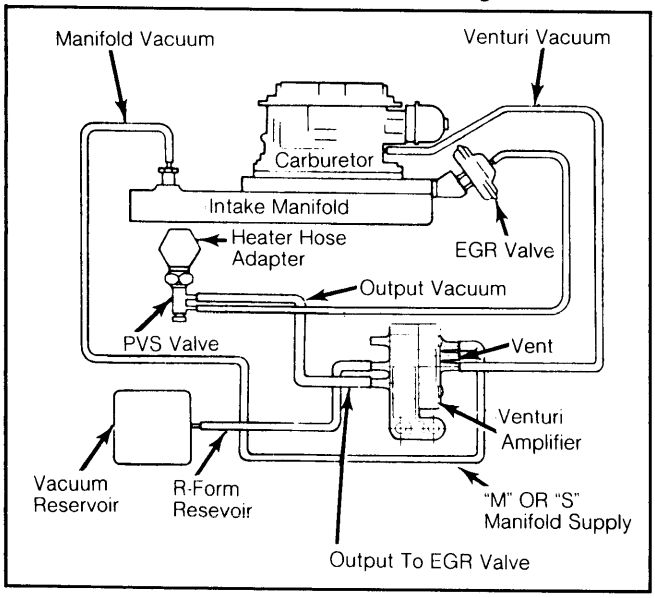
1982 Exhaust Emission Systems

FORD EXHAUST GAS RECIRCULATION

DESCRIPTION

The Exhaust Gas Recirculation (EGR) system is used to reduce NOx emissions. This is accomplished by recycling exhaust gases back into the intake manifold, resulting in cooler combustion temperatures and controlled NOx emissions.

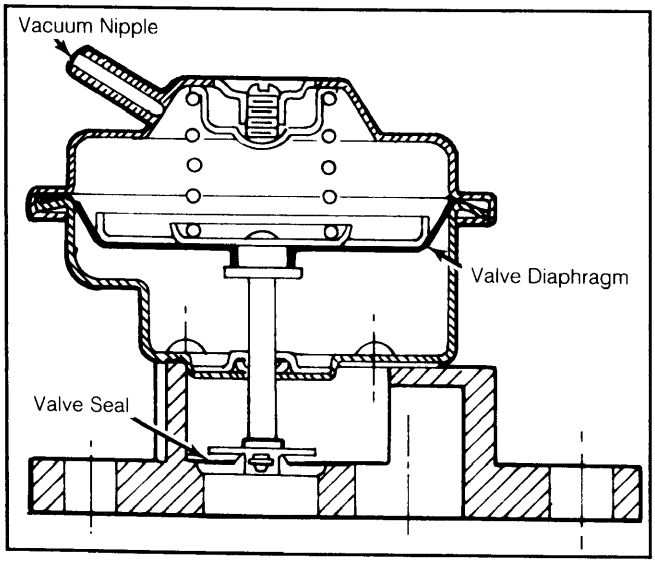
Fig. 1: Typical Ford EGR System for V8 Engines



Lowers emissions by reducing combustion temperatures.

The EGR system used by Ford consists of an EGR valve, a vacuum amplifier, a vacuum reservoir, ported vacuum switch (PVS) and connecting lines and hoses.

Fig. 2: Cutaway View of EGR Valve Without Back Pressure Transducer



When testing apply 8 in. Hg to EGR Valve and hold it for at least 30 seconds.

OPERATION

EGR system is controlled by EGR valve. When valve is open, exhaust gas enters manifold passages. When closed, no gas is allowed to enter intake manifold. Vacuum signals control opening and closing of EGR valve.

Light Duty Emissions EGR systems use a back pressure transducer to aid in controlling exhaust gas recirculation. This unit senses exhaust gas back pressure and modulates vacuum signal to EGR valve in response to amount of back pressure. Back pressure is used to provide information on engine operation modes. The back pressure transducer is integral with EGR valve.

TESTING

EGR VALVE WITHOUT BACK PRESSURE TRANSDUCER

1) Start and run engine until normal operating temperature is reached (to be sure PVS is open).

2) Check all vacuum hoses for proper condition and that they are tightly seated on connectors.

3) Remove vacuum supply hose from EGR valve and plug hose. Attach another vacuum hose to EGR valve and attach a vacuum gauge to hose (preferably one calibrated in 1 in. Hg increments).

4) Gradually apply 8 in. Hg vacuum to EGR valve, while watching EGR valve stem. At idle, it should take no more than 1 in. Hg to cause stem to move (begin to open). If stem does not move, replace EGR valve.

5) Turn engine off and apply 8 in. Hg vacuum to EGR valve and hold it. Vacuum should remain (within 1") for at least 30 seconds. If not, replace EGR valve.

6) Restart engine and idle. Apply 8 in. Hg to EGR valve. Valve stem should move full length of travel and idle condition will get rough, RPM decrease and possibly stall. If not, EGR is not functioning and system is plugged. Clean as required.

7) Reconnect all hoses to original (normal) positions, restart engine and idle at normal operating temperature. If idle is not acceptable, EGR valve may not be sealing.

8) Install new gasket and adjust curb idle. Recheck idle condition. If no improvement, problem is elsewhere. Reinstall original EGR valve, and perform other engine diagnosis to seek out problem area.

EGR VALVE WITH INTEGRAL BACK PRESSURE TRANSDUCER

1) Loosen air cleaner, and move aside without disconnecting vacuum hose from thermal vacuum switch on air cleaner housing.

2) Inspect EGR system for proper hose routing, condition and connections. *See "Ford Vacuum Diagrams" in this Section.*

3) Check EGR valve assembly for obvious damage, looseness, or exhaust "blowouts" at gaskets. Repair or replace as required.

4) With engine at normal operating temperature and transmission in neutral, slowly open and close throttle. Valve stem should move up, oscillate and move down with throttle movement. If so, system is okay.

5) If unable to see stem move, open throttle. Hold steady at 2000-2500 RPM. Remove and pinch off vacuum hose to EGR valve. Engine speed should increase.

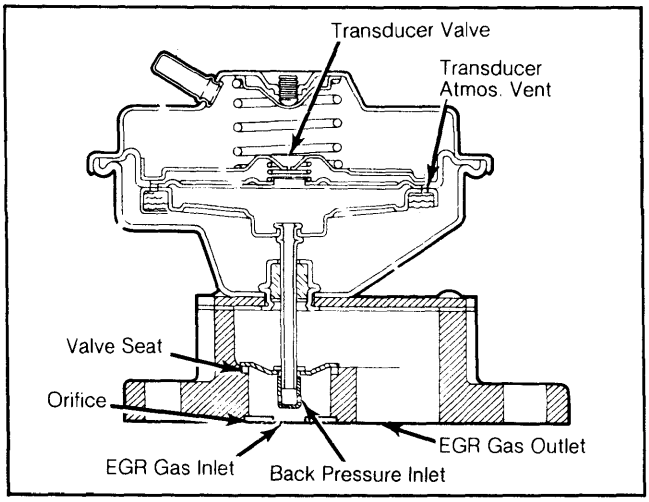
6) If valve operates as described, transducer is functioning properly. If not, replace EGR valve.

FORD EXHAUST GAS RECIRCULATION (Cont.)

7) To test for leakage, remove and cap EGR valve vacuum hose. Start engine. If engine idle improves noticeably, check vacuum hose routing, as valve may have vacuum supply at idle.

8) If engine idle does not improve, remove EGR valve. Block EGR passages with a plate. Start engine. If idle quality is still bad, problem is elsewhere. Reinstall EGR valve. If quality improves, replace EGR valve.

Fig. 3: Integral Back Pressure Transducer & EGR Valve



Valve cannot be opened by vacuum, until bleed hole is closed by exhaust back pressure

CARBURETOR EGR PORT

1) Attach vacuum gauge directly to EGR carburetor port, using hose. Start engine, quickly open throttle to halfway position and close.

2) Observe vacuum gauge for quick rise and fall as throttle is opened and closed. If definite vacuum is evident, port is okay. If not, port is clogged and must be cleaned.

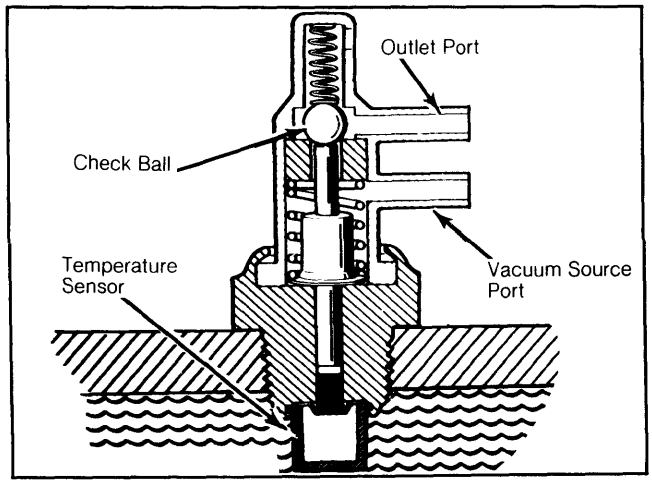
PORTED VACUUM SWITCH

PVS with 2 Connections

1) Detach both vacuum hoses from PVS, and connect a vacuum gauge to top port on PVS. Connect other PVS nipple to manifold vacuum or external vacuum supply of at least 10 in. Hg. *See Fig. 4.*

2) Start engine and warm until PVS opening temperature is reached. *See chart.* If no vacuum reading is noted, PVS should be replaced. If vacuum is present, PVS is okay.

Fig. 4: Cutaway View of 2-Port PVS

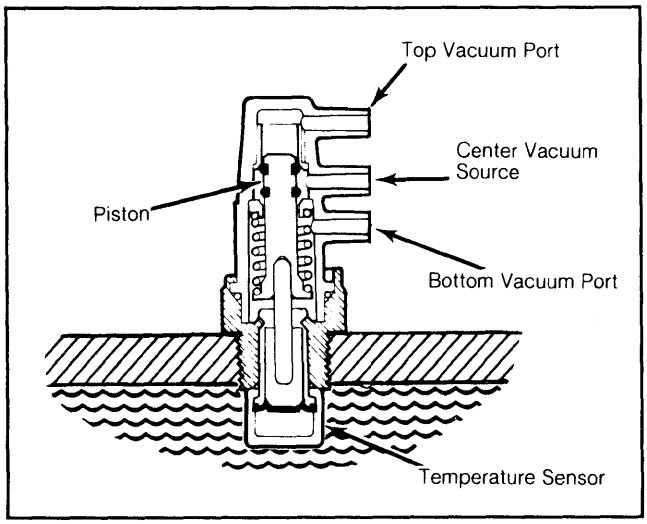


PVS will open when engine reaches operating temperature.

PVS with 3 Connections

1) Disconnect EGR vacuum hose from PVS and connect manifold vacuum or external vacuum source to lowest port on PVS. *See Fig. 5.*

Fig. 5: Cutaway View of 3-Port PVS



Warm engine should indicate vacuum at center PVS port.

2) Detach distributor supply hose from center port, and attach vacuum gauge to center port.

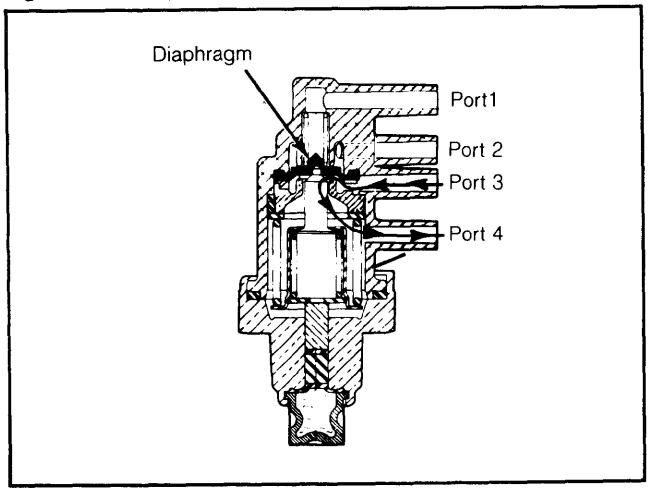
3) Start engine and warm up until PVS opening temperature is reached. *See chart.* If no vacuum is present, replace PVS. If present, PVS is okay.

PVS with 4 Connections

1) Disconnect vacuum hoses at PVS valve. Connect a vacuum gauge to top port of PVS. Connect external vacuum source to 2nd port. *See Fig. 6.*

2) Start engine and warm up until PVS opening temperature is reached. *See chart.* If no vacuum, this

Fig. 6: Cutaway View of 4-Port PVS



Connect vacuum gauge to 1st & 3rd port to check PVS.

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portion of PVS is damaged and valve should be replaced. If vacuum is present, proceed to next step.

3) Connect gauge to 3rd port and vacuum supply to the bottom port. If vacuum is noted, PVS is okay. If no vacuum, replace PVS.

PVS OPENING TEMPERATURES

Color Code	Temp.°F (C°)
Pink or Natural	Above 90° (32°)
Black	Above 100° (38°)
Blue or Plain	Above 133° (56°)
Yellow or Gray	Above 155° (68°)

VENTURI VACUUM AMPLIFIER

NOTE: Amplifiers have built-in calibrations, and no external adjustments are required. If an amplifier bias test reveals malfunction, replace amplifier. Always check venturi vacuum amplifier last, after checking all other basic EGR components.

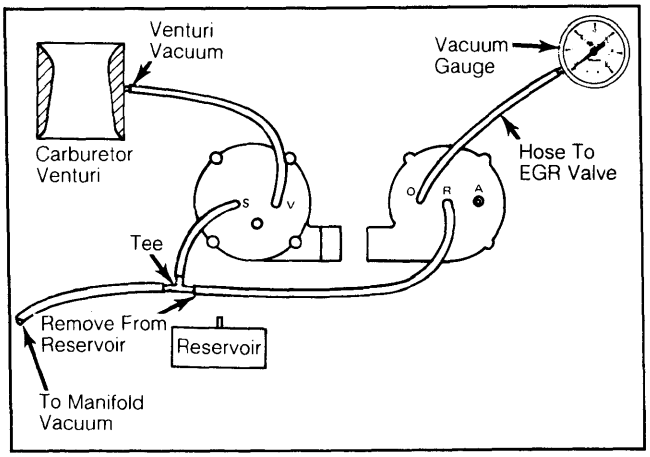
1) Remove hose connecting EGR valve to amplifier at EGR valve end, and connect vacuum gauge to hose. By-pass EGR delay valve, if so equipped. Disconnect vacuum hose at reservoir and "T" this line to a manifold vacuum source.

2) Start engine and accelerate to 1500-2000 RPM. Release throttle to idle speed. Disconnect hose at carburetor venturi. Vacuum should be within .3 in. Hg of specified bias value. If specification is zero, vacuum may read up to .5 in. Hg. Replace amplifier if not to specification.

NOTE: Before performing the following steps, by-pass vacuum solenoid valve or vacuum-operated switch, if so equipped.

3) Accelerate engine to 1500-2000 RPM. Release throttle to idle speed. If vacuum gauge reading increased more than 1 in. Hg during acceleration, replace amplifier. Reconnect venturi hose to carburetor. If output vacuum increases more than .5 in. Hg, check idle speed. If idle speed is too high, output vacuum could increase due to increase in venturi vacuum.

Fig. 7: Testing Ford Venturi Vacuum Amplifier



Amplifiers do not require external adjustments.

4) Accelerate engine to 1500-2000 RPM, and check vacuum gauge. Vacuum should measure above 4 in. Hg during acceleration, and should return to specified bias when throttle is released. If vacuum does not return to specified bias, replace amplifier.

5) Connect "R" nipple to manifold vacuum source, "S" nipple to spark port vacuum, "V" nipple to venturi vacuum, and "O" nipple to vacuum gauge. Accelerate engine to 1500-2000 RPM, and release throttle to idle speed. Remove vacuum hose at carburetor venturi, and check spark port vacuum. If vacuum is greater than 2 in. Hg, amplifier output vacuum could increase. Vacuum gauge reading should be less than .5 in. Hg for all amplifiers. If not to specification, replace amplifier.

VACUUM AMPLIFIER RESERVOIR

1) If reservoir does not have an external check valve, disconnect hose to amplifier, and connect an external vacuum source to reservoir. Apply 14 in. Hg to reservoir. Charge reservoir with 14 in. Hg vacuum. Vacuum should hold, with no more than 1 in. Hg drop, for at least 1 minute. If vacuum drops, replace reservoir.

2) If reservoir has an external check valve, apply an external vacuum source of 15 in. Hg to "T" between check valve and reservoir at amplifier side of "T". Vacuum should not vary more than 1 in. Hg in 1 minute. If vacuum drops, replace reservoir.

3) Remove hose leading to reservoir "T", and charge reservoir with an external vacuum source of 15 in. Hg. Vacuum should not vary more than 1 in. Hg in one minute. If vacuum varies, replace reservoir. To test check valve, disconnect hose to check valve at "T", and apply an external vacuum source of 15 in. Hg. Vacuum should not vary more than 1 in. Hg in 1 minute. If vacuum varies more, replace check valve.