OPEL ENGINE MODIFICATION 1973

Opel – All Models (1973)

DESCRIPTION

The basic components of the Opel Emission Control System (OECS) are; leaned out carburetion, a dual acting (advance and retard) distributor vacuum unit, a thermostatically controlled air cleaner, on all except GT models, and a Exhaust Gas Recirculation (EGR) system.

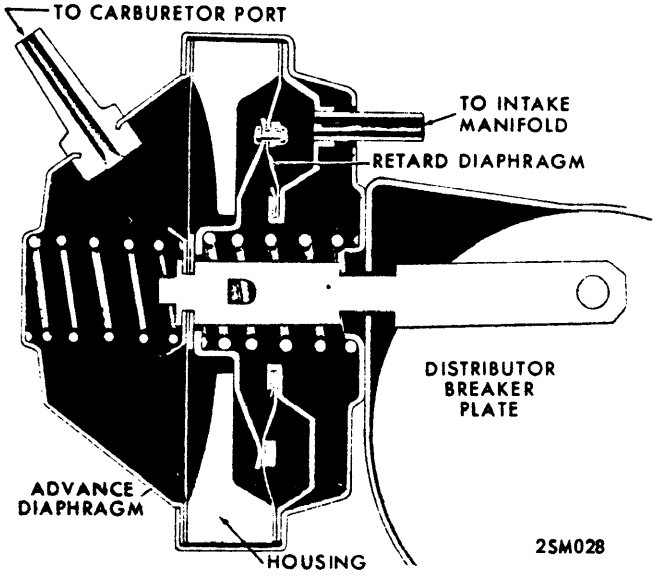
OPERATION

DISTRIBUTOR VACUUM UNIT

Distributor has a double acting (two diaphragms) vacuum unit which operates as follows:

1) Advance side of unit is supplied with vacuum from a port in the primary barrel of carburetor, located just above throttle valve. This port does not supply vacuum during idling or during closed throttle deceleration. It supplies full vacuum (to advance timing) at all speeds when the throttle valve is opened enough to uncover port.

2) Retard side of unit is supplied with intake manifold vacuum through a line connected directly to intake manifold. During idling and deceleration (when there is no vacuum to advance side of unit) retarded side of unit will cause timing to be retarded about 5°. However, during part throttle operation, when vacuum is supplied to advance side of unit, advance side will overpower retard unit and retard unit will have no effect on timing.



DISTRIBUTOR ADVANCE/RETARD UNIT

THERMOSTATICALLY CONTROLLED AIR CLEANER

Carburetor air intake system consists of a heat stove, a corrugated paper heated air pipe and an air cleaner incorporating a temperature controlled door operated by vacuum through a temperature sensor. Operation is as follows:

1) Heat stove is a sheet metal cover, shaped and bolted onto exhaust manifold. Air drawn in along lower edge of stove passes across manifold surface, picking up heat. Heated air passes through corrugated paper air pipe and enters snorkel of air cleaner.

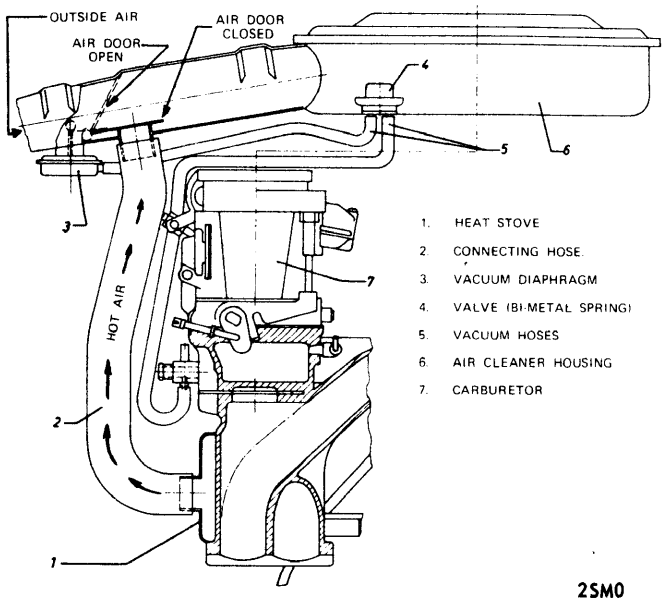
2) Temperature controlled air cleaner is designed to mix this heated air with cold air from engine compartment so that carburetor air temperature averages 115°F. Mixing is done by an air door located in snorkel. Most of the time, door will be partially open. When underhood temperature reaches about 135°F, door will close and will not allow any more warm air from manifold to enter air cleaner.

3) Temperature door is moved by a diaphragm type vacuum motor. When there is no vacuum present in motor, diaphragm spring forces door closed. Whenever engine is running, amount of vacuum present in vacuum motor depends on temperature sensor in air cleaner, which is located in vacuum line between intake manifold and vacuum motor.

4) Inside sensor, a bi-metal temperature sensing spring starts to open a valve to bleed more air into vacuum line whenever temperature in air cleaner rises above 115°F. At this temperature, sensing spring starts to close air bleed into vacuum line allowing more manifold vacuum to reach vacuum motor. Whenever there is 9" or more of vacuum in vacuum motor, diaphragm spring is compressed and door is opened.

5) When starting a cold engine (air temperature under 85°F) air door will open immediately. This is because air bleed valve in sensor is closed so that full manifold vacuum is applied to vacuum motor. As soon as air cleaner starts receiving hot air from heat stove, sensor will cause air door to close partially, mixing cold and hot air as necessary to regulate air cleaner temperature within 20°F of the ideal 115°F air inlet temperature.

6) While air cleaner temperature is being regulated, accelerating the engine hard will cause vacuum level in intake manifold and in vacuum motor to drop. Whenever vacuum drops below 5" of vacuum, diaphragm spring will close air door in order to get maximum outside air flow required for maximum acceleration.

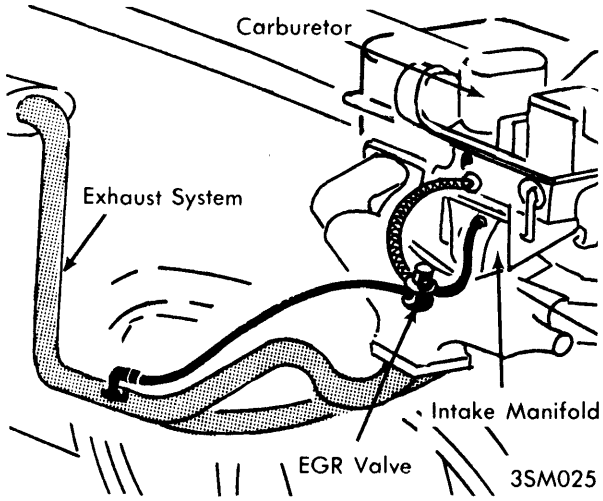


THERMOSTATICALLY CONTROLLED AIR CLEANER

OPEL ENGINE MODIFICATION 1973 (Cont.)

EXHAUST GAS RECIRCULATION

Exhaust gas recirculation is used on all models. System recirculates exhaust gas into intake system of engine during acceleration and part throttle operation, but system does not receive sufficient vacuum at idle to operate. System consists of a pipe connected to exhaust system, an EGR valve, a pipe from valve to intake manifold and a vacuum hose connected from EGR valve to base of carburetor.



OPEL EGR SYSTEM

TESTING

THERMOSTATICALLY CONTROLLED AIR CLEANER

NOTE – Always perform checks in order listed below.

Vacuum Motor Test – Check all hoses for damage. With engine not running, observe position of damper door through snorkel. Door should be in such a position that heat stove passage is covered. If not, check for binds in linkage. Apply at least 9" of vacuum to diaphragm assembly through hose disconnected at sensor unit. Damper door should completely close snorkel passage when vacuum is applied. With vacuuum applied, clamp hose to trap vacuum in diaphragm assembly. Snorkel passage should remain closed, if not, there is a leak in diaphragm assembly.

Sensor Test – Test with engine cold (engine compartment temperature below 85°F). Observe air door before starting engine, it should be closed. Start engine and allow it to idle. Immediately after starting engine, air door should open. As engine warms up, air door should start to close and air cleaner should become warm to the hand. If correct operation of air cleaner is in doubt, proceed to thermometer test.

Thermometer Test Of Sensor – *NOTE – Test must be made with engine cold and air cleaner temperature below 85°F.* Remove air cleaner cover and install a suitable temperature gauge as close as possible to sensor. Reinstall air cleaner cover (do not install wing nut). Start engine, air door should open immediately (if engine is cool enough). When air door starts to close, remove air cleaner cover and read temperature gauge. It must read 115°F ± 20°F. If air door does not start to close at temperature indicated, temperature sensor is defective and must be replaced.

EXHAUST GAS RECIRCULATION

EGR Valve – EGR valve syould be checked at 12,000 mile intervals. With engine at normal operating temperature, connect a tachometer and note idle RPM. Disconnect vacuum hose at intake manifold that goes to vir cleaner. Disconnect vacuum hose for EGR valve and connect it to intake manifold where air cleaner vacuum hose was connected. Engine speed should now decrease between 100-240 RPM from previously noted RPM. If RPM decrease is less than 100 RPM, remove EGR valve and fitting on intake manifold. Clean as described in Maintenance. Reconnect both vacuum hoses to their proper places.

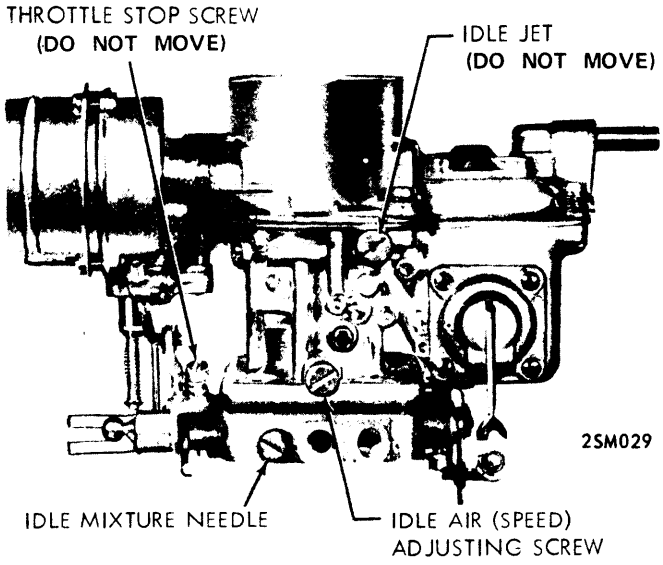
MAINTENANCE

Ignition Timing – Connect timing light and tachometer. Disconnect and plug vacuum advance and retard unit hoses. Start engine, set idle speed to 900 RPM. Rotate distributor as necessary to align timing marks. Timing mark is a steel ball embedded in flywheel and a pointer in a window located in right side of flywheel housing. Tighten clamp bolt and recheck timing. Reconnect vacuum hoses and adjust idle speed and mixture.

Idle Speed & Mixture Adjustment – *NOTE – Valve adjustment, cam angle, ignition timing and spark plug gap must be correct and exhaust gas recirculation system must be functioning properly before setting idle speed and mixture.* With air cleaner installed and engine at normal operating temperature, remove plastic caps from idle mixture screw and air speed screw. Adjust idle mixture screw until highest RPM is obtained. Alternately adjust idle mixture screw and air speed screw to obtain best idle at 50 RPM over specifications. Now turn idle mixture screw clockwise (lean) until specified idle speed is obtained. Install red plastic caps over air speed screw and idle mixture screw.

Final Idle Speed

Manual Transmission	850-900 RPM
Automatic Transission	800-850 RPM



IDLE SPEED & MIXTURE ADJUSTMENTS

Exhaust Gas Recirculation – Clean EGR valve and fitting with a piece of stiff wire, removing all exhaust deposits. *CAUTION – Do not soak EGR valve in solvent.* After reinstalling valve and fitting, check operation as outlined under Testing. If valve does not operate properly after a thorough cleaning it must be replaced.