AIR INJECTION

AMERICAN MOTORS

1966 All Models
1967 199", 290" & 343" Engines
1968-72 V8 Engines With Manual Transmissions
1973-74
6 Cyl. – Matador Station Wagon Only
V8 – All Models

BUICK

1966-67 California Cars
1972 350" Non-California Cars
1973-74 All Models

CADILLAC

1966-67 California Cars
1968-69 All Models
1971-74 All Models

CHEVROLET

1966 California Cars (Exc. 90HP-153" & 425HP-427")
1967 All Models
1968-72 Some Models
1973-74 6 Cyl. & V8 Some Models

CHRYSLER CORP.

1972 6 Cyl., 400" & 440" Engines
1973 Some California Models

FORD MOTOR CO.

1966 All Models
1967-68 Most Models With Manual Transmssions
1969 428" Engines
1970-71 Some Models
1973-74 Some Models

JEEP

1970-71 134", 225" & 232" Engines
1972 304" With Manual Transmission & 360" Wagoneer
1973-74 All Models (Exc. 232" 6 Cyl.)

OLDSMOBILE

1966-67 California Cars
1973-74 6 Cyl. Only

PONTIAC

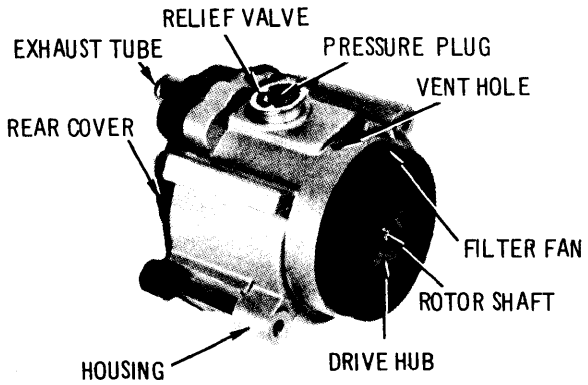
1966-67 Most California Cars
1973 All (Exc. V8 4-Bbl.)
1974 Some 250" 6 Cyl. & 350" 2-Bbl.

DESCRIPTION

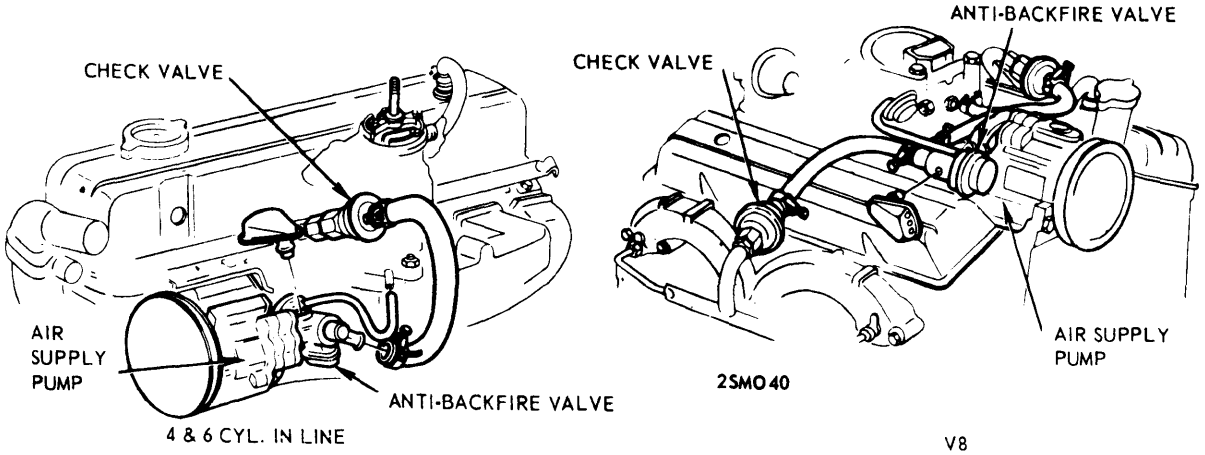
An exhaust port air injection system is used to reduce hydrocarbon and carbon monoxide emissions on many emission controlled vehicles. System adds a controlled amount of air to exhaust gases in exhaust ports, causing oxidization of gases. Air injection system consists of a belt driven air pump, connecting hoses, check valve(s) to protect system from hot gases and injection tubes. In addition, most 1966-67 models incorporate an anti-backfire valve while 1968-74 models use a by-pass valve or a combination diverter-pressure relief valve assembly.

OPERATION

Inlet air to air pump is drawn in through either engine air cleaner or a separate air pump air cleaner assembly. Pressurized air leaving air pump is transmitted through hoses, check valve(s) and air manifold(s) to individual stainless steel tubes or internal passages in cylinder heads and/or intake and exhaust manifolds to each cylinder exhaust port. Fresh air ignites and burns unburned portion of exhaust gases in exhaust system, thus minimizing exhaust emissions.



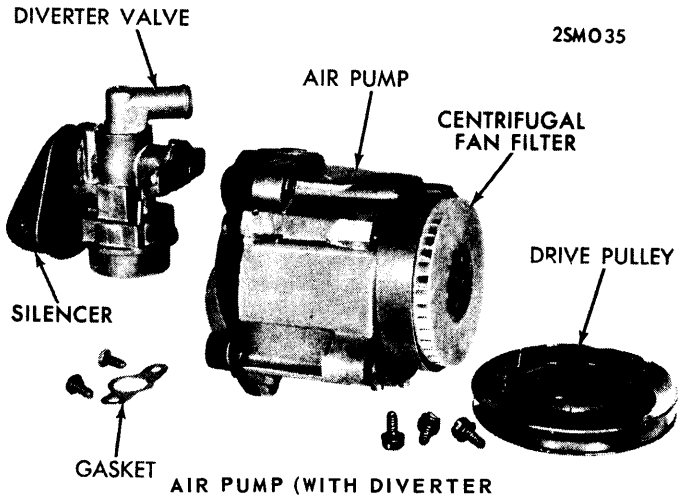
AIR PUMP (TYPICAL WITH SEPARATE RELIEF VALVE)



TYPICAL AIR INJECTION SYSTEM

AIR INJECTION (Cont.)

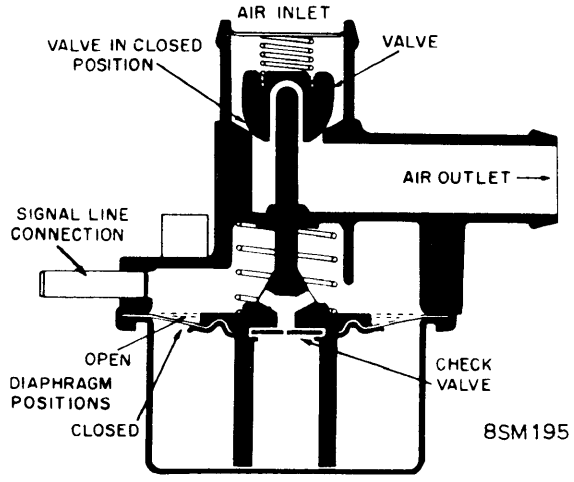
Air Pump – Pump is belt driven and mounted on the front of the engine with power take-off at the crankshaft pulley. Intake air passes through a centrifugal filter at the front of the pump. Air is delivered to the injection manifold by a rubber hose, through a diverter or by-pass valve, and tubing. Some models utilize a pressure relief valve in air pump body, while others have a relief valve in combination with diverter valve.



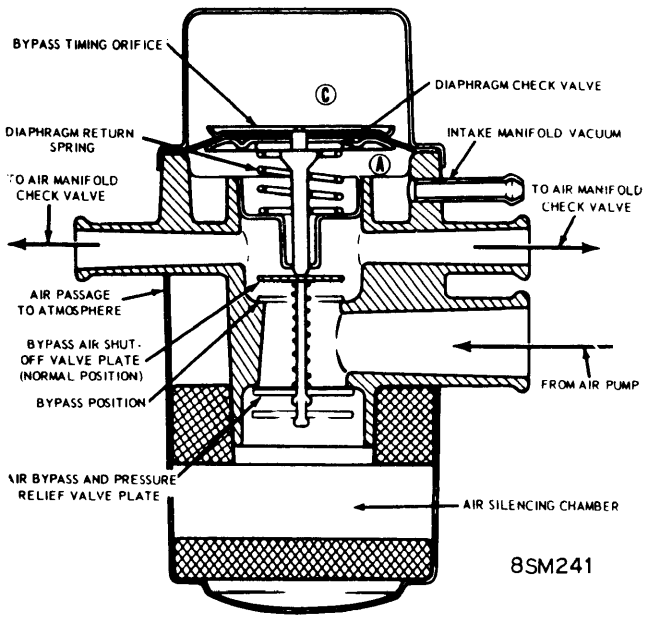
AIR PUMP (WITH DIVERTER VALVE AND RELIEF VALVE COMBINED)

Anti-Backfire Valve – Used on most 1966-67 models. When throttle is closed suddenly after hard acceleration carburetor air is shut off instantly but fuel flows momentarily which results in a rich mixture. To eliminate backfire, anti-backfire valve opens momentarily to allow clean air from air pump into intake manifold to prevent a rich mixturing from occuring. Opening of valve is "triggered" whenever there is a rapid rise in intake manifold vacuum. Opening of this valve also prevents rapid reduction of engine RPM, which eliminates necessity of dashpot.

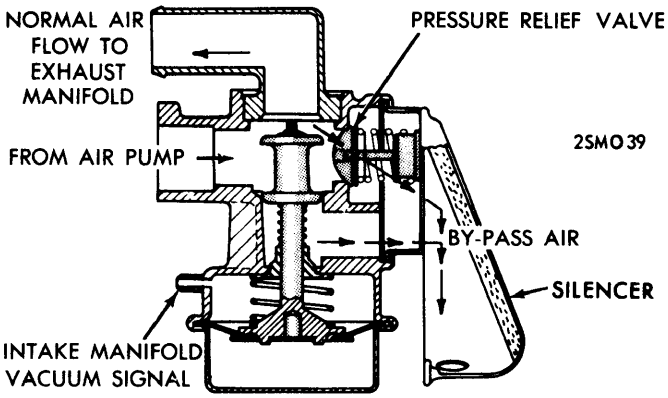
Diverter Valve – Valve prevents backfire in exhaust system during sudden deceleration. Valve senses sudden increases in intake manifold vacuum, causing valve to open and allowing air from air pump to vent to atmosphere. In some applications a pressure relief valve is incorporated in the same housing, while on all others, pressure relief is provided for by a valve in air pump itself. This valve controls pressure within system by diverting excessive pump output to atmosphere.



ANTI-BACKFIRE VALVE (TYPICAL)



DIVERTER VALVE (TYPICAL WITHOUT RELIEF VALVE)



DIVERTER VALVE (TYPICAL WITH RELIEF VALVE)

Check Valve – Valve has a one-way diaphragm which prevents hot exhaust gases from backing up into the hose and pump. Valve protects system in case of pump belt failure, high exhaust system pressure, or air hose ruptures.

TROUBLE SHOOTING

Excessive Belt Noise – Loose pump drive belt or seized pump.

Excessive Pump Noise – Leak in hose, loose hose, hose touching other engine parts, diverter valve or by-pass valve failure, check valve failure, pump mounting loose, pump or impeller damaged.

No Air Supply – Loose drive belt, leak in hose or hose fitting, diverter valve or by-pass valve failure, check valve failure, pump failure.

Exhaust Backfire – Incorrect engine tune-up, engine vacuum leaks, faulty anti-backfire or diverter valve, or faulty check valve(s).

NOTE – Proper operation of the Air Injection System is dependent upon proper engine tune-up. See individual car models for specifications and procedures.

AIR INJECTION (Cont.)

TESTING

Anti-Backfire Valve – Check valve by removing large hose from anti-backfire valve to air pump. With finger placed over open end of hose (not valve), accelerate engine and allow throttle to close rapidly. Valve is operating properly if a momentary rushing noise is audible.

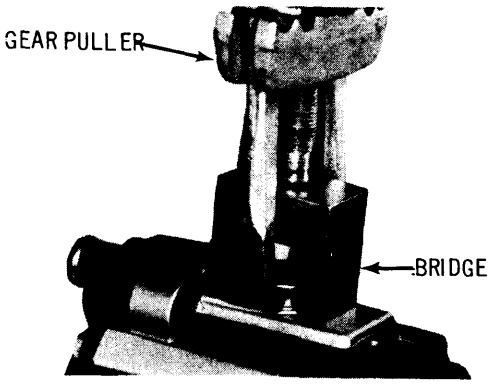
Diverter Valve Test - Check valve by accelerating engine and allowing throttle to close rapidly; a momentary rush of air should be noted at diverter air outlet.

Check Valve Test - To check operation of this valve, remove air supply hose from pump at distribution manifold. With engine operating listen for exhaust leakage at check valve which is connected to distribution manifold.

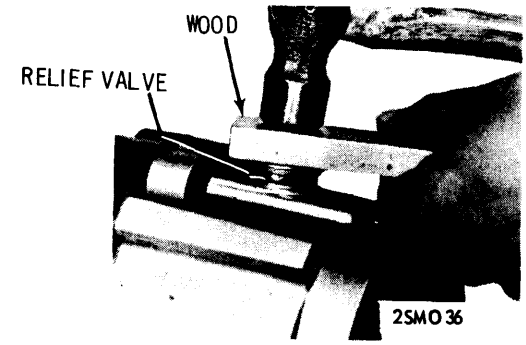
SERVICE PROCEDURES

At 12,000 miles or 12 months, complete system should be checked for proper operation. Condition of engine tune-up should be checked whenever air injection is not operating properly. Overhaul is recommended only on 1966-67 air pumps. If pump has pressure relief valve located on housing of pump, valve may be replaced. On all 1968 and later air pumps, centrifugal fan filter may be replaced. Anti-backfire valve, diverter valve, or check valve are not serviceable and must be replaced if defective.

Pressure Relief Valve – Valve may be replaced only if valve is mounted in pump housing. Remove pump and place on bench. *NOTE – Do not hold pump by clamping in vise.* Using a steel bridge and a gear puller, valve may be removed. To replace, insert new valve into mounting hole. Place a block of wood over valve and tap with hammer until valve shoulders lightly in housing. *NOTE – If pressure plug is installed in new relief valve, remove this plug before installing valve.* After valve is installed, pressure plug is installed into valve by pressing against its center.

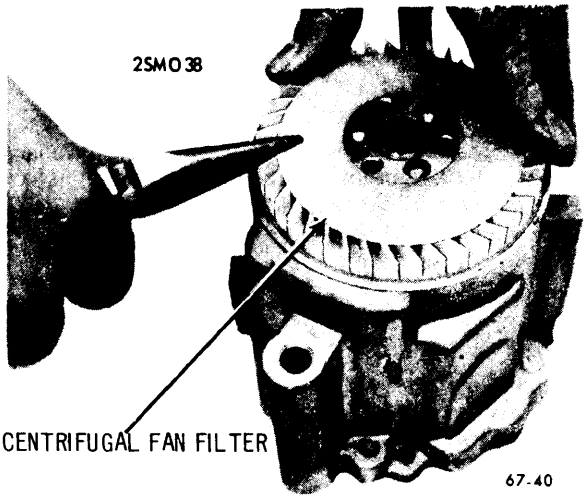


REMOVING PRESSURE RELIEF VALVE



INSTALLING PRESSURE RELIEF VALVE

Centrifugal Fan Filter – Used on all models after 1968. To replace, remove drive belt, pulley mounting bolts and pulley. Break off remaining portions of centrifugal fan filter from pump hub, being careful that fragments do not enter air intake hole. Install new filter by drawing it on with pulley and pulley bolts. Do not attempt to hammer or press filter on.



REMOVING CENTRIFUGAL FAN FILTER

NOTE – After new filter is installed, it may squeal during operation until its outside diameter has worn in. This may require 20 to 30 miles of operation.

CAUTION – If engine or engine compartment is to be cleaned with steam or high pressure detergent, centrifugal filter fan should be masked off to prevent liquids from entering air pump.

Exhaust Emission System Cleaning - DO NOT attempt to clean diverter valve. Do not blow compressed air through check valve.

Pump Exhaust Tube Replacement - Remove by placing tube in vise or use a suitable pair of pliers to pull tube with a twisting motion. Insert new tube into holes and tap in with a block of wood to protect tube. Approximately 7/8" of tube should extend above cover.

AIR INJECTION (Cont.)

OVERHAUL

NOTE – Overhauling air pump is not recommended on 1968 and later pumps since internal components of pump are not serviceable. However, certain service items can be replaced as previously described. Following overhaul procedure applies only to 1966-67 pumps.

Dismantling Pump – Support drive hub in a soft-jawed vise and remove four housing cover bolts. Lightly tap housing end cover with a soft mallet, alternating sides, remove. Remove six socket-headed screws from rotor ring and remove rotor ring and carbon seal. Clean bearing in petroleum solvent. If bearing is in good condition, dry thoroughly, then lubricate. Remove vanes from rotor and clean in petroleum solvent and inspect bearings, if in good condition, thoroughly dry and lubricate. Carefully remove carbon shoes with tweezers, then remove shoe springs. Press rear bearing from ring, give adequate support to avoid distortion. Remove relief valve from housing, using a suitable extractor and bridge.

Reassembling Pump – Fit relief valve into housing bore using a protective plate, tap valve with a hammer until it abuts seat in housing. Fit vanes onto assembly pin, lubricate each bearing. Insert pump drive hub in a vise, then fit vanes into rotor, ensuring that one vane is positioned adjacent to stripper. Do not remove assembly pin at this time. Fit a carbon shoe to each side of every vane, ensuring that shoes are fitted with their bearing surface adjacent to vanes and with rounded point of contact toward outside diameter of rotor. Fit and adjust three shoe springs into each of deepest shoe slots, ensuring that curved portion of each spring is nearest shoe. Push springs flush or beneath rotor surface. Press rear rotor bearing into ring until bearing is 1/32" below surface of rings. Press lettered end of bearing only. Lubricate bearing. Fit carbon ring and a new carbon seal onto rotor end. Apply an applicable thread locking compound to socket-headed cap screws, secure rotor ring to rotor and torque to between 30 and 40 in. lbs. Now, remove assembly pin from vanes and start end cover into position. Move cover radially until pivot pin is located in vane bearing. Replace end cover retaining screws, and progressively torque screws to between 10 and 16 ft. lbs.

NOTE – All rubber "O" rings removed during disassembly should be replaced. Special wire hose clips that secure anti-backfire valve and P.C.V. should be replaced, once removed. Any damaged or faulty valves should be replaced. Any rubber hoses that appear deteriorated or misshapen should also be replaced.