Thomas P. Turner's
# Mastery of Flight™

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# *FLYING LESSONS* for August 29, 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.**



## *This week's LESSONS:*

**What's the riskiest thing you do in an airplane?** I received a phone call from a pilot who suggested yet another *great* idea for a book (added to the growing list that'll have to wait until I retire). The pilot related how he flies with a former military aviator as instructor and mentor and, in the course of their training, this simple yet profound question came up. It's the type of ***down-to-the-basics risk management question we should all ask ourself*** from time to time.

**In my case** the question has two answers. My riskiest flight activities are:

1. **Providing flight instruction, including engine-out practice, in a specific piston multiengine airplane** I've never flown before, flown by pilot-receiving-instruction (PRI) with whom I've never flown and most likely had never met until the preflight briefing for that flight.
2. **Flying in instrument meteorological conditions (IMC) in other people's airplanes.** The almost airframe-specific uniqueness of modern avionics packages mandate extreme caution, especially since the way avionics and autopilots interface with each other often differs from one to another in otherwise identical airplanes.

**In the case of instruction** I've encountered long-time owners of that airplane and otherwise highly experienced pilots who surprised me when they're behind the yoke, especially in unusual-to-them conditions and situations.

**In both cases** I don't *really* know the state of airplane and systems maintenance, or the way its avionics and autopilot work and work together, until I'm in the airplane, in the air.

**How do I mitigate** these risks?

**Multiengine instruction:** To lessen the hazards of this historically very risky activity, I:

- Provide multiengine instruction ***only*** in Beechcraft Barons, which has been virtually the only type of multiengine airplane I've flown or instructed in for over 34 years. I have "the numbers" (combinations of known pitch attitudes, power settings and flap/gear configurations that result in predictable performance), type-specific procedures and techniques, and airplane systems "down cold." When things go right, and especially if something goes wrong, ***I don't have to think about how to fly the airplane. I can focus on the bigger picture***.

- **Avoid flying in IMC with a student unless I've recently flown with that same pilot in the same airplane in visual meteorological conditions (VMC).** This means sometimes rescheduling a training flight on a "perfect instrument training conditions" day if we can't get some flight together in under VMC first.
- **Avoid single-engine operations in IMC**—even if I know the pilot and the airplane. Simulate engine failures are visual training maneuvers.
- **Stick to fairly long, fairly wide paved runways** unless specifically working on maximum-performance (short field) performance and practicing maximum performance takeoffs and landings only after the pilot has demonstrated the required level of proficiency while using a longer runway.
- **Thoroughly brief** the pilot before flight, and before each maneuver or procedure during the training flight.
- **Emphasize good checklist and cockpit flow checks** use by the PRI.
- Exercise all **safety-of-flight protocols** including **strict adherence to airplane limitations**.
- **Stay proficient** in multiengine airplanes myself.

**Flying IFR in other people's airplanes.** To manage this risk I:

- **Fly only airplane types I'm very familiar with.** This is a short list for me: most variants of Beechcraft Bonanzas and Barons, and some Cessna singles. As in multiengine instruction, I have "the numbers" (combinations of known pitch attitudes, power settings and flap/gear configurations that result in predictable performance), type-specific procedures and techniques, and airplane systems "down cold." When things go right, and especially if something goes wrong, ***I don't have to think about how to fly the airplane and can focus on larger issues.***
- **Fly in IMC only with avionics and autopilot combinations with which I'm experien**ced.
- **Fly in IMC only in an airplane I've flown in VMC previously.**
- **Adhere to high personal minimums** and employ a very conservative weather strategy overall.
- **Do not fly night IMC.** Everything is harder to do in a dark cockpit. ***Failures are no more likely to happen at night than in the daylight, but the potential consequences are much more severe.***
- **Strictly adhere to the use of checklists and cockpit flow checks** in all phases of flight.
- **Exercise all safety-of-flight protocols** including **strict adherence to airplane limitations.**
- **Thoroughly brief myself** before flight, and before each maneuver or procedure during the flight.

**What's the riskiest thing *you* do** in airplanes? How do ***you*** actively mitigate those hazards? These are simple questions, but ones we all need to ask—and answer—ourselves regularly. **Let me know your risks and strategies.**

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

# Debrief

Readers write about last week's *FLYING LESSONS* on **Takeoff Targets**:

Jeff Dill comments:

> In response to the Cessna 210L" **partial power loss due to the engine mixture probably not being set to full rich":** Often we lean our engines after the runup to avoid plug fouling, which is a set-up to the above scenario. I learned a technique from a youngster I was flying with that has stuck with me.
>
> - Lights
>
> - Camera
>
> - Action
>
> So, when it is your turn for takeoff:
>
> - Exterior lighting to be seen
>
> - "Camera" is a double-check on the transponder which, these days, should have been correctly squawking from the chocks.
>
> - Action = mixture set. Being a lowlander, that is always full rich for me.

John Scherer adds:

> Hi Tom, I really liked the article on **the five stages of a takeoff**. We calculate the rotate speed on every takeoff in our P35 Bonanza. It ranges from 74 to 78 MPH. On the C-5B [Galaxy I used to fly] rotate speeds ranged from 120 to 155 KIAS. We always use the **70% of liftoff speed at the 50% takeoff roll** point. We always check that as well. A typical check speed at our usual flying weights is 52 MPH at 500 - 600 feet.
>
> Don't forget to check your **HSI [or other heading indicator] versus surveyed runway heading** on each takeoff. As for **power**, we check Manifold Pressure [is] 29 inches at [our home airport near sea level]. Prop should be 2625 RPM. Fuel flow is 22.0. Also the GEM [Graphic Engine Monitor] t**emperatures** on all six cylinders should be about the same and in the normal range.
>
> If you check these every time you'll have **a lot of data confirming your takeoff performance**. Also, don't forget to calculate your takeoff roll for each flight and check the CG every time, including fuel burn before landing. Keep up the great work.

Reader and flight instructor Mark Sletten writes:

> Tom, have you seen this from Catherine Cavagnaro?
>
> I've recently attained my CFI certificate, and begun flight training with my oldest grandson, who has expressed an interest in becoming an aviation professional. This topic came up on one of our early flights. Specifically, assuming you achieve the required static RPM, **how do you know if you should abort a takeoff?** You can't really tell someone who doesn't have any experience to go by "feel." And **the 50/70 rule doesn't make any sense for a C172 on a 3,500' runway. Using that rule, as long as the plane accelerates to 45 knots by 1,700' (or so) you're good to go.** I

> defaulted that day to saying I've flown that aircraft at the specified weight often, and I know that 3,500' of runway is sufficient, but that didn't really answer his question.
>
> On reflection after the flight, I decided to use the question as an opportunity to go over the performance charts. Once ***we computed the runway distance required we used the 50/70 rule based on THAT number.***
>
> 1. Determine the required takeoff distance required and pad it appropriately.
> 2. If the computed takeoff distance doesn't exceed runway length then set an abort point based on the computed distance.
> 3. Use a runway diagram and/or a satellite image to find appropriate landmarks (taxiways, crossing runways, lights, prominent buildings, etc.) along the runway for an abort point.
>
> This seems like a complicated "rule of thumb," and it IS, mainly because **takeoff performance is a complicated topic**. The numbers constantly change based on weather conditions, altitude, engine health, pilot technique, etc., etc., etc. I think we do a disservice to inexperienced pilots to suggest there's an "easy" way to compute a takeoff abort point without referring to those pesky charts.

Hi, Mark. You figured it out. Catherine's fault in logic, **often repeated** by others, is comparing airplane performance to the available runway length. **The 50/70 rule, correctly applied, compares airplane performance to the *expected* performance**, that is, the computed takeoff distance under current conditions. **If the airplane has not attained at least 70% of liftoff speed at 50% of *the computed ground roll distance* then reject the takeoff.**

Put another way, you accept a runway based on its length compared to expected performance. Once you've made that commitment, you continue a takeoff only when the airplane meets its performance targets. Best of luck as a new CFI!

Mark replied:

> I guess my concern about the 50/70 rule is you almost never hear "50% of computed takeoff distance" when the subject comes up, it's "50% of the runway." For example, one of my favorite flight training resources, www.boldmethod.com, gets it wrong in this article. I guess I should've sent my gripe to them instead of to you!

As I said, "often repeated by others." Thanks, Mark.

Well-known Australian flight instructor and flying school co-owner Lyn Gray wraps up the discussion that was begun by an Australian Transport Safety Bureau (ATSB) report:

> I'm glad you included some translations for your locals up there!
>
> **I find that people who don't fly often and student pilots tend to use checklists consistently but pilots who fly professionally, especially in charter or parachute ops who conduct multiple take offs a day, soon find this discipline disappearing in the interests of saving time or just through complacency.**
>
> It becomes ***an interesting human psychology problem***. Companies as well as their pilots need to realise that the extra time **it takes to carefully consider their takeoff in all its stages**, will in reality, **only add minutes**.
>
> It's great how you have broken the takeoff up into five sections where I've only considered three. I'll show your article to my instructing team to see how we can improve our practices and pass this on to our students. I'll let you know our results. Many thanks, Tom!

I'm getting pretty good at US-Aussie translation and back again <g>. Once again, I'm honored and humbled to be able to help you and your fantastic staff, Lyn. I look forward to hearing your staff's critique of my strategy and perhaps learning again from them and you. Thank you.

And **thank you to *all* my Debriefers** this week.

See:
https://thomaspturner.com/flying-lessons-weekly/flying-lessons-for-august-22-2024/
https://www.aopa.org/news-and-media/all-news/2023/june/pilot/flying-smart-reality-check
https://www.boldmethod.com/learn-to-fly/performance/how-to-use-the-50-70-rule-of-thumb-for-your-next-takeoff-hot-weather/
https://www.atsb.gov.au/media/news-items/2024/groote-eylandt-engine-mixture-control-accident-demonstrates-importance-familiarisation-aircraft-systems-and-well-structured-take-safety-brief

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


See https://nafisummit.org

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