

Renovating the ABS/ASF Bonanza

PART III: HEADLINER

By Dennis and Cynthia Wolter

Ask any writer what they think to be the most difficult part of creating a good article and the most frequent answer will be “writing the first paragraph.” I’m trying to conjure up a way to make a technical discussion about not-so-exciting Beech headliners exciting. Well, I give up. I will just dive into the minutiae of preparing and recovering late-style Beech headliners.

To properly repair and reupholster these headliners, it’s important to understand why they were designed and fabricated as they were. The previous iteration of Beech headliners installed in the 1970s was a two-piece, semi-rigid urethane foam design that is prone to sagging and shrinking when exposed to temperature cycles (Photo 1). They also had a complicated and not very efficient fresh air ducting system. Beech engineers solved these problems by designing an entirely new headliner with a larger and more efficient fresh air duct system, fabricated of thermally stable and lightweight molded honeycomb material. To include as much head room as possible and incorporate a large air duct, Beech lowered the center of the headliner, creating a convex shape running the entire length of the headliner. As often happens when solving one problem, another is created. As the finish vinyl bonded to these headliners ages, it begins to shrink slightly. At the same time the foam backing material begins to disintegrate, causing the two materials to pull away from the concave areas at the edges of the convex fresh air duct. This eventually leads to the sagging headliners we’ve seen all too often in later Beech airplanes (Photo 2).

So much for the problem. Here’s the multi-step fix. With the headliner and

related pieces removed (lights, nozzles, etc.), it’s on to removing the existing finish material, foam, and adhesive. If the headliner still has factory original materials, you must first peel off the vinyl finish cover and degraded black foam (Photo 3). With that mess removed, strip the remaining clear adhesive. Our method is to soak towels in lacquer thinner, lay them on the adhesive, and then cover the headliner with plastic to allow the thinner to start dissolving the adhesive (Photo 4). We use plastic scrapers to carefully remove gross amounts of this tenacious adhesive. It’s very important to not damage the delicate composite honeycomb substrate (Photo 5). The final cleanup step is to use pieces of old carpet soaked in thinner to totally remove all the old adhesive. Unlike rags, the open pile of carpet acts almost like a brush and doesn’t readily load up with the old adhesive. It works great and it’s free!

The ABS Air Safety Foundation’s 1981 A36 had a replacement headliner recover job that was in the early stages of delamination and was beginning to separate in the concave areas of the headliner (Photo 6). To prevent separation of the finish vinyl and backing when this existing headliner was installed, very firm foam had been heavily glued to the composite substrate (Photo 7), then



Photo 1



Photo 2



Photo 3

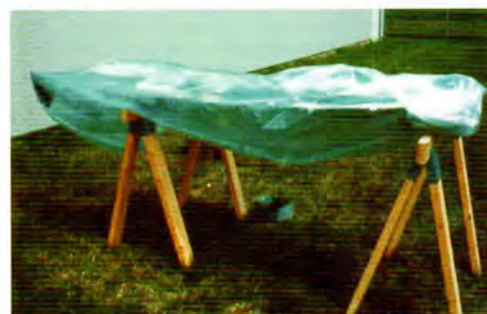


Photo 4



Photo 5

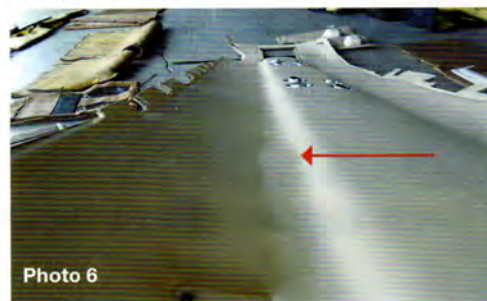


Photo 6



Photo 7



Photo 8

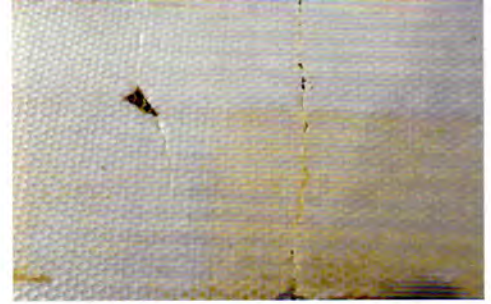


Photo 9



Photo 10



Photo 11



Photo 12

the finish vinyl was bonded to the foam with a very tenacious adhesive. This made removing these materials a difficult challenge. We had to carefully cut the foam off the surface of that delicate composite substrate using a sharp putty knife (Photo 8). We then soaked the remaining foam residue and adhesive with terrycloth rags doused with lacquer thinner, as mentioned earlier. This allowed us to use carpet to safely clean the glue off the substrate without causing damage to its surface. This process took a patient and careful person eight hours to complete.

Once we're finished with the cleanup process, the next step is to repair any cracks or deformations in the composite structure (Photo 9), a process we described in the July 2017 article on side panels. We then addressed the frustrating results of a shortcut taken by the factory: holding the threaded mounting rings for the reading lights in place with RTV silicon sealer (Photo 10). This pipe dream solution frequently allows the mounting rings to separate from the headliner substrate any time a light is removed. This makes it almost impossible to reinstall a light without having to completely remove and disassemble the headliner. A six-hour job: ouch! The fix is to remove the reading light mounting rings, clean off all of the old silicon adhesive, and re-mount the rings with $\frac{8}{32}$ " machine screws and self-locking nylock nuts. We then seal the outer perimeter of the rings with thick Polyfix™ adhesive.

The next improvement we make is to secure the threaded fresh air vent nozzle mounting rings with thick Polyfix™ (Photo 11). These rings do not have mounting flanges so they must be thoroughly cleaned before bonding with Polyfix™.

The next issue facing us was how to mount the reading light switches, so as to have access to them and be able to remove them in the future as they are prone to failure. With the air vent nozzle mounting rings now properly secured, we simply unscrew the nozzle and reach through the mounting hole to remove the light switch. The switches were originally secured in a delicate plastic locking collar that is most likely already damaged, or likely will

be damaged by even the most careful technician trying to remove the switch. A simple and durable fix is to slide a piece of rubber hose over the body of the installed switch and secure it with a small screw clamp. We orient the screw head of the clamp so the switch may be unscrewed and removed from the air vent hole. The picture shows the old, unusable plastic collar and the hose and clamp (Photo 12). No more need to remove the headliner

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Photo 13



Photo 14



Photo 15

just to replace the switch. One final switch issue: These switches are prone to sticking and mechanical failure. When removing the switches for headliner renovation,

it is absolutely the time to slather them with a quality electrical contact cleaner and lubricant. We do this several times, blowing them out with compressed air

between respraying with more contact cleaner. An ounce of prevention is worth a pound of cure!

With all that preparation drama completed, we're finally ready to foam and upholster the headliner. The first time we renovated one of these one-piece, dropped center headliners years ago, it was obvious that we had to solve the problem of finish materials potentially separating from the headliner's molded substrate. The fix we came up with is to cover the headliner in three sections. First we bond a thin, 1/8" layer of high-density foam to the center section of the headliner. Then we bond the customer's selected finish material to extend 1/2" beyond the foam. Using this thin, firm foam backing allows us to very precisely cut out the light, vent, and switch holes, ensuring more controlled fit and installation of these components.

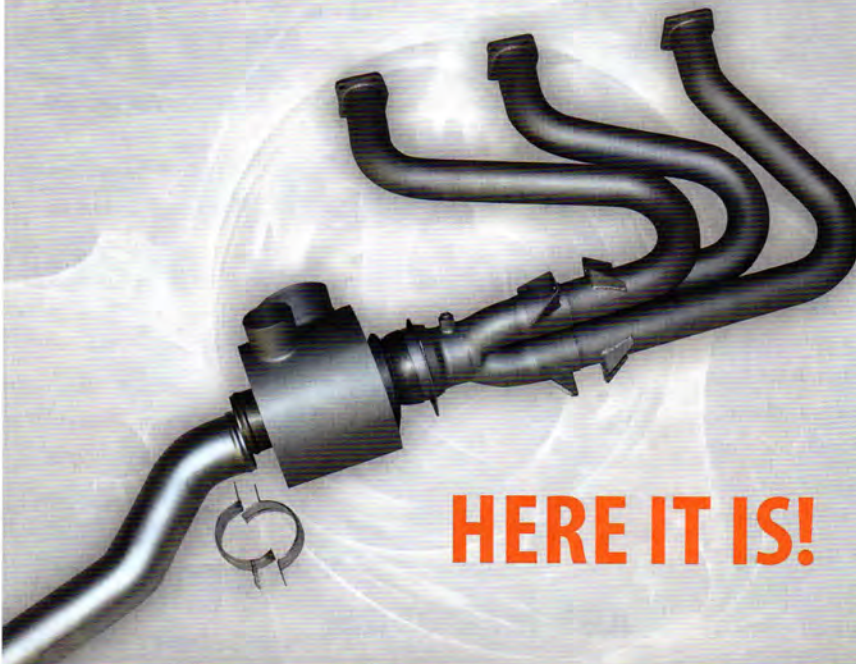
Here's the good part: To eliminate any possibility of future separation of materials, we physically secure the finish material at the lowest point of the concave area along the entire length of the headliner. This is done by fabricating full-length, 1" wide, 0.040" thick strips of aluminum, drilled and countersunk every 1 1/2 inches (Photo 13). These mounting strips are bonded to the outer headliner finish material, secured with #4 countersunk upholstery screws and flat Tinnerman nuts. Next we bond 1/2" soft urethane foam to the outer headliner substrate. We then pull the finish material outward and wrap the edges of the headliner (Photo 14). The final result is a securely installed, clean-looking, durable headliner that will never sag (Photo 15).

Next month it's on to repairing the one-piece plastic spar covers common to this generation of Beech piston airplanes.

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