

Time In Your Tanks



FOREWORD

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 produced 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. 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, General Aviation and Commercial Division, Aviation Safety Program Branch, AFS-810, 800 Independence Avenue, SW, Washington, DC 20591.
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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 flight safety. What no pilot wants to happen is to have a forced off-airport landing 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.

The following provides some 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 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 allow for an extra margin of safety.

1. How to determine the “Time In Your Tanks”

a. Maintain accurate flight time, power setting, and refueling records for each trip to determine fuel usage per flight hour.

b. Be conservative. Figure your flight time from engine start up to shut down.

c. Reasonably accurate fuel consumption rates can be computed after a few flights under similar operating conditions.

d. The amount of usable fuel for your aircraft can be found in your aircraft’s POH.

e. Multiply the usable fuel on board your aircraft by 75 percent and divide the result by your previously confirmed consumption rate. This will be your SAFE FLIGHT TIME limit for the aircraft at that specific operating condition. Resolve never to

exceed it.

f. 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 minutes of reserve fuel on board. Anything less could compromise safety.

g. Remember and allow for the VFR or IFR fuel reserves required by the Federal Aviation Regulations (FAR) Sss 91.151 and 91.167.

2. Other tips on fuel management

a. Compute a reasonable time limit for your aircraft.

b. Factors to be considered in planning each flight include:

- (1) Trip length.
- (2) Cruise altitude.
- (3) Wind—don’t count on forecasted tailwinds, they can change. Allow for stronger than forecasted head winds.
- (4) The number of passengers (weights plus baggage).
- (5) Inflight physiological endurance of persons on board.
- (6) Guidance in the pilot’s operating handbook. But remember such guidance is based upon flight tests with new aircraft and engines flown by experienced factory test pilots. Your aircraft may or may not be able to match the “book” data. Always be conservative.
- (7) Available fuel stops and alternate destinations in case of weather.
- (8) Computed aircraft gross weight and center of gravity limitations.

c. Resolve not to exceed the time limit you establish.

d. Compute your estimated time of arrival (ETA) for each checkpoint. Be aware of your actual progress and think about landing at an alternate if you are running behind on your ETA’s.

e. Use the grade of aviation gasoline specified in your POH for your particular aircraft. Normally, you can use the next

higher grade when the specified grade is not available. Always follow your aircraft’s POH regarding any aircraft operating question.

f. Never use automotive gasoline or aviation fuel of a lesser grade than that specified by your aircraft’s manufacturer without the approval of the manufacturer or FAA.

g. Visually check the fuel in your aircraft for proper type, grade, and possible contamination. Drain the fuel sumps and strainers after each fueling and during each preflight inspection as recommended in your POH.

h. Do not assume your fuel quantity and quality to be correct. Visually check it.

i. Know the fuel system of your aircraft and how it operates. Never operate a fuel system selector control without visually checking its position and operation.

j. Fuel gauges are subject to malfunctions and errors. Fuel gages must only be calibrated to accurately indicate an empty tank. They do not have to be accurate at any other fuel level. Therefore, unless restricted by the gross weight or center of gravity limits of your aircraft, it is considered good judgement to “top off” the tanks at all fuel stops. If the fuel load must be limited, an accurate measurement can be made by use of a dipstick calibrated for your specific aircraft.

k. Water condensation can occur in partially-filled fuel tanks when the temperature drops. Filling your aircraft’s tanks at the completion of each trip will reduce the probability of condensation. Be aware that water condensation can also occur in fuel storage tanks and trucks. Because there is always the possibility of water contamination, you should always check your fuel for water. In winter operations, if your fuel contains any water, ice can form in your fuel tanks and lines during freezing temperatures.

l. Do not reposition the fuel selector just before takeoff or landing. Check your aircraft’s POH for the proper procedure.

m. Know why you should lean the fuel mixture. Although you should always follow your POH and appropriate checklist when operating your aircraft, you generally lean an engine:

- (1) To improve engine efficiency and increase air speed.
- (2) To provide smoother engine operation.
- (3) To provide greater fuel economy and longer range of operation.
- (4) To provide longer spark plug life with less fouling.
- (5) n To reduce maintenance costs.

n. Know when you should lean the fuel mixture. Again, you should always follow your aircraft's POH, but generally you should lean:

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

o. Know how to adjust the mixture setting for high density altitude takeoff and landing. Again, you should follow your aircraft's POH, but you should generally:

- (1) Lean to maximum RPM for carburetor engines.
- (2) Lean to proper fuel flow and fuel pressure settings for injected engines.
- (3) Lean before entering the traffic pattern to ensure maximum power for go around.

p. Enrich the mixture for descent as required only:

- (1) Enough to keep the engine running smoothly.
- (2) Go to full rich when in the traffic pattern (or as required for full available power when landing at high density altitude elevations). Check your POH for the proper procedure.

REMEMBER — “A TANK FULL OF FUEL IS A TANK FULL OF TIME”

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