

# DINOSAURS, DUMPSTERS & DOLLARS

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I'm sure that for most of us, our years in school are fondly remembered. I truly enjoyed the years I spent getting my industrial design degree at the University of Cincinnati. However, there is a definite downside to living in a world dominated by the concepts of form and function. Just ask my wife how frustrated I get when I come face to face with bad design. Something as simple as a poorly designed corkscrew can send me into an extended dissertation on bad corkscrew design! Sometimes, however, not everything about an object is poorly designed...

We've all noticed an out-of-place feature that can be a visual distraction from an otherwise good design. Some of the tailfins on cars in the 1950s definitely detracted from the otherwise acceptable design for a car of that period. Or how about the nose wheel violating the pleasing and functional lines of a Piper Tri-Pacer? And then there are some wild paint jobs that have been popular lately that try real hard to make even a Bonanza look ugly.



Instrument panel with a short overhang glareshield.

**W**HEN IT COMES TO BEECH INSTRUMENT PANELS, ONE THING THAT CAN ABSOLUTELY DISTRACT FROM A BEAUTIFUL NEW PANEL INSTALLATION IS A POORLY DESIGNED OR ILL-CRAFTED GLARESHIELD.

Drives me crazy! A well-designed, beautifully finished and installed custom panel with a glareshield that barely extends out past the face of the panel is not much glare reduction in my book. Then when you turn on those glareshield lights that are so close to the face of the panel, all that gets illuminated is the upper panel paint. Trying to read the instruments in a panel with a

glareshield like that is like flying into bright sunlight with a very dirty windshield. An example of dysfunctional design at its highest level.

The point is, a custom-built glareshield presents a perfect opportunity to apply the design principle of form follows function to create an aesthetically pleasing and very functional instrument panel cover. Icing on the cake!

Here at Air Mod, custom-designed glareshields come in two basic types. The first is a modified stock or after-market glareshield. The second one is completely fabricated in-house from raw materials.

The majority of the time we are able to modify an existing glareshield to fit a new or modified instrument panel. We make this decision after the panel is rough-cut and temporarily installed in the airplane. The two driving forces behind the decision of glareshield type are panel height and windshield configuration.

A sloped windshield will definitely accommodate a taller instrument panel. In fact, we had originally intended to keep the stock nonsloped two-piece windshield in the M35 Bonanza we referred to so often in this series of panel articles. Both the owner and I like the look of vintage Bonanzas.

However, when we temporarily installed the new taller panel, the stock S35 glareshield and nonsloped windshield, two problems became apparent. First, the glareshield would be so close to the inner surface of the windshield that it would be impossible to clean the windshield without removing the glareshield. The second problem was how difficult it would be to actually remove and reinstall the glareshield.

The fix here was to install a sloped windshield. This solved the glareshield problems, provided more working room between the taller panel and the sloped windshield, and allowed for the installation of a better fixed-defroster system. The functional advantages of a sloped windshield definitely took precedence over our aesthetic preference for the classic look of a 50-year-old Bonanza.

We were using a D'Shannon Aviation full-panel mod kit, so we had the fiberglass glareshield that is included with the kit. To enhance instrument lighting, we wanted to install red and white selectable lights under the glareshield's aft lip. To make this lighting as effective as possible, we needed to extend the overhang of the

glareshield by three inches. Since the D'Shannon glareshield is molded in fiberglass, this can be easily accomplished by riveting a .020" 2024T-3 aluminum splice at the widest part of the glareshield. Low-tech nonstructural hardware-store pop rivets can be used to fasten the splice together.

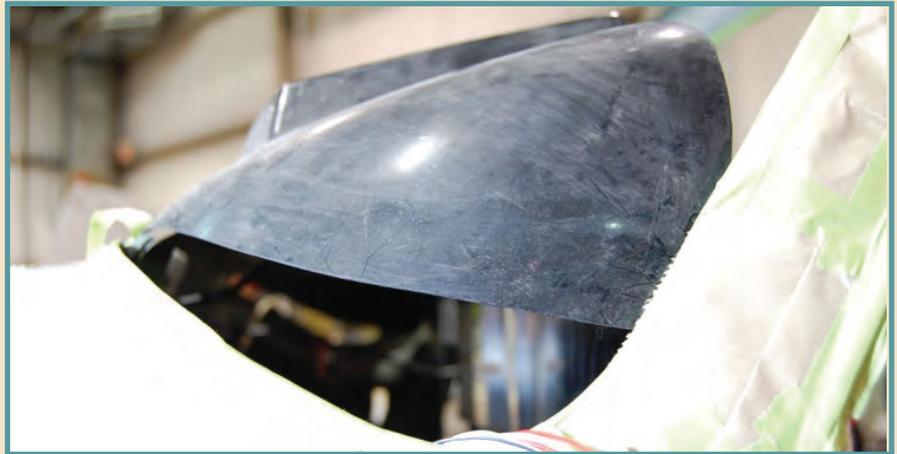
We applied a 1/8" layer of body filler to smooth the splice area. With a 1/2" layer of backing foam and a nicely sewn and mounted black antiglare cover, the splice will be invisible. The extended glareshield looks better than the original short one, and the additional overhang really shields the entire instrument panel and instruments—a real benefit on bright sunny days. Looks better, works better!

By installing a new sloped windshield at the same time we are building a new instrument panel, we can more easily do all the intricate fitting and trimming of the glareshield with the windshield removed.

Another detail that makes a big difference in the function and appearance of the D'Shannon glareshield is to increase the dimension of the aft lip. We riveted a .020" 2024T-3 aluminum augmentation piece along the entire fiberglass lip. By increasing the dimension of the lip, we can gain enough depth to install incandescent lighting that is shielded from the pilot's eyes. Also, by adding this aluminum lip, we reinforce a previously somewhat delicate part of the glareshield that over time will often crack as the glareshield is flexed during installation and removal.

(If you choose to do this work yourself, a D'Shannon glareshield can be purchased by calling Scott at 800-291-7616.)

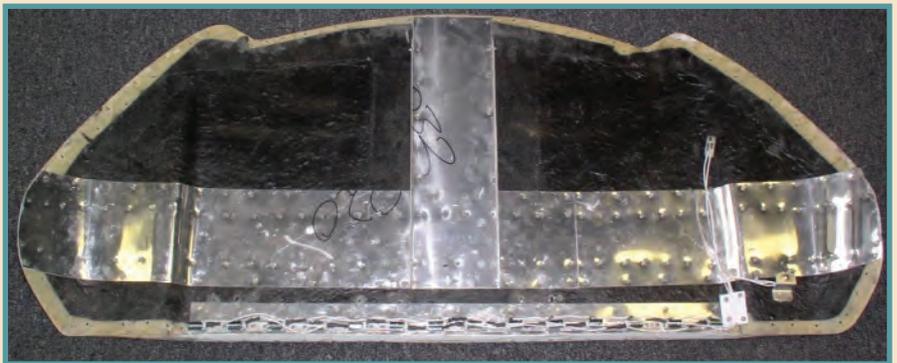
One final issue worthy of mention is how to get the glareshield to fit nicely at the windshield base. On some panel mods, we install full-depth radios at the very top of the radio stack. To get a good fit of the glareshield, an aluminum bump-out piece must be fabricated and grafted to the glareshield in the area above the radio stack. Again,



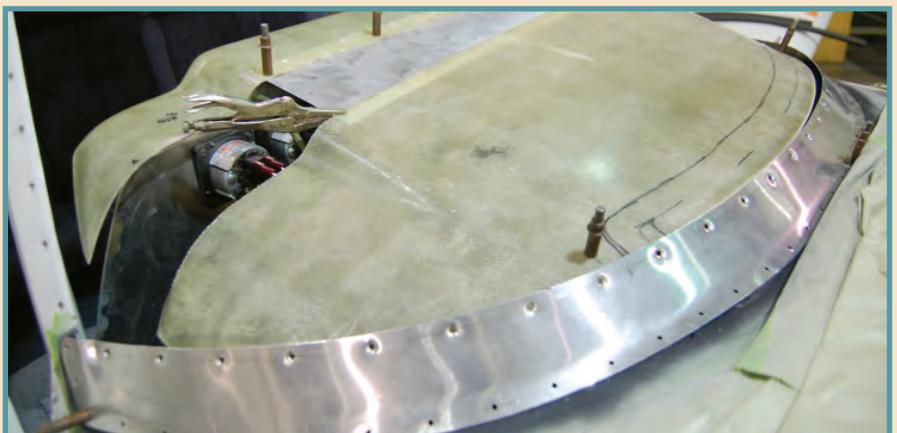
S35 glareshield for non-sloped windshield – won't work with a taller panel.



Finished extended D'Shannon glareshield with white lighting.



Three-inch extension riveted to a D'Shannon glareshield.



Fitting a modified glareshield with the windshield removed and the windshield cuff in place.



Finished hump to accommodate a tall full-depth radio.

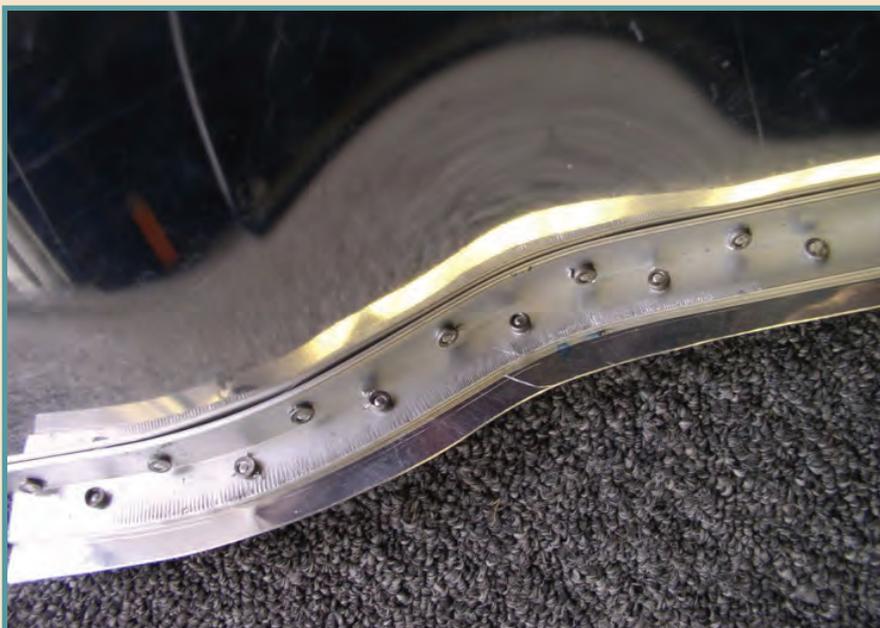
we use hardware-store pop rivets, .020" 2024T-3 aluminum sheet and body fillers. Once padded and upholstered, the glareshield looks great.

In rare and extreme cases, we have built a custom .020" 2024T-3 aluminum glareshield. We started by making a cardboard pattern, and then hand-formed the basic shape of the glareshield in aluminum. To get a contoured lip on the overhang, we used 1/2"

x 1/2" dead soft aluminum angle, formed to emulate the contour of the finished edge of the glareshield overhang. We then used pop rivets on the 1 1/2" centers to secure the 1/2" x 1/2" angle to the glareshield. A .020" x 3/4" aluminum fascia strip is riveted to the vertical face of 1/2" x 1/2" angle, creating a finish lip at the exposed edge of the glareshield overhang.

It's important to use untempered

Back in the early '70s when we got our initial approval for this aluminum glareshield design, we actually had to hit it with a frozen chicken until the glareshield collapsed onto the face of the instrument panel. If the skin on the chicken wasn't broken, the glareshield passed the test. That's what the FAA wanted. (We did pass the chicken test – works for me!)



Riveted soft aluminum angle formed to the contour of a custom-built glareshield.

dead soft angle for this area to have a frangible glareshield that will fold down and not be so strong as to cause injury if a person's face should come in contact with it in an accident. As an additional safety enhancement, we bond very firm 1/2" thick rubber foam to this finish lip area.

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Due to the cost of constructing a field-fabricated glareshield, as well as the availability of both factory-original and aftermarket glareshields, we only choose the hand-built option as a last resort.

Once the glareshield hard-shell is fabricated or modified and the lighting is installed, it's time to get into the padding and upholstering phase. Years of light airplane flying and fixing has convinced me that the best material with which to cover a glareshield is unquestionably a semi-gloss, ultraviolet-light-tolerant, noncombustible black vinyl.

Covering a glareshield in a light color that matches the interior is a major mistake. On bright sunny days there will be enough reflected glare in the windshield to almost allow you to log the time as IFR. Semi-gloss black absorbs light and almost eliminates glare, allowing us aging pilots to better see other airborne traffic.

Attempts have been made to cover glareshields with various black fabrics, which will definitely do a better job of absorbing light than even semi-gloss vinyl. Two problems, however, will eventually rear their ugly heads. First, windshield cleaners will be absorbed into the porous cloth and be impossible to get out.

The second problem is sun tolerance. Black fabrics eventually begin to fade and then will literally disintegrate

We use genuine Naughahide US393 black expanded vinyl. We now have glareshields that have been in service in that hostile environment for 35 years. Never use leather. Sun and heat will accelerate the aging of the leather, causing it to crack and shrink.



A 12-year-old factory glareshield destroyed by a shrinking and deteriorating leather cover.

long before aircraft vinyl. We use genuine Naughahide US393 black expanded vinyl. We now have glareshields that have been in service in that hostile environment for 35 years. The stitching may have faded a little, but otherwise they look fine.

One last word on glareshield cover materials: Never use leather. Sun and heat will accelerate the aging of the leather, causing it to crack and shrink. The shrinking of the leather will cause severe warping of the glareshield hard-shell. The picture above says it all.

The first step in the actual glareshield-covering process is to bond the ½" thick high-impact black foam to the exposed aft lip area of the glareshield. We bond ½" urethane foam to the main body of the glareshield, and then sew a two-piece top stitched vinyl cover that is patterned to fit the precise shape of the glareshield. Once the vinyl cover is stretched and glued at the edges to the glareshield, we neatly bond fine-weave black grospoint cloth to the exposed underside of the glareshield.

In an effort to reduce cabin sound levels, we bond a ½" layer of flame-proof black closed-cell, sound-absorbing, neoprene-rubber padding to the back side of the glareshield. Think of all

that noise behind the panel close to the firewall. Well, it can blast through a non-insulated glareshield and be reflected aft, right into the cabin. Every little bit of noise reduction helps. The final product

is a durable, pleasant-looking, formfitting, easily installed and removed glareshield that will last for years.

One final note on glareshields: For those who have a 1969-and-newer Baron or Bonanza with the often broken-up glareshields, Aircraft Spruce (877-477-7823) has a very cost-effective and high-quality aftermarket glareshield. This product is fabricated using thermally stable high-strength fiberglass and comes with the defroster plenum molded to the forward end of the glareshield. Such a deal!

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We have pretty much covered the subject of glareshields...no pun intended! Next time, we will wrap up this series of instrument-panel articles by discussing how we paint and placard these new panels. Till then, fly safe!

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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.



Glareshield completely foam-padded and ready for the sewn vinyl cover; note the black high-impact foam.