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RISK

By Jason Blair

The Post-Maintenance Check Flight

Post-maintenance flying has a greater potential to encounter problems than our typical everyday flying. Learn how to reduce the risk.

After lifting off and establishing a positive rate of climb in the Cessna 340, I retracted the gear when I was out of usable runway, but the result wasn't normal. As the gear went up, both airspeed indicators stopped working and dropped to zero. Uh, oh, that's not normal. Pitching forward a little to guarantee sufficient airspeed in a climb without a functioning airspeed indicator to reference, the problem solving began.

The old adage, "If you just did something and something stopped working, undo what you last did," was forefront in my mind. After climbing, leveling off and allowing a little airspeed to build, I put the gear back down. The airspeed indication didn't return. It was time for some more problem solving.

A problem wasn't entirely unexpected on this flight because it was a post-maintenance check flight to confirm the proper operation of a replaced attitude indicator. The good news was that the instrument we had replaced seemed to be working properly. The bad news was that something else wasn't.

Climbing for some more altitude, my focus shifting from basic aircraft control and the airspeed indicator to more systems. Now that I looked at it, the altimeter also seemed to be problematic. Thinking through the systems with some altitude below us, I took a guess at a potential static pressure problem and tried the alternate static air source. No change. Next, I depressurized the cabin, and my airspeed and altimeter functions returned. Better. With a functioning airspeed and altimeter back, it was time to put the plane back on the ground and return it to maintenance. It turned out that when the attitude indicator had been slid into the panel, it had caused a static line to become unattached from the back of the adjacent airspeed indicator. This caused the entire static system to receive incorrect static pressure when the aircraft was pressurized, resulting in the failures I encountered.



So, why do I tell you this specific story? It illustrates the fact that post-maintenance flying has a greater potential to encounter problems than our typical everyday flying. Even if the thing that was being fixed is now working, other systems could have been accidentally compromised.

Flying an aircraft after maintenance is going to involve some heightened level of risk, but just how much risk is something that can be mitigated.

The FAA does address some of this officially in its *System Safety Handbook* (Chapter 15: Operational Risk Management), where it notes that "Risk management requires a clear understanding of what constitutes unnecessary risk, i.e., when benefits actually outweigh costs. Accepting [some] risk is a function of both risk assessment and risk management." I know this sounds like legalese to most of us pilots, but it definitely does apply to our post-maintenance flying. We could mitigate all potential risks by just never flying a plane again after it's broken, but that certainly doesn't accomplish what we're trying to do in a post-maintenance flight!

Part of a good post-maintenance flight procedure is to conduct a risk assessment and minimize any unnecessary risks in order to get the plane flying again. This allows us to determine if the aircraft is fit to fly in normal operations after maintenance or upgrades have been completed. With this in mind, here are a few tips to minimize the risks of post-maintenance flying.

INVOLVE MAINTENANCE IN THE PREFLIGHT OR FLIGHT

Too many times, an aircraft is just left for an owner to pick up or in their hangar after maintenance with no discussion between the pilot and the maintenance provider. I encourage pilots to have the maintenance provider present when they pick up the plane, involve the maintenance provider in thorough preflight or run-up procedures, and ideally take the maintenance provider along on the first after-maintenance flight. It may sound funny, but I've always had a personal rule that if the mechanic isn't

willing to get in the plane and fly with you after the work was completed, you should probably be very concerned.

Involving the maintenance provider in this process can help identify any unsolved or newly developed problems that could be related to the work that they did. I'm not saying it's always a matter of them not doing their job correctly, but we all know systems interact with each other, and any work being completed has some potential to have other effects.

NEVER IFR OR AT NIGHT

A post-maintenance flight should be completed in VFR conditions with a ceiling sufficiently high to allow for maneuvering and, if necessary, an easy return to an airport with reduced power. In my example above, if instead of doing a check flight in day VFR conditions I had departed into IFR conditions on a normal operational flight, I would have found myself in the clouds without an airspeed indicator trying to maintain sufficient airspeed without any visual references and a failed gauge—a terrifying thought to me. The additional risk of flying in IFR or at night with reduced visibility and reduced ability to visually control the aircraft if any systems fail greatly increases the risk of any post-maintenance flights.

ALWAYS STAY CLOSE TO THE AIRPORT

I always stick close to the airport when flying after maintenance, preferably, near an airport with a larger runway. If you're flying from a towered airport, a little coordination with ATC will typically allow you to stay over the airport. At a non-towered airport, you'll have to self-coordinate a little more with traffic, but in both cases you should be able to climb to an altitude above the airport that won't cause traffic conflicts, but would still allow for a quick return to the runway, if necessary, gliding. Flying 15 miles away to a practice area takes you away from safe landing areas and services that could help you if an emergency does develop.

COORDINATE WITH ATC

If you're operating from a towered airport or even near a location where radar services are available at a non-towered airport, coordinate your flight with ATC. I sometimes even call ahead or notify

ATC prior to taxi that the flight is a post-maintenance flight and, depending on the level of maintenance that was done, ask for their help coordinating any specific flight requests that I may have for testing. Having contact with them will ensure that if you have a problem, someone will know where you are and be able to send emergency services to your location quickly, if necessary.

» **“The added pressure of a “need-to-go” flight reduces the potential that you’ll want to call off the flight and increases the potential that any maintenance problems will cause problems with the completion of the flight.”**

I experienced this exact scenario on a Seneca I was test flying after major electronics work was completed. After a successful run-up and taxi, I was cleared for takeoff. Just after lifting off, I noticed smoke in the cockpit and immediately aborted the takeoff; fortunately, it was a long runway. By the time I had taxied off, the cabin was filling and I noticed a small fire near the door of the Seneca on the floor. I was glad the test flight was completed at an airport with a control tower that was able to send the fire trucks to me immediately. Had this test flight taken place at an airport without services, the fire would have resulted in much more aircraft damage.

TAKE A COMPETENT SECOND PILOT WITH YOU

Unless the flight is operating under a special flight permit (commonly referred to as a “ferry permit”) and it's limited to required crew only, a second competent pilot can be helpful. Having a second pilot, even if not specifically familiar with the make and model of aircraft, can allow for workload management if a problem is encountered. Even items as simple as having the second pilot hold the aircraft straight and level or

take over radio duties can allow the PIC to focus more on any problems that are encountered. A post-maintenance flight is certainly not the time to take a friend for a joyride, but having competent additional pilot support can reduce workload and help manage any problems encountered.

NEVER USE A NORMAL OPERATIONAL FLIGHT FOR POST-MAINTENANCE CHECKING

Whenever maintenance is completed, I never plan the next flight to be a normal operational flight. There should always be a flight between when you had maintenance completed and when you use the aircraft for fun, business or travel. If you can't get a post-maintenance check flight in on your aircraft prior to that family vacation or the business trip you planned to use the aircraft to complete, it's time to find an alternate method of travel for the trip. The added pressure of a “need-to-go” flight right after maintenance reduces the potential that you'll want to call off the flight and increases the potential that during that flight any maintenance problems that resulted will cause problems with the completion of the flight.

Anytime we have maintenance done on our planes, even small things, the potential that the maintenance completed didn't solve the problem or caused another problem results in increased risk on the flight. These are risks that can be mitigated to a great degree. There are certainly more that could be considered. If you have any personal experiences or other tips, please share them with us!

The FAA General Aviation Joint Steering Committee also offers a Safety Enhancement Topic sheet entitled “Advanced Preflight After Maintenance” that has additional information and resources a pilot can utilize when planning for post-maintenance flying. If your flying is going to encounter these conditions, I encourage you to give it a read. You can find it at https://www.faa.gov/news/safety_briefing/2016/media/SE_Topic_16_02.pdf. **PP**

Jason Blair is an active single and multi-engine instructor and FAA Designated Pilot Examiner with 4,900 hours total time and 2,850 hours instruction given. In his role as Examiner, over 900 pilot certificates have been issued. He actively works within the general aviation industry and actively flies volunteer missions.