FLYING LESSONS for April 13, 2017

FLYING LESSONS uses recent 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 airplane have little direct bearing on the possible causes of aircraft accidents—but knowing how your airplane's systems respond can make the difference as a scenario unfolds. So apply these *FLYING LESSONS* to the specific airplane you fly. Verify all technical information before applying it to your aircraft or operation, with manufacturers' data and recommendations taking precedence. **You are pilot in command, and are ultimately responsible for the decisions you make.**

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This week's LESSONS:

I always get a sickly feeling when I read about a general aviation crash, especially if it involves injuries or death. I'm emotionally as well as intellectually and professionally invested in this industry and the people who populate it. I feel especially bad when innocent passengers who put blind faith in their pilot, or persons innocently going about their lives on the ground or in their homes, are involved. I think about the family of those killed in light airplanes, the deceased's co-workers, employees, customers, patients and other relations whose lives are forever changed. Whether the pilot is accompanied or solo in the cockpit, whether or not persons on the ground are affected, whether there's a family (there always is, somewhere) or business associates involved, I feel let down by *aviation* when a fatal crash occurs… especially when excellent pilots get caught up in less-than-excellent circumstances.

It got a bit more real this week. After seeing my friend Tom Camman Tuesday through Friday at the Sun n Fun airshow, he lost his life Saturday during an attempted takeoff on the first flight of a classic Piper after an extensive, two-year restoration. Tom was a fixture in the American Bonanza Society (my real job) tent at Sun n Fun and Oshkosh every year. For years he's proudly shown me photos of both his F33 Bonanza and his Piper PA-12 Super Cruiser, and the full-down-to-the-frame restoration as the tube-and-fabric taildragger slowly progressed.

Tom was an Airbus captain for a major airline, and told me the day before his death that it was the 35th anniversary of his first commercial flight, hauling cancelled checks in the dark, night skies in a Beech Baron as many young pilots used to do. He always attended my seminars at airshows and ABS events; I could always count on him to add useful comments and experiences to the discussions, just as I knew he would follow me from the presentation to wherever I had to go next to ask me more questions. He was so into aviation—constantly flying his personal Bonanza back and forth to his airline job, mentoring young commercial pilots, instructing in all types of airplanes including ABS' type-specific training in Bonanzas and Barons, hosting youth aviation events…and just *living* airplanes and flying.

See http://www.bonanza.org

The last time I saw Tom, on Friday, we stood briefly under the wing of a B-25 on the warbird line at Sun n Fun and discussed three things:

- How he could help my younger brother make the transition from regional airline pilot to the right seat of an Airbus (he remembered a conversation from Oshkosh 2016; I didn't have to bring it up);
- How we'd both like to fly as the student of the other. We'd missed an opportunity while I was lecturing near his home last year, so we promised to fly together next time (now remembering what "next time" sometimes means); and mostly

- How much he was looking forward to test-flying his PA-12 the next morning after working so long to restore it.

The FAA preliminary report says the airplane "went off the side of the runway and caught fire." A close friend of Tom's, a fellow pilot who would know the meaning of the words he uses, watched the takeoff. He said immediately at liftoff the airplane pitched up, stalled, and the wing dropped; the Piper erupted into flame on impact. The NTSB's report is still somewhere very early in the pipeline, and of course the final report will likely not be published for a year or more as air crash investigators do what they can to find out what happened so it might not happen again.

See http://www.asias.faa.gov/pls/apex/f?p=100:96:8051840344267::::P96_ENTRY_DATE,P96_MAKE_NAME,P96_FATAL_FLG:10-APR-17,PIPER

Reminded a little more forcefully than normal that we're all susceptible on any given day, that we can never let our guard down even (or especially) when we are highly motivated and excited to fly, I offer this slightly edited version of an article I published way back in 2001 on the now-defunct www.ipilot.com website. Tom was an ardent supporter of *FLYING LESSONS* so I know he'd approve, and agree that although we don't know (yet) what happened in this specific tragic event, it reminds us of *LESSONS* we should all review…in this case for **the first flight after inspection, maintenance, modification, repair or restoration**.

Your Post-Maintenance Acceptance Flight

The annual is endorsed, repairs are complete, the modification is installed, the restoration is done ...whatever the reason your airplane was in the shop, but it's all buttoned up now and ready to fly. Or is it?

Any time an airplane has been opened up for inspection, maintenance or repair, the possibility exists that in the process of making all the wrong things right, some right things were made wrong. There may be a few things out of place. Mechanics and inspectors are professionals, and I don't doubt their professionalism. But like pilots, mechanics are people too, subject to the same human factors and just as likely to make mistakes.

I've picked up airplanes from very reputable shops, and even accompanied customers accepting aircraft brand new from the factory, only to discover an oversight that affects the safety of flight. ***Returning an airplane to service is a team effort***, and as pilots we need to accept at least some of the responsibility to determine an airplane is ready to fly when it comes out of the shop. Here are some considerations for self-defense when making the first flight after an inspection, maintenance, modification, restoration or repair (IMMRR) event:

1. PAPERWORK

ARROW. Airworthiness Certificate, Registration, Radio Station License (only if a U.S.-registered airplane is to be flown outside the United States), Operating Limitations, and Weight and Balance/Equipment List. All these things need to be in a U.S.-registered airplane.

Logbook Entry. The airplane logs need to have a signed statement listing all the work that was done, engine items in the engine log(s) and everything else in the airframe log. Even if the logbooks won't be carried in the airplane (not required in the U.S.), the pilot is still responsible if he/she flies the airplane without the proper endorsements. Yellow tags, Form 337 (Alterations paperwork), and all Supplemental Type Certificate (STC) paperwork must be in the logbooks. The common shop practice of "I'll mail you a logbook sticker" doesn't cut it; ask them to print and sign the sticker and give it to you so you're certain it has been endorsed, if the logbooks aren't handy.

Return to Service statement. If the work performed requires a logbook endorsement stating "the airplane be returned to service as airworthy," that signed logbook entry must appear in the books. Note that even if a mechanic or other authorized person has made this

endorsement, it's still very likely that you as pilot are making the very first flight (and sometimes, even the first engine start) of that aircraft after the work was complete. ***You are the test pilot.*** **You are performing the *only* aerial quality control check of the work performed.**

2. AIRWORTHINESS CHECK

Inspect the airplane like your life depends on it…because that's *exactly* what you are trying to protect. Budget at least an hour to look over a complex airplane, maybe a little less time if it's a simpler type. The more of the work you did yourself, the more time you need to look at the airplane—confirmation bias will make you tend to see what you *expect* to see, or what you *want* to see, not necessarily what is really in front of you. If you missed it while during the job, what makes you think you'll catch it in your preflight? ***Even better:*** if you did the work, have another pilot or mechanic check it out for you. Then, give it an extremely thorough check yourself as well, and compare notes.

See http://www.mastery-flight-training.com/20170216-flying-lessons.pdf

Use a checklist. That's what checklists are for: to serve as a reminder in case you forget to do something. Don't walk around the airplane with the checklist in your hand—you'll end up looking at the checklist, not the airplane itself. Instead, study the checklist so you know what to check—and what "normal" looks like—then do your inspection one major airplane part at a time. After completing one part, for example, the cockpit, or the left wing, or the nose wheel well, pull out the checklist and make sure you checked everything. Bring anything abnormal or that you don't understand to a mechanic's attention before you decide whether you can fly.

Pay special attention to these things:

- **Primary and secondary flight control continuity, correctness and connections.** Do the controls move in the proper direction and smoothly reach full travel in all directions? You may not be able to see the stick or yoke while you move the elevators, or vice versa: you may need a helper to make the first check. Ensure the controls are mounted correctly and secured, including safety wire, cotter pins, paint or putty markers where required, etc.

- **Landing gear bolts, nuts, springs and other connections.** Tailwheel springs, gear downlock springs, strut nuts and bolts—make sure they are all in good shape and properly installed, with added security as required by the type.

- **Engine compartment safety wiring.** Check that all is reinstalled properly.

- **Access panels.** Check all the nuts and bolts for security, paying special attention to anything else that was likely moved or removed in the shop.

- **Fluids**. Check them, and look for leaks or stains. There shouldn't be any unexplained leaks of fuel or oil, so bring any drips or puddles to your mechanic's attention, get an explanation, and fix any problems before you fly.

- **Ergonomics.** Check the cabin. The seats were probably moved or removed. So be sure they move correctly and lock in position where you want them. Make sure that controls and switches aren't obstructed by improperly re-installed interiors or wiring.

Clearly you need a great deal of very type-specific knowledge and experience in order to properly check an airplane that has been in the shop. If you're not intimately familiar with the type, refer the acceptance inspection and test flight to someone who is. This is ***not*** the time to think "if it has wings, I can fly it."

3. TEST FLIGHT

Paperwork and preflight complete, now it's time to test it in flight. Notice I use that term over and over—this is a ***test flight*** to ensure the airplane performs as expected, or to detect any anomalies or outage. Do *not* jump in the airplane and fly home. Regardless of how good the airplane looks, or who did the work (including yourself), commit to making a short, local area test flight in good day visual conditions. You do *not* want to be in the clouds or in the dark the first time you test an airplane; you don't want to get to far from the airport so you can quickly return if needed…and have the same mechanic who did the work address discrepancies.

Before and as you fly check these items:

- **Powerplant.** All engine, fuel system, and propeller operation using the Pilot's Operating Handbook (POH) procedures. Pay special attention to find loose hoses or connections, leaks and other signs of insecure or cracked items.
- **Controls.** Operation of all systems like trim, flaps, cowl flaps, carb heat, deicing systems, and flight controls.
- **Electronics.** All avionics including radios, navigation devices, autopilots (there's likely an autopilot inspection checklist in the POH supplement, so use it), lightning detectors (look for false returns caused by uninsulated wiring), radar, etc.
- **Performance.** Compute expected climb rates, cruise speeds, fuel burns, etc., and compare actual performance to your computed expectations.

It helps to make a list before departing terra firma of things you'll check once airborne. Then, use the list as a guide while in flight.

FLIGHT TEST

After a *very* thorough Before Takeoff check, take off and climb to a safe altitude. Your altitude and distance from the field should allow you to stay clear of pattern traffic, but close enough to make it back if you lose power. Check control feel, engine operation, and the use of all systems and avionics just as you had on the ground and confirm a lack of surprises while in the air. Finish your short test flight by landing, taxiing back to the shop, and then completing another detailed inspection of the airplane. Bring any discrepancies to your mechanic's attention right away, and get them fixed (and re-tested) before accepting the airplane.

After a short, local test flight, return to the maintenance base, shut down, and once again very thoroughly inspect the airplane. Pay special attention to find loose hoses, leaks and other symptoms of vibration or looseness.

Here are just a few things I've found "for real" when picking up different airplanes from different shops. The list proves that, every now and then, a little paranoia is a good thing...

- Inaccessible manual landing gear extension handles, because of improperly installed interiors.
- Fuel selector handles that won't move to the "OFF" position.
- Inoperative alternators.
- Safety wire missing on emergency exit window latches.
- Mounting screws missing on the underside of ailerons.
- Ailerons improperly mounted so that they could not reach full deflection.
- Landing gear doors reversed (right door on the left wing and vice versa), preventing gear retraction.
- Instrument air (vacuum) regulators adjusted well out of tolerance.
- Flap limit switches out of position, inhibiting flap movement.
- Autopilot disconnect switches that weren't hooked up.

These were all found at very reputable shops that were recommend by leaders in the industry. Each was a situation where a good mechanic was having a bad day. Don't ask me the shop names; most of these happened 15 years ago or more, and most of the facilities no longer exist.

Mechanics are people too, subject to the same human error as pilots. Airplane owners that perform work themselves have to overcome confirmation bias to detect things they missed—if you forgot during the repair work, you may forget during the preflight too, so get a second opinion by asking another pilot or mechanic to preflight the airplane also, then compare notes.

Returning an airplane to service after IMMRR is a team effort. As the test pilot you are final and most important part of the process.

You're never certain everything on an airplane will perform as designed. But when the airplane has been opened up for work it's far more likely you'll find a discrepancy. Until the airplane proves to be trustworthy you are a test pilot. Check everything you can and address all squawks before you leave the ground, but just in case make a day/VMC, local-area test flight, then return and give the airplane another check, before you fly away from the repair base.

God's speed, Tom Camman.

Comments? Questions? Criticism? Let us learn from you, at mastery.flight.training@cox.net

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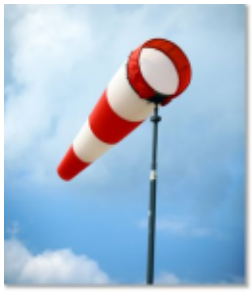

What's the best way to estimate crosswinds?

Click here for a simple, effective, yet rarely taught tip.

See http://www.pilotworkshop.com/tip/estimating-crosswinds/turner

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