



FLYING LESSONS for April 4, 2013

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.

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This week's lessons:

Last week I gave [part one of my answer](#) to a reader's very introspective comment:

I don't see a clear path to safe, happy flying, [and] that's what I'm looking for...[a] simple, clear-cut path, i.e. a one page syllabus that guarantees safe flying. The carriers guarantee safe flying for their passengers. If I am going to be flying people I should be able to provide the same assurances.

See www.mastery-flight-training.com/20130328flying_lessons.pdf

There is nothing that *guarantees* safe flying, even by the airlines. Pilots, mechanics and dispatchers have to work hard on managing risk for every flight, every day. By doing so we have enjoyed unprecedented levels of "safety," (i.e., the absence of crashes) in air carrier operations in the past decade, in the U.S. and around the world. The few high profile crashes that do occur ([Air France 447](#), [Colgan 3407](#)) remind us of the dangers, and the heroic escapes ([Qantas 32](#), [US Airways 1549](#)) detail the high level of readiness necessary to handle unusual circumstances that may arise at any time.

See:

www.bing.com/videos/search?q=air+france+447&mid=3437F9C594960F52DEC23437F9C594960F52DEC2&view=detail&FORM=VIRE4
<http://www.youtube.com/watch?v=lxwEE1kK6I>

Answering the reader's question in a short list of recommendations appropriate to the single-pilot operator of a general aviation airplane turns out to be a harder chore than I anticipated. There are so many things I think contribute to a level of *appropriately managed risk* ("safety," by a more correct and descriptive name).

Compelled to try, however, and with some working background of the nature of personal aviation accident causes, here is Part 2 of what I offer. Some of these suggestions may sound overly conservative. But I bet the pilots who crashed in the events these rules suggest thought they could get away with it too. First, some general tenets:

1. **Know what the airplane is...and isn't.** The airplane you're flying may have extraordinary avionics and equipment, but it is *not* an airliner. It is a recreational and business tool. It has not been designed, tested, certificated or maintained to the same level as an air carrier aircraft. It doesn't have the performance or redundancy of an airliner. It is very safe and very capable...*if* it's flown within its limitations.
2. **Know what you are...and aren't.** You are probably not an air carrier pilot. Even if you are, or have been at one time or another, your air carrier experience does not fully prepare you for the workload of single-pilot operations in a less capable airplane. You almost certainly do not get the level of initial and recurrent training in light airplane single-pilot operations that an airline pilot routinely receives. You won't be able to do everything alone that you could do in a jet airliner. This is doubly true if you are a retired airline pilot, because like it or not, age takes its toll on endurance, reaction time and cognitive ability.
3. **Know and evaluate the environment.** By far, the most common reason for airline delays is adverse weather. Your airplane is less capable to handle adverse weather than an air carrier airplane. Consequently, you will need to delay, divert or cancel flights more

frequently than the airlines. I flew Beech Barons 250-300 hours a year for several years in the U.S. Southeast, and I routinely diverted around weather, landed at an alternate to sit out the weather, missed approaches “for real,” parked myself in holding patterns for showers to move on or fog to finish clearing, and canceled a trip and drove a rental car home because of long-lasting weather hazards.

If you are the person who sets the schedule for events or meetings that create the need for your trip, or if there are adverse repercussions or lost revenue if you have to delay or cancel a flight, then plan to depart in time to delay, divert or cancel and make it to your commitment by other means if necessary. This is especially true for the trip back home, when you generally have more pressure to arrive on schedule. This sometimes means traveling to your destination a day earlier, or cutting your trip a day or two short if the forecasts show the weather may close in on the last day of your vacation. The old adage is spot on: “Time to spare, go by air.”

4. **Fulfill your roles.** You are pilot-in-command. You are also Dispatcher and the Director of Maintenance. You are the aviation medical examiner, responsible for self-certification before and during flight. Plan each flight consciously thinking about the responsibility of all four of these roles. To paraphrase a self-help cliché, “if it’s to do, it’s up to you.” Flying a cross-country aircraft is a profession, whether it’s your chosen or compensated profession or not. It requires the time and study and practice of a second job.

Now, for some specific recommendations, based on actual mishap history in the order of most to least likely cause of a fatal crash:

- **Put time into training.** One hour of flight instruction every two years (the regulatory requirement under U.S. rules) is not nearly enough to grow in the profession of flying. The less you fly, the more you need to train. A corollary to this, however, is that more flying time does not by itself replace the need to train. Two hundred hours of point A to point B probably won’t protect you if an engine-driven fuel pump dies close to the ground, or if the weather moves in faster than forecast and low-level wind shear affects everywhere within the airplane’s fueled range. Two hours of solid practice and/or instruction of some sort three times a year is probably a better measure of the prepared pilot, *if* that time is spent on things like...
- **Get very comfortable with angle of attack and stalls.** Loss of control (“LOC”) is a hot item because it is the cause of over 40% of all fatal general aviation events in the approach and landing phase of flight (General Aviation Joint Steering Committee [Loss of Control Working Group report](#), published this week). Although aeromedical factors and partial panel flight are included, LOC is in most cases a euphemism for “stall.”
See www.aopa.org/advocacy/articles/2013/130327safety-committees-report-focuses-on-loss-of-control-ac.html?CMP=News:S1RM
- **Hand-fly the airplane—a lot.** Fatal crashes often resulting from a pilot’s inability to hand-fly the airplane in the event of an autopilot disconnect or failure. Air Safety Investigator (and *FLYING LESSONS* reader) Jeff Edwards points out a trend of pilots losing control immediately upon a trim runaway or autopilot disconnect, when the pilot must instantly transition from automated flight to hand-flying with an airplane that is radically out of trim as a result of the failure mode.
- **Practice partial panel.** A couple hours of partial panel flying may be worth more than a panel full of backup instruments. The hard part, however, is identification of a partial panel situation in the first place. Unless this has actually happened to you at night or in IMC (and you bucked the odds by surviving your first encounter), the only way to experience this realistically is in a flight training device or simulator.
- **Maintain mode awareness.** The corollary to hand-flying is to be adept at the operation of your avionics and autopilot, so there’s never any doubt about the mode in which it’s operating, or what the equipment is going to do next.

- **Maintain situational awareness.** NTSB says the rate of Controlled Flight Into Terrain (CFIT) is declining noticeably, which the Board attributes to the almost universal availability of at least some type of moving map display (and to a far lesser extent synthetic vision, because extremely few airplanes have this equipment yet). That said, CFIT continues to be a problem, especially at night and during visual approaches in marginal visibility. A corollary: intentional low-altitude flight (“buzzing”) I recently spent some time with a pilot’s group in Australia, and I can’t tell you how many times in a two-day period I heard pilots mention the LSA...the Lowest Safe Altitude for any given point on the charts. VFR or IFR, always knowing the lowest safe altitude is drilled into pilots Down Under, and the rest of us can learn from that example.
- **Know your EPs.** EPs, for Emergency Procedures, at those airplane attitudes, configurations (flap and landing gear positions, etc.) airspeeds, angles of attack and checklist procedures for abnormal conditions or catastrophic failures. Why are airline operations so safe? In large part it’s because the crews are required to perform on EPs in simulated scenarios every six months, so when an actual abnormality or emergency arises (which almost never “textbook” as presented in the simulator) the pilots have a recent wealth of experience with which to correlate to the situation at hand. If you’ve not been practicing and reviewing EPs regularly, you won’t be ready on the unlikely but far from impossible day an actual emergency occurs.
- **Don’t push it with fuel.** It seems to be in vogue to talk about flying maximum range, requiring running all but your last tank dry and the last tank down to minimum fuel. Far too many people have died trying to make it home because that’s where the cheaper fuel was, or stretched the airplane’s range to its limits to avoid the inconvenience of a stop or simply to have a story to tell or chat about online. When one tank is down to 1/8 full and the other is at 1/4, it’s time to be inbound on the approach or entering the traffic pattern. Recall that a great many fuel exhaustion mishaps happen within five miles of the intended destination—the pilot *thought* he could make it.
- **Consider weighty matters.** Calculating aircraft weight and balance isn’t a training exercise that only applies for checkrides and flight reviews. You need to know your airplane is loaded within its control and performance flight envelope at all times. An overweight airplane or one loaded at or beyond its design capability will be harder to control under abnormal situations, and perform less well when other conditions (density altitude, wind, etc.) adversely affect the aircraft. Except in fuel as needed for endurance, fly at the lowest weight that meets the trip requirements—the lighter the airplane the better it will perform, and the more options you’ll have in an emergency.
- **Stay within limitations.** This means the airplane’s limitations (there’s no such thing as “a little overweight” or “a little over redline”). It means the weather limitations (no flying through “a little thunderstorm” or “a trace of ice,” or flying “a little lower” to find the runway on approach to your home airport). It means your limitations (certificates, ratings, and currency). If you allow yourself to “fudge” the limitations, human nature says it’s likely you’ll soon be accepting more and more risk as “creeping normalcy” or (as reader Tony Kern says, “normalization of risk”) sets in, and what was once unacceptable has gradually become your norm. It means the mechanical limitations. Follow the FARs about required equipment and inoperative equipment. Get familiar with the airplane’s Kinds of Operation and Equipment Limitations (KOEL chart) if one exists for the aircraft.

The Federal Air Regulations (or those of your home country) are a *minimum* standard...the very edge of appropriately managed risk. Where limitations are concerned, “no means no.”
- **Employ SOPs.** Standard Operating Procedures (SOPs) are the normal way you do things. Strive to take off and climb, fly an approach, and make your landings as close to the same way every time. This eliminates most of the decisions (actually not eliminated, just decided ahead of time), and permits you to more easily detect and act upon variables like wind, traffic, equipment issues and other factors—you’re not so busy with the basics

of flying that you have no mental bandwidth for external variables. Knowing and using SOPs has one other advantage as well—in the very unusual case you need to do something different from your SOP, you'll know what “good” is and be better able to judge how what you're actually doing compared to your expectations and needs.

- **Fly stabilized.** Unstabilized approaches, those where the airspeed, power and airplane configuration do not conform to an established and nearly uniform SOPs for the final approach segment until the flare, commonly correlate to airport environment crashes. Further, know and use the same power, attitude and configuration cues for approach every time, and on final approach ask yourself three things:
 - Is the airplane on speed ($V_{ref} +5$ knots -0 knots) at the proper rate of descent (usually 500 to 750 feet per minute, except in an obstacle landing)?
 - Is the airplane on target (proceeding at the proper attitude and glide path to touch down at 1000 feet from the runway threshold or in the first third of the runway, whichever is shorter)?
 - Is the airplane in configuration (flaps and gear set correctly, power and attitude as expected

If any answer is “no” when you're within, say, 500 feet of the ground, go around, set up properly and try again.

- **Get real about fatigue.** Pilot fatigue is one of the great unknowns of general aviation air crash investigation. Yet even more so than in highly regimented airline operations, with maximum duty days and mandated sleep periods and time off, nothing stands between the pilot and command and his or her own judgment of their fatigue state. If you're a morning person, don't fly after work. If you dance or work the night away, don't plan on an 0600 departure. A Friday evening trip after a long work week, or a Sunday afternoon flight home after a whirlwind vacation or active vacation trip, is setting you up for bad decision-making...which we all know is a factor in as much as 80% of all general aviation crashes. Even more challenging: evaluate not only how you feel for departure, but predict how you're likely to feel and perform three hours later after bouncing around in turbulence or solid in IMC or at high altitude at reduced cabin pressure or on supplemental oxygen.
- **Involve your family and passengers.** Teach your family (whether they're riding with you, or just expecting you to be somewhere at some specific time) and your passengers what it is you're looking for when you gather information and make informed decisions about appropriately managed risks. Ask them to concur with your go/no-go decision, and give them the power to cancel or delay a flight, or divert it while en route. Often it's pressure from family or the passengers that leads a pilot to accept an unacceptable level of risk, usually because nonpilots have no idea what conditions you require to safely complete a flight. If those around you have some basic understanding of what is acceptable, and what is not, you may find you're under far less pressure to “go” into conditions that would normally cause you to decide against it.
- **Maintain your airplane.** Normally it's decision-making that results in a crash. Sometimes things do break, however. The failure may not be complete, but the status and reduced capability will demand more of the pilot's attention, making it harder to appropriately manage risk in other areas. Pilots and airplane owners tend to interchange the words “maintenance” and “repair,” but there is a vital distinction. One is to keep things from breaking, the other is to fix it once it's broken. Think about what “maintain-ance” means. It is something you do routinely, before something breaks or fails, to *maintain* the current level of system fidelity and functionality. It may be “safe” (appropriately managed risk) to defer some maintenance tasks for a time, assuming that you step up the intensity and frequency of inspections to confirm the item has not yet showing signs of imminent failure.

Going beyond recommended Time Before Overhaul of an engine or a landing gear motor, for example, may be safe (if it's legal for your operation under the rules of its governing authority), but you'll have more down time and spend more money to properly confirm it remains safe until the time comes you indeed do overhaul or replace. Continuing to defer the maintenance task will soon reach a point of diminishing returns, when the cost of more frequent and intrusive inspections could have been folded into the cost of the overhaul or replacement you know you'll eventually need.

OK, that's a lot more than a one-page synopsis of rules for assuring a level of general aviation "safely" on par with that of commercial airlines. I absolutely promise that the very next issue of *FLYING LESSONS* will contain the one-page suggested syllabus the reader requests, that is aimed at achieving this level of safety. The good news is, however, that in the process of creating this tome on appropriately managed risk, I've reaffirmed that general aviation can indeed be "safe" because, with a little discipline and practice, it is quite possible to appropriately manage the risk and still complete most of your trips near your originally intended schedule (say, on the same day as originally planned). So bear with me for one more wait...for a very reasonable pilot training regimen to help you establish and maintain (there's that word again) that appropriate level of risk management.

What do you think? Let us know, at Mastery.flight.training@cox.net



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Debrief: Readers write about recent *FLYING LESSONS*:

Lyn Gray is a flight instructor I met last month in Australia, who specializes in teaching in the growing number of glass-cockpit Beechcraft Bonanzas in her country. Lyn attended my program at Cowra, New South Wales, and now subscribes to *FLYING LESSONS*. She writes:

G'day Tom,

Thanks for the welcome! There's always so much to learn in aviation, especially as an instructor and I gained lots of really useful teaching points from your presentation at Cowra!! I'll pass your *FLYING LESSONS* on to others in aviation and will encourage their subscription.

Where you have "freedom, choice and responsibility," as an instructor I use "determination, discipline and dedication". Happy landings,

Another great outlook on what's involved in being a good pilot. Thanks, Lyn.

Frequent Debrief, retired TWA intercontinental captain and enthusiastic general aviation pilot Tom Rosen writes about last week's *LESSON* about the relative risk of flying in light airplanes:

Your comparison between the safety of riding a motorcycle vs. flying an airplane got me thinking. While the accident records may in fact indicate a similar number of accidents per hour of operation, a closer look at the causes behind the numbers might prove to be thought provoking.

This analogy hits home because recently a friend lost his life after being taken out by a distracted teenage driver who crossed into his lane. He had been riding [motorcycles] over fifty years, and was considered by all to be at the top of his game from a safety practices standpoint. Yet the law of averages caught up with

him and apparently there was absolutely nothing he could have done about it short of not riding on two lane roads. I think we can all agree that this type of innocent victim being involved in a motorcycle accident happens quite often, and while it can be mitigated to some degree by defensive operating techniques, it cannot be eliminated except by selling the bike. So it becomes a roll of the dice.

On the other hand, **we aviators are almost always taken out by ourselves**. It's unusual for an airplane to be involved in an accident that is the result of something outside the control of the pilot. Perhaps 10 percent of the time the cause is a[n] unforeseen mechanical failure that leads to the accident, and considerably less often are we involved because of the actions of another pilot in the sky. **Usually the smoking gun ends up pointing to poor decision-making, a woeful lack of continuing training, or intentional disregard of the warning signs of a mechanical problem.**

So while flying, the outside influences on our accident rate are far less than while riding a motorcycle or even driving a car. We really don't have to worry about "the other guy" as much. We have to worry about ourselves. **We have to have a mind set that realizes, "I am the enemy when I flying my plane."** It's unusual but refreshing to see that your reader [the reader who asked the question that is the focus of this and last week's *LESSONS*—tt] seems to really get it, and wants to do what ever he can to reduce this risk.

Perhaps a **look at how the experts accomplish this reduction of risk** and now have the track record to prove that they are doing so, is simply to observe what the airlines have done and are doing. They **use equipment that is suitable for the task. They use experienced and highly trained pilots in command positions and they continue to train those pilots.** Airline pilots who have thousands of hours of experience and fly ten times or more hours each year than we recreational pilots do, are still **required to attend training AT LEAST once a year to remain current.** If they have to do this, it certainly stands to reason that we would benefit greatly from following the same program of continuing periodic training.

I wonder how many of the pilots reading this can say they regularly continue with their training? Have they recently (within the past year or two) gone flying with an instructor who is specialized in their aircraft? **I suggest that we light aircraft GA pilots would benefit greatly from training more often. We certainly need to accomplish it at least once a year.**

This is one big thing that we really do have within our control: that we can significantly impact in the reduction of risk of being involved in an accident that is a result of pilot error.

Brilliant, Tom! You've made the leap I'd been trying to achieve but not yet voiced—internal vs. external mishap causation. We can build on that, and have, in the answer to the reader's question in last week's, this week's and, as you'll see, next week's *FLYING LESSONS*. Thanks!

We had more Debrief material from last time, but I've found a correlation between exceeding six printed pages of material and the beginning of people unsubscribing from *FLYING LESSONS Weekly*. So I'll hold that reader mail and superb reader insights for next time...when I expect to have several comments about this week's *LESSONS* as well. Thanks again for waiting.

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NTSB Outreach

The U.S. National Transportation Safety Board (NTSB) recently announced publication of five additional Safety Alerts for pilots and mechanics that focus on the most frequent types of general aviation accidents.

"Because we investigate each of the 1,500 GA accidents that occur in the United States every year, we see the same types of accidents over and over again," said NTSB Chairman Deborah A.P. Hersman. "What's especially tragic is that so many of these accidents are entirely preventable." Each year, about 475 pilots and passengers are killed and hundreds more are seriously injured in GA accidents in the United States, which is why GA Safety is on the NTSB's Most Wanted List. (<http://go.usa.gov/28DF>)

The five Safety Alerts are:

- Is your aircraft talking to you? Listen!

- Reduced visual references require vigilance
- Avoid aerodynamic stalls at low altitude
- Mechanics: Manage risks to ensure safety
- Pilots: Manage risks to ensure safety

The NTSB will be creating a short video for each Safety Alert some time this spring. The videos will feature regional air safety investigators sharing their experiences and observations of the many accident investigations they conducted, as well as advice on how pilots and mechanics can avoid mistakes that can have such tragic consequences.

"GA is essentially an airline or maintenance operation of one, which puts the responsibility for sound decision making on one person's shoulders," Hersman said. "We are promoting and distributing the alerts to reach pilots and mechanics who can benefit from these lifesaving messages."

The five Safety Alerts, as well as others that have been issued since 2004, are available at http://www.nts.gov/safety/safety_alerts.html.

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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

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