

GENERAL MOTORS EXHAUST GAS RECIRCULATION

DESCRIPTION

Exhaust Gas Recirculation (EGR) System used on General Motors vehicles is designed to reduce emission of oxides of nitrogen (NOx). This is accomplished by lowering combustion temperatures of burning gases. Recirculated, metered amounts of exhaust gases are reintroduced into engine through intake manifold where they are mixed with air/fuel mixture. System consists of an EGR valve, a thermal vacuum switch and a modified intake manifold. Some vehicles are equipped with a dual diaphragm EGR valve for more precise control under varying engine loads.

OPERATION

On dual diaphragm EGR valves, vacuum signal is supplied by a timed vacuum port in carburetor and direct intake manifold vacuum. Amount of exhaust gases introduced into manifold can be controlled by throttle opening plus engine load. Upper diaphragm receives carburetor ported vacuum and lower diaphragm receives vacuum directly from intake manifold. Lower vacuum chamber controls opening of EGR valve with respect to engine load. During high manifold vacuum (part throttle cruising), EGR valve is open just enough to allow correct amount of exhaust gases into intake manifold air/fuel mixture. Forces tending to open and close valve are balanced. Then manifold vacuum drops, (during acceleration), vacuum between two diaphragms drops, allowing upper diaphragm to open further. This increases amount of exhaust gases introduced into intake manifold. Single diaphragm EGR valve works in a similar manner except it receives vacuum from carburetor port only, and is not as sensitive to engine load conditions. Purpose of Thermal Vacuum Switch, (located in thermostat water outlet), is to cut off vacuum to EGR valve until water temperature reaches 100°F.

MAINTENANCE & TESTING

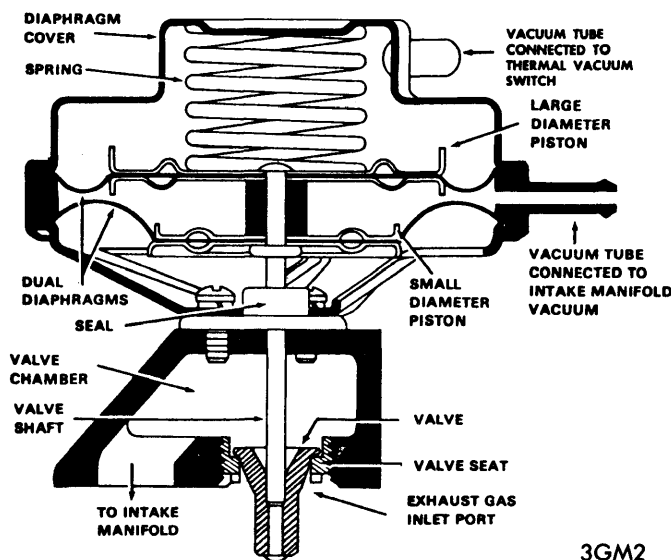
EGR Valve Inspection – Remove valve from engine and manually depress EGR valve diaphragm to make sure valve is free. If diaphragm cannot be moved manually, valve should be

cleaned before proceeding with check. If valve is free, apply approximately 9 inches of vacuum to tube on top of EGR valve. Valve should move to full open position, and should remain open, (no leak down), with vacuum applied. On dual diaphragm valves, apply vacuum to vacuum tube at center of valve and check for leak down, (valve will not open in this check). If leak is noted, repair or replace as necessary. **NOTE** – Replace only with identical part number.

EGR Valve Check – A rough idling engine may be caused by a malfunction of the EGR valve; such as, exhaust deposits holding valve open, broken diaphragm spring, vacuum hose disconnected, ruptured diaphragm or a leaky gasket. If inspection procedure does not indicate any of the above malfunctions, then install a new valve or cover valve pad on manifold with a plate and new gasket. Plug and disconnect vacuum lines. If proper idle performance is restored, proceed with cleaning old valve. If cleaned valve does not restore proper idle, then valve must be replaced. **NOTE** – Do not wash EGR valve in solvent or degreaser, permanent damage to valve may result.

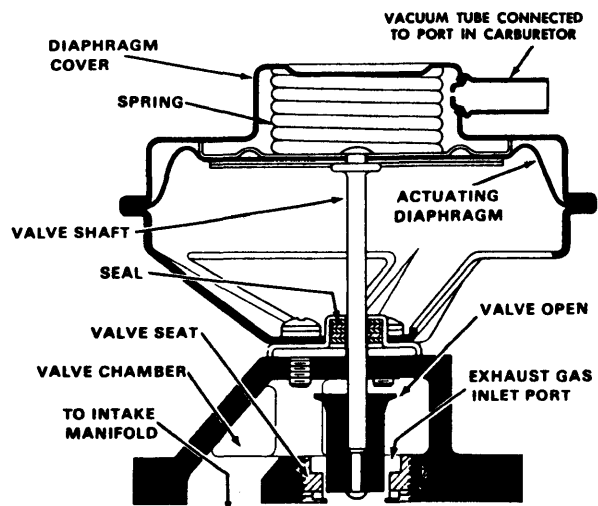
EGR Passages – If inspection of EGR passages in intake manifold indicates excessive build up of deposits, passages should be cleaned. Care should be taken to ensure that all loose particles are completely removed to prevent them from clogging EGR valve or from being ingested into engine.

Thermal Vacuum Switch – EGR Thermal Vacuum Delay Switch should be open above 100°F coolant temperature, permitting ported vacuum signal to reach EGR valve above that temperature. Check as follows: Remove EGR valve vacuum hose at EGR valve and connect hose to a vacuum gauge. Start engine, place transmission in Neutral and open throttle partially. As throttle is opened, vacuum gauge should respond with an increase in vacuum reading. **NOTE** – Coolant temperature must be above 105°F during this test. If operation is satisfactory, remove gauge and reconnect hose to EGR valve. If gauge does not respond to throttle opening, remove carb-to-switch hose from switch and connect to vacuum gauge. If vacuum gauge responds to throttle opening, then replace with new switch. If gauge does not respond to throttle opening, then check for plugged hose or defective carburetor.



DUAL DIAPHRAGM EGR VALVE

3GM2



SINGLE DIAPHRAGM EGR VALVE

3GM3