



**Flight Operations Standards Directorate**  
**Commercial Air Transport Section - Special Approvals - EFBs Approval**  
**EFBs Approvals Applications Attachments Compliance List**

<b>• Operator Name</b>			
<b>• Airplane Type(s)</b>			
<b>• EFBs Requested Approval</b>	<input type="checkbox"/> <b>Class 1 EFB</b>	<input type="checkbox"/> <b>Class 2 EFB</b>	
<b>• AOC Applicant/Holder Focal Point</b>	<b>Name</b>	<b>Phone No.</b>	<b>E-mail</b>

No	EFBs Operational Approval Application Attachments	JCAR OPS AMC 20-25	OD	YES	NO	NA	Remarks
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<b>A</b>	<b>Operator Document</b>
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<b>1</b>	<b>Risk Assessment for EFB Systems</b>
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<b>a</b>	<b>General</b>
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(1)	Prior to the entry into operation of any EFB system, the operator should carry out a risk assessment as part of its hazard identification and risk management process. The risk assessment should:	7.2.1					
(a)	Evaluate the risks associated with the use of an EFB and to define the appropriate mitigation	7.2.1					
(b)	Identify potential losses of function or malfunction (detected and undetected erroneous output) and associated failure scenarios	7.2.1					
(c)	Analyses the operational consequences of these failure scenarios	7.2.1					
(d)	Establish mitigating measures; and	7.2.1					
(e)	Ensure that the EFB system (hardware and software) achieves at least the same level of accessibility, usability, and reliability as the means of presentation it replaces	7.2.1					
(2)	In considering the accessibility, usability, and reliability of the EFB system, the operator should ensure that the failure of the complete EFB system as well as individual applications, including corruption or loss of data and erroneously displayed information, has been assessed and that the risks have been mitigated to an acceptable level.	7.2.1					
(3)	This risk assessment should be defined before the beginning of the trial period and should be amended accordingly, if necessary, at the end of this trial period. The results of the trial should establish the configuration and use of the system	7.2.1					



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(4)	When the EFB system is intended for introduction alongside a paper-based system, only the failures that would not be mitigated by the use of the paper-based system need to be addressed. In all other cases, and especially when an accelerated introduction with a reduced trial period (as defined in 7.14) or paperless entry-into-service of a new EFB system is intended, a complete risk assessment should be carried out	7.2.1					
<b>b Assessing and Mitigating the Risks</b>							
(1)	Some EFB applications parameters may depend on crew/dispatchers entries whereas others may be parameters defaulted from within the system and subject to an administration process (e.g. the runway line-up allowance in an aircraft performance application). In the first case, mitigation means would concern mainly training and crew procedures aspects whereas in the second case, mitigation means would more likely focus on administrator and data management aspects	7.2.2					
(2)	The analysis should be specific to the operator concerned and should address at least the following points:	7.2.2					
(a)	Minimization of undetected erroneous application output and assessment of worst case scenario	7.2.2					
(b)	Erroneous outputs from the software application including:	7.2.2					
	• Description of corruption scenarios; and	7.2.2					
	• Description of mitigation means.	7.2.2					
(c)	Upstream processes including:	7.2.2					
	• Reliability of root data used in applications (qualified/verified input data)	7.2.2					
	• Software application validation and verification checks according to appropriate industry standards; and	7.2.2					
	• independence between application software, e.g. robust partitioning between Type A, B and other certified SW applications	7.2.2					
(d)	Description of the mitigation means following detected loss of application, or detected erroneous output due to internal EFB error	7.2.2					
(e)	Need to access to an alternate power supply, in order to achieve an acceptable level of safety for certain software applications, especially if used as a source of required information	7.2.2					



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(3)	As part of the mitigation means, the operator should consider establishing a reliable alternative means of providing the information available on the EFB system. The mitigation means could be, for example, one or a combination of the following:	7.2.2					
(a)	System design (including hardware and software)	7.2.2					
(b)	Alternative EFB possibly supplied from a different power source	7.2.2					
(c)	EFB applications hosted on more than one platform	7.2.2					
(d)	Paper backup (e.g. Quick Reference Handbook (QRH))	7.2.2					
(e)	Procedural means	7.2.2					
(f)	Training; and	7.2.2					
(g)	Administration	7.2.2					
(4)	EFB system design features such as those assuring data integrity and the accuracy of performance calculations (e.g. a 'reasonableness' or 'range' check) may be integrated in the risk assessment performed by the operator	7.2.2					
(5)	When relevant, the EFB system supplier may also apply this risk assessment methodology to allow the operational environment to be taken into account and to support the development of the risk assessment by the operator	7.2.2					
<b>2</b>	<b>Human Factors Assessment</b>						
a	The operator should carry out an assessment of the human machine interface, installation, and aspects governing Crew Resource Management (CRM) when using the EFB system. Elements to be assessed are provided in Appendix D	7.5					
b	In addition to any possible already performed Agency assessment for which the operator may take credit, the human machine interface assessment should be carried by each operator for each kind of device and application installed on the EFB. Each operator should assess the integration of the EFB into the flight deck environment, considering both physical integration (anthropometrics, physical interferences, etc.) and cognitive ergonomics (compatibility of look and feel, workflows, alerting philosophy, etc.)	7.5					



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<b>3 Specific Considerations for mass and balance and performance Applications</b>							
a	A specific part of the evaluation will be dedicated to the verification that aircraft performance or mass and balance data provided by the application are correct in comparison with data derived from the AFM (or other appropriate sources) under a representative cross check of conditions (e.g. for performance applications: take-off and landing performance data on a dry, wet and contaminated runway, different wind conditions and aerodrome pressure altitudes, etc.)	7.6					
b	Further considerations regarding the assessment can be found in Appendix F.	7.6					
c	The HMI training and crew procedures should as well be part of the evaluation	7.6					
d	Where there is already a certified mass and balance and performance application (e.g. hosted in the FMS), the operator should ensure independence of EFB and avionics based algorithms or other appropriate means	7.6					



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<b>B</b>	<b>Operation Manual Part D - Training Program</b>						
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<b>1</b>	<b>Flight Crew Training</b>						
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<b>a</b>	<b>General</b>						
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(1)	Flight crew should be given specific training on the use of the EFB system before it is operationally used	7.13					
(2)	As far as practicable, it is recommended that the training simulators' environments include the EFBs in order to offer a higher level of representativeness.	7.13					
(3)	Consideration should also be shown to the role that the EFB system plays in operator proficiency checks as part of recurrent training and checking, and to the suitability of the training devices used during training and checking	7.13					
(4)	EFB training should be included in the relevant training program established and approved in accordance with JCAR OPS	7.13					
(5)	Training programs for the EFB may take credit for previous EFB experience. For example, previous experience of an aircraft performance application hosted on a portable EFB and using similar software may be credited toward training on an installed EFB with a performance application	E.1.2					

<b>b</b>	<b>Ground Training.</b> The ground training of the EFB shall be incorporated in conversion and recurrent training programs. The training consist of:						
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(1)	System architecture overview	E.1.3.2.1					
(2)	Display Unit features and use	E.1.3.2.1					
(3)	Limitations of the system	E.1.3.2.1					
(4)	Restrictions on the use of the system	E.1.3.2.1					
(a)	Phases of the flight	E.1.3.2.1					
(b)	Alternate procedures (e.g. MEL)	E.1.3.2.1					
(5)	Applications as installed	E.1.3.2.1					
(6)	Use of each application	E.1.3.2.1					
(7)	Restrictions on the use of each application	E.1.3.2.1					
(a)	Phases of the flight	E.1.3.2.1					
(b)	Alternate procedures (e.g. MEL)	E.1.3.2.1					
(8)	Data input	E.1.3.2.1					
(9)	Cross-checking data input and output; and	E.1.3.2.1					
(10)	Use of data output	E.1.3.2.1					



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<b>c</b>	<b>Ground Checking</b>						
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<b>(a)</b>	The check conducted following the ground-based element of Initial EFB Training may be accomplished by questionnaire (oral or written) or as an automated component of EFB computer-based training depending on the nature of the training conducted	E.1.4.1					
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<b>d</b>	<b>Flight Simulator Training.</b> The flight simulator training of the EFB shall be incorporated in conversion and recurrent training programs. The training consist of practical training and evaluation on the use of the system and terrain avoidance procedures to include:						
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(1)	Practical use of the Display Unit	E.1.3.2.2					
(2)	Display Unit Controls	E.1.3.2.2					
(3)	Data input devices	E.1.3.2.2					
(4)	Selection of applications	E.1.3.2.2					
(5)	Practical use of applications	E.1.3.2.2					
(6)	CRM and human factor considerations	E.1.3.2.2					
(7)	Situational awareness	E.1.3.2.2					
(8)	Avoidance of fixation	E.1.3.2.2					
(9)	Cross-checking data input and output; and	E.1.3.2.2					
(10)	Practical integration of EFB procedures into SOPs	E.1.3.2.2					

<b>e</b>	<b>Operator Proficiency Check (OPC)</b>						
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(1)	Each flight crew member undergoes operator proficiency checks to demonstrate his/her competence in carrying out normal, abnormal and emergency procedures	OPS 1.965 (b) E.1.4.3					
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(2)	Areas of emphasis during EFB checking						
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(a)	Proficiency in the use of each EFB application installed	E.1.4.5					
(b)	Proper selection and use of EFB displays	E.1.4.5					
(c)	Where an aircraft performance application is installed, proper cross-checking of data input and output	E.1.4.5					
(d)	Where a terminal chart application is installed, proper check of the validity of the information and the use of the chart clip function	E.1.4.5					
(e)	Where a moving map display is installed, maintenance of a proper outside visual scan without prolonged fixation on EFB operation, especially during the taxiing operations; and	E.1.4.5					
(f)	Actions following the failure of component(s) of the EFB, including hot EFB battery	E.1.4.5					



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<b>f Line Flying Under Supervision (LFUS)</b>							
(1)	Line flying under supervision provides the opportunity for a flight crew member to carry into practice the procedures and techniques he has been made familiar with during the ground and flying training of a conversion course	IEM 1.945 1.1					
<b>g Line Check.</b>							
(1)	An operator shall ensure that each flight crew member undergoes a line check on the airplane to demonstrate his/her competence in carrying out normal line operations described in the Operations Manual	OPS 1.965 (c) E.1.4.4					
<b>h Recurrent Training and Checking</b>							
(1)	The EFB recurrent training program - ground and flight simulator training shall be under taken every 3 years	E.3.1					
<b>2 Flight Dispatcher Training</b>							
(1)	Specific equipments	AC No 13					
(2)	Flight plan	AC No 13					
(3)	MEL requirements	AC No 13					
(4)	Normal procedures	AC No 13					
(5)	Contingency procedures	AC No 13					



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<b>C</b>	<b>Operations Manual</b>						
<b>1</b>	<b>Operations Manual Part A</b>						
<b>a</b>	<b>Flight Crew Operating Procedures</b>						
<b>(1)</b>	<b>Procedures for using EFB systems with other flight crew compartment systems.</b>						
<b>(a)</b>	Procedures should be established to ensure that the flight crew knows which aircraft system to use for a given purpose, including the EFB system. Procedures should define the actions to be taken by the flight crew when information provided by an EFB system is not consistent with that from other flight crew compartment sources, or when one EFB system shows different information than the other. If an EFB system generates information similar to that generated by existing automation, procedures should clearly identify which information source will be the primary, which source will be used for backup information, and under which conditions the backup source should be used.	7.7.1					
<b>(2)</b>	<b>Flight crew awareness of EFB software/database revisions.</b>						
<b>(a)</b>	The operator should have a procedure in place to verify that the configuration of the EFB, including software application versions and, where applicable, database versions, are up to date. Flight crews should have the ability to easily verify database version effectivity on the EFB. Nevertheless, 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 or a list of airport codes. An example of a date-sensitive revision is that applied to an aeronautical chart database. Procedures should specify what actions should be taken if the software applications or databases loaded on the EFB system are out of date	7.7.2					





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<b>(3) Procedures to mitigate and/or control workload.</b>							
(a)	Procedures should be designed to mitigate and/or control additional workload created by using an EFB system. The operator should implement procedures that, while the aircraft is in flight or moving on the ground, flight crew members do not become preoccupied with the EFB system at the same time. Workload should be allocated between flight crew members 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	7.7.3					
<b>(4) Defining flight crew responsibilities for performance calculations.</b>							
(a)	Procedures should be established to define any new roles that the flight crew and dispatch office may have in creating, reviewing, and using performance calculations supported by EFB systems	7.7.4					
<b>b Compliance monitoring (Quality Assurance).</b>							
(1)	The operator should include the EFB system in its compliance monitoring program. The purpose is to provide confidence that EFB operations and administration are conducted in accordance with all applicable requirements, standards, and operational procedures	7.8					
<b>c EFB System Security</b>							
(1)	The EFB system (including any means used for its updating) should be secure from unauthorized intervention (e.g. malicious software). The operator should ensure that adequate security procedures are in place to protect the system at software level and to manage hardware (e.g. identification of the person to whom the hardware is released, protected storage when the hardware is not in use). These procedures should guarantee that prior to each flight the EFB operational software works as specified and the EFB operational data is complete and accurate. Moreover, a system should be in place to ensure that the EFB does not accept a data load that contains corrupted contents. Adequate measures should be in place for compilation and secure distribution of the data to the aircraft	7.9					



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(2)	The procedures should be transparent, easy to understand to follow and to oversee:	7.9					
(a)	If an EFB is based on consumer electronics, e.g. a laptop, which can be easily removed, manipulated, or replaced by a similar component, then special consideration should be shown to the physical security of the hardware	7.9					
(b)	Portable EFB platforms should be subject to allocation tracking to specific aircraft or persons	7.9					
(c)	Where a system has input ports and especially if widely known protocols are using these ports or internet connections are offered, then special consideration should be shown to the risks associated with these ports	7.9					
(d)	Where physical media is used to update the EFB system and especially if widely known types of physical media are used, then the operator should use technologies and/or procedures to assure that unauthorized content cannot enter the EFB system through these media	7.9					
(3)	The required level of EFB security depends on the criticality of the used functions (e.g. an EFB which only holds a list of fuel prices may require less security than an EFB used for performance calculations)	7.9					
(4)	Beyond the level of security required to assure that the EFB can properly perform its intended functions, the level of security ultimately required depends on the abilities of the EFB	7.9					
(5)	Examples of typical safety and security defenses are contained in the following non exhaustive list:	7.9					
(a)	Individual system firewalls	7.9					
(b)	Clustering of systems with similar safety standards into domains	7.9					
(c)	Data encryption & authentication	7.9					
(d)	Virus scans	7.9					
(e)	Keeping the OS up to date	7.9					
(f)	Initiating air/ground connections only when required and always from the aircraft	7.9					
(g)	'White lists' for allowed Internet domains	7.9					
(h)	VPNs	7.9					
(i)	Granting of access rights on a need-to-have basis	7.9					
(j)	Troubleshooting procedures should consider as well security threats as potential root cause of EFB misbehavior, and responses should be developed to prevent future successful attacks when relevant	7.9					
(k)	Virtualization; and	7.9					
(l)	Forensic tools and procedures	7.9					



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(6)	The EFB administrator should not only keep the EFB system, but also his/her knowledge about security of EFBs systems up to date	7.9					
<b>d Dispatch Considerations</b>							
(1)	The operator should establish dispatch criteria for EFB system. The operator should ensure that the availability of the EFB system is confirmed by pre-flight checks. Instructions to flight crew should clearly define the actions to be taken in the event of any EFB system deficiency. Mitigation may be in the form of maintenance and/or operational procedures such as:	7.4					
(a)	Replacement of batteries at defined intervals as required	7.4					
(b)	Fully charged backup battery on board	7.4					
(c)	Procedures for the flight crew to check the battery charging level before departure; and	7.4					
(d)	Procedures for the flight crew to switch off the EFB in a timely manner when the aircraft power source is lost	7.4					
<b>e Dispatch with inoperative EFB elements</b>							
(1)	In case of partial or complete failure of the EFB, alternative dispatch procedures should be followed. These procedures should be included either in the Minimum Equipment List (MEL) or in the Operations Manual and ensure an acceptable level of safety	7.4.1					
(2)	MEL coverage can be granted only when the corresponding item exists in the applicable Master Minimum Equipment List (MMEL) or MMEL supplement of the aircraft type.	7.4.1					
(3)	Particular attention should be paid to alternative dispatch procedures to obtain operational data (e.g. performance data) in case of a failure of an EFB hosting applications providing such calculated data	7.4.1					
(4)	When data input and output integrity is obtained by cross-checking and gross error checks, the same checking principle should apply to alternative dispatch procedures to ensure equivalent protection.	7.4.1					



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<b>f</b>	<b>Electronic signatures (Operations manual)</b>						
(1)	JCAR OPS 1, Part-M, and other regulations may require a signature to signify either acceptance or to confirm the authority (e.g. load sheet, technical logbook, NOTOC). In order to be accepted as an equivalent to a handwritten signature, electronic signatures used in EFB applications need, as a minimum, to fulfill the same objectives and should, as a minimum; assure the same degree of security as the handwritten or any other form of signature it intends to replace.	7.10					
(2)	In the case of legally required signatures, an operator should have in place procedures for electronic signatures, acceptable to the competent authority, that guarantee:	7.10					
(a)	The uniqueness: A signature should identify a specific individual and be difficult to duplicate	7.10					
(b)	The significance: An individual using an electronic signature should take deliberate and recognizable action to affix his or her signature	7.10					
(c)	The scope: The scope of information being affirmed with an electronic signature should be clear to the signatory and to subsequent readers of the record, record entry, or document	7.10					
(d)	The signature security: The security of an individual's handwritten signature is maintained by ensuring that it is difficult for another individual to duplicate or alter it	7.10					
(e)	The non-repudiation: An electronic signature should prevent a signatory from denying that he or she affixed a signature to a specific record, record entry, or document. The more difficult it is to duplicate a signature, the likelier the signature was created by the signatory; and	7.10					
(f)	The traceability: An electronic signature should provide positive traceability to the individual who signed a record, record entry, or any other document	7.10					
(3)	An electronic signature should retain those qualities of a handwritten signature that guarantee its uniqueness. Systems using either a PIN or a password with limited validity (time-wise) may be appropriate in providing positive traceability to the individual who appended it. Advanced electronic signatures, qualified certificates and secured signature-creation devices needed to create them are typically not required for EFBs operations	7.10					



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<b>g</b>	<b>Role of the EFB Administrator</b>						
(1)	The role of the EFB administrator is a key factor in the management of the EFB system of an operator. Complex EFB systems may require more than one individual to conduct the administration process, but one person should be designated as the EFB administrator responsible for the complete system with appropriate authority within the operator's management structure	7.11					
(2)	The EFB administrator 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	7.11					
(3)	The EFB administrator is responsible:	7.11					
(a)	For all the applications installed, and for providing support to the EFB users on these applications	7.11					
(b)	To check potential security issues associated with the application installed	7.11					
(c)	For hardware and software configuration management and for ensuring, in particular, that no unauthorized software is installed	7.11					
(d)	For ensuring that only a valid version of the application software and current data packages are installed on the EFB system; and	7.11					
(e)	For ensuring the integrity of the data packages used by the applications installed	7.11					
(4)	The operator should make arrangements to ensure the continuity of the management of the EFB system in the absence of the EFB administrator.	7.11					
(5)	EFB administration should be subject to independent routine audits and inspections as part of the operator's compliance monitoring program (see paragraph 7.8)	7.11					



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(6)	Each person involved in EFB administration should receive appropriate training in their role and should have a good working knowledge of the proposed system hardware, operating system, and relevant software applications, and also of the appropriate regulatory requirements related to the use of EFB. The content of this training should be determined with the aid of the EFB system supplier or application supplier	7.11					
(7)	The administrator training material should be made available on request to the competent authority	7.11					

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<b>2</b>	<b>EFBs Policy and Procedures Manual</b>						
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a	The EFB system supplier or the operator in the case of consumer device should clearly identify those parts of the EFB system that can be accessed and modified by the operator's EFB administration process and those parts that are only accessible by the EFB system supplier. The EFB administrator should establish procedures, documented in an EFB policy and procedures manual, to ensure that no unauthorized changes take place. The EFB policy and procedures manual may be fully or partly integrated in the Operations Manual	7.11.1					
b	The EFB policy and procedures manual should also address the validity and currency of EFB content and databases, ensuring, thus, the integrity of EFB data. This may include establishing revision control procedures so that flight crews and others can ensure that the contents of the system are current and complete. These revision control procedures may be similar to the revision control procedures used for paper or other storage means	7.11.1					
c	For data that is subject to a revision cycle control process, it should be readily evident to the user which revision cycle has been incorporated in the information obtained from the system. Procedures should specify what action to take if the applications or databases loaded on the EFB are out of date. This manual may include, but is not limited to, the following:	7.11.1					



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(1)	Document changes to content/databases	7.11.1					
(2)	Notification to crews of updates	7.11.1					
(3)	If any applications use information that is specific to the aircraft type or tail number, ensuring that the correct information is installed on each aircraft	7.11.1					
(4)	Procedures to avoid corruption/errors during changes to the EFB system; and	7.11.1					
(5)	In case of multiple EFBs in the flight crew compartment, procedures to ensure that they all have the same content/databases installed	7.11.1					
(6)	The EFB administrator should be responsible for the procedures and systems, documented in the EFB policy and procedures manual that maintain EFB security and integrity. This includes system security, content security, access security, and protection against harmful software (see paragraph 7.9)	7.11.1					

No	EFBs Operational Approval Application Attachments	JCAR OPS AMC 20-25	MEL	YES	NO	NA	Remarks
<b>3</b>	<b>Minimum Equipment List - Dispatch with inoperative EFB elements</b>						
a	In case of partial or complete failure of the EFB, alternative dispatch procedures should be followed. These procedures should be included either in the Minimum Equipment List (MEL) or in the Operations Manual and ensure an acceptable level of safety	7.4.1					
b	MEL coverage can be granted only when the corresponding item exists in the applicable Master Minimum Equipment List (MMEL) or MMEL supplement of the aircraft type.	7.4.1					
c	Particular attention should be paid to alternative dispatch procedures to obtain operational data (e.g. performance data) in case of a failure of an EFB hosting applications providing such calculated data	7.4.1					
d	When data input and output integrity is obtained by cross-checking and gross error checks, the same checking principle should apply to alternative dispatch procedures to ensure equivalent protection.	7.4.1					



**Flight Operations Standards Directorate  
Commercial Air Transport Section - Special Approvals - EFBs Approval  
EFBs Approvals Applications Attachments Compliance List**

<b>• Assessment Result</b>	
<input type="checkbox"/> Satisfactory	<input type="checkbox"/> Unsatisfactory

• Remarks	

<b>Flight Operations Inspector Name</b>	<b>Signature</b>	<b>Date</b>