FLYING LESSONS for May 13, 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:

Air pressure drops about one inch per 1000 feet in the lower levels of the atmosphere, and therefore three inches for each 3000 feet. Given that sea level air pressure on a standard day is 29.92 inches, very close to 30 inches, then a normally aspirated engine's power decreases almost 20% at 6000-foot density altitude compared to the same engine at sea level – 1000 MSL if all other conditions are equal.

Wing efficiency is reduced and propellers generate less thrust in the thinner air, so the actual performance loss is likely closer to 25%. This assumes the pilot properly leans the mixture for optimal engine power at the higher density altitude; leaving the mixtures too rich or too lean would degrade power even more.

A "rolling" takeoff, i.e., letting the airplane roll forward as power is applied, which is the norm for most pilots, can add up to 500 feet to the takeoff roll in many airplanes. Letting the airplane accelerate until it is "ready to fly," another common piston aircraft technique, will add even more distance to the takeoff roll. Add these techniques to a high density altitude and performance is progressively worse.

In multiengine airplanes at high density altitudes it may be a given that, if the pilot accelerates all the way to "rotation" speed, that it will not be possible to come to a stop on the runway, even with maximum braking. The pilot must accept under those conditions that the decision to abort must be made earlier in the takeoff roll to prevent a runway overrun.

There is never a guarantee the landing gear won't collapse or other bad things happen in or as the aftermath of a runway overrun. It is prudent to have a thorough landing gear inspection conducted by a type-knowledgeable mechanic after any excursion from a prepared runway or taxiway surface.

Midair collisions and "near misses" (more correctly, "near hits") most commonly occur in good visual conditions, in the immediate vicinity of airports and, quite frequently, at less than 500 feet above ground level.

As recent events have shown, positive Air Traffic Control is no guarantee of traffic separation. In the air or on the ground, in VMC—precisely when pilots are expected to see and avoid—controllers may relax separation requirements to increase traffic flow. This is when pilot vigilance must be at its height.

I teach my students that upon receiving a runway crossing, takeoff or landing clearance, to say out loud: "The runway is clear, the sky [in the pattern] is clear, we're cleared for takeoff" or "The runway is clear, the sky is clear, we're cleared for landing" before acting on an ATC

clearance. Speaking the words aloud tends to make pilots more likely to actually perform the check.

Reviewing the AOPA Air Safety Foundation Safety Advisor on collision avoidance would be a good follow-on to reading this week's *FLYING LESSONS.*

See:
www.ntsb.gov/ntsb/brief.asp?ev_id=20100503X92217&key=1
www.ntsb.gov/ntsb/brief.asp?ev_id=20100420X55951&key=1
www.aopa.org/asf/publications/sa15.pdf.

Comments? Questions? Tell us what you think at mastery.flight.training@cox.net.

Debrief: Readers write about recent *FLYING LESSONS*

AOPA's accident statistician David Kenny writes:

> Spending as much time in the accident reports as I do, I'm repeatedly amazed at the number of pilots who (a) don't seem to have put much urgency into learning to master crosswind landings and (b) don't have any clear idea of what their personal limits are. The combination bends a lot of aluminum (and tears a lot of fabric, and shreds a lot of fiberglass) every year.

Thanks very much, David. I've been speaking with several insurance leaders and all agree if we can change the crosswind attitudes of pilots we'll have a much safer, and less expensive, world. I'll be presenting "The Lost Art of Directional Control" in the FAA building at AirVenture on Saturday, July 31 at 10 am.

David then turned his attention to touch-and-goes in retractable gear airplanes:

> Further evidence supporting your recommendation against doing touch-and-goes in retracts … especially retracts with which you're not familiar. By the way, I've been meaning to send my compliments on your "Five Crosswind Exercises" article in *Aviation Safety*. Nice work!

And thank you, David, for your efforts to make us safer.

See:
www.ntsb.gov/NTSB/brief2.asp?ev_id=20100322X02926&ntsbno=ERA10CA183&akey=1
www.aviationsafetymag.com

Regarding last week's lessons about V_A and the effect of aircraft weight, reader John Townsley writes:

> This issue has some great points regarding Va and turbulence. I've always wondered how lift-enhancing devices (like VGs, STOL, etc.) affect Va. I've talked with several vendors for these products. The companies all say the effect is "negligible" and "the FAA doesn't require any change to the published VA. However in the same breath they boast that the wing mods will reduce stall speeds by 3-5 knots… For a typical piston single that's between 8% and 12% of the published stall speed. Seems like anyone who has flys an aircraft with wing mods might want to be extra conservative when in turbulence. Obviously, if the wing stalls at slower speeds under 'normal' operations, it's NOT gonna stall at published Va challenged by turbulence. An accelerated stall at Va that occurs in turbulence is our safety valve intended to prevent structural overload and failure.
>
> To me, a conservative approach (i.e. a lower turbulence penetration speed than Va) is a darn good idea, especially if my wing is modified with VGs, a cuff, stall fences, or other lift enhancing devices. I recall several accident reports where structural failure caused by excessive airspeed. It's definitely on my mind when things look like they'll get bumpy.

John continues:

> Dr. [David] Roger's article [on V_A] is fascinating! I don't have time to dig into it now, but will in the future. I'm also interested in the negative load Va speed since it is quite possible to get a significant down draft while penetrating turbulence. For the C172 and C182 I fly the negative load is only 1.76, vs the positive load

> of about 4.4 or 3.5. The Vg envelope for these aircraft has a published Va speed for positive LF, but I've never found a published Va for negative LF.
>
> Thanks for sharing this article. I'd like to see you discuss negative LF and the implications for turbulence penetration in a future article.

Thanks, John. I'll contact Dr. Rogers and see if he has any follow-up information about negative loads and the concept of turbulent air penetration speed.

New requirements from NTSB

An FAA Information for Operators (InFO) letter details new situations requiring a report to the National Transportation Safety Board. Propeller blade separation, loss of information from "glass cockpit" displays, receiving Airborne Collision and Avoidance System (ACAS) resolution advisories, damage to helicopter tail or main rotor blades, and events involving air carrier aircraft that land or depart on a taxiway, incorrect runway, or other area not designed as a runway, or runway incursions, have been added to the situations requiring immediate NTSB notification.

InFOs contais valuable information for operators that should help them meet certain administrative, regulatory, or operational requirements with relatively low urgency or impact on safety.

See www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/info/all_infos/media/2010/InFO10004.pdf

Heater warning

FAA has issued a Special Airworthiness Information Bulletin (SAIB) warning of the possibility of carbon monoxide (CO) poisoning through leaking exhaust heat-exchange mufflers. The SAIB comes as a result of a fatal mishap attributed to CO poisoning to the pilot and subsequent incapacitation and loss of aircraft control.

FAA writes:

> The Federal Aviation Administration tasked Wichita State University to conduct research that focuses on carbon monoxide safety issues as they apply to general aviation products. A technical report titled "Detection and prevention of carbon monoxide exposure in General Aviation Aircraft, Document No. DOT/FAA/AR-09/49, dated October 2009" is available at www.tc.faa.gov/its/worldpac/techrpt/ar0949.pdf.
> The report shows that after researching National Transportation Safety Board (NTSB) accidents related to carbon monoxide (CO) poisoning, the muffler system was the top source of CO. For the CO-related cases where the muffler was identified as the source of the CO leakage, 92 percent had a muffler with more than 1,000 hours of service.

And FAA recommends:

> Replace the mufflers on reciprocating engine-powered airplanes with more than 1,000 hours on the muffler and at each 1,000-hour interval, unless the manufacturer recommends or FAA regulations require a more frequent replacement.
>
> Review and continue to follow the guidance for exhaust system inspections and maintenance in SAIB CE-04-22, dated December 17, 2003, and Aviation Maintenance Alert (AMA), All Powered Models, Carbon Monoxide Poisoning Potential, October 2006 issue of Advisory Circular 43-16A.
>
> Use CO detectors while operating your aircraft as recommended by SAIB CE-10-19R1, dated March 17, 2010.
>
> Continue to inspect the complete engine exhaust system during 100-hour/annual inspections and at inspection intervals recommended by the aircraft and engine manufacturers in accordance with their applicable maintenance manual instructions.

For full details see the SAIB.

See http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgSAIB.nsf/0/413FA715BC3AEC0E8625771C00683D3C?OpenDocument&Highlight=ce-10-33

Crosswinds and the pilot-in-command

Several times in recent months *FLYING LESSONS* has focused on loss of directional control accidents, most resulting from adverse crosswinds. This week AVweb posted news of an American Airlines captain who made a pilot-in-command call when he determined the runway in use, selected for ease of traffic management and not alignment with the wind, was unsafe. Eventually the captain had to declare an emergency in order to get the runway of his choice. You can hear the ATC audio and decide for yourself if the crew's actions were justified, and read AVweb editor (and *FLYING LESSONS* reader) Paul Bertorelli's take on the event.

See:
www.avweb.com/avwebflash/news/jkf_construction_crosswind_American_pilots_clearance_crosswind_emergency_202510-1.html
www.avweb.com/other/jfkemergencygo.mp3
www.avweb.com/blogs/insider/AVwebInsider_EmergencyAtJFK_202513-1.html

Over the years I've seen a number of groundlops, bent wingtips, runway excursions, nose-overs and propeller strikes at Oshkosh during the EAA Convention because pilots attempt to land with adverse winds because "that's the runway in use." Would you have the presence of mind to refuse a landing clearance if the conditions aren't safe, even if that means having to land somewhere else while others accept the runway and manage to make it down unscathed?

Question of the Week

This week's question:

> **Have you ever refused to accept an ATC clearance because you felt attempting to comply was unsafe? Tell us your story at mftsurvey@cox.net.**

Last week's question was:

> **Do you fly multiple airplanes, or always the same one? If you fly more than one airplane, how do you prepare for the differences?**

Here are your responses:

- Since I own an airplane (and only one), it's not surprising that I log 90-plus percent of my flight time there. When I do fly something else, I get thoroughly checked out by a CFI familiar with the model (or a refresher check-out if I haven't flown it in a while), preferably with a second dual flight in which the instructor pretends (s)he isn't there while watching to make sure I wouldn't do anything disastrous flying solo. The adjustment is actually easier in an airplane that's plainly different from my own -- going from low-wing to high-wing, for example, or a yoke to a stick. However, my employer operates the fixed-gear version of the retract I usually fly, and they're just similar enough to get me really confused. Approach and landing speeds are 10-20 knots slower in the fixed-gear model (close to the stall speed of my own machine) and the typical descent rate's a lot slower, so it takes some concerted practice to get over coming in high and hot.
- As a CFII ME, I fly multiple airplane types. Many airplanes have differences based on the year that they were manufactured. Different airspeeds, flap settings, and techniques for takeoff and landings are common. I have checklists and POH's for almost every make and model of the airplanes I fly. I typically review the model in question the night prior to my flight. As part of our preflight briefing, I take out the owner's POH from the airplane and review all airspeeds, limitations and performance charts along with the airplane owner in preparation for the flight. While flying, I keep the POH handy for quick reference.

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