AMERICAN MOTORS EXHAUST GAS RECIRCULATION

DESCRIPTION

The Exhaust Gas Recirculation (EGR) system is designed to lower burning temperatures of gases in combustion chambers, thereby reducing formation of oxides of nitrogen (NOx). Metered amounts of exhaust gas dilutes air/fuel mixture, lowering combustion temperatures. This system consists of a diaphragm-actuated EGR valve, coolant temperature override switch (CTO), a thermal vacuum switch (TVS) and connecting hoses.

EGR VALVE

The EGR valve is mounted on a spacer plate beneath carburetor on 4-cylinder engines and on the side of the intake manifold on 6-cylinder engines. Two types of EGR valves are used.

EGR Valve without Back-Pressure Sensor (Some 4-Cylinder Models) – This valve is held in normally closed position by spring pressure. When enough vacuum is applied, the EGR valve opens allowing exhaust gas recirculation.

EGR Valve with Back-Pressure Sensor (4 and 6 Cylinder Models) – An EGR valve and back-pressure transducer are combined into one unit. Normally closed, exhaust gas exerts pressure (back-pressure) inside the exhaust manifold when engine is running. This pressure is conducted through the hollow pintle stem into the control diaphragm chamber. If this pressure is great enough to overcome control spring pressure, the control diaphragm is moved out against the bleed valve. Full vacuum is now applied to the power diaphragm and the pintle moves, opening the EGR port.

If back-pressure drops enough, the control diaphragm moves away from the bleed valve. The power diaphragm relaxes and closes the EGR port causing exhaust gas recirculation to stop.

NOTE – *On some models, the EGR valve is mounted on a restrictor plate (thin stainless steel between manifold and EGR valve gaskets). These plates are stamped with a calibration I.D. number. If replacing, use restrictor with same calibration number.*

EGR CTO SWITCH

This switch is located in coolant passage at right rear of intake manifold (4-cylinder) or on front left side of cylinder block (6-cylinder).

The inner port ("S") is connected to the EGR port at the carburetor. The outer port ("E") connects to the EGR valve or TVS. When coolant temperature is low, there is no vacuum signal to the EGR system. EGR operation will begin when coolant temperature reaches 100°F (4-cylinder models), 115°F (6-cylinder models).

THERMAL VACUUM SWITCH (TVS)

This switch is located in air cleaner and acts as an on-off switch for the EGR system. It is controlled by ambient temperature in the air cleaner. This switch controls the vacuum passage between EGR/CTO switch and EGR valve. Below 40-55°F, TVS limits passage of vacuum, delaying EGR operation and improving cold driveability.

EGR FORWARD DELAY VALVE

EGR Forward Delay Valve is used on some 4-cylinder engines. It is located between EGR/CTO valve and EGR valve. See *Fig. 1*. Its purpose is to modify initial vacuum signal applied to EGR valve by delaying full vacuum force. A gradual vacuum is applied to EGR valve, avoiding a sudden application of EGR system. Black side of valve should be installed toward vacuum source.

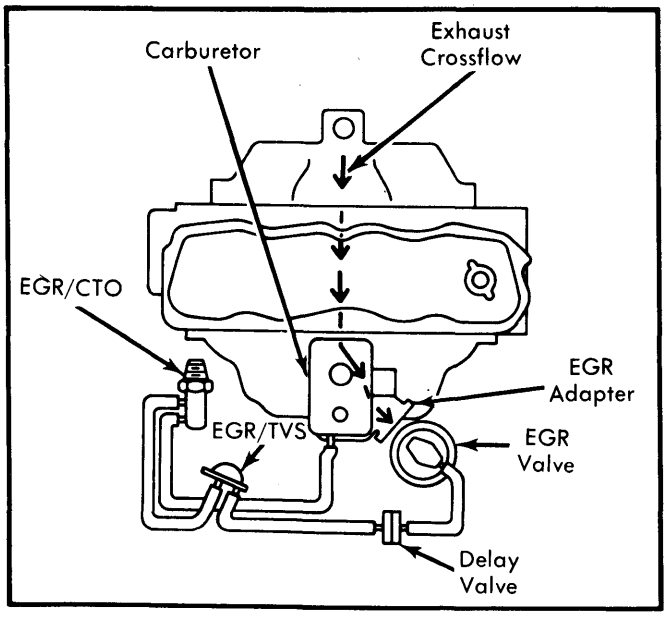

Fig. 1 EGR System Layout for 4-Cylinder

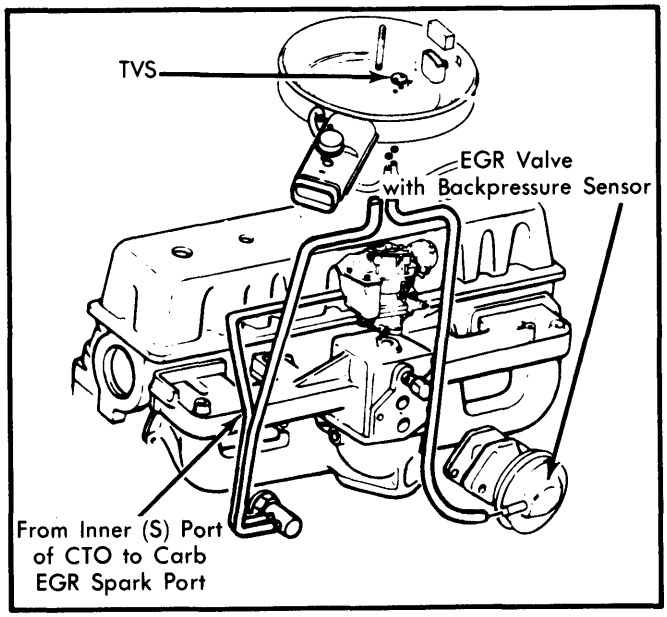

Fig. 2 EGR System Layout for 6-Cylinder

AMERICAN MOTORS EXHAUST GAS RECIRCULATION (Cont.)

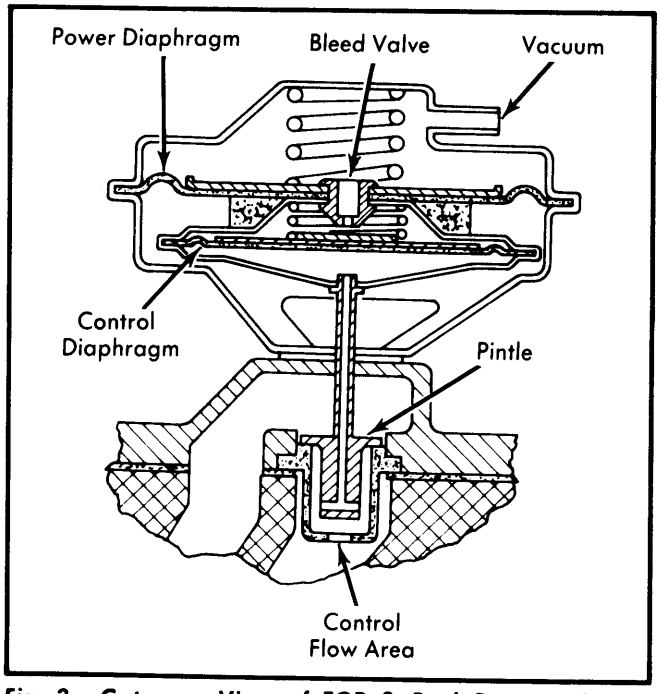

Fig. 3 Cutaway View of EGR & Back-Pressure Sensor

MAINTENANCE

Inspect EGR system every 30,000 miles (every complete precision tune-up). EGR system should be inspected for proper operation, carbon deposits and leaking vacuum hoses. Clean and repair system as necessary. Also check for proper vacuum hose routing.

TROUBLE SHOOTING

Improper combustion and/or faulty emission levels may be caused by any or all the following:

1) EGR system components inoperative or malfunctioning.

2) EGR exhaust ports restricted or blocked.

3) EGR vacuum hoses disconnected, crimped or improperly routed.

4) Leaks in exhaust system decreasing back pressure.

TESTING

EGR VALVE

Opening Test – 1) With engine at operating temperature, rapidly open and close throttle (rev engine to at least 1500 RPM). A movement should be seen in the EGR diaphragm.

2) If diaphragm does not move, probable causes are: faulty vacuum signal to EGR valve; defective EGR diaphragm or back-pressure sensor diaphragm; vacuum leak.

Closing Test – 1) With engine at normal operating temperature, manually depress EGR valve diaphragm. This should cause an immediate drop in engine speed.

2) If not, passage between EGR valve and manifold may be plugged. If engine idles rough and is not affected by depressing diaphragm, fault is in hoses or EGR valve.

3) If engine idles properly but there is no change in RPM when valve is depressed, exhaust gases are not reaching the combustion chamber. There is probably a plugged passage between the EGR valve and the intake manifold.

COOLANT TEMPERATURE OVERRIDE (CTO) SWITCH

1) For test, coolant temperature must be at least 10°F below appropriate valve opening temperature. Check for vacuum leaks and proper hose routings. *See appropriate illustration in this article.*

2) Disconnect hose at TVS and connect line to vacuum gauge. Operate engine at 1500 RPM. No vacuum should be indicated. If it is, replace CTO switch for EGR system.

3) Idle engine until coolant temperature is above CTO switch opening temperature. Accelerate engine to 1500 RPM. Carburetor ported vacuum should be indicated on vacuum gauge. If not, replace EGR/CTO switch.

THERMAL VACUUM SWITCH (TVS)

1) Cool air cleaner to less than 40°F. Detach vacuum lines from TVS and connect external vacuum source to one outlet and vacuum gauge to the other.

2) Apply vacuum to TVS. No vacuum should be indicated on gauge while TVS is below 40°F . If it is, replace TVS.

3) Start engine and idle until TVS temperature is above 55°F. Vacuum should now be indicated on gauge when applied with vacuum source. If not, replace TVS.

EGR FORWARD DELAY VALVE

1) Apply a constant vacuum of 10 in. Hg to Black side of delay valve. Connect one end of 24" section of vacuum hose to vacuum gauge and other end to colored side of delay valve.

2) Observe time in seconds for gauge pointer to move from 0 to 8 in. of Hg with constantly applied 10 in. Hg vacuum source. Check with specifications listed in table to ensure correct operation.

Forward Delay Valve Test

Color	Time in Seconds Minimum	Maximum
Black/Gray	10	12
Black/Brown	20	24
Black/White	63.5	77
Black/Yellow	100	120
Black/Purple	4	4.8
Black/Green	200	240
Black/Orange	2	2.5