Thomas P. Turner's
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FLYING LESSONS for November 6, 2025

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 most 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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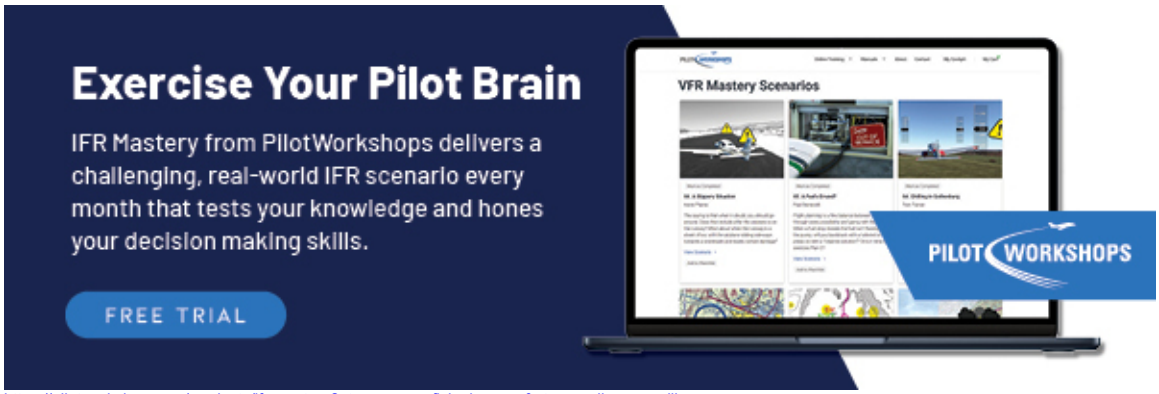
This week's LESSONS

Let's go straight to the Debrief this week.

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



https://pilotworkshop.com/products/ifr-mastery?utm_source=flyinglessons&utm_medium=emailbanner

Debrief

Readers write about recent *LESSONS*:

Reader and Cirrus instruction thought leader Mike Radomsky writes:

> Thank you for yet another edifying edition of *FLYING LESSONS* - you are performing a very valuable service for your readers. In the October 30 DEBRIEF, John Whitehead pointed out that train operators in Japan must POINT at signs to help embed the information they conveyed in their brains - this directly related to your discussion of single-pilot emulation of multi-pilot crew interaction.
>
> I spend a good deal of time teaching Emergency Procedures in a full motion simulator. One of the scenarios involves a main tire blowout just as the pilot rotates for takeoff. Everyone makes the (very logical) decision to land on the side of the runway with the good tire, knowing that they are likely to be dragged across the runway by the bad tire. Interestingly, though, **I found that about half the pilots forget which tire blew by the time they are landing, although they certainly knew it *at the moment it happened*.**
>
> At first, I tried helping by asking them what had occurred as soon as they rotated, and I noticed that when I did that, **they always remembered**. Accordingly, I now teach that **if anything abnormal occurs during the high-concentration take-off and departure sequence, the pilot**

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> **should say it out loud** - "The LEFT tire has blown". So far, this has proven completely effective.
>
> Keep up the excellent work.

This is good observational evidence that supports the idea of maintaining **situational and operational awareness by talking to yourself** as if you were working as part of a crew. I've found that to be an effective technique for myself and I encourage it with the pilots I teach and with whom I fly. Thank you, Mike.

See https://thomaspturner.com/wp-content/uploads/2025/10/2025.1030-FLYING-LESSONS-1.pdf

Frequent Debriefer Arthur Utay asks about last week's primary topic:

> I read your latest *FLYING LESSONS* after returning from a cross country flight that included moderate to severe turbulence and heavy precipitation. The first lesson you discuss:
>
> > "Areas of precipitation, even moderate to heavy echoes, do not always mean thunderstorms and turbulence. In general, however, *reflectivity plotted as yellow or red (or more) on radar correlate to extreme hazard"*
>
> caught me off guard. While I give wide berth to red precipitation and t-storms, **I have routinely flown through areas of turbulence and precipitation for decades without incident**. My Sentry receiver displays ADS-B weather on my iPad, which along with ATC guidance, has worked well for me.
>
> Your statement makes me wonder: **am I missing something?** In my flying career (40+ years) turbulence is routine and avoiding precipitation would severely curtail my activity. My Bonanza has been **reliably pressed into** service in **most weather** (except thunderstorms and ice).

No, I think you get the point but you may not have expressed it fully. **First,** let's look at the definitions of turbulence intensity (from avnwx.com):

AvnWx.com Aviation Weather

Help

Privacy Policy Conditions of Use >>View Turbulence-related Airmets, Sigmets and Pilot Reports on Aviation Weather Map

Turbulence Intensities

Turbulence is a subjective measure, and its measurement is somewhat depending on the size of the aircraft in which it is felt and the aircraft's speed.

Aeronautical Information Manual provides this guide (Chapter 7-1-44):

Intensity	Aircraft Reaction	Reaction Inside Aircraft	Reporting Term-Definition
Light	Turbulence that momentarily causes slight, erratic changes in altitude and/or attitude (pitch, roll, yaw). Report as **Light Turbulence** or Turbulence that causes slight, rapid and somewhat rhythmic bumpiness without appreciable changes in altitude or attitude. Report as **Light Chop**.	Occupants may feel a slight strain against belts or shoulder straps. Unsecured objects may be displaced slightly. Food service may be conducted and little or no difficulty is encountered in walking.	Occasional-Less than 1/3 of the time. Intermittent-1/3 to 2/3. Continuous-More than 2/3.
Moderate	Turbulence that is similar to Light Turbulence but of greater intensity. Changes in altitude and/or attitude occur but the aircraft remains in positive control at all times. It usually causes variation in indicated speed. Report as **Moderate Turbulence**; or Turbulence that is similar to Light Chop but of greater intensity. It causes rapid bumps or jolts without appreciable change in aircraft or attitude. Report as **Moderate Chop**.	Occupants feel definite strains against seat belts or shoulder straps. Unsecured objects are dislodged. Food service and walking are difficult.	**NOTE** 1. Pilots should report location(s), time (UTC), intensity, whether in or near clouds, altitude, type of aircraft and, when applicable, duration of turbulence. 2. Duration may be based on time between two locations or over a single location. All locations should be readily identifiable.
Severe	Turbulence that causes large, abrupt changes in altitude and/or attitude. It usually causes large variations in indicated airspeed. Aircraft may be momentarily out of control. Report as **Severe Turbulence**.	Occupants are forced violently against seat belts or shoulder straps. Unsecured objects are tossed about. Food service and walking are impossible.	**EXAMPLES:** a. Over Omaha, 1232Z, Moderate Turbulence, in cloud, Flight Level 310, B707. b. From 50 miles south of Albuquerque to 30 miles north of Phoenix, 1210Z to 1250Z, occasional Moderate Chop, Flight Level 330, DC8.
Extreme	Turbulence in which the aircraft is violently tossed about and is practically impossible to control. It may causes structural damage. Report as **Extreme Turbulence**.		
High level turbulence (normally above 15,000 feet ASL) not associated with cumuliform cloudiness, including thunderstorms, should be reported as CAT (clear air turbulence) preceded by the appropriate intensity, or light or moderate chop.			

I doubt you pressed into **severe** or **extreme turbulence**, because as the table above suggests these levels of turbulence result in "occupants [being] forced violently against seat belts or shoulder straps" and "unsecured objects are tossed about." I suspect you do not routinely experience "**momentarily out of control**" conditions as you likely would in severe or extreme turbulence either. You might not fly routinely into areas of **moderate** turbulence either—experiencing "definite strains against seat belts or shoulder straps" and "dislodged" objects but

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not objects being tossed about the cabin. In up to and including moderate turbulence "changes in altitude and/or attitude occur but the aircraft remains in positive control at all times."

Like most pilots (myself included) you likely **overestimate the severity of turbulence**. Let's look at it another way: the **G force** experienced by (and in) the aircraft as a result of the turbulence encounter. A "*momentarily out of control* "airplane may be one that has **briefly stalled** as a result of encountering a gust or other wind shear**.** Assuming your indicated airspeed is below **V_B, the turbulent air penetration speed*** when you encounter the shear, the wing will momentarily stall at or below that aircraft's **maximum design load**. For Normal category airplanes this is 3.8Gs; for Utility category it is 4.4G. Acrobatic category aircraft are stressed to 6Gs, and for our rotary wing readers helicopters have a maximum design load factor of 3.5Gs. There are exceptions for some individual aircraft models, and there is a maximum negative G load for each category also.

> *Most light aircraft manuals do not list a V_B. Generally we talk about V_A, the Design Maneuvering Speed, in the context of turbulent air penetration. But V_A is based maximum, abrupt control movement in one axis of movement **only**, while V_B, if identified, is not so limited and may be lower than maneuvering speed. See the *Air Facts Journal* article for more on how to use these speeds.

So if you are actually in "severe" turbulence, you are experiencing up to 3.5, 3.8, 4.4 or 6.0G depending on the aircraft you fly. An aircraft I commonly fly is certificated in the Utility category. It also has a G meter on its Primary Flight Display (PFD). I've noticed that my threshold of "beginning to notice the bumps" is about 1.2G, and when I think I'm being bounced around pretty badly it's still no more than just a little above 2Gs at its greatest. In other words, my mind might think the turbulence is worse but my body seems to self-select to avoid turbulence at about half the design load of the airplane…well below V_B. **It's up to me** to heed this internal warning. **Note:** an upset might occur below maximum design load but that should allow for recovery at altitude.

Second, think about what the observations and forecasts, cockpit weather displays and what you see out the windscreen are telling you. If there is any indication of lightning then the entire complex is suspect for thunderstorm turbulence, not just the yellow or red. If the clouds are lightning-less cumulous types more than a few thousand feet tall they also mark strong updrafts, probable downdrafts and turbulence where the rising and falling masses meet.

As I wrote in a 2019 article in *Aviation Safety*, Dr. David Strahle, "the father of datalink weather," tells us (with my new *FLYING LESSONS* emphasis added) in areas of vertical-development clouds or lightning activity:

> It's generally safe to fly through areas of light precipitation (green returns on most radar plots) if there is no moderate or greater precipitation associated with those clouds. However, [Strahle] warns, if there is any ***moderate*** precipitation in the radar plot (generally yellow), you need to **remain at least 10 miles away from *even the light (green) returns* surrounding the heavier precipitation**. If there is ***heavy*** (often, but not always orange or red) or extreme (darker red, white or other) precipitation, **remain at least 20 miles away** from even the light (green) returns.
>
> Why is this? [Strahle's] research shows that individual storm cells will "share" or "exchange" energy, creating massive areas of instability and turbulence between them that may be invisible to radar…and even to the eye. If there are moderate or greater returns in the storm complex, there's the chance of extreme turbulence anywhere in it. Dr. Strahle warns that **if a thunderstorm complex has enough energy to create yellow or red radar returns, it has the potential to create dangerous turbulence *anywhere* within or near the cloud.**
>
> So what exactly should you stay 20 miles away from? **If there's moderate, heavy or extreme precipitation (yellows, reds or worse) in the group of cells, it's not safe to be anywhere in their precipitation footprint.** Remaining 20 miles clear of that thunderstorm means staying 20 miles or more away from the outside edges of even the light-green radar returns.

If on the other hand your knowledge of the weather system tells you it consists of stratiform clouds, and there is no indication of lightning strikes or vertical cumulus development, it's generally safe to enter "green" precipitation returns and maybe even some yellow as long as you do so with an immediate way out if needed. Even a "red" return may be navigable below V_B if you're absolutely sure all clouds in the system are stratiform, which may happen regionally and

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under some conditions. But it would be a rare event to get heavy precipitation without moderate turbulence, or greater. You must ***know***, not just hope, that the ride will be acceptably smooth. ***Hope* is not a good risk management strategy.**

Remember also that when it comes to overstressing the airplane ***you don't get one free bump***…you need to **be at or below turbulent air penetration speed *before* you encounter the first wind shear** that results in greater than moderate turbulence. Thanks, Art.

See:
https://maps.avnwx.com/help/turb_desc.html
https://airfactsjournal.com/2020/12/understanding-vb-turbulence-penetration-speed/#:~:text=In%20aviation%2C%20Vb%20is%20the%20design%20speed,fps%20(4%2C000%20fpm)%20for%20Transport%20category%20aircraft.
https://en.wikipedia.org/wiki/Load_factor_(aeronautics)
https://aviationsafetymagazine.com/features/sidestepping-storms/

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See https://nafimentor.org/

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