FLYING LESSONS for October 19, 2017

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:

Two pilots I know, one an instructor, the other an experienced pilot receiving instruction in his high-performance single-engine airplane, began their takeoff roll. As the airplane accelerated the Pilot Receiving Instruction (PRI) noticed the control yoke pushing aft against his practiced inputs—it was moving more nose-up than normal. Continuing to accelerate, the unusual control pressure increased. The PRI added additional forward pressure on the wheel to prevent a premature liftoff.

At the normal liftoff speed the PRI relaxed some of the pressure. The airplane's nose pitched firmly up; the pilot pushed against the excessive nose-up tendency. ***"We have a problem,"*** he told his instructor.

Abort! The instructor commanded. The PRI immediately pulled the throttle to idle as he pushed the nose to a landing attitude. He landed the airplane smoothly and they taxied clear of the runway. Shutting down, they discussed the indications and began to investigate.

The elevator trim indicator was in the proper takeoff position. Exiting the airplane, however, the crew found that the elevator trim tabs were in the full Nose Up position. Moving either the manual trim wheel or the electric trim switches in the cockpit had no effect on the elevator trim—it was stuck fully Nose Up.

Just prior to the aborted takeoff, the PRI and instructor had practiced a simulated engine-failure glide to landing on the runway. In many airplane types, the elevator trim will be at or near the full Nose Up position at Best Glide airspeed in an engine-out glide. I recall my WWII-era instructor teaching me glides when he checked me out in my 1946 Cessna 120 in the early 1980s. His standard technique was to have me trim the nose all the way up and then keep the wings level with rudder alone (that was the WWII Navy technique for an emergency descent through clouds if trapped above an overcast also, he told me).

It's likely, as he trimmed the airplane for that power-off glide to a landing, that the PRI had trimmed his airplane to the full Nose Up position before touching down on the last landing before the aborted takeoff.

The instructor contacted a nearby mechanic who is an expert in the type of airplane owned by the PRI. The mechanic found that the trim system's turnbuckles had failed, jamming the trim tabs. The failure must have happened during the simulated engine failure. When the crew reset and verified the trim before the next takeoff the cockpit indications were right even though the actual trim position was radically wrong.

Most of the time we teach and talk about aborting takeoffs in the context of an engine failure during the ground roll or shortly after the airplane lifts off. That failure might be in the form of an unusual engine instrument indication—low fuel flow, high or low oil pressure, a temperature excursion—or in a perceived loss of power, partial or total.

There are other situations, however, when a takeoff abort is equally wise. A door or window comes open during the takeoff roll. A pilot (or even a passenger) seat slips out of position. An obstacle—a person, an animal, a vehicle, or another airplane—appears on the runway ahead. The airplane is difficult to control in a crosswind, or does not track the centerline for some other reason. Or as in the case of this week's *LESSON*, the controls simply do not feel right.

Every time you line up for takeoff, briefly review the takeoff abort procedure:

- ***Fly the airplane*** (whether in the air or on the ground),
- ***Reduce throttle to idle***,
- ***Maintain directional control*** until you come to a stop, and if necessary
- ***Shut down*** the engine(s) and ***evacuate*** the airplane.

It's natural for we pilots to try to figure out what's going wrong, so we can demonstrate our skill by responding to the abnormality. But trying to "fly through" a scenario like these pilots experienced is incredibly risky. **There's a *far better* way for us to exercise mastery of the airplane…to *get out* of the hazardous situation.**

Figuring out what's wrong, whether it be as simple as improperly set trim from failure to follow procedures, to as complicated and unusual as a jammed elevator trim system that appears to be entirely normal from cockpit indications, **can wait** until the airplane is stopped. In this particular case, the decision to immediately abort may well have saved two lives.

Kudos to the instructor for commanding the takeoff abort without pausing to gather more data, **and to the PRI** for executing the abort without question when the CFI called for it. That's the sign of a well-briefed instructional flight.

The *LESSON* from this event: be ready to make the **Abort!** call yourself, without help, any time *anything* seems wrong during and immediately after takeoff.

Comments? Questions? Let us learn from you, at mastery.flight.training@cox.net

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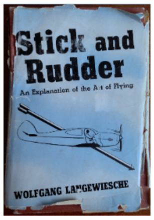
Debrief: Readers write about recent *FLYING LESSONS:*

Reader Alan Johnson asks:

> I enjoyed your notes and observations for the first three chapters of *Stick and Rudder*. Do you think you will continue sharing additional chapters soon?



Thank you for your interest, Alan. Yes, although I was unable to create a *FLYING LESSONS* report last week, I was able to post my Chapter 3 notes.

I am nearly complete with my Chapter 4 review, and plan to put them online by next week's *LESSONS.* Chapter 4 is especially interesting…author Wolfgang Langewiesche proposed Angle of Attack Indicators (AOAIs) in aircraft, and expresses interesting thoughts on the impact AOAIs might have not only on accident rates, but the training and medical requirements for pilots.

Watch the Mastery Flight Training website for updates, and for my notes and comments on Chapters 1-3, linked from the center of the home page.

See:
https://www.amazon.com/Stick-Rudder-Explanation-Art-Flying/dp/0070362408
http://www.mastery-flight-training.com/stickandruddernotesch3.pdf
www.mastery-flight-training.com

The most recent edition of *FLYING LESSONS* reported on dramatic, short-term increases in accident rates among professionally flown, turbine aircraft, and my cautionary tale about possible knee-jerk reaction to this increase before a clear trend is established. Reader Paul Sergeant agrees:

> I work peripherally to the "business jet" market, and one likely explanation for the rise in accidents is that there are simply more private jets and turboprops, flying more hours with the rise of partial ownership and sharing (e.g. NetJets) as an alternative to airline flying, which has become more and more difficult, time consuming and uncomfortable. The other likely reason is that **the sample size [of accidents] is too small, making yearly results susceptible to random fluctuations**.
>
> Private turbine aircraft used to be a relatively rare phenomenon, even at airports like Addison [Texas] or White Plains [New York]. Now most "high net worth individuals", those with net worth greater than $10 million, own a share of one or rent them online like a taxi. There's more and more of those people, about 4.5 million in the USA, a similar number in Europe, and a quickly increasing number in the developing world such as in China. There are currently about 15,000 private turbojets in the USA, and almost that amount in the rest of the world. The market for $2 million, 8-seat single engine turboprops is growing rapidly. Doctors and executives used to buy V-tail Bonanzas, then Cirri, now they buy Piper M500 Turbo Mirages and TBMs. My daughter's boyfriend's father is a doctor, and the whole family went skiing last January. How did they travel? In his part-share owned Beechjet. **I don't think the rise in accidents, fatal and non-fatal, in 2017 year-to-date represents anything more than a temporary blip**, combined with more hours being flown as a whole.

Somewhere along the way I learned a philosophy: *one* ***event is an anomaly,*** **two** ***is a coincidence, and*** **three** ***is a trend***. I feel that it will take three consecutive years of a major increase in turbine-powered airplane crashes before we can declare it a real trend that needs special attention.

True, part of the increase may be due to an overall increase in the exposure to threat, i.e., more turbine airplanes flying. Also, I agree that the expansion of the owner-flown turbine market, which has a much higher historical accident rate than professionally flown airplanes, is undoubtedly going to become reflected in the rate of turbine airplane crashes. It's likely, however, that the 43% increase in fatal accidents in turboprop and jet airplanes is an anomaly…at least as far as we currently can tell.

I'd like to see a distinction between owner-flown and professionally flown single-pilot turbine aircraft in NTSB reports, and a separation of single-pilot turbine reports from those flown by multiplied crews. The results could better direct training and risk mitigation efforts in the turbine fleet. Thanks for your insights, Paul.

See http://www.mastery-flight-training.com/20171005-flying-lessons.pdf

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

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CO Season

As cooler weather approaches for readers in the northern hemisphere, the U.S. National Transportation Safety Board (NTSB) has issued *Safety Alert 070: Prevent Carbon Monoxide Poisoning*. This document warns:

> **Carbon monoxide (CO)** is a colorless, odorless, tasteless gas by-product of internal combustion engines found in exhaust gases. Sufficiently high levels of CO in the bloodstream will lead to oxygen starvation and the onset of symptoms (such as headaches, drowsiness, nausea, or shortness of breath).
>
> Many internal combustion engine airplanes are heated by air that has been warmed by circulating air around the exhaust system using a heater shroud. **A defect or leak in the exhaust pipes or muffler can introduce CO into the cockpit.**
>
> Cracks in exhaust/heater mufflers and tubes and unplugged holes in the firewall can go unnoticed during inspections and lead to CO entering an airplane's cabin during flight. Degraded door and window seals or leaks in the air ducting can also allow CO into the cabin.

The *Safety Alert* goes on to cite sample CO-related NTSB investigations, and to suggest things you can do to prevent carbon monoxide poisoning. Read NTSB *Safety Alert 070*.

See https://ntsb.gov/safety/safety-alerts/Documents/SA-070.pdf

Visual Best Practices

Prompted by the July 7, 2017 Air Canada event at San Francisco International Airport, when the crew of an arriving jet mistakenly aligned with a crowded taxiway and not the runway for which it was cleared, the U.S. Federal Aviation Administration has released Safety Alert for Operators (SAFO) 17010. "This SAFO," it states, "provides some best practices for accomplishing [a visual] approach and landing on the correct airport surface."

Although SAFO 17010 is intended for airline crews, its recommendations are applicable to single-pilot operators of non-commercial airplanes as well. Take a look—and see what *you* can do to avoid lining up on the wrong surface for landing.

See https://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo/all_safos/media/2017/SAFO17010.pdf

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Thomas P. Turner, M.S. Aviation Safety
Flight Instructor Hall of Fame 2015 Inductee
2010 National FAA Safety Team Representative of the Year
2008 FAA Central Region CFI of the Year
Three-time Master CFI