MERCEDES-BENZ AIR INJECTION SYSTEM

280 Series
380 Series

DESCRIPTION

All models are fuel injected and use an oxygen sensor and feedback system to reduce emissions. The air injection systems are designed to work with the feedback system to reduce exhaust emissions and improve driveability. System components vary by engine model, as listed.

280 Series – Air injection components include an air pump, relief valve, diverter valve, air filter, check valve, delay valve, 2 thermal vacuum valves, and connecting hoses. The air is injected through ports in the cylinder head.

380 Series – The system includes an air pump with magnetic clutch, air shut-off valve, check valve, switch-over valve, coolant and oil temperature switches and electrical relay.

NOTE – *The air injection relay is located behind the glove box, underneath the instrument panel.*

OPERATION

280 MODELS

The system is designed to inject air into the exhaust ports during a specified period of engine warm-up operation. The oxygen sensor detects the additional oxygen in the exhaust and richens the air/fuel mixture slightly, resulting in smooth operation.

When coolant is below 62°F (17°C), the first thermal valve is closed and no vacuum reaches the diverter valve. Air is vented to atmosphere. When the first valve opens, vacuum passes through to open the diverter valve and direct air to the cylinder head. When the second thermal valve opens at 122°F (50°C), the vacuum is bled to atmosphere at the air intake. The diverter valve once again vents air pressure.

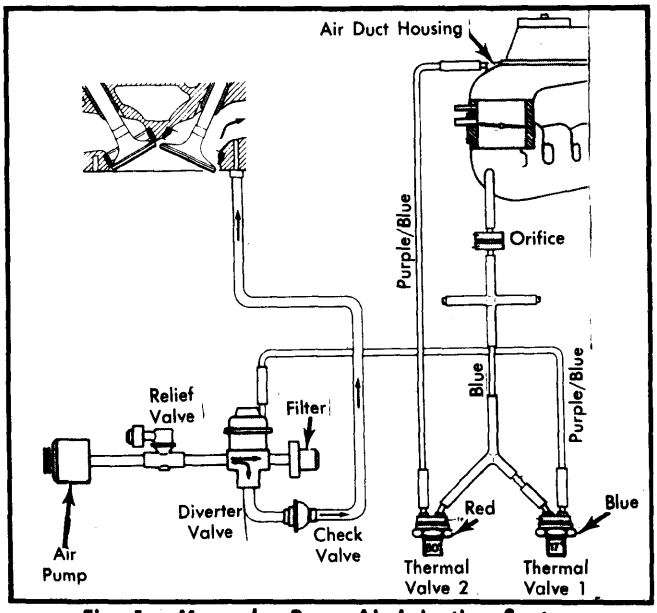

Fig. 1 Mercedes-Benz Air Injection System (280 Models)

380 MODELS

The air injection system is used to improve catalyst operation when the engine is warming up. Air is injected only if engine coolant temperature is below 108° F (42° C), oil temperature is above 61° F (18° C) and the oxygen sensor is not operating. When these conditions are present, the air injection relay provides power to the air pump clutch and the switch-over valve.

When the switch-over valve is activated, it provides vacuum to open the air injection shut-off valve, allowing air from the pump to pass through the check valve into the exhaust manifold.

TESTING

280 MODELS

1) Warm engine to normal operating temperature. Remove cap from diagnostic connector on fenderwell. Connect the negative lead of a voltmeter to pin 3 in connector, and positive lead to battery voltage. Disconnect oxygen sensor connector. Voltmeter reading should be constant. Make a mark on voltmeter dial to indicate needle position.

2) Connect oxygen sensor lead. Disconnect Purple/Blue hose at air duct housing and seal end of hose with finger. If voltage reading increases, system is operating properly. If not, continue with testing procedure.

3) Check vacuum hose routing and ensure that hoses are tightly connected and no lines are plugged. Disconnect "Y" fitting at thermal vacuum valves and check for vacuum at "Y". If not present, clean intake manifold vacuum fitting.

4) Check to ensure that air passes through both thermal vacuum valves. If not, replace closed valve. If both valves are open and pass air, replace diverter valve.

5) If system does not operate after these checks, inspect belt tension and air pump operation. Remove test equipment and reinstall diagnostic connector cap.

380 MODELS

System Check – 1) Start engine and warm to operating temperature. Air pump clutch should be disengaged and pump should be stopped.

2) Disconnect plug from coolant switch and insert jumper wire into connector terminals. Turn ignition off and then on without starting engine. Clutch and switchover valve should operate.

3) Connect negative lead of voltmeter to terminal 3 of diagnostic plug (on fenderwell). Connect positive lead of voltmeter to battery. With engine running at operating temperature, voltage should be present. Mark voltmeter dial to indicate needle position, then stop engine.

4) Remove connector from magnetic clutch on air pump. Use jumper wires to connect clutch terminals to ground and battery voltage. Start engine and observe voltmeter. Reading should be as previously marked. Disconnect vacuum lines from switch-over valve and connect them together. Voltmeter reading should increase. If not, proceed to component testing.

MERCEDES-BENZ AIR INJECTION SYSTEM (Cont.)

Component Testing – 1) If air pump clutch operated with engine at normal operating temperature, check coolant temperature switch with ohmmeter. If zero resistance is shown, replace temperature switch. If infinite resistance is shown, replace relay.

2) Coolant must be approximately 212° F (100° C). With engine idling, unplug oxygen sensor (plug is near exhaust pipe bracket under engine) and coolant temperature switch. Connect a jumper wire across terminals in coolant switch connector. Clutch should operate. If not, check for voltage at temperature switch connector. Repair wiring as necessary.

3) Reconnect temperature switch. With oxygen sensor still disconnected, remove vacuum line from air shut-off valve and connect a vacuum gauge to the line. No vacuum should be present. If vacuum is noted, unplug temperature switch connector. If vacuum drops, replace coolant temperature switch. If vacuum does not drop, repair or replace wiring, relay or switch-over valve.

4) Connect a jumper wire across temperature switch connector terminals. Vacuum should be present on gauge. If not, check and repair vacuum lines as necessary. Check shut-off valve for leaks.

5) Pull hose from air cleaner that leads to air pump. If strong suction is present, system testing is complete. If no air is drawn in, check hose condition or replace air pump. If a slight amount of air is drawn in, pull Purple/Blue vacuum line from air switch-over valve. If vacuum is present at valve, replace it.

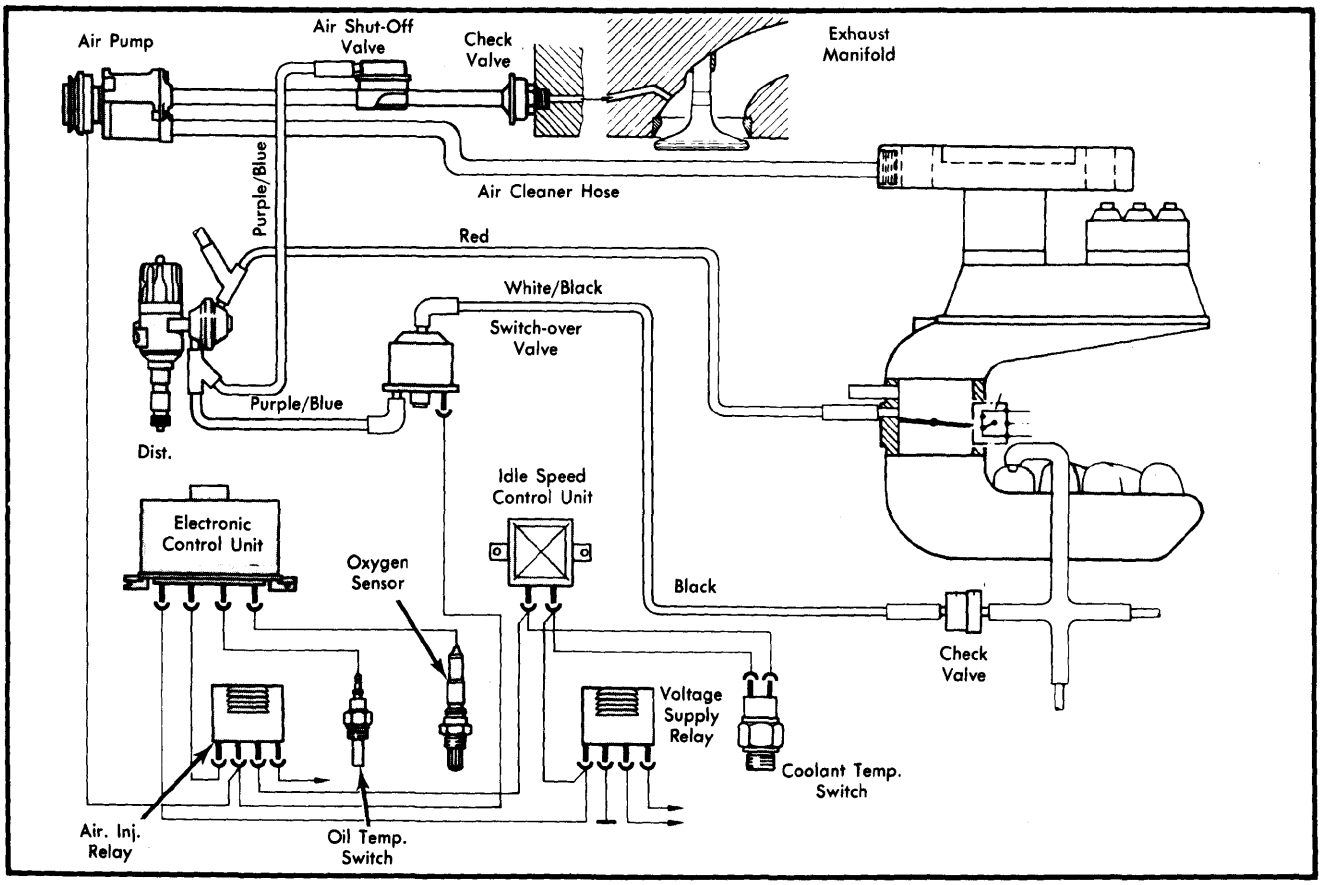

Fig. 2 Mercedes-Benz Air Injection System (380 Models)