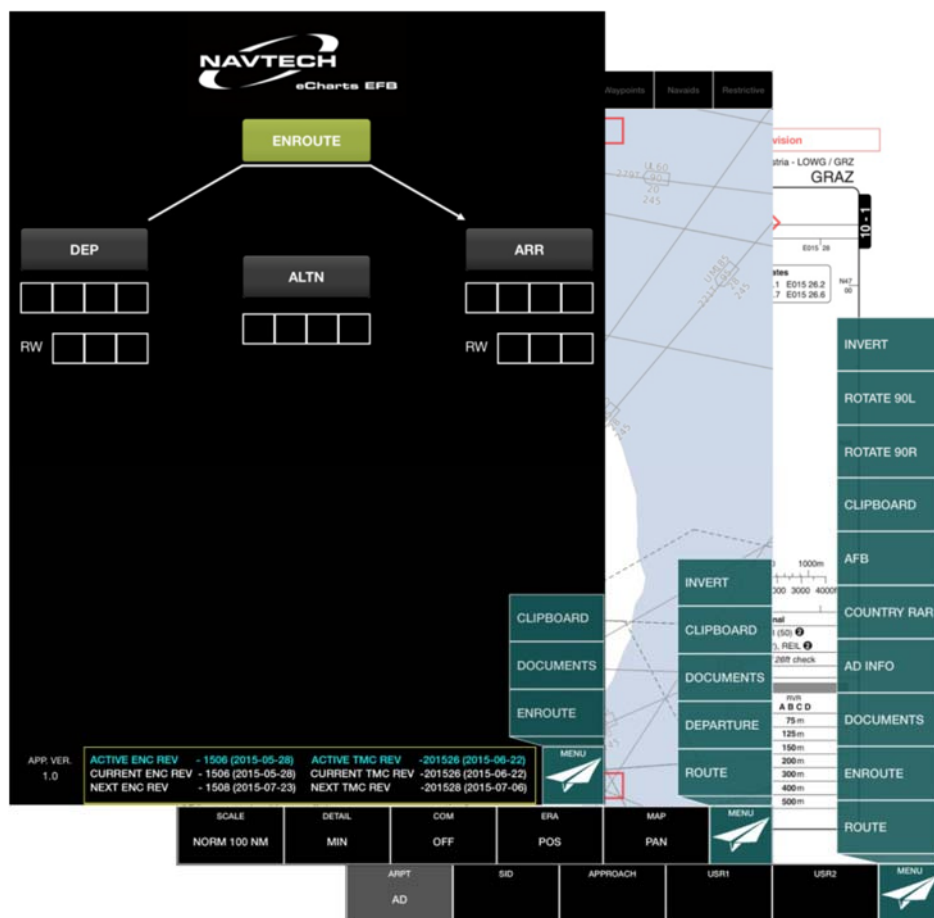


# EUROPEAN AVIATION SAFETY AGENCY

## ELECTRONIC FLIGHT BAG (EFB) SOFTWARE EVALUATION REPORT



### NAVTECH

### Navtech eCharts (Version 15.1)

02 Feb. 2016

REVISION RECORD

| REVISION NO: | DATED        | SUMMARY        |
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Dated: 02 Feb. 2016

## 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 EASA on 4 August 2014 for the operational evaluation of the eCharts EFB application (iOS).

The OEB evaluation found that the Navtech eCharts EFB for iOS application satisfy the guidelines of 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.

Requirements contained in Commission Regulation (EU) N° 965/2012 of 5 October 2012 (Air Operations Rules) have been considered together with guidance material in AMC 20-25 (Airworthiness and Operational considerations for Electronic Flight Bags).

This report does not substitute for, or prevail over, any of the terms of the Navtech applications End User License Agreements (EULA) or other hardware and software Product Agreements. The operators must read the EULA or other applicable software Product Agreements and take the responsibility to accept the different agreements prior to using the applications.

EASA sees no technical objections to the grant by the National Authorities of an operational approval for the use of Navtech eCharts 15.1 software application taking the recommendations proposed in this report into account.



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Date:

04 - Feb - 2016



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Date:

05 Feb. 2016

# 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 eCharts EFB for iOS application under 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 eCharts EFB for iOS (Version 15.1), as well as subsequent versions added via addendum, or not requiring one under the conditions mentioned in 1.2.1 below.

Findings of compliance and recommendations contained in this report are consistent with the guidance specified in 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 15.1) 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 chapter 5.6.1.

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

The requirements of Commission Regulation (EU) No 965/2012 and of AMC 20-25 have been considered during this evaluation.

The structure of this report (chapters 4 and 5) has been adapted to follow the structure of the AMC 20-25.

## 2 GENERAL DESCRIPTION OF THE SOFTWARE

Navtech eCharts EFB for iOS is a chart and document viewing application for iOS devices. It is comprised of the Route screen, the Terminal Chart screens, the Enroute screen, Clipboard and the Document Viewer.

The following chapters describe each of the screens.

The primary functions of eCharts EFB for iOS application are accessed by the menu button located at the bottom right of the screen.

The menu can include:

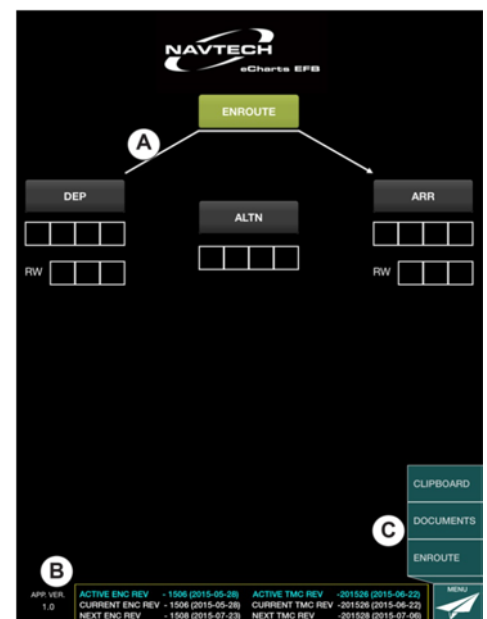
- Clipboard: Clipboard workspace
- Documents: Document Viewer workspace
- Route: Home (Main) screen
- Departure, Arrival, Alternate: airport terminal charts workspace
- Enroute: Enroute map workspace

In addition, a quick navigation toolbar located in the lower-left corner of the screen allows an easy access to specific aerodrome documents from any terminal chart screen.

#### **Route screen (main screen):**

The route screen is the first screen seen when opening the application. It reflects a typical workflow, where the crew can specify departure, arrival, and alternate airports, enabling quick access to the corresponding charts.

In addition, this screen allows to check the revision and version information.





Terminal Chart Screen: This is the function for viewing Navtech Terminal Charts manuals. Terminal chart screens display charts and supporting information for the specific aerodrome entered on the Route screen. Charts screens feature a chart viewer, a tile ribbon with five tiles where charts can be assigned for quick access, and the menu button. Grey tiles indicate the chart category and title of the chart currently displayed in the terminal chart screen.

Enroute: The Enroute map provides information for enroute navigation. A layer tool bar at the top of the map allows to control map details by turning layers on and off. The enroute map also allows quick access to the terminal chart screen for airports which are in the subscription.

Document Viewer: Navtech eCharts EFB for iOS also allows EFB 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 eCharts EFB. eCharts EFB acts as a basic document viewer in this mode, allowing the operator to navigate multiple documents.

Clipboard: The Navtech eCharts EFB for iOS clipboard provides another way to organize a subset of charts for quick access, in addition to the DEP (departure), ARR (arrival), and ALTN (alternate) chart screens.

### **3 SOFTWARE CLASSIFICATION**

#### **3.1 Classification**

Navtech eCharts EFB for iOS is classified as a Type B application, following 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 includes:

- 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**

The Risk Assessment process of AMC 20-25 corresponds to the former Operational Risk Analysis from TGL-36.

Elements of the Risk Assessment required by AMC 20-25 §7.2 were elaborated by Navtech and are provided in two separate documents, covering hardware and software considerations. References of these documents are included in chapter 8.

The Risk Assessment documents should be considered while establishing the EFB policy and procedures within the operator organisation.

They should be reused to produce a Risk Assessment tailored to the specific operator's operations, as required by AMC 20-25 §7.2.

### **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 Navtech documents.

#### **5.3.1 *Legibility of Text***

eCharts provides a Brightness control that adjusts the general device brightness (i.e. coupled with the iOS slider).

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, eCharts satisfies the guidance provided by 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 terminal charts. The display of enroute charts is on the other hand dependent upon the device specifications. It is recommended to follow the hardware requirements and evaluate if the enroute charts functions responsiveness is satisfactory before use in operations.

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. 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:

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 chartclip. The document viewer does not have a search feature. Mitigation strategies (e.g. bookmarks, hyperlinks) may have to be envisaged depending on the documents to avoid time consuming manual searches.

## **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 terminal charts clearly specify their applicability date. The operators should nevertheless 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 documents (see [chapter 8](#)).

## **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 eCharts application.

## **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 (NCDIS) to allow handling of the eCharts EFB for iOS 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 8.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 eCharts.

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

The iOS system provides defaults 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 eCharts 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 "Documents" menu,
  - HMI particularities, quick access menu, terminal chart menu functions, chartclip;
  - Enroute chart decluttering and use of layers toggle buttons (3-states color scheme);
  - Gestures in the enroute chart screen (e.g. double tap);

- Use of the enroute charts viewer in case of Flight Management System failure or in complex operational environments, as well as mitigations procedures in case of application failure;
- Activation and monitoring of the enroute auto-centering (POS) function (without ownship symbol). Conditions leading to automatic deactivation of the function;
  - The enroute moving map function should not be used to check, control, or deduce the aircraft position or trajectory;
- 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 eCharts EFB, 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 OPS 1.135(b) and 1.1040(m) / AMC1 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 Navtech documents and [chapter 5.1](#);
- 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.

### **5.9 Final operational report**

Operators 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. Refer to AMC 20-25 7.15 and Appendix I.

## **6 APPLICATION OF EFB EVALUATION REPORT**

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 eCharts application. The OEB has found that the eCharts EFB for iOS software as evaluated satisfy the corresponding guidance of AMC 20-25, as exposed in this report.

However, the EFB Risk Assessment, the crew and administrator procedures and evaluation of the hardware and its compliance with regulations remain 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.

A Compliance Matrix lists items of the AMC 20-25 that are considered to remain under operator's responsibility. It is available on request to Navtech.

## **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 NAVTECH COMPLIANCE DOSSIER**

The evaluation of the eCharts 15.1 was supported by Compliance documents provided by Navtech and reviewed by EASA.

The following documents are part of the dossier:

Compliance Statement – Version 1.0 - August 23<sup>rd</sup> 2015

EFB Hardware ORA – eCHART EFB-ORA-2 – Version 2.0 – August 23<sup>rd</sup> 2015

Operational Evaluation – eCHART EFB-1 – Version 6 – August 23<sup>rd</sup> 2015

Charts, Enroute, and Doc. Viewer ORA – eCHART EFB-ORA-1 - Version 2.0 – August 23<sup>rd</sup> 2015

Installation Instructions – Version 1.1 – August 2015

User Manual – Version 1.4 – August 2015

## **9 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.