EUROPEAN AVIATION SAFETY AGENCY

SPECIAL OPS EVALUATION REPORT

Class 2 EFB
With Electronic Performance Calculation

Dated 29/08/2013

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TABLE OF CONTENTS

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EXECUTIVE SUMMARY

ATR has applied to EASA Flight Standards on May 3rd, 2010, for an operational suitability evaluation of a class 2 Electronic Flight Bag (EFB) with a performance calculation software named Single-point Performance Software (SPS).

The EFB hardware is a Esterline CMC Electronics' PilotView® CMA-1100. It can be installed in all ATR series.

The SPS allows computing takeoff and landing performance parameters. It is for now available for ATR 42-500/-600 and 72-500/-600 series. It was initially evaluated in version 1.1, and a complementary evaluation of version 2.1.0 was performed in 2013. The Weight & Balance module was not evaluated. ATR 42-500/-600 was not evaluated.

- The verification process and the results concerning the accuracy of the SPS versus the approved AFM for the ATR72-212A were deemed satisfactory.
- Some suggestions were made concerning the HMI of SPS and the integrity check of the performance database files. The modifications were agreed upon. Some of them (HMI modifications) have been taken into account in SPS version 1.2 (released in October 2011); the rest (integrity check) have been implemented in version 1.3.
- The SPS evaluation has been based on the CMA-1100 hardware. Should it be installed on another EFB by an operator, a complementary evaluation of the hardware differences should be performed by the National Authority.

A document viewer (e-DocView) is also installed on the EFB. Depending on the airline policy for loading the EFB with electronic manuals, it could allow for removal of the paper versions of the manuals. The Operational Risk Assessment was based on the assumption that the paper operational documentation (takeoff and landing performance charts, operation manuals) is removed from the cockpit, except the QRH, which shall always be kept in paper version in the aircraft.

The evaluation was based upon the following ATR documents:

- A comprehensive Master Policy.
- A comprehensive Operational Risk Assessment (ORA).
- A compliance matrix to the draft AMC 20-25 (2009 version) and to Operational Review Item (ORI) n°10.
- Training material (User and Administrator) for the EFB and the SPS.
- OPS documents amendements (FCOM, QRH, MMEL).
- Results and process of the SPS validation by comparison to the approved AFM.
- Results of the Graphical User Interface evaluation report.

EASA has found that the CMA-1100 Class 2 EFB with SPS for the ATR -500 and -600 series as evaluated satisfies the guidance of JAA TGL 36 and draft AMC 20-25, 2009 version (prior to publication of NPA 2012-02).

The EASA-OEB sees no technical objections to the grant by the National Authorities of an operational approval for the use of the ATR CMA 1100 Class 2 EFB, taking the recommendations proposed in this report into account.

Francois Fabre
Deputy Head of experts department - Flight:
Date: 12.09.2013

Jean Baril
Special OPS Evaluation Section Manager
Date:

1 EFB SYSTEM DESCRIPTION

The EFB hardware is a Esterline CMC Electronics' PilotView® CMA-1100. It can be installed in all ATR series. Two identical devices are installed on each side of the cockpit. The displays are fixed to a mounting device attached to the sidewall of the cockpit.

1.1 EFB Hardware Components and Interfaces

A CMC Electronics' PilotView® CMA-1100 EFB consists of two line replaceable units (LRUs):

- A self-contained Electronic Display Unit (EDU), P/N 245-604128-004;
- A remotely mounted Enhanced Expansion Module Unit (EEMU), P/N 245-604170-007.

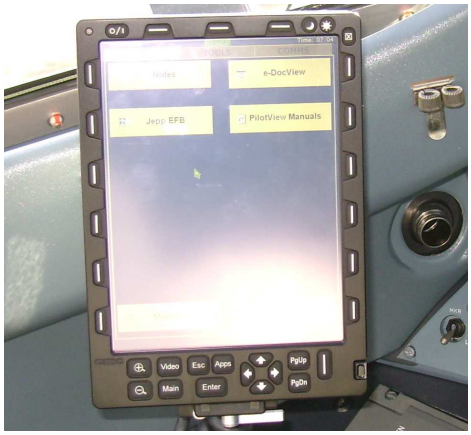
In addition, a mounting device secures the EFB when in use and allows for it to be stowed when not in use.

The following picture shows the installation with the keyboard deployed:

The following shows the installation with the keyboard stowed:

1.1.1 Electronic Display Unit (EDU)

The EDU consists of an 8.4" AMLCD XGA (1024x768) display with an internal processor running Microsoft Windows™ based applications. The display unit's capabilities are expanded with the addition of 2 x USB 2.0 ports and a PCMCIA interface.



The EDU has a fully dimmable display, a "film-on-glass" touch-sensitive screen, and backlit line select keys (LSKs) providing quick access to specific functions.

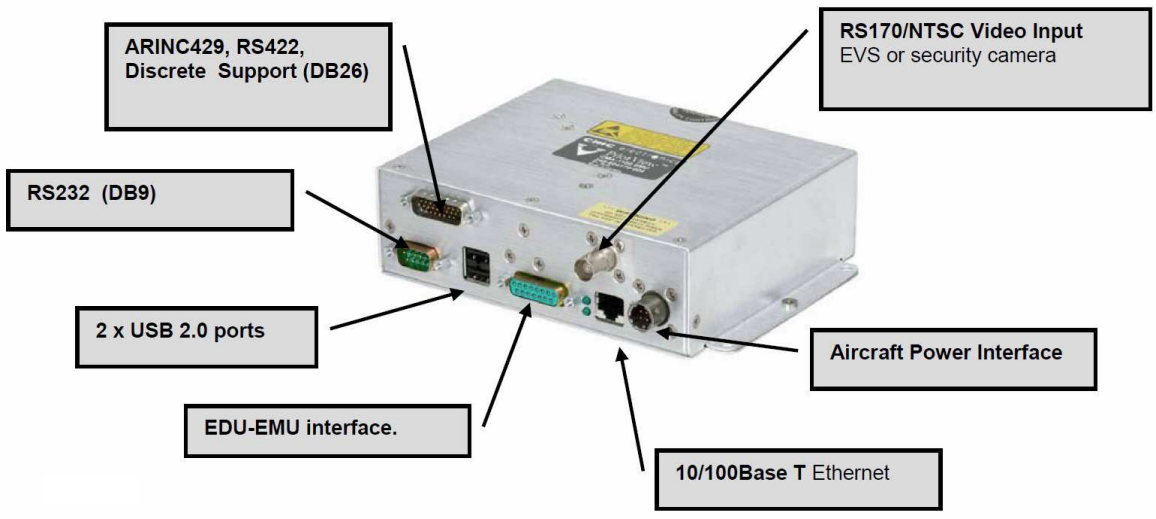
EDU technical specifications:

FEATURE	DETAILS
Size	8.5" H x 6.1" W x 1.5" D (216mm H x 155mm W x 40mm D)
Weight	Including batteries: 3.5 lbs (1.6kg) nominal, 4.0 lbs (1.8kg) maximum
Casing	Machined aircraft-grade aluminium alloy.
Battery	Lithium Ion rechargeable (2 battery packs inside unit).
Display	• Active Matrix Liquid Crystal Display (AMLCD); • "Film-on-glass" touch-sensitive screen; • Custom, Cold Cathode Fluorescent Lamp (CCFL) backlight; • 8.4"(214 mm) diagonal screen; • Resolution 1024 x 768 (XGA); • 262,144 colours; • Viewing angle: ➢ Vertical: +40°, -50° ➢ Horizontal: +60°, -60° The EDU display has very low reflectance and is readable in direct sunlight. An integrated ambient light sensor automatically adjusts brightness levels. The brightness level may also be adjusted using the controls in the upper-right corner of the EDU.
Memory	The EDU provides 512 Mbytes of Error Correcting Code (ECC) RAM in the standard configuration. ECC encoding protects the processing environment from electrical field interference, in particular at high altitudes. As an option, 1 Gb of ECC RAM can be installed on the EDU.
Storage	The EDU has two internal interfaces that accommodate solid-state Compact Flash cards providing up to a total storage capacity of 16 Gb that provides

	high performance and reliability particularly in high vibration environments.
Processor	The EDU is based on an Intel Centrino 1.1 GHz or, optionally, a 1.4 GHz processor with a 400 MHz system bus and Enhanced SpeedStep® power management. The chipset integrates an Intel® Graphics and Memory Controller HUB (GMCH) as well a 3D graphics engine that supports Intel's Extreme Graphics 2 suite of graphics drivers.
Power Supply	On the aeroplane during normal operation, the EFB is powered by the EEMU-EDU interface. Nominal power consumption is 45W with a peak of 75W maximum. Battery backup in the EDU provides 40 minutes or more of independent power in the event of aeroplane power failure. When used outside of the aeroplane in a portable manner, the EDU is powered by an optional 110-220 VAC (50-60Hz) Power Adapter that is similar to a laptop computer power supply.
EDU Communication Interfaces	The EDU communicates with aeroplane systems via the EEMU and the EDU-EEMU cable. The EDU also provides an integrated IEEE 802.11 a:b:g wireless LAN communications capability with dual antennas integrated in the EDU case. For additional i/o communications, the EDU incorporates a single channel PCMCIA/Card Bus interface on the motherboard through a TI PCI1510 Card Bus controller. Two USB 2.0 ports are available externally, one on each side, of the EDU to interface to external devices such as a USB memory stick or CD/DVD ROM.

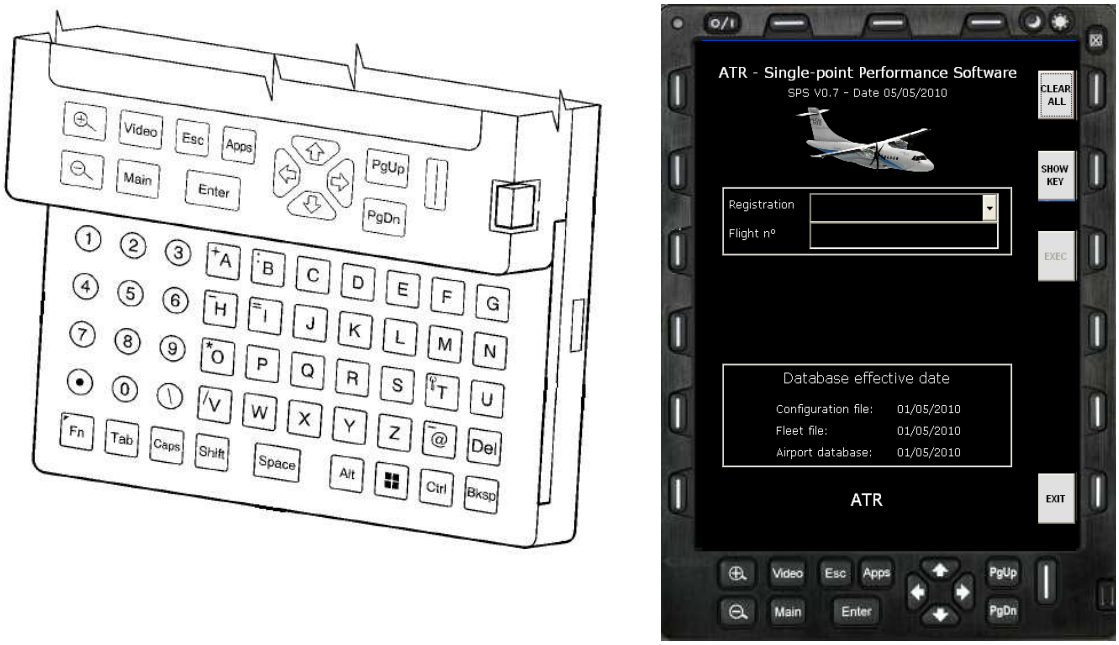
1.1.2 Enhanced Expansion Module Unit (EEMU)

The Enhanced Expansion Module Unit (EEMU) provides certified aircraft power to the EDU, protecting applications from aircraft power spurious and short term interruptions. The EEMU provides the following interfaces between aircraft systems and the EDU:

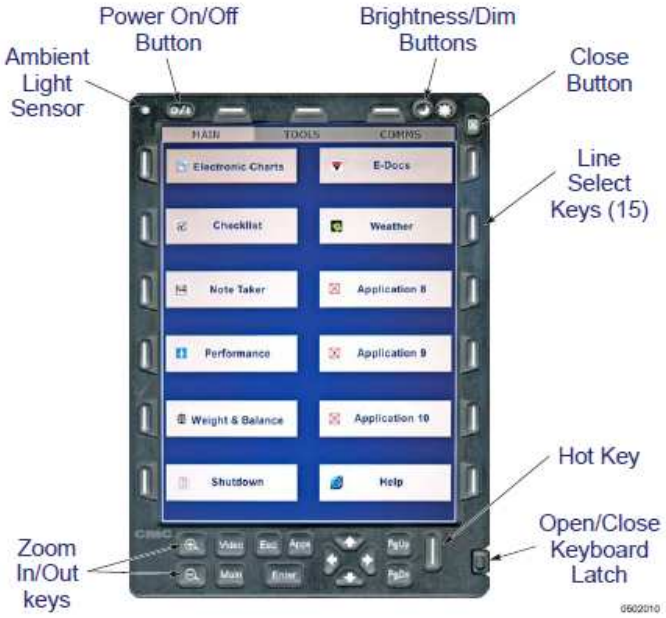


1.1.3 Crew Interface

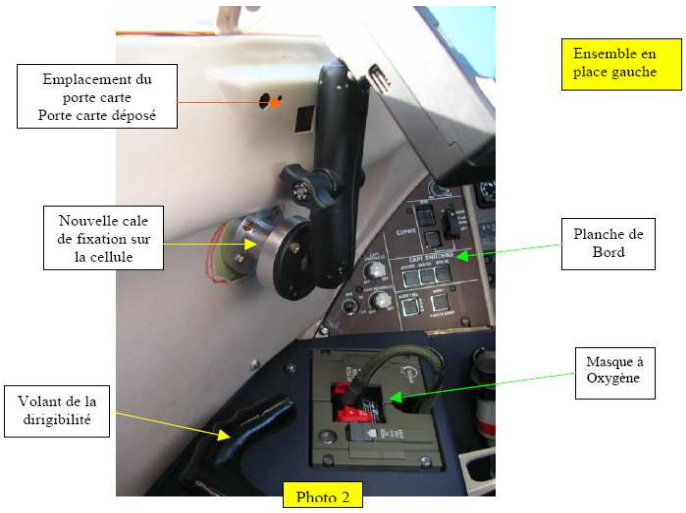
The EDU pilot interface is performed via the touch screen as well as by backlit bezel keys. Several bezel keys functions are pre-defined to facilitate user navigation across applications. In addition, the display portion of the EDU slides up to reveal an “FMS-style” alphanumeric keyboard with backlit keys.



Other controls are dispatched as follows:



1.1.4 Mounting Device



The mounting device consists of a Docking Mount with a latching device which holds the EDU to the mount and provides power and a high speed interface to the unit by means of the EDU-EEMU/EEMU interface cable.

The Docking Mount is attached to the aircraft by means of an adjustable arm fixed to the sidewall of the cockpit. The adjustable arm allows the device to be positioned within the pilot's view or to be stowed away when not in use.

Identical devices are installed on each side of the cockpit.

1.2 Operating System and installed software

1.2.1 Operating System

The CMC PilotView® CMA-1100 EFB Electronic Flight Bag contains an Operating System (OS) consisting of:

- Windows XP Professional at Service Pack 2;
- Master Menu.

1.2.2 Main page

After boot, the front page offers shortcuts to:

- Installed applications;
- EFB management including:
  - Windows access protection
  - EFB settings
- Note Taker;
- e-Docs
- Calculator;

1.2.2 Installed Applications

The following applications are provided by default by CMC:

- Adobe Reader (pdf viewer); not part of the evaluation
- Internet Explorer; not part of the evaluation
- Outlook Express; not part of the evaluation
- Wifi controller; not part of the evaluation
- Note taker; not part of the evaluation (non-critical application), developed by CMC
- e-DocView, developed by CMC

The SPS (Single point performance software), developed by ATR, is then installed by the operator.

2 SOFTWARE APPLICATIONS EVALUATED

The following applications have been evaluated for use on this specific EFB.

2.1 Type A applications

No Type A applications was evaluated.

2.2 Type B applications

The type B applications assessed during this evaluation are described in the following chapters.

2.2.1 e-DocView

The operational documentation display is provided by e-DocView. This application, developed by CMC, is an interface between the user and the operational documentation. It allows easy consultation of documents.
e-DocView interface is inspired from the standard MCDU interface.

This software is coupled with documentation management software called x-ViewManager and also developed by CMC. x-ViewManager guides the airline in fitting the architecture of the documentation to be displayed on board and allows generating documentation update to be loaded onboard.
The displayed documentation by e-DocView has therefore the architecture as defined by the company. Each airline shall define her own on-board documentation (could be ATR documentation and/or airlines' own documentation) as requested by their operational practices and policy.

x-ViewManager application is included in the ATR EFB package. It is delivered to the airline after a training performed by CMC before (or soon after) EFB delivery. This ground tool is then installed by the airline itself on ground stations (administrator stations).

2.2.2 SPS

The SPS is an aircraft performance application that allows computing takeoff and landing performance parameters. It is available for ATR 42-500/-600 and 72-500/-600 series. It was initially evaluated in version 1.1, and further in version 2.1.0. The Weight & Balance module was not evaluated.

In addition to the CMA-1100, the SPS can be hosted on others Class 1, Class 2 Electronic Flight Bag as well as on ground PCs (dispatch, briefing stations etc.) running Windows XP, Vista or Seven.

SPS falls down in 2 main parts:
- SPS user part : installed on the EFB and used by flight crews for performance calculations,
- SPS administrator part: hosted in the Flight Operations Software (FOS), PC based. Allows administrating airline data (configuration, fleet, airport databases) and generating update package, containing database(s) to be updated associated with effective date, to be uploaded in SPS User part.

2.3 Type C Applications

No Type C applications were evaluated.

2.3 Non-EFB Applications

Certain applications listed in §1.2.2 (Adobe Reader, Internet Explorer, Outlook Express) are not essential to the operation of the EFB and can be regarded as non-EFB software applications as per draft AMC 20-25. The operator administrator (see §3.9) should ensure that these applications do not adversely impact operation of the EFB or inhibit them.

3 OPERATIONAL EVALUATION

3.1 Hardware Evaluation

3.1.1 Airworthiness Approval

A class 2 EFB requires an airworthiness approval limited in scope to the mounting device, crashworthiness, data connectivity, and power supply.

These elements are covered by the EASA major mod approval N°5785.

3.1.2 Operational Hardware Evaluation

As required per TGL-36 and AMC 20-25 draft, in addition to the airworthiness items, the EMI, battery safety, and rapid depressurization aspects needed to be assessed.

EMI aspects:

The Class 2 EFB System is intended to be powered during take-off and landing. This requires the System to meet the requirements of ED-14()/DO-160() Section 21, Emission of Radio Frequency Energy as described in TGL 36 paragraph 6.1.1(a).

The EMI compliance was established during the approval of the major mod N°5785.

Lithium battery compliance testing:

Each CMC CMA-1100 device is powered by a lithium battery that has been demonstrated to meet the Underwriters Laboratory Inc (UL) Standard for Safety for Lithium Batteries reference UL 1642. This ensures that:

- Safe cell temperatures and pressures are maintained during any foreseeable charging or discharging condition and during any failure of the charging or battery monitoring system. The lithium battery installation precludes explosion in the event of those failures.
- The design of the lithium batteries precludes the occurrence of self-sustaining, uncontrolled increases in temperature or pressure.
- No explosive or toxic gases emitted by the lithium battery in normal operation, or as the result of any failure of the battery charging system or monitoring system, can accumulate in hazardous quantities within the aeroplane.
- No corrosive fluids or gases that may escape from the lithium battery will damage the surrounding structure or any adjacent systems, equipment, or electrical wiring of the aeroplane.

- Each lithium battery has 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.

The CMC CMA-1100 device has the capability to control the charging rate of the battery automatically, so as to prevent battery overheating or overcharging.

The lithium battery compliance was established during the approval of the major mod N°5785.

Rapid depressurization testing:

The EFB (EDU and EEMU) has been tested as per RTCA DO160-D Change No. 3 qualification tests; testing consisted of:

- Operation up to 15,000 ft;
- Overpressure to -15,000 ft;
- Decompression to 55,000 ft

No abnormal operation was observed.

The testing and compliance are traced in the Esterline DDP (Doc. N° 4030-1518), dated 12/11/08.

Note: *The EFB is fitted with solid state data storage devices*.

3.2 Operational Risk Analysis (ORA)

The ORA process was conducted as per AMC 20-25 (2009 version) in order to provide elements for operators to reuse in their own and more complete EFB Risk Assessment.

The ORA demonstrated that the ATR Class 2 EFB system achieves at least the same level of integrity as the "traditional" means that it replaces.

The analysis has been conducted for e-DocView and SPS. The Note taker application has not been taken into account since it is considered as a non-EFB application.

Throughout the ORA, the paper operational documentation (operations manual, MEL, etc.) and takeoff and landing performance data (charts, tables) are assumed to be removed from the cockpit. However navigation charts and the QRH are kept on paper format.

The ORA has been divided in three parts:
- The first one relates to hardware failure and mitigation means, general and per application.
- The second part relates to the SPS software failures
- The third part relates to the e-DocView software failures

Each time, the before departure and in-flight situations were detailed.

When necessary, the ORA references the procedures from the FCOM or the DDG chapter 46.

3.3 Dispatch Considerations

Assessment of the dispatch considerations has been carried out and led to the drafting of the Dispatch Deviation Guide (DDG) chapter 46.25-1, attached to the MMEL.

The DDG provides the procedures for dispatch under the MMEL:

- Inoperative EFB
- Inoperative mounting device
- Inoperative power connection

3.4 HMI EVALUATION

3.4.1 EFB HMI Evaluation

During the certification process, ground and flight tests have been performed by the ATR design office and flight test pilots.

The tests and their results are addressed in the document DO-TY-3220-08 (ATR EFB ground tests and flight tests report).

The final design of the EFB integration is deemed satisfactory by ATR and EASA.

The EFB general HMI (main menu) is deemed satisfactory but EASA recommends that the NAAs check that the latest CMC image is installed on the EFB, with when possible inhibition or protection of the access to non-EFB applications (e.g. Internet Explorer) and password-protection of the EFB settings.

3.4.2 SPS HMI Evaluation

SPS HMI has been designed to fit the CMC Pilotview® interface, with a cockpit “look and feel”.

The application background is black, and the font colors follow the ATR -600 FMS colour code. The SPS function keys correspond to the CMA-1100 LSKs.

SPS fields’ dimensions were defined to allow using the SPS application with the touchscreen.

SPS virtual keyboard has been developed to be consistent with the EFB physical keyboard (numbers on the left, letters on the right, alphabetical order).

ATR TRI (Type Rating Instructors) pilots were involved in the interface design. SPS was then tested on ground and in-flight by ATR Flight test pilots (May 2009), addressing in particular the use of the application via the touchscreen.

A panel of airlines was selected at that time to evaluate the SPS interface. 6 airlines agreed to take part of the evaluation.

From those evaluations, 100 evolution requests were logged and treated. Some major changes were agreed that led to the current SPS interface. All evaluation results are available in the ATR document “Eval_SPS_updated_EN_1.0.xls”.

In addition to reviewing this HMI assessment, the EASA team performed a SPS hands-on evaluation on version 1.1 and provided a number of comments and recommendations for HMI improvement.

These comments and recommendations were taken into account by ATR and were implemented from version 1.2, which was released in October 2011.

A complementary evaluation of version 2.1.0 has taken place in 2013.

The SPS HMI is deemed satisfactory by EASA. The Weight&Balance module was not evaluated.

3.4.3 Hardware-Software Compatibility

The HMI of the EFB and of its applications are optimized for the CMA-110 hardware, for instance by taking profit of the Line Select Keys around the screen.

Should an NAA evaluate the use of the SPS on another EFB by an operator, a complementary evaluation of the hardware differences should be performed.

3.5 Specific Considerations – Performance Application

The EASA team required through the ORI assurance that aircraft performance data provided by the EFB software applications produce the correct output in comparison with data derived from the AFM (or other

appropriate sources) under a representative cross section of conditions (e.g. take-off and landing performance data on a dry, wet and contaminated runway, different wind conditions and aerodrome pressure altitudes, etc).

An important part of the evaluation was dedicated to this verification, which was conducted by ATR and reviewed by the EASA team.

3.5.1 Overview of the verification process

The verification has been performed during the evaluation of version 1.1, and for the **ATR72-212A** aircraft, taking into account the four optional modifications which could impact the performance: MOD 5906 (Use of Reserve TO power for Takeoff), MOD 5908 (Boost Option), and MOD 6055 and 5561 (modifications to the braking system).

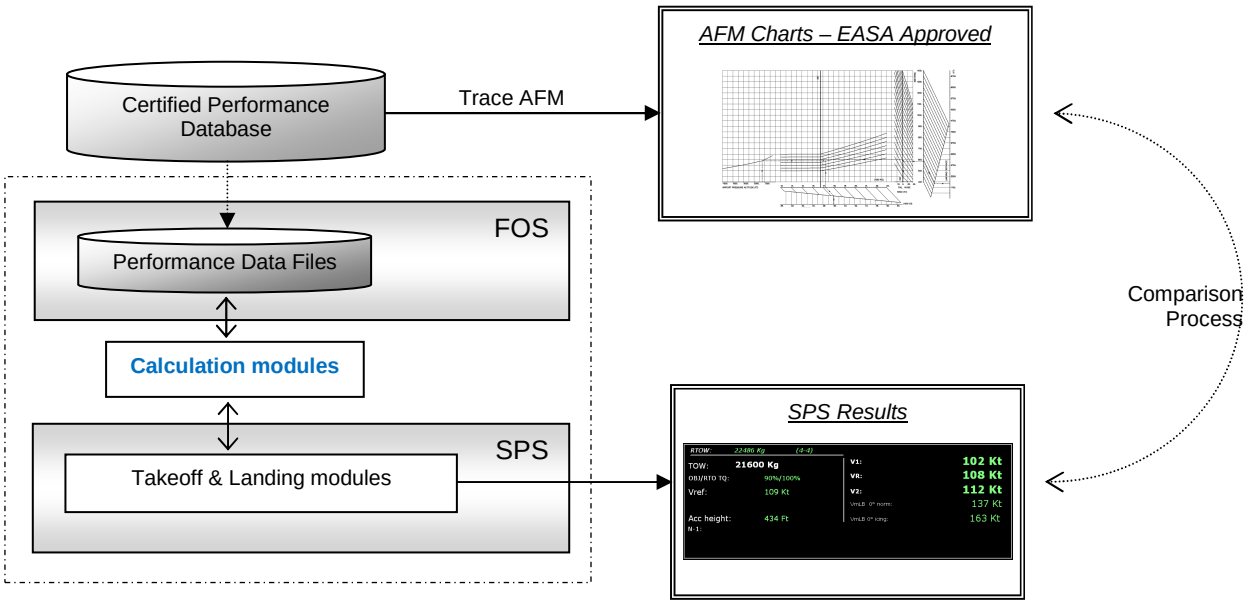
During the aircraft certification process, a performance database was elaborated, through the results of certification flight tests and in accordance with the regulatory requirements. This database was used to produce the charts from the AFM Performance Section, which was then approved by the EASA airworthiness experts.

The performance data files used by FOS and SPS to produce the performance results on the EFB are derived from this certified performance database.

The verification aims at ensuring that the results given by the SPS (by using these derived files and the SPS calculation modules) do not differ from the certified AFM results over a defined tolerance.

The tolerance thresholds (verification criteria) were defined by ATR performance specialists.

The process of the verification is illustrated in the following picture:



The detailed verification process is presented in ATR documents ref. DO/TD-3059/10 (Takeoff module) and ref. DO/TD-3061/10 (Landing module).

The verification process was found acceptable by EASA.

3.5.2 Verification results

The detailed results and their analysis are provided in ATR document ref. DO/TD-3072/11.

The performance verification of the ATR72-212A results are deemed satisfactory by ATR and EASA.

3.5.3 Other considerations

Some comments and recommendations for improvements were made after hands-on evaluation by the EASA.

In particular EASA recommended the implementation of an integrity check for the performance database files. This modification has been agreed by ATR and has been implemented in version 1.3.

Some remarks concerning the HMI of the SPS were also noted, and are addressed in chapter 3.4.2.

3.6 Flight Crew Procedures

ATR proposes procedures for use of EFB by flight crew, in FCOM volume 3/ Special Operations / Electronic Flight Bag.

The procedures for performance calculation with the SPS are described for:

- Normal operation (2 devices), on ground and in flight,
- Degraded operation: (1 or 2 devices inop): reference to the MMEL/DDG.

Airlines can base their own procedures on the proposed guidelines.

EASA found the proposed FCOM procedures to be acceptable but, where an operator modifies these procedures to integrate with the operating policies that define their own Standard Operating Procedures, the operator should ensure, and the NAA should verify, that the operator's SOPs do not compromise the operating philosophy and level of safety established by the ATR procedures.

3.6.1 Gross Error Check

A gross error check was deemed necessary in the use of the SPS software.

On certain aircraft, this check can be performed using the FMS as a reference. However, the SPS is proposed at the moment on -500 and -600 aircrafts, and only the -600 features an FMS. Hence, the gross error check in the performance calculation procedure was not based using this equipment.

ATR proposed a gross error check bases on the VmLB speeds, which was found acceptable to EASA.

The gross error check implements a verification of the VmLB 0° Icing (minimum speed in case of icing conditions with flaps 0°). The VmLB computed by SPS has to be compared with the values provided in the QRH volume 4/ OPS DATA. To that effect, it is recommended that operators put together a table customized to the applicable aircraft type and compiling the VmLB for different weights.

3.7 Quality Assurance

Quality Assurance functions in the Administration of the ATR Class 2 EFB are the responsibility of the operator and its Quality Assurance programme.

3.8 EFB System Security

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

Where physical media is used to load software parts on a data loader, especially if widely available types of physical media are used (such as USB drives), the operator should use technologies and/or procedures to assure that unauthorized content cannot enter the EFB system through these media.

3.9 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. Due to the presence of a performance application, the Administrator should be, or be supported by, a qualified performance engineer.

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 the draft AMC 20-25.

The EFB administrator should ensure that the non-EFB software applications (see §2.3) are inhibited or have no adverse impact on the operation of the EFB.

3.9.1 Configuration control

Appropriate configuration control procedures should be in place to ensure that each Class 2 EFB is maintained at the appropriate configuration according to the policy defined by the Administrator and these procedures should be documented in the EFB Policy and Procedures Manual.

3.10 System Maintenance

EFB system maintenance should be included in the approved aeroplane maintenance programme and documented in the Aeroplane Maintenance Manual (AMM).

3.11 Specifications for Training

Training for the use of the EFB should be for the purpose of operating the EFB itself and the applications hosted on it and it should not be intended to provide basic competence in areas such as aeroplane performance etc. Initial EFB training, therefore, 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.

The requirement for ground-based initial training may be satisfied by the ATR material presented hereafter.

3.11.1 Initial EFB Training

ATR has developed training for both EFB administrator and user. The course is based on a 2 hours self-training, with a question part and a possibility to practice.

The structure of the course is as follows:

- General part composed of introduction to EFB, applicable regulations, basic definitions (software types, EFB classes) and ATR choice
- Overview of CMC PilotView with system architecture, on board installation, EDU/EEMU specifications, overview of the hardware and main menu interface
- Main menu description with overview of Note taker, e-DocView* and SPS*.
- Tool menu with description of all setting up functionalities.
- Communication menu.

* Dedicated training are proposed for e-DocView (associated with xViewManager) and SPS.

3.11.2 Initial SPS training

ATR has developed 2 training modules related to SPS: SPS user training (1 day) and SPS administrator training (1 day ½).

Pre-requisites:
For both courses, participants shall have a degree in aircraft performance and a good command of English language.
In addition, for SPS administrator course, participants shall have a good knowledge of Windows operating system.

The SPS administrator course is dedicated to operational and performance engineers and is structured as follows:

DAY 1

- Introduction to SPS
- SPS installation including exercises (practical examples on SPS/Administrator and/or SPS/User modules installation on EFB and standard PC)
- SPS/Administrator
  - SPS/Administrator module
  - SPS File Administrator
    - Exercises SPS/Administrator: airport database, SPS configuration and SPS fleet files creation and management, SPS update generation update package creation, with associated errors, and SPS update package management, update of the SPS/User module
- SPS/User – Part I
    - Generalities and Welcome page
    - Takeoff module

DAY 2

- SPS/User – Part 2
    - Takeoff module (to be continued)
    - Landing module

- Exercises SPS/User module: standard and degraded computation, with associated errors, use of modify function, MEL function, print and save, computation with alternative units. For administrator retrieval of savings (automatic and on-demand).

  One SPS administrator course (for one person) is included in each ATR EFB contract, this to ensure sufficient knowledge on this critical application.

  The SPS/User course is dedicated to pilots. It is based on the introduction and second part of SPS/administrator training.

An attendance certificate is given to each trainee after course completion (SPS administrator training course or SPS user course).

3.11.3 Recurrent Training

Recurrent training for the use of an EFB is not normally required, provided the functions of the EFB system are used regularly in line operations.

EASA recommends that normal EFB operations are included as a component of the annual ground and recurrent training required by App. 1 to EU-OPS 1.965(a)(1), including, in particular, the alternative procedures to be used for dispatch with an EFB inoperative or not available.

3.11.4 Suitability of Training Devices

Where the operator's SOPs are dependent on the use of the 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 aeroplane type and variant. This should apply to:

- The Operator's Conversion Course;
- Differences or Familiarisation Training;
- Recurrent Training and Checking.

It is recommended that the EFB flight deck components are installed and operable in the training device (simulator) and used during all phases of flight during which they would be used under the operator's SOPs. The supporting infrastructure for the EFB flight deck components needs not be replicated provided the flight deck components and the installed software operate in a manner representative of the system installed on the aeroplane.

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 not installed equipment in the basic aeroplane type or variant (i.e. it is an operator option or aftermarket installation), the installation and use of the EFB in the training device is not required for the training and checking (Skill Test) for the issue of the type rating nor for the checking (Licence Proficiency Check) for the renewal or revalidation of the type rating.

3.12 Operational Evaluation Test

Before the granting of an Operational Approval, the operator should ensure, and the NAAs should verify by means of an Operational Evaluation Test, that the guidance and recommendations of JAA TGL 36, Draft AMC 20-25 and those contained in this report have been satisfied.

3.12.1 Initial Retention of Paper Back Up

Where paper is initially retained as back-up, the Operational Evaluation Test will 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 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)). 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 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.

3.12.2 Commencement of Operations Without Paper Back Up

Where an operator seeks credit to start operations without paper back up, the Operational Evaluation Test should consist of the following elements:

- A detailed review of the Operational Risk Analysis (ORA) – *performed by EASA, see §3.2*;
- 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 Quality Assurance Programme.

4 CONCLUSION

This EASA Special OPS EFB Evaluation Report is applicable to both operators and NAAs when considering an application for Operational Approval of the ATR Class 2 EFB.

EASA has found that the ATR Class 2 EFB and its software as evaluated (SPS version 2.1.0 – ATR72-212A) satisfy the guidance of JAA TGL 36 and Draft AMC 20-25, 2009 version (prior to publication of NPA 2012-02).

However, this finding does not, in itself, constitute an Operational Approval and individual operators must obtain approval from their NAA prior to use of this Class 2 EFB system.

Alternate means of compliance to the recommendations contained in this report may be approved by the operator's NAA. 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 report. Analysis, demonstrations, proof of concept testing, differences documentation, or other evidence may be required.

APPENDIX 1 – DOCUMENTS REVIEWED

The following ATR documents have been reviewed and evaluated by the EASA during the determination of this report:

- Compliance Matrix (See appendix 2)
- Master Policy (V1.1 dated 20/10/2011)
- ORA (V1.1 dated 20/10/2011)
- Ops documents: FCOM, MMEL&DDG
- GUI Evaluation Report
- Training Course.

The documents are available on request.

APPENDIX 2 – COMPLIANCE REQUIREMENTS

I / Airworthiness Means of compliance AMC 20-25
II / Operational means of compliance-The means of compliance stated in the ORI are identified

I / Airworthiness requirements in AMC 20-25. (Ref DO/TY/3485-08 “Certification means, compliance matrix”)

DRAFT AMC 20-25 (2009)	Means of compliance / Comments	Reference documentation
Class 1 EFB		
6.1.1.1 Electromagnetic interference	Not applicable	Not applicable
6.1.1.2 Batteries	Not applicable	Not applicable
6.1.1.3 Power source	Not applicable	Not applicable
6.1.1.4 Data connectivity	Not applicable	Not applicable
6.1.1.5 Rapid depressurisation testing	Not applicable	Not applicable
Class 2 EFB		
6.1.2.1 Design of mounting device		P-EASA.A.C.06922 (from 08 December 2008) All ATR aircraft models and variants
6.1.2.2 Placement of EFB display		P-EASA.A.C.06922 (from 08 December 2008) All ATR aircraft models and variants
6.1.2.3 EMI Demonstrations		P-EASA.A.C.06922 (from 08 December 2008) All ATR aircraft models and variants
6.1.2.4 Batteries		P-EASA.A.C.06922 (from 08 December 2008) All ATR aircraft models and variants
6.1.2.5 Power source		P-EASA.A.C.06922 (from 08 December 2008) All ATR aircraft models and variants
6.1.2.6 Data connectivity		P-EASA.A.C.06922 (from 08 December 2008) All ATR aircraft models and variants
6.1.2.7 Rapid depressurisation testing		System description and declaration of design and performance pilotview® electronic flight bag (doc n° 4030-1518), dated 12/11/08.
6.1.2.8 Installed resources	Not applicable	Not applicable

DRAFT AMC 20-25 (2009)	Means of compliance / Comments	Reference documentation
Class 3 EFB		
6.1.4.1 AFM	Not applicable	Not applicable
6.1.4.2 Guidelines for EFB software class3	Not applicable	Not applicable
6.1.4.3 Guidelines for EFB system suppliers class3	Not applicable	Not applicable

II / Requirements common to the ORI10 and the AMC20-25- Statement of the documents used as means of compliance

ORI 10 Compliance Matrix

Requirement 1	A Human / Machine Interface (HMI) Assessment addressing the functionality of applications designed for the EFB architecture.
Requirement 2	Details of the recommended operating procedures designed to be used for both the hardware and the software applications.
Requirement 3	An Operational Risk Analysis addressing failures, loss of function and errors and additionally the impact of available application customization on the application's compliance with operational and other requirements.
Requirement 4	Details of the proposed or recommended EFB flight crew and operations personnel training including, if applicable, the recommended flight crew Differences and Familiarization training syllabi for EFB applications in situations where the EFB system is installed on other aircraft types or variants.
Requirement 5	Verification that aircraft performance data output provided by the EFB software applications produce the correct output in comparison with data derived from the AFM (or other appropriate certified source) under a representative cross section of conditions (e.g. take-off and landing performance data on a dry, wet and contaminated runway, different wind conditions and aerodrome pressure altitudes, etc.).
Requirement 6	Details of the proposed or recommended EFB Administration procedures.
Requirement 7	Details of proposed or recommended EFB Administrator training required.
Requirement 8	Where an own ship position can be displayed on any EFB application, verification that the accuracy of the position displayed in terms of the position source, the charting used and other factors (total system error) is appropriate.

DRAFT AMC 20-25 (2009)	Common to ORI	Means of compliance / Comments	Reference documentation
5.1.1 Hardware Classes of EFB Systems - Class 1		Not applicable	Not applicable
5.1.2 Hardware Classes of EFB Systems - Class 2		Class 2 CMC Pilotview®	Master Policy document
5.1.3 Hardware Classes of EFB Systems - Class 3		Not applicable	Not applicable
5.2 Software Applications for EFB Systems		• Type A application: eDocView, Note taker • Type B applications: SPS Jeppview flitedeck viewer needs to be removed as it is not part of the current official image and will not be included in new ATR EFB image.	Master Policy document
5.2.3 Software Applications for EFB Systems - Type C		Not applicable	Not applicable
6.1.1 Hardware Approval Process – Class 1 EFB			
6.1.1.1 Electromagnetic interferences (EMI)		Not applicable	Not applicable
6.1.1.2 Batteries		Not applicable	Not applicable
6.1.3.3 Power source		Not applicable	Not applicable
6.1.1.4 Data connectivity		Not applicable	Not applicable
6.1.2.5 Rapid Depressurization Testing		Not applicable	Not applicable
6.1.2.1. Hardware approval process - Class 2 EFB			
6.1.2.1 Design of the Mounting Device		Ref Part 1	Ref Part 1
6.1.2.2 Placement of EFB Display		Ref Part 1	Ref Part 1
6.1.2.3 EMI Demonstrations		Ref Part 1	Ref Part 1
6.1.2.4 Batteries		Ref Part 1	Ref Part 1

DRAFT AMC 20-25 (2009)	Common to ORI	Means of compliance / Comments	Reference documentation
6.1.2.5 Power Source		Ref Part 1	Ref Part 1
6.1.2.6 EFB Data Connectivity		Ref Part 1	Ref Part 1
6.1.2.7 Rapid Depressurization Testing		Ref Part 1	Ref Part 1
6.1.2.8 Installed Resources		Ref Part 1	Ref Part 1
6.1.3 Hardware Approval Process – Class 3 EFB			
6.1.4.1 Certification Documentation - AFM		Not applicable	Not applicable
6.1.4.2 Guidelines for EFB Software Application Developers - Class 3 EFB		Not applicable	Not applicable
6.1.4.3 Guidelines for EFB System Suppliers-Class 2		Not applicable	Not applicable
6.2.1 Type Software applications		Type B: eDocView / SPS	Master_policy_1.1.doc
6.2.2 Software Approval Process - Type C Software Applications		Not applicable	Not applicable
6.2.3 Software Approval Process - Non-EFB Software Applications		See report §2.3.	Not applicable
6.2.4 Specific considerations for mass and balance and performance applications Appendix F Software application approval submission	Item 5	SPS results have been checked against the AFM. Mass and balance module not part of the evaluation scope.	DO/TD-3059/10 (SPS takeoff AFM validation methodology) DO/TD-3061/10 (SPS landing AFM validation methodology) DO/TD-3072/11 (SPS AFM validation results)
7 Operational Approval Process			
7.1 Role of the EFB System Supplier		CMC is responsible for the initial ATR image and for subsequent updates.	Master_policy_1.1.doc
7.2.1 Risk Assessment - MS Risk assessment	Item 3	Cf 7.2.2	Cf 7.2.2
7.2.2 ORA	Item 3	An ORA has been established for EFB, SPS and eDocView failures with identified	ORA_1.1.doc

DRAFT AMC 20-25 (2009)	Common to ORI	Means of compliance / Comments	Reference documentation
		mitigation means.	
7.3 Dispatch considerations		Addressed both in MMEL and in DDG (ATA 46)	MMEL_ATA46.pdf EFB DDG (o)_1.1.doc
7.3.1 Dispatch with inoperative EFB Elements		Addressed in MMEL, DDG (ATA 46) and QRH (procedure following failures)	MMEL_ATA46.pdf EFB DDG (o)_1.1.doc EFB-QRH-FOLLOWING FAILURES_1.0.doc
7.4 HMI Assessment for Type A & B Software Applications Appendix D : HMI Assessment and HF Considerations	Item 1	Only SPS assessment has been addressed by ATR. ATR pilots were involved in SPS interface development (both TRI and flight test pilots). A test phase has been conducted within ATR Training Centre with a panel of airlines.	Eval_SPS_updated_EN_1.0.xls
7.5.1 procedure for using EFB systems with other flight deck systems	Items 2, 4	Addressed in dedicated FCOM chapter (FCOM 1.00.21 and FCOM 2.02.23)	ELECTRONIC FLIGHT BAG FCOM_descriptif_1.0.doc EFB-FCOM2-500_1.0.doc Master_policy_1.1.doc
7.5.2 flight crew awareness of EFB software	Items 4, 6	Addressed in dedicated FCOM chapter (FCOM 2.02.23)	EFB-FCOM2-500_1.0.doc Master_policy_1.1.doc
7.5.3 Procedure to mitigate / control workload	Item 2	Addressed in dedicated FCOM chapter (FCOM 2.02.23)	EFB-FCOM2-500_1.0.doc Master_policy_1.1.doc
7.5.4 defining of FC responsibilities for performance calculation	Items 2, 4	Addressed in dedicated FCOM chapter (FCOM 2.02.23) and in DDG (ATA 46).	EFB-FCOM2-500_1.0.doc EFB DDG (o)_1.1.doc
7.6 Quality assurance	Items 6, 7	Operator responsibility	
7.7 System security	Items 6, 7	data base updates: shared with CMC and ATR One data base (performance database) is provided by ATR A CRC check is implemented on SPS databases to ensure integrity.	Master_policy_1.1.doc

DRAFT AMC 20-25 (2009)	Common to ORI	Means of compliance / Comments	Reference documentation
7.8 Electronic Signatures		Applicable to weight and balance module, not evaluated.	
7.9 Role of the EFB administrator	Items 6, 7	Operator's responsibility.	Master_policy_1.1.doc
7.10 EFB system maintenance		EFB system is addressed in standard maintenance documentation.	Master_policy_1.1.doc AMM - Aircraft Maintenance Manual (Description/Operation – D/O, Job Instruction Card - JIC), Illustrated Part Catalogue – IPC Wiring Diagram Manual (Aircraft Schematic Manual – ASM, Aircraft Wiring Manual – AWM, Aircraft Wiring List – AWL, Standard Practices Manual – SPM) Documents will be provided on request.
7.11 Flight crew training Appendix E	Item 4	A 2h00 self training has been developed for the EFB. Training courses (classroom with instructor) have been developed for SPS user (1 day) and SPS administrators (1 day ½).	Master_policy_1.1.doc
7.12 Operational evaluation test	Items 2, 4	Operator's responsibility.	Operator's responsibility.
7.12.1 Initial retention of paper back up		Operator's responsibility.	Operator's responsibility.
7.12.2 Commencement of operations without paper back up		Operator's responsibility.	Operator's responsibility.
7.13 Operational approval submission		Operator's responsibility.	Operator's responsibility.