

# **FLYING LESSONS** for June 17, 2010

suggested by this week's aircraft mishap reports

*FLYING LESSONS* uses the past week's mishap reports to consider what *might* have contributed to accidents, so you can make better decisions if you face similar circumstances. In almost all cases design characteristics of a specific make and model airplane have little direct bearing on the possible causes of aircraft accidents, so apply these *FLYING LESSONS* to any airplane you fly. Verify all technical information before applying it to your aircraft or operation, with manufacturers' data and recommendations taking precedence.

**If you wish to receive the free, expanded *FLYING LESSONS* report each week, email "subscribe" to [mastery.flight.training@cox.net](mailto:mastery.flight.training@cox.net).**

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## ***This week's lessons:***

**Especially in the Midwest, West and Southwest**, weather conditions often meet the criteria for MVFR or even good VFR around and under all but the rain shafts associated with towering cumulus and thunderstorms. A check of METARs, TAFs and area forecasts may look good when the overlying conditions create severe turbulence near the ground and aloft.

**Many thunderstorm hazards occur** outside the "IMC" part of the storm. Wind shear can (and does) extend to the surface beneath the cell, and spreads out radially near the surface. Hail shafts have been encountered 10 or more miles from the thunderstorm cloud, especially under the anvil—hence the standard recommendation to avoid storm cells by 20 miles, to have a buffer between you and hail, and to avoid underflying the anvil portion of the cloud. Severe and extreme turbulence may dangerously toss the air—and aircraft—in that same 10- to 20-mile radius.

**If you find yourself in the storm** don't give up—fly wings level, with a margin below turbulence air penetration speed ( $V_a$  adjusted for weight or, if published in your POH,  $V_o$ ) but well above a stall as well. Extend retractable landing gear for more stability and increased drag to resist accelerations. Leave flaps retracted; maximum certificated load factor is usually reduced with flaps extended, and you have no guidance as to the reduced  $V_a/V_o$  speed.

**If your airplane's wing has been modified** with lift enhancing devices it's turbulent air speed is almost certainly reduced as a result...and most STC providers do not tell you by how much. As a rule of thumb reduce published  $V_a$  by the same amount that stalling speed is reduced as a result of the modification. Then make your weight-based adjustments to the speed from there.

**Sigmets, Convective Sigmets and the Convective Outlook** provide a much more accurate picture of potential thunderstorm conditions when combined with radar, METARs and TAFs, than any one or two weather briefing products. In the United States, the [Aviation Weather Center](#) is an excellent source of self-briefing weather information.

See [www.aviationweather.gov](http://www.aviationweather.gov)

**The Aeronautical Information Manual** [chapter 7](#) provides a solid review of thunderstorm avoidance procedures and emergency escape; AOPA's Air Safety Institute program "[Thunderstorms and ATC](#)" reviews how you can work with controllers to maintain separation from thunderstorms, and ATC's limitations and priorities when it comes to weather-avoidance flight.

See:

[www.faa.gov/air\\_traffic/publications/ATpubs/AIM/Chap7/aim0701.html](http://www.faa.gov/air_traffic/publications/ATpubs/AIM/Chap7/aim0701.html)  
[http://flash.aopa.org/asf/wxwise\\_thunder](http://flash.aopa.org/asf/wxwise_thunder)

**Sources in the insurance industry** tell us the typical "minor damage" gear up landing costs \$40,000 to \$60,000 to repair, the majority from propeller replacement and engine tear-down inspection and repair. Trying to save money by skipping the engine tear-down inspection presents greater hazard, because many crankshaft failures are predated by an earlier prop strike.

**In many airplanes the repair cost** exceeds the roughly 80% of insured value that triggers "totaling" the airplane, and in even more the expense is not economical given the value of the airplane afterward. Consequently it's not unusual for this sort of "minor" damage to result in the airplane being parted out in salvage.

**Landing gear-related mishaps (LGRMs)** appear to be the greatest single cause of airframe retirements among retractable-gear airplanes. LGRMs follow distinct patterns that result in 10 tips for avoiding gear up and gear collapse mishaps, detailed in the Mastery Flight Training DVD "Those Who Won't: Avoiding Gear Up and Gear Collapse Mishaps." Consider investing \$25 and 16 minutes to avoid common scenarios that could put your airplane on the ground for months of costly repairs, or end its operational days altogether. Great for WINGS events.



See <https://secure5.webfirst.com/ABS/Store/#ThoseWhoWont>.

Comments? Questions? Tell us what you think at [mastery.flight.training@cox.net](mailto:mastery.flight.training@cox.net).

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

Regarding last week's *LESSONS* on off-airport site selection, reader John Townsley adds this recommendation:

*How to CRASH an Airplane (and Survive!)* by Mick Wilson is a great resource for anyone flying small aircraft. The book, as well as a DVD and a CD of his seminar on this topic are available from [www.crashandsurvive.com](http://www.crashandsurvive.com). It has several suggestions for selecting either an emergency landing site (for when you **MUST** come down) or a 'precautionary' landing site (when you're coming down, but you have a little time to pick your meeting place with terra firma). Mick had lots of experience flying in mountainous conditions, then later as an FAA accident investigator. Surviving an "off airport" landing really begins well before the emergency or abnormal indications dictate an immediate return to earth. There are skill factors, but also significant psychological factors that have a lot of influence on whether the pilot and passengers survive or join the data set of aircraft related fatalities. It's a good read.

Thanks, John! Instructor Tony Johnstone adds his expertise on off-airport field selection:

Good commentary on emergency landings. I believe it is an area that does not get enough attention from some CFIs. I certainly notice on flight reviews that many pilots don't have a good plan for dealing with an engine failure. You shouldn't be trying to work it out on the fly. My priorities:

1. Best glide speed **IMMEDIATELY** to maximize time in the air and options. (Rolling the elevator trim all the way back will do this for you in most high-wing Cessnas, for instance.)
2. Look for a place to land and head right at it. Be realistic about how far you can get, know what your rate of descent is power-off, how high you are, so you know how long you have in the air. If you are gliding at 60 kts at 3000 feet AGL, descending at 700 FPM, you've realistically got just over 3 minutes to get to your landing site with enough altitude to maneuver to land. So count on about 3 miles gliding distance with no wind, you will not get to that airport that is 5 miles away unless you have a significant tailwind.

Best choices, in descending order:

1. Airfield (always be aware of the closest one as you go cross-country, and remember it may be behind you).
2. Paved road. 4-lanes will not have wires most of the time. Land **WITH** the traffic flow which should be moving at about the same speed as you.
3. Unpaved road. Look for wires, even if there are wires they are often far enough back to allow you

to get down, but if there are buildings on the opposite side there are probably overhead wires crossing the road.

4. Fields are my last choice unless you can be sure they are dry and hard. Wet or muddy surfaces will almost always result in you winding up on your back.

If you are heading to a landing site and you see something better, my rule is you can change your mind one time only! Don't take time dithering between two sites and winding up between them. And I agree with your last point, if I'm going to roll an airplane up into a ball in an off-airport landing, I'd like it to be close to someone who can help to get me out of the airplane!

If you can't get the engine to restart and you are committed, make the radio call, if you are already in contact with a facility tell them first, then go to 121.5 if instructed. Hopefully they will have the sheriff and the EMS guys waiting or at least enroute when you get down. And follow Bob Hoover's advice, fly it all the way into the crash. Even if you have to land in a less-than optimal spot, if you touch down at minimum speed with the wings level you are probably going to walk away from it!

Thanks, Tony. As you say, wings level, under control, at the lowest safe airspeed.

Reader Randy Kenyon writes about last week's *FLYING LESSONS* on instructional flight from the viewpoint of an experienced aviation insurance professional:

Another great article, Tom! I was most interested in responding to the section:

***Consequently we're in a period of increased risk as new pilots are receiving checkouts that, by their very nature, put the pilot in unusual (for them) situations, often in unfamiliar equipment. And, instructors are not always intimately familiar with the nuances of the specific model of airplane in which they're teaching.***

We have so many owners of newly purchased aircraft that want their current CFI to give them dual requirements in the new aircraft. When we ask if the CFI meets the Open Pilot Clause, the response is, "No, but he has thousands of hours and can fly anything!". That always makes an insurance underwriter feel better. I like to ask, "Well, if there is an in-flight emergency, does that CFI even know what to do in that aircraft? If it is an electrical emergency, does he even know where the circuit breakers are and which are essential and which are the non essential circuit breakers?" Why do we even want to be taught by someone with limited knowledge of our aircraft? Especially in the Technologically Advanced Aircraft of today.

Keep beating these guys up on CFI safety. Insurance is going to demand experienced pilots for that make and model, so when an aircraft owner demands his CFI-buddy do the training or he will move his insurance to another company, we lose financially, but the pilot loses on life expectancy for him and his family that flies with him.

Thanks, Randy. Emphasizing the need for very type-specific instruction, reader Lew Gage uses as an example a recent *FLYING LESSON* on propeller overspeeds:

Regarding prop over speed, one propeller that will overspeed from a breakage of part of the governor system is the Beech 215, electrically controlled propeller on the old V-tail [Bonanzas, 1947 through] 1956 model year. For those props still utilizing the original electro/mechanical Beech issued governor, if the tachometer type governor drive cable breaks, the governor senses an under speed due to the broken drive cable causing the rotation of the governor internal mechanism to come to a stop. The governor will therefore run the prop back to the fine pitch, high RPM, stop since it has sensed an under speed. In cruise or descent flight with IAS at or above 140 MPH this will cause the RPM to start toward about 3000 RPM. If the IAS were higher during a descent and the pilot controlled prop mode switch were in "auto" this could lead to a really high RPM causing who knows what.

Additionally, the Hartzell propeller that is approved for conversion of the Beech electric to the Hartzell hydraulic differs from most other hydraulic props in that if oil pressure is lost the prop goes to full coarse pitch (low RPM) and will limit the available engine speed to about 1900 RPM, if the engine doesn't fail due to low oil pressure. The low oil pressure in the prop system could be caused by either low engine oil pressure or a failure of the governor or other prop component.

Thanks, Lew. That depth of knowledge is why I restrict myself to instructing only in later-model airplanes, and refer pilots seeking instruction in earlier airplanes to an expert like you.

On the same topic of CFI responsibility, reader Paul Wood passes along this tremendous wisdom from his instructor:

Regarding the hazards of dual instruction, my primary flight instructor, a PhD in polymer physics and 40-plus year veteran of instruction, gave me this one day to ponder. He had just signed me off to take my private practical test and told me that, “I have taught you all of MY weaknesses.” I thought this to be amazingly insightful and completely divorced from ego. He encouraged me to seek another competent CFI on the field to evaluate my ability before taking the exam. This turned out to be sage advice. I did exactly that and found that I did have a hole in my understanding of accelerated stalls. This became a great learning experience for me, and it underscored the fact that no singular person can effectively teach everything to you, nor can you possibly learn everything you need to learn from just one instructor.

I really appreciate you volunteering that experience, Paul.

## Charity flights advisory

*FLYING LESSONS* has previously commented on the strong mission orientation demonstrated by generous aircraft owners who donate their services to charities, most frequently by transporting ambulatory medical patients and their family members. The feeling of being on an “aeromedical mission” appears at times to have negatively affected go/no-go decision making, resulting in four high-profile fatal accidents in a single 12-month period. All took place in challenging weather conditions.

The National Transportation Safety Board (NTSB) has published a [recommendation](#) that all charitable flights be operated with the same level of pilot and operational oversight as commercial operations under FAR Part 135. “The NTSB is concerned that these pilots did not provide the passengers with the basic level of safety that passengers in these circumstances have a right to expect. Furthermore, the voluntary pilot organization arranging or fostering the flights made no attempt to verify the pilots’ currency. Because each of these flights was operated under Part 91, the passengers on board received only the level of safety that the individual pilot provided to them; no additional oversight, training, verification, or guidance was provided to these pilots beyond the basic Part 91 requirements imposed on the pilots themselves.”

While the NTSB’s recommendation may seem over-reaching to some, remember that the Federal government’s oversight of aviation safety is designed primarily to protect the *public*, not necessarily those of us who voluntarily assume the risks of personal flight. Regardless of whether you’re flying yourself, your family and friends, or through your extreme generosity volunteering to fly others, consider your responsibility to those who depend on you for safety, and the fact that nonpilots often do not appreciate the risk management decisions we pilots must make. Safety is your job—regardless of the mission.

See [www.nts.gov/recs/letters/2010/A-10-102-104.pdf](http://www.nts.gov/recs/letters/2010/A-10-102-104.pdf).

## General Aviation Awards Program

Congratulations, Tom! The honor is well deserved. It makes me all the more grateful to be on the mailing list for *Flying Lessons*.—David Kenny, AOPA

Thank you very much, David. He’s talking, of course, about the [2010 General Aviation Awards Program](#). I’m greatly honored to have been selected as the National FAA Safety Team Representative of the Year, primarily for my weekly work on *FLYING LESSONS*. I invite all my readers to attend the award presentation at Oshkosh during EAA AirVenture, on Wednesday evening in Theater in the Woods, which honors National CFI of the Year Jeffery R. Moss of Los Angeles, CA; National Aviation Maintenance Technician of the Year Neil John Nederfield of Lafayette, NJ; and National Avionics Technician of the Year Kirk H. Peterson of Larimore, ND, as well as me.

See [www.generalaviationawards.org](http://www.generalaviationawards.org)

## And speaking of AirVenture...

Flying to Oshkosh creates great personal rewards, but it also entails notable risks as so many disparate airplanes converge on a single airport, often at the same time. Last week we began the

annual *FLYING LESSONS* seven-part series on Arriving at AirVenture. This week we'll present Part 3: [Airspeed Control](#).

See [www.aero-news.net/news/genav.cfm?ContentBlockID=2AA8E421-F426-4450-A28A-E6A665891317&Dynamic=1](http://www.aero-news.net/news/genav.cfm?ContentBlockID=2AA8E421-F426-4450-A28A-E6A665891317&Dynamic=1)

Recapping the earlier articles:

Part 1: [Know the NOTAM](#) (note: the correct link for this year's EAA NOTAM is [here](#).)

Part 2: [Have a Back-up: Fill 'er Up](#)

See:

[www.aero-news.net/news/featurestories.cfm?ContentBlockID=E1FEE301-00FA-4BC9-9B2A-A114EDAA14D6&Dynamic=1](http://www.aero-news.net/news/featurestories.cfm?ContentBlockID=E1FEE301-00FA-4BC9-9B2A-A114EDAA14D6&Dynamic=1)

[www.airventure.org/flying/2010\\_NOTAM.pdf](http://www.airventure.org/flying/2010_NOTAM.pdf)

[www.aero-news.net/news/featurestories.cfm?ContentBlockID=11B5B140-1161-457B-BE89-3AA633B059B8&Dynamic=1](http://www.aero-news.net/news/featurestories.cfm?ContentBlockID=11B5B140-1161-457B-BE89-3AA633B059B8&Dynamic=1)

Arrive safely; I hope to see you there!

<b>Program note:</b> I will not publish <i>FLYING LESSONS</i> next week. Watch for the next issue July 1 <sup>st</sup> .
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## Question of the Week

This week's question:

**How did you select the instructor you used when you checked out in the airplane you currently fly? Is he/she an expert in the specific type? What type of airplane is it?** Tell us your story at [mftsurvey@cox.net](mailto:mftsurvey@cox.net).

Last week's question was:

**Have you ever mis-diagnosed an abnormal or emergency procedure in flight?**

Here's what one of you wrote:

Safety was never at risk -- but once I started seeing an odd, rhythmic fluctuation in the electrical-system instruments of my retractable single. Every few seconds the voltage would drop and the ammeter would show an increased load, which would last only an instant. This was accompanied by a slight but distinct hum in the intercom. I spent several hours attempting to help the IA troubleshoot the electrical system, but we were unable to reproduce the problem on the ground.

Eventually one of his mechanics, who had extensive experience with a closely related model, noticed and told us what was really going on: A deteriorating O-ring in a valve in the hydraulic system was allowing the pressure to slip, making the pump kick on and off to keep the gear up. He was able to fix it in less time than we'd spent monkeying around with the [electrical system].

Another reader wrote about a past Question of the Week:

Here's an answer to a several-week-old Question of the Week: Have you ever refused an ATC clearance because you felt it was unsafe?

Yes. Enroute, flying to [Chicago] O'Hare from the east in a [Beechcraft] Bonanza, I was given an amended clearance that would have taken me out over Lake Michigan. I replied that I could not accept that clearance, and, after a little while, ATC came back with a new amended clearance that kept me south of the lake.

Thanks, readers!

***Fly safe, and have fun!***

Thomas P. Turner, M.S. Aviation Safety, MCFI  
2010 National FAA Safety Team Representative of the Year  
2008 FAA Central Region CFI of the Year



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