1975-79 EXHAUST EMISSION SYSTEMS
American Motors EGR System

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.

System consists of a diaphragm-actuated EGR valve, Coolant Temperature Override (CTO) switch and connecting hoses. 1975 Calif. and all 1976 engines use an external Backpressure Sensor (BPS). 1977-79 models use an EGR valve with integral BPS.

EGR VALVE

The EGR valve is mounted on the side of the intake manifold (4 and 6-cylinder) or on the rear of the intake manifold (V8). Three types of EGR valves are used. These are described below:

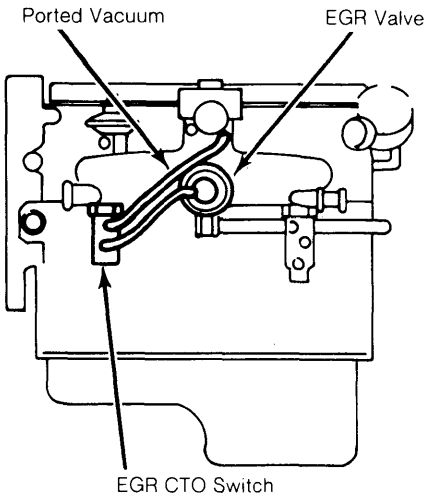
EGR Valve without BPS (1975 Fed. & 1978-79 4-Cyl.) - This EGR valve uses a restrictor plate on 4-cylinder engines (except on high altitude vehicles). The valve is normally closed by spring pressure. When enough vacuum is applied, the EGR valve opens, allowing exhaust gas recirculation.

EGR Valve with External BPS (1975-76 6-Cyl. & V8) - Used on 1975 Calif. only and all 1976 applications, this EGR valve uses a restrictor plate. (identified by last digit of part No.). The valve is normally closed by spring pressure. When enough vacuum is applied, the EGR valve opens, allowing exhaust gas recirculation.

The PBS is connected to a plate mounted between the EGR valve and its mounting flange. Exhaust gases exerts pressure (backpressure) inside the exhaust manifold whenever the engine is running. When the pressure is high enough, it allows manifold vacuum (if present) to allow EGR operation.

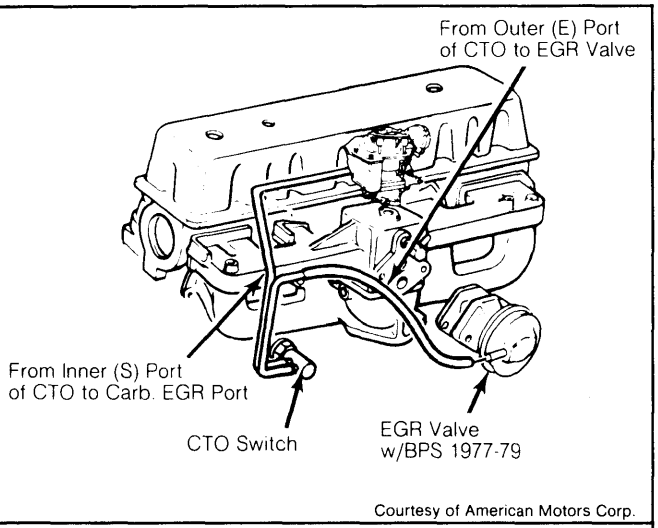
EGR Valve with Integral BPS (1977-79 6-Cyl. & V8) - An EGR valve and BPS combined into a single unit. Normally closed, no exhaust gas recirculation occurs through the EGR valve. Exhaust gas exerts pressure (backpressure) inside the exhaust manifold whenever the engine is running. This pressure is conducted through the hollow pintle stem into the control diaphragm chamber. *Fig. 8.* If this pressure is great enough to overcome control spring pressure, the control diaphragm is moved against the bleed valve. Full vacuum is now applied to the power diaphragm and the pintle moves. EGR begins.

If backpressure drops enough, the control diaphragm moves away from the bleed valve. The power diaphragm relaxes and EGR stops. System pressure remains constant, within the range of the EGR unit. Recirculation occurs as a result of backpressure levels.



Courtesy of American Motors Corp.

Fig. 1: EGR System Layout for 1977-79 4-Cyl.



Courtesy of American Motors Corp.

Fig. 2: EGR System Layout for 1975-76 Federal & 1977-79 6-Cyl. 1-Bbl.

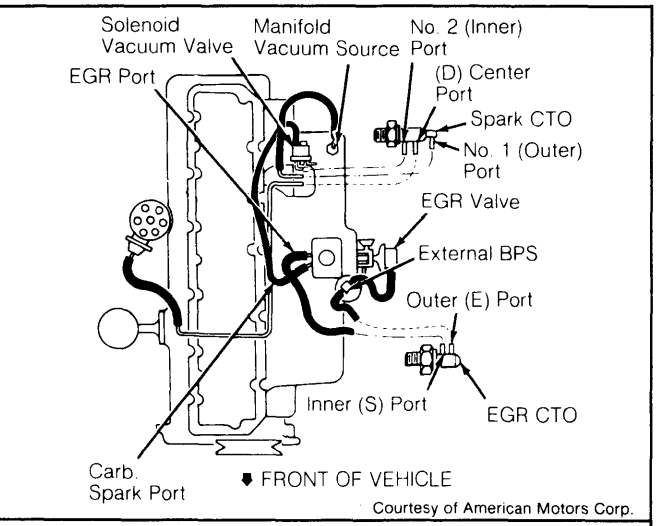
EGR CTO SWITCH

This switch is located in the coolant passage on the bottom of the intake manifold (4-cylinder), at the left side of the cylinder block (6-cylinder), or next to the oil filler tube on the intake manifold (V8).

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 160°F (Yellow valve), 115°F (Black valve) or 85°F (White valve).

THERMAL VACUUM SWITCH (TVS)

Used only on 6-cylinder engines with 2-Bbl., this switch is located in the 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 40-50°F, TVS limits passage of vacuum, delaying EGR operation and improving cold driveability. *See Fig. 4.*



Courtesy of American Motors Corp.

Fig. 3: EGR System Layout for 1975-76 Calif. 6-Cyl.

1975-79 EXHAUST EMISSION SYSTEMS
American Motors EGR System (Cont.)

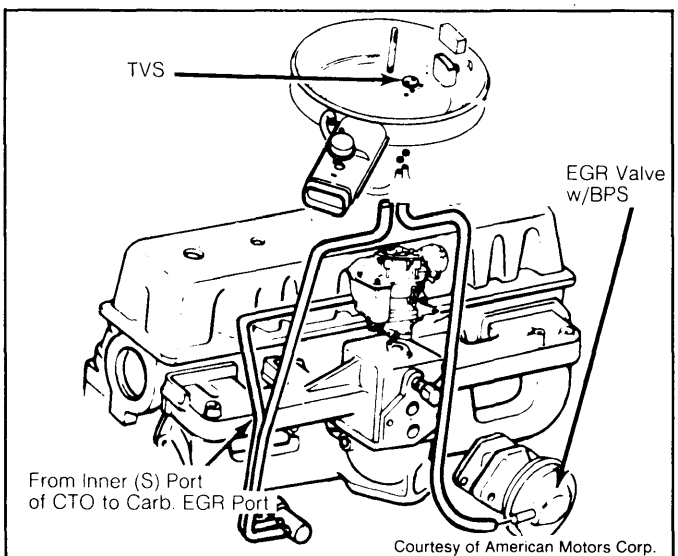


Fig. 4: EGR System Layout for 1979 6-Cyl. 2-Bbl.

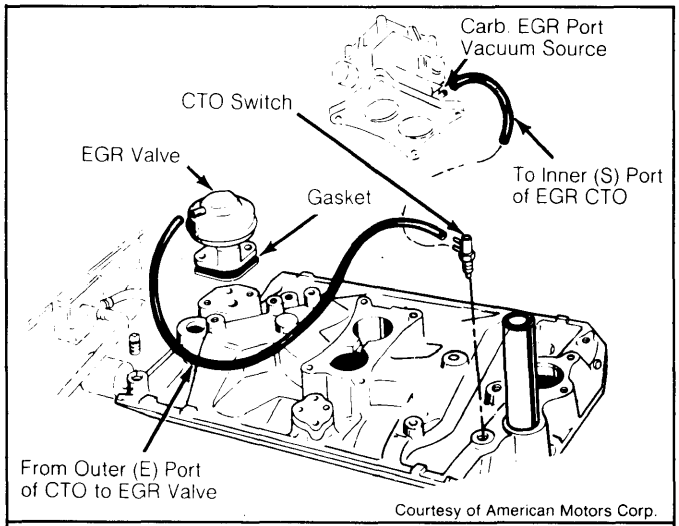


Fig. 5: EGR System Layout for 1975 Fed. V8.

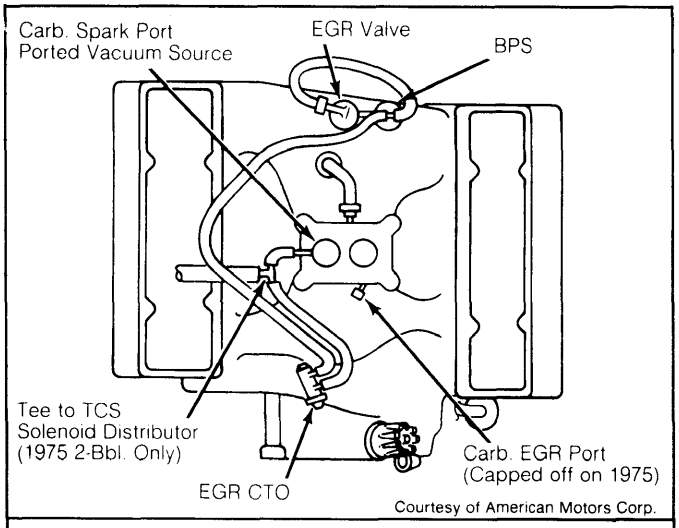


Fig. 6: EGR System Layout for 1975 Calif. & 1976 V8

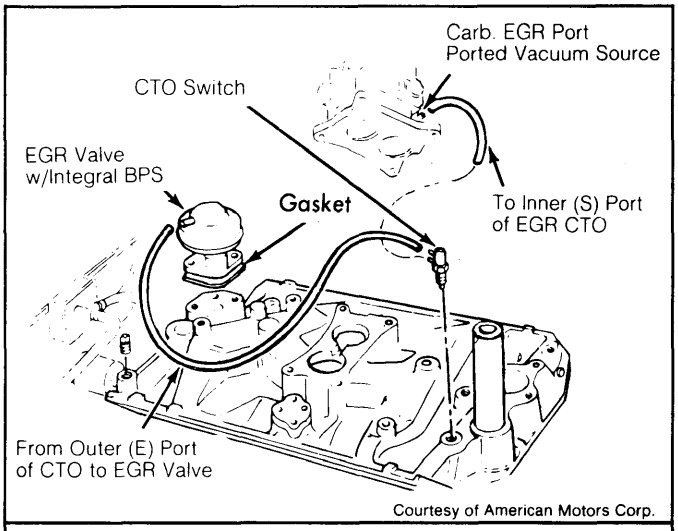


Fig. 7: EGR System Layout for 1977-79 V8

MAINTENANCE

Inspect EGR system every 10,000 miles (1975 vehicles using leaded fuel only) or 30,000 miles (all others). 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:

- EGR system components inoperative or malfunctioning.
- EGR exhaust ports restricted or blocked.
- EGR vacuum hoses disconnected, crimped or improperly routed.

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 backpressure 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. Check for a plugged passage between the EGR valve and the intake manifold.

COOLANT TEMPERATURE OVERRIDE (CTO) SWITCH

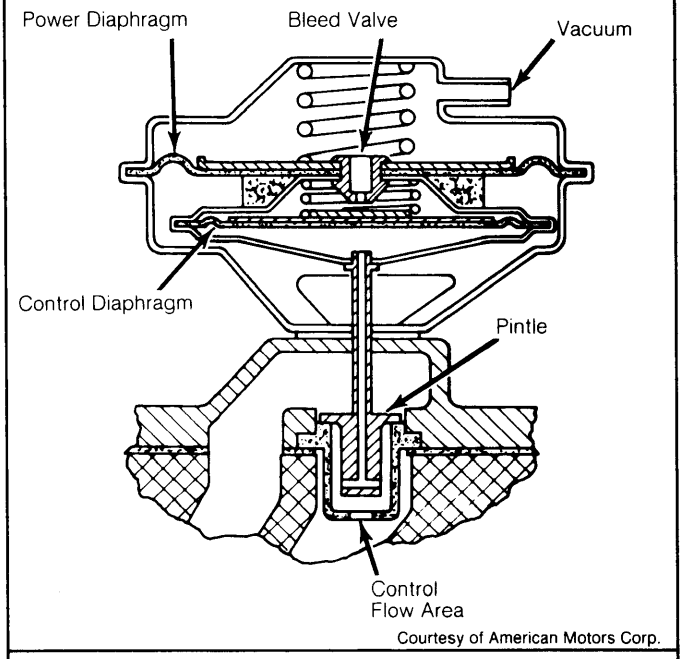
1) For test, coolant temperature must be at least 10°F below appropriate valve opening temperature of 160°F for Yellow CTO switch, 115°F for Black CTO switch and 85°F for White CTO switch. Check for vacuum leaks and proper hose routings.

1975-79 EXHAUST EMISSION SYSTEMS
American Motors EGR System (Cont.)

2) Disconnect vacuum line at external BPS or EGR valve and connect line to vacuum gauge. Also, disconnect TVS if so equipped.
3) Operate engine at 1500 RPM. No vacuum should be indicated. If it is, replace the CTO switch for the EGR system.
4) Run 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 warm TVS to above 50°F. Vacuum should now be indicated on gauge when applied with vacuum source. If not, replace TVS.

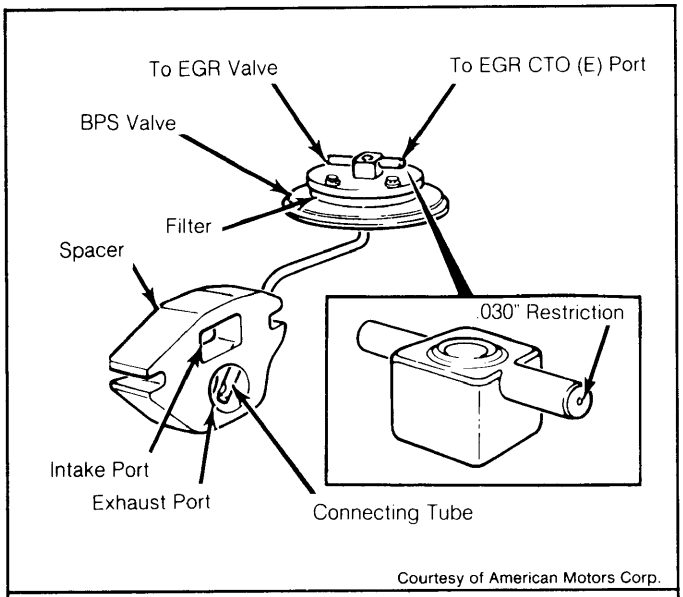


Courtesy of American Motors Corp.

Fig. 8: 1977-79 EGR & Integral BPS Valve

BACKPRESSURE SENSOR (BPS)

1975-76 Only - 1) Inspect all vacuum hoses for leaks and correct routing. "T" a vacuum gauge in vacuum hose between EGR valve and BPS. Ensure no vacuum is present when engine is idling.
2) If present, check for correct hose routing. Ensure manifold vacuum is not being used as a vacuum source. If carburetor is providing ported vacuum, inspect for a partially open or damaged throttle plate.
3) With engine at warm operating temperature, accelerate engine to 2000 RPM. Observe vacuum gauge. If no vacuum is present, check operation of the CTO. If okay, and vacuum does not reach inlet side of BPS, replace BPS.



Courtesy of American Motors Corp.

Fig. 9: 1975-76 External BPS Valve