Many Factors Must Be Given Consideration When Diagnosing and Correcting Vapor Lock

IN RESPONSE TO several inquiries from Cadillac service men, the following article regarding the causes and the correction of vapor lock has been prepared.

Vapor lock is caused by boiling of the gasoline in the fuel supply system and many factors must be considered when attempting to correct this condition.

In any discussion regarding vapor lock it is important to remember that the nature of a fuel itself, as well as atmospheric pressure, can help to cause this condition.

Some fuels have lower boiling points than others, the boiling point being the temperature at which the fuel will vaporize. During the winter, fuels with a low boiling point are used to assure proper starting. These same fuels are sold in the spring season until the stocks are depleted, which explains why vapor lock is more prevalent during that time of the year.

Most of the fuels furnished today, however, have a relatively high boiling point, and no trouble should be experienced with fuel systems that are in proper operating condition.

Atmospheric pressure directly affects the boiling point of a fuel. The lower the atmospheric pressure the lower the boiling point. Thus in extremely high altitudes, where the atmospheric pressure is low, gasoline will boil at temperatures as low as 100°F.

How Vapor Lock Occurs

Vapor lock usually occurs in the fuel system between the fuel pump and the gasoline tank, or within the fuel pump itself. What happens is that the suction of the pump reduces the pressure on the gasoline, which in turn results in a reduction of the boiling point of the fuel.

The pump, instead of drawing gasoline only from the line, draws a combination of solid fuel and vapor. Then when the pump attempts to force the fuel to the carburetor it compresses the vapor and does not deliver a sufficient amount of fuel. On the next suction stroke the vapor expands, greatly reducing the efficiency of the pump.

The efficiency of the average fuel pump when pumping gasoline that vaporizes easily is none too good, but if the entire fuel system is at peak operating efficiency it will usually handle such vapor as is formed, plus a sufficient quantity of fuel to start and operate the engine.

Any factor which further contributes to the inefficiency of the pump, however, may cause vapor lock. Some of these factors, together with the proper corrective measures, are described in the balance of this article.

Inspect Connections and Lines

Any leakage or restrictions in the connections and fuel lines between the fuel tank and the pump may cause vapor lock and/or hard starting. The connections and lines should be inspected first in the event of hard starting or improper operation caused by vapor lock. The points to check are as follows:

- Pick-up tube inside tank (rare)
- Coupling at fuel tank
- Coupling in middle of fuel line (some models)
- Fuel line between tank and pump (cracks or dents)
- Fittings at pump
- Flexible connections (check for twisted, flattened or swollen connections)
- Non-standard fuel filter or gascolator other than that on the pump (these should be removed)

Carburetor and Fuel Pump

The next things to check are the carburetor float valve and the fuel pump exhaust valve. The efficiency of these valves is determined by installing a pressure gauge, with absolutely air-tight connections between the pump and the carburetor.

Run the engine until the pump reaches its maximum operating pressure, which should be from 3½ pounds to 5½ pounds. When the engine is stopped the pump should maintain this pressure for several minutes. If it does not, gasoline is leaking either at the carburetor float valve or back through the fuel pump valves.

Leaks at the carburetor float valve will cause flooding, for there is always the possibility that the engine will stop at the extreme of the fuel pump stroke, with one entire pump stroke discharge being forced into the carburetor.

To determine whether the leak is in the pump or the carburetor, duplicate the above test with the gauge on the pump only, doing it so that there is no discharge of gasoline to the carburetor.

If the pressure is then held for several minutes, it indicates that the carburetor float valve is leaking. If the pump does not hold the pressure, the leak is in the pump valves or the diaphragm.

If the above inspections and tests reveal that the carburetor float valve, the lines and the fuel pump valves and diaphragm are satisfactory, the trouble may still be caused by inefficient operation of the pump.

Checking Capacity of Fuel Pump

In such cases, the capacity of the fuel pump must be checked. Make this test according to the procedure described on page 53 of the 1942 Shop Manual. Complete instructions for inspecting and servicing a pump that does not deliver the proper amount of gasoline were included in the March-April, 1944, issue of the Serviceman.

With these inspections made and any necessary corrective service performed, the fuel system should function properly, providing the engine is not overheating and that the vehicle is not being used for some unusual service, such as towing a heavy trailer.

1936 Through 1939 Series Cars

The fuel pump used on 1940 and later series cars is different in design from the pump used on 1936 through 1939 V-8 engines. The later pump has a higher output and better cooling and vapor handling characteristics, and in most cases can be installed on earlier series cars by making special lines. It is recommended that this be done when vapor lock cannot be corrected by using normal methods.

To install this pump on 1936 through 1939 V-8 engines, a special 30-inch piece of copper tubing should be used. This tubing must be bent as required, cut to length, the fittings installed and the ends flared. The tubing is supplied with the pump as an assembly, under Part No. 1097176.

This later pump is available on an exchange basis, as explained in General Service Letter No. GS-316, and is definitely an advantage in sections of the country where heat and elevation are extreme.

Under extreme conditions it may also be advisable to insulate the fuel lines to the pump. This is especially true of the line in the engine compartment on the intake side of the pump and that portion of the line that is near the muffler on those series cars in which the fuel line and muffler are on the same side of the car. Electrician's loom, known as Romax, is ideal insulating material for this purpose.