FLYING LESSONS for March 11, 2010

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.

If you wish to receive the free, expanded *FLYING LESSONS* report each week, email "subscribe" to mastery.flight.training@cox.net.

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This week's lessons:

Crosswind landings are a common topic of safety programs and flight reviews. Pilots tend to spend less time, it seems, thinking about crosswind control during takeoff. This week's mishaps, however, include several versions of "loss of directional control on takeoff."

The danger in a crosswind landing comes at the end of the landing roll, when airspeed is lowest and control authority at its least. Taking off with a crosswind, the hazard is at the *beginning* of the process, when the airplane is slowest…but pilots being goal-oriented, we tend to conceptualize the liftoff, not the beginning of the takeoff roll.

"Climb into the wind." That's the mnemonic for proper positioning of flight controls when taxiing into the wind—aft elevator and upwind aileron up. Your takeoff roll begins as an accelerating taxi into the wind, so it's reasonable (and correct) to position the controls accordingly.

As the airplane accelerates the controls become more effective, so you'll gradually reduce aileron deflections on the roll. Optimally aileron will just reach neutral at the moment the airplane lifts off, so the aircraft is wings level in flight. That's when crab angle into the wind, not aileron control, defines the airplane's path along the ground.

In gusty conditions use care to remain firmly on the ground until established at the normal liftoff speed. If you position the controls to lift off "when the airplane is ready to fly," as you might do for a smooth liftoff in calm conditions, it's possible a gust can cause the airplane to lift off momentarily at a speed where you don't yet have the control authority necessary to counter the crosswind. The airplane drifts off the side of the runway or drops hard to the pavement, possibly damaging the landing gear or setting the pilot up for a pilot-induced oscillation that leads to a runway excursion.

Ice, snow or rain-contaminated runways make the job of runway alignment much more challenging. What works on dry pavement or grass may not do the job. Use extreme caution when deciding whether to combine a crosswind with a contaminated runway.

It's usually the pilot's expertise, not the airplane's design, that determines the maximum crosswind capability on any given day.

Comments? Questions? Tell us what you think at mastery.flight.training@cox.net.

Are we safer? Part I

The general aviation accident rate is down significantly the last couple of years, compared to years before. But are we really safer? John Clark is the Chief Scientist of the National Transportation Safety Board, and a general aviation pilot. In a March 8 speech in Wichita, Mr. Clark announced:

> There's been a big improvement in general aviation safety. It's the economy. Flying activity is way down, and the number of accidents with it. A lot of people will try to take credit for creating this improvement, but when the economy returns the same people will forget about wanting to take credit.

The onus is on pilots to maintain our skills during the down cycle, so when things pick back up the mishap rate won't soar with them. I know my own flying time has been down significantly the last couple of years, so my first goal this spring is to get some serious dual instruction as a refresher. What's your plan?

Are we safer? Part II

NTSB announced March 9 that a study concludes single-engine airplanes equipped with glass cockpits have no better overall safety record than airplanes with conventional instrumentation, and a higher fatal accident rate. The study looked at the accident rates of over 8,000 piston-powered airplanes manufactured between 2002 and 2006.

The issue, according to NTSB, is training and currency in the highly complex, not-always-intuitive operation of Primary Flight Displays (PFDs) and Multi-Function Displays (MFDs). NTSB Chairman Deborah A.P. Hersman notes:

> Training is clearly one of the key components to reducing the accident rate of light planes equipped with glass cockpits…. We know that while many pilots have thousands of hours of experience with conventional flight instruments, that alone is just not enough to prepare them to safely operate airplanes equipped with these glass cockpit features. While the technological innovations and flight management tools that glass cockpit equipped airplanes bring to the general aviation community should reduce the number of fatal accidents, we have not -- unfortunately -- seen that happen…. The data tell us that equipment-specific training will save lives. To that end, [NTSB has] adopted recommendations today responsive to that data -- recommendations on pilot knowledge testing standards, training, simulators, documentation and service difficulty reporting so that the potential safety improvements that these systems provide can be realized by the general aviation pilot community.

Based on the study findings, the NTSB made six safety recommendations to the FAA:

1. Enhance pilot knowledge and training requirements;
2. Require manufacturers to provide pilots with information to better manage system failures;
3. Incorporate training elements regarding electronic primary flight displays into training materials and aeronautical knowledge requirements;
4. Incorporate training elements regarding electronic primary flight displays into initial and recurrent flight proficiency requirements for pilots of small light general aviation airplanes equipped with those systems, that address variations in equipment design and operations of such displays;
5. Support equipment-specific pilot training programs by developing guidance for the use of glass cockpit simulators other than those that are approved by the FAA as flight training devices; and
6. Inform the general aviation community about the importance of reporting malfunctions or defects with electronic flight, navigation and control systems through the Service Difficulty Reporting system.

This announcement closely mirrors a 2007 AOPA Air Safety Foundation Technologically Advanced Aircraft (TAA) Special Report, and a concurrent 2006-2007 Mastery Flight Training study that compared glass cockpit airplanes to "similar mission aircraft" with traditional panels.

See www.aopa.org/asf/publications/topics/TAA2007.pdf

Why might the glass cockpit record be worse than traditional IFR single-engine airplanes? I suggest these possibilities:

- Glass cockpit pilots tend to use their airplanes almost exclusively for "serious" transportation, and are therefore are exposed to more hazardous conditions than a comparable number of traditional-panel aircraft.
- Glass-cockpit aircraft manufacturers have been successful at marketing airplanes to younger pilots and pilots with a low level of piloting experience. The typical glass cockpit pilot may have less experience with which to make a sound go/no-go decision than the typical traditional-panel pilot.
- The tremendous capability of glass-cockpit avionics, including weather uplinks and in some cases synthetic vision encourages pilots to venture deeper into hazardous weather or lower into instrument approaches with a false sense of assurance.
- Glass-cockpit instructors stress almost full-time use of autopilots. In phases of flight where hand-flying is required, such as initial takeoff and at the beginning of a missed approach, the pilot has far less experience in precision flight just where the margins for error are smallest.
- Except a very few later versions of Cirrus aircraft, most glass-cockpit airplanes have no backup to the Heading/Attitude Reference System. A single sensing failure has a much greater impact on attitude display than a single failure in a traditional-panel airplane.
- Where traditional-panel pilots in a partial panel situation are left with fewer gauges that nonetheless are familiar in display and in the pilot's primary scan, glass cockpit pilots are left to reference a very few gauges that do not display and are not interpreted the same as glass panels, and often are placed at remote parts of the instrument panel or in location that require disorienting head movements to scan.
- If the autopilot fails the pilot of a glass cockpit airplane has less recent hand-flying experience than the typical traditional-panel pilot.
- Most glass cockpit airplanes have no manual trim override. If the autopilot or trim system fails the pilot will have to hand-fly a potentially radically out-of-trim airplane.
- The workload of managing glass cockpit systems is greater than most pilots expect.
- Traditional-panel pilots who transition into glass cockpit airplanes may not spend the time necessary to become fully proficient with the new avionics.
- Remaining truly current in using glass cockpit avionics requires more frequent flights "in the system" than most general aviation pilots fly.
- Glass-cockpit initial and recurrent training tends to focus almost exclusively on operation of the panel systems, to the detriment of basic flying skills including stall avoidance, recognition and recovery.
- Typical glass-cockpit airplanes are very clean aerodynamically, meaning they are more susceptible to performance degradation from amounts of airfoil contamination from light ice or even moderate to heavy rain encounters, and if they enter a nose-low attitude will more rapidly descend and accelerate.

Do you have a theory? Let us know at mastery.flight.training@cox.net.

I'm a big proponent of the capability brought by cockpit technology. Glass cockpits by themselves, however, do not make safer pilots. They take more effort to learn, and more frequent serious operation for the pilot to remain current. The design of the panel and ancillary systems leads to more dramatic failure modes, and glass cockpit pilots in general have less experience to handle abnormal procedures and to make sound risk management decisions. The good news is that the NTSB report hammers home these points, so pilots who take themselves and their families and friends aloft know what it should take to remain current, and the seriousness that must go into pre- and in-flight decision-making…regardless of whether the panel is traditional or glass.

The complete NTSB safety study will be available at www.ntsb.gov in several weeks.

New Name for FAA's free general aviation safety publication

FAA Aviation News is now FAA Safety Briefing. “We’re changing the name to more accurately reflect the magazine’s mission: SAFETY,” said John Allen, Director, Flight Standards Service. “As for the word *briefing*,” Allen added, “briefings are used in health care, in the military, and in aviation, and are essential to get crucial information before the flight. That’s the point of FAA Safety Briefing: providing pilots, aviation maintenance technicians, and others across the general aviation community with valuable safety information.” The March/April 2010 issue features the FAA Safety Team (FAASTeam) and its role promoting safer skies through outreach, training, and education.

See www.faa.gov/news/safety_briefing

What goes around…should keep going

An AOPA Air Safety Foundation Special Report focuses on a common occurrence: a crash while trying to fly an approach procedure again after having to miss on the first attempt. Announcing the Report the ASF states:

> Pilots who are paid to carry passengers aren’t allowed to even attempt an instrument approach if the weather is below that approach’s published minimums. General aviation pilots flying under Part 91 are under no such constraint. They’re free to request and fly the approach no matter how low the weather. But the fact that something is possible doesn’t make it wise, and the fact that it’s legal doesn’t make it safe.

See www.aopa.org/asf/epilot_acc/sea08fa078.html?WT.mc_id=&wtmcid;&WT.mc_sect=sap

Instrument approaches should be uniformly safe as long as the fuel holds out. History shows, however, that the pilot-as-human often gets sloppy on subsequent approaches, or flies “just a little bit lower” or “just a little bit longer” in the hope of seeing the runway environment when under the stress of trying to land at a specific destination “at all costs.” *FLYING LESSONS* has frequently recommended a simple rule for deciding whether to attempt an approach a second time:

If you have to miss an instrument approach attempt the approach a second time only if one or both of these conditions exist:

1. You have evidence-based reason (not ?hope? or ?a feeling?) to expect conditions will improve before you make it to the missed approach point the second time. This may involve a short hold if you still have fuel to make it to your alternate with reserves.
2. You can positively identify something you did incorrectly that caused you to miss the first time (for example, were one dot high on glideslope at the MAP), that you know you will do correctly the second time around.

If neither of these conditions exist by trying the approach again you’re just exposing yourself (and others) to human-factors risk, and burning precious fuel you may need to make it safely to an alternate. If for any reason you miss the approach a second time, there is no third…head to your alternate right away.

Dallas-area pilots

2009 National FAA Safety Team Representative of the Year (and *FLYING LESSONS* reader) Kent Lewis is again hosting an Aviation Human Factors conference, March 31-April 1 at Love Field in Dallas. The program features a long list of notable speakers. Registration is required and there is a small tuition fee.

See www.signalcharlie.net/Seminar+2010

Too tied to fly?

National Transportation Safety Board Chairman Deborah A.P. Hersman encourages continued research and education on the dangers of fatigue in all modes of transportation. Fatigue has

been a concern for the Board since the creation of the agency in 1967 and it has been an issue on the Board's Most Wanted List of Transportation Safety Improvements since the list was established in 1990. A number of accident investigations include fatigue as the probable cause or a contributing factor. "We can't always prove fatigue as a cause of an accident, but the frequency with which we now routinely document the presence of fatigue-related factors in transportation operations is alarming," Hersman stated.

I attended the Bombardier Aircraft Safety Stand-down in 2007. In the three-day corporate aviation safety conference a medical researcher asked the roughly 400 pilots in the conference to anonymously note (through electronic vote counters at each seat) whether he/she has ever found him/herself waking up unexpectedly while in flight. Sixty percent reported "yes." This was a true "wake-up call" to the need for fatigue management by pilots.

See www2.bombardier.com/en/3_0/3_2/3_2_15/3_15.html.

Most *FLYING LESSONS* readers are single-pilot operators. Many of you fly yourselves for business or personal travel, meaning much of your flying occurs after the end of a business day or on weekends following hectic business lives. No one but you can evaluate your fatigue state, and no one will catch you if you drift off in flight. This leads to this week's Question of the Week….

What criteria do you use to determine whether you're too fatigued to fly, and that you'll be able to complete a flight without begin too fatigued before landing?

Send your answer to *FLYING LESSONS* Question of the Week (mftsurvey@cox.net)…then return to read more *FLYING LESSONS*.

Last week's question was:

Do you run fuel tanks dry in flight as a normal technique? Does the extra two to five minutes' endurance per tank you run dry make the difference in your ability to make it to your planned destination with a safe reserve?
Here are the replies I received:

Run tanks dry - absolutely not. I can find no reasonable justification for increasing the probability of disaster in order to save minutes (or even hours if fuel availability is an issue). It is a requirement to plan to land with a 45 min reserve still left in the tank (VFR). Even with this requirement there are examples of [fuel] starvation, usually due to failure to comply. Half an hour on one tank, change to the alternate on an hourly cycle is the way to go. It also maintains balance and avoids all of those issues you raised in the last *FLYING LESSON*- and gets you there in one piece.

I have searched my mind, and can find no logical reason to run a tank dry under normal circumstances. I know exactly how much fuel my plane burns per hour, and always plan no less than 45 minutes of fuel upon landing. I once ran an aux tank dry by mistake, and even though an immediate switch resulted in a no problem return to full power I see no reason to tempt fate. I wonder how the conversation with the insurance agent and the FAA would go? If you're not flying solo how would you explain to your passengers the need for an off airport landing? Assuming you survived the crash by the time the lawyers got through with you, you might wish you didn't.

Not as a normal technique, but I have run each wing tank dry twice to verify the actual fuel capacity. [My] Beech Bonanza's 40 gal. tanks hold 41.3 gal. I don't routinely run the tanks dry and I don't plan on the extra 1.3 gal. per tank in my fuel planning. Having said that, I really like knowing how much fuel I have left. When all the preflight planning is undone by weather, ATC, mechanical gremlins, or what have you, that knowledge is priceless. Besides that, the uncertainty of fuel usage after taxi, takeoff and climb, even with a digital fuel instrument, puts a cloud over the actual fuel remaining. My KFC-150 [autopilot] has a limitation to not operate it with more than 1/8 tank imbalance. I could make a career of tracking fuel used from each tank after switching tanks every half hour that would only distract from other important duties. After all this, what's left in the tank reading "E" could easily be more than two to five minutes.

I have in the past, on long distance flights. It's nice knowing that all the fuel is available in the remaining tank. I have a JPI [fuel totalizer] and use it to estimate when I'm going to run out on the current tank. When it gets close, I watch the fuel pressure gauge and when it wiggles, it's time to change. I have a hard limit at 15 gallons [about one hour's flight] at destination and if the JPI shows I'm going to have less at destination, I change engine settings to try to get

more range, change altitude, or change altitude down to an airport to put in more fuel. However, on short flights (most of my flights are 2-3 hours or less) I use the 30-minute-per-side rule. I start my timer on engine start, taxi on left, takeoff on right, and then use the right tank for first 30 minutes, left next thirty, etc. If you look at a clock, the minute hand points to the side you should be on.

I avoid the practice of running a tank dry. I have only 2 tanks, and the answer might be different if I had more. Having one dry tank means that you are completely dependent upon being able to feed fuel from my sole remaining tank. With a dry tank I have no Plan B. And I find that I remain calm as long as I have a viable Plan B. Otherwise I tend to tighten up a bit.

I run my tanks dry, of course one during one flight and the second tank on another flight, to update my useable fuel at top off. I perform this operation approximately every four months.

My answers are Never and No. To add to the discussion, my autopilot (KFC 150) manual says that it should not be engaged with tanks more than 1/8 out of balance. This limitation precludes the concept of one hour out of one tank and run the other tank dry. If the aircraft is being hand flown, then the out of balance fuel situation will necessitate aileron usage to keep wings level. The out of trim situation will hurt true airspeed. Not good.

As a general operating procedure, we do not intentionally run any of the four tanks on our Navajo Chieftains dry at any time. Having said that, the fellow I fly with sometimes used to work for a 135 running Chieftains and he said that they would run the outboards dry before switching to the inboards. Given our normal flights (1-2 hours, 2-3 passengers), I just do not see the need for running a tank dry before making a switch. I do not know how our passengers would like it and I do not know how good it is for the engines. Maybe I am on the very-conservative side, but operating this way has never seemed to be a problem. Anyway, this has been a very interesting conversation for me. Thank you.

Thank you…and everyone who responded, all quoted above.

Fly safe, and have fun!

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2010 National FAA Safety Team Representative of the Year
2008 FAA Central Region CFI of the Year