INTERNATIONAL HARVESTER CO.
EXHAUST GAS RECIRCULATION – DIESEL ENGINES

DESCRIPTION

The exhaust gas recirculation (EGR) system is designed to reduce the emission of oxides of nitrogen (NOx). The EGR system accomplishes this by introducing a controlled amount of inert (non-combustible) exhaust gas into the intake manifold, where it mixes with intake air, thereby reducing the amount of oxygen to each cylinder. This reduces combustion pressure which reduces temperature and the formation of NOx. This system consists of a vacuum actuated EGR valve, an electric push switch, a solenoid valve, a vacuum pump and a bi-metal thermoswitch.

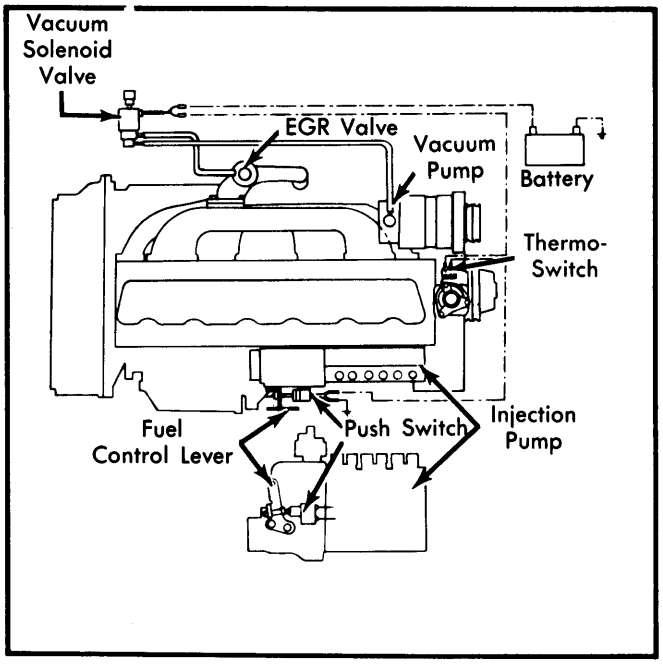

Fig. 1 Emission Control System Diagram

OPERATION

VACUUM PUMP

To provide a vacuum signal, to open EGR valve, a rotary vane type vacuum pump is mounted integrally to the alternator. The rotor and vanes are driven directly by the alternator rotor shaft and are lubricated with engine oil. This pump sends a vacuum signal directly to the vacuum solenoid valve.

VACUUM SOLENOID VALVE (VSV)

The VSV is a 3-port valve with an electric solenoid controlling which passages are interconnected (vacuum signal passage-to-EGR passage or EGR passage-to-atmosphere). The solenoid, when energized, interconnects vacuum signal passage and EGR valve passage which opens EGR valve. When de-energized, the solenoid interconnects EGR valve passage and atmosphere passage, allowing vacuum signal to bleed off which closes EGR valve.

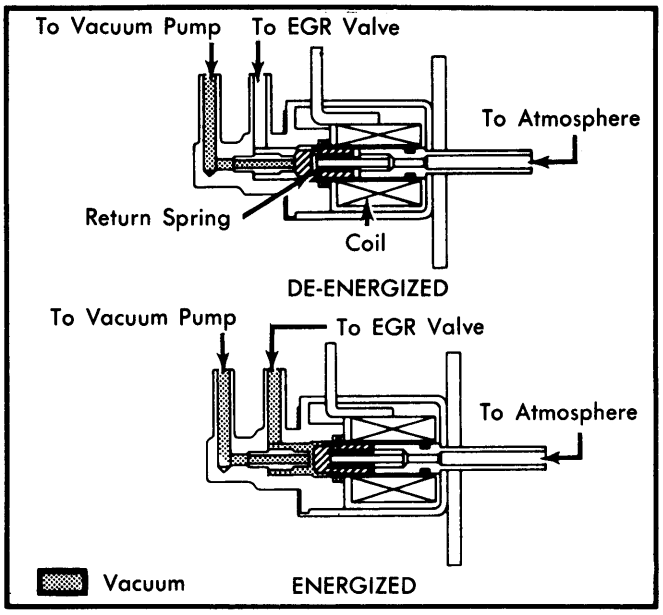

Fig. 2 Cutaway View of Vacuum Solenoid Valve

BI-METAL THERMOSWITCH & PUSH SWITCH

The bi-metal thermo switch and push switch are connected in series in the ground circuit leading to the VSV. They control when the solenoid is to be energized and de-energized.

The bi-metal thermoswitch is located in the thermostat housing and detects coolant temperature. Whenever the coolant temperature is below 122° F the thermoswitch is open. At or above that temperature the thermoswitch closes, causing complete circuit which energizes the VSV. This switch prevents exhaust recirculation when engine is cold and exhaust temperatures are low.

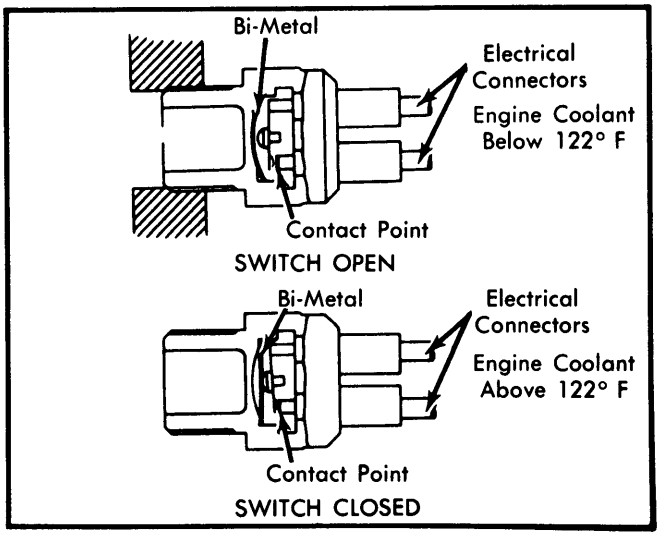

Fig. 3 Cutaway View of Bi-Metal Thermoswitch

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EXHAUST GAS RECIRCULATION – DIESEL ENGINES (Cont.)

The push switch is mounted directly to the injection pump governor and is actuated by the fuel control lever. This switch is in a closed position (complete ground circuit to VSV) at idle and up to 2400 RPM (1200 RPM injection pump speed). At this time, the fuel control lever makes contact with swtich and pushes it to an open position, opening VSV ground circuit to de-energize solenoid.

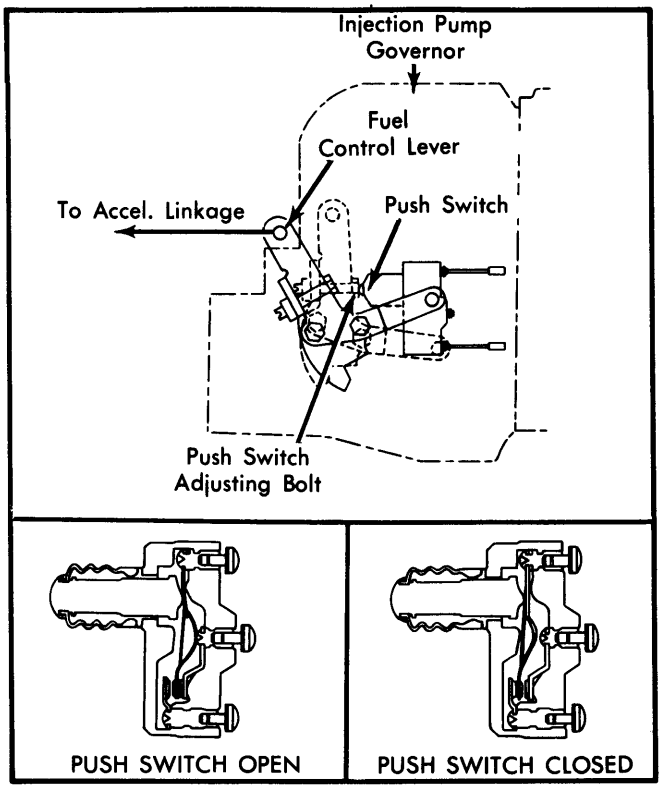

Fig. 4 Push Switch and Mounting Location

EGR VALVE

The EGR valve is mounted on the intake manifold and has exhaust gases piped from exhaust manifold to EGR valve mounting pad. This valve controls the amount of exhaust gases entering the intake manifold. The EGR valve is controlled by vacuum, which is determined by position of fuel control lever and coolant temperature. The valve is held closed by spring pressure until there is enough vacuum signal in diaphragm chamber to overcome the spring and open the valve. When the valve opens, exhaust gases flow directly into intake manifold through passage in valve.

TESTING

EGR VALVE

Remove EGR valve from engine. Apply 15.7 in. Hg of vacuum to diaphragm port. As vacuum is applied, valve stem and diaphragm should move upward, opening pintle valve in exhaust gas passage. If not, valve is faulty and should be replaced.

MAINTENANCE

EGR VALVE

EGR valve, vacuum hoses and ports should be checked, cleaned and replaced if necessary, every or 12,000 miles. Clean EGR valve using spark plug type cleaner (sand blaster) with a rubber spacer between cleaning machine and EGR valve mounting surface (with hole cut in spacer to expose pintle valve). Also, cover outlet port of valve and apply pressure to EGR valve diaphragm when cleaning to open valve and expose passages.

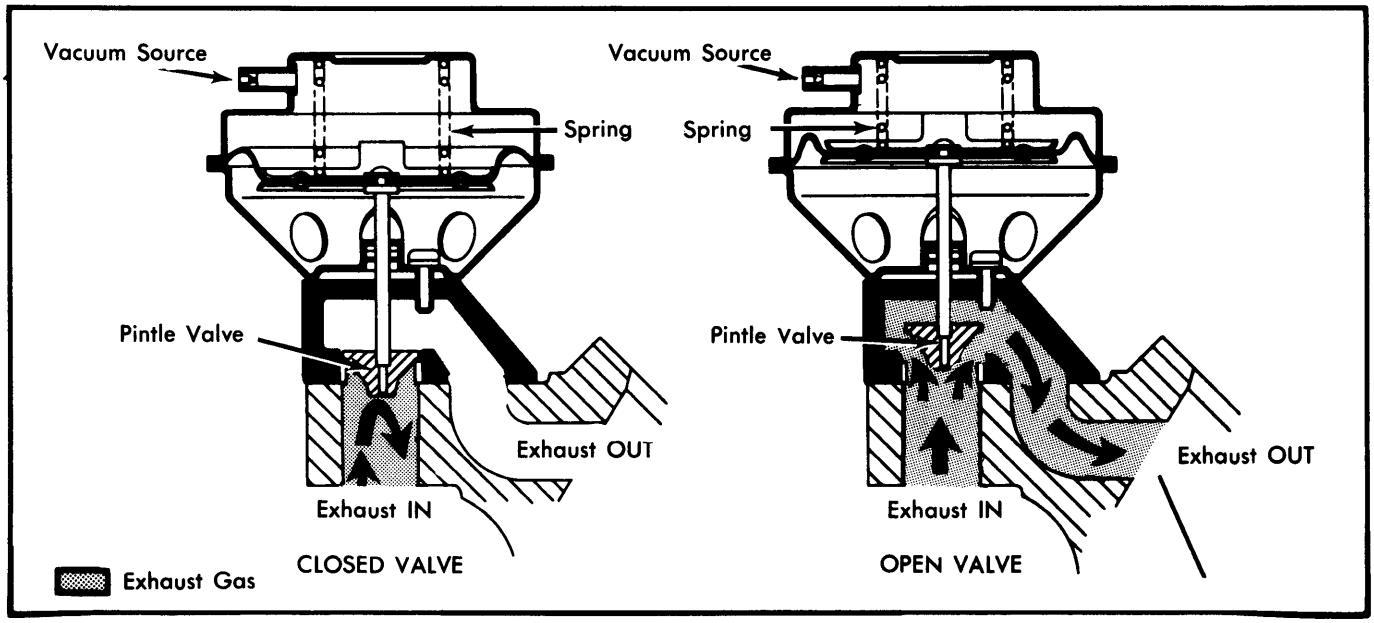

Fig. 5 Cutaway View of EGR Valve