Panel Renovation (Sep 2007)

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Thirty-seven years of sins and good work were hiding behind our PA-39 Twin Comanche panel. We knew it was a challenge to get avionics work done because when the audio panel needed to be changed in 2005 so we could free up some space, it took twice the allotted time and five trips to get everything back to working order. Then the poorly placed JPI EDM 760 installation pushed up the right side of the glare shield. Because we'd had such difficulty on the last two panel changes, I was not looking forward to renovating the center stack. Some folks may recall that I wrote an article when we overhauled both engines. Like most airplane projects, we saw this one coming and had some budget numbers in mind with some key new functions we wanted. This is the second most expensive elective expenditure for our plane. In March the only fast flying I saw was the money leaving the checking account – but it is truly worth it! Here is my/our experience.

The owners

The "we" is my husband of 32 years, Ken, and me. We make decisions as a team – sometimes this is more interesting than others – and divide the work to our strengths. Ken enjoys doing the research, I do the execution and between the two of us, we anticipate most of the issues. Our Valentine's gift to each other for 2007 – and maybe for years to come – was the new center stack and a 496.

Why Now?

The avionics were beginning to talk to us. Two things happened – last fall we'd planned to go to Port Aransas, Texas for an informal ICS Saturday lunch fly-in. We needed to file IFR and we realized we couldn't because we didn't have a certified GPS approach. The impetus to change came when the 295 antenna connection failed. We'd bought it for our 25th wedding anniversary. It was as much to repair as it was to buy an overhauled one. Coincidentally the 530 became WAAS capable. We looked at each other and said, "Yup, now is the time to renovate the center stack."

Choosing an Avionics Shop

When you live just north of Fort Worth, there are a number of avionics shop choices. I chose to fly an hour west and frequently drive about five-and-a-half hours round trip. As an aircraft owner, panel renovation like overhauling an engine, isn't something you do every day. So how do you know who would do the best job? I had enough experience with shops that had done our IFR static checks over the years to know I needed to do more research. A reference from Twin and 260 owner and former Tribe Leader Carolyn Moody led me to Abilene Aero. I had some minor work done by them about six months ago and was impressed with the organization of the shop. While I was there, I spoke with other owners that were there for service. All pointed to an excellent, professionally-managed company.

I was very pleased with their work. Starting with the quote process, Stuart Douglas asked me to e-mail a photo of the panel and then we spent about 30 minutes on the phone discussing options to accomplish our goals for the panel. His advice on what was best to buy new and what was fine as used was helpful to keep the costs down. After my husband and I looked at everything again, I called with more questions. Stuart was patient, knowledgeable and provided all the answers.

Panel before Renovation

Panel Wiring before Renovation

It got even better once I brought the plane in. Bobby Faulks sat in the plane and we walked through the planned work. Line item by line item we discussed each of the 27 elements of change and Bobby made two great suggestions we had not considered. I made several and my husband made a few trips during the two-to-three-week project. I used the down time to wash and wax the plane while peeking inside whenever I wasn't in the way of the work. We could see huge improvements in the quality of work that lives behind the panel. Problems that we didn't even know we had such as bad grounds were handled with expertise honed by experience. I was delighted to see blue plastic 'drapes' in the high traffic area to protect the paint. When parts were removed, the associated screws were put in a section of a box and the section was labeled. I like that process.

Not only do they have bench checking ability but also a GPS repeater and portable radar to check the transponder in the aircraft. It was fascinating to see items checkout in the hangar and then have several things not perform correctly on the first test flight. We had a faulty new Garmin power cable, a bad ground, a transponder failure and we needed to have the GPS wiring fine tuned. The problems were fixed quickly with a very positive attitude and an apology for the delay.

Another advantage of Abilene Aero was that I could get the oil changed and the 50-hour fuel screen AD done at the same time. The mechanical side of this shop asked us to bring our Comanche Maintenance Manual so they could make sure they did the items correctly. All went without a hitch and the fuel screens continue to be noticeably cleaner since I had the main and aux tanks vacuumed.

New Stuff and Changes

The new 530W sits just below our audio panel and vintage transponder. We had great advice to have it as high as possible in the stack and this is as high as it would fit in our aircraft due to depth issues. We went with a 530W because of the WAAS capability and the extra screen real estate that allowed Garmin to put more function in it. I suspect one of our favorite extra features might be the automatic station identification instead of the old method of listening to the Morse code. We heard so much about the learning curve on being able to use this new stuff effectively, that while I was in Abilene with the plane, Ken ordered and took the King 430/530 course. Even though the course used the 430 most of the time and hadn't been updated for WAAS capabilities, he still found it helpful to take the course and use the Garmin simulator to become familiar with the 530W before ever getting in the plane. Since we live in Texas, we added a cooling fan especially for the 530W.

In Ken's research he found the advantages of GPS Roll Steering for our Century 2000 autopilot, so we bought it too. When this is combined with the 530W and all is programmed correctly, it will correctly enter and fly a hold for you (too cool), fly a DME arc, fly a procedure turn for you and in general, reduce the workload of flying IFR.

Our primary navigation will now be the 530W with the Century NDS360 HSI. Should it fail or be out of the plane for service, our backup is the "new-to-us" used KX-155 with a new King 209 Indicator with glideslope. Should we have a full electrical failure (and we did once in IMC when both alternators failed for different reasons – but that's another story), we will have the 496 as backup.

Once we took out the VFR-only Trimble GPS , we lost the very handy Shadin fuel computer function of displaying the fuel remaining at destination being automatically calculated and displayed for us, so we bought a new one. This will be good in the future because when our fairly expensive fuel flow transducers fail (cross your fingers, they've been good for 14 years now), we can tune the new Shadin to accept less expensive transducers with a different K factor because the newer Shadin Digflo L has upgradeable software and tunable K factors. A new STC was not required by Osborne.

The JPI EDM-760 fits well now in its new home which is just to the left of the center stack and it helps keep the engine information in the pilot's scan. For those of us who wear tri-focal glasses, it also lowers eye fatigue because your eye doesn't have to keep re-focusing to different distances. Our Hobbs meter used to hang at the bottom of the stack and whack the container we use for our charts and it is now higher and adjacent to the temp gauge. Also, we effectively raised our stack by an inch which guaranteed control cable clearance.

Another workload reduction was gained with a switch being added to toggle the DME between the 530W and the King Nav. We can still manually enter a frequency to ascertain another DME distance. We moved our second Attitude Indicator one hole to the left which makes the scan easier should the primary Attitude Indicator fail.

The circuit breakers were suspect so we spent some money to have all the breakers tested and validate that their labeling was correct. One circuit breaker had to be replaced.

Beyond the equipment, there were huge changes in the quality of wiring from two perspectives. Apparently, standards for avionics wiring have changed over the years and we now know that much of our

panel needed to be changed from unshielded to shielded wiring. The audio panel cable bundle was in excess of two feet long so it was shortened to more easily fit in our space efficient plane. The blind encoder had been waving in the wind and it is now securely fastened in the nose compartment. Bobby also fabricated a nice platform for the two 496 antennas that can Velcro to the glare shield.

What We Didn't Do

We had planned on replacing the ancient ammeter with the EI indicator. This turned out to be harder than we thought because the shunts in the ammeter circuit were hard to find. They were on the backside of the panel of fuses that live under the floor access panel immediately below the power quadrant. And then, once we found them, their value was not printed on them so we gave up and left the ammeter alone. We had also planned on adjusting the voltage regulator so it outputted 14V instead of our typical 13.3V. It had been dialed down due to an over-voltage problem years ago. The advice we received was, unless we were having electrical problems to just leave it alone, so that's what we did.

Thank You(s) to other ICS members

I want to publicly recognize those ICS members that really helped us achieve the successful panel renovation. Carolyn Moody was key in her recommendation of Abilene Aero. They had done a good job on her panel. When I authored a solicitation for any advice and counsel on our proposed panel on the Comanche Owners Delphi Forum hosted by Dale Vandever, I received a lot of excellent comments. The most memorable were the concrete suggestions by John Van Bladeren about cooling, spacing and stack height. Dave Gitelman kindly sent photos of how he creatively mounted his portable GPS on the co-pilot yoke. Thanks to everyone for their input. This is what makes owning a 37-year-old airplane a bit easier.

Selling On e-Bay

Abilene Aero offered to sell the removed items on e-Bay but since I had a whole three transactions to my credit, I thought I'd give it a go myself. Key parts of success were the en route photos during the flight to Abilene so I could have dated material that showed the units in operation. A great job of careful removal of the units, trays, connectors, wiring and antennas was done. Also remember aviation is an international industry so expect overseas buyers. From e-Bay sales, the VFR Trimble GPS, 2 Narco Navcoms with 1 indicator, ADF system and Shadin brought back about 13 percent of the total cost of the panel renovation.

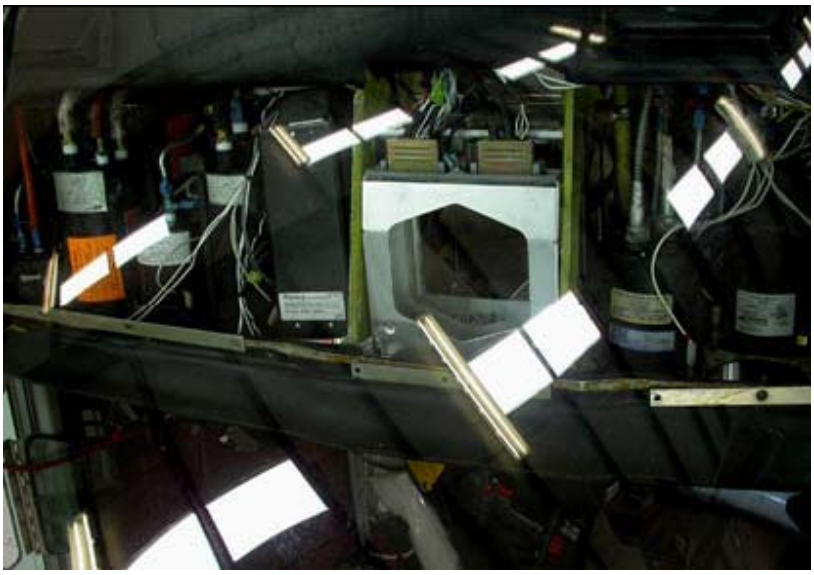
The Results

The work took just over two-and-a-half weeks and we are having a great time checking out all the new functions. Communications and the intercom are incredibly clear. It is a good thing Ken studied. We're checking how the stuff works when properly programmed and what happens when mistakes are made. Parts of it are just pure magic!

We asked that any superfluous wiring be taken out. All the wiring that supported any removed equipment was discarded and we gained 10.5 pounds of useful load.

Hindsight is 20/20 and if I could do this project again, I would do nearly everything the same. I would definitely choose to work with Abilene Aero again. I might try harder to find a place for the ADF. I miss the ADF flight time function and handy 360 card for assessing landing crosswinds. I would also look for a glideslope indicator to work with the Nacro 12D+ because I miss the 10 stored frequency function. These are very small things compared to all the new capabilities and past-sins that got fixed. Next on our list is a new paint job.

Author Pat Keefer holds the FAI Gold Medal for the longest race in history with her mother, Marion Jayne. Past articles include: Time to Overhaul, Long Range Flying, Angel or Speed Demon & Racing for Gold: 24 Days Around the World. She is President of the U.S. Air Race, Inc www.us-airrace.org and RTW (Round the World), A Motivational Company & can be reached at pjkeefer@gmail.com



Panel Wiring after Renovation

New Panel in Flight