AMERICAN MOTORS AIR INJECTION SYSTEMS

DESCRIPTION

There are 2 air injection systems used with AMC vehicles. A single air injection system is used with all Federal (49 States) Spirit and Concord passenger cars equipped with 4-cylinder engines and manual transmissions. The dual air injection system is used with all 6-cylinder engines for Spirit, Concord and Eagle models.

The systems add a controlled amount of air to exhaust gases in the exhaust ports, causing oxidation of gases and reduction of carbon monoxide and hydrocarbon emissions. In addition to this, the dual system adds air at the dual bed catalytic converter.

The single stage system consists of a belt driven air pump, diverter (by-pass) valve, air injection manifold, check valve, and connecting hoses. In addition to these components the dual system contains an air switch valve, "downstream" air injection tube, and in conjunction with the CEC (Computerized Emission Control) a reverse delay valve, coolant temperature override valve, 2-way delay valve, diverter solenoid and upstream solenoid.

OPERATION

Fresh air is drawn into the air pump through a filter fan. The air is compressed in the pump and then discharged through the pump to the diverter valve which directs it to the air distribution system or dumps it through a bypass port, depending on engine operating conditions. Air pressure in this system is maintained at approximately 5 psi by a relief valve incorporated in the diverter valve.

Air from the diverter valve is directed through the air injection mounted check valve. At each exhaust port, a hollow fitting carries air into the exhaust manifold. The air mixes with hot exhaust gases and causes a further burning of the mixture, reducing hydrocarbon and carbon monoxide emissions.

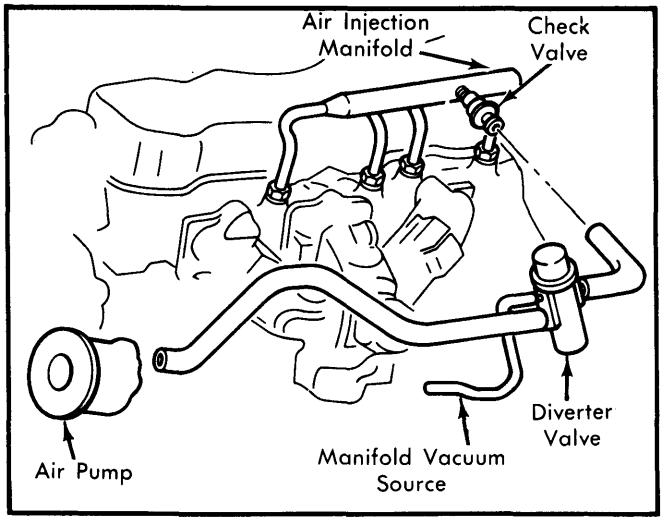

Fig. 1 Single Air Injection System

Air Pump (Dual & Single Systems) – Pump is belt driven and mounted on front of engine with power take-off at crankshaft pulley. Intake air passes through a centrifugal filter at front of pump. Air is delivered to injection manifold(s) by a rubber hose, through a diverter valve and tubing.

NOTE – *The air pump is serviceable only by replacement. Do not remove rear housing cover for any reason. The internal components of the pump are not serviceable.*

Diverter Valve (Dual & Single Systems) – This valve momentarily diverts air pump output from the exhaust manifold during rapid deceleration when intake manifold vacuum exceeds 20 inches Hg. Diverter also operates when air pump output exceeds 5 psi.

Air Injection Manifold (Dual & Single Systems) – The air injection manifold distributes air from the pump to each of the injection tubes. A check valve prevents reverse flow of exhaust gases in case of pump or belt failure. Air injection manifold distribution tubes are connected directly to exhaust manifold.

Coolant Temperature Override Valve (Dual System) – The CTO valve controls manifold vacuum signal. Manifold vacuum should be present at air control valve when coolant temperature is less than 100°F on 4-cylinder models and 115°F on 6-cylinder models. No vacuum should be present when coolant temperature is above specifications. The CTO is connected to the air valve by a vacuum hose.

Upstream Air Input Hoses (Dual & Single Systems) — These hoses direct air up to the air injection manifold.

Downstream Air Input Hoses (Dual Systems) – These hoses direct air down to the dual-bed catalytic converter.

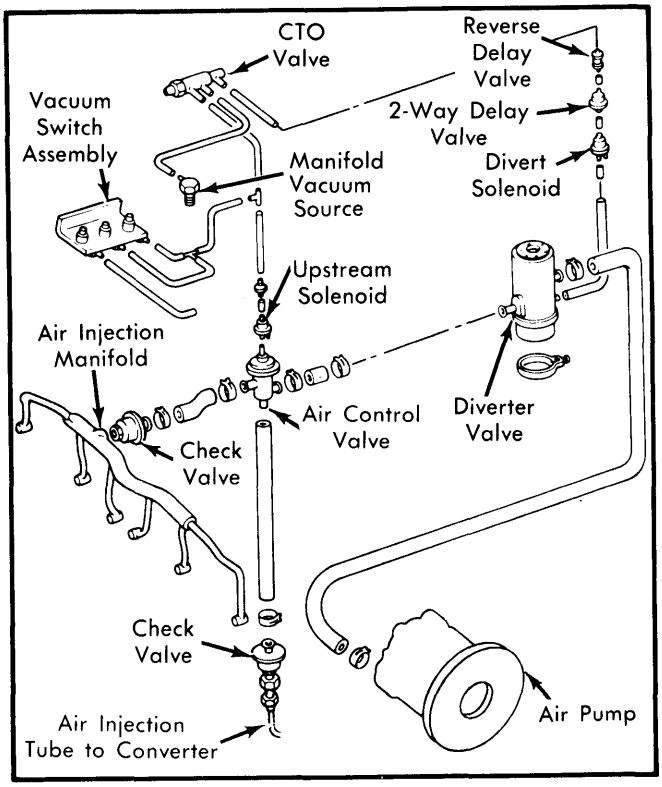

Fig. 2 Dual Air Injection System

Air Control Valve (Dual System) – This valve is located between the diverter valve and the air injection manifold. Air control valve directs air pressure "upstream" (into air injection manifold) when no vacuum is applied to valve and "downstream" (into dual bed catalytic converter) when vacuum is applied to valve.

AMERICAN MOTORS AIR INJECTION SYSTEMS (Cont.)

Air By-Pass Circuit (Dual System) – The controlling vacuum is regulated by the diverter solenoid, Open Loop 3 vacuum switch feedback system and 2-way and reverse delay valves.

Upstream Solenoid (Dual System) – Upstream solenoid controls the air control valve vacuum. Solenoid is connected through the feedback system. When solenoid is energized it opens air control valve vacuum to atmosphere, and air control valve directs system air pressure to upstream air input hoses and air injection manifold. During non-energized state, system air pressure is directed "downstream" to the dual bed catalytic converter.

Diverter Solenoid (Dual Systems) – The diverter solenoid is grounded through the feedback system. When current flows through the circuit, the energized solenoid allows atmospheric pressure to displace the vacuum, which allows diverter valve to release system air pressure to the atmosphere.

Two-Way and Reverse Delay Valves (Dual Systems) – Two-way and reverse delay valves are used to prevent a sudden loss of vacuum during a rapid vacuum decrease engine operation such as acceleration.

TESTING

DIVERTER VALVE

1) Start engine and run at idle. Check diverter vents. Little or no air should flow from vents. Accelerate engine to 2000-3000 RPM and rapidly close throttle. A strong flow of air should pass from diverter vents for 5 seconds.

2) Slowly accelerate engine. Between 2500 and 3500 RPM air should begin to flow from diverter vents. Replace diverter valve if defective. Valve is not serviceable and must be replaced as an assembly.

CHECK VALVE

Disconnect air supply hose at check valve. With engine running above idle speed, listen and feel for exhaust leakage at check valve. If check valve leaks excessively, replace as complete assembly.

NOTE – *The Dual Air Injection system should be diagnosed together with the Computerized Emission Control (CEC) System. See Computerized Emission Control article in this section.*

AIR BY-PASS CIRCUIT

1) Disconnect air hoses from ports "A" and "B" of air control valve (port "A" is connected to air injection manifold and port "B" to catalytic converter pipe). Start engine, warm to normal operating temperature and turn off ignition.

2) Restart engine and increase speed to 1500 RPM. Air should exhaust from port "A" of air control valve for approximately 30 seconds, then exhaust from port "B".

3) If no air exhausts, inspect the base of diverter valve for air. If air is being exhausted, increase engine speed to 1500 RPM and determine if vacuum is being applied to diverter valve. If vacuum is present, replace diverter valve and retest. If no vacuum is present, test diverter solenoid as outlined in *Computerized Emission Control article in this section.*

4) If air is not being exhausted from base of diverter valve, inspect air pump for proper operation. If air exhaust from air control valve is normal, depress accelerator to floor, return engine to idle and check base of diverter valve for air exhaust. If air is exhausted, circuit is normal.

5) If no air is exhausted, check diverter valve vacuum hose for vacuum. If no vacuum is present, replace diverter valve. If after replacement of diverter valve, there is still no vacuum present in diverter vacuum hose, test diverter solenoid as outlined in *Computerized Emission Control article in this section.*

6) If air exhaust from air control valve is normal, depress accelerator to floor, return engine to idle and check base of diverter valve for air exhaust. If air is exhausted, circuit is normal. If no air is exhausted, check diverter valve vacuum hose for vacuum. If there is no vacuum, replace diverter valve. If after replacement there is still no vacuum at diverter valve, test diverter solenoid as outlined in *Computerized Emission Control article in this section.*

AIR CONTROL CIRCUIT

1) Follow procedures outlined in Air By-Pass Circuit in this article to step **4)**. If air is not being exhausted from base of diverter valve, inspect air pump for proper operation.

2) If air exhausts from both ports of air control valve, replace air control valve and retest system. If air exhausts only from port "B", remove vacuum hose and check for vacuum during the first 30 seconds of operation. If no vacuum is present, replace air control valve and retest. If vacuum is present, test upstream solenoid as described in *Computerized Emission Control article in this section.*

3) If air exhaust from control valve is normal, see procedure outlined in step **6)** of *Air By-Pass Circuit Test in this article.*