SAVVY MAINTENANCE

Opinion: Have a test-pilot mindset

AOPA PILOT November 1, 2018 | By Mike Busch

What to do when you pick up your aircraft from the shop

My company employs 14 A&P mechanics, 11 of whom are seasoned IAs with decades of general aviation maintenance experience. The other day, a client asked one of them what he should look for during the preflight immediately following an annual inspection. The IA decided it might be useful to create a post-maintenance checklist for owners, so he posed the client's question to our whole group. A vigorous discussion ensued.

Figure 1 Savvy Aviator

Many owners incorrectly assume that when an aircraft completes its annual inspection, it has been thoroughly scrutinized by well-trained eyes and can be depended upon to be in condition for safe flight. Mechanics know better. The first flight after maintenance is by far the most likely time for something to go wrong with the aircraft. After all, it has just been partially disassembled, inspected, and then reassembled. While the inspection process is intended to uncover discrepancies, the reassembly process is vulnerable to human error.

Obvious stuff

Our group started tossing out ideas about what owners should look for after maintenance—in addition to their usual preflight items. Initially, the discussion focused on the obvious maintenance-induced failures that are often seen after annuals. Owners should always be on the lookout for loose or missing inspection plates, panels, and fairings, and for missing screws used to attach them. Cowling fasteners should be checked to make sure they're all latched, and that nose bowl screws are in place.

Flight controls should always be checked for free and correct movement from stop to stop to ensure there's no interference or rubbing. Seats should be checked for security, ensuring that they are properly mounted to the seat rails with seat stops in place. Shine a flashlight into the cowling air inlets—ensure there's nothing loose on top of the engine and that all flexible baffle seals are oriented properly to point upward or forward. (It's easy for these to get misoriented when the cowling is reinstalled.)

Check the fuel level, preferably by "sticking the tank." Pull the dipstick and check the oil level. Drain fuel from all sump drains into a clear container and make sure no water or particulate matter is present. Do another walk-around looking for any signs of hangar rash and anything that doesn't look quite right. Verify security of baggage doors, oil filler doors, and anything else that should be closed and latched.

Start and runup

Time to climb into the cockpit. Check that all electrical switches are off and that all pullable circuit breakers are pushed in. Turn on the master switch and check the bus voltage if you have a voltmeter installed, making sure the battery voltage is correct (typically 12 or 24 volts). The ammeter should show a very small discharge.

Start the engine and make sure oil pressure comes up promptly into the green arc. (If you don't see oil pressure starting to come up within 10 to 15 seconds, shut down the engine and call the mechanic.) Make sure the engine idles smoothly with the throttle pulled all the way back. If you have an engine monitor, verify on the exhaust gas temperature display that all cylinders are combusting. Let the engine idle until you see oil and cylinder head temperature starting to rise. Then lean the engine to maximum rpm (or leaner). Power up the avionics and make sure everything lights up properly and nothing smells wrong.

As you start your taxi, tap the brakes to verify they're working. Do a few shallow S-turns on the ground to check steering and that the turn-and-slip indicator or turn coordinator are working properly. Also check the attitude indicator to make sure it has erected properly, and the directional gyro or horizontal situation indicator to verify proper heading information as you turn during taxi-out.

At the runup area, do an extra-thorough preflight runup with a suspicious mindset. Verify that the brakes are holding well, and the brake pedals feel firm and not spongy. The magneto check should be perfect, with no signs of roughness during single-magneto operation. Cycle the propeller (if applicable) and verify that it responds promptly. Verify that all engine and electrical instruments have normal in-the-green indications, and all flight instruments also look normal.

Prior to takeoff, recheck that flight control movement is free and correct throughout its range. Set flap and trim positions for takeoff, mindful that they may have been disturbed during maintenance.

Test flight

The first flight after maintenance needs to be treated as a test flight, and performed with a test pilot's mindset. It should always be performed in good day VFR conditions and without passengers (except, perhaps, your A&P, if he's willing to ride along). Prepare yourself for something to go wrong. In fact, expect something to go wrong.

If you're flying a piston airplane, be spring-loaded to abort the takeoff if anything looks, sounds, feels, or smells wrong during your takeoff roll. Never take a problem into the air if you can avoid it. (Things are a bit different for jets, where rejected takeoffs can be risky.)

On the first flight after an annual inspection or any other sort of invasive maintenance (e.g., a cylinder change), it's a good idea to make a few circles near the airport before departing the vicinity to ensure you can put the airplane back on the ground quickly in the event anything goes wrong. (You are expecting something to go wrong on this flight, right?)

Take note of oil pressure, oil temperature, cylinder head temperatures, and (if applicable) turbine inlet temperature. Check the ammeter (and voltmeter if you have one), as well. Try flying with hands and feet off the flight controls and ensure that the airplane flies straight. Exercise the avionics—especially the autopilot—and make sure everything that was working before the airplane went into the shop still works. If any engine or electrical indications, flight characteristics, or avionics functionality aren't what you're accustomed to seeing, return to the shop.

As a general proposition, if you leave the shop and encounter any sort of anomaly that you consider significant, execute a one-eighty and fly back so your mechanic can investigate. Few things frustrate mechanics more than owners who fly home and then call to report a problem with the airplane, when they could have just as easily turned around and let the mechanic rectify the problem.

Timing is everything

In that spirit, always pick up your airplane during the shop's business hours, never at night or on a weekend or holiday when the shop is closed. That way, if you find something wrong during your preflight or your post-maintenance test flight, your mechanic will be available to fix it then and there. Pickup should be early enough in the day that if you encounter a problem on the flight home, you'll have the option to fly back to the shop to get it resolved.

Don't pick up your airplane on a Friday if you can avoid it. Things tend to get frantic at maintenance shops on Friday afternoons. That's when everyone else wants to pick up their airplane so they can have it for the weekend. (This goes triple if it's a holiday weekend.) Mechanics tend to be under lots of pressure on Friday afternoons to button up airplanes and get them out the door, with lots of distractions caused by customers arriving and departing, so the likelihood of mechanic mistakes—especially errors of omission—is highest. That's why it's smart to schedule your pickup on any workday other than Friday.

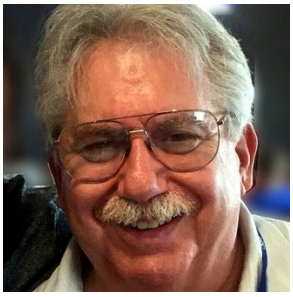
One last thing

Finally, never pick up your airplane from maintenance unless you also pick up a signed logbook entry approving the aircraft for return to service—and in the case of an annual inspection, certifying that the aircraft was determined to be in airworthy condition. It is disturbingly common for shops to deliver airplanes to owners after maintenance with an IOU for the paperwork—especially on Fridays.

This can be a nasty trap for aircraft owners, because it sets them up for possible FAA violations. The regulations (specifically FAR 43.9 and 43.11) require mechanics to prepare and sign logbook entries whenever they perform maintenance on an aircraft, but do not impose any timeliness requirement for doing this. A mechanic can take three hours, three days, or three months to prepare this paperwork without violating any regulation. But if the owner flies the airplane before the logbook entry is made and signed off, the owner is in violation of FAR 91.407. Be warned, and never accept an IOU for a logbook entry.AOPA

Mike Busch is an A&P/IA. Email **mike.busch@savvyaviator.com**

Web: **www.savvyaviation.com**



Mike Busch

Mike Busch is arguably the best-known A&P/IA in general aviation. He writes the monthly "Savvy Maintenance" column in AOPA PILOT and hosts free monthly EAA-sponsored maintenance webinars. Mike is a mathematician by training, having received his Bachelor of Arts degree in mathematics from Dartmouth College. After Dartmouth, he did graduate work in mathematics at Princeton University and in business administration at Columbia University. While at Dartmouth, Mike did pioneering work in computer software development, and ultimately retired from a long, successful career as a software entrepreneur. Mike then co-founded AVweb in 1995 and served as its editor-in-chief and investigative journalist until its sale to Belvoir Publications in 2002. Through his work as a type club tech rep for Cessna Pilots Association, American Bonanza Society, and Cirrus Owners and Pilots Association, and as CEO of Savvy Aviation, Inc., Mike has helped thousands of aircraft owners resolve thorny maintenance problems that have stumped their local A&Ps. Founded in 2008, Mike's company Savvy Aviation, Inc. provides a broad palette of maintenance-related services to thousands of owners of piston GA airplanes. Those services include maintenance management and consulting, engine monitor data analysis, a nationwide prebuy management program, and 24/7 breakdown assistance that's essentially "AAA for GA."

Go to Mike Busch's Profile