



FLYING LESSONS for February 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 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.**

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This week's LESSONS:

Engine fire in flight. It's one of the most frightening emergency scenarios. It rarely happens—but if it does, you need to know exactly what to do, and how to do it.

There is little in the engine compartment that will burn except the contents of fuel and oil lines. But those fires are as hazardous as we fear. Smoke and hazardous gases can enter the cabin in single-engine airplanes and in pressurized twins, impairing vision and breathing or even overcoming the pilot. If a fire goes unchecked, however, it may burn through engine or even structural components, making matters far, far worse. Engine fires have been known to burn through firewalls, letting flames enter the cockpit of single-engine airplanes and even burn through wing spars in twin-engine airplanes.

The Pilot's Operating Handbook (POH) or Airplane Flying Manual (AFM) for most types of aircraft contains a simple but critical checklist for limiting the damage and avoiding the hazards of an engine failure in flight. With variations for the specific aircraft—*check the manual for each type you fly*—the Engine Fire in Flight checklist tells us to:

1. **Stop the smoke.** This could be shutting off the heater, closing a firewall shutoff, or pulling a pressurization cutoff control, to prevent or limit contamination of cabin air.
2. **Fuel selector: OFF.** This prevents additional fuel from entering the engine compartment; cutting off most of the combustible fluid (you can't do anything about the oil).
3. **Mixture: OFF.** This completes the fuel cutoff steps.
4. **Cabin: Ventilate.** Open windows, crack open doors, open cabin pressurization valves...whatever is needed to get toxic and choking smoke out of the airplane.

Most POHs call for immediate shutdown of the engine at the first sign of an engine fire. Others have different recommendations—some advising to fly the burning airplane to a point from which landing is assured, and only then shutting off the engine—or they may have no Engine Fire in Flight checklist at all.

You could probably debate the merits of shutting the engine down immediately upon detecting an engine fire in flight versus flying with a burning engine using whatever power you have remaining until you're within gliding range of a runway or a landing field. Me, I'm not too keen on keeping an engine fire alive in flight, and would rather shut it off *now* and then worry about precisely where I'll land...just as if handed an engine failure in flight. You may think otherwise.

The key is to **think about these things now**, in a comfortable chair at home or at the office, and decide what you'll do before you have to make a choice under the extreme stress of an engine fire in your airplane in flight.

If the fire goes out, you have initiated a total engine shutdown in flight. Perform the Glide and Landing without Power procedures in single-engine airplanes, or the Engine Securing and Single-Engine Approach and Landing procedures in twins. Each of these procedures has short memory steps of their own.

To be ready if an engine fire happens to you I suggest this exercise:

1. Sit in your airplane on the ground with the engine shut down. Sitting in the hangar or in the tiedowns on the ramp is fine.
2. Do not start the engine, but put all controls in their normal inflight positions: throttle forward, propeller control forward, mixture forward, battery and alternator switches on, fuel selector on one of the tanks. **Caution:** Do not move the gear handle in retractable gear airplanes.
3. From memory, complete the Engine Fire in Flight checklist steps. Actually move the controls, shutting off the fuel, pulling the mixture control, etc...anything but landing gear, if it's a retract.
4. When you're complete, pull out the POH and consult the checklist. See if you've completed all memory items of the Engine Fire in Flight checklist. Score your performance.
5. Reset the controls and practice the procedure two or three more times or until you have it memorized.
6. Use the Shutdown/Securing checklist to secure the airplane at the end of your practice.
7. Repeat the exercise in a month to see if you remember all the steps, and then every few months for as long as you fly the aircraft.

An engine fire in flight is one of the scariest and most dangerous scenarios you face as a pilot. It's very unlikely to occur. But you have to be ready to act correctly without having to think about it if it does.

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

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See <https://pilotworkshop.com>

Debrief: Readers write about recent *FLYING LESSONS*:

Reader Stephen Vook writes:

I will see your friend's [student solo cross country in Hawaii](#) (where I have many hours of flying and picked up my Glider and ASES tickets) and raise you a student solo cross country on Guam. PGUM>PGWT>PGSN>PGUM.

It looks like 112 nm from KGUM (Guam) to PGSN (Saipan), virtually all over water. Such trips would require great confidence and preparation—for the endorsing instructor as well as the student. Thanks, Stephen.

See <https://www.mastery-flight-training.com/20210121-flying-lessons.pdf>

Reader Henry Sickels writes about [last week's LESSON](#) and *FLYING LESSONS* in general:

These fatal accidents reminds me of two sayings that keep me in check and safety-wise. Dirty Harry in the movie Magnum Force is quoted "A man (person) needs to know his limitations." As a Vietnam veteran, the general attitude was that "it is not important unless they are shooting at you."

The bottom line is: *If it causes you concern or stresses you then you do not need to go there.* It is simply not worth it or the risk. You can always find a better job or task that does not put you in jeopardy. There are companies or flight opportunities that will reduce the risk of exceeding your limitations. YOU are the Pilot in Command and YOU have the final authority of YOUR limitations.

Good advice for all pilots-in-command, whether for a job or for personal and business flying. Thank you, Henry.

See <https://www.mastery-flight-training.com/20210211-flying-lessons.pdf>

Reader and instructor Brian Sagi comments on a Debrief item from last week:

Regarding last minute ATC changes, I like to introduce such changes, and the challenges they create, as part of flight training. The response of most pilots to a last-minute change of approach is predictable – over saturation and some loss of situational awareness. There is a simple solution to this: **ask ATC for help.** "Social Approach, Bonanza 08S is not ready for the approach. Requesting vectors while we set up." ATC will often be happy to help. It may "cost" you a few more minutes, and you may even lose "you place in line" for the approach. It is well worth it! Accepting an approach when you are not fully ready is a recipe for a slippery slope of getting farther and farther behind the airplan and the situation.

"Delaying vectors" is a good plan for breaking off an approach if you're not ready, as we discussed last week. We all have the authority to say "unable." It's even better if we say "Unable, what I'd like to do is...." Thank you, Brian.

On the recurring topic of type-specificity in flying aircraft career flight instructor Dan Bindl, who for many years taught business aircraft pilots at a major simulation facility in Florida, writes about flying at the very light end of the aircraft spectrum:

Thank you again for very important information! Let me share a couple ultralight thoughts:

If a human has been certified, to be a certified pilot, in a certified airplane, it is possible, that an ultralight could also have several different emergency 'behaviors.' Features such as an engine and its propeller mounted on top (as compared to an engine and its propeller mounted up front on most certified airframes) and/or geared engines, could produce responses and/or corrective actions, in the case of an "engine failure" emergency that could be different than the behaviors of certified pilots, in certified airplanes.

For example, if an engine is mounted on top of an ultralight, and this uncertified engine should fail, the ultralight would probably pitch up. In the case of the certified airplane with the certified engine and propeller mounted on the front of the airframe, an engine failure will generate a pitch down, leading to a glide. If the



ultralight pitched up as a result of an engine failure it could be a surprise to a certified pilot, because it would probably result in decreasing airspeeds.

Another example: if an engine failure should occur in an ultralight with a geared engine, in many cases its propeller would not continue to windmill, therefore influencing the restart considerations.

Prepare yourself to fly the airframe, and its unique features, safely!

Your final statement applies to any aircraft regardless of size, configuration and certification standard. As I write in the fine print at the head of each *FLYING LESSONS* online posting:

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.

Thank you, Dan.

Reader Amnon Shmueli, a past Israeli Air Force pilot and instructor and now 737 pilot, writes about the [February 4 *FLYING LESSONS Weekly*](#) prompted by inflight shutdown of the wrong engine on a U.S. Air Force reconnaissance jet:

It was very interesting *LESSON* and I couldn't agree with more about **two super-important issues: time and confirmation.**

Some 15 years ago I flew the C-130 on a training mission for the flight engineers. They practice a simulated engine failure and then go through the procedure, all is simulated. So just as the #3 engine was simulated down, there was a real problem with #2. I felt power loss and then the Instructor started to dictate orders as to put that engine down. But...he was wrong. I remember that I told the crew, not too aggressively, *please don't do anything...* let us watch carefully the engines and find out what is wrong. And so we did, and **that pause did all the difference.**

The second point concerning **confirmation.** As an airliner for the last 8 years (and I hope for the years to come, since we are grounded from 17.3.21) this is a heavy issue! It is defined exactly when [confirmation] is needed, how to perform it, and surely it is well practiced (Boeing philosophy).

See <https://www.mastery-flight-training.com/20210204-flying-lessons.pdf>

Thank you, Amnon. Good to hear from you again. Reader Cunningham adds:

After reading this morning's Debrief concerning the E-11A accident, I ran across [\[this article\]](#) that might add some useful background to this terrible circumstance. I certainly can't vouch for its correctness, but if what the article suggests is true, it might shed some light on the unfortunate decisions made preceding the crash.

See <https://www.thedrive.com/the-war-zone/32016/e-11a-pilots-died-flying-an-aircraft-from-a-fleet-so-small-none-are-in-the-u-s-for-training>

And reader Ian O'Connell continues:

Reading this week's *FLYING LESSONS* I was struck by the number of people who depicted military aviators as following procedures, regardless of the situation. That is very sad and I have to think this is something that has changed in the last 30 years. Going through all my Air Force flight training (F-4 Electronic Warfare Officer) and all my operational flying, we always were trained to "**aviate, navigate, communicate**" in an emergency. Any pilot or crew with any experience always verified the situation before taking action. I think the one situation where reaction had to take precedence was a flight control malfunction while flying at low level, in which case gaining altitude was a great way to get to a place to evaluate the situation in more detail. Of course, older aircraft like the F-4 had pretty straight-forward instruments, nothing like the EICAS display in the E-11. As you said, *"technology doesn't always mean an improvement in situational awareness and accident avoidance."*

In the aircrew's defense, Dave and Ian, a knowledgeable *FLYING LESSONS* Debriefing indicated in the February 4 *LESSONS* that ambiguous and potentially misleading instrument indications may have been a factor in the E-11A crash. I, too, was trained to USAF combat crew standards, albeit in [Minuteman ICBM](#) operations ("I learned a lot about flying while 60 feet underground"). We were taught strict adherence to checklists. But we were also taught extensive systems knowledge so we would know when it was appropriate to be following a specific procedure. Aircrew training standards may have indeed changed to reflect more recent cultural attitudes toward "knowing how things work." But I suspect the pilots' relative lack of time in the actual

airplane (despite, I'm sure, extensive simulator training) and the possibility of unique and possibly confusing status indications as described by the USAF itself, may have set the crew up for failure.

"Back in the day" in missiles trainers and evaluators had ongoing friction about whether to make operations and techniques as simple and straightforward as possible, or if it shouldn't be easy and (as they said all the time) we should not "spoon-feed the crews." These folks wanted to make us *earn* safe and efficient operation. **This same argument applies to civil airplanes and especially single-pilot operations.** As we discussed in recent *LESSONS* some pilots feel they don't want flying to be made easy for them, that they enjoy the challenges and revel in the accomplishment of mastering an aircraft. "[Do We Want Flying to be Hard or Easy?](#)" by *Air Facts Journal* editor (and *FLYING LESSONS* reader) John Zimmerman further explores the debate.

Readers, what do you think?

See:

<https://www.nps.gov/articles/minuteman-ii-missile.htm>

<https://airfactsjournal.com/2021/02/do-we-want-flying-to-be-hard-or-easy/>

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Reader Michael Baum, who for many years has spearheaded a series of Model Code of Conduct for numerous flight and flight support professionals, announces release of the Designated Pilot Examiner (DPE) Model Code of Conduct. His [press release](#) states:

Developed by a team of aviation professionals, and drawing upon decades of research and experience, the Code offers recommendations to advance professionalism and safety in the conduct of practical tests. The manner in which DPEs undertake their responsibilities, and the examples they set, impact the safety culture of aviation. The Code of Conduct will help DPEs serve as role models for the entire aviation community.

The full Aviators' Model Codes of Conduct series is [on the Secureav website](#).

See:

<https://www.secureav.com/Announcement-DPEMCC-Released.pdf>

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