Thomas P. Turner's
Mastery of Flight

www.thomaspturner.com

FLYING LESSONS for January 11, 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.**

FLYING LESSONS is an independent product of MASTERY FLIGHT TRAINING, INC.

Pursue ***Mastery of Flight***™

This week's LESSONS:

We've heard a lot this week about doors opening in flight. But while a **door (or "door plug") separating from a passenger cabin during high-speed pressurized flight** is an extreme hazard by itself, there are many lesser "door opening in flight" events that are dangerous only if the pilot responds in a way that *makes* it dangerous. Take for example this event that also happened this week (from an **FAA preliminary incident report**):

> 1/10 2310Z (1710 local Wednesday afternoon): An F33A Bonanza's "door popped open on liftoff." The pilot "attempted to set back down and ran off the end of the runway resulting in a nose gear failure," at Tulsa, Oklahoma. The pilot, alone in the aircraft, was not hurt. Airplane damage is "unknown."

See:
https://en.wikipedia.org/wiki/Alaska_Airlines_Flight_1282
https://www.asias.faa.gov/apex/f?p=100:96:13891011349006::::P96_ENTRY_DATE,P96_MAKE_NAME,P96_FATAL_FLG:11-JAN-24,BEECH

Most experts teach flying a normal pattern when a door opens after the airplane is airborne, then landing and securing the door. In most low-wing airplanes—Bonanzas among them—suction over the wing pulls the door outward while the slipstream pushes it inward, resulting in the door riding slightly open at equilibrium between the forces acting on it. In some airplane types—Bonanzas *not* among them—it works to open a pilot-side vent window, put the airplane into a steep slip and then secure the door. Or at least some Pilot's Operating Handbooks (POHs) suggest this is possible, I've never tried.

Regardless of airplane type, there are two larger issues here. Some events, such as engine failure immediately after takeoff, require an immediate response. ***Single or twin,*** at low altitude the best, most survivable response is to **push** the nose down to maintain airspeed and angle of attack **and hold** wings-level heading primarily with rudder to avoid asymmetric aileron drag and its increased likelihood of a low-altitude snap roll.

An unlatched door, however, usually leaves the airplane controllable with only somewhat degraded climb performance. The loud "pop" might *sound* like an engine explosion, so it's up to the pilot to make a quick initial diagnosis or at least rule out catastrophic engine failure. Other possibilities, including bird strikes (and the growing number of drone strikes) might also sound similar, leaving the pilot to assess aircraft controllability.

The first *LESSON* from this initial report (which, unless the damage is determined to be "substantial" per the **NTSB 830** definition:

> *Substantial damage* means damage or failure which adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component. Engine failure or damage limited to an engine if only one engine fails or is damaged, bent fairings or cowling, dented skin, small punctured holes in the skin or fabric, ground damage to rotor or propeller blades, and damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wingtips are not considered "substantial damage" for the purpose of this part.

…is to **react *properly and immediately* in the event of engine failure, but react *correctly and deliberately*** to any other sudden event. To be ready and able to do this requires **training** in emergencies, optimally supplemented by Aviation Training Device or simulator emergency and abnormal indications training. And it takes **forethought**, considering your response before every takeoff to refresh yourself on your reaction to sudden events, engine related and not.

The second *LESSON* is the whole idea of "runway remaining." We usually consider "runway remaining" in the context of retractable gear airplanes, i.e., "retract the landing gear when there is no usable runway remaining." The idea is to leave retractable landing gear down until it's of no use to you during engine failure.

This means you'll have to keep the runway in sight during your initial climb, continually evaluating not only the amount of runway remaining ahead of you but also your height above that runway, and if you could **push and hold** now and still get stopped on the remaining runway. That's no easy task. One way might be to adopt something similar to the balanced field concept. Although a balanced field is not necessarily the same as a multiengine airplane's accelerate/stop distance, it is similar: the runway distance required to accelerate to takeoff speed, lose one engine at that precise moment (while still on the ground), and then, using maximum braking and reverse trust if available, come to a complete stop.

See:
https://en.wikipedia.org/wiki/Balanced_field_takeoff#:~:text=In%20aviation%2C%20a%20balanced%20field,aircraft%20configuration%20and%20runway%20condition.
https://www.law.cornell.edu/cfr/text/14/25.109

Note that every POH, Airplane Flight Manual (AFM) or Owner's Manual I've seen for retractable gear airplanes calls for gear retraction upon confirming a positive rate of climb. I've not seen any that suggest delaying retraction while "usable runway" remains, probably because of the difficulty of making that determination.

But we're not limiting this week's *LESSONS* to multiengine airplanes, or even to retractable gear airplanes.

In the context of deciding whether there is sufficient runway remaining *after* a sudden event—engine failure, a door coming open, whatever—**accelerate/stop distance and/or a balanced field length runway doesn't answer the question**. Both those calculations, if you have data to compute them, assume the event that prompts a rejected takeoff (RTO) happens ***on the ground***.

More usable information might come from **computing the airplane's takeoff obstacle clearance distance**, which (if the pilot uses the handbook technique, in most POHs/AFMs essentially a short field takeoff) takes the airplane from the beginning of the ground roll to a point 50 feet above the runway at Best Angle of Climb (V_X) speed, **and adding the computed 50—foot obstacle clearance landing distance** (starting from close to that same speed, and using short field landing technique and maximum braking).

The result gives an estimate of taking off, having a sudden event immediately after liftoff (in most airplanes 50 feet is less than two wingspans above the ground) and then landing and coming to a stop. This is valid ***only*** if you use short field takeoff and landing techniques including maximum braking on landing—use more "normal" techniques and you'll need some unknown,

longer runway length. And it only works in the initial seconds after taking off, when you're not yet climbed two wingspans into the air. Even if you're a "positive rate, gear up" pilot in retractable gear airplanes, if you actually confirm a positive rate of climb you'll probably be 50 feet in the air by the time you make that confirmation.

Back to the report that prompts this week's *LESSONS*. It may well have been that landing immediately was the best option for the pilot of the accident airplane, even knowing it would take the airplane off the end of the runway—we don't know the full circumstances. Given this will may not meet the "substantial damage" reporting requirement there probably will be no further public investigation and we'll never know more than we do right now.

This event *does* remind us, however, that if we're making a decision whether there's runway remaining to land ahead of us, for whatever reason, it's not as easy to make that determination as you might think. And short of using POH/AFM data to find the sum of takeoff and landing distances over a 50-foot obstacle, providing usable data for only the first seconds of flight and requiring maximum performance technique every time to be able to use that sum in this way, there is no performance data from which to decide.

So unless you're making a full-length takeoff from a very long runway, if you experience a sudden event shortly after takeoff and the airplane is still capable of powered flight, your best response is probably to continue to fly, make a normal pattern and then land to resolve the problem.

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

Debrief: Readers write about recent *FLYING LESSONS:*

Reader Chris Kirk of Wild Blue Aircraft Sales writes about last week's *LESSONS* on avoiding runway and taxiway incursions:

> Thanks Tom, this is good, but one thing I see -- and have had to speak up about -- is pilots being distracted by the use of their electronic devices. The number of people I witness talking on the phone, texting, etc. is staggering. It's a real problem and one that needs to be addressed.

You're right. Last week I warned of distraction from using aviation technology while taxiing—including use of georeferenced taxi diagrams—but I did not mention the hazards of cell phones, text messaging and other nonaviation devices. Going "airplane mode" with phones, texts, onboard video cameras and such, whether literally (turn them off) or at least practically (ignore them) should be part of your pre-start briefing as well. Good reminder, Chris.

See:
www.flywildblue.com
https://thomaspturner.com/wp-content/uploads/2024/01/2024.0104-FLYING-LESSONS.pdf

Reader/instructor Brian Sagi adds:

> 2023 has been a year of many high-profile runway excursions at busy airports. The January 2, 2024 Tokyo Haneda airport accident is a sore reminder that in spite of strong efforts among aviation regulators, airlines and pilots to improve runway safety, the issue is not resolved.

> **You make excellent suggestions for single pilot operations. I would like to offer a corollary for when there is more than one pilot in the airplane.** Maybe the other pilot is just a friend flying with you or maybe he or she is an instructor on a training flight. Regardless of seniority, when there are multiple pilots on board, **anytime there is less than 100% agreement among the pilots, *stop and ask!*** For example, if one pilot heard a clearance to land, but the other pilot does not remember if a clearance was given, ask ATC for clarification. Likewise, if one pilot heard "hold short," while the other pilot believes ATC issued "line up and wait" instructions, stop and ask!
>
> As I have employing these practices at various airports, on the occasions when I have asked for clarification, ATC not only gladly clarified the instruction, they also gave us a complement for asking! By the way, the **"total agreement in the cockpit"** concept also works for clearances given during flight, for example when there is lack of total agreement in the cockpit as to an ATC assigned altitude, heading, approach, etc.
>
> No sure what ATC asked do to do? Don't be shy – ask!

That holds true whether or not multiple pilots are aboard—if in doubt, ask. Multiple pilots aboard an aircraft, in whatever capacity, gives us an opportunity to improve safety if we clearly define each pilot's roles before flight and then effectively communicate until after engine shutdown. Any time there's doubt, clarify. Thank you, Brian.

Reader/instructor John Rosenberg takes us back to earlier *LESSONS* which suggest the wisdom of making forced landings gear up as a standard operating procedure (SOP), with putting the wheels down being an exception only under optimal circumstances. John asks:

> I am genuinely interested in your thoughts re. the gear up/gear down forced landing issue. My question has to do with landing with a malfunctioning landing gear where one or more gear legs may not extend or only partially extend. All this with no engine issue and landing on a hard surface runway. I'm particularly interested in larger multi-engine aircraft. What does conventional wisdom say about landing with as much gear as is available?

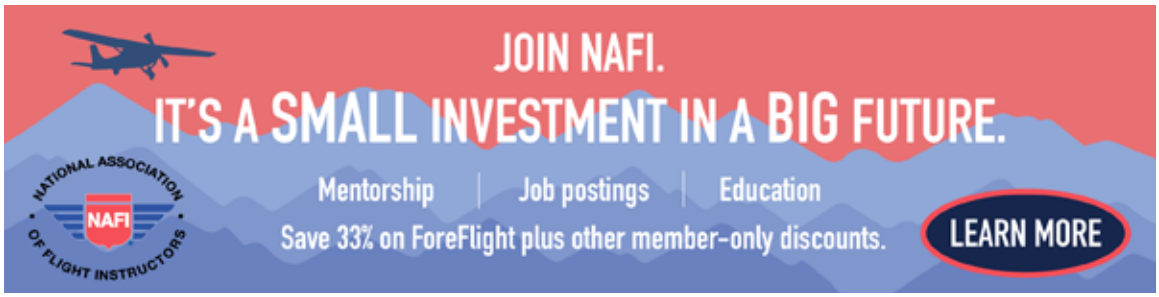
My opinion is tempered with my focus on light airplanes (by FAA definition, less than 12,500 pounds maximum weight). This is different from our previous discussion about off-airport landings with engine failure and the danger of attempting to extend a glide if *barely* able to make it to a runway.

If I have a situation where one or more gear leg is not fully down and I cannot get them fully down, but I still have engine power and an otherwise controllable airplane, if possible I'll retract all the gear and make a controlled gear-up landing. This is to avoid a high speed, sudden change in direction upon landing or even cartwheeling the airplane, both extremely hazardous to survivability of persons on board.

But I'll open the question to *FLYING LESSONS* readers with experience in heavier airplanes. What do your manuals and your training suggest? Is the recommended response different if it's a main gear leg or a nosewheel that's partly extended? Let me know the SOP in heavier airplanes.

See https://thomaspturner.com/wp-content/uploads/2023/12/2023.1214-FLYING-LESSONS.pdf

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



See https://nafi.memberclicks.net/join-nafi-now

Share safer skies. Forward *FLYING LESSONS* to a friend

Thomas P. Turner's Mastery of Flight

Please help cover the ongoing costs of providing *FLYING LESSONS* through this secure PayPal donations link.

Or send a check made out to **Mastery Flight Training, Inc.** at 247 Tiffany Street, Rose Hill, Kansas USA 67133.
Thank you, generous supporters.

Thank you to our regular monthly financial contributors:

Steven Bernstein, Montclair, NJ. Robert Carhart, Jr., Odentown, MD. Randy Carmichael, Kissimmee, FL. James Cear, South Jamesport, NY. Greg Cohen, Gaithersburg, MD. John Collins, Martinsburg, WV. Paul Damiano, Port Orange, FL. Dan Drew. Rob Finfrock, Rio Rancho, NM. Norman Gallagher. Bill Griffith, Indianapolis, IN. Steven Hefner, Corinth, MS; Ellen Herr, Ft Myers, FL. Erik Hoel, Redlands, CA. Ron Horton. Robert Hoffman, Sanders, KY. David Karalunas, Anchorage, AK. Steve Kelly, Appleton, WI. Karl Kleiderer. Greg Long, Johnston, IA. Rick Lugash, Los Angeles, CA. Richard McCraw, Hinesburg, VT. David Ovad, Resiertown, MD. Steven Oxholm, Portsmouth, NH. Brian Schiff, Keller, TX. Paul Sergeant, Allen, TX. Ed Stack, Prospect Heights, IL; Robert Thorson, Reeders, PA. Paul Uhlig, Wichita, KS. Richard Whitney, Warrenton, VA. James Preston, Alexandria, VA.

And thanks to these donors for helping with the Mastery Flight Training website rebuild and *FLW* costs in 2023

Karl Kleiderer, Jeffery Scherer, Ken Newbury, William Eilberg, Wallace Moran, Lawrence Peck, Lauren McGavran, Stanley Stewart, Stu and Barbara Spindel, Danny Kao, Mark Sanz, Wayne Mudge, David Peterson, Craig Simmons, John and Betty Foose, Kendell Kelly, Sidney Smith, Ben Sclair, Timothy Schryer, Bruce Dickerson, Lew Gage, Martin Pauly, Theodore Bastian, Howard Greenberg, William Webber, Marc Dullude, Ian O'Connell, Michael Morrow, David Meece, Mike Gonce, Gianmarco Armellin, Mark Davis, Jason Ennis, William Moore, Gilbert Buettner, Don Denny, John Kolmos, LeRoy Cook, Mark Finklestein, Rick Lugash, Tom Carr, John Zimmerman, Lee Perrin, Bill Farrell, Kenneth Hoeg, William Jordan Jr., Mark Rudo, Boyd Spitler, Michael Brown, Gary Biba, Meaghan Cohen, Robert Chatterton, Lee Gerstein, Peter Tracy, Dan Drew, David Larson, Joseph McLaughlin, Nick Camacho, Paul Uhlig, Paul Schafer, Gary Mondry, Bruce Douglass, Joseph Orlando, Ron Horton, George Stromeyer, Sidney Smith, William Roper, Louis Olberding, George Mulligan, David Laste, Ron Horton, John Kinyon, Doug Olson, Bill Compton, Ray Chatelain, Rick McCraw, David Yost , Johannes Ascherl, Rod Partio, Bluegrass Rental Properties, David Clark, Glenn Yeldezian, Paul Sherrerd, Richard Benson, Douglass Lefeve, Joseph Montineri, Robert Holtaway, John Whitehead; Martin Sacks, Kevin O'Halloran, Judith Young, Art Utay, Mark Still, Charles Lloyd, Danny Kao, Leroy Atkins, Peter Grass, David Butoe, Bill Cannon, Thomas Fankhauser, David Kenny ; Jeffery Scherer, Allen Leet, Joseph Victor, Susan Wolber, Glenn Beavers, Bill Farrell, Scott Snider, Ken Newbury, Robert Gates, Surojeet Ghatak, David Peterson, Moshe Glenner, Kent Stones, Mark Davis, George and Amy Steed, Shiva Mayer, Craig Simmons

NEW 2024 DONORS THIS WEEK: Jim Lara, Joseph Stadelmann, Dixon Smith, Barry Warner, Wayne Mudge, Joseph Vandenbosch, Ian Campbell, Jay Apt, John Kimmons, Derek Rowan, Michael Maya Charles, Ron Horton, Lauren McGavran

Pursue *Mastery of Flight*™

Thomas P. Turner, M.S. Aviation Safety
Flight Instructor Hall of Fame Inductee
2021 Jack Eggspuehler Service Award winner
2010 National FAA Safety Team Representative of the Year
2008 FAA Central Region CFI of the Year