

EUROPEAN AVIATION SAFETY AGENCY

ELECTRONIC FLIGHT BAG (EFB) EVALUATION REPORT



Lufthansa Systems GmbH & Co. KG

Lido/mPilot for iOS – V1.2.0

29 Aug. 2016

REVISION RECORD

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Date: 29 Aug. 2016

ACRONYMS AND ABBREVIATIONS

AMC	Acceptable Means of Compliance
AMMD	Airport Moving Map Display
CBT	Computer Based Training
CDL	Configuration Deviation List
EASA	European Aviation Safety Agency
EFB	Electronic Flight Bag
EMI	Electromagnetic Interference
FAA	United States Federal Aviation Administration
FCOM	Flight Crew Operating Manual
FSTD	Flight Simulation Training Device
HMI	Human Machine Interface
LIFUS	Line Flying Under Supervision
MFD	Multi-function Display
MMEL	Master Minimum Equipment List
NAA	National Aviation Authority
OEB	Operational Evaluation Board (EASA term)
TGL	Temporary Guidance Leaflet

EXECUTIVE SUMMARY

The evaluation found that Lido/mPilot 1.2.0 satisfies the guidelines of AMC 20-25.

This current evaluation has been performed using the following methods:

- Desktop review of the software specifications;
- Review of the results from the software evaluations performed by Lufthansa Systems GmbH & Co. KG;
- Review of compliance documents;
- Limited functional tests on the application.

A preliminary letter covering the use of the application in version 1.0.8 was already released by EASA on 19/03/2015. A preparatory EASA evaluation also took place on the Lido/iRM, Lido/Enroute and Lido/DocView applications.

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).

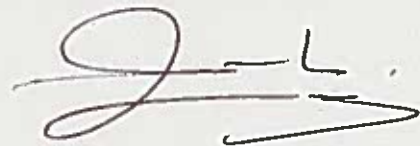
This report does not substitute for, or prevail over, any of the terms of the application End User License Agreements (EULA) or other hardware and software Product Agreements. The operators must read the EULA and take the responsibility to accept the different agreements prior to using the applications.

EASA sees no technical objections to the grant by the National Authorities of an operational approval for the use of Lido/mPilot 1.2.0 taking the recommendations proposed in this report into account.



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Date: 29-08-2016



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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 Lido/mPilot 1.2.0 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 Lido/mPilot version 1.2.0, as well as subsequent versions added via addendum or not requiring a further evaluation by EASA (see chapter 1.2.1 below).

Findings of compliance and recommendations of approval contained in this report are consistent with the guidance specified in AMC 20-25.

This Report assumes that the parts not covered by this report regarding the evaluation of the compliance of the software will be performed by the operator 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.

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

1.2.1 Changes

Updates to the evaluated software 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. Changes considering minor or below according to Lufthansa Systems GmbH & Co. KG's number scheme (increment of the version number's second or third digits) fall in this category. They do not require additional training.

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 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

Lido/mPilot 1.2.0 is an aeronautical chart application, running on iOS.

It includes the following modules:

2.1 Terminal Module

The Lido/mPilot Terminal Module contains digitally pre-composed Lido navigation charts and chart NOTAMs of specific airports according to the operator's network. The content and content structure of the digitally pre-composed Lido navigation chart is a direct reflection of the paper equivalent. The user can search for airports by IATA code, ICAO code or city name. A virtual clipboard for each airport allows the user to view and manage the required charts for the flight. User can rotate and zoom in and out on the airport charts using the iPad's typical multi-touch gestures, as well as adding annotation text and highlighting items on the charts. The display can be dimmed for night usage.

A textual ATC flight plan can be loaded from any other iPad application using the systems pasteboard. Simply copy the full ICAO flight plan text and paste it into the Route Entry box to automatically define the route.

2.2 Enroute Module

The Lido/mPilot Enroute Module is a dynamically generated map which contains Enroute information. User can select the layers of his interest. Depending on the chosen zoom level, information is presented either in detail or automatically de-cluttered. Further information on single map elements can be opened with one tap on the map. Selected elements like NAV Aids or COM Frequency areas are highlighted on the map.

2.3 Document Module

Lido/mPilot Document Module displays operator supplied document content distributed through the Document Viewer Management Systems (DVMS).

The web based DVMS application provides a platform for the operator's EFB administrator to manage the distribution of their in-house documentation to their pilot groups. Additionally, with the purchase of CBT Reporting, DVMS is capable of distributing Lufthansa Systems' computer based training (CBT). The completion status and quiz score for each CBT is recorded for EFB administrator to review.

3 SOFTWARE CLASSIFICATION

3.1 Classification

The application proposed is classified as type B. In order for the Enroute application to retain this classification, the ownship position function shall not be activated.

3.2 Non-EFB Applications

The iOS operating systems provide defaults 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 [paragraph 4.7.4](#)) and include them in the EFB configuration management.

It is reminded that third party applications enabling a display of own-ship position or flight parameters are considered to be normal avionics functions (as provided by AMC 20-25), if the present position function is not inhibited and locked by the administrator.

4 HARDWARE OPERATIONAL EVALUATION

The hardware operational evaluation is not covered by this evaluation and remains 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

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 during this evaluation and are provided in [Lido's compliance dossier](#) detailed in [chapter 8](#).

These elements can be reused by operators to produce a Risk Assessment tailored to their operations, as required by AMC 20-25 §7.2.

5.2 Changes to the EFB system

As stated in AMC 20-25, the modifications to the EFB applications that do not bring changes to the calculation algorithms or HMI, or introduce new functionalities, do not require an approval from the competent authority. See [chapter 5.10](#).

5.3 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.

Lido provides generic dispatch considerations in the EFB risk assessment that should be considered by operators. The considerations address various possible mitigation means and can be customized to the operator's specific operations (e.g. possibility to use paper back-up or availability of alternative EFB platforms). The sections that need to be customized are highlighted in red in Lido's document.

5.4 Human Factors and HMI Assessment

The following elements are based on a limited EASA evaluation and on supporting material provided by Lido during the evaluation. More details can be found in Lido's HMI Assessment contained in the compliance dossier (see chapter 8).

These elements have led to the content of the chapters below, including recommendations for the flight crew training. In addition, several HMI points raised during the evaluation were discussed with Lido, and upon agreement several modifications were brought to the applications.

The HMI is deemed satisfactory and compliant with AMC 20-25 appendix D, provided the training recommendations are implemented.

The results of this evaluation may be reused by operators. It is reminded however that operators should carry out a complementary HMI assessment of the integration of the EFB in the flight deck environment (see AMC 20-25 §7.5).

5.4.1 Human Machine Interface

An EASA evaluation of the application was performed on a standard iPad with the application. In general, the HMI was found consistent and intuitive. Several modifications were discussed and implemented by Lido or are planned for implementation in future versions.

5.4.2 Legibility of Text

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 by the operator. It depends in particular on the characteristics of the screen used to display the applications.

5.4.3 Input Devices

The assessment of the input device (touch screen) was out of scope of this evaluation. However, the behaviour of the touch screen during limited ground trials was satisfactory (see also chapter 4.2.7.).

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

5.4.4 User Interfaces Consistencies

Consistency between EFB applications:

Lido/mPilot is a standalone and unique application. The consistency between different applications should be assessed by operators depending on their own EFB solution.

Consistency with flight deck applications:

Operators and their competent authorities should evaluate on a case by case basis if applicable.

5.4.5 *Messages and Use of Colours*

Use of colour:

In general, Lido/mPilot satisfies the guidance provided by the AMC 20-25. The use of red is limited and is not deemed to be confusing.

Messages:

Various information and failure-related messages are implemented in the applications. Although Lido/mPilot complies independently, there is no way to ensure at the application level that interactions (visual and auditory) coming from other (non-EFB) applications, or from the OS, 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. Updates to the operating system (iOS) may also require a re-assessment of potentially unwanted messages or pop-ups over EFB applications.

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

5.4.6 *System Error Messages*

Lido/mPilot is deemed compliant. The errors trigger appropriate notifications (e.g. loss of data connectivity) and system status messages, which are documented in the User Guide.

Non-EFB applications should be assessed in order to avoid the triggering of undue error messages.

The stability of the application has been good during the evaluation. In case “crashes” of the EFB applications occur, it is recommended that there is a process for the crew to report this to the EFB administrator.

5.4.7 *Data Entry Screening and Error Messages*

The application is deemed compliant.

5.4.8 *Error and Failure Modes*

5.4.8.1 *Flight Crew Error*

The applications have been designed to be consistent with common flight deck systems, through the use of the colour coding and entry formats.

5.4.8.2 *Identifying Failure Modes*

Application failure identification is ensured by the use of error messages (see 5.4.6 & 5.4.7).

5.4.9 *Responsiveness of Applications*

During the limited hands-on trial by EASA the responsiveness of the applications was satisfactory. It is however dependent on the hardware used by the operator and on the configuration and number of applications simultaneously running on the EFB. Ensuring that the responsiveness is acceptable therefore remains under EFB administrator responsibility.

A “system busy” indicator is implemented.

5.4.10 *Off-Screen Text and Content*

If a document is not visible in its entirety in the available display area, such as during “zoom” or “pan” operations, the existence of off-screen content is identified by scroll bars when the device touch screen is in use. The responsiveness of the touch screen allows for easy zooming and panning in the documents.

5.4.11 *Active Regions*

The application uses the standards widgets and shapes and standard iOS interaction means; there is no ambiguity concerning the active regions.

5.4.12 *Managing Multiple Open Applications and Documents*

The application does not allow to open multiple documents at the same time. The toggling between applications is achieved through the flight folder menu which is accessible at all times.

5.4.13 *Flight Crew Workload*

The crew workload evaluation can be considered partially 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 (including possible use of a viewable stowage device), to insure there is no unacceptable increase of flight crew workload or adverse safety implications.

This evaluation should be performed taking into account the specific operators SOPs, in an operationally representative context, and using adequate Human Factors methodology.

5.5 *Flight Crew Operating Procedures*

5.5.1 *Procedures for using EFB systems with other flight crew compartment 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.

5.5.2 *Flight crew awareness of EFB Software / Databases Revisions*

Flight Crew must be made aware of the applicable revision status. This can be achieved through the verification in the information available on the status page.

It is recommended that the crew is trained to ensure before flight that the necessary documents and charts are properly loaded in the application.

5.5.3 Procedures to mitigate and/or control workload

The flight crew procedures are out of scope of this evaluation and remain under the operator's responsibility.

5.6 Compliance Monitoring

The operators' compliance monitoring programme (required by Part-OPS, ORO.GEN.200) should include procedures related to the EFB system.

These procedures should ensure that the EFB operations and administration are conducted in accordance with all applicable requirements, standards and operational procedures.

5.7 EFB System Security

The operator's EFB Administration procedures must be capable of ensuring an appropriate level of EFB security as described in the AMC 20-25.

The operator should use technologies and/or procedures to assure that unauthorized content cannot enter the EFB system. These evaluations may take credit of the protections which are already built-in in the application. Refer to §4.2.1.3 of Lido's HMI Assessment and Operational Risk Assessment document.

The operator may also for this purpose implement a detection of jailbroken devices, using a mobile device management system.

5.8 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.

Administration procedures for the configuration of the EFB system, its updating, operational feedback, quality assurance functions 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 at 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.

The administration workflows are to be defined by the operator. The administrator should in particular be responsible to set up the application properly and in accordance with the regulation (position function deactivated), and ensure that revision data are dispatched correctly.

The administrator should test the correct synchronization and display of the documents in the application. He should ensure that documents are produced in a way to facilitate the navigation in the iPad application. This includes for instance, ensuring that the documents feature Table of Contents useable in the application (through the dedicated icon in the viewer), to jump easily from one chapter to another.

5.8.1 *EFB Policy and Procedures Manual*

The EFB policy and procedures manual is under operator's responsibility. Refer to AMC 20-25 7.11.1.

5.8.2 *System updates*

This evaluation is not applicable to a particular operating system.

In any case, the configuration management responsibilities are with the EFB administrator.

Any new OS version should imply a complementary evaluation to verify that it has no adverse effect on the EFB applications.

It is also recommended that operators implement administrator procedures to check with Lido that no compatibility issues exist between the operating system and the Lido/mPilot application.

5.8.3 *Non-EFB Software applications*

These applications are out of the scope of this evaluation, however their use is subject to the applicable operational rules and to chapter 6.2.2.3 of the AMC 20-25.

It is recommended that the EFB administrator inhibits the possibility to install new applications for non-administrator users.

5.9 *System Maintenance*

The EFB system maintenance is under operator's responsibility. AMC 20-25 7.12 applies.

The operator is in particular responsible for the maintenance of the batteries, and should ensure that they are periodically checked and replaced as required.

5.10 *Flight Crew Training*

Training for the use of the EFB should be for the purpose of operating the EFB itself and the Lido/mPilot application hosted on it and should assume basic competence in the functions addressed by the software applications installed. Where flight crew do not have the necessary experience, additional requirements may have to be applied by the NAA.

Training programmes for the EFB may take credit for previous EFB experience, in particular if using other Lido applications.

In addition to the training material from Lido and to the areas provided in AMC 20-25 chapters 7.13 and E.1.3.1, it is recommended that the initial training include the following areas of emphasis:

- All aspects linked to the use of the EFB hardware such as the need for proper adjustment of lighting etc. when the system is used in-flight;
- The intended use of each function of Lido/mPilot, together with limitations and prohibitions on their use;
- Use of the application during night operations and use of the independent brightness settings with respects to other EFB applications that might be installed;
- Use of the application in case of Flight Management System failure or in complex operational

environments, as well as mitigations procedures in case of application failure;

- Various entry formats, in particular for random fixes in the enroute function;
- If necessary, any known problem traced in Lido's release notes warranting crew attention.

5.11 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.

5.11.1 Initial Retention of Paper Back Up

Where paper is initially retained as back-up for the purpose of validating the paperless-solution provided by Lido, 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 AMC1 to 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;
- 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.

5.11.2 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 Lido document;
- 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, diversion to an alternate, and taxiing in low-visibility conditions 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 Quality Assurance Programme.

5.12 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 EFB Software Evaluation Report is applicable to both operators and NAAs when considering an application for Operational Approval with use of Lido/mPilot 1.2.0 for iOS. EASA has found that the software as evaluated satisfy the corresponding guidance of AMC 20-25.

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 is provided by Lido.

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 AMC 20-25 and this OEB Report. Analysis, demonstrations, proof of concept testing, differences documentation, or other evidence may be required.

8 COMPLIANCE DOSSIER

The evaluation of the Lido/mPilot 1.2.0 for iOS application was supported by Compliance documents provided by Lido and reviewed by EASA.

The following documents are part of the dossier:

Lido/mPilot Human Machine Interface Assessment and Operational Risk Assessment (Final version, dated 27th March 2015) - addresses HMI compliance, Risk Assessment, and also contains the compliance matrix to AMC 20-25.

Lido/mPilot User Guide