

Should you get yourself an STC to legally burn unleaded automotive gasoline (auto gas) in your aircraft engine?

Thanks to the efforts of the Experimental Aircraft Association, over 10,000 aircraft owners have been issued Supplemental Type Certificates.

The EAA's leadership in developing alternative fuel sources has led the FAA to fully approve use of unleaded auto gas for more than 300 different aircraft models and engine combinations. Since launching its program in 1980, EAA has conducted more than 7200 hours of engineering flight tests, burning auto gas in a Cessna 150, Cessna 182, Cessna 172, Piper Cherokee, Beechcraft Bonanza and Ercoupe.

L.E. "Zeke" Lamb, the EAA member from Tupelo, Miss., who won the 10,000th STC last summer, says: "Auto fuel saves me about \$1 per gallon of gas. It's also more readily available. I've got a 1650-foot airstrip here, and I can buy my fuel closer to home, fill some storage tanks that I can transport on my truck, and bring the fuel back home."

Use of auto gas cuts in half the cost of filling the tanks of an airplane, roughly from \$2 a gallon for avgas to \$1 a gallon for auto gas. Furthermore, 80/87 octane avgas is virtually unattainable in many parts of the country. Says Harry Zeisloft, director of engineering at the EAA Aviation Foundation's Kermit Weeks Flight Research Center: "The FAA has recognized our successful research efforts by awarding an increasing number of auto gas STCs to the EAA Aviation Foundation. As a result, flying has been made more affordable, and thereby more accessible to thousands of aviation enthusiasts. This benefits the aviation industry as a whole, because it is a positive step toward fighting the threat of rising fuel costs."

But is it really 100 percent safe to burn auto gas in your airplane engine? Last October the EAA issued an auto gas field alert that warned of potential problems associated with using auto gas. At the top of the list is the presence of alcohol in gasoline.

Says EAA: "Any form of alcohol, including ethanol and methanol, is *not approved* for use since it can attack the synthetic materials in the fuel system."

Alcohol has recently been added to auto gas in many states to boost the octane rating (to compensate for reduction of lead content to meet Environmental Protection Agency standards). A Cessna technician warned that, in Kansas, the alcohol content of auto gas runs to 10 percent. In some states, auto gas retailers are required by law to warn that fuel may contain alcohol.

Additional EAA warnings include:

- *Use of leaded gasoline in freshly overhauled Continental engines.* After an over-

haul affecting the valves, use two to three hours of *leaded* aviation gasoline per Continental motors recommendation (Continental Motors Special Bulletin M46-32). Then use unleaded auto gas thereafter.

- *Swelling of Bendix carburetor float needle valves in Continental A-65 series through C-90 series engines.* The use of obsolete neoprene float needle valves with either auto gas or 100LL avgas may cause continual leaning unknown to the pilot, contributing to possible engine damage. If this is suspected, verify that the needle valve has Bendix part number 2523047.

- *Potential deterioration of Marvel-Schebler carburetor floats.* Any avgas or auto gas may cause deterioration of the cellular plastic floats in Marvel-Schreiber carburetors, resulting in carburetor flooding, rough engine at low power settings, or inconsistent engine shutdown. If symptoms occur, contact A&P mechanic.

- *Possible separation of gascolator rubber plunger.* The rubber plunger in the gas-

colator drain assembly in some Cessna models may separate from the metal shaft, causing a potential leak. This problem, caused by either avgas or auto gas, is being reviewed by the manufacturer. Inspect for proper fit.

- *Potential attack of varnish on old cork fuel tank floats.* The varnish on older aircraft cork floats may be attacked by either avgas or auto gas. Inspect floats and, if indicated, recoat with polyurethane type of varnish.

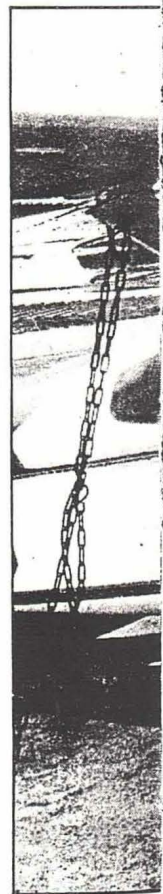
- *Potential degradation of hot day engine performance.* After any prolonged period of heat soak, such as hot day ground idling or engine restart a short time after a long period of engine operation, perform a full power check before taking off. Ensure that recommended fuel pressure is indicated on aircraft so equipped.

Recently, I had to replace both rubber fuel bladders in my 1964 Cessna 180 wing tanks when leaks appeared at the wing root area. It was an expensive repair. Whether it was caused by alco-

Don't Fuel Around

Assorted cautions on the use of inexpensive auto gas in your aircraft powerplant

By Don Dwiggins



hol or simple aging, I do not know.

Some years ago the FAA's General Aviation Accident Prevention Program issued a lengthy warning on problems that can occur when aircraft fuel is used in reciprocating engines. "While you may choose almost any gasoline for your automobile," they said, "do not underestimate the importance of using the fuel specified by the manufacturer for your aircraft engine. The substitution of any fuel other than the kind specified by the manufacturer can be very dangerous." Their report noted the following differences between automotive and aircraft fuels:

- The octane numbers shown for automotive fuels do not have the same meaning as those shown for aviation fuels. This could result in an appreciable difference in actual knock rating for two fuels which have the same number. If automotive fuel is used, this difference could lead to detonation, pre-ignition and possible structural failure of the engine.

- Most automotive fuels have higher vapor pressure, which can lead to vapor lock—extremely dangerous, due to power loss.

- Tetraethyl lead in automotive fuels may contain an excess of chlorine and bromine, whereas aviation fuels contain only the minimum practical amount of bromine. The chlorine is very corrosive, and under-service conditions can lead to exhaust valve failures.

- Automotive fuels may have a higher gum content. Gum deposits can result in valve sticking and poor fuel distribution.

- Automotive fuels may have solvent characteristics, not suitable for aircraft engines. Seals, gaskets and flexible fuel lines are susceptible to attack.

(Since the FAA report was issued, the EAA ran tests with auto gas under high desert heat conditions in Eloy, Ariz., and reportedly did not encounter any vapor lock problems.)

The FAA's warning continues:

"Your aircraft engine operates on a higher average power output than your automobile, 55 percent to 85 percent of maximum power as compared to 20 percent to 40 percent in your auto-

mobile. Your aircraft engine is also operating under higher temperatures and pressures. It is subjected to a wider variation in climatic conditions and more rapid changes in atmospheric temperature and pressure. Every aircraft engine has been designed to use a specific grade of aviation fuel for satisfactory performance, and unless the manufacturer's recommendations are followed, damage to the engine or power failure may result."

Anti-knock qualities of aviation fuels are designated by grades, the FAA reminds us, such as 80/87, 100/130, 108/135 and 115/145. The higher the grade, the more compression the fuel can stand without detonating. The more compression the fuel can stand without detonation, the more power that can be developed from it.

The first of the two numbers in a fuel designation indicates the lean-mixture rating (as during cruise); the second number indicates the rich-mixture rating (as during takeoff and climb).

No engine manufacturer recommends a fuel with a lower octane/grade rating than that specified for your engine, says the FAA. When you are faced with a shortage of the correct type of fuel, always use whatever other alternate fuel grade is specified by the manufacturer.

Availability of different fuel grades at servicing facilities will be largely dependent on the classes of aircraft using the particular airport, says FAA. The engine manufacturers have made information available concerning satisfactory alternate grade fuels for those which have been discontinued.

While most fuel pumps or trucks are plainly marked indicating the type and grade of fuel being delivered, you

can always determine the proper grade by its color. Dyes have been added by the refinery for ready identification of the various grades of aviation gasoline:

Grade	Color
80/87	red
100/130	green
108/135	orange/brown
115/145	purple

The FAA further warns that gasoline in storage for long time periods may lose some of its octane rating, and may leave gum deposits after evaporation.

"Storing the aircraft with partially filled fuel tanks may cause condensation and water contamination," it warns. "Water is the most common fuel contaminant, and condensation inside the tank is one of the methods by which it finds its way into your fuel system." P&P

Author Dwiggins tries auto gas in his beloved Cessna 180.

