JEEP EXHAUST GAS RECIRCULATION

DESCRIPTION

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

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

OPERATION

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

EGR VALVE

The EGR valve is mounted on a spacer plate located beneath carburetor on 4-cylinder models, on a machined surface at rear of intake manifold on V8 models, and on the side of intake manifold on 6-cylinder models. Exhaust gas is drawn from exhaust crossover passage in V8 and 4-cylinder engines and from an area near heat riser in 6-cylinder engines. Two types of EGR valves are used: A valve without back pressure sensor and a valve with integral back pressure sensor.

EGR Valve w/o Integral Back Pressure Sensor

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

EGR Valve w/Integral Back Pressure Sensor

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

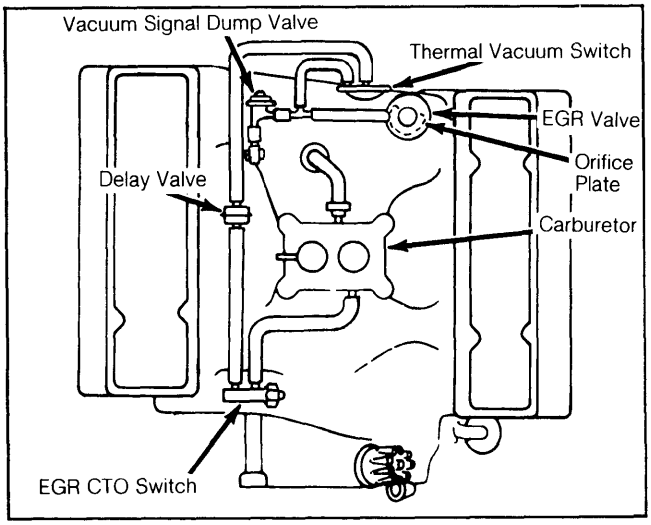
Exhaust gas exerts back pressure inside exhaust manifold whenever engine is running. This pressure is conducted through a hollow pintle stem into EGR diaphragm control chamber. If this pressure is great enough to overcome spring tension against diaphragm, the diaphragm is moved against bleed valve and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

COOLANT TEMPERATURE OVERRIDE (CTO) SWITCH

Coolant temperature override (CTO) switch is located in coolant passage at right rear of cylinder head on 4-cylinder engines, at coolant passage of intake manifold, or at right rear corner of intake manifold near EGR valve on V8 engines, or at left front side of cylinder block on 6-cylinder engines.

The inner port of switch is connected to EGR spark port on carburetor and outer port is connected to EGR valve, or TVS. Switch opens at 100°F (38°C) for 4-cylinder engines, or 115°F (46°C) for 6-cylinder and V8 engines. Below these temperatures, no EGR is possible.

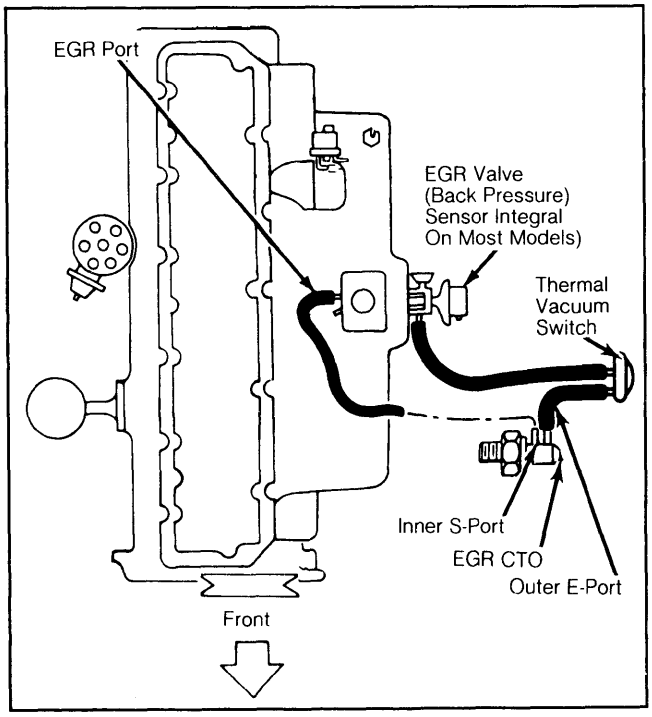
Fig. 1: Typical Jeep V8 Engine EGR System



THERMAL VACUUM SWITCH (TVS)

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

Fig. 2: Typical Jeep 6-Cylinder Engine EGR System



EGR DUMP VALVE

Used on some models, EGR dump valve is connected in series with vacuum source and EGR valve.

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JEEP EXHAUST GAS RECIRCULATION (Cont.)

Valve is used to eliminate EGR function at low vacuum levels. When vacuum drops below a predetermined level, valve "dumps" vacuum rather than allowing it to flow to EGR valve.

FORWARD DELAY VALVE

The forward delay valve is located between EGR CTO switch and EGR valve. It modifies the 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 curb idle, rapidly open and close throttle. Open throttle sufficiently to obtain at least 1500 RPM. A definite 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 back pressure sensor diaphragm (if equipped); or leaks in vacuum lines or connections.

Valve Closing Test

1) With engine at normal operating temperature and at curb idle, manually depress EGR valve diaphragm. This should cause an immediate engine speed drop, indicating that EGR valve 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. There is probably a plugged passage between EGR valve and intake manifold.

3) If engine idles poorly and RPM is not greatly affected by moving diaphragm, EGR valve is not closing off exhaust gas flow. Defective hoses, hose routing, or EGR valve is problem.

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 back pressue sensor (if equipped) or at EGR valve, and attach this line to a 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) Accelerate engine to 1500 RPM. Carburetor 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) Accelerate engine 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 accelerate engine to 2000 RPM. No vacuum should be felt at exhaust ports on bottom of valve. If vacuum is present, replace valve.

THERMAL VACUUM SWITCH

1) With 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. Vacuum should be held. If not, replace TVS.

3) Start engine and warm air cleaner to 55°F (13°C), or above. Vacuum should not be held. If it is held, replace TVS.

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