MERCEDES-BENZ DIESEL EXHAUST GAS RECIRCULATION

300 Series

DESCRIPTION

All 5-cylinder diesel models are equipped with exhaust gas recirculation (EGR). The system reduces oxides of nitrogen (NOx) by allowing a small quantity of exhaust gas to enter the intake manifold. This lowers combustion chamber temperatures and reduces NOx formation. The system consists of an EGR valve, thermal vacuum valve, switch-over valves, vacuum control valve, several orifices and connecting hoses.

OPERATION

When engine coolant is below 63° F (17° C), no EGR takes place. When engine coolant is above this temperature, EGR is permitted except when the engine is at idle or full throttle. The vacuum control valve and an orifice regulate vacuum flow to the EGR valve at different engine speeds, ensuring that the EGR flow is correct. Individual system components function as follows:

EGR VALVE

The EGR valve is operated by a vacuum signal. The valve controls the amount of EGR depending upon the strength of the vacuum control signal. A corrugated tube from the exhaust manifold provides exhaust gases to the EGR valve, located on the intake manifold.

THERMAL VACUUM VALVE

The thermal vacuum valve is Blue and is installed in the thermostat housing. The valve is closed below 63° F (17° C) and open above this temperature. When the valve is open, EGR can take place.

SWITCH-OVER VALVE

The switch-over valves control vacuum flow to the EGR valve. Two valves are used in the EGR system (a third valve controls full-throttle downshifts on non-Turbo models). One valve vents vacuum when the engine is at idle, while the other vents vacuum when the engine is at full-throttle operation. All valves are located under a plastic cover on the cylinder head cover and are actuated by a throttle linkage cam.

VACUUM CONTROL VALVE

The vacuum control valve is located on the fuel injection pump. It vents vacuum to atmosphere as the throttle opens. With increasing engine load, the vent size increases, decreasing the vacuum signal to the EGR valve. This reduces EGR as engine load increases. The Black plastic line leads to the passenger compartment where vacuum is vented.

ORIFICE

Several vacuum restrictors are used to control system vacuum levels. These restrictors should not be changed unless system testing indicates adjustment is needed. The standard orifice is Yellow.

TESTING

NOTE – *Testing procedures should be used if complaints describe poor performance, excessive smoke, knocking at full throttle or rough idle.*

System Check – 1) Connect vacuum gauge between thermal vacuum valve and EGR valve using "T". With engine idling and throttle against throttle stop, no vacuum should be present. Open throttle until all slack in free travel rod is taken up.

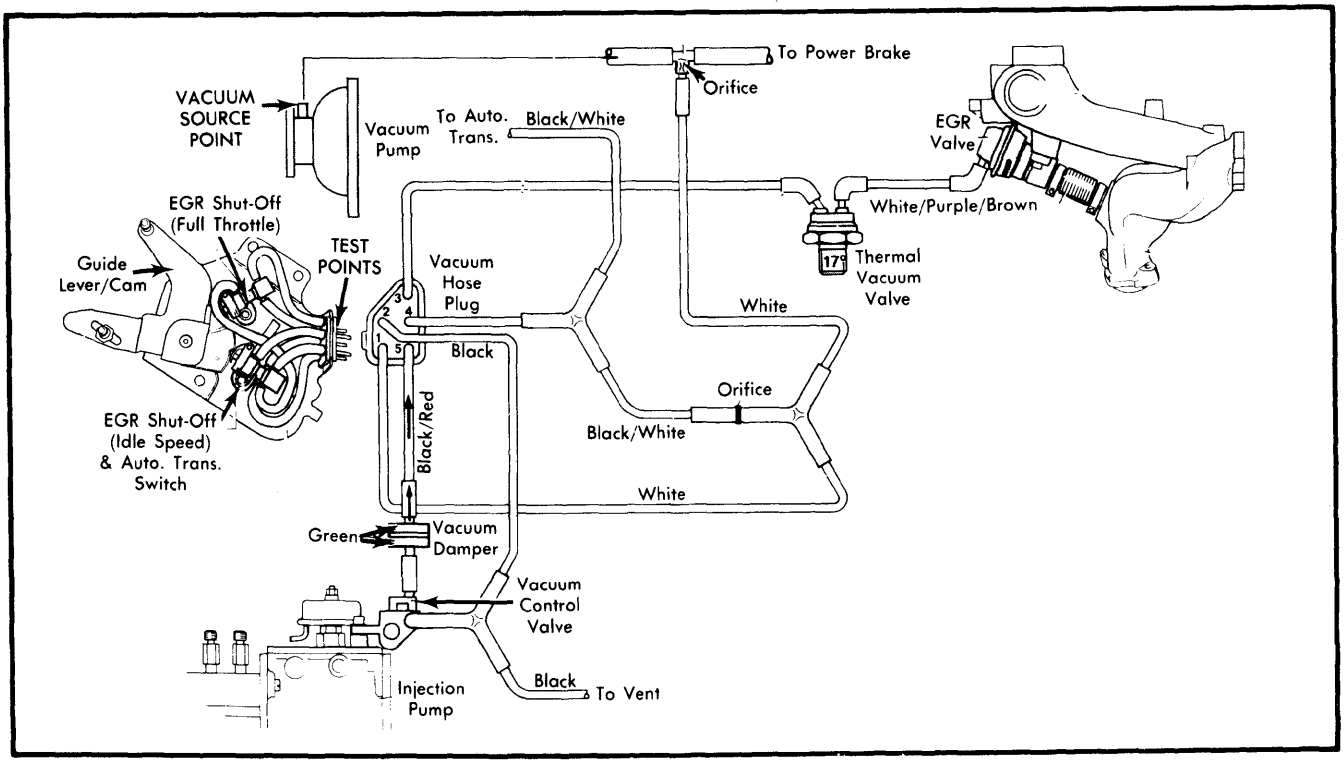

Fig. 1 300 Series Diesel Exhaust Gas Recirculation (Non-Turbo)

MERCEDES-BENZ DIESEL EXHAUST GAS RECIRCULATION

Vacuum level should be 5-7 in. Hg. If system operates correctly, test EGR valve. If not, proceed with system check.

NOTE – *Engine must be at normal operating temperature.*

2) Check all vacuum lines for tight connections. Blow through lines to ensure none are plugged. Clean vacuum source fitting on pump.

3) Disconnect vacuum line at EGR valve, then pull off White/Purple/Brown hose at thermal vacuum valve. Blow through hoses. If no air passes, replace thermal vacuum valve.

4) Disconnect vacuum hose plug at switch-over valve plate. Connect a jumper hose from vacuum source point to point 1 at switch-over valve plug. Plug point 2 and connect a vacuum gauge to point 3. See *Fig. 1 or 2.*

5) With engine idling, no vacuum should be present. Open throttle until slack is taken up in free travel rod. About 10-12 in. Hg should be present. Return engine to idle speed, then watch vacuum gauge. Vacuum should remain constant for at least 2 minutes.

6) Pull plug from point 2. Vacuum should drop to zero. If valve does not operate properly, replace it. Connect vacuum source jumper hose to point 2 and plug point 1. Leave vacuum gauge connected to point 3.

7) With engine idling, about 10-12 in. Hg vacuum should be present. Clamp vacuum source jumper hose tightly and stop engine. Vacuum should remain constant for at least 2 minutes. Move throttle to full throttle stop, pull off hose at point 1, and observe vacuum gauge.

8) Vacuum should remain constant. Return throttle to idle and pull off jumper hose. Vacuum should drop to zero. If switch does not operate properly, replace it. If switch is okay, check EGR valve.

EGR Valve – Start engine. With engine at idle, eliminate slack in free travel rod by pulling with hand. Disconnect and connect vacuum line at EGR valve and listen for valve operation. If valve does not operate, replace it.

Vacuum Control Valve – 1) Connect vacuum gauge between thermal vacuum valve and EGR valve. Increase engine speed to 1000 RPM (do not pull on STOP lever).

2) Vacuum should measure 5.7-6.7 in. Hg on non-Turbo models, and 4.9-5.7 in. Hg on Turbo models. If not, check orifice to ensure it is clean. If level is too high, install a larger orifice. If level is too low, install a smaller orifice. If vacuum level cannot be correctly adjusted, replace vacuum control valve.

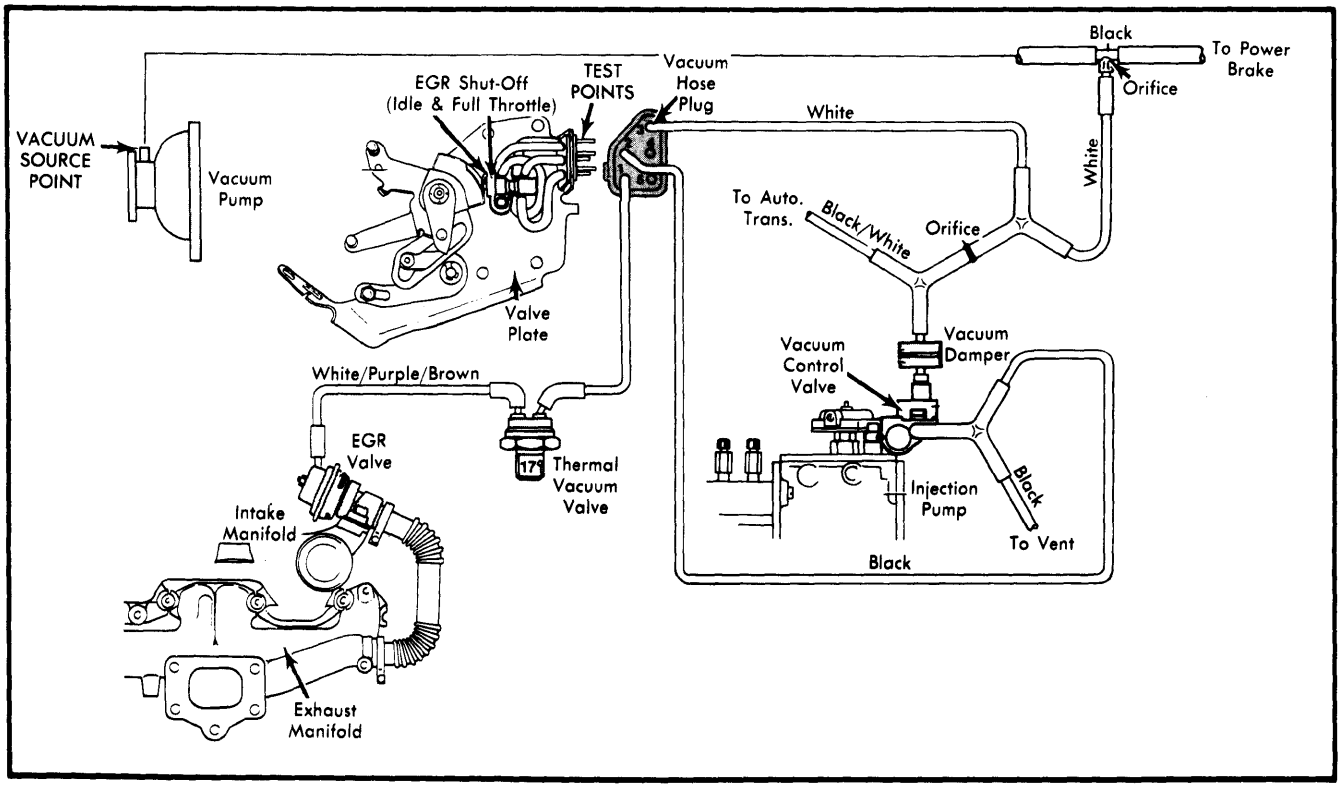

Fig. 2 300 Series Diesel Exhaust Gas Recirculation (Turbo)