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COMMENTARY / AIRWORTHY

Traps and Tips for the Secondhand Homebuilt Owner

Don't forget to do your homework

BY LISA TURNER

"THEY'RE ALL THE SAME. It should be easy, right?"

Kate looked at Brent with a smile and shook her head.

"No, they're not all the same," she said. "In fact, each homebuilt aircraft of the same make and model, even those made in the same year, will be unique."

"I'm having trouble understanding that," Brent said. "Aren't the parts and the directions the same?"

"Yes, but every builder is different, and the instructions aren't always thorough," Kate said. "And, since it's experimental, builders do different things to the kits to make them unique. I've never seen any two of the same model look or be identical."

Kate was a judge at the multichapter sponsored fly-in, and Brent was walking the line, hoping to see some for-sale signs on the models he was considering.

"I don't want to be too forward, but can I offer you some advice?" Kate said. She looked up from her clipboard and peered inquiringly at Brent.

"Sure."

"I said earlier that no two homebuilt aircraft are the same," she said. "Not only are they not the same, but there's often a massive difference in the quality of the build. Do your homework, get a thorough prepurchase inspection, and get some familiarization from the owner."

"Thanks. I'll take your advice to heart, but I may fall in love with something and have to get it," Brent said. "In fact, I think I see it now."

Kate shook her head as Brent excitedly took off toward the next row of airplanes.

Purchasing an aircraft kit that's built and flying is a great way to get in the air at a reasonable cost. With few exceptions, homebuilt aircraft will sell for what the builder has in the airplane materially. It does not include build hours. So, while some builders see this as a drawback, it's a great deal for buyers.

When you purchase a homebuilt completed in the last 10 years, you are getting a modern panel and relatively new paint, interior, and accessories. Typically, you're also getting a low-time engine if the builder purchased all new components. Most builders fly fewer than 100 hours a year.

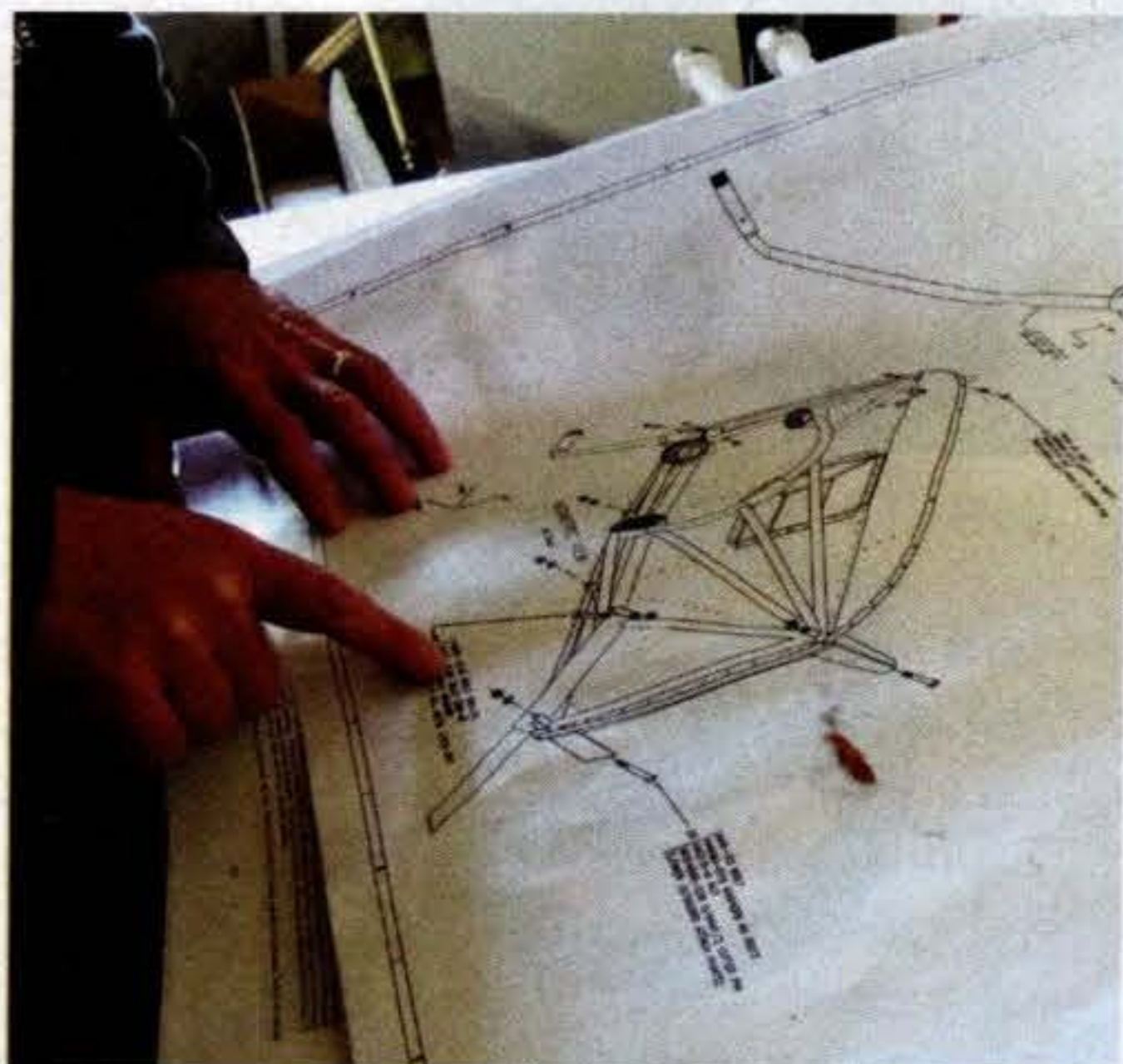
Modern homebuilts can sport wonderful performance, efficiency, and reliability, with many using Rotax engines that sip autogas. You can also do the maintenance on your experimental airplane, although you'll need to get a person with a repairman certificate, or an A&P mechanic, to sign off the condition inspection.

If the owner is a motivated seller, you can usually get them to come down on the price. There may be a host of reasons why someone is selling their pride and joy, from moving away to moving on to another build.

I said there are exceptions on pricing. This is true if you are purchasing a homebuilt with a big fan base, with lots of airplanes flying, and airplanes with great performance and flight characteristics. These homebuilts will demand a premium, though you can still find deals with patient research.

Sounds all rosy, right? Wrong. While there is a lot to like about buying a homebuilt, there are some serious traps for the unwary. Here they are, and what to do about them.

If you are a secondhand homebuilt owner reading this, take a good look at the "System issues common to homebuilts" section that follows and go through your aircraft to make sure you do not see any of these problems. This is an opportunity to make your aircraft safer and become a better inspector in the process.



Purchasing an aircraft kit that's built and flying is a great way to get in the air at a reasonable cost.

SECONDHAND E-AB OWNER CHECKLIST

FUEL SYSTEM

- ☐ Is it the correct fuel hose for the type of gas you're running?
- ☐ Are clamps and connections of the right type, and tight?
- ☐ Is the venting system design correct?
- ☐ Is there a backup fuel vent in case the system clogs?
- ☐ No traps in vent lines?
- ☐ Are there vents for each fuel tank?
- ☐ No chafing of fuel lines, and protection through firewall and bulkheads?
- ☐ Is the selector clearly marked? Is it easy to move with a detent at each position?
- ☐ Is the selector easy to see and operate from your seated and belted position?
Can the passenger reach it?
- ☐ Are the fuel filters the recommended type per the manufacturer? Is the filter material something other than paper? Does the mesh size pass the fuel flow test?
- ☐ Are filters easily accessible for change-outs?
- ☐ If the engine is fuel-injected, do you have the recommended fuel pump and filter combination along with a bypass and cockpit indicator?
- ☐ Keep a close eye on fuel filter debris and change the filter often in the first 200 hours.
- ☐ Are sump drains at low points in the system?
- ☐ Are all placards installed and correct?

ELECTRICAL SYSTEM

- ☐ Are connections clean and tight?
- ☐ Check integrity of crimp connections; pull on several, and if there's a problem, you've got some work to do throughout the aircraft.
- ☐ Are D-sub connector housings correct?
- ☐ Is the harness bundling correct and secured?
- ☐ Is the wire gauge correct in each circuit?
- ☐ Is there an accurate wiring diagram?
- ☐ Is the wiring protected against heat in the engine compartment?
- ☐ Is there a single point of reset (breaker or fuse) in each circuit?
- ☐ Are all circuits labeled?
- ☐ Are the panel breaker switches labeled?
- ☐ Are coax connections strong and correct?
- ☐ Is the battery secure and vented if necessary?
- ☐ Is the emergency locator transmitter (ELT) installed if the aircraft has two seats or more?
- ☐ Is the ELT orientation and hookup correct?

HARDWARE AND COMPONENT INSTALLATION

- ☐ Check the flight controls at their full range of movement to detect possible interference with radios and equipment, electrical wires, instrument lines, and engine controls.
- ☐ Do the flight control surfaces move in the correct direction?
- ☐ Check seat and shoulder harness/seat belt installation for strong anchors.
- ☐ Check the canopy and/or door latching system for proper operation and security.
- ☐ Is torque seal used? While not required, it's great for visual inspections.
- ☐ Check control cables, turnbuckles, and safeties.
- ☐ Check for correct nuts and bolts per plans or design.

BRAKES AND GEAR

- ☐ Check brakes, fluid, and solid feel of pedals/controls.
- ☐ Check for hydraulic leaks.
- ☐ Check for air in the system.
- ☐ Check for bearings loosening up in the nose gear.
- ☐ Check for smooth gear operation.
- ☐ Do you know what the tire pressure should be?
- ☐ Are the tires in good condition?

PANEL AND INSTRUMENTS

- ☐ Are systems — fuel, senders, pressures, and temperatures — all calibrated to your gauges?
- ☐ Is everything clearly labeled?
- ☐ Are static ports clear?
- ☐ Are radios working?
- ☐ Are radios noise-free (no grounding problems)?

STRUCTURAL COMPONENTS

- ☐ If sheet metal, are rivets correctly spaced and driven?
- ☐ Are the wings, tail, ailerons, and trim tabs all secured correctly?
- ☐ Are fabric, rib lacing, and spacing correct for the appropriate speeds?
- ☐ Do you have the correct weight of fabric?

ENGINE INSTALLATION

- ☐ Is the exhaust system secured and not chafing on anything?
- ☐ Is there a single secure electrical engine ground?
- ☐ Are mounts correct and secure?
- ☐ Make sure there are no leaks anywhere.

PROPELLER

- ☐ Are bolts torqued and safetied?
- ☐ Was tracking checked and is it correct per the plans?
- ☐ Is the spinner securely attached? Are all the bolts the same?
- ☐ Is the prop itself in good shape without nicks?

DOCUMENTATION

- ☐ Does the data plate match what you're seeing in the aircraft documents?
- ☐ Are there any service bulletins, letters, or ADs that apply? Have you complied?
- ☐ Are there any operating limitations in the aircraft?
- ☐ Is Phase I signed off and in the logbook?
- ☐ Are N-numbers the correct size for the airplane category?
- ☐ What is the weight and balance in the aircraft? Does it appear to be correct?
If you have any doubts, consider running another one.
- ☐ Do you have current registration?

TRAPS

A homebuilt airplane is unique.

The only time I saw two homebuilts that were nearly identical was a situation where two friends were building the same model in hangars next to each other. The differences were subtle, and the mistakes were identical. Apparently, they consulted each other on everything, including copying what was wrong.

Research the airplane you want. Identify and talk to owners. Find out what things you should look for and what the airplane's idiosyncrasies are. Put together a list of things to check.

Can you identify any build mistakes?

Get a prepurchase inspection, even if you think you know the airplane. While following the inspector around the aircraft, you'll probably be surprised at what is found. Just catching one serious fault will be worth the expense. Typically, homebuilt aircraft have multiple build errors that don't get discovered until someone other than the builder does the inspection.

Is the paperwork in order?

I've discovered homebuilts that were never signed off after flight testing and aircraft with no paperwork. The airplane should have a registration, an airworthiness certificate, operating limitations, and a weight and balance calculation. Make sure everything matches, and that you're looking at an experimental amateur-built (E-AB) aircraft, not an experimental exhibition aircraft.

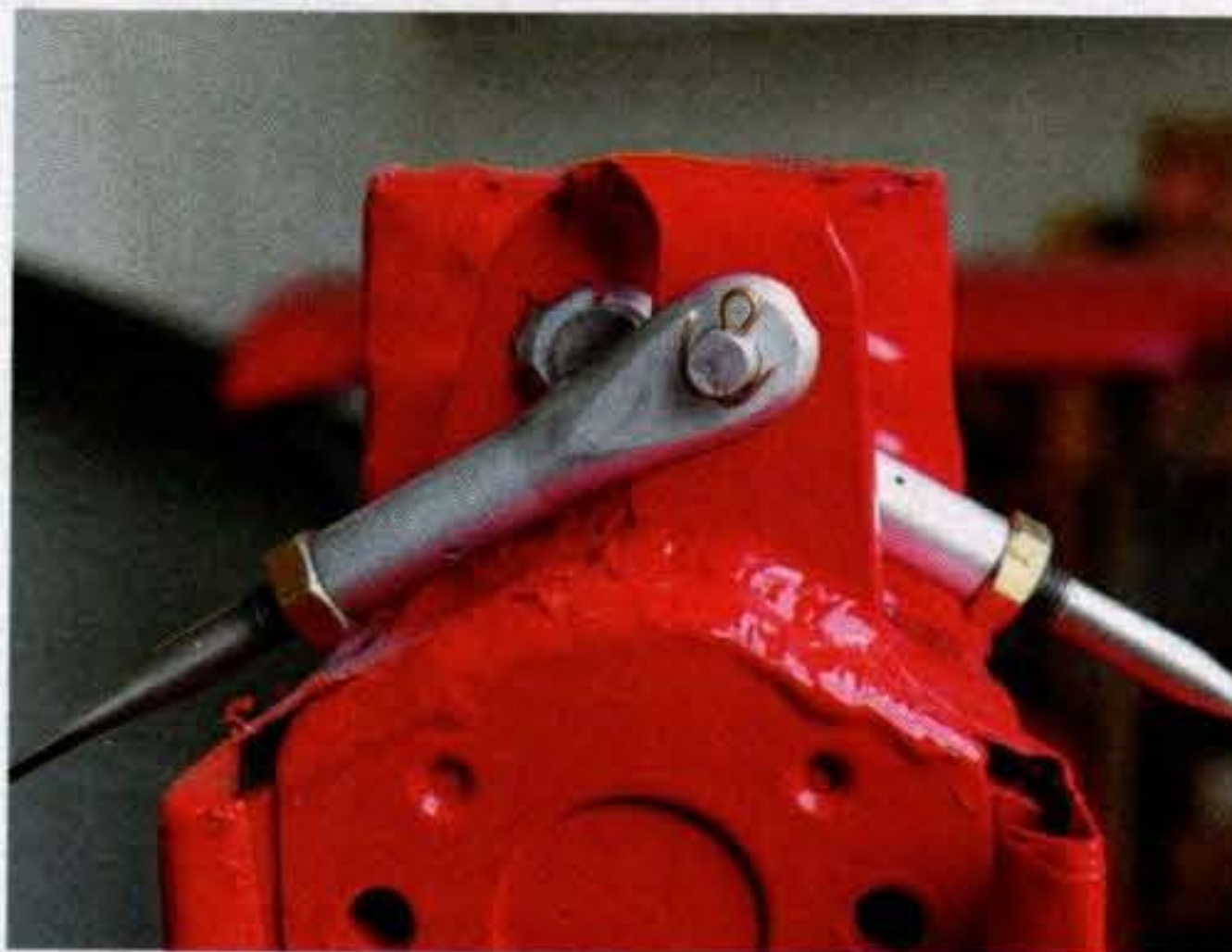
System issues common to homebuilts.

Make sure the following items are somewhere on your inspection checklist. Specifically, check for these; if you don't feel qualified, get a technical counselor or A&P to help you. I've included a full inspection checklist at www.EAA.org/extras that may help as you evaluate a homebuilt. It's also something you can use to supplement your condition inspection checklist.

Fuel system: Typical problems include using the wrong fuel hose type, inadequate venting, too many inline filters, wrong filters, clogged filters, complicated vent line routing, missing placards, fuel selector not easily reached by pilot and passenger, and incorrect fuel selector labeling or setup.

Electrical system: Common issues include connections that are not clean and tight, poor crimp connections, incorrect housings used on harnesses, harnesses not bundled and/or secured, wrong gauge wire used for the circuit load, wiring not protected against heat areas in the engine compartment, multiple fuses on one circuit, unlabeled switches and circuits, poor coax connections, and no schematic in the documentation. You or your inspector should actually pull on some of the connections to make sure they are secure. If they pull out, then the other crimps and connections also are likely to be weak.

Hardware and component installation: There are more mistakes in this category than anywhere else. Many of these are easy to overlook if you're not taking a slow, detailed view. They include using the wrong nut (for example, not using a castellated nut with a pin on a bolt where a part rotates) and jam nuts not run down and tightened. Check control cables, turnbuckles, and safeties. Check the routing of cables. Don't assume that since the airplane has been flying uneventfully that something won't come loose or that it is assembled with the right hardware.



Above: Jam nuts tight

Below: Make sure the fastener is correct for the application and is secured.



Brakes and gear: The first owner may have overused the brakes due to lack of familiarity during testing, so it's common to see high wear in the first 50 hours. Check for hydraulic leaks, air in the system, nose-wheel bearings loosening up, and smooth gear operation.

Panel: Common mistakes include not calibrating systems in the engine monitor and gauges — from fuel flow rates to temperature and pressure limits.

Weight and balance: Consider weighing the empty airplane to see where it comes in. Homebuilts seem to get heavier over time ("weight creep"). Owners think, "It's just this one thing," but it all adds up. Extra weight can change the flying characteristics of the aircraft. If you're concerned, get a new weight and balance calculated.

Airworthiness directives: Have manufacturer service letters and ADs been noted and complied with? You might think manufacturer updates and ADs do not apply because the airplane is experimental. But if you have a certified component on your homebuilt, ADs should be followed to stay safe. This is common on engine components. Manufacturer updates and service letters are also safety-related and so should be documented and complied with.

TIPS

Here are tips to keep your homebuilt airplane healthy and keep you safe.

Learn detailed inspection techniques.

Spend some time with a technical counselor who can methodically show you what to look for on your specific airplane. Even if you've been flying your aircraft and think everything is fine, go through this exercise with the TC, an A&P, or the builder. I've identified enough hidden mistakes on flying aircraft to say that this one step is absolutely mandatory. Over time, you'll get better and better at spotting problems.

Learn what maintenance is required.

Even if you're going to have an A&P maintain your aircraft, you should develop a working knowledge of the systems. This will improve the level of safety on every flight, and probably reduce your stress levels. Ask the builder or an A&P to let you follow what they are doing on the next inspection.



43.13-1B — ACCEPTABLE METHODS, TECHNIQUES, AND PRACTICES — AIRCRAFT INSPECTION AND REPAIR

AC-43-13 is your friend. If you don't have a copy, get one. It's what the A&P/IAs use for everything from safety wiring technique and repairing fabric to checking propeller tracking and what bolt to use where. At 646 pages long, it's the handiest free online manual you'll ever have.

The PDF is free on the FAA website, and you can find the link to it as well as other resources like checklists via www.EAA.org/extras.

If you're doing your own maintenance, do a self-evaluation to make sure you're doing it right. Spend time with your local A&P, or attend a repairman's class. Even though the repairman's class is for light-sport aircraft, it will show you the basics of what you should know on your home-built. Don't forget the great resources EAA offers, from books and articles to hundreds of videos and webinars.

Make sure you've read the operating limitations and are familiar with the paperwork that came with your airplane. If your homebuilt has limited information, consider doing some research and assembling a pilot's operating handbook.

Is the preflight checklist adequate?

Consider adding details to it. Use the checklist I've included under resources at www.EAA.org/extras to make sure you have as much detail as possible.

Learn detailed inspection techniques. Spend some time with a technical counselor who can methodically show you what to look for on your specific airplane.

A homebuilt aircraft is uniquely wonderful. Understand its peculiarities and weaknesses, and assemble the information and checklists you need to do inspections. Over time, you'll become an expert. *EAA*

Lisa Turner, EAA Lifetime 509911, is a manufacturing engineer, A&P, technical counselor, flight advisor, and former DAR. She built and flew a Pulsar XP and Kolb Mark III, and is researching her next homebuilt project. Lisa's third book, *Dream Take Flight*, details her Pulsar flying adventures and life lessons. Write Lisa at Lisa@DreamTakeFlight.com and learn more at <https://DreamTakeFlight.com>.