

INTERIORS

THE INSIDE STORY PART X

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In this final article of our interior renovation series, we are down (literally) to the last subject: Carpet. Of all the major components in renovating interiors, installation of carpet is the easiest. But there are still some important factors to consider. If you followed the first nine "Interior" articles, you know my way of covering all the decisions and details of a job is to take you through it a step at a time. So let's get started.

Carpet selection

Aircraft carpeting must hold up under demanding conditions. The owner or operator of the airplane is usually not the one who wears out the carpet—it's the maintenance personnel.

I strongly believe the material of choice is a tightly woven dense carpet in a mid-tone color. Although light colors look good at delivery, they require more care and constant cleaning. We have found that mid-range colors, particularly those woven with a subtle variegation of different yarns, hold up best.

Wool is unquestionably best because it is durable, fade-resistant and easy to flameproof. Remember, though—as mentioned in an earlier article—too much flameproofing chemistry can cause a corrosion problem.

Keep in mind that dark, smooth carpets readily show dust and loose stuff like grass and lint; light colors show soiling and dirt. Pick your poison: Do you want to vacuum frequently or shampoo? With a mid-tone multicolored carpet, you'll do very little of either.

It's important that your floor carpets are easy to install and remove. You'll find this to be quite an advantage when you take your airplane in for maintenance. An ounce of prevention is worth a pound of cure.

More about carpets

Aircraft carpet comes from our suppliers with all the necessary FAA flameproofing documents. It is usually manufactured in 12' widths. For an early short-cabin Bonanza or Travel Air, we order 12 x 6 or 8 square yards. A long-cabin later F33A or 55 requires 12 x 7, or about 9½ square yards. An A36 or 58 requires 12 x 8, or almost 11 square yards. If throw carpets are to be made, add approximately two square yards.

These quantities will cover the floors, lower cabin sidewalls (kick panels), forward lower firewall and the aft bulkhead. For post-1979 A36s and 58s, add an additional 1½ square yards for

the aft extended baggage compartment.

Unroll the carpet. Give it a good inspection in bright light. Step back and look for color and texture irregularities. Then verify the direction of the nap. Carpet looms create a bias as to the way the carpet fibers stand up when they are woven. It is very important to keep this fiber "slant" running in the same direction throughout the cabin.

If you put misaligned carpet panels next to each other, you will see what appears to be a very noticeable color difference because of the way light reflects off the carpet fibers. To prevent this from happening, we place the uncut piece of carpet face down on the floor and mark it with lots of "V" marks pointing to what will always be forward for floor pieces and up for sidewall, bulkhead or firewall pieces.

Since the cost of this aircraft carpet is so high, we don't order more than we need. That means laying out every sec-



Keeping the carpet properly oriented as all of the pieces are efficiently laid out.

tion of carpet before the first cut is made. Keeping the orientation marks in mind, all the old pieces removed from the airplane are carefully laid out face down on the back side of the new carpet. After some trial and error, all the different shapes will be laid out to most efficiently fit on the new carpet.

Cutting is done in two stages, depending on carpet location. Fixed side panel pieces are rigid backed, and the metal backing panels can be used as accurate templates to precisely cut the shape and size of the piece required.

The main floor carpet pieces are another story. Due sometimes to a poor initial fit at the factory, shrinkage with age, or being aftermarket carpets, you should scrutinize the fit of the existing carpets carefully before they are removed and mark any misfit places. Then using the old floor carpets only as rough patterns, add about an extra inch around the perimeter of the new carpet pieces as you cut.

With the carpet pieces cut, it's time to serge the kick panel carpet pieces and bond them to their respective aluminum backing panels with contact cement. Once carpeted, the kick panels and spar covers are installed.

The floor carpets can then be positioned in the airplane and finish-trimmed to precisely fit the cabin floors and accurately meet the carpeted kick panels. If you merely cut the floor carpets using the original patterns, they often won't fit properly.

Cut the carpet with sharp, heavy-duty industrial scissors. Razor knives are difficult to control, dull quickly and can produce a ragged cut. Scissors



Final trimming of the carpet in the airplane.

allow more precise, controlled and clean cuts, especially at inside corners where it is very critical not to overcut the edges. You'll have a problem later as the carpet serger tries to apply loop stitching to ragged edges of overcut inside corners.

Serging: What it is, how and why it's done

You've all seen the neat, color-matched, thick-thread loopstitching that is often applied to an exposed edge of carpet. This is done with an expensive and temperamental serging machine. Of the three methods of finishing the edge of carpet, I think serging is best for four reasons:

First, with the proper machine and a skilled operator, almost any shape of carpet edge can be beautifully finished. Second, the heavy yarn used is very durable. Third, if a thread should break, all you need to do is tie off the loose end on the back side of the carpet and no unraveling will occur. And fourth, no stress is put on the carpet when serging around a corner, and the corners don't lose their shape or roll up.

We've tried the other two methods of carpet edge-finishing, but they really are not optimum. The first alternative is

to use leather, vinyl or cloth tape sewn to the carpet's edge. This works, but as the materials age and shrink slightly, the carpet edges will become misshapen.

The second alternative to serging is to roll the carpet's edge under about one inch, glue it in place, then hem it with an industrial sewing machine. This works with thinner automotive carpet, but is not an option with heavy carpets used in aircraft.

For those of you doing this job yourself, take your accurately cut carpet pieces to a commercial carpet company for serging. The cost of \$1 to \$1.50 a foot is a good deal.

An important detail: It's imperative that you make the emergency landing gear crank cutout large enough



Serging the trimmed carpet.



Sewing on the rudder pedal booties.

that it will not interfere with the cranking process. The cutout Beech originally made was sometimes so small that you hit your fingers when attempting to crank down the gear while sitting in the pilot's seat. Doublecheck this.

Protective pads & backing

It's now time to sew the vinyl or leather booties around the rudder pedal cutouts. Use the originals as a pattern and cut out new ones. We actually lightly glue the new booties in place to help hold them in position as they are being sewn to the new thick carpet.

We next sew the heel pads to the front carpets. Again, glue is used to temporarily hold the pads during sewing. Pads are available from automotive upholstery supply houses in about 20 different colors. If a good match is not available, use aluminum or stainless steel to fabricate a durable and neutral heel pad. We like to secure these metal heel pads to the carpet with short countersunk upholstery screws and flat tinerman nuts. Don't screw them to the wood floorboards because, after a couple of annual inspections, the floorboards will begin to look like they have been used for target practice.

Beech used snaps in older airplanes



Aluminum heel pad and finished rudder pedal booties.

to hold the floor carpet in place, but with the invention of Velcro in the mid-60s, snaps are history. However, Velcro comes with its own rules. First, it must be sewn, not just glued, to the carpet. No glue will permanently hold it. Second, it must be properly secured to the cabin floors, and cleanliness is the key.

Thoroughly clean the surface, then apply a thin coat of contact cement as a primer and let it dry for at least an hour. I buy only 3M self-stick Velcro because of failures encountered with other brands.

Apply the soft or loop Velcro to the floor and the hard hook part to the carpet. The hook stuff will collect and retain almost any type of dirt or lint, as well as stick to clothing when you're on the floor working under the panel, so you're better off with the soft Velcro on the floor.

Last is the foam backing that not only insulates against sound and cold, but also helps give the floor carpet a soft

plush feel. We use a black closed cell (not water-absorbing) 1/4" insulite foam that we buy from Skandia Inc. (815-393-4600), product # IV-1. It is light, flameproof, durable, has great sound attenuation qualities, and is easy to bond to the carpet backing with the spray-on contact cement mentioned in an earlier article.

Cover the entire back of the carpet



Velcro sewn to the edge of the foam-backed carpet.

BEECH A36	NXXXXX	s/n X-XXX	1000.0 hrs tach	01-01-06
Fabricate and install a new interior using the following approved materials. Beige leather on seats & side panels: Douglass LL3844 dalwhinnie, passes FAR 25.853a. Blue leather trim: Hemisphere 112213 indigo, passes FAR 25.853a. Carpet: Glen Eden cardigan bay napoleon blue, passes FAR 25.853a. Headliner: Tapis ultrasuede 3722 seashell, passes FAR 25.853a. Remove old glue and excess damping tar, clean belly, chromate surfaces of inner cabin skins and insulate with GFG and NS-Astaire fiberglass which passes FAR 25.853a per Skandia test report 11232, work order 106474-04. Insulate forward cabin with Skandia ADC122 insulation that passes FAR 25.853a. Insulate aft floorboards with Skandia IV-1 insulite soundproofing that passes FAR 25.853a. Repair, re-form, reinforce and modify edges of headliner mounting. Remove unused antenna coax and properly secure radio wires in cabin. Modify side panels for components to be mounted on aluminum T-rail extrusion. Replace all seat and side panel foam with Skandia flame retardant urethane foam which passes FAR 25.853a. Repair and reinforce cabin trim components as required; refinish cabin trim with Dietzler acrylic lacquer, placard as original. Install four Osram gooseneck reading lights on side panels, two connected to previously approved 75ohm Ohmite rheostats, all wired to the main bus with #18 Astro mil spec wire (MIL-W-22759E) through a 1 amp inline fuse; electrical work performed per AC 43-13-1B, chapter 11, section 3, paragraphs 11-30, 11-31, 11-32, 11-33, 11-37, section 4, paragraphs 11-47, 11-48, 11-49, 11-50 a, 11-51, section 5, paragraphs 11-66 b, c, d (1), fig 11-2, paragraphs 11-67 a, b, d, 11-68 d (1) (2), b (1) (2) (3) (4) (5) (6) (7), section 6, paragraphs 11-76 a, b, 11-77 a, b (2), c, d, e, 11-78, section 7, paragraphs 11-85 a, c, 11-86, table 11-11, section 8, paragraphs 11-96 a, b, c, d, e, f, g, h, j, k, l, n, o, q, r, s, w, aa, bb, cc, dd, ee (1) (2) (3) (4), 11-98 c, d, e, f, I, 11-104, 11-107 a, section 9, paragraphs 11-117 b, 11-118 a, b, c, 11-125, section 10, paragraphs 11-135, 11-137, 11-138, 11-139 a, b (1) (2) (3) (4), c, d, section 11, paragraphs 11-146 a, b, c, d, 11-147, fig 11-12, 11-13, 11-14; lights were tested at 220°F for 12 hours at 12 volts with no discrepancy noted; for continuing airworthiness inspect wiring behind side panel and in circuit breaker box whenever these areas are accessed, replace bulb with Osram #378 bulb or equivalent. Install Beech shoulder harness components for pilot and co-pilot seats as specified by Beech kit drawing #58-5005; inertia reels were re-webbed for color at Aircraft Belts Inc, WO# 67456R, TSO C-22 and/or C-114. Install six new Aircraft Belts Inc lap belts, WO# 67456N, TSO C-22 and/or C-114. Disassemble, repair and reinforce glare shield, upholster with Boltaflex spirit II black vinyl which passes FAR 25.853a. Re-mount ELT below hat shelf and install access door on aft bulkhead. Remove, prep, paint, placard and reinstall yoke caps. Remove old seals and glue from cabin door and center opening windows, install new Beech T-6000-18 and 115155-12000 seals. Check doors and windows for function and leaks with no discrepancy noted. Fabricate lexan box for front spar cover. Revise weight and balance as follows:				

New empty weight	2271.48 lbs
New useful load	1328.52 lbs
New EWCG	77.89 ins
New moment	176918.66 in lbs

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A TYPICAL LOGBOOK ENTRY FOR AN UNMODIFIED INTERIOR IN AN A36.

pieces with the foam to within an inch or two of the serged edges, allowing an untreated area around the perimeter for the application of Velcro.

We've just about covered everything related to your new interior. But before we're finished, there's the issue of paperwork. There's always paperwork, so we have included a breakdown of what is required for a typical interior renovation.

Paperwork

Logbook entry. This details a complete description of the work performed during an interior renovation, including documentation verifying that all materials and processes conform to Federal Aviation Regulations (FARs). Every step must be spelled out in full detail, identifying all materials, new parts installed, part numbers, reworked parts reinstalled with their work orders and FAR-conformity documents.

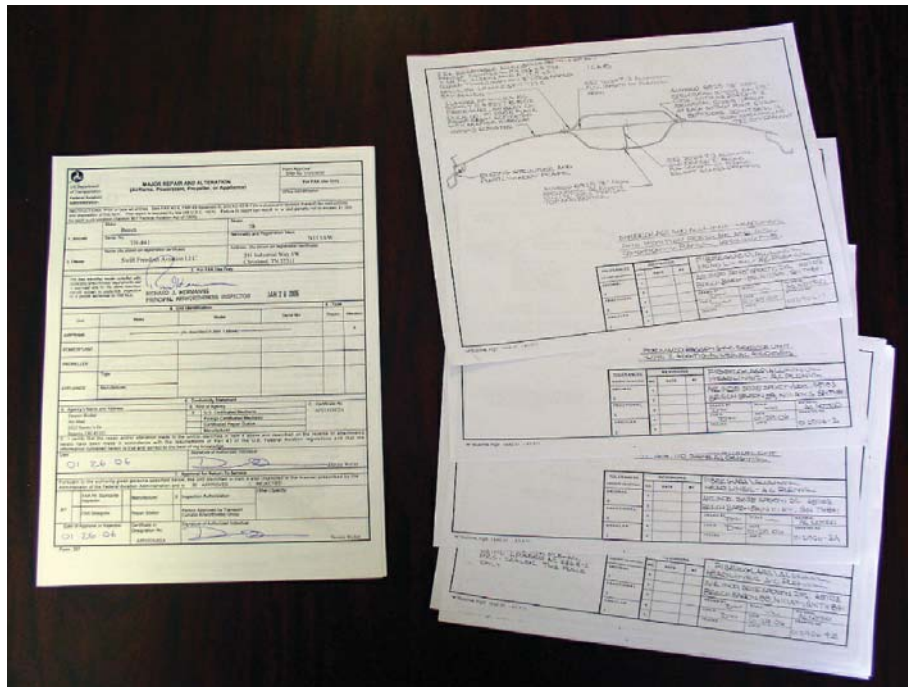
Flameproofing documents. A minimum of three documents is required to verify that all interior finish materials, foam and insulation meet the FAA flame specification for use in an aircraft: 1) A packing slip or invoice identifying the material; 2) a burn certification that quantifies how the material performed during the actual burn test; 3) an 8110-3 form signed by an FAA inspector or DER who witnessed the test and who states that the material passes.

Major alteration paperwork. If a major alteration or STC'd kit was installed, an FAA Form 337 and a copy of the STC must be included.

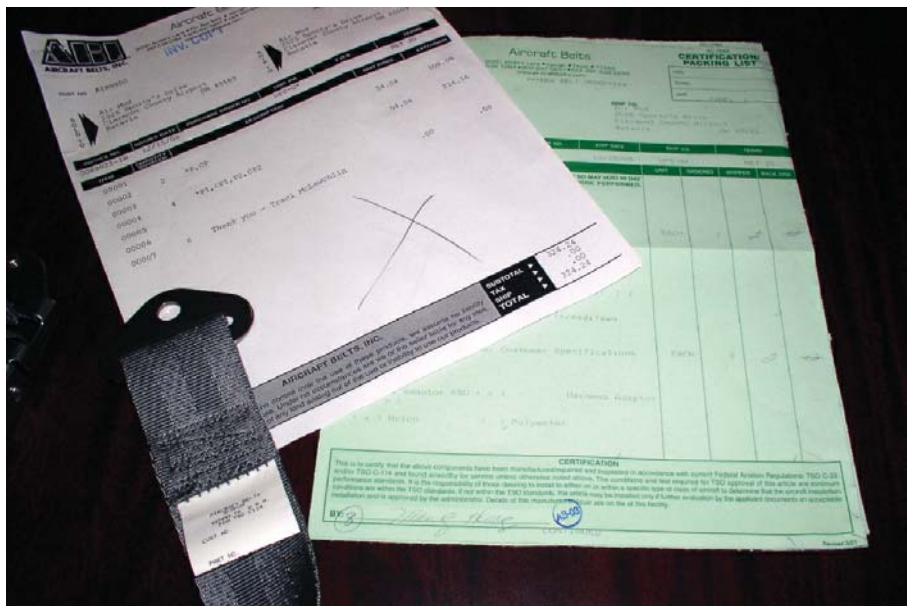
Seat belt/shoulder harness documents. There are three documents that verify compliance for seat belts and shoulder harnesses, both new and rewbedded. 1) An identifying packing slip or invoice; 2) a certification document signed by an FAA-licensed inspector; 3) a certification tag sewn to the belt. These tags are item-specific, and must never be sewn to a different belt or harness.



Packing list, test report and 8110-3 form.



Major alteration Form 337 and supporting documents.



Seat belt/harness invoice, certification document and certification tag on belt.

Weight & balance. A new weight and balance must be calculated, and don't leave this task to the end. There are often components that need to be weighed coming out as well as going in throughout the course of the project. The sample shown to the right is very typical.

This wraps up the subject of interior renovation. Cynthia and I have enjoyed writing this series and sharing our passion for this business. Hopefully, you're better prepared to make the right choices when you take on your own renovation. Your comments are welcome.

Fly safe, and enjoy these beautiful Beech airplanes!

P.S. An FAA friend and I plan to collaborate on a Beech-specific article for a future issue that will cover all levels of FAA approvals and paperwork—not just those related to the interior.

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 has a degree in industrial design from the University of Cincinnati.

BASIC WEIGHT & BALANCE and EQUIPMENT LIST CHANGE			
01-01-06			
NXXXXX	Beech A36	s/n X-XXX	

	WEIGHT	CG/ARM	MOMENT
PREVIOUS EMPTY	2256.23	77.41	174649.58
Remove old antenna coax	-1.10	122.00	-134.20
Remove forward ashtrays	-1.20	68.00	-81.60
Remove center ashtrays	-1.20	110.00	-132.00
Remove aft ashtray	-.60	155.00	-93.00
Remove forward seat backs	-2.60	87.00	-226.20
Remove center seat backs	-2.60	102.00	-265.20
Remove aft seat backs	-1.90	167.00	-317.30
New side panels (net)	-.90	122.00	-109.80
New cabin insulation (net)	8.70	114.00	991.80
Second mapcase co-pilot seat	.20	87.00	17.40
Second mapcase C/P1 seat	.20	102.00	20.40
Inertia reel shoulder harnesses	3.00	97.00	291.00
Center intercom jack mounts	.20	129.00	25.80
Aft intercom jack mounts	.20	152.00	30.40
Accessory plug	.35	136.00	47.60
Headliner reinforcement/upholstery	6.10	133.00	811.30
Forward gooseneck reading lights	.40	68.00	27.20
Center gooseneck reading light	.20	126.00	25.20
Aft gooseneck reading light	.20	148.00	29.60
Install fire extinguisher	4.70	111.00	521.70
Reinforce aft window frames	.60	151.00	90.60
Glareshield repair/upholstery	2.84	56.00	159.04
Floorboard repair	.32	93.00	29.76
Aft bulkhead trim	2.37	170.00	402.90
Pedestal carpet	1.42	54.00	76.68
Lexan box on spar	.40	75.00	30.00
NEW EMPTY	WEIGHT	CG	MOMENT
	2271.48	77.89	176918.66
New empty weight	2271.48 lbs		
New useful load	1328.52 lbs		
Max gross weight	3600.00 lbs		
New empty wt CG		77.89 ins	