

FLYING LESSONS for February 12, 2009

suggested by this week's aircraft mishap reports

FLYING LESSONS uses the past week's mishap reports as the jumping-off point 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.

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This week's lessons:

Moments after takeoff the captain felt a catastrophic loss of power to both engines. Seizing control of the situation, he planned first a return to the departure airport or one nearby, but quickly realized he didn't have the glide capability remaining to make it. So he leveled the wings and guided the aircraft to a successful off-airport touchdown, soon caught in the camera's lens. All aboard safely exited the airplane.

No, we're not discussing Captain "Sully" Sullenberger and the crew of US Air Flight 1549, although in most respects what the pilot faced was similar. Instead, the scenario related above took place in a Cessna 421 near Wichita, Kansas on January 30th. [Photos](#) in a local news report show the Golden Eagle bellied into a field ringed with fences and stopping short of a stand of sturdy, "*I can take Kansas winds*" trees. From the [NTSB preliminary report](#):

On January 30, 2009, approximately 0810 Central Standard Time, a twin-engine Cessna 421C...was substantially damaged during a forced landing following the loss of power on both engines. The airline transport pilot and two passengers on board sustained minor injuries during the emergency landing. Visual meteorological conditions prevailed and an instrument flight rules flight plan was filed....

According to the pilot, they had landed the night before with 100 gallons of fuel on board. The pilot made a request to line personnel for an additional 80 gallons, 40 gallons in each tank, to be put on. The morning of the accident, the pilot performed a normal pre-flight, loaded everyone on the airplane, and taxied for takeoff. The pilot checked the engines, magnetos and propellers, and prepared to take off.

During the takeoff, the pilot noted [the expected] 2,800 rpm, 39 inches of manifold pressure, and engine instruments "in the green." While climbing to 3,000 feet...the pilot noted the propeller rpms were still 2,800 but felt no "power" being produced by the engines, so the pilot coordinated for an emergency return [to the departure airport]. While attempting to troubleshoot the engines malfunction, the pilot noted that he wouldn't make it back to the airport. He elected to perform a forced landing straight ahead. The pilot maneuvered around transmission lines and landed wheels up in an open field. The airplane skidded to a stop. The pilot called for emergency services on a cell phone and attended to his passengers.

Both engines quit in a twin-engine airplane and the prime suspect is always "fuel." Many times it's fuel exhaustion—simply running out of gas—while at others it's fuel starvation, when fuel remains on board the airplane but for some reason (usually fuel selector position or attempting to take off or land using fuel tanks limited to level flight operation only) that fuel isn't reliably delivered to the engines. And sometimes the culprit is mis-fueling. The NTSB report continues:

An examination of the airplane revealed that that the fuel tanks contained what appeared to be a

mixture of 100 low-lead (100LL) and Jet-A fuel. When questioning the line person employed by the fixed base operator (FBO), FAA inspectors learned that he had fueled the accident airplane with 80 gallons of Jet-A.

See www.kansas.com/news/local/story/683328.html

Jet fuel pumped into a piston airplane's tanks will result in catastrophic fuel detonation at high power settings. Typically mis-fueling detonation occurs shortly after takeoff, when engine compressions and temperature get high enough to cause high-energy turbine fuels to explode with far more force than AVGAS. Engines can literally blow apart from the force of detonation, and the onset is so rapid there's no real option of throttling back to preserve power for an emergency landing.

Mis-fueling a turbine with AVGAS is indeed undesirable but not as potentially catastrophic. Many turbines, in fact, may be operated with AVGAS in emergencies (within certain limitations), and by the nature of their training turbine pilots watch engine temperatures and power outputs very closely on takeoff and climb, with power lever application only enough to reach temperature or power/torque limits being the norm.

Single or twin, piston or turbine, your best defense is to be present to watch your airplane's fueling. Only then can you be sure that:

1. The correct **type** of fuel is added
2. The correct **amount** of fuel is added
3. The fuel is pumped into **the tank(s) you expect**
4. Fuel is **not pumped into tanks it's not supposed to be** (a fairly common modern example: avgas pumped into TKS fluid tanks, which if done requires a complete purge of the TKS system)

Don't fuel filler port restrictors prevent mis-fueling? Only if the fuel truck's or tank's nozzle is modified with a corresponding jet-fuel spout. Many, many airports have old, surplus fuel trucks that may not have modified nozzles, even at fairly large and busy reliever airports like the C421's departure field. And although we don't often talk about it, line service training is often *very* minimal. Fuelers may not have enough aviation savvy to distinguish between piston and turbine versions of similar airframes, or might think "turbine" when they see the word "turbo" on a fuselage, tail or cowling.

But if the engine(s) do go silent for whatever reason, what will you do? As much as we'd all like to think we're ready to do the right thing, right away, even the best among us will have a dangerous moment of denial at the onset of a serious problem. Consider the "Hero of the Hudson" Sully Sullenberger, as quoted on CBS' [60 Minutes website](#):

"My initial reaction was one of disbelief. 'I can't believe this is happening. This doesn't happen to me,'" [Sullenberger] remembered. Asked what he meant by that, Sullenberger said, "I meant that I had this expectation that my career would be one in which I didn't crash an airplane."

In any emergency it's vital the pilot(s) do what it takes to fly the airplane safely during the inevitable period of denial. Moments like this are very rare, or aviation would not have its overall superb safety record. But the pilot must seize control of the situation if he/she is to avoid "going along for the ride". Sullenberger continued:

The plane...lost forward momentum almost completely. "The airplane stopped climbing and going forward, and began to rapidly slow down. That's when I knew I had to take control of the airplane."

Airspeed will decay rapidly in a climb attitude with a power loss. Here's when you must exercise the *command* in pilot-in-command.

"I put my hand on the side stick and I said, the protocol for the transfer of control, 'my aircraft,' and the first officer Jeff [Skiles] immediately answered, 'Your aircraft,'" Sullenberger...remembered.

And here's where airmanship and complete understanding of what it takes to maximize safety and performance make the difference. The pilot who is forced to "make it up as he goes" may be responding to an unique set of circumstances for the very first time, but success means applying the lessons of flight to minimize the variables...such as these basics, taught by all instructors and required to be mastered by every pilot before his/her very first solo:

"I needed to touch down with the wings exactly level. I needed to touch down with the nose slightly up. I needed to touch down at a descent rate that was survivable. And I needed to touch down just above our minimum flying speed but not below it. And I needed to make all these things happen simultaneously," he explained.

What has *FLYING LESSONS* said about off-airport landings, many times and for all classes of airplane? Land with the wings level, under control, at the lowest safe airspeed to maximize your chances of survival. Okay, you've thought about that in your Cessna, Piper, Diamond or Cirrus trainer; what you already know applies equally well in a Bonanza, a Mooney, a King Air, a Citation...or an Airbus.

Confusion is the manifestation of a discrepancy between what your mind senses and what it *wants* to believe. At the beginning of any emergency, in those moments when you know *something* is wrong but you don't yet know *what*, aggressively take command:

1. Level the wings
2. Step on the slip/skid ball (1 and 2 together will stop any turn, putting all your lift in the vertical)
3. Control airspeed by pitching down if slow, up if fast. Level on the horizon is a good middle ground until you have more information.

Do these three things and you'll maintain control of the airplane long enough to collect the information you need to eliminate confusion and identify the problem.

Captain Sullenberger's 60 Minutes transcript continues:

And he had to keep his cool. "The physiological reaction I had to this was strong, and I had to force myself to use my training and force calm on the situation," he said.

The final *FLYING LESSON* from this spectacular event? Train, train and train some more; think about not only what you're doing, but why; expect a moment of denial at the onset of an emergency; and if things go terribly wrong, trust your knowledge and your training to fly through denial until take control of the situation, and your passengers and you return safely to earth. Do that and you too can be a flying hero.

See www.cbsnews.com/stories/2009/02/08/60minutes/main4783580.shtml

Questions? Comments? Email me at mastery.flight.training@cox.net

Debrief: Readers comment on recent *FLYING LESSONS*:

Regarding last week's discussion of recent icing mishaps, ice's effects and the FAA's new definition of "known ice", Savvy Aviator author and AVweb co-founder Mike Busch writes:

Tom, this issue was exceptionally illuminating. Great work!

Thanks, Mike. Other readers added vignettes from their personal experience, including this from retired Pan American World Airways captain and frequent *FLYING LESSONS* "debrief" Lew Gage:

This issue has a lot of useful information regarding ice accumulation on small airplanes. That category, to me, [means] anything that is not a turbojet or a multi-engine large turboprop. Small airplanes and ice are a very bad combination.

I have had only one experience with an accumulation of clear ice in my [Beechcraft] Bonanza. A few times I have accumulated a small amount (1/8 inch or less) of rime ice in that airplane and I did not like even that amount, knowing that there was more where that came from. The one occasion of clear ice was at 11,000 MSL about 60 miles south east of Boulder, Nevada. We were on a clearance in thin cloud with no rime accumulation and inadvertently flew into an embedded building cell (in mid November). I made an immediate 180 degree turn and was not in the cell for more than one minute. In that short time there was approximately 1/2 inch of clear ice on everything and one VHF antenna (the ELT) departed the airplane. The last of this accumulation left the airplane on short final back at Las Vegas. That will make a believer out of you about the hazards of winter time flying in clouds at altitudes that might result in icing conditions.

Thank you, Lew. Very early in my flying career I blundered into icing in a fixed-gear Cessna 182 (departing Cleveland, Ohio in mid-September with strong, cold winds blowing off Lake Erie—what was I thinking?). The most obvious problem I had was that iced-over antennae made communications weak and scratchy, and VOR reception almost nonexistent (this was pre-aviation LORAN or GPS). As soon as I got into clear skies and the ice was shed the abnormal nav/com issues were resolved. Chalk up another hazard of airframe ice—lost communication and navigation capability.

Retired Dallas-area air traffic controller, aviation author, safety consultant and *FLYING LESSONS* reader Norm Scroggins gives his experience and advice:

When you're being "iced" in an airplane.....it may be best to DECLARE AN EMERGENCY. My experience with ice was in the seventies on a trip in our [Cessna] 210 from OKC [Oklahoma City] to MKC [Kansas City, MO Downtown] on the leading edge of a polar front. The trip up was [flown] easily IFR on top....which I was also my planning for the return. There were three of [us] Air Traffic Controllers, all pilots, with a spread of experience on the FAA business trip to the ARTCC [Kansas City Center, near Olathe, KS). Our return to OKC involved a climb through the clouds. During the climb, there was some light ice accumulation which I expected to melt when reaching "on-top". Unfortunately the tops were higher than we could reach and we began flying through small showers that impacted as glaze [clear] ice.

I was told that 1/4 inch of ice on a C210 equated to the weight of the airplane in regards to performance [loss] and the way things were going, I was headed "down" one way or the other. I requested an immediate descent to the MEA. The controller's response indicated a slight delay due to other traffic. My response was, "then get them out of the way....or turn me any way you wish because I am Declaring an Emergency and beginning descent." Obviously we made it.....dropping ice all over ranch land near Bartlesville, Oklahoma. (YES, I confessed my sin to appropriate authorities.)

I'm not proud of this experience because frankly it was poor flight planning on my part. My experience [as a controller] involved assisting other pilots avoid making such bad decisions...experience that obviously I didn't apply to myself.

Thanks for the confession, Norm. We'll all benefit from your insights.

Fly safe, and have fun!

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