MERCEDES-BENZ EXHAUST GAS RECIRCULATION

300 Series (Calif. Only)

DESCRIPTION

All California 5-cylinder diesel models are equipped with exhaust gas recirculation (EGR). The system reduces oxides of nitrogen (NOx) by allowing a small amount of exhaust gas to enter the intake manifold. This lowers combustion chamber temperatures and NOx formation. The system consists of an EGR valve, thermal vacuum valve, switch-over valve (2 on Turbo), vacuum modulator valve, several orifice connectors, and connecting vacuum hoses.

OPERATION

Above a coolant temperature of 63°F (17°C), a portion of the exhaust gases is recirculated during part throttle operation. On non-Turbo models, EGR takes place during idle as well. EGR is shut off when the engine is cold or at full throttle. Operation of the individual components of the system is 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.

THERMO VACUUM VALVE

The thermo vacuum valve is colored blue and installed in the thermostat housing. The valve is constructed so a bimetal disc closes the passageway when coolant temperature is below 63°F (17°C). Above this temperature, the bimetal disc snaps downwards due to heating. This opens the vacuum source connection and allows vacuum to the EGR system.

SWITCH-OVER VALVE

The switch-over valve(s) control vacuum to the EGR valve. A cam located on the cylinder head cover operates the valve(s) as the throttle is opened. On Turbo models, 2 valves are used. Vacuum is permitted to flow to the EGR valve when the engine is above idle, then is shut off as the throttle approaches full-open position. On all other models, one switch-over valve is used and vacuum is sent to the EGR valve during idle and part-throttle operation.

VACUUM MODULATING VALVE

The vacuum modulating valve is located on the fuel injection pump. It vents EGR valve vacuum to atmosphere as the throttle opens. With increasing engine load, the vent size increases, resulting in a decreased vacuum signal to the EGR valve. This reduces EGR as engine load increases. The black plastic line to the passenger compartment is used for venting the vacuum signal.

ORIFICE

Several vacuum restrictors with a specially sized orifice are used. The vacuum supply line orifice, located between the vacuum pump and brake booster, is 0.024" (0.6 mm) in size. It must not be interchanged with any other size. The other orifice is located near the vacuum modulator (Turbo) or near the switch-over valve (all other models). It can be changed to compensate for vacuum modulating valve adjustment.

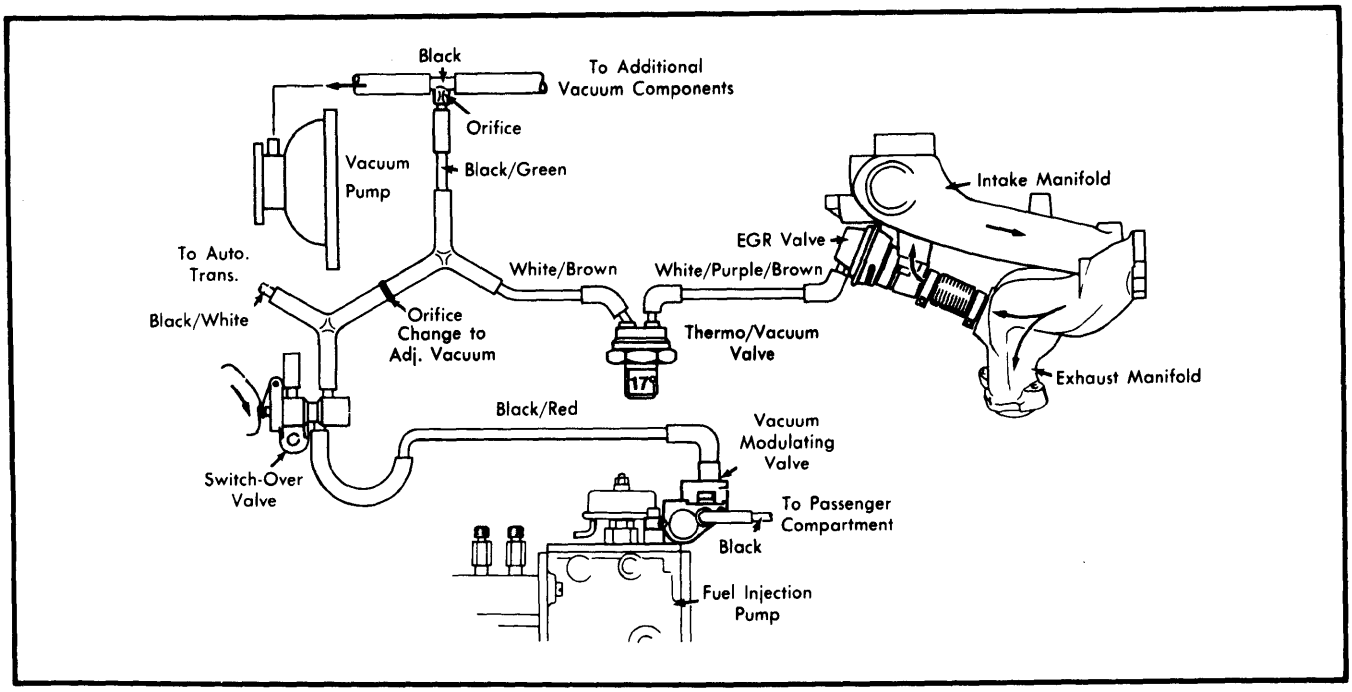

Fig. 1 300 Series Diesel Exhaust Gas Recirculation (Non-Turbo)

MERCEDES-BENZ EXHAUST GAS RECIRCULATION (Cont.)

TESTING

Preliminary Check – 1) Before proceeding with system and component tests, be sure all hoses are free of obstructions and connected properly. Clean out orifices with compressed air. Check that vent line to passenger compartment is clear.

2) With engine at normal operating temperature, coolant above 63°F (17°C), thermo/vacuum valve should be open. Remove both hoses and blow through to test. If not open, replace. If all lines and valve are okay, proceed with system testing.

Non-Turbo System Test – 1) With engine idling, disconnect and reconnect vacuum line at EGR valve. The valve should close audibly. If not, "T" a vacuum gauge between switch-over valve and "Y" fitting. Vacuum should be 20.6-23.6 in. Hg.

2) Pinch "Y" fitting shut with clamp. Vacuum should hold for at least 2 minutes. If not, replace switch-over valve. If vacuum holds, remove clamp, then actuate throttle linkage until switch-over valve is operated. Vacuum should drop. If EGR valve still does not operate, replace it.

3) Connect vacuum gauge between thermal vacuum valve and vacuum supply line (white/purple/brown). Using throttle linkage, raise engine speed to 1000 RPM. Vacuum reading should drop to 10.0-10.9 in. Hg.

4) If vacuum does not drop enough, install larger orifice. If vacuum drops too low, install smaller orifice. If reading cannot be corrected, replace vacuum modulating valve.

Turbo System Test – 1) Connect vacuum gauge into vacuum line (white/purple/brown) between EGR valve and full-throttle switch-over valve. At idle, no vacuum should be present. Move throttle linkage until play in telescoping rod is eliminated. Vacuum should read 11.8-14.8 in. Hg.

2) If vacuum is not correct, connect vacuum gauge between thermo/vacuum valve and idle switch-over valve. Vacuum reading should be 11.8-14.8 in. Hg at idle. Clamp vacuum line on thermo/vacuum valve side. Vacuum level should hold for at least 2 minutes. If not, replace idle switch-over valve.

3) If vacuum remains constant, remove clamp and disconnect hose between the 2 switching valves. Actuate throttle linkage until idle switch-over valve is operated. Vacuum should drop. If not, replace idle switch-over valve.

4) Reconnect hose between switch-over valves. Disconnect vacuum line (white/purple/brown) from idle switch-over valve, and disconnect vacuum line (white) from full-throttle switch-over valve. Connect a vacuum gauge between white/purple/brown line and full-throttle switch-over valve.

5) Vacuum should read 11.8-14.8 in. Hg. Clamp vacuum line and check that valve holds vacuum for at least 2 minutes. If not, replace valve. If it holds vacuum, remove clamp and actuate valve with screw-driver tip. Vacuum reading should drop to zero.

6) Reconnect all hoses. Actuate throttle linkage until idle switch-over valve is operated, then disconnect and reconnect vacuum line at EGR valve. If valve does not operate audibly, replace it.

7) Connect vacuum gauge between EGR valve and full-throttle switch-over valve. Using throttle linkage, raise engine speed to 1000 RPM. Vacuum reading must be 9.5-10.3 in. Hg. If vacuum reading is incorrect, exchange orifice sizes to correct. If level cannot be obtained, replace vacuum modulating valve.

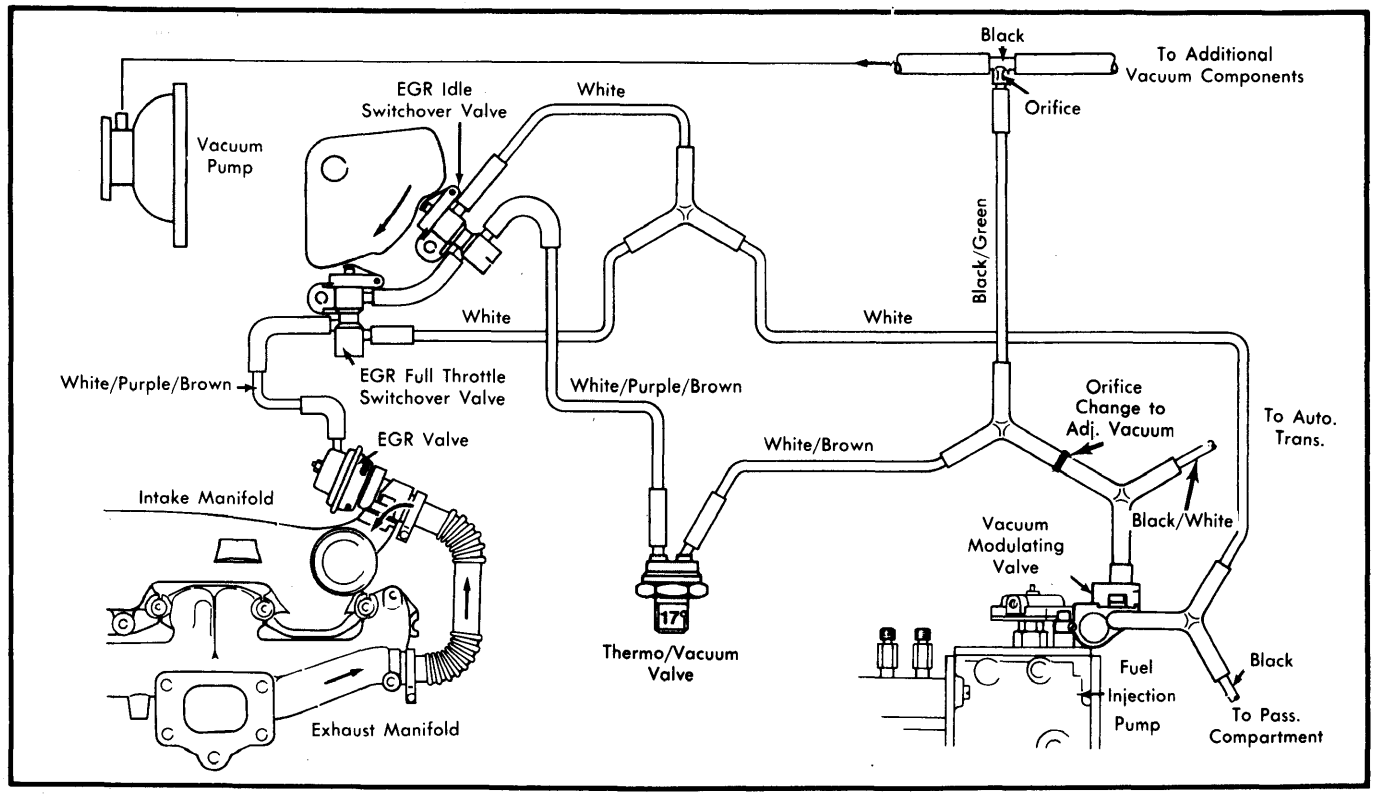

Fig. 2 300SD Diesel Exhaust Gas Recirculation (Turbo)