 ***FLYING LESSONS* for May 23, 2024**

*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.**

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***This week’s LESSONS:***

**Decision Points**

**Flight planning** is something we are taught to complete before boarding the aircraft. Weather, airport information, fuel requirements...all things we look up or compute in the comfort of an office or general aviation terminal. For pilots flying under the U.S. regulations, [14 CFR 91.109](https://www.ecfr.gov/cgi-bin/text-idx?node=14:2.0.1.3.10#se14.2.91_1103) notably includes (with my emphasis added):

*For a flight under IFR or a flight not in the vicinity of an airport*, weather reports and forecasts, fuel requirements, [and] **alternatives available if the planned flight cannot be completed….**

See <https://www.ecfr.gov/cgi-bin/text-idx?node=14:2.0.1.3.10#se14.2.91_1103>

**It’s much less** commonly stressed, that flight planning is only the beginning of the process. At least as important is **active flight *monitoring*** for the entire duration of the flight.

**Every flight** presents the pilot with a series of decision points. At these points in the flight, you must use the information you uncovered in your preflight planning, and the data that support or refute that information as a result of active monitoring, to make a revised go/deviate/no-go decision. This is when you **exercise the “alternatives available,”** as described in the regulation.

**To illustrate,** let’s look at excerpts from [this NTSB final report](https://thomaspturner.com/wp-content/uploads/2024/05/2017.1220.G35-FL.pdf). As you read from this report think in terms of when the pilot *might* have been presented with inflight **decision points**.

The commercial pilot [of a 1956 G35 Bonanza] was conducting a long cross-country flight. There was no record that he received a weather briefing from an official source, and he did not file a flight plan before departing. The pilot completed the first leg of the trip uneventfully and purchased fuel at an intermediate stop.

During the second leg, about 30 minutes after takeoff and over a period of about 20 minutes, the airplane climbed from 3,400 ft mean sea level (msl) to 7,100 ft msl. It then made two left, 360° turns, followed by a rapid descent to 1,400 ft msl. During the next approximate hour, the target flew east at alternating altitudes below 2,500 ft msl, before turning south, flying s-turns and descending to 1,400 ft. The target proceeded south at 1,100 ft msl until about 10 minutes before the accident, when it flew near a cold front boundary. After that, the airplane completed numerous course deviations, including three complete left 360° and two right 360 turns; the last recorded radar return was about 0.4 mile east of the accident site at an altitude of 450 ft msl. The recorded weather near the accident site about the time of the accident included 10 miles visibility and an overcast ceiling at 600 ft. Examination of the airframe and engine did not reveal any preimpact mechanical malfunctions that would have precluded normal operation.

Although the pilot held an instrument rating, his most recent simulated instrument experience was about 11 months before the accident and his most recent actual instrument experience was more than 2 years before the accident. The dark night, restricted visibility conditions, and the pilot’s extensive maneuvering in the last 10 minutes of flight, coinciding with the frontal boundary, provided conditions conducive to the development of spatial disorientation. The final path of the airplane in a direction opposite the last radar returns and the airplane’s steep impact angle are consistent with the known effects of spatial disorientation and a subsequent loss of control.

**Probable Cause and Findings**

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot’s improper decision to continue visual flight rules flight into instrument meteorological conditions, which resulted in the pilot experiencing spatial disorientation and a subsequent loss of airplane control.

The NTSB Final Report adds:

The pilot, age 78, held a commercial pilot certificate with ratings for airplane single-engine land and instrument airplane. His most recent FAA second-class medical certificate was issued on August 6, 2015. At that time, he reported a total flight experience of 4,405 hours. The pilot applied for BasicMed privileges on September 1, 2017.

Cross City Airport (CTY), Cross City, Florida, was located about 11 miles southeast of the accident site. The recorded weather at CTY at 1855, was: wind from 210° at 9 knots, gusting to 15 knots; visibility 10 miles; overcast ceiling at 600 ft; temperature 21°C; dew point 21°C, altimeter 30.05 inches of mercury.

See <https://thomaspturner.com/wp-content/uploads/2024/05/2017.1220.G35-FL.pdf>

**Although he was flying** under visual flight rules, **the pilot held an instrument rating.** History tells us ***that about half of all attempted visual flight into instrument meteorological conditions (“VFR into IMC”) crashes involve an instrument-rated pilot***. **It’s a fallacy to think *a VFR into IMC can’t happen to you*** because you hold an instrument rating.

**As I fly** I’m always asking myself ***which way I’ll go*** if conditions begin getting worse than expected. For example, if I’m approaching a line of clouds, one with conditions that suggest it’s safe to penetrate, I will still actively consider that direction—***left, right, back from where I came, up and/or down***—will quickly return me to better air. Even when in the clouds I still think about an escape path.

**Flying visually,** especially at night, requires active monitoring and an immediate response to worsening conditions. It’s almost impossible to see clouds at night except in bright moonlight conditions. In warm temperatures (it was 21°C, close to 70° Fahrenheit,at the surface at the time of the crash), it’s not unusual in the southeastern United States for haze to make night flight essentially instrument flight. In any event it would have been very hard to “remain VFR.”

**If you *do*** have flight visibility at night, any encounter with clouds that requires you to maneuver to remain in visual meteorological conditions (VMC) strongly suggests you implement your escape plan right away, and get the airplane quickly on the ground.

**We don’t yet know** what happened in this particular crash. We *do* know the pilot was en route to visiting family for the Christmas holiday, pressure and a powerful temptation to press on when conditions worsen.

**But say *you* were flying** VFR at night. Finding yourself compelled to do these maneuvers, which would you accept—and permit yourself to continue to your destination—and which is the first that would prompt *you* to deviate and land at a nearby airport?

* ***climbed from 3,400 ft mean sea level (msl) to 7,100 ft msl***
* ***two left 360° turns***
* ***rapid descent to 1,400 ft msl***
* ***alternating altitudes below 2,500 ft msl***
* ***then turned south***
* ***flying s-turns and descending to 1,400 ft***
* ***numerous course deviations***
* ***three complete left circuits and two right circuits***

**What will it take** for ***you*** to resist pressure and temptation, and decide *not* to continue to your original destination?

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



See <https://pilotworkshop.com/products/ifr-procedures-pfm/?utm_source=abs&utm_medium=bnr&ad=abs-bnr>

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

Reader and pilot examiner Byron Hamby continues [last week’s Debrief](https://thomaspturner.com/wp-content/uploads/2024/05/2024.0516-FLYING-LESSONS-1.pdf) discussion:

As a fellow DPE, I found some of the points Dale Bleakney raised in his “wrinkle” to CFI readers unsettling and feel compelled to share another perspective…

On a practical test, I too follow the ACS. I believe this is the best way to ensure the highest level of safety and avoid any potential confusion during the test. **Applicants of every level should come to their tests having already been exposed to the ACS and prepared to meet its requirements** for the certificate or rating they are testing for – ***not* for new experiences**. For both Private and Commercial tests, I require applicants to explain the performance charts on short field takeoffs and landings, as well as the appropriate obstacle clearance speeds and approach speeds to be used, during the ground evaluation portion of the test.  I also discuss the topic of risk assessment, and include these speeds in that discussion, during the preflight brief - in the interest of CRM and safety **there should be no confusion prior to flight as to what speeds an applicant should use to perform the required tasks.**

I have looked again in the appendices of the relevant ACS publications and do not see anything regarding the examiner’s discretion to add the 50-foot obstacle on landings. The short field takeoff standards do specifically require that the pilot clear the obstacle or 50 feet AGL “if simulating an obstacle,” but do not, for either Private or Commercial standards, require a 50-foot obstacle clearance for the short field landings. However, **the ACS does include standards regarding manufacturers' published approach speeds** and when we encourage, or require, applicants to perform particular tasks for the first time during a test, we are in turn encouraging, or requiring, them to perform those tasks however they have to, irrespective of these established speeds, if they have any hopes of leaving the test with their certificate or rating in hand.  In my own experiences as an examiner, the number of notices of disapproval issued for exceeding the limits in the ACS standards regarding manufacturers' published approach speeds suggests that **flight training needs to focus more on achieving consistent and appropriate speeds** than it does on further stressing out applicants with the spectre of possible new experiences during a test.

Unfortunately what **I am seeing are not occasional or isolated instances of a lack of proper speed control,** nor are they limited to the Private applicants.  In fact, information obtained from applicants during the debrief process - regardless of the outcome of the test - has revealed that **published approach speeds are being disregarded in the training received by many applicants.** One test for a Commercial applicant resulted in a notice of disapproval following the ground evaluation when the applicant advised that his normal takeoff was accomplished by reaching Vr and then climbing out while maintaining Vr to 200 feet - despite the fact that nowhere in any section of the POH for his aircraft was that specified as the proper procedure for a normal takeoff. When I questioned the applicant's CFI after the test as to why takeoffs were being taught in that manner, he was unable to provide any answer.

Some CFIs in the area where I conduct tests are teaching applicants to climb on takeoff for six seconds (what I have come to call the "Dangerous 6 Count" since I often hear the stall warning indicator and end up having to take the controls during these takeoffs) as the proper obstacle clearance procedure. When I ask about this procedure during the debrief, I am told that the applicant or CFI "did the math" so they would know if they cleared the obstacle - yet upon further questioning, it becomes clear that these calculations failed to take into account air density, wind, weight of the aircraft, etc. **I often ask applicants to tell me when we are at 50 feet AGL, on both takeoffs and landings, and cover up the altimeter to keep them honest** - many CFIs would be surprised to learn that **low-time pilots (which includes both Private and Commercial applicants) are unable to determine their height AGL** during either of these critical phases of flight by looking out the window and referencing the ground below.  (The jump school towers are usually 34 feet high for a reason - many people are unable above that level to determine their distance from the ground without lots of practice. Airborne All the Way!)

 Regarding the use of the 1000 foot marker as the touchdown point for short field landings - I am one of the DPEs who uses that point in evaluating that task. **The ACS specifically requires applicants to fly a stabilized approach, *not* to meet the performance data as specified in the POH** (which would be difficult for some high-time pilots, and virtually impossible for most low-time pilots, under imperfect wind conditions and using an aircraft that has been flown for several years, both of which are often the case for a practical test). Almost every airport where I meet applicants has either VASI or PAPI approach lights, the use of which leaves no doubt for either the examiner or the applicant as to whether the approach is stable or unstable and thus whether the ACS standards have indeed been met.

While I appreciate the unique approach to practical tests described by my colleague, **I would prefer to see CFIs training students to fly as recommended in the respective POHs and as required by the applicable ACS standards.**  The practical test is the time to really focus on the ACS standards, rather than introducing new experiences with the goal of building confidence. For the applicants I have tested, meeting (or even better, exceeding) those standards and earning the certificate or rating they are testing for is a confidence builder in and of itself.

The Airman Certification Standards (ACS) defines the minimum performance, knowledge and risk awareness required to earn the applicable certificate or rating. I agree, applicants should come to a Practical Test knowing the standards by which they will be evaluated. **Flight instructors have a responsibility to educate students on the standards** and ensure they meet or exceed them, and **examiners should have objective standards** by which to evaluate applicants.

There is still a lot of room for subjective judgment on the part of the examiner. At times an examiner may ***have*** to interpret the ACS, and specify how a maneuver should be flown not so much for personal preference but because of very real safety concerns.

**For example,** the Private Pilot ACS includes standards for Short Field takeoffs. The ACS requires the applicant “rotate and lift off at the [manufacturer’s] recommended airspeed and accelerate to the recommended obstacle clearance airspeed **or** VX, **+10/-5 knots**.” Immediately following, the ACS states, “establish a pitch attitude that will maintain the recommended obstacle clearance airspeed **or** VX, **+10/-5 knots** until clearing the obstacle or until the airplane is 50 feet above the surface.”

The [*Pilot’s Operating Handbook* for the ubiquitous Cessna 172S](https://www.se.edu/aviation/wp-content/uploads/sites/4/2020/10/172S-POH.pdf) includes a checklist for Short Field Takeoff that calls for climbing at 56 KIAS “until all obstacles are cleared.” It does not provide a short field liftoff speed. The Airspeeds for Normal Operation at the beginning of Section IV adds this detail: the 56 KIAS is the “speed at 50 feet,” suggesting that liftoff and climb to 50 feet might be at speeds lower than 56 KIAS, and that the pilot should not necessarily maintain that speed but instead be accelerating through that speed as the airplane passes through 50 feet AGL.

Interestingly, the POH defines **VX,** Best Angle of Climb, to be 62 KIAS at sea level and 67 KIAS at 10,000 feet. The ACS-target Short Field Takeoff speed using Cessna’s recommendation, then, is **six knots (10%) below VX** at sea level and **11 knots (16%) below VX** at 10,000 feet.

The +10/-5 knot tolerance using POH guidance gives the pilot an **ACS-approved range of 51-66 knots**. But wait: **VS1**(stall speed, flaps up) in the C172S is 48 KIAS. **VS0,** stall speed at full flaps, is 40 knots. Cessna recommends 10° of flaps for a short field takeoff, and the decrease in stall speed is probably not along a straight-line from zero to full flaps. ***At 10° flaps stall speed is likely somewhere around 46 knots***…**meaning the acceptable range of ACS short field takeoff speeds may be within five knots of stall speed in the short field takeoff configuration…or even closer**. The stall warning horn is typically set to activate at five to seven knots above stall speed (or more correctly, the equivalent angle of attack margin). Is an examiner *really* going to pass an applicant who makes a short field takeoff with the stall warning shrieking continuously?

If you base short field takeoff speed on VX, 62 knots, the ACS-allowable speed range is 57 to 72 knots. If you follow the manufacturer’s guidance, the range is 51 to 66 knots. **The ACS tells us that anywhere in a 21-knot range of 51 to 72 knots, from stall speed to just below VY, should be evaluated as a successful Short Field Takeoff maneuver.** Would an examiner accept that?



My point is not to argue or refute how ***any*** examiner interprets the ACS. However, it is not nearly as simple as “climb at VX until 50 feet up,” given the wording of the ACS and at least this aircraft manufacturer’s recommendations. **Somehow, some way, instructors and examiners have to better define what is acceptable performance, and agree what might somehow meet the ACS tolerances may not always be indicative of safe operation or sound risk management.**

***One last thing:*** when discussing takeoff and landing airspeed targets and POH performance charts, I point out to my students that in most light aircraft **50 feet Above Ground Level is a little more than one wingspan above the surface.** Think about it like that and the FAA-standard 50-foot obstacle is not that imposing. Asking the applicant to tell you when they are at 50 feet AGL is a good learning experience during a checkride…but knowing the answer is not strictly in the ACS. Again, it’s illustrative of the challenge, and the opportunity, of being a pilot examiner.

Thanks very much, Byron.

See:

<https://thomaspturner.com/wp-content/uploads/2024/05/2024.0516-FLYING-LESSONS-1.pdf>

<https://www.se.edu/aviation/wp-content/uploads/sites/4/2020/10/172S-POH.pdf>

<https://www.faa.gov/sites/faa.gov/files/training_testing/testing/acs/private_airplane_acs_change_1.pdf>

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