FLYING LESSONS for January 15, 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:

When selecting your landing surface pick a "go-around point" that, if reached before the airplane is on the ground, requires you execute a balked landing. Your go-around point should be in the first third of the landing surface or 1000 feet from the runway threshold, whichever is shorter. If you plan to intentionally "land long" your go-around point should meet the same criteria from your intended touchdown point.

In all cases, your touchdown point must leave enough runway remaining for landing and rollout under the current conditions of weather and airplane weight, with appropriate reserves. Your landing "aim point" should be closer to the arrival threshold than your touchdown point, to allow for additional distance flown in the landing flare unless you are flying a true "short field" profile.

Engine failure on takeoff in multiengine airplanes is rare, but it is an event multiengine pilots need to anticipate every time the throttles go forward for flight. Asymmetric thrust is great at high power, while airspeed during takeoff is low enough control surfaces may not have the authority needed to counteract the resulting directional change. The proper pilot action faced with an engine failure during the takeoff roll is to immediately "chop" both throttles: "chop" indicating a very rapid movement; both throttles because there is not time to identify which engine has failed. This removes the asymmetry of thrust and gives the pilot the control he/she needs to bring the airplane to a stop on or near the runway.

How do pilots prepare for this? Multiengine training in the actual aircraft is limited by the threat of actual damage or injury. The FAA Practical Test Standards requires no intentional (i.e., training) engine failures on the runway when the indicated airspeed is more than 50% of the V_{MC} or "red radial" airspeed. In most piston twins the airspeed indicator does not become effective until reaching at least 40 knots. This means that *if the airspeed indicator is alive, the airplane is traveling too fast to safely simulate an engine failure on the runway*.

At pre-50% V_{MC} speeds nosewheel steering (if the airplane is so equipped) still helps overcome the asymmetric thrust; the rate of departure from controlled roll is slow enough that recovery on the pavement is fairly assured because, once turned from runway heading, the plane does not travel off the runway as quickly. Does this simulation fully prepare you for a surprise engine failure at a higher speed, when the nose wheel is not in firm contact but controls are not yet effective enough to "keep it on the runway" if an engine fails? History suggests it may not.

What about engine failure immediately after takeoff? At a high angle of attack and relatively low airspeed, asymmetric thrust may require almost all the control authority you have…*if* you very rapidly lower pitch attitude to retain speed while you chop both throttles. If you wisely climb out shallower than usually taught (when taking off without obstacles) you will *still* have to act quickly and lower the nose to maintain a safe speed. And when one of a twin's engines quits, airspeed is life. This is the V_{MC} recovery demonstration we all had to master to earn our multiengine wings, but which few of us practice after the checkride.

If the landing gear is still down airspeed will decay extremely rapidly following an engine failure—so quickly as to get dangerously near (or below) V_{MC} before you could get the gear fully up. The "Accelerate/go" option is rarely available; in most designs drag increases when the gear is in transit, so you can't safely "snatch the gear up" if the engine quits while the gear is still down. I teach the mnemonic **"if the gear is down, go down"** to avoid loss of directional control after takeoff engine failure.

How does typical training fare for this scenario? By regulation all V_{MC} practice must be done no closer than 3000 feet above ground level. Normally aspirated engines lose roughly 10% of their power for every 3000 feet of altitude increase. Consequently the rate of departure from controlled flight resulting from lessened asymmetric thrust is significantly reduced in practice compared to what would be encountered closer to sea level. In fact, most multiengine instructors restrict rudder pedal movement with a foot so the pilot receiving instruction (PRI) encounters "maximum" control deflection before slowing to aerodynamic stall speed when presenting the practice V_{MC} maneuver. Although you see the sequence of events in the training maneuver, you won't experience it in its full fury at this reduced-power setting.

The best training tool for the multiengine airplane engine failure on takeoff scenario is a well-programmed simulator with a savvy instructor, where you can practice engine failures that come without warning until you instinctively chop both throttles while applying control inputs at the first sign of an engine anomaly. At least for initial qualification in type and preferably on a regular basis afterward, include simulator-based training as a component of your regimen as the only means of preparing for this rare but deadly occurrence. Also, consciously consider the mantra "If the gear is down, go down" at the beginning of every twin-engine takeoff.

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

Debrief: Reader comments on past *FLYING LESSONS*

Last week's *FLYING LESSONS* contained an item with typographical errors. The corrected *LESSON* appears below with the updates in italics. I apologize for the error.

> **Turbocharger power may help evade icing to a point,** but when wing and tail aerodynamics begin to fail there's very little power can do; power itself will fade in ice as well as *ice-laden* propeller blades become *less* efficient at turning power into thrust, and if the induction air filter plugs turbocharged engines may lose significant power operating on alternate air if that air is taken from the low-pressure portion of the engine compartment.

Reader Larry Olson, a retired captain for a major airline and current owner of a twin-engine personal airplane adds:

> As usual, I enjoy your Flying Lessons and your mishap reports so that we can learn.
>
> I really agree with your comments about the turbocharged A36 in ice. While the turbo can "sometimes" get one out of ice, I feel strongly that it's not a good "anti ice" tool. It can so often lead one into worse conditions and into situations that there is no comfortable out. I hear so often that one is getting a turbo to help them get "above" the weather and ice. Hell, sometimes a jet can't do that....
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> While any plane can be flown above, around, [or] below ice, it's a fallacy that the turbo will be successful to climb thru nasty icing to a comfortable ride above every time. Sure, sometimes it helps... but in 22,000 hours I've had it help only twice, and both times freezing rain was encountered.

About aerobatic flight in nonaerobatic airplanes reader Don Johanson, a CFI and FAA Safety Representative, writes:

> A very nice assessment on the pilot doing aerobatics in a non-aerobatic aircraft, but I think the correct (current) PTS standard for commercial steep turns is for "at least a 50 degree bank" and the pilot is expected to hold that +/- 5 degrees. Using 50 degrees, +/- 5, would definitely keep an applicant well within the 60 degree FAR limit.

And reader Doug Jackson addresses the ethics of unauthorized aerobatic flight:

> As a professional airshow pilot, I and my colleagues take aerobatic flying seriously. And so do the FAA and ICAS (International Council of Airshows). ICAS [is] the professional airshow organization [that] also helps regulate airshow flying through its close working relationship with the FAA. Airshow aerobatic flying is tightly controlled, in equipment, training and the approvals we have to get. Further, it is controlled [by limiting] the airspace we [in which] can do such flying, our flight paths and direction of energy, and passengers (or lack thereof during airshows).
>
> In the case of the pilot of the Twin Beech who flies airshows, to note a friend, he has had years of professional training. He has been administered and passed many check rides for his FAA aerobatic card and ultimately his low altitude waiver to fly that particular aircraft within the specific maneuvering he does. He does not take his risks lightly, and his flying is closely monitored. To be accurate in this overall discussion, as you are aware, there was an aerobatic version of the 33 model Bonanza, but built in very limited numbers. I know of three folks who do airshow routines in their aerobatic Bonanzas. This aircraft is different, though, from a regular 33 in that has a shorter baggage area (like the "P" and earlier Bonanzas), selected strengthened structure, quick release doors, and requires parachutes and is limited to just two the front seat occupants when doing acro. It was specifically certified by Beech for certain aerobatic maneuvers; there are no other Bonanzas certified for doing aerobatics.
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> In the case mentioned of the supposed "aerobatic pilot" doing rolls in his (regular) A36 Bonanza, he is doing nothing more than dangerous stunt flying, not professionally planned nor executed aerobatic flying (the "gee, watch this" syndrome). He is taking great risks with his friends and passengers on board. He is flying without required appropriate equipment nor is he in an approved aerobatic aircraft. And of course he can lose his license if caught.
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> But the biggest issue is not if this fellow can "get away with it" but of his ethics and judgment. He has an obligation as a professional airman . . . and if he is a member of ICAS and/or IAC, to the organization(s) he belongs to . . . to follow the rules, and to protecting the well being of his passengers and to every person "below" him on the ground. This responsibility is well above his own personal desires or thrill seeking efforts.
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> He puts a stain on all of us in the industry who take this type of flying very seriously and do everything we can to mitigate the risks . . . *most importantly* . . . to protect the public.

Thanks, readers, for your valuable comments.

Do you have a question or a comment? Send it to mastery.flight.training@cox.net.

Fly safe, and have fun!

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2008 FAA Central Region CFI of the Year