Annex D

Draft Civil Aviation Advisory Publication – CAAP 233-1(0) - Electronic Flight Bag

INTENTIONALLY LEFT BLANK

Australian Government
Civil Aviation Safety Authority

DRAFT CAAP 233-1(0)

Electronic Flight Bag

Civil Aviation Advisory Publication

August 2012

CAAPs provide guidance, interpretation and explanation on complying with the Civil Aviation Regulations (CAR) or Civil Aviation Orders (CAO).

This CAAP provides advisory information to the aviation industry in support of a particular CAR or CAO. Ordinarily, the CAAP will provide additional 'how to' information not found in the source CAR, or elsewhere.

A CAAP is not intended to clarify the intent of a CAR, which must be clear from a reading of the regulation itself, nor may the CAAP contain mandatory requirements not contained in legislation.

Note: *Read this advisory publication in conjunction with the appropriate regulations/orders.*

The relevant regulations and other references

- Regulation 138 of CAR 1988
- Regulation 139 of CAR 1988
- Regulation 215 of CAR 1988
- Regulation 232 of CAR 1988
- Paragraph 233 (1) (h) of CAR 1988
- Regulation 235 of CAR 1988
- Civil Aviation Order 82.0
- Civil Aviation Order 82.3
- Civil Aviation Order 82.5
- Civil Aviation Order 100.7

This CAAP will be of interest to

This Civil Aviation Advisory Publication (CAAP) applies to:

- Registered Operators;
- Air Operators Certificate holders, and
- Pilots.

Why this publication was written

This CAAP provides information and guidance in the use of portable Electronic Flight Bags (EFB) as a replacement for paper in the flight compartment.

Status of this CAAP

This is the first issue of this CAAP.

For further information

For application and policy advice contact the Civil Aviation Safety Authority (CASA) Office closest to you on Telephone 131 757.

Contents

1. Acronyms

AC Advisory Circular
AOC Air Operator's Certificate
CAAP Civil Aviation Advisory Publication
CASA Civil Aviation Safety Authority
COTS Commercial-of-the-shelf
EFB Electronic Flight Bag
EFBA Electronic Flight Bag Administrator
EMI Electromagnetic Interference
FAA Federal Aviation Administration (of the USA)
GPS Global Positioning System
ICAO International Civil Aviation Organization
MEL Minimum Equipment List
PED Portable Electronic Device
SOPs Standard Operating Procedures

2. Definitions

Electronic Flight Bag (EFB): A portable Information System for flight deck crew members which allows storing, updating, delivering, displaying and/or computing digital data to support flight operations or duties.

EFB system: The hardware, the operating system, the loaded software and any antennae, connections and power sources, used for the operation of an EFB.

Interactive Information: Information presented on the EFB that, via software applications, can be selected and rendered in a number of dynamic ways. This includes variables in the information presented based on data-oriented software algorithms, concepts of de-cluttering and on-the-fly composition as opposed to pre-composed information.

Operating System: Software that controls the execution of programs and that may provide services such as resource allocation, scheduling, input-output control and data management.

Mounting device: May include arm-mounted, kneeboard, cradle or docking-stations etc.

Portable Electronic Device (PED): A self contained electronic device that is not permanently connected to any aircraft system, although it may be connected temporarily to an aircraft's electrical power system, externally mounted antenna, data bus or mounting device. PED's include numerous communications and computing devices. Class 1 and 2 EFBs are considered PEDs. For the intent of this publication, a PED is a device that can display EFB information.

Pre-Composed Information: Information previously composed into a static composed state (non-interactive). The composed displays have consistent, defined and verifiable content and formats that are fixed in composition.

Software application: Software program, installed on an EFB system, that allows specific operational functionality.

3. Introduction

3.1 The EFB is an electronic storage and display system designed to replace traditional paper products in the cockpit. EFB devices can store and display a variety of aviation data or perform calculations such as performance and weight and balance calculations. The scope of the EFB system functionality may also include various other hosted databases and applications. Physical EFB displays may use various technologies, formats and forms of communication.

3.2 This CAAP looks to provide guidance for the use of EFB by Air Operator's Certificate (AOC) holders as they are bound to meet the obligations detailed in the AOC conditions set out in Appendix 9 of CAO 82.0. These AOC conditions will be applicable to foreign registered operators as detailed in Paragraph 10 of CAO 82.3 and Paragraph 10 of CAO 82.5. It will cover areas such as hardware, software, administration, maintenance, security and the operational approvals for the AOC holder. The CAAP will also provide general guidance for private operators.

3.3 This CAAP does not provide guidance on integrated EFB Class 3 devices as defined later in this document. For this class of equipment the manufacturer's approved data is to be used as the basis for operational procedures and maintenance practices.

4. Background

4.1 EFBs can electronically store and retrieve documents required for flight operations, such as maps, charts, the Flight Crew Operations Manual, Minimum Equipment Lists (MEL) and other control documents. In the past, some of these functions were traditionally accomplished using paper references or were based on data provided to the flight crew by an airline's "flight dispatch" function. The scope of the EFB system functionality may also include various other hosted databases and applications. Physical EFB displays may use various technologies, formats and forms of communication.

4.2 The concept of EFBs is not new, as an example, the Federal Aviation Administration of the United States of America (FAA) issued guidance material as early as 2003 (FAA Advisory Circular (AC) 120-76A) and the International Civil Aviation Organization (ICAO) issued Annex 4 Chapter 20 to deal with electronic display of charts and provide guidance on the basic requirements aimed at standardising electronic aeronautical chart displays while not unduly limiting the development of new cartographic technology.

4.3 In the past, Australia published Airworthiness Bulletin 00-017 which endorsed the FAA AC 120-76A as guidance for EFBs in Australia. However, FAA AC 120-76A was based on the technology of 2003, and CASA has recognised that, with the advent of the latest technological advancements in commercial-off-the-shelf (COTS) tablets and Wi-Fi standards, FAA AC 120-76A has been overtaken by technology development.

5. Approvals

5.1 The technological advancements that facilitated the growth in everyday electronic transactions, the Australian Government introduced legislation that recognised that, from a legal perspective, electronic versions of documentation that are required by regulation are acceptable. The media used to store and display the document has become irrelevant.

5.2 The *Acts Interpretation Act 1901*; and *Electronic Transactions Act 1999* are the enabling legislation allowing the use of digital media to display the documentation required by the *Civil Aviation Act 1988* and any of its subordinate regulations.

5.3 Documents that have already been approved in accordance with the relevant regulations do not need additional approval if they have been stored in the EFB in essentially the same form as the original document.

6. Classification of EFB by Functionality

6.1 CASA is harmonising with ICAO Standards and Recommended Practices together with associated guidance. The classification of an EFB has two categories. These are:

- **Hardware type**. This classification defines the physical characteristics of the device and indicates what airworthiness approvals are required, for example whether the device is handheld, mounted or installed.
- **Functionality**. What particular functions the EFB is intended to perform.

6.2 Hardware Type

- Class 1:
  - Portable, COTS devices that are not attached to any mounting device permanently attached to aircraft structure.
  - Without aircraft data connectivity.
  - Not considered part of certified aircraft configuration and do not require airworthiness approval. An example of Class 1 may be an Electronic Chart Display.
- Class 2:
  - Attached to a mounting device permanently attached to aircraft structure and/or connected to aircraft systems but without the capability to send data to the certified aircraft systems.
  - May require airworthiness approval for physical mounting, connections to power, antennae etc.
- Class 3:
  - Requires airworthiness approval via Type Certificate or Supplemental Type Certificate and is fully integrated into the aircraft flight compartment and aircraft system. This class is not considered in the context of this CAAP.

6.3 Functionality

6.3.1 From an operational perspective EFB's are defined by their functionality. The four functionalities are outlined in the following paragraphs. Refer to Appendix A of this CAAP for EFB functionality cross reference in relation to the current hardware class.

Functionality Level 1

6.4 The EFB is used as a document viewer utilising aeronautical data that has been supplied either by the publisher of the Australian Aeronautical Information Publication or by a CASA approved vendor, as being suitable for use in maps, charts or aeronautical databases. This data is considered approved for air navigation purposes. The document viewer functionality may be enhanced with the incorporation of a flight planning tool that utilises this approved data. The application performing the display or flight planning functions must not be capable of altering the approved database. Any amendment to the data supplied by an approved vendor will render it unsuitable for air navigation purposes.

6.5 The EFB may be:

- Hand held but is to be stowed during the following phases of flight;
- during take-off and landing; and
- during an instrument approach; and
- when the aircraft is flying at a height less than 1000 feet above the terrain; and
- in turbulent conditions:
- Mounted in an approved mount within the flight compartment or using a suitable kneeboard attachment (with no attachment to the aircraft) which is securely attached to the pilot;
- Connected to aircraft power for battery recharging; and
- Connected to an installed antenna (e.g. GPS) intended for use with that EFB.

6.6 The EFB, with GPS functionality, may be used for situational awareness only. It is not an approved navigation system and cannot be used as the primary means of navigation.

6.7 There may be an appreciable lag time between position indicated on the EFB and actual position. Loss of signal or failure indication on the EFB might not be present in the device to indicate the integrity of the information being displayed.

6.8 Backup/redundancy provisions will need to be addressed to ensure flight crew access to required information in the event of an EFB failure in flight. EFB may be prone to shutting down inadvertently during flight due to environmental factors that were not considered critical during the design and manufacture of the device.

6.9 A Functionality Level 1 EFB requires an airworthiness approval if it is a Class 2 device. However, this approval is limited in scope to the mounting device, crashworthiness and EFB power connection.

Functionality Level 2

6.10 In addition to the Functionality Level 1 capabilities, the EFB has one or more applications that utilise algorithms within a software application that require manual input to satisfy operational requirements. These include, but are not limited to, the weight and balance and/or performance calculations as required by the aircraft's approved flight manual for use by the aircrew. The software applications must be validated to ensure the outputs from the application comply with the limitations detailed in the aircraft's approve flight manual, for example any weight control shall be validated by an authorised weight control officer in accordance with Civil Aviation Order 100.7.

6.11 Devices that only perform these calculations are not classified as EFB. However the need for validation of those software applications remains to ensure that the aircraft is operating within its approved flight manual limitations.

6.12 A Functionality Level 2 EFB requires an airworthiness approval if it is a Class 2 device. However, this approval is limited in scope to the mounting device, crashworthiness and EFB power connection.

Functionality Level 3

6.13 The EFB has one or more applications that utilise algorithms requiring manual input and accepting data directly (one way) from aircraft systems to satisfy operational requirements. These include, but are not limited to, the weight and balance and/or performance calculations as required by the aircraft's approved flight manual for use by the aircrew. The software applications shall be validated by an authorised person. As this link may be via Wi-Fi, system security must be assessed to identify any risks associated with the data link.

6.14 A Functionality Level 3 EFB, as a Class 2 device, requires an airworthiness approval but this approval is limited in scope to the mounting device, crashworthiness, data connectivity and EFB power connection.

Functionality Level 4

6.15 The EFB has one or more applications that utilise algorithms requiring manual input and accepting data directly from aircraft systems to satisfy operational requirements. These include, but are not limited to, the weight and balance and/or performance calculations as required by the aircraft's approved flight manual for direct input to the aircraft's flight management system. The software applications utilising this bi-directional data link to the aircraft system will need to be certified to ensure ongoing system integrity. As this bi-directional link may be via wireless connectivity e.g. commercial telecom or Wi-Fi, system security will need to be capable of preventing external interference.

6.16 A Functionality Level 4 EFB, as a Class 2 device, requires an airworthiness approval. However, this approval is limited in scope to the mounting device, crashworthiness, data connectivity, EFB power connection and software applications.

7. Airworthiness approval of EFB

General

7.1 AOC Holders, including foreign operators, incorporating EFBs into their operations are specifically bound by the AOC conditions set out in Appendix 9 of CAO 82.0 and should carefully review the contents of this CAAP to determine applicable requirements. For the most part the level of complexity associated with the operational implementation will depend on the functionality of the EFB.

7.2 Table 1 – EFB Functionality Matrix in Appendix A of this CAAP summarises the various EFB functionalities.

7.3 Regardless of functionality type, the operational implementation will require a structured sequence of events and actions to satisfy both the operator and regulator that aircraft equipped with an EFB(s) can be operated safely.

7.4 The following aspects should be considered when evaluating the use of EFB hardware and/or software on an aircraft

Screen Size

7.5 The screen size and resolution will need to demonstrate the ability to display information in a manner comparable to the paper aeronautical charts and data it is intended to replace. The recommended minimum size of the screen is A5 (see ICAO Annex 4). If the intent of the installation is to display charts and maps, the device should be suitably sized to display the image without excessive scrolling.

7.6 The size of the proposed EFB installation may be cumbersome to use during normal use. A laptop may have sufficient computing power to handle the required software, but the size may be a hindrance.

Hardware

7.7 The following list should be used in conjunction with Appendix B – EFB Installation Evaluation of this CAAP.

Mounting Device

7.8 EFB that utilize temporary mounts that attach to the aircraft, for example suction mounts, Velcro pads etc., are regarded as Class 1 devices and must be stowed during the phases of flight identified above. Kneeboard holders are acceptable storage for Class 1 devices.

7.9 All EFBs that are mounted to the aircraft structure will require airworthiness approval (Subpart 21.M of the *Civil Aviation Safety Regulations 1998*) for the mounting device. An unsafe condition must not be created when attaching any EFB control yoke attachment/mechanism or mounting device. For example, the weight of the EFB and mounting bracket combination may affect flight control system dynamics, even though the mount alone may be considered light.

7.10 The mounting device, if it is adjustable, must be able to be locked in place by the flight crew. An adjustable mount will also assist the flight crew to compensate for glare and reflections. The mount must not block access to any of the EFB controls or display.

7.11 The mounted EFB must not cause obstruction to:

- External vision;
- Physical access to aircraft displays or controls; and
- Visual access to aircraft displays or controls.

7.12 The equipment when mounted and/or installed shall not present a safety-related risk or associated hazard to any flight crew member. A means to store or secure the device when not in use should be provided. Additionally, the unit (or its mounting structure) must not present a physical hazard in the event of a hard landing, crash landing or water ditching. EFBs and their power cords must not impede crew ingress, egress or emergency egress.

Cabling

7.13 The cables required for EFB operation must not present a hazard. The required cabling should be a sufficient length to prevent damage or hazards. Any cables need to be secured to prevent any damage or hazard. Use of cable ties, restraints and conduits should be considered depending on the installation.

Stowage Area for EFB Systems

7.14 Stowage need only be considered for EFBs that are not mounted to the aircraft or by a kneeboard. A stowage area with a securing mechanism for these EFBs is recommended for storage of portable units when they are not in use. Stowage provisions should be readily accessible by the crew in flight and should not cause any obstruction or hazard during aircraft operations.

7.15 EFB systems that are not secured in a mounting device during use shall be designed and used in a manner that prevents the device from jamming flight controls, damaging flight compartment equipment or injuring flight crew members should the device move about as a result of turbulence, manoeuvring or other action in other than the phases of flight described above.

Operating Conditions

7.16 The proposed EFB installation has to be able to operate in a wide variety of environmental conditions, e.g. temperature range, low humidity, altitude, etc. The operator needs to ensure that appropriate testing is undertaken to confirm the suitability of the selected device for use as an EFB in the conditions they intend operating in.

Power

Power Source

7.17 Aircraft electrical power outlets that are not part of the original design of the aircraft will require airworthiness approval.

> ***Note:*** *An electrical load analysis should be conducted to replicate a typical EFB system to ensure that powering or charging the EFB will not adversely affect other aircraft systems and that power requirements remain within power-load budgets.*

7.18 The EFB power source should be designed such that it may be deactivated at any time. Where there is no possibility for the flight crew to quickly remove or un-plug the power to the EFB system, a clearly labelled and conspicuous means (e.g. on/off switch) should be provided.

7.19 Useful battery life must be established and documented for the EFB. When EFB battery charging is not possible in the aircraft, additional fully charged EFB batteries should be available to ensure the operational performance is maintained for the planned duration of the flight, including diversion times and operation on the ground.

7.20 Charging the proposed EFB device will generate extra heat, especially in warmer climates. However this heat shall not cause the EFB to shutdown. The placement of the EFB should allow sufficient airflow around the unit. Considerations must be made to ensure that the proposed EFB device does not heat excessively higher than manufacturer's recommendations during usage. All care must be taken to ensure that the battery in the proposed EFB device does not go into a thermal runaway condition. Reliance on accessories to control cooling of the EFB should be avoided.

7.21 Rechargeable batteries in EFB's have a limited life and will gradually lose their capacity to hold a charge. This loss of capacity is irreversible. As the battery loses capacity, the length of time it will power the product decreases. Batteries also continue to slowly discharge when the EFB is not in use or while in storage. Operators should also develop a procedure or policy to establish the level of battery capacity degradation during the life of the EFB. Careful monitoring of EFB batteries that are nearing the end of their service life should be implemented.

7.22 Circuit breakers are not to be used as switches; their use for this purpose is not acceptable. In order to achieve an equivalent level of safety, certain software applications, especially when used as a source of required information, may require that the EFB system have access to an alternate power supply. Guidance should also be provided in the adverse event of a battery failure or malfunction.

Electrical Backup Power Source

7.23 Some applications, especially when used as a source of required information, may require that the EFB use an alternate power supply to achieve an equivalent level of safety. The operator is also responsible to ensure that the batteries are replaced as required.

Electromagnetic Interference and Compatibility (EMI/EMC) Demonstrations

7.24 For the purpose of EMI demonstrations, EFB devices are considered PEDs and should satisfy the criteria contained within FAA AC 91.21-1A. All EFB devices must demonstrate that they meet appropriate industry-adopted environmental qualification standards for radiated emissions for equipment operating in an airborne environment. Initial testing may take the form of simple victim/source testing which may identify issues warranting further investigation.

7.25 The EFB should not be adversely affected by any radiated fields and conducted fields for EFB for which aircraft power is being supplied. The victim/source testing detailed above may identify the unsuitability of that type of EFB for use on that aircraft.

Emergency Procedures

7.26 The AOC holder is to establish, and set out in the OM, procedures for the crew to safely manage serious EFB malfunctions including:

- EFB battery overheat;
- battery fire;
- smoke evacuation; and
- secure isolation of an EFB that has seriously malfunctioned to prevent further hazard.

7.27 Procedures to mitigate a serious EFB malfunction will need to be designed specifically for the particular class of EFB in use, either a Class 1 or Class 2 EFB.

Data Connectivity

EFB Functionality Level 1 or 2

7.28 Data connectivity with the aircraft avionics/systems is not permitted for Functionality Level 1-2 EFB.

EFB Functionality Level 3

7.29 Data connectivity with the aircraft avionics in a "read-only" manner is permitted for Functionality Level 3 EFB through a certified interface unit. If the EFB is connected to a certified data link (either wired or wireless) where the data link, through the certification process, has an approved firewall protection to aircraft systems, then there is no further evaluation required prior to connecting the EFB to the data link port. Operators must demonstrate that safety mechanisms are in place to prevent EFB data connectivity failures from having any adverse effects on aircraft avionics systems.

EFB Functionality Level 4

7.30 Data connectivity is permitted for Functionality Level 4 EFB. If a Functionality Level 4 EFB is connected to an essential data bus, then compliance with lightning protection requirements should be demonstrated. If the Functionality Level 4 EFB is connected to a critical aircraft data bus, then compliance with High Intensity Radiated Fields and lightning protection requirements should be demonstrated. The safety and non-interference aspects of using portable and/or wireless technology connections to installed equipment will also need to be evaluated as part of the overall operational approval process. The intended function and safety (e.g. security and integrity), is applicable only to the interfaces with the avionics data sources and not to the software applications.

7.31 The failure modes of the interface between the EFB and its avionics data sources should be assessed under normal and fault conditions (e.g. demonstrate that EFB inputs can be overridden by manual input in the event of an EFB failure, demonstrate that safety mechanisms are in place to prevent EFB data connectivity failures from having adverse effects on aircraft avionics systems). The assessment of safety and integrity of the software application should be addressed through the approval of the application itself.

Other Connectivity

7.32 Wireless data connectivity (Wi-Fi/3G/4G) may be used to receive/transmit information for aircraft administrative control process e.g. Aeronautical Information Regulation and Control etc. The AOC holder will need to ensure that the OM clearly identifies the situations where this connectivity is to be used.

Software

7.33 It is the responsibility of the operator to ensure that the operating system and application programs meet the intended function. Unauthorised modification of any database or the loading of any new or additional software intended is not permitted unless that software is demonstrated to comply with original validation basis.

7.34 Some software applications installed for flight operations may require regulatory approval prior to operational use. Any information that is provided to the pilot needs to be a true and accurate representation of the charts or documents being replaced and as such must be validated to confirm compliance with the aircraft's approved flight manual. Validation should be by endorsement of the software application by the person responsible for the relevant approved flight manual limitations or by a suitably qualified and accredited person.

7.35 The operator should identify a means to demonstrate that adequate security measures are in place to prevent malicious introduction of unauthorised modifications to the EFB's operating system, its specific hosted applications and any of the databases or data links used to enable its hosted applications. EFB systems need to be protected from possible contamination from external viruses.

8. Managing EFBs for operational use

General

8.1 AOC holders should address the items listed below as guidance to assist them in meeting the conditions of their AOC. These items should be used in conjunction with Appendix B of this CAAP, AOC Holder's Self Evaluation Checklist for the Introduction of EFB.

8.2 Otherwise, it is recommended that the paper based system be available to the pilot or flight crew as backup.

EFB Administrator

8.3 The operator shall appoint a competent person as an EFB Administrator (EFBA) who will be responsible to manage the administration of the operator's EFB hardware and software. The operator should assign the EFBA responsibilities and duties to ensure that the proposed paperless system is as robust and reliable as the paper based system that is being replaced. Operators must ensure that EFBAs are provided with adequate resources and a suitable level of training.

8.4 Individual EFB users will need to administer the use of their EFBs to ensure the currency and availability of the required documentation.

Operational Risk Analysis

8.5 Operators and other users shall determine appropriate procedures to eliminate, reduce or control risks associated with identified failures in the EFB system. These procedures will be the result of an operational risk analysis conducted by the operator or the user that considers:

- total and partial failures of the EFB;
- loss of data;
- corrupt/erroneous outputs; and
- MEL dispatch condition (Class 3 and mount for Class 2).

8.6 The results of such an analysis may highlight the need for more than one EFB system for redundancy. It is also possible that the second EFB may have to be a different model (dissimilar system) to minimise common mode failures. Or it may mean using the paper system for redundancy either selectively or in aggregate.

Procedures/Considerations for the use of EFBs In-flight

8.7 Clear limitations and procedures shall be provided and documented for all phases of flight. A system description and operating philosophy should be included. Procedures should:

- be properly integrated with existing Standard Operating Procedures (SOPs). For pilots not operating to company SOPs, the EFB should be integrated with airmanship that is consistent with safe flying practices;
- contain suitable flight crew crosschecks for verifying safety critical data;
- mitigate and/or control any additional workload associated with the EFB;
- provide contingency procedures for total or partial EFB failure;
- cover system reboots, lock-ups and recovery from incorrect crew actions;
- include a requirement to verify the revision status of software. For example, ensure that flight crew confirm the revision numbers and/or dates of EFB flight databases and software installed on their units for each flight. For instance, a date-sensitive revision is an aeronautical chart database on a 28-day revision cycle. Procedures should specify what action to take if the applications or databases loaded on the EFB are out-of-date;
- ensure that the maps charts etc required for the flight are current at time of departure;
- provide for easily adjustable brightness and contrast controls of the EFB by the flight crew, to compensate for varying lighting conditions;

- be designed to define the actions to be taken when information provided by an EFB does not agree with that from other flight compartment sources, or when one EFB disagrees with another; and
- be designed to ensure that if an EFB simultaneously displays information that existing cockpit automation displays, identifies which information source will be primary and which source will be secondary (and procedures to identify under what conditions to use the backup source).

Update Process

8.8 The operator and individual users need to establish a method for revising EFB databases. The method of data revision should ensure integrity of the data, the operator or user loads and ensure that it does not negatively impact the integrity of the EFB operation. Particularly when using internet and/or wireless means, procedures should exist to protect the EFB data from corruption.

8.9 Operators also need to establish revision control procedures so that flight crews and others can ensure that the contents of databases are current and complete. These revision control procedures may be similar to the revision control procedures used for paper or other storage media. For data that is subject to a revision cycle control process, it should be readily evident to the user which revision cycle is currently loaded into the system.

8.10 Other users need to be cognisant of the requirement to carry up to date documents, and how they may achieve this.

Operator Training Program

8.11 The operator should establish suitable training programs for ground staff and crew members. Once it is established, the training program will need to be evaluated to determine that:

- the program is fully documented;
- the training methodology matches the level of knowledge and experience of the participants;
- the operator has assigned adequate resources to deliver the training;
- procedures are clearly presented, suitably illustrated and readily understood;
- adequate EFB and/or EFB simulation equipment has been provided;
- human factors and cockpit resource management are included in the training;
- training for flight crew to carry out cross-checks for verifying safety-critical data;
- the training material matches both the EFB equipment status and the published procedures;
- the training program incorporates training for system changes and upgrades; and
- if applicable, the training program maintains crew proficiency in non-EFB (e.g. paper charts) procedures.

Hardware Management Procedures

8.12 The AOC holder shall establish documented procedures for the control of hardware and component stocks covering removal, repair, replacement, re-installation and maintenance. Procedures should also cover validation of operation following an EFB repair or replacement.

8.13 Any other accessories (batteries, docks, screen protectors etc.) required for the EFB usage should also be taken into account during installation and usage.

8.14 If any protective screens are fitted to the EFB, then they should not interfere with the viewing of the display or the ability to control the EFB.

Software Application Management Procedures

8.15 The operator shall establish documented procedures for the control of installed software. These procedures must include:

- a clear definition of who has access rights to install or modify software;
- adequate controls to prevent user corruption of operating systems and software; and
- adequate security measures to prevent viruses and unauthorised user access.

8.16 Database revisions must not include application software or operating system changes, unless the application software and/or operating system program changes are controlled and properly tested prior to use in flight. Also, changes to the database and/or application software should not be undertaken during operations (taxi, take-off, in-flight, landing).

8.17 Procedures should also be clearly defined to track EFB database expiry. Procedures should be documented to control and manage data on the unit.

8.18 For private operators, it is strongly recommended that a dedicated device be used for the purpose of an EFB.

8.19 For AOC holders, it is strongly recommended that a dedicated device be used for the purpose of an EFB. However if the AOC holder allows the use of the EFB for personal use the following should be considered:

- All applications and data must be centrally controlled by the EFBA;
- The EFB should be locked to prevent unauthorised installation of applications or data; and
- The AOC holder needs to have a cleasr policy on the use of non-flight related applications during flight.

Data Management Procedures

8.20 The operator shall establish documented data management procedures. These procedures will need to:

- interface satisfactorily with procedures used by external data providers;
- define access rights for users and administrators;
- incorporate necessary EFB operations into existing operations manuals and AFM supplements;
- provide adequate controls to prevent user corruption of data; and
- provide means for the flight crew to recover the EFB to the default settings.

Document Change Management Control

8.21 The operator is to establish, and set out in the OM, procedures for the amendment of electronic documents.

8.22 The operator is to ensure that any amendment to any company operational document will not take effect until the users of the EFB system are given sufficient notification to ensure assimilation of the information and user feedback.

Executive Manager
Standards Division

August 2012

APPENDIX A – EFB functionality matrix

EFB Functionality Type (5) / **Hardware**	**1**	**2**	**3**	**4**
Class 1 • *Portable* • *Not attachable to an aircraft mounting device* • *Do not require aircraft certification approval* • *Considered PED*	Ops approval not required. AW approval not required. View documents only. (1) No data connectivity with a/c systems.	Ops approval required for AoC holders. AW approval not required. Approved software may be used (4). No data connectivity with a/c systems.	Ops approval required for AoC holders. AW approval required (3). Approved software may be used (4). Read only data connectivity with a/c systems.	Ops approval required for AoC holders. AW approval required (3). Read/Write data connectivity with a/c systems allowed for approved s/w.
Class 2 • *Portable* • *Attachable to an aircraft mounting device* • *Requires certification approval of mounting and connectivity aspects* • *Considered PED*	Ops approval not required. AW approval required (2). View documents only (1). No data connectivity with a/c systems.	Ops approval required. AW approval required (2). Approved software may be used (4). No data connectivity with a/c systems.	Ops approval required. AW approval required (2) (3). Approved software may be used (4). Read only data connectivity with a/c systems.	Ops approval required. AW approval required (2) (3). Read/Write data connectivity with a/c systems allowed for approved s/w.
Class 3 • *Installed equipment* • *Requires certification approval of all hardware, mounting and connectivity aspects*				Ops approval required. AW approval required (2) (3). Read/Write data connectivity with a/c systems allowed for approved s/w.

TABLE 1: EFB Functionality Matrix

(1) Utilises approved data as per paragraph 233 (1) (h) of CAR 1988 requirement.
(2) Airworthiness (AW) approval required for installed components (mounting device etc.).
(3) AW approval required for software applications and data connectivity.
(4) Software issued by CASA approved vendor or authorised person or aircraft manufacturer.
(5) Higher EFB functionality levels contain all the functions of the lower EFB functionality levels.

APPENDIX B –

AOC Holder's Self Evaluation Checklist for the Introduction of EFB

Part 1

Hardware	
Do the physical characteristics of the proposed device make it suitable for use as an EFB?	Yes □ No □ N/A □
Will the display be readable in all the ambient lighting conditions, both day and night, encountered on the flight deck?	Yes □ No □ N/A □
What testing has been conducted to confirm EMI/EMC compatibility? Details:	Yes □ No □ N/A □
Is the format of the EFB suitable for the intended application (e.g. is it a map reader only, performance calculator only etc)?	Yes □ No □ N/A □
Has the EFB been tested to confirm operation in the anticipated environmental conditions (e.g. temperature range, low humidity, altitude, etc)? Details:	Yes □ No □ N/A □
Does charging cause the EFB to heat above ambient temperature? Details:	Yes □ No □ N/A □
During operations in warm climates, can the operating temperature of the EFB, whilst charging, rise above OEM specifications/recommendations?	Yes □ No □ N/A □
Has the internal battery of the EFB sufficient capacity to function for the maximum duration of operations anticipated? Details:	Yes □ No □ N/A □
What procedure has been developed to establish the level of battery capacity degradation during the life of the EFB? Details:	Yes □ No □ N/A □
Does the EFB require any external connectivity to function, i.e. is it self-contained? Details:	Yes □ No □ N/A □

Part 2

Note: *This part may be required to be completed multiple times to account for the different applications being considered.*

Software	
Does the software application/s installed on the EFB enable it to replace documents and charts required to be carried on board the aircraft?	Yes □ No □ N/A □
Does the software application/s proposed require regulatory approval prior to operational use? Details:	Yes □ No □ N/A □
Has the software application been evaluated to confirm that the information being provided to the pilot is a true and accurate representation of the documents or charts being replaced? Details:	Yes □ No □ N/A □
Has the software application been evaluated to confirm that the computational solution/s being provided to the pilot is a true and accurate solution (E.g. weight and balance, performance etc)? Details:	Yes □ No □ N/A □
Are there other software applications intended to support any additional requirements of the operator or the NAA, e.g. tech log, flight folder, taxi camera, etc? Details:	Yes □ No □ N/A □
Does the software application/s have adequate security measures to prevent unauthorised database modifications and prevention of contamination by external viruses? Details:	Yes □ No □ N/A □

Part 3

Installation	
Mounting	
If EFB is hand held, can it be easily stowed securely?	Yes □ No □ N/A □
When stowed, is the EFB readily accessible in flight?	Yes □ No □ N/A □
Is the mounting device compliant with the applicable crashworthiness requirements?	Yes □ No □ N/A □
Has the installation of the mounting device been approved in accordance with the appropriate airworthiness regulations?	Yes □ No □ N/A □
If the mounting device for the EFB is moveable, can it be easily be locked in place?	Yes □ No □ N/A □
Has provision been provided to secure or lock the mounting device in a position out of the way of flight crew operations? *Note: When stowed, the device and its securing mechanism should not intrude into the flight deck space to the extent that they cause either visual or physical obstruction of flight controls/displays and/or egress routes*.	Yes □ No □ N/A □
Is there any evidence that there is mechanical interference issues with the mounting device, either on the side panel (side stick controller) or on the control yoke in terms of full and free movement under all operating conditions and non-interference with buckles etc?	Yes □ No □ N/A □
If EFB mounting is on the control yoke, have flight control system dynamics been affected?	Yes □ No □ N/A □
For fixed mounts, has it been confirmed that the location of the mounted EFB does not obstruct visual or physical access to aircraft displays or controls or external vision?	Yes □ No □ N/A □
For fixed mounts, has it been confirmed that the mounted EFB location does not impede crew ingress, egress and emergency egress path?	Yes □ No □ N/A □
Does the mounted EFB allow easy access to the EFB controls & EFB display?	Yes □ No □ N/A □
Power Connection	
Does a dedicated power outlet for powering/charging the EFB need to be fitted? Details:	Yes □ No □ N/A □
Is there a means other than a circuit breaker to turn off the power outlet?	Yes □ No □ N/A □

Installation	
If the EFB has an alternate backup power source, does the backup source have an equivalent level of safety to the primary power source? Details:	Yes □ No □ N/A □
Have guidance/procedures been provided for battery failure or malfunction? Details:	Yes □ No □ N/A □
Cabling	
Does the EFB cabling present a hazard?	Yes □ No □ N/A □
Is there a means to secure any cabling?	Yes □ No □ N/A □
Stowage	
Is stowage readily accessible in flight?	Yes □ No □ N/A □
Does the stowage cause any hazard during aircraft operations?	Yes □ No □ N/A □

Part 4

Usability	
Operation	
Is the EFB mount easily adjustable by flight crew to compensate for glare and reflections?	Yes □ No □ N/A □
Can the brightness or contrast of the EFB display be easily adjusted by the flight crew for various lighting conditions?	Yes □ No □ N/A □
Is the hand held EFB easily stowed in an approved receptacle during flight?	Yes □ No □ N/A □
Is there an easy means for the flight crew to turn off the EFB in the event of a failure?	Yes □ No □ N/A □
Does the location of the EFB interfere with any normal or emergency procedures?	Yes □ No □ N/A □
Does the protective screen (if fitted) interfere with the viewing of the EFB or the ability to manipulate the cursor?	Yes □ No □ N/A □
Configuration	
Is there an easy way to recover the configuration of the EFB back to the default settings, as controlled by the EFB administrator, in the event of a failure?	Yes □ No □ N/A □
Can the flight crew easily determine the validity and currency of the software installed on the EFB?	Yes □ No □ N/A □
When hosting a variety of applications on the EFB is the flight crew able to make a clear distinction between flight and non-flight related activities?	Yes □ No □ N/A □

Part 5

Administration	
EFB Administration	
Is the person nominated to administer the EFB suitably trained?	Yes □ No □ N/A □
Do the listed responsibilities match the requirements of the system?	Yes □ No □ N/A □
Are there adequate resources assigned for EFB administration?	Yes □ No □ N/A □
Crew Procedures	
Are there appropriate procedures for all phases of flight?	Yes □ No □ N/A □
Are the procedures clearly presented, suitably illustrated and readily understood?	Yes □ No □ N/A □
Is there a clear description of the system, its operational philosophy and operational limitations?	Yes □ No □ N/A □
Has the information in the AFM supplement been incorporated into the company Ops Manual?	Yes □ No □ N/A □
Have crew procedures for EFB operation been integrated with existing Ops manual?	Yes □ No □ N/A □
Are there suitable crew cross-checks for verifying safety-critical data?	Yes □ No □ N/A □
Is there any additional workload mitigated/controlled? Details:	Yes □ No □ N/A □
Do crew procedures include a requirement to verify the revision status of software and data?	Yes □ No □ N/A □
Do the procedures cover system re-boots, lock-ups and recovery from incorrect crew actions?	Yes □ No □ N/A □
Operational Risk Analysis	
Are there procedures/guidance for loss of data and identification of corrupt/erroneous outputs?	Yes □ No □ N/A □

Administration	
Are there contingency procedures for total or partial EFB failure? What are redundancy provisions? Details:	Yes □ No □ N/A □
Is the procedure in the event of a total EFB failure available outside the EFB, e.g. as a paper checklist?"	Yes □ No □ N/A □
Have the EFB redundancy requirements been incorporated into the Ops Manual?	Yes □ No □ N/A □
Training	
Are flight crew members and ground staff training programs fully documented?	Yes □ No □ N/A □
Is the training methodology matched to the participant's level of experience and knowledge?	Yes □ No □ N/A □
Has the operator assigned adequate resources (time/personnel/facilities) for training in operation of EFB?	Yes □ No □ N/A □
Is there access to actual or simulated EFB equipment for interactive training?	Yes □ No □ N/A □
Does the training material match the EFB equipment status and published procedures?	Yes □ No □ N/A □
Does the training program include human factors/CRM in relation to EFB use?	Yes □ No □ N/A □
Does the training program incorporate training system changes and upgrades in relation to EFB operation?	Yes □ No □ N/A □
Does the training material match the EFB equipment status and published procedures? Comment:	Yes □ No □ N/A □
Hardware Management Procedures	
Are there controlled, documented procedures for the control of hardware and component stocks?	Yes □ No □ N/A □
Do the procedures include repair, replacement and maintenance of EFB equipment and peripherals?	Yes □ No □ N/A □
Do the procedures include validation following repair?	Yes □ No □ N/A □

Administration	
Software Management Procedures	
Are there documented procedures for the configuration control of installed software?	Yes □ No □ N/A □
Are the access rights for personnel to install or modify software components clearly defined?	Yes □ No □ N/A □
Are there adequate controls to prevent user corruption of operating systems and software?	Yes □ No □ N/A □
Are there adequate security measures to prevent system degradation, viruses and unauthorised access?	Yes □ No □ N/A □
Are procedures defined to track database expiration and install chart database updates?	Yes □ No □ N/A □
Are there documented procedures for the control and management of data? Details:	Yes □ No □ N/A □
How do the procedures interface with procedures used by external data providers?	Yes □ No □ N/A □
Are the access rights for users and administrators to manage data clearly defined?	Yes □ No □ N/A □
Are there adequate controls to prevent user corruption of data? Details:	Yes □ No □ N/A □
Does the operator allow private use of the EFB?	Yes □ No □ N/A □
Does the operator have a policy on private use? If so, how is this monitored? Details:	Yes □ No □ N/A □