Common Causes of EVAP System Failures

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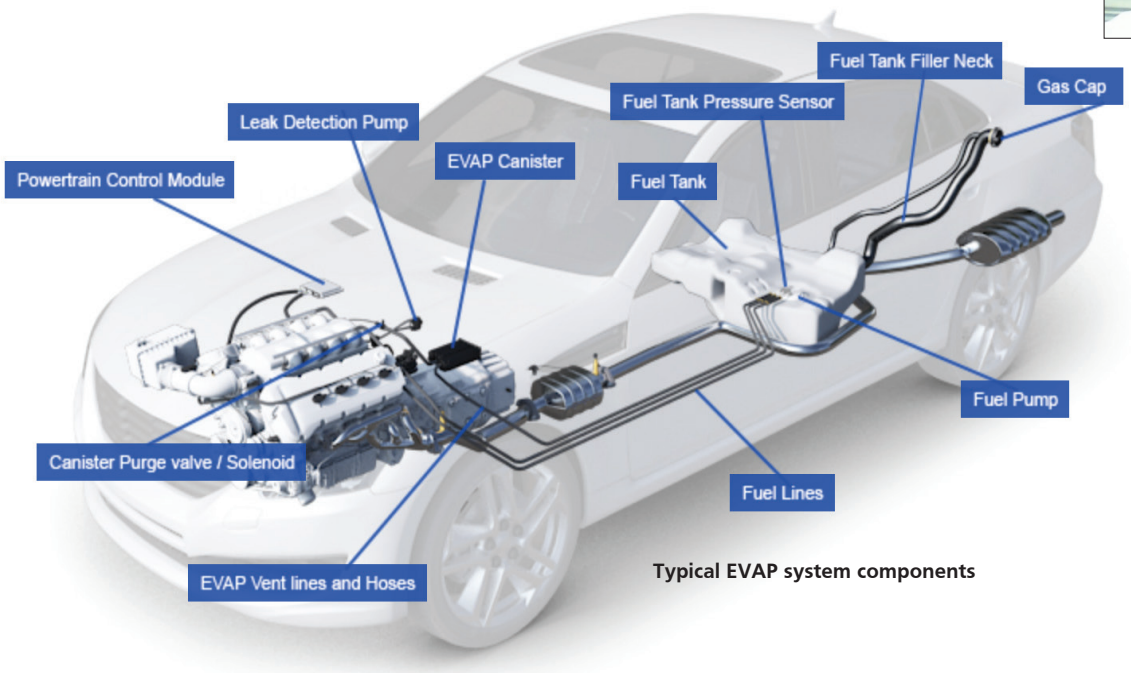

Typical EVAP system components

EVAP Canister

When OBD II was introduced to control the emissions from the tailpipe, it also introduced a system to control and monitor the hydrocarbon emissions from the fuel supply system itself.

Any leak in the fuel supply or storage could release hydrocarbons at all times, 24 hours a day, even when the vehicle is parked. To control and monitor these hydrocarbons from the petrol supply, a system was developed we know as the Evaporative Emission Control System (EVAP). Evaporative emissions are kept sealed from the atmosphere, and used in the combustion process.

Vapour from the fuel tank is stored in an activated carbon canister, and the PCM will vent this stored vapour into the engine's air intake. These vapours are then consumed in the combustion process.

One of the OBDII requirements is to monitor the EVAP system performance, and check for leaks within the system. It also allows for atmospheric air to enter into the fuel tank to replace the fuel volume used during the drive. This can be achieved via one-way valves built into the fuel cap or the EVAP canister itself. Without this make-up air, the fuel tank would collapse.

Some systems will incorporate a leak detection pump. The pump pressurises the tank, and pressure sensors monitor the tank for any pressure drop.

During evaporation, the Powertrain Control Module (PCM) will monitor the performance, and will detect any air leaks in the system that are creating a lean condition.

The main control of the EVAP system is the control valve that opens the inlet to the carbon canister, when the system is not controlled, this valve will remain closed.

EVAP Control Valve

Very often we see a leaking EVAP control solenoid allowing unmetered air into the inlet, creating a lean condition and triggering a P0171 code.

When the PCM activates the EVAP valve, it will monitor the increased mixture signal from the upstream Lambda sensor. If this does not show the required increase, a trouble code will be logged. In this situation, a test of the system will be required to determine the area of the leak.

Another source of faults are possible leaks from the carbon canister. This canister is often located under the vehicle, near the fuel tank.

The best test we have found to detect leaks in the EVAP is to monitor the Long Term Fuel Trim (LTFT) figures in EOBD. They should be no more than 5% positive or negative.

A high positive LTFT indicates a lean condition. In this case, block off the EVAP system at the manifold and monitoring the fuel trim over a few minutes. If the figure returns to an acceptable level, this indicates a leak in the EVAP circuit.

A smoke test of the system from the manifold will determine the location of the leak.