Checkpoints

by Dave Jackson
Contributing Editor

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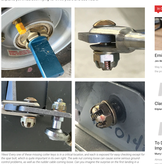
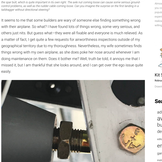
There's no doubt that the first flight of an amateur-built aircraft can be quite stressful, both on the builder and the family. Coming in at a close second seems to be the airworthiness inspection. At least that is my sense from the many comments I hear and also see on the various builder forums. Seeing as these are first-time builders, I can understand all of the fuss. We were all first-time builders at one time and probably just as nervous about that inspection. However, there are a lot more resources available today, and I would think it is a great thing to have someone else perform a very thorough inspection of the project before you go flip it. Yet I see comments from builders who "shrug" EAWs and FAA inspectors who really only focus on the paperwork. Having been a DAR for over 10 years now and having learned hundreds of airplanes, I've only had to issue two denials, and all parties agreed we needed to do that. One had to do with an engine of unknown age and origin, and the other was really misrepresented as a new airplane, yet it had been flying for three years and 300 hours.





Allied Fabs one of three missing collar keys is a critical fastener, and each is exposed for easy checking except for the one that is hidden behind the fuel tank. Although the inspection process is tedious and time-consuming, it is worthwhile, as some of the earlier problems only show up when the engine has warmed up. Pre-flight engine inspections are the hallmark of some developed popular inspections and the hallmark of some developed inspection processes. Although the inspection processes, the author says, is tedious but by the end of flying everything is worthwhile.

Why is it more than just luck on the Lancair Legacy, and Kit Fox Series and Zenith Series and Vans RV Series? It probably don't need to say anything more about the reliability of parts such as rudder pivot bolts.

The Usual Suspects

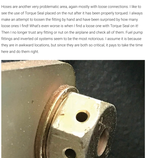
Here are some of the most common issues I find on the airworthiness inspection. This is meant to help you look more closely at the usual problem areas, not to show you what I can find (or any other DAR for that matter). I am not going to go into any paperwork issues in this column as I have done that before, and one of my coworkers (Dave Prisco) has also already done that for you. The pictures that follow will speak more to the point than a lot of words in print, so I've included quite a few this time.

Flap actuators torn apart as it supposed to be assembled (safety wire, if it should have one) or, if an inner-wire with rubber bushing.

When I arrive at the location, once the pleasantries are completed, my eyeballs are looking for anything out of the ordinary as I am approaching the airplane. Over the years I have noticed two lights on the wing wingtips (red on the right side as an example) and missing cotter keys from axle nuts. Both are certainly easy to do, but the builders are quite surprised when I point them out. Next my eyes are looking toward the engine compartment, where it is very common to find things that haven't been tightened up. Common things here are loose exhaust nuts that cause a leak, and improper installation conditions if they some components off, allowing hot gases to reach the fiberglass covering and possibly cause a first and damage that haven't been tightened.

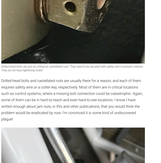
All of the critical nuts were loose in the picture, and the engine had already been around for a while (hot oil stains) anyhow.

Hoses are another very problematic area, again mostly with loose connections I like to see the use of Torque Seal on the nut after it has been properly torqued. I always make an attempt to loosen the fitting by hand and have been surprised by how many times I find that's even loose. I don't know if it is a loose one with Torque Seal on it! Then I no longer trust any fitting or nut on the airplane and check all of them. Fuel pump fittings and inverted oil systems seem to be the most notorious. I assume it is because they are in awkward locations, but since they are both so critical, it pays to take the time here and do them right.



Drilled head bolts are just as critical as castellated nuts. They need to be secured with safety wire to prevent rotation. They do not have cotter keys in them.

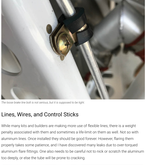
Drilled head bolts and castellated nuts are usually there for a reason, and each of them requires safety wire or a cotter key respectively. Most of them are in critical locations such as control systems, where a missing bolt connection could be catastrophic. Again, some of them can be a hard to reach and even hard to see locations. I have I have written enough about jam nuts, in this and other publications, that you should think the problem would be eradicated by now. I'm convinced it is some kind of undiscovered plague!



Why is it so common to find a jam nut installed in the right?

Lines, Wires, and Control Sticks

While many kits and builders are making more use of flexible lines, there is a weight penalty associated with them and sometimes a life limit on them as well. Not so with aluminum lines. Once installed they should last forever. However, flaring them properly takes some patience, and I have discovered many leaks due to over-torqued aluminum flare fittings. One also needs to be careful not to nick or scratch the aluminum too deeply, or else the tube will be prone to cracking.



Be careful not to nick or scratch aluminum tubes too deeply or they may be prone to cracking.

Unsecured wiring has the potential to cause intermittent problems down the road as the wiring can eventually break from the vibrations. Another real safety aspect is the potential for unsecured wiring to chafe and cause shorts and sparks. Allegedly, the in-flight explosion and crash of a 747 was eventually attributed to chafing wires in the fuel tank.

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By the way, all of the pictures you are looking at in this column came from one airplane. That's right, one airplane. I did comment the person for asking me to come and perform the inspection, as it was a 3.5 hour one-way trip in the RV-10. He knew he wanted someone to look it over closely. Kudos for doing that. However, no points for missing the obvious stuff.

My points for unexcused wiring: Most definitely they will eventually cause intermittent problems down the wiring road, and they have the potential to cause much more serious issues, such as chafing and shorting or even causing a fire.

Take the time to put the tools away and thoroughly go over your airplane, making a list of everything you find. Then go back and fix it. It's too easy to get distracted by fixing everything as you find it. At least try it. You could even practice playing DAR. So what if you find some things you missed. We all do.

Make it fun. I know I try to make the inspection fun and relaxing for everyone. It's all supposed to be fun.

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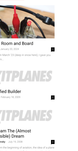

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