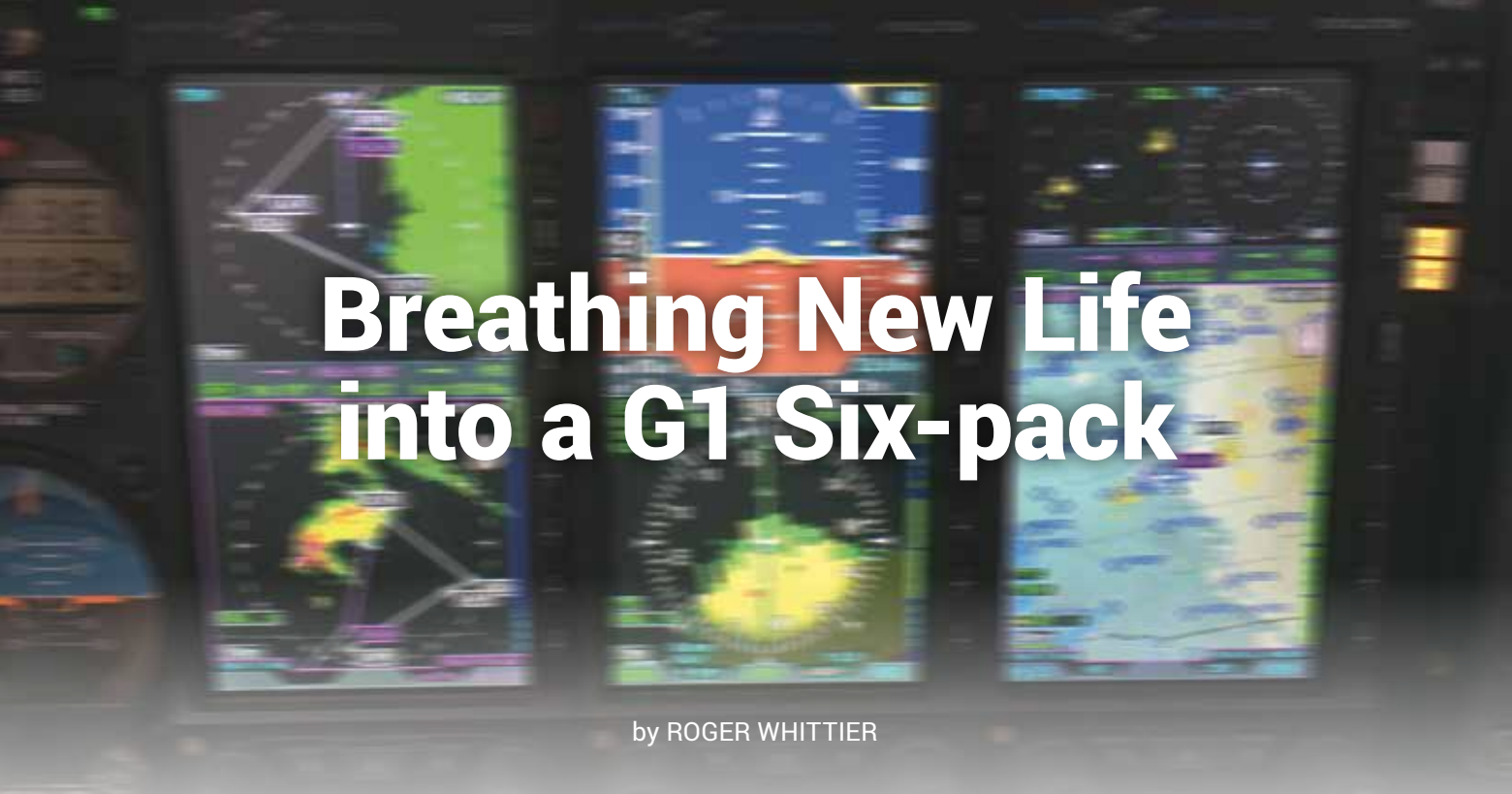


Breathing New Life into a G1 Six-pack

by ROGER WHITTIER

I took delivery of my brand-new Cirrus SR22, N706CD, on May 2, 2001. It is almost as old of an SR22 as you can find – serial number 0009! It was very exciting owning this new, unique airplane; fuel stops took a minimum of an hour because *everyone* wanted to see that new plane with the parachute. It was all electric and had a state-of-the-art Sandel EHSI. With a Stormscope, a couple of Garmin 430s and an STEC 55X autopilot, with the "B" avionics configuration, I was on top of the aviation world! Little did I know …

I flew 6CD to AirVenture in 2002. Imagine my horror when I saw the initial PFD display. It was shocking that my, still under warranty, new Technically Advanced Aircraft could be so terribly outdated in a mere 15 months. Naturally I considered a trade-in, ultimately deciding spending that much money made no sense – I rationalized that a wind vector simply was not worth six figures. Of course I flew PFD-equipped aircraft, both Avidyne and Perspective, and liked them, but there was simply nothing that a PFD-equipped plane could do that I could not. As a mission-oriented kind of pilot who generally flies VFR in the southwestern skies, I didn't need it. I told myself that for the next 14 years …

Over the years, I tried to keep up with technology creep. I was an early adopter of WAAS; I converted to an Avidyne MFD with EMax; I added a TAS-600 active traffic system, a six-point mount, and more. It may be one of the most highly modified early planes there is. In short, my SR22 was competitive in all ways that mattered to me, but it didn't have a glass cockpit. I called it half-glass, it had a Multi-Function Device and steam gauges.

I didn't want to trade off a reliable aircraft with an outstanding useful load (1,181 pounds useful, when delivered) in order to get glass. What were my options? I went through an in-depth analysis several years ago. Cost, options, performance, weight, etc. were easy to sketch out. They haven't changed appreciably in that time.

They were:

1. Avidyne R8. Budgetary quotes with the necessary STC and equipment were around $40K. Depending on what you add, that would get a DFC-90 autopilot in the process. At this point, it was an old, but reliable and effective architecture.

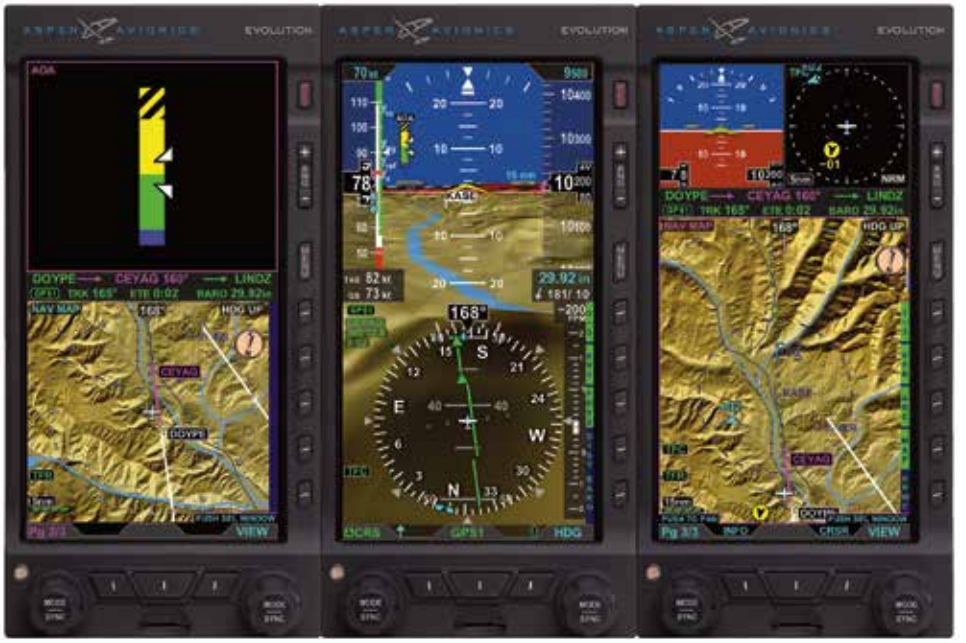
2. Convert to Avidyne R9. This is a first-rate system and I REALLY liked it. Quotes I received were more than half the value of the airframe. I did not consider it practical to sink that kind of money in an old airframe.

3. A Garmin G500. A nice system from a first-rate company. Quotes were pushing $40K. The system does not have built-in redundancy, so part of the installation requires mounting bolster backup gauges. While the system price looks attractive, the installation is costlier. Newer backup instrument options might make this easier to do, but probably will not reduce costs since those gauges are still very pricey.

4. Aspen Avionics. Very flexible and you can do as much or as little as you want. A minimal installation is a single tube for $10K, plus installation, or you can do all three like I did. There was no need to modify the existing panel, which keeps installation costs down. Also, being modular, you can do a little now and more later, which is nice when you're on a budget. It is compatible with the STEC 55X or you can opt for a DFC-90 autopilot, keeping a digital autopilot in the realm of possibility.

My Decision Process

I made the decision several years ago that Aspen was the right choice for me for multiple reasons. As an independent flight display manufacturer, they have to work just a little harder at design and interfaces. They don't make GPS navigators or autopilots so they interface with everyone. That is desirable to someone with a mixed panel like mine. The picture at right, of a three tube Aspen, their Evolution 2500 system, shows its many display features and flexibility.



The full Aspen Evolution 2500 system.

The Aspen approach is unique. The system is a building block design that lets you do as much or as little as you want. They specialize fitting these into legacy aircraft without extensive repaneling or modifications. With the system I chose, they provide full PFD redundancy by having two independent air data computers and two attitude heading and reference systems displayed on two different screens. Should the primary unit fail, you simply press the revisionary button and the second independent unit takes over.

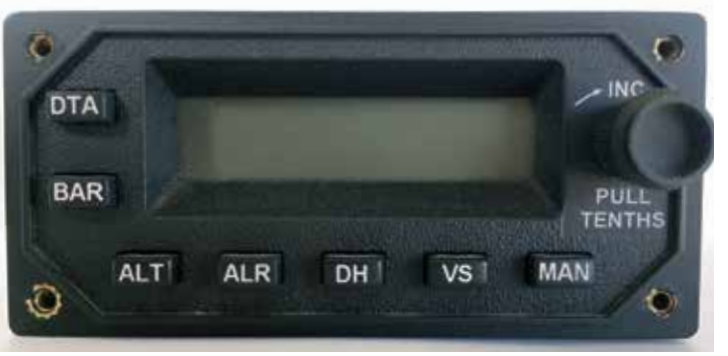
With internal backup batteries standard, and available external battery backup options, loss of power is not a problem. With the optional autopilot source select capability, in the event I lose primary PFD I press reversionary mode and then toggle the Autopilot Select Switch and the autopilot is there. In fact, you have every capability you had before with the loss of a PFD. Beyond those options, any avionics in the plane can be displayed in any location you want. Critical items you want can be overlaid on the HSI or either MFD, or on all of them. I liked the flexibility and redundancy.

Despite those very attractive features, I still decided to wait until my Sandel died, however the decision was made, I was going to go with Aspen.

An Unexpected Opportunity

I met James Buck, director of flight operations and test pilot for Aspen Avionics, at a COPA formation clinic. He owns an early Cirrus that was originally configured like mine, but, of course, it had been thoroughly decked out with Aspen equipment. I made the mistake of flying it, and it confirmed what I knew – I loved it, but I still wasn't ready yet, as my Sandel had not died. Neither he, nor I, had any idea what the future would bring. We simply had a lot in common, love of flying, love of Cirrus aircraft and formation flying.

Then fate intervened – Aspen needed a test mule. Would I be interested in doing a swap of avionics for time? Why me? They were interested in my particular equipment set. Early six- pack, STEC 55X-equipped Cirrus had an STEC control head called an "Altitude Preselect" (pictured below). This preselect is also common in other types of aircraft making it attractive for Aspen to include in their standard equipment interfaces. The focus of the project would be to integrate the Aspen displays with the STEC 55X to be the control head for setting altitude and vertical speed, as well as displaying flight director modes across the PFD. Additionally, Aspen wanted to add several new ADS-B features to their displays as part of this software update. For flight testing it was helpful that I had already completed the WAAS upgrade to my GNS-430s. To get approval to mimic the STEC preselect for vertical speed, they would need to precisely copy the preselect behavior into their product. Flight testing would be necessary to confirm it.

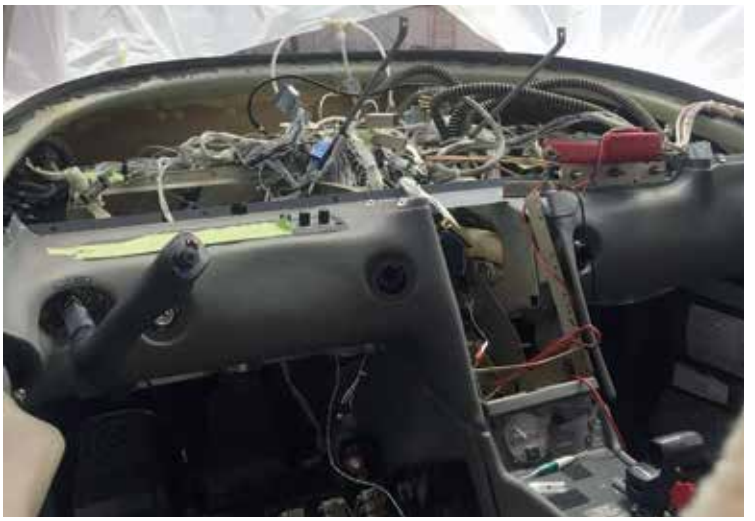


The STEC Preselect

It was a very attractive offer, but also mentally challenging for me to lease the plane. I bought the plane new and essentially every hour on the HOBBS was mine. As many readers know, I am an A&P and I take great pride that all the work is done by me. It would be painful to allow someone else to fly and care for it, but what was I worried about? James flies the same aircraft and I know he knows how to operate it. I wanted to know more – Aspen wanted a prepaid lease for up to 120 days of flight testing. They would insure and maintain it. As painful as it was,

I needed to trust my instincts and the man I knew who would be responsible for it.

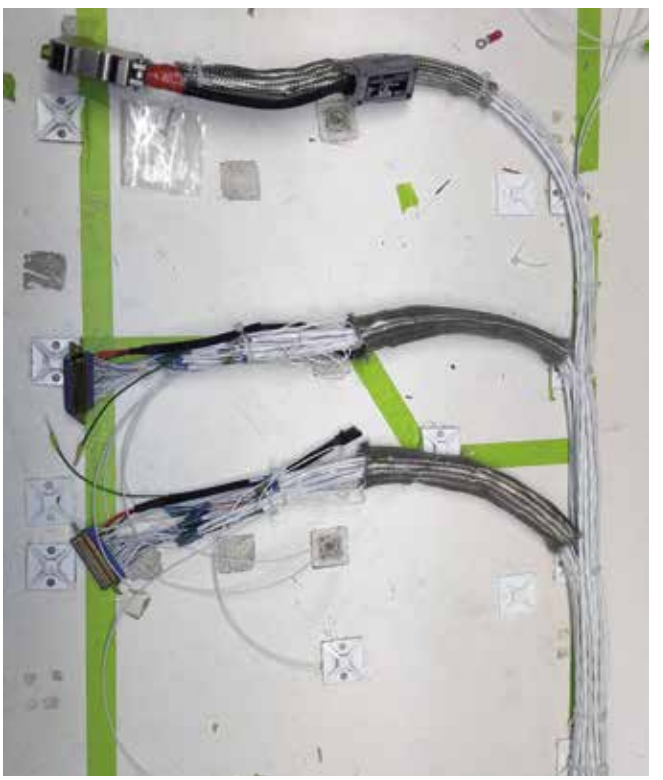
Ultimately we came to a mutually beneficial arrangement. I ended up with a "Cadillac" system at a far more modest price. It is a real step up from a six-pack and includes synthetic vision, terrain protection, ADS-B, Angle of Attack, redundant PFDs, autopilot source select, on-board weather, traffic and other features. It was what I had hoped for when I first decided Aspen was my flight display of choice. All this offer did was accelerate the installation.



Within a day it looked like this, ugh.

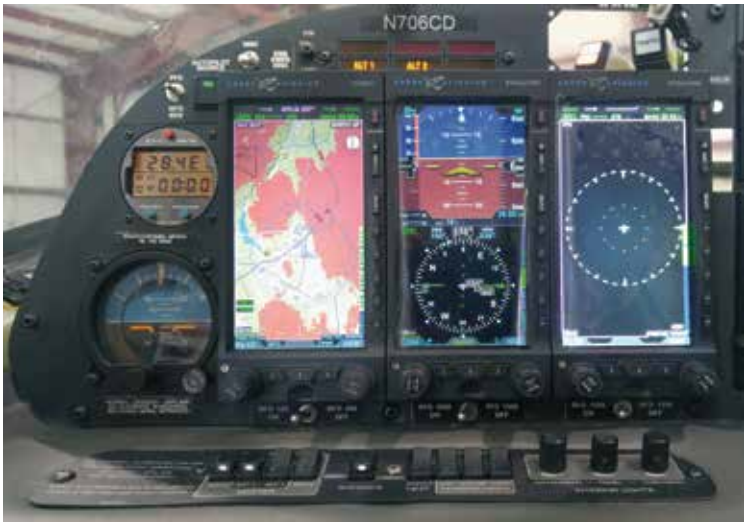
The Installation

Aspen wanted me to choose an installer I was comfortable with to perform a conforming installation. I obtained quotes from several Aspen dealers, and decided on



They built harnesses for it.

Santa Fe Aero Services in Santa Fe, New Mexico. The advantages were that they are a Cirrus Service Center and had done several installations, including the one on James' aircraft. Also, they are just an hour drive (shorter by air) north of Aspen headquarters, which made it easy for them to keep tabs on the installation process for me. Finally, there is hourly commercial service between Phoenix and Albuquerque. The installation quote was a bit higher than expected, but they were willing to negotiate. I'm very thankful I chose Santa Fe Aero Services; they have been exceptional to deal with. Brandon Maestas is a talented avionics tech and he jumped right on it. This was by far the best avionics installation process I have been involved with.



First power, no smoke. Now that's what I'm talking about!

Test Mule

My aircraft was returned in late February and needed to complete the annual inspection. Aspen took custody in mid-April. They were true to their word in every respect. They first had the airworthiness certificate changed to "Experimental R&D." They took great care of the plane and flew it just under 40 flight hours. They kept it until mid-August – almost 120 days to the day.

While they had it, they spent quite a bit of time perfecting the autopilot. I think it is fair to say I had grown complacent over time with its performance. Today it is better than new, and truly a digital level performance in an analog device. Aspen always gave me updates and I enjoyed being part of the process.

Paperwork is always a detailed process and I received my standard airworthiness certificate back in mid-September, even though I had the plane back in August flying under an Experimental Market Survey status. Aspen has asked if some magazines could see 6CD and its advanced panel, so it may well end up in a magazine (I may be flying a centerfold!).

Win-win situations like this are rare and I am grateful to Aspen for the opportunity to work with them. Would I do it again should our needs align? Absolutely, in a heartbeat.

Learnings and Suggestions

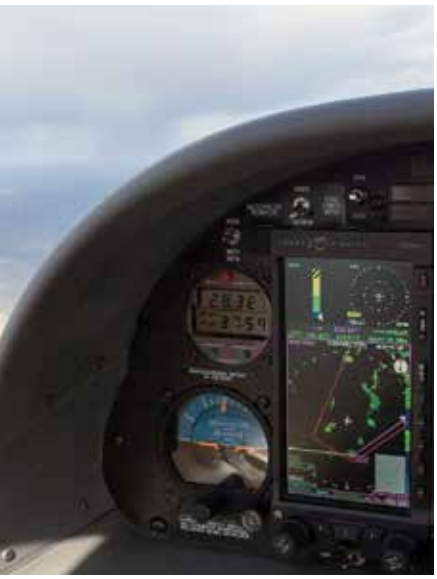
Along the way I had a lot of little decisions and things I learned that I can pass on.

1. Develop a detailed plan of what you expect with the installation in a written list or matrix and go over that with your installer. That written list is your scope of work; mine was several pages long.

2. Get competitive quotes from a few shops. Be sure to be clear what equipment set you have today and be clear in writing what you want. Once you have quotes in hand, pay a visit to the shop and talk to the guy that will be working on your airplane. How busy is the shop? How organized are they? Talk to some of their customers. All of this will alleviate any surprises.

3. Talking to different shops isn't just about price, it will give you different ideas and options. One shop, too busy to meet my time schedule, was still willing to give me ideas. They were the source of the suggestion to put the RSM (Remote Sensor Module – looks a bit like a GPS puck) in the wings (see item 7). One I am grateful for.

4. I added an Aspen ATX100 UAT ADS-B transceiver. I was already 2020 out compliant (GTX330ES) but doing this put FIS-B and TIS-B on the displays. Do this. FIS-B Weather on the display is really nice and at this point, while the panel is apart and new wire bundles are being made, it is a nominally priced upgrade. The ATX unit is a 978 transceiver, but they also offer the option of a Garmin GDL-88 or at the high end an L3 Lynx 9000.



Who says ADS-B Wx isn't accurate? Note the cell on the bottom left display and the view out the window clearly showing it. This was in eastern Arizona in a pretty rural area and still had good coverage. And yes, the red line is a convective SIGMET.

5. The right-hand display is an MFD1000. While it normally acts as an MFD, it actually is a fully redundant Primary Flight Display. It has its own fully independent Air Data Computer and ADHRS. Press one button to put it into reversionary mode and it is a PFD. NICE! See item 9 for icing on the cake.

6. Cirrus provided an authorized ADS-B out antenna location engineering order for free just like they said they would at Migration 13. That is very generous of Cirrus.

7. If you put in an ACU2 (a larger Analog Converter Unit, necessary to replace the Altitude Preselect anyway) you can install a separate OAT in it. That allows the RSM to be mounted inside the wings. One RSM is where the magnometer was mounted, and no longer needed, and the second is in about that same place in the other wing on a fabricated mount. This saves money, a DAR (Designated Airworthiness Representative) isn't necessary, no drilling holes in the fuselage and no lumps added to the outside of the plane. My OAT is under the left wing in an inspection panel. One upside – I suspect it is more accurate than the Cirrus ones given they are removed from the influence of engine heat.

8. I opted to put in the third tube, more formally known as the MFD500. I like it. The real value to it is a couple of things:

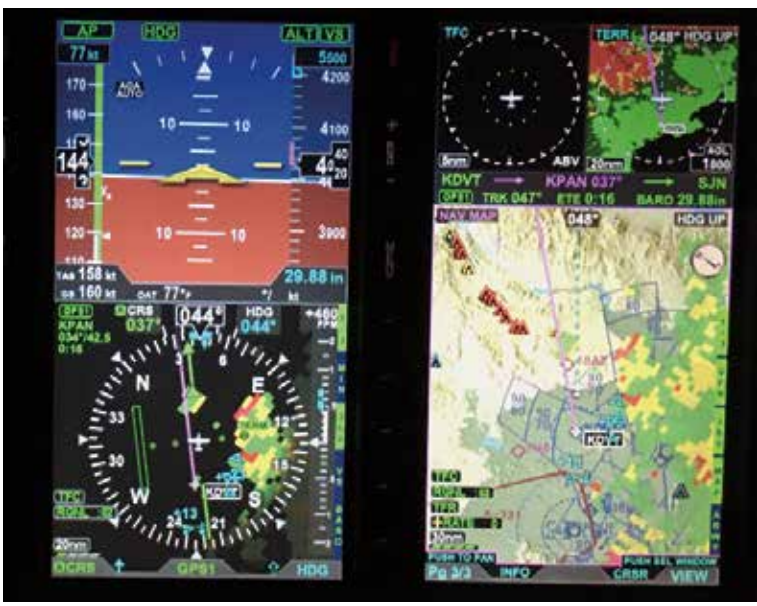
   a. It is another display to put information (approach plates, stormscope, etc.) on.

   b. It balances the look of the panel.

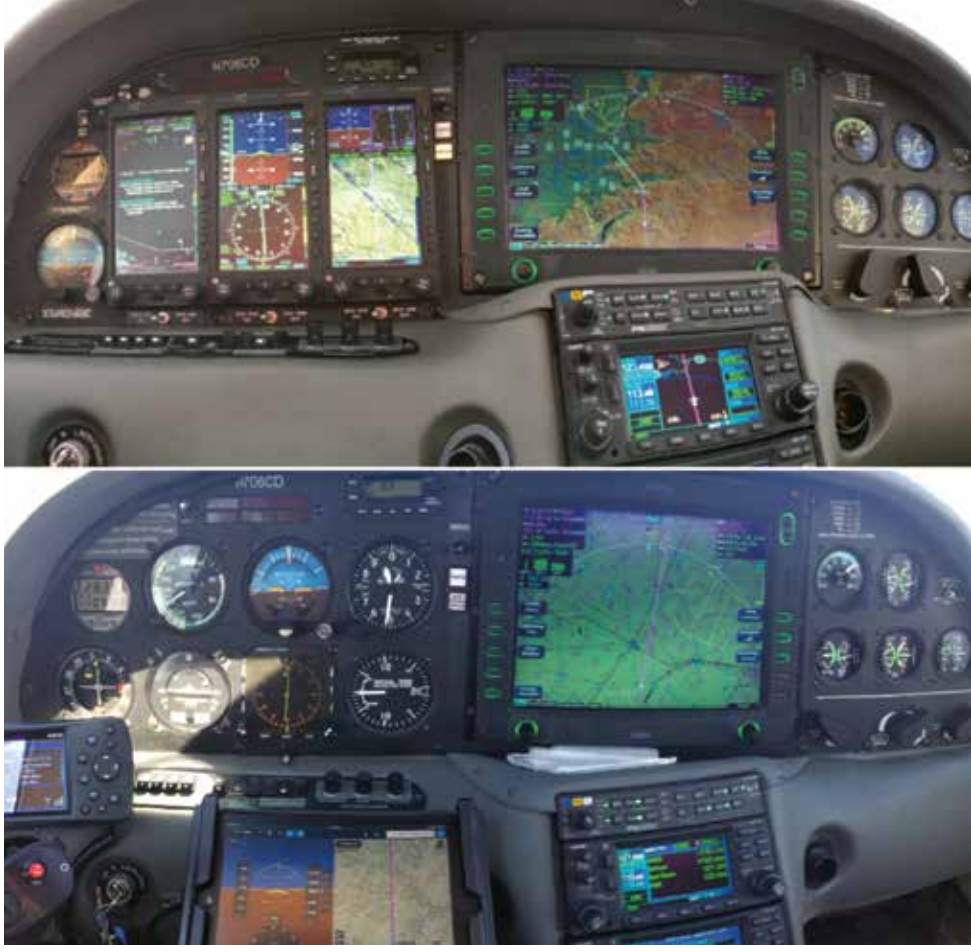
   c. It forces the removal of steam gauges. You cannot believe how compelling it is to glance at the steam gauges when on approach. This takes away that habit. You acclimate to speed and altitude ribbons faster.

9. I opted for Synthetic Vision (SV) and Angle of Attack (AoA). AoA is very accurate and useful; you will not be sorry. SV is nice but, in my opinion, AoA is more useful. Both options are software and can be added at any time with an SD card with an unlock code. You can defer these and still add them later with little additional installation cost implications (maybe an hour or so of shop time for SW updates and logbook entries).

10. Add the Autopilot Source feature. That allows the pilot to switch to the redundant PFD and then tie the autopilot to it. That feature is unique to Aspen and extremely handy. It is not available if you opt for the DFC-90 optional autopilot.



Ugly weather on the way to M14, so I deviated. Note the FIS-B Wx return overlaid on the HSI and map, the Terrain page with AGL box, the traffic shown and the altitude select features integrated into the Aspen to the right of the HSI.



Before (bottom) and after (ignore the iPad and 496). The Altitude Preselect is now removed but was still in at this point.

11. Get the Emergency Backup Battery (EBB) option for the MFD1000. It is a remote battery that can run the Aspen equipment if the aircraft power is lost for a *minimum* of 30 minutes and typically up to a few hours depending on the temperature. The standard PFD has a smaller battery inside it but the EBB is great peace of mind.

12. Charts and plates are only available from Seattle Avionics for $299 per year for the full USA; no trip kits needed, it is always there. They have sales from time to time. I bought two years for $199 a year. That is a huge savings over other MFD charts.

13. The Aspen requires you to keep a backup Attitude Indicator. I simply put my old indicator where the Garmin OBS was previously installed.

14. I consciously chose to not trade in any avionics and sold mine individually. I found I was able to get a higher return for them.

Post Script

Now, how do I like it? In a word – WOW! I should have done it long ago. The Aspen PFD1000 is a real step up from a Sandel. Features like Synthetic Vision, Terrain Protection, Angle of Attack and others make it almost an information overload compared to the Sandel. The seemingly endless display configurations on the MFDs allow me to tailor the displays to the particular flight I am taking. I have a configuration I like in local VFR conditions, one I use in mountainous terrain and yet another one if the weather is challenging.

Having ADS-B allows the display of weather in various ways. On the MFD map page or overlaid on the HSI (or both). The terrain features give me AGL clearly displayed for making a quick CAPS decision (a feature I hope to never need).

The list price for all this equipment (without software upgrades that can be added easily later from the front SD card slots) is around $25K. Installation is extra. Aspen does have sales promotions and it is worth watching for those. So, while it is not inexpensive, it is awesome. See the before and after shots above and you decide. It certainly changes an old G1 into a far more modern traveling machine. And it substantially improves resale value.

While I can still hear myself, in a curmudgeonly tone, saying "it can't go anywhere today my old Sandel couldn't have gone before," it certainly presents more information than it did before. And the truth is, it is less work and more fun. ⊕