EMISSION CONTROL SYSTEM AND VACUUM FITTING

2-1

SUBARU

1988

System Application

There are three emission control systems which are as follows:
1) Crankcase emission control system
2) Exhaust emission control system
   - Ignition control system
   - Front catalyst (Three-way catalyst)
   - Rear catalyst (Oxidation catalyst)
3) Evaporative emission control system

General Precautions

1) Know the importance of periodic maintenance services.
   (1) Every service item in the periodic maintenance schedule must be performed.
   (2)Failing to do even one item can cause the engine to run poorly and increase exhaust emissions.
2) Determine if you have an engine or emission system problem.
   (1) Engine problems are usually not caused by the emission control systems.
   (2) When troubleshooting, always check the engine and the ignition system first.
3) Check hose and wiring connections first.
The most frequent cause of problems is simply a bad connection in the wiring or vacuum hoses. Always make sure that connections are secure and correct.
4) Avoid coasting with the ignition turned off and prolonged engine braking.
5) Do not damage parts.
   (1) To disconnect vacuum hoses, pull on the end, not the middle of the hose.
   (2) To pull apart electrical connectors, pull on the connector itself, not the wire.
   (3) Be careful not to drop electrical parts, such as sensors, or relays.
   If they are dropped on a hard floor, they should be replaced and not reused.
   (4) When steam cleaning an engine, protect the distributor, coil, air cleaner, and throttle body from water.
   (5) When checking continuity at the wire connector, the test bar should be inserted carefully to prevent terminals from bending.
6) Use SUBARU genuine parts.
7) Record how hoses are connected before disconnecting.
   (1) When disconnecting vacuum hoses, use tags to identify how they should be reconnected.
   (2) After completing a job, double check to see that the vacuum hoses are properly connected. See the "Vacuum connections label" under the hood.

Schematic Drawing

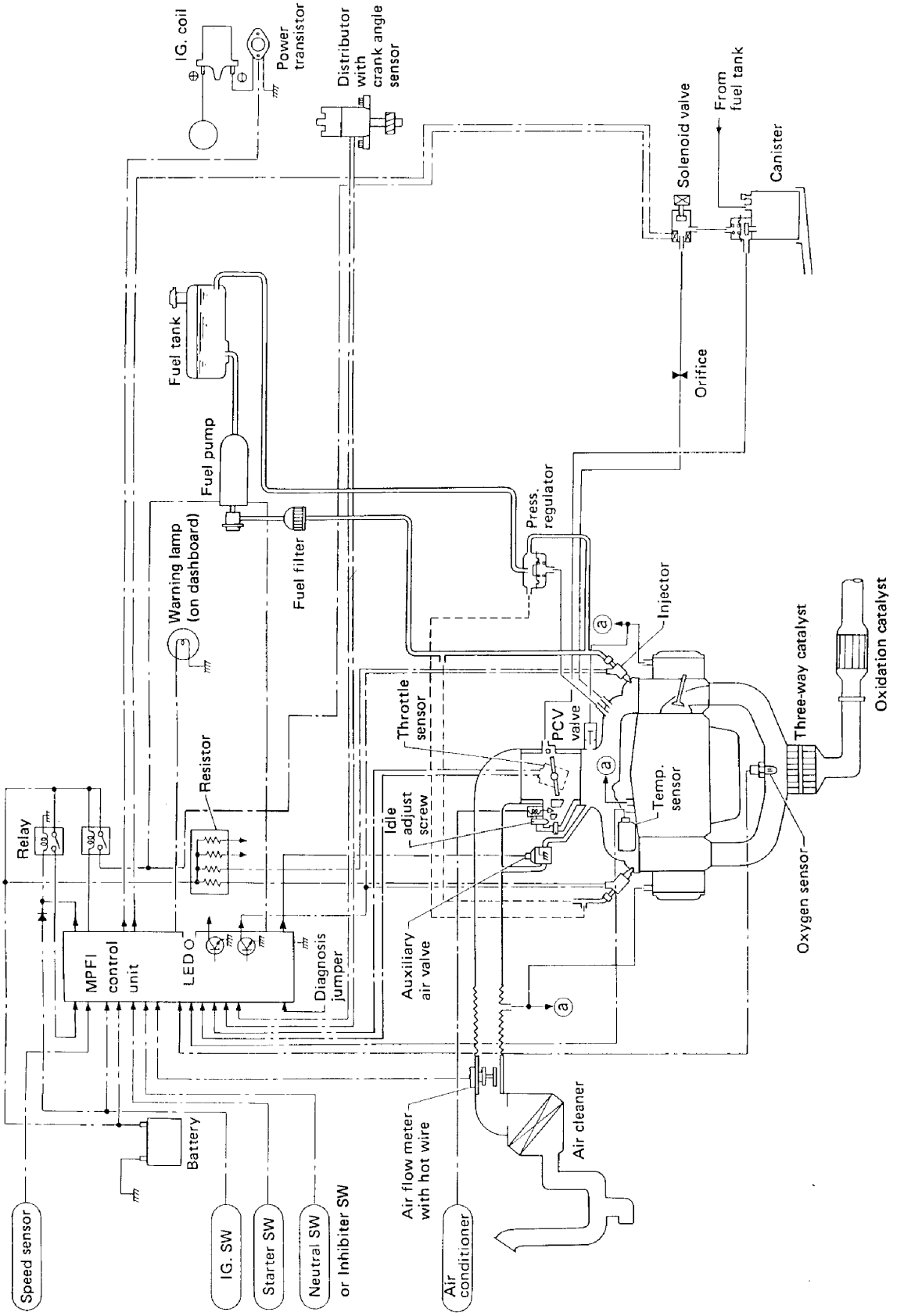


Fig. 1 1800 cc

L2-1255

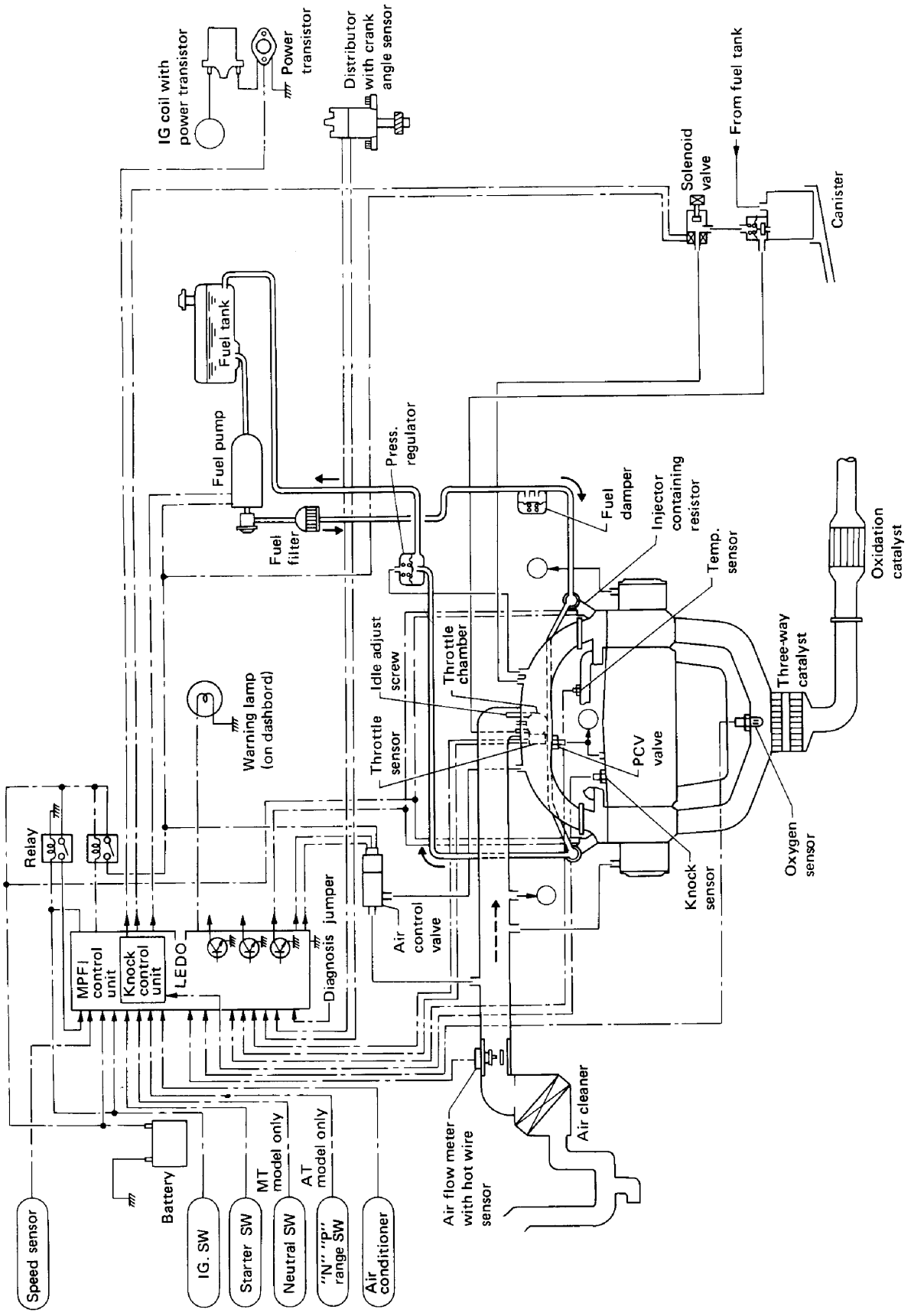


Fig. 2 2700 cc

L2-1256

Crankcase Emission Control System

DESCRIPTION

The positive crankcase ventilation (PCV) system is employed to prevent air pollution which will be caused by blow-by gas being emitted from the crankcase.

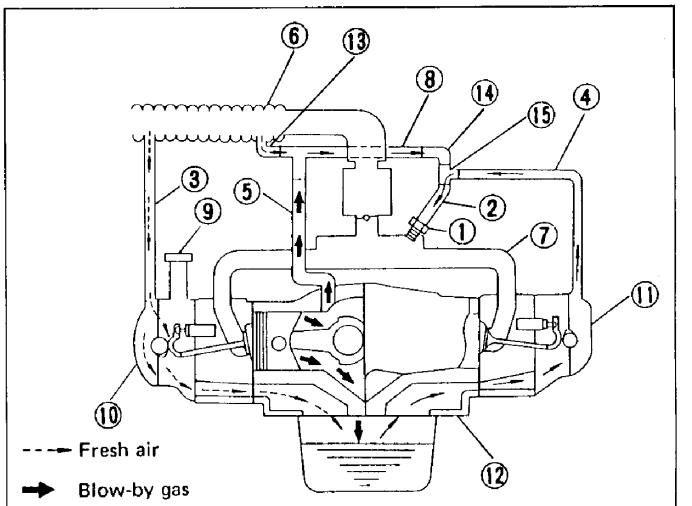
The system consists of a sealed oil filler cap, rocker covers with an emission outlet and fresh air inlet, connecting hoses, PCV valve and an air cleaner.

At the part throttle, the blow-by gas in the crankcase flows into the intake manifold through the connecting hose of rocker cover on #2/#4 side, connecting hose of crankcase and PCV valve by the strong vacuum of the intake manifold. Under this condition, the fresh air is introduced into the crankcase through connecting hose of rocker cover on #1/#3 side, and drawn to the intake manifold through PCV valve together with the blow-by gas.

At the wide open throttle, a part of blow-by gas flows into the air cleaner through the connecting hose of rocker cover on #1/#3 side and is drawn to the throttle body, because under this condition, the intake manifold vacuum is not so strong as to introduce all blow-by gases increasing with engine speed directly through the PCV valve.

Under the special operating condition, such as steep right turn driving, engine oil sometimes blows up into connecting hose or rocker cover on #2/#4 side and flows into the intake manifold by the force of the vacuum.

However, in this case, the connecting hose between intake duct and connecting hose of rocker cover on #2/#4 side reduces the vacuum to prevent this.



1 PCV valve
2 PCV hose
3 Blow-by hose (RH)
4 Blow-by hose (LH)
5 Blow-by hose (CTR)
6 Intake duct
7 Intake manifold
8 Connector
9 Oil filler cap
10 Rocker cover (#1/#3)
11 Rocker cover (#2/#4)
12 Crankcase
13 Connecting hose
14 Connecting hose
15 Connector

L1-039

Fig. 3 1800 cc

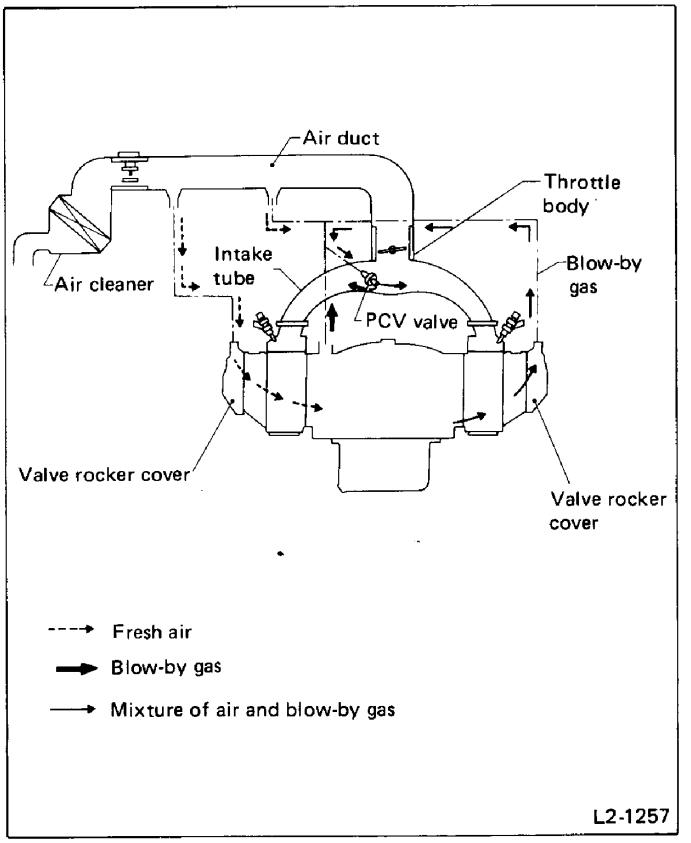


Fig. 4 2700 cc

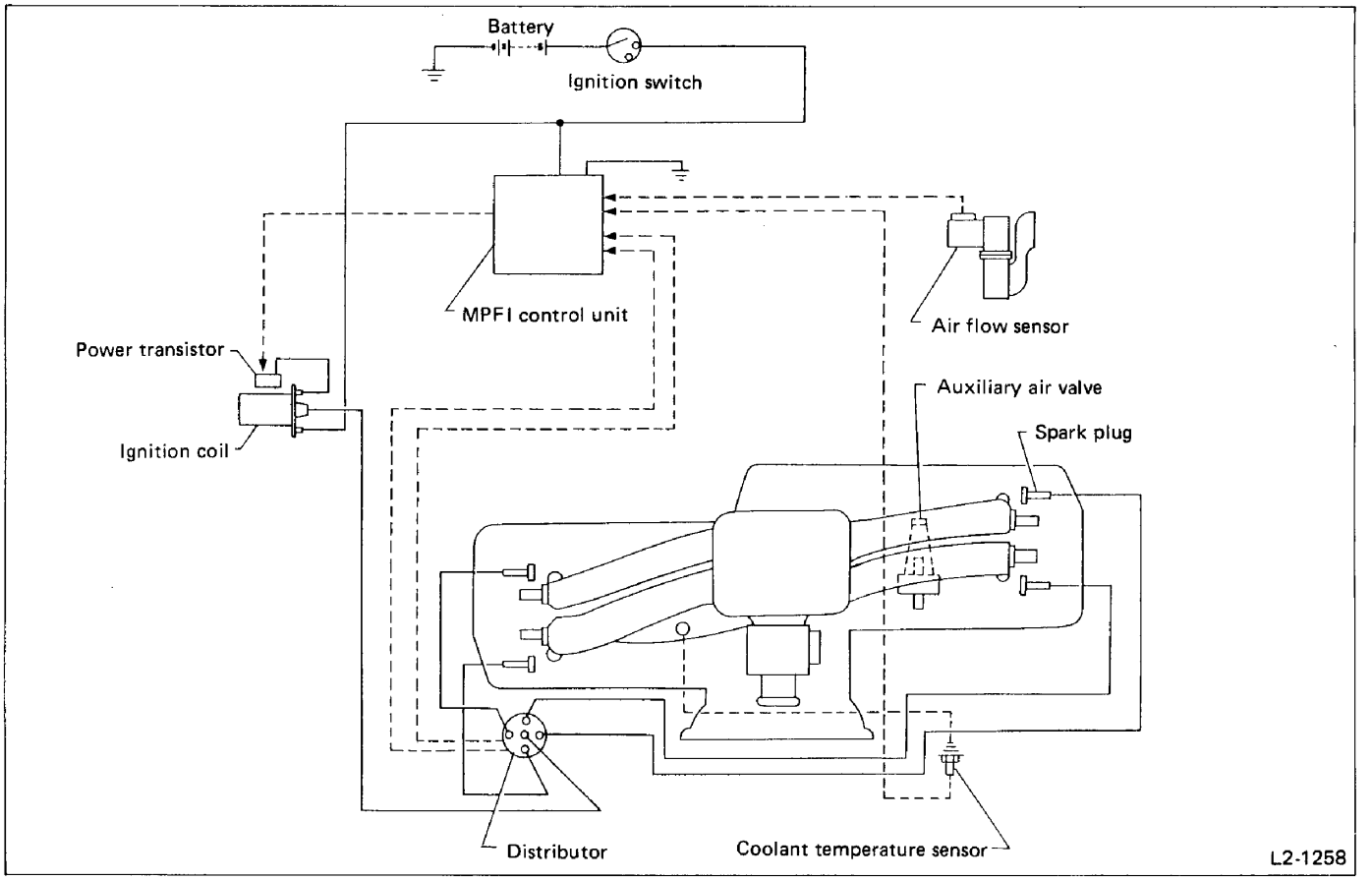


Fig. 6 1800 cc

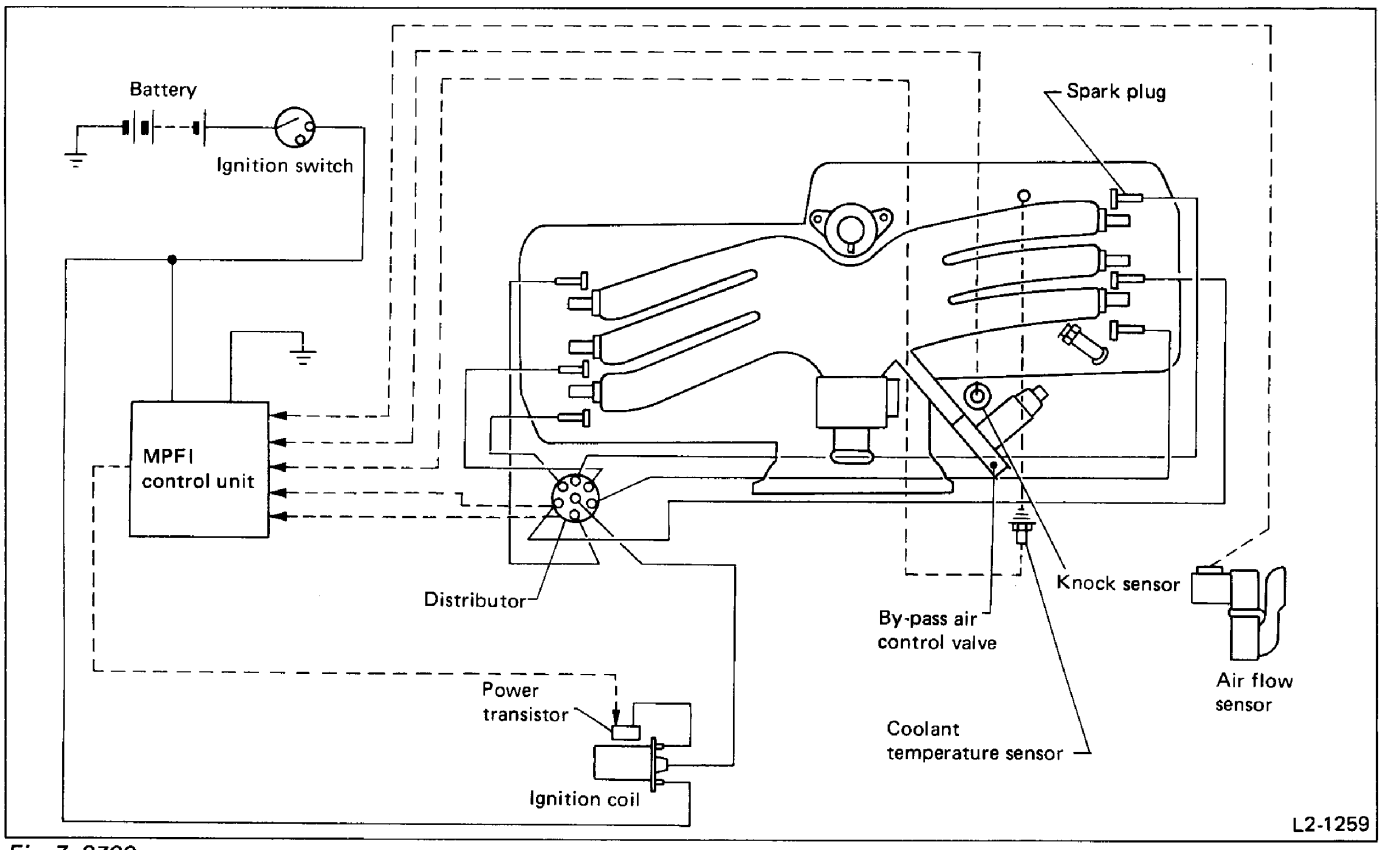


Fig. 7 2700 cc

Three-way Catalyst

The basic material of three-way catalyst is platinum (Pt) and rhodium (Rh), and a thin film of their mixture is applied onto honeycomb or porous ceramics of an oval shape (carrier). To avoid damaging the catalyst, only unleaded gasoline should be used.

The catalyst is used to reduce HC, CO and NOx in exhaust gases, and permits simultaneous oxidation and reduction. To obtain an excellent purification efficiency on all components HC, CO and NOx, a balance should be kept among the concentrations of the components. These concentrations vary with the air-fuel ratio.

The air-fuel ratio needs to be controlled to a value within the very narrow range covering around the theoretical (stoichiometric) air-fuel ratio to purify the components efficiently.

The air-fuel ratio is controlled by the MPFI system.

Refer to 2-7 "FUEL INJECTION SYSTEM".

Oxidation Catalyst

The basic material is Palladium (Pd) and Rhodium (Rh).

A thin film of their mixture is applied onto honeycomb or porous ceramics of an oval shape (carrier). To avoid damaging the catalyst, only unleaded gasoline should be used.

The catalyst is used to reduce HC, CO in exhaust gases.

Evaporative Emission Control System

DESCRIPTION

The evaporative emission control system is employed to prevent evaporative fuel from being discharged into ambient atmosphere. This system includes a canister, two-way valve, fuel separator, purge control solenoid valve, connecting lines, etc.

Gasoline vapor evaporated from the fuel in the fuel tank is introduced into the canister located in the engine compartment through the evaporation line, and is absorbed on activated carbon in it. A two-way valve and a fuel separator are also incorporated on the tank fuel line.

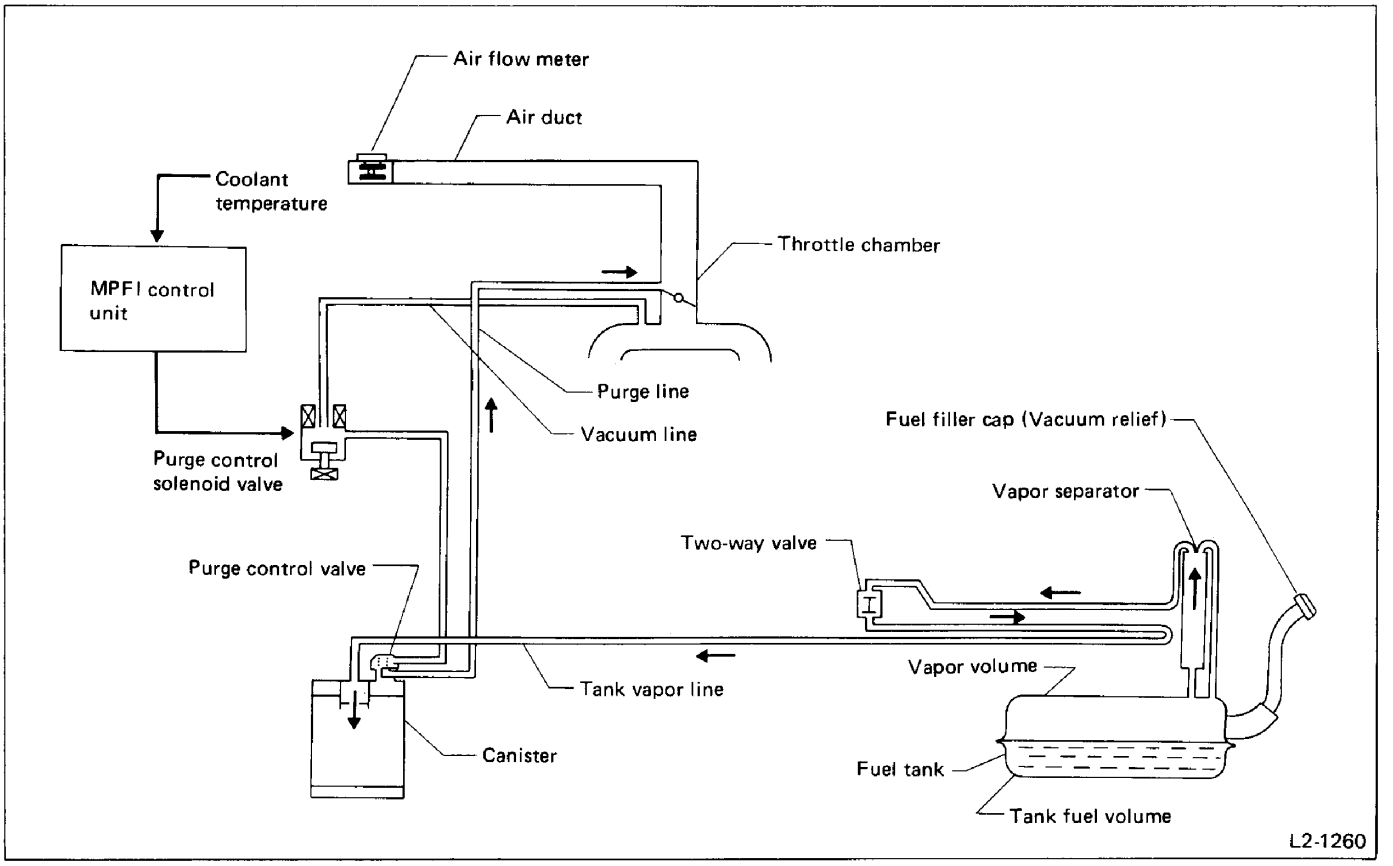


Fig. 8 1800 cc

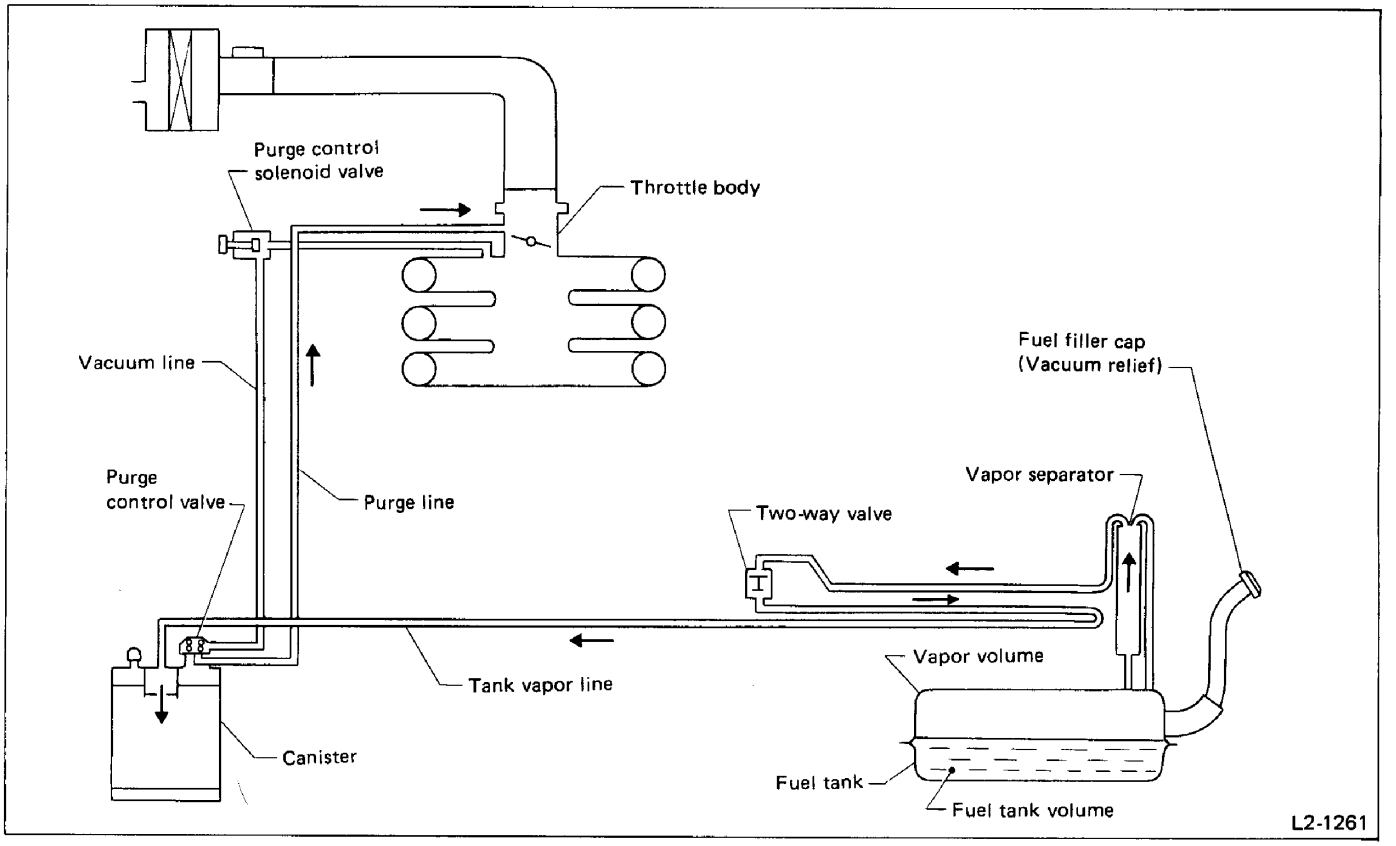


Fig. 9 2700 cc

CANISTER

The purge control valve on the canister is controlled by the intake manifold vacuum. When the purge control valve is opened, the absorbed vapor is introduced from the canister into the throttle body.

When the engine is not running, the purge control valve is closed by the return spring.

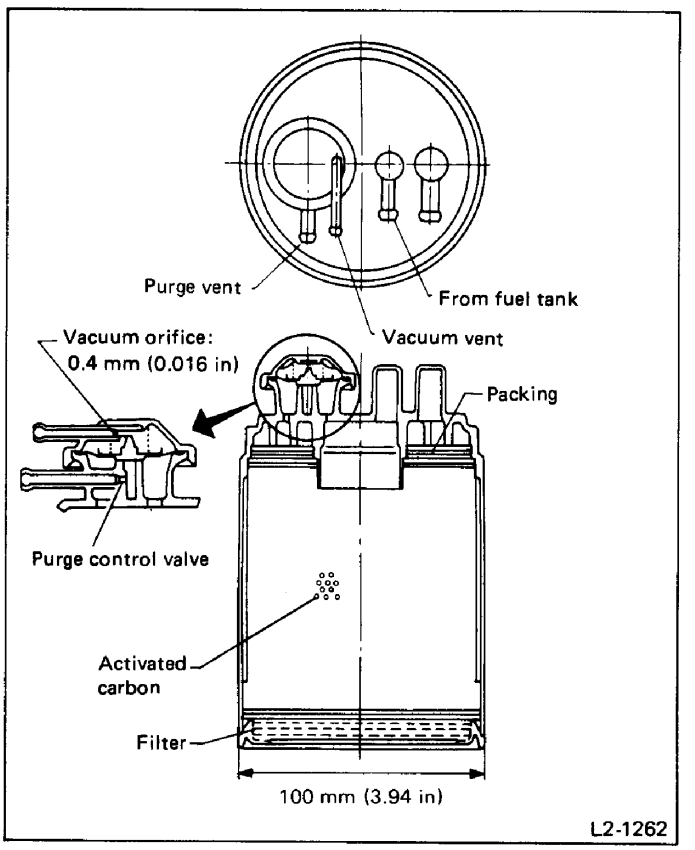


Fig. 10

TWO-WAY VALVE

The two-way valve is located in the fuel vapor line and functions to control the pressure in the fuel tank.
When the fuel tank pressure is positive above a certain point, the valve A is open to permit the fuel vapor to the canister, and when the fuel tank pressure is negative below a certain point, the valve B is open to introduce fresh air into the fuel tank.

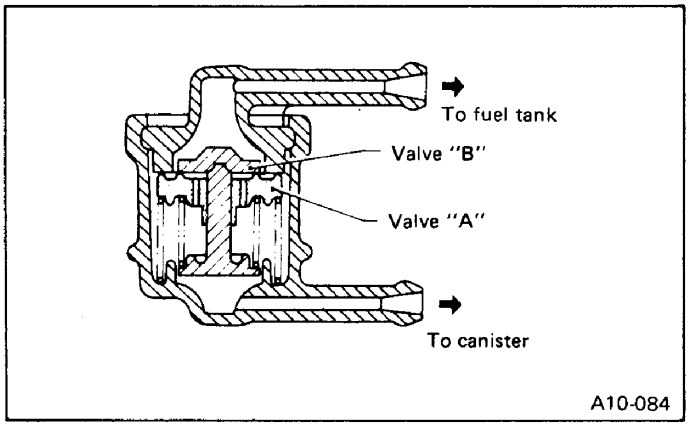


Fig. 11

FUEL SEPARATOR

The fuel separator is to prevent liquid fuel from flowing into the canister in case of abrupt cornering, etc.

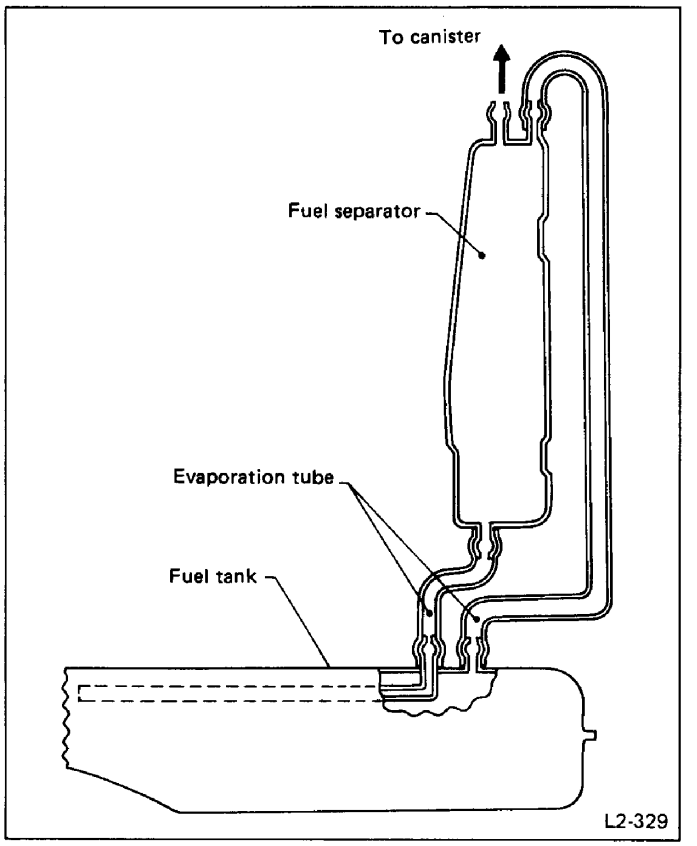


Fig. 12

FUEL CAP

The relief valve is adopted to prevent the development of vacuum in the fuel tank which may occur in case of trouble in the fuel vapor line.
In normal condition, the filler pipe is sealed at Ⓐ and at the packing pressed against the filler pipe end. As vacuum develops in the fuel tank, atmospheric pressure forces the spring down to open the valve; consequently air is led into the fuel tank controlling the inside pressure.

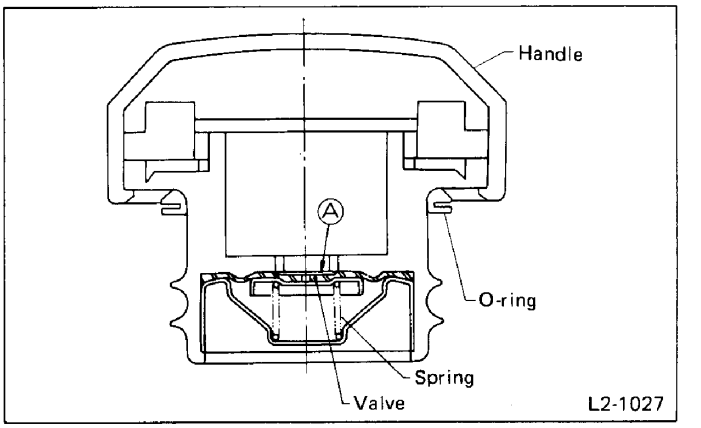


Fig. 13

INSPECTION

FUEL PIPING

Check fuel piping and connections for leakage.

EVAPORATION LINE FROM FUEL TANK TO CANISTER

1) Remove fuel filler cap.
2) Disconnect evaporation line at evaporation pipe CP.
3) Check for unobstructed evaporation line on fuel tank side except for a little resistance due to 2-way valve by blowing air into hose.
4) Check for unobstructed evaporation line on canister side with no resistance by blowing air into hose.

TWO-WAY VALVE

1) Check for air passage with slight resistance due to the valve by blowing air into the nipple on the side marked with letters "To engine".
2) Repeat the same step on the other nipple.
3) Check for the valve case with no crack. If cracked, replace it with new one.

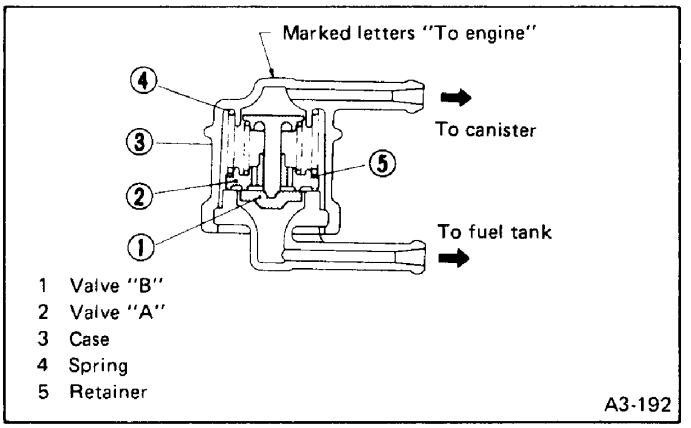


Fig. 14

PURGE LINE AND CANISTER

1) Disconnect the vacuum hose. Orally blow air through the hose to ensure that air does not leak.

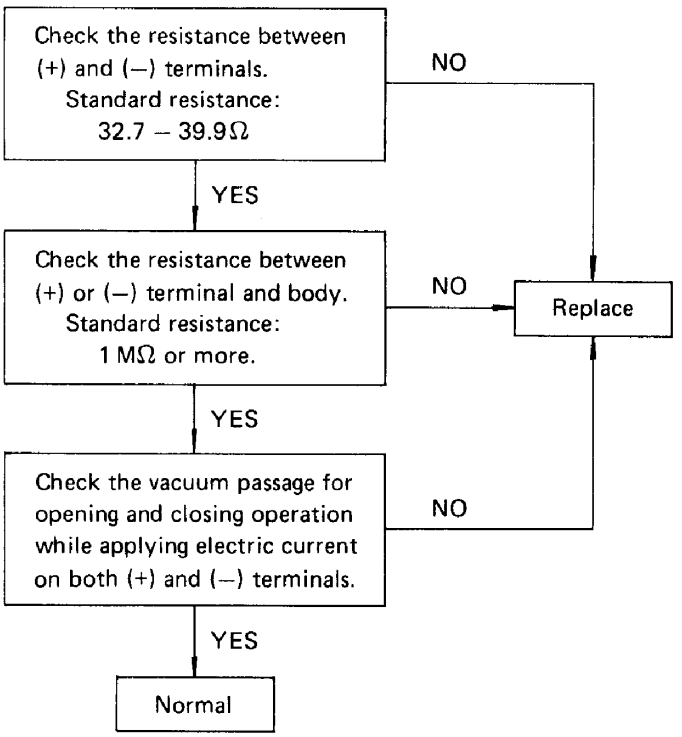
2) Disconnect the purge hose. Orally blow air through the hose to ensure that air does not leak.

3) Disconnect the evaporation hose from the fuel tank side. Orally blow air through the hose to ensure that air flows.

Be careful not to suck on the hose as this causes fuel evaporating gas to enter your mouth.

4) Check the exterior of the canister to ensure that it is not cracked or scratched.

PURGE CONTROL SOLENOID VALVE



Usually (when the current is OFF), the plunger is forced upwards by the spring force to close the passage between Ⓐ and Ⓑ, and to open the passage between Ⓑ and Ⓒ.
When the current is ON in the solenoid, the plunger is attracted downwards to open the passage between Ⓐ and Ⓑ, and to close the passage between Ⓑ and Ⓒ.

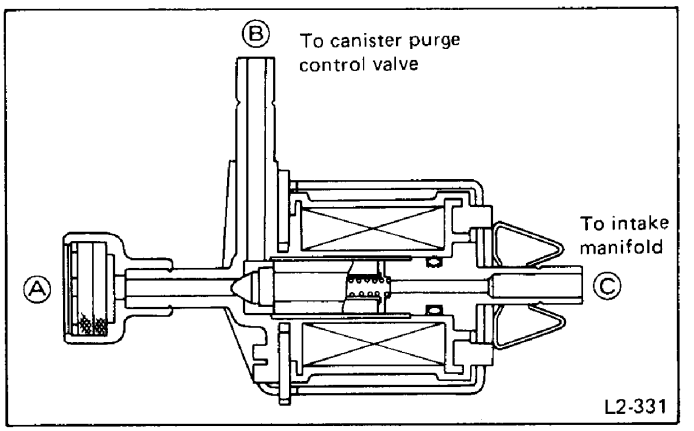


Fig. 15 1800 cc

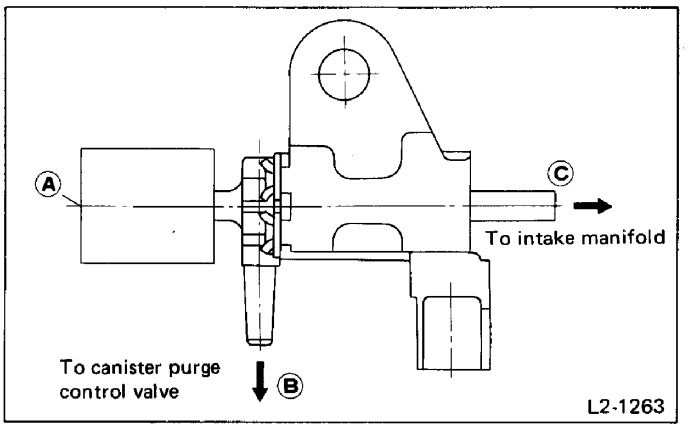


Fig. 16 2700 cc

Vacuum Fitting

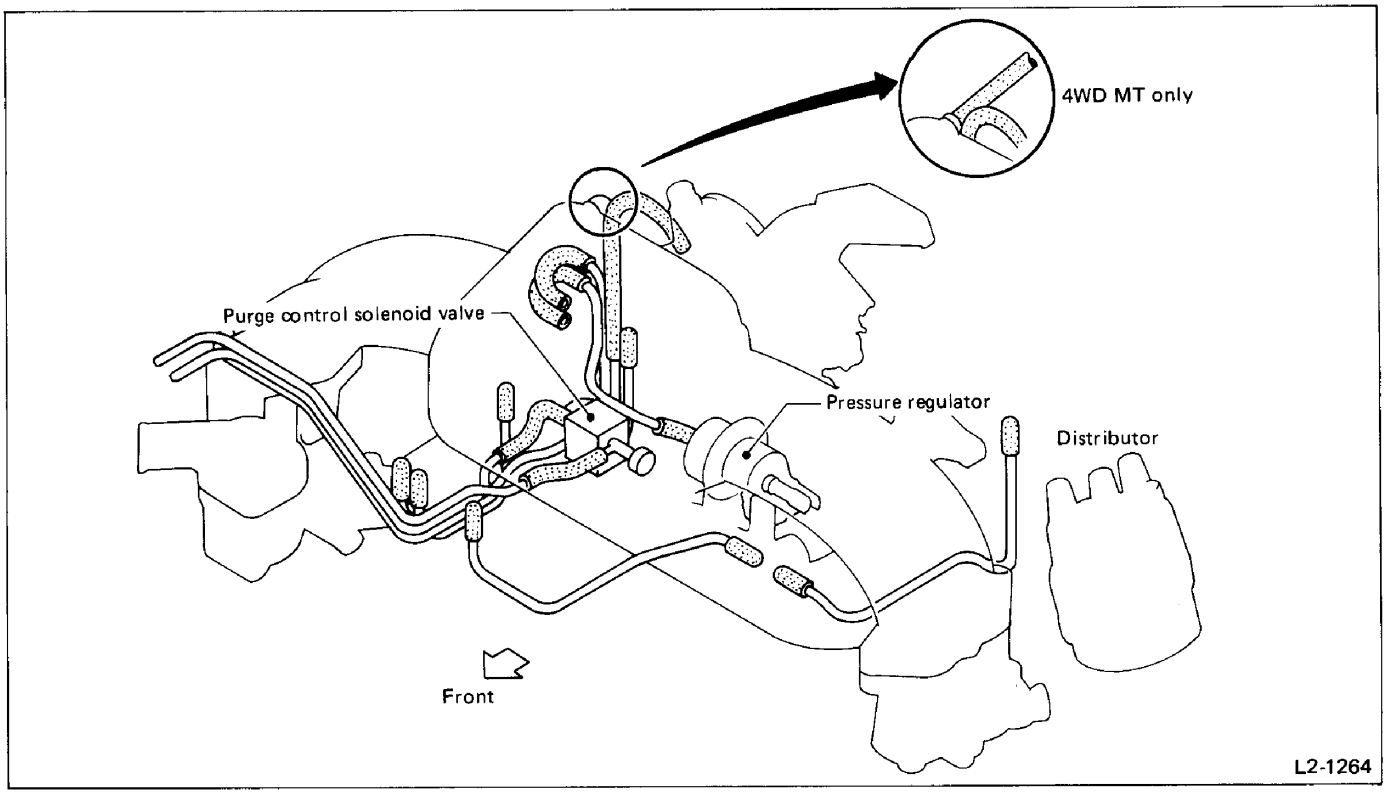


Fig. 17 1800 cc

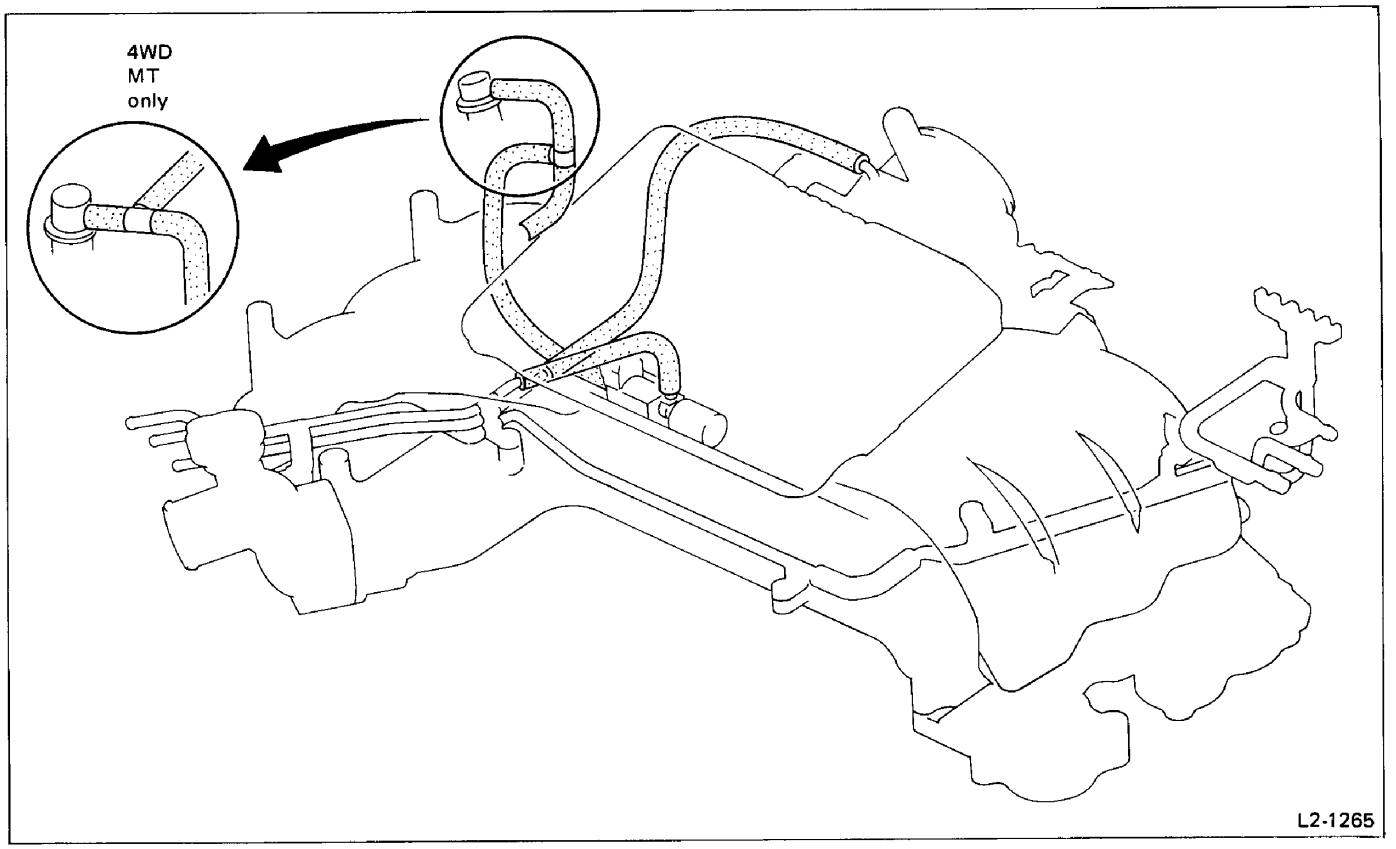


Fig. 18 2700 cc