Aviation Apps for iPads & Smartphones

Wednesday, October 23: 2:30-4:00pm

Presented by:

Rick Ellerbrock, Jeppesen
Ken Wilson, FltPlan.com
Tyson Weihs, ForeFlight
Hilton Goldstein, Hilton Software/WingX
Bill Stone, Garmin
Session Topics

Regulatory Guidance & Documents

Mobile Technology & Apps

Implementation & Best Practices

What’s on the Horizon?
Mobile EFB
Making the Regulatory Guidance Work for You

Rick Ellerbrock
Agenda

• Phenomenal **growth** enabled by regulatory support
• Regulatory **documents and process** overview
• **Special** topics
  – From COTS tablet to EFB: EMC, Rapid-D, and Battery
  – Class 1 and “Viewable Stowage”
• **Future** policy direction
  – AC 120-76B “Change 1”
  – AC 120-76C
  – March towards global harmonization
Phenomenal Growth

Mobile EFB has become a Global Phenomenon

• Key drivers
  – Breakthrough technologies
  – Positive ROI/business case
  – User-friendly experience
  – Complete ecosystem
  – Regulator receptivity
Amazing Statistics

89% of FAA EFB Authorizations in last six months have been for iPad

273 new FAA Authorizations for iPad in last six months (23% increase)

72% of FAA Authorizations are for iPad (compared to 60% a year ago)

132 FAA Authorizations now involve iPad mini

FAA EFB Authorizations (Active A061, July 2013)

- iPad EFB: 1,483 (72%)
- Installed EFB: 301 (15%)
- Other Portable EFB: 266 (13%)
Key Regulatory Docs

Advisory Circulars (ACs)
- AC 120-76B EFB overall Policy
- AC 20-173 Hardware Installation
- AC 91-78 Considerations for Part 91

Bulletins
- INFO 11011 Clarifications for Tablet EFBs
- 8900.1 Inspector Handbook
- EMC Standardized Checklist

Supporting Resources
- FAA Advisory Circulars
- EASA Bulletins

Acceptable Means of Compliance (AMC)
- AMC 20-25 EFB overall Policy

FAA Authorization Process

<table>
<thead>
<tr>
<th>Phase</th>
<th>Activity</th>
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<tbody>
<tr>
<td>1</td>
<td>Initiation&lt;br&gt;Meet with inspector(s), begin building package</td>
</tr>
<tr>
<td>2</td>
<td>Submit required information&lt;br&gt;Focus on package of information you prepared</td>
</tr>
<tr>
<td>3</td>
<td>POI Review&lt;br&gt;Review package, complete the 8900.1 checklists</td>
</tr>
<tr>
<td>4</td>
<td>Interim authorization&lt;br&gt;Allows for EFB primary use with paper backup</td>
</tr>
<tr>
<td>5</td>
<td>Final authorization&lt;br&gt;Authorization to go paperless</td>
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</table>

Resources for EFB Standardization
- ICAO
- Annex 6 EFB definition, Standards and Recommended Practices (SARPs), EFB Manual

Local Country Policy
- CAAs
- EFB Guidance<br>Typically refers to FAA and/or EASA, plus any local variations
## Applicability

<table>
<thead>
<tr>
<th>FAR Part</th>
<th>Primary References</th>
<th>Compliance</th>
<th>Means</th>
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<tbody>
<tr>
<td>91</td>
<td>AC 91-78, AC 120-76B</td>
<td><strong>Not Required</strong>&lt;br&gt;Formal authorization is NOT required. Advisory materials provide many recommendations and best practices for the pilot’s consideration.</td>
<td></td>
</tr>
<tr>
<td>91F</td>
<td>AC 120-76B, InFO 11011</td>
<td><strong>Required</strong>&lt;br&gt;Keep records of key documents to demonstrate self-compliance (e.g., ramp checks).</td>
<td></td>
</tr>
<tr>
<td>91K, 121, 135</td>
<td>AC 120-76B, AC 20-173, InFO 11011, FSIMS 8900.1, V4, CH15, FSIMS 8900.1, V3, CH18</td>
<td><strong>Required</strong>&lt;br&gt;Principal Inspector (PI)&lt;br&gt;Flight Standards District Office (FSDO)&lt;br&gt;Certificate Management Office (CMO)</td>
<td></td>
</tr>
</tbody>
</table>
Special Topics

Electromagnetic Compatibility
AC 120-76B section 11.f.(2), (3)
- EFB must be compatible with onboard systems
- Method 1 vs. Method 2

Rapid Decompression
AC 120-76B section 11.f.(4).(b)
- Representative device testing
- FAA recommends against placing actual tested devices into service as EFB

Lithium Batteries
AC 120-76B section 11.e.(4)
- Must meet a combination of UN and UL standards
- Various ways to comply
- OEM provides credentials
- Policy somewhat confusing

Good News Update!
- New industry-standard checklist published by FAA on August 22
  - http://fsims.faa.gov...
  - Publications… Other Documents

Good News Update!
- Update in AC 120-76B “Change 1” and 8900.1 handbook will help clarify
Special Topics

Viewable Stowage
AC 120-76B Section 4.c, 4.s, 10.a

• Introduced in AC 120-76B
• “Secured & viewable” concept
• Major driver for EFB adoption
• Most common forms
  – Kneeboard
  – Suction cup mount

Good News Update!

• Harmonized with EASA
• Popular in Business and (more recently) Commercial aviation
Notable Policy Changes

**AC 120-76B “Change 1”**

- **Re-classifies** the App to Type B
  - Same classification as nav charts
  - TSO no longer required

- **Required** Job Aid ensures:
  - GPS & database accuracy validation
  - Overall availability, reliability
  - Human factors issues addressed

- **Position source** flexibility
  - Airplane installed GNSS/GPS system
  - COTS/Portable GPS
  - Tablet EFB internal GPS

- **Database accuracy**
  - Must fit within 40m total error budget

- A few other improvements to the AC & inspector handbook

- Change 1 revision to be published by end of October!

**Harmonize/Modernize**

- FAA & EASA
- Local CAAs
- ICAO
- EFB Users Forum
- NBAA
- Other venues

**AC 120-76C (future)**

- Sizable revision expected
- Bring up-to-date
- Harmonize (ICAO/EASA)
- Class 1, 2, 3 replaced by
  - Portable
  - Installed

Good News Update!
Useful Resources

**FAA**

**FAA AC 120-76B**
http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC%20120-76B.pdf

**FAA AC 91-78**
http://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/documentinformation/documentID/73540

**FAA InFO Bulletin 11011 (iPad EFB)**
http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/info/all_infos/media/2011/InFO11011.pdf

**FAA Inspector Handbook (8900.1) Volume 4, Chapter 15**
http://fsims.faa.gov/PICDetail.aspx?docId=8900.1,Vol.4,Ch15,Sec1

**FAA Inspector Handbook (8900.1) Volume 3, Chapter 16**
http://fsims.faa.gov/PICDetail.aspx?docId=8900.1,Vol.3,Ch18,Sec1

**FAA AC 20-173 (Hardware Installation)**

**EASA**

**EASA AMC 20-25**

**EASA OEB Administrative and Guidance Procedures**

**EASA OEB Report on Jeppesen FliteDeck Mobile**

**NBAA**

**NBAA EFB Resource Page**
http://www.nbaa.org/ops/cns/efb/

**NBAA/Jeppesen Podcast #1 (AC 120-76B)**

**NBAA/Jeppesen Podcast #2 (Apple Battery)**

**Jeppesen**

**Jeppesen Rapid Decompression Test Overview**
http://www.youtube.com/watch?v=xvQAUyMBeiY

**Jeppesen Position Paper on iPad mini**

**Apple**

**Apple iPad Battery Quality Certification**
http://support.apple.com/kb/HT5423

**Apple iOS Security White Paper**
Ken Wilson, President
FltPlan.com

Mobile Technology and Apps
Thousands of Aviation Apps in App Stores
Keywords

flight plan, flight planning, EFB, weather, aviation weather, general aviation, corporate aviation, flight, flying, pilots, pilot tools, weight and balance, flight training, navlog, flight tracking, flight filing, faa, aviation charts, aviation maps, aircraft filing, elogbook, airport information, airport diagrams, runways, FBOs, fuel pricing, etc.
Flight Planning

- File flight plans
- Download navlogs
- View maps and charts
- Documents
- Airport information
- FBO information

Foreflight
Wing X
FltPlanGo
Jeppesen
Flight Planning

- File flight plans
- Download NavLogs
Flight Planning

- View maps and charts
Flight Planning

- Documents
Flight Planning
  - Airport Info
  - FBO Info
Weather

General Weather

- Forecast Weather
- Radar
Aviation Weather

Online

- Location weather
- Enroute weather
Aviation Weather

Offline

- ADS-B
- XM Weather
- Aircraft Performance / Runway Analysis
- Weight and Balance
- eLogbook
- Flight Tracking
• Synthetic Vision
• Datalink Providers
• FARS/AIM
• Aviation Exams
• Flight Training
Aviation Apps for iPads
Implementation, Best Practices, and Day-to-day with iPad

Presenter

ForeFlight
Intelligent Apps for Pilots™
Overview

• Device observations / mix
• Authorization / approval (already covered)
• Implementation
• Best practices: initial and recurrent training
• Best practices: operating procedures
Device Selection: Tablet Mix

• iPad
  – Full size
  – Mini
• Android*
• Windows*

Source: iPad Pilot News Poll, Jan 2013
iPad Dominates

• Uniformity and consistency
• Remarkable stability
• Simplicity
  – “All our pilots seem fairly iPad proficient these days”
• Manageable (in an IT sense)
• Vibrant accessory market / choice
• Variety of high quality apps, can build a portfolio of best of breed
Observed iPad Device Mix

- iPad mini: 21%
- iPad 2: 36%
- iPad 3: 26%
- iPad 4: 17%

Source: ForeFlight Analytics, September 2013
Say Intentions

iPad (Mini) 37%
iPad (Maxi) 63%

Source: ForeFlight Customer Survey, September 2013
Implementation

• Bring Your Own Device ("BYOD") vs Company Owned Device ("COD")
  – BYOD the business megatrend; most flight departments heading this way (< 50 pilots)
  – COD in larger enterprises / flight departments (+50 pilots)
• Centrally managed vs. individually managed
  – Growth in use of Mobile Device Management ("MDM"): parental controls, consistency, stops at the app level
  – Apps evolving to allow administrators to configure app setting defaults
• App selection: charts, documents, route planning, weight & balance, scheduling / dispatching, maintenance
• Establish the training plan
• Establish operating procedures and policies
### Status: Some Problems

Compliance reports are generated when your devices complete downloads.

You are using 5 of 5 iPads.
You are using 1 of 5 iPhones.

<table>
<thead>
<tr>
<th>Pilots</th>
<th>Devices</th>
<th>Model</th>
<th>App</th>
<th>Charts/Data</th>
<th>Documents</th>
<th>Action</th>
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<tr>
<td>Tyson Weihs</td>
<td>tyPadMini</td>
<td>iPad</td>
<td>5.5</td>
<td>OK</td>
<td>OK</td>
<td>Remove</td>
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<td>Tyson Weihs</td>
<td>tyPhone5</td>
<td>iPhone</td>
<td>5.4</td>
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<td>—</td>
<td>Remove</td>
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<tr>
<td>Tyson Weihs</td>
<td>fugnown</td>
<td>iPad</td>
<td>5.2.Beta.56f75e77</td>
<td>Expired</td>
<td>Expired</td>
<td>Remove</td>
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<tr>
<td>Tyson Weihs</td>
<td>tyPadMini</td>
<td>iPad</td>
<td></td>
<td>Waiting for device.</td>
<td></td>
<td>Remove</td>
</tr>
<tr>
<td>Tyson Weihs</td>
<td>iPad Simulator</td>
<td>iPad Simulator</td>
<td></td>
<td>Waiting for device.</td>
<td></td>
<td>Remove</td>
</tr>
</tbody>
</table>

*Current version: 5.4

Export as: CSV

Remove compliance from your account
# Pilot Dashboards

You have **4** of **5** pilot slots remaining.

<table>
<thead>
<tr>
<th>Pilots</th>
<th>Email</th>
<th>Home Airport</th>
<th>Actions</th>
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<tbody>
<tr>
<td>Tyson Weihs</td>
<td><a href="mailto:tyson@foreflight.com">tyson@foreflight.com</a></td>
<td>KSCR</td>
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</table>

**Export pilots:** CSV

## Devices for Tyson Weihs

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Model</th>
<th>Device UUID</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>tyPadMini</td>
<td>iPad</td>
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</tr>
<tr>
<td>2</td>
<td>tyPadMini</td>
<td>iPad</td>
<td>F84DEFA0-39E3-4D02-84B4-52B8A2A8126F</td>
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<tr>
<td>3</td>
<td>iPad Simulator</td>
<td>iPad Simulator</td>
<td>5908E6D0-1644-4D0B-80B4-6179G0F895C4</td>
</tr>
<tr>
<td>4</td>
<td>tyPhone5</td>
<td>iPhone</td>
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<tr>
<td>5</td>
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<td>6</td>
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<td>iPad</td>
<td>109D2EDF-95C3-421D-83A3-9BD73F4F4A40</td>
</tr>
</tbody>
</table>
Training

- **Initial Training (device, app, operating procedures)**
  - One-on-one / practical
  - Training via learning management systems (internally developed, however more third party training materials are becoming available every year)
  - Integrated simulator training at FlightSafety, CAE, etc.

- **Recurrent training**
  - App release training / communication
  - Observation flights to monitor crew performance and SOP adherence; iPad distractions are noted, if any, but no trend seems to be few deviations noted among professional flight crews*; crews are comfortable with ipads
Standard Operating Procedures

• iPad use permitted in cockpit for display of electronic charts, documents, flight planning, in-flight weather, and wifi access for weather getting. WiFi use for personal communications or activities prohibited
• Crew members cautioned to prevent distracting activities
• Crew members responsible for securing devices
• iPad use during sterile cockpit phases limited to critical tasks only (e.g. approach plates)
• iPad GPS or GPS accessories prohibited for navigation use; situational awareness only; airport moving map moving up-market, supported by regulatory evolution;
• Company computer policies apply to iPad use
Preflight Operating Procedures

• 50% minimum charge. 75% charge if using continuous ADS-B / in-flight weather
• Accessories available and charged
• Databases and documents current
• Apps programmed: flight plan entered, primary and alternate airport information loaded / organized, performance calculations completed
**Power Management**

- iPad battery life monitored while pilot is on duty. Pilots pro-actively recharging if concerns arise about power level.
- Power below 20% is a caution; battery saving actions advised, including:
  - Reduction of screen brightness to lowest acceptable setting; brightness is the largest source of power drain;
  - Ensure iPad is in airplane mode: this disables all radios and thus preserves power;
  - Sleep the iPad and only awake it when necessary for terminal and en-route charts;
  - Connect the iPad to the auxiliary battery pack.
Abnormal Procedures

- Operation with a single iPad is considered an abnormal procedure
- Paper prints for terminal charts must be available to the pilots for departure, destination, and alternates
- In-flight iPad failure
- Notify ATC of an EFB failure causing loss of access to charts
- Consider diverting to an airport with VFR conditions if destination, alternate are IFR
- If an approach is required, approach instructions obtained from ATC / flight operations
Post-Flight Procedures

- Record squawks: device, operating system, apps, or other
- Reset airport selections, performance calcs, or other information related to the last flight (not applicable when pilots have their own devices)
- Begin charging iPads and accessories
- iPads removed from aircraft during overnight stays, used for planning and recharged when out of the aircraft
Resources

• Sample operating procedures

• Sample iPad checklist

• Training Resources
  – Flying Like the Pros iPad Courses
    • http://www.flyinglikethepros.com/courses/ipad-flight
  – Sporty’s Flying with ForeFlight Video
    • https://www.sportys.com/pilotshop/product/17994
What’s on the horizon? A look ahead

Bill Stone
Garmin International
Industry trends & new developments in mobile technology in the future

• Data Convergence
• Cockpit Connectivity
• Individual Perspectives
Data Convergence
Two-way Flight Plan Transfer
Receive Weather from Avionics
Receive Position from Avionics
Automatic Pilot Logbook entry
Individual Perspectives
Thank you!

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http://www.nbaa.org/ops/cns/efb/