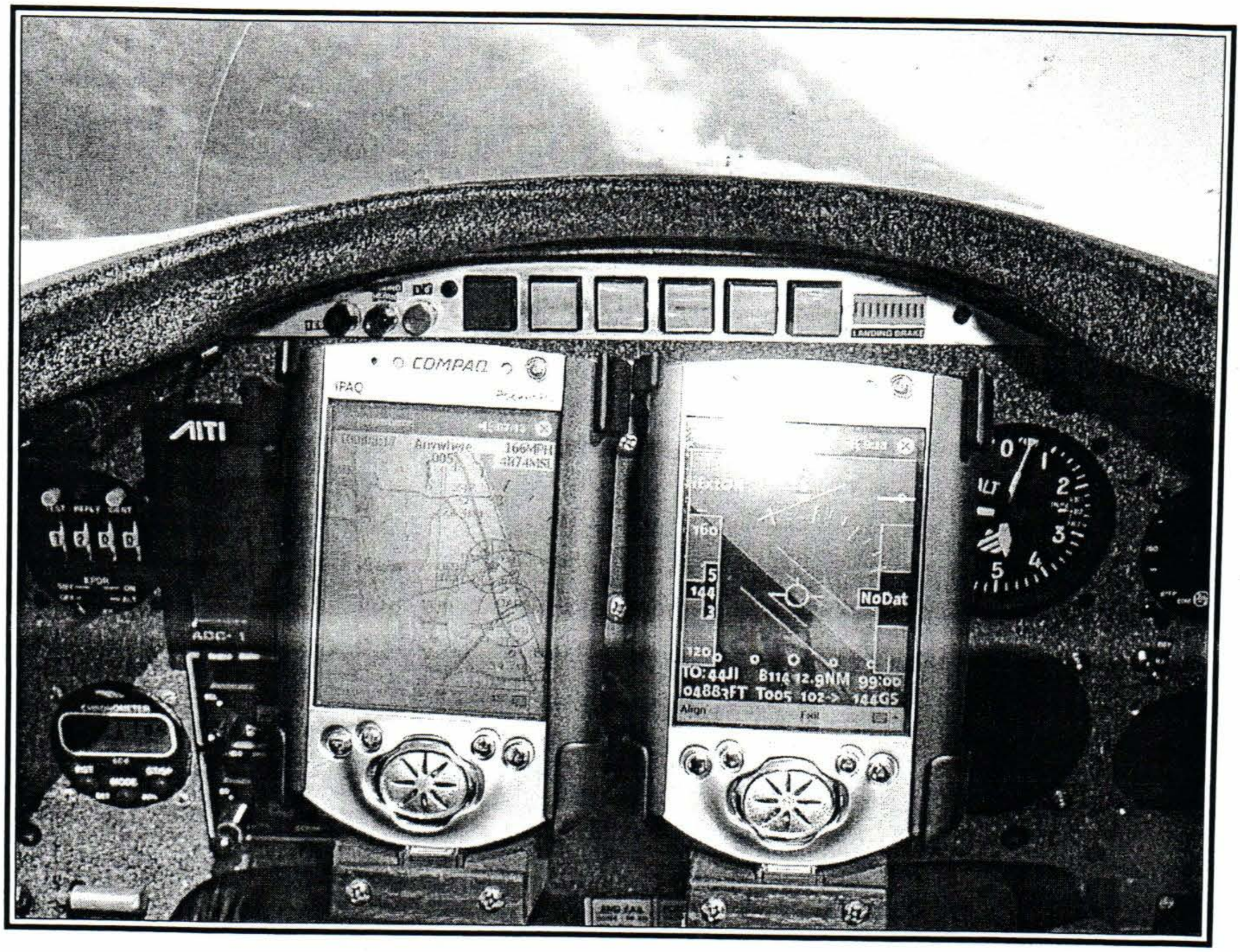

EFIS, from 500 Moving Parts to None

Dave Knox (FL) - I love the 21st century! I just finished installation of a poor man's glass electronic flight information system (EFIS). It works well. It's relatively easy to install. It's relatively inexpensive: about $1600-$2500. It should be far more reliable than my vacuumasaraus, since it has no moving parts. It weighs a total of 3.5 lbs (vacuum system weighed 16 lbs total). But it is not IFR certified.

Artificial Horizon. Reference web page http://www.pcflightsystems.com/ Craig Sellers makes the 'gyro' unit and software in his home workshop. The guy is scary-smart, friendly and very interested in satisfying his customers.

The 2" x 4.5" x 6.5" module fit neatly under my Long-EZ's seat, below my left thigh. With solid state accelerometers and gyros, it senses the accelerations and does some of the math, then sends the rest of the data to a personal digital assistant (PDA). The PDA is used for the rest of the math and displays a full color horizon with turn and bank.

But wait, there's more! Feed RS232 data from GPS or an air data computer into the gyro unit and you get a Primary Flight Display with airspeed tape on one side, altitude on the other, and a lot of additional GPS data around the edges. A GPS feed gives you GPS ground speed and GPS altitude, but an air data computer (ADC), such as Rocky Mountain Micro Encoder, or Mach III, gives you indicated airspeed and pressure altitude.

Its software can also be upgraded online as Craig comes up with improved algorithms and new features. He just released a software version with a flight director mode and highway-in-the-sky that works well. Set the altitude on the PDA and select a waypoint on the GPS. A series of circles guide you to an intercept and up or down to the selected altitude. In the pipeline are new display features, an autopilot feed, even a HUD made by Microvision, Inc (http://www.mvis.com/prod_nomad.htm.)

Another exciting development is Craig's own Edata module, which will have a built in ADC, integrated into his systems.

I was doubtful about its suitability until I 'chair flew' the gyro module while holding a PDA in the other hand. It was rock solid. I was sold and am pleased with it in the airplane as well. Also, it will run for hours on it's internal batteries if unable to feed from the aircraft and is fully portable via Velcro mounting.

Craig has a long list of upgrades to

come, including an interface module that will collect up all kinds of information and give it to numerous devices as required, such as a repeater display for the back seat. This is what will make the two axis autopilot feed happen as well. This upgrade will directly feed two servos, not needing an interface with an expensive autopilot black box. Craig is also planning a vertical navigation mode, able to leave your current altitude and capture a new one! That's normally a feature found only in five-digit autopilots!

If you want a little more glass in your cockpit look at his Engine Monitor, fed directly from sensors or piggybacking off an existing system with RS232 output, it uses an iPAQ to show a dual analog/digital engine display like the expensive Sierra Flight Systems. There's more, but you just have to see his web site.

I use Compaq's iPAQ PDA. I recommend it strongly and yes, it is going to survive the HP/Compaq merger. It color and fully sunlight readable. It also serves many other functions before, during and after flight. I have checklists on it, a slew of books (free web downloads), star charts, and all that happy PDA organizer junk: address book, calendar, task list, etc. I bought it thinking it was a fun toy, but it has turned into essential travel gear.

One inexpensive source for these is HP/Compaq's Factory Outlet web site where I got a 'scratch and dent' for about $350. Normal retail is near $450, and I saw no scratches, nor dents. (Just a stubborn piece of tape which a little elbow grease removed.) I recommend a 3700 model, or 3800 (newer, more expensive.) Also, I recommend the PC Card sleeve with it. It cost more, but now you can put in a huge external CF Card with a PC Card adapter and the PC sleeve has a built in external battery, greatly lengthening runtime.

The gyro module will run for 8 hours on it own 9v battery and the iPAQ for at least 4 hours with the external battery. That's backup capability!

Moving Map. Reference web page http://www.anywheremap.com/cv/ The Anywhere Map is a strong product and ControlVision is a company that values customer service as well. It's software turns an iPAQ into a high quality color GPS moving map. The existing product is great, and it is constantly evolving with online updates to the database and the application software, most recently adding GPS approaches. It comes with a year of free monthly updates and then costs about $100 per year to stay up to speed with monthly downloads. I like it so much I am going to sell my Garmin 195 and never look back.

One of the features I like, which makes Anywhere Map unique for its price is its 'Cone of Safety.' If I'm inside a green ring displayed around each airfield, I can glide to the field. I've told it my glide ratio, it knows our GPS altitude, and the ring 'breathes' depending on glide range.

Another iPAQ / GPS map possibility is http://www.gonavgps.com. Craig is integrating their software into his big picture now. I didn't know about them until after my installation was complete, so all I can say is that the potential synergy from these two pieces of software is remarkable. Example: Craig just released a combined version of his EFIS software with NAVGPS's map. One push of a button and the display flips back and forth, reducing the need for a second iPAQ. I still like all the information in front of me with two iPAQs (as well as the backup one provides the other), but as a backup or a repeater for the back seat, this scenario would be very Gucci. I've tried NAVGPS's free trial download and like it. Some features more, some less. It will boil down to personal preference and maybe to the integration of the EFIS / Map software. I have not used http://www.teletype.com/ but it looks strong on its web site.

This also highlights the flexibility of this glass setup. After a 10 minute download, I can change my cockpit to a new, better configuration, not just cosmetically, but fundamentally.

Installation. The RAM company (http://www.ram-mount.com/) now has an iPAQ mount. I mounted two side-by-side, on a three-inch extension, wired to their support gear via the panel. This solves one sometime-weak area of the iPAQ: at some sun angles the display does wash out a little. But with the RAM mount I can adjust the angle. After flying for about 15 hours in many different conditions I can say it is always readable, though a few times less readable than most.

Another advantage of this setup was keeping the remaining instrument holes behind the displays. I may have pulled my vacuum system out (and danced around the funeral pyre under a full moon) but I'd still like some old-fashioned steam gauges available for altitude and airspeed. They now live behind the EFIS where I can easily view them with a twist on the RAM base mount.

Installation of the EFIS was straight forward, with the only bugaboo being mounting the gyro module as true to the flying longitudinal axis as possible. It can adjust, electronically, for a generous mounting error, but as always: the truer the better. The Anywhere Map and NAVGPS can be independent or piggybacked off another GPS with NMEA out. I installed an independent unit in the backseat for my GIB and a dependent one in the front, though I plan to sell the Garmin 195 and free the iPAQ from its bonds. This change will also allow me to use the portable iPAQ / GPS in the car, since there is plenty of memory left for a street atlas.

Another weak area of the iPAQ is the tiny connector on the bottom. It tends to wiggle loose. I solved that by mounting a piece of MDF, cut to snuggly position it in place (see photo). Since this creation however, new cradles are on the market, which should alleviate this necessity. Craig sells these too.

In summary, this stuff is what the 21st century is all about! It works; it's cost effective, lightweight and of course, it's very cool looking.