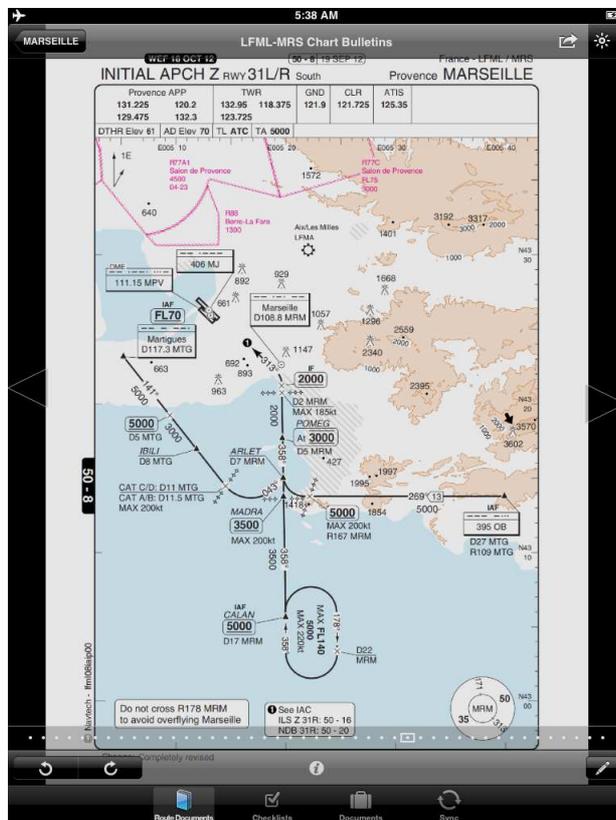


# EUROPEAN AVIATION SAFETY AGENCY

## ELECTRONIC FLIGHT BAG (EFB) SOFTWARE EVALUATION REPORT



NAVTECH

Navtech iCharts (Version 12.7)

17 06 2013

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## REVISION RECORD

REVISION NO:	DATED	SUMMARY
0	17 June 2013	Initial Issue.

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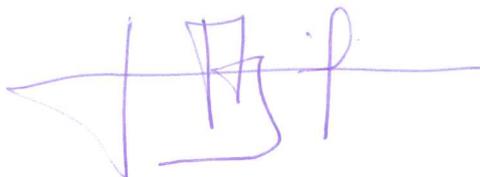
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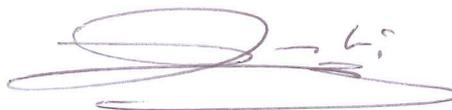
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Dated: 17 06 2013

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## ACRONYMS AND ABBREVIATIONS

AMC	Acceptable Means of Compliance
CRD	Comments Response Document (step of the NPA process)
EASA	European Aviation Safety Agency
EFB	Electronic Flight Bag
EMI	Electromagnetic Interference
FAA	United States Federal Aviation Administration
HMI	Human Machine Interface
MEL	Minimum Equipment List
MFD	Multi-function Display
NAA	National Aviation Authority
NPA	Notice of Proposed Amendment
OEB	Operations Evaluation Board (EASA term)
TGL	Temporary Guidance Leaflet

## EXECUTIVE SUMMARY

Navtech has applied to the EASA Special OPS Evaluation Certification section on 30 November 2012 for the operational evaluation of the iCharts application (iOS).

The OEB evaluation found that the Navtech iCharts satisfy the guidelines of JAA TGL 36 and AMC 20-25, taking into account that this report does not address the evaluation of the hardware platform used to run the applications. The evaluation of the non-certified hardware, and the compliance with regulations linked to the regulations and guidance material remain a responsibility of the operators and their competent authority.

This evaluation has been performed using the following methods:

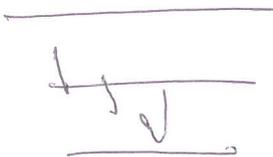
- Desktop review of the software specifications;
- Review of the results from the software evaluations performed by Navtech;
- Review of Navtech's Risk Assessment and compliance matrix;
- Limited functional tests on a sample iPad.

This evaluation did not consider the "Checklists" function of iCharts.

Requirements contained in Commission Regulation (EC) N° 859/2008 of 20 August 2008 (EU-OPS) and Commission Regulation (EU) N° 965/2012 of 5 October 2012 (Air Operations Rules) have been considered together with guidance material in JAA TGL 36 (Approval of Electronic Flight Bags) and AMC 20-25 (Airworthiness and Operational considerations for Electronic Flight Bags – CRD Version).

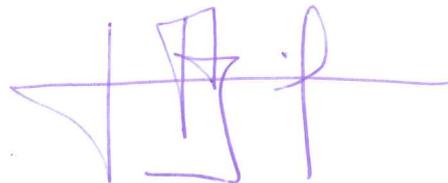
This report does not substitute to, or prevail over any of the terms of the Apple hardware and software Product Agreements. The operators must read these terms and take the responsibility to accept the different agreements prior to using the applications.

The EASA-OEB sees no technical objections to the grant by the National Authorities of an operational approval for the use of Navtech iCharts software application taking the recommendations proposed in this report into account.



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Date:

17/06/2013



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# EFB SOFTWARE EVALUATION REPORT

## 1 PURPOSE AND APPLICABILITY

### 1.1 Purpose

This Report specifies EASA requirements and recommendations applicable to operators seeking Operational Approval to use the Navtech iCharts application under Commission Regulation (EC) N° 859/2008 of 20 August 2008 (EU-OPS), or Commission Regulation (EU) No 965/2012 of 5 October 2012 (referred to in this Report as “Part-OPS”), and it additionally provides guidance to National Aviation Authorities (NAAs) responsible for granting such approvals.

### 1.2 Applicability

This report is applicable to Navtech iCharts (Version 12.7), as well as subsequent versions added via addendum, or not requiring one under the conditions mentioned in 1.2.1 below. The “Checklists” function has not be considered during this evaluation and is out of the scope of this report.

Findings of compliance and recommendations contained in this report are consistent with the guidance specified in JAA TGL 36 and AMC 20-25. This report assumes that the evaluation of the compliance of the EFB hardware and installation is under operator’s responsibility and evaluated by its competent authority.

This report includes:

- Minimum requirements which should be applied by the NAA when considering the grant of an Operational Approval;
- Information which is advisory in general, but is mandatory for particular operators if the designated configurations apply and if approved for that operator.

Provisions of this Report are effective until amended, superseded, or withdrawn.

#### 1.2.1 Changes

Updates to the evaluated software (version 12.7) which do not bring any change to the HMI, are not susceptible to change the application classification, or do not introduce new functionalities, do not require an approval and can be considered to be covered under this report. The changes should nevertheless be controlled and properly tested prior to use in flight.

As detailed in AMC 20-25 chapter 7.3, other modifications to the software require a supplemental evaluation. If applicable this may be done by the operator through the procedure approved by the competent authority in accordance with rule ARO.GEN.310(c).

Changes to the operating system (iOS) are addressed in 5.6.1.

### 1.3 Use of the AMC 20-25 as Acceptable Means of Compliance

This evaluation has started and has been performed while the AMC 20-25 was in the Notice of Proposed Amendment process (NPA 2012-02 published on the 12<sup>th</sup> March 2012).

In order to facilitate the use of the evaluation results by operators and NAAs, it was decided to use the draft version of the AMC 20-25 that is proposed in the Comments Response Document (CRD to be published in Summer 2013).

The resulting AMC 20-25 is significantly more detailed than TGL-36 and different in some areas (for example for the EFB classes and software types definition).

Questions regarding consistency / compatibility between the past, current draft and future regulations can be addressed to EASA.

## 2 GENERAL DESCRIPTION OF THE SOFTWARE

The Navtech iCharts application grants electronic access to Navtech terminal charts, text pages, and company-authored documents.

The four primary functions of Navtech iCharts are accessed by tapping on the related icon along the bottom edge of the screen:



**Route Documents:** This is the function for viewing Navtech Terminal Charts manuals, and is the primary function of Navtech iCharts. Tapping on this icon will take the user to the Navtech Charts manual(s) downloaded to the iPad as set up by the Customer Administration Interface (CAI) Administrator. In the top-left corner of the screen is the Route Document navigation button. At the top level of the hierarchy the user will find the list of Navtech Charts manual(s) available. By tapping on the desired manual, the user can navigate through the manual index to find the needed aerodrome charts. The aerodrome charts in the manual are organized first by country, then by aerodrome. Tapping on a specific aerodrome will bring the user to the list of charts available for that aerodrome.

**Checklists:** **This function has not been evaluated and is out of the scope of this report.**

**Documents:** Navtech iCharts also allows customer CAI Administrators to upload company-authored PDF documents for distribution to the iPads. This feature allows uploading aircraft documents, company procedure documents, or any reference documents the operator desires to be accessed from within Navtech iCharts. Navtech iCharts acts as a basic document viewer in this mode, allowing the operator to navigate multiple documents, search and find information needed, and navigate through each document. Due to the basic feature of the viewer, it may not be suitable for all documents and as a replacement of the paper. This is further detailed in this report.

**Sync:** Updating of content is managed by tapping on this icon, taking the user to a screen where the current manual revision information is displayed. If the iPad is connected to the internet, the app checks for any available updates. Additionally, the user can tap on the circle-arrow icon in the top left to ask Navtech iCharts to determine if there are any updates available. If an update is available, the (i) button on the right shows "Incomplete" and tapping on that button brings up revision information. Tapping the "Synchronize" button starts the revision update process where any updates to the chart manual, new documents, and/or new checklists are downloaded.

## **3 SOFTWARE CLASSIFICATION**

### **3.1 Classification**

Navtech iCharts is classified as a Type B application, following TGL-36 and AMC 20-25.

### **3.2 Non-EFB Applications**

The iOS system provides default applications not related to flight operations and allows easy installation of additional applications.

These applications are out of the scope of this document. An operator's EFB administrator should ensure that non-EFB software applications do not adversely impact the operation of the EFB (see [5.6.2](#)).

Non-Navtech applications providing an indication of current position, should be considered to be non-EFB applications, requiring an airworthiness approval, if the present position function is not inhibited and locked by the administrator. Refer to AMC 20-25 Appendix C.

## **4 HARDWARE OPERATIONAL EVALUATION**

The hardware operational evaluation is not covered by this evaluation and remain under the responsibility of the operator. This include:

- Electromagnetic Interference (EMI) Demonstrations (AMC 20-25 §6.2.1.1)
- Battery (AMC 20-25 §6.2.1.2)
- Power Source (AMC 20-25 §6.2.1.3)
- Environmental Testing (AMC 20-25 §6.2.1.4)
- Display Characteristics (AMC 20-25 §6.2.1.5)
- Viewable Stowage if applicable (AMC 20-25 §6.2.1.6)

## **5 SOFTWARE OPERATIONAL EVALUATION**

### **5.1 Risk Assessment**

Elements of the Risk Assessment required by AMC 20-25 §7.2 were elaborated during this evaluation and are provided in [Appendix A](#) (available on request).

### **5.2 Dispatch Considerations**

Dispatch considerations remain under operator's responsibility and should be carried out with regard to the EFB system specificities. Refer to AMC 20-25 §7.4.

### **5.3 Human Factors and HMI Assessment**

The following elements are based on a limited EASA evaluation and on supporting material provided by Navtech during the evaluation.

They provide recommendations for operators and NAAs to ensure compliance with AMC 20-25 and particularly its appendix D, in addition to the document "Navtech position" (cf [Appendix C](#) of this report).

### **5.3.1 Legibility of Text**

iCharts provides a Brightness control that adjusts brightness for the application only, without the need to use the device settings. If the display is accidentally dimmed too much, a medium setting can be restored thanks to a dedicated control that appears in the lower right corner.

It is recommended that crew training emphasizes that during night flight, switching from iCharts to a third-party application on the EFB may suddenly increase the screen brightness, which could be disturbing.

The legibility under the full range of lighting conditions expected on the operator's flight deck, including use in direct sunlight, is out of scope of this document and remains to be evaluated.

### **5.3.2 Input Devices**

The assessment of the input device (touch screen) is out of scope of this evaluation. However, the behaviour of the touch screen during limited ground trials was satisfactory.

Operators and their competent authorities should evaluate on a case by case basis that reasonably expected environmental factors in the flight deck (in particular turbulence) do not affect the usability of the touch screen and the application.

### **5.3.3 Messages and Use of Colours**

In general, Navtech iCharts satisfies the guidance provided by TGL-36 and AMC 20-25.

Regarding messages, there is however no way to ensure at the application level that interaction (visual and auditory) coming from non-EFB applications are disabled. Pop-ups, notifications and alarm sounds may be triggered unexpectedly depending on the configuration.

Thorough testing is therefore recommended to check the possible interactions of the suite of applications considered for use as part of the operator's EFB solution.

Possible work-around include turning notifications and sound off in the crew procedures. Certain pop-ups will however not be de-configurable, as the low battery warnings.

### **5.3.4 Responsiveness of Applications**

During the limited hands-on trial by EASA the responsiveness of the device and of the applications was satisfactory.

The response time of the application can be considered almost immediate for using charts, and is virtually independent from conditions in and selections made on the device.

A system busy indicator is implemented in the application.

Route documents other than charts are visualized in a similar way than charts.

Other documents are accessed through the "Documents" function. It should be noted that the search function is slower for larger documents. The responsiveness of the Documents function should be evaluated by the operators with the manuals intended to be loaded on the EFBs.

### **5.3.5 Flight Crew Workload**

Part of the crew workload evaluation can be considered out of the scope of this document since it depends on operator specificities, like positioning of the device and standard procedures.

Operators and their competent authorities should evaluate the EFB positioning, stowing, and intended use during applicable phases of flight (use of a mounting system or a viewable stowage – refer to AMC 20-25), to insure there is no unacceptable flight crew workload or adverse safety implications.

Those specificities are relevant to the overall workload evaluation to be performed by the operator:

The “Documents” function does not feature a page rotation. An evaluation at operator level should take into account the format of the documents, and the iPad mounting system, in order to insure that accessibility, usability, and workload are acceptable. Documents that include pages in different orientations may not be useable properly in flight.

Proper use and navigation in the chart and route documents supposes that the crew is trained and familiarized with the application. In particular, the crew needs to understand the steps required to quickly access the needed airports and charts, and the use of the favourites.

## **5.4 Flight Crew Procedures**

### **5.4.1 Procedures for using EFB systems with other flight deck systems**

Procedures for using the EFB with other flight deck systems is out of scope of this evaluation and remain under the operator’s responsibility.

### **5.4.2 Flight crew awareness of EFB Software / Databases revisions**

All charts clearly specify their applicability date.

The operators should include crew procedures to check the currency of each EFB database during pre-flight checks.

These procedures should specify what actions should be taken if the databases loaded on the EFB are out of date.

### **5.4.3 Procedures to mitigate and/or control workload**

The flight crew procedures are to be proposed by the operator, remain under his responsibility.

Specificities mentioned in [5.3.5](#) should however be taken into account, as well as the elements provided by the Navtech document in [Appendix C](#).

## **5.5 EFB System Security**

The operator’s EFB Administration procedures must be capable of ensuring an appropriate level of EFB security.

The operator should use technologies and/or procedures to assure that unauthorized content cannot enter the EFB system.

Some protections are already built-in in the Navtech iCharts application.

Several other general considerations regarding iOS EFB security are available in the evaluation results provided in [appendix D](#).

## **5.6 EFB Administration**

The operator should appoint a person to the role of EFB Administrator. The EFB Administrator is responsible for hardware and software configuration management and for ensuring, in particular, that no unauthorised software is installed. The EFB Administrator is also responsible for ensuring that only a valid version of the application software and current data packages are installed on the EFB system.

The EFB Administrator should have received detailed training in both the ground systems hardware and the software applications used to configure the EFB.

Navtech provides a Customer Administrator Interface (CAI) to allow handling of the iCharts users registrations.

Administration procedures for the configuration of the EFB system, its updating, operational feedback, compliance monitoring and software configuration control should be established by the operator and documented in an EFB Policy and Procedures Manual. Details of the content of a typical EFB Policy and Procedures Manual may be found in AMC 20-25, appendix G.

Although EFB administration remains an operator's responsibility, the paragraphs below address some aspects that were discussed during the evaluation and deemed important.

### **5.6.1 System updates (iOS)**

This evaluation is applicable to iOS 6.x.

Any new iOS major version should imply an evaluation to verify it has no adverse effect on the application.

It is recommended that operators implement administrator procedures to not update their devices to new major releases of iOS until such time as Navtech reports that no compatibility issues remain between the revised OS and iCharts. Refer to Navtech document iCHART-1, chapter 8.

### **5.6.2 Non-EFB Software applications**

The iOS system provides default applications not related to flight operations and allows to easily install additional applications.

These applications are out of the scope of this document. However, it should be reminded that the EFB administrator should ensure that non-EFB software applications do not adversely impact the operation of the EFB.

It is recommended that the EFB administrator inhibits the possibility to install new applications, once the EFB is in the defined software configuration. This should be achieved with a passcode.

## **5.7 Flight Crew Training**

Areas of emphasis during initial EFB training concerning the iCharts application:

- The intended use of the software application together with limitations and prohibitions on its use;
- Proper verification of the applicability of the information (charts, text) being used and documents update process;

- If applicable, restriction to the use of the document browser;
- Proper use of the electronic charts versus paper charts, including:
  - Structure and hierarchy of the “Route Documents” menu,
  - HMI particularities, e.g. edit plates function and favourites function;
- Failure of the applications;
- Restrictions on the use of the device (non-EFB applications and configuration management);
- Device battery management and autonomy.

These topics should be part of a larger training program covering as well the hardware aspects, like the use of the EFB hardware and the need for proper adjustment of lighting when the system is used in-flight, hardware environmental limitations, etc.

## **5.8 Operational Evaluation Test**

Before the granting of an Operational Approval, the operator should ensure, and the NAA should verify by means of an Operational Evaluation Test, that the guidance and recommendations of AMC 20-25 and those contained in this OEB Report have been satisfied.

### **5.8.1 Initial Retention of Paper Back Up**

Where paper is initially retained as back-up for the purpose of validating the paperless-solution provided by this iCharts, the Operational Evaluation Test will consist of an in-service proving period typically performed via an operationally-appropriate number of test and evaluation flights. The purpose of the in-service proving period is for the operator to demonstrate to the NAA 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) / CAT.GEN.MPA.180). In particular that:

- The operator’s flight crew are able to operate the EFB applications without reference to paper;
- The operator’s administration procedures are in place and function correctly;
- The operator is capable of providing timely updates to the applications on the EFB where a database is involved;
- The introduction of the EFB without paper back up does not adversely affect the operator’s operating procedures and that alternative procedures for use when the EFB system is not available provide an acceptable equivalent;
- The six month period dedicated to this check should take the frequency of the flights into account.

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 then be granted an Operational Approval of the EFB to allow removal of the paper back up by their NAA if they have shown that the EFB system is sufficiently robust.

### **5.8.2 Commencement of Operations Without Paper Back Up**

Where an operator seeks credit to start operations without paper back up, in addition to the above, the Operational Evaluation Test should also consider the following elements:

- A detailed review of the EFB Risk Assessment – see Appendix A;
- Credit from experience accrued from actual flight experience with paper back-up;
- A simulator LOFT session to verify the use of the EFB under operational conditions including normal, abnormal and emergency conditions. Items such as a late runway change and diversion to an alternate should be included;
- Observation by the NAA of the initial line flights.

The operator should demonstrate to the NAA that they will be able to continue to maintain the EFB to the required standard through the actions of the Administrator and the Compliance Monitoring programme.

## **6 CONCLUSION OF THE EFB SOFTWARE EVALUATION**

This OEB EFB Software Evaluation Report is applicable to both operators and NAAs when considering an application for Operational Approval with use of the Navtech iCharts application. The OEB has found that the iCharts software as evaluated satisfy the guidance of JAA TGL 36 and AMC 20-25, as exposed in this report.

However, the evaluation of the hardware and its compliance with regulations remains a responsibility of the operators and their competent authority. The findings of this report do not constitute an Operational Approval and individual operators must obtain approval from their NAA prior to use of these applications.

## **7 ALTERNATE MEANS OF COMPLIANCE**

Alternate means of compliance to the recommendations contained in this Report may be approved by National Authorities. If alternate means of compliance are proposed, operators may be required to establish that any proposed alternate means provides an equivalent level of safety to the recommendations of JAA TGL-36, AMC 20-25 and this OEB Report. Analysis, demonstrations, proof of concept testing, differences documentation, or other evidence may be required.

## 8 LIST OF REQUIRED DOCUMENTS

Operators will need to develop, or have available, the following documents to support their application for Operational Approval:

- Aeroplane Flight Manual if modified (e.g. in case of mounting device or installed resources);
- Flight Crew Operations Manual;
- Flight Crew Training Manual;
- MEL;
- EFB Policy and Procedures Manual;
- Training syllabus and courseware for:
  - Flight Crew;
  - EFB Administrator and ground support personnel;
  - Maintenance.
- Software:
  - Data revision process;
  - Configuration Control process;
  - Compliance monitoring processes.
- Relevant Maintenance documents for EFB, e.g. :
  - Aircraft Maintenance Manual (Chapter 46);
  - Fault Reporting Manual;
  - Fault Isolation Manual;
  - Illustrated Parts Catalogue.
- Maintenance Procedures.

## 9 APPENDICES

The following Appendices are attached:

**Appendix A Risk Assessment**

**Appendix B Compliance Matrix**

**Appendix C Navtech iCharts Operational Evaluation Report**

**Appendix D Evaluation Report**

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## **APPENDIX A: RISK ASSESSMENT**

Separate documents (EFB Hardware; Document viewer; Terminal charts viewer) available on request to EASA or Navtech.

**APPENDIX B: COMPLIANCE MATRIX**

Separate document available on request to EASA or Navtech.

**APPENDIX C: NAVTECH ICHARTS OPERATIONAL EVALUATION REPORT**

Separate document available on request to EASA or Navtech.

## **APPENDIX D: EVOKE EVALUATION REPORT**

This report is independent from the iCharts evaluation and presents some security aspects and recommendations linked to the iPad hardware and iOS. It is available on request to EASA.