

# **FLYING LESSONS** for December 30, 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. You are pilot in command, and are ultimately responsible for the decisions you make.

**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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**Safe flying and a very happy and prosperous New Year to all!**

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

This end-of-the-year issue will take a one-week deviation from the standard delivery of *FLYING LESSONS*, and look at where we'll be flying together for the next 52 weeks:

## **Coming in 2011...**

*FLYING LESSONS* will continue to follow the same basic format in 2011—short, focused lessons drawn from recent mishap history, links to the fluff-free articles, products and services that will make a serious difference in how you fly, a few product reviews I've promised but have not yet had time to deliver, and tons of reader comment and questions to keep you engaged. But many *FLYING LESSONS* readers have convinced me it's time to make better use of this opportunity to actively address the causes of the worst accidents, those types that happen again and again. If we do it right, the message will move beyond the current, growing *FLYING LESSONS* community to reach an even wider audience of pilots and instructors around the world.

The *FLYING LESSONS* subscriber list has grown **60%** since January 2010, with many, many more reading on chat lines, internet bulletin boards and through websites like [www.faasafety.gov](http://www.faasafety.gov)—but we still need you to [forward this report](#) to others so we can spread the word even farther, for safer, more viable personal aviation.

Limited only by focusing first on my family life, my demanding work responsibilities, some writing commitments and my need for sleep (*FLYING LESSONS*, after all, remains an after-hours pursuit), we'll add specific focus on three areas throughout the New Year:

### **1. Redefining Flight Training**

I'm far from alone in coming to the conclusion that the manner in which we train our pilots isn't up to the task of significantly lowering the fatal accident rate. Other voices in the wilderness are being heard ([Bob Miller's Flight Training](#) and Bill Rhodes' [Airmanship Education Research Initiative](#) are but two examples). AOPA's [pilot training conference](#) last November at AOPA Summit focused on business and instructional practices to grow the pilot population, including instructor professionalism, and the upcoming Society for Aviation and Flight Educators ([SAFE Pilot Training Reform Symposium](#) (May 4-5 in Atlanta, Georgia) seeks to improve the effectiveness of pilot training by moving away from the *see-a-task*, *do-a-task*, *evaluate-a-task* instruction that has defined pilot education since the Wright Brothers set up their first flying school over a hundred years ago.

<http://bobmillerflighttraining.com/>

<http://humanfactors.illinois.edu/news/news.aspx?29>

[www.aopa.org/aopalive/?watch=J2MHh0MT09WjnmD7SJwANo5y6RKRahx9](http://www.aopa.org/aopalive/?watch=J2MHh0MT09WjnmD7SJwANo5y6RKRahx9)

[www.safepilots.org/](http://www.safepilots.org/)

[www.pilottrainingreform.org/](http://www.pilottrainingreform.org/)

Today's pilot training system has its strong points and its weak links. For instance, with the exception of stalls and directional control on the runway, we seem to do a pretty good job of teaching Practical Test Standards-type skills. What we instructors *don't* seem to be getting across is how to make good decisions...not just a "don't do this..." set of rules, because many pilots tend to ignore other peoples' advice when it isn't placed in context, but teaching pilots to understand the "whys" of rules and limitations, and to place great value on their personal ability to make an informed go/no-go decision despite external pressures to the contrary.

2011's *FLYING LESSONS* will focus on the safety aspects of flight training, with the goal of directly attacking the causes of fatal general aviation accidents, specifically through:

**ADM-based flight instruction.** We need to teach our students to make good go/no-go decisions from the very first flight lesson; actively evaluate Aeronautical Decision Making (ADM) in stage checks, proficiency checks and Practical Tests; and reinforce ADM in recurrent training and flight reviews. Student-involved decision-making (going beyond the basic PAVE and IMSAFE type of exercise) needs to be an integral part of flight instruction in all phases from Lesson 1 through your next flight check or Flight Review.

**Return to the basics of airmanship.** Tremendous advances in avionics have displaced training time and effort spent on basic stick-and-rudder skills in many programs. But independent studies have confirmed the fatal mishap rate is higher in Technologically Advanced Airplanes. Scenario-Based Training (SBT) is a superb *part* of what it takes to learn to fly well, but just as a pianist needs to master scales and chords before he/she can play a concerto, so too must a pilot focus on the stick-and-rudder basics in addition to, not in place of, scenario and avionics training. *FLYING LESSONS* will continue to hone in on basic skills training in addition to ADM-based instruction.

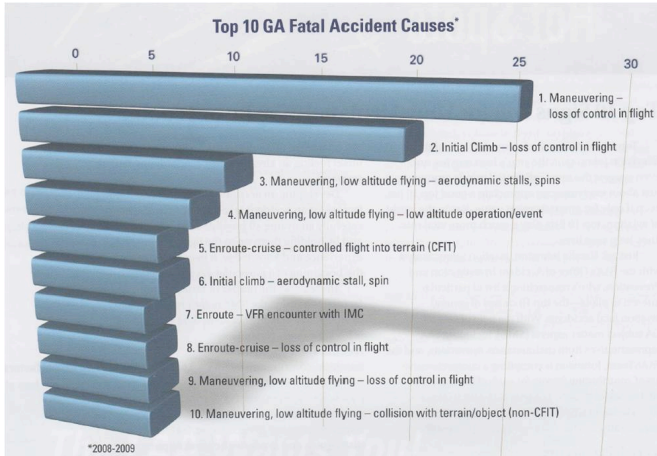
**Pilot expectations.** A recent survey of flight instructors revealed that student retention could be significantly increased if we ask new pilots what they plan to do with an airplane, and shape their expectations for the limitations as well as the expectations of personal aviation...including the time and money required to earn certificates and ratings. Sure, we might discourage some people from starting at all, but a more realistic student is more likely to continue to completion. [Sporty's Academy](http://sportys.com/academy/) in Batavia, Ohio, does this, and recently reported that 80% of all its students who take a second lesson (not just an intro flight) complete their Recreational or Private Pilot certificate. This phenomenal record (when the industry standard is less than 15%) tells us creating expectations is a big part of welcoming new pilots to the world of personal flight, and encouraging current pilots to make safe decisions throughout their flying careers.

See <http://sportys.com/academy/>.

**"Fly by Example"**. Much of what we're discussing revolves around instructors, but I'd like to introduce the concept that all pilots are teachers of flight, whether we extend those lessons to others or we simply benefit from them ourselves. Part of being a truly great teacher is to live the lessons you teach. *FLYING LESSONS* will challenge all pilots to "fly by example" for ourselves and those pilots and nonpilots around us—to make doing what we know is right our standard operating procedure, and our fallback whenever faced with a go/no-go decision.

Does this all run the risk of becoming yet another academic exercise? Frankly, yes. So I'm going to put it all in the context of addressing the most frequent scenarios for fatal general aviation accidents. [FAA Safety Briefing's November/December 2010 issue](#) explores the Top 10 causes of fatal GA accidents. *FLYING LESSONS* will focus on one of the Top 10 each month, going well beyond the "maintain control during climb" type of advice to instead look at the particular circumstances of each mishap, then suggesting ways the pilot training syllabus might be changed to address these root factors.

See [www.faa.gov/news/safety\\_briefing/2010/media/NovDec2010.pdf](http://www.faa.gov/news/safety_briefing/2010/media/NovDec2010.pdf)



The approach is simple: see what we need to change in the way we train, both as instructors and as pilots receiving initial and recurrent instruction, then develop strategies to train these causes out of our students, and ourselves.

(left) *FAA Safety Briefing's* Top 10 causes of fatal general aviation accidents.

By the end of 2011 I hope we'll have positively influenced many pilots in ways that will ultimately be reflected in a reduction in the fatal accident rate.

I absolutely *cannot* do this alone. I don't know everything...but collectively, *FLYING LESSONS* readers may come close. The community of *FLYING LESSONS* readers can, and I hope will, make a difference over the coming year.

Two other vital safety areas where *FLYING LESSONS* will concentrate in 2011:

## 2. Attacking Angle of Attack



Airmanship includes visualization of the airplane's energy state and angle of attack at all times. I'll write more about my recent, introductory Angle of Attack Indicator experience; explore different AoA displays and options; publish input from pilots who use AoA systems, including the systems' advantages and limitations; and maybe make you an AoA enthusiast too, in upcoming issues of *FLYING LESSONS*.

## 3. Showing Some Restraint(s)

Shoulder harnesses save lives in runway overruns, short landings, and loss of directional control on the runway. The record unequivocally shows this. *FLYING LESSONS* will continue to place special emphasis on serious-injury or fatal rapid-deceleration mishaps that should have been relatively injury-free had shoulder harnesses been installed and used. We'll urge owners of airplanes not fitted with shoulder harnesses make every effort to rectify that issue with one of the very most beneficial safety devices you can install in an airplane.

How am I going to do all this, given all the demands on my time? Like any other flight training, I'm going to do it in little pieces. And as always, I'm going to ask for your input, and your help.



Highly complex tasks, like mastering the flight engineer panel of the old 747-200 (left), or the integrated suite of the Garmin G1000 (below) are possible using a building-block approach...and some expert help.



OK, I've laid out a very ambitious plan for the coming year, especially for an after-hours volunteer effort. But together I think we can do it.

## Another 2011 Trend

Beginning in 2011 and becoming more obvious by 2015, I expect to see an increase in the *rate* of general aviation accidents. Here's why:

Readers of Mastery Flight Training's [Beech Weekly Accident Update](#) know that, on average, about 20% of all reported mishaps occur during the first year of registered airplane ownership. We know this by correlating accident data to airplane registration data, and for over 12 years of the WAU the figure has remained fairly steady (dropping somewhat the last couple of years when airplane sales faltered). As owners of U.S.-registered airplanes know, however, new FAA rules will require re-registering airplanes every three years. Unless the FAA changes fields in the online database, then, I'll stop tracking this statistic because it will be impossible to determine if a registration represents a new airplane purchase, or simply compliance with the new rule.

However, I think there will be a positive informational result from the triennial registration rule. As has been widely reported, the FAA has no idea exactly how many aircraft registrations represent airworthy, active airframes. In the mid- to late 1990s, when I sold airplane insurance, our underwriters assumed that only about 60% of all registered propeller airplanes more than 25 years old were still operational. Somewhere in there is a truth: there are fewer airplanes flying than the registration record suggests.

Almost all general aviation aircraft accident studies are based on an estimated number of hours flown by the fleet per year. The re-registration rule will give us a much better idea of one of the two key factors—fleet size—in this estimation (the other factor being hours flown annually per airframe). As the true fleet size becomes known—and we *know* the result will be fewer airplanes than we assume now, we just don't yet know the magnitude of the difference—I expect to see a spike in accident *rates* as the fleetwide hours-flown estimate is revised downward. Four years from now, however, after the first round of phased-in triennial re-registration is complete, we will be able to much more confidently estimate the number of accidents and fatal mishaps per flying hour. And with better input data will come better training products as a result.

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

Thanks for supporting website hosting and email delivery of *FLYING LESSONS* with a donation at [www.mastery-flight-training.com](http://www.mastery-flight-training.com). **Thank you!**

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

Responding to the angle of attack discussion begun (actually, resumed) in the December 23<sup>rd</sup> issue, reader Fred Scott beams:

Thunderous applause heard in Virginia for Tom T!!!! THIS is SO GREAT to read! You did it!

I am DELIGHTED to see the recent articles with more promised. Clearly you have been quietly following the [angle of attack] discussions elsewhere. Your support means the world to me, Young Tom. But you were among the first to “get it” with your “I would dearly love to have something like this...” [in an earlier email discussion]. Keep up the good work, and I'll point [my site](#) to yours. Good stuff, Tom. Thanks for pitching in without being asked.

Wow, thanks for your enthusiasm, Fred! Readers, Fred is a leading proponent of bringing angle of attack presentations to light airplanes. He has *no* financial interest in his crusade, and a *great deal* of good information on [his AoA website](#). We'll be referring to Fred's work in future *FLYING LESSONS* discussions.

See [www.ballyshannon.com/aoashort.html](http://www.ballyshannon.com/aoashort.html).

Fred's partner in non-financial promotion of AoA indicators in light airplanes, reader Tom Rosen, also wrote this week:

[I] just finished reading [the December 23<sup>rd</sup>] *FLYING LESSONS Weekly*. Thanks for including the AOA information. You mentioned something that had totally escaped me until now. It has been my custom when flying an airplane other than a Bonanza [the type of plane he owns] to quiz the owner (who is beside me in the plane) what the different V-speeds are for takeoff, climb, pattern and approach - particularly for [the] approach. "What do you fly your approach at?" is a standard question. With [a properly calibrated] AOA [indicator], you just fly the green donut [or equivalent approach angle-of-attack display indication], no matter what" the indicated airspeed turns out to be.

Thanks, Tom. I found that to be true...I flew the pilot's suggested AoA indication (yellow chevrons and the bottom half of the "green donut" on the display we used). Once I had that sight picture I used the AoA reference, rarely scanning to the airspeed indicator, to fly my visual approach and to make adjustments as the Kansas winds rocked our glidepath. I found it to be easier than chasing a bouncing airspeed needle in turbulent air.

Aeronautical engineering student, fairly recently minted private pilot and *FLYING LESSONS* reader Allen Herbert adds to the "you know you're a test pilot when..." discussion:

I'd say you become a test pilot whenever you enter a flight envelope that you are not familiar with, either due to a lack of experience or currency or both. Essentially whenever you enter a flight regime where the aircraft handles in an unfamiliar way.

For a reasonably low-time pilot you've got a fantastic grasp of risk management, Allen. I'd add only one thing...you become a test pilot "whenever you enter a flight regime where the aircraft handles in an unfamiliar *or unpredictable way*"...noting that some situations add a heightened element of unpredictability (for instance, flying a return-to-service flight after maintenance, inspection or especially modification). Thanks, Allen.

Naval aviator and military test pilot Tom Clarke gives us even more to work with:

Great points concerning test pilots/flying. It is important to remember, as your article pointed out, that the test pilot is fully briefed, scripted, and ALERTED. He *knows* that he will lose that engine at V1 and probably has practiced it in the simulator many times. The [aircraft performance] charts are based on that data. Not that non-test pilots cannot handle these situations, but your reaction time comes into play when something goes "bang" right after liftoff. Those few seconds of recognition and deciding on action can make the difference between a successful outcome and being in the dirt.

One of my jet transition instructors told me that he repeated to himself, "abort, abort, abort" until he heard the V1 call and then he silently repeated "fly, fly, fly" until he rotated. Helps you avoid trying to abort after V1. Worked for me!

One of my chief test pilots used to give us all a little card with "Survival Rules". Some of these are applicable to everyday use. Here it is:

**Lyle's 10 Rules for Test Pilot Survival**

1. Thorough planning (Plan the Flight)
2. Challenge Everything
3. Don't assume anything
4. Know your procedures
5. Know your aircraft
6. Don't rush the test
7. Keep fit to fly
8. Plan for survival
9. Plan the whole test
10. Follow the script (Fly the Plan)

Most common (test) pilot killers:

\*\*\*Complacency\*\*\*

\*\*Overconfidence\*\*

Thanks for the great info and lessons.

Excellent guidance! Thank you, Tom.

Frequent Debriefer and retired Pan Am captain Lew Gage writes:

Regarding short field takeoff operations or high altitude takeoffs [that] sort of add the same problems as a short field. That is, getting up to flying speed before the runway ends.

The responder stated some thoughts on pitch attitude during the takeoff roll may have given some readers a slightly different picture than I have observed in my 49 years of flying and 45 years as a flight instructor.

With tail wheel airplanes the best acceleration on the ground is with no positive angle of attack (AOA) of the wing. However any negative angle (too high a tail wheel height above the runway) will do a good job of greatly increasing the distance required to get to lift off speed. Getting zero AOA is difficult to do so a slight positive angle is a better technique since it relieves some of the rolling resistance of the main wheel tires as the wing lifts some small percentage of the airplane weight. These are the facts of life in airplanes of marginal horsepower such as 65-85 HP Luscombes, Cubs, T Craft and Cessna 120/140s and heavy C170s.

Airplanes such as the Cessna 180/185, Maule and Super Cub types that have an abundance of thrust can actually do well on a short paved surface (not dirt, grass, etc.) and just lift off when the speed is right in the three-point attitude with the elevators in the neutral position.

Airplanes with a nose gear will accelerate much better if the nose wheel is unloaded to the point where it is not carrying any great amount of weight. I have been on board Bonanzas making takeoffs at Leadville, Colorado (with density altitudes of around 12,000') during which the airplane stopped accelerating at about 50 MPH/IAS until the nose was raised somewhat to unload the nose wheel. I am not suggesting soft field attitude, but enough pitch increase from the normal three-point attitude to relieve some of the weight to reduce the rolling resistance of that tire.

And that is what I have seen over the years of flying.

Thanks, Lew. Another Debriefing regular, "Old Bob" Siegfried, comments on Sparky Imerson's recommendations for avoiding hydroplaning on wet runways, as quoted in last week's *FLYING LESSONS*:

I never met Sparky and I have no idea what he had in mind when he recommended getting the nose gear on the ground as soon as possible. I think that is a DUMB idea. Tricycles do not steer well with the main gear not solidly on the ground. Transferring any amount of weight to the nose gear is counterproductive. The way to gain directional control is to make proper use of the aerodynamic controls.

Rudder and aileron used correctly will do the job best. Right aileron makes the nose go left [because of differential aileron drag]. Left aileron makes the nose go right. How well such technique works varies with the design of the airplane, but it works better than forcing the nose wheel to the ground.

We are ALWAYS better off keeping the nose wheel in the air until the main gear is firmly on the ground and is providing good traction to the aircraft. The transition from flying to taxiing is a bit difficult to evaluate, but getting the nose wheel on the ground early does not aid us at all. Nose gears and tail wheels are for taxiing, not for flying. That goes for everything I have ever flown up to and including the Boeing 747.

Thanks, Bob.

Do you have a relevant experience to share? What's your opinion? Let us learn from you, at [mastery.flight.training@cox.net](mailto:mastery.flight.training@cox.net).

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

***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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