

2-1 [M100] EMISSION CONTROL SYSTEM AND VACUUM FITTING

1. System Application

There are three emission control systems which are as follows:

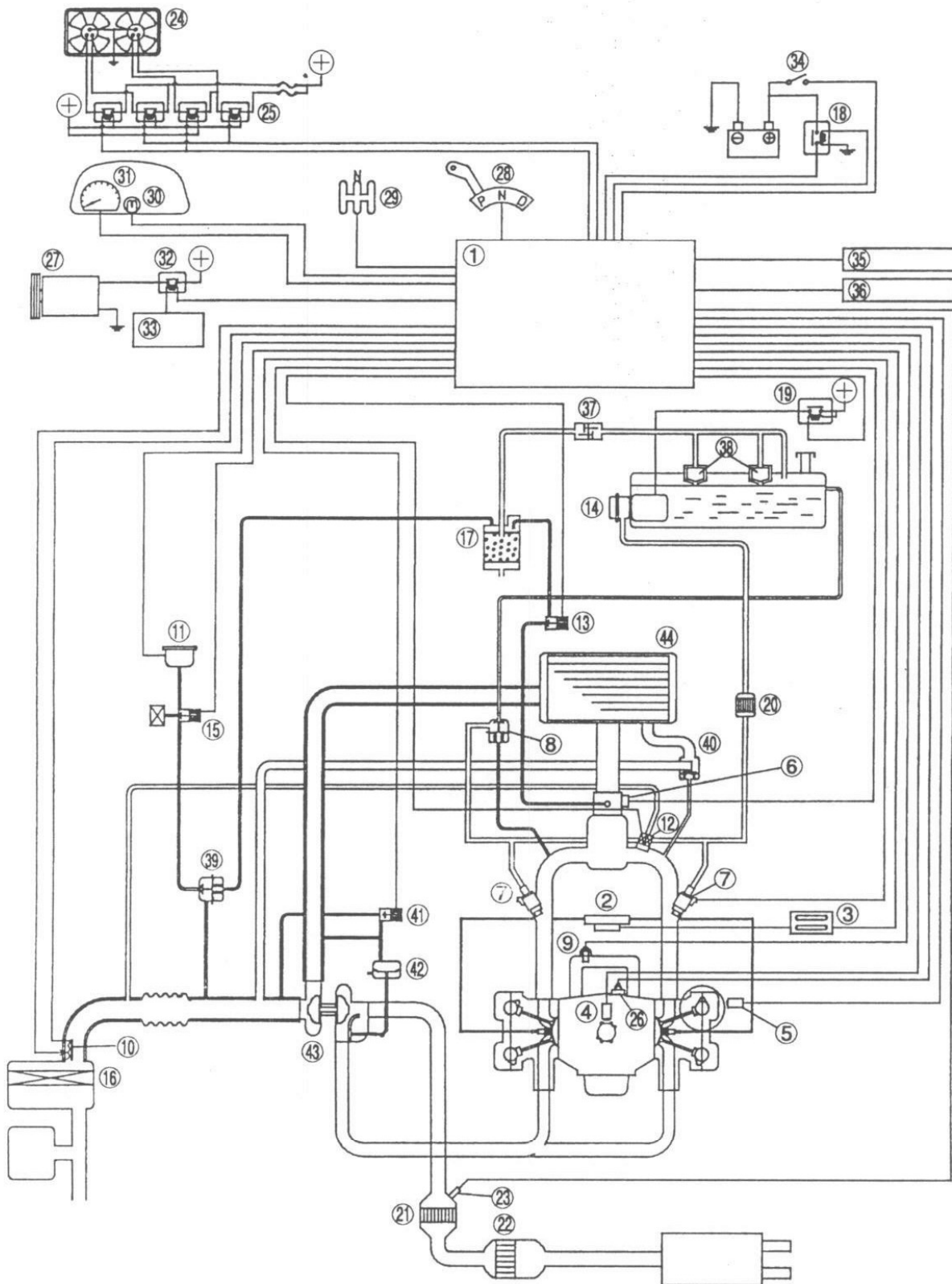
- 1) Crankcase emission control system
- 2) Exhaust emission control system
 - Three-way catalyst system
 - A/F control system
 - Ignition control system
- 3) Evaporative emission control system

Item			Main components	Function
Crankcase emission control system			PCV valve	Draws blow-by gas into intake manifold from crankcase and burns it together with air-fuel mixture. Amount of blow-by gas to be drawn in is controlled by intake manifold pressure.
Exhaust emission control system	Catalyst system*1	Front	Three-way catalyst	Oxidizes HC and CO contained in exhaust gases as well as reducing NOx.
		Rear*2		
	A/F control system		ECM (Engine control module)	Receives input signals from various sensors, compares signals with stored data, and emits a signal for optimal control of air-fuel mixture ratio.
			Oxygen sensor*1	Detects density of oxygen contained exhaust gases.
			Mass air flow sensor (2000 cc model)	Detects amount of intake air.
			Pressure sensor (1600 cc and 1800 cc models)	Detects absolute pressure of intake manifold.
			Intake air temperature sensor (1600 cc and 1800 cc models)	Detects intake air temperature of air cleaner case.
			Throttle position sensor	Detects throttle position.
	Ignition control system		ECM	Receives various signals, compares signals with basic data stored in memory, and emits a signal for optimal control of ignition timing.
			Crankshaft position sensor	Detects engine speed (Revolution).
			Camshaft position sensor (2000 cc model)	Detects reference signal for combustion cylinder discrimination.
			Engine coolant temperature sensor	Detects coolant temperature.
			Knock sensor	Detects engine knocking.
Evaporative emission control system			Canister	Absorbs evaporative gas which occurs in fuel tank when engine stops, and sends it to combustion chambers for a complete burn when engine is started. This prevents HC from being discharged into atmosphere.
			Purge control solenoid valve	Receives a signal from ECM and controls purge of evaporative gas absorbed by canister.

*1 : Except General model

*2 : Except Australia model

2000 cc TURBO MODEL

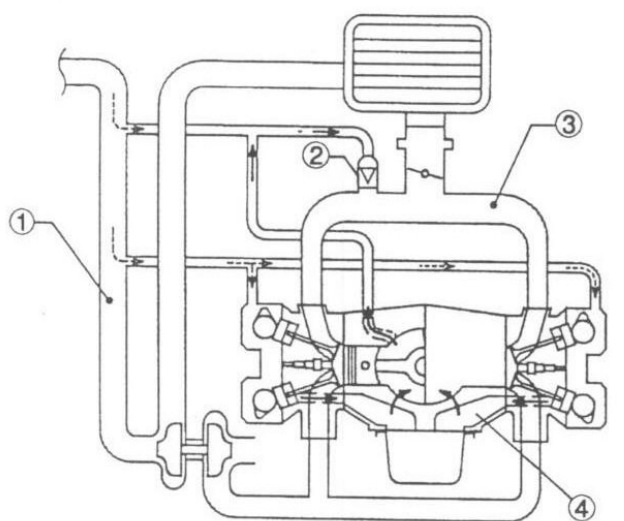


H2H1849A

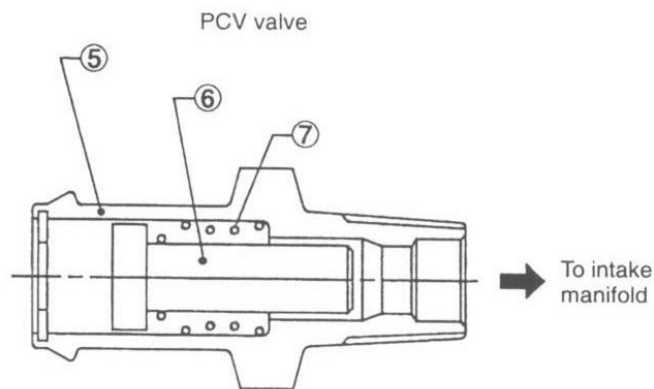
- | | |
|--|--|
| ① Engine control module (ECM) | ②④ Oxygen sensor |
| ② Ignition coil | ②④ Radiator fan |
| ③ Ignitor | ②⑤ Radiator fan relay |
| ④ Crankshaft position sensor | ②⑥ Knock sensor |
| ⑤ Camshaft position sensor | ②⑦ A/C compressor |
| ⑥ Throttle position sensor | ②⑧ Inhibitor switch (AT vehicle only) |
| ⑦ Fuel injectors | ②⑨ Neutral position switch (MT vehicle only) |
| ⑧ Pressure regulator | ③⑩ CHECK ENGINE malfunction indicator lamp (MIL) |
| ⑨ Engine coolant temperature sensor | ③⑪ Tachometer |
| ⑩ Mass air flow sensor | ③⑫ A/C relay |
| ⑪ Pressure sensor | ③⑬ A/C control module |
| ⑫ Idle air control solenoid valve | ③⑭ Ignition switch |
| ⑬ Purge control solenoid valve | ③⑮ Vehicle speed sensor 2 |
| ⑭ Fuel pump | ③⑯ Data link connector |
| ⑮ Pressure sources switching solenoid valve | ③⑰ Tow way valve |
| ⑯ Air cleaner | ③⑱ Fuel cut valve |
| ⑰ Canister | ③⑲ Auxiliary purge control valve |
| ⑱ Main relay | ④① Air vent valve |
| ⑲ Fuel pump relay | ④② Wastegate control solenoid valve |
| ⑳ Fuel filter | ④③ Wastegate controller |
| ㉑ Front catalytic converter | ④④ Turbocharger |
| ㉒ Rear catalytic converter (Except Australia spec. vehicles) | ④⑤ Intercooler |

B: TURBO MODEL

- 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 fresh air inlet, connecting hoses, PCV valve and an air intake duct.
- At the part throttle, the blow-by gas in the crankcase flows into the intake manifold through the 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.
- At wide open throttle, a part of blow-by gas flows into the air intake duct through the connecting hose and is drawn to the throttle chamber, 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.



- ① Air intake duct
- ② PCV valve
- ③ Intake manifold
- ④ Crankcase



H2H1851A

- ⑤ Case
- ⑥ Valve
- ⑦ Spring

4. 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 stoichiometric mixture ratio to purify the components efficiently.

5. A/F Control System

- The air/fuel control system compensates for the basic amount of fuel injection in response to a signal sent from the oxygen sensor to provide proper feedback control of the mixture. Thus, the theoretical air-fuel ratio is maintained to provide effective operation of the three-way catalyst. The basic amount of fuel injection is preset according to engine speed and loads, as well as the amount of intake air.
- This system also has a “learning” control function which stores the corrected data in relation to the basic amount of fuel injection in the memory map. A new air-fuel ratio correction is automatically added for quick response to the deviation of the air-fuel ratio. Thus, the air-fuel ratio is optimally maintained under various conditions while stabilizing exhaust gases, improving driving performance and compensating for changes in sensors’ performance quality with elapse of time.

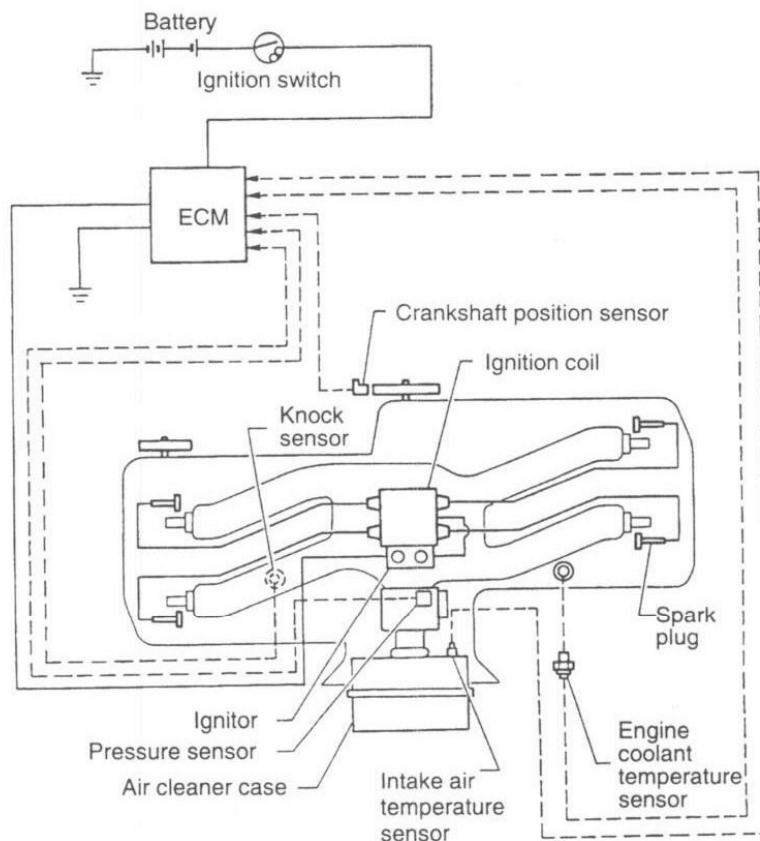
Refer to 2-7 “FUEL INJECTION SYSTEM”.

6. Ignition Control System

A: 1600 cc AND 1800 cc MODEL

- The ignition control system is controlled by the ECM. The ECM determines the optimal ignition timing according to signals sent from various sensors (which monitor the operating conditions of the engine), and sends a signal to the igniters.
- The ECM has a “closed-loop” control function with map which provides superb transient characteristics for responsive ignition timing control.

Refer to 2-7 “FUEL INJECTION SYSTEM”.



H2H1852A

1. Evaporative Emission Control System

1. GENERAL

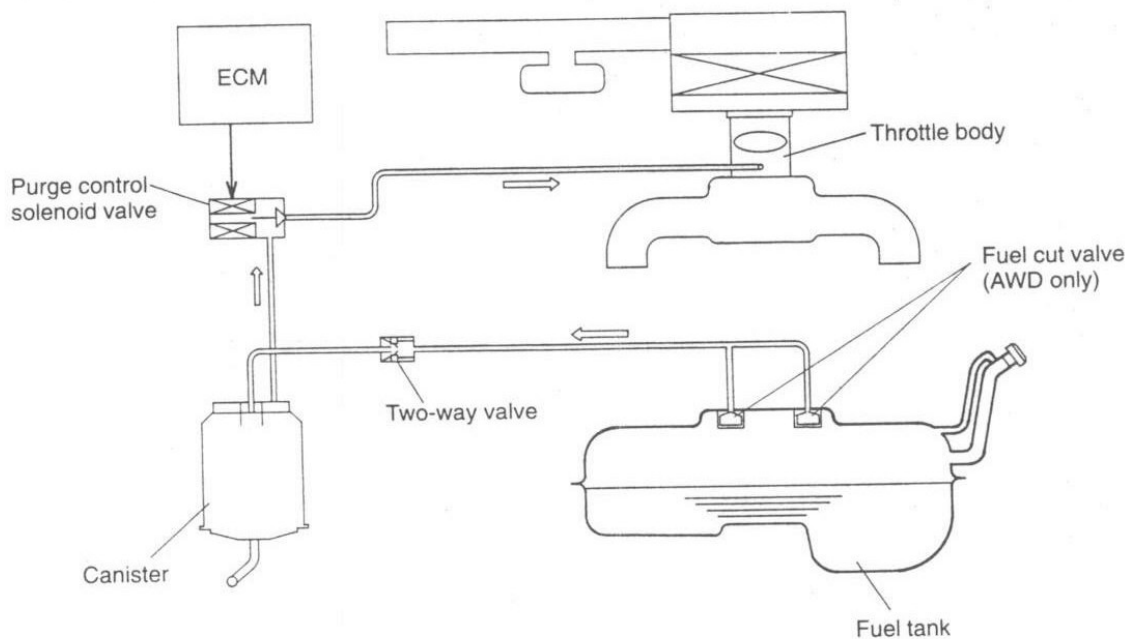
The evaporative emission control system is employed to prevent evaporative fuel from being discharged into ambient atmosphere. This system includes a canister, purge control solenoid valve, fuel cut valve, their connecting lines, etc.

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 the canister.

A fuel cut valve is also incorporated on the fuel tank line.

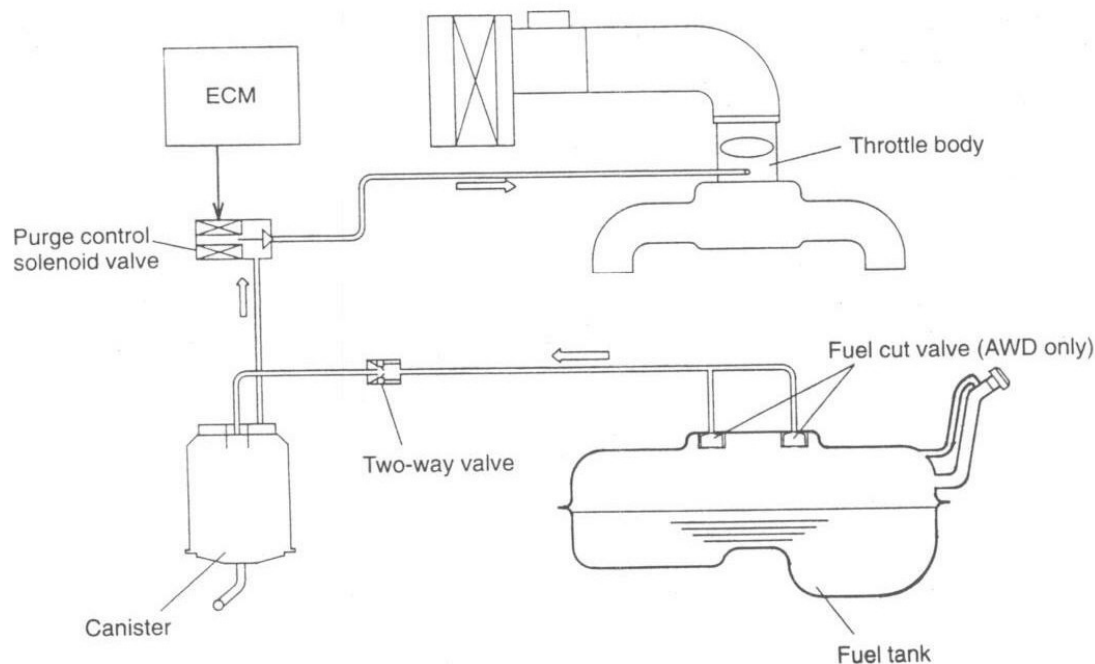
The purge control solenoid valve is controlled by the ECM and provides optimal purge control according to the engine condition.

1. 1600 cc AND 1800 cc MODELS



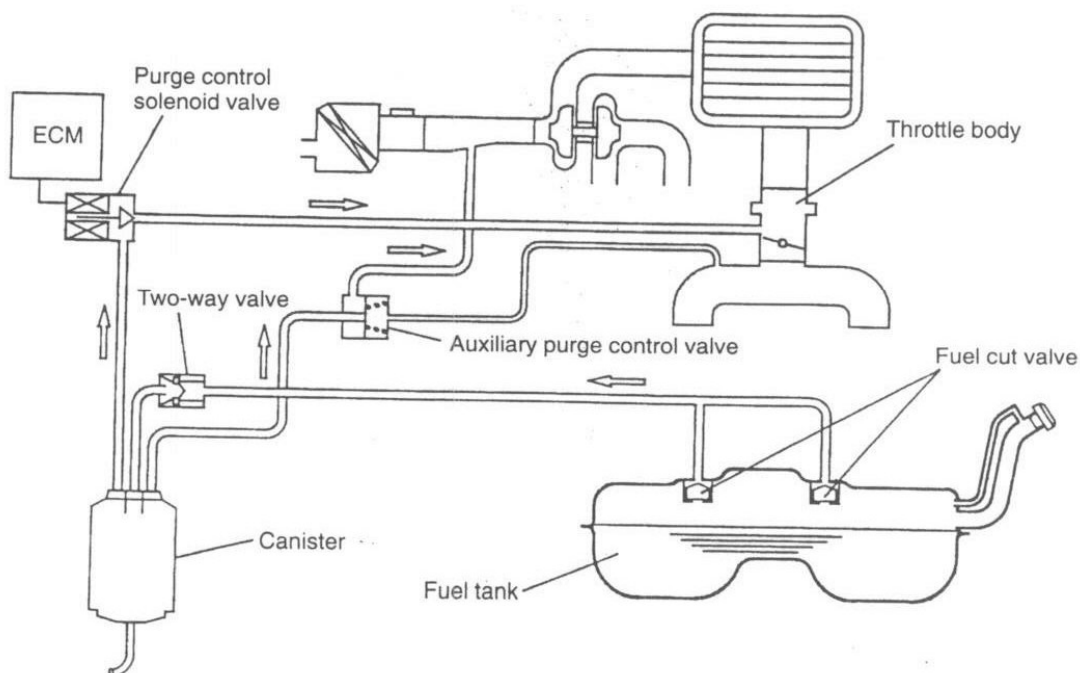
H2H1853A

2. 2000 cc NON-TURBO MODEL



H2H1854A

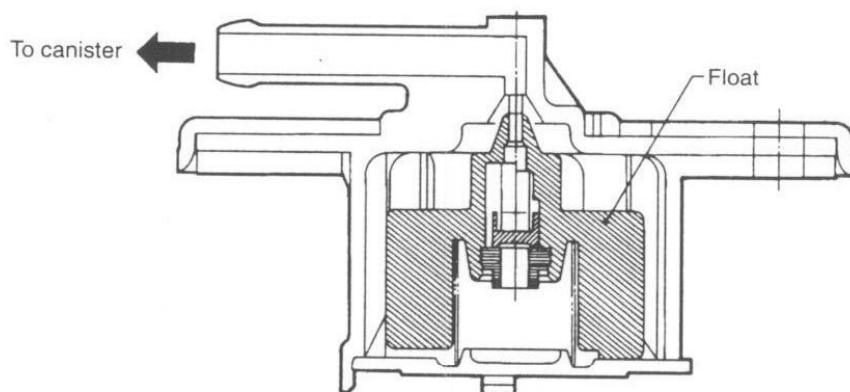
3. 2000 cc TURBO MODEL



H2H1855A

B: FUEL CUT VALVE

On AWD model, the fuel cut valve is built onto the evaporation pipe of the fuel tank cap. The rising level of the fuel from the fuel tank causes the float to move up and close the cap hole so that no fuel can enter during evaporation line.



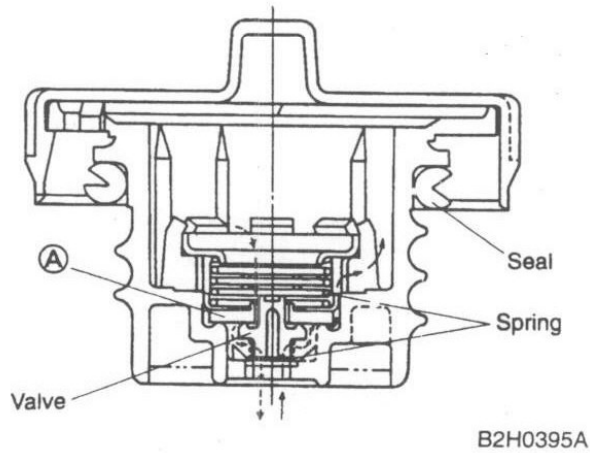
G2H0008

C: FUEL CAP

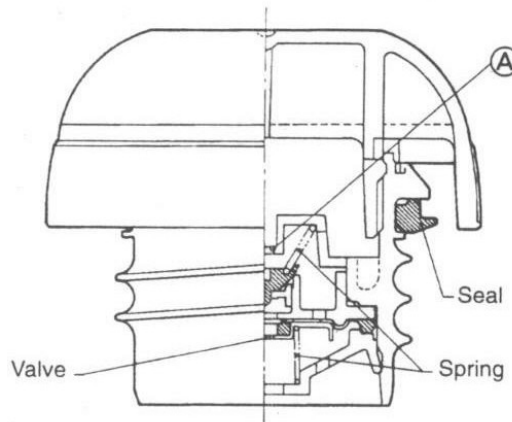
The relief valve is adopted to prevent the development of vacuum in the fuel tank which may occur in case of trouble in the fuel vapor line.

In normal condition, the filler pipe is sealed at ① 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.

1. UNLEADED GASOLINE SPEC. VEHICLES



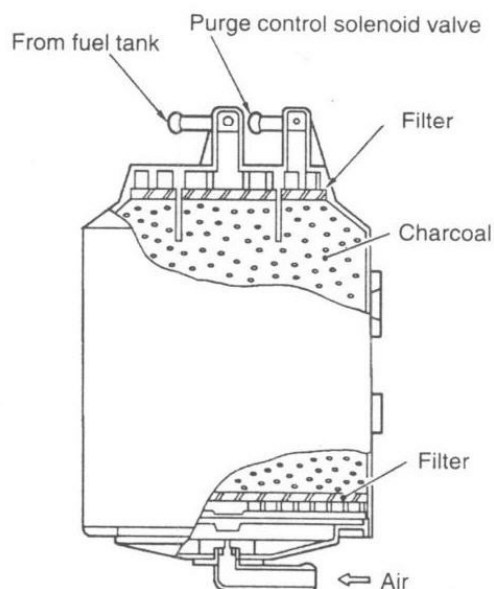
2. LEADED GASOLINE SPEC. VEHICLES



D: CANISTER

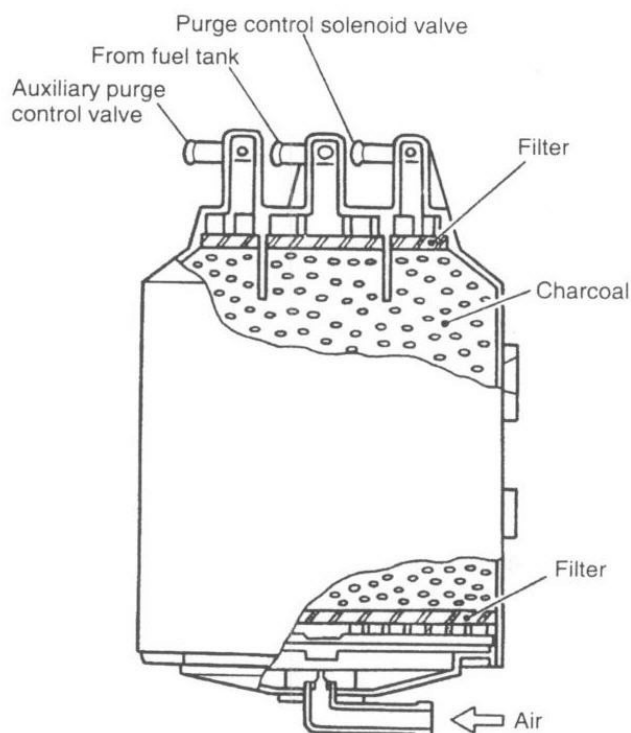
The canister temporarily stores the evaporation gas. When the purge control solenoid valve is opened from a signal sent from the ECM, the evaporation gas is sent into the collector chamber after being mixed with fresh external air.

1. NON-TURBO MODEL



G2H0010

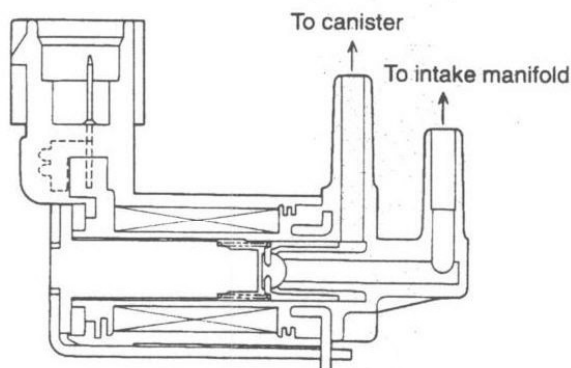
2. TURBO MODEL



G2H0672

E: PURGE CONTROL SOLENOID VALVE

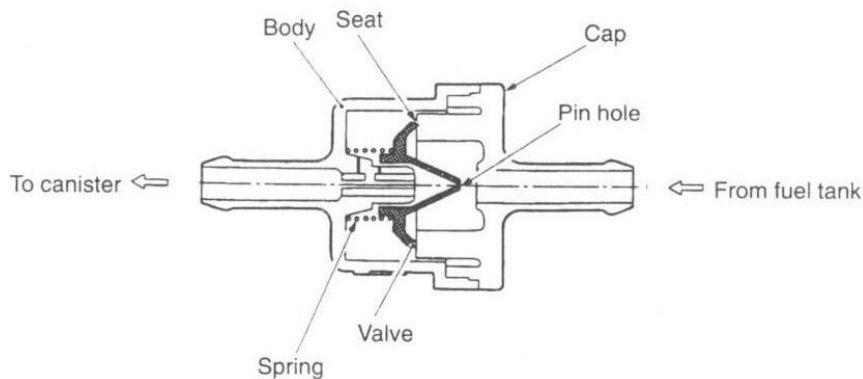
The purge control solenoid valve is on the evaporation line between canister and throttle body. It is built on the inside of intake manifold.



B2H0148

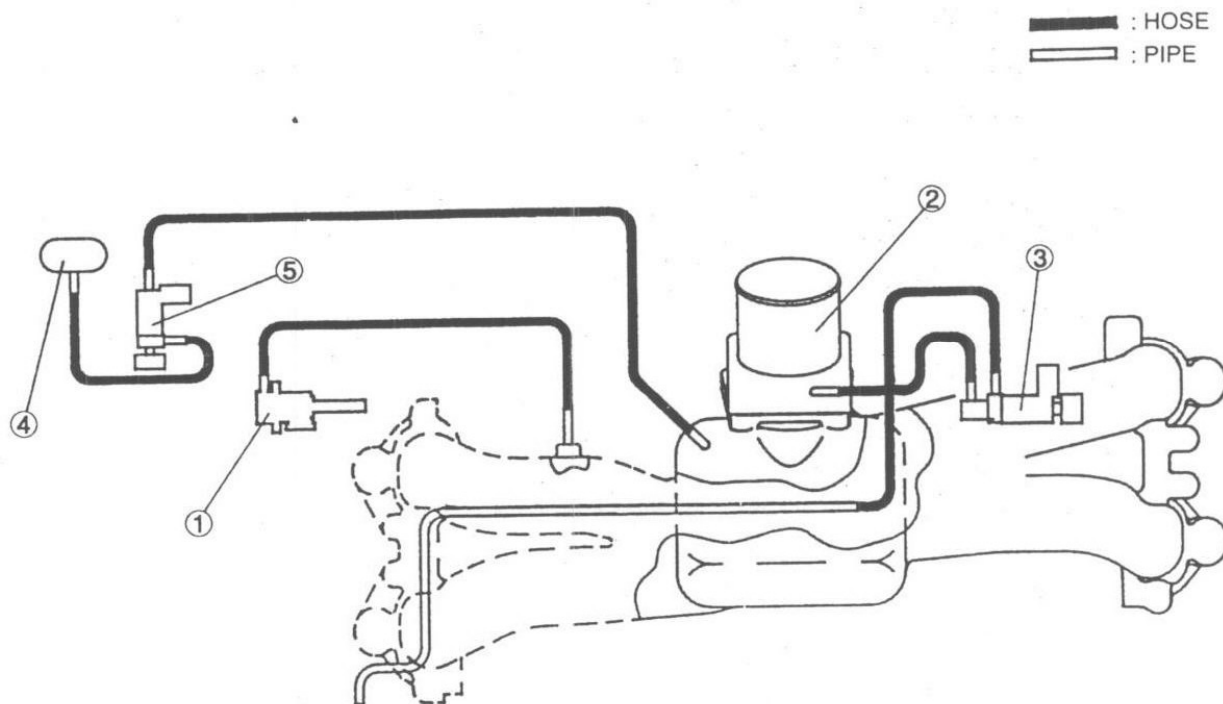
F: TWO-WAY VALVE

- The two-way valve is located in the evaporation line between the fuel tank and canister. When evaporation gas pressure in fuel tank exceeds the specified value, the valve is pressurized to push the spring. This lifts the valve seat so that evaporative gas is discharged to the canister.
- When evaporation gas pressure in fuel tank drops specified value, the valve move to close the valve seat. However, air which enters from the inlet port of the canister is introduced into the fuel tank through the pin hole located at end of the valve.



G2H0003

C: 2000 cc TURBO MODEL



↓
FRONT OF VEHICLE

H2H1856A