

EGR SYSTEM

1988 Jeep Cherokee

1983-88 Exhaust Emission Systems
JEEP EXHAUST GAS RECIRCULATION

DESCRIPTION

Purpose of the Exhaust Gas Recirculation (EGR) system is to limit formation of oxides of nitrogen (NO_x) emissions. This is done by reducing high peak combustion temperatures at which NO_x is formed. By reintroducing some exhaust gas back into combustion chamber, high temperatures are avoided. Thus NO_x emissions formation is reduced.

System consists of vacuum-operated EGR valve and coolant temperature override (CTO) switch. In addition, some models are equipped with air cleaner-mounted thermal vacuum switch (TVS), and some are equipped with an EGR vacuum dump valve.

OPERATION

When the EGR valve receives vacuum signal, through the CTO switch, EGR valve opens and meters gases from exhaust manifold into intake manifold. Individual component operation is as follows:

EGR VALVE

EGR valve is mounted on intake manifold. Exhaust gas is drawn from exhaust crossover passage or exhaust manifold. Two types of EGR valves are used: valve without backpressure sensor and valve with integral backpressure sensor.

EGR Valve W/O Integral Backpressure Sensor

EGR valves are calibrated by use of different shapes of valve pintles or orifices. Valve is normally held closed by spring (above diaphragm). Valve opens by overcoming spring tension when vacuum is sensed through coolant temperature override switch (CTO) and backpressure sensor (if equipped).

EGR Valve W/Integral Backpressure Sensor

Calibration is accomplished by use of different diaphragm spring loads and flow control orifices. This integral type unit combines EGR valve and backpressure sensor functions into one component. Restrictor plate is required with some engines.

Exhaust gas exerts backpressure inside exhaust manifold whenever engine is running. This pressure is conducted through hollow pintle stem into EGR diaphragm control chamber. If this pressure is great enough to overcome spring tension against diaphragm, diaphragm is moved against bleed valve and exhaust gas flow begins.

COOLANT TEMPERATURE OVERRIDE (CTO) SWITCH

Coolant temperature override (CTO) switch is located in coolant passage at cylinder head or coolant passage at intake manifold.

Inner port of switch is connected to EGR port on intake manifold and outer port is connected to EGR valve, or EGR-TV. Switch opens at a preset temperature. Below these temperatures, no EGR is possible.

Vacuum Signal Dump Valve

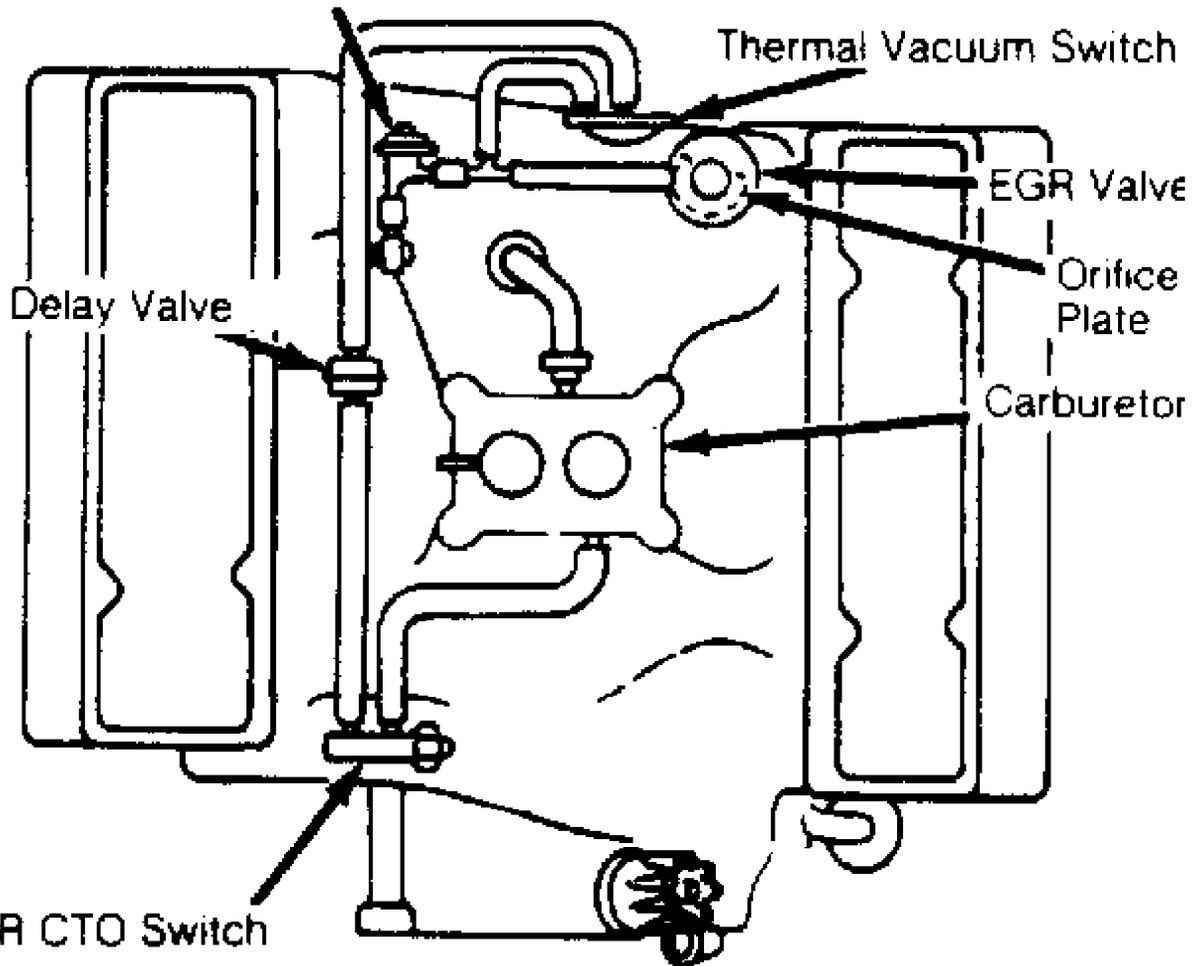


Fig. 1: Jeep V8 Carbureted Engine EGR System
Courtesy of Chrysler Motors.

THERMAL VACUUM SWITCH (TVS)

Used only on carbureted 6-cylinder and V8 engines, this switch is located in air cleaner and acts as on-off switch for EGR system. It is controlled by ambient temperature in air cleaner. Switch controls vacuum passage between CTO switch and EGR valve. Below preset temperature, TVS blocks passage of vacuum delaying EGR operation and improving cold driveability.

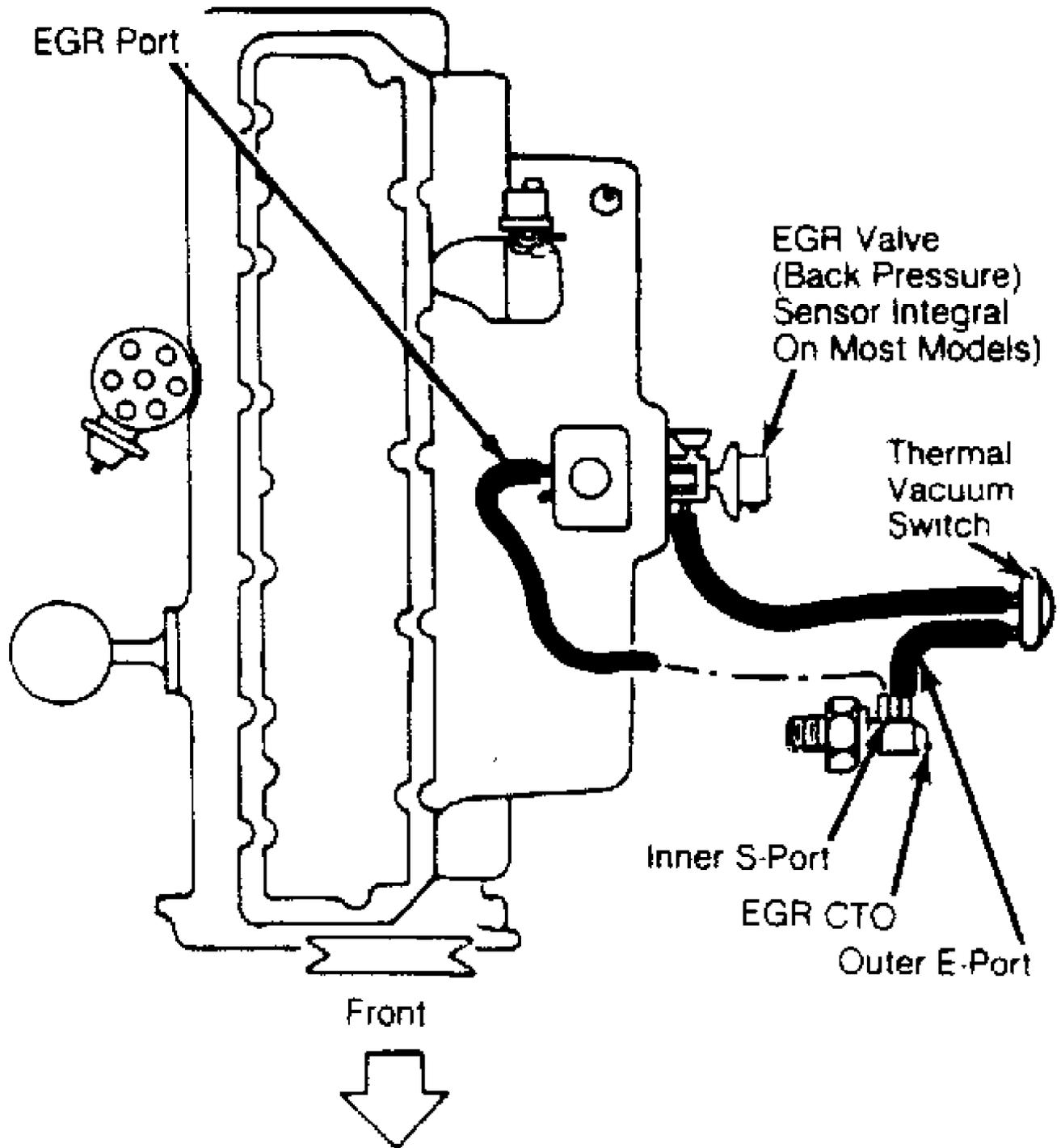


Fig. 2: Jeep 6-Cylinder Carbureted Engine EGR System
 Courtesy of Chrysler Motors.

EGR DUMP VALVE

Used on some models, EGR dump valve is connected in series with vacuum source and EGR valve. Valve is used to eliminate EGR function at low vacuum levels. When vacuum drops below predetermined level, valve "dumps" vacuum rather than allowing it to flow to EGR

valve.

FORWARD DELAY VALVE

Forward delay valve is located between EGR CTO switch and EGR valve. It modifies initial vacuum signal applied to EGR valve by delaying full vacuum force.

TESTING

EGR VALVE

Valve Opening Test

1) With engine at normal operating temperature and at idle, rapidly open and close throttle. Open throttle sufficiently to obtain at least 1500 RPM. Movement should be noticed in EGR diaphragm.

2) If diaphragm does not move, probable causes are: faulty vacuum signal to EGR, defective EGR diaphragm or defective backpressure sensor diaphragm (if equipped), or leaks in vacuum lines or connections.

Valve Closing Test

1) With engine at normal operating temperature and at idle, manually depress EGR valve diaphragm. RPM should immediately drop, indicating that EGR valve is not leaking and had been properly cutting off exhaust gas flow at idle.

2) If there is no change in RPM and engine is idling properly, exhaust gases are not reaching combustion chamber. Check for plugged passage between EGR valve and intake manifold.

3) If engine idles poorly and RPM is not greatly affected by manually moving diaphragm up, EGR valve is not closing off exhaust gas flow. Check for carbon between pintle, leaking EGR valve gasket or bad EGR valve.

COOLANT TEMPERATURE OVERRIDE (CTO) SWITCH

NOTE: Engine coolant temperature must be below 100°F (38°C) to perform this test.

1) Check vacuum lines for leaks and correct routing. Disconnect vacuum line at backpressure sensor (if equipped) or at EGR valve, and attach this line to vacuum gauge.

2) Operate engine at 1500 RPM. No vacuum should be indicated on gauge. If vacuum is shown, replace CTO switch.

3) Idle engine until coolant temperature exceeds 100°F (38°C) on 4-cylinder engines, or 115°F (46°C) on 6-cylinder and V8 engines.

4) Raise engine speed to 1500 RPM. Ported vacuum should be shown on gauge. If not, replace CTO switch.

DUMP VALVE

1) With engine at normal operating temperature, remove dump valve vacuum hose from manifold and plug manifold connection.

2) Raise engine speed to 2000 RPM. Vacuum should be present at exhaust ports on bottom of valve. If not, replace valve.

3) Reconnect vacuum hose to manifold and raise engine speed to 2000 RPM. No vacuum should be felt at exhaust ports on bottom of valve. If vacuum is present, replace valve.

THERMAL VACUUM SWITCH (TVS)

1) With the air cleaner temperature below 40°F (-4°C), disconnect vacuum hoses from TVS and connect vacuum source to large outlet.

2) Apply vacuum to TVS. TVS should hold vacuum. If not, replace TVS.

3) Start engine and warm air cleaner to 55°F (13°C), or greater. TVS should not hold vacuum. If it does, replace TVS.