FLYING LESSONS for January 1, 2009

suggested by this week's aircraft mishap reports

FLYING LESSONS uses the past week's mishap reports as the jumping-off point 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:

Anticipate changes in glide path resulting from air movement that forms when surface wind flows over obstructions, and rising and falling columns of air create up- and down-drafts over varying surface features. The effect can be enhanced near or shortly after sundown on a cool, clear night as a low-level inversion forms.

Strong winds flowing across mountain ridges can create strong turbulence or, more insidiously, intense downdrafts in smooth air. Watch for these conditions:

- Wind direction roughly perpendicular to the mountain ridge
- Wind speeds exceeding 30 knots at or near the ridge height
- A stable air mass

Despite the inference in most books, mountain waves may not always be marked by standing lenticulars, rotor clouds or mountaintop pendant clouds if the air is sufficiently dry.

Avoid mountain wave encounters by evaluating area forecasts, winds aloft forecasts, pilot reports and atmospheric stability charts for the conditions conducive to mountain wave formation. If the elements exist, alter your route of flight to be well downwind of the high terrain (50 miles or more). If airspeed fluctuates in cruise flight (assuming a constant altitude) or uncommanded vertical rates occur (at a constant aircraft attitude), begin your escape away from the rising terrain immediately. In many cases you'll simply need to delay your trip until the winds subside to safe levels.

If you must cross a ridge, do so at an angle that permits you to dive away from terrain should you enter a strong downdraft. Once across the ridge, depart at right angles to get away from the ridge (and adverse winds) as quickly as possible. To do so safely requires you fly in VMC during daylight hours, to see and avoid terrain.

Mountain waves tend to be more intense in winter, when the jet stream is at a lower altitude. Higher-speed winds are closer to terrain in colder months; very cold air is generally stable, making mountain wave formation more likely.

Some of the strongest mountain wave activity occurs downwind of the Great Smoky Mountains in North Carolina and Virginia, and in the lee of the White Mountains in northern New England. Because these states are not usually considered "mountainous" in the same way we think about Colorado and Wyoming, for instance, pilots flying in these areas tend to be less aware of the extreme hazard of mountain wave turbulence when conditions prevail.

Before you take on the high country consider training on mountain flying with an organization like the Colorado Pilots Association. AOPA's Air Safety Foundation also has an excellent—and free—online Mountain Flying course to acquaint you with the basics before you begin your mountain-flying flight instruction.

See
www.coloradopilots.org/content_mtnfly_class.asp?menuID=24~24
http://flash.aopa.org/asf/mountainFlying/html/flash.cfm?

Certified for flight in icing conditions or not, treat the first sign of ice accumulation the same way you should treat an unexpected sounding of the stall warning horn—as a signal that you need to do something *now* to prevent additional ice accumulation, remove the ice that's already formed, and maneuver the airplane into ice-free air for the remainder of the flight.

Engine failure resulting from blocked inlet air filters is a strong possibility in icing or heavy snow showers, an oft-overlooked hazard of flying in below-freezing precipitation.

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

Debrief: Reader comments on past *FLYING LESSONS*

Regarding a recent *FLYING LESSON* about attempted aerobatics in non-aerobatic airplanes, reader and former Pan American Airways captain Lew Gage writes:

> There are many pilots that have misconceptions about what the limitations are regarding maneuvers in various airplanes. The Luscombe 8 series is a prime example. Many have the mistaken idea that it is an aerobatic airplane when in fact it is certified as the old "normal' category.
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> When I bought into my Luscombe I only bought half of it, the partnership lasting about a year before I bought my partner out. He told me that he and his prior partner did "a lot of aerobatics" including snap rolls, a maneuver that is extremely stressful on the tail surfaces in particular and the entire airplane in general. I threatened to have the FAA visit him for "careless and reckless" operation if that continued.
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> 15 years later when I completely restored the airplane and had the tail area uncovered by removing parts that were riveted in place I found the aft bulkhead that carries the vertical fin loads cracked in all areas and directions. This part, critical as it is, is not accessible during a normal annual inspection. Of course when I finished, the entire aft portion that does the hard duty was replaced with new, heavier parts. I have never gone outside the stipulated restrictions with this airplane, both before and after the restoration. I believe that had this abuse continued after I had it stopped the vertical and horizontal tail surfaces would have departed the airplane in flight.
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> Any airplane can be made to do aerobatics as the famous 707 roll done in front of a huge crowd in Seattle, but it takes either an extraordinary pilot or a lot of luck (or both) to get back to the ground safely, and then there may be hidden damage waiting for the next guy that flies the airplane.

Thanks, Lew. Many pilots rely on the "margin of safety" inherent to FAA certification, i.e., airframes are stressed to 150% the load factor stipulated in the type of certification (normal, utility, aerobatic, etc.). This 150% figure is called the *ultimate* load. Pilots thinking the margin above 100% protects them forget that under such rules an airplane flown up to its *limit* load (100% of certificated stress) will not, if the airplane conforms to its type certificate or an STC, incur damage. Operate above the margin (150% or more rated stress) and all bets are off—critical structure is likely to fail, perhaps catastrophically. Within the margin (above limit load but below ultimate load) permanent deformation of structure is still likely, although damage should not cause a catastrophic failure on that particular flight. The deformation will vastly accelerate

airframe fatigue, however, and may make the airplane incapable of operating safely to ultimate or even limit load on future flights. I say again, fly the airplane you're flying, within its limitations. If you want to fly aerobatics, fly a well-maintained aerobatic airplane.

A pilot's guide to weather decision-making

It's not brand-new, but it's superb: it's the *General Aviation Pilot's Guide to Preflight Weather Planning, Weather Self-Briefings, and Weather Decision Making*. Written by FAA safety honcho Susan Parsons and with input from 2008 CFI of the Year Max Trescott (both *FLYING LESSONS* readers), the *Guide* includes structured and extremely helpful strategies and checklists for making your VFR or IFR go/no-go decision before takeoff, and continually updating it in flight. It's 36 easily understood, highly illustrated and *free* government pages to keep you and your passengers informed an safe…and a must-read for all *FLYING LESSONS* readers.

See www.faa.gov/pilots/safety/media/ga_weather_decision_making.pdf.

Icing *Safety Alert*

It appears not everyone's getting the message, so the National Transportation Safety Board has issued a *Safety Alert* on detecting and dealing with inflight ice accumulation. "This Safety Alert, directed to the pilot community, is intended to increase the visibility of airplane icing issues and address procedures taught regarding the accumulation of ice before activating deice boots," said NTSB Acting Chairman Mark V. Rosenker (a *FLYING LESSONS* reader). Reminders once ice begins to form include:

- Leading-edge deice boots should be activated as soon as icing is encountered, unless the aircraft flight manual or the pilot's operating handbook specifically directs not to activate them.
- If the aircraft flight manual or the pilot's operating handbook specifies to wait for an accumulation of ice before activating the deice boots, maintain extremely careful vigilance of airspeed and any unusual handling qualities.
- While icing conditions exist, continue to manually cycle the deice system unless the system has a provision for continuous operation.
- Turn off or limit the use of the autopilot in order to better "feel" changes in the handling qualities of the airplane.
- Be aware that some aircraft manufacturers maintain that waiting for the accumulation of ice is still the most effective means of shedding ice.

Pilots of airplanes equipped with TKS-based "known ice" systems should adhere to manufacturer recommendations for pre-emptive use of "anti-ice" flow rates in suspected icing conditions and full "deice" operation once ice begins to form. Same goes for anti- and de-icing use of electric and electrothermal equipment. See the Pilot's Operating Handbook (POH) or POH Supplement for using ice protection.

See http://www.ntsb.gov/alerts/SA_014.pdf

Fly safe, and have fun!

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