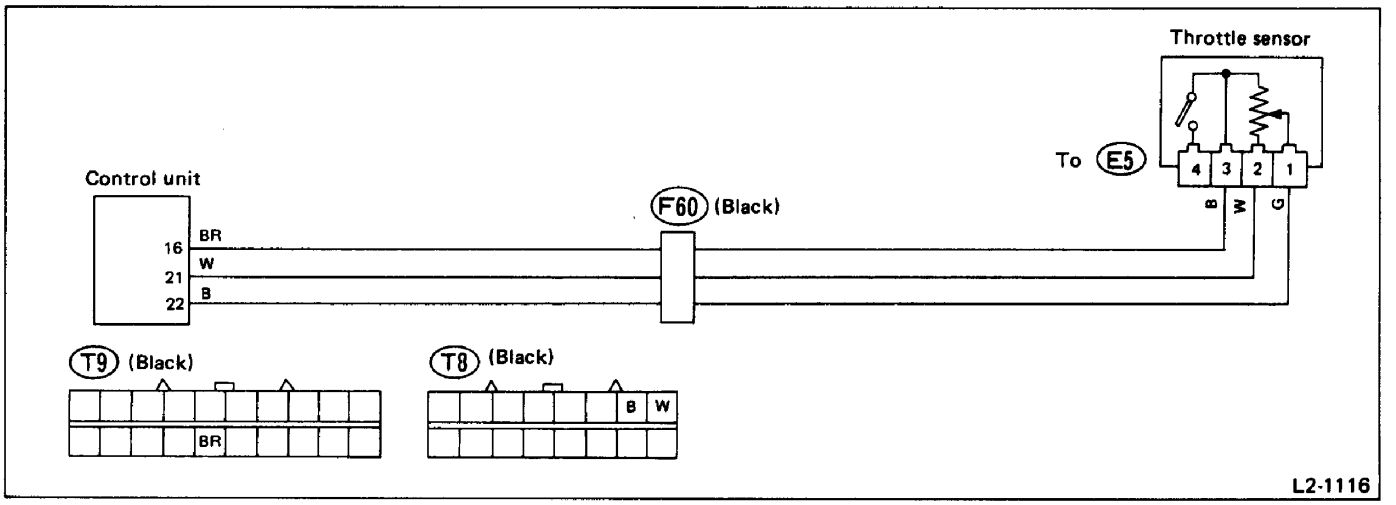
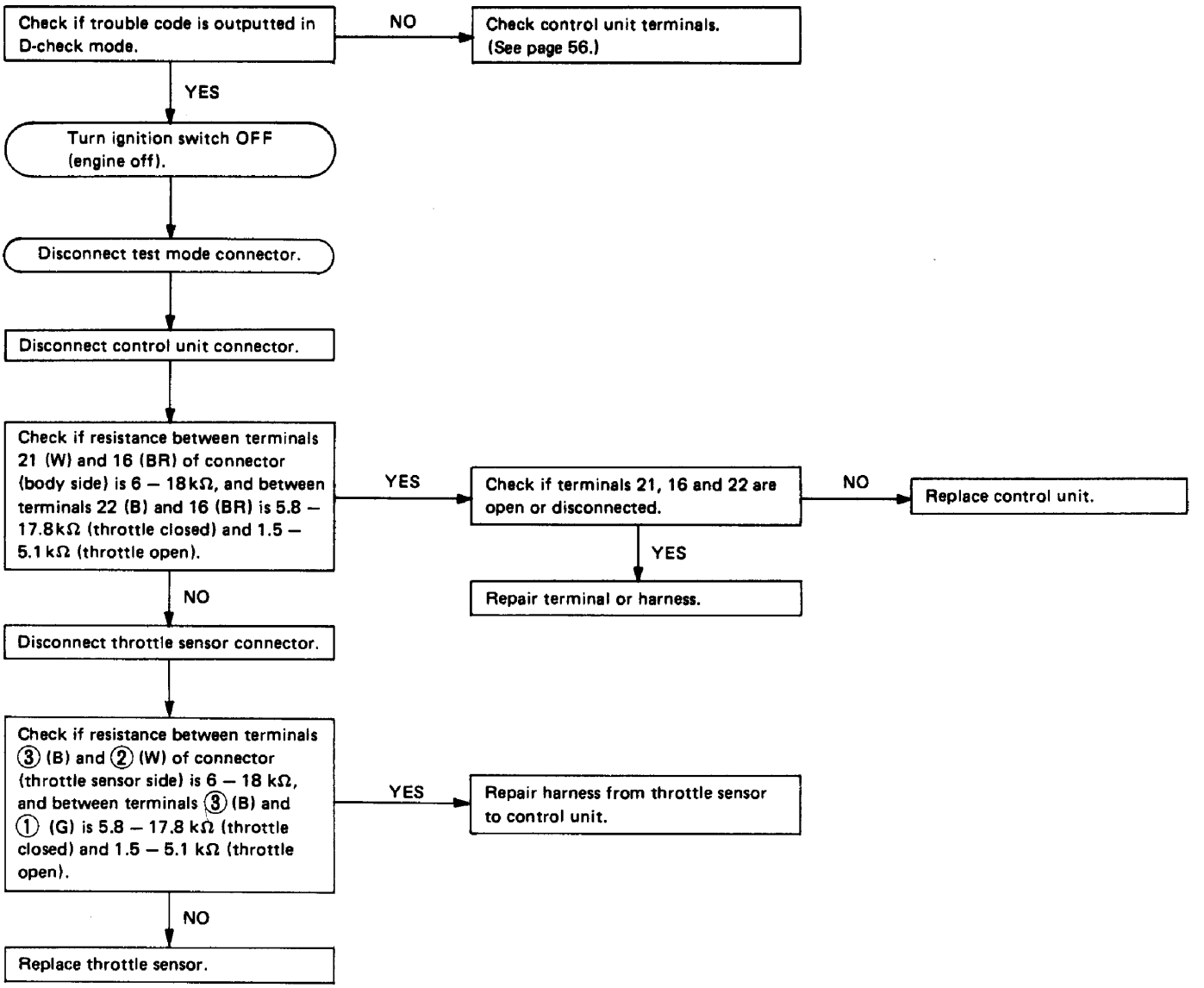


Fig. 90



TROUBLE CODE (31): THROTTLE SENSOR [2700cc model]

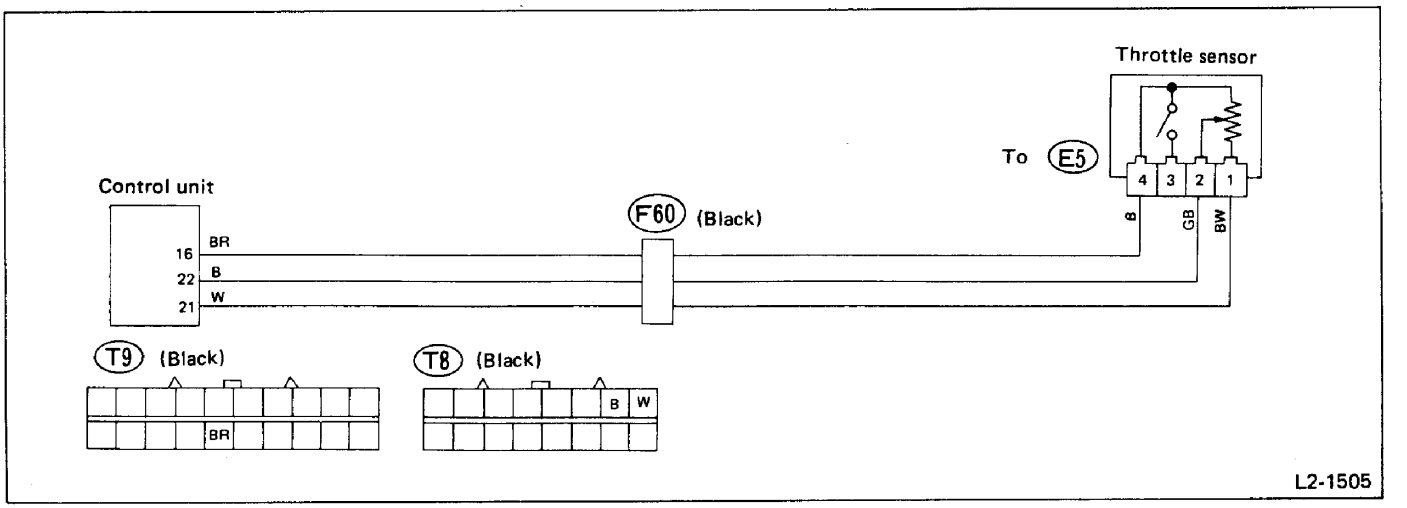


Fig. 91

Check if trouble code is outputted in D-check mode.
NO → Check control unit terminals. (See page 56.)
YES
Turn ignition switch OFF (engine off).
Disconnect test mode connector.
Disconnect control unit connector.
Check if resistance between terminals 21 (W) and 16 (BR) of connector (body side) is 3 – 7 kΩ, and between terminals 22 (B) and 16 (BR) is 4.2 – 15 kΩ (throttle closed) and 0.1 – 11 kΩ (throttle open).
YES → Check if terminals 21, 16 and 22 are open or disconnected.
NO → Replace control unit.
YES
Repair terminal or harness.
NO
Disconnect throttle sensor connector.
Check if resistance between terminals ① (BW) and ④ (B) of connector (throttle sensor side) is 3 – 7 kΩ, and between terminals ② (GB) and ④ (B) is 4.2 – 15 kΩ (throttle closed) and 0.1 – 11 kΩ (throttle open).
YES → Repair harness from throttle sensor to control unit.
NO
Replace throttle sensor.

TROUBLE CODE (32): O_2 SENSOR

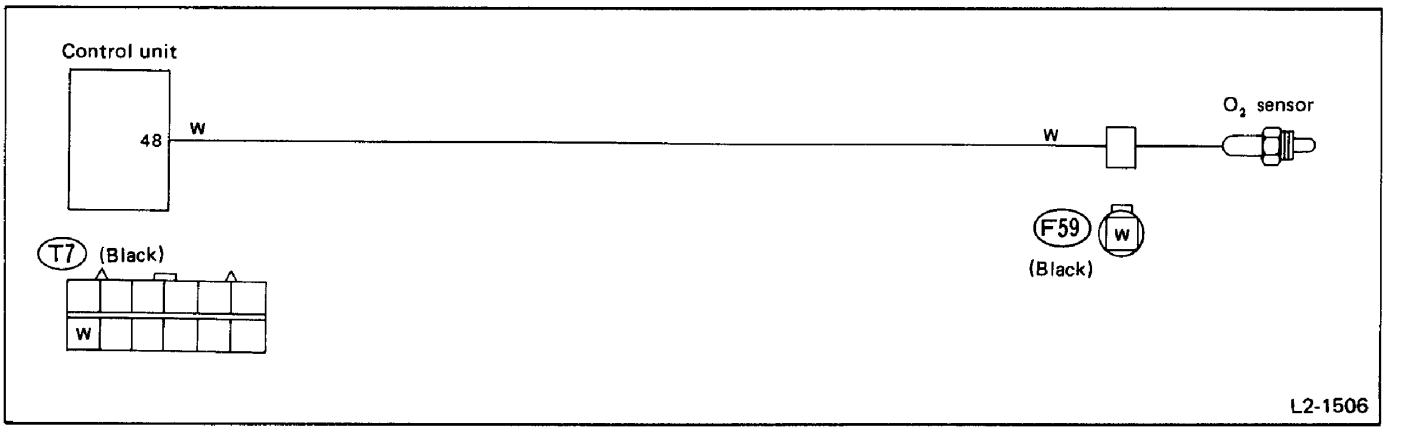
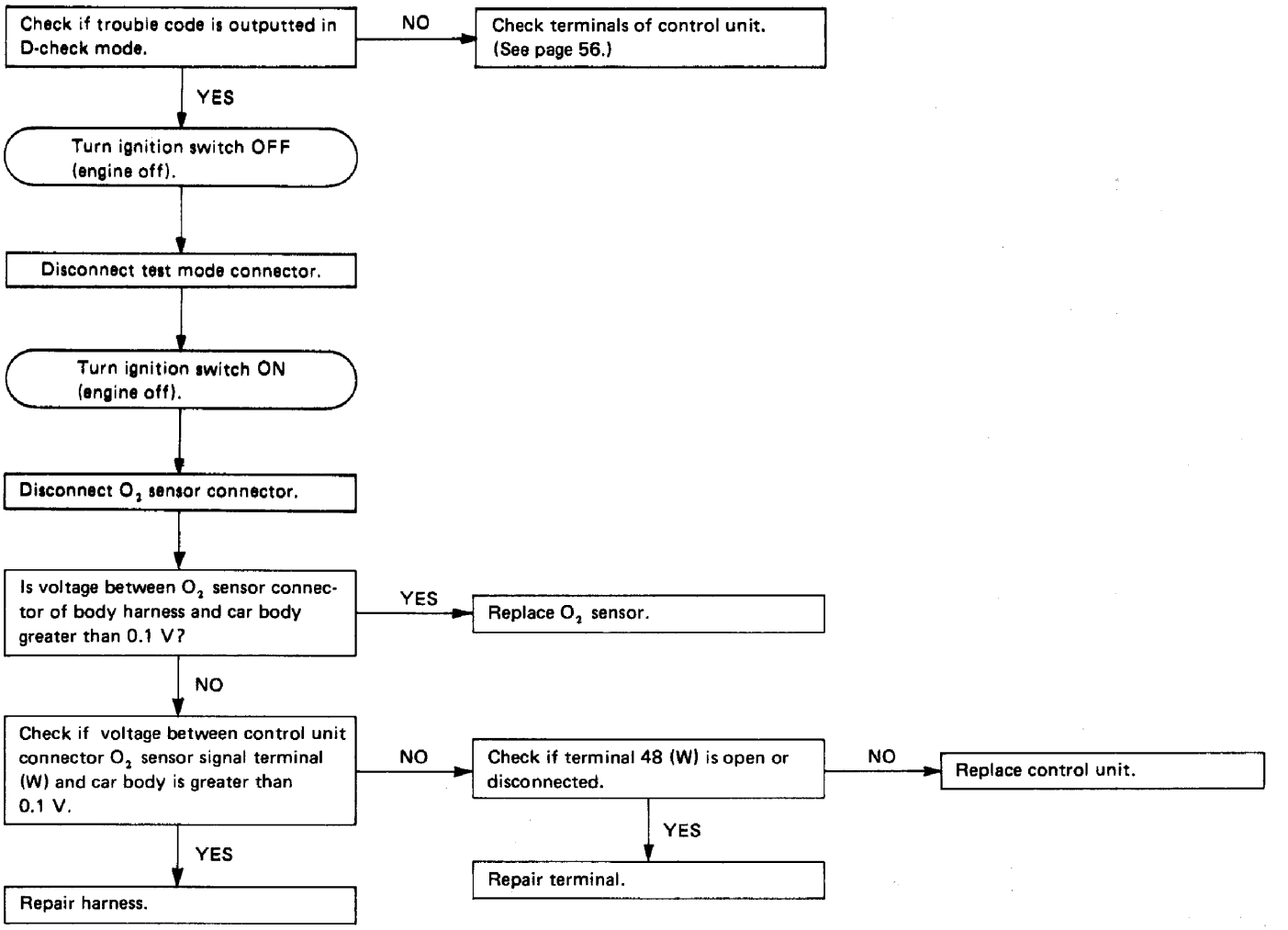


Fig. 92



TROUBLE CODE (33): SPEED SENSOR

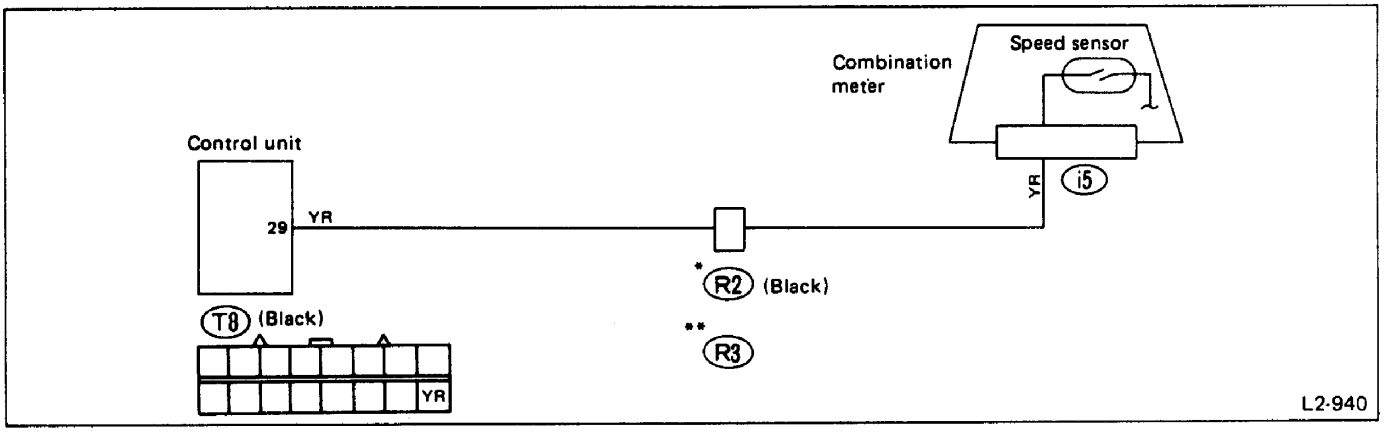
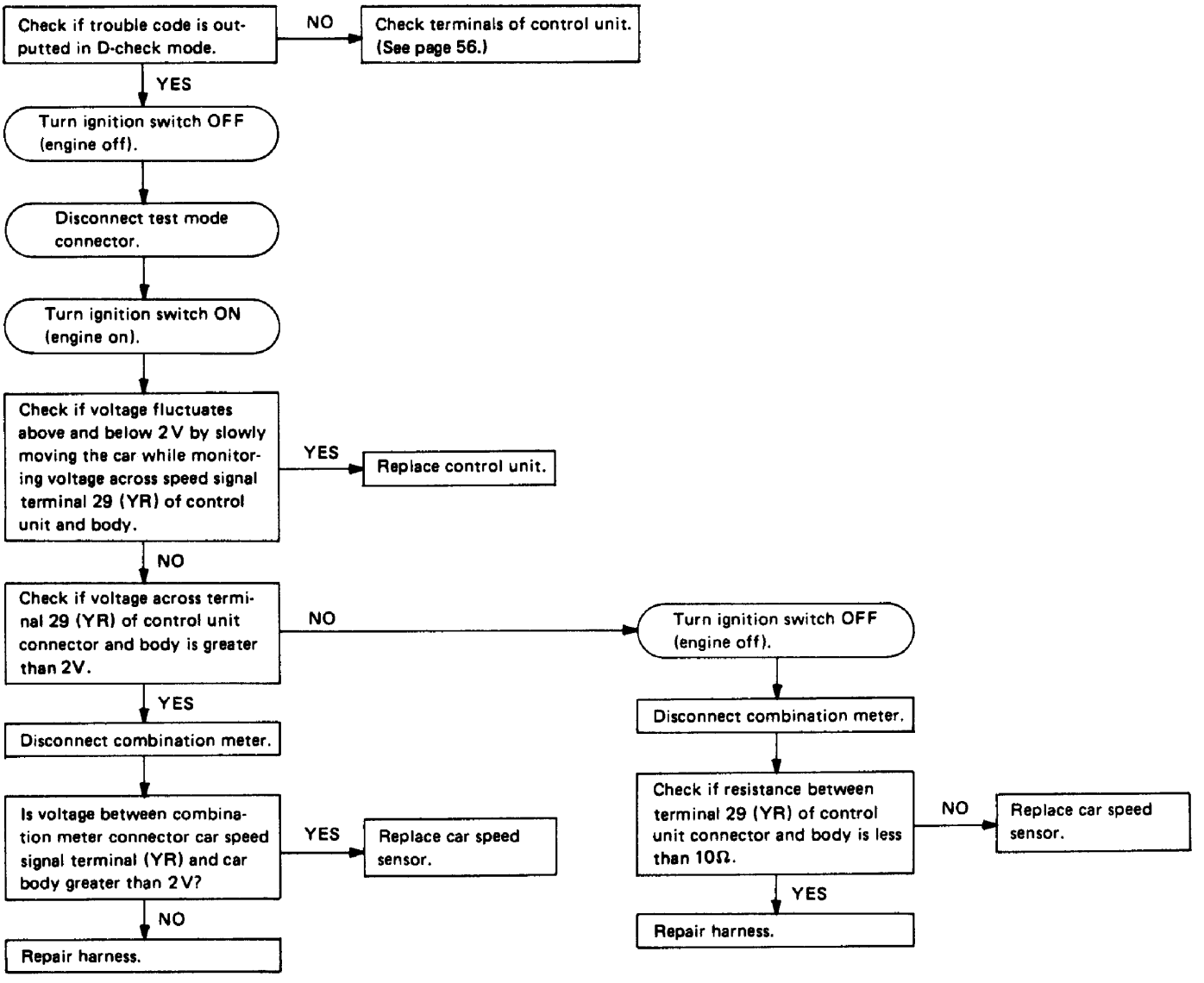


Fig. 93

*: 1800 cc model **: 2700 cc model



TROUBLE CODE (35): PURGE CONTROL SOLENOID VALVE

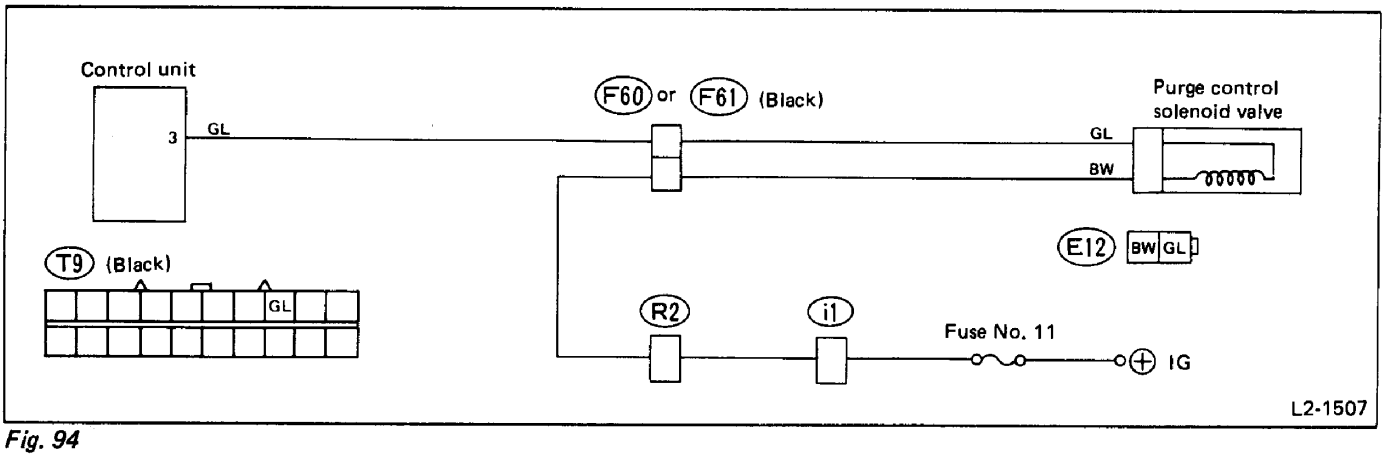
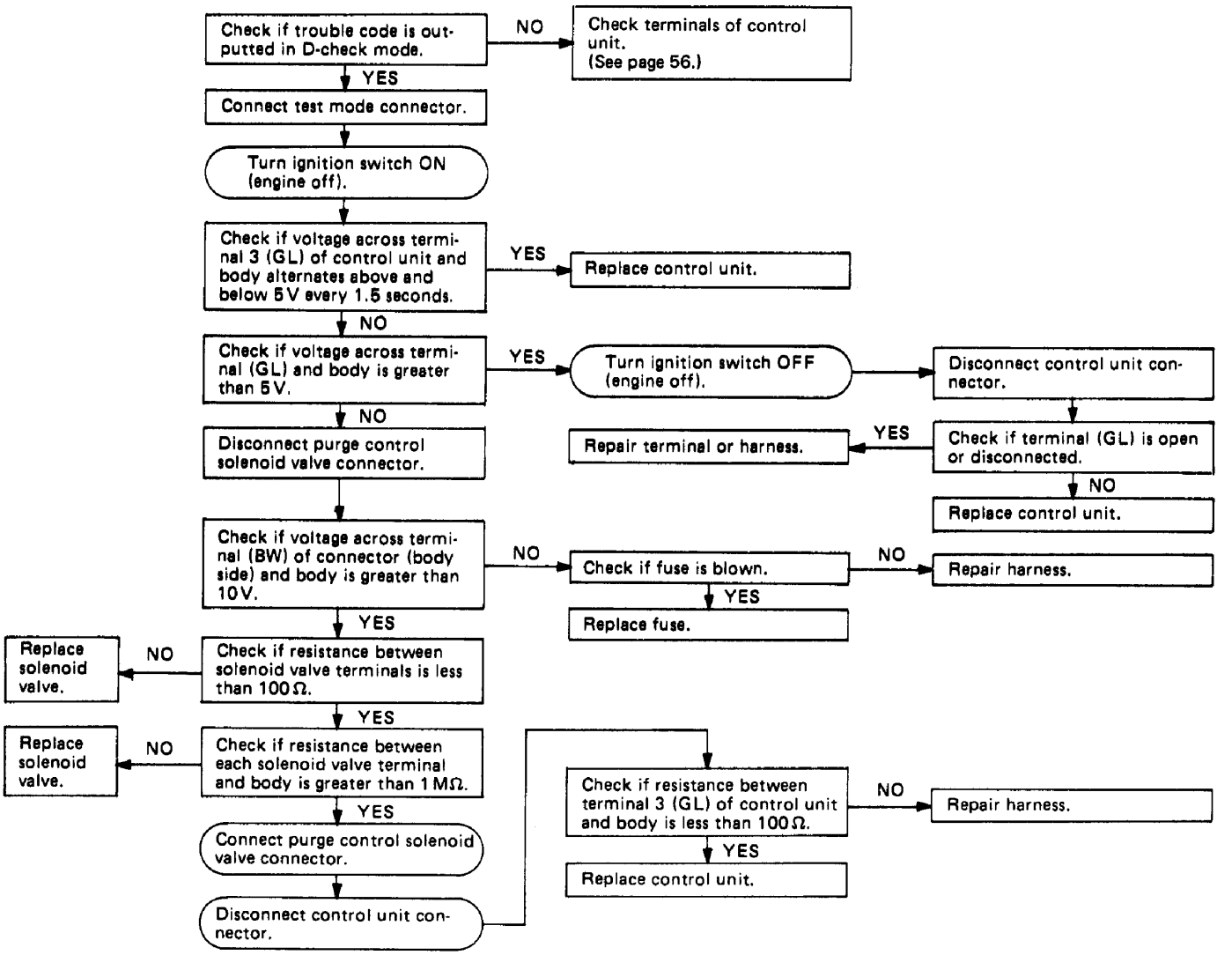


Fig. 94



TROUBLE CODE (41): SYSTEM

Trouble code (41) indicates that the mixture is too lean. When another trouble code is not outputted, all system components are electrically in good order.
Check the following:
① Injector nozzles (for clogging)
② Fuel pressure
③ Performance characteristics of water temperature sensor
If the above three are OK, check the following:
④ Drive some distance after replacing the air flow meter.
If still no good, proceed to ⑤.
⑤ Replace fuel injectors and drive some distance.
If still no good, proceed as follow:
⑥ Replace control unit.

TROUBLE CODE (42): IDLE SWITCH

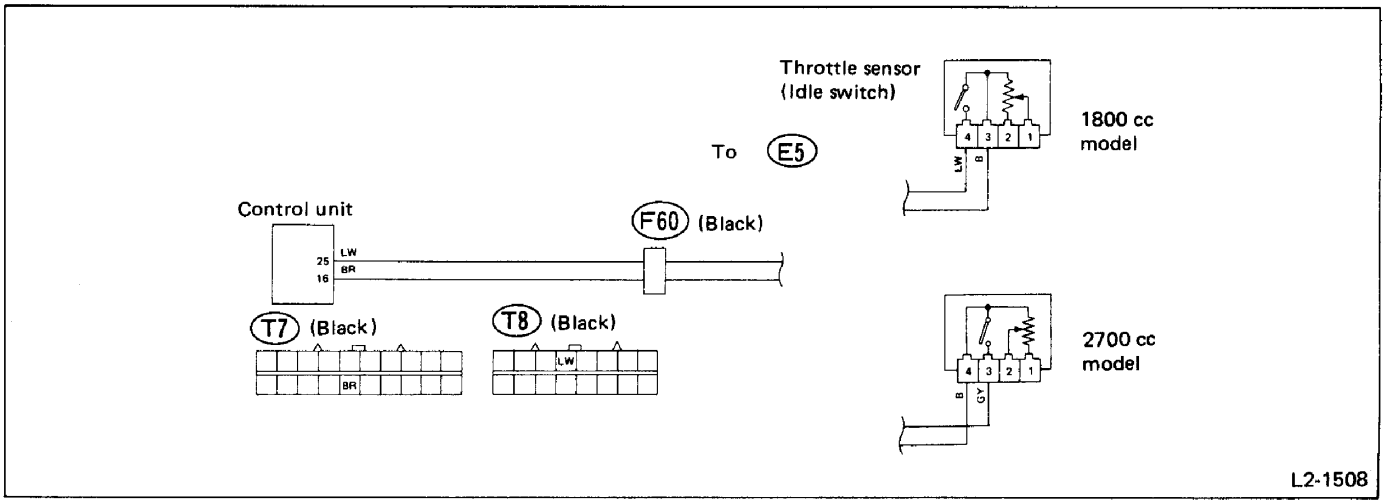


Fig. 95

Check if trouble code is outputted in D-check mode.
NO → Check terminals of control unit. (See page 56.)
YES
Turn ignition switch OFF (engine off).
Disconnect test mode connector.
Disconnect control unit connector.
Check if continuity exists between terminals 25 (LW) of connector (body side) and body when accelerator pedal is released and does not exist when accelerator pedal is depressed.
YES → Check if terminal 25 is open or disconnected.
NO → Replace control unit.
YES → Repair terminal or harness.
NO
Disconnect throttle sensor connector.
Check if continuity exists between terminals ③ and ④ of connector (throttle sensor side) when accelerator pedal is released.
NO → Adjust throttle sensor as outlined in Chapter 2-7 on page 21.
YES
Check if continuity exists when accelerator pedal is released.
NO → Replace throttle sensor.
YES
Check if there is no continuity when accelerator pedal is depressed.
NO → Replace throttle sensor.
YES
Repair harness.

TROUBLE CODE (51): NEUTRAL SWITCH [MT]

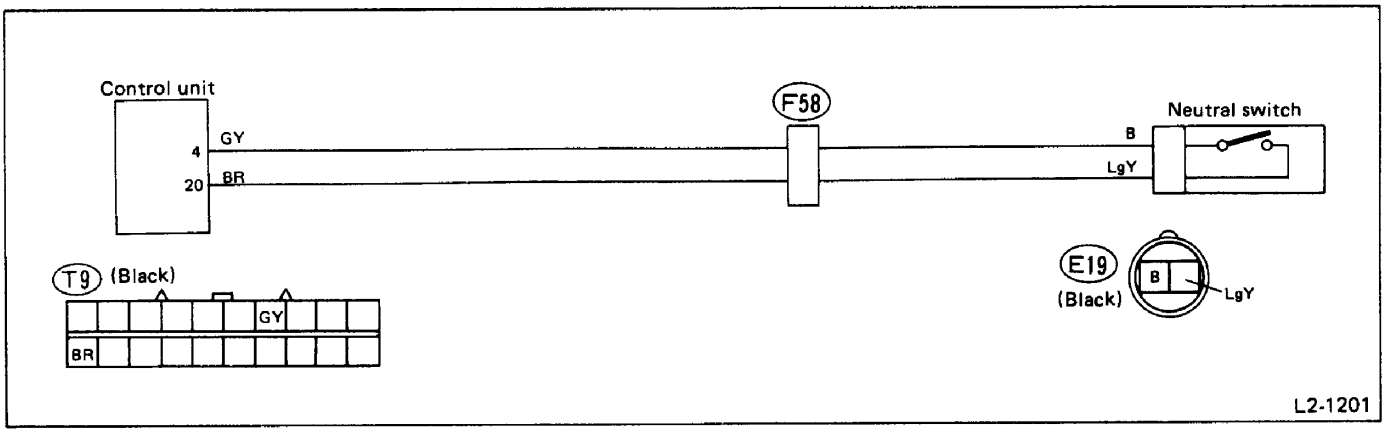


Fig. 96

Check if trouble code is outputted in D-check mode.
NO → Check terminals of control unit. (See page 56.)
YES
Turn ignition switch OFF (engine off).
Disconnect test mode connector.
Disconnect control unit connector.
Check if continuity exists between terminal 4 of connector (body side) and body when switch is in Neutral and does not exist in any other position.
YES → Check if terminal 4 is open or disconnected.
NO → Replace control unit.
YES
Repair terminal or harness.
NO
Disconnect neutral switch connector.
Check if continuity exists between terminals of neutral switch when switch is in Neutral and does not exist when switch is in any other position.
Replace neutral switch.
YES
Repair harness.