1975-79 EXHAUST EMISSION SYSTEMS
General Motors Air Injection Reactor

1978-79 General Motors

NOTE: For information on 1975-77 vehicles with AIR, see AIR INJECTION SYSTEM - EXC. FORD W/CAT. CONVERTER article at the front of this section. A Pulse Air (PAIR) Injection system is also used on some General Motors models. See PULSE AIR INJECTION SYSTEM article in this section.

DESCRIPTION

The Air Injection Reactor (AIR) system is used to reduce HC and CO by injecting air into the exhaust ports to continue burning of exhaust gases.

All 4-cyl., 6-cyl. and V8 engine systems includes a belt-driven air pump, specially-designed cylinder head(s), diverter valve with silencer assembly and necessary connecting tubes.

V6 engine (231" Calif. & High Alt.) systems use a specially-designed internal plumbing in the intake manifold which eliminates some of the external passages and tubing. This system also injects air at the 4 outside exhaust ports, rather than at all exhaust ports. This system consists of the belt-driven air pump, special cylinder heads, check valve, vacuum differential valve, air by-pass (diverter) valve and differential delay valve and separator valve assembly.

NOTE: The carburetor and distributor used with this system are specially designed for the special AIR system on these engines. Components are not interchangeable with other engines.

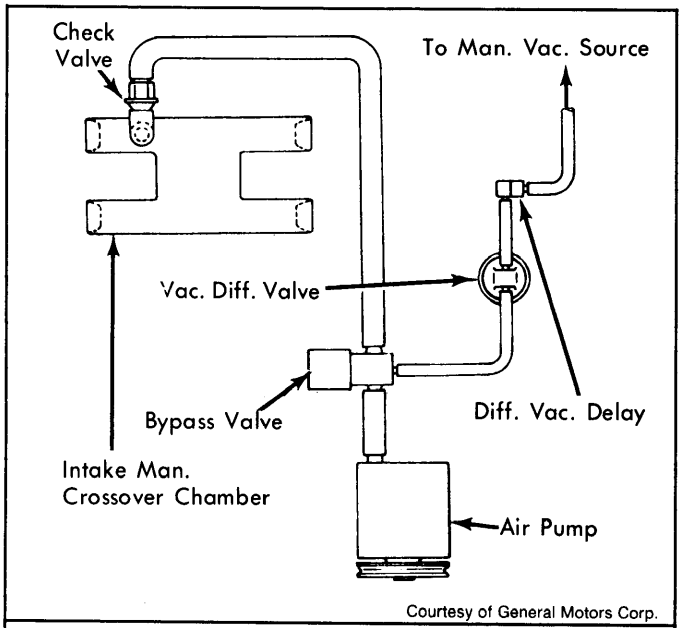

Fig. 1: 231" V6 AIR System Schematic (Calif. & High Alt. Only)

OPERATION

AIR PUMP

Intake air passes through the centrifugal filter at front of pump. Air is delivered to injection manifold by hoses and tubing.

DIVERTER (BY-PASS VALVE) & DIFFERENTIAL VACUUM VALVE

These 2 types of valves are used for the same purpose - to prevent backfiring in the exhaust system during sudden deceleration. When the valve senses a sharp rise in intake manifold vacuum, it opens to allow air from air pump to vent to atmosphere. In addition, some by-pass valves also act to prevent high exhaust temperatures under certain engine load conditions. This type of valve will vent injection air to the atmosphere.

DIFFERENTIAL VACUUM DELAY & SEPARATOR VALVE

This valve delays the air by-pass function during heavy acceleration. It allows immediate air injection during sudden acceleration, but will by-pass air injection under sustained high load operation where high exhaust temperatures can occur. This valve also has a fuel separator. It is designed to prevent liquid fuel from reaching the vacuum-operated components of the AIR system.

CHECK VALVE

The check valve prevents backflow of exhaust gas into the air distribution system. The valve prevents backflow when air pump by-passes at high speed and loads, or in case the air pump malfunctions.

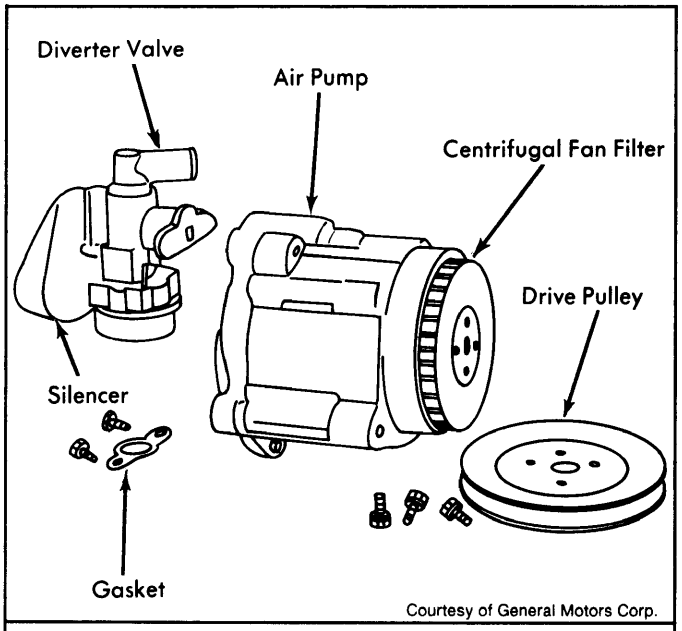

Fig. 2: Typical Air Pump Components

TESTING

FUNCTIONAL TEST

1) Start engine and let idle in Neutral or Park. Feel for presence of air exhausting out of lower portion of diverter valve. There should be no air coming out.
2) Seal off vacuum supply to diverter valve by pinching hose. Hold for at least one second, then release hose. Air should now be exhausting from bottom of diverter valve. It should do so for about 4 seconds. Replace diverter valve if air does not exhaust.

CHECK VALVE

1) Inspect check valve whenever working on AIR system. If pump were inoperative and had signs of exhaust gases reaching pump, a failed check valve would be indicated.
2) After detaching valve, blow through it in direction of flow to cylinder head, then attempt to suck back against direction of flow. Replace valve if it allows airflow against direction of flow.

DIVERTER VALVE

See FUNCTIONAL TEST in this article.

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General Motors Air Injection Reactor System (Cont.)

AIR PUMP

1) Accelerate engine to approximately 1500 RPM and observe airflow from hoses. If airflow increases as engine is accelerated, pump is operating satisfactorily. If it does not increase, or is not present, proceed to next step.
2) Check for proper pump belt tension, leaky valves, seized pump, or improperly routed or disconnected hoses. Check diverter valve, as described. Detach pump belt and operate engine to check if excessive noise is coming from air pump.

NOTE: Do not oil air pump. Also note that air pump system is not completely noiseless.

TROUBLE SHOOTING

EXCESSIVE NOISE

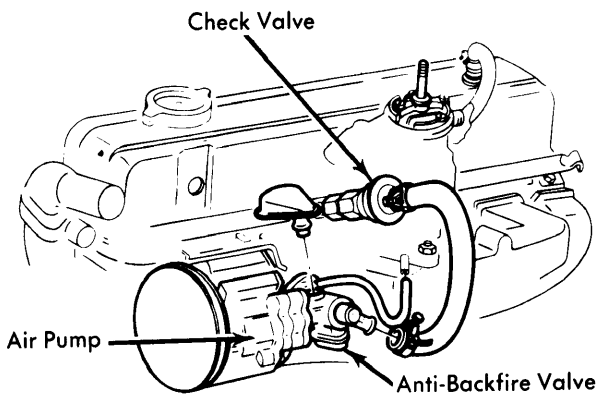
Loose drive belt or seized pump. Leaking hose. Improperly positioned hose. Diverter and/or bypass valve failure. Loose pump mounting. Pump damaged.

NO AIR SUPPLY

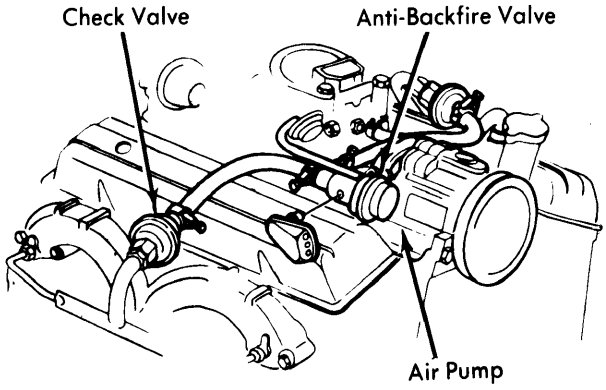
Loose drive belt. Leak in hoses or tubing. Diverter or by-pass valve failure. Check valve failure. Pump malfunction.

EXHAUST BACKFIRE

Engine not tuned to specifications. Engine vacuum leaks. Faulty diverter valve or check valve.



4 & 6 Cyl. Inline



V8

Courtesy of General Motors Corp.

Fig. 3: Typical Air Injection Systems (All Exc. V6 Applications)