FLYING LESSONS for March 3, 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.

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:

A six-inch free-fall, such as stalling just a little high in the flare, results in touchdown forces equivalent to a 340 foot-per-minute impact. Drop in from a little higher than that and you can cause serious damage to the airplane.

A hard landing can impart several Gs of force on the airframe. How many times have you heard of an Emergency Locator Transmitter (ELT) going off as a result of a hard landing? Most ELTs require six or more Gs in order to trip…an objective measure of the force of a hard landing.

The trick, of course, is to reduce your vertical speed and increase your angle of attack so the airplane touches down in a stall. Stall too high and, well, we've just seen what will happen. Don't reduce vertical speed soon enough and the airplane will rebound off the runway in a bounce.

Every type of airplane has its own landing technique. Most of us fly or have flown airplanes that are best landed in a full stall. Some heavier airplanes have to be flown onto the touchdown, not quite stalling. Tailwheel airplanes may be landed either way, either a three-point or a wheel landing. Technique may vary if there's a strong wind, or if you're landing on a short or soft field. I was surprised when I flew Federal Express' MD-11 simulator in Memphis several years ago, that after the mains touched the correct procedure was to push *forward* to stick the plane on…just like the wheel landings I used to do in my much, much smaller Cessna 120.

Regardless of the airplane type's best technique, you need to transition from some vertical speed to close to no vertical speed in a very small vertical distance, timed just right to put the plane down with neither a bounce nor a hard landing.

Roundout and flare is a real art form, one we do at least once in every flight. We have to do it right, within permissible tolerances. And right or wrong, it's the standard by which others will judge our ability as a pilot.

How do you best make this happen? Fly the proper airspeed on final approach. There's a reason the Practical Test Standards requires airspeed control to +10/-5 knots 1.3 V_{SO} on final approach for the Private certificate, to 1.3 V_{SO} $\pm$5 knots for type ratings and the ATP. Focus on the far end of the runway—it's easier to judge your height and rate of descent, and therefore reduce it to near zero just inches above the runway, by looking at the horizon than it is looking straight down or to a point just ahead of the airplane. Practice landings…and practice some more.

If it doesn't work out and you land hard—hard enough to jar you, and maybe set off the ELT—have a mechanic checkout the airplane out before flying again. Pay special attention to the obvious things, like tires and landing gear components, but focus also on anything that may flex vertically, such as stabilizer attach points, battery boxes and baggage shelves. And make sure the propeller tips didn't contact the runway as the airplane slammed down on landing.

Many airplane types have a Hard Landing Inspection checklist in the manufacturer's maintenance manual. If you own the airplane, look at your manuals (or your mechanic's) and see what your airplane's makers thinks is at risk in a hard landing.

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

Debrief: Readers write about recent *FLYING LESSONS:*

Reader Paul Safran writes:

> Your quest to improve the GA fatal rate by recognizing that pilot actions/attitudes are the largest factor is great. How about a campaign, long and enduring, even incorporated in the PTS [FAA Practical Test Standards] somehow.....

…and Paul relates this online post:

> *WATCH THIS!!!! A Pilot's Two Most Dangerous Words*
>
> [He] was a great ambassador for GA, but had the common "surgeon's attitude" of "I can fix/do anything". I first met him when he wanted to land on the ice runway at Alton Bay in NH. I contacted him at his office to warn of forecast winds not being a good day to go. He was prudent, and opted for another day. I arranged to meet him there under the premise I'd land first, and if he didn't see my plane or talk to me on the radio, he'd not land. All went well, we had a great lunch.
>
> It was fairly obvious to me that he had a close support group of other pilots with similar attitude.
>
> This is my 3rd friend/acquaintance that has not only died from an avoidable situation, but was young and left behind a wife and young children. My wife, a very positive GA flyer, even made the comment to me that I personally know an awful lot of dead pilots. It does make her think about the risk tolerance. Not good!
>
> I do not have the answers, but please keep up the call to recognize it. The pilot community needs to be harder on its own before the fatal rate will change.

Thank you, Paul. It's a team effort. And yes, we need to somehow break through the aviation culture so that it's OK to tell another pilot you think he should re-evaluate the hazards he/she willingly faces…and so we're willing to accept and act on such a recommendation from another.

Although he did not write it as a direct response to a past *FLYING LESSONS* item, reader Tom Drew recently posted a very insightful statement on an online bulletin board, and granted my request to quote his wisdom here:

> Take a pilot, put him in his car and send him down the interstate. If he is in driving rain, he will slow down. Put him in a construction zone, he will slow down. Most important, run him through some pot holes at 70mph

> and he will slow down. Put that same pilot in his airplane in heavy rain and/or heavy turbulence, and most will keep the power right up there at cruise and just tighten their seat belt. What is the disconnect?

Excellent observation, Tom. Readers, what do you think? Do you recognize yourself in Tom's illustration? Tom adds:

> Tom, I have followed your writings in *Flying Lessons Weekly* and ABS [American Bonanza Society, which, if readers haven't figured it out, is my "real job"]. Your legacy, which has yet to be written, is that you saved lives. Keep it up and thank you on behalf of the aviation community.

There's no higher praise for someone who considers himself above all things to be an instructor pilot and teacher of flight. I'm honored you think so, Tom. Thank you.

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

A few weeks ago I mentioned a short demonstration flight I took courtesy of Charles Lloyd, a retired Cessna sales demonstration pilot and fractional ownership program captain, in his wonderfully upgraded Cessna 182J. Charles picked my up at Wichita Mid-Continent Airport and graciously put me in the left seat of his Skylane for a demonstration of his airplane's angle of attack indicator.

FLYING LESSONS is joining a number of individuals and industry leaders in trying to raise awareness of angle of attack (AoA, or "alpha") indicators as a more precise way of avoiding stalls and, by extension, of safely flying maximum performance maneuvers by directly displaying the angle of attack and its relationship to "critical" AoA, the angle at which the wing stalls.

I've previously described the landing and takeoff regimes with an Alpha indicator, but I had failed to return to the narrative to describe one of the more instructive uses of the device. Leveled at 3000 feet, a little more than 1500 feet above ground level, we cruised eastward out of the Wichita Class C toward the little residential air park Benton, Kansas known as Stearman Field, so named to honor Lloyd Stearman, his family, and the thousands of Boeing Aircraft employees that produced Stearman PT- and N@-series training biplanes before and during the Second World War (as well as a few other notable pre-war airplane types).

Overflying Stearman Field, Charles asked me to slow to about 80 knots and set up for a series of steep turns. S-turning to clear the airspace as we moved five miles beyond Stearman, Charles had me note the indicated AoA: a yellow chevron and green circle or "donut," which denotes something near a best-angle-of-glide AoA. Seeing no other traffic, I smoothly rolled into a 45° bank to the left, holding altitude…and the AoA display quickly changed to a green "donut" topped by a red chevron. Adding a little power to maintain airspeed and altitude I held the AoA display steady (well, fairly steady—it was a bit turbulent). Completing a 180° turn I rolled out and reduced power to stop the turn on speed…and the AoA returned to the donut-over-yellow-chevron that had displayed before the maneuver.

After a couple more steep turn entries and exists, including a 55° bank Commercial Pilot standards maneuver, I entered a steep turn without adding power, letting the airspeed decay—and more importantly, seeing the angle of attack increase. It didn't take much extra pull in a steep turn to feel the beginnings of a stall. And I recovered solely by reducing bank angle, instantly returning the AoA to the "flying" range.

Hold speed, vary bank and the angle of attack varies. The steeper the level turn, the higher the angle of attack. It doesn't take a nose-high attitude to stall the airplane, just a little extra "pull" or bank while trying to turn in level flight…and when it does stall, it does so at higher-than-book stalling speeds. To recover, reduce bank angle and you reduce the G-load and angle of attack. Or let the nose drop to reduce AoA while maintaining bank angle. Great *FLYING LESSONS* for all pilots, instantly visible—and therefore easily teachable—with a properly calibrated angle of attack gauge.

Thanks again, Charles, for the great *FLYING LESSON*.

See:
www.bentonairpark.com
www.yelp.com/biz/stearman-field-bar-and-grill-benton

This week we received several more, very insightful responses to the seven scenarios representing the ninth most common cause of fatal general aviation accidents, loss of control during low-altitude maneuvering. Here are some excerpts from comments received this week…thank you Cynthia H., Doug White and Rick Garner:

- The pilot was pushed, heavily, to accept an assignment his common sense initially told him to refuse.
- The pitch up is suggestive of a CG shift, the control forces of which may have been unanticipated (due to a strange flap configuration.)
- Too much attention outside the cockpit, not enough cross-checking airspeed.
- This guy's a hot dog. Rules don't apply to him.
- The pilot got disoriented looking inside, trying to fix the problem, and lost spatial orientation.
- Rain all night and fuel cap off in the AM? Scratch the flight and get maintenance.
- Non instrument rated in almost minimum conditions and he still goes?
- Would not a proper run up have revealed the sputtering and missing engine?
- So, even if you do not want a 'full tank,' what is wrong with 50%?
- It would appear the pilot's decision-making was clouded by a serious case of get-home-itis.
- Not a whole lot of good things happen in an airplane at 100' AGL unless you are about to land.

Next week I'll wrap up discussion of Cause #9 with some suggestions and perhaps a sample lesson plan or two for instructors to incorporate into checkride preparation, flight review and recurrent training syllabi. I'll incorporate the ideas you've submitted, for which I'm grateful. You still have time to register your thoughts. Look over one of more of the accident scenarios below, then email your impressions, ideas or cautionary tales to me at mastery.flight.training@cox.net. I'll combine responses into my final report, and keep your replies anonymous on request.

Scenario 1: http://www.mastery-flight-training.com/ga_fatals_9_1.pdf

Scenario 2: http://www.mastery-flight-training.com/ga_fatals_9_2.pdf

Scenario 3: http://www.mastery-flight-training.com/ga_fatals_9_3.pdf

Scenario 4: http://www.mastery-flight-training.com/ga_fatals_9_4.pdf

Scenario 5: http://www.mastery-flight-training.com/ga_fatals_9_5.pdf

Scenario 6: http://www.mastery-flight-training.com/ga_fatals_9_6.pdf

Scenario 7: http://www.mastery-flight-training.com/ga_fatals_9_7.pdf

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

Fly safe, and have fun!

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