



FLYING LESSONS for November 9, 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:

It's in the way that you use it, it comes and it goes
It's in the way that you use it, boy don't you know
And if you lie you will lose it, feelings will show
So don't you ever abuse it, don't let it go

- Eric Clapton

Listen: <https://www.youtube.com/watch?v=l0XQwazkx10>

The internet is abuzz, as it often is when a celebrity is involved, about the swift death of a well-known, retired sports figure in a new-to-him airplane. You know who I'm talking about. You've probably seen even the aviation media opining on the flight characteristics of the amphibious airplane involved, and the effect this crash—the second in type in only a few months for the fledgling manufacturer—may have on future sales and production.

Although the investigation has scarcely begun, its been widely quoted that the pilot posted on social media items like “flying the [airplane type] low over the water is like flying a fighter jet.” Video, also posted widely, shows the accident airplane stunting aggressively at very low altitude over the water before the fatal, high-speed impact.

The same type of aircraft has fatally crashed as a result of low-altitude flight before, flown by very experienced pilots at the time. It does not appear that there is necessarily anything wrong with the airplane design. ***It's in the way pilots use them*** that results in these crashes.

Other excellent airplane designs are regularly flown into the ground because pilots tried to use them in ways for they were not intended. How many perfectly good airplanes are destroyed, and their occupants killed, when a pilot attempts or continues [visual flight into known instrument meteorological conditions](#)? How many deaths result from [flying below minimums during an instrument approach](#)? How about pilots who attempt to fly through “[just a little ice](#),” or attempt to sneak in or out of an airport [just ahead of a thunderstorm](#)? Or those who [abdicate responsibility for their own actions](#), and cede command to someone outside the aircraft?

See:

<https://app.nts.gov/pdfgenerator/ReportGeneratorFile.ashx?EventID=20140211X72802&AKey=1&RTtype=Final&IType=LA>
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None of these woefully common accident scenarios is the fault of the airplane. They're all the fault of a pilot. So **don't you ever abuse** your aircraft. Don't take yourself, **don't let it go** where it's not designed to go, physically or operationally.

A staple of the extraordinarily low-accident world of professionally flown, turbine equipped corporate flight departments is the **independent safety audit**. Safety audits aren't perfect. But they do force pilots and managers to submit to scrutiny, and at least read and think about the *results* of the audit. There is no personal aviation auditor waiting to check out your one-person flight department.

Although this is really the function of flight instructors conducting Flight Reviews, Instrument Proficiency Checks and other recurrent training, **it's up to the individual to audit his or her own operation** to determine whether he/she is mastering the aircraft, the environment, and themselves. Even when an airplane is marketed by its manufacturer as an extreme-sports "flying jet ski" or an all-weather, no-cancellations travel machine, it's the flight instructor—and pilot examiners—who act as quality control on the results of training. And ultimately it's the pilot him/herself who is responsible **in the way that they use it**.

At the most basic your **personal audit** compares your actions to the minimum standards set in the regulations under which you fly, and the limitations placed on the airplane. You know the rules. They permit us to do wondrous things in airplanes. And they'll continue to do so for a very long time, if you stick with them.

It's as if flying isn't exciting and demanding enough, that we look for ways to make it more so. So many crashes happen because pilots seek to do something to make flying more stimulating, more of a "rush." *That* is the cause of so many completely avoidable crashes that snuff out so many lives. *That* is a category of air crashes that is 100%, entirely avoidable.

As you read reports of this recent, high-profile crash, and the many, many others you'll likely read and discuss in the months ahead, ask yourself: was the pilot intentionally doing something for which the airplane was not intended? Was the violation of standards so obvious that it *had* to be intentional? Was the pilot truly *commanding* the aircraft?

NTSB Chairman Robert Sumwalt summed it up at the recent [Bombardier Safety Standdown](#), quoting John Fenton: "You can fool the [safety] auditors, but you can never fool yourself." **If you lie you will lose it.**

See <http://www.safetystanddown.com/aviation-safety-seminars/united-states-2017>

To paraphrase Eric Clapton, **don't you ever abuse your aircraft. Don't let yourself go.**

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



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Debrief: Readers write about recent *FLYING LESSONS*:

Frequent Debriefer Robert Thorson writes about [recent LESSONS](#) on **oxygen altitudes**:

It seems ludicrous to me to fly a Mooney at FL250. The amount of time and fuel used to get to altitude is just a start. Get over weather or head winds? Myth. I never topped the trop[opause] in any jet from B-747, 757, 767 or GIV and saw a wind reduction. **No matter how much capability in an aircraft you have, beating the weather is a chess game** and not checkers. So pushing an unpressurized aircraft to the limit of its capabilities is very foolish and extremely risky.

The amount of knowledge and fiddling with additional gear to keep the oxygen flow correct is above the knowledge and focus level of most airmen. We are not in a B-17 in wartime conditions. We are not setting speed and endurance records. So why turn an average GA flight into a risky operation? If you want to save fuel on a trip you may find a 12,000-14,000 a better option. Just an old pilot speaking to the bold ones out there.

See <http://www.mastery-flight-training.com/20171026-flying-lessons.pdf>

I have flown and instructed in a lot of turbocharged (TC) and turbonormalized (TN) airplanes in my career. A few were pressurized twins, but most were unpressurized, single-engine airplanes. One of the big selling points of TC/TN aircraft is to “top the weather.” As you said, however, these airplanes can rarely overfly hazardous weather. The best they can do—and it is a big plus—is to fly high enough to get out of a general overcast layer, to be able to see large buildups that are otherwise obscured by the clouds so that they can fly visually *between* these hazards. My experience is that if this is going to be possible it can usually be done anywhere above about 10,000 feet.

Most of the pilots I know who have flown TC/TN airplanes for some time tend to fly them where you suggest, in the 12,000 – 15,000 foot range. Very few airplanes fly at these heights; either they stay lower or they zip up and down through them on the way to and from turbine altitudes. A lot of TC/TN pilots don't like to have to use supplemental oxygen (even though I recommend it above 10,000 feet), and/or they have passengers that don't like to stick oxygen hoses up their nostrils. Even many of the pressurized Beech Baron pilots I've flown with prefer the mid-teens for cruising altitudes, primarily (as you wrote) it just doesn't make sense to spend all the time to climb at very high fuel flow, then have to descend all the way back down again, over the length of a trip. I recall an NBAA study many years ago that showed that even in light turbines the average trip length is 250 miles. There's barely enough time to climb to the flight levels and down again in a TC/TN or light pressurized twin airplane over that distance.

However, I've found there is a subgroup of TC/TN pilots who appear to climb as high as possible because they like being up there. These are the folks who frequently tell others in hangars or at parties about other pilots or controllers being surprised that an airplane of their type is flying that high. Very early in my career I recall writing about how controllers were calling the turbocharged Bonanzas I flew “King Air”, and one time the captain of an airliner asked me “what are you doing up here?” on Center frequency. For some pilots flying in the Flight Levels may be more of an ego thing than an operational advantage.

The Mooney pilot may have had an unusual set of weather conditions coupled with a trip duration so long it made sense to fly at FL250. That would be a wildly unusual set of circumstances, but I can't rule it out. However (as I wrote in **oxygen altitudes**),

I recommend against flying solo above 20,000 feet. At those heights I'd like to have a second set of eyes watching me and the supplemental oxygen indicators.

Thanks, Robert.

Reader David Dewhurst, whose Wichita-based company Sabris Aviation specializes in acquisition and transition training primarily for buyers of pressurized twins and turboprops, adds:

Great article on the misfortune of the Mooney pilot. The problem is not limited to unpressurized flight, but the lessons are the same.

I was flying a Cessna 421 at FL250, at night, westbound over central Colorado mountains, when my ears popped. Hmm, that is not supposed to happen in a pressurized airplane. Checking the system, the cabin rate-of-climb (ROC) showed 500 FPM climb and the pressurization differential (DIF) showed 0.5" loss. OK, something is going wrong, **better get down now and fix it later**.

A call to Center with the information that we had a small pressurization problem and needed lower immediately received an immediate response. We were cleared to descend immediately, to advise when we knew altitude we wanted, and a reminder that the off route altitude (ORCA) in that area was 16,000 feet. We were going down about 2,000 FPM, no need for a big hurry.

Then it happened. The cabin completely dumped all pressurization. The cabin ROC pegged at 4,000 FPM, the cabin DIFF went to zero, and the cabin altitude was immediately at 22,000. OK, no problem. I have the oxygen mask hanging around my neck, just put it on and turn on the oxygen. I did that and had oxygen immediately – *for about 30 seconds*. **The oxygen system went from full to totally empty instantly.** Uh, now at FL210 with no pressurization and no oxygen. **Time for emergency descent**, about 5,000 FPM in this airplane.

Center noticed this and asked for status when able. **Time of useful consciousness increased rapidly with this rate of descent.** Level at 16,000 I was able to get about 2 PSI and a 12,000 ft. cabin. I reported to Center that were stable with some pressurization and continuing to destination. Center made the normal response confirming the plan. It was only at that point I realized that during the five minutes for this issue to unfold, on this normally busy frequency, no one said a thing. Only after we reported stable did the conversation continue. Everyone was looking out for us by keeping the frequency clear. Aviation really is a family.

Here are the *LESSONS* (in addition to your list):

- Whatever kind of oxygen system is available, frequently check it and its backup systems.
- Monitor the status of the system enroute.
- Practice emergency descents.
- If a problem occurs at altitude, get down first and fix the problem later.
- Be aware of how low a flight can be maintained. In mountainous areas, be aware of the change in the ORCA, where the Victor airways are located, and the minimum altitudes for them.
- Go through an altitude chamber session.

Excellent additions, Dave. Thank you.

Reader Ron Apfelbaum continues the discussion:

This is a timely and important topic. As a former USAF/Air National Guard Flight surgeon (22 yrs), a former FAA AME [Aviation Medical Examiner], and a former Mooney 231/252 owner for 20+, years I would offer a few observations:

The O₂ system in the 231/252 (Mooney 20K) has the O₂ bottle behind the cargo area bulkhead where it cannot be observed on a routing preflight. O₂ from the tank is piped to outlets and a pressure gauge near the pilot's left armrest. The control to initiate O₂ flow is in the same area but I don't recall if this actuated a remote shut off at the tank or locally at the region of the pressure gauge. In any case **the pilot still would have an indication of the tank being depleted** by the low or absent pressure on the gauge. In addition to the flow indicators on the tubing, some systems such as the Mountain High controller also have alarms that will alert the pilot to low O₂ flows or failure to breathe regularly.

Beyond this **there are physical clues to hypoxia** such as blue nail beds, rapid breathing, tingling around the mouth, etc. But **these vary a lot from individual to individual, as does their tolerances of hypoxia at various altitudes.**

Which brings me to this point: The USAF has offered opportunities for civilians to take a one day O₂/hypoxia course including exposure to hypoxia in one of their altitude chambers. This used to be required of their aircrews every 3 years. This is really valuable as **it teaches one what their own specific hypoxia symptoms** are and hopefully will allow them to recognize them early. A frequent and very dramatic symptom is a sense of euphoria and the **inability to recognize when they are making cognitive errors**. It is shocking when the participant, without their O₂ mask on, is doing simple tasks like drawing a square or adding single digits and the observer (who has his mask on) replaces the mask on the participant. At first they question why since they are sure they are doing fine and then after a few breaths are shocked to see that they were writing unintelligible gibberish and they weren't aware of it!

If this training is still available I highly recommend it to all pilots flying unpressurized aircraft above 16-18,000 ft. Perhaps that could have averted this tragic outcome.

For myself, while I am old enough now that I have moved to "low and slow" flying in an experimental Super Cub-type plane, there are still times when I fly in the low to mid teens because I fly in mountainous terrain, or am looking for more favorable winds. I have taken to using supplemental O₂ from a small portable system whenever I'm over 8,000 ft MSL. I check my O₂ saturation with a pulse oximeter and adjust the system to keep it at or above 90%. While I do not notice any significant symptoms of hypoxia at these altitude, I find, subjectively, that **I feel less fatigued** after a long flight. Hopefully I am also helping to preserve what remaining neurons I still have functioning!

Thank you, Ron. I took the physiological training and altitude chamber "ride" at the FAA's Oklahoma City facility many years ago. My personal symptom of the onset of hypoxia is that my feet feel hot. Given the performance of a typical single-engine airplane's heater system at **oxygen altitudes**, it's a good bet that if my feet are hot it's *not* because I have the cabin heat cranked up too high.

The FAA's Civil Aerospace Medical Institute (CAMI) still holds physiological training including experience in the hypobaric ("altitude") chamber in Oklahoma City. I've not found information online about civilian access to military or other government programs; readers, let me know if you can confirm a location currently open to civil aviators, including links or contact information, and I'll pass it along. [The FAA/CAMI program is described here](#). FAA Advisory Circular [\(AC\) 61-107B](#) provides excellent information about high altitude training and physiology as well.

See:

https://www.faa.gov/pilots/training/airman_education/aerospace_physiology/

https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_61-107B_CHG_1_FAA.pdf

I'll keep the next reader anonymous, although the writer did not specifically ask I do so.

My name is [X] and I live [X]. I am interested in signing up for your flight training lessons, as per this sign up link from your website.

I left the airline industry for a non-flying combat tour supporting EOD bomb forensics back in 2008 - 2009. Upon returning from Iraq I decided to ground myself, which I still stand by as a sound decision. Staying in flying at the time would have potentially been a poor and selfish human factors related decision. Since then, I have added a second masters degree from ERAU and teach part-time at a brick-n-mortar college as an Adjunct-Professor. Very rewarding!

I just printed up your first three chapters of the book, *Stick and Rudder*. After a long hiatus from the airlines; the flying bug has bitten me again. I credit this to finding your extremely focused and effective note writing style from the mentioned book. **SOMETIMES IT'S GOOD TO GET BITTEN!** This also ties into my desire to get back involved with simulator based flight training and my goal to become involved with upset recovery training. Additionally, I plan on getting the B737NG Type Add-On to my previous B737 (Glass) Type-Rating, so I can possibly re-track back into aviation employment again; maybe at a FAR121/135/91 jet type rating schoolhouse or possibly the FAA as an ASI.

Looking back; I'm still glad I grounded myself to pursue work as a non-flying military contractor here at WPAFB. I'm much more grateful about the beauty of what is possible. It took me some years to rebuild after a divorce following my deployment to Iraq. No pity party for me, because my near-zero debt status teamed with my savings and investments just keep making life greener. No more funding or free rides for a 365/24/7 shoe shopping derelict -ha ha!

Keep up the great work! I am truly inspired again! Thank you Thomas!

[X], I've honestly been wondering for a while whether I should continue publishing *FLYING LESSONS Weekly*, and whether it's doing any real good, or if I should spend all that time on something else, when I received your email. Well, you've re-energized me and I'm very glad I had a little of the same impact on you. Thank you for letting me know. Best of luck in the next stage of your career, and keep me advised on your progress.

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

"Thanks for all your research, writing and teaching. In addition to being thought-provoking, your safety-related articles in the various aviation magazines and your *FLYING LESSONS Weekly* are very useful. I hope [my donation] will help keep the fire stoked." – Randy Starbuck

Thank you, Randy. Your letter and donation came right after the email from [X] above. Your generous

donation covers about two months of my Mailchimp email fee, and your message helps convince me to keep *FLYING LESSONS* going. Thanks again. – TT

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NTSB Safety Alert

The National Transportation Safety Board [Safety Alert 071-17](#) highlights the potential hazards associated with conducting intersection takeoffs. It stresses the need for general aviation pilots to use all the runway available to them for takeoff.

By reducing the amount of runway used during takeoff, the Safety Alert says, pilots have less runway available to them in the event of a system or engine malfunction during takeoff, to abort the takeoff or to perform an emergency landing. This increases the risk of injury, death and aircraft damage. The safety alert emphasizes the need for pilots to:

- Know their airplane's takeoff and landing performance limitations
- Not feel obligated to accept an intersection takeoff if offered by air traffic control
- Use all available runway length to increase the margin of safety

[Read NTSB Safety Alert 071-17.](#)

See:

<https://www.nts.gov/news/press-releases/Pages/PR20171031.aspx>
<https://www.nts.gov/safety/safety-alerts/Documents/SA-071.pdf>

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