



EXPERIMENTER
FEATURE



BUYING A FLYING HOMEBUILT

RANDOM THOUGHTS
ON THE PROCESS

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BUYING A FLYING HOMEBUILT AIRPLANE CAN RANGE FROM BEING A WONDERFUL EXPERIENCE TO ONE THAT HAUNTS YOU AT NIGHT.

Only a *little* of that is because it's an experimental amateur-built (E-AB). Buying an airplane of any kind, within reason, is based on the same combination of factors that form a foundation for the buying decision. Once those foundation factors are examined, then, and only then, do we begin to consider the homebuilt aspect of the airplane in question. And when we do that, we do so with a more critical eye than we would with a certified airplane.



WITTMAN TAILWIND



PITTS S-1SX

THE UNIVERSAL BASICS OF BUYING ANY AIRPLANE

There are probably a million overlapping considerations that apply to buying an airplane, homebuilt or otherwise. We'll miss a few, but in the interest of shortcutting to the subject of buying a flying homebuilt, the following bullet points should suffice. Then, when getting into the E-AB arena, we'll circle back to some of these points as needed.

» MATCH THE AIRPLANE TO YOUR MISSION

If you're just buying \$100 hamburgers on Sunday morning, do you really need a Velocity or Lancair IV? If you never carry friends, do you need a four-place bird? If you are married with kids, can you get away with buying a single-hole Pitts? You get the idea.

» WEIGH FLYING TIME VERSUS SITTING TIME

While buying low-time airplanes is always the goal, a 210-hour 1972 Cessna 172 isn't a good buy. Nor is a Tailwind just discovered in a barn where it sat for 15 years. Nothing kills an engine faster than not flying it, and a sleeping airplane attracts bugs, rust, and corrosion. Avoid aircraft with long dead periods in their logbooks.

» WHAT WERE THE STORAGE CONDITIONS?

Did it sit outside? Was it close to the ocean or an industrial city (acid rain)? Did it live in the desert (low moisture is ideal)?

» WHAT'S THE OVERALL CONDITION?

Unless you can do every bit of work yourself, forget about buying a fixer-upper. Minor cosmetic work and interior work are okay. Engines, paint, fabric, corrosion, rust — no. If you have to farm it all out you'll be upside down financially regardless of how cheaply it is priced. Be very conservative about estimating the cost of setting everything right.

» HANGAR REQUIREMENTS?

Can this airplane be left outdoors? Fabric airplanes take a beating when tied down. It can be done, but it shortens their lives. Is the local environment hard on airplanes? How expensive are local hangars? All these things should be considered when thinking about buying an airplane, homebuilt or otherwise.

GETTING HOMEBUILT SPECIFIC

E-AB aircraft present lots of challenges and require questions that are different than those you ask when buying a certified airplane. The biggest difference when buying a homebuilt airplane is they are, well, homebuilt. Or amateur-built, if you'd prefer. Nothing about their structure, design, or handling is being regulated by the government. There are no established and enforced standards to be met. This is especially true of quality control during construction. So, not only can you not assume that they fit the FAA's well-codified definition of handling in the air, but you cannot look at two seemingly identical Zombie Killer Mk.IVs and assume they are the same airplanes. In fact, you can take two of the most common homebuilts, with the best design and best kits — two RV-6s, for instance — and it's guaranteed you'll find lots of differences. This is because one of the fun aspects of building an E-AB is that you can incorporate as many changes as you want to make it "your" airplane. So, when you go to buy a homebuilt, you'll find that it's not *your* airplane, but is still *their* airplane. These are not production line airplanes, although the major components of the more popular quick-build kits do meet that standard. In those cases, it would be the assembly and systems that would be in question.



PIETENPOL

OLD DESIGN VERSUS NEW DESIGN VERSUS ORPHAN DESIGN

The age of a design may or may not be a point to be considered. We tend to think of Van's RVs, for instance, as being modern designs. Here's a shocker: The RV-3 is more than 45 years old. Of course, it sired a dozen or more designs that are much more recent. But, other than introducing more size and bigger engines, nothing about the breed is "old." So, the age of a successful design may not be a factor.

There are hundreds of E-AB designs to choose from, ranging from the Wittman Tailwind of 1953 (still a winner), or the far older Pietenpol, to newer designs on which the paint isn't dry yet. For that reason, at any given time, there are dozens of E-ABs floating around for sale. Scattered throughout that history are some designs that are known to be good airplanes but have aged out, like the Stits Playmate, or even the Bowers Fly Baby. There is nothing wrong with any of those designs, but they won't have more modern handling like an RV and many individual examples will be long in the tooth. Their age alone mandates a more careful inspection before plunking cash down for them.



LANCIAR SUPER ES

MATCH THE AIRPLANE TO YOUR MISSION.

TOTAL TIME SINCE NEW AS AN E-AB YARDSTICK

While flight time is a way to judge the wear and tear an airplane has seen and can establish its "newness," it is also a way of judging how a homebuilt flies. For instance, if an E-AB is 25 years old, has gone through six owners, but only has 100 hours on it, that's a possible indication that the airplane doesn't fly very well or has problems. Owners weren't happy with it or they would have flown it more. Also, that amount of time in that many years also says you should examine the logs carefully to look for long periods of time when it sat around doing nothing but deteriorating. As with any airplane, that makes the engine suspect. On the other hand, if an airplane is 2 or 3 years old, has 250 hours on it, and you'll be the second owner, it's probably a good flying airplane. That's also good news for the engine. A lot of owners and low time is almost never a good thing.



BUYING A FLYING HOMEBUILT

Also, throughout the world of E-AB airplanes are what might be called “homebuilt orphans.” They might be old or they might be fairly recent, but they most likely showed up at EAA AirVenture Oshkosh a few times. Some plans were sold and airplanes were built, but they never caught on. There were few built, and when they come up for sale they are almost always priced at a fraction of the value of the parts. For that reason, they are tempting. However, when only a few examples of a given design have been built, that says something about the design. It may have been poor flying, or maybe there was no building support behind it, or it was unreasonably complicated to build. Since so few were built, there is almost no widespread experience with the airplane so you won’t know how it flies until you strap it on for the first time. More than one airplane has been resold shortly after that first flight. If only a few of a given design exist, there is a reason — and it’s not because it was never available as a kit. The Tailwind, for instance, was never a kit, nor has there ever been builder support offered by any formal organization. These are two factors that are necessary for a successful design. However, there are hundreds of Tailwinds flying, it has a sterling reputation, and a solid online community has built up around it to support builders. Quality always wins.

**WHEN JUDGING THE QUALITY OF AN E-AB
DO YOUR BEST TO LOOK PAST THE PAINT,
NO MATTER HOW DAZZLING OR POOR IT MAY BE.**

CONSIDERATIONS: WOOD, ALUMINUM, COMPOSITE, RAG, AND TUBE

When buying an amateur-built, some thought has to be given as to the type of construction the airplane uses. However, it should be noted that there is no such thing as “the best material for building airplanes.” Each material presents its own difficulties when it comes to storage, construction, and inspection. That’s another reason to have the pre-buy done by someone who really knows the airplane.

» WOOD

More sensitive to storage conditions, less sensitivity to building skill, harder to inspect.

» ALUMINUM

Less sensitive to storage conditions, medium sensitivity to building skill, easier to inspect.

» COMPOSITE

Medium sensitivity to storage conditions, less sensitivity to building skill, harder to inspect.

» RAG/TUBE

Medium sensitivity to storage conditions, less sensitivity to building skill, easier to inspect.

CAN YOU FLY IT?

Actually, “Can you fly it?” is the wrong question. The question should be, “Are you willing to learn to fly it?” Anyone can learn to fly anything. However, homebuilts can present challenges the average GA pilot has never seen. This might be tail wheel versus nose wheel. It might be handling characteristics that are much lighter and quicker (RV or Pitts), or slower and more leisurely (Pietenpol or Hatz). Regardless, depending on a pilot’s background, some homebuilts are aircraft someone shouldn’t just jump into and fly. A few are, however. Sometimes a couple of laps around the pattern represent the entire learning curve. In others, a more prolonged period of instruction may be called for. However, there are no homebuilts commonly available that the average pilot can’t learn to fly. The trick, once in a while, is finding an instructor who is experienced and qualified to instruct in that specific airplane. Fortunately, a mini-industry has been formed around giving instruction for transitioning into specific homebuilt aircraft.

PRE-BUY INSPECTION BY A KNOWLEDGEABLE A&P

Experimental airplanes have a lot of similarities to certified airplanes, but they sometimes present challenges during a pre-buy inspection that are unique to the breed. To do the pre-buy inspection, don’t pick an A&P mechanic out of the Yellow Pages. Almost every homebuilt airplane has a community built up around it online. Reach out and see if anyone knows the airplane in question and if they know a (more or less) local A&P who is familiar with the type who can do the inspection. This can’t be overemphasized! An A&P who services general aviation aircraft can’t be expected to know about bungees or rudder bolt life on a Pitts or where to look on a Lancair for signs of wear and tear.



IT'S ALL ABOUT CRAFTSMANSHIP AND CONDITION

In general, EAA members strive for better and safer building practices, but there is no quality control supervisor cruising from garage to workshop to attic to monitor the skills of every individual builder. The advent of quick-build kits alleviated much of that variance, but even with a quick-build, the individual builder still has plenty of places where he or she can introduce less-than-wonderful craftsmanship because of skill level or attitude. This last factor — the builder's attitude — deserves some discussion.

First, it is seldom that you run across a builder whose attitude about building could be considered bad. Bad can be defined as the builder who thinks doing something "good enough" is good enough. It's not. Once in a blue moon, you'll see an example of that kind of building, but they are almost always easily identifiable by their generally crude construction so they don't factor into this discussion. One doesn't need to be a skilled craftsman to recognize crude when we see it. However, there are not only different skill levels but also different attitudes about how finely finished something has to be. These range from being functional and workman-like to absolute perfection in every aspect of the airplane's construction. The majority of flying homebuilts will fall somewhere in between, and sometimes it's difficult to tell where a given airplane falls in the perfection totem pole — at the top, in the middle, or at the bottom. Part of this judgment difficulty is because of the camouflaging effect of paint jobs.

DON'T LET THE PAINT FOOL YOU

The quality of a paint job can go a long way toward skewing our opinion of how well an airplane is built even though the paint job contributes less than nothing to either the construction or the flying qualities. When judging the quality of an E-AB do your best to look past the paint, no matter how dazzling or poor it may be. The rule for buying a flying homebuilt should be to first quantify the airplane, and then circle back to the paint. Paint could easily be a reason to reject an airplane ("I don't like the color, the scheme, or the quality"), but we should never leave the ground in an airplane we bought simply because we think it's pretty.

Sometimes, when walking around an airplane, we get sure indications of either the builder's attitude or their skill. Or both. Aluminum airplanes are easiest to judge in this area. If multiple "happy faces" dance across the skin, there are gaps all over the airplane from crude fitting panels, and the cowling Fiberglass is a collection of hills, valleys, and weave showing through, we know where this builder fits in the builder totem pole.

On fabric airplanes, a less-than-perfect covering or paint job can easily be covering up an exquisitely built airframe. Or, it could reflect the marginal aspect all the way through the build. So, closer inspection is required.



RV-6

GOTCHAS TO WATCH OUT FOR

There are some factors in a homebuilt airplane that should raise alarms immediately.

» CHANGES FROM THE PLANS

Cosmetic changes are okay, but anything that messes with the control surfaces, aerodynamics, primary structure, or anything that adds significant weight are all suspect. Without knowing the designer's basic design parameters (allowables), changes can cause problems. There is always that question of whether those changes were properly engineered or just eyeballed.

» NON-AIRCRAFT HARDWARE

Grade 5 hardware store bolts and screws might be okay in some appropriate places, but using them says something about the builder's attitude toward aircraft standards. AN hardware isn't that much more expensive, and it's a chancy place to try to save a few bucks. Thanks to the internet, proper AN hardware is only a couple of clicks and a day or two away.

» FIREWALL FORWARD DETAILS

A neat, clean firewall forward is a must. Sloppy engine installations also speak to a lack of skill or lack of desire to do things right.

» WEIGHT VERSUS DESIGN WEIGHT

It's easy to look at 50 pounds overweight as not being that big of a deal, but think of that as having a bag of cement in your lap on every takeoff. It compromises performance, lowers the aircraft's usable load, and lowers the airframe's strength if the airplane is flown over the published gross weight.

» ODD ENGINES

If an engine is used that is not a mainstream engine, that will increase the difficulties of maintaining it. Franklins, for instance, are good engines, but parts and expertise are not as readily available as those for a Lycoming. Although Lycomings are as common as dirt, a few variations are harder to support than others because of dwindling parts supplies. The O-290s and O-435s are good engines, but jugs are becoming harder to find. Crankshafts for C90 Continentals are reportedly in short supply, etc. Mainstream, popular engines are mainstream and popular for a reason.

» ENGINE PEDIGREE

Who overhauled it and when? What parts were replaced? Was it overhauled to "new" limits or "service" limits? If overhauled to service limits, theoretically it could go out of limits in the next five hours.

» LOOK FOR LEAKS

Look carefully for oil leakage and exhaust smudges. A dirty engine is telling you something bad, but a clean one doesn't necessarily mean something good. At least do a leak-down compression test and borescope the cylinders. Also, remember that recommended time between overhauls of an engine goes down with time. The more distant the overhaul, the shorter the TBO.

» WELD QUALITY IS HARD TO QUANTIFY

Welds may be lumpy but are okay if they appear to have penetration at the edges. Totally avoid welds that undercut the surrounding surface and those that have a frosty appearance on their surface. That's an indication of oxidation and too much heat, and that produces brittle welds. Ideal welds have an even, "stack of dimes" appearance, the surface is smooth with no crud, and the edges appear to flow into the surrounding surface. Tungsten inert gas or gas welding is preferred — MIG done by a home craftsman is to be avoided because of the difficulty of getting a factory-quality weld with economy equipment and the need for stress relieving in some areas (some aircraft factories do use it, but it's being done by professionals with professional grade equipment). Stick welding is an absolute no-no, but it is unlikely that'll be seen.

» LOOK FOR STRESS RISERS

Aluminum airplanes are more susceptible to stress risers than any other kind. Examine the interior of the cockpit, down the tail cone, and as much of the interior of the wings as practical. What you're looking for are burrs or sharp edges left on the edge of sheets and fittings. Also, if there are random scratches on the surfaces, it says something about the builder's understanding and avoidance of stress risers. Keep your eye open for clinched (bent over) rivets. That also says something about the builder's attitude that he didn't drill them out and replace them. A smeared, off-center rivet is one thing. A clinched one is something altogether different. A couple of those is not a deal breaker, but if you find one, start looking for others to see if it was the builder's habit to leave them.

THE LIST COULD BE ENDLESS

Having said all the foregoing, I admit that we've barely scratched the surface in regard to buying a homebuilt. Hopefully, what we have left is the very clear impression that emotions, which are inevitably the root of all aircraft purchases, have to be overruled by logical thought that is followed up with pointed instruction. This, by the way, is not as easy as it sounds. Nothing having to do with emotions and airplanes ever is. *EAA*

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