Vapor lock with/without heat soak

Simple, pragmatic solution for eliminating the problem on classic cars.

Vapor lock is a problem caused by liquid fuel in the fuel system of gasoline-powered combustion engines turning into vapor - the formation of vapor bubbles. This disrupts the operation of the fuel pump, leading to a loss of supply pressure to the carburetor or injection system, which results in a temporary loss of power or complete engine stalling. Restarting the engine in this condition can be difficult or simply impossible.

The fuel may evaporate due to **heating from the engine or engine components**, **local ambient weather**, a **lower boiling point at high altitude** or **heating from the fuel pump**. In regions where fuels with lower viscosity (and lower boiling point) are used in winter to facilitate engine starting, the continued use of these special fuels in summer can result in vapor lock occurring (much) more easily.

Another point is that the fuel blends for modern vehicles (should) evaporate more quickly, especially the mixtures of the last two decades.
Vapor lock therefore tends to occur more frequently with today's modern fuel formulations in classic cars.

Vapor trap with fuel filter - Purolator F21117.
Note: Limited space between the two outlets.

Vapor lock was also far more common in older gasoline fuel systems with a mechanical low-pressure fuel pump driven by the engine, located in the engine compartment and feeding a carburetor.

Such pumps were usually located higher than the fuel tank, were “heated” directly by the engine and pumped the fuel directly into the float bowl of the carburetor. The fuel was sucked out of the supply line under negative pressure, which increased the risk of a vapor bubble between the tank and the pump.
A vapor bubble sucked into the fuel pump could interrupt the fuel pressure long enough to partially or completely empty the float bowl in the carburetor, resulting in fuel starvation in the engine. Even a temporary interruption of the fuel supply to the float chamber is not ideal; most carburetors are designed to operate with a fixed fuel level in the float bowl, and lowering the level reduces the fuel-air mixture supplied to the engine.

A vapor lock is more likely to occur when the vehicle is in stop-and-go traffic because the temperature below the hood rises significantly. A vapor lock can also occur if the engine is

turned off while it is hot and the vehicle is stopped for a short time (heat soak). The fuel in the fuel line near the engine does not circulate and can therefore heat up to such an extent that vapor bubbles and thus a vapor lock occur. In both cases, the problem is more likely to happen in hot weather and/or at high altitudes.

Gravity-driven fuel systems are not immune to vapor lock. Much of what has been described above also applies to a gravity fuel system. When vapor forms in the fuel line, its lower density reduces the pressure created by the weight of the fuel. This pressure is what normally moves the fuel from the tank to the carburetor, so the fuel supply is cut off until the vapor is removed, either by the remaining fuel pressure forcing it into the float bowl and out the vent, or by allowing the vapor to cool and condense again.

Many classic car drivers are very familiar with this. The obligatory 10-minute wait after parking. On hot days or at high altitudes, even longer...

Also some of our classics had this problem from time to time. Especially in summer (here in Costa Rica: December to May) and/or after switching off the engine in the wonderfully “warm” Puntarenas or Golfito.
Or - more rarely - in great weather high up in the mountains above 3,000m.
Well, Costa Rica has special demands on its vehicles.


Separator filter in slightly modified form: FRAM G3499

And rewards the classic crews with humble patience...
Or a cold beer while waiting.
Until now.

I know what you’re thinking and you’re right!: The problem of vapor lock has now been completely solved, and you can find out how right here. Don't worry, the explanation is pragmatic, simple and efficient.

My special thanks go to our super-competent 3-country rally team from March 2025, who added a few more interesting puzzle pieces to the vapor lock problem.

The eight steps to vapor lock happiness:

1. If present, check that the fuel return line to the tank is free. If clogged, clean.

2. Install fuel lines as far away as possible from extremely hot engine components (e.g. exhaust manifold) to prevent the fuel from heating up in the engine compartment.

3. Check that the fuel pump is installed in a relatively cool place (near the tank and away from exhaust components), otherwise select a more suitable location.

4. If the filter is mounted on the suction side of the pump (i.e. between the tank and fuel pump), check whether it is clogged, otherwise replace it or omit it if necessary.

5. Install filter with vapor trap just before the carburetor with connection to the fuel return line in the tank. E.g. Purolator F21117, WIX Filters - 33040, FRAM G3499 or ECOGARD XF21117 all priced at around 9 USD.
   Caution: On some models, the two outlets are quite close to each other!

   These things used to be very common and have unfortunately been (almost) forgotten, although they work wonderfully. The vapor separator filter trap must be turned so that the return line to the tank (for the vapor bubbles) is at the top.

In extremely stubborn cases, continue here:

6. Fuel lines in the engine compartment made of reflective metal, rubber lines store heat for longer (heat soak / heat build-up in the engine compartment after the vehicle has been turned off).
   Reflective sleeves (e.g. from Design Engineering, Vapor Block Fuel Line Sleeve) make sense for rubber lines; fuel lines of reflective (and possibly polished) metal are better.

Not necessary in our case, but there are two other measures that would help:

7. Install carburetor spacer if possible - and if there is sufficient headroom.

8. Install heat shielding to the carburetor and fuel line in the engine compartment.

After the first five steps, the vapor lock problem will almost certainly be solved.

After point five, miserable vapor bubbles have disappeared and/or trapped even in Costa Rica.
No more trouble with them.

And if the above tips are sufficient for the special demands of the tropics, they should be more than enough working for moderate climate zones.

But with the global climate change just knocking on our door...
Who knows?

I hope, I've been able to help one or the other classic driver.
If you have any corrections, further tips ~~or criticism~~, let me know, I would be glad to edit and/or include them here.