Thomas P. Turner's
Mastery of Flight™

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FLYING LESSONS for April 24, 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.**

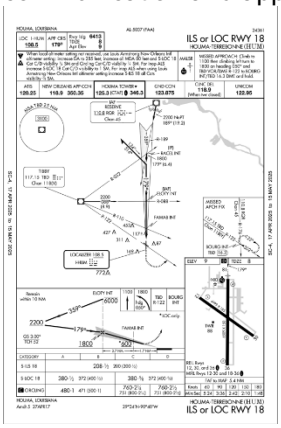
This week's LESSONS:

From a recent NTSB preliminary report:

> A Cessna 210L was destroyed in an accident near Raceland, Louisiana. The pilot and flight instructor were fatally injured. The accident pilot had recently reached 500 hours of total flight experience, and that **the purpose of the accident flight was to provide the pilot the opportunity to gain more night flight experience and to conduct an instrument proficiency check.** The [aircraft] operator intended to add the accident pilot to [its] on-demand air charter certificate sometime in the future and were helping her gain the experience necessary.
>
> The flight later **requested an instrument clearance** since they would **need to penetrate clouds**. The controller provided **vectors for the ILS runway 18** approach. The crew requested a **climb to 3,000 ft msl to attempt to get out of turbulence**, which was granted by the controller. The controller continued issuing vectors and ultimately **cleared** the flight **for the approach**. The flight **acknowledged** the approach clearance. The controller authorized a **frequency change** to the advisory frequency. **No further communications were recorded** from the accident airplane.
>
> The reported weather at HUM about the time of the accident included wind 140° at 19 knots, gusting to 26 knots, 7 miles visibility, overcast ceiling at 1,400 ft. temperature 26° C, dew point 23°C, altimeter 29.89 in-Hg.
>
> **The airplane impacted a marsh** about 7.5 nm north of HUM. The only part of the airplane visible above the surface of the marsh was the left wing. The **wreckage was confined to a small area and the wreckage signatures were consistent with a near vertical impact.** Examination confirmed the presence of all primary aircraft structures and flight control surfaces, the engine and propeller blades. The airplane's instrument panel and firewall were not found.

See https://thomaspturner.com/wp-content/uploads/2025/04/2025.0405-C210-LA.pdf

It's a mystery. What might happen so catastrophically, so quickly, between a routine communication and apparently high-speed, near-vertical impact with terrain? With a field elevation of 8 feet Mean Sea Level (MSL) and a ceiling at 1400 feet, at 7.5 miles north of the airport the airplane should have been **in the clouds** somewhere below 2200 MSL at or descending to 1800 MSL, prior to intercepting the glideslope. It would have been **very dark** in those clouds.



What about the turbulence? An eager 500-hour pilot and an instructor employed by the company evaluating her for possible employment probably would not have requested the altitude change unless the turbulence was very bad. It's an assumption on my part, but on a flight that was essentially part of an extended job interview the prevailing pilot culture is to ***tough it out in the turbulence*** and a common instructor response is, "let's see how she handles this." So **it's likely the airplane was being jostled about sharply** as it descended to intercept the glideslope.

The NTSB's preliminary report doesn't reveal the instructor's experience, which in a charter operation may have been great. Don't be too fast to think a 500-hour pilot is inexperienced, either. It's a matter of ***training quality*** and ***pilot attitude***. Remember that aerial action the Second World War was fought primarily by 250-hour total time pilots. And a 500-hour total time F-35 pilot today is probably well into his/her second tour of duty. **We don't know** the pilot's qualifications with the scant information available at this point.

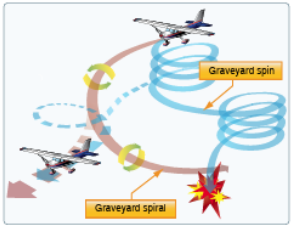
Could it have been an avionics issue? How was the airplane equipped? Was it retrofitted with a glass panel and new to the Pilot Receiving Instruction (PRI)? Perhaps more likely, was the pilot's previous experience in a G1000-equipped trainer with the 210L retaining legacy round-gauge instruments? Was the GPS or the autopilot unfamiliar, somehow inducing a "what's it doing now" moment? Did something on the panel fail for real, or in an instructor-induced simulated partial panel failure? The instrument panel wasn't found. **We don't know**.

Perhaps it was a pilot incapacitation event. Did they encounter turbulence that knocked the pilots' heads against the cabin interior, rendering them both unconscious? This would have to have happened to them both, unless one was knocked out and the other did or could not recover the airplane in time for some reason. It *might* have happened. But **we don't know**.

Did something break besides the previously speculated instrument or autopilot malfunction? Could the workload of failure, or some adverse impact on airplane controllability, lead to loss of control? Again, **we don't know**…but if it did, this sort of thing might leave evidence investigators will discover and report later.

What we *do* know, at least preliminarily, is that the airplane entered a rapid, steep descent and buried itself in the swamp—likely the result of a **spiral**. The FAA's *Pilot's Handbook of Aeronautical Knowledge* (PHAK) describes a "graveyard spiral" as a physiological problem:

> …a pilot in a prolonged coordinated, constant-rate turn may experience the illusion of not turning. During the recovery to level flight, the pilot will then experience the sensation of turning in the opposite direction causing the disoriented pilot to return the aircraft to its original turn. Because an aircraft tends to lose altitude in turns unless the pilot compensates for the loss in lift, the pilot may notice a loss of altitude. The absence of any sensation of turning creates the illusion of being in a level descent. The pilot may pull back on the controls in an attempt to climb or stop the descent. This action tightens the spiral and increases the loss of altitude; this illusion is referred to as a "graveyard spiral."



See https://www.faa.gov/sites/faa.gov/files/regulations_policies/handbooks_manuals/aviation/phak/19_phak_ch17.pdf

That's certainly *one* way a spiral might begin. Interestingly, the PHAK figure also depicts a "graveyard spin" (a term I don't remember seeing anywhere else) while not using that term anywhere in the text. But the Cessna does not appear to have been in a "prolonged" turn before the rapid descent began.

A spiral is the natural result of the combination of **three aircraft characteristics:**

1. Roll instability
2. Lift vector
3. Pitch stability

Roll instability: When you learned to fly steep turns your instructor probably mentioned something called the ***overbanking tendency***, as explained here:

> …the outside wing travels at a faster airspeed than the inside wing and, as a result, it develops more lift. This creates an overbanking tendency that needs to be controlled by the use of opposite aileron when the desired bank angle is reached.

See https://www.faa.gov/sites/faa.gov/files/regulations_policies/handbooks_manuals/aviation/airplane_handbook/04_afh_ch3.pdf

Lift vector: ***Lift is generated perpendicular to the wing chord***. When the wing is level lift is all vertical. When the wing banks the lift is still perpendicular to the wing; a reduced amount of lift acts as a vertical component while part of the lifting force can be considered to be horizontal. Unless the pilot (or autopilot) increases angle of attack and/or adds power to increase G load—either or both increasing total lift enough that the vertical component of lift still equals airplane weight—the airplane will begin to descend. That causes its airspeed to increase.

Pitch stability: ***An aircraft stable in pitch will seek the indicated airspeed for which it is trimmed***. More correctly, once trimmed if the airplane is disturbed in pitch it will oscillate back to regain the **air flow over the elevator** and elevator trim that existed before it was disturbed. This is the basis of so-called flying "by the numbers."

- If you **add power** so propeller blast increases over the tail and **the airplane pitches up** to reduce airflow; **decrease power** and **the airplane pitches down** to increase airflow (the advantage sought by T-tails that were the rage in the late 1970s was constant pitch attitude with changes in power).
- **Add drag** and **the airplane pitches down** to return to the trimmed airflow; **reduce drag** and **the airplane pitches up**.

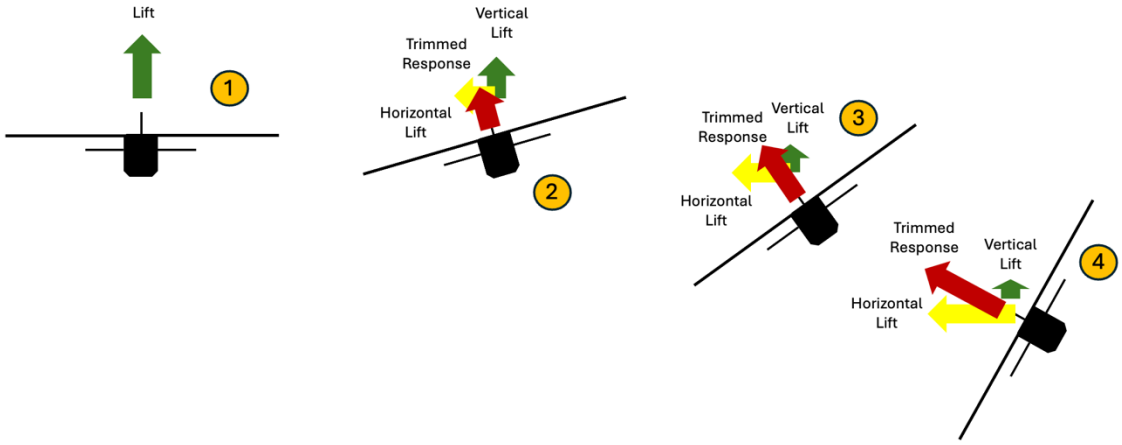
Except that "up" is relative ***to the airplane***, not the horizon.

Here is the sequence that results in an ever-deepening spiral:

1. Something causes the wing to bank steeply. Overbanking tendency makes the bank progressively steeper.
2. The airplane begins to descend and accelerate.
3. The airplane pitches up relative to the airframe. This only steepens the spiral.
4. Airspeed and vertical speed build very rapidly.

When I demonstrate this in a high performance airplane starting from well below V_A speed and staying in the spiral only a short time, vertical speed reaches 1000 to 1500 feet per minute in the first 20 seconds or so of the maneuver.

Uncorrected, one of two things will happen: if the spiral starts from high enough altitude the airplane will accelerate beyond never exceed speed and G load will cause an **inflight breakup**. If the spiral begins at a lower altitude or from a lower initial speed the airplane **impact at high speed**, nearly vertically.



What *LESSONS* might we learn from this preliminary report?

To recover from a spiral:

1. **Reduce power** to reduce the overall dynamic energy.
2. **Unload the wing** with forward control pressure to reduce G load.
3. **Level the wings** in a rudder-coordinated coordinated maneuver. This eliminates the overbanking tendency and returns lift to the vertical, removing the spiral-inducing inputs.
4. **Continue forward control pressure** to manage G load as the airplane pitches to the normal climb attitude and hold the pitch there as it returns to normal climb speed.
5. **Smoothly transition back** to normal climb power and control inputs to complete the recovery.

This is a good maneuver to practice with an instructor **very** experienced in your airplane type.

- Start from low power, no faster than halfway between V_{S1} and V_A.
- Smoothy roll into a level turn at 35° to 45° bank…and let go of the controls.
- Observe the airplane continue to roll more steeply, pitch downward and accelerate.
- Watch the impressive rate at which airspeed and vertical speed increase.
- Recover before reaching 60° bank or V_A, whichever comes first.

We usually discuss spirals as something that happens to a pilot disoriented in instrument conditions. It certainly can happen then. But it might happen at other times as well. Consider an airplane in the visual portion of a **circling approach**. As the runway disappears behind the wing in reduced visibility, if the pilot rolls steeply to keep the airport environment in sight and does not manage power and pitch properly, the airplane will naturally enter an incipient spiral. If it takes 20 seconds to reach a 1000 to 1500 foot per minute descent, and the spiral begins at 500 to 800 feet above ground as would be normal in a circling approach, the airplane will very rapidly plunge into terrain. **The same thing** could happen while flying a VFR traffic pattern at night into a “dark hole” airport, one where there are few lights on the surface and the runway appears as a lighted rectangle seemingly suspended in space.

What happened in the tragic case of the C210 training flight? We don’t know. But it gives us a lot to think about so we can guard against at least some of the possible causes.

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

Debrief

Readers write about previous *LESSONS*

Last week I focused on a rash of recent fatal general aviation accidents, the eight fatal accidents and 22 total deaths in the previous two weeks being far above the norm. The next day AOPA published an article that tells us despite the recent events both accidents and fatal accidents have been fewer this far into 2025 as they were in the previous year. AOPA states:

> The AOPA Air Safety Institute has analyzed NTSB data and found that, as of April 13, GA accidents as a whole—and the number of fatal accidents—are both down 21 percent year-to-date when compared to 2024. In addition, the number of fatalities also dropped 16 percent over the same period.
>
> "These numbers are no fluke," [AOPA Air Safety Institute Senior Vice President Mike] Ginter added. "General aviation has seen a declining accident and fatality rate for more than 30 years. Since the early 1990s, the accident rate has dropped 45 percent, and the rate of fatal accidents has fallen even more—55 percent."

Great news. Hopefully the recent spate of fatal crashes was indeed a fluke. Let's all work to ensure it was.

See:
https://thomaspturner.com/flying-lessons-weekly/flying-lessons-for-april-17-2025/
https://www.aopa.org/news-and-media/all-news/2025/april/17/ga-safer-than-ever-despite-recent-accidents

Reader Mark Dolen also writes about last week's *LESSONS*:

> Thank you for making me look up Archilochus.

That's why I include links in the reports. It's amazing how an ancient Greek chronicler is relevant to flying airplanes today. Thanks, Mike.

See:
https://thomaspturner.com/flying-lessons-weekly/flying-lessons-for-april-17-2025/
https://en.wikipedia.org/wiki/Archilochus

Reader and Piper Seneca twin pilot Brad Wolansky asks about a suggestion I made last week about off-airport landings:

> Gear up for off-airport landings: In a twin as well?

Yes. The risks keeping the gear up for an off-airport landing in a retractable gear airplane mitigates are (1) slamming the nose down hard is the nose gear collapses, putting far more force on the airplane's occupants than a smooth gear-up slide, and/or (2) cartwheeling if one main gear collapses or sinks into the surface enough that a wing tip digs in, or if the surface is uneven enough that this happens and the higher airplane center of gravity with gear extended causes it to flip. These risks are independent of the number of engines so what goes in single-engine aircraft (in my opinion, shared by several others I know of) applies in twins as well. Thank you, Brad.

A reader whose name I'll withhold writes about the April 3rd Mastery of Flight™:

> I wanted to let you know that your April 3rd "Mastery of Flight" email was timely. The last time I flew was March 22nd. My wife was diagnosed with stage 4 pancreatic cancer on March 24th. Unfortunately, it's in already in multiple organs. The outlook is not good.
>
> I wouldn't dream of flying as PIC right now. I am not ready to make a cross-country trip in my car, much less an airplane. The $64,000 question is ***when will I be ready to resume flying?***
>
> I realize that's a question that you can't answer.
>
> Needless to say, it's an important question. **At some point we all have to answer the question.** A parent, a grandparent, a spouse, or a child or grandchild will die. Maybe even a close friend.
>
> I don't know about you, but I don't want to be the subject of an NTSB report! (I think I know your answer!).

I'm so sorry. I can't imagine what it feels like to be in your place. All I can think of is, when you feel you want to fly again find an instructor and go see how it turns out. Measure your performance against the Airman Certification Standards (ACS) so you can objectively see how well you do, and if there is anything you need to work on. Focus on VFR-only flying for a trip or two before you get back into the IFR system. I've heard similar stories from about a dozen readers who have opened up since the April 3rd report. Best to you all.

See https://thomaspturner.com/flying-lessons-weekly/flying-lessons-for-april-3-2025/

Reader David Dow takes us back to the April 3rd report:

> In my construction safety career, I was involved in 11 fatalities. In EVERY situation, **the equipment did not fail**. **Folks** on jobsites and in the offices **just made bad decisions**. You can quote me on that.

I was also a safety officer for a construction company, for fours years. In that time there were two fatal accidents, one a motorist who intentionally drove where she was not supposed to be, the other a company employee who crossed a barrier line to intentionally walk where he was not supposed to be. Both were tragic but avoidable. I write *FLYING LESSONS Weekly* mainly because those words—**tragic but avoidable**, and the pilot **just made bad** decisions—apply to a great many NTSB reports. My hope is that by reading about flawed decision-making, unintended or intentional, will help us all make better decisions if facing similar circumstances. Thank you, David.

More to say? Let us learn from you, at **mastery.flight.training@cox.net**

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"[My donation is] long overdue support for you and your incredible work. Thanks as always for providing the best continuing General Aviation education in the industry."

– Andrew Urban, Sun River, Wisconsin

Thank *you*, Andy, for your continued contributions toward the costs of hosting and delivering **Mastery of Flight**.™ And thank you to all these *FLYING LESSONS* readers:

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NEW THIS WEEK: Dave Wacker, Bill Farrell, David Miller

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2021 Jack Eggspuehler Service Award winner
2010 National FAA Safety Team Representative of the Year
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