

INTERIORS

THE INSIDE STORY- PART II

BY DENNIS WOLTER
AIR MOD, CINCINNATI, OHIO

Sitting here, pen in hand, staring at a blank yellow pad, I feel somewhat daunted by all the factors that need to be covered to do justice to this series on interiors. As this has been my passion and livelihood for 32 years, I wonder how much more intimidating it must be to an airplane owner planning a renovation project for the first time, knowing that decisions made now could last 20 or 30 years and cost a substantial amount of money and time.

The rewards of having a beautiful, safe and comfortable interior certainly make it worth all the cost and effort. The best way to ensure a positive outcome is to approach this task with your eyes wide open, possess as much technical knowledge as possible and develop a good plan.



Fabricating your dream interior.



Typical mess under the floor and behind side panels.

Changing with the times

Our airplanes left the factory with a one-size-fits-all design approach to the interior. But airplane owners today are no longer content with an economy-car-looking interior when they drive to the airport in a new Lexus and live in an upscale home. Times have changed.

Take storage issues: An interior redo should address the need for additional storage demands created by the complex equipment used in a complex air-space system. Anyone who had an instrument rating 40 or 50 years ago can remember how few charts and manuals we used to carry in those good old days.

Great strides have also been made in ergonomic design, cabin soundproofing, lighting, passenger restraint systems—to name a few. All of this factors into the decision-making process involved in designing your new interior.

PLANNING A NEW INTERIOR FALLS INTO FIVE CATEGORIES:

- 1) Planned-for items (ergonomically designed seats and side panels, headliner, carpet, interior painting, insulation)

- 2) Unseen but expected items (minor corrosion issues, need for plastic repairs, bent or torn side panels, mess under the floorboards)
- 3) Unexpected issues (hidden structural damage from accidents, more extensive corrosion, poor maintenance, etc.)
- 4) Optional upgrades (passenger restraints, ventilation options, instrument panel repair and painting, modifications to side panels and armrests, storage upgrades, cabin and panel lighting, high-security door locks, baggage extensions, super soundproofing, DVD screens, additional intercom jacks, cosmetic enhancements such as wood trim, etc.)



Corroded fuel line.



Severely compromised floor structure. This area should be inspected at every annual.

5) Related and while-we're-at-it items (window installations, radio installations, third windows, larger baggage doors, etc.)

This list certainly makes it obvious that serious thought and research is the order of the day. Something that may take only 20 or 30 minutes to do when

the interior is being fabricated can take hours to retrofit after the job is finished.

What comes first?

With the wish list completed, the next decision is how to sequence the various projects so as not to undo or put at risk any previous work. Having a new radio package installed after a new interior has been completed doesn't make sense. Side panels, instrument panels, headliner, seats and carpet must all come out to remove old wiring and install new. If you install radios when the interior is being done, you're already paying the interior shop to remove and reinstall the interior, and an interior expert is doing that part of the job instead of a radio technician.

Most radio shops see interior removal and reinstallation as a necessary evil, certainly not something they like to do. We work closely with the radio shop on our field, and they are able to reduce the installation cost of new equipment for their customers if we are also doing a new interior at the same



There are numerous interior options: wood trim, up-graded vents, embroidering, visors, inertial-reel shoulder harness, enhanced lighting, etc:

time. The same is true of window and shoulder harness installations. It's not hard to see how many things can be much more cost-effective if done at interior time.

Wait for the paint, and interior, too.

Here is another very important concept to consider. Almost everyone who buys a used airplane wants to make it look as good as possible as soon as possible. Who wants to spend all that money to fly around in something that looks and feels bad? Well, cool your jets, because I truly think that the last projects you should do are paint and interior.

Think of all the other issues that are involved here. Plan to fly the airplane for a year because during that time you will make friends with the airplane and feel comfortable with how you and your family use it. During the first month of ownership, if a new owner were to make a punch list of desirable items that he or she would like to include in a new interior, then put the list away, and a year later generate a new wish list, there would be many additional and different items on the later list.

Here's an even bigger consideration: Extensive pre-purchase inspection or not, the first year of ownership will likely present some surprises in the mechanical department. Until you have lived with an airplane for 100 hours and gone through that nailbiting first annual, the to-do list is up for grabs. My involvement with the ABS Service Clinics for many years has made me a believer in "pretty comes last." So here is my idea of a good renovation plan (subject to change, of course).

STEP 1: Buy an airplane with enough engine time and basic radio equipment to allow you to safely operate it for the first year. During that time, evaluate and repair deficiencies as required. Use the first annual to correct as many problems as possible.

STEP 2: If it's time, get the engine overhauled or upgraded.

STEP 3: Install airframe upgrades – tip tanks, fuel cells, gap seals, etc. Fly the airplane for awhile and work out any bugs with these items.

STEP 4: While using the airplane during this one to three year period, keep a notepad and a small camera in the airplane. Take notes as to what's wrong with the interior, panel layout, lighting, storage, ventilation system, etc. When you get to the interior renovation phase, you will be well prepared to team up with the interior person to ensure that all issues are addressed and optimum solutions are implemented. I love it when a customer comes in with 20 or 30 items on their punch list. Conversely, when a customer drops in ready to do an interior but has no idea what they want other than, "I kinda like blue" and "Do you recommend leather?"). it is a little more difficult.

One photo worth 1,000 words

What about the camera? That's a mental alignment tool! As you fly around, take photos of paint jobs and interiors that catch your eye. These photos will communicate your taste and emotions to the person who is going to help you design your new interior or paint job. It's not about copying someone else's work, but rather about communicating your taste and ideas to your partner in this process.

Think of it as a starting point from which you build the perfect interior or paint design. One picture is worth a thousand words (I don't want to even begin to discuss aging memories here – just go with the photo). Snap a picture and you are one step closer to creating a perfect design.

Another great design idea source can be airplane sales brochures and trade magazines. If you see something you like, tear it out and make a note. It's also very important to stress here that good ideas can come from other types of airplanes, so don't just look at the Beech stuff.

Moving forward

Now that you know what your new interior is to include aesthetically and functionally, there are four ways to get it done:

- (1) Do it all yourself.
- (2) Employ the joint project method where you enlist the services of a professional to do the part that you can't or choose not to do.
- (3) Buy a kit from a company such as Airtex and install the pre-sewn components yourself.
- (4) Locate and take the entire project to a professional shop.

If you plan to do the entire job yourself, approach this task realistically and be prepared for the unexpected. With that said, the rewards of successfully accomplishing this can be priceless. Having taught many do-it-yourself sessions at Oshkosh and other places over the past 30 years, I can relate to the excitement I see in people who proudly show me what they have done on their own. (I confess to having picked up quite a few ideas and clever solutions from the fresh approach that some of these do-it yourselfers have taken.)

To ensure a good outcome, you'll need a clean, well-lit, temperature-controlled space to do the job. An unheated T-hangar in the winter is not an option, but can certainly work during the summer.

You will need a way to spray paint and glue, and a common paint gun does an excellent job of spraying glue.

You'll need a way to cut foam, and since speed is not a factor, the household electric carving knife will do an adequate job for the patient user. (You really don't need the \$800 professional foam-cutting knives that we use.)

This brings us to the big item – the sewing machine. It's unrealistic to plan to use a home sewing machine, even though the optimistic salesman told you otherwise. Think of the many layers of material you must sew through to do seat and side panel upholstery. It simply



The business end of an upholstery sewing machine everything moves!

cannot be done with a home machine.

What you need is a walking-foot, needle-feed commercial upholstery sewing machine. They are quite expensive if purchased new, but can be acquired used for \$700 or \$800.

Make sure you are buying an upholstery machine where the upper needle and the lower foot move simultaneously to advance the heavy material through the machine. Commercial dress and drapery machines look very much like an upholstery machine, but do not have this feature and will not do the job. The two most common machines available for this purpose are a Singer 211 and a Juki LU562.

For those of you handy enough to attempt this interior renovation, the rest of the tools and talent needed are pretty obvious and will be covered later in this series. If you live in a larger town or city, you probably have an upholstery supply house close to you that can be a good source for equipment and information.

Finally, be prepared for the amount of time it will take to do a thorough job, particularly in an older Beech airplane. For our shop to complete a four-place interior in a 60s Bonanza, we generally spend 250 to 300 hours taking care of both planned-for and unexpected items.

And realize that we have trained people, often with 15 years or more experience. You may want to plan for at least half-again as many hours as a professional shop would take.

However, if your mission is just to re-cover existing components without getting into corrosion removal, repairs, modifications, etc., I imagine your time spent can be significantly reduced. It's a great idea to pay your mechanic to inspect the seat frames and cabin when everything is stripped out. It may not be this open again for 20 or 30 years.

The joint project method

Choosing this method—where you have a professional sew and upholster the seats, side panels and headliner components—greatly reduces your own equipment and time requirements. After removing the components and taking them to your professional “assistant,” you can spend your time repairing floorboards, cleaning corrosion, painting cabin trim and insulating the airplane.

The most unknown part of this arrangement is finding a qualified and reliable upholsterer, and I firmly believe the best place to look is at hotrod and vintage car shows. The people working on these cars can be quite skilled at their craft, and you get to see the finished product.

Don't forget that aircraft seats are very different than car seats, and an upholsterer who has done only cars is going to have a substantial learning curve to properly work on your airplane. Try to find someone who has done both; you don't want your project to be a training aid.

Be careful when choosing someone from the Yellow Pages. Check out their work and make sure they have experience on airplane seats. Be suspicious of someone who repeatedly says, “No problem.” The person you're looking for is aware of potential problems and can explain how they will solve them.

The kit method

Without question, the most pre-

dictable way to get a good result with an owner-installed interior is to buy a kit. We have worked with Airtex for many years, solving problems that both our companies have encountered with materials, suppliers, etc. The folks there have an extensive knowledge of aircraft interior fabrication and installation. They, and companies like them, are selling you a product that has been installed hundreds of times by both professionals and amateurs in the field. If you have a question during the process, they are there to help you solve it. All FAA requirements for materials will be met by these suppliers, with necessary documentation included (more about FAA requirements later).

Turning it over to the pro

Certainly the most common and convenient approach to an interior renovation is to go to a professional shop. Since all the labor will be done by paid practitioners, this is obviously the most expensive way to go. Choosing the right company requires some research, and it's important to find a shop that will do work on the level that meets your expectations.

The range goes from re-covering the interior pretty much the way it left the factory (the mission being to make it look fresh again), to a total redesign and modification of the interior to be something that is state-of-the-art. At the high end, you will have a custom interior that is ergonomically comfortable, aesthetically pleasing and as functional, safe, durable and maintainable as modern technology and design will allow.

Being that budget can be paramount, it is essential that you get what you pay for, on whatever level of finish-out you chose. There is a tendency in this business for interior companies to say they can do work that unfortunately they are incapable of doing, and there are a few things you can do to truly evaluate whether your expectations will be met.

One, look at the work itself. A picture in an ad can be very misleading.

Two, talk to an owner who had interior work done to find out how capable, reliable and responsive the company was. If you're lucky, you might even talk to a customer who experienced a problem, and you can find out how the company chose to handle it. (Ideally, they should be as enthusiastic about solving a post-delivery problem as they were about selling the job in the first place.)

Three, and most important, stop in and personally inspect the physical plant. See if the company operates in a neat and organized space, and has the personnel, environment and equipment to do the job on the level you are expecting. Take the opportunity to observe processes and procedures to make a first-hand determination that the underlying work necessary to protect the value of the airplane is being done, guaranteeing that the interior will do more than just look good on delivery.

Ask also about the company's product liability insurance. It protects you as well as them. And if the owner is also a pilot and licensed mechanic, you are probably dealing with someone who understands your needs and who will more than likely meet your expectations.

It's obvious there's more to this than having a sewing machine and a paint gun. Just as an example, to repair the floor section shown in the accompanying photograph, sheet metal tools costing about \$6,000 were needed for fabricating the appropriate FAA-approved repair. The good old days when these airplanes were new enough not to require these substantial repairs are over with. The fleet needs our help.

Approvals and materials

As always, we must deal with FAA paperwork as part of the job. The approval process for this type of work involves conforming to Federal Air Regulations (FARs) in three areas.

First, the person performing the work, i.e. the one installing the repaired, modified or upholstered part. Here's the

good news – you don't have to be a licensed mechanic. Almost all of the tasks involved in interior renovation can legally be performed by an aircraft owner under the guidelines of the preventive maintenance section of Federal Air Regulation 43, appendix A, sub-part C.

Logbook entries, stating what was done and listing materials used with their appropriate approvals and documents, can be made by an aircraft owner. The owner must specify date of completion and tach time, and sign off the work using his or her pilot's license number. As you probably are aware, there are some installations and modifications that do require a licensed mechanic, which is why I recommend using a shop where you find a technician with at least an airframe mechanic's license.

For those of you doing all or part of this work yourselves, one final note. The FAA publishes a "how to" advisory

circular full of down-to-earth, clearly explained information covering many of the preventive maintenance tasks you can undertake. It is AC 43.13-1B — "Acceptable Methods, Techniques and Practices - Aircraft Inspection and Repair." In my opinion, this manual is a must-have.

The second area of FAA regulations involves flameproofing of materials. According to the letter of the law, flameproofing requirements do not apply to almost all piston-powered Beech aircraft. Since these airplanes were certified under an old regulation known as Civil Air Regulation 3 that contains no flameproofing specifications for cabin materials, one could technically install combustible materials in the cabin area.

Good judgment and strong encouragement by the FAA certainly override the letter of the law here. That being said, here's what should be included in



All this stuff for metal repair.



Completed floor structure repair.

or with a logbook entry to establish the pedigree of each of the materials used in a new interior:

- 1) Description of the material and where it was installed
- 2) What FAR flameproofing standard it meets, for instance
 - a) FAR 25.853a, vertical burn, self-extinguishing
 - b) FAR 23.853a, vertical burn, 4" per minute burn rate
- 3) Documents to support the above specifications
 - a) flame test report from a certified testing lab
 - b) 8110-3 form signed by a designated engineering representative (FAA-DER)
- 4) Certification that seat belts and harnesses comply with FAA TSOs
- 5) Other paperwork including STCs and field-approved modifications

The third area of compliance involves the weight & balance and equipment list. These must be amended to reflect the changes made during the installation of a new interior.

The FARs state that no weight & balance change need be made if the difference is less than one percent of the empty weight or CG. However, most FSDO airworthiness inspectors want any change to be included in a new weight & balance calculation.

Think about it; a pound here, a pound there, and over time several less-than-one-percent changes contribute to an airplane that is 20 pounds overweight. (We've all heard the stories

about how much heavier these airplanes are when they are physically weighed than the mathematical weight & balance calculations would ever indicate.)

So whether you're doing this yourself, or relying on a professional shop, weight & balance and equipment list revisions need to be included in the total paperwork package. If you are doing this yourself, you'll need to enlist the help of your mechanic, as a license is required to change either of these two documents. Set up a plan to weigh things coming out and weigh things going in to avoid the unnecessary expense of weighing the airplane at the completion of the job.

At this point, we've just about covered the logistical planning stage of the interior renovation process. Next month, we will don our artist/designer hats, dive into the idea lists and photos you have collected, and bring your dream interior to fruition—at least on paper. Think of the possibilities!

ABS member Dennis Wolter started Air Mod in 1973 to bring innovative design and high-quality renovations to the general aviation market. Dennis, his wife Cynthia and 10 dedicated employees complete about 40 renovations each year at their facility on the east side of Cincinnati. Dennis has a degree in industrial design from the University of Cincinnati. He is an A&P, IA and a 3,000-hour instrument pilot.



Typical design study for a new interior.