AOG 6-8

AIR OPERATOR GUIDANCE
ON
REQUIREMENTS FOR APPROVAL OF ELECTRONIC FLIGHT BAG (EFB) OPERATIONS.

First Edition

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CIVIL AVIATION AUTHORITY OF BANGLADESH
HQ, KURMITOLA, DHAKA-1229

FOREWORD

The purpose of this Air Operator Guidance (AOG) is to provide guidance to the operators for the preparation of applications for operational approval to use Electronic Flight Bag leading to paperless cockpit operations. Over the years, a significant improvement has been made towards the development on the concept of paperless cockpit and aircraft manufacturers have taken various steps to reduce cockpit work load.

All operators will adhere to the policy and procedures contained in this AOG when requesting for approval for use of Electronic Flight Bag either partially or fully in all three classes and operators will take appropriate guidance from this AOG while submitting application forms for obtaining permission. Because of the wide scope of operations involved and the many variables that can be encountered in aircraft equipment it is not possible to anticipate all situations, therefore operators must exercise common sense and good judgment in the application of these policies and procedures.

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1. INTRODUCTION

An electronic flight bag (EFB) is an information management and display system by electronic means, intended primarily for flight crew or cabin crew functions that were traditionally accomplished using paper references (e.g. navigation charts, operating manuals, performance calculations). The EFB may also support other functions that have no paper equivalent, e.g. a video surveillance display or flight dispatch function such as flight performance calculations based on data provided to the airline's flight crew. The EFB may also be used to host other secondary functions on the same display system.

It is the sole responsibility of the operator to ensure the accuracy and integrity of the information used and all data derived from are from verifiable sources.

2. PURPOSE

The purpose of this AOG is to provide guidance for operators applying for operational approval for Electronic Flight Bag operations

3. DEFINITIONS

Aircraft Administrative Communications (AAC). AAC data link receive/ transmit information that includes but is not limited to, the support of applications identified in Appendices A and B of this Leaflet. Aeronautical Administrative Communications (AAC) are defined by ICAO as communications used by aeronautical operating agencies related to the business aspects of operating their flights and transport services. The airlines use the term Airline Operational Communication (AOC) for this type of communication.

Controlled PED. A controlled PED is Portable Electronic Device that is subject to administrative control by the company. This will include, inter alia, tracking the location of the devices to specific aircraft or persons and ensuring that no unauthorized changes are made to the hardware, software or databases. A Controlled PED will also be subject to procedures to ensure that it is maintained to the latest amendment state.

COTS..Commercial off-the-shelf is a term that references non-developmental items (NDI) sold in the commercial marketplace and used or obtained through government contracts. The set of rules for COTS is defined by the Federal Acquisition Regulation (FAR). A COTS product is usually a computer hardware or software product tailored for specific uses and made available to the general public)

Data Connectivity for EFB Systems. Supporting either uni or bi-directional data communication between the EFB and the aircraft systems (e.g., avionics).

Electronic Flight Bag (EFB). An electronic display system intended primarily for 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.). 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 operator s flight dispatch organization. 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. These devices are sometimes referred to as auxiliary performance computers (APC) or laptop auxiliary performance computers (LAPC). An EFB may be portable or installed either as an independent system or as part of an integrated onboard information system.

EFB Administrator. The EFB Administrator is the person appointed by the operator, held responsible for the administration of the EFB system within the company. The EFB administrator is the primary link between the operator and the EFB system supplier. He/she will be the person in overall charge of the EFB system and will be responsible for ensuring that any hardware conforms to the required specification and that no unauthorized software is installed. He/she will also be responsible for ensuring that only the current version of the application software and data packages are installed on the EFB system.

EFB System. An EFB system includes the hardware and software needed to support an intended function.

Hosted Application. Software installed on an EFB system that allows specific operational functionality.

Interactive Information. Information presented on the EFB that, via software applications, could 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.

Mounting Device. May include arm-mounted, kneeboard, cradle, or docking-stations, etc. May have ship s power and data connectivity. May require quick-disconnect for egress.

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. Applications based on pre-composed information may support contextual access like hyperlink, bookmark.

Portable Electronic Device. Class 1 and 2 EFBs are considered PEDs.

4. SYSTEM DESCRIPTION AND CLASSIFICATION OF EFB SYSTEMS

An EFB system has essentially two components, viz. a host platform or hardware to run the software programmes and software programmes or applications to provide the required functionality. Under EASA/JAA TGL 36 and FAA AC 120-76A the host platform or hardware is categorized into Class1, Class 2 and Class 3 EFB systems while the software programmes or applications are identified as Type A and Type B. For information, a matrix showing the relationship between airworthiness and operational approval processes is provided in Appendix 'E'.

4.1 Hardware Classes of EFB Systems

4.1.1 Class 1

Class 1 EFB systems are:

- Generally Commercial-Off-The-Shelf (COTS)-based computer systems used for aircraft operations,
- Portable,
- Connect to aircraft power through a certified power source,
- Not attached to an aircraft mounting device,
- Considered as a controlled PED,
- Normally without aircraft data connectivity except under specific condition (see Para 5),
- Class 1 EFB systems do not require airworthiness approval, but require operational approval.

4.1.2 Class 2

Class 2 EFB systems are:

- Generally COTS-based computer systems used for aircraft operations,
- Portable,
- Connect to aircraft power through a certified power source,
- Connected to an aircraft mounting device during normal operations,
- Considered as a controlled PED,
- Connectivity to Avionics is possible,
- Class 2 EFB systems require airworthiness approval as described in Para

4.1.3 Class 3

Class 3 EFB systems are installed equipment requiring an airworthiness approval. This approval should cover the integrity of the EFB hardware installation (e.g. server, display, keyboard, power, switching), including hardware and software qualification. Aspects such as the human machine interface should also be addressed.

4.2 Software Applications for EFB Systems

The functionality associated with the EFB System depends upon the applications loaded on the host. The classification of the applications into two Types (A and B) is intended to provide clear divisions between the scope and therefore the approval process applied to each one.

4.2.1 Type A

Type A software applications include pre-composed, fixed presentations of data currently presented in paper format. Type A software applications:

- May be hosted on any of the hardware classes
- Require Operational approval.
- Do not require an airworthiness approval
- Typical examples of Type A software applications may be found in Appendix 'A'.

4.2.2 Type B

Type B software applications include dynamic, interactive applications that can manipulate data and presentation. Type B applications:

- May be hosted on any of the hardware classes
- Require Operational approval.
- Do not require an airworthiness approval
- Typical examples of Type B software applications may be found in Appendix 'B'.

5. AIRWORTHINESS APPROVAL

The following airworthiness criteria are applicable to EFB installation.

5.1 EFB Hardware Approval Process (Host Platform)

5.1.1 Class 1 EFB

A Class 1 EFB does not require an airworthiness approval because it's a non- installed equipment however paragraph 5.1.1.a) through 5.1.1.d) here below should be assessed if relevant. During the operational approval process an assessment should be made of the physical use of the device on the flight deck. Safe stowage, crashworthiness, security and use under normal environmental conditions including turbulence should be addressed.

a) EMI Demonstrations

If the EFB system is to be used during critical phases of flight (e.g., during take-off and landing), EMI demonstrations (laboratory, ground or flight test) are required to provide greater assurance of non-interference and ensure compatibility. For use during critical flight phases, the EFB system should comply with the requirements of ED-14()/DO-160() Section 21, Emission of Radio Frequency Energy.

b) Lithium Batteries

During the procurement of Class 1 EFBs, special considerations should be given to the intended use and maintenance of devices incorporating lithium batteries. In particular, the operator should address the following issues:

- Risk of leakage
- Safe storage of spares including the potential for short circuit
- Hazards due to on-board continuous charging of the device, including battery overheat

As a minimum specification, the lithium battery incorporated within the EFB device should have been tested to Underwriters Laboratory Inc (UL) Standard for Safety for Lithium Batteries reference UL 1642. The operator is responsible for the maintenance of EFB system batteries and should ensure that they are periodically checked and replaced when required.

c) Power Source

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. Circuit breakers are not to be used as switches; their use for this purpose is prohibited. In order to achieve an acceptable 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.

d) Data Connectivity

Data connectivity to other systems is not authorized except if connected to a system completely isolated from the avionics/aircraft systems (e.g., EFB system connected to a transmission media that receives and transmits data for AAC purposes on the ground only). Any other type of data connectivity requires an airworthiness approval.

5.1.2 Class 2 EFB

A Class 2 EFB requires an airworthiness approval. However, this approval is limited in scope to the mounting device, crashworthiness, data connectivity and EFB power connection. An evaluation of the EFB mounting device and flight deck location should be conducted as described below:

a) Design of Mounting Device

The mounting device (or other securing mechanism) that attaches or allows mounting of the EFB system, may not be positioned in such a way that it obstructs visual or physical access to aircraft controls and/or displays, flight crew ingress or egress, or external vision. The design of the mount should allow the user easy access to the EFB controls and a clear view of the EFB display while in use. The following design practices should be considered:

(i) The mount and associated mechanism should not impede the flight crew in the performance of any task (normal, abnormal, or emergency) associated with operating any aircraft system.

(ii) Mounting devices should be able to lock in position easily. Selection of positions should be adjustable enough to accommodate a range of flight crewmember preferences. In addition, the range of available movement should accommodate the expected range of users physical abilities (i.e., anthropometrics constraints). Locking mechanisms should be of the low-wear type that will minimize slippage after extended periods of normal use. Crashworthiness considerations will need to be considered in the design of this device. This includes the appropriate restraint of any class device when in use.

(iii) A provision should be provided to secure or lock the mount in a position out of the way of flight crewmember operations when not in use.

(iv) Mechanical interference issues of the mount, 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. For yoke mounted devices Original Equipment Manufacturer (OEM) data should be obtained to show that the mass inertia effect on column force has no adverse effect on the aircraft handling qualities.

(v) If the EFB requires cabling to mate with aircraft systems or other EFBs, and if the cable is not run inside the mount, the cable should not hang loosely in a way that compromises task performance and safety. Flight crewmembers should be able to easily secure the cables out of the way during aircraft operations (e.g., cable tether straps).

(vi) Cables that are external to the mount should be of sufficient length to perform the intended tasks. Cables too long or short could present an operational or safety hazard.

b) Placement of Mounting Device

The device should be mounted so that the EFB is easily accessible when stowed. When the EFB is in use (intended to be viewed or controlled), it should be within 90 degrees on either side of each pilot s line of sight. This requirement does not apply if the information is not being directly monitored from the EFB during flight. For example, an EFB may generate takeoff and landing V-speeds, but these speeds are used to set speeds bug or are entered into the FMS, and the airspeed indicator is the sole reference for the V-speeds. In this case, the EFB system need not be

located in the pilot's primary field of view. A 90-degree viewing angle may be unacceptable for certain EFB applications if aspects of the display quality are degraded at large viewing angles (e.g., the display colours wash out or the displayed colour contrast is not discernible at the installation viewing angle). In addition, consideration should be given to the potential for confusion that could result from presentation of relative directions (e.g., positions of other aircraft on traffic displays) when the EFB is positioned in an orientation inconsistent with that information. For example, it may be misleading if own aircraft heading is pointed to the top of the display and the display is not aligned with the aircraft longitudinal axis. Each EFB system should be evaluated with regard to these requirements.

c) EMI Demonstrations, Lithium Batteries, Power Source

In respect of the EMI demonstrations, use of lithium batteries and power source, see Paragraphs 5.1.1 a), b) and c) above.

d) EFB Data Connectivity

EFB data connectivity should be validated and verified to ensure non-interference and isolation from aircraft systems during transmission and reception.

5.1.3 Class 3 EFB

A Class 3 EFB is considered as installed equipment and therefore requires an airworthiness approval. Assessment of compliance with the airworthiness requirements would typically concentrate on two areas:

- The intended function and safety (e.g., security and integrity), applicable only to the interfaces with the avionics data sources and not to the software applications. The failure modes of the interface between the EFB and its avionics data sources should be assessed under normal and fault conditions. The assessment of safety and integrity of the software application should be addressed through the approval of the application itself (see Para 5.2).
- Hardware and software qualification should be conducted in accordance with the agreed Design Assurance Level (DAL) for the system and its interfaces. Note: DAL attribution at this stage (empty platform) may prohibit hosting of future software applications due to inconsistency between the criticality of the future software application and the platform DAL.

A Class 3 EFB may form part of a host platform (i.e., a network server) supporting other functions such as central maintenance. Such functions are considered to be outside of the scope of this leaflet and their approval should be conducted in accordance with normal certification procedures.

For a Class 3 EFB a human factors assessment should be conducted. At this stage the evaluation is restricted to the EFB hardware resources comprising display, keyboard, switches, annunciators, etc. However, in order to assess the human factors aspects of these devices, it may be necessary to host emulation software on the platform. This may be a dedicated software package developed purely for the purposes of conducting the assessment or be one or more of the intended

EFB software applications. The human factors assessment should be conducted in accordance with the criteria applied during the aircraft type design or modification exercise and identified within the aircraft certification basis. If no prior human factors requirements have been applied, the applicant should follow the process described in Appendix 'D'.

5.1.4 Certification Documentation

a) Aircraft Flight Manual

For Class 2 and 3 EFB the Aircraft Flight Manual (AFM) should contain any limitations affecting the use of the EFB system e.g., a statement that a particular function is not intended as a primary navigation reference.

Note: Under certain circumstances a placard mounted adjacent to the EFB display might also be warranted. The AFM should also make reference to any applicable guidelines for application developers and operators– see Para 5.1 .4.b) below.

b) Guidelines for EFB Application Developers

The guideline document should provide a set of requirements and guidelines to design, develop and integrate software applications into the EFB host platform. It is intended primarily for use by software application developers. The guideline should address at least the following:

- A description of the architecture for the host platform
- Information necessary in order to define a software application, including library routines etc.
- The EFB Design Assurance Level (DAL) and any assumptions, limitations or risk mitigations made in support of this
- Information necessary to ensure development of a software application consistent with the avionics interface and the human machine interface, that is also accurate, reliable, secure, testable, and maintainable
- Rules of co-habitation of any new software application with those already approved
- Guidelines on how to integrate any new software application into the platform
- A quality assurance process for developing software applications in the context of the host platform

5.2 EFB Software Applications (Type A and B)

Type A and B software applications do not require airworthiness approval, but should be approved through the operational approval process. Examples of Type A and Type B software applications, based mainly on FAA AC 120-76A, are given in Appendix 'A' and B of this circular respectively. Some differences with FAA AC 120-76A have been introduced and are highlighted in these appendices. If a software application is not listed in these appendices and does not clearly fall into the existing definitions of Para 4.2, advice should be sought from FSD, CAAB.

a) Applications Ineligible for Type A or Type B EFB Classification

It should be noted that, unlike FAA AC 120-76A, this Circular does not include a Type C software application classification. The FSD, CAAB policy is that any software application not falling within the scope of Type A or Type B should undergo a full airworthiness approval. This is consistent with the FAA policy for Type C software applications under the Advisory Circular, but eliminates the confusion of what is Type C EFB and what is normal aircraft function. This has been a particular issue with Class 3 hardware platforms where other non-EFB functions may be hosted requiring separate airworthiness approval. By removing Type C, in terms of airworthiness assessment all non Type A and Type B software applications are treated the same as non-EFB functions. Examples of software applications that the CAA consider to be ineligible for Type A or Type B EFB classification are provided in Appendix 'C'.

b) Specific Considerations for Performance and Electronic Checklist Applications

Although the AELD of CAA is not directly involved in the approval of Type B software applications such as performance calculations (weight & balance, take-off and landing performance) and electronic checklist, they may become indirectly involved.

Performance applications are typically derived from Computerized AFM Information, approved against the applicable airworthiness regulations. Only certain modules of the performance program are approved, and then against a particular program revision and a particular host e.g., Personal Computer. With performance Type B software applications CAA requires assurance that the resulting data, through software derivation, customization or optimization, provides performance figures that are consistent with the approved computerized aircraft flight manual information. If there is any concern, the CAA Flight Standards Directorate (FSD) may wish to seek advice from airworthiness performance specialists to assist in the validation of these types of software application. In general, this involves checking that the EFB derived performance calculations provides consistent results when compared with calculations from the approved AFM modules.

With electronic checklists, there is already regulatory guidance material published on the subject e.g., FAA AC 120-64. The concern here is where the EFB software application is customized or changed through the user-modifiable partition such that the electronic checklist differs from the approved procedures contained within the AFM. Of particular concern are changes affecting the approved Abnormal and Emergency Procedures?

6. ELECTRONIC FLIGHT BAG (EFB) OPERATIONAL APPROVAL:

6.1 The Approval Process:

The introduction and use of EFBs in the Cockpit and Cabin require authorization from FSR Division,CAAB. This requirement includes CAAB evaluation of all operating procedures, pertinent training modules, checklists, operations manuals, training manuals, maintenance programs, minimum equipment lists (MEL), other pertinent documents, and reporting procedures. This AOG contains the means to obtain Airworthiness and Operational approval for EFBs and will be used by the Inspector. Job aids checklist is in AOG 6-8-1 is only for approval of electronic data management for

Class 1 type and will be used for the operational approval process. Flight Operations Inspector will take the following steps before giving approval:

A. Phase One: Request Authorization:

(i) Phase one of the process begins when the operator requests authorization from CAAB to use the EFB. It should be noted that use of the EFB prior to operational approval does not imply any deviation from the operator's present procedures. It simply defines a training phase which will eventually lead to paperless trials.

(ii) During this phase, the CAAB and the operator reach a common understanding of when paperless trials should begin, how they must be conducted and documented, the role of the CAAB, and what documents and actions the operator is responsible for during each phase of the authorization process. Phase one is typically applicable when the operator transition from paper to a paperless flight deck;

B. Phase Two: Application

(i) Phase two begins when the operator submits a formal compliance plan to FSR Division, CAAB for evaluation. The plan is reviewed for completeness and FSR Division, CAAB may coordinate with other inspectors as necessary. Once the plan is accepted, the operator follows that plan to produce a complete EFB program. The operator must clarify the intent of the operation (with or without paper back-up or a combination of paperless and paper). The applicant user should submit the following information in the application package:

(ii) EFB hardware and application specification EFB operator procedures/manual revisions, EFB cockpit procedures checklists,

(iii) EFB training program,

(iv) EFB RD test data (when required), Complete non-interference test results,

(v) Airworthiness documents when required for installed resources, EFB evaluation report,

(vi) Operational risk analysis.

C. Phase Three: Review

CAAB should conduct a review of the application submitted by an operator. All assigned regulatory specialties should participate in the review of an operator's EFB program. CAAB should participate in the simulator evaluation or flight evaluation of an EFB when an operator is requesting initial EFB authorization. Additional simulator or flight evaluations are not required for adding a new EFB to an existing authorization unless there is a substantial change in EFB intended functions. When a new aircraft is added to a certificate with existing EFB authorization, the suitability of the EFB for that aircraft must be addressed as part of the aircraft conformity and configuration control process. CAAB should examine the technical content and quality of the proposed EFB program and other supporting documents and procedures. The EFB program must address all EFB issues and be well documented.

D. Phase Four: Interim Authorization to Use EFB

(i) An interim EFB authorization may be granted to allow the operator to proceed with EFB validation testing.

(ii) For operator transitioning from paper to EFB, during this validation phase, the operator must maintain paper back-up for all electronic information. The validation phase begins when the operator formally begins use of the EFB combined with paper backup for an established period of time.

(iii) For operators starting EFB operations without paperback-up, they must have in place adequate mitigations means to access the information in case of EFB failures, that are accepted by the CAAB;

(iv) Final considerations by CAAB:

(a) Unacceptable Validation Results. If the CAAB finds the proposed EFB reliability and/or function to be unacceptable, the CAAB should contact the operator for corrective action. EFB deficiencies should be corrected and the EFB function revalidated prior to paperless authorization being issued.

(b) Acceptable Validation Results. If the CAAB finds the proposed EFB reliability and/or function to be acceptable based on validation data then paperless authorization may be issued.

E. Phase Five: Authorization to Use EFB

A formal letter is issued by the CAAB granting use of the EFB to the operator. Additionally, the approval of a "paperless flight deck" should be added to the authorization, if it was included as a part of the Ops Evaluation. The initial authorization should define criteria for changes to the EFB system which may require consideration of an amended authorization.

6.2 Operational Risk Analysis

FSR Division will need to be satisfied that the operator has considered the failure of the complete EFB system as well as individual applications including corruption or loss of data and erroneously displayed information.

The objective of this process is to demonstrate that the software „application achieves at least the same level of integrity and availability as the traditional means that it is intended to replace

The impact of the EFB system on the Minimum Equipment List (MEL) should be assessed. The operator should demonstrate how the availability of the EFB is confirmed by pre-flight checks. Instructions to flight crew should clearly define actions to be taken in the event of any EFB system deficiency and whether dispatch is allowed. The MEL must include EFB irrespective of whether it is included or not in the MMEL.

6.3 Flight Crew Operating Procedures.

6.3.1 Procedures for Using EFB Systems with other Flight Deck Systems

Procedures should be designed to ensure that the flight crew know which aircraft system (e.g., Engine Indicating and Crew Alerting System (EICAS), Flight Management System (FMS), or EFB system) to use for a given purpose, especially when both the aircraft and EFB systems provide similar information. Procedures should also be designed to define the actions to be taken when information provided by an EFB system does not agree with that from other flight deck sources, or when one EFB system disagrees with another. If an EFB system generates information similar to that generated by existing cockpit automation, procedures should clearly identify which information source will be primary, which source will be used for back up information, and under what conditions to use the back up source. Whenever possible and without compromising innovation in design/use, EFB/user interfaces should be consistent (but not necessarily identical) with the flight deck design philosophy.

6.3.2 Flight Crew Awareness of EFB Software/Database Revisions

The operator should have a procedure in place to allow flight crews to confirm prior to fight the revision number and/or date of EFB application software including where applicable, database versions. However, flight crews should not be required to confirm the revision dates for other databases that do not adversely affect flight operations, such as maintenance log forms, a list of airport codes, or the Captain s Atlas. An example of a date sensitive revision is an aeronautical chart database on a 28-day AIRAC revision cycle. Procedures should specify what actions to take if the software applications or databases loaded on the EFB system are out-of-date.

6.3.3 Procedures to Mitigate and/or Control Workload

Procedures should be designed to mitigate and/or control additional workloads created by using an EFB system. The operator should develop procedures such that both flight crewmembers do not become preoccupied with the EFB system at the same time. Workload should be apportioned between flight crewmembers to ensure ease of use and continued monitoring of other flight crew functions and aircraft equipment. These procedures should be strictly applied in flight and should specify the times at which the flight crew may not use the EFB system.

6.3.4 Defining Flight Crew Responsibilities for Performance Calculations

Procedures should be developed that define any new roles that the flight crew and dispatch office may have in creating, reviewing, and using performance calculations supported by EFB systems.

6.4 Quality Assurance

The operator should document procedures for the quality control of the EFB system. This should detail who will be in overall charge of the EFB system, i.e. the EFB Administrator, and who will have authority to authorize and activate amendments to the hardware and software.

Procedures should be established for the maintenance of the EFB system and how unserviceability and failures will be dealt with to ensure that the integrity of the EFB system is assured. Maintenance procedures will also need to include the handling of updated information and how this will be accepted and then promulgated in a timely and complete format to all users and aircraft platforms.

Should a fault or failure of the system come to light it is essential that such failures are brought to the immediate attention of the flight crew and that the system is isolated until rectification action is taken. As well as back up procedures to deal with system failures a reporting system will need to be in place so that any action necessary, either to a particular EFB system, or to the whole system, is taken in order to prevent the use of erroneous information by flight crews.

The EFB system will need to be secure from unauthorized intervention. This should include the use of password protected system updates as well as physical security of the hardware. Measures should also include the control of laptop software installations to prevent use of unauthorized data.

6.5 Role of the EFB Administrator

The role of the EFB Administrator is a key factor in the running of the EFB system. He/she will need to receive appropriate training in the role and should have a good working knowledge of the proposed system hardware and operating system. The EFB system supplier should provide guidelines to clearly identify, which parts of the system can be accessed and modified by the EFB Administrator and which parts are only accessible by the supplier. It should also be clearly stated which changes and modifications may be further delegated by the EFB Administrator to

maintenance and support staff. The EFB Administrator should establish procedures to ensure that these guidelines are strictly adhered to and that no unauthorized changes take place. The EFB Administrator will also be responsible for conducting audits and for ensuring that company procedures are complied with by all personnel. This should include systematic audits/checks against the procedures and random checks of reports to ensure that any detected errors are correctly followed up. An EFB Administrator will be approved by FSD CAAB following an interview process.

6.6 Flight Crew Training

Flight crew will need to be given specific training in the use of the EFB system before any approval is given. Training should include at least the following:

An overview of the system architecture

- Pre-flight checks of the system
- Limitations of the system
- Specific training on the use of each application and the conditions under which the EFB may and may not be used
- Restrictions on the use of the system, including where some or all of the system is not available
- Procedures for cross checking of data entry and computed information
- Phases of flight when the EFB system may and may not be used
- CRM and human factor considerations on the use of the EFB
- Additional training for new applications or changes to the hardware configuration

Consideration should also be given to the role that the EFB system plays in Proficiency Checks as part of recurrent training and checking.

6.7 Operational Evaluation Test

The object of the Operational Evaluation Test will be to verify that the above elements have been satisfied before final approval of the EFB in place of paper documentation.

6.7.1 Initial Retention of Paper Back Up

Where paper is initially retained as back up, the operational evaluation test will typically be conducted in two stages. The first stage should run in parallel with the equivalent paper format to verify the correctness and reliability of the system. This will normally be for a six-month period but may be varied at the discretion of FSD. The evaluation should include audits of the procedures used as well as checks on the accuracy of any computed data. On completion of the first stage a report should be sent to FSD who will then issue an approval for the use of the system in place of the paper format. As a precaution, the paper documentation must be retained during a second stage for use in the event of the EFB system

not being available or any fault being detected with the system. When FSD, CAAB is satisfied that the back-up procedures are sufficiently robust, approval may be given to allow removal of the paper documentation.

6.7.2 Commencement of Operations without Paper Back Up

Where the applicant / operator seeks credit to start of operations without paper back up the operational evaluation test will consist of the following elements:

- A detailed review of the operational risk analysis

- A simulator LOFT session to verify the use of the EFB under operational conditions including normal, abnormal and emergency conditions. Items such as a late runway change and diversion to an alternate should also be included. This should be conducted before any actual line flights, as the outcome may need a change to the flight crew training and/or administrative procedures.

- Observation by CAAB FOI of the initial line flights.

FSD CAAB must also be satisfied that operator will be able to continue to maintain the EFB to the required standard through the actions of the administrator and quality assurance system.

6.8 Final Operational Report (Operational Compliance Summary)

The operator should produce a final operational report, which summarizes all activities conducted as demonstrated means of compliance, supporting the issue of an operational approval of the EFB system. The report should include, but not be limited to, the following:

- EFB platform/hardware description
- Description of each software application to be included in the approval
- Risk analysis summary for each application and mitigation means put in place
- Human factor assessment for the complete EFB system, human machine interface and all software applications
    - Pilot workload in both single-pilot and multi-crew flown aircraft
    - Size, resolution, and legibility of symbols and text
    - For navigation chart display: access to desired charts, access to information within a chart, grouping of information, general layout, orientation (e.g., track-up, north-up), depiction of scale information.
- Training
- EFB Administrator qualification

7. ISSUE OF APPROVAL

CAAB inspectors before approving the use of Electronic Navigation Data Management of the operator for the purpose of EFB will ensure the following steps:

A. That an operator must not use any electronic navigation data product for application in air or on ground unless the chairman has approved the procedures for ensuring that:

   (i) The process applied and the data product delivered meet acceptable standard so integrity; and
   (ii) The data product is compatible with, and meets the specifications of the intended function of the equipment that will use the data product;

B. That the process and the electronic navigation data product mentioned in paragraph A are continuously monitored so that they meet the standards of integrity,

C. That the electronic navigation data product implementation procedures in mentioned in Operator's OM for timely distribution and insertion of current and un altered navigation data to each aircraft requiring insertion of such data;

D. That the data base in valid with an expiry date;

E. That the data supplier complies with the standards set by agencies like FAA/EASA/CASA or equivalent standard acceptable to CAAB;

F. That the operator has a procedure in both OM and MCM regarding updating and uploading of the related data;

G. Where applicable in Class 1 :

   (i) All operators should provide at least two serviceable and updated I pads for each aircraft for operation of the flight;

   (ii) No personal I pad shall be used by any individual pilot during the operation of the flight;

   (iii) Must have an approved device for holding the Pad in position during all phases of flight for viewing the data;

Once FSR Division is satisfied that the EFB may be used in place of, or as an alternative to paper-based information, it will issue an approval based on the submission described above. The approval will consist of the issue of an operations specification (Ops Spec) or a Letter of Authorization.

8. WITHDRAWAL OF OPERATIONAL APPROVAL.

The operator shall develop its maintenance programme for EFB system including conduct of regular evaluation and audit.

Any defect or operational anomaly must be investigated and rectified promptly. Failure to comply with the terms of approval may result in the Authority withdrawing the operational approval.

9. RELATED MATERIAL

JAA TGL 36 Approval of Electronic Flight Bags

FAA AC 120-76A Guidelines for the Certification, Airworthiness and Operational Approval of Electronic Flight Bag Computing Devices

FAA AC 120-64 Operational use and Modification of Electronic Checklists.

EFB CLASSIFICATION MATRIX AND DERIVED CERTIFICATION AND OPERATIONAL APPROVAL

This appendix provides a matrix showing the relationship between the respective airworthiness and operational approval processes for all EFB Classes and Types.

EFB Applications	Hardware Class	Airworthiness Involvement (Paragraph 5)	Operational Involvement (Paragraph 6)
Type A Refer to Appendix A	Class 1,2,3	1) Class 1: No 2) Class 2: Yes, for • Mounting device • Power • Data Connectivity 3) Class 3:Yes for the EFB installation and human factor aspects 4) Type A: No	CAAB FOI: • Risk Analysis • Human Factor assessment • Quality Assurance • System Administration • Crew Training • Operational Evaluation Test • Statement approval
Type B Refer to Appendix B	Class 1,2,3	1) Class 1: No 2) Class 2: Yes, for • Mounting device • Power • Data Connectivity 3) Class 3: Yes for the EFB installation and human factor aspects 4) Type B: No*	CAAB FOI: • Risk Analysis • Human Factor assessment • Quality Assurance • System Administration • Crew Training • Operational Evaluation Test • Final report

* Subject to consultation and agreement with AELD during the operational approval process, see Appendix B.

AIR OPERATOR GUIDANCE ON
REQUIREMENTS FOR APPROVAL OF ELECTRONIC
FLIGHT BAG (EFB) OPERATIONS.

CHECK LIST

	CHECKLIST FOR APPROVAL OF ELECTRONIC DATA MANAGEMENT	**CAAB FORM NO: AOG 6-8-2**

OPERATOR'S NAME:	**DATE OF INSPECION :**
AOC NO:	**CAAB INSPECTOR'S NAME:**

LEGEND: S- SATISFACTORY | U- UNSATISFACTORY | N/A NOT APPLICABLE

SL.NO	ITEM	GRADES	REMARKS
1.	Has the Operator's Operation Manual developed as per CAR 84 Rule 143(4)?		
2.	Has the operator got CAAB's approval for using the electronic navigation data for application in air or ground?		
3.	Is there any procedure developed by the operator for implementation in Operation Manual for timely distribution and insertion current and an altered navigation data to each aircraft requiring insertion of such data??		
4.	Is the process applied and the data product delivered meet the acceptable standard so integrity?		
5.	Is there any process to ensure that the data products are continuously monitored so that they meet the standards of integrity?		
6.	Is the data product compatible with and meets the specifications of the intended function of the equipment that will use the data product?		
7.	Ensure that the electronic navigation data is valid with an expiry date?		
8.	Does the data supplier comply with the standard set by agencies like FAA/EASA/CASA or equivalent standard acceptable to CAAB?		
9.	Does the operator have a procedure in both operation manual (OM) and maintenance control manual (MCM) regarding updating and uploading of the related data?		

REMARKS:

SATISFACTORY ☐ **UNSATISFACTORY ☐**

SIGNATURE OF OPS INSPECTOR(S)

	CHECKLIST FOR APPROVAL OF ELECTRONIC FLIGHT BAG (EFB)	**CAAB FORM NO: AOG 6-8-1**

NAME OF THE OPERATOR:	**DATE OF INSPECTION:**
AOC NO:	**NAME OF INSPECTOR(S):**

GRADES/LEGEND: Y– YES | N-NO | NA- NOT APPLICABLE

	PART-1 GENERAL	**GRADES**	**REMARKS**
1.	Have the installed EFB resources been certified by a CAA to accepted aviation standards either during the certification of the aircraft, service bulletin by the original equipment manufacturer, or by a third-party supplemental Type certification(STC)?		
2.	Has the operator assessed the physical use of the device on the flight deck to include safe stowage, crash worthiness (mounting devices and EFBs, if installed) safety and use under normal environmental conditions including turbulence?		
3.	Will the display be readable in all the ambient lighting conditions, both day and night, encountered on the flight deck?		
4.	Has the operator demonstrated that the EFB will not electromagnetically interfere with the operation of aircraft equipment?		
5.	Has the EFB been tested to confirm operation in the anticipated environmental conditions (e.g temperature range, low humidity, altitude, etc.)?		
6.	Have procedures been developed to establish the level of battery capacity degradation during the life of the EFB?		
7.	Is the capability of connecting the EFB to certified aircraft systems covered by an airworthiness approval?		
8.	When using the transmitting functions of a portable EFB during flight, has the operator ensured that the device does not electromagnetically interfere with the operation of the aircraft equipment in any way?		
	If two or more EFBs on the flight deck are		

9.	connected to each other, has the operator demonstrated that this connection does not negatively affect otherwise independent EFB platforms?		
10.	Can the brightness or contrast of the EFB display be easily adjusted by the flight crew for various lighting conditions?		

PART- 2 INSTALLATION (MOUNTING)		GRADES	REMARKS
1.	Has the installation of the mounting device been approved in accordance with the appropriate airworthiness regulations?		
2.	Is it evident that there are no mechanical interference issues between the EFB in its mounting device and any of the flight controls in terms of full and free movement, under all operating conditions and no interference with other equipment such as buckles, oxygen hoses, etc.?		
3.	Has it been confirmed that the mounted EFB location does not impede crew ingress, egress and emergency egress path?		
4.	Is it evident that the mounted EFB does not obstruct visual or physical access to aircraft displays or controls?		
5.	Does the mounted EFB location minimize the effects of glare and/or reflections?		
6.	Does the mounting method for the EFB allow easy access to the EFB controls and a clear unobstructed view of the EFB display?		
7.	Is the EFB mounting easily adjustable by flight crew to compensate for glare and reflections?		
8.	Does the placement of the EFB allow sufficient airflow around the unit, if required?		

PART- 3 SOFTWARE		GRADES	REMARKS
1.	Is the application considered an EFB function?		
2.	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?		
3.	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. performance, and mass and balance (M&B), etc.)?		
4.	Does the software application have adequate security measures to ensure data integrity (e.g. preventing unauthorized manipulation)?		

5.	Does the EFB system provide, in general, a consistent and intuitive user interface, within and across the various hosted applications?		
6.	Has the EFB software been evaluated to consider HMI and workload aspects?		
7.	Does the software application follow Human Factors guidance?		
8.	Can the flight crew easily determine the validity an currency of the software application and database installed on the EFB, if required?		

	PART- 4 POWER CONNECTION/BATTERY	**GRADES**	**REMARKS**
1.	Is there a means other than a circuit-breaker to turn off the power source (e.g. can the pilot easily remove the plug from the installed outlet)?		
2.	Is the power source suitable for the device?		
3.	Have guidance/procedures been provided for battery failure or malfunction?		
4.	Is power to the EFB, either by battery and/or supplied power, available to the extent required for the intended operation?		
5.	Has the operator ensured that the batteries are compliant to acceptable standards?		

	PART- 5 CABLING	**GRADES**	**REMARKS**
1.	Has the operator ensured that any cabling attached to the EFB, whilst mounted or *hand-held* does not present an operational or safety hazard (e.g. it does not interfere with flight controls movement, egress, oxygen mask deployment, etc.) remove the plug from the installed outlet)?		
	PART- 6 STOWAGE		
1.	If there is no mounting device available, can the EFB be easily stowed securely and readily accessible in flight?		
2.	Is it evident that stowage does not cause any hazard during aircraft operations?		
	PART – 7 VIEWABLE STOWAGE		
1.	Has the operator documented the location of its viewable stowage?		
2.	Has the operator assessed that the stowage characteristics remain within acceptable limits for the proposed operations?		
3.	Has the operator assessed that if the EFB moves or is separated from its stowage, or if the viewable stowage is unsecured from the aircraft (because of turbulence, maneuvering, or other action), it will not interfere with flight controls, damage flight		

	deck equipment, or injure flight crew members? (A full motion flight simulator may be used for this assessment)		

PART- 8 MANAGEMENT (EFB MANAGEMENT)		GRADES	REMARKS
1.	Is there an EFB management system in place?		
2.	Does one person possess an overview of the complete EFB system and responsibilities within the operator's management structure?		
3.	Are the authorities and responsibilities clearly defined within the EFB management system?		
4.	Are there adequate resources assigned for managing the EFB?		
5.	Are third parties (e.g. software vendor) responsibilities clearly defined?		

PART- 9 CREW PROCEDURES		GRADES	REMARKS
1.	Is there a clear description of the system its operational philosophy and operational limitations?		
2.	Are the requirements for EFB availability in the operations manual and / or as part of the minimum equipment list (MEL)?		
3.	Have crew procedures for EFB operation been integrated within the existing operations manual?		
4.	Are there suitable crew cross-checks for verifying safety-critical data (e.g. performance, mass & balance (M&B) calculations)?		
5.	If an EFB generates information similar to that generated by existing flight deck systems, do procedures identify which information will be primary?		
6.	Are there procedures when information provided by an EFB does not agree with that from other flight deck sources, or, if more than one EFB is used, when one EFB disagrees with another?		
7.	Are there procedures that specify what actions to take if the software applications or databases loaded on the EFB are out of date?		
8.	Are there procedures in place to prevent the use of erroneous information by flight crews?		
9.	Is there a reporting system for system failures?		

10.	Have crew operating procedures been designed to mitigate and/or control additional workload created by using an EFB?		
11.	Are there procedures in place to inform maintenance and flight crews about a fault or failure of the EFB, including actions to isolate it until corrective action is taken?		

PART 10 - TRAINING		**GRADES**	**REMARKS**
1.	Is the training material appropriate with respect to the EFB equipment and published procedures?		
2.	Does the training cover the list of items in Paragraph 13 (Flight Crew Training of this CAD)?		
PART 11 - HARDWARE MANAGEMENT PROCEDURES			
1.	Are there documented procedures for the control of EFB hardware configuration?		
2.	Do the procedures include maintenance of EFB equipment?		
PART 12 - SOFTWARE MANAGEMENT PROCEDURES			
1	Are there documented procedures for the configuration control of loaded software and software access rights to the EFB?		
2.	Are there adequate controls to prevent corruption of operating systems, software, and databases?		
3.	Are there adequate security measures to prevent system degradation, malware and unauthorized access?		
4	Are procedures defined to track database expiration /updates?		
5.	Are there documented procedures for the management of data integrity?		
6.	If the hardware is assigned to the flight crew, does a policy on private use exist?		

REMARKS:

SATISFACTORY ☐ **UNSATISFCTORY** ☐