FLYING LESSONS for November 11, 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:

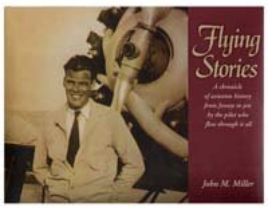
Head-Banger

Retired airline pilot who now fills his time delivering airplanes (and *FLYING LESSONS* reader) John Whitehead made this post on a Facebook group recently:

> The good news is that I truly enjoy flying [Beech] Bonanzas, flying the country and meeting new people. The bad news is that some days, it's not all fun. These last two days have seen winds (at a minimum) in the high 30s with gusts into the 40s. Even higher winds in the DFW [Dallas/Fort Worth, Texas] metro causing flights delays (crosswind restrictions on the airplanes) and power outages even though it was a beautiful day otherwise. Flying home yesterday, I experienced two pronounced gusts that banged my head on the ceiling…. Y'all be careful out there.

Several group members related stories of their own that involved "hitting the headliner" when encountering turbulence in flight.

I replied: One of [Captain] John Miller's old stories in *ABS Magazine* relates an experience he had flying in strong turbulence (I believe in a cargo DC-8) and hitting his head on the headliner so hard it knocked him out briefly. He speculates that a lot of loss of control crashes in strong wind shears and areas near thunderstorms might have been from pilot incapacitation from knockout or even broken necks.



I believe this article is one that was included in ABS' now out-of-print compilation book *Flying Stories* that chronicles Miller's astonishing carrier "from Jennys to Jets."

See:
www.mastery-flight-training.com/john-miller-in-abs-magazine.pdf
www.bonanza.org
https://www.amazon.com/Flying-Stories-John-M-Miller/dp/0972207309
https://www.amazon.com/Flying-Stories-John-M-Miller/dp/0972207309

Group participant and *FLYING LESSONS* reader John Majane added:

> There was a fellow in the late 1970s [who] flew a [Piper] Lance out of CGS [College Park, Maryland]. He always took his seatbelts off in cruise. He was near HGR [Hagerstown, Maryland], called ATC [Air Traffic

> Control] and said he hit his head and could not see. They watched him spiral down. The wreckage was scattered [over] ¼ mile.

I could not find that accident report in the NTSB database, which seems progressively harder to navigate the farther back in time you search. But That sounds like a very plausible scenario: a pilot encounters turbulence, bangs his or her head on the headliner, and suffers injury resulting in physiological symptoms that make controlling the airplane difficult or even impossible.

A couple of group members mused whether we should be wearing helmets in light airplanes. I even quipped that "***all the cool pilots wear helmets***." It's not likely, however, that pilots of personal and light business airplanes will begin wearing "brain buckets" to protect against concussion and other adverse results of head-banging into the headliner in turbulence (and a helmet wouldn't protect against neck injury that might result from the same impact).

"All the cool pilots wear helmets."
Photo courtesy FLYING LESSONS *reader George Steed from his days in the US Navy. Happy Veterans Day, George!*

Even if we don't all start wearing hard hats in the left seat, we can learn something from the collective experience of those posting on that group. Most pilot discussion of turbulence encounters, V_A (Design Maneuvering Speed) and its lesser-known but more topically appropriate V_B (Turbulent Air Penetration Speed), and avoiding conditions conducive to moderate or great turbulence, surrounds techniques for avoiding airplane damage.

At least as important is the hazard of pilot impairment or incapacitation that may result from a turbulence encounter, perhaps even one that is not strong enough to damage the airplane but sufficient to bang the pilot's head into the cabin interior.

The *LESSON* for those of us not cool enough to be wearing a helmet in flight: if you expect you'll encounter moderate or greater turbulence, tighten down your seat belt and shoulder harness in addition to slowing down, and as John Whitehead said, ***y'all be careful out there***.

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

Debrief: Readers write about recent *FLYING LESSONS:*

Frequent Debriefer John Majane comments on last week's *LESSONS* inspired by the apparent incapacitation event in a turbocharged Bonanza:

> Interesting story about the B36[TC] accident. It sounds like hypoxia, I am sure the coroner will be able to tell. Amazing that the plane basically landed in a field and remained intact. **Wonder if it ran out of gas and the autopilot kept trimming up to prevent a descent and, in the process slowed it down?** I doubt if it hit at 150 knots the outcome would have been the same.

> I did the full high altitude chamber and O_2 training at Andrews Air Force Base when they used to provide that. It was in preparation for wave camp where we flew sailplanes in Mountain Wave out of Petersburg, West Virginia. We used diluter demand systems in the sailplanes since it was expected that we would be regularly going over 20,000'. **Nasal cannulas are only good up to 18,000 feet.** Possibly the pilot had only the nasal cannula and passed out at the higher altitude then died of hypoxia?
>
> When I did go to wave camp I was instructing. I would take the students to 18,000 feet to get the whole experience including flying through the rotor which was pretty wild. Never got over 18K but we had the equipment to do it.

Reader and instructor Doug Fortnam adds:

> I just finished reading about the recent loss of the turbocharged Beech Bonanza in central Wisconsin. There was no mention in the article about whether or not the pilot was using a cannula or a good fitting mask with microphone. I couldn't find the reference, but I learned long ago that over 18,000 cannulas should not be used.

Nothing with that level of detail has been published yet that I've seen. However you're right—most, if not all, nasal cannulas are limited to use below 18,000 feet. I remind pilots of the need to use a full oxygen mask above FL180. It's amazing how many times I read people online trying to justify using cannulas above that height, primarily because they are uncomfortable. I would not be the least bit surprised to find the Bonanza pilot was using a cannula at FL240.

I wondered about whether the pilot was using a cannula as well. The NTSB preliminary report, posted this week, suggests a scenario similar to what you describe. The selected fuel tank was empty. I've still trying to figure out how that results in the landing shown in news accounts; I hope the eventual NTSB docket answers all our questions. Thanks, Doug and John.

Reader Ward Combs telephoned me with a question: The list of required instructional topics in 14 CFR 61.31g includes Item 5:

> 5. Effects of prolonged usage of supplemental oxygen;

Ward asked what those effects might be. My understanding is this topic centers primarily on dehydration. Oxygen used in supplemental systems must be extremely low humidity to prevent being blocked by ice in the delivery system. Breathing very dry air for long periods must be supplemented with water intake to avoid dehydration, which among other physiological reactions can negatively impact judgement and physical aircraft control.

See https://www.ecfr.gov/current/title-14/part-61

Reader Randall Phillips writes:

> While there is no real substitute for a built-in oxygen system (my airplane has one), or an FAA-approved portable O_2 bottle like what we in the airlines called a "walk-around bottle" with adjustable flow, there is a new product out there called Boost which I carry in my airplane **for emergency use only**. Based in Denver and needing to cross the Rocky Mountains via mountain passes westbound, I frequently have to climb to 14,500 feet or more temporarily. [It's] also good for "flatlander" passengers with altitude discomfort or any indication of carbon monoxide in the cockpit. One large bottle of Boost is advertised for two hundred 1-second bursts of pure oxygen flow using a trigger on the can. However, I have seen no endorsement of this product by aviation resources. Aircraft Spruce and other aviation suppliers do sell it.

I've not seen any aviation endorsement of Boost or similar products either, Randall. Of course if a pilot is flying at an altitude where supplemental oxygen is required, even temporarily, then an approved supplemental oxygen system must be on board, operational and used by the pilot. A similar approved system must be available to any passengers above 15,000 feet. That requirement negates any reason for Boost or similar products at altitude where supplemental oxygen is required. There might be some value to having Boost or a similar product on board for pilots or passengers experiencing hypoxic symptoms at altitudes lower than those where supplemental oxygen is required—which might well be construed as an emergency, as you describe. Thank you, Randall.

See https://www.amazon.com/Oxygen-Supplement-Increases-Endurance-Performance/dp/B077NLSBXD/ref=asc_df_B077NLSBXD/?tag=hyprod-20&linkCode=df0&hvadid=241981208294&hvpos=&hvnetw=g&hvrand=6502226898382855114&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9024183&hvtargid=pla-585277172069&psc=1

Long-timer reader Ed Livermore continues:

> Good and timely article. [My wife] Marcia and I have had the Oklahoma City oxygen training, though probably 30 years back. The *LESSONS* remain.
>
> In our turbonormalized A36 [Bonanza] we have built-in oxygen and use it regularly. Our favorite cruising altitude is 10,000 – 13,500. We are always on oxygen at 11,000 or above and often 10,000 and above. Our personal altitude limit is 17,500 though we seldom go that high. We have a Mountain High metering system which works quite well.
>
> We find at age 77 we feel much better after breathing the gas.

It's been 30 years for me as well, Ed. You raise an important point: **oxygen regulations provide a *minimum* standard of safety**. It's prudent to use supplemental oxygen at lower altitudes than the rules require, for fatigue reduction and general well-being as well as avoiding the more immediately ominous symptoms of hypoxia. Thank you.

See:
https://www.mastery-flight-training.com/20211104-flying-lessons.pdf
https://www.mastery-flight-training.com/20211008-b36tc-ca.pdf

Reader Rich Sellman wraps up this week with the type of email I really like to receive:

> As I progressed further into my IFR training, which began last year, I found your Mastery class and have read it earnestly each week. Your teachings, along with podcasts from Max Trescott have helped me immensely and I wanted to share my success in ***passing my checkride a few days ago*** with a donation to Mastery. I'm thankful the aviation community is so great. My CFII's (I had 2) and DPE feel like family now. It's almost sad to know I won't be training with them until my BFR next September. But they reminded me anytime I wanted a right seater they'd be happy to oblige.
>
> Anyway, just wanted to say thanks to you, as well. After reading your column and listening to Max's podcast, I always come out of it saying to myself "don't be 'that' guy" that everyone uses as an example of poor judgement or poor aircraft mastery. Hoping to never be…that guy…

Congratulations on earning your instrument rating, Rich—a major accomplishment. I'm happy to have played a small part in your success. You're right, Max is great. I support Max's podcast in a small way, and listen to as many of them as I can.

Thank you for your generous donation to *FLYING LESSONS* as well. Keep doing what you're doing, and seeking out even more ways to learn, and you'll enjoy many years as an instrument pilot.

See https://aviationnewstalk.com

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

Encouraging news

Despite recent reports that the overall rate of general aviation fatal accidents has increased, there's outstanding news about the biggest growth area in personal aviation, experimental category aircraft. From the Experimental Aircraft Association:

Safety for experimental category aircraft in the U.S. over the past 12 months continued the trend of improvement seen over the past 15 years, as **the fatal accident total fell another five percent** and finished below the Federal Aviation Administration not-to-exceed number for the federal fiscal year ending September 30, 2021.

There were 42 fatal accidents in experimental category aircraft during that period (October 1, 2020-September 30, 2021), five below the FAA's not-to-exceed number set for the year. Of that total, 33 were in amateur-built aircraft.

"This is continued good news on the safety front, as **fatal accident totals in the experimental category have fallen 40 percent in the past decade**," said Sean Elliott, EAA's vice president of advocacy and safety. "**Fatal accidents in homebuilt aircraft have dropped by one-third over that time** as well, reflecting *a* ***safety culture that is more widely accepted and followed*** as an important part of the balance of freedom and responsibility that is such an essential element of flying."

See:
https://www.eaa.org/eaa/news-and-publications/eaa-news-and-aviation-news/news/10-28-2021-experimental-category-fatal-accident-total-drops-again?mkt_tok=OTEwLVNFVS0wNzMAAAGAZ-pKYIzFmJbH2jeUjjlWBZsMJ1P1MX5FAz9AW74cLhS4s6rpRn-j0l8xwAtYsURdeWV0xtLr84ia2LJipiaoB0WBA8yI1E79HLHFFW7sLmc

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Thomas P. Turner, M.S. Aviation Safety
Flight Instructor Hall of Fame Inductee
2021 Jack Eggspuehler Service Award winner
2010 National FAA Safety Team Representative of the Year
2008 FAA Central Region CFI of the Year
Three-time Master CFI
