

Why Do Pilots Run out of Gas?

BY LEROY COOK



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FUEL IS ONE of those absolutes in aviation, like altitude and airspeed, that positively must be maintained and managed until the aircraft is parked. It would seem simple enough to keep sufficient gas in the tanks to enable a planned landing. But several times a year, pilots try to fly with their tanks contaminated by air, with less-than-successful outcomes. It's embarrassing to run out of gas in a car, but it's more than embarrassing to do the same in an airplane, when you can't just coast over to the side and flag down a passerby. Rather than preach about checking for fuel quantity before departure and keeping plenty of reserves, let's examine why people run dry and see how it can be prevented.

Three methods persist in bringing us to earth, when it comes to running empty. Fuel exhaustion is simply using up every drop of gas on board. There are no options; the airplane is now a glider and must be steered to a landing of some sort. Fuel starvation means that the pilot mismanaged the fuel supply, running empty on one tank and allowing himself to be forced down while there's still fuel available somewhere else. Fuel system failure is more rare, but it can happen, such as when a pump fails, a valve won't turn or a leak develops, rendering all or some of the fuel unavailable at just the wrong time.

Ignorance

Amazingly, some pilots just don't have a clue as to how their engine gets its fuel. Understanding the fuel system is crucial to longevity in this business, meaning that you need to know how many tanks there are, how they feed and what it takes to get the fuel to the engine—lines, vents, pumps, valves and drains. Easy fuel management is a great asset for an airplane, but it's important for pilots to know that not every airplane is as friendly as a Cessna 152, which has its fuel tanks interconnected so there's no work to it at all. The fuel is either on or off, and gravity makes it feed without pumps.

By comparison, Cessna's other extreme, its older tiptanked twins, had a convoluted fuel system drawn by the inimitable Rube Goldberg. Fuel is contained in as many as six tanks, which must be used in an exact order, with pumps on the engines, in the tanks and in the lines, some of which are activated by switches and some on their own. The valving and gauging takes some study, and I guarantee that running dry once in a while is a given. Not studying a diagram of the twin Cessna fuel system before flying it is a big mistake.

Another case of ignorance that leads to running out of fuel is guessing at the consumption rate. I never cease to be amazed at the pilots who actually base their decisions on POH numbers, which were developed by test pilots using new airplanes with engines that would be disposed of after the tests were done. No way you and I, as cautious owners of older planes, are going to equal those figures. Develop your own fuel-burn figure, based on actual refueling experience. Yes, a Shadin fuel computer in your panel works off a super-accurate transducer in the line, but even then erratic refueling can fool it.

Missionitis

The intense desire to get home even if the fuel is running low, or to finish the flight without making an inconvenient stop, or because you don't have the company credit card with you, has put more than one airplane down a few miles short. We had one such incident near my house last summer. A Skyhawk ran out of options because the pilot was determined to make it home.

I'm no stranger to pressure to complete a mission. I nearly had to glide in with a turbocharged cabin twin in the dark. I was returning after midnight, and it would have been difficult to find fuel at that hour. Plus, my passengers wanted to get to bed. So I stared out at the beacon light, inching closer as the gauges settled more solidly on the

empty mark, mixtures leaned to the edge of roughness. I had already sucked the aux tanks dry, so it was the mains or nothing now, baby.

The approach was straight in because the wind was in our face (ain't it always when you're pushing fuel?), and we parked at the pumps, quite full of ourselves for completing the trip. The next morning I signed a fuel chit that showed 5 gallons were left in the system, hardly enough for a good go-around. That's what comes of letting a desire to complete the mission override your judgment.

Sometimes you start a mission with a barely adequate fuel load, and then everything changes, leaving you hanging there with low fuel. Increasing headwinds or passengers who can't make up their minds are simply factors that have to be dealt with. Pick the best fuel stop and eliminate the pressure. The risks of night flight are hazard enough without adding low fuel to the mix. If you're coming back later than expected, take on extra fuel. As with any limitation you encounter during a flight, be prepared to turn around, make a stop, miss the approach and offload baggage, just because you're acting as pilot in command and the mission can't make you abdicate your responsibility.

Overoptimism

I had to retrieve a Cessna single from a wheat field one day because the pilot ran bone-dry attempting to make it home on what he had left. His planned refueling stop couldn't give him any gas, so he just assumed there was enough and took off anyway. Wishing won't create fuel or extend range. I'll never forget that hollow sound as I poured 5 gallons into the tank out there in the middle of nowhere.

I suppose one reaches a point where there's no sense in worrying because there's nothing more that you can do. Acceptance should be a last-ditch condition, however. As long as you have flight controls and a turning propeller, you have an option to improve your condition, even if it's just steering to stay over landable terrain. In the case of my stranded Cessna, there were other airports along his route, had he but chosen to head for one.

When you plan the flight, base your expectations on worst-case scenarios. Add extra time to a headwind calculation,

and don't count on every bit of tailwind that's forecast. Move to the more pessimistic line on the cruise chart if you're between altitudes or power settings. Don't pin your hopes on refueling at only one airport along your route. That may be the one that's closed for construction, under a TFR or out of fuel. Every planned stop needs an alternate, and that alternate needs an alternate.

Fuel Management

Most fuel incidents happen because no one manages the fuel, not because the gauges fail, a filler cap comes off or headwinds pick up. Start by checking the tanks during preflight. If you want full tanks, make sure you have full tanks—and that means slopping full, not up close to the neck. Most flat wing tanks hold several gallons more if topped off slowly, and you better believe that placard amount painted on the wing was based on squeezing in every drop. If you have interconnected tanks, position the valve so fuel can't run across while the other tank is being filled.

Lean consistently, so you'll get your expected rate of consumption. You'll have to expect imprecision with a carburetor-fed engine because the fuel distribution through an intake manifold just isn't as even as with matched injectors, and you can't lean as aggressively without starving one cylinder. Keep a log of the time you switched tanks, so you'll know how much is left in each tank. Don't operate a simple Cessna on the "both" position right up to exhaustion; the left/right selections allow you to develop a reserve when seeking maximum range.

The worst condition is to have three or four tanks with 3 gallons left in each as you near the end of a long flight. Learn to empty a tank before switching. Keep an eye on the fuel pressure, and flip the selector when the needle first begins to fall. Properly done, you can change tanks before the engine misses. Then you'll know there's no more fuel in that tank, and you'll have full reserve in the other one.

Pilots run out of fuel because they ignore the obvious and refuse to make piloting decisions. Taking an optimistic view of life may make you a joy to be around, but it won't extend the time left in your tanks. Learn your airplane's fuel system; then use that knowledge to make good fuel decisions.

