FLYING LESSONS for July 14, 2011

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.

This week's lessons:

It was well above 90°F at nine o'clock last Sunday morning. I was flying a six-place, high-performance single, my friend and instructor David Gee in the right seat administering my annual flying club checkout. I'm instrument current and had a solid, type-specific Flight Review last March, so that morning's briefing included David's query about what I'd like to practice that I'd not practiced recently.

Most of my flying is to and from large, tower-controlled airports. So although I'm comfortable at the low-speed end of the airplane's envelope, and I regularly present and coach practice short-field takeoffs and landings in the same type of airplane (albeit on long runways), I asked whether we could scoot down the road about seven miles and do some real-world short-field work at a local skydiving airport. Turns out that was David's plan too, so we made the short hop to Cook Field, about two miles west of my home in Rose Hill, Kansas.

There are real trees on short final for Cook's 2500 ft x 40 ft (760 x 12 meter) Runway 17, not enough to really be an issue (unless you fly a *really* flat approach with power), but enough of a presence to, as David put it, "make you think about landing over an obstacle."

My first step was to fly an upwind leg alongside Rwy 17, to check for movement on the ground and to put myself in the standard arrival pattern. That's extremely helpful when flying to a precision landing—fly it the same way every time, and you will only have to make small adjustments to stay on target, not making it up as you go like you would if you didn't fly "normal."

I also recommend flying a close-in, tight approach every time (unless there's a legitimate reason to do otherwise, like extending you pattern for other traffic). Fly patterns like this every time and you'll be ready when you need to do a short-field landing (or if the "usual" reasons for doing this, engine failure in the traffic pattern and an engine-out glide to an off-airport landing). Airspeed, configuration and glide path, and I descended steeply, cleared the trees, and touched down right where I wanted.

This was just the set-up, however, for Sunday morning's *LESSON* on short-field operations. First, we lined up for takeoff, using the standard short-field technique—feet on the brakes, power to full, and *then* brake release, acceleration to the takeoff speed from the Takeoff Performance chart, and then a firm pull to lift off into the Vx attitude for obstacle clearance (in most light airplanes, around 10 to 12 degrees nose high if you have time to scan the attitude indicator).

After a second short-field landing we repeated the takeoff exercise. Only this time I did what most pilots would do, I let the airplane begin to roll as soon as power was applied. With nothing different other than this change in technique we lifted off on short-field speed in a Vx attitude.

The difference? The stand-on-the-brakes takeoff permitted liftoff at about 1000 feet down the runway, just a little shy of halfway. Letting the airplane roll from the beginning of power application caused us to roll 1500-1800 feet before lifting off at the same speed. The end of the 2500-foot runway was *very* evident before we lifted off.

Heat and, if the airplane had been more heavily loaded, weight, exaggerate the difference in takeoff performance—the higher the density altitude and/or the airplane's takeoff weight, the more detrimental effect a rolling takeoff will have on runway requirement.

The Pilot's Operating Handbook Takeoff Distance charts for most airplanes illustrate the airplane's "best" performance, meaning you have data for a power-before-brake-release takeoff but no real guidance for the type of rolling takeoff we do most of the time. If you find you're in a situation requiring you maximize takeoff performance, remember you need to use the "book" technique to get the "book" performance.

Now, I already knew this (my students can tell you I demonstrate the difference in rolling vs. short-field performance all the time). But the demonstration is much more effective on a short (yet still safe-length) runway. And the hot day really did make it a powerful *LESSON*. Thanks, David…we all need a good refresher now and again.

Readers, practice a few takeoffs using both the power up, brake release technique and a rolling takeoff to see for yourself what affect different techniques have on your airplane's takeoff performance.

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

Debrief: Readers write about recent *FLYING LESSONS:*

Last week's *FLYING LESSONS* included discussion of wire strikes. Reader Robert Thorson sent this:

> Your readers may be interested in the wire avoidance perspective from the helicopter guys who are always down low. This video is available at the Helicopter Association International (HAI) website.

See: www.rotor.com/Publications/HAIVideosLibrary/SurvivingtheWiresEnvironment.aspx

Thanks, Robert. Very instructive.

Long-time *FLYING LESSONS* reader Woodie Diamond also writes about wire strikes, and (on a broader scale) the role of task-orientation and fixation of risk exposure:

> Enjoyed, as always, this week's *FLYING LESSONS*. I would add that another reason pilots may collide with power lines is because they "can't see the forest for the trees." To illustrate this, my good friend Bill Chandler and I flew in formation down to First Flight Airport (KFFA). Beautiful flight, CAVU day, flying into the birthplace of aviation. We circled the field, performed our break and flew the pattern to landing on runway 20. As I came in over the beach, lined up on final, I noticed that there was a large multi-story home sitting right at the end of the runway overrun clearing. I remember thinking that was a strange place to build a large home, that I should keep a little height on short final to clear it. My attention was divided between the runway and that house. After landing and parking, Bill came up to me and asked "…what did you think of those wires on final?" I looked at him and said "…what wires?" Just across the street from the house is tall set of three-line power transmission wires. I never saw them.

Good *LESSON* in your own right, Woodie!

Recent *FLYING LESSONS* have also discussed low-altitude maneuvering and stalls. Reader James Badgett writes:

> In the late ‘60s the FAA hadn't [et] establish[ed] minimum instruction experience rules, so a low-time instructor like me me could recommend pilots for their CFI checkrides. The flying school I was working for part-time assigned me at least two CFI students.
>
> One of the students was a Red Cross Safety Instructor who followed all the rules regardless of the situation. At that time we didn't stop forced landing practice at 500 feet (don't worry, we didn't go all the way to the ground). One day the safety instructor and were practicing maneuvers in a farming area. As we passed below 400 feet, it was obvious that we were headed directly for a large barn. I said to the instructor student, "Aren't you going to turn so we won't hit the barn?"
>
> His reply was, "We can't! We're below 400 feet." At that point I told him to add power and turn anyway so we could avoid the barn.
>
> The 400 feet referred to a rule his original instructor had given him when he was a student: no turns below 400 feet. He seemed to feel that the laws of aerodynamics changed below 400 feet for turns and below 1500 feet for stalls. Our next lesson was turns at low altitudes and stalls below 1500 feet. Both not to be recommended, and one in defiance of the FARs, but necessary for my student's understanding and confidence, and for the sake of his future students.
>
> In the case of my subsequent private pilot students, I've never given them a specific minimum altitude rule for turns.

Thanks, James. We indeed must be wary not to set the stage for erroneous thinking or unintended consequences when presenting valid risk assessment and mitigation scenarios to other pilots (whether through discussion, instruction, or the example of our actions). In the case of low-altitude stalls, we should discuss the general inadvisability of turns below 400 AGL in normal departures and in emergencies, but also that in an emergency we must do what we need to do to avoid disaster or minimize its impact. It’s the difference between rote learning and the attainment of “correlation” we strive for as we learn to fly, or (those readers who are instructors and/or pilot mentors) teach others. We’re all in this “safe flying” thing together…or at least we should be.

Aerobatics instructor Tony Johnstone adds more detail to the *LESSON* on avoiding the use of aileron in stall recoveries. Tony writes:

> Good discussion on stall recovery, I would like to expand a little on Dale Bleakney's comments and your response.
>
> I was taught to fly by an old Royal Air Force pilot (my dad) who constantly hammered into me to pick up a wing with rudder, not aileron, in a stall. The RAF turned out very good pilots and felt this was important. I learned this way but did not truly understand the aerodynamics involved until I started teaching aerobatics.
>
> If you stall an airplane with the ball out of the cage, as often occurs in power-on stalls (intentional or otherwise), usually the airplane is yawing left due to inadequate compensation for P-Factor. As the stall breaks, the left wing will likely drop, [and] the instinctive response is to apply right aileron. The right aileron goes up; this decreases the camber of the right wing, effectively decreasing angle of attack and increasing lift.
>
> The left aileron goes down, this increases camber, increases angle of attack past the already-stalled point, thus decreasing lift rather dramatically. With this also comes an exponentially-rising increase in induced drag, plus the effect of the down-going aileron increases yaw to the left.
>
> Thus you have an *explosion* of forces that cause the airplane to yaw and roll towards the dropped wing, decreased lift and AOA on the inside, and increasing lift and decreased induced drag on the outside wing. Result- Left spin entry, and believe me this can be dramatic.
>
> We get away with this most of the time due to washout designed into the wing so the tip flies at a lower angle of attack than the inboard wing, so the wingtip isn't stalled yet. Airplanes without washout, such as aerobatic airplanes, don't have this protection from pilot sloppiness. [But] if you stall a Pitts and try to pick the wing up with aileron it will spin in the opposite direction from the stick input. (A good reason not to have washout in an aerobatic design is that the airplane may be stalled inverted, and the tip would stall first. I used to own a Zlin 526 which had significant washout, inverted stalls were rather interesting!)
>
> Bottom line, and Dale is right, this seems to be an increasingly-common habit, DON'T use the ailerons to

> pick up the wing, use rudder, this will correct the yaw which can result in a spin, using aileron may actually aggravate the problem.

Great input, Tony. Thanks! Frequent *Debriefer* Lew Gage adds:

> I might have missed it in the various contributions that your many readers send you, but in some airplanes the configuration of the airplane has a great deal to do with the results of doing a stall. I know that if a Bonanza, either straight tail or V tail, is in the landing configuration (gear down and full flaps with about 17 inches MP and 23 to 2500 RPM) that if the stall is not broken in about one second after occurring that the airplane will probably snap over the top to the right, with the nose pointing straight down and rotating at a fast rate. Use of ailerons only aggravates the situation.

Thank you, Lew. Stall characteristics are a very type- and configuration-specific thing, requiring initial experience with a type-savvy instructor, and regular practice to retain proficiency for the day a stall catches you unaware. Reader David Heberling has even more:

> It is sobering to read Dale Bleakney's report on the state of stall recoveries in his role as a flight examiner and flight instructor. As regards aileron usage during stall recovery, we had a cure for that back in the day when I used to instruct. I called it the "falling leaf" maneuver. It was also called "walking the stall". Basically, I would start at a higher than normal altitude to gives us some room to descend during the maneuver. Once the airplane was stalled, I had the student keep the stick back to hold it in the stall. Then as a wing dropped in one direction or the other, I only allowed the student to use the rudders to level the wing. This is where the "walking" would occur. Of course the nose would be bobbing up and down as the maneuver went on as the airplane "broke" the stall, sped up then stalled again. It proved to the student that ailerons do nothing to keep the wings level during the stall. It also showed them that keeping the airplane coordinated using the rudder only will keep a wing from falling off. I realize that the whole point is to recover from the stall. But it is useful to show the student why we say what we say about recoveries...rudder, rudder, rudder.
>
> Is all of this now out of date? As for swept wings, I have never seen anything different about stall recoveries in jets. Of course, they never really let us do a full stall either. At the first indication of a stall (the Airbus yells, STALL, STALL, STALL), you are expected to initiate the recovery immediately. This is a hand-flown procedure, which I find amusing only from the fact that we hand-fly airliners so seldom. The company would prefer us to go on autopilot 100 feet agl from take off to 200 feet agl on landing. I find this highly detrimental to having intimate knowledge of the airplane I am flying. I have been in the habit of hand-flying all the way up to 10,000 feet MSL and then going on autopilot. On descent, I would hand fly from 6,000 feet MSL to the surface. Since RNAV departures have come into being, my hand flying has been diminished. RNAV departures have to be flown on autopilot. So is it any wonder why airline pilots have a hard time recognizing they are in a stall when they spend so much time on automation? They cannot even tell what they are feeling through the controls or seeing on their PFDs.
>
> Maybe aileron usage is bleeding over from upset recovery. The new mantra being PUSH then ROLL then THRUST. No rudder usage at all. I guess we are all too afraid of knocking [the rudder] off the airplane.

Thanks, David.

Nearing press time I spoke by phone with a test pilot I greatly admire and respect, whose opinion is in counterpoint to what we've read about the use of aileron and rudder in stall recoveries. He also addressed the differences in swept-wing airplanes that was part of my initial *FLYING LESSON*. The caller requested, however, that he write his response himself if he is to be attributed as its source. I hope to have his very thought-provoking response in time for next week's report…and that perhaps we can spur a meeting of the test-pilot minds on this issue.

David Heberling has more to teach us this week, on the *LESSONS* of circling instrument approaches:

> Circling approaches! At night! The airport is a black hole on a sawed-off mountaintop with two towns miles away on either side. We used to do those back in my commuter days into the likes of Bradford, PA. We flew the VOR/DME to runway 14, except in those days we flew a DME arc to intercept the final and then would circle to land the other way. It was like landing on an aircraft carrier with no depth perception because there was no development nearby, and [it was] forested all around. We were flying a Beech 99 then. Now, in the big iron, we can only circle in VFR conditions.
>
> It is one thing to do something like this at your home airport, where you have done it number of times. To do this at an airport where you have never been before could be rather sporting. I am sure that with moving map displays and GPS, it is much easier to see where you are in relation to the airport. There is still the issue of

> keeping the airport in sight at all times. That is not always easy if the airport is on the opposite side of the airplane from you (sitting in the left seat). If you go back into the clouds, it is time to do the missed. Press on [otherwise] and you are asking for trouble. If you try to stay out of the clouds by descending below the circling minimums, you are asking for trouble again.
>
> If you are going to do a circling approach, you had better have studied the approach ahead of time and not be "winging it" as you fly the approach. If I have a capable autopilot on board, I would definitely be using it to my advantage on a circling approach. There is much to do and only one set of eyeballs to do it. Using the autopilot will also likely keep you from trying to "duck under" to salvage the approach. By the way, the circling minimums for runway 14 at KBFD is 500-1 (category A + B). That is not a lot to work with.

When it comes to circling approaches, David, familiarity is everything. Thanks!

Circling approach guru Bob Siegfried also writes about last week's *FLYING LESSONS*:

> I think one of the best uses of the circling approach is when arriving at an unfamiliar and maybe poorly marked airport in marginal conditions. I like to descend to the circling MDA even if the wind favors a straight-in approach. At the circling MDA, I know that I can safely maneuver around the airport as I familiarize myself with the runways and make sure that what I think is the runway really is the runway, and not just a road running around WalMart.
>
> As long as we stay at the circling MDA we have all the time in the world to plan a comfortable approach to whichever runway best suits conditions. I think that is a LOT smarter than starting down toward what appears to be the runway then suddenly aborting when we find out that it really is the WalMart parking lot.
>
> The only thing required of us is that we let ATC know what we are planning to do. We can circle multiple times if we need to make sure we see what we think we see.

Thanks, Bob, as always.

Readers, what's *your* opinion? Tell us at mastery.flight.training@cox.net.

Fisk Inbound #6

Flying to Oshkosh for the EAA's AirVenture convention and exhibition? You're running out of time to hone the flying skills you'll need to make a safe arrival. This week read Fisk Inbound #6: Crosswinds, Tailwinds and Go-Arounds.

If you do come to Oshkosh, consider attending my seminars on Saturday, July 30th:

- **The Psychology of Fuel Exhaustion** 10:00 – 11:15 am in the American Bonanza Society hospitality tent, immediately across the street from the Theatre in the Woods. It's not Beech-specific, and you don't have to be an ABS member to attend—so stop on by!
- **Strategy to Avoid General Aviation Accidents** 2:30 – 3:45 in the FAA Safety Center, near the air traffic control tower.

See you there!

See: www.aero-news.net/news/featurestories.cfm?ContentBlockID=439EFF1E-2A8F-4F12-A1FD-13EF01B27318&Dynamic=1

The fifth most common cause of fatal general aviation aircraft, according to the U.S. Federal Aviation Administration: Controlled Flight into Terrain/Cruise Flight.

To kick off the discussion, here are three sample scenarios from the Federal databank. I'd like your ideas on possible factors that led to each crash, and ways a pilot might recognize and avoid similar situations. For each scenario please email mastery.flight.training@cox.net, focusing (but not limiting) your response on these items:

1. Cite the number of the scenario (which one you're writing about).
2. What do you think the pilot may have been able to do before takeoff to mitigate the risk?
3. What do you think the pilot may have been able to do in flight to mitigate the risk?
4. What hints might the pilot had that he/she was headed toward a mishap?

Scenario 1
During the night flight, the [helicopter] pilot was cleared through Class Bravo airspace and he queried the controller if there was an altitude restriction on his route. The controller stated that he must remain at or below 500 feet and that a frequency change was approved upon reaching a local geographical reporting point (Century Boulevard). A review of radar data disclosed that the helicopter followed an interstate southbound toward the destination airport. The radar data further showed that about 3 minutes prior to the last target, the helicopter's altitude varied between 200 and 400 feet mean sea level (msl). The last target was observed at a mode C reported altitude of 400 feet msl (about 250 feet above ground level), and located adjacent to Century Boulevard. Several witnesses reported observing the helicopter flying low southbound along the interstate. They then recalled seeing a bright spark as the helicopter collided with a high voltage transmission line, followed by the helicopter impacting the asphalt. The main wreckage, consisting of the fuselage and engine, came to rest in the far left lane of the seven-lane southbound side of the interstate. The wreckage was located almost immediately above Century Boulevard, which extended perpendicular (and under) the interstate. Power lines were located adjacent to the wreckage with two major steel support tower structures on either side of the interstate. Neither the towers nor the wires had obstruction markings or lights, nor were they required to have any.

Scenario 2
The flight departed in VFR flight conditions on a cross-country flight to the pilot's home airport. About 35 miles southeast of the destination airport, the airplane impacted the northwest side of an 11,000-foot mountain approximately 150 feet below the mountain's crest. Based on an analysis of the meteorological conditions existing at the time of the accident and in the vicinity of the accident site, the cloud bases were near 7,000 feet with the cloud tops above 15,000 feet. An Airman's Information (AIRMET) report for icing and turbulence had been issued for the time of the accident, in the accident area. An airframe and engine inspection revealed no preimpact mechanical anomalies that would have precluded normal operation.

Scenario 3
The airplane impacted a vertical rock cliff face in mountainous terrain about 500 feet below a mountain ridge line. Data was recovered from a portable GPS unit that was located with the airplane wreckage. The GPS data track originated in the vicinity of the departure airport, and proceeded at 8,350 feet mean sea level (msl) northeast for 57 miles, and abruptly ends in the vicinity of the accident site. During the last 2 minutes of the flight, the track increased in altitude from 8,350 feet to 8,891 feet msl. The height of the mountain ridge line directly ahead of the airplanes' flight path was between 9,100 feet and 9,580 feet msl. The end of the GPS track did not exhibit any deviations that could be interpreted as an evasive maneuver. The cloud coverage in the vicinity of the accident location was between scattered and broken, with bases between 8,000 and 9,000 feet msl, cloud tops were about 15,000 feet msl, with visibility greater than 3 miles in cloud-free areas.

Please send your insights to mastery.flight.training@cox.net. Thanks!

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

Flying has risks. Choose wisely.

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