

1974-79 EXHAUST EMISSION SYSTEMS

Volvo Exhaust Gas Recirculation

All Models

DESCRIPTION

On 1974-78 models, two basic EGR systems are used. Federal models use an EGR system without a vacuum amplifier, while California models use a vacuum amplifier controlled EGR system. The EGR system consists of EGR valve, a coolant temperature thermostatic vacuum switch, vacuum solenoid valve (if equipped), throttle valve micro switch (if equipped), vacuum amplifier (if equipped), and various connecting hoses and pipes.

In addition, all models also have an EGR maintenance reminder system which will turn on a light on instrument panel every 15,000 miles.

All 1979 Federal 240 models, are equipped with an Exhaust Gas Recirculation (EGR) system. This system is designed to reduce the formation of oxides of nitrogen (NOx). This is accomplished by recirculating a small amount of exhaust gases back into the intake system where it mixes with the air/fuel mixture. By adding these gases to the air/fuel mixture, the combustion temperatures are lowered, thereby reducing NOx emissions. The system consists of an EGR valve, a thermal control valve, a vacuum amplifier, and the various connecting hoses and pipes.

OPERATION

EGR SYSTEM WITHOUT VACUUM AMPLIFIER

With this system, exhaust gas recirculation occurs only when engine is warm and throttle is between idle and full throttle position. When throttle is closed, EGR valve vacuum port is in front of throttle valve and no vacuum is supplied to EGR valve.

When throttle is partially open, vacuum is supplied to EGR valve, allowing exhaust gas recirculation to take place. At full throttle, insufficient vacuum is supplied to EGR valve, stopping exhaust gas recirculation.

If coolant temperature is below 130-140°F (55-60°C), thermostatic vacuum switch will be closed and no vacuum will be supplied to EGR valve regardless of throttle position. When temperature rises above this point, normal EGR operation is allowed as vacuum valve will open vacuum passage to EGR valve.

EGR SYSTEM WITH VACUUM AMPLIFIER

On 1974-78 models, the EGR system uses two vacuum sources: venturi vacuum and intake manifold vacuum. System uses venturi vacuum as a measure of total air flow. This weak venturi vacuum signal controls vacuum amplifier to regulate EGR valve. The amplifier receives this weak venturi signal and amplifies it using intake manifold vacuum.

The throttle valve micro switch senses when throttle plate is closed. When throttle is closed, micro switch opens and denies power to EGR solenoid vacuum valve. The EGR solenoid vacuum valve closes and denies vacuum to EGR valve. When throttle valve is opened, micro switch will close and supply power to EGR solenoid vacuum valve. Solenoid valve will open and allow normal EGR to occur.

On 1979 models, the thermal control valve is closed when engine is cold, stopping vacuum amplifier vacuum from reaching the EGR valve. While the valve is closed, exhaust gas cannot pass into the intake system. At normal operating temperature, the thermal valve is open and vacuum passes to the EGR valve. Recirculation now occurs.

The vacuum signal received from the vacuum amplifier originates at the throttle valve housing. During certain engine modes, the vacuum signal is transferred to the vacuum amplifier where it is strengthened enough to operate the EGR valve.

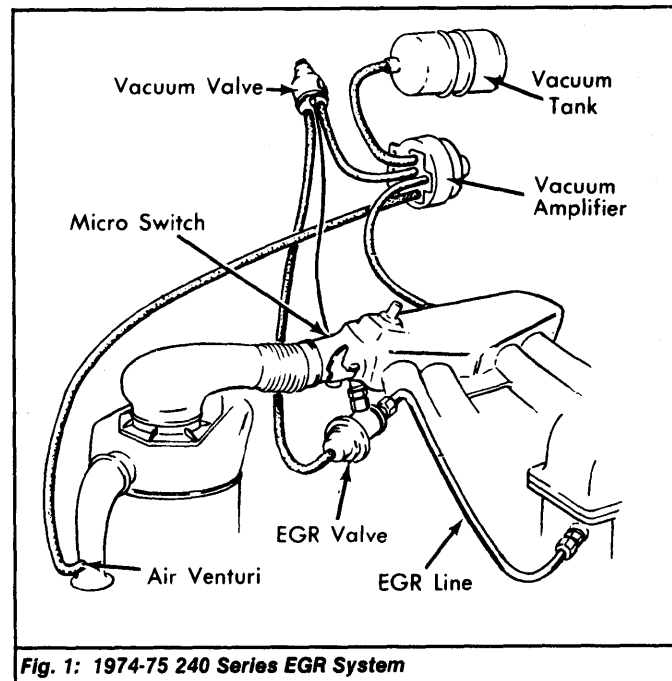


Fig. 1: 1974-75 240 Series EGR System

ADJUSTMENTS

MICRO SWITCH

1974-75 Models - 1) Disconnect one wire from throttle valve micro switch and connect test lamp to switch. Back off throttle plate screw until throttle is completely closed.

2) Back off micro switch so it will not interfere with throttle setting. Adjust throttle plate stop screw until it just touches stop, then turn an additional 1/2 turn.

3) Insert a .06" (1.5 mm) feeler gauge under throttle stop screw. Test lamp should not be lit. Turn micro switch atop screw until test lamp just lights. Tighten lock nut on stop screw. Remove feeler gauge and reconnect micro switch wire.

1976-78 Models (With Vacuum Amplifier) - Disconnect one wire from throttle valve micro switch and connect test lamp to switch. See Fig. 2. Insert a .06" (1.5 mm) feeler gauge between throttle stop screw and boss. Loosen lock nut on stop screw. Turn stop screw in until test lamp just lights and tighten lock nut on stop screw.

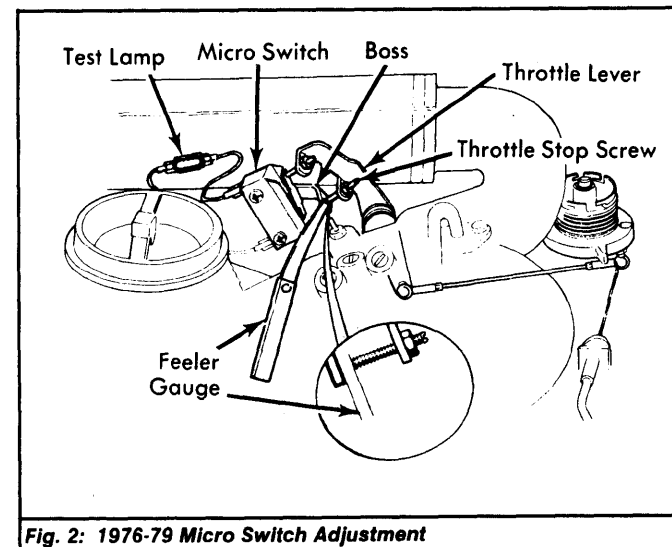


Fig. 2: 1976-79 Micro Switch Adjustment

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TESTING

EGR SYSTEM TEST

1974-75 240 Series - 1) Disconnect one wire from throttle valve micro switch and connect test lamp to switch. Turn ignition on and insert a .056" (1.4 mm) feeler gauge between throttle adjustment screw and stop. Open and close throttle by hand. Test lamp should light.

2) Now insert a .072" (1.8 mm) feeler gauge between adjustment screw and stop. Test lamp should not be lit. If micro switch does not function as indicated, adjust micro switch.

3) Start engine and disconnect vacuum hose at connection No. 1 of vacuum amplifier (air venturi hose). Connect a vacuum pump to this vacuum amplifier port. Vacuum should hold and idle should not change.

4) Disconnect micro switch wire. The EGR valve should open and engine should run rough or stall. Reconnect micro switch wire and vacuum line. Increase engine speed and check that EGR valve opens. If not, the EGR valve or vacuum amplifier are defective.

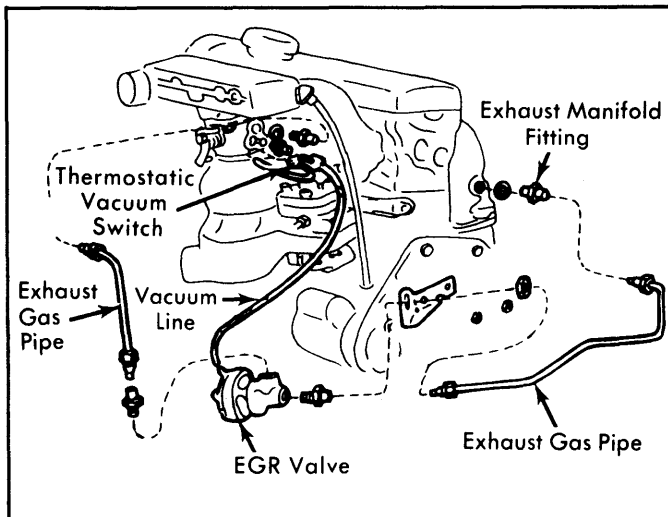


Fig. 3: 1976 240 Series EGR System (W/O Vacuum Amplifier)

1976-78 Models (Without Vacuum Amplifier) - 1) Start engine with coolant temperature below 130-140°F (55-60°C). Increase engine RPM and check that EGR valve does not open. If EGR valve opens with engine cold, thermostatic vacuum switch is defective.

2) Warm engine until coolant temperature is above 130-140°F (55-60°C). Increase engine RPM and check that EGR valve opens. If valve

does not open, EGR valve, thermostatic vacuum switch, or vacuum hoses are defective. See Fig. 3.

3) Stop engine and disconnect vacuum hose from EGR valve. Blow through disconnect vacuum hose. If no air passes, thermostatic vacuum switch is defective. If air passes, first check that vacuum hoses are not loose or damaged. If vacuum hoses are okay, replace EGR valve and repeat test.

1976-78 Models (With Vacuum Amplifier) - With engine idling at normal operating temperature, increase engine RPM and check that EGR valve opens by observing EGR valve stem movement. If EGR valve does not open, test individual components. See Fig. 4.

1979 Models - 1) With engine at normal operating temperature, increase engine speed and observe the movement of the EGR valve rod in the window of the valve housing. Rod should move upwards, opening EGR valve and allowing exhaust gas recirculation.

2) Release throttle quickly and observe that the valve closes, shutting off exhaust gas recirculation. If EGR valve does not operate as specified, it should be replaced.

THERMOSTATIC VACUUM SWITCH

1976-78 Models (With Vacuum Amplifier) - 1) Disconnect vacuum hoses from thermostatic vacuum switch. With engine coolant temperature below 130-140°F (55-60°C), no air should pass through switch.

2) Start and warm engine until coolant temperature is above 130-140°F (55-60°C). Air should pass through thermostatic vacuum switch with engine warm. If not, thermostatic vacuum switch is defective.

MICRO SWITCH

1976-78 Models (With Vacuum Amplifier) - 1) Disconnect one wire from throttle valve micro switch and connect test lamp to switch. See Fig. 2. Turn ignition on and insert a .06" (1.5 mm) feeler gauge between throttle stop screw and boss. Test lamp should light.

2) Now insert a .08" (2.0 mm) feeler gauge between stop screw and boss. Test lamp should not be lit. If micro switch does not function as indicated, adjust micro switch. After adjustment, repeat test procedure.

SOLENOID VACUUM VALVE

1976-78 Models (With Vacuum Amplifier) - 1) Allow engine to idle and disconnect vacuum hose at connection No. 1 of vacuum amplifier. Connect a vacuum pump to vacuum amplifier. See Fig. 5. The EGR valve should remain closed.

2) Increase engine speed and check that EGR valve opens. Quickly release throttle and check that EGR valve quickly closes. If not, and micro switch is operating correctly, the EGR valve or solenoid vacuum valve are defective.

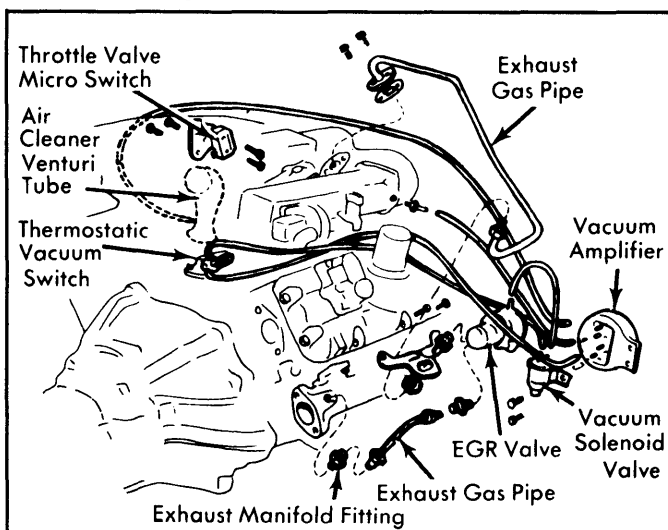


Fig. 4: 1976 260 Series EGR System (With Vacuum Amplifier)

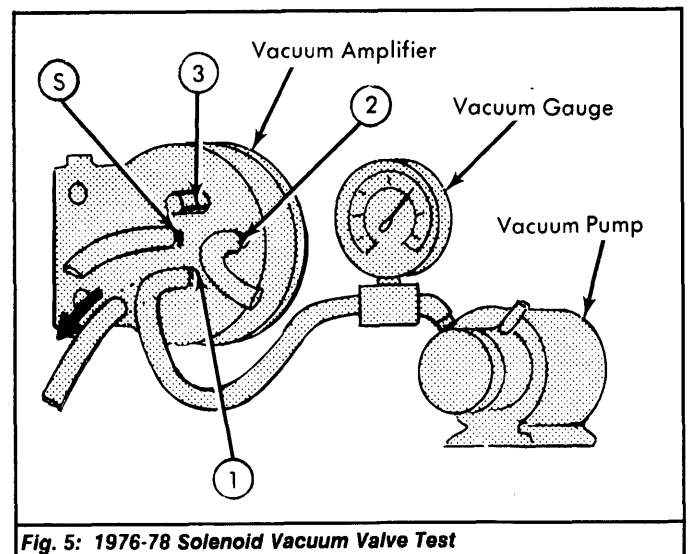


Fig. 5: 1976-78 Solenoid Vacuum Valve Test

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Volvo Exhaust Gas Recirculation (Cont.)

VACUUM AMPLIFIER

1976-78 Models (With Vacuum Amplifier) - 1) Allow engine to idle and disconnect vacuum hose at connection No. 1 of vacuum amplifier. Connect a vacuum pump to vacuum amplifier. See Fig. 5.

2) Vacuum gauge reading should not vary during a period of 10 seconds. If reading varies, and vacuum hoses are tight and not damaged, vacuum amplifier is defective and must be replaced.

EGR VALVE

1974-75 164 Models - With engine running, remove EGR valve vacuum hose at intake manifold. Apply at least 12 in. Hg of vacuum to hose (EGR valve). Engine should run rough or stall. If not, EGR valve is defective or EGR passage is plugged. Clean or replace as necessary.

1976-78 Models (With Vacuum Amplifier) - Allow engine to idle and disconnect one wire from throttle valve micro switch. The EGR valve should open and cause engine to run rough or stall. If not, EGR valve is defective if all other EGR component are okay.

MAINTENANCE

Clean and inspect entire EGR system every 15,000 miles. Every 30,000 miles the EGR valve should be replaced. After completing required service, the EGR reminder light must be reset. Remove cover from back of odometer and press White reset button on mileage counter. See Fig. 6.

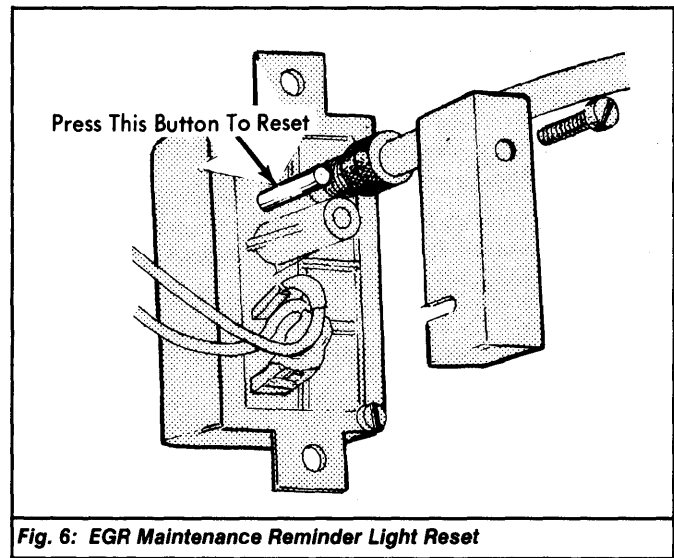


Fig. 6: EGR Maintenance Reminder Light Reset