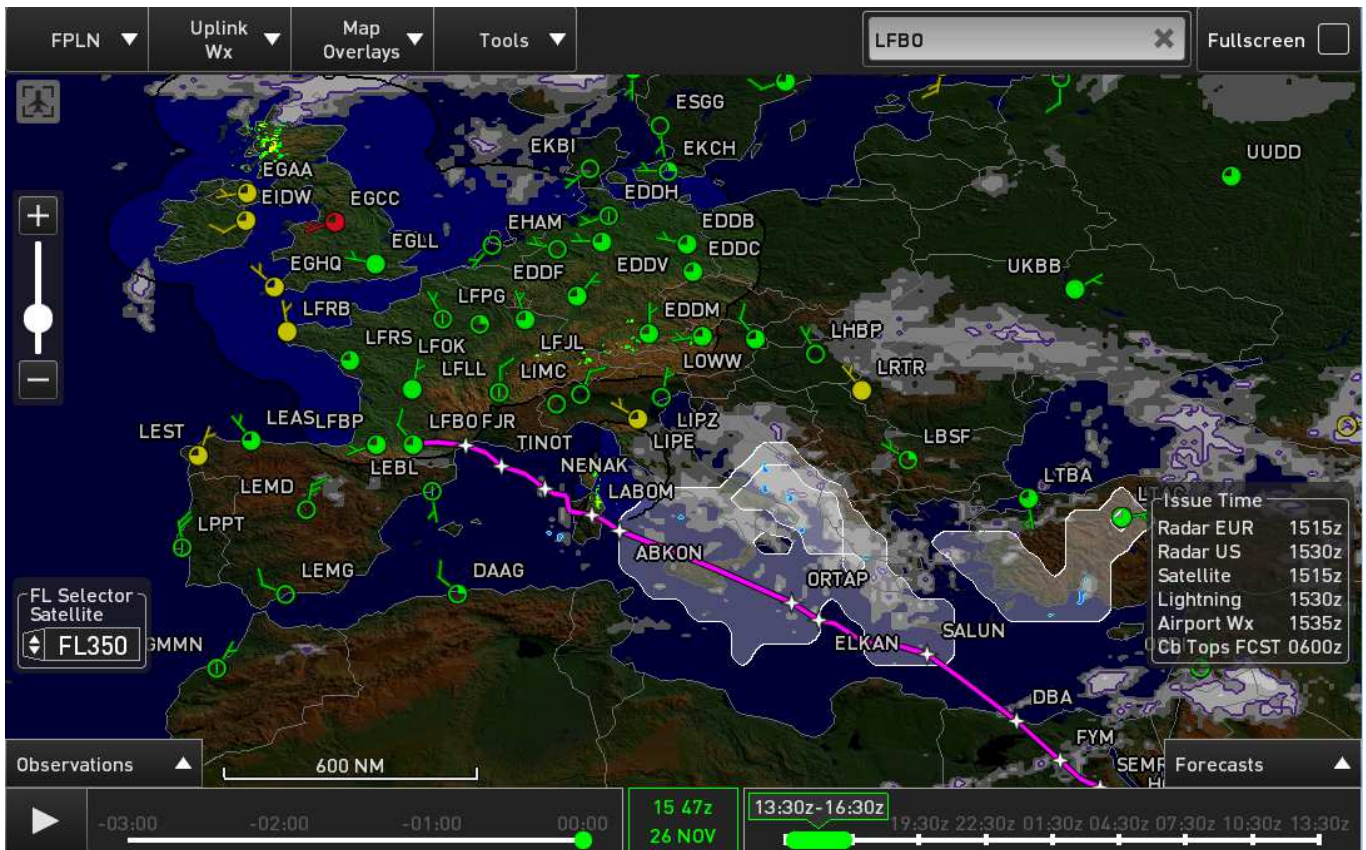


EUROPEAN AVIATION SAFETY AGENCY

ELECTRONIC FLIGHT BAG (EFB) EVALUATION REPORT



HONEYWELL

Weather Information Service – V1.2.0

Weather on Board Essential – V1.2.0

11 Dec. 2015

REVISION RECORD

REVISION NO:	DATED	SUMMARY
0	11 Dec. 2015	Initial Issue.

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ACRONYMS AND ABBREVIATIONS

AIRMET	Airmans' Meteorological Information
ATC	Air Traffic Control
CAT	Clear Air Turbulence
Cb	Cumulonimbus (cloud)
CPT	Captain
D-ATIS	Digital Automated Terminal Information Service
dBZ	Decibels of Z
DD	Display Device
D-VOLMET	Digital meteorological information for aircraft in flight
EASA	European Aviation Safety Agency
EFB	Electronic Flight Bag
ETOPS	Extended range Twin (engine) Operations
F/O	First Officer
FAR	False Alarm Rate
FIR	Flight Information Region
FL	Flight Level
FMC	Flight Management Computer
FMS	Flight Management System
FPLN	Flight plan
GDC	Global Data Center
GDW	goDirect Weather application
GUI	Graphical User Interface
HF	Human Factors
HON	Honeywell
ICAO	International Civil Aviation Organization
Kts	Knots
LAT/LON	Latitude/Longitude
METAR	Meteorological report from observation station
MPI	Miles per inch
NAVAID	Navigation Aid
NOTAM	Notice to Airmen
PF	Pilot Flying
PIREP	Pilot Report
PM	Pilot Monitoring
PMO	Project Management Offices
PSI	Potentially Shippable Increments
SIGMET	Significant Meteorological Information
SOP	Standard Operating Procedure
SPECI	Special meteorological report
TAF	Terminal Aerodrome Forecast
TFR	Temporary Flight Restriction
TOD	Top Of Descent
VOLMET	Meteorological information for aircraft in flight
VSD	Vertical Situation Display
WAFC	World Area Forecast Center
WIS	Weather Information Service
WPNT	Waypoint

EXECUTIVE SUMMARY

The evaluation found that the Weather Information Service (WIS) V1.2.0 and Weather on Board (WoB) Essential V1.2.0 applications satisfy the guidelines of AMC 20-25.

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 Honeywell;
- Review of Honeywell compliance documents;
- Part-time witnessing of the dedicated Human Factors evaluation organised by Honeywell;
- Limited functional tests on sample EFBs.

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 Honeywell applications 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 WIS V1.2.0 and WoB Essential V1.2.0 software applications taking the recommendations proposed in this report into account, in particular regarding the flight crew training.

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STC & Special Projects Section Manager
Date: 08/12/2015



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Date: 07/12/2015



1 PURPOSE AND APPLICABILITY

1.1 Purpose

This Report specifies EASA requirements and recommendations applicable to operators seeking Operational Approval and/or performing an operational assessment to use the Weather Information Service (hereafter WIS) V1.2.0 and Weather on Board Essential (hereafter WoB Essential) V1.2.0 applications 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 WIS version 1.2.0 and WoB Essential version 1.2.0, as well as subsequent versions added via addendum or not requiring a further evaluation by EASA (see chapter 5.2).

If subsequent versions require applying the change management procedure under ARO.GEN.310(c), their evaluation can be performed by the operator itself in accordance with AMC 20-25 criteria. Parts of this report can remain applicable to those versions if it is justified that they are not impacted by the update.

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 EFB will be performed by the operator and evaluated by its competent authority. The compliance matrix from Honeywell summarizes which parts are covered by this report and which are not. Other documents from the compliance dossier may further indicate areas that the operators have to consider during their own operational assessment.

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.

Unless otherwise specified, the statements contained in this report are applicable to both WIS and WoB Essential applications.

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.

1.4 Other Means of Compliance

Other Means of Compliance and guidance from industry standards (or subsets thereof) were considered by Honeywell for the design and evaluation of the applications, namely: AMC 25-11, AC 20-149A, SAE ARP 5289, RTCA DO267A, SAE ARP 5740 and ICAO Annex 3.

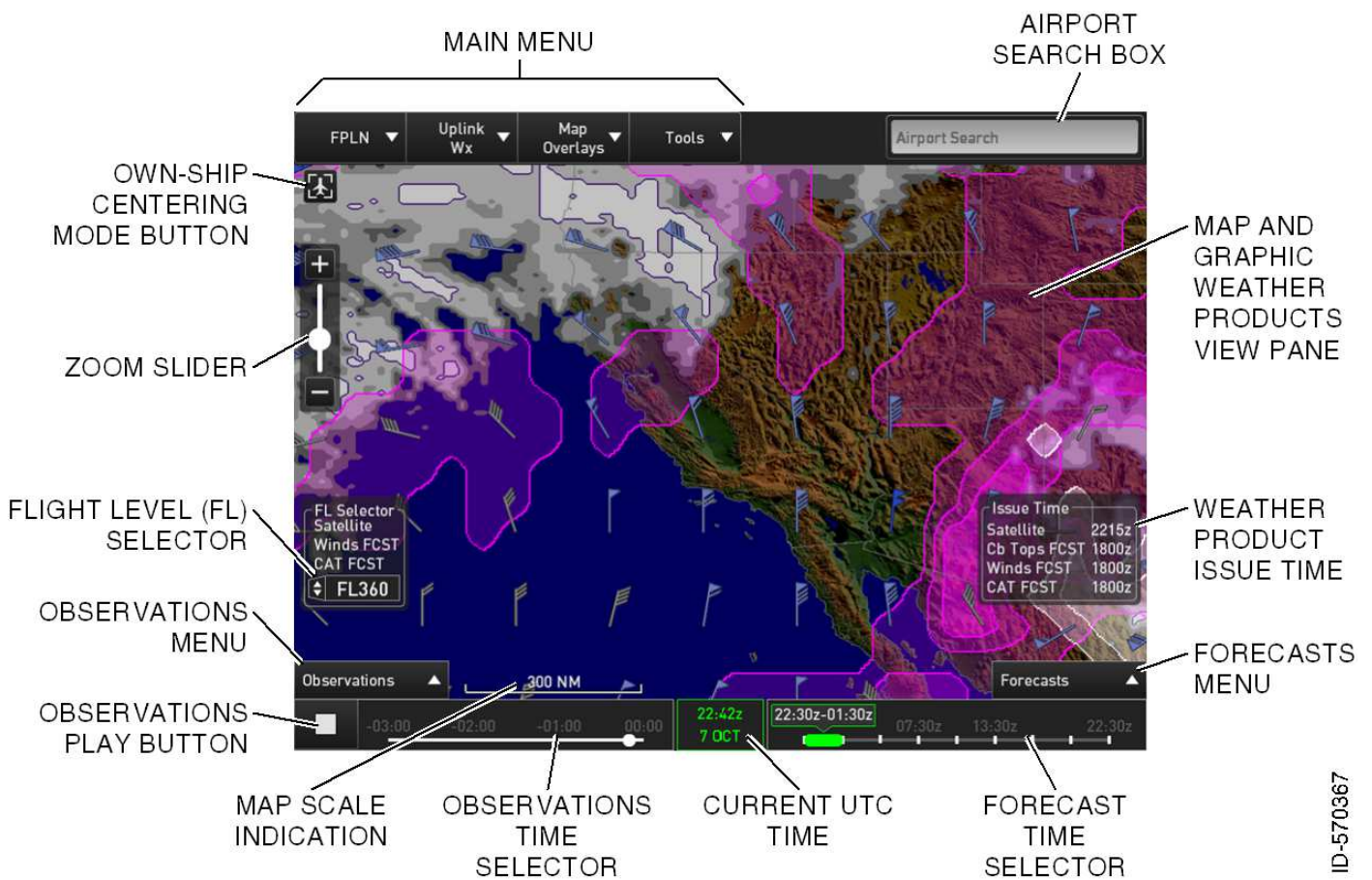
1.4 Operating System

Both applications can be installed either on Windows or iOS operating systems. Unless otherwise specified, this report does not address a specific OS, as the functions and GUI are similar.

2 GENERAL DESCRIPTION OF THE SOFTWARE

WIS and WoB Essential are graphical weather applications intended to support flight crews and dispatch/flight support crews with graphical and textual weather information.

2.1 WIS overview



ID-570367

2.2 Weather Products

Product Name	Type	Horizontal Coverage	Vertical Coverage	Validity	Issue Time	New Data in GDC
Radar-US	O	Cont. US, AK, HI, and San Juan	N/A	15 min	5 min	5 min
Radar-EUR	O	West and Central Europe	N/A	15 min	15 min	15 min
Radar-AUS	O	Australia	N/A	15 min	15 min	15 min
Satellite	O	N65-S65	6 FL ranges	15 min	15 min	15 min
METAR/SPECI WX Weather	O	Global	N/A	75 min	C	5 min
TAF-WX Weather	O	Global	N/A	75 min	C	5 min
DATIS-WX Weather	O	Global	N/A	75 min	C	5 min
PIREP	O	Global	Spec FL	2h	C	C
Cb Tops	F	Global	4 FL ranges	3h*	6h	6h
Winds	F	Global	FL60- FL500	3h*	6h	6h
CAT-Clear Air Turbulence	F	Global	FL240- FL480	3h*	6h	6h
Icing	F	Global	FL70- FL290	3h*	6h	6h
SIGMET	F	Global	FL range	Specific	C	10 min
Lightning	O	Global	N/A	5 min	C	C

O – Observation F – Forecast C- Continuous * - (T+6 – T+36)

2.3 Weather Products Source

Weather products displayed by the applications are downloaded from Honeywell Global Data Center (GDC). The GDC does not create the data but aggregates it from different sources. More details are provided in Honeywell's Risk Assessment.

2.4 Differences between WIS and WoB Essential

WoB Essential 1.2.0 is derived from WIS 1.2.0, with the following differences:

- For Windows OS, specific interface with Airbus FlySmart middleware for app launch / minimizing / maximizing,
- The following weather products are not available in WoB Essential:
 - o PIREPs/AIREPs
 - o SAT observation
 - o RAD observation
 - o LTG observation
 - o D-ATIS
 - o Flight plan overlay visualization
 - o VSD

2.5 Concept of use

The applications are intended to provide supplementary weather information to the flight crew and are not a replacement of the information that is required on-board and for the flight preparation. They are intended to be used only during the flight preparation (on ground) and during cruise.

3 EFB CLASSIFICATION

3.1 Hardware Classification

The choice of the EFB hardware platform and its physical use is under the operator's responsibility and is not covered by this report.

Operators must be careful about the suitability of the whole EFB solution in the cockpit of their particular aircraft types. The operator's solution should ensure compliance with the AMC to CAT.GEN.MPA.180, in particular that "an electronic storage medium is acceptable if accessibility, usability and reliability can be assured".

3.2 Software Classification

Since the applications were deemed to present a high degree of novelty and are not part of the possible type A and type B applications listed in AMC 20-25, a classification assessment was performed following Appendix C from the AMC.

The assessment was made with the support of a risk assessment, part of the compliance dossier, and demonstrating that the applications failures are limited to minor failure condition.

The resulting classification for both applications is type B.

To achieve this classification, applications malfunctions and misuses must be properly mitigated by operator's SOPs and training as detailed in this report.

3.3 Non-EFB Applications

The EFB operating system may provide default applications not related to flight operations and allow easy installation of additional applications.

These applications are out of the scope of this document. The EFB administrator should ensure that non-EFB software applications do not adversely impact the operation of the EFB (see chapter 5.10.3) 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 avionics functions (not eligible as EFB applications) under AMC 20-25, if the present position function is not inhibited and locked by the administrator.

4 HARDWARE OPERATIONAL EVALUATION

No aspects related to the EFB hardware compliance are addressed by this report.

5 SOFTWARE OPERATIONAL EVALUATION

5.1 Risk Assessment

Elements of the Risk Assessment required by AMC 20-25 §7.2 were elaborated and provided by Honeywell.

These elements can be reused by operators to produce a Risk Assessment tailored to their operations, as required by AMC 20-25 §7.2. In addition the Risk Assessment provides a set of assumptions that operators should verify to be met.

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 algorithm or HMI (see paragraph below), or introduce new functionalities, do not require a supplementary approval from the competent authority. See also chapter 5.10 which contains considerations on the EFB administration.

EASA considers that WIS and WoB versions changes that are limited to bug or database fixes, as well as to minor HMI changes (HMI widget aesthetic, menu structure,...), fall within the above definition and do not require a supplementary approval from the competent authority.

Honeywell has adopted the following numbering scheme for software versions, in line with this recommendation:

Software version A.B.C
A = product
B = major change
C = minor change

The introduction of a new weather product, as it may introduce some specific training to be able to make operational decisions, is considered as a major change requiring a supplementary approval.

5.3 Dispatch Considerations

The applications dispatch criteria is under operators' responsibility, however Honeywell's risk assessment may be used to develop this material.

Since no credit is taken for the use of the application, it is expected that no alternative dispatch procedures would be necessary.

5.4 Human Factors and HMI Assessment

The following elements are based on a Human Factors evaluation organised by Honeywell, and on EASA's own experience with the application.

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 Honeywell, 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

The HMI was found consistent and intuitive both during the limited EASA evaluation and also by the conclusion of the Human Factors evaluation conducted by Honeywell specialists.

5.4.2 Legibility of Text

Although the legibility is highly dependent on the hardware solution chosen by the operator, it is expected that the text displayed on the EFB will be legible to the typical user at all likely and reasonable viewing distances. The operator should assess the legibility with his own configuration, taking into account the specifications of the EFB mounting device (if any).

5.4.3 Input Devices

The assessment of the various input devices (touch screen) is out of scope of the main part of this report.

5.4.4 User Interfaces Consistencies

Consistency between EFB applications:

The assessment of the consistency between WIS (or WoB Essential) and the other EFB applications used by the operator are left under his responsibility.

Consistency with flight deck applications:

The applications were developed to be consistent as far as applicable with generic flight deck systems. Operators are however encouraged to pay particular attention to this point, in particular regarding the consistency of the weather color coding between the EFB application and the weather radar avionics function. Further information on the standards used by the applications to depict weather can be provided by Honeywell.

5.4.5 Messages and Use of Colours

Use of colour:

In general, the applications satisfy the guidance provided by AMC 20-25. The use of colors was studied to be consistent with industry standards, and common practices. Inputs were taken from the Human Factors evaluation.

Messages:

Although the applications comply independently, there is no way to ensure at the applications 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 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 might however not be de-configurable, e.g. low battery warnings.

5.4.6 System Error Messages

The applications are deemed compliant. The errors trigger appropriate notifications (e.g. loss of data connectivity). The different error messages are listed and explained in the user manual.

Non-EFB applications should be assessed in order to avoid the triggering of undue error messages. This is particularly true on the Windows operating system.

The stability of the applications 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 (the “report feature” (Tools/About/Report Issue) of the applications can be used to that effect.

5.4.7 Data Entry Screening and Error Messages

The application is deemed compliant; there are nevertheless few user entry fields in the applications.

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.

The Human Factors evaluation has shown that a proper training on the applications is crucial to prevent weather interpretation errors. The dynamic and 4-dimensional nature of the application should be understood. Critical areas include the use of the time slider and of the flight level selector. More details on flight crew training are provided in 5.12.

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. It is recommended to respect the following guidelines from Honeywell to ensure an acceptable responsiveness:

- CPU : minimum 1.2 GHz
- RAM : minimum 1 GB
- Available storage : minimum 1 GB
- Display : minimum 9.7 inches screen diagonal
- GPU : Support of OpenGL 2 and higher

5.4.10 Off-Screen Text and Content

The applications rely on scrollbars, which allow to identify that out of screen content exist. The Human Factors evaluation has shown that the presence of off-screen content was obvious to users.

5.4.11 Active Regions

The applications use a consistent HMI scheme and interaction means so that there is no ambiguity concerning the active regions.

5.4.12 Managing Multiple Open Applications and Documents

The toggling with other EFB or non-EFB applications if necessary has to be defined by the administrator and may depend on the hardware solution.

5.4.13 Flight Crew Workload

Although a Human Factors evaluation was performed by Honeywell, the question of workload evaluation depend on operators specificities and remain under his responsibility.

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, and in an operationally representative situation), to ensure there is no unacceptable flight crew workload or adverse safety implications.

Operators should follow Honeywell's limited guidelines in order to assess the impact on workload of the introduction of WIS or WoB Essential applications.

It is reminded that the applications are intended for use only during flight preparation and cruise, as mentioned in Honeywell documentation.

5.4.14 HMI - Performance and Mass & Balance applications

Not applicable.

5.5 Specific Considerations for Performance and Mass & Balance applications

Not applicable.

5.6 Flight Crew Operating Procedures

5.6.1 Procedures for using EFB systems with other flight crew compartment systems

Procedures for using the EFB with other flight deck systems remain under the operator's responsibility.

EASA recommends to pay particular attention to the use of the weather EFB applications vis-à-vis certified weather functions (e.g. weather radar display), and more generally other weather information made available for the flight preparation and that should be considered as primary.

If the FMS F-PLAN import function is used, the procedures should describe normal operations as well as when to manually command an AOC downlink following a significant F-PLAN update (e.g. rerouting). If it is not possible to update the F-PLAN loaded by WIS, the procedures should specify at which point it should be deleted by the crew.

5.6.2 Flight crew awareness of EFB Software / Databases Revisions

Flight Crew must be made aware of the applicable revision status. Procedures should include the verification of the applicable software and database load.

5.6.3 Procedures to mitigate and/or control workload

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

Operators can base their procedures on the content suggested by Honeywell, provided they do not conflict with the existing SOPs.

It is recommended to pay attention that the procedures do not infringe the recommendations to limit the use of the applications to flight preparation and cruise phases.

5.6.4 Flight Crew Responsibilities for Performance Calculations

Not applicable.

5.7 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.

5.8 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. A list of typical measures is proposed in AMC 20-25 chapter 7.9.

Nevertheless, as detailed in Honeywell's risk assessment, the GDC data and communications with the EFB are secured through encryption protocols. Those measures are considered satisfactory for the purpose of WIS/WoB Essential compliance to AMC 20-25.

5.9 Electronic Signatures

Not applicable.

5.10 EFB Administration

Administration instructions are included in the user manual provided by Honeywell.

Operators are responsible to define the administrator role and appoint him.

Considerations regarding the administrator role, training, and responsibilities are contained in AMC 20-25 §7.11. In addition, the following should be considered as part of the training of the administrator:

- Proper installation of the applications as per Honeywell guidelines
- Reporting procedures for the crew to signal any occurrence of erroneous displays.

5.10.1 EFB Policy and Procedures Manual

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

5.10.2 System updates (Windows & iOS)

This report is not applicable to a specific Operating System (OS) version. The selection of the OS running on the EFB system has to be made by the operator, taking into account any guideline from Honeywell.

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

It is recommended that operators implement administrator procedures to not update their devices to new major releases of the OS until such time as Honeywell reports that no compatibility issues remain between the revised OS and WIS / WoB.

It is also recommended that the administrator configures the devices in a way which prevents crew to perform updates themselves.

In all cases the configuration management responsibilities are with the EFB administrator.

5.10.3 Non-EFB Software applications

The OS (Windows & iOS) provides defaults applications not related to flight operations and allows as well to install additional applications that may be defined as "Miscellaneous" under chapter 5.2.3 and 6.2.2.3 of the AMC 20-25.

These applications are out of the scope of this report, 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 for the crew to install new applications, once the EFB is in the defined software configuration.

5.11 System Maintenance

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

5.12 Flight Crew 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 should not be intended to provide basic competence in areas such as meteorology or piloting techniques / weather avoidance. 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.

Training programmes for the EFB may take credit for previous EFB experience.

The training can be facilitated by the course offered by Honeywell.

In addition to the areas provided in AMC 20-25 chapters 7.13 and Appendix E, it is recommended that the initial training follows the areas the Syllabus proposed by Honeywell.

5.13 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 (as applicable) and those contained in this report including the applicable appendices have been satisfied.

5.13.1 Initial Retention of Paper Back Up

Not applicable, since the applications are not intended to replace paper elements.

5.13.2 Commencement of Operations Without Paper Back Up

Not applicable, since the applications are not intended to replace paper elements.

5.14 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 the WIS and WoB Essential applications. EASA has found that the software as evaluated satisfy the corresponding guidance of AMC 20-25.

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

In addition to all recommendations provided in this report, the compliance matrix from Honeywell provides an overview of which parts have been covered with Honeywell during this evaluation, and which remain under operator's responsibility.

7 HONEYWELL COMPLIANCE DOSSIER

The evaluation of the WIS and WoB applications was supported by Compliance documents provided by Honeywell and reviewed by EASA.

The following documents are part of the dossier:

- Cover document, Ref 88000132 (Rev 1),
- Compliance Matrix, Ref 88000131 (Rev 1),
- HF evaluation report, Ref 88000133 (Rev 1),
- Risk Assessment, Ref 88000134 (Rev 1),
- Training Syllabus, Ref 88000135 (Rev 1),
- Users Guide, Ref 88000136 (Rev 1).

Note: Although addressed by the compliance matrix, the EASA evaluation did not cover compliance to FAA's AC 120-76C.

8 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 report. Analysis, demonstrations, proof of concept testing, differences documentation, or other evidence may be required.