FLYING LESSONS for October 4, 2018

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FLYING LESSONS uses recent 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 airplane have little direct bearing on the possible causes of aircraft accidents—but knowing how your airplane's systems respond can make the difference as a scenario unfolds. So apply these *FLYING LESSONS* to the specific 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:

It's ironic that in so many "landed long" accidents, the runway is far longer that needed for the airplane being flown. It may be that a pilot who flies most or all of the time from very long runways (relative to the "book" landing distance requirement) develops a type of *landing complacency* that, left unchecked, can contribute to an off-the-far-end runway excursion.

Most lightplane pilots have very little need to fly from short runways. But even if you are flying a Skyhawk or a Cirrus or a TBM…or even a Falcon 50…exclusively from air carrier- sized airports, it's a good idea to practice at least *as if* you need to get the airplane down in a distance as described by your Pilot's Operating Handbook (POH) or Airplane Flight Manual (AFM).

Why is that? A precision, by-the-numbers approach and landing will have you flying ***on speed***, ***on glidepath***, and ***on target*** to the touchdown zone every time. More importantly, assuming you have done your homework and computed the expected landing distance, it will put you in a position to **always know whether you have sufficient runway remaining** to come to a stop, regardless of airplane weight or the density altitude.

It's the sloppy pilot who does not pay attention to landing targets, even (or especially) on more-than-adequate-length runways. Conversely, flying precisely will keep you from adding to the "landed long" statistic.

So how should you practice approaches and landings? First, get out the Landing checklist and the Landing Distance chart for the airplane you're going to fly. They will probably provide guidance on the airspeed to fly on final approach. Note this will be higher than the speed you'll fly in the flare; if you aim for the 50-foot or "over the fence" speed at that point in your landing and flare normally beyond that point, you'll be slowing through the appropriate speed as the wing's lift can no longer overcome the airplane's weight and the airplane settles that last couple of inches (hopefully) to the surface.

Now that you know the speed, put the airplane in the landing configuration (flaps and landing gear position as applicable) and find the power setting that results in a 500-600 foot per minute descent. This is a "normal" landing (we'll cover short field approaches another day). Look at the position of the airplane's nose relative to the horizon while you're on speed, in configuration to land.

This is similar to the oft-touted concept of a stabilized approach. It's not precisely the same, however, as the technique of setting power, flaps and airspeed several miles out for a

continuous-speed descent as practiced in air transport category equipment—it's modified for lighter aircraft, and usable in a standard circuit or traffic pattern as well as on a long, straight-in approach. I wrote more about stabilized approaches in light airplanes in an article on *AVWeb* about a decade ago.

See https://www.avweb.com/news/leadingedge/leading_edge_23_stabilized_approaches-199047-1.html

Get comfortable with this "sight picture" at altitude—you have precious seconds to practice if you do this only an actual landings, but given enough altitude you have all the time in the world when you practice. Drill the flight condition: configuration, attitude, power, and the resulting airspeed and rate of descent. Work until this is natural for you. Then practice to keep it fresh.

Now take that practice to the runway environment and practice holding configuration, attitude, power and airspeed while you remain aligned with a visual approach slope indicator (VASI) or other runway glidepath guidance. Most VASIs, PAPIs, etc. are aligned to have you touch down 1000 feet from the approach end of the runway or one-third the total runway length, whichever is shorter. Practice landings until it is second nature for you to stay on target all the way to flare over the touchdown zone.

Once you have this mastered, try a runway without a visual glidepath indicator. Pick a touchdown zone—I like the second runway stripe, close enough to the threshold to get full use of the runway but far enough away to accommodate a slight undershoot—and practice holding speed, attitude and configuration until you can consistently flare and touch down on your runway target.

The spot your airplane is aiming for will appear to remain motionless in your windscreen. If you are coming up short you spot will appear to move away, or up on the windshield. If you're overshooting the spot will appear to be coming toward you, and toward disappearing under the airplane's nose.

Of course, as you flare and settle onto the surface you'll actually touch down a little beyond this aim point on short final. The key is that ***the spot that appears motionless in your windscreen should be just before the point you'll actually touch the surface***.

Now you're ready to go back to that air carrier runway and still touch down smoothly in the touchdown zone, with minimum sink and at the slowest safe speed to minimize distance covered in the flare and on the landing roll.

Every time you land, aim precisely for speed, attitude, power and configuration to the touchdown zone you identify. Now, even if the airplane is heavy or the density altitude is high, you'll instinctively know what "looks and feels right," and can make minor adjustments if necessary to keep the plane on target all the way to touchdown. If conditions call for "landing long" on a long runway to accommodate some operational imperative (such as landing "on the dot" at Oshkosh), you'll know exactly what to do to touch down where you want, at the speed you need, so you won't overrun the end of the pavement.

Most importantly, mastering the landing approach and disciplining yourself to do it "on target" each time will tell you instantly if you are in danger of running off the end of the runway, while there's still time to do something about it. Is your speed too high? Are you not in the landing configuration? Is your power setting too great? Is your pitch attitude wrong? Does the landing zone appear to be coming toward you and disappearing beneath the airplane's nose? If any of these is the case within about 500 feet of the ground, power up and go around before you find yourself landing long and rolling off the far end of the runway.

Practice these skills and you won't end up like the pilots in at least four FAA-reported incidents this past week.

Questions? Ideas? Opinions? Send them to mastery.flight.training@cox.net

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Debrief: Readers write about recent *FLYING LESSONS:*

Reader Tony Johnstone, an aerobatics instructor and son of a WWII Spitfire pilot, writes about last week's *LESSONS* concerning pre-takeoff checklists:

> You have heard this from me before (as has anyone who has had to sit through any of my safety seminars!): **TMPFFGG**. Any RAF, RCAF, or RAAF pilot from the WW2 era will hear this in his sleep. Trim, Mixture, Pitch, Fuel, Flaps, Gills (British for cowl flaps), Gyros. Voiced before EVERY takeoff, in a piston airplane you will not miss anything that can kill you on or after takeoff. Everyone I trained in my Twin Comanche will remember the piece of white surgical tape stuck on the panel with that mantra on it.
>
> Whatever checklist you use, be it written or memory, **if you don't do it every time eventually something will rise up and smite you (and your passengers)**. Keep up the good work.

Thanks, Tony, I do remember that one. It's close enough to what I use that I've not changed my practiced mnemonic. But thank you.

See http://www.mastery-flight-training.com/20180927-flying-lessons.pdf

Retired corporate pilot and flight instructor Dick Druschel addresses last week's report in more detail:

> You talk about the two King Air accidents and how the second one was caused by not ensuring the trim was reset. You talk about how crucial it is to use our checklists for every takeoff and landing. I could not agree with you more. To paraphrase an old credit card commercial, "never conduct a takeoff without it".
>
> I teach the use of checklists to every pilot I fly with for all normal operations.....no exceptions.
>
> The first sentence of one of your leading paragraphs says something about checklists helping with pilot memory or lack thereof. Yep, right on. Where I disagree with you is in the use of mnemonics. Have you ever made a list of all the mnemonics the FAA and King Schools and ABS and AOPA and many others would have us use? The list is mind boggling. Perhaps the Australian pilot was used to using a mnemonic in his flying. Maybe this time he simply forgot or got distracted.
>
> Where I am going with this is that your statement about **checklists helping with memory lapses** is valid. Can you remember what each and every mnemonic actually means? Have you every forgotten one of the letters or gotten then out of sequence? How about when you fly totally different airplanes....makes, models and types?
>
> **Pick up the checklist and do it in sequence until done completely**. If you get interrupted place the checklist somewhere that interferes with the normal takeoff or blocks the view of the instruments, anywhere that visually reminds you that the checklist has not been completed. We did this in all of the jets that I flew for my company.
>
> I confess that I do not use or teach mnemonics.....with the exception of GUMPS, and then only after the student has sufficient familiarity with the airplane. Most of the other mnemonics are too easily forgotten or confused with some other airplane or some other system. That could lead to a disastrous situation. USE THE CHECKLIST.....PERIOD!

I do use (and teach use of) the printed checklists. I use mnemonics as last-minute re-checks at times when I do not have time to reference the printed checklist as a single-pilot operator. All the "killer items" (including, as was the subject of last week's discussion) are already done…my FLATS pre-departure check reminds me to confirm those items one more time, while also performing less critical tasks like turning on the landing lights (that would quickly burn out in many airplanes if turned on before there's significant airspeed for cooling air). Your use of GUMPS is a similar example. You are exactly right—use checklists in all phases of flights when workload permits. I'll add, use well-practiced mnemonics when workload does not. Thanks, Dick.

Two readers wrote about the specific Australian Transport Safety Bureau (ATSB) report that kicked off the discussion. Jock Folan writes:

> It was interesting reading the ATSB report earlier this week, however it does pose a further question.
>
> Why was the trim set full left? There is no reason for a pilot to do this and leave the trim set that way unless there was an engine failure on the previous flight, not the case.
>
> I therefore suggest that there was a problem was **either a trim run-way prior to or during the take-off, or it was left that way post-maintenance**. I have seen this occur before with full nose up being set by maintenance personnel and the pilot not picking it up prior to departing on the first post-maintenance flight. As an ex maintainer this is not meant as a slur against maintenance personnel, it is more about checking the aircraft thoroughly post-maintenance, an issue that you have previously addressed.
>
> One event that was particularly memorable for me was taking off in a C208 with 17 skydivers onboard. I had checked the trim indicator prior to take-off, however, unbeknown to me the trim indicator had skipped to an incorrect position. Following rotation and lift off the aircraft commenced a rapid pitch up that I could not override. I immediately reduced power to a point where I could hold enough forward pressure to stop the pitch up and maintain sufficient airspeed to maintain height. It was a short runway so the option of putting it back onto the runway did not exist. While manoeuvring around trees at low level I was frantically rolling in forward trim until control inputs felt normal, at that point I looked at the trim indicator and it had disappeared from the window. Everything else being normal I continued with the sortie.
>
> I realise that someone will probable make comment about continuing the skydive sortie following the pitch up, however have had a maintenance background I was confident of what had occurred. After landing I confirmed the actual trim travel and counted the number of turns to set neutral, **I now include this in my preflight** and train our new C208 drivers to do the same.
>
> The lesson learned, **if something is not right, do something and do it immediately** so that you can **maintain control**, further acceleration will only exacerbate the problem.
>
> A similar incident happened again a couple of years later when conducting a first flight for an owner builder, the difference that time was that as a first flight I was prepared for something to occur. In this case the builder had set an incorrect tailplane incidence.
>
> Keep up the good work. I look forward to catching up with you at Cowra next year.

I agree with you. The trim setting discovered by ATSB when investigating the Victoria King Air crash was probably *not* set by the pilot—it was likely moved out of position during a maintenance function. Undetected and uncorrected, during takeoff the airplane may have been close to uncontrollable, similar to your harrowing Cessna Caravan experience. If the trim position was an artifact of some maintenance event, then it's something that the pilot should have caught and corrected using the Before Start and Before Takeoff checklists. Thank you, Jock. I'll see you at the Cowra NSW training event next March.

See http://www.atsb.gov.au/publications/investigation_reports/2017/aair/ao-2017-024/

Reader Chris Ceplecha adds:

> Great article about trim and the importance of having it set correctly prior to takeoff. I am however a bit suspicious about the Australian findings on that King Air accident. I went through and read the whole report, and I took time to look up the operation of the rudder system on the King Air 200 via FlightSafety's extensive online training documents.
>
> 1. The Australian board said that overloading was not a factor, but it was. The plane was overweight, by hundreds of pounds. That is a contributing factor, period. **Being overweight cuts into**

performance margins, and definitely contributed to the lack of climb capability. There is no disputing that fact.

2. The Australian board said that the rudder boost and yaw damper systems were not a factor, but did not elaborate on how they reached that conclusion. What tests did they run to verify that? Their findings would have been more believable if they discussed how they came to that conclusion. The rudder boost system (auto-ruder activation in the event of an engine failure on takeoff) will activate if it senses a change in bleed air pressure, 60 PSI to be exact. The board did not explain how they ruled out a malfunctioning rudder boost system being the cause.
3. Yaw damper malfunction was ruled out as a cause, but once again I did not see them explain their rational. The report would be more believable if they had done that.
4. Rudder trim is completely mechanical, not electric according to the FlightSafety training document. What the report did not state was just how that full rudder trim could have been introduced. It is improbable that any pilot would do that in the course of normal flight operations. Copious amounts of elevator trim are a natural result of a normal landing in just about every aircraft I have ever flown, and that includes over a dozen jets and every more GA platforms. But, I have never, ever, run into a situation where copious amounts of rudder trim were input as a normal technique in any of these aircraft.

The *LESSON* of checking the trim and verifying correct position is extremely important, but in this case, the investigative body has not convinced me that the King Air in question did not suffer a serious flight control malfunction. I hope they are right and we do not have another one of these events, but if I were a King Air pilot I'd be darn sure the Rudder Boost and Yaw Damper systems were operating properly, and I'd rehearse what I'd do if they failed.

Many years ago I was lucky enough to survive a runaway trim situation in a Lear 35. It was a handful, and took both of us and all our strength to keep from impacting the ground. I have since learned to **be very suspicious of the possibility of runaway trim**.

In summary, I am not totally believing the Australian report, but I totally support your article and *LESSONS* derived and relayed to the aviation community. For what it is worth,,,,and thanks again for a great article.

Hi, Chris. I do not intend to discuss the merits of this specific investigation, or to cast doubt on how it was completed. I thought it a good reminder about the entire topic of pretakeoff checks. That's why I also mentioned the October 2014 KA200 crash in Wichita—the first flight after major repair and maintenance—and the A36TC event in which I was deposed. Thank you.

See https://app.ntsb.gov/pdfgenerator/ReportGeneratorFile.ashx?EventID=20141030X24112&AKey=1&RType=Final&IType=FA

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

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