

FLYING LESSONS for November 12, 2009

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:

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 $\frac{6}{10}$ 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.

Do you have a question or comment? Email me at mastery.flight.training@cox.net.

Fly safe, and have fun!

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



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