

Technical Service Bulletin

Date: 8/29/2003

Product Description: Air Filters

Subject: Mass Airflow Sensors

DESCRIPTION

The mass airflow sensor (MAF) is a common engine component on nearly all electronically fuel injected engines. It is an electronic unit that measures the volume of air being drawn into the engine and allows the engine computer to calculate how long the fuel injectors need to be open to maintain the correct fuel to air ratio under all operating conditions. MAF sensors have no moving parts. Instead, they use a heated sensing element to measure air flow.

There are two types of MAF sensors: hot-film and hot-wire. In a hot-film MAF, a foil grid is heated about 170 degrees F above ambient air temperature. In a hot-wire MAF, a platinum wire is heated approximately 212 degrees F above the incoming air temperature.



As air flows past the sensor element, it cools the wire and increases the current needed to keep the element at its operating temperature.

The wire element is very sensitive to any form of contamination, including oil vapor from PVC systems, dirt, silicon, moisture, etc. To eliminate any deposits on the wire, it undergoes a burn off cycle every time the engine is switched off. Approximately four to five seconds after the engine is stopped, the wire is heated to 1,000 degrees C for about one second through the use of a relay switch. Due to the high temperature and the presence of oxygen in the air, a reaction called wire erosion occurs. Eventually, the erosion causes the MAF output voltage to be skewed and will not allow the engine to run correctly. As with the filament in a light bulb, the sensor wire within a MAF will eventually fail and require its replacement.

In some instances contamination becomes substantial enough to produce skewed information, causing the sensor to over-estimate air flow at idle and under-estimate air flow at higher air flow volumes. The symptoms of an



improperly functioning MAF include hard starting, engine stall, pinging, lack of power, jerking, hesitation/surge on acceleration and high emissions.

Besides contamination, there are other factors that cause the MAF to fail, including the burn off relay not functioning, shorting of the MAF harness, overheating of the hot wire assembly due to grounding, engine backfire, cracking of MAF housing, dead spot in the throttle position sensor, vibration or shock, sensor wire fatigue and physical damage due to poor handling or physically attempting to clean the wire element.

Because of the many possible reasons for a MAF failure, the exact cause is often incorrectly diagnosed. Available diagnostic tools can only indicate that a MAF is not functioning and provide virtually no information as to why it failed. All too often, the engine's air filter is blamed for the MAF failure, whether it be a conventional pleated paper filter or an oil wetted foam filter such as the AMSOIL Air Filter. However, the likelihood of an air filter causing MAF failure is minimal.

AMSOIL Air Filters will not cause MAF failures for the following reasons:

- **Filter oil is tackified, preventing oil migration.**
- **MAF sensors are designed to function in the presence of contaminants.**
- **Filters are centrifuged to insure the proper amount of oil is in the filter upon installation.**

A rare exception could be if, during field servicing, the AMSOIL Air Filter was grossly over-oiled or re-oiled using the wrong (non-tackified) oil.

AMSOIL Air Filters can be used with confidence in applications utilizing MAF sensors.

Submitted By: DW

Approved By: DRA

Approval Date: 9/08/03

Distribution: Internal All