FLYING LESSONS for September 10, 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.

If you wish to receive the expanded weekly *FLYING LESSONS* report emailed directly to you, email "subscribe" to mastery.flight.training@cox.net.

FLYING LESSONS is an independent product of MASTERY FLIGHT TRAINING, INC. www.thomaspturner.net

This week's lessons:

I watched what was very nearly a crash this week. A turbocharged, tip tank-equipped retractable-gear airplane was departing. Almost immediately after lifting off the pilot retracted the landing gear; when the airplane pitched upward to climb it began to settle back to the runway. Only after several seconds with the propeller and belly perilously close to the pavement did it accelerate out of ground effect and climb away, trailing black smoke from its exhaust.

It was dramatic enough that I ran several yards to get a better view of what would almost certainly be a "gear-up takeoff." A couple of the FBO staff also dropped what they were doing to watch, expressing concern. But the pilot and passengers (and everyone waiting to take off behind them) were lucky, and a runway-closing mishap was averted.

Density altitude was about 6500 feet, and many other airplanes were taking off without similar experience—normally aspirated *and* turbocharged. Why would this happen with a turbocharged airplane? Part of the problem, I think, lay in pilot indoctrination and prevailing technique.

It's currently in vogue to "crank up" fuel flows to the maximum the "book" allows—and then some. Engine management experts rightly suggest that richer-than-book fuel flows support engine cooling in extended climbs. If a little is a good thing, one might reason, a lot should be even better. Not quite. Engines run cooler with extra fuel flow, but power is retarded is well—and you may need that power when taking off from a high density altitude airport.

The trailing smoke was a giveaway that the fuel/air mixture was so rich it was reducing power output. As a former production test pilot of an aftermarket turbocharging system very similar to that installed on this airplane, I'd been warned by control towers I was trailing smoke when taking off at full rich mixture in airplanes with the fuel flow cranked up per the prevailing wisdom. That works fine if the airplane has surplus power for climb. But if the density altitude is high you may not be able to afford the power loss.

Sometimes you need to sacrifice a little engine cooling in the short term by leaning to book fuel flows for takeoff in turbocharged airplanes. Once clear of obstacles and established in climb you can advance the mixture for long-term cooling, if your fuel flow has been intentionally set beyond the original manufacturer's recommendations. The normal recommendation that mixture if always set to full rich for takeoff in turbocharged airplanes may not hold true when departing from a high density altitude, especially if the airplane is heavy and the fuel flows custom-set. Aim for power and performance targets, not fuel flow alone.

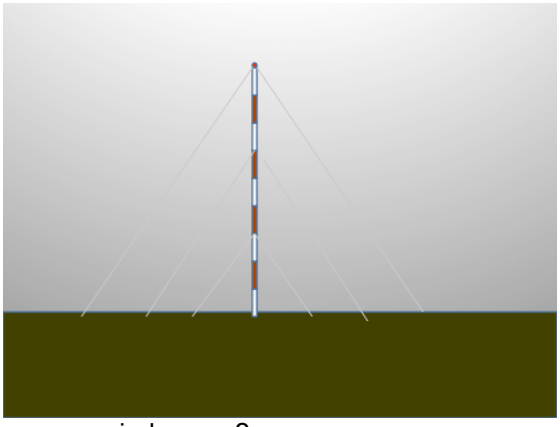
Why do I mention the tip tanks? In many airplane types tip tanks and/or aftermarket turbocharging permit an increase in maximum takeoff weight. In the model airplane I watched nearly curl its prop these modifications can increase the airplane's allowable weight by more than

10%. With no more power than the airplane has at sea level but a big increase in airplane weight, takeoff and initial climb will definitely be affected…adversely. The same airplane at the same weight will do better at a high density altitude than it would without the turbocharger, but that's not the point—the turbo will still have reduced performance compared to sea-level book. Consider the performance impact of taking advantage of increased takeoff weight.

Turbocharged or not, altitude robs wings of lift and engines of power. Propellers are less effective turning power into thrust; jets are normally aspirated engines, so even their typically great power is reduced with altitude. Fly the proper airspeeds and accept the reduced performance that results—attempting to climb too soon will result in sinking back toward the ground. Compute expectations for takeoff distance and initial climb rate based on conditions and the airplane's weight, and follow the right technique to meet those goals.

"Scud-running" is an often-fatal trap that catches even experienced pilots. The record shows that about half of all pilots involved in scud-running accidents are instrument rated. Although instrument-flying skills are a vital component to surviving an inadvertent IMC (Instrument Meteorological Conditions) encounter, it's a fallacy to assume that just because you can fly by reference to the gauges that you're somehow immune to the dangers of attempted visual flight in IMC.

Many VFR into IMC collisions are with towers and other poorly seen obstacles. Consider the depiction (below) of a typical radio tower. Can you see the guy wires angling away from the tower itself? If you're flying at 120 knots ground speed (two miles a minute) are you going to see a wire in time to steer clear? What about a 150-knot ground speed? See-and-avoid experts tell us it takes 12 to 15 seconds to see a well-defined threat, decide whether it's a hazard, choose a corrective action, make control inputs and wait for a typical light airplane to respond. At 120 knots you'll cover half a mile in this time; at 150 knots you'll fly nearly two-thirds of a mile. If the obstacle is poorly defined, like the cables supporting a tower, will you see it in time to avoid it, especially if it's masked by fog or darkness, or obscured by raindrops streaming up your windscreen?



It's common practice to launch VFR from nontowered airports at the beginning of an IFR trip. The pilot must be certain he/she will be able to remain in visual conditions until picking up a clearance in the air, lest pilot and passengers be exposed to the dangers of scud-running. Conditions must be quite good to use this technique because other traffic in the area may prevent ATC from issuing a clearance right away.

You must be able to climb to Minimum Vectoring Altitude to be identified on radar and given a clearance—MVA isn't on any of the pilot charts, so ask a local instrument pilot or phone an air traffic controller in the area for the information before taking off.

If the airport has an air traffic control tower you can obtain his IFR clearance on the ground, then launch directly into the clouds without lingering at a low altitude. But what if the takeoff clearance is delayed for some reason? What if you are under self-induced pressure to take off to try to make it to destination on time?

Don't try to shortcut the IFR system by departing without your clearance unless you are absolutely certain you can remain well clear of instrument conditions. You must also be able to climb to MVA before needing your clearance. Remember your time VFR may be extended if other traffic, difficulty establishing communications, or a radar outage prevents controllers from giving you your clearance.

QUESTION OF THE WEEK

September Question of the Week #2

This week's question:

> **Do you use *FLYING LESSONS* when mentoring or training other pilots? How?**

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 September. Copy and paste the questions with your response to MFTsurvey@cox.net…then come back to read the rest of *FLYING LESSONS*.

Last week's question asked what other aviation safety e-newsletters you read, and what additional features you'd like to see in *FLYING LESSONS*. Most commonly noted were AVweb, AOPA and EAA's e-newsletters, iPilot.com's weekly updates [I used to write for iPilot.com] and Bob Miller's Over the Airways. No one suggested any different features or approach for *FLYING LESSONS*, one reader in particular summing it so:

> Anyway, I like the present form of *FLYING LESSONS* and have no immediately useful suggestions. Keep it up!

Thanks! Suggest anything, any time, at mastery.flight.training@cox.net.

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
