FLYING LESSONS for November 13, 2008

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:

In many cases of mechanical landing gear failure, a pushrod or rod end bends or breaks but at that point the gear may still be capable of being extended the rest of the way suing alternate/emergency procedures. Although often we are taught to "cycle the gear" if something interrupts gear extension, in practice such cycling frequently causes additional damage that prevents the gear from being fully extended by any means.

If the gear circuit breaker trips or landing gear dies not fully extend for any other reason, your safest course of action is to attempt to get the gear the rest of the way down with an alternate/emergency extension procedure. Do ***not,*** however, attempt to raise and re-lower ["cycle"] the landing gear, as this carries a very real risk of making matters much worse.

Many retractable gear airplanes' gear warning horns and/or annunciator lights are designed to activate if the landing gear is not fully down and the throttle is reduced to or very near idle. Alter your technique to land with power (landing in strong winds, or trying to comply with a "keep your speed up" approach) and the gear warnings will not sound or illuminate.

Some airplanes also trigger the gear warnings if the flaps are fully down and the gear is not. Landing with less than full flaps (such as many pilots do out of a low IFR approach or in strong winds) also defeats these types of landing gear warning systems.

Altering an establish technique because ATC requests a deviation from the usual technique, the weather is different than expected or you think an approach *might* need to be missed can set you up for forgotten items that could lead to a gear mishap or Controlled Flight Into Terrain (CFIT). Be extremely careful any time you fly something other than your own standard operating procedure.

Aft center of gravity loadings, even within limits, will have the following effects on takeoff, go-around or missed approach:

- Requirement for the pitch trim to be set more nose-low than in a "normal" takeoff.
- Tendency of the airplane to pitch up excessively on liftoff for any given trim position.
- Decreased pitch stability, i.e., a less stable, "squirrelier" airplane.
- Decreased longitudinal stability, with increased rudder necessary to compensate for propeller turning tendencies at high power. In ground effect this may exceed the available rudder if airspeed is low, causing the airplane to drift uncontrollably to the left.
- Requirement for more nose-up trim for a given speed on landing, exacerbating the nose-up tendency at power application at the beginning of a balked landing or missed approach.

Consequently it will take careful application of power and pitch control at the beginning of a go-around or missed approach, to assure control authority exists to transition safely into a climb. The further aft the center of gravity the more gingerly this transition needs to be made.

If the c.g. is out of limits aft the condition may not be recoverable at slow forward airspeeds. The condition is also aggravated by high aircraft weight and/or high density altitude.

The FAA's *Airplane Flying Handbook* (section 8) provides guidance on what it called Rejected Landings, advises "in cleaning up the airplane during the go-around, the pilot should be concerned first with flaps and secondly with the landing gear." The *AFH* does provide the caveat "Unless otherwise specified in the AFM/POH," but reiterates

> …it is generally recommended that the flaps be retracted (at least partially) *before* retracting the landing gear—for two reasons. First, on most airplanes full flaps produce more drag than the landing gear; and second, in case the airplane should inadvertently touchdown as the go-around is initiated, it is most desirable to have the landing gear in the down-and-locked position. After a positive rate of climb is established, the landing gear can be retracted…. If the pitch attitude is increased excessively in an effort to keep the airplane from contacting the runway, it may cause the airplane to stall. This would be especially likely if no trim correction is made and the flaps remain fully extended. The pilot should not attempt to retract the landing gear until after a rough trim is accomplished and a positive rate of climb is established.

See www.faa.gov/library/manuals/aircraft/airplane_handbook/media/faa-h-8083-3a-4of7.pdf.

In all airplanes it's best to confirm hold the nose to an attitude that prevents downward movement but still permits rapid acceleration to a speed with full control authority, then to reconfigure the airplane carefully to reduce drag and transition to a climb (Vx if obstacles are present; Vy otherwise).

Questions? Comments? Send me a note at mastery.flight.training@cox.net.

How to do it

FLYING LESSONS reader Ed Livermore and his wife show us the proper way to respond to an in-flight emergency in their A36 Bonanza. Ed reports:

> "We had the dreaded 'uh-oh' Sunday [Nov. 9] after we departed from Ardmore, OK, and headed down to the north Dallas area. At 4,500 [ft] and at relatively moderate power, our engine cratered. We later found the #5 cylinder head blew off, disconnected. There was a 'bang', the engine immediately ran rough, and the JPI confirmed power loss in the cylinder. Of course while in the air, we had no idea what had happened, but I sort of reckoned it was a cylinder coming apart. We have ECi cylinders. There's an AD out on the subject, though it doesn't appear to cover our specific cylinders.
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> "Marcia pushed the GPS 'nearest' button to locate the nearest airport, which fortunately turned out to be Gainesville, TX (GLE). We were on Center frequency, declared an 'emergency' and stayed with them for a couple minutes until we identified GLE, then we switched to GLE Unicom, again declared an emergency asking everyone to stay clear because we were coming in with only limited power. The engine was still running, but we had plenty of altitude and we didn't want to push the power issue. There was a clunking noise. Our altitude was just fine for the 6.5 nm coast to GLE, and we entered onto base, then turned final, and landed quite normally. The engine provided taxi power to get us to the tie down. We shut it down normally.

> "Once on the ground, we opened the cowl to find #5 cracked all the way around about 5 fins up from the bottom of the louvers. It had separated by about a third of an inch."

This is an excellent example of how to handle an emergency, including division of cockpit chores, use of technology, obtaining ATC assistance by declaring an emergency, and assertiveness in dealing with the situation. Going the extra mile to warn all pilots in the area on Unicom shows the "crew" was unmistakably in control and situationally aware enough to still be thinking about the world outside the cockpit. The subject cylinder had approximately 1100 hours Time-In-Service (TIS) amassed in roughly seven years' time. The engine is turbonormalized and the pilot reports following the STC holder's operating instructions, which include high cruise power settings but lean-of-peak mixture operation to keep temperatures and internal pressures down. The subject cylinder had suffered "problems" several years ago, according to the pilot, including repeated failure to develop power on takeoff that was overcome by ground leaning and proper operation on the second takeoff. That was addressed by mechanics but no cause was ever found. Again, a tremendous job by the crew of this A36.

Do you have an "uh-oh" story? Send it in to mastery.flight.training@cox.net.

Debrief—Reader discussion of past *FLYING LESSONS* reports

Dave Kenny is Manager of Aviation Safety Analysis for AOPA's Air Safety Foundation. Regarding last week's *FLYING LESSONS* about midair collisions and traffic avoidance Dave writes:

> I enjoy your newsletter, but I'm afraid I have to take issue with one statement you quoted from Fred DeLacerda, namely, that "Mid-airs are almost universally fatal". The AOPA's Air Safety Foundation has just completed an analysis of mid-air collisions en route to updating our Safety Advisor on "Collision Avoidance". In the ten years between 1998 and 2007, GA aircraft were involved in 128 mid-air collisions, an average of about one a month, but only 66 of these -- just over half -- resulted in any deaths. Forty-five caused no injuries to anyone on either aircraft. I know this is counterintuitive -- it surprised me, as well! -- but most of the non-fatal collisions occurred on final approach to the runway, sometimes immediately over the runway, at relatively low speed. Mid-air collisions in cruise are generally fatal, as are many of those that occur in the other legs of the traffic pattern. To be fair, Mr. DeLacerda's book was published twenty years ago, but I can't think of an obvious reason this pattern would have changed much in the interim. The rest of his description is indeed consistent with the results of our analysis. If you have any questions or additional comments, I hope you won't hesitate to reply. Keep up the good work!

I have indeed spoken with Dave since and confirmed the updated Safety Advisor will be complete in the next few months. Until then look for the current version, and a host of other Safety Advisor guidance at www.aopa.org/asf/publications/advisors.html. Thanks, Dave!

Fly safe, and have fun!

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