FLYING LESSONS for November 17, 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.

FLYING LESSONS is an independent product of MASTERY FLIGHT TRAINING, INC. www.mastery-flight-training.com

This week's lessons:

Additional engines were first added to airplanes to boost their load-carrying capability. Engine-out safety was a much later afterthought; before the development of the full-feathering propeller, an engine failure was almost always an automatic forced landing (the same as in a single-engine airplane, albeit with a greatly extended glide range from the remaining engine). As late as the Second World War, many training and utility twins still did not have feathering propellers—lose an engine, lower the nose to keep the speed up, and use the maximum remaining power to make to a field.

Although now almost all twins have "featherable" propellers and therefore the option (under at least some conditions) of continued flight with one engine shut down. Although payload is still greatly increased with the increase in horsepower (compare the maximum gross weights of a Piper Saratoga vs. a Seneca, a Beech A36 Bonanza vs. a 58 Baron, or a Piper Comanche vs. a Twin Comanche, all essentially the same airframes with a single- and twin-engine variant), today's pilot considers a twin for its engine-out safety, and airplane salespeople tout the added safety of a multiengine airplane.

It's true that the "extra engine" provides a great increase in safety, not only from the engine itself, but also from the redundant electrical, pneumatic and hydraulic systems that often accompany it. With great power comes great responsibility, however, and in the case of a multiengine airplane that responsibility comes in the form of an added commitment to training and proficiency on the part of the pilot.

In my days as a simulator instructor (more correctly, it was a "flight training device") I found a pilot's performance with engine anomalies and failures was very predictable. Almost universally, regardless of the pilot's background and the frequency of his/her routine flying, the pilot who attended the week-long program (eight simulator hours) for the first time needed significant work to get up to Practical Test Standards (PTS) performance when given an engine failure, especially during or soon after takeoff. Pilots who had attended simulator-based training before but no more frequently that once per year generally could get back to PTS-tolerance performance (i.e., the minimum acceptable when earning the multiengine rating) during the course of a three-day refresher (six simulator hours)…but probably would not have been ready for a real engine failure close to the ground if it had happened on their flight to the simulator center.

It was the twin pilot who trained in simulators every six to nine months, in my experience, who showed up able to fly to PTS on the first simulator "flight." These pilots were prepared not just to "knock off the rust" and get back up to minimum standards in a three day refresher, but were able to learn something new and show steady improvement from one refresher course to the next.

The chilling thing is that after I left the "sim school" but began returning as a customer a few years later, I found the same rule applied to me even though I was flying 250 or more twin-engine hours a year.

In other words, the safety advantage in a twin-engine airplane is a direct function of how much emphasis the pilot puts on challenging, no-holds-barred instruction.

The danger, though, is that the very situations that call for our greatest expertise as multiengine pilots are the ones we cannot safely simulate in an airplane. Rapid engine failures in low speed/high power conditions (i.e., on the takeoff roll) and most critically when combined with a high angle of attack (initial takeoff, balked landing or missed approach) are simply suicidal in airplanes (and arguably homicidal, if you're the instructor setting up the scenario).

We have rules and recommendations specially designed to keep us out of these high-risk situations. Simulated engine failures are generally supposed to be conducted at or above 3000 feet AGL. V_{MCA} demos, which put us at the very edge of the low speed/high power/high angle of attack envelope, *must* be performed above that height, and entered into at a slow, measured rate of deceleration.

Most multiengine airplanes have a published V_{SSE}, or Minimum Safe Single-Engine speed (the minimum speed at which to simulate an engine failure in flight, usually 10 knots above Vmc). Section II Area X Task B of the FAA's Private Pilot (Multiengine) Practical Test Standards notes that "Engine failure (simulated) shall be accomplished before reaching 50 percent of the calculated VMC" on takeoff.

It's all about having enough airflow over the control surfaces to give them enough authority to counter the yaw, roll and pitch excursions brought on by asymmetric thrust.

Except with turbocharged engines, the power of an engine even at full throttle at 3000 feet MSL will be about 10% less than the same engine at sea level. Considering an airplane in a training configuration (two aboard, forward center of gravity) will have much more control authority than the same airplane at a rearward center of gravity under otherwise identical conditions, the engine-out drill we almost always practice is good at presenting and reviewing the *procedure* to follow is an engine quits closer to the ground, but it does not reproduce the *rate of departure from controlled flight* that the pilot would experience at lower altitude and especially at a loaded, more rearward center of gravity. Add to that a "surprise" engine failure "for real," and the psychological factor of seeing the ground close up.

Practice engine "cuts" at speeds between 50% of V_{MCA} and "blue line," or V_{YSE}, speed, are best left for practice in simulators and Flight Training Devices. True, most FTDs do not accurately represent the airplane's layout or precise handling. However, most will reproduce a more realistic rate of departure from controlled flight with an engine failure at low speed, low altitude and high angle of attack. They're the best training devices we've got for this kind of work.

Certainly it's been my experience as a simulator instructor and then later a simulator student at the same facility, that it takes frequent training if you are to avoid the additional potential hazards of engine failure in a twin-engine airplane, and are able to benefit from an *increase* in safety when flying between, instead of behind, your powerplant.

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

Every little bit helps cover the expenses of keeping *FLYING LESSONS* online. Please support *FLYING LESSONS* at www.mastery-flight-training.com. Thank you, generous supporters!

TEXAS/OKLAHOMA Pilots: *FLYING LESSONS* is coming to Denton, Texas the first Saturday of December for the fourth straight year, with *FLYING LESSONS: The Deciding Factor* on Saturday, December 3rd. This day-long event has sold out

every year, with 25 seats available (several have already sold). See this announcement for more information about this new presentation, and to pre-register for *FLYING LESSONS* at Denton, Texas (KDTO).

See http://www.mastery-flight-training.com/masteryflight_groundschoolt.pdf

---

Debrief: Readers write about recent *FLYING LESSONS:*

Regarding last week's *LESSONS* about the limitations of traffic avoidance systems, reader and aviation safety evangelist Michael Baum writes:

> Your concern about gliders without transponders is way on target! While it may have been acceptable when transponders drew piles of current, this is no longer the case.
>
> Separately, on the day I completed my glider rating and then departed in my 'Toga, I radioed the glider tow plane which I saw descending to land to communicate that his transponder was not functioning. The tow pilot casually informed me that the tow plane *never* have a transponder! And I had used that tow plane for ***all*** of my glider training!
>
> You may recollect the following Sample Recommended Practices in the *Glider Aviators Model Code of Conduct (GAMCC)*:
>
> - Listen and be heard. Monitor applicable frequencies to remain aware of the location of other aircraft, and concisely inform other pilots of your position and intentions. Doing so is particularly important in gliders and towplanes that are not transponder-equipped.
> - Always use a transponder with altitude encoding if equipped and operable unless otherwise authorized or directed by ATC.
> - And, GAMCC Section VI.c: *"***for gliders and towplanes, use transponders.**

See www.secureav.com/Glider-Listings-Page.html

Thanks, Michael. Recall the item about gliders and transponders came from reader Jim Herd.

Frequent Debriefer Woodie Diamond touches on an oft-overlooked aspect of risk management: ***is the pilot emotionally ready for the flight?*** With Woodie's open invitation for me to use his emails for pilot education, I relate his personal yet instructional revelation:

> I was sitting here doing some advance flight planning for a trip that I have to make (don't want to make) next week, and thought I would share a dilemma with you that directly involves aviation safety.
>
> Recently I lost a very dear friend of mine to a suicide bomber in Afghanistan. Actually, Dave was more like a brother than a friend. Since that time I have been overwhelmed with my usual responsibilities of raising two children, and new tasks of helping his family with arrangements and whatnot. Keeping busy during these times of loss is a good distraction, but doesn't readily provide time for individual grieving.
>
> The funeral is being held next week in Houston, and his family is most earnest that the children and I attend and speak at the ceremony. Obviously I also wish to be there. With last minute tickets on an airline very expensive, and the inconvenience of dragging two young children through the airline traveling process, flying ourselves makes perfect sense. However, there are additional considerations that I've been thinking about.
>
> Thanks to my very first "real" flight instructor, the very first item on my pre-flight checklist (actually written on the sheet) is: "Is the pilot ready for the flight?" You have to admit, that this item is too often overlooked or ignored during the pre-flight preparation process.
>
> So what does that mean, "Is the pilot ready for the flight?" For most, if not all, the most obvious interpretation is whether the pilot is "physically" prepared and capable of safely making the flight. Is the pilot currently taking any type of medication that would alter his judgment and/or physical alertness? Is the pilot suffering from any type of ailment, such as the flu, common cold, infection, etc., that by the very nature of the illness lessons his/her ability to focus solely on the operation of the aircraft?
>
> I am willing to bet that seldom, if ever, does a pilot ask whether he/she is "emotionally" prepared for the flight. Has there been a dramatic event in the pilot's life, additional family or business stresses, that will distract his/her focus before or during the flight? Losing an engine over inhospitable terrain is a bad time to be worrying about making that big sale, getting the contract signed, losing your job, or in my case, grieving over a lost loved one.

Thank you very much, Woodie, for caring enough to let us learn from your experience. I'm very sorry for the loss of your friend…and know from more recent communications that you had a safe flight out and a good trip back home.

As always, readers, tell us what you think, at mastery.flight.training@cox.net.

The second most common cause of death in general aviation airplanes is **Loss of Control During Initial Climb**, usually right after takeoff. Reader David Heberling, a welcome collaborator on the Top 10 discussion, writes:

I can identify with scenario #1 as I have had to do this kind of takeoff numerous times during my career as a pilot. It is well known that taking off over a featureless area such as a lake or ocean on a dark night is almost impossible to do without utilizing your instrument flying skills. It is very hard to discern the horizon under such conditions. The pilot in this scenario probably did not even realize he was in trouble until he impacted the lake. Seat of the pants flying has its place, but this kind of takeoff is not one of them. VFR only pilots should have enough instrument flying skills to be able to do this kind of takeoff safely. They also come in handy when doing that 180 after inadvertently flying into instrument conditions. The danger here is that those very skills might embolden some VFR only pilots to fly in the clouds when they should not be. As an aside, consider the River Visual Approach to Runway 19 at Reagan National Airport in Washington, DC. This approach requires the pilot to make a large turn to final close to the river (about 400 feet). While it is one of my favorite approaches, this turn is challenging especially with a wind out of the west or southwest. A light GA airplane could negotiate this turn without nary a thought. However at the speeds airliners use, it keeps us on our toes. Add doing this at night and the challenge is even greater.

Scenario #2. Distractions. They can be a real killer. Do not let yourself be distracted from the business of flying the airplane. In this case one has to wonder what that pilot was thinking. If he was having difficulty with the canopy on the ground, how was this going to become better in the air? I have no idea how the canopy worked on this airplane (i.e. lifting from the front, or from the side). Even though it kills many pilots, a door open in flight is a non-issue, just noisy. A canopy open in flight can have aerodynamic consequences.

Scenario #4. Ah, maneuvering an airplane close to the ground. You have to love the carefree attitude some pilots take to this kind of flying. The low altitude means that there is little margin for error. Steep banks are a no-no because the risk of an accelerated stall are too great. If the pilot sticks with only flying the airplane he has a greater likelihood of keeping the airplane flying and in one piece. If the pilot insists on sightseeing too, then no one is flying the airplane.

Scenario #5. One would think that when contemplating flying in an airplane you have never flown before and in a type that does not allow instruction, you would proceed with caution. Just think how professional test pilots approach their job. They proceed slowly, with an abundance of caution and in measured steps. This pilot was in way over his head with no idea how to proceed in a safe manner. The steep turn close to the ground sealed his fate.

Thanks, Dave. I'll be putting together some suggestions for an upcoming issue of *FLYING LESSONS* before we move on to the most common cause of fatal general aviation accidents.

Still have something to say? Hit me at mastery.flight.training@cox.net.

Next week is Thanksgiving, and many *FLYING LESSONS* readers will take advantage of their unique abilities as pilots to travel to be with family and friends. Have a great time, and don't paint yourself into any scheduling corners that make you feel you "have to get there" (or "have to get home"), and don't box yourself into any weather conditions or mechanical situations that tempt you to fly outside your personal bubble of hazard avoidance. Remember, *flying has risks…choose wisely*.

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