FLYING LESSONS for December 6, 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:

From the NTSB:

> The pilot stated that while turning on to final for the ILS approach, and while at 1000-1500 feet MSL, he noticed that he was above the glide path for a normal landing. The pilot said that he "performed a brief slip to lose altitude quicker." It was then that he pushed the propeller control forward and the engine made an unusual noise: a "roaring," as he described. The pilot declared an emergency on the common traffic advisory frequency. The pilot switched from the left fuel tank feed to the right fuel tank feed, and deduced that he was not going to be able make a safe landing on the runway. He performed the emergency checklist for an engine failure by memory, as he stated. The [then] pilot lined up on a lighted parking lot and executed an emergency landing about one half of a nautical mile short of the runway.
>
> Examination of the airplane by Federal Aviation Administration inspectors revealed damage to the firewall, left wing root and wing spar. Although the left wing tank was punctured, no fuel pooling, and no leakage or fumes were present at the accident site. FAA inspectors were able to drain 14 gallons of fuel from the right wing tank.

This crash serves as a reminder to read Section II, Limitations, of your Pilot's Operating Handbook (POH) or Approved Flight Manual (AFM). As the name suggests, the Limitations section lists prohibited operations and maneuvers that take the peculiarity of the type's systems into account, in addition to airspeed, engine temperature and weight limitations.

They're right there in the book. My experience, however, is that most pilots with whom I fly (for the first time) have learned some of the limitations indirectly from other parts of the handbook (e.g., knowing the maximum weight from learning to compute center of gravity location) or from unofficial sources (being aware of engine temperature limits from reading internet chat lines frequented by more engine-savvy posters). It's the rare pilot, so it seems, who has actually take time to read the Limitations section of the POH, especially if they don't own the aircraft.

Further, airplanes that have been modified may have additional limits published in the Limitations section of that modification's POH Supplement. A common example is that aftermarket auxiliary fuel tanks are usually limited to operation in straight-and-level flight only in most aircraft types. The NTSB record backs up the risks of violating that particular Limitation.

An "approved" POH or Flight Manual is one for which Section II, Limitations, has been reviewed and deemed limiting by the Federal Aviation Administration (or your country's authority). Violate a published Limitation (in the POH/AFM or Supplement) and you have violated a Federal Air Regulation. Of course, the legal ramifications pale in comparison to the potential hazards to life.

By contrast, the remainder of the POH/AFM is merely "accepted" by U.S. authorities. Its recommendations are not legally binding, nor does lack of data mean an operation is illegal.

For example, most POHs do not list a specific procedure for taking off using a "soft field" takeoff technique, nor do they give takeoff and obstacle performance data for such a departure. Yet you know if the runway is contaminated with slush or snow, or you're departing from a muddy field or a runway with puddles or long grass, you should hold the nose slightly off the ground (or the tail, in a tailwheel airplane), lift the airplane up into ground effect at the slowest possible

speed, then lower the nose to remain in ground effect until accelerating to the normal liftoff speed, adjusting attitude and climbing out. You may use some flaps in this type of departure to get off the ground at a slower speed.

There are no takeoff performance charts, published speeds or obstacle clearance distance data for this technique in the POH. It's not *prohibited*, there's just no way to predict the precise performance beforehand. Sometimes, nonetheless, this undocumented procedure is the best way to deal with runway conditions.

Sometimes the aero-pundits suggest that certain Section II Limitations are overly conservative, or don't apply to more knowledgeable or experienced pilots. Without firm data, though, including scientific, control-group research into the long-term effects of violating the published limits, it's not possible to determine whether or not the "smarter" pilot or mechanic really knows more than the manufacturer or modifier.

Conversely, the longer I fly and the more airplane owners and mechanics with whom I speak, the more convinced I become that some serious thought and engineering went into establishing at least some of the limitations affecting airframes and powerplants. Certainly, I've learned of enough crashes where violating published limitations is a precipitating factor to conclude that the drafters of Limitations know more about airplane and engine design than do I.

In the case of the type of airplane involved in the crash cited above, the Limitations include avoiding more than 20 seconds of continuous slip…precisely to prevent the sort of fuel-unporting event that likely prevented engine re-start on the right fuel tank after exhausting fuel in the left tank on final approach.

No one likes to be told what they can't do, especially with something representing personal freedom as uniquely as an airplane. Part of enjoying that freedom, however, comes from peace of mind that the airplane and engine will continue to operate safely.

Read (or re-read) Section II of your airplane's manual. Observe the limitations. Heed their warnings. Don't fall into the trap of thinking you know better than the writers of the POH, and that it's warnings somehow don't apply to you.

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

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Debrief: Readers write about recent *FLYING LESSONS:*

Frequent Debriefer and recent *FLYING LESSONS* guest editorialist David Heberling writes:

> I hope more than one person has responded to my editorial on *Stick and Rudder*. The march of technology cannot be stopped or turned back. However, we have to keep our priorities straight, especially when it comes to learning the fundamentals of flying. Nothing should be allowed to detract from that.
>
> When I was training pilots back in the mid '70s, the shortest amount of time to solo was eight hours. It was rare to see someone solo in that amount of time, though. Most of the time, it occurred around 10 to 12 hours. I taught out of a towered field [that] required students to learn how to communicate on the radio with the tower. I can imagine learning how to fly at a non-towered field would be simpler and require less time. The nav radios [of the era] were so stone-simple to use that teaching how to track to a station was not that difficult or time consuming.
>
> Today, the story is entirely different, with the new era of avionics being incredibly complex and rich with information. Unfortunately, it takes a lot of time to master any of these boxes. For students just starting out

> in aviation, there can be too much information. I think that Pipistrel has struck a nice balance with their new Alpha S-LSA. Of course **once we learn the fundamentals, we cannot let them atrophy from disuse**.
>
> Ultimately **it is up to instructors to show students where stalls [and] spins are most likely to occur, and why**. It is up to instructors to teach the use of rudder in coordinated flight. It is up to instructors to teach students that the only place for crossed controls is during crosswind landings and slips to landings. **One of the side effects of airplanes with adverse yaw designed out of them is a cadre of pilots that have no idea what the rudder pedals are for (other than taxiing), and who go on to find more unhealthy uses for them (skidding turns to final).**

Thank you, David. That seems to be the theme of the week. Reader Paul Gretschel continues the *LESSON*, about airspeed control during landing:

> Most…pilots that I have flown with over the last 12 years fly too fast over the fence. The way that I handle [this] is to read the POH and get the best short-field landing approach speed appropriate for the weight of the aircraft with passengers. Then, I proceed to take the pilot to altitude (5000-6000 ft). At altitude, I have the pilot extend the landing gear and deploy full flaps. We fly the aircraft at the recommended "over the fence" airspeed and practice turns, climbs, descents, all at the constant recommended airspeed. The maneuvers are accomplished by only varying power settings while maintaining airspeed.
>
> At the completion of the exercise, I point out that we never heard a stall horn, intermittent or otherwise, or any aerodynamic buffet. The aircraft was stable. This gives pilots a new confidence of flying the aircraft slower (as recommended) on final approach.

Very good, Paul. The POH target "over the fence" airspeed is usually 1.2 to 1.3 times V_{SO} as adjusted for the airplane's weight. This provides, as you say, a healthy margin above stall, and is (as you also say) usually quite stable and controllable. An added bonus is that at the high angle of attack that results, the pilot will see the need for significant rudder pressure to maintain coordinated flight. This, too, is good practice for landing, and for balked landing/go-around as well. As one of the most common scenarios for fatal general aviation accidents, loss of control (LOC) during balked landing/go-around is a major area of emphasis for the FAA, and the FAA/industry General Aviation Joint Steering Committee (GA-JSC) attempting to reduce the fatal accident rate. Good rudder and directional control, along with the pitch control Paul's exercise reinforces, are vital elements of avoiding go-around LOC.

Reader Lew Gage adds more about learning directional control—in this case, our discussion of directional control on the runway:

> When I started flying in early 1961 I practiced crosswind landings by flying in a slip about 50 to 100 feet above many dirt roads and fence lines. This was in my 1940 BC-12D Taylorcraft. It did not matter if the road curved or was straight, the idea was to fly in a slip and track the line. There could be a cross wind or no wind, it just made doing a slip an everyday trick and being able to determine how the airplane was tracking. I would both over-slip and under-slip, and then practice slipping back to the line. If there was no wind I would transition back and forth between a slip to the right and then to the left. All very good practice.
>
> Also, I would not always take the favorable runway for takeoff and landing. Those hours of practice paid off many times in both light airplanes and in the 707/747 and Airbus 310. We did crosswind landings the same way [in the jets] as I had always done in the old T-craft. I suppose an outboard engine pod could be drug on a wing down situation, but I never saw this happen, and many landings were made by the other pilot with me on the wing low-side getting a quick look at the outboard engine. There was always plenty of room to spare, even in some stiff winds.
>
> If the runway was wet it usually made for a better touchdown if the airplane was not lined up exactly with the runway, but the wing low slipping method proved best. Normally the slip was not started until very short final to allow for passenger comfort. I can tell you that I saw some really fine stick and rudder work while working for Pan American World Airways (gone but not forgotten) and the practice I did years before paid off big time when it was my turn in the barrel.

Great idea for an exercise, and always a good history *LESSON*. Thanks, Lew.

Flight instructor/reader Ken Zimmerman continues:

> I agree with you in general about the slipping approach in a crosswind for low-time pilots in light aircraft. Not only do they improve their skills by controlling the path with the wing down, but the moment of touchdown in a lighter plane can be unpredictable in a gusty crosswind. They can drift off the runway if they

hang in the air after squaring up, or land crossways if they drop too soon. Heavier aircraft such as light twins are more predictable.

Thank you also, Ken. David Heberling wraps it up for this week:

As usual, very interesting topics here in this issue. I was taught originally to lower a wing into the wind and compensate with opposite rudder down the final approach. For pilots that fly by themselves most of the time, this probably works well enough. As you said, it gives you time to fine tune your corrections.

However, passengers can find it rather disconcerting to be hanging lopsided down the final to landing. Consequently, I have changed to crabbing down the final until over the threshold and then adding the correction. I do not wait until just before touchdown because I want a little time to get it right.

I have never flown a four-engine jet [David is an airline pilot], so all of my crosswind landings are of the wing-low variety. I never liked putting huge side loads on the landing gear that a crab on landing would impose. I agree that it does not matter whether it is a high- or low-wing aircraft. The wing-low method works equally well in either type.

One more thing: As in all things aviation, **proficiency in crosswind landings takes practice, and a lot of it**. That is why it is important for instructors to take their students out on windy days to practice these types of landings. Besides, I always appreciated getting three [individual] chirps from the wheels in a crosswind landing.

I appreciate it, David.

Question of the Week

Last week reader Woodie Diamond posed this query:

One of the myriad of initiatives that you are involved in is the whole revamping of flight training stuff with the FAA. During one of your meetings, sure would like for you to ask **"What is a flight instructor?"** And see what the other gurus have to say. Sure, it is important to have a good "technical" flight instructor, but it's even more important to have a great "operational" flight instructor. One that remembers that flying is supposed to be fun, and has the aptitude to go with it. Put away the pilot standards checklist and teach some fun. Make aptitude and student reporting a mandatory part of recurring CFI training/certification. Weed out those who may be good "technical" instructors, but in reality should never interact with a student pilot.

Here's what we you said:

I know from my own experience, that in order to obtain the Flight Instructor Certificate it took mastering a lot of skills, information, and techniques. Fun was never built into the curriculum. **It was left up to the flight instructor to dream up ways to make learning how to fly fun.** I used to take students to some of the local grass fields for a change of pace. During the summer, there were pancake breakfasts to attend and sample. Somehow, these things had to fit within the flying budget of the student. Everyone tries to get their ticket in the least amount of time possible because this keeps the cost down. Not everyone has the same goals in mind when going for a flying license. Some just want to put around the sky. Others want to slam through all of the licenses and ratings on the way to a professional piloting career. Then there are those who find airplanes wonderful business tools. Finally, some just want to travel for pleasure. What is fun for one, is not necessarily fun for someone else. **A good instructor talks to their student to find out their goals and desires and tailors the lessons accordingly**.

A flight instructor is an instructor of flight. Put that way, it places the **emphasis on the word "instructor", or teacher**. I personally hated learning the Fundamentals Of Instructing (the dreaded "FOI") part of my CFI training, not being good at rote memorization. But **the message I got from the FAA was that teaching flying was more about being a good *teacher***, making sure that the content is presented clearly and more importantly, absorbed and understood, which is an active and engaged process.

I've had good, brilliant, not-so-good and downright awful instructors over the course of my flying addiction. The best have either 1) female or 2) very good, patient male communicators. The worst have been arrogant

show offs, screamers, and impatient. The worst one that stands out was an ex-USAF F-15 pilot who tried to teach me aerobatics. What he mostly ended communicating is what a hot-shot pilot HE was. I ended up annoyed with him and desperately airsick, and dropped the course. Someday I'll go back to it.

The best one was a quiet spoken, retired photographer who taught me to fly instruments. **He listened and learned where I needed help in a very active and engaged way**. I try to be like him in the air, but I'm not. When it comes to aviation I have an ego that needs checking at the hangar door.

Now when I need to be a consumer of flying instruction, rather than a provider of it, I pick my CFI based on their style – I know that getting the wrong one will have poor results. It's not about their flying knowledge; anyone who has passed the CFI exam and check ride has that in spades.

Thank you both.

Readers, what do *you* think? **What are the qualities that make the best instructor you know, the best?** Send your comments and observations to mastery.flight.training@cox.net.

Share safer skies. Forward *FLYING LESSONS* to a friend.

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