# Yak/CJ General Condition Inspection

**Part 1 - Preparation**

## By Craig Payne

The General Condition Inspection, an Annual by a different name, should be regarded as an opportunity to keep your bird in good condition rather than as a nuisance, even though it can be a nuisance with your busy schedule. If you are *not* certified to sign-off the General Condition Inspection, as specified in your Operation Limitations document, then your choices are limited. You could hand over the aircraft to a maintenance shop, get an A&P to perform the inspection, or work with the mechanic in an owner-assisted inspection. In any circumstance, it is in your interest to understand the process by preparing for it. This article is the first of 3 parts that will remove some of the mystery out of the process.

**Usage Interview:** As an A&P, I prefer to work on airplanes that have been flying on a regular basis. Their squawks and issues are well known rather than approaching an airplane that has been sitting for months. For “hanger queens”, the unknowns are always an issue. Issues take time, and time is money. My process begins with interviewing the owner about the regularity and type of flying the aircraft has experienced. There are different mechanical results from hard acro on every flight to using only for occasional hops to pancake breakfast fly-ins.

Hard acro stresses the airframe, loosens mechanical connections, wears control system bearings, and stretches cables. Regular wingman work works the prop and engine harder than normal cruise. Sunday breakfast airplanes seem to be susceptible to corrosion from sitting, as well as deterioration of rubber seals and leakage of oil.

**The Owner-Assisted Inspection:** My preference is for an owner to be involved in the maintenance and inspection of their aircraft. In the long run it makes my job easier and the owner knowledgeable. Knowledge is power when it comes to understanding what will happen when you hire someone to work on your bird.

**Making Lists:** Every few days I make a list of what I want to get done. I might not get it all done but at least I start with a roadmap. Do the same with your “Annual”. Certainly there must be an inspection, some maintenance done and maybe some upgrades. Break it all down:

* **Squawk list:** Usually it’s not hard to list what needs to be fixed or adjusted. Anything from a busted knob to a heavy wing. Perhaps an uneven fuel burn? A soft main strut? Ball off center in cruise? Not always safety of flight issues but still an annoyance that detracts from the business of flying the airplane.
* **Maintenance List:** Research the logs and maintenance manual for what tasks are interval-specific and due; hose changes, air bottle service, transponder checks, ELT batteries, prop grease, wheel bearings and such. These will become part of the work to be performed. I prefer that the owner do a fair share of “grunt work” as Part 43.3(g) allows. Tasks; such as removing the wheel bearings and cleaning them for my inspection, shortens my hands-on time and saves the owner money. Knowing what must be done also leads to having parts ready to do the work. Appendix A, Part 43(c) provides a list of preventative maintenance tasks that may be owner/pilot performed.
* **Upgrade List:** Certainly, “annual” time is also an opportunity to swap out an old gauge, add a modification or install new avionics since your schedule has built-in some down time for just this occasion.
* **The Inspection Checklist:** Yaks and CJ’s, as well as other Experimental-Exhibition certificated aircraft will specify Appendix D of Part 43 for the General Condition inspection in their operations limitations document. While Appendix D covers a lot it is general in nature. M-14P engines come with a detailed manual that includes dozens of “Tasks” to be performed and there are interval-specific checks listed in the Nanchang manuals. Same with Yak airframes. However, for annual use, there is a checklist focused on these aircraft and can be found in the RPA Store under manuals. I updated that list a few years ago and it is a good place to start. Review this list with your inspector and come up with an agreed upon inspection plan. There may be some overlap between the maintenance list that doesn’t need to be repeated.

Cleaning: While the airplane is sitting out for the run-up, it’s a great time to wash and dry it, especially the belly where all that engine oil ends up. Paragraph (a) of Appendix D of Part 43 specifies that the airframe and engine must be cleaned as well as opening up and removing panels, and cowling for inspection. Expect to find some oil on the inside of the belly panels. Now is the time to clean all of that off but take time to note *where* the oil was found. It could lead back to the leak.

While cleaning the airplane, note where any “smoking” rivets are and mark them with a crayon for the mechanic’s inspection. The “smoke” is actually traces of aluminum resulting from the movement of loose rivets. Cracks in the cowling and fairings are reason for concern but cracks in the skin or airframe are reason for alarm! Mark any cracks with that crayon or sharpie.

## Data Collection: Establishing a baseline

The inspection checklist begins with an engine run-up, oil and fuel pressure readings are recorded, Idle RPM, magneto drop, prop governor testing, etc. All are important to building a baseline. Note if any readings are not within specification. At the end of the inspection and maintenance, the same run-up will be done to compare against manufacturer’s recommendations as provided in Part 43.15(c)(2). The best time to perform this task is just prior to going into the hanger for the “annual” work.

## Documents: It’s not done until the paperwork’s done

Every aircraft is required to have certain documents on board: Aircraft Registration, Airworthiness Certification, W&B, POH. Additionally, “Experimental-Exhibition” also requires a current Program letter. In the airframe logbook, there must be evidence of a Transponder check with the last 24 months. An instrument certified A/C also requires a Pitot-Static check.

Following a recent engine change my CJ was used in a weight and balance demonstration for an EAA Chapter meeting. I was pleased to see that only seven pounds were added since the last weigh-in ten years previous. EW was measured at 2350 pounds, and that includes 51 pounds of ballast and an aux fuel tank. I cannot be positive about the accuracy of that old W&B because the equipment used was not as good as the WiFi load cell setup used for the recent demo. Check that equipment changes made over the last few years does not affect your W&B.

Don’t forget to have all of your manuals handy as well as logbooks. While a propeller log is not mandatory, I prefer keeping one since my prop has spanned the life of two different engines so far. Above all, paper and clipboard to record each task to be performed and finished. The log book entries will be built on these notes.

**Organizing the Hanger:** Say what? I’m not making a big deal out of this….well, in a professional shop or military maintenance hangers, it is a really big deal. Get the equipment needed staged and ready:

* Hanger space – book at least 2 weeks if you do not normally hanger your bird.
* Aircraft jacks and tail stand - I made a simple tail stand out of a saw horse with concrete weights and a strap that attaches to the tail skid.
* Oil catch buckets
* Ladder and mechanics stool
* Drop lights and overhead lighting
* Air compressor for the differential compression test
* High pressure air bottle for system refill after gear swings
* Nearby work table for parts
* Floor cardboard or carpet to set cowlings on
* Yak or Nanchang tool set. It does not matter which one as they seem to be the same tools anyway. Only some of the prop tools differ. **See attached picture**
* Metric wrenches and sockets – provide tools for each specific task
* Mineral spirits and rags – a parts washer is a handy luxury
* Defueling barrel and pump if testing the fuel level sensors is required
* Paper tags and zip lock bags for small parts

Ask the mechanic which tools he will be bringing. Most likely a differential compression tester, a torque wrench, LCD bore-scope and perhaps some custom tools as well. **See attached picture**. I always set my cowling pieces and larger panels on carpet or big cardboard pieces. Back in the days when most FBO’s did maintenance, it was common to see fresh “hanger rash” on your painted parts after an annual.

**Unbuttoning:** Once positioned in the hanger, the cowling, panels and fairings come off and are set aside out of the way. Strip out the seats, kick panels, and rear “baggage” hatch in the CJ, which once was the avionics bay. The integrity of the harness and security of the attachment to the seats will be inspected. Provide a furniture blanket or carpet to protect the rudder cables as well as the inspector when kneeling down in the fuselage. Bag and tag all the screws removed as one never knows how long it will take. If something comes up for a few days of interruption, you will wonder where all that unmarked hardware belongs.

**Misc:** If an oil change will be part of the work, the oil cooler will slowly drain overnight into your bucket. The propeller reduction gear case and oil tank drain much quicker.

Notes on the Inspection: The actual inspection will probably be done in a day or so but prep, maintenance and re-assembly will consume a work week. I have done General condition inspections on both Yaks and CJ’s and 40 man-hours is a consistent benchmark I experience. Expect that upgrades and modifications will add even more time. Clearly, the work that the owner does will substantially lower the expense of paying an A&P but the big benefit is that the owner knows what went into the effort and generally a lot more about the airplane. Even after 20 years of working on these critters, I’m still seeing issues I never ran across before.

**Next Issue:** The Inspection Process and Maintenance

**Figure 1: Specialized tools –** Partial Yak set plus bent 14mm for front mag nuts, offset 17mm open end, 22,24,27,28 and 32mm open ends. Large socket is for Huosai prop removal, digital level for prop angle.

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**Figure 2: Common inspection tools -** plus mag timing equipment and torque wrench for spark plugs

