



# Homebuilding Phobias

Their causes and cures

BY BUDD DAVISSON

**WHEN THE SUBJECT** of building airplanes comes up around non-homebuilders, you can almost count on someone saying, “Boy, you’d never catch me flying something *I* built.”

Unfortunately, there are those who wholeheartedly support the concept of homebuilding but still show some of the same skepticism, and it is almost always aimed at a given building process: “Boy, you’d never catch me flying something that *I* welded (substitute glued, riveted, etc. as necessary) together.” These kinds of thoughts could be considered to be “process-phobic” and are 100 percent unfounded fears. However, phobias being what they are (irrational), it’s hard to convince folks of that.

As a general rule, building phobias are rooted in the unknown: The builder has never had the opportunity to investigate the process he fears. At the same time, it’s also normal that when he finally works up the nerve to stick his toes in the water, his concerns evaporate almost instantly. It’s as simple as that. Fortunately, there are lots of educational outlets designed specifically to help even the most technologically traumatized amongst us take that first hands-on step

that will show us there is no black magic involved in any building process.

**WELDING: SPORT AVIATION’S BOOGYMAN** Welding scares the stuffing out of half of the homebuilding population, while the other half is so in love with it that they can’t live without it. Why is that?

The fear of welding is based on the fact that you’re turning steel into a liquid, and that alone makes it look as if a minor screw up on your part will result in a wing, or something equally as important, falling off, which is definitely not the case. Although there are a lot of factors to be controlled and a few techniques to be learned, if even the most rudimentary welding skill is mastered, it is actually fairly difficult to make



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catastrophically bad gas welds on an aircraft structure. Ugly, yes, but downright dangerous? No. This is because steel structures are designed to be redundant with no single weld being a deal breaker. Also, the ease of penetration in thin materials and the long weld lengths found in most joints provide large safety margins that reduce the dependency on craftsmanship.

Make no mistake, welding requires learning new skills, but once the basics are understood, the skill is built on nothing more than intelligent practice. Visit [www.SportAviation.org](http://www.SportAviation.org) for welding articles, videos, and more.)

#### **RIVETING AND SHEET METAL WORK**

Riveting pre-dates welding (invented circa 1903) by a couple of thousand years. As soon as there was sheet metal there was riveting, and the methods we use building aluminum E-AB aircraft

differ little from what was pioneered in the 1920s, so the techniques are, like welding, well-known and easy to learn. However, it should be noted that aluminum is less tolerant of sloppy craftsmanship than steel. Building a steel tube fuselage is basically blacksmithing: Steel is much more forgiving of minor misdeeds such as scratches and burrs in holes. Aluminum, however, hates scratches that steel won't even notice.

Okay, that's it for the downsides to building in aluminum. Basically, you need to have a neater, cleaner work bench and guard your aluminum surfaces as if it were your own skin. From that point on, the methods of building in aluminum are no more difficult to learn.

Also, progress in aluminum, while it begins more slowly than rag and tube structures, advances more quickly toward the end. When the aluminum sub-components

(ribs, spars, etc.) are riveted together, they are ready to fly. With rag and tube, when you're done welding a fuselage, you still have to make all the formers, stringers, stand-offs, etc. Then comes the fabric and the coats of paint, sanding, etc. However, once you have an aluminum wing skinned, theoretically you can bolt it on and fly it. Paint is optional (and heavier).

#### **COMPOSITES**

Working with composites requires numerous "soft" skills, as opposed to welding or sheet metal work. Cutting cloth and smearing resin doesn't carry with it the innate fear the others sometimes engender. The material and required skills give a subliminal feeling of being more familiar and user-friendly.

The current trend in composite home-built design features kits that use pre-formed composite shells (usually



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glass-foam-glass sandwiches) that go together literally like a plastic model airplane: Pre-formed fuselage wing and fuselage halves require internal parts to be glued/bonded to one half before the other half is glued over them and the component closed up. Then the sanding begins and continues for a long period of time while the surface is prepared for paint. The finishing process is tedious and time-consuming, but it's not difficult.

Compared to all other building mediums, composites are the most forgiving of mistakes and erratic craftsmanship, hence their popularity. However, it is critical that the builder take advantage of DVDs and workshops or forums to develop a feel for wetting out lay-ups and how to know when the work is being done right because composite structures are difficult to inspect, after the fact. Most composite companies offer educational kits—some foam, Fiberglas, and resin

that you can play with before committing to the project. These are a good investment.

### WOOD: COMPLEX AND LONG, BUT NOT DIFFICULT—USUALLY

Everyone includes wood in their building comfort zones, so it almost never ranks as a phobia-producing material. Nor should it. However, before glossing over it as being a “friendly” material, it should be pointed out that wooden aircraft construction, while not difficult, will usually involve a higher parts-count than other methods. Lots of corner blocks, gussets, and connecting parts are needed to carry the loads from piece to piece. Unless compound curves are involved, none of those pieces are difficult, but there will be a lot of them. Fortunately, modern glues have made wooden construction much easier and just a little less dependent on a warm and comfy building environment.

### PAINT: SPORT AVIATION'S OTHER BOOGYMAN

Okay, so really good paint jobs actually are the result of black magic. Or so it seems. That's not entirely true, but really good paint jobs consist of two parts. One is easily learned, the other is learnable over time, but not easily.

The first part is preparing the surface before painting. This is also known as priming, sanding, priming, sanding some more, then priming, then...get the picture? Fortunately, continued development of new surfacing primers and fillers has made this part of the job easier and nearly foolproof. Mistakes at this point are easily corrected. Not so during the final painting.

It's the actual painting that scares folks. This is where there is simply no substitute for experience and proper painting conditions. The conditions (dust-free environment, etc.) *can*, with diligence and creativity, be achieved in



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home workshop paint booth, but super-high-quality paint application only comes out of an experienced gun hand. Even so, lots and lots of first-time painters have produced surprisingly good finishes courtesy of modern paints. However, they do so with a total awareness of the safety issues involved coupled with a determination to adhere to every safety warning ever issued because some of the more popular paints can be lethal in the extreme. The new water-based paints eliminate that worry. Paint is where lots of builders do all the prep work, then take the disassembled airplane to an auto body shop that has the equipment and experience to do a perfect job with no health risks to the airplane owner.

### WIRING: LOVE IT OR HATE IT, BUT FIGURE IT OUT

Wiring often strikes fear into the heart the same as welding does. Here again, however, thanks to the Internet, simplified

schematics, and training videos, it can be reduced to a step-by-step, connector-A-to-terminal-B kind of process.

Fortunately, basic wiring in the average airplane is much simpler than in a car. And most of the installation techniques, including soldering, crimping, etc., are clearly spelled out in all training material with an emphasis on getting quality tools (strippers, cutters, crimpers, etc.) rather than hardware store items. They may be more expensive, but they yield faster, better results. The same thing holds true for connecting hardware such as terminals, splices, etc. Always buy high-quality parts from a known source. And buy more hardware than you need so you don't get stranded one piece short. In quality and quantity, tools and hardware are silly places to try to save a few dollars.

And as for installing radios and such: These days it is the rare manufacturer that is selling to the sport aviation market that

doesn't offer pre-wired harnesses for its products. To the wire-phobic builder, these are real heaven-sent items. If you can tell positive from negative and know the function of a ground, these are generally nothing but plug-and-play devices.

### THE KEY IS IN RESEARCH AND EDUCATION

Circling back to what I said at the beginning: Building phobias are almost always based on a lack of understanding and having no hands-on experience in the procedure or material. Thanks to the Internet and EAA's website, there are no questions that can't be answered or phobias that can't be cured. Can we all say Google, boys and girls? **EAA**

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