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Flying Paper Airplanes

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Okay, I admit it: I love gadgets, especially gizmos that let me dispense with paper. Address book? That's in the iPhone, which is also well-stocked with a variety of handy aviation apps. Latest version of a draft magazine article? That would be on the thumb drive—but also accessible via a newly-acquired app that lets me put files in one place and read them on any device with an Internet connection. Weather info? The stack of dot-matrix printer paper I used to lug around has long since been supplanted by datalink weather acquired through a collection of handheld and panel-mounted devices.

In my increasingly paperless world, the recent arrival of updated paper instrument approach procedure (IAP) charts is admittedly something of an anomaly. I do like the “security blanket” aspect of those neatly folded paper charts, possibly because I have personally seen how one mistaken button-push can lead to instant and simultaneous amnesia for two GPS moving-map navigators. Paper prevailed on that occasion.

Still, the lure of lightening my flight-bag load and dispensing with the clutter of a papered airplane is strong. Envy of a pilot pal's e-chart setup was the final push I needed to do some basic research into the concept of the Electronic Flight Bag (EFB). Here's what I learned.

There's a Doc for That

Like airplanes themselves, EFBs come in a variety of forms, capabilities, and restrictions.

The FAA defines those forms, capabilities, and restrictions—plus the term itself—in Advisory Circular (AC) 120-76A, *Guidelines for the Certification, Airworthiness, and Operational Approval of Electronic Flight Bag Computing Devices*. It can be found at: www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/23222.

Let's get one important point on the table right away: As stated in the opening paragraph of AC 120-76A, the guidance material in this AC applies to the usual collection of commercial operators in Title 14 Code of Federal Regulations (14 CFR) part 121, 125, 129, or 135 operations. For 14 CFR part 91, it applies to large and turbine-powered multi-engine aircraft operating under 14 CFR part 91, subpart F (which covers fractional ownership), but only if the operating regulations require specific functionality and/or equipment under 14 CFR section 91.503 for *Flying equipment and operating information*.

Other part 91 operations—including those of us who fly light general aviation aircraft for business or pleasure—do not require any specific authorization for EFB operations, as long as the EFB does not replace any system or equipment required by the regulations. Yet, even if the EFB conditions and restrictions outlined in the AC don't apply to the kind

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of flying you currently do, it is still useful to know how the FAA defines and classifies these devices.

The ABCs of EFBs

Advisory Circular 120-76A defines the term EFB as:

An electronic display system intended primarily for cockpit/flight deck or cabin use. EFB devices can display a variety of aviation data or perform basic calculations (e.g., performance data, fuel calculations, etc.). The scope of EFB system functionality may include

various hosted databases and applications. Physical EFB displays may use various technologies, formats, and forms of communication. These

devices are sometimes referred to as auxiliary performance computers (APC) or laptop auxiliary performance computers (LAPC).

Pilots of paperless airplanes need to use their discretion wisely.

The FAA categorizes EFBs in three classes. Class 1 and Class 2 EFB systems are both based on commercial off-the-shelf (COTS) systems and both are considered to be personal electronic devices (PED). Also, both are portable (not permanently installed in the aircraft). The difference between Class 1 and Class 2 is primarily derived from how they are mounted in the aircraft and what must be approved.

A Class 1 system is not attached to an aircraft mounting device, aircraft primary power supply, or

data connectivity. Class 1 EFB systems can be used both on the ground and during flight, but must be stowed for takeoff and landing. They are limited to providing supplemental information and cannot replace any required system or equipment. A Class 1 EFB may be connected to aircraft power through a certified power source to operate the EFB and recharge its batteries. A Class 1 EFB can display tabular data, such as performance tables, checklists, and the pilot operating handbook (POH).

A Class 2 EFB system can be attached to a structural-mounting bracket to ensure that it does not interfere with other aircraft systems. Though considered a PED, the use of a structural-mounting bracket made only for that device means that a logbook entry is required to remove a Class 2 EFB from the aircraft. A Class 2 system can be connected to aircraft power and to a certified data connection in order to exchange data with aircraft systems and make interactive performance calculations. In addition, a Class 2 EFB can be used to compute weight-and-balance information as well as takeoff-and-landing V-speeds. It can also provide flight-critical data, such as navigation charts. Since it is not necessarily stowed for takeoff and landing, a pilot can also use the Class 2 EFB to display departure, arrival, and approach charts.

Class 3 EFB systems, which are the most capable, require approvals. A Class 3 EFB system is installed equipment that, with exceptions for user-modifiable software used to host certain kinds of applications, requires a Supplemental Type Certificate (STC) or certification design approval as part of the aircraft equipment. It is also subject to certification requirements that enable additional applications and functions.

Know When to Hold 'Em

There was a time when features such as moving maps, airport diagrams, and datalink weather existed only on Class 3 EFBs. Today, however, these functions (and many more) are available in Class 2 models that are—as the COTS characterization would imply—widely available commercial devices that anyone can buy. However, due to lack of airworthiness approval to demonstrate reliability, the display of “own-ship” position in flight on a Class 1 or Class 2 device is not authorized




where regulatory compliance is required. A unit with current IAP charts can be characterized as a Class 1 EFB, if it is not attached to the airplane, or as a Class 2 EFB, if it is mounted in the panel.

The question is: Can you legally use an EFB? According to the guidance, 14 CFR part 121 and 135 operators must obtain specific operational authorization to use them. For those in part 91 operations, however, the FAA states that use of Class 1 and 2 EFBs to replace paper charts is at the pilot's discretion.

Know When to Fold 'Em

That's good news, of course, but pilots of paperless airplanes need to use that discretion wisely. Reasons for caution include:

- Devices not subject to FAA approval of components or installation are not guaranteed to provide the kind of reliability you expect from products that have successfully made it through these processes.
- Devices can fail, and they often fail at inopportune moments. In the personal example mentioned earlier, the pilot's hand was jostled by turbulence and he accidentally pressed the GPS data-card ejection button instead of the flight-plan key he meant to activate in response to an amended ATC clearance. The unit—and the secondary unit configured for “cross-talk” with the primary navigator—immediately went into reboot mode and “forgot” everything connected with the flight.
- The cables, cords, and antennas required for portable EFBs can create more clutter—and, potentially, more hazardous clutter—than the paper charts they are intended to replace.

The bottom line: EFB technology is available here and now, and proper use of any class of EFB system can improve efficiency and safety while eliminating considerable weight in paper. Sounds like I need to shop for my next gadget. 

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