



Big Glass For Less Money

Guardian Avionics' New smartPlane Is Worth Watching

I have been a fan of Ash Vj and his company Guardian Avionics for some time, enough to do an article on them back in April of 2017 when I featured their products including their carbon monoxide detectors, USB charging ports, and their line of FAA-approved iPad panel mounts with built-in cooling. Ash seems to get right to a problem and right to the solution!

At Oshkosh 2019, which seems like a long time ago, Ash showed me something he was working on that did not “click” with me at the time. Today, I see Guardian’s smartPlane concept as something we need to talk about, especially if you are flying a legacy aircraft and dreaming of a glass cockpit but with less of a budget than EFIS typically requires.

What Guardian Is Known For

If you are not familiar with Guardian Avionics, chances are you have not been in the market for a USB charger or a CO detector. Certainly, the iPad in the cockpit has become standard equipment in not only a VFR or Light IFR aircraft, but pilots flying sophisticated aircraft in True IFR also see a place in their heavily equipped panels for the iPad. Thus, it would follow that the ability to keep your iPad fully charged in flight would be a requirement. Guardian was one of the first companies into the USB power market.

You might not think so much about the carbon monoxide detector market, yet many of the major aircraft manufacturers including Cessna, Cirrus, Piper, and Diamond now include a Guardian CO detector as OEM equipment in their aircraft! In my original article, I documented new aircraft, fresh from the factory with exhaust leaks and a carbon monoxide issue. CO is a real issue and if you are unfamiliar with it, check out my article “Avoiding CO” in the April 2017 issue.



Guardian USB Charger and CO Detector

NORSEE, or “Non-Required Safety Enhancing Equipment,” an FAA concept that has significantly changed the way the FAA looks at new technology, has opened the door to lots of new products. Guardian’s CO detectors were one of the first. Guardian followed with a broad line of iPad panel mounts that allowed you to install an iPad or iPhone into your panel.

The problem I saw was that most Cessnas with conventional factory panels just do not have room in the panel to mount an iPad. When you do an avionics update and eliminate ADFs and large legacy navcoms, you can sometimes find room on the far-right side of the panel, however an iPad mounted in the panel seldom will fit. But an iPad on a reticulating arm away from the panel can sometimes work. What if the iPad was to play a larger role? Simply stated, that is the idea and the concept behind Guardian’s smartPlane concept. The second goal is to add glass and do it for less.



smartLink: the FDR-851 (\$1,499)

The “heart” of the smartPlane concept is the Guardian FDR-851 Flight Data Link.

The FDR is a Flight Data Recorder, CO detector, and dual 2.7-amp USB power source. The FDR-851 connects with your GPS, Primary Flight Display (AHRS) systems, and engine management systems through a hard-wired RS-232 connection. This allows positional, navigational, attitude, and engine data to be collected and displayed on an iPad via the Guardian smartMFD app, and the FDR-851 plays very well with others! The smartLink 851 can be connected to your onboard GPS: Garmin GNS430, 480, 530, GTN625, 635, 650, 725, 750, GTN750Xi, 650Xi, GPS175, GNX375, GNC355, and Avidyne IFD440 and 540.

AHRS data from the Garmin G5 or G3X (and G3X Touch) can be displayed on the iOS app and engine monitors: Garmin G3X and G3X Touch, JPI EDM730, 830, 900 Primary, and 930 Primary and Guardian Avionics’ new EM100 (not yet approved for certified aircraft) will interface via the RS-232 connection, allowing accurate attitude and navigation data, and engine performance data to be aggregated, transmitted, displayed, and recorded on your iPad and/or iPhone through the Guardian Avionics smartMFD app.

As a result, your iPad (and iPhone) become mini-multifunction displays, fully equipped with accurate VFR and IFR maps and charts, rich graphical engine performance information, and even a mini-PFD/MFD for quick reference. All carbon monoxide alerts and levels are also available on the smartMFD app, too!

The Brains of smartMFD

The “brains” of the smartPlane concept is Guardian’s smartMFD app. The smartMFD app turns your iPad into an affordable MFD that can provide the following:

- Easy-to-understand MFD display.
- GPS location, speed, altitude, and engine data recording with automatic uploading to smartData web app.
- Accurate airspeed and altitude data display.
- Attitude display with AHRS equipped smartPlane products.
- Configurable engine monitor display with custom warning thresholds.
- VFR & IFR sectional chart display with airport information and approach plates.
- METAR and TAF weather data with AIRMET/SIGMET map overlays.
- Carbon monoxide level reporting and alerting when connected to smartPlane products.
- Pulse oximeter from your Apple watch data display on G3X and iPads.

In short, The Guardian Avionics smartMFD application for Apple iOS is what makes the smartPlane system a true budget-friendly multifunction display for your aircraft. We will look at the numbers a little later.



smartPlane EM100 Engine Monitor (\$699 plus probes and sensors)

As mentioned, the Guardian FDR-851 interfaces with many of the popular engine management units on the market. Since the concept is to get this done for less, the EM100 offers a very affordable option and Ash expects the EM100 to be available in certified aircraft soon.

Unlike some engine management systems that use proprietary probes and sensors, Guardian uses standard, over-the-counter probes and sensors and makes many of them available on their website for purchase. These are not included with the EM100’s \$699 price but Guardian provides an in-depth list of everything you need to complete the EM100 installation. The EM100 or alternative engine management unit sends all data to the FDR-851. This allows engine performance data to be aggregated, transmitted, displayed, and recorded on your iPad and/or iPhone through the Guardian Avionics smartMFD app. Again, the data stored on the iPad or iPhone is transmitted to the cloud via cellular or WiFi, allowing you to access it later. Guardian calls this smartData. This allows you to look at your engine data with a critical eye after a flight and share this info with your mechanic or engine rebuilder.

With the smartPlane EM100, you can measure, display, and record the following parameters from a variety of engine configurations:

- Exhaust Heat Temperature (EGT) - up to six cylinders
- Cylinder Heat Temperature (CHT) - up to six cylinders
- Turbine Inlet Temperature (TIT) - up to three inputs
- Outside Air Temperature (OAT)
- Internal Inside Air Temperature (IAT)
- Oil Temperature (OT)
- Oil Pressure (OP)
- Fuel Pressure (FP)
- Fuel Levels (FL) - up to four tanks
- Fuel Flow (FF) - up to two inputs
- Revolutions Per Minute/Tachometer (RPM)
- Manifold Pressure (MP)
- Shunt for AMP Meter
- Voltage Input Monitor

SmartCloud Storage

The data stored on the iPad or iPhone is transmitted to the cloud via cellular or Wi-Fi and that data will be located at www.guardianavionicsdata.com. Through the smartMFD app, all your flight data is stored and uploaded to your account on the Guardian Avionics smartData website at the end of every flight, with

the ability to download and view flight tracks on programs like Google Earth, view engine data through rich charts and graphs, and even export your data for use through other programs or to send to others. If your iPad is connected to your audio panel through a 3.5mm audio jack, the app will even record the audio from your intercom and upload it to your account for each flight.

How This Works in a Certified Airplane

For a certified or even experimental aircraft to fly in IFR conditions, a certified instrument that shows Attitude, Heading, Altimeter, Airspeed, Turn & Slip and Vertical Speed is required. Traditionally, that required your standard six-pack of six individual instruments all dedicated to one job. EFIS Electronics Flight Instruments like the Garmin GI-275 with Magnetometer can provide all of these in a single instrument but it does not output RS-232 to the FDR-851. The G5 does provide the output but it only provides Primary Attitude. Your least expensive option would be to maintain your existing altimeter, airspeed, VSI and turn and slip. The alternative would be to add a GI-275 that legally replaces the four analog instruments.

While at Sun n' Fun in April, I found out that Kelly Manufacturing, better known as R.C. Allen, has introduced what they are calling the "Mini6" electronic flight instruments that should legally fill the bill for this concept and do so at considerable savings. I will be keeping an eye on that product since the first goal of smartPlane is to add big glass to your panel and the second goal is to do it for less. So, an electronic flight instrument with RS-232 interface sends all this data to your iPad and provides all the info you need to keep the aircraft straight and level and on course.

Like any IFR application, an IFR GPS or Integrated Navigator takes the lead navigation role and a navcom with ILS serves in the back-up role. Your GPS/navcom will interface to the FDR-851 and your EFIS HSI and provides an advisory PFD on your iPad. The EFIS AI and HSI are your legal tools to be able to navigate the IFR world but you also have your iPad mounted directly in front of you with a mini-PFD/MFD advisory version.

You can therefore fly IFR with or without the iPads. Guardian's Cessna 172 demo aircraft has three 11" iPads in the panel. You can have as many as you want but I am suggesting that a panel with two large-format iPads is plenty for most pilots.

Guardian's FAA approved iPad mounts allow you to "park" your iPad when you plan to fly and snap them out and take them home when you are not. The basic mount for something like the iPad 11 Pro is \$299 but for \$499 you get a mount with built-in USB charger, and since iPads are notorious for getting hot, especially in direct sunlight, the \$499 unit includes a built-in cooling fan. You would need two of these for a two-panel application. Now, you add your engine management option from the more basic, advisory JPI EDM-730 that will transmit all data to your iPad or the top-of-the-line EDM-930 Primary. Guardian's EM100, once approved through NORSEE, should offer an affordable alternative when available. It is a remote mounted unit which, as you can see, has all the bases covered.

The Numbers

Many of my clients come to me with a legacy airplane full of the original factory installed avionics with the goal of safely flying Light IFR. That calls for a new audio panel, IFR GPS (often needing a second com), a back-up navcom with glideslope, an ADS-B Out and In solution, autopilot, engine analyzer, and many also need to update their old 121.5 ELT. A common recommendation by me in this situation is the following:

PS Engineering	PMA8000BT
Garmin	GNC-355 IFR GPS com with GI-106B CDI
Garmin	GNC-255A with CDI
Garmin	GTX 335 Mode S Transponder with Portable ADS-B In
Trio	Pro Pilot Autopilot
JPI	EDM-830 Engine Analyzer
Artex	Model 345 406 ELT

This package *installed* is about \$36,000 by my estimates.



SmartPlane system in Guardian's Certified Cessna 172.

Many pilots are currently being seduced by EFIS or "Big Glass," but I discourage clients with a short-term plan for the aircraft to consider EFIS. It is a luxury in a Light IFR airplane, in my opinion, but for a client with goals beyond Light IFR or a client who will keep the airplane for 10 years plus, solid-state gyros can make sense, even dollars and sense.

Let's add "Big Glass" from Garmin or Dynon to the package above and look at the numbers and then compare it to Guardian's smartPlane concept.

From the package above, we remove one GI-106B CDI and the JPI EDM-830 and add *either* two Dynon or two Garmin Big Glass panels with built-in engine monitoring. The installed estimate *including a new panel* with the Dynon system comes out at about \$78,000. (I estimate the dual Dynons alone installed at about \$29,000). The Garmin G3X option comes in about \$3,000 higher, so about \$81k.

That is a big upgrade for any legacy aircraft!

Removing the Dynons or Garmin G3Xs from the equation and installing the smartPlane system gives you the same size "Big Glass" for about \$20,000 less and at the same time, you actually have more tools on the iPads available to you in flight, plus smartData, so you can access engine and flight data after the flight. Frankly, right now the only issue is having an EFIS electronic flight instrument that can drive the FDR-851 (with RS-232) and at the same time meet the primary requirements for altitude, airspeed, vertical speed and turn and slip, and heading. The G5 does attitude; the GI-275 does it all but does not have an RS-232 output to drive the FDR. The R.C Allen new "Mini6" may prove to be the perfect solution.

Conclusion

Don't get me wrong, the Dynon HDX and the Garmin G3X are excellent large format EFIS systems. Pilots installing these systems are generally flying faster, more expensive aircraft. As I said, EFIS is a luxury in a Legacy Light IFR airplane. However, if you fly a legacy aircraft, plan of keeping it for an extended period (and expend-

ing your budget) and you're considering a full panel upgrade, the Guardian smartPlane system makes Big Glass possible for you.

Oshkosh 2021 is approaching. If you're in the market for Big Glass, you'll want to visit Dynon and Garmin and look at the systems available from them but also plan to include Guardian Avionics and R.C Allen in your research.

Thanks for Reading.
Until next time, Safe and Happy Flying! 🛩️



Bob Hart purchased his first airplane in 1971 at age 21. He's owned five others since. As a Senior Avionics Consultant at Eastern Avionics, Bob has personally sold over \$20 million in Avionics. Bob

now offers avionics advice through many online forums and consults avionics clients through his website www.AvionixHelp.com. He is semi-retired. After living in Colombia, South America, for a few years, he is now back in sunny Florida.

Editor's Note: Bob Hart is a regular participant on the Cessna Owner Organization's forums and is available to answer your avionics-related questions. To contact him, visit www.CessnaOwner.org, click the Forums tab, and scroll down to the "Avionics" forum. COO membership is required.

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