For much more on flying safely see www.thomaspturner.net.

FLYING LESSONS for November 12, 2009

suggested by this week's 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.

FLYING LESSONS is also available in PDF through a link in the left column at www.thomaspturner.net.

FLYING LESSONS is an independent product of Mastery Flight Training, Inc.

FLYING LESSONS is featured on the FAA's safety website!

This week's lessons:

Will a multiengine airplane climb on a single engine? The answer depends on many factors. What was the speed when the engine failed? Was it enough to provide control authority needed to compensate for asymmetric thrust? Was the landing gear down? What was the airplane's weight, center of gravity location, and the density altitude?

Sometimes conditions require both throttles be brought to idle as the nose is lowered, and the pilot make an off-airport landing. It would be an extremely tough decision when we're trained so hard to fly out of an engine failure on takeoff, but at times it may be the best possible decision we can make.

Single or twin, many times we've been reminded surviving an engine failure depends on landing wings level, under control, at the lowest safe speed.

On-board thunderstorm warning is ubiquitous in today's cross-country airplane, but storm warning systems have limitations. "Spherics", lightning detectors, show trends information but not enough detail to be used to pick your way between cells. Weather uplinks have delays, sometimes long enough a storm cell can grow from nothing to maturity between sequential updates. And since uplinks are derived from weather radars meant for warning people on the ground, they depict only the lowest levels of precipitation, so their use for deviating around storms at altitude is at best ill-advised.

Weather uplinks and lightning detectors are superb tools for avoiding areas of thunderstorms, but they are not meant as means for picking your way around individual cells. Without on-board active radar, and the specialized training on how to use it, the best method of thunderstorm avoidance remains to be visual avoidance of storm clouds, staying 20 miles or more from towering cumulonimbus.

The *Aeronautical Information Manual* (AIM) gives what is still the best advice for flying in the vicinity of thunderstorms, and for escaping if your avoidance strategy fails:

Above all, remember this: never regard any thunderstorm "lightly" even when radar observers report the echoes are of light intensity. Avoiding thunderstorms is the best policy. Following are some Do's and Don'ts of thunderstorm avoidance:

1. Don't land or takeoff in the face of an approaching thunderstorm. A sudden gust front of low level turbulence could cause loss of control.
2. Don't attempt to fly under a thunderstorm even if you can see through to the other side. Turbulence and wind shear under the storm could be disastrous.
3. Don't fly without airborne radar into a cloud mass containing scattered embedded thunderstorms. Scattered thunderstorms not embedded usually can be visually circumnavigated.
4. Don't trust the visual appearance to be a reliable indicator of the turbulence inside a thunderstorm.
5. Do avoid by at least 20 miles any thunderstorm identified as severe or giving an intense radar echo. This is especially true under the anvil of a large cumulonimbus.
6. Do clear the top of a known or suspected severe thunderstorm by at least 1,000 feet altitude for each 10 knots of wind speed at the cloud top. This should exceed the altitude capability of most aircraft.
7. Do circumnavigate the entire area if the area has $^{6}/_{10}$ thunderstorm coverage.
8. Do remember that vivid and frequent lightning indicates the probability of a strong thunderstorm.
9. Do regard as extremely hazardous any thunderstorm with tops 35,000 feet or higher whether the top is visually sighted or determined by radar.

If you cannot avoid penetrating a thunderstorm, following are some Do's before entering the storm:

1. Tighten your safety belt, put on your shoulder harness if you have one and secure all loose objects.
2. Plan and hold your course to take you through the storm in a minimum time.
3. To avoid the most critical icing, establish a penetration altitude below the freezing level or above the level of minus 15 degrees Celsius.
4. Verify that pitot heat is on and turn on carburetor heat or jet engine anti-ice. Icing can be rapid at any altitude and cause almost instantaneous power failure and/or loss of airspeed indication.
5. Establish power settings for turbulence penetration airspeed recommended in your aircraft manual.
6. Turn up cockpit lights to highest intensity to lessen temporary blindness from lightning.
7. If using automatic pilot, disengage altitude hold mode and speed hold mode. The automatic altitude and speed controls will increase maneuvers of the aircraft thus increasing structural stress.
8. If using airborne radar, tilt the antenna up and down occasionally. This will permit you to detect other thunderstorm activity at altitudes other than the one being flown.

Following are some Do's and Don'ts during the thunderstorm penetration:

1. Do keep your eyes on your instruments. Looking outside the cockpit can increase danger of temporary blindness from lightning.
2. Don't change power settings; maintain settings for the recommended turbulence penetration airspeed.
3. Don't attempt to maintain constant altitude; let the aircraft "ride the waves."
4. Don't turn back once you are in the thunderstorm. A straight course through the storm most likely will get you out of the hazards most quickly. In addition, turning maneuvers increase stress on the aircraft.

AOPA's Air Safety Foundation has a superb online course, Weather Wise: Thunderstorms and ATC. Consider taking (or re-taking) this course your *FLYING LESSONS* homework assignment for the week.

See:
www.faa.gov/air_traffic/publications/atpubs/aim/Chap7/aim0701.html
http://flash.aopa.org/asf/wxwise_thunder/thunderstorms.cfm?

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

FLYING LESSONS comes to North Texas

Saturday, December 12th, Denton, TX: *FLYING LESSONS* is hosted by Aircraft Precision Maintenance, Inc. The day-long program includes:

- Running out of fuel: Lessons from three case studies
- Keep it on the runway: The lost art of directional control
- A pilot's guide to aviation insurance
- Those who won't: Avoiding gear up and gear-collapse mishaps
- What *really* happens in IMC

Check here for complete details. Contact Aircraft Precision Maintenance at 940-765-7975 or Wesley@amptx.com to enroll.

See www.thomaspturner.net/Denton%20Dec%202009.pdf

Watch for additional *FLYING LESSONS* events in 2010. Contact mastery.flight.training@cox.net if you'd like to arrange a presentation at your conference, FBO, safety meeting or flying club.

DEBRIEF: Readers comment on past *FLYING LESSONS*

Reader and aerobatics instructor Anthony Johnson writes about a recent *FLYING LESSON* concerning approach checklists:

> Here's one to add to the mix. Flying an ILS approach into Alexandria, MN on a very low IFR day, I was tracking in to the IAF on the GPS, reached over to hit the CDI button on the 430 to switch to LOC mode, and hit the next button (OBS) by mistake. The box promptly sent me to the missed approach point. Fortunately, I had the ILS tuned on the #2 receiver, so continued to fly it using that one. Add to checklist - tune the secondary receiver if you have one to something useful!

Good tip. Thanks, Tony. Prompted by last week's *FLYING LESSONS* about overreliance on cockpit technology, another reader relates a story from one of his clients:

> The airplane was in IMC cruise flight when the airplane hit some unexpected turbulence. The jolts activated the airplane's emergency locator transmitter (ELT). The signal was so strong it jammed the GNS 530 navigation signal and made the communications radios almost unreadable. Considering the loss of GPS/moving map capability an emergency, the pilot descended on his emergency authority until reaching VMC and landed, explaining later. Investigation revealed the ELT had come loose in flight and activated—normally it should be clamped and tie-wrapped but it had not been tie-wrapped as a backup. The airplane did not have the panel-mount switch required in later airplanes and the pilot could not turn it off in flight.

Thanks, reader. This is a good reminder for airplane owners to be familiar with their airplanes, inside and out, and to double-check everything's properly secure after inspections. Further, and more importantly, loss of GPS is *not* a total loss of navigation capability…although losing navigation capability requires a report to ATC, and the communication difficulty may indeed have warranted the pilot's emergency actions.

Reader Loren Sheren writes about the recent FAA warning about losing visual reference in the final seconds before touchdown:

> I was interested in the FAA/NTSB bulletin on rejected landings due to rapidly deteriorating visibility. Having suffered the consequences of that very scenario, it is the classic VFR into IFR scenario that I used to think I was immune to being an experienced instrument pilot. Bottom line- that last 100-200 feet is VFR even on a low instrument day. And if ceases to become VFR the landing needs to be rejected-IMMEDIATELY.

And reader Doug White relates an instance of autopilot surprise, responding to yet another *FLYING LESSON*:

> My "ah ha" moment with trusting in autopilot flying made me agree with airline pilot Paul who said "Watch it like a hawk!" This will come as a "no duh" to all of you experienced hands, but when I was being taught about hand cranking a stuck landing gear in a Beech Bonanza, we put it on autopilot at straight and level and 1,000 feet, and 120 KIAS. I slid the seat back and started cranking. No problem. Until the airspeed started to deteriorate rapidly and if the instructor would not have pointed out that the autopilot will fly you right into a stall and you need to watch the airspeed, I would have gone into a power on stall on autopilot, because I was so focused on handcranking the gear. This was a battle I did not, nor would not, like to fight, especially at night or in IMC.

Thanks, Doug. It's another reminder that autopilots reduce cockpit workload, but we cannot relinquish responsibility for flying the airplane.

QUESTION OF THE WEEK

November's Question of the Week #2

> **What's your thunderstorm avoidance or encounter story?**

Win your choice of a Mastery Flight Training hat or the instructional DVD *Those Who Won't: Avoiding Gear Up and Gear Collapse Mishaps.* **Answer this Question of the Week to be included in the random drawing for October. Copy and paste the question with your response to MFTsurvey@cox.net…then come back to read the rest of** *FLYING LESSONS.*

Last week we asked:

> **What's your experience with a subtle aircraft or engine indication turning into a major event? How quickly did the issue progress? How much warning did you have between subtle cues and major failure?**

One reader wrote:

> Since the 1960's there has been a constant change in how maintenance requirements have been determined. We [in Australia] have been moving from an overhaul-based maintenance regime to *on condition*-based maintenance. On condition-based maintenance is often misunderstood to mean On-Failure. On-condition maintenance looks to identify *potential* failures, not "functional" failures. [For example] brake pads found to be worn to limits identify a potential failure and have not failed but do require maintenance action to avoid functional failure [later].
>
> The identification of potential failure modes is increasingly being passed on to the pilot. New, evolving and cost-effective technology has enabled us to increase the level of monitoring and its accuracy, e.g. Graphic Engine Monitors. Data from these monitors can be downloaded and analysed by maintenance personnel or savvy operator/owners to identify changes in trends to identify potential failure' modes. They also allow the pilot to monitor and recognise changes, or potential failures, at their onset, thus allowing the pilot to instigate action to manage the problem and provide accurate information to assist

him in identifying the problem to maintenance personnel—thereby preventing unrecognised further deterioration until a functional failure is experienced.

A side benefit is the reduction of maintenance effort (cost) in identifying the problem. Depending on the nature of the defect and the rate of change or degradation being experienced by the pilot, he may decide to deviate to an alternate airport for rectification prior to suffering a catastrophic failure while airborne. Experience and familiarity with your instrumentation, and understanding what it is telling you, will assist in deciding whether a potential failure requires immediate action. Your recent [*FLYING LESSONS* item] **'Even Catastrophic Failure by anonymous'** identifies that the operator must first believe their instruments. However in this case he was unfamiliar with the aircraft and his decision process was led astray by maintenance personnel. Very few failures (not defects) happen instantaneously, most are preceded by identifiable degradation or deterioration, a potential failure.

Thanks, reader!

Congratulations to Dr. Lorne Sheren of West Virginia, who was selected randomly from readers who answered October questions of the week. Lorne chose a copy of the Mastery Flight Training landing gear DVD.

What do you think? Let us know at mastery.flight.training@cox.net.

For piston Beech pilots

The November 12, 2009 Weekly Accident Update is now posted at www.thomaspturner.net, including these reports:

- A Baron landed off-airport when one engine failed on takeoff…
- An A36 appears to have broken up in flight during an attempted flight near thunderstorms…

For more information, commentary and analysis see the Beech Weekly Accident Update link at www.thomaspturner.net/WAU 2009.htm.

Fly safe, and have fun!
Thomas P. Turner, M.S. Aviation Safety MCFI
2008 FAA Central Region Flight Instructor of the Year

I welcome your comments and suggestions. Contact mastery.flight.training@cox.net.

If someone has forwarded this message to you and you want to have *FLYING LESSONS* sent directly to you each week, tell me. If you received this message directly (as opposed to through a digest or chat room) and you wish to stop receiving *FLYING LESSONS*, email "unsubscribe" to mastery.flight.training@cox.net.

Holder of an ATP certificate with instructor, CFII and MEI ratings and a Masters Degree in Aviation Safety, and **2008 FAA Central Region CFI of the Year**, Master CFI Thomas P. Turner has been Lead Instructor for FlightSafety International's Bonanza pilot training program at the Beechcraft factory; production test pilot for engine modifications; aviation insurance underwriter; corporate pilot and safety expert; Captain in the United States Air Force; and contract course developer for Embry-Riddle Aeronautical University. He now manages education and technical services for a 10,000-member pilots' organization. With over 3600 hours logged, including more than 2200 as an instructor, Tom writes, lectures and instructs extensively from his home at THE AIR CAPITAL--Wichita, Kansas.