FLYING LESSONS for May 31, 2012

This week’s lessons:

When I was first learning to fly in the mid-1980s, there were several now-quaint bits of flying wisdom batted about from pilot to pilot. One an early instructor taught me was to be especially careful watching for airplanes when within about five miles of a VOR. In pre-GPS (or even LORAN) days most cross-country navigation (even under Visual Flight Rules) was along low-altitude, VOR-based airways (Victor Airways in the U.S.). This made the area around VORs natural choke points, funnels through which many airplanes frequently flew. It made sense to be especially alert for other airplanes in these choke points.

I was also taught to avoid flying directly over prominent landmarks or points of interest…on the assumption they would be interesting to other pilots as well, so I was more likely to collide with another aircraft in such a place.

Another pearl of wisdom was to fly slightly off of normal routes and altitudes. Keep slightly to the right of centered on the airway. Fly at 6700 feet instead of 6500. When following a road or railroad track, keep to the right of directly overhead. The idea was that oncoming aircraft would be on altitudes and centerlines, so you’d miss a near head-on collision, and did not run the risk of overtaking (or being overtaken by) airplanes flying at substantially higher speeds. All this assumed, of course, that the other guy wasn’t privy to your wisdom, and wasn’t also flying to the right of course and 200 feet above the expected altitude.

In today’s GPS-guided, point-to-point world, the chokepoints of VORs and Airways centerlines are generally moot (Northeast U.S. flying excepted). Today’s chokepoints, instead, are created by invisible boundaries of airspace, VFR corridors and tight stretches between airspace requiring mandatory ATC participation (frequently unavailable to VFR airplanes) and temporary or permanent Special Use Airspace such as Restricted and Prohibited Areas and Temporary Flight Restrictions airspace.

The limitations of flying in these areas are such that, however, that often we don’t have any luxury to fly at an “off” altitude or along anything other than a narrow course centerline, lest we bust the airspace or signal some sort of alarm-triggering intent by our noncompliance. We have to fly with precision—in the same airspace with other pilots presumably flying the same routes and altitudes just as precisely.

When flying in VFR corridors or any narrow path between, around, over or beneath airspace, it’s all the more important to keep your eyes outside the airplane, with your head on the proverbial swivel watching for other aircraft. Ironically very precise paths will tend to make us be more heads-down in the cockpit in order to more precisely fly approved routes and altitudes.

It takes practice and a good scan to hold attitude, altitude, heading and course as precisely as when flying an instrument approach, while you’re flying heads-up, eyes-outside in Visual Meteorological Conditions (VMC).

It’s even more important to have this “precision VFR” capability as second nature before you fly in between-the-restrictions airspace. It’s not a skill to be learned while actually flying the route and watching for traffic.
Another common heads-down activity in flight is instrument and/or GPS familiarization training. Think about your last simulated instrument flight (even if you’re VFR only); under U.S. rules you logged at least three hours of simulated IFR to earn anything other than a Recreational or Sport Pilot certificate, and any pilot might expect some simulated IFR on a Flight Review. You were scanning the panel while wearing a View Limiting Device specifically designed to prevent you from looking outside the airplane. If you’re getting checked out on a new GPS or other avionics, your attention is probably very focused on the panel. Your instructor, meanwhile, may be overly intent on watching you—what you’re doing, how your performing, and teaching what you need to know—as well as scanning the flight instruments or Primary Flight Display (PFD) to gauge your performance.

In other words, in most instrument and avionics instruction, there’s a very real risk that no one is looking outside the airplane.

Two FLYING LESSONS result from this knowledge: First, the flight instructor should remember her/his first responsibility is the safety of the flight, even if the CFI is not officially acting as pilot-in-command. Watching outside takes precedence over scanning the panel, even if this means the instructor is not instructing full-time as a result. Second, even if the instructor is good at cross-checking inside and outside to fulfill the primary safety role as well as teach, instrument instruction is not something that should be done while flying through a VFR corridor or in a tight spot between, over, under or around airspace not open to you at the time.

Flying in a corridor or around restrictive airspace? Do it with all eyes looking outside. Save your simulated instrument dual or new avionics checkout for after you’ve exited the choke points where many airplanes fly in a confined area.

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

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Debrief: Readers write about recent FLYING LESSONS:

A reader who wishes to remain nameless commented on a recent LESSON involving dispatching with inoperative equipment. He writes that in addition to FAR 91.213, Inoperative instruments and Equipment:

…many people do not know that a generic single-engine MEL [Minimum Equipment List] has been around for quite a while. The latest revision can be found in http://fsims.faa.gov. There really isn't much wiggle room. You point is well taken but as around the NYC area pilots still fly with out heedng the guidance.

Reader Fred Wilson wrote about recent LESSONS admonishing pilots to avoid excessive braking on landing, to avoid brake overheat or even locking up a wheel:

Just a comment on your braking article. Two years ago I'd have totally agreed with you. Since then I've added SPC Inc.'s, Wireless Tire Pressure Monitoring System to my main tires on a '79 Piper Dakota http://www.aircraftspruce.com/catalog/lgpages/tiresensor.php. The Dakota is a 'relatively heavy' single. (3000 pounds [max] gross). This system, in addition to showing you the tire pressure in each tire, also measures temperature (at the valve stem - which I admit is not the brake disc, but...) As a test: July, Las Vegas, OAT=112 degrees [F], before taxi, temperature readings L=111F, R=109 degrees [F]. After one mile taxi: L=114F, R= 113F degrees (temp went up 3/4 degrees - not a lot of braking but may have been due to the asphalt being hotter than the OAT).

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I made three trips around the pattern, using heavy braking to a full stop, followed immediately by a takeoff (stop and go). After one landing: L= 113°F, R=112°F. I assume (never assume) the reading were less due to the cooling effect of the wind during the pattern. Second landing: L= 112°F, R= 110°F. Third landing: L= 111°F, R=110°F.

While this doesn't directly measure the temperature at the disk, I think it's safe to assume (there I go again) that, while the brake disk will certainly get hot (which it is designed to do), it stays within it's [sic] design parameters. The numbers above, say to me that the cooling effect (on the brakes) of the flying is greater than the heating effect of the braking. --- That additional landings would continue to decrease the total brake disk temperature.

I flew for United for 30 years and fully understand hard braking and the ensuing brake fires that can occur. (Had two, both at Kauai, Hawaii. DC-10, 6000' runway).

Interesting, Fred. Does anyone else have experience with this or a similar brake temperature monitoring device?

Reader Guy Mangiamele responds to last week's link to the King Schools article on risk management. Guy writes:

Although I've read the Kings' writings on the fatality rate, I had never heard it expressed quite that way: **GA fatalities are 8 times higher than automobiles on a per mile basis.** That and the fact that everyone in GA probably knows at least one person who has died doing what we love. I know two, in the nearly 20 years since I received my Private. One was the chief flight instructor at my first school, who I believe I may have written you about on another occasion. The school had a student/renter who had taken a 172 over the mountains east of San Diego to pick up two teenaged girlfriends and give them a ride back to the coast. For whatever reason, he called the school to say he didn't feel he could make the return flight; perhaps because it had gotten late and night had fallen. The school dispatched another 172 with the chief flight instructor and a less senior CFI to bring them and the first 172 back. The chief flight instructor took the two girls as passengers in his plane, and the junior CFI right-seat for the pilot who had originally flown toward the desert. Once high enough to see over the mountains to the west, the original pilot later reported that all of the lights of San Diego were clearly visible. The chief flight instructor's 172 impacted 100' beneath the peak of some of the highest terrain in the area--throttle configured for cruise. I flew with him on several occasions and he seemed to be an excellent pilot. One can only imagine the impact on those girls' families.

I received a few emails about last week’s LESSON suggesting engine start on an main fuel tank, and no changes in tank selection before takeoff. Reader and instructor Mark Brightman writes:

I guess I do not understand why starting an airplane on one tank, insuring that tank will feed and then switching to the other tank for run up and takeoff is not a good practice. Wouldn't you want to know before takeoff that this would work in flight? I teach students to accomplish this as a technique and it makes sense. I also teach that should a student return to the traffic pattern with a fuel imbalance beyond that prescribed, they switch tanks. I know fuel starvation is an unfortunate cause of general aviation accidents but if you have tested both tanks, checked the quantity and then switch to the fullest tank prior to landing, I do not consider the risk of an engine failure to be significant.

Reader Tom Allen comments:

Great article. For a long time now, I select the takeoff tank before engine crank. For cruise, I switch tanks on the hour. While thinking about starting the descent, I access the fuel situation and switch if necessary to the final descent and landing tank. I use GUMPS for the landing checklist.

…and reader Bill Caton, whom I've personally instructed on the technique of checking individual tanks before takeoff but always taking off on the tank used for engine run-up, writes:

I like your method in that it checks for obstructions in fuel flow..” on the ground” and not in the air. I would rather find out with my feet on the ground than wait until cruise and then be short of fuel in the air.

Guy Mangiamele also writes about his experience from the other side of the fuel hose, at it were:

I've written before that I used to work the line at the airport where my plane is now based. All of the pilots there were close, and the little house we had beside the runway was where everyone gathered to hangar fly. One of the pilots had a [Cessna] 182 with an engine conversion...I want to say 300 hp? I've never been checked out on a 182, but in the back of my mind I seem to remember that he wanted the fuel selector set to "Off" during refueling because it was the only way to truly top the tanks.

One day when I wasn't working the line, but in front of everybody in the office, he rolled down the runway
with his wife in the plane. He got to about 50' AGL when the engine stopped and the airplane crashed into trees near the airport property. His wife survived with minor injuries, but he was killed on impact. The post-crash investigation found the fuel selector in the "Off" position with the tanks full.

Although it's true that he didn't have the reputation for sitting around while doing lengthy engine run ups, it's also true that his hangar was downhill and some distance from the departure end of the runway. I find it hard to believe that if he had started the engine with the selector in this position, he could have made it to the runway with that thirsty engine turning. Perhaps he was checking for continuity between tanks?

Frequent Debriefer David Heberling chimes in on last week's LESSONS on carburetor icing. By the way, the current and two most recent FLYING LESSONS Weekly reports are always available through links at www.mastery-flight-training.com. Regarding carb ice, David writes:

Thanks again for another FLYING LESSONS chock full of interesting subjects. Carburetor heat is something I have not had to worry about for a very long period of time. However, I used to fly an S-model Beech 18 with 450 HP radial engines. These engines were carbureted and supercharged. I always valued an instrument I never saw on any other airplane I flew. It was a carburetor temperature gauge. Carburetor heat on the Beech 18 was called manifold heat and as long as we kept the carb temp out of the yellow range, no ice would form. In an airplane like the Beech 18, we rarely if ever made idle descents. I never understood why such an instrument was never found in any single engine airplane I ever flew. If more information is good for you, why would you not want to know the temperature inside of your carburetor? Otherwise, you are left guessing. I see that with the new digital engine instrument displays, carburetor temperature is an optional display. This should be mandatory for all carbureted engines.

Carburetor temperature gauges were common in post-WWII military piston airplanes like T-28s, but they are indeed rare in light general aviation airplanes. They are, however, available through most aircraft parts supply houses.

I flew a fixed-gear, mid-70s Cessna 182 several times about a decade ago, and it had a Carb Temp gauge. The goal was to use enough carb heat to keep the gauge in the green arc, or as low in the yellow ("caution range") arc as possible. I was amazed that even on a fairly warm day at cruise altitude, the Skylane almost always required at least a little carb heat to stay in the green range...robbing the engine of a little power, and therefore the airplane of performance, but I assumed the gauge was calibrated properly in the rental Cessna, and used carb heat accordingly. Thanks, David.

And reader Doug W. sends his Questions Three:

1. Why are not all small singles and twins set up with a fuel system that automatically feeds from "both" sides and has automatic cross feeds, ala, larger planes, and therefore eliminates one major step and that is "switch tanks"? and........

2. Why are not pistons developed with carburetors that are not prone to icing or have piston engines that have no carburetors?

3. Why don't automobiles with their piston engines, have carbs that 'ice up' in Denver in January when it is 0*?

I'm not very mechanical but I was just wondering. Probably some brilliant engineers have already researched these. Makes too much sense to me.

Let me take a stab at them, Doug:

1. Many larger planes also have complicated fuel systems with multiple tank selection options, or a complex system of transferring fuel from one tank or the other to retain balance or to transfer fuel into a "header tank" or other single fuel tank for each engine. That said, I think what you're really asking is "Why don't all airplanes have a simple ON/OFF fuel selector valve like the Cessna 150 or 172?" Note that some newer piston twins have a simple ON/OFF fuel selector for each engine, along with a CROSSFEED position to run an engine on one wing using fuel from a tank or tanks in the other. In the case of most airplanes, however, I think the answer is that designers want(ed) pilots to have the ability to balance fuel load manually if the airplane is out of rig. Is this worth the complexity of fuel management, and resulting potential for error? In my opinion, probably not. Like 1970s Cessna 172s, I think it should be possible for the fuel selector to be
placed in a BOTH position where fuel feeds equally from both wings at the same time, with LEFT and RIGHT wing selections available in case the pilot indeed does need to balance the fuel load (a requirement I don’t ever recall encountering as pilot of airplanes with BOTH tank selection).

2. In the 1950s several engine designs went from a standard carburetor to what’s commonly called a “pressure carb,” which is in fact a single-point fuel injection system, with fuel introduced to the induction system in one place instead of in each individual cylinder’s intake manifold (in the Experimental world this is sometimes called Throttle Body Injection). Pressure carbs are not very prone to icing. Of course most new engines produced today are full fuel injection models, with each cylinder receiving liquid fuel immediately before the intake valve. In fact, a small but vibrant industry exists to provide balanced fuel injection to make these engines run even more efficiently.

3. I don’t know. Readers?

Digging back into my past email stack, I find David also writes about Scenario-Based Training—object of FLYING LESSONS a couple of weeks ago. David comments:

I too agree wholeheartedly with Rod Machado's column in Flying Magazine (Stick and Rudder vs. Scenario Base Training). In fact, he is the first pilot I have seen write something against SBT. It seems that the whole GA industry is agog over SBT as [the solution to] lower the stagnant accident rate. As in other things in life, SBT may be part of the answer, but certainly not the whole one.

The requirements for the PPL [Private Pilot-Land certificate] have changed little since I started flying in 1972. However, technology has not stood still. It has grown by leaps and bounds and permeates modern aircraft. Even the lowliest LSA has a technologically advanced cockpit. Somehow, a student pilot is supposed to master all of this technology and at the same time, learn how to fly the airplane. All of this is supposed to be done in the same amount of time as 40 years ago. What makes matters worse is no two boxes from different manufacturers work the same. Even with the same manufacturer, early boxes work differently than newer ones do.

It used to be so simple to get checked out in a different model airplane. The avionics were stone simple and hardly rated a mention. Now, it is hugely complicated, particularly if the avionics in the new plane are different from what you had in the old plane. It is hard to get to know a new avionics suite well if it is only flown occasionally. From a safety standpoint, this is not where technology was supposed to bring us. It has been sold as a workload reducer. This is only true if you know how to use it well and fly with it a lot. Just look at the number of GPS approaches we have now. I am not talking about the total number, but the different types. It is so complicated now, I would need a cheat sheet to tell me what my box is capable of, and what kind of approaches I can do, and how to set them up. We actually have this type of information in a Quick Reference Manual in the Airbuses I fly.

Yes, I do worry how new students are supposed to assimilate all of this new information. I just hope it is not at the expense of learning stick and rudder skills.

Readers, what do you think? Let us learn from you at mftsurvey@cox.net.

What would you do?

Last week FLYING LESSONS related an editorial by EAA president Rod Hightower, where he described watching the owner of a high-performance Cessna refuse all offers of help while trying to hand-start the airplane…with no one aboard, and pointed at a business jet and several other airplanes. In last week’s issue FLYING LESSONS asked readers to complete a one-question survey on what they would do under similar circumstances. Here is the question, and your responses:

Imagine you were with Rod’s crew and saw the Cessna pilot trying to prop his airplane. Would you:

43.5 % Offer to get in the airplane to hold the brakes and manage the engine as needed

17.4 % Attempt to talk the pilot out of hand-propping his airplane

13.0 % Write down the Cessna’s N-number and report the pilot to the FAA
8.7 % Video the whole thing to post it on YouTube
0.0 % Grab some popcorn and watch the show

Other (comments):

- I would offer to tie and then untie the plane after starting. From a liability perspective I don't think I would offer to get in the plane.
- Express my concerns about safety, note the pilot's desire to get out quick, and try to negotiate a safer handling of the situation. If that failed, I might escalate my demands--at least have the plane pointed in a direction where no one else or their property could be hurt.
- Tactfully, but firmly inform the pilot that his current methods are putting other people and property at risk, and that you will help him safely start his plane either by jumping, or propping (depending on which the helper feels he can safely do properly), and that lack of cooperation on his part will result in involving both local, and FAA authorities in protecting the public from his current course of action.
- Park car in front of his airplane. Offer to move it if he will listen to some reason. If not, call 911, "trying to prevent an idiot from crashing an airplane"

Do you have other ideas? Do we have a moral obligation to intercede? Does our typical (and understandable) lack of action when seeing blatantly unsafe actions contribute to the overall accident rate? How can we create a much more pervading culture of risk evaluation and management in general aviation? Or would that be limiting our freedoms too much? Let us hear your thoughts, anonymously on request…at mftsurvey@cox.net.

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**Improving Experimental-Amateur-Built Aircraft Safety**

Last week *FLYING LESSONS* reported on the U.S. National Transportation Safety Board study of Experimental-Amateur Built Aircraft (E-ABA) mishaps. I commented: "Undoubtedly you'll be hearing more from EAA to better define the risk and address mitigation strategies as well."

As expected, hear from EAA we did. President and CEO Rod Hightower provides an eloquent, three-minute video with an overview of NTSB’s 16 recommendations, including four directed specifically at EAA, and the Association’s reaction. EAA Vice President of Government Relations Doug MacNair also comments on the report in this podcast, including the nature of NTSB recommendations and what’s likely to happen next. Both express a very realistic and healthy attitude toward the need for improved initial pilot training in E-ABA types, and agree there are actions that must be taken that can still remain short of imposing new, Draconian regulations. Both are worth a listen, even if you never fly E-ABA.

See:
- [www.eaa.org](http://www.eaa.org)

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**Program note:** Because of business travel, a personal vacation, and my participation in the NTSB’s General Aviation Safety Forum, *FLYING LESSONS* will not be produced next week or the week after. I’ll return with a full, new issue for Thursday June 21—so send in your comments and questions; I’ll get to them when *FLYING LESSONS* returns. Don’t get any ideas because my address is on my website…my son (and probably about seven of his college-age friends) will be staying in our home, we have some wonderfully inquisitive neighbors across the street, and the interior is guarded by a 20-pound attack cat.

*FLYING LESSONS* will be back in a couple weeks. Fly safely!
For piston Beech pilots

The Beech Weekly Accident Update is posted at www.mastery-flight-training.com/beech-weekly-accident-updat-2.html


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