

SECTION 5

EMISSION CONTROL SYSTEM

NOTE:

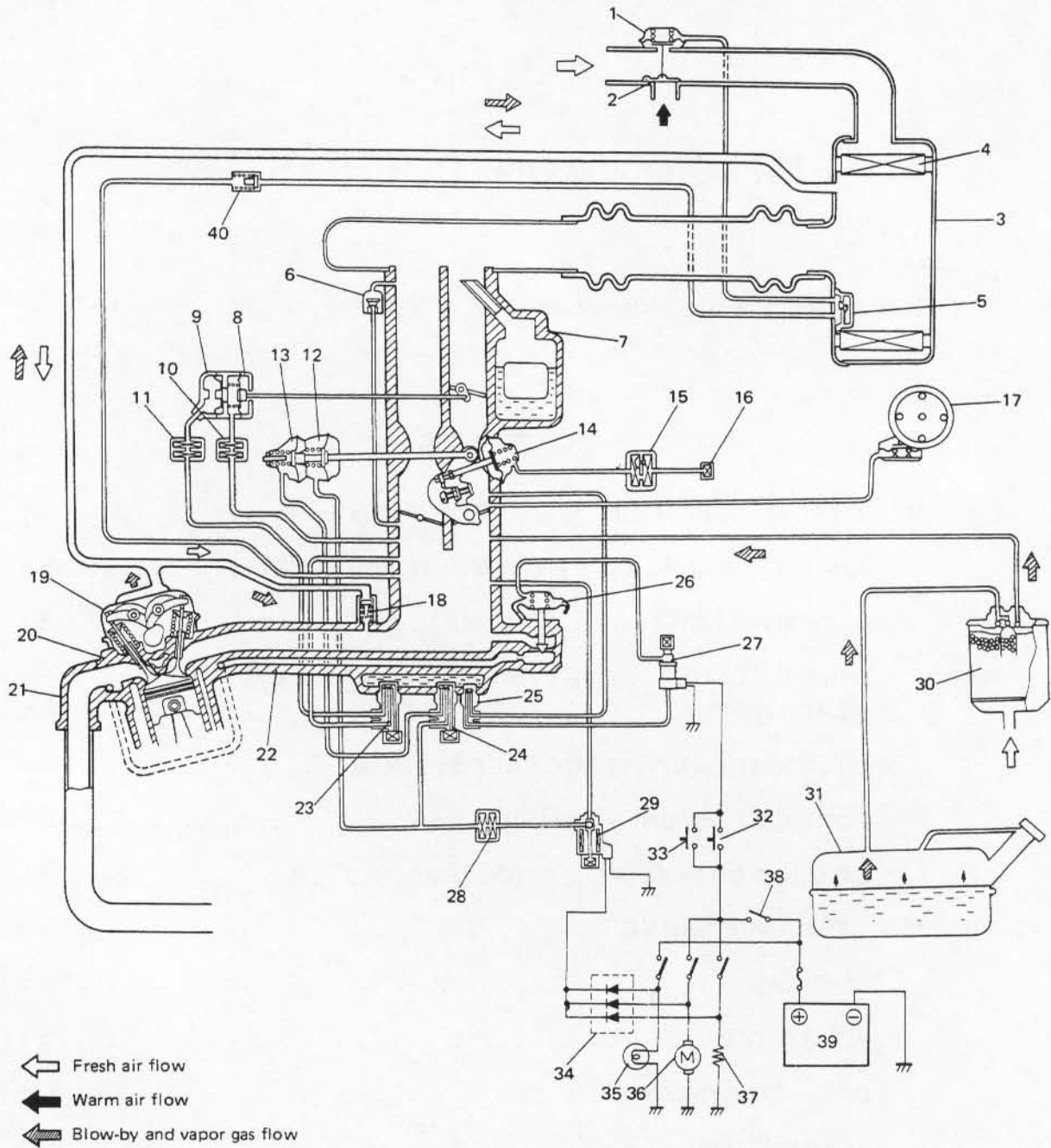
This section is applicable to vehicle not equipped with catalytic converter.

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5-1. GENERAL DESCRIPTION

This section describes operation of the above six systems and inspection of their component parts. As for the dash pot system, TCAC system, charcoal canister storage system and EGR system among the six systems, whether they are provided or not depends on countries due to the difference in specifications.



- | | | |
|--|--|-------------------------------------|
| 1. Air control actuator | 15. VTV (Vacuum Transmitting Valve) | 27. TWSV (Three Way Solenoid Valve) |
| 2. Damper | 16. Filter | 28. Jet (Gray) |
| 3. Air cleaner case | 17. Distributor | 29. TWSV |
| 4. Air cleaner element | 18. PCV (Positive Crankcase Ventilation) Valve | 30. Charcoal canister |
| 5. Thermo sensor | 19. Cylinder head cover | 31. Fuel tank |
| 6. HIC (Hot idle compensator) | 20. Cylinder head | 32. 4th switch |
| 7. Carburetor | 21. Exhaust manifold | 33. 5th switch |
| 8. Choke opener (primary side) [For auto] | 22. Intake manifold | 34. Diode |
| 9. Choke opener (secondary side) [choke type] | 23. BVSV (Bi-metal Vacuum Switching Valve, Yellow) | 35. Head & small light |
| 10. Jet (Green) | 24. BVSV (Brown) | 36. Heater blower motor |
| 11. Jet (Green) | 25. BVSV (Orange) | 37. Rear defogger (if equipped) |
| 12. Idle up actuator (primary side) [For 2-step] | 26. EGR valve | 38. Main switch |
| 13. Idle up actuator (secondary side) [type] | | 39. Battery |
| 14. Dash pot actuator | | 40. Check valve |

Fig. 5-1-1

**POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM
(Blow-by gas recycling system)**

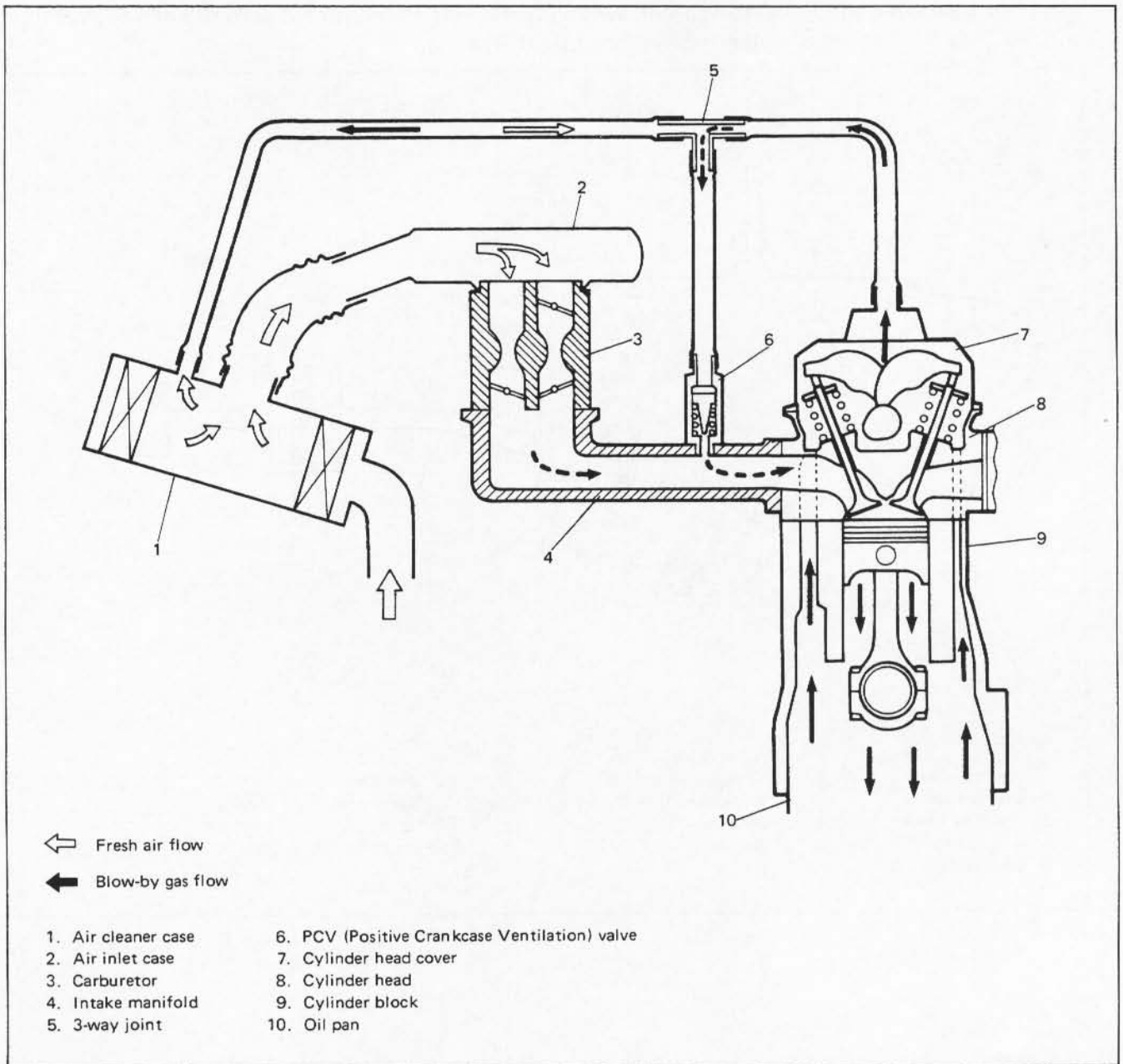


Fig. 5-1-2

System Operation

The blow-by gas in the crankcase flows through the blow-by gas passage in the cylinder block into the cylinder head. The oil particles are separated from the blow-by gas by the oil separating unit in the cylinder head cover. The gas is then returned together with the fresh air coming from the air cleaner through the PCV valve into the intake manifold for recombustion.

When the vacuum in the intake manifold is low (throttle valve open), the PCV valve is wide open due to its spring force. Thus a large amount of the blow-by gas is drawn into the intake manifold.

On the other hand, when the vacuum in the manifold is high, the PCV valve opening is limited due to the high vacuum. Thus the amount of the blow-by gas drawn into the intake manifold is small.

DASH POT SYSTEM

This system prevents the throttle valve from returning to the idle position immediately when the accelerator pedal is released suddenly, thereby preventing inefficient combustion due to too rich air/fuel mixture and reducing the amount of unburned hydrocarbon (HC).

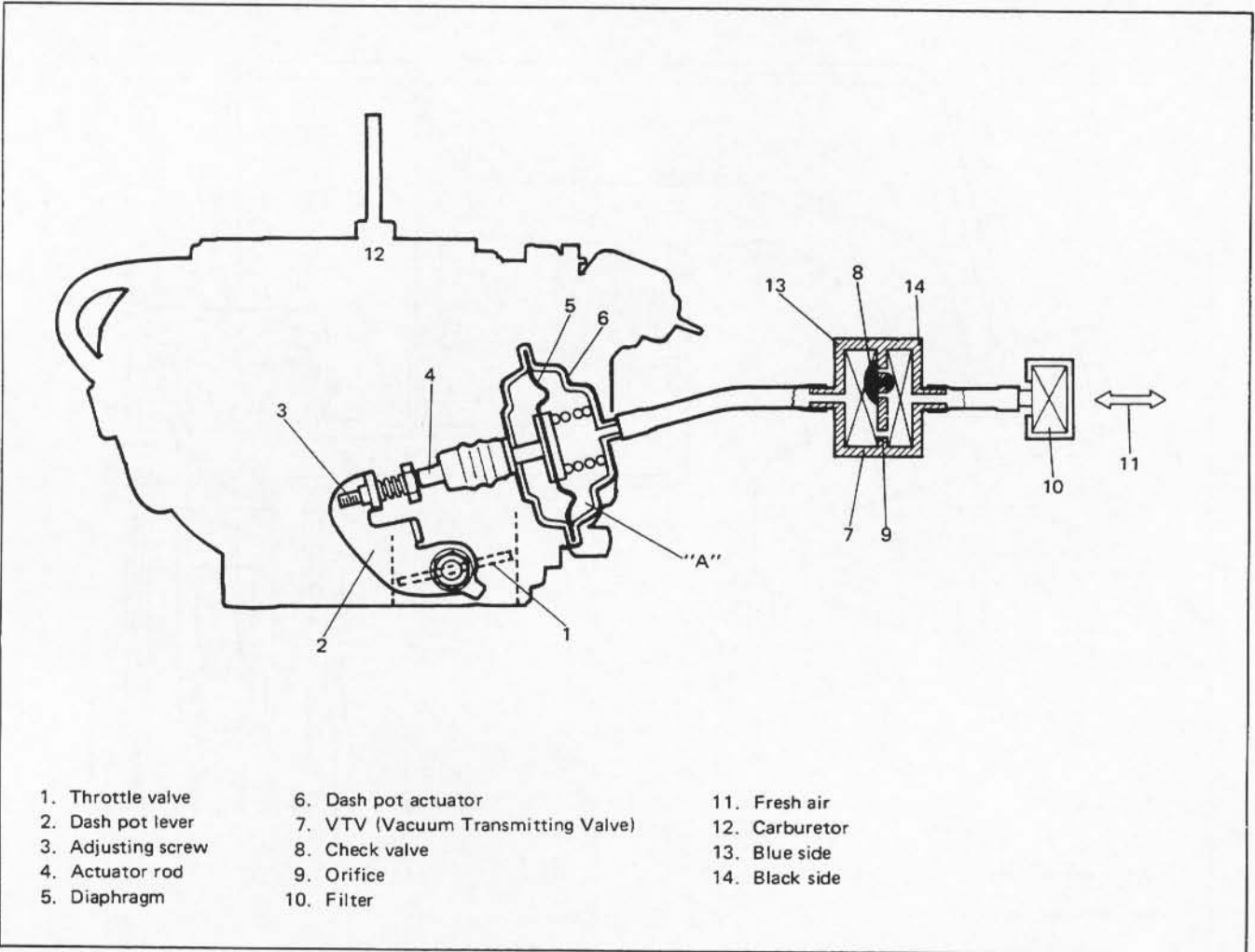


Fig. 5-1-3

System Operation

This system consists of the parts as shown above and functions in the following way. When the accelerator pedal is depressed, the dash pot lever linked with throttle lever is moved downward, the dash pot rod is pushed down with spring force and the air which has passed through the filter and the VTV check valve flows into the chamber "A" of the actuator. When the accelerator pedal is suddenly released, the air in the chamber "A" does not go out quickly, but goes out gradually through the VTV orifice. Consequently, the throttle valve returns slowly from the certain opening position to the idle position, thereby reducing the amount of unburned hydrocarbon (HC) that has been emitted.

THERMOSTATICALLY CONTROLLED AIR CLEANER (TCAC) SYSTEM

This system helps to improve fuel vaporization by controlling the temperature of the intake air almost at a constant level automatically regardless of driving conditions and outside temperature, to distribute the mixture to each cylinder evenly and to stabilize the air/fuel mixture ratio.

It consists of the thermo sensor (thermo valve) and the Air Control Actuator (ACA). The thermo sensor located in the air cleaner case senses the temperature of the intake air and controls the vacuum line by opening and closing its passage to the ACA. According to this opening and closing operation, the vacuum in the intake manifold actuates the damper through the diaphragm in the ACA. For the warm air, the air is warmed up in the exhaust manifold cover and for the cold air, the outside air is drawn through the fresh air passage and both enter the air cleaner.

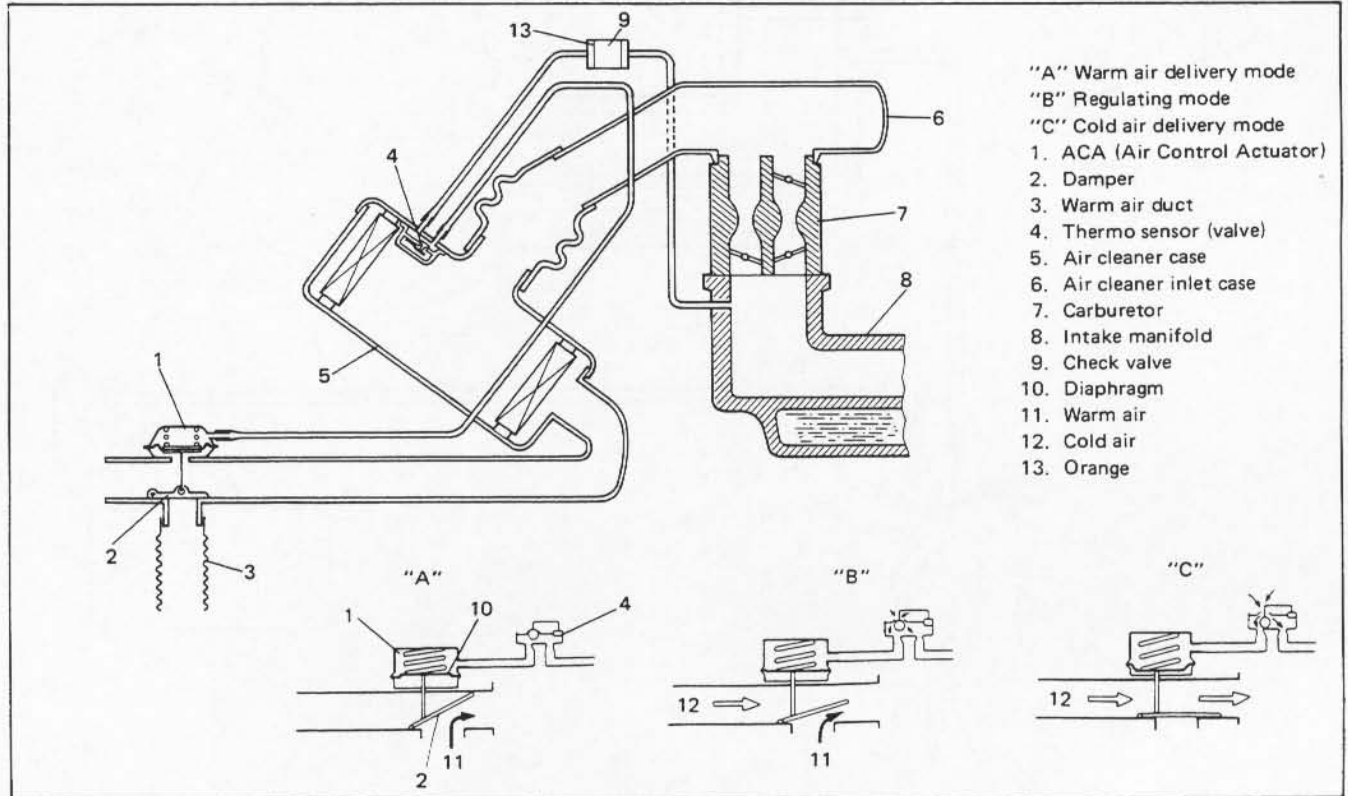


Fig. 5-1-4

System Operation

When engine is started in cold weather, the thermo valve is closed because the temperature of the intake air in the air cleaner is low. Therefore, the vacuum is transmitted to the ACA diaphragm, which then pulls up the damper linked to the diaphragm to open the warm air duct fully. As the engine is warmed up, the temperature of the intake air coming into the air cleaner from the warm air duct rises and the thermo valve starts opening. As a result, the vacuum transmitted to the ACA diaphragm decreases, and the damper pushed down by the spring force lessens the warm air duct opening. In this state, warm air and cold air are mixed together and enters the air cleaner.

When the engine is operating at high rpm and under high load condition, the temperature of the air coming from the warm air duct rises very high, causing the thermo valve opening to become even larger and the damper opening smaller. That is, the amount of the warm air coming from the warm air hose decreases and the cold air amount increases.

In this way, this system serves to maintain the temperature of the intake air going into the carburetor almost at a constant level.

CHARCOAL CANISTER STORAGE SYSTEM

This system serves to reduce the amount of fuel evaporative emission (HC) to be released into the atmosphere.

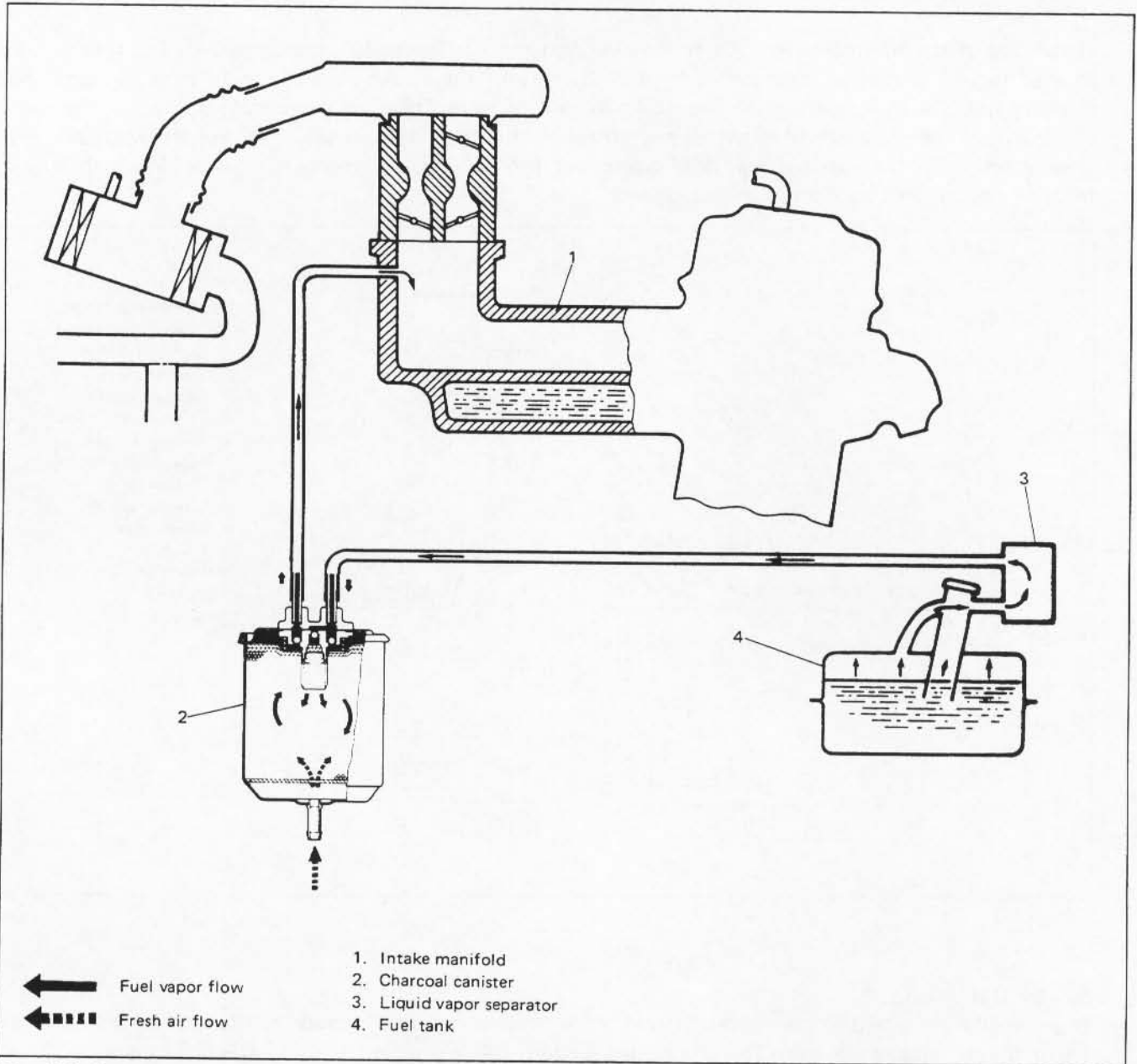


Fig. 5-1-5

Operation

The vapor generated in the fuel tank while driving or the engine at a stop enters the charcoal canister where the charcoal absorbs and stores the fuel vapor. While the engine is running, the fuel vapor stored in the canister is drawn into the intake manifold together with fresh air to be burned. While the engine is not running, the fuel vapor is stored in the canister.

HOT IDLE COMPENSATOR (HIC)

HIC attached to the carburetor body serves to provide the optimum air/fuel mixture during hot idle so as to ensure stable idle speed.

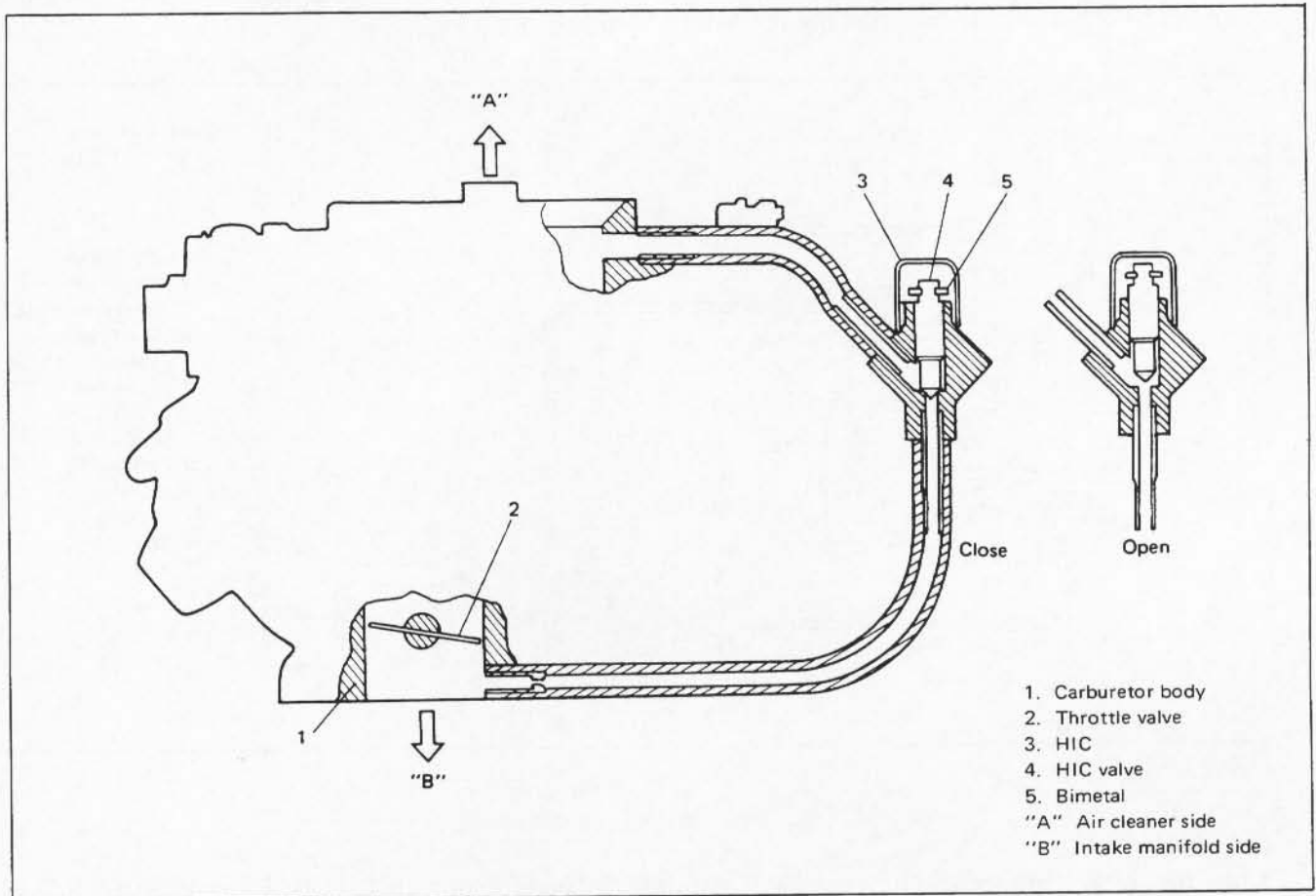


Fig. 5-1-6

Operation

HIC has a bimetal which warps as the heat transferred to it rises higher than about 50°C (122°F). Caused by this, the valve in HIC starts to open and it reaches to the full open state at about 68°C (154°F).

While the engine at idle, the throttle valve is closed and the vacuum in the intake manifold stays high. As the HIC valve opens in this state, the air from the air cleaner side of the carburetor is drawn through the HIC valve into the intake manifold to prevent the air/fuel mixture getting richer during hot idle, thus maintaining a stable idle speed.

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

This system consists of EGR valve, BVSV (Bi-metal Vacuum Switching Valve), TWSV (Three Way Solenoid Valve), 4th switch and 5th switch, and recycles a part of the exhaust gas from the exhaust manifold back to the intake manifold through the EGR valve so as to lower the combustion temperature in the combustion chamber. This reduces the formation of nitrogen oxides (NO_x).

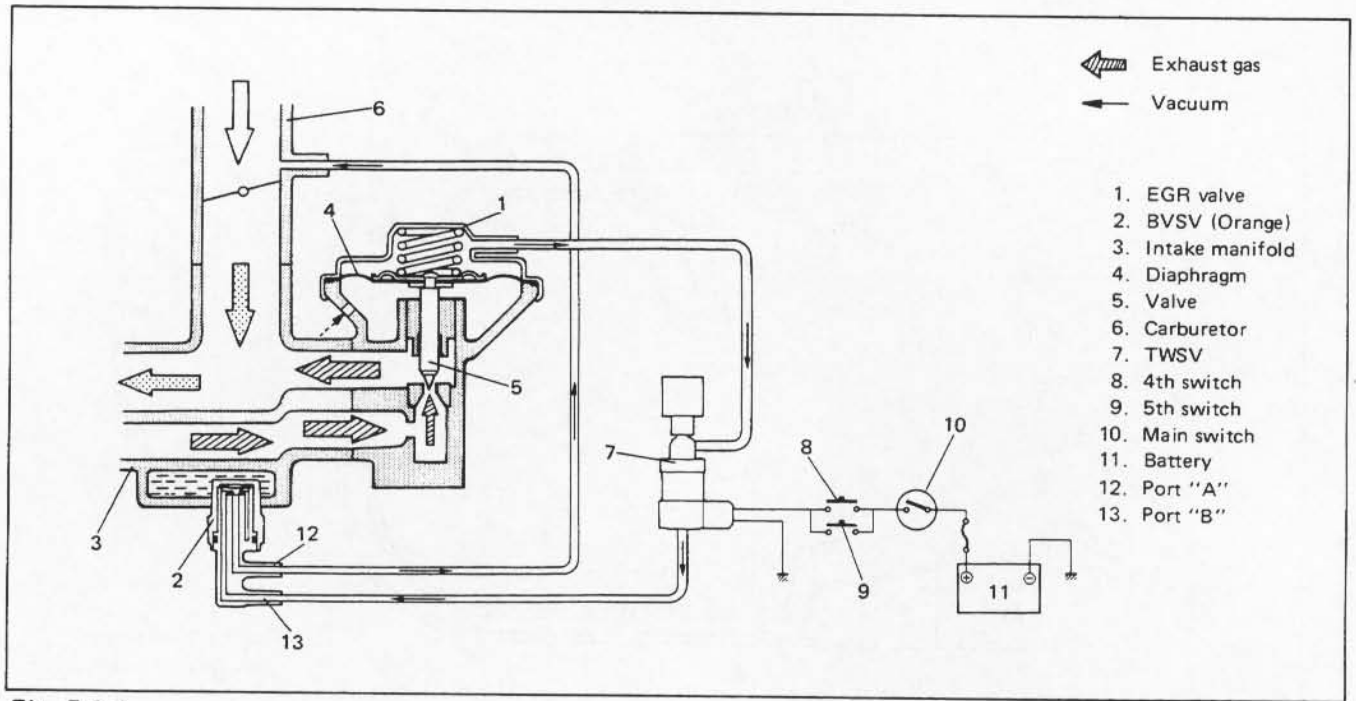


Fig. 5-1-7

Operation

When the water temperature in the intake manifold is below about 55°C (131°F), both BVSV and EGR valve remain closed.

When the water temperature in the intake manifold reaches about 65°C (149°F), the ports "A" and "B" of the BVSV are connected. Through these ports, the vacuum in the carburetor reaches the EGR valve and pulls its diaphragm as shown in the figure. Consequently, the EGR valve itself moves to open the passage between the exhaust manifold and intake manifold. In this state, a part of the exhaust gas can pass through the EGR valve and the intake manifold and back into the combustion chamber. However, if the gear shift lever is shifted to the 4th or the 5th position, the TWSV closes the vacuum passage from the BVSV to the EGR valve. Consequently, the EGR valve closes and the exhaust gas does not flow into the intake manifold.

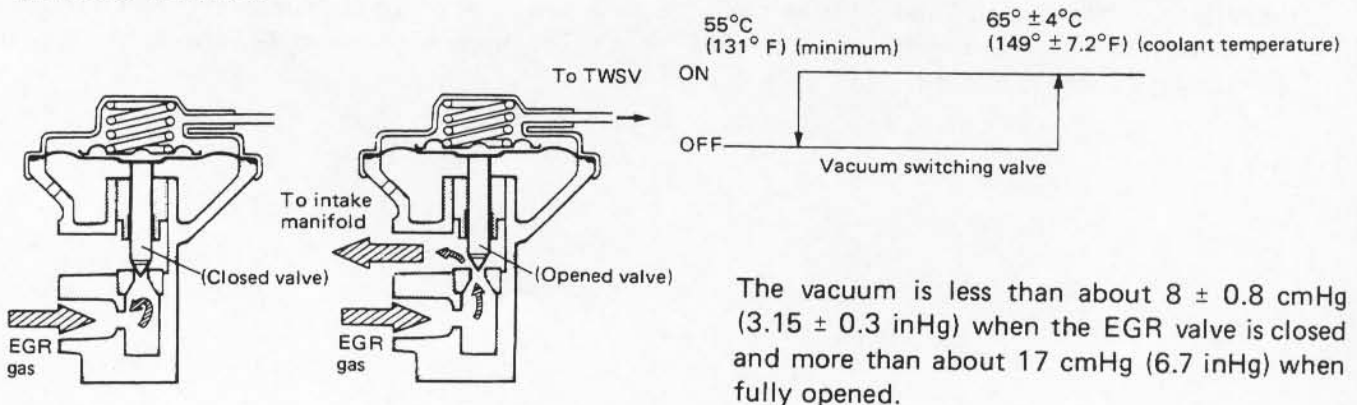


Fig. 5-1-8

5-2. MAINTENANCE SERVICE

GENERAL

If the emission control hoses were disconnected and any system component was removed for service, be sure to reinstall the component properly and route and connect hoses correctly after service. Refer to Fig. 5-1-1 for hose connection.

PCV SYSTEM

Checking PCV System

NOTE:

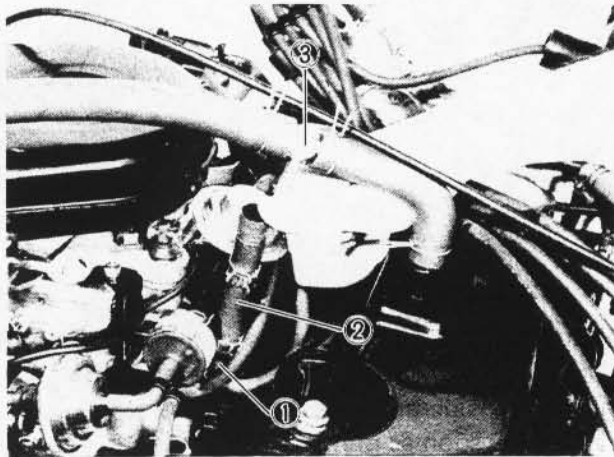
If the engine is idling rough, this may be caused by a clogged PCV valve, plugged hoses or vacuum leakage of PCV line, therefore, never adjust the carburetor idle without first checking the PCV valve and hoses.

[PCV hoses]

Check hoses for connection, leakage, clog, and deterioration. Replace as necessary.

[PCV valve]

- 1) Disconnect PCV hoses at three way joint.
- 2) Run engine at idle.
- 3) Place your thumb over the end of disconnected PCV hose to check for vacuum. If there is no vacuum, check for clogged hose or valve. Replace as necessary.



1. PCV valve
2. PCV hose
3. Three way joint

Fig. 5-2-1

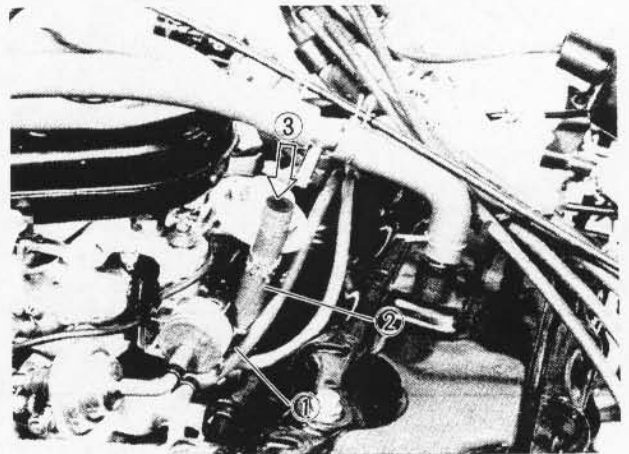
- 4) After checking vacuum, stop engine and check PCV valve for sticking.

With engine stopped, remove PCV hose and connect a new hose to PCV valve.

Blow air into new hose and check that air flows with difficulty from cylinder head side to intake manifold side. If air flows without difficulty, the valve is stuck in "Open" position. Replace PCV valve. Before installing new PCV valve to intake manifold, wind sealing tape on thread of the valve.

WARNING:

Do not suck air through PCV valve. The petroleum substances inside the valve and fuel vapor inside intake manifold are harmful.



1. PCV valve
2. New PCV hose
3. Blow air

Fig. 5-2-2

- 5) Connect PCV hose securely.

DASH POT SYSTEM

Checking Dash Pot System

- 1) Start engine and warm it up enough.
- 2) Confirm that engine is at specified idle speed and stop engine (ignition key at OFF position).
- 3) Move throttle lever to the halfway (1/2) position of its full open stroke with a finger.
- 4) Then let finger off the throttle lever.
- 5) Observe how long it takes the lever ① to return to its original position after being released.

It should be between 1 to 4 seconds.

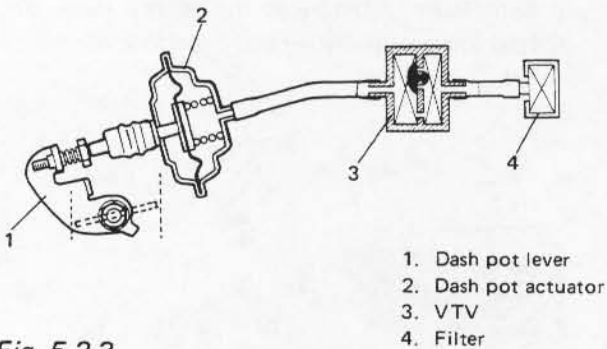


Fig. 5-2-3

Return time of dash pot lever ①	1 - 4 seconds
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If not within above specification, check following parts.

[Dash pot hose]

Check hose for breakage or damage and also for secure connection. If found defective, replace or repair.

[Actuator]

With engine stopped, disconnect hose "A" from actuator and move throttle lever to the wide open throttle position. Holding throttle lever at this position, close actuator pipe (where hose "A" was taken off) with a finger and then take hand off the throttle lever.

If rod "B" doesn't move (remains where it is) at this time and if it returns smoothly to its original position (idle position) when finger is taken off the pipe, actuator is in good condition. If something is found wrong in this check, replace actuator.

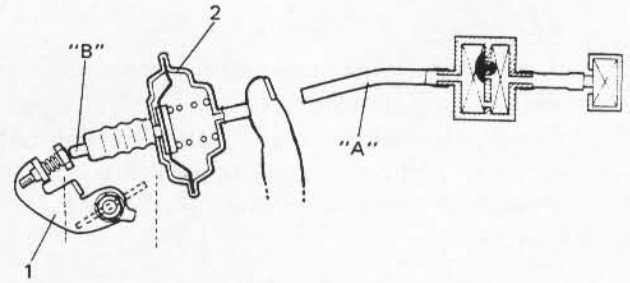


Fig. 5-2-4

[VTV (Vacuum Transmitting Valve)]

Remove VTV from carburetor. Use a vacuum pump gauge for VTV check. If pointer of vacuum pump gauge reacts as described below in each condition, VTV is in good condition.

With vacuum pump gauge set at "A" (Blue) side of VTV, when pump is operated, pointer doesn't move (remains at zero position).

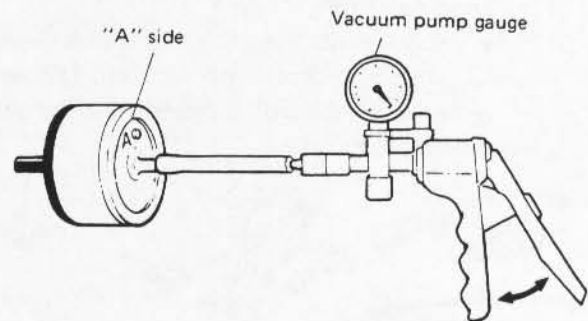


Fig. 5-2-5

With vacuum pump gauge set at "B" (Black) side of VTV, when pump is operated, pointer moves considerably but moves back to zero position as soon as pump operation is stopped.

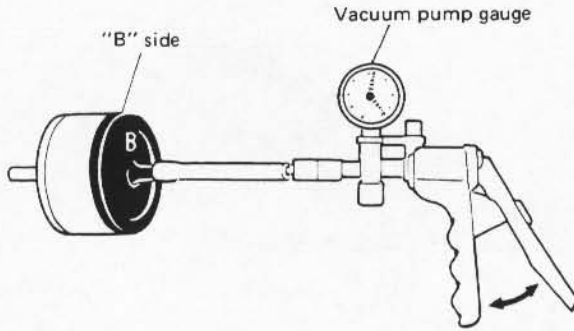


Fig. 5-2-6

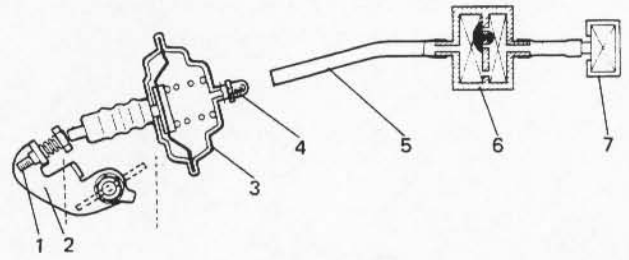
If check result is unsatisfactory, replace VTV.
Be sure to direct "A" side (blue) forward actuator for installation.

[Dash pot adjustment]

If every part of this system was confirmed to be in good condition and yet dash pot lever ① return time is out of specification, adjust as follows.

- 1) Start engine and warm it up to normal operating temperature.
- 2) Confirm that engine is at specified idle speed.
- 3) Disconnect vacuum hose from dash pot actuator.
- 4) Open throttle lever to the halfway (1/2) position. With dash pot rod extended fully, close actuator pipe with finger or blind plug. Release throttle lever. At this time, dash pot lever should be held in certain position with fully extended dash pot rod. In this state, adjust engine speed to the following specification with dash pot adjusting screw.

Engine speed when dash pot rod is extended fully	2,000 – 2,200 r/min
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1. Dash pot adjusting screw
2. Dash pot lever
3. Dash pot actuator
4. Blind plug
5. Hose
6. VTV
7. Filter

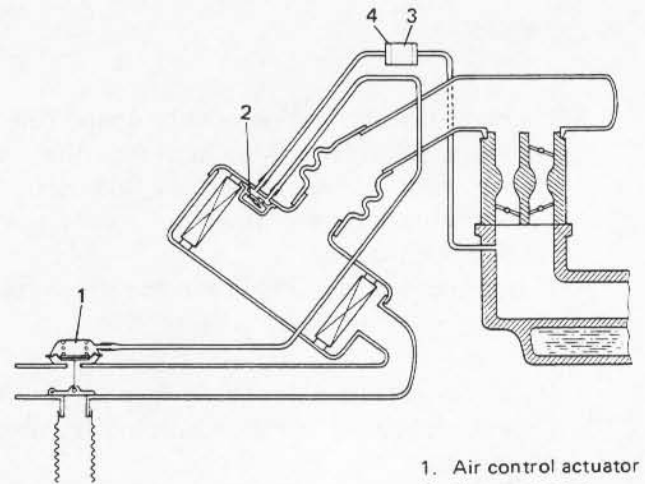
Fig. 5-2-7

After adjusting, be sure to connect vacuum hose to actuator.

TCAC SYSTEM

Checking TCAC System

- 1) Check vacuum hose for connection, deterioration or damage. Replace as necessary.



1. Air control actuator
2. Thermo sensor
3. Check valve
4. Orange side

Fig. 5-2-8

- 2) With engine at a stop, make sure that the valve indicated in figure is completely closed (closing warm air side). This check should be carried out by putting finger into duct after removing warm air hose from it.

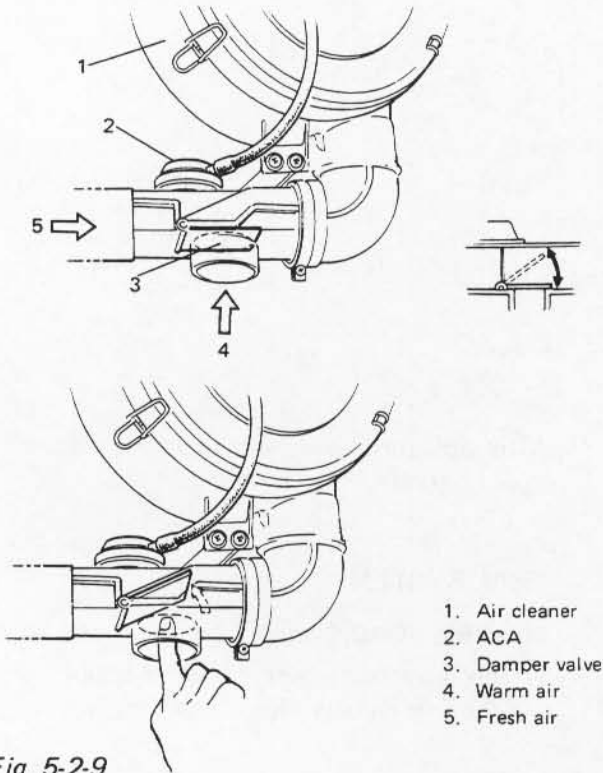


Fig. 5-2-9

- 3) Check that when engine is started (and run at idle speed) under the condition that air cleaner is cool, valve on warm air side becomes fully open and one on fresh air inhaling side is completely closed.
- 4) If nothing was found faulty in the above step, connect warm air hose.

If found defective in above step 2) or 3), inspect following parts according to each procedure.

[Air control actuator]

- 1) Disconnect vacuum hose from thermo sensor.
- 2) Make sure that damper opens fully when more than 20 cmHg (7.87 in.Hg) vacuum is applied to ACA.

Also, make sure that damper is held at the same position when a constant vacuum is applied to it.

If damper doesn't open or close smoothly, or it isn't held at the same position, replace ACA.

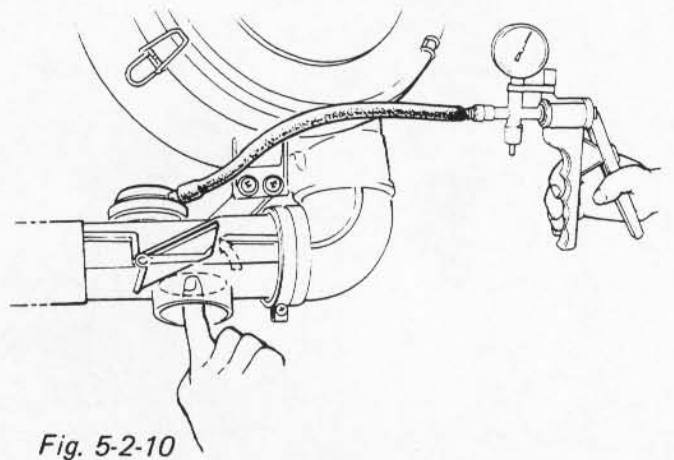


Fig. 5-2-10

[Thermo sensor]

- 1) Remove air cleaner case cap.
- 2) Disconnect two vacuum hoses from thermo sensor.
- 3) Measure the temperature around thermo sensor.
- 4) Close a nozzle with finger and then blow air into nozzle. If measured temperature is above 40°C (104°F), air should come out of thermo sensor valve (valve is open) as shown in Fig. 5-2-11.

If the temperature is below 25°C (77°F), air should not come out (valve is closed).

Replace defective parts.

NOTE:

- To check thermo sensor for operation at higher than 40°C (104°F) temperature when thermo sensor is lower than 25°C (77°F), remove thermo sensor from air cleaner cap and warm it up with hair drier or photo light before checking.
- Never touch bimetal or valve in thermo sensor.

- 5) After checking, connect two vacuum hoses to thermo sensor, and reinstall air cleaner case cap.

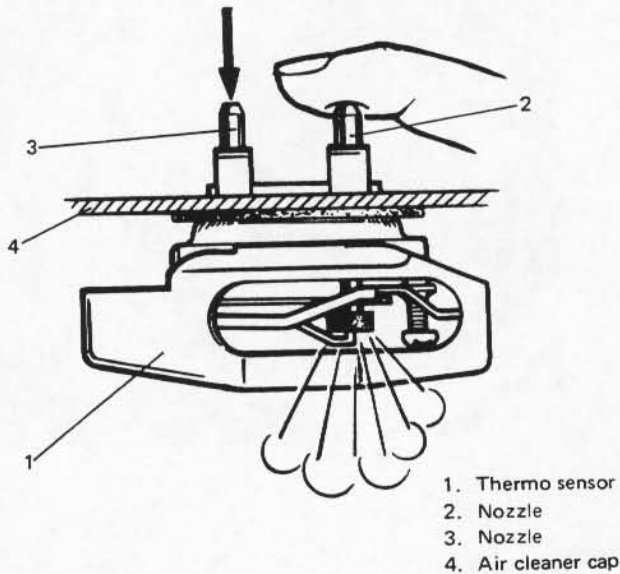


Fig. 5-2-11

[Check valve]

- 1) Remove check valve with vacuum hose.
- 2) Using vacuum pump gauge, check for the following.

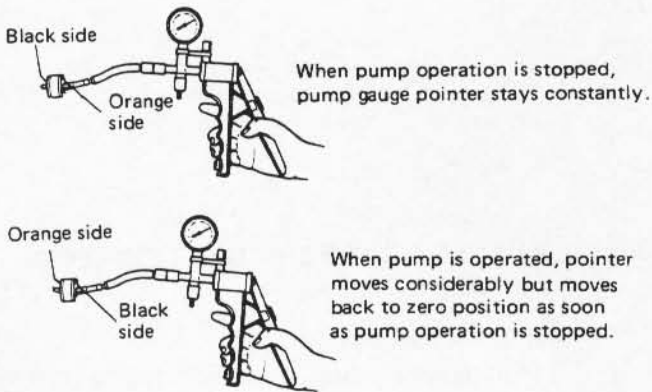


Fig. 5-2-12

If found defective, replace.

- 3) Install check valve with its orange side directed toward thermo valve.

CHARCOAL CANISTER STORAGE SYSTEM

Checking Charcoal Canister Storage System

- 1) Disconnect hose (A & B) from charcoal canister, which is located in engine compartment (Fig. 5-2-13 shows right hand vehicle).

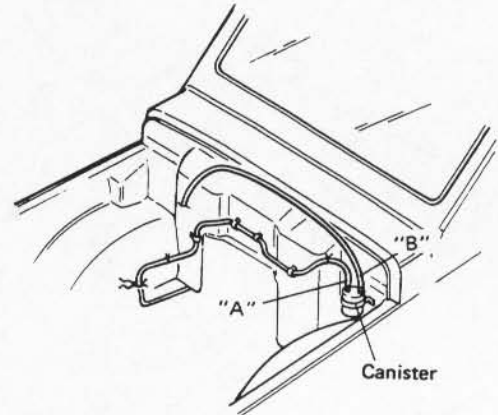


Fig. 5-2-13

- 2) When air is blown into pipe A, there should be no restriction of flow through pipes B and C.
- 3) When air is blown into pipe B, air should not pass through either pipe A or C.
- 4) If operation differs from above description, charcoal canister must be replaced.
- 5) The canister is cleaned by blowing 40 psi of (3 kg/cm²) air into pipe A while sealing pipe B with finger.

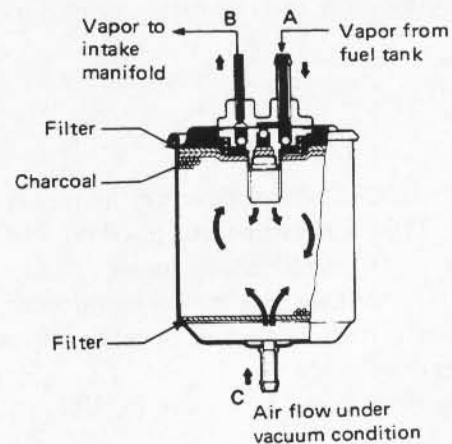


Fig. 5-2-14

[Hoses]

Visually inspect hoses and pipe for cracks, damage, or excessive bends, and hose connection for tightness (Fig. 5-2-15 shows right hand vehicle).

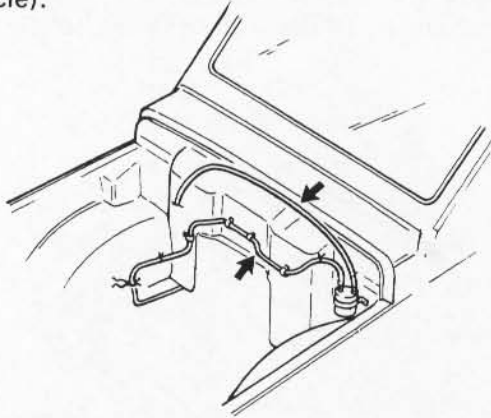


Fig. 5-2-15

HOT IDLE COMPENSATOR (HIC)

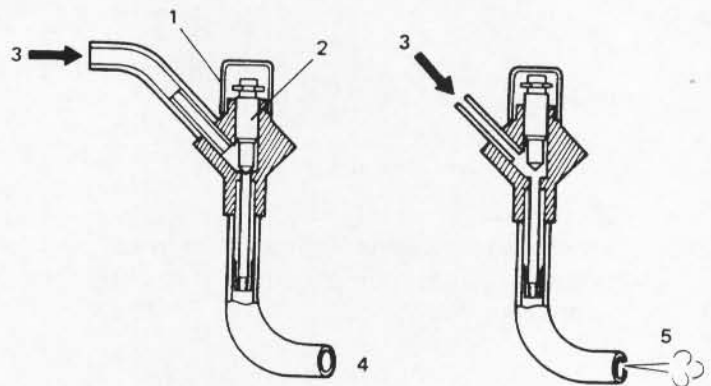
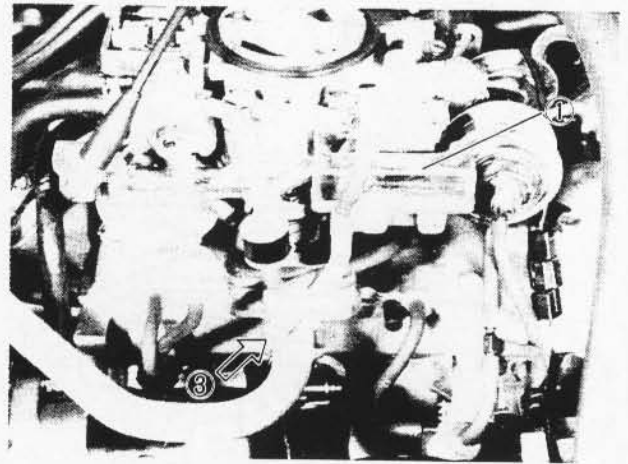
Checking Hot Idle Compensator

- 1) Remove air cleaner inlet case.
- 2) Remove vacuum hoses from carburetor.
- 3) Check temperature around HIC with thermometer.
- 4) If temperature is below 50°C (122°F), air should not come out of HIC when air is blown into HIC nozzle. If temperature is above 68°C (154°F), air comes out of HIC.
- 5) After checking, connect vacuum hose to carburetor and then reinstall air cleaner inlet case.

Replace HIC if defective.

NOTE:

- To check HIC for operation at higher than 68°C (154°F) temperature when HIC (bi-metal) temperature is lower than 50°C (122°F), remove HIC from carburetor body and warm it up with hair drier or photo light before checking.
- Never touch bimetal or valve in HIC.



- | | |
|--------------|-----------------------|
| 1. HIC | 4. Below 50°C (122°F) |
| 2. HIC VALVE | 5. Above 68°C (154°F) |
| 3. Blow air | |

Fig. 5-2-16

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

Checking EGR System

- 1) Run engine when it is cool (coolant temperature is below 55°C (131°F)) and check that EGR valve diaphragm is not operating in this state, by touching diaphragm with finger.

WARNING:

If EGR valve is hot, it may be necessary to wear gloves to avoid burning finger.

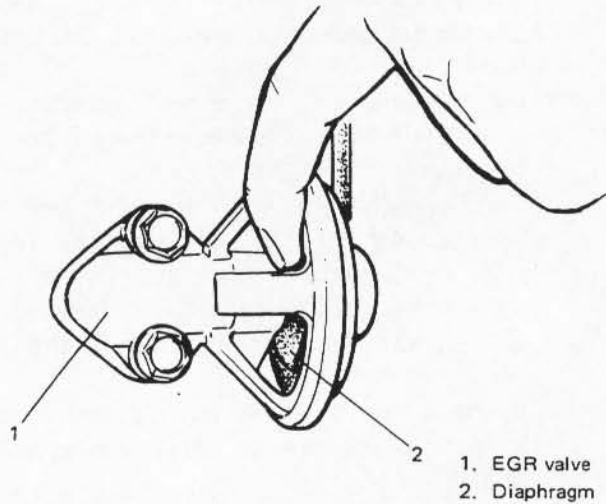


Fig. 5-2-17 Checking EGR Valve Diaphragm

2) Warm up engine to normal operating temperature and race it after warming up. Then check to be sure that diaphragm moves toward ① in Fig. 5-2-18 during acceleration and toward ② during deceleration.

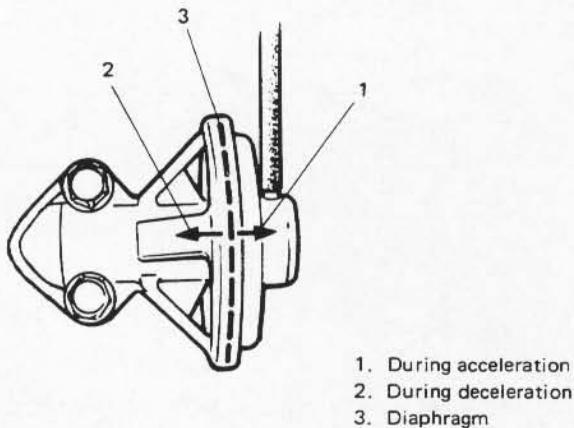


Fig. 5-2-18 Movement of EGR Valve Diaphragm

If found defective in above step 1) or 2), inspect following parts according to each procedure.

[Vacuum hoses]

Check hoses for connection, leakage, clog and deterioration. Replace as necessary.

[EGR valve]

- 1) Disconnect vacuum hose from TWSV.
- 2) Connect vacuum pump gauge to its hose.
- 3) Check that EGR valve diaphragm moves smoothly and that it is held at the same position when more than 20 cmHg vacuum is applied to EGR valve.

If diaphragm doesn't move smoothly, or it isn't held at the same position, replace EGR valve.

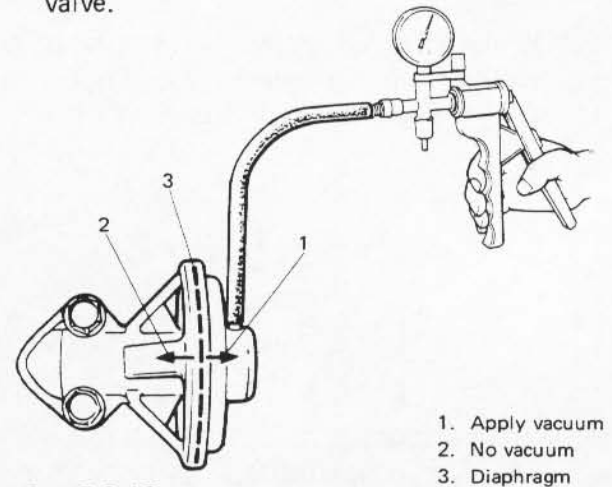


Fig. 5-2-19

- 4) After checking, be sure to connect vacuum hose to TWSV.

[Bi-metal vacuum switching valve (BVSV)]

NOTE:

For the rough check of the operation, BVSV can be checked by warming up or cooling down the engine without being removed from the intake manifold.

The check procedure is the same as the following except item 1), 2) and 5).

- 1) Drain cooling system when engine is cold.
- 2) Disconnect vacuum hoses and remove BVSV from intake manifold.
- 3) While keeping BVSV cool (below 53°C (127°F)), blow nozzle "3". Air should not come out of nozzle "4".

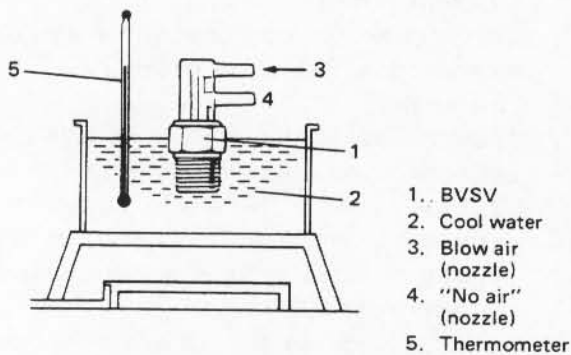


Fig. 5-2-20 Checking BVSV (1)

- 4) While keeping BVSV warm (above 65°C (149°F)) in hot water, blow nozzle "3". Air should come out of nozzle "4".

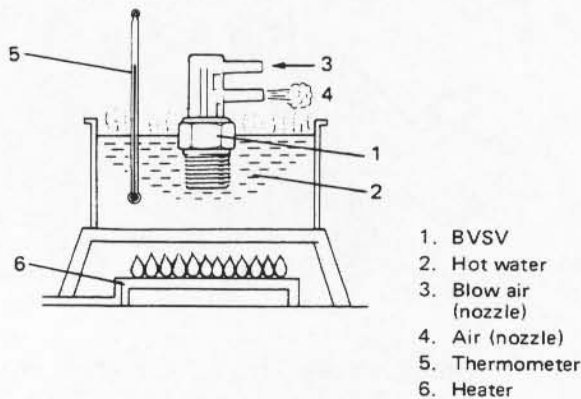
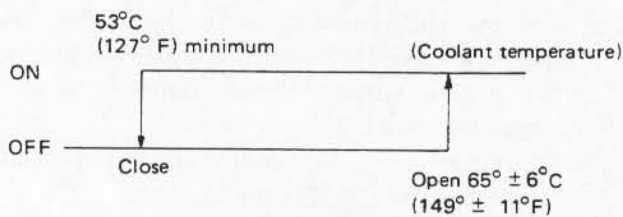


Fig. 5-2-21 Checking BVSV (2)

* Bi-metal Vacuum switching valve



- 5) Reinstall BVSV to intake manifold. Before installing, wind sealing tape on its thread.
6) Connect vacuum hoses.

[Three way solenoid valve (TWSV)]

- 1) Disconnect vacuum hoses from EGR valve and BVSV.
- 2) By blowing air into hose ① disconnected from EGR valve, make sure there is continuity between hoses ① and ②.
- 3) Turn on ignition switch and shift gear shift lever to 4th or 5th gear position. In this state, by blowing air into hose ①, make sure there is no continuity between hoses ① and ② but continuity between hose ① and filter.

If check results were unsatisfactory in above 2) and 3), replace or repair wiring harness or TWSV.

Also, check 4th and 5th switches as it is possible that cause may lie in either switch.

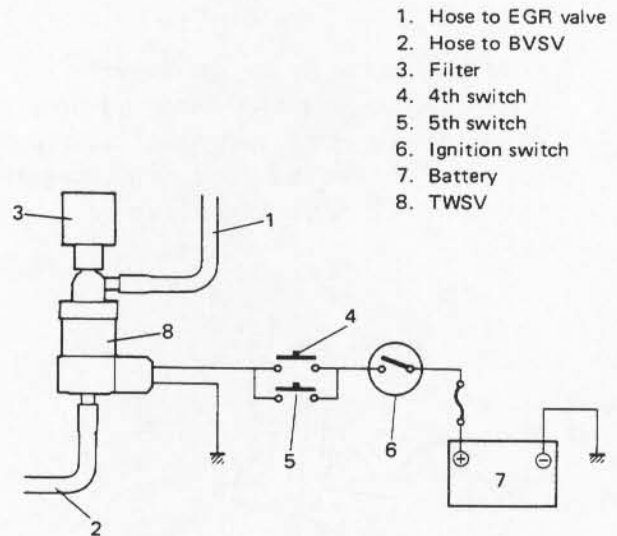


Fig. 5-2-22

- 4) After checking, be sure to connect vacuum hoses to EGR valve and BVSV.

[4th and 5th switch]

- 1) Disconnect 4th switch lead wire at coupler.
- 2) Using ohm meter check it for continuity as follows. There should be continuity when gear shift lever is shifted to 4th position but no continuity at other gear positions. If defective, replace.
- 3) Be sure to connect its lead wire after checking.
- 4) Carry out the same check (steps 1) to 3) with 5th switch.