INTERIOR RENOVATIONS - ARMRESTS

by Dennis Wolter, Founder & Owner - Air Mod, Inc.

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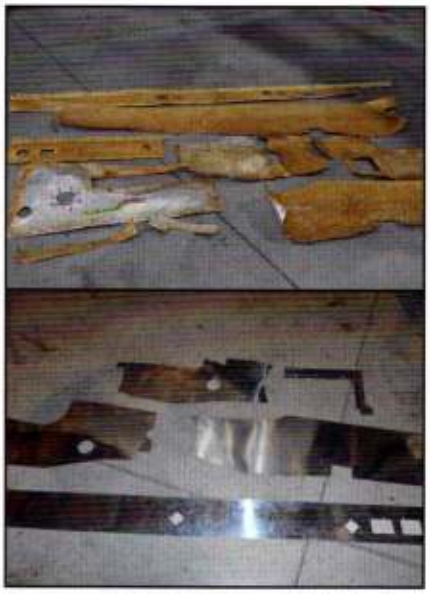
As the 1960s rolled into the '70s, aircraft manufacturing was becoming increasingly competitive and Cessna was challenged to reduce airframe weight and production cost. There were very few options for reducing powerplant, avionics, and airframe cost and weight, so Cessna's engineers focused on the design of the interiors to solve this challenging problem. They were not alone in addressing this issue. Beech and Piper also were redesigning their interiors and fabricating them using lighter, less durable, and cheaper materials for the same reasons.

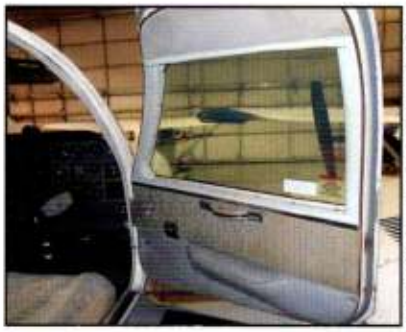
Enough for the economics lecture. This month we will discuss how Cessna changed their Twin Cessna side panel and armrest designs, why they are now failing, and how to improve the design and material options of these components in an effort to make them better looking, more durable, and easier to remove and reinstall.

The quilting process applied to .016" aluminum didn't solve the delicate nature of original factory side panels.

In later interiors, Cessna stuck with very thin .016" aluminum side panel backing material. However, in an effort to make it more rigid and durable, they developed a process of putting an embossed quilting pattern on this material. Over time, this quilting produced no improvement in the durability of the side panels. The only fix is to fabricate new side panels using more rigid aluminum, either .020" or .025" 2024T-3 tempered structural aircraft aluminum. Fabricating side panels using this more durable material greatly reduces the potential for damage during removal and reinstallation.



Top: Unusable set of 310R original factory side panels.
Bottom: A new set of 310R side panels, fabricated using more durable .020" or .025" aircraft aluminum.



The formed stainless steel edge molding strips installed by the factory in an effort to create a pleasant looking edge closure. This tedious installation process makes it almost impossible to remove and reinstall the thin upholstery panels without damaging the panels, the stainless edge trim, or both.

Due to the flimsiness of the thin quilted panels, Cessna installed formed stainless steel edge trim pieces in an attempt to neatly hold these thin side panels in place. This made it very difficult to remove and reinstall the panels, and resulted in torn, deformed and ill-fitting side panels and stainless steel edge trim. Side panels fabricated with more rigid .020" or .025" aluminum do not require the complex installation of trim strips to create a nice looking and durable finished edge around doors and windows. And, as we said, these new panels are far easier to remove and reinstall.

Typical damage found on plastic armrests on later-production wing mounted twin engine airplanes.

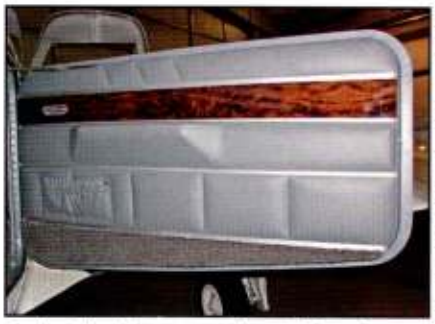
Let's take a look at the flimsy armrests that were installed in all 310s through 425s. These cabin length armrests have an aluminum base with plastic armrests riveted to them. That's right, plastic, the same stuff the delicate window frames are made of. The photo illustrates the condition we usually see when we remove the cover material from the armrests. The fix is to fabricate new armrests using .025" aircraft aluminum. With new armrests made, it's time to improve the flimsy way Cessna secured them to the sides of the cabin.

A new sturdy aluminum armrest being riveted to the original armrest base.

The original mounting system employed a "U" shaped, formed, thin aluminum channel riveted along the full length of the cabin. A full length retaining strip located on the upper back of the armrest fit into this open channel, securing the upper edge of the armrest to the cabin. The lower edge of the armrest was secured to the cabin structure with sheet metal screws. Over time, the upper, formed sheet metal mounting strip becomes loose in its

Flimsy U-shaped thin aluminum factory upper armrest mounting channel.

A rebuilt armrest assembly secured to the cabin side structure with sturdy extruded aluminum.



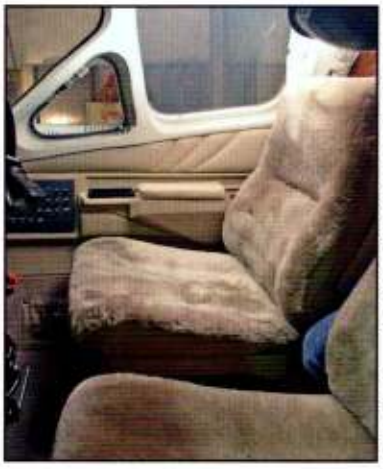
A finished door panel with hardwood inlay, rebuilt armrest and new .025" aircraft aluminum side panels, all securely held in place with nice-looking extruded aluminum divider rails.

mounting and results in ill-fitting armrests.

The fix is to rivet strong full length extruded aluminum rails to both the top and bottom edges of the repaired and upholstered armrests. We then thoroughly secure the renovated armrest to the cabin side structure with screws. This system of extruded aluminum rails creates an aesthetically pleasing mounting rail that allows for the installation of more durable side panels without needing unsightly screws to hold the new panels in place. The new panels fit neatly into the open channels of the extruded aluminum mounting rails creating a well-fitting, easy to install and remove side panel design typically found in corporate jet interiors.

Moving forward to the often damaged, molded plastic armrest/side panel assemblies we find in the flight deck, we're faced with repairing any cracks and reinforcing the armrests with .040" aluminum. If the plastic side panels are badly damaged or they are brittle due to exposure to the sun, new molded plastic panels are available from Plane Plastics. These aftermarket components are molded using a superior, thicker, and more sun tolerant Lustran brand of flame retardant polymer. To ensure long life, we still reinforce the new panels with .040" aluminum and finish them with three coats of color-matched ultraviolet reflective lacquer-based paint.

One final side panel problem we find on most cabin class Cessna twins is the way Cessna attached the main cabin feed hose to the cabin length heat outlet plenum located at the base of the main cabin side panels. This coupling is originally mounted to the back surface of the plenum with two machine screws that are awkwardly installed and removed from the back surface of the big cabin side panel. We often find the back of this plenum is damaged and seals poorly as a result of this difficult installation.



New, reinforced, aftermarket flight deck side panel armrest.

The fix is to repair the damaged area on the back surface of the panel and modify the cabin heat coupling box to allow for it to be mounted from the cabin side using long screws and spacers. This mod increases cabin heat and makes the side panels much easier to remove and reinstall.

These aesthetic and maintenance-friendly improvements will add approximately six pounds of weight in a 340, and eight pounds in a 400 airframe. That's about it for late style Twin Cessna side panels. Next month we'll move on to inspecting, repairing, re-foaming, and upholstering Twin Cessna seats.