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Assisting with Your Annual

By Ken Willaford

The cost of owning my airplane has begun to outweigh the love of flying it. The rising costs of fuel, hangar rent, maintenance, and insurance have taken all the enjoyment out of owning an aircraft. I thought I would have to stop flying because of medical reasons some day, not because of the high cost of ownership! I thought I had no other option, until I saw a flyer at a nearby airport FBO. The maintenance shop there was encouraging aircraft owners to be more involved in the maintenance of their aircraft and save money on their annual inspections. That inspired me to talk to the IA about my assisting in the annual inspection. The IA told me that there are several tasks I can legally perform as an owner. In turn, I get to learn about my airplane and save

myself some money! Being somewhat mechanically inclined with hand tools and safety-minded, I felt very comfortable with what I was doing, and I wanted to share my experience with other owners in the hopes that they, too, will become inspired.

I brought my airplane to the shop for the annual as scheduled. The IA and I sat down, and he asked about my abilities and expectations; he then explained my role and his role in the inspection process. I signed a liability waiver (in case I hurt myself while working in his shop) and some other paperwork, and we were off to look at the logbooks. We checked for recurrent inspection items, 24-month recertification items, and the AD summary. I then told him of a few discrepancies with the airplane that I wanted us to address.



Engine controls.

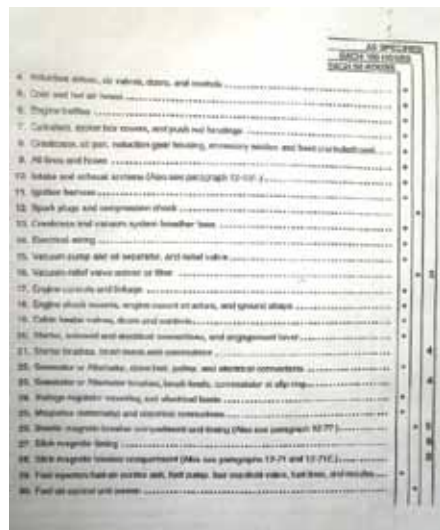
We went out to the airplane and did a walk-around inspection of the aircraft. We took notes on items that needed attention, such as some corrosion we spotted and some missing fasteners. We got in the



airplane and did a run-up in order to perform a check of the magnetos, carburetor heat, propeller, and instruments. He showed me how to check the engine controls for proper rigging. Again, we made sure to take note of any problems.

We got back to the hangar, and the IA showed me the tools I would be using and supplied me with a copy of the annual inspection checklist.

This shop has an area set up just for this operation. All of the tools, tables,



Checklist.

and supplies were set up for me before I got there. He gave me a notebook so that I could write down all the tasks I performed during the inspection process, as per FAR 43.3 (c) Persons Authorized to Perform Preventative Maintenance, which would provide me with a record of what I had done.

Next, we did a complete exterior light test. We checked the operation of the pitot heat and other flight control systems involving STCs. Problem items were jotted down, and I was ready to begin my hands-on experience!

I found out that most inspection checklists start with the engine compartment and prop and that physically removing the cowling is usually a two-person process.

The IA told me to start removing the cowling so that he could perform a compression test before changing the oil and while the engine was still hot.

I informed him that I wanted to be able to remove, clean, gap, and install spark plugs properly. He taught me how to do this, including torquing the plugs, installing the anti-seize compound, and tightening the spark plug wires.

I was surprised to learn that this could be done with very few hand tools, and I found myself very confident in my abilities to do this again!

I updated my notebook with this task, and we moved on to changing the oil and oil filter (which he told me is a service item, not necessarily an inspection item.) But, it was time to change the oil, and my inspector advised me that this was a good time to cut the filter open and look for metal.

He inspected under the cowling for oil leaks, fuel leaks, damaged or broken wiring, exhaust system leaks, and cabin air heat valves and leaks.

I said I was concerned about carbon monoxide leaks. How does it get into the cabin? This led to a detailed explanation from the IA of how the



Preparing the engine for a compression check and spark plug removal.



Spark plugs.



Anti-seize and spark plug gap gauge.

muffler, baffling, and hot and cold control valves worked.

I also learned that there are about 50 components under the cowling that are inspected at each annual and that the cowling is left off until a final ground run and leak check is done.

We then looked at the inspection checklist, which stated to remove the spinner. The IA showed me what hardware to remove, and I then put the hardware in small bags and set the spinner and hardware safely on a worktable. The inspector looked at all the safety wire and bolts, and then he looked for oil or grease leaks at the hub and crankshaft. He checked the prop blades for tightness and for corrosion on the blades and under the paint on the hub. My airplane had no issues here, so I proceeded to re-install the spinner. We spent less than an hour for this prop inspection, but if the inspector had found corrosion or oil and grease leaks, we would have had to make some decisions before going any further.

While the IA was performing the necessary inspections on the engine, engine mounts, and firewall, I began removing the interior. Removing the interior was fairly simple. I had to remove the seat stops or quick-disconnect pins,

the carpets (which are installed with hook-and-loop fasteners, so that was easy), and the panels, which are held by sheet-metal screws. It took about 2-1/2 hours of taking the hardware out, putting it in bags, and placing the parts on the worktable. While the inspector began work on the airframe inspection, I cleaned the carpets.

The fuel system was next. I told the inspector that I had noticed that, when the aircraft sat closed up for several days, I could smell what I thought was fuel when I opened the door, but I never saw any blue stains anywhere. When the floor panels were removed, the fuel selector valve had blue fuel stains on the top of the valve. The inspector and I did a quick review of the logbooks and found that nothing had ever been done to the fuel selector valve, and this is a 1978-model aircraft.

The airframe inspection includes about 80 items: seats, seat rails, control cables under the floor, brake and hydraulic lines, landing gear fittings and supports, structural braces, wiring, fuel lines and valves, door and windows, seatbelts, battery and battery relays, steering controls, flight controls, and more. I learned how all the flight controls were connected



Exhaust system.



Alternator, wiring, and belt tension.



Magneto and wiring.



Oil filter with safety wire.



Oil drain.



Propeller governor and linkage.

under the floor, which was very informative, as well as how the fuel system is routed from the tanks to the engine. I was educated by the IA on what types of lube should be used on chains and pulley bearings (not pulleys), and no lube on hinges with Teflon bearings.

No unairworthy items were found with the airframe, other than the leaking fuel selector valve, which was removed by an A&P and sent out for inspection and reseal. I reinstalled the interior parts and panels, except for the access to the fuel selector valve. This took about another 2-1/2 hours.

The landing gear was next. I wasn't comfortable with jacking the aircraft for wheel removal to inspect the bearings and brakes, but I wanted to be supervised so that I could do it the next time. I also asked if he could supervise me on servicing the brake system with hydraulic fluid. The inspector



Fire extinguisher.

instructed me where to place the jacks, how to remove the brake caliper, and what to look for on the brake linings and discs. The bearings were cleaned and inspected, repacked with grease, and reinstalled. The wheels were reinstalled. The axle nut proved to be a challenge when it came to installing the cotter pin, but I stayed with it and won! I purchased a set of safety wire pliers and some .032-inch safety wire and was taught how to safety-wire the brake bolts (knowledge of which I can also use

for my oil filter next time).

The wing panel removal went very quick. The panels were removed, the inspection performed, the bellcranks and jackscrews lubed, and the panels were reinstalled.

I didn't know that I was missing some decals on the instrument panel. The IA explained that the aircraft needs to meet the same "type

design" standards when it comes out of an annual as it did the day it left the factory. This may sound complicated, but it is fairly simple. The aircraft needs to be kept to the same standards, "airworthy standards," at all times. This could mean something as simple as a compass card not being readable.

After the interior was reinstalled, I removed the tail cone for the elevator and rudder inspection. The inspector explained that some of the screws in the inspection panels were incorrect. I told him that they were the same ones I took out. He informed me that just because the screw fits the hole does not mean that it is the correct one. Apparently, sometime in the past, when the aircraft had been painted, someone put in a screw kit.

He showed me in the parts book that some screws are structural grade, and some are just panel screws (no stress on them). We installed the correct screws and performed the final ground run and leak check of the engine.

Next on the list was to verify that all of the airworthiness directives (ADs) and any recurring ADs were done and that no new ADs were out that needed to be complied with. I was quite surprised to learn that there are ADs on



Propeller hub and blades.



Electrical system and cables.



Main wheel and cotter pin location.

fire extinguishers, circuit breakers, seatbelts, ignition switches, and even tires.

I really believe that if an owner were to spend the time to go through a complete annual inspection as I did, be involved in disassembly, inspection, and re-assembly of the aircraft the way the inspection guide suggests, the owner would feel that the aircraft was properly inspected and the amount of labor time was justified. If you stay working on the process of remove, inspect, lube, and reinstall, the job moves along quickly. At no time did I get the feeling that I was slowing down the process. The IA answered my questions, showed me how to work quickly and not damage

anything, and he would just move on to something else instead of waiting on me. He made out my log entries, signed my notebook, and I paid my bill, which was about 40 percent less than



Non-structural and structural screws.

last year's! It was definitely worth my labor time! With my new wisdom and my notebook to prove it, I can honestly say that my experience in assisting with my annual inspection was exactly what I had hoped it would be, and I suspect that more aircraft owners will be inspired, both mentally and financially, to do the same.^{CO}

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