FLYING LESSONS for February 19, 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:

Although most landing gear systems are designed to withstand nine Gs or better vertically and along the longitudinal axis of the airplane, certification requires they withstand only about 1.5 G side load. Remember this when deciding whether to attempt a crosswind takeoff or landing, and to avoid gear damage or collapse by slowing to a "walking pace" before beginning a turn off the runway anywhere except onto high-speed taxiway exits.

Most powerful light airplanes will pitch up excessively when takeoff or go-around power is applied. The effect is magnified if the aircraft is in a landing configuration and the pilot has trimmed for short-final speed—airplanes will pitch to maintain a trimmed airspeed as configuration and/or power changes; a slow airplane given a lot of power will pitch up excessively, possibly into a stall or to a point where the pilot does not or cannot compensate for the turning tendencies created by the propeller.

There are specific pitch and performance targets to attain in a balked landing ["go-around"]. Power-up must include controlling pitch to achieve and maintain a controllable climb speed and angle, with adequate rudder applied as necessary for coordination and directional control.

NASA's video on ice-related tailplane stall is required annual viewing in many corporate flight departments and regional airlines, and is a great resource on the subject for any pilots flying airplanes certified for flight in icing conditions—as well as emergency knowledge for those who might blunder into icing conditions.

At least 16 business and air carrier mishaps can be blamed on ice-related tailplane stall, according to the 1998 NASA video. Undoubtedly the number has grown more than just the recent Buffalo, NY crash.

An autopilot will trim out an aircraft, within its capabilities, to compensate for changing conditions -- including airflow disturbances caused by icing -- without the flight crew necessarily becoming aware of any abnormalities. If you're on autopilot while in icing conditions, according to NASA, you may miss these signs of tailplane icing:

- Lightening of control forces, especially in pitch in the forward direction, toward nose down
- Difficulty trimming the airplane (the autopilot will do this, perhaps without your knowledge)
- The onset of pilot-induced pitch oscillations as you attempt to control the ice-contaminated aircraft

"**You may be able in a manual mode** to sense something sooner than the autopilot can sense it," NTSB spokesman and Board member Steven R. Chealander said after the recent Continental Express tragedy at Buffalo, NY. He emphasized the need to hand-fly the airplane in icing to "feel how it's really flying."

Are *you* current and capable enough to hand-fly your airplane in icing-IMC conditions while adding ice protection system operation to your workload? If not, stay away from places a "reasonably prudent" pilot would suspect to find ice.

When the horizontal tail accumulates ice it may stall, creating a sudden—often uncontrollable—nose-down movement. If you don't notice the signs of tailplane icing you won't know there's a problem until you find yourself in a potentially unrecoverable, vertical descent toward the ground.

The action of increasing flap extension tends to increase tail angle of attack on most airplanes, which is while most identified tailplane icing accidents happen near the outer marker on an icy instrument approach—because that's where many commercial pilots are trained to extend flaps for a stabilized approach. Hence the Federal recommendation to *avoid increasing flap extension when ice is adhering to the airframe*.

Tailplane stall is differentiated from a wing stall by a buffeting in the *controls* that is not a buffeting in the *airframe*. Put another way, tailplane stall doesn't give you feedback "in the seat of your pants." If control buffet occurs at higher indicated airspeeds it's more likely to be a tailplane stall than a wing stall.

Recovering from a tailplane stall is exactly backward from the wing stall recoveries we're all taught and practice. From NASA:

	Pitch	Power	Deice boots
Tailplane stall	Pull BACK	Reduce	Activate several times immediately
Wing stall	Push FORWARD	Increase	Activate as required

NASA's 23-minute video includes these **key recommendations** for pilots flying in ice:

- Become acutely aware of the conditions conducive to and the symptoms of tailplane stalls.
- Be prepared to immediately undo any configuration changes, especially flaps extension, if tailplane stall symptoms appear.
- Avoiding using the autopilot in known icing conditions.
- Significant ice may form on the tail before it begins to accumulate on the wings. If equipped with a deicing system, use it to clear even very small amounts of windshield or wing ice.
- If you lower flaps and the controls begin shaking, do not mis-identify the condition as a wing stall. Retract the notch of flaps you just added, and be prepared to pull back and reduce power if the nose suddenly drops.

NASA hasn't forgotten the general aviation pilot. "A Pilot's Guide to Inflight Icing" is NASA's interactive, online course intended for the general aviation pilot who flies aircraft certified for flight in icing, although much of the information is applicable to all pilots. With an operational focus, this course provides tools pilots can use to deal with in-flight icing.

For more see:
http://video.google.com/videoplay?docid=2238323060735779946
http://aircrafticing.grc.nasa.gov/courses_inflight.html

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

Debrief: Readers comment on recent *FLYING LESSONS:*

Regarding last week's *LESSONS* about mis-fueling, reader Shirley Roberts writes:

> The misfueling with Jet A brought back memories. Back in my FAA days I'd just been assigned as the Airport Certification Safety Inspector to Love Field [in Dallas, TX] and had not yet done an annual inspection there. A Navajo Chieftain lost all power very shortly after takeoff, too low to make any runway, and successfully landed in a school yard....too early for children to be present. Someday I'd like to chat with you about that and all the trail of errors that led to the accident. Fortunately, no one was killed of the seven (I think) that were on board. I attended the interviews with the CAMI representative. The pilot had kept his cool and didn't let the plane go below V_{MCA} even though he took out part of a chimney.

A good reminder that, when faced with an emergency, it's all about aircraft control. About identifying jet fuel pumped into a piston airplane's tanks reader Ron Williams asks:

> Hmm, I thought a "normal pre-flight" included sumping each tank. Would the Jet-A settle to the bottom?

Jet-A appears nearly clear (it has no dye additive) while 100LL has a blue tint. Almost universally, I see pilots hold a fuel sample up to the sky when checking for contamination. Even on a cloudy day this puts a slight blue tint in a clear sample, from sky color. I've noticed that the shade of blue tinting seems to be lighter than in years past (less tint = less refinery cost?), so the contrast between blue and clear fuel may be reduced.

I teach pilots to hold the sample not up against the sky, but against the side of the airplane. Almost all airplanes are white or light-colored, so a blue tint (or lack of it) will be more obvious.

On the whole I think the typical pilot "goes through the motions" of sampling the fuel; if there's nothing floating around in it or there isn't an obvious line between water and fuel, he/she feels the check is complete. If the *whole* sample is bad it doesn't register. Concern about the health and environmental issues of handling leaded fuel increase the "hassle factor" of sumping the drains as well, possibly prompting some pilots to skip the fuel sample. We have to be more careful to check…really check…the fuel in our tanks before takeoff.

Do any readers have specific information about the rate at which Jet-A separates from 100LL? Let me know at mastery.flight.training@cox.net.

Fly safe, and have fun!

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