



PANEL MODIFICATIONS - PART I

DINOSAURS, DUMPSTERS & DOLLARS

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The realization that one is getting old presents itself in many ways. It often hits when you look in a mirror and wonder what happened, or when you put on a new shirt that doesn't fit as well as the last one you bought in that size. Or maybe your back lets you know you're not the person you were in college. Those traditional reality checks have pretty much come and gone painlessly for me. The aging reality check that *really* hit me was triggered by the advent of the glass cockpit in light airplanes.

It's not that I wasn't forewarned. About 15 years ago a really good airline pilot friend of mine (also a Bonanza owner), went through training in the new MD88, US Air's first glass airplane. While going through "computer-controlled-airplane" ground school, Tom shared his learning struggle with me on the phone as he took a break from the books. It was like getting a call from another planet.

As Tom tried to paint a picture for me, all I could see was black. Thanks to partnering with a couple of young, sympathetic, computer-savvy first officers, he made it through. The naïve optimist in me took comfort in the belief that all of that stuff was for the heavy airplane drivers; that's why they made the big bucks and it wasn't going to affect me.

Then it started. First there was Loran, then first-generation GPS, and finally glass in little airplanes. Added to this were those marketing and engineering departments striving to out-do the competition.

Wow! The new millennium hit me like a ton of bricks. Flying a coupled approach down to minimums you need only to punch a precise sequence of buttons and dials and, bingo, the exact barometric pressure on Mars magically appears in the corner of your full-color screen. OK, so now I'm exaggerating a bit.

I think a lot of my fellow seasoned pilots share my feelings. This wonderful equipment comes at a price, and it's not

all measured in dollars. Fortunately for me, I limit my PIC IFR flying to my own airplane, with its mid-1980s GPS and analog stuff. If I need to move a customer's glass cockpit airplane on a VFR day, I'll ask a Cincinnati Avionics technician to come over and show me how to make this thing point and talk.

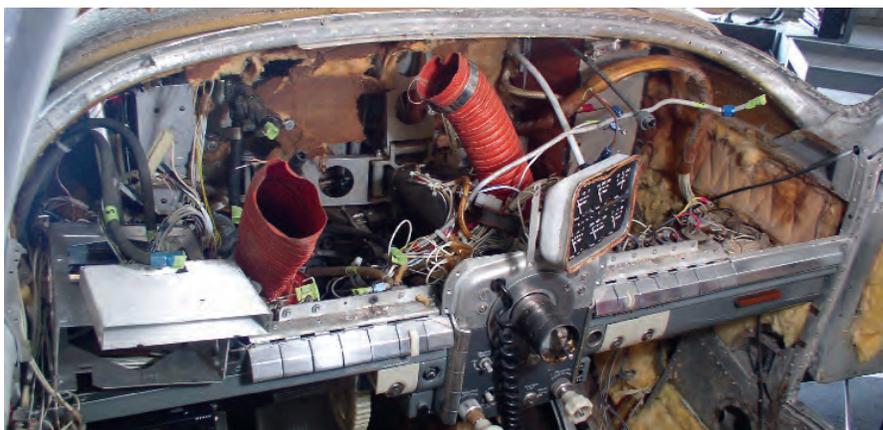
I am slowly getting the hang of some of this new stuff, but I'm going down this path kicking and screaming. I'm a dinosaur. This dinosaur does, however, recognize the future when he sees it.

The dumpster

So much for the dinosaur bit. Just what does the dumpster have to do with this business? Anyone who has a pre-1962 P-model Bonanza or early Debonair knows that the new glass equipment can't just be shoehorned into that '48 Buick panel. Even newer-style panels common to many post-1962 Beech airplanes require extensive modification to install, say, a couple of Garmin 530s and an MX20 multifunction display screen.

What is one to do? You love your 50-year-old Bonanza for its flying characteristics, build quality, efficiency—and the fact that it's become part of the family. For those of you considering upgrading or replacing your dated equipment, be assured that, with a little compromise, some creative thinking and of course dollars, it can be done.

The first step involves the dumpster. Take out that old panel and - you got it - put it in the dumpster. Or I guess you



Old panel and defroster removed.



Avionics installation, 1980's style. could take it home and hang it on a wall in the den, maybe next to your grandfather's mounted moose head. I'm sure non-flying spouses will be thrilled.

So there you are, staring at that big hole. There are a number of options when it comes to Beech panel upgrades. To keep this discussion of this topic to a reasonable length, I'm going to concentrate on building or modifying panels in pre-1984 Bonanzas, Debonairs and A36s. This article will focus on changing out the earliest panel design installed in straight 35s through N35s, as well as early Debonairs.

As timeless as the original Bonanza airframe design is, the most dated feature of these beautiful airplanes is that '48 Buick panel. It's a nightmare to work on, very limited in usable space and filled with old stuff like cloth-insulated wire, sagging shock mounts, 50-year-old static system plumbing, hidden circuit breakers and lots of other components that could and should be left on the ground.

Back in the pre-glass days, we managed to shoehorn enough equipment into these antiquated panels to stay up with the times. Between knee-cracking KX 175s hanging under the left side subpanel and VOR glideslope nav heads and an ADF crammed into the pilot's side of the upper panel, we managed.

Flying IFR with this set-up definitely required a very unique panel scan. I'm sure those seasoned Bonanza pilots had no problem passing the peripheral-vision part of the driver's license eye exam.

Panel designs

These early Bonanza panels can be replaced with four different panel designs and most can be made to accommodate glass equipment.

- **First option:** The first and most predictable option is to use one of the full panel replacement kits (Beryl D'Shannon or Aviation Research). This type of installation replaces everything, including subpanels and switching as stated earlier. These kits are readily available, well-engineered and quality-built.

The Beryl D'Shannon kit includes an oversized, shock-mounted flight panel that can hold three rows of four full-sized 3 1/8" diameter instruments mounted directly in front of the pilot. This allows for easy viewing of all the flight and navigation instruments, even those that formerly hid behind the black yoke bar. What a great idea! Also included is a new upholstered

glareshield, a pre-finished set of sub-panel overlays, and the necessary trim pieces that result in a professional-looking, functional installation.

- **Second option:** The second early Bonanza panel replacement design is identical to the old no longer available Beech kit, and replaces everything from the piano keys up. This eliminates the expense of replacing the original electrical switching and breakers, saving approximately \$2,000. This panel design can be replicated in the field by building a .090" 2024T3 aluminum fixed panel and installing a shock-mounted flight panel and mountings, available from Beech. The glareshield and defroster are the standard issue P thru early V35.

- **Third option:** Building the piano-keys-up panel as described here with the larger Beryl D'Shannon type of three-row flight panel is the third option and is an absolute necessity if you want to install a large multifunction display screen in the center of the fixed panel close to the pilot.

As the photo of this installation shows, substantial deviation from the standard panel layout is required, but when built this way, the panel is very well-organized and functional.

- **Fourth option:** Of course, you could build a one-off custom panel of your own design. We have seen an almost limitless number of different panels that fall into this design category—some as simple as



Option 1: Beryl D'Shannon full panel mod with larger three-row flight panel.



Option 2: Beech kit panel mod works for limited glass, but is best for steam gauges and maybe a 430 or 530 in the stack.



Option 3: Taller "piano-keys up" panel mod with the larger three-row shock-mounted flight panel and a center-mounted multifunction display.

a flat .090" aluminum panel, some so complex that they involved very intricate metal forming and heliarc welding to fabricate the various panel components.

I am often asked about the necessity of shock-mounting the panel. Back in the days of oversized A/N WWII-type gyros, I think shock-mounting was an absolute necessity. With today's smaller gyros and soon-to-be electronic horizons and HSIs, I would consider shock-mounting to be a nice option, but not necessary.

For a first-time installer, I would probably stick to tried-and-true designs like the D'Shannon or Aviation Research kits. They greatly enhance ease of maintenance by having a removable glareshield, allowing for behind-the-panel access. Instruments are face-mounted, eliminating having to remove and install the instrument mounting hardware from behind the old panel.

If you install the wiring and plumb-

ing with long enough service loops, the shock-mounted flight panel and removable radio stack can also be removed for even more behind-the-panel maintenance access; sure beats having to lie on your back and reach up under the old panel to get to the instruments and systems. This translates to dollar savings as well as improved work quality when panel-related radio or instrument maintenance is required.

If your plans for your older Bonanza include avionics upgrades, I highly recommend that you start with a new panel mod so that you have a functional money-saving home for your new avionics. Paying the cost of installing (cramming) new radios into an old panel, only to have them reinstalled in a new panel at a later date, makes no sense at all.

The second major group of panels is the intermediate design that was

installed in the P thru the V35Bs, 33 thru F33As, and 36s, A36s thru the 1983 model year, A36TCs and 1982-83 B36TCs. These panels don't require total replacement, but do require serious modification to accommodate some of the new glass equipment. More on this in a later article.

When installing one of these panel mods in an old Bonanza or Debonair, there are additional related components that must be installed as well. The first issue to be addressed is the *battery box*. Original battery boxes were mounted behind the right side of the firewall itself, putting the battery right where a new radio stack would be located. The solution is to buy a Beryl D'Shannon stainless-steel battery-box kit that mounts on the front side of the firewall. This well-made kit includes all hardware and paperwork.



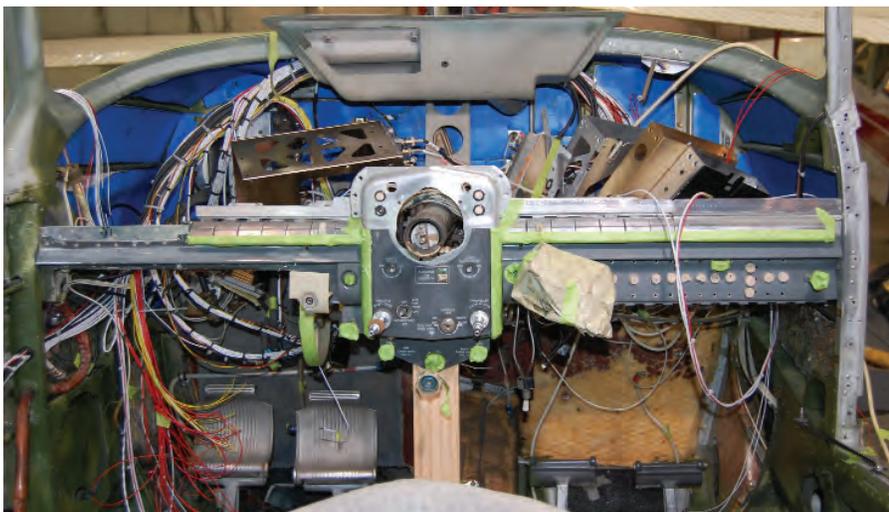
New battery box mounted on forward side of firewall.

The next must-do item to address is the *defroster system*. The fixed glareshield part of the old panel includes the defroster. Removing the fixed glareshield necessitates installation of a new defroster system. The D'Shannon full-panel kit is normally installed with their speedsloped windshield kit that includes a new permanently mounted defroster plenum installed on the old boot cowl close to the base of the new extended windshield.

If we are installing a "piano-keys-up" panel mod (1947-1961 airplanes) with the larger three-row D'Shannon flight panel, the speedsloped windshield and defroster must also be installed. The added height of the new taller fixed and floating panels forces the removable glareshield up against the old non-



Old, permanently-mounted glareshield and defroster assembly.



New insulation on the firewall and boot cowl.

sloped windshield in such a way as to make it almost impossible to remove and reinstall the glareshield.

Another problem is that the padded vinyl glareshield cover will be smashed up against the surface of the windshield, eventually causing premature crazing to the Plexiglas.

If the standard-sized, lower-in-total-panel-height, two-row floating flight panel mod is being installed, you can use an original Beech short removable glareshield, and install a permanently mounted defroster. These are the same components as installed in 1962 thru 1967 P35 thru V35 models. If a standard two-row floating panel mod is being

installed with a speedsloped windshield, the glareshield and defroster included in the kit will work fine.

The final must-do item in the panel modification game is to replace the nasty *fiberglass insulation on the firewall and boot cowl*. This is a win-win deal. With the old panel removed, you have convenient access to an area that is normally very difficult to reach. What would have taken hours to do, lying upside down on the spar in back-wrenching pain, is now easily done sitting in a position God intended for humans.

New insulation on the firewall and boot cowl is now a cinch. I love it! We use Skandia ADC152 PSA insulation. It

is effective, neat and durable, and it doesn't cause itching like the old fiberglass did. Your avionics tech will thank you.

The game of mod options

By this point it should be obvious that the Beech panel modification business is a game of options. Research is a key part of creating the functional panel of your dreams. Keep a list as you fly, noting your ideas, problems and questions. Doing this while using your old panel will help ensure that no detail is overlooked when you meet with the panel builder to design your new panel.

An experienced panel builder who is also an instrument-rated pilot can add to the success of your project. Human factors influence a big part of any panel design, and having a technician who understands the way you fly is a huge benefit. Your experience level, how you fly approaches and your interest in technically advanced equipment all play an important role in a great panel design.

Continued communication is a key factor

The communication doesn't end when you drop off the airplane. There should be lots of dialogue as the installation progresses. Expect the unexpected, such as hidden problems caused by age or previous work. These old Beech panels are often a journey through uncharted territory. We've built lots of panels in these beautiful airplanes, and each one has presented its own unique surprises and design challenges.

Of the many different aspects of aircraft renovation I am involved in, I most enjoy the custom instrument panel business. And the best part comes when the customer takes delivery of the finished project! (Christmas can come more than once a year.)

Dennis Wolter is an A&P/IA and a 3,000-hour instrument pilot who started AirMod 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.

