Thomas P. Turner's
Mastery of Flight

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FLYING LESSONS for January 25, 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:

How It's Done (number 2)

It's a common-sounding FAA preliminary report:

> The single-engine Cessna made an emergency landing on a road shortly after takeoff….

The unique thing about this particular case: the single-engine airplane was a Cessna 208B Grand Caravan with its ultra-reliable Pratt and Whitney PT-6 turboprop engine, flown by a two-pilot crew in scheduled airline service. Also unique (unfortunately; I wished it happened all the time), the pilots and five passengers escaped injury and airplane damage was only minor.

More details were reported in the press. On *AVweb* by the aeroprolific Russ Niles:

> A Southern Airways Cessna Caravan on a scheduled flight with seven people onboard made an emergency landing on a busy freeway in Virginia. There were no injuries, and the plane is intact but l [sic] damaged from collision with a guard rail. It was snowing at the time of the mishap. The plane, identified in local media as Flight 246, took off from Dulles International Airport after noon and shortly after takeoff made what initial reports said was a "hard landing" on the toll lanes of the Loudoun County Parkway northwest of Washington, D.C. The plane was on its way to Lancaster, Pennsylvania. Southern Airways Pacific LLC is a Part 135 operator based in Palm Beach and operates dozens of Caravans.

See https://www.avweb.com/aviation-news/caravan-lands-on-virginia-freeway/?MailingID=FLY240122003&utm_campaign=avwebflash&utm_medium=newsletter

The website Viewfromthewing.com posted Air Traffic Control audio of the event, which the site summarizes:

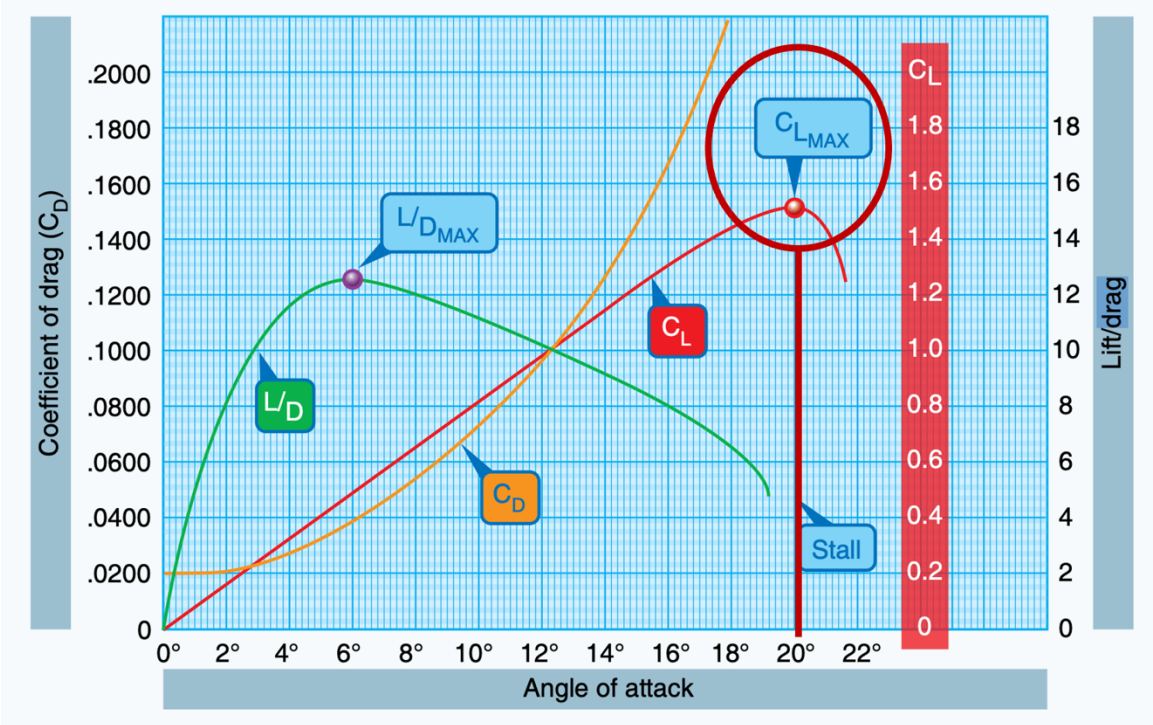
> Air traffic control audio is just… breathtaking. Southern Airways Express (call sign "FRIENDLY") declares "Mayday Mayday" followed by indistinguishable chatter. They said "We're landing on" and the next thing that's audible is that they are "on the ground." Air traffic control repeats, "Did you say you're on the ground?" The Southern Airways Express flight confirms, **"We're on the ground, we just landed."**
>
> ATC says "we are dispatching emergency services to your location now." And the pilot gives their location as "**Across from the Wendy's and Aldi's**." Fortunately she confirms, **"All passengers and crew are alive and well."**

See:

https://viewfromthewing.com/breathtaking-audio-of-air-traffic-control-as-washington-dulles-flight-lands-on-highway/?utm_source=BoardingArea&utm_medium=facebook
https://viewfromthewing.com/breathtaking-audio-of-air-traffic-control-as-washington-dulles-flight-lands-on-highway/?utm_source=BoardingArea&utm_medium=facebook

The best chance of survival if you lose power after takeoff is to **PUSH *and* HOLD**:

- **PUSH** the nose down to the attitude that results in Best Glide speed.
- **HOLD** heading with rudder, not aileron (to avoid asymmetric lift and a snap roll when one wing stalls before the other, and the other wing is near its maximum lift coefficient).
- **Aim** for the best option for landing—most often, within a few degrees of straight ahead.
- When you have your option made, **Slow to Landing Without Power** speed. This speed, often listed at the beginning of the Emergency Procedures section of the Pilot's Operating Handbook (POH) or Airplane Flight Manual (AFM), is close to Minimum Sink speed but sometimes a bit faster to provide sufficient airflow of the elevators to flare from a high engine-out rate of descent. In a sense, Best Glide is like V_Y, best performance (in this case, most distance) for altitude lost, while Landing Without Power speed is akin to V_X, the best vertical performance over time but not necessarily over distance.
- Flare and touch down **WUSS: *Wings level, Under control, at the Slowest Safe speed.***



Coefficients of lift and drag at various angles of attack, from the FAA's Pilot's Handbook of Aeronautical Knowledge, *chapter* 5. *I've highlighted the* ***CL_{MAX}, the maximum coefficient of lift and its associated angle of attack****. Note that if aileron deflection results in variations in angle of attack between one wing and the other—***asymmetric lift****—that* ***when the wing with the higher angle of attack stalls the other wing will be near its maximum coefficient of lift****...and the airplane will snap over uncontrollably. That's why it's so important to neutralize ailerons at the beginning of stall recovery (or more proactively,* **before** *the first wing stalls), and to keep the ailerons neutral until* **both** *wings are well below their critical angle of attack.*

See https://www.faa.gov/sites/faa.gov/files/07_phak_ch5_0.pdf

Landing straight ahead, under control, gives the aircraft's occupants their best chance of protecting them from the forces of impact. Airplane structure and restraint systems are strongest in the direction of normal flight, and provide much less protection if there is sideways motion at touchdown and until coming t a stop. As Bob Hoover so famously said, **"fly the thing as far into the crash as possible."**

Well done, Caravan pilots. Like Mike Patey with his own PT-6 engine failure last summer, you've shown us **how it's done.**

See https://thomaspturner.com/wp-content/uploads/2024/01/2023.0727-FLYING-LESSONS.pdf

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

Debrief: Readers write about recent *FLYING LESSONS:*

Frequent Debriefer and aerobatics/tailwheel instructor Anthony Johnstone ties this week's report to recent *LESSONS* on landing gear emergencies:

> Referencing partial gear up landings, my dad shared this with me over 50 years ago. While on a night training flight in the Vickers Wellington, one gear indicator didn't light. You couldn't see the wheel from the aircraft, and a flyby from the tower wasn't helpful. So he landed on the good side, holding the suspect wing off the ground as long as possible. Turned out the gear was actually down; he told me it was the best wheel landing he ever made! Bottom line, **fly the airplane all the way through the crash.**

I love your dad's stories of flying Spitfires, and now Vicker's geodetic wonder…and how you turn them into *LESSONS* still valid for we who fly today. Thank you, Tony.

UK-based reader Tony Purton addresses recent *LESSONS* on inflight distractions:

> From Tony Purton, UK PPL 1,350hrs aged 88 and still flying on a Class 2 medical but limited to flying with a Safety Pilot because of hearing problems - and old age!
>
> Thomas. The stories of doors opening in flight in your 18 January letter promoted me to recall something I did in summer of 1999 soon after gaining my PPL [Private Pilot Licence] at Denham airfield (EGLD) close to London's Heathrow airport. After a session of dual radio nav training I persuaded my instructor, Fred, to take me through some simulated emergency engine-off landings using Denham's 750m [~2460 feet] grass strip beside its tarmac Runway 24. This is what I wrote in my journal at the time:
>
> "On our final landing **I asked Fred to unlatch the door** of the aircraft just prior to landing, as recommended in pilots notes for emergency landings, **to see what effect it would have on aircraft handling**. At 200 feet Fred unlatched the door – ***and all hell broke loose***.
>
> **The aircraft continued to handle quite normally, but the whirlwind** that entered the cockpit, making my spectacles bounce on my nose, **proved extremely distracting** to me as the landing pilot and took Fred by surprise too. I put the aircraft down quite roughly but safely, and Fred and I agreed that despite pilot's notes, ***unlatching the door for a real emergency landing would***

> ***probably turn a rough landing into a bad crash***. We might undo the top latch in the air to make our ground exit quicker, but the main latch would remain firmly closed until the aircraft came to a stop."

That's a very interesting observation, Tony. Knowing the distraction created by noise in the cockpit when I train pilots on an open door in Beech airplanes, you have a good point. Tony continues:

> Your weekly letters are avidly read here in England for the *LESSONS* we can learn from you and your readers. We fly for recreation in England's crowded airspace, from paved and grass runways that vary between 600 m and 1000 m [~1900 to 3200 feet]. We can reach France in 1 hr 15 min which is a convenient gateway to the whole of continental Europe with its varied languages and cultures. Although our flying environment is very different from yours, the experiences you and your contributors relate are very relevant for us. Thank you all for your contributions to our safe flying.

Thank you for saying so, Tony. I envy the experiences you have air-touring around the UK and Europe.

See https://thomaspturner.com/wp-content/uploads/2024/01/2024.0111-FLYING-LESSONS.pdf

Reader Jim Piper relates a personal experience when distraction led to inflight mistakes:

> I departed Concord (KCCR) for Torrance (KTOA) a few years ago in my A36 with my wife in the right seat in VMC. As I leveled off to remain below the KSFO Class BRAVO and began to accelerate a very loud fluttering sound began. My first thought was my wife's seatbelt but a quick glance showed it latched. The airplane was handling normally but the loud fluttering was very distracting! A few seconds later I realized that **the long skirt my wife was wearing was stuck in the door** and was able to pull most of it back in and rest tore off and was carried away by the slipstream, end of flutter and we continued uneventfully to KTOA. When I finally established contact with NorCal departure I was given the dreaded ***"I have a contact number for you to call when you reach your destination."*** Turns out I penetrated the floor of the Bravo by about 100 feet for a few seconds for which I received verbal admonishment.

A good reminder to always **fly the airplane**. Thank you, Jim.

Frequent Debriefer Karl Kleiderer adds his own experiences:

> I've [had] the door pop open in my 2005 A36 on 3 occasions in real-life flights (not including my intro to it with Cory Johnson at my BPPP checkout). Needless to say that **I am now the only one who closes the passenger door.**
>
> First time was on my very first family trip with the new-to-us Bonanza in 2019. It's me, my wife, and 3 teenagers and a week's worth of bags. We landed for fuel and a break. We start the takeoff roll down the runway departing and the door pops open...**my oldest son about lost it right then and there**. Huge runway which we hadn't left yet, **I powered back, taxied off the runway to shut the door and try the whole thing again.** ***My son will never forget it.***

Passenger reaction to unexpected noise and disorientation is a commonly overlooked distraction. Karl continues:

> Second time was a night flight with Ron Horton (one of your monthly contributors and a DPE) and another large adult in the back. All went well until **about 40 nm from landing when the door popped open**. Nighttime in the winter here at 7000 MSL means ***it was* really *cold***...I told Approach that **I'm not declaring an emergency but I need to get this thing on the ground as soon as possible** because it's freezing up here. They gave me a straight-in to the short runway and all was well. We gave Ron a new callsign..."Latch."

As instructor I enjoy presenting the door open scenario on hot Kansas summer days, and really dislike it on even just-cool Kansas autumn and spring…let alone winter. Interestingly, your first two experiences go to show that doors (and possibly windows) can come open at times besides just after takeoff. Karl relates another experience:

> Third time was this past summer all by myself coming back from a golf trip. I had filled [fuel] all the way up (114 gallons) because I had a long trip coming up and the fuel was cheap. It was very warm, there was a serious crosswind, and I was way under maximum gross weight with plenty of runway. **I raised the nose on takeoff and door popped open.** I took a minute to decide if I wanted to land in that crosswind or just head home. It's 82nm and it was VFR and comfortably cool up at 7500 MSL...**I decided to just fly home with the door slightly ajar and deal with the noise level.**
>
> [I] landed without issue but realized upon unloading that ***I had a jacket on the seat that had disappeared out the door*** when it came open. I left a message at the FBO that evening explaining what happened and, sure enough, they found it blown up against a hangar door and **I was able to fly down to retrieve it** a week later.
>
> My only comment about flying with the door open is when getting slow on final approach I seem to get a buffeting on the elevator; nothing crazy but enough to notice.
>
> Thanks for all you do for the GA world. I know you hear it all the time but you're saving lives with your content and we should all be eternally grateful.

I appreciate your kind comments, Karl. Putting on my Bonanza type-specific hat, pilots of the long-body Beechcraft (36 and 58 models) commonly report a “buzz” to the elevator in the flare when landing with the door open. Air flow disturbed by the open door apparently creates turbulence, and the long-body Beeches must put this burble directly over the elevator when the turbulence misses it on shorter aircraft. The BE36/58 “elevator buzz” when landing with an open forward door is mentioned in the American Bonanza Society’s training programs.

A frequent Debriefer who asked to remain anonymous provides additional details pertinent to last week’s Debrief that was a continuation of earlier discussions on aircraft performance charts. The reader asked not to post his response, but passed along these U.S. light aircraft certification regulations references, with my emphasis added:

> § 23.45 General.
> (f) Unless otherwise prescribed, **in determining the takeoff and landing distances**, changes in the airplane's configuration, speed, and power must be made in accordance with procedures established by the applicant for operation in service. **These procedures must be able to be executed consistently by pilots of average skill** in atmospheric conditions reasonably expected to be encountered in service.
>
> § 23.141 General.
> The airplane must meet the requirements of §§ 23.143 through 23.253 … **without requiring exceptional piloting skill, alertness, or strength.**
>
> § 25.101 General.
> (h) The procedures established under paragraphs (f) and (g) of this section must -
>
> (1) Be **able to be consistently executed in service by crews of average skill….**
>
> § 25.105 Takeoff.
> …(b) **No takeoff made to determine the data required by this section may require exceptional piloting skill or alertness.**

Let’s put this old saw to bed. Performance charts in Pilot’s Operating Handbooks (POHs) and Airplane Flight Manuals (AFMs) are by regulation adjusted to reflect **average** flying skill, not the exceptional skills of test pilots. They still do, however, reflect well-rigged, new aircraft. Thanks for the reminder, reader. I’ll stress this when it comes up again.

See https://thomaspturner.com/wp-content/uploads/2024/01/2024.0118-FLYING-LESSONS.pdf

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