

INTERIORS

THE INSIDE STORY

PART VII

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I know I spent a lot of time last month on the design and upholstery of seats, as well as the importance of seat support and comfort. But, of all the areas of an aircraft interior that presents the greatest opportunity for aesthetic and function improvement, it's the side panels. Think of all the side panel issues that, if properly addressed, can significantly improve comfort, airframe maintainability, durability, cabin amenities and aesthetic appeal.

Since many of the installation, repair, upholstery and inspection techniques are either common to or similar for both headliners and side panels, I'm going to include headliners in this discussion.

Remember that notebook you've been carrying in your airplane recording notes about your ideal interior? Well, here's where it really pays off, enabling you to incorporate all the details you want in your new interior.

A WISH LIST TO START YOU THINKING ABOUT WHAT COULD BE ADDED TO YOUR AIRPLANE:

- Inertia reel shoulder harnesses
- Gooseneck reading lights
- Cup holders
- Wood grain inlays
- Overhead reading lights
- More efficient vents and vent systems
- Additional heat outlets
- Super soundproofing
- Storage cases
- Accessory plugs (14- or 28-volt)
- Special storage pouches
- Flush-mounted intercom jacks
- Better sun visors
- Improved oxygen outlet mountings
- Discrete storage solutions
- Tables

Following is a list of various areas that should be addressed before we modify, repair and upholster those dated and dingy side panels.

□ **Airframe corrosion** - With the interior removed, now is the time to undertake a major cleanup of corrosion, insulation and old glue, possibly saving your aging airplane from an early date with the salvage yard. This subject was covered in detail in our corrosion series (May - July 2003).

□ **Insulation** - As light airplanes go, Bonanzas and Barons are quieter than most. As insulated by the factory, most of them register at between 90 and 93 decibels at the pilot's ear, and that's horribly loud. With the right materials and proper installation techniques, the noise level can be reduced by 4 to 8 decibels. What controls sound levels also positively affects thermal properties of the cabin, an obvious benefit. More on this in a future article.

□ **Remove abandoned wiring & systems** - It's surprising to see how much of this old stuff is still flying around with us in our airplanes. Now is your chance to really clean things up.



All this unused old wiring was hiding behind the side panels.

□ **Water leak detection** - The source of a nagging water leak can best be found by taking a garden hose to an airplane with a stripped-out cabin. Start low and work up; you will find it! Often the water wasn't coming in where the wet spot was.

□ **Systems evaluation** - Now that you can see it all, check out the condition of heat and fresh air ducting, cables, pulleys and fuel and hydraulic hoses. Carefully inspect old antenna co-ax leads and static lines. You'll be surprised how much deterioration can occur in a mere 40 years.

□ **Remove floorboards** - Don't forget to remove the floorboards as part of your inspection and cleanup process. It's not uncommon to find things under there that belong in a natural history museum. Also, critter droppings are very corrosive. Later in this series we will discuss repair and/or replacement of floorboards.

DESIGNING NEW SIDE PANELS

Now it's time to put on our designer's caps and brainstorm the many design options that can be included in your new side panels. If you need some inspiration, spend a little time and see what is being done in new cars. With proper planning, you can have all of that neat stuff (and more) in your airplane.

There are basically three levels of side panel renovation: You can retain the original design, choose to do a moderate upgrade, or go with a total redesign.

RETAINING THE ORIGINAL DESIGN

Many things are possible at this stage. By keeping original armrests and reconditioning and upgrading such things as the mounting hardware and mounting brackets, you can make improvements without the more costly option of a total redesign.

Dividing large, one-piece panels into smaller sections can make them easier to install and remove. Using modern fasteners and retrimming headliner and side panel components can prevent damage and save time and money at annual. Discuss the side panel design and installation with your mechanic. He will know what you should consider changing.

My preference is to keep vintage airplanes original in their design character. But vintage doesn't have to mean spartan. We can carefully incorporate modern amenities such as reading lights, more efficient ventilation, cup holders and ergonomic armrests without giving up the elegance of a true classic.

MODERATE UPGRADE

This level of side panel upgrade is done on older airplanes and mostly involves incorporating a later-style armrest. This not only looks more contemporary but, due to the molded shape of the armrest, also accesses unused space hidden behind a flat side panel.

This upgrade requires the installation of new armrest supporting brackets, cabin door pull mounting hardware and the forming of a relief in the previously all-flat side panel. Believe me, the trouble is well worth it.

There are at least three advantages to this level of upgrade. First, a major aesthetic change can be made for very little weight gain and cost. Second, by in-setting the contoured armrests, we can get the effect of a cabin that is two or three inches wider without doing the impossible task of actually making the fuselage wider. And third, all the maintenance-saving features mentioned earlier can be incorporated in this design.

TOTAL REDESIGN

And then there is the choice of an all-out effort of total redesign of the interior hard-shell. This means the entire original side panel and armrest system will be redesigned and newly fabricated prior to upholstery.

Since you are starting with a clean sheet of paper, you can take full advantage of nearly 60 years of Bonanza flying to rethink this space. Function, safety and aesthetics can be developed to a whole new level. And then, when you add modern lighter materials, wonderful things can happen.



Structural bracket and recession in the side panel to accommodate the new molded armrest.



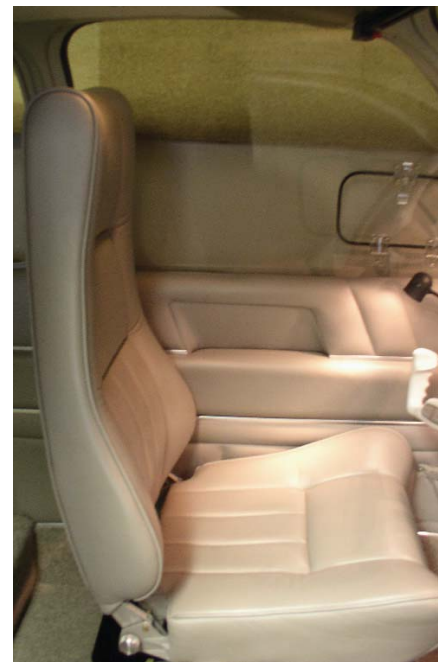
Original side panels in a 1959 J35.



Contemporary armrest in an early Bonanza.



Rail-mounted three-piece headliner with overhead lights and air vents in a B35.



All aluminum rail-mounted side panel installation in a 1950 B35.



Four-step process to fabricating a fiberglass side panel. Top to bottom: (1) Handbuilt prototype side panel, (2) epoxy mold, (3) rough-formed glass side panel, and (4) trimmed fit and upholstered side panel.

At Air Mod, we have two basic ways of fabricating these new side panel/armrest installations.

The first is to build the new panels using .020" 2024 T-3 aluminum and mounting them on an extruded divider or "T" rail. This system affords us the option of fabricating a continuous armrest that runs from the instrument panel back to the baggage compartment. It looks great and allows for an obstruction-free space inside the new armrest to run electrical wiring and other systems without having to drill holes in cabin bulkheads.

An ergonomically dimensioned recession is built in above each armrest,

increasing elbow room by an inch or so. The entire interior is mounted on extruded rails, making installation and removal a snap and adding a very appealing visual trim feature.

In pre-1963 airplanes, we can also fabricate a new headliner mounted on these extruded aluminum rails. It looks great and is easy to install and remove. An added advantage is that many types of ventilation and lighting upgrades can be incorporated into the new installation.

Since the new side panels described here are aluminum and can only be formed on one axis, we are limited to the shapes that can be generated. Another system we can install employs

the use of molded structural fiberglass for the upper side panels. It is very strong, durable, lightweight and—with proper tooling—is easily molded into any compound shape.

We can now take advantage of previously inaccessible space behind the side panels. Accessing this space allows us to build ergonomically positioned armrests with exotic wood inlaid panels for such things as switches, lights, intercom jacks or oxygen outlets.

Think of the possibilities! Thanks to the characteristics of composite materials, a total aesthetic enhancement is possible. Soft flowing curves of a seat can be fully emulated in the side panels. It's a win-win deal when the old concept of form and function comes together so well.

And here's the best part: Both of these total re-do systems add very little weight and are much easier to install and remove than old components, meaning less damage at annual inspection and radio repair time. I love it!

WHAT DOES IT COST?

We all know there's no free lunch, so here is an idea of what all of this adds to a *standard* interior redo. Certainly the most cost-effective side panel upgrade is to install late-style recessed fiberglass armrests. At approximately \$650 for a four-place airplane, they completely change the character and comfort of older Bonanza, Travel Air and Baron side panels. The weight increase is only two or three pounds.

You should expect to pay approximately \$3,500 for the *all-aluminum extruded rail-mounted side panel armrest installation* in a four-place airplane. This system requires an entire replacement of the side panels, armrests and armrest supporting structures. There is a weight increase of three to five pounds.

This modification alone takes about 55 hours of skilled labor, so you should allow at least an extra week of downtime for an upgrade of this complexity.

The most *elaborate side panel*

upgrade with the molded fiberglass side panel system includes exotic wood inlays and angle-mounted contoured cabin accessory panels, which can contain rheostat-controlled gooseneck reading lights for each cabin seat. The cost for this modification in a four-place Bonanza is about \$5,000, due to the wood and electrical work, as well as the side panel and armrest fabrication.

This modification takes an extra 70 hours, so factor an additional one-and-a-half weeks to the down time.

Whether you choose to keep your

side panels as originally designed or have a major upgrade installed, many options can be incorporated into the new interior. If you have a need or an idea for something, discuss it with the renovator who is going to do your interior. Many deficiencies can be improved upon and problems can be solved.

OK, so much for modified side panels and armrests. When doing a renovation, most of our customers—and probably customers of other shops as well—choose to reuse their original side panels. So from this point on, I will

discuss the work required to get those original side panels into better-than-new condition.

There are four different generations of Beech side panels that we need to deal with. We'll get into all the interesting details next month. Until then, fly safe. (And keep taking notes!)

Dennis Wolter is an A&P, IA and a 3,000-hour instrument pilot who 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.



I've been an ABS member for quite some time but I've never sent you a photo of our beloved 1961 N35, nor have I ever sent you photos of my four kids! So here is a shot with the airplane AND the kids on a warm mid-fall day. It was taken just before we had a campfire and toasted marshmallows right on the field property at 9NCO (Knightdale, North Carolina), a private field with a wonderful group of people based here.

Obviously my wife and I have too many kids now for all of us to enjoy our great old airplane at the same time, but I have no plans to move to an A36 or a Baron because N1231Z is part of the

family. Besides, with four kids, we are rarely able to all go anywhere at the same time—what with football, lacrosse, swimming and diving, tennis, soccer—you get the idea.

My father purchased this airplane in 1977. He still enjoys riding in her, but lost his medical. My older brother also flies it. We use 31Z for business and pleasure travel, mostly on the east coast but we've been as far as the northern tip of Nova Scotia and as far west as Seattle via Reno.

Thanks for all the good work y'all do at ABS.

— Robert P. Crone, Raleigh, North Carolina



Madeline (10), Peyton (8), Palmer (6) and Margo (4) with the N35 purchased in 1977 by their grandfather and now flown by their dad and uncle.