

Learning Center Library Contents



Time in Your Tanks - P-8740-03

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Introduction

What does "time in your tanks" mean? Depending upon your aircraft's particular fuel consumption rate, the amount of usable fuel in your aircraft equates directly to how long your aircraft will fly. The longer you can fly, the more choices you have for ensuring a safe flight; consequently, you can say that flight time equates directly to flight safety. No pilot wants to have a forced off-airport landing and an accident because of fuel starvation, or an emergency without enough fuel to be able to solve the problem or to reach an airport safely.

To ensure that a fuel-related forced landing is not in your future, you should always plan on landing before the "time" in your tank expires. Know your aircraft's limits and don't exceed those limits.

This document provides general tips on determining and managing the "time" in your tanks. These are general comments only. All pilots need to review and follow the operating procedures and limitations published in their particular aircraft's Pilot Operating Handbook or other operating manual. Every pilot needs to remember that the performance and fuel information in his or her POH is based upon manufacturer's data, which are derived from testing new aircraft with experienced test pilots. Your aircraft may or may not be able to match its POH data. You should be conservative and *always* allow an extra margin for safety.

Tips for Telling (Tank) Time

- *Pay attention.* Maintain accurate flight time, power setting, and refueling records for each trip.
- *Be conservative.* Calculate your flight time from start up to shut down.
- *Know your airplane.* Reasonably accurate fuel consumption rates (in gallons per hour) can be computed after a few flights under similar operating conditions.
- *Read the POH.* The amount of usable fuel for your aircraft may be found in the Pilot's Operating Handbook.

- *Set limits.* Multiply the usable fuel on board your aircraft by 75 percent and divide the result by your previously confirmed consumption rate. This number will be your *safe flight time limit* for the aircraft. Resolve never to exceed it.
- *Heed the rules.* Even when you are familiar enough with your aircraft to know exactly how much time is in your tanks, plan to land with at least 45-60 minutes of reserve fuel on board. Anything less could compromise safety.

Fuel Management Tips

Flight Planning

As described in the previous chapter, you should compute a reasonable time limit for your aircraft. Factors to be considered in planning each flight include:

- Trip length.
- Cruise altitude.
- Wind. (Caution: Don't count on forecast tailwinds; they can change!)
- Number of passengers (weights plus baggage).
- Inflight endurance of persons on board.

Resolve not to exceed the time limit you establish, and estimate your ETA for each checkpoint. Be aware of your actual progress, and think about landing at an alternate if you are running behind your estimated ETA.

Fuel Quantity and Quality

Fuel gauges are subject to malfunctions and errors. Therefore, unless restricted by the gross weight or center of gravity limits, it is considered good judgment to "top off" the tanks at fuel stops. If the fuel load must be limited, you should endeavor to get an accurate measurement of fuel quantity by using a dipstick calibrated for the aircraft.

Condensation can occur in partially filled tanks. Filling the tanks at the completion of the trip will reduce the probability of fuel contamination by condensation.

Use the grade of aviation gasoline specified by the manufacturer for your aircraft. Use the next higher grade when the specified grade is not available. Never use automotive gasoline or aviation gasoline of a lesser grade than that specified by the engine manufacturer.

Visually check the color and cleanliness of the fuel in your aircraft by draining the fuel sumps and strainers after each fueling and during preflight inspection. *Never* assume your fuel quantity and quality to be correct. Check it! In addition, you should know the fuel system of your aircraft, and never operate a fuel selector without visually checking its position. Do not reposition the fuel selector just before takeoff or landing.

Leaning the Mixture

Proper leaning of the fuel mixture will provide a number of benefits:

- Improve engine efficiency and increase airspeed.
- Provide smoother engine operation.
- Provide greater fuel economy and longer range of operation.
- Provide longer spark plug life with less fouling.
- Reduce maintenance costs.

You should also know *when* to lean the mixture:

- *Normally aspirated engines:* Lean any time the setting is 75 percent or less. Use full rich for full throttle operation at 5,000 feet density altitude and below.
- *Turbocharged engines:* Always use full rich for takeoff, regardless of altitude. Lean at cruise as recommended by the manufacturer.

Finally, you should also know how to *adjust* the mixture for high altitude takeoff and landing:

- Lean to maximum RPM for carburetor engines.
- Lean to proper fuel flow and fuel pressure settings for injected engines.
- Lean before entering the traffic pattern to ensure maximum power for go around.
- Enrich the mixture for descent only as required. Enrich enough to keep the engine running smoothly.
- Go to full rich when in the traffic pattern, or as required when landing at high elevations.

Remember - A tank full of fuel is a tank full of time! Don't let either run out.

About This Series

The purpose of this series of Federal Aviation Administration (FAA) Aviation Safety Program publications is to provide the aviation community with safety information that is informative, handy, and easy to review. Many of the publications in this series summarize material published in various FAA advisory circulars, handbooks, other publications, and various audiovisual products developed by the FAA and used in its Aviation Safety Program.

Some of the ideas and materials in this series were developed by the aviation industry. The FAA acknowledges the support of the aviation industry and its various trade and membership groups in the production of this series.

Comments regarding these publications should be directed to the National Aviation Safety Program Manager, Federal Aviation Administration, Flight Standards Service.