



FLYING LESSONS for May 17, 2018

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:

A reader who asks to be identified only as “Steve T” sent a FLYING LESSONS [donation](#) this week with this note:

I am a very green, very new student pilot and have been anxious to understand the anomalies in my understanding of flight. *Stick and Rudder* helps tremendously, and my CFI thinks it’s a good book to read. I see many things in it I want to try in the cockpit with him, and he’s agreed to help work on a list for our next flying lesson. Incidentally, **I had my first emergency off field landing in my third lesson: power failure on takeoff.**

See https://www.paypal.com/donate/?token=FMNfIEKisue5X9z8CYFRhea7ZI_kS4LGDd88scPxV7xITX6zaX_7b1achRINbmfQmghm&country.x=US&locale.x=US

That’s a pretty big “incidentally,” so I asked the reader for more about his experience. He replied:

I am learning in a [Piper] Cherokee.

The previous week to our flight, a soloing student pilot had noted a loss of power during the landing stage, which was duly noted, and **the engine examined** by the A&P man at our field. No anomalies were found, and apparently the issue was **attributed to the carb deicing [heat] not being on** - despite, as my CFI says, him noting that **there was no chance of carb icing in flight conditions that day.**

The plane was returned to service, and my CFI used it for three hours before we started our lesson.

Everything checked out normally before flight, all engine gauges were well in the green, both mags worked perfectly. I took off at nominal 2700 RPM on the prop. I had asked to feel the effects of flap at takeoff, so we’d added the first notch - a factor my CFI said afterwards meant we were higher and safer than we might have been [taking off flaps up].

We got to **around 600 feet**, and I was told to begin to trim the plane for our climb **when we lost power**. Revs dropped back to 2000 RPM. I carried on flying, my CFI told me to **pitch down**, and I initiated a gentle bank to the left while he tried to manipulate the controls to get more RPM. Nothing helped for around 15 seconds, at which point we could note **we were well beyond glide to the airport, and too low to attempt to fly on to** [a nearby airport], which is probably 250 feet higher than [the one we were departing], though only two miles away. At which point I handed control of the plane to my CFI, who nominated our landing spot, and took us safely to a grass off-field landing on a rising slope. We missed every groundhog burrow too.

I believe it was a classic approach under the circumstances. My CFI was also grateful I don’t weigh much ☺. No injuries to anyone, and the plane is fine too.

Investigation reveals **the most likely cause of our experience was a bad exhaust valve** that was coated with carbon/exhaust debris and was not opening or closing completely, thus limiting the power of the #4 cylinder. That back pressure prevented the other cylinders from being able to develop full power. [It was] a condition that was **a result of normal wear and tear and age.**

I am convinced of **the vital need for engine monitoring systems**, personally. I am, as you can imagine, now passionately interested in power-off landing.

I wrote back: Excellent summation of a frightening event. There are several very good **LESSONS** there, and some good piloting decisions. Is there anything that in retrospect you think you (or your CFI, or the mechanic) should have done differently?

The student pilot (remember, this happened on his *third lesson*) replied:

Thank you. Well obviously, I think *the A&P guy should have been far more interested in the power loss incident previously noted*. I was watching an online seminar recently where an A&P mechanic was making the case that basically "shit happens" and you can't account for some incidents, which, as a professional engineer I personally find unacceptable. I am prepared to accept that stuff happens that you can't explain, but *you need then to pass the problem higher up*.

And I really, really think that there is room, even in a Cherokee for an **EMS [Engine Management System] with a data logging function**, because I am pretty sure the issue would have been visible as a change in EGT from the [cylinders] in question. I particularly like MGL Avionics' stuff.

I can't say I feel my CFI *could* have done anything, and I was pleased that **there wasn't the slightest hint of panic or fear**, really from either of us. He can't believe I was as cool as I was, and suggested I might make a good test pilot when I get my license. We are, however, now bonded like brothers....

You have my permission to use the story - it has to be public knowledge. **We immediately entered a teardrop attempt to return, and aborted under control when it wasn't feasible or safe.**

See:

https://www.paypal.com/donate/?token=fMNftEKjsue5X9z8CYFRhea7ZI_kS4LGDd88scPxVj7xITyX6zaX_7b1achRINbmfQmghm&country.x=US&locale.x=US
http://www.mglavionics.com/html/xtreme_ems.html

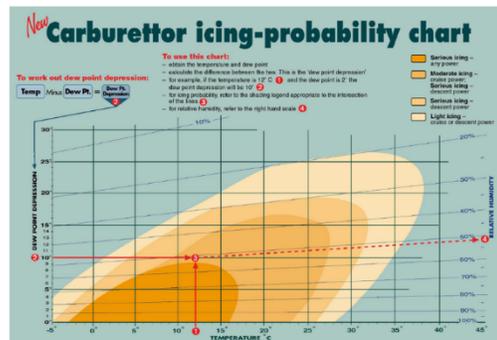
Some comments on your power loss experience:

- First and foremost, **great job both by your instructor**, and from what you relate he said about your response, **you as well**. It's gratifying that you turn this into a learning experience for yourself and for us as well, instead of turning away from the grounded Cherokee and never looking at airplanes again. Perhaps you do have a future as a test pilot...or a great flight instructor.
- **"...the engine examined by the A&P man at our field. No anomalies were found, and apparently the issue was attributed to the carb deicing [heat] not being on - despite, as my CFI says, him noting that there was no chance of carb icing in flight conditions that day."**

Carb icing occurs at far higher temperatures than many pilots suspect—it is a spring/autumn and even summertime phenomenon, more related to humidity than the outside air temperature alone. The Australian Transport Safety Bureau ([ATSB](#)) has recently updated its [Carburetor Icing Probability Chart](#). It is an extremely helpful guide to predicting the likelihood of carb ice at various power settings.

That said, it sounds from your report that the mechanic and your instructor had made this evaluation and determined conditions were not right for carburetor icing. In that case, they fell into the collective trap of noting a problem and, absent any other obvious cause, choosing an explanation that (1) would leave no evidence and (2) let them (collectively) feel good about doing nothing further to investigate the cause.

This is a common decision-making outcome ("If you choose not to decide you still have made a choice"—Rene Descartes, and also [Rush](#)). It affects all disciplines, not just aviation—read one of my favorite books of all time, Thomas Kuhn's [The Structure of Scientific Revolutions](#), which among many things proves just how much a nerd I really am, and almost sent me down a path to become a professor of the history and philosophy of science instead of pursuing this airplane stuff.



Humans seek simple solutions, and often filter facts to make our solutions fit. Now, that's kind of what I do sometimes with *FLYING LESSONS*. But my goal is **to introduce questions and alternatives**, not necessarily find the definitive answers when we don't yet have all the facts. I hope readers see it that way. Anyway, your mechanic and instructor saw nothing obvious to explain the earlier indications, and being quite human they chose to accept a solution without investigating further.

However, as a pilot for over 30 years (and a homeowner, and automobile owner, and other things), I've found that **squawks very rarely fix themselves**. Instead, **they tend to reappear and get worse at the worst possible moment**.

See:

https://www.atsb.gov.au/media/47763/carb_icing.pdf

<https://www.bing.com/search?q=youtube+free+will+rush&src=IE-TopResult&FORM=IETR02&conversationid=>

https://en.wikipedia.org/wiki/The_Structure_of_Scientific_Revolutions

- “We got to **around 600 feet**, and I was told to begin to trim the plane for our climb when **we lost power**. Revs dropped back to 2000 RPM....”

Most emergency training in light piston airplanes focuses on engine failures—*total* engine failures. Rarely do we present a partial loss of power. Yet as a landmark study by the Australian Transport Safety Bureau (yes those great Australians again) found that partial power loss is **three times more likely** than total loss of thrust during and immediately after takeoff. Recognizing and responding to a partial loss of power is more challenging because the loss of thrust is less obvious, and it may make you think you have more options than you do because, hey, not *all* of the power is gone. I commented on the ATSB study in a [2013 FLYING LESSONS](#), and of course you may [read the original study](#).

See:

www.atsb.gov.au

http://www.mastery-flight-training.com/20130502flying_lessons.pdf

<https://www.atsb.gov.au/publications/2010/avoidable-3-ar-2010-055.aspx>

- “...my CFI told me to **pitch down**, and I initiated a gentle bank to the left while he tried to manipulate the controls to get more RPM. Nothing helped for around 15 seconds, at which point we could note **we were well beyond glide to the airport, and too low to attempt to fly on [a nearby airport]....**”

Smart instructor! *FLYING LESSONS* readers should be familiar with the need to **PUSH and HOLD** when experiencing a loss of power (partial or total) immediately after takeoff, as well as the idea of briefing a departure alternate, that is, what airport you'll aim for if there is a problem that requires you to land but that permits (or may permit) landing on an airport. [I wrote about both last summer](#)—the example concerns a twin-engine airplane, but what is a twin with one engine inoperative except an airplane experiencing a partial loss of power?

We've also reviewed the idea of perhaps *trying* to turn toward a better landing spot in the event of power loss, but to pre-establish a minimum altitude that, upon reaching, you stop turning and accept the best option that is generally straight ahead. I covered that in my notes about a webinar called “The Improbable Turn,” in red font starting on page 2 of [this edition](#).

It sounds like your instructor is teaching those same *LESSONS*. You are extremely fortunate.

See:

<http://www.mastery-flight-training.com/20170713-flying-lessons.pdf>

<http://www.mastery-flight-training.com/20180322-flying-lessons.pdf>

- “I am convinced of **the vital need for engine monitoring systems....**”

I agree. But installing the monitor alone will not allow you to detect discrepancies that may lead to failure. Engine monitors and data logging requires someone to actually monitor and review the data, someone who knows how to interpret it. There is a huge gap in pilot training that does not usually develop this sort of expertise. For example, what indications might you expect to have seen on that cylinder prior to the time power was lost? What (if anything) might you have seen on the EGT (exhaust gas temperature) and/or CHT (cylinder head temperature) that your instructor could have told the mechanic that would have prompted him/her to investigate further?

- “...there wasn't the slightest hint of panic or fear....”

That's a sign of mindset and preparation. I'm reminded of (yes, Australian) Red Bull Racing pilot Matt Hall. Matt flew F/A-18s in the RAAF and U.S. Air Force F-15Es over Iraq as an exchange officer. Speaking at a dinner I attended (guess where), Matt said he has often been called an "adrenalin junkie." Matt says that honestly he did not feel an adrenalin rush when he flew fighters and does not now when he flies in Red Bull Air Races and other air show routines. Adrenalin is a physical reaction to fear and surprise, Matt explained, and a properly planned flight—even in combat and low-altitude aerobatics—will only very rarely present something unexpected for which the pilot had not already planned and considered his options and actions. "*An adrenalin rush,*" Matt concluded, "*is a sign of poor flight planning.*"

- "We immediately entered a teardrop attempt to return, and aborted under control when it wasn't feasible or safe."

That's what it's all about. Well done.

Thank you, Steve T, for letting us learn from you even as you just begin to learn yourself. Best of luck—and *skill*—as you continue your training!

Comments? Questions? Let us learn from you, at mastery.flight.training@cox.net



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You consistently do an outstanding job in your *FLYING LESSONS* articles. You have the very uncommon ability to take what are really very complex subjects and present them in such a way that they are easily understandable. If I hadn't in the past studied some of the topics you present I would have no idea as to how complex they really are. Your explanations are clear and concise. You're providing a great service to any pilot that takes the time to read what you write.

– Reader, flight instructor and decorated U.S. Army Aviator Mike Friel

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I'll get back into the again-overflowing email in-box next week. Thanks for your Debrief comments!

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