

Many of us grew up listening to ads for STP – The Racer’s Edge. When we were in college, trying to nurse that jalopy through senior year, we were drawn to the auto parts department in K-Mart. Bars Leaks would cure a leaky radiator. It worked on the nuclear submarine Nautilus. Various oil additives promised better mileage. Air conditioning refrigerant refills had a leak plugger.

What about similar fixes for your airplane?

There are some fixes that work. Some of those fixes are legal.

Sticky valves

Valves in an air-cooled engine collect carbon and lead deposits on the valve stem. Those deposits can impede the closing movement of the valve. A typical indication is rough starting with one cylinder not firing. After a few seconds, the last cylinder kicks in and engine smooths out. It gets worse with more deposits.

The best solution is disassembly of the cylinder, cleaning the valve, and reaming the valve guide. Another solution is staking the valve, lightly tapping the end of the valve.

There are two chemical solutions: the first is to change the chemical composition of the oil to dissolve the deposits. The second is to change the composition of the fuel to prevent the deposit of lead. We discuss the fuel solution first.

Tri Cresyl Phosphate

Tri Cresyl Phosphate (TCP) as a fuel additive lowers the temperature at which lead is carried out of the cylinder as exhaust. When used in recommended concentrations it prevents build up of lead on valve stems and spark plugs. TCP is approved by the FAA for use in aircraft engines.

Alcor is the only producer of TCP approved by the FAA.

Another fuel additive containing TCP is Decalin. This product contains another additive not approved. The FAA has not approved Decalin.

LW-16702

Textron Lycoming LW-16702 oil additive is recommended for Lycoming O-360-H2AD engine and similar models, which have a known issue with camshaft wear. It is an FAA-approved anti-scuffing agent. Many aviation oils include this agent, so no additive is required.

Avblend

Avblend is an FAA approved oil additive, whose ingredients are not published. It does work to free sticky valves. It’s not a replacement for physical maintenance, but it does work to free sticky valves. At \$18 per dose, it is

Marvel Mystery Oil

Bud Pierce, the inventor of the Marvel carburetor, invented Marvel Mystery Oil, which is a thin, perfumed petroleum product of secret composition. Today, it is a product of Turtle Wax, Inc, and is recommended as both an oil additive and fuel additive. Some people swear by it. My belief is that it contains short-chain



Hope in a Jar

hydrocarbons, which when added to the oil dissolve deposits in the engine, including deposits on the valve stems. When added to the fuel, the thin oil probably attaches itself to the cylinder walls and rings.

As an oil additive, its most likely effect is lowering the viscosity of the oil, reducing oil pressure. As a fuel additive, it will likely reduce the anti-knock index of the fuel. Marvel Mystery Oil is not approved in aircraft engines. You use it at your own risk.

Water and Ice in Fuel

Water is the most common contaminant in aviation gasoline and jet fuel. Aviation gasoline will support up to 30 ppm without ill effect. When small amounts of water are ingested by the engine, the result is rough running. When large amounts of water are ingested, the result may be engine stoppage. Because water sinks to the bottom of a container of avgas, the water is concentrated, and the danger of engine stoppage is compounded. To reduce this risk, one needs an agent that disperses the water in the fuel. An approved fuel additive works the same way as an addition of dishwashing detergent to a cooking pot with a layer of fat on the surface. There are two approved anti-water additives for avgas fuel.

Diethylene Glycol Monomethyl Ether

DGME is the chemical name for a commercial product PRIST Hi-Flow. DGME is an alcohol that seeks out and combines with water in the fuel. It depresses the freezing point of the water-DGME mix. It keeps the water suspended in the fuel, so it does not concentrate and stop the engine.

Prist H-Flow is FAA approved for use in both Avgas and jet fuel.

Isopropyl Alcohol

Isopropanol is the poor man's alternative to DGME. It is FAA approved for use in piston aircraft engines. Isopropanol, like other simple alcohols, has some downside, however. In large concentrations, it may attack hoses, gaskets, and seals in the fuel system. When spring comes, it may extend the range of atmospheric conditions in which carburetor ice may develop.

If you choose to use Isopropanol, you can use commercially packaged products like Iso-Heet, or you can use 100% Isopropanol, available from a chemical supply company. Do not use Isopropanol from the drugstore; it includes some percentage of water already. No need to add more to the tank.