1975-79 EXHAUST EMISSION SYSTEMS
Jeep Exhaust Gas Recirculation

DESCRIPTION

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

System consists of a vacuum-operated EGR valve, exhaust backpressure transducer (may be integral or external) and a Coolant Temperature Override (CTO) switch. In addition, some 6-cylinder models are equipped with an air cleaner-mounted Thermal Vacuum Switch (TVS), and some models are equipped with an EGR vacuum dump valve.

OPERATION

EGR VALVE

The EGR valve mounts on a machined surface at the rear of the intake manifold on V8 engines and on the side of the intake manifold on 6-cylinder engines. When the separate (non-integral) backpressure sensor is used, the EGR valve mounts on the spacer which is an attached part of the backpressure sensor. Exhaust gas is drawn from the exhaust crossover passage in V8 engines and from an area near the heat riser in 6-cylinder engines. Three types of EGR valves are used: valve without backpressure sensor, valve with integral backpressure sensor and valve with non-integral back pressure sensor.

EGR Valve (Non-Integral Backpressure Sensor) - EGR valves are calibrated by the use of different shapes of the valve pintles. The valve is normally held closed by a spring (above the diaphragm). The valve opens by overcoming spring tension when vacuum is sensed through the Coolant Temperature Override (CTO) switch and the backpressure sensor (if used).

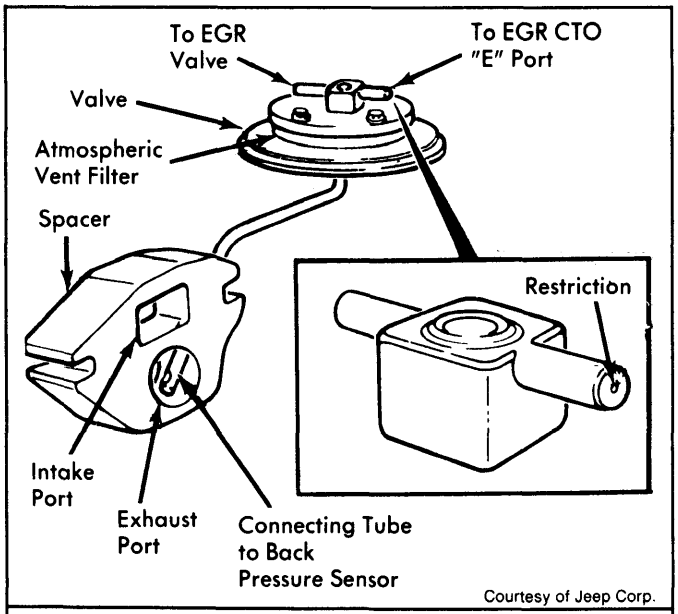

Fig. 1: Non-Integral Exhaust Backpressure Sensor

EGR Valve (Integral Backpressure Sensor) - Calibration is accomplished by the use of different diaphragm spring loads and flow control orifices. This integral type unit combines the EGR valve and backpressure sensor functions into one component. A restrictor plate is not required with this unit.

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

CTO SWITCH

The Coolant Temperature Override (CTO) switch is located in the coolant passage of the intake manifold (adjacent to the oil filler tube) on V8 engines, and at left front side of cylinder block on 6-cylinder engines. The inner port of the switch is connected to the EGR port on the carburetor and the outer port is connected to the backpressure sensor (if used), or to the EGR valve.

Switch with a Black paint dab or body opens at 115°F to allow EGR operation; switch with Yellow paint dab or body opens at 160°F. Below these temperatures, no EGR is allowed.

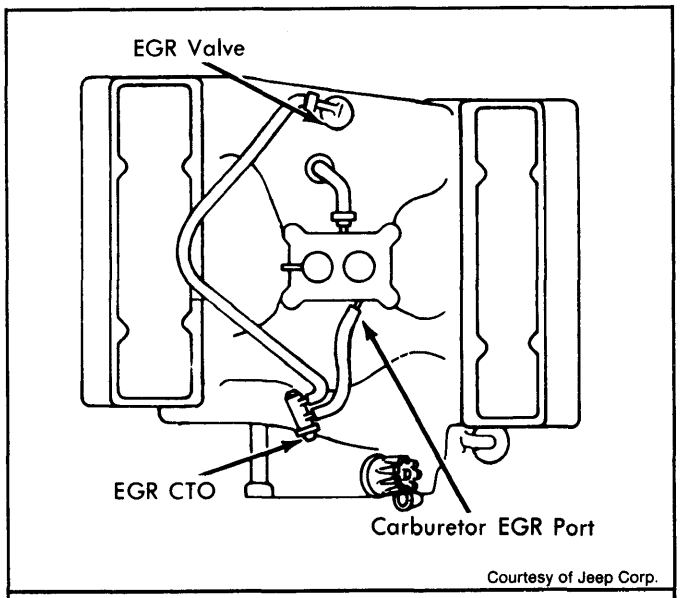

Fig. 2: Typical V8 Engine EGR System

THERMAL VACUUM SWITCH (TVS)

Used only on 6-cylinder models, 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. The switch controls vacuum passage between CTO switch and EGR valve. Below a preset temperature, TVS blocks passage of vacuum, delaying EGR operation and improving cold driveability.

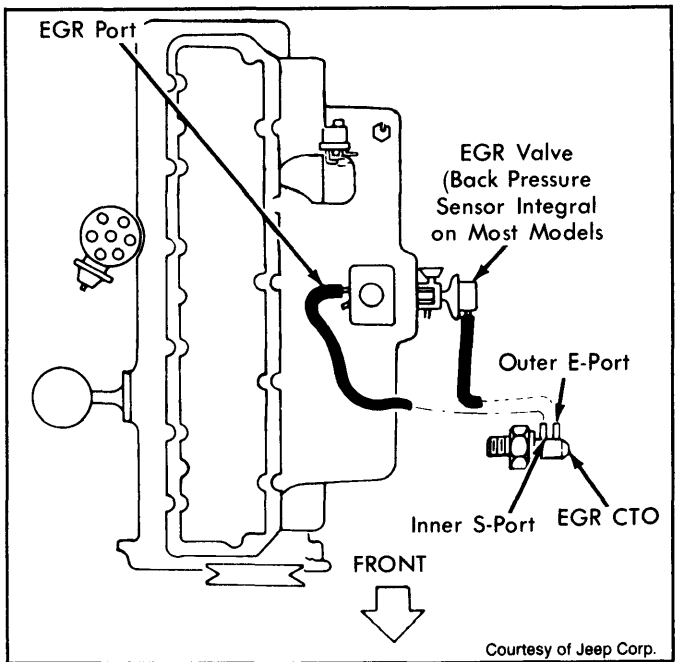

Fig. 3: Typical 6-Cylinder Engine EGR System

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Jeep Exhaust Gas Recirculation (Cont.)

EGR DUMP VALVE

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

TESTING

EGR VALVE

Valve Opening Test - 1) With engine of 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 the EGR diaphragm.
2) If diaphragm does not move, check vacuum signal to EGR valve, defective EGR diaphragm or defective backpressure sensor diaphragm (if equipped).
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. Release diaphragm. Engine should return to normal idle.
2) If there is no change in RPM and engine is idling properly, remove EGR valve and check for a carbon plugged passage.
3) If engine idles poorly and RPM is not greatly affected by moving the diaphragm, check for EGR valve not closing off exhaust gas flow, improper hose routing or defective EGR valve.

CTO SWITCH

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

1) Check vacuum lines for leaks and correct routing. Disconnect vacuum hose at backpressure sensor (if equipped) or at EGR valve, and attach this hose 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 115°F (Black switch) or 160° (Yellow switch).
4) Accelerate engine to 1500 RPM. Carburetor ported vacuum should be shown on gauge. If not, replace CTO switch.

BACKPRESSURE SENSOR

Non-Integral Type - 1) Check all vacuum lines for leaks and correct routing. Tee a vacuum gauge into the vacuum line between EGR valve and backpressure sensor. Start engine and allow to idle. No vacuum should be indicated.
2) If vacuum is indicated at idle, recheck all line connections and make sure manifold vacuum is not used as vacuum source. Check for partially open throttle plate, which could apply some vacuum to backpressure sensor.
3) Accelerate engine to 2000 RPM and observe vacuum gauge. Below 115°F coolant temperature, no vacuum should be indicated. Above 115°F or 160°F (according to CTO used), ported vacuum should be indicated.
4) If no vacuum is indicated during test, be sure vacuum is being applied to inlet side of backpressure sensor. Remove sensor and inspect spacer port and tube for restrictions. If necessary, replace back-pressure sensor.
Integral Type - 1) Remove EGR valve. Apply a constant external vacuum of 10 in. Hg (or more) to EGR valve signal tube. Valve should not open. If it does, control valve in atmospheric vent is stuck closed. Clean or replace EGR valve.
2) With vacuum still applied, apply a stream of air from a low pressure source into the EGR valve exhaust gas intake passage. Valve should open completely. If it does not open at all, control valve is stuck open or exhaust passages are plugged. Clean EGR valve.
3) If EGR valve and control valve are both functioning properly, clean the mounting surfaces, then using a new gasket, install valve on engine. Reconnect vacuum hose.