



SWEEPSUPDATE

A MONTHLY UPDATE ON THE PROGRESS OF YOUR SWEEPSTAKES AIRPLANE



A panel comes alive

Wrapping up work on your sweepstakes airplane

BY IAN J. TWOMBLY

The switch is flipped on with a satisfying click, and the culmination of months of work begins to shine brightly. Fans whine and displays glow as they begin their test routines. One lone mechanical gyro announces it's still there as it spools up for the day's flight. The panel is alive.

Watching the Get Your Glass Sweepstakes Piper Archer come together has, at times, been unnerving. Photos of the stripped airplane or without an instrument panel have been ego crushing. But in early June, just a few days before AOPA's annual Fly-In and Open House, we saw the finished airplane for the first time and nervousness about making the deadline for the fly-in melted away.

The instrument panel had come together and it looked beautiful.

Peter Stelzenmuller, Chris Vinciguero, and the staff at Penn Avionics worked hard to finish by the deadline. They were tasked with finishing the entire panel job, including the J.P. Instruments engine analyzer, the S-Tec System Fifty Five X autopilot, the L-3 Communications Avionics Systems WX500 Stormscope, and the one-piece metal panel in six weeks. This second work order began after Sun 'n Fun in mid-April, and was the culmination of the initial project that primarily involved installing GPS units, the multifunction display (MFD), and the Aspen Avionics EFD1000 primary flight display (PFD) (see "Uber Upgrades," August *AOPA Pilot*).

Penn Avionics' Chris Vinciguero works on the Archer's panel.

Making them talk

A primary capability of modern avionics, and one trait that makes integrated panel displays possible, is their ability to transfer information to one another. With different systems from different manufacturers powering each major panel function, we had some initial concerns over how well integrated the Archer's panel was going to be. But Vinciguero, the technician who completed the install, said integration wasn't going to be a problem. "Each device comes with a diagram that shows how to connect it to other devices," he said. There is leeway in what an owner can put in a panel, but there's not much argument as to how each piece will interact.

At the foundation of all modern integration is serial data, according to Vinciguero. Whereas HSI's and older radios all worked off analog data, today's avionics are digital and utilize serial data. For the installer, that means instead of one wire for heading, one for bank, one for altitude, and so on, it takes just a few wires to transmit all the information. Vinciguero said it makes the installer's job much easier and the outcome of the job is never in doubt.

With the Archer, we knew we wanted two Garmin GNS430W GPS/com/nav units talking to the Aspen PFD, the PS Engineering PMA 8000B-MP3 audio panel, and the J.P. Instruments engine analyzer, the PFD talking to the autopilot, and the GPSs talking to each other. But with the Avidyne EX500 MFD, things were slightly more complicated. We ended up with the Avidyne TAS600 traffic system talking to the EX500 and the Garmins. Of course, the Garmins also talk to the MFD to provide flight plan information. The WX500 and the MLB 700 datalink also display on the EX500. It's an incredibly complex array of information that cross feeds all around the cockpit, giving the pilot multiple pieces of situational awareness from a number of different sources. So not only is the Archer a highly capable glass-equipped airplane, it's also a safe one thanks to the large amount of redundant data.

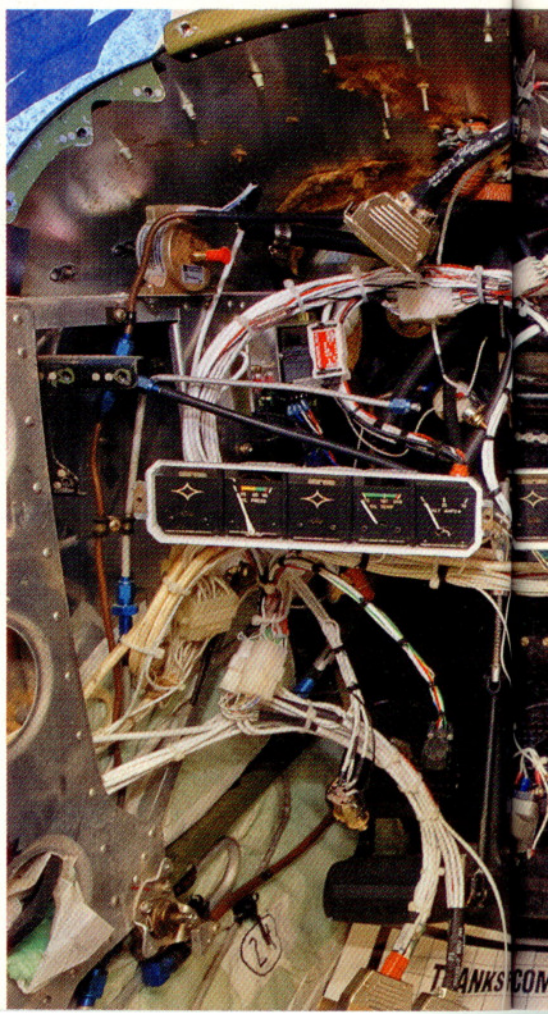
Vinciguero's install was virtually flawless (we had a small glitch with the WX500 when it worked itself slightly loose), a result he was able to achieve by creating a wiring diagram and physically laying out the serial data wires. "I never have any doubt that it's going to work," he said, "because I lay it all out ahead of time. The problem isn't going

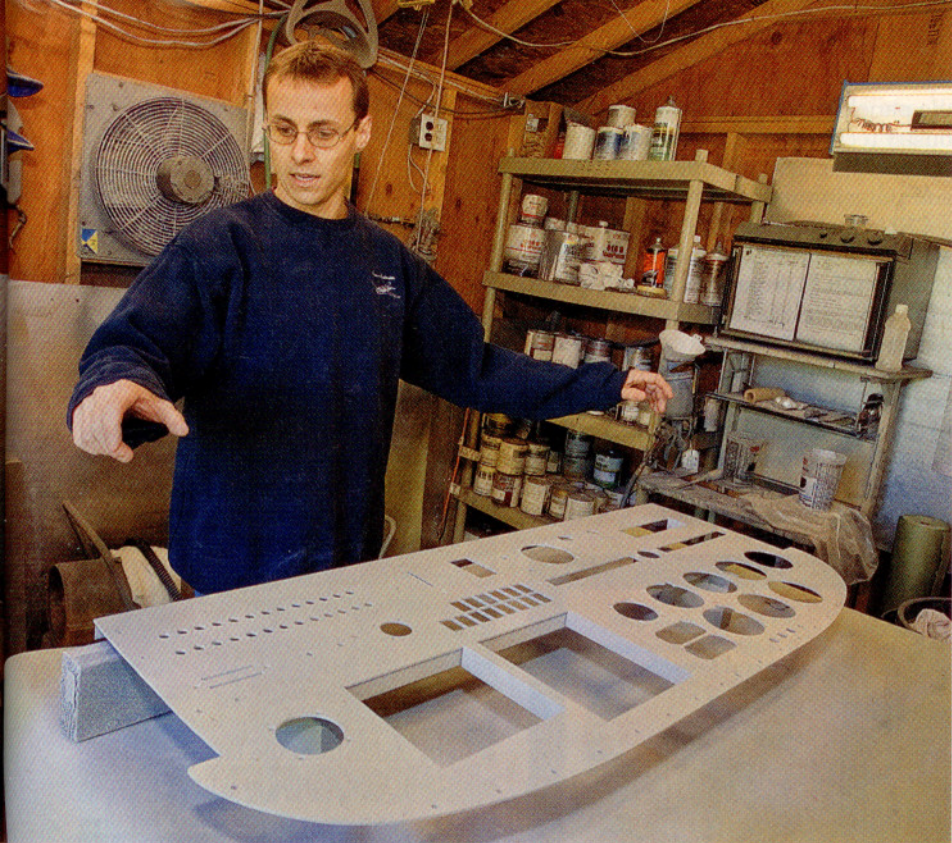
to be in my wiring." Incidentally, reaching the moment of truth and turning on each device is not unlike setting up a home computer. "Except, when you plug a program into Windows, it recognizes it. With avionics, I have to turn on the unit and open the port I've connected something to," he said.

Putting on the one-piece

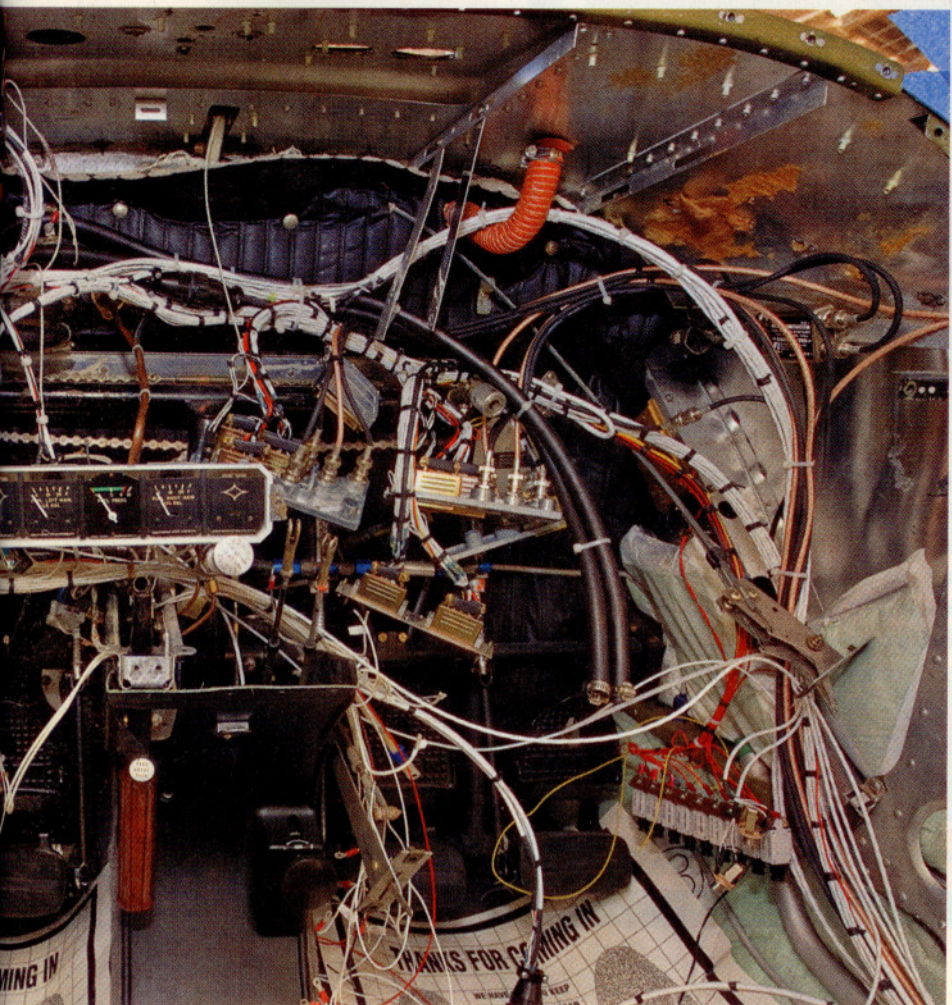
The most lengthy part of the panel refurbishment process was, without question, the one-piece flat metal panel. To the uninitiated taking a piece of aluminum, cutting some holes in it for instruments, and then placing it in the cockpit may seem like one of the easier parts of the installation process. But considering the panel must be designed, cut, primed and painted, installed, and approved, it's a process that takes weeks and must be carefully coordinated with the rest of the work. To do otherwise would significantly hold up the job, a luxury Penn couldn't afford with the tight timeframe.

With only two weeks left before delivery, it's hard to believe the panel went from a state of seemingly total disarray (below) to finished in time for AOPA's Annual Fly-In and Open House in early June.





Vinciguerra explains the fabrication process for the Archer's new one-piece flat metal panel (above). In this photo the panel has been primed, but not painted. The panel's support structure can be seen through the bottom of the radio stacks.



To ensure the panel was ready to be installed when it was needed, Penn began working on it even before the Archer arrived for its first round of avionics work. We worked with Peter Fiorot, Penn's panel layout specialist, to create a computer-aided design (CAD) representation of the Archer's panel. The layout served not only as a guide for Vinciguerra to complete the installation, but also as the basis for creating the one-piece metal panel.

After laying out the design and setting the proper placement of the instruments, it was time to begin cutting

the panel. There are a few different industry techniques used to make a panel, including laser cutting and CNC, or computer numerical control. Penn uses a CNC machine to cut the aluminum, a process that begins with a test cut. Usually this is done with a heavy piece of PVC plastic. The PVC is cut and then placed in the airplane to check for the proper fit and alignment. Any changes are made in CAD, and then transferred to the CNC machine for another test cut. When all are happy with the fit, a piece of 2024 T3 aluminum is loaded into the CNC machine and cut. Then it

is cleaned and primed with a self-etching process.

Usually at this point in the process the panel is primed by hand. But the designated engineering representative, who is required to endorse the panel's structural integrity, wanted the Archer's panel to have more support. While some manufacturers have a sub support structure, Piper used the actual panel itself for support. Vinciguerra said it's the only thing holding the fuselage apart in that area. Because of that needed support, the DER required Penn to rivet strips of aluminum to the back of the panel for additional strength. Apparently increasing the thickness of the aluminum by a factor of four wasn't enough.

After the panel was primed, it was time for another hard decision—what color to paint it. This was harder than it sounds. Aside from the fact that, as the pilot, you'll be staring at it for hundreds

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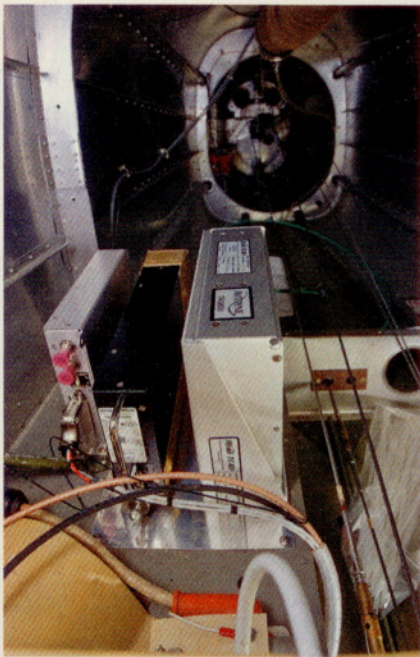
Featured contributors

S-Tec

S-Tec's System Fifty Five X autopilot is widely considered to be one of the best light aircraft autopilots on the market today. With built-in capabilities like GPS steering, and optional altitude preselect, it's no wonder the company is well respected for its autopilot designs. The sweepstakes Archer's System Fifty Five X is just one of the many units the company produces. Chances are they have one that fits your mission and budget. Visit them online (www.s-tec.com) or call 800-872-7832.

PS Engineering

From its humble beginnings producing inexpensive intercoms, PS Engineering has grown to be a market leader in built-in audio panels. The company's Web site says it all: "Audio control is our one and only mission." This year's sweepstakes airplane features a PMA8000B-MP3, the company's top audio panel, complete with a front auxiliary jack for entertainment, a built-in 1GB hard drive for audio playback, programmable soft keys, and recorded playback. Visit the Web site (www.ps-engineering.com) or call 800-427-2376.



Many pieces of modern avionics reside not only in the panel, but in an auxiliary box as well. The Archer's new state-of-the-art panel meant having to put three boxes in the tail, one each for the Stormscope, traffic system, and weather datalink.

of hours, there were simply too many choices. Penn has hundreds of DuPont paint chips to select from, and each one looks strikingly similar to the one immediately before and after.

Then there's the choice of what to match the color to, if anything at all. Matching it to the carpet doesn't make sense because it's usually too dark. Sidewalls are a good option, but we were afraid the color would just run together and look flat. The upper trim and headliner seemed like the best option. We finally narrowed it down and Penn went to work applying the three coats.

Bringing it together

Once the panel was finished, Vinciguerra put it in place. "It was pretty easy," he said. "I just lined it up and slid it in place." From here, Vinciguerra went to work installing all the instruments and configuring the avionics. After he was satisfied that everything was on, testing properly, and transferring data to the appropriate places, he began Penn's detailed quality control process.

First Vinciguerra, acting as the primary installer, completed a 27-page checklist covering everything from basic wiring to advanced integration. Then he grabbed another installer in the shop

who completed the exact same checklist. Finally, when both were satisfied the job was complete, the airplane was handed over to Stelzenmuller for the final check.

Stelzenmuller is a pilot and aircraft owner who understands the needs of general aviation owners. He flies each airplane to put the new avionics through their paces. When he's finished, the paperwork is carefully completed (we know because we checked), and the airplane is delivered.

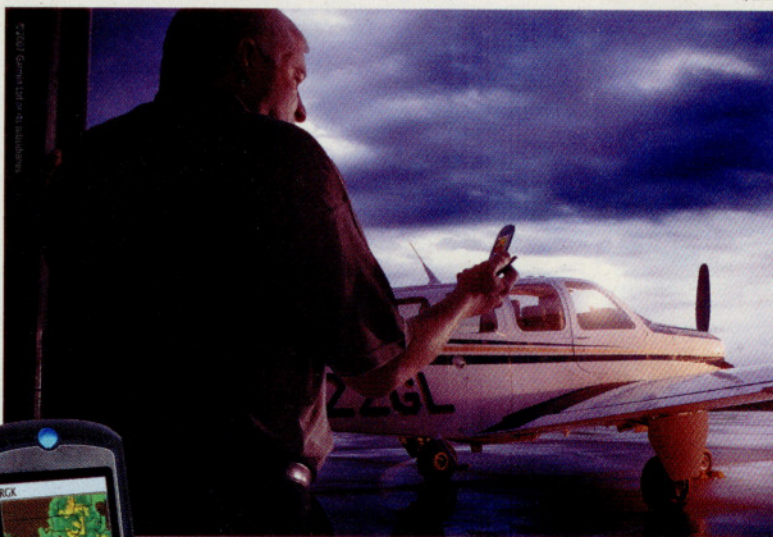
Flying the Archer for a short hour from Penn's shop at Brandywine Air-

port to Frederick, Maryland, for the fly-in was intensely satisfying and exciting. Although we expected some glitches with such a major job, only one minor hiccup could be detected.

By the time you read this, the Archer will have greeted members at AOPA's Big Yellow Tent at Oshkosh and be back in Frederick awaiting its next adventure. Stay tuned to find out more about what it's like flying such a well-equipped, beautiful airplane. **AOPA**

E-mail the author at ian.twombly@aopa.org

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