FLYING LESSONS for May 24, 2012

suggested by this week's aircraft mishap reports

FLYING LESSONS uses the past week's mishap reports to consider what *might* have contributed to accidents, so you can make better decisions if you face similar circumstances. In almost all cases design characteristics of a specific make and model airplane have little direct bearing on the possible causes of aircraft accidents, so apply these *FLYING LESSONS* to any airplane you fly. Verify all technical information before applying it to your aircraft or operation, with manufacturers' data and recommendations taking precedence. You are pilot in command, and are ultimately responsible for the decisions you make.

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This week's lessons:

A great many engine failure accidents occur when the pilot does not properly select a fuel tank before takeoff or before landing, and the engine starves for fuel very close to the ground.

Virtually all light airplane designs have multiple fuel tanks and one or more selector valves. If the selector control handle is not set properly, or the selected tank is low or completely out of fuel, the act of switching tanks can cause a power interruption. If the pilot is not quick to restore fuel flow or if the airplane is too low to the ground for a restart to take place, the airplane will end up impacting the surface.

For many years I have suggested starting the engine on one tank, switching to the other before engine run-up (assuming two main tanks), the idea being an on-ground check that good, usable fuel could be drawn from either main tank. Regardless, the technique requires always taking off on the tank you used for your engine run-up, with no intermediate tank selections, to ensure you were departing on a tank that had been recently proven able to support a relative high power setting.

Some readers have objected, on the grounds they think this will wear out fuel valves and selectors prematurely. *The real objection, however,* is the persistent number of engine failures on or shortly after takeoff that can be traced to a quick fuel tank change just prior to taking off.

I've come to the conclusion, as reminded by *FLYING LESSONS* reader and friend, retired TWA captain Tom Rosen, that the best practice is to check the proper tank is selected before engine start, and *do not change the fuel selector* until level in cruise flight. If the other tank does not provide good, usable fuel, or for any reason you cannot deliver fuel from that other tank to the engine(s), you should have enough gas remaining in the takeoff tank to land without stretching fuel reserves.

Similarly, an off-airport landing after attempting to switch fuel tanks in the landing pattern is common occurrence. In many cases there simply is not time to re-light the engine by re-switching the tank selection if the engine starves for fuel from pattern height.

There is an apparently common misperception that the ubiquitous "Fuel selector—Fullest Tank" for takeoff or landing means "switch to the fullest tank just before you take off and just before you land." The popular GUMPS check in retractable-gear airplanes (the G is for "gas") is a prompt to check that the intended tank is selected, *not* to change that selection in the landing circuit.

No, the proper thing to do is to make your tanks selection *before* getting close to the runway. As Tom Rosen suggests, make your takeoff tank selection before engine start and confirm, but do not change, it during your Engine Start, Before Takeoff and Departure checklists. And choose your landing tank at "top of descent," before leaving cruise height to descend to an approach or visual landing.

In both takeoff and landing, the goal is to employ good enough fuel management that you still have sufficient gas on board for a landing, somewhere, if your tank selection results in engine

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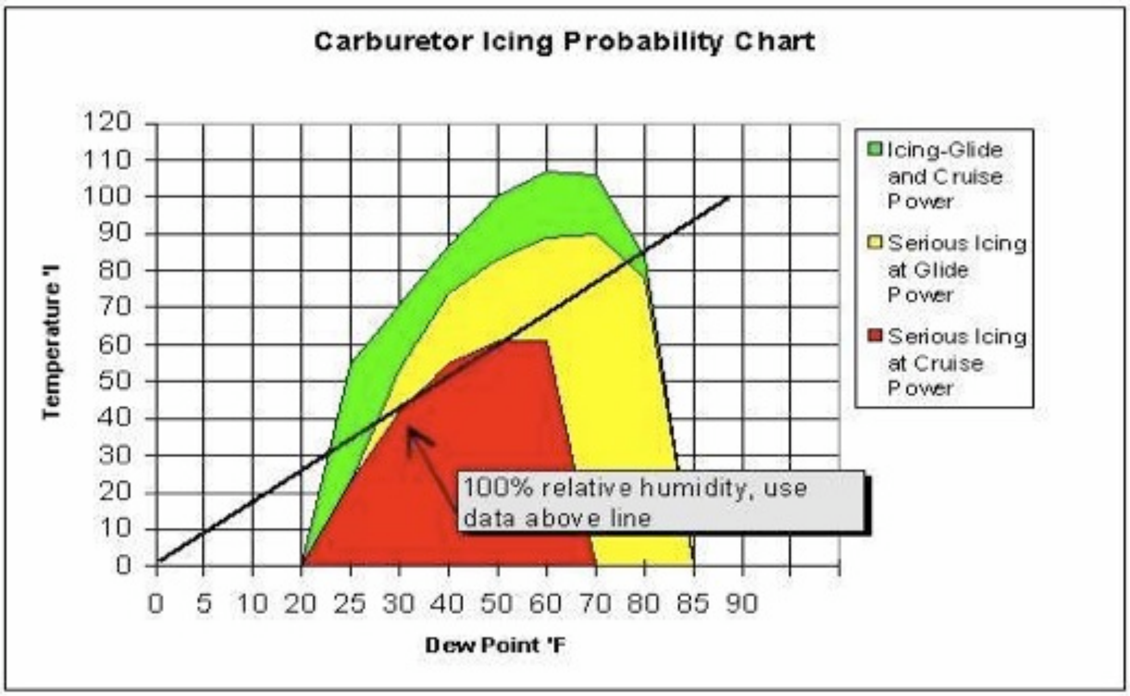
stoppage and you need to return to the previously selected fuel tank.

Will this shorten the range of your airplane? No. Will it shorten your *perception* of your airplane's range? Perhaps, if you've not yet established a realistic fuel-related risk management strategy.

Carburetor ice is another common contributor to engine failures. It seems odd to be thinking about "ice" as we enter the warmest part of the year (in the northern hemisphere—although most of *FLYING LESSONS'* southern hemisphere readers are in Australia, South Africa and Argentina, in moist and fairly warm maritime areas even in the cooler parts of the year). Yet "carb ice" is most likely in warm to even hot conditions—as long as the air is sufficiently humid.



The carburetor ice probability chart tells us there is a "serious" threat of engine-choking carb ice even at high power settings in temperatures as warm as 60°F (about 15°C). At reduced power, such as in a glide, carb ice is possible at temperatures up to 90°F/32°C. There is even a slight risk of carb ice at any power setting above 100°F/40°C or more. Obviously more humid air makes carb ice more likely.

This is why pilots of carbureted-engine airplanes, which still make up the vast majority of the general aviation fleet, are constantly drilled to apply carburetor heat before reducing power for landing, and as the first step in an engine power loss—there is almost always a possibility of carb ice, and some conditions (and some types of engines) are especially prone to carb ice development.

We check the carb heat before takeoff by pulling the control and noting a loss of engine power—the engine runs much richer with carb heat applied, and combined with the reduced density of heated air causes the power to drop.

But many pilots don't know the indications of actual carburetor icing, especially when carb heat is applied. If the engine runs roughly or quits completely, you apply full carb heat because *that's what you're trained to do*—in carbureted airplanes this is the most likely way to repair an engine failure.

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But if there really is ice in the carburetor venturi, the engine will run *even rougher* and develop even *less power* when you apply carburetor heat. **You've got to anticipate and accept this "worse" condition** long enough for the ice to be melted out.

If you are impatient, or blindly follow the tenet that "if you do something and things get worse, undo the thing you just did," you will not apply carb heat long enough to do any good. You may well end up landing off-airport when a minute or so of carburetor heat would have restored engine power.

Like many other things in aviation, it takes good system knowledge, some thought and study outside of the cockpit, and a little patience to take time for good things to happen in order to recover from a bought of carburetor ice.

This more than anything else is why we're trained to apply carb heat at various points of a flight regardless of the carburetor icing probability…to *prevent* the formation of carb ice, because *removing* carb ice once it's already formed may take too long, and require somewhat counterintuitive acceptance of temporarily worse performance until the result of carb heat activation is seen.

Questions? Comments? Let us know, at mastery.flight.training@cox.net

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Debrief: Readers write about recent *FLYING LESSONS:*

Reader Alan Davis writes about recent crosswind landings *FLYING LESSONS*:

> Great crosswind landing advice, in addition to being for retractable gear. On the crosswind front, what I have found over time us that students/pilots tend to "quit flying" the airplane once they have "wheels on the ground" (or even "a" wheel on the ground) by relaxing their control efforts - even though it is still fast enough to fly.
>
> This is even often the case on normal landings where, by a simple addition of back pressure, the aircraft can be proven to still be a "flying machine" - a demonstration that I use, when safe to do so, to prove the point. In the words of several people with whom I have worked over the years, if it can still fly - keep flying it until the wheels can no longer come off the ground, OR, in the case of cross wind, until you run out of crosswind control. THEN, and only then, is it a ground bound machine.
>
> The same is true of retractable, where people stop flying to get ready for the touch and go clean-up when it is still fast enough to fly. Loss of directional control is almost, or perhaps more, common as is inadvertent retraction - even if only for a moment and then recovered. However, some of them don't get recovered and wind up in the grass - or worse.

I've done the same thing—demonstrate that, if you make an absolutely perfect, full-stall landing by reaching the critical angle of attack just as the wheels touch the surface, then all it takes is reducing the AoA by one or two degrees to generate enough lift that the airplane skips to lifts back into the air. At that point, very near critical AoA, the airplane may stall and drop in from an uncomfortable (and potentially damaging) height. You wouldn't want to attempt this "perfect" landing in a gusty or strong crosswind, but your point is well taken: fly the airplane until you are taxiing the airplane. And as tailwheel pilots will tell you, even then we should all "fly the airplane to the tiedowns." Thank you, Alan.

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What would you do?

That's the question asked by EAA president (and *FLYING LESSONS* reader) Rod Hightower in his Commentary in the May 2012 issue of EAA *Sport Aviation*. Rod's comments are apropos to our continuing discussion of hand-propping airplanes with failed batteries and/or charging systems and, frankly, airplanes that are intended to be cranked with the "Armstrong starter" as well.

Without reprinting Rod's article completely here (if you're a member of EAA and have registered for online access to *Sport Aviation*, you may read Rod's full editorial online), here's a synopsis of the experience he relates:

- Rod and several others were at the airport and observed that across the ramp "two passengers…were standing beside a high-performance Cessna with the passenger door open…. The pilot's door was also open, and there was a gentleman attempting to hand-prop the airplane…."
- The Cessna "was sitting in a tiedown spot but had been untied…." It was "pointed directly at a parked Learjet, other airplanes were everywhere, and several people were milling around the ramp not far from the Cessna."
- No one was in the aircraft to manage the engine, hold the brakes, or serve to cut off the engine after start if any emergency occurred.
- One of Rod's crew took a set of chocks and a battery booster to the Cessna, chocked a main wheel and repeatedly offered to help. The Cessna's pilot refused his help each time. Rod's mechanic returned and reported the Cessna pilot "was not receptive to input and was in a hurry to leave."
- As the whole crew was preparing to intercede, the Cessna's engine roared to life. "Thankfully, the parking brake held as we watched the pilot pull our chocks, and all climbed in to go."

Rod writes: "We felt horrible and embarrassed at our collective slowness to realize the gravity of the situation and failure to take action sooner." And yet the Cessna pilot "was clearly not receptive to assistance," and Rod is forced to ask, "what could we have done about that?"

See www.sportaviationonline.org/sportaviation/201205#pg3

So what would you do? Take this one-question survey, including an opportunity to comment. I'll publish the results next week.

See www.surveymonkey.com/s/597ZV3Q

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Thomas P. Turner, M.S. Aviation Safety, MCFI
2010 National FAA Safety Team Representative of the Year
2008 FAA Central Region CFI of the Year

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