# *FLYING LESSONS* for August 6, 2020

*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.**

*FLYING LESSONS* is an independent product of MASTERY FLIGHT TRAINING, INC. www.mastery-flight-training.com

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## *This week's LESSONS:*

**Last weekend** I spoke with a pilot, repeating a conversation I have fairly often. The pilot has owned a nearly 60-year-old airplane for almost 20 years, and has about 1500 hours experience in it. The aircraft has a one-axis autopilot installed, that is, a "wing leveler" that can also track a navigation signal but does not have modes to maintain attitude or altitude, or to track a glide path or control rate of descent.

**The pilot** is instrument rated and regularly flies in instrument meteorological conditions (IMC). Very frequently he flies approaches using the autopilot to track the lateral navigation signal while manually controlling his descent. He is very comfortable with this technique, he told me.

**Yet, he said,** he is getting older (as are well all) and feels he needs a new autopilot that has altitude, attitude and vertical navigation modes to continue to safely fly approaches under IFR. The reason he called? He's concerned about his approach-flying skills going forward, and about the complexity and reliability of modern autopilots. He's also dismayed that such an autopilot, including installation, would cost at least half the current value of his airplane and will add only a fraction of that cost to its resale value. He asked me the usual question: ***"What would* I *do?"***

**First,** I told him that a new-technology autopilot would be far less likely to fail than his tried-and-true, but decades-old equipment. The "new factor" hazard is mainly a function of his ability to master the autopilot's operation and how it interfaces with other avionics installed in his aircraft. I reviewed the choices available to him—they're all about the same price, especially when you consider the labor for installation. I cannot, of course, resolve the disparities between this cost and the airplane's value before or after the modification.

**That said,** the comparative simplicity of his aging autopilot and the (perhaps) surprising continued support for repairing it makes continuing to use it a viable alternative if he finds a newer system beyond his reach (or threshold-of-pain) financially. He's been using it to his satisfaction for a very long time and that probably has not changed overnight.

**I suggested** he take ***only 5%*** of the roughly $30,000 or more he'd expect to pay to install a new autopilot in his $60,000 airplane, split that amount into $300 increments, and **log at least three hours of dual instruction with an instrument instructor every year for five years**, splitting the time between integrated use of his existing autopilot (i.e., practice what he's been doing) and hand-flying in both full- and partial-panel flight. This could be done as a solid, two-hour Instrument Proficiency Check (IPC) at the beginning of his flying season in the spring each year, and a one-hour refresher about six months later. Along the way he can re-evaluate his performance and decide whether to increase personal minimums or stop flying IFR altogether if he is no longer comfortable. At the end of five years he'll be five years older than his is now and

have spent only 5% of the projected new-autopilot cost (plus fuel for the training flights); he can make another decision what to do for his flying future then.

See https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_61-98D.pdf

**The capability** and functionality of today's new autopilots is phenomenal. Autopilots are great workload reducers, and make it easier to see the "big picture" when flying a complex procedure. They make perfect sense for many airplane owners. We need people to buy these things and have them installed to keep the manufacturers and shops in business to support older equipment and continue innovating for the future. I understand *why* it costs so much to buy autopilots and have them installed, and I understand *why* they do not increase the airplane's value by the amount it takes to buy it and have it put in. I don't suggest pilots avoid autopilot installation on the basis of price and depreciation alone.

**But part** of my training philosophy is that ***you should never let an autopilot take you somewhere you're not comfortable flying by hand***. Autopilots have very little redundancy in light airplanes and they sometimes do fail. We've got to be ready if they do, and even when they work perfectly we should not use them to compensate for our own shortcomings. So when a pilot is considering an upgrade based primarily on his or her ability to fly the airplane, I suggest a program of instruction even (or especially) if that pilot ultimately chooses to upgrade the aircraft.

**Capability doesn't come cheap.** It comes from solid investment in new equipment, and proper maintenance of the equipment you already have. But ***the greatest capability comes at the lowest cost***—the cost of experience and regular instruction. Fly as much as you can. Train enough to make it count. To borrow the slogan of my past employer FlightSafety International, "**the best safety device in an aircraft is a well-trained pilot.**"

**I guess it's time** for me to schedule my own next training event!

See https://www.flightsafety.com/

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



# Debrief: Readers write about recent *FLYING LESSONS:*

Reader Les Ferguy asks:

> [I] have followed your publications with great interest. I have started flying an Eurostar EV97. How [do I] find or establish the best landing attitude to prevent possibility of [a] nose or tail strike.

Hi, Les. I don't have any experience with the EV97 or similar Light Sport aircraft. So my first response is to ask your instructor or other pilots of the type. That said, think about what it looks and feels like just as the aircraft lifts off the runway during takeoff. The Eurostar may lift off "on its own" or "when it's ready." But I bet you are being (or have been) trained to hold the elevator control back *just this far* so the nose comes up *just this far* for liftoff. If it's similar to many light airplanes you apply elevator pressure to bring the forward edge of the cowling up so it appears to be on or slightly above the horizon line. This is your liftoff attitude; the aircraft lifts off

as soon as it exceeds stall speed and generates enough weight to exceed aircraft weight under the existing conditions.

It's also the touchdown attitude, the *sight picture* that results when the main wheels touch down just as the aircraft stalls under current conditions. Optimally this stall results of a roundout or flare you time to reach this attitude and this result as the main wheels are just inches above the pavement. This attitude holds the nosewheel off but is not so steep that the tail scrapes the runway.

In other words, make the landing look like the takeoff. To extend the time you spend at this attitude—giving you more time to learn what it looks like—a common instructional technique is find a long runway and fly its entire length at just above the lowest flyable speed…what we used to learn as ***flight at minimum controllable airspeed***. You'll hear the stall warning, experience the control feel at this rate of air flow, and reinforce what it looks like to be at a speed that, if you reduce power or increase angle of attack any more, the aircraft will stall. Be sure to begin your go-around well before the end of the runway and at a point where you'll have no trouble clearing obstacles.

Alternately, begin a takeoff. Just before you reach liftoff speed and attitude, reduce power to hold that speed and attitude as you continue down the runway—again extending the time you can experience and learn this attitude and the required control inputs, and again, being sure to either apply power and lift off or reduce power and abort the takeoff with plenty of runway to spare.

At least that's how I'd approach helping ingrain the landing attitude if I was your flight instructor. Readers, if you have more ideas and/or personal experience with the EV97 or similar aircraft, let us learn from you. And Les, please let me know what finally works for you.

Reader Ron Koyich writes about recent *LESSONS* describing somatogravic illusion:

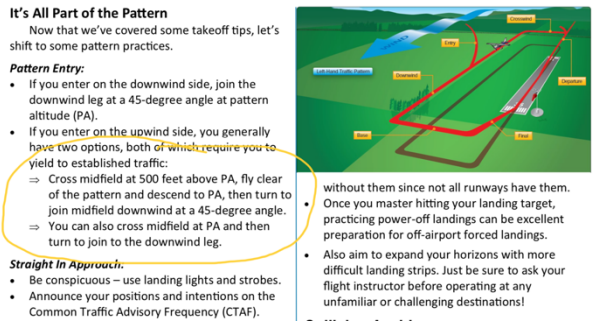
> G'day, Tom. [Last] Sunday [was] the 30th anniversary of a King Air crash in Queensland. There is an article in The Australian newspaper about the daughter of one of the passengers trying to find out details and the circumstances of her father's death.
>
> There few a few inaccuracies in the article, such as saying the plane took on Avgas, before its departure. So I looked up the ATSB report. The plane was refueled with jet fuel as it should have been, and the most likely cause was our old enemy, somatogravic illusion, which I know you have dealt with before, but which is important enough for [continued] review for your readers.

The ATSB (Australian Transport Safety Bureau)'s conclusion (on page 11 of the report) describes a wings-level, shallow descent into terrain at a speed somewhat higher than normal initial climb speed, following a night takeoff with few ground references. In short, it's a textbook example of somatogravic ("false climb") illusion. Thanks for adding this to our knowledge base, Ron.

See:
https://www.mastery-flight-training.com/20200723-flying-lessons.pdf
https://www.atsb.gov.au/media/5226668/199003089.pdf

Reader William Herrmann asks a question about a topic we've discussed frequently in *FLYING LESSONS*, collision avoidance in the visual traffic pattern:

> Tom: [Here] is a screen shot of the FAASTeam flyer, "Pattern Precision." I am surprised by the advice, "...if entering (the traffic pattern) on the upwind side... cross midfield at 500 feet above PA [pattern altitude]." But PA +500 feet is the altitude turbine aircraft are to fly pattern altitude. I instruct [to] cross midfield at PA plus 1000 feet, proceed approximately 1.5 miles away from airport, then a descending 270 turn to pattern altitude to join the downwind leg. Your thoughts, please.



**It's All Part of the Pattern**

Now that we've covered some takeoff tips, let's shift to some pattern practices.

***Pattern Entry:***

- If you enter on the downwind side, join the downwind leg at a 45-degree angle at pattern altitude (PA).
- If you enter on the upwind side, you generally have two options, both of which require you to yield to established traffic:
  - ⇒ Cross midfield at 500 feet above PA, fly clear of the pattern and descend to PA, then turn to join midfield downwind at a 45-degree angle.
  - ⇒ You can also cross midfield at PA and then turn to join to the downwind leg.

***Straight In Approach:***

- Be conspicuous – use landing lights and strobes.
- Announce your positions and intentions on the Common Traffic Advisory Frequency (CTAF).



without them since not all runways have them.

- Once you master hitting your landing target, practicing power-off landings can be excellent preparation for off-airport forced landings.
- Also aim to expand your horizons with more difficult landing strips. Just be sure to ask your flight instructor before operating at any unfamiliar or challenging destinations!

I learned the “PA +500 feet” crossover technique when I began learning to fly (I’m still learning) in the mid-1980s. That was a time before a 1500-foot Above Ground Level (AGL) turbine airplane pattern was commonly published in the then-Airport/Facilities Directory (now the Chart Supplement).

The good news is that, using this technique, the pilot is crossing the downwind leg at a right angle and should have a mainly unobstructed view of the downwind and airplanes entering on an extended downwind or a 45° entry to the downwind. At the same time the turbine airplane on downwind would have the crossing aircraft forward in the windscreen while either on downwind or on that 45°-to-downwind entry.

So pilots of both aircraft have the maximum ability to see and avoid the other aircraft…*if* they are looking out the window and scanning in the right direction. If the turbine airplane is already positioned on downwind then it has the right-of-way. If the turbine airplane is on a 45° entry to downwind it is not yet established *in* the pattern, so neither airplane has regulatory right-of-way over the other. Of course in practice both pilots should be actively looking for other aircraft and maneuvering as necessary to avoid potential collisions.

That said, overflying at 1000 AGL, flying well clear of the pattern and then making a 45° entry to the downwind as you suggest would reduce chances of a collision even more. It seems to me a safer alternative when flying at an airport where turbine operations may occur. Thanks, William. Readers, what do you think?

See https://medium.com/faa/pattern-precision-cdf95fa76d8d

Questions? Comments? You know the drill: mastery.flight.training@cox.net.

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## Free Weather Courses

*From NAFInet.org:*

The Partnership to Enhance General Aviation Safety, Accessibility, and Sustainability (PEGASAS) Center of Excellence research team from Western Michigan University and Iowa State University have partnered with the FAA Weather Technology in the Cockpit NexGen Research Program and FLY8MA Ground School to develop **aviation weather lessons for flight instructors and the GA community**. These lessons are available free and are sponsored by The FAA Weather Technology in the Cockpit (WTIC) NexGen Program.

The WeatherXplore mini-lessons are 10 short weather lessons with real-world scenarios of weather phenomenon [sic] and weather products a General Aviation pilot may encounter. The complete lessons can be accessed **here**. Each lesson provides a short quiz with a completion certificate. If an instructor would like to access the videos to embed or share with students as an instructional aid they can be accessed **here.**

See:
https://fly8ma.com/courses/weatherxplore-course/
https://www.youtube.com/channel/UC6AI3ivlsJrr2Qke6shlzGw

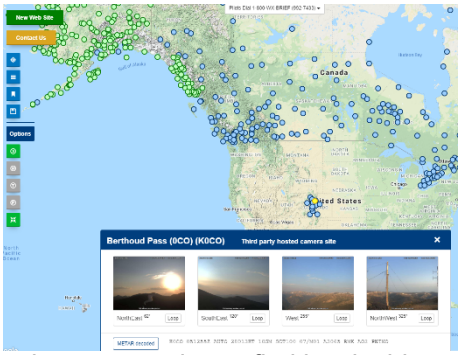
## New Colorado weather cams

*From the General Aviation Joint Steering Committee (GA-JSC):*

Last week, we finished installing the 13 weather cameras that were planned for this year, and we hope to double that by next year. We placed cameras in areas of the Rockies where we can offer a clear view for a good distance from multiple angles, where pilots frequently travel. When pilots

come to our website to look at near real-time photos of specific points on their flight path, they can also get radar images and other information to supplement the images.




What's unique about Colorado is that we are doing this collaboratively with the state, which funded the program through a reimbursable agreement. We're teaching local officials how to maintain the equipment after we're done installing it. We plan to officially kick off the Colorado program in a couple weeks.

In Alaska, we get about 300,000 hits a week on images from our 230 weather camera sites because pilots can check out remote terrain such as coastlines where weather changes quickly. The cameras have contributed to improved safety records in Alaska. We think Colorado aviators are going to find it valuable too. The National Transportation Safety Board and state aviation officials have been eager for us to expand the program.

Our team is looking at a number of improvements to the program, including higher quality cameras with 360-degree views, and technology that will determine cloud heights and additional information. We also plan to bring the program to additional locations where it's needed most. We expect to start installing 23 camera sites in Hawaii beginning this fall.

Teri L. Bristol
ATO Chief Operating Officer

Find them on the FAA Aviation Weather Cameras website.

See https://avcams.faa.gov/

## 10 Questions

The National Association of Flight Instructors has begun a YouTube series in which NAFI's John Neihaus asks instructors 10 questions about their careers and *LESSONS* they've learned that can benefit newer CFIs. One goal of the 10 Questions Challenge, Neihaus states, is to find "the common threads of flight instructor success, and what it means to utilize that experience while transitioning into other aspects of aviation like flight school ownership, airline pilot, author, NAFI Master Instructor, and anything else a pilot dreams to become." I was honored to be interviewed for this series in a program that was posted last week. If you're interested, here's my interview and a link to the full NAFI 10 Questions Challenge series. Thank you, NAFI, for asking me to participate.

NATIONAL ASSOCIATION OF FLIGHT INSTRUCTORS
*Excellence in Flight Instruction*

See:
https://www.youtube.com/watch?v=GuC4GCoKCNo
https://www.nafinet.org/index.php?option=com_content&view=article&id=137:soaw-nafi-video&catid=20:site-content

Share safer skies. Forward *FLYING LESSONS* to a friend

**Pursue *Mastery of Flight.***

Thomas P. Turner, M.S. Aviation Safety
Flight Instructor Hall of Fame 2015 Inductee
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2008 FAA Central Region CFI of the Year
Three-time Master CFI