

# Thomas P. Turner's Mastery of Flight

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## FLYING LESSONS for December 14, 2023

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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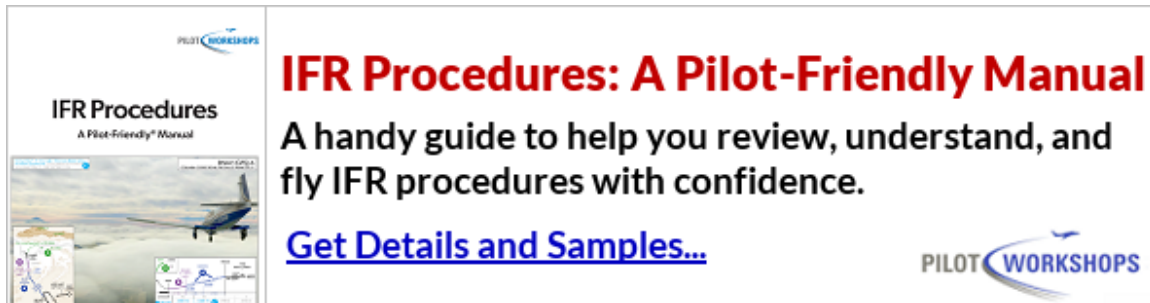
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### This week's LESSONS:

**This week** we'll go straight to reader insights and my comments in response, in the Debrief.

**Questions? Comments? Supportable opinions?** Let us know at [mastery.flight.training@cox.net](mailto:mastery.flight.training@cox.net).

**NOTE:** Family priorities prevented me from updating the Beech Weekly Accident Report this week. I'll catch up all reports since my most recent update next week.



See [https://pilotworkshop.com/products/ifr-procedures-pfm/?utm\\_source=abs&utm\\_medium=bnr&ad=abs-bnr](https://pilotworkshop.com/products/ifr-procedures-pfm/?utm_source=abs&utm_medium=bnr&ad=abs-bnr)

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

A few readers wrote comments about the [November 30 LESSONS](#) along the lines of this from commercial pilot, flight instructor and aviation maintenance technician Andy Swineford:

Something in your report on Nov. 30th took me by surprise. When describing an off-airport dead-stick landing, you said...

**"After an unexplained loss of power from the ultra-reliable PT6A-35 turboprop engine, the pilot appears to have done everything right:**

1. Fly the aircraft;
2. Aim somewhere (not wasting time flying away from a good option before selecting a landing target);
3. Complete the emergency procedure checklist while still flying the airplane and aiming toward your target;
4. Reassess the target and change targets only if necessary.

5. Touch down **wings level, under control at the slowest safe speed, and in a retractable gear airplane, with the landing gear up.**"

*Why on earth would touching down on land with the gear up be the right thing to do?* This is very contrary to what I have read, been taught and currently understand.

The landing gear provides shock absorption and reduces the impact on human bodies of the airplane contacting the ground. Even if the landing gear is sheared off in the landing, the force required will *reduce the forward motion of the aircraft, helping to bring it to a stop.*

It seems to me that landing with the gear up may have contributed to the fatal injuries of the passenger. I'd like to know what your reasoning is for landing gear up.

See <https://thomaspturner.com/wp-content/uploads/2023/11/2023.1130-FLYING-LESSONS.pdf>

Planning to land gear up in the event of total engine failure in a retractable gear airplane (unless everything is perfect on very short final, if you make it to a runway) is **my opinion**, and a recent change in my opinion at that.

**For decades I thought and taught the same**—at best putting the gear down smooths the touchdown, and at worst the gear shears off after absorbing much of the shock of an off-airport landing. In the past year or so I've changed my mind for reasons I'll shortly relate. Further, I've learned a few aircraft accident investigators and instructors have come to the same conclusion as a result of accident history, that off-airport landings that result in shearing off the landing gear can impart much more force on aircraft occupants than a controlled gear-up landing.

So, here's my reasoning:

**First** is an experience I've related many times in Beechcraft circles, but I don't remember whether I've ever used it as an example in *FLYING LESSONS*. My very first flight in a Beech Bonanza was my checkout when I was first hired to teach Bonanzas, Barons and Dukes at FlightSafety International in Wichita, Kansas in 1990. Flying an over-TBO (Time Between Overhauls) IO-520 A36, I was in the left seat with then-Bonanza Lead Instructor Norm Thompson in the right (Norm is still teaching there 34 year later, and recently earned his Wright Brothers Master Pilot Award).

Several thousand feet above the rural Anthony, Kansas airport, Norm pulled the throttle to idle to simulate a total engine failure. Having never practiced this in a Bonanza before, I established Best Glide speed and configuration (gear and flaps up) and did my best impression of the Commercial Pilot Steep Spiral to Landing maneuver I'd performed in a Cessna 182RG two years before. Using this technique I circled tightly downward to set myself up for landing to the south at Anthony. Making my last, continuous turning glide I turned short final, with the runway made, I did what came naturally—I extended the landing gear. **Instantly I knew this was a mistake**, that I was no longer going to be able to make it to the runway.

In most piston airplanes Best Glide speed isn't too terribly different from approach and landing speeds, and in most retractable gear piston airplanes extending the wheels at approach speed adds about 500 feet per minute to the descent rate. That's what happened in my Bonanza checkout—I **had it made until I tried to save the airplane** instead of focusing on saving my passengers and myself. If that had been a real engine failure I would have either descended short into obstacles, or stalled the airplane trying to "stretch the glide" to the runway. As it was we powered up and went around to try it again.

From this experience, and with the fast-running Beechcraft landing gear, I developed this teaching point: At least in the Bonanza, in a power-off landing **wait until you have passed over the last obstacle to extend the landing gear**. If you're gliding to a prepared runway, wait until you're past obstacles and over the mowed grass around the runway before putting the wheels down. This can be part of the transition from glide speed to Landing Without Power speed in the extremely few moments before touchdown. As experts in the type of airplane you fly what they think is best.

As I grew into that first teaching job and began reading accident reports and identifying accident trends, I learned **how very frequently pilots of retractable gear aircraft with engine failures**

come up a quarter mile short of their intended landing zone, or stall on short final trying to “stretch the glide.” Could this be related to the big increase in rate of descent that results from gear extension? Could destabilizing a stable, planned engine-out glide by throwing out the landing gear be a frequently fatal mistake? Might have things turned out better if they’d kept the gear up?

**My second point** relates to the idea of a gear leg shearing off as shock absorber. If the nose gear breaks off this will slam the nose down and create a very sudden deceleration, dramatically increasing impact forces on the aircraft’s occupants. Persons on board who are not wearing shoulder harnesses usually have fatal or life-changing head injuries as a result, especially front seat occupants. If a main gear leg snaps off this will most likely cause the airplane to swerve in



Figure 1. Airplane as it came to rest in the rolling terrain.

that direction, causing massive side loads that most aircraft restraint systems are not designed to protect against. This would also dig a wingtip into the ground and make it likely the aircraft will cartwheel. Look again at the NTSB photo of the mishap airplane that prompted the most recent *LESSONS*. The ground is very irregular and it looks like there is a small gully just aft of the airplane. If the gear was down it would almost certainly have dug the nose in or caused massive side loads. As it is it appears the airplane slid in a straight line until stopping. Why did the aft seat passenger die, and the pilot suffer serious injuries? The gully may have caused a sudden stop, or some issue with wear and function of

passenger restraints may emerge in the investigation to come.

The ASIs (Air Safety Investigators) and instructors who share my opinion about landing gear up generally cite the impact forces, side loads and threat of cartwheeling as their reason.

**Third** is the notion that shearing off the gear would make the aircraft stop more suddenly. That’s right, but **survival is actually improved by sliding gradually and as far as possible**. Most general aviation aircraft restraint systems are designed to make survivable a deceleration at or below 9Gs. Our friends at [Bold Method](https://www.boldmethod.com/learn-to-fly/navigation/if-your-engine-fails-how-to-pick-your-off-field-landing-on-a-spot/) remind us that touchdown speed and the distance of roll/slide to experience 9G or less are related, and not linearly. Generally **the longer the ground roll/slide distance the lower the impact forces**...at least unless you hit something that penetrates the cabin structure.



See <https://www.boldmethod.com/learn-to-fly/navigation/if-your-engine-fails-how-to-pick-your-off-field-landing-on-a-spot/>

What really cinched it for me, however, was the widely reported crash of a Cessna 177RG at Lake Placid, New York—the Richard McSpadden/Russ Francis crash. I’ve already written about *LESSONS* suggested by this tragedy in the [October 26](#) and [November 2](#) reports. [The NTSB preliminary report](#), however, includes more details that tell us the accident scenario might not have been precisely what we thought it to be initially. According to investigators the aircraft (with my emphasis added):

...impacted an embankment in a right-wing, nose-low attitude **about 15 feet below the top of a plateau** on airport property. The airplane then slid about 30-feet down the embankment... The initial impact point on the embankment was located about 440 feet from the approach end of runway 14, approximately 250 feet left of the runway centerline. The downslope angle was about 70-degrees....

The nose landing gear was crushed aft during the impact sequence and ...[t]he **main landing gear were in an intermediate position**.... The main landing gear wheels were observed in contact with the buckled lower fuselage and not in the wheel wells.

The C177RG POH recommends landing gear up in an off-airport landing “if terrain is rough or soft.” I can’t find anything specific in the Cardinal RG POH but recall from flying a Cessna 210 with essentially identical landing gear that the Cessna advises for departure that vertical speed is decreased by 200 feet per minute while the gear is in transit—an advisory to delay gear retraction until clear of all obstacles. The unique C177RG/182RG/210/337 gear geometry puts the main wheels out at 90 degrees to the slipstream at the beginning of extension and actually pauses there briefly, two big drag discs that will increase vertical speed at that point of the cycle.

**How does this relate to the Lake Placid crash?** A plausible scenario is that, after deciding to return to the airport for whatever reason, and once it appeared they had the runway (or at least the flat area of the airport) made, one or the other pilot about the C177RG chose to extend the landing gear...prioritizing saving the airplane over saving themselves, assuming the ground roll would remain controllable, or figuring that the gear would absorb some of the shock of landing. Would the airplane have been 15 feet higher in its glide and cleared the top of the plateau had the gear not been in transit at the time of impact? I’ll leave the specifics of this event to the NTSB. But it reinforces my opinion to **make landing gear up the default technique** in the event of engine failure in a retractable gear airplane.

See:

<https://thomaspturner.com/flying-lessons-weekly/flying-lessons-for-october-26-2023/>  
<https://thomaspturner.com/flying-lessons-weekly/flying-lessons-for-november-2-2023/>  
<https://thomaspturner.com/wp-content/uploads/2023/10/2023.1001-C177RG-NY.pdf>

It seems a rare quality today—and perhaps always has been—to change decades-long beliefs as a result of new information. In this case I’ve made the switch. In an off-airport landing chances of survival are maximized if you can land **Wings level, Under control at the Slowest Safe Speed, flying the aircraft as far into the crash as possible** in a manner that allows the restraint system and the aircraft structure itself to protect you and your passengers as it was designed to do. In a retractable gear airplane, maintaining control as far as possible suggests—in my opinion—**leaving the landing gear up and concentrating on a smooth belly touchdown**.

Is that your opinion too? Have you ever even thought about it?

More to say? Let us learn from you, at [mastery.flight.training@cox.net](mailto:mastery.flight.training@cox.net).



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Thomas P. Turner, M.S. Aviation Safety  
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