

Electronic flight bags

Rapidly changing products in a dynamic market

BY DAVE HIRSCHMAN

The first electronic flight bags (EFBs) were airline inventions. Instead of stuffing every cockpit with cumbersome paper charts, operations manuals, and performance calculators—all of which were subject to regular revisions—carriers such as

FedEx and Lufthansa designed their own software in the 1990s for portable computers that could hold all that critical information.

The FAA requires that airline EFBs be built to withstand rapid depressurizations and extreme temperatures, and they're wildly expensive by GA standards, frequently topping \$30,000 apiece.

Corporate flight departments saw the benefits of EFBs and came up with their own versions using plentiful and relatively inexpensive tablet computers. Now the technology has migrated to individual aircraft owners and pilots



Garmin's GPSMAP 696 is marketed as an electronic flight bag capable of replacing paper charts and approach plates for some general aviation operations.

who can choose from a dizzying variety of EFB hardware and software—and the capabilities go far beyond simply replacing paper.

Today's EFBs offer geo-referenced charts and approach plates that display aircraft position, real-time weather, traffic and terrain, GPS-based synthetic vision, and three-dimensional "highway in the sky" approaches. And since they use commercial, off-the-shelf electronics, EFB prices have fallen dramatically, with some chart subscriptions falling below \$100 annually and top-of-the-line units retailing for about \$5,000.

But buyers should also know that EFBs are the most rapidly changing part of an already tumultuous avionics market. Prices, products, and the companies that supply them can change without notice. Most EFBs use ubiquitous but shutdown-prone Microsoft Windows operating systems. The high altitudes at which unpressurized, turbocharged GA airplanes fly can ruin mechanical computer hard-drives causing possible data loss and catastrophic failures.

There's also an undeclared war going on between EFB manufacturers and traditional avionics firms. Garmin and

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rival Bendix/King, for example, are both marketing their new portable navigation products (the GPSMAP 696 and Vision/Horizon 3D, respectively) as EFBs, noting that they contain built-in, updatable charts and approach plates. At the same time, EFB makers are offering moving maps, traffic, terrain, and synthetic vision—features that had previously been the exclusive domain of traditional avionics manufacturers.

Despite their divergent starting points, however, avionics manufacturers and EFB firms are closing in on a similar goal: to enable GA pilots flying IFR or VFR to check weather and TFRs and file flight plans electronically, load that information into their aircraft avionics, and fly to destinations (or alternates) with portable computers providing essential information along the way.

Early adopter

Mike Knobler, an instrument-rated GA pilot and Mooney owner in Atlanta, bought his first EFB from AirGator about five years ago—and his progression through the product line illustrates some of the EFB's evolving capabilities.

At first, Knobler regarded the ability to store and update electronic approach plates as the primary benefit. Since then,



Features such as synthetic vision, moving maps, real-time weather, and terrain warnings are now being offered on a variety of EFBs.

however, he has added an XM satellite weather subscription (\$49 a month), terrain warnings, and geo-referenced approach plates.

“Having access to timely weather information in the cockpit has almost become a go/no-go item for me on long IFR trips,” said Knobler, who has flown

his Mooney throughout North America as well as to Europe and South America. “I used to fly IFR and totally depend on ATC and Flight Watch for weather information along the way. But having satellite weather is incredibly useful for avoiding bad weather and planning route changes because you can see trends developing far ahead.”

Knobler typically flies with a Sony tablet computer running the AirGator software on his lap or, if the right seat is empty, next to him. A power box connected to the aircraft electrical system through a cigarette-lighter adaptor powers his computer, weather antenna, GPS, and Bluetooth wireless connections.

Knobler said he rarely uses his EFB's terrain or elevation mapping features. And although his current system has the capacity to display geo-referenced approach plates, he hasn't used them during actual approaches.

“I may glance at the screen to doublecheck a piece of information,” he said. “But I don't ever want to stare at the computer screen, or a paper approach plate for that matter, while flying an approach.”

Knobler, a journalist, said he originally thought his tablet computer would do double duty as a writing tool on long trips. But he uses it only for flying and updating his panel-mount avionics.

“The tablet computer isn't terribly practical for word processing,” he said, “and I can't use it to check my e-mail

Defining EFB

Electronic Flight Bags (EFBs) have evolved so quickly, and terms describing them are thrown around so loosely, that defining the electronic gadgets and their capabilities can be a matter of contention. The FAA weighed in on EFBs with Advisory Circular (AC) 120-76A, a guideline for EFB certification and use in 2003, a decade after commercial operators began widely using EFBs. But even the AC leaves room for interpretation.

“Operators have long recognized the benefits of using portable electronic computing devices, including commercially available computers, to perform a variety of functions traditionally accomplished using paper references,” according to the AC. “EFB systems may be approved for use in conjunction with or to replace some of the hard-copy material that pilots typically carry in their flight bags.”

The FAA broadly defines three classes of EFBs.

“Class I” EFBs are commercial, off-the-shelf computer systems that may be connected to the aircraft power source but not attached or mounted to the flight deck.

“Class II” EFBs are portable computers, possibly based on commercial, off-the-shelf systems, connected to the aircraft power source and are mounted on the flight deck.

“Class III” EFBs are installed equipment and they require airworthiness approval and FAA certification. They must be able to run moving-map software that displays “own-ship” position.

Class I, II, and III EFBs may be used at the pilot's discretion to replace paper charts in Part 91, but Part 121 and 135 carriers must obtain specific operational approval. Features such as GPS-based moving maps, airport diagrams, satellite weather, which used to be limited to Class III EFBs, are quickly finding their way to lower-cost, Class I and II models. New features such as GPS-based synthetic vision that were unavailable in 2003 are becoming increasingly common across the EFB spectrum. And a GPS unit with current approach plates such as Garmin's GPSMAP 696 can be considered a Class I EFB if it's sitting on the pilot's knee, or a Class II EFB if it's mounted on the panel. —DH

at work, so I end up bringing my work computer, anyway.”

Frankenstein's laboratory

Stein Bruch, founder and president of SteinAir, a Minnesota avionics sales and installation firm, said the growing computing power of panel-mount avionics may someday swallow stand-alone EFBs completely.

Avidyne Entegra and Garmin G600 multi-function displays (MFDs) can display approach plates already, and Bruch said some primary flight displays (PFDs) now under development are likely to include approach plates and charts, too.

“The EFB’s original promise was providing a cheap and easy way to replace paper in the cockpit,” he said. “But stand-alone EFBs can create a Frankenstein’s laboratory of wires and antennae. They end up being something else to keep batteries in and manage downloads for. And they’re based on a Microsoft operating system that was never meant for the cockpit environment.”

Geo-referenced approach plates have attracted a vocal following because of the increased situational awareness they can provide. But Bruch argues such approach plates aren’t as good at showing an aircraft’s position as other cockpit tools.

“If you’re trying to follow your progress on a geo-referenced approach plate during an actual approach, you’re probably not competent to be flying the approach at all,” Bruch said. “Moving maps, PFDs, and MFDs provide much more timely, detailed, and pertinent information.”

AirGator’s Amir Tirosh disagrees.

“The EFB should be a completely integrated part of your scan, like a flight instrument,” he said. “If you just brief the approach and put it away, you don’t get the benefit of the situational awareness it provides.”

A fast transition

Ross Neher, a technical sales manager for FlightPrep, an Oregon-based company that sells EFBs, electronic charts, and flight planning software, says its products are increasingly popular with GA and corporate pilots.

FlightPrep products range from simple downloads of flight planning software and approach plates (\$99) to solid-state, tablet computers and tools that allow them to show geo-referenced maps, terrain, weather, IFR and VFR charts, checklists, pictorial approaches, and airport diagrams that show an airplane’s real-time position on the ramp (\$4,896).

FlightPrep also distributes data on eight-gigabyte memory sticks that fit into computer USB ports, allowing pilots to access the sophisticated software on a limitless number of computers.

“Using our products can be as simple as opening a book,” said Neher, a CFII. “Our geo-referenced approach plates improve pilot situational awareness without increasing workload. Pilots don’t have to push any more buttons because the airplane just shows up on the approach plate. It’s the same with the airport diagrams. We never lose sight of the fact that our technology is supposed to make flying easier.”

Jeppesen, the aviation chart pioneer

that started 75 years ago, also designs EFB software to fit the broadest possible range of computer hardware.

The Colorado company is encouraging customers to move to electronic subscriptions which are quicker, less costly, and easier to update than paper chart books—and potentially more profitable to Jeppesen. The Boeing-owned firm provides its Flight Deck software for customers to install on a range of electronics. And JeppView subscriptions allow customers to download charts and approach plates on up to four computers (desktop or portable) per subscription.

“There’s a fast transition underway in the GA and business aviation market,” said Mark Ruger, Jeppesen’s business manager for electronic charting services. “Just about all the new aircraft being sold today have glass avionics in the panel. We support data distribution so that our customers can go completely paperless if they choose.”

Prices vary, but a JeppView subscription that covers charts and approach plates for the entire United States costs \$738 a year while regional coverage is \$238 a year.

“The GA marketplace is very diverse,” Ruger said. “Some want the biggest screens they can get on their EFBs. Others are OK with smaller displays and fewer options. Our customers can make the hardware decisions that are best for them. We’re here to provide the data—and we’ll do it electronically, on paper, or whatever combination they want.” **AOPA**

E-mail the author at dave.hirschman@aopa.org.