European Aviation Safety Agency — Rulemaking Directorate

Comment-Response Document 2012-02

Airworthiness and operational criteria for the approval of Electronic Flight Bags (EFBs)

CRD to NPA 2012-02 — RMT.0001 (20.002) — 31/07/2013

EXECUTIVE SUMMARY

The scope of this rulemaking activity is outlined in the Terms of Reference (ToR) RMT.0001 (20.002) Issue 1 of 4 December 2006. Notice of Proposed Amendment (NPA) 2012-02 proposed:

— new AMC 20-25 on the airworthiness and operational criteria of Electronic Flight Bags (EFBs) used by Commercial Air Transport (CAT) operators;
— a new version of ETSO-2C165a on Airport Moving Map Display (AMMD); and
— a draft Opinion to amend the Regulation on air operations in relation to EFBs.

Based on the 913 comments received from 45 commentators and the individual responses to each of them, as contained in the present CRD, the Agency concludes that no stakeholder objected that Option 2 (i.e. enhance material in JAA TGL 36 to align with the state of the art) is the preferred one.

Stakeholders proposed major modifications to AMC 20-25, which are incorporated in the resulting text, concerning in particular EFB Hardware Taxonomy (EFBs is either 'installed' or 'portable'), EFB Software Application Types (AMMD converted into Type B) and new guidance material for Performance applications, EFB administrator and risk assessment. There is no explicit mention of either operational approval or evaluations by the Agency in the resulting text. Stakeholders also requested to publish ETSO-C165a in index 1 (i.e. technically equivalent to the corresponding FAA TSO) and not in index 2 of CS-ETSO.

In total, the majority of the received comments has been accepted or partially accepted.

The above has been endorsed during a focussed consultation: Workshop at the level of Regulatory Advisory Group (RAG) and Safety Standards Consultative Committee (SSCC) held on 18 April 2013.

The Workshop in addition recommended:

— to open the possibility of requesting the evaluation service by the Agency (on a voluntary basis) not only to authorities and manufacturers, but also to aircraft operators and EFB system suppliers;
— to accelerate RMT.0601 to produce an Opinion for more comprehensive rules on EFB in Commission Regulation (EU) No 965/2012 in line with the amendment to ICAO Annex 6 expected in 2014; and
— to explore, the possibility for the Agency to promote exchange of experiences on EFB and to host a database (e.g. suitable models of portable EFB; suitable batteries; etc.).

The Agency intends to adopt AMC 20-25 and ETSO-C165a in the revised text attached to this CRD;

After two months given to stakeholders to react to this CRD if their comments were misinterpreted or not fairly taken into account, the Agency intends to progress towards the adoption and publication of the said AMC and ETSO, after the Decision of the Executive Director.

Reactions to this CRD should be submitted via the CRT by clicking the 'add a general reaction' button.
Please indicate clearly the applicable page and paragraph.

Applicability		Process map	
Affected regulations and decisions:	CS-ETSO AMC 20	Concept Paper:	No
		Rulemaking group:	Yes
		RIA type:	Light
Affected stakeholders:	Aircraft and equipment manufacturers Developers of software for EFB Commercial aircraft operators	Technical consultation during NPA drafting:	No
		Publication date of the NPA:	12 March 2012
		Duration of NPA consultation:	3 months
		Review group:	Yes
Driver/origin:	Technological Development	Focussed consultation:	Yes (Workshop 18 April 2013)
Reference:	ED Decision 2003/10/RM of 24 October 2003 ED Decision 2003/12/RM of 05 November 2003	Publication date of the Opinion:	N/A
		Publication date of the Decision:	2014/Q1

Table of Contents

Explanatory Note

I. General

1. The purpose of NPA 2012-12, dated 15 March 2012, was to propose:

   — an amendment to Decision 2003/12/RM of the Executive Director of 5 November 2003 on general acceptable means of compliance for airworthiness of products, parts and appliances ('AMC-20') to introduce a **new AMC 20-25** providing acceptable means of compliance for the airworthiness and operational approvals of Electronic Flight Bags (EFB);

   — an amendment to Decision 2003/10/RM of the Executive Director of 24 October 2003 on certification specifications, including airworthiness codes and acceptable means of compliance, for European Technical Standard Orders (currently published as CS-ETSO) and in particular proposing amended **ETSO-2C165a on Airport Moving Map Display (AMMD)**; and

   — a draft **Opinion in order to insert a new rule addressed to Commercial Air Transport (CAT) operators** in the Commission Regulation on air operations[1].

II. Consultation

2. The two above-mentioned draft Executive Director Decisions and the draft Opinion were published on the website (http://www.easa.europa.eu) on 15 March 2012.

3. By the closing date of 18 June 2012, the European Aviation Safety Agency (hereinafter referred to as the 'Agency') had received 921 comments from 45 National Aviation Authorities, professional organisations, and private companies.

III. Publication of the CRD

4. All comments received have been acknowledged and incorporated into this Comment-Response Document (CRD) with the responses of the Agency.

   In responding to comments, a standard terminology has been applied to attest the Agency's position. This terminology is as follows:

   (a) **Accepted** — The Agency agrees with the comment and any proposed amendment is wholly transferred to the revised text.

   (b) **Partially accepted** — The Agency either agrees partially with the comment, or agrees with it but the proposed amendment is only partially transferred to the revised text.

   (c) **Noted** — The Agency acknowledges the comment but no change to the existing text is considered necessary.

   (d) **Not accepted** — The comment or proposed amendment is not shared by the Agency.

5. The two Executive Director Decisions mentioned in paragraph 1 will be issued at least two months after the publication of this CRD to allow for any possible reactions of stakeholders regarding possible misunderstandings of the comments received and answers provided.

[1] Commission Regulation (EU) No 965/2012 of 05/10/2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council. (OJ L 296, 25.10.2012, p.1)

6. Stakeholders are invited to provide reactions to this CRD regarding possible misunderstandings of the comments received and the responses provided.

Such reactions should be received by the Agency not later than 1 October 2013 and should be submitted using the automated Comment-Response Tool (CRT) available at http://hub.easa.europa.eu/crt[2].

IV. CRD table of comments, responses, and resulting text

(General Comments)	-

comment	*171* comment by: *AIRBUS* General comment (applicable to all document): This NPA raises significant issues (and even showstoppers), notably because of the following reasons : 1) large rupture with JAA TGL 36 and FAA AC 120-76A which have been used up to now to certify and approve EFB systems, with following adverse consequences : - No guarantee of backward practicability of AMC 20-25 to support changes of EFBs already approved (for both Airworthiness and Ops approval aspects) - Possible conflicts for aircraft already embodying a certified EFB system (as provisions) but not operationally approved yet for EFB operations. - For EFB systems already certified, no possibility to provide a full AMC 20-25 compliance if requested by a NAA (NAA could question airworthiness certification aspects covered by TGL 36 and/or a CRI not consistent with AMC 20-25) 2) Large lack of harmonization with FAA AC 120-76B (to be released) and AC 20-173 (already released). An aircraft operated worldwide cannot be designed based on 2 conflicting regulations. 3) Large lack of harmonization with existing CRIs (Certification Review Items). By principle of precedence and similarity (notably, when there are no novelties), EASA should recognize certification policies already agreed on a case-by-case basis with the applicants (through CRI) 4) Large reinforcing of Airworthiness requirements at the expense of the Operational considerations, whereas Airworthiness and OPS requirements were much more balanced with TGL 36. Such approach could jeopardize the EFB concept. It must be pointed out that a Class 2 EFB is not an avionics equipment, and some airworthiness requirements usually applicable to an avionics equipement (eg., FHA, ED-12B compliance, ...) which are relaxed for an EFB, are balanced by additional operational requirements. As per NTSB conclusions, even if not required by regulations, EFB improves the global safety (compared to the prior paper process), so, by unjustified airworthiness over-requirements, AMC 20-25 could slow down operations based on EFB and therefore, AMC 20-25 could not promote safety enhancement.
response	Partially accepted 1. Indeed, the proposed AMC 20-25 deviated from JAA TGL 36 and FAA AC 120-76A. But the TGL had been published in 2004 and also the FAA is planning subsequent amendments of their regulatory material. Furthermore, the state of the art in the EFB field is in rapid evolution and, therefore, the Agency believes that AMC 20-25 should be aligned as much

[2] In case of technical problems, please contact the CRT webmaster (crt@easa.europa.eu).

as possible with the current state of the art.

2. FAA experts have been involved in the Review Group revising the AMC 20-25 and they confirmed the willingness to harmonise future edition C of AC 120-76 with the Agency's provisions as much as possible.

3. Existing Certification Review Items (CRIs) are not necessarily binding on future rules. However, significant manufacturers have participated to the Review Group in order to avoid major mismatch.

4. The principle that 'portable' EFB (or any other portable device not part of the approved aircraft design) cannot be under the responsibility of the manufacturers is fully shared by the Agency and clarified in the resulting text of AMC 20-25.

comment *250* comment by: *Dassault Aviation*

DASSAULT-AVIATION comments on this NPA 2012-02 result from a common job with some others companies and are entirely shared with Airbus ones.

response Noted
Please see responses to comments from Airbus.

comment *252* comment by: *Dassault Aviation*

DASSAULT-AVIATION General comment # 1 (applicable to all document) shared with Airbus:

This NPA raises significant issues (and even showstoppers), notably because of the following reasons :
1) large rupture with JAA TGL 36 and FAA AC 120-76A which have been used up to now to certify and approve EFB systems, with following adverse consequences :
- No guarantee of backward practicability of AMC 20-25 to support changes of EFBs already approved (for both Airworthiness and Ops approval aspects)
- Possible conflicts for aircraft already embodying a certified EFB system (as provisions) but not operationally approved yet for EFB operations.
- For EFB systems already certified, no possibility to provide a full AMC 20-25 compliance if requested by a NAA (NAA could question airworthiness certification aspects covered by TGL 36 and/or a CRI not consistent with AMC 20-25)

2) Large lack of harmonization with FAA AC 120-76B (just released) and AC 20-173 (already released). An aircraft operated worldwide cannot be designed based on 2 conflicting regulations.

3) Large lack of harmonization with existing CRIs (Certification Review Items). By principle of precedence and similarity (notably, when there are no novelties), EASA should recognize certification policies already agreed on a case-by-case basis with the applicants (through CRI).

4) Large reinforcing of Airworthiness requirements at the expense of the Operational considerations, whereas Airworthiness and OPS requirements were much more balanced with TGL 36. Such approach could jeopardize the EFB concept. It must be pointed out that a Class 2 EFB is not an avionics equipment, and some airworthiness requirements usually applicable to an avionics equipement (eg., FHA, ED-12B compliance, ...) which are relaxed for an EFB, are balanced by additional operational requirements. As per NTSB conclusions, even

	if not required by regulations, EFB improves the global safety (compared to the prior paper process), so, by unjustified airworthiness over-requirements, AMC 20-25 could slow down operations based on EFB and therefore, AMC 20-25 could not promote safety enhancement.
response	Partially accepted Please see response to comment No 171 from Airbus.

comment	*265* comment by: *UK CAA* Please be advised that the UK CAA do not have any comments on NPA 2012-02: Electronic Flight Bags.
response	Noted The Agency assumes that UK CAA is in principle in favour of a rapid publication of AMC 20-25.

comment	*370* comment by: *Luftfahrt-Bundesamt* The LBA has no comments on NPA 2012-02.
response	Noted The Agency assumes that LBA is in principle in favour of a rapid publication of AMC 20-25.

comment	*437* comment by: *Oliver Ast (CLH)* General comment (applicable to all document): This NPA raises significant issues (and even showstoppers), notably because of the following reasons : 1) large rupture with JAA TGL 36 and FAA AC 120-76A which have been used up to now to certify and approve EFB systems, with following adverse consequences : - No guarantee of backward practicability of AMC 20-25 to support changes of EFBs already approved (for both Airworthiness and Ops approval aspects) - Possible conflicts for aircraft already embodying a certified EFB system (as provisions) but not operationally approved yet for EFB operations. - For EFB systems already certified, no possibility to provide a full AMC 20-25 compliance if requested by a NAA (NAA could question airworthiness certification aspects covered by TGL 36 and/or a CRI not consistent with AMC 20-25) 2) Large lack of harmonization with FAA AC 120-76B (to be released) and AC 20-173 (already released). An aircraft operated worldwide cannot be designed based on 2 conflicting regulations. 3) Large lack of harmonization with existing CRIs (Certification Review Items). By principle of precedence and similarity (notably, when there are no novelties), EASA should recognize certification policies already agreed on a case-by-case basis with the applicants (through CRI) 4) Large reinforcing of Airworthiness requirements at the expense of the Operational considerations, whereas Airworthiness and OPS requirements were much more balanced with TGL 36. Such approach could jeopardize the EFB concept. It must be pointed out that a Class 2 EFB is not an avionics equipment, and some airworthiness requirements usually applicable to an avionics equipement (eg., FHA, ED-12B compliance, ...) which are relaxed for an EFB, are balanced by additional operational requirements. As per NTSB conclusions, even

	if not required by regulations, EFB improves the global safety (compared to the prior paper process), so, by unjustified airworthiness over-requirements, AMC 20-25 could slow down operations based on EFB and therefore, AMC 20-25 could not promote safety enhancement. A Harmonization between FAA and EASA rulemaking in this matter is strongly recommended, especially in terms of classification of EFB Systems and data transfer between aircraft and EFB. Classification of application types according to hazard levels does not make sense, as even a failure of a classical text viewer software (e.g. landing distance charts) may have a major impact on flight safety
response	Partially accepted Please see response to comment No 171 from Airbus.

comment	*474* comment by: *Star Alliance* Attachment #1
response	Partially accepted Comment 474 is identical to 171 above. Please see response to comment No 171 from Airbus.

comment	*508* comment by: *Jeppesen Inc.* Suggest provision of ownship on surface charts/maps should be considered Type B software. No need for AMMD ETSO-2C165. Rationale: Harmonization with current AC 120-76B, and current Change 1 activity redefining AMM (and other surface charts with ownship) to be Type B software, and supporting COTS/Portable GPS position sources. The application is universally recognized as having a Minor failure effect. Type B classification is appropriate for minor. History shows that adoption of the capability as a Type C application has been extremely limited due to economic and logistical constraints. Type C is aligned to applications with Major failure effect.
response	Partially accepted The Agency agrees that the Airport Moving Map Display (AMMD) is Type B application. However, Article 3.d of Regulation (EC) 216/2008 (hereinafter referred to as the 'Basic Regulation') allows to issue ETSO authorisations to software modules, delivered by the manufacturer without the hardware platform on which they will run. The ETSO authorisation is never mandatory, but available to manufacturers, if they believe that they should apply for it.

comment	*509* comment by: *Jeppesen Inc.* Suggest allowance be made to use of COTS/Portable GPS position sources. Rationale: Harmonization with current AC 120-76B, and current Change 1 activity

	redefining AMM to be Type B software, and supporting COTS/Portable GPS position sources. The application is universally recognized as having a Minor failure effect. Type B classification is appropriate for minor. History shows that adoption of the capability as a Type C application has been extremely limited due to economic and logistical constraints. Type C is aligned to applications with Major failure effect. With proper evaluation and validation, COTS/Portable GPS position sources can be proven to be reliable and accurate, as demonstrated by field trials leading to the current FAA AC 120-76B "Change 1" effort.
response	Accepted In the resulting text of AMC 20-25, the use of any position sensor for AMMD applications on portable EFB applications, which remain Type B, is allowed.

comment	*510* comment by: *Jeppesen Inc.* Jeppesen supports current EASA plan to separate Airworthiness and Operational guidance. Rational: Harmonization with AC 120-76B/8900.1 Vol 4 Chap 15 and decouples Ops Approval from aircraft certification.
response	Accepted The structure of resulting AMC 20-25 separates airworthiness requirements from operational criteria. In the long term, the Agency intends also to progressively migrate the operational provisions into AMC to the Regulation on air operations[3], leaving, thus, in the series of AMC 20-XX only airworthiness provisions applicable to different aircraft categories.

comment	*570* comment by: *ERA* European Regions Airline Association [ERA] would stress that EASA should not forget that the aim of the NPA should not only be better harmonization and greater flexibility but also reducing the eventual implementation costs.
response	Noted Indeed, the Agency is tasked by the legislator (Article 2.2(c) of the Basic Regulation) to also promote cost-efficiency in the regulatory and certification processes.

comment	*635* comment by: *Deutsche Lufthansa AG* This NPA raises significant issues (and even showstoppers), notably because of the following reasons: 1) large rupture with JAA TGL 36 and FAA AC 120-76A which have been used up to now to certify and approve EFB systems, with following adverse

[3] Commission Regulation (EU) No 965/2012 of 05/10/2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council. (OJ L 296, 25.10.2012, p.1)

consequences:

- No guarantee of backward practicability of AMC 20-25 to support changes of EFBs already approved (for both Airworthiness and Ops approval aspects)
- Possible conflicts for aircraft already embodying a certified EFB system (as provisions) but not operationally approved yet for EFB operations.
- For EFB systems already certified, no possibility to provide a full AMC 20-25 compliance if requested by a NAA (NAA could question airworthiness certification aspects covered by TGL 36 and/or a CRI not consistent with AMC 20-25)

2) Large lack of harmonization with FAA AC 120-76B (to be released) and AC 20-173 (already released). An aircraft operated worldwide cannot be designed based on 2 conflicting regulations.

3) Large lack of harmonization with existing CRIs (Certification Review Items). By principle of precedence and similarity (notably, when there are no novelties), EASA should recognize certification policies already agreed on a case-by-case basis with the applicants (through CRI)

4) Large reinforcing of Airworthiness requirements at the expense of the Operational considerations, whereas Airworthiness and OPS requirements were much more balanced with TGL 36. Such approach could jeopardize the EFB concept. It must be pointed out that a Class 2 EFB is not an avionics equipment, and some airworthiness requirements usually applicable to an avionics equipement (eg., FHA, ED-12B compliance, ...) which are relaxed for an EFB, are balanced by additional operational requirements. As per NTSB conclusions, even if not required by regulations, EFB improves the global safety (compared to the prior paper process), so, by unjustified airworthiness over-requirements, AMC 20-25 could slow down operations based on EFB and therefore, AMC 20-25 could not promote safety enhancement.

response

Partially accepted

Please see response to comment No 171 from Airbus.

comment

726 comment by: *SVFB/SAMA*

2012-02 NPA EFB, SAMA v01
SAMA Swiss Aircraft Maintenance Association, a member of ECOGAS
SAMA supports the content of NPA 2012-02 with the following reservations:
The economical effect of the NPA to the aviation community will not so much depend on this well designed NPA but more on the effect the "alignment" of the terms CAT, commercial purposes etc. by, for example NPA 2010-10 and others, respective the economical effect created by them on:

Ø CAT on one hand, and on
Ø Business and General Aviation and
Ø on the private, sports, leisure segment.

We would like to highlight, what the 34 Presidents of the AEA Airlines told the VP of the EU Commission, Mr. Siim Kallas at their common meeting May 24th:
" Europe's leader must come to an end with economically illiterate regulation,
that the 34 AEA airlines are sick and tired of misguided regulation, which is hampering the ability to deliver growth and jobs. "
What is true for the mighty airlines is much more true for Business Aviation and General Aviation and their respective Small and Medium Enterprise (SME)

Maintenance Repair Organisations (MRO).
Our specific concerns are:
(1) CAT is integrated several times in NPA 2012-02 text.
The effect on the aviation community will depend very much from what CAT will encompass.
If CAT means (like under the FAA and ICAO interpretation) Airlines and Charter Airlines, then we have no objection.
If however the intention as stipulated in NPA/CRD 2010-10 "Alignment of Regulation (EC) No 2042/2003 with Regulation (EC) No 216/200…" differs from what the general public in Europe and the FAA understand under Public Air Transport, we have strong objections, because then this NPA respective the decision following this and other NPA's would embrace and affect a far greater part of the aviation community in a commercially negative way.
(2) weight of the commercial factor
We support the principle, that safety is the most important factor in the NPA's/regulations. However, the European Industry needs regulations which promote the European Industry and therefore economic considerations should be risen to a higher multiplicator than one.
(3) a perfect alignment with the respective FAA AC's would ease application of the regulation for European manufacturers in competing with global competitors. A 100 % alignment should be a goal.
Franz Meier
Director of SAMA
A Member of ECOGAS
120617

response

Partially accepted

1. Commercial Air Transport is defined by Article 2.1 of Commission Regulation (EU) No 965/2012 as an aircraft operation to transport passengers, cargo or mail for remuneration or other valuable consideration; it includes transport from 'A to A' (e.g. sightseeing flights), as well as any remunerated transport from 'A to B', whether scheduled, non-scheduled or air taxi. It excludes corporate aviation, as well as remunerated aerial work or remunerated instruction in flight. AMC 20-25, in addition to manufacturers, addresses all operators subject to Annex IV of the above-mentioned regulation.
2. Indeed, the Agency is tasked by the legislator (Article 2.2(c) of the Basic Regulation) to also promote cost-efficiency in the regulatory and certification processes.
3. Both FAA and the Agency constantly strive for the greatest possible harmonisation of respective rules. In this case, the FAA has participated to the Review Group on the matter and reported that they intend to publish a future edition C of their AC 120-76, based on the same principles of the resulting text of AMC 20-25.

comment

826 comment by: *Eurocopter*

EFB obviously present an attractive alternative to paper in cockpit and even allow interactive applications that paper does not.
Nevertheless, as compared to avionics equipment, COTS electronic equipment generally lack all or part of the following:
- Specification and validation by the aircraft manufacturer, taking into account all necessary context (aircraft characteristics and embedded systems), including validation of man machine interface by test flight crew,
- Hazard analysis and system safety assessment, according to aeronautical state

of the art and standards,
- System, hardware and software development according to aeronautical state of the art and standards, ensuring a level of design verification commensurate to the criticality of system malfunctions,
- Adequate integration in the aircraft environment, including electromagnetic emission and susceptibility,
- Full configuration control of installed hardware and software.

Recent rulemaking does not seem to fully consider these gaps and it appears that EFB are introduced at operational level without actual consideration of possible safety impacts (see for example the proposals in the AMC/GM to the future EASA Part CAT operational regulation to compute mass and balance data using an EFB (see GM1-CAT.POL.MAB.105(c)).

A significant part of these gaps could be filled even in the case of COTS EFB platforms and applications:
- Functional hazard analyses can be performed in order to establish the feasibility of ensuring given functions using an EFB and possible associated limitations and mitigations,
- EFB applications can be validated, even when specified and developed by EFB vendors,
- EFB applications can be verified against their specification by functional and robustness tests, giving if needed an equivalence to ED-12C/DO-178C DAL D, with a precise identification of the platform configuration(s) under which these tests have been performed,
- Even if such level of verification is not possible for EFB platforms (hardware and operating system), they can be evaluated in order to select those which appear as the most appropriate,
- Also, tests can be performed to evaluate the electromagnetic emission and susceptibility of EFB platforms, as well as other hardware characteristics (behaviour of Lithium batteries, robustness to depressurisation, …).

However, such considerations and precautions are out of the scope of most aircraft operators, as well as all certification material referenced in § 3 of this NPA.

Consequently, we suggest limiting the operational use of EFB to those which have been assessed as having no safety impact (type A applications) or for which the loss, malfunction or misuse may not lead to more than a minor safety impact (type B applications).

As the safety impact assessment and associated referenced material (25.1309, ...) are out of the scope of operators, we suggest that application type classification be based on fixed lists of functions, with possible indication of usage limitations and mitigations for type B applications.

Also, in the case of type B applications, more precise V&V criteria should be given.

response

Accepted

Only Type A or B applications are allowed in the resulting text of AMC 20-25 to run on portable EFB (in addition to non-EFB software not related to aircraft operations).

comment

827 comment by: *Eurocopter*

We encourage in the future a shared approach between FAA and EASA, in order to define harmonised policy (which was an objective initially assigned to this task, according to the RIA).

Nevertheless, having observed inconsistencies in the newly published AC 120-

	76B, we would not recommend a simple alignment on that document.
response	Partially accepted Both FAA and the Agency constantly strive for the greatest possible harmonisation of respective rules. In this case, the FAA has participated to the Review Group on the matter and reported that they intend to publish a future edition C of their AC 120-76, based on the same principles of the resulting text of AMC 20-25.

comment	*902* comment by: *AEA* Attachment #2
response	Partially accepted Comment 474 is very similar to 171 above. Please see response to comment No 171 from Airbus. All the other detailed comments raised by AEA have been taken into consideration by the Review Group and largely incorporated into the resulting text of AMC 20-25.

comment	*913* comment by: *CMC Electronics* **General Comments:** From a definition stand-point, this new document clearly outlines the functional capability of a 'controlled PEDs'. While CMC's EFB system as several other Class 2 and Class 3 EFB systems fully supports associated tracking, change control to hardware and system software, this definition places extensive requirements on application developers in supporting Operator's responsibility to maintain and be able to report on any software and database related changes in the life cycle of the EFB system. The draft AMC 20-25 now largely aligns to FAA AC120-76B vis a vis the AMM (Airport Moving Map) partial TSO based approval process which is welcomed. CMC notes that for Class 1 and Class 2 EFB, the non-installed components (display-processor) are considered controlled PEDs. Underlying to this control aspects are the responsibilities and procedures needed to ensure configuration control and security of these elements of the EFB system. Class 2 & Class3 systems will be naturally easier to manage thru this process where Class 1 devices including PDAs will place significant burden on the Operator in developing ad-hoc methods to achieve these objectives. From a hardware system (section 5.), CMC's EFB Systems can be installed as Class 2 system and are fully compliant with the associated draft requirements. In particular, CMC s architecture enables EFB data connectivity as specified in section 6.1.2.4.
response	Noted Indeed, the possibility of using portable EFB, not subject to airworthiness approval, inevitably puts some responsibility on the operators wishing to use such a possibility.

CONCLUSION ON GENERAL COMMENTS

17 general comments have been received. The majority from aircraft manufacturers and operators.

Two competent authorities supported the proposed rules with no comments.

Other stakeholders emphasised the importance of:

— clearly separating the responsibilities of the aircraft manufacturers from those of operators;

— minimising the impact on other than Commercial Air Transport (CAT) aircraft operators;

— reducing implementation and operating costs of EFB;

— possibility to approve the use of Type A and B software applications, even if the portable EFB platform on which they can run is non-certified COTS hardware; and

— realising that, whenever an object is not covered by the aircraft design approved through the airworthiness certification process, this inevitably transfers some burden to demonstrate safety to aircraft operators and/or suppliers of EFB.

The Agency welcomes the general support expressed and clarifies that:

— of course, safety remains the prime objective of the Agency and of all commercial aviation stakeholders, which means that the impact of any possible hazard has to be assessed, and where necessary mitigated, either during the design and production phases or during operations;

— the resulting text of AMC 20-25 contains airworthiness criteria for any aircraft, but for the operational aspects it applies only to Commercial Air Transport (CAT) operators, as clearly stated in par. 2 therein;

— CAT is exclusively aircraft operation to transport passengers, cargo, or mail for remuneration or other valuable consideration (please refer to Article. 2.1 of the EU Regulation on Aircraft Operations);

— therefore, the proposed operational rules do not apply to aerial work (commercial or not) or to any sort of non-commercial activity (recreational or business);

— the resulting text of AMC 20-25 tries to contribute to cost-efficiency in the regulatory processes (please refer to Article 2.2.(c) of the Basic Regulation), and, in particular, to streamline introduction of Type A applications, taking advantage of the operators' safety management (please refer to the rule ORO.GEN.200 in the above-mentioned forthcoming EU Regulation on AIR-OPS) and associated 'notification' processes (please refer to ORO.GEN.130c); and

— article 3.d of the Basic Regulation allows the Agency to authorise only software applications, and this is the basis for the proposed ETSO-2C165a, whose application, like any other ETSO, is voluntary and not mandatory.

The received general comments, however, also raised some criticism in particular for:

— the 'rupture' in respect of JAA TGL 36 and FAA AC 120-76A;

— the reinforcement of airworthiness requirements for Class 2 EFB hardware platforms;

— the lack of harmonisation with recently published (June 2012) FAA AC 120-76B; and

— the possible impact on existing certified EFB implementations (at level of Type Certificate) and on already issued operational approvals.

The Agency observes that:

— the FAA AC 120-76A was published in March 2003 and JAA TGL 36 in June 2004;

— it is not surprising that, in a field where technological progress is very rapid, rules may

require modernisation after a few years;

— indeed, the entire concept of Class 2 EFB platforms is disputable and this CRD proposes to eliminate it and have only 'portable' and 'installed' EFB; and

— the rules on EFB are in evolution at world-wide level, and AMC 20-25 is only a step along this path; in fact:

- the Agency and FAA are both supporting the work of the ICAO for introducing EFB standards in Annex 6, supported by an EFB 'Manual' applicable world-wide, whose text should, of course, be aligned to the state of the art at the moment of publication;
- FAA has announced the intention of issuing version 'C' of their AC 120-76, which will take AMC 20-25 into account; and
- FAA and the Agency remain both committed to the greatest possible future harmonisation.

Finally, the principle of 'grandfathering' for existing TC/STC and for existing operational approvals, is fully shared. However, in the EU regulatory framework, approval processes (and related transition clauses) are adopted at the level of binding implementing rules. AMC 20-25, like any other AMC, is 'not-retroactive' but, since it does not mandate any formal approval process, there is no need for explicit transition measures.

The resulting text of AMC 20-25 is presented in Appendix A.

EXECUTIVE SUMMARY p. 2

comment	*31* comment by: *NetJets Europe* How does this apply to operators that will both do CAT and NCC flights?
response	Noted The airworthiness requirements in resulting text of AMC 20-25 apply to the aircraft and not to the operation. The operational requirements apply only to CAT. Nothing, however, prevents to use an EFB approved for CAT even during non-CAT flights. Conversely, for EFB exclusively used in non-commercial operations, AMC 20-25 is not applicable. Whether to have two sets of EFBs (one suitable for CAT and the second to be used only in non-commercial flights) or a single one (suitable for CAT but also used only in non-commercial flights) is a business decision.

comment	*32* comment by: *NetJets Europe* *"Improved definitions of EFB classes and types to make them more precise and objective, i.e. better delimiting the boundary between what has to be considered as part of the onboard avionics and the 'non-avionics' part of the flight crew compartment;"...* What does this mean precisely? It is not clear if the procedures to receive **operational** approval for an aircraft that comes from the factory with EFB Class 3 systems installed are the same as for one that has a Class 3 system retro-fitted at a later stage. Are the requirements the same for forward-fitting as for retro-fitting?
response	Noted

Article 11 of the Basic Regulation establishes that Member States shall, without further technical requirements or evaluation, recognise airworthiness certificates issued in accordance with the EU common rules, whether this is part of the original Type certificate (TC), of a change introduced by the manufacturer in a later production batch (i.e. forward fit), or covered by a supplemental TC in the case of retrofit.
Competent authorities at national level shall, therefore, 'credit' any approval, verification, ETSO authorisation or certification issued on the basis of the common rules, without requesting any additional evidence to be submitted by the operator.

comment

33 comment by: *NetJets Europe*

"Continuous progress of Information Technology on the commercial market outside aviation, leading to increasing use and requests for EFB applications, requires rulemaking initiative from the Agency in the earliest possible time;"…
Consumer Off the Shelf (COTS) products nowadays have remarkable build standards often comparable even to Aviation Standards. However, their core markets are not aviation. As such, often they do not/cannot provide most of the paperwork required as per this AMC, e.g. EMI testing as per DO 160. The industry in general could greatly benefit from an EASA list of pre-evaluated Tablet/Computer brands and models

response

Not accepted
The Agency has some sympathy for this comment, but it regrets to say that the legislator gave to it no direct approval tasks in the domain of aircraft operations.

comment

559 comment by: *Monarch Airlines*

We disagree with the proposal that data connectivity between a Class II EFB and avionics can only be 'one way'. This proposal seems to fall out of the new definition of a Class II EFB, which we also disagree with. There is no reason why a Class II EFB cannot connect to a datalink. Datalinks are not configured to store pass data from the source LRU to other aircraft LRUs; they are designed to transfer data from an on-board system to an external receiver. Data from a Class II EFB should be allowed to be fed to another certified on-board LRU via a datalink as long as it is suitably firewalled. For example, every time the pilot transmits on the radio, he is connecting to a 'datalink', but his voice data does not 'contaminate' other on-board systems.

It is vital that Class II EFBs are allowed to connect to certified datalinks, as they are currently being used by some airlines to pass AAC information via ATSU/ACARS/radio datalinks. This is an important element of the Class II functions (and the concomitant business case) that should not be unnecessarily prohibited unless there is a safety implication.

response

Accepted

In the resulting text of AMC 20-25, bi-directional connectivity even for portable EFB, subject to certain conditions, is allowed.

comment

689 comment by: *Thomson Airways*

"One way connectivity between a Class 2 EFB and avionics" would defeat one of the key purposes of EFB systems.

	A Class 2 EFB system must be authorised to connect to certified communications systems (e.g.ACARS / SatCom), in order to transmit AAC information, as it is currently done by Airlines.
response	Accepted In the resulting text of AMC 20-25, bi-directional connectivity even for portable EFB, subject to certain conditions, is allowed.

comment	*758* comment by: *Mario Sabourin SITA* Original text states: *The proposed data connectivity between EFBs and avionics is:* *o not allowed for class I EFBs;* *o allowed from the avionics to the EFBs for class II (i.e. 'one way');* *o allowed in both directions for class III;* A Class 2 EFB system should be able to transmit bi-directionaly over various ACARS or IP-based subnetworks non-flight critical information, such as AAC or AOC type information to aircraft systems such as the ATSU/CMU or printer through a certified aircraft interface device. There are approved Class 2 systems that have this functionality today. See comment # 757
response	Accepted In the resulting text of AMC 20-25, bi-directional connectivity even for portable EFB, subject to certain conditions, is allowed.

comment	*765* comment by: *Ingo Pucks, Owner IP Aerospace* IP Aerospace welcomes the initiative of EASA speed up the regulatory process on EFB matters. As the variety, complexity, interactivity and life time of the various EFB hardware, software and system-components increases very fast over time, IP Aerospace suggest to establish a working group at EASA that can maintain an oversight. IP Aerospace is ready to support the matter at any time.
response	Partially accepted Indeed, the Agency established a Review Group at expert level to consider all the comments received on NPA 2012-02. However, the Agency policy is to establish rulemaking groups only in relation to active tasks. Permanent groups are discouraged since all authorities and relevant stakeholders can voice their need at the level of the Regulatory Advisory Group (RAG) and Safety Standard Consultative Committee (SSCC).

comment	*893* comment by: *Ingo Pucks, Owner IP Aerospace* The NPA in general still lacks clarity in terms of recognizing the various components of an EFB system and their providers, sources or manufacturers. Clearly HW on-board and in the cockpit of an airlines interacting with avionics shall be regulated in a similar manner as any other avionics parts and systems. SW which would fulfil DAL A and B safety considerations might be developed and provided in a manner similar to what DO-178 outlines. Aeronautical data as such, and presented on an EFB shall fulfil those considerations stemming from Do-200.

	An EFB program at an CAT operator not only consist of the before mentioned modules, but also a variety of providers, integrators and manufacturers. It is too much of a burden loading all operational approval on the shoulders of the operator. This also requires to more comprehensibly define the various roles and responsibilities of the before mentioned organisations. Similarities to avionics systems and their regulatory approaches is proposed to resolve these matters.
response	Partially accepted In the resulting text of AMC 20-25, manufacturers' and operators' responsibilities are better clarified. The provision of data for navigation, according to the Basic Regulation, is responsibility of certified data Providers (DAT) in turn part of the larger family of Air Navigation Service Providers (ANSPs comprising ATS providers, providers of COM or radio-navigation signals and others, as defined in Article 3 of Basic Regulation). More specific rules for DAT may be proposed by the Agency in the future (RMT.0593 and RMT.0594), further, thus, alleviating the burden on aircraft operators.

CONCLUSION ON COMMENTS ON THE EXECUTIVE SUMMARY

A number of comments have been received on the Executive Summary.

One stressed the need not to overload the aircraft operators with too much responsibilities, which somehow has to be balanced with time/cost for airworthiness certification under responsibility of manufacturers.

Other noticeable comments proposed to:

— establish a list of pre-evaluated tablet/computer brands and models; and

— to allow bi-directional connectivity to/from portable EFB platforms, for Aeronautical Operational Control (AOC) and Airline Administrative Communications (AAC) neither of which is connected to aircraft flight functions.

The Agency has sympathy for the idea of establishing a list of approved portable EFB platforms and software applications. This idea, however, goes beyond the legal mandate in the Basic Regulation. Its feasibility might be assessed in the future in coordination with competent authorities and industry.

The proposal to allow bi-directional connectivity, in limited and specified cases and based on clear rules, is in principle accepted by the Agency.

The resulting text of AMC 20-25 is presented in Appendix A.

TABLE OF CONTENTS p. 3-4

comment	*766* comment by: *Ingo Pucks, Owner IP Aerospace* In general, it would be helpful to include a list of abbreviations used throughout the document here.
response	Noted The Explanatory Note to the NPA will not be re-published. However, a glossary of the used terms and acronyms is contained in paragraph 4 of the resulting text of AMC 20-25.

CONCLUSION ON COMMENTS ON THE TABLE OF CONTENT

One stakeholder proposed to add a list of abbreviations/glossary to the Explanatory Note of the NPA.

The comment is partially accepted. As such a list is contained in paragraph 4 of the resulting text of AMC 20-25, it is not felt necessary to duplicate it into the Explanatory Note.

The comments on the Table of Contents do not produce any change in the resulting text of the proposed rules.

A. Explanatory Note - I. General p. 5

comment

34 comment by: *NetJets Europe*

"…new AMC 20-25 providing acceptable means of compliance for the airworthiness and operational approvals of Electronic Flight Bags (EFB);"
Are the requirements for operational approval for Class 3 installations the same for forward-fit as retro-fit equipment?

response

Noted

Any modification to the aircraft design approved through the original TC process needs to be approved, where necessary through a change to the TC (which is usually the case for forward fit, when the configuration changes from one production batch to the next, under the responsibility of the TC holder) or through a supplemental TC issued under application by a different approved design organisation (DOA), which is usually the case for retrofit.

Any operational approval does not include any airworthiness approval. On the contrary, possible airworthiness approvals have to be considered when evaluating EFB applications in order to avoid unnecessary duplications of assessments.

comment

151 comment by: *Swedish Transport Agency, Civil Aviation Department (Transportstyrelsen, Luftfartsavdelningen)*

The general impression is that the Swedish Transport Agency, Civil Aviation Department hereinafter referred to as the NAA Sweden agrees to the NPA 2012-02 that is to propose:

- § amendment of Decision 2003/12/RM to introduce a new AMC 20-25 on the airworthiness and operational approval criteria of Electronic Flight Bags (EFB) used by Commercial Air Transport (CAT) operators by aeroplanes or by helicopters;
- § amendment of Decision 2003/10/RM regarding an associated new version of ETSO-2C165a on Airport Moving Map Display (AMMD); and
- § a draft Opinion in order to amend the forthcoming Regulation on Air operations for Commercial Air Transport (CAT) operators in relation to EFBs.

response

Noted

The support from the Swedish competent authority is noted.

CONCLUSION ON COMMENTS ON PAGE 5 (GENERAL) OF THE EXPLANATORY NOTE

One more competent authority supported the rules proposed by NPA 2012-02.

One stakeholder asked clarification on the applicability of the proposed rules to 'forward-fit' and to 'retro-fit'. The clarification was provided in the individual reply above.

The comments on page 5 (General) of the Explanatory Note do not produce any change in the resulting text of the proposed rules.

CONCLUSION ON COMMENTS ON PAGES 6-7 (GENERAL CONSIDERATIONS) OF THE EXPLANATORY NOTE

Two stakeholders noted a typing error in a date. The comments on pages 6-7 (General Considerations) of the Explanatory Note do not produce any change in the resulting text of the proposed rules.

A. Explanatory Note - IV. Content of the draft Opinion/Decision - General Considerations p. 6-7

comment	*76* comment by: *Grégory DELBEKE* **Item 10:** The opinion 04/2011 is dated 1 June 2011 instead of 1 June 2012.
response	Noted Apologies for the typing error.

comment	*811* comment by: *Fédération Nationale de l'Aviation Marchande (FNAM)* Paragraph number 10, as a minor comment, the Opinion 04/2011 has been published 1st June 2011, and not 2012.
response	Noted Apologies for the typing error.

A. Explanatory Note - IV. Content of the draft Opinion/Decision - JAA TGL 36 versus the proposed AMC (Reasons for changing) p. 8-11

comment	*1* comment by: *Air France* Through point nb 37, EASA asks for our point of view about the operational approval of EFB as decribed by chapter 7. We recognize the effort to make the approval process easier. For instance the transition from a paper solution to an electronic solution, by a case by case analysis is a welcomed guidance. Nevertheless the subtype of application of the category B requiring an EASA evaluation seems to complexify the process. Today, all performance applications (performance papers, dispatch, or performance via a centralized system accessed by ACARS) are monitored by the national authority. The operator can settle mitigation means to a risk identified by the the use of EFB. The national authority is competent to deal with application of performance and mass and balance. The competency of the national authority should be oversighted by EASA. We suggest to keep the current process: OEB analyses manufacturer tools and gives recommendations; the operator uses them to apply for an operational approval from the national authority who is competent to monitor that kind of operations.
response	Accepted Evaluations by the Agency are not included in the resulting text of AMC 20-25.

In fact, this service remains available to organisations requesting it on a voluntary basis but it cannot be mentioned in regulatory material since the responsibility for any decisions on the subject has been assigned by the legislator to the competent authorities at national level.

comment

133 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 2 shared with Airbus

JUSTIFICATION for the Comment on page # 10 A.IV.35 a)

In the frame of the certification, AFM already gives limitations linked to the aircraft type. Since the EFB software applications are controlled by Operators, how can operational limitations in the frame of the OSD be produced, valid for all operators, for all possible EFB software applications, for any kind of operations, valid for the entire aircraft life cycle (despite the fast EFB evolution), ... ?

PROPOSED TEXT / COMMENT
item 35 should be removed

response

Accepted

Evaluations by the Agency are not included in the resulting text of AMC 20-25.

In fact, this service remains available to organisations requesting it on a voluntary basis but it cannot be mentioned in regulatory material since the responsibility for any decisions on the subject has been assigned by the legislator to the competent authorities at national level.

comment

172 comment by: *AIRBUS*

"In summary, based on the new legislation on OSD recalled above, the operational evaluation made by the Agency will no longer produce a 'recommendation' to the operator's competent authority, but limitations linked to the aircraft type, that the operator should respect and that the competent authority shall consider prior to granting the operational approval to the operator."

The term "Limitations" is not appropriate when dealing with OSD. The EFB "Limitations" as identified in the frame of the airworthiness certification, are referenced in the AFM and not the OSD. We suggest to replace the term "limitations" by the appropriate term "Operational Suitability Data" to refer to the Flight crew procedures, Training requirements, Dispatch considerations,… linked to an EFB platform and evaluated during the OEB. Some of this OSD may fall into the Box 3 or 4 whether it is considered as mandatory or recommendation to the operators.

Suggested text:
In summary, based on the new legislation on OSD recalled above, the operational evaluation made by the Agency will no longer only produce "recommendation" to the operator's competent authority. Some EFB operational suitability data linked to the aircraft type may be identified as requirement that the operator should respect and that the competent authority

	shall consider prior to granting the operational approval to the operator.
response	Partially accepted Evaluations by the Agency are not included in the resulting text of AMC 20-25. In fact, this service remains available to organisations requesting it on a voluntary basis but it cannot be mentioned in regulatory material since the responsibility for any decisions on the subject has been assigned by the legislator to the competent authorities at national level.

comment	*438* comment by: *Oliver Ast (CLH)* item 35 should be removed In the frame of the certification, AFM already gives limitations linked to the aircraft type. Since the EFB software applications are controlled by Operators, how can operational limitations in the frame of the OSD be produced, valid for all operators, for all possible EFB software applications, for any kind of operations, valid for the entire aircraft life cycle (despite the fast EFB evolution), ... ?
response	Accepted Evaluations by the Agency are not included in the resulting text of AMC 20-25. In fact, this service remains available to organisations requesting it on a voluntary basis but it cannot be mentioned in regulatory material since the responsibility for any decisions on the subject has been assigned by the legislator to the competent authorities at national level. However, the Explanatory Note to the NPA, including its paragraph 35, will not be reissued.

comment	*444* comment by: *Lufthansa Technik Design Organisation* Ref. to para. 35: Consideration of oparational suitability is very valid. However, limitations should be only one of several means. In the light of its applicability to all kinds of oprators, for the entire aircraft life, recommendations may be more suitable in many cases.
response	Accepted Evaluations by the Agency are not included in the resulting text of AMC 20-25. In fact, this service remains available to organisations requesting it on a voluntary basis but it cannot be mentioned in regulatory material since the responsibility for any decisions on the subject has been assigned by the legislator to the competent authorities at national level.

comment	*503* comment by: *Star Alliance* Attachment #3
response	Accepted

Please see response to comment No 444 above.

comment 562 comment by: *Monarch Airlines*

Para 23. Whilst we agree that the TGL36 definitions Class I, II, III EFBs requires refining, we think the proposed new definitions are too simplistic and broad, and that there are severe implications as a result. We think that more intellectual rigour needs to be applied to the new definitions. Indeed, as they stand, the proposed definitions are actually 'descriptions' rather than 'definitions'.

response

Accepted

Definitions of hardware Class 1, 2 and 3 have been removed from the resulting text of AMC 20-25, which now comprises only 'portable' and 'installed' EFB platforms.

comment 636 comment by: *Deutsche Lufthansa AG*

Proposal:
delete item 35 of the explanatory note

Comment/Justification:
In the frame of the certification, AFM already gives limitations linked to the aircraft type. Since the EFB software applications are controlled by Operators, how can operational limitations in the frame of the OSD be produced, valid for all operators, for all possible EFB software applications, for any kind of operations, valid for the entire aircraft life cycle (despite the fast EFB evolution), ... ?

response

Accepted

Please see response to comment No 444 above.

CONCLUSION ON COMMENTS ON PAGES 8-11 (REASONS FOR CHANGING) OF THE EXPLANATORY NOTE

8 comments were received on this segment of the NPA.

Most of them asked the Agency to avoid using the term 'limitation' in the frame of Operational Suitability Data (OSD) in the context of evaluations carried out by the Agency. All these comments have been accepted, since this evaluation service remains available to organisations requesting it on a voluntary basis but it cannot be mentioned in regulatory material since the responsibility for any decisions on the subject has been assigned by the legislator to the competent authorities at national level.

One individual comment asked for simplification and clarity of definitions of EFB hardware (HW) classes for host platforms. As stated in replying to comments on other segments, this issue has been solved by referring into the resulting text of AMC 20-25 only to two possibilities for EFB HW: i.e. 'portable' and 'installed' as suggested by the FAA.

Finally, one individual comment proposes to not involve the Agency in the evaluation of Type B software (SW) since this activity is already performed by the competent authorities at national level. Even this comment has been accepted, since evaluations by Agency are no longer mentioned in the resulting text of AMC 20-25, which is reproduced in Appendix A.

A. Explanatory Note - IV. Content of the draft Opinion/Decision - Alignment with evolving EASA rules p. 11-12

comment	*40* comment by: *Air France* It seems that EFB approval is considered as "an operational approval" type, therefore without any mention on OPS SPECS. It would be welcomed to mention the use of EFB in OPS SPECS and so classify it as a "specific approval" to allow inspectors to check the operator rights to use EFB.
response	Not accepted The number of possible EFB applications is quite large and including a lot of lines in the OPS SPECS is not considered appropriate, taking also into consideration the large number of specific approvals introduced by Annex V (i.e. part-SPA) to Commission Regulation (EU) No 965/2012 on AIR-OPS.

CONCLUSION ON COMMENTS ON PAGES 11-12 (ALIGNMENT WITH EVOLVING EASA RULES) OF THE EXPLANATORY NOTE

One stakeholder proposed to include EFB in the list of 'specific approvals' (ref. Annex V to AIR-OPS; Part SPA) and, hence, in the OPS SPECS.

The 'specific approval' is the heaviest possible administrative process, and several stakeholders (e.g. in the context of Performance-Based Navigation) have criticised that the list of SPA is already becoming longer and longer along the years.

A decade of operational experience with EFB, without SPA, did not produce any evidence that a SPA process is necessary to ensure safety. There are, therefore, no reasons to accept this isolated comment, which, therefore, does not produce any change in the resulting text of the proposed rules.

A. Explanatory Note - IV. Content of the draft Opinion/Decision - Harmonisation with Federal Aviation Administration regulations and advisory circulars p. 12-13

comment	*722* comment by: *NetJets Europe* We strongly support on-going harmonization efforts with the US Federal Aviation Administration, and encourage policy consistent with the recently released AC 120-76B, resulting in increased efficiency and adoption with OEMs, foreign and domestic operators, other aviation authorities and ICAO. Additionally, we believe that current FAA initiatives pertaining to the authorization of the depiction of airport surface own-ship depiction as a Type B application on capable portable COTs devices have substantial potential to increase safety margins, be widely deployable and rapidly effective. We request that advancements in FAA policy in this area be considered for inclusion into this document as well. (Source: Executive Jet Management, a NetJets company)
response	Partially accepted — Airport Moving Map Display (AMMD) is considered a Type B application in the resulting text of AMC 20-25; — FAA has been involved in the Review Group on NPA 2012-12; but — further harmonisation will be achieved when the FAA will publish its planned edition C of AC 120-76 which will also consider the published AMC 20-25.

comment	*767* comment by: *Ingo Pucks, Owner IP Aerospace* EFB Class 3 and 2 would, at least to a large degree, resemble in their specific reason of being other avionics components on board of aeroplanes, hence it is proposed to adopt the rulemaking for those EFB classes from what is currently available for avionics equipment, such as EASA Part 21 and 145, for the hardware and kernel software of such EFB classes.
response	Partially accepted In the resulting text of AMC 20-25, there is no longer a distinction of three hardware classes, but only between 'portable' and 'installed' EFB. Furthermore, the respective responsibilities of manufacturers (for whatever is part of the approved aircraft design) and of operators (any additional object introduced and used in the cockpit, beyond what has been approved during the airworthiness process) have been clarified.

comment	*901* comment by: *Franz Redak* In general we miss the harmonisation with the newly issued AC 120-76B and believe that this is a major burden and disadvantage for the european industry (both equipment manufacturer, Design Holder and Operator). The deviations from AC 120-176B to the proposed AMC are significant. Supporting data and analysis should be provided before accepting essentialy different wording.
response	Not accepted — FAA has been involved in the Review Group on NPA 2012-12; but — further harmonisation will be achieved when the FAA will publish its planned edition C of AC 120-76, which will also consider the published AMC 20-25.

comment	*911* comment by: *SAT-WAY sa* Power back-up sources. (Appendix 3 page 68 and new FAA AC120-76B) Back-up power source for 30 minutes EFB was generally required. A set of fully charged spare batteries is suggested in the newly FAA published AC120-76B document. Lithium batteries charged for a long time in climatic changing environment cannot be guarantied at full stable capacity. High temperature exposure in cockpits on parked aircraft on the ramp in very hot countries will affect capacity. The new FAA AC120-76B point (11.6 page 11) states a procedures. At least one EFB connected to the aircraft power supply is more reliable. Should that power supply fail, two cockpit EFB's can both offer minimum 30 minutes. The power supply 28 VDC or 110 AC 60-100 Hz should feed only certified and TSO'd equipment, to guaranty a stable and battery explosion risk free energy supply. DO311 standards are a good guideline for airworthiness standards.
response	Accepted The resulting text of AMC 20-25 has been revised to be more precise on power

sources. Please see, in particular, paragraphs 6.2.1.2 and 6.2.1.3 which refer, inter alia, to RTCA/DO-311.

comment *912* comment by: *SAT-WAY sa*

Comment on FAA AC 120-76B

This document published on June 1st, 2012 draws a clear line between Class 1 and class 2 EFB units.

Many descriptions and requirements are well described and a good source of inspiration.

response Partially accepted

In the resulting text of AMC 20-25, only 'portable' or 'installed' EFB are mentioned now. The FAA experts participating to the Review Group stated that the same taxonomy would be adopted in planned edition 'C' of AC 120-76.

CONCLUSION ON COMMENTS ON PAGES 12-13 (HARMONISATION WITH FAA) OF THE EXPLANATORY NOTE

The few received comments stressed the need to harmonise with ICAO and FAA, and, in particular, with AC 120-76B (e.g. for the power supply and the procedures for the batteries) and for the use of Airport Moving Map Display (AMMD) on portable EFB platforms.

One comment also proposed airworthiness certification for portable COTS Class 2 EFB HW host platforms.

The Agency confirms that:

— any possible effort will be devoted to harmonise with ICAO and FAA and, in particular, with planned AC 120-76 edition C, whose development has been announced by the FAA;

— no competent authority in the world considers it beneficial or even feasible, to issue airworthiness certifications to portable (i.e. not installed) COTS EFB HW host platforms;

— indeed, the proposed rules allow implementing AMMD on portable EFB platforms, as Type B applications.

The resulting text of AMC 20-25 is reproduced in Appendix A.

A. Explanatory Note - IV. Content of the draft Opinion/Decision - Possible evolution of EASA rules on EFB p. 13-14

comment *24* comment by: *FAA*

Page 14, #58

Comment:
FAA- Type B applications (e.g weight and balance) will require approval for use by Principal Inspector. Type B performance applications must adhere to this published data and must be validated for accurate determination of aircraft performance for the entire operating envelope. Type B W&B and/or performance applications must meet the approval criteria listed in FAA Order 8900.1 Volume 4, Chapter 3, Section 3, Approval of Performance Data Sections of CFM's.

Reason for Comment:

	Clarification
response	Noted It is acknowledged that FAA requires approval of any mass and balance application, even if running on a 'portable' EFB.

comment	*41* comment by: *Air France* Comments about note 2 of point 58: It is said that mass and balance applications require to be approved by CAT.POL.MAB.105. It seems that there is here an excessive interpretation of OPS1.625 during the transposition into IR OPS. Here are the pertinent extracts: Appendix 1 to OPS 1.625 Mass and Balance Documentation (c) Onboard mass and balance systems. An operator must obtain the approval of the Authority if he wishes to use an onboard mass and balance computer system as a primary source for despatch. CAT.POL.MAB.105 Mass and balance data and documentation: "(e) The operator shall obtain approval by the competent authority if he/she wishes to use an onboard integrated mass and balance computer system or a stand -alone computerised mass and balance system as a primary source for dispatch. The operator shall demonstrate the accuracy and reliability of that system." Indeed Onboard mass and balance systems concern only avionic systems and exclude the EFB. The note and the opinion 04/2011 should be changed.
response	Accepted The extracts from regulatory material quoted in the comment are correct. The interpretation that portable EFB is not covered by CAT.POL.MAB.105 is shared by the Agency. In the resulting text of AMC 20-25, however, operational requirements, which, to ensure safety, are also applicable to portable EFBs, are suggested. Nevertheless, the said AMC does neither mandate nor recommend any formal operational approval, since, in the Agency's regulatory framework, formal processes can only be established by legally binding implementing rules and not at the level of AMC.

comment	*152* comment by: *Swedish Transport Agency, Civil Aviation Department (Transportstyrelsen, Luftfartsavdelningen)* · **Possible evolution on EASA rules on EFB** o The proposed table suggests EFB systems 1B, 2A and 2B not to require approval from NAA. (If table is misunderstood, please regard this text only to support clarification) o NAA Sweden opinion: EFB Systems (Except 1A) requires operational and, if applicable, airworthiness approval

from NAA.

- Reason and motivation: To assure adequate level of safety and to assure information contained to be level with previous system or documentation. EFB Systems should also be stated by Type and Class on AOC/OPS Specification to assure compliance vs. e.g. SAFA inspections.

response

Not accepted

In the resulting text of AMC 20-25, operational requirements are suggested. However, the said AMC neither mandates nor recommends any formal operational approval, since, in the Agency's regulatory framework, formal processes can only be established by legally binding implementing rules and not at the level of AMC.

If there is no operational approval, there cannot be any entry in the OPS SPECS. This possibility appears to be totally disproportionate to the Agency.

comment

698 comment by: *AT-CAA-PAM*

Skip for EFB Class1 (2) "Except for Mass & balance applications and performance calculation"

Mass and Balance:
As long as pilots are allowed to use simple mathematics to do a mass & balance manually or with the assistance of a calculator, no approval from EASA should be required. The electronic sw installed on an EFB should be under the responsibility of the EFB Administrator.

Performance calc
As long as pilots are allowed to use simple tables out of the AFM for performance checks and interpolate in between these tables inclusive the use of a calculator, no approval from EASA should be required. It should be the EFB Administrator's responsibility.

response

Accepted

Evaluations by the Agency have been removed from the resulting text of AMC 20-25.

comment

768 comment by: *Ingo Pucks, Owner IP Aerospace*

58. Table, it would be helpful to compile an overview document outlining all regulatory aspects of EFB HW and SW classes and types touching all aspects of safety, risk, operations, manufacturing, maintenance that come with employing EFB on board CAT aeroplanes.

response

Not accepted

The Agency believes that the resulting text of AMC 20-25 contains sufficient explanations.

Any future possible amendment will, of course, undergo the normal consultation process through a specific NPA.

CONCLUSION ON COMMENTS ON PAGES 13-14 (POSSIBLE EVOLUTION OF EASA RULES ON EFB) OF THE EXPLANATORY NOTE

In this segment, the Agency presented a possible evolution of the EFB requirements and requested stakeholders to express their point of view on these preliminary views. In summary, the long-term view was to:

— restructure the architecture on the rules on EFB, by mainly publishing the operational provisions as AMCs to AIR-OPS, leaving, thus, into a future edition of AMC 20-25 only the airworthiness ones; and

— build upon the recent introduction of safety management by operators and the competencies of the Agency now extended to the total system, to reduce, in some cases, the administrative burden (i.e. 'notification' process instead of 'approval' process).

5 comments were received on this segment of the NPA; in particular:

— FAA confirmed that, as proposed by the Agency, even under current and expected FAA provisions, the use of mass and balance (MAB) and performance applications requires an explicit formal approval;

— One competent authority stated that the proposals by the Agency were too stringent (no administrative process for MAB approval should be established in their opinion), while, on the opposite side, another authority expressed preference for documented approval processes for almost any application;

— One single aircraft operator is also in favour of not requiring approval for the use of MAB application on-board on EFB.

The Agency observes that the requirement for approval of on-board MAB applications is already contained in the AIR-OPS (Part CAT), at least in the case of installed EFB HW host platforms. For safety reasons, and in harmony with FAA, the Agency intends, however, to maintain the principle that any aircraft performance application should be subject to the same requirements, whether running on a portable or installed EFB platform.

The Agency also noted that no commentator opposed the perspective of long-term evolution of the structure of Agency rules (i.e. AMC 20-XX limited to airworthiness and the operational aspects as AMCs to AIR-OPS), which would, therefore, be pursued. Of course, any new proposed rule, or change, will be subject to public consultation, including any possible future changes to the procedures for notification or approval.

Finally, one stakeholder suggested creating a document additional to AMC 20-25 for guidance purposes. This comment has not been accepted.

The resulting text of AMC 20-25 is presented in Appendix A.

A. Explanatory Note - IV. Content of the draft Opinion/Decision - Urgency of the task p. 15

comment	*769* comment by: *Ingo Pucks, Owner IP Aerospace* 61. It would be appreciated if the agency also would outline and understand the commercial impact that taking any position by the agency could mean for CAT operators. And, there is also an impact on the industry developing and manufacturing SW and HW components of and for EFBs.
response	Noted In fact all operators, manufacturers, and other stakeholders have the possibility to comment on any NPA issued by the Agency, and, should this be the case,

voice their concerns.

CONCLUSION ON COMMENTS ON PAGE 15 (URGENCY OF THE TASK) OF THE EXPLANATORY NOTE

One stakeholder emphasised the need to consider the economic impact of any proposed rule.

The Agency confirms that, indeed, the economic perspective is always considered when compiling Regulatory Impact Assessments (RIA). More in particular AMC 20-25 aims at eliminating the administrative process for operational approvals, at least for changes to the simplest (i.e. Type A) applications.

This comment on page 15 (urgency of the task) of the Explanatory Note does not produce any change in the resulting text of the proposed rules.

A. Explanatory Note - V. Regulatory Impact Assessment - 1. Purpose and Intended Effect p. 16-17

comment *77* comment by: *Grégory DELBEKE*

Page 16 of 72, item A. V. 1. b.:
When the implementing rules for specialized operations (SPO) will be issued, it will be necessary to adapt the AMC related to EFBs to those operations. In fact, the use of EFBs shall be regulated to achieve a common safety level through the entire commercial aviation field.

response Noted

The suggestion by the commentator is noted by the Agency. EFB related provisions for operators of aerial work, are, however, out of scope of RMT.0001.

The suggestion might be considered in the future, when proposing possible amendments to Part-SPO (whose initial issue is not yet adopted at the time of compiling this CRD).

The Agency, however, observes that, even if aerial work can be commercial, there are, unlike what happens with CAT, no paying passengers on board.

comment *770* comment by: *Ingo Pucks, Owner IP Aerospace*

1.a. EFB Class 3 and 2 would, at least to a large degree, resemble in their specific reason of being other avionics components on board of aeroplanes, hence it is proposed to adopt the rulemaking for those EFB classes from what is currently available for avionics equipment, such as EASA Part 21 and 145, for the hardware and kernel software of such EFB classes.

response Partially accepted

Please see response to identical comment No 767.

comment *862* comment by: *Boeing*

Page: 16
Paragraph: V.1.b.
3rd & 5th paragraphs

The text states:

V. Regulatory Impact Assessment
1. Purpose and Intended Effect
…
b. Scale of the issue
…
Furthermore, several aircraft manufacturers already apply for type-certification (or STC) with EFB's hardware in the aircraft and with a variety of applications for the buyers to select. Their number is estimated ***in the order of few tens****.*
…
Furthermore, ***tens of 'data houses'*** *are involved, since providing not the computational software, but the data bases necessary to feed it.*

REQUESTED CHANGE: The references "***in the order of a few tens"*** and ***"tens of 'data houses' "*** are confusing and should be revised to exactly clarify their meaning.

JUSTIFICATION: These phrases are confusing and could cause possible misunderstanding.

response

Noted

Nevertheless, this comment does not invalidate the selection of Option 2 (i.e. modernise the provisions contained in TGL 36) as the preferred one.

CONCLUSION ON COMMENTS ON PAGES 16-17 (RIA – PURPOSE AND INTENDED EFFECT) OF THE EXPLANATORY NOTE

One stakeholder reiterated one previous comment. A second one asked quantification of affected stakeholders which goes beyond the scope of a 'light' RIA as the one in NPA 2012-02.

Finally, one stakeholder proposed to extend the applicability of AMC 20-25 to specialised operations (Part-SPO; i.e. commercial aerial work).

The Agency clarifies that Part-SPO operators are beyond the scope of RMT.0001 (and, hence, NPA 2012-12 and this CRD) which only covers CAT operators. Any proposal for new rulemaking tasks addressing commercial operators of aerial work should be forwarded to the Agency, which will assess it in coordination with competent authorities and stakeholders, according to the rulemaking procedure[4].

The comments on pages 16-17 (RIA – Purpose and intended effect) of the Explanatory Note do not invalidate the selection of Option 2 (i.e. modernise the provisions contained in TGL 36) as the preferred one and do not produce any change in the resulting text of the proposed rules.

A. Explanatory Note - V. Regulatory Impact Assessment - 3. Sectors concerned p. 17

comment *771* comment by: *Ingo Pucks, Owner IP Aerospace*

3. A clear definition of the various components of an IT-application could help here. Usually that would be: a) System - that is all components, i. e. the sum of SW, HW, data, b) HW, that is all components which together form a piece of hardware capable of running certain SW, c) SW, that in turn needs a specific HW to be run, and maintains, creates compiles and computes certain data, d) data, which is either fed into the system from outside ("loaded", i. e. the FMS data

[4] Rulemaking procedure adopted by the EASA MB in 2012.

	base), is computed, modified, calculated or compiled by running loaded data on the SW on the HW. Especially in a class 3 EFB any of the above components can cause failures, uncertainties or impose other risks upon the aeroplane and its occupants. In turn, again, the similarities to the regulatory aspects of on-board avionics are highlighted.
response	Noted While the technical content of the comment can be considered factual, it does not invalidate the selection of Option 2 (i.e. modernise the provisions contained in TGL 36) as the preferred one.

CONCLUSION ON COMMENTS ON PAGE 17 (RIA – SECTORS CONCERNED) OF THE EXPLANATORY NOTE

One stakeholder explained which different constituents an EFB system can be comprised of.

The description of the system is, however, beyond the scope of a RIA.

The comments on page 17 (RIA – sectors concerned) of the Explanatory Note do not invalidate the selection of Option 2 (i.e. modernise the provisions contained in TGL 36) as the preferred one and do not produce any change in the resulting text of the proposed rules.

A. Explanatory Note - V. Regulatory Impact Assessment - 4. Impacts p. 17-21

comment	*565* comment by: *Monarch Airlines* We note with interest the November 26 Airbus A340 incident which is quoted as an example of where EFBs may have contributed to an incident. However, it is not mentioned that, if the aircraft had been equipped with an Airport Moving Map, it would almost certainly NOT have attempted to take-off from a taxiway. We highlight this to make the point that EFBs can have a very positive contribution to flight safety and we feel it is incorrect to paint the unbalanced picture that EFBs are detrimental.
response	Noted The potential benefits of EFB, including in safety terms, are acknowledged by the Agency. However, this comment does not invalidate the selection of Option 2 (i.e. modernise the provisions contained in TGL 36) as the preferred one.

comment	*772* comment by: *Ingo Pucks, Owner IP Aerospace* These examples indicate that any EFB should also be considered to be part of the MMI (man-machine interface) and as such an increased awareness of the HDI (human device interface) design shall be given and respectively regulatory aspects of human factors might be applied. Furthermore these examples show the importance of graphical representation of any state and result of computation, specifically when safety critical calculations and/or tasks are conducted using an EFB.
response	Noted The need to assess human factors in relation to EFB is acknowledged by the

	Agency. However, this comment does not invalidate the selection of Option 2 (i.e. modernise the provisions contained in TGL 36) as the preferred one.

comment	*773* comment by: *Ingo Pucks, Owner IP Aerospace* To make a point here, it would be interesting to show how many incidents and accidents during take-off and landing resulted from incorrect data present in the on-board (paper and /or manual) library of aeroplanes, i. e. performance tables and such.
response	Partially accepted It will be taken into account in any future RIA related EFB. However, it does not invalidate the selection of Option 2 (i.e. modernise the provisions contained in TGL 36) as the preferred one.

comment	*774* comment by: *Ingo Pucks, Owner IP Aerospace* iii, Economic, option 3: Here a clear penalization of the industry providing EFB components by enhanced regulatory aspects could also be taken into account.
response	Noted Even if the considerations raised by the comment had not been taken into account by the Agency, nevertheless, Option 3 was not the recommended one. In other words, this comment does not invalidate the selection of Option 2 (i.e. modernise the provisions contained in TGL 36) as the preferred one.

CONCLUSION ON COMMENTS ON PAGES 17-21 (RIA – IMPACTS) OF THE EXPLANATORY NOTE

Stakeholders emphasised the positive safety effect which EFB operational use can produce, as well as the need to consider human factors throughout the EFB life cycle and the safety criticality not only of computational software, but also of digital data.

One added that Option 3 should not be preferred.

The Agency shares all the above concerns and in particular clarifies that indeed the RIA proposes Option 2 (i.e. modernisation of TGL 36) and not Option 3.

No commentator argued against the selection of Option 2.

The comments on pages 17-21 (RIA – impacts) of the Explanatory Note do not produce any change in the resulting text of the proposed rules.

B. Draft Opinion and Decisions - I. Draft Opinion p. 23

comment	*43* comment by: *Air France* CAT.OP.MPA.235 §a.3: the term "**approved** training programmes" could be removed as there is a general EFB approval which includes training. Proposal : 1) Remove the term "**approved** training programmes" approved from §a.3
response	Noted

Nevertheless, the Agency is aware that the 15th meeting of the Working Group of the Whole of the ICAO OPS Panel (OPSP WG-WHL/15 in March 2013) has recommended to amend Annex 6 to the Chicago Convention to introduce therein specific standards on EFB, including its operational approval.

This text, after revision by the ICAO Air Navigation Commission (ANC), would most probably be subject to consultation with all ICAO Contracting States in 2013. As result of the ANC revision and of the consultation, the draft text may as well change.

Adoption by the ICAO Council is expected early in 2014, and its applicability in November of that year.

The Agency, therefore, withdraws its proposed Opinion, waiting to be aware of the final text adopted by ICAO. Transposing the planned amendment to all the three Parts of Annex 6, would be part of a new specific Rulemaking Task in the Rulemaking Programme 2014-17.

comment *78* comment by: *Grégory DELBEKE*

Page 23 of 72, item B. I. CAT.OP.MPA.325 Electronic Flight Bag (EFB) Paragraph (a):

The Belgian CAA would suggest to add the following paragraph before the proposed paragraph (a) in order to avoid the use of EFB system without approval:

(a) An operator shall not use an EFB system without an operational approval granted by the Competent Authority

Page 23 of 72, item B. I. CAT.OP.MPA.325 Electronic Flight Bag (EFB) Paragraph (a):

The BCAA would suggest the following paragraph to replace the proposed paragraph (a) in order to clarify the operator responsibilities and to be more accurate in the wording of the requirements:

The operator shall only use an EFB system under the following conditions:
(1) The operator shall define clearly the responsibilities and procedures to ensure configuration control and security of the EFB;
(2) The operator shall demonstrate the accuracy and the integrity of all EFB data and all calculation performed by the EFB;
(3) The operator shall provide appropriate training and checking for flight crew in approved training programmes;
(4) The operator shall analyze, assess and mitigate the risks caused by any failure or malfunction condition related to the complete EFB system or any individual component or application based on the EFB and including corruption or loss of data ad erroneously displayed information;
(5) The operator shall demonstrate that the EFB system design and usability are compatible with the intended use; and
(6) The competent authority has received notification of changes to the Operations Manual for the use of the EFB system and granted its operational approval.

Page 23 of 72, item B. I. CAT.OP.MPA.325 Electronic Flight Bag (EFB) Paragraph (b):

The BCAA does not agree with this paragraph and therefore, the BCAA proposes

to remove this paragraph for the following reasons:
- Class 1 EFB hardware and Type A EFB software are not defined in the Implementing Rules EASA OPS Part CAT;
- In most EFB software applications, we have both type A and type B software;
- The software classification is not always well understood/interpreted by the operators and this could lead to a situation where the operator considers the software as type A instead of type B;
- Some requirements are essential for safety in the cockpit and do not depend on the software type (e.g. EMI, batteries compliance,…) ;- Such stipulation throws the door wide open to software EFB other than Type A use without approval ("we thought it was not necessary to have an approval"…), it could create difficulties in terms of supervision for the NAAs.

response

Noted

Please see response to comment No 43 above.

comment

109 comment by: *DGAC*

In paragraph (b), the requirement should be clarified.
Should not "and" be replaced by "with" :
"(b) paragraph (a)(6) does not apply to Class 1 EFB hardware ~~and~~ **with** Type A EFB software."

We understand that only those class 1 EFB with Type A software fall under (b)

response

Noted

Please see response to comment No 43 above.

comment

110 comment by: *DGAC*

Only flight crew are quoted.
Other crew members, Cabin or Technical crew, are potentially concerned.
This comment is valid for the whole NPA

response

Noted

Please see response to comment No 43 above.

comment

166 comment by: *CAA-NL*

Paragraph (b) refers to Class 1 EFB hardware and Type A EFB software. The definitions of which are only given in the AMC 20 which is only indirectly linked to this point of the rule.

For clarity we suggest to include the definition of the Class and Type in Annex I of the Operation regulation.

Secondly the text suggests that all Class 1 EFB hardware irrespective of the software installed, and all Type A software irrespective of the hardware on which it is installed do not need to be notified and operational approved, as visualized below. However further in the AMC (AMC 20-25 § 7 Operational Approval Process Page 39/40) one can conclude otherwise.

	Class 1	Class 2	Class 3

Type 1	No Not/ No App	No Not/ No App	No Not/ No App
Type 2	No Not/ No App		
Type 3	No Not/ No App		

Please make the text unambiguous maybe in line with our proposal for AMC 20-25 § 7 Operational Approval Process Page 39/40

response

Noted

Please see response to comment No 43 above.

comment

775 comment by: *Ingo Pucks, Owner IP Aerospace*

(a) (1) As an EFB could be considered a system composed of various components (HW, SW, data), and the various components might stem from various sources, and the various components might to a degree allow alterations by the operator, a clear distinction shall be made for all components and all applications in terms if configuration control.
It is proposed to apply at least the requirements for configuration control as in ISO 9100, EASA Part 21, CS 25 ad alike and EASA Part 145.

response

Noted

Please see response to comment No 43 above.

comment

776 comment by: *Ingo Pucks, Owner IP Aerospace*

(a) (2) For any data going to, loaded on or otherwise put an an in EFB for the intentions of use, and if such data or its alterations can be considered safety critical, the applicable directives of RTCA DO-200A might be worth considering here as a basis for a regulatory approach.

response

Noted

Please see response to comment No 43 above.

comment

777 comment by: *Ingo Pucks, Owner IP Aerospace*

(a) (3) Training should be included in the training syllabus of the operator and hence be subject to approval by the agency.

response

Noted

Please see response to comment No 43 above.

comment

778 comment by: *Ingo Pucks, Owner IP Aerospace*

(a) (4) Due to the composition, complexity and nature of a EFB this might be beyond the capability of an operator.
Hence it is proposed to establish a procedure that includes a multi level approach, such that manufacturers, integrators, training organisations and the

	operator conduct such risk assessment on all levels and components of integration. Depending of the degree of integration the responsibilities than might be channeled to the operator, however the technical feasibility of such a task remains questionable. Again here the risk and safety assessment procedure of avionic components, at least for EFB Class III devices might serve as guidance.
response	Noted Please see response to comment No 43 above.

comment	*812* comment by: *Fédération Nationale de l'Aviation Marchande (FNAM)* In paragraph (a), other crew than flight crew could be concerned in the future by EFBs, such as cabin crew and technical crew. Only flight crews are mentioned.
response	Noted Please see response to comment No 43 above.

comment	*813* comment by: *Fédération Nationale de l'Aviation Marchande (FNAM)* Reference text: *"paragraph (a)(6)does not apply to Class 1 EFB hardware and Type A EFB software"* Comment: FNAM suggests EASA editing this line and writing "with" instead of "and". Indeed, the wording may lead to misunderstandings.
response	Noted Please see response to comment No 43 above.

comment	*828* comment by: *Eurocopter* The proposed rule is considered not acceptable for the following reasons: - Item (a)(1): What could be the rules to ensure configuration control and security of the EFB and who should approve these procedures is absolutely unclear, - Item (a)(2): How can be ensured accuracy and integrity of data produced and calculation performed by the EFB if no applicable standard is defined? - Item (a)(4): Assessment and mitigation of the risks linked to the use of an EFB cannot be left to the unique appreciation of the operator, without a defined methodology, - Item (a)(5): Beyond an obvious objective, how can be assessed at operational stage, that the design of a "black box" EFB is compatible with its intended use? - Item (b) has no effect, because "Class 1 hardware" and "Type A software" are totally undefined concepts at this stage. Instead, Eurocopter suggests stating that the use of EFB shall be restricted to predefined lists of functions and submitted to prior operational approval by the competent authority.
response	Accepted The draft Opinion proposed by the NPA would be no further progressed. Please see response to comment No 43 above.

CONCLUSION ON COMMENTS ON PAGE 23 (DRAFT OPINION)

12 comments were received on this segment of the NPA. One stated that the proposed Opinion was not acceptable. The others proposed changes to the text.

The Agency is now aware that the 15th meeting of the Working Group of the Whole of the ICAO OPS Panel (OPSP WG-WHL/15 in March 2013) has recommended to amend Annex 6 to the Chicago Convention to introduce therein specific (mandatory) standards on EFB, including its operational approval for use in international commercial air transport by aeroplanes.

These standards, after revision by the ICAO Air Navigation Commission (ANC), would most probably be subject to consultation with all ICAO Contracting States in 2013. As result of the ANC revision and of the consultation, the text may change.

Adoption by ICAO Council is expected early in 2014, and its applicability in November of that year.

The Agency, therefore, accepting one comment and noting the others, withdraws its proposed Opinion, waiting to be aware of the final text adopted by ICAO. Transposing the planned amendments to all the three Parts of Annex 6, would be part of a new specific Rulemaking Task in the Rulemaking Programme 2014-17.

This would allow to align as much as possible the possible future Opinion on the legally binding implementing rules (IR) on EFB with the ICAO standards.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 p. 24

comment	*502* comment by: *Star Alliance* General Comments: A Harmonization between FAA and EASA rulemaking in this matter is strongly recommended, especially in terms of classification of EFB Systems and data transfer between aircraft and EFB. Classification of application types according to hazard levels does not make sense, as even a failure of a classical text viewer software (e.g. landing distance charts) may have a major impact on flight safety
response	Partially accepted Indeed, FAA participated in the NPA 2012-02 Review Group where they stated their intention to publish edition C of AC 120-76 harmonised as much as possible with the Agency's AMC 20-25. The classification of Type A and B applications, based on the severity of the possible effects of failure conditions, has been accepted unanimously by the Review Group and is proposed in this CRD by the Agency.

comment	*637* comment by: *Deutsche Lufthansa AG* General Comment to the Decision Proposal: A Harmonization between FAA and EASA rulemaking in this matter is strongly requested, especially in terms of classification of EFB Systems and data transfer between aircraft and EFB. Classification of application types according to hazard levels does not make sense, as even a failure of a classical text viewer software (e.g. landing distance charts) may have a major impact on flight safety.
response	Partially accepted

Please see response to comment No 502 above.

CONCLUSION ON COMMENTS ON PAGE 24 (DRAFT DECISION AMC 20-25)

Two aircraft operators submitted the same comment, requesting:

— harmonisation with FAA; and

— not to classify application types according to hazard levels.

The first idea is welcome, noting, however, that FAA plans a new edition 'C' of their AC 120-76, which would possibly be harmonised with Agency's AMC 20-25 as much as possible.

The classification of Type A and B applications, based on the severity of the possible effects of failure conditions, has been accepted unanimously by the Review Group and is proposed in this CRD by the Agency.

The comments on page 24 (draft Decision AMC 20-25) of the Explanatory Note do not produce any change in the resulting text of the proposed rules.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 1 PURPOSE AND SCOPE p. 24

comment

35 comment by: *NetJets Europe*

"This Acceptable Means of Compliance is one means but not the only means to obtain airworthiness and operational approval for the use of Electronic Flight Bags (EFBs)."

A frequent point of discussion is what other means are possible. Maybe the addition of some examples or further elaboration could help NAAs understand what other means to obtain OPERATIONAL APPROVAL are possible. Currently AMCs tend to be treated more as hard rules than "one means of compliance", not showing any flexibility at all.

response

Not accepted

According to paragraph (2) of Annex I to Commission Regulation (EU) No 965/2012 on AIR OPS, 'acceptable means of compliance (AMC)' means non-binding standards adopted by the Agency to illustrate means to establish compliance with Regulation (EC) No 216/2008 and its Implementing Rules.

Rule ARO.GEN.120 (Means of compliance) in Annex II (Part-ARO) to the same Regulation establishes that:

(a) The Agency shall develop acceptable means of compliance (AMC) that may be used to establish compliance with Regulation (EC) No 216/2008 and its Implementing Rules. When the AMC are complied with, the related requirements of the Implementing Rules are met.

(b) Alternative means of compliance may be used to establish compliance with the Implementing Rules.

(c) The competent authority shall establish a system to consistently evaluate that all alternative means of compliance used by itself or by organisations and persons under its oversight allow the establishment of compliance with Regulation (EC) No 216/2008 and its Implementing Rules.

(d) The competent authority shall evaluate all alternative means of compliance proposed by an organisation in accordance with ORO.GEN.120 (b) by analysing the documentation provided and, if considered necessary, conducting an

inspection of the organisation. When the competent authority finds that the alternative means of compliance are in accordance with the Implementing Rules, it shall without undue delay:

(1) notify the applicant that the alternative means of compliance may be implemented and, if applicable, amend the approval or certificate of the applicant accordingly; and

(2) notify the Agency of their content, including copies of all relevant documentation;

(3) inform other Member States about alternative means of compliance that were accepted.

(e) When the competent authority itself uses alternative means of compliance to achieve compliance with Regulation (EC) No 216/2008 and its Implementing Rules it shall:

(1) make them available to all organisations and persons under its oversight; and

(2) without undue delay notify the Agency. The competent authority shall provide the Agency with a full description of the alternative means of compliance, including any revisions to procedures that may be relevant, as well as an assessment demonstrating that the Implementing Rules are met.

These legal provisions, therefore, allow AMC to evolve, based on experience and proposals by all operators and authorities in the EU. Initially, it is sufficient for the Agency to publish one single AMC, since the regulatory framework is flexible enough to allow evolution, when appropriate.

comment

36 comment by: *NetJets Europe*

"This AMC does not contain additional or double set requirements to those already contained in the operational requirements for the basic information, documentation and data sources that would need to be carried on board."

So there is no requirement to have multiple electronic sources of documents that would normally only require 1 conventional paper copy/original to be on-board? Having all these documents on 1 EFB unit will suffice?

response

Noted

Not necessarily, since it is assumed that portable (commercial off-the-shelf) EFB platforms may fail more frequently than a printed sheet of paper. In any case, this has to be discussed between the operator and the competent authority, based on paragraph 7.14.1 of the resulting text of AMC 20-25, which allows, after evaluation, to remove paper documents from cockpit. The mitigation means mentioned therein may include more than one portable EFB on board, depending on the results of the evaluation.

comment

37 comment by: *NetJets Europe*

"The evaluation of an EFB has both an airworthiness and operational aspect and, where necessary, to make a complete evaluation of an EFB system, there is a need for close coordination between two processes."

A more clear description of when this would be the case is needed. Otherwise there is a risk that conservative NAAs will interpret "where necessary" as

	"always"
response	Accepted The resulting text of AMC 20-25 now more clearly identifies the airworthiness aspects under responsibility of the aircraft TC holder and the requirements to be fulfilled by the operators. It is assumed that the competent authorities at national level will 'credit' (i.e. accept without further assessment) anything that has been verified and approved through the mandatory (e.g. type certification) or voluntary (e.g. ETSO authorisations) initial airworthiness processes. This is common practice even beyond EFB, based on Article 11 of the Basic Regulation.

comment	*44* comment by: *Air France* This paragraph should explicitly includes the case of previously approved EFB. It is proposed to keep the current rights without perimeters changes. If an operator applies for a new application, this application should be performed with a compliance with the new AMC20-25. Proposal : Add Operational approval obtained before the issue of this revision remains valid. If an operator applies for a new perimeter, this application should be performed with a compliance demonstration with this text.
response	Noted The content of the comment is fully shared by the Agency. However, in the text of the Agency's AMC there are never legal clauses since the entire document is not legally binding. However, all AMC are published as part of a legal Decision by the Executive Director. All such Decisions clearly state the date of entry in force. No AMC is applicable before said date. Consequently, all approvals issued on a prior date remain valid.

comment	*106* comment by: *DGAC* AMC 20-25 should contain grandfathering provisions. In particular : - In case the use of an EFB has been approved by the Authority of a Member State, such approval should not be reinvestigated. - For operators that have applied for EFB approval but have not been authorised to use it by the time this AMC is published, transitional measures should be implemented (E.g. entry into force 3 to 6 months after publication so that the investigation carried out by the Authority of a Member State with a view to approving the use of an EFB can be completed) New applicants, applicants intending to change the scope of use of their EFB or intending to change their EFB should comply with the current AMC.
response	Noted The content of the comment is fully shared by the Agency. However, in the text of the Agency's AMC there are never legal clauses since the entire document is not legally binding. However, all AMC are published as part of a legal Decision by the Executive Director. All such Decisions clearly state the date of entry in force. No AMC is

	applicable before said date. Consequently, all approvals issued on a prior date remain valid.

comment	*111* comment by: *DGAC* Other crew than flight crew (Cabin or Technical crew) are potentially concerned. This comment is valid for the whole NPA, and in particular for the whole AMC. Cabin crew are referred to only in §1 Purpose and scope and in §4.5 Electronic Flight Bag (EFB).
response	Not accepted Paragraph 4.6 of the resulting text of AMC 20-25 defines EFB as an Information System for flight deck crew members which allows storing, updating, delivering, displaying and/or computing digital data to support flight operations or duties. This definition is aligned with the definition recommended for Annex 6 by the WG of the Whole of the ICAO OPS Panel in March 2013. It also allows technical members of the flight crew, beyond pilots, to use the EFB. Conversely, cabin crews are not supposed to have duties in the cockpit and, therefore, they are not supposed to use the EFB applications during flight. This does not exclude the use of the same portable EFB platform (e.g. prior to the flight) to host non-EFB applications useful for the cabin crew members. It neither prevents cabin crew members to use T-PEDs to fulfil their specific duties. This latter topic is, however, out of scope of AMC 20-25.

comment	*336* comment by: *British Airways* Any new AMC should seek a harmonization between AC120-76B and EASA.
response	Partially accepted FAA participated in the work of the Review Group on the matter. They announced their intention to develop a new edition C of AC 120-76 and the intention to have it harmonised as much as possible with the Agency's AMC 20-25.

comment	*439* comment by: *Lufthansa Technik Design Organisation* A Harmonization between FAA and EASA rulemaking in this matter is strongly recommended, especially in terms of classification of EFB Systems and data transfer between aircraft and EFB.
response	Partially accepted FAA participated in the work of the Review Group on the matter. They announced their intention to develop a new edition C of AC 120-76 and the intention to have it harmonised as much as possible with the Agency's AMC 20-25. Date transfer to/from portable EFB is allowed, under certain conditions, by the resulting text of AMC 20-25.

CONCLUSION ON COMMENTS ON PAGE 24 (DRAFT AMC 20-25 – PURPOSE AND SCOPE)

Eight comments were received on this segment of the NPA.

The comments mainly dealt with:

— 'grandfathering' provisions, which means that existing approvals should not be invalidated by the publication of AMC 20-25;

— harmonisation with FAA AC 120-76; and

— the general status of this AMC, in particular for possible other means of compliance and clarification of boundary between OPS and airworthiness.

The Agency fully agrees on the 'grandfathering' principle, recalling, however, that AMC are published as Decision by the Executive Director. Such Decisions always mention a date of entry into force, before which, of course, the AMC is not applicable and, therefore, existing approvals remain valid.

The Agency also confirms that any possible effort will be devoted to harmonise with ICAO and FAA and, in particular, not with published AC 120-76 B, but with the planned edition 'C' of this document.

The Agency reminds that, AMC20-25, as defined in the 'purpose and scope', is only 'one' means of compliance but not the only means to obtain the required approvals for the use of EFB. Each operator has the possibility of defining alternative means and submitting it to its competent authority, based on the provisions in rule ARO.GEN.120 (Means of compliance) in Annex II (Part-ARO) to Commission Regulation (EU) No 965/2012 on AIR OPS.

The resulting text of the proposed Decision on AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 2 APPLICABILITY p. 24

comment *167* comment by: *CAA-NL*

Please include here the proper references to those regulatory points where this AMC is an acceptable means to comply with, with the presumption of compliance and thus approval, as was agreed in AGNA some time ago. E.G. CAT.OPS.MPA.325, ETSO-2C165a, CS-….. etc.

response

Accepted

A list of the regulatory references is included in paragraph 3 of the resulting text of AMC 20-25.

comment *173* comment by: *AIRBUS*

"This AMC is to be used by:

a) Commercial Air Transport operators by aeroplane or by helicopter;"

Applicability is not consistent with AC 120-76 which addresses operations by other than Commercial Air Transport (eg., operations under Part 91, 125, 129 or 135).

Current applicability raises a concern for Airbus since its does not cover Non-Commercial Operations with Complex Motor-Powered Aircraft, carried out by Airbus A319-CJ model (see forthcoming part-NCC) .

Note : Complex motor-powered aircraft are defined in Article 3 of Regulation

(EC) No 216/2008.

Suggested text:
This AMC is to be used by:

a) Commercial or Non-Commercial Air Transport operators by Complex Motor-Powered aeroplane or by helicopter;

response

Partially accepted

'Non-commercial Air Transport' operators are defined nowhere in the EU legislation.

Nevertheless, the resulting text of AMC 20-25 clarifies that it is applicable not only to aircraft operators but also to the manufacturing industry with regard to the aspects connected to airworthiness. Therefore, Airbus or other manufacturers may offer EFB provisions on respective products regardless of whether the customer is a commercial or non-commercial operator.

Equally, nothing prevents non-commercial operators to use AMC 20-25 as a reference guidance document on a voluntary basis, if so wished.

comment

263 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 3 shared with Airbus

JUSTIFICATION for the Comment on page # 24 §2 a)

Applicability is not consistent with AC 120-76 which addresses operations by other than Commercial Air Transport (eg., operations under Part 91, 125, 129 or 135).
Current applicability raises a concern for DASSAULT-AVIATION since its does not cover Non-Commercial Operations with Complex Motor-Powered Aircraft, carried out by Falcon (see forthcoming part-NCC) .
Note : Complex motor-powered aircraft are defined in Article 3 of Regulation (EC) No 216/2008.

PROPOSED TEXT / COMMENT

This AMC is to be used by:

a) Commercial or Non-Commercial Air Transport operators by Complex Motor-Powered aeroplane or by helicopter;

response

Partially accepted

Please see reply to comment No 173 above.

comment

440 comment by: *Oliver Ast (CLH)*

Proposed Text:
This AMC is to be used by:

a) Commercial or Non-Commercial Air Transport operators by Complex Motor-Powered aeroplane or by helicopter;

Comment:
Applicability is not consistent with AC 120-76 which addresses operations other

	than Commercial Air Transport (eg., operations under Part 91, 125, 129 or 135). Curent applicability raises a concern for Airbus since its does not cover Non-Commercial Operations with Complex Motor-Powered Aircraft carried out by Airbus A319-CJ model (see forthcoming part-NCC) . Note : Complex motor-powered aircraft are defined in Article 3 of Regulation (EC) No 216/2008.
response	Partially accepted Please see reply to comment No 173 above.

comment	*504* comment by: *Star Alliance* **Original AMC20-25 NPA text:** This AMC is to be used by: a) Commercial Air Transport operators by aeroplane or by helicopter; **RATIONALE / REASON / JUSTIFICATION for the Comment :** Applicability is not consistent with AC 120-76 which addresses operations other than Commercial Air Transport (eg., operations under Part 91, 125, 129 or 135). Curent applicability raises a concern for Airbus since its does not cover Non-Commercial Operations with Complex Motor-Powered Aircraft carried out by Airbus A319-CJ model (see forthcoming part-NCC) . Note : Complex motor-powered aircraft are defined in Article 3 of Regulation (EC) No 216/2008. **PROPOSED TEXT / COMMENT:** This AMC is to be used by: a) Commercial or **Non-Commercial** Air Transport operators by **Complex Motor-Powered** aeroplane or by helicopter;
response	Partially accepted Please see reply to comment No 173 above.

comment	*514* comment by: *Jeppesen Inc.* Suggest add "d) Manufacturers of EFB Hardware and Software" Rationale: To cover the case of hw/sw that is not linked to TC/STC/airworthiness approval. (i.e. Class 1 and 2 EFBs and Type A and B applications). Also, to bring early consideration of human factors considerations at time of manufacture (per section 7.4)
response	Not accepted The spirit of the comment is encouraged by the Agency, and manufacturers of EFB hardware and software are encouraged to use AMC 20-25 as a reference for their respective developments. However, from the legal point of view, the Agency's rules apply directly only to applicants/holders of TC/STC or ETSO Authorisation. Manufacturers of portable EFBs are, therefore, not directly addressed.

When portable devices are brought by an aircraft operator into the cockpit, the operator is responsible to ensure compliance with the requirements.

Consequently, while manufacturers of software and portable devices are encouraged to use AMC 20-25 as much as possible, this remains a voluntary decision, since the ultimate responsibility lies with the operator.

comment

633 comment by: *Garmin International*

From an operational perspective, the applicability of this AMC is intended only for "Commercial Air Transport operators by aeroplane or by helicopter" but from an aircraft and equipment manufacturer perspective, the effect of this AMC reaches far beyond this boundary because the same equipment is used in both commercial and general aviation operations.

As noted in several of our comments, installed display equipment with TSO/ETSO and/or existing TC/STC aircraft installation approvals have the potential to be adversely effected by this proposed AMC and proposed ETSO-2C165a. In particular, re-opening evaluations of functions/capabilities previously accepted as part of a TSO and TC/STC does not enhance safety and instead will hinder the use of these safety enhancing functions/capabilities.
Recommend explicitly excluding functions/capabilities that have airworthiness approval as part of aircraft type design from this AMC.

Additionally, proposed ETSO-2C165a is of particular concern because it has the far reaching effect of driving changes to equipment that is not designed solely for the Commercial Air Transport market (e.g., Garmin's GTN 6xx/7xx products whose primary use is in the general aviation market) with no obvious safety benefit provided by the additional requirements levied by ETSO-2C165a. Garmin strongly urges EASA to remain with the existing ETSO-C165 which is harmonized with FAA TSO-C165. Garmin has provided other comments with specific reasons for why these additional requirements are unnecessary.

response

Noted

AMC 20-25 will be applicable from the date specified in the Decision of the Executive Director if the Agency. This date will not be retroactive. Any prior approval will, therefore, not be affected.

ETSO-2C165a is only for voluntary application and it will also apply only after its adoption, not requiring any change to previously developed applications. In any case, FAA and the Agency are working to harmonise their respective ETSOs on the matter, in order to include such an ETSO in index 1 as soon as practicable.

comment

638 comment by: *Deutsche Lufthansa AG*

Proposal:

This AMC is to be used by:
a) Commercial or **Non-Commercial** Air Transport operators by **Complex Motor-Powered** aeroplane or by helicopter;

Comment/Justification:

Applicability is not consistent with AC 120-76 which addresses operations other than Commercial Air Transport (eg., operations under Part 91, 125, 129 or 135). Current applicability raises a concern for Airbus airplanes since it does not cover

	Non-Commercial Operations with Complex Motor-Powered Aircraft carried out by Airbus A319-CJ model (see forthcoming part-NCC) . Note : Complex motor-powered aircraft are defined in Article 3 of Regulation (EC) No 216/2008.
response	Partially accepted Please see reply to comment No 173 above.

comment	*723* comment by: *NetJets Europe* Suggest adding d) Other Suppliers of EFB Hardware and Software Rationale: To apply to the suppliers of hardware and software intended for use on an EFB that are not associated with the above approval processes. (in example a supplier of a Type A or B application intended for a Class 1 or 2 device.) (Source: Executive Jet Management, a NetJets company)
response	Not accepted Please see reply to comment No 514 above.

comment	*829* comment by: *Eurocopter* Applicability for operators should not be restricted to Commercial Air Transport operators.
response	Partially accepted Please see reply to comment No 173 above.

CONCLUSION ON COMMENTS ON PAGE 24 (DRAFT AMC 20-25 – APPLICABILITY)

10 comments were received on this segment of the NPA.

The comments mainly dealt with:

— the harmonisation with FAA AC120-76;

— the extension of the scope to include non-commercial operators;

— the inclusion of EFB suppliers (HW and SW) into the applicability section; and

— ETSO-C165 not being amended.

As already mentioned, any possible effort will be devoted to harmonise with ICAO and FAA and, in particular, not with published AC 120-76B, but with the planned edition 'C' of this document.

As mentioned in the Explanatory Note to the NPA, Non-Commercial operators of Complex motor-powered aircraft (NCC) are not in the scope of this rulemaking task.

The need to address rules on EFB to such NCC operators could be explored in the future by the Agency, according to the Rulemaking procedure, and based on proposals from stakeholders or analysis of safety occurrences. However, manufacturers can put on the market identical products for commercial and non-commercial operators, if so wished.

Since most of the EFB are based on COTS devices, which do not receive any airworthiness approval, it is considered that the legal responsibility can only remain with the operator wishing to use a portable EFB.

It should be noted that all the already issued TC/STC, ETSOA and operational approvals remain valid even if ETSO-2C165a is published. In fact, any ETSO only applies to applications for authorisation received after its entry into force (no retro-active effect). The same applies to AMC 20-25.

The resulting text of the proposed Decision on AMC 20-25 is presented in Appendix A, and that of ETSO-2C165a in Appendix B.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 3 REFERENCE DOCUMENTS - 3.2 Related Certification Specifications p. 25

comment *174* comment by: *AIRBUS*

"3.2 Related Certification Specifications

CS 25.1301, 25.1302, 25.1309, 25.1316, 25.1321, 25.1322, 25.1431, 25.1529, 25.1581"

- 25.1302 is only applicable if part of the aircraft certification basis
- 25.1316 is not applicable to Class 1 and 2 EFB because they are not certified and because they do not cause a condition preventing a continued safe flight and landing. 25.1316 is only applicable to a Class 3 EFB hosting S/W applications with Failure Conditions classified as Major or more.
- 25.1357 (a) should be added to address need for Circuit Breakers (C/B) required for protecting Class 2 and 3 EFB power supply wiring.
- For crashworthiness considerations of a Class 2 EFB [see section 6.1.2.1.c).], it is suggested to refer 25.561 (c), 25.787 (a), 25.789 (a)
- For cockpit layout considerations applicable to Class 2 and 3 EFB (see section 6.1.2.2.), it is suggested to refer 25.773 (a), 25.777 (a)
- For structure considerations applicable to Class 2 and 3 EFB, it is suggested to refer 25.301, 25.303, 25.305, 25.625

Suggested text:
CS 25.301, 25.303, 25.305, 25.561, 25.625, 25.773, 25.777, 25.787, 25.789, 25.1301, 25.1302, 25.1309, 25.1321, 25.1322, 25.1357, 25.1431, 25.1529, 25.1581
Note : 25.1302 is applicable only if part of the aircraft certification basis.

response Partially accepted

This list is provided as guidance; it is not intended to be an exhaustive list. However, some of the suggested CSs have been added to the list.In any case, for each TC or TC change, the appropriate certification basis and/or paragraphs affected are agreed by the Agency case by case.

comment *175* comment by: *AIRBUS*

"3.2 Related Certification Specifications
[…]
EASA Special Condition on Information Security (Network Security)"

EASA Special Condition on Information Security (Network Security) is out of the AMC 20-25 scope. Indeed, this Special Condition is not applicable to legacy aircraft and not applicable to a single system such as a Class 2 or 3 EFB. This Special Condition is intended to protect aircraft systems from all possible

	security threats which could create adverse safety effects. This Special Condition is intended to address data security at AIRCRAFT LEVEL in a specific context, ie. for new aircraft implementing largely new technologies, based on Information Systems (Ethernet or Ethernet-like data networks, public COTS software, more connectivity with ground using IP technology, …). That is not at all the case on legacy aircraft, mainly using proprietary solutions (no avionics data communications network but only ARINC 429 links, private solutions, …). In the Class 2 or 3 EFB context, security considerations should be limited to the both following objectives : 1) Protect the aircraft systems from possible EFB security threats 2) Protect the EFB system itself from external security threats (notably, not to impair EFB information displayed to the flight crew). Airbus considers that these both objectives are already addressed by NPA AMC 20-25 section 6.1.1.4 (Class 1 Data connectivity), section 6.1.2.4 (Class 2 EFB data connectivity), section 6.1.3 (Class 3 EFB), section 7.8 (EFB system security), section 7.10 (Role of the EFB administrator). Note : If necessary, security considerations for a Class 2 EFB in section 6.1.2.4 (Class2 EFB data connectivity) could reflect those proposed by the AMC 20-25 rulemaking group in 2008 : --Quote-- "EFB data connectivity should be validated and verified to ensure non-interference and isolation from aircraft systems during data transmission and reception. Installed aircraft systems should not be adversely affected by EFB system failures. The EFB system can only send data to the aircraft systems if: a. The EFB system is connected to a certified data link (either wired or wireless) where the data link, through the certification process, has an approved security device to protect the aircraft systems from installation or use of unauthorised applications and data. If this data link is approved through the certification process, then there is not further evaluation required when connecting the EFB to the aircraft data link port. b. A direct connection from the EFB system to an aircraft system has been assessed to ensure that security threats from the EFB system are identified and risk mitigation strategies are implemented to protect the aircraft systems from adverse impacts reducing the aircraft safety, functionality and continued airworthiness. The EFB system can receive data from any aircraft systems. It can be connected as well to a system outside the aircraft (e.g., "Gatelink" or GPRS) for AAC/AOC communications purposes. Connectivity may be wired or wireless." --Unquote-- Suggested text: Remove the following sentence from section 3.2 : "EASA Special Condition on Information Security (Network Security) "
response	Not accepted It is agreed that 'EASA Special Condition on Information Security (Network Security)' will not be relevant in all cases, but, since in some instances it would be applicable, it is considered useful for the readers to refer to it.

comment	*264*	comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 4 shared with Airbus

JUSTIFICATION for the Comment on page # 25 §3.2 related CS: "CS 25.1301, 25.1302, 25.1309, 25.1316, 25.1321, 25.1322, 25.1431, 25.1529, 25.1581"

- 25.1302 is only applicable if part of the aircaft certification basis
- 25.1316 is not applicable to Class 1 and 2 EFB because they are not certified and because they do not cause a condition preventing a continued safe flight and landing. 25.1316 is only applicable to a Class 3 EFB hosting S/W applications with Failure Conditions classifed as Major or more.
- 25.1357 (a) should be added to address need for Circuit Breakers (C/B) required for protecting Class 2 and 3 EFB power supply wiring.
- For crashworthiness considerations of a Class 2 EFB [see section 6.1.2.1.c).], it is suggested to refer 25.561 (c), 25.787 (a), 25.789 (a)
- For cockpit layout considerations applicable to Class 2 and 3 EFB (see section 6.1.2.2.), it is suggested to refer 25.773 (a), 25.777 (a)
- For stucture considerations applicable to Class 2 and 3 EFB, it is suggested to refer 25.301, 25.303, 25.305, 25.625

PROPOSED TEXT / COMMENT

CS 25.301, 25.303, 25.305, 25.561, 25.625, 25.773, 25.777, 25.787, 25.789, 25.1301, 25.1302, 25.1309, 25.1321, 25.1322, 25.1357, 25.1431, 25.1529, 25.1581
Note : 25.1302 is applicable only if part of the aircraft certification basis.

response

Partially accepted

Please see reply to comment No 174.

comment

270 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 5 shared with Airbus

JUSTIFICATION for the Comment on page # 25 §3.2 " EASA Special Condition on Information Security (Network Security) "

EASA Special Condition on Information Security (Network Security) is out of the AMC20-25 scope. Indeed, this Special Condition is not applicable to legacy aircraft and not applicable to a single system such as a Class 2 or 3 EFB.
This Special Condition is intended to protect aircraft systems from all possible security threats which could create adverse safety effects.
This Special Condition is intended to address data security at AIRCRAFT LEVEL in a specific context, ie. for new aircraft implementing largely new technologies, based on Information Systems (Ethernet or Ethernet-like data networks, public COTS software, more connectivity with ground using IP technology, …). That is not at all the case on legacy aircraft, mainly using proprietary solutions (no avionics data communications network but only ARINC 429 links, private solutions, …).
In the Class 2 or 3 EFB context, security considerations should be limited to the both following objectives :
1) Protect the aircraft systems from possible EFB security threats
2) Protect the EFB system itself from external security threats (notably, not to impair EFB information displayed to the flight crew).

DASSAULT-AVIATION consider that these both objectives are already addressed

	by NPA AMC 20-25 section 6.1.1.4 (Class 1 Data connectivity), section 6.1.2.4 (Class 2 EFB data connectivity), section 6.1.3 (Class 3 EFB), section 7.8 (EFB system security), section 7.10 (Role of the EFB administrator). Note : If necessary, security considerations for a Class 2 EFB in section 6.1.2.4 (Class2 EFB data connectivity) could reflect those proposed by the AMC 20-25 rulemaking group in 2008 : '--Quote-- "EFB data connectivity should be validated and verified to ensure non-interference and isolation from aircraft systems during data transmission and reception. Installed aircraft systems should not be adversely affected by EFB system failures. The EFB system can only send data to the aircraft systems if: a. The EFB system is connected to a certified data link (either wired or wireless) where the data link, through the certification process, has an approved security device to protect the aircraft systems from installation or use of unauthorised applications and data. If this data link is approved through the certification process, then there is not further evaluation required when connecting the EFB to the aircraft data link port. b. A direct connection from the EFB system to an aircraft system has been assessed to ensure that security threats from the EFB system are identified and risk mitigation strategies are implemented to protect the aircraft systems from adverse impacts reducing the aircraft safety, functionality and continued airworthiness. The EFB system can receive data from any aircraft systems. It can be connected as well to a system outside the aircraft (eg., "Gatelink" or GPRS) for AAC/AOC communications purposes. Connectivity may be wired or wireless." --Unquote-- PROPOSED TEXT / COMMENT Remove the following sentence from section 3.2 : "EASA Special Condition on Information Security (Network Security) "
response	Not accepted Please see reply to comment No 175..

CONCLUSION ON COMMENTS ON PAGE 25 (DRAFT AMC 20-25 – RELATED CERTIFICATION SPECIFICATIONS)

Two airframe manufacturers submitted the same two comments requesting:

— changes on the list of related CS paragraphs; and

— removal of the reference to the EASA Special Condition on Security.

The Agency, having replied individually to the said comments, while maintaining in the list of references the special conditions (even for the batteries), agrees that the following requirements will be added in the list of related CS: 25.561, 23.561, 25.789, 25.1357, 23.1357, 25.777.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 3 REFERENCE DOCUMENTS - 3.3 Related Guidance Material p. 25

comment	*275*	comment by: *Dassault Aviation*

	DASSAULT-AVIATION comment # 6 shared with Airbus JUSTIFICATION for the Comment on page # 25 § 3.3 Guidance materials are given for software considerations (ED-12 and DO-178) but not for hardware considerations (ED-80 and DO-254) PROPOSED TEXT / COMMENT Add ED-80 in section 3.3.1 Add DO-254 in section 3.3.2
response	Accepted

CONCLUSION ON COMMENTS ON PAGE 25 (DRAFT AMC 20-25 – RELATED GUIDANCE MATERIAL)

One comment recommended to include additional material in the list of references. It was accepted.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 3 REFERENCE DOCUMENTS - 3.3 Related Guidance Material - 3.3.1 Europe p. 25

comment	*176* comment by: *AIRBUS* "Related Guidance Material" Guidance materials are given for software considerations (ED-12 and DO-178) but not for hardware considerations (ED-80 and DO-254) Suggested text: Add ED-80 in section 3.3.1 Add DO-254 in section 3.3.2
response	Accepted

comment	*253* comment by: *Thales Avionics* Operational Risk Analysis addresses database accuracy. In addition, ETSO-2C165a recognizes that misleading display of EMD or VSD in flight is a major condition and requires the use of DO-200/ED-76A for navigation databases. What is EASA position on database processing regarding EFB, and in particular, is there any requirement to address DO-200A/ED-76? In such case, update of section 3.3.1 and 3.3.2 should also be considered.
response	Partially accepted Software applications with failure conditions classified above 'minor' are ineligible as EFB Type A or B applications. DO-200/ED-76 is not mandatory for the databases associated to EFB software applications. EMD or VSD database quality is covered through ETSO-2C165a by DO-272/ED-99C. Additional references are included in sections 3.3.1 and 3.3.2.

comment	*332* comment by: *Thales Avionics* DO-254/ED-80 should be added to the reference documents to support hardware qualification as required per §5.1.3 and 6.1.3
response	Accepted

comment	*515* comment by: *Jeppesen Inc.* Suggest add "EASA AMC 25.1309 System and Design Analysis" Rationale: Used in document
response	Accepted

CONCLUSION ON COMMENTS ON PAGE 25 (DRAFT AMC 20-25 – RELATED GUIDANCE MATERIAL - EUROPE)

Please see below conclusion on comments received on paragraph 3.3.2 of proposed AMC 20-25.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 3 REFERENCE DOCUMENTS - 3.3 Related Guidance Material - 3.3.2 USA p. 25-26

comment	*2* comment by: *FAA* **Page 25, Para 3.3.2** **Comment:** FAA AC 120-76A Should be updated to AC 120-76B Reason for Comment: Clarification **Suggested Change**: Should read "FAA AC 120-76B'
response	Accepted The reference is updated

comment	*253* ❖ comment by: *Thales Avionics* Operational Risk Analysis addresses database accuracy. In addition, ETSO-2C165a recognizes that misleading display of EMD or VSD in flight is a major condition and requires the use of DO-200/ED-76A for navigation databases. What is EASA position on database processing regarding EFB, and in particular, is there any requirement to address DO-200A/ED-76? In such case, update of section 3.3.1 and 3.3.2 should also be considered.
response	Partially accepted Software applications with failure conditions classified above minor are ineligible as EFB Type A or B applications. DO-200/ED-76 is not mandatory for the databases associated to EFB software applications. EMD or VSD database quality

	is covered through ETSO-2C165a by DO-272/ED-99C. Additional references are included in sections 3.3.1 and 3.3.2.

comment	*330* comment by: *Thales Avionics* AC 120-76A should be replaced by AC 120-76B.
response	Partially accepted The reference is updated

comment	*332* ❖ comment by: *Thales Avionics* DO-254/ED-80 should be added to the reference documents to support hardware qualification as required per §5.1.3 and 6.1.3
response	Accepted

CONCLUSION ON COMMENTS ON PAGES 25-26 (DRAFT AMC 20-25 – RELATED GUIDANCE MATERIAL - USA)

In total, nine comments were received with recommendation to include additional material (i.e. AMC 25.1309, DO-254, ED-80, DO-200A, ED-76) or to refer to AC 120-76B instead of AC 120-76A.

These comments on pages 25-26 (draft Decision AMC 20-25- Related Guidance Material) are, at least, partially accepted.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 4 GLOSSARY OF TERMS IN THE CONTEXT OF THIS AMC p. 26

comment	*98* comment by: *NetJets Europe* The term "COTS" has dissapeared from the glossary of terms. Instead the term "Consumer Electronic Computing Device" is being used. Please add a definition of this term in this section.
response	Accepted Commercial Off-The-Shelf (COTS) is a term defined by the Federal Acquisition Regulation (FAR) in the USA, that refers to non-developmental items (NDI) sold in the commercial marketplace and used or obtained through government contracts. The term 'COTS' is widely used in the world. The Agency and the Review Group preferred to use the term 'consumer device' to refer to an item developed for non-aeronautical use. A definition of 'consumer device' has been added to paragraph 4 of the resulting text of AMC 20-25 as suggested by the comment.

comment	*114* comment by: *DGAC* The glossary of terms should include a definition for "risk assessment" and "Operational risk analysis" and indicate how they differ.

For instance, we propose to base the definition of "Operational risk analysis" on the fact that :
- this analysis is performed on the basis of potential failures or defaults in the systems taking into account hardware, software and operational environment (Human Factors, CRM, IHM) in the cockpit
- mitigations means have to be implemented
- feedback experience during operations should allow improvement of the system. This improvement may mean amendment of flight crew procedures (addition to the OPS Manual) and or ground staff procedures.

All the necessary elements for proper definitions can be found in §7.2 of the NPA.

response

Partially accepted

The definition of 'Operational Risk Assessment' is now replaced by 'EFB Risk Assessment and Mitigation' in accordance with other comments.

Definitions of 'Risk Assessment' or 'Risk Mitigation' are not added since such general definition could prove difficult to draft, while they are described in legal and technical literature. For instance, ICAO Doc 9859 (Safety Management Manual Manual) uses the term 'risk mitigation', referring to the process of incorporating defences or preventive controls to lower the severity and/ or likelihood of a hazard's projected consequence. This meaning is very general and applicable to any aviation topic, including EFB.

comment

157 comment by: *DGAC*

AMMD may also need a definition

response

Accepted

The definition has been added to paragraph 4 of the resulting text of AMC 20-25 as suggested by the comment.

comment

256 comment by: *Thales Avionics*

Definitions for "EFB Host Platform", "Application Developper" and "EFB Host Platform Developper" should be proposed

response

Accepted

The definitions have been added to paragraph 4 of the resulting text of AMC 20-25 as suggested by the comment.

comment

814 comment by: *Fédération Nationale de l'Aviation Marchande (FNAM)*

Among the list of terms used in this AMC, FNAM suggests introducing new definitions for Operational Risk Analysis (ORA) and Airport Moving Map Display (AMMD). Appendix H deals with AMMD, but it can be useful to introduce there the definition of the acronym; given that it is a recent system which didn't appear in the TGL 36.

response

Partially accepted

The definition of AMMD has been added to paragraph 4 of the resulting text of AMC 20-25 as suggested by the comment.

For ORA, please refer to the response to comment No 114.

CONCLUSION ON COMMENTS ON PAGE 26 (DRAFT AMC 20-25 – GLOSSARY OF TERMS)

Commentators on this segment requested new definitions for the following terms:

— Consumer (Electronic Computing) Device, which is different from COTS;

— Risk Assessment;

— Operational Risk Analysis (requested 2 times);

— AMMD (requested 2 times);

— EFB Host Platform;

— SW Application Developer; and

— EFB Host Platform Developer;

Several commentators also requested that the Agency's definitions remain consistent with those envisaged at ICAO level.

The Agency agrees in principle to add the proposed definitions with the exception of 'Risk Assessment' which is a process described in legal and technical literature, but for which a clear-cut and simple definition could prove difficult to draft.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 4 GLOSSARY OF TERMS IN THE CONTEXT OF THIS AMC - 4.1 Aircraft Administrative Communications (AAC) p. 26

comment *79* comment by: *Grégory DELBEKE*

Page 26 of 72, item B. II. 4.1:

The BCAA proposes to change the abbreviation of Airline Operational Communication (AOC) to avoid confusion with Air Operator Certificate.

response Not accepted

Both terms are industry standards, and the confusion can be avoided thanks to the context. It is, therefore, proposed to keep AOC as it is.

CONCLUSION ON COMMENTS ON PAGE 26 (DRAFT AMC 20-25 – AAC)

Only one comment received, requesting to change the acronym 'AOC' (Airline Operational Communication) to avoid possible confusion with Air Operator Certificate.

The Agency agrees that the two terms have a totally different meaning, but an identical acronym, which may cause confusion. However, both terms have been widely used by the industry and ICAO for decades. This tradition cannot be changed by an Agency's AMC, while the confusion could be avoided thanks to the context.

In summary, this comment to the proposed AMC 20-25 does not produce any change in the resulting text.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 4 GLOSSARY OF TERMS IN THE CONTEXT OF THIS AMC - 4.2 Portable Electronic Device (PED) p. 26

comment *746* comment by: *Jeppesen Inc.*

Recommended Wording Change:
A controlled PED is subject to administrative control by the operator using it. This may include, but is not limited to, tracking the location of the devices to specific aircraft or persons and ensuring that changes made to the hardware, software or databases are authorised by the operator. A controlled PED will also be subject to procedures to ensure software and data currency and/or version control, as required.

Rationale:
An operator may desire to allow some safe, minor changes or updates to the device at the discretion of the crew, increasing its utility and value. This should be allowable provided that the operator can demonstrate that the configuration remains stable despite certain permitted minor changes by the crew. The current text can be interpreted in a manner that may prove to be too restrictive for the needs of some operators and the inherent stability of some configurations. The governing agency will be able to assess whether adequate configuration control has been administered, appropriate to the operator's requirements. The last sentence was changed to reflect an operator's option to 'freeze' the configuration of a software application, if needed. In other words, an operator is not required to adopt the latest version of a software application, if a newer version is available.

response Noted

The definition has been amended due to other comments in 4.3. The last sentence has been removed since the requirements are set forth in the relevant part of chapter 7.

CONCLUSION ON COMMENTS ON PAGE 26 (DRAFT AMC 20-25 – PED)

Only one comment received, whose content is, however, related to Section 4.3 or proposed AMC 20-25.

The subject is discussed in the context of the said Section 4.3, immediately below in this CRD.

This comment to the proposed AMC 20-25 does not produce any change in the resulting text.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 4 GLOSSARY OF TERMS IN THE CONTEXT OF THIS AMC - 4.3 Controlled Portable Electronic Device (PED) p. 26

comment *38* comment by: *NetJets Europe*

"A controlled PED will also be subject to procedures to ensure that it is maintained to the latest amendment state."

It should read instead: "A controlled PED will also be subject to procedures to ensure that it is maintained to the latest CONTENT amendment state and to the CURRENT configuration approved by the operator (EFB Administrator)."
Because it could happen that there is an Operating System update available, but

	for technical or operational reasons it is decided not to update. The requirement for latest amendment should only be applicable to the content not the operating system.
response	Noted The Agency concurs with the opinion that operators should not be forced to adopt the latest versions of software unless there is evidence of safety or security issues in the previous version. The provisions in the last sentence have, however, been moved to the relevant chapter (EFB administrator duties).

comment	*257* comment by: *Thales Avionics* "Tracking the location of the devices": what does this statement cover? Is the intent is to request geographic localization of the device or to know if the device is within/outside the aircraft and under whose responsibility?
response	Accepted Clarified: 'Tracking the location' is corrected to 'Tracking the allocation'.

comment	*258* comment by: *Thales Avionics* "no unauthorized changes are made to the hardware, software or databases": It should be clarified that the configuration control of the device need only be enforced while on the aircraft: changes may be performed on ground and controled configuration be restored while installed on the aircraft.
response	Noted This sentence has been moved to the EFB administrator chapter. The EFB administrator will be responsible to enforce those requirements for the EFB when in operational use, i.e. in the aircraft, or on ground when used by the flight crew.

comment	*724* comment by: *NetJets Europe* Currently reads: A controlled PED is subject to administrative control by the operator using it. This will include, inter alia, tracking the location of the devices to specific aircraft or persons and ensuring that no unauthorised 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. Recommended Change: A controlled PED is subject to administrative control by the operator using it. This may include, but is not limited to, tracking the location of the devices to specific aircraft or persons and ensuring that changes made to the hardware, software or databases are authorised by the operator. A controlled PED will also be subject to procedures to ensure software and data currency and/or version control, as required. Rationale: An operator may desire to allow some safe, minor changes or updates to the device at the discretion of the crew, increasing its utility and value. This should be allowable provided that the operator can demonstrate that the configuration

	remains stable despite certain permitted minor changes by the crew. The current text can be interpreted in a manner that may prove to be too restrictive for the needs of some operators and the inherent stability of some configurations. The governing agency will be able to assess whether adequate configuration control has been administered, appropriate to the operator's requirements. The last sentence was changed to reflect an operator's option to 'freeze' the configuration of a software application, if needed. In other words, an operator is not required to adopt the latest version of a software application, if a newer version is available. (Source: Executive Jet Management, a NetJets company)
response	Noted The Agency concurs with the opinion that operators should not be forced to adopt the latest versions of software, unless there is evidence of safety or security issues in the previous version. The last sentence has been removed since the requirements are set forth in the relevant part of chapter 7.

comment	*779* comment by: *Ingo Pucks, Owner IP Aerospace* 4.3 Does tracking then mean if a device is allocated or related to a specific aircraft or person it is controlled? In today's aviation environment only those devices that are controlled 100% of the time can be considered as such. Furthermore, all devices allowing for data communication, specifically wireless, might be subject to unlawful interference at any time.
response	Accepted Clarified: 'Tracking the location' is corrected to 'Tracking the allocation'.

comment	*914* comment by: *CMC Electronics* **Concerns and Issues:** 4.3 Controlled Portable Electronic Device (PED) The definition proposed is generally clear in intent but it may be useful to add minimum criterion that would satisfy the objective of ensuring no authorized changes are made to the hardware, software or databases. It may also be useful to clarify what the statement "maintaining to the latest amendment state" involves. For an avionics type equipment, this may mean to the latest applicable part number revision or mod. It is not clear how this would apply to a PDA or other devices in this context.
response	Partially accepted The definition of C-PED has been clarified, also considering the suggestions received through this comment and others above. Mention of the 'latest amendment' has been removed.

CONCLUSION ON COMMENTS ON PAGE 26 (DRAFT AMC 20-25 – CONTROLLED PED)

Six comments were received, proposing changes to the definition of 'Controlled PED'.

The Agency accepts the proposal (reiterated several times) on the modification of the last sentence: 'operators should not be forced to adopt the latest versions of software, unless there is evidence of safety or security issues in the previous version'.

Furthermore, the clarification of the notion of 'location tracking' was requested twice. The Agency agrees that the wording published in the NPA was misleading and, therefore, it has partially accepted the suggestion and tried to improve the wording.

Finally, the Agency cannot accept changes to the device at the discretion of the operator without controlled processes. The same applies to authorising uncontrolled changes while in 'non-EFB' use. The definition of C-PED has, however, been reworded to be clearer.

The resulting text of AMC 20-25, where the expressions 'location tracking' and 'latest amendment' are no longer used, is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 4 GLOSSARY OF TERMS IN THE CONTEXT OF THIS AMC - 4.4 Data Connectivity for EFB Systems p. 26

comment	*259* comment by: *Thales Avionics* The AMC does not address the questions related to EFB data connectivity with ground, either in flight (satellite communicaiton for example) or on ground (Wireless connection at gate for example). Guidance is needed on this area.
response	Accepted Further guidance has been included to clarify that these connections, under specified conditions, are allowed even in the case of portable EFB.

comment	*780* comment by: *Ingo Pucks, Owner IP Aerospace* 4.4 A distinction between connectivity to the aeroplane's systems and with other devices, systems or the environment might be helpful here.
response	Accepted The clarification has been included.

CONCLUSION ON COMMENTS ON PAGE 26 (DRAFT AMC 20-25 – DATA CONNECTIVITY)

Two comments were received on the definition of 'data connectivity' on page 26.

The Agency recognises the need to distinguish between T-PED (i.e. GSM, Bluetooth) and data connectivity with aircraft systems which can be wired or wireless.

Further guidance is included in the resulting text of AMC 20-25, which is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 4 GLOSSARY OF TERMS IN THE CONTEXT OF THIS AMC - 4.5 Electronic Flight Bag (EFB) p. 26

comment	*3* comment by: *FAA*

Page 26 Para 4.5

Comment:
EFB definition is not in alignment with AC 120-76B. It does not explain if the system becomes a PED if the function for EFB is not being displayed.

Note: The FAA has not yet approved theuse of an EFB by Cabini Crew (Flight Attendants)

Reason for Comments:
Harmonization of definitions.

Should Read:

" An electronic display system intended primarily for flight deck use that includes the hardware and software necessary to support an intended function. An EFB must be able to host Type A and/or Type B sofware applications."

response

Partially accepted

In agreement with the Review Group, including FAA, the definition has been replaced by the one recommend to ICAO by the last meeting of the OPS Panel (WG-WHL/15; March 2013).

comment

260 comment by: *Thales Avionics*

The case of electronic display systems intended to be used by the maintenance crew is not explicitely addressed. Should such systems be considered to be EFB as per this definition?

response

Noted

The definition has been replaced by the ICAO one. For now, PED used by cabin or maintenance crew are out of scope of the AMC and not considered EFB applications.

comment

381 comment by: *Garmin International*

The EFB definition is too broad. As written, it encompasses current functions/capabilities performed on TSOd multi-function displays ("e.g., navigation charts, operating manuals, performance calculations") and thus could unnecessarily require additional certification approval activity that hinders installation and operational approval of these functions/capabilities. In particular, re-opening evaluations of functions/capabilities previously accepted as part of a TSO and TC/STC does not enhance safety and instead will hinder the use of these safety enhancing functions/capabilities.

Recommend explicitly excluding functions/capabilities that have airworthiness approval as part of aircraft type design from this AMC.

response

Partially accepted

EFBs can, indeed, be installed and certified or covered by ETSOs, and host Type A or B EFB applications. The operational evaluation has still to be performed, but credit may be taken from the work already done during the certification process. As mentioned in the general conclusions, existing TC/STCs and operational approvals are grand-fathered in. The applicability date of AMC 20-25 ('non-retroactive' like any Agency's AMC) will be specified in the Decision of the

	Executive Director which will adopt the final text.

comment	*610* comment by: *Monarch Airlines* The definition of an EFB needs to make clear that it is designed for use in the cockpit in flight. This is required to differentiate it from a Portable Electronic Device used on the ground only. The definition could be amended to read '... accomplished using paper references (eg....) in flight.'
response	Not accepted The definition has been replaced by the ICAO one. However, it is not restricted to the use in flight, since the use on ground is also relevant (airport maps, performance computation on ground).

comment	*690* comment by: *Thomson Airways* Should stipulate "on the ground or in some/all phases of flight".
response	Partially accepted The definition has been replaced by the ICAO one. The definition is general enough to encompass the cases requested here.

comment	*781* comment by: *Ingo Pucks, Owner IP Aerospace* 4.5, This definition is pretty imprecise. Firstly, an EFB is not only a display device as it may provide data computation capabilities and data storage capabilities. It might be an idea to differentiate between "read only" devices, that is a device that allows only to read previously uploaded (and hence "controlled" documentation) - however some of these could be considered "read and execute" (such as OM part A-D), "read and send" devices, that would be a device that would allow to alter or add previously uploaded (and hence "controlled" incoming documentation but uncontrolled outgoing documentation), i. e. a flight plan return, "read and calculate" devices, such as an aircraft performance calculation, which also could be considered a "read, calculate and execute" device.
response	Partially accepted The definition has been replaced by the ICAO one. It does no longer define an EFB as a 'display system'. The definition does not differentiate between 'read only' and other devices but those issues are covered by the various chapters in the operational assessment process.

CONCLUSION ON COMMENTS ON PAGE 26 (DRAFT AMC 20-25 – EFB)

The five comments received on this section are quite varied. However, the idea that the definition is too broad or too imprecise is expressed several times.

The Agency accepts the intent of the said comments and proposes a revised definition in line with the current ICAO proposed standard, as stemming from the OPS Panel (March 2013). In particular and as commented, the wording of 'display system' has been removed, since 'display' is not the primary function of an EFB.

Commentators inquired about the devices used by cabin crew and maintenance crew. The

Agency clarifies that PED (or T-PEDs) used by cabin crew are out of scope of AMC 20-25.

One commentator suggested mentioning that an EFB is necessarily used in flight. While this may be true for the majority of cases, use on ground is also part of the use of EFBs (e.g. airport maps, performance computation on ground).

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 4 GLOSSARY OF TERMS IN THE CONTEXT OF THIS AMC - 4.6 EFB Administrator p. 26

comment

104 comment by: *AT-CAA-PAM*

A clear statement should be add, that the EFB Administrator must be capable and responsible to maintain, check and distribute minor software and database updates from the software/database provider for EFB's.

e.g. some performance applications are distributed 13x per year (Airac cycle) and contain minor software updates. So, an evaluation / approval from outside the company cannot be required. Therefore, only the involved EFB Administrator can take care of this task.
Also Jeppesen as an Approach Chart provider distributes software updates (bugfixes and minor improvements) where the basic idea of a 6 month EASA approval procedure would be an overkill.

response

Accepted

The management of changes to the EFB is now addressed by the new paragraph 7.3. Minor software updates and database updates, when within the criteria exposed in this paragraph, do not require an approval. Those changes will, therefore, be performed by the administrator (or under its responsibility).

comment

261 comment by: *Thales Avionics*

In the case the EFB is attached to the pilot, if the administrator is the sole person capable of introducing software or database changes, how can be adressed the data that the crew may prepare or retrieve while on ground for the preparation of the flight?

response

Noted

The EFB administrator is responsible for the configuration management of the EFBs. According to the established EFB procedures, of course, the crew can insert data and update databases.

comment

699 comment by: *AT-CAA-PAM*

4.6 EFB Administrator
Due to the important role the EFB Admin has to fulfill add to clearify the position and responsibilities:

ADD: The EFB Administrator must be acceptable to the authority.

after ..that no unauthorised software is installed. Add: He is furthermore responsibly to track and install and check updates of Software including Mass and Balance and performance updates. This includes new performance and mass and balance software.

response

Partially accepted

The review of the administrator qualifications and role in the companies is part of an operational assessment process. Therefore, the authority can accept, note, or reject the operator's proposals based on the procedures defined according to rule ORO.GEN.130 in Commission Regulation (EU) No 965/2012.

In any case, the role of the EFB administrator has been detailed further in the relevant paragraph (7.11) stating, in particular, that the administrator is responsible to ensure the integrity of the data packages, covering performance and mass and balance databases.

comment

725 comment by: *NetJets Europe*

Currently reads:
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 and software suppliers. 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 unauthorised 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.

Recommended Change:
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 and software suppliers. 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 changes made to the software or databases are as authorised by the operator.. He/she will also be responsible to ensure software and data currency and/or version control, as required.

Rationale:
An operator may desire to allow some safe, minor changes or updates to the device at the discretion of the crew, increasing its utility and value. This should be allowed provided that the operator can demonstrate that the configuration remains stable despite certain permitted minor changes by the crew. The current text can be interpreted in a manner that may prove to be too restrictive for the needs of some operators and the inherent stability of some configurations. The governing agency will be able to assess whether adequate configuration control has been administered, appropriate to the operator's requirements. The last sentence was changed to reflect an operator's option to 'freeze' the configuration of a software application, if needed. In other words, an operator is not required to adopt the latest version of a software application, if a newer version is available.

(Source: Executive Jet Management, a NetJets company)

response

Noted

The Agency concurs with the opinion that operators should not be forced to adopt the latest versions of software, unless there is evidence of safety or security issues in the previous version.

Please see also reply to comment No 261..

comment	*747* comment by: *Jeppesen Inc.* Recommended Wording Change: 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 and software suppliers. 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 changes made to the software or databases are as authorised by the operator.. He/she will also be responsible to ensure software and data currency and/or version control, as required. Rationale: An operator may desire to allow some safe, minor changes or updates to the device at the discretion of the crew, increasing its utility and value. This should be allowed provided that the operator can demonstrate that the configuration remains stable despite certain permitted minor changes by the crew. The current text can be interpreted in a manner that may prove to be too restrictive for the needs of some operators and the inherent stability of some configurations. The governing agency will be able to assess whether adequate configuration control has been administered, appropriate to the operator's requirements. The last sentence was changed to reflect an operator's option to 'freeze' the configuration of a software application, if needed. In other words, an operator is not required to adopt the latest version of a software application, if a newer version is available.
response	Noted Please see reply to comment No 725..

comment	*782* comment by: *Ingo Pucks, Owner IP Aerospace* 4.6 Having highlighted the similarities to avionics components, it might be worth considering the EFB administrator not only responsible for the administration but also for the continued airworthiness or operational airworthiness of the device. As such he/she might have an importance within the operational department as well as in the training and technical department of the operator. This cross functional responsibility is probably unique for an operator and might require specific training and regulation.
response	Noted This is, in fact, addressed by paragraphs 7.11 and 7.12 of the resulting text of AMC 20-25.

comment	*815* comment by: *Fédération Nationale de l'Aviation Marchande (FNAM)* Within the definition of an EFB administrator, it should be specified that a pilot can held the responsibility for the administration of the EFB system, and its tasks of EFB administrator should not be conducted during his flight duty period.
response	Noted The current definition does not prevent the administrator from being a pilot as well. The administrator duties should, indeed, not be performed during the flight duty period, but this is covered by generic regulations (OPS, FCL).

CONCLUSION ON COMMENTS ON PAGE 26 (DRAFT AMC 20-25 – EFB

ADMINISTRATOR)

A few commentators proposed to make clear in the definition that the administrator can handle minor changes/updates software and databases.

The Agency agrees with the principle; however, any privileges have to be spelled out in the rules and not in the definitions. The same applies to the 'acceptability' of the administrator by the NAA.

It is, therefore, proposed to move the second paragraph of the definition proposed by the NPA, to paragraph 11 of AMC 20-25.

In addition, the new paragraph 7.3 clarifies which changes to the EFB never require an approval, and which require the application of authority-approved evaluation procedures.

A comment mentions that the administrator should be responsible for 'the continued airworthiness or operational airworthiness of the device'. This is, in fact, addressed in paragraph 7.11 and paragraph 7.12 of AMC 20-25.

The current definition does not prevent the administrator from being a pilot as well. A commentator wished to include a mention that the administrator duties should not be performed during the flight duty period. The Agency believes this is already covered by FCL and OPS regulations.

Finally, the resulting text of AMC 20-25 does not explicitly require any approval. Approvals are only needed when required by rule ORO.GEN.130 in Commission Regulation (EU) No 965/2012, which allows sufficient flexibility for competent authorities to grant privileges to certified operators in relation to changes.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 4 GLOSSARY OF TERMS IN THE CONTEXT OF THIS AMC - 4.7 EFB System p. 26

comment	*783* comment by: *Ingo Pucks, Owner IP Aerospace* 4.7 HW and SW only are usually accompanied, in the case of the EFB certainly, by all kinds of data (i. e. aeronautical data, such as manuals, tables, charts and many more). Hence it is proposed to divide an EFB system in the three subsystems HW, SW and data. For data considerations as such outlined in Do-200A might be applicable and a basis for regulatory aspects.
response	Partially accepted The definition has been modified to distinguish hardware and software (including databases).

comment	*922* comment by: *Tyler Clark - Transport Canada Civil Aviation* **Section 4** **Glossary of terms** **(page 26)** 4.7 EFB system definition should include the EFB battery, aircraft connectivity (including power and data) and potential input devices (e.g. keyboards).
response	Partially accepted The definition recommended to ICAO as a standard, by the WG-WHL of the OPS Panel in March 2013, is used in the resulting text of AMC 20-25.

CONCLUSION ON COMMENTS ON PAGE 26 (DRAFT AMC 20-25 – EFB SYSTEM)

Two comments were received, suggesting, for clarity purposes, to include as part of the EFB system definition:

— 'data' comprising the databases and files that are necessary for the EFB software to run; and

— EFB battery, aircraft connectivity (including power and data) and potential input devices (e.g. keyboards).

The two comments have been partially accepted and the definition has been revised.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 4 GLOSSARY OF TERMS IN THE CONTEXT OF THIS AMC - 4.8 EFB Software Application p. 27

comment	*784* comment by: *Ingo Pucks, Owner IP Aerospace* 4.8 A SW application is often, possibly always, accompanied by data, which is either (pre)-stored, compiled, computed or otherwise changed and/or presented to the user.
response	Noted Already addressed by the comment to section 4.7.

comment	*923* comment by: *Tyler Clark - Transport Canada Civil Aviation* **Section 4** **Glossary of terms** 4.8 EFB Software Application (page 27) definition to include associated databases
response	Not accepted The Agency prefers to keep the definition more general. The application may include databases, if appropriate.

CONCLUSION ON COMMENTS ON PAGE 27 (DRAFT AMC 20-25 – EFB SOFTWARE APPLICATION)

Two comments, similar to those provided in relation to Section 4.7 of AMC 20-25 mentioned above, were received.

The two comments have been not accepted since the definition on software applications (4.11) does not need to be modified.

The text of section 4.8 in AMC 20-25 is, therefore, not directly affected.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 4 GLOSSARY OF TERMS IN THE CONTEXT OF THIS AMC - 4.9 Interactive Information p. 27

comment	*45* comment by: *Air France* Interactive information and pre-composed information definitions could be removed as the application nomenclature (type A and type B) doesn't use them anymore.
response	Accepted The definitions have been removed.

comment	*785* comment by: *Ingo Pucks, Owner IP Aerospace* 4.9 Interactive Information is, given our comments to section 4.7 and 4.8 data.
response	Noted Already addressed by the comment to section 4.7. This definition has been removed.

CONCLUSION ON COMMENTS ON PAGE 27 (DRAFT AMC 20-25 – INTERACTIVE INFORMATION)

One comment proposes to remove this definition since it is no longer used due to the new definitions of software types (A and B).

The Agency agrees.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 4 GLOSSARY OF TERMS IN THE CONTEXT OF THIS AMC - 4.10 Minor failure condition p. 27

comment	*80* comment by: *Grégory DELBEKE* **Page 27 of 72, item B. II. 4.10:** The BCAA would suggest to replace the word “reduce” in the first sentence by “affect”.
response	Not accepted The text is aligned with AMC 25.1309.

comment	*126* comment by: *DGAC* Is it relevant to refer to "minor failure condition" (4.10) and "no safety effect" (4.12) when, in this NPA, such concepts apply to not approved software implemented on equipment possibly not approved either? See §5.2.1, §5.2.2, §7 (page 41), Appendix A (page 50), Appendix B (page 51) etc where such terms are used...
response	Not accepted The intention of AMC 20-25 is not to request qualification of the Type A and Type B software according to the safety repercussions. This AMC and also FAA AC

120-76B include criteria referring to 'minor failure effect'.

comment *177* comment by: *AIRBUS*

"4.10 Minor failure condition
[…] Further guidance can be found in the AMC 25.1309."

Failure Condition terminology and reference to AMC 25.1309 could be misleading. Indeed, AMC 25.1309 is out of the Operational approval scope. AMC 25.1309 is not applicable to Portable EFB Class 1 and 2 H/W and to Type A & B Software applications. By referring AMC 25.1309, the applicant should interpret it as being required to carry out a system safety assessment (FHA, pSSA, SSA) in accordance with §§ 25.1309 and ARP 4754 during the OPS approval process. See comment as well about section 5.2.2.b). (Type B software application vs minor failure condition).
Since it is proposed not to use minor failure condition in the rest of the document (see other relevant comments), it is proposed to remove this definition from section 4.

Suggested text:
Remove section 4.10

response Not accepted

Please see reply to comment No 126.

comment *278* comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 7 shared with Airbus

JUSTIFICATION for the Comment on page # 27 §4.10 […] Further guidance can be found in the AMC 25.1309.

Failure Condition terminology and reference to AMC 25.1309 could be misleading. Indeed, AMC 25.1309 is out of the Operational approval scope. AMC 25.1309 is not applicable to Portable EFB Class 1 and 2 H/W and to Type A & B Software applications. By refering AMC 25.1309, the applicant should interpret it as being required to carry out a system safety assement (FHA, pSSA, SSA) in accordance with §§ 25.1309 and ARP 4754 during the OPS approval process. See comment #21 as well about section 5.2.2.b). (Type B software application vs minor failure condition).
Since it is proposed not to use minor failure condition in the rest of the document (see other relevant comments), it is proposed to remove this definition from section 4.

PROPOSED TEXT / COMMENT
Remove section 4.10

response Not accepted

Please see reply to comment No 126..

comment *441* comment by: *Oliver Ast (CLH)*

Remove section 4.10

Failure Condition terminology and reference to AMC 25.1309 could be misleading. Indeed, AMC 25.1309 is out of the Operational approval scope. AMC 25.1309 is not applicable to Portable EFB Class 1 and 2 H/W and to Type A & B Software applications. By refering AMC 25.1309, the applicant should interpret it as being required to carry out a system safety assement (FHA, pSSA, SSA) in accordance with §§ 25.1309 and ARP 4754 during the OPS approval process. See comment #13 about minor failure condition vs Type B software application. Since it is proposed not to use minor failure condition in the rest of the document (see other relevant comments), it is proposed to remove this definition from section 4.

response

Not accepted

Please see reply to comment No 126..

comment

505 comment by: *Star Alliance*

Original AMC20-25 NPA text:
4.10 Minor failure condition […] Further guidance can be found in the AMC 25.1309.
RATIONALE / REASON / JUSTIFICATION for the Comment :
Failure Condition terminology and reference to AMC 25.1309 could be misleading. Indeed, AMC 25.1309 is out of the Operational approval scope. AMC 25.1309 is not applicable to Portable EFB Class 1 and 2 H/W and to Type A & B Software applications. By refering AMC 25.1309, the applicant should interpret it as being required to carry out a system safety assement (FHA, pSSA, SSA) in accordance with §§ 25.1309 and ARP 4754 during the OPS approval process. See comment #13 about minor failure condition vs Type B software application.Since it is proposed not to use minor failure condition in the rest of the document (see other relevant comments), it is proposed to remove this definition from section 4.
PROPOSED TEXT / COMMENT:

Remove section 4.10

response

Not accepted

Please see reply to comment No 126.

comment

639 comment by: *Deutsche Lufthansa AG*

Proposal:

Delete 4.10

Comment/Justification:

Failure Condition terminology and reference to AMC 25.1309 could be misleading. Indeed, AMC 25.1309 is out of the Operational approval scope. AMC 25.1309 is not applicable to Portable EFB Class 1 and 2 H/W and to Type A & B Software applications. By refering AMC 25.1309, the applicant should interpret it

as being required to carry out a system safety assement (FHA, pSSA, SSA) in accordance with §§ 25.1309 and ARP 4754 during the OPS approval process. See also our comment about minor failure condition vs Type B software application.
Since it is proposed not to use minor failure condition in the rest of the document (see other relevant comments), it is proposed to remove this definition from section 4.

response | Not accepted

Please see reply to comment No 126.

comment | *786* comment by: *Ingo Pucks, Owner IP Aerospace*

4.10 It is suggested to apply the failure conditions used in safety and risk assessment of electronic HW and SW as lined out in the relevant regulatory material, such as CS-25, DO-178, Do-254, Do-294 and alike. benefit is to reduce the number of different approaches to establish, conduct and maintain risk and saftey assessments.

response | Noted

Nevertheless, the intention of AMC 20-25 is not to request qualification of the Type A and Type B software or associated hardware according to the safety repercussions, but to use this to discriminate the functions which are not eligible as EFB Type A or B

CONCLUSION ON COMMENTS ON PAGE 27 (DRAFT AMC 20-25 – MINOR FAILURE CONDITION)

Eight comments were received. Seven of them requested the removal of the definition and one suggested a wording change.

The justification provided to remove the definition is not considered acceptable to the Agency.

Also, FAA AC 120-76B includes criteria referring to 'minor failure effect'.

Furthermore, the intention of AMC 20-25 is not to request qualification of the Type A and Type B software according to the safety repercussions.

The comments on page 27 (draft Decision AMC 20-25- MINOR FAILURE CONDITION) do not produce any change in the resulting text of the proposed rules.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 4 GLOSSARY OF TERMS IN THE CONTEXT OF THIS AMC - 4.11 Mounting Device p. 27

comment | *4* comment by: *FAA*

Page 27, Para 4.11

Comment:
AC 120-76B definition has been updated.

Reason for Comment:
Harmonization of definitions.

Suggested Change:
" A mounting device secures portable equipment. It may include arm mounted,

kneeboard, cradle or docking stations, etc. It may have provisions for aircraft power and data connectivity. It may require quick disconnect for egress."

response

Partially accepted

The intent of the comment is supported. However, the Agency proposes a much shorter revised definition with wording very close to the FAA definition.

comment

28 comment by: *SKY JET AG*

AMC 20-25, 5 SYSTEM DESCRIPTION AND CLASSIFICATION OF EFB SYSTEMS, 5.1.1 Class 1:

Class 1 EFB systems are stowed during critical phases of flight. However, in the case of electronic aeronautical chart applications, the competent authority may allow its use during critical phases of flight, provided the Class 1 EFB is used with a kneeboard system and is securely attached to the pilot in a manner which allows its normal use and meets the criteria specified in paragraphs 6.1.2.1 and 6.1.2.2.

There may be better systems to securely attach a Class 1 EFB in the case of electronic aeronautical chart applications than on pilots kneeboard system.

AMC 20-25, 4.11 Mounting Device
A mounting device builds up portable equipment. It may include arm-mounted, kneeboard, cradle, or docking-stations, etc. It may have aircraft power and data connectivity. It may require quick-disconnect for egress.

Portable equipment brought to an aircraft need not to be certified in any aircraft, since they do not belong to the aircraft's TCDS or STC. In addition;

Annexes to the draft Commission Regulation on 'Air Operations - OPS'
Annex IV 'Part-CAT'
CAT.IDE.A.100 Instruments and equipment — general

(a) Instruments and equipment required by this Part shall be approved in accordance with Regulation (EC) No 1702/2003, except for the following items:

(1) Spare fuses;
(2) Independent portable lights;
(3) An accurate time piece;
(4) Chart holder;
(5) First-aid kits;
(6) Emergency medical kit;
(7) Megaphones;
(8) Survival and signalling equipment;
(9) Sea anchors and equipment for mooring; and
(10) Child restraint devices.

CAT.IDE.A.100 Instruments and equipment — general clearly states that chart holders do not need to have an approval in accordance with Regulation (EC) No 1702/2003. Modern electronic aeronautical chart applications are lightweight and its masses close to or similar to paper chart folders. It should therefore be possible to fix such a electronic aeronautical chart application unit into the same chart holder as used for paper chart folders, and not only on kneeboards as sugested in the AMC 20-25 5.5.1.

Therefore, AMC 20-25, 5.1.1 Class 1 should be amended with

Definition:
Class 1 EFB systems:

a. Are not attached to any aircraft mounting device;
b. Are without aircraft data connectivity;
c. paragraph a. does not apply to Class 1 EFB electronic aeronautical chart applications.

And be amended with

Complementary characteristics:
Class 1 EFB systems are stowed during critical phases of flight. However, in the case of electronic aeronautical chart applications, the competent authority may allow its use during critical phases of flight, provided the Class 1 EFB is ~~used with a kneeboard system and is~~ securely attached ~~to the pilot~~ in a manner which allows its normal use and meets the criteria specified in paragraphs 6.1.2.1 and 6.1.2.2.

response

Partially accepted

The kneeboard is not considered to be a mounting device; instead 'viewable stowage' concept is included. The revised AMC text does not make any distinction between Class 1 and Class 2. The notion, that a chart holder, as covered by CAT.IDE.A.100, is suitable to hold an electronic device, is not supported by the Agency on a general basis. The suitability of any viewable stowage not certified as part of the aircraft (TC or STC) needs to be assessed prior to operational use.

comment

236 comment by: *DGAC*

A "kneeboard" does not need any mounting device. If such equipment is quoted, this clarification should be made. As a consequence, defnition of "mounting device" could be slightly amended as follows :

"A mounting device builds up portable equipment **attached to the aircraft's structure**. It may include arm-mounted, ~~kneeboard,~~ cradle, or docking-stations, etc. It may have aircraft power and data connectivity. It may require quick-disconnect for egress.
Note : a kneeboard does not need any mounting device and, as such, is attached to the aircraft as they."

response

Partially accepted

The intent of the comment is supported. The definition has been amended. The kneeboard is not considered to be a mounting device.

comment

262 comment by: *Thales Avionics*

It is important that data connectivity capability for mounting device remains in the final release of this document.

response

Noted

Nothing prevents to integrate additional functionality (e.g. connectivity) in the mounting device.

comment	*442* comment by: *Oliver Ast (CLH)* "Mounting" should only be used related to attachment of EFB to aircraft. In case of attachment to pilot the term "securing device" is more appropriate.
response	Partially accepted In fact the kneeboard is not considered to be a mounting device; instead, 'viewable stowage' concept is included.

comment	*506* comment by: *Star Alliance* **Original AMC20-25 NPA text:** 4.11 Mounting Device A mounting device builds up portable equipment. It may include arm-mounted, kneeboard, cradle, or docking-stations, etc. It may have aircraft power and data connectivity. It may require quick-disconnect for egress. **RATIONALE / REASON / JUSTIFICATION for the Comment :** "Mounting" should only be used related to attachment of EFB to aircraft. In case of attachment to pilot the term "securing device" is more appropriate.
response	Partially accepted Please see reply to comment No 442.

comment	*574* comment by: *ERA* ERA members request EASA remove the sentence "It may require quick-disconnect for egress". The reason is that this goes against the later requirement to consider the security of the hardware (page 45, 7.8) against manipulation, etc. Also the design of the mount should be taken into consideration so that it does not obstruct ingress/egress (6.1.2.1. page 34).
response	Accepted The sentence has been removed from the definition.

comment	*640* comment by: *Deutsche Lufthansa AG* <u>Proposal:</u> Use term "securing device". <u>Comment/Justification:</u> "Mounting" should only be used related to attachment of EFB to aircraft. In case of attachment to pilot the term "securing device" is more appropriate.
response	Partially accepted Please see reply to comment No 442.

comment	*703* comment by: *ANE (Air Nostrum) OPS QM*

	- 4. Glossary, 4.11. (page 27), remove the sentence "It may require quick-disconnect for egress". This goes against the later requirement to consider the security of the hardware (page 45, 7.8) against manipulation, etc. Also the design of the mount should take into consideration that it does not obstruct ingress/egress (6.1.2.1. page 34)
response	Accepted Please see reply to comment No 574.

comment	*787* comment by: *Ingo Pucks, Owner IP Aerospace* That is either a mechanical or electrical or electronic interface with its intended operating environment (aircraft, cockpit etc.) and any combination hereof. This definition opens a broader perspective on the subject matter and resulting regulatory approaches.
response	Noted

comment	*903* comment by: *SAT-WAY sa* As SAT-WAY is only a manufacturer of hardware and wireless mobile communication on the ground, these comments will be limited to hardware issues. Reading the received NPA 2012-02, we have the following comments: 1. Mounting devices (4.11 page 27) No details are given on minimum mechanical requirements applicable on mounting devices. For fixed installations, should the 9G crash test be sufficient?
response	Noted The installed mounting devices need to be compliant with the applicable certification basis. Section 3.2. Related Certification Specification has been updated.

CONCLUSION ON COMMENTS ON PAGE 27 (DRAFT AMC 20-25 – MOUNTING DEVICE)

11 comments were received, requesting mainly to:

— clarify that a 'kneeboard' is a securing device and not a(n) (aircraft) mounting device;

— remove 'quick-disconnect for egress' (which is only a possibility);

— harmonise the definition with FAA AC 120-76B.

The current FAA definition is more a list of examples: '... include arm-mounted, cradle, clips, docking stations, etc.'

The Agency agrees that the definition of 'mounting device' proposed by the NPA (i.e. '… builds up portable equipment') should be made clearer and improved. However, adding examples or other details to the definition does not address the root of the problem.

Therefore, while the technical content remains aligned with the stakeholder proposals and, in addition, the wording is very close to the FAA definition, the Agency proposes a much shorter revised definition, based on the principles of rule 21A.303 (i.e. 'installed' parts approved through the airworthiness processes, as parts of the aircraft design):

'A mounting device is an aircraft certified part which secures portable or ...'

Requirements should never be included in a definition; equally, examples are not considered necessary in a definition.

In line with the current FAA views and the advice from the Review Group, the Agency also proposes a definition for 'viewable stowage' (not certified) in the resulting text of AMC 20-25 as presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 4 GLOSSARY OF TERMS IN THE CONTEXT OF THIS AMC - 4.12 No Safety Effect p. 27

comment	*178* comment by: *AIRBUS* "4.10 No Safety Effect […] Further guidance can be found in the AMC 25.1309." See similar comment about section 4.10 (Definition of minor failure condition). See comment about section 5.2.1 (Type A definition vs NSE failure condition). Suggested text: Remove section 4.12
response	Not accepted Please see reply to comment No 126.

comment	*284* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 8 shared with Airbus JUSTIFICATION for the Comment on page # 27 §4.12 […] Further guidance can be found in the AMC 25.1309. see similar comment # 278 about section 4.10 (Definition of minor failure condition). See comment #284 about section 5.2.1 (Type A definition vs NSE failure condition). PROPOSED TEXT / COMMENT Remove section 4.12
response	Not accepted Please see reply to comment No 126

comment	*445* comment by: *Oliver Ast (CLH)* Remove section 4.12 see similar comment about definition of minor failure condition. See comment about NSE failure condition vs Type A software application.
response	Not accepted Please see reply to comment No 126

comment	*507* comment by: *Star Alliance*

Original AMC20-25 NPA text:
4.10 No Safety Effect
[…] Further guidance can be found in the AMC 25.1309.
RATIONALE / REASON / JUSTIFICATION for the Comment :
see similar comment about definition of minor failure condition. See comment about NSE failure condition vs Type A software application.

PROPOSED TEXT / COMMENT:

Remove section 4.12

response Not accepted

Please see reply to comment No 126

comment *641* comment by: *Deutsche Lufthansa AG*

Proposal:
Delete 4.12

Comment/Justification:
see similar comment #639 about definition of minor failure condition. See comment #650 about NSE failure condition vs Type A software application.

response Not accepted

Please see reply to comment No 126

CONCLUSION ON COMMENTS ON PAGE 27 (DRAFT AMC 20-25 – NO SAFETY EFFECT)

Five comments were received and all of them requested the removal of the definition. None has been accepted since the definition is perfectly in line with AMC CS-25.1309. The definition is, however, necessary since AMC 20-25 applies to any aircraft and not only to large aeroplanes.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 4 GLOSSARY OF TERMS IN THE CONTEXT OF THIS AMC - 4.13 Pre-Composed Information p. 27

comment *9* comment by: *FAA*

page 27, para 4.13

Comment:
Pre-composed information can not contain contextual access in AC 120-76B. Creating hyperlinks would be a dynamic function which would require oversight from higher lelvel of safety than a PDF document

Reason for Comment;
Harmonization of definitions

Suggested Change:
- Should delete: Application based on pre-composed information may contain contextual access like hyperlink bookmark.

response

Noted

Nevertheless, the definitions for software types are no longer based on this notion (in accordance with FAA). The definition has been removed.

comment

788 comment by: *Ingo Pucks, Owner IP Aerospace*

In terms of information, respectively data, it might be worth considering to differentiate between the pure data (content) and its presentation to the user (format, layout) as any of these characteristics can lead to incorrect information provision. Example: Data correctly compiled and computed but erroneously presented is as safety critical as incorrect but correctly presented data.

response

Noted

This definition has been removed. The new software type definitions take into account the effects of designed induced human errors.

CONCLUSION ON COMMENTS ON PAGE 27 (DRAFT AMC 20-25 – PRE-COMPOSED INFORMATION)

Two comments suggest modifications of the wording to the definition.

However, given the above conclusions on section 4.9 of AMC 20-25 (i.e. removal of the definition on 'interactive information'), this definition has been also removed from the resulting text of AMC 20-25, which is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 5 SYSTEM DESCRIPTION AND CLASSIFICATION OF EFB SYSTEMS - 5.1 Hardware Classes of EFB Systems p. 28

comment

266 comment by: *Thales Avionics*

Recognizing that Hardware Classes of EFB systems indeed address the EFB Host Platform (i.e. hardware and Operating System), the Hardware Classes should be renamed EFB Host Platform Classes.

response

Accepted

The term 'class' has been, in fact, removed from the resulting text of AMC 20-25. The term 'host platform' is defined and mostly used throughout the document.

comment

268 comment by: *Thales Avionics*

Paragraph 5.1 describes the different EFB hardware classes. For class 1 and 2, the paragraph 5.1 describes the application types that can be supported, while these application types are defined later in paragraph 5.2.
It would therefore be more practical to avoid any reference to application type in paragraph 5.1, and to define in paragraph 5.2, for each application type, on

	which hardware class they can be installed. In addition, a table showing the permitted application type allocation to hardware class would be useful.
response	Partially accepted Paragraph 5.1 of the resulting text of AMC 20-25 clarifies that both portable and installed EFB may host Type A and/or Type B applications.

comment	*446* comment by: *Oliver Ast (CLH)* The Classification of Devices should be harmonized with FAA, beacuse otherwise misinterpretations could arise between different airline solutions. The classification should only be dedicated to the installation and not to the software and data transfer functions, as this would limit useful and safety improving features, such as own ship position as reference (runway incursions), sigmet data transfer and display in enroute chart.
response	Partially accepted In agreement with the Review Group, where FAA was present and concurred, EFB host platforms in the resulting text of AMC 20-25 can only be 'portable' or 'installed'. Whether 'portable' or 'installed', they may host Type A and/or Type B applications. The Agency understands that FAA may propose a similar taxonomy for their planned edition 'C' of AC 120-76.

comment	*511* comment by: *Star Alliance* The Classification of Devices should be harmonized with FAA, beacuse otherwise misinterpretations could arise between different airline solutions. The classification should only be dedicated to the installation and not to the software and data transfer functions, as this would limit useful and safety improving features, such as own ship position as reference (runway incursions), sigmet data transfer and display in enroute chart.
response	Partially accepted Please see reply to comment No 446.

comment	*642* comment by: *Deutsche Lufthansa AG* The Classification of Devices should be **harmonized with FAA**, beacuse otherwise misinterpretations could arise between different airline solutions. The classification should only be dedicated to the installation and not to the software and data transfer functions, as this would limit useful and safety improving features, such as own ship position as reference (runway incursions), sigmet data transfer and display in enroute chart.
response	Partially accepted Please see reply to comment No 446.

comment	*789* comment by: *Ingo Pucks, Owner IP Aerospace* Interestingly this section pretty much picks up on the recognition of EFB by CAT as firstly being a HW device. However the HW is only required to run the SW and stored and provide the data. We suggest to take more operational view on the matter, as the application are SW and data but not so much HW driven, while the development of both SW and HW will rapidly lead to new and different HW/SW configurations.
response	Noted The entire Chapter 7 of the resulting text of AMC 20-25 is devoted to operational matters.

CONCLUSION ON COMMENTS ON PAGE 28 (DRAFT DECISION AMC 20-25 – HARDWARE CLASSES)

Six comments were received on this segment of NPA 2012-02 mainly:

— reiterating the need for harmonisation with the FAA; and

— proposing to avoid reference to types of applications in the classification of EFB host platform classes.

The first idea is welcome, noting , however, that FAA plans a new edition 'C' of their AC 120-76 and that FAA experts have been involved in the Review Group contributing to this CRD.

The suggestion not to mix the taxonomy of the EFB host platform classes (i.e. Hardware) with the requirements concerning the ability to host or not certain types of applications (i.e. Software) is also accepted.

As a consequence, 'classes' of EFB host platforms are no longer proposed. Instead, such platforms are identified as either 'portable' or 'installed'. In both cases they may host Type A and/or Type B applications.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 5 SYSTEM DESCRIPTION AND CLASSIFICATION OF EFB SYSTEMS - 5.1 Hardware Classes of EFB Systems - 5.1.1 Class 1 p. 28

comment	*6* comment by: *FAA* Page 28, Para 5.1.1, a,b **Comment:** AC 120-76B definition has been updated. A kneeboard was defined as a mount. This definition would prevent an operator from calling a kneeboard a Class 1 EFB. This would not be in harmony with current FAA definitions **Reason for Comment:** Policy Harmonization **Suggested Change:** Should read "Class 1 EFB systems are stowed or secured during critical phases of flight. However, the competent authority may allow its use during critical phases of flight, provided teh Class 1 EFB is properly stowed (e.g., kneeboard) allowing its normal use and meets the criteria specified in paragraph 6.1.2.1 and 6.1.2.2."

response

Partially accepted

The resulting text of AMC 20-25 includes mounting devices and viewable stowage, as well as allowing the use of a kneeboard.

comment

39 comment by: *NetJets Europe*

This paragraph clearly states what kind of Data Connectivity is not authorised, but mentions nothing about what kind is.
We agree on the concept that EFB Class 1 systems cannot genrally have aircraft data connectivity that may compromise airworthiness functions, but there are other types of connectivity as well.
EFB Class 1 systems have the capability to send and receive AAC (or AOC) communications that commplement/support daily operations either via WiFi (Gatelink or similar), 3G/4G or other suitable means. A provision for this should be included in this paragraph. Technological developments in this area will continue to produce more and more dispatch, flight planning, briefing, e-techlog and performance software with the capability to replace all current paper versions and processes. Connectivity is the biggest limiting factor to the adoption of this technology. Guidance is required in the form of this AMC, other wise there is a big risk that different NAAs will treat similar request differently, causing unequal playing field. Similar cases have to be treated in a similar manner to guarantee fair treatment

Refer to AC 120-76A Chapter 8a for example of possible wording.

We propose the following text:
"Class 1 EFB may communicate with aircraft systems providing the airworthiness function is segregated and the system architecture isolates the non-secure data from secure (airworthiness) data.
The operator is responsible to justify via airworthiness assessment report the non-interference of EFB data with aircraft airworthiness functions"

response

Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25 connectivity even for portable EFB, albeit with a wording different from that proposed by the comment, is allowed.

comment

97 comment by: *NetJets Europe*

"They may be consumer electronics computing devices (e.g. laptop, tablet PC)."

The text should include IOS devices such as the Apple iPad. We propose the following text:

"They may be consumer electronics computing devices (e.g. laptop, tablet PC **running Windows, IOS or other operating systems**)."

response

Partially accepted

The list of examples has been removed from paragraph 5.1.1 of the resulting text of AMC 20-25.

comment 99 comment by: *NetJets Europe*

Attachments #4 #5

Most business aviation aircraft flight decks lack the physical space to install a mounting device. Being able to use a knee-board as a mount for a Class 1 EFB running electronic aeronautical chart applications during critical phases of flight is an essential add-on to the text. However, from our extensive flight testing, it has become obvious that in order to guarantee unobstructed control movements during final phases of an approach or initial phases of a take-off, there needs to be the possibility to store the tablet in a side-pocket with the charts constantly displayed and immediately accessible. Data shows that anthropometrics plays a big role in the suitability of a knee-board during critical phases of flight.

We propose the following text or similar*:" However, in the case of electronic aeronautical chart applications, the competent authority may allow its use during critical phases of flight, provided the Class 1 EFB is used with a kneeboard system and is securely attached to the pilot in a manner which allows its normal use and meets the criteria specified in paragraphs 6.1.2.1 and 6.1.2.2. Depending on anthropometrics and specific flight deck design and when full and free control movement cannot be guaranteed, the Class 1 EFB can be stowed, with the charts constantly displayed(unit stays on) and immediately accessible by the crew member, just prior to landing and take-off."*

Company SOPs could include three possibilities to secure a Class 1 EFB during critical phases of flight. These should be:

1. Pilot Monitoring holding the Class 1 EFB in his/her hand similar to a check-list (This works fine as long as the tablet used is small and light weight)
2. Pilot Monitoring keeps the unit in the side pocket with the charts visible and readily accessible. This way it can be quickly pulled out and used
3. A kneeboard can be used, if it does not interfere with the free movement of flight controls

response Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, the use of portable EFB in any phase of the flight, if mounted or attached to a viewable stowage, subject to operational assessment, is allowed.

comment 120 comment by: *DGAC*

We propose to make a clear distinction between class 1 EFB that are attached to the aircraft and those not attached.
Indeed, there is a clear benefit to use attached class 1 EFB. This must be recognised (see proposed amendment in "Complementary characteristics") and, as a consequence, this distinction should be introduced in the definition which we propose to amend :

"Class 1 EFB systems **not attached**:
a. Are not attached to any aircraft mounting device;
b. Are without aircraft data connectivity.

Class 1 EFB systems attached :
a. Are attached to the aircraft mounting device;
b. Are without aircraft data connectivity"

response

Noted

The hardware classes have been removed from the resulting text of AMC 20-25 which now contemplates only 'portable' (i.e. not part of the certified aircraft design) or 'installed' EFB.

comment

121 comment by: *DGAC*

A clear distinction should be made in this paragraph between attached and not attached class 1 EFB (see previous comment for the definition).
Benefits are awaited from attached systems, even when able to be connected to the aircraft systems, and should be recognised. This is why we propose to amend from the second paragraph :

"Class 1 EFB systems are stowed during critical phases of flight **if not attached.**
Class 1 EFB systems attached allow use of electronic Charts applications during the critical phases of flight.
The kneeboard may be used in case there is no other solution provided that a specific risk assessment has been conducted on a case by case basis with appropriate mitigations means. ~~However, in the case of electronic aeronautical chart applications, the competent authority may allow its use during critical phases of flight, provided the Class 1 EFB is used with a kneeboard system and is securely attached to the pilot in a manner which allows its normal use and meets the criteria specified in paragraphs 6.1.2.1 and 6.1.2.2."~~

response

Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, the use of portable EFB in any phase of the flight, if mounted or attached to a viewable stowage, subject to operational assessment, is allowed.

comment

122 comment by: *DGAC*

The distinction between class 1 EFB attached and class 1 EFB not attached would need the following change to be implemented at the end of "Complementary characteristics) of §5.1.1 :

"A Class 1 EFB systems **not attached** is not considered to be part of the certified aircraft configuration, i.e. not defined in the aircraft Type design nor installed by a change to the Type design. Therefore, Class 1 EFB systems do not require airworthiness approval.

A Class 1 EFB systems attached requires a Supplemental Type Certificate for the mounting device."

response

Partially accepted

Even if with a wording different from that proposed by the comment, in the resulting text of AMC 20-25,the fact that portable EFB are not certified, while mounting devices are part of the approved aircraft design, is clarified.

comment

123 comment by: *DGAC*

Even if this may be inferred from the following paragraphs (concerning type A, B

and C software definitions), we think that the text could explicitly indicate that no CNS derived information should be displayed on a class 1 EFB.

We propose to introduce the following text at the end of "Complementary characteristics" :
"No application with Communication, nor Navigation nor Surveillance information should be displayed on a Class 1 device."

response

Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, the use of T-PEDs as portable EFB in any phase of the flight, but subject to the provisions in the approved Aircraft Flight Manual (AFM) which gives sufficient flexibility to assess the proposals from applicants, while maintaining safety through a controlled process, is allowed.

comment

179 comment by: *AIRBUS*

"Class 1 EFB systems:
[…]
b. Are without aircraft data connectivity."

NPA AMC 20-25 not consistent with forthcoming AC 120-76B which does not prevent any connectivity for a Class 1 EFB (refer to AC 120-76B - section 10.l - page 16).
NPA AMC 20-25 not consistent with JAA TGL 36 [refer to TGL 36 - page 36-5 - section 6.1.1.d). - Class 1 EFB data connectivity] whereas no rationales have been given in the explanatory note (section A) of the NPA for such change. More particularly, Class 1 EFB data connectivity has not been identified as impairing safety and as contributing to incidents/accidents reported in section V.4.i. (safety) of the NPA in page 17.

Example of existing solution : Class 1 EFB installed on the oldest aircraft models for capture of the flight deck effects by the flight crew and sending of this fault report to the ground (for mechanics, for ground e-Logbook, ...).
It is suggested to come back to the prior TGL 36 wording.

Suggested text:
Class 1 EFB systems:

[…]
b. Are without aircraft data connectivity 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). Any other type of data connectivity requires an airworthiness approval.

response

Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB, albeit with a wording different from that proposed by the comment, is allowed.

comment

180 comment by: *AIRBUS*

"Class 1 EFB systems are stowed during critical phases of flight. However, in the case of electronic aeronautical chart applications, the competent authority may

allow its use during critical phases of flight, provided the Class 1 EFB is used with a kneeboard system and is securely attached to the pilot in a manner which allows its normal use and meets the criteria specified in paragraphs 6.1.2.1 and 6.1.2.2."

Paragraph 5.1.1 is applicable to a Class 1 EFB whereas paragraphs 6.1.2.1 ("Design of the mounting device") and 6.1.2.2. ("Characteristics and placement of the EFB Display") are applicable to a Class 2 EFB. Many requirements about the mounting device and the placement of the EFB display are impracticable for a kneeboard EFB.
It is suggested either to remove reference to paragraphs 6.1.2.1 and 6.1.2.2. only, or to add new relevant requirements in section 5.1.1. instead of referring paragraphs 6.1.2.1 and 6.1.2.2.

Suggested text:
Class 1 EFB systems are stowed during critical phases of flight. However, in the case of electronic aeronautical chart applications, the competent authority may allow its use during critical phases of flight, provided the Class 1 EFB is used with a kneeboard system and is securely attached to the pilot in a manner which allows its normal use.

response

Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, the use of portable EFB in any phase of the flight, if mounted or attached to a viewable stowage, subject to operational assessment, is allowed.

comment

237 comment by: *DGAC*

The definition of class 1 EFB would probably need clarification concerning the connectivity.

We suggest to add a note indicating that Class 1 EFB may have connectivity with other than aircraft systems indeed (e.g. wifi, 3/4G, Tether, Bluetooth), in compliance with airworthiness requirements. Furthermore, the flight crew should be able to inhibit this capability.

Such specification may be included in the "Complementary characteristics" paragraph or in §6.1.2.4 "Data connectivity"

response

Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB, albeit with a wording different from that proposed by the comment, is allowed.

comment

267 comment by: *Thales Avionics*

Thales concurs on the need for class 1 EFB systems to meet class 2 requirements when used during critical phase of flight. However, EMI acceptability of class 1 systems remains questionable as the location of these EFB will vary during their use. This will affect the level of radiated interferences received by other equipment installed in the cockpit. EMI, as well as pure magnetic influence on standby compass, should therefore be evaluated considering the closest possible location to each of the equipment installed in the cockpit.

response | Partially accepted

The assessment of EMI has been substantially revised in paragraph 6.2.1.1 of the resulting text of AMC 20-25. For portable EFB to be used during critical phases of flight, criteria as stringent as those for avionics, are recommended.

comment | *268* ❖ comment by: *Thales Avionics*

Paragraph 5.1 describes the different EFB hardware classes. For class 1 and 2, the paragraph 5.1 describes the application types that can be supported, while these application types are defined later in paragraph 5.2.
It would therefore be more practical to avoid any reference to application type in paragraph 5.1, and to define in paragraph 5.2, for each application type, on which hardware class they can be installed.
In addition, a table showing the permitted application type allocation to hardware class would be useful.

response | Partially accepted

In agreement with the Review Group, EFB host platforms in the resulting text of AMC 20-25 can only be 'portable' or 'installed'. Whether 'portable' or 'installed', they may host Type A and/or Type B applications.

comment | *287* comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 9 shared with Airbus

JUSTIFICATION for the Comment on page # 28 §5.1.1 b Are without aircraft data connectivity.

NPA AMC 20-25 not consistent with forthcoming AC 120-76B which does not prevent any connectivity for a Class 1 EFB (refer to AC 120-76B - section 10.l - page 16).
NPA AMC 20-25 not consistent with JAA TGL 36 [refer to TGL 36 - page 36-5 - section 6.1.1.d). - Class 1 EFB data connectivity] whereas no rationales have been given in the explanatory note (section A) of the NPA for such change. More particularly, Class 1 EFB data connectivity has not been identified as impairing safety and as contributing to incidents/accidents reported in section V.4.i. (safety) of the NPA in page 17.
Example of existing solution : Class 1 EFB installed on the oldest aircraft models for capture of the flight deck effects by the flight crew and sending of this fault report to the ground (for mechanics, for ground e-Logbook, ...).
It is suggested to come back to the prior TGL 36 wording.

PROPOSED TEXT / COMMENT

Class 1 EFB systems:
[…]
b. Are without aircraft data connectivity 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). Any other type of data connectivity requires an airworthiness approval.

response | Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for

	portable EFB, albeit with a wording different from that proposed by the comment, is allowed.

comment	*288* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 10 shared with Airbus JUSTIFICATION for the Comment on page # 28 § 5.1.1- Complemetary... 2nd § Paragraph 5.1.1 is applicable to a Class 1 EFB whereas paragraphs 6.1.2.1 ("Design of the mounting device") and 6.1.2.2. ("Characteristics and placement of the EFB Display") are applicable to a Class 2 EFB. Many requirements about the mounting device and the placement of the EFB display are unpracticable for a kneeboard EFB. It is suggested either to remove reference to paragraphs 6.1.2.1 and 6.1.2.2. only, or to add new relevant requirements in section 5.1.1. instead of referring paragraphs 6.1.2.1 and 6.1.2.2. PROPOSED TEXT / COMMENT Class 1 EFB systems are stowed during critical phases of flight. However, in the case of electronic aeronautical chart applications, the competent authority may allow its use during critical phases of flight, provided the Class 1 EFB is used with a kneeboard system and is securely attached to the pilot in a manner which allows its normal use.
response	Partially accepted In paragraph 5.1.1 of the resulting text of AMC 20-25, the use of portable EFB in any phase of the flight, if mounted or attached to a viewable stowage, subject to operational assessment, is allowed.

comment	*337* comment by: *British Airways* At what level is controlled software? Tracking the location of a device to a person maybe in contravention of a human right?
response	Noted No other stakeholder made a similar comment.

comment	*342* comment by: *British Airways* Mounting device!! Classification should be by connectivity rather than mounting and power supply. Interp. of mountings please? What defines a mounting. Not necessarily a kneeboard. Power supply's? Does the power supply have to be approved and if so what constitutes an 'approved power supply'? The manufacturer's power supply, supplied with the device upon purchase?
response	Partially accepted The airworthiness requirements have been split from the operational criteria in

the resulting text of AMC 20-25. The basic principle is that the manufacturer can apply to certify any item comprised in the aircraft design, including mounting devices. Conversely, operators are responsible for the safe use of any item not included in the approved aircraft design.

comment

422 comment by: *PMV-Engineering / ADCISSE*

Concerning the kneeboard, the following aspects are not adressed :
- The visibility and access of the EFB display and the fact that the pilot will have to be head down to see the display,
- The legibility in the different flight conditions (turbulences) and lighting conditions,
- Potential interferences with cockpit control (control stick on some aircraft),
- Risks due to the fact that the EFB can be connected to the A/C power (potential interferences due to cable connected to the EFB),
- Risks due to battery (leakage, heat...),
- The safety of the flight crew in case of crash / turbulences.

In our point of view, use of a Class 1 in critical phase of flight cannot be accepted. As a matter of example the use of kneeboard systems can lead to safety concerns.

response

Partially accepted

In the resulting text of AMC 20-25 the use of portable EFB in any phase of the flight, if mounted or attached to a viewable stowage, subject to operational assessment, is allowed. All the parameters mentioned in the comment are taken into account. Please. see, for instance, paragraphs 6.2.1.6, 7.5 and Appendix D to the said AMC.

comment

447 comment by: *Oliver Ast (CLH)*

Proposed Text:
Class 1 EFB systems:
[…]
b. Are without aircraft data connectivity 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). Any other type of data connectivity requires an airworthiness approval.

Comment:
NPA AMC 20-25 not consistent with forthcoming AC 120-76B which does not prevent any connectivity for a Class 1 EFB (refer to AC 120-76B - section 10.l - page 16).
NPA AMC 20-25 not consistent with JAA TGL 36 [refer to TGL 36 - page 36-5 - section 6.1.1.d). - Class 1 EFB data connectivity] whereas no rationales have been given in the explanatory note (section A) of the NPA for such change. More particularly, Class 1 EFB data connectivity has not been identified as impairing safety and as contributing to incidents/accidents reported in section V.4.i. (safety) of the NPA in page 17.
Example of existing solution : Class 1 EFB installed on the oldest aircraft models for capture of the flight deck effects by the flight crew and sending of this fault report to the ground (for mechanics, for ground e-Logbook, ...).
It is suggested to come back to the prior TGL 36 wording.

response

Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB, albeit with a wording different from that proposed by the comment, is allowed.

comment 513 comment by: *Star Alliance*

Original AMC20-25 NPA text:
Class 1 EFB systems:
[…]
b. Are without aircraft data connectivity.
RATIONALE / REASON / JUSTIFICATION for the Comment :
NPA AMC 20-25 not consistent with forthcoming AC 120-76B which does not prevent any connectivity for a Class 1 EFB (refer to AC 120-76B - section 10.l - page 16).
NPA AMC 20-25 not consistent with JAA TGL 36 [refer to TGL 36 - page 36-5 - section 6.1.1.d). - Class 1 EFB data connectivity] whereas no rationales have been given in the explanatory note (section A) of the NPA for such change. More particularly, Class 1 EFB data connectivity has not been identified as impairing safety and as contributing to incidents/accidents reported in section V.4.i. (safety) of the NPA in page 17.
Example of existing solution : Class 1 EFB installed on the oldest aircraft models for capture of the flight deck effects by the flight crew and sending of this fault report to the ground (for mechanics, for ground e-Logbook, ...).

It is suggested to come back to the prior TGL 36 wording.
PROPOSED TEXT / COMMENT:
Class 1 EFB systems:
[…]
b. Are without aircraft data connectivity 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). Any other type of data connectivity requires an airworthiness approval.

response Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB, albeit with a wording different from that proposed by the comment, is allowed.

comment 516 comment by: *Jeppesen Inc.*

Suggest remove: "b. Are without aircraft data connectivity"

Rationale:
Understanding is that new technologies are being developed that could allow reading of aircraft data into Class 1 EFBs in the near future.

response Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB, albeit with a wording different from that proposed by the comment, is allowed.

comment 589 comment by: *ERA*

	ERA members are concerned that using a kneeboard system during critical phases is not very safe; as the pilot haven't an external view when he looks to the EFB screen. In addition at least in smaller aircraft pilots are unable to apply full deflection of aileron, elevator and rudder when they have an EFB on a kneeboard. In case of engine failure pilots may damage their EFB with the horn.
response	Partially accepted In the resulting text of AMC 20-25, the use of portable EFB in any phase of the flight, if mounted or attached to a viewable stowage, subject to operational assessment, is allowed. The latter should take into account all ergonomics and cognitive factors involved, including those for which ERA has concerns.

comment	*634* comment by: *Goodrich* Align Class I EFB Power Guidance with FAA AC120-76B wording (Sec 10 a.) "Class 1 EFBs **do not have dedicated power connectivity** and have no data connectivity with installed aircraft systems"
response	Noted Nevertheless, class 1 EFB has been removed from the resulting text of AMC 20-25, in which the use of aircraft power and connectivity, under specified conditions, even in the case of portable EFB, is allowed.

comment	*643* comment by: *Deutsche Lufthansa AG* <u>Proposal:</u> Detail the requirement as follows: Class 1 EFB systems: […] b. Are without aircraft data connectivity **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). Any other type of data connectivity requires an airworthiness approval.** <u>Comment/Justification:</u> NPA AMC 20-25 not consistent with forthcoming AC 120-76B which does not prevent any connectivity for a Class 1 EFB (refer to AC 120-76B - section 10.l - page 16). NPA AMC 20-25 not consistent with JAA TGL 36 [refer to TGL 36 - page 36-5 - section 6.1.1.d). - Class 1 EFB data connectivity] whereas no rationales have been given in the explanatory note (section A) of the NPA for such change. More particularly, Class 1 EFB data connectivity has not been identified as impairing safety and as contributing to incidents/accidents reported in section V.4.i. (safety) of the NPA in page 17. Example of existing solution : Class 1 EFB installed on the oldest aircraft models for capture of the flight deck effects by the flight crew and sending of this fault report to the ground (for mechanics, for ground e-Logbook, ...). It is suggested to come back to the prior TGL 36 wording.
response	Partially accepted In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB, albeit with a wording different from that proposed by the

	comment, is allowed.

comment	*701* comment by: *AT-CAA-PAM* Class 1 and 2 EFB's should be considered as controlled PED's. Change wording, otherwise there will be missunderstandings... Actually: 5.1.1 p28 Statement Class 1: "Class 1 EFB systems should be controlled PEDs" Actually 5.1.2 p29 Statement Class 2: "A class 2 EFB is considered to be a controlled PED" Use same wording , or should a class 1 EFB not be a controlled PED? Recomendation: Both should be the same sentence.
response	Noted Nevertheless, class 1 and 2 EFBs have been removed from the resulting text of AMC 20-25. Portable EFB is, indeed, a controlled PED (please refer to paragraph 5.1.1 of the resulting text).

comment	*830* comment by: *Eurocopter* The reference to § 6.1.2.1 and 6.1.2.2 for class 1 EFB is not appropriate, because those paragraphs are related to class 2 EFB.
response	Noted Nevertheless, class 1 and 2 EFBs have been removed from the resulting text of AMC 20-25.

comment	*863* comment by: *Boeing* Page: 28 Paragraph: 5.1.1.b The text states: ***5.1.1 Class 1*** ***Definition:*** *Class 1 EFB systems:* *a. Are not attached to any aircraft mounting device;* *b. Are without aircraft data connectivity.* **REQUESTED CHANGE:** We recommend that paragraph b. not be stated as an absolute. **JUSTIFICATION:** There are developments currently being designed for a Class I type EFB to have possible connectivity to aircraft data. If the NPA text is left as proposed, it will inhibit new and future EFB development
response	Partially accepted In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB, albeit with a wording different from that proposed by the comment, is allowed.

comment	*915* comment by: *CMC Electronics* 5.1.1 Class 1 (definition): CMC has concerns that the wording "however, in the case of electronic aeronautical chart applications, the competent authority may allow the use during critical phases of flight, provided the Class 1 EFB is used with a kneeboard system and is securely attached to the pilot...". opens the door to two Operational related issues: a) as para. 6.1.2.1 Design of the Mounting device and 6.1.2.2 Characteristics and placement of the display would then apply to the controlled PED and related kneeboard system, it appears that some form of quick disconnect mechanism should be in place to satisfy 6.1.1.3 (b) and 6.1.2.1 (h) in such configuration, b) it is not clear how evaluation of the knee mounted display can satisfy CS 23.1321 and CS 25.1321 during critical phases of flight considering its location from the normal or suitable viewing direction of the pilot.
response	Partially accepted In the resulting text of AMC 20-25, the use of portable EFB in any phase of the flight, if mounted or attached to a viewable stowage (e.g. a kneeboard), subject to operational assessment, is allowed. The latter should take into account all ergonomics and cognitive factors involved, but in principle CSs only apply to initial airworthiness processes and not literally to operational assessments. Guidance for the latter is offered in particular in paragraphs 6.2.1.6 and 7.5 of the resulting text of AMC 20-25.

CONCLUSION ON COMMENTS ON PAGE 28 (DRAFT DECISION AMC 20-25 – HARDWARE CLASS 1)

27 comments were received on this segment of NPA 2012-02.

Only one stakeholder proposed to completely prohibit use of portable EFB (even if secured through a kneeboard) during critical phases of the flight.

At the other extreme, a different single stakeholder proposed to present flight information or aircraft data on a portable EFB instead than on cockpit equipment.

The two above comments, clearly representing minority views, have not been accepted. Other comments suggesting editorial changes to the proposed AMC 20-25 have been replied individually above.

Furthermore, one competent authority proposed to clearly exclude CNS applications from possible applications on portable EFB applications. The Agency agrees that portable EFB shall neither be used for controller-pilot data link communications (CPDLC), nor for radio-navigation or to present surveillance traffic data (e.g. ADS-B). In the current Agency's Opinion, this does not, however, exclude presenting on portable EFB meteorological information or AIS information (e.g. NOTAMs), bearing in mind that AIS and MET are not part of CNS in the taxonomy of Air Navigation Services (please refer to Article 3 of the Basic Regulation).

Finally, the Agency accepts the comments aiming at:

— allowing bi-directional data connectivity to/from portable EFB host platforms:

- not sending data to aircraft systems relevant to airworthiness or guidance and control of flight; and
- aiming at flight regularity, if limited to Aeronautical Operational Control (AOC) and Airline Administrative Communications (AAC);

— allowing use of kneeboard secured portable EFB during critical phases of the flight, not subject to airworthiness approval since the kneeboard is not mounted on the airframe, but subject to operational approval by the competent authority, taking into account human factors and, in particular, anthropometrics and 'head down' time;

— allowing other viewable stowage devices (e.g. suction cups) attached by the operator to the airframe and supporting portable EFB host platforms, for which airworthiness certification is not necessary before operational approval (the latter may include specific training and procedures as well as evaluation by Agency); and

— requesting that EMI assessment of portable EFB be carried out in the closest position to each cockpit equipment, where the EFB could be during operational use.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 5 SYSTEM DESCRIPTION AND CLASSIFICATION OF EFB SYSTEMS - 5.1 p. 28-29 **Hardware Classes of EFB Systems - 5.1.2 Class 2**

comment

5 comment by: *FAA*

page 28 Para, 5.1

Comment:
Future FAA guidance/policy is being developed to focus more on the use of terms "portable and installed" with less focus on Classes of EFB's.

Reason for Comment:
Policy Harmonization

Suggested Change:
Use More "portable and installed and use less emphasis on "Classes"

response

Accepted

The term 'class' has been removed from the resulting text of AMC 20-25, which instead distinguishes portable and installed EFB.

comment

7 comment by: *FAA*

Page 28, Para 5.1.2, Definition 1st para a, d, e.

Comment:
Definition being updated to portable and installed. May still reference Class 1/2 as portable, but FAA is migrating away from these classifications

AC 120-76B definition has been updated.
d) How is "rapidly" going to be defined?

Reason for Comment:
Harmonization of definitions

Suggested Change;
Should read:

Attached to an aircraft mounting device and/or connected to aircraft systems,

provided they use read-only access, or transmitt-recieve access only by use of an installed interference with certified aircraft systems (with the exception of the EVB dedicated installed resources).

recommended changing d to.. Perform the tast proficiently and in an expeditious manner.

response

Noted

Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment

8 comment by: *FAA*

Page 29, para 5.1.2

Comment:
Definition being updated to portable and installed. May still reference Class 1/2 as portable, but FAA is migrating away from these classifications.
AC 120-76B has been updated

Reason for Comment:
Harmonization of definitions.

Suggested comment:
Class 2 EFB systems should be controlled PED's.

response

Noted

Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment

39 ❖ comment by: *NetJets Europe*

This paragraph clearly states what kind of Data Connectivity is not authorised, but mentions nothing about what kind is.
We agree on the concept that EFB Class 1 systems cannot genrally have aircraft data connectivity that may compromise airworthiness functions, but there are other types of connectivity as well.
EFB Class 1 systems have the capability to send and receive AAC (or AOC) communications that commplement/support daily operations either via WiFi (Gatelink or similar), 3G/4G or other suitable means. A provision for this should be included in this paragraph. Technological developments in this area will continue to produce more and more dispatch, flight planning, briefing, e-techlog and performance software with the capability to replace all current paper versions and processes. Connectivity is the biggest limiting factor to the adoption of this technology. Guidance is required in the form of this AMC, other wise there is a big risk that different NAAs will treat similar request differently, causing unequal playing field. Similar cases have to be treated in a similar manner to guarantee fair treatment

Refer to AC 120-76A Chapter 8a for example of possible wording.

We propose the following text:
"Class 1 EFB may communicate with aircraft systems providing the airworthiness function is segregated and the system architecture isolates the non-secure data from secure (airworthiness) data.
The operator is responsible to justify via airworthiness assessment report the non-interference of EFB data with aircraft airworthiness functions"

response

Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB, albeit with a wording different from that proposed by the comment, is allowed.

comment

46 comment by: *Air France*

The definition of Class2 lists five requirements (paragraphs a, b, c, d and e). However §a and §b seem to be incoherent as a mounting device needs a certifcation file to be installed.

Proposal : remove the sentence of §b after ie.

Note : check the coherence with §5 of complementary characteristics: "Any EFB components/hardware not accessible on the flight crew compartment by the flight crew members and/or not portable should be installed and certificated equipment covered by a Type Certificate (TC), changed TC or Supplemental (S)TC."

response

Noted

Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment

47 comment by: *Air France*

The paragraph d of definition of class 2 forbids the use of autotheft system.

Proposal : Change to "Based on a portable hardware platform", and remove the following.

response

Noted

Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment

105 comment by: *NetJets Europe*

Proposed change to text:
"*c) Not sharing any display or other input/output device (e.g. keyboard, pointing device)*
with certified aircraft systems ***that may compromise airworthiness functions****.*

Class 2 EFB may communicate with aircraft systems providing the airworthiness function is segregated and the system architecture isolates the non-secure data from secure (airworthiness) data.
The operator is responsible to justify via airworthiness assessment report the non-interference of EFB data with aircraft airworthiness functions."

response

Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB, albeit with a wording different from that proposed by the comment, is allowed.

comment

113 comment by: *DGAC*

	Current definition brings some confusion with "and/or". Indeed, if one reads that the EFB is "Attached to an aircraft mounting device **or** connected to aircraft systems", one may understand that an EFB attached to the aircraft mounting device and not able to connect to the aircraft could be considered as an EFB class 2. This is not the intent : as mentioned in §e), class 2 EFB are able to receive data from aircraft system. It is then proposed to amend the definition of class 2 EFB to read : Class 2 EFB systems are: a) Attached to an aircraft mounting device ~~and/or~~ **with the ability to be** connected to aircraft systems, but without the capability to send data to the certified aircraft systems
response	Noted Nevertheless, class 2 has been removed from the resulting text of AMC 20-25. Portable EFB may be attached to a mounting device and connected to aircraft power. But they may also be neither attached to any aircraft point, nor powered by aircraft systems. The expression 'and/or' covers all possibilities.

comment	*115* comment by: *DGAC* In Definition of §5.1.2, §a), could this sentence be clarified : "(with the exception of the EFB dedicated installed resources)"
response	Noted Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment	*117* comment by: *DGAC* In definition, §b) indicates that class 2 EFB are "not in the aircraft Type design nor installed by a change to the Type design nor added by a Supplemental Type Certificate" whereas it is installed ("attached to the aircraft mounting device"). It is proposed to make b) consistent removing the last part of the sentence, after "i.e.": "b) Not considered to be part of the certified aircraft configuration" Last paragraph of "Complementary characteristics" may need revision also in that perspective.
response	Noted Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment	*119* comment by: *DGAC* Last paragraph of "Complementary characteristics" may need revision in consideration of the comment concerning §b) the definition. The use of "and/or" is confusing and should be avoided to (see our proposition to remove it from the definition of class 2 EFB, §a)
response	Noted Nevertheless, class 2 has been removed from the resulting text of AMC 20-25. Portable EFB may be attached to a mounting device and connected to aircraft

	power. But they may also be neither attached to any aircraft point, nor powered by aircraft systems. The expression 'and/or' covers all possibilities.
comment	*181* comment by: *AIRBUS* "Class 2 EFB systems are: a) [..] but without the capability to send data to the certified aircraft systems (with the exception of the EFB dedicated installed resources)." NPA AMC 20-25 not consistent with forthcoming AC 120-76B (notably AC 120-76B section 10.l). EASA should substantiate why a Class 2 EFB cannot send data to aircraft systems whereas TGL36 allows it. No rationale has been found in the NPA explanatory note and more particularly data connectivity has not been identified as a potential cause of accidents reported in section A. V. 4. (Impacts) in pages 17/18. This requirement is solution-prescriptive whereas it should be objective-oriented only. It is suggested that, based on an objective of protection of certified aircraft systems, the applicant defines the most suitable solution, demonstrates its effectiveness and submits it to the Agency for approval. The applicant objective is not to get EFB data directly used by aircraft functions such as FMS, but to have capability of using certified common resources, provided that those common resources provide an acceptable level of segregation between EFB and other aircraft systems. If unchanged, such requirement will prevent use of common resources such as printer, CMV (Concentrator and Multiplexer for Video) which receives the EFB video link and which manages all the cockpit display systems. Such requirement could lead to duplicate some resources with cost and weight penalties. Current requirement is in conflict with the A350 design. Indeed, Class 2 EFB data connectivity has already been positively discussed with EASA in the frame of the A350 CRI F-21 and A320 CRI SE-59. Based on the A350 CRI F-21 agreed and closed by EASA, by principle of precedence and similarity (ie., no novelty), Airbus suggests the following wording. Suggested text: Class 2 EFB systems are: a) [..] but without the capability to send data to the certified aircraft systems (with the exception of the EFB installed resources in accordance with section 6.1.2.5).
response	Partially accepted In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB, albeit with a wording different from that proposed by the comment, is allowed.
comment	*182* comment by: *AIRBUS* "Class 2 EFB systems are: b) [..] Not considered to be part of the certified aircraft configuration," Definition given in section 5.1.2.b). excludes the EFB installed resources described in section 6.1.2.5 ("Installed Resources"). Therefore, section 5.1.2.b). conflicts with section 6.1.2.5. - see comment about section 6.1.2.5 ("Installed Resources").

Suggested text:
b) Not considered to be part of the certified aircraft configuration, i.e. not in the aircraft Type design nor installed by a change to the Type design nor added by a Supplemental Type Certificate, except for the EFB installed resources which are certified.

response

Noted

Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment

183 comment by: *AIRBUS*

"c) Not sharing any display or other input/output device (e.g. keyboard, pointing device) with certified aircraft systems."
NPA AMC 20-25 not harmonized with forthcoming FAA AC 120-76B.
In the same way, NPA AMC 20-25 is not harmonized with FAA AC 20-173 ("Installation of Electronic Flight Bag Components") paragraph 5.d ("Display") which clearly addresses shared displays as follows :
--quote-- "This section provides design guidance for the installation of EFB displays, including installation of shared displays, supporting both portable EFBs and installed systems." --unquote--
This requirement is solution-prescriptive whereas it should be objective-oriented only. It prevents technical innovation such as use of "Very Large Displays" supporting multiple display formats (PFD, ND, EFB display, ...) which would be displayed concurrently in separate windows, in accordance with AMC 25-11 - Chapter 5 - 31.e ("sharing information on a display").
Note : Even if AMC 25-11 (Chapter 1- Table 1) addresses display aspects of Class III Electronic Flight Bag (installed equipment), Airbus considers that there are no differences between :
1) a certified display unit which is part of a Class 3 EFB, vs a certified display unit which is part of a Class 2 EFB,
2) Type A or B EFB Information displayed on a certified class 3 EFB Display unit, vs Type A or B EFB Information displayed on a certified class 2 EFB Display unit,
3) certified input/output device which is part of a Class 3 EFB, vs a certified input/output device which is part of a Class 2 EFB.
Since AMC 25-11 (Chapter 5 - 31.e and chapter 7) allows sharing of display or sharing of input/output device with Class 3 EFB installed resources, the same principle should apply with Class 2 EFB installed resources.
see similar comment as well about section 6.1.2.5 ("Installed resources").

Suggested text:
c) sharing display or other input/output device (e.g. keyboard, pointing device) with certified aircraft systems in accordance with section 6.1.2.5 (Installed resources).

response

Partially accepted

In paragraph 6.1.1.1 of the resulting text of AMC 20-25, using shared resources, even for portable EFB, but subject to airworthiness approval, in the case of large aeroplanes based on CS 25.1302 (alternatively 23.1301), is allowed.

comment

184 comment by: *AIRBUS*

"e) Able to receive data from aircraft system through a certified interface unit, but unable to send data, except to systems which are completely isolated (in both directions)."

NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given for comment about section 5.1.2.a). (Class 2 definition)

Suggested text:
e) Able to receive data from aircraft system through a certified interface unit, but unable to send data, except to systems which are completely isolated (in both directions) or EFB installed resources in accordance with section 6.1.2.5.

response

Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB, albeit with a wording different from that proposed by the comment, is allowed.

comment

238 comment by: *DGAC*

In paragraph 5.1.2 "Definition", the provision in c) may be slightly changed to take into account that manufacturers are for instance developing EFB whose display may be directed to avionics displays. This can be very useful for briefings, allowing a better communication between flight crew members, thus CRM.
Such provision would only be valid for non critical phases of flight. The amended text would then be :

"c) Not sharing any display or other input/output device (e.g. keyboard, pointing device) with certified aircraft systems**, except, possibly, during non critical phases of flight**, **for briefing purposes**. "

response

Partially accepted

In paragraph 6.1.1.1 of the resulting text of AMC 20-25, using shared resources, even for portable EFB, but subject to airworthiness approval, in the case of large aeroplanes based on CS 25.1302 (alternatively 23.1301), is allowed.

The result of the airworthiness approval process may be limiting the use of certain applications only during non-critical phases of the flight, but the Agency believes that the text of the AMC should not be over-prescriptive.

comment

268 ❖ comment by: *Thales Avionics*

Paragraph 5.1 describes the different EFB hardware classes. For class 1 and 2, the paragraph 5.1 describes the application types that can be supported, while these application types are defined later in paragraph 5.2.
It would therefore be more practical to avoid any reference to application type in paragraph 5.1, and to define in paragraph 5.2, for each application type, on which hardware class they can be installed.
In addition, a table showing the permitted application type allocation to hardware class would be useful.

response

Partially accepted

In agreement with the Review Group, EFB host platforms in the resulting text of AMC 20-25 can only be 'portable' or 'installed'. Whether 'portable' or 'installed', they may host Type A and/or Type B applications.

comment

269 comment by: *Thales Avionics*

Subparagraph a): The proposed authorized connectivity for class 2 devices is very restrictive. It is acknowledged that a removable device should not be given unrestricted access to the aircraft systems. However, limitation to "receive only" greatly limits the capabilities which can be offered from a class 2 device while keeping acceptable safety and security level. For example, maintenance applications should be granted access to aircraft systems provided it is demonstrated that such connectivity cannot result in adverse effect. Such demonstration could be based on the type of connection (A429 protocol), on certified aircraft systems criticality, on interlock mechanisms preventing inflight activation, etc, ...
It is therefore proposed to reword "and/or connected to aircraft systems, but without the capability to send data to the certified aircraft systems" into "and/or connected to aircraft systems, when such connection can be shown to have no adverse safety or security impact on certified aircraft systems"
Similarly, e) may be reworded as follows "Able to exchange data with aircraft systems through a certified interface unit, without adverse safety or security impact on certified systems."

Obviously, the change would also affect 6.1.2.4.

response

Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB, albeit with a wording different from that proposed by the comment, is allowed.

comment

271 comment by: *Thales Avionics*

Subparapgraph a): "and/or connected to aircraft systems, but without the capability to send data" is redundant with subparagraph e)
In addition, it is not clear, given subparagraph e) if an EFB attached to a mounting device but not connected to aircraft systems is a class 2 EFB. It is proposed to reword e) into "For devices capable of connection to aircraft systems, able to (...)"

response

Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB, albeit with a wording different from that proposed by the comment, is allowed.

comment

272 comment by: *Thales Avionics*

Considering an EFB composed of a removable resources and attached resources and consistently with the 5th paragraph of "Complementary characteristics", subparagraph d) should be written "Based on a portable hardware platform the cockpit-installed components of which do not …"

response

Noted

Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment

273 comment by: *Thales Avionics*

Subparagraph e): The statement "except to systems which are completely isolated (in both directions)" should be clarified (no connection, electrical isolation, logical isolation, …)

response

Noted

Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment

289 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 11 shared with Airbus

JUSTIFICATION for the Comment on page # 28 §5.1.2 a)

NPA AMC 20-25 not consistent with AC 120-76B (notably AC 120-76B section 10.l).
EASA should substantiate why a Class 2 EFB cannot send data to aircraft systems whereas TGL36 allows it. No rationale has been found in the NPA explanatory note and more particularly data connectivity has not been identified as a potential cause of accidents reported in section A. V. 4. (Impacts) in pages 17/18.
This requirement is solution-prescriptive whereas it should be objective-oriented only. It is suggested that, based on an objective of protection of certified aircraft systems, the applicant defines the most suitable solution, demonstrates its effectiveness and submits it to the Agency for approval.
The applicant objective is not to get EFB data directly used by aircraft functions such as FMS, but to have capability of using certified common resources, provided that those common resources provide an acceptable level of segregation between EFB and other aircraft systems.
If unchanged, such requirement will prevent use of common resources such as printer, CMV (Concentrator and Multiplexer for Video) which receives the EFB video link and which manages all the cockpit display systems. Such requirement could lead to duplicate some ressources with cost and weight penalties.
Another wording is proposed

PROPOSED TEXT / COMMENT

Class 2 EFB systems are:
a) [..] but without the capability to send data to the certified aircraft systems (with the exception of the EFB installed resources in accordance with section 6.1.2.5).

response

Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB, albeit with a wording different from that proposed by the comment, is allowed.

comment

290 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 12 shared with Airbus

JUSTIFICATION for the Comment on page # 28 §5.1.2 b) [..] Not considered to be part of the certified aircraft configuration,

Definition given in section 5.1.2.b). excludes the EFB installed resources described in section 6.1.2.5 ("Installed Resources"). Therefore, section 5.1.2.b). conflicts with section 6.1.2.5. - see comment #310 about section 6.1.2.5 ("Installed Resources").

PROPOSED TEXT / COMMENT

b) Not considered to be part of the certified aircraft configuration, i.e. not in the aircraft Type design nor installed by a change to the Type design nor added by a Supplemental Type Certificate, except for the EFB installed resources which are certified.

response

Noted

Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment

291 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 13 shared with Airbus

JUSTIFICATION for the Comment on page # 28 § 5.1.2. c)
NPA AMC 20-25 not harmonized with FAA AC 120-76B.
In the same way, NPA AMC 20-25 is not harmonized with FAA AC 20-173 ("Installation of Electronic Flight Bag Components") paragraph 5.d ("Display") which clearly addresses shared displays as follows :
--quote-- "This section provides design guidance for the installation of EFB displays, including installation of shared displays, supporting both portable EFBs and installed systems." --unquote--
This requirement is solution-prescriptive whereas it should be objective-oriented only. It prevents technical innovation such as use of "Very Large Displays" supporting multiple display formats (PFD, ND, EFB display, ...) which would be displayed concurrently in separate windows, in accordance with AMC 25-11 - Chapter 5 - 31.e ("sharing information on a display").
Note : Even if AMC 25-11 (Chapter 1- Table 1) addresses display aspects of Class III Electronic Flight Bag (installed equipment), DASSAULT-AVIATION considers that there are no differences between :

1) a certified display unit which is part of a Class 3 EFB, vs a certified display unit which is part of a Class 2 EFB,
2) Type A or B EFB Information displayed on a certified class 3 EFB Display unit, vs Type A or B EFB Information displayed on a certified class 2 EFB Display unit,
3) certified input/output device which is part of a Class 3 EFB, vs a certified input/output device which is part of a Class 2 EFB.
Since AMC 25-11 (Chapter 5 - 31.e and chapter 7) allows sharing of display or sharing of input/output device with Class 3 EFB installed resources, the same principle should apply with Class 2 EFB installed resources.
see similar comment #306 as well about section 6.1.2.5 ("Installed resources").

PROPOSED TEXT / COMMENT

c) sharing display or other input/output device (e.g. keyboard, pointing device) with certified aircraft systems in accordance with section 6.1.2.5 (Installed resources).

response

Partially accepted

In paragraph 6.1.1.1 of the resulting text of AMC 20-25, using shared resources, even for portable EFB, but subject to airworthiness approval, in the case of large aeroplanes based on CS 25.1302 (alternatively 23.1301), is allowed.

comment

292 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 14 shared with Airbus

JUSTIFICATION for the Comment on page # 29 § 5.1.2 e)

NPA AMC 20-25 not harmonized with AC 120-76B. See rationale given for comment # 289 about section 5.1.2.a). (Class 2 definition)

PROPOSED TEXT / COMMENT
e) Able to receive data from aircraft system through a certified interface unit, but unable to send data, except to systems which are completely isolated (in both directions) or EFB installed resources in accordance with section 6.1.2.5.

response

Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB, albeit with a wording different from that proposed by the comment, is allowed.

comment

338 comment by: *British Airways*

a) "Attached to an aircraft mounting device and/or connected to aircraft systems, but without the capability to send data to the certified aircraft systems (with the exception of the EFB dedicated installed resources").

Clarrification on this statement is sought. What does this mean and whats its implication in the eyes of EASA? What was the intention of EASA? Why restrict EFB dedicated resources?

response

Accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB is allowed.

comment

341 comment by: *British Airways*

"Class 2 EFb hardware may be used during all phases of flight....."

What about software??

response

Noted

It depends on the results of the operational assessment, including human factors, as clarified in paragraph 7.5 of the resulting text of AMC 20-25.

comment

343 comment by: *British Airways*

c) "Not sharing any display or other input/putput device....."

What does this mean please in the opinion of EASA? What is the future implication and what are EASA endeavouring to protect/achieve by this restriction?

response

Partially accepted

In paragraph 6.1.1.1 of the resulting text of AMC 20-25, using shared resources, even for portable EFB, but subject to airworthiness approval, in the case of large aeroplanes based on CS 25.1302 (alternatively 23.1301), is allowed.

comment	*344* comment by: *British Airways* a) ", but without the capability to send data to the certified aircraft systems (with the exception of the EFB dedicated installed resources"). Clarrification sought, what does this part of the statement mean?
response	Partially accepted In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB is allowed.

comment	*345* comment by: *British Airways* e) ", except to systems whcih are completely isolated (in both directions)" When is a system completely isolated? When is a system "completely isolated"? Could data be sent to a printer with multiple input interfaces? Is it not enough to assures (e.g through an "AID – Aircraft Interface Device") that the Class 2 EFB cannot send data to critical aircraft systems:
response	Partially accepted This is clarified in the resulting text of AMC 20-25.

comment	*346* comment by: *British Airways* EFB Class 2 systems may.....through a certified power source...." Why not approved rather than certified? Definition of both approved and certified. Whats the difference?
response	Noted Article 3(g) of the Basic Regulation establishes that 'certificate' shall mean any approval, licence or other document issued as the result of the certification process. These terms are, therefore, equivalent in the Agency's framework. The difference between 'approved' and 'certified' is not standardised in any Annex to the Chicago Convention.

comment	*347* comment by: *British Airways* "Any EFB components/hardware not accessible on the flight crew compartment by the flight crew members....." If this is to prevent installation of EFB's in the E&E bay, then this should be more clear?
response	Partially accepted The last three lines of paragraph 5.1.1. of the resulting text of AMC 20-25 have been slightly amended to be clearer.

comment	*408* comment by: *European Cockpit Association*

	5.1.2 e/ "Isolated" should be "physically isolated"
response	Not accepted The Agency still believes that the right expression in this case is 'completely isolated', as in paragraph 6.1.1.1.4 c) of the resulting text of AMC 20-25, and not simply 'physically isolated'.

comment	*423* comment by: *PMV-Engineering / ADCISSE* b) "Not considered to be part of the certified aircraft configuration" apart from the provisions required for installation (mount, power sources…). e) The definition of isolated system is not clear. For example, is the Printer considered as an isolated system? Printer may be used with the Class 2 EFB and interface with the printer has to be in both direction (send data but also receive data as printer status).
response	Partially accepted In paragraph 6.1.1.1 of the resulting text of AMC 20-25, using shared resources, even for portable EFB, but subject to airworthiness approval, in the case of large aeroplanes based on CS 25.1302 (alternatively 23.1301), is allowed.

comment	*448* comment by: *Oliver Ast (CLH)* Proposed Text: Class 2 EFB systems are: a) [..] but without the capability to send data to the certified aircraft systems (with the exception of the EFB installed resources in accordance with section 6.1.2.5). Comment: NPA AMC 20-25 not consistent with forthcoming AC 120-76B (notably AC 120-76B section 10.l). This requirement is solution-prescriptive whereas it should be objective-oriented only. It is suggested that, based on an objective of protection of certified aircraft systems, the applicant defines the most suitable solution, demonstrates its effectiveness and submits it to the Agency for approval. The applicant objective is not to get EFB data directly used by aircraft functions such as FMS, but to have capability of using certified common resources, provided that those common resources provide an acceptable level of segregation between EFB and other aircraft systems. If unchanged, such requirement will prevent use of common resources such as printer, CMV (Concentrator and Multiplexer for Video) which receives the EFB video link and which manages all the cockpit display systems. Such requirement could lead to duplicate some ressources with cost and weight penalties. Current requirement is in conflict with the A350 design. Indeed, Class 2 EFB data connectivity has already been positively discussed with EASA in the frame of the A350 CRI F-21 and A320 CRI SE-59. Based on the A350 CRI F-21 agreed and closed by EASA, by principle of precedence and similarity (ie., no novelty), Airbus suggests the following wording (see above)
response	Partially accepted In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB is allowed.

comment	*449* comment by: *Oliver Ast (CLH)* Proposed Text: b) Not considered to be part of the certified aircraft configuration, i.e. not in the aircraft Type design nor installed by a change to the Type design nor added by a Supplemental Type Certificate, except for the EFB installed resources which are certified. Comment: Definition given in section 5.1.2. b) excludes the EFB installed resources described in section 6.1.2.5. Therefore, section 5.1.2. b) conflicts with section 6.1.2.5.
response	Noted Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment	*450* comment by: *Lufthansa Technik Design Organisation* "c) Not sharing any ..." is too restrictive. There may be good reasons to share a device well in the frame of a Class 2 EFB and with no negative effect on aircraft safety - e.g. the shared display and keyboard in the Lufthansa Technik A380 EFB installation (EASA STC No. 10030228).
response	Partially accepted In paragraph 6.1.1.1 of the resulting text of AMC 20-25, using shared resources, even for portable EFB, but subject to airworthiness approval, in the case of large aeroplanes based on CS 25.1302 (alternatively 23.1301), is allowed.

comment	*451* comment by: *Oliver Ast (CLH)* Proposed Text: c) sharing display or other input/output device (e.g. keyboard, pointing device) with certified aircraft systems in accordance with section 6.1.2.5 (Installed resources). Comment: NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. This requirement is solution-prescriptive whereas it should be objective-oriented only. It prevents technical innovation such as use of "Very Large Displays" supporting multiple display formats (PFD, ND, EFB display, ...) which would be displayed concurrently in separate windows, in accordance with AMC 25-11 - Chapter 5 - 31.e ("sharing information on a display"). Note : Even if AMC 25-11 (Chapter 1- Table 1) addresses display aspects of Class III Electronic Flight Bag (installed equipment), Airbus considers that there are no differences between : 1) a certified display unit part of a Class 3 EFB, vs a certified display unit part of a Class 2 EFB 2) Type A or B EFB Information displayed on a certified class 3 EFB Display unit, vs Type A or B EFB Information displayed on a certified class 2 EFB Display unit 3) certified input/output device part of a Class 3 EFB, vs a certified input/output device part of a Class 2 EFB. Since AMC 25-11 (Chapter 5 - 31.e and chapter 7) allows sharing of display or sharing of input/output device with Class 3 EFB installed resources, the same principle should apply with Class 2 EFB installed resources.

response

Partially accepted

In paragraph 6.1.1.1 of the resulting text of AMC 20-25, using shared resources, even for portable EFB, but subject to airworthiness approval, in the case of large aeroplanes based on CS 25.1302 (alternatively 23.1301), is allowed.

comment

452 comment by: *Oliver Ast (CLH)*

Proposed Text:

e) Able to receive data from aircraft system through a certified interface unit, but unable to send data, except to systems which are completely isolated (in both directions) or EFB installed resources in accordance with section 6.1.2.5.

Comment:
NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given for comment about section 5.1.2 a)

response

Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB is allowed.

comment

517 comment by: *Jeppesen Inc.*

Unclear what is meant by "(with the exception of the EFB dedicated installed resources)"

response

Noted

Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment

518 comment by: *Jeppesen Inc.*

Suggest add to "a)": "Class 2 devices are typically portable or COTS devices, attached to an…"

Rationale:
Provides additional clarification as to the nature of the Class 2 EFB device itself.

response

Noted

Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment

519 comment by: *Jeppesen Inc.*

Suggest add to b): "Portable or COTS devices are not considered to be….."

Rationale:
Provides additional clarification as to the nature of the Class 2 EFB device itself, and that it is independent from the entirety of the EFB "system", only some components of which subject to aircraft certification evaluation.

response

Noted

Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment	*520* comment by: *Jeppesen Inc.* Suggest remove : "c) Not sharing…..aircraft systems." Rationale: Understanding is that there are already approved architectures by which stowed Class 2 EFBs send images to other flightdeck displays.
response	Partially accepted In paragraph 6.1.1.1 of the resulting text of AMC 20-25, using shared resources, even for portable EFB, but subject to airworthiness approval, in the case of large aeroplanes based on CS 25.1302 (alternatively 23.1301), is allowed.

comment	*521* comment by: *Jeppesen Inc.* Unclear of the meaning of "….systems which are completely isolated (in both directions)" Rationale: Needs clarification.
response	Partially accepted This has been clarified in paragraph 6.1.1.1.4 c) of the resulting text of AMC 20-25.

comment	*522* comment by: *Star Alliance* **Original AMC20-25 NPA text:** Class 2 EFB systems are: a) [..] but without the capability to send data to the certified aircraft systems (with the exception of the EFB dedicated installed resources). **RATIONALE / REASON / JUSTIFICATION for the Comment :** NPA AMC 20-25 not consistent with forthcoming AC 120-76B (notably AC 120-76B section 10.l). This requirement is solution-prescriptive whereas it should be objective-oriented only. It is suggested that, based on an objective of protection of certified aircraft systems, the applicant defines the most suitable solution, demonstrates its effectiveness and submits it to the Agency for approval. The applicant objective is not to get EFB data directly used by aircraft functions such as FMS, but to have capability of using certified common resources, provided that those common resources provide an acceptable level of segregation between EFB and other aircraft systems. If unchanged, such requirement will prevent use of common resources such as printer, CMV (Concentrator and Multiplexer for Video) which receives the EFB video link and which manages all the cockpit display systems. Such requirement could lead to duplicate some ressources with cost and weight penalties. Current requirement is in conflict with the A350 design. Indeed, Class 2 EFB data connectivity has already been positively discussed with EASA in the frame of the A350 CRI F-21 and A320 CRI SE-59. Based on the A350 CRI F-21 agreed and closed by EASA, by principle of precedence and similarity (ie., no novelty), Airbus suggests the following wording : **PROPOSED TEXT / COMMENT:**

Class 2 EFB systems are:
a) [..] but without the capability to send data to the certified aircraft systems (with the exception of the EFB installed resources **in accordance with section 6.1.2.5**).
Original AMC20-25 NPA text:
Class 2 EFB systems are:
b) [..] Not considered to be part of the certified aircraft configuration,
RATIONALE / REASON / JUSTIFICATION for the Comment :
Definition given in section 5.1.2. b) excludes the EFB installed resources described in section 6.1.2.5. Therefore, section 5.1.2. b) conflicts with section 6.1.2.5. (see respective comment)
PROPOSED TEXT / COMMENT:
b) Not considered to be part of the certified aircraft configuration, i.e. not in the aircraft Type design nor installed by a change to the Type design nor added by a Supplemental Type Certificate, **except for the EFB installed resources which are certified**.
Original AMC20-25 NPA text:
c) Not sharing any display or other input/output device (e.g. keyboard, pointing device) with certified aircraft systems.
RATIONALE / REASON / JUSTIFICATION for the Comment :
NPA AMC 20-25 not harmonized with forthcoming AC 120-76B.
This requirement is solution-prescriptive whereas it should be objective-oriented only. It prevents technical innovation such as use of "Very Large Displays" supporting multiple display formats (PFD, ND, EFB display, ...) which would be displayed concurrently in separate windows, in accordance with AMC 25-11 - Chapter 5 - 31.e ("sharing information on a display").
Note : Even if AMC 25-11 (Chapter 1- Table 1) addresses display aspects of Class III Electronic Flight Bag (installed equipment), Airbus considers that there are no differences between :
1) a certified display unit part of a Class 3 EFB, vs a certified display unit part of a Class 2 EFB
2) Type A or B EFB Information displayed on a certified class 3 EFB Display unit, vs Type A or B EFB Information displayed on a certified class 2 EFB Display unit
3) certified input/output device part of a Class 3 EFB, vs a certified input/output device part of a Class 2 EFB.

Since AMC 25-11 (Chapter 5 - 31.e and chapter 7) allows sharing of display or sharing of input/output device with Class 3 EFB installed resources, the same principle should apply with Class 2 EFB installed resources.

see comment concerning p. 36

PROPOSED TEXT / COMMENT:

c) sharing display or other input/output device (e.g. keyboard, pointing device) with certified aircraft systems **in accordance with section 6.1.2.5 (Installed resources).**

Original AMC20-25 NPA text:

e) Able to receive data from aircraft system through a certified interface unit, but unable to send data, except to systems which are completely isolated (in both directions).

RATIONALE / REASON / JUSTIFICATION for the Comment :

NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given for comment about section 5.1.2 a)

PROPOSED TEXT / COMMENT:

e) Able to receive data from aircraft system through a certified interface unit, but unable to send data, except to systems which are completely isolated (in both directions) **or EFB installed resources in accordance with section 6.1.2.5.**

response

Partially accepted

Please see responses to comments above, in particular for connectivity and shared resources.

comment *523* comment by: *Jeppesen Inc.*

p 29

Complimentary Characteristics. 1st sentence

Suggest should read: "Class 2 EFB hardware and software….."

Rationale:
Clarification by inclusion of "software".

response

Noted

Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment *592* comment by: *ERA*

ERA members request that EASA relook at 5.1.2.d) and remove the statement "that does not require any tool to be removed…". ERA members suggest this, goes against security needs. If it can easily be removed, it can easily be swapped, manipulated, etc

response

Not accepted

The portable EFB is usually brought into the cockpit and removed by the flight crew.

But, in any case, aircraft operators shall implement a security management

system in compliance with Article 13 of Regulation (EC) No 300/2008, encompassing the aircraft and any item present on the airframe, whether portable, installed, or removable.

comment *611* comment by: *Monarch Airlines*

We strongly disagree with the proposed definition of a Class II EFB.

Firstly, we think the proposed wording is more of a loose functional description than a 'tight' definition and needs a more rigorous approach. It is not clear, for example, whether the 'definition' just covers the processor/display unit, or whether the entire installation (ie, wiring, power supply, mount, etc) is included under the definition.

More importantly, we disagree with the proposal that data connectivity between a Class II EFB and avionics can only be 'one way' (sub-paras a and e). This proposal seems to fall out of the new definition of a Class II EFB. There is no reason why a Class II EFB cannot connect to a datalink. Datalinks are not configured to store pass data from the source LRU to other aircraft LRUs; they are designed to transfer data from an on-board system to an external receiver. Data from a Class II EFB should be allowed to be fed to another certified on-board LRU via a datalink as long as it is suitably firewalled. For example, every time the pilot transmits on the radio, he is connecting to a 'datalink', but his voice data does not 'contaminate' other on-board systems.

It is vital that Class II EFBs are allowed to connect to certified datalinks, as they are currently being used by some airlines to pass AAC information via ATSU/ACARS/radio datalinks. This is an important element of the Class II functions (and the concomitant business case) that should not be unnecessarily prohibited unless there is a safety implication.

Finally, in sub-para b, we consider that the installation provisions of a Class II EFBs should be covered by an STC.

response

Accepted

Class 2 has been removed from the resulting text of AMC 20-25.

For connectivity of portable EFB and sharing of resources, kindly see the responses provided to comments above.

comment *618* comment by: *Goodrich*

5.1.2 a)

A Class 2 EFB system should be able to transmit non-flight critical information, such as AAC or AOC type information to aircraft systems such as the ATSU or CMU through a certified aircraft interface. There are approved Class 2 systems that have this functionality today.

Align Language with AC20-173:
All EFBs using data connectivity provisions to aircraft systems must incorporate an interface protection device (e.g., physical partitioning, read-only access, etc.) to ensure data connection required by the device, and its software applications, have no adverse effects on other aircraft systems, including installed antennas, installed data servers, data storage devices, and memory. EFBs having data

connectivity to aircraft systems; either wired or wireless, may read or transmit data to and from aircraft systems, provided the connection and interface protection device is incorporated into the aircraft type design.

Suggest adding the following text to the end of the statement "... with the exception of the EFB dedicated installed resources, or to certified interface unit for Aircraft Administrative Communications).

response

Partially accepted

Class 2 has been removed from the resulting text of AMC 20-25.

For connectivity of portable EFB and sharing of resources, kindly see the responses provided to comments above.

comment

621 comment by: *Goodrich*

5.1.2 e) Suggested update: "Able to receive data from aircraft system through a certified interface unit." (Rational available in previous comment on 5.1.2 a) Comment no 618.

This ties in with item 5.1.2 a) above. and suggested modification 5.1.2 e) .

Suggest adding item f) that would state: f) Able to send data through a certified interface unit to systems which are completely isolated (in both directions), or to systems approved for the transmission of AAC/AOC information such as an ATSU or CMU or aircraft printer.

response

Partially accepted

Class 2 has been removed from the resulting text of AMC 20-25.

For connectivity of portable EFB and sharing of resources, kindly see the responses provided to comments above.

comment

644 comment by: *Deutsche Lufthansa AG*

Proposal:

Detail the requirement as follows:

Class 2 EFB systems are:
a) [..] but without the capability to send data to the certified aircraft systems (with the exception of the EFB installed resources **in accordance with section 6.1.2.5).**

Comment/Justification:
NPA AMC 20-25 not consistent with forthcoming AC 120-76B (notably AC 120-76B section 10.l).
This requirement is solution-prescriptive whereas it should be objective-oriented only. It is suggested that, based on an objective of protection of certified aircraft systems, the applicant defines the most suitable solution, demonstrates its effectiveness and submits it to the Agency for approval.
The applicant objective is not to get EFB data directly used by aircraft functions such as FMS, but to have capability of using certified common resources, provided that those common resources provide an acceptable level of

segregation between EFB and other aircraft systems.
If unchanged, such requirement will prevent use of common resources such as printer, CMV (Concentrator and Multiplexer for Video) which receives the EFB video link and which manages all the cockpit display systems. Such requirement could lead to duplicate some ressources with cost and weight penalties. Current requirement is in conflict e.g. with the A350 design. Indeed, Class 2 EFB data connectivity has already been positively discussed with EASA in the frame of the A350 CRI F-21 and A320 CRI SE-59. Based on the A350 CRI F-21 agreed and closed by EASA, by principle of precedence and similarity (ie., no novelty), we suggest the wording as above.

response

Partially accepted

Class 2 has been removed from the resulting text of AMC 20-25.

For connectivity of portable EFB and sharing of resources, kindly see the responses provided to comments above.

comment

645 comment by: *Deutsche Lufthansa AG*

Proposal:

Detail the requirement as follows:
b) Not considered to be part of the certified aircraft configuration, i.e. not in the aircraft Type design nor installed by a change to the Type design nor added by a Supplemental Type Certificate**, except for the EFB installed resources which are certified**.

Comment/Justification:
Definition given in section 5.1.2. b) excludes the EFB installed resources described in section 6.1.2.5. Therefore, section 5.1.2. b) conflicts with section 6.1.2.5. (see comment #661)

response

Noted

Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment

646 comment by: *Deutsche Lufthansa AG*

Proposal:

Detail the requirement as follows:
c) sharing display or other input/output device (e.g. keyboard, pointing device) with certified aircraft systems **in accordance with section 6.1.2.5 (Installed resources)**.

Comment/Justification:

NPA AMC 20-25 not harmonized with forthcoming AC 120-76B.
This requirement is solution-prescriptive whereas it should be objective-oriented only. It prevents technical innovation such as use of "Very Large Displays" supporting multiple display formats (PFD, ND, EFB display, ...) which would be displayed concurrently in separate windows, in accordance with AMC 25-11 - Chapter 5 - 31.e ("sharing information on a display").
Note : Even if AMC 25-11 (Chapter 1- Table 1) addresses display aspects of Class III Electronic Flight Bag (installed equipment), we consider that there are no differences between:

1. a certified display unit part of a Class 3 EFB, vs a certified display unit part of a Class 2 EFB
2. Type A or B EFB Information displayed on a certified class 3 EFB Display unit, vs Type A or B EFB Information displayed on a certified class 2 EFB Display unit
3. certified input/output device part of a Class 3 EFB, vs a certified input/output device part of a Class 2 EFB.

Since AMC 25-11 (Chapter 5 - 31.e and chapter 7) allows sharing of display or sharing of input/output device with Class 3 EFB installed resources, the same principle should apply with Class 2 EFB installed resources.
see comment #660

response

Partially accepted

In paragraph 6.1.1.1 of the resulting text of AMC 20-25, using shared resources, even for portable EFB, but subject to airworthiness approval, in the case of large aeroplanes based on CS 25.1302 (alternatively 23.1301), is allowed.

comment

647 comment by: *Deutsche Lufthansa AG*

Proposal:

Detail the requirement as follows:
e) Able to receive data from aircraft system through a certified interface unit, but unable to send data, except to systems which are completely isolated (in both directions) **or EFB installed resources in accordance with section 6.1.2.5.**

Comment/Justification:
NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given with comment #644 on section 5.1.2 a)

response

Partially accepted

Class 2 has been removed from the resulting text of AMC 20-25.

For connectivity of portable EFB and sharing of resources, kindly see the responses provided to comments above.

comment

691 comment by: *Thomson Airways*

This definition is too vague and conflicts with some of the information provided below, under "Complementary characteristics".

1. The definition of "EFB systems" is unclear. More clarity is required concerning what parts of the EFB system are included in this definition. installation components, mounting, cabling, power supply? processor units? display units?
2. bullet point b) states 'not part of the certified aicraft systems...', while the "Complementary characteristics" section states that various components need to be certified and/or require airworthiness approval.

response

Partially accepted

The definition of EFB system, now in paragraph 4.12 of the resulting text of AMC 20-25, has been clarified.

comment	*692* comment by: *Thomson Airways* As per previous comment (689), "One way connectivity between a Class 2 EFB and avionics" would defeat one of the key purposes of EFB systems. A Class 2 EFB system must be authorised to connect to certified communications systems (e.g.ACARS / SatCom), in order to transmit AAC information, as it is currently done by Airlines.
response	Partially accepted In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB is allowed.

comment	*704* comment by: *ANE (Air Nostrum) OPS QM* - 5.1.2.d) page 29, remove "that does not require any tool to be removed…". Like before, goes against security needs. If it can easily be removed, it can easily be swapped, manipulated, etc.
response	Not accepted The portable EFB is usually brought into the cockpit and removed by the flight crew. But, in any case, aircraft operators shall implement a security management system in compliance with Article 13 of Regulation (EC) No 300/2008, encompassing the aircraft and any item present on the airframe, whether portable, installed, or removable.

comment	*727* comment by: *NetJets Europe* Currently reads: 5.1.2 Class 2 Definition: Class 2 EFB systems are: a) Attached to an aircraft mounting device and/or connected to aircraft systems, but without the capability to send data to the certified aircraft systems (with the exception of the EFB dedicated installed resources). b) Not considered to be part of the certified aircraft configuration, i.e. not in the aircraft Type design nor installed by a change to the Type design nor added by a Supplemental Type Certificate. c) Not sharing any display or other input/output device (e.g. keyboard, pointing device) with certified aircraft systems. Recommended Change: 5.1.2 Class 2 Definition: Class 2 EFB systems are: a) Typically composed of portable or COTs devices attached to an aircraft mounting device and/or connected to aircraft systems, but without the capability to send data to the certified aircraft systems (with the exception of the EFB dedicated installed resources). b) Portable or COTs components are not considered to be part of the certified aircraft configuration, i.e. not in the aircraft Type design nor installed by a change to the Type design nor added by a Supplemental Type Certificate. c) Not sharing any display or other input/output device (e.g. keyboard, pointing device) with certified aircraft systems.

Rationale:
Clarity is required. Use of the word 'systems' in the definition title appears to encompass all portable and installed elements of the configuration, however a) and b) appear to need a clear line between uncertified COTs components and those installed elements to support mounting and data connectivity which typically require a (S)TC. An alternate and recommended approach is to harmonize these definitions with FAA AC 120-76B.

(Source: Executive Jet Management, a NetJets company)

response

Noted

Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment *757* comment by: *Mario Sabourin SITA*

A Class 2 EFB system should be able to transmit bi-directionaly over various ACARS or IP-based subnetworks non-flight critical information, such as AAC or AOC type information to aircraft systems such as the ATSU/CMU or printer through a certified aircraft interface device. There are approved Class 2 systems that have this functionality today.
A Class 2 EFB system should be allowed to have bi-directional links setup with the certified aircraft systems in order to access shared aircraft systems (systems that provide technical services, such as printers, displays, aircraft-ground communication systems such as ATSU/CMU), provided that:
a) control/data flows from EFB system to shared aircraft systems cannot be re-directed to flight safety systems such as FMS
b) demonstration is provided that the bi-directional exchange of data does not jeopardize the intended function of the shared aircraft systems - the demonstration should be based on specific means of compliance applicable to EFB dedicated installed resources providing interface to avionic systems, bringing the proof that these systems are resistant to potentially unsecured and unstable behaviour of the EFB Class II hardware and software and will adequately protect the avionic systems.

response

Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB is allowed.

comment *759* comment by: *Mario Sabourin SITA*

Original text states: *e) Able to receive data from aircraft system through a certified interface unit, but unable to send data, except to systems which are completely isolated (in both directions).*

See comment #757.

Proposed change:
Able to receive data from aircraft system through a certified interface unit, but unable to send data, except to systems which are proven to provide adequate isolation (in both directions).

response

Partially accepted

In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for

	portable EFB is allowed.

comment	*816* comment by: *Fédération Nationale de l'Aviation Marchande (FNAM)* In the definition of Class 2 EFB systems, FNAM asks EASA to detail the case of dedicated installed resources.
response	Noted Nevertheless, class 2 has been removed from the resulting text of AMC 20-25

comment	*817* comment by: *Fédération Nationale de l'Aviation Marchande (FNAM)* Reference text: *"c) Not sharing any display or other input/output device (e.g. keyboard, pointing device) with certified aircraft systems."* Comment: This line forbids the possibility to display specific information (MEL, ground briefing) on a central screen, such as Multi-Function Displays (MFD) on the Airbus A350. That could allow flight crews reading the same information on a unique central screen, instead of looking at 2 different EFB screens.
response	Partially accepted In paragraph 6.1.1.1 of the resulting text of AMC 20-25, using shared resources, even for portable EFB, but subject to airworthiness approval, in the case of large aeroplanes based on CS 25.1302 (alternatively 23.1301), is allowed.

comment	*831* comment by: *Eurocopter* "*Class 2 EFB systems are: […] c) Not sharing any display […] with certified aircraft systems*." *"e) […] unable to send data, except to systems which are completely isolated (in both directions)*." Whereas data coming from EFBs should not be used by any function of the aircraft installed avionics, it should be allowed to display data from class 2 EFBs on an aircraft display, whether dedicated or shared, provided correct data segregation and appropriate display priorities are ensured. Also, the flight crew shall be aware that the source of such displayed data is an EFB, not the aircraft avionics.
response	Partially accepted Class 2 has been removed from the resulting text of AMC 20-25. For connectivity of portable EFB and sharing of resources, kindly see the responses provided to comments above.

comment	*842* comment by: *Lufthansa Technik Design Organisation* "a) .. without the capability to send data to the certified aircraft systems .." The objective, to restrict control of aircraft systems to class 3 EFBs is not well described. Definition of data flow should be harmonized with AC 120-76B, especially for data communication purposes as outlined in para 10.
response	Partially accepted

	In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB is allowed.

comment	*849* comment by: *Lufthansa Technik Design Organisation* "e) .. but unable to send data, except to systems which are completely isolated (in both directions)" This should also be harmonized with AC 120-76B. Data communication may be safely transferred through sytems which are not completely isolated.
response	Partially accepted In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB is allowed.

comment	*856* comment by: *navAero* • 5.1.2.a The limitation "..but without the capability to send data to the certified aircraft systems" is in disharmony with AC 120-76B and AC 20-173 which allows for bi-directional wired or wireless data connectivity. EASA is encouraged to review its position in view the current AC 120-76B and 20-173 with respect to aircraft connectivity. It would be beneficial to have a harmonized standard between EASA and FAA as STCs are in many cases validated. The comment is also affecting 6.1.2.4.
response	Partially accepted In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB is allowed.

comment	*864* comment by: *Boeing* Page: 28 Paragraph: 5.1.2.a) The text states: ***5.1.2 Class 2*** ***Definition:*** *Class 2 EFB systems are:* *a) Attached to an aircraft mounting device and/or connected to aircraft systems, but without the capability to send data to the certified aircraft systems (with the exception of the EFB dedicated installed resources).* *…* **REQUESTED CHANGE**: The use of the phrase ***"dedicated EFB dedicated installed resources"*** is confusing. Why would this possible restriction apply to this type of device? Better clarification is needed. **JUSTIFICATION:** The proposed definition is Incomplete and confusing. It could possibly pose a very restrictive interpretation – limiting future designs and current devices.
response	Noted Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment	*865* comment by: *Boeing* Page: 28 Paragraph: 5.1.2.b) The proposed text states: ***5.1.2 Class 2*** ***Definition:*** *Class 2 EFB systems are:* *…* *b) Not considered to be part of the certified aircraft configuration, i.e. not in the aircraft Type design nor installed by a change to the Type design nor added by a Supplemental Type Certificate.* *…* **REQUESTED CHANGE:** The proposed text implies that a Class 2 device will not be allowed to receive STCs for possible retrofit devices, including mounts, etc., which would make it very nearly impossible to install EFBs in older generation aircraft. We suggest the text be changed or deleted. **JUSTIFICATION:** As proposed, the statement would eliminate most of the post-production devices and their possible STC capabilities from being developed for the majority of the fleets being flown today by the major carriers.
response	Partially accepted The airworthiness requirements have been split from the operational criteria in the resulting text of AMC 20-25. The basic principle is that the manufacturer can apply to certify any item comprised in the aircraft design, including mounting devices. Conversely, operators are responsible for the safe use of any item not included in the approved aircraft design. No restrictions are imposed to manufacturers on which items should be included in their possible applications for TC, change to TC, or STC.

comment	*866* comment by: *Boeing* Page: 28 Paragraph: 5.1.2.c) The proposed text states: ***5.1.2 Class 2*** ***Definition:*** *Class 2 EFB systems are:* *…* *c) Not sharing any display or other input/output device (e.g. keyboard, pointing device) with certified aircraft systems.* **REQUESTED CHANGE:** This statement is incomplete and very limiting to any future Class 2 type EFB development. We recommend either providing a more complete, clearer statement or dropping the statement altogether. **JUSTIFICATION:** As proposed, the statement presents a situation that would inhibit future designs and development.
response	Partially accepted In paragraph 6.1.1.1 of the resulting text of AMC 20-25, using shared resources, even for portable EFB, but subject to airworthiness approval, in the case of large

aeroplanes based on CS 25.1302 (alternatively 23.1301), is allowed.

comment 867 comment by: *Boeing*

Page: 29
Paragraph: 5.1.2.d)
The proposed text states:

> ***5.1.2 Class 2***
> ***Definition:***
> *Class 2 EFB systems are:*
> *…*
> *d) Based on a portable hardware platform that does not require any tool to be removed from the flight crew compartment; a flight-crew member should be able to perform the task reasonably easily and rapidly.*

REQUESTED CHANGE: We question whether the proposed text is necessary.

JUSTIFICATION: A removable Class 2 device will normally be easily attached or removed as a part of its ergonomic design and approval. We recommend deleting the entire sentence.

response

Noted

Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment 868 comment by: *Boeing*

Page: 29
Paragraph: 5.1.2.e)
The proposed text states:

> ***5.1.2 Class 2***
> ***Definition:***
> *Class 2 EFB systems are:*
> *…*
> *e) Able to receive data from aircraft system through a certified interface unit, but unable to send data, except to systems which are completely isolated (in both directions).*

REQUESTED CHANGE: The meaning of the term ***"completely isolated"*** is unclear – especially with regard to such devices as a printer that may have multiple input capabilities.

JUSTIFICATION: When is a system "completely isolated" in today's system designs with the transmission and receipt of electronic data between devices such as wireless printers, etc.? We recommend clarifying the proposed paragraph.

response

Partially accepted

Class 2 has been removed from the resulting text of AMC 20-25.

For connectivity of portable EFB and sharing of resources, kindly see the responses provided to comments above.

comment	*869* comment by: *Boeing* Page: 29 Paragraph: 5.1.2 -- *Complementary characteristics* 1st sentence The proposed text states: ***Complementary characteristics:*** *Class 2 EFB hardware may be used during all phases of flight. They may also receive data from the aircraft avionics.* **REQUESTED CHANGE:** We recommend revising the text as follows: ***Complementary characteristics:*** *Class 2 EFB hardware **and software** may be used during all phases of flight. They may also receive data from the aircraft avionics.* **JUSTIFICATION:** Our suggested change would provide a more complete definition and explanation.
response	Noted Nevertheless, class 2 has been removed from the resulting text of AMC 20-25.

comment	*870* comment by: *Boeing* Page: 29 Paragraph: 5.1.2 -- *Complementary characteristics* 3rd sentence The proposed text states: *EFB Class 2 systems may only be connected to aircraft power through a certified power source (See section 6.1.2.3).* **REQUESTED CHANGE:** This text should be revised to take into account capabilities of components that may not actually require an aircraft certified part listing, such as a device power-charging cord/plug. **JUSTIFICATION:** It will not be possible to get certified power cords, etc., for many of the Class 2 devices. Most devices have a UL approval on the power cords that are supplied with the devices.
response	Accepted Class 2 has been removed from the resulting text of AMC 20-25, but the comment is also applicable to portable EFB. Paragraphs 6.1.1.1.3 and 6.1.1.1.5 have been revised following the principle that any 'installed' item should be included in the approved aircraft design data. However, there is no mandatory list of such items. Depending on the design, the list may or may not include cabling. Equally, power supply units not part of the certified aircraft design can be used, but under the responsibility of the aircraft operator.

comment	*896* comment by: *Franz Redak* 5.1.2.a) We strongly oppose the wording in the identified paragraph: ....but without the capability to send data to the certified aircraft systems for following reasons:

	1. basically everything on an aircraft is certified by definition...which means no interface to any system even when EFB dedicated. 2. certified aircraft system is not defined in the regulation and would need explanation/definition. 3. The wording is not consistent with prior TGL wording and is also not harmonized with FAA AC 120-76B. Even though the harmonization might not be a topic in the ongoing process, it is strongly recommended to do so, due to the extra burden on EU vs. US STC holder obligations and future validation processes. Will a US STC for a Class 2 be able to interface to other systems? 4. Class 2 systems may want to be interfaced with ACARS, Printers or similar other systems. We don´t see any technical reason why this could not be included in a Class 2 certification.
response	Partially accepted In paragraph 5.1.1 of the resulting text of AMC 20-25, connectivity even for portable EFB is allowed.

CONCLUSION ON COMMENTS ON PAGES 28-29 (DRAFT DECISION AMC 20-25 – HARDWARE CLASS 2)

A very significant number (i.e. 74) of comments were received on this segment of NPA 2012-02.

Most of the comments criticised the clarity of the definition of Class 2 EFB host platform. Several proposed more precise wording (e.g. better definition of 'isolated'). A number of these editorial or precise suggestions have been either accepted or partially accepted.

In more general terms, all commentators agree that:

— the portable EFB host platform shall not be part of the certified aircraft configuration, which, besides possible improvement to the precision of the wording, was already the proposal in NPA 2012-02; and

— conversely, resources installed (i.e. proposed by the manufacturer in the aircraft design submitted to the certification process) on the aircraft shall be part of the certified aircraft design associated to TC, changes to TC or STC, which again was the original Agency's proposal, even if in some cases it was not worded precisely.

Several comments challenged the prohibition to implement bi-directional data connectivity on Class 2, for AOC/AAC, similar to comments on the same subject related to Class 1. As mentioned above, the Agency accepts the principle of these comments, with some limitations.

A number of commentators also stressed that sharing of resources between the portable EFB host platform and installed aircraft systems, like displays or input/output devices (e.g. keyboard, printer, pointing devices) should be allowed. They also provided the example of Airbus A350.

The content of these comments has been partially accepted (i.e. identified non-critical resources, e.g. the printer, can be shared if covered and demonstrated during the airworthiness certification process for obtaining the initial TC, or subsequent major changes/STC including for the human factors linked to specific EFB applications).

Finally, FAA stated that they are planning (in edition 'C' of AC 120-76) to depart from Classes 1, 2 and 3, and instead refer to only two categories of EFB host platforms, i.e. 'portable' and 'installed'. The Agency agrees with this suggestion, which would improve clarity and simplicity, as well as harmonisation (although in the future) with FAA.

The resulting text of AMC 20-25, in which EFB host platform classes (i.e. 1, 2 and 3) are no longer present and replaced by only two possibilities (i.e. 'portable' and 'installed'), is

presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 5 SYSTEM DESCRIPTION AND CLASSIFICATION OF EFB SYSTEMS - 5.1 Hardware Classes of EFB Systems - 5.1.3 Class 3 p. 29

comment

10 comment by: *FAA*

Page 29, para 5.1.3

Comment:
AC 120-76B definition has been updated.
Definition being updated to portable and installed. May still reference Class 3 as installed, but FAA is migrating away from these classifications

Reason for Comment:
Harmonization of definitions

Suggested Change:
Should read: Approved software to be consistent with AC 20-173.

response

Partially accepted

In paragraph 5.1.2 of the resulting text of AMC 20-25 (i.e. installed EFB) hosting certified software applications is allowed. In this case, relevant Agency's CSs or AMC would apply, as for instance AMC 20-115.

comment

11 comment by: *FAA*

Page 29, para 5.1.3
Complementary characteristics 5th para,

Comment:
AC 20-173 and AC 120-76B definitions have been updated.

Reason for Comment:
Harmonization of definitions.

Suggested Change:
Should read - Attached to an aircraft mounting device and/or connected to aircraft systems, provided they use read-only access, or transmit receive access only by use of an installed interface providing a means of partition and non interference with certified aircraft systems with the exception of EFB dedicated installed resources.

response

Not accepted

As advised by the Review Group, in paragraph 5.1.2 of the resulting text of AMC 20-25, the Agency has included a much shorter and simpler definition, based on the key words 'installed' and 'aircraft part'.

comment

71 comment by: *Air France*

"Data connectivity is allowed for Type A or Type B applications hosted on a Class 3 EFB but without the capability to send data to other certified aircraft systems."

Proposal : It should be precised also : "except for isolated systems."
Justification : cf. 5.1.2.e and 6.1.2.4 p36 (transmission media).

response

Partially accepted

In paragraph 5.1.2 of the resulting text of AMC 20-25 no limits are put to connectivity for installed EFB, being the latter subject to the airworthiness approval processes which are considered sufficient to assess the safety of any proposed design solution.

comment

185 comment by: *AIRBUS*

"Data connectivity is allowed for Type A or Type B applications hosted on a Class 3 EFB but without the capability to send data to other certified aircraft systems."

NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given for comment about section 5.1.2.a). (Class 2 definition)

Suggested text:
Data connectivity is allowed for Type A or Type B applications hosted on a Class 3 EFB but without the capability to send data to other certified aircraft systems, with the exception of the EFB installed resources in accordance with section 6.1.2.5.

response

Partially accepted

In paragraph 5.1.2 of the resulting text of AMC 20-25 no limits are put to connectivity for installed EFB, being the latter subject to the airworthiness approval processes which are considered sufficient to assess the safety of any proposed design solution.

comment

268 ❖ comment by: *Thales Avionics*

Paragraph 5.1 describes the different EFB hardware classes. For class 1 and 2, the paragraph 5.1 describes the application types that can be supported, while these application types are defined later in paragraph 5.2.
It would therefore be more practical to avoid any reference to application type in paragraph 5.1, and to define in paragraph 5.2, for each application type, on which hardware class they can be installed.
In addition, a table showing the permitted application type allocation to hardware class would be useful.

response

Partially accepted

In paragraph 5.1of the resulting text of AMC 20-25 it is clarified that both portable and installed EFB may host Type A and/or Type B applications.

comment

293 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 15 shared with Airbus

JUSTIFICATION for the Comment on page # 29 § 5.1.3 "Da connectivity is allowed for Type A or Type B applications hosted on a Class 3 EFB but without the capability to send data to other certified aircraft systems."

NPA AMC 20-25 not harmonized with AC 120-76B. See rationale given for comment # 289 about section 5.1.2.a). (Class 2

definition)

PROPOSED TEXT / COMMENT
Data connectivity is allowed for Type A or Type B applications hosted on a Class 3 EFB but without the capability to send data to other certified aircraft systems, with the exception of the EFB installed resources in accordance with section 6.1.2.5.

response

Partially accepted

In paragraph 5.1.2 of the resulting text of AMC 20-25 no limits are put to connectivity for installed EFB, being the latter subject to the airworthiness approval processes which are considered sufficient to assess the safety of any proposed design solution.

comment

382 comment by: *Garmin International*

As noted in the comment on AMC 20-25 4.5 EFB definition, a Class 3 EFB could be interpreted as being applied to multi-function displays with "navigation charts, operating manuals, performance calculations" functions/capabilities. Burdening the TSO'd MFD equipment and/or TC/STC aircraft installation with the additional requirements found within this AMC is not productive to enabling the use of these safety enhancing functions/capabilities.

Recommend explicitly excluding functions/capabilities such as MFDs with TSO-C165 that have airworthiness approval as part of aircraft type design from this AMC.

response

Not accepted

The content of the comment may well be true. Nevertheless, the Agency believes that the regulatory material should be open to different design solutions, leaving, thus, to manufacturers to decide whether a certain solution is appropriate (even in managerial and economic terms) or not.

comment

409 comment by: *European Cockpit Association*

Only if no COTS equipment / software is used.
Justification: COTS is known for security holes

response

Not accepted

It is for the aircraft designer to propose which parts are comprised in the aircraft design submitted to approval. Some of these parts may have already been developed (e.g. used on earlier aircraft types) and, therefore, they are 'COTS', which does not necessarily imply that they are not secure. Airworthiness processes are robust enough to consider any possible failure condition, including in respect of data security.

comment

419 comment by: *European Cockpit Association*

Type A/B applications can be hosted on a connected class 3 EFB, provided they do not interfere with type C applications (…) and fullfill certification requirements for type C software.

Justification: As all applications are connected at certain points in a class 3 EFB, same high software requirements are essential for all applications.

response

Partially accepted

Paragraph 6.1.2.2 of the resulting text of AMC 20-25 has been revised, made more stringent and clarifies the responsibilities of the TC/STC holder, including with regard to software DAL.

comment

453 comment by: *Oliver Ast (CLH)*

Proposed Text:
Data connectivity is allowed for Type A or Type B applications hosted on a Class 3 EFB but without the capability to send data to other certified aircraft systems, with the exception of the EFB installed resources in accordance with section 6.1.2.5.

Comment:
NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given for comment about section 5.1.2 a)

response

Partially accepted

In paragraph 5.1.2 of the resulting text of AMC 20-25 no limits are put to connectivity for installed EFB, being the latter subject to the airworthiness approval processes which are considered sufficient to assess the safety of any proposed design solution.

comment

526 comment by: *Star Alliance*

Original AMC20-25 NPA text:
Data connectivity is allowed for Type A or Type B applications hosted on a Class 3 EFB but without the capability to send data to other certified aircraft systems.
RATIONALE / REASON / JUSTIFICATION for the Comment :
NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given for comment about section 5.1.2 a)
PROPOSED TEXT / COMMENT:
Data connectivity is allowed for Type A or Type B applications hosted on a Class 3 EFB but without the capability to send data to other certified aircraft systems, with the exception of the EFB installed resources in accordance with section 6.1.2.5.

response

Partially accepted

Please see response to comment 453 above.

comment

612 comment by: *Monarch Airlines*

We disagree with the Class 3 definition. 'An EFB which is not classified as class 1 or 2' is far too broad and requires much more intellectual rigour to develop a usable definition.

As with our comments about Class II EFBs (comment 611), we think that type A and B applications should be able to send data to suitably firewalled datalinks and radios.

response

Partially accepted

As advised by the Review Group, in paragraph 5.1.2 of the resulting text of AMC 20-25, the Agency has included a clearer definition for installed EFB, based on the key words 'installed' and 'aircraft part' and expressed in positive terms.

For data connectivity, please see response to comment No 453 above.

comment

622 comment by: *Goodrich*

A Class 3 EFB may host Type A and/or B applications along with Type C applications on the same system provided there is no interference between the Type A/B and Type C applications as stated in the paragraph below. The non-interference may be accomplished with a dual operating system architecture. If a Class 3 EFB system includes both a certified and non-certified operating system, the non-certified operating system should not be included as part of the certified aircraft configuration.

Suggest inserting the following sentence to this paragraph: " ... including hardware and operating system software qualification. In a case where the Class 3 EFB is capable of hosting more than one operating system, only the operating system hosting the Type C applications should be included as part of the certified aircraft configuration".

The data connectivity for Type A or Type B applications should be allowed with a certified interface unit for AAC/AOC data and printing capability. Suggest adding the same text as suggested for 5.1.2 part f) (Comment 621)

" ... ,except to a certified interface unit to systems which are completely isolated (in both directions), or to systems approved for the transmission of AAC/AOC information such as an ATSU or CMU or aircraft printer."

response

Partially accepted

The technical content of the comment is accepted. Text of paragraph 5.1.2 of the resulting text of AMC 20-25 has been revised, clarifying that the certification processes for non-certified applications, are limited to the 'no-hazard' principle. Partitioning the operating systems may be a design solution.
For data connectivity, kindly see response to comment 453 above.

comment

648 comment by: *Deutsche Lufthansa AG*

Proposal:
Detail the requirement as follows:
Data connectivity is allowed for Type A or Type B applications hosted on a Class 3 EFB but without the capability to send data to other certified aircraft systems, **with the exception of the EFB installed resources in accordance with section 6.1.2.5.**

Comment/Justification:
NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given for comment #644 about section 5.1.2 a)

response

Partially accepted

Please see response to comment 453 above.

comment	*693* comment by: *Thomson Airways* The definition of Class 3 systems is unacceptably vague, given the possible confusion arising from the incomplete / conflicting definition of Class 2 systems.
response	Partially accepted As advised by the Review Group, in paragraph 5.1.2 of resulting text of AMC 20-25 the Agency has included a clearer definition for installed EFB, based on the key words 'installed' and 'aircraft part' and expressed in positive terms.

comment	*694* comment by: *Thomson Airways* As per previous comments (689 & 692), Type A and B applications must be authorised to connect to certified communications systems (e.g. ACARS / SatCom).
response	Partially accepted Please see response to comment No 453 above.

comment	*832* comment by: *Eurocopter* "*Data connectivity is allowed for Type A or Type B applications hosted on a Class 3 EFB but without the capability to send data to other certified aircraft systems*" In line with the previous remark for class 2 EFB, we suggest allowing the display of type A or B applications' output data on shared displays, under the same conditions.
response	Accepted Text of paragraph 6.1.1.1 of the resulting text of AMC 20-25 has been revised, allowing the use of shared resources, for installed and portable EFB. Of course, the installed resources are subject to airworthiness approval, including the aspects connected to their shared use.

comment	*871* comment by: *Boeing* Page: 29 Paragraph 5.1.3 *Complementary characteristics* 5th sentence The proposed text states: *Any EFB components/hardware not accessible on the flight crew compartment by the flight crew members and/or not portable should be installed and certificated equipment covered by a Type Certificate (TC), changed TC, or Supplemental (S)TC.* **REQUESTED CHANGE:** The phrase that reads ***"capability to send data to the other certified aircraft systems"*** cannot be stated as such for many Class 3 certified EFBs. Many of the Class 3 type devices have already been approved under TGL 36 (in the JAA jurisdiction). We recommend deleting this phrase or revising it to fit current and future capabilities. **JUSTIFICATION:** This section of the NPA should take into account previous

approval in pre-EASA approved documents or regulatory authorities dealing with such devices.

response

Accepted

The text of paragraph 6.1.1.1 of the resulting text of AMC 20-25 has been revised, allowing the use of shared resources, for installed and portable EFB. Of course, the installed resources are subject to airworthiness approval, including the aspects connected to their shared use.

CONCLUSION ON COMMENTS ON PAGE 29 (DRAFT DECISION AMC 20-25 – HARDWARE CLASS 3)

18 comments were received on this segment of NPA 2012-02.

A few of them highlighted that the proposed definition of Class 3 EFB (i.e. 'neither 1 nor 2') is too vague. This issue would be solved by turning to 'portable' and 'installed' as suggested by FAA, in relation to Class 2. Furthermore, the definition of installed EFB has been expressed in short and positive terms.

In addition to suggesting some improvements to the clarity/precision of the wording, most stakeholders reiterated the need to allow a wider connectivity, similarly to their comments on Class 1 and 2 replied above. The same applies to sharing of displays and input/output devices. These comments have been in most cases partially accepted (i.e. accepted in principle, but not necessarily with precisely the same words used by the commentator).

One stakeholder emphasised that COTS may have security holes and, therefore, need to be certified. Also, security aspects need to be considered, which is agreed in principle by the Agency.

No stakeholder challenged the principle that installed EFB host platforms shall be part of the certified aircraft configuration.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 5 SYSTEM DESCRIPTION AND CLASSIFICATION OF EFB SYSTEMS - 5.2 Software Applications for EFB Systems p. 30

comment

186 comment by: *AIRBUS*

"For the purpose of the following definitions, "malfunction or **misuse**" means any failure, malfunction of the application, design-related human errors, or **erroneous interpretation of information or controls**."

This requirement introduces Human Factors considerations at S/W application level for determining safety effect.
Compliance with 25.1302 (if part of the aircraft certification basis) is required only for certified software. AMC 25.1309, required only for certified software, does not address the misuse.
It is pointed out that it is impossible to mitigate all possible misuses. If we would have to quantify the probability of misuse, such probability would be equal to "1". Even for a certified equipment compliant with ED-12B DAL A requirements, a bad HMI specification will lead to a bad HMI solution. So, robustness against misuse is mainly based on a robust operational assessment.
For EFB, misuse or erroneous interpretation of information or controls are already covered by ORA, by verification activities (correct computations, positive operational assessment, ...), by new Standard Operation Procedures (SOP), by

flight crew training, by in-service proving period if any, ... All those activities provide an acceptable assurance of robustness against misuse. Consequently, and in accordance with other comments related to failure condition classification, it is suggested to remove this sentence.

Suggested changes:
1 - Sentence to be removed
2 - Airbus suggests to add at the beginning of 5.2 a generic criteria for the classification the applications to ascertain that this classification is not based on safety (1309) criteria but on operational and capability ones. Suggestion: "EFB applications are classified as a function of their intended operational use and their ability to exchange data with certified aircraft system".

response

Partially accepted

The sentence has been reworded so that it is not overly restrictive.

However, the Agency underlines that the introduction of human factors considerations to classify applications is deliberate, and deemed necessary in the light of recent incidents and accidents. This allows introducing compliance demonstrations proportionate to the complexity of operations and the risk involved.

The Agency underlines as well that no reference to CS-25.1302 is made in paragraph 5.2 of the resulting text of AMC 20-25.

Concerning point 2, the new classification process described in Appendix C clearly states that a full system safety assessment as per 25.1309 is not required.

comment

268 ❖ comment by: *Thales Avionics*

Paragraph 5.1 describes the different EFB hardware classes. For class 1 and 2, the paragraph 5.1 describes the application types that can be supported, while these application types are defined later in paragraph 5.2.
It would therefore be more practical to avoid any reference to application type in paragraph 5.1, and to define in paragraph 5.2, for each application type, on which hardware class they can be installed.
In addition, a table showing the permitted application type allocation to hardware class would be useful.

response

Partially accepted

Paragraph 5.1 still contains references to software types, as it would have required too much restructuring effort to avoid doing so. However, a table has been introduced in chapter 6, that shows the hardware/software compatibility.

comment

294 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 16 shared with Airbus

JUSTIFICATION for the Comment on page # 30 § 5.2 " For the purpose of the following definitions, "malfunction or misuse" means any failure, malfunction of the application, design-related human errors, or erroneous interpretation of information or controls."
This requirement introduces Human Factors considerations at S/W application level for determining safety effect.
Compliance with 25.1302 (if part of the aircraft certification basis) is required

only for certified software. AMC 25.1309, required only for certified software, does not address the misuse.
It is pointed out that it is impossible to mitigate all possible misuses. If we would have to quantify the probability of misuse, such probability would be equal to "1". Even for a certified equipment compliant with ED-12B DAL A requirements, a bad HMI specification will lead to a bad HMI solution. So, robusteness against misuse is mainly based on a robust operational assessement.
For EFB, misuse or erroneous intepretation of information or controls are already covered by ORA, by verification activities (correct computations, positive operational assessement, ...), by new Standard Operation Procedures (SOP), by flight crew training, by in-service proving period if any, ... All those activities provide an acceptable assurance of robustness against misuse.
In addition to a robust EFB operational assessement, misuse can be mitigated by new aircraft functions such as ROW (Runway Overrun Warning) or ROPS (Runway Overrun Protection System) or T/O securing function ... Such new aircraft functions are intended to protect the aircraft from accidents/incidents as described in paragraph A.V.4 ("Impacts") of NPA AMC 20-25 in page 17.
Finally, balance between EFB misuses and pilot/dispatcher errors with the traditional paper process, is positive for the EFB, and EFB enhances the overall safety.
Consequently, and in accordance with other comments related to failure condition classification, it is suggested to remove this sentence.

PROPOSED TEXT / COMMENT
Sentence to be removed

response

Partially accepted

The sentence has been reworded so that it is not overly restrictive.

However, the Agency underlines that the introduction of human factors considerations to classify applications is deliberate, and deemed necessary in the light of recent incidents and accidents. This allows introducing compliance demonstrations proportionate to the complexity of operations and the risk involved.

The Agency underlines as well that no reference to CS-25.1302 is made in paragraph 5.2 of the resulting text of AMC 20-25.

comment

454 comment by: *Oliver Ast (CLH)*

Sentence to be removed:
For the purpose of the following definitions, "malfunction or misuse" means any failure, malfunction of the application, design-related human errors, or erroneous interpretation of information or controls.

Comment:
This requirement introduces Human Factors considerations at S/W application level for determining safety effect.
Compliance with 25.1302 (if part of the aircraft certification basis) is required only for certified software. AMC 25.1309, required only for certified software, does not address the misuse.
Misuse or erroneous intepration of information or controls are already covered by ORA, verification activities, flight crew training, in-service proving period if any, ...
In accordance wit other comments related to failure condition classification, it is suggested to remove this sentence.

response

Partially accepted

The sentence has been reworded in relation to 'misuse' so that it is not overly restrictive.

However, the Agency underlines that the introduction of human factors considerations to classify applications is deliberate, and deemed necessary in the light of recent incidents and accidents. This allows introducing compliance demonstrations proportionate to the complexity of operations and the risk involved.

The Agency underlines as well that no reference to CS-25.1302 is made in paragraph 5.2 of the proposed AMC 20-25.

comment

528 comment by: *Star Alliance*

Original AMC20-25 NPA text:
For the purpose of the following definitions, "malfunction or **misuse**" means any failure, malfunction of the application, design-related human errors, or **erroneous interpretation of information or controls**.
RATIONALE / REASON / JUSTIFICATION for the Comment :
This requirement introduces Human Factors considerations at S/W application level for determining safety effect.
Compliance with 25.1302 (if part of the aircraft certification basis) is required only for certified software. AMC 25.1309, required only for certified software, does not address the misuse.
Misuse or erroneous intepration of information or controls are already covered by ORA, verification activities, flight crew training, in-service proving period if any, ...
In accordance wit other comments related to failure condition classification, it is suggested to remove this sentence.

PROPOSED TEXT / COMMENT:
Sentence to be removed

response

Partially accepted

The sentence has been reworded in relation to 'misuse' so that it is not overly restrictive.

However, the Agency underlines that the introduction of human factors considerations to classify applications is deliberate, and deemed necessary in the light of recent incidents and accidents. This allows introducing compliance demonstrations proportionate to the complexity of operations and the risk involved.

The Agency underlines as well that no reference to CS-25.1302 is made in paragraph 5.2 of the proposed AMC 20-25.

comment

649 comment by: *Deutsche Lufthansa AG*

Proposal:

	Limit the requirement as follows: For the purpose of the following definitions, "malfunction ~~or misuse~~" means any failure, malfunction of the application, design-related human errors~~, or erroneous interpretation of information or controls~~. Comment/Justification: This requirement introduces Human Factors considerations at S/W application level for determining safety effect. Compliance with 25.1302 (if part of the aircraft certification basis) is required only for certified software. AMC 25.1309, required only for certified software, does not address the misuse. Misuse or erroneous intepration of information or controls are already covered by Operational Risk Assessments (element of SMS), verification activities, flight crew training, in-service proving period if any, ... In accordance with other comments related to failure condition classification, it is suggested to limit this requirement as proposed.
response	Partially accepted The sentence has been reworded in relation to 'misuse' so that it is not overly restrictive; 'erroneous interpretation of information or controls' has been deleted. However, the Agency underlines that the introduction of human factors considerations to classify applications is deliberate, and deemed necessary in the light of recent incidents and accidents. This allows introducing compliance demonstrations proportionate to the complexity of operations and the risk involved. The Agency underlines as well that no reference to CS-25.1302 is made in paragraph 5.2 of the proposed AMC 20-25.

comment	*833* comment by: *Eurocopter* "*If there is any doubt as to the classification of an application, applicants should seek advice early on in the approval process from EASA*." The concept of approval process from EASA is applicable to the aircraft certification. As far as the operational approval process is between the operator and its competent authority, how would EASA be involved in the decision for classification of the application? Considering general Eurocopter position (see general comment) and the fact that system safety analyses are out of the scope of operators, we suggest the following: - Type A applications should be restricted to a predefined list of applications published by EASA, - Type B applications should also be restricted to a predefined list of applications published by EASA, considering a need for no more than the equivalent of DAL D, with possible associated usage limitations and acceptable risk mitigations, - Other applications should be classified as type C and submitted to full airworthiness approval.
response	Not accepted The suggestion is noted. Publishing a 'closed' list of applications was considered during the development of the NPA. However, given the nature of the EFB and the rapid cycles of development, the Agency is of the opinion that no application

list could stand the test of ages and would be rapidly outdated. The new classification approach directly answers the concerns about the applications' safety effects while being more generic and future-proof. Open lists are kept as examples.

Concerning the classification, the Agency can, indeed, provide advice on request from national authorities, if needed.

CONCLUSION ON COMMENTS ON PAGE 30 (DRAFT AMC 20-25 – SOFTWARE APPLICATIONS FOR EFB SYSTEMS)

Among the seven received comments, five criticised in a similar way the need for studying the effects of the 'misuse' and human errors to classify the EFB applications. While it is agreed to seek an improvement in order for the classification not to be overly restrictive or confusing (in particular concerning the term 'misuse'), the Agency also underlines that the introduction of human factors considerations to classify applications is deliberate, and deemed necessary in the light of recent incidents and accidents. This allows introducing compliance demonstrations proportionate to the complexity of operations and the risk involved.

The Agency underlines that no reference to CS-25.1302 is made in paragraph 5.2 of the resulting text of AMC 20-25.

The proposal to discuss the software type/host platform classes 'compatibility' matrix is fair, and understood.

The proposal to publish 'closed' lists of applications was extensively discussed during the drafting of the NPA. However, given the nature of the EFB and the rapid cycles of development, the Agency maintains the opinion that no 'closed' application list could stand the test of age and would rapidly be out-dated. The new classification directly answers the concerns about the applications safety effects while being more generic and future-proof.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 5 SYSTEM DESCRIPTION AND CLASSIFICATION OF EFB SYSTEMS - 5.2 Software Applications for EFB Systems - 5.2.1 Type A p. 30

comment

12 comment by: *FAA*

Page 30, para 5.2.1 1st para,

Comment:
AC 20-173 and AC 120-76B definitions have been updated.

Reason for Comment
Harmonization fo definitions

Suggested Comment:
Should highlight at the point that a Type A and B applications are EFB applications, while Type C approved software applications are non-EFB.

response

Accepted

In harmonisation with the FAA AC 120-76B, the resulting text of AMC 20-25 does no longer include a Type C software application classification as a potential EFB application.

comment	*13* comment by: *FAA* page 30, para 5.2.1, Definition **Comment:** Do not require any approval? If an operator wants to replace their paper documents, which are required to be on board, with an EFB, shouldn't the Principal Inspector be approving this? **Reason for Comment:** Clarification **Suggested Change:** Delete - Do not require any approval Suggest approval is interfaced with authorization. With one exception, the FAA does not require approval for Type A applications for use outside of the critical phase of flight regime. Thus, the crews can access manuals outside of the critical phase of flight without requiring an authorization.
response	Not accepted The Agency confirms that certified CAT operators (i.e. now obliged by Commission Regulation (EU) No 965/2012 to implement safety management) should have the 'privilege' of approving by themselves Type A applications (and changes thereto), subject, though, to 'notification' of the authority. Higher level regulations can, however, apply concerning the approvals needed to have required documentation in electronic format. In the future, once possible ICAO standards on operational approval will become applicable (expected in November 2014), the Agency may launch a new rulemaking task to transpose these standards, but at the level of implementing rules (i.e. amendment to Commission Regulation (EU) No 965/2012) and not simply at the level of AMC.

comment	*81* comment by: *Grégory DELBEKE* **Page 30 of 72, item B. II. 5.2.1:** As explained above (page 23 of 72) the BCAA does not agree with the fact that type A applications does not require any operational approval.
response	Not accepted The Agency confirms that certified CAT operators (i.e. now obliged by Commission Regulation (EU) No 965/2012 to implement safety management) should have the 'privilege' of approving by themselves Type A applications (and changes thereto), subject, though, to 'notification' of the authority. Higher level regulations can, however, apply concerning the approvals needed to have required documentation in electronic format. In the future, once possible ICAO standards on operational approval will become applicable (expected in November 2014), the Agency may launch a new rulemaking task to transpose these standards, but at the level of implementing rules (i.e. amendment to Commission Regulation (EU) No 965/2012) and not simply at the level of AMC.

comment	*124* comment by: *DGAC* The entity in charge of deciding if an application can be classified "type A" or not is not mentioned. If the ultimate responsible for deciding the software classification is the operator, does he need to notify the classification to the competent Authority? Is the notification made through a possible amendment of the OPS manual?
response	Noted The Agency confirms that certified CAT operators (i.e. now obliged by Commission Regulation (EU) No 965/2012 to implement safety management) should have the 'privilege' of approving by themselves Type A applications (and changes thereto), subject, though, to 'notification' of the authority. Higher level regulations can, however, apply concerning the approvals needed to have required documentation in electronic format. In the future, once possible ICAO standards on operational approval will become applicable (expected in November 2014), the Agency may launch a new rulemaking task to transpose these standards, but at the level of implementing rules (i.e. amendment to Commission Regulation (EU) No 965/2012) and not simply at the level of AMC.

comment	*187* comment by: *AIRBUS* "Type A applications are EFB applications whose malfunction or misuse would have no adverse effect on the safety of any flight operation, i.e. a hazard level defined as no greater than a "no safety effect" failure condition classification." NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. This requirement is solution-prescriptive whereas it should be objective-oriented only. AMC20-25 does not explain how to assess that a Type A application has no safety effect. Since EFB Type A and B S/W applications are not certified, AMC 25.1309 is out of scope and therefore, the applicant has no guidance to assess the severity of the EFB failure conditions effects. In the frame of a Type A application (not operationally approved as suggested in AMC 20-25 section 5.2.1.b).), the assessment will be even more difficult for the applicant alone with no NAA supervision. For instance, for a FCOM classified as a Type A S/W application (as per TGL 36) or even a Type B as per NPA AMC 20-25, the Operator may question the safety effect of a wrong FCOM procedure. Has the safety assessment to consider the source data (i.e., the procedures approved by NAA and used as the same source for both paper and electronic FCOM formats) or only to consider the electronic data generation process ? The purpose of AMC 20-25 should not be to limit severity of the EFB failure conditions effects without guidance to assess them. AMC should explain how to cope with new safety risks when replacing paper format by electronic format of some of the documentation and information available to flight crew. As per ICAO ANNEX 6 - PART II (Amdt 30 - 15/12/11) - section 3.3.2 and its cross-referred guidance on safety management systems contained in the Safety Management Manual (SMM) (Doc 9859), the severity risk effect is only a part of the safety risk management. Safety risk management requires that safety risk likelihood, safety risk tolerability, safety risk control/mitigation be assessed as well. So, a risk may have safety effects provided that the risk be either acceptable or eliminated or mitigated. Safety Management Manual (Doc 9859) available at : "http://www2.icao.int/en/ism/Guidance%20Materials/DOC_9859_FULL_EN.pdf"

Additional guidance is given in "Guidance on Hazard Identification - March 09" from the Safety Management System and Safety Culture Working Group (SMS WG) - ESSI/ECAST (with EASA participation).

"Guidance on Hazard Identification - March 09" available at: "https://easa.europa.eu/essi/ecast/wp-content/uploads/2011/08/ECASTSMSWG-GuidanceonHazardIdentification1.pdf"
Refer as well to the ARMS Methodology for Operational Risk Assessment in Aviation Organisations available at :
"http://www.easa.eu.int/essi/documents/Methodology.pdf"
Airbus considers that the section 7.2 ("Risk assessment for EFB systems") of NPA AMC20-25 is fully in accordance with ICAO recommendations and guidance mentioned here above and section 7.2 is sufficient to address safety risks raised by Type A EFB S/W applications.
So, it is suggested removing consideration about failure classification.

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

response

Partially accepted

Some differences with the FAA AC 120-76B on this definition are acknowledged. The use of the interactivity criterion for classification purposes (as in the NPA, but also in the text suggested by the commentator) is, however, superseded by the new definition in paragraph 5.2.1 of the resulting text of AMC 20-25, developed in cooperation with the Review Group, including FAA.

Unlike what is stated in this comment, this paragraph is not a requirement but a definition. Guidance is to be found further on in the text on the software that is related to this definition.

comment

188 comment by: *AIRBUS*

"Type A applications:
b) Do not require any approval;"

NPA AMC 20-25 not consistent with forthcoming AC 120-76B.
NPA AMC 20-25 section 5.2.1.b). not consistent with the 3rd paragraph of section 7 (operational approval process) in page 39 :
"When an operator is seeking an operational approval for an EFB system, the evaluation should be conducted by the operator's competent authority when the system is based on a class 1 or 2 EFB and only hosts:
* Type A applications; and/or"
Airbus does think that an operational approval is necessary, notably to address :
- Class 1 EFB embodying only Type A S/W applications
- correct EFB S/W type classification by the Operator
- correct safety risk assessment carried out by the Operator, notably when starting operations with no paper
See comment about section 6.2.1 (Type A software applications) on the subject as well.

Suggested text:
b. Require and operational approval by the competent authority (operator's NAA). Although, the operational assessment of a Type A application is normally undertaken by the operator's competent authority (NAA), it could also be undertaken by the Agency. In this case, the operator's competent authority

approval should be based on the operational assessment performed by the Agency.

response

Partially accepted

The Agency confirms that certified CAT operators (i.e. now obliged by Commission Regulation (EU) No 965/2012 to implement safety management) should have the 'privilege' of approving by themselves Type A applications (and changes thereto), subject, though, to 'notification' of the authority.

In addition, as suggested in the comment, even for a class 1 EFB (now defined as 'portable EFB') containing only Type A applications, a preliminary operational assessment is necessary to deal with the EFB hardware aspects. This is detailed in chapter 6.

In the future, once possible ICAO standards on operational approval will become applicable (expected in November 2014), the Agency may launch a new rulemaking task to transpose these standards, but at the level of implementing rules (i.e. amendment to Commission Regulation (EU) No 965/2012) and not simply at the level of AMC.

comment

189 comment by: *AIRBUS*

"Should follow basic **human factors** guidance as described in Appendix D, paragraph 2."

The wording "human factors guidance" could be misinterpreted as a requirement to comply with CS 25.1302, and more generally to carry out a Human Factors assessment.
Compliance with 25.1302 (if part of the aircraft certification basis) is required only for certified software (Type C) or certified EFB hardware. This is reminded in the note of paragraph D.1 in Appendix D :
--quote-- "Note: Where an assessment is conducted as part of an airworthiness approval e.g. for a Class 3 EFB system or Class 2 EFB installed resources, CS 25.1302 titled "Installed systems and equipment for use by the flight crew" or applicable airworthiness basis should be applied." --unquote--
Consequently, basic human factors guidance should not be applicable to Type A software applications.

Suggested text:
Should follow guidelines described in Appendix D, paragraph 2.

response

Not accepted

The Agency believes that there is no risk of confusion as the link to Appendix D (not to CS 25.1302) is clearly made.

comment

268 ❖ comment by: *Thales Avionics*

Paragraph 5.1 describes the different EFB hardware classes. For class 1 and 2, the paragraph 5.1 describes the application types that can be supported, while these application types are defined later in paragraph 5.2.
It would therefore be more practical to avoid any reference to application type in paragraph 5.1, and to define in paragraph 5.2, for each application type, on which hardware class they can be installed.
In addition, a table showing the permitted application type allocation to hardware class would be useful.

response

Partially accepted

In paragraph 5.1 of the resulting text of AMC 20-25, it is clarified that both portable and installed EFB may host Type A and/or Type B applications.

comment

295 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 17 shared with Airbus

JUSTIFICATION for the Comment on page # 30 §5.2.1 Definition
NPA AMC 20-25 not harmonized with AC 120-76B.
This requirement is solution-prescriptive whereas it should be objective-oriented only. AMC20-25 does not explain how to assess that a Type A application has no safety effect. Since EFB Type A and B S/W applications are not certified, AMC 25.1309 is out of scope and therefore, the applicant has no guidance to assess the severity of the EFB failure conditions effects.
In the frame of a Type A application (not operationally approved as suggested in AMC 20-25 section 5.2.1.b).), the assessement will be even more difficult for the applicant alone with no NAA supervision.
For instance, for a FCOM classified as a Type A S/W application (as per TGL 36) or even a Type B as per NPA AMC 20-25, the Operator may question the safety effect of a wrong FCOM procedure. Has the safety assessment to consider the source data (ie., the procedures approved by NAA and used as the same source for both paper and electronic FCOM formats) or only to consider the electronic data generation process ?
The purpose of AMC 20-25 should not be to limit severity of the EFB failure conditions effects without guidance to assess them. AMC should explain how to cope with new safety risks when replacing paper format by electronic format of some of the documentation and information available to flight crew.
As per ICAO ANNEX 6 - PART II (Amdt 30 - 15/12/11) - section 3.3.2 and its cross-referred guidance on safety management systems contained in the Safety Management Manual (SMM) (Doc 9859), the severity risk effect is only a part of the safety risk management. Safety risk management requires that safety risk likelihood, safety risk tolerability, safety risk control/mitigation be assessed as well. So, a risk may have safety effects provided that the risk be either acceptable or eliminated or mitigated.
Safety Management Manual (Doc 9859) available at :
"http://www2.icao.int/en/ism/Guidance%20Materials/DOC_9859_FULL_EN.pdf"
Additional guidance is given in "Guidance on Hazard Identification - March 09" from the Safety Management System and Safety Culture Working Group (SMS WG) - ESSI/ECAST (with EASA participation).
"Guidance on Hazard Identification - March 09" available at:
"https://easa.europa.eu/essi/ecast/wp-content/uploads/2011/08/ECASTSMSWG-GuidanceonHazardIdentification1.pdf"
Refer as well to the ARMS Methodology for Operational Risk Assessment in Aviation Organisations available at:
"http://www.easa.eu.int/essi/documents/Methodology.pdf"

DASSAULT-AVIATION consider that the section 7.2 ("Risk assessement for EFB systems") of NPA AMC20-25 is fully in accordance with ICAO recommendations and guidances mentioned here above and section 7.2 is sufficient to address safety risks raised by Type A EFB S/W applications.
So, it is suggested removing consideration about failure classification classification.

PROPOSED TEXT / COMMENT

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

response

Partially accepted

Some differences with the FAA AC 120-76B on this definition are acknowledged. The use of the interactivity criterion for classification purposes (as in the NPA, but also in the text suggested by the commentator) is, however, superseded by the new definition in paragraph 5.2.1 of the resulting text of AMC 20-25, developed in cooperation with the Review Group, including FAA.

Unlike what is stated in this comment, this paragraph is not a requirement but a definition. Guidance is to be found further on in the text on the software that is related to this definition.

comment

296 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 18 shared with Airbus

JUSTIFICATION for the Comment on page # 30 § 5.2.1 b)
NPA AMC 20-25 not consistent with AC 120-76B.
NPA AMC 20-25 section 5.2.1.b). not consistent with the 3rd paragraph of section 7 (operational approval process) in page 39 :
"When an operator is seeking an operational approval for an EFB system, the evaluation should be conducted by the operator's competent authority when the system is based on a class 1 or 2 EFB and only hosts:
* Type A applications; and/or"
DASSAULT-AVIATION does think that an operational approval is necessary, notably to address :
- Class 1 EFB embodying only Type A S/W applications
- correct EFB S/W type classification by the Operator
- correct safety risk assessement carried out by the Operator, notably when starting operations with no paper
See comment #316 about section 6.2.1 (Type A software applications) on the subject as well

PROPOSED TEXT / COMMENT
b. Require and operational approval by the competent authority (operator's NAA). Although, the operational assessment of a Type A application is normally undertaken by the operator's competent authority (NAA), it could also be undertaken by the Agency. In this case, the operator's competent authority approval should be based on the operational assessment performed by the Agency.

response

Partially accepted

The Agency confirms that certified CAT operators (i.e. now obliged by Commission Regulation (EU) No 965/2012 to implement safety management) should have the 'privilege' of approving by themselves Type A applications (and changes thereto), subject, though, to 'notification' of the authority.

In addition, as suggested in the comment, even for a class 1 EFB (now defined as 'portable EFB') containing only Type A applications, a preliminary operational assessment is necessary to deal with the EFB hardware aspects. This is detailed in chapter 6.

In the future, once possible ICAO standards on operational approval will become applicable (expected in November 2014), the Agency may launch a new rulemaking task to transpose these standards, but at the level of implementing

rules (i.e. amendment to Commission Regulation (EU) No 965/2012) and not simply at the level of AMC.

comment *297* comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 19 shared with Airbus

JUSTIFICATION for the Comment on page # 30 §5.2.1 c)
The wording "human factors guidance" could be misinterpreted as a requirement to comply with CS 25.1302, and more generally to carry out a Human Factors assessment.
Compliance with 25.1302 (if part of the aircraft certification basis) is required only for certified software (Type C) or certified EFB hardware. This is reminded in the note of paragraph D.1 in Appendix D :
--quote-- "Note: Where an assessment is conducted as part of an airworthiness approval e.g. for a Class 3 EFB system or Class 2 EFB installed resources, CS 25.1302 titled "Installed systems and equipment for use by the flight crew" or applicable airworthiness basis should be applied." --unquote--
Consequently, basic human factors guidance should not be applicable to Type A software applications.

PROPOSED TEXT / COMMENT
Suggestion for new wording :
"Should follow guidelines described in Appendix D, paragraph 2. "

response Not accepted

The Agency believes that there is no risk of confusion as the link to Appendix D (not to CS 25.1302) is clearly made.

comment *455* comment by: *Oliver Ast (CLH)*

Proposed Text:

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

Comment:
NPA AMC 20-25 not harmonized with forthcoming AC 120-76B.
This requirement is solution-prescriptive whereas it should be objective-oriented only. AMC20-25 does not explain how to assess that a Type A application has no safety effect. Since EFB Type A and B S/W applications are not certified, AMC 25.1309 is out of scope and therefore, the applicant has no guidance to assess the severity of the EFB failure conditions effects.
In the frame of a Type A application (not operationally approved as suggested in AMC 20-25 section 5.2.1.b), the assessement will be even more difficult for the applicant alone with no NAA supervision.
For instance, for a FCOM classified as a Type A S/W application (as per TGL 36) or even a Type B as per NPA AMC 20-25, the Operator may question the safety effect of a wrong FCOM procedure. Has the safety assessement to consider the source data (ie., the procedures approved by NAA and used as the same source for both paper and electronic FCOM formats) or only to consider the electronic data generation process ?
The purpose of AMC 20-25 should not be to limit severity of the EFB failure conditions effects without guidance to assess them. AMC should explain how to cope with new safety risks when replacing paper format by electronic format of

some of the documentation and information available to flight crew.
As per ICAO ANNEX 6 - PART II (Amdt 30 - 15/12/11) - section 3.3.2 and its cross-referred guidance on safety management systems contained in the Safety Management Manual (SMM) (Doc 9859), severity risk effect is only a part of the safety risk management. Safety risk management requires that safety risk likelihood, safety risk tolerability, safety risk control/mitigation be assessed as well. So, a risk may have safety effects provided that the risk be either acceptable or eliminated or mitigated.
Safety Management Manual (Doc 9859) available at :
http://www2.icao.int/en/ism/Guidance%20Materials/DOC_9859_FULL_EN.pdf
Additional guidance is given in "Guidance on Hazard Identification - March 09" from the Safety Management System and Safety Culture Working Group (SMS WG) - ESSI/ECAST (with EASA participation).

"Guidance on Hazard Identification - March 09" available at:
https://easa.europa.eu/essi/ecast/wp-content/uploads/2011/08/ECASTSMSWG-GuidanceonHazardIdentification1.pdf
Refer as well to the ARMS Methodology for Operational Risk Assessment in Aviation Organisations available at :
http://www.easa.eu.int/essi/documents/Methodology.pdf
Star Alliance considers that the section 7.1 of NPA AMC20-25 is fully in accordance with ICAO recommendations and guidances mentioned here above and section 7.1 is sufficient to address safety risks raised by Type A EFB S/W applications.
So, Star Alliance suggests removing consideration about failure classification classification.

response

Partially accepted

Some differences with the FAA AC 120-76B on this definition are acknowledged. The use of the interactivity criterion for classification purposes (as in the NPA, but also in the text suggested by the commentator) is, however, superseded by the new definition in paragraph 5.2.1 of the resulting text of AMC 20-25, developed in cooperation with the Review Group, including the FAA.

Unlike stated in this comment, this paragraph is not a requirement, but a definition. Guidance is to be found further on in the text on the software that is related to this definition.

comment

456 comment by: *Oliver Ast (CLH)*

Proposed Text:
b. Require an operational approval by the competent authority (operator's NAA). Although, the operational assessment of a Type A application is normally undertaken by the operator's competent authority (NAA), it could also be undertaken by the Agency The operator's competent authority approval should be based on the operational assessment performed by the Agency.

Comment:
NPA AMC 20-25 not consistent with forthcoming AC 120-76B.
NPA AMC 20-25 section 6.2.1 not consistent with section 7 (3rd paragraph in page 39) :
"When an operator is seeking an operational approval for an EFB system, the evaluation should be conducted by the operator's competent authority when the system is based on a class 1 or 2 EFB and only hosts:
* Type A applications; and/or"
Airbus does think that an operational approval is necessary, notably to address :

- Class 1 EFB embodying only Type A S/W applications
- correct EFB S/W type classification by the Operator
- correct safety risk assessement carried out by the Operator, notably when starting operations with no paper

response

Partially accepted

The Agency confirms that certified CAT operators (i.e. now obliged by Commission Regulation (EU) No 965/2012 to implement safety management) should have the 'privilege' of approving by themselves Type A applications (and changes thereto), subject, though, to 'notification' of the authority.

In addition, as suggested in the comment, even for a class 1 EFB (now defined as 'portable EFB') containing only Type A applications, a preliminary operational assessment is necessary to deal with the EFB hardware aspects. This is detailed in chapter 6.

In the future, once possible ICAO standards on operational approval will become applicable (expected in November 2014), the Agency may launch a new rulemaking task to transpose these standards, but at the level of implementing rules (i.e. amendment to Commission Regulation (EU) No 965/2012) and not simply at the level of AMC.

comment

533 comment by: *Star Alliance*

Original AMC20-25 NPA text:

Type A applications are EFB applications whose malfunction or misuse would have no adverse effect on the safety of any flight operation, i.e. a hazard level defined as no greater than a "no safety effect" failure condition classification.

RATIONALE / REASON / JUSTIFICATION for the Comment :

NPA AMC 20-25 not harmonized with forthcoming AC 120-76B.
This requirement is solution-prescriptive whereas it should be objective-oriented only. AMC20-25 does not explain how to assess that a Type A application has no safety effect. Since EFB Type A and B S/W applications are not certified, AMC 25.1309 is out of scope and therefore, the applicant has no guidance to assess the severity of the EFB failure conditions effects.
In the frame of a Type A application (not operationally approved as suggested in AMC 20-25 section 5.2.1.b), the assessement will be even more difficult for the applicant alone with no NAA supervision.
For instance, for a FCOM classified as a Type A S/W application (as per TGL 36) or even a Type B as per NPA AMC 20-25, the Operator may question the safety effect of a wrong FCOM procedure. Has the safety assessement to consider the source data (ie., the procedures approved by NAA and used as the same source for both paper and electronic FCOM formats) or only to consider the electronic data generation process ?
The purpose of AMC 20-25 should not be to limit severity of the EFB failure conditions effects without guidance to assess them. AMC should explain how to cope with new safety risks when replacing paper format by electronic format of some of the documentation and information available to flight crew.

As per ICAO ANNEX 6 - PART II (Amdt 30 - 15/12/11) - section 3.3.2 and its cross-referred guidance on safety management systems contained in the Safety Management Manual (SMM) (Doc 9859), severity risk effect is only a part of the safety risk management. Safety risk management requires that safety risk likelihood, safety risk tolerability, safety risk control/mitigation be assessed as well. So, a risk may have safety effects provided that the risk be either acceptable or eliminated or mitigated.
Safety Management Manual (Doc 9859) available at : http://www2.icao.int/en/ism/Guidance%20Materials/DOC_9859_FULL_EN.pdf

Additional guidance is given in "Guidance on Hazard Identification - March 09" from the Safety Management System and Safety Culture Working Group (SMS WG) - ESSI/ECAST (with EASA participation).
"Guidance on Hazard Identification - March 09" available at: https://easa.europa.eu/essi/ecast/wp-content/uploads/2011/08/ECASTSMSWG-GuidanceonHazardIdentification1.pdf

Refer as well to the ARMS Methodology for Operational Risk Assessment in Aviation Organisations available at : http://www.easa.eu.int/essi/documents/Methodology.pdf

Star Alliance considers that the section 7.1 of NPA AMC20-25 is fully in accordance with ICAO recommendations and guidances mentioned here above and section 7.1 is sufficient to address safety risks raised by Type A EFB S/W applications.
So, Star Alliance suggests removing consideration about failure classification classification.

PROPOSED TEXT / COMMENT:

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

Original AMC20-25 NPA text:

Type A applications:
b) Do not require any approval;

RATIONALE / REASON / JUSTIFICATION for the Comment :

NPA AMC 20-25 not consistent with forthcoming AC 120-76B.
NPA AMC 20-25 section 6.2.1 not consistent with section 7 (3rd paragraph in page 39) :
"When an operator is seeking an operational approval for an EFB system, the evaluation should be conducted by the operator's competent authority
when the system is based on a class 1 or 2 EFB and only hosts:
* Type A applications; and/or"

Airbus does think that an operational approval is necessary, notably to address :
- Class 1 EFB embodying only Type A S/W applications
- correct EFB S/W type classification by the Operator
- correct safety risk assessement carried out by the Operator, notably when starting operations with no paper
See comment concerning p. 36 on the subject as well

PROPOSED TEXT / COMMENT:

b. Require operational approval by the competent authority (operator's NAA). Although, the operational assessment of a Type A application is normally undertaken by the operator's competent authority (NAA), it could also be undertaken by the Agency. The operator's competent authority approval should be based on the operational assessment performed by the Agency.

response

Partially accepted

Some differences with the FAA AC 120-76B on this definition are acknowledged. The use of the interactivity criterion for classification purposes (as in the NPA, but also in the text suggested by the commentator) is, however, superseded by the new definition in paragraph 5.2.1 of the resulting text of AMC 20-25, developed in cooperation with the Review Group, including the FAA.

Unlike what is stated in this comment, this paragraph is not a requirement but a definition. Guidance is to be found further on in the text on the software that is related to this definition.

The Agency confirms that certified CAT operators (i.e. now obliged by Commission Regulation (EU) No 965/2012 to implement safety management) should have the 'privilege' of approving by themselves Type A applications (and changes thereto), subject, though, to 'notification' of the authority.

In addition, as suggested in the comment, even for a class 1 EFB (now defined as 'portable EFB') containing only Type A applications, a preliminary operational assessment is necessary to deal with the EFB hardware aspects. This is detailed in chapter 6.

In the future, once possible ICAO standards on operational approval will become applicable (expected in November 2014), the Agency may launch a new rulemaking task to transpose these standards, but at the level of implementing rules (i.e. amendment to Commission Regulation (EU) No 965/2012) and not simply at the level of AMC.

comment

650 comment by: *Deutsche Lufthansa AG*

Proposal:

Reword as follows:
Type A applications ~~are EFB applications whose malfunction or misuse would have no adverse effect on the safety of any flight operation, i.e. a hazard level defined as no greater than a "no safety effect" failure condition classification.~~ **include pre-composed, fixed presentations of data currently presented in paper format.**

Comment/Justification:
NPA AMC 20-25 not harmonized with forthcoming AC 120-76B.
This requirement is solution-prescriptive whereas it should be objective-oriented only. AMC20-25 does not explain how to assess that a Type A application has no safety effect. Since EFB Type A and B S/W applications are not certified, AMC 25.1309 is out of scope and therefore, the applicant has no guidance to assess the severity of the EFB failure conditions effects.
In the frame of a Type A application (not operationally approved as suggested in AMC 20-25 section 5.2.1.b), the assessement will be even more difficult for the applicant alone with no NAA supervision.
For instance, for a FCOM classified as a Type A S/W application (as per TGL 36) or even a Type B as per NPA AMC 20-25, the Operator may question the safety effect of a wrong FCOM procedure. Has the safety assessement to consider the source data (ie., the procedures approved by NAA and used as the same source for both paper and electronic FCOM formats) or only to consider the electronic data generation process?

The purpose of AMC 20-25 should not be to limit severity of the EFB failure conditions effects without guidance to assess them. AMC should explain how to cope with new safety risks when replacing paper format by electronic format of some of the documentation and information available to flight crew.
As per ICAO ANNEX 6 - PART II (Amdt 30 - 15/12/11) - section 3.3.2 and its cross-referred guidance on safety management systems contained in the Safety Management Manual (SMM) (Doc 9859), severity risk effect is only a part of the safety risk management. Safety risk management requires that safety risk likelihood, safety risk tolerability, safety risk control/mitigation be assessed as well. So, a risk may have safety effects provided that the risk be either acceptable or eliminated or mitigated.
Safety Management Manual (Doc 9859) available at : http://www2.icao.int/en/ism/Guidance%20Materials/DOC_9859_FULL_EN.pdf
Additional guidance is given in "Guidance on Hazard Identification - March 09" from the Safety Management System and Safety Culture Working Group (SMS WG) - ESSI/ECAST (with EASA participation).
"Guidance on Hazard Identification - March 09" available at: https://easa.europa.eu/essi/ecast/wp-content/uploads/2011/08/ECASTSMSWG-GuidanceonHazardIdentification1.pdf
Refer as well to the ARMS Methodology for Operational Risk Assessment in Aviation Organisations available at : http://www.easa.eu.int/essi/documents/Methodology.pdf
Airbus considers that the section 7.1 of NPA AMC20-25 is fully in accordance with ICAO recommendations and guidances mentioned here above and section 7.1 is sufficient to address safety risks raised by Type A EFB S/W applications.

Conclusion:

Lufthansa suggests removing consideration about failure classification classification.

response

Partially accepted

Some differences with the FAA AC 120-76B on this definition are acknowledged. The use of the interactivity criterion for classification purposes (as in the NPA, but also in the text suggested by the commentator) is, however, superseded by the new definition in paragraph 5.2.1 of the resulting text of AMC 20-25, developed in cooperation with the Review Group, including the FAA.

Unlike what is stated in this comment, this paragraph is not a requirement but a definition. Guidance is to be found further on in the text on the software that is related to this definition.

comment

651 comment by: *Deutsche Lufthansa AG*

Proposal:
Modify b as follows:
b. Require an operational approval by the competent authority (operator's NAA). Although, the operational assessment of a Type A application is normally undertaken by the operator's competent authority (NAA), it could also be undertaken by the Agency The operator's competent authority approval should be based on the operational assessment performed by the Agency.

Comment/Justification:
NPA AMC 20-25 not consistent with forthcoming AC 120-76B.
NPA AMC 20-25 section 6.2.1 not consistent with section 7 (3rd paragraph in page 39):

	"When an operator is seeking an operational approval for an EFB system, the evaluation should be conducted by the operator's competent authority when the system is based on a class 1 or 2 EFB and only hosts: * Type A applications; and/or" We do think that an operational approval is necessary, notably to address: - Class 1 EFB embodying only Type A S/W applications - correct EFB S/W type classification by the Operator - correct safety risk assessement carried out by the Operator, notably when starting operations with no paper See comment #659 on the subject as well
response	Partially accepted The Agency confirms that certified CAT operators (i.e. now obliged by Commission Regulation (EU) No 965/2012 to implement safety management) should have the 'privilege' of approving by themselves Type A applications (and changes thereto), subject, though, to 'notification' of the authority. In addition, as suggested in the comment, even for a class 1 EFB (now defined as 'portable EFB') containing only Type A applications, a preliminary operational assessment is necessary to deal with the EFB hardware aspects. This is detailed in chapter 6. In the future, once possible ICAO standards on operational approval will become applicable (expected in November 2014), the Agency may launch a new rulemaking task to transpose these standards, but at the level of implementing rules (i.e. amendment to Commission Regulation (EU) No 965/2012) and not simply at the level of AMC.

CONCLUSION ON COMMENTS ON PAGE 30 (DRAFT AMC 20-25 – SOFTWARE APPLICATIONS FOR EFB SYSTEMS – TYPE A)

16 comments have been received on this segment, but several reiterated the same ideas.

— An OPS approval (based on the process application–reply) should be maintained also for Type A applications, according to some commentators;

— Only one competent authority is against the possible 'privilege' for operators having implemented safety management, of only 'notifying' any change to the said Type A applications;

— Another competent authority asked who is responsible to decide if a given application is Type A or not.

The Agency observes that:

— the new definition of Type A applications (in particular, the fact that they are considered to have no safety effect) greatly reduces the risk connected to this type of applications, although security aspects/unintended interference still need to be considered;

— implementing safety management by operators is an organisational and economic burden, whose return, according to technical literature, should, in fact, be more control by the authority on the processes and less on the details;

— this approach has been applied for decades in the Air Traffic Management (ATM) domain and in the airworthiness domain (e.g. privileges of a DOA), with no detrimental effect;

— in a period of shrinking public resources, the effort available in the competent authorities should be concentrated on the major safety risks and not on excessive paperwork;

— the 'notification' allows the authority not only to challenge the classification of the type,

but also to request, if so wished, deeper details, or even to decide to inspect the operator on the matter; and

— in any case, only one isolated authority declared to be against the proposed 'privilege'.

The Agency then confirms that certified CAT operators (i.e. now obliged by Commission Regulation (EU) No 965/2012 to implement safety management) should have the 'privilege' of approving by themselves Type A applications (and changes thereto), subject, though, to 'notification' of the authority.

Some other comments highlighted the differences with the FAA AC 120-76B on the definition of Type A applications. The Agency, however, intends to move towards a more modern definition, which departs from the use of interactivity as a classification criterion, which is no longer appropriate.

The resulting text of AMC 20-25 is presented in Appendix A, but the definition for Type A remains substantially as in the NPA.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 5 SYSTEM DESCRIPTION AND CLASSIFICATION OF EFB SYSTEMS - 5.2 Software Applications for EFB Systems - 5.2.2 Type B p. 30

comment *14* comment by: *FAA*

Page 30, Para 5.2.2, 1st bullet.

Comment:
AC 20-173 and AC 120-76B definition have been updated.

Reason for Comment:
Harmonization fo definitions

Suggest Change:
This seems a little vague. THis seems to say any required paper is not allowed to be Type B, which is incorrect with respect to EFB function. Also, what about a clock? There are required pieces of equipment which repeating may also provide some redundancy.

response Partially accepted

Type B definition has been modified, in consultation with FAA.

comment *48* comment by: *Air France*

As the operational manual is required by an operational rule, it seems that §a forbids its use on EFB.

Proposal : remove "functionality" from §a

response Accepted

A clarification has been added that Type B applications can be used to present documents required by the OPS rules.

comment *69* comment by: *Air France*

Type A and type B nomenclature uses the failure condition classification. This concept issued from the airworthiness regulation (CS25.1309) applies to

	operational framework with difficulty; SMS succeeds in implementing a similar process, but this NPA doesn't achieve the same level of maturity. The term of Minor failure can reopened the debate on the content of the appendix B list. Proposal : return to the application classification of TGL36.
response	Partially accepted A dedicated appendix has been added in order to provide guidance on the classification process. The definitions have been modified following the discussions in the Review Group but will still be based on failure condition classification.

comment	*73* comment by: *FAA* Page 30, Para 5,2,2, 1st Bullet. **Comment** AC 20-173 and AC 120-76B definitions have been updated **Reason for Comment:** Harmonization of definitions. **Suggested Change:** Many of the paper products Type A/B EFB software replaces are operationally required (e.g. charts, W&B, etc) . The FAA is concerned this paragraph could be misinterpreted as not allowing paper chart replacement
response	Accepted A clarification has been added that Type B applications can be used to present documents required by the OPS rules.

comment	*125* comment by: *DGAC* Is it relevant to refer to "minor failure condition" (4.10) or "no safety effect" when, in this NPA, such concepts apply to not approved software implemented on equipments possibly not approved either?
response	Partially accepted A dedicated appendix has been added in order to provide guidance on the classification process. The definitions have been modified following the discussions in the Review Group but will still be based on failure condition classification.

comment	*190* comment by: *AIRBUS* "a) **Do not substitute to** or duplicate any system or **functionality required by** airworthiness regulation or **operational rule**; and" The requirement for not substituting or not duplicating functionality required by operational rule is not applicable. This is the purpose of the EFB to substitute or to duplicate some functionalities, required by operational rule, which were up to now based on the paper process. For instance, Manuals to be carried, as required by OPS 1.130, can be now Type

B applications.

Suggested text:
a) Do not substitute to or duplicate any system or functionality required by airworthiness regulation or any system required by operational rule; and

response

Accepted

A clarification has been added that Type B applications can be used to present documents required by the OPS rules.

comment

191 comment by: *AIRBUS*

"Type B applications are applications that:
[…]
b) Whose malfunction or misuse would have an adverse safety effect, i.e. a hazard level no greater than a "minor" failure condition classification; and"

The rationale given for Type A applications still applies for Type B applications - see comment about section 5.2.1 (Type A complementary characteristics).
Moreover, this requirement should prevent classification of Performance and W&B applications as Type B EFB S/W applications.
Indeed, events described in NPA AMC 20-25 section A. V. 4. i. (safety) clearly show that wrong performance computation may be catastrophic.
In accordance with the comment about section 5.2.1 ("Type A definition"), the final objective is not the severity of a safety risk but the guarantee that the safety risk is reduced, controlled and acceptable.
Through a risk assessment process as described in section 7.2 ("Risk assessment for EFB systems"), the applicant can rely on extensive and positive worldwide experience of Performance application, daily used by all ground dispatchers, if such application is imported on board as a Type B S/W application.
In accordance with comment #192, it should be indicated that Type B application may be "strategically" used by crew in order to use the criterion Tactical/Strategic to distinguish Type B from Type C. This is in line with AC 120-76B that for the Type B Weather application restricts its use for strategic purpose.

Suggested text:
Type B applications are applications that:
[…]
b) include dynamic, interactive applications that can manipulate data and presentation and that may be used strategically by the crew.

response

Partially accepted

Some differences with the FAA AC 120-76B on this definition are acknowledged. The use of the interactivity criterion for classification purposes (as in the NPA, but also in the text suggested by the commentator) is, however, superseded by the new definition in paragraph 5.2.1 of the resulting text of AMC 20-25, developed in cooperation with the Review Group, including FAA.

comment

268 ❖ comment by: *Thales Avionics*

Paragraph 5.1 describes the different EFB hardware classes. For class 1 and 2, the paragraph 5.1 describes the application types that can be supported, while these application types are defined later in paragraph 5.2.
It would therefore be more practical to avoid any reference to application type in

paragraph 5.1, and to define in paragraph 5.2, for each application type, on which hardware class they can be installed.
In addition, a table showing the permitted application type allocation to hardware class would be useful.

response

Partially accepted

In paragraph 5.1 of the resulting text of AMC 20-25, it is clarified that both portable and installed EFB may host Type A and/or Type B applications.

comment

274 comment by: *Thales Avionics*

Type B applications are defined as "Do not have any of the capabilities defining type C applications".
Type C applications are defined as "Type C applications are applications considered to be ineligible for classification as either Type A or B."
This circular reference makes the definition of type B and type C applications unclear.

response

Accepted

The definitions have been modified and there is no longer reference to Type C applications in the Type B definition.

comment

298 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 20 shared with Airbus

JUSTIFICATION for the Comment on page # 30 § 5.2.2 a)
The requirement for not substituting or not duplicating functionality required by operational rule is not applicable.
This is the purpose of the EFB to substitute or to duplicate some functionalities, required by operational rule, which were up to now based on the paper process. For instance, Manuals to be carried, as required by OPS 1.130, can be now Type B applications.

PROPOSED TEXT / COMMENT
a) Do not substitute to or duplicate any system or functionality required by airworthiness regulation or any system required by operational rule; and

response

Accepted

A clarification has been added that Type B applications can be used to present documents required by the OPS rules.

comment

299 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 21 shared with Airbus

JUSTIFICATION for the Comment on page # 30 § 5.2.2 b) Type B... b)
The rationale given for Type A applications still applies for Type B applications - see comment #295 about section 5.2.1 (Type A complementary characteristics).
Moreover, this requirement should prevent classification of Performance and W&B applications as Type B EFB S/W applications.
Indeed, events decribed in NPA AMC 20-25 section A. V. 4. i. (safety) clearly show that wrong performance computation may be catastrophic.

	In accordance with the comment # 295 about section 5.2.1 ("Type A definition"), the final objective is not the severity of a safety risk but the guarantee that the safety risk is reduced, controlled and acceptable. Through a risk assessment process as described in section 7.2 ("Risk assessment for EFB systems"), the applicant can rely on extensive and positive worldwide experience of Performance application, daily used by all ground dispatchers, if such application is imported on board as a Type B S/W application. PROPOSED TEXT / COMMENT b) include dynamic, interactive applications that can manipulate data and presentation
response	Partially accepted Some differences with the FAA AC 120-76B on this definition are acknowledged. The use of the interactivity criterion for classification purposes (as in the NPA, but also in the text suggested by the commentator) is, however, superseded by the new definition in paragraph 5.2.1 of the resulting text of AMC 20-25, developed in cooperation with the Review Group, including FAA.

comment	*424* comment by: *PMV-Engineering / ADCISSE* "Type B application malfunction or misuse would have an adverse safety effect (i.e Minor failure condition)." Minor FC cannot be achieved with a software hosted by MS Windows in the great majority of Class 1 or 2 EFB platform? DO178B Level D must be achieved in this case as stated in ARP 4761 and CSXX.1309.
response	Not accepted Although the use of DO-178 is possible for the development of EFB applications, this is not required by the resulting text of AMC 20-25. The effect of the FC depends not only on the probability of it occurring, but also on the estimated effects in the considered operational scenario. Furthermore, there is no requirement, even in CS 25.1309, to develop software as level D for applications whose safety effect is no worse than minor.

comment	*457* comment by: *Oliver Ast (CLH)* Proposed Text: a) Do not substitute to or duplicate any system or functionality required by airworthiness regulation or any system required by operational rule; and Comment: The requirement for not substituting or not duplicating functionality required by operational rule is not applicable. This is the purpose of the EFB to substitute or to duplicate some functionalities, required by operational rule, which were up to now based on the paper process. For instance, Manuals to be carried, as required by OPS 1.130, can be now Type B applications.
response	Accepted A clarification has been added that Type B applications can be used to present documents required by the OPS rules.

comment	*458* comment by: *Oliver Ast (CLH)*

Proposed Text:
b) include dynamic, interactive applications that can manipulate data and presentation

Comment:
The rationale given for Type A applications still applies fro Type B applications (see comment #11 about section 5.2.1).
Moreover, this requirement should prevent classification of Performance and W&B applications as Type B EFB S/W applications.
Indeed, events decribed in NPA AMC 20-25 section A. V. 4. i. (safety) clearly show that wrong performance computation may be catastrophic.
The final objective is not the severity of a safety risk but the guarantee that the safety risk is reduced, controlled and acceptable.
Through a risk assessment process as described in section 7.2, the applicant can rely on extensive and positive worldwide experience of Performance application daily used by all ground dispatchers if such application is imported on board as a Type B S/W application.

response

Partially accepted

The use of the interactivity criterion for classification purposes (as in the NPA, but also in the text suggested by the commentator) is, however, superseded by the new definition in paragraph 5.2.1 of the resulting text of AMC 20-25, developed in cooperation with the Review Group, including FAA.

comment

524 comment by: *Jeppesen Inc.*

Under "Type B applications are applications that:,
Suggest adding: "d) Can be used during critical phases of flight such as take-off and landing as a replacement for the paper equivalents (e.g. approach charts)

Rationale:
Harmonization with AC 120-76B

response

Not accepted

The proposed addition is not a defining characteristic, but a privilege that can be granted following a proper operational evaluation and approval. Considerations for use during all phases of flight depend on the EFB hardware, and further requirements apply to the replacement of paper charts.

comment

525 comment by: *Jeppesen Inc.*

Under "Type B applications are applications that:,

Suggest adding: "e) Are weight-and-balance or performance calculation applications using validated algorithms. Algorithms may have the ability to interpolate data but must not extrapolate, and therefore must be tested and proven accurate by the manufacturer or operator to represent the AFM- or Rotorcraft Flight Manual (RFM)-approved data.

Rationale:
Harmonization with AC 120-76B

response

Partially accepted

The proposed addition is not a defining characteristic. However, it is already addressed: W&B and performance applications are listed in Appendix B, and

requirements concerning the accuracy and the algorithms have to be addressed in the chapter dedicated to these applications.

comment

527 comment by: *Jeppesen Inc.*

Under "Type B applications are applications that:,

Suggest adding: "f) Displaying information which may be used by the flight-crew members as an aide to help establish and maintain situation awareness relative to the intended navigation route, adverse weather, obstacles or other traffic, in flight or on ground."

Rationale:
We suggest that, with proper implementation such as limiting "zoom-in" functionality to zoom-levels that can only provide situational awareness, combined with proper training in the use of said function (including ownship position symbol), a very useful quick orientation-reference, map-to-position, can be provided without supplanting avionics navigation solutions.

response

Not accepted

The proposed addition is not a defining characteristic. Whatever the characteristics, the classification is now based on potential severity of the effects of failure conditions.

Specific HF considerations on charts applications have to be spelled out in the proper chapters (e.g. Human Factors chapter).

comment

539 comment by: *Star Alliance*

Original AMC20-25 NPA text:
a) **Do not substitute to** or duplicate any system or **functionality required by** airworthiness regulation or **operational rule**; and
RATIONALE / REASON / JUSTIFICATION for the Comment :
The requirement for not substituting or not duplicating functionality required by operational rule is not applicable.
This is the purpose of the EFB to substitute or to duplicate some functionalities, required by operational rule, which were up to now based on the paper process. For instance, Manuals to be carried, as required by OPS 1.130, can be now Type B applications.
PROPOSED TEXT / COMMENT:
a) Do not substitute to or duplicate any system or functionality required by airworthiness regulation or any system required by operational rule; and
Original AMC20-25 NPA text:
Type B applications are applications that:
[…]
b) Whose malfunction or misuse would have an adverse safety effect, i.e. a hazard level no greater than a "minor" failure condition classification; and

RATIONALE / REASON / JUSTIFICATION for the Comment :

The rationale given for Type A applications still applies fro Type B applications (see comment about section 5.2.1).
Moreover, this requirement should prevent classification of Performance and W&B applications as Type B EFB S/W applications.

Indeed, events decribed in NPA AMC 20-25 section A. V. 4. i. (safety) clearly show that wrong performance computation may be catastrophic.
In accordance with comment about section 5.2.1., the final objective is not the severity of a safety risk but the guarantee that the safety risk is reduced, controlled and acceptable.
Through a risk assessment process as described in section 7.2, the applicant can rely on extensive and positive worldwide experience of Performance application daily used by all ground dispatchers if such application is imported on board as a Type B S/W application.

PROPOSED TEXT / COMMENT:

b) include dynamic, interactive applications that can manipulate data and presentation

response

Partially accepted

— A clarification has been added that Type B applications can be used to present documents required by the OPS rules.

— The resulting text of AMC 20-25 includes a more modern definition, where the use of interactivity as a classification criterion (as in the suggested text) is no longer relevant (please see responses to comments above).

comment

652 comment by: *Deutsche Lufthansa AG*

Proposal:

extend the sentence as follows:
a) Do not substitute to or duplicate any system or functionality required by airworthiness regulation or **any system required by** operational rule; and

Comment/Justification:
The requirement for not substituting or not duplicating any functionality required by operational rule falls too short.
This is the purpose of the EFB to substitute or to duplicate some functionalities, required by operational rule, which were up to now based on the paper process.
For instance, Manuals to be carried, as required by OPS 1.130, can be now Type B applications.

response

Accepted

A clarification has been added that Type B applications can be used to present documents required by the OPS rules.

comment

653 comment by: *Deutsche Lufthansa AG*

Proposal:

Reword b) as follows:

~~b) Whose malfunction or misuse would have an adverse safety effect, i.e. a hazard level no greater than a "minor" failure condition classification; and~~

b) include dynamic, interactive applications that can manipulate data and presentation

Comment/Justification:
The rationale given for Type A applications still applies for Type B applications (see comment #650 about section 5.2.1).
Moreover, this requirement should prevent classification of Performance and W&B applications as Type B EFB S/W applications.
Indeed, events decribed in NPA AMC 20-25 section A. V. 4. i. (safety) clearly show that wrong performance computation may be catastrophic.
In accordance with comment #650, the final objective is not the severity of a safety risk but the guarantee that the safety risk is reduced, controlled and acceptable.
Through a risk assessment process as described in section 7.2, the applicant can rely on extensive and positive worldwide experience of Performance application daily used by all ground dispatchers if such application is imported on board as a Type B S/W application.

response

Partially accepted

The use of the interactivity criterion for classification purposes (as in the NPA, but also in the text suggested by the commentator) is, however, superseded by the new definition in paragraph 5.2.1 of the resulting text of AMC 20-25, developed in cooperation with the Review Group, including FAA.

comment *728* comment by: *NetJets Europe*

Currently reads:
5.2.2 Type B
Type B applications are applications that:
a) Do not substitute to or duplicate any system or functionality required by airworthiness regulation or operational rule; and
b) Whose malfunction or misuse would have an adverse safety effect, i.e. a hazard level no greater than a "minor" failure condition classification; and
c) Do not have any of the capabilities defining type C applications (see §5.2.3).

Recommended Change:
5.2.2 Type B
Type B applications are applications that:
a) are intended for use during critical phases of flight, and/or replace required aeronautical information traditionally presented in a paper format such as navigation or approach charts.,
b) are interactive weight and balance or performance applications that use algorithms for calculation and must be validated for accuracy.
c) Whose malfunction or misuse would have an adverse safety effect, i.e. a hazard level no greater than a "minor" failure condition classification; and
d) Do not have any of the capabilities defining type C applications (see §5.2.3).

Rationale:
Attempted to align definition to be harmonized with recently released FAA AC 120-76B.

The current sentence "may not substitute to or duplicate any system or function required by airworthiness regulation or operational rule…" leads to confusion. An operator's primary EFB program objective may be to substitute or duplicate information such as an Airplane Flight Manual or aeronautical charts (examples of airworthiness and operational material, respectively) electronically.
Item for Consideration:
Is it possible that the restriction of Type B applications to a 'MINOR' classification would cause an undue burden on the industry as they attempt to determine the hazard level of a particular application? For example, a standard approach procedure may be considered very hazardous if the printed information is incorrect, however its presentation on an EFB is clearly within the intent of 'Type B'. Perhaps hazard level requirements should be explained in another area of the document, outside of the 'Definition' section?

(Source: Executive Jet Management, a NetJets company)

response

Partially accepted

— The proposed addition 'a)' is not a defining characteristic, but a privilege that can be granted following a proper operational evaluation. Considerations for use during all phases of the flight depend on the EFB hardware, and further requirements apply to the replacement of paper charts.

— The proposed addition 'b)' is not a defining characteristic. Nevertheless, it is already addressed: W&B and performance applications are listed in Appendix B, and requirements concerning the accuracy and the algorithms have to be addressed in the chapter dedicated to these applications.

— A clarification has been added that Type B applications can be used to present documents required by the OPS rules.

— 'Item for consideration': this is addressed with the addition of a new chapter (Appendix C) dedicated to guidance for the classification process of applications that are not in Appendices A or B.

comment

748 comment by: *Jeppesen Inc.*

Recommended Wording Change:
5.2.2 Type B
Type B applications are applications that:
a) are intended for use during critical phases of flight, and/or replace required aeronautical information traditionally presented in a paper format such as navigation or approach charts.,
b) are interactive weight and balance or performance applications that use algorithms for calculation and must be validated for accuracy.
c) Whose malfunction or misuse would have an adverse safety effect, i.e. a

	hazard level no greater than a "minor" failure condition classification; and d) Do not have any of the capabilities defining type C applications (see §5.2.3). Rationale: Attempted to align definition to be harmonized with recently released FAA AC 120-76B. The current sentence "may not substitute to or duplicate any system or function required by airworthiness regulation or operational rule…" leads to confusion. An operator's primary EFB program objective may be to substitute or duplicate information such as an Airplane Flight Manual or aeronautical charts (examples of airworthiness and operational material, respectively) electronically.
response	Partially accepted — The proposed addition 'a)' is not a defining characteristic, but a privilege that can be granted following a proper operational evaluation. Considerations for use during all phases of flight depend on the EFB hardware, and further requirements apply to the replacement of paper charts. — The proposed addition 'b)' is not a defining characteristic. Nevertheless, it is already addressed: W&B and performance applications are listed in Appendix B, and requirements concerning the accuracy and the algorithms have to be addressed in the chapter dedicated to these applications. — A clarification has been added that Type B applications can be used to present documents required by the OPS rules.

comment	*834* comment by: *Eurocopter* "*Type B applications are applications that: a) Do not substitute to or duplicate any system or functionality required by airworthiness regulation or operational rule*". Such a rule would exclude the use of type B EFB applications for the display of documentation needed by operational rules, e.g. Aircraft Flight Manual or Operations Manual, which is not in line with appendix B and the primary intent of EFB. We suggest removing "*or operational rule*".
response	Accepted A clarification has been added that Type B applications can be used to present documents required by the OPS rules.

CONCLUSION ON COMMENTS ON PAGE 30 (DRAFT AMC 20-25 – SOFTWARE APPLICATIONS FOR EFB SYSTEMS – TYPE B)

24 comments were received on this segment.

One of the most frequent is about the wording 'Do not substitute or duplicate any system or functionality required by […] operational rule' in the definition. Several commentators argue that since manuals are required by the OPS rules, this would forbid documents and charts applications being Type B. The Agency accepts this concern and has, therefore, amended the wording to make it clear that the documents and information required per OPS 1.125, 130 and 135 (or CAT.GEN.MPA.180) can be supported by Type B applications.

Furthermore, the use of the failure hazard severity is criticised, as in the previous segment (Type A definition). The Agency has improved the classification criterion (interactivity no longer being relevant to the application criticality), now similar in the wording to FAA (From AC120-76B: 'Portable EFBs are limited to hosting Type A and Type B software applications with

intended functions limited to a minor failure effect classification.').

Several commentators argue that some traditional Type B applications (e.g. performance) have catastrophic failure effects.

The Agency acknowledges the potential safety effects linked to the performance applications, which are, in fact, in the resulting text of AMC 20-25, subject to a dedicated assessment process. During the process, any manufacturer rating the effects of a particular hazard linked to the application as 'catastrophic' should clearly not propose it on a 'portable' (non-certified) platform. And, in any case, all Type B applications remain under oversight by the competent authority.

The resulting text of AMC 20-25 is presented in Appendix A but the definition proposed by the NPA for Type B applications, while clarified, is not substantially changed.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 5 SYSTEM DESCRIPTION AND CLASSIFICATION OF EFB SYSTEMS - 5.2 Software Applications for EFB Systems - 5.2.3 Type C p. 31

comment

26 comment by: *FAA*

Page 31, Para 5.2.3 1st paragraph.
Comment:
AC 20-173 and AC 120-76B definitions have been updated.

Reason for Comment:
Harmonization of definitions.

Suggested Change:
Approved software applications, which are non-EFB software applications are found in avionics including intended functions for communications navigation, and surveillance requiring design, production and installation approval Type C.

Also, Also, Type A and B applications listed in our appendices include various miscellaneous, non-required functions. It is possible for additional functions to be added to Type A and B in the future.

response

Partially accepted

The definitions have been harmonised with FAA.

comment

127 comment by: *DGAC*

With type C applications, we are a long way from the initial application of EFB which was to remove paper from the cockpit.

In particular, one has to be very cautious about display of CNS information.
Human Factors have to be considered before adding a new application with sensitive data such as CNS applications (ADS-B IN,…).
The EFB device shouldn't be an easy way to by-pass installation, or retrofitting, of certified equipment.
In that perspective, we have doubts about paragraph c) of 5.2.3 "Definition" where "communciation as primary means" is envisaged on an EFB.

response

Partially accepted

Type C software applications have been redefined and converted into Non-EFB/Avionics Software, in alignment with FAA latest definition, as not eligible for

	EFBs.

comment	*192* comment by: *AIRBUS* "Any application enabling the following capabilities are considered as type C applications: a) Displaying information which may be tactically used by the flight-crew members to check, control, or deduce the aircraft position or trajectory, either to follow the intended navigation route or to avoid adverse weather, obstacles or other traffic, in flight or on ground." The term "tactically" must be pointed out because it has a very significant importance in the definition of a Type C EFB software application. "Tactically" is about real-time or short-term decision making by the flight crew, supported by certified systems (FMS, GPS, Weather radar, ...) providing tactical data displayed on ND (Navigation Display). "Tactically" should be opposed to the term "Strategically" which is about long-term decision making by the flight crew, supported by EFB Type B software applications such as Weather charts (eg. from weather data uploaded or uplinked from the ground), navigation charts with own ship position, ..., providing strategical data displayed on an EFB display (shared or not with certified aircraft systems). The flight crew cannot be confused by : - on one hand, a Navigation Display (ND) displaying a FMS flight plan with the own ship position and weather radar information for short term or tactical operations, - on the other hand, an EFB display displaying nav charts with own ship position and meteorological graphical interpretation (uploaded on ground or received by datalink in air) for long term or strategical operations and which cannot be used as Primary means. In the same way, the flight crew would not be confused by the usual own ship symbol on ND, and an appropriate and a distinct symbol on EFB nav charts with a uncertainty level attached to it. Displaying an aircraft symbol on EFB nav charts would definitely bring a higher level of awareness of the in-flight position and therefore, would enhance safety. Such approach has already been positively used for the Airport Moving map Display (AMMD) on Class 2 EFB. Indeed, as per section H.1.2 of the AMC 20-25 NPA about AMMD, the tactical means of taxiing navigation is the use of normal procedures and direct visual observation out of the cockpit window, whereas the strategical means of taxiing navigation is the Airport Moving Map Display (AMMD) with own ship position. Suggested text: No change suggested for section 5.2.3. a) but comment raised for consistency purpose with further comments about Appendix B (Type B applications) and Appendix C (Type C applications).
response	Partially accepted Please see response to comment No 127.

comment	*193* comment by: *AIRBUS* "Any application enabling the following capabilities are considered as type C applications:

	[…] d) Sending data to the certified aircraft systems other than the EFB installed resources." NPA AMC 20-25 not consistent with forthcoming AC 120-76B. See rationale given for comment about section 5.1.2.a). (Class 2 definition). Suggested text: Any application enabling the following capabilities are considered as type C applications: […] d) Sending data to the certified aircraft systems other than the EFB installed resources described in section 6.1.2.5.
response	Partially accepted The sentence has been modified: … other than the EFB installed resources certified according to the X.X section' (X.X pending final numbering)

comment	*194* comment by: *AIRBUS* "Complementary characteristics: Type C applications: a) May only be hosted on Class 3 Hardware with the exception of AMMD (refer to § 5.2.3.1);" The wording should allow more flexibility to prevent the need of reopening AMC 20-25 for each future evolution. In addition to AMMD, it is suggested that other Type C applications could be hosted in Class 2 if they are subject to new dedicated ETSO (e.g. ADS-B). Suggested text: a) May only be hosted on Class 3 Hardware with the exception of AMMD (refer to § 5.2.3.1) or other EFB-eligible applications subject to a dedicated e-TSO or equivalent;
response	Partially accepted Flexibility has been added for classification of EFB software applications. Type C has been converted into Non-EFB/Avionics Software.

comment	*268* ❖ comment by: *Thales Avionics* Paragraph 5.1 describes the different EFB hardware classes. For class 1 and 2, the paragraph 5.1 describes the application types that can be supported, while these application types are defined later in paragraph 5.2. It would therefore be more practical to avoid any reference to application type in paragraph 5.1, and to define in paragraph 5.2, for each application type, on which hardware class they can be installed. In addition, a table showing the permitted application type allocation to hardware class would be useful.
response	Partially accepted Although classes have disappeared, the comment has been taken into account in the revised text of AMC 20-25

comment	*274* ❖ comment by: *Thales Avionics* Type B applications are defined as "Do not have any of the capabilities defining type C applications". Type C applications are defined as "Type C applications are applications considered to be ineligible for classification as either Type A or B." This circular reference makes the definition of type B and type C applications unclear.
response	Partially accepted In the revised text of AMC 20-25, circular references have been avoided to the greatest possible extent.

comment	*276* comment by: *Thales Avionics* It should be made clear that Type 3 software applications, being subject to airworthiness approval, are, as the hardware platform, part of the aircraft certified configuration.
response	Partially accepted Please see response to comment No 127.

comment	*277* comment by: *Thales Avionics* Complementary characteristics, b) "(refer to section 6.2.2)" should be replaced by "(refer to section 6.2.3)"
response	Partially accepted Cross-references have been updated in the revised text of AMC 20-25 according to the new distribution of paragraphs.

comment	*279* comment by: *Thales Avionics* "Displaying information which may be directly used by the flight crew to assess the real-time status of aircraft critical and essential systems, as a replacement for existing installed avionics, and/or to manage aircraft critical and essential systems following failure.": AC 120-176A identifies that "Electronic checklists, including normal, abnormal, and emergency" are type B applications and refers to "the current version of Advisory Circular (AC) 120-64, Operational Use & Modification of Electronic Checklists, for additional guidance." AC 120-64 identifies that ECL can "For example, the completion of an action item may be sensed bythe ECL system, and a non-normal (abnormal or emergency) checklist may be displayed automatically upon detection of the related fault." It should be clarified that ECL functions remain type B applications (including with closed-loop items) as long as the Crew Alerting messages are displayed by the Avionics Aircraft System (Aircraft status from Crew Alerting takes precedence over sensed items in the ECL).
response	Partially accepted Electronic Check List (ECL) is eligible as Type B, but following the Appendix C criteria.

comment	*300* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 22 shared with Airbus JUSTIFICATION for the Comment on page # 31 §5.2.3 Definition a) The term "tactically" must be pointed out because it has a very significant importance in the definition of a Type C EFB software application. "Tactically" is about real-time or short-term decision making by the flight crew, supported by certified systems (FMS, GPS, Weather radar, ...) providing tactical data displayed on ND (Navigation Display). "Tactically" should be opposed to the term "Strategically" which is about long-term decision making by the flight crew, supported by EFB Type B software applications such as Weather charts (eg. from weather data uploaded or uplinked from the ground), navigation charts with own ship position, ..., providing strategical data displayed on an EFB display (shared or not with certified aircraft systems). The flight crew cannot be confused by : - on one hand, a Navigation Display (ND) displaying a FMS flight plan with the own ship position and weather radar information for short term or tactical operations, - on the other hand, an EFB display displaying nav charts with own ship position and meteorological graphical interpretation (uploaded on ground or received by datalink in air) for long term or strategical operations and which cannot be used as Primary means. In the same way, the flight crew would not be confused by the usual own ship symbol on ND, and an appropriate and a distinct symbol on EFB nav charts with a uncertainty level attached to it. Displaying an aircraft symbol on EFB nav charts would definitely bring a higher level of awareness of the in-flight position and therefore, would enhance safety. Such approach has already been positively used for the Airport Moving map Display (AMMD) on Class 2 EFB. Indeed, as per section H.1.2 of the AMC 20-25 NPA about AMMD, the tactical means of taxiing navigation is the use of normal procedures and direct visual observation out of the cockpit window, whereas the strategical means of taxiing navigation is the Airport Moving Map Display (AMMD) with own ship position. PROPOSED TEXT / COMMENT No change suggested for section 5.2.3. a) but comment raised for consistency purpose with further comments about Appendix B (Type B applications) and Appendix C (Type C applications).
response	Partially accepted Please see response to comment No 127

comment	*301* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 23 shared with Airbus JUSTIFICATION for the Comment on page # 31 § 5.2.3 Definition d) NPA AMC 20-25 not consistent with AC 120-76B. See rationale given for comment #289 about section 5.1.2.a). (Class 2 definition). PROPOSED TEXT / COMMENT Any application enabling the following capabilities are considered as type C applications:

	[…] d) Sending data to the certified aircraft systems other than the EFB installed resources described in section 6.1.2.5.
response	Partially accepted Please see response to comment No 193

comment	*302* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 24 shared with Airbus JUSTIFICATION for the Comment on page # 31 § 5.2.3 Complementary a) The wording should allow more flexibility to prevent the need of reopening AMC 20-25 for each future evolution. In addition to AMMD, it is suggested that other Type C applications could be hosted in Class 2 if they are subject to new dedicated ETSO (eg. ADS-B). PROPOSED TEXT / COMMENT a) May only be hosted on Class 3 Hardware with the exception of AMMD (refer to § 5.2.3.1) or other EFB-eligible applications subject to a dedicated ETSO or equivalent;
response	Partially accepted Please see response to comment No 194

comment	*383* comment by: *Garmin International* As noted in other comments, the definition of Type C applications is so broad as to cover many existing applications performed on installed multi-function display (MFD) devices that already have TSO and TC/STC approvals. It is unclear what benefit will be provided by having to reassess previously approved functions/capabilities via AMC 20-25. Suggest excluding functions/capabilities performed on installed MFDs that already have TSO and TC/STC approvals from this AMC.
response	Partially accepted Type C has been converted into Non-EFB/Avionics Software. In any case, the intention is not to reassess with the criteria included in AMC 20-25 any already existing approval. The principle of 'grandfathering' for existing TC/STC approvals or existing ETSO authorisations will apply.

comment	*410* comment by: *European Cockpit Association* 5.2.3 d/ Should read "Sending data to the certified aircraft systems (…), if the data integrity is confirmed and the data is secure." Justification: It is crucial, that no compromised data from the EFB can influence any other system.
response	Partially accepted The sentence has not been changed precisely as requested, but data connectivity needs to be certified including compliance with safety and security requirements.

comment	*459* comment by: *Oliver Ast (CLH)* No change suggested for section 5.2.3. a) but comment raised for consistency purpose with further comments about Appendix B (Type B applications) and Appendix C (Type C applications). Comment: The term "tactically" must be pointed out because it has a very significant importance in the definition of a Type C EFB software application. "Tactically" is about real-time or short-term decision making by the flight crew, supported by certified systems (FMS, GPS, Weather radar, ...) providing tactical data displayed on ND (Navigation Display). "Tactically" should be opposed to the term "Strategically" which is about long-term decision making by the flight crew, supported by EFB Type B software applications such as Weather charts (eg. from weather data uploaded or uplinked from the ground), navigation charts with own ship position, ..., providing strategical data displayed on an EFB display (shared or not with certified aircraft systems). The flight crew cannot be confused by : - on one hand, a Navigation Display (ND) displaying a FMS flight plan with the own ship position and weather radar information for short term or tactical operations, - on the other hand, an EFB display displaying nav charts with own ship position and meteorological graphical interpretation (uploaded on ground or received by datalink in air) for long term or strategical operations and which cannot be used as Primary means. In the same way, the flight crew would not be confused by the usual own ship symbol on ND, and an appropriate and a distinct symbol on EFB nav charts with a uncertainty level attached to it. Displaying an aircraft symbol on EFB nav charts would definitely bring a higher level of awareness of the in-flight position and therefore, would enhance safety. Such approach has already been positively used for the Airport Moving map Display (AMMD) on Class 2 EFB. Indeed, as per section H.1.2 of the AMC 20-25 NPA about AMMD, the tactical means of taxiing navigation is the use of normal procedures and direct visual observation out of the cockpit window, whereas the strategical means of taxiing navigation is the Airport Moving Map Display (AMMD) with own ship position.
response	Partially accepted Please see response to comment No 127.

comment	*460* comment by: *Oliver Ast (CLH)* Proposed Text: Any application enabling the following capabilities are considered as type C applications: […] d) Sending data to the certified aircraft systems other than the EFB installed resources described in section 6.1.2.5. Comment: NPA AMC 20-25 not consistent with forthcoming AC 120-76B. See rationale given for comment about section 5.1.2.a)
response	Partially accepted Please see response to comment No 193.

comment	*529* comment by: *Jeppesen Inc.* Suggest changing paragraph a) to read: " a)Displaying information which is intended to be the primary source used by the flight-crew members to check, control, or deduce the aircraft position or trajectory, either to follow the navigation route or as a primary means to avoid adverse weather, obstacles or other traffic, in flight or on ground." Rationale: This provides an appropriate distinction between applications that provide supplemental situation awareness (Type B), and applications that are designed for primary reference/usage (Type C).
response	Not accepted A Type C software application (now Non-EFB/Avionics Software) cannot be converted into a Type B just because it is not the primary reference. This is clarified in the revised text of AMC 20-25 – Appendix C.

comment	*530* comment by: *Jeppesen Inc.* Complimentary Characteristics Suggest add "d) ED-12/DO-178 compliance required" Rationale: Harmonization with AC 120-76B. Else, how is airworthiness ensured?
response	Partially accepted Type C has been converted into Non-EFB/Avionics Software which is not covered by AMC 20-25.

comment	*531* comment by: *Jeppesen Inc.* Suggest remove: "d) Sending data to…..installed resources". Rationale: Understanding is that there already exist approved Type B performance applications which send data through comm links such as ACARS to FMC's.
response	Accepted In the resulting text of AMC 20-25, bi-directional connectivity even for portable EFB, subject to certain conditions, is allowed.

comment	*540* comment by: *Star Alliance* **Original AMC20-25 NPA text:** Any application enabling the following capabilities are considered as type C applications: a) Displaying information which may be tactically used by the flight-crew members to check, control, or deduce the aircraft position or trajectory, either to follow the intended navigation route or to avoid adverse weather, obstacles or other traffic, in flight or on ground.

RATIONALE / REASON / JUSTIFICATION for the Comment :
The term "tactically" must be pointed out because it has a very significant importance in the definition of a Type C EFB software application. "Tactically" is about real-time or short-term decision making by the flight crew, supported by certified systems (FMS, GPS, Weather radar, ...) providing tactical data displayed on ND (Navigation Display).
"Tactically" should be opposed to the term "Strategically" which is about long-term decision making by the flight crew, supported by EFB Type B software applications such as Weather charts (eg. from weather data uploaded or uplinked from the ground), navigation charts with own ship position, ..., providing strategical data displayed on an EFB display (shared or not with certified aircraft systems).

The flight crew cannot be confused by :
- on one hand, a Navigation Display (ND) displaying a FMS flight plan with the own ship position and weather radar information for short term or tactical operations,
- on the other hand, an EFB display displaying nav charts with own ship position and meteorological graphical interpretation (uploaded on ground or received by datalink in air) for long term or strategical operations and which cannot be used as Primary means.
In the same way, the flight crew would not be confused by the usual own ship symbol on ND, and an appropriate and a distinct symbol on EFB nav charts with a uncertainty level attached to it. Displaying an aircraft symbol on EFB nav charts would definitely bring a higher level of awareness of the in-flight position and therefore, would enhance safety.

Such approach has already been positively used for the Airport Moving map Display (AMMD) on Class 2 EFB. Indeed, as per section H.1.2 of the AMC 20-25 NPA about AMMD, the tactical means of taxiing navigation is the use of normal procedures and direct visual observation out of the cockpit window, whereas the strategical means of taxiing navigation is the Airport Moving Map Display (AMMD) with own ship position.

PROPOSED TEXT / COMMENT:

No change suggested for section 5.2.3. a) but comment raised for consistency purpose with further comments about Appendix B (Type B applications) and Appendix C (Type C applications).
Original AMC20-25 NPA text:
Any application enabling the following capabilities are considered as type C applications:
[…]
d) Sending data to the certified aircraft systems other than the EFB installed resources.
RATIONALE / REASON / JUSTIFICATION for the Comment :
NPA AMC 20-25 not consistent with forthcoming AC 120-76B. See rationale given for comment about section 5.1.2.a)

PROPOSED TEXT / COMMENT:

Any application enabling the following capabilities are considered as type C applications:
[…]
d) Sending data to the certified aircraft systems other than the EFB installed resources described in section 6.1.2.5.

Original AMC20-25 NPA text:

Complementary characteristics:
Type C applications:
a) May only be hosted on Class 3 Hardware with the exception of AMMD (refer to § 5.2.3.1);

RATIONALE / REASON / JUSTIFICATION for the Comment :

The wording should allow more flexibility to prevent the need of reopening AMC 20-25 for each future evolution.
In addition to AMMD, it is suggested that other Type C applications could be hosted in Class 2 if they are subject to new dedicated eTSO (eg. ADS-B).

PROPOSED TEXT / COMMENT:

a) May only be hosted on Class 3 Hardware with the exception of AMMD (refer to § 5.2.3.1) or other EFB-eligible applications subject to a dedicated e-TSO or equivalent;

response

Partially accepted

Please see response to comments No 127, No 193, and No 194.

comment

654 comment by: *Deutsche Lufthansa AG*

Proposal:
No change suggested for section 5.2.3. a) but comment raised for consistency purpose with further comments about Appendix B (Type B applications) and Appendix C (Type C applications).

Comment/Justification:
The term "tactically" must be pointed out because it has a very significant importance in the definition of a Type C EFB software application.
"Tactically" is about real-time or short-term decision making by the flight crew, supported by certified systems (FMS, GPS, Weather radar, ...) providing tactical data displayed on ND (Navigation Display).
"Tactically" should be opposed to the term "Strategically" which is about long-term decision making by the flight crew, supported by EFB Type B software

applications such as Weather charts (eg. from weather data uploaded or uplinked from the ground), navigation charts with own ship position, ..., providing strategical data displayed on an EFB display (shared or not with certified aircraft systems).

The flight crew cannot be confused by :
- on one hand, a Navigation Display (ND) displaying a FMS flight plan with the own ship position and weather radar information for short term or tactical operations,
- on the other hand, an EFB display displaying nav charts with own ship position and meteorological graphical interpretation (uploaded on ground or received by datalink in air) for long term or strategical operations and which cannot be used as Primary means.

In the same way, the flight crew would not be confused by the usual own ship symbol on ND, and an appropriate and a distinct symbol on EFB nav charts with a uncertainty level attached to it. Displaying an aircraft symbol on EFB nav charts would definitely bring a higher level of awareness of the in-flight position and therefore, would enhance safety.
Such approach has already been positively used for the Airport Moving map Display (AMMD) on Class 2 EFB. Indeed, as per section H.1.2 of the AMC 20-25 NPA about AMMD, the tactical means of taxiing navigation is the use of normal procedures and direct visual observation out of the cockpit window, whereas the strategical means of taxiing navigation is the Airport Moving Map Display (AMMD) with own ship position.

response

Not accepted

Please see response to comment No 127 but a Type C (now Non-EFB/Avionics Software) application cannot be converted into Type B just because it is not the primary reference. This is clarified in the resulting text of AMC 20-25 – Appendix C.

comment

655 comment by: *Deutsche Lufthansa AG*

Proposal:
Any application enabling the following capabilities are considered as type C applications:
[…]
d) Sending data to the certified aircraft systems other than the EFB installed resources described in section 6.1.2.5.

Comment/Justification:
NPA AMC 20-25 not consistent with forthcoming AC 120-76B. See rationale given for comment #644 about section 5.1.2.a)

response

Not accepted

There is no inconsistency. EFB software applications can only send data to EFB installed resources which have been certified for that purpose.

comment

695 comment by: *Thomson Airways*

Like for Class 3 EFB vs Class1 or 2, a more detailed definition of Type C applications is required. "Ineligible for classification as either Type A or B" is too vague, certainly considering the evolution of EFB technology and the associated advent of new EFB applications.

response

Accepted

The Type C has been removed and converted into Non-EFB/Avionics Software

comment

696 comment by: *Thomson Airways*

The Enroute Moving Map Display with own-ship position should be treated the same way the AMMD is.

Similarly to the AMMD, the own-ship position is not used "**by the flight-crew members to check, control, or deduce the aircraft position or trajectory, either to follow the intended navigation route or to avoid adverse weather, obstacles or other traffic, in flight or on ground**" but increases situational awareness by assisting crews in orientating themselves on the electronic enroute map.
Therefore, like the AMMD (and with the same conditions and approval processes provisions), it should be authorised for use on Class 2 EFB systems.

response

Not accepted

AMMD is recognised as potential Type B, not because it increases the situational awareness, but because, as recognised in the proposed ETSO-2C165a or TSO-C165, an AMMD application with display of own-ship position is considered as having a minor safety effect when displaying misleading information and the failure condition for the loss of function is classified as 'no effect'.

On the contrary graphical depiction of navigation information on the EMD used to improve the flight crew awareness of the aircraft own-ship position relative to other items depicted on the EMD used in flight have been determined, per ETSO-2C165a or TSO-C165, to be a major failure condition for malfunctions causing the display of misleading information.

Therefore, the classification of own-ship position in flight as EFB Type B software application, would be in contradiction with the (E)TSO-C165 standard, the opinion of most of the Agency's experts and of the Review Group, and the current FAA material.

comment

729 comment by: *NetJets Europe*

Currently reads: 5.2.3 Type C
Definition:
Type C applications are applications considered to be ineligible for classification as either Type A or B.
Any application enabling the following capabilities are considered as type C applications:
a) Displaying information which may be tactically used by the flight-crew members to check, control, or deduce the aircraft position or trajectory, either to follow the intended navigation route or to avoid adverse weather, obstacles or other traffic, in flight or on ground.
b) Displaying information which may be directly used by the flight crew to assess the real-time status of aircraft critical and essential systems, as a replacement for existing installed avionics, and/or to manage aircraft critical and essential systems following failure.
c) Communicating as, primary means, to air traffic services, or whereby the flight path of the aircraft is authorised, directed or controlled.

d) Sending data to the certified aircraft systems other than the EFB installed resources.

Recommended Change: 5.2.3 Type C
Definition:
Type C applications are applications considered to be ineligible for classification as either Type A or B.
Any application enabling the following capabilities are considered as type C applications:
a) Displaying information which is intended to be a primary source used by the flight-crew members to check, control, or deduce the aircraft position or trajectory, either to follow the navigation route or as a primary means to avoid adverse weather, obstacles or other traffic, in flight or on ground.
b) Displaying information which may be directly used by the flight crew to assess the real-time status of aircraft critical and essential systems, as a replacement for existing installed avionics, and/or to manage aircraft critical and essential systems following failure.
c) Communicating as, primary means, to air traffic services, or whereby the flight path of the aircraft is authorised, directed or controlled.
d) Sending data to the certified aircraft systems other than the EFB installed resources.

Rationale:
Current definition appears too broad and may inadvertently deny many crewmembers valuable tools for situational awareness such as the display of graphical weather or enroute charts with a moving map function or the depiction of terrain.

Item for consideration:
Is the wording of b) intended to include abnormal and emergency procedure checklists (Type B applications per FAA AC 120-76B)?

Please harmonize with FAA AC 120-76B.

(Source: Executive Jet Management, a NetJets company)

response

Partially accepted

The request to harmonise with FAA is in principle accepted. Please see responses to comments No 695 and No 696.

comment

749 comment by: *Jeppesen Inc.*

Recommended wording change to paragraph a):
a) Displaying information which is intended to be a primary source used by the flight-crew members to check, control, or deduce the aircraft position or trajectory, either to follow the navigation route or as a primary means to avoid

	adverse weather, obstacles or other traffic, in flight or on ground. b) Displaying information which may be Rationale: Clarifies the definition of Type C in this area, compared to applications designed for supplemental use as Type B (see also previous related comments).
response	Not accepted Please see response to comment No 529.

comment	*760* comment by: *Mario Sabourin SITA* Original text limites 'd) Sending data to the certified aircraft systems other than the EFB installed resources.' to type C applications only. Type B application running on a Class 2 EFB system should be able to transmit bi-directionaly over various ACARS or IP-based subnetworks non-flight critical information, such as AAC or AOC type information to aircraft systems such as the ATSU/CMU or printer through a certified aircraft interface device. There are approved Class 2 systems that have this functionality today.
response	Accepted In the resulting text of AMC 20-25, bi-directional connectivity even for portable EFB, subject to certain conditions, is allowed.

comment	*761* comment by: *Mario Sabourin SITA* See comment #632
response	Partially accepted Please see response to comment No 632.

comment	*790* comment by: *Ingo Pucks, Owner IP Aerospace* A difficulty may arise from a need to show that a Type C application only uses data that has not be channeled or related or copied from a Type A or B application, i. e. aircraft performance correction factors (wing and engine anti-ice etc.) during calculations of a take-off data are automatically taken from procedures laid out in the operations manual. type C applications should have controlled data and configuration management of such data and applications should fulfil similar criteria as those of on-board complex electronic software (Do-200A and Do-178C). Possibly Type C data should be segregated from data of Type A and B applications during communication, configuration management, set-up, compilation and any other process and task that could inadvertently later data unnoticed.
response	Partially accepted Type C has been removed and converted into Non-EFB/Avionics Software. An avionics system which is receiving data from non-certified source, has to be certified for that purpose. Each data link shall be shown compliant with the certification requirements including, but not limited to, safety, security, and human factors aspects.

comment	*794* comment by: *Ingo Pucks, Owner IP Aerospace* A Type C application should be certified in accordance with its design assurance level (ref. to Do-178).
response	Accepted Type C has been removed and converted into Non-EFB/Avionics Software. In this case, AMC 20-115 applies.

CONCLUSION ON COMMENTS ON PAGE 31 (DRAFT AMC 20-25 – SOFTWARE APPLICATIONS FOR EFB SYSTEMS – TYPE C)

31 comments were received, some requesting no change to the definition; others requesting 'tactical' to be replaced by 'primary' to allow a wider range of applications to be classified as Type B and not C.

The Agency observes that some commentators have generally interpreted Type C in two improper ways:

— Type C applications are potential EFB applications;

— Whatever is not a Type C is a Type A/B.

Requested harmonisation with FAA doesn't help as FAA definition looks not perfect: 'Type C EFB Applications. Type C applications are FAA-approved software using RTCA/DO-178B compliance or other acceptable means. These non-EFB software applications are those found in avionics, including intended functions for communications, navigation, and surveillance that require FAA design, production, and installation approval.' since it mixes examples and requirements, while a real definition is missing.

Type C SW applications are, hence, removed from the resulting text of AMC 20-25.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 5 SYSTEM DESCRIPTION AND CLASSIFICATION OF EFB SYSTEMS - 5.2 Software Applications for EFB Systems - 5.2.3 Type C - 5.2.3.1 Airport Moving Map Display (AMMD) Application with Own-Ship Position p. 31

comment	*15* comment by: *FAA* Page 31, Para 5.2.3.1 **Comment**: AMMD is being reviewed at the FAA to determine if this function can be considered a Type B application. **Reason for Comment**: Harmonization of Policy **Suggested Change:** AC 120-76B Change 1 should reflect change of FAA policy.
response	Accepted AMMD that is used to improve the flight crew awareness is considered a Type B application in the resulting text of AMC 20-25.

comment	*25* comment by: *FAA* Page 31, para 5.2.3.1, 1st bullet. **Comment:** AC 20-173 and AC 120-76B definitions have been updated. **Reason for Comment:** Harmonization of definitions. **Suggested Comment:** It is a Type C Application that may be hosted on Class 2 or Class 3 EFB without segregation from Type A and B applications.
response	Partially accepted Please see response to comment No 15.

comment	*30* comment by: *SKY JET AG* AMMD with own-ship position: a) It is a type C application that may be installed on Class 2 or Class 3 host platform without segregation. b) It is subject to the specific conditions and approval processes described in Appendix H of this AMC. This paragraph prevents the use of own-ship position indication on Class 1 EFBs. Although it is partially understandable, we believe that a good opportunity as an easy-to-use, and therefore important and available, safety net available on Class 1 EFBs is lost. If procedures are established and notified to the operator's competent authority, as a safety net, own-ship position indications should also be allowed on Class 1 EFBs. Therefore, we believe AMC 20-25, 5.2.3.1 Airport Moving Map Display (AMMD) Application with Own-Ship Position should be amended with: AMMD with own-ship position: a) It is a type C application that may be installed on Class 2 or Class 3 host platform without segregation. b) It is subject to the specific conditions and approval processes described in Appendix H of this AMC. c) AMMD with own-ship position may be displayed on Class 1 host platform as advisory only, if appropriate procedures are established and notified to the operator's competent authority.
response	Partially accepted Please see response to comment No 15.

comment	*129* comment by: *DGAC* Could "without segregation" be clarified in that specific case. Is it needed?

response

Accepted

The phrase 'without segregation' has been removed from the revised text

comment 130 comment by: DGAC

We propose to delete "it" at the beginning of a) and b) of §5.2.3.1
We propose to add "and" at the end of a) to clarify that both conditions should be met.

response

Accepted

The wording has been improved as proposed

comment 268 ❖ comment by: Thales Avionics

Paragraph 5.1 describes the different EFB hardware classes. For class 1 and 2, the paragraph 5.1 describes the application types that can be supported, while these application types are defined later in paragraph 5.2.
It would therefore be more practical to avoid any reference to application type in paragraph 5.1, and to define in paragraph 5.2, for each application type, on which hardware class they can be installed.
In addition, a table showing the permitted application type allocation to hardware class would be useful.

response

Partially accepted

In paragraph 5.1 of the resulting text of AMC 20-25, it is clarified that both portable and installed EFB may host Type A and/or Type B applications.

comment 384 comment by: Garmin International

Many installed MFDs already support AMMD application with own-ship position display under TSO-C165 and TC/STC approvals. It is unclear what benefit will be derived from having to reassess the AMMD application under this new AMC guidance, particularly the added burden in AMC 20-25 Appendix H. As noted in several other Garmin comments, we recommend EASA retain the existing ETSO-C165 which is harmonized with FAA TSO-C165.

response

Partially accepted

Appendix H and ETSO-2C165 have been revised. Please see response to comment No 383.

comment 613 comment by: Monarch Airlines

We think that an additional class of special Type C applications needs to be recognised (in the same way as AMM is a 'special case' Type C application).

The new 'special Type C' application is an aeronautical chart with 'own ship' position. This is an extension of the AMM, ie the 'own ship' position is NOT used for deducing aircraft position, trajectory or following a navigational route, but rather to assist crews in orientating themselves relative to the features on the map to assist pilot situational awareness.

We have conducted authorised trials which demonstrate that, when using a map without own-ship position, pilots spend up to 30 seconds orientating themselves

	on the map relative to the map features. During this time, the pilot cannot monitor the aircraft. The same process, with own-ship position, takes less than 1 second, which enhances flight safety and reduces 'heads in' time. Our trials have indicated that this feature is the most useful and popular feature of EFB charting. This is also a feature currently implemented on many military aircraft using, for example, the Jeppesen Flitedeck application. EASA would need to justify why it is safe for military transports to use this safety-enhancing feature, but not commercial aircraft. Therefore, we strongly recommend that aeronautical charts with own-ship position be included as a special case in the same way as AMM is.
response	Not accepted Please see response to comment No 696..

comment	*730* comment by: *NetJets Europe* Current FAA research and initiatives pertaining to the authorization of the depiction of airport surface own-ship depiction as a Type B application on capable portable COTs devices have substantial potential to increase safety margins, be widely deployable and rapidly effective. We request that any advancement in FAA policy in this area be considered for inclusion into this document as well. (Source: Executive Jet Management, a NetJets company)
response	Partially accepted AMMD that is used to improve the flight crew awareness can be considered a Type B application. Displaying own-ship position in flight is not currently recognised as a Type B application. Please see response to comment No 696.

comment	*750* comment by: *Jeppesen Inc.* Comment: Harmonization with the current FAA 120-76B "Change 1" activity pertaining to the authorization of the depiction of airport surface ownship depiction as a Type B application on capable portable COTs devices should be considered in this policy as well. This has the potential to greatly increase adoption of an important safety tool that has a corresponding "Minor" failure effect.
response	Accepted Please see response to comment No 15.

comment	*835* comment by: *Eurocopter* According to the general policy, if the malfunction of the AMMD is considered as having no more than a minor safety impact, it should be classified as type C and, consequently, allowed to run on a class 2 platform and not submitted to EASA airworthiness approval. The reason for handling it as an exception is not clear: - Is the erroneous behaviour of this function actually considered as more than a

minor failure condition, despite what is stated in Appendix H and ETSO-2C165? - Or is there a specific reason for asking for an EASA approval, for example ensuring that complements/changes to the standard DO-257A have been considered?

In the latter case, such an example shows that the classification of EFB in 3 HW classes and 3 software types and the associated rules, among which mixability of classes and types and implications of EASA, are not totally adequate.
NOTE: The statement that the AMMD cannot lead to more than a minor failure condition is based on the fact that this is not a primary means of taxiing navigation. However, we believe that, as far as the flight crew has access to such an application, they could strongly rely on it.

response

Accepted

Please see response to comment No 15.

comment

872 comment by: *Boeing*

Page: 31
Paragraph 5.2.3.d)

The proposed text states:

5.2.3 Type C

Definition: …
Any application enabling the following capabilities are considered as type C applications:

…
d) Sending data to the certified aircraft systems other than the EFB installed resources.

REQUESTED CHANGE: The phrase ***"EFB installed resources"*** should either be deleted or revised to provide a better definitive explanation that includes more specifics.

JUSTIFICATION: Approval by EASA has already been accomplished on a device on the Boeing Model 787-8 certified EFB that is capable of transmitting data successfully to the aircraft FMS.

response

Accepted

'EFB installed resources' have been clarified in the revised text of AMC 20-25. Please see response to comment No 760.

CONCLUSION ON COMMENTS ON PAGE 31 (DRAFT AMC 20-25 – SOFTWARE APPLICATIONS FOR EFB SYSTEMS – TYPE C - AMMD)

11 comments were logged on this segment, requesting:

— reclassifying AMMD as Type B application, as per FAA initiative;

— adding additional functions as navigation charts with own-ship position in flight;

— Not to include ETSO-2C165a in 'index 2' of CS-ETSO (i.e. different from the corresponding FAA TSO), but maintain it fully harmonised with FAA TSO-C165 and therefore as ETSO-C165a in index 1; and

— some rewording proposals for editorial purposes.

Readers are kindly invited to read below concerning the ETSO on AMMD.

The proposal to reclassify AMMD as Type B is acceptable to the Agency but subject to specific considerations and in compliance with the Appendices to AMC 20-25, that ensures the suitability of the application for the intended function. One acceptable means to meet this objective at software/database level is an authorisation by the Agency on the basis of the published ETSO.

Agency cannot accept that display of own-ship position in flight is always Type B since the safety effect could be more severe than minor. Therefore, the requests to include additional functions as navigation charts with own-ship position in flight in the list of examples in AMC 20-25 are not accepted.

This, however, does not prevent to assess such applications according to Appendix C in the said AMC, and possibly approve them. The procedure applies to any new application (e.g. future own-ship position) which industry may want to propose since the lists of examples in AMC 20-25 are not exhaustive, but deliberately left open to evolution.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES p. 32

comment	*472* comment by: *Oliver Ast (CLH)* Comment: As a general rule, when dealing with airworthiness and/or operational approval processes, the AMC should clearly state the maximum waiting period an operator should expect between the request submission and the Agency or NAA approval.
response	Not accepted The proposal goes much beyond the scope of AMC 20-25 since in the EU framework, regulatory processes can be defined only at the level of legally binding implementing rules.

comment	*665* comment by: *Deutsche Lufthansa AG* As a general rule, when dealing with airworthiness and/or operational approval processes, the AMC should clearly state the maximum waiting period an operator should expect between the request submission and the Agency or NAA approval.
response	Not accepted Please see response to comment No 472.

CONCLUSION ON COMMENTS ON PAGE 32 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES)

Two comments were received asking for a defined time imposed to competent authorities to process an EFB operational approval request from an operator.

Since there is no such expiry period for any other OPS approval in the EU rules, for consistency reasons the Agency is not in favour of introducing such maximum processing period. In addition, such a period could only be established at the level of implementing rules and not at the level of AMC. Finally, due to the extremely wide range of possible uses of EFBs, it is considered that it is difficult to set a maximum processing period for an operator between the submission and the potential approval.

These two comments on page 32 (draft Decision AMC 20-25- Approval processes - general) did not produce any change in the resulting text of the proposed rules.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) p. 32

comment	*904* comment by: *SAT-WAY sa* Production standards (6.1 page 32 and draft decision CS-ETSO) A Class 2 or Class 3 EFB in a paperless cockpit environment becomes de facto an essential information source for navigation and aircraft operation. Except for a Class 1 and a non paperless cockpit, should any device not need to comply with minimum production quality assurance standards and production traceability, (ETSO) guarantying components stability. DO 160 compliance guaranties a test unit. Quality deviation of features on components can only be guarantied with Standard Order production procedures. When used as a Class 2 or 3 in a paperless cockpit environment, EF B units will in fact become essential for safe flight operations. Their level of reliability has to be as high as other avionics. This requirement exist for AMMD use but why not for all paperless cockpit use. As the door is open to many "off the shelf" commercial products as EFB, many do not comply with similar ETSO standards. This is relevant for lithium batteries, screens and other components. No direct reference is made in the document to any ETSO procedure except in the Appendix CS-ETSO without specification of the application field.
response	Noted Please see conclusion on this segment of the NPA, immediately below.

CONCLUSION ON COMMENTS ON PAGE 32 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – 6.1 EFB HARDWARE APPLOVAL PROCESS – HOST PLATFORM)

The single received comment emphasised the safety risks connected to the use of EFB in a 'paper-less' cockpit.

The Agency notices that on the basis of current EU-OPS rules, OPS 1.135 and 1.1040 allow replacing paper by electronic means, subject to certain safety conditions, for all required documents.

Provisions to allow operators to migrate towards a paper-less cockpit have already been proposed in the NPA in section 7 of AMC 20-25.

In conclusion, while the expressed safety concerns are shared by the Agency, this comment leads to no changes in proposed text of AMC 20-25.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) - 6.1.1 Class 1 EFB p. 32

comment	*128* comment by: *DGAC* The distinction between class 1 EFB attached and class 1 EFB not attached would need the following change to be implemented: "A Class 1 EFB device **not attached** does not require an airworthiness approval. **The mounting device of a Class 1 EFB attached requires a Supplemental Type Certificate.** ~~However,~~ paragraphs 6.1.1.1 through 6.1.1.6 need to be assessed where applicable during the operational approval process."
response	Accepted In the revised text of AMC 20-25, a new split structure is included, with paragraphs dedicated to the provisions covering airworthiness aspects, paragraphs addressed to aircraft manufacturers, and paragraphs dedicated to aspects related to operations under the responsibility of the aircraft operator.

comment	*425* comment by: *PMV-Engineering / ADCISSE* "A Class 1 EFB device does not require an airworthiness approval." We do not agree with this statement as some aspect of Class 1 EFB approval (as well as Class 2 EFB), e.g. power supply, EMI demonstration require the expertise of a competent organisation under DOA/A-DOA privilege. Airline OPS personal are not qualified to assess the results of DO-160 activities such as EMI, rapid decompression, etc...This needs a CVE oversight.
response	Noted While the power supply always requires an airworthiness approval, the EMI testing of a portable EFB can be performed by a DOA/A-DOA company and used as supporting material to get the operational approval but this is not mandatory.

CONCLUSION ON COMMENTS ON PAGE 32 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – CLASS 1)

The two comments received claim that some provisions for Class 1 (if mounted on the airframe) require airworthiness approval as well.

The intent of the comments is fully shared by the Agency. The wording is adjusted, taking into account that class 1 and class 2 are now combined into the 'portable' EFB. All the airframe mounted accessories supporting this portable EFB, are considered aircraft parts, covered by the initial airworthiness certification processes.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) - 6.1.1 Class 1 EFB - 6.1.1.1 Electromagnetic Interference (EMI) Demonstrations p. 32

comment	*100* comment by: *NetJets Europe* Should mention *"...or ED-14(G)/DO-160(G)"* as well, since this is the current latest version.

response

Accepted

The revised text of AMC 20-25 refers to ED-14()/DO-160() to denote the latest version.

comment

101 comment by: *NetJets Europe*

EMI laboratory testing should be performed by the OEM. Ground and flight testing can be performed by the operator for each EFB unit model and each different aircraft flight-deck combination.

The text states*:"…If the Class 1 EFB device is to remain powered (including being in stand-by mode) during take-off and landing, further EMI demonstrations (**laboratory, ground or flight test**) are required to provide greater assurance of non-interference and compatibility."*

Does this mean that all 3 requirements (Laboratory, ground and flight tests) need to be performed? This seems excessive, since most Class 1 EFBs will use COTS or Consumer Electronics Computing Devices, for which the OEM does not have or is not willing to share their Laboratory Test results. One must consider that although aviation, like the medical sector, is a promising expansion market for modern handheld tablets like the iPad and Galaxy tablets, it is still a very small part of the total sales. Hence their reluctance to share information with consumers.

Tests performed on the aircraft by operators should be sufficient to assure non-interference and compatibility of COTS devices. The current text does not unambiguously state this and can benefit from slight rewording

response

Partially accepted

The original text intention was not to request all 3 types of test to be performed but to give flexibility to the applicants to choose the method which is more convenient case by case. The revised text has been improved to achieve more clarity.

comment

153 comment by: *Swedish Transport Agency, Civil Aviation Department (Transportstyrelsen, Luftfartsavdelningen)*

- **6.1.1.1 EMI Demonstrations**
  - o §6.1.1.1 states EFB Class 1 to show compliance with ED and/or RCTA documents.
  - o NAA Sweden opinion: EFB Class 1 Systems may be given the possibility to show EMI compliance by alternate means e.g structured documented aircraft ground demonstrations.
  - o Reason and motivation: Should be sufficient to assure adequate level of safety for Class 1 EFB

response

Partially accepted

In the revised text, 'classes' are no longer used. Alternative methods to show compliance are included in harmonisation with the FAA material.

comment

267 ❖ comment by: *Thales Avionics*

Thales concurs on the need for class 1 EFB systems to meet class 2

	requirements when used during critical phase of flight. However, EMI acceptability of class 1 systems remains questionable as the location of these EFB will vary during their use. This will affect the level of radiated interferences received by other equipment installed in the cockpit. EMI, as well as pure magnetic influence on standby compass, should therefore be evaluated considering the closest possible location to each of the equipment installed in the cockpit.
response	Noted Testing should include all locations which are reasonably expected.

comment	*426* comment by: *PMV-Engineering / ADCISSE* "Class 1 EFB device should satisfy criteria contained within ED-130/DO294A" : DO294 is only applicable to Transmitting PED. The PED/T-PED tests shall be part of the airworthiness approval and managed by DOA/A-DOA in compliance with process described in ED130/DO294. Last revision of DO294 is C. "If the Class 1 EFB device is to remain powered (including being in stand-by mode) during take-off and landing, further EMI demonstrations (laboratory, ground or flight test) are required to provide greater assurance of non-interference and compatibility." Additional EMI demonstration should be done under responsibility of competent organisation, e.g. DOA/A-DOA in the scope of airworthiness approval process.
response	Partially accepted ED-130()/DO-294() has been used in the revised text of AMC 20-25 to denote the latest version. Please see response to comment No 425..

comment	*731* comment by: *NetJets Europe* Please rewrite this section to contain a policy consistent with the recently released AC 120-76B. Many COTs PED and TPED devices do not present an EMI threat due to low power output, compatible center frequencies and reasonable 'interference path loss'. But yet these same devices may show harmless anomalies when tested to DO-160 standards. The FAA AC 120-76B presents a safe, viable, affordable, and effective option to address COTs devices. If a DO-160 standard must be required, then further detail is required to allow an operator to interpret the test results and move forward with those devices that may show slight variances, but are electromagnetically compatible in the actual operational environment. (Source: Executive Jet Management, a NetJets company)
response	Accepted AMC 20-25 has been harmonised with the FAA AC 120-76B.

comment	*751* comment by: *Jeppesen Inc.* Comment: Please consider rewriting this section to contain a policy consistent with the recently released AC 120-76B. Many COTs PED and TPED devices do not present an EMI threat due to low power output, compatible center frequencies and reasonable 'interference path loss'. But yet these same devices may show harmless anomalies when tested to DO-160 standards. The FAA AC 120-76B presents a safe, viable, affordable, and effective option to address COTs devices. If a DO-160 standard must be required, then further detail is required to allow an operator to interpret the test results and move forward with those devices that may show slight variances, but are electromagnetically compatible in the actual operational environment.
response	Accepted Please see response to comment No 731.

CONCLUSION ON COMMENTS ON PAGE 32 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – CLASS 1 - EMI)

Seven comments were received on this segment, requesting:

— harmonisation with FAA;

— alternative means of compliance; and

— clarifications regarding wording.

The Agency has, at least, partially accepted these comments and used as much as possible the FAA regulatory text on this topic.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) - 6.1.1 Class 1 EFB - 6.1.1.2 Batteries p. 32-33

comment	*27* comment by: *FAA* Page 33, Para 6.1.1.2 bullet e **Comment:** AC 120-76B policy has been updated and is more comprehensive. **Reason for Comment:** Harmonization of Policy **Suggested Change:** UL 2054, Household and Commercial Batteries and UL 60950-1, Information Technology Equipment - Safety Should also note that compliance with UL 2054 indicated compliance with Ul 1642 Should also address migration from UL 1642 to International Standard IEC 62133, Secondary cells and batteries containing alkaline or other non-acid

	electrolytes which is supposed to be complete by May 1, 2012 for North American only products. UL 1642 may sill be used but it will limit ability to offer products internationally FAA also requires UN ST/SG/AC.10/11/Rev .5-2009 Recommendations on the Transport of Dangerous Goods Manual of Tests and Critera. Should also add an appropriate airworthiness testing standard such as RTCA/DO-311 can be used to address concerns reguarding overcharging, over discharging and the flammability of cell components. RTCA/DO-311 is intended to test permanently installed equipment; however, these tests are applicable and sufficient to test EFB rechargable lithium type batteries if RTCA/DO -311 is used then RTCA/DO-311 Table 4-1 and appendix C should be used for guidance on applicable testing.
response	Accepted

comment	*49* comment by: *Air France* The demonstation of compliance with §e should be sufficient to answer to §a, c and d. Proposal : Remove paragraphs a, c and d or requalify those paragraphs as a guidance of the purpose of the minimum specification required by UL 1642.
response	Accepted

comment	*50* comment by: *Air France* Analyse the benefit to introduce UL 2054 which includes UL 1642. Proposal : Add UL 2054 next to UL 1642.
response	Accepted

comment	*82* comment by: *Grégory DELBEKE* **Page 33 of 72, item B. II. 6.1.1.2:** The BCAA would suggest to add the European Standard on lithium batteries EN 62133:2003 as equivalent to UL 1642.
response	Accepted

comment	*102* comment by: *NetJets Europe* Most COTS are not specifically designed for Aviation use. And since the aviation market is not their primary customer base, it is not reasonable to require a UL1642 certificate. OEMs are reluctant to share these with customers for fear of sharing proprietary information. *"(e) 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**, user replaceable battery category. "*

There is a need for another suitable means of compliance when no UL 1642 certificate is available

response: Accepted

comment: *131* comment by: *DGAC*

Does the reference to "lithium" batteries only introduce any limitation?
Are all batteries of this kind?

response: Noted

The most common rechargeable batteries on the consumers electronic market today are lithium-ion batteries. AMC 20-15 does not impose any limitation to the use of other types of batteries.

comment: *132* comment by: *DGAC*

Paragraphs (a), (c) and (d) of 6.1.1.2 seem to repeat requirements laid down in the standard referred to in (e).
If confirmed, (a),(c) and (d) are useless nd can be removed

response: Accepted

comment: *154* comment by: *Swedish Transport Agency, Civil Aviation Department (Transportstyrelsen, Luftfartsavdelningen)*

Attachment #6

- **6.1.1.2 (e) Batteries**
  - §6.1.1.2 (e) states: 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, user replaceable battery category.
  - NAA Sweden opinion: This UL reference document and/or standard might need clarification and/or opening for alternative means of compliance. Documentation presented at UL website suggests that standard UL 1642 is applicable for the battery cell and other COTS standards such as UL 2054 is referring to the battery pack (the sum of cells, connections, shell etc), which might include cells in compliance with UL 1642.
  - FAA 120-76B (10.e and 10.f) should also be addressed, is it less restrictive?
  - Reason and motivation: Ref http://www.ul.com/global/documents/offerings/industries/hightech/batteries/

response: Accepted

comment: *282* comment by: *Thales Avionics*

Given the potential safety impact, it is important the considerations regarding the hazards linked to batteries remain in final release of this document.

response: Accepted

comment	*366* comment by: *DGAC* General comment on 6.1.1.2 : the variety of portable devices is very important; tracking battery evolutions for Dangerous Goods purposes is not obvious at all. If an oversight has to be exercised over these provisions, we think that the Agency should be entitled to do so.
response	Noted Nevertheless, oversight of dangerous goods goes beyond the purpose of AMC 20-25.

comment	*427* comment by: *PMV-Engineering / ADCISSE* "(b) The operator is responsible for the maintenance of EFB system batteries and should ensure that they are periodically checked and replaced as required." This activity is under responsibility of maintenance organization of the operator following continued airworthiness process (ICA). This process has also to be defined by competent organisation, e.g. DOA/A-DOA in the scope of airworthiness approval process. Demonstration of the compliance with DO311 "Minimum Operational Performance Standards for Rechargeable Lithium Battery Systems" should be required.
response	Not accepted The batteries which belong to portable EFBs are not under the responsibility of the Aircraft Type Design holder. Demonstration of compliance with the airworthiness standards is one way to demonstrate suitability, but it is not mandated for portable EFBs, which are considered PEDs, and as such, they are under the responsibility of the aircraft operator.

comment	*461* comment by: *Oliver Ast (CLH)* Comment 6.1.1.2 (c)(1) Can this criteria be fulfilled by most commonly used and already certified EFB systems with COTS devices (e.g. iPads, Laptops) ?
response	Partially accepted COTS or commercial electronic devices are not usually certified EFB. They are considered PEDs which are generally not shown compliant with the aircraft certification requirements. The revised text of AMC 20-25 has been modified in order to introduce additional criteria.

comment	*541* comment by: *Star Alliance* **Original AMC20-25 NPA text:** (1)Safe cell temperatures and pressures should be maintained during any foreseeable charging or discharging condition and during any failure of the charging or battery monitoring system. The lithium battery installation should preclude explosion in the event of those failures.

RATIONALE / REASON / JUSTIFICATION for the Comment :
Comment: Can this criteria be fulfilled by most commonly used and already certified EFB systems with COTS devices (e.g. iPads, Laptops) ?

response

Partially accepted

The revised text of AMC 20-25 has been modified in order to introduce additional criteria.

comment

656 comment by: *Deutsche Lufthansa AG*

Proposal:
Review requirement for reasonability.

Comment/Justification:
Can this criteria be fulfilled by most commonly used and already certified EFB systems with common-off-the-shelves devices (e.g. iPads, Laptops)?

response

Noted

Nevertheless, COTS or commercial electronic devices are not usually certified EFB.

comment

732 comment by: *NetJets Europe*

COMMENT 1:
Please rewrite this section to contain a policy consistent with the recently released AC 120-76B.
The nature of COTs devices requires flexibility. FAA AC 120-76B allows a reasonable amount of flexibility in compliance methods without a compromise in safety.

COMMENT 2:
Section 6.1.1.2, in its entirety, is not appropriate for COTs devices. We recommend deleting those items that are not applicable to uncertified COTs portable units and amending as follows:

Recommended Change:
6.1.1.2 Batteries
(a) During the procurement of Class 1 EFB devices, special consideration should be given to the intended use and maintenance of devices incorporating lithium batteries. In particular, the applicant should address the following issues:
(1) Risk of leakage;
(2) Safe storage of spares including the potential for short circuit;
(3) Hazards due to on-board continuous charging of the device, including battery overheat;
(4) Any other hazards due to battery technology.

(b) The operator is responsible for the maintenance of EFB system batteries and should ensure that they are periodically checked and replaced as required.
(c) When EFBs with lithium battery systems are connected to the aircraft power system, the lithium battery should comply with the following criteria:
(1) Safe cell temperatures and pressures should be maintained during any foreseeable charging or discharging condition and during any failure of the charging or battery monitoring system. The lithium battery installation should preclude explosion in the event of those failures.
(2) Design of the lithium batteries should preclude the occurrence of self-sustaining, uncontrolled increases in temperature or pressure.
(3) Design of the lithium batteries should preclude the escape of corrosive fluids or gases that may damage the surrounding structure or any adjacent systems, equipment, or electrical wiring of the aircraft.
(d) There should be a capability to control the charging rate of the battery automatically, so as to prevent battery overheating or overcharging.
(e) As a minimum specification, the lithium battery incorporated within the EFB device should have been tested to at least one of the following standards:
- Underwriters Laboratory (UL). UL 1642, Lithium Batteries; UL 2054, Household and Commercial Batteries; and UL 60950-1, Information Technology Equipment - Safety. NOTE: Compliance with UL 2054 indicates compliance with UL 1642.
- International Electrotechnical Commission (IEC). International Standard IEC 62133, Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications.
- RTCA/DO-311, Minimum Operational Performance Standards for Rechargeable Lithium Battery Systems. An appropriate airworthiness testing standard such as RTCA/DO-311 can be used to address concerns regarding overcharging, over-discharging, and the flammability of cell components. RTCA/DO-311 is intended to test permanently installed equipment; however, these tests are applicable and sufficient to test EFB rechargeable lithium-type batteries.

The following statements were deleted for the following reasons:
(3) No explosive or toxic gases emitted by any lithium battery in normal operation, or as the result of any failure of the battery charging system or monitoring system, may accumulate in hazardous quantities within the aircraft.
(5) Each lithium battery should have provisions to prevent any hazardous effect on structure or essential systems caused by the maximum amount of heat the

battery can generate during a short circuit of the battery or of its individual cells.

Reason for deletion:
- How would the quantity of gas emission be measured by an operator?
- Reasonable standards have already been applied at the COTs batteries UL or equivalent certification.
- Why restrict a COTs device as a Class 1 EFB due an administrative burden in the application of Aircraft Certification tests, particularly when the passengers may be using dozens of the same device in the back of the aircraft?
- Fortunately, the prolific nature of the intended COTs device also means that there will be failure trends available and publicized outside of aviation circles. Rather than burden an operator with tests that are more appropriate for avionics, an alternate approach might be to require the operator to monitor failure trends of the COTs device.

(Source: Executive Jet Management, a NetJets company)

response

Accepted

The revised text of AMC 20-25 has been harmonised with the FAA material.

comment

752 comment by: *Jeppesen Inc.*

Recommended Change:
6.1.1.2 Batteries
(a) During the procurement of Class 1 EFB devices, special consideration should be given to the intended use and maintenance of devices incorporating lithium batteries. In particular, the applicant should address the following issues:
(1) Risk of leakage;
(2) Safe storage of spares including the potential for short circuit;
(3) Hazards due to on-board continuous charging of the device, including battery overheat;
(4) Any other hazards due to battery technology.
(b) The operator is responsible for the maintenance of EFB system batteries and should ensure that they are periodically checked and replaced as required.
(c) When EFBs with lithium battery systems are connected to the aircraft power system, the lithium battery should comply with the following criteria:
(1) Safe cell temperatures and pressures should be maintained during any foreseeable charging or discharging condition and during any failure of the charging or battery monitoring system. The lithium battery installation should preclude explosion in the event of those failures.
(2) Design of the lithium batteries should preclude the occurrence of self-sustaining, uncontrolled increases in temperature or pressure.
(3) Design of the lithium batteries should preclude the escape of corrosive fluids or gases that may damage the surrounding structure or any adjacent systems, equipment, or electrical wiring of the aircraft.
(d) There should be a capability to control the charging rate of the battery automatically, so as to prevent
battery overheating or overcharging.
(e) As a minimum specification, the lithium battery incorporated within the EFB device should have been tested to at least one of the following standards:

- Underwriters Laboratory (UL). UL 1642, Lithium Batteries; UL 2054, Household and Commercial Batteries; and UL 60950-1, Information Technology Equipment - Safety. NOTE: Compliance with UL 2054 indicates compliance with UL 1642.
- International Electrotechnical Commission (IEC). International Standard IEC 62133, Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications.
- RTCA/DO-311, Minimum Operational Performance Standards for Rechargeable Lithium Battery Systems. An appropriate airworthiness testing standard such as RTCA/DO-311 can be used to address concerns regarding overcharging, over-discharging, and the flammability of cell components. RTCA/DO-311 is intended to test permanently installed equipment; however, these tests are applicable and sufficient to test EFB rechargeable lithium-type batteries.

Rationale:
The nature of COTS devices requires appropriate flexibility, which is gained by allowing the operator to prove goodness through at least one of the four options outlined in paragraph (e) above. Also, this supports harmonization with FAA AC 120-76B.

Note that the following two statements are proposed to be deleted from the original text:
(3) No explosive or toxic gases emitted by any lithium battery in normal operation, or as the result of any failure of the battery charging system or monitoring system, may accumulate in hazardous quantities within the aircraft.
(5) Each lithium battery should have provisions to prevent any hazardous effect on structure or essential systems caused by the maximum amount of heat the battery can generate during a short circuit of the battery or of its individual cells.

Reason for deletions:
- How would the quantity of gas emission be measured by an operator?
- Reasonable standards have already been applied at the COTs batteries UL or equivalent certification.
- Why restrict a COTs device as a Class 1 EFB due an administrative burden in the application of Aircraft Certification tests, particularly when the passengers may be using dozens of the same device in the back of the aircraft?

response

Accepted

Please see response to comment No 732.

comment

836 comment by: *Eurocopter*

Reference to a proprietary standard (UL 1642) for Lithium batteries is questionable. By comparison, AC 120-76B also considers alternative standards (DO-311, IEC 62133, …).

response

Accepted

Please see response to comment No 732.

comment

857 comment by: *Lufthansa Technik Design Organisation*

This paragraph refers to lithium batteries whereas current COTS laptops are powered by lithium ion batteries. This should not be mixed up. The dangerous nature is much different between these two types of batteries.

response

Noted

Demonstration of compliance with the airworthiness standards is one way to demonstrate suitability of any type of battery, but this is not mandated for portable EFBs, which are considered PEDs, and as such, they are under the responsibility of the aircraft operator.

comment

861 comment by: *navAero*

Further clarifications are required of how to substantiate the listed requirements under section a (1-5) and section c (1-5). This as COTS equipment manufacturers in general does not revile any design data which are required to substantiate the mentioned sections.

EASA is encouraged to review the current AC 120-76B which details and recognizes Battery Safety and testing standards. It would be beneficial to have a harmonized standard between EASA and FAA as STCs are in many cases validated. Discrepancy in standards would create an undue burden for the European Industry which impose increased costs and significant time delays.

response

Accepted

Please see response to comment No 732.

comment

897 comment by: *Franz Redak*

Clarification would be required on how the applicant can substantiate the requirements identified in a1 to a4. Since we agree that the equipment is usually considered COTS, the supporting substantiation could only be done by the equipment manufacturer. In most cases they are not interested to be involved in such certification tasks. That would in principle eliminate the possibility to involve COTS equipment unless "modified" by approved data. In such case the equipment would become part of the STC which we assume is not the intention.
AC 120-76B provides alternative ways which recognises alternative testing and qualification standards currently used in the commercial industry. We suggest a harmonised wording with the FAA AC.

response

Accepted

The revised text of AMC 20-25 has been harmonised with the FAA material.

comment

905 comment by: *SAT-WAY sa*

Lithium batteries. (6.1.1.2 page 32)

A description of isolated criteria leading to lithium battery explosion is insufficient. Not one but combinations of multi variable factors can lead to an explosion. It is impossible for crew members to compute any time those one's to evaluate permanently that risk. A lithium battery explosion in a cockpit is extremely dangerous and has caused a loss of control of aircraft.

Small electronic components running dedicated software on each battery element can act as full internal own circuit breaker, and fully prevent any

explosion.

Compliance to UL 1642 standard is addressing and covering only storage and transportation issues for Lithium batteries and does not consider aviation operative conditions. DO-311 should be considered as well.

response Accepted

Revised criteria for the assessment of batteries are included in paragraph 6.2.1.2 of the resulting text of AMC 20-25.

comment *921* comment by: *AWComplianceGroup*

Cessna has the following comment on the subject document:

In section 6.1.1.2 – Batteries, the NPA allows UL qualification. Cessna appreciates EASA recognizing an industry standard. In addition, Cessna suggests that EASA include other methods proposed in draft AC 120-76B to create a standardized process.

Cessna Aircraft Company appreciates your consideration of our comments.

response Accepted

Revised criteria for the assessment of batteries are included in paragraph 6.2.1.2 of the resulting text of AMC 20-25.

CONCLUSION ON COMMENTS ON PAGE 32 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – CLASS 1 - BATTERIES)

22 comments were received requesting:

— harmonisation with FAA;

— alternative means of compliance or more guidance (e.g. DO-311) for safety of the batteries; and

— clarifications and rewording.

The Agency agrees that, indeed, non-certified batteries on portable EFB host platforms, which are considered PEDs, may lead to safety risks. While the demonstration of safe carriage remains under the responsibility of the operators, more guidance has been provided in paragraph 6.2.1.2 of the resulting text of AMC 20-25, as presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) - 6.1.1 Class 1 EFB - 6.1.1.3 Power Source p. 33

comment *16* comment by: *FAA*

Page 33, Para 6.1.1.3 E

Comment:
Certain software applications. Which ones?

Reason for Comment:
Clarification

	Suggested Change: Delete Certain software applications.
response	Accepted

comment	*51* comment by: *Air France* §e requires an alternate power supply for some EFB uses. The appendix J explains that it is not required for class 1 and class 2 EFB. Therefore this electrical requirement applies only on some type C applications. Could you detail what they are?
Response	Partially accepted The text of AMC 20-25 has been drastically revised with regard to the aspects concerning power supply.

comment	*134* comment by: *DGAC* On the one hand, §e of 6.1.1.3 indicates : "(e) 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." Yet, on the other hand, last paragraph of appendix J indicates for class 1 and 2 EFB : " Certification specifications require that an alternate high integrity electrical power supply system, independent of the normal electrical power system, be provided to power those services necessary for continued safe flight and landing, in case of loss of the normal system. Adding other unnecessary services/loads will affect the integrity of this alternate power system. Class 1 and 2 EFBs are not considered necessary for continued safe flight and landing and should not be connected to an essential power bus." In consideration of last sentence of Appendix J, what is the nature of the alternate power supply quoted in §e of 6.1.1.3?
response	Noted When the EFB contains a battery, a connection to a non-critical bus bar is considered alternate power supply.

comment	*170* comment by: *CAA-NL* (editorial comment) Bullet (b) ends with the words " ... their use for this purpose is prohibited". This is not terminology normally used in an AMC. Proposal: Correct text to read " ... they should not be used for this purpose".
Response	Partially accepted The wording has been improved.

comment	*195* comment by: *AIRBUS* "(e) 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." For overall AMC consistency purpose : Airbus concurs with this section but highlights that this section is not consistent with Appendix J which recommends that Class 1 and 2 EFB be not connected to an essential power bus - see comment about appendix J (Power supply considerations for Class 1 and 2 EFBs). Suggested text: No change
response	Noted Nevertheless, alternate power supply is not necessarily connection to an essential power bus.

comment	*303* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 25 shared with Airbus JUSTIFICATION for the Comment on page # 33 § 6.1.1.3 (e) For overall AMC consistency purpose : DASSAULT-AVIATION concurs with this section but highlights that this section is not consistent with Appendix J which recommends that Class 1 and 2 EFB be not connected to an essential power bus - see comment # 379 about appendix J (Power supply considerations for Class 1 and 2 EFBs). PROPOSED TEXT / COMMENT No change
response	Noted Nevertheless, alternate power supply is not necessarily connection to an essential power bus.

comment	*348* comment by: *British Airways* a) A placard should be mounted beside the power outlet and containing the information....." What is this information in the opinion of EASA? Watts, Voltage, Hertz, EFB's only????? Limitations?
response	Partially accepted The wording has been improved.

comment	*368* comment by: *DGAC* It would be interesting to mention "EASA Proposed CM - ES – 001 Issue: 01" as a reference document, either at the beginning or the end of 6.1.1.3, or in Appendix J.
response	Accepted

	A reference has been added.

comment	*428* comment by: *PMV-Engineering / ADCISSE* Power Source : EFB Power source has to be certified under airworthiness approval process. Furthermore, guidelines provided in Appendix K clearly identify activities in the scope of airworthiness approval.
response	Accepted

comment	*462* comment by: *Oliver Ast (CLH)* Comment 6.1.1.3 (e): For overall AMC consistency purpose : Star Alliance concurs with this section but highlights that this section is not consistent with Appendix J which recommends that Class 1 and 2 EFB be not connected to an essential power bus.
response	Noted Nevertheless, alternate power supply is not necessarily connection to an essential power bus.

comment	*542* comment by: *Star Alliance* **Original AMC20-25 NPA text:** (e) 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. **RATIONALE / REASON / JUSTIFICATION for the Comment :** For overall AMC consistency purpose : Star Alliance concurs with this section but highlights that this section is not consistent with Appendix J which recommends that Class 1 and 2 EFB be not connected to an essential power bus (see comment concerning p. 68). **PROPOSED TEXT / COMMENT:** No change
response	Noted Nevertheless, alternate power supply is not necessarily connection to an essential power bus.

comment	*657* comment by: *Deutsche Lufthansa AG* <u>Proposal:</u> Review (e) for consistency. <u>Comment/Justification:</u>

For overall AMC consistency purpose: Lufthansa concurs with this section but highlights that this section is not consistent with Appendix J which recommends that Class 1 and 2 EFB be not connected to an essential power bus.

response

Noted

Nevertheless, alternate power supply is not necessarily connection to an essential power bus.

comment *702* comment by: *AT-CAA-PAM*

Statement: "A placard should be mounted beside the power outlet and containing the information ..."

Usually on standard power outlet you find a placard like:
"230V" or "110V"
Some aircraft have a placard: "for ground use only"

What else do you expect that a flight crew might be informed?
Please specify...

response

Accepted

The wording has been improved.

comment *873* comment by: *Boeing*

Page: 33
Paragraph: 6.1.1.3.(a)

The proposed text states:

> ***6.1.1.3 Power Source***
> *(a) A placard should be mounted beside the power outlet and containing the information needed by the flight or maintenance crews.*

REQUESTED CHANGE: We recommend that this requirement be revised to require more specifics -- such as stating the volts, hertz, amperage, or watt limits.
JUSTIFICATION: Our suggested change would ensure better standardization with current aircraft component listings/placards.

response

Accepted

The wording has been improved.

comment *899* comment by: *Franz Redak*

6.1.1.3b) We recognise this wording from TGL 17 in regards to IFE. We believe that the installation of a switch in the cockpit for only the EFB Power is not justified. TGL 17 intention was to separate (potential) high power consumers in the cabin from the power source following the SR 111 accident. EFBs are consumers of approximate 5 AMP. We believe that this does not justify a power switch. Disconnection of a plug (as identified) and a Circuit breaker should provide a sufficient means to separate this consumer from the power source.

	This is another area where the AC 120-76B deviates from the AMC.
response	Not accepted The AMC 20-25 criterion is equivalent to FAA AC 20-173.5.b.(1) Installed Switch. A means, reachable by the pilot seated at the controls, should be provided for de-powering the EFB or power port (e.g. access to unplug the EFB, or a separate switch clearly labelled for the power port).

CONCLUSION ON COMMENTS ON PAGE 33 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – CLASS 1 – POWER SOURCE)

15 comments were received requesting, in addition to more precision or editing of the wording,:

— removal of inconsistency between this section of proposed AMC 20-25 and Appendix J in the same AMC, which prohibits the connection to the essential power bus; and

— removal of the requirement of the switch for power disconnection.

The Agency clarifies that the switch to disconnect power is only mandatory when the pilot cannot disconnect the plug. Some rewording is now proposed to improve clarity.

The Agency also agrees to remove inconsistency with Appendix J in order not to forbid connection to the essential power bus, subject to the applicable requirements.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) - 6.1.1 Class 1 EFB - 6.1.1.4 Data Connectivity p. 33

comment	*39* ❖ comment by: *NetJets Europe* This paragraph clearly states what kind of Data Connectivity is not authorised, but mentions nothing about what kind is. We agree on the concept that EFB Class 1 systems cannot genrally have aircraft data connectivity that may compromise airworthiness functions, but there are other types of connectivity as well. EFB Class 1 systems have the capability to send and receive AAC (or AOC) communications that commplement/support daily operations either via WiFi (Gatelink or similar), 3G/4G or other suitable means. A provision for this should be included in this paragraph. Technological developments in this area will continue to produce more and more dispatch, flight planning, briefing, e-techlog and performance software with the capability to replace all current paper versions and processes. Connectivity is the biggest limiting factor to the adoption of this technology. Guidance is required in the form of this AMC, other wise there is a big risk that different NAAs will treat similar request differently, causing unequal playing field. Similar cases have to be treated in a similar manner to guarantee fair treatment Refer to AC 120-76A Chapter 8a for example of possible wording. We propose the following text: *"Class 1 EFB may communicate with aircraft systems providing the airworthiness function is segregated and the system architecture isolates the non-secure data from secure (airworthiness) data.* *The operator is responsible to justify via airworthiness assessment report the*

	non-interference of EFB data with aircraft airworthiness functions"
response	Accepted The text of AMC 20-25 has been drastically revised.

comment	*75* comment by: *FAA* Page 33, Para 6.1.1.4 **Comment:** The FAA allows all portable EFB's to connect to the certified avionics, with the appropriate interface protection. Reference AC 20-173. **Reason for Comment:** Harmonization of policy **Suggested Change:** Harmonize definition
response	Accepted The text of AMC 20-25 has been drastically revised.

comment	*349* comment by: *British Airways* Does this include certified aircraft systems totally separated from critical aircraft systems? Why should passenger PEDs be allowed to connect to a broadband communication system while a Class 1 EFB is not allowed?
response	Accepted The text of AMC 20-25 has been drastically revised.

comment	*895* comment by: *Boeing* Page: 33 Paragraph: 6.1.1.4 - *Data Connectivity* The proposed text states: ***6.1.1.4 Data Connectivity*** *Data connectivity with certified aircraft systems is not authorised.* **REQUESTED CHANGE:** We find this paragraph to be the most limiting statement in the NPA. We request that it be removed. As currently proposed, it will inhibit future EFB development as well as require a stop to the usability of many current EFB devices and their functions. **JUSTIFICATION:** Data connectivity has already been proven and certified on currently flying aircraft that have been demonstrating this capability. It is also one of the most requested features for the future by most of the major air carriers throughout the world. There are already proven systems that maintain the encryption and integrity of such capabilities.
response	Accepted

The text of AMC 20-25 has been drastically revised.

CONCLUSION ON COMMENTS ON PAGE 33 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – CLASS 1 – DATA CONNECTIVITY)

Four comments were received criticising the proposal to fully prohibit data connectivity for class 1 portable EFB host platform.

The request that non-certified portable EFBs host platforms should have, at least, the same connectivity permissions as passengers PEDs, is supported by the Agency. This has now become clear in the general guidance provided in the resulting text of AMC 20-25, in relation to portable/non-certified (i.e. former classes 1 and 2) EFB host platforms.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) - 6.1.1 Class 1 EFB - 6.1.1.5 Environmental Testing p. 33

comment *52* comment by: *Air France*

It is required to test rapid depressurisation or to use suitable alternate procedures in case of total loss of EFB. As this latter is required in all cases, and as the probability of a rapid depressurizsation is remote, is it useful to detail this failure case in an already complicated AMC?
proposal : remove §6.1.1.5 and the appendix K

response Partially accepted

Rapid depressurisation guidance has been improved.

comment *53* comment by: *Air France*

Class2 EFB can be COTS, so the tracability of part number is difficult. For instance an identification change can come from a hardware change or from a warranty condition change... §c is only applicable to a certified device.

Proposal : if the previous comment is refused and the paragraph 6.1.1.5 is kept, adapt §c to take into account only certified devices.

response Not accepted

The Agency is aware that consumer electronics do not have traceability or control of configuration. If this is a point of concern, operators can always choose qualified equipment which has been designed and produced for aviation. Operators need to be aware that certification requirements and specifications are not going to change to ensure that consumer electronics are certifiable.

Portable EFBs can be authorised for use, but are not covered by approved STC/TC. Even if there is a STC/TC, that will be just covering the mounted EFB provisions (i.e. installed resources) but not the host platform, which is considered a PED.

It's, therefore, of paramount importance that the operators understand their responsibility. It's the operator's responsibility to determine that performed rapid depressurisation is sufficiently representative. Otherwise, if the availability of the portable EFBs cannot be ensured after a rapid depressurisation, adequate

	mitigations (i.e. training, minimum paper available) must ensure the safety of the flight.

comment	*83* comment by: *Grégory DELBEKE* **Page 33 of 72, item B. II. 6.1.1.5:** The BCAA would suggest to add specific requirements for the EFB use in helicopter (e.g. vibration testing for which guidance can be found in the standard MIL-STD-810G method 514.6,…). Indeed, helicopter environment can be considered as an hostile environment for EFB due to the vibrations and the weather conditions (e.g. offshore operations). Therefore, the EFB systems used in helicopter shall be addressed by specific requirements regarding vibration testing, humidity testing,…
response	Partially accepted Vibration testing, humidity testing, etc. are covered in a general way by the Environmental Testing. Portable EFBs environmental testing, through operational assessment, will depend on the location and operational use of the EFB. Paragraph 6.2.1.4 of the resulting text of AMC 20-25 has been improved.

comment	*429* comment by: *PMV-Engineering / ADCISSE* "(c) Testing for rapid depressurisation, may need to be repeated when the EFB model identification changes, or battery type is changed." Model identification statement is not clear. If the EFB model is a COTS, the tests has to be performed for each EFB used as no hardware configuration management can be ensured.
response	Not accepted Please see response to comment No 53.

comment	*544* comment by: *Jeppesen Inc.* Suggest to add: "Operational" prior to word "approval" to last sentence in paragraph a). Rationale: Clarifies type of approval
response	Accepted Paragraphs in the resulting text of AMC 20-25 have been reorganised to clearly distinguish between airworthiness and operational approvals.

comment	*546* comment by: *Jeppesen Inc.* Suggest should read: "….many Class 1 and 2 EFB devices…." Rationale: Many Class 2 EFBs are COTS.
response	Partially accepted Classes have been removed, and class 1 and class 2 EFBs have been converted into portable EFBs.

comment	*706* comment by: *AT-CAA-PAM* 6.1.1.5 (c) or battery type is changed... Usually a PED is produced for a period of 6 months by the manufacturer. During that time several updates and cost reduction processes are done. Nobody can tell which manufacturer has assembled this particular device. (Usually big companies have several manufacturers under contract to help to bring the product to the market in time, therefore nobody knows which battery from which manufacturer is in this device.) So, therefore how to deal with the mentioned requirement that "if the battery type is changed" You may have bought 2 PEDs from the same dealer, delivered at the same with different batteries installed. Define what you mean with type of battery.
response	Not accepted Please see response to comment No 53. If batteries are replaced by the same size, same characteristics and same basic components (e.g. Lithium-Ion), similarity can be assumed and credit taken from previous tests under operators responsibility.

comment	*916* comment by: *CMC Electronics* 6.1.1.5 Environmental Testing (Class 1) Section (c) of this section appears tentative as it is stated "Testing for rapid de-pressurization, may need to be repeated when the EFB model identification changes, or battery type is changed". CMC's opinion is that as Class 1 are essentially un-controlled devices from a change management stand-point, rapid-depressurization and EMI testing should be repeated for each and every installed item.
response	Partially accepted Paragraphs 6.2.1.1 and 6.2.1.4 of the resulting text of AMC 20-25 have been improved.

CONCLUSION ON COMMENTS ON PAGE 33 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – CLASS 1 – ENVIRONMENTAL TESTING)

Eight comments were received which claim that the guidance material is not appropriate for COTS for which configuration control is not ensured.

The Agency confirms that no environmental qualification can be mandated for the manufacturers 'portable' EFB host platforms (i.e. consumer devices). This does not prevent EFB suppliers or TC/STC holders from testing specific host platforms and from providing the resulting information to aircraft operators. The latter remain anyway responsible to demonstrate compliance with section 6.2.1.4 of the resulting text of AMC 20-25, prior to using portable EFBs on aircraft.

Furthermore, the Agency acknowledges that, since consumer devices are not under configuration control, nothing guarantees that test of one specimen is also applicable to other units with same commercial part number. However, experience acquired after more than one decade of use of this equipment seems not to recommend environmental testing of each single EFB host platform unit. On the contrary, this testing, may in fact decrease the reliability of the

tested unit.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) - 6.1.1 Class 1 EFB - 6.1.1.6 Other aspects p. 34

comment

103 comment by: *NetJets Europe*

How? This paragraph does not sufficiently describe how to show compliance? This can easily lead to NAAs imposing unnecessary and excessive requirements to show compliance with this part, like for example requiring a crashworthiness test for the side-pocket used to secure the EFB Class 1 unit while not in use.

A simple flight or simulator demonstration of proposed Standard operating procedures for the EFB Class 1 device should suffice.

response

Partially accepted

Crashworthiness has been deleted.

comment

158 comment by: *Swedish Transport Agency, Civil Aviation Department (Transportstyrelsen, Luftfartsavdelningen)*

- **6.1.1.6 Other aspects**
  - o §6.1.1.6 states only briefly compliance requirement regarding hardware operational temperature span.
  - o NAA Sweden opinion: It is necessary to open up previous compliance requirements, since it was too strict for COTS good enough for operational use. But it might need some clarification to avoid misunderstandings and/or disadvantages for European aviation industry vs. other parts of the world if EU operators and suppliers don't know how to show compliance and/or alternative means.
  - o To be fully clear: Previous standard from EUROCAE ED-14rev/RTCA DO-160rev temperature requirement is too strict and this opening is reasonable to show safe EFB´s. But it might need some clarification to avoid misunderstandings and differing NAA standards.
  - o Reason and motivation: Should be sufficient to assure adequate level of safety for Class 1 and 2 EFB.

response

Partially accepted

The intent of the comment is accepted. In the paragraph, portable EFB is not requested to be qualified to ED-14()/DO-160() specifications. It's, nevertheless, part of the operator's responsibility to check for potential issues (i.e. EFBs are damaged due to low temperature if the aircraft operates in cold weather), and establish appropriate mitigations (i.e. remove the EFB from the parked aircraft).

comment

614 comment by: *Monarch Airlines*

Sub-para d assumes that mounting devices have 'stowed' and 'unstowed' positions. This is not always the case, so the wording about 'locking the mounting device in a position out of the way of flight crew operations when not in use' is not universally appropriate and needs a caveat for fixed mounting

	systems.
response	Accepted The sentence has been deleted from the resulting text of AMC 20-25.

CONCLUSION ON COMMENTS ON PAGE 34 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – CLASS 1 – OTHER ASPECTS)

Three comments were received on this segment, claiming that the guidance material may lead to requiring unreasonable justifications or evidence.

The Agency agrees that this section can be deleted in its entirety providing that some additional provisions are added to previous AMC 20-25 section 6.1.1.5 (i.e. environmental testing; safe storage).

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) - 6.1.2 Class 2 EFB p. 34

comment	*159* comment by: *Swedish Transport Agency, Civil Aviation Department (Transportstyrelsen, Luftfartsavdelningen)* · **6.1.2.1 Design of the Mounting Device** o NAA Sweden opinion: The regulatory scope regarding the interface between airworthiness and flight operational aspects is not clear regarding EFB systems which include minor modifications. The limit where the airworthiness work will stop is clear, but the operator's responsibility to meet this modification with other missing elements, which is normally included in a major modification, is not clear and quite often out of competence from the operator or subcontractor. When creating a minor modification order, it should be clear to the operator to include all flightsafety aspects in this order. Not just the mounting device as a standalone device. o Major and minor modifications of equipment supporting an EFB system should be clarified and aspects to be added to a minor to achieve level of flight safety could be exemplified. o Example: An operator achieves a minor modification including a mounting device for a class 2 EFB. The airworthiness approval may only cover strength calculations on the mounting device itself, not with the equipment that is supposed to be mounted, i.e. a tablet computer device. It needs to be clarified who is responsible for the strength calculation of crashworthiness, safety and use under normal environmental conditions including turbulence that are normally included in a major modification. The airworthiness approval should therefore always include strength calculations with the equipment mounted, i.e. a tablet computer device. Other aspects are operational fit vs. other equipment and controls etc. o Reason and motivation: Refers to EFB systems class 2 (some cases class1).To clarify, achieve guidance to the industry, and reduce gap between airworthiness **-** operational aspects.
response	Partially accepted The share of responsibilities has been further clarified in the resulting text. The

sentence above: 'The airworthiness approval may only cover strength calculations on the mounting device itself, not with the equipment that is supposed to be mounted, i.e. a tablet computer device.' should not be true. When a mounting device is certified, it has an intended use. Strength calculations (including crashworthiness) need to consider the weight of the PED. The mounting device is, therefore, certified for a specific PED (identified by commercial name and model) or if the mounting device has a standard locking mechanism, a maximum weight of the device has to be established for certification. This can be further clarified in the approved AFM.

comment *430* comment by: *PMV-Engineering / ADCISSE*

"The EFB computer system hosting the EFB software applications and the Operating system do not require an airworthiness approval" : There are different model available in the market and this statement is not applicable to some models. For example if the software and OS is hosted by the EFB display, it shall not be considered as part of the airworthiness approval. This is not consistent with §6.1.2.2.

The airworthiness approval of the EFB display is not indicated here and is confusing.
Indeed, the placement and characteristics of the EFB display has to be assessed in the scope the airworthiness approval.

response Partially accepted

The share of responsibilities airworthiness/operational have been further clarified in the revised text. The EFB display when it is not an installed EFB resource, is not certified. A Portable EFB device does not require an airworthiness approval but it is assessed prior to operational use. The considerations in section 6.1.2.2 of the NPA have been split into airworthiness and operational aspects.

comment *547* comment by: *Jeppesen Inc.*

Suggest first sentence should read; "….contents of paragraphs 6.1.2.1 and 6.1.2.3 through 6.1.2.5"

Rationale:
6.1.2.2 characteristics are intrinsic to the EFB device itself and should only fall under Operational Approval. Consistency within this AMC.

response Partially accepted

The considerations in section 6.1.2.2 of the NPA have been split into operational and airworthiness aspects. Some of the considerations (i.e. view and access to any cockpit control or instrument) are applicable as part of the mounting device certification, as its intended function is to hold a particular PED display.

comment *874* comment by: *Boeing*

Page: 34
Paragraph: 6.1.2 - *Class 2 EFB*
1st sentence

The proposed text states:
6.1.2 Class 2 EFB

Class 2 EFB systems require an airworthiness approval of the installation provisions, limited in scope to the contents of paragraphs 6.1.2.1 through 6.1.2.5.

REQUESTED CHANGE: This appears to be contradictory to the stated definition of Class 2 EFB elsewhere in the NPA. We suggest this either be deleted or revised to agree with Class II EFB definition.

JUSTIFICATION: Contradictory statements within same document should be reconciled.

response Accepted

comment *917* comment by: *CMC Electronics*

6.1.2 Class 2 EFB

The first sentence in this section states "Class 2 EFB Systems require an airworthiness approval of the installation provisions, limited in scope to the content of the paragraphs 6.1.2.1 through 6.1.2.5".

As these paragraph cover:
. Mounting,
. Display viewing and position characteristics,
. Data source,
. EFB data connectivity,
. Installed resources,

It may be worthwhile emphasizing in this context that the certification plans associated to Class 2 EFB system and covering these aspects (and only these aspects) would satisfy the requirements.

response Noted

Nevertheless, class 2 is no longer present in the resulting text of AMC 20-25.

CONCLUSION ON COMMENTS ON PAGE 34 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – CLASS 2)

5 comments were received on this segment, highlighting that some clarifications are needed in two following main areas:

— delimitation of the airworthiness vs operational approval responsibilities; and

— clarification that the airworthiness justification may cover, as supporting material, aspects which are identified as part of the operational approval scope. One example could be the EMI testing of a particular COTS which can be performed by a DOA company and approved by the Agency as part of a STC and used as supporting material to get the operational approval.

The Agency accepts the intent of the comments summarised above.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) - 6.1.2 Class 2 EFB - 6.1.2.1 Design of the Mounting Device p. 34-35

comment 29 comment by: *SKY JET AG*

AMC 20-25, 6.1.2.1 Design of the Mounting Device
b) The mounting device should be able to be locked in position easily. Selection of positions should be adjustable enough to accommodate a range of flight crew member 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 types that will minimise slippage after extended periods of normal use.

Other system interfaces such as FMS Keyboards etc. are not adjustable, since they are normally mounted in a fixed panel. Therefore, a EFB may as well be installed in a fixed position, which would not be possible if it must be adjustable. Although "selection of positions" seems to be unclear. Is this a proposed position by each individual crew member or meant to be the position selected by the engeneering?

Therefore, AMC 20-25, 6.1.2.1 Design of the Mounting Device should be amended with

b) The mounting device should be able to be locked in position easily. The ~~Selection of~~ positions should be adjustable enough to accommodate a range of flight crew member preferences where necessary. 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 types that will minimise slippage after extended periods of normal use.

response Not accepted

Keyboards and Cursor Control Devices are located on pedestals and take benefit of multiple anthropometrics assessments during the certification process. There are more constraints when installing and EFB since it is normally installed next to the lateral windows, with numerous potential interferences with other controls. As a consequence, the EFB may not be installed at the optimal location. This is the reason why an adjusting capability is required. Another reason is that the EFB should not impair the emergency egress when it is planned to be performed from the lateral windows.

comment 196 comment by: *AIRBUS*

"h) Adequate means should be provided (e.g. hardware or software) to shut down the portable EFB computer when its controls are not accessible by the pilot strapped in the normal seated position. This objective can be achieved through a dedicated installed resource certified according to 6.1.2.5 (e.g. button accessible from pilot seated position) or through dedicated software to be addressed in the guidelines for EFB system suppliers (see 6.1.4.3)."

The example for shutting down the portable EFB computer through a dedicated installed resource ("e.g. button accessible from pilot seated position") seems a little bit prescriptive. In accordance with other solutions already accepted by EASA through A320 CRI SE-59 and A350 CRI F-21, automatic means for shutting down the portable EFB computer should be considered as well (e.g. automatic power busbar shedding to supply essential systems, automatic switching off according to power consumption / temperature / flight phases...)

Suggested text:
h) Adequate means should be provided (e.g. hardware or software) to shut down the portable EFB computer when its controls are not accessible by the pilot strapped in the normal seated position. This objective can be achieved through a dedicated installed resource certified according to 6.1.2.5 (e.g. button accessible from pilot seated position or automatic switching means) or through dedicated software to be addressed in the guidelines for EFB system suppliers (see 6.1.4.3).

response

Not accepted

The intended function of such a hardware or software shutdown capability is to allow the crews to cope with any audio or electrical interference, or other anomaly (overheating, software freeze) in a timely manner and without having to leave their normally seated position. It is understood that an automatic power down capability would not allow meeting this requirement.

comment

304 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 26 shared with Airbus

JUSTIFICATION for the Comment on page # 35 § 6.1.2.1 h)
The example for shutting down the portable EFB computer through a dedicated installed resource ("e.g. button accessible from pilot seated position") seems a little bit prescriptive. In accordance with other solutions already accepted by EASA through some CRI, automatic means for shutting down the portable EFB computer should be considered as well (eg. automatic power busbar shedding to supply essential systems, automatic switching off according to power consumption / temperature / flight phases...)

PROPOSED TEXT / COMMENT
h) Adequate means should be provided (e.g. hardware or software) to shut down the portable EFB computer when its controls are not accessible by the pilot strapped in the normal seated position. This objective can be achieved through a dedicated installed resource certified according to 6.1.2.5 (e.g. button accessible from pilot seated position or automatic switching means) or through dedicated software to be addressed in the guidelines for EFB system suppliers (see 6.1.4.3).

response

Not accepted

The intended function of such a hardware or software shutdown capability is to allow the crews to cope with any audio or electrical interference, or other anomaly (overheating, software freeze), in a timely manner and without having to leave their normally seated position. It is understood that an automatic power down capability would not allow meeting this requirement.

comment

339 comment by: *British Airways*

"The mounting device (or other securing mechanism) attaches or allows mounting of the EFB system".

Attached or secured? Is there a difference in the opinion of EASA?

response

Not accepted

A mounting device is considered as a kind of securing mechanism among others. 'Or other securing mechanism' refers to other devices than mounting devices

	that may allow to attach an EFB.
comment	*385* comment by: *Garmin International* FAA removed the installation guidance from AC 120-76B, *Guidelines for the Certification, Airworthiness, and Operational Use of Electronic Flight Bags*, and moved it to AC 20-173, *Installation of Electronic Flight Bag Components*. Suggest EASA be consistent in this regard and move the installation guidance to a separate AMC. Also suggest that EASA closely compare the AMC guidance that results from NPA 2012-02 against both AC 120-76B and AC 20-173 to ensure harmonized guidance between certification authorities.
response	Not accepted This comment does not give any rationale regarding the reason why such an harmonisation should be performed. In addition, it looks appropriate to have both in the same AMC.
comment	*431* comment by: *PMV-Engineering / ADCISSE* h) "Shut down the EFB computer (…) this objective can be achieved through dedicated software." How can this be demonstrated in the scope of the airworthiness approval considering the software is only to be considered in the scope of the operational approval?"
response	Accepted The airworthiness requirement is to have a readily accessible means to shut down the EFB when the EFB is stowed and not directly accessible by the crew. Software control is part of the acceptable means. The airworthiness approval of the mounting device should include a check that, in the case there is no provision for hardware shutdown capability, a software one is provisioned. The text has been improved accordingly.
comment	*463* comment by: *Oliver Ast (CLH)* Proposed Text: h) Adequate means should be provided (e.g. hardware or software) to shut down the portable EFB computer when its controls are not accessible by the pilot strapped in the normal seated position. This objective can be achieved through a dedicated installed resource certified according to 6.1.2.5 (e.g. button accessible from pilot seated position or automatic switching means) or through dedicated software to be addressed in the guidelines for EFB system suppliers (see 6.1.4.3). Comment: The example for shutting down the portable EFB computer through a dedicated installed resource ("e.g. button accessible from pilot seated position") seems a little bit prescriptive. In accordance with other solutions already accepted by EASA through A320 CRI SE-59 and A350 CRI F-21, automatic means for shutting down the portable EFB computer should be considered as well (eg. automatic power busbar shedding to supply essential systems, automatic switching off according to power consumption / temperature / flight phases...)

response

Not accepted

The intended function of such a hardware or software shutdown capability is to allow the crews to cope with any audio or electrical interference, or other anomaly (overheating, software freeze) in a timely manner and without having to leave their normally seated position. It is understood that an automatic power down capability would not allow meeting this requirement.

comment

543 comment by: *Star Alliance*

Original AMC20-25 NPA text:
h) Adequate means should be provided (e.g. hardware or software) to shut down the portable EFB computer when its controls are not accessible by the pilot strapped in the normal seated position. This objective can be achieved through a dedicated installed resource certified according to 6.1.2.5 (e.g. button accessible from pilot seated position) or through dedicated software to be addressed in the guidelines for EFB system suppliers (see 6.1.4.3).
RATIONALE / REASON / JUSTIFICATION for the Comment :
The example for shutting down the portable EFB computer through a dedicated installed resource ("e.g. button accessible from pilot seated position") seems a little bit prescriptive. In accordance with other solutions already accepted by EASA through A320 CRI SE-59 and A350 CRI F-21, automatic means for shutting down the portable EFB computer should be considered as well (eg. automatic power busbar shedding to supply essential systems, automatic switching off according to power consumption / temperature / flight phases...)
PROPOSED TEXT / COMMENT:

h) Adequate means should be provided (e.g. hardware or software) to shut down the portable EFB computer when its controls are not accessible by the pilot strapped in the normal seated position. This objective can be achieved through a dedicated installed resource certified according to 6.1.2.5 (e.g. button accessible from pilot seated position or automatic switching means) or through dedicated software to be addressed in the guidelines for EFB system suppliers (see 6.1.4.3).

response

Not accepted

The intended function of such a hardware or software shutdown capability is to allow the crews to cope with any audio or electrical interference, or other anomaly (overheating, software freeze) in a timely manner and without having to leave their normally seated position. It is understood that an automatic power down capability would not allow meeting this requirement.

comment

658 comment by: *Deutsche Lufthansa AG*

Proposal:

Extend text as follows:
h) Adequate means should be provided (e.g. hardware or software) to shut down the portable EFB computer when its controls are not accessible by the pilot

	strapped in the normal seated position. This objective can be achieved through a dedicated installed resource certified according to 6.1.2.5 (e.g. button accessible from pilot seated position **or automatic switching means**) or through dedicated software to be addressed in the guidelines for EFB system suppliers (see 6.1.4.3). Comment/Justification: The example for shutting down the portable EFB computer through a dedicated installed resource ("e.g. button accessible from pilot seated position") seems a little bit prescriptive. In accordance with other solutions already accepted by EASA through A320 CRI SE-59 and A350 CRI F-21, automatic means for shutting down the portable EFB computer should be considered as well (eg. automatic power busbar shedding to supply essential systems, automatic switching off according to power consumption / temperature / flight phases...)
response	Not accepted The intended function of such a hardware or software shutdown capability is to allow the crews to cope with any audio or electrical interference, or other anomaly (overheating, software freeze) in a timely manner and without having to leave their normally seated position. It is understood that an automatic power down capability would not allow meeting this requirement.

comment	*792* comment by: *Ingo Pucks, Owner IP Aerospace* A mounting device, as long as it features mechanical, electric and electronic interface to and with its intended environment (=aeroplane) shall be subject to the similar regulations for these kind of aircraft parts and systems, and not referenced here in addition.
response	Not accepted An airworthiness approval is not only required for the design of the mounting device, but also for the characteristics and placement of the EFB display, the power source, the EFB data connectivity and the installed resources. Consequently, this installation is subject to the same Certification Specifications with those for any other aircraft part.

CONCLUSION ON COMMENTS ON PAGE 34 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – CLASS 2 – DESIGN OF THE MOUNTING DEVICE)

10 comments have been received on this segment of the NPA but one was replicated five times asking to accept an automatic EFB shut down capability.

The intended function of such a HW or SW shutdown capability is to allow the crews to cope with any audio or electrical interference, or other anomaly (overheating, software freeze) in a timely manner and without having to leave their normally seated position. It is understood that an automatic power down capability would not allow meeting this requirement. These comments are, therefore, not accepted.

One other comment asked how a dedicated SW control for shutdown can be approved in the frame of airworthiness approval since the SW is part of the operational approval. This comment is accepted. The airworthiness approval of the mounting device could, in fact, include a check that, in the case there is no provision for HW shutdown capability, a SW one is provisioned. The text has been improved accordingly.

Finally, one comment requested that portable EFB may be docked in a fixed position rather than in an adjustable one. This comment is not accepted since keyboards and Cursor Control Devices are located on pedestals and take benefit of multiple anthropometrics assessments

during the certification process, including for emergency egress.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) - 6.1.2 Class 2 EFB - 6.1.2.2 Characteristics and placement of the EFB Display p. 35

comment *54* comment by: *Air France*

"In addition, consideration should be given to the potential for confusion that could result from presentation of relative directions 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."

This matter is also applicable to a paper chart with two possible orientation (North-up or Heading-up) and with a disaligned clip board.

Moreover, there is no specific safety report on this subject with the AMM, and those systems are not used as a primary means of navigation.

Proposal : Remove this paragraph.

response Partially accepted

It is not appropriate to remove this paragraph as suggested. However, a clearer distinction has been introduced between static maps, which can be considered as comparable with paper charts, and dynamic maps, for which additional considerations should remain applicable.

comment *135* comment by: *DGAC*

In the last but one paragraph, is indicated that "consideration should be given to the potential for confusion that could result from presentation of relative directions 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."

Such a provision is not understood when, for instance, the EFB potentially replaces paper approach charts for which orientation has, luckily, never been considered a problem

response Partially accepted

Please see response to comment No 54.

comment *285* comment by: *Thales Avionics*

"The EFB data should be legible under the full range of lighting conditions expected on a flight crew compartment, including use in direct sunlight." and "When the EFB is in use (intended to be viewed or controlled), its display should be within 90 degrees on either side of each pilot's line of sight. The 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)." Criteria should be defined for manufacturers to develop acceptable products. Alternatively, reference to AMC 25-11, Chapter 3, 16.a. could be used.
response	Accepted The Agency agrees that it looks appropriate to add a reference to AMC 25-11 as an appropriate guidance material. The text has been modified accordingly.

comment	*286* comment by: *Thales Avionics* "Users should be able to adjust the screen brightness of an EFB". Is software controlled (manually or automatically from ambient light) brightness acceptable?
response	Accepted It should be acceptable to control the EFB displays brightness by software. However, such a software control should not lead to a significant increase of workload. The text has been modified in this direction, taking into account those two statements.

comment	*411* comment by: *European Cockpit Association* 6th § should read: The EFB GUI, including buttons and labels should have adequate illumination for night use. Justification: For optimal human performance, it is necessary that all essential controls and display elements can be adjusted in lighting / illumination / brightness.
response	Noted In the text, "Buttons and labels" refers to hardware controls located on the display itself. Graphical User Interface components have to be designed in accordance with proper human factors CSs and AMCs (i.e. CS/AMC 25.1302). This comment does not lead to any modification.

comment	*432* comment by: *PMV-Engineering / ADCISSE* Answer to this § is only possible if EFB display is part of the airworthiness approval. Visual & physical access to A/C controls, external vision, etc. has to be assessed with the EFB display installed. This means that this display shall be part of the airworthiness approval and managed in configuration. "EFB Data should be legible under a full range of lighting condition". Which EFB data has to be considered? As software applications are not part of the airworthiness approval, which data has to be selected?
response	Partially accepted The EFB displays characteristics and placement are actually proposed to be part of the airworthiness approval (see Section 6.1.2, §1).

Regarding the legibility of EFB data, it has to be assessed using a sample of representative Graphical User Interface design elements (widgets, colours, colour contrasts, etc.). The text has been modified accordingly.

comment

604 comment by: *ERA*

ERA members would like to raise a number of observations and suggestions regarding 6.1.2.2 Characteristics and placement of the EFB Display. Mention is made of glare, reflection and direct sunlight. Whilst in the case of direct sunlight, reflection on the bright Ipads screen can reduce the legibility; ERA members would suggest that available antiglare films could be used. In addition the adequate illumination of buttons and labels at night is requested in the NPA. ERA members would seek clarification from EASA as to what kind of illumination is suggested as there is currently no backlighting available on Ipad buttons.

response

Noted

This comment is deemed relevant. Nevertheless, it does not lead to any text modification.

The Agency has nothing against the use of antiglare films, should they not impair the display legibility. However, this proposal is too specific and it is not deemed appropriate to mention it in a regulatory document.

Regarding comment on iPad controls: The rationale of this sentence is to ensure an easy access of any button and control that may be used during the flight from taxi to taxi, whatever the kind of device which is used. Under nightlight conditions, should a control not be backlighted or properly illuminated, its poor accessibility may lead to an increase of flight crew workload or even to human errors. It is understood that this requirement does not apply to the iPad button provided that they do not need to be used in flight.

comment

708 comment by: *AT-CAA-PAM*

6.1.2.2 "Users should be able to adjust the screen brightness..."

Copy this requirement also to class 1 EFB's

Info: Flight tests have shown in the approval phase with the IPAD1 as a class1 EFB, that this is a very important feature, and was requested to Jeppesen who add this feature.

response

Partially accepted

The text of the paragraph has been improved in the resulting text of AMC 20-25.

comment

763 comment by: *Denim Air*

The text "buttons and labels should have adequate illumination for night use" requires expansion to make it clear that this requirements only applies to buttons and labels that are required to be used during flight.

"Flight" here means "operating under own power".

The justification for this is as follows: the Class2 EFB package using the iPad

	includes two buttons that are not illuminated and cannot be so. They are however not used after the iPad is deployed and is connected to a power source; part of the pre-flight SOPs.
response	Noted The rationale of this sentence is to ensure an easy access of any button and control that may be used during the flight from taxi to taxi, whatever the kind of device which is used. Under nightlight conditions, should a control not be backlighted or properly illuminated, its poor accessibility may lead to an increase of flight crew workload or even to human errors. It is understood that this requirement does not apply to the iPad buttons provided that they do not need to be used in flight.

comment	*906* comment by: *SAT-WAY sa* Screen brightness on start up (6.1.2.2 page 35) Turning on a EFB after any power interruption or on start up, in a night conditions, the screen should stay dimmed at the lowest level before loading any operating system. Should that not be the case, the pilot is blinded for some time, impacting his visual sensitivity and accuracy.
response	Not accepted This issue is too specific and is not considered to be significant in the context of AMC 20-25.

comment	*907* comment by: *SAT-WAY sa* Screen exposure to sunlight. (6.1.2.2 page 35) Measurable numbers objectively defined in scientific existing units should be mentioned to avoid field variable, subjective and dangerous appreciations. A brightness of 1.000 Nits or Candella per square meter should be required to ensure in all circumstances the perfect legibility of all details on any chart, drawings and manuals. Absence of objective numbers equals to publishing approach charts without minima as if they should mention "continue flying until you see the runway".
response	Partially accepted — A reference to AMC 25-11 has been added which provides enough criteria to design and assessment of display luminance. This part of the comment is accepted. — This AMC states that a subjective evaluation has to be preferred to objective criteria. This part of the comment is rejected.

CONCLUSION ON COMMENTS ON PAGE 34 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – CLASS 2 – EFB DISPLAY)

11 comments were received on this segment of the NPA, being heterogeneous though, as illustrated below:

— One proposed the removal of section 6.1.2.2 (Offset of maps) from AMC 20-25 (i.e. 'consideration should be given to the potential for confusion that could result from presentation of relative directions when the EFB is positioned in an orientation inconsistent with that information'). The proposal is partially accepted and section 6.1.2.2 has been improved by making a clearer distinction between static maps, which can be considered as comparable with paper charts, and dynamic maps, for which the 'consideration' remains applicable;

— One other comment proposed to make reference to the AMC 25-11, for the evaluation of luminance and legibility of displays. This comment is accepted, like another comment suggesting to allow automatic setting of the screens brightness, applicable also to portable EFB host platforms; in any case, 'portable' EFB host platforms will not be certified, and the proposed AMC 20-25 is only for guidance of assessment at operational level;

— Some comments pointed out that there may be some confusion in the AMC 20-25 text between controls belonging to HMIs and hard controls. The text has been improved to allow a better distinction between buttons and labels (referring to hardware controls located on the display itself) and GUIs (referring to HMIs design elements, e.g. widgets, colours, and colour contrasts, etc); and

— Finally, some comments highlighted an incompatibility between iPad design and the proposed section 6.1.2.2 requesting that 'buttons and labels should have adequate illumination for night use'. These comments are not accepted since, under nightlight conditions, should a control not be backlighted or properly illuminated, its poor accessibility may lead to an increase of flight crew workload or even to human errors. The Agency, however, clarified that this does not prevent the use of alternative means of compliance (e.g. iPad/tablet PC with only one button). Wording in the resulting text will be reviewed by the group.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) - 6.1.2 Class 2 EFB - 6.1.2.3 Power Source p. 36

comment	*433* comment by: *PMV-Engineering / ADCISSE* As stated in 6.1.2 : "Class 2 EFB systems require an airworthiness approval of the installation provisions, limited in scope to the contents of paragraphs 6.1.2.1 through 6.1.2.5." For Class 2 EFB, the Power Source ("6.1.2.3") is part of the airworthiness approval (with the same requirements to be applied) whereas this is not the case for Class 1 EFB. This is not consistent.
response	Noted The issue is now eliminated as the Agency has removed the 'classes' from the proposed AMC 20-25.

CONCLUSION ON COMMENTS ON PAGE 34 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – CLASS 2 – POWER SOURCE)

One comment was received on this segment, identifying unequal treatment of the power source of the class 1 vs class 2 case.

The comment is noted and the issue is now eliminated as the Agency has removed the 'classes' from proposed AMC 20-25.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) - 6.1.2 Class 2 EFB - 6.1.2.4 EFB Data Connectivity p. 36

comment *17* comment by: *FAA*

Page 36, Para 6.1.2.4 1st para,

Comment:
If Class 2 EFB's are prohibited from sending data, WiFI would be prohibited Recommend review of AC 20-173.

Reason for Comment;
Harmonization of Policy

Suggested Change;
Class 2 EFB's should be able to connect to WiFI as long as it is done in a safe manner, taking into account security risks, corruption of data, non-effect of aircraft systems in a negative manner, etc.

response Partially accepted

Data connectivity in the revised text of AMC 20-25 is limited to connection to aircraft systems. Direct interconnectivity between EFBs or direct connectivity between EFBs and ground systems as with T-PED (i.e. GSM, Bluetooth) is not covered by this definition. This kind of connectivity is regulated by EU-OPS CAT (please refer to CAT.GEN.MPA.140).

comment *74* comment by: *FAA*

Page 36, 6.1.2.4, 1st para

Comment:
Portable EFBs can be connected to aircraft systems

Reason for Comment:
Harmonization of policy

Suggested Change:
"Portable EFB can be connected to installed aircraft systems provided they use read-only access, or transmit-receive access only by use of an installed interface providing a means of partition and non-interference with certified aircraft systems (with the exception of the EFB dedicated installed resources)."

response Partially accepted

Provisions for data connectivity have been introduced in the revised text of AMC 20-25. Nonetheless, the Agency is of the opinion that EFB applications (listed in AC 120-76B Appendix 1 and 2) do not require to read many parameters from aircraft data buses, with only few exceptions or for Aircraft Administrative Communication (AAC) purposes.

comment *197* comment by: *AIRBUS*

"A class 2 EFB can receive data from aircraft system through a certified interface unit, **but does not have the capability to send data, except to systems which are completely isolated (in both directions) from the certified aircraft systems** (e.g. EFB system connected to dedicated installed resources or a transmission media that receives and transmits data for Aircraft Administrative Communications (AAC) purposes on the ground only).
EFB data connectivity should be validated and verified to ensure non-interference and isolation from certified aircraft systems during data reception.
Certified aircraft systems should not be adversely affected by EFB system failures or the transmission media for AAC used on the ground.
Any consequent airworthiness limitations should be included in the Aircraft Flight Manual (ref. to 6.1.4.1)."

See rationale given for comment about section 5.1.2.a). (Class 2 definition). Airbus reminds that the objective is not to supply aircraft functions (e.g., FMS) with non-certified data, but only to share certified common resources (e.g. Printer, control device, ...) for cockpit rationalization purpose.
Airbus suggests the proposed text derived from A350 CRI F-21 which has been agreed by EASA (see opposite).
As an alternative to the proposed text (see opposite), the wording could reflect abstract from FAA AC 120-76B section 10.l (page 16) :
--quote--
"l. Data Connectivity with Aircraft Systems (Wired or Wireless). This section applies to both portable and installed EFBs. Typically, installed EFBs will have an interface protection built into the installed EFB, while portable EFBs will have a separate data connectivity provision installed in the aircraft. All EFBs using data connectivity provisions to aircraft systems must incorporate an interface protection device (e.g., physical partitioning or read-only access) to ensure that the data connection required by the device, and its software applications, have no adverse effects on other aircraft systems. EFBs having data connectivity to aircraft systems, either wired or wireless, may read or transmit data to and from aircraft systems, provided the connection and interface protection device is defined as part of the aircraft type design. This connectivity includes data bus and communication systems access (e.g., through an avionics data bus, server, network interface device, or wireless network). Use the following guidance for read-only and transmit-receive data interface protection devices
(1) Read-Only Access. The design of interface protection devices that provide read-only access must ensure protection by using one-way communication of data.
(2) Transmit-Receive Access. The design of interface protection devices that provide transmit (talk) and receive (read) capability must include:
(a) Partition. The design must provide a means of partition for applications that have not been approved from installed systems on the aircraft.
(b) Non-Interference. The design must include a means to ensure that EFB operation, malfunction, or failure does not adversely affect other installed aircraft systems to which a connection is made (i.e., non-essential, essential, and critical).
(c) Security Considerations. The design of interface protection devices enabling connection of EFBs to existing aircraft equipment, systems, data buses, or networks must not introduce potential security vulnerabilities and threats in terms of computer viruses, worms, unauthorized access, and malicious access. Design the data interface protection device to prevent any potential security threats. Provide plans for verifying and maintaining the security protection

mechanisms and functionality to adequately address each threat." --unquote--

Suggested text:
A class 2 EFB can receive data from aircraft system through a certified interface unit, but does not have the capability to send data, except to:
• a) systems which are completely isolated (in both directions) from the certified aircraft systems (e.g. EFB system connected to dedicated installed resources or a transmission media that receives and transmits data for Aircraft Administrative Communications (AAC) purposes on the ground only).
• b) certified aircraft systems which are used as shared resources in accordance with section 6.1.2.5.
EFB data connectivity (wired or wireless) should be validated and verified to ensure non-interference with aircraft systems during data transmission and reception.
Certified aircraft systems should not be adversely affected by EFB system failures.
Certified aircraft systems should be protected from installation or use of unauthorized software and data or from any other security threats from the EFB.

response

Partially accepted

Provisions for data connectivity have been introduced in the revised text of AMC 20-25.

comment

269 ❖ comment by: *Thales Avionics*

Subparagraph a): The proposed authorized connectivity for class 2 devices is very restrictive. It is acknowledged that a removable device should not be given unrestricted access to the aircraft systems. However, limitation to "receive only" greatly limits the capabilities which can be offered from a class 2 device while keeping acceptable safety and security level. For example, maintenance applications should be granted access to aircraft systems provided it is demonstrated that such connectivity cannot result in adverse effect. Such demonstration could be based on the type of connection (A429 protocol), on certified aircraft systems criticality, on interlock mechanisms preventing inflight activation, etc, ...
It is therefore proposed to reword "and/or connected to aircraft systems, but without the capability to send data to the certified aircraft systems" into "and/or connected to aircraft systems, when such connection can be shown to have no adverse safety or security impact on certified aircraft systems"
Similarly, e) may be reworded as follows "Able to exchange data with aircraft systems through a certified interface unit, without adverse safety or security impact on certified systems."

Obviously, the change would also affect 6.1.2.4.

response

Partially accepted

Provisions for data connectivity have been introduced in the revised text of AMC 20-25.

comment

305 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 27 shared with Airbus

JUSTIFICATION for the Comment on page # 36 §6.1.2.4

See rationale given for comment # 289 about section 5.1.2.a). (Class 2 definition).
DASSAULT-AVIATION reminds that the objective is not to supply aircraft functions (eg., FMS) with non-certified data, but only to share certified common resources (eg. Printer, control device, ...) for cockpit rationalization purpose.
DASSAULT-AVIATION agree with Airbus below proposed text derived from CRI which has been agreed by EASA.

As an alternative to the proposed text , the wording could reflect abstract from FAA AC 120-76B section 10.l (page 16) :
"l. Data Connectivity with Aircraft Systems (Wired or Wireless). This section applies to both portable and installed EFBs. Typically, installed EFBs will have an interface protection built into the installed EFB, while portable EFBs will have a separate data connectivity provision installed in the aircraft. All EFBs using data connectivity provisions to aircraft systems must incorporate an interface protection device (e.g., physical partitioning or read-only access) to ensure that the data connection required by the device, and its software applications, have no adverse effects on other aircraft systems. EFBs having data connectivity to aircraft systems, either wired or wireless, may read or transmit data to and from aircraft systems, provided the connection and interface protection device is defined as part of the aircraft type design. This connectivity includes data bus and communication systems access (e.g., through an avionics data bus, server, network interface device, or wireless network). Use the following guidance for read-only and transmit-receive data interface protection devices
(1) Read-Only Access. The design of interface protection devices that provide read-only access must ensure protection by using one-way communication of data.
(2) Transmit-Receive Access. The design of interface protection devices that provide transmit (talk) and receive (read) capability must include:
(a) Partition. The design must provide a means of partition for applications that have not been approved from installed systems on the aircraft.
(b) Non-Interference. The design must include a means to ensure that EFB operation, malfunction, or failure does not adversely affect other installed aircraft systems to which a connection is made (i.e., non-essential, essential, and critical).
(c) Security Considerations. The design of interface protection devices enabling connection of EFBs to existing aircraft equipment, systems, data buses, or networks must not introduce potential security vulnerabilities and threats in terms of computer viruses, worms, unauthorized access, and malicious access. Design the data interface protection device to prevent any potential security threats. Provide plans for verifying and maintaining the security protection mechanisms and functionality to adequately address each threat."

PROPOSED TEXT / COMMENT
A class 2 EFB can receive data from aircraft system through a certified interface unit, but does not have the capability to send data, except to:
• a) systems which are completely isolated (in both directions) from the certified aircraft systems (e.g. EFB system connected to dedicated installed resources or a transmission media that receives and transmits data for Aircraft Administrative Communications (AAC) purposes on the ground only).
• b) certified aircraft systems which are used as shared resources in accordance with section 6.1.2.5.
EFB data connectivity should be validated and verified to ensure non-interference

with aircraft systems during data transmission and reception.
Certified aircraft systems should not be adversely affected by EFB system failures.
Certified aircraft systems should be protected from installation or use of unauthorized software and data or from any other security threats from the EFB .

response

Partially accepted

Provisions for data connectivity have been introduced in the revised text of AMC 20-25.

comment

464 comment by: *Oliver Ast (CLH)*

Proposed Text:

A class 2 EFB can receive data from aircraft system through a certified interface unit, but does not have the capability to send data, except to:
• a) systems which are completely isolated (in both directions) from the certified aircraft systems (e.g. EFB system connected to dedicated installed resources or a transmission media that receives and transmits data for Aircraft Administrative Communications (AAC) purposes on the ground only).
• b) certified aircraft systems which are used as shared resources in accordance with section 6.1.2.5.
Comment:

See rationale given for comment about section 5.1.2 a). Star Alliance reminds that the objective is not to supply aircraft functions (eg., FMS) with non-certified data, but only to share certified common resources (eg. Printer, control device, ...) for cockpit rationalization purpose.

response

Partially accepted

Provisions for data connectivity have been introduced in the revised text of AMC 20-25.

comment

545 comment by: *Star Alliance*

Original AMC20-25 NPA text:
A class 2 EFB […] does not have the capability to send data, except to systems which are completely isolated (in both directions) from the certified aircraft systems
RATIONALE / REASON / JUSTIFICATION for the Comment :

See rationale given for comment about section 5.1.2 a). Star Alliance reminds that the objective is not to supply aircraft functions (eg., FMS) with non-certified data, but only to share certified common resources (eg. Printer, control device, ...) for cockpit rationalization purpose.

PROPOSED TEXT / COMMENT:

A class 2 EFB can receive data from aircraft system through a certified interface unit, but does not have the capability to send data, except to:
• a) systems which are completely isolated (in both directions) from the certified aircraft systems (e.g. EFB system connected to dedicated installed resources or a transmission media that receives and transmits data for Aircraft Administrative Communications (AAC) purposes on the ground only).
• b) certified aircraft systems which are used as shared resources in accordance with section 6.1.2.5.

response

Partially accepted

Provisions for data connectivity have been introduced in the revised text of AMC 20-25.

comment

615 comment by: *Monarch Airlines*

We strongly disagree with the proposal that a Class II EFB is prohibited from sending AAC data to a certified aircraft system. This proposal seems to fall out of the new definition of a Class II EFB. There is no reason why a Class II EFB cannot connect to a datalink. Datalinks are not configured to store pass data from the source LRU to other aircraft LRUs; they are designed to transfer data from an on-board system to an external receiver. Data from a Class II EFB should be allowed to be fed to another certified on-board LRU via a datalink as long as it is suitably firewalled. For example, every time the pilot transmits on the radio, he is connecting to a 'datalink', but his voice data does not 'contaminate' other on-board systems.

It is vital that Class II EFBs are allowed to connect to certified datalinks, as they are currently being used by some airlines to pass AAC information via ATSU/ACARS/radio datalinks. This is an important element of the Class II functions (and the concomitant business case) that should not be unnecessarily prohibited unless there is a safety implication.

response

Partially accepted

Provisions for data connectivity have been introduced in the revised text of AMC 20-25.

comment

625 comment by: *Goodrich*

A Class 2 EFB should be able to transmit AAC data while in flight to ACARS systems (i.e. ATRSU/CMU) provided the data is sent through a certified interface unit. The ground only limitation should be in place for data transfer via cellular or WiFi type technologies.

Suggest removing the "on the ground only" clause.

response

Accepted

Provisions for data connectivity have been introduced in the revised text of AMC

	20-25.
comment	*659* comment by: *Deutsche Lufthansa AG* Proposal: Modify as follows: A class 2 EFB can receive data from aircraft system through a certified interface unit, but does not have the capability to send data, except to: • a) systems which are completely isolated (in both directions) from the certified aircraft systems (e.g. EFB system connected to dedicated installed resources or a transmission media that receives and transmits data for Aircraft Administrative Communications (AAC) purposes on the ground only). • **b) certified aircraft systems which are used as shared resources in accordance with section 6.1.2.5.** Comment/Justification: See rationale given for comment #644 about section 5.1.2 a). Airbus reminds that the objective is not to supply aircraft functions (eg., FMS) with non-certified data, but only to share certified common resources (eg. Printer, control device, ...) for cockpit rationalization purpose.
response	Partially accepted Provisions for data connectivity have been introduced in the revised text of AMC 20-25.
comment	*697* comment by: *Thomson Airways* 1. The statement "completely isolated" is vague as all systems are connected through aircraft power. 2. What is the definition and scope of "Certified Avionics Systems"? There should be a distinction between non-essential equipment and essential equipment that is required for flight safety. I.e. ACARS or SatCom are not required to operate a safe flight. Therefore, in the unlikely event where the connection from the EFB to the communication system would affect the functionality of the said communication system, there would be no safety effect Subsequently, as per previous comments (689, 692 & 694), Class 2 EFB systems must be authorised to connect to certified communications systems (e.g.ACARS / SatCom), in order to transmit AAC information, as it is currently done by Airlines.
response	Accepted Provisions for data connectivity have been introduced in the revised text of AMC 20-25.
comment	*705* comment by: *Thomson Airways* EASA appears to be more restrictive than FAA AC 20-173, as referenced in the recently released FAA AC 120-76B. AC 20-173 states (5.c) "EFBs having data connectivity to aircraft systems; either wired or wireless, may read or transmit data to and from aircraft systems,

provided the connection and interface protection device is incorporated into the aircraft type design. This connectivity includes data bus and communication systems access (e.g., through an avionics data bus, server, network interface device, or wireless network)."

What are the safety considerations behind this more restrictive approach from EASA? Is there any intention to harmonise AMC-20-25 with FAA AC 20-173 / FAA AC 120-76B?

response Accepted

Provisions for data connectivity have been introduced in the revised text of AMC 20-25.

comment *762* comment by: *Mario Sabourin SITA*

A Class 2 EFB should be able to transmit AAC/AOC data while in flight to ACARS systems (i.e. ATSU/CMU) provided the data is sent through a certified interface unit. The ground only limitation should be in place for data transfer via cellular or WiFi type technologies.

PROPOSED TEXT CHANGE:
Suggest removing the "on the ground only" clause.

response Accepted

Provisions for data connectivity have been introduced in the revised text of AMC 20-25.

comment *858* comment by: *navAero*

The intention of the proposed guideline is unclear as it mixes roles that are partly Part 21.J and Hardware / SW Supplier.

If is it assumed that Part 21.J is the EFB System Supplier, it is suggested that the section is rephrased to utilize "Design holder"

The section needs to be rephrased to distinguish the different parties and their responsibilities. The Design holder is responsible for all aspects of the provisions installed. However the design holder should not be required to provide guidlines for software applications as such software is not a part of the certification process for Class 2 EFBs, but for the operational approval process.

Further in section 7.1 the EFB system supplier has another role.

response Partially accepted

The involved parties and responsibilities have been clarified in the revised text of AMC 20-25.

comment *859* comment by: *navAero*

The reference to avionics access through a "Certified interface unit" imposes design restrictions. The wording is suggested to be replaced with "..certified provision.."

	The new wording which restricts data to be sent to " .. systems which are completely isolated (in both directions) from the certified aircraft systems (e.g. EFB system connected to dedicated installed resources or a transmission media that receives and transmits data for Aircraft Administrative Communications (AAC) purposes on the ground only). " requires clarification. The section is suggested to be rephrased to include .." ... for Aircraft Administrative Communications (AAC) purposes on the ground only) *or to systems that cannot create a catastrophic or hazardous failure condition.* This limitation are in disharmony with AC 120-76B and AC 20-173 which allows for bi-directional wired or wireless data connectivity. EASA is encouraged to review the current AC 120-76B and 20-173 with respect to aircraft connectivity. It would be beneficial to have a harmonized standard between EASA and FAA as STCs are in many cases validated.
response	Partially accepted Provisions for data connectivity have been introduced in the revised text of AMC 20-25.

comment	*875* comment by: *Boeing* Page: 36 Paragraph: 6.1.2.4 - *EFB Data Connectivity* 2nd sentence The proposed text states: *"EFB data connectivity should be validated and verified to ensure non-interference and isolation from certified aircraft systems during data reception."* **REQUESTED CHANGE:** We recommend revising the text as follows: *"EFB data connectivity should be validated and verified to ensure non-interference and isolation from **non EFB utilized** certified aircraft systems during data reception."* **JUSTIFICATION:** As currently written in the proposed NPA, the statement would cause major roadblocks to the development of future EFB systems on new generation aircraft. Our recommended change better defines the intentions on data connectivity in dealing with future integration of EFBs and aircraft systems that may fall under the jurisdiction of "certified systems."
response	Partially accepted The sentence has been reworded but not according to the requested change.

comment	*885* comment by: *Lufthansa Technik Design Organisation* Similar to LHT comment for Para 5.1.2: The aim is to prevent class 2 EFBs from controlling or interfering with aircraft systems. Complete isolation may be one means to achieve this. But it's not the only means and it could prevent reasonable developments.
response	Accepted Provisions for data connectivity have been introduced in the revised text of AMC 20-25.

comment	*898* comment by: *Franz Redak* See also previous comment in 5.1.2. for limitation on transmitting data (wired and wireless) only during ground operation. AC 120-76B does allow for bi-directional connectivity and should be used for baseline harmonised approach. However, we agree, that if bi-directional connectivity (in flight) is allowed that the impact of failure of the EFB on the essential (certified) system must be limited. (e.g. MAJ, MIN only) The intention and definition of "in both directions" in regards to "completely isolated" is required!
response	Accepted Provisions for data connectivity have been introduced in the revised text of AMC 20-25.
comment	*918* comment by: *CMC Electronics* 6.1.2.4 EFB Data Connectivity In the sentence " which are completely isolated (in both directions) from the certified aircraft system (e.g. EFB system connected to dedicated installed resources or a transmission media that receives and transmits…", CMC's interpretation of dedicated installed resources is that these installed resources can be part of the installed resources such as power and interface units dedicated to EFB functions only.
response	Accepted The resulting text of AMC 20-25 has been clarified.

CONCLUSION ON COMMENTS ON PAGE 36 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – CLASS 2 – DATA CONNECTIVITY)

19 comments were received, mainly requesting bi-directional data connectivity.

The Agency agrees that bi-directional connectivity can be allowed to/from portable EFB host platforms if isolated from aircraft functions relevant to airworthiness or safety of flight and if limited to Aeronautical Operational Control (AOC) and Airline Administrative Communications (AAC), aiming at flight regularity. In other words, bi-directional connectivity is allowed e.g. with communication equipment, if the latter is able to support AOC/AAC (only, or in addition to ATS communications).

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) - 6.1.2 Class 2 EFB - 6.1.2.5 Installed Resources p. 36

comment	*198* comment by: *AIRBUS* "The installed resources should be dedicated to EFB functions only." NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given for comment about section 5.1.2.c). (Class 2 definition). Airbus suggests replacing the sentence ("The installed resources should be

dedicated to EFB functions only.") by the A350 CRI F-21 wording which has already been accepted by EASA.

Suggested text:
The installed resources can be dedicated to EFB functions only or shared between both EFB and airworthiness-approved avionics functions provided the EFB is segregated from the installed resource by an approved interface that prevents the EFB from adversely affecting certified systems, resources or functionality.
If installed resources are shared :
- Segregation / non-interference between EFB and Avionics functions in terms of functionalities and resources, in normal and degraded configurations, should be maintained.
note : intended suppression of EFB information as per design is not considered as interference in this context.
- when sharing an installed Display Unit, either in part or completely, the EFB should not obstruct or restrict the display of required aircraft parameters under both normal and abnormal operating conditions e.g., engine parameters and fault warning system.
- when sharing an installed Display Unit either in part or completely, the display of EFB information should be clearly distinguishable from other approved information (see related considerations as well in paragraph 7.5.1).
- the means of controlling the display of information on a shared display unit should be developed to a software assurance level at least as high as the highest software assurance level of functions presented on the display.

response

Partially accepted

The sentence 'The installed resources should be dedicated to EFB functions only' has been removed. The text of CRI F-31 is not incorporated as it is tailored to the A350 design.

comment

199 comment by: *AIRBUS*

"Installed resources require an airworthiness approval."

See comment about section 5.1.2.b). (Class 2 definition) which excludes the EFB installed resources. For consistency purpose between sections 5.1.2.b). and 6.1.2.5, section 5.1.2.b). should be modified in order that definition of a Class 2 EFB encompasses EFB installed resources.

Suggested text:
No change

response

Noted

The Agency has removed the 'classes' from the proposed AMC 20-25. Furthermore, clarifications have been included regarding EFB installed resources.

comment

306 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 28 shared with Airbus

JUSTIFICATION for the Comment on page # 36 §6.1.2.5 "The installed resources should be dedicated to EFB functions only."

NPA AMC 20-25 not harmonized with AC 120-76B.
See rationale given for comment #291 about section 5.1.2.c). (Class 2 definition).
DASSAULT-AVIATION agree with Airbus suggested wording which has already been accepted by EASA.

PROPOSED TEXT / COMMENT
The installed resources can be dedicated to EFB functions only or shared between both EFB and airworthiness-approved avionics functions provided the EFB is segregated from the installed resource by an approved interface that prevents the EFB from adversely affecting certified systems, resources or functionality.
If installed resources are shared :
- Segregation / non-interference between EFB and Avionics functions in terms of functionalities and resources, in normal and degraded configurations, should be maintained.
note : intended suppression of EFB information as per design is not considered as interference in this context.
- when sharing an installed Display Unit, either in part or completely, the EFB should not obstruct or restrict the display of required aircraft parameters under both normal and abnormal operating conditions e.g., engine parameters and fault warning system.
- when sharing an installed Display Unit either in part or completely, the display of EFB information should be clearly distinguishable from other approved information (see related considerations as well in paragraph 7.5.1).
- the means of controlling the display of information on a shared display unit should be developed to a software assurance level at least as high as the highest software assurance level of functions presented on the display.

response

Partially accepted

Please see response to comment No 198.

comment

310 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 29 shared with Airbus

JUSTIFICATION for the Comment on page # 36 §6.1.2.5 "Installed resources require an airworthiness approval."

See comment #290 about section 5.1.2.b). (Class 2 definition) which excludes the EFB installed resources. For consistency purpose between sections 5.1.2.b). and 6.1.2.5, section 5.1.2.b). should be modified in order that definition of a Class 2 EFB encompasses EFB installed resources.

PROPOSED TEXT / COMMENT
No change

response

Noted

Please see response to comment No 199.

comment

434 comment by: *PMV-Engineering / ADCISSE*

Installed ressources definition should be provided in the glossary.

response

Not accepted

Such a definition is not considered necessary to be introduced in the glossary by the Agency.

comment 435 comment by: *PMV-Engineering / ADCISSE*

Installed remote display requires an airworthiness approval whereas EFB displays hosting the EFB computer system does not require airworthiness approval. This is not consistent.

response Not accepted

EFBs have been accepted as PEDs since the publication of JAA TGL.36. This has not been changed with the AMC 20-25. Displays which are installed need to be certified. Portable EFB do not require airworthiness certification.

comment 465 comment by: *Oliver Ast (CLH)*

Proposed Text:

The installed resources can be dedicated to EFB functions only or shared between both EFB and airworthiness-approved avionics functions provided the EFB is segregated from the installed resource by an approved interface that prevents the EFB from adversely affecting certified systems, resources or functionality.
If installed resources are shared :
- Segregation / non-interference between EFB and Avionics functions in terms of functionalities and resources, in normal and degraded configurations, should be maintained.
note : intended suppression of EFB information as per design is not considered as interference in this context.
- when sharing an installed Display Unit, either in part or completely, the EFB should not obstruct or restrict the display of required aircraft parameters under both normal and abnormal operating conditions e.g., engine parameters and fault warning system.
- when sharing an installed Display Unit either in part or completely, the display of EFB information should be clearly distinguishable from other approved information.
- the means of controlling the display of information on a shared display unit should be developed to a software assurance level at least as high as the highest software assurance level of functions presented on the display.

Comment:

NPA AMC 20-25 not harmonized with forthcoming AC 120-76B.
See rationale given for comment about section 5.1.2 c).
Star Alliance suggests replacing the sentence ("The installed resources should be dedicated to EFB functions only.") by the A350 CRI F-21 wording which has already been accepted by EASA.

response Partially accepted

Please see response to comment No 198.

comment 466 comment by: *Oliver Ast (CLH)*

Comment about "Installed resources require an airworthiness approval.":

see comment about section 5.1.2. b) which excludes the EFB installed resources. For consitency purpose between sections 5.1.2. b) and 6.1.2.5, section 5.1.2. b) should be modified in order that definition of a Class 2 EFB encompasses EFB installed resources.

response

Partially accepted

Please see response to comment No 199.

comment

549 comment by: *Star Alliance*

Original AMC20-25 NPA text:
The installed resources should be dedicated to EFB functions only.
RATIONALE / REASON / JUSTIFICATION for the Comment :
NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given for comment about section 5.1.2 c). Star Alliance suggests replacing the sentence ("The installed resources should be dedicated to EFB functions only.") by the A350 CRI F-21 wording which has already been accepted by EASA.
PROPOSED TEXT / COMMENT:
The installed resources can be dedicated to EFB functions only or shared between both EFB and airworthiness-approved avionics functions provided the EFB is segregated from the installed resource by an approved interface that prevents the EFB from adversely affecting certified systems, resources or functionality.
If installed resources are shared :
- Segregation / non-interference between EFB and Avionics functions in terms of functionalities and resources, in normal and degraded configurations, should be maintained.
note : intended suppression of EFB information as per design is not considered as interference in this context.
- when sharing an installed Display Unit, either in part or completely, the EFB should not obstruct or restrict the display of required aircraft parameters under both normal and abnormal operating conditions e.g., engine parameters and fault warning system.
- when sharing an installed Display Unit either in part or completely, the display of EFB information should be clearly distinguishable from other approved information.
- the means of controlling the display of information on a shared display unit should be developed to a software assurance level at least as high as the highest software assurance level of functions presented on the display.
Original AMC20-25 NPA text:
Installed resources require an airworthiness approval.
RATIONALE / REASON / JUSTIFICATION for the Comment :
see comment about section 5.1.2. b) which excludes the EFB installed resources. For consitency purpose between sections 5.1.2. b) and 6.1.2.5, section 5.1.2. b) should be modified in order that definition of a Class 2 EFB encompasses EFB installed resources.
PROPOSED TEXT / COMMENT:

No change

response

Partially accepted

Please see response to comment No 198.

comment 660 comment by: *Deutsche Lufthansa AG*

Proposal:

Replace the sentence "The installed resources should be dedicated to EFB functions only." as follows:

"The installed resources can be dedicated to EFB functions only or shared between both EFB and airworthiness-approved avionics functions provided the EFB is segregated from the installed resource by an approved interface that prevents the EFB from adversely affecting certified systems, resources or functionality.

If installed resources are shared :

- Segregation / non-interference between EFB and Avionics functions in terms of functionalities and resources, in normal and degraded configurations, should be maintained.Note: intended suppression of EFB information as per design is not considered as interference in this context.
- when sharing an installed Display Unit, either in part or completely, the EFB should not obstruct or restrict the display of required aircraft parameters under both normal and abnormal operating conditions e.g., engine parameters and fault warning system.
- when sharing an installed Display Unit either in part or completely, the display of EFB information should be clearly distinguishable from other approved information.
- the means of controlling the display of information on a shared display unit should be developed to a software assurance level at least as high as the highest software assurance level of functions presented on the display."

Comment/Justification:
NPA AMC 20-25 not harmonized with forthcoming AC 120-76B.
See rationale given for comment #646 about section 5.1.2 c).
Lufthansa suggests replacing the sentence ("The installed resources should be dedicated to EFB functions only.") by the A350 CRI F-21 wording which has already been accepted by EASA.

response

Partially accepted

Please see response to comment No 198.

comment 661 comment by: *Deutsche Lufthansa AG*

last sentence: "Installed resources require an airworthiness approval."

	No text change proposed, but consistency check: See comment #645 about section 5.1.2. b) which excludes the EFB installed resources. For consistency purpose between sections 5.1.2. b) and 6.1.2.5, section 5.1.2. b) should be modified in order that definition of a Class 2 EFB encompasses EFB installed resources.
response	Partially accepted Please see response to comment No 199.

comment	*837* comment by: *Eurocopter* Like stated for § 5.1.2, we suggest to keep the opportunity to display data from class 2 EFBs on an aircraft display, even if not dedicated (see previous remark for details).
response	Partially accepted Some provisions have been included in the resulting text of AMC 20-25.

comment	*876* comment by: *Boeing* Page: 36 Paragraph: 6.1.2.5 – *Installed Resources* 2nd sentence The proposed text states: *"The installed resources should be dedicated to EFB functions only."* **REQUESTED CHANGE:** It is unclear what this statement is referring to. It needs to be better explained or clarified. **JUSTIFICATION:** Better clarity is necessary to ensure appropriate compliance.
response	Accepted Paragraph 6.1.1.1 of the resulting text of AMC 20-25 now explicitly includes 'shared' resources as well.

CONCLUSION ON COMMENTS ON PAGE 36 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – CLASS 2 – INSTALLED RESOURCES)

13 comments were received, in essence requesting the possibility of using avionics displays as installed resources shared with EFB. A few comments required clarification in the proposed wording.

The Agency clarifies that the proposed AMC 20-25 is only one among the possible acceptable means of compliance related to the majority of the current EFBs designs in the aircraft, known at the moment of its publication.

The publication, therefore, of this material does not prevent alternative means of compliance from being accepted by the competent authority. Most of the aircraft today in operational service in the fleet were not certified covering the possibility that the installed displays could be used also in connection with non-certified hardware and software applications.

The Agency agrees that some improvement of the wording is necessary, to clarify that use of installed avionics displays to present EFB information is allowed when this possibility is part of the approved type design, including accomplishment of an appropriate Human Factors assessment

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) - 6.1.2 Class 2 EFB - 6.1.2.6 EMI Demonstrations p. 36

comment	*436* comment by: *PMV-Engineering / ADCISSE* As indicated before, the evaluation of these aspects have to be included in the airworthiness approval as requiring expertise of DOA/A-DOA.
response	Not accepted Please see response to comment No 425.

CONCLUSION ON COMMENTS ON PAGE 36 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – CLASS 2 – EMI)

Only one comment was received on this segment, requesting EMI to be part of the airworthiness certification process, as requiring expertise of DOA/A-DOA.

The Agency clarifies that nothing prohibits that the airworthiness justification covers, as supporting material, aspects which could later become part of the scope of the operational assessment. One example could be the EMI testing of a specific COTS item, which can, indeed, be performed by a DOA company, if so wished since going beyond the requirements for initial airworthiness, and approved by the Agency as part of a S/TC. In such a case, the provided supporting material could be used as credit during the operational assessment process (i.e. no need to duplicate testing and verification).

However, the above is neither prescriptive for S/TC applicants, nor it is likely to cover all the possible EFB host platforms available on the market.

Therefore, the CAT operator should remain free, if so wished, to use any EFB host platform, subject to operational assessment under oversight by the competent authority. It is true that this may represent a significant economic burden and a technical challenge for the operator, while standardisation on the market (e.g. few models of EFB host platforms already covered by S/TC) could be beneficial. The Agency would, however, leave to the market, and not to the rules, to possibly drive evolution in this direction.

The resulting text of AMC 20-25, containing the above clarifications, is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) – 6.1.2 Class 2 EFB – 6.1.2.7 Batteries p. 36

comment	*924* comment by: *Tyler Clark - Transport Canada Civil Aviation* **<u>TCCA COMMENT #2</u>:** **Section 6.1.2.7** **Batteries (for Class 2 EFB)** **(page 36)** *General comment:* Refers back to 6.1.1.2 (page 32) lithium batteries for Class 1 EFB where it mentions standard UL 1642. Consider adding RTCA/DO-311 MOPS for rechargeable lithium batteries (for Class 2) as a way to address concerns regarding overcharging, over-discharging and cell flammability.

	Should mention that the operator have procedures to prevent mishandling (storage, maintenance…) of the lithium batteries. 6.1.1.2 (b) (page 32) states that the operator is responsible for the maintenance; • Should mention for Class 2 that they should establish a schedule for periodic checks to determine the health (cycles, leakage, temperature…) of the battery (since it will probably be connected to aircraft power more often than a Class 1)
response	Accepted Reference standards for batteries have been introduced in paragraph 6.2.1.2 of the resulting text of AMC 20-25, as well as mention of batteries in paragraph 7.12 (maintenance).

CONCLUSION ON COMMENTS ON PAGE 32 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – 6.1 EFB HARDWARE APPLOVAL PROCESS – HOST PLATFORM)

One comment was received, requesting:

— adding RTCA/DO-311 MOPS for rechargeable lithium batteries; and

— clarifications and rewording.

The Agency has improved the guidance for batteries on PEDs contained in the resulting text of AMC 20-25, aligned with the latest FAA criteria.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) - 6.1.3 Class 3 EFB p. 36

comment	*200* comment by: *AIRBUS* "a) **The safety assessment addressing failure conditions** of the EFB system hardware, **of any approved application** installed on the Class 3 EFB and the partition provided for uncertified applications and non-EFB applications." Refer to comment about section 5.2.1 ("Type A - Definition") and comment about section 5.2.2.b). ("Type B"). Type A and Type B software applications are not certified and therefore, they should not follow a safety assessment process (as per 25.1309) to address associated failure conditions. Suggested text: a) The safety assessment addressing failure conditions of the EFB system hardware, of any certified application installed on the Class 3 EFB and the partition provided for uncertified applications and non-EFB applications. The assessment of safety, integrity and security of the EFB Type A and B software applications should be addressed through the operational approval of the applications themselves (see sections 6.2 and 7).
response	Not accepted

The installed systems, applicable to both installed EFBs and EFB installed resources, have to be designed and certified in order to ensure that the aircraft systems are still compliant with the certification requirements, and this certification is not invalidated when connected to non-certified hardware or software.

comment *283* comment by: *Thales Avionics*

The sentence "Aspects linked to 6.1.1.1 to 6.1.1.6 above should be considered" need to be detailed:
- 6.1.1.1 mainly addresses class 1 and should not be referred to.
- 6.1.1.3: given the Class 3 hardware airworthiness approval, there should be no need to quickly unplug or power off the EFB,
- 6.1.1.4 is in contradiction to class 3 as by definition data connectivity is authorized

response Partially accepted

The share of responsibilities between airworthiness and operational approval have been clarified in the revised text of AMC 20-25.

comment *314* comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 30 shared with Airbus

JUSTIFICATION for the Comment on page # 36 § 6.1.3 a)
Refer to comment #295 about section 5.2.1 ("Type A - Definition") and comment #299 about section 5.2.2.b). ("Type B").
Type A and Type B software applications are not certified and therefore, they should not follow a safety assessment process (as per 25.1309) to address associated failure conditions.

PROPOSED TEXT / COMMENT
a) The safety assessment addressing failure conditions of the EFB system hardware, of any certified application installed on the Class 3 EFB and the partition provided for uncertified applications and non-EFB applications. The assessment of safety, integrity and security of the EFB Type A and B software applications should be addressed through the operational approval of the applications themselves (see sections 6.2 and 7).

response Not accepted

Please see response to comment No 200.

comment *626* comment by: *Goodrich*

6.1.3 b) This statement should apply only to the operating system hosting Type C applications. A Class 3 EFB can host Type A and/or Type B applications as stated in 5.1.3. The operating system used to host Type A or B applications is not subject to any DAL.

Suggested adding the following text to the end of this statement: "... for the system and its interfaces when required for hosting Type C applications."

response Not accepted

The operating system used to host Type A or B applications can be DAL E for

	Type A and B applications.
comment	*793* comment by: *Ingo Pucks, Owner IP Aerospace* Equally a Type C application should be certified in accordance with its design assurance level (ref. to Do-178).
response	Noted The issue is now eliminated as the Agency has removed the 'Type C' from the proposed AMC 20-25.
comment	*925* comment by: *Tyler Clark - Transport Canada Civil Aviation* **Section 6.1.3** **Class 3 EFB** **(page 36)** mentions aspects linked to 6.1.1.1 to 6.1.1.6 which includes 6.1.1.4 data connectivity; • 6.1.1.4 reads "data connectivity with certified aircraft systems is not authorised" yet it is for Class 3.
response	Accepted Provisions for data connectivity have been introduced in the revised text of AMC 20-25.

CONCLUSION ON COMMENTS ON PAGE 36 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – CLASS 3)

The six comments received on this segment, mainly requested a further level of detail or clarification regarding requirements which are only applicable to the installed (or class 3) EFB host platform and certified applications. The host platform, of course, includes the Operating System (OS).

Section 6.1.3 of the proposed AMC 20-25 has, hence, been revised by the Agency, to remove inconsistencies, provide further clarification, and improved level of detail.

Furthermore, one of the comments addressed in particular the OS of a Class 3 EFB host platform, when there are no Type C software applications residing on it. The Agency has already faced this issue and, in fact, there is a decision by the avionics Panel of Experts (PoE) which requires the OS to be part of the installed EFB host platform approved configuration. In this specific aspect, the Agency is not harmonised with FAA.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) - 6.1.4 Certification Documentation - 6.1.4.1 Aircraft Flight Manual p. 37

comment	*467* comment by: *Oliver Ast (CLH)* Comment:

If an STC is necessary due to installation of an EFB, the AFM must be ammended.
What is the rationale behind this changed paragraph ?

response

Not accepted

If an STC is necessary to install an EFB, the AFM has to be consequently amended.

comment

551 comment by: *Star Alliance*

Original AMC20-25 NPA text:
6.1.4.1 Aircraft Flight Manual
For Class 2 and 3 EFB, the Aircraft Flight Manual (AFM) section or an Aircraft Flight Manual Supplement (AFMS) should contain
a) A statement which identifies the equipment and aircraft build or modification standard as necessary. This may include a very brief description of the installed system.
b) Appropriate amendments or supplements to cover any limitations concerning:
i. the use of the EFB host platform for Class 3 EFB system;
ii. the use of the installed EFB provisions/resources for Class 2 EFB system.
For this purpose, the AFM(S) should make reference to any guidelines (relevant to the airworthiness approval), intended primarily for EFB software application developers or EFB system suppliers.
RATIONALE / REASON / JUSTIFICATION for the Comment :
If an STC is necessary due to installation of an EFB, the AFM must be ammended.
What is the rationale behind this changed paragraph ?

response

Not accepted

If an STC is necessary to install an EFB, the AFM has to be consequently amended.

comment

662 comment by: *Deutsche Lufthansa AG*

If an STC is necessary due to installation of an EFB, the AFM must be amended.

So, what is the rationale behind this changed paragraph?

response

Not accepted

If an STC is necessary to install an EFB, the AFM has to be consequently amended.

comment

795 comment by: *Ingo Pucks, Owner IP Aerospace*

In the AFM only the HW of the EFB system could be referred to, while the SW and data configuration needs to be referred similarly in a appropriate manner, i. e. the OPS manual, a listing of the on-board library, a configuration list (as part of the CDL).

response	Not accepted If an STC is necessary to install an EFB, the AFM has to be consequently amended.

CONCLUSION ON COMMENTS ON PAGE 37 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – AIRCRAFT FLIGHT MANUAL)

One common issue emerges from the four comments received on this segment, on the rationale behind "this changed paragraph" (in relation to TGL 36).

The Agency cannot accept the comments since if an STC is necessary to install an EFB, the AFM has to be consequently amended.

These comments, therefore, do not lead to any modification in the text of AMC 20-25.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) - 6.1.4 Certification Documentation - 6.1.4.2 Guidelines for EFB Software Application Developers (Class 3) p. 37

comment	*307* comment by: *Thales Avionics* The restriction to class 3 in the title should be removed as there is a need for application software developpers to provide guidelines as to the use of the EFB system hardware and operating system to be able to garantee the software application qualification.
response	Partially accepted It is proposed now to be applicable to both installed EFBs and EFB installed resources. It is not applicable to portable EFBs as this is part of the airworthiness approval but these guidelines do not guarantee the qualification of non-certified Type A/B EFB SW applications.
comment	*308* comment by: *Thales Avionics* It should be considered that the software application developpers may be distinct from the EFB host platform developper. As a result, the relevant organization capable of performing the task described in 6.1.4.2 are not the software application developpers, but the EFB host platform developper (first sentence), except for e), f), and g). e) and f) apply to EFB system integrator, possibly to the EFB Host platform developper, not to application software developper g) applies to application software developper For the same reasons, the application software developpers need to be added to the list of recipients.
response	Partially accepted The organisation responsible for providing the guidelines is the TC/STC holder.
comment	*309* comment by: *Thales Avionics* The guideline document need also to be distributed to the EFB system integrator In addition, as EFB may be installed through an STC process, it is suggested to

	replace "aircraft manufacturer" by "TC or STC applicant" or something equivalent.
response	Partially accepted The EFB system integrator can get the guidelines from the operator.

comment	*412* comment by: *European Cockpit Association* Add: h) IT Security Considerations Justification: It is necessary to consider IT security
response	Not accepted Aircraft systems security needs to be addressed independently of the guidelines provided in this section as part of the certified aircraft TC/STC. Security of the non-certified applications is referred in paragraph c) and covered by section EFB System Security (Section 7.8).

comment	*628* comment by: *Goodrich* Title 6.1.4.2 This should either be "Type C" or Type B or C", not Class 3. The software classification should be independant of the hardware clarification. Additional rigor described in this section should not be applicable to Class 3 Type A/B only configurations
response	Not accepted The paragraph is intended to provide information to Type A and B developers about the EFB hardware which is part of the aircraft TC/STC.

comment	*796* comment by: *Ingo Pucks, Owner IP Aerospace* In general application development (SW and data) for Class 3 EFB should follow the procedures as for electronic SW (Do-178) to maintain a similar safety standard for avionics and EFBs Class 3 (which could be considered as mobile avionics), DAL (design assurance levels A and B).
response	Partially accepted The 'class 3' or installed EFB intended function is to host EFB Software Applications. Type A and B applications do not require an airworthiness approval, therefore, they are not required to be qualified according to ED-12()/DO-178(). Assurance Level, if any, is to be determined by the operational approval process.

comment	*838* comment by: *Eurocopter* This section is totally misleading. It is apparently intended that the platform developer provides guidelines to software application developers. However, first sentence ("*The software application developers should compile* …") suggests the reverse.
response	Accepted

The organisation capable to provide the guidelines is the TC/STC holder.

CONCLUSION ON COMMENTS ON PAGE 37 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – GUIDELINES FOR EFB SOFTWARE APPLICATION DEVELOPERS)

The seven comments received on this segment, mainly requested:

— not to limit applicability of section 6.1.4.2 of proposed AMC 20-25 to only developer of SW for class 3/installed EFB host platform;

— to identify correctly all the players: software application developer, platform supplier, system integrator, TC/STC holder; and

— to better clarify the security considerations.

The section has been now corrected and reworded to clarify its applicability also to installed resources supporting 'portable' EFB host platforms and to provide further clarification and improved level of detail.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.1 EFB Hardware Approval Process (Host Platform) - 6.1.4 Certification Documentation - 6.1.4.3 Guidelines for EFB system suppliers (Class 2) p. 37-38

comment	*311* comment by: *Thales Avionics* The software application developpers should be added to list of recipient of the guidelines document, or at least, to the part of it necessary to ensure application software development meet software qualification requirement and that application will behave correctly on the system.
response	Partially accepted Software application developers should get guidelines from operators.

comment	*413* comment by: *European Cockpit Association* Add: h) IT Security Considerations Justification: It is necessary to consider IT security
response	Partially accepted Please see response to comment No 412.

comment	*468* comment by: *Oliver Ast (CLH)* Comment 6.1.4.3: Isn't this already part of the STC approval process ?
response	Noted It's confirmed to be part of the TC/STC airworthiness approval.

comment	*553* comment by: *Star Alliance* **Original AMC20-25 NPA text:** 6.1.4.3 Guidelines for EFB system suppliers (Class 2) Comment: Isn't this already part of the STC approval process ?
response	Noted It's confirmed to be part of the TC/STC airworthiness approval.

comment	*663* comment by: *Deutsche Lufthansa AG* Isn't this already part of the STC approval process?
response	Noted It's confirmed to be part of the TC/STC airworthiness approval.

comment	*700* comment by: *Thomson Airways* For the sake of consistency with 6.1.4.2, "The guidelines document should be available to the operator, the competent authority and the EASA." should read "The guidelines document should be available to the operator, the competent authority and the Agency."
response	Accepted

comment	*797* comment by: *Ingo Pucks, Owner IP Aerospace* In general application development (SW and data) for Class 2 EFB should follow the procedures as for electronic SW (Do-178) to maintain a similar safety standard for avionics and EFBs Class 2 (which could be considered as mobile avionics), DAL (design assurance levels C and D).
response	Not accepted Airworthiness demonstration is not mandatory for Type A and B applications. This does not exclude to apply for ED-12 or equivalent on a voluntary basis.

CONCLUSION ON COMMENTS ON PAGES 37-38 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – GUIDELINES FOR EFB SYSTEM SUPPLIERS)

Seven comments received were received on this segment.

Four of them requested to clarify the case of the EFB System Supplier not being the S/TC holder or in general the different EFB players.

The Agency confirms that, being the portable EFB system assumed to be a consumer device, no design or production approvals are required for it. Therefore, the EFB supplier could be the T/STC holder, but it could also be a separate and non-approved organisation.

In the resulting text of AMC 20-25, there is, in fact, identification of the different players and their responsibilities, which can or can not coincide in one organisation,. The wording has been improved, taking into account some of the received suggestions.

A further comment required the application of DO-178 but the Agency reiterates that airworthiness demonstration is not mandatory for Type A and B applications. This does not exclude to apply for ED-12 or equivalent on a voluntary basis**.**

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.2 EFB Software Approval Process p. 38

comment *471* comment by: *Oliver Ast (CLH)*

Comment:

As a general rule, when dealing with airworthiness and/or operational approval processes, the AMC should clearly state the maximum waiting period an operator should expect between the request submission and the Agency or NAA approval.

response Not accepted

The proposal goes much beyond the scope of AMC 20-25, since in the EU framework, regulatory processes can be defined only at the level of legally binding implementing rules.

CONCLUSION ON COMMENTS ON PAGES 37-38 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – EFB SOTFWARE APPROVAL PROCESS)

Only one comment was received on the general aspects of the proposed section 6.2 of AMC 20-25.

The comment asked for a maximum time to be specified for the competent authority to process an EFB operational approval request from an operator.

Since there is no such maximum period for any other OPS approval in the EU rules, for consistency reasons, the Agency is not in favour of introducing such processing period. In addition, due to the extremely wide range of possible uses of EFBs, it is considered that it is difficult to set a maximum processing period for an operator between the submission and the potential approval.

The comment did not produce any change in the resulting text of the proposed rules.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.2 EFB Software Approval Process - 6.2.1 Type A Software Applications p. 38

comment *18* comment by: *FAA*

Page 38, Para 6.2.1

Comment:
What if the paper must be aboard? Shouldn't the Principal Inspector approve the use of an electronic device to display these materials?

Reason for Comment:
Harmonization of future policy

Suggested Change:

Delete " do not require an approval'

Suggest "approval" is interfaced with authorization.

response

Not accepted

The Agency confirms that certified CAT operators (i.e. now obliged by Commission Regulation (EU) No 965/2012 to implement safety management) should have the 'privilege' of approving by themselves Type A applications (and changes thereto), subject, though, to 'notification' of the authority.

Higher level regulations can, however, apply concerning the approvals needed to have required documentation in electronic format.

In the future, once possible ICAO standards on operational approval become applicable (expected in November 2014), the Agency may launch a new rulemaking task to transpose these standards, but at the level of implementing rules (i.e. amendment to Commission Regulation (EU) No 965/2012) and not simply at the level of AMC.

comment

201 comment by: *AIRBUS*

"Type A software applications do not require an approval, but should follow the HMI and human factors guidance material provided in appendix D."

NPA AMC 20-25 section 6.2.1 not consistent with forthcoming AC 120-76B.
NPA AMC 20-25 section 6.2.1 not consistent with the 3rd paragraph of section 7 (operational approval process) in page 39 :
"When an operator is seeking an operational approval for an EFB system, the evaluation should be conducted by the operator's competent authority when the system is based on a class 1 or 2 EFB and only hosts:
* Type A applications; and/or"
See rationale given for comment about section 5.2.1.b). (Type A complementary characteristics).
Airbus does think that an operational approval is necessary, notably to address :
- Class 1 EFB embodying only Type A S/W applications
- correct EFB S/W type classification by the Operator
- correct safety risk assessment carried out by the Operator, notably when starting operations with no paper

Suggested text:
Type A software applications do not require airworthiness approval, but should be approved through the operational approval process, with respect to the HMI guidance provided in Appendix D.

response

Not accepted

Please see response to comment No 18..

comment

316 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 31 shared with Airbus

JUSTIFICATION for the Comment on page # 38 § 6.2.1
NPA AMC 20-25 section 6.2.1 not consistent with AC 120-76B.
NPA AMC 20-25 section 6.2.1 not consistent with the 3rd paragraph of section 7 (operational approval process) in page 39 :
"When an operator is seeking an operational approval for an EFB system,

the evaluation should be conducted by the operator's competent authority when the system is based on a class 1 or 2 EFB and only hosts:
* Type A applications; and/or"
See rationale given for comment #296 about section 5.2.1.b). (Type A complementary characteristics).
DASSAULT-AVIATION does think that an operational approval is necessary, notably to address :
- Class 1 EFB embodying only Type A S/W applications
- correct EFB S/W type classification by the Operator
- correct safety risk assessement carried out by the Operator, notably when starting operations with no paper

PROPOSED TEXT / COMMENT
Type A software applications do not require airworthiness approval, but should be approved through the operational approval process, with respect to the HMI guidance provided in Appendix D.

response

Not accepted

Please see response to comment No 18.

comment

418 comment by: *European Cockpit Association*

Type A software applications do not require airworthiness approval, but should be approved through the operational approval process, considering the HMI guidance, contained in the AMC 20-25 EFB.

Justification: Direct link to the HMI guidance, provided in the regulation.

response

Not accepted

Please see response to comment No 18.

comment

469 comment by: *Oliver Ast (CLH)*

Proposed Text:

Type A software applications do not require airworthiness approval, but should be approved through the operational approval process.

Comment:

NPA AMC 20-25 section 6.2.1 not consistent with forthcoming AC 120-76B.
NPA AMC 20-25 section 6.2.1 not consistent with section 7 (3rd paragraph in page 39) :
"When an operator is seeking an operational approval for an EFB system, the evaluation should be conducted by the operator's competent authority when the system is based on a class 1 or 2 EFB and only hosts:
* Type A applications; and/or"
See rationale given for comment about section 5.1.2 b).
Airbus does think that an operational approval is necessary, notably to address :
- Class 1 EFB embodying only Type A S/W applications
- correct EFB S/W type classification by the Operator
- correct safety risk assessement carried out by the Operator, notably when starting operations with no paper

response | Not accepted

Please see response to comment No 18.

comment | *548* comment by: *Jeppesen Inc.*

Suggest to add: "Operational" prior to word "approval"..

Rationale:
Clarifies type of approval

response | Noted

Nevertheless, the mention of operational approval has been removed from AMC 20-25, since, in the EU framework, formal approval processes can only be established at the level of implementing rules, and not at the level of AMC.

comment | *555* comment by: *Star Alliance*

Original AMC20-25 NPA text:
Type A software applications do not require an approval, but should follow the HMI and human factors guidance material provided in appendix D.

RATIONALE / REASON / JUSTIFICATION for the Comment :
NPA AMC 20-25 section 6.2.1 not consistent with forthcoming AC 120-76B.
NPA AMC 20-25 section 6.2.1 not consistent with section 7 (3rd paragraph in page 39) :
"When an operator is seeking an operational approval for an EFB system, the evaluation should be conducted by the operator's competent authority when the system is based on a class 1 or 2 EFB and only hosts:
* Type A applications; and/or"

See rationale given for comment about section 5.1.2 b). Airbus does think that an operational approval is necessary, notably to address :
- Class 1 EFB embodying only Type A S/W applications
- correct EFB S/W type classification by the Operator
- correct safety risk assessement carried out by the Operator, notably when starting operations with no paper

PROPOSED TEXT / COMMENT:

Type A software applications do not require airworthiness approval, but should be approved through the operational approval process.

response | Not accepted

Please see response to comment No 18.

comment | *664* comment by: *Deutsche Lufthansa AG*

Proposal:

Modify as follows:

Type A software applications do not require an ~~approval, but should follow the HMI and human factors guidance material provided in appendix D.~~ **airworthiness approval, but should be approved through the operational approval process**.

Comment/Justification:

NPA AMC 20-25 section 6.2.1 not consistent with forthcoming AC 120-76B.
NPA AMC 20-25 section 6.2.1 not consistent with section 7 (3rd paragraph in page 39):
"When an operator is seeking an operational approval for an EFB system, the evaluation should be conducted by the operator's competent authority when the system is based on a class 1 or 2 EFB and only hosts:
* Type A applications; and/or"

See rationale given for comment #645 about section 5.1.2 b).
We think that an operational approval is necessary, notably to address:
- Class 1 EFB embodying only Type A S/W applications
- correct EFB S/W type classification by the Operator
- correct safety risk assessement carried out by the Operator, notably when starting operations with no paper

response

Not accepted

Please see response to comment No 18.

comment

709 comment by: *AT-CAA-PAM*

6.2.1 Type A Software does not need an approval.
for Type C Software you write airworthiness and operational approval. This means, that for a Type A, authority not need be informed in any way? Please clearify.

I recommend: All EFB's need at least an operational approval by the local authority.
Do we really want an operator to use self made approach charts (copied / extracted from some jeppesen software on a pc, and stored as pdf in some bad quality way? (This was already seen on a german reg. aircraft)

response

Not accepted

Please see response to comment No 18.

CONCLUSION ON COMMENTS ON PAGE 38 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – TYPE A SOTFWARE APPLICATIONS)

Nine comments were received on this segment of the NPA.

The comments mainly dealt with:

— the harmonisation with the FAA AC120-76B regarding EFB Type A exception (i.e. no operational approval required);

— the inconsistency regarding this exception; and

— the clarification of the said exception.

As already mentioned, the Agency makes any possible effort to harmonise with ICAO and FAA and, in particular, not only with the published AC 120-76B, but also with the planned edition 'C' of this document. Of course, 100% harmonisation might be not achievable.

The Agency has accepted the comments related to the second bullet above, and, hence, corrected the inconsistencies.

The Agency confirms that certified CAT operators (i.e. now obliged by Commission Regulation (EU) No 965/2012 to implement safety management) should have the 'privilege' of approving by themselves Type A applications (and changes thereto), subject, though, to 'notification' of the authority.

Higher level regulations can, however, apply concerning the approvals needed to have required documentation in electronic format.

In the future, once possible ICAO standards on operational approval will become applicable (expected in November 2014), the Agency may launch a new rulemaking task to transpose these standards, but at the level of implementing rules (i.e. amendment to Commission Regulation (EU) No 965/2012) and not simply at the level of AMC.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.2 EFB Software Approval Process - 6.2.2 Type B Software Applications p. 38

comment *202* comment by: *AIRBUS*

"Type B software applications do not require airworthiness approval, but should be approved through the operational approval process."

Section 6.2.2 does not give any considerations regarding the involvement of the Agency. So, section 6.2.2 could be interpreted as not consistent with sections 7 ("Operational approval process") and 7.5 ("Specific Considerations for mass and balance and performance Applications").
Sections 7 and 7.5 should be modified to be consistent with this section 6.2.2 - see comment about section 7 (Operational approval process) and comment about section 7.5 (Specific Considerations for mass and balance and performance Applications)

Suggested text:
No change

response Noted

comment *321* comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 32 shared with Airbus

JUSTIFICATION for the Comment on page # 38 § 6.2.2
Section 6.2.2 does not give any considerations regarding the involvement of the Agency. So, section 6.2.2 could be interpretated as not consistent with sections 7 ("Operational approval process") and 7.5 ("Specific Considerations for mass and balance and performance Applications").
Sections 7 and 7.5 should be modified to be consistent with this section 6.2.2 - see comment #331 about section 7 (Operational approval process) and comment #351 about section 7.5 (Specific Considerations for mass and balance

	and performance Applications) PROPOSED TEXT / COMMENT No change
response	Noted

comment	*470* comment by: *Oliver Ast (CLH)* Comment: For overall AMC consistency purpose : sections 7 and 7.5, which should be modified, are not consistent with this section 6.2.2 which does not give any considerations regarding the involvement of the Agency.
response	Not accepted The role of the Agency is: – to receive and process applications for TC and changes to TC or STC, submitted by DOAs; – to notify a certification basis and to issue airworthiness certificates when compliance with the basis has been verified; – the certification basis may include additional equipment (e.g. installed EFB resources) or data (e.g. compatibility of certain models of portable EFBs), not required by the CS, but proposed by the applicant; – to inspect the competent authorities to verify that they apply the implementing rules of the Basic Regulation (e.g. for operational matters). The legislator has not given to the Agency any responsibility to approve or evaluate EFBs and related applications. On the contrary, the oversight of OPS is responsibility of the competent authorities at national level. Nevertheless, nothing prevents the said authorities, or even manufacturers, if so wished, from requesting the Agency, on a voluntary basis, to provide an EFB evaluation service which is available.

comment	*557* comment by: *Star Alliance* **Original AMC20-25 NPA text:** Type B software applications do not require airworthiness approval, but should be approved through the operational approval process. **RATIONALE / REASON / JUSTIFICATION for the Comment :** For overall AMC consistency purpose : sections 7 and 7.5, which should be modified, are not consistent with this section 6.2.2 which does not give any considerations regarding the involvement of the Agency (see comments concerning pages 39 and 44) **PROPOSED TEXT / COMMENT:** No change

response	Not accepted Please see response to comment No 18.

CONCLUSION ON COMMENTS ON PAGE 38 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – TYPE B SOTFWARE APPLICATIONS)

Four comments were received on this segment of the NPA.

They all dealt with the fact that this paragraph is not reflecting the role of the Agency described in paragraph 7 regarding Type B applications.

The Agency agrees with the intent of some of these comments and, therefore, section 6.2.2 of the proposed AMC 20-25 has been further expanded for consistency and clarification, harmonised, of course, with section 7 in the same AMC.

The Agency also clarifies that its role is:

— to receive and process applications for TC and changes to TC or STC, submitted by DOAs;

— to notify a certification basis and to issue airworthiness certificates when compliance with the basis has been verified;

— the certification basis may include additional equipment (e.g. installed EFB resources) or data (e.g. compatibility of certain models of portable EFBs), not required by the CS, but proposed by the applicant;

— to inspect the competent authorities to verify that they apply the implementing rules of the Basic Regulation (e.g. for operational matters).

The legislator has not given to the Agency any responsibility to approve or evaluate EFBs and related applications. On the contrary, the oversight of OPS is responsibility of the competent authorities at national level.

Nevertheless, nothing prevents the said authorities, or even manufacturers, if so wished, from requesting the Agency, on a voluntary basis, to provide an EFB evaluation service which is available.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.2 EFB Software Approval Process - 6.2.3 Type C Software Applications p. 38

comment	*561* comment by: *Star Alliance* As a general rule, when dealing with airworthiness and/or operational approval processes, the AMC should clearly state the maximum waiting period an operator should expect between the request submission and the Agency or NAA approval.
response	Not accepted The proposal goes much beyond the scope of AMC 20-25, since in the EU framework, regulatory processes can be defined only at the level of legally binding implementing rules.
comment	*839* comment by: *Eurocopter* The need for having an operational approval of a type C application is not understood, as far as such application is supposed to have airworthiness approval.

response	Accepted In paragraph 5.1.2 of the resulting text of AMC 20-25, it is clarified that installed EFB may also host certified applications (i.e. certified under the responsibility of the TC/STC holder).

CONCLUSION ON COMMENTS ON PAGE 38 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – TYPE C SOTFWARE APPLICATIONS)

Two comments were received on this segment of the NPA. One asked for a maximum time imposed to the competent authority to process an operator's application to use an EFB.

This idea was not accepted for the same reasons as explained above.

The other comment dealt with the need to require an OPS approval for the use of a Type C application since this application is expected to receive an airworthiness approval. In paragraph 5.1.2 of the resulting text of AMC 20-25, it is clarified that installed EFB may also host certified applications (i.e. certified under the responsibility of the TC/STC holder).

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 6 HARDWARE AND SOFTWARE APPROVAL PROCESSES - 6.2 EFB Software Approval Process - 6.2.4 Non-EFB Software Applications p. 38

comment	*55* comment by: *Air France* As class 1 EFBs are normally used as a personnal computer at the same time, it is utopic to require non EFB software to be part of the EFB configuration management. Proposal : Remove this requirement.
response	Partially accepted Indeed, flight crews may use the EFB portable platform to also host their personal miscellaneous (non-EFB) applications. A few lines have been added to paragraph 6.2.2.3 in the resulting text of AMC 20-25 to clarify under which conditions this personal use can be safely allowed. These above-mentioned conditions are, in particular, the ones when the administrator ensures that the applications do not impact the operation of the EFB. Updates should be managed as well to ensure that the initial evaluation remains valid.

comment	*312* comment by: *Thales Avionics* Examples of Non-EFB applications would be welcomed. It is anticipated that applications used for aircraft system maintenance for example are considered non EFB-application and would therefore not be covered by this AMC. Similarly, it is anticipated that a Quick Access Recorder function is considered a non EFB-application.
response	Accepted A list of a few examples of possible miscellaneous (non-EFB) applications has been added to paragraph 6.2.2.3 in the resulting text of AMC 20-25.

comment	*340* comment by: *British Airways* "However, the EFB administrator should ensure that non-EFB software applications do not adversely impact the operation of the EFB and in particular include non-EFB software in the scope of EFB configuration management". An expansion of non-EFB software is sought. If operators are to issues personal iPads as PED's and Pilots would like to 'download' an approved App from the Apple Store, how do EASA see the operator ensuring that non-EFB software (such as Angry Birds or Pilot Weather App) on an iPad will not adversely impact the EFB or EFB operation?
response	Partially accepted Indeed, flight crews may use the EFB portable platform to also host their personal miscellaneous (non-EFB) applications. A few lines have been added to paragraph 6.2.2.3 in the resulting text of AMC 20-25 to clarify under which conditions this personal use can be safely allowed.

comment	*799* comment by: *Ingo Pucks, Owner IP Aerospace* Non-EFB software applications shall be, for EFBs featuring Type C and B applications, segregated from those and it shall be shown by the integrator that no adverse affect of running both types of application on one device is not present. Refer to Do-178 for further considerations.
response	Partially accepted Please see response to comment No 55.

comment	*818* comment by: *Fédération Nationale de l'Aviation Marchande (FNAM)* Reference text: *"However, the EFB Administrator should ensure that non-EFB software applications do not adversely impact the operation of the EFB [...]"* Comment: Non-EFB software applications can be used in the specific case where the system is a Class 1 EFB and also a personal computer. It might not be feasible for the EFB Administrator to check personal computers. FNAM suggests editing this paragraph. Proposal: *"However, flight crew should be given specific recommendations in the use of non-EFB software applications, so as they do not adversely impact the operation of the EFB."*
response	Partially accepted Please see response to comment No 55.

comment	*877* comment by: *Boeing* Page: 38 Paragraph: 6.2.4 -- *Non-EFB Software Applications* 2nd sentence The proposed text states: ***6.2.4 Non-EFB Software Applications*** ***...*** *However, the EFB Administrator should ensure that non-EFB software applications do not adversely impact the operation of the EFB (refer to*

§7.8) and in particular include non-EFB software in the scope of EFB configuration management.

REQUESTED CHANGE: We recommend revising the text as follows:

6.2.4 Non-EFB Software Applications
…
However, the EFB Administrator should ensure that non-EFB software applications do not adversely impact the operation of the EFB (refer to §7.8) ~~*and in particular include non-EFB software in the scope of EFB configuration management*~~*.*
JUSTIFICATION: The phrase (stuck out above) should not be applicable. If non-EFB software is determined to not interfere or adversely affect EFB functions, then the EFB Administrator should not be required to track or maintain records on non-applicable software.

response

Not accepted

Please see response to comment No 55.

CONCLUSION ON COMMENTS ON PAGE 38 (DRAFT AMC 20-25 – HARDWARE AND SOFTWARE APPROVAL PROCESSES – NON-EFB SOTFWARE APPLICATIONS)

On this segment concerning the non-EFB applications, six comments have been received.

In particular, several commentators reminded that EFBs can be assigned to crew members personally and used for private purposes as well. The crews could, therefore, be authorised to change the configuration related to these private applications.

Some comments also required to include examples of possible non-EFB applications, including for use during ground maintenance activities, in the proposed AMC 20-25.

The Agency agrees in principle on both topics. However, the possible personal use should be done in a way compatible with the configuration control to be exercised by the administrator on the EFB applications. The Agency, in fact, believes that any delegation for the management of non-EFB applications from the administrator to the flight crew, should not jeopardise safety, due to possible side effects on the EFB software. Additional lines have been inserted in the resulting text.

Examples of typical non-EFB applications have been added to the proposed text of AMC 20-25.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS p. 39-41

comment

19 comment by: *FAA*

Page 39, Para 7, 3rd para

Comment:
This makes it seem Type A applications would require an operational approval. Other paragraphs within this document has stated that Type A software applications do not require and approval.

Reason for Comment:
Clarification

Suggested Change:

	Delete Type A applications and /or
response	Partially accepted A clarification has been added to paragraph 6.2.2.1 of the resulting text of AMC 20-25, to state that Type A applications never require an operational approval.

comment	*20* comment by: *FAA* Page 40, 2nd para **Comment:** See paragraph 7.12 should read 7.2 **Reason for Comment:** Clairifcation **Suggested Change:** Delete especially when both the aircraft and EFB systems provide similar information.
response	Noted Nevertheless, the leading text in Chapter 7 of the resulting text of AMC 20-25 has been drastically revised and, therefore, the comment is no longer applicable.

comment	*56* comment by: *Air France* "Any modification of the previously approved process for database management **or the loading of any new, modified or additional software** intended for operational use should not be permitted unless it can be shown that the software does not contravene any applicable regulations, the conditions under which the initial operational approval was granted or any other applicable regulations." It should be added that some changes that belong to an accurate perimeter, can be directly applied without requiring a modification of the operational approval. For instance, for a take-off parameters application, all updates of airports database, or the cosmetic HMI changes can be performed as a normal maintenance process. Proposal : Add a note with the previous content and remove the following paragragh "Any new, modified or additional software should be acceptable to, or, where applicable, should be approved by the competent authority in accordance with the conditions specified under this AMC." which is a repetition.
response	Accepted A new paragraph 7.3 (i.e. changes to EFB) has been added to the resulting text of AMC 20-25, to clarify which changes never require an operational approval. For all other changes, the emphasis is moved from the competent authority controlling each change, to the oversight of the process, based on rule ARO.GEN.310(c) in Commission Regulation (EU) No 965/2012.

comment	*57* comment by: *Air France* Check if the reference to §7.9.1 is correct as the paragraph doesn't exist.

response	Accepted The reference has been corrected.

comment	*84* comment by: *Grégory DELBEKE* **Page 39 of 72, item B. II. 7:** As explained above (page 23 of 72) the BCAA does not agree with the fact that type A applications does not require any operational approval. **Page 39 of 72, item B. II. 7:** The BCAA does not agree with the proposal of EASA related to the approval of Type B software applications. Our point of view is that all type B applications can be assessed by the NAA. In case of need (lack of experience, lack of expertise,…), the NAA can delegate the task to EASA. For example, some weight and balance calculation software for small aircraft are quite elementary and therefore, the need to be evaluate by EASA is not justified.
response	Partially accepted A reply to the first comment has been provided above. The second comment is accepted: in the resulting text of AMC 20-25, any recommendation to use the evaluation service provided by the Agency has been removed. In fact, while this service remains available on a voluntary basis, it is not appropriate to mention it into regulatory material.

comment	*85* comment by: *Grégory DELBEKE* **Page 41 of 72, item B. II. 7:** The BCAA proposes to add in the sentence below that the notification to the competent authority of minor changes in the EFB system shall include the safety assessment of the proposed changes. This will allow the competent authority to check if the operator has performed a safety assessment to demonstrate that the changes can be classified as minor. "All other changes (e.g. minor or no safety impact) not requiring prior approval shall be managed by the operator and notified to the competent authority with the safety assessment of the proposed changes as defined in the procedure approved by the competent authority in accordance with the rule ARO.GEN.310(c)."
response	Accepted The reference to ARO.GEN.310(c) has been added to paragraph 7.3 (i.e. changes to EFB) in the resulting text of AMC 20-25; this, as in general granted by Commission Regulation (EU) No 965/2012 will give authorities the flexibility to tailor procedures for each operator.

comment	*155* comment by: *DGAC* First lines of page 41 refer to part ARO, which mean the future regulation. In other places of this AMC, EU-OPS is referred to. References to the future regulation should be inserted by the time the CRD is published.
response	Accepted

The references are now to provisions in Commission Regulation (EU) No 965/2012 on AIR-OPS and the associated AMC/GM.

comment

156 comment by: *DGAC*

Third paragraph of page 41 (in §7) indicates :
"Any new, modified or additional software should be acceptable to, or, where applicable, should be approved by the competent authority in accordance with the conditions specified under this AMC"

There is no such notion as "acceptable to the competent authority" in the future regulation but approvals or notifications. This should be changed.
Other inappropriate occurrences of the term "acceptable" may exist in this document.

response

Accepted

The terminology has been aligned with Commission Regulation (EU) No 965/2012.

comment

160 comment by: *Swedish Transport Agency, Civil Aviation Department (Transportstyrelsen, Luftfartsavdelningen)*

· **7 Operational Approval Process**
o §7 states requirements for EFB evaluations to be conducted by NAA or by the Agency.
o NAA Sweden opinion: This procedure will lead to the fact that most applications will need EASA evaluation. This will create increased administration and resources both within the NAA´s and from EASA. It might also be harder and more costly for a European operator to reach EFB approval than similar process for an operator from other parts of the ICAO world with the same level of flight safety standard.
Summary: With enhanced regulation and AMC NAA´s should be able to conduct all EFB evaluations and approvals from 1A up to, and including, 2B systems.
o Reason and motivation: Should be sufficient to assure adequate level of safety for Class 1 and 2 EFB systems and will be more effective and less costly for EU CAT Operators.

response

Accepted

In the resulting text of AMC 20-25, any recommendation to use the evaluation service provided by the Agency has been removed. In fact, while this service remains available on a voluntary basis, it is not appropriate to mention it into regulatory material.

comment

168 comment by: *CAA-NL*

The first sentence of this paragraph says that no operational approval is needed for Type A applications on a Class 1 EFB. However, the third sentence in combination with the first bullet indicates that this combination needs approval of the operator's competent authority.
In addition, the figure on page 40 does not address Type A or Type C applications.

Proposal for clarification and prevention of confusion:

	1. Change the third sentence of § 7 to read: "When an operator is seeking an operational approval for an EFB system, the evaluation should be conducted by the operator's competent authority when the system is based on a class 1 or 2 EFB and only hosts Type B applications belonging to the list hereafter:" , followed by the bulleted list starting with " - Document browser ..." 2. Clarify that the figure on page 40 only applies to EFB with Type B applications.
response	Partially accepted The figure has been removed and a clarification has been added that Type A applications never require operational approval.

comment	*169* comment by: *CAA-NL* (editorial comment) The top box in the figure on page 40 mentions "Class III"; this presumably should read "Class 3".
response	Noted The figure has been deleted from the resulting text of AMC 20-25.

comment	*203* comment by: *AIRBUS* "Type A applications hosted in Class 1 EFB can be used by properly trained pilots when exercising their privileges and without the need for any notification or application for operational approval to the competent authority." This paragraph, which does not require an operational approval, is conflicting with the 3rd paragraph which requires an operational approval (see comment about third paragraph here after). This 1st paragraph should be deleted or modified in order that Type A applications require an operational approval. Suggested text: Paragraph to be removed
response	Partially accepted A clarification has been added that Type A applications never require operational approval.

comment	*204* comment by: *AIRBUS* "When an operator is seeking an operational approval for an EFB system, the evaluation should be conducted by the operator's competent authority when the system is based on a class 1 or 2 EFB and only hosts: - Type A applications" For overall AMC consistency purpose : Sections 5.2.1.b). ("Type A complementary characteristics"), section 6.2.1 ("Type A software applications") and 1st paragraph of section 7 should be modified to be consistent with this 3rd paragraph of section 7 which requires an operational approval by the competent authority for Type A applications. Refer to comment about section 5.2.1.b), comment about section 6.2.1 ("Type A

software applications") and comment about section 7 ("Operational approval process").

Suggested text:
No change

response | Noted

comment | *205* comment by: *AIRBUS*

" Type B applications belonging to the list hereafter:

- Document Browser displaying the following documents, interactive or not, or not in pre-composed format, and not driven by sensed aircraft parameters:

The manuals and additional information and forms required to be carried by Regulations such as:
● The Operations Manual (including the MEL and CDL);
● Aircraft Flight Manual;
● The Operational Flight Plan;
● The aircraft continuing airworthiness records, including the technical Log;
● Meteorological information including with graphical interpretation;
● ATS Flight Plan;
● NOTAMs and AIS briefing information;"

Inconsistencies between the lists of Type B applications in paragraph 7 (p.39) and Appendix B (p.51).

Type B applications should address:
- only interactive documents (non-interactive document should be Type A)
- not in pre-composed format
- driven by sensed aircraft parameters (this capability enhances significantly the safety by minimizing the crew workload, eg. automatic and direct access to the relevant FCOM page giving the right procedure)
The following documentation and information are pre-composed and fixed. They are not intended to be changed in flight. They should be removed from the list of Type B applications and added to the list of Type A applications.
● The aircraft continuing airworthiness records, the aircraft Technical Log other than the Sector Record pages;
● ATS Flight Plan;
● NOTAMs and AIS briefing information;

Suggested text:
Type B applications belonging to the list hereafter:

- Document Browser displaying documents that are interactive, or not in pre-composed format, and/or with contextual access or display driven by sensed aircraft parameters:

The manuals and additional information and forms required to be carried by Regulations such as:
● The Operations Manual (including the MEL and CDL);
● Aircraft Flight Manual;
● The Operational Flight Plan;
● The Sector Record pages of the aircraft Technical Log;
● Meteorological information with graphical interpretation;

response

Partially accepted

The examples of Type B applications have been revised in the resulting text of AMC 20-25, in accordance, however, with the new definitions.

comment

206 comment by: *AIRBUS*

"'- Electronic aeronautical chart applications including en-route, area, approach, and airport surface maps including panning, zooming, scrolling, and rotation, centring and page turning but without display of aircraft/own-ship position."

The requirement about the display of aircraft/own-ship position should be relaxed for the following reasons :

- EFBs are not guidance systems, but could improve significantly situation awareness (easier and quicker assessment of the position and navigation follow-up on a digital map than the finger on a paper map).
- Errors and mistakes with a finger on the paper map are much more frequent than the very remote cases of failures of the display of the own-ship symbol on a moving map.
- Through an appropriate and a distinct symbol on EFB nav charts with a uncertainty level attached to it, displaying an aircraft symbol on EFB nav charts would definitely bring a higher level of awareness of the in-flight position with regards to the en-route chart, minimize flight crew workload and therefore, would enhance safety.

Refer to comment about section 5.2.3.a). (Type C definition) aiming to distinguish tactical data (real-time or short-term data displayed on ND) vs strategical data (long-term data displayed on EFB display).
The flight crew cannot be confused by :
- on one hand, a Navigation Display (ND) displaying a FMS flight plan with the own ship position and weather radar information for short term or tactic operations,
- on the other hand, an EFB display displaying nav charts with an appropriate own ship position symbol and weather charts (uploaded on ground or received by datalink in air) for long term or strategic operations and which cannot be used as Primary means.

As a consequence, it is suggested to add meteorological chart application and to change the following current wording "but without display of aircraft/own-ship position".

Suggested text:
- Electronic aeronautical chart applications (including en-route, area, approach), airport surface maps and meteorological graphical interpretation, including panning, zooming, scrolling, and rotation, centring and page turning, with or without display of aircraft/own-ship position.

response

Not accepted

The in-flight depiction of the own-ship position remains a certified application, beyond the scope of either Type A or B, due to the experts consensus on the effects of the failure conditions linked to that function. Please see also Appendix C.

comment

207 comment by: *AIRBUS*

"- Applications that make use of the Internet and/or other aircraft operational communications (AAC) or company maintenance-specific data links to collect,

process, and then disseminate data for uses such as spare parts and budget management, spares/inventory control, unscheduled maintenance scheduling, etc."

The examples limited to maintenance and budget are very restrictive and could be misinterpreted.
It would be very helpful for the flight crew to access many other applications which would be more flight operations-oriented. For instance :
- access to aeronautical weather web sites for strategical weather decisions,
- video applications over IP communications to get technical assistance from the airline organization on ground
- EFB data connectivity based on IP wireless communications in flight and on ground (eg., iPad which could be handled freely in the cockpit with no wiring constraints, except in critical phases of flight) in accordance with requirements of section 6.1.2.4 (EFB data connectivity, including security considerations) and section 6.1.2.6 (EMI demonstrations).

Suggested text:
- Applications that make use of the Internet and/or other aircraft operational communications (AAC) or company specific data links or wired/wireless communications

response

Noted

This part has been removed and remains only in Appendix B, which is an example list. Other uses, if properly demonstrated as corresponding to the Type B definition, are, therefore, acceptable.

comment

208 comment by: *AIRBUS*

"In other cases the evaluation should be conducted by the Agency. The competent authority at national level should then base the granting of the operational approval on the results of the operational evaluation conducted by the Agency."

NPA AMC 20-25 not consistent with forthcoming AC 120-76B (in AC, the evaluation responsible is the PI, Principal Inspector and not the AEG, Aircraft Evaluation Group).
This requirement could conflict with section 6.2 ("EFB software approval process") if section 6.2 considers the competent authority at national level (NAA and not the Agency).
Airbus considers that EASA overtakes their prerogatives (mainly, when an EFB evaluation is not part of an OSD). Mandating a systematic evaluation by the Agency is equivalent to classify such applications as Type C applications. OPS approval is under sovereignty of each European States and a guidance material such as AMC 20-25 cannot take precedence on regulations such as ICAO Annex 6 (section 4.2: Operational certification and supervision). Such requirement conflicts with EU-OPS 1.530, 1.535, 1.545, 1.550, 1.625, Appendix 1 to OPS 1.625 (c) about the way to get approval for Performance and W&B documentation.
In the same way, this requirement conflicts with CAT.POL.MAB.105 about Mass and balance data and documentation, for which the competent authority is the authority granting an operational approval to the Operator.
On the other side, involvement of the Agency for the initial approval and further updates of all the Type B applications (not part of the exception list) and for all the European Operators will create a huge bottleneck. This is at the opposite of the flexibility which is sought by all the Operators.

However, on a case by case basis, it could make sense that an EASA assistance or involvement be requested by a NAA or by an applicant (e.g., to minimize demonstration effort when an OEM is seeking an official evaluation report recognized by all the NAA).

Suggested text:
Prior to an operational approval, the operator's competent authority may request the Agency to carry out an operational evaluation.
In the same way, where an OEM is seeking an operational evaluation of an EFB system, or component of an EFB system, prior to an operator seeking an operational approval, the OEM may make an application to the Agency. In both cases, the competent authority at national level should then base the granting of the operational approval on the results of the operational evaluation conducted by the Agency.

response

Partially accepted

The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The content of the comment is agreed by the Agency since, in fact, the evaluation service remains available on a voluntary basis.

comment

209 comment by: *AIRBUS*

"Decision tree for allocating the evaluation responsibility" decision step : "Is the EFB a Class III?"

NPA AMC 20-25 not consistent with forthcoming AC 120-76B.
See rationale given for comment about section 7 (Operational approval process).
This decision tree is not practicable because it is conflicting with Part 21, indeed the Agency (EASA) cannot delegate the airworthiness certification of a Class 3 EFB to a NAA.
This decision tree should be consistent with the sentence which is just before the decision tree and which introduces it : "All required airworthiness evaluations will be conducted by EASA"

Suggested text:
Replace :
"Does the EFB run Type B applications that are not part of the exception list as defined in App B?"
by : "Does the EFB run Type C applications?"
Change the direction of the arrow between NAA and EASA and replace its associated caption : "Delegation" by "EFB evaluation request"

response

Partially accepted

Nevertheless, the recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25 and, consequently, the decision tree too.

comment

210 comment by: *AIRBUS*

"For any changes requiring prior approval in accordance with Regulation (EC) No 216/2008 and its Implementing Rules (e.g. major changes which could cause events of major severity or worse), the operator is expected to apply for and obtain an approval issued by the competent authority.
All other changes (e.g. minor or no safety impact) not requiring prior approval

shall be managed by the operator and notified to the competent authority as defined in the procedure approved by the competent authority in accordance with rule ARO.GEN.310(c)."

It is assumed that these paragraphs are applicable to Type C EFB software applications and/or Class 3 EFB Hardware.

Suggested text:
No change

response

Noted

Nevertheless, ARO.GEN.310(c) is a very general rule applicable to several operational matters, including all aspects of EFB.

comment

240 comment by: *DGAC*

Even when the Agency is leading the evaluation prior to the approval, the national Authorities should be kept in the loop.
That is for the benefit of all concerned parties.

That is why we propose in the last paragraph of page 39 the following amendment:
"In other cases the evaluation should be conducted by the Agency **in close coordination with the competent Authority of the Member State**. The competent authority at national level should then base the granting of the operational approval on the results of the operational evaluation conducted by the Agency. NPA 2012-02 12 Mar 2012"

response

Partially accepted

Nevertheless, the recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25 and, consequently, the proposed text is no longer applicable. This service remains available on a voluntary basis, under arrangements to be discussed on a case by case basis between the requesting competent authority and the Agency.

comment

241 comment by: *DGAC*

Comment in relationship with the 2d paragraph after the diagram (page 40).

An ORA should always be conducted before the EFB is operationally used, even with paper back-up.
This is the first analysis taking into account hardware, software, operational environment indeed. It is thus of high importance.
Stemming from this first analysis, some mitigation means have to be put in place for ground staff, operational procedures for flight crew. Then, the operator has to take into account all the feedback coming from the use of EFB to improve the first ORA.
We believe that this method should always be implemented, be there paper back up or not. The robustness of the system has to be forecast the sooner and the deeper, the better.

response

Accepted

In paragraph 7 of the resulting text, it is stated that a risk assessment is

	required in any case. In addition, the leading sentence in paragraph 7.2.1 of resulting text of AMC 20-25 clarifies that a risk assessment is always required, on the basis of rule ORO.GEN.200.
comment	*242* comment by: *DGAC* We notice the use of ORA for "Operational Risk Analyis" in some parts of the text and "Operational Risk Assessment" in other parts We suggest tu use a unique term to avoid confusion.
response	Accepted The expression 'risk assessment' is now used throughout the resulting text of AMC 20-25.
comment	*313* comment by: *Thales Avionics* Beginning of paragraph 7 lists Type B applications, most of them being already listed in Appendix B, with some minor differences. In addition, Appendix B, unlike appendices A and C, addresses approval process with EASA or national authorities. It is therefore suggested to split Appendix B in two paragraphs, with B.1 paragraph containing those application to be approved by national authorities, and B.2 containing those to be approved by EASA; and to replace the lists in paragraph 7 by references to B.1 and B.2. This would also permit to make the figure for Class III EFB (Decision tree) clearer, by replacing the sentence " Does the EFB run Type B (...) ?" by "Does the EFB run Type B application listed in Appendix B.1?" Finally, paragraph 7.5 could also directly refer to B.2
response	Partially accepted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25 and, consequently, the decision tree too. Nevertheless, paragraph 7 does not include anymore a list of applications, only Appendix B does.
comment	*317* comment by: *Thales Avionics* In the decision tree, it is unclear to what the "Exception" list refers: 1st or 2nd part of Appendix B?
response	Partially accepted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25 and, consequently, the decision tree too.
comment	*324* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 33 shared with Airbus JUSTIFICATION for the Comment on page # 39 §7 1rst §

This paragraph, which does not require an operational approval, is conflicting with the 3rd paragraph which requires an operational approval (see comment #325).
This 1st paragraph should be deleted or modified in order that Type A applications require an operational approval.

PROPOSED TEXT / COMMENT
Paragraph to be removed

response

Partially accepted

A clarification has been added that Type A applications never require operational approval.

comment

325 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 34 shared with Airbus

JUSTIFICATION for the Comment on page # 39 § 7 3rd §
For overall AMC consistency purpose : Sections 5.2.1.b). ("Type A complementary characteristics"), section 6.2.1 ("Type A software applications") and 1st paragraph of section 7 should be modified to be consistent with this 3rd paragraph of section 7 which requires an operational approval by the competent authority for Type A applications.
Refer to comment #296 about section 5.2.1.b). , comment #316 about section 6.2.1 ("Type A software applications") and comment #324 about section 7 ("Operational approval process").

PROPOSED TEXT / COMMENT
No change

response

Noted

comment

328 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 35 shared with Airbus

JUSTIFICATION for the Comment on page # 39 § 7 5th §
Inconsistencies between the lists of Type B applications in paragraph 7 (p.39) and Appendix B (p.51).
Type B applications should address:
- only interactive documents (non-interactive document should be Type A)
- not in pre-composed format
- driven by sensed aircraft parameters (this capability enhances significantly the safety by minimizing the crew workload, eg. automatic and direct access to the relevant FCOM page giving the right procedure)
The following documentation and information are pre-composed and fixed. They are not intended to be changed in flight. They should be removed from the list of Type B applications and added to the list of Type A applications.
● The aircraft continuing airworthiness records, the aircraft Technical Log other than the Sector Record pages;
● ATS Flight Plan;
● NOTAMs and AIS briefing information;

PROPOSED TEXT / COMMENT
Type B applications belonging to the list hereafter:

- Document Browser displaying documents that are interactive, or not in pre-composed format, and/or with contextual access or display driven by sensed aircraft parameters:

The manuals and additional information and forms required to be carried by Regulations such as:
● The Operations Manual (including the MEL and CDL);
● Aircraft Flight Manual;
● The Operational Flight Plan;
● The Sector Record pages of the aircraft Technical Log;
● Meteorological information with graphical interpretation;

response

Partially accepted

The examples of Type B applications have been revised in the resulting text of AMC 20-25, in accordance, however, with the new definitions.

comment

329 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 36 shared with Airbus
JUSTIFICATION for the Comment on page # 39 § 6th §
The requirement about the display of aircraft/own-ship position should be relaxed for the following reasons:
- EFBs are not guidance systems, but could improve significantly situation awareness (easier and quicker assessment of the position and navigation follow-up on a digital map than the finger on a paper map).
- Errors and mistakes with a finger on the paper map are much more frequent than the very remote cases of failures of the display of the own-ship symbol on a moving map.
- Through an appropriate and a distinct symbol on EFB nav charts with a uncertainty level attached to it, displaying an aircraft symbol on EFB nav charts would definitely bring a higher level of awareness of the in-flight position, minimize flight crew workload and therefore, would enhance safety.
Refer to comment #300 about section 5.2.3.a). (Type C definition) aiming to distinguish tactical data (real-time or short-term data displayed on ND) vs strategical data (long-term data displayed on EFB display).
The flight crew cannot be confused by :
- on one hand, a Navigation Display (ND) displaying a FMS flight plan with the own ship position and weather radar information for short term or tactic operations,
- on the other hand, an EFB display displaying nav charts with an appropriate own ship position symbol and weather charts (uploaded on ground or received by datalink in air) for long term or strategic operations and which cannot be used as Primary means.
As a consequence, it is suggested to add meteorological chart application and to change the following current wording "but without display of aircraft/own-ship position".

PROPOSED TEXT / COMMENT
- Applications that make use of the Internet and/or other aircraft operational communications (AAC) or company specific data links or wired/wireless communications

response

Not accepted

The proposed text is inconsistent with the body of the comment. Please refer to answer to comments No 206 and No 207.

comment	*331* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 38 shared with Airbus JUSTIFICATION for the Comment on page # 39 §7 last § of the page NPA AMC 20-25 not consistent with AC 120-76B (in AC, the evaluation responsible is the PI, Principal Inspector and not the AEG, Aircraft Evaluation Group). This requirement could conflict with section 6.2 ("EFB software approval process") if section 6.2 considers the competent authority at national level (NAA and not the Agency). DASSAULT-AVIATION considers that EASA overtakes their prerogatives (mainly, when an EFB evaluation is not part of an OSD). Mandating a systematic evaluation by the Agency is equivalent to classify such applications as Type C applications. OPS approval is under sovereignty of each European States and a guidance material such as AMC 20-25 cannot take precedence on regulations such as ICAO Annex 6 (section 4.2: Operational certification and supervision). Such requirement conflicts with EU-OPS 1.530, 1.535, 1.545, 1.550, 1.625, Appendix 1 to OPS 1.625 (c) about the way to get approval for Performance and W&B documentation. In the same way, this requirement conflicts with CAT.POL.MAB.105 about Mass and balance data and documentation, for which the competent authority is the authority granting an operational approval to the Operator. On the other side, involvement of the Agency for the initial approval and further updates of all the Type B applications (not part of the exception list) and for all the European Operators will create a huge bottleneck. This is at the opposite of the flexibility which is sought by all the Operators. However, on a case by case basis, it could make sense that an EASA assistance or involvement be requested by a NAA or by an applicant (eg., to minimize demonstration effort when an OEM is seeking an official evaluation report recognized by all the NAA). PROPOSED TEXT / COMMENT Prior to an operational approval, the operator's competent authority may request the Agency to carry out an operational evaluation. In the same way, where an OEM is seeking an operational evaluation of an EFB system, or component of an EFB system, prior to an operator seeking an operational approval, the OEM may make an application to the Agency. In both cases, the competent authority at national level should then base the granting of the operational approval on the results of the operational evaluation conducted by the Agency.
response	Partially accepted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The content of the comment is agreed by the Agency since, in fact, the evaluation service remains available on a voluntary basis.

comment	*333* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 39 shared with Airbus JUSTIFICATION for the Comment on page # 40 § figure in page 40 ""Decision tree for allocating the evaluation responsibility"

	decision step : "Is the EFB a Class III?" NPA AMC 20-25 not consistent with AC 120-76B. See rationale given for comment #331 about section 7 (Operational approval process). This decision tree is not practicable because it is conflicting with Part 21, indeed the Agency (EASA) cannot delegate the airworthiness certification of a Class 3 EFB to a NAA. This decision tree should be consistent with the sentence which is just before the decision tree and which introduces it : "All required airworthiness evaluations will be conducted by EASA" PROPOSED TEXT / COMMENT Replace : "Does the EFB run Type B applications that are not part of the exception list as defined in App B?" by : "Does the EFB run Type C applications?" Change the direction of the arrow between NAA and EASA and replace its associated caption : "Delegation" by "EFB evaluation request"
response	Partially accepted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25 and, consequently, the decision tree too.

comment	*334* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 40 shared with Airbus JUSTIFICATION for the Comment on page # 40 §7 last § It is assumed that these paragraphs are applicable to Type C EFB software applications and/or Class 3 EFB Hardware. PROPOSED TEXT / COMMENT No change
response	Noted

comment	*350* comment by: *British Airways* BA believe that all Type B applications should be approved by the local authority. The local authority should have the right to involve EASA, if they deem necessary.
response	Not accepted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The evaluation service remains available on a voluntary basis, but this does not need to be mentioned in regulatory material. Operational approval by the local authority will be revisited once Implementing Rules are modified, following amendment of ICAO Annex 6 Part I.

comment	*380* comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 37 shared with Airbus

JUSTIFICATION for the Comment on page # 39 §7 " "'- Applications that make use of the Internet and/or other aircraft operational communications (AAC) or company maintenance-specific data links to collect, process, and then disseminate data for uses such as spare parts and budget management, spares/inventory control, unscheduled maintenance scheduling, etc. "

The examples limited to maintenance and budget are very restrictive and could be misinterpretated.
It would be very helpful for the flight crew to access many other applications which would be more flight operations-oriented. For instance :
- access to aeronautical weather web sites for strategical weather decisions,
- video applications over IP communications to get technical assistance from the airline organization on ground
- EFB data connectivity based on IP wireless communications in flight and on ground (eg., iPad which could be handled freely in the cockpit with no wiring constraints, except in critical phases of flight) in accordance with requirements of section 6.1.2.4 (EFB data connectivity, including security considerations) and section 6.1.2.6 (EMI demonstrations).

PROPOSED TEXT / COMMENT
'- Applications that make use of the Internet and/or other aircraft operational communications (AAC) or company specific data links or wired/wireless communications

response

Noted

This part has been removed and remains only in Appendix B, which is an examples list. Other uses, if properly demonstrated as corresponding to the Type B definition, are, therefore, acceptable.

comment

404 comment by: *Flybe*

It would be beneficial to allow the documents that are listed in EU-Ops, under OPS 1.125 to be made available on the Electronic Flight Bag only, instead of the requirement for having the original or copies of the documents carried on each flight.
The original copies may be retained by the Operator on the ground for inspection by a representative of the Authority/Regulator when requested.

response

Accepted

In paragraph 7.14.1 of the resulting text of AMC 20-25, it is, in fact, allowed to remove paper backup from on board, after a testing period.

comment

443 comment by: *DGAC*

At the end of page 39 is indicated : "The competent authority at national level should then base the granting of the operational approval on the results of the operational evaluation conducted by the Agency. NPA 2012-02 12 Mar 2012"
We would appreciate that the scope of operational evaluations conducted by the Agency be specified in general terms in this AMC.
This scope should also be precisely specified when the results of said evaluation are forwarded to the competent authority so as to facilitate the granting of the approval: this will ease and better focus the investigation performed by the competent Authority.

response

Noted

The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The comment is, therefore, no longer applicable.

comment

473 comment by: *Oliver Ast (CLH)*

Comment:
These waiting periods should be stated for all combinations of hardware classes and software types

response

Not accepted

The proposal goes much beyond the scope of AMC 20-25, since in the EU framework, regulatory processes can be defined only at the level of legally binding implementing rules.

comment

475 comment by: *Oliver Ast (CLH)*

Proposed Text:
- Electronic aeronautical chart applications (including en-route, area, approach), airport surface maps and meteorological graphical interpretation, including panning, zooming, scrolling, and rotation, centring and page turning, with or without display of aircraft/own-ship position.

Comment:
The requirement about the display of aircraft/own-ship position should be relaxed for the following reasons :
- EFBs are not guidance systems, but could improve significantly situation awareness (easier and quicker assessment of the position and navigation follow-up on a digital map than the finger on a paper map).
- Errors and mistakes with a finger on the paper map are much more frequent than the very remote cases of failures of the display of the own-ship symbol on a moving map.
- Through an appropriate and a distinct symbol on EFB nav charts with a uncertainty level attached to it, displaying an aircraft symbol on EFB nav charts would definitely bring a higher level of awareness of the in-flight position, minimize flight crew workload and therefore, would enhance safety.
Refer to the comment about section 5.2.3.a). (Type C definition) aiming to distinguish tactical data (real-time or short-term data displayed on ND) vs strategical data (long-term data displayed on EFB display).
The flight crew cannot be confused by :
- on one hand, a Navigation Display (ND) displaying a FMS flight plan with the own ship position and weather radar information for short term or tactic operations,
- on the other hand, an EFB display displaying nav charts with an appropriate own ship position symbol and weather charts (uploaded on ground or received by datalink in air) for long term or strategic operations and which cannot be used as Primary means.
As a consequence, it is suggested to add meteorological chart application and to change the following current wording "but without display of aircraft/own-ship position".

response

Not accepted

The in-flight depiction of own-ship position remains a certified application,

	beyond the scope of either Type A or B, due to the experts consensus on the effects of the failure conditions linked to that function. Please see also Appendix C.
comment	*476* comment by: *Oliver Ast (CLH)* Proposed Text: - Applications that make use of the Internet and/or other aircraft operational communications (AAC) or company specific data links or wired/wireless communications Comment: The examples limited to maintenance and budget are very restrictive and could be misinterpretated. It would be very helpful for the flight crew to access many other applications which would be more flight operations-oriented. For instance : - access to aeronautical weather web sites for strategical weather decisions, - video applications over IP communications to get technical assistance from the airline organization on ground - EFB data connectivity based on IP wireless communications in flight and on ground (eg., iPad which could be handled freely in the cockpit with no wiring constraints, except in critical phases of flight) in accordance with requirements of section 6.1.2.4 (EFB data connectivity, including security considerations) and section 6.1.2.6 (EMI demonstrations).
response	Noted This part has been removed and remains only in Appendix B, which is an examples list. Other uses, if properly demonstrated as corresponding to the Type B definition, are, therefore, acceptable.
comment	*477* comment by: *Oliver Ast (CLH)* Proposed Text (last Paragraph: "In other cases ...": Prior to an operational approval, the operator's competent authority may request the Agency to carry out an operational evaluation. In the same way, where an OEM is seeking an operational evaluation of an EFB system or component of an EFB system prior to an operator seeking an operational approval, the OEM may make an application to the Agency. In both cases, the competent authority at national level should then base the granting of the operational approval on the results of the operational evaluation conducted by the Agency. Comment: NPA AMC 20-25 not consistent with forthcoming AC 120-76B (in AC, the evaluation responsible is the PI, Principal Inspector and not the AEG, Aircraft Evaluation Group). TBC This requirement is conflicting with section 6.2 ("EFB software approval process") since section 6.2 considers only the competent authority (NAA) and not the Agency. Star Alliance considers that EASA overtakes their prerogatives (mainly, when an EFB evaluation is not part of an OSD). Mandating a systematic evaluation by the Agency is equivalent to classify such applications as Type C applications. OPS approval is under sovereignty of each European States and a guidance material such as AMC 20-25 cannot take precedence on regulations such as ICAO Annex 6 (section 4.2: Operational certification and supervision).

	Such requirement conflicts with EU-OPS 1.530, 1.535, 1.545, 1.550, 1.625, Appendix 1 to OPS 1.625 (c) about the way to get approval for Perf and W&B documentation. On the other side, involvement of the Agency for the initial approval and further updates of all the Type B applications (not part of the exception list) and for all the European Operators will create a huge bottleneck. This is at the opposite of the flexibility which is sought by all the Operators. However, on a case by case basis, it could make sense that an EASA assistance or involvement be requested by a NAA or by an applicant (eg., to minimize demonstration effort when an OEM is seeking an official evaluation report recognized by all the NAA).
response	Partially accepted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The content of the comment is agreed by the Agency since, in fact, the evaluation service remains available on a voluntary basis.

comment	*478* comment by: *Oliver Ast (CLH)* Replace : "Does the EFB run Type B applications that are not part of the exception list as defined in App B?" by : "Does the EFB run Type C applications?" Change the direction of the arrow between NAA and EASA and replace its associated caption : "Delegation" by "EFB evaluation request" Comment: NPA AMC 20-25 not consistent with forthcoming AC 120-76B. See rationale given for comment about section 7. This decision tree is not practicable because it is conflicting with Part 21, indeed the Agency (EASA) cannot delegate the airworthiness certification of a Class 3 EFB to a NAA. This decision tree should be consistent with the sentence which is just before the decision tree and which introduces it : "All required airworthiness evaluations will be conducted by EASA"
response	Partially accepted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25 and, consequently, the decision tree too.

comment	*479* comment by: *Oliver Ast (CLH)* Comment for last Paragraph: It is assumed that these paragraphs are applicable to Type C EFB software applications and/or Class 3 EFB Hardware.
response	Noted

comment	*487* comment by: *Oliver Ast (CLH)* Comment: EFBs and particularly software applications are a very fast-growing and changing technology, aimed to optimize airline operations, processes and costs. Therefore,

	all Type B software evaluations should be conducted by the National Authorities which, in turn, should have performance and mass & balance specialists in their staff to evaluate the applications and notify the operator in a proper time period.
response	Not accepted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The evaluation service remains available on a voluntary basis, but this does not need to be mentioned in regulatory material. However, in the opinion of the Agency: — it is not realistic, under the current economic climate, to envisage that the quantity of resources available to the competent authorities would increase, in the face of the continuous development of the state of the art; and — on the contrary, present safety regulation shifts the emphasis from the competent authority controlling each change, to the oversight of the process, based on rule ARO.GEN.310(c) in Commission Regulation (EU) No 965/2012.

comment	*550* comment by: *Jeppesen Inc.* Type B application item Suggest adding two words at the end of the sentence: "....but without display of aircraft/own-ship position in flight" Rationale: Commensurate with General comment. Harmonization with the current FAA 120-76B "Change 1" activity pertaining to the authorization of the depiction of airport surface ownship depiction as a Type B application on capable portable COTs devices should be considered in this policy as well. This has the potential to greatly increase adoption of an important safety tool that has a corresponding "Minor" failure effect.
response	Accepted In the resulting text of AMC 20-25, AMMD is considered a type B application.

comment	*552* comment by: *Jeppesen Inc.* p39 last paragraph Suggest that NAA can grant Operational Approvals for Type A and B applications with no associated or precursor involvement of EASA, except in the case of irresolvable issues. Rationale: Relieves EASA of much unnecessary OA engagement and ensures efficient uptake of rapidly developing EFB technologies.
response	Partially accepted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The evaluation service remains available on a voluntary basis, which does not require any mention in regulatory material.

comment	*554* comment by: *Jeppesen Inc.* Section 7 Last paragraph Suggest to add: "Operational" prior to word "approval". Two instances. Rationale: Clarifies type of approval
response	Noted The mention of operational approval has been removed from AMC 20-25, since in the EU framework formal approval processes can only be established at the level of implementing rules, and not at the level of AMC.

comment	*556* comment by: *Jeppesen Inc.* p41 Section 7 First paragraph Suggest to add: "Operational" prior to word "approval". Rationale: Clarifies type of approval
response	Noted The mention of operational approval has been removed from AMC 20-25, since in the EU framework formal approval processes can only be established at the level of implementing rules, and not at the level of AMC.

comment	*558* comment by: *Jeppesen Inc.* p41 Section 7 Fourth paragraph Suggest to add: "Operational" prior to word "approval". Rationale: Clarifies type of approval
response	Noted The mention of operational approval has been removed from AMC 20-25, since in the EU framework formal approval processes can only be established at the level of implementing rules, and not at the level of AMC.

comment	*577* comment by: *Star Alliance* **Original AMC20-25 NPA text:** When an operator is seeking an operational approval for an EFB system, the evaluation should be conducted by the operator's competent authority when the system is based on a class 1 or 2 EFB and only hosts: - Type A applications

RATIONALE / REASON / JUSTIFICATION for the Comment :
These waiting periods should be stated for all combinations of hardware classes and software types
PROPOSED TEXT / COMMENT:
No change
Original AMC20-25 NPA text:
- Electronic aeronautical chart applications including en-route, area, approach, and airport surface maps including panning, zooming, scrolling, and rotation, centring and page turning but without display of aircraft/own-ship position.
RATIONALE / REASON / JUSTIFICATION for the Comment :
The requirement about the display of aircraft/own-ship position should be relaxed for the following reasons :
- EFBs are not guidance systems, but could improve significantly situation awareness (easier and quicker assessment of the position and navigation follow-up on a digital map than the finger on a paper map).
- Errors and mistakes with a finger on the paper map are much more frequent than the very remote cases of failures of the display of the own-ship symbol on a moving map.
- Through an appropriate and a distinct symbol on EFB nav charts with a uncertainty level attached to it, displaying an aircraft symbol on EFB nav charts would definitely bring a higher level of awareness of the in-flight position, minimize flight crew workload and therefore, would enhance safety.

Refer to the comment about section 5.2.3.a). (Type C definition) aiming to distinguish tactical data (real-time or short-term data displayed on ND) vs strategical data (long-term data displayed on EFB display).
The flight crew cannot be confused by :
- on one hand, a Navigation Display (ND) displaying a FMS flight plan with the own ship position and weather radar information for short term or tactic operations,
- on the other hand, an EFB display displaying nav charts with an appropriate own ship position symbol and weather charts (uploaded on ground or received by datalink in air) for long term or strategic operations and which cannot be used as Primary means.

As a consequence, it is suggested to add meteorological chart application and to change the following current wording "but without display of aircraft/own-ship position".

PROPOSED TEXT / COMMENT:

- Electronic aeronautical chart applications (including en-route, area, approach), airport surface maps and meteorological graphical interpretation, including panning, zooming, scrolling, and rotation, centring and page turning, with or without display of aircraft/own-ship position.

Original AMC20-25 NPA text:

- Applications that make use of the Internet and/or other aircraft operational communications (AAC) or company maintenance-specific data links to collect, process, and then disseminate data for uses such as spare parts and budget management, spares/inventory control, unscheduled maintenance scheduling, etc.

RATIONALE / REASON / JUSTIFICATION for the Comment :

The examples limited to maintenance and budget are very restrictive and could be misinterpretated.
It would be very helpful for the flight crew to access many other applications which would be more flight operations-oriented. For instance :
- access to aeronautical weather web sites for strategical weather decisions,
- video applications over IP communications to get technical assistance from the airline organization on ground
- EFB data connectivity based on IP wireless communications in flight and on ground (eg., iPad which could be handled freely in the cockpit with no wiring constraints, except in critical phases of flight) in accordance with requirements of section 6.1.2.4 (EFB data connectivity, including security considerations) and section 6.1.2.6 (EMI demonstrations).

PROPOSED TEXT / COMMENT:

- Applications that make use of the Internet and/or other aircraft operational communications (AAC) or company specific data links or wired/wireless communications

Original AMC20-25 NPA text:

In other cases the evaluation should be conducted by the Agency. The competent authority at national level should then base the granting of the operational approval on the results of the operational evaluation conducted by the Agency.

RATIONALE / REASON / JUSTIFICATION for the Comment :

NPA AMC 20-25 not consistent with forthcoming AC 120-76B (in AC, the evaluation responsible is the PI, Principal Inspector and not the AEG, Aircraft Evaluation Group).
This requirement is conflicting with section 6.2 ("EFB software approval process") since section 6.2 considers only the competent authority (NAA) and not the Agency.

Star Alliance considers that EASA overtakes their prerogatives (mainly, when an EFB evaluation is not part of an OSD). Mandating a systematic evaluation by the Agency is equivalent to classify such applications as Type C applications. OPS approval is under sovereignty of each European States and a guidance material such as AMC 20-25 cannot take precedence on regulations such as ICAO Annex 6 (section 4.2: Operational certification and supervision). Such requirement conflicts with EU-OPS 1.530, 1.535, 1.545, 1.550, 1.625, Appendix 1 to OPS 1.625 (c) about the way to get approval for Perf and W&B documentation.

On the other side, involvement of the Agency for the initial approval and further updates of all the Type B applications (not part of the exception list) and for all the European Operators will create a huge bottleneck. This is at the opposite of the flexibility which is sought by all the Operators.

However, on a case by case basis, it could make sense that an EASA assistance or involvement be requested by a NAA or by an applicant (eg., to minimize demonstration effort when an OEM is seeking an official evaluation report recognized by all the NAA).

PROPOSED TEXT / COMMENT:

Prior to an operational approval, the operator's competent authority may request the Agency to carry out an operational evaluation.
In the same way, where an OEM is seeking an operational evaluation of an EFB system or component of an EFB system prior to an operator seeking an operational approval, the OEM may make an application to the Agency. In both cases, the competent authority at national level should then base the granting of the operational approval on the results of the operational evaluation conducted by the Agency.

response

Partially accepted

The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The evaluation service

remains available on a voluntary basis, which does not require any mention in regulatory material.

This comment, however, is 'copy and paste' of a number of comments already replied above. Kindly refer to above responses.

comment *582* comment by: *Star Alliance*

Original AMC20-25 NPA text:
"Decision tree for allocating the evaluation responsibility" decision step : "Is the EFB a Class III?"
RATIONALE / REASON / JUSTIFICATION for the Comment :
NPA AMC 20-25 not consistent with forthcoming AC 120-76B. See rationale given for comment #22 about section 7.

This decision tree is not practicable because it is conflicting with Part 21, indeed the Agency (EASA) cannot delegate the airworthiness certification of a Class 3 EFB to a NAA.
This decision tree should be consistent with the sentence which is just before the decision tree and which introduces it : "All required airworthiness evaluations will be conducted by EASA"

PROPOSED TEXT / COMMENT:
Replace :
"Does the EFB run Type B applications that are not part of the exception list as defined in App B?"
by : "Does the EFB run Type C applications?"

Change the direction of the arrow between NAA and EASA and replace its associated caption : "Delegation" by "EFB evaluation request"

Original AMC20-25 NPA text:

For any changes requiring prior approval in accordance with Regulation (EC) No 216/2008 and its Implementing Rules (e.g. major changes which could cause events of major severity or worse), the operator is expected to apply for and obtain an approval issued by the competent authority.

All other changes (e.g. minor or no safety impact) not requiring prior approval shall be managed by the operator and notified to the competent authority as defined in the procedure approved by the competent authority in accordance with rule ARO.GEN.310(c).
RATIONALE / REASON / JUSTIFICATION for the Comment :

It is assumed that these paragraphs are applicable to Type C EFB software applications and/or Class 3 EFB Hardware.
PROPOSED TEXT / COMMENT:

No change

response

Partially accepted

The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The evaluation service remains available on a voluntary basis, which does not require any mention in regulatory material.

This comment however is 'copy and paste' of a number of comments already replied above. Kindly refer to above responses.

comment

590 comment by: *Star Alliance*

EFBs and particularly software applications are a very fast-growing and changing technology, aimed to optimize airline operations, processes and costs. Therefore, all Type B software evaluations should be conducted by the National Authorities which, in turn, should have performance and mass & balance specialists in their staff to evaluate the applications and notify the operator in a proper time period.

response

Not accepted

The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The evaluation service remains available on a voluntary basis, but this does not need to be mentioned in regulatory material.

However in the opinion of the Agency:

— it is not realistic, under the current economic climate, to envisage that the quantity of resources available to the competent authorities would increase, in the face of the continuous development of the state of the art; and

— on the contrary, modern safety regulation should move the emphasis from the competent authority controlling each change, to the oversight of the process, based on rule ARO.GEN.310(c) in Commission Regulation (EU) No 965/2012.

comment

666 comment by: *Deutsche Lufthansa AG*

As a general rule, when dealing with airworthiness and/or operational approval processes, the AMC should clearly state the maximum waiting period an operator should expect between the request submission and the Agency or NAA approval.

These waiting periods should be stated for all combinations of hardware classes and software types

response

Not accepted

The proposal goes much beyond the scope of AMC 20-25, since in the EU framework, regulatory processes can be defined only at the level of legally binding implementing rules

comment 667 comment by: *Deutsche Lufthansa AG*

Referring to
"- Electronic aeronautical chart applications including en-route, area, approach, and airport surface maps including panning, zooming, scrolling, and rotation, centring and page turning but without display of aircraft/own-ship position."

Proposal:
Modify to read:
- Electronic aeronautical chart applications (including en-route, area, approach), airport surface maps **and meteorological graphical interpretation**, including panning, zooming, scrolling, and rotation, centring and page turning, **with or** without display of aircraft/own-ship position.

Comment/Justification:

The requirement about the display of aircraft/own-ship position should be relaxed for the following reasons:

- EFBs are not guidance systems, but could improve significantly situation awareness (easier and quicker assessment of the position and navigation follow-up on a digital map than the finger on a paper map).
- Errors and mistakes with a finger on the paper map are much more frequent than the very remote cases of failures of the display of the own-ship symbol on a moving map.
- Through an appropriate and a distinct symbol on EFB nav charts with a uncertainty level attached to it, displaying an aircraft symbol on EFB nav charts would definitely bring a higher level of awareness of the in-flight position, minimize flight crew workload and therefore, would enhance safety.

Refer to comment #654 about section 5.2.3.a). (Type C definition) aiming to distinguish tactical data (real-time or short-term data displayed on ND) vs strategical data (long-term data displayed on EFB display).
The flight crew cannot be confused by:

- on one hand, a Navigation Display (ND) displaying a FMS flight plan with the own ship position and weather radar information for short term or tactic operations,
- on the other hand, an EFB display displaying nav charts with an appropriate own ship position symbol and weather charts (uploaded on ground or received by datalink in air) for long term or strategic operations and which cannot be used as Primary means.

As a consequence, it is suggested to add meteorological chart application and to change the wording to "with or without display of aircraft/own-ship position".

response Not accepted

The in-flight depiction of own-ship position remains a certified application, beyond the scope of either Type A or B, due to the experts consensus on the effects of the failure conditions linked to that function. Please see also Appendix C.

comment 668 comment by: *Deutsche Lufthansa AG*

Referring to:
"- Applications that make use of the Internet and/or other aircraft operational communications (AAC) or company maintenance-specific data links ~~to collect, process, and then disseminate data for uses such as spare parts and budget management, spares/inventory control, unscheduled maintenance scheduling, etc.~~"

Proposal:

Modify to read:

"- Applications that make use of the Internet and/or other aircraft operational communications (AAC) or company specific data links **or wired/wireless communications**

Comment/Justification:

The examples limited to maintenance and budget are very restrictive and could be misinterpretated.
It would be very helpful for the flight crew to access many other applications which would be more flight operations-oriented. For instance:

- access to aeronautical weather web sites for strategical weather decisions,
- video applications over IP communications to get technical assistance from the airline organization on ground
- EFB data connectivity based on IP wireless communications in flight and on ground (eg., iPad which could be handled freely in the cockpit with no wiring constraints, except in critical phases of flight) in accordance with requirements of section 6.1.2.4 (EFB data connectivity, including security considerations) and section 6.1.2.6 (EMI demonstrations).

response Noted

This part has been removed and remains only in Appendix B, which is an examples list. Other uses, if properly demonstrated as corresponding to the Type B definition, are, therefore, acceptable.

comment 669 comment by: *Deutsche Lufthansa AG*

Referring to:
"In other cases the evaluation should be conducted by the Agency. The competent authority at national level should then base the granting of the operational approval on the results of the operational evaluation conducted by the Agency."

Proposal:
Change to:
"Prior to an operational approval, the operator's competent authority may request the Agency to carry out an operational evaluation.
In the same way, where an OEM is seeking an operational evaluation of an EFB system or component of an EFB system prior to an operator seeking an operational approval, the OEM may make an application to the Agency. In both cases, the competent authority at national level should then base the granting of the operational approval on the results of the operational evaluation conducted

by the Agency."

Comment/Justification:
NPA AMC 20-25 not consistent with forthcoming AC 120-76B (in AC, the evaluation responsible is the PI, Principal Inspector and not the AEG, Aircraft Evaluation Group).
This requirement is conflicting with section 6.2 ("EFB software approval process") since section 6.2 considers only the competent authority (NAA) and not the Agency.
We consider that EASA overtakes their prerogatives (mainly, when an EFB evaluation is not part of an OSD). Mandating a systematic evaluation by the Agency is equivalent to classify such applications as Type C applications.
OPS approval is under sovereignty of each European States and a guidance material such as AMC 20-25 cannot take precedence on regulations such as ICAO Annex 6 (section 4.2: Operational certification and supervision). Such requirement conflicts with EU-OPS 1.530, 1.535, 1.545, 1.550, 1.625, Appendix 1 to OPS 1.625 (c) about the way to get approval for Perf and W&B documentation.
On the other side, involvement of the Agency for the initial approval and further updates of all the Type B applications (not part of the exception list) and for all the European Operators will create a huge bottleneck. This is at the opposite of the flexibility which is sought by all the Operators.
However, on a case by case basis, it could make sense that an EASA assistance or involvement be requested by a NAA or by an applicant (eg., to minimize demonstration effort when an OEM is seeking an official evaluation report recognized by all the NAA).

response

Partially accepted

The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The content of the comment is agreed by the Agency since, in fact, the evaluation service remains available on a voluntary basis.

comment

670 comment by: *Deutsche Lufthansa AG*

Referring to figure on page 40:
"Decision tree for allocating the evaluation responsibility"
decision step: "Is the EFB a Class III?"

Proposals:
Replace:
"Does the EFB run Type B applications that are not part of the exception list as defined in App B?"
by:
"Does the EFB run Type C applications?"

Change the direction of the arrow between NAA and EASA and replace its associated caption:
"Delegation" by "EFB evaluation request"

Comment/Justification:
NPA AMC 20-25 not consistent with forthcoming AC 120-76B.
See rationale given for comment #669 about section 7.
This decision tree is not practicable because it is conflicting with Part 21, indeed the Agency (EASA) cannot delegate the airworthiness certification of a Class 3 EFB to a NAA.

	This decision tree should be consistent with the sentence which is just before the decision tree and which introduces it : "All required airworthiness evaluations will be conducted by EASA"
response	Partially accepted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25 and, consequently, the decision tree too.

comment	*671* comment by: *Deutsche Lufthansa AG* Referring to: "For any changes requiring prior approval in accordance with Regulation (EC) No 216/2008 and its Implementing Rules (e.g. major changes which could cause events of major severity or worse), the operator is expected to apply for and obtain an approval issued by the competent authority. All other changes (e.g. minor or no safety impact) not requiring prior approval shall be managed by the operator and notified to the competent authority as defined in the procedure approved by the competent authority in accordance with rule ARO.GEN.310(c)." Comment: The commentator assumes that these paragraphs are applicable to Type C EFB software applications and/or Class 3 EFB Hardware. In that case, the proposed text is acceptable.
response	Noted Nevertheless, ARO.GEN.310(c) is a very general rule applicable to several operational matters, including all aspects of EFB.

comment	*677* comment by: *Deutsche Lufthansa AG* EFBs and particularly software applications are a very fast-growing and changing technology, aimed to optimize airline operations, processes and costs. Therefore, all Type B software evaluations should be conducted by the National Authorities which, in turn, should have performance and mass & balance specialists in their staff to evaluate the applications and notify the operator in a proper time period.
response	Not accepted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The evaluation service remains available on a voluntary basis, but this does not need to be mentioned in regulatory material. However, in the opinion of the Agency: — it is not realistic, under the current economic climate, to envisage that the quantity of resources available to the competent authorities would increase, in the face of the continuous development of the state of the art; and — on the contrary, modern safety regulation should move the emphasis from the competent authority controlling each change, to the oversight of the process, based on rule ARO.GEN.310(c) in Regulation 965/2012.

comment	*710* comment by: *AT-CAA-PAM* Type B applications should include: performance mass & balance / loadsheet Mass and Balace: As long as pilots are allowed to use simple mathematics to do a mass & balance manually or with the assistance of a calculator, no approval from EASA should be required. Performance calc As long as pilots are allowed to use simple tables out of the AFM and interpolate in between these tables inclusive the use of a calculator, no approval from EASA should be required. It should be the EFB Administrator responsibility. EASA has demonstrated in several ways that everything takes much time and everywhere with the name EASA on it, it becomes very expensive. We are under high pressure from the industry and we should assist the industry. If EASA wants to do EFB approvals which might take 6 months, the product already tested will no longer exist on the market. E.g. performance software is published by some manufacturer with the AIRAC cycle, so basically 13x per year. There is always a software update included, not only database! Do you really have the possibility to do 13 performance software tests where the operator has to wait for? Recommendation: EFB Administrator has the responsibility to check performance software changes .. (easy to check) So, therefore no EASA approval required for Class 1 + 2 EFB's
response	Accepted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The evaluation service remains available on a voluntary basis, but this does not need to be mentioned in regulatory material.

comment	*733* comment by: *NetJets Europe* Currently reads: Type A applications hosted in Class 1 EFB can be used by properly trained pilots when exercising their privileges and without the need for any notification or application for operational approval to the competent authority. Recommended Change: Type A applications hosted in Class 1 EFB can be used by properly trained pilots when exercising their privileges and without the need for any notification or application for operational approval to the competent authority. Device use is limited to non-critical ground and phases of fight. EMI testing requirements are still applicable for intentionally emitting devices (TPEDs). Rationale:

Existing statement does not reinforce use limitations or EMI considerations.

(Source: Executive Jet Management, a NetJets company)

response

Partially accepted

EMI requirements have been reinforced in paragraph 6.2.1.1 of the resulting text of AMC 20-25.

comment

734 comment by: *NetJets Europe*

Currently reads:
When an operator is seeking an operational approval for an EFB system, the evaluation should be conducted by the operator's competent authority when the system is based on a class 1 or 2 EFB and only hosts:

Recommended Change:
When the system is based on a class 1 or 2 EFB and only hosts the following applications, the operator will conduct an operational evaluation with oversight provided by the competent agency.

Rationale:
The primary burden to conduct the evaluation should be on the operator. They have built the systems and processes in place for their EFB program and are prepared to demonstrate it. Placing the primary workload burden on the competent authority will overload governmental resources.

(Source: Executive Jet Management, a NetJets company)

response

Accepted

A new paragraph 7.3 (i.e. changes to EFB) has been added to the resulting text of AMC 20-25, to clarify which changes never require an operational approval. For all other changes the emphasis is moved from the competent authority controlling each change, to the oversight of the process, based on rule ARO.GEN.310(c) in Commission Regulation (EU) No 965/2012.

comment

735 comment by: *NetJets Europe*

Currently reads:
- Electronic aeronautical chart applications including en-route, area, approach, and airport surface maps including panning, zooming, scrolling, and rotation, centring and page turning but without display of aircraft/own-ship position.

Recommended Change:
- Electronic aeronautical chart applications including en-route, area, approach, and airport surface maps including panning, zooming, scrolling, and rotation, centring and page turning

but without display of aircraft/own-ship position in flight.

Rationale:
Current FAA research and initiatives pertaining to the authorization of the depiction of airport surface own-ship depiction as a Type B application on capable portable COTs devices have substantial potential to increase safety margins, be widely deployable and rapidly effective. We request that any advancement in FAA policy in this area be considered for inclusion into this document as well.

(Source: Executive Jet Management, a NetJets company)

response

Accepted

In the resulting text of AMC 20-25, AMMD is considered a Type B application.

comment

764 comment by: *Danish Air Transport*

- Electronic aeronautical chart applications including en-route, area, approach, and airport surface maps including panning, zooming, scrolling, and rotation, centring and page turning but without display of aircraft/own-ship position.

comment:
For a Class II: If the device contains a build in GPS receiver, or is connected with ARINC 429 with GPS data input, that can be active while the GSM and WiFi is selected off, and the accuracy fulfill the requirement from the own-ship position minima from the chart provider, mounted in the certified mount with power connection, it is allowed for **information purposes only**. This will assist the pilot in his position awareness.

Or: not to use in critical phases of the flight (below 1500 feet)

response

Not accepted

The in-flight depiction of own-ship position remains a certified application, beyond the scope of either Type A or B, due to the experts consensus on the effects of the failure conditions linked to that function. Please see also Appendix C.

comment

791 comment by: *ERA*

ERA members request EASA to consider bullet point:

- Electronic aeronautical chart applications including en-route, area, approach, and airport surface maps including panning, zooming, scrolling, and rotation, centring and page turning but without display of aircraft/own-ship position.

The reason is that for Class II EFB to assist the pilot in his position awareness. If the device contains a built in GPS receiver, or is connected via ARINC 429 with GPS data input, that can be active while the GSM and WiFi is selected off, and the accuracy fulfils the requirement of the own-ship position minima from the chart provider, whilst mounted in the certified mount with power connection, such a display should be allowed for information purposes only. However, a below 1500 feet (critical flight phase) restriction could apply.

response	Not accepted The in-flight depiction of own-ship position remains a certified application, beyond the scope of either Type A or B, due to the experts consensus on the effects of the failure conditions linked to that function. Please see also Appendix C.

comment	*801* comment by: *Ingo Pucks, Owner IP Aerospace* At this point in time it is foreseeable that in the near future aircraft intended for use by CAT operators might be produced, which have all supporting and required (by regulation) documentation and and data presented in a paperless manner. This in turn could require that the agency will keep this proposed regulation open for such developments, which in turn today relay on physical specific HW, referred herein as EFB. That might not be the case in the future though, such that the aspects of safety of SW applications and data will be increased. It it suggested to consider this at this point and prepare accordingly to minimize undue delay.
response	Noted The Agency is of the opinion that the regulation can apply to those new aircrafts as well. The Type B software definition is adapted to potential future developments. In paragraph 7.14.2, commencement of operations without paper backup is addressed.

comment	*802* comment by: *Ingo Pucks, Owner IP Aerospace* Establishing quality control and assurance matters for aeronautical data intended to be used by any class of application in a EFB system might be necessary, those considerations given in Do-178 might be used as a guideline.
response	Not accepted Data origination and design of instrument procedures are already subject to Commission Regulation (EU) No 73/2010[5]. AIS providers and providers of data for navigation are Air Navigation Service Providers (ANSPs) subject to the common requirements in Commission Implementing Regulation (EU) No 1035/2011[6]. The provisions in AMC 20-25 are sufficient to ensure quality control of data inside the organisation of the aircraft operator.

comment	*819* comment by: *Fédération Nationale de l'Aviation Marchande (FNAM)* Comment: According to the point 37 of the Explanatory Note, EASA is interested to know the stakeholders' opinion regarding the chapter 7 "Operational Approval of EFBs".

[5] Commission Regulation (EU) No 73/2010 of 26 January 2010 laying down requirements on the quality of aeronautical data and aeronautical information for the single European sky (OJ L 23, 27.1.2010, p. 6)

[6] Commission Implementing Regulation (EU) No 1035/2011 of 17 October 2011 laying down common requirements for the provision of air navigation services and amending Regulations (EC) No 482/2008 and (EU) No 691/2010 (OJ L 271, 18.10.2011, p. 23)

	Type A applications hosted in Class 1 EFBs don't require the operator to ask for an operational approval. FNAM agrees that this category of EFBs don't require an operational approval. Regarding other EFB categories, the process is divided into 2 parts: - Either, the EFB system belongs to Class 1 or Class 2 with Type A or B applications (except Type B applications for performance calculation), and the operators need to obtain an operational approval from the NAA. - Either, in all others cases (Class 3 EFBs and Class 2 with Type B application only for performance calculation), the granting of an operational approval from the NAA will require an EASA evaluation. FNAM considers that the evaluation conducted by the Agency will complexify the process. Nowadays, according to the Basic Regulation, the NAAs are competent to monitor the operational activities such as performance and mass/balance calculation. They should be completely competent for granting an operational approval in any case, and they can still be oversighted by EASA. Thus FNAM is completely opposed to this requirement, and is afraid about the costs implied by this process. Proposal: FNAM proposes to keep the current situation. EASA should be responsible for granting approval for airworthiness aspects and OSD during certification process. Each competent authority should be responsible for granting operational approvals, without any evaluation from the Agency.
response	Accepted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The evaluation service remains available on a voluntary basis, but this does not need to be mentioned in regulatory material.

comment	*840* comment by: *Eurocopter* According to § 5.2.1 b) and § 6.2.1, type A applications do not need any approval. According to first sentence in § 7, class 1 EFB with type A only applications do not need any approval. However, this is in contradiction with the subsequent sentences in § 7, which state about an operational approval for class 1 or 2 hosting type A applications. NOTE: Our suggestion is that an operational approval should be needed in all cases, except when an airworthiness approval has been granted in the frame of a TC or STC.
response	Not accepted A new paragraph 7.3 (i.e. changes to EFB) has been added to the resulting text of AMC 20-25, to clarify which changes never require an operational approval. Equally, Type A applications do not require an operational approval. For all other changes, the emphasis is moved from the competent authority controlling each change, to the oversight of the process, based on rule ARO.GEN.310(c) in Commission Implementing Regulation (EU) No 965/2012. Please see also response to comment No 18.

comment	*841* comment by: *Eurocopter*

	It is not understood why a list of type B applications which can be approved by the operator's authority is published twice, i.e. in § 7 and in Appendix B. Also notice that those 2 lists are not strictly identical.
response	Accepted The list of examples has been revised and the duplication with Appendix B has been avoided in the resulting text of AMC 20-25.

comment	*843* comment by: *Eurocopter* In the decision tree, instead of "*Is the EFB a Class III?*", first decision should ask "Is *the EFB a Class 3 or does it host Type C applications?*".
response	Noted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25 and, consequently, the decision tree too.

comment	*844* comment by: *Eurocopter* In the decision tree, in order to be conservative, second decision should be based on the list of type B applications allowed for operational approval, not on the list of the exceptions needing EASA approval, because this last list may not be exhaustive (and it is actually not, as explicitly underlined by the text in appendix B, which states "*In other cases the evaluation should be conducted by the Agency, as for instance for the following applications:*").
response	Noted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25 and, consequently, the decision tree too.

comment	*845* comment by: *Eurocopter* The concept of delegation as shown in the decision tree should be substantiated.
response	Noted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25 and, consequently, the decision tree too.

comment	*846* comment by: *Eurocopter* "*Alternatively, the operator may choose to keep the paper backup as a cross-check against the EFB information and as a means of mitigation against failure or malfunction*". When intended to replace paper documentation by EFB, we believe that a cross-check between the EFB and paper documentation is not a realistic solution to mitigate the risk of erroneous information from the EFB, except if defined and explicitly documented in the operational procedures for a trial period. Paper documentation should only be considered as a valuable backup to mitigate

	the loss of the EFB, another mitigation to the loss being to have at least 2 operational EFBs, which is a pre-requisite in AC 120-76B for an operator to remove the paper.
response	Accepted In paragraph 7 of the resulting text, it is stated that the operator may keep paper backup as a mitigation against failure (not malfunction).

comment	*847* comment by: *Eurocopter* (top of page 41) There seems to be confusion between the concepts of changes according to basic regulation No 216/2008 and its implementing rules, which applies to product airworthiness and concerns the TC or STC holders, and changes according to ARO.GEN.310(c), which applies to aircraft operation organisations approval.
response	Noted Indeed ARO.GEN.310(c) is a very general rule applicable to several operational matters, including all aspects of EFB. This rule is, in fact, addressed to aircraft operators. Additional guidance, in the context of EFB, is offered to operators and their competent authorities in paragraph 7.3 of the resulting text of AMC 20-25. Changes to an EFB system or any of its installed resources, can, of course, also be introduced by manufacturers. In this case, the usual processes established by Part-21 apply. No further guidance on them is felt necessary in AMC 20-25.

comment	*878* comment by: *Boeing* Page: 39 Paragraph: 7 -- *OPERATIONAL APPROVAL PROCESS* 4th paragraph The proposed text states: *- Electronic aeronautical chart applications including en-route, area, approach, and airport surface maps including panning, zooming, scrolling, and rotation, centring and page turning but without display of aircraft/own-ship position.* **REQUESTED CHANGE:** We recommend that the underlined portion of this statement be restated to better align with the philosophy and statements in Appendix H – Airport Moving Map Display. **JUSTIFICATION:** Standardization of the complete document is needed.
response	Noted The paragraph addressed by the comment has been removed; the latter is, hence, no longer applicable. It remains in Appendix B, but it is not meant to address AMMD. AMMD has been added to the list of Type B applications in the revised text.

comment	*879* comment by: *Boeing* Page: 39 Paragraph: 7 -- *OPERATIONAL APPROVAL PROCESS* Last paragraph on page

	The proposed text states: *In other cases the evaluation should be conducted by the Agency. The competent authority at national level should then base the granting of the operational approval on the results of the operational evaluation conducted by the Agency.* **REQUESTED CHANGE:** Type B Applications should have a process to be approved through the NAAs and, if necessary, coordinate with the Agency for non-resolvable applications. We recommend this paragraph be revised to reflect the fact that the Agency does not need to approve the Type B applications as they are completed at the NAA level. **JUSTIFICATION:** Our suggested revision would minimize the lag time and confusion caused among the NAAs for new approvals and/or changes.
response	Partially accepted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The content of the comment is agreed by the Agency since, in fact, the evaluation service remains available on a voluntary basis.

CONCLUSION ON COMMENTS ON PAGES 39-41 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS)

This was the most commented segment of the NPA with 75 comments: 49 (i.e. almost 2/3) have been accepted or partially accepted, 22 have been noted and only 4 (i.e. around 5%) have not been accepted.

Beyond typographic errors or other editorial mistakes, **two topics have been heavily commented: the operational approval and the evaluations by the Agency**.

Several commentators requested the **reintroduction of operational approval for Type A applications**. Six competent authorities from the EU MS and FAA commented in general terms on this segment of the NPA. Only one of them (BCAA) explicitly requested the reintroduction of operational approval for any change to Type A applications.

Many comments challenged the provisions recommending to competent authorities to use the evaluation service provided by the Agency, mostly based on concerns for additional delays and costs.

Having replied individually to each received comment, the Agency concludes that:

— the new definition of Type A applications (in particular, the fact that they have no safety effect) greatly reduces the risk connected to this type of applications;

— implementing safety management by operators is an organisational and economic burden, whose return, according to technical literature, should, in fact, be more control by the authority on the processes and less on the details;

— this approach has been applied for decades in the Air Traffic Management (ATM) and in the airworthiness domain (e.g. privileges of a DOA), with no detrimental safety effect;

— certified CAT operators (i.e. now obliged by Regulation 965/2012 to implement safety management) should have the 'privilege' of approving Type A applications (and changes thereto), however subject to 'notification' of the authority;

— the 'notification' allows the authority to request, if so wished, further details, or even to decide to inspect the operator on the matter;

— a new paragraph 7.3 (i.e. changes to EFB) has been added to the resulting text of AMC 20-25, to clarify which changes never require an operational approval;

— the solution of requiring an airworthiness approval for performance applications, as

suggested in some comments, could be even more costly and less practical;

— changes to an EFB system or any of its installed resources can of also be introduced by manufacturers. In this case, the usual processes established by Part-21 apply;

— it is not realistic to envisage that the resources available to the competent authorities would increase, in the face of the continuous development of the state of the art;

— for all changes, the emphasis is, hence, moved from the control of each change, to the oversight of the process, based on rule ARO.GEN.310(c) in Commission Regulation (EU) No 965/2012;

— this rule, allows removing mention of approval, also because in the EU framework formal processes can only be established by implementing rules, and not at the level of AMC;

— subject to adoption by ICAO (envisaged in 2014) of standards for operational approval of EFB, appropriate provisions could be proposed by the Agency through a new rulemaking task, aiming at amending Commission Regulation (EU) No 965/2012;

— the recommendation to apply for evaluations carried out by the Agency, which would contravene current legislation (although this evaluation service remains available, if requested on a voluntary basis) is removed;

— AMMD is considered a Type B application, but the in-flight depiction of own-ship position remains a certified application, beyond the scope of either Type A or B; and

— data origination and design of instrument procedures are already subject to Commission Regulation (EU) No 73/2010. AIS providers and providers of data for navigation are Air Navigation Service Providers (ANSPs) subject to the common requirements in Commission Implementing Regulation (EU) No 1035/2011. The provisions in AMC 20-25 are sufficient to ensure quality control of data inside the organisation of the aircraft operator.

The resulting text of AMC 20-25, which also includes a number of clarifications and additional details based on the received comments, is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.1 Role of the EFB System Supplier p. 41

comment

318 comment by: *Thales Avionics*

"The EFB system supplier is the link between the application developer and the EFB administrator"
This statement is not compatible of some current implementations and would have adverse impact on the cost and industrial organization between aircraft manufacturer, EFB supplier and software application developper.
As on many consumer electronics market, it has to be recognized that the EFB host platform supplier may have no control nor contractual arrangement with the application developper.
EFB applications may be installed and submitted for approval by the operator for Class 1 and 2 EFB and by the aircraft manufacturer or STC applicant for Class 3 EFB, without the EFB host platform supplier being in the loop.

response

Accepted

The sentence has been deleted.

comment

803 comment by: *Ingo Pucks, Owner IP Aerospace*

It is proposed to rather refer to the role of a EFB integrator here, which is a role

	of integrating SW applications on a probably already certified or certifiable EFB HW. Only at this point in the deployment of a system the necessary knowledge and expertise is available to conduct HW/SW integration testing, which should be described, planned and then approved by the agency, following procedures for airborne HW and SW (refer to Do-178 and 254), and form an integral part of validation and verification testing of an EFB system. Only after such a testing and approval has been concluded can a responsibility transferred to an CAT operator.
response	Noted In this paragraph, the responsibility of the conformance to the EFB which is ultimately attributed to the applicant for the ops approval, is discussed. It has, however, been clarified that the EFB system supplier is not necessarily in the loop (the first sentence has been deleted).

comment	*860* comment by: *navAero* It is unclear who is defined as the EFB System Supplier as the "System" can be created using One vendor, or several vendors (or the operator itself) with different scope (e.g. HW, SW, Integration and Certification).
response	Noted As mentioned in the two previous responses, the first sentence has been deleted since the EFB system supplier(s) is (are) not necessarily involved in those various processes.

comment	*900* comment by: *Franz Redak* Definition is required for "EFB System Supplier". This is a unknown term. We believe that the wording to a large extent points to the "Design holder" of the installation and to a certain extent to the manufacturer of the COTS equipment which may be selected by the operator without involvement of the design holder. Our experience is that COTS manufacturer will usually not get involved (nor is interested) in the supply of conformity statements. In general, we believe the responsibilities of the five parties involved in the installation must be clearly defined: • Operator e.g. does he have to competence to support the application? (SW and HW requirements? • Design Holder (STC, MINOR) e.g. what is his role in the operational approval. What supporting data is expected from him (by the authority for operational approval)? • if applicable: Production Organisation (STC Kit including EFB?) e.g. may a POA provide a complete kit with EFB equipment and may he issue a Form 1 for the EFB. What about marking of the EFB in such case (EPA)? • Authority in charge for operational approval • EASA (technical approval)
response	Noted The first sentence referring to the EFB system supplier has been deleted. Definitions have been added for more specific terms like 'EFB Host Platform Developer'.

CONCLUSION ON COMMENTS ON PAGE 41 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – EFB SYSTEM SUPPLIER)

Four comments were received on this segment. They all requested clarification or update of section 7.1 of AMC 20-25 as proposed in the NPA, to better define who exactly the EFB system supplier is, and what should his/her responsibilities be. The comments also mentioned that with the increased use of consumer products, the EFB system supplier can be outside the aviation world.

The Agency concurs with several of the received suggestions and, therefore, in the resulting text the main addressee are aircraft manufacturers and operators.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.2 Risk Assessment for EFB Systems p. 41

comment	*58* comment by: *Air France* Could it be detailed what is a reduced trial period?
response	Accepted The mention of a limited trial period has been removed from paragraph 7.2.1 in the resulting text of AMC 20-25.

comment	*59* comment by: *Air France* It seems that you specifically use different terms to refer to accurate concepts: Risk Assessment and Operational Risk Analysis. Could you define those terms? If all of them are part of the management system, would it be possible to homogenize the vocabulary with the SMS terms?
response	Accepted The expression 'risk management' is now used throughout the resulting text of AMC 20-25, in line with ICAO Doc 9859.

comment	*64* comment by: *Air France* 1) It would be interesting to illustrate what the operator needs to demonstrate by listing all the required documents: A first list for an entry into service without paper backup and a second list for a transition of six months. 2) Define the length of a reduced trial period
response	Accepted In paragraph 7.14.1 of the resulting text of AMC 20-25, it is, in fact, allowed to remove paper backup from on board after a testing period. Guidance contained therein has been expanded.

comment	*86* comment by: *Grégory DELBEKE* **Page 41 of 72, item B. II. 7.2:** The BCAA does not agree with the following sentence: "Where an accelerated

introduction with a reduced trial period or paperless entry-into-service of a new EFB system is intended, a detailed Operational Risk Analysis will be required".
In our point of view, a detailed Operational Risk Analysis (ORA) shall be required in any case to avoid the occurrence of scenarios which can endanger the safety. During the trial period, the ORA will be updated with the new scenarios encountered during this period.
If EASA use the term "reduced trial period", EASA should define this term (2 weeks, 2 months, 6 months,…).
Our experience as national authority is that most operators want the shortest trial period possible.

response

Accepted

The first sentence in paragraph 7.2.1 of the resulting text of AMC 20-25 clarifies that risk assessment is always necessary, based on rule ORO.GEN.200.

A minimum trial period of three months is included in paragraph 7.14.1.

comment

243 comment by: *DGAC*

It is believed that, in the following sentence :
"Where the EFB system is intended for introduction alongside a paper-based system for a trial period, no risk assessment is required beyond that conducted under the MS"
it is not appropriate to indicate "no risk assessment is required beyond that conducted under the MS".

See preceding justification concerning ORA, which we support to be systematic.

response

Accepted

Please see response to comment No 86.

comment

804 comment by: *Ingo Pucks, Owner IP Aerospace*

Similarly to what is said in 7.1 risk assessments need to be conducted on the various levels and components of an EFB system. Only after successfully showing compliance to safety standards an EFB integrator can hand over an EFB system to a CAT operator for further approval with the NAA or agency.

response

Not accepted

The responsibility for the operational assessment belongs to the operator. Nothing prevents the latter, but only if so wished, to contract to other organisation part of the related work.

comment

820 comment by: *Fédération Nationale de l'Aviation Marchande (FNAM)*

Reference text: "*Where an accelerated introduction with a reduced trial period or paperless entry-into-service of a new EFB system is intended, a detailed Operational Risk Analysis will be required."*

Comment: FNAM is wondering if the reduced period of time lasts less than 6 month, as it is written in the paragraph 7.13.1. If it is the case, we suggest explaining and writing again p41 that a reduced trial period is a period of no

	more than 6 months and which drives the operator to assess a detailed Operational Risk Analysis. Otherwise, could it be detailed?
response	Accepted A maximum duration of six months has been included in paragraph 7.14.1 of the resulting text of AMC 20-25.

comment	*821* comment by: *Fédération Nationale de l'Aviation Marchande (FNAM)* The process of ORA is clearly explained further in the AMC, whereas the expression of "risk assessment" is not detailed at all. Could it be defined to highlight the differences between both concepts?
response	Accepted A definition of risk assessment and mitigation has been included in the glossary.

CONCLUSION ON COMMENTS ON PAGE 41 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – RISK ASSESSEMENT FOR EFB SYSTEMS)

Eight comments were received on this segment of the NPA.

Most of the comments requested clarification regarding the requirement for a risk assessment as part of the operator's management system. Most of them also proposed to require risk assessment whatever the use of paper backup. Others highlighted possible confusion between the terms 'risk assessment' and 'operational risk assessment'.

In the resulting text of AMC 20-25, only the term 'risk assessment' (common across multiple aviation domains and in line with ICAO Doc 9859) is used.

Other topics were also commented:

— Minimum and maximum duration of the trial period; and

— Clarification of the data/documents to be produced as dependant on the application type.

The Agency added minimum and maximum duration in paragraph 7.14.1, as well as some further guidance on the details**.**

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.2 Risk Assessment for EFB Systems - p. 41-42 **7.2.1 Management System Risk Assessment**

comment	*560* comment by: *Jeppesen Inc.* Suggest should read: "Appropriate backup of required operational information" Rationale: If a suitable backup is provided, in any form, , risk is mitigated.
response	Partially accepted The text referring the mitigation means, now in paragraph 7.2.2 of the resulting text, has been reworded.

comment	*712* comment by: *AT-CAA-PAM*

	"Redundant EFB applications hosted on different platforms" Do we really want to have e.g. an Apple IPAD and a windows based computer together on the flight deck in use, where the pilots have to deal with different user interfaces? This sounds for me a real dangerous safety issue !
response	Accepted Indeed, the Agency had no intention of suggesting different models of EFB host platform. The word 'different' has now been removed from the resulting text of paragraph 7.2.2 to avoid ambiguity.

CONCLUSION ON COMMENTS ON PAGES 41-42 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – MANAGEMENT SYSTEM RISK ASSESSEMENT)

Two comments were received on this segment of the NPA.

One comment requested to state more generally that an appropriate backup should be required as a mitigation means.

The second comment asked to reword the bullet point recommending redundant EFB applications on different host platforms.

The Agency agrees with the intent of both comments.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.2 Risk Assessment for EFB Systems - p. 42-43 **7.2.2 Operational Risk Analysis (ORA)**

comment	*87* comment by: *Grégory DELBEKE* **Page 43 of 72, item B. II. 7.2.2:** The BCAA proposes to change "may still" by "shall in any case" in the following sentence: "Note: The competent authority may still require a limited trial period during which paper documentation is retained to confirm the robustness of the system". Our point of view is that paper shall be on board during a certain period to mitigate unforeseen hazards which could occur. When the operator performs his ORA, he will take some mitigation measures for the scenarios which he has analyzed. If the operator has forgotten some scenarios and if those scenarios occurs during the trial period, it shall be necessary to have paper on board because the scenarios are unforeseen and therefore, no mitigation measures have been developed. If the paper is on board, the crew can manage the situation with the paper without endangered the safety of the operations and a long term mitigation measure linked to this scenario can be further developed.
response	Not accepted The technical content of the comment is considered correct by the Agency. However, in paragraph 7.14 of the resulting text of AMC 20-25, some flexibility for the paper backup, when simulator sessions are used instead of actual flight, is left.

comment	*244* comment by: *DGAC* As we support that ORA should always be performed (see justification above), it would be logical in that perspective do delete the first part of the following sentence : "~~Where a detailed Operational Risk Analysis is required,~~ the ORA process should"
response	Accepted The leading sentences in paragraphs 7.2.1 and 7.2.2 of the resulting text of AMC 20-25 clearly indicate that the risk assessment process is always required.

comment	*245* comment by: *DGAC* The note should take due account of the fact that ground staff may also be concerned. We then propose the following amendment to be more precise : "Note: 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 will concern mainly training and ~~crew~~ procedures whereas in the second case, mitigation means will more likely focus on administrator **(training and procedues)** and quality policy aspects. "
response	Accepted

comment	*246* comment by: *DGAC* Before the following paragraph : "The availability of backup data, procedures etc. may be in the form of an alternative EFB possibly supplied from a different power source or some form of paper backup system" we suggest to insert : "One class 1 EFB for each flight crew member should be available." Justification : it improves the robustness and the cross check procedures are more efficient when two pilots are required
response	Partially accepted In paragraph 7.2.2 of the resulting text of AMC 20-25, the possibility of using, as mitigation means, more than one EFB host platform, is made more explicit.

comment	*253* ❖ comment by: *Thales Avionics* Operational Risk Analysis addresses database accuracy. In addition, ETSO-2C165a recognizes that misleading display of EMD or VSD in flight is a major condition and requires the use of DO-200/ED-76A for navigation databases. What is EASA position on database processing regarding EFB, and in particular, is there any requirement to address DO-200A/ED-76? In such case, update of section 3.3.1 and 3.3.2 should also be considered.

response	Noted Data origination and design of instrument procedures are already subject to Commission Regulation (EU) No 73/2010. AIS providers and providers of data for navigation are Air Navigation Service Providers (ANSPs) subject to the common requirements in Commission Implementing Regulation (EU) No 1035/2011. The provisions in AMC 20-25 are sufficient to ensure quality control of data inside the organisation of the aircraft operator.

CONCLUSION ON COMMENTS ON PAGES 42-43 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – OPERATIONAL RISK ANALYSIS)

Five comments were received on this segment of the NPA dealing with the topics discussed below:

1. Requirement to carry a paper backup during all trial period

This request is, actually, not consistent with the approach taken later in the proposed AMC 20-25. The Agency, in fact, intends to keep this flexible and this way to provide a possibility for operators to start a trial period without paper backup under specific conditions (e.g. sessions at simulator).

2. Requirement to provide each flight crew with one portable EFB

Such a prescriptive requirement is considered not necessary in the regulatory material, which, however, recognised this possible mitigation, among others, to provide flexibility.

3. Requirement to carry out in all cases a risk assessment: accepted.

4. Add dispatchers in the personnel who might enter data in the EFB: accepted.

5. One last point was on the applicability of DO-200A to databases, which is not part of the EFB. Nothing prevents data providers from using it if so wished. In any case, the responsibility to ensure currency and integrity of the data belongs to the aircraft operator, taking into account that per Basic Regulation and related implementing rules, AIS, MET and navigation data providers, are certified Air Navigation Service Providers (ANSPs).

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.3 Dispatch Considerations p. 43

comment	*805* comment by: *Ingo Pucks, Owner IP Aerospace* An EFB and its components might become part of the CDL and MEL to fulfil this requirement.
response	Noted But this had already been addressed in paragraph 7.3.1 of AMC 20-25 as proposed in the NPA, and has been now replaced by 7.4.1 in the resulting (identical) text.

CONCLUSION ON COMMENTS ON PAGE 43 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – DISPATCH CONSIDERATIONS)

One single comment was received on this segment, asking to consider that EFB might become part of the MEL/CDL.

In fact, the possibility to add an item in MEL for EFB had already been addressed by paragraph 7.3.1 in the text of AMC 20-25 as proposed by the NPA.

Consequently, while the intent is accepted, this comment leads to no changes in the text of AMC 20-25.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.3 Dispatch Considerations - 7.3.1 Dispatch with Inoperative EFB Elements p. 43

comment	*247* comment by: *DGAC* Just before the note, we wish the text could insist on the fact that double calculations are recommended (it could be two on board if EFB are working, one on the ground and one on board if one EFB is out inoperative or two on the ground..). We then suggest to insert : "**In particular, double calculations should always be performed**"
response	Not accepted The Agency deems that this section 7.4.1 of the resulting text AMC 20-25 should remain flexible for operator to define the appropriate procedures for dispatch with inoperative EFB elements and not too prescriptive on the mitigation means to be used.

CONCLUSION ON COMMENTS ON PAGE 43 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – DISPATCH WITH INOPERATIVE EFB ELEMENTS)

One single comment was received on this segment, asking to systematically require calculations to be performed on two different devices and especially in the case of a failure of an EFB on-board.

This is considered to be one possible means of ensuring accuracy of the calculation performed following the dispatch with one EFB inoperative for example.

The Agency deems that this section 7.4.1 of the resulting text AMC 20-25 should remain flexible for operator to define the appropriate procedures for dispatch with inoperative EFB elements. Where necessary, this should be reflected in the Minimum Equipment List (MEL).

Consequently, no changes to the text stem from this comment.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.4 Human Factors Assessment p. 44

comment	*65* comment by: *Air France* If this part has already been achieved by OEB, the operator can skip this requirement. Proposal : Add "OEB can be sufficient to demonstrate those requirements."
response	Partially accepted This comment proposes to replace the sentence 'If this part [Human Factors assessment] has already been achieved by OEB, the operator can skip this requirement' by the following one: 'OEB can be sufficient to demonstrate those

requirements.'

Indeed, if a Human Factors assessment has already been performed in the frame of the OEB, the operator can take credit for this. However, operators will still have to assess the integration of the EFB into the flight deck environment, considering both physical integration (ergonomics, physical interferences, etc.) and cognitive ergonomics (compatibility of look and feel, workflows, alerting philosophy, etc.). Therefore, the following proposed text has been made clear referring to this possible credit:

'In addition to any already performed EASA 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.)."

comment *148* comment by: *DGAC*

At the end of 7.4, it should be emphasized that each operator should perform this assessment and that this assessment should depend upon the device and applications that are implemented:

"**The human machine interface assessment should be carried by each operator for each kind of device and application installed on the EFB**."

response Partially accepted

The proposed additional text has been partially incorporated in the resulting text of AMC 20-25.

comment *806* comment by: *Ingo Pucks, Owner IP Aerospace*

EFBs featuring HMIs which are not within standards as defined by other avionic and cockpit instrumentation shall not be considered certifiable by any operator. Certification aspects for EFB for HMI shall be developed for application developers and EFB integrators.

response Noted

This comment does not lead to any text modification. EFB software applications other than Type A or Type B have, in fact, to be certified by fulfilling the whole airworthiness approval process. For the other software application, it is recommended that HMIs are designed in accordance with the relevant guidance material.

CONCLUSION ON COMMENTS ON PAGE 44 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – HUMAN FACTORS ASSESSMENT)

The two received comments requested that the process of human factors evaluation in the frame of OPS and operational approvals be made clearer in the proposed AMC 20-25. In particular,:

— the first comment proposes to replace the sentence 'If this part [Human Factors assessment] has already been achieved by OEB, the operator can skip this requirement' by the following one: 'OEB can be sufficient to demonstrate those requirements.' This proposal is partially accepted. Indeed, if a Human Factors assessment has already been performed in the frame of the OEB, the operator can take credit for this. However,

operators will still have to assess the integration of the EFB into the flight deck environment, considering both physical integration (ergonomics, physical interferences, etc.) and cognitive ergonomics (compatibility of look and feel, workflows, alerting philosophy, etc.). Therefore, the proposed text has been made clear referring to this possible credit; and

— the second comment states that at the end of section 7.4 of AMC 20-25, it should be emphasised that each operator should perform this assessment and that this assessment should depend upon the device and applications that are implemented. The comment proposed additional text which is partially accepted by the Agency.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.5 Specific Considerations for mass and balance and performance Applications p. 44

comment *88* comment by: *Grégory DELBEKE*

Page 44 of 72, item B. II. 7.5:

In our opinion, NAAs should be able and authorized with this AMC to give approvals for Type B software, therefore, this item 7.5 should be more developed to give more guidance to operators and to NAAs.

response

Accepted

Paragraph F.1 in Appendix F to the resulting text of AMC 20-25 has been significantly expanded in comparison to the corresponding proposed text in the NPA.

comment *211* comment by: *AIRBUS*

"Since performance and mass and balance software applications are typically type B, the EASA is directly involved in their evaluation"

NPA AMC 20-25 not consistent with forthcoming AC 120-76B. See rationale given for comment about section 6.2.2 (Type B software applications) and comment about section 7 (Operational approval process). To get assurance about development, validation and verification of performance and mass and balance software applications, it is suggested to request systematic ORA.

Suggested text:
The operator's competent authority may seek advice from performance specialists of the Agency to assist in the validation of these types of software application. The operator's competent authority may request as well a complete evaluation of these types of types of software application by the Agency. For such applications, the Operator should carry out a systematic Operational Risk Analysis (section 7.2.2) even if EFB operations start with back-up paper. Additional considerations are given in Appendix F.1.

response

Accepted

In the resulting text of AMC 20-25, any recommendation to use the evaluation service provided by the Agency has been removed. In fact, while this service remains available on a voluntary basis, it is not appropriate to mention it into

regulatory material.

comment

313 ❖ comment by: *Thales Avionics*

Beginning of paragraph 7 lists Type B applications, most of them being already listed in Appendix B, with some minor differences. In addition, Appendix B, unlike appendices A and C, addresses approval process with EASA or national authorities.
It is therefore suggested to split Appendix B in two paragraphs, with B.1 paragraph containing those application to be approved by national authorities, and B.2 containing those to be approved by EASA; and to replace the lists in paragraph 7 by references to B.1 and B.2.
This would also permit to make the figure for Class III EFB (Decision tree) clearer, by replacing the sentence " Does the EFB run Type B (...) ?" by "Does the EFB run Type B application listed in Appendix B.1?"
Finally, paragraph 7.5 could also directly refer to B.2

response

Partially accepted

The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25 and, consequently, the decision tree too.

comment

351 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 41 shared with Airbus

JUSTIFICATION for the Comment on page # 44 §7.5 "Since performance and mass and balance software applications are typically type B, the EASA is directly involved in their evaluation"

NPA AMC 20-25 not consistent with AC 120-76B.
See rationale given for comment #321 about section 6.2.2 (Type B sofware applications) and comment #331 about section 7 (Operational approval process).
To get assurance about development, validation and verification of performance and mass and balance software applications, it is suggested to request systematic ORA.

PROPOSED TEXT / COMMENT
The operator's competent authority may seek advice from performance specialists of the Agency to assist in the validation of these types of software application. The operator's competent authority may request as well a complete evaluation of these types of types of software application by the Agency. For such applications, the Operator should carry out a systematic Operational Risk Analysis (section 7.2.2) even if EFB operations start with back-up paper. Additional considerations are given in Appendix F.1.

response

Accepted

In the resulting text of AMC 20-25, any recommendation to use the evaluation service provided by the Agency has been removed. In fact, while this service remains available on a voluntary basis, it is not appropriate to mention it into regulatory material.

comment

480 comment by: *Oliver Ast (CLH)*

Proposed Text:
The operator's competent authority may seek advice from performance specialists of the Agency to assist in the validation of these types of software application. The operator's competent authority may request as well a complete evaluation of these types of types of software application by the Agency. For such applications, the Operator should carry out a systematic Operational Risk Analysis (section 7.2.2) even if EFB operations start with back-up paper.

Comment:
NPA AMC 20-25 not consistent with forthcoming AC 120-76B. See rationale given for comments about section 6.2.2 and about section 7. To get assurance about development, validation and verification of performance and mass and balance software applications, it is suggested to request systematic ORA.

response

Accepted

In the resulting text of AMC 20-25, any recommendation to use the evaluation service provided by the Agency has been removed. In fact, while this service remains available on a voluntary basis, it is not appropriate to mention it into regulatory material.

comment *481* comment by: *Oliver Ast (CLH)*

Comment: EASA is not directly involved in Performance calculation via ACARS or Rwy weight Charts on a Type A Application. This contradicts to the intended ammendment.

response

Not accepted

It is true that performance calculations received by ACARS and performed by ground facilities are not certified by the Agency, as these ground facilities are not considered as part of the aircraft by the Basic Regulation. Nevertheless, equipment used for sending data from EFB into the avionics system and then to the ground, is part of the aircraft.

comment *482* comment by: *Oliver Ast (CLH)*

Comment:
Considering comment of 7.11, the present section should be removed from the document or, alternatively, should only serve as guidelines to be used by the National Authorities.

response

Partially accepted

Further guidance for competent authorities has been incorporated in Appendix F to the resulting text of AMC 20-25.

comment *585* comment by: *Star Alliance*

Original AMC20-25 NPA text:

7.5 Specific Considerations for mass and balance and performance Applications Since performance and mass and balance software applications are typically type B, the EASA is directly involved in their evaluation.

Comment: EASA is not directly involved in Performance calculation via ACARS or Rwy weight Charts on a Type A Application. This contradicts to the intended ammendment.
PROPOSED TEXT / COMMENT:

Considering this comment`, the present section should be removed from the document or, alternatively, should only serve as guidelines to be used by the National Authorities.

Original AMC20-25 NPA text:
Since performance and mass and balance software applications are typically type B, the EASA is directly involved in their evaluation
RATIONALE / REASON / JUSTIFICATION for the Comment :
NPA AMC 20-25 not consistent with forthcoming AC 120-76B. See rationale given for comments about section 6.2.2 and about section 7. To get assurance about development, validation and verification of performance and mass and balance software applications, it is suggested to request systematic ORA.
PROPOSED TEXT / COMMENT:

The operator's competent authority may seek advice from performance specialists of the Agency to assist in the validation of these types of software application. The operator's competent authority may request as well a complete evaluation of these types of types of software application by the Agency.
For such applications, the Operator should carry out a systematic Operational Risk Analysis (section 7.2.2) even if EFB operations start with back-up paper.

response

Noted

Please see response to comment No 481 and others, since this comment is only 'copy and paste' of suggestions made by other stakeholders.

comment

672 comment by: *Deutsche Lufthansa AG*

Proposal:
Change "Since performance and mass and balance software applications are typically type B, the EASA is directly involved in their evaluation" to:

"The operator's competent authority may seek advice from performance specialists of the Agency to assist in the validation of these types of software application. The operator's competent authority may request as well a complete evaluation of these types of types of software application by the Agency.
For such applications, the Operator should carry out a systematic Operational Risk Analysis (section 7.2.2) even if EFB operations start with back-up paper."

Comment/Justification:

NPA AMC 20-25 not consistent with forthcoming AC 120-76B. See rationale given for comment #669 (about section 7).
To get assurance about development, validation and verification of performance and mass and balance software applications, it is suggested to request

systematic ORA.

EASA is not directly involved in Performance calculation via ACARS or Rwy weight Charts on a Type A Application. This as well contradicts to the intended amendment.

response

Partially accepted

As mentioned in the responses to section 7, this will be clarified. The equivalency of performance calculations via ACARS is not accepted. Please refer to the response to comment No 481.

comment

713 comment by: *AT-CAA-PAM*

Type B sw applications like mass & balance should not need an EASA approval!

Keep in mind, that many operator use basic graphical or simple mathematical calculations according AFM to do the mass & balance sheet. Some changed to a mass and balance sheet done in Microsoft Excel to simplify this procedure and to reduce the mistakes done by crews found during ops return analysis.

Mass and Balance:
As long as pilots are allowed to use simple mathematics to do a mass & balance manually or with the assistance of a calculator, no approval from EASA should be required.
Performance calc
As long as pilots are allowed to use simple tables out of the AFM and interpolate in between these tables inclusive the use of a calculator, no approval from EASA should be required.
It should be the EFB Administrator responsibility.

response

Accepted

In the resulting text of AMC 20-25, any recommendation to use the evaluation service provided by the Agency has been removed. In fact, while this service remains available on a voluntary basis, it is not appropriate to mention it into regulatory material.

comment

736 comment by: *NetJets Europe*

Please consider rewriting this section to introduce policy consistent with the recently released AC 120-76B.

We agree that the accuracy of mass and balance and aircraft performance applications is critical. However, please consider a policy that will allow the evaluation of at least some mass and balance and performance applications by the operator or local authority. The quantity of solutions to be evaluated is numerous and potentially represents a volume that the Agency may not be able to support.

If the Agency evaluates an application, we encourage that the results and the details of the evaluation are posted for the public, enhancing safety and easing the

	burden for other operators. Additionally we respectfully request that the criteria which comprised the evaluation be included. (Source: Executive Jet Management, a NetJets company)
response	Accepted In the resulting text of AMC 20-25, any recommendation to use the evaluation service provided by the Agency has been removed. In fact, while this service remains available on a voluntary basis, it is not appropriate to mention it into regulatory material.

comment	*807* comment by: *Ingo Pucks, Owner IP Aerospace* Aircraft performance applications could be considered to be DAL A or B level applications and hence should to be approved by the agency in accordance with the considerations laid out in Do-178.
response	Not accepted DAL A or B are associated to software applications with failure conditions considered as having hazardous or catastrophic effects. Such applications are not eligible as EFB software applications and are required to be certified. The M&B and performance calculations eligible for EFBs are only those whose malfunction or misuse have effects not more severe than minor.

comment	*848* comment by: *Eurocopter* The statement "*Since performance and mass and balance software applications are typically type B, the EASA is directly involved in their evaluation*" is not consistent with the principle given in § 5.2.2 that type B applications do not need an airworthiness approval. Moreover, we do not concur with such classification for performance calculation functions, for which undetected erroneous outputs are likely to have more than minor safety impact and which, as a result, miss the safety criterion in the definition of type B applications in § 5.2.2.
response	Not accepted The M&B and performance calculations eligible for EFBs are only those whose malfunction or misuse have effects not more severe than minor.

CONCLUSION ON COMMENTS ON PAGE 44 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – MASS AND BALANCE AND PERFORMANCE APPLICATIONS)

13 comments were received on this segment.

— Five comments requested that a systematic risk assessment is performed, even in the case of operations with paper backup, which is accepted;

— In other comments, the evaluations by the Agency were criticised: in the general conclusion on section 7, the Agency already stated that the recommendation to apply to the Agency for evaluation has been removed;

— Two stakeholders mentioned that it is inconsistent that the Agency is not involved in the case of performance received by ACARS. The Agency disagrees since FMS/ACARS and their interface are part of the certified aircraft system;

— Two comments requested to introduce more guidance material concerning the evaluation of performance applications. The Agency agreed and additional guidance was introduced in Appendix F;

— Two stakeholders requested that performance and W&B applications are certified. While an airworthiness approval for performance and W&B applications is not prevented by this AMC (which is also envisaged by FAA), the Agency offers an alternative approach to operators.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.6 Flight Crew Operating Procedures - 7.6.1 Procedures for using EFB systems with other Flight crew compartment systems p. 44

comment

21 comment by: *FAA*

Page 44, para 7.6.1

Comment:
Especially when both the aircraft and EFB systems provide similar information. This sentence is out of harmony with section 5.2.2 a.
Reason for Comment:
Clarification

Suggested Change:
Delete especially when both the aircraft and EFB systems provide similar information

response

Accepted

The sentence has been deleted.

comment

67 comment by: *Air France*

"procedures should clearly identify which information source will be the primary (the one provided by aircraft system)"

It is not always the case, for instance with takeoff speed provided by some FMS.

Proposal : Remove "(the one provided by aircraft system)"

response

Accepted

The sentence has been deleted.

CONCLUSION ON COMMENTS ON PAGE 44 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – PROCEDURESFOR USING EFB WITH OTHER FLGIHT CREW COMPARTMENT SYSTEMS)

Two comments were received on this segment of the NPA, requesting that this section of AMC 20-25 be streamlined for clarity.

The Agency, however, agreed.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.6 Flight Crew Operating Procedures - 7.6.2 Flight Crew Awareness of EFB Software/Database Revisions p. 44

comment	*89* comment by: *Grégory DELBEKE* **Page 44 of 72, item B. II. 7.6.2:** The BCAA proposes to include in the first sentence of this paragraph the fact that the flight crew confirmation shall enforced (e.g. similarly to FMC, GPS,…) or be traceable. In fact our experience shows us that flight crew does not systematically check the database revision unless they are forced to do it in a traceable way. "The operator should have a procedure in place to enforce flight crews to confirm prior to use the revision number and/or date of EFB application software including, where applicable, database revision."
response	Accepted The sentence has been reinforced.

comment	*808* comment by: *Ingo Pucks, Owner IP Aerospace* All EFB application which have a DAL A or B should feature an easily accessible and understandable data base revision status.
response	Noted Nevertheless, there are no Type A or B EFB applications which require software level A or B.

comment	*909* comment by: *SAT-WAY sa* Data base revisions (7.6.2. page 44) A centralized management of all EFB's in a fleet is easy to install on any central server unit of the IT division inside any operator's organization. When the upload of an update is structured with an acknowledgement of installation, updates within mandatory timeframes are simple to manage. Warnings to crew can be notified timely and wireless connectivity can supply updates. Proceeding so, updates of revisions could no longer be an issue.
response	Noted Indeed, the one mentioned in the comment can be an optimal method. However, the Agency would prefer to maintain regulatory material open to different solutions, allowing, thus, operators to choose the one best suited for them.

CONCLUSION ON COMMENTS ON PAGE 44 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – FLIGHT CREW AWARENESS OF SOFTWARE/DATABASE REVISIONS)

Three comments were received on this segment of the NPA, asking for the following additions to section 7.6.2 of AMC 20-25:

— a requirement for the flight crew to check the database validity; and/or

— a requirement for an easy access to the status of the database.

Two of the comments were noted and the other one was accepted, leading to a slight reinforcement of a sentence in the resulting text of AMC 20-25, which is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.6 Flight Crew Operating Procedures - 7.6.3 Procedures to Mitigate and/or Control Workload p. 44

comment	*68* comment by: *Air France* These procedures "should specify the times at which the flight crew may not use the EFB system." If the general purpose is perfectly understantable, this particular requirement is too strict. This case is already dealt with the tasks to be performed during the critical phases of flight. Proposal : Remove : "should specify the times at which the flight crew may not use the EFB system."
response	Not accepted This requirement is justified. It is intended to mitigate unsafe conditions observed in the light of some recent incidents.

comment	*149* comment by: *DGAC* We think that this provision "The operator should develop procedures such that both flight crew members do not become preoccupied with the EFB system at the same time" is not relevant if the aircraft is at the parking. This is why we propose to limit the scope as follows : "The operator should develop procedures such that**, while aircraft is in flight or moving on the ground,** both flight crew members do not become preoccupied with the EFB system at the same time"
response	Accepted The text has been modified accordingly.

CONCLUSION ON COMMENTS ON PAGE 44 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – PROCEDURES TO MITIGATE/CONTROL WORKLOAD)

Two comments were received on 'the times at which the flight crew may not use the EFB system'.

One suggested that this requirement is too restrictive and should be removed. The second proposed a clearer wording. The second proposal is accepted.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.6 Flight Crew Operating Procedures - 7.6.4 Defining Flight Crew Responsibilities for Performance Calculations p. 45

comment	*248* comment by: *DGAC* We suggest to insert at the end of §7.6.4 : "**Each flight crew member should have an EFB to be able to perform the calculations.**" Justification : it improves the robustness and the cross check procedures are more efficient when two pilots are required
response	Not accepted The Agency reiterates that this is a possible means which is allowed by the AMC text proposed by the NPA. However, other solutions could be used by operators. To keep AMC20-25 proportionate, the Agency, hence, prefers to leave flexibility to operators to define procedures consistent with the intended use of the EFB.

CONCLUSION ON COMMENTS ON PAGE 45 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – FLIGHT CREW RESPONSIBILITIES FOR PERFORMANCE CALCULATIONS)

One single comment was received on this segment, asking to systematically require one EFB to be provided to each crew member to be able to perform the calculations.

The Agency reiterates that this is a possible means which is allowed by the AMC text proposed by the NPA. However, other solutions could be used by operators. To keep AMC20-25 proportionate, the Agency hence prefers to leave flexibility to operators to define procedures consistent with the intended use of the EFB.

Consequently, while the proposed solution is an acceptable one, this comment leads to no changes in the text of AMC 20-25.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.7 Quality Assurance p. 45

comment	*809* comment by: *Ingo Pucks, Owner IP Aerospace* An EFB system might have the same importance and impact as a flight planning application or a aeronautical chart, and the lack thereof. Consequently the same standards for maintaining quality over all processes at the operator shall apply. However, during manufacturing, the responsibility may remain with the developer/manufacturer only.
response	Noted The Agency observes that EFB host platforms might well be COTS for which there is no airworthiness approval and, therefore, no design or production approved organisations. This does not exclude the possibility for COTS manufacturers to have their own quality management system (QMS), but such a requirement cannot be imposed by EU rules on organisations which are not regulated on the basis of the Basic Regulation.

CONCLUSION ON COMMENTS ON PAGE 45 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – QUALITY ASSURANCE)

One single comment was received on this segment, mentioning that the responsibility for the quality assurance may remain with the manufacturer/EFB provider during the manufacturing

phase.

The Agency observes that EFB host platforms might well be COTS for which there is no airworthiness approval and, therefore, no design or production approved organisations. This does not exclude the possibility for COTS manufacturers to have their own quality management system (QMS), but such a requirement cannot be imposed by EU rules on organisations which are not regulated on the basis of the Basic Regulation.

In any case, the possible QMS implemented by EFB manufacturers/suppliers, does not eliminate the obligation for the operator to implement its own QMS as well.

Consequently, while it is acknowledged that QMS at EFB manufactures/providers could be beneficial, this comment leads to no changes in the text of AMC 20-25.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.8 EFB System Security p. 45-46

comment *22* comment by: *FAA*

Page 45, Para 7.8 8th para

Comment;
According to this document, only Class 3 EFB's would be able to send data. Whatever the EFB class is confusing. It makes it seems as though other classes could be considered.

Reason for Comment:
Clarification

Suggested Change:
Delete whatever the EFB class

response

Accepted

The phrase 'whatever the EFB class' has been removed from the resulting text of AMC 20-25.

comment *212* comment by: *AIRBUS*

"Examples of typical safety and security defences are:
[…]
● Procedures for flight crews and other staff to report perceived security threats to the EFB administrator and to develop responses that will prevent future successful attacks"

This example is very subjective. Which are the criteria to perceive a security threat and how to report a perception ?
Rather than focusing on the cause which should be very difficult to be perceived or identified by the flight crew, it is suggested to focus on the consequence which should be more factual. So, if the flight crew reports a loss of EFB availability or integrity, during the troubleshooting, security should be considered as well as a potential root cause of the EFB misbehavior.

Suggested text:
Examples of typical safety and security defences are:
[…]
● 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
response	Accepted

comment	*352* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 42 shared with Airbus JUSTIFICATION for the Comment on page # 46 §7.8 " Examples of typical safety and security defences are: […] ● Procedures for flight crews and other staff to report perceived security threats to the EFB administrator and to develop responses that will prevent future successful attacks" This example is very subjective. Which are the criteria to perceive a security threat and how to report a perception ? Rather than focusing on the cause which should be very difficult to be perceived or identified by the flight crew, it is suggested to focus on the consequence which should be more factual. So, if the flight crew reports a loss of EFB availability or integrity, during the troubleshooting, security should be consided as well as a potential root cause of the EFB misbehavior. PROPOSED TEXT / COMMENT Examples of typical safety and security defences are: […] ● 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
response	Accepted

comment	*414* comment by: *European Cockpit Association* Paragraph 2-4, especially second sentence para 4: "EFB systems which have a data connection to aircraft systems (…)" Justification: Data connectivity is the crucial factor for IT security, thus limiting higher EFB security requirements not only to "sending" EFBs.
response	Accepted The wording has been revised.

comment	*415* comment by: *European Cockpit Association* Add bullet point: Virtualization Justification: Using virtualization technologies (e.g. virtual machines), is another means of securing systems.
response	Noted The list of examples is not exhaustive. Indeed, operators may propose alternative or additional defences.

comment	*416* comment by: *European Cockpit Association* Add bullet points: Forensic tools and procedures Justification: In case of a infiltration with malware, it is necessary to identify the damage, the source and the security leaks.
response	Noted The list of examples is not exhaustive. Indeed, operators may propose alternative or additional defences.

comment	*810* comment by: *Ingo Pucks, Owner IP Aerospace* This again should be regulated similar to what is applicable for airborne HW and SW, hence the regulations for avionics devices. An operator is usually not able to give proof of the here required technical details. The majority of the responsibility needs to be exercised earlier during the manufacturing/developing/integrating of the EFB system, by an integrator or manufacturer for example.
response	Not accepted The responsibility for the operational assessment belongs to the operator. Nothing prevents the latter, but only if so wished, to contract to other organisation part of the related work.

comment	*908* comment by: *SAT-WAY sa* Functional integrity and system security (7.8. page 45) Today each pilot has an own PED, tablet or PC to prepare his flight and gathering flight information. Personal flight preparation does not require the EFB presence. To keep the EFB in a safe controlled environment, it should be used only for aircraft operations and not as a personal tool. Information transfer between personal devices and EFB should require the highest care to prevent malicious interferences. The EFB should remain an operational tool attached to aircraft, receiving electronically from the OPS the flight folders, the manuals update, logbooks, W & B cross check, MEL in real time and others functions on a highly secured way from a reliable wireless network or flash memory. Very tight and tamperproof links should be recommended between the operator main IT structure and EFB. VPN's should be the only wireless connectivity allowed, funneling all communications in a safe mode on the VPN server. A latest updated officially active version of EFB configuration and contend resident on the server could be the reference to upload anytime.
response	Noted The list of examples is not exhaustive. Indeed, operators may propose alternative or additional defences.

comment	*910* comment by: *SAT-WAY sa* EFB System security. (7.8. page 45)

As explained in point 6 and 7 of this document, funneling all data exchange through a well structured server and tamperproof communication on VPN, security of EFB systems can easily be guarantied.

response

Noted

The list of examples is not exhaustive. Indeed, operators may propose alternative or additional defences.

comment

919 comment by: *CMC Electronics*

7.8 EFB System Security

This paragraph appears to be intended to address the physical and system level security of the EFB system where it also refers to Operator's demonstration requirements that the software such EFB system will support also offers suitable control in terms of software version control, data currency, and data integrity which are more Operator's application and software level requirements.

It may be preferable to organize the text so that these two aspects of security can be clearly delineated and addressed as part of the operational approval process.

From a System stand-point, It has to be noted that in order to ensure no risks are associated to certain input/output ports (such as USB 2.0 interfaces), they may have to be disabled at all time thereby reducing the functionality or flexibility of the system.

response

Noted

The list of examples is not exhaustive. Indeed, operators may propose alternative or additional defences.

comment

926 comment by: *Tyler Clark - Transport Canada Civil Aviation*

Section 7.8
EFB System Security
(page 45)

Consideration of system security for internet access and AAC (firewalls, system scans, threats…) when using EFBs on the ground (part of the system security procedures).

response

Noted

The list of examples is not exhaustive. Indeed, operators may propose alternative or additional defences.

CONCLUSION ON COMMENTS ON PAGES 45-46 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – EFB SYSTEM SECURITY)

11 comments were received on this segment of the NPA. These comments mainly requested:

— modification to the concept of perceived security threat which is found subjective and, therefore, difficult to report;

— the addition of other types of security defences like virtualisation, forensic tools, VPN, etc.;

— clarification regarding the two levels of security at system level and at the operator level; and

— provisions regarding the interface with flight crew personal PED.

The suggestion in the first bullet is accepted by the Agency and the related sentence has been redrafted.

The second and third bullet are, in general, means accepted by the Agency during its evaluations, but they still need to be individually assessed case by case, while a published list of security defences is not be exhaustive and does not prevent an operator to use another possible defence.

Finally, the proposed AMC 20-25 deals with PED used as an EFB by flight crew. All other uses of PEDs are already covered by the PED requirement contained in AIR-OPS. Nevertheless, as mentioned in the comment, the possible interface between an EFB and a PED needs to be considered by an operator.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.9 Electronic signatures p. 46

comment	*417* comment by: *European Cockpit Association* para 3: Systems using either a PIN or a password may be appropriate in providing positive traceability to the individual who appended it. "Systems using either a PIN or password with limited validity (timewise) may be (…)" Justification: PIN/Password only is not safe enough
response	Accepted Limited validity of password has beeb inserted in paragraph 7.10 of the resulting text of AMC 20-25.

comment	*884* comment by: *Ingo Pucks, Owner IP Aerospace* Digital or electronic signatures will become more and more a standard, not only in matters related to EFB. It would be desirable to have a general regulation dealing with that matter instead of including it wherever appropriate or necessary.
response	Noted This goes beyond the scope of task RMT.0001 and AMC 20-25 and is already covered by AMC1 to CAT.POL.MAB.105(c) in Part-CAT. Should the said AMC1 be considered insufficient, any stakeholder can address proposals to the Agency for future tasks: http://easa.europa.eu/rulemaking/docs/programme/Rulemaking%20Proposal%20Form.doc

comment	*920* comment by: *CMC Electronics* 7.9 Electronic Signatures

	The last sentence (note) in this paragraph suggests its scope is outside the scope of the document. CMC agrees and recommends 7.9 be removed from the published AMC 20-25. In line with our comment in 7.8, it may be worthwhile removing overall in the proposed AMC 20-25 references to requirements such as sw and data configuration control and security that are more associated to Operator applications and software outside the scope of the EFB system functionality domain.
response	Not accepted Electronic signatures can reduce the volume of paper used by operators and are, therefore, very useful, including for environment. EFB can support them.

comment	*927* comment by: *Tyler Clark - Transport Canada Civil Aviation* **Section 7.9** **Electronic Signatures** **(page 46)** Should mention competent authority should be made aware of operator's intention on implementing electronic signatures.
response	Partially accepted Indeed, where signatures are required by other rules, the replacement of them by electronic means has to be, at least, notified to the competent authority.

CONCLUSION ON COMMENTS ON PAGE 46 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – ELECTRONIC SIGNATURES)

Four comments were received on this segment of the NPA, suggesting:

— PIN or password to be changed on a regular basis;

— electronic signature provisions defined by the operator to be notified to the competent authority;

— clarification of what is at an operator level and what is at a software level; and

— general policy for electronic signature needed rather than some provision in each Agency rule.

The comments in the first three bullets have been partially accepted. AMC 20-25 is, in fact, not restrictive, but as generic as possible. This means that internal operator procedures and IT would have freedom to select the most appropriate means.

The Agency agrees, in principle, that there is a need for a consistent approach in all the Agency rules regarding electronic signature and will consider in the future the need to have a common policy. This is, however beyond, the scope of RMT.0001 since already covered by AMC1 to CAT.POL.MAB.105(c) in Part-CAT.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.10 Role of the EFB Administrator p. 47

comment	*60* comment by: *Air France* "The EFB Administrator is responsible for conducting internal quality control measures to ensure that all EFB administration personnel comply with the

	defined procedures. EFB administration should be subject to independent routine audits conducted by the operator's Quality Assurance Programme (see paragraph 7.6)." The quality assurance programme allows to check the implementation of EFB administration procedures. There should not be a second kind of audits conducted by the EFB administrator himself. Proposal : remove the first sentence.
response	Accepted Duplication of audits has been removed.

comment	*61* comment by: *Air France* "The administrator training material should be made available on request to the competent authority and the EASA." All material is available to the competent authority. EASA requests should go through the competent authority. Proposal : remove " and the EASA"
response	Accepted

comment	*90* comment by: *Grégory DELBEKE* **Page 47 of 72, item B. II. 7.10:** The BCAA proposes to add the following sentence in this paragraph to be compliant with EU-OPS 1 Appendix 2 to OPS 1.175: "The operator must make arrangements to ensure the continuity of the management of the EFB system in the absence of the EFB administrator." In other words, the operator shall appoint a deputy to the EFB administrator.
response	Accepted

comment	*144* comment by: *DGAC* The proposed text could be completed to have more comprehensive provisions. In that perspective, we propose to add to the second paragraph, after the first sentence : "**The EFB Administrator is responsible for all the applications installed on the EFB, be they EFB or non-EFB applications. He has to check that the security of the system is guaranteed.** **He is also responsible of the data integrity**"
response	Accepted The suggestions have been added in the list of bullets in pargraph 7.11 of the resulting text of AMC 20-25.

comment	*145* comment by: *DGAC* After the third paragraph, we propose to specify that means should be provided

	to make sure only the EFB Administrator has effective access to it. The objective is to avoid e.g. that crew carry out administration tasks : Administration and use on board tasks have to be separated clearly. The following sentence could then be inserted after the their paragraph : "**Means should be provided to ensure that only the EFB Administrator be granted access to administrative tools. This may consist of secured codes. Such codes should not be communicated to persons not in charge of the EFB Administration**"
response	Not accepted This level of detail is not necessary in AMC 20-25.

comment	*146* comment by: *DGAC* In the third paragraph, audits carried out under the Quality's Assurance Program can also address procedures that EFB administration personnel should comply with. We do not understand why specific audits by the Administrator are mentioned (first sentence of the third paragraph)
response	Accepted Duplication of audits has been removed.

comment	*213* comment by: *AIRBUS* "The administrator training material should be made available on request to the competent authority and the EASA." The operational approval is under the NAA responsibility, except if the NAA requests EASA support (in this case, EASA will act like the NAA and might request the evidences as needed). So, there is no rationale to make the administrator training material available to EASA. Suggested text: The administrator training material should be made available on request to the competent authority.
response	Accepted

comment	*483* comment by: *Oliver Ast (CLH)* Proposed Text: The administrator training material should be made available on request to the competent authority. Comment: The operational approval is under the NAA responsibility, except if the NAA requests EASA support (in this case, EASA will act like the NAA and might request the evidences as needed). So, there is no rationale to make the administrator training material available to EASA.
response	Accepted

comment	*586* comment by: *Star Alliance*

Original AMC20-25 NPA text:
..as the EFB Administrator responsible for the complete system with appropriate authority within the operator's management structure..
RATIONALE / REASON / JUSTIFICATION for the Comment :
see comment about section 4.6
PROPOSED TEXT / COMMENT:
wording in accordance with section 4.6 or to add phrase only in section 7.10
Original AMC20-25 NPA text:
The administrator training material should be made available on request to the competent authority and the EASA.
RATIONALE / REASON / JUSTIFICATION for the Comment :
The operational approval is under the NAA responsibility, except if the NAA requests EASA support (in this case, EASA will act like the NAA and might request the evidences as needed). So, there is no rationale to make the administrator training material available to EASA.
PROPOSED TEXT / COMMENT:

The administrator training material should be made available on request to the competent authority.

response: Accepted

comment: *673* comment by: *Deutsche Lufthansa AG*

Proposal:
The administrator training material should be made available on request to the competent authority ~~and the EASA~~.

Comment/Justification:
The operational approval is under the NAA responsibility, except if the NAA requests EASA support (in this case, EASA will act like the NAA and might request the evidences as needed). So, there is no rationale to make the administrator training material available to EASA.

response: Accepted

comment: *714* comment by: *AT-CAA-PAM*

The competent authority should have the possibility to assess the EFB administrator.
Therefore add:
The EFB Administrator must be acceptable to the authority.

response: Noted

Formal approval processes cannot be introduced through an AMC. However, commercial air transport operators are already subject to rules ORO.GEN.200 and ORO.GEN.210 which allow the competent authority to oversee organisations, post holders, and reporting lines.

comment	*886* comment by: *Ingo Pucks, Owner IP Aerospace* The role of the administrator might well reach far out to other matters, especially with respect to regulations. The responsibilities are then more than just configuration management and validation only officially released SW and data is available on the EFB. This role needs a more thorough and comprehensive approach, reflecting the interfaces to the flight operations, dispatch, maintenance, flight crew, training and may other departments and the responsibilities that come with it.
response	Noted Indeed, the mentioned aspects are relevant. However, they are already covered by rules ORO.GEN.200 and ORO.GEN.210 which allow the competent authority to oversee organisations, post holders, reporting lines and any interface relevant to safety.

CONCLUSION ON COMMENTS ON PAGE 47 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – EFB ADMINISTRATOR)

12 comments were received on this segment of the NPA, mainly dealing with:

— training programmes to be sent only to the competent authority (not to the Agency as well);

— the removal of duplicated quality control processes;

— the enhancement of the role of the EFB administrator; and

— the EFB administrator being acceptable to the competent authority.

The comments referred in the first three bullets have been accepted and the text of AMC 20-25 has been modified accordingly.

In particular, the Agency agrees that the role of the EFB ADM should be further enhanced, including the relationship with other departments (including QMS), the specific access rights to the device, and the responsibility for all the installed applications.

The fourth bullet is already subject to rules ORO.GEN.200 and ORO.GEN.210 which allow the competent authority to oversee organisations, post holders and reporting lines in a proportionate way.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.10 Role of the EFB Administrator - p. 47-48 **7.10.1 The EFB Policy and Procedures Manual**

comment	*72* comment by: *Air France* "The (S)TC holder or the EFB system supplier 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" Proposal : add "internal shop or other" after "EFB system supplier".
response	Partially accepted The first paragraph of 7.11.1 has been slightly amended.

comment	*161* comment by: *Swedish Transport Agency, Civil Aviation Department (Transportstyrelsen, Luftfartsavdelningen)* · **7.10.1 The EFB Policy and Procedures Manual** o §7.10.1 states "The (S)TC holder or the EFB system supplier 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." o NAA Sweden opinion: To make AMC clear; this might be the operator itself. Not all EFB systems are delivered and/or supported by subcontractors. o Reason and motivation: To clarify only.
response	Accepted The first paragraph of 7.11.1 has been amended.

comment	*162* comment by: *Swedish Transport Agency, Civil Aviation Department (Transportstyrelsen, Luftfartsavdelningen)* · **7.10.1 The EFB Policy and Procedures Manual** o §7.10.1 states "The EFB Policy and Procedures Manual may be part of the Operator's Operations Manual." o NAA Sweden opinion: The wording "may" is open. AMC should emphasize the need for published procedures available to crew. o Reason and motivation: To clarify.
response	Noted The requirement to establish procedures was already contained in the text proposed by the NPA. The word 'may' refers to the possibility of publishing such procedures as part of the OPS Manual or as a separate document. The Agency believes that this alternative choice should be left to operators.

comment	*353* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 43 shared with Airbus JUSTIFICATION for the Comment on page # 47 §7.10 "The administrator training material should be made available on request to the competent authority and the EASA" PROPOSED TEXT / COMMENT The administrator training material should be made available on request to the competent authority.
response	Accepted

comment	*887* comment by: *Ingo Pucks, Owner IP Aerospace* The regulation would benefit from a clear distinction of the various components of an EFB System (System, HW, SW, data), the different providers (HW, SW, data, integrator, operator) and their responsibilities during the various steps and processes of selecting, integrating, introducing and operating an EFB system. a clear understanding of operational processes combined with a comprehensive

process based evaluation are deemed necessary here by IP Aerospace.

response

Accepted

The structure of AMC 20-25 has been significantly revised, in particular, to separate the requirements addressed to manufacturers from those addressed to operators.

CONCLUSION ON COMMENTS ON PAGES 47-48 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – EFB POLICY AND PROCEDURES MANUAL)

Five comments were received on this segment of the NPA, dealing with:

— training to be made available to the competent authority only;

— clarification of the first sentence, especially for devices not supported by a manufacturer; and

— the requirement to publish EFB procedures.

The majority of these comments has been accepted and the related sentences in AMC 20-25 have been redrafted.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.11 EFB System Maintenance p. 48

comment

163 comment by: *Swedish Transport Agency, Civil Aviation Department (Transportstyrelsen, Luftfartsavdelningen)*

· **7.11 EFB System Maintenance**

o See #5 above, the airworthiness approval for a class 2 EFB may only cover the installation of the mounting device. The instructions for continued airworthiness may set out servicing information and scheduled inspections as not applicable, N/A. Depending on the design of the mounting device, this might be a question that will be raised during §6.1 EFB Hardware approval process when the equipment is mounted. The airworthiness approval should therefore always include proactive inspections with the equipment mounted, i.e. a tablet computer device. The instructions for continued airworthiness will then be included in the aircraft maintenance program.

o Reason and motivation: To clarify, achieve guidance to the industry, and reduce gap between airworthiness **-** operational aspects.

response

Noted

The requirements for EFB maintenance have been revised and improved (e.g. for the batteries). However, in paragraph 7.12 of the resulting text of AMC 20-25, portable EFB and viewable stowage are mainly addressed.

Any installed part included in the approved type design, is, of course, subject to all provisions for continuous airworthiness, which do not need to be reproduced in AMC 20-25.

comment

214 comment by: *AIRBUS*

"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."

This requirement is conflicting with 25.1322 (c) (1) and 25.1322 (d) (1) which require alert prioritisation and minimization of false and nuisance alerts. This requirement is conflicting as well with section D.2.4.3 of Appendix D - see comment about section D.2.4.3 (System error messages).

Suggested text:
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 **if required** and that the system is isolated until rectification action is taken (refer to section D.2.4.3).

response

Not accepted

This level of detail is not necessary in AMC 20-25.

comment

354 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 44 shared with Airbus

JUSTIFICATION for the Comment on page # 48 §7.11 2nd §

This requirement is conflicting with 25.1322 (c) (1) and 25.1322 (d) (1) which require alert prioritisation and minimization of false and nuisance alerts. This requirement is conflicting as well with section D.2.4.3 of Appendix D - see comment # 374 about section D.2.4.3 (System error messages).

PROPOSED TEXT / COMMENT
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 **if required** and that the system is isolated until rectification action is taken (refer to section D.2.4.3) .

response

Not accepted

This level of detail is not necessary in AMC 20-25.

comment

484 comment by: *Oliver Ast (CLH)*

Proposed Text:
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 if required and that the system is isolated until rectification action is taken (refer to section D.2.4.3) .

Comment:
This requirement is conflicting with 25.1322 (c) (1) and 25.1322 (d) (1) which require alert prioritisation and minimization of false and nuisance alerts. This requirement is conflicting as well with section D.2.4.3 of Appendix D

response

Not accepted

This level of detail is not necessary in AMC 20-25.

comment

587 comment by: *Star Alliance*

Original AMC20-25 NPA text:
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.
RATIONALE / REASON / JUSTIFICATION for the Comment :
This requirement is conflicting with 25.1322 (c) (1) and 25.1322 (d) (1) which require alert prioritisation and minimization of false and nuisance alerts. This requirement is conflicting as well with section D.2.4.3 of Appendix D (see comment concerning p. 54).
PROPOSED TEXT / COMMENT:

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 **if required** and that the system is isolated until rectification action is taken (refer to section D.2.4.3) .

response

Not accepted

This level of detail is not necessary in AMC 20-25.

comment *674* comment by: *Deutsche Lufthansa AG*

Proposal:
Modify as follows:
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 **if required** and that the system is isolated until rectification action is taken **(refer to section D.2.4.3)**.

Comment/Justification:
This requirement is conflicting with 25.1322 (c) (1) and 25.1322 (d) (1) which require alert prioritisation and minimization of false and nuisance alerts. This requirement is conflicting as well with section D.2.4.3 of Appendix D (see comment #687).

response

Not accepted

This level of detail is not necessary in AMC 20-25.

comment *888* comment by: *Ingo Pucks, Owner IP Aerospace*

Failures in an EFB system. specifically a Class 3 system with Type C applications should be reported, dealt with and remedied with the utmost priority, as, due to the nature of the product, it is pretty likely a failure in one device of type occurs in all devices with the same set-up, configuration and components, too. Here, too, similarities to safety as for avionic units may be a guideline to define the requirements.

response

Noted

comment *928* comment by: *Tyler Clark - Transport Canada Civil Aviation*

EFB System Maintenance

	(page 48) Reference to the EFB system definition in section 4.7, not mentioned is the EFB battery, data and power connectivity and the input devices connected to the system. Operator's procedures for routine maintenance should include these as well. There is no mention of reporting failures to the EFB administrator (e.g. software configuration failure, database corruption…). Procedures for the routine maintenance of the EFB system should be based on the complexity of the system as well.
response	Partially accepted Specific mention of batteries has been included in paragraph 7.12 of the resulting text of AMC 20-25. The rest can be covered at the level of detail of the maintenance procedures to be established by the operator.

CONCLUSION ON COMMENTS ON PAGE 48 (DRAFT DECISION AMC 20-25 – OPERATIONAL APPROVAL PROCESS – EFB SYSTEM MAINTENANCE)

Several stakeholders pointed out that CS-25 requires alert prioritisation and, therefore, indication of EFB failure should be immediately presented to the flight crew only if required. While this is understood and applicable to systems installed on large aeroplanes, the Agency believes that this requirement is disproportionate to portable EFB.

One competent authority emphasised that for mounted EFB elements, the TC/STC holder should provide instructions for continuing airworthiness (ICA), which is noted and already covered by Commission Regulation (EC) No 2042/2003.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.12 Flight Crew Training p. 48

comment	*62* comment by: *Air France* "The flight crew training material should be made available on request to the competent authority and to the Agency." All material is available to the competent authority. EASA requests should go through the competent authority. Proposal : remove " and the EASA"
response	Accepted

comment	*63* comment by: *Air France* "Flight crew should be given specific training in the use of the EFB system before any operational approval is granted by the operator's competent authority." As the training programme needs to be approved before being applied, this sentence blocks the system. Proposal : Write : "Flight crew should be given specific training in the use of the EFB system before operational use of EFB ."

response | Accepted

The text has been amended accordingly.

comment | *141* comment by: *DGAC*

We propose to add that flight crew training is part of the OPS approval at the beginning of 7.12 :

"**Flight crew training review by the NAA is an integral part of the operational approval process.**"

response | Accepted

The text has been amended accordingly.

comment | *142* comment by: *DGAC*

We understand that the intent of the first paragraph is to forbid the use of EFB if no training has been performed.
As currently written, this statement would oblige to train all flight crew before approval is granted!

We propose to amend this paragraph as follows :
Flight crew should be given specific training in the use of the EFB system before **it is operationally used** ~~any operational approval is granted by the operator's competent authority~~

response | Accepted

The text has been amended accordingly.

comment | *143* comment by: *DGAC*

It is important that the environment of pilots during training and checking be representative of the real operational environment : EFB have an impact on workload, procedures... We propose to take due consideration of this in the last but one paragraph to indicate:

"Consideration should also be given to the role …during training and checking. **The simulator environment of the LPC and OPC should be representative of the aircraft real environment, including the EFB, as EFB have an important impact on interface procedures and workload**"

response | Accepted

The text has been amended accordingly.

comment | *215* comment by: *AIRBUS*

"The flight crew training material should be made available on request to the competent authority and to the Agency."
The operational approval is under the NAA responsibility, except if the NAA requests EASA support (in this case, EASA will act like the NAA and might request the evidences as needed). So, there is no rationale to make the administrator training material available to EASA.

	Suggested text: The flight crew training material should be made available on request to the competent authority.
response	Accepted The text has been amended accordingly.

comment	*367* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 45 shared with Airbus JUSTIFICATION for the Comment on page # 48 §7.12 " The flight crew training material should be made available on request to the competent authority and to the Agency. " The operational approval is under the NAA responsibility, except if the NAA requests EASA support (in this case, EASA will act like the NAA and might request the evidences as needed). So, there is no rationale to make the administrator training material available to EASA. PROPOSED TEXT / COMMENT The flight crew training material should be made available on request to the competent authority.
response	Accepted The text has been amended accordingly.

comment	*485* comment by: *Oliver Ast (CLH)* Proposed Text: The flight crew training material should be made available on request to the competent authority. Comment: The operational approval is under the NAA responsibility, except if the NAA requests EASA support (in this case, EASA will act like the NAA and might request the evidences as needed). So, there is no rationale to make the administrator training material available to EASA.
response	Accepted The text has been amended accordingly.

comment	*563* comment by: *Jeppesen Inc.* Suggest add: "Training in proper use and consideration of own-ship presentation(s)" Rationale: Communicates situational awareness character of any own-ship position indication by the EFB
response	Not accepted This is part of bullet 4: 'Specific training on the use of each application and the

	conditions under which the EFB may or may not be used'. Thus, there is no need to have a dedicated item to the use and consideration of the own-ship position.

comment	*588* comment by: *Star Alliance* **Original AMC20-25 NPA text:** The flight crew training material should be made available on request to the competent authority and to the Agency. **RATIONALE / REASON / JUSTIFICATION for the Comment :** The operational approval is under the NAA responsibility, except if the NAA requests EASA support (in this case, EASA will act like the NAA and might request the evidences as needed). So, there is no rationale to make the administrator training material available to EASA. **PROPOSED TEXT / COMMENT:** The flight crew training material should be made available on request to the competent authority.
response	Accepted The text has been amended accordingly.

comment	*675* comment by: *Deutsche Lufthansa AG* Proposal: The flight crew training material should be made available on request to the competent authority ~~and to the Agency.~~ Comment/Justification: The operational approval is under the NAA responsibility, except if the NAA requests EASA support (in this case, EASA will act like the NAA and might request the evidences as needed). So, there is no rationale to make the administrator training material available to EASA.
response	Accepted The text has been amended accordingly.

comment	*737* comment by: *NetJets Europe* Suggest adding: Proper use and consideration of ownship presentation(s) Rationale: Allows for training and communication pertaining to ownship presentations that have been provided for situational awareness only, and not for navigation.

(Source: Executive Jet Management, a NetJets company)

response

Not accepted

This is part of bullet 4: 'Specific training on the use of each application and the conditions under which the EFB may or may not be used'. Thus, there is no need to have a dedicated item to the use and consideration of the own-ship position.

comment *889* comment by: *Ingo Pucks, Owner IP Aerospace*

Flight crew training only is not enough for maintaining safety and proficiency of an EFB in an operational environment. All departments which run applications on a EFB might need similarly configured devices for all kinds of tasks within their responsibility, let alone trouble shooting. hence the training aspect shall include all relevant parties, and flight crews.

response

Noted

This comment is reasonable, but already covered by general provisions on qualification of staff in Commission Regulation (EU) No 965/2012. There is no subsequent modification of the text.

CONCLUSION ON COMMENTS ON PAGE 48 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – FLIGHT CREW TRAINING)

13 comments were received, among which:

— one comment duplicated six times against the fact that the Agency could require an operator to make training material available (bypassing NAAs). This comment is accepted;

— three comments on the training that provided improvement to paragraph 7.13 in the resulting text of AMC 20-25; and

— two comments asking the Agency to require specific training on the use of the own-ship position symbols. Those comments are not accepted since this is already covered by the proposed text, like for all the other EFB applications.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.13 Operational Evaluation Test p. 49

comment *564* comment by: *Jeppesen Inc.*

At sentence beginning "The Operational Risk assessment…". Unclear what criteria for "complete and correctly written" is defined to be.

Rationale:
Request clarification/template.

response

Accepted

The phrase 'complete and correctly written' is deleted.

comment *566* comment by: *Jeppesen Inc.*

Suggest to add: "Operational" prior to word "approval".

Rationale:
Clarifies type of approval

response

Noted

The expression 'operational approval' has been removed from the resulting text of AMC 20-25, since formal approval processes, in the EU framework, can only be established at the level of implementing rules and not at the level of AMC.

comment *890* comment by: *Ingo Pucks, Owner IP Aerospace*

testing an EFB system shall take place on all levels and integration steps, the operational evaluation should be the final step before the system is released to CAT service. The wording is slightly indication this is more an operational than a safety related matter.

response

Noted

CONCLUSION ON COMMENTS ON PAGE 49 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – OPERATIONAL EVALUATION TEST)

Three comments were received: two were noted and one editorial correction was accepted.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.13 Operational Evaluation Test - 7.13.1 Initial Retention of Paper Backup p. 49

comment *23* comment by: *FAA*

Page 49, 7.13.1

Comment:
Is EASA going to allow reductions to the operational evaluation period? If so, recommend reviewing the guidance the FAA has included in AC 120-76B

response

Accepted

A minimum (3 months) and maximum (6 months) duration of the trail period has been introduced.

comment *95* comment by: *NetJets Europe*

The Last bullet point in 7.13.1 "Initial Retention of paper Backup". states:

- The operational Risk Assessment is complete and correclty written

This according to § 7.2 "Risk Assessment for EFB Systems" is incorrect.

"7.2 Risk Assessment for EFB Systems
*….**Where the EFB system is intended for introduction alongside a paper-based system for a trial period, no risk assessment is required beyond***

***that conducted under the MS**. The results of the trial should establish the configuration and use of the system.*
Where an accelerated introduction with a reduced trial period or paperless entry-into-service of a new EFB system is intended, a detailed Operational Risk Analysis will be required".

So when paper is retained only a Management System Risk Assessment should be required

response

Accepted

The phrase 'complete and correctly written' has been deleted.

comment

96 comment by: *NetJets Europe*

*"Where paper is initially retained as backup, the operational evaluation test should consist of an in-service proving period typically lasting **not less than six months**."*
The minimum duration of the proving period should depend on the complexity of the proposed EFB system. Some set-ups might only require a Class 1 system running Type A software that in case of failure does not have any adverse effect on the operator's operating procedures. In these cases a six months minimum seems excessive.
The duration of the operational evaluation test should be proposed by the applicant, and subject to approval by the competent authority. Taking into consideration the complexity and criticality of the EFB installation.

response

Accepted

A minimum (3 months) and maximum (6 months) duration of the trail period has been introduced. The operator may propose an intermediate duration if felt appropriate.

comment

216 comment by: *AIRBUS*

"The Operational Risk Assessment is complete and correctly written."

The criteria to determine whether the Operational Risk Assessment is "correctly written", are missing. The added value of this requirement is not clear : it is up to the NAA to assess whether the Operational Risk Assessment is correctly written or not (ie., clear enough or detailed enough) ; if unacceptable, the NAA will reject it.

Suggested text:
The Operational Risk Assessment is complete.

response

Accepted

The phrase 'complete and correctly written' has been deleted.

comment

319 comment by: *Thales Avionics*

According to chapter 7: "Alternatively, the operator may choose to keep the paper backup as a cross-check against the EFB information and as a means of mitigation against failure or malfunction.". This is contradictory with chapter 7.13.1, "The Operational Risk Assessment is complete and correctly written." which can be understood that a full ORA is required even when "paper is initially

	retained as backup".
response	Accepted In paragraph 7.14.1 of the resulting text of AMC 20-25, it is, in fact, allowed to remove paper backup from on board, after a testing period. Guidance contained therein has been expanded.

comment	*355* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 46 shared with Airbus JUSTIFICATION for the Comment on page # 49 § 7.13.1 last bullet "The Operational Risk Assessment is complete and correctly written. " The criteria to determine whether the Operational Risk Assessment is "correctly written", are missing. The added value of this requirement is not clear : it is up to the NAA to assess whether the Operational Risk Assessment is correctly written or not (ie., clear enough or detailed enough) ; if unacceptable, the NAA will reject it. PROPOSED TEXT / COMMENT The Operational Risk Assessment is complete.
response	Accepted The phrase 'complete and correctly written' has been deleted.

comment	*405* comment by: *Flybe* Could EU-OPS 1.125 be added to the first paragraph?
response	Not accepted EU-OPS 1.125 is no longer in force.

comment	*486* comment by: *Oliver Ast (CLH)* Proposed Text: The Operational Risk Assessment is complete. Comment: The criteria to determine whether the Operational Risk Assessment is "correctly written", are missing. The added value of this requirement is not clear : it is up to the NAA to assess whether the Operational Risk Assessment is correctly written or not (ie., clear enough or detailed enough) ; if unacceptable, the NAA will reject it.
response	Accepted The phrase 'complete and correctly written' has been deleted.

comment	*567* comment by: *Jeppesen Inc.* Suggest to add: "Operational" prior to word "approval".

	Rationale: Clarifies type of approval
response	Noted The expression 'operational approval' has been removed from the resulting text of AMC 20-25 since formal approval processes, in the EU framework, can only be established at the level of implementing rules and not at the level of AMC.

comment	*568* comment by: *Jeppesen Inc.* Suggest to add additional bullet: "*A reduction to the 6-month proving period may be considered if the operator has previous experience with EFBs. A request to reduce the 6-month operational test evaluation requires approval from the associated NAA. The operator must submit a plan with justification to reduce the 6-month operational test evaluation to the operator's POI assigned with oversight responsibility for subsequent coordination and review with the applicable NAA." Rational: Harmonization with AC 120-76B
response	Accepted A minimum (3 months) and maximum (6 months) duration of the trail period has been introduced. The operator may propose an intermediate duration if felt appropriate.

comment	*676* comment by: *Deutsche Lufthansa AG* Proposal: Modify as follows: The Operational Risk Assessment is complete ~~and correctly written~~. Comment/Justification: The criteria to determine whether the Operational Risk Assessment is "correctly written", are missing. The added value of this requirement is not clear : it is up to the NAA to assess whether the Operational Risk Assessment is correctly written or not (ie., clear enough or detailed enough) ; if unacceptable, the NAA will reject it.
response	Accepted The phrase 'complete and correctly written' has been deleted.

comment	*715* comment by: *AT-CAA-PAM* Time - not less than 6 month There are operator who do only 2 legs per month! Are 6 month enough? Others do 6 legs per day per aircraft, do we need the "not less than six month" Recommendation: Change to : "typically 6 month" to give the competent authority room for own time frame.

Keep in mind, that our experience with EFBs and approach chart display is , that paper was much more dangerous than all EFB solutions and their risks together.

response

Partially accepted

A minimum (3 months) and maximum (6 months) duration of the trail period has been introduced. The operator may propose an intermediate duration if felt appropriate.

comment

738 comment by: *NetJets Europe*

Suggestion to add an additional bullet:
A reduction to the 6 month proving period may be considered if the operator has previous experience with EFBs. A request to reduce the 6 month operational test evaluation requires approval from the associated NAA. The operator must submit a plan with justification to reduce the 6 month operational test evaluation to the operator's POI assigned with oversight responsibility for subsequent coordination and review with the applicable NAA.

Rationale:
Harmonization with FAA AC 120-76B.
(Source: Executive Jet Management, a NetJets company)

response

Accepted

A minimum (3 months) and maximum (6 months) duration of the trail period has been introduced. The operator may propose an intermediate duration if felt appropriate.

comment

880 comment by: *Boeing*

Page: 49
Paragraph: 7.13.1 - *Initial Retention of Paper Backup*
1st paragraph, final bullet

The proposed text states:

7.13.1 Initial Retention of Paper Backup

Where paper is initially retained as backup, the operational evaluation test should consist of an in-service proving period typically lasting not less than six months. The purpose of the in-service proving period is for the operator to demonstrate to the competent authority that the EFB system provides an acceptable level of accessibility; usability and reliability to those required by the applicable operational requirements (see EU-OPS 1.135(b) and 1.1040(m)). In particular that:

…

- *The Operational Risk Assessment is complete and correctly written.*

REQUESTED CHANGE: We recommend that EASA provide either an example or reference document to the NAAs to clearly specify what a *"complete and correctly written"* document is.

JUSTIFICATION: Including our recommended information will ensure completeness of guidance materials necessary for compliance.

response

Accepted

	The phrase 'complete and correctly written' has been deleted.

comment	*891* comment by: *Ingo Pucks, Owner IP Aerospace* How will be, during this phase, dealt with issues tapping the safety and reliability of an EFB system shortly before its introduction into CAT operations? Please take into account the often costly programs that come with an EFB program in an airline.
response	Partially accepted The resulting text is explicit about the reduction of the evaluation period.

CONCLUSION ON COMMENTS ON PAGE 49 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – INITIAL RETENTION OF PAPER BACK-UP)

15 comments were received on this segment of the NPA, mainly dealing with:

— the inconsistency in section 7.13.1 of the proposed AMC 20-25 since the risk assessment should be always required;

— the subjectivity of the criteria 'complete and correctly written'; and

— provisions for the reduction of the evaluation period.

The comments related to the first two bullets have been accepted. In addition, following the comments received on the ORA segment, the Agency has redrafted the affected sections of the proposed AMC 20-25 to make them clearer.

Also, comments concerning the third bullet have been accepted. Provisions related to the use of a reduced/extended validation period have been defined taking into consideration the comments received and, also, the provisions contained in FAA AC120-76B.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - 7 OPERATIONAL APPROVAL PROCESS - 7.14 Operational Approval Submission p. 49

comment	*320* comment by: *Thales Avionics* Reference to "Appendix J" seems in fact to be a reference to "Appendix I"
response	Accepted

comment	*707* comment by: *Thomson Airways* "An example of typical items that the operator should include in this report is provided in Appendix J." should read "An example of typical items that the operator should include in this report is provided in Appendix I.".
response	Accepted

comment	*822* comment by: *Fédération Nationale de l'Aviation Marchande (FNAM)* As a minor comment, it is not Appendix J but Appendix I which deals with Operational Approval report.
response	Accepted

comment	*892* comment by: *Ingo Pucks, Owner IP Aerospace* This should also include a shortened OAR for those cases where another operator operates a similar or the same EFB successfully. A parallel to aircraft airworthiness approval shall be considered.
response	Noted Indeed. Any pertinent available experience or information may be credited when building the evidence necessary for the risk assessment.

CONCLUSION ON COMMENTS ON PAGE 49 (DRAFT AMC 20-25 – OPERATIONAL APPROVAL PROCESS – OPERATIONAL APPROVAL SUBMISSION)

The few received comments addressed points already covered in this CRD or editorial mistakes in cross references inside AMC 20-25. They have been accepted.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - Appendix A - Examples of Type A Software Applications p. 50

comment	*217* comment by: *AIRBUS* "Type A applications are EFB applications whose malfunction or misuse would have no adverse effect on the safety of any flight operation, i.e. a hazard level defined as no greater than a "no safety effect" failure condition classification." NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given for comment about section 5.2.1. (Type A definition). In addition, AMC 20-25 cannot question and creates a rupture with all the Type A applications which have been approved up to now under TGL 36 and AC 120-76A. Such Type A definition makes AMC 20-25 impracticable for operators with mixed fleets (fleet with EFB already approved as per TGL 36 and new fleet to be approved as per AMC 20-25). For an OEM, it is impossible to manage Type A applications with two opposite EASA and FAA definitions. Airbus recommends that Type A definition be consistent with TGL 36 one, AC 120-76 one and with draft AMC 20-25 one (version 2008). Suggested text: Type A applications include pre-composed, fixed presentations of data currently presented in paper format.
response	Not accepted Please see responses to comments on paragraph 5.2.1.

comment	*218* comment by: *AIRBUS* "- Browser displaying:" Characteristics of the browser clarified to be consistent with the definition of a Type A application - see comment about Appendix A (Examples of Type A Software Applications).

Suggested text:
- Document Browser displaying non-interactive documents in pre-composed format and without contextual access or display driven by sensed aircraft parameters:

response

Not accepted

Please see responses to comments on paragraph 5.2.1.

comment

219 comment by: *AIRBUS*

"b. Some manuals and additional information and forms required to be carried by the applicable operational regulations such as:
- Notification of special categories of passenger;
- Notification of special loads and any other information that might be required such as passenger and cargo manifests."
Pre-composed documents such as Operations manual should be added.

Suggested text:
b. Some manuals and additional information and forms required to be carried by the applicable operational regulations such as:
- The Operations Manual (including the MEL and CDL);
- Aircraft Flight Manual;
- The aircraft Technical Log other than the Sector Record pages;
- ATS flight plan
- NOTAMs and AIS briefing information;
- Meteorological information in a pre-composed format;
- pre-computed masse and balance information;
- Notification of special categories of passenger;
- Notification of special loads and any other information that might be required such as passenger and cargo manifests.

response

Partially accepted

Appendix A has been substantially revised with support from the Review Group.

comment

220 comment by: *AIRBUS*

"- Interactive applications for crew rest calculation;
- Interactive forms to comply with the reporting requirements of the competent authority and the operator."

Since they are interactive, those applications should be classified as Type B.

Suggested text:
Move the following text from Appendix A to Appendix B :
"- Interactive applications for crew rest calculation;
- Interactive forms to comply with the reporting requirements of the competent authority and the operator."

response

Not accepted

With new software definitions, interactive applications can be type A. Please refer to responses to 5.2.1.

comment

356 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 47 shared with Airbus

JUSTIFICATION for the Comment on page # 50 App A "Type A applications are EFB applications whose malfunction or misuse would have no adverse effect on the safety of any flight operation, i.e. a hazard level defined as no greater than a "no safety effect" failure condition classification."

NPA AMC 20-25 not harmonized with AC 120-76B.
See rationale given for comment #295 about section 5.2.1. (Type A definition).
In addition, AMC 20-25 cannot question and creates a rupture with all the Type A applications which have been approved up to now under TGL 36 and AC 120-76A.
Such Type A definition makes AMC 20-25 unpracticable for operators with mixed fleets (fleet with EFB already approved as per TGL 36 and new fleet to be approved as per AMC 20-25).
For an OEM, it is impossible to manage Type A applications with two opposite EASA and FAA definitions.
DASSAULT-AVIATION recommends that Type A definition be consistent with TGL 36 one, AC 120-76 one and with draft AMC 20-25 one (version 2008).

PROPOSED TEXT / COMMENT
Type A applications include pre-composed, fixed presentations of data currently presented in paper format.

response

Not accepted

Please see responses to comments on paragraph 5.2.1.

comment

357 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 48 shared with Airbus

JUSTIFICATION for the Comment on page # 50 App A "' - Browser displaying:" characteristics of the browser clarified to be consistent with the definition of a Type A application - see comment #
356 about Appendix A (Examples of Type A Software Applications).

PROPOSED TEXT / COMMENT
'- Document Browser displaying non-interactive documents in pre-composed format and without contextual access or display driven by sensed aircraft parameters:

response

Not accepted

Please see responses to comments on paragraph 5.2.1.

comment

358 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 49 shared with Airbus

JUSTIFICATION for the Comment on page # 50 App A b " Some manuals and additional information and forms required to be carried by the applicable operational regulations such as:
- Notification of special categories of passenger;
- Notification of special loads and any other information that might be required such as passenger and cargo manifests."

Pre-composed documents such as Operations manual should be added

PROPOSED TEXT / COMMENT
b. Some manuals and additional information and forms required to be carried by the applicable operational regulations such as:
- The Operations Manual (including the MEL and CDL);
- Aircraft Flight Manual;
- The aircraft Technical Log other than the Sector Record pages;
- ATS flight plan
- NOTAMs and AIS briefing information;
- Meteorological information in a pre-composed format;
- pre-computed masse and balance information;
- Notification of special categories of passenger;
- Notification of special loads and any other information that might be required such as passenger and cargo manifests.

response

Partially accepted

Appendix A substantially revised with support from the Review Group. Nevertheless, due to the new definitions, some of the proposed uses of document browser are type B.

comment

359 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 50 shared with Airbus

JUSTIFICATION for the Comment on page # 50 App A "'- Interactive applications for crew rest calculation;
- Interactive forms to comply with the reporting requirements of the competent authority and the operator."

Since they are interactive, those applications should be classified as Type B.

PROPOSED TEXT / COMMENT
Move following text from Appendix A to Appendix B :
"- Interactive applications for crew rest calculation;
- Interactive forms to comply with the reporting requirements of the competent authority and the operator."

response

Not accepted

With new software definitions, interactive applications can be Type A. Please refer to responses to 5.2.1.

comment

406 comment by: *Flybe*

It would be beneficial to allow the documents that are listed in EU-Ops, under OPS 1.125 to be made available on the Electronic Flight Bag only, instead of the requirement for having the original or copies of the documents carried on each flight.

The original copies may be retained by the Operator on the ground for inspection by a representative of the Authority/Regulator when requested.

response

Accepted

In paragraph 7.14.1 in the resulting text of AMC 20-25, removing the paper

	backup after a trial period is allowed.

comment	*488* comment by: *Oliver Ast (CLH)* Proposed Text: Type A applications include pre-composed, fixed presentations of data currently presented in paper format. Comment: NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given for comment #11 about section 5.2.1. In addition, AMC 20-25 cannot question and creates a rupture with all the Type A applications which have been approved up to now under TGL 36 and AC 120-76A. Such Type A definition makes AMC 20-25 unpracticable for operators with mixed fleets (fleet with EFB already approved as per TGL 36 and new fleet to be approved as per AMC 20-25). For an OEM, it is impossible to manage Type A applications with two opposite EASA and FAA definitions. Airbus recommends that Type A definition be consistent with TGL 36 one, AC 120-76 one and with draft AMC 20-25 one (version 2008).
response	Not accepted Please see responses to comments on paragraph 5.2.1.

comment	*489* comment by: *Oliver Ast (CLH)* Proposed Text: - Document Browser displaying non-interactive documents in pre-composed format and without contextual access or display driven by sensed aircraft parameters: Comment: characteristics of the browser clarified to be consistent with the definition of a Type A application (see comment)
response	Not accepted Please see responses to comments on paragraph 5.2.1.

comment	*490* comment by: *Oliver Ast (CLH)* Move following text from Appendix A to Appendix B : "- Interactive applications for crew rest calculation; - Interactive forms to comply with the reporting requirements of the competent authority and the operator." Comment: Since they are interactive, those applications should be classified as Type B.
response	Not accepted The new definition of Type A, indeed, allows applications with negligible effect on safety to be considered Type A, whether they are interactive or not.

comment	*569* comment by: *Jeppesen Inc.* Suggest add item: "Simplex CPDLC on-ground comms (one-way, ATC-to-Flight Crew), such as digital clearances, could be provided via Type A EFB software." Rationale: Suggested to support alternatives to current and future comm functions.
response	Not accepted This is an examples list and an application not present here does not signify it is forbidden. Nevertheless, the Agency believes it will be difficult to justify that failure conditions of an application supporting CPDLC have no safety effect.

comment	*591* comment by: *Star Alliance* **Original AMC20-25 NPA text:** Type A applications are EFB applications whose malfunction or misuse would have no adverse effect on the safety of any flight operation, i.e. a hazard level defined as no greater than a "no safety effect" failure condition classification. **RATIONALE / REASON / JUSTIFICATION for the Comment :** NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given for comment about section 5.2.1. In addition, AMC 20-25 cannot question and creates a rupture with all the Type A applications which have been approved up to now under TGL 36 and AC 120-76A. Such Type A definition makes AMC 20-25 unpracticable for operators with mixed fleets (fleet with EFB already approved as per TGL 36 and new fleet to be approved as per AMC 20-25). For an OEM, it is impossible to manage Type A applications with two opposite EASA and FAA definitions. Airbus recommends that Type A definition be consistent with TGL 36 one, AC 120-76 one and with draft AMC 20-25 one (version 2008). **PROPOSED TEXT / COMMENT:** Type A applications include pre-composed, fixed presentations of data currently presented in paper format.
response	Not accepted Please see responses to comments on paragraph 5.2.1.

comment	*593* comment by: *Star Alliance* **Original AMC20-25 NPA text:** - Browser displaying: **RATIONALE / REASON / JUSTIFICATION for the Comment :** characteristics of the browser clarified to be consistent with the definition of a Type A application (see comment above).

PROPOSED TEXT / COMMENT:

- Document Browser displaying non-interactive documents in pre-composed format and without contextual access or display driven by sensed aircraft parameters:

response

Not accepted

Please see responses to comments on paragraph 5.2.1.

comment

594 comment by: *Star Alliance*

Original AMC20-25 NPA text:
b. Some manuals and additional information and forms required to be carried by the applicable operational regulations such as:
- Notification of special categories of passenger;
- Notification of special loads and any other information that might be required such as passenger and cargo manifests.

RATIONALE / REASON / JUSTIFICATION for the Comment :
Pre-composed documents such as Operations manual should be added

PROPOSED TEXT / COMMENT:

b. Some manuals and additional information and forms required to be carried by the applicable operational regulations such as:
- The Operations Manual (including the MEL and CDL);
- Aircraft Flight Manual;
- The aircraft Technical Log other than the Sector Record pages;
- NOTAMs and AIS briefing information;
- Meteorological information
- Notification of special categories of passenger;
- Notification of special loads and any other information that might be required such as passenger and cargo manifests.

response

Partially accepted

Appendix A has been substantially revised with support from the Review Group. Nevertheless, due to the new definitions, some of the proposed uses of document browser are Type B.

comment

595 comment by: *Star Alliance*

Original AMC20-25 NPA text:
- Interactive applications for crew rest calculation;
- Interactive forms to comply with the reporting requirements of the competent authority and the operator.

RATIONALE / REASON / JUSTIFICATION for the Comment :

Since they are interactive, those applications should be classified as Type B.
PROPOSED TEXT / COMMENT:

Move following text from Appendix A to Appendix B :
"- Interactive applications for crew rest calculation;
- Interactive forms to comply with the reporting requirements of the competent authority and the operator."

response

Not accepted

The new definition of Type A, indeed, allows applications with negligible effect on safety to be considered Type A, whether they are interactive or not.

comment

678 comment by: *Deutsche Lufthansa AG*

Referring to:
"Type A applications are EFB applications whose malfunction or misuse would have no adverse effect on the safety of any flight operation, i.e. a hazard level defined as no greater than a "no safety effect" failure condition classification."

Proposal:
Change to read:
"Type A applications include pre-composed, fixed presentations of data currently presented in paper format."

Comment/Justification:
NPA AMC 20-25 not harmonized with forthcoming AC 120-76B.
See rationale given for comment #650 about section 5.2.1.
In addition, AMC 20-25 cannot question and creates a rupture with all the Type A applications which have been approved up to now under TGL 36 and AC 120-76A.
Such Type A definition makes AMC 20-25 unpracticable for operators with mixed fleets (fleet with EFB already approved as per TGL 36 and new fleet to be approved as per AMC 20-25).
For an OEM, it is impossible to manage Type A applications with two opposite EASA and FAA definitions.
Airbus recommends that Type A definition be consistent with TGL 36 one, AC 120-76 one and with draft AMC 20-25 one (version 2008).

response

Not accepted

Please see responses to comments on paragraph 5.2.1.

comment

679 comment by: *Deutsche Lufthansa AG*

Referring to:
"- Browser displaying:"

Proposal:
Change to read:
"- Document Browser displaying non-interactive documents in pre-composed format and without contextual access or display driven by sensed aircraft parameters:"

Comment/Justification:
characteristics of the browser clarified to be consistent with the definition of a Type A application (see comment #678).

response

Not accepted

Please see responses to comments on paragraph 5.2.1.

comment

680 comment by: *Deutsche Lufthansa AG*

Referring to:
"b. Some manuals and additional information and forms required to be carried by the applicable operational regulations such as:
- Notification of special categories of passenger;
- Notification of special loads and any other information that might be required such as passenger and cargo manifests."

Proposal:
Extend for more clarity:
"b. Some manuals and additional information and forms required to be carried by the applicable operational regulations such as:
- The Operations Manual (including the MEL and CDL);
- Aircraft Flight Manual;
- The aircraft Technical Log other than the Sector Record pages;
- NOTAMs and AIS briefing information;
- Meteorological information
- Notification of special categories of passenger;
- Notification of special loads and any other information that might be required such as passenger and cargo manifests."

Comment/Justification:
Pre-composed documents such as Operations manual should be added

response

Partially accepted

Appendix A has been substantially revised with support from the Review Group.

comment

881 comment by: *Boeing*

Page: 50
Paragraph: Appendix A - *Examples of Type A Software Applications*
2nd paragraph

The proposed text states:

Appendix A - Examples of Type A Software Applications

Type A applications are EFB applications whose malfunction or misuse would have no adverse effect on the safety of any flight operation, i.e. a hazard level defined as no greater than a "no safety effect" failure condition classification.

Such applications might typically be: …

REQUESTED CHANGE: We suggest the following revision to the text:

*Such applications might typically be**, but not limited to**: …*

JUSTIFICATION: As proposed in the draft NPA, this information is incomplete. Our suggested change would provide more clarification.

response

Accepted

CONCLUSION ON COMMENTS ON PAGE 50 (DRAFT AMC 20-25 – APPENDIX A – EXAMPLES OF TYPE A SOFTWARE APPLICATIONS)

All 21 comments received on this segment dealt with the definition of Type A applications (please refer to section 5.2.1 in the proposed AMC 20-25). Several suggested amending the list of examples.

As explained when replying to the comments received on paragraph 5.2.1 of the proposed AMC 20-25, the definition of Type A remains unchanged (i.e. like in the NPA, but different from TGL 36).

Nevertheless, the (non-exhaustive) list of examples in Appendix A has been substantially revised with support from the Review Group.

The resulting text of AMC 20-25 is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - Appendix B - Type B Software Applications p. 51

comment

164 comment by: *Swedish Transport Agency, Civil Aviation Department (Transportstyrelsen, Luftfartsavdelningen)*

· **Appendix B - Type B Software Applications**
o See #6 above, evaluation process is too administrative time- and cost consuming without achieving higher level of standard if regulation and AMC is enhanced in line with this NPA.

response

Accepted

The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25.

comment

165 comment by: *Swedish Transport Agency, Civil Aviation Department (Transportstyrelsen, Luftfartsavdelningen)*

· **Appendix B - Type B Software Applications**

o Appendix B states:
Type B applications are applications that:
- Do not substitute to or duplicate any system or functionality required by airworthiness regulation or operational rule, and
- Whose malfunction or misuse would have an adverse safety effect, i.e. a hazard level no greater than a "minor" failure condition classification, and
- Do not have any of the capabilities defining type C applications (see § 5.2.3).
(…..)

The following list of applications can be evaluated by the competent authorities at national level:
- Document Browser displaying the following documents, interactive or not, or not in pre-composed format, and not driven by sensed aircraft parameters:
The manuals and additional information and forms required to be carried by Regulations such as:
☐The Operations Manual (including the MEL and CDL);
☐Aircraft Flight Manual;

o NAA Sweden opinion: These documents are usually displayed by a Pdf reader or a browser application. They are, from a flight safety aspect, perhaps more

applicable to software type A. Operational manuals, MEL and AFM are all approved or accepted documents in a previous step, from NAA or EASA/TC/STC holder. The transfer to screen interface and presentation of text document is common standard in the industry. If the system would above this include interactive applications, such as performance calculation programs based on OM-B tables of course these application need approval from NAA according to suggestion #6 and #10 above.

o Reason and motivation: Regulation is making EFB implementation more difficult without enhancing flight safety.

response

Not accepted

According to the new software definitions based on safety effects, such applications are classified Type B.

comment

221 comment by: *AIRBUS*

"Type B applications are applications that:
[…]
- Whose malfunction or misuse would have an adverse safety effect, i.e. a hazard level no greater than a "minor" failure condition classification"

NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given for comment about section 5.2.2.b). (Type B definition).

Suggested text:
Type B applications are applications that:
[…]
- Include dynamic, interactive applications that can manipulate data and presentation

response

Not accepted

Please see responses to comments on paragraph 5.2.2.

comment

222 comment by: *AIRBUS*

"- Document Browser displaying the following documents, interactive or not, or not in pre-composed format, and not driven by sensed aircraft parameters:"

Type B applications should address:
- only interactive documents (non-interactive document should be Type A)
- not in pre-composed format
- driven by sensed aircraft parameters (this capability enhances significantly the safety by minimizing the crew workload, eg. automatic and direct access to the relevant FCOM page giving the right procedure)

Suggested text:
- Document Browser displaying documents that are interactive, or not in pre-composed format, and/or with contextual access or display driven by sensed aircraft parameters:

response

Not accepted

Please see responses to comments on paragraph 5.2.2.

comment 223 comment by: AIRBUS

"- The aircraft Technical Log other than the Sector Record pages;
- ATS flight plan
- NOTAMs and AIS briefing information;
- Meteorological information"

These documentation and information are pre-composed and fixed. They are not intended to be changed in flight. They should be removed from Appendix B. Note : in this case, Meteorological information are without graphical interpretation (ie., not dynamic weather charts).

Suggested text:
Remove the following from Appendix B :
"- The aircraft Technical Log other than the Sector Record pages;
- ATS flight plan
- NOTAMs and AIS briefing information;
- Meteorological information"

response Not accepted

According to the new software definitions based on safety effects, such applications are classified Type B.

comment 224 comment by: AIRBUS

"- Electronic aeronautical chart applications including en-route, area, approach, and airport surface maps including panning, zooming, scrolling, and rotation, centring and page turning but without display of aircraft/own-ship position."

The requirement about the display of aircraft/own-ship position should be relaxed for the following reasons :
- EFBs are not guidance systems, but could improve significantly situation awareness (easier and quicker assessment of the position and navigation follow-up on a digital map than the finger on a paper map).
- Errors and mistakes with a finger on the paper map are much more frequent than the very remote cases of failures of the display of the own-ship symbol on a moving map.
- Through an appropriate and a distinct symbol on EFB nav charts with a uncertainty level attached to it, displaying an aircraft symbol on EFB nav charts would definitely bring a higher level of awareness of the in-flight position with regards to the en-route chart, minimize flight crew workload and therefore, would enhance safety.
Refer to comment about section 5.2.3.a). (Type C definition) aiming to distinguish about tactical data (real-time or short-term data displayed on ND) vs strategical data (long-term data displayed on EFB display).
The flight crew cannot be confused by :
- on one hand, a Navigation Display (ND) displaying a FMS flight plan with the own ship position and weather radar information for short term or tactical operations,
- on the other hand, an EFB display displaying nav charts with an appropriate own ship position symbol and weather charts (uploaded on ground or received by datalink in air) for long term or strategic operations and which cannot be used as Primary means.
As a consequence, it is suggested to add meteorological chart application and to change the following current wording "but without display of aircraft/own-ship position".

In accordance with comment #191, Airbus also suggests to indicate that Type B Electronic chart applications are for "strategic" use by the crew only.

Suggested text:
- Electronic aeronautical chart applications (including en-route, area, approach), airport surface maps and meteorological graphical interpretation, including panning, zooming, scrolling, and rotation, centring and page turning, with or without display of aircraft/own-ship position, for strategic use by the crew.

response

Not accepted

The in-flight depiction of the own-ship position remains a certified application, beyond the scope of either Type A or B, due to the experts consensus on the effects of the failure conditions linked to that function. Please see also Appendix C.

comment

225 comment by: *AIRBUS*

"- Applications that make use of the Internet and/or other aircraft operational communications (AAC) or company maintenance-specific data links to collect, process, and then disseminate data for uses such as spare parts and budget management, spares/inventory control, unscheduled maintenance scheduling, etc."

The examples limited to maintenance and budget are very restrictive and could be misinterpreted.
It would be very helpful for the flight crew to access many other applications which would be more flight operations-oriented. For instance :
- access to aeronautical meteo web sites for strategic meteo decisions
- video applications over IP communications to get technical assistance from the airline ground infrastructure
- EFB data connectivity based on IP wireless communications in flight and on ground (eg., iPad which could be handled freely in the cockpit with no wiring constraints, except in critical phases of flight) in accordance with requirements of section 6.1.2.4 (EFB data connectivity, including security considerations) and section 6.1.2.6 (EMI demonstrations).

Suggested text:
- Applications that make use of the Internet and/or other aircraft operational communications (AAC) or company specific data links or wired/wireless communications

response

Noted

Nevertheless, this part has been removed and remains only in Appendix B, which is an examples list. Other uses, if properly demonstrated as corresponding to the Type B definition, are, therefore, acceptable.

comment

226 comment by: *AIRBUS*

"In other cases the evaluation should be conducted by the Agency, as for instance for the following applications:"

NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given for comment about section 7 (Operational approval process). In addition, evaluation consideration is out of the Appendix B scope (limited to

Type B definition). Type B software evaluation and approval process is part of section 6.2.2.

Suggested text:
Remove the following from Appendix B :
"In other cases the evaluation should be conducted by the Agency, as for instance for the following applications:"

response

Partially accepted

The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The content of the comment is agreed by the Agency since, in fact, the evaluation service remains available on a voluntary basis.

comment

313 ❖ comment by: *Thales Avionics*

Beginning of paragraph 7 lists Type B applications, most of them being already listed in Appendix B, with some minor differences. In addition, Appendix B, unlike appendices A and C, addresses approval process with EASA or national authorities.
It is therefore suggested to split Appendix B in two paragraphs, with B.1 paragraph containing those application to be approved by national authorities, and B.2 containing those to be approved by EASA; and to replace the lists in paragraph 7 by references to B.1 and B.2.
This would also permit to make the figure for Class III EFB (Decision tree) clearer, by replacing the sentence " Does the EFB run Type B (...) ?" by "Does the EFB run Type B application listed in Appendix B.1?"
Finally, paragraph 7.5 could also directly refer to B.2

response

Partially accepted

The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25 and, consequently, the decision tree too.

comment

322 comment by: *Thales Avionics*

Electronic aeronautical chart applications including en-route, area, approach, and airport surface maps including panning, zooming, scrolling, and rotation, **centring** and page turning but **without display of aircraft/own-ship position**.
This statement may be ambiguous: auto-centring with an adequate zoom may be seen as a way to infere the aircraft/own-ship position. Can it be clarified that auto-centering without the display of an aicraft mock-up or of other reticle is compliant to this requirement?

response

Not accepted

The in-flight depiction of the own-ship position remains a certified application, beyond the scope of either Type A or B, due to the experts consensus on the effects of the failure conditions linked to that function. Please see also Appendix C.

Applications with auto-centring function may be classified as Type B depending on the process detailed in Appendix C.

comment	*360* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 51 shared with Airbus JUSTIFICATION for the Comment on page # 51 App B "Type B applications are applications that: […] - Whose malfunction or misuse would have an adverse safety effect, i.e. a hazard level no greater than a "minor" failure condition classification" NPA AMC 20-25 not harmonized with AC 120-76B. See rationale given for comment #299 about section 5.2.2.b). (Type B definition). PROPOSED TEXT / COMMENT Type B applications are applications that: […] - Include dynamic, interactive applications that can manipulate data and presentation
response	Not accepted Please see responses to comments on paragraph 5.2.2.

comment	*361* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 52 shared with Airbus JUSTIFICATION for the Comment on page # 51 App B "'- Document Browser displaying the following documents, interactive or not, or not in pre-composed format, and not driven by sensed aircraft parameters:" Type B applications should address: - only interactive documents (non-interactive document should be Type A) - not in pre-composed format - driven by sensed aircraft parameters (this capability enhances significantly the safety by minimizing the crew workload, eg. automatic and direct access to the relevant FCOM page giving the right procedure) PROPOSED TEXT / COMMENT '- Document Browser displaying documents that are interactive, or not in pre-composed format, and/or with contextual access or display driven by sensed aircraft parameters:
response	Not accepted Please see responses to comments on paragraph 5.2.2.

comment	*362* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 53 shared with Airbus JUSTIFICATION for the Comment on page # 51 App B "'- The aircraft Technical Log other than the Sector Record pages; - ATS flight plan

- NOTAMs and AIS briefing information;
- Meteorological information"

These documentation and information are pre-composed and fixed. They are not intended to be changed in flight. They should be removed from Appendix B. Note : in this case, Meteorological information are without graphical interpretation (ie., not dynamic weather charts).

PROPOSED TEXT / COMMENT
Remove the following from Appendix B :
"- The aircraft Technical Log other than the Sector Record pages;
- ATS flight plan
- NOTAMs and AIS briefing information;
- Meteorological information"

response

Not accepted

According to the new software definitions based on safety effects, such applications are classified Type B.

comment

363 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 54 shared with Airbus

JUSTIFICATION for the Comment on page # 51 App B "'- Electronic aeronautical chart applications including en-route, area, approach, and airport surface maps including panning, zooming, scrolling, and rotation, centring and page turning but without display of aircraft/own-ship position. "

The requirement about the display of aircraft/own-ship position should be relaxed for the following reasons :
- EFBs are not guidance systems, but could improve significantly situation awareness (easier and quicker assessment of the position and navigation follow-up on a digital map than the finger on a paper map).
- Errors and mistakes with a finger on the paper map are much more frequent than the very remote cases of failures of the display of the own-ship symbol on a moving map.
- Through an appropriate and a distinct symbol on EFB nav charts with a uncertainty level attached to it, displaying an aircraft symbol on EFB nav charts would definitely bring a higher level of awareness of the in-flight position, minimize flight crew workload and therefore, would enhance safety.
Refer to comment #300 about section 5.2.3.a). (Type C definition) aiming to distinguish about tactical data (real-time or short-term data displayed on ND) vs strategical data (long-term data displayed on EFB display).
The flight crew cannot be confused by :
- on one hand, a Navigation Display (ND) displaying a FMS flight plan with the own ship position and weather radar information for short term or tactical operations,
- on the other hand, an EFB display displaying nav charts with an appropriate own ship position symbol and weather charts (uploaded on ground or received by datalink in air) for long term or strategic operations and which cannot be used as Primary means.
As a consequence, it is suggested to add meteorological chart application and to change the following current wording "but without display of aircraft/own-ship position".

PROPOSED TEXT / COMMENT

'- Electronic aeronautical chart applications (including en-route, area, approach), airport surface maps and meteorological graphical interpretation, including panning, zooming, scrolling, and rotation, centring and page turning, with or without display of aircraft/own-ship position.

response

Not accepted

The in-flight depiction of the own-ship position remains a certified application, beyond the scope of either Type A or B, due to the experts consensus on the effects of the failure conditions linked to that function. Please see also Appendix C.

comment

364 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 55 shared with Airbus

JUSTIFICATION for the Comment on page # 51 App B " '- Applications that make use of the Internet and/or other aircraft operational communications (AAC) or company maintenance-specific data links to collect, process, and then disseminate data for uses such as spare parts and budget management, spares/inventory control, unscheduled maintenance scheduling, etc. "

The examples limited to maintenance and budget are very restrictive and could be misinterpretated.
It would be very helpful for the flight crew to access many other applications which would be more flight operations-oriented. For instance :
- access to aeronautical meteo web sites for strategic meteo decisions
- video applications over IP communications to get technical assistance from the airline ground infrastructure
- EFB data connectivity based on IP wireless communications in flight and on ground (eg., iPad which could be handled freely in the cockpit with no wiring constraints, except in critical phases of flight) in accordance with requirements of section 6.1.2.4 (EFB data connectivity, including security considerations) and section 6.1.2.6 (EMI demonstrations).

PROPOSED TEXT / COMMENT
'- Applications that make use of the Internet and/or other aircraft operational communications (AAC) or company specific data links or wired/wireless communications

response

Noted

Nevertheless, this part has been removed and remains only in Appendix B, which is an examples list. Other uses, if properly demonstrated as corresponding to the Type B definition, are, therefore, acceptable.

comment

365 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 56 shared with Airbus

JUSTIFICATION for the Comment on page # 51 App B "In other cases the evaluation should be conducted by the Agency, as for instance for the following applications:"

NPA AMC 20-25 not harmonized with AC 120-76B.
See rationale given for comment #331 about section 7 (Operational approval process).

In addition, evaluation consideration is out of the Appendix B scope (limited to Type B definition). Type B software evaluation and approval process is part of section 6.2.2.

PROPOSED TEXT / COMMENT
Remove the following from Appendix B :
"In other cases the evaluation should be conducted by the Agency, as for instance for the following applications:"

response

Partially accepted

The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The content of the comment is agreed by the Agency since, in fact, the evaluation service remains available on a voluntary basis.

comment

407 comment by: *Flybe*

It would be beneficial to allow the documents that are listed in EU-Ops, under OPS 1.125 to be made available on the Electronic Flight Bag only, instead of the requirement for having the original or copies of the documents carried on each flight.

The original copies may be retained by the Operator on the ground for inspection by a representative of the Authority/Regulator when requested.

response

Accepted

In paragraph 7.14.1 of the resulting text of AMC 20-25, it is, in fact, allowed to remove paper backup from on board, after a testing period.

comment

491 comment by: *Oliver Ast (CLH)*

Proposed Text:
Type B applications are applications that:
[…]
- Include dynamic, interactive applications that can manipulate data and presentation

Comment:
NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given for comment about section 5.2.2 b)

response

Not accepted

Please see responses to comments on paragraph 5.2.2.

comment

492 comment by: *Oliver Ast (CLH)*

Proposed Text:

- Document Browser displaying the following documents that are interactive, or not in pre-composed format, and driven by sensed aircraft parameters:

Comment:
Type B applications should address:

	- only interactive documents (non-interactive document should be Type A) - not in pre-composed format - driven by sensed aircraft parameters (this capability enhances significantly the safety by minimizing the crew workload, eg. automatic and direct access to the relevant FCOM page giving the right procedure)
response	Not accepted Please see responses to comments on paragraph 5.2.2.

comment	*493* comment by: *Oliver Ast (CLH)* Remove the following from Appendix B : "- The aircraft Technical Log other than the Sector Record pages; - NOTAMs and AIS briefing information; - Meteorological information" Comment: These documentation and information are pre-composed and fixed. They are not intended to be changed in flight. They should be removed from Appendix B.
response	Not accepted According to the new software definitions, based on safety effects, such applications are classified Type B.

comment	*494* comment by: *Oliver Ast (CLH)* Proposed Text: - Electronic aeronautical chart applications (including en-route, area, approach), airport surface maps and meteorological graphical interpretation, including panning, zooming, scrolling, and rotation, centring and page turning, with or without display of aircraft/own-ship position. Comment: The requirement about the display of aircraft/own-ship position should be relaxed for the following reasons : - EFBs are not guidance systems, but could improve significantly situation awareness (easier and quicker assessment of the position and navigation follow-up on a digital map than the finger on a paper map). - Errors and mistakes with a finger on the paper map are much more frequent than the very remote cases of failures of the display of the own-ship symbol on a moving map. - Through an appropriate and a distinct symbol on EFB nav charts with a uncertainty level attached to it, displaying an aircraft symbol on EFB nav charts would definitely bring a higher level of awareness of the in-flight position, minimize flight crew workload and therefore, would enhance safety. Refer to the comment about section 5.2.3.a). (Type C definition) aiming to distinguish about tactical data (real-time or short-term data displayed on ND) vs strategical data (long-term data displayed on EFB display). The flight crew cannot be confused by : - on one hand, a Navigation Display (ND) displaying a FMS flight plan with the own ship position and weather radar information for short term or tactical operations, - on the other hand, an EFB display displaying nav charts with an appropriate

	own ship position symbol and weather charts (uploaded on ground or received by datalink in air) for long term or strategic operations and which cannot be used as Primary means. As a consequence, it is suggested to add meteorological chart application and to change the following current wording "but without display of aircraft/own-ship position".
response	Not accepted The in-flight depiction of the own-ship position remains a certified application, beyond the scope of either Type A or B, due to the experts consensus on the effects of the failure conditions linked to that function. Please see also Appendix C.

comment	*495* comment by: *Oliver Ast (CLH)* Remove the following from Appendix B : "In other cases the evaluation should be conducted by the Agency, as for instance for the following applications:" Comment: NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given for comment about section 7. In addition, evaluation consideration is out of the Appendix B scope (limited to Type B definition). Type B software evaluation and approval process is part of section 6.2.2.
response	Partially accepted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The content of the comment is agreed by the Agency since, in fact, the evaluation service remains available on a voluntary basis.

comment	*571* comment by: *Jeppesen Inc.* Suggest reference to "Document Browser" implies an unnecessarily constraining implementation-detail. These Type B functions could be provided via other means. Rationale: Suggestion provides flexibility to software application developers to provide these functions in other ways.
response	Not accepted The term ‘document browser’ is standard in the EFB industry and deemed generic enough. In any case, this is an open list of example applications; other applications should achieve the same function.

comment	*572* comment by: *Jeppesen Inc.* Suggest add item: "Simplex CPDLC on ground and in-flight comms (one-way, ATC-to-Flight Crew), such as digital clearances, could be provided via Type B EFB software."

Rationale:
Suggested to support alternatives to current and future comm functions.

response

Not accepted

Provided the applications are demonstrated fulfilling the EFB software definitions, such functions could be implemented. The list is not closed.

comment

573 comment by: *Jeppesen Inc.*

Suggest add some ADS-B (e.g. CDTI-Surf, Wx) functionality as Type B software function

Rationale:
Suggested to support alternatives to current and future comm functions.

response

Not accepted

According to experts consensus within the Review Group, and to the process described in Appendix C and chapter 5.2.3, such functions are in the domain of avionics and require an airworthiness approval.

comment

575 comment by: *Jeppesen Inc.*

Suggest add "Performance applications sending data to the Flight Management System or any other certified avionics system"

Rationale:
Understanding is that there already exist approved Type B performance applications which send data through comm links such as ACARS to FMC's.

response

Not accepted

EFB can be interfaced with certified systems, but this requires airworthiness approval and, therefore, it is not presently the case to mention such applications in Appendix B.

comment

596 comment by: *Star Alliance*

Original AMC20-25 NPA text:
Type B applications are applications that:
[…]
- Whose malfunction or misuse would have an adverse safety effect, i.e. a hazard level no greater than a "minor" failure condition classification

RATIONALE / REASON / JUSTIFICATION for the Comment :
NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given for comment about section 5.2.2 b)

PROPOSED TEXT / COMMENT:

Type B applications are applications that:
[…]
- Include dynamic, interactive applications that can manipulate data and presentation

response

Not accepted

Please see responses to comments on paragraph 5.2.2.

comment

597 comment by: *Star Alliance*

Original AMC20-25 NPA text:
- Document Browser displaying the following documents, interactive or not, or not in pre-composed format, and not driven by sensed aircraft parameters:
RATIONALE / REASON / JUSTIFICATION for the Comment :
Type B applications should address:
- only interactive documents (non-interactive document should be Type A)
- not in pre-composed format
- driven by sensed aircraft parameters (this capability enhances significantly the safety by minimizing the crew workload, eg. automatic and direct access to the relevant FCOM page giving the right procedure)

PROPOSED TEXT / COMMENT:
- Document Browser displaying the following documents that are interactive, or not in pre-composed format, and driven by sensed aircraft parameters:

response

Not accepted

Please see responses to comments on paragraph 5.2.2.

comment

598 comment by: *Star Alliance*

Original AMC20-25 NPA text:
- The aircraft Technical Log other than the Sector Record pages;
- NOTAMs and AIS briefing information;
- Meteorological information
RATIONALE / REASON / JUSTIFICATION for the Comment :
These documentation and information are pre-composed and fixed. They are not intended to be changed in flight. They should be removed from Appendix B.
PROPOSED TEXT / COMMENT:

Remove the following from Appendix B :
"- The aircraft Technical Log other than the Sector Record pages;
- NOTAMs and AIS briefing information;
- Meteorological information"

response

Not accepted

According to the new software definitions, based on safety effects, such applications are classified Type B.

comment 599 comment by: *Star Alliance*

Original AMC20-25 NPA text:
- Electronic aeronautical chart applications including en-route, area, approach, and airport surface maps including panning, zooming, scrolling, and rotation, centring and page turning but without display of aircraft/own-ship position.

RATIONALE / REASON / JUSTIFICATION for the Comment :
The requirement about the display of aircraft/own-ship position should be relaxed for the following reasons :
- EFBs are not guidance systems, but could improve significantly situation awareness (easier and quicker assessment of the position and navigation follow-up on a digital map than the finger on a paper map).
- Errors and mistakes with a finger on the paper map are much more frequent than the very remote cases of failures of the display of the own-ship symbol on a moving map.
- Through an appropriate and a distinct symbol on EFB nav charts with a uncertainty level attached to it, displaying an aircraft symbol on EFB nav charts would definitely bring a higher level of awareness of the in-flight position, minimize flight crew workload and therefore, would enhance safety.

Refer to the comment about section 5.2.3.a). (Type C definition) aiming to distinguish about tactical data (real-time or short-term data displayed on ND) vs strategical data (long-term data displayed on EFB display).
The flight crew cannot be confused by :
- on one hand, a Navigation Display (ND) displaying a FMS flight plan with the own ship position and weather radar information for short term or tactical operations,
- on the other hand, an EFB display displaying nav charts with an appropriate own ship position symbol and weather charts (uploaded on ground or received by datalink in air) for long term or strategic operations and which cannot be used as Primary means.

As a consequence, it is suggested to add meteorological chart application and to change the following current wording "but without display of aircraft/own-ship position".
PROPOSED TEXT / COMMENT:

- Electronic aeronautical chart applications (including en-route, area, approach), airport surface maps and meteorological graphical interpretation, including panning, zooming, scrolling, and rotation, centring and page turning, with or without display of aircraft/own-ship position.

response Not accepted

The in-flight depiction of the own-ship position remains a certified application, beyond the scope of either Type A or B, due to the experts consensus on the effects of the failure conditions linked to that function. Please see also Appendix C.

comment 600 comment by: *Star Alliance*

Original AMC20-25 NPA text:

In other cases the evaluation should be conducted by the Agency, as for instance for the following applications:
RATIONALE / REASON / JUSTIFICATION for the Comment :
NPA AMC 20-25 not harmonized with forthcoming AC 120-76B. See rationale given for comment about section 7.
In addition, evaluation consideration is out of the Appendix B scope (limited to Type B definition). Type B software evaluation and approval process is part of section 6.2.2.
PROPOSED TEXT / COMMENT:

Remove the following from Appendix B :
"In other cases the evaluation should be conducted by the Agency, as for instance for the following applications:"

response

Partially accepted

The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The content of the comment is agreed by the Agency since, in fact, the evaluation service remains available on a voluntary basis.

comment

616 comment by: *Monarch Airlines*

It is not clearly articulated why EASA proposes to retain authority for evaluating performance-related applications.

However, we consider that the software manufacturers should be compelled to conduct any such approval. This will reduce the burden on the Agency significantly by reducing the number of applications. Additionally, the requirement for individual airlines to conduct in-flight verification can significantly increase the cockpit workload (because pilots are required to simultaneously conduct paper processes while actioning and monitoring EFB processes and simultaneously note the differences between them). This workload can potentially degrade safety margins. This could be avoided by forcing the software provider to gain approval. It would also place responsibility on the software providers, who are best placed to rectify any deficiencies.

Currently, responsibility lies with the airlines who, post contract signing, can have relatively little leverage over the software provider.

response

Accepted

The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The evaluation service however remains available on a voluntary basis.

comment 681 comment by: *Deutsche Lufthansa AG*

Referring to:
"- Document Browser displaying the following documents, interactive or not, or not in pre-composed format, and not driven by sensed aircraft parameters:"

Proposal:
Modify to:
- Document Browser displaying the following documents~~, interactive or not~~ **that are interactive,** or not in pre-composed format, and driven by sensed aircraft parameters:

Comment/Justification:
Type B applications should address:
- only interactive documents (non-interactive document should be Type A)
- not in pre-composed format
- driven by sensed aircraft parameters (this capability enhances significantly the safety by minimizing the crew workload, eg. automatic and direct access to the relevant FCOM page giving the right procedure)

response Not accepted

Please see responses to comments on paragraph 5.2.2.

comment 682 comment by: *Deutsche Lufthansa AG*

Proposal:
Delete the following from Appendix B (move to A).
~~"- The aircraft Technical Log other than the Sector Record pages; - NOTAMs and AIS briefing information; - Meteorological information"~~

Comment/Justification:
These documentation and information are pre-composed and fixed. They are not intended to be changed in flight. They should be removed from Appendix B.

response Not accepted

According to the new software definitions, based on safety effects, such applications are classified Type B.

comment 683 comment by: *Deutsche Lufthansa AG*

Referring to:
"- Electronic aeronautical chart applications including en-route, area, approach, and airport surface maps including panning, zooming, scrolling, and rotation, centring and page turning but without display of aircraft/own-ship position."

Proposal:
Modify to read:
- Electronic aeronautical chart applications (including en-route, area, approach), airport surface maps **and meteorological graphical interpretation**, including panning, zooming, scrolling, and rotation, centring and page turning, **with or** without display of aircraft/own-ship position.

Comment/Justification:
The requirement about the display of aircraft/own-ship position should be

relaxed for the following reasons:

- EFBs are not guidance systems, but could improve significantly situation awareness (easier and quicker assessment of the position and navigation follow-up on a digital map than the finger on a paper map).
- Errors and mistakes with a finger on the paper map are much more frequent than the very remote cases of failures of the display of the own-ship symbol on a moving map.
- Through an appropriate and a distinct symbol on EFB nav charts with a uncertainty level attached to it, displaying an aircraft symbol on EFB nav charts would definitely bring a higher level of awareness of the in-flight position, minimize flight crew workload and therefore, would enhance safety.

Refer to comment #654 about section 5.2.3.a). (Type C definition) aiming to distinguish about tactical data (real-time or short-term data displayed on ND) vs strategical data (long-term data displayed on EFB display).

The flight crew cannot be confused by:

- on one hand, a Navigation Display (ND) displaying a FMS flight plan with the own ship position and weather radar information for short term or tactical operations,
- on the other hand, an EFB display displaying nav charts with an appropriate own ship position symbol and weather charts (uploaded on ground or received by datalink in air) for long term or strategic operations and which cannot be used as Primary means.

As a consequence, it is suggested to add meteorological chart application and to change the wording to "with or without display of aircraft/own-ship position".

response

Not accepted

The in-flight depiction of the own-ship position remains a certified application, beyond the scope of either Type A or B, due to the experts consensus on the effects of the failure conditions linked to that function. Please see also Appendix C.

comment

711 comment by: *Thomson Airways*

The rationale behind the transfer of authority from national competent authorities to EASA for the evaluation of aircraft performance calculation applications is not explained.

This change raises a lot of questions:

1. Why is this and how is it going to increase safety?
2. Does the Agency have the capacity and resources to take care of these evaluations without causing unnecessary delays to Airline plans?
3. Would it not be more efficient to impose the evaluation to the software supplier? This would also significantly decrease the workload on the Airlines and the Agency.

response

Accepted

The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The evaluation service, however, remains available on a voluntary basis.

comment	*716* comment by: *AT-CAA-PAM* Type B Software There should be no Agency approval required ! Mass and Balance: As long as pilots are allowed to use simple mathematics to do a mass & balance manually or with the assistance of a calculator, no approval from EASA should be required. Performance calc As long as pilots are allowed to use simple tables out of the AFM and interpolate in between these tables inclusive the use of a calculator, no approval from EASA should be required. It should be the EFB Administrator responsibility.
response	Accepted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25. The evaluation service, however, remains available on a voluntary basis.

comment	*739* comment by: *NetJets Europe* Currently reads: 5.2.2 Type B Type B applications are applications that: a) Do not substitute to or duplicate any system or functionality required by airworthiness regulation or operational rule; and b) Whose malfunction or misuse would have an adverse safety effect, i.e. a hazard level no greater than a "minor" failure condition classification; and c) Do not have any of the capabilities defining type C applications (see §5.2.3). Recommended Change: 5.2.2 Type B Type B applications are applications that: a) are intended for use during critical phases of flight, and/or replace required aeronautical information traditionally presented in a paper format such as navigation or approach charts., b) are interactive weight and balance or performance applications that use algorithms for calculation and must be validated for accuracy. c) Whose malfunction or misuse would have an adverse safety effect, i.e. a hazard level no greater than a "minor" failure condition classification; and d) Do not have any of the capabilities defining type C applications (see §5.2.3). Rationale: Attempted to align definition to be harmonized with recently released FAA AC 120-76B. The current sentence "may not substitute to or duplicate any system or function required by airworthiness regulation or operational rule…" leads to

confusion. An operator's primary EFB program objective may be to substitute or duplicate information such as an Airplane Flight Manual or aeronautical charts (examples of airworthiness and operational material, respectively) electronically.

Item for Consideration:
Is it possible that the restriction of Type B applications to a 'MINOR' classification would cause an undue burden on the industry as they attempt to determine the hazard level of a particular application? For example, a standard approach procedure may be considered very hazardous if the printed information is incorrect, however its presentation on an EFB is clearly within the intent of 'Type B'. Perhaps hazard level requirements should be explained in another area of the document?

(Source: Executive Jet Management, a NetJets company)

response

Partially accepted

Please see response to comment No 728.

comment

740 comment by: *NetJets Europe*

Currently reads:
- Electronic aeronautical chart applications including en-route, area, approach, and airport surface maps including panning, zooming, scrolling, and rotation, centring and page turning but without display of aircraft/own-ship position.

Recommended Change:
- Electronic aeronautical chart applications including en-route, area, approach, and airport surface maps including panning, zooming, scrolling, and rotation, centring and page turning but without display of aircraft/own-ship position in flight.

Rationale:
Current FAA research and initiatives pertaining to the authorization of the depiction of airport surface own-ship depiction as a Type B application on capable portable COTs devices have substantial potential to increase safety margins, be widely deployable and rapidly effective. We request that any advancement in FAA policy in this area be considered for inclusion into this document as well.

(Source: Executive Jet Management, a NetJets company)

response

Accepted

In the resulting text of AMC 20-25, AMMD is considered a Type B application.

comment	*741* comment by: *NetJets Europe* Suggestion to add as type B software applications: - Simplex CPDLC function (one way from ATC to flight crew) - Some ADS-B functions such as CDTI Surf or graphical weather. (Source: Executive Jet Management, a NetJets company)
response	Not accepted Provided the applications are demonstrated fulfilling the EFB software definitions, such functions could be implemented. The list is not closed.

comment	*753* comment by: *Jeppesen Inc.* Suggest wording changes: 5.2.2 Type B Type B applications are applications that: a) are intended for use during critical phases of flight, and/or replace required aeronautical information traditionally presented in a paper format such as navigation or approach charts., b) are interactive weight and balance or performance applications that use algorithms for calculation and must be validated for accuracy. c) Whose malfunction or misuse would have an adverse safety effect, i.e. a hazard level no greater than a "minor" failure condition classification; and d) Do not have any of the capabilities defining type C applications (see §5.2.3). Rationale: Attempted to align definition to be harmonized with recently released FAA AC 120-76B. The current sentence "may not substitute to or duplicate any system or function required by airworthiness regulation or operational rule…" leads to confusion. An operator's primary EFB program objective may be to substitute or duplicate information such as an Airplane Flight Manual or aeronautical charts (examples of airworthiness and operational material, respectively) electronically.
response	Partially accepted — The proposed addition 'a)' is not a defining characteristic, but a privilege that can be granted following a proper operational evaluation. Considerations for use during all the phases of flight depend on the EFB hardware, and further requirements apply to the replacement of paper charts. — The proposed addition 'b)' is not a defining characteristic. Neverthelss, it is already addressed: W&B and performance applications are listed in Appendix B, and requirements concerning the accuracy and the algorithms have to be addressed in the chapter dedicated to these applications. A clarification has been added that Type B applications can be used to present documents required by OPS rules.

comment	*754* comment by: *Jeppesen Inc.* Suggest adding "in flight" to end of paragraph, as follows: - Electronic aeronautical chart applications including en-route, area,

	approach, and airport surface maps including panning, zooming, scrolling, and rotation, centering and page turning but without display of aircraft/own-ship position in flight. Rationale: Aligns with FAA AC 120-76B and Change 1 activity to reclassify AMMD with own-ship as a Type B application.
response	Accepted In the resulting text of AMC 20-25, AMMD is considered a Type B application.

comment	*850* comment by: *Eurocopter* The applications given as examples of what would need an EASA evaluation for confirmation of type B are typically performance calculations, which should not be considered as potentially of type B (see previous remark).
response	Noted The recommendation to request the evaluation service provided by the Agency has been removed from the resulting text of AMC 20-25.

CONCLUSION ON COMMENTS ON PAGE 51 (DRAFT AMC 20-25 – APPENDIX B – TYPE B SOFTWARE APPLICATIONS)

As for Type A, the 43 comments received on this segment dealt with the definition of Type B applications (please refer to section 5.2.2 in the proposed AMC 20-25). Many comments are, in fact, similar to those raised in the segment above related to section 5.2.2.

The conclusion of the analysis of the comments on 5.2.2 (please see above) was that the definition proposed by the NPA (i.e. different from TGL 36) for Type B has been clarified, but not substantially changed.

Most of the received comments on this segment were, therefore, not applicable.

Furthermore, some comments were also linked to the comments on section 7 of AMC 20-25 about the evaluation by the Agency of certain Type B applications. This issue has already been discussed above.

The Agency, however, agreed to improve the text of Appendix B to AMC 20-25, which was done with the support of the Review Group.

The resulting text of AMC 20-25 (including its Appendices) is presented in Appendix A to this CRD.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - Appendix C - Type C Software Applications p. 52

comment *227* comment by: *AIRBUS*

"Appendix C - Type C Software Applications"

The Type C definition is missing. A definition should be added before the list of examples.

Suggested text:
Appendix C - Type C Software Applications
Any application which cannot be classified as Type A or B, and which has to be certified through the airworthiness approval process.

response Partially accepted

This issue would be solved by referring into the resulting text of AMC 20-25 to only two types of EFB software applications, A and B.

comment *228* comment by: *AIRBUS*

"- Performance applications sending data to the Flight Management System or any other certified avionic system;"

This requirement excludes EFB installed resources which are certified systems. So, it is not consistent with section 5.2.3.d) which says :
"Any application enabling the following capabilities are considered as type C applications: [...]
d) Sending data to the certified aircraft systems other than the EFB installed resources."
Results of the performance applications can be displayed on a display used as an installed resource (which can be shared or not with other certified avionic systems). In this case, Performance applications sending data to an installed remote display (which is certified) should be classified as a Type B EFB software applications.

Suggested text:
- Performance applications sending data to the Flight Management System or any other certified avionic system, except to EFB installed resources;

response Partially accepted

The sentence has been reworded. Nevertheless, the issue would be solved by referring into the resulting text of AMC 20-25 to only two types of EFB software applications ,A and B.

comment *229* comment by: *AIRBUS*

"- Any application displaying information which may be tactically used by the flight crew for example to check, control, or deduce the aircraft position or trajectory, either to follow the intended navigation route or to avoid adverse weather, obstacles or other traffic, in flight or on ground."

Refer to comment about the difference between :
● the term "tactically" which is about real-time or short-term decision making by

	the flight crew, supported by certified systems (FMS, GPS, Weather radar, ...) providing tactical data displayed on ND (Navigation Display) ● and the term "Strategically" which is about long-term decision making by the flight crew, supported by EFB Type B software applications such as Weather charts (e.g. from weather data uploaded or uplinked from the ground), navigation charts with own ship position, ..., providing strategical data displayed on an EFB display (shared or not with certified aircraft systems). Suggested text: Add the following note : Note: the term 'tactically used by the flight crew' means that which supports short term decision making by the flight crew.
response	Not accepted This clarification note would require further clarification regarding the meaning of 'short term' and 'decision making support'. Application classification process should be based on the definition of Type A and B.

comment	*323* comment by: *Thales Avionics* "Any application displaying information which may be tactically used by the flight crew for example to check, control, or deduce the aircraft position or trajectory, either to follow the intended navigation route or to avoid adverse weather, obstacles or other traffic, in flight or on ground" This sentence is very inclusive: most type B applications such as Meteorological information with graphical interpretation, NOTAMs and AIS briefing information, ATS Flight Plan can be tactically used by the flight crew to follow the intended navigation route or to avoid adverse weather. May be "with exception of applications listed in Appendix B" could be added
response	Not accepted The examples listed in Appendix B of NPA 02-2012 do not include features to deduce the aircraft position or trajectory.

comment	*371* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 57 shared with Airbus JUSTIFICATION for the Comment on page # 52 App C Title "Appendix C - Type C Software Applications" The Type C definition is missing. A definition should be added before the list of examples. PROPOSED TEXT / COMMENT Appendix C - Type C Software Applications Any application which cannot be classified as Type A or B, and which has to be certified through the airworthiness approval process.
response	Partially accepted This issue would be solved by referring into the resulting text of AMC 20-25 to only two types of EFB software applications, A and B.

comment	*372* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 58 shared with Airbus JUSTIFICATION for the Comment on page # 52 App C " '- Performance applications sending data to the Flight Management System or any other certified avionic system; " This requirement excludes EFB installed resources which are certified systems. So, it is not consistent with section 5.2.3.d) which says : "Any application enabling the following capabilities are considered as type C applications: [...] d) Sending data to the certified aircraft systems other than the EFB installed resources." Results of the performance applications can be displayed on a display used as an installed resource (which can be shared or not with other certified avionic systems). In this case, Performance applications sending data to an installed remote display (which is certified) should be classified as a Type B EFB software applications. PROPOSED TEXT / COMMENT '- Performance applications sending data to the Flight Management System or any other certified avionic system, except to EFB installed resources;
response	Partially accepted The sentence has been reworded. Nevertheless, the issue would be solved by referring into the resulting text of AMC 20-25 to only two types of EFB software applications, A and B.

comment	*373* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 59 shared with Airbus JUSTIFICATION for the Comment on page # 52 App C " '- Any application displaying information which may be tactically used by the flight crew for example to check, control, or deduce the aircraft position or trajectory, either to follow the intended navigation route or to avoid adverse weather, obstacles or other traffic, in flight or on ground. " Refer to comment #300 about the difference between : ● the term "tactically" which is about real-time or short-term decision making by the flight crew, supported by certified systems (FMS, GPS, Weather radar, ...) providing tactical data displayed on ND (Navigation Display) ● and the term "Strategically" which is about long-term decision making by the flight crew, supported by EFB Type B software applications such as Weather charts (eg. from weather data uploaded or uplinked from the ground), navigation charts with own ship position, ..., providing strategical data displayed on an EFB display (shared or not with certified aircraft systems). PROPOSED TEXT / COMMENT Add a note : Note: the term 'tactically used by the flight crew' means that which supports short term decision making by the flight crew.
response	Not accepted

	Please see response to comment No 229.

comment	*386* comment by: *Garmin International* All of the application examples in this appendix are currently performed on TSOd multi-function displays (MFDs) that have installation approval via TC/STC. Furthermore, recently published FAA AC 120-76B does not include a similar appendix of Type C Software Applications. Recommend that this appendix be removed or ensure that Type C applications be excluded from the guidance in AMC 20-25 under the conditions that the equipment already has installation approval for these functions.
response	Partially accepted The issue would be solved by referring into the resulting text of AMC 20-25 to only two types of EFB software applications, A and B. Nevertheless, the principle of 'grandfathering' for existing TC/STC approvals or existing ETSO authorisations will apply.

comment	*496* comment by: *Oliver Ast (CLH)* Proposed Text: Appendix C - Type C Software Applications Any EFB application which cannot be classified as Type A or B, and which has to be certified. Comment: The Type C definition is missing. A definition should be added before the list of examples.
response	Not accepted The issue would be solved by referring into the resulting text of AMC 20-25 to only two types of EFB software applications, A and B.

comment	*497* comment by: *Oliver Ast (CLH)* Proposed Text: - Performance applications sending data to the Flight Management System or any other certified avionic system, except to EFB installed resources; Comment: This requirement excludes EFB installed resources which are certified systems. So, it is not consistent with section 5.2.3.d) which says : "Any application enabling the following capabilities are considered as type C applications: [...] d) Sending data to the certified aircraft systems other than the EFB installed resources." Results of the performance applications can be displayed on a display used as an installed resource (which can be shared or not with other certified avionic systems). In this case, Performance applications sending data to an installed remote display (which is certified) should be classified as a Type B EFB software applications.
response	Partially accepted Please see response to comment No 228..

comment	*498* comment by: *Oliver Ast (CLH)* Add a note : Note: the term 'tactically used by the flight crew' means that which supports short term decision making by the flight crew. Comment: refer to the comment about section 5.2.3.a) about the difference between : ● the term "tactically" which is about real-time or short-term decision making by the flight crew, supported by certified systems (FMS, GPS, Weather radar, ...) providing tactical data displayed on ND (Navigation Display) ● and the term "Strategically" which is about long-term decision making by the flight crew, supported by EFB Type B software applications such as Weather charts (eg. from weather data uploaded or uplinked from the ground), navigation charts with own ship position, ..., providing strategical data displayed on an EFB display (shared or not with certified aircraft systems).
response	Not accepted Please see response to comment No 229..

comment	*576* comment by: *Jeppesen Inc.* Suggest remove: "Performance applications sending data to the Flight Management System or any other certified avionics system" Rationale: Understanding is that there already exist approved Type B performance applications which send data through comm links such as ACARS to FMC's.
response	Partially accepted Please see response to comment No 228..

comment	*578* comment by: *Jeppesen Inc.* Suggest "Applications supporting Controller-Pilot Data-Link Communications(CPDLC)" should read "Applications supporting duplex Controller-Pilot Data-Link Communications(CPDLC)". Rationale: Suggested to support alternatives to current and future comm functions.
response	Partially accepted Application classification process should be based on the definition of Type A and B.

comment	*579* comment by: *Jeppesen Inc.* Suggest remove: "Airport Moving Map Display with own ship position." Rationale: Makes document consistent with other AMMD comments included throughout this response.
response	Accepted

comment	*601* comment by: *Star Alliance* The Type C definition is missing. A definition should be added before the list of examples. **PROPOSED TEXT / COMMENT:** Appendix C - Type C Software Applications Any EFB application which cannot be classified as Type A or B, and which has to be certified.
response	Partially accepted The issue would be solved by referring into the resulting text of AMC 20-25 to only two types of EFB software applications, A and B.

comment	*602* comment by: *Star Alliance* **Original AMC20-25 NPA text:** - Performance applications sending data to the Flight Management System or any other certified avionic system; **RATIONALE / REASON / JUSTIFICATION for the Comment :** This requirement excludes EFB installed resources which are certified systems. So, it is not consistent with section 5.2.3.d) which says : "Any application enabling the following capabilities are considered as type C applications: [...] d) Sending data to the certified aircraft systems other than the EFB installed resources." Results of the performance applications can be displayed on a display used as an installed resource (which can be shared or not with other certified avionic systems). In this case, Performance applications sending data to an installed remote display (which is certified) should be classified as a Type B EFB software applications. **PROPOSED TEXT / COMMENT:** - Performance applications sending data to the Flight Management System or any other certified avionic system, except to EFB installed resources;
response	Partially accepted The sentence has been reworded. Nevertheless, the issue would be solved by referring into the resulting text of AMC 20-25 to only two types of EFB software applications, A and B.

comment 603 comment by: *Star Alliance*

Original AMC20-25 NPA text:
- Any application displaying information which may be tactically used by the flight crew for example to check, control, or deduce the aircraft position or trajectory, either to follow the intended navigation route or to avoid adverse weather, obstacles or other traffic, in flight or on ground.

RATIONALE / REASON / JUSTIFICATION for the Comment :
refer to the **comment about section 5.2.3.a)** about the difference between :
● the term "tactically" which is about real-time or short-term decision making by the flight crew, supported by certified systems (FMS, GPS, Weather radar, ...) providing tactical data displayed on ND (Navigation Display)

● and the term "Strategically" which is about long-term decision making by the flight crew, supported by EFB Type B software applications such as Weather charts (eg. from weather data uploaded or uplinked from the ground), navigation charts with own ship position, ..., providing strategical data displayed on an EFB display (shared or not with certified aircraft systems).

PROPOSED TEXT / COMMENT:
Add a note :
Note: the term 'tactically used by the flight crew' means that which supports short term decision making by the flight crew.

response Not accepted

Please see response to comment No 229.

comment 617 comment by: *Monarch Airlines*

The categorisation of aeronautical chart with 'own ship' position not used for deducing aircraft position, trajectory or following a navigational route (but rather to assist crews in orientating themselves relative to the features on the map to assist pilot situational awareness) is unclear.

response Partially accepted

Application classification process should be based on the definition of Type A and B.

comment 632 comment by: *Mario Sabourin SITA*

Page 52, Appendix C:

Segment description:
Any application displaying information which may be tactically used by the flight crew for example to check, control, or deduce the aircraft position or trajectory, either to follow the intended navigation route or to avoid adverse weather, obstacles or other traffic, in flight or on ground.

RATIONALE / REASON / JUSTIFICATION for the Comment:
On-board weather applications should be type B and be capable to run on Class II EFB systems.
In-flight connectivity improves flight safety. For example, weather application on class II system could overlay weather update information on electronic en-

route chart providing necessary information for flight crew to determine to fly to planned destination or choose option as early as possible to divert flight.

PROPOSED TEXT / COMMENT:
Be consistent with AC 120-76B, page 7, section 10.e.4.c, which states that On-board weather applications should be type B and be capable to run on Class II EFB systems.

response

Partially accepted

We are consistent with AC 120-76B, page 10. The in-flight depiction of the own-ship position is classified as a major safety effect and cannot be formally authorised for use on a Class 1 or Class 2 EFB.

comment

684 comment by: *Deutsche Lufthansa AG*

Proposal:
Appendix C - Type C Software Applications
Any EFB application which cannot be classified as Type A or B, and which has to be certified.

Comment/Justification:
The Type C definition is missing. A definition should be added before the list of examples.

response

Partially accepted

The issue would be solved by referring into the resulting text of AMC 20-25 to only two types of EFB software applications, A and B.

comment

685 comment by: *Deutsche Lufthansa AG*

Proposal:
Extend to read:
- Performance applications sending data to the Flight Management System or any other certified avionic system**, except to EFB installed resources**;

Comment/Justification:
This requirement excludes EFB installed resources which are certified systems. So, it is not consistent with section 5.2.3.d) which says:
"Any application enabling the following capabilities are considered as type C applications: [...]
d) Sending data to the certified aircraft systems other than the EFB installed resources."

Results of the performance applications can be displayed on a display used as an installed resource (which can be shared or not with other certified avionic systems). In this case, Performance applications sending data to an installed remote display (which is certified) should be classified as a Type B EFB software applications.

response

Partially accepted

The sentence has been reworded. Nevertheless, the issue would be solved by referring the resulting text of AMC 20-25 to only two types of EFB software applications, A and B.

comment	*686* comment by: *Deutsche Lufthansa AG* Referring to: "- Any application displaying information which may be tactically used by the flight crew for example to check, control, or deduce the aircraft position or trajectory, either to follow the intended navigation route or to avoid adverse weather, obstacles or other traffic, in flight or on ground." Proposal: Add a note: "Note: the term 'tactically used by the flight crew' means that which supports short term decision making by the flight crew." Comment/Justification: refer to comment #654 about the difference between: ● the term "tactically" which is about real-time or short-term decision making by the flight crew, supported by certified systems (FMS, GPS, Weather radar, ...) providing tactical data displayed on ND (Navigation Display) ● and the term "Strategically" which is about long-term decision making by the flight crew, supported by EFB Type B software applications such as Weather charts (eg. from weather data uploaded or uplinked from the ground), navigation charts with own ship position, ..., providing strategical data displayed on an EFB display (shared or not with certified aircraft systems).
response	Not accepted Please see response to comment No 229.

comment	*742* comment by: *NetJets Europe* Currently reads: Appendix C - Type C Software Applications Examples of Type C software applications: - Airport Moving Map Display with own ship position; - Performance applications sending data to the Flight Management System or any other certified avionic system; - Applications supporting duplex Controller-Pilot Data-Link Communications(CPDLC); - Applications displaying traffic information; - Any application displaying information which may be tactically used by the flight crew for example to check, control, or deduce the aircraft position or trajectory, either to follow the intended navigation route or to avoid adverse weather, obstacles or other traffic, in flight or on ground. Recommended Change: Appendix C - Type C Software Applications Examples of Type C software applications: - ~~Airport Moving Map Display with own ship position~~; - Performance applications sending data to the Flight Management System or any other certified avionic system; - Applications supporting Controller-Pilot Data-Link Communications(CPDLC); - Applications displaying traffic information;

- Any application displaying information which is intended to be a primary source used by the flight-crew members to check, control, or deduce the aircraft position or trajectory, either to follow the navigation route or as a primary means to avoid adverse weather, obstacles or other traffic, in flight or on ground.

Rationale:
Current definition appears too broad and may inadvertently deny many crewmembers valuable tools for situational awareness such as the display of graphical weather or enroute charts with a moving map function or the depiction of terrain.

Additionally, current FAA research and initiatives pertaining to the authorization of the depiction of airport surface own-ship depiction as a Type B application on capable portable COTs devices have substantial potential to increase safety margins, be widely deployable and rapidly effective. We request that any advancement in FAA policy in this area be considered for inclusion into this document as well.

(Source: Executive Jet Management, a NetJets company)

response

Partially accepted

The issue would be solved by referring into the resulting text of AMC 20-25 to only two types of EFB software applications, A and B. Software applications eligible for EFBs should be based on these definitions.

comment

755 comment by: *Jeppesen Inc.*

Suggest changing words in bullet as follows:
- Any application displaying information which is intended to be a primary source used by the flight-crew members to check, control, or deduce the aircraft position or trajectory, either to follow the navigation route or as a primary means to avoid adverse weather, obstacles or other traffic, in flight or on ground.

Rationale:
Emphasizes that Type C deals with applications that are intended for primary use.

response

Not accepted

Software applications eligible for EFBs should be based exclusively on either Type A or B definitions, whether or not they are the primary source.

comment

882 comment by: *Boeing*

Page: 52
Paragraph: Appendix C -- *Type C Software Applications*
2nd bullet

The proposed text states:
Appendix C - Type C Software Applications

Examples of Type C software applications:
…
- Performance applications sending data to the Flight Management System or any other certified avionic system;
…

REQUESTED CHANGE: This statement in the draft NPA is somewhat confusing since some operational applications falling under this description are already classified/accepted as Type B software applications (as described elsewhere in the NPA). We suggest this section be revised.
JUSTIFICATION: Standardization within the NPA is needed.

response

Partially accepted

Please see response to comment No 228.

CONCLUSION ON COMMENTS ON PAGE 52 (DRAFT AMC 20-25 – APPENDIX C – TYPE C SOFTWARE APPLICATIONS)

25 comments were received on this segment, most of them requesting the reclassification of some of the examples of Type C as Type B.

Some comments requested also a definition of Type C, which has, however, been addressed above in relation to section 5.2.3 of the proposed AMC 20-25.

Indeed, the Agency agrees that certified software applications (labelled Type C in the NPA) should be better redefined or clarified (see conclusions on 5.2.3 Type C. But in line with FAA AC 120-76B, examples of Type C applications are considered not necessary in AMC 20-25 and therefore Appendix C proposed by NPA 2012-12 is removed.

The resulting text of AMC 20-25 is presented in Appendix A**.**

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - Appendix D - Human Machine Interface Assessment and Human Factors Considerations p. 53-55

comment *140* comment by: *DGAC*

In D.2.10 the following amendment is proposed :
"The positioning **and procedures associated with the use** of the EFB should not result in unacceptable flight crew workload."
This phrasing is more comprehensive indeed.

response

Accepted

This comment is deemed relevant. The text has been modified accordingly.

comment *147* comment by: *DGAC*

In paragraph D.2.1, we propose that the following text be added :

"**Particular attention should be paid to consistency of all interfaces, in particular when applications/EFB are originated from different providers.**"

response

Accepted

This comment is deemed relevant. The text has been amended by reorganising

	paragraph D.2.4.1.
comment	*230* comment by: *AIRBUS* "EFB status and fault messages should be prioritised" For overall AMC consistency purpose : section 7.11 should be modified because not consistent with this section D.2.4.3 - see comment about section 7.11 (EFB system maintenance). Suggested text: No change
response	Noted
comment	*374* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 60 shared with Airbus JUSTIFICATION for the Comment on page # 54 App D " EFB status and fault messages should be prioritised" For overall AMC consistency purpose : section 7.11 should be modified because not consistent with this section D.2.4.3 - see comment #354 about section 7.11 (EFB system maintenance). PROPOSED TEXT / COMMENT No change
response	Accepted Although no change was proposed by the commentator, this comment is deemed relevant, leading, thus, to modification of paragraph 7.11.
comment	*387* comment by: *Garmin International* Appendix D section D.1 includes the following: "Note: Where an assessment is conducted as part of an airworthiness approval e.g. for a Class 3 EFB system or Class 2 EFB installed resources, CS 25.1302 titled "Installed systems and equipment for use by the flight crew" or applicable airworthiness basis should be applied." As noted in several other comments, installed MFDs already perform many EFB functions and will have already undergone Human Machine Interface assessments under 2x.1301 and/or 25.1302. Since it was deemed appropriate to accept the 25.1302 assessment in lieu of the guidance in AMC 20-25 Appendix D, it would be similarly appropriate to exclude installed MFDs from other aspects of AMC 20-25 when they have already undergone assessments under the rules that are applicable to the particular aircraft installation.
response	Noted This comment is well noted by the Agency. There is no subsequent change in the text.

comment	*499* comment by: *Oliver Ast (CLH)* Comment D2.4.3: For overall AMC consistency purpose : section 7.11 should be modified because not consistent with this section D.2.4.3 (see comment)
response	Accepted This comment has been taken into account, leading, thus, to modification of paragraph 7.11.

comment	*605* comment by: *Star Alliance* **Original AMC20-25 NPA text:** D.2.4.3 EFB status and fault messages should be prioritised **RATIONALE / REASON / JUSTIFICATION for the Comment :** For overall AMC consistency purpose : section 7.11 should be modified because not consistent with this section D.2.4.3 (see comment concerning p. 48). **PROPOSED TEXT / COMMENT:** No change
response	Accepted Although no change was proposed by the commentator, this comment is deemed relevant, leading, thus, to modification of paragraph 7.11.

comment	*620* comment by: *Monarch Airlines* **D.2.1.** The comment that *'the EFB system should provide a consistent user interface*' is impractical. This may be an 'ideal' from an HF perspective, but unfortunately, in the market place, you cannot find one software provider that supplies all the necessary applications. As a result, there will always be more than one manufacturer's applications on an EFB. A more helpful statement would encourage airlines to minimise the number of different 'looks and feels' across the suite of applications. **D.2.4.2**. The comment that *'EFB messages, both visual and auditory, should be inhibited during critical stages of flight*' should be caveated with words to the following effect: 'or *SOPs should ensure that applications generating these messages are not displayed at such times*' since not all applications are aware of the stage of flight. **D.3.1.** When discussing the size of electronic vs paper charts, it should be made clear that the determining factor is apparent size, not actual size. Thus, a slightly smaller sized electronic chart can subtend a larger angle to the pilot (ie appear larger) than its paper equivalent if the electronic chart is positioned closer to the eye.

response

Noted

The comment related to paragraph D.2.1 is rejected. The requirements and guidance material have to be driven by safety preoccupations rather than commercial ones. Reports from some recent major incidents show that a lack of consistency can be a contributing factor.

The comment related to paragraph D.2.4.2 is rejected. When a system is installed and used in an aircraft, it has to comply with generally applicable design requirements and principles. It is a very basic principle that alarms and warning shall not distract crew members during critical phases of the flight such as Take Off and Landing (see CS 25.1322). Any EFB has to follow this principle.

The comment related to paragraph D.3.1 is well noted by the Agency. Nevertheless, it does not lead to text modification.

comment

687 comment by: *Deutsche Lufthansa AG*

Referring to:
"EFB status and fault messages should be prioritised"

Proposal:
No change here, but check 7.11 for consistency.

Comment/Justification:
For overall AMC consistency purpose : section 7.11 (see comment thereto) should be modified because not consistent with this section D.2.4.3

response

Accepted

This comment has been taken into account, leading, thus, to modification of paragraph 7.11.

CONCLUSION ON COMMENTS ON PAGES 53-55 (DRAFT AMC 20-25 – APPENDIX D HMI ASSESSMENT AND HUMAN FACTORS CONSIDERATIONS)

Among the nine received comments, three were deemed particularly constructive by the Agency. They led to text modification, in particular regarding the notion of consistency across EFB applications and between EFB and flight deck applications.

Three other comments have not been accepted.

The resulting text of AMC 20-25 (including its Appendices) is presented in Appendix A.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - Appendix E - Flight Crew Training p. 56-59

comment

70 comment by: *Air France*

The Paragraph 2 of E.3.1 Recurrent EFB Training :
"Where an operator has established alternative procedures to be used for dispatch with an EFB inoperative or not available, these alternative procedures should be included in the recurrent Aircraft/STD Training as required by App1 to EU-OPS 1.965(a)(2)."

App1 to EU-OPS 1.965(a)(2)
"(i) The aeroplane/STD training programme shall be established such that all major failures of aeroplane systems

	and associated procedures will have been covered in the preceding three-year period." No EFB application are used to cope with major failures, so the alternative procedures training can't be required by App1 to EU-OPS 1.965(a)(2). Proposal : Remove this paragraph.
response	Accepted The paragraph has been removed.

comment	*91* comment by: *Grégory DELBEKE* **Page 57 of 72, item B. II. Appendix E §E.1.3.2:** This paragraph could also be applicable to a class 2 EFB system with performance application and a documents browser. The sentence should be review in this way.
response	Noted Nevertheless, class 2 EFB host platform has been removed from the resulting text of AMC 20-25.

comment	*92* comment by: *Grégory DELBEKE* **Page 58 of 72, item B. II. Appendix E §E.1.4.3:** How do you address Class 2 EFB OPC when the simulator is not equipped? The business jet operators which do not use their own instructors/examiners during OPC have sometimes difficulties to use EFB class 1 in the simulator because the policy of the provider does not allow the use of EFB in the simulator. How do you address this problem and could you develop alternative means of compliance?
response	Noted Nevertheless, class 2 EFB host platform has been removed from the resulting text of AMC 20-25..

comment	*93* comment by: *Grégory DELBEKE* **Page 59 of 72, item B. II. Appendix E §E.4:** In the following paragraph, it could be an improvement to add the case where the EFB system is not installed in the training device. “Where the EFB system is based on a Class 2 or Class 3 device, it is recommended that the device is installed and operable in the training device (simulator) and used during all phases of flight during which it would be used under the operator’s SOPs. If the device is not installed and operable in the training device (simulator), alternative training means shall be developed by the operator.”
response	Accepted Paragraph E.4 has been revised to encompass the case of portable EFB.

comment	*139* comment by: *DGAC*

Second paragraph refers to app. 1 to 1.965 (a)(2) of EU-OPS, which requires that training programmes be established so that major failures only be covered. Clearly, EFB applications are not in the scope of this appendix to EU-OPS.

Reference/paragraph should be removed

response

Accepted

The paragraph has been removed.

comment

580 comment by: *Jeppesen Inc.*

Suggest add: "Training in proper use and consideration of ownship presentation(s)'" to all subsections.

Rationale:
Communicates situational awareness character of any own-ship position presentation by the EFB

response

Accepted

Appendix E has been revised to encompass the case mentioned in the comment.

comment

606 comment by: *Star Alliance*

Original AMC20-25 NPA text:
E.3.1
3rd paragraph
In the case of Mixed Fleet Flying, or where the EFB is not installed across the fleet, NAAs should consider applying additional recurrent training requirements.
RATIONALE / REASON / JUSTIFICATION for the Comment :
To make the recurrent training be more practical in case simulator which airliner used to train their pilots installed with different type of EFB or have no EFB installed.
PROPOSED TEXT / COMMENT:

In the case of Mixed Fleet Flying, or where the EFB is not installed across the fleet, NAAs should consider applying additional recurrent training requirements. However, initial training which state under clause E.1.3 is considered to be sufficient.

response

Accepted

comment

607 comment by: *Star Alliance*

Original AMC20-25 NPA text:

Where the EFB system is based on a Class 2 or Class 3 device, it is recommended that the device is installed and operable in the training device (simulator) and used during all phases of flight during which it would be used under the operator's SOPs.
RATIONALE / REASON / JUSTIFICATION for the Comment :
To consider also other interactive training devices.
PROPOSED TEXT / COMMENT:

Where the EFB system is based on a Class 2 or Class 3 device, it is recommended that the device is installed and operable in the training device (simulator) and used during all phases of flight during which it would be used under the operator's SOPs. Apart from the simulator device, fixed base training device, computer base training, or other means of interactive device shall be considered sufficient.

response

Accepted

Paragraph E.4 has been revised to encompass the case of portable EFB.

comment

624 comment by: *Monarch Airlines*

E.4. It should be made clear that Class II EFBs can be emulated in the simulator by a similarly-sized tablet containing all the flight safety critical applications as the aircraft EFB.

This is the only practical solution as most airlines do not have their own simulators, so cannot permanently install airworthy Class II EFBs. The cost is also prohibitive, and secure storage of $100,000 of avionics-grade EFB in a commercial simulator building is challenging beyond the bounds of practicality.

response

Accepted

Appendix E has been revised to encompass the case mentioned in the comment.

comment

717 comment by: *Thomson Airways*

Most Airlines do not operate their own simulators. Therefore, installing Class 2 EFBs in shared training devices would not only be cost prohibitive but also absolutely imossible, given each Airline is likely to use different hardware / software.

E.4 should allow Airlines to use tablet-type computers replicating the Class 2 EFB, including location of the device and all applications required for the safe conduct of the flight.

response

Accepted

Appendix E has been revised to encompass the case mentioned in the comment.

comment

929 comment by: *Tyler Clark - Transport Canada Civil Aviation*

Appendix E

	Flight Crew Training (page 56-59) Should consider training for maintenance personnel (daily checks/in-transit checks) and EFB admin staff (in regards to internal procedures and reporting).
response	Not accepted In the case of ground personnel, the general training and qualification requirements contained in Commission Regulation (EU) No 965/2012 are considered sufficient. No specific mention is deemed necessary in AMC 20-25.

CONCLUSION ON COMMENTS ON PAGES 56-59 (DRAFT AMC 20-25 – APPENDIX E FLIGHT CREW TRAINING)

11 comments were received on this segment, mainly asking:

— to remove paragraph on recurrent training on EFB inoperative as App1 to EU-OPS 1.965(a)(2) deals with major failures;

— to extend initial training for class 3 EFBs to class 2 with performance applications;

— ways to comply with suitability of training devices when simulators are not equipped with EFBs. Stakeholders require the possibility for operators to develop alternative means of compliance;

— to add to all subsections 'Training in proper use and consideration of own-ship presentation(s)'; and

— to consider training for ground personnel.

The Agency agrees with the comments on initial and recurrent training and has revised the concerned paragraphs accordingly. The Agency does not agree with the comment in the fourth bullet above, since training on situational awareness is already included in paragraph E.1.3.2.

Comments on the presence of EFB class 2 and 3 on simulators are agreed. Alternate means of compliance for Flight Crew Training are explicitly allowed.

Comment on training of ground personnel is not agreed. General provisions for training of ground personnel were already established (in general terms) by Appendix 2 to OPS 1.175 (The management and organisation of an AOC holder) now transposed in Part-CAT.

The resulting text of AMC 20-25 (including its Appendices) is presented in Appendix A to this CRD.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - Appendix F - Software Application Approval Submission p. 60

comment *231* comment by: *AIRBUS*

"F.1 Additional Requirements for Performance Applications for Take-off, Landing and Mass & Balance Calculations

When demonstrating compliance for a performance application, the submission should include a data validation report consisting of:
● The methodology and/or plans for validation;
● Representative calculations throughout the operating envelope considering corner points, routine and break points and typically containing at least 250 calculations (including wet and contaminated runway data if used);"

The wording could be misleading by requiring systematic calculations by the end user as part of the Operational approval process.
Demonstration and data validation may be carried out by the OEM and submitted to the Agency for a assessment report, prior to any EFB approval process by an end user (Operator).
So, to fix this ambiguity, it is suggested to add a note in Appendix F.1.

Suggested text:
Add the following note:
Note : Instead of the end user, the Original Equipment Manufacturer (aircraft manufacturer or EFB supplier) or the Performance application supplier may carry out the compliance demonstration and may submit the associated data validation report to the competent authority for assessment of the performance application. The results of this assessment may be included by the end user in their operational approval submission report when seeking an Operational approval.

response Partially accepted

The text has been revised to include provisions on credit based on demonstration for performance applications performed by the Original Equipment Manufacturer (OEM; i.e. aircraft or EFB manufacturer).

comment *251* comment by: *TNT Airways*

Part F1 related to take-off/landing calculations:

Point 1 "The methodology, ..."
EASA should provide a standard methodology for performance calculations related to take-off and landing. This will allow deviations in operator reports. "Classic" cases such as tire speed limitation, VMCG limitation should be detailed in this document. This will avoid that airlines produce 10 calculations points on the same zone.
With 250 points, how many landing calculations versus take-off calculations must be provided?

Point 2 "Representative calculations throughout..."
Comment: non-modern aircraft (737-300, 757-200, ...) don't contain any certification for wet/contaminated fata in their AFM. As this document is the only reference, all calculations on these runway conditions will be advisory and not certified.

	Many thanks in advance for your reading Regards Jean-Marc Urbani
response	Noted The technical content is factual and unfortunately recognised by investigations after a number of excursions from runways, especially when contaminated. The subject is, however, out of scope of AMC 20-25.

comment	*375* comment by: *Dassault Aviation* DASSAULT-AVIATION comment # 61 shared with Airbus JUSTIFICATION for the Comment on page # 60 App F.1 The wording could be misleading by requiring systematic calculations by the end user as part of the Operational approval process. Demonstration and data validation may be carried out by the OEM and submitted to the Agency for a assessment report, prior to any EFB approval process by an end user (Operator). So, to fix this ambiguity, it is suggested to add a note in Appendix F.1. PROPOSED TEXT / COMMENT Note : Instead of the end user, the Original Equipment Manufacturer (aircraft manufacturer or EFB supplier) or the Performance application supplier may carry out the compliance demonstration and may submit the associated data validation report to the competent authority for assessment of the performance application. The results of this assessment may be included by the end user in their operational approval submission report when seeking an Operational approval.
response	Partially accepted Please see response to comment No 231.

comment	*388* comment by: *Garmin International* Many of the requirements in this Appendix are redundant with those required for TSO and/or TC/STC approvals for MFDs performing EFB functions, including those providing TOLD and W&B calculations. It is unproductive to require this same information to be submitted when the equipment performing the function already has airworthiness approval.
response	Partially accepted Please see response to comment No 231.

comment	*581* comment by: *Jeppesen Inc.* Suggest: "Viewers should use software components equivalent to the airborne application" Rationale: The ground viewer should not necessarily consist of the same software components. If enforced may require an additional burden for viewers to e.g. class 3 devices or front panel avionics (including EPIC, or PL21 - where JeppView is used as the ground viewer.)
response	Noted

The intent of the comment is unclear. Assuming it suggests to remove the sentence, it is not accepted. Regarding the rationale provider it is not requested to use 'same components' but equivalent.

comment 608 comment by: *Star Alliance*

Original AMC20-25 NPA text:
F.1 Additional Requirements for Performance Applications for Take-off, Landing and Mass & Balance Calculations

When demonstrating compliance for a performance application, the submission should include a data validation report consisting of:

- The methodology and/or plans for validation;
- Representative calculations throughout the operating envelope considering corner points, routine and break points and typically containing at least 250 calculations (including wet and contaminated runway data if used);

RATIONALE / REASON / JUSTIFICATION for the Comment :
The wording could be misleading by requiring systematic calculations by the end user as part of the Operational approval process. Demonstration and data validation may be carried out by the OEM and submitted to the Agency for a assessment report, prior to any EFB approval process by an end user (Operator).
So, to fix this ambiguity, it is suggested to add a note in Appendix F.1.
PROPOSED TEXT / COMMENT:

Note : Instead of the end user, the Original Equipment Manufacturer (aircraft manufacturer or EFB supplier) or the Performance application supplier may carry out the compliance demonstration and may submit the associated data validation report to the competent authority for assessment of the performance application. The results of this assessment may be included by the end user in their operational approval submission report when seeking an Operational approval.

response Partially accepted

Please see response to comment No 231.

comment 798 comment by: *Ingo Pucks, Owner IP Aerospace*

Software application approval should follow the procedures as laid out in Do-178 for such applications that are considered to be type B and C, with the respective DAL (design assurance levels). Specific procedure for quality assurance, control and management of airborne software shall either be developed or applied such as those laid out in the relevant sections of Do-178.

response Partially accepted

Development to DO-178 could, in fact, be requested for applications covered by airworthiness approval, which is not prohibited, but is out of scope of AMC 20-25. Software applications eligible for EFBs should be based on Type A and B definitions, therefore, limited to minor failure effect.

CONCLUSION ON COMMENTS ON PAGE 60 (DRAFT AMC 20-25 – APPENDIX F - SOFTWARE APPLICATION APPROVAL SUBMISSION)

Seven comments were received on this segment of the NPA.

Three stakeholders requested AMC 20-25 to clarify that the compliance demonstration for performance applications can be performed by the Original Equipment Manufacturer (OEM; i.e. aircraft or EFB manufacturer) instead of the operator. This is accepted.

Additional guidance concerning the compliance demonstration for performance applications is also requested. The Agency agrees and Appendix F to AMC 20-25 is modified to include such additional guidance, which is when possible aligned with the FAA material.

One stakeholder commented that Type B and C applications should follow DO-178. The Agency disagrees to include such considerations in this Appendix. Development to DO-178 could, in fact, be requested for applications covered by airworthiness approval, which is not prohibited, but is out of scope of AMC 20-25.

The resulting text of AMC 20-25 (including its Appendices) is presented in Appendix A to this CRD.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - Appendix G - EFB Policy and Procedures Manual p. 61-62

comment *94* comment by: *Grégory DELBEKE*

Page 61 of 72, item B. II. Appendix G:
The BCAA proposes to add in the typical content of the EFB policy & procedures manual the following items:
- Flight crew
  - Training
  - Operating procedures (normal, abnormal and emergency)
- HMI Assessment
- Software application(s) and database(s) validation plan

response Partially accepted

Appendix G has been revised with support from the Review Group.

comment *232* comment by: *AIRBUS*

"8. EFB Security Policy

- EFB System architecture
- Limitations of the EFB system
- EFB general philosophy, environment and dataflow
- Detailed presentation of the EFB applications
- EFB application customisation
- Data management:
  - o Data administration
  - o Organisation & workflows

o Data Loading
o Data revision mechanisms

o Approval workflow

o Data Publishing & dispatch

o Customisation

o How to manage Airline's specific documents

o Airport data management

o Aircraft fleet definition

- Data authoring

o Navigation and customisation"

All those considerations are not specific to security (eg., "limitations of the EFB system" are not just limited to security limitations ; max laptop weight or max power consumption are not security-related, ...). Security may contribute to some of those considerations but definitively, those considerations are not the only outcomes of a security assessment process. Those considerations are driven as well by the customer needs, risk assessment process, dispatch considerations, flight crew procedures and training, EFB administration...

Suggested text:
Shift all the content of paragraph 8 to paragraph 4 (Introduction) of appendix G and add the following to paragraph 8 "EFB Security Policy": "Security solutions description and security procedures in accordance with section 7.8 of this AMC."

response

Partially accepted

Appendix G has been revised with support from the Review Group.

comment

376 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 62 shared with Airbus

JUSTIFICATION for the Comment on page # 61 App G §8
All those considerations are not specific to security (eg., "limitations of the EFB system" are not just limited to security limitations ; max laptop weight or max power consumption are not security-related, ...). Security may contribute to some of those considerations but definitively, those considerations are not the only outcomes of a security assessement process. Those considerations are driven as well by the customer needs, risk assessement process, dispatch considerations, flight crew procedures and training, EFB administration, ...

PROPOSED TEXT / COMMENT
Move all the content of paragraph 8 to paragraph 4 (Introduction) of appendix G and add the following to paragraph 8 "EFB Security Policy" : "Security solutions description and security procedures in accordance with section 7.8 of this AMC."

response	Partially accepted Appendix G revised with support from the Review Group.

comment	*627* comment by: *Monarch Airlines* **4. Introduction**. The word 'definition' in the text is superfluous as a 'glossary' is a list of words with their definitions. **6. Software Application Control and Configuration**. An explanation of exactly what is required against each of the bullet points would be very helpful, as the meaning of these short titles is unclear. **8. Security Policy**. The majority of the bulleted items listed here are not related to security
response	Partially accepted Appendix G revised with support from the Review Group.

comment	*718* comment by: *Thomson Airways* "Definitions" in 4. Introduction should be deleted, as the definitions will be included in the glossary.
response	Partially accepted Appendix G revised with support from the Review Group.

comment	*719* comment by: *Thomson Airways* The title of section 8 is misleading and restrictive. Most of the contents are not security related. Data management, Data administration, Organisation & workflows, Data Loading, Data revision mechanisms & Data Publishing & dispatch are key elements of the control of EFB systems and these sections should include a lot more than security information.
response	Partially accepted Appendix G revised with support from the Review Group.

CONCLUSION ON COMMENTS ON PAGE 49 (DRAFT AMC 20-25 – APPENDIX G – EFB POLICY AND PROCEDURES MANUAL)

Six comments were received on this segment of the NPA, mainly proposing improvements to the recommended structure of an EFB policy and procedure manual.

Some of the information proposed to be included in the table of content are in particular:

— Crew procedures;

— Rewording of the security section; and

— more details of what is required under each bullet point.

All these comments have been at least partially accepted and the proposed structure of the EFB policy and procedures manual accordingly reviewed.

The resulting text of AMC 20-25 (including its Appendices) is presented in Appendix A to this

CRD.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - Appendix H - Airport Moving Map Display (AMMD) Application with Own-Ship Position p. 63-65

comment *327* comment by: *Thales Avionics*

This appendix does not address the source of the own-ship position. Should it be computed by an aircraft system sensor or may it be computed by a GNSS sensor embedded in the EFB equipment?

response Noted

H.2.2.c) requires that the Total System Error of the end-to-end system is specified and characterised. In the case of an unqualified embedded sensor, this requirement is not easily achievable.

comment *389* comment by: *Garmin International*

Comments on H.1.1:
The inclusion of Class 3 EFBs in the Appendix H AMMD guidance is problematic. Many installed MFDs already provide AMMD with own-ship position capability. Some of this equipment was certified prior to TSO-C165 and others since TSO-C165 but in either case, the equipment already has installation approval via TC/STC and should not be subject to the additional requirements in Appendix H and ETSO-2C165a.

Recommend excluding equipment with TSO and/or installation approval from these requirements; perhaps H.2.1 is viewed as already doing so but as has been noted in several other comments, this should be emphasized within the entire AMC 20-25.

response Partially accepted

It is not the intention to reassess with the criteria included in AMC 20-25 any already existing approval. The principle of 'grandfathering' for existing TC/STC approvals or existing ETSO authorisations will apply.

comment *390* comment by: *Garmin International*

Comments on H.1.2:
It is unclear what benefit is being provided by creating ETSO-2C165a, which is not harmonized with FAA TSO-C165 (see additional comments on ETSO-2165a). Paragraph H.1.2 clearly acknowledges that:

- 'An AMMD application shall **not be used as the primary means of taxiing navigation** ...' (**emphasis** in original),
- 'Note: When an AMMD is in use, the primary means of taxiing navigation remains the use of normal procedures and direct visual observation out of the cockpit window.' (emphasis added), and
- 'an AMMD application with display of own-ship position is considered as having a minor safety effect when displaying misleading information and the failure condition for the loss of function is classified as "no effect."'

Why is it necessary to "raise the certification bar" for a function whose primary

purpose is situational awareness with a worst-case failure effect of minor?

Recommend remaining with the existing ETSO-C165 which is harmonized with FAA TSO-C165.

response

Partially accepted

In order to be useful as an AMMD, it has been demonstrated that there are additional requirements which are needed. One example is the 40 meters TSE. FAA has also the intention to add this requirement.

comment

391 comment by: *Garmin International*

Comments on H.2.2 item c):
As noted in the comments on H.1.2, the AMMD's primary purpose is situational awareness with a worst-case failure effect of minor. Taxi navigation decisions must be made based on normal procedures using direct visual observation out of the cockpit window. What additional benefit will be provided by requiring a more stringent Total System Error (TSE) than is required by existing ETSO-C165 and RTCA/DO-257A?

Additionally, the H.2.2 item c) requirement for TSE of 40 meters will be impossible to meet if the ETSO-2C165a Appendix 1 item 1 requirement is left at 40 meters for database error alone as there is no margin available for position error, latency, display pixel error, etc. that are accounted for in RTCA/DO-257A section 3.2.3 Note 5. Changing the database error from 65 m to 40 m while holding all other factors constant in the DO-257A 3.2.3 Note 5 equation results in a TSE of 79 m, which far exceeds the H.2.2 item c) requirement for TSE of 40 m.

Recommend retaining the existing ETSO-C165 and RTCA/DO-257A requirements for TSE. However, if the H.2.2 item c) TSE requirement is retained, recommend basing it on a more realistic assessment of what is required to attain TSE like that performed in RTCA/DO-322 for surface ADS-B applications; such an assessment should be performed by a committee that includes industry experts as well as certification authorities due to the complexities involved with arriving at a realistic TSE.

response

Partially accepted

Further guidance is proposed in order to assess the 40 meters TSE.

comment

392 comment by: *Garmin International*

Comments on H.2.2 item e):

This item states "The AMMD ... shall detect and annunciate ... incorrect behaviour of the platform (..., frozen system, ...)".

It is unclear why it is necessary to annunciate a frozen system display for a function with a worst-case failure effect of minor. A frozen system display typically can be detected only by monitoring the display outputs from a commercial graphics processor (CGP). EASA CM - SWCEH - 001 Issue: 01 section 10.1, which provides guidance on CGP states:

"This Section of the Certification Memorandum is related to the use of Commercial Off-the-Shelf (COTS) Graphical Processors (CGPs) (which have been

	allocated a DAL/IDAL of A, B or C) in airborne display systems that are part of the technical configuration of an aircraft. NOTE: For Level D components, the additional guidance of this Section does not apply but the ED-80/DO254 processes are still applicable." (emphasis added) Consequently, the requirement to annunciate a frozen system display for a function with minor failure effect is not consistent with other EASA guidance. Recommend removing "frozen system," from H.2.2 item e).
response	Partially accepted This is now proposed as recommended.

comment	*393* comment by: *Garmin International* Comments on H.2.2 item f): It is unclear why additional Data Quality Requirements defined in ETSO-2C165a Appendix section 4 are required. As noted previously, creation of ETSO-2C165a will result in a new standard that is not harmonized with FAA TSO-C165. It is unclear why it is necessary to "raise the certification bar" for a function whose primary purpose is situational awareness with a worst-case failure effect of minor. Recommend remaining with the existing ETSO-C165 which is harmonized with FAA TSO-C165.
response	Not accepted Please see response to comment No 390.

comment	*583* comment by: *Jeppesen Inc.* Suggest remove entire appendix and simply classify AMM and other surface map/chart functions with ownship provided, as Type B applications Rationale: Harmonization with the current FAA 120-76B "Change 1" activity pertaining to the authorization of the depiction of airport surface ownship depiction as a Type B application on capable portable COTs devices should be considered in this policy as well. This has the potential to greatly increase adoption of an important safety tool that has a corresponding "Minor" failure effect
response	Not accepted Even if AMMD is considered as a Type B software application, requirements to ensure that the software is adequate for its intended function are necessary.

comment	*629* comment by: *Monarch Airlines* We think that an additional class of special Type C applications needs to be recognised (in the same way as AMM is a 'special case' Type C application) and should be included under Appendix H.

The new 'special Type C' application is an aeronautical chart with 'own ship' position. This is an extension of the AMM, ie the 'own ship' position is NOT used for deducing aircraft position, trajectory or following a navigational route, but rather to assist crews in orientating themselves relative to the features on the map to assist pilot situational awareness. Thus, it acts as the airborne equivalent of the AMM.

We have conducted authorised trials which demonstrate that, when using a map without own-ship position, pilots spend up to 30 seconds orientating themselves on the map relative to the map features. During this time, the pilot cannot monitor the aircraft. The same process, with own-ship position, takes less than 1 second, which enhances flight safety and reduces 'heads in' time. Our trials have indicated that this feature is the most useful and popular feature of EFB charting. This is also a feature currently implemented on many military aircraft using, for example, the Jeppesen Flitedeck application. EASA would need to justify why it is safe for military transports to use this safety-enhancing feature, but not commercial aircraft.

Therefore, we strongly recommend that aeronautical charts with own-ship position be included as a special case in the same way as AMM is.

response

Not accepted

Please see response to comment No 696.

comment

720 comment by: *Thomson Airways*

The Enroute Moving Map Display with own-ship position should be treated the same way the AMMD is.
Similarly to the AMMD, the own-ship position is not used "**by the flight-crew members to check, control, or deduce the aircraft position or trajectory, either to follow the intended navigation route or to avoid adverse weather, obstacles or other traffic, in flight or on ground**" but increases situational awareness by assisting crews in orientating themselves on the electronic enroute map.
Therefore, like the AMMD (and with the same conditions and approval processes provisions), it should be authorised for use on Class 2 EFB systems.

response

Not accepted

Please see response to comment No 696.

comment

743 comment by: *NetJets Europe*

Current FAA research and initiatives pertaining to the authorization of the depiction of airport surface own-ship depiction as a Type B application on capable portable COTs devices have substantial potential to increase safety margins, be widely deployable and rapidly effective. We request that any advancement in FAA policy in this area be considered for inclusion into this document as well.

(Source: Executive Jet Management, a NetJets company)

response

Accepted

AMMD is allowed as EFB Type B software application.

comment	*851* comment by: *Eurocopter* The classification of safety impact not more than minor (and the associated software level D) for this AMMD function is questionable, as we believe that, as far as the flight crew has access to such an application, they could strongly rely on it.
response	Noted AMMD is allowed as EFB Type B software application based on very specific assumptions of its intended use (as per AMC 20-25 Appendix H - H.2.2).

CONCLUSION ON COMMENTS ON PAGE 60 (DRAFT AMC 20-25 – APPENDIX H - AMMD)

11 comments have been received on this segment of the NPA, mainly:

— suggesting reclassification of the application as Type B and removal of the appendix;

— Claiming that some of the objectives could be difficult to achieve;

— Proposing an additional application, chart with own-ship position, to be dealt in the same way; and

— One stakeholder claimed that the "minor" safety criticality is questionable.

Reclassification of AMMD as Type B is accepted and addressed in the replies to the comments on section 5.2.3.1. of proposed AMC 20-25. Nevertheless it is noted that the FAA has still not officially issued any policy on the subject.

Several suggestions to improve the wording of Appendix H to AMC 20-25 are however accepted, but this does not substantially change the technical content, based on mentioned eleven comments.

The resulting text of AMC 20-25 (including its Appendices) is presented in Appendix A to this CRD.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - Appendix I - Example of Operational Approval Submission Report p. 66-67

comment	*138* comment by: *DGAC* For more clarity, it is proposed to reorganise a little bit the paragraph "operational approval" : **Operational Approval** **1. Risk Analysis** Details of Operational Risk Analysis (ORA) conducted (§ 7.1) Risk analysis summary for each application and mitigation means put in place; **2. EFB platform/hardware description;** Description of each software application to be included in the approval (see Appendix F); (OS, software version, hardware version) **3. Ground staff** Operator Training (ground staff) EFB Administrator qualification, Details of EFB Administration procedures including provision of the EFB Policy and Procedures Manual (§ 7.6 & § 7.6.1) Details of EFB System Security measures (§ 7.5)

Details of the system for routine EFB System maintenance (§ 7.7)
Details of proposed Quality Assurance oversight of EFB system (§ 7.4)
4. Human Machine Interface Evaluation
Details of the Human Machine Interface Assessment conducted for Type A and B Software Applications (§ 7.2)
Human factor assessment for the complete EFB system, human machine interface and all software applications;
o Pilot workload in both single-pilot and multi-crew flown aircraft
o Size, resolution, and legibility of symbols and text
o 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.
5. Flight Crew
5.1. SOPs/ Contingency SOPs
Details of Flight Crew Operating Procedures (§ 7.3):
o Procedures for Using EFB Systems with Other Flight crew compartment Systems (§ 7.3.1)
o Flight Crew Awareness of EFB Software/Database Revisions (§ 7.3.2)
o Procedures to Mitigate and/or Control Workload (§ 7.3.3)
o Flight Crew Responsibilities for Performance Calculations (§ 7.3.4)
5.2. Flight Crew Training
Details of Flight Crew Training (§ 7.8):
o Initial training
o Differences training
o Recurrent training
6. Report of the Operational Evaluation Test (§ 7.9):
o Proposals for the initial retention of paper back up (§ 7.9.1)
o Proposals for the commencement of operations without paper back up (§ 7.9.2)

response

Partially accepted

Appendix I revised with support from the Review Group. The Appendix is however renamed 'Example of final operational report', to be consistent with the removal of the expression 'operational approval' from the resulting text of AMC 20-25.

comment

233 comment by: *AIRBUS*

Many cross-references to paragraphs of the NPA are wrong. E.g., for Software applications, § 5.3.1 ; §5.3.2 ; §5.3.3 do not exist in the document. They should be replaced (resp.) by § 5.2.1 ; §5.2.2 ; §5.2.3.

response

Partially accepted

Appendix I revised with support from the Review Group. The Appendix is however renamed 'Example of final operational report', to be consistent with the removal of the expression 'operational approval' from the resulting text of AMC 20-25.

comment

234 comment by: *AIRBUS*

"Relevant Information or references related the EFB hardware Approval For a Class 1 EFB:"

To be in accordance with AMC section 6.1.1.3 (Power source), requirement about "Details of the Power Source" is missing.

Refer to comment about data connectivity for a Class 1: requirement about "Details of any Data Connectivity" is missing.

Suggested text:
Add the following :
• Details of the Power Source
• Details of any Data Connectivity

response

Partially accepted

Appendix I revised with support from the Review Group. The Appendix is however renamed 'Example of final operational report', to be consistent with the removal of the expression 'operational approval' from the resulting text of AMC 20-25.

comment

377 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 63 shared with Airbus

JUSTIFICATION for the Comment on page # 66-67 App I
Many cross-references to paragraphs of the NPA are wrong. E.g., for Sotware applications, § 5.3.1 ; §5.3.2 ; §5.3.3 do not exist in the document. They should be replaced (resp.) by § 5.2.1 ; §5.2.2 ; §5.2.3

PROPOSED TEXT / COMMENT
Check and update all cross-referred paragraphs

response

Partially accepted

Appendix I revised with support from the Review Group. The Appendix is however renamed 'Example of final operational report', to be consistent with the removal of the expression 'operational approval' from the resulting text of AMC 20-25.

comment

378 comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 64 shared with Airbus

JUSTIFICATION for the Comment on page # 66-67 App I " Relevant Information or references related the EFB hardware Approval For a Class 1 EFB:"

To be in accordance with AMC section 6.1.1.3 (Power source), requirement about "Details of the Power Source" is missing.
Refer to comment # 287 about data connectivity for a Class 1 : requirement about "Details of any Data Connectivity" is missing

PROPOSED TEXT / COMMENT
Add the following :
• Details of the Power Source
• Details of any Data Connectivity

response

Partially accepted

Appendix I revised with support from the Review Group. The Appendix has been, however, renamed 'Example of final operational report', to be consistent with the removal of the expression 'operational approval' from the resulting text of AMC 20-25.

CONCLUSION ON COMMENTS ON PAGES 66-67 (DRAFT AMC 20-25 – APPENDIX I – EXAMPLE OF OPERATIONAL APPROVAL SUBMISSION REPORT)

The five received comments requested some clarification and additional paragraphs to be added to reflect the material from the hardware section 6.1.1.3.

Most of the suggestions have been accepted.

The resulting text of AMC 20-25 (including its Appendices) is presented in Appendix A to this CRD.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - Appendix J - Power Supply Considerations for Class 1 and 2 EFBs p. 68

comment *235* comment by: *AIRBUS*

"Class 1 and 2 EFBs are not considered necessary for continued safe flight and landing and should not be connected to an essential power bus."

This requirement is solution-prescriptive whereas it should be objective-oriented only. This requirement is not consistent with section 6.1.1.3.(e). (Power source) recommending access to an alternate power supply in order to achieve an acceptable level of safety - see comment about section 6.1.1.3.(e). (Power source). Indeed, in abnormal or emergency condition, the flight crew may be required to access electronic documentation giving the suitable mitigation procedure. For no paper operations, EFB must be supplied in abnormal or emergency condition to compute landing performance.

Suggested text:
If connected to an essential power bus, a Class1 or Class 2 EFB and the aircraft electrical network should be demonstrated not to adversely affect aircraft systems required for continued safe flight and landing (eg., automatic electrical load-shedding). In the case of a STC, Original Equipment Manufacturer (TC holder) should be involved, notably to provide or confirm power-load budgets and distribution system characteristics.

response Partially accepted

Alternative power supply is not necessarily connection to an essential power bus. In FAA AC 20-273, it is also recommended to connect EFB power provisions to a non-essential or the least critical power bus so failure or malfunction of the device, or power supply, will not affect safe operation of critical or essential systems. The AMC 20-25 text has been reworded in order not to be prescriptive.

comment *379* comment by: *Dassault Aviation*

DASSAULT-AVIATION comment # 65 shared with Airbus

JUSTIFICATION for the Comment on page # 68 App J 5th § "Class 1 and 2 EFBs are not considered necessary for continued safe flight and landing and should not be connected to an essential power bus."

This requirement is solution-prescriptive whereas it should be objective-oriented only. This requirement is not consistent with section 6.1.1.3.(e). (Power source) recommending access to an alternate power supply in order to achieve an acceptable level of safety - see comment #303 about section 6.1.1.3.(e). (Power

source). Indeed, in abnormal or emergency condition, the flight crew may be required to access electronic documentation giving the suitable mitigation procedure. For no paper operations, EFB must be supplied in abnormal or emergency condition to compute landing performance.

PROPOSED TEXT / COMMENT
If connected to an essential power bus, a Class1 or Class 2 EFB and the aircraft electrical network should be demonstrated not to adversely affect aircraft systems required for continued safe flight and landing (eg., automatic electrical load-shedding). In the case of a STC, Original Equipement Manufacturer (TC holder) should be involved, notably to provide or confirm power-load budgets and distribution system characteristics.

response

Partially accepted

Please see response to comment No 235.

comment

501 comment by: *Oliver Ast (CLH)*

Proposed Text:
Class 1 EFBs should not be connected to an essential power bus.
If connected to an essential power bus, a Class 2 EFB and the aircraft electrical network should be demonstrated not to adversely affect aircraft systems required for continued safe flight and landing (eg., automatic electrical load-shedding).

Comment:
This requirement is solution-prescriptive whereas it should be objective-oriented only. This requirement is not consistent with section 6.1.1.3 (e) recommending access to an alternate power supply in order to achieve an acceptable level of safety. Indeed, in abnormal or emergency condition, the flight crew may be required to access electronic documentation giving the suitable mitigation procedure.
However, restriction should still apply to Class 1 because conection to an essential power bus should require a certification.

response

Partially accepted

Please see response to comment No 235.

comment

584 comment by: *Jeppesen Inc.*

Propose harmonizing guidance with FAA AC 120-76B and associated FAA airworthiness guidance, AC 20-173.

response

Partially accepted

Please see response to comment No 235.

comment

609 comment by: *Star Alliance*

Original AMC20-25 NPA text:

Class 1 and 2 EFBs are not considered necessary for continued safe flight and landing and should not be connected to an essential power bus.
RATIONALE / REASON / JUSTIFICATION for the Comment :
This requirement is solution-prescriptive whereas it should be objective-oriented only. This requirement is not consistent with section 6.1.1.3 (e) recommending access to an alternate power supply in order to achieve an acceptable level of safety (see comment on chapter 6.1.1.3.e). Indeed, in abnormal or emergency condition, the flight crew may be required to access electronic documentation giving the suitable mitigation procedure. However, restriction should still apply to Class 1 because conection to an essential power bus should require a certification.
PROPOSED TEXT / COMMENT:

Class 1 EFBs should not be connected to an essential power bus. If connected to an essential power bus, a Class 2 EFB and the aircraft electrical network should be demonstrated not to adversely affect aircraft systems required for continued safe flight and landing (eg., automatic electrical load-shedding).

response

Partially accepted

Please see response to comment No 235.

comment

630 comment by: *Goodrich*

1. Appendix J: Last paragraph, replace last two sentences with: "For risk mitigation in support of a paperless cockpit, EFBs may be connected to the essential power bus provided the EFB is installed in accordance with the applicable airworthiness certification specifications; including an electrical load analysis to ensure the power requirements remain within the power load budget in operational conditions."

response

Partially accepted

Please see response to comment No 235.

comment

631 comment by: *Monarch Airlines*

We strongly disagree that Class II EFBs are not considered necessary for continued safe flight. It is difficult to believe that this shocking comment has been written by an aviator...

Without paper terminal charts, a pilot suffering a total electrics failure and subsequently reliant on the essential power bus is, when in IMC or at night, 100% reliant on the electronic charting within the EFB to accurately navigate the aircraft to a safe landing. Air Traffic Control officers are not trained to interpret terminal charts, so cannot be of significant assistance even if they have the charts available. Therefore, a Class II EFB should be connected to the essential services busbar.

This is a shockingly unsafe statement that must not be published in the final version! If you do, you must remove the 'S' from EASA.

	This statement is also incongruent with Appendix K which states that Class II EFBs 'that are required to be used for flight following a rapid decompression' must undergo demonstrate rapid decompression testing. Thus, Appendix K implies that Class 2 EFBs are required for continued safe flight (because they are required to operate following decompression).
response	Noted Please see response to comment No 235.

comment	*688* comment by: *Deutsche Lufthansa AG* Referring to: "Class 1 and 2 EFBs are not considered necessary for continued safe flight and landing and should not be connected to an essential power bus." <u>Proposal:</u> Change to read: "Class 1 EFBs should not be connected to an essential power bus. If connected to an essential power bus, a Class 2 EFB and the aircraft electrical network should be demonstrated not to adversely affect aircraft systems required for continued safe flight and landing (eg., automatic electrical load-shedding)." <u>Comment/Justification:</u> This requirement is solution-prescriptive whereas it should be objective-oriented only. This requirement is not consistent with section 6.1.1.3 (e) recommending access to an alternate power supply in order to achieve an acceptable level of safety (see comment #657). Indeed, in abnormal or emergency condition, the flight crew may be required to access electronic documentation giving the suitable mitigation procedure. However, restriction should still apply to Class 1 because conection to an essential power bus should require a certification.
response	Partially accepted Please see response to comment No 235.

comment	*721* comment by: *Thomson Airways* Considering Class 2 EFB systems and the applications they include are designed to replace their paper equivalent, there is a clear requirement for power supply from an essential power bus. It must be noted that Appendix K mandates rapid depressurisation tests, indicating that the Class 2 EFB is required to be functional following a rapid depressurisation and is therefore essential to the safe conduct of the flight.
response	Partially accepted Please see response to comment No 235.

comment	*744* comment by: *NetJets Europe* Please harmonize with guidance with FAA AC 120-76B

and associated FAA airworthiness guidance, AC 20-173.

(Source: Executive Jet Management, a NetJets company)

response

Partially accepted

Please see response to comment No 235.

comment

883 comment by: *Boeing*

Page: 68
Paragraph: Appendix J -- *Power Supply Considerations for Class 1 and 2 EFBs* 4th Paragraph

The proposed text states:

Appendix J - Power Supply Considerations for Class 1 and 2 EFBs

...

If an EFB is permanently attached to the essential power network, it could affect the essential generation system (emergency generator and/or battery, bus bars, distribution system) to which it is connected.

…

REQUESTED CHANGE: We request more clarity as to the intent of this sentence. Consideration should be given to the fact that today's EFBs require very little AC power and, in some cases, even have their own backup battery source. A proper risk analysis would mitigate the possible reservations of an EFB being placed on an essential bus for power.

JUSTIFICATION: More clarity on this point would be beneficial for appropriate compliance.

response

Partially accepted

Please see response to comment No 235.

comment

894 comment by: *Lufthansa Technik Design Organisation*

It might be possible to show that connection of a class 1 or 2 EFB to an essential bus will not adversely affect the essential generation system and thus its connection could contribute to enhanced safety. This should not be ruled out.

response

Noted

Please see response to comment No 235.

comment

911 ❖ comment by: *SAT-WAY sa*

Power back-up sources. (Appendix 3 page 68 and new FAA AC120-76B)

Back-up power source for 30 minutes EFB was generally required. A set of fully charged spare batteries is suggested in the newly FAA published AC120-76B document. Lithium batteries charged for a long time in climatic changing environment cannot be guarantied at full stable capacity. High temperature exposure in cockpits on parked aircraft on the ramp in very hot countries will affect capacity. The new FAA AC120-76B point (11.6 page 11) states a procedures.

	At least one EFB connected to the aircraft power supply is more reliable. Should that power supply fail, two cockpit EFB's can both offer minimum 30 minutes. The power supply 28 VDC or 110 AC 60-100 Hz should feed only certified and TSO'd equipment, to guaranty a stable and battery explosion risk free energy supply. DO311 standards are a good guideline for airworthiness standards.
response	Noted Please see response to comment No 235.

CONCLUSION ON COMMENTS ON PAGE 60 (DRAFT AMC 20-25 – APPENDIX J – POWER SUPPLY CONSIDERATIONS)

13 comments have been received on this segment, requesting unanimously harmonisation with FAA policy, recognising, thus, the possibility to connect to the essential power bus to supply energy to portable (Class 2) EFBs host platforms.

The Agency agrees to harmonise with FAA and not to forbid connection to the essential power bus, subject to applicable requirements.

The resulting text of AMC 20-25 (including its Appendices) is presented in Appendix A to this CRD.

B. Draft Opinion and Decisions - II. Draft Decision AMC-20 - AMC 20-25 - Appendix K - Considerations for Rapid Depressurisation Test p. 69

comment	*326* comment by: *Thales Avionics* For non-pressurized aircraft, particularly rotorcraft, this statement makes that Class 3 EFB are not exempted of rapid decompression testing, while this test requirement seems useless in such a case. It is proposed to reword "Rapid decompression testing is not required for a Class 1 or 2 EFB used in an non-pressurised aircraft." into "Rapid decompression testing is not required for EFB used in an non-pressurised aircraft."
response	Accepted The reason for the original text is that Appendix K provides guidance on the environmental testing which is part of the operational assessment for portable EFBs, while for installed EFBs, the environmental qualification is part of the airworthiness approval.

comment	*823* comment by: *Fédération Nationale de l'Aviation Marchande (FNAM)* *FNAM proposes the following correction : "no mitigating procedures need <u>to</u> be developed beyond dual redundancy"*
response	Accepted

comment	*824* comment by: *Fédération Nationale de l'Aviation Marchande (FNAM)* Regarding considerations for rapid depressurisation test, it is written that once Class 1 or 2 EFBs have successfully completed the test, there is no need to develop specific procedures, except the "<u>dual redundancy</u>". We understand thus that there is an obligation to have <u>at least 2 EFBs on board</u> the aircraft, as backup information. The following sentence supports this idea, since it is written:

	"1 of the 2 EFBs on board". This obligation has never been mentioned before in the AMC. We would suggest EASA editing this paragraph, and removing this obligation.
response	Accepted The first sentence of Appendix K states 'When the EFB system hosts applications that are required to be used during flight following a rapid depressurisation', therefore, it is assumed that there is not backup of the EFB data apart from the EFB system. In such cases, two EFB host platforms are the normal configuration. Nevertheless, the text has been amended in order not to be prescriptive.

CONCLUSION ON COMMENTS ON PAGE 60 (DRAFT AMC 20-25 – APPENDIX K – RAPID DEPRESSURISATION TEST)

Three comments have been received, requesting some clarifications.

The suggestions are accepted or, at least, partially accepted by the Agency. Of course, not all units need to be tested but only one representative sample.

The resulting text of AMC 20-25 (including its Appendices) is presented in Appendix A to this CRD.

B. Draft Opinion and Decisions - III. Draft Decision CS-ETSO p. 70

comment	*904* ❖ comment by: *SAT-WAY sa* Production standards (6.1 page 32 and draft decision CS-ETSO) A Class 2 or Class 3 EFB in a paperless cockpit environment becomes de facto an essential information source for navigation and aircraft operation. Except for a Class 1 and a non paperless cockpit, should any device not need to comply with minimum production quality assurance standards and production traceability, (ETSO) guarantying components stability. DO 160 compliance guaranties a test unit. Quality deviation of features on components can only be guarantied with Standard Order production procedures. When used as a Class 2 or 3 in a paperless cockpit environment, EF B units will in fact become essential for safe flight operations. Their level of reliability has to be as high as other avionics. This requirement exist for AMMD use but why not for all paperless cockpit use. As the door is open to many "off the shelf" commercial products as EFB, many do not comply with similar ETSO standards. This is relevant for lithium batteries, screens and other components. No direct reference is made in the document to any ETSO procedure except in the appendix CS-ETSO without specification of the application field.
response	Noted In the EU regulatory system: — all the processes related to initial airworthiness, including ETSO, are subject to Commission Regulation (EU) No 748/2012 (Part 21); — the ETSO process is only voluntary in the case the applicant believes that the authorisation is useful for its business, otherwise also parts not covered by ETSO authorisation can be integrated or used in aircraft;

— the applicant/holder of the ETSO authorisation shall be an approved organisation (AP-DOA);

— the organisation producing the item and signing the declaration of conformity ('EASA Form 1') shall also be an approved organisation (POA); and

— the general (non-functional) requirements applicable to all ETSO items (e.g. environmental testing, software development) are published in Subpart A of CS-ETSO.

B. Draft Opinion and Decisions - III. Draft Decision CS-ETSO - Amend ETSO-C165 to become 2C165a and to read as follows p. 70-72

comment *369* comment by: *DGAC*

Are somewhere in the ETSO technical specifications provided about the GNSS position?
From which reciver should it come (TSO C129, TSO C145, 146) ? Has the integrity to be checked in case stabnd alone receivers are used ?

Some details should be given if not provided elsewhere in the document.

response Partially accepted

DO-257A, as referenced by proposed ETSO-2C165a (paragraph 3.1.1.2) for AMMD applications, contains (paragraphs 2.3.1.1.1.5 and 2.3.1.1.2.3 therein) a high-level requirement for the position source (i.e. accuracy less than 36 m) and a note that any GSS receiver is considered adequate to meet that requirement.

Position source requirements have been redefined, being in line with ETSO-C195a AMMD applications using ADS-B in for target display.

comment *394* comment by: *Garmin International*

As was noted in comments on AMC 20-25 Appendix H, it is unclear what benefit is being provided by creating ETSO-2C165a, which is not harmonized with FAA TSO-C165 when AMC 20-25 Appendix H paragraph H.1.2 clearly acknowledges that:

- 'An AMMD application shall **not be used as the primary means of taxiing navigation** ...' (**emphasis** in original),
- 'Note: When an AMMD is in use, the primary means of taxiing navigation remains the use of normal procedures and direct visual observation out of the cockpit window.' (emphasis added), and
- 'an AMMD application with display of own-ship position is considered as having a minor safety effect when displaying misleading information and the failure condition for the loss of function is classified as "no effect."'

Why is it necessary to "raise the certification bar" for a function whose primary purpose is situational awareness with a worst-case failure effect of minor?

Recommend remaining with the existing ETSO-C165 which is harmonized with FAA TSO-C165.

response | Partially accepted

FAA has indicated their willingness to adopting TSO-C165a technically harmonised with ETSO-C165a. Both Technical Orders introduce more stringent requirements for the AMMD application. ETSO-C165a, being harmonised with the FAA will be published in Index 1 of CS-ETSO.

comment | *395* comment by: *Garmin International*

ETSO-2C165a section 2.2 begins with the statement "To support Airport Moving Map Display (AMMD) applications for Electronic Flight Bags (EFB) ...".

The quoted statement can be interpreted to mean that EASA will apply ETSO-2C165a only to AMMD applications for EFBs. If that is the case, it is unclear what ETSO will apply to installed MFDS with the in flight, AMMD, and VSD electronic map functions defined in RTCA/DO-257A section 2.

Additionally, FAA has addressed the differences in a software only AMMD TSO via AC 20-159, *Obtaining Production Approval of Airport Moving Map Display Applications Intended for Electronic Flight Bag Systems*.

Recommend including any software only AMMD guidance in AMC 20-25 or a separate EASA AMC. This will result in there being no need for ETSO-2C165a section 2.2 and allow the existing ETSO-C165 to remain harmonized with FAA TSO-C165.

response | Partially accepted

The reference to the AMMD application has been removed to make the statement more general. Keeping the statement in the eTSO would not exclude from harmonisation aims only for technical equivalency and the bilateral agreement accounts for procedural differences.

Another example in this context is the fact that the Agency's CS-ETSO does neither address production nor quality management aspects usually covered in the equivalent FAA TSOs. The need for clarification/guidance on those aspects is perceived today by the Agency mainly in the context of this specific ETSO, where the procedural clarification is maintained.
This does not preclude the Agency from developing further guidance in another context in the future, if felt necessary.

comment | *396* comment by: *Garmin International*

ETSO-2C165a section 3.1.1 item 2) adds requirements for AMMD applications beyond those required by DO-257A, FAA TSO-C165, and existing ETSO-C165. Since EASA's policy is to require equipment that carries multiple TSOs to move to the latest TSO revision for all TSOs the equipment carries whenever any TSO is added or a major change is made to any one of the TSOs the equipment carries, this will require installed MFDs that already carry ETSO-C165 for AMMD to meet the additional requirements with no obvious benefit since the equipment already has been evaluated both from an ETSO and installation perspective.

It is unclear why EASA believes it is necessary to "raise the certification bar" for a function whose primary purpose is situational awareness with a worst-case failure effect of minor.

	Recommend remaining with the existing ETSO-C165 which is harmonized with FAA TSO-C165.
response	Noted The main 'raised certification bar' is the accuracy of the airport moving map data base to avoid misleading information when showing the aircraft on the wrong taxiway. The Agency feels that this change is necessary, since showing the aircraft on the wrong taxiway may cause confusion.

comment	*397* comment by: *Garmin International* ETSO-2C165a Appendix 1 is not identified as "Appendix 1". If ETSO-2C165a is retained, recommend identifying ETSO-2C165a Appendix 1 as "Appendix 1".
response	Accepted

comment	*398* comment by: *Garmin International* ETSO-2C165a Appendix 1 item 1 modifies the DO-257A 2.3.1.1.2.4 and 2.3.1.1.1.6 requirements for total database accuracy for taxiways and runways to 40 meters or less. The use of 40 meters as the most stressing case for total database error may not be appropriate to what is required for a Total System Error (TSE). Total database error is only one component of the TSE assessment (see RTCA/DO-257A section 3.2.3 Note 5 equation). As noted in our comments on AMC 20-25 H.2.2 item c), we recommend retaining the existing ETSO-C165 and RTCA/DO-257A requirements for TSE. Similarly, we recommend retaining the existing ETSO-C165 and RTCA/DO-257A requirements for total database error; i.e., remove ETSO-2C165a Appendix 1 item 1. However, if the AMC 20-25 H.2.2 item c) TSE requirement is retained, we recommend basing it on a more realistic assessment of what is required to attain TSE like that performed in RTCA/DO-322 for surface ADS-B applications (see DO-322 Table B.11 for a summary of the most stressing cases); such an assessment should be performed by a committee that includes industry experts as well as certification authorities due to the complexities involved with arriving at a realistic TSE. Additionally, FAA Policy AIR-100-10-130-001, *Policy Statement on Airport Map Database (AMD) Accuracy*, dated October 20, 2010, acknowledges: "Currently, the data published in aeronautical information publications cannot be assured to meet these [RTCA/DO-257A sections 2.3.1.1.1 and 2.3.1.1.2 data accuracy] requirements [for runways and taxiways, respectively] for every data point." FAA Policy AIR-100-10-130-001 goes on to state: "Therefore, there is no requirement to establish that the data in the aeronautical database complies with these accuracy requirements before implementation. Instead, manufacturers that choose this means of compliance must be able to demonstrate that they have processes to collect, verify, correct,

and communicate errors as stated in RTCA/DO-257A, section 2.3.5. These manufacturers must use their error reporting procedures to identify airports with appreciable errors and should endeavor to correct these errors in the source data."

This policy was generated in part due to the difficulty of showing the database accuracy at airports that have only non-precision approaches and/or no approaches. Such airports are often used by general aviation operators. Without explicit recognition by certification authorities of this issue, AMMD manufacturers may feel compelled to not display runway and/or taxiway data at such airports which could result in reduced safety for general aviation operators.

Consequently, we would recommend EASA also acknowledge these issues in AMC 20-25 and/or ETSO-2C165a (if ETSO-2C165a is retained).

response

Partially accepted

The Agency is fully aware of the discussions held recently during the development of RTCA DO-317A as recognised by ETSO/TSO-C195a for the Airborne Traffic Situational Awareness (ATSA) for Surface (SURF) Operations. The ATSA-SURF Safety, Performance and Interoperability requirements (ED-165/DO-322) contains the assumptions and the rationale for those requirements. To relieve industry from demonstrating the TSE, we now require a certified GNSS sensor and a database of medium accuracy as defined by ED-99C/DO272C, which equals to, in general, a five meter accuracy, and the data provider indicated to us that they are able to meet those requirements. This is fully in line with the ETSO-C195a approach.

comment

399 comment by: *Garmin International*

ETSO-2C165a Appendix 1 item 2 "Depiction of Ownship Position" adds requirement 8 for "Horizontal Position Latency shall be less than 2 seconds (95% probability)". RTCA/DO-257A 2.2.4 item 20 states "Maximum latency of aircraft position data at the time of display update shall be one second, measured from the time the data is received by the EMD system." Per ETSO-2C165a paragraph 3.1.1 item 2, AMMD applications must meet RTCA/DO-257A sections 2.1, 2.2, and 2.3; consequently, there is already a more stringent "Position Latency" required to be met by RTCA/DO-257A. Additionally, the "Horizontal Position Latency shall be less than 2 seconds (95% probability)" is ambiguous in that, unlike the RTCA/DO-257A 2.2.4 item 20 requirement, it fails to define the boundary at which the latency should be measured.

Recommend removing the ETSO-2C165a Appendix 1 item 2 "Depiction of Ownship Position" item 8 requirement for "Horizontal Position Latency shall be less than 2 seconds (95% probability)" because there is already a more stringent and well defined RTCA/DO-257A requirement.

Furthermore, if the intent of this requirement is to perform an end-to-end latency analysis, such an analysis will have to be performed at the installation level since the AMMD architecture likely does not include the position source itself. FAA AC 20-172A, *Airworthiness Approval for ADS-B In Systems and Applications*, Appendix 1 paragraphs 5 and 6 includes guidance regarding Ownship Position Latency Analysis and Ownship Position Position Time of Applicability that may be appropriate to adapt to AMC 20-25 but which would not be appropriate to include in ETSO-2C165a. However, assessing total latency and

	defining the interfaces associated with it is a complex task that should be performed by a committee that includes industry experts as well as certification authorities.
response	Accepted The requirement has been deleted.

comment	*400* comment by: *Garmin International* ETSO-2C165a Appendix 1 item 2 "Depiction of Ownship Position" adds requirement 9 that includes the statement "Means shall be provided to allow the use of lower values which may be required due to the actual aircraft performance or to mitigate installation dependent Horizontal Position Latency". The quoted requirement may or may not have a real use in an actual installation. If ETSO-2C165a Appendix 1 item 2 "Depiction of Ownship Position" requirement 9 is retained (another Garmin comment recommends its removal), recommend changing "Means shall be provided ..." to "It is recommended to include a means ...".
response	Accepted

comment	*401* comment by: *Garmin International* ETSO-2C165a Appendix 1 item 3 "Failure Annunciations" adds requirement 2.3.4.2 item a) 2. for failure annunciation for "Loss of heading input". RTCA/DO-257A does not require the use of heading for AMMD. Instead it allows the use of either track or heading for AMMD. Furthermore, RTCA/DO-257A 2.3.1.2 item 2 requires "If direction/track is not available, the ownship symbol shall not imply directionality". Recommend removing the ETSO-2C165a Appendix 1 item 3 "Failure Annunciations" 2.3.4.2 item a) 2. "Loss of heading input" requirement as the existing RTCA/DO-257A requirement is sufficient that a separate failure annunciation should not be required.
response	Accepted

comment	*402* comment by: *Garmin International* ETSO-2C165a Appendix 1 item 3 "Failure Annunciations" adds requirement 2.3.4.2 item a) 4. for failure annunciation for "Violation of latency criteria". RTCA/DO-317A, which has well-defined latency requirements for ADS-B In applications, has no similar requirement. Furthermore, it is unclear how a latency violation could be detected by the AMMD system other than by loss of position input, which is already required to be annunciated by RTCA/DO-257A 2.2.4 item 23, which states "If aircraft positioning data are not received by the EMD for five seconds (i.e., data timeout), this condition shall be indicated to the flight crew." Per ETSO-2C165a paragraph 3.1.1 item 2, AMMD applications must meet RTCA/DO-257A sections 2.1, 2.2, and 2.3, hence RTCA/DO-257A 2.2.4 item 23 is a requirement that must be met by an AMMD application. As an example of the difficulty involved with detecting a latency violation, consider a system where the AMMD is receiving a position input from an external

source and has no means of knowing when the position was actually computed (e.g., the AMMD does not have access to a position time mark input). Thus, the AMMD has no way of timing whether the position input it receives is within the allowed latency. Additionally, a position time mark is not a required output of TSO-C129, TSO-C145, or TSO-C196 GPS position equipment; thus adding further difficulty to meeting the proposed latency violation failure annunciation requirement.

Recommend removing the ETSO-2C165a Appendix 1 item 3 "Failure Annunciations" 2.3.4.2 item a) 4. "Violation of latency criteria" requirement as it is not possible to reliably implement.

response | Accepted

comment | *403* comment by: *Garmin International*

ETSO-2C165a Appendix 1 item 3 "Failure Annunciations" adds requirement 2.3.4.2 item a) 1. for failure annunciation for "Loss of position input including loss of position integrity". RTCA/DO-257A 2.2.4 item 23 states "If aircraft positioning data are not received by the EMD for five seconds (i.e., data timeout), this condition shall be indicated to the flight crew." RTCA/DO-257A 2.2.4 item 22 states 'When the EMD receives a "data not valid" or "reduced performance" (e.g., dead reckoning mode) indication from the source, this condition shall be indicated on the EMD within one second.' Per ETSO-2C165a paragraph 3.1.1 item 2, AMMD applications must meet RTCA/DO-257A sections 2.1, 2.2, and 2.3; consequently, both the "loss of position input" and "position integrity" aspects of the additional 2.3.4.2 item a) 1. requirement are already required to be met by RTCA/DO-257A.

Recommend removing ETSO-2C165a Appendix 1 item 3 "Failure Annunciations" requirement 2.3.4.2 item a) 1. "Loss of position input including loss of position integrity" failure annunciation requirement.

response | Accepted

comment | *420* comment by: *Garmin International*

ETSO-2C165a Appendix 1 item 3 "Failure Annunciations" adds requirement 2.3.4.2 item b) for adequate indications of a frozen display.

As noted in our comments on AMC 20-25 H.2.2 item e), it is unclear why it is necessary to annunciate a frozen system display for a function with a worst-case failure effect of minor. A frozen system display typically can be detected only by monitoring the display outputs from a commercial graphics processor (CGP). EASA CM - SWCEH - 001 Issue: 01 section 10.1, which provides guidance on CGP states:

"This Section of the Certification Memorandum is related to the use of Commercial Off-the-Shelf (COTS) Graphical Processors (CGPs) (which have been allocated a DAL/IDAL of A, B or C) in airborne display systems that are part of the technical configuration of an aircraft.

NOTE: For Level D components, the additional guidance of this Section does not apply but the ED-80/DO254 processes are still applicable." (emphasis added)

Consequently, the requirement to annunciate a frozen system display for a

function with minor failure effect is not consistent with other EASA guidance.

Recommend removing the ETSO-2C165a Appendix 1 item 3 "Failure Annunciations" 2.3.4.2 item b) requirement for frozen display indication.

response

Partially accepted

It is understood that the requirement in the classical sense is too demanding in this context. On the other hand, the detection of a frozen display is a difficult task, especially when considering no or slow aircraft movement. Therefore a 'watchdog' function is required with the maximum detection delay time set at the same value as for the loss of position input.

comment

421 comment by: *Garmin International*

ETSO-2C165a Appendix 1 item 4 "Data Base" adds 2.3.5.3 to demonstrate "the applicable requirements of EUROCAE ED-99B/RTCA DO-272B section 3".

First, it is unclear whether this is considered a "requirement" since the statement uses the verb "have to be demonstrated" rather than "shall demonstrate".

In any case, it is unclear what benefit will be provided by this additional demonstration for a function with a worst-case failure effect of minor.

In particular, expanding the requirements to encompass DO-272B section 3 also brings with it the possibility of requiring compliance with RTCA DO-291B since DO-272B section 3 includes the statement that: "In addition to the following requirements, those described in DO-200A/ED-76 and DO-291A/ED-119A are applicable." Yet it is not clear which requirements in DO-291A would be applicable to AMMD.

Note: While the quoted DO-272B section 3 statement references DO-291A, DO-291B is the current revision.

Furthermore, some of the requirements are not useful to comply with. For example:

- DO-272B 3.1.5 states: "The metric system shall be used for all linear measurements (e.g., runway length)." Some AMMDs will use data that comes from an ARINC 424 database to display runways. ARINC 424 provides runway length in units of "feet". It makes little sense to convert the ARINC 424 data to metric units and possibly lose resolution, which could result in a less accurate depiction of the airport environment.
- Similarly, DO-272B 3.8.2 states: "DO-291A/ED-119A shall be applied with respect to the interchange of AMDBs." Garmin's proven, safety-enhancing SafeTaxi database supporting AMMDs is not based on the DO-291A AMDB interchange specification. It is unclear what safety benefit will be provided to our customers by being required to document how our SafeTaxi format is equivalent to the DO-291 AMDB requirements or alternatively have to change our SafeTaxi format to be identical to the DO-291 AMDB requirements.

Note that this is not an exhaustive list of examples as there are other similar issues that could be raised.

Recommend removing the ETSO-2C165a Appendix 1 item 4 "Data Base" 2.3.5.3

	requirement to demonstrate "the applicable requirements of EUROCAE ED-99B/RTCA DO-272B section 3".
response	Partially accepted The requirement has been limited to provide DQRs only.

comment	*619* comment by: *Garmin International* ETSO-2C165a Appendix 1 item 2 "Depiction of Ownship Position" adds requirement 9 for removing "own-ship position at a ground speed above 40 knots". This requirement is inconsistent with the AMC 20-25 H.2.2 item d) guidance to "remove automatically the own-ship position when the aircraft is in flight" which allows alternatives for determining when to remove the own-ship position including "weight on wheels, speed monitoring". Recommend removing the ETSO-2C165a Appendix 1 item 2 "Depiction of Ownship Position" item 9 requirement since the issue of removing the own-ship on AMMD-only EFB displays is already covered by AMC 20-25 H.2.2 item d) and since retaining this requirement will make the ETSO unharmonized with FAA TSO-C165.
response	Partially accepted It has been harmonised with AMC 20-25.

comment	*623* comment by: *Garmin International* ETSO-2C165a Appendix 1 item 2 "Depiction of Ownship Position" adds "requirement" item 7 to "[c]onsider the installation dependent antenna position bias error". First, it is unclear whether this is considered a "requirement" since the statement does not include the verb "shall". Regardless, this issue could be addressed in AMC 20-25 H.2.2 item c), which discusses Total System Error. This would be consistent with the discussion in RTCA/DO-257A section 3.2.3 "AMMD System Installed Equipment Performance Requirements" Note 5, which includes antenna bias in addition to other factors such as position error, latency, display pixel error. See our additional comments on AMC 20-25 H.2.2 item c). Recommend removing the ETSO-2C165a Appendix 1 item 2 "Depiction of Ownship Position" item 7 statement since the issue of antenna bias can be covered by AMC 20-25 H.2.2 item c) and since retaining this statement will make the ETSO unharmonized with FAA TSO-C165.
response	Partially accepted The requirement has been redefined to be more precise and to allow for an alternate solution.

comment	*745* comment by: *NetJets Europe* Current FAA research and initiatives pertaining to the authorization of the depiction of airport surface own-ship depiction as a Type B application on capable

	portable COTs devices have substantial potential to increase safety margins, be widely deployable and rapidly effective. We request that any advancement in FAA policy in this area be considered for inclusion into this document as well. (Source: Executive Jet Management, a NetJets company)
response	Accepted In the resulting text of AMC 20-25, AMMD is considered a Type B application.

comment	*756* comment by: *Thatch VandenBergh/Jeppesen Inc.* Comment: Suggest removing this section. ETSO should no longer be required for AMMD. Rationale: Consistent with other comments in this response. Harmonization with the current FAA 120-76B "Change 1" activity pertaining to the authorization of the depiction of airport surface ownship depiction as a Type B application on capable portable COTs devices should be considered in this policy as well. This has the potential to greatly increase adoption of an important safety tool that has a corresponding "Minor" failure effect.
response	Not accepted The ETSO authorisation is a voluntary process; in its absence compliance can always be demonstrated only during installation. There is no requirement in the ETSO itself which generates the requirement to apply for the authorisation. Furthermore, there is already a reference in ETSO-C195a modifying some requirements of ETSO-C165 for the airport moving map application. The applicability of ETSO is not limited to ground EFB applications, but include any cockpit display of the airport moving maps and other maps.

comment	*825* comment by: *Fédération Nationale de l'Aviation Marchande (FNAM)* Reference text: "This ETSO gives the requirements which Electronic Map Systems for the Graphical Depiction of Aircraft Position that are manufactured on or after the date of this ETSO must meet in order to be identified with the applicable ETSO marking." Comment: The wording of the paragraph is not clear. We would suggest rewriting this paragraph. Proposal: "This ETSO gives the requirements that any Electronic Map Systems must meet for the Graphical Depiction of Aircraft Position that are manufactured on or after the date of this ETSO , in order to be identified with the applicable ETSO marking."
response	Accepted The text has been changed in accordance with the comment.

comment	*853* comment by: *Eurocopter* As written, the statement in § 2.2 opens for acceptance of AMMD applications without a strong control on the platform (hardware and operating system) on which it operates. We suggest a stronger approach like the one in FAA AC 20-159, § 8. a., which requests an "*Identification of each target EFB system computing platform [...] with which this AMMD application was demonstrated to be compatible*".
response	Not accepted The approach follows the general installation principles. With the change of the parts and appliances definition in the Basic Regulation software can be handled like any other part. The developer of a software part or appliance would need to identify the platform into which the part or appliance can be installed. This is certainly one possible approach, which is used for the same equipment, but is very limiting as well. I general it is therefore accepted to define the boundaries of use, the interfaces, etc. to allow the final selection of the installation environment by the installer. To achieve this flexibility the requirement needs to be more open to this possibility, than suggested by the commentator.

comment	*854* comment by: *Eurocopter* Although pre-existing in the present revision of this ETSO, the classification of safety impact (§ 3.2.1) not more than minor for the AMMD function is questionable, as we believe that, as far as the flight crew has access to such an application, they could strongly rely on it.
response	Noted The classification has been established in various documents and the Agency does not have sufficient evidence that a further change is necessary.

comment	*855* comment by: *Eurocopter* Sentence "*When developing the AMMD application and the data base quality requirements the applicable requirements of EUROCAE ED-99B/RTCA DO-272B section 3 have to be demonstrated*" is lacking precision. Also please consider that ED-99/DO-272 are now in revision C.
response	Accepted The requirements has been reworded.

CONCLUSION ON COMMENTS ON PAGES 70-72 (DRAFT ETSO-2C165a)

21 comments were received, requesting harmonisation with FAA and therefore maintaining ETSO C165a in index 1 of CS-ETSO and not issuing ETSO-2C165a.

In particular, Garmin identified several requirements which are already covered or they are even more stringent in the FAA TSO-C165. Some other requirements in the proposed ETSO-2C165a, in the opinion of several commentators, may be difficult to demonstrate.

The main reason to propose ETSO-2C165a was to consider for such application a maximum

acceptable error of 40 metres (based on half the separation of taxiways at aerodrome code letter E as specified in ICAO Annex 14). FAA has unofficially expressed the intention to improve accuracy requirements in TSO C-165. A common FAA/EASA approach has informally been achieved, which allows keeping this ETSO in list 1 of the CS-ETSO, acknowledging that the FAA respective material may be shortly updated.

Suggestions to partially revisit some of the requirements are accepted or partially accepted.

The resulting text of ETSO-C165a is presented in Appendix B to this CRD.

V. General conclusions on comments to NPA 2012-02

The majority of the received comments have been accepted or partially accepted:

	Accepted	Partially accepted	Noted	Not accepted	Total
Sums	**227**	**337**	**170**	**179**	**913**
%	**25%**	**37%**	**19%**	**19%**	**100.0%**

Based on these comments received from 45 commentators, and the individual responses to each of them, as contained in the present CRD, the Agency concludes that:

— no stakeholder objected that Option 2 (i.e. enhance and amend the material existing in JAA TGL 36 to align it with current state of the art and propose as soon as appropriate a new rule to 'EASA-OPS') is the preferred one on the basis of the RIA;

— in principle, the stakeholders agreed with the earliest possible publication of AMC 20-25;

— the stakeholders also proposed major modifications to this AMC, which are incorporated in the resulting text:

- EFB Hardware Taxonomy:
  - removal of classes (1,2,3);
  - EFBs are either 'installed' or 'portable'; and
  - 'Viewable Stowage';
- EFB Software Application Types:
  - AMMD has been converted into Type B; and
  - removal of Type C (non-EFB) 'approved' software applications;
- new guidance material for performance applications, EFB administrator, and risk assessment;
- no explicit mention of either operational approval or evaluations by the Agency; and
- the lists of examples for Type A and B applications are not exhaustive;

— the stakeholders also requested to publish ETSO-C165a in index 1 (i.e. technically equivalent to the respective FAA TSO) and not in index 2 of CS-ETSO;

— the above has been endorsed during a focussed consultation in the form of a Workshop at the level of Regulatory Advisory Group (RAG) and Safety Standards Consultative Committee (SSCC) held on 18 April 2013;

— the Workshop, having noted that evaluations by the Agency and explicit mention of operational approval have been removed from the resulting text of AMC 20-25, recommended:

- to offer the possibility of requesting the service by the Agency (which remains available on a voluntary basis) not only to competent authorities and aircraft manufacturers, but also to aircraft operators and EFB system suppliers;
- to accelerate RMT.0601 to produce an Opinion and so introduce more comprehensive rules on EFB in Commission Regulation (EU) No 965/2012 in line with the amendment to ICAO Annex 6 expected in 2014;
- to explore, beyond the scope of rulemaking, the possibility for the Agency to promote exchange of experiences on EFB and to host a database (e.g. suitable models of portable EFB; suitable batteries; etc.);

— the Agency, therefore, intends to adopt AMC 20-25 and ETSO-C165a in the revised text attached to this CRD; and

— after two months given to stakeholders to react to this CRD if their comments were misinterpreted or not fairly taken into account, the Agency intends to progress towards the adoption and publication of the said AMC and ETSO, after the Decision of the Executive Director.

Appendix A to CRD 2012-02

II. Draft Decision AMC-20

Issue new AMC 20-25 EFB to read as follows:

AMC 20-25

Airworthiness and operational consideration for Electronic Flight Bags (EFBs)

1 PURPOSE AND SCOPE

This Acceptable Means of Compliance (AMC) is one, but not the only, means to obtain airworthiness approval and to satisfactorily assess the operational aspects for the use of Electronic Flight Bags (EFBs).

It is considered an acceptable means of complying with the requirements contained in CAT.GEN.MPA.180 concerning carriage of electronic documents and manuals, Commission Regulation (EC) No 2042/2003 and Commission Regulation (EU) No 748/2012.

Traditionally, some of the documentation and information available to flight crew for use on the flight crew compartment has been in paper format. Much of this information is now available in electronic format. In addition, many non-required information services, data, and company procedures may also be made available to flight or cabin crew electronically. Operators have long recognised the benefit of hosting these materials on the flight crew's EFBs.

This AMC does not contain additional or double set requirements to those already contained in the operational requirements for the basic information, documentation and data sources that would need to be carried on board. The operator remains responsible for ensuring the accuracy of the information used and that it is derived from verifiable sources. The use of EFBs was initially intended to cover an alternative method of storing, retrieving, and using the manuals and information required to be on board by the applicable operational requirements. Subsequent technical development has led to potentially hosting on EFBs even applications using computational software (e.g. for performances), databases (e.g. digital navigation data) or real-time data coming from the avionics (e.g. Airport Moving Map Display).

The evaluation of an EFB may have both an airworthiness and an operational aspect depending on the category/type of EFB/application used and, therefore, where necessary, to make a complete evaluation of an EFB system, there is a need for close coordination between the two processes.

In harmonisation with FAA, this AMC does not include a Type C software application classification as a potential EFB application. The Agency's policy is that any non-Type A (please refer to paragraph 5.2.1) or non-Type B (please refer to paragraph. 5.2.2) software application, unless it is miscellaneous (non-EFB) application, should undergo a full airworthiness approval and so become a certified avionics function. A non-exhaustive list of examples of Type A and B applications is provided in Appendices A and B.

2 APPLICABILITY

This AMC is to be used by:

(a) Commercial Air Transport operators by aeroplane or by helicopter;

(b) applicants or holders of an aircraft Type Certificate (TC) or Supplemental TC; and

(c) applicants or holders of ETSO authorisations covering software applications hosted in EFBs.

3 REFERENCE DOCUMENTS

3.1 Related Requirements

From Annexes III and IV to Commission Regulation (EU) No 965/2012 ('Part ORO' and 'Part-CAT')[7], the following articles are to be used as references:
CAT.GEN.MPA.140, CAT.GEN.MPA.180, ORO.GEN.130, ORO.GEN.140, ORO.GEN.200, ORO.MLR.100, CAT.POL.MAB.105, ORO.FC.230.

3.2 Related Certification Specifications

CS 25.561, 25.777, 25.789, 25.1301, 25.1302, 25.1309, 25.1316, 25.1321, 25.1322, 25.1357, 25.1431, 25.1529, 25.1581
CS 23.561, 23.1301, 23.1309, 23.1321, 23.1322, 23.1357, 23.1431, 23.1581
CS 29.1301, 29.1309, 29.1321, 29.1322, 29.1431, 29.1581
CS 27.1301, 27.1309, 27.1321, 27.1322, 27.1581
EASA CS-MMEL (Draft) Master Minimum Equipment List

Appendix G to CS-23, Appendix H to CS-25, and Appendices A to CS-27 and CS-29: Instructions for Continued Airworthiness
ETSO-C165a: Electronic map systems for graphical depiction of aircraft position
EASA Special Condition on Information Security (Network Security)

[7] Commission Regulation (EU) No 965/2012 of 05 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council. (OJ L 296, 25.10.2012, p.1)

3.3 Related Guidance Material

3.3.1 Europe

EASA AMC 25.1581	Appendix 1 – Computerised Aeroplane Flight Manual
EASA AMC 25.1309	System Design and Analysis
EASA AMC 25-11	Electronic Flight Deck Displays
EUROCAE ED-130()	Guidance for the Use of Portable Electronic Devices (PEDs) on Board Aircraft
EUROCAE ED-12()	Software Considerations in Airborne Systems and Equipment Certification
EUROCAE ED-14()	Environmental Conditions and Test Procedures for Airborne Equipment
EUROCAE ED-76()	Standards for Processing Aeronautical Data
EUROCAE ED-80()	Design Assurance Guidance for Airborne Electronic hardware
UL 1642	Underwriters Laboratory Inc. (UL) Standard for Safety for Lithium Batteries

3.3.2 USA

FAA AC 20-159	Obtaining Design and Production Approval of Airport Moving Map Display Applications Intended for Electronic Flight Bag Systems
FAA AC 120-74A	Parts 91, 121, 125, and 135 Flight crew Procedures during Taxi Operations
FAA AC 120-76()	Guidelines for the Certification, Airworthiness, and Operational Approval of Electronic Flight Bag Computing Devices
FAA AC 120-78	Acceptance and use of Electronic Signatures
FAA AC 20-173	Installation of Electronic Flight Bag Components
FAA TSO-C165	Electronic Map Display Equipment for Graphical Depiction of Aircraft Position
RTCA DO-160()	Environmental Conditions and Test Procedures for Airborne Equipment
RTCA DO-178()	Software Considerations in Airborne Systems and Equipment Certification
RTCA DO-200()	Standards for Processing Aeronautical Data
RTCA DO-254()	Design Assurance Guidance for Airborne Electronic Hardware
RTCA DO-257()	Minimum Operation Performance Standards for the Depiction of Navigational Information on Electronic Maps
RTCA DO-294()	Guidance on Allowing Transmitting Portable Electronic Devices (T-PEDs) on Aircraft
RTCA DO-311()	Minimum Operational Performance Standards for Rechargeable Lithium Battery Systems

4 GLOSSARY OF TERMS IN THE CONTEXT OF THIS AMC

4.1 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 AMC. Aircraft 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.

4.2 Airport Moving Map Display (AMMD)

A software application displaying airport maps and using a navigation source to depict the aircraft current position on this map while on ground.

4.3 Consumer device

Electronic equipment primarily intended for non-aeronautical use.

4.4 Controlled Portable Electronic Device (C-PED)

A controlled PED is a PED subject to administrative control by the operator using it. This will include, inter alia, tracking the allocation of the devices to specific aircraft or persons and ensuring that no unauthorised changes are made to the hardware, software, or databases.

4.5 Data connectivity for EFB systems

Data connectivity for EFB system supports either uni- or bi-directional data communication between the EFB and other aircraft systems (e.g. avionics).
Direct interconnectivity between EFBs or direct connectivity between EFBs and ground systems as with T-PED (e. .g. GSM, Bluetooth) are not covered by this definition.

4.6 Electronic Flight Bag (EFB)

An information system for flight deck crew members which allows storing, updating, delivering, displaying, and/or computing digital data to support flight operations or duties.

4.7 EFB administrator

An EFB administrator is a 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 and software suppliers.

4.8 EFB host platform

When considering an EFB system, the EFB host platform is the equipment (i.e. hardware) in which the computing capabilities and basic software (e.g. operating system, input/output software) reside.

4.9 EFB risk assessment and mitigation

A process that considers an EFB system, its software applications, and its integration inside a specific aircraft, to identify the potential malfunctions and failure scenarios, analyse their operational repercussions, and, if necessary, propose mitigation means.

4.10 EFB software application

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

4.11 EFB system

An EFB system comprises the hardware (including any battery, connectivity provision, I/O devices) and software (including databases) needed to support the intended EFB function(s).

4.12 EFB system supplier

The company responsible for developing, or for having developed, the EFB system or part of it. The EFB system supplier is not necessarily a host platform or aircraft manufacturer.

4.13 Minor failure conditions

Failure conditions which would not significantly reduce aeroplane safety, and which involve crew actions that are well within their capabilities. Minor failure conditions may include, for

example, a slight reduction in safety margins or functional capabilities, a slight increase in crew workload, such as routine flight plan changes, or some physical discomfort to passengers or cabin crew. Further guidance can be found in AMC 25.1309.

4.14 Mounting device

A mounting device is an aircraft certified part which secures portable or installed EFB, or EFB system components.

4.15 No safety effect

Failure conditions that would have no effect on safety: for example, failure conditions that would not affect the operational capability of the aeroplane or increase crew workload. Further guidance can be found in AMC 25.1309.

4.16 Portable Electronic Device (PED)

PEDs are typically consumer electronic devices, which have functional capability for communications, entertainment, data processing, and/or utility. There are two basic categories of PEDs – those with and those without intentional transmitting capability; please refer to ED-130/RTCA DO-294().

4.17 Software application developer

The company responsible for developing, or for having developed a particular software application.

4.18 Transmitting PED (T-PED)

PEDs that have intended radio frequency (RF) transmission capabilities.

4.19 Viewable stowage

A device that is secured on the flight crew (e.g. kneeboard) or in/to an existing aircraft part (e.g. suction cups) with the intended function to hold charts or to hold acceptable light mass portable devices (for example an EFB of no more than 1 Kg) viewable to the pilot. The device is not necessarily part of the certified aircraft configuration.

5 SYSTEM DESCRIPTION AND CLASSIFICATION OF EFB SYSTEMS

This section is divided into two parts. The first part deals with the host platform (e.g. the hardware and operating system) used to run the EFB software suite. The second part deals with this software suite which includes the EFB applications installed to provide the relevant functionality.

5.1 EFB systems hardware

This AMC defines two possibilities for the hardware of EFB systems: portable and installed.

5.1.1 Portable EFB

Definition

A portable EFB is a portable EFB host platform, used on the flight deck, which is not part of the certified aircraft configuration.

Complementary characteristics

A portable EFB can be operated inside and outside the aircraft.

A portable EFB hosts type A and/or type B EFB software applications. In addition, it may host miscellaneous (non-EFB) software applications (see 6.2.2.3).

A portable EFB is a portable electronic device (PED) as defined in GM1 CAT.GEN.MPA.140[8].

The mass, dimensions, shape, and position of the portable EFB should not compromise flight safety.

[8] PEDs are any kind of electronic device, typically but not limited to consumer electronics, brought on board the aircraft by crew members, passengers, or as part of the cargo and that are not included in the approved aircraft configuration. All equipment that is able to consume electrical energy falls under this definition. The electrical energy can be provided from internal sources as batteries (chargeable or non-rechargeable) or the devices may also be connected to specific aircraft power sources.

A portable EFB may be provided with aircraft power through a certified power source (see 6.1.1.1.3).
If mounted, the portable EFB is easily removable from its mounting device or attached to it, without the use of tools by the flight crew. If mounted, the attachment or removal does not constitute a maintenance action.
A portable EFB may be part of a system containing EFB installed resources which are part of the certified aircraft configuration.
The installed EFB components are part of the certified aircraft configuration with the intended function to mount (see 6.1.1.1.1) the EFB to the aircraft and/or connect to other systems (see 6.1.1.1.4).
When a portable EFB is a T-PED, the conditions for use of its transmitting capability are established in the approved Aircraft Flight Manual (AFM). In absence of information in the AFM, the EFB transmitting capability may be allowed during non-critical phases of the flight (see 6.2.1.1.2).
Portable EFBs may be used in all phases of the flight if secured to a certified mount or securely attached to a viewable stowage device in a manner which allows its normal use (see 6.1.1.1.1, 6.1.1.1.2, and 6.2.1.6).
Portable EFBs not meeting the above characteristic, should be stowed during critical phases of the flight.
Portable EFBs are controlled PEDs (see paragraph 4.4).
Any EFB component that is either not accessible in the flight crew compartment by the flight crew members or not removable by the flight crew, should be installed as 'certificated equipment' covered by a Type Certificate (TC), changed TC or Supplemental (S)TC.

5.1.2 Installed EFB

Definition
An EFB host platform installed in the aircraft and considered as an aircraft part, covered, thus, by the aircraft airworthiness approval.
Complementary characteristics
An installed EFB is managed under the aircraft type design configuration.
In addition to hosting Type A and B applications, an installed EFB may host certified applications, provided the EFB meets the certification requirements for hosting such applications, including assurance that the non-certified software applications do not adversely affect the certified application(s). For example, a robust partitioning mechanism is one possible means to ensure the independence between certified applications and the other types of applications.

5.2 Software applications for EFB systems

The functionality associated with the EFB system depends, in part, upon the applications loaded on the host platform. The classification of the applications, based on respective safety effects, is intended to provide clear divisions among such applications and, therefore, the assessment process applied to each.
Appendices A and B provide support regarding the classification of traditional EFB software applications. They may be used for justifying a classification provided that the application does not feature design or functional novelties introducing new ways of interaction or unusual procedures.
If an application is not listed in the appendices or presents a high degree of novelty, the classification should be established using the definitions provided hereafter and the guidance in Appendix C.
For the purpose of the following definitions, 'malfunction or misuse' means any failure, malfunction of the application, or design-related human errors that can be reasonably expected in service.

5.2.1 Type A
Definition
Type A applications are EFB applications whose malfunction or misuse have no safety effect.
Complementary characteristics

Type A applications:

(a) may be hosted on either portable or installed EFBs;

(b) do not require any approval (see paragraph 6.2.2.1);and

(c) should follow guidance provided in Appendix D, paragraph D.2.

Examples of Type A applications can be found in Appendix A.

5.2.2 Type B

Definition
Type B applications are applications:

(a) whose malfunction or misuse are limited to a minor failure condition; and

(b) which do neither substitute nor duplicate any system or functionality required by airworthiness regulations, airspace requirements, or operational rules[9].

Complementary characteristics
Type B applications:

(a) may be hosted on either portable or installed EFBs;

(b) require an operational assessment as described in paragraph 6.2.2.2; and

(c) do not require an airworthiness approval.

Examples of Type B applications can be found in Appendix B.

5.2.2.1 Airport Moving Map Display (AMMD) application with own-ship position

AMMD with own-ship position is a Type B application that is subject to the specific conditions described in Appendix H of this AMC.

5.2.3 Miscellaneous (non-EFB) software applications

Miscellaneous software applications are non-EFB applications, supporting function(s) not directly related to operations conducted by the crew on the aircraft.

6 HARDWARE AND SOFTWARE PROCESSES

The table below provides a summary of the different processes presented in this chapter.

<table>
<tr><th colspan="2" rowspan="2">EFB constituent</th><th colspan="2">Portable EFB
paragraph 5.1.1</th><th colspan="2">Installed EFB
paragraph 5.1.2</th></tr>
<tr><th>Assessment</th><th>Records or approvals</th><th>Assessment</th><th>Records or approvals</th></tr>
<tr><td rowspan="2">Hardware</td><td>EFB Installed resources mounting device</td><td colspan="2">EASA Airworthiness process and approval
paragraph 6.1.1.1</td><td colspan="2">EASA Airworthiness process and approval
paragraph 6.1.1.1</td></tr>
<tr><td>EFB host platform</td><td>Evaluation
paragraph 6.2.1</td><td>As a minimum, operations Manual amended as required</td><td colspan="2">EASA Airworthiness process and approval
paragraph 6.1.1.2</td></tr>
<tr><td>Software</td><td>Miscellaneous</td><td>Operator</td><td>Operation</td><td>Operator</td><td>Operation</td></tr>
</table>

[9] This does not preclude Type B software applications from being used to present the documents, manuals, and information required by CAT.GEN.MPA.180.

	software paragraph6.2.2.3	evaluation paragraph6.2.2.3	s Manual amended as required	evaluation paragraph6.2.2.3	s Manual amended as required
	Software Type A paragraph5.2.1	Operator evaluation paragraph6.2.2.1	Operations Manual amended as required	Operator evaluation paragraph6.2.2.1	Operations Manual amended as required
	Software Type B paragraph5.2.2	Evaluation paragraph6.2.2.2	As a minimum, operations Manual amended as required	Evaluation paragraph6.2.2.2	As a minimum, operations Manual amended as required

6.1 Airworthiness approval

The airworthiness approval is necessary for installed EFB systems (see paragraph5.1.2), as well as EFB installed resources and mounting device.
A portable EFB device does not require an airworthiness approval but its presence and use in the cockpit needs to be evaluated (see paragraph6.2.1).

6.1.1 Hardware airworthiness approval

6.1.1.1 Installed resources

Installed resources are the input/output components external to the EFB host platform itself, such as an installed remote display, a control device (e.g. a keyboard, pointing device, switches, etc.) or a docking station.

The installed resources should be dedicated to EFB functions only, or in the case of use of resources shared with avionics, this possibility shall be part of the approved type design. It should be demonstrated, using the appropriate level of assessment, that the integration in the aircraft of the EFB and the EFB software applications does not jeopardise the compliance of the aircraft installed systems and equipment (including the shared resources) to airworthiness requirements such as CS 25.1302 or 25.1309.

Installed resources require an airworthiness approval.

6.1.1.1.1 Mounting device
The mounting device (or other securing mechanism) attaches or allows mounting of the EFB system. The EFB system may include more than one mounting device if it consists of separate items (e.g. one docking station for the EFB host platform and one cradle for the remote display).
The mounting device should 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 mounting device should allow the user easy access to any item of the EFB system, even if stowed, and notably to the EFB controls and a clear view of the EFB display while in use. The following design practices should be considered:

(a) The mounting device and associated mechanisms should not impede the flight crew in the performance of any task (normal, abnormal, or emergency) associated with operating any aircraft system.

(b) When the mounting device is used to secure an EFB display (e.g. portable EFB, installed EFB side display), the mount should be able to be locked in position easily. If necessary, selection of positions should be adjustable enough to accommodate a range of flight crew member 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 types that will minimise slippage after extended periods of normal use.

(c) Crashworthiness considerations should be taken into account in the design of this device. This includes the appropriate restraint of any device when in use.

(d) When the mounting device is used to secure an EFB display (e.g. portable EFB, installed EFB side display), a provision should be provided to secure or lock the mounting device in a position out of the way of flight crew operations when not in use. When stowed, the device and its securing mechanism should not intrude into the flight crew compartment space to the extent that they cause either visual or physical obstruction of flight controls/displays and/or egress routes.

(e) Mechanical interference issues of 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. For yoke mounted devices, (Supplemental) Type Certificate holder data should be obtained to show that the mass inertia effect on column force has no adverse effect on the aircraft handling qualities.

(f) Adequate means should be provided (e.g. hardware or software) to shut down the portable EFB when its controls are not accessible by the pilot strapped in the normal seated position. This objective can be achieved through a dedicated installed resource certified according to 6.1.1.1 (e.g. button accessible from pilot seated position).

6.1.1.1.2 Characteristics and placement of the EFB display

(a) <u>Placement of the display</u>

The EFB display and any other element of the EFB system should be placed in such a way that they do not unduly impair the pilot's external view during all phases of the flight. Equally, they should not impair the view and access to any cockpit control or instrument.
The location of the display unit and the other EFB system elements should be assessed for impact on egress requirements.
When the EFB is in use (intended to be viewed or controlled), its display should be within 90 degrees on either side of each pilot's line of sight.
Glare and reflection on the EFB display should not interfere with the normal duties of the flight crew or unduly impair the legibility of the EFB data.
The EFB data should be legible under the full range of lighting conditions expected on a flight crew compartment, including use in direct sunlight.
In addition, consideration should be given to the potential for confusion that could result from presentation of relative directions when the EFB is positioned in an orientation inconsistent with that information. For example, it may be misleading if the aircraft heading is pointed to the top of the display and the display is not aligned with the aircraft longitudinal axis. This does not apply to charts that are presented in a static way (e.g. with no HMI mechanisation such like automatic repositioning), and that can be considered as similar to paper charts.

(b) <u>Display characteristics</u>

Consideration should be given to the long-term display degradation as a result of abrasion and ageing. AMC 25-11 (paragraph3.16a) can be used as an appropriate guidance material to assess luminance and legibility aspects.
Users should be able to adjust the screen brightness of an EFB independently of the brightness of other displays on the flight crew compartment. In addition, when incorporating an automatic brightness adjustment, it should operate independently for each EFB in the flight crew compartment. Brightness adjustment using software means may be acceptable providing that this operation does not affect adversely the crew workload.
Buttons and labels should have adequate illumination for night use. 'Buttons and labels' refers to hardware controls located on the display itself.
The 90-degree viewing angle on either side of each pilot's line of sight, 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).

(c) Applicable specifications

Each EFB system should be evaluated with regard to the requirements in this section 6.1.1.1.2: see CS 23.1321, CS 25.1321, CS 27.1321, and CS 29.1321.
If the display is an installed resource, it should be assessed against CS 25.1302 or in accordance with the applicable certification basis.

6.1.1.1.3 Power Source

This section applies to design considerations for installing dedicated power port and cabling provisions for EFBs. EFB power provisions should comply with the applicable airworthiness specifications.
Connection of EFB power provisions to a non-essential, or to the least critical power bus, is recommended, so failure or malfunction of the EFB, or power supply, will not affect safe operation of aircraft critical or essential systems.
Connection to more critical aircraft power buses is, however, permitted if appropriate, taking into account the intended function of the EFB. Further considerations can be found in Appendix J of this AMC.
In all cases, 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.
The aircraft power source delivering power supply to the EFB system should be demonstrated to protect the aircraft electrical network from EFB system failures or malfunctions (e.g. short-circuit, over-voltages, over-load, electrical transients or harmonics, etc.).

(a) A placard should be mounted beside the power outlet, containing the information needed by the flight or maintenance crews (e.g. 28 VDC, 115 VAC, 60 or 400 Hz, etc.).

(b) The EFB power source should be designed so that it may be deactivated at any time. If the flight crew cannot quickly remove the plug, which is used to connect the EFB to the aircraft electrical network, an alternate means should be provided to quickly stop powering and charging the EFB. Circuit breakers are not to be used as switches; their use for this purpose is prohibited.

(c) If a manual means (e.g. on/off switch) is used, this means should be clearly labelled and be readily accessible.

(d) If an automatic means is used, the applicant should describe the intended function and the design of the automatic feature and should substantiate that the objective of deactivating the EFB power source, when required to maintain safety, is fulfilled.

Further considerations can be found in 6.1.1.1.5 which deals with connecting cables.

6.1.1.1.4 EFB data connectivity

Portable EFB having data connectivity to aircraft systems, either wired or wireless, may receive or transmit data to and from aircraft systems, provided the connection (hardware and software for data connection provisions) and adequate interface protection devices are incorporated into the aircraft type design.
A portable EFB can receive any data from aircraft systems, but data transmission from EFB is limited to:

(a) systems whose failures have no safety effect or minor safety effect at aircraft level (e.g. printer or ACARS);

(b) aircraft systems which have been certified with the purpose of providing connectivity to PEDs (e.g. SATCOM with a router) in accordance with the limitations established in the AFM;

(c) systems which are completely isolated (in both directions) from the certified aircraft systems (e.g. a transmission media that receives and transmits data for Aircraft Administrative Communications (AAC) purposes on the ground only); and

(d) EFB system installed resources according to section 6.1.1.1.

EFB data connectivity should be validated and verified to ensure non-interference and isolation from certified aircraft systems during data transmission and reception.
The safety assessment of the EFB data connectivity installation should include an analysis of vulnerabilities to new threats that may be introduced by the connection of the EFB to the aircraft systems (malware and unauthorised access) and their effect on safety. This assessment is independent and does not take any credit from the operational assessment of EFB System Security (see section 7.9), which is intended to protect EFB systems themselves.

Certified aircraft systems should not be adversely affected by EFB system failures.

Any consequent airworthiness limitations should be included in the AFM (please refer to 6.1.2.1).

6.1.1.1.5 Connecting cables

If cabling is installed to mate aircraft systems with an EFB,

(a) 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 crew should be able to easily secure the cables out of the way during operations (e.g., cable tether straps);

(b) cables that are external to the mounting device should be of sufficient length in order not to obstruct the use of any movable device on the flight crew compartment; and

(c) for Part-25 airplanes, installed cables are considered electrical wiring interconnection systems and, therefore, need to comply with CS 25 subpart H.

6.1.1.2 Installed EFB

An installed EFB is considered as part of the aircraft and, therefore, requires a full airworthiness approval. This host platform includes the Operating System (OS).
The assessment of compliance with the airworthiness requirements would typically include two specific areas:

(a) the safety assessment addressing failure conditions of the EFB system hardware, of any certified application (or applications ineligible as Type A and/or Type B) installed on the EFB and the partition provided for uncertified applications and miscellaneous non-EFB applications; and

(b) hardware and operating system software qualification conducted in accordance with the necessary Development Assurance Level (DAL) for the system and its interfaces.

6.1.2 Certification documentation

6.1.2.1 Aircraft flight manual

For installed EFB and certified installed resources, the AFM section or an Aircraft Flight Manual Supplement (AFMS) should contain:

(a) a statement of the limited scope of the airworthiness approval of EFBs provisions (e.g. these EFB provisions are only intended for Type A and Type B applications in accordance with this AMC 20-25. The airworthiness approval does not replace the operational assessment for the use of the EFB system).

(b) identification of the installed equipment which may include a very brief description of the installed system or resources; and

(c) appropriate amendments or supplements to cover any limitations concerning:

(1) the use of the EFB host platform for installed EFB system; and

(2) the use of the installed EFB provisions/resources for portable EFB system.

For this purpose, the AFM(S) should make reference to any guidelines (relevant to the airworthiness approval), intended primarily for EFB software application developers or EFB system suppliers.

6.1.2.2 Guidelines for EFB software application developers (Installed EFB and certified installed resources)

TC/STC holders for EFB installed resources or installed EFBs should compile and maintain a guidelines document to provide a set of limitations, considerations, and guidelines to design, develop, and integrate software applications into the installed EFB or with certified resources for portable EFB. The guideline should address, at least, the following:

(a) a description of the architecture for the EFB installed components;

(b) The EFB component Development Assurance Level (DAL) and any assumptions, limitations, or risk mitigations means necessary to support this;

(c) 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;

(d) integration procedures between any new software application with those already approved; and

(e) guidelines on how to integrate any new software application into the installed platform or installed resources.

The guidelines document should be available, at least, to the aircraft operator, to the competent authority, and to the Agency.

6.1.2.3 Guidelines for EFB system suppliers (installed resources for portable EFBs)

TC/STC holders for installed resources of portable EFBs should provide a set of requirements and guidelines to integrate the portable EFB in the installed provisions, and to design and develop EFB software applications.
Guidelines intended primarily for use by the EFB system supplier, should address, at least, the following:

(a) A description of the installed EFB resources and associated limitations, if any. For example:

  (1) intended function, limitations of use, etc.;

  (2) characteristics of the mounting devices, display units, control and pointing devices, printer, etc.;

  (3) maximum authorised characteristics (dimensions, weight, etc.) of the portable parts of the EFB system supported by the mounting devices;

  (4) EFB provisions architecture description, including normal/abnormal/manual/ automatic reconfigurations; and

  (5) normal/abnormal/emergency/maintenance procedures including allowed phases of the flight.

(b) Characteristics and limitations, including safety and security considerations concerning:

  (1) power supply;

  (2) laptop battery; and

  (3) data connectivity.

The guidelines document should be available at least to the operator, the competent authority and the Agency.

6.2 Operational assessment

6.2.1 Hardware operational assessment

The hardware operational assessment is focussed on the portable EFB platforms which do not require an airworthiness approval.

Paragraphs 6.2.1.1 through 6.2.1.6 need to be assessed where applicable prior to the operational use of the portable EFB.
Additionally, paragraph 6.1.1.1 contains considerations for installed resources. When any of those resources are not certified but are parts of the portable EFB, relevant criteria need to be assessed prior to the operational use.

6.2.1.1 Electromagnetic Interference (EMI) demonstrations

It is the user's/operator's responsibility to determine that the operation of a PED will not interfere in any way with the operation of aircraft equipment. which remain on (or in standby mode) during critical phases of the flight, require the additional guidance for non-interference testing contained in subparagraph 6.2.1.1.1 and if applicable 6.2.1.1.2. Further considerations can be found in CAT.GEN.MPA.140.
If some part of the testing (for example 6.2.1.1.2(i) Test Requirement 1) has been completed during the certification of the aircraft, the corresponding TC or STC data can be used as supporting material to demonstrate safe operational use.

6.2.1.1.1 PED non-interference compliance test method

In order to operate a PED during all phases of the flight, the user/operator is responsible for ensuring that the PED will not interfere in any way with the operation of aircraft equipment. The following methods are applicable to portable EFBs which remain 'on' (or in standby mode) during critical phases of the flight. The user/operator may use either Method 1 or Method 2 for non-interference testing.

(a) The two following steps complete Method 1 for compliance with PED non-interference testing for all phases of the flight.

(1) Step 1 is to conduct an EMI test in accordance with ED-14()/DO-160(), section 21, category M. An EFB vendor or other source can conduct this Step 1 test for an EFB user/operator. An evaluation of the results of the ED-14()/DO-160() EMI test can be used to determine if an adequate margin exists between the EMI emitted by the PED and the interference susceptibility threshold of aircraft equipment. If Step 1 testing determines that adequate margins exist for all interference (both front door and back door susceptibility), then Method 1 is complete. It is necessary to complete Step 2 testing if Step 1 testing identifies inadequate margins for interference, or either front door or back door susceptibility. (Front door emissions couple to aircraft system antennas by means of propagation through aircraft apertures such as doors and windows. Back door emissions couple to aircraft equipment, wires, and cables.)

(2) Step 2 testing is specific to each aircraft model in which the PED will be operated. Test the specific PED equipment in operation on the aircraft to show that no interference of aircraft equipment occurs from the operation of the PED. Step 2 testing is conducted in an actual aircraft, and credit may be given to other similarly equipped aircraft of the same make and model as the one tested.

(b) Method 2 for compliance with PED non-interference testing for all phases of the flight is a complete test in each aircraft using standard industry practices. This should be to the extent normally considered acceptable for non-interference testing of a PED in an aircraft for all phases of the flight. Credit may be given to other aircraft of the same make and model equipped with the same avionics as the one tested.

6.2.1.1.2 Additional T-PED non-interference compliance test method

In order to activate the transmitting capability of the EFB during flight in other conditions than those certified at aircraft level (e.g. tolerance to specific T-PED models) and, hence, documented in the AFM, or equivalent document, the user/operator is responsible to ensure that the T-PED will not interfere with the operation of the aircraft equipment in any way.
Otherwise the following method is applicable to portable EFBs that are to remain powered (including being in standby mode) during critical phases of the flight, during the operational assessment process.
Non-interference testing for T-PEDs consists of two separate test requirements:

(a) Test Requirement 1. Each T-PED model should have an assessment of potential electro-magnetic interferences (EMI) based on a representative sample of the frequency and power output of the T-PED. This EMI assessment should be in accordance with applicable processes set forth in ED-130()/DO-294(). The applicable DO-160() section 21 Category to be considered in the ED-130() process for an EFB used as a T-PED, is Cat M. This EMI assessment should confirm that no interference with aircraft equipment will occur as a result of intentional transmissions from these devices.

(b) Test Requirement 2. Once an EMI assessment determines there will be no interference from the T-PED's intentional transmissions, test each T-PED model while powered but not deliberately transmitting using either Method 1 or Method 2 for basic non-interference testing requirements. This basic non-interference testing is applicable to both an EFB-integrated T-PED and a T-PED that is remote to an EFB. When an EFB has an integrated T-PED, complete the basic non-interference testing both with and without the T-PED transmit function being operative. If a T-PED is located remotely from the EFB, the T-PED basic non-interference testing is independent from the EFB non-interference testing. T-PED position is very critical to T-PED non-interference testing. Clearly define and adhere to the operating/testing locations of a T-PED in T-PED operating procedures.

Any restriction in the use of the transmitting capability should be documented in the operator manual.

6.2.1.2 Batteries

Due to their proximity to the flight crew and potential hazard to safe operation of the aircraft, the use of rechargeable lithium-type batteries in portable EFBs located in the aircraft cockpit call for the following standards. Operators should collect and retain evidence of the following testing standards to determine whether rechargeable lithium-type batteries used to power EFBs are acceptable for use and for recharging. Operators should collect and retain evidence of the standards in subparagraphs (a) and either (b) or (c) or (d). Refer to the following current editions:

(a) United Nations (UN) Transportation Regulations. UN ST/SG/AC.10/11/Rev.5-2009, Recommendations on the Transport of Dangerous Goods-Manual of Tests and Criteria.

(b) Underwriters Laboratory (UL). UL 1642, Lithium Batteries; UL 2054, Household and Commercial Batteries; and UL 60950-1, Information Technology Equipment - Safety.

NOTE: Compliance with UL 2054 indicates compliance with UL 1642.

(c) International Electrotechnical Commission (IEC). International Standard IEC 62133, Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications.

(d) RTCA/DO-311, Minimum Operational Performance Standards for Rechargeable Lithium Battery Systems. An appropriate airworthiness testing standard such as RTCA/DO-311 can be used to address concerns regarding overcharging, over-discharging, and the flammability of cell components. RTCA/DO-311 is intended to test permanently installed equipment; however, these tests are applicable and sufficient to test EFB rechargeable lithium-type batteries.

6.2.1.3 Power source

(a) Portable EFB system design must consider the source of electrical power, the independence of the power sources for multiple EFBs, and the potential need for an independent battery source. A non-exhaustive list of factors to be considered includes:

(1) The possibility to adopt operational procedures to assure an adequate level of safety (for example minimum level of charge at pre-flight);

(2) The possible redundancy of portable EFBs to reduce the risk of exhausted batteries;

(3) The availability of back up battery packs to assure an alternative source of power.

(b) Battery-powered EFBs that have aircraft power available for recharging the internal EFB battery (see also 6.1.1.1.3) are considered to have a suitable backup power source.

(c) For EFBs having an internal battery power source and that are used in place of paper products required by the operating rules, the operator should either have at least one EFB connected to an aircraft power bus or established and documented mitigation means and procedures to ensure that sufficient power will be available during the whole flight with acceptable margins.

(d) For guidance on the design and installation of aircraft electrical power sources see section 6.1.1.1.3.

(e) If the aircraft is equipped with electrical power outlet(s) in the cockpit, the operator should ensure that their certified characteristics are compatible with the intended use for the EFB system. The powering or charging of the EFB system should be compatible with the electrical characteristics of the power supplied by the outlets in terms of power consumption, voltage, frequency, etc. in order not to impair the EFB system or other aircraft systems.

6.2.1.4 Environmental testing

Environmental testing, in particular testing for rapid depressurisation, may need to be performed when the EFB host applications that are required to be used during flight following a rapid depressurisation, and/or when the EFB environmental operational range is potentially insufficient with respect to the foreseeable cockpit operating conditions. However, since many portable EFB devices were originally consumer electronic systems accepted for aviation use, testing done on a specific EFB model configuration may be applied to other aircraft installations and these generic environmental tests may not need to be duplicated. The operator should collect and retain:

(a) evidence of these tests that have already been accomplished; or

(b) suitable alternate procedures to deal with the total loss of the EFB system.

Further considerations can be found in Appendix K of this AMC.
Testing for rapid depressurisation may need to be repeated when the EFB model identification changes, or the battery type is changed.
This testing is not equivalent to a full environmental qualification. Operators should account for the possible loss or erroneous functioning of the EFB in abnormal environmental conditions (see 7.2.2).
The safe stowage and the use of the EFB under any foreseeable cockpit environmental conditions, including turbulences, should be evaluated.

6.2.1.5 Display characteristics

Even though a portable EFB is not certified, the display characteristics should be considered during the operational assessment process. For that purpose, the material from 6.1.1.1.2 (a) and (b) apply.
For a portable EFB which is neither mounted nor stowed (e.g. handheld, or sitting on the pilot tray), the considerations on the location of the display proposed in 6.1.1.1.2 should apply at the proposed location of the display when the EFB is in use.

6.2.1.6 Viewable stowage

The viewable stowage should comply to 6.1.1.1.1.
The evaluation of the viewable stowage should be performed for a given location in the flight deck. This location should be documented and this information should be part of the EFB policy.
Some types of viewable stowage securing means may have characteristics that degrade sensibly with ageing or due to various environmental factors. In that case, the documentation should include procedures (e.g. crew procedures, checks, or maintenance actions) to ensure that the stowage characteristics remain within acceptable limits for the proposed operations. Securing means based on vacuum (e.g. suction cups) have a holding capacity that decreases

with pressure. It should be demonstrated that they will still perform their intended function at operating cabin altitudes or in case of rapid depressurisation.
In addition, it should be demonstrated that if the EFB moves or is separated from its stowage, or if the viewable stowage is unsecured from the aircraft (as a result of turbulence, manoeuvring, or other action), it will not jam flight controls, damage flight deck equipment, or injure flight crew members.

6.2.2 Software operational assessment

6.2.2.1 Type A software applications

Type A software applications never require an operational approval, but should follow the HMI and human factors guidance material provided in Appendix D.
Type A applications hosted in portable EFB can be used by properly trained pilots when exercising their privileges.

6.2.2.2 Type B software applications

Type B software applications do not require airworthiness approval, but should be assessed through the process presented in chapter 7. The operator responsible for the evaluation should collect and retain the documentation listed in Appendix F.
The list of Type B software application that require a documented evaluation is provided in Appendix B.

6.2.2.3 Miscellaneous (non-EFB) software applications

The use of miscellaneous software applications is out of the scope of this document, but is subject to the applicable operational rules.

The EFB administrator should ensure that miscellaneous software applications do not adversely impact the operation of the EFB (refer to paragraph7.11) and include miscellaneous software in the scope of EFB configuration management. The configuration of those applications (e.g. applications updates, installation of new applications) has to be managed by the EFB administrator.

This does not preclude that EFB devices from being allocated to specific crew members.

However, and only in the cases where it is demonstrated that miscellaneous software applications run in a fully segregated and partitioned way compared to EFB or avionics applications (e.g. on a separate Operating System on a distinct 'personal' hard drive partition that is selected at the boot), the administration of these miscellaneous applications can be exercised by the flight crew and not by the EFB administrator.

Examples of miscellaneous software applications are: web browser (not used for operational purposes), e-mail client, picture management application, or even applications used by ground crews (e.g. for maintenance purposes).

7 OPERATIONAL ASSESSMENT PROCESSES

The operator should ensure the continued compliance of the EFB software package with this AMC.
When an aircraft manufacturer is seeking an operational evaluation of an EFB system or component of an EFB system prior to an operator carrying out the operational assessment, the manufacturer may file an application for an evaluation by the Agency.
The operator may demonstrate the fidelity and reliability of the system in different ways, but a detailed EFB risk assessment and suitable means of mitigation against failure or malfunction are required. Operators or EFB system suppliers, if deemed appropriate, may ask evaluations by the Agency. Those evaluations will assess compliance with this AMC.
The operator may choose to keep the paper backup as a cross-check against the EFB information and as a means of mitigation against failure. A combination of solutions, with limited on board paper backup, may also be used.
The scope of the final operational evaluation test (see paragraph 7.14) will depend on the selected solutions.

The air operations requirements do not foresee a prior approval of EFB. However, the competent authority may, through the change management procedure, require the operator to notify any change concerning EFB[10].
Modifications and amendments of database and/or software may also be required by the competent authority. The operator should ensure that these modifications and amendments are incorporated and they follow the revision control procedures specified in paragraph 7.11.1.

7.1 Role of the EFB system supplier

As stated in paragraph 7, the operator should ensure as well the compliance of the initial EFB software package (batch) with this AMC at the time it is delivered.
However, an EFB system supplier may apply for an Agency evaluation to assess conformity against this AMC, to simplify the operator's assessment process.

7.2 Risk assessment for EFB systems

7.2.1 General

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 required by ORO.GEN.200.
The risk assessment should:

(a) evaluate the risks associated with the use of an EFB and to define the appropriate mitigation;

(b) identify potential losses of function or malfunction (detected and undetected erroneous output) and associated failure scenarios;

(c) analyse the operational consequences of these failure scenarios;

(d) establish mitigating measures; and

(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.

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.
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.
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 7.13) or paperless entry-into-service of a new EFB system is intended, a complete risk assessment should be carried out.

7.2.2 Assessing and mitigating the risks

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.
The analysis should be specific to the operator concerned and should address at least the following points:

(a) Minimisation of undetected erroneous application output and assessment of worst case scenario;

[10] Refer to ORO.GEN.130

(b) Erroneous outputs from the software application including:

(1) description of corruption scenarios; and

(2) description of mitigation means.

(c) Upstream processes including:

(1) reliability of root data used in applications (qualified/verified input data);

(2) software application validation and verification checks according to appropriate industry standards; and

(3) independence between application software, e.g. robust partitioning between Type A, B and other certified SW applications.

(d) Description of the mitigation means following detected loss of application, or detected erroneous output due to internal EFB error;

(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.

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:
(a) system design (including hardware and software);

(b) alternative EFB possibly supplied from a different power source;

(c) EFB applications hosted on more than one platform;

(d) paper backup (e.g. Quick Reference Handbook (QRH));

(e) procedural means;

(f) training; and

(g) administration.

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.
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.

7.3 Changes to EFB

Modifications to an EFB may have to be introduced, either by the EFB system suppliers, the EFB applications developers, or by the operator itself.
The modifications which:

(a) do not bring any change to the calculation algorithm and/or to the HMI of a type B application,

(b) introduce a new Type A application or modify an existing one (provided its software classification remains Type A),

(c) do not introduce any additional functionality to an existing Type B application, or

(d) update an existing database necessary to use an existing Type B,

may be introduced by the operator without the need to notify the competent authority.
These changes should, nevertheless, be controlled and properly tested prior to use in flight.
The modifications in the following non-exhaustive list are considered to meet these criteria:

(a) Operating system updates;

(b) Chart or airport database update;

(c) Update to introduce fixes (patch); and

(d) Type A application installation and modification.

For all other types of modification, the operator should apply the change management procedure approved by the competent authority in accordance with rule ARO.GEN.310(c).

7.4 Dispatch considerations

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:

(a) replacement of batteries at defined intervals as required;

(b) fully charged backup battery on board;

(c) procedures for the flight crew to check the battery charging level before departure; and

(d) procedures for the flight crew to switch off the EFB in a timely manner when the aircraft power source is lost.

7.4.1 Dispatch with inoperative EFB elements

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.
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.
Guidance for MMEL is provided in Appendix 1 to GM1 MMEL.145 of the CS-MMEL.
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.
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.

7.5 Human factors assessment

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.
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.).

7.6 Specific Considerations for mass and balance and performance applications

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.).
Further considerations regarding the assessment can be found in Appendix F.
The HMI training and crew procedures should as well be part of the evaluation.
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.

7.7 Flight crew operating procedures

7.7.1 Procedures for using EFB systems with other flight crew compartment systems

Procedures should be established to ensure that the flight crew know 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.

7.7.2 Flight crew awareness of EFB software/database revisions

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.

7.7.3 Procedures to mitigate and/or control workload

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.

7.7.4 Defining flight crew responsibilities for performance calculations

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.

7.8 Compliance monitoring

The operator should include the EFB system in its compliance monitoring programme that is required in accordance with ORO.GEN.200. The purpose is to provide confidence that EFB operations and administration are conducted in accordance with all applicable requirements, standards, and operational procedures.

7.9 EFB system security

The EFB system (including any means used for its updating) should be secure from unauthorised 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.

The procedures should be transparent, easy to understand to follow and to oversee:

(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;

(b) portable EFB platforms should be subject to allocation tracking to specific aircraft or persons;

(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;

(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 unauthorised content cannot enter the EFB system through these media.

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).
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.
Examples of typical safety and security defences are contained in the following non exhaustive list:

(a) Individual system firewalls;

(b) Clustering of systems with similar safety standards into domains;

(c) Data encryption & authentication;

(d) Virus scans;

(e) Keeping the OS up to date;

(f) Initiating air/ground connections only when required and always from the aircraft;

(g) 'Whitelists' for allowed Internet domains;

(h) VPNs;

(i) Granting of access rights on a need-to-have basis;

(j) Troubleshooting procedures should consider as well security threats as potential root cause of EFB misbehaviour, and responses should be developed to prevent future successful attacks when relevant;

(k) Virtualisation; and

(l) Forensic tools and procedures.

The EFB administrator should not only keep the EFB system, but also his/her knowledge about security of EFBs systems up to date.

7.10 Electronic signatures

Part-CAT, 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 fulfil 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. AMC1 CAT.POL.MAB.105(c) provides a means to comply with the required handwritten signature or equivalent for the mass and balance documentation.
In the case of legally required signatures, an operator should have in place procedures for electronic signatures, acceptable to the competent authority, that guarantee:

(a) **the uniqueness**: A signature should identify a specific individual and be difficult to duplicate;

(b) **the significance**: An individual using an electronic signature should take deliberate and recognisable action to affix his or her signature;

(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;

(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;

(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

(f) **the traceability**: An electronic signature should provide positive traceability to the individual who signed a record, record entry, or any other document.

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.
Note: The provision of secure access to EFB functions is outside the scope of this section, which only addresses the replacement of handwritten signature by an electronic one.

7.11 Role of the EFB administrator

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.
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 unauthorised 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.
The EFB administrator is responsible:

(a) for all the applications installed, and for providing support to the EFB users on these applications;

(b) to check potential security issues associated with the application installed;

(c) for hardware and software configuration management and for ensuring, in particular, that no unauthorised software is installed;

(d) for ensuring that only a valid version of the application software and current data packages are installed on the EFB system; and

(e) for ensuring the integrity of the data packages used by the applications installed.

The operator should make arrangements to ensure the continuity of the management of the EFB system in the absence of the EFB administrator.
EFB administration should be subject to independent routine audits and inspections as part of the operator's compliance monitoring programme (see paragraph 7.8).
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.
The administrator training material should be made available on request to the competent authority.

7.11.1 The EFB policy and procedures manual

The (S)TC holder, 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 unauthorised changes take place. The EFB policy and procedures manual may be fully or partly integrated in the Operations Manual.
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.
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:

(a) Document changes to content/databases;

(b) Notification to crews of updates;

(c) 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;

(d) Procedures to avoid corruption/errors during changes to the EFB system; and

(e) In case of multiple EFBs in the flight crew compartment, procedures to ensure that they all have the same content/databases installed.

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).
Note: An example of the subjects relevant for inclusion in the EFB policy and procedures manual is included at Appendix G.

7.12 EFB system maintenance

Procedures should be established for the routine maintenance of the EFB system and how unserviceability and failures are to be dealt with to ensure that the integrity of the EFB system is assured. Maintenance procedures may also need to include the secure handling of updated information and how it is accepted and then promulgated in a timely and complete format to all users and aircraft platforms.
The operator is responsible for the maintenance of EFB system batteries, and should ensure that they are periodically checked and replaced as required.
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. In addition to backup procedures, to deal with system failures, a reporting system will need to be in place so that the necessary action, 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.

7.13 Flight crew training

Flight crew should be given specific training on the use of the EFB system before it is operationally used.
Training should include at least the following:

(a) An overview of the system architecture;

(b) Pre-flight checks of the system;

(c) Limitations of the system;

(d) Specific training on the use of each application and the conditions under which the EFB may and may not be used;

(e) Restrictions on the use of the system, including where some or the entire system is not available;

(f) Procedures for normal operations, including cross-checking of data entry and computed information;

(g) Procedures to handle abnormal situations, such as a late runway change or diversion to an alternate aerodrome;

(h) Procedures to handle emergency situations;

(i) Phases of the flight when the EFB system may and may not be used;

(j) CRM and human factor considerations on the use of the EFB; and

(k) Additional training for new applications or changes to the hardware configuration.

As far as practicable, it is recommended that the training simulators' environments include the EFBs in order to offer a higher level of representativeness.
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.
EFB training should be included in the relevant training programme established and approved in accordance with ORO.FC
Note: Further guidance and means of compliance are provided in Appendix E.

7.14 Operational evaluation test

The operator should conduct an operational evaluation test which should allow verifying that the above elements have been satisfied before final decision on the operational use of the EFB.
The operator should notify its competent authority of its intention to conduct an operational evaluation test by sending a plan which should contain at least the following information:
(a) starting date of the operational evaluation test;

(b) duration;

(c) aircraft involved;

(d) EFB hardware and type(s) of software(s); and

(e) when no paper backup is retained:

(1) EFB detailed risk assessment,

(2) simulator LOFT session programme, and

(3) proposed flights for the competent authority observation flights.

7.14.1 Applications replacing paper products with an initial retention of paper backup

Where paper is initially retained as backup, the operational evaluation test should consist of an in-service proving period no longer than six months. A reduction to no less than three months may be considered taking into account the following criteria:
(a) the operator's previous experience with EFBs,

(b) the intended use of the EFB system, and

(c) the mitigation means defined by the operator.

An operator wishing to reduce the six months operational evaluation test should submit to its competent authority a request with justification in its operational evaluation plan.
The competent authority may ask for an operational evaluation test lasting more than six months if the number of flights operated in this period is not considered sufficient to evaluate the EFB system.
The purpose of the in-service proving period is for the operator to demonstrate that the EFB system provides an acceptable level of accessibility; usability and reliability to those required by the applicable operational requirements (see AMC1 CAT.GEN.MPA.180 and AMC1 ORO.MLR.100). In particular that:
(a) the flight crews are able to operate the EFB applications without reference to paper;

(b) the operator's administration procedures are in place and function correctly;

(c) the operator is capable of providing timely updates to the applications on the EFB, where a database is involved;

(d) the introduction of the EFB without paper backup does not adversely affect the operator's operating procedures and alternative procedures for use when the EFB system is not available provide an acceptable equivalent;

(e) for a system including uncertified elements (hardware or software), that the system operates correctly and reliably; and

(f) the EFB risk assessment, as required under 7.2, is adequate to the type of operations intended after the operational evaluation test (with or without paper backup).

The results of the demonstration may be documented in the form of a report from the in-service proving period on the performance of the EFB system.
The operator may remove the paper backup once it has shown that the EFB system is sufficiently robust.

7.14.2 Applications replacing paper products without paper backup at commencement of operations and other applications

Where an operator seeks to start operations without paper backup, the operational evaluation test should consist of the following elements:
(a) a detailed review of the EFB risk assessment;

(b) a simulator LOFT session to verify the use of the EFB under operational conditions including normal, abnormal, and emergency conditions; and

(c) observation by the competent authority of the initial operator's line flights.

The operator should demonstrate that they will be able to continue to maintain the EFB to the required standard through the actions of the Administrator and Compliance Monitoring Programme.

7.15 Final operational report

The operator should produce and retain a final operational report, which summarises all activities conducted and the means of compliance used, supporting the operational use of the EFB system. An example of typical items that the operator should include in this report is provided in Appendix I.

APPENDIX A — EXAMPLES OF TYPE A SOFTWARE APPLICATIONS

Type A applications are EFB applications whose malfunction or misuse would have no adverse effect on the safety of any flight operation, i.e. a hazard level defined as no greater than a 'no safety effect' failure condition classification.
Such applications might typically be, but not limited to:

(a) browser displaying:

(1) the certificates and other documents required to be carried by the applicable operational regulations and where copies are acceptable such as:

(i) the Aircraft Noise Certificate;

(ii) the Air Operator Certificate and OPSSpecs; and

(iii) the Third-Party Liability Insurance Certificate;

(2) some manuals and additional information and forms required to be carried by the applicable operational regulations such as:

(i) notification of special categories of passenger; and

(ii) notification of special loads and any other information that might be required such as passenger and cargo manifests; and

(3) other information within the operator's aircraft library such as:

(i) airport diversion policy guidance, including a list of special designated airports and/or approved airports with emergency medical service (EMS) support facilities;

(ii) maintenance manuals;

(iii) Emergency response guidance for aircraft incidents involving dangerous goods (ICAO Doc 9481-AN/928);

(iv) aircraft parts manuals;

(v) service bulletins/published Airworthiness Directives, etc.;

(vi) current fuel prices at various airports;

(vii) trip scheduling and bid lists;

(viii) passenger information requests;

(ix) check airman and flight instructor records; and

(x) Flight crew currency requirements.

(b) interactive applications for crew rest calculation;

(c) interactive forms to comply with the reporting requirements of the competent authority and the operator; and

(d) realistic training modules, including 'personal computer (PC) at home' training applications, 'off-duty' training materials review, and pre-flight 'mission' rehearsals.

APPENDIX B — TYPE B SOFTWARE APPLICATIONS

A non-exhaustive list of possible Type B software applications, that are to be evaluated, is provided in this Appendix.

- Document Browser displaying the following documents, interactive or not, or not in pre-composed format, and not driven by sensed aircraft parameters:
    - The manuals and additional information and forms required to be carried by Regulations such as:
    - The Operations Manual (including the MEL and CDL);
    - Aircraft Flight Manual;
    - The Operational Flight Plan;
    - The aircraft continuing airworthiness records, including the technical Log;
    - Meteorological information including with graphical interpretation;
    - ATS Flight Plan;
    - NOTAMs and AIS briefing information;

- Electronic aeronautical chart applications including en route, area, approach, and airport surface maps; these applications may offer features such as panning, zooming, scrolling, and rotation, centring and page turning, but without display of aircraft/own-ship position.
- Use of Airport Moving Map Displays (AMMD) applications that are compliant with the means set forth in Appendix H paragraphH.2, in particular with the ETSO-C165a approval.
- Applications that make use of the internet and/or other aircraft operational communications (AAC) or company maintenance-specific data links to collect, process, and then disseminate data for uses such as spare parts and budget management, spares/inventory control, unscheduled maintenance scheduling, etc.
- Cabin-mounted video and aircraft exterior surveillance camera displays;
- Aircraft performance calculation application that uses algorithmic data or calculates using software algorithms to provide:
    - Take-off, en route, approach and landing, missed approach, etc. performance calculations providing limiting masses, distances, times and/or speeds;
    - Power settings, including reduced take-off thrust settings;
    - Mass and balance calculation application used to establish the mass and centre of gravity of the aircraft and to determine that the load and its distribution is such that the mass and balance limits of the aircraft are not exceeded.

- Airport Moving Map Displays (AMMD) applications not covered by an ETSO-C165a approval;
- Other Type B applications not listed in this appendix.

APPENDIX C — PROCESS FOR THE CLASSIFICATION OF SOFTWARE APPLICATIONS

1. Purpose

As described in 5.2, the classification of the Type A and Type B EFB applications is based on the severity of failure conditions resulting from malfunctions and misuse (hereinafter referred to as 'failures') of the EFB applications.

It is not required to perform a full system safety assessment (as defined in AMC 25.1309) in order to classify EFB applications.

In practice, the assessment of these failure conditions can be achieved through the application at software level of the process described in chapter 2 of this Appendix.

The severity of the failure conditions will determine the classification of the EFB applications.

2. Process

As a first step, it should be verified that the application does not belong to the following list of applications that are not eligible for classification as either type A or B:

Applications:

(a) displaying information which may be tactically used by the flight-crew members to check, control, or deduce the aircraft position or trajectory, either to follow the intended navigation route or to avoid adverse weather, obstacles or other traffic, in flight or on ground;

(b) displaying information which may be directly used by the flight crew to assess the real-time status of aircraft critical and essential systems, as a replacement for existing installed avionics, and/or to manage aircraft critical and essential systems following failure;

(c) communications with air traffic services;

(d) sending data to the certified aircraft systems other than the EFB installed/shared resources.

Then, this process should:

(a) identify failure conditions resulting from potential losses of function or malfunction (detected and undetected erroneous output) with consideration of any relevant factors (aircraft/system failures, flight crew procedures, operational or environmental conditions, etc.) which would alleviate or intensify the effects; and

(b) classify the failure conditions according to the severity of their effects (using AMC 25.1309 definitions).

Failure conditions classified as minor should then be verified through a qualitative appraisal of the integrity and safety of the system design and installation. Software involved in Minor Failure Condition should be classified as level D according to the relevant industry standard (e.g. those referenced in AMC/AC 20-115()).

Software applications with failure conditions classified above minor are ineligible as EFB Type A or B applications.

Notes:

— The severity of the failure conditions linked to displaying a function already existing in the certified type design, or already authorised through an ETSO, and used with same concept of operation, cannot be less than already assessed for this function;

— The data resulting from this process may be reused by the operators in the context of the EFB risk assessment process described in chapter 7.2.2.

Further guidance material concerning hazard analysis process can be found in section 10 of AMC 25.1309.

APPENDIX D — HUMAN MACHINE INTERFACE ASSESSMENT AND HUMAN FACTORS CONSIDERATIONS

D.1 General principles

This Appendix provides Guidance Material for the assessment of the human machine interface associated with the EFB system. It provides general criteria that may be applied during assessments conducted during both the airworthiness approval and operational assessment and is restricted to human factors assessment techniques and means of compliance. The process for division of responsibilities and who does what is contained within the main body of the AMC.

Note: Where an assessment is conducted as part of an airworthiness approval e.g. for an installed EFB system or installed resources for portable EFB, CS 25.1302 titled 'Installed systems and equipment for use by the flight crew' or applicable airworthiness basis should be applied.

D.2 Common considerations

D.2.1 Human machine interface

The EFB system should provide a consistent and intuitive user interface, within and across the various hosted applications. This should include, but not be limited to, data entry methods, colour-coding philosophies, and symbology.

D.2.2 Legibility of text

Text displayed on the EFB should be legible to the typical user at the intended viewing distance(s) and under the full range of lighting conditions expected on a flight crew compartment, including use in direct sunlight. Users should be able to adjust the screen brightness of an EFB independently of the brightness of other displays on the flight crew compartment. In addition, when automatic brightness adjustment is incorporated, it should operate independently for each EFB in the flight crew compartment. Buttons and labels should be adequately illuminated for night use. All controls should be properly labelled for their intended function. Consideration should be given to the long-term display degradation as a result of abrasion and ageing.

D.2.3 Input devices

In choosing and designing input devices such as keyboards or cursor control devices, applicants should consider the type of entry to be made and flight crew compartment environmental factors, such as turbulence, that could affect the usability of that input device. Typically, the performance parameters of cursor control devices should be tailored for the intended application function as well as for the flight crew compartment environment.

D.2.4 General EFB design guidelines

D.2.4.1 Consistency

D.2.4.1.1 Consistency between EFBs and applications

Particular attention should be paid to the consistency of all interfaces, in particular when a provider develops the software application and a different organisation integrates it into the EFB.

D.2.4.1.2 Consistency with flight deck applications

Whenever possible and without compromising innovation in design/use, EFB user interfaces should be consistent with the other flight deck avionics applications with regard to design philosophy, look and feel, interaction logics and workflows.

D.2.4.2 Messages and the use of colours

For any EFB system, EFB messages and reminders should meet the requirements in CS 23.1322, 25.1322 or applicable certification basis, as is appropriate for the intended aircraft. While the regulations refer to lights, the intent should be generalised to extend to the use of colours on displays and controls. That is, colour 'red' is to be used only to indicate a warning level condition. 'Amber' is to be used to indicate a caution level condition. Red and amber colours should be limited and considerate. Any other colour may be used for items other than warnings or cautions, providing that the colours used, differ sufficiently from the colours prescribed to avoid possible confusion. EFB messages and reminders should be integrated with (or compatible with) presentation of other flight crew compartment system alerts. EFB messages, both visual and auditory, should be inhibited during critical phases of the flight.

Flashing text or symbols should be avoided in any EFB application. Messages should be prioritised and the message prioritisation scheme evaluated and documented.
Additionally, during critical phases of the flight, required flight information should be continuously presented without un-commanded overlays, pop-ups, or pre-emptive messages, excepting those indicating the failure or degradation of the current EFB application. However, if there is a regulatory or Technical Standard Order (TSO) requirement that is in conflict with the recommendation above, those should have precedence.

D.2.4.3 System error messages

If an application is fully or partially disabled, or is not visible or accessible to the user, it may be desirable to have a positive indication of its status available to the user upon request. Certain non-essential applications such as e-mail connectivity and administrative reports may require an error message when the user actually attempts to access the function rather than an immediate status annunciation when a failure occurs. EFB status and fault messages should be prioritised and the message prioritisation scheme evaluated and documented.

D.2.4.4 Data entry screening and error messages

If user-entered data is not of the correct format or type needed by the application, the EFB should not accept the data. An error message should be provided that communicates which entry is suspect and specifies what type of data is expected. The EFB system should incorporate input error checking that detects input errors at the earliest possible point during entry, rather than on completion of a possibly lengthy invalid entry.

D.2.5 Error and failure modes

D.2.5.1 Flight crew error

The system should be designed to minimise the occurrence and effects of flight crew error and maximise the identification and resolution of errors. For example, terms for specific types of data or the format in which latitude/longitude is entered should be the same across systems. Data entry methods, colour-coding philosophies, and symbology should be as consistent as possible across the various hosted EFB applications. These applications should also be compatible with other flight crew compartment systems.

D.2.5.2 Identifying failure modes

The EFB system should be capable of alerting the flight crew of probable EFB system failures.

D.2.6 Responsiveness of application

The system should provide feedback to the user when user input is accepted. If the system is busy with internal tasks that preclude immediate processing of user input (e.g. calculations, self-test, or data refresh), the EFB should display a 'system busy' indicator (e.g. clock icon) to inform the user that the system is occupied and cannot process inputs immediately.
The timeliness of system response to user input should be consistent with an application's intended function. The feedback and system response times should be predictable to avoid flight crew distractions and/or uncertainty.

D.2.7 Off-screen text and content

If the document segment is not visible in its entirety in the available display area, such as during 'zoom' or 'pan' operations, the existence of off-screen content should be clearly indicated in a consistent way. For some intended functions it may be unacceptable if certain portions of documents are not visible. This should be evaluated based on the application and intended operational function. If there is a cursor, it should be visible on the screen at all times while in use.

D.2.8 Active regions

Active regions are regions to which special user commands apply. The active region can be text, a graphic image, a window, frame, or other document object. These regions should be clearly indicated.

D.2.9 Managing multiple open applications and documents

If the electronic document application supports multiple open documents, or the system allows multiple open applications, indication of which application and/or document is active should be continuously provided. The active document is the one that is currently displayed and responds to user actions. Under non-emergency, normal operations, the user should be able to select which of the open applications or documents is currently active. In addition, the user should be able to find which flight crew compartment applications are running and switch to any one of these applications easily. When the user returns to an application that was running in the

background, it should appear in the same state as when the user left that application, with the exception of differences stemming from the progress or completion of processing performed in the background.

D.2.10 Flight crew workload

The positioning and procedures associated with the use of the EFB should not result in unacceptable flight crew workload. Complex, multi-step data entry tasks should be avoided during take-off, landing, and other critical phases of the flight. An evaluation of the EFB intended functions should include a qualitative assessment of incremental pilot workload, as well as pilot system interfaces and their safety implications.

D.3 Specific application considerations

D.3.1 Approach/departure and navigation chart display

The approach, departure, and navigation charts that are depicted should contain the information necessary, in appropriate form, to conduct the operation to at least a level of safety equivalent to that provided by paper charts. It is desirable that the EFB display size is at least as large as current paper approach charts and that the format be consistent with current paper charts.

The HMI assessment is key to identifying acceptable mitigation means, e.g.:

(a) to establish procedures to reduce the risk of making errors;

(b) to control and mitigate additional workload related to EFB use;

(c) to ensure consistency of colour coding and symbology philosophies, between EFB applications and their compatibility with other flight crew compartment applications; and

(d) to consider aspects of Crew Resource Management (CRM) when using an EFB system.

D.3.2 Performance applications and mass & balance calculations

Input data and output data (results) shall be clearly separated from each other. All the information necessary for a given calculation task should be presented together or easily accessible.

All data required for the performance and mass & balance applications should be asked for or displayed, including correct and unambiguous terms (names), units of measurement (e.g. kg or lbs), and when applicable index system and CG-position declaration (e.g. Arm/%MAC). The units should match the ones from the other cockpit sources for the same kind of data.

Airspeeds should be provided in a way directly useable in the cockpit unless the unit clearly indicates otherwise (e.g. KCAS). Any difference in the type of airspeed provided by the EFB application and the type provided by the AFM or FCOM performance charts should be mentioned in the pilot guides and training material.

If the application allows to compute both dispatch (regulatory, factored) and other results (e.g. in-flight or unfactored), the flight crew should be made aware of the active mode.

<u>Inputs</u>

The application should allow to clearly distinguish user entries from default values or entries imported from other aircraft systems.

Performance applications should offer to the flight crew the ability to check whether a certain obstacle is included in the performance calculation and/or to include revised or new obstacle information in the performance calculation.

<u>Outputs</u>

All critical performance calculation assumptions (e.g. use of thrust reversers, full or reduced thrust/power rating) should be clearly displayed. The assumptions made about any calculation should be at least as clear to pilots as similar information would be on a tabular chart.

All output data should be available in numbers.

The application should indicate if a set of entries results in an unachievable operation (for instance a negative stopping margin) with a specific message or colour scheme. This should be done in accordance with D.2.4.2 (Messages and the use of colours).

In order to allow a smooth workflow and to prevent data entry errors, the layout of the calculation outputs should be such that it is not inconsistent with the data entry interface of the aircraft applications in which the calculation outputs are used (e.g. Flight Management Systems).

<u>Modifications</u>

The user should be able to modify performance calculations easily, especially when making last minute changes.
Calculation results and any outdated input fields should be deleted:

(a) when modifications are entered;

(b) when the EFB is shut down or the performance application is closed; and

(c) when the EFB or the performance application have been in a standby or 'background' mode long enough, i.e. such that it is likely that when it is used again the inputs or outputs are outdated.

APPENDIX E — FLIGHT CREW TRAINING

The purpose of this Appendix is to describe considerations for training and checking when Standard Operating Procedures (SOP) are dependent on the use of an EFB system.

E.1 EFB training and checking

E.1.1 Assumptions regarding flight crew previous experience

Training for the use of the EFB should be for the purpose of operating the EFB itself and the applications hosted on it, and should not be intended to provide basic competence in areas such as aircraft performance, etc. Initial EFB training, therefore, should assume basic competence in the functions addressed by the software applications installed.
Training should be adapted to the crew experience and knowledge.

E.1.2 Programmes crediting previous EFB experience

Training programmes 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.1.3 Initial EFB training

Training required for the grant of an aircraft type rating may not recognise variants within the type nor the installation of particular equipment. Any training for the grant of a type qualification need not, therefore, recognise the installation or use of an EFB unless it is installed equipment across all variants of the type. However, where training for the issue of the type rating is combined with the operator's conversion course required by ORO.FC.220, the training syllabus should recognise the installation of the EFB where the operator's SOPs are dependent on its use.
Initial EFB Training may consist of both ground-based and in-flight training depending on the nature and complexity of the EFB system. An operator or approved training organisation (ATO) may use many methods for ground-based EFB training including written hand-outs or FCOM material, classroom instruction, pictures, videotape, ground training devices, computer-based instruction, FSTD, and static aircraft training. Ground-based training for a sophisticated EFB lends itself particularly to CBT-based instruction. In-flight EFB training should be conducted by a suitably qualified person during Line Flying Under Supervision or during Differences, Conversion or Familiarisation Training.

E.1.3.1 Areas of emphasis during initial EFB training

(a) The use of the EFB hardware and the need for proper adjustment of lighting, etc. when the system is used in-flight;

(b) The intended use of each software application together with limitations and prohibitions on their use;

(c) If an aircraft performance application is installed, proper cross-checking of data input and output;

(d) If a terminal chart application is installed, proper verification of the applicability of the information being used;

(e) If a moving map display is installed, the need to avoid fixation on the map display; and

(f) Failure of component(s) of the EFB.

E.1.3.2 Typical initial EFB training

The following might be a typical training syllabus, if not contrasting with the operational suitability data provided by the aircraft manufacturer.

E.1.3.2.1 Ground-based training

(a) System architecture overview;

(b) Display Unit features and use;

(c) Limitations of the system;

(d) Restrictions on the use of the system;

(1) Phases of the flight;

(2) Alternate procedures (e.g. MEL).

(e) Applications as installed;

(f) Use of each application;

(g) Restrictions on the use of each application;

(1) Phases of the flight;

(2) Alternate procedures (e.g. MEL).

(h) Data input;

(i) Cross-checking data input and output; and

(j) Use of data output.

E.1.3.2.2 Flight training

(a) Practical use of the Display Unit;

(b) Display Unit Controls;

(c) Data input devices;

(d) Selection of applications;

(e) Practical use of applications;

(f) CRM and human factor considerations;

(g) Situational awareness;

(h) Avoidance of fixation;

(i) Cross-checking data input and output; and

(j) Practical integration of EFB procedures into SOPs.

E.1.4 Initial EFB checking

E.1.4.1 Initial ground EFB checking

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.1.4.2 Skill test & proficiency check

Proficiency in EFB use is not shown in the required items in Appendix 9 to Annex I (Part-FCL) to Commission Regulation (EU) No 1178/2011 for the Skill Test for the issue of a type rating following type conversion training or for the Proficiency Check for the renewal or revalidation of a type rating. Where the operator's SOPs are dependent on the use of the EFB on the particular type or variant, proficiency in the use of the EFB should be assessed in the appropriate areas (e.g. item 1.1, item 1.5, etc. in Appendix 9 to Annex I (Part-FCL) to Commission Regulation (EU) No 1178/2011.

E.1.4.3 Operator proficiency check

ORO.FC.230 (b)(1) requires that flight crew demonstrate their competence in carrying out normal procedures during the Operator Proficiency Check (OPC). Therefore, where an operator's SOPs are dependent on the use of an EFB, proficiency in its use should be assessed during the OPC. Where the OPC is performed on an FSTD not equipped with the operator's EFB, proficiency should be assessed by another acceptable means.

E.1.4.4 Line check

ORO.FC.230 (c) requires that flight crew demonstrate their competence in carrying out normal procedures during the line check. Therefore, where an operator's SOPs are dependent on the use of an EFB, proficiency in its use should be assessed during line check.

E.1.4.5 Areas of emphasis during EFB checking

(a) Proficiency in the use of each EFB application installed;

(b) Proper selection and use of EFB displays;

(c) Where an aircraft performance application is installed, proper cross-checking of data input and output;

(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) 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

(f) Actions following the failure of component(s) of the EFB, including hot EFB battery.

E.2 Differences or familiarisation training

When the introduction of the use of an EFB requires Differences or Familiarisation Training to be carried out under ORO.FC.125, the elements of Initial EFB Training should be used, as described above.

E.3 Recurrent EFB training and checking

E.3.1 Recurrent EFB training

Recurrent training is normally not required for the use of an EFB, provided the functions are used regularly in line operations. Operators should be encouraged, however, to include normal EFB operations as a component of the annual ground and refresher training required by AMC1 ORO.FC.230.

In the case of mixed fleet flying, or where the EFB is not installed across the fleet, additional recurrent training should be applied. Initial training programme developed under E.1.3 is considered to be sufficient.

E.3.2 Recurrent EFB Checking

Recurrent EFB checking should consist of those elements of the licence proficiency check, the operator proficiency check and the line check applicable to the use of an EFB as described in paragraphs E.1.4.2, E.1.4.3, and E.1.4.4. Areas of emphasis are as described in paragraph E.1.4.5.

E.4 Suitability of training devices

Where the operator's SOPs are dependent on the use of an EFB, it is recommended that the EFB is present during the operator's training and checking. Where present, the EFB should be configured and operable in all respects as per the relevant aircraft. This should apply to:

(a) the operator's conversion course required by ORO.FC.220;

(b) Differences or familiarisation training required by ORO.FC.125; and

(c) Recurrent training and checking required by ORO.FC.230.

Where the EFB system is based on a portable device used without any installed resources, it is recommended that the device is present and operable and used during all phases of the flight during which it would be used under the operator's SOPs.

For all other types of EFB system, it is recommended that the device is installed and operable in the training device (FFS) and used during all phases of the flight during which it would be used under the operator's SOPs. However, an operator may define an alternative means of compliance when the operator's EFB system is neither installed nor operable in the training device.

Note: It is not necessary for the EFB to be available for that training and checking which is not related to the operator and the operator's SOPs.

Where the EFB is installed equipment in the basic aircraft type or variant, the installation and use of the EFB in the training device is required for the training and checking for the issue of the type rating and for the checking for the renewal or revalidation of the type rating.

APPENDIX F — SOFTWARE APPLICATION DOCUMENTATION

The operator should develop and retain the following documentation:

(a) Functional description document (for the initial assessment and any subsequent functional change);

(b) Release notes (for both initial and all subsequent software releases) or equivalent;

(c) Version description document (for both initial and all subsequent releases);

(d) First article inspection report (refers to quality controlled release of the EFB Software Application);

(e) Ground viewer (to enable user validation of the software releases and data base releases and updates);

(1) Viewers should use the same software components as the airborne application; and

(2) Viewers should enable user validity checking of airborne data bases before installation on an aircraft.

F.1 Additional requirements for performance applications for take-off, landing and mass & balance calculations

F.1.1 General

The performance and mass & balance applications should be based on existing published data found in the AFM or performance manual, and deliver results that allow the crew to operate in compliance with the appropriate OPS regulations. The applications may use algorithms or data spread sheets to determine results. They may have the ability to interpolate within but should not extrapolate beyond the information contained in the published data for the aircraft.
If the program is designed to be used by operators under different regulation frameworks and allows to choose between Agency and other reference regulations, this choice should be protected so that it is accessible only to the administrator.

To protect against intentional and unintentional modifications, the database files related to performance and mass & balance (performance database, airport database, etc.) integrity should be checked by the program before performing calculation. This check can be run once at the start-up of the application.

Each software version should be identified by a unique version number. Only specific modules of the performance or M&B software application are approved, for a specific software revision and on a specific host (e.g. computer model).The performance and mass & balance applications should keep a trace of each computation performed (inputs and outputs) and the airline should have procedures in place to retain this information.

F.1.2 Testing

The demonstration of the compliance of a performance or mass & balance application should include evidence of the software testing activities performed with the software version candidate for operational use.

The testing can be performed either by the operator or a third party, as long as the testing process is documented and the responsibilities identified.

The testing activities should include HMI testing, reliability testing, and accuracy testing.
HMI testing should demonstrate that the application is not error-prone and that calculation errors can be detected by the crew with the proposed procedures. The testing should demonstrate that the applicable HMI guidelines are followed and that the HMI is implemented as specified by the application developer and this AMC. Refer to Appendix D.3.2 for further information.

Reliability testing should show that the application in its operating environment (OS and hardware included) is stable and deterministic, i.e. identical answers are generated each time the process is entered with identical parameters.

F.1.2.1 Accuracy testing

Accuracy testing should demonstrate that the aircraft performance or mass & balance computations provided by the application are correct in comparison with data derived from the AFM or other appropriate sources, under a representative cross section of conditions (e.g. for performance applications: runway state and slope, different wind conditions and pressure altitudes, various aircraft configuration including failures with a performance impact, etc.).
The demonstration should include a sufficient number of comparison results from representative calculations throughout the entire operating envelope of the aircraft, considering corner points, routine and break points.
Operators are expected to justify that they covered a sufficient number of testing points with respect to the design of their software application and databases.
Any difference compared to the reference data that is judged significant should be examined and explained. When differences come from a reduced conservatism or reduced margins that were purposely built into the approved data, this approach should be clearly mentioned and motivated. Compliance to the certification and operational rules need to be demonstrated in any case.

The testing method should be described. The testing may be automated when all the required data is available in appropriate electronic format, but in addition to a thorough monitoring of the correct functioning and design of the testing tools and procedures, it is strongly suggested to perform additional manual verification. It could be based on a few scenarios for each chart or table of the reference data, including both operationally representative scenarios and 'corner-case' scenarios.

The testing of a software revision should, in addition, include non-regression testing and testing of any fix or change.

Furthermore, an operator should conduct testing related to its customisation of the applications and to any element proper to its operation that was not covered at an earlier stage (e.g. airport database verification).

F.1.3 Procedures

In addition to the provisions of chapter 7.6, specific care is needed regarding the crew procedures concerning performance or mass and balance applications:

(a) Crew procedures should ensure that calculations are conducted independently by each crew member before data outputs are accepted for use.

(b) Crew procedures should ensure that a formal cross-check is made before data outputs are accepted for use. Such cross-checks should utilise the independent calculations described above, together with the output of the same data from other sources on the aircraft.

(c) Crew procedures should ensure that a gross-error check is conducted before data outputs are accepted for use. Such a gross-error check may use either a 'rule of thumb' or the output of the same data from other sources on the aircraft.

(d) Crew procedures should ensure that, in the event of loss of functionality by an EFB through either the loss of a single application, or the failure of the device hosting the application, an equivalent level of security of data output can be maintained by the use of alternative procedures. Consistency with the EFB Risk Assessment assumptions should be confirmed.

F.1.4 Training

In addition to the provisions of chapter 7.13, the training should emphasise the importance of executing all performance calculations in accordance with the SOPs to assure fully independent calculations.

Furthermore, due to the optimisation at different levels brought by performance applications, the crew may be confronted with new procedures and different aircraft behaviour (e.g. use of multiple flaps settings for take-off). The training should be designed and provided accordingly.

Where an application allows computing both dispatch (regulatory calculations, factored calculations) and other results, the training should highlight the specificities of those results. Depending of the representativeness of the calculation, the crew should be trained on the operational margin that might be required. (refer to Part-CAT requirements).

The training should also address the identification and the review of default values, if any, and assumptions about the aircraft status or environmental conditions made by the application.

F.1.5 Additional considerations for mass & balance applications

The basic data used for the mass & balance calculation should be modifiable by the EFB Administrator himself/herself or by the software application provider on behalf of the EFB Administrator.

Mass values for passengers and baggage should fulfil the applicable legal requirements.
In addition to the figures, a graph should visualise the mass and its associated CG-position.

APPENDIX G — EFB POLICY AND PROCEDURES MANUAL

These are the typical contents of an EFB policy and procedures manual that can be part of the Operation Manual. The proposed outline is very extensive. It may be adapted to the specific EFBs system and to the size and complexity of the operations in which the operator is involved.

EFB policy & procedures Manual
Typical Contents

1. Revision history

2. List of effective pages or paragraphs

3. Table of contents

4. Introduction

- Glossary of terms and acronyms
- EFB general philosophy, environment and dataflow
- EFB system architecture
- Limitations of the EFB system
- Hardware description
- Operating system description
- Detailed presentation of the EFB applications
- EFB application customisation
- Data management:
  - Data administration
  - Organisation & workflows
  - Data loading
  - Data revision mechanisms
  - Approval workflow
  - Data publishing & dispatch
  - Customisation
  - How to manage the airline specific documents
  - Airport data management
  - Aircraft fleet definition
- Data authoring
  - Navigation and customisation

5. Hardware and operating system control and configuration

- Purpose and scope
- Description of the following processes:
  - Hardware configuration and part No control
  - Operating system configuration and control
  - Accessibility control
  - Hardware maintenance
  - Operating system updating

- Responsibilities and accountabilities
- Records and filing
- Documentary references

6. Software application control and configuration

- Purpose and scope
- Description of the following processes:
  - Part No control
  - Software configuration management
  - Application updating process
- Responsibilities and accountabilities
- Records and filing
- Documentary references

7. Flight crew

- Training
- Operating procedures (normal, abnormal, and emergency)

8. Maintenance considerations

9. EFB security policy

- Security solutions and procedures

APPENDIX H — AIRPORT MOVING MAP DISPLAY (AMMD) APPLICATION WITH OWN-SHIP POSITION

H.1 General considerations

H.1.1 Preamble

This Appendix guides the applicant in how to demonstrate the safe operational use for AMMD applications as a Type B software application to be hosted in EFBs.
It is recognised that an AMMD can aid pilot positional awareness on the airport manoeuvring area and the Agency proposes to allow AMMDs to be Type B application under the conditions established in this Appendix H.

H.1.2 Assumptions of intended use of an AMMD

An AMMD application is **not used as the primary means of taxiing navigation** and is only used in conjunction with other materials and procedures identified within the Operating Concept – see paragraph H.3.

Note: When an AMMD is in use, the primary means of taxiing navigation remains the use of normal procedures and direct visual observation out of the cockpit window.

Thus, as recognised in ETSO-C165a, an AMMD application with display of own-ship position is considered as having a minor safety effect when displaying misleading information and the failure condition for the loss of function is classified as 'no safety effect.'

H.2 Approval of AMMD in EFBs

H.2.1 Minimum requirements

The AMMD software and database that is compliant with the Agency's European Technical Standard Order ETSO-C165a, or an equivalent standard, with following AMMD system features implemented, is considered acceptable:

(a) The system provides means to display the revision number of the software installed.

(b) The system is capable of accepting updated airport mapping information and provides means to display the validity period of the database to the flight crew. The flight crew should be able to easily ascertain the validity of the on-board map database. The application should provide an indication when the AMMD database is no longer valid. Refer to section 2.2.5 of RTCA DO-257A as per section 3.1.1 of ETSO-C165a.

(c) The Total System Error (TSE) of the end-to-end system is specified and characterised. An accuracy threshold of 40 m is considered to ensure that the own-ship symbol is depicted on the correct runway or taxiway.

Note: An approved sensor using the Global Positioning System (GPS) in combination with a RTCA DO-272 medium accuracy compliant database is considered one acceptable means to satisfy this requirement.

(d) The system removes automatically the own-ship position when the aircraft is in flight (e.g. weight on wheels, speed monitoring) and when the positional accuracy exceeds the maximum value. Refer to section 4 in Appendix 1 of ETSO-C165a.

(e) It is recommended that the AMMD detects, annunciates to the flight crew, and fully removes depiction of own-ship data, in case of any loss or degradation of AMMD functions due to failures such as memory corruption, frozen system, latency, etc. Refer to section 1 in Appendix 1 of ETSO-C165a.

(f) Data Quality Requirements (DQRs) for the AMMD data base.

H.2.2 Data provided by the AMMD software application developer

The AMMD software application developer should provide the appropriate data to each integrator in an EFB:

(a) The executable object code in an acceptable transferring medium;

(b) Installation instructions or equivalent as per ETSO-C165a section 2.2. addressing:

(1) identification of each target EFB system computing platform (including hardware platform and operating system version) with which this AMMD software application and database was demonstrated to be compatible;

(2) installation procedures and limitations to address the AMMD installation requirements for each applicable platform such as target computer resource requirements (e.g. memory resources) to ensure the AMMD will work properly when integrated and installed;

(3) interface description data including the requirements for external sensors providing data inputs; and

(4) verification means required to verify proper integration of the AMMD in the target platform environment, including identification of additional activities that the integrator of an EFB must perform to ensure the AMMD meets its intended function, such as testing in the aircraft.

(c) Any AMMD limitations, and known installation, operational, functional, or performance issues on the AMMD.

H.2.3 AMMD software installation in the EFB

The operator should review the documents and the data provided by the AMMD developer, and ensure that the installation requirements of the AMMD software in the specific EFB platform and aircraft are addressed. The following activities are required:

(a) Ensure that the software and database are compatible with the EFB system computing platform on which they are intended to function, including the analysis of compatibility of the AMMD with other EFB Type A and B software applications residing in the same platform. Follow the programme installation instructions provided by the software supplier, as applicable to the compatible EFB computer.

(b) Check that the objectives for installation, assumptions, limitations and requirements for the AMMD, as part of the data provided by the AMMD software application developer (see H.2.2), are satisfied.

(c) Perform any verification activities proposed by the AMMD software application developer, as well as identify and perform additional integration activities to be completed.

(d) Ensure the compatibility and the compliance with requirements for data provided by other installed systems, such as a GNSS sensor and latency assumptions.

H.3 Operating concept

The operating concept should include, as minimum,:

(a) pilot operation, including confirmation of effectivity;

(b) handling of updates;

(c) quality assurance function;

(d) handling of NOTAMS; and

(e) the provision of current maps and charts to cover the intended operation of the aeroplane**.**

Changes to operational or procedural characteristics of the aircraft (e.g. Flight crew procedures) are documented in the Operations Manual or user's guide as appropriate. In particular, the following text is required:

This EFB airport moving map display (AMMD) with own-ship position symbol is designed to assist flight crews in orienting themselves on the airport surface to improve pilot positional awareness during taxi operations. The AMMD function is not to be used as the basis for ground manoeuvring. This application is limited to ground operations only.

H.4 Training requirements

The operator may use flight crew procedures to mitigate some hazards. This will include limitations on the use of the AMMD function. As the AMMD could be a compelling display and the procedural restrictions are a key component of the mitigation, training should be provided in support of an AMMD's implementation.

Any mitigation to hazards that are mitigated by flight crew procedures should be included in flight crew training. Details of AMMD training should be included in the operator's overall EFB training (refer to Appendix E).

APPENDIX I — EXAMPLE OF FINAL OPERATIONAL REPORT

System description and classification of EFB system

- A general description of the proposed EFB system
- EFB system (harware and software applications) proposed (paragraph 5.1)

Software applications

- List of Type A applications installed (paragraph 5.2.1)
- List of Type B applications installed (paragraph 5.2.2)
- List of miscellaneous (non-EFB) software applications installed (paragraph 6.2.2.3

Hardware (relevant information or references)

For portable EFB used without installed resources:

- EMI compliance demonstration (paragraph 6.2.1.1)
- Lithium battery compliance demonstration (paragraph 6.2.1.2)
- Depressurisation compliance demonstration (paragraph 6.2.1.4)
- Details of the power source (paragraph 6.2.1.3)

For portable EFB served by installed resources:

- Details of the airworthiness approval for the mounting device (paragraph 6.1.1.1.1)
- Description of the placement of the EFB display (paragraph 6.1.1.1.2)
- Details of the use of installed resources (paragraph 6.1.1.1)
- EMI compliance demonstration (paragraph 6.2.1.1)
- Lithium battery compliance demonstration (paragraph 6.2.1.2)
- Depressurisation compliance demonstration (paragraph 6.2.1.4)
- Details of the power source (paragraph 6.1.1.1.3)
- Details of any data connectivity (paragraph 6.1.1.1.4)

For installed EFB:

- Details of the airworthiness approval as installed equipment (paragraph 6.1.1.2)

Certification documentation

- Limitations contained within the AFM (paragraph 6.1.2.1)
- Guidelines for EFB application developers (paragraph 6.1.2.2)
- Guidelines for EFB system suppliers (paragraph 6.1.2.3)

Specific considerations for performance applications

- Details of performance data validation conducted (paragraph 7.5)

Operational assessment

- Details of the EFB risk assessment conducted (paragraph7.2)
- Details of the human machine interface assessment conducted for Type A and B Software applications (paragraph7.4)
- Details of flight crew operating procedures (paragraph7.6):
    - Procedures for using EFB systems with other flight crew compartment systems (paragraph7.6.1)
    - Flight crew awareness of EFB software/database revisions (paragraph7.6.2)

- Procedures to mitigate and/or control workload (paragraph7.6.3)
- Flight crew responsibilities for performance calculations (paragraph7.6.4)

- Details of proposed compliance monitoring oversight of the EFB system (paragraph7.7)
- Details of EFB system security measures (paragraph7.8)
- Details of EFB administration procedures including provision of the EFB policy and procedures manual (paragraph 7.10 & paragraph 7.10.1)
- Details of the electronic signatures procedure (paragraph 7.9)
- Details of the system for routine EFB System maintenance (paragraph 7.11)
- Details of flight crew training (paragraph 7.12):
  - Initial training
  - Differences training
  - Recurrent training
- Report of the operational evaluation test (paragraph 7.13):
  - Proposals for the initial retention of paper backup (paragraph 7.13.1)
  - Proposals for the commencement of operations without paper backup (paragraph 7.13.2)
- EFB platform/hardware description;
- Description of each software application to be included in the assessment (see Appendix F);
- Risk assessment summary for each application and mitigation means put in place;
- Human factors 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
- Operator training;
- EFB administrator qualification.

Appendix J — Power Supply Considerations for PORTABLE EFBs

If an EFB is permanently attached to the essential power network, it could affect the essential generation system (emergency generator and/or battery, bus bars, distribution system) to which it is connected.

Certification specifications require that an alternate high integrity electrical power supply system, independent of the normal electrical power system, be provided to power those services necessary for continued safe flight and landing, in case of loss of the normal system. Adding other unnecessary services/loads will affect the integrity of this alternate power system. Portable and installed EFBs are considered non-essential equipment and, therefore, not considered necessary for continued safe flight and landing . It is, hence, not recommended to connect the EFB to an essential power bus.

APPENDIX K — CONSIDERATIONS FOR RAPID DEPRESSURISATION TEST

When the EFB system hosts applications that are required to be used during flight following a rapid depressurisation, testing is required to determine an EFB device's functional capability. The information from the rapid depressurisation test is used to establish the procedural requirements for the use of that EFB device in a pressurised aircraft. Rapid decompression testing should follow the EUROCAE ED-14G/RTCA DO-160F guidelines for rapid decompression testing up to the maximum operating altitude of the aircraft on which the EFB is to be used. The EFB should be operative for at least 10 minutes after the start of the decompression.

(a) **Pressurised aircraft:** When a portable EFB has succesfully completed rapid depressurisation testing, then no mitigating procedures for the depressurisation event need to be developed. When a portable EFB has failed the rapid depressurisation testing while turned ON, but successfully completed it when OFF, then procedures will need to ensure that at least one EFB on board the aircraft remains OFF during the applicable flight phases or configured so that no damage will be incurred should rapid decompression occur in flight above 10 000 ft AMSL.

If the EFB system has not been tested or has failed the rapid depressurisation test, then alternate procedures or paper backup should be available.

(b) **Non-Pressurised aircraft**: Rapid decompression testing is not required for an EFB used in an non-pressurised aircraft. The EFB should be demonstrated to reliably operate up to the maximum operating altitude of the aircraft. If EFB operation at maximum operating altitude is not attainable, procedures should be established to preclude operation of the EFB above the maximum demonstrated EFB operation altitude while still maintaining availability of the required aeronautical information.

Appendix B to CRD 2012-02

ETSO-C165a

European Aviation Safety Agency

European Technical Standard Order

SUBJECT: ELECTRONIC MAP ~~DISPLAY EQUIPMENT~~ SYSTEMS FOR GRAPHICAL DEPICTION OF AIRCRAFT POSITION

1 - Applicability

This ETSO gives the requirements ~~which~~ that any Electronic Map ~~DISPLAY EQUIPMENT~~ System must meet for the Graphical Depiction of Aircraft Position (own-ship) that are manufactured on or after the date of this ETSO ~~must meet~~ in order to be identified with the applicable ETSO marking.

This ETSO applies to equipment intended to provide graphical depiction of advisory information on a display (e.g. navigation, traffic, weather, obstacles, graphical taxi routing, etc.). The system is intended to improve flight crew positional awareness of the aircraft own-ship position relative to other items depicted on the display.

2 - Procedures

2.1 - General

Applicable procedures are detailed in CS-ETSO Subpart A.

2.2 – Specific

~~None~~

Applications to certify only software without certifying the hardware and/or the operating system will be accepted. Nevertheless, the applicant has to specify requirements for the hardware and/or the operating system to be used, the tests to be performed once the software is integrated into the final system, and the environment, which has been used to demonstrate the system functionality.

3 - Technical Conditions

3.1 - Basic

3.1.1 - Minimum Performance Standard (MPS)

New models of Electronic Map ~~Displays~~ Systems that are to be so identified and that are manufactured on or after the effective date of this ETSO must meet the standards set forth for moving map equipment in Section 2 of RTCA document DO-257A, 'Minimum Operational Performance Standards for the Depiction of Navigational Information on Electronic Maps', dated June, 25, 2003 as amended by Appendix 1 to this ETSO.

1) Electronic Map ~~Displays~~ Systems for use in flight must meet the MPS in Sections 2.1 and 2.2 of DO-257A.
2) Electronic Map ~~Displays~~ Systems for use on the airport surface – AMMD applications - must meet the MPS in Sections 2.1, 2.2, and 2.3 of DO-257A, and
3) Electronic Map ~~Displays~~ Systems including Vertical Situation Displays (VSD) for use in facilitating pilot's awareness of the aircraft's vertical flight path must meet the MPS in Sections 2.1, 2.2, and 2.4 of DO-257A.

3.1.2 - Environmental Standard

See CS-ETSO Subpart A paragraph 2.1.

3.1.3 – Computer Software

See CS-ETSO Subpart A paragraph 2.2.

3.1.4 - Electronic Hardware Qualification

See CS-ETSO Subpart A paragraph 2.3

3.2 - Specific

3.2.1 - Failure Condition Classification

See CS-ETSO Subpart A paragraph 2.4. For the definitions of the intended functions see RTCA DO-257A section 1.4.

Failure of the functions defined in paragraph 3.1.1 of this ETSO for Electronic Map ~~Displays~~ Systems used in flight and VSD equipment (airborne applications) have been determined to be a major failure condition for malfunctions causing the display of misleading information . Loss of function for Electronic Map ~~Displays~~ Systems used in flight and VSD equipment (airborne applications) ~~have~~ has been determined to be a minor failure condition.

Failure of the function defined in paragraph 3.1.1 of this ETSO for Electronic Map ~~Displays~~ Systems used on the airport surface (ground applications) have been determined to be a minor failure condition for malfunctions causing the display of misleading information.

Loss of function for Electronic Map Displays used on the airport surface (ground applications) is determined to be a no safety effect failure condition.

4 - Marking

4.1 - General

Marking as detailed in CS-ETSO Subpart A paragraph 1.2.

4.2 - Specific

None

5 - Availability of Referenced Document

See CS-ETSO Subpart A paragraph 3.

Additional Requirements for Airport Moving Map Display (AMMD) Applications

This Appendix defines changes to the Minimum Operational Performance Standards (MOPS) for EMD equipment for Graphical Depiction of Aircraft Position. The applicable standard is RTCA/DO-257A, 'Minimum Operational Performance Standards for the Depiction of Navigational Information on Electronic Maps', dated June 25, 2003. The changes shown in this Appendix modify RTCA/DO-257A in five principle ways. They:

1) require the processes for production and updating of the aeronautical databases for this standard (i.e., navigation, airport map, terrain, and obstacle, etc.) to meet the requirements of RTCA/ DO-200A, 'Standards for Processing Aeronautical Data', dated September 28, 1998, regardless of whether the database is internal or external to the physical box housing the EMD;
2) require the position source to be received from any ETSO-approved GNSS sensor;
3) require aerodrome databases to meet medium quality as defined in RTCA/DO-272C,'User Requirements for Aerodrome Mapping Information', dated September 28, 2011, or later versions to be considered compliant;
4) require aeronautical databases for this standard to be loaded on components or equipment of controlled and approved design; and
5) adopt the agreed harmonisation with Federal Aviation Authority (FAA) Technical Standard Order (TSO) TSO-C165a.

DO-257A MOPS is modified as follows:

1. Clarify the scope

1.2.1 In page 3, Figure 1-1 has been replaced with:

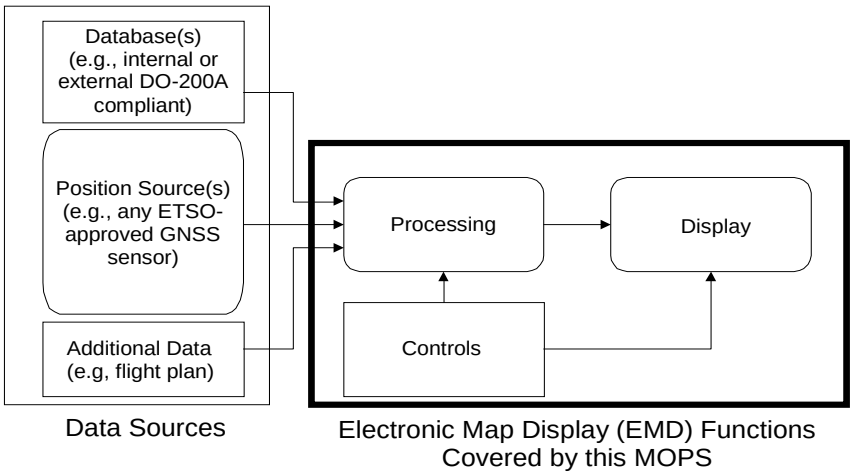

FIGURE 1-1 ELECTRONIC MAP DISPLAY SYSTEM

2. Display Operating Characteristics and Status Indications

2.2.4 In page 26, a new sub-section 25 to section 2.2.4 has been added:

25. A process activity monitor (watchdog) should be implemented allowing to detect frozen processes and to remove outdated/frozen information from the screen or, at least, to indicate the invalidity of that data e.g. by providing a red cross. The process activity monitor should be able to detect the occurrence of the failure within 5 seconds.

3. Database (Navigation)

2.2.5 In page 29, the first paragraph from 2.2.5 has been replaced, the note of subsection 4 has been replaced with new text, the current sub-section 5 has been replaced, and then new sub-sections to 2.2.5 have been added:

In the new first paragraph, changes are underlined and deleted text is strikethrough:
As an alternative to (or in addition to) an external data source, the EMD (as illustrated in Figure 1-1) may use ~~a~~an ~~internal~~ database to store information such as flight plans, nearby fixes, airspace boundaries, raster aeronautical charts, or airport mapping information. If an internal or external database is being used, the following requirements apply:

Add the following text instead of the Note to subsection 4:
The aeronautical information used in the development of AMMDs shall meet the standards specified in the current version of RTCA DO-272/EUROCAE ED-99 and meet the requirements for medium quality.

New subsection 5 changes are underlined and deleted text is strikethrough:

5. The processes of producing and updating aeronautical databases shall meet the standards specified in RTCA DO-200A/EUROCAE ED-76 or subsequent revisions.
Add the following new subsections:

7. Specification of the Data Quality Requirements (DQRs) for the EMD system shall be developed and incorporated as part of the compliance documentation.

8. Corruption of the map database shall be detected and annunciated to the flight crew.

4. Map depiction

2.3.1 In page 31, the current note 3 from sub-section 1 of section 2.3.1 has been deleted and then the following new notes 3 and 4 to sub-section 1 of section 2.3.1 have been added:

Notes:

3. *Until such time as ICAO Annex 15 requirements include airport map data as a part of the aeronautical information publication (AIP), the most significant error source is expected to be the data describing the airport environment. Until airport map data is made available as part of the AIP, the aeronautical data used in the development of AMMDs shall meet the accuracy, resolution, and assurance level requirements specified in section 2.2.5(6).*
4. *When airport map data is made available as part of the AIP, there is no requirement to validate runway and taxiway accuracy of airport map data before it is used. Acceptable system performance is achieved through reporting of errors and having a process to take corrective action, notify the source, and notify operators when there is an unresolved error. It is expected that pilots will report errors if they observe that the indicated position is inconsistent with the accuracy implied by the display. One intention of this paragraph is to reduce the number of false data error reports, caused because the implied accuracy is better than the actual, and expected accuracy.*

5. Runways

2.3.1.1.1 In page 31, the current sub-sections 5 and 6 of section 2.3.1.1.1 have been deleted and replaced by:

5. The aircraft position sensor horizontal positional accuracy for own-ship position on runways and taxiways shall be less than 36 m.

Notes:

1. The horizontal positional accuracy is defined as the difference between a sensor's measured horizontal position and its true horizontal position.

2. The sensor horizontal positional accuracy requirement of 36 m derived from the 95 % horizontal performance of GPS (Reference DOD, GPS Standard Positioning Service Performance Standard, October 2001). The horizontal positional accuracy supports the total accuracy requirement provided in Section 3.2.3.

3. There are no horizontal protection limit (HPL) requirements for the position information used for the AMMD.

4. Acceptable compliance with this requirement is to demonstrate that the system is connected to any ETSO-approved GNSS sensor.

5. The aerodrome database accuracy shall meet medium quality as defined in the current version of RTCA DO-272/ED-99.
Notes:
1. Aerodrome total database accuracy derives as follows: (Aerodrome total database accuracy)^2 = (database accuracy)^2 + (survey accuracy)^2.
2. The aerodrome total database accuracy supports the total accuracy requirement provided in section 3.2.3.

6. Taxiways

2.3.1.1.2 In page 32, the current sub-sections 3 and 4 of section 2.3.1.1.2 have been deleted and replaced by:

3. The aircraft position sensor horizontal positional accuracy for own-ship position on runways and taxiways shall be less than 36 m.
4. The aerodrome database accuracy shall meet medium quality as defined in the current version of RTCA DO-272/ED-99.
Note: For airports where no known taxiway data is published and errors are noted, operators using the moving map will report database errors to the database supplier as described in section 2.3.5.

7. Depiction of Ownship Position

2.3.1.2 In page 33, new sub-sections 7 and 8 to section 2.3.1.2 have been added:

7. The AMMD shall provide compensation means for the installation dependant antenna position bias error i.e. along track error associated to the GNSS antenna position to the flight deck. As an alternate, a limitation of the GNSS sensor antenna installation position in relation to the pilots position of two metres is acceptable as well.
8. AMMD applications limited to the airport surface (ground applications) and having only a minor failure classification, shall remove the depiction of the latest own-ship position at a ground speed above 80 knots. It is recommended to include a means to allow the use of lower values which may be required due to the actual aircraft performance or to mitigate installation dependant on Horizontal Position Latency

8. Database (AMMD)

2.3.5 In page 35, the notes have been kept and sub-section 2 of section 2.3.5 has been deleted and replaced by:

2. The processes of producing and updating aerodrome databases shall meet the standards specified in RTCA DO-200A/EUROCAE ED-76 or subsequent revisions.

9. Database (Verification)

2.6.3.1.2 In page 48, section 2.6.3.1.2 has been replaced by:

Verify compliance with the following requirements:

1. The system shall provide a means to identify the database(s) version and valid operating period. [2.2.5 (1)]
2. The system shall indicate if any data is not yet effective or is out of date. [2.2.5 (2)]
3. The aeronautical information used in the development of AMMDs shall meet the standards specified in the current version of RTCA DO-272/EUROCAE ED-99 and meet the requirements for medium quality. [2.2.5(3)]
4. The processes producing and updating aeronautical databases shall meet the standards specified in RTCA DO-200A/EUROCAE ED-76 or subsequent revisions. [2.2.5(4)]
5. Specification of the Data Quality Requirements (DQRs) for the system shall be developed and incorporated as part of the compliance documentation. [2.2.5(5)]
6. Corruption of the system database shall be detected and annunciated to the flight crew. [2.2.5(6)]
7. WGS-84 position reference system or an equivalent earth reference model shall be used for all displayed data. (Reference RTCA DO-236B; ICAO Annex 15). [2.2.5(7)]

For systems that have an AMMD, verify compliance with the following requirements:

8. If the airport map database is separate from the system navigation information database, the AMMD shall provide a means to identify the database version, and/or date, and/or valid operating period. [2.3.5(1)]
9. The processes of producing and updating aerodrome databases shall meet the standards specified in RTCA DO-200A/EUROCAE ED-76 or subsequent revisions. [2.3.5(2)]

10. Map and Flight Plan Depiction (verification)

2.6.3.1.3 In page 48, section 2.6.3.1.3 has been replaced by:

Display programmed flight plan and verify compliance with the following requirements:

1. The system shall have the capability of displaying flight plans. [2.2.1.2(1)]

Note: Flight plans are not required for the AMMD, but graphical taxi overlays may be enabled and displayed.

2. The system shall display distinctive symbols for different fixes types (waypoints, airports, VORs, NDBs, intersections) and the aircraft (own-ship). [2.2.1.1(1)]
3. The system shall use symbols similar to those shown on published charts or that are consistent with established industry standards. Guidelines for electronic display symbology are provided in SAE ARP5289. [2.2.1.1(2)]
4. Lines shall be displayed indicating the path to be flown between fixes in a flight plan. [2.2.1.2.1(1)]
5. If the display is incapable of representing curves, due to either data or system limitations, then curved path segments shall not be depicted as a single straight line (Reference Figure 2-3). [2.2.1.2.1(3)]

6. If a flight plan is being displayed, and the system is receiving an active flight plan from an external navigation system (e.g., an external GNSS navigator or FMS), the active external flight plan shall be displayed, unaltered, on the display. [2.2.1.2(2)]

7. If the system is used to edit the active flight plan on the display, it shall update the flight plan in the external navigator. [2.2.1.2(3)]

8. The way flight plans are depicted in the preview or edit mode shall be distinctive from the normal depiction of the active flight plan. [2.2.1.2(4)]

9. If the system receives RNP leg data (i.e., Direct to a Fix (DF), Course to a Fix, (CF), Track between two Fixes (TF), course from a Fix to an Altitude (FA), constant Radius to a Fix (RF)), the system shall display the leg type in compliance with RTCA DO-236B or not at all. [2.2.1.2.1(2)]

For systems with an AMMD, verify the following requirements for AMMD:

10. The capability to depict runways shall exist. [2.3.1.1.1(1)]

11. The depiction of runways shall be distinctive from all other symbology. [2.3.1.1.1(2)]

12. Taxi route information shall be distinguishable from all other AMMD map attributes. [2.3.1.1.3(1)]

13. The way taxi routes are depicted in the preview or edit mode shall be distinctive from the depiction of the active taxi route. [2.3.1.1.3(2)]

14. The AMMD shall contain a symbol representing the location of own-ship. [2.3.1.2(1)]

15. The AMMD shall provide a means to compensate for installation dependant antenna position bias error (i.e., along track error associated with GNSS antenna position to the flight deck). [2.3.1.2(7)]

16. AMMD applications limited to the airport surface (ground applications) and having only a minor failure condition classification shall remove the own-ship position symbol at a ground speed above 80 knots. [2.3.1.2(8)]

For systems with a VSD with a flight plan programmed and active, examine the depiction of the VSD and verify the following: (Note that this test should be repeated in all modes. Any items that cannot be done on the ground, should be verified during flight.)

17. The swathe shall be centred along the current track of the aircraft or the flight plan. [2.4.1.1(1)]

18. If the VSD is capable of displaying more than one swathe definition (e.g., swath can be defined or based on RNP, Estimated Position Uncertainty, Airway type, TAWS, etc.), the current swath definition shall be available for display. [2.4.1.1(3)]

19. In flight plan mode, the flight plan, including the desired path and fixes, shall be displayed on the VSD when within the selected VSD map range. [2.4.1.3(1)]

20. When in track mode and the flight plan is not contained within the swath, the flight plan shall not be displayed. [2.4.1.3(2)]

21. If flight plan altitude information is not available, then the VSD shall not depict a vertical path, and waypoints without altitude restrictions shall be depicted at the aircraft's current altitude. [2.4.1.3(3)]

22. When operating in flight plan mode, the VSD shall depict the same flight plan as the plan view map depiction. [2.4.1.3(4)]

23. The VSD depiction of own-ship position relative to the flight plan shall not conflict with the vertical guidance (e.g., deviations) on the primary flight display. [2.4.1.3(5)]

24. If depicting the DME distance to a symbol on the VSD (e.g. fix on an approach), the VSD shall correctly represent and label the DME distance as it would be measured by a DME receiver (i.e. not necessarily the distance to the DME station in the case of an offset DME). [2.4.1.3(6)]

25. The profile display shall accurately depict with respect to the scale factors of the display (i.e., vertical and horizontal) all vertical path information displayed, including glide slope, approach path, or angle of descent. [2.4.1.3(7)]

26. If the VSD is in flight plan mode and the aircraft deviates from the flight plan to the extent that it is no longer within the swath, the system shall either 1) switch to track mode, 2) flag the display, or 3) remove the own-ship symbol from the VSD. [2.4.1.3(8)]

27. If in flight plan mode, all displayed distances shall be the total of along-path distances (i.e., an 'unwound' flight plan) so that distance between fixes is consistent with the distances between the fixes on the plan view map (including published arcs or fixed radius turns). [2.4.1.3(9)]

28. When in flight plan mode, if the altitude and the desired vertical path are both known, the desired path shall be displayed on the VSD. [2.4.1.3.1(1)]

29. All indications of altitude information depicted on the EMD shall use the same vertical reference (i.e., cannot intermix barometric data with non-barometric data). [2.4.1.4.2(1)]

30. If the VSD depicts the vertical predictor, it shall be visually distinctive from any depiction of approach glidepath angle or glide slope. [2.4.1.4.2(2)]

31. If the following items are displayed on the VSD, they shall be consistent with existing vertical information on other flight deck equipment including: depiction of selected altitude, depiction of altitude alert setting, and depiction of vertical speed selection. [2.4.1.4.2(3)]

32. Indicated altitude of the own-ship position on the VSD shall be consistent with the altitude indicated on the primary flight display. [2.4.1.4.2(4)]

11. Accuracy

2.6.3.1.10 In page 56, section 2.6.3.1.10 has been replaced by:

1. The aircraft position sensor horizontal positional accuracy for own-ship position on runways and taxiways shall be less than 36 m. [2.3.1.1.1 and 2.3.1.1.2]

2. The aerodrome database accuracy shall meet medium quality as defined in the current version of RTCA DO-272/ED-99. [2.3.1.1.1 and 2.3.1.1.2]

3. The AMMD shall provide a means to compensate for installation dependant antenna position bias error (i.e., along track error associated with GNSS antenna position to the flight deck). [2.3.1.2]

4. The AMMD shall provide an indication if the accuracy implied by the display is smaller than the level supported by the total system accuracy. [2.3.1(1)]

5. Until airport map data is made available as part of the AIP, the aeronautical data used in the development of AMMDs shall meet the accuracy, resolution, and assurance level requirements specified in the current version of RTCA DO-272/EUROCAE ED-99 for medium quality. [2.3.1]

12. Display Operating Characteristics

2.6.3.2.4 Page 57, add new sub-section 7 to section 2.6.3.2.4:

7. A process activity monitor (watchdog) shall be implemented allowing to detect frozen processes and to remove outdated/frozen information from the screen, or to indicate the invalid data (e.g. by providing a red cross). The process activity monitor shall be able to detect the occurrence of the failure within 5 seconds. [2.2.4]