

1981 Exhaust Emission Systems

GENERAL MOTORS DIESEL EXHAUST GAS RECIRCULATION

DESCRIPTION

NOTE — The following information applies to the 5.7L Diesel engine. The 1.8L Diesel does not have an EGR system.

Two basic Exhaust Gas Recirculation (EGR) systems are used on General Motors diesel engines to lower oxides of nitrogen (NOx) emissions. Federal vehicles use a modulated (internal) EGR system, while California vehicles use a throttle position modified orifice (external) EGR system. See Fig. 1.

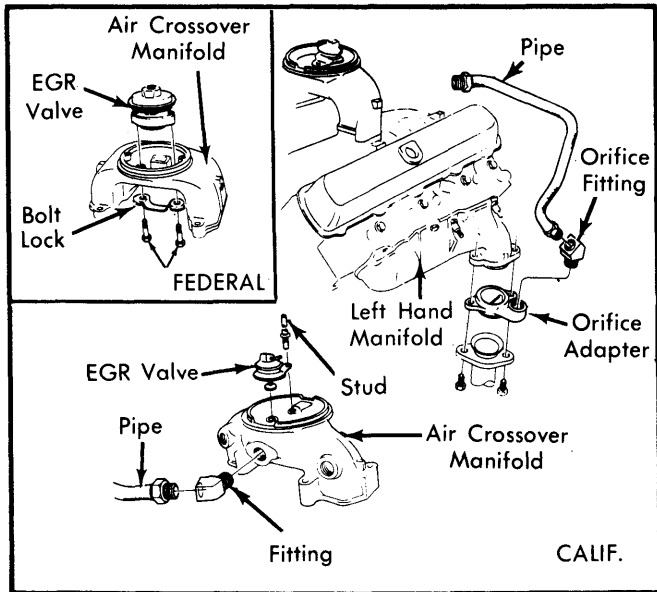


Fig. 1 General Motors Diesel Engine EGR Valves

Both systems introduce exhaust gas into the intake manifold and then the combustion chambers. This recirculation lowers combustion chamber temperatures and NOx emissions. EGR valves allow exhaust gas flow into the intake manifold at all times, except wide open throttle.

Federal models use an Exhaust Pressure Regulator (EPR) valve in the exhaust system to increase back pressure in the exhaust flow. Some Federal models (not Eldorado, Seville or Toronado) have an additional EGR control assembly between the vacuum regulator valve and EGR valve to reduce recirculation when the Torque Converter Clutch (TCC) is engaged.

OPERATION

MODULATED (INTERNAL) EGR SYSTEM (FEDERAL VEHICLES)

EGR valve opening rate is modulated by a signal from the Vacuum Regulator Valve (VRV) mounted on the diesel fuel injection pump. See Fig. 2. EGR valve opening is regulated from fully open at idle to fully closed at wide open throttle. EGR is reduced when the TCC is engaged, the reduction being controlled by the EGR control assembly.

The control assembly is located between the VRV and the EGR valves. When the TCC is disengaged, the solenoid of the EGR control assembly is de-energized and VRV regulated vacuum is directed to the EGR valve. When the TCC is engaged, an electrical signal energizes the solenoid in the control assembly, allowing the vent to open. The reducer valve portion of the control assembly then reduces VRV regulated vacuum (otherwise equal to EGR valve vacuum) by 2.5" Hg.

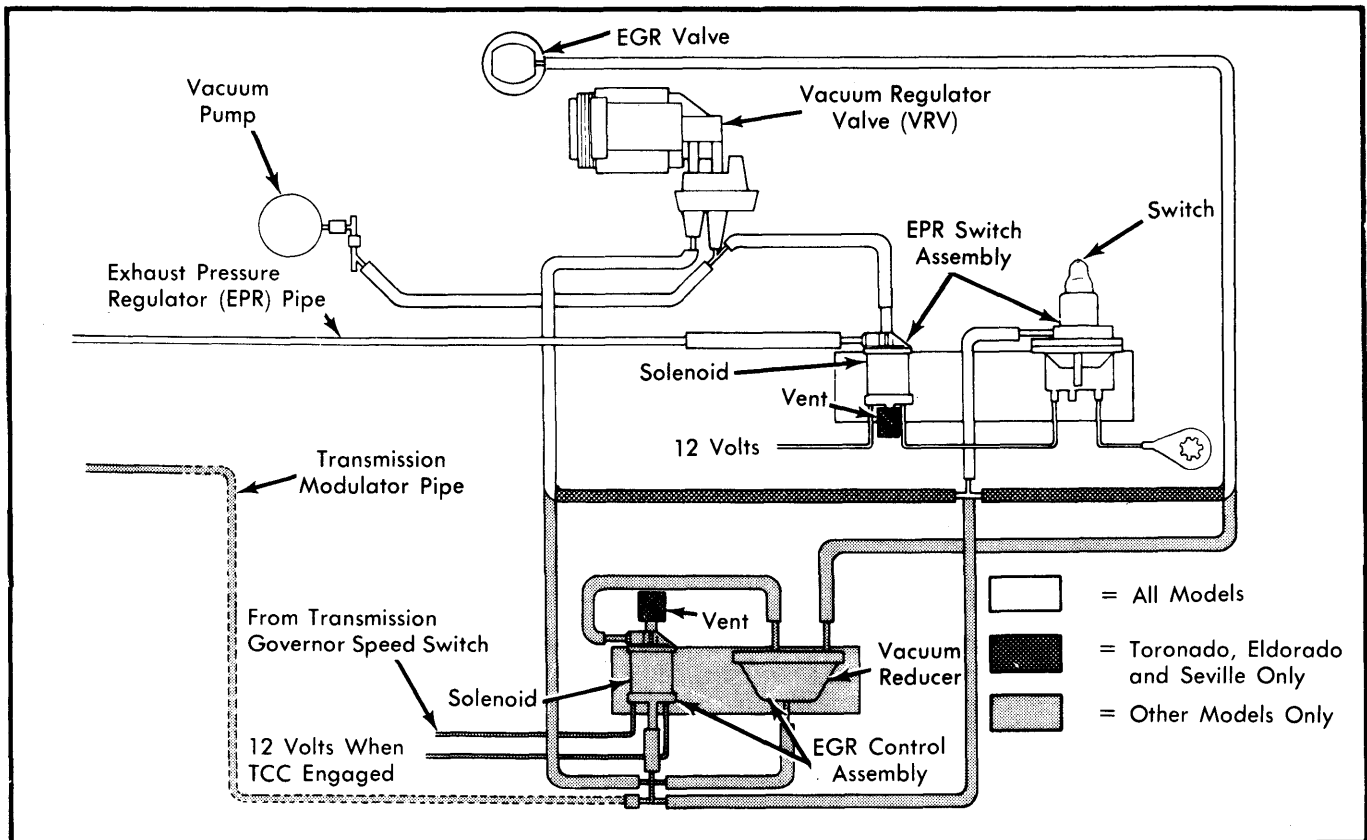


Fig. 2 General Motors Diesel Engine EGR System (Federal)

GENERAL MOTORS DIESEL EXHAUST GAS RECIRCULATION (Cont.)

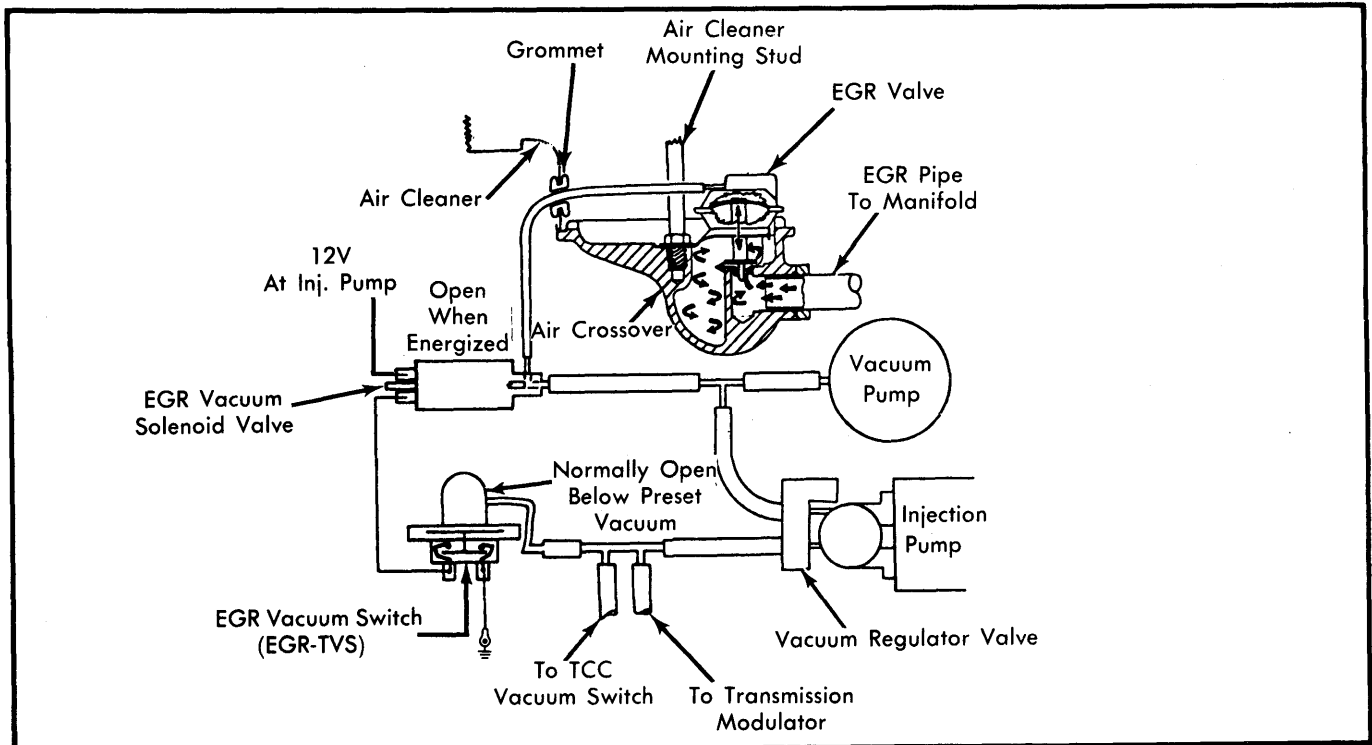


Fig. 3 General Motors Diesel Engine EGR System (California)

Normally open during driving, the EPR valve is closed at idle to increase exhaust pressure. This increases EGR flow to the engine. Above idle, the EPR valve opens to provide normal EGR level for driving.

Throttle position is sensed by the VRV on the injection pump. The VRV then sends a vacuum signal proportional to throttle travel. When VRV regulated vacuum is above 12 in. Hg, the EPR switch closes the circuit. This energizes the solenoid, allowing full vacuum pump vacuum to be directed to the EPR valve, closing it.

The closed EPR valve results in additional exhaust back pressure, which boosts EGR for reduced emissions. When vacuum is below 12 in. Hg, the switch opens and vacuum to the solenoid is blocked. The EPR valve is vented at the solenoid portion of the EPR switch, opening the EPR valve.

THROTTLE POSITION MODIFIED ORIFICE (EXTERNAL) EGR SYSTEM (CALIF. VEHICLES)

The amount of EGR is controlled by a fixed orifice, located where the EGR pipe enters the exhaust manifold. See Fig. 3.

The orifice size varies with engine applications. The EGR valve, mounted in the crossover manifold shuts the EGR off. It is an on-off type valve and does not provide a controlled, varying amount of gas flow.

Throttle position is sensed by the VRV mounted on the injection pump throttle shaft. The valve regulates vacuum proportional to throttle travel. At wide open throttle, the vacuum switch de-energizes the solenoid, which shuts off the vacuum signal to the EGR valve. This closes the EGR valve, stopping EGR flow.

TROUBLE SHOOTING

EGR VALVE WILL NOT OPEN

Binding or stuck valve — replace. No vacuum to EGR valve — check hoses and vacuum switches, regulator valve, solenoid and pump.

HEAVY SMOKE ON ACCELERATION EGR VALVE WILL NOT CLOSE

Binding or stuck valve — replace. Vacuum to EGR valve at wide open throttle — check solenoid, vacuum switch, and vacuum regulator valve.

EGR VALVE CLOSSES EARLY

Vacuum switch opening above 8 in. Hg (Tornado, Eldorado, and Seville Federal models) or 6 in. Hg (California and other Federal models) — replace switch. Vacuum regulator valve misadjusted — adjust. See *GM Diesel Fuel Injection*.

SMOKE ON MEDIUM ACCELERATION EGR VALVE CLOSSES LATE (CALIF. MODELS)

Vacuum switch opening below 8 in. Hg — replace switch. Vacuum regulator misadjusted — adjust. See *GM Diesel Fuel Injection*.

LOSS OF PERFORMANCE, SMOKEY EXHAUST

Exhaust or air cleaner restriction — clean or replace.