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In this issue:

Pre-Purchase Inspections

Stigma or a valuable tool: The Un-Airworthy sign off

What's so important about a current equipment list, anyway?

Tidbits, Customer Spotlight & Letters

Pre-Purchase Inspections

Maybe it's more speed you need. Could be space. Might be less of either. What ever the reason, the mission profile you fly has changed, and your current airplane can't be refined, or it's time to own your first airplane. The search can be exhaustive, but a prudent shopper knows one of the keys to buying the right airplane correctly is a quality pre-purchase (or some call it a pre-buy) inspection.

No I didn't use the word *quality* just to fill space. The pre-purchase inspection should be based upon something. Seriously! A few years back, I had a customer looking at a bird on the East Coast. He asked me to find a shop to do the pre-purchase; I phoned about a half dozen in that area before I found one that would do it and had a clue to what it was all about. (One shop told me they would look at what we wanted looked at, but would not offer comments, just yes and no answers. Interesting...)

When I am asked to perform a pre-purchase inspection, I have a couple of questions before I will accept the job. A prudent purchaser should look at the same questions, to get a reliable inspection. First, is the airplane one I have worked on in the last 5 years? If I have a working relationship with the seller, it may not be fair to the buyer to act as his agent in this matter. Second, where is the airplane located? If the seller is willing to bring the aircraft to my facility, this may not be as important. (That said I have traveled as far as Houston to perform a pre-purchase inspection.)

I'll get the N-number, and look up current registration and check the NTSB database. Depending on the requested scheduling, I will order the aircraft file from the FAA. The registration branch in Oklahoma City will get that for you on CD for a minimal fee, but it takes a couple of weeks.

The scope and detail of a quality pre-purchase inspection depends on the complexity of the aircraft. A fixed-gear fixed-prop single takes less time than a retractable gear twin. Makes sense. As applicable to each aircraft, here are some of the items we look for when performing a pre-purchase inspection:

Operational checks: Do the instruments and indicators look correct with power on and off, before and with the engine operating? This is an easy one to overlook, and can be very telling. A full engine run-up, and if possible,

Pre-Purchase Inspections (continued)

flight check to see how things operate and feel (rigging).

Powerplant inspection: Compression check, oil filter inspection (unless very recently changed), general condition of engine mounts and structure, induction and exhaust systems, engine controls, and baffles. Dates of manufacture on hoses. Prop condition and security.

Airframe inspection: Cabin door hinges and fit. Security of antennas and fairings. Control surface bearings and push-rods for wear and lubrication. Binding in control systems. Exterior and interior structural corrosion. Known problem areas (for specific aircraft type).

Landing gear inspection: Tires, brakes, and wheels. Proper lubrication. Rigging and functional check of retractable gear. Fit of gear doors.

Paperwork inspection: Last annual, IFR certification, ELT battery status. Oxygen cylinder hydrostatic inspection status. Times on critical components. Registration, airworthiness certificate, and weight and balance. (Also, see separate article on the subject of equipment lists, page 3.) Airworthiness Directive compliance and status. Form 337's for repairs or alterations. Oil analysis history.

Typically, I will then type up a report for the purchaser; this will list out results of the inspection, as well as notes and general comments (good and not-so-good). I will often be consulted about costs to repair any items that may have a bearing on the purchase. The purchaser will then generally get together with the seller and complete their negotiations.

As stated, a quality pre-purchase inspection is crucial to the investment process. On more complex aircraft, I try to persuade the purchaser to get an annual inspection for the pre-purchase, as the typical pre-purchase inspection may not be as revealing as desired. Remember, if you confine the pre-purchase to just a handful of items, you can't be disappointed if problems do exist that are not found until you are the proud new owner. Happy airplane hunting!

Stigma or a valuable tool: The Un-Airworthy sign off

The purpose of the aircraft log books are to have a common place for maintenance events to be recorded. According to FAR 43.9 (a)(1), a description of the work performed is required. Also, FAR 91.405 (b), it is the aircraft owner's responsibility to make sure the maintenance record entries are completed.

This is all assuming the work has been completed satisfactorily. Or, there may be question of whether the work was approved. Let me share a couple of stories.

In the first, the aircraft owner primarily used a maintenance provider at another airport, but his aircraft was at PLU for an avionics upgrade at Spencer Avionics, the local avionics shop. They were waiting for some equipment, so the aircraft owner asked us to perform the annual inspection on his bird. Unfortunately, with the instrument panel in mid-overhaul, we were left with several items that didn't meet airworthiness requirements that we couldn't repair, as it was part of the avionics upgrade. Although we work with Spencer's on many projects, the owner's timing was such that we needed to complete the annual prior to Spencer's finishing their work. However, I could not perform the necessary inspections to perform the completion of the annual.

In the second, the aircraft owner balked at the list of discrepancies found during the annual inspection. Many of them he knew about, as his previous IA had let them go. Well, we all know that our aircraft are used, they all have little problems that do not affect airworthiness. This aircraft, however, had some pretty glaring issues that dealt directly with it's airworthiness. The customer knew about them, his previous IA had ignored them (for reasons only known to him), and I was a bad-guy for telling him his aircraft was un-airworthy.

We are aware that not all of the service or shop manuals for the aircraft we fly are not very good at black and

The Un-Airworthy sign off (continued)

white, but service bulletins, airworthiness directives, and the FAR's give us a good clue of what to be aware of. (Note: I am not an advocate of complying with all service bulletins, but many of them do have valid points. That is a subject for another time.) In the end, the aircraft owner is primarily responsible for the airworthiness of his aircraft; but you hire professionals, like us at AVSTAR, to assist you. And, as professionals, we have a tool that is used occasionally, that was pulled from the toolbox for both of the above aircraft.

This tool is called the un-airworthy sign-off. The box it lives in is FAR 43.11(a)(5), where in the conformity statement of the annual inspection log book entry, we state the aircraft is un-airworthy, and we have provided the owner a listing of the un-airworthy discrepancies. (The listing of airworthiness related discrepancies is required by FAR 43.11(b).)

Now what? The discrepancies must be repaired by an appropriately rated mechanic or repairman and recorded in the aircraft logs. In our first example, this was not a problem, as the technicians at Spencer's completed and signed off their work, noting in their log entry repair of the discrepancies on my list, and the aircraft was (magically) airworthy. In the second example, the customer refused us to repair his aircraft (certainly his right), I would not state the aircraft was safe for a special flight permit (ferry permit), so it just disappeared one day. (I don't think it was trucked out.)

Do the words 'un-airworthy' have a bad connotation? I don't think so; as I stated, it is a tool that gets used. During a log book review, it shows the aircraft received an inspection, and for whatever reason, some repairs were not completed. The next log entry (or possibly more, depending on how many places it visits before all the discrepancies are cleared) should indicate that all or part of the 'list dated _____' were repaired. (This listing of un-airworthy items is not part of the log book entry, but a separate paper that is disposed of after all items are cleared (FAR 91-417(b)(3)). However, if there are no records of the discrepancies being resolved by the next annual, it might provide the next IA with a bit of owner insight.

And, yes; if an aircraft is un-airworthy, it does require that special flight permit to be legally flown; but just because you want one, doesn't mean the FAA will grant you one.

What's so important about a current equipment list, anyway?

An equipment list is simply a listing of installed equipment to a specific aircraft. It can have all sorts of useful information on it, but it must be used carefully, and updated regularly.

For example, if you take your aircraft into an avionics shop for something like changing out the nav-com for a GNS-430, you will most likely notice you have a new weight and balance, but just as importantly, a revision to the equipment list. This is generally on the same piece of paper, as the weight and balance and equipment list work together. The information on the equipment list discusses what type of equipment and all the associated parts of it that make up your airplane. For example, not only the GNS-430, but the rack, wiring, antennas and couplers, and any external indicators or switching panels.

The equipment list that came with your aircraft from the factory generally lists location (arm) and weight or moment for the installation or individual parts. At installation of your new GNS-430, the shop may list it out as an installation (complete) with an associated arm and weight, or may list the entire pile of parts individually. Either is acceptable, provided it is calculated correctly.

Over the years of an aircraft's life, there can be many substantial changes to it. Avionics in and out, engine changes, prop changes, adding other things like gap seals or additional fuel tanks. Many times, these are added (or subtracted) from the previous weight and balance and equipment list, and you 'just keep going' from there. Again, this is acceptable, provided the calculations are correct. However, we have found many instances where avionics were "removed", the weight and balance recalculated from the installation numbers (or the weight and arm from the original equipment list), but yet the harnesses are still there, running through the belly or sidewall, with the

Equipment List (continued)

connectors tied off.

The equipment list (and associated weight and balance) says it's not there, but a visual inspection shows it is. With enough of this happening, there can be serious errors in the weight and balance. Even if this extra wiring is removed, there is a time when enough equipment changes are made, and a new weight and balance is in order.

Weighing an aircraft is a relatively simple task. Decide if you are going to do it empty or with full fuel and calculate the useable fuel out. (Completely empty is more accurate, provided you also remember to drain out the fuel lines - simply draining out the sump valves will induce errors.) Then put it on the scales, level it, and take your readings, do some simple math, and you have a new weight and balance.

But, that's only half of it. You need a paper showing how the aircraft is represented at the time of weighing. *The equipment list*. This shows the engine, prop, governor, oil cooler, wheels, brakes and tires, seating configuration, lights, radios etc. Generating a new equipment list can be a time consuming task on an IFR twin, a lot easier on a J3. However, it is equally important for either. In essence, it validates the basic weight and balance by showing what is included in the empty weight. When we do a new weight and balance, if there is not a current equipment list (I don't mean reams of pages from previous calculated weight and balances), we have to generate a new one.

When I generate a new equipment list, I do not list out location and weight of the individual parts, like the equipment list from the factory. Why? For best accuracy, the components would need to be removed and actually weighed - much too exhaustive (and expensive!) for our purposes, and it necessitates the next person removing equipment to accurately weigh and measure the removed items, which means greater accuracy in that calculated weight and balance.

A customer of mine purchased his J Bonanza several years ago. It had the Beech panel mod (with a ton of equipment and a wiring web Charlotte would be proud of), long third window, and several more alterations that were calculated for weight and balance purposes. At the first annual we performed, we re-weighed the aircraft and generated a new equipment list. A couple of years ago, we installed a larger engine and new prop. As easy as it is to weigh an aircraft, we chose that accuracy over calculation, and as I keep the equipment list in my computer, generating the new equipment list was a snap. The aircraft is back again for it's annual; as part of continually making his aircraft better, we are installing a new windshield (speed-slope conversion). We started the annual a couple of weeks ago, including fitting and drilling the new windshield, but did not install it right away. The aircraft then went to our local avionics shop (Spencer's), and got a few antiques and the wiring web removed and new stuff installed. Looking at the pile of wires removed from behind the panel and sidewalls, John at Spencer's commented on the task of updating the weight and balance. Although the numbers are published for the windshield conversion we are doing, I told John it's as simple as weighing the aircraft, and updating the equipment list. Everybody's happy, because we know it's correct.

Tidbits

Ameritech Industries, parent company of **Eagle Engines**, has named AVSTAR an authorized Sales and Service Center. Now, more than ever, you can do your one-stop shopping and installations for your fresh engine at AVSTAR! With several options for custom overhauled engines, Eagle Engines has one to fit your need and budget.

Dale Sanderson has been with AVSTAR for several years, the last 3 as Mike's right hand man and lead tin-smith. In January, he completed his studies and took the test for his Inspection Authorization (IA) and passed with flying colors. Although the personnel is the same, this is a great addition to our staff and will assist us in serving you better. Congratulations to Dale!



Customer Spotlight

Although we have performed miscellaneous repairs and inspections for them in the past, **Island Air**, based in Friday Harbor, WA., has re-structured their aircraft maintenance department, with Mike being named their Director of Maintenance. This became effective January 1 of this year, and means you will see their aircraft at AVSTAR a little more often as most of the heavy maintenance will be performed at AVSTAR, and it will give Mike a chance to fly 891JH more as he will be going up to FHR regularly. Island Air provides on-demand charter (Part 135) operations, with destinations from Seattle to Canada, utilizing Cessna 172, 206 and 207 aircraft. Island Air is approved for single-pilot IFR operations in one of their 206's, also the 206's and 207 are all used for air-ambulance operations from the San Juan Islands.



One of Island Air's impeccable aircraft, LS is equipped with a fresh Eagle Engines' *Marquis Series* overhaul of its IO-550 engine

Letters

Merry Christmas Mike,

You put out a nice news letter, keep up the good work! I like the Door Steward, I will think about that for my plane. The 406 ELT has some good points. My concern is that this is the first step in charging for flying through air space, it is easily tracked and billed on a monthly basis.

All the best, Jon

Interesting thought on the 406's. My research found that the "test signal" the units send out after activation (on the 406MHz) is for the first 50 seconds or so after activation, then the signal goes "live". (The 121.5MHz signal starts at activation). I have not found any indication they transmit continuously, or intermittently, unless activated. As the battery has an internal timer to let you know when you have accumulated 1 hour of usage, I don't think this is a way of big-brother watching us. My opinion, for what it's worth. Now, don't get me started on Mode-S or ADS-B as far as being monitored... Mike

Thank you for reading this issue of our newsletter. I hope you have found it interesting and informative. If you have any questions or comments, you can email them to me at avstarair@att.net. If this issue was sent to you by a friend, you may opt in to receive further issues by sending an email to me at avstarair@att.net. If you chose to opt-out of receiving further issues, please email me at avstarair@att.net with the word remove in the subject line.

Gear Green,

Mike

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