

# **FLYING LESSONS** for March 4, 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.

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

**A common tendency** among more experienced pilots and in commercial operations is to run Before Takeoff checks during taxi. GPS programming is also being implicated more and more in taxi collisions, taxiway excursions and runway incursions.

**Best practice is to configure** the airplane before moving, keeping your eyes outside during all taxiing, and running checks and programming navigation aids only when at a complete stop with the parking brake set...unless you have a Pilot Not Flying aboard solely responsible for those tasks while the Pilot Flying fills the primary roll of aircraft control. "Aviate" in "aviate, navigate and communicate" starts as soon as the airplane starts moving forward under power.

**If your engine quits on takeoff** it will take an immediate push nose-down to maintain airspeed and avoid a stall. Keep the wings level and the rudder coordinated, unless you need to slip to a landing spot. Strive to touch down wings level, under control, at the lowest safe speed and rate of descent, aiming for the best option within the performance capability of the engine-out airplane.

**Sometimes we have to justify** owning or renting a private aircraft--justify it to family, or accountants, or to stockholders...or to ourselves. There's no way around it: flying is expensive, and since most pilots tend to fly the most expensive airplane they can afford, almost all of us look constantly at the costs versus the benefits.

**It's easier to justify the costs** if we are able to fly whenever we want, where we want, and how we want. We want to carry a full load of passengers and baggage, to go on our schedule, and to fly from here to there without having to stop. We want the airplane to do what we *want* it to do--however each of us personally defines it, we want the airplane to provide *utility*.

**The word "utility"** is often combined with a maximum payload, the ability to dispatch into almost any weather, or flight to the very limits of an airplane's performance or endurance. Remember the reason why many of us strive for utility in the first place: to justify the expense and the on-ground preparation time of flying private aircraft instead of some other mode of transportation or means of recreation.

**Don't let a desire to achieve some notion of utility** drive your risk management decision-making. Evaluate payload, weather and endurance for each flight based on the facts, combined with your own skills and the capability of the airplane. Utility is the result of decision making, and it varies from flight to flight based on the environment and your mission goals.

**The bottom line:** Fly the airplane you're flying...not the airplane you wish it to be.

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

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

*FLYING LESSONS* recently touched on off-airport emergency landings. Reader Geoff Scott writes:

I hate to be cynical... but OFF FIELD/NO FUEL landings are not as big of a deal, if you do some glider time at your local flying club. I was lucky to have done gliders first (at 12) and when we got to that [emergency landing] section of the Japanese [ab initio pilot] training, it looked like "just another landing" setup. Only without all the bold-face type and red headings. Love your pub~ keep it up!

I replied: Thanks, Geoff. Gliders tend to have a lot less energy to dissipate during an off-field landing. And almost universal 3- or 4-point harness systems help! Thanks for writing...and for reading *FLYING LESSONS*. To which Geoff responded:

Thank YOU, and yes, love the harness. You're completely right about the energy management issues. That's what the belly skid is for. Geoff publishes [www.av8news.net](http://www.av8news.net), an online review of regulatory and other issues that impact flying safety. Take a look!

Charlie Davidson writes about using the FLATS pretakeoff mnemonic, and a reader's suggestion to preface it with an "R" for Runway:

Enjoy reading your Mastery comments! I noted today the "R for runway" comment by a reader. I flew to Lexington, KY last weekend and pointed out to my non-pilot passengers the unfortunate layout of the runways there (that led to the Regional Jet accident a few years ago when the pilots departed the incorrect runway). I agree that adding that R is probably a good acronym idea.

As expected, the topic of intentionally running a fuel tank dry in flight brought a lot of comment. In order of receipt:

Running a fuel tank dry: - My 1963 Mooney M20C's POH tells me to fly on one tank for one hour then switch to the other tank and run it dry. When it runs dry switch back to the original tank and I should know how much flying time I have left. Truth of the matter is that I don't really know how much fuel I used during taxi, run up, take off and climb to altitude since I don't have a fuel flow indicator. I can compute it pretty close but frankly I don't have the cajones to run a tank dry and then try to change tanks. I've watched the fuel pressure and when it started to go down switched tanks and knew that I cannot go back to that tank which is really too close for my personal comfort.

Instead what I do is to check the performance chart and fly those numbers. That way I know when I'm getting close and then I switch tanks. I also know that when the needles are on "E" I'm out of fuel in that tank so I watch that too. Yeah, I'm a chicken but that's ok. I don't see why I should push the fuel envelope.

Deciding when and where to stop for fuel before I take off is better than looking for fuel while I'm flying. Part of that decision is making sure I'm going to have enough fuel to make the fuel stop well before I run out of fuel. In order to make the numbers easy, I use one hour instead of 45 minutes for my alternate. 15 minutes is not much in the over all scheme of things, but it may save my butt some day. To my mind, planting an airplane because of fuel starvation when there's fuel in the tank is the most embarrassing thing a pilot can do. Why risk that?

--Bob Wassam

Interesting article about fuel management and running a tank dry. My first choice is to have no option on a separate tank. One big tank per engine suits me fine. However, in the many airplanes, that is not possible so, I for one, like the option of running a tank(s) dry. However, there must be some discipline and understanding of how to do it. There's absolutely NO reason that an engine won't run after running a tank dry, if the fuel is reintroduced again and the spark is there and the mixture is close to the same. Now, here's some rules for thought:

1. With a new plane, run each tank dry so the actual fuel quantity will be known for future flights.
2. Use modern fuel measuring, a digital fuel flow is a must. Backed up with analog gauges, sight gauges and power settings and time. If ANY one of the indications is not giving good info, stop.
3. Always run the tank dry during cruise, where there are no other distractions.

4. Always time the tank so one will know when it will run dry... yes, one can get within two minutes, and with a little practice, one can see the fuel flow fluctuate and the engine never misses a beat.
5. Plan on ONE tank from top of descent, to touchdown, including alternate and reserve fuel.

While there certainly IS some risk, there's a significant benefit in being able to use all of the fuel in a tank to increase utility and range. Just takes some reasonable skills and discipline, just like other phases of flight.

--Larry Olson

Know the airplane - and that includes running each tank dry to get a feel for the actual reading of the gages when empty. This should be done at high altitude and need only be done once, preferably on long trips. An airplane with metal tanks (Cherokee, Archer, Saratoga etc.) will have no problem restarting. Extra care should be taken in airplanes with bladder tanks due to debris and water that may be lurking in the folds of the rubber.

--Terry Van Blaricom

I wouldn't do it -- but then, I live in a part of the country where fuel stops are plentiful. In that setting, trying for maximum range doesn't offer any benefits that justify the added risk. On the other hand, you might look at the last paragraph of Dave Hirschman's piece in the current (March) AOPA Pilot (page 99), which mentions flying the Commemorative Air Force's SBD Dauntless dive-bomber. The airplane burned 60 gph in cruise, and on a trip of any length, he hated to leave any significant amount of fuel in a tank before he switched.

--David Kenny

I am sure you are expecting this message. <G> I just gotta do it! Have your records ever shown that a pilot who regularly ran his tanks dry, and was doing so intentionally after proper evaluation and training, has ever experienced a failure of the engine to restart? I just can not conceive of that happening. The examples I have seen have all been cases where the engine failure occurred when it was not expected and/or when the pilot was stretching his fuel beyond where he wanted to be! Not a comfortable place for anyone.

When we fly our six-tank equipped Bonanzas, it is totally impractical and inefficient to leave a little bit of fuel in each tank. I think you should be encouraging pilots to learn how to operate their airplanes safely. In my mind, that includes knowing how and when to run tanks dry. Telling them not to cut it too close seems a bit ingenuous. We all expect that we will not cut things too close, but my interpretation of too close is likely to be different than yours. When we were doing sling work with the helicopter, we thought having fifteen minutes of fuel on board was just fine. It really does all depend.

--"Old Bob" Siegfried

I'd like to reply to the item in your latest FLYING LESSONS about running a tank dry. Fuel starvation. This is one subject dear to my heart. What I've learned over 40 years of instructing is that there are so many different kinds of airplanes out there. (Yes, I read your fine print caution at the top.) What is a problem on one aircraft is a non-issue to another. (A multiple tank Taylorcraft drains wing fuel into a central tank, for example.) I've found that fuel injected engines are a monster when tanks runs dry, but in airplanes having a carburetor, the engine is easily reignited.

It is necessary to run each tank dry when making my especially long distance flights in my [Piper] Comanche. How I do it is to monitor the fuel pressure. When pressure drops to zero, I have about 10 seconds to switch to a tank with fuel in it and the fuel pressure returns to normal. The carburetor is designed to pass air in the line while using the fuel. A fuel injected design does not. A diagram of the carburetor explains this. When I taught in a Cherokee Six 300, I would tell students to watch the fuel quantity and not let that big engine run dry. Invariably each and every one of them let it quit, once and only once. I allowed them do this at a safe altitude to demonstrate how the big Lycoming reacts. It surges violently, so much so that every student I flew with was careful not to let it happen again.

Let me go on to give reasons why it's good to empty any particular fuel tank.

1. You know exactly the quantity remaining. No guess work, it's empty. You can't go back to that tank on this flight.
2. Upon the next fill up, you can verify the quantity of the tank. If it doesn't take the listed quantity, something is wrong; a particular concern with neoprene fuel cells.
3. Assures tank cleanliness. Some folks reason that sediment and water remain in the tank. This is

bogus due to the fact that flying in turbulence sloshes debris at the tank bottom, but emptying the tank assures removal of all possible sediment. (Check the fuel screens.)

4. When a tank is empty, the system can be verified that fuel migration is not occurring through the fuel selector. Sometimes this takes an overnight test, but without having an empty tank, the migration might not be noticed.
5. To counter a negative aspect, I've seen in print that in a multiple tank airplane, you must pass the fuel selector through an empty tank position. That is not true; it just takes careful planning.

Now that I've given my view on the subject, let me add that fuel management is not to be taken lightly. I totally concur with your position. I recall the pathetic loss of N991PP, a really beautiful A36 Bonanza. I recommend running a tank dry to only the more advanced aviators. To the pilot who doesn't grasp the fine details of the procedure, I don't dwell on the topic. I advise to switch tanks early, just as you have alluded to in your *FLYING LESSON*.

--Mike Dolin

I will never advocate the practice of running a tank dry. I do know a lot of pilots that have done that for years and believe in the system. My first problem is that I always plan on landing with one hour of fuel remaining. Most of my flying is in Bonanzas and Barons and never run tanks dry. It has happened on a couple of occasions that we ran a tank dry inadvertently. Quick action switching tanks make these mistakes non-events. I think the risk level is the question here. I am not willing to take that extra risk by running one tank dry and landing with less than one hour of fuel.

--Paul Gretschel

Here are a few notes on running a tank dry. If the pilot is going to intentionally run a tank dry, it is best to brief the passengers. Otherwise, pass out a change of underwear.

Changing the fuel selector while in the traffic pattern is first class dumb. We teach that the tank for landing should be selected while still above 3000 AGL and three miles from the airport or IAF. If doing landing practice, do a full stop landing and change the selector before the next takeoff. Some instructors intentionally run a tank dry or turn the fuel selector off during transition training. I am not a big fan of that, but it would be nice for the pilot not to be experiencing an actual engine failure as his first experience and to know how much time the restart takes. I have never had an engine fail to restart, but I know it happens. I sure would like to know why.

One of the reasons why running a tank dry is a common procedure is the difficulty in telling exactly how much fuel remains in a tank. The pilot may not intend to run a tank dry, it is just that the fuel gauge or clock system may not be all that accurate. Besides, it is inherently a Y-chromosome issue that the fuel tank will always have more fuel in the tank than is shown on the gauge. If we have identical airplanes except for the fuel system, the one with the fuel load in the fewest number of tanks will have the greatest range. Each tank requires the pilot to leave a certain amount of fuel in the tank to avoid engine failure. The unusable fuel in the airplane will not be the published amount. It will be the total of the published unusable fuel plus the amount the pilot chooses to leave in the tank to avoid engine stoppage. The pilot will have to plan for less range to avoid scaring the passengers. Early in the flight select the tank to be used for landing and be sure it keep enough fuel in it. Consider whether the fuel remaining is within the placarded area for no takeoff. If so, then do not plan on being able to do a missed approach or go-around.

At some point most every instructor has decided to do airwork with the aux tanks selected, just to allow for more endurance. There is always a first-time curiosity about how much maneuvering can be done before an engine quits. A double engine failure certainly gets the attention of the student.

When intentionally running a tank dry, it is possible to anticipate the fuel exhaustion point by carefully watching the fuel flow or fuel pressure gauge. The pilot must be holding his hand on the fuel selector and switch tanks at the first twitch of the gauge.

Airplanes flown by a number of different pilots present another problem. If the previous pilot ran a tank dry there will be air in the line, but the next pilot will not have knowledge of the previous pilot's actions. When the next pilot switches to that tank there may be a momentary interruption of power while the air in the line is purged. The pilot should verify fuel will feed from all tanks before takeoff.

--Dave Dewhirst

Thanks, everyone, for joining the discussion!

## Notes on NOTAMs

For about the past year local NOTAMs (NOTAM-L) have been reclassified as distant NOTAMs (NOTAM-D): meaning you will be briefed on local conditions even if you're getting your preflight information from somewhere outside the area of the Flight Service Station that "owns" your destination airport. Now, for U.S. readers, the FAA wants to hear from you about your NOTAM experiences since the change. Take the FAA's [NOTAM survey](#).

See <http://www.surveymonkey.com/s/629HRNH>

## Why we Make Mistakes

From AVweb: Following a pair of serious incidents and a fatal accident, commercial flight crew training and professionalism in the cockpit have become hot topics in Washington. In this podcast, AVweb caught up with Dr. Key Dismukes, chief scientist for human factors at the human systems integration division at NASA Ames Research Center. Dismukes talks about the science of explaining why skilled pilots--professional and general aviation both--make mistakes while performing familiar tasks. He adds his insight on "pilot error" statistics and the techniques you can use to avoid becoming one. [Listen here](#).

See [www.avweb.com/alm?podcast20100226&kw=AVwebAudio](http://www.avweb.com/alm?podcast20100226&kw=AVwebAudio)

## Question of the Week

This week's Question of the Week stems from our Debrief discussion. I ask all readers to respond so we get a representative answer:

**Do you run fuel tanks dry in flight as a normal technique? Does the extra two to five minutes' endurance per tank you run dry make the difference in your ability to make it to your planned destination with a safe reserve?**

[Send your answer](#) to FLYING LESSONS Question of the Week (mftsurvey@cox.net)...then return to read more FLYING LESSONS.

Last week's question was: **Do you think you'll be transitioning "down" to a Light Sport aircraft this year?**

A great many of you simply answered "no." A couple readers added comments:

- Although I am sure that LSA have a productive place in aviation, I have no desire at this time of my life to start flying LSA. I love flying Bonanzas and Barons and plan on staying with Beechcraft airplanes. Just not my cup of tea.
- I chiefly use my airplane for transportation, for which a smaller, slower aircraft would be less practical.

***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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