



FLYING LESSONS for November 18, 2021

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 in your success as the 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:

For the largest number of FLYING LESSONS readers next week is a holiday—Thanksgiving, next week Thursday in the United States. Thanksgiving is perhaps the ultimate family holiday here in the States, and a great many of us will be taking **planes, trains and automobiles** (one of my all-time favorite movies—“Welcome to Wichita!”) to get home for the first of the holidays.



See https://www.imdb.com/video/vi4026316313?playlistId=tt0093748&ref=tt_ov_vi

The last two times I used a light aircraft to fly myself to my mother’s for Thanksgiving the weather has been great for the trip up but very challenging for the flight home. Isn’t that always the case? I’m staying home with my wife and extended family this year.

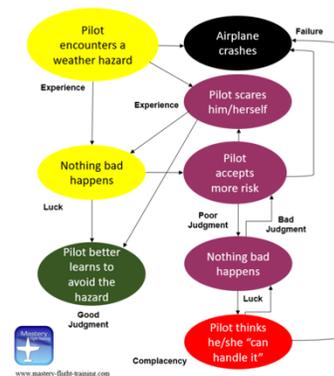
But anticipating that many FLYING LESSONS readers will be flying home for the holidays, I’ll keep this narrative short this time and invite you to read my experiences the last time I used planes and automobiles (there’s not much in the way of passenger train service out here) at Thanksgiving...and the LESSONS I learned each time.

Read:

- **“Weather experience decision tree”**—LESSONS from my 2019 Thanksgiving trip, along with LESSONS from two then-recent weather-related crashes.
- **“Aim for the blue”**—my 2018 Thanksgiving flying adventure.

See:

- <http://www.mastery-flight-training.com/20191205-flying-lessons.pdf>
- <https://www.mastery-flight-training.com/20181129-flying-lessons.pdf>



I certainly hope the weather is great for all your flights, to and from your holiday destination—or anywhere you may fly between now and the end of the year. But as I’ve said many times, **hope is not a good risk management strategy**. So as you prepare for your next cross-country trip, take time to read and heed the LESSONS from my past experience. I “hope” it helps you **have a happy and safe holiday trip**.

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

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Debrief: Readers write about recent *FLYING LESSONS*:

Reader Justin Graff writes about [recent LESSONS](#) concerning the use of supplemental oxygen:

Oxygen for most everyone should be strongly considered for people that live at sea level when flying at or above 8,000 feet.

I'm a neurologist, and **there's no physiologic reason why oxygen is more desirable at night than during the day.** The historic reason for that recommendation is because people flying at night noticed the lights on the ground got brighter almost immediately with use of oxygen. During the day, that effect is not perceptible. **If you are so hypoxic that your occipital cortex (used for vision) gets better with oxygen, you should have been on oxygen well before then.** During the day, the occipital cortex is using more oxygen than at night, processing information from a rapidly changing, lit up world.

It is true our visual cortex uses a lot of oxygen and glucose compared to other areas, but **association areas that are important for decision making, etc. are also affected early.** The problem is *there is no easy way for a pilot to measure their cognition or decision making in flight.*

I use an oximeter on every flight at 6,000 MSL and above. I find my first sign of a slightly reduced oxygen saturation is increased resting heart rate, which occurs reliably when the oximetry drops from the usual 98-100% at sea level to around 94-95%. **Many people conserve oxygen and use just enough to be at 92% or 95%. I keep mine at 98%.**

My oximetry drops faster with altitude than my wife's over the last 20 years I've had access to pulse oximetry. The drop with altitude is very consistent from flight to flight. It's not clear why we differ, as we are both healthy. It could be that I don't have as much of an automatic deep breathing response to mild hypoxia that she may have. That way parts of my lungs don't get as much oxygen into the blood. It could be that oxygen dissociates from hemoglobin differently between us. This mechanism also plays a role, along with increasing hemoglobin level in the blood, in adaption to living at high altitude.

I find with **using oxygen at 6,000 and above that I am not as tired on arrival and for several hours afterward** as compared to no oxygen.

I've not done any cognitive testing with vs. without, but I generally think that **most of us cannot go by what we perceive about our own cognition.** Hypoxia clearly causes insidious cognitive dysfunction.

I also use my series 6 Apple Watch to check oximetry. I find it accurate, though I have to keep my arm very still for 15 seconds to get a reading. That is hard to do in turbulence. At present there is no ability to get it to do frequent, scheduled checks while flying, which is really unfortunate, or set a low oximetry alarm. It generally only checks once every several hours, probably to save battery. I suspect they've not included these features to avoid FDA approval of the oximetry function.

It's great to get some learned input to correct and add to what's batted around in aviation circles. Thank you very much, Justin.

See <http://www.mastery-flight-training.com/20211104-flying-lessons.pdf>

Reader John Hodgson adds:

Tom, I have my uncle's WWII log book. A Petty Officer, he was an observer in the RN FAA [Royal Navy Fleet Air Arm] and flew throughout the war in operations in aircraft including the Fairy Swordfish and Fulmar, Supermarine Walrus, Blackburn Shark and Grumman Goose.

[The reader included] a page with the results of his test in a "mobile altitude chamber." Difficult to read, but it says he was rendered anoxic at 26,000 feet and with 15 minutes above 30,000 and a maximum of 32,000

feet "showed no effects from high altitude" and "developed no ear or sinus trouble." Signed by a Surgeon Lieutenant. I did a search but could find no details of the chamber or test procedure. Interesting.

Indeed it is, John. Your uncle was apparently an extremely fit young crewmember. To a historian-trained aviation enthusiast with a bent toward lesser-known aircraft types, that's an impressive list (the Blackburn was the only one I couldn't immediately visualize, and had to look up). Thanks for sending that along.

Reader Mike Blackburn (interesting how this all ties together this week) writes more:

Hello Thomas, from sunny South Africa. I read t[*last week's*] Debrief with interest - particularly the comments related to the use of supplemental oxygen.

All of your points are well made. **As an anesthesiologist I'm a purveyor of supplemental oxygen at ground level all day. I believe that the risk of hypoxemia is generally underappreciated by the pilot population.**

The FARs (and equivalents in other countries) stipulate the requirement for the use of supplemental oxygen but it has to be appreciated that *these are based on the average individual*. If you live and work at high elevation (I live at 5500 AMSL) you have a greater tolerance for altitude due to physiological adjustment of the oxyhemoglobin dissociation curve. If you are a flatlander then your tolerance (on average) is less.

In my aircraft I have a portable 4-place oxygen system with low flow oxysaver cannulae. **I will not fly above 10,000 ft without using the oxygen.** I'm a healthy middle-aged chap. **I will not allow my passengers to [go without] oxygen above 10,000 feet.** That's my personal minimum. Likewise at night I will use if over 8000 feet. Conservative? Definitely. Do I want to become hypoxic? No.

Say what you like, prolonged exposure to atmospheres above 10,000 feet without oxygen (in the band 10-12,000 feet) causes fatigue, headaches and a subtle decrease in performance which may have critical outcomes in the high fidelity environment of an approach and landing.

With respect to the "Boost" type oxygen canisters: these are nothing more than snake oil. I see this every day where patients are in a post anaesthetic care unit - **it takes more than a single breath or two breaths of 100% oxygen to make ANY difference to oxygen saturation.** You simply cannot absorb all the provided oxygen in a single breath, so lots of it disappears into the cabin when you exhale. **I think they are dangerous because they lead to a false sense of security.**

I'm always baffled by pilots who own and operate high performance piston aircraft. They have few qualms about dropping \$50,000 on an avionics suite but will balk at the significantly lower expense of a portable oxygen kit as supplied by Mountain high or one of the other suppliers. **Oxygen is cheap** (it costs me the equivalent of \$20 US to refill an E cylinder which will give me 30 hours of oxygen). **Hypoxaemia at the controls of an aircraft can cost more than you can pay.**

Keep up the good work - Thursday/Friday is my favorite day because its Mastery day!

More learned input. Thank you, Mike. I had the very pleasant opportunity to visit your country several years ago. I was surprised to learn that despite being far from mountains, Johannesburg is at about the same elevation as Denver here in the U.S. Very pretty country (we saw a lot of it), and when our Boeing 777 took off loaded for 16 hours' flight to Atlanta it sure used a lot of runway. Just as I had much better reaction to high altitude when I lived at 7600-foot Pagosa Springs, Colorado than I do now (well, I was 25 years younger, too) I'm sure you're better acclimatized to altitude than most pilots as well. All the more reason to take your advice.

Reader Larry Slade continues:

Ironic you were discussing John Miller's head bump and in the same posting discussing hypoxia. Remember he had an incident of disorientation in his 56TC Baron (famous for the contrails photo), I think at [age] 80+ which he attributed to hypoxia. But I can't mention him without his quote about aviation in the 20's: "In those days flying was pretty much a continuous emergency." What a treasure that guy was.

John was indeed a character from a bygone era. Thanks, Larry.

Reader and self-described "ex-freight dog" Richard Depinay writes about last week's *LESSONS, Head-Banger*, about the hazards of flight in turbulence:

I remember flying with a helmet: Amerflight 132 was a tough run in a Piper Lance in the late '90s. It wasn't too bad in the morning, as the winds were calm. But the return was in late afternoon with winds howling in 30 knots and above, and was on the lee side of the Sierras. You had to stay in this rotor wind,

because of multiple stops back toward Burbank. From Mammoth Lake to Independence, Lone Pine and Inyokern.

Even flying slower, the plane would suddenly drop or climb, or go so much sideways that your head would hit the sidewall, hence the helmet.

I shouldn't have been surprised by the winds. In the 1950s the USAF, with the help of UCLA, based a few gliders in Bishop to learn more about mountain waves. [Exploring the Monster](#) is an excellent book about this study. It has a picture of a P-38 Lightning which was able to fly for over an hour with both engines feathered! I wonder if the pilot was wearing a helmet too.

Interesting, Richard. Did everyone flying that run wear a helmet, or was this your unique choice?

See <https://www.amazon.com/Exploring-monster-Mountain-aerial-elevator/dp/1891118323>

Coincidentally, [this preliminary report](#) appeared on the FAA's website today:

The pilot of a Be58 "encountered severe turbulence resulting in a laceration to the co-pilot's head," en route to Harrison, Arkansas. The landing was otherwise uneventful. The copilot's injuries are "minor" and the pilot was not injured. Airplane damage is "minor".

See https://www.asias.faa.gov/apex/f?p=100:96:7020304307480:::P96_ENTRY_DATE,P96_MAKE_NAME,P96_FATAL_FLG:17-NOV-21,BEECH

Frequent Debrief, past Naval Flight Officer and air safety investigator Jeff Edwards wraps up this week with a note to a reader who last week reported having just earned his instrument rating:

For Rich Sellman: Congratulations on passing your checkride! Training is not just for passing a checkride or getting a flight review endorsement. Training is a means to improve knowledge, skills and gain experience. **Make training part of your regular monthly flying routine and become a better pilot every day.**

Thank you, Jeff, and congratulations again, Rich.

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



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Departure [terrain] clearance

The [October 21 FLYING LESSONS Weekly](#) addressed the sometimes complex, often vital and strangely voluntary Obstacle Departure Procedures, or ODPs. This week *Air Facts'* John Zimmerman does his usual outstanding job by taking the concept a step further. Read "[It's time to reform Obstacle Departure Procedures.](#)"

See:

<http://www.mastery-flight-training.com/20211021-flying-lessons.pdf>

<https://airfactsjournal.com/2021/11/its-time-to-reform-obstacle-departure-procedures/>

One-person flight department

The business aviation world is focused on the concept of SMS—a *safety management system*. The central concept of SMS is penalty-free safety reporting to managers who will then use those reports to reinforce or change procedures to mitigate the risks. The management has supervisory

authority and provides independent oversight of the members of the flight department.

In the years I was on the [National Business Aviation Association](#)'s Safety Committee, in the [Single-Pilot Working Group](#), I contended that SMS did not apply to the majority of business pilots who are both the pilot and the CEO. They make up the entire "flight department" and by definition cannot provide independent oversight. What Dr. Graff wrote in the Debrief in the context of hypoxia is applicable here as well: "***Most of us cannot go by what we perceive about our own cognition.***"

There are, however, some concepts of SMS that can still apply to the one-person flight department. Long-time *FLYING LESSONS* reader and business aviation safety consultant (and one of the guys who recruited me for the Single Pilot Working Group) Jim Lara addresses the SMS aspects of one-person flight departments in a sidebar to [this NBAA article](#). The entire article is worth your time, and if you are a flight department of one, especially the part written by Jim Lara.

Readers, what do you think about this article?

See:

www.nbaa.org

<https://nbaa.org/aircraft-operations/safety/single-pilot-operations/>

https://nbaa.org/news/business-aviation-insider/2021-nov-dec/scalable-proactive-safety/?utm_medium=email&utm_source=rasa_io&PostID=40600881&MessageRunDetailID=6880653198

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