

Easily preventable

Avoid a fuel-exhaustion accident *By Dan Namowitz*

Let's make a pact right now in the name of safety and piloting's best practices. Neither of us will ever run out of gas while flying an airplane.

On board? Then let's take it a step further: No one we know who flies will ever run out of fuel. Like us, they are too well trained and far too conscientious to ever do something like that. Plus, our flying companions are familiar with the regulatory requirements to carry certain reserves for day flight, night flight, and on instrument flights—both with and without the need to file alternate destinations on their IFR flight plans as determined by weather forecasts. So confident are we that these people whom we know and trust would never violate this essential article of aviation faith that we will go right out on a limb and make the vows for them, too. We'll tell them tomorrow when we give them their "I'll never fly dry" certificate (suitable for framing) and accompanying eye-catching bumper sticker.

Well, that settles that. From now on, no more fuel exhaustion accidents. Contact the FAA and tell them the good news. Inform the accident statisticians that it is OK to drop the fuel exhaustion category from next year's mishap report. Then let's all breathe a huge sigh of relief and pat ourselves on the back for a job well done!

So, why does everyone look so nervous? Did someone just say, "It's not as simple as that"?

Perhaps it isn't. Media accounts of aircraft accidents aside, not every pilot who ran an airplane out of fuel did so out of flagrant neglect or incompetence. But as with gear-up landings, the onus remains on the pilot to demonstrate why he or she should be afforded more credit than the perpetrator in the stereotypical fuel exhaustion scenario. Still, from time to time it's not as simple as that, and all pilots can study occurrences, debate the circumstances, and learn from the exercise.

With fuel exhaustion accidents, any pilot can tell you which risks must be in play for the accident chain to build. One of the most obvious risks is intentionally planning a flight close to the limits of the amount of fuel that you will carry (or believe that you are carrying). Another is passing up a fuel stop. Still another is misjudging your ability to navigate under adverse circumstances of darkness or marginal conditions. Combine the first risk with any of the others, and any setback reduces your margin to zero. If there does not happen to be an airport directly below when this fact makes itself known, you will become a news story—or worse.

Eight hours is a lot of endurance for a single-engine airplane; many pilots work with far less. So when the pilot of a Cessna 182, flying his third leg of the day on a single fueling, picked up a Commonwealth of Kentucky forest ranger for a fire-spotting flight, he had estimated that he was flying his fifth hour since the airplane had been fueled, was using an "economy" power setting, would fly no more than seven hours, and was not concerned.

"The passenger stated that they were circling over a fire when the engine lost power. The passenger asked the pilot if anything was wrong. The pilot replied, 'I think we are out of gas,'" according to the National Transportation Safety Board report of the accident. The Cessna landed in a cornfield and flipped over, about two hours and 20 minutes after taking off from Pike County-Hatcher Field.

Accident inspectors questioned the pilot about how he made his fuel calculations and confirmed that none was seen in the tanks at the accident scene. The pilot also reported that "earlier in the day, he telephoned the fixed based operator (FBO) at Mount Sterling Airport in Mount Sterling, Kentucky, and asked that the accident airplane be fueled to capacity. He arrived at the airport and performed a preflight inspection of the airplane." The tanks appeared to be full.

Apparently they weren't. The report also contained this information from the investigation: "The manager of the FBO that serviced the accident airplane stated that it was completely fueled. However, a different pilot flew it for 1.2 hours before the accident pilot arrived at the airport. The manager estimated that the accident pilot departed with 76 gallons of fuel, instead of 88 gallons." While this fuel-on-board estimate, taken together with the pilot's fuel-burn estimate using an economy cruise power setting (by leaning to peak EGT, according to a Cessna 182S pilot's operating handbook) does not put him in the red, or even into reserves (leaving him with a theoretical 16 usable gallons when the engine stopped), this did not mitigate the resulting determination of a cause. The NTSB cited "the pilot's inadequate preflight inspection of the aircraft, which resulted in fuel exhaustion during cruise flight."

Taking on fuel at every opportunity obviously helps to hedge risk. But not all the risk. Eighteen days before the Skylane ran out of gas over Kentucky, fuel exhaustion claimed the life of a Cessna 172 pilot during a night flight over Texas. Marginal visual conditions prevailed on the dark night. The pilot, who reportedly had 1,500

hours of experience, had made an intermediate fuel stop en route and had taken on 27.1 gallons of fuel. The 1964 aircraft had a 42-gallon capacity, of which 39 gallons was usable in all flight attitudes, and 41 gallons in wings-level flight.

The aircraft took off again for its final destination, Bay City Municipal, but over the next three hours things went very wrong. "The radar data depicted the airplane making multiple 'S' turns, 360-degree turns, and at one point flying past the destination airport. The airplane's altitude varied between 3,100 feet and 600 feet. At 9:35 p.m., the airplane's transponder code changed from 1200 (visual flight rules) to 7700 (emergency), and the pilot contacted the Conroe Automated Flight Service Station. He reported that he had '10 minutes of fuel on board and was disoriented.'"

Houston Center tried to help by providing radar vectors to an airport, "however, at 9:45, the pilot reported that he had 'run out of fuel.' At 9:46:28, the final radar return was received, approximately 10 miles north of Bay City. According to the radar data, the airplane was airborne for 3 hours and 47 minutes." Probable cause: "The pilot's delay in taking remedial action (contacting ATC) after he became lost/disoriented during a night cross-country flight, which resulted in a forced landing due to fuel exhaustion. Contributing factors to the accident were the pilot's failure to contact a flight service station for a weather briefing, the low clouds, and dark night light conditions."

This grim report is unusual in that fuel exhaustion accidents are rarely fatal—during 2001, only 4.7 percent of the time to pilots of fixed-gear, single-engine aircraft, according to the AOPA Air Safety Foundation's *2002 Nall Report* (download it at www.aopa.org/asf/publications/02nall.pdf). On the other hand, marginal-weather accidents bring a higher risk (fatal 56.5 percent of the time to single-engine, fixed-gear pilots in 2001) as this case also clearly shows.

The *Nall Report* observes that such accidents were "easily preventable by increased diligence" on the part of pilots. Which brings us to April 8, 2001, in Merrillville, Indiana, when even a carburetor known to have leaked did not motivate a pilot to visually check his fuel supply before taking off and flying along the Lake Michigan shoreline toward Milwaukee in a Piper J3C-65

that not been flown since September 2000—except for one brief trip around the traffic pattern on April 5.

North of Gary, Indiana, the engine quit, and the pilot landed on a road. Said the NTSB: "The inspector reported that there was no evidence of fuel leakage at the accident site. The inspector drained 1-1/2 ounces of fuel from the fuel line between the header fuel tank and the fuel selector. He reported that the fuel gauges indicated the right tank was empty and the left tank contained one-third of a tank of fuel [and that] a visual inspection of both tanks revealed they were empty. The airplane had been modified with an extended-range fuel system." The pilot was noted to have said that a mechanic instructed him to tap on the leaky carburetor with a wrench to free a stuck float needle. But, "The pilot reported to the FAA inspector that he did not visually check the fuel level prior to takeoff on the accident flight."

How do these accidents make us feel about our vow never to run out of gas while flying?

More confident? Less? One option, now that we are bound by our vow, is to add still stricter constraints to how far we will fly on a given fuel supply before either refueling or calling it a day. Inconvenient but safe. Also helpful will be to truly investigate how much fuel the airplanes we fly burn when compared to book values, and then add an additional generous margin to that figure when making calculations. Embracing the due diligence called for in the *Nall Report* seems to take care of such issues as never implicitly trusting fuel gauges. It also mandates making a visual inspection of fuel quantity. Download the ASF's *Fuel Awareness Safety Advisor* for more insights on fuel management (www.aopa.org/asf/publications/sa16.pdf).

The next time you fly, say, an hour on a topped-off fuel supply, look in the tanks after the flight and ask yourself whether you could have mistaken what you see for a full tank of gas. In many aircraft, you could. It's a small thing that can have big effect on the outcome of a flight. Most kinds of accidents are preventable. But as the *Nall Report* reminds us, fuel exhaustion accidents are "easily preventable." 

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