EMISSION CONTROL SYSTEMS

CONTENTS

EMISSION CONTROL SYSTEMS

Vehicles equipped with a gasoline engine present three potential sources of air pollution: engine crankcase emissions, fuel system evaporative emissions and engine exhaust emissions.

Emission Control System Specifications

	Federal (not available in California)	California (can also be sold in Federal States)
Crankcase Emission Control System		
Type of system	Closed	Closed
Control valve	P.C.V. valve	P.C.V. valve
Evaporative Emission Control System		
Canister	Single	Single
Bowl vent valve	X	X
Carbon element	X	X
Purge control valve	X	X
Fuel filler cap	With relief valve	With relief valve
Vapor separator tank	Vapor-liquid	Vapor-liquid
Overfill limiter (Two-way valve)	X	X
Fuel check valve	X	X
Exhaust Emission Control System		
Jet valve	X	X
Catalytic converter (c/c)	Dual oxidation type	Dual three way type
Secondary air supply system	Dual reed valve	Single reed valve
Exhaust gas recirculation system		
EGR valve	Dual + sub	Single + sub
Thermo valve	Single three-way type with conventional carburetor	Single two-way type with feed back carburetor
Heated air intake system	X	–
Deceleration device		
Coasting air valve	X	X
Air switching valve	X	X
Throttle opener for air conditioner	X	X
Tamper-proof (mixture, choke)	X	X
High-altitude compensation device	X	X
Fuel control system	Conventional carburetor	Feed back carburetor

X:available
–:not available

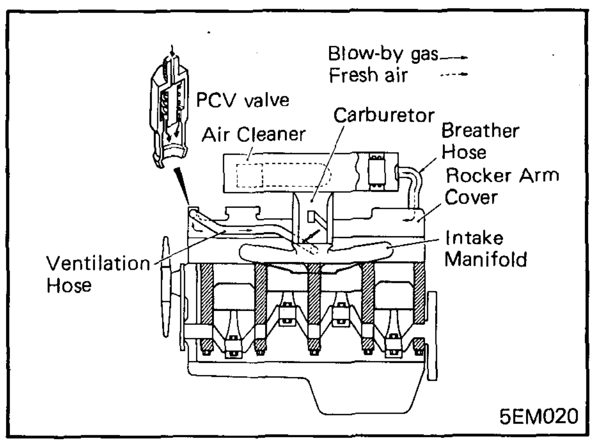
FUEL USAGE STATEMENT

Use gasoline having a minimum antiknock index (Octane value) of 87, or a gasoline classification number of
These designations are comparable to a Research Octane Number of 91.
All vehicles equipped with catalyst emission control systems have labels located on the instrument panel and on the back of fuel filler lid that state: "UNLEADED GASOLINE ONLY".
These vehicles also have fuel filler tubes especially designed to accept only the smaller-diameter unleaded gasoline dispensing nozzle only.

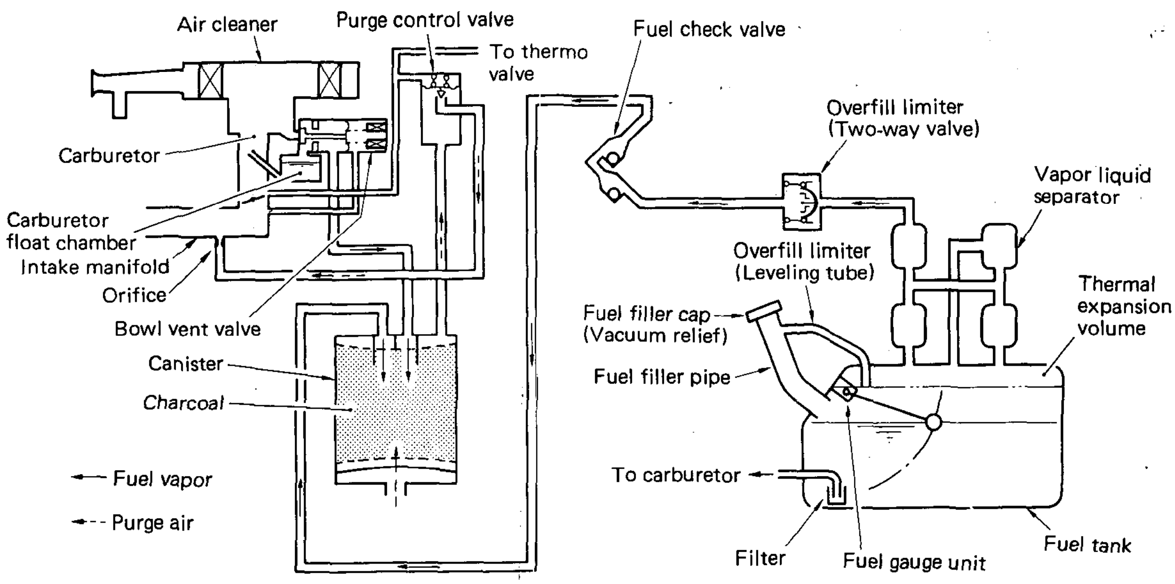
C51520

CRANKCASE EMISSION CONTROL SYSTEM

A closed-type crankcase ventilation system is utilized to prevent the blow-by gas from escaping into the atmosphere. This system has a positive crankcase vent valve (PCV valve) at the rocker arm cover.
This system supplies fresh air to the crankcase through the air cleaner. Inside the crankcase, the fresh air is mixed with blow-by gases, and this mixture passes through the PCV valve into the induction system.
The PCV valve has a metered orifice through which the mixture of fresh air and blow-by gases is drawn into the intake manifold in response to the intake manifold vacuum. The valve capacity is adequate for all normal driving conditions.
Under heavy acceleration or high-speed driving, there is less intake manifold vacuum available, and the blow-by gases exceed the PCV valve capacity. In this case, the blow-by gases back up into the air cleaner through the breather hose.



EVAPORATIVE EMISSION CONTROL SYSTEM



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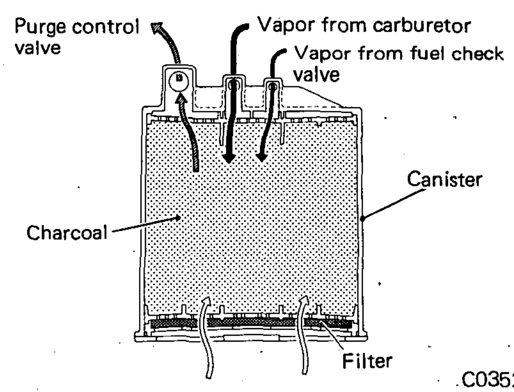
In order to prevent the loss of fuel vapor from the fuel system to the atmosphere, the evaporative emission-control system consists of a charcoal canister, a bowl vent valve, a purge-control vavle, and so on.

Canister

While the engine is inoperative, fuel vapors generated inside the fuel tank and the carburetor float chamber are absorbed and stored in the canister. When the engine is running, the fuel vapors absorbed in the canister are drawn into the intake manifold through the purge-control valve and an orifice. And the carburetor bowl vapors flow into the carburetor through the bowl vent valve.



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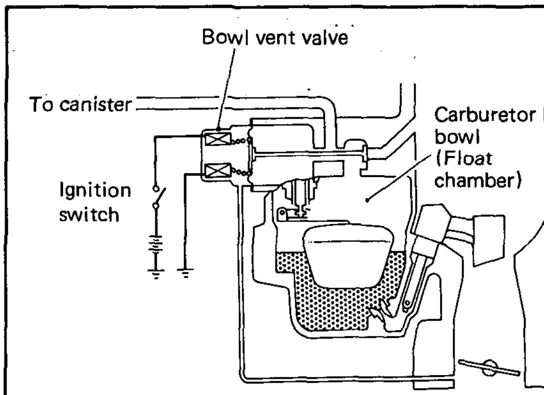
Bowl Vent Valve

The bowl vent valve, which controls the carburetor bowl vapors, is opened when the intake manifold vacuum working on the diaphragm of the valve exceeds the pre-set value after the ignition key is turned on, and is kept being opened by the solenoid valve, even though the intake manifold vacuum becomes the atmospheric pressure during engine operation, once the ignition key has been turned on. When the engine is off, the valve is closed.



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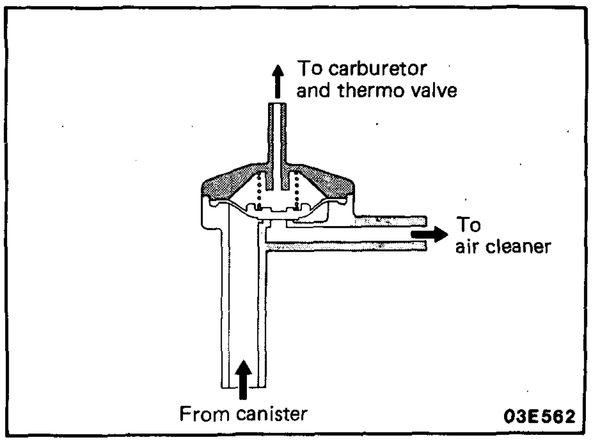
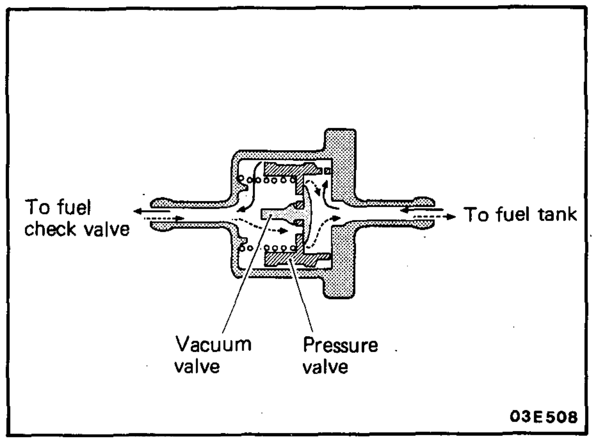
Purge Control Valve

The purge-control valve is kept closed during idling in order to prevent vaporized fuel from entering into the intake manifold for positive control of high idle-CO emissions, which is a particular problem under high ambient temperatures. When the carburetor vacuum working on the diaphragm of the valve exceeds the pre-set value, the purge-control valve is opened.



Overfill Limiter (Two-way Valve)

The overfill limiter consists of a pressure valve and a vacuum valve. The pressure valve is designed to open when the fuel tank internal pressure has increased over the normal pressure and the vacuum valve opens when a vacuum has been produced in the tank.

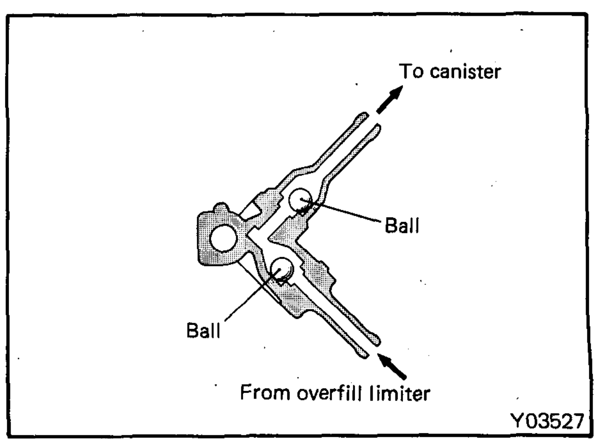


Thermo Valve

A thermo valve incorporated in this system (for sensing the coolant temperature at the intake manifold) closes the purge-control valve when the coolant temperature is lower than a pre-set value, in order to reduce CO and HC emissions under engine warm-up conditions, and opens the purge-control valve when the coolant temperature become above the pre-set temperature.
The thermo valve is deemed to be an acceptable AECD, according to the criteria defined in section.

Fuel Check Valve

The fuel check valve is used to prevent fuel leaks should the vehicle roll over. This valve is connected in the fuel vapor line (between canister and overfill limiter) and is mounted on the back of the filler hose protector.
The fuel check valve contains two balls as shown in the illustration. Under normal conditions, the gasoline vapor passage in the valve is opened, but if roll-over occurs, one of the balls closes the fuel passage, thus preventing fuel leaks.

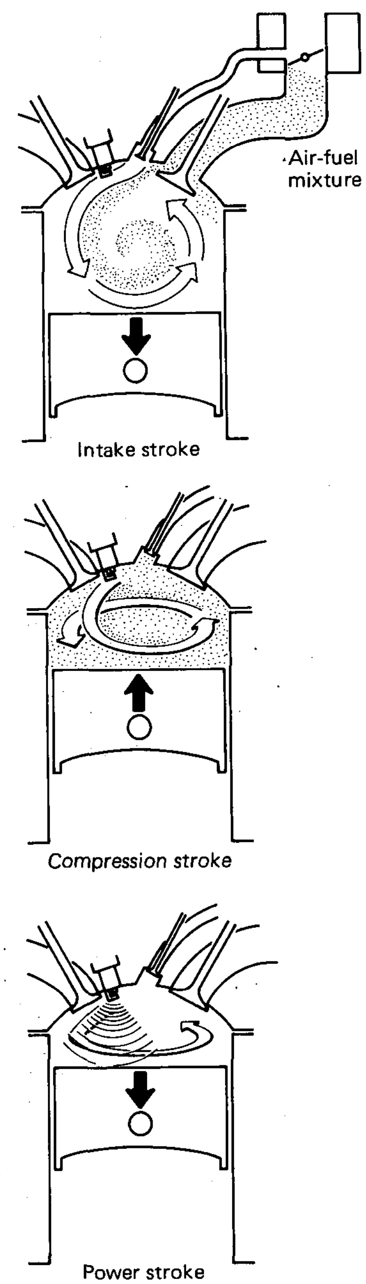


EXHAUST EMISSION CONTROL SYSTEM

Exhaust emissions (carbon monoxide, hydrocarbons and nitrogen oxides) are controlled by a combination of engine modifications and the addition of special control components. These components have been integrated into a highly effective system which controls exhaust emissions while maintaining good performance.

Jet Air System

The combustion chamber is the same cross-flow type hemispherical combustion chamber as the conventional one. In addition to the intake valve and exhaust valve, a jet valve has been provided for drawing jet air (super-lean mixture or just air) into the combustion chamber. The jet valve assembly consists of the jet valve, jet body and spring, and is screwed into the jet piece which is press-fitted into the cylinder head with the jet opening toward the spark plug.
A jet air passage is provided in the carburetor, intake manifold and cylinder head. Air flows through the two intake openings provided near the primary throttle valve of the carburetor, goes through the passage in the intake manifold and cylinder head, and flows through the jet valve and the jet opening into the combustion chamber.
The jet valve is actuated by the same cam as the intake valve and by a common rocker arm so that the jet valve and intake valve open and close simultaneously.
On the intake stroke, the air-fuel mixture flows through the intake valve port into the combustion chamber. At the same time, jet air is forced into the combusion chamber because of the pressure difference produced between the two ends of the jet air passage (between the jet air intake openings in the carburetor throttle bore and the jet opening of the jet piece) as the piston moves downward.
When the throttle valve opening is small during idling or light load, a large pressure difference is produced as the piston moves downward, causing jet air to flow into the combustion chamber rapidly. The jet air flowing out of the jet opening scavenges the residual gases around the spark plug and creates a good ignition condition. It also produces a strong swirl in the combustion chamber which continues throughout the compression stroke and improves flame propagation after ignition, assuring high combustion efficiency.
When the throttle valve opening is increased, more air-fuel mixture is drawn in from the intake valve port so that the pressure difference is reduced and less jet air forced in.
The jet air swirl dwindles with increase of the throttle valve opening, but the intensified inflow of normal intake air-fuel mixture can satisfactorily promote combustion.



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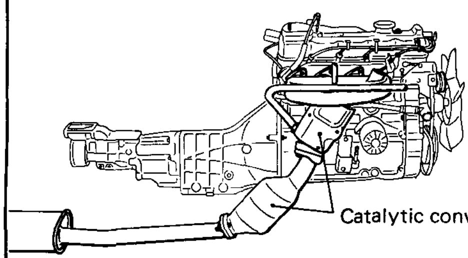
Catalytic Converter

The catalytic converter requires the use of unleaded gasoline only.
Leaded gasoline will destroy the effectiveness of the catalyst as an emissions-control device.
Under normal operating conditions the catalytic converter will not require maintenance. However, it is important to keep the engine properly tuned. If the engine is not kept properly tuned, engine misfiring may cause overheating of the catalyst. This may cause heat damage to the converter or vehicle components. This situation can also occur during diagnostic testing if any spark plug cables are disconnected and the engine is allowed to idle for a prolonged period of time.



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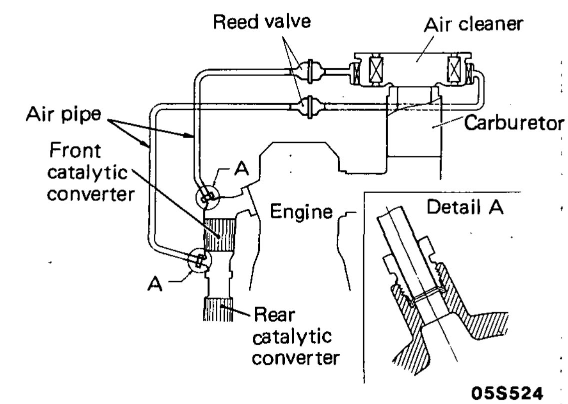
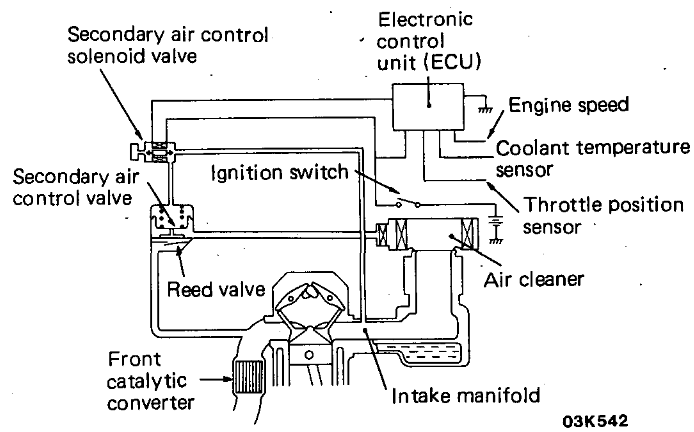
Caution

1. **Operation of any type, including idling, should be avoided if engine misfiring occurs. Under this condition, the exhaust system will operate at abnormally high temperature, which may cause damage to the catalyst or underbody parts of the vehicle.**
2. **Alteration or deterioration of ignition or fuel system or any type of operating condition which results in engine misfiring must be corrected to avoid overheating the catalytic converter.**
3. **Proper maintenance and engine tune-ups according to manufacturer's specifications should be made to correct any improper operating conditions as soon as possible. Interrupting the ignition at high speeds with the transmission in gear will result in a catalyst overheat condition.**

Secondary Air Supply System

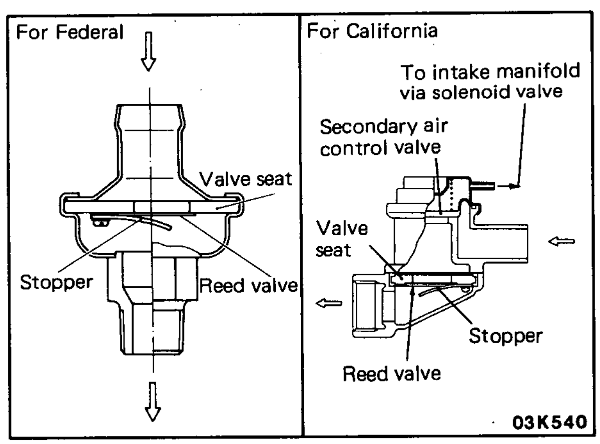
The air injection system consists of a reed valve with a secondary air control valve, and a solenoid valve.





REED VALVE

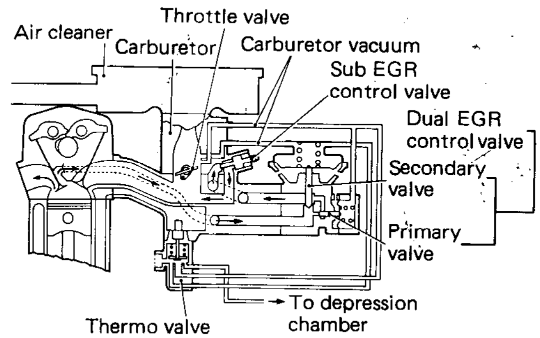
The reed valve supplies secondary air into the front catalytic converter for the purpose of promoting oxidation of exhaust emissions during the engine warm-up operation and the vehicle deceleration.
The reed valve is actuated by exhaust vacuum being generated from pulsation in the exhaust manifold, and extra air is supplied into the exhaust manifold through the secondary air control valve.
The secondary air control valve is opened by the intake manifold pressure when the solenoid valve is energized by the ECU based on the information on coolant temperature, engine speed, and idle position.



Exhaust Gas Recirculation (EGR) System

An Exhaust Gas Recirculation (EGR) system is utilized to reduce nitrogen oxides in the exhaust. In this system, the exhaust gas is partially recirculated from a cylinder head exhaust port into a port located at the intake manifold below the carburetor. The EGR flow is controlled by the EGR control valve and the thermo valve.

For Federal
—Manual transmission



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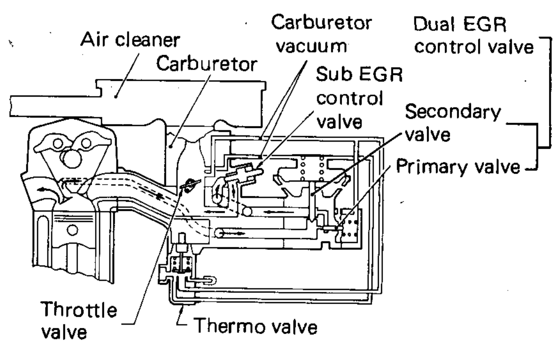
For Federal
—Automatic transmission



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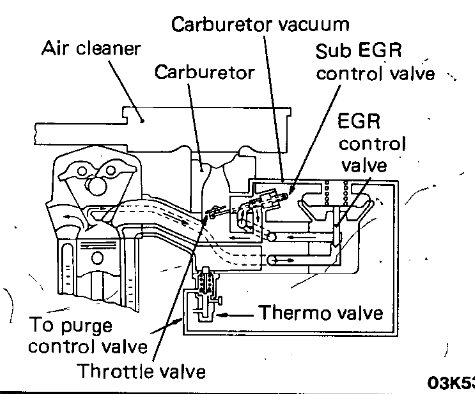
For California



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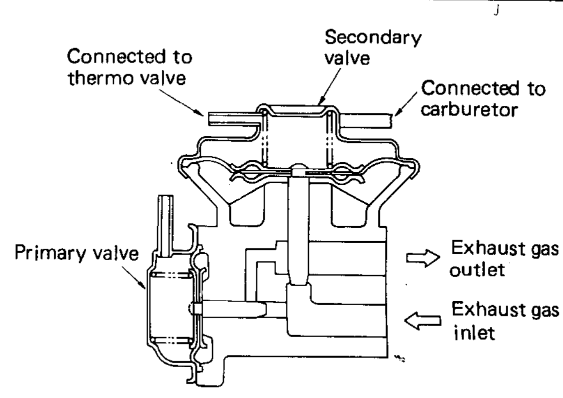
DUAL EGR CONTROL VALVE

The dual EGR control valve consists of primary and secondary valves which are controlled by different carburetor vacuums in response to the throttle valve openings, while the EGR flow is suspended at idle and WOT operation. The primary valve controls EGR flow for vehicle operation with relatively narrow throttle valve openings, while the secondary control valve allows the recirculation of exhaust gas into the intake mixture when the throttle valve is further opened. The vacuum applied on the dual EGR control valve is controlled by a thermo valve as described in next section.



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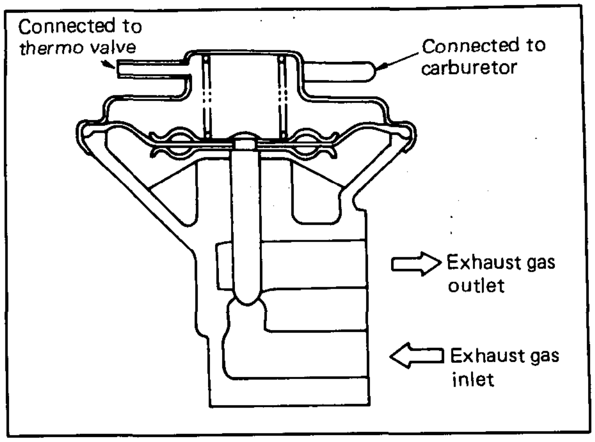
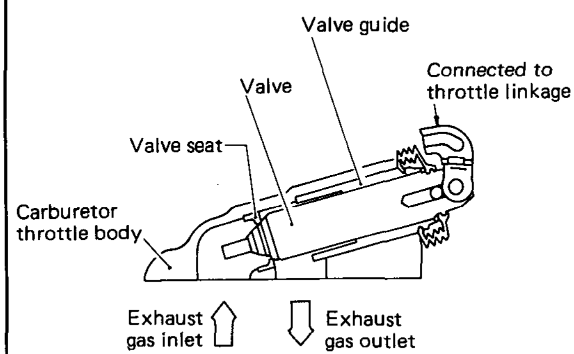
EGR CONTROL VALVE

The EGR control valve, which is a conventional type, is controlled by carburetor vacuum in response to the throttle valve opening, while the EGR flow is suspended at idle and WOT operations.
The vacuum to be applied on the EGR control valve is controlled by a thermo valve as described in next section.



SUB EGR CONTROL VALVE

The sub EGR control valve is directly opened and closed with the motion of the throttle valve through a linkage in response to the throttle valve opening in order to closely modulate the EGR flow which is controlled by the EGR control valve.

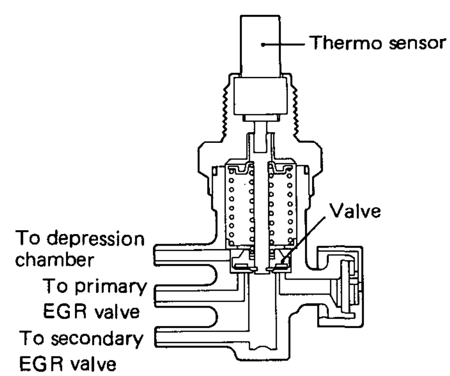


E03556

THERMO VALVE

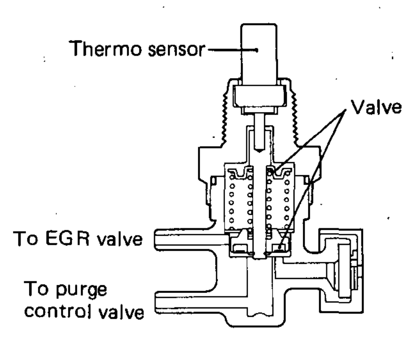
A thermo valve incorporated in the EGR system for sensing the coolant temperature at the intake manifold closes the EGR control valve when the coolant temperature is lower than a pre-set value. This prevents deterioration of vehicle driveability and startability during initial starting and opens the EGR control valve when the coolant temperature exceeds the pre-set temperature. Once the engine is stopped and the coolant temperature again becomes lower than the pre-set value, the thermo valve once again closes the EGR control valve.

For Federal



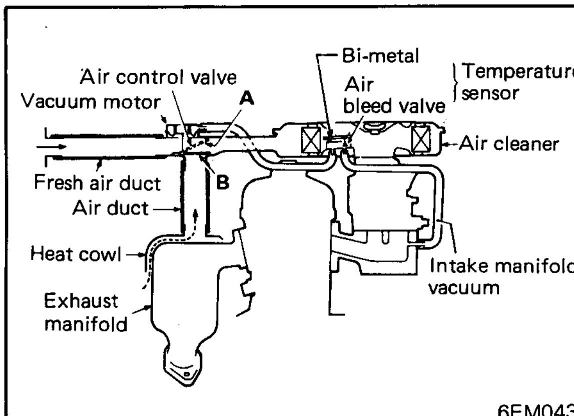
6EM062

For California



6EM063

Heated Air Intake System (Conventional Carburetor only)



All vehicles are equipped with a temperature regulated air cleaner so that the carburetor can be calibrated leaner to reduce CO and HC emissions, and so that improved engine warm-up characteristics and minimized carburetor icing can be attained. The air cleaner is provided with an air control valve, inside the snorkel, to modulate the temperature of carburetor intake air. The air control valve is controlled by a vacuum motor and temperature sensor combination system which responds to the intake manifold vacuum and temperature inside the air cleaner. When the bi-metal senses a temperature inside air cleaner of below about 29°C (84°F), the air bleed valve of the temperature sensor assembly remains closed. The intake manifold vacuum is then applied to the diaphragm of the vacuum motor, which in turn opens air control valve (A) so as to let the pre-heated intake air flow through the heat cowl and air duct into the air cleaner.

When the bi-metal senses a temperature inside air cleaner of above about 45°C (113°F), the air bleed valve is fully opened. As a result, the intake air to the carburetor comes directly through the fresh air duct since the air control valve is positioned at (B), regardless of the intake manifold vacuum.

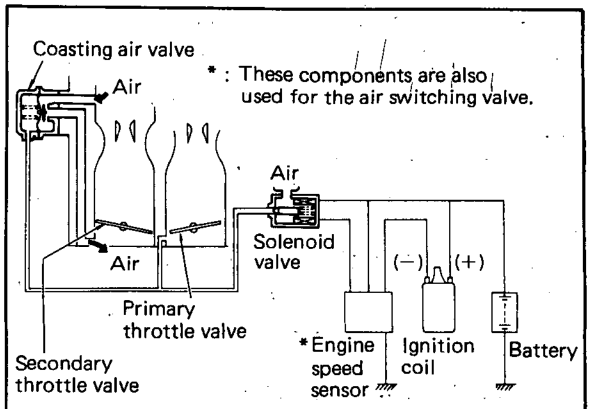
At intermediate temperatures the air entering the carburetor is a blend of fresh air and pre-heated air as regulated by the thermostatically actuated air control valve.

Deceleration Devices

These deceleration devices are used to decrease HC emissions during vehicle deceleration. They include the coasting air valve (CAV) system, the air switching valve (ASV) system and the dashpot. The CAV, ASV, and dashpot are all installed on the carburetor.

COASTING AIR VALVE (CAV) SYSTEM

In order to decrease HC emissions emitted during vehicle deceleration, the coasting air valve (CAV), which is activated by carburetor ported vacuum, supplies additional air into the intake manifold. The activation of the CAV is suspended by the opening of the solenoid valve when the engine speed sensor detects engine speeds at or below the specified value in order to maintain smooth vehicle operation in transient phase to help prevent engine stalling. The solenoid valve and the engine speed sensor are also used for the air switching valve system.



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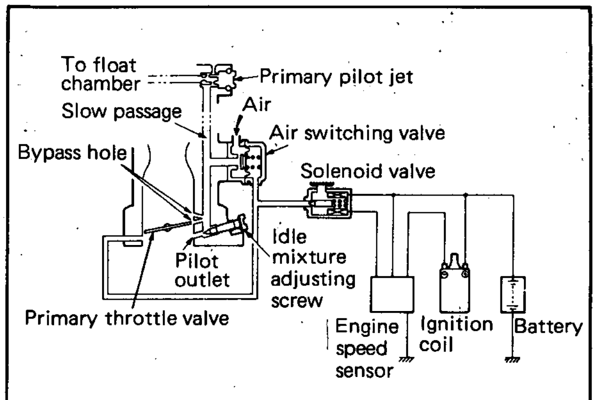
AIR SWITCHING VALVE (ASV) SYSTEM

In order to improve fuel economy as well as reduce HC emissions during vehicle deceleration, the air switching valve, which is activated by carburetor ported vacuum, cuts off the fuel flow to the bypass holes and pilot outlet by supplying additional air into the slow passage. The activation of the air switching valve is suspended by opening the solenoid valve when the engine speed sensor detects engine speeds at or below the specified value in order to maintain smooth vehicle operation in transient phase to help prevent engine stalling.



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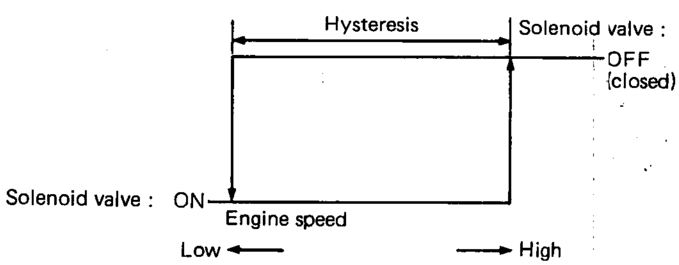
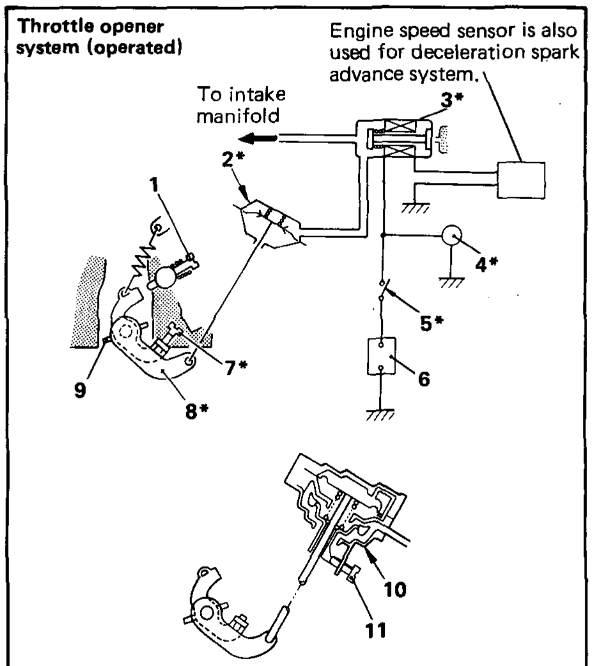


Throttle Opener System (for air conditioner only)

This system consists of a throttle opener assembly, a solenoid valve, an engine speed sensor and the air conditioner compressor switch. When the compressor switch is turned on and when the engine speed sensor detects engine speeds at or below the specified value, the solenoid valve is opened so as to transfer the intake manifold vacuum to the throttle opener, the throttle valve is slightly opened by the throttle opener via the throttle opener lever which moves on the throttle valve shaft. Consequently the engine runs at a speed determined by the new throttle valve opening to offset the compressor load. When the compressor switch is turned off, the throttle opener system stops working.
The engine speed sensor used in the deceleration spark advance system is also used in this throttle opener system. When the sensor detects engine speeds at or below the specified value, the deceleration spark advance system does not operate and when the engine speed is above the specified value, the deceleration spark advance system functions as designed. Therefore, the engine speed sensor does not cause this throttle opener system violate the regulations of the Clean Air Act.



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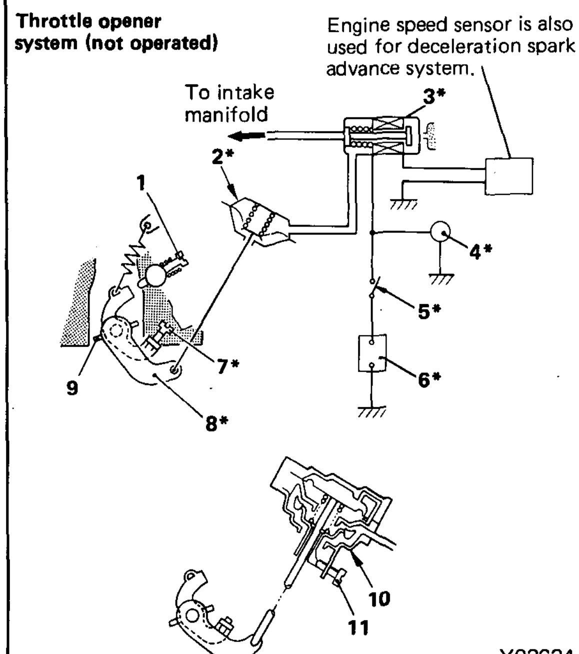

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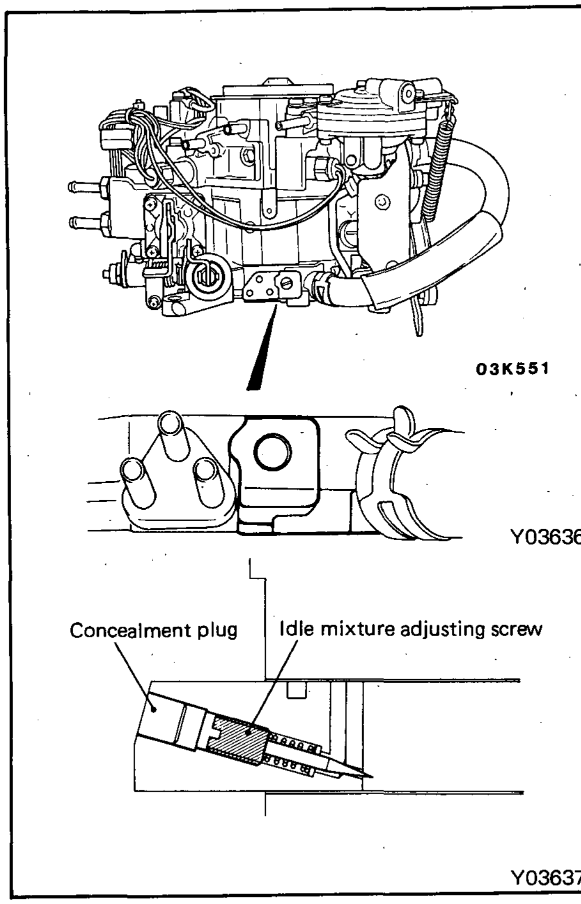
* : Parts with the asterisks are included in the air-conditioning unit.

1. Idle speed adjusting screw
2. Throttle opener for vehicles with automatic transmission
3. Solenoid valve
4. Compressor
5. Compressor switch
6. Battery
7. Throttle opener setting screw
8. Throttle opener lever
9. Throttle valve
10. Throttle opener for vehicles with manual transmission for California
11. Throttle opener setting screw

Tamper-proof

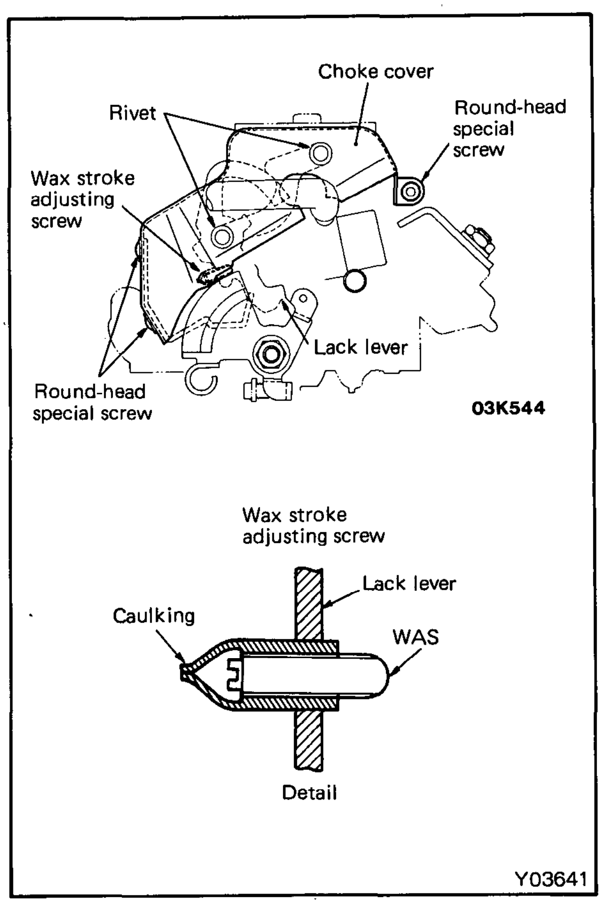
TAMPER-RESISTANT FOR IDLE MIXTURE ADJUSTMENT

All carburetors have tamper-resistant idle mixture adjustment. The CO setting has been adjusted at the factory. Neither removal of the plug nor tampering with the mixture screw is required in service except during a major carburetor overhaul or throttle body replacement, or when high-idle CO adjustments are required by state or local regulations.



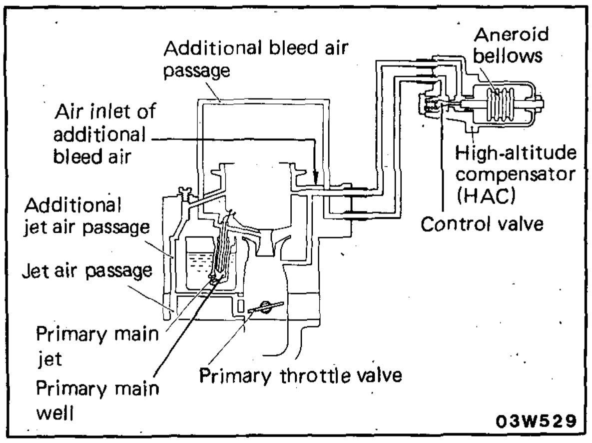
TAMPER-PROOF AUTOMATIC CHOKE

All carburetors also have tamper-proof choke. The choke-related parts are factory adjusted. Neither removal of the choke cover, nor tampering with W.A.S., (wax-stroke adjusting screw) is required in service except during a major carburetor overhaul, or when adjustment of choke-calibration-related parts is required by state or local regulations.



High Altitude Compensation System
–For Federal (not available in California)

In order to comply with the Federal high altitude requirements, the Federal vehicles are equipped with high altitude compensation system, which consists of dual catalytic converters, two reed valves, a high altitude compensator (HAC), and passages for additional bleed air and additional jet air.



HAC

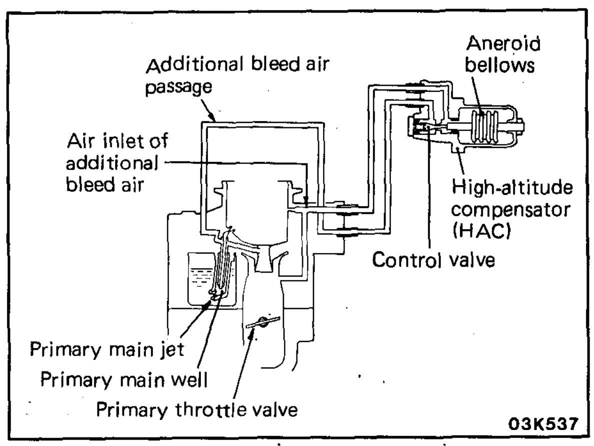
With the aid of those high altitude compensation systems, the air/fuel ratios at high altitude are maintained to approximately the same degree as at sea level.

ADDITIONAL JET AIR

In order to further compensate the air/fuel ratio for engine idling and light load operation, additional air is supplied into the jet air passage for the Jet Valve System.

High Altitude Compensation System
–For California (can also be sold in Federal States)

In order to meet the requirements at all altitudes, all the feedback carburetor vehicles for california are equipped with high altitude compensation system in addition to feedback carburetor system. High altitude compensation system consists of a high altitude compensator (HAC), and passages for additional bleed air.



HAC

The air/fuel ratios at high altitude are maintained by the HAC to approximately the same degree as at sea level, by supplying additional bleed air into the primary main well through a control valve controlled by an aneroid bellows of the HAC.
Then the air/fuel ratios are controlled precisely by feedback carburetor with high altitude compensation system to comply with the applicable emissions standards at all altitudes.

FUEL CONTROL SYSTEM (FBC SYSTEM)

Feedback carburetor system provides the capability to perform closed loop fuel control. It also provides the capability to control the secondary air system, the deceleration spark control system and throttle opener system.
The basic functions of this system are depicted below. Input signals from a variety of sensors are fed to a microprocessor based Electronic Control Unit (ECU). The ECU then generates output signals for all of the controlled functions.
This feedback carburetor is a 2-barrel, downdraft carburetor designed for Closed Loop System.
When used with the Closed Loop System of mixture control, this carburetor includes special design features for optimum air/fuel mixtures during all ranges of engine operation.
Fuel metering is accomplished through the use of three solenoid- operated on/off valves (jet mixture, enrichment and deceleration solenoids) adding or reducing fuel to the engine. The activation of the on/off valve is controlled by the length of time current supplied to the solenoid. The solenoid operates at a fixed frequency. By varying the amount of time the solenoid is energized during each cycle (defined as duty cycle) the air/fuel mixture delivered to the engine can be precisely controlled. The duty cycle to the solenoid is controlled by the electronic control unit (ECU) in response to signals from the exhaust oxygen sensor, throttle position sensor and so on.
Incorporated in the feedback carburetor are 8 basic systems of operation: fuel inlet, primary metering, secondary metering, accelerating pump, choke, jet mixture, enrichment and fuel cut-off. The former 5 systems are substantially the same as the conventional carburetor.
The latter 3 systems, which are unique to this feedback carburetor, are described as follows.

1. **Sensor**

(1) **Exhaust oxygen sensor**

The oxygen sensor is mounted in the exhaust manifold. The output signal from this sensor, which varies with oxygen content of the exhaust gas stream, is provided to the ECU for use in controlling closed loop compensation of fuel delivery.

(2) **Coolant temperature sensor**

The coolant temperature sensor is installed in the intake manifold. This sensor provides data to the ECU for use in controlling fuel delivery, secondary air management.

(3) **Engine speed sensor**

The engine speed signal comes from the ignition coil. Electric signals are sent to the ECU where the time between these pulses is used to calculate engine speed, which is used in controlling fuel delivery, secondary air management, deceleration spark and throttle opener managements.

(4) **Throttle position sensor (TPS)**

This is a potentiometer mounted to the carburetor. The TPS provides throttle angle information to the ECU to be used in controlling the fuel delivery and secondary air management.

(5) **Vacuum switch**

This switch is installed on the toe board or the fender and is turned "ON" when the throttle valve is at the closed (idling) position. Information from this switch is provided to the ECU for use in controlling fuel delivery and secondary air management.

(6) **Intake air temperature sensor**

The intake air temperature sensor is installed in the air cleaner. This sensor measures the temperature of the intake air in the air cleaner and provides this information to the ECU for use in controlling fuel delivery.

2. **Electronic Control Unit (ECU)**

The Electronic Control Unit is mounted in the passenger compartment and consists of a printed circuit board mounted in a protective metal box.
It receives analog inputs from the sensors and converts them into digital signals. These digital signals and various discrete inputs are processed and used by the ECU in controlling the fuel delivery, secondary air, deceleration spark and throttle opener managements.

3. **Electronically Controlled System**

(1) **Feed back Carburetor A/F Control**

The feedback carburetor A/F is controlled by the ECU. The ECU monitors the throttle position, engine speed, coolant temperature, intake air temperature and exhaust oxygen concentration to calculate the fuel flow required to yield the desired A/F ratios for all operating conditions.
Closed loop control is used to adjust the fuel flow to yield a near stoichiometric A/F ratio when required. The fuel flow is modified to account for special operating conditions such as cold/hot starts, acceleration and deceleration.

(2) Adaptive Memory Control

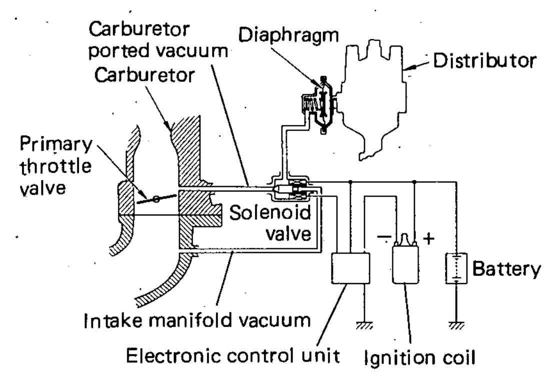
During the closed loop operation, the ECU controls, the duty cycle of the jet mixture control solenoid valve based on the output voltage signal from the exhaust oxygen sensor.
The mean values of the duty cycle are stored in a RAM (Random Access Memory) and the last ones are stored even if the ignition switch is turned off.

(3) Secondary Air Control

A solenoid is used to control the air control valve signal vacuum. The solenoid is controlled by the ECU based on engine speed, idle position and coolant temperature. This valve sends air to the exhaust manifold.

(4) Deceleration Spark Control

In order to decrease HC emissions emitted during vehicle deceleration, ignition timing is advanced by the solenoid-operated vacuum valve on the distributor, changing the vacuum supplied to the valve from the carburetor ported vacuum to intake manifold vacuum.
The solenoid valve is controlled by the ECU based on engine speed.



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(5) Throttle Opener Control

When the air conditioner switch is "ON", or the accessory switch such as instrument panel light and power steering switch is "ON" (in families where applicable), the engine idle speed is increased by changing the throttle valve opening. In order to decrease HC emissions emitted during vehicle deceleration and to improve engine-brake performance, ECU deenergizes the solenoid valve which supplies the manifold vacuum to the throttle opener at or above the preset engine speed and then the throttle opener operation is suspended.

(6) Air Conditoner Control

In order to get good vehicle performance the ECU renders inoperative the air conditioner at or above pre-set throttle opening.

Jet Mixture System

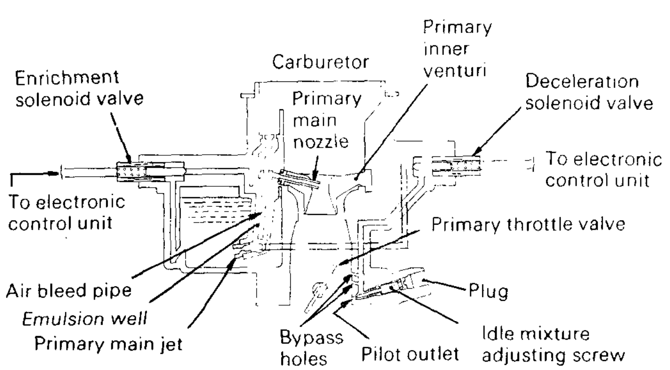
The jet mixture system supplies fuel to the engine through jet mixture passages and jet valves for optimum air/fuel mixtures. This system is calibrated by jet mixture solenoid which is responding to an electrical impulse from the electronic control unit (ECU).
If the exhaust oxygen sensor detects a lean condition, the ECU energizes the solenoid at increasing duty cycles to enrich the mixture. If the exhaust sensor detects a rich condition, the solenoid receives a signal from the ECU at decreasing duty cycle to lean out the mixture. Thus, the solenoid is *constantly* responding to an electrical signal from the ECU to provide efficient control of air/fuel mixtures.

Enrichment System

Enrichment system consists of metering jet and an enrichment solenoid-operated on/off valve which provides additional fuel for main metering system. The activation of the on/off valve is controlled by the length of time current supplied to the solenoid.
When additional fuel is required such as heavy acceleration, heavy engine loads, cold start or warm-up operation, the ECU energizes the solenoid at the pre-set duty cycles.

Fuel Cut-Off system

When the ignition key is turned off, the deceleration solenoid valve cuts off the fuel flow to prevent engine "run-on" (dieseling).
During certain deceleration, the deceleration solenoid valve reduces the fuel flow in order to decrease HC emissions and improve fuel economy.
Under normal engine operation, the needle valve is drawn by the solenoid to provide the necessary fuel flow for smooth engine operation.



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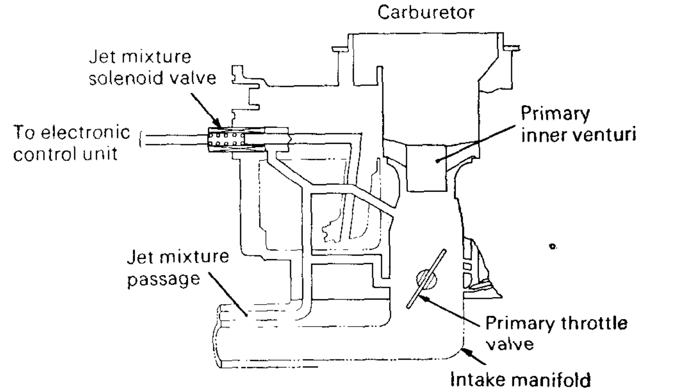


03K538

CANISTER

Removal

1. Disconnect all hoses and detach all clamps.
2. Unhook the canister band tightening clamp.

Installation

When installing the canister, observe the following items:
(1) Securely tighten each clamp.
(2) Confirm correct hose routing to ensure proper engine performance.
(3) Check surface of hoses for cracks and replace if defective.

Inspection and Maintenance

1. Clogging or damage of the fuel vapor vent line will cause discharge of fuel vapor into the atmosphere and destroy the effectiveness of the system. Disconnect both ends of the line and inspect it by blowing air through it.
2. If the canister is used over a long period, the interior filter will become clogged, which decreases the quantity of purge air and lowers the capacity of the canister. Replace it with a new one at the specified period. Also, because rubber and vinyl hoses will deteriorate with normal use, replace them with new ones when replacing the canister.

PURGE CONTROL VALVE

Inspection

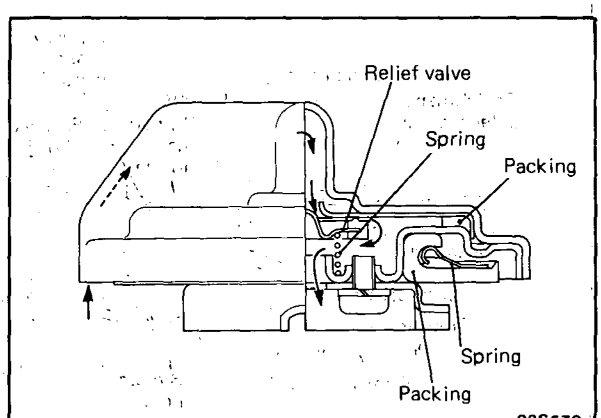
1. Make sure that the cooling water is at temperatures between 80 and 90°C (176 and 194°F).
2. Disconnect the purge hose from the air cleaner and blow into the purge hose. If the valve is not open, its operation is normal. Then, start the engine and increase the engine speed to 1,500 to 2,000 rpm and blow into the purge hose. If the valve is open, it is normal. If the valve is not open, check for clogged or broken vacuum hose, or malfunctioning thermo valve.

FUEL FILLER CAP

1. Fuel filler cap is equipped with relief valve to prevent the escape of fuel vapor into the atmosphere. (03S579)
2. If the pressure in the tank drops below the specified negative pressure, the valve will open to adjust the pressure.

Negative-pressure Valve Performance

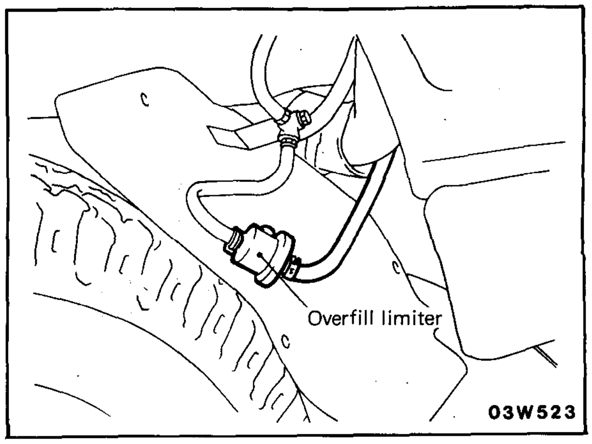
Valve opening pressure	−4.413 ± 1.275 kPa (−.640 ± .185 psi)
Open valve flow (at −33.1 mmHg)	1 liter/min. minimum (1.06 U.S.qt./min. minimum), (.88 Imp.qt./min. minimum)



OVERFILL LIMITER (Two-way Valve)

Removal

1. Remove the filler hose protector. (Refer to GROUP 14.)
2. Disconnect the vapor hoses from the overfill limiter, and then remove the overfill limiter mounting bolts. (03W523)



03W523

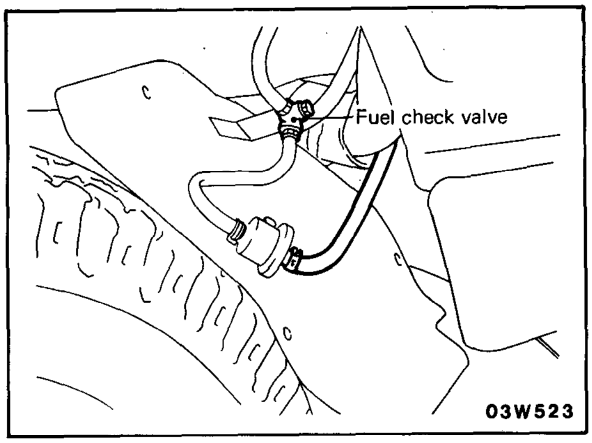
Inspection

Check the overfill limiter body for cracks, leaks, malfunctions; replace it if defective. Inspection of overfill limiter requires a measuring instrument. A simple way of inspection, however, is to remove it and lightly blow air into either the intake or outlet ports. If the air passes after a slight resistance, the overfill limiter is in good condition.

FUEL CHECK VALVE

Removal

1. Remove the filler hose protector. (Refer to GROUP 14.)
2. Remove the fuel check valve mounting bolt. (03W523)
3. Remove the hose attaching clamps and disconnect the hoses from the check valve.



03W523

Installation

When installing the fuel check valve, observe the following items:

1. Securely tighten each hose clamp.
2. Replace hoses if they have cracks.
3. Securely tighten the valve mounting bolt.

EXHAUST EMISSION CONTROL SYSTEM

CATALYTIC CONVERTER

Removal

Caution

Before removing or inspecting the exhaust system, ensure that the exhaust system is cool enough.

1. Remove the air cleaner.
2. Remove the air duct and heat cowl.
3. Disconnect the front exhaust pipe at exhaust manifold and secondary air supply pipe.
4. Remove stud nuts attaching the exhaust manifold to the cylinder head. Slide manifold off studs and away from cylinder head.
5. Remove bolts tightening the exhaust manifold to the catalyst case assembly.

Installation

To replace the interior parts of front catalytic converter: Place a new cushion on the catalyst. Be sure the cushion is not deformed. Place a new stainless steel gasket on the catalyst case. Be sure the gasket fits the inside diameter of the cushion.

1. Combine the exhaust manifold and the catalyst case assembly and evenly tighten the bolts to the specified torque.

Tightening torque	
Exhaust manifold-to-catalyst case tightening bolts	30 to 34 Nm (22 to 25 ft.lbs.)

2. After installing the exhaust manifold gasket to the cylinder head, install the exhaust manifold assembly and tighten the nuts to the specified torque. If the gasket is to be reused, check both sides of the gasket for damage. The gasket may be reused if there are no signs of damage.

Tightening torque	
Exhaust manifold assembly mounting nuts	15 to 19 Nm (11 to 14 ft.lbs.)

3. Install the heat cowl.
4. Install the air duct.
5. Install the air cleaner.

SECONDARY AIR SUPPLY SYSTEM

Inspection

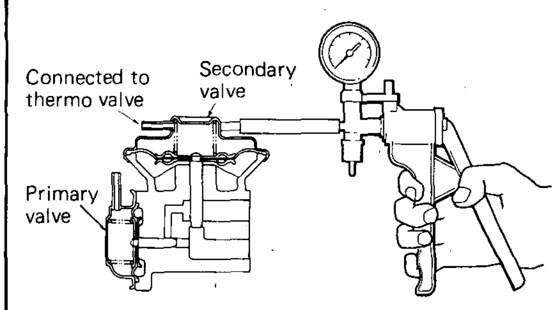
1. Check the air hoses and air pipes for damage or cracks; replace if necessary.
2. Check the air pipe connections for leakage.
3. Start and run the engine at idle.
4. Disconnect the air hose from the reed valve.
5. Put your hand lightly on the intake port of reed valve. If you feel suction, the reed valve is good. Check to ensure that no exhaust emission is blown back. Replace if defective.

EGR SYSTEM

Test

1. Check the vacuum hose routing and installation.
2. Cold start and run the engine at idle speed.
3. Check to ensure that increasing engine rpm (idle to 2,500 rpm) does not cause the secondary EGR valve to operate. If the secondary EGR valve operates, replace the thermo valve.
4. Warm up the engine until the coolant temperature exceeds 55°C (131°F).
5. Check to ensure that when engine speed is increased as described in step 3, the secondary valve operates. If it does not operate, inspect the EGR control valve and the thermo valve.

6. Disconnect the green stripe hose from the thermo valve.
7. Connect a vacuum pump to the thermo valve and apply vacuum. If no vacuum is available, the thermo valve is good. (6EM042)
8. Disconnect the green stripe hose from the nipple of carburetor.
9. Connect a vacuum pump to the green stripe hose.
10. While opening the sub EGR valve by pulling it by hand, apply −20 kPa (−5.9 in. Hg.) vacuum with the vacuum pump.
11. If the idling speed becomes unstable, the secondary valve is operating properly. If the idling speed remains unchanged, the valve is not operating. Replace the EGR valve.



6EM042

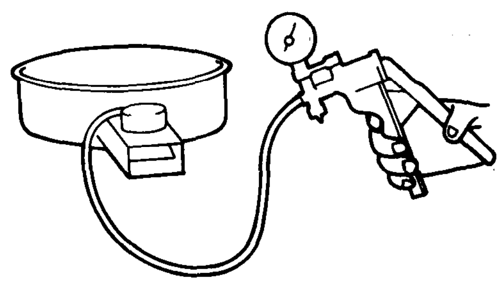
SUB EGR VALVE

1. Check to ensure that when the sub EGR valve is pulled by hand, it moves smoothly. If the valve is hard to move, remove the sub EGR valve and check it for carbon, dust or other deposits. If necessary, clean with a solvent and apply a slight amount of oil. If the valve is still hard to move, replace it.
2. If it is difficult to remove the sub EGR valve, spray it with a solvent so that it can be turned easily.

HEATED AIR INTAKE SYSTEM

Inspection

1. Make sure all vacuum hoses and the heat cowl to air cleaner air duct are properly attached and are in good condition.
2. With a cold engine and ambient temperature less than 30°C (86°F), the air control valve in the snorkel should be in the up or heat-on position.
3. With the engine warmed up and running, check the temperature of the air entering the snorkel or at the sensor. When the temperature of the air entering the outer end of snorkel is 45°C (113°F) or higher, the valve should be in the down position (heat off).
4. Remove the air cleaner from the engine and allow the air cleaner to cool down to 30°C (84°F). With 49.4 kPa. (15 in. Hg.) vacuum applied to the sensor, the valve should be in the up (heat on) position. Should the valve not rise to the heat-on position, check the vacuum motor for proper operation.
5. To test the vacuum motor, apply 32.5 kPa. (10 in. Hg.) of vacuum using vacuum pump. (6EM044) The valve should be in the full up position. Should the vacuum motor not perform adequately, replace air cleaner body assembly.


6EM044

DECELERATION DEVICE

Air Switching Valve (ASV) System

TEST

1. Run the engine at idle.
2. Disconnect the solenoid valve connector to turn off the solenoid valve (manifold vacuum will act on the air switching valve, causing the valve to open). If the idle speed falls excessively or the engine stalls, the air switching valve and solenoid valve are good. If the idle speed does not change, check the vacuum passage for clogging and check the condition of the air switching valve and solenoid valve.
3. With the engine at idle, the battery voltage should be present at the solenoid valve connector. If no voltage is present, either the electrical wiring or engine speed sensor is defective.
4. Increase the engine speed to 1,500 rpm. Check to ensure that voltage is present at the solenoid valve connector. If there is no voltage, the engine speed sensor is defective.
5. Increase the engine speed to 2,500 rpm. Check to ensure that no voltage is present at the solenoid valve connector. If there is voltage, the engine speed sensor is defective.

TAMPER PROOF

Adjustment

When mixture adjustment is required, clean the carburetor as follows.

1. Remove any parts connected to the carburetor in preparation for breaking the tamper prevention plug.
2. Remove the carburetor from the engine.
3. Before attempting to remove the concealment plug, secure the carburetor in a vice.
4. Clean the carburetor by using compressed air.
5. Reinstall carburetor without the concealment plug and replace the parts removed above.