FLYING LESSONS for January 28, 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.

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This week's lessons:

Aborting a takeoff is a matter of pilot judgment. Unless you have a realistic expectation of how your airplane will perform on takeoff, you can't adequately judge whether your airplane is meeting takeoff expectations. To better judge the success of your takeoff attempt, you need to establish and aim for ***takeoff targets***.

You can divide a takeoff into five phases, and for every phase set goals, or targets. Only then can you correctly determine if your takeoff is going to be successful, and if not, begin an abort while there's still time. ***The phases of a takeoff are:***

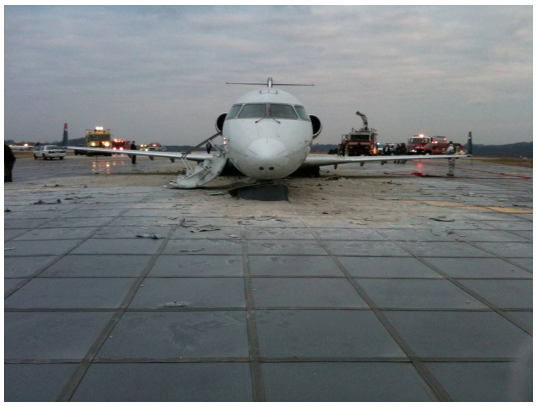
- The **pre-takeoff** phase
- The **power** phase
- The **acceleration** phase
- The **rotation** phase
- The **initial climbout** phase

PRE-TAKEOFF: A successful takeoff even before you board the airplane. This is when you evaluate airplane, pilot technique and environmental factors that affect takeoff performance. How much distance will your takeoff require, and how long is the available runway? Are obstacles or rising terrain on your departure path? What's the airplane's weight? How strong is the wind? What is the proper technique for this particular takeoff? Should you use flaps, or not? Answer these questions, and those from the remaining phases of a takeoff, in the pre-takeoff phase.

POWER: Is your airplane producing maximum available power? You won't know unless you've established some power targets. In a **fixed-pitch propeller** airplane you should know the static rpm--the tachometer indication at full throttle and with no forward motion, and compare that to what you see at power-up. If your airplane have a manifold pressure gauge know what to see at full throttle. Most engines lose about one inch of air pressure around a fully-open throttle...so a wide-open engine at sea level should get around 29 inches of manifold pressure most days. What's the optimum takeoff mixture? Check your airplane's Pilot's Operating Handbook (POH) for specific guidance, but in general **fixed-pitch** propeller engines need to be leaned for maximum propeller speed at full throttle. Those with **controllable pitch** propellers should be leaned per POH fuel flow tables (often placarded on the airplane's fuel flow gauge) or for a target Exhaust Gas Temperature (EGT) setting. Regardless, know what indication you're leaning for, and lean the mixture for that setting before beginning your takeoff roll.

ACCELERATION: Does it "feel" right? A better measure of acceleration is to visualize, beforehand, the point at which you expect to reach rotation speed. A rule of thumb is that you should be at 70% of liftoff speed when you pass 50% of the anticipated runway distance.

ROTATION: Reaching your rotation speed target at the predetermined distance down the runway, raise the airplane's nose to the necessary attitude. Whether visually or on instruments, there is one best attitude that provides optimum climb performance. Reach that attitude (Vx or, if runway distance and obstacles are absolutely no factor, a lower, Vy attitude, even shallower in multiengine airplanes if obstacles permit), and the airplane will climb smartly. A few degrees more "up" and induced drag may seriously degrade climb performance; a few degrees "down" and climb rate may also be significantly eroded.



Not just for "little" airplanes: A January 19th CRJ runway overrun on takeoff

INITIAL CLIMB: If you've used flaps for the takeoff, leave them set until you've confirmed a positive rate of climb and have cleared all obstacles. Don't pull up retractable landing gear too soon, either; many retractable gear designs suffer from a significant, climb-robbing drag increase while in transit. Have a pre-takeoff idea of your expected climb attitude and vertical speed. Compare "real" to "expected" to decide if your takeoff is going as planned.

Questions? Comments? Email me at mastery.flight.training@cox.net

DEBRIEF: Readers comment on past *FLYING LESSONS*

Reader Geoff "Scott" Beth writes about last week's report:

> I think you covered most "practical hints" for dealing with fog, dew point spreads, plenty of fuel and terrain considerations, etc. The only thing I would add is the benefit of added "hood" time for the VFR pilot occasionally, like the IFR pilots must do, (and what we the VFR guys don't do enough once past the initial check ride). I love to go up with my old instructor as safety pilot and do the things that push the envelope. The hood, (and how he occasionally resets my DG while under it) [is] one of these tools we use in preparation of the possibility of any "unforeseen event". I was surprised, the first time, how far off the 210 degree VOR radial was from the RWY-21 ILS on simulated instrument approach to my familiar airport for example. And then of course there is the "Directional Steer" service from ATC should worse come to absolute worse. These scenarios, more so, for those who get caught, as opposed to avoiding it all together, as you wrote about. From the "ice fog" capitol of the Inland northwest; Keep up the great publication!

Thanks, Scott. Readers, do you know of any facility that still practices DF steers? Naval aviator and NATOPS program specialist Tom Clarke adds:

> Nice info on fog. The dew point trending suggestion is a good one. When I went through Pensacola to get my "Wings of Gold", our Met instructor gave us the gouge that a 4 degree temp/dewpoint spread means that you need to expect fog. Even with a greater than 4 degree spread, if the trend is down, it is time to increase your vigilance! Fly Safe(ly)!

Thank you, Tom. Fog requires condensation nuclei like dust or smoke. The more nuclei present,

the sooner and thicker fog will form; the actual visibility for a given temperature/dew point spread will vary. That's why a four or five degree spread in, say, New Jersey, might result in three to five miles' visibility on a hot summer day, when the same spread out here in Kansas will still permit maybe 10 miles visibility or more. Thanks for your service, and for reading *FLYING LESSONS*.

Another reader writes about the November 19, 2009 issue of *FLYING LESSONS*:

> The reader feedback in "Debrief" stated, "I read the reader's tale of his client's having an ELT go off inadvertently in turbulence. He thinks the newer installations have a panel-mounted switch so they can be turned "off" remotedly [sic], but I don't think the FAA allows this, only "arm" and "on". The old Piper installations had an "off", but evidently the FAA thought this was placing too much power in the hands of the pilot and it's no longer done. It would sure make sense to be able to turn it off from the cockpit--bureaucracy rules!" Let's get to the facts:
>
> 1. The "oldest" ELT's conform to TSO C91. This TSO does not require the ELT to have a remote switch, however some models could be turned on and off through a 2-wire interface to a simple toggle switch on the instrument panel. The options with this switch, if installed, were pretty simple; "on" and "off".
> 2. The "newer" ELT's conform to TSO C91a. This TSO requires the installation of a remote switch unless the ELT is installed within arm's reach of the primary flight crew. That switch was labelled in different fashions, depending on the manufacturer - no specific labelling is specified in the TSO. Most switches have, at a minimum, an "on" position. The alternate switch positions may have been labelled "arm", "off", or "reset", depending on the manufacturer. Some may also have a third position labelled "test".
> 3. The "newest" ELT's conform to TSO C126. These are the 406MHz units. This TSO very clearly requires the ELT to have a remote switch unless the ELT is installed within arms reach of the primary flight crew. Once again, the same vagaries of switch labelling found in TSO C91a ELT's applies to C126 ELT's.
>
> The most important piece of information which needs to be conveyed in this discussion is that, while some ELT remote switches only have an "arm" or "reset" and "on" position, those two positions are sufficient to perform all functions related to controlling ELT operation. A few moments spent reviewing the Operator's Manual for any of these ELTs will reveal that using the remote switch to turn the unit "on" does just that - transmission of a valid distress signal starts immediately in the case of TSO C91a units and after 50 seconds of self-testing in the case of TSO C126 units. If the ELT is transmitting as a result of the pilot having moved the switch to the "On" position, returning the switch to the "Arm" position will reset the ELT and transmissions will cease. In the event that G-switch activation has occurred, moving the remote switch first to the "On" position and then back to the "Arm" position resets the internal logic of the ELT and turns its transmissions off.
>
> While bureaucracy does indeed rule, in this instance it's a benevolent rule which has resulted in pilots having the ability to turn off ELT transmissions after the ELT G-switch has been activated. It would be a good idea to remind your reader community of their obligations to inform ATC in the event a false ELT signal has been transmitted.
>
> Mark Briggs
> Aircraft Owner, Private Pilot, Aircraft Maintenance Engineer (Category E, Avionics & Electrical Systems)

The author of the item in question replies:

> Mr. Briggs is technically qualified and correct in his analysis. It is my contention, however, that the remote switch only resets the unit to "arm" and there is no way to deactivate it until gaining access to the ELT itself, if it has a fault that causes it to immediately reactivate. The only fool-proof way to fully shut down a battery-powered device is to detach the battery.
>
> LeRoy Cook

Thank you both for letting us benefit from your debate (edited somewhat for length). The real

FLYING LESSON is to read and understand the POH, any supplements and operating instructions...and that even then sometimes the true nature of a design is left to interpretation and experience.

Two on Ice

NASA's Aviation Safety Reporting System *Callback* reports several incidents involving ice. Two apply to light airplanes commonly flown by *FLYING LESSONS* readers:

Always Have a Plan B
An ATP-rated Cessna 340 pilot with many thousands of hours in mountain flying experienced an inflight hazard ASRS has received many reports on from other GA pilots — unforecast icing.

IFR flight, VFR conditions most of the way with numerous contingency airfields en route…I had received current weather from FSS about 25 minutes prior, weather above minimums with lower clouds and higher overcast. Flight continued…between layers, overcast above, broken clouds about 2,000 feet below, with no precipitation encountered. Unable to hear the destination airport's AWOS-3 weather report. Unfortunately, this AWOS is…unreadable until close to airport….We continued originally at 15,000 feet MSL (filed altitude), we stepped down to 14,000 feet MSL then 13,000 feet MSL per ATC clearance. About the time AWOS became readable our flight entered solid overcast IMC with severe icing. All de-ice/anti-ice equipment, including boots/hot props/windscreen protection were functioning normally, but it was apparent the conditions encountered were rapidly overwhelming the aircraft capability. The altered flight characteristics, burble, airframe vibration and general control deterioration from ice build-up required immediate action. I disconnected the autopilot and turned 180 degrees while descending to 12,000 feet MSL, the MVA, in search of warmer air and to fly out of the IMC/icing conditions we had entered. While turning/descending, I declared an emergency with Center and apprised the controller of our change in course/altitude. The aircraft flew out of IMC conditions at 12,000 feet and we terminated our emergency status with Center…While inbound Approach Control took down the icing info from our experience and passed it along, resulting in an icing SIGMET issuance….It is important to realize that the de-ice/anti-ice capability of prop-driven GA aircraft is inadequate to handle severe icing situations. I am convinced our immediate change in direction to reverse course was the correct response to the weather encountered. Always have an 'out' or 'Plan B' if weather conditions are different from forecast.

Boxed In, But a Way Out

A low-time, instrument rated Cessna 172 pilot demonstrated good situational awareness and decision skills after encountering unforecast icing.

Flight departed after receiving a weather briefing for the route of flight. Weather was VFR and predicted to remain VFR for the flight. A shelf of clouds started to develop about 1,000 feet below the aircraft and ceilings about 2,500 feet above the aircraft. In-between the shelf and base, I could make out airport in the distance, so I requested VFR clearance on top to airport. I received the clearance via radar vectors and flew the vector. The temperature was at 32 degrees F and I requested vectors that would not make me penetrate visible moisture. At this point the shelf merged with the bases and prior to continuing, I looked behind the aircraft and saw a cloud rolling in behind the aircraft, almost as a curtain drawing, making it impossible to divert. I followed the vectors to the best of my ability, but was distracted, making it difficult.

After penetrating a cloud, I noticed approximately 1/8 inch of ice on the leading edge. At this point, I announced my icing condition to ATC and they gave me priority handling. Shortly after, I declared an emergency and ATC gave me vectors for the ILS. I tuned and identified the ILS and tried to track it, but I was unable to receive the glideslope. I then received vectors for the airport and descended to 400 feet AGL. At this point I had closer to 1/4 to 1/2 inch of mixed ice on the wings. I had visual on the airport abeam runway…and circled to land using no flaps and had a

smooth, safe landing. After landing, I proceeded to the FBO with Airport Rescue following me in. After examining the aircraft, the propeller was clear and the wings had about 1/3 inch of ice extending about 6 inches aft of the leading edge.

Read *Callback* issue #361 for more, including reports from large and turbine airplanes.

See http://asrs.arc.nasa.gov/publications/callback/cb_361.html.

Fly safe, and have fun!

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