EMISSION CONTROL SYSTEMS
ALL MODELS

CONTENTS

DESCRIPTION AND OPERATION

OPEL EMISSION CONTROL SYSTEM (O.E.C.S.)

All 1973 cars must be capable of passing certain tests which measure the quantity of unburned impurities in the exhaust system. Federal law places a limit on the hydrocarbon and carbon monoxide emissions from the exhaust system. The purpose of this law is to keep the atmosphere cleaner, particularly in populous areas where these impurities add to the smog problem. Basically, excessive exhaust emissions are caused by incomplete combustion of the air-fuel mixture in the cylinders.

The basic components of the OECS on the 1.9 liter engines are (1) leaned out carburetion, (2) heated air (except GT), and (3) tuned spark timing.

(1) The carburetor idle system is leaned out and special features are incorporated into the carburetors to make possible additional idle mixture adjustments over and above those manufactured into the carburetors.

(2) The heated air package consists of a heat stove, a corrugated paper heated air pipe, and an air cleaner containing a temperature controlled door operated by vacuum through a temperature sensor. See Figure 6F-1.

The heat stove is a sheet metal cover, shaped to and bolted onto the exhaust manifold. Air drawn in along

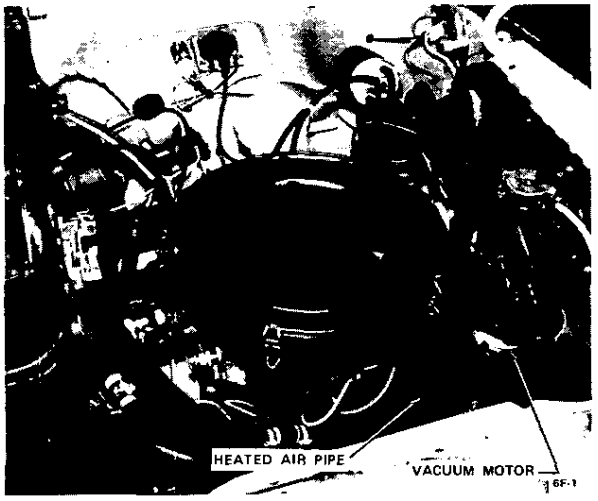

Figure 6F-1 Heated Air System Installed

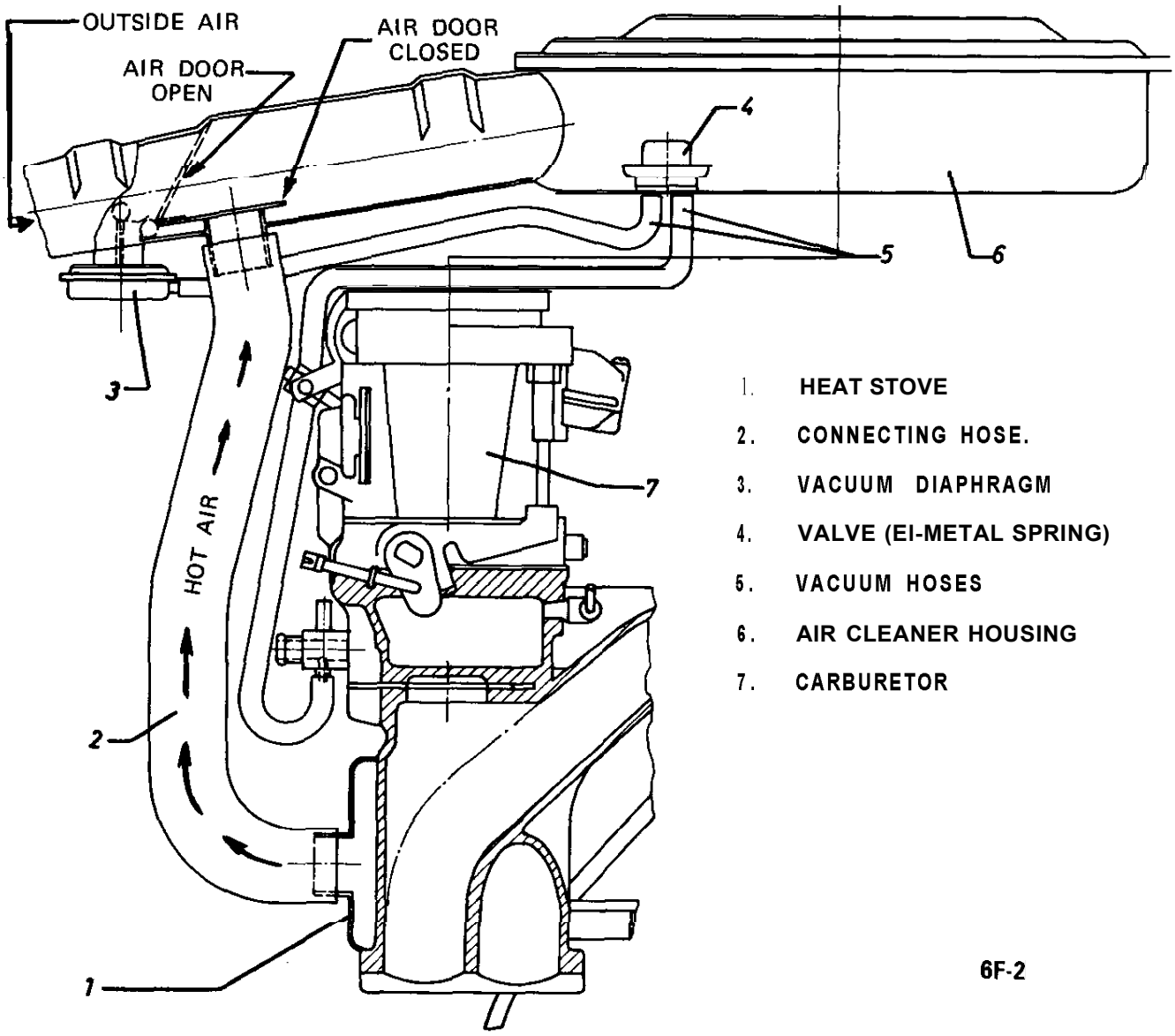

Figure 6F-2 Heated Air System

the lower edge of the stove passes across the manifold surface, picking up heat. The heated air is drawn out from the upper end of the manifold, through the heated air pipe into the snorkel of the air cleaner. See Figure 6F-2.

The temperature control air cleaner is designed to mix this heated air with cold air from under the hood so that carburetor inlet air temperature averages about 115 degrees. This mixing is done by an air door located in the air cleaner snorkel. Most of the time, the door will be partially open, as required, to control the temperature. When the underhood temperature reaches about 135 degrees, the door will close tight, not allowing any more warm air from the mainifold to enter the snorkel of the air cleaner. Obviously, if underhood temperatures rise above 135 degrees, the air cleaner will no longer be able to control temperature and the inlet air temperature will rise with underhood temperature.

The temperature door is moved by a diaphragm type vacuum motor. When there is no vacuum present in the motor, the diaphragm spring forces the door closed. Whenever the engine is running, the amount of vacuum present in the vacuum motor depends on the temperature sensor in the air cleaner which is located in the vacuum line between the intake manifold and the vacuum motor. In the sensor, a bi-metal temperature sensing spring starts to open a valve to bleed more air into the vacuum line whenever the temperature in the air cleaner rises above about 115 degrees. Whenever the temperature falls below about 115 degrees, the sensing spring starts to close the air

bleed into the vacuum line, allowing more manifold vacuum to reach the vacuum motor. Whenever there is nine inches or more of vacuum in the vacuum motor, the diaphragm spring is compressed, the door is opened.

When the engine is not running, the diaphragm spring will always hold the door closed. However, when the engine is running, the position of the door depends on the air temperature in the air cleaner.

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

If underhood air temperature rises to 135 degrees, the air bleed valve in the sensor will be wide open so that vacuum to the vacuum motor approaches zero. The diaphragm spring in the vacuum motor will hold the air door closed tightly. If underhood temperature rises above 135 degrees, carburetor inlet air temperature will also rise above 135 degrees.

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

The carburetor is set by the manufacturer for 800-850 RPM (automatic transmission) or 850-900 RPM (manual transmission) and 1.5 to 2.5 percent CO.

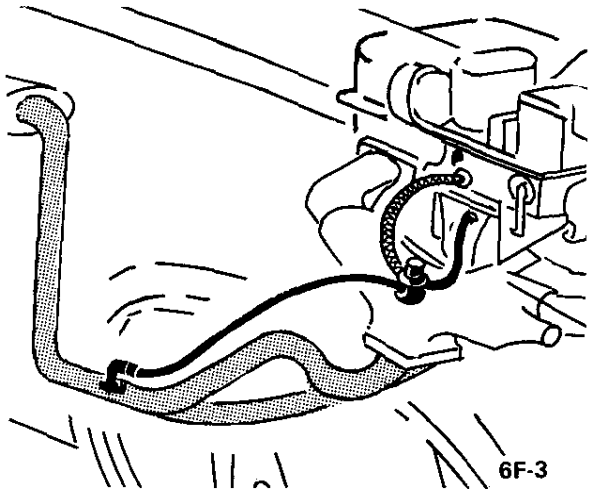

Figure 6F-3 E.G.R. System

EXHAUST GAS RECIRCULATION SYSTEM

All 1973 Opel 1900's, Manta's and GT's are equipped with an exhaust gas recirculation (E.G.R.) system. See Figure 6F-3.

The E.G.R. system consists of a pipe connected to the center of the front exhaust pipe, an E.G.R. valve, a short pipe from the valve to the intake manifold and a short vacuum hose from the E.G.R. valve to the base of the carburetor. See Figure 6F-4.

The system does not receive sufficient vacuum at idle to operate, but will operate during acceleration and part throttle providing sufficient intake manifold vacuum is present.

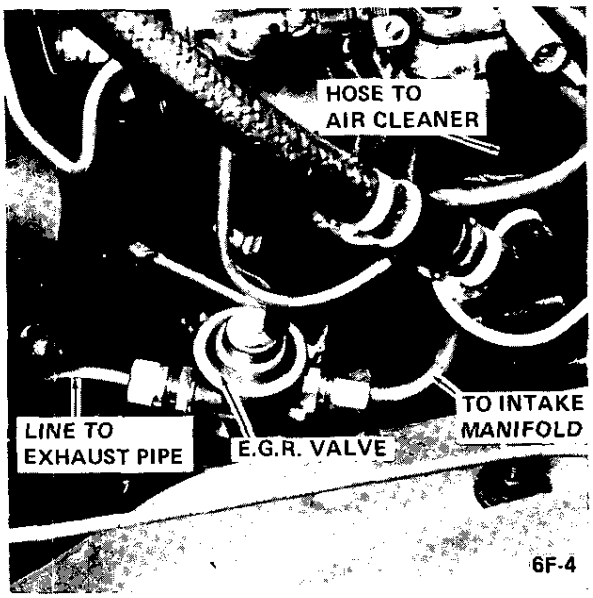

Figure 6F-4 E.G.R. Valve Location

DIAGNOSIS

TESTING THERMO AIR CLEANER OPERATION

Since failure of the thermo air cleaner will generally result in the snorkel air door staying open, failure will probably go unnoticed in warm or hot weather. In cold weather, however, owners will complain of leaness, hesitation, sag, surge, or stalling. When any type of lean operation complaint is received, always test the thermo air cleaner for proper functioning before doing any work on the carburetor.

Always perform checks in the same order as listed below.

Vacuum Motor Check

1. Check all hoses for proper hookup. Check for kinked, plugged, or damaged hoses.

2. With the engine "OFF", observe damper door position through snorkel opening. If position of snorkel makes observation difficult "se the aid of a mirror. At this point damper door should be in such a position that the heat stove passage is covered (snorkel passage open). If not, check for binds in linkage.

3. Apply at least nine in. Hg. of vacuum to diaphragm assembly through hose disconnected at sensor "nit. This can be done by mouth. Damper door should completely close snorkel passage when vacuum is applied. If not, check to see if linkage is hooked up correctly and for a vacuum leak.

4. With vacuum applied, bend or clamp hose to trap vacuum in diaphragm assembly. Damper door should remain in position (closed snorkel passage). If it does not, there is a vacuum leak in diaphragm assembly. Replace diaphragm assembly.

Sensor Check

Quick Check of System:

1. Start test with engine cold, air cleaner at a temperature below 85 degrees. If the engine has been in recent "se, allow it to cool.

2. Observe the air door before starting the engine: it should be closed.

3. Start the engine and allow it to idle. Immediately after starting the engine, the air door should open.

4. As the engine warms up, the air door should start to close, and the air cleaner should become warm to the hand.

5. The system is operating normally as described above. If the air cleaner fails to operate as above or if correct operation of the air cleaner is still in doubt, proceed to the thermometer check.

Thermometer Check of Sensor:

1. Start test with air cleaner temperature below 85 degrees. IF ENGINE HAS BEEN RUN RECENTLY, ALLOW IT TO COOL DOWN. While engine is cooling, remove air cleaner cover and install a temperature gage such as J- 22973 as close as possible to sensor. Reinstall air cleaner cover. Let car stand idle for 1/2 hour or more before proceeding to step 2.

2. Start the engine. Air door should open immediately if engine is cool enough. When air door starts to close (in a few minutes), remove air cleaner cover and read temperature gage. It must read 115 degrees plus or minus 20 degrees.

3. If air door does not start to close at temperature indicated, temperature sensor is defective and must be replaced.

EXHAUST GAS RECIRCULATION SYSTEM

Testing

The exhaust gas recirculation valve is to be checked at 12,000 mile intervals "sing the following procedure:

1. With engine at operating temperature, connect a tachometer to engine and note R.P.M. at idle.

2. Disconnect vacuum hose at the intake manifold that goes to the air cleaner.

3. Disconnect vacuum hose for exhaust gas recirculation valve from the throttle valve and connect it to the intake manifold where vacuum hose to air cleaner was connected.

4. Engine speed should decrease between 100-240 R.P.M. from previously noted R.P.M.

5. If the R.P.M. decrease is less than 100 R.P.M., the exhaust gas recirculation valve and fitting going into the intake manifold must be removed, cleaned, and' reinstalled.

MAINTENANCE AND ADJUSTMENTS

EXHAUST GAS RECIRCULATION SYSTEM

Cleaning

Clean the exhaust gas recirculation valve and fitting with a piece of stiff wire removing all exhaust deposits.

> **CAUTION:** *Do not soak in solvent. After reinstalling the valve and fitting, check operation as outlined under "Testing". If valve does not operate properly after a thorough cleaning, replace it.*

MAJOR REPAIR

REMOVAL AND REPLACEMENT OECS UNITS

The damper door is not serviceable. The air cleaner assembly must be replaced if the damper door is defective.

R And R Vacuum Motor

1. Remove vacuum motor retainer spring. See Figure 6F-5.

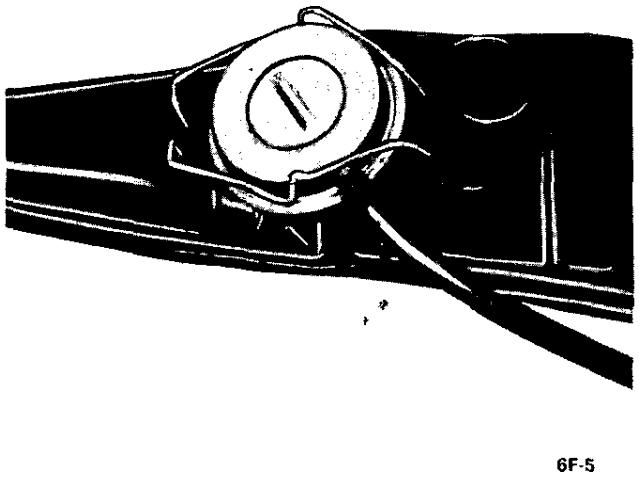

Figure 6F-5 Replacing Vacuum Motor Assembly

2. Lift vacuum motor, cocking it to one side to unhook motor linkage at the control door.

3. Install in reverse sequence.

R And R Air Cleaner Sensor

1. Remove sensor retaining clips by prying. See Figure 6F-6.

2. Pull vacuum hoses from sensor.

3. Note carefully the installed position of the sensor so that you can install new sensor in same position. Then remove sensor.

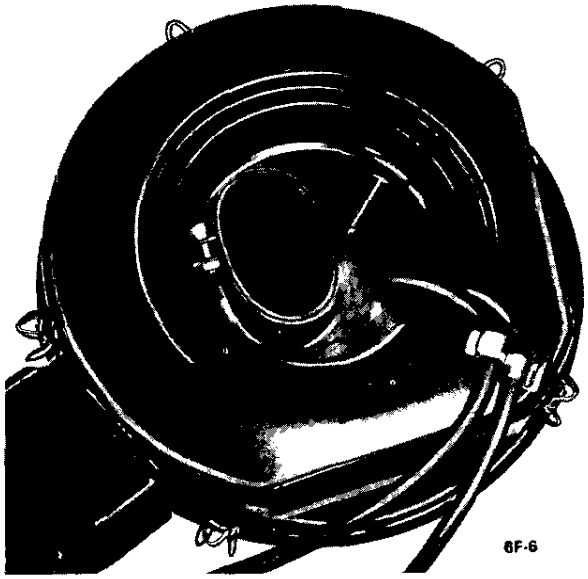

Figure 6F-6 Replacing Sensor Assembly

4. Install sensor and gasket assembly in air cleaner in same position as noted in Step 3. This is to eliminate the possibility of interference with the air filter element. See Figure 6F-4.

5. Install sensor retaining clip. Meanwhile supporting sensor around the outside rim to prevent damage to the temperature sensing spring.

6. Reinstall vacuum hoses.

SPECIFICATIONS

EMISSION CONTROL SYSTEM SPECIFICATIONS

Carburetor Inlet Air Regulated Temperature	115" ± 20
Idle Mixture Setting (Lean From Best Idle)	50 RPM
Thermo Vacuum Switch Operating Temperature	220
Engine Thermostat Operating Temperature	189