

Static System Checks

For the

Owner Built and Maintained Aircraft

Re: AeroElectric-List message posted by bakerocb@cox.net

3/21/2010

Hello Fellow Listers, I had the need to conduct a regulatory required static system test and inspection on my experimental amateur built airplane recently and I'd like to share the process with you.

The need came about because, in the process of a qualified technician performing the mandatory (for IFR flight) every two year's 14 CFR 91.411 and 91.413 tests and inspections (commonly called an "IFR cert"), he determined that the VSI (Vertical Speed Indicator) had an excessive internal leak (See note 2). He bypassed the offending instrument with some plumbing and successfully completed the remainder of the tests and inspections required.

After he left I removed the VSI and took it to an instrument repair facility who fixed it for \$213. I reinstalled the instrument and reconnected the plumbing, but was not good to go because of 91.411 which reads in part:

"91.411 Altimeter system and altitude reporting equipment tests and inspections.

(a) No person may operate an airplane, or helicopter, in controlled airspace under IFR unless-

(2) Except for the use of system drain and alternate static pressure valves, following any opening and closing of the static pressure system, that system has been tested and inspected and found to comply with paragraph (a), appendix E, of part 43 of this chapter; and....."

"(b) The tests required by paragraph (a) of this section must be conducted by-

{several different qualification requirements listed including:}

(3) A certificated mechanic with an airframe rating (static pressure system tests and inspections only)." (Note 1)

Being a certificated A&P mechanic I turned to Appendix E, of part 43 which reads in part:

"Appendix E to Part 43-Altitude System Test and Inspection

Each person performing the altimeter system tests and inspections required by §91.411 shall comply with the following:

(a) Static pressure system:

(2) Determine that leakage is within the tolerances established in §23.1325 or §25.1325, whichever is applicable."

So I then needed to go on to PART 23--AIRWORTHINESS STANDARDS: NORMAL, UTILITY, ACROBATIC, AND COMMUTER CATEGORY AIRPLANES to find out how to perform the test and what the leakage tolerances were.

Here is what 23.1325 says in part:

"23.1325 Static pressure system.

(b) If a static pressure system is necessary for the functioning of instruments, systems, or devices, it must comply with the provisions of paragraphs (b)(1) through (3) of this section.

(2) A proof test must be conducted to demonstrate the integrity of the static pressure system in the following manner:

(i) Unpressurized airplanes. Evacuate the static pressure system to a pressure differential of approximately 1 inch of mercury or to a reading on the altimeter, 1,000 feet above the aircraft elevation at the time of the test. Without additional pumping for a period of 1 minute, the loss of indicated altitude must not exceed 100 feet on the altimeter."

So how to evacuate the static pressure system? After plugging up the two static ports I opened the system drain connection in my static system and plumbed in this MixMizer syringe:

<http://www.hopkinsmfg.com/10111.html>

This device readily evacuated the system and the static system passed the leak test. After closing up the system drain connection and making the required log book entry I was good to go.

What did we learn from this exercise?

A) For some mandatory regulatory requirements there are some provisions of 14 CFR that do apply to our experimental amateur built aircraft even if at first glance some of them (Part 43 and Part 23 for example) do not appear to apply.

B) Even though anyone can work on, repair, modify, inspect, and maintain an amateur built experimental aircraft there are certain items that require action by specially qualified individuals. The annual condition inspection is one item requiring performance by either the holder of the Repairman Certificate for that specific aircraft or the holder of an A&P certificate. Another is the requirement for either the holder of an Airframe certificate or one of the other entities identified in 91.411 (b) in order to conduct a regulatory acceptable static system check.

I welcome questions or comments.

<mailto:bakerocb@cox.net>

'OC' Says: "The best investment we can make is the effort to gather and understand knowledge."

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Notes:

1. Being the builder and designated repairman for this specific experimental amateur built airplane did not qualify me to perform the static system test and inspection.
2. I had suspected that the instrument was faulty because on the last two or three flights it showed 300 - 400 feet per minute rate of descent while flying straight and level.