SECTION 5

EMISSION CONTROL SYSTEM

CONTENTS

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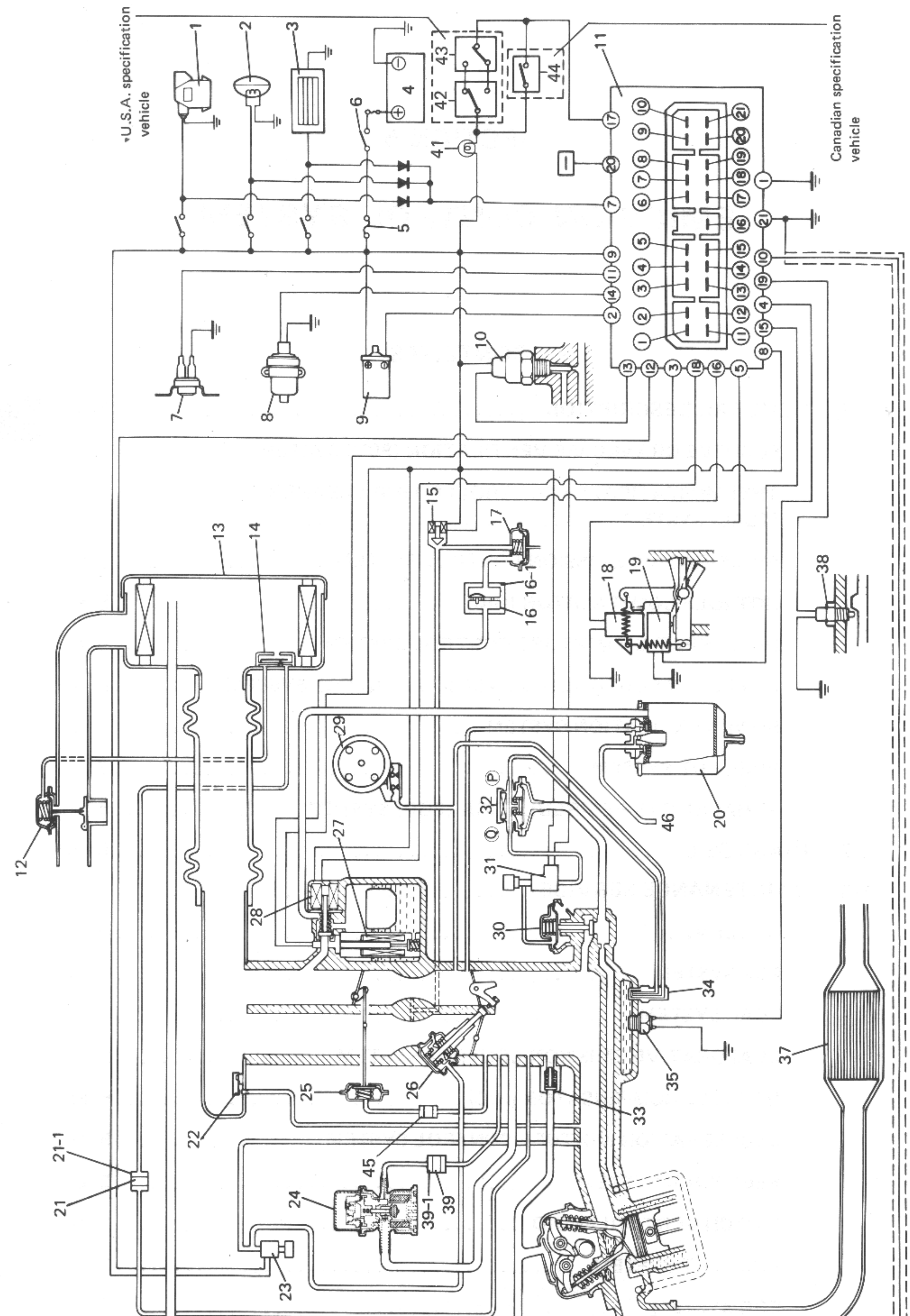


Fig. 5-1-1 Engine emission control systems

1. Heater fan
2. Small, Tail, Side marker & license light
3. Rear defogger
4. Battery
5. Fuse (circuit fuse)
6. Ignition switch
7. Thermal engine room switch
8. High altitude compensator (HAC)
9. Ignition coil
10. Fuel cut solenoid
11. Electronic control module (ECM)
12. Air control actuator
13. Air cleaner
14. Thermo sensor
15. Vacuum switching valve (VSV)
16. Vacuum transmitting valve (VTV)

16-1. Brown side

17. Secondary throttle valve actuator
18. Wide open micro switch
19. Idle micro switch
20. Vapor storage canister
21. Check valve (black)

21-1. Orange side

22. Hot idle compensator (HIC)
23. Three way solenoid valve (TWSV)
24. Mixture control valve (MCV)
25. Choke piston
26. Idle up actuator
27. Mixture control solenoid valve (MCSV)
28. Vent solenoid valve
29. Distributor
30. Exhaust gas recirculation (EGR) valve
31. Three way solenoid valve (TWSV)
32. EGR modulator
33. Positive crankcase ventilation (PCV) valve
34. Bi-metal vacuum switching valve (BVSV)
35. Thermal switch
36. Oxygen sensor
37. Three way catalyst
38. Fifth switch
39. Jet (colorless)

39-1. Gray side

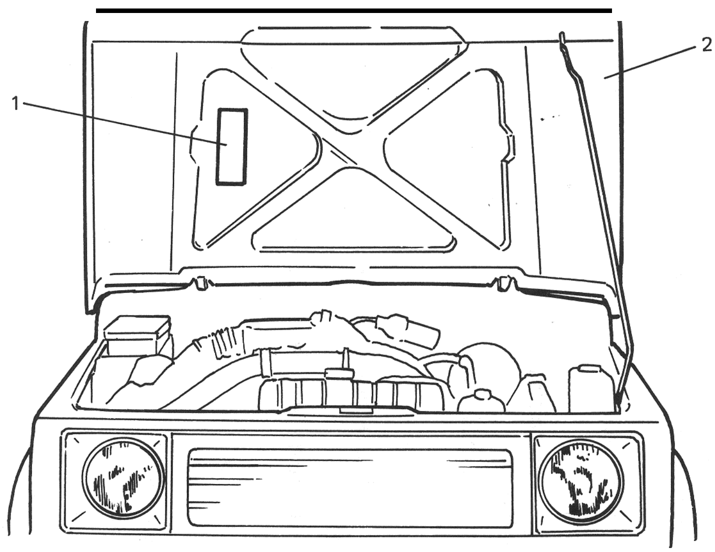
40. Check connector
41. "CHECK ENGINE" light
42. Mileage sensor (U.S.A. specification vehicle)
43. Cancel switch (U.S.A. specification vehicle)
44. Check switch (Canadian specification vehicle)
45. Delay valve (orifice)
46. To fuel tank

5-1. GENERAL DESCRIPTION

VEHICLE EMISSION CONTROL INFORMATION LABEL

The Vehicle Emission Control Information Label is located under hood. The label contains important emission specifications and setting procedures, as well as a vacuum hose schematic with emission components identified.

When servicing the engine or emission systems, the Vehicle Emission Control Information Label should be checked for up-to-date information.



1. Emission control label
2. Hood

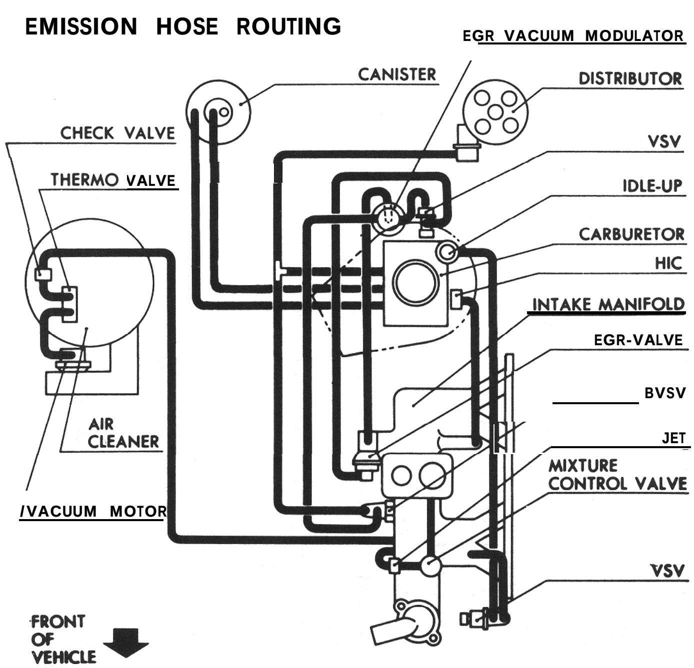


Fig. 5- 1-2 Vehicle emission control information label

POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

(Blow-by gas recycling system)

The blow-by gas in the crankcase flows through the 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 (when the opening of the throttle valve is large), 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.

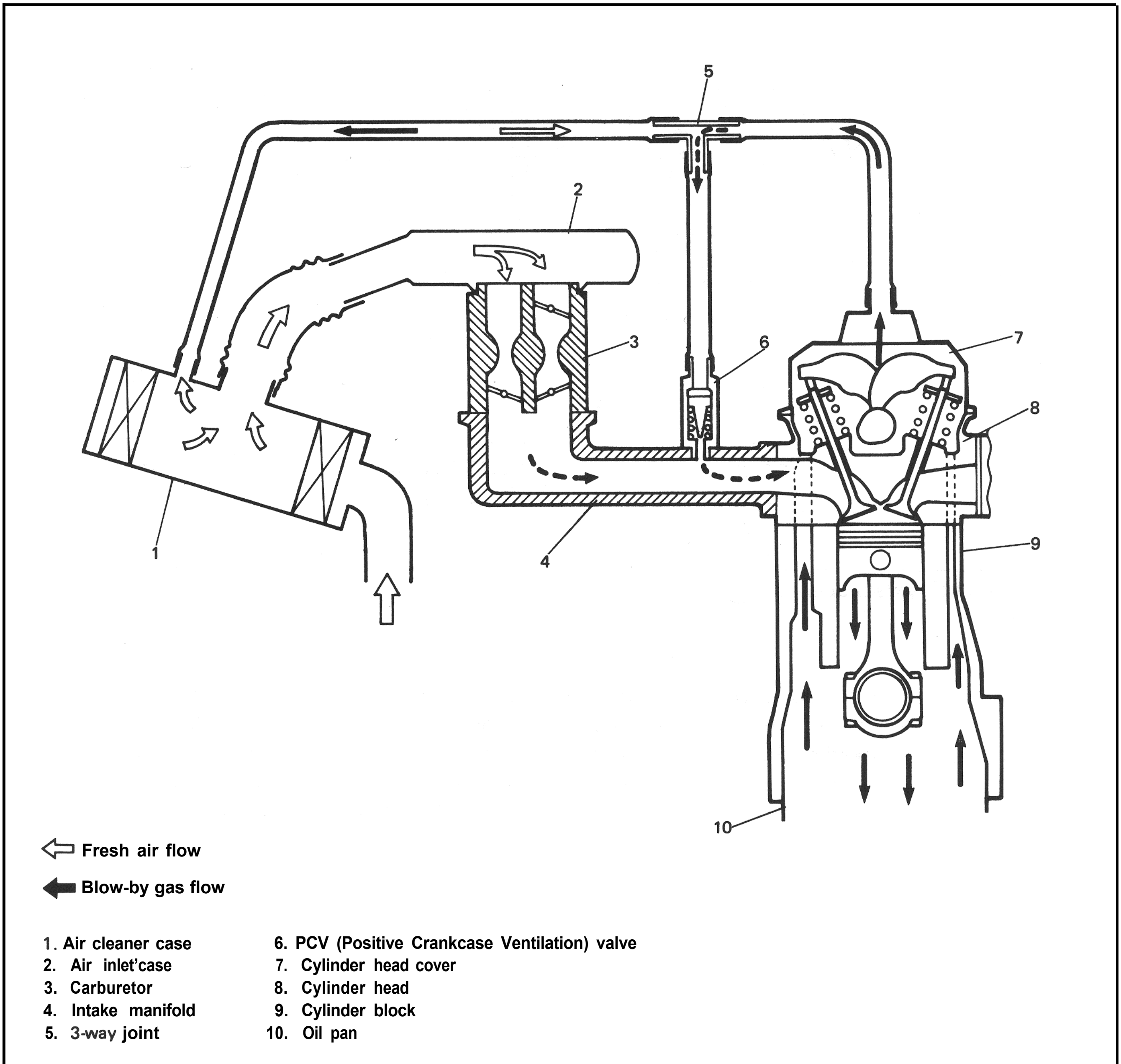
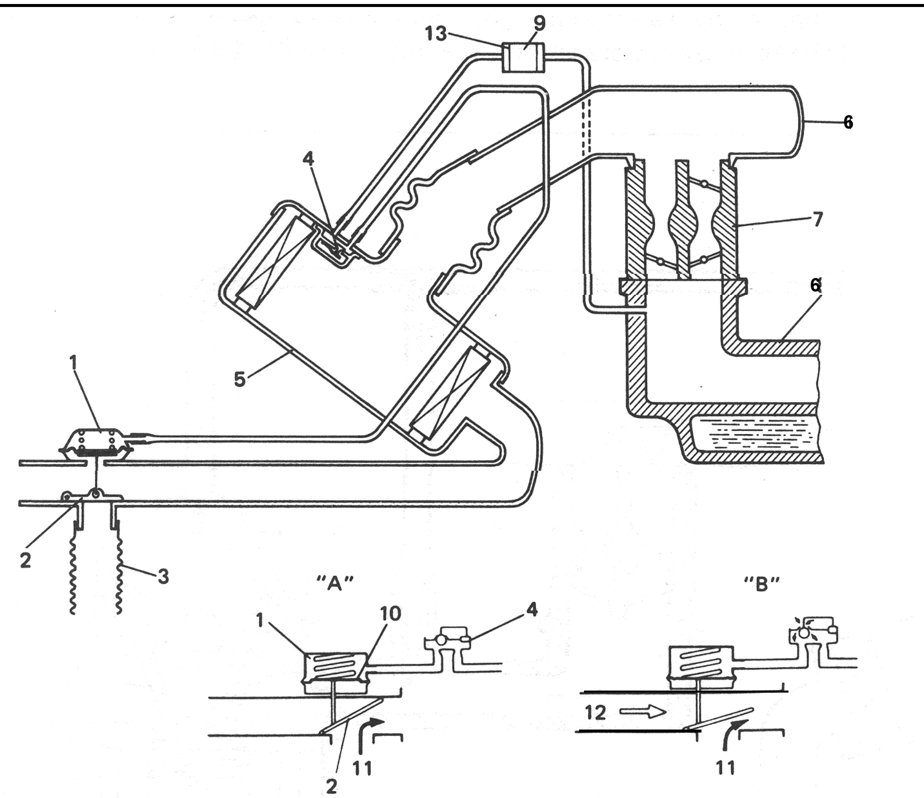


Fig. 5-I-3 PCV system operation

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.



"A" Warm air delivery mode
"B" Regulating mode
"C" Cold air delivery mode
1. ACA (Air Control Actuator)
2. Damper
3. Warm air duct
4. Thermo sensor (valve)
5.' Air cleaner case
6. Air cleaner inlet case
7. Carburetor
8. Intake manifold
9. Check valve
10. Diaphragm
11. Warm air
12. Cold air
13. Orange

FIG. 5-1-4 TCAC system operation

System Operation

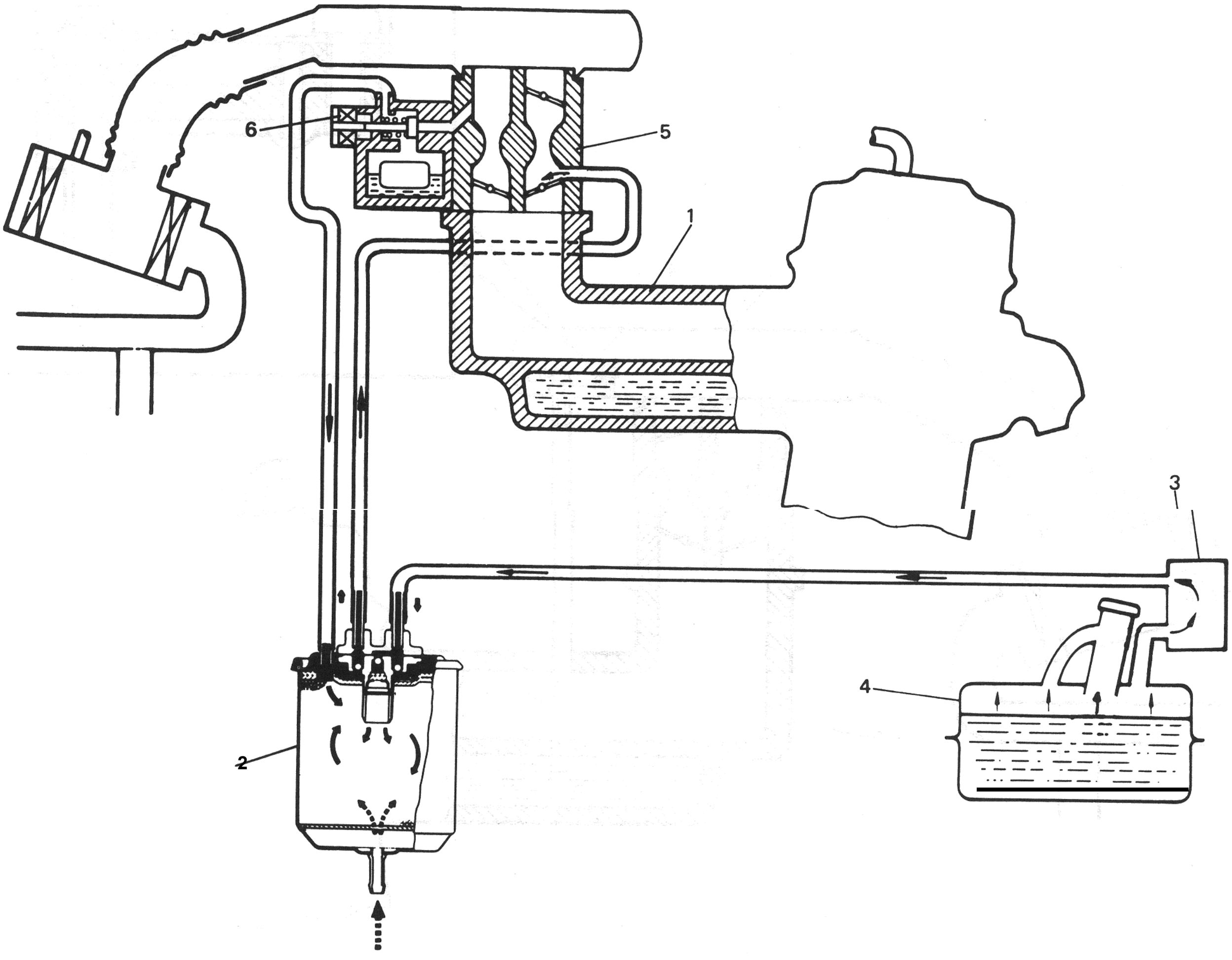
When engine is started in cold weather, the thermo valve is closed because the temperature of the intake air in the air cleaner is low. Therefore, the vacuum is transmitted to the ACA diaphragm, which then pulls up the damper linked to the diaphragm to open the warm air duct fully. As the engine is warmed 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.

EVAPORATIVE EMISSION CONTROL SYSTEM

An evaporative emission control system is used to prevent emission of fuel vapors from the vehicle fuel system.
The system allows evaporating fuel vapors to be stored, when the engine is not running.
This is accomplished by venting the fuel tank and carburetor float chamber through a vapor storage canister containing activated charcoal.
The major system components are vapor storage canister, vent solenoid, and liquid vapor separator.
The fuel vapor from the fuel tank is led into the canister and stored there when the engine is not running.
The fuel vapor from the carburetor float chamber is also stored in the canister when the ignition switch is "OFF".
When engine runs, the fuel vapor stored in the canister is drawn into the carburetor together with fresh air.
For vent solenoid valve operation, refer to item of "BOWL VENTILATION SYSTEM."



1. Intake manifold
2. Vapor storage canister
3. Liquid vapor separator
4. Fuel tank
5. Carburetor
6. Vent solenoid valve

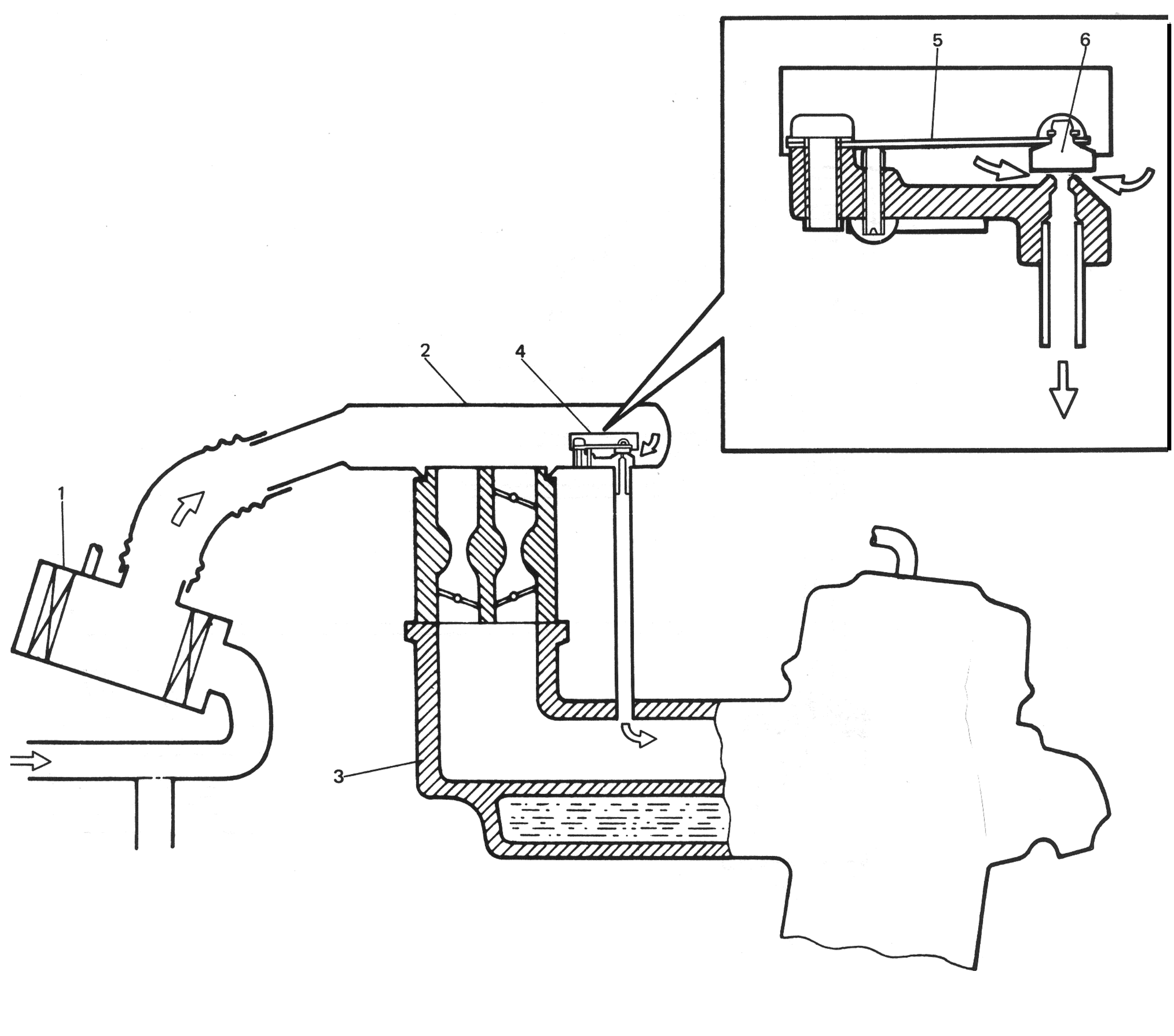
Fig. 5- I-5 Evaporative emission con trol sys tern

HOT IDLE COMPENSATOR (HIC)

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

HIC has a bimetal which warps as the heat transferred to it rises higher than about 55°C (131" F). Caused by this, the valve in HIC starts to open and it reaches to the full open state at about 70°C (158" 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 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.



1. Air cleaner
2. Air intake case
3. Intake manifold
4. HIC
5. Bi-metal
6. HIC valve

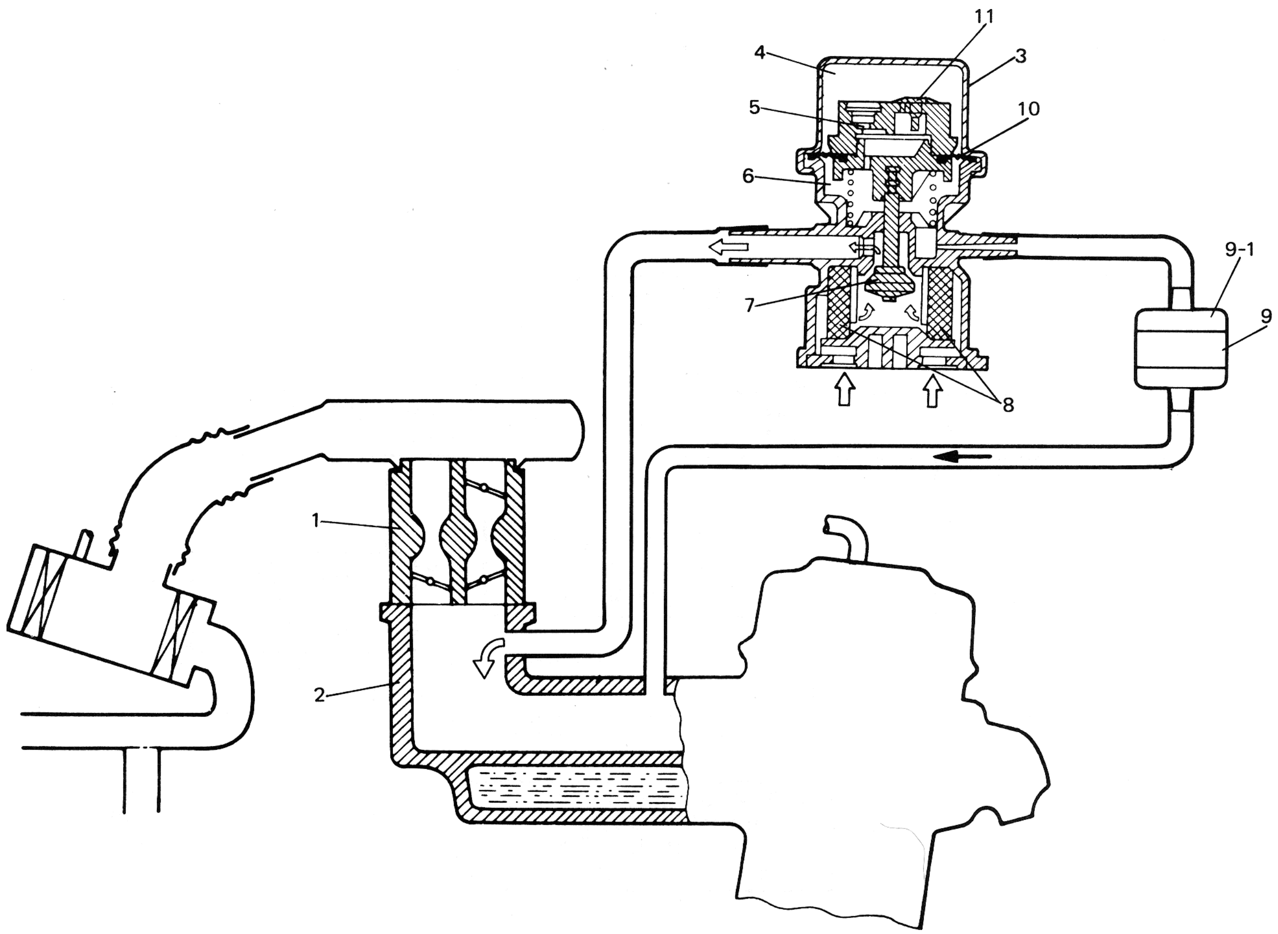
Fig. 5-1-6 Hot idle; compensator

DECELERATION MIXTURE CONTROL SYSTEM

This system consists of a MCV (Mixture Control Valve), jet and vacuum hoses.

This system is designed to introduce fresh air into the intake manifold to reduce generation of excessive HC and CO emission caused by temporary rich air-fuel ratio while rapid deceleration.

The MCV has a pressure balancing orifice and check valve on its diaphragm, and closes when manifold vacuum is constant. As manifold vacuum increases according to rapid deceleration, manifold vacuum applies to MCV chamber "B" through jet, the MCV opens and introduces fresh air into the intake manifold. When manifold vacuum becomes constant, pressure difference between two sectioned chambers "A" and "B" gradually diminishes through pressure balancing orifice, then the MCV closes.



1. Carburetor
2. Intake manifold
3. MCV
4. Chamber "A"
5. Orifice
8. Chamber "B"
7. Valve
8. Filter
9. Jet (Colorless)
9-1. Gray side
10. Diaphragm
11. Check valve

Fresh air

Vacuum

Fig. 5-I-7 Deceleration mixture control system

COMPUTER CONTROLLED EMISSION CONTROL SYSTEM

[Feed back system]

A prime purpose of this system is to maintain a controlled air fuel ratio, allowing the catalyst to reduce oxides of nitrogen, hydrocarbons, carbon monoxide and to improve fuel economy simultaneously.
The electronic control module (ECM) and the oxygen sensor are provided in this system.
The oxygen sensor mounted on the exhaust manifold monitors the exhaust gas air fuel ratio and signals to the ECM.
The ECM processes the oxygen sensor signal and controls carburetor air fuel ratio by the operation of the mixture control solenoid in the carburetor.
Thus the signal of the exhaust gas air fuel ratio sensed by the oxygen sensor is fed back to ECM and the carburetor air fuel ratio is controlled.

[Electronic control module (ECM)]

The ECM controls the fuel cut system, idle-up system, bowl vent system, EGR system and secondary throttle valve system, as well as the feed back system. The ECM is located under the glove box of the instrument main panel. Refer to Fig. 5-l -9.

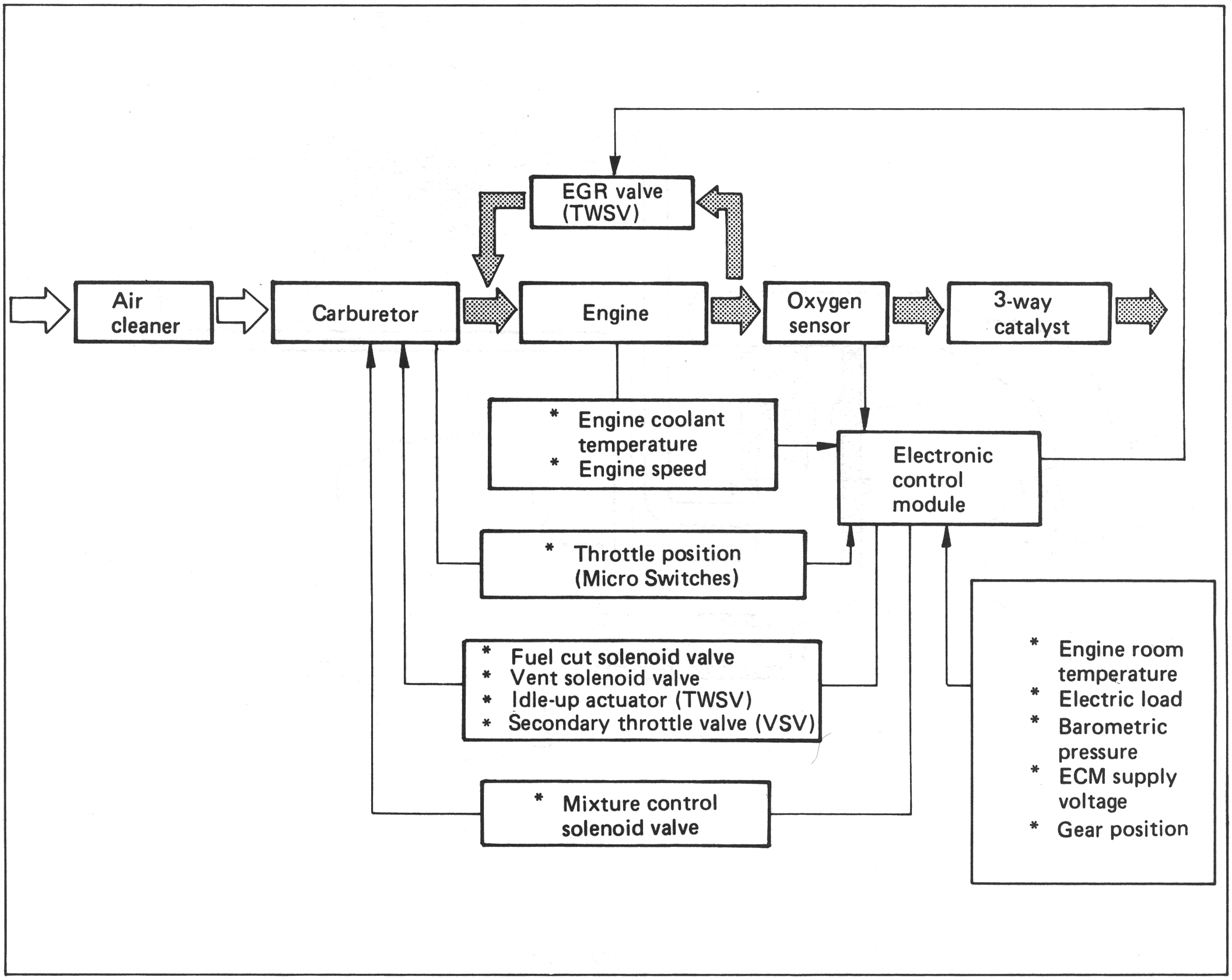


Fig. 5-1-8 Computer con trolled emission con trot s ys tern

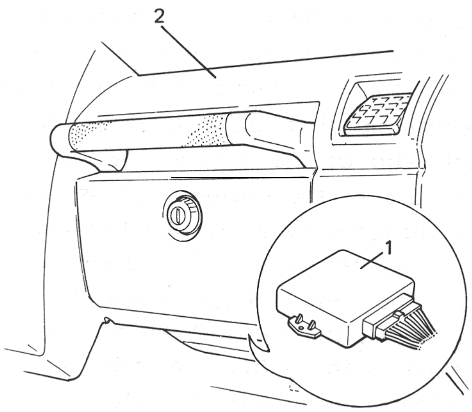


Fig. 5-1-9 ECM

1. ECM
2. Instrument panel

The ECM sensed parameters are as follows:

- Exhaust Oxygen Concentration.
  It is sensed by the oxygen sensor installed on the exhaust manifold.

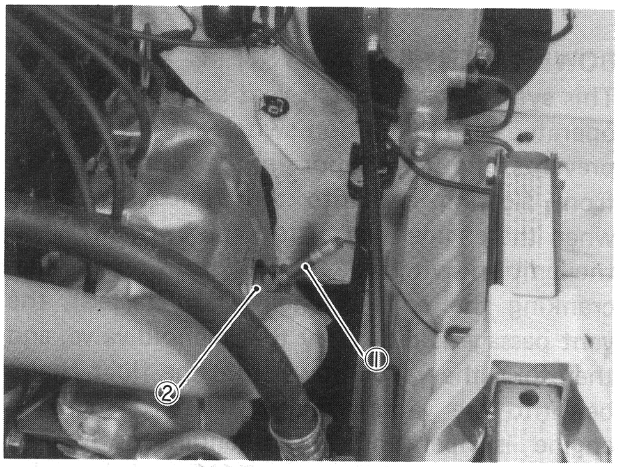
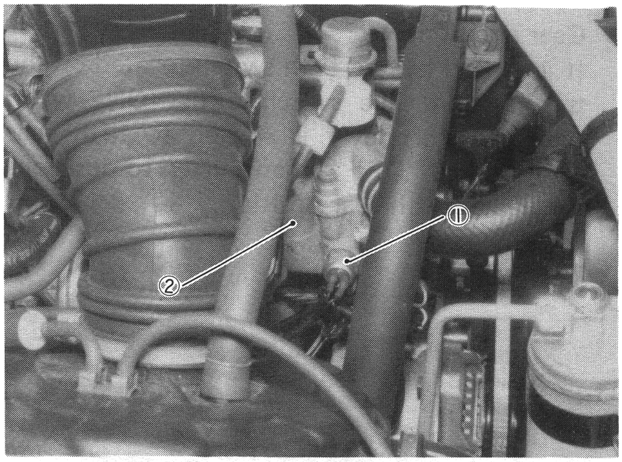


Fig. 5-1-10 Oxygen sensor

1. Oxygen sensor
2. Exhaust manifold

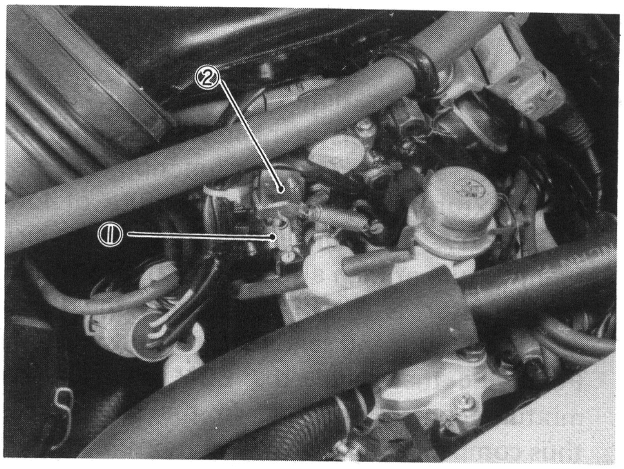
- Engine coolant temperature.
  It is sensed by the thermal switch installed on the intake manifold.



1. Thermal switch
2. Intake manifold

Fig. 5-1-11 Thermal switch

- Throttle position.
  It is sensed by the micro switches (wide open switch and idle switch) installed on the carburetor.



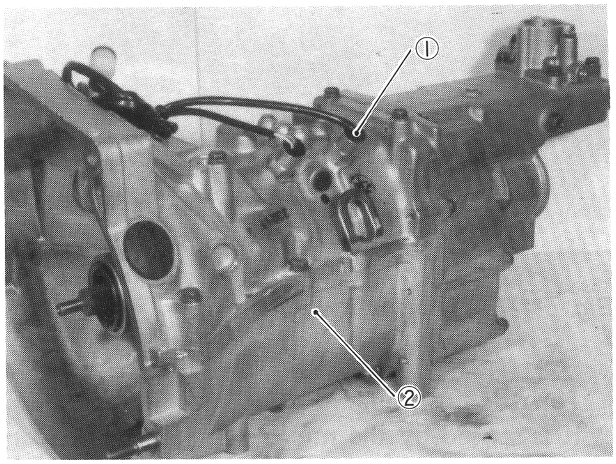
1. Idle micro switch
2. Wide open micro switch

Fig. 5-1-12 Micro switches

- Engine speed.
  It is computed by the ECM based on the electrical signal received from the ignition system.

- Electric load.
  The ECM senses electric loads of the following items to provide idle speed compensation.
  a. Small, tail, side marker, license light.
  b. Rear defogger (if equipped).
  c. Heater fan.

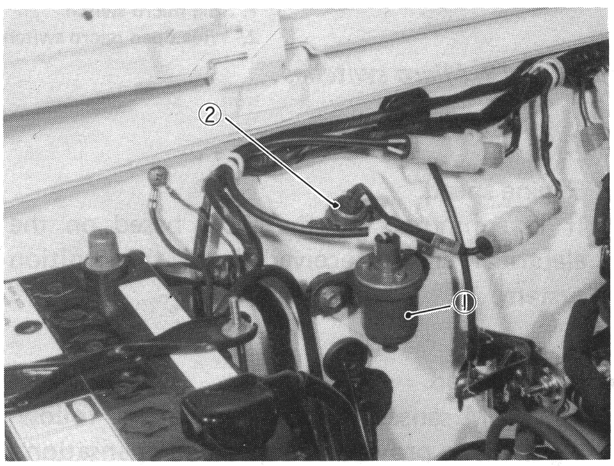
- Gear position.
  It is sensed by the fifth switch located on the transmission. The switch turns "ON" when the gear shift lever is shifted to fifth gear position and "OFF" when shifted to positions other than fifth gear position.



1. Fifth switch
2. Transmission

Fig. 5-I-13 Fifth switch

- Altitude compensation.
  When the vehicle is at high altitude and the feed back system does not function, the air/fuel mixture becomes richer because of low air density. To compensate the richer air/fuel mixture at high altitude, the high altitude compensator is "ON" by sensing the barometric pressure and sends a signal to the ECM. Following the signal, the ECM controls the mixture control solenoid in the carburetor, thus compensating the air/fuel mixture.



1. High altitude compensator
2. Thermal engine room switch

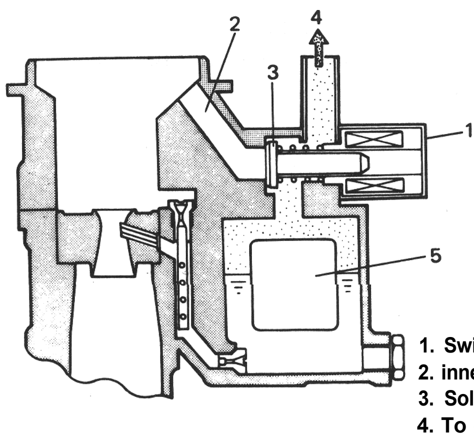
Fig. 5-1- 14 High altitude compensator and thermal engine room switch

- Engine room temperature compensation.
  Sensing the air temperature in the engine room the thermal engine room switch sends an electric signal to ECM to compensate the air/fuel ratio of the mixture. When the air temperature in the engine room is low, the switch operates to make the mixture rich. When the air temperature in the engine room is high, the switch stops operating, which means, the air/fuel ratio of the mixture is not controlled by the switch. Refer to Fig. 5-1-I 4 for the thermal engine room switch.

[Three-way catalyst]
The three-way catalyst is provided in the exhaust system (exhaust center pipe). The function of the catalyst is to reduce the emission of CO, HC and NOx in the exhaust gas by oxidizing or converting them into CO_2, H_2 0 and N_2 respectively.

BOWL VENTILATION SYSTEM

This system has a switch vent solenoid which is operated by the ignition switch and the ECM. It prevents the fuel vapor in the float chamber from flowing out into the atmosphere both when the engine is at a stop and at work. When the ignition switch is at "OFF" position or when cranking the engine (engine not started), the vent passage is closed by the solenoid valve, and therefore, the vapor flows from the float chamber into the vapor storage canister. When the engine is operating, the solenoid receives an electrical signal from the ECM and its valve keeps the inner vent passage open. As a result, the vapor passes through the passage into the carburetor and is drawn into the engine.



1. Switch vent solenoid
2. inner vent passage
3. Solenoid valve
4. To canister
5. Float

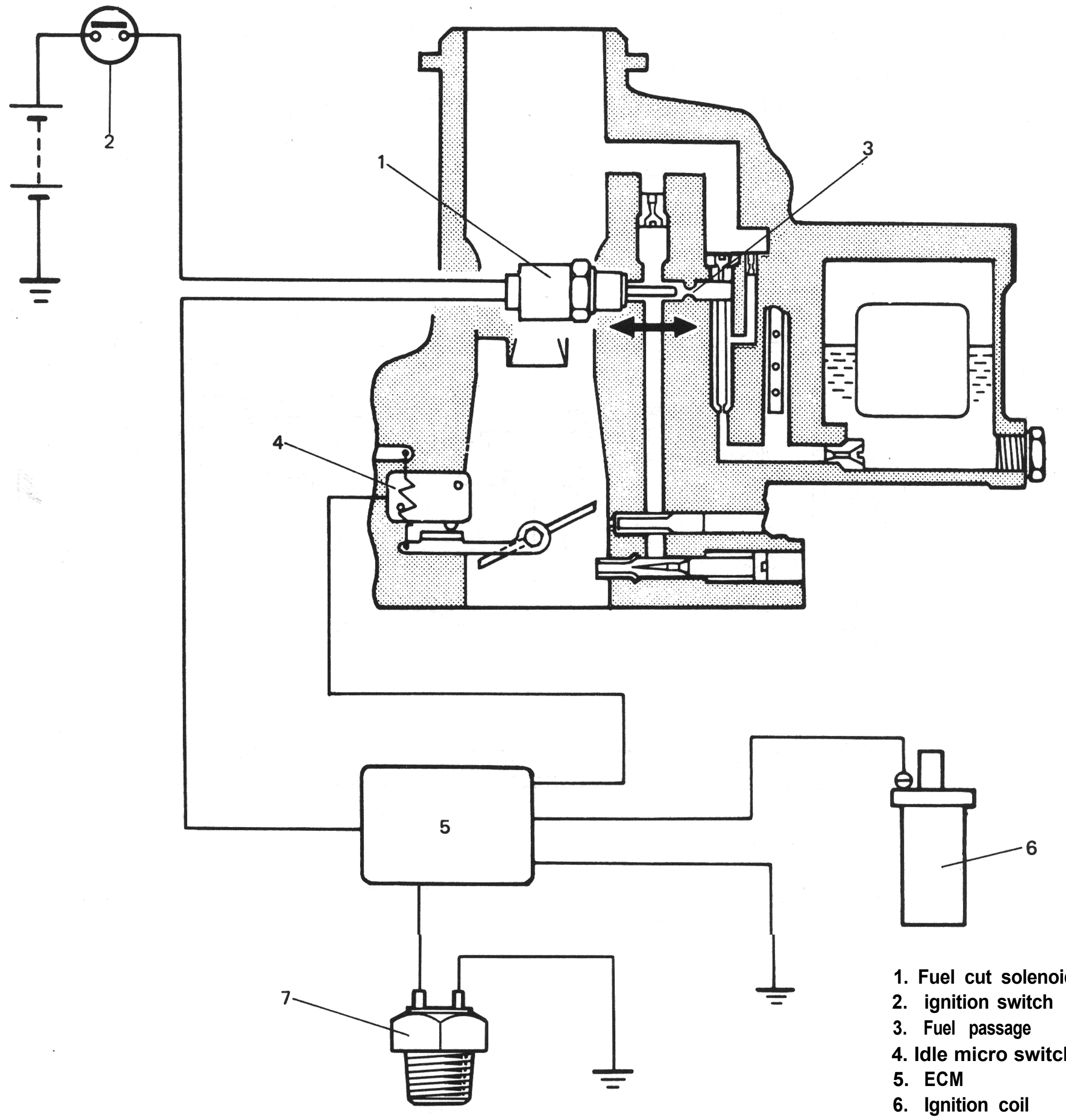
Fig. 5-1-15 Bowl ventilation system

FUEL CUT SYSTEM

As shown in the figure, the fuel cut solenoid valve is provided in the primary slow system of the carburetor to open and close the fuel passage of the slow system.
As turning the ignition switch "OFF" cuts off the electric current to the solenoid, the solenoid closes the fuel passage. Thus this system contributes to preventing dieseling of the engine after the ignition switch is turned "OFF". Also, during the deceleration and provided that all below listed three conditions exist, the fuel cut solenoid valve operates to cut the fuel feed to the engine temporarily by closing the fuel passage when it received a signal from the ECM.
Such operation of this system prevents the three-way catalyst from getting heated high and improves fuel economy.

Three conditions:

- The coolant temperature is normal.
- The idle micro switch is in "ON" position. In other words, the primary throttle valve is closed.
- The engine revolution is more than 2,400 rpm.



1. Fuel cut solenoid valve
2. ignition switch
3. Fuel passage
4. Idle micro switch
5. ECM
6. Ignition coil
7. Thermal switch

Fig. 5-1-16 Fuel cut system

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

This system controls the formation of NOx emission by recirculating the exhaust gas into the combustion chamber through the intake manifold.

The diaphragm mounted in the EGR modulator is operated by back pressure of the exhaust gas to open and close the valve. By this opening and closing action of the valve, the EGR modulator controls the vacuum transmitted to the EGR valve.

Under a low load condition such as low speed driving, the exhaust pressure is low. In this state, the diaphragm in the EGR modulator is pushed down by the spring force and the modulator valve opens to allow the air into the vacuum passage from the outside.

As a result, the vacuum transmitted to the EGR valve becomes smaller and so does the opening of the EGR valve. Thus, less amount of exhaust gas is recirculated to the intake manifold.

Under a high load condition such as high speed driving, on the other hand, the exhaust pressure is high. By the high exhaust pressure, the diaphragm in the modulator is pushed up and closes its valve. As the air does not enter the vacuum passage in this state, the vacuum transmitted to the EGR valve grows larger and so does the opening of the EGR valve. Thus, larger amount of exhaust gas is recirculated to the intake manifold.

Under any one of the following conditions, the vacuum passage is closed by the TWSV or BVSV and the vacuum is not transmitted to the EGR valve which, therefore, doesn't operate.

- When the coolant temperature is low. (BVSV is closed)
- When the gear shift lever is shifted to fifth gear position and fifth switch is turned on. (TWSV is closed)
- When HAC is turned on. (TWSV is closed)

Other than the above, EGR valve opens and closes in accordance with the EGR modulator operation.

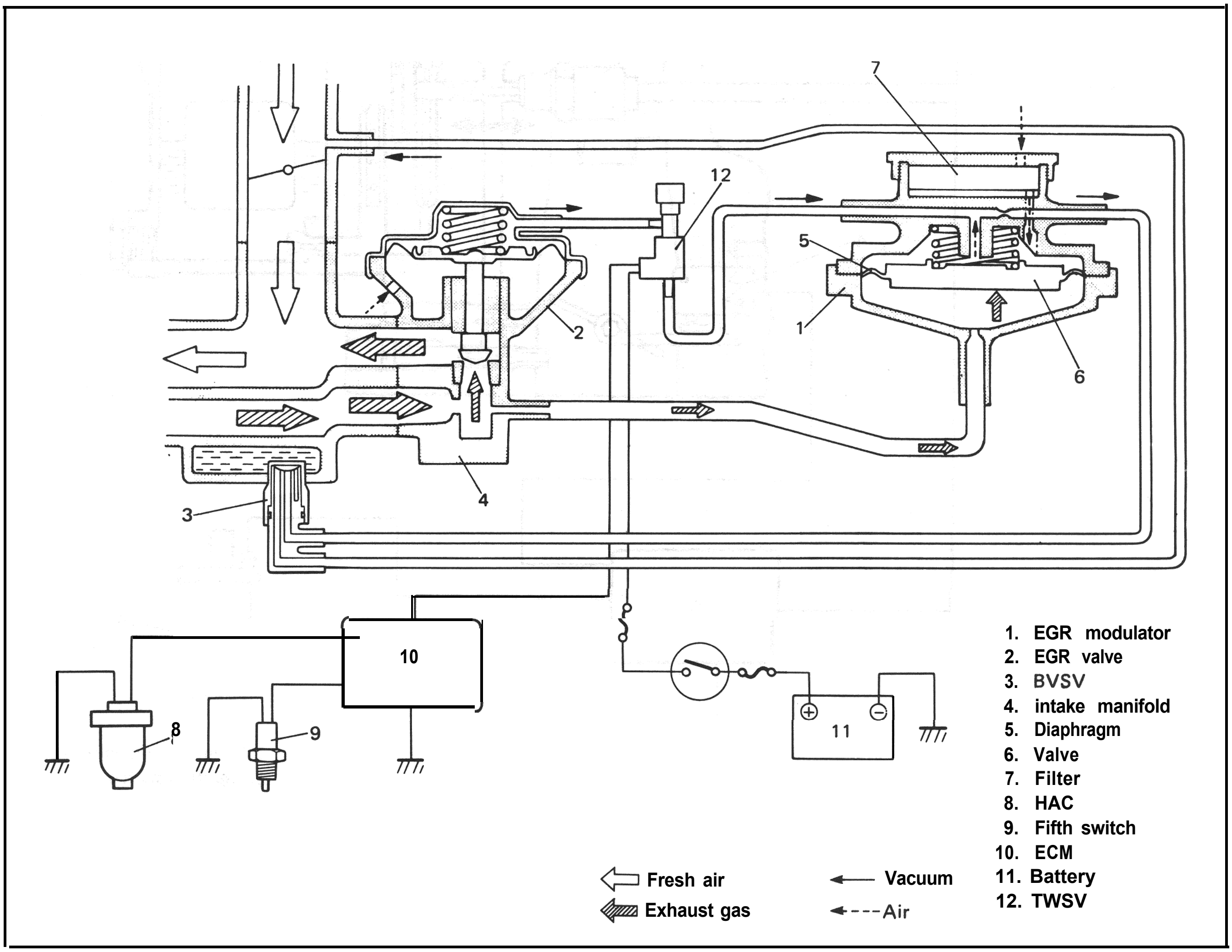


Fig. 5-1-17 EGR system operation

5-2. DIAGNOSIS

POSSIBLE CAUSES OF EMISSIONS TEST FAILURES

Excessive Emission	Explanation	Possible Causes
Hydrocarbons (HC)	Excessive hydrocarbons are caused by an air/fuel mixture that is not burning completely.	• Engine not at normal operating temperature • Disconnected, obstructed, leaking, or misrouted vacuum hoses • Vacuum leaks • Maladjusted idle mixture • Improper adjusted/sticking choke • Maladjusted initial spark timing • Defective spark plugs, wires or distributor cap • Malfunctioning MCV • Lead contamination of catalytic converter • Malfunctioning feed back system
Carbon monoxide (CO)	Excessive carbon monoxide emissions are due to a mixture that is rich.	• Engine not at normal operating temperature • Maladjusted idle mixture • Improperly adjusted/sticking choke • Lead contamination of catalytic converter • Leaking carburetor fuel passages or gaskets • Carburetor float level • Restricted air cleaner element • Malfunctioning feed back system
Oxides of nitrogen (Nox)	Excessive oxides of nitrogen are generally due to high temperatures in the combustion chamber.	• Obstructed/leaking/misrouted vacuum lines • Improper operation of the EGR system • Plugged EGR passages • Inoperative BVSV or TWSV • Lead contamination of catalytic converter • Malfunctioning feed back system

EGR DIAGNOSIS

Condition	Possible Cause	Correction
Engine idles abnormally rough and/or stalls.	EGR valve vacuum hoses mis-routed.	Check EGR valve vacuum hose routing. Correct as required.
	Leaking EGR valve.	Check EGR valve for correct operation.
	EGR valve gasket failed or loose EG R attaching bolts.	Check EGR attaching bolts for tightness. If no loose, remove EGR valve and inspect gasket.
	Improper vacuum to EGR valve at idle.	Check vacuum from carburetor EGR port with engine at stabilized operating temperature and at idle speed.
	Sticky EGR valve	Check EGR valve for correct operation,
Engine runs rough on light throttle acceleration and has poor part load performance.	EGR valve vacuum hose mis-routed.	Check EGR valve vacuum hose routing. Correct as required.
	Loose EGR attaching bolts	Torque bolts.
	Sticky or binding EGR valve.	Same as listing in "Engine idles Abnomrally Rough and/or Stalls" condition. Clean EGR passage deposits. Perform EGR System Check.
	EGR modulator valve blocked or air flow restricted.	Check EGR modulator valve operation.
	Wrong or no EGR gasket.	Install new gasket, torque attaching parts.
Engine stalls on decelerations.	EGR modulator valve blocked of air flow restricted.	Check EGR modulator valve operation.
	Restriction in EGR vacuum line.	Check EGR vacuum lines for kinks, bends, etc. Remove or replace hoses as required.
	VSV filter plugged.	Check VSV for correct operation.
	Sticking or binding EGR valve.	Check EGR valve for excessive deposits causing sticky or binding operation.
Part throttle engine detonation.	EGR modulator valve blocked of air flow restricted.	Check internal control valve operation.
NOTE: Non-functioning EGR valve could contribute to part throttle detonation. Detonation can be caused by several other engine variables. Perform ignition and carburetor related diagnosis.	Insufficient exhaust gas recirculation flow during part throttle accelerations.	Check EGR valve hose routing. Check EGR valve operation. Repair or replace as required. Replace valve as required. Check EGR passages and valve for excessive deposit. Clean as required. Check VSV operation.

Condition	Possible Cause	Correction
Engine starts but immediately stalls when cold. NOTE: **Stalls after start can also be caused by carburetor problems.**	EGR valve hoses misrouted. BVSV is out of order.	Check EGR valve hose routings. Check BVSV. Replace as necessary.

PCV SYSTEM DIAGNOSIS

Condition	Possible Cause	Correction
Unstable idle, frequent stalling.	PCV valve completely stuck. Hose plugged.	Replace valve. Check hoses.
Oil in air cleaner.	PCV system plugged.	Replace valve.

5-3. 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-l-l for hose connection.

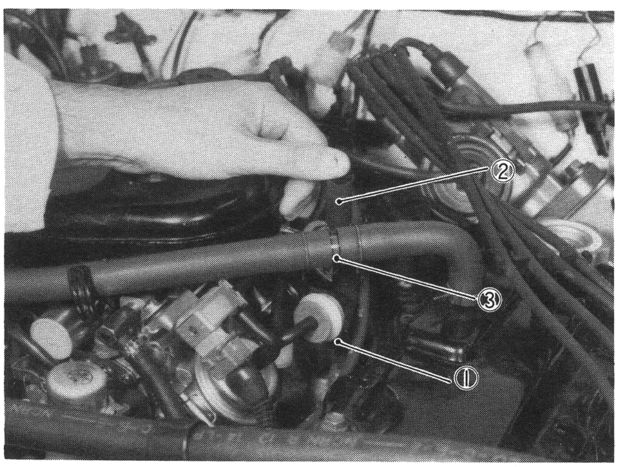
PCV SYSTEM

Checking PCV System

NOTE:
If the engine is idling rough, this may be caused by a stuck 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.

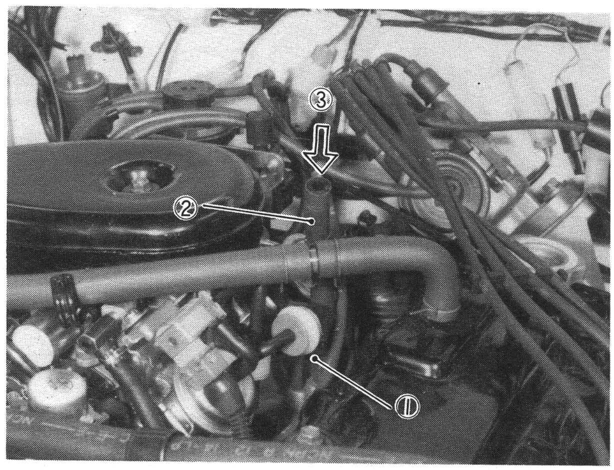


1. PCV valve
2. PCV hose
3. Three way joint

Fig. 5-3- 1 Checking vacuum

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. 5-3-2 Checking PCV valve for sticking

5) Connect PCV hose securely.

TCAC SYSTEM

Checking TCAC System

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

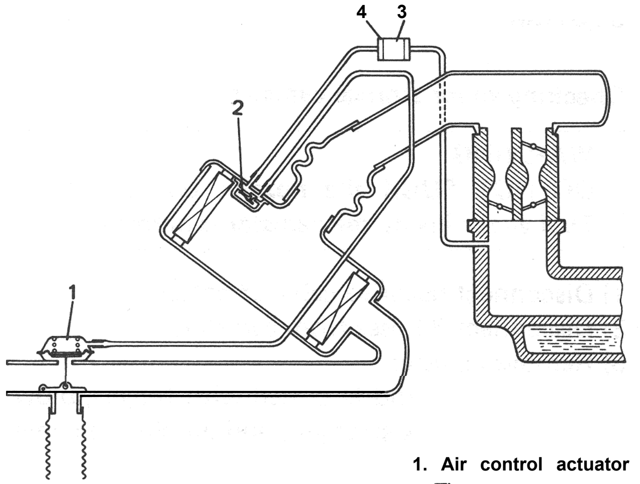


Fig. 5-3-3 TCA C sys tern

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.

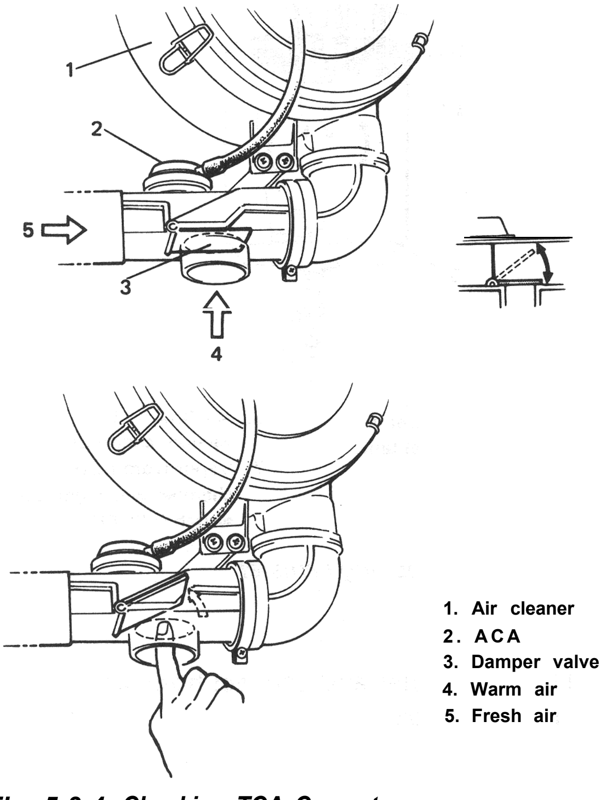


Fig. 5-3-4 Checking TCA C sys tern

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.

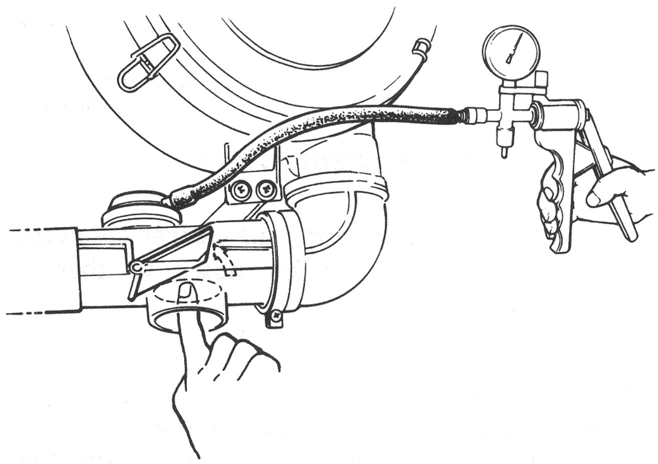


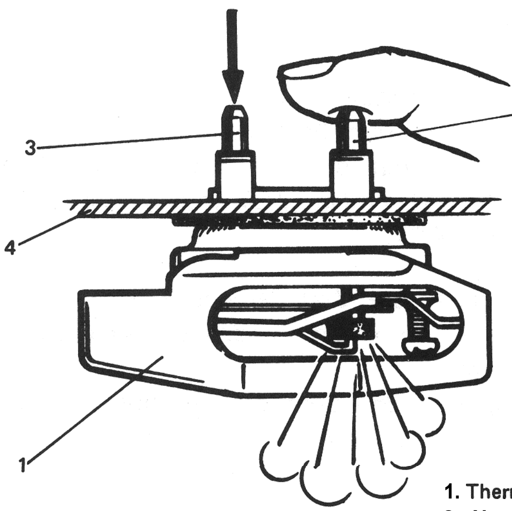
Fig. 5-3-5 Checking A CA

[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. 5-3-6.
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.**



1. Thermo sensor
2. Nozzle
3. Nozzle
4. Air cleaner cap

Fig. 5-3-6 Checking thermo sensor

5) After checking, reinstall air cleaner case cap, and connect 2 vacuum hoses to thermo sensor.

[Check valve]

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

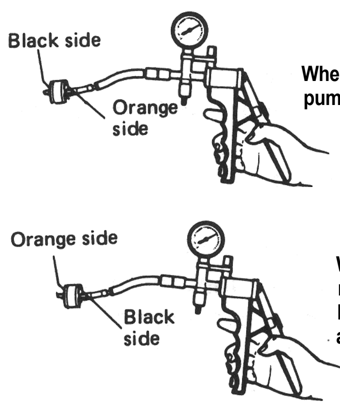


Fig. 5-3-7 Checking check valve

If found defective, replace.

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

EVAPORATIVE EMISSION CONTROL SYSTEM

Checking vapor storage canister

> **WARNING:**
> **DO NOT SUCK the nozzles on canister.**
> **Fuel vapor inside the canister is harmful.**

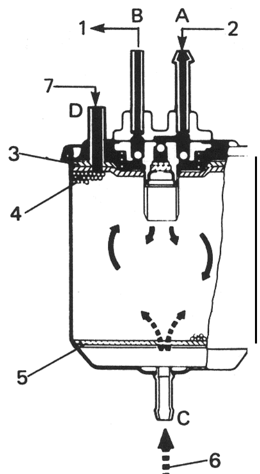
1) Disconnect negative cable at battery.
2) Disconnect 3 hoses from canister.
3) Remove canister.

air into pipe A strongly, and air should come out from pipe B.

pass through pipe A, C or D.

6) When air is blown into pipe C, air should come out from pipe A, B and D.

If operation differs from above description, canister must be replaced.



1. Vapor to carburetor
2. Vapor from fuel tank
3. Filter
4. Charcoal
5. Filter
6. Air flow under vacuum condition
7. Vapor from float chamber when ignition switch is "OFF"

Fig. 5-3-8 Checking canister

7) Install canister and connect hoses and battery negative cable.

[Hoses]
Visually inspect hoses and pipe for cracks, damage, or excessive bends, and hose connection for tightness.

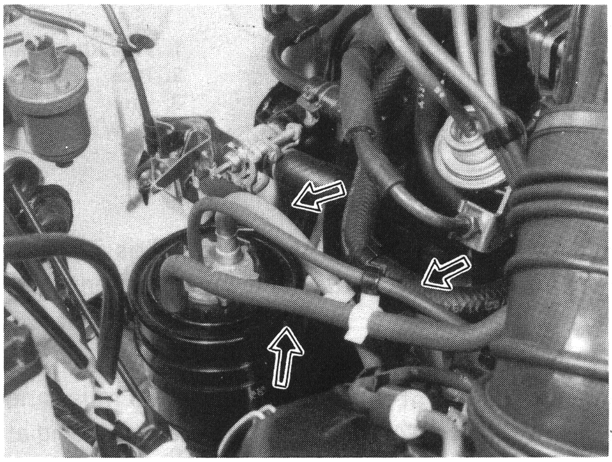


Fig. 5-3-9

HOT IDLE COMPENSATOR (HIC)

Checking Hot Idle Compensator

1) Remove air intake case with hose.
2) Check temperature around HIC with thermometer.
3) If temperature is below 45°C (113° F), air should not come out of HIC when air is blown into hose. If temperature is above 65°C (149° F), air comes out of HIC.
   Replace H IC if defective.
4) After checking, install air intake case and connect hose to intake manifold.

NOTE:

- **To check HIC for operation at higher than 65°C (149°F) temperature when HIC (bimetal) temperature is lower than 45°C (113° F), warm it up with hair drier or photo light before checking.**
- **Never touch bimetal or valve in HIC.**

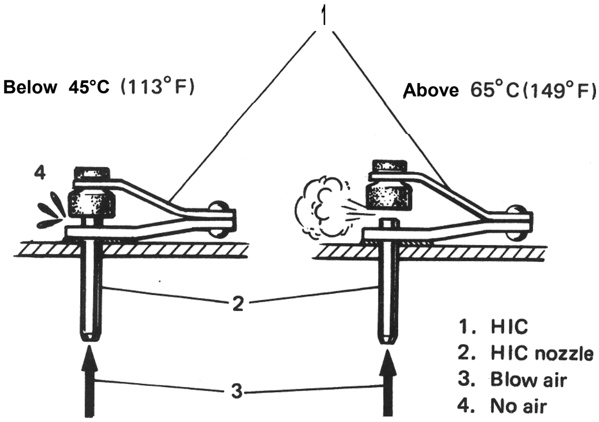


Fig. 5-3- 10

DECELERATION MIXTURE CONTROL SYSTEM

Checking

[Hoses]
Inspect each hose for pinholes, cracks or damage. Also check to ensure that each joint is securely connected. Any part found defective must be corrected or replaced.

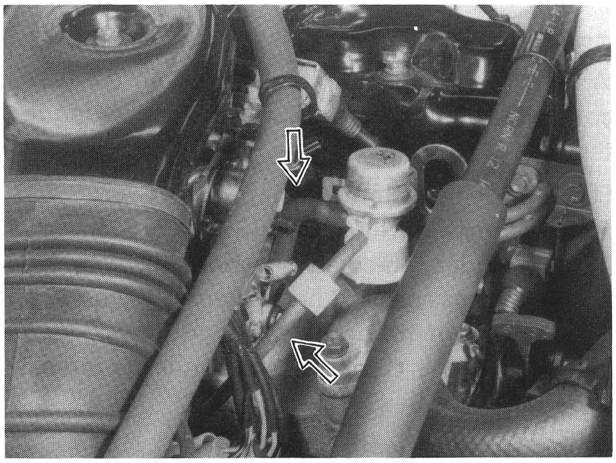


Fig. 5-3-11

[Mixture control valve (MCV)]

1) Warm up the engine to normal operating temperature.
2) Disconnect hose ① and reconnect it. At this time, check that air is drawn into MCV.

NOTE:
At this time, the engine will idle rough or die, but this is normal.

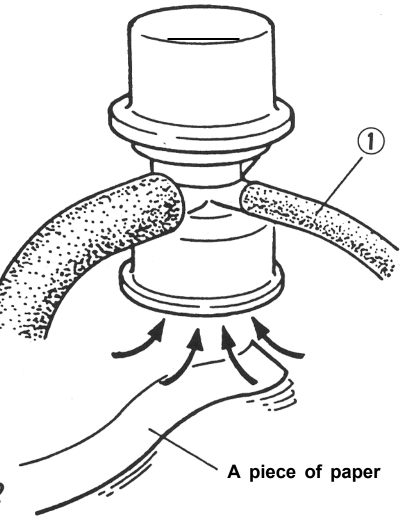
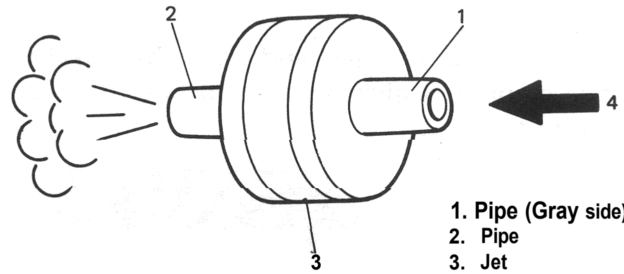


Fig. 5-3-12

If the above checks show anything wrong, replace it.

[Jet]

1) Remove jet.
2) When blowing air into pipe ①, air should come out of pipe ②.
   Replace clogged jet.
3) Install jet with its gray side directed toward **MCV.**



1. Pipe (Gray side)
2. Pipe
3. Jet
4. Blow air

Fig. 5-3-13

FEED BACK SYSTEM

Whether feed back system including oxygen sensor and ECM (Electronic Control Module) is in good condition or not, can be judged by checking for operation of "CHECK ENGINE" light in instrument cluster.

[U.S.A. specification vehicle]

As previously outlined, "CHECK ENGINE" light automatically flashes at 50,000 miles, 80,000 miles and 100,000 miles indicated on odometer when running warmed up engine. And this automatical flashing at above mileages proves that system is in good condition.

Should any of following malcondition occur, the system check can be performed according to "System check flow chart", even when mileage indicated by odometer is not any of 50,000 miles, 80,000 miles and 100,000 miles.

[Canadian specification vehicle]

Should any of following malconditions occur, the system check can be performed according to "System check flow chart".

- Fuel consumption increases excssively even in normal driving.
- Engine tends to stall.
- Engine is hard to start.

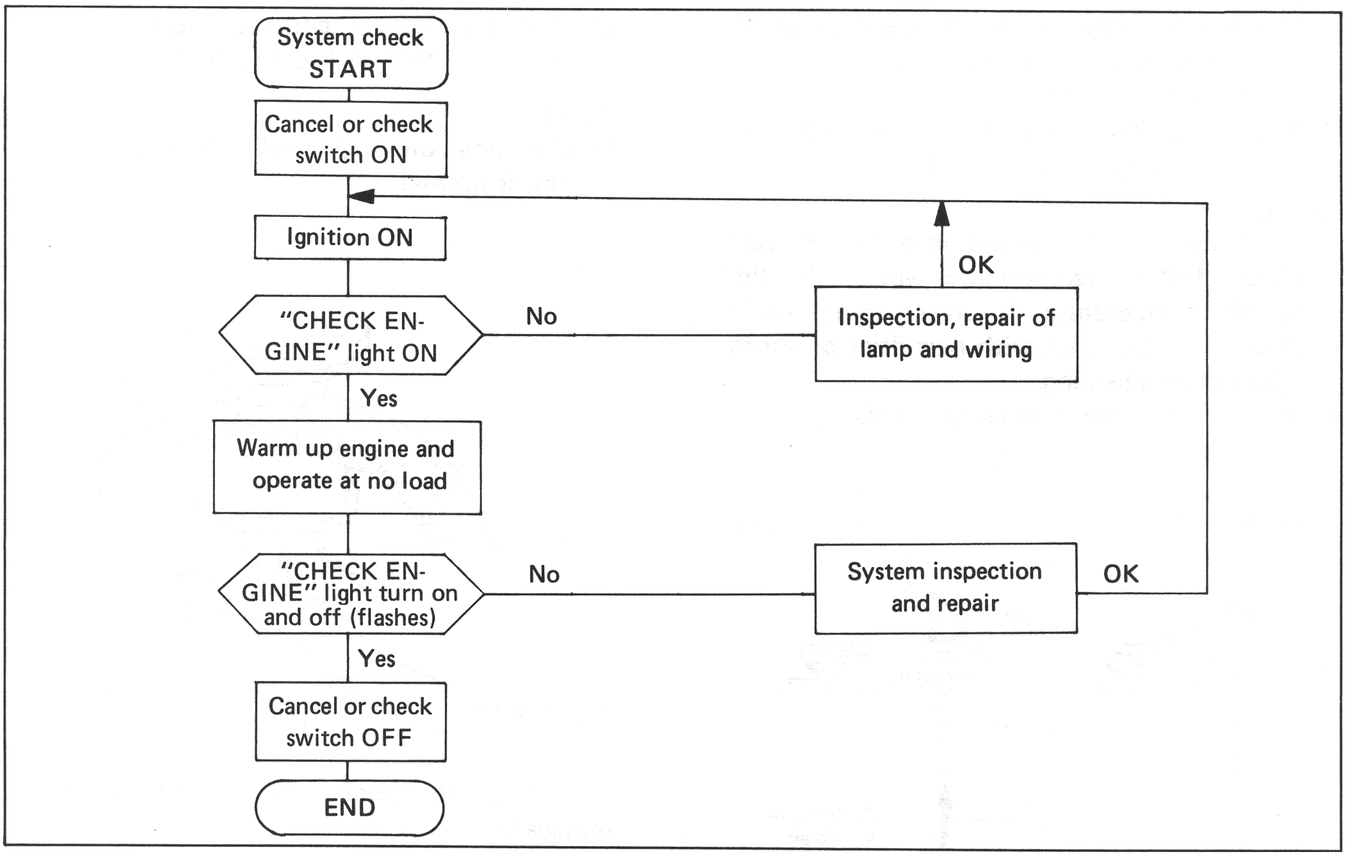
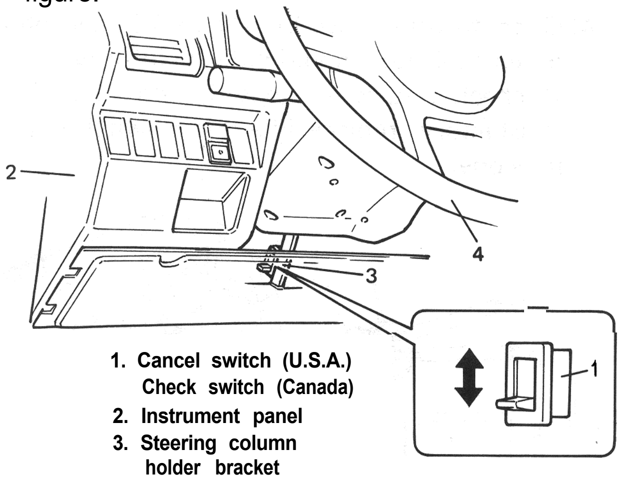


Fig. 5-3-14 ***System check flow chart***

Checking feed back system

1) Operate (turn ON) cancel switch or check switch located at the place shown in below figure.



1. Cancel switch (U.S.A.)
   Check switch (Canada)
2. Instrument panel
3. Steering column holder bracket
4. Steering wheel

Fig. 5-3-15 Cancel switch or check switch

2) Turn ignition switch ON without running engine.
   At this time, "CHECK ENGINE" light should light (should not flash).
   If it does not light, check electric circuit of the light, namely light for blow off and lead wire for disconnection.

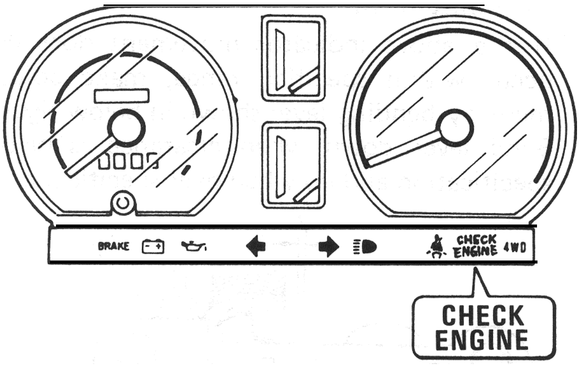


Fig. 5-3- 16 "CHECK ENGINE" light

3) After lighting of the light is confirmed, start engine and warm it up to normal operating temperature.
4) When engine is warmed up, run engine at 1,500 – 2,000 rpm. In this state, make sure that "CHECK ENGINE" light flashes. Flashing of light proves that system is in good condition.
   If light does not flash, it can be caused by one of the following. Check them and replace or adjust as necessary.

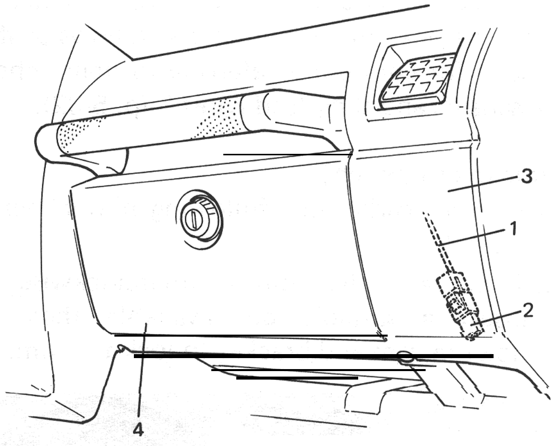
- Defective oxygen sensor
- Defective mixture control solenoid valve
- Defective carburetor or maladjusted idle mixture
- Defective thermal switch
- Disconnected or loosely connected electric lead wires of emission control systems
- Defective ECM
- Defective micro switches (idle and wot)

5)After making sure that "CHECK ENGINE" light flashes, turn cancel switch OFF. Light should go off.
6) Stop engine.

Checking idle and wide open micro switches

Check idle and wide open micro switches according to the following procedures.

1. Warm up engine to normal operating temperature and stop engine.
2. For this check, use check terminal coming from the lower right of instrument panel as shown.
   Connect negative prod of ohmmeter to check terminal and positive prod to body.



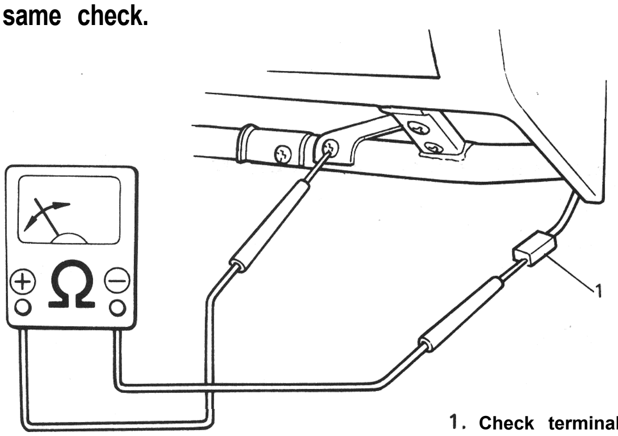
1. Light green wire
2. Check terminal
3. Instrument panel
4. Glove box lid

Fig. 5-3-17

3. Turn ignition switch to "ON" position.
4. Observe ohmmeter indicator reaction to make sure for the following movement for each throttle valve position.

THROTTLE VALVE POSITION	INDICATOR MOVEMENT
Idle position	Swing
1/2 open	Stay after deflection
Full open	Swing

NOTE:
If indicator doesn't deflect at all, reverse above connection, that is, negative prod to body and positive one to check terminal, and carry out the same check.

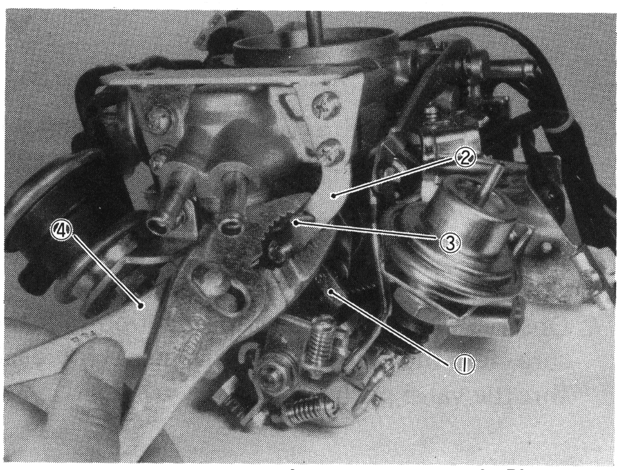


1. Check terminal

Fig. 5-3- 18

If check results are not satisfactory, check idle and wide open micro switches as follows or their circuits for continuity referring to item "checking sensors and their lead wires" (p. 5-32).

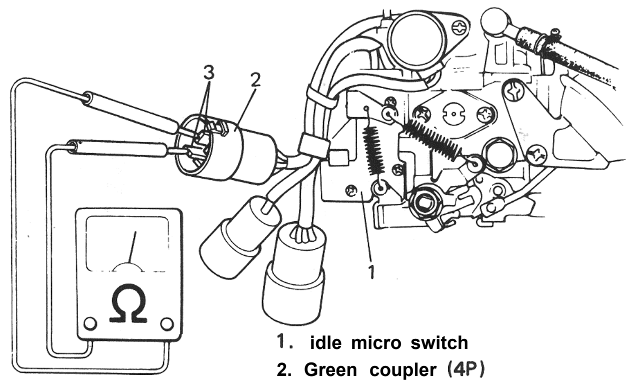
[Idle micro switch]
1) Remove carburetor following normal service procedures.
2) Turn fast idle cam counterclockwise and insert a suitable pin available then into holes in **cam** and bracket to lock the cam.



1. Fast idle cam
2. Bracket
3. Pin
4. Plier

Fig. 5-3- 19

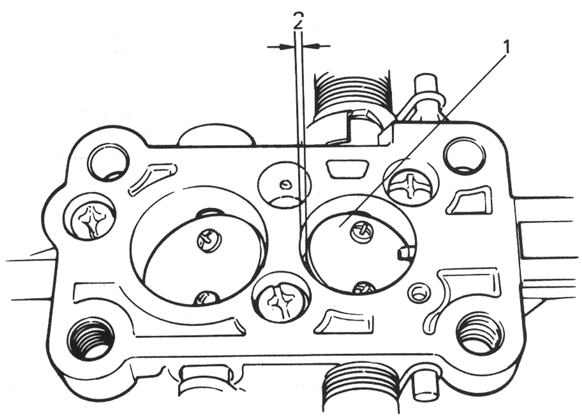
3) Connect ohmmeter to terminals of idle micro switch. Check for continuity between terminals. When throttle valve is at idle position, ohmmeter should indicated "zero" ohm.
4) Open throttle valve by 1/4 to 1/2, and ohmmeter indicator should indicate infinity.
If check results in steps 3) and 4) are not satisfactory, replace idle micro switch with a new one.



1. idle micro switch
2. Green coupler (4P)
3. idle micro switch's terminals (Green/White and Black wires)

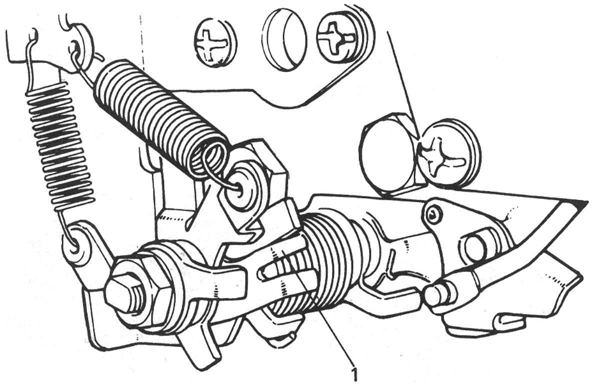
Fig. 5-3-20 Connecting ohmmeter to idle micro switch

5) Open throttle valve slowly till throttle valve-to-carburetor bore clearance becomes 0.36 – 0.62 mm (0.014 – 0.024 in) and check that ohmmeter indicator moves from "zero" ohm to infinity then.
If the above indicator movement does not occur within specified range, make adjustment by bending lever shown in below figure. Bend lever down when clearance is below specification and up when over specification.



1. Primary throttle valve
2. Clearance

Fig. 5-3-21 Clearance between throttle valve and carburetor bore

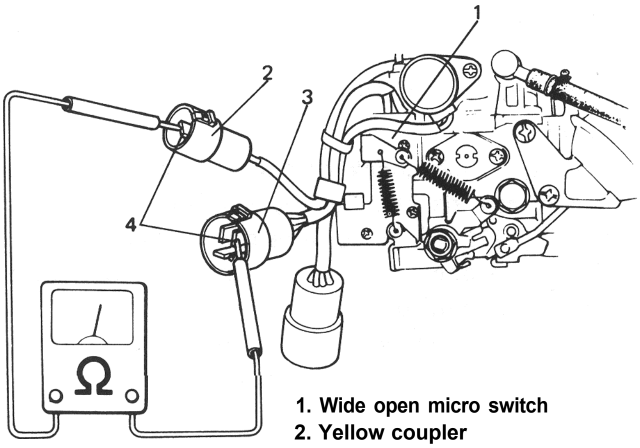


1. Lever

Fig. 5-3-22 Lever

[Wide open micro switch]

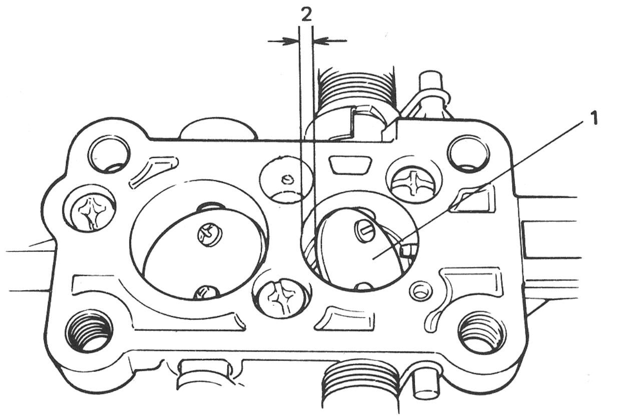
1) Connect ohmmeter to wide open micro switch as indicated in below figure.
   At this time, ohmmeter indicator should indicate "zero" ohm.
2) When throttle valve is fully opened, ohmmeter should indicate infinity.
   If any defect, replace.



1. Wide open micro switch
2. Yellow coupler
3. Green coupler (4P)
4. Wide open micro switch's terminals (Green and Black/Yellow wires)

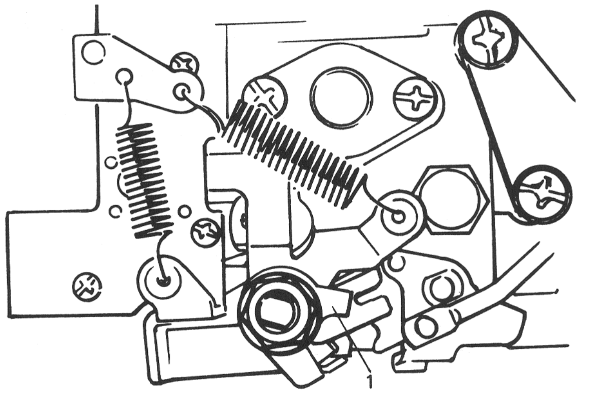
Fig. 5-3-23 Checking wide open micro switch

3) Open throttle valve gradually until the ohmmeter indicates infinity. Then, using a vernier, measure the clearance between throttle valve and carburetor bore as shown in below figure. The clearance should be within 6.0 – 7.2 mm (0.24 – 0.28 in). If the clearance is out of specified range, make adjustment by bending the lever in below figure.



1. Primary throttle valve
2. Clearance

Fig. 5-3-24 Clearance between throttle valve and carburetor bore



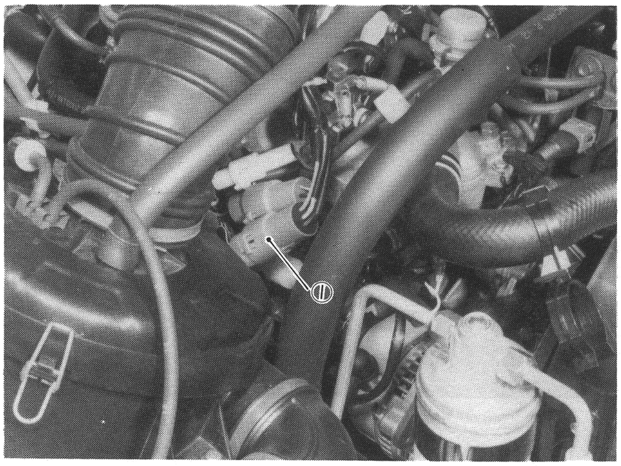
1. Wide open micro switch lever

Fig. 5-3-25 Wide open micro switch lever

Upon completion of checks, install carburetor following normal service procedures.

Checking mixture control solenoid valve

1) Check to make sure that ignition switch is at "OFF" position.
2) Disconnect couplers from ECM, TWSVs and VSV.
3) Disconnect mixture control solenoid valve lead wires at the coupler (5P).

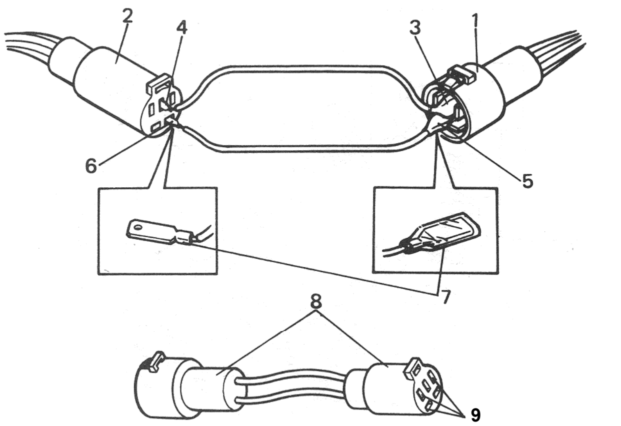


1. Green coupler (5P)

Fig. 5-3-26

4) Using couplers of the same shape as that mentioned in step 3) or 1P couplers, connect only mixture control solenoid valve wire terminals (Yellow/Black terminal of coupler ① and Black/White terminal of coupler ②, White terminal of coupler ① and Blue/Red terminal of coupler ②.

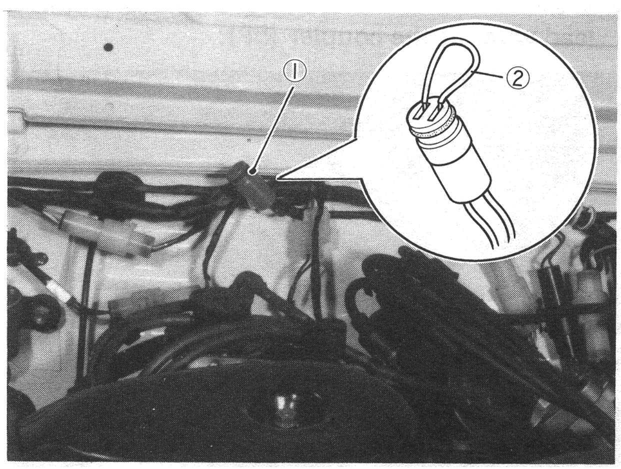
NOTE:
- Couplers must be used to connect each terminal.
- Use special care when connecting terminals as wrong connection may cause damage to other parts.



1. Coupler of MCSV side
2. Coupler of wire harness side
3. Yellow/Black wire terminal
4. Black/White wire terminal
5. White wire terminal
6. Blue/Red wire terminal
7. 1 p coupler
8. 5p coupler (when using this coupler, leave positions indicated as 9 in figure blank).
9. Blank

Fig. 5-3-27

5) Remove cap of duty check coupler located on dash panel and connect terminals with a lead wire to short them.



1. Duty check coupler
2. Lead wire

Fig. 5-3-28

6) Turn ignition switch "ON" and "OFF" repeatedly (without starting engine) and check if MCSV operating sound is heard as ignition switch is operated.

Operating sounds prove its proper operation.

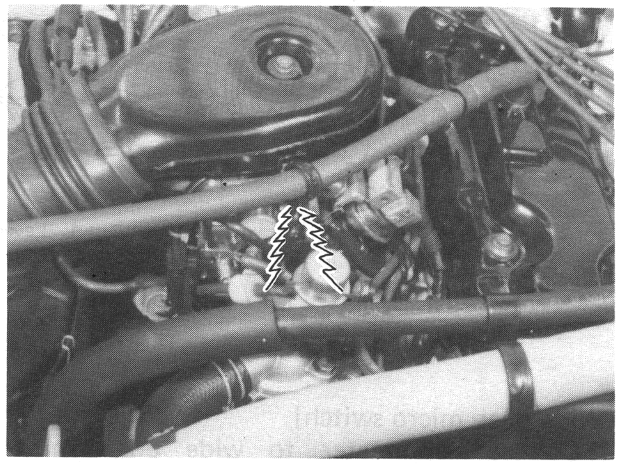


Fig. 5-3-29

7) Upon completion of checks, re-connect disconnected couplers to original positions securely.

Checking thermal switch

NOTE:
For the rough check of the operation, thermal switch can be checked by warming up (above 46.5°C, 116°F) or cooling down (below 30°C, 86°F) the engine without being removed from the intake manifold.
The check procedure is the same as the following except item 1), 2), 5) and 6).

1) Drain cooling system.
2) Remove thermal switch from intake manifold.
3) Cool switch to below 30°C (86" F), and using an ohmmeter, check that there is continuity between terminals.

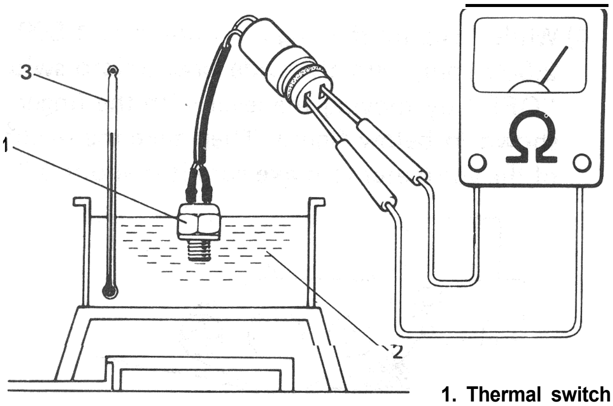


Fig. 5-3-30 Checking thermal switch in cool water

4) Heat switch to above 46.5°C (116°F), and check that there is no continuity between terminals.

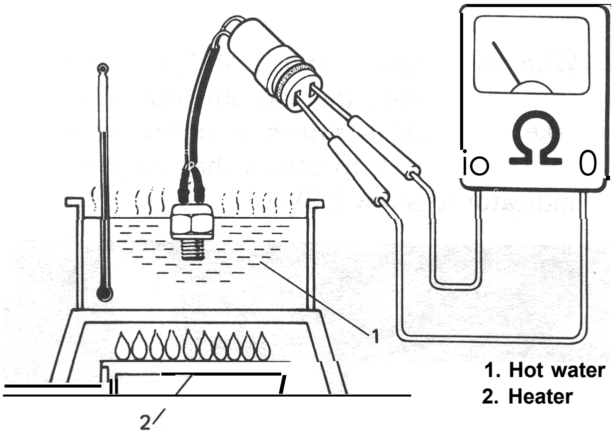


Fig. 5-3-31 Checking switch in hot water

5) Reinstall switch to intake manifold. Before installing, wind sealing tape on its thread.
6) Refill cooling system.

Checking thermal engine room switch
1) Disconnect connector of switch and connect ohmmeter between terminals on switch side.
2) Make sure that switch is "ON" (ohmmeter indicates "Zero" ohm) when atmospheric temperature is below 7°C (44" F) and "OFF" (ohmmeter. indicates infinity) when above 19.5°C (67" F).

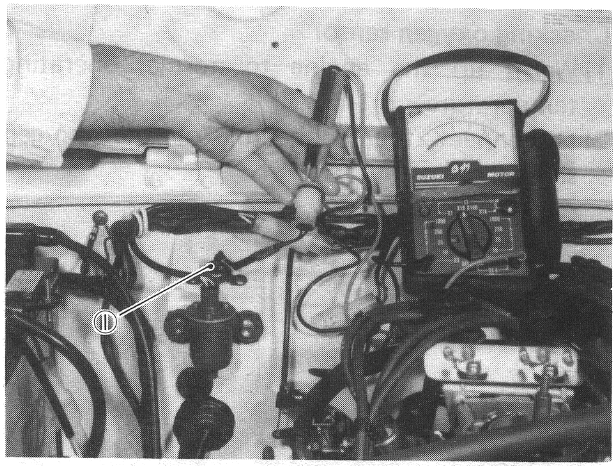


Fig. 5-3-32 Checking thermal engine room switch

Checking high altitude compensator
Check the compensator as follows:
1) Disconnect the coupler of compensator and connect an ohmmeter to the compensator.
2) Check to be sure that;
- If the altitude of the place where this check is performed is above 1,220 m (4,000 ft), the ohmmeter should indicate "Zero" ohm (compensator is ON).
- If the altitude is below 1,220 m (4,000 ft), the ohmmeter should indicate infinity ohm (compensator is OFF).

3) After checking, connect the coupler.

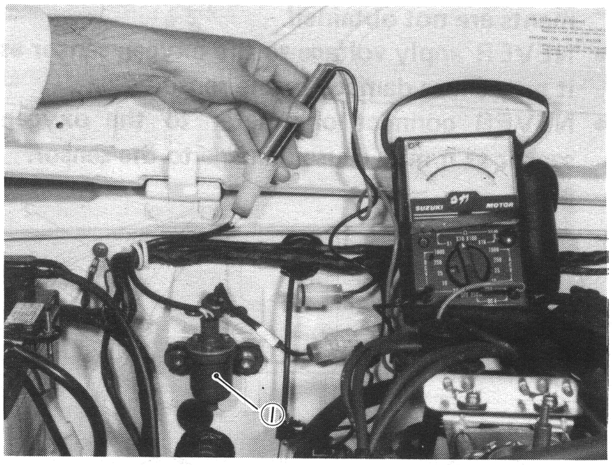


Fig. 5-3-33 Checking high altitude compensator

Checking oxygen sensor

1) Warm up the engine to normal operating temperature.
2) Disconnect the connector of the oxygen sensor.

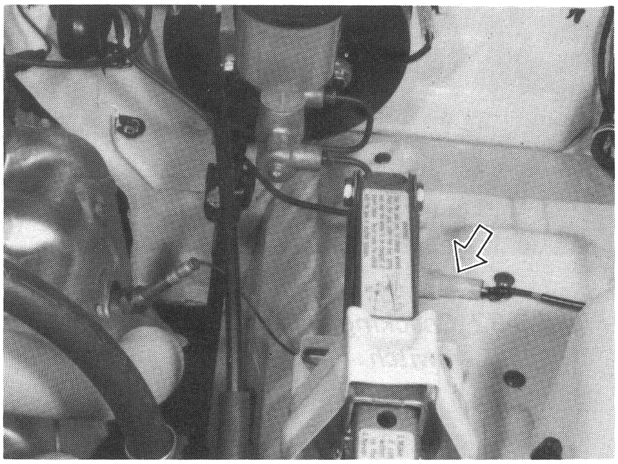
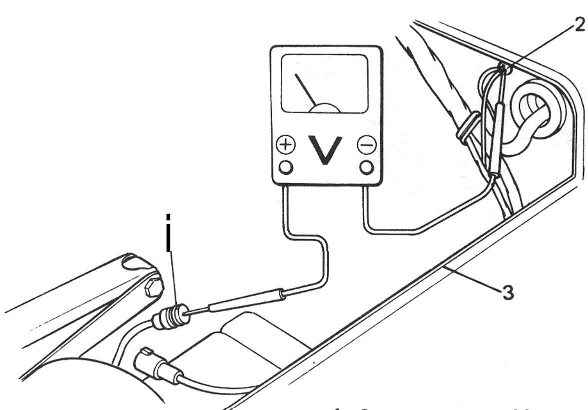


Fig. 5-3-34 Connector of oxygen sensor

3) Connect the voltmeter between the oxygen sensor side terminal of the disconnected connector and the ground as shown in below figure.

NOTE:

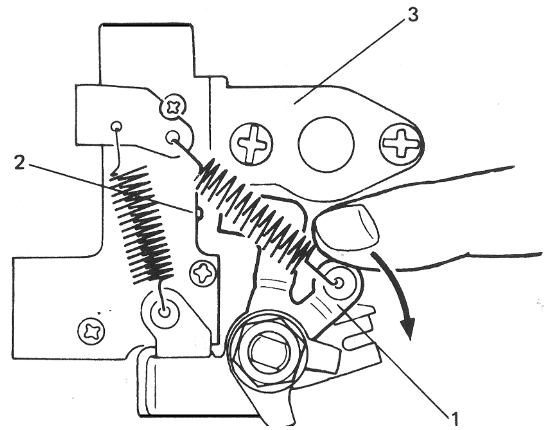
- Be sure to use a voltmeter whose inner resistance is more than some MΩ per IV or a digital type voltmeter. Any other voltmeter should not be used because accurate measurements are not obtained.
- NEVER apply voltage to the oxygen sensor as it may cause damage to the sensor.
- NEVER connect ohmmeter to the oxygen sensor as it may cause damage to the sensor.



1. Oxygen sensor side terminal
2. Ground
3. Left side fender

Fig. 5-3-35 Connecting voltmeter

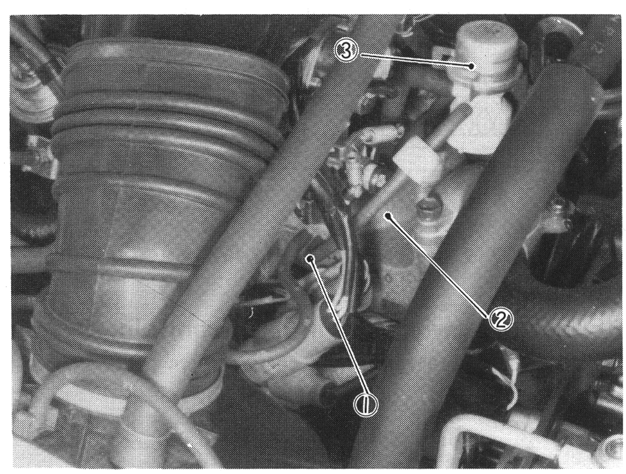
4) While keeping the engine running at 1,500 – 2,000 rpm, turn the wide open micro switch "OFF" by moving the lever with the finger as shown in below figure. Then take the reading of the voltmeter to make sure it is about 0.8V.



1. Lever
2. Wide open micro switch
3. Carburetor

Fig. 5-3-36 Moving lever

5) With the engine running at 1,000 – 1,500 rpm, disconnect the vacuum hose at the intake manifold as shown in below figure. At this time, check to ensure that the voltmeter indicator is below 0.2V.



1. Vacuum hose
2. Intake manifold
3. MCV

Fig. 5-3-37 Disconnecting vacuum hose

6) After checking, reconnect the vacuum hose to the intake manifold and the connector of oxygen sensor.

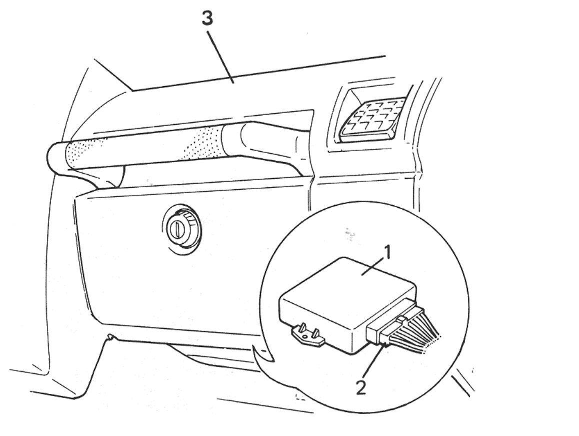
Checking feed back system circuits

When the feed back system does not seem to operate properly even after each of its components has been checked and proved normal, it is necessary to check each circuit of the feed back system. The checking procedure of each circuit is described here.

[Checking ECM ground circuits]

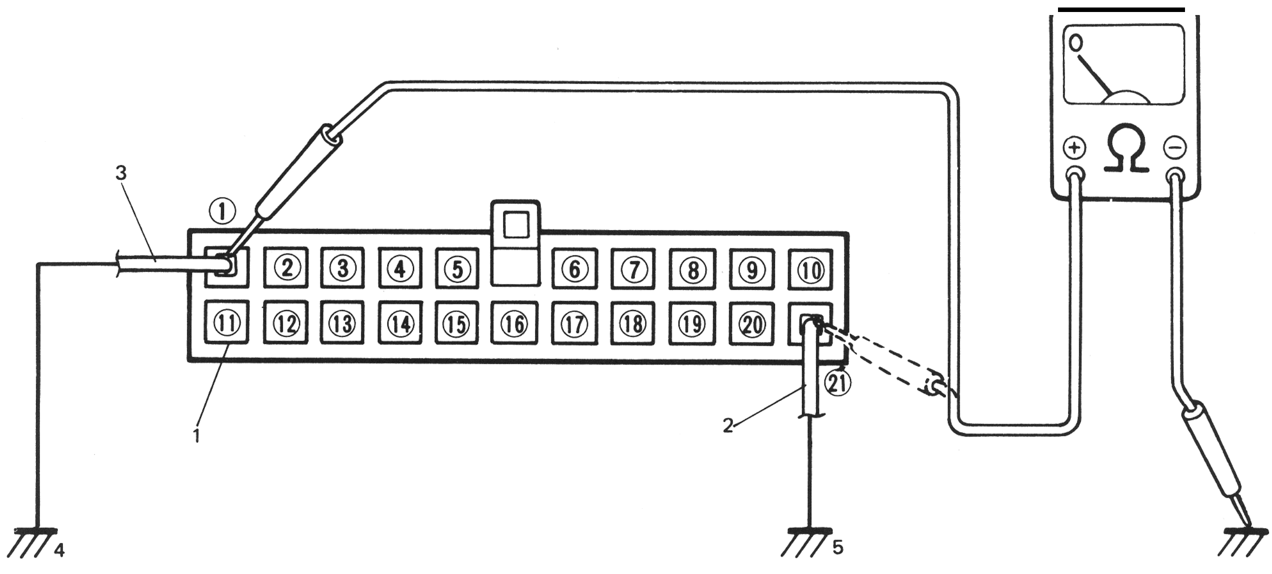
The ECM is grounded both at the dash panel and the intake manifold. If either grounding is not made securely, the feed back system will not operate. Therefore, check if the ECM is properly grounded at these two points according to the following procedure.

1) Turn OFF the ignition switch.
2) Disconnect the coupler from the ECM.
3) Connect an ohmmeter between the terminal ① of the disconnected coupler (on the wiring harness side) and the body (ground) as shown in below figure, and measure the resistance. Then repeat the same with the terminal ㉑ .



1. ECM (Electronic Control Module)
2. Coupler
3. Instrument main panel

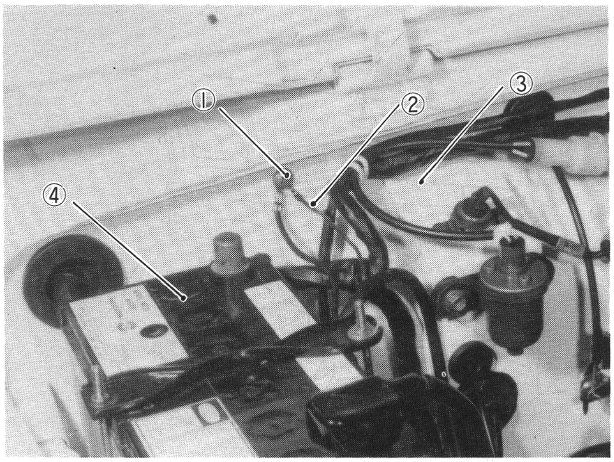
Fig. 5-3-38 ECM and coupler



1. Coupler (Viewed from wire harness side)
2. “B” (Black) leed wire
3. “B/G” (Black/Green) lead wire
4. Body ground
5. Engine ground

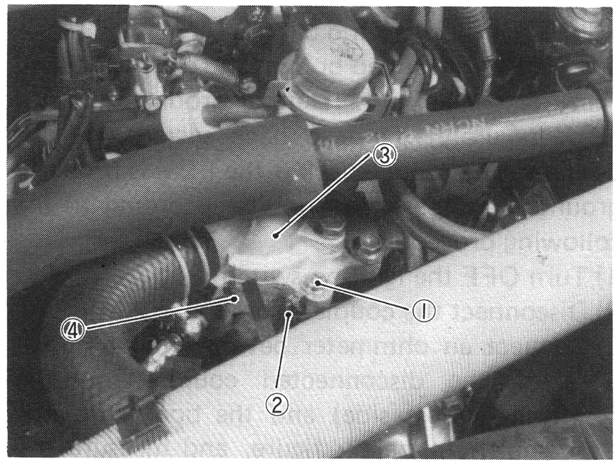
Fig. 5-3-39 Checking ECM ground circuit

4) If the measured resistance between each terminal (① and ㉑) and the body is "ZERO (0)" ohm, the ECM is grounded securely at two points. If the resistance is not "ZERO (0)" ohm, the possibility is that the lead wire between the terminal (① or ㉑) and the ground is not securely grounded or disconnected.
The below figures show the particular points where "B" and "B/G" wires are grounded. Check for their secure grounding by referring to these figures.



1. Body ground
2. Black/Green lead wire
3. Dash panel
4. Battery

Fig. 5-3-40 Body ground



1. Engine ground
2. Black lead wire
3. Thermostat cap
4. Intake manifold

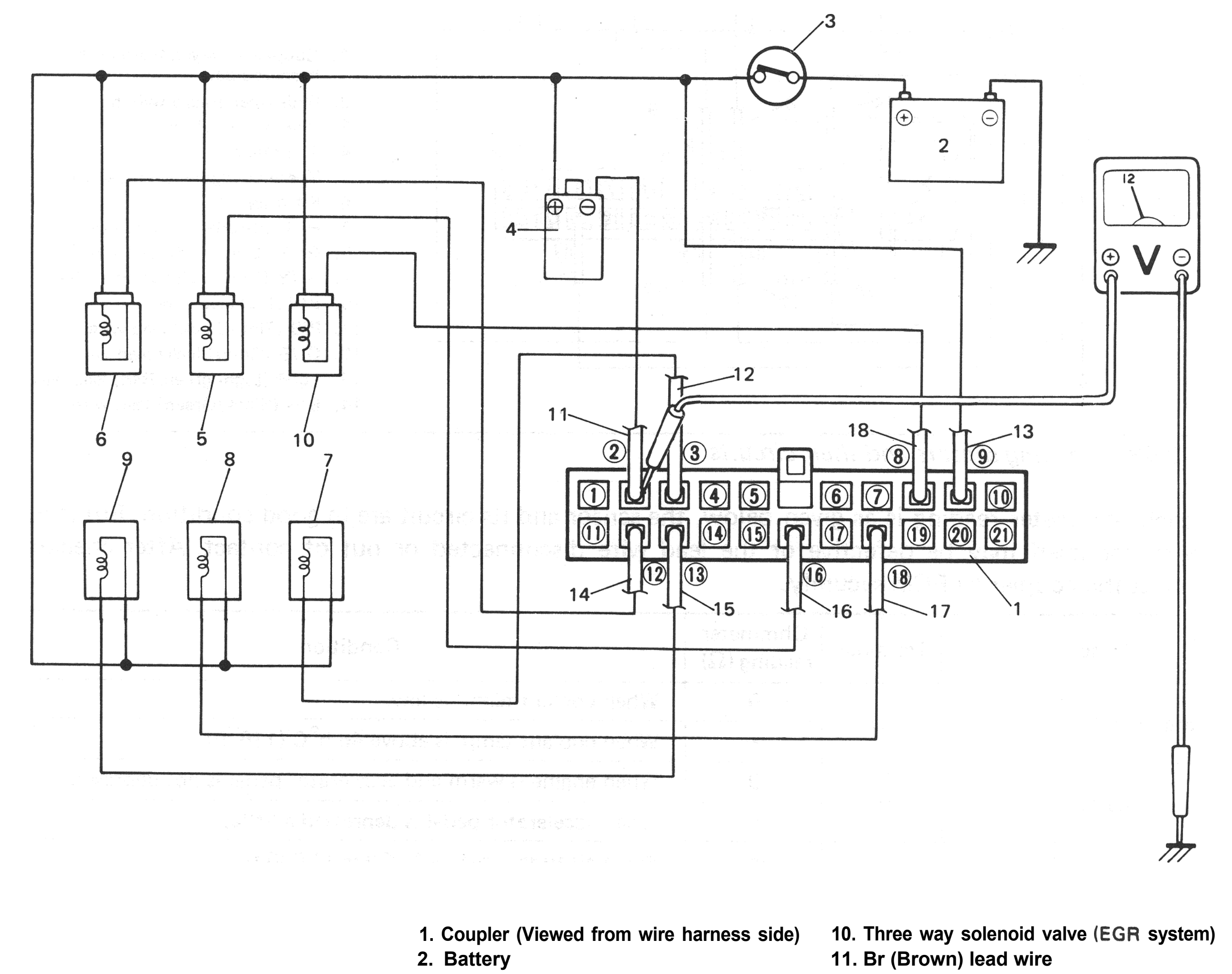
Fig. 5-3-41 Engine ground

5) After checking, connect the coupler to ECM securely.

[Checking ECM power circuits]

Connected to the ECM are the ignition coil and solenoids or solenoid valves. If a disconnection or a failure of contact occurs within a circuit (power circuit) including any of these coil or solenoids or solenoid valves, signals will not be sent to the ECM and as a result, the feed back system will not operate properly. Therefore, check the power circuits according to the following procedure.

1) Disconnect the coupler connected to the ECM.
2) Turn ON the ignition switch but be sure not to run the engine.
3) Connect a voltmeter between the terminal ② of the disconnected coupler (on the wiring harness side) and the body (ground) as shown in below figure and measure the voltage. And then repeat the same with each of the terminals ③, ⑧, ⑨, ⑫, ⑬, ⑯ and ⑱. If the measured voltage between each terminal and the body is about 12V, each circuit is in good condition.
4) If about 12V is not obtained in the above check, the particular circuit may be disconnected or out of contact. Check the circuit for such conditions.
5) After checking, connect the coupler to ECM securely.



1. Coupler (Viewed from wire harness side)
2. Battery
3. Ignition switch (ON)
4. Ignition coil
5. Vacuum switching valve (secondary throttle valve)
6. Three way solenoid valve (Idle-up)
7. Mixture control solenoid
8. Switch vent solenoid
9. Fuel cut solenoid valve
10. Three way solenoid valve (EGR system)
11. Br (Brown) lead wire
12. Bl/R (Blue/Red) lead wire
13. B/W (Black/White) lead wire
14. Br/W (Brown/White) lead wire
15. Bl/B (Blue/Black) lead wire
16. Bl/Y (Blue/Yellow) lead wire
17. Bl/W (Blue/White) lead wire
18. Bl/G (Blue/Green) lead wire

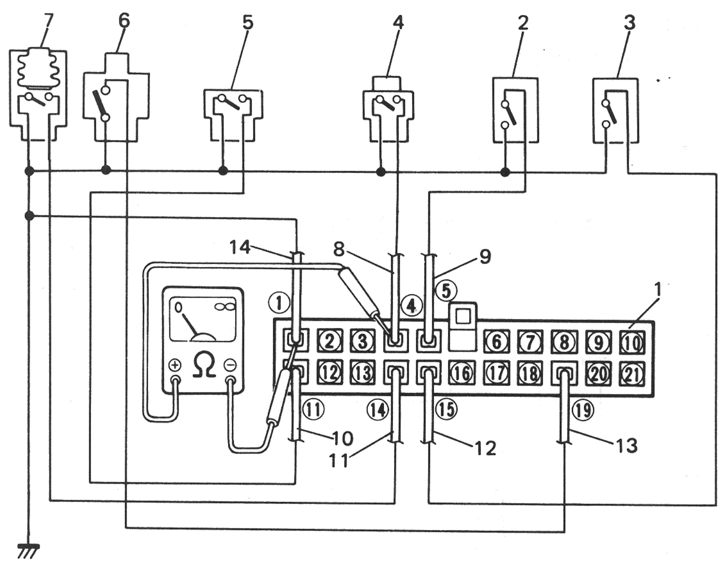
Fig. 5-3-42 Checking ECM power circuits

[Checking sensors and their lead wires]

The sensors constituting the feed back system are; wide open micro switch, idle micro switch, thermal switch, high altitude compensator, thermal engine room switch and fifth switch. If any of the above sensors malfunctions or if the sensor circuit has some trouble, signals are not sent to the ECM and consequently the feed back system will not function properly.

Therefore, check each sensor and its circuit according to the following procedure.

1) Turn OFF the ignition switch.
2) Disconnect the coupler from the ECM.
3) Connect the ohmmeter between the terminal ④ of the disconnected coupler and the terminal ① (ground) as shown in below figure and measure the resistance. And then repeat the same with each of the terminals ⑤, ⑪, ⑭, ⑮ and ⑲.



1. Coupler (Viewed from wire harness side)
2. Wide open micro switch
3. idle micro switch
4. Thermal switch
5. Thermal engine room switch
6. Fifth switch
7. High altitude compensator
8. Gr/R (Gray/Red) lead wire
9. Gr/Y (Gray/Yellow) lead wire
10. Bl (Blue) lead wire
11. P/B (Pink/Black) lead wire
12. Gr/B (Gray/Black) lead wire
13. Lg/R (Light green/Red) lead wire
14. B/G (Black/Green) lead wire

Fig. 5-3-43 Checking sensors and their circuits

4) If each ohmmeter reading is as given below, the sensor and its circuit are in good condition. But if not, the sensor itself may be defective or the lead wire disconnected or out of contact. After checking, connect the coupler to ECM securely.

Sensor	Terminal	Ohmmeter reading (Ω)	Condition
Thermal switch	④	0	When coolant temp. is low.
		∞	When coolant temp. is above 46.5°C (116°F).
Idle micro switch	⑮	0	When engine is warm and accelerator pedal is not depressed.
		∞	When accelerator pedal is depressed a little.
High altitude compensator	⑭	∞	When altitude is below 1,220 m (4,000 ft.).
		0	When altitude is above 1,220 m (4,000 ft.).
Thermal engine room switch	⑪	0	When temp. in engine room is low.
		∞	When temp. in engine room is above 19.5°C (67°F).
Wide open micro switch	⑤	0	When accelerator pedal is not depressed or depressed only a little.
		∞	When accelerator pedal is depressed all the way.
Fifth switch	⑲	∞	When gear shift lever is shifted to low, second, third, forth or reverse gear position.
		0	When gear shift lever is shifted to fifth gear position.

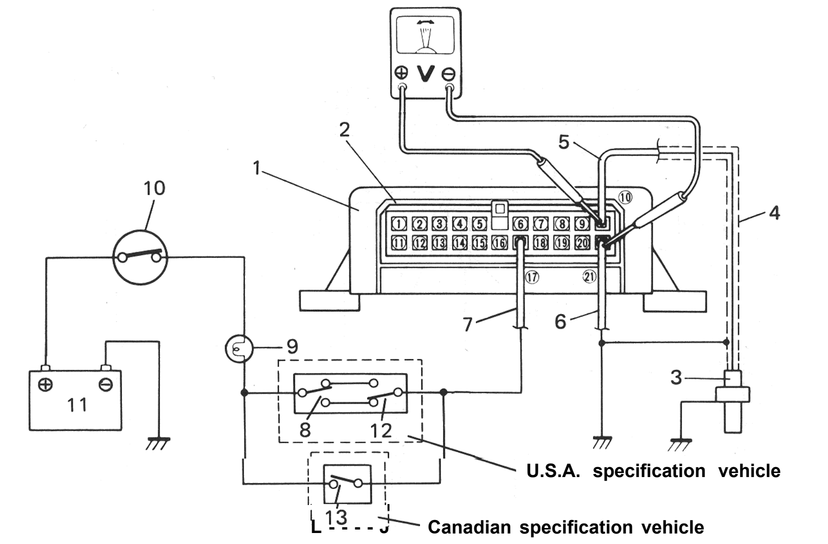
[Checking function of oxygen sensor and feed back system1

If oxygen sensor fails to send signal to the ECM, the feed back system does not operate. While the feed back system is at work, the ECM sends out the feed back signal, and in this condition, after warming up engine to normal operating temperature, when the cancel switch or check switch, is turned ON, the "CHECK ENGINE" light in the instrument cluster flashes. If the "CHECK ENGINE" light does not flash in such conditions as described above, check the feed back system for function according to the following procedure.

NOTE:

Except for Canadian specification vehicle, also when mileage sensor is turned ON (the odometer indicates 50,000, 80,000 or 100,000 miles), the "CHECK ENGINE" light flashes. If the "CHECK ENGINE" light does not flash in such condition, check the feed back system for function according to the following procedure.

1) Remove the ECM from the instrument main panel.
2) Connect the coupler to the ECM.
   (Don't disconnect the coupler from the ECM if connected)
3) **Warm up the engine to the normal operating temperature and keep it at idle.**
4) **Connect voltmeter between the terminals ⑩ (oxygen sensor signal) and ㉑ (ground) as shown in below figure.**
5) If the voltmeter indicator deflects between **OV** and 0.8V while racing the engine at a speed between **idling and 1,500 — 2,000 rpm, the feed back system is in good condition.**



NOTE:
Never connect ohmmeter as it may cause damage to the oxygen sensor.

1. ECM
2. Coupler (Connected to ECM)
3. Oxygen sensor
4. Sealed wire
5. W (White) lead wire
6. B (Black) lead wire
7. Br/B (Brown/Black) lead wire
8. Cancel switch
9. "CHECK ENGINE" light
10. Ignition switch (ON)
11. Battery
12. Mileage sensor
13. Check switch

Fig,. 5-3-44 Checking oxygen sensor signal

6) If the indicator does not deflect between **OV** and 0.8V, possible causes are as follows.

Voltmeter indicator:	Possible causes
Remains at "Zero (0)"V	● Oxygen sensor lead wire is disconnected or out of contact. ● intake system is leaky or air/fuel mixture is too lean due to malfunction of carburetor, ● Inner resistance of voltmeter is too small. ● Oxygen sensor is defective.
Indicates about 0.8V and does not deflect.	● Choke is operating because engine is not warmed up fully. ● Thermal switch is defective. ● Wide open micro switch is defective. ● Lead wire of mixture control solenoid is disconnected. ● Mixture control solenoid valve is defective.

7) After it isconfirmed through steps 1) to 5) that oxygen sensor sends signals to ECM properly, check feed back signal according to the following procedure. If feed back system operates properly, ECM should send out feed back signal.

a) Connect an ohmmeter between terminal ⑰ and body (ground). Be sure to connect positive (+) prod of the ohmmeter to body (ground) and negative (–) prod to terminal ⑰ as shown in below figure and never connect the other way around.

NOTE:
For this check, cancel switch must be OFF ("CHECK ENGINE" light off).

b) If indicator of ohmmeter deflects when connected as described in the above step, it means that ECM sends out feed back signal, that is, feed back system operates properly.

NOTE:
If indicator doesn't deflect at all, reverse connection (positive prod to terminal ⑰ and negative prod to body) and check.

In this state, turning ON cancel or check switch causes "CHECK ENGINE" light to flash. If "CHECK ENGINE" light does not flash, wire harness, bulb of light or cancel/check switch may be defective.

8) After checking, install ECM to instrument main panel, and make sure coupler is connected to ECM securely.

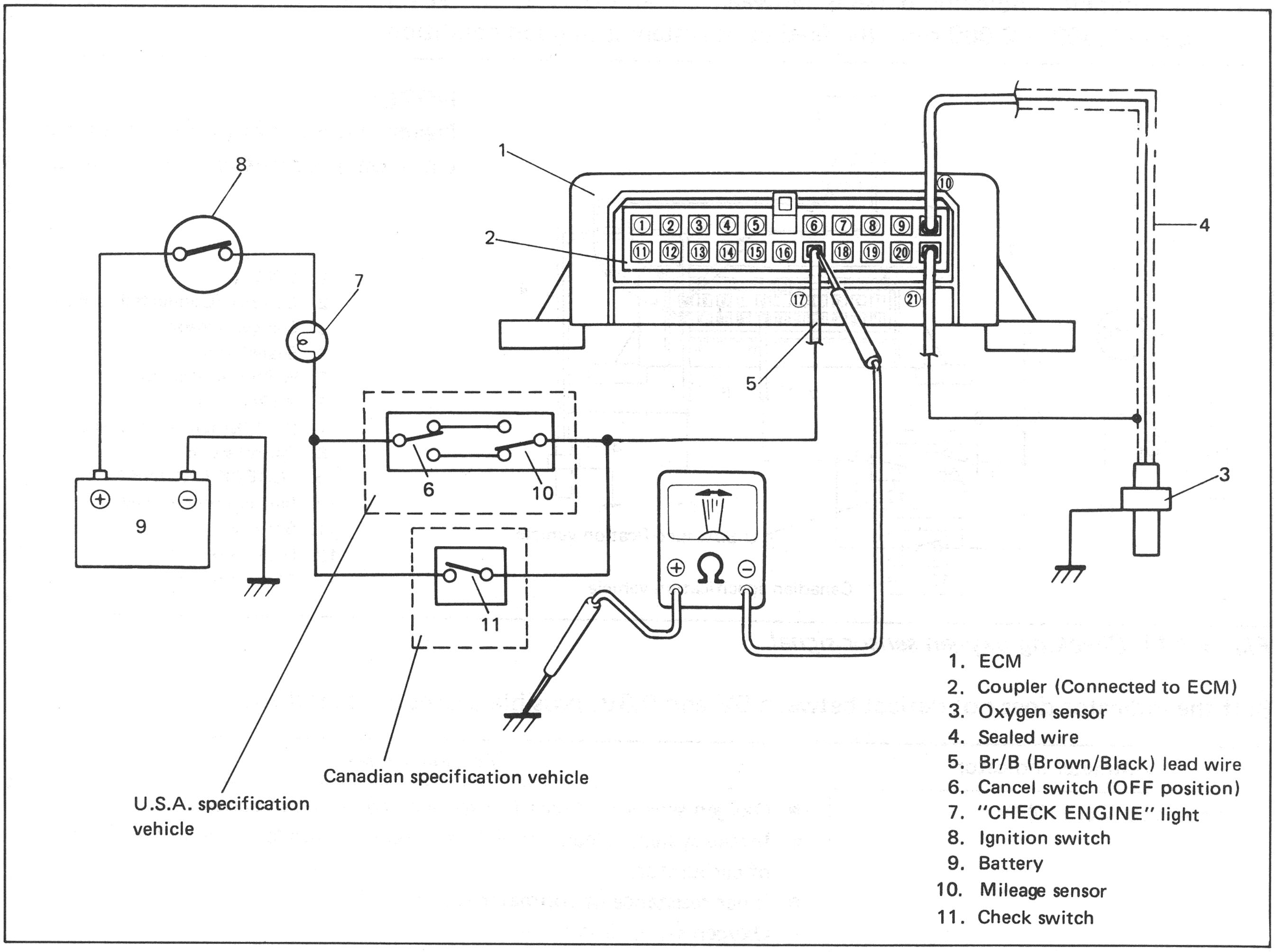


Fig. 5-3-45 Checking feed back signal

[Checking idle-up signal]

The idle-up system operates when any of the small lights (such as tail light, side marker light and license light), heater fan and rear defogger is put in operation. If the idle-up actuator fails to operate even when any of such equipments is put in operation, check if signal is sent to the ECM according to the following procedure.

1) Disconnect the coupler from the ECM.
2) Turn ON the ignition switch but don't run the engine.
3) Connect a voltmeter between the ⑦ terminal and the body (ground) as shown in below figure. If the voltmeter indicates 11 – 14V when each equipment is operated individually, it means that idle-up signal is sent to the ECM.
   If the voltmeter does not indicate 11 – 14V, the particular circuit is disconnected or in poor contact. Check the circuit for such conditions.
4) After checking, connect the coupler to ECM securely.

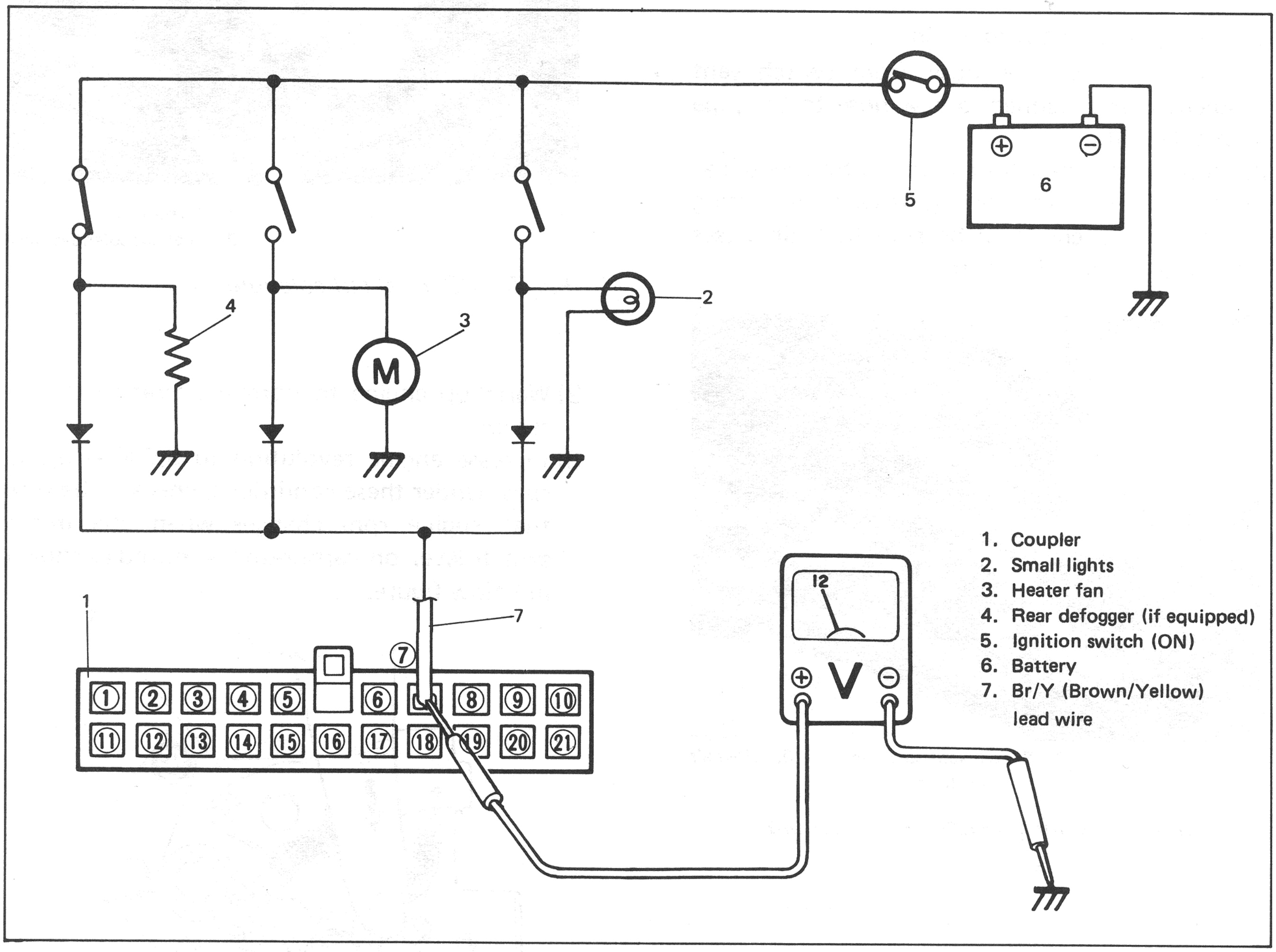


Fig. 5-3-46 Checking idle-up signal

[Replacing ECM]

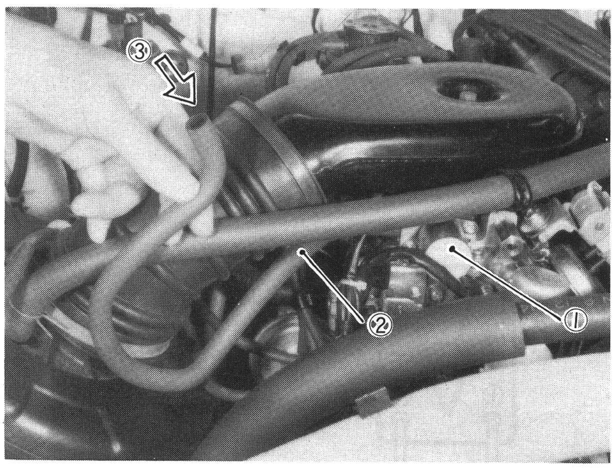
If a malcondition such as those listed below still occurs even after confirming proper function and condition of the sensors of the feed back system and their circuits through the above checks, a trouble may exist within the ECM. In such a cause, replace the ECM.

- Fuel consumption increases even in normal driving.
- Engine tends to stall.
- Engine is hard to start.

SWITCH VENT SOLENOID

Checking switch vent solenoid

1) Disconnect canister hose from switch vent solenoid and connect a new hose to the pipe of solenoid.
2) Blow air into new hose with ignition switch at both "OFF" and "ON" (but without starting engine) and check to be sure that air passes through solenoid in both cases.



1. Switch vent solenoid
2. Canister hose (new)
3. Blow air

Fig. 5-3-47 Checking switch vent solenoid

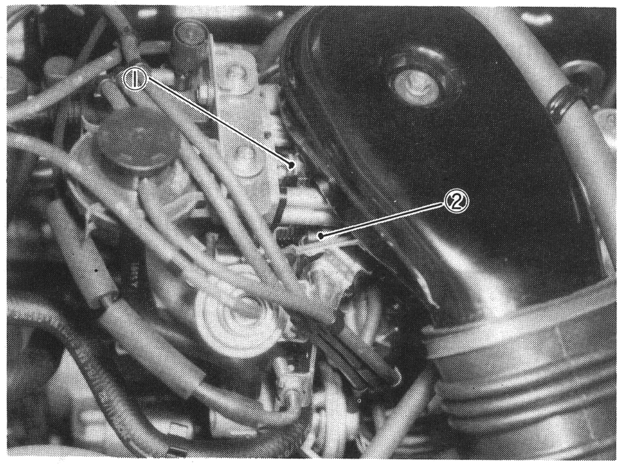
> **WARNING:**
> **Do not suck the hose. The fuel vapor in float chamber is harmful.**

3) Start engine and run it at idle speed. Then check to be sure that air does not pass through solenoid when blowing air into new hose.
4) Remove new hose and connect original hose to switch vent solenoid.

FUEL CUT SYSTEM

Checking fuel cut system

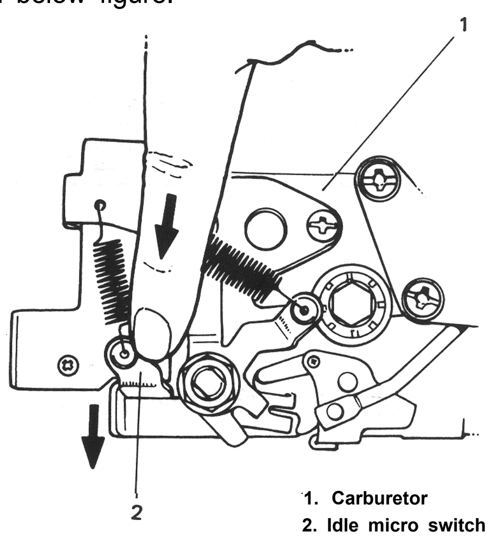
1) Make sure that fuel cut solenoid valve makes a clicking sound when ignition switch is turned to "ON" or "OFF" without cranking engine.



1. Carburetor
2. Fuel cut solenoid valve

Fig. 5-3-48 Fuel cut solenoid valve

2) Warm up engine to normal operating temperature.
3) Increase engine revolution to 3,000 – 3,500 rpm. Under these conditions, check to be sure that engine rpm changes when idle micro switch lever on carburetor is moved as shown in below figure.



1. Carburetor
2. Idle micro switch lever

Fig. 5-3-49 Idle micro switch lever

If found defective in above checks 1) and 3), check fuel cut solenoid circuit referring to item "checking feed back system circuits" in p. 5-29.

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

Checking EGR system

NOTE:
- **Before checking, confirm that altitude is not higher than 1,220 m (4,000 ft) (atmospheric pressure is below 680mmHg) and gear shift lever is at neutral position.**
- **When performing this check at higher than 1,220 m (4,000 ft) altitude, be sure to disconnect HAC coupler.**

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.**

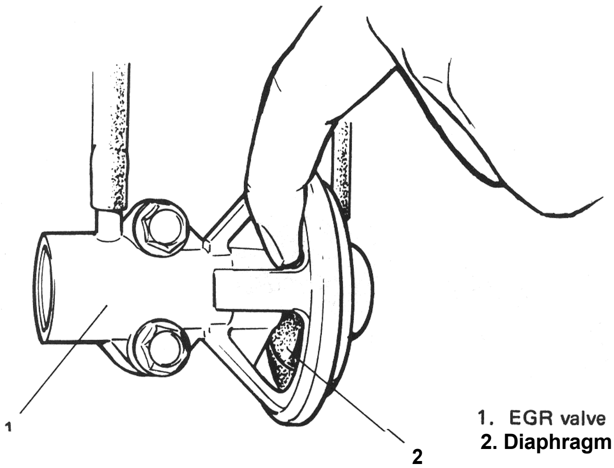


Fig. 5-3-50 Checking EGR valve diaphragm

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 below figure during acceleration and toward ② during deceleration.

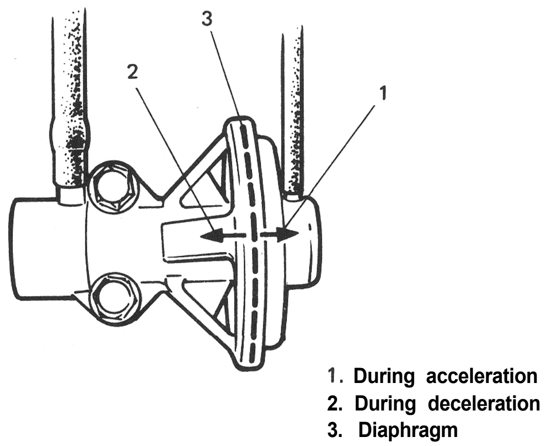


Fig. 5-3-51 Movement of EGR valve diaphragm

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

NOTE:
Refer to item "CHECKING SENSOR AND THEIR LEAD WIRES" in page 5-32 for checking HAC, fifth switch and their circuit.

[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.

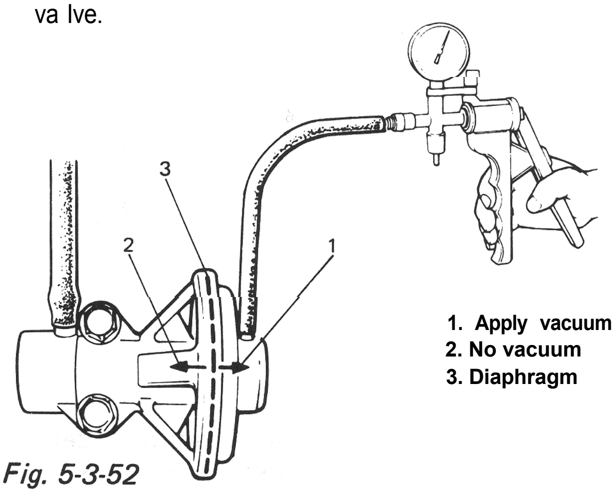


Fig. 5-3-52

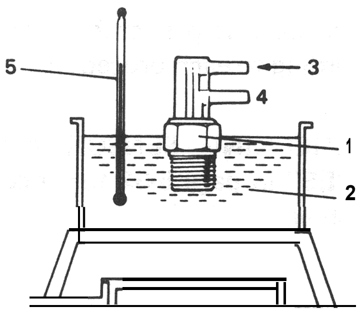
4) After checking, be sure to connect vacuum hose to TWSV.

[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).

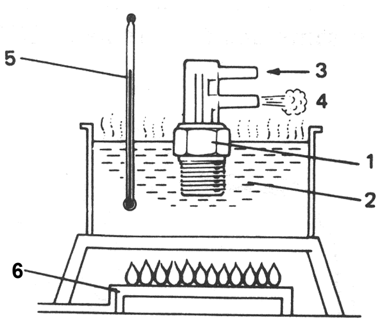
1) Drain cooling system when engine is cold.
2) Disconnect vacuum hoses and remove BVSV from intake manifold.
3) While keeping BVSV cool (below 53°C (127" F)), blow nozzle "3". Air should not come out of nozzle "4".



1. BVSV
2. Cool water
3. Blow air (nozzle)
4. "No air" (nozzle)
5. Thermometer

Fig. 5-3-53 Checking B VSV (1)

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



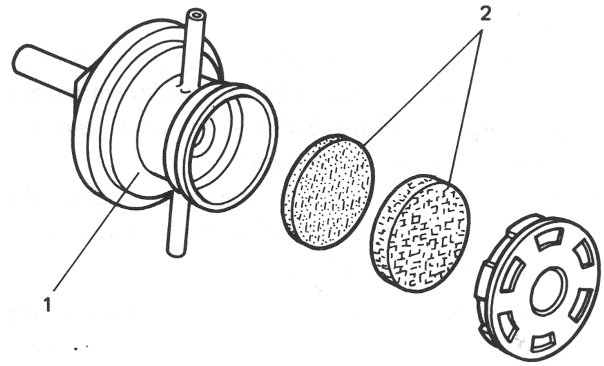
1. BVSV
2. Hot water
3. Blow air (nozzle)
4. Air (nozzle)
5. Thermometer
6. Heater

Fig. 5-3-54 Checking B VSV (2)

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

[EG R modu latorl

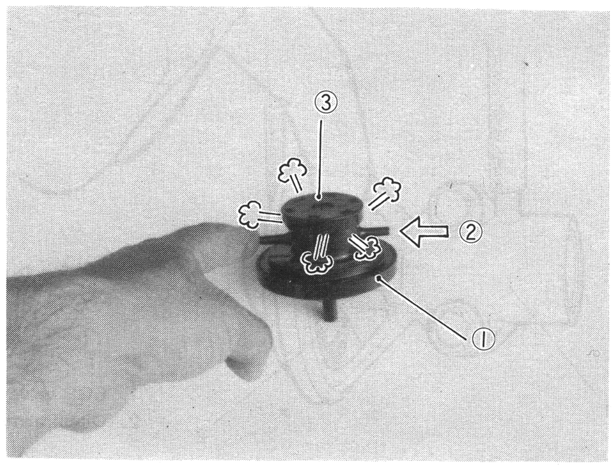
1) Check filter for contamination and damage. Using compressed air, clean filter.



1. EGR modulator
2. Filter

Fig. 5-3-55 Filter of EGR modulator

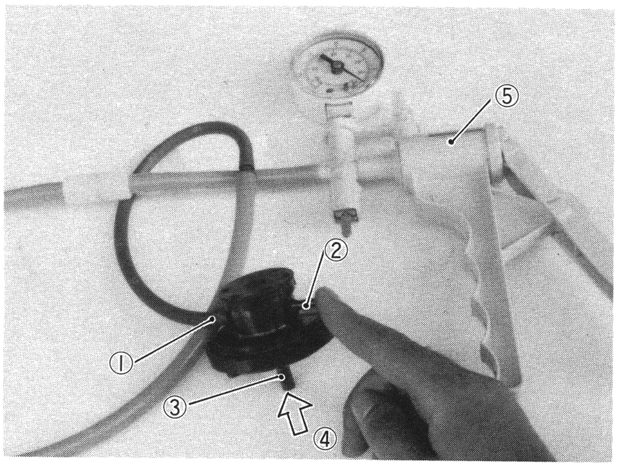
2) Remove EGR modulator and plug nozzle with your finger. Blow air into another nozzle and check that air passes through to air filter side freely.



1. EGR modulator
2. Blow air
3. Air filter

Fig. 5-3-56 Checking EGR modulator (1)

3)Connect vacuum pump gauge to nozzle ① and plug nozzle ② with your finger.
While blowing air into nozzle ③, operate vacuum pump gauge and check that vacuum is applied to modulator then.



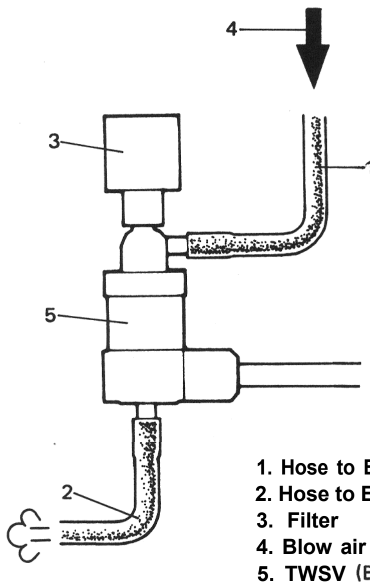
1. Nozzle
2. Nozzle
3. Nozzle
4. Blow air
5. Vacuum pump gauge

Fig. 5-3-57 Checking EG R modulator (2)

4) After checking, install modulator and connect hoses securely. Refer to Fig. 5-I-I for connecting.

[Three way solenoid valve (TWSV)]

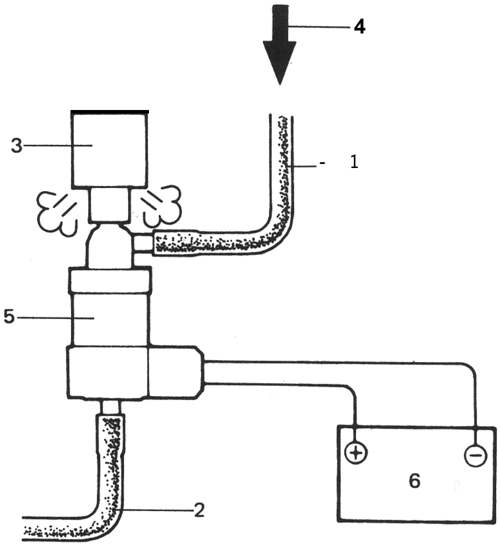
1) Disconnect 2 vacuum hoses from EGR modulator and EGR valve.
2) Blow hose ①. Air should come out of hose ② and not out of filter.



1. Hose to EGR valve
2. Hose to EGR modulator
3. Filter
4. Blow air
5. TWSV (Blue)

Fig. 5-3-58

3) Disconnect coupler and connect 12V-battery to TWSV terminals. In this state, blow hose ①. Air should come out of filter and not out of hose ②.



1. Hose to EGR valve
2. Hose to EGR modulator
3. Filter
4. Blow air
5. Twsv
6. Battery

Fig. 5-3-59

4)After checking, be sure to connect vacuum hoses and coupler.