

On Flying Turbulence

It was the latter part of November 1964. I had gone down to San Diego over the Thanksgiving Holiday and was returning to College in Berkeley. It would be another four years before I would even be thinking of getting my Private Pilot's License. In those days you could get a one way ticket on PSA for \$19.99. The weather was absolutely terrible that morning. You knew it was bad when the airlines were taking off to the East, and they were taking off to the East on that day. PSA was using the four engine Electra Turboprops at that time. They did not go all that high, and on this day we would be slogging along at 24,000 feet after a stop in LA. I did hesitate getting on the plane that morning, but I did it anyway. Immediately after the first takeoff I was slammed into the seat as we hit a huge updraft. After landing in LA, I seriously considered getting off and taking the bus, but I needed to get back to classes so I stayed aboard.

I will never forget the next hour and a half. Even at that time I guess I was smart enough to chose to be near the wing and the center of gravity for the best ride. There was no best place that day. It rained and rained and the clouds were so thick that when I looked out at the wing, I couldn't see it most of the time. When I could see it, what I saw made me want to close my eyes. The severe turbulence was creating torsion on the wing that caused bending it in all kinds of directions and the engines were moving in ways that made me feel very uncomfortable, if it was possible to feel any more uncomfortable. Wings had been known to depart the Electras before they were strengthened. The flight attendants were trying to calm petrified passengers and were handing out sick sacks like they were going out of style. A friend next to me asked to "borrow" mine. He and just about everyone on the flight were not doing well. I may have been the only one not to get sick, but if I had had to stay on the plane another 15 minutes... I can't tell you how many people were asking or rather begging, "When were we going to land?" When I finally saw water, I thought we were crashing. Instead we were on final approach to SFO. On landing there were numerous ambulances waiting to take off some very sick people. After all these years, that was the worst plane ride I have ever experienced to date. So I have a baseline for me of how bad turbulence can be.

I think it is a good idea to have a worse case baseline that you won't forget. If you rode alone with me in the above example and have not experienced anything so bad, then let that be your baseline without having to experience it. The Electra was not a small plane and yet it was treated like a tin can in a swirling ocean. That should be a lesson to us. There is a big ocean of air out there and in our small airplanes we are like a small molecule in it. So most importantly, if you want your passengers to fly with you again, then you want to do everything possible to keep them comfortable and that means trying to avoid at best or minimize in the least, turbulence.

The best way to minimize it is to not come in contact with it. This means studying and becoming as knowledgeable as you can about weather phenomena. There are many good aviation weather books, and I would read as many of them as you can. Some of the ones that I have found most useful are "Severe Weather Flying" by Dennis Newton and "Weather Flying" by Robert Buck. The purpose of reading those books is not to go out

and fly the types of weather discussed, but to understand the conditions that create turbulent weather and thus avoid flying it. This applies to both VFR and IFR pilots. The instrument rating allows you to become competent flying in some instrument conditions, but at least from my experience, many types of instrument conditions should not be flown in our type of airplanes. Becoming a “weather expert” and applying good aeronautical decision making skills to that knowledge will keep you from taking unnecessary risks with the weather. Rarely, if ever, should you be surprised by the weather you have chosen to fly.

Weather comes in basically two types: convective and non convective. This was not something I fully understood when I got my Private License. Understanding when each is likely to occur will go a long way toward staying clear of, or at least being able to mitigate the effects of, turbulence. Obviously, you want to stay clear of convective activity (thunderstorms), and certainly you don’t want to fly your airplane IMC in it. With the up to date weather products available to us in flight today, there is no reason to end up in heavy convective activity. By far, it’s best to fly early in the morning and be done flying by noon, especially in the mountains and the mid west.

So, we’ve done our preflight planning, and determine that while it is safe to go, the probability is that along our route of flight we can expect some turbulence. This is discussed with your passengers, if any. You tell them the expected magnitude and your plan to mitigate it. They agree to go.

About a half hour into the flight and on the autopilot you experience light chop that becomes increasingly worse. The first method of mitigation is to disconnect the autopilot and “hand fly” the airplane. We can hand fly the airplane much, much better than the autopilot can fly it, however, it is very important not to over control. Go with the flow and remember, “less is better” when it comes to control movements. I often see people making the ride much worse by trying to correct for every bump. Don’t. There comes a time when even the most proficient pilot can’t smooth the ride satisfactorily.

The next method of mitigation is to climb. Oftentimes a few thousand feet can make all the difference. If the turbulence is eliminated, then go back to the autopilot. If it’s not, but it is not too uncomfortable, then continue to hand fly.

If you’ve run out of an acceptable altitude to which to climb, then it’s time to reduce speed gradually to maneuvering speed. This will “soften” the effects of the bumps both on the passengers and the airplane. Depending on the severity of the turbulence and passenger discomfort, it might be time to consider calling it a day and landing.

Should turbulence be any worse than just discussed (and that is just below moderate), I would recommend not having passengers on board. In addition to fearful passengers, the stress on the pilot worrying about his passengers is a distraction that can impact flying performance.

For moderate turbulence, there are additional mitigations. Leaving Farmington, New Mexico one cold winter morning on the way to a Cleveland band venue in a student's Ovation, the winds were 35 gusting to 45 on takeoff. There are mountains to the East on the way to Oklahoma City, our next stop. The Ovation is a great airplane, but climbing to 17,000 feet is a chore. We stayed at 15,000 feet and had moderate or greater turbulence that was expected. So, the next method of mitigation is to extend the gear. This acts as a rudder of sorts and stabilizes the plane. And finally, as a last method of mitigation for those who have them, extending the speed brakes also acts to stabilize the plane. We alternately were extending and retracting both the gear and speed brakes for nearly 5 hours in the worst turbulence I have experienced over a prolonged period of time in a light airplane.

While flying in smooth air is like I would imagine a magic carpet ride to be, the above turbulence mitigate techniques will go a long way towards acquiring a passenger following on those days where a less proficient pilot might lose such a following. Know your weather and turbulence signals and chose your flying days wisely.

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