Annex VII to ED Decision 2019/008/R

'AMC/GM to Part-SPO – Amendment 11'

The Annex to Decision 2014/018/R of 24 April 2014 is hereby amended as follows:

The text of the amendment is arranged to show deleted, new or amended text as shown below:

1. deleted text is is marked with ~~strike through~~;
2. new or amended text is highlighted in blue; and
3. an ellipsis '(…)' indicates that the remaining text is unchanged in front of or following the reflected amendment.

1. GM1 SPO.GEN.107 is amended as follows:

GM1 SPO.GEN.107 Pilot-in-command responsibilities and authority
GENERAL

In accordance with ~~1.c. of Annex IV~~point 1.3 of Annex V to Regulation ~~(EC) No 216/2008~~(EU) 2018/1139 (Essential requirements for air operations), the pilot-in-command is responsible for the operation and safety of the aircraft and for the safety of all crew members, task specialists and cargo on board. This includes the following:

(a) the safety of all persons and cargo on board, as soon as he/she arrives on board, until he/she leaves the aircraft at the end of the flight; and

(b) the operation and safety of the aircraft:

(1) for aeroplanes, from the moment it is first ready to move for the purpose of flight until the moment it comes to rest at the end of the flight and the engine(s) used as primary propulsion unit(s) is/are shut down;

(2) for helicopters, from the moment the engine(s) are started until the helicopter comes to rest at the end of the flight with the engine(s) shut down and the rotor blades stopped.~~; or~~

~~(3) for sailplanes, from the moment the launch procedure is started until the aircraft comes to rest at the end of the flight.~~

2. A new AMC1 SPO.GEN.131(a) is added:

AMC1 SPO.GEN.131(a) Use of electronic flight bags (EFBs)
ELECTRONIC FLIGHT BAGS (EFBS) — HARDWARE — COMPLEX AIRCRAFT

TIn addition to AMC1 CAT.GEN.MPA.141(a), the following should be considered:

SUITABILITY OF THE HARDWARE — COMPLEX AIRCRAFT

(a) Display characteristics

Consideration should be given to the long-term degradation of a display as a result of abrasion and ageing. AMC 25-11 (paragraph 3.16a) may be used as guidance to assess luminance and legibility aspects.

Information displayed on the EFB should be legible to the typical user at the intended viewing distance(s) and under the full range of lighting conditions expected in a flight crew compartment, including direct sunlight.

Users should be able to adjust the screen brightness of an EFB independently of the brightness of other displays in the flight crew compartment. In addition, when incorporating an automatic brightness adjustment, it should operate independently for each EFB in the flight crew compartment. Brightness adjustment using software means may be acceptable provided that this operation does not adversely affect the flight crew workload.

Buttons and labels should have adequate illumination for night use. 'Buttons and labels' refers to hardware controls located on the display itself.

All controls should be properly labelled for their intended function, except if no confusion is possible.

The 90-degree viewing angle on either side of each flight crew member's line of sight may be unacceptable for certain EFB applications if aspects of the display quality are degraded at large viewing angles (e.g. the display colours wash out or the displayed colour contrast is not discernible at the installation viewing angle).

(b) Power source

The design of a portable EFB system should consider the source of electrical power, the independence of the power sources for multiple EFBs, and the potential need for an independent battery source. A non-exhaustive list of factors to be considered includes:

(1) the possibility to adopt operational procedures to ensure an adequate level of safety (for example, ensure a minimum level of charge before departure);

(2) the possible redundancy of portable EFBs to reduce the risk of exhausted batteries;

(3) the availability of backup battery packs to assure an alternative source of power.

Battery-powered EFBs that have aircraft power available for recharging the internal EFB batteries are considered to have a suitable backup power source.

For EFBs that have an internal battery power source and that are used as an alternative for paper documentation that is required by SPO.GEN.140, the operator should either have at least one EFB connected to an aircraft power bus or have established mitigation means and procedures to ensure that sufficient power with acceptable margins will be available during the whole flight.

(c) Environmental testing

Environmental testing, in particular testing for rapid decompression, should be performed when the EFB hosts applications that are required to be used during flight following a rapid decompression and/or when the EFB environmental operational range is potentially insufficient with respect to the foreseeable flight crew compartment operating conditions.

The information from the rapid-decompression test of an EFB is used to establish the procedural requirements for the use of that EFB device in a pressurised aircraft. Rapid-decompression testing

should follow the EUROCAE ED-14D/RTCA DO-160D (or later revisions) guidelines for rapid-decompression testing up to the maximum operating altitude of the aircraft at which the EFB is to be used.

(1) Pressurised aircraft: when a portable EFB has successfully completed rapid-decompression testing, then no mitigating procedures for depressurisation events need to be developed. When a portable EFB has failed the rapid-decompression testing while turned ON, but successfully completed it when turned OFF, then procedures should ensure that at least one EFB on board the aircraft remains OFF during the applicable flight phases or that it is configured so that no damage will be incurred should rapid decompression occur in flight at an altitude higher than 10 000 ft above mean sea level (AMSL).

If an EFB system has not been tested or it has failed the rapid-decompression test, then alternate procedures or paper backup should be available.

(2) Non-pressurised aircraft: rapid-decompression testing is not required for an EFB used in a non-pressurised aircraft. The EFB should be demonstrated to reliably operate up to the maximum operating altitude of the aircraft. If the EFB cannot be operated at the maximum operating altitude of the aircraft, procedures should be established to preclude operation of the EFB above the maximum demonstrated EFB operating altitude while still maintaining availability of any required aeronautical information displayed on the EFB.

The results of testing performed on a specific EFB model configuration (as identified by the EFB hardware manufacturer) may be applied to other aircraft installations and these generic environmental tests may not need to be duplicated. The operator should collect and retain:

(1) evidence of these tests that have already been accomplished; or

(2) suitable alternative procedures to deal with the total loss of the EFB system.

Rapid decompression tests do not need to be repeated if the EFB model identification and the battery type do not change.

The testing of operational EFBs should be avoided if possible to preclude the infliction of unknown damage to the unit during testing.

Operators should account for the possible loss or erroneous functioning of the EFB in abnormal environmental conditions.

The safe stowage and the use of the EFB under any foreseeable environmental conditions in the flight crew compartment, including turbulence, should be evaluated.

3. A new AMC2 SPO.GEN.131(a) is added:

AMC2 SPO.GEN.131(a) Use of electronic flight bags (EFBs)
ELECTRONIC FLIGHT BAGS (EFBS) — HARDWARE — NON-COMPLEX AIRCRAFT

The same considerations as those in AMC1 NCO.GEN.125 should apply in respect of EFB hardware.

4. A new AMC1 SPO.GEN.131(b) is added:

AMC1 SPO.GEN.131(b) Use of electronic flight bags (EFBs)
ELECTRONIC FLIGHT BAGS (EFBS) — SOFTWARE — COMPLEX AIRCRAFT

The same considerations as those in AMC1 CAT.GEN.MPA.141(b), AMC2 CAT.GEN.MPA.141(b) and AMC3 CAT.GEN.MPA.141(b) should apply in respect of EFB software.

5. A new AMC2 SPO.GEN.131(b) is added:

AMC2 SPO.GEN.131(b) Use of electronic flight bags (EFBs)
ELECTRONIC FLIGHT BAGS (EFBS) — SOFTWARE — NON-COMPLEX AIRCRAFT

The same considerations as those in AMC2 NCO.GEN.125 should apply in respect of EFB software.

6. A new AMC1 SPO.GEN.131(b)(1) is added:

AMC1 SPO.GEN.131(b)(1) Use of electronic flight bags (EFBs)
RISK ASSESSMENT — COMPLEX AIRCRAFT

(a) General

Prior to the use of any EFB system, the operator should perform a risk assessment for all type B EFB applications and for the related hardware as part of its hazard identification and risk management process.

The operator may make use of a risk assessment established by the software developer. However, the operator should ensure that its specific operational environment is taken into account.

The risk assessment should:

(1) evaluate the risks associated with the use of an EFB;

(2) identify potential losses of function or malfunction (with detected and undetected erroneous outputs) and the associated failure scenarios;

(3) analyse the operational consequences of these failure scenarios;

(4) establish mitigating measures; and

(5) ensure that the EFB system (hardware and software) achieves at least the same level of accessibility, usability, and reliability as the means of presentation it replaces.

In considering the accessibility, usability, and reliability of the EFB system, the operator should ensure that the failure of the complete EFB system as well as of individual applications, including corruption or loss of data and erroneously displayed information, has been assessed and that the risks have been mitigated to an acceptable level.

This risk assessment should be defined before the beginning of the trial period and should be amended accordingly, if necessary, at the end of this trial period. The results of the trial should establish the configuration and use of the system.

When the EFB system is intended to be introduced alongside a paper-based system, only the failures that would not be mitigated by the use of the paper-based system need to be addressed. In all other cases, a complete risk assessment should be performed.

(b) Assessing and mitigating the risks

Some parameters of EFB applications may depend on entries made by flight crew/dispatchers, whereas others may be default parameters from within the system that are subject to an administration process (e.g. the runway line-up allowance in an aircraft performance application). In the first case, mitigation means would mainly concern training and flight crew procedure aspects, whereas in the second case, mitigation means would more likely focus on the EFB administration and data management aspects.

The analysis should be specific to the operator concerned and should address at least the following points:

(1) The minimisation of undetected erroneous outputs from applications and assessment of the worst-credible scenario;

(2) Erroneous outputs from the software application including:

  (i) a description of the corruption scenarios; and

  (ii) a description of the mitigation means;

(3) Upstream processes including:

  (i) the reliability of root data used in applications (e.g. qualified input data, such as databases produced under ED-76/DO-200A 'Standards for Processing Aeronautical Data');

  (ii) the software application validation and verification checks according to appropriate industry standards, if applicable; and

  (iii) the independence between application software components, e.g. robust partitioning between EFB applications and other airworthiness certified software applications;

(4) A description of the mitigation means to be used following the detected failure of an application, or of a detected erroneous output;

(5) The need for access to an alternate power supply in order to ensure the availability of software applications, especially if they are used as a source of required information.

As part of the mitigation means, the operator should consider establishing a reliable alternative means to provide the information available on the EFB system.

The mitigation means could be, for example, one of, or a combination of, the following:

(1) the system design (including hardware and software);

(2) a backup EFB device, possibly supplied from a different power source;

(3) EFB applications being hosted on more than one platform;

(4) a paper backup (e.g. quick reference handbook (QRH)); and

(5) procedural means;

Depending on the outcome of its risk assessment, the operator may also consider performing an operational evaluation test before allowing unrestricted use of its EFB devices and applications.

EFB system design features such as those assuring data integrity and the accuracy of performance calculations (e.g. a 'reasonableness' or 'range' check) may be integrated in the risk assessment to be performed by the operator.

(c) Changes

The operator should update its EFB risk assessment based on the planned changes to its EFB system.

However, modifications to the operator's EFB system which:

(1) do not bring any change to the calculation algorithms and/or to the HMI of a type B EFB application;

(2) introduce a new type A EFB application or modify an existing one (provided its software classification remains type A);

(3) do not introduce any additional functionality to an existing type B EFB application;

(4) update an existing database necessary to use an existing type B EFB application; or

(5) do not require a change to the flight crew training or operational procedures,

may be introduced by the operator without having to update its risk assessment.

These changes should, nevertheless, be controlled and properly tested prior to use in flight.

The modifications in the following non-exhaustive list are considered to meet these criteria:

(1) operating system updates;

(2) chart or airport database updates;

(3) updates to introduce fixes (patches); and

(4) installation and modification of a type A EFB application.

7. A new GM1 SPO.GEN.131(b)(1) is added:

GM1 SPO.GEN.131(b)(1) Use of electronic flight bags (EFBs)
RISK ASSESSMENT— NON-COMPLEX AIRCRAFT

The operator of non-complex motor-powered aircraft should at least perform the check before the flight actions described in paragraph (b) of AMC2 NCO.GEN.125.

8. A new AMC1 SPO.GEN.131(b)(2) is added:

AMC1 SPO.GEN.131(b)(2) Use of electronic flight bags (EFBs)
EFB ADMINISTRATION — COMPLEX AIRCRAFT

The operator should ensure:

(a) that adequate support is provided to the EFB users for all the applications installed;

(b) that potential security issues associated with the application installed have been checked;

(c) that hardware and software configuration is appropriately managed and that no unauthorised software is installed.

The operator should ensure that miscellaneous software applications do not adversely impact on the operation of the EFB and should include miscellaneous software applications in the scope of EFB configuration management;

(d) that only a valid version of the application software and current data packages are installed on the EFB system; and

(e) the integrity of the data packages used by the applications installed.

9. A new AMC2 SPO.GEN.131(b)(2) is added:

AMC2 SPO.GEN.131(b)(2) Use of electronic flight bags (EFBs)
PROCEDURES — COMPLEX AIRCRAFT

The procedures for the administration or the use of the EFB device and the type B EFB application may be fully or partly integrated in the operations manual.

(a) General

If an EFB system generates information similar to that generated by existing certified systems, procedures should clearly identify which information source will be the primary, which source will be used for backup information, and under which conditions the backup source should be used. Procedures should define the actions to be taken by the flight crew when information provided by an EFB system is not consistent with that from other flight crew compartment sources, or when one EFB system shows different information than the other.

In the case of EFB applications providing information which might be affected by Notice(s) to Airmen (NOTAMS) (e.g. Airport moving map display (AMMD), performance calculation, etc.), the procedure for the use of these applications should include the handling of the relevant NOTAMS before their use.

(b) Flight crew awareness of EFB software/database revisions

The operator should have a process in place to verify that the configuration of the EFB, including software application versions and, where applicable, database versions, are up to date. Flight crew members should have the ability to easily verify the validity of database versions used on the EFB. Nevertheless, flight crew members should not be required to confirm the revision dates for other databases that do not adversely affect flight operations, such as maintenance log forms or a list of airport codes. An example of a date-sensitive revision is that applied to an aeronautical chart database. Procedures should specify what actions should be taken if the software applications or databases loaded on the EFB system are outdated.

(c) Workload mitigation and/or control

The operator should ensure that additional workload created by using an EFB system is adequately mitigated and/or controlled. The operator should ensure that, while the aircraft is in flight or moving on the ground, flight crew members do not become preoccupied with the EFB system at the same time. Workload should be shared between flight crew members to ensure ease of use and continued monitoring of other flight crew functions and aircraft equipment. This should be strictly applied in flight and the operator should specify any times when the flight crew members may not use the specific EFB application.

(d) Dispatch

The operator should establish dispatch criteria for the EFB system, when type B EFB applications that replace paper products are hosted. The operator should ensure that the availability of the EFB system

is confirmed by preflight checks. Instructions to the flight crew should clearly define the actions to be taken in the event of any EFB system deficiency.

Mitigation may be in the form of maintenance and/or operational procedures for items such as:

(1) replacement of batteries at defined intervals as required;

(2) ensuring that there is a fully charged backup battery on board;

(3) the flight crew checking the battery charging level before departure; and

(4) the flight crew switching off the EFB in a timely manner when the aircraft power source is lost.

In the event of a partial or complete failure of the EFB, specific dispatch procedures should be followed. These procedures should be included either in the minimum equipment list (MEL) or in the operations manual and should ensure an acceptable level of safety.

Particular attention should be paid to establishing specific dispatch procedures allowing to obtain operational data (e.g. performance data) in the event of a failure of an EFB that hosts an application providing such calculated data.

When the integrity of data input and output is verified by cross-checking and gross-error checks, the same checking principle should be applied to alternative dispatch procedures to ensure equivalent protection.

(e) Maintenance

Procedures should be established for the routine maintenance of the EFB system and detailing how unserviceability and failures are to be dealt with to ensure that the integrity of the EFB system is preserved. Maintenance procedures should also include the secure handling of updated information and how this information is validated and then promulgated in a timely manner and in a complete format to all users.

As part of the EFB system's maintenance , the operator should ensure that the EFB system batteries are periodically checked and replaced as required.

Should a fault or failure of the system arise, it is essential that such failures are brought to the immediate attention of the flight crew and that the system is isolated until rectification action is taken. In addition to backup procedures, to deal with system failures, a reporting system should be in place so that the necessary action, either to a particular EFB system or to the whole system, is taken in order to prevent the use of erroneous information by flight crew members.

(f) Security

The EFB system (including any means used for updating it) should be secure from unauthorised intervention (e.g. by malicious software). The operator should ensure that the system is adequately protected at the software level and that the hardware is appropriately managed (e.g. the identification of the person to whom the hardware is released, protected storage when the hardware is not in use) throughout the operational lifetime of the EFB system. The operator should ensure that prior to each flight the EFB operational software works as specified and the EFB operational data is complete and accurate. Moreover, a system should be in place to ensure that the EFB does not accept a data load that contains corrupted contents. Adequate measures should be in place for the compilation and secure distribution of data to the aircraft.

Procedures should be transparent and easy to understand, to follow and to oversee that:

(1) if an EFB is based on consumer electronics (e.g. a laptop) which can be easily removed, manipulated, or replaced by a similar component, that special consideration is given to the physical security of the hardware;

(2) portable EFB platforms are subject to allocation tracking to specific aircraft or persons;

(3) where a system has input ports, and especially if widely known protocols are used through these ports or internet connections are offered, that special consideration is given to the risks associated with these ports;

(4) where physical media are used to update the EFB system, and especially if widely known types of physical media are used, that the operator uses technologies and/or procedures to assure that unauthorised content cannot enter the EFB system through these media.

The required level of EFB security depends on the criticality of the functions used (e.g. an EFB that only holds a list of fuel prices may require less security than an EFB used for performance calculations).

Beyond the level of security required to assure that the EFB can properly perform its intended functions, the level of security that is ultimately required depends on the capabilities of the EFB.

(g) Electronic signatures

Some applicable requirements may require a signature when issuing or accepting a document (e.g. load sheet, technical logbook, notification to captain (NOTOC)). In order to be accepted as being equivalent to a handwritten signature, electronic signatures used in EFB applications need, as a minimum, to fulfil the same objectives and should assure the same degree of security as the handwritten or any other form of signature that they are intended to replace. GM1 SPO.POL.115 provides guidance related to the required handwritten signature or its equivalent for mass and balance documentation.

On a general basis, in the case of legally required signatures, an operator should have in place procedures for electronic signatures that guarantee:

(1) their uniqueness: a signature should identify a specific individual and should be difficult to duplicate;

(2) their significance: an individual using an electronic signature should take deliberate and recognisable action to affix their signature;

(3) their scope: the scope of the information being affirmed with an electronic signature should be clear to the signatory and to the subsequent readers of the record, record entry, or document;

(4) their security: the security of an individual's handwritten signature is maintained by ensuring that it is difficult for another individual to duplicate or alter it;

(5) their non-repudiation: an electronic signature should prevent a signatory from denying that they affixed a signature to a specific record, record entry, or document; the more difficult it is to duplicate a signature, the more likely it is that the signature was created by the signatory; and

(6) their traceability: an electronic signature should provide positive traceability to the individual who signed a record, record entry, or any other document.

An electronic signature should retain those qualities of a handwritten signature that guarantee its uniqueness. Systems using either a PIN or a password with limited validity (timewise) may be appropriate in providing positive traceability to the individual who affixed it. Advanced electronic signatures, qualified certificates and secured signature-creation devices needed to create them in the context of Regulation (EU) No 910/2014[1] are typically not required for EFB operations.

10. A new AMC3 SPO.GEN.131(b)(2) is added:

AMC3 SPO.GEN.131(b)(2) Use of electronic flight bags (EFBs)
FLIGHT CREW TRAINING — COMPLEX AIRCRAFT

Flight crew members should be given specific training on the use of the EFB system before it is operationally used.

Training should at least include the following:

(a) an overview of the system architecture;

(b) preflight checks of the system;

(c) limitations of the system;

(d) specific training on the use of each application and the conditions under which the EFB may and may not be used;

(e) restrictions on the use of the system, including cases where the entire system, or some parts of it, are not available;

(f) procedures for normal operations, including cross-checking of data entry and computed information;

(g) procedures to handle abnormal situations, such as a late runway change or a diversion to an alternate aerodrome;

(h) procedures to handle emergency situations;

(i) phases of the flight when the EFB system may and may not be used;

(j) human factors considerations, including crew resource management (CRM);

(k) additional training for new applications or changes to the hardware configuration;

(l) actions following the failure of component(s) of the EFB, including cases of battery smoke or fire; and

(m) management of conflicting information.

11. A new AMC4 SPO.GEN.131(b)(2) is added:

AMC4 SPO.GEN.131(b)(2) Use of electronic flight bags (EFBs)
PERFORMANCE AND MASS AND BALANCE APPLICATIONS — COMPLEX AIRCRAFT

(a) General

[1] Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC (OJ L 257, 28.8.2014, p. 73).

Performance and mass and balance applications should be based on existing published data found in the AFM or performance manual and should account for the applicable CAT.POL performance requirements. The applications may use algorithms or data spreadsheets to determine results. They may have the capability to interpolate within the information contained in the published data for the particular aircraft but should not extrapolate beyond it.

To protect against intentional and unintentional modifications, the integrity of the database files related to performance and mass and balance (the performance database, airport database, etc.) should be checked by the program before performing any calculations. This check can be run once at the start-up of the application.

Each software version should be identified by a unique version number. The performance and mass and balance applications should record each computation performed (inputs and outputs) and the operator should ensure that this information is retained for at least 3 months.

The operator should ensure that aircraft performance or mass and balance data provided by the application is correct compared with the data derived from the AFM (e.g. for take-off and landing performance data) or from other reference data sources (e.g. mass and balance manuals or databases, in-flight performance manuals or databases) under a representative cross-check of conditions (e.g. for take-off and landing performance applications: take-off and landing performance data on dry, wet, and contaminated runways, with different wind conditions and aerodrome pressure altitudes, etc.).

The operator should define any new roles that the flight crew and, if applicable, the flight dispatcher, may have in creating, reviewing, and using performance calculations supported by EFB systems.

(b) Testing

The verification of compliance of a performance or mass and balance application should include software testing activities performed with the software version candidate for operational use.

The testing can be performed either by the operator or a third party, as long as the testing process is documented and the responsibilities identified.

The testing activities should include reliability testing and accuracy testing.

Reliability testing should show that the application in its operating environment (operating system (OS) and hardware included) is stable and deterministic, i.e. identical answers are generated each time the process is entered with identical parameters.

Accuracy testing should demonstrate that the aircraft performance or mass and balance computations provided by the application are correct in comparison with data derived from the AFM or other reference data sources, under a representative cross section of conditions (e.g. for take-off and landing performance applications: runway state and slope, different wind conditions and pressure altitudes, various aircraft configurations including failures with a performance impact, etc.).

The verification should include a sufficient number of comparison results from representative calculations throughout the entire operating envelope of the aircraft, considering corner points, routine and break points.

Any difference compared to the reference data that is judged significant should be examined. When differences are due to more conservative calculations or reduced margins that were purposely built

into the approved data, this approach should be clearly specified. Compliance with the applicable certification and operational rules needs to be assessed in any case.

The testing method should be described. The testing may be automated when all the required data is available in an appropriate electronic format, but in addition to performing thorough monitoring of the correct functioning and design of the testing tools and procedures, operators are strongly suggested to perform additional manual verification. It could be based on a few scenarios for each chart or table of the reference data, including both operationally representative scenarios and 'corner-case' scenarios.

The testing of a software revision should, in addition, include non-regression testing and testing of any fix or change.

Furthermore, an operator should perform tests related to its customisation of the applications and to any element pertinent to its operation that was not covered at an earlier stage (e.g. airport database verification).

(c) Procedures

Specific care is needed regarding the crew procedures concerning take-off and landing performance or mass and balance applications. The crew procedures should ensure that:

(1) calculations are performed independently by each flight crew member before data outputs are accepted for use;

(2) a formal cross-check is made before data outputs are accepted for use; such cross-checks should utilise the independent calculations described above, together with the output of the same data from other sources on the aircraft;

(3) a gross-error check is performed before data outputs are accepted for use; such gross-error checks may use either a 'rule of thumb' or the output of the same data from other sources on the aircraft; and

(4) in the event of a loss of functionality of an EFB through either the loss of a single application, or the failure of the device hosting the application, an equivalent level of safety can be maintained; consistency with the EFB risk assessment assumptions should be confirmed.

(d) Training

The training should emphasise the importance of executing all take-off and landing performance or mass and balance calculations in accordance with the SOPs to assure fully independent calculations.

Furthermore, due to the optimisation at different levels brought by performance applications, the flight crew members may be confronted with new procedures and different aircraft behaviour (e.g. the use of multiple flap settings for take-off). The training should be designed and provided accordingly.

Where an application allows the computing of both dispatch results (from regulatory and factored calculations) and other results, the training should highlight the specificities of those results. Depending on the representativeness of the calculation, the flight crew should be trained on any operational margins that might be required.

The training should also address the identification and the review of default values, if any, and assumptions about the aircraft status or environmental conditions made by the application.

(e) Specific considerations for mass and balance applications

In addition to the figures, a diagram displaying the mass and its associated centre of gravity (CG) should be provided.

(f) Human-factors-specific considerations

Input data and output data (i.e. results) shall be clearly separated from each other. All the information necessary for a given calculation task should be presented together or be easily accessible.

All input and output data should include correct and unambiguous terms (names), units of measurement (e.g. kg or lb), and, when applicable, an index system and a CG-position declaration (e.g. Arm/%MAC). The units should match the ones from the other flight-crew-compartment sources for the same kind of data.

Airspeeds should be provided in a way that is directly useable in the flight crew compartment, unless the unit clearly indicates otherwise (e.g. Knots Calibrated Air Speed (KCAS)). Any difference between the type of airspeed provided by the EFB application and the type provided by the AFM or flight crew operating manual (FCOM) performance charts should be mentioned in the flight crew guides and training material.

If the landing performance application allows the computation of both dispatch results (regulatory, factored) and other results (e.g. in-flight or unfactored), the flight crew members should be made aware of the computation mode used.

(1) Inputs

The application should allow users to clearly distinguish user entries from default values or entries imported from other aircraft systems.

Performance applications should allow the flight crew to check whether a certain obstacle is included in the performance calculation and/or to include new or revised or new obstacle information in the performance calculations.

(2) Outputs

All critical assumptions for performance calculation (e.g. the use of thrust reversers, full or reduced thrust/power rating) should be clearly displayed. The assumptions made about any calculation should be at least as clear to the flight crew members as similar information would be on a tabular chart.

All output data should be available in numbers.

The application should indicate when a set of entries results in an unachievable operation (for instance, a negative stopping margin) with a specific message or colour scheme. This should be done in accordance with the relevant provisions on messages and the use of colours.

In order to allow a smooth workflow and to prevent data entry errors, the layout of the calculation outputs should be such that it is consistent with the data entry interface of the aircraft applications in which the calculation outputs are used (e.g. flight management systems).

(3) Modifications

The user should be able to easily modify performance calculations, especially when making last-minute changes.

The results of calculations and any outdated input fields should be deleted whenever:

(i) modifications are entered;

(ii) the EFB is shut down or the performance application is closed; or

(iii) the EFB or the performance application has been in a standby or 'background' mode for too long, i.e. such that it is likely that when it is used again, the inputs or outputs will be outdated.

12. A new AMC5 SPO.GEN.131(b)(2) is added:

AMC5 SPO.GEN.131(b)(2) Use of electronic flight bags (EFBs)

AIRPORT MOVING MAP DISPLAY (AMMD) APPLICATION WITH OWN-SHIP POSITION — COMPLEX AIRCRAFT

(a) General

An AMMD application should not be used as the primary means of navigation for taxiing and should be only used in conjunction with other materials and procedures identified within the operating concept (see paragraph (e)).

When an AMMD is in use, the primary means of navigation for taxiing remains the use of normal procedures and direct visual observation out of the flight-crew-compartment window.

Thus, as recognised in ETSO-C165a, an AMMD application with a display of own-ship position is considered to have a minor safety effect for malfunctions that cause the incorrect depiction of aircraft position (own-ship), and the failure condition for the loss of function is classified as 'no safety effect'.

(b) Minimum requirements

AMMD software that complies with European Technical Standard Order ETSO-C165a is considered to be acceptable.

In addition, the system should provide the means to display the revision number of the software installed.

To achieve the total system accuracy requirements of ETSO-C165a, an airworthiness-approved sensor using the global positioning system (GPS) in combination with a medium-accuracy database compliant with EUROCAE ED-99C/RTCA DO-272C, 'User Requirements for Aerodrome Mapping Information' (or later revisions) is considered one acceptable means.

Alternatively, the use of non-certified commercial off-the-shelf (COTS) position sources may be acceptable in accordance with AMC6 SPO.GEN.131(b)(2).

(c) Data provided by the AMMD software application developer

The operator should ensure that the AMMD software application developer provides the appropriate data including:

(1) installation instructions or equivalent as per ETSO-C165a Section 2.2 addressing:

(i) the identification of each specific EFB system computing platform (including the hardware platform and the operating system version) with which this AMMD software application and database was demonstrated to be compatible;

(ii) the installation procedures and limitations for each applicable platform (e.g. required memory resources, configuration of Global Navigation Satellite System (GNSS) antenna position);

(iii) the interface description data including the requirements for external sensors providing data inputs; and

(iv) means to verify that the AMMD has been installed correctly and is functioning properly;

(2) any AMMD limitations, and known installation, operational, functional, or performance issues of the AMMD.

(d) AMMD software installation in the EFB

The operator should review the documents and the data provided by the AMMD developer, and ensure that the installation requirements of the AMMD software in the specific EFB platform and aircraft are addressed. Operators are required to perform any verification activities proposed by the AMMD software application developer, as well as identify and perform any additional integration activities that needs to be completed;

(e) Operational procedures

Changes to operational procedures of the aircraft (e.g. flight crew procedures) should be documented in the operations manual or user's guide as appropriate. In particular, the documentation should highlight that the AMMD is designed to assist flight crew members in orienting themselves on the airport surface so as to improve the flight crew members' positional awareness during taxiing and that it is not to be used as the basis for ground manoeuvring.

(f) Training requirements

The operator may use flight crew procedures to mitigate some hazards. These should include limitations on the use of the AMMD function or application. As the AMMD could be a compelling display and the procedural restrictions are a key component of the mitigation, training should be provided in support of an AMMD implementation.

All mitigation means that rely on flight crew procedures should be included in the flight crew training. Details of the AMMD training should be included in the operator's overall EFB training.

13. A new AMC6 SPO.GEN.131(b)(2) is added:

AMC6 SPO.GEN.131(b)(2) Use of electronic flight bags (EFBs)

USE OF COMMERCIAL OFF-THE-SHELF (COTS) POSITION SOURCE — COMPLEX AIRCRAFT

COTS position sources may be used for AMMD EFB applications and for EFB applications displaying the own-ship position in flight when the following considerations are complied with:

(a) Characterisation of the receiver:

The position should originate from an airworthiness approved GNSS receiver, or from a COTS GNSS receiver fully characterised in terms of technical specifications and featuring an adequate number of channels (12 or more).

The EFB application should, in addition to position and velocity data, receive a sufficient number of parameters related to the fix quality and integrity to allow compliance with the accuracy requirements (e.g. the number of satellites and constellation geometry parameters such as dilution of position (DOP), 2D/3D fix).

(b) Installation aspects:

COTS position sources are C-PEDs and their installation and use should follow the requirements of SPO.GEN.130.

If the external COTS position source transmits wirelessly, cybersecurity aspects have to be considered.

(c) Practical evaluation:

As variables can be introduced by the placement of the antennas in the aircraft and the characteristics of the aircraft itself (e.g. heated and/or shielded windshield effects), the tests have to take place on the type of aircraft in which the EFB will be operated, with the antenna positioned at the location to be used in service.

(1) COTS used as a position source for AMMD

The test installation should record the data provided by the COTS position source to the AMMD application.

The analysis should use the the recorded parameters to demonstrate that the AMMD requirements are satisfactorily complied with in terms of the total system accuracy (taking into account database errors, latency effects, display errors, and uncompensated antenna offsets) within 50 metres (95 %). The availability should be sufficient to prevent distraction or increased workload due to frequent loss of position.

When demonstrating compliance with the following requirements of DO-257A, the behaviour of the AMMD system should be evaluated in practice:

(i) indication of degraded position accuracy within 1 second (Section 2.2.4 (22)); and

(ii) indication of a loss of positioning data within 5 seconds (Section 2.2.4 (23)); conditions to consider are both a loss of the GNSS satellite view (e.g. antenna failure) and a loss of communication between the receiver and the EFB.

(2) COTS position source used for applications displaying own-ship position in flight:

Flight trials should demonstrate that the COTS GNSS availability is sufficient to prevent distraction or increased workload due to frequent loss of position.

14. A new AMC7 SPO.GEN.131(b)(2) is added:

AMC7 SPO.GEN.131(b)(2) Use of electronic flight bags (EFBs)
CHART APPLICATIONS — COMPLEX AIRCRAFT

The navigation charts that are depicted should contain the information necessary, in an appropriate form, to perform the operation safely. Consideration should be given to the size, resolution and position of the display to ensure legibility whilst retaining the ability to review all information required to maintain adequate situational awareness. The identification of risks associated with the human–machine interface, as part of the operator's risk assessment, is key to identifying acceptable mitigation means, e.g.:

(a) to establish procedures to reduce the risk of making errors;

(b) to control and mitigate the additional workload related to EFB use;

(c) to ensure the consistency of colour-coding and symbology philosophies between EFB applications and their compatibility with other flight crew compartment applications; and

(d) to consider aspects of crew resource management (CRM) when using an EFB system.

In the case of chart application displaying own-ship position in flight, AMC9 SPO.GEN.131(b)(2) is applicable.

15. A new AMC8 SPO.GEN.131(b)(2) is added:

AMC8 SPO.GEN.131(b)(2) Use of electronic flight bags (EFBs)
IN-FLIGHT WEATHER APPLICATIONS — COMPLEX AIRCRAFT

(a) General

An in-flight weather (IFW) application is an EFB function or application enabling the flight crew to access meteorological information. It is designed to increase situational awareness and to support the flight crew when making strategic decisions.

An IFW function or application may be used to access both information required to be on board (e.g. World Area Forecast Centre (WAFC) data) and supplemental weather information.

The use of IFW applications should be non-safety-critical and not necessary for the performance of the flight. In order to be non-safety-critical, IFW data should not be used to support tactical decisions and/or as a substitute for certified aircraft systems (e.g. weather radar).

Any current information from the meteorological documentation required to be on board or from aircraft primary systems should always prevail over the information from an IFW application.

The displayed meteorological information may be forecasted and/or observed, and may be updated on the ground and/or in flight. It should be based on data from certified meteorological services providers or other reliable sources evaluated by the operator.

The meteorological information provided to the flight crew should be as far as possible consistent with the information available to users of ground-based aviation meteorological information (e.g. operations control centre (OCC), dispatchers, etc.) in order to establish common situational awareness and to facilitate collaborative decision-making.

(b) Display

Meteorological information should be presented to the flight crew in a format that is appropriate to the content of the information; coloured graphical depiction is encouraged whenever practicable.

The IFW display should enable the flight crew to:

(1) distinguish between observed and forecasted weather data;

(2) identify the currency or age and validity time of the weather data;

(3) access the interpretation of the weather data (e.g. the legend);

(4) obtain positive and clear indications of any missing information or data and determine areas of uncertainty when making decisions to avoid hazardous weather; and

(5) be aware of the data-link means status enabling necessary IFW data exchanges.

Meteorological information in IFW applications may be displayed, for example, as an overlay over navigation charts, over geographical maps, or it may be a stand-alone weather depiction (e.g. radar plots, satellite images, etc.).

If meteorological information is overlaid on navigation charts, special consideration should be given to HMI issues in order to avoid adverse effects on the basic chart functions.

In case of display of own-ship position in flight, AMC9 SPO.GEN.131(b)(2) is applicable.

The meteorological information may require reformatting to accommodate, for example, the display size or the depiction technology. However, any reformatting of the meteorological information should preserve both the geo-location and intensity of the meteorological conditions regardless of projection, scaling, or any other types of processing.

(c) Training and procedures

The operator should establish procedures for the use of an IFW application.

The operator should provide adequate training to the flight crew members before using an IFW application. This training should address:

(1) limitations of the use of an IFW application:

(i) acceptable use (strategic planning only);

(ii) information required to be on board; and

(iii) latency of observed weather information and the hazards associated with utilisation of old information;

(2) information on the display of weather data:

(i) type of displayed information (forecasted, observed);

(ii) symbology (symbols, colours); and

(iii) interpretation of meteorological information;

(3) identification of failures and malfunctions (e.g. incomplete uplinks, data-link failures, missing info);

(4) human factors issues:

(i) avoiding fixation; and

(ii) managing workload.

16. A new AMC9 SPO.GEN.131(b)(2) is added:

AMC9 SPO.GEN.131(b)(2) Use of electronic flight bags (EFBs)

APPLICATIONS DISPLAYING OWN-SHIP POSITION IN FLIGHT — COMPLEX AIRCRAFT

(a) Limitations

The display of own-ship position in flight as an overlay to other EFB applications should not be used as a primary source of information to fly or navigate the aircraft.

Except on VFR flights over routes navigated by reference to visual landmark, the display of the own-ship symbol is allowed only in aircraft having a certified navigation display (moving map).

In the specific case of IFW applications, the display of own-ship on such applications is restricted to aircraft equipped with a weather radar.

(b) Position source and accuracy

The display of own-ship position may be based on a certified GNSS or GNSS based (e.g. GPS/IRS) position from certified aircraft equipment or on a portable COTS position source in accordance with AMC6 SPO.GEN.131(b)(2).

The own-ship symbol should be removed and the flight crew notified if:

(1) the estimated accuracy is not sufficient for the intended operations;

(2) the position data is reported as invalid by the GNSS receiver; or

(3) the position data is not received for 5 seconds.

(c) Charting data considerations

The display of own-ship position is only allowed when the underlying map/chart data is designed using a projection system that is suitable for aeronautical use.

If the map involves raster images that have been stitched together into a larger single map, it should be demonstrated that the stitching process does not introduce distortion or map errors that would not correlate properly with a GNSS-based own-ship symbol.

(d) Human machine interface (HMI)

(1) Interface

The flight crew should be able to unambiguously differentiate the EFB function from avionics functions available in the cockpit, and in particular with the navigation display.

A sufficiently legible text label ‘AIRCRAFT POSITION NOT TO BE USED FOR NAVIGATION’ or equivalent should be continuously displayed by the application if the own-ship position depiction is visible in the current display area over a terminal chart (i.e. SID, STAR, or instrument approach) or a depiction of a terminal procedure.

(2) Display of own-ship symbol

The own-ship symbol should be different from the ones used by certified aircraft systems intended for primary navigation.

If directional data is available, the own-ship symbol may indicate directionality. If direction is not available, the own-ship symbol should not imply directionality.

The colour coding should not be inconsistent with the manufacturer philosophy

(3) Data displayed

The current map orientation should be clearly, continuously and unambiguously indicated (e.g., Track-up vs North-up).

If the software supports more than one directional orientation for the own-ship symbol (e.g., Track-up vs North-up), the current own-ship symbol orientation should be indicated.

The chart display in track-up mode should not create usability or readability issues. In particular, chart data should not be rotated in a manner that affects readability.

The application zoom levels should be appropriate for the function and content being displayed and in the context of providing supplemental position awareness.

The pilot should be able to obtain information about the operational status of the own-ship function (e.g. active, deactivated, degraded).

During IFR, day VFR without visual reference or night VFR flights, the following parameters' values should not be displayed:

(i) Track/heading;

(ii) Estimated time of arrival (ETA);

(iii) Altitude;

(iv) Geographical coordinates of the current location of the aircraft; and

(v) Aircraft speed.

(4) Controls

If a panning and/or range selection function is available, the EFB application should provide a clear and simple method to return to an own-ship-oriented display.

A means to disable the display of the own-ship position should be provided to the flight crew.

(e) Training and procedures

The procedures and training should emphasise the fact that the display of own-ship position on charts or IFW EFB applications should not be used as a primary source of information to fly or navigate the aircraft or as a primary source of weather information.

(1) Procedures:

The following considerations should be addressed in the procedures for the use of charts or IFW EFB application displaying the own-ship position in flight by the flight crew:

(i) Intended use of the display of own-ship position in flight on charts or IFW EFB applications;

(ii) Inclusion of the EFB into the regular scan of flight deck systems indications. In particular, systematic cross-check with avionics before being used, whatever the position source; and

(iii) Actions to be taken in case of the identification of a discrepancy between the EFB and avionics.

(2) Training:

Crew members should be trained on the procedures for the use of the application, including the regular cross-check with avionics and the action in case of discrepancy.

17. A new GM1 SPO.GEN.131(b)(2) is added:

GM1 SPO.GEN.131(b)(2) Use of electronic flight bags (EFBs)
IN-FLIGHT WEATHER (IFW) APPLICATIONS — COMPLEX AIRCRAFT

'Reliable sources' of data used by IFW applications are the organisations evaluated by the operator as being able to provide an appropriate level of data assurance in terms of accuracy and integrity. It is recommended that the following aspects be considered during that evaluation:

(a) The organisation should have a quality assurance system in place that covers the data source selection, acquisition/import, processing, validity period check, and the distribution phase;

(b) Any meteorological product provided by the organisation that is within the scope of the meteorological information included in the flight documentation as defined in MET.TR.215(e) (Annex V (Definitions of terms used in Annexes II to XIII) to Commission Regulation (EU) 2016/1377) should originate only from authoritative sources or certified providers and should not be transformed or altered, except for the purpose of packaging the data in the correct format. The organisation's process should provide assurance that the integrity of those products is preserved in the data for use by the IFW application.

18. A new GM2 SPO.GEN.131(b)(2) is added:

GM2 SPO.GEN.131(b)(2) Use of electronic flight bags (EFBs)
USE OF COMMERCIAL OFF-THE-SHELF (COTS) POSITION SOURCE – PRATICAL EVALUATION — COMPLEX AIRCRAFT

The tests should consist of a statistically relevant sample of taxiing. It is recommended to include taxiing at airports that are representative of the more complex airports typically accessed by the operator. Taxiing segment samples should include data that is derived from runways and taxiways, and should include numerous turns, in particular of 90 degrees or more, and segments in straight lines at the maximum speed at which the own-ship symbol is displayed. Taxiing segment samples should include parts in areas of high buildings such as terminals. The analysis should include at least 25 inbound and/or outbound taxiing segments between the parking location and the runway.

During the tests, any unusual events (such as observing the own-ship symbol in a location on the map that is notably offset compared to the actual position, the own-ship symbol changing to non-directional when the aircraft is moving, and times when the own-ship symbol disappears from the map display) should be noted. For the test, the pilot should be instructed to diligently taxi on the centre line.

19. A new GM3 SPO.GEN.131(b)(2) is added:

GM3 SPO.GEN.131(b)(2) Use of electronic flight bags (EFBs)
APPLICATIONS DISPLAYING OWN-SHIP POSITION IN FLIGHT

The depiction of a circle around the EFB own-ship symbol may be used to differentiate it from the avionics one.

20. In Subpart D ('Instruments, data and equipment'), Section 3 ('Sailplanes') is deleted:

~~SECTION 3~~

~~Sailplanes~~

~~GM1 SPO.IDE.S.100(a) Instruments and equipment — general~~

~~APPLICABLE AIRWORTHINESS REQUIREMENTS~~

~~The applicable airworthiness requirements for approval of instruments and equipment required by this Part are the following:~~

~~(a) Commission Regulation (EU) No 748/2012 for sailplanes registered in the EU; and~~

~~(b) Airworthiness requirements of the state of registry for sailplanes registered outside the EU.~~

~~GM1 SPO.IDE.S.100(b) Instruments and equipment — general~~

~~REQUIRED INSTRUMENTS AND EQUIPMENT THAT DO NOT NEED TO BE APPROVED IN ACCORDANCE WITH THE APPLICABLE AIRWORTHINESS REQUIREMENTS~~

~~The functionality of non-installed instruments and equipment required by this Subpart and that do not need an equipment approval, as listed in SPO.IDE.S.100(b), should be checked against recognised industry standards appropriate to the intended purpose. The operator is responsible for ensuring the maintenance of these instruments and equipment.~~

~~GM1 SPO.IDE.S.100(c) Instruments and equipment — general~~

~~NOT REQUIRED INSTRUMENTS AND EQUIPMENT THAT DO NOT NEED TO BE APPROVED IN ACCORDANCE WITH THE APPLICABLE AIRWORTHINESS REQUIREMENTS, BUT ARE CARRIED ON A FLIGHT~~

~~(a) The provision of this paragraph does not exempt any installed instrument or item of equipment from complying with the applicable airworthiness requirements. In this case, the installation should be approved as required in the applicable airworthiness requirements and should comply with the applicable Certification Specifications.~~

~~(b) The failure of additional non-installed instruments or equipment not required by this Part or by the applicable airworthiness requirements or any applicable airspace requirements should not adversely affect the airworthiness and/or the safe operation of the sailplane. Examples may be portable electronic devices carried by crew members or task specialists.~~

~~AMC1 SPO.IDE.S.115 & SPO.IDE.S.120 Operations under VFR & Cloud flying — flight and navigational instruments~~

~~INTEGRATED INSTRUMENTS~~

~~(a) Individual equipment requirements may be met by combinations of instruments or by integrated flight systems or by a combination of parameters on electronic displays. The information so available to each required pilot should not be less than that required in the applicable operational requirements, and the equivalent safety of the installation should be approved during type certification of the sailplane for the intended type of operation.~~

~~(b) The means of measuring and indicating turn and slip and sailplane attitude may be met by combinations of instruments or by integrated flight director systems, provided that the safeguards against total failure, inherent in the three separate instruments, are retained.~~

~~**AMC1 SPO.IDE.S.115(a)(1) & SPO.IDE.S.120(a) Operations under VFR & Cloud flying — flight and navigational instruments**~~

~~MEANS OF MEASURING AND DISPLAYING MAGNETIC HEADING~~

~~The means of measuring and displaying magnetic direction should be a magnetic compass or equivalent.~~

~~**AMC1 SPO.IDE.S.115(a)(2) & SPO.IDE.S.120(b) Operations under VFR & Cloud flying — flight and navigational instruments**~~

~~MEANS OF MEASURING AND DISPLAYING THE TIME~~

~~A means of measuring and displaying the time in hours, minutes and seconds may be a wrist watch capable of the same functions.~~

~~**AMC1 SPO.IDE.S.115(a)(3) & SPO.IDE.S.120(c) Operations under VFR & Cloud flying — flight and navigational instruments**~~

~~CALIBRATION OF THE MEANS FOR MEASURING AND DISPLAYING PRESSURE ALTITUDE~~

~~(a) The instrument measuring and displaying pressure altitude should be of a sensitive type calibrated in feet (ft), with a sub-scale setting, calibrated in hectopascals/millibars, adjustable for any barometric pressure likely to be set during flight.~~

~~(b) Calibration in metres (m) is also acceptable.~~

~~**AMC1 SPO.IDE.S.115(a)(4) & SPO.IDE.S.120(d) Operations under VFR & Cloud flying — flight and navigational instruments**~~

~~CALIBRATION OF THE INSTRUMENT INDICATING AIRSPEED~~

~~(a) The instrument indicating airspeed should be calibrated in knots (kt).~~

~~(b) Calibration in kilometres per hour (kph) or in miles per hour (mph) is also acceptable.~~

~~**AMC1 SPO.IDE.S.115(B)(2) OPERATIONS UNDER VFR — FLIGHT AND NAVIGATIONAL INSTRUMENTS**~~

~~SLIP INDICATION~~

~~The means of measuring and displaying slip may be a yaw string for operations under VFR.~~

~~**GM1 SPO.IDE.S.115(b) Operations under VFR — flight and navigational instruments**~~

~~CONDITIONS WHERE THE SAILPLANE CANNOT BE MAINTAINED IN A DESIRED ATTITUDE WITHOUT REFERENCE TO ONE OR MORE ADDITIONAL INSTRUMENTS~~

~~Sailplanes operating in conditions where the sailplane cannot be maintained in a desired attitude without reference to one or more additional instruments means a condition that is still under VFR (under VMC) though where there is no external reference such as the natural horizon or a coastline, that would allow the attitude to be maintained. Such conditions may occur over water, a desert or snow-covered areas where the colour of the surface cannot be distinguished from the colour of the sky and therefore no external reference is available. Cloud flying is not considered to be one of these conditions.~~

~~**AMC1 SPO.IDE.S.125 Seats and restraint systems**~~

~~UPPER TORSO RESTRAINT SYSTEM~~

(a) A seat belt with upper torso restraint system should have four anchorage points and should include shoulder straps (two anchorage points) and a seat belt (two anchorage points), which may be used independently.

(b) A restraint system having five anchorage points is deemed to be compliant with the requirement for seat belt with upper torso restraint system with four anchorage points.

AMC1 SPO.IDE.S.135 Flight over water

MEANS OF ILLUMINATION FOR LIFE-JACKETS

Each life-jacket or equivalent individual flotation device should be equipped with a means of electric illumination for the purpose of facilitating the location of persons.

RISK ASSESSMENT

(a) When conducting the risk assessment, the pilot-in-command should base his/her decision, as far as is practicable, on the Implementing Rules and AMCs applicable to the operation of the sailplane.

(b) The pilot-in-command should, for determining the risk, take the following operating environment and conditions into account:

(1) sea state;

(2) sea and air temperatures;

(3) the distance from land suitable for making an emergency landing; and

(4) the availability of search and rescue facilities.

GM1 SPO.IDE.S.135(a) Flight over water

SEAT CUSHIONS

Seat cushions are not considered to be flotation devices.

AMC1 SPO.IDE.S.135(b) Flight over water

BATTERIES

(a) All batteries used in ELTs or PLBs should be replaced (or recharged, if the battery is rechargeable) when the equipment has been in use for more than 1 cumulative hour or in the following cases:

(1) Batteries specifically designed for use in ELTs and having an airworthiness release certificate (EASA Form 1 or equivalent) should be replaced (or recharged, if the battery is rechargeable) before the end of their useful life in accordance with the maintenance instructions applicable to the ELT.

(2) Standard batteries manufactured in accordance with an industry standard and not having an airworthiness release certificate (EASA Form 1 or equivalent), when used in ELTs should be replaced (or recharged, if the battery is rechargeable) when 50 % of their useful life (or for rechargeable, 50 % of their useful life of charge), as established by the battery manufacturer, has expired.

(3) All batteries used in PLBs should be replaced (or recharged, if the battery is rechargeable) when 50 % of their useful life (or for rechargeable, 50 % of their useful life of charge), as established by the battery manufacturer, has expired.

(4) The battery useful life (or useful life of charge) criteria in (1),(2) and (3) do not apply to batteries (such as water-activated batteries) that are essentially unaffected during probable storage intervals.

(b) The new expiry date for a replaced (or recharged) battery should be legibly marked on the outside of the equipment.

AMC2 SPO.IDE.S.135(b) Flight over water

TYPES OF ELT AND GENERAL TECHNICAL SPECIFICATIONS

(a) The ELT required by this provision should be one of the following:

(1) Automatic fixed (ELT(AF)). An automatically activated ELT that is permanently attached to an aircraft and is designed to aid SAR teams in locating the crash site.

(2) Automatic portable (ELT(AP)). An automatically activated ELT that is rigidly attached to an aircraft before a crash, but is readily removable from the aircraft after a crash. It functions as an ELT during the crash sequence. If the ELT does not employ an integral antenna, the aircraft-mounted antenna may be disconnected and an auxiliary antenna (stored on the ELT case) attached to the ELT. The ELT can be tethered to a survivor or a life-raft. This type of ELT is intended to aid SAR teams in locating the crash site or survivor(s).

(3) Automatic Deployable (ELT(AD)). An ELT that is rigidly attached to the aircraft before the crash and that is automatically ejected, deployed and activated by an impact, and, in some cases, also by hydrostatic sensors. Manual deployment is also provided. This type of ELT should float in water and is intended to aid SAR teams in locating the crash site.

(4) Survival ELT (ELT(S)). An ELT that is removable from an aircraft, stowed so as to facilitate its ready use in an emergency and manually activated by a survivor. An ELT(S) may be activated manually or automatically (e.g. by water activation). It should be designed to be tethered to a life-raft or a survivor.

(b) To minimise the possibility of damage in the event of crash impact, the automatic ELT should be rigidly fixed to the aircraft structure, as far aft as is practicable, with its antenna and connections arranged so as to maximise the probability of the signal being transmitted after a crash.

(c) Any ELT carried should operate in accordance with the relevant provisions of ICAO Annex 10, Volume III and should be registered with the national agency responsible for initiating search and rescue or other nominated agency.

AMC3 SPO.IDE.S.135(b) Flight over water

PLB TECHNICAL SPECIFICATIONS

(a) A personal locator beacon (PLB) should have a built-in GNSS receiver with a *cosmicheskaya sistyema poiska avariynich sudov* — search and rescue satellite-aided tracking (COSPAS-SARSAT) type approval number. However, devices with a COSPAS-SARSAT with a number belonging to series 700 are excluded as this series of numbers identifies the special-use beacons not meeting all the technical requirements and all the tests specified by COSPAS-SARSAT.

(b) Any PLB carried should be registered with the national agency responsible for initiating search and rescue or other nominated agency.

~~AMC4 SPO.IDE.S.135(b) Flight over water.~~

~~BRIEFING ON PLB USE~~

~~When a PLB is carried by a task specialist, he/she should be briefed on its characteristics and use by the pilot-in-command before the flight.~~

~~GM1 SPO.IDE.S.135(b) Flight over water~~

~~TERMINOLOGY~~

~~(a) An ELT is a generic term describing equipment that broadcasts distinctive signals on designated frequencies and, depending on application, may be activated by impact or may be manually activated.~~

~~(b) A PLB is an emergency beacon other than an ELT that broadcasts distinctive signals on designated frequencies, is standalone, portable and is manually activated by the survivors.~~

~~AMC1 SPO.IDE.S.140 Survival equipment~~

~~GENERAL~~

~~Sailplanes operated across land areas in which search and rescue would be especially difficult should be equipped with the following:~~

~~(a) signalling equipment to make the distress signals;~~

~~(b) at least one ELT(S) or a PLB; and~~

~~(c) additional survival equipment for the route to be flown taking account of the number of persons on board.~~

~~AMC2 SPO.IDE.S.140 Survival equipment~~

~~ADDITIONAL SURVIVAL EQUIPMENT~~

~~(a) The following additional survival equipment should be carried when required:~~

~~(1) 500 ml of water;~~

~~(2) one knife;~~

~~(3) first-aid equipment; and~~

~~(4) one set of air/ground codes.~~

~~(b) If any item of equipment contained in the above list is already carried on board the sailplane in accordance with another requirement, there is no need for this to be duplicated.~~

~~GM1 SPO.IDE.S.140 Survival equipment~~

~~SIGNALLING EQUIPMENT~~

~~The signalling equipment for making distress signals is described in ICAO Annex 2, Rules of the Air.~~

~~GM2 SPO.IDE.S.140 Survival equipment~~

~~AREAS IN WHICH SEARCH AND RESCUE WOULD BE ESPECIALLY DIFFICULT~~

~~The expression 'areas in which search and rescue would be especially difficult' should be interpreted, in this context, as meaning:~~

(a) areas so designated by the authority responsible for managing search and rescue; or

(b) areas that are largely uninhabited and where:

(1) the authority referred to in (a) published any information to confirm whether search and rescue would be or would not be especially difficult; and

(2) the authority referred to in (a). does not, as a matter of policy, designate areas as being especially difficult for search and rescue.

GM1 SPO.IDE.S.150 Navigation equipment

APPLICABLE AIRSPACE REQUIREMENTS

For sailplanes being operated under European air traffic control, the applicable airspace requirements include the Single European Sky legislation.

AMC1 SPO.IDE.S.155 Transponder

GENERAL

(a) The SSR transponders of sailplanes being operated under European air traffic control should comply with any applicable Single European Sky legislation.

(b) If the Single European Sky legislation is not applicable, the SSR transponders should operate in accordance with the relevant provisions of Volume IV of ICAO Annex 10.