OPEL ENGINE MODIFICATION 1970-72

Opel – All Models (1970-72)

DESCRIPTION

Opel Exhaust Emission Control is achieved through leaning out air/fuel mixture in carburetor, a thermostatically controlled air cleaner (except 1972 GT), a dual acting (advance and retard) distributor vacuum unit, and mixture control during deceleration. Carburetors on 1.1 liter engines incorporate a vacuum operated diaphragm valve and an electronically controlled magnetic valve, both of which must be open so air/fuel mixture can be fed to manifold and combustion chamber.

OPERATION

Carburetor (1.1 Liter Engine) – Carburetor idle system is leaned out and special features are incorporated which make possible additional idle mixture adjustments over and above those manufactured into the carburetors. Leaner carburetion is possible because of more accurate metering and better distribution achieved by two carburetors. An additional air/fuel mixture valve assembly is attached to balance tube of intake manifold. A mechanism is incorporated into mixture valve assembly which allows an additional air/fuel mixture to be drawn into combustion system when decelerating.

Carburetor Deceleration Control – *NOTE – Only used on models equipped with 1.1 liter engines having standard transmissions.* Deceleration control assembly consists of an electromagnetic valve, a diaphragm valve and a deceleration mixture screw. Electromagnetic valve is controlled by an RPM switch which receives its impulses from ignition coil. Above 1800 RPM valve is open, below 1800 RPM valve is closed. Diaphragm is operated by intake manifold vacuum. Vacuum can only operate diaphragm when electromagnetic valve is open due to engine speed being above 1800 RPM. Therefore, at engine speeds above 1800 RPM and with increased vacuum, caused by engine overrun during deceleration, an additional mixture is supplied. Require amount of mixture is adjusted by means of deceleration mixture screw.

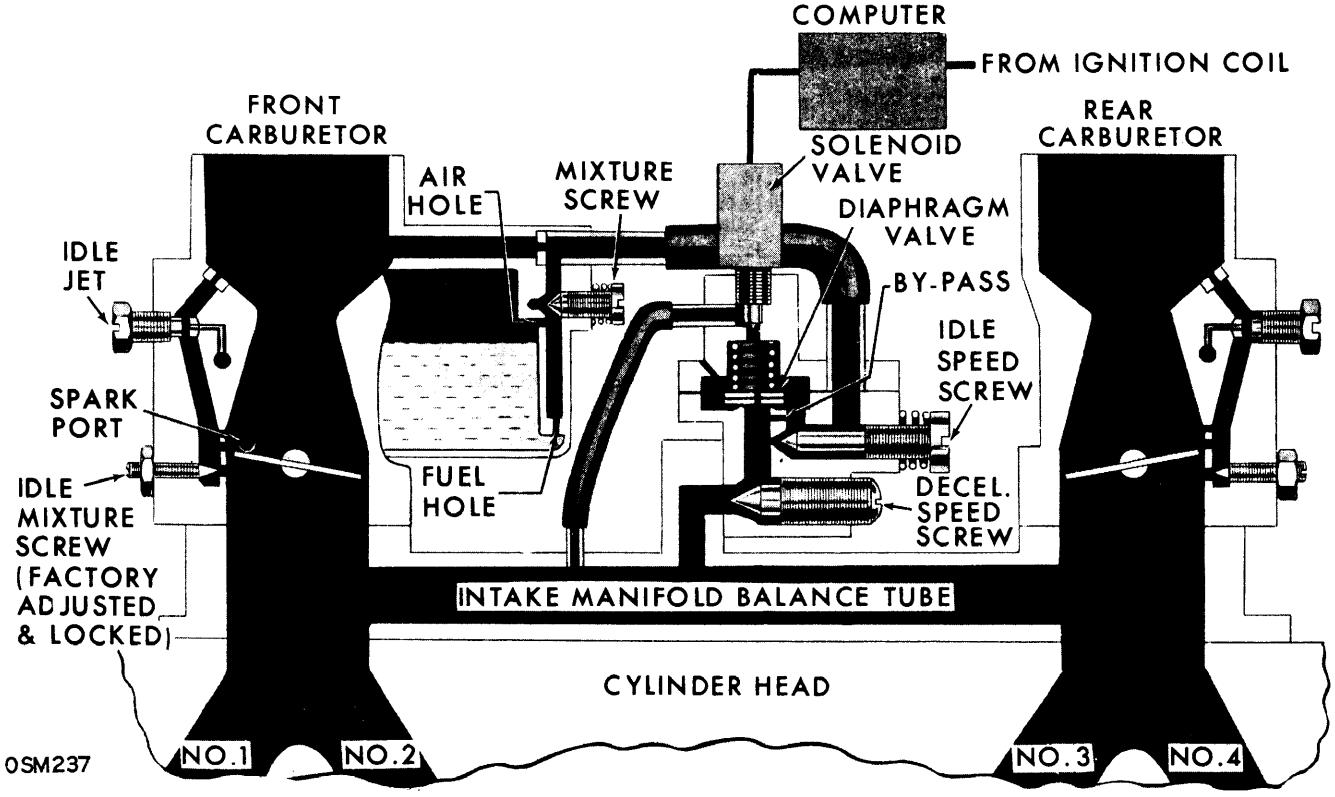
Carburetor (1.9 Liter Engine) – Carburetor has an adjustable idle air by-pass system. System consists of an air passage with an entrance above throttle valve and exit below throttle valve. An idle air speed adjusting screw can open or close this passage.

Thermostatically Controlled Air Cleaner (All Engines) – Carburetor air intake system consists of a heat stove, a corrugated paper heated air pipe and an air cleaner incorporating temperature controlled doors operated by vacuum through 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.

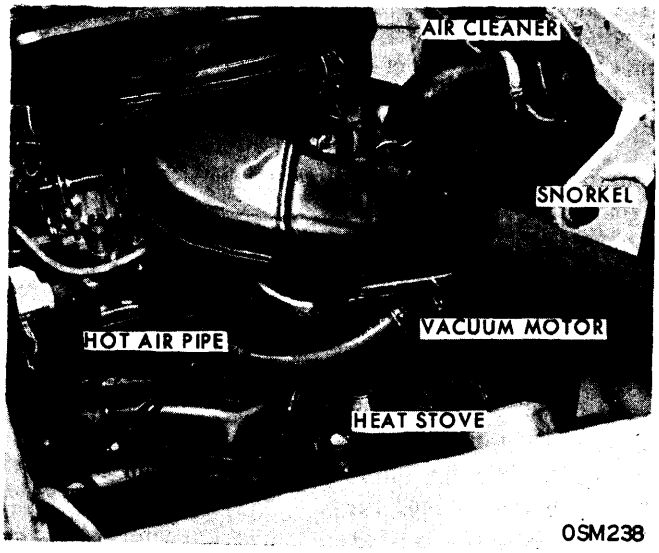
2) Temperature controlled air cleaner is designed to mix this heated air with cold air from engine compartment so that carburetor air temperature averages 115°F. Air mixing is done by two doors which move together so that when cold air door is closed, hot air door is open and vice versa. Usually both doors will be partially open.

3) When engine compartment temperature reaches approximately 135°F, cold air door will be fully open and hot air door will be fully closed. Temperature doors are controlled by a diaphragm type vacuum motor. When there is no vacuum present in the motor, diaphragm spring forces cold air door open and hot air door closed.



CARBURETOR SYSTEM 1.1 LITER ENGINE STANDARD TRANSMISSION

OPEL ENGINE MODIFICATION 1970-72 (Cont.)



THERMOSTATICALLY CONTROLLED AIR CLEANER (1.1 LITER ENGINE)

4) When 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.

5) 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. Whenever temperature falls below 115°F, 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, cold air door is closed and hot air door is open.

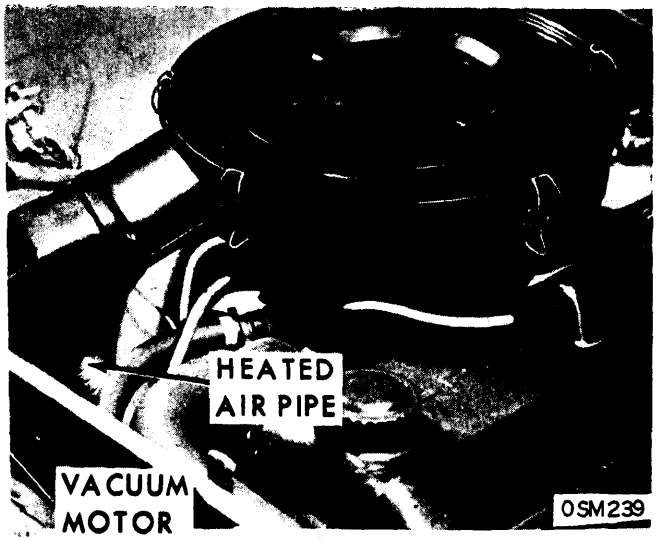
6) When starting a cold engine (air temperature under 85°F), cold air door will close and hot air door will open immediately. This is because air bleed valve in sensor is closed so that full manifold vacuum is applied in vacuum motor. Cold air door will remain closed only a few minutes. As air cleaner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

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

IGNITION DISTRIBUTOR

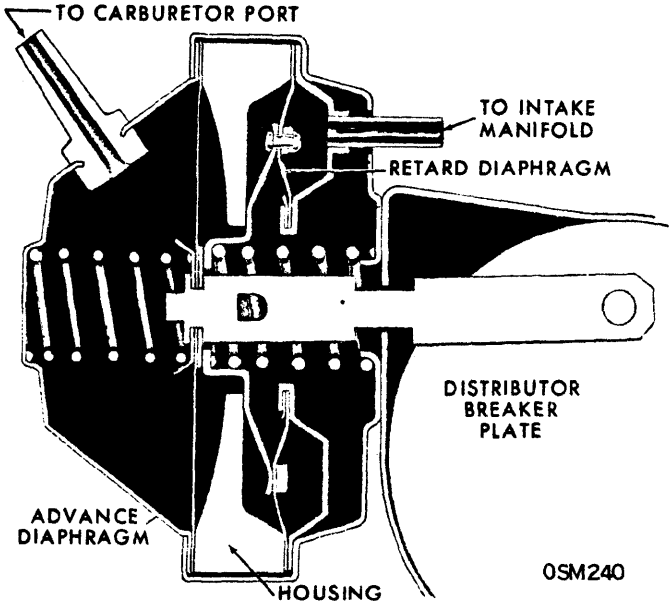
NOTE – Both 1.1 and 1.9 liter engines use a distributor equipped with a dual acting diaphragm unit, however operational procedures differ as follows:

1.1 Liter Engine – Vacuum advance unit is connected to carburetor vacuum port. Vacuum retard unit is connected to intake manifold balance tube. At engine idle, high manifold vacuum acts on retard diaphragm and assists spring in advance unit to push rod and breaker plate 10° ATDC. When carburetor throttle valves are opened, intake manifold vacuum drops and carburetor venturi vacuum rises causing an immediate action on advance diaphragm. Retard diaphragm follows because of drop in intake manifold vacuum. Vacuum advance travel is not affected by retard mechanism. During periods of deceleration, vacuum retard diaphragm will effect a 10° spark retard.



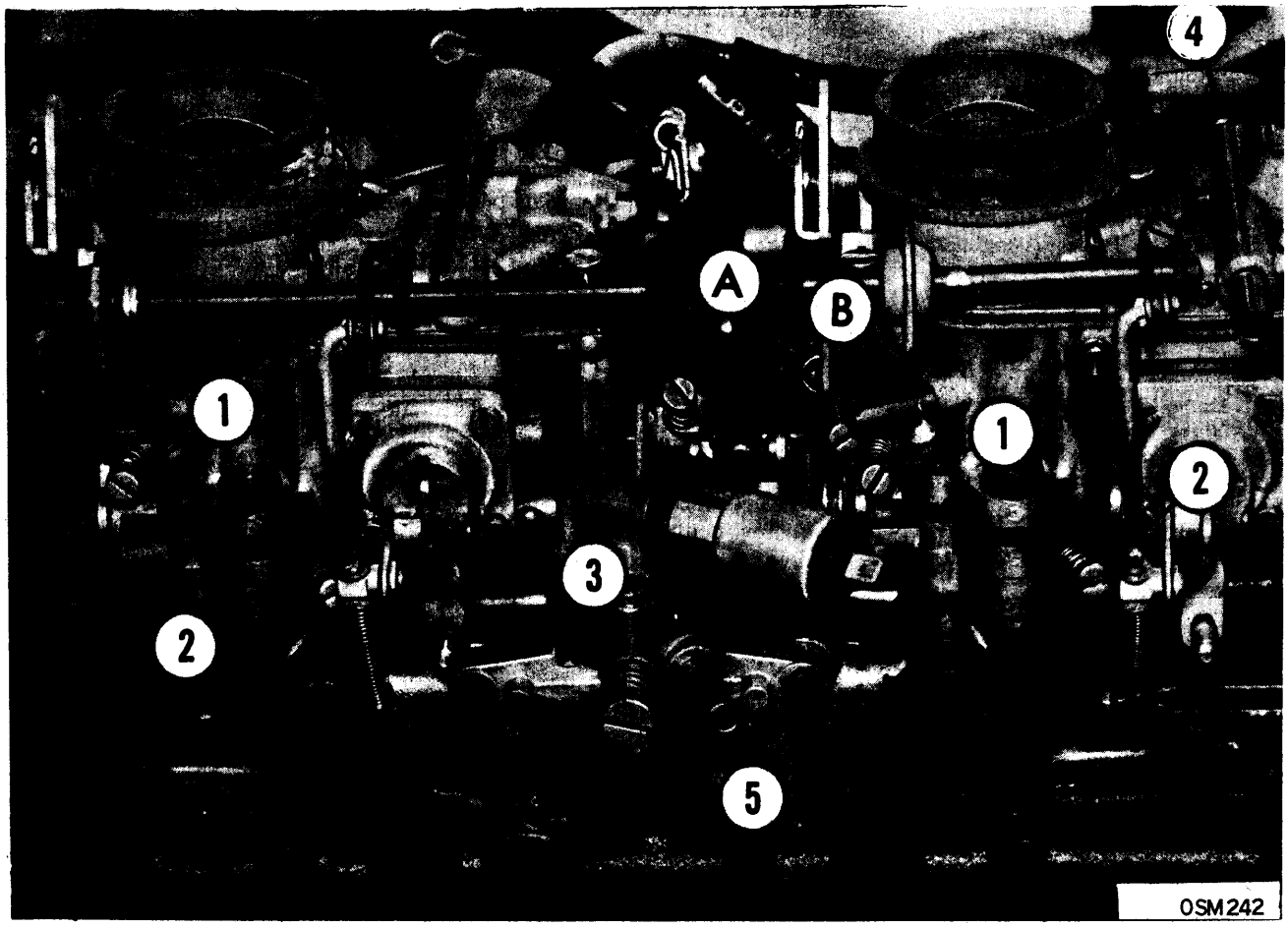
THERMOSTATICALLY CONTROLLED AIR CLEANER (1.9 LITER ENGINE)

1.9 Liter Engine – Vacuum advance is controlled from a port in primary barrel of carburetor located just above closed throttle valve. No vacuum is supplied during idling or during closed throttle deceleration. Full intake manifold vacuum is supplied at all speeds where throttle valve is opened enough to uncover port. Vacuum retard unit is supplied with intake manifold vacuum at all times by means of a line connected directly to intake manifold. During idling and deceleration, when there is no vacuum to advance unit, retard unit will cause timing to be retarded 4-9°. During part throttle operation when there is vacuum to advance unit, advance unit will overpower retard unit so that retard unit has no effect on timing.



DISTRIBUTOR ADVANCE-RETARD UNIT

OPEL ENGINE MODIFICATION 1970-72 (Cont.)



A – LINKAGE COUPLING SCREWS
B – CHOKE STOP SCREW
1 – THROTTLE STOP SCREW
2 – MIXTURE ADJUSTING SCREW
3 – CENTER UNIT AIR SPEED SCREW
4 – CENTER UNIT MIXTURE ADJUSTING SCREW
5 – DECELERATION SPEED SCREW

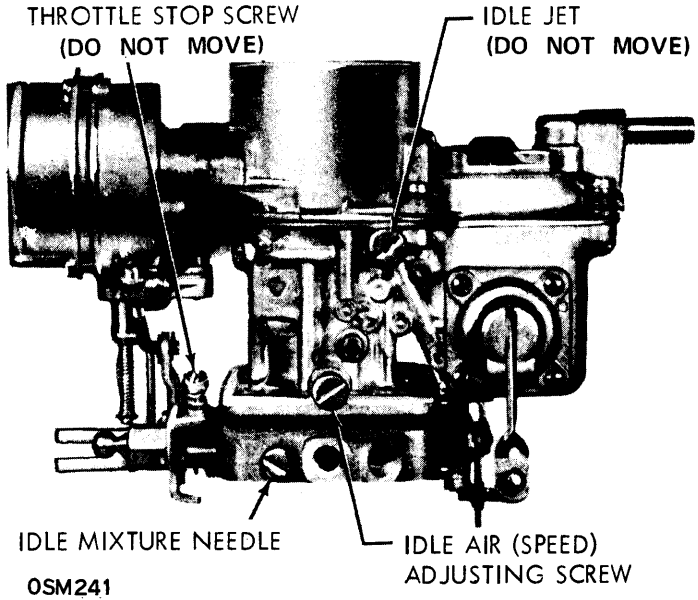
MAINTENANCE

Ignition Timing – Distributor point gap and cam angle should always be checked before adjusting timing. *See Tune-up charts for specifications.*

Idle Speed & Mixture Adjustment (1970 1.9 Liter Engine) – To adjust idle speed and mixture, engine must be at normal operating temperature, choke valve must be open and air cleaner installed.

1) Connect tachometer and start engine. Turn in idle air adjusting screw until fully closed. Adjust idle mixture and throttle stop screws to obtain best possible mixture at 650-700 RPM. At this point, throttle valve has been positioned to obtain best low speed performance available. Do not move throttle stop screw from this position. All further changes in idle speed will now be made with idle air speed adjusting screw.

2) Turn idle air speed adjusting screw to obtain an engine speed of 850 RPM. Adjust idle mixture needle to mid-point of highest RPM range. If engine speed increases, reset idle air speed adjusting screw to obtain 850 RPM. Whenever idle speed is changed, always make an idle mixture needle adjustment last. Lean idle mixture slightly by turning mixture needle in to reduce idle speed 30 RPM.



IDLE SPEED & MIXTURE ADJUSTMENTS (1.9 LITER ENGINE)

OPEL ENGINE MODIFICATION 1970-72 (Cont.)

Idle Speed & Mixture Adjustment (1971-72 1.9 Liter Engine) – With engine at normal operating temperature, choke valve open and air cleaner installed, connect tachometer and remove hose going from rear of carburetor to charcoal canister at canister inlet and plug hose. Adjust idle air speed screw and mixture screw to obtain best idle at 820-870 RPM (Auto. Trans.) or 870-920 RPM (Manual Trans.). Make final adjustment by screwing in mixture screw to reduce idle speed 20-50 RPM. CO content at idle should be 1.5-2.5% (1972 models only).

Idle Speed & Mixture Adjustment (1970 1.1 Liter Engine) – Make basic carburetor adjustments as follows:

1) Remove air cleaner. Back out both carburetor linkage coupling and choke stop screws a few turns. Shut off center unit by pulling hose from front carburetor to center unit, then plug hose and carburetor nipple. Plug intake manifold vacuum port.

2) Using a suitable carburetor synchronizer, balance air flow by adjusting throttle stop screw of each carburetor. Adjust idle mixture screw (on each carburetor) for best idle at 700 RPM.

3) Reconnect hose to center unit. Adjust center unit air speed screw and center unit mixture needle alternately, to achieve an engine speed of 925 RPM (on Auto. Trans.) and 875 RPM (Man. Trans.). At this point air flow through front carburetor will be somewhat greater than air flow through rear carburetor, as front carburetor also supplies air for center unit.


OSM243

ADJUSTING DECELERATION SPEED SCREW

4) Turn center unit mixture screw in to lean idle mixture and reduce engine speed 50 RPM. Turn carburetor linkage coupling screw in until a clearance of .006" is obtained between screw and stop. Turn in choke stop screw until a clearance of .002" is obtained between screw and stop. Install air cleaners.

Idle Speed & Mixture Adjustment (1971 1.1 Liter Engine) – Make basic carburetor adjustments as follows:

1) Remove air cleaners. Back out both carburetor linkage coupling and choke stop screws a few turns. Shut off center unit by pulling hose from front carburetor to center unit, then plug hose and carburetor nipple. Plug intake manifold vacuum port.

2) Using a suitable carburetor synchronizer, balance air flow by adjusting throttle stop screw to each carburetor. Adjust idle mixture screw on each carburetor for best idle at 700-750 RPM.

3) Screw in front and rear idle mixture screws by same amount to obtain a 20 RPM drop. Adjust coupling linkage and choke stop screws by turning clockwise until a 0.0-.002" clearance is obtained. Unplug front carburetor and intake manifold vacuum hoses and connect center unit hose. Install air cleaners.

4) Screw out center unit mixture screw ½ turn and open center unit air speed screw until 1000 RPM is obtained. Adjust center unit mixture screw to obtain best idle then screw in mixture screw until idle speed drops 50 RPM. Final idle speed setting is 925-975 RPM.

NOTE – After final carburetor adjustments, it may be necessary to adjust deceleration mixture on standard transmission vehicles to obtain correct dashpot action.

ADJUSTING CARBURETOR DECELERATION CONTROL

1.1 Liter Engines (Manual Transmissions) – 1) Connect jumper wire between battery positive post and solenoid valve terminal. This will hold solenoid valve open so intake manifold vacuum can open diaphragm valve. With engine running, actuate throttle linkage to attain 3000 RPM. Release linkage, engine should idle at 1800-1900 RPM.

2) If engine speed is not correct, turn deceleration speed screw in to decrease speed. After any deceleration speed screw adjustment, engine must again be speeded up to 3000 RPM then allowed to slow to idle before checking new speed adjustment. When 1800-1900 RPM is obtained, remove jumper wire.

3) To check operation of RPM switch, connect a test light from solenoid valve terminal to ground. Slowly increase engine speed, test light should come on between 2100-2500 RPM. Slowly decrease engine speed, test light should go off between 2500-2100 RPM.

TESTING

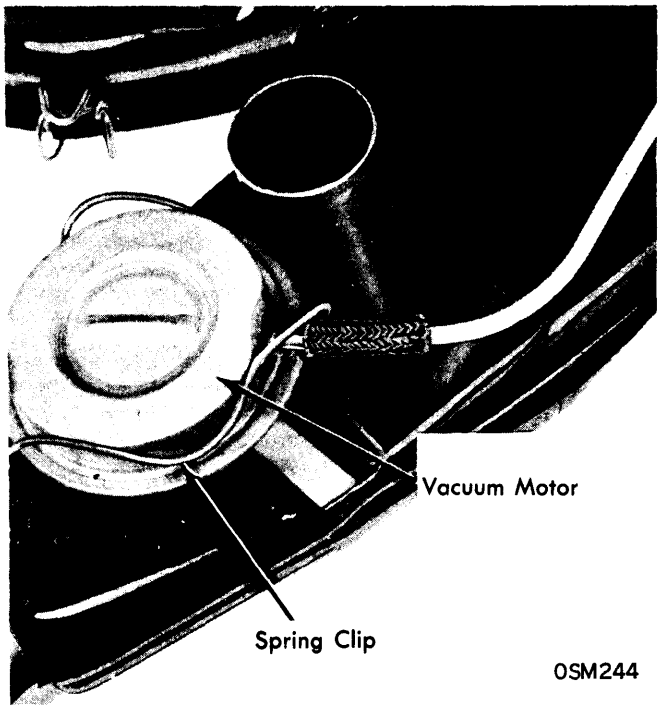
TESTING THERMOSTATICALLY CONTROLLED AIR CLEANER

NOTE – Always perform checks in order listed below.

Checking Vacuum Motor – Check all hoses for damage. With engine off, observe position of damper door through snorkel. Damper door should be in such a position that heat stove passage is covered. 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 vacuum applied, clamp hose to trap vacuum in diaphragm assembly. Snorkel passage should remain closed, if not there is a leak in diaphragm assembly.

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

OPEL ENGINE MODIFICATION 1970-72 (Cont.)

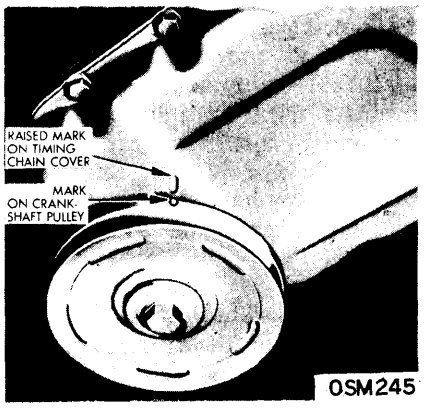


AIR CLEANER VACUUM MOTOR

Thermometer Check 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 and allow it to idle. Cold air door should close immediately. When cold air door does start jo open, remove air cleaner cover and read temperature gauge. It must read 115°F ± 20°F.

Checking Timing – 1) Connect timing light and tachometer. Both vacuum advance and retard hoses must be disconnected and plugged. Start engine, set idle speed to specifications listed below:

Engine	Timing RPM
1970 1.1 Liter	500
1970 1.9 Liter	700
1971 1.1 Liter	950
1971-72 1.9 Liter	900



IGNITION TIMING MARK (1.1 ENGINE)

2) Rotate distributor as necessary to align timing marks. Timing marks on 1.1 liter engines are a projection in rear edge of crankshaft pulley and a projection on timing chain cover. Timing mark on 1.9 liter engine is a steel ball embedded in flywheel and a pointer in a window in right flywheel housing.

IGNITION TIMING MARK (1.9 ENGINE)