

New Glass - Old Panels

by Dennis Wolter

It's hard to believe that we're ten years into the new millennium. Maybe it's my age showing, or maybe things are really changing faster than ever before. Instant communication, global markets, new world politics, smart phones, and more. Makes Buck Rogers seem antiquated. Who'd have thought!

Things in the GA world haven't lagged behind, either. It seems like state of the art ends for your new avionics installation about the same day you finally feel comfortable using your Garmin 530 and multi-function display (MFD). These rapid changes have created new challenges for the technicians vested with installing these new MFDs and electronic engine instrument screens in the often dated instrument panels in those legacy aircraft of ours (I just used a nice word to say our airplanes are old).

overlays. Actually, these installations look and function even better than if they had been done at the factory.

In an effort to make Air Mod a one-stop facility for all the disciplines needed to totally renovate an airplane from spinner to tail cone, we are partnered with a group of several independent companies that include Cincinnati Avionics for avionics installations, Dial Eastern States for exterior paint, and Select Aircraft Service for maintenance and engine work. As expected, we frequently work together with Cincinnati Avionics on our customers' instrument panel upgrades. Our shop will do the custom panel work and they will install the new avionics components. With so many airplanes getting MFDs these days, we've developed a process of modifying the plastic overlays to accommodate these installations.

Each installation is totally custom, with no two panels in any model being the same. Vacuum forming an entirely new overlay would be a costly process involving complex tooling, so we've developed a method of locating a large rectangular cut-out in the plastic overlay and bonding a 1/4" acrylic lip to the back side of the overlay. We then use 80-grit sandpaper bonded to a paint stick to hand sculpt a finished radius to the new cut-out, resulting in a hole that looks like it was molded into the overlay at the factory. Apply a little filler and primer and you are ready to paint.



Cosmetically renovated 210 panel, modified to accommodate a Garmin 500 system and more.

There are two ways to solve this problem. The first is to tear out the old panel with its plastic overlays and build a new all-metal replacement. This process gives the panel designer almost total freedom to locate new as well as old components as the owner chooses. As with most things, this comes at a price. In most four- and six-place Cessna singles, building an all-metal panel can add \$4000-\$8000 to the new radio installation cost.

The second option is to retain the original panel and plastic overlays, and modify them to accommodate the new MFDs. Here's the good news: properly done, this solution would cost about 1/3 as much as doing a metal panel, take less time, and greatly improve the appearance and security of the plastic



1/4" acrylic doubler being bonded to the original plastic overlay.

If the layout of the MFD is such that there is a partial hole located along the edge of the new hole, we cut out the radius portion of the unwanted original hole and simply bond in a new



The panel overlay is sanded, filled, primed and ready for paint.

flat fill piece before we bond the 1/4" acrylic back piece – works great! This process also works for creating an eight-sided hole for such things as auto pilot control heads and stormscopes. The beauty of this plastic material is that it is very solvent sensitive, and glues and fillers bond easily to it. With a little practice you can create almost any shape necessary to accommodate a new piece of equipment. These techniques also work well for repairing and refinishing unmodified overlays.

On occasion, another problem surfaces. As with most modern avionics installations, technicians are ‘robbing from Peter to pay Paul’ in order to cram a blend of steam gauges and multiple MFDs into the old panel space. Modifications are first made to the metal subpanel that structurally holds the instruments and MFDs in place. The new layout may move a component a fraction of an inch, creating a misalignment when the overlay is installed. This, too, is fixable. We simply cut a ‘like’ hole out of a donor panel overlay, then cut out the misaligned hole on the project overlay and bond the donor hole in the new location. Fill and prime as needed, and you’re in business.

For the do-it-yourselfers, we think the adhesive that works best is a product called polyfix, available from Aircraft Spruce & Specialty (877-477-7823). This is a two-part cyanoacrylate adhesive that instantly cures and creates a strong heat fusing bond. This is the same product that we also use to repair those



Painted finish screw and washer. Looks good, holds firmly and is easy to install and remove – wow!

pesky cracks in your plastic window frames. This material sands well and is paintable. Practice on some scrap material first and you’ll get the hang of it. Please take care, though, as this is not healthy stuff to breathe. FOLLOW THE SAFETY INSTRUCTIONS.

No plastic panel overlay discussion would be complete without getting into mounting issues. Except for perhaps the use of bubble gum, Cessna has tried every way imaginable to secure these panel overlays. For over thirty-five years we’ve tried and tried to improve on every one of Cessna’s previous systems. The real fix is to remove the original mounting hardware and install an 8-32 riv nut in the metal subpanel. Then locate a 5/32" hole in the panel overlay on the center of the riv nut, and bond a 1/4" thick 1/2" x 1/2" acrylic spacer over the hole on the back side of the overlay. Go to the front side of the overlay and drill a 5/32" hole through the 1/4" thick spacer. Finally, carefully countersink the finished side of the overlay to accommodate a #8-32 Auveco finish screw and #8 Auveco flush upholstery finish washer. You now have a fool-proof, secure and aesthetically pleasing mounting system for the former flimsily mounted panel overlays. Don’t be shy about adding some additional mounting screws where needed; we do it all the time.

Some mounting systems that Cessna used employed a plas-



1/4" acrylic mounting screw doubler bonded to the back side of the panel overlay.



An 8-32 nutplate installed in an oversized hole.



Repaired, re-painted and placarded sub-panel with removable circuit breaker placard strip.



Renovated side panel circuit breaker panel.



Close-up of the renovated panel with the Garmin 500 installed.

tic pin that mated to a rubber grommet and hole in the metal instrument mounting panel. This hole for the grommet is too large for an 8-32 rivnut, making it necessary to install an 8-32 nut plate on the back side of the instrument mounting panel centered on the original oversized hole. This takes a little more time, but is definitely worth the effort.

To complete the original panel renovation, you should also re-work the sub-panel, pedestal and side panel-mounted circuit breaker panels. For the sub-panel circuit breakers, start by removing all of the mounting nuts, and push the entire circuit breaker rack back behind the sub-panel. Slide a strip of thin cardboard over the faces of the circuit breakers, then push the plastic rocker switches partly out of the sub-panel just enough to allow for masking and painting under the switch bezel flanges, without requiring disconnection of the wiring. Mask the engine and cabin environmental controls as required, then you're ready to clean, repair, prep, prime, paint and placard the sub-panel.

Here is a big time saver that will allow you to avoid the tedious process of placarding all of those circuit breakers while in an awkward position in the airplane. Fabricate a .040" aluminum strip that is mounted with three or four short 4-40 countersunk machine screws tapped into the aluminum sub-panel structure. Paint and placard this strip out of the airplane. Any future changes to the placarding is a snap; just remove the strip and make the change.

The pedestal and side panel circuit breaker panel are removed, repaired, painted and placarded using the same methods as used on the instrument panel overlays and sub-panel components housing controls and circuit breakers.

What does all of this cost? As an example, the 210 panel mod depicted in these pictures took about 31 hours at \$75/hr, which did include repairing several post lights. With materials and a new Dialco high volts warning light to replace the original, hard to see cheap plastic light, the bill came to about \$2400. Once the overlays and related components are painted and placarded, the panels look and function even better than new and at a lower cost than a new metal panel. Certainly something to consider....

*Til next time, fly safe!

Dennis Wolter and his wife Cynthia are the owners of Air Mod at the Clermont County Airport in Batavia, OH. Since 1973 Air Mod has set the standard in aircraft interiors and refurbishment. Dennis is a pilot and A&P/IA, and owns a Cessna 172 and a Taylorcraft. For more information on Air Mod, visit www.airmod.com.

