

Technical Notes

Vapor Locks

By Chris Pelikan from Model A Times

Gasoline engines operate by igniting a mixture of air and gasoline vapors. Therefore, a gasoline's tendency to vaporize, or its volatility, is important. Gasoline formulations are varied by season and geographical locations. Mixtures that do not vaporize readily may cause hard starting of cold engines and poor vehicle drivability during warm-up and acceleration.

Conversely, gasoline that vaporizes too readily in fuel tanks, lines and carburetors can cause decreased liquid flow to the engine, resulting in rough engine operation or stalling (vapor lock). Today's common gasoline formulations for winter start to transition to vapor at about 105 degrees F, and the summer mixture is changed to transition at 140 degrees F.

The Model A engine was designed to utilize the 40 to 50 octane fuel of the 1930's, leaving the engine susceptible to vapor lock with the high octane gasoline of today. This typically occurs in a parade or when we have to sit through a series of long stoplights on a hot day. The airflow through the radiator slows down, the engine gets hotter, and the fuel starts to boil in the carburetor. When traffic picks up and we want to go, the engine hesitates and tends to stall with vapor lock. If the problem isn't too severe, a quick pull and a little counter clockwise turn of the choke rod will enrich the mixture enough to let the engine accelerate. With more air now moving through the radiator, the engine soon cools down a little and you are on your way.

If the problem is severe, hopefully you can find a shade tree to park under so you and your Model A can cool off.

I have conducted a series of engineering experiments to evaluate many suggested techniques to minimize the risk of vapor lock, and here the five that I have found to be most effective:

1. Drive your Model A regularly so that you're not still using winter formulations of gasoline in the heat of summer. Be aware that you can unknowingly fill your tank with a winter blend of fuel at a gas station that is late in restocking with summer blend.
2. The cooling and timing systems must be properly maintained to keep your engine temperature under 190 degrees F and the fuel in the carburetor under 140 degrees F. A four-core radiator and a 160 degrees F thermostat installed in the upper radiator hose will both improve cooling.
3. A copper gasket will improve the conducted heat transfer from the exhaust manifold back to the block and water jacket, and will reduce heat transfer to the intake manifold and carburetor.
4. A couple of stacked, copper-clad asbestos gaskets between the carburetor and the intake manifold will reduce the conduction of heat to the fuel in the carburetor. Some people install a machined phenolic block to increase the thermal insulation between the carburetor and intake manifold even more. However, these blocks can diminish engine performance in very cold weather.
5. A quart of diesel fuel added to a nearly full gas tank, will reduce fuel volatility and thus vapor lock tendency, and not significantly affect your engine performance on a hot day in a parade.