Bhutan Civil Aviation Requirements

Specialised Operations (BCAR-SPO)

Initial Issue

(October 2021)

INTENTIONALLY LEFT BLAK

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Bhutan Civil Aviation Authority
Royal Government Of Bhutan
Paro : Bhutan

Foreword

The Bhutan Civil Aviation Authority is pleased to issue Bhutan Civil Aviation Requirements- Specialized Operations (BCAR-SPO) initial issue establishing technical requirements to be fulfilled by the specialized operators for the implementation and enforcement of Civil Aviation Act of Bhutan 2016 and rules and regulations regarding civil air operations.

These requirements have been developed under the South Asian Regional Initiatives (SARI OPS) to harmonize the air operations requirements in the region.

This BCAR-SPO shall supersede the air operations rules and regulations issued earlier and shall come into force from 01 August 2022.

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RECORD OF AMENDMENTS

Issue No	Rev No	Particulars of Issue/ Revision	Amendment Date	Entered By
01	00	Initial issue	01 October 2021	Flight operations

LIST OF EFFECTIVE PAGES

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BCAR.SPO.GEN.005 Scope

(a) This BCAR applies to any specialised operation in day VFR where the aircraft is used for specialised activities such as agriculture, construction, photography, surveying, observation and patrol, aerial advertisement in Bhutan.

(b) Not applicable

(c) Not applicable

AMC1 BCAR.SPO.GEN.005 Scope

CRITERIA

The operators should consider the following criteria to determine whether an activity falls within the scope of specialised operations:

(a) the aircraft is flown close to the surface to fulfil the mission;

(b) abnormal manoeuvres are performed;

(c) special equipment is necessary to fulfil the mission and which affects the manoeuvrability of the aircraft;

(d) substances are released from the aircraft during the flight where these substances are either harmful or affect the manoeuvrability of the aircraft;

(e) external loads or goods are lifted or towed; or

(f) persons enter or leave the aircraft during flight.

GM1 BCAR.SPO.GEN.005 Scope

LIST OF SPECIALISED OPERATIONS

(a) Specialised operations include the following activities:

(1) helicopter external loads operations;

(2) helicopter survey operations;

(3) human external cargo operations;

(4) not applicable;

(5) agricultural flights;

(6) aerial photography flights;

(7) not applicable

(8) aerial advertising flights;

(9) not applicable;

(10) construction work flights, including stringing power line operations, clearing saw operations;

(11) not applicable;

(12) not applicable;

(13) survey operations, including aerial mapping operations, pollution control activity;

(14) news media flights, television and movie flights;

(15) special events flights, including such as flying display and competition flights;

(16) not applicable;

(17) not applicable;

(18) not applicable;

(19) scientific research flights;

(20) cloud seeding; and

(21) not applicable.

(b) For other operations, the operator can apply the criteria specified in AMC1 BCAR.SPO.GEN.005 to determine whether an activity falls within the scope of specialised operations.

SUBPART A: GENERAL REQUIREMENTS

BCAR.SPO.GEN.100 Competent authority

The competent authority shall be the authority designated by the State in which the operator has its principal place of business or is residing.

BCAR.SPO.GEN.101 Means of compliance

Not applicable

BCAR.SPO.GEN.105 Crew responsibilities

(a) The crew member shall be responsible for the proper execution of his/her duties. Crew duties shall be specified in the standard operating procedures (SOP) and, where appropriate, in the operations manual.

(b) during critical phases of flight or whenever deemed necessary by the pilot-in-command in the interest of safety, the crew member shall be restrained at his/her assigned station unless otherwise specified in the SOP.

(c) During flight, the flight crew member shall keep his/her safety belt fastened while at his/her station.

(d) During flight, at least one qualified flight crew member shall remain at the controls of the aircraft at all times.

(e) The crew member shall not undertake duties on an aircraft:

(1) if he/she knows or suspects that he/she is suffering from fatigue as referred to in applicable requirements or feels otherwise unfit to perform his/her duties; or

(2) when under the influence of psychoactive substances or alcohol or for other reasons as referred to in applicable requirements.

(f) The crew member who undertakes duties for more than one operator shall:

(1) maintain his/her individual records regarding flight and duty times and rest periods as referred to in BCAR-ORO, Subpart FTL, if applicable; and

(2) provide each operator with the data needed to schedule activities in accordance with the applicable FTL requirements.

(g) The crew member shall report to the pilot-in-command:

(1) any fault, failure, malfunction or defect, which he/she believes may affect the airworthiness or safe operation of the aircraft, including emergency systems; and

(2) any incident that was endangering, or could endanger, the safety of the operation.

GM1 BCAR.SPO.GEN.105 (e)(2) Crew member responsibilities

GENERAL

In accordance with this BCAR, a crew member must not perform duties on board an aircraft when under the influence of psychoactive substances or alcohol or when unfit due to injury, fatigue, medication, sickness or other similar causes. This should be understood as including the following:

(a) effects of deep water diving and blood donation, and allowing for a certain time period between these activities and returning to flying; and

(b) without prejudice to more restrictive national regulations, the consumption of alcohol while on duty or less than 8 hours prior to the commencement of duties, and commencing a flight duty period with a blood alcohol level in excess of 0.2 per thousand.

BCAR.SPO.GEN.106 Task specialists responsibilities

(a) The task specialist shall be responsible for the proper execution of his/her duties. Task specialists' duties shall be specified in the SOP.

(b) during critical phases of flight or whenever deemed necessary by the pilot-in-command in the interest of safety, the task specialist shall be restrained at his/her assigned station unless otherwise specified in the SOP.

(c) The task specialist shall ensure that he/she is restrained when carrying out specialised tasks with external doors opened or removed.

(d) The task specialist shall report to the pilot-in-command:

(1) any fault, failure, malfunction or defect, which he/she believes may affect the airworthiness or safe operation of the aircraft, including emergency systems; and

(2) any incident that was endangering, or could endanger, the safety of the operation.

BCAR.SPO.GEN.107 Pilot-in-command responsibilities and authority

(a) The pilot-in-command shall be responsible for:

(1) the safety of the aircraft and of all crew members, task specialists and cargo on board during aircraft operations;

(2) the initiation, continuation, termination or diversion of a flight in the interest of safety;

(3) ensuring that all operational procedures and checklists are complied with in accordance with the appropriate manual;

(4) only commencing a flight if he/she is satisfied that all operational limitations referred in applicable requirements are complied with, as follows:

(i) the aircraft is airworthy;

(ii) the aircraft is duly registered;

(iii) instruments and equipment required for the execution of that flight are installed in the aircraft and are operative, unless operation with inoperative equipment is permitted by the minimum equipment list (MEL) or equivalent document, if applicable, as required in BCAR.SPO.IDE.A.105, BCAR.SPO.IDE.H.105;

(iv) the mass of the aircraft and, except in the case of balloons, the centre of gravity location are such that the flight can be conducted within limits prescribed in the airworthiness documentation;

(v) all equipment and baggage is properly loaded and secured;

(vi) the aircraft operating limitations as specified in the aircraft flight manual (AFM) will not be exceeded at any time during the flight; and

(vii) any navigational database required for PBN is suitable and current;

(5) not commencing a flight if he/she, or any other crew member or task specialist is incapacitated from performing duties by any cause such as injury, sickness, fatigue or the effects of any psychoactive substance;

(6) not continuing a flight beyond the nearest weather-permissible aerodrome or operating site when his/her or any other crew member or task specialist's capacity to perform duties is significantly reduced from causes such as fatigue, sickness or lack of oxygen;

(7) deciding on acceptance of the aircraft with unserviceabilities in accordance with the configuration deviation list (CDL) or MEL, if applicable;

(8) recording utilisation data and all known or suspected defects in the aircraft at the termination of the flight, or series of flights, in the aircraft technical log or journey log for the aircraft; and

(9) ensuring that:

(i) flight recorders are not disabled or switched off during flight;

(ii) in the event of an occurrence other than an accident or a serious incident that shall be reported according to ORO.GEN.160(a), flight recorders' recordings are not intentionally erased; and

(iii) in the event of an accident or a serious incident, or if preservation of recordings of flight recorders is directed by the investigating authority:

(A) flight recorders' recordings are not intentionally erased;

(B) flight recorders are deactivated immediately after the flight is completed; and

(C) precautionary measures to preserve the recordings of flight recorders are taken before leaving the flight crew compartment.

(b) The pilot-in-command shall have the authority to refuse carriage of or disembark any person or cargo that may represent a potential hazard to the safety of the aircraft or its occupants.

(c) The pilot-in-command shall, as soon as possible, report to the appropriate air traffic services (ATS) unit any hazardous weather or flight conditions encountered that are likely to affect the safety of other aircraft.

(d) Notwithstanding the provision of (a)(6), in a multi-crew operation the pilot-in-command may continue a flight beyond the nearest weather-permissible aerodrome when adequate mitigating procedures are in place.

(e) The pilot-in-command shall, in an emergency situation that requires immediate decision and action, take any action he/she considers necessary under the circumstances in accordance with applicable requirements. In such cases he/she may deviate from rules, operational procedures and methods in the interest of safety.

(f) The pilot-in-command shall submit a report of an act of unlawful interference without delay to the competent authority and shall inform the designated local authority.

(g) The pilot-in-command shall notify the nearest appropriate authority by the quickest available means of any accident involving the aircraft that results in serious injury or death of any person or substantial damage to the aircraft or property.

AMC1 BCAR.SPO.GEN.107 Pilot-in-command responsibilities and authority

FLIGHT PREPARATION FOR PBN OPERATIONS

Not applicable

AMC2 BCAR.SPO.GEN.107 Pilot-in-command responsibilities and authority

DATABASE SUITABILITY AND CURRENCY

Not applicable

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

GENERAL

In accordance with applicable requirements, 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) not applicable

(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;

GM1 BCAR.SPO.GEN.107(a)(8) Pilot-in-command responsibilities and authority

RECORDING UTILISATION DATA

Where an aircraft conducts a series of flights of short duration — such as a helicopter doing a series of lifts — and the aircraft is operated by the same pilot-in-command, the utilisation data for the series of flights may be recorded in the aircraft technical log or journey log as a single entry.

GM1 BCAR.SPO.GEN.107(a)(9) Pilot-in-command responsibilities and authority

IDENTIFICATION OF THE SEVERITY OF AN OCCURRENCE BY THE PILOT-IN-COMMAND

The definitions of an accident and a serious incident as well as examples thereof can be found in Civil Aviation Act of Bhutan 2016.

AMC1 BCAR.SPO.GEN.107(c) Pilot-in-command responsibilities and authority

REPORTING OF HAZARDOUS FLIGHT CONDITIONS

(a) These reports should include any detail which may be pertinent to the safety of other aircraft.

(b) Such reports should be made whenever any of the following conditions are encountered or observed:

(1) severe turbulence;

(2) severe icing;

(3) severe mountain wave;

(4) thunderstorms, with or without hail, that are obscured, embedded, widespread or in squall lines;

(5) heavy dust storm or heavy sandstorm;

(6) not applicable

(7) not applicable.

(c) When other meteorological conditions not listed above, e.g. wind shear, are encountered that, in the opinion of the pilot-in-command, may affect the safety or the efficiency of other aircraft operations, the pilot-in-command should advise the appropriate air traffic services (ATS) unit as soon as practicable.

AMC1 BCAR.SPO.GEN.107 (e) Pilot-in-command responsibilities and authority

VIOLATION REPORTING

If required by the State in which the incident occurs, the pilot-in-command should submit a report on any such violation to the appropriate authority of the said State; in that event, the pilot-in-command should also submit a copy of it to the BCAA. Such reports should be submitted as soon as possible and normally within 10 days.

BCAR.SPO.GEN.110 Compliance with laws, regulations and procedures

The pilot-in-command, crew members and task specialists shall comply with the laws, regulations and procedures of Bhutan.

BCAR.SPO.GEN.115 Common language

The operator shall ensure that all crew members and task specialists are able to communicate with each other in a common language.

BCAR.SPO.GEN.119 taxiing of aircraft

The operator shall establish procedures for taxiing of aircraft in order to ensure safe operation and in order to enhance runway safety.

AMC1 BCAR.SPO.GEN.119 taxiing of aircraft

PROCEDURES FOR TAXIING

Procedures for taxiing should include at least the following:

(a) application of sterile flight deck crew compartment procedures:

(b) use of standard radio-telephony (RTF) phraseology;

(c) use of lights;

(d) measures to enhance the situational awareness of the pilot-in-command. The following list of typical items should be adapted by the operator to take into account its operational environment:

(1) the pilot-in-command should have the necessary aerodrome layout charts available;

(2) if applicable, the pilot taxiing the aircraft should announce in advance his/her intentions to the pilot monitoring;

(3) if applicable, all taxi clearances should be heard, and should be understood by the pilot-in-command;

(4) if applicable, all taxi clearances should be cross-checked against the aerodrome chart and aerodrome surface markings, signs and lights;

(5) an aircraft taxiing on the manoeuvring area should stop and hold at all lighted stop bars, and may proceed further when an explicit clearance to enter or cross the runway has been issued by the aerodrome control tower, and when the stop bar lights are switched off;

(6) if the pilot-in-command is unsure of his/her position, he/she should stop the aircraft and contact air traffic control;

(7) any action, which may disturb the pilot-in-command from the taxi activity, should be avoided or done with the parking brake set.

BCAR.SPO.GEN.120 taxiing of aeroplanes

Reserved

BCAR.SPO.GEN.125 Rotor engagement

A helicopter rotor shall only be turned under power for the purpose of flight with a qualified pilot at the controls.

GM1 BCAR.SPO.GEN.125 Rotor engagement

INTENT OF THE RULE

(a) The following two situations where it is allowed to turn the rotor under power should be distinguished:

(1) for the purpose of flight, as described in the implementing rule;

(2) for maintenance purposes.

(b) Rotor engagement for the purpose of flight: it should be noted that the pilot should not leave the control when the rotors are turning. For example, the pilot is not allowed to get out of the aircraft in order to welcome persons and adjust their seat belts with the rotors turning.

(c) Rotor engagement for the purpose of maintenance: the implementing rule, however, should not prevent ground runs being conducted by qualified personnel other than pilots for maintenance purposes.

The following conditions should be applied:

(1) The operator should ensure that the qualification of personnel, other than pilots, who are authorised to conduct maintenance runs, is described in the appropriate manual.

(2) Ground runs should not include taxiing the helicopter.

(3) There should be no other persons on board.

(4) Maintenance runs should not include collective increase or auto pilot engagement (risk of ground resonance).

BCAR.SPO.GEN.130 Portable electronic devices

The operator shall not permit any person to use a portable electronic device (PED) on board an aircraft that could adversely affect the performance of the aircraft's systems and equipment.

GM1 BCAR.SPO.GEN.130 Portable electronic devices

DEFINITIONS

(a) Definition and categories of PEDs

PEDs are any kind of electronic device, typically but not limited to consumer electronics, brought on board the aircraft by crew members, passengers, or as part of the cargo and that are not included in the approved aircraft configuration. All equipment that is able to consume electrical energy falls under this definition. The electrical energy can be provided from internal sources as batteries (chargeable or non-rechargeable) or the devices may also be connected to specific aircraft power sources.

PEDs include the following two categories:

(1) Non-intentional transmitters can non-intentionally radiate RF transmissions, sometimes referred to as spurious emissions. This category includes, but is not limited to, calculators, cameras, radio receivers, audio and video players, electronic games and toys; when these devices are not equipped with a transmitting function.

(2) Intentional transmitters radiate RF transmissions on specific frequencies as part of their intended function. In addition, they may radiate non-intentional transmissions like any PED. The term 'transmitting PED' (T-PED) is used to identify the transmitting capability of the PED. Intentional transmitters are transmitting devices such as RF-based remote control equipment, which may include some toys, two-way radios (sometimes referred to as private mobile radio), mobile phones of any type, satellite phones, computers with mobile phone data connection, wireless local area network (WLAN) or Bluetooth capability. After deactivation of the transmitting capability, e.g. by activating the so-called 'flight mode' or 'flight safety mode', the T-PED remains a PED having non-intentional emissions.

(b) Definition of the switched-off status

Many PEDs are not completely disconnected from the internal power source when switched off. The switching function may leave some remaining functionality e.g. data storage, timer, clock, etc. These devices can be considered switched off when in the deactivated status. The same applies for devices having no transmitting capability and are operated by coin cells without further deactivation capability, e.g. wrist watches.

GM2 BCAR.SPO.GEN.130 Portable electronic devices

GENERAL

(a) PEDs can pose a risk of interference with electronically operated aircraft systems. Those systems could range from the electronic engine control, instruments, navigation or communication equipment and autopilots to any other type of avionic equipment on the aircraft. The interference can result in on-board systems malfunctioning or providing misleading information and communication disturbance. These can also lead to an increased workload for the flight crew.

(b) Interference may be caused by transmitters being part of the PED's functionality or by unintentional transmissions from the PED. Due to the likely proximity of the PED to any electronically operated aircraft system and the generally limited shielding found in small aircraft, the risk of interference is to be considered higher than that for larger aircraft with metal airframes.

(c) During certification of the aircraft, when qualifying the aircraft functions consideration may only have been made of short-term exposure to a high radiating field, with an acceptable mitigating measure being a return to normal function after removal of the threat. This certification assumption may not be true when operating the transmitting PED on board the aircraft.

(d) It has been found that compliance with the electromagnetic compatibility (EMC) Directive 2004/108/EC and related European standards as indicated by the CE marking is not sufficient to exclude the existence of interference. A well-known interference is the demodulation of the transmitted signal from GSM (global system for mobile communications) mobile phones leading to audio disturbances in other systems. Similar interferences are difficult to predict during the PED design and protecting the aircraft's electronic systems against the full range of potential interferences is practically impossible. Therefore, not operating PEDs on-board aircraft is the safest option, especially as effects may not be identified immediately but under the most inconvenient circumstances.

(e) Guidance to follow in case of fire caused by PEDs is provided by the International Civil Aviation Organisation, 'Emergency response guidance for aircraft incidents involving dangerous goods', ICAO Doc 9481-AN/928.

BCAR.SPO.GEN.131 use of electronic flight bags (EFBs)

(a) Where an EFB is used on board an aircraft, the operator shall ensure that it does not adversely affect the performance of the aircraft systems or equipment, or the ability of the flight crew member to operate the aircraft.

(b) Prior to using a type B EFB application, the operator shall:

(1) conduct a risk assessment related to the use of the EFB device that hosts the application, to the EFB application concerned and its associated function(s), identifying the associated risks and ensuring that they are appropriately mitigated; the risk assessment shall address the risks associated with the human–machine interface of the EFB device and the EFB application concerned; and

(2) Establish an EFB administration system, including procedures and training requirements for the administration and use of the EFB device and the EFB application.

AMC1 BCAR.SPO.GEN.131 (a) use of electronic flight bags (EFBs)

ELECTRONIC FLIGHT BAGS (EFBS) — HARDWARE — COMPLEX AIRCRAFT

In 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.

AMC2 BCAR.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.

AMC1 BCAR.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.

AMC2 BCAR.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.

AMC1 BCAR.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.

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.

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.

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.

(f) 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.

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.

AMC4 SPO.GEN.131 (b)(2) Use of electronic flight bags (EFBs)

PERFORMANCE AND MASS AND BALANCE APPLICATIONS — COMPLEX AIRCRAFT

(a) General

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.

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 need 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.

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.

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.

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.

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.

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.

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.

GM2 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.

BCAR.SPO.GEN.135 Information on emergency and survival equipment carried

The operator shall, at all times, have available for immediate communication to rescue coordination centres (RCCs) lists containing information on the emergency and survival equipment carried on board.

AMC1 BCAR.SPO.GEN.135 Information on emergency and survival equipment carried

CONTENT OF INFORMATION

The information, compiled in a list, should include, as applicable:

(a) the number, colour and type of life rafts and pyrotechnics;

(b) details of emergency medical supplies and water supplies; and

(c) the type and frequencies of the emergency portable radio equipment.

BCAR.SPO.GEN.140 Documents, manuals and information to be carried

(a) The following documents, manuals and information shall be carried on each flight as originals or copies unless otherwise specified below:

(1) the AFM, or equivalent document(s);

(2) the original certificate of registration;

(3) the original certificate of airworthiness (CofA);

(4) the noise certificate, if applicable;

(5) a copy of the declaration as specified in ORO.DEC.100 and, if applicable, a copy of the authorisation as specified in ORO..SPO.110;

(6) the list of specific approvals, if applicable;

(7) the aircraft radio licence, if applicable;

(8) the third party liability insurance certificate(s);

(9) the journey log, or equivalent, for the aircraft;

(10) the aircraft technical log, in accordance with BCAR – M, if applicable;

(11) details of the filled ATS flight plan, if applicable;

(12) current and suitable aeronautical charts for the route/area of the proposed flight and all routes along which it is reasonable to expect that the flight may be diverted;

(13) procedures and visual signals information for use by intercepting and intercepted aircraft;

(14) information concerning search and rescue services for the area of the intended flight;

(15) the current parts of the operations manual and/or SOP or AFM that are relevant to the duties of crew members and task specialists, which shall be easily accessible to them;

(16) the MEL or CDL, if applicable;

(17) appropriate notices to airmen (NOTAMs) and aeronautical information service (AIS) briefing documentation;

(18) appropriate meteorological information, if applicable;

(19) cargo manifests, if applicable; and

(20) any other documentation that may be pertinent to the flight or is required by the States concerned with the flight.

(21) appropriate crew license as applicable.

(b) Notwithstanding (a), the documents and information in (a)(2) to (a)(11) and (a)(14), (a)(17), (a)(18) and (a)(19) may be retained at the aerodrome or operating site on flights:

(1) intending to take off and land at the same aerodrome or operating site; or

(2) remaining within a distance or area determined by the competent authority in accordance with ARO.OPS.210.

(c) In case of loss or theft of documents specified in (a)(2) to (a)(8), the operation may continue until the flight reaches its destination or a place where replacement documents can be provided.

(d) The operator shall make available, within a reasonable time of being requested to do so by the BCAA, the documentation required to be carried on board.

AMC1 BCAR.SPO.GEN.140 Documents, manuals and information to be carried

GENERAL

The documents, manuals and information may be available in a form other than on printed paper. An electronic storage medium is acceptable if accessibility, usability and reliability can be assured.

GM1 BCAR.SPO.GEN.140 (a)(1) Documents, manuals and information to be carried

AFM OR EQUIVALENT DOCUMENT

'Aircraft flight manual (AFM), or equivalent document' means the flight manual for the aircraft or other documents containing information required for the operation of the aircraft within the terms of its certificate of airworthiness, unless these data are available in the parts of the operations manual carried on board.

AMC1 BCAR.SPO.GEN.140 (a)(3) Documents, manuals and information to be carried

CERTIFICATE OF AIRWORTHINESS

The certificate of airworthiness should be a normal certificate of airworthiness, a restricted certificate of airworthiness or a permit to fly issued in accordance with the applicable airworthiness requirements.

GM1 BCAR.SPO.GEN.140 (a)(9) Documents, manuals and information to be carried

JOURNEY LOG OR EQUIVALENT

'Journey log or equivalent' means in this context that the required information may be recorded in documentation other than a log book, such as the operational flight plan or the aircraft technical log.

AMC1 BCAR.SPO.GEN.140 (a)(12) Documents, manuals and information to be carried

CURRENT AND SUITABLE AERONAUTICAL CHARTS

(a) The aeronautical charts carried should contain data appropriate to the applicable air traffic regulations, rules of the air, flight altitudes, area/route and nature of the operation. Due consideration should be given to carriage of textual and graphic representations of:

(1) aeronautical data including, as appropriate for the nature of the operation:

(i) airspace structure;

(ii) significant points, navigation aids (navaids) and air traffic services (ATS) routes;

(iii) navigation and communication frequencies;

(iv) prohibited, restricted and danger areas; and

(v) sites of other relevant activities that may hazard the flight; and

(2) topographical data, including terrain and obstacle data.

(b) A combination of different charts and textual data may be used to provide adequate and current data.

(c) The aeronautical data should be appropriate for the current aeronautical information regulation and control (AIRAC) cycle.

(d) The topographical data should be reasonably recent, having regard to the nature of the planned operation.

AMC1 BCAR.SPO.GEN.140 (a)(13) Documents, manuals and information to be carried

PROCEDURES AND VISUAL SIGNALS FOR USE BY INTERCEPTING AND INTERCEPTED AIRCRAFT

The procedures and the visual signals information for use by intercepting and intercepted aircraft should reflect those contained in the International Civil Aviation Organisation's (ICAO) Annex 2. This may be part of the operations manual.

GM1 BCAR.SPO.GEN.140 (a) (14) Documents, manuals and information to be carried

SEARCH AND RESCUE INFORMATION

This information is usually found in the State's aeronautical information publication.

GM1 BCAR.SPO.GEN.140 (a) (20) Documents, manuals and information to be carried

DOCUMENTS THAT MAY BE PERTINENT TO THE FLIGHT

Any other documents that may be pertinent to the flight or required by the States concerned with the flight may include, for example, forms to comply with reporting requirements.

STATES CONCERNED WITH THE FLIGHT

The States concerned are those of origin, transit, over flight and destination of the flight.

BCAR.SPO.GEN.145 handling of flight recorder recordings: preservation, production, protection and use

(a) Following an accident, a serious incident or an occurrence identified by the investigating authority, the operator of an aircraft shall preserve the original recorded data of the flight recorders for a period of 60 days or until otherwise directed by the investigating authority.

(b) The operator shall conduct operational checks and evaluations of recordings to ensure the continued serviceability of the flight recorders which are required to be carried.

(c) The operator shall ensure that the recordings of flight parameters and data link communication messages required to be recorded on flight recorders are preserved. However, for the purpose of testing and maintaining those flight recorders, up to 1 hour of the oldest recorded data at the time of testing may be erased.

(d) The operator shall keep and maintain up to date documentation that presents the necessary information to convert raw flight data into flight parameters expressed in engineering units.

(e) The operator shall make available any flight recorder recordings that have been preserved, if so determined by the competent authority.

(f) Without prejudice to Regulations, and except for ensuring flight recorder serviceability:

(1) audio recordings from a flight recorder shall not be disclosed or used unless all the following conditions are fulfilled:

(i) a procedure related to the handling of such audio recordings and of their transcript is in place;

(ii) all crew members and maintenance personnel concerned have given their prior consent; and

(iii) such audio recordings are used only for maintaining or improving safety.

(1a) When flight recorder audio recordings are inspected for ensuring flight recorder serviceability, the operator shall protect the privacy of those audio recordings and make sure that they are not disclosed or used for purposes other than ensuring flight recorder serviceability.

(2) Flight parameters or data link messages recorded by a flight recorder shall not be used for purposes other than for the investigation of an accident or an incident that is subject to mandatory reporting. That limitation shall not apply, unless such recordings meet any of the following conditions:

(i) are used by the operator for airworthiness or maintenance purposes only;

(ii) are de-identified; or

(iii) are disclosed under secure procedures.

(3) Except for ensuring flight recorder serviceability, images of the flight crew compartment that are recorded by a flight recorder shall not be disclosed or used unless all of the following conditions are fulfilled:

(i) a procedure related to the handling of such image recordings is in place;

(ii) all crew members and maintenance personnel concerned have given their prior consent;

(iii) such image recordings are used only for maintaining or improving safety.

(3a) When images of the flight crew compartment that are recorded by a flight recorder are inspected for ensuring the serviceability of the flight recorder, then:

(i) those images shall not be disclosed or used for purposes other than ensuring flight recorder serviceability;

(ii) if body parts of crew members are likely to be visible on the images, the operator shall ensure the privacy of those images.

AMC1 BCAR.SPO.GEN.145 (a) Handling of flight recorder recordings: preservation, production, protection and use

PRESERVATION OF RECORDED DATA FOR INVESTIGATION

(a) The operator should establish procedures to ensure that flight recorder recordings are preserved for the investigating authority.

(b) These procedures should include:

(1) instructions for flight crew members to deactivate the flight recorders immediately after completion of the flight and inform relevant personnel that the recording of the flight recorders should be preserved. These instructions should be readily available on board; and

(2) instructions to prevent inadvertent reactivation, test, repair or reinstallation of the flight recorders by operator personnel or during maintenance or ground handling activities performed by third parties.

GM1 BCAR.SPO.GEN.145 (a) Handling of flight recorder recordings: preservation, production, protection and use

REMOVAL OF RECORDERS IN CASE OF AN INVESTIGATION

The need for removal of the recorders from the aircraft is determined by the investigating authority with due regard to the seriousness of an occurrence and the circumstances, including the impact on the operation.

AMC1 BCAR.SPO.GEN.145 (b) Handling of flight recorder recordings: preservation, production, protection and use

INSPECTIONS AND CHECKS OF RECORDINGS

Whenever a flight recorder is required to be carried:

(a) the operator should perform an inspection of the FDR recording and the CVR recording every year unless one or more of the following applies:

(1) If the flight recorder records on magnetic wire or uses frequency modulation technology, the time interval between two inspections of the recording should not exceed three months.

(2) If the flight recorder is solid-state and the flight recorder system is fitted with continuous monitoring for proper operation, the time interval between two inspections of the recording may be up to two years.

(3) In the case of an aircraft equipped with two solid-state flight data and cockpit voice combination recorders, where

(i) the flight recorder systems are fitted with continuous monitoring for proper operation, and

(ii) the flight recorders share the same flight data acquisition,

a comprehensive inspection of the recording needs only to be performed for one flight recorder position. The inspection of the recordings should be performed alternately so that each flight recorder position is inspected at least every four years.

(4) Where all of the following conditions are met, the inspection of FDR recording is not needed:

(i) the aircraft flight data are collected in the frame of a flight data monitoring (FDM) programme;

(ii) the data acquisition of mandatory flight parameters is the same for the FDR and for the recorder used for the FDM programme;

(iii) an inspection similar to the inspection of the FDR recording and covering all mandatory flight parameters is conducted on the FDM data at time intervals not exceeding two years; and

(iv) the FDR is solid-state and the FDR system is fitted with 'continuous monitoring for proper operation'.

(b) the operator should perform every five years an inspection of the data link recording.

(c) when installed, the aural or visual means for preflight checking the flight recorders for proper operation should be used every day. When no such means is available for a flight recorder, the operator should perform an operational check of this flight recorder at time intervals not exceeding seven calendar days of operation.

(d) the operator should check every five years, or in accordance with the recommendations of the sensor manufacturer, that the parameters dedicated to the FDR and not monitored by other means are being recorded within the calibration tolerances and that there is no discrepancy in the engineering conversion routines for these parameters.

GM1 BCAR.SPO.GEN.145 (b) Handling of flight recorder recordings: preservation, production, protection and use

INSPECTION OF THE FLIGHT RECORDERS RECORDING

(a) The inspection of the FDR recording usually consists of the following:

(1) Making a copy of the complete recording file.

(2) Converting the recording to parameters expressed in engineering units in accordance with the documentation required to be held.

(3) Examining a whole flight in engineering units to evaluate the validity of all mandatory parameters. This could reveal defects or noise in the measuring and processing chains and indicate necessary maintenance actions. The following should be considered:

(i) when applicable, each parameter should be expressed in engineering units and checked for different values of its operational range. For this purpose, some parameters may need to be inspected at different flight phases; and

(ii) if the parameter is delivered by a digital data bus and the same data are utilised for the operation of the aircraft, then a reasonableness check may be sufficient; otherwise a correlation check may need to be performed:

(A) a reasonableness check is understood in this context as a subjective, qualitative evaluation, requiring technical judgement, of the recordings from a complete flight; and

(B) a correlation check is understood in this context as the process of comparing data recorded by the flight data recorder against the corresponding data derived from flight instruments, indicators or the expected values obtained

during specified portion(s) of a flight profile or during ground checks that are conducted for that purpose.

(4) Retaining the most recent copy of the complete recording file and the corresponding recording inspection report that includes references to the documentation required to be held.

(b) When performing the CVR recording inspection, precautions need to be taken to comply with BCAR.SPO.GEN.145(f)(1a).The inspection of the CVR recording usually consists of:

(1) checking that the CVR operates correctly for the nominal duration of the recording;

(2) examining, where practicable, a sample of in-flight recording of the CVR for evidence that the signal is acceptable on each channel; and

(3) preparing and retaining an inspection report.

(c) The inspection of the DLR recording usually consists of:

(1) Checking the consistency of the data link recording with other recordings for example, during a designated flight, the flight crew speaks out a few data link messages sent and received. After the flight, the data link recording and the CVR recording are compared for consistency.

(2) Retaining the most recent copy of the complete recording and the corresponding inspection report.

GM2 BCAR.SPO.GEN.145 (b) Handling of flight recorder recordings: preservation, production, protection and use

MONITORING AND CHECKING THE PROPER OPERATION OF FLIGHT RECORDERS – EXPLANATION OF TERMS

For the understanding of the terms used in AMC1 BCAR.SPO.GEN.145(b):

(a) 'operational check of the flight recorder' means a check of the flight recorder for proper operation. It is not a check of the quality of the recording and, therefore, it is not equivalent to an inspection of the recording. This check can be carried out by the flight crew or through a maintenance task.

(b) 'aural or visual means for preflight checking the flight recorders for proper operation' means an aural or visual means for the flight crew to check before the flight the results of an automatically or manually initiated test of the flight recorders for proper operation. Such a means provides for an operational check that can be performed by the flight crew.

(c) 'flight recorder system' means the flight recorder, its dedicated sensors and transducers, as well as its dedicated acquisition and processing equipment.

(d) 'continuous monitoring for proper operation' means for a flight recorder system, a combination of system monitors and/or built-in test functions which operates continuously in order to detect the following:

(1) loss of electrical power to the flight recorder system;

(2) failure of the equipment performing acquisition and processing;

(3) failure of the recording medium and/or drive mechanism; and

(4) failure of the recorder to store the data in the recording medium as shown by checks of the recorded data including, as reasonably practicable for the storage medium concerned, correct correspondence with the input data.

However, detections by the continuous monitoring for proper operation do not need to be automatically reported to the flight crew compartment.

GM3 BCAR.SPO.GEN.145 (b) Handling of flight recorder recordings: preservation, production, protection and use

CVR AUDIO QUALITY

Examples of CVR audio quality issues and possible causes thereof may be found in the document of the French Bureau d'Enquêtes et d'Analyses, titled 'Study on detection of audio anomalies on CVR recordings' and dated September 2015[1].

AMC1 BCAR.SPO.GEN.145 (f) Handling of flight recorder recordings: preservation, production, protection and use

USE OF CVR RECORDINGS FOR MAINTAINING OR IMPROVING SAFETY

(a) The procedure related to the handling of cockpit voice recorder (CVR) recordings should be written in a document which should be signed by all parties (aircraft operator, crew members, maintenance personnel if applicable). This procedure should, as a minimum, define:

(1) the method to obtain the consent of all crew members and maintenance personnel concerned;

(2) an access and security policy that restricts access to CVR recordings and identified CVR transcripts to specifically authorised persons identified by their position;

(3) a retention policy and accountability, including the measures to be taken to ensure the security of the CVR recordings and CVR transcripts and their protection from misuse. The retention policy should specify the period of time after which CVR recordings and identified CVR transcripts are destroyed; and

(4) a description of the uses made of the CVR recordings and of their transcripts.

(b) Each time a CVR recording file is read out under the conditions defined by BCAR.SPO.GEN.145(f)(1):

(1) parts of the CVR recording file that contain information with a privacy content should be deleted to the extent possible, and it should not be permitted that the detail of information with a privacy content is transcribed;

(2) the operator should retain, and when requested, provide to the competent authority:

(i) information on the use made (or the intended use) of the CVR recording; and

(ii) evidence that the persons concerned consented to the use made (or the intended use) of the CVR recording file.

(c) The person who fulfils the role of a safety manager should also be responsible for the protection and the use of the CVR recordings and the CVR transcripts.

(d) In case a third party is involved in the use of CVR recordings, contractual agreements with this third party should, when applicable, cover the aspects enumerated in (a) and (b).

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AMC2 BCAR.SPO.GEN.145 (f) Handling of flight recorder recordings: preservation, production, protection and use

CVR RECORDING INSPECTION FOR ENSURING SERVICEABILITY

(a) When an inspection of the CVR recording is performed for ensuring audio quality and intelligibility of recorded communications:

(1) the privacy of the CVR recording should be ensured (e.g. by locating the equipment in a separated area and/or using headsets);

(2) access to the CVR replay equipment should be restricted to specifically authorised persons;

(3) provision should be made for the secure storage of the CVR recording medium, the CVR recording files and copies thereof;

(4) the CVR recording files and copies thereof should be destroyed not earlier than two months and not later than one year after completion of the CVR recording inspection, except that audio samples may be retained for enhancing the CVR recording inspection (e.g. for comparing audio quality); and

(5) only the accountable manager of the operator, and when identified to comply with ORO.GEN.200, the person fulfilling the role of safety manager, should be entitled to request a copy of the CVR recording file.

(b) The conditions enumerated in (a) should also be complied if the inspection of the CVR recording is subcontracted to a third party. The contractual agreements with the third party should explicitly cover these aspects.

GM1 BCAR.SPO.GEN.145 (f) Handling of flight recorder recordings: preservation, production, protection and use

USE OF CVR RECORDINGS FOR MAINTAINING OR IMPROVING SAFETY

(a) The CVR is primarily a tool for the investigation of accidents and serious incidents by investigating authorities. Misuse of CVR recordings is a breach of the right to privacy and it works against an effective safety culture inside the operator.

(b) Therefore, the use of a CVR recording, when for purposes other than CVR serviceability or those laid down by BCAR-Air Operations, should be subject to the free prior consent of the persons concerned, and framed by a procedure that is endorsed by all parties and that protects the privacy of crew members and (if applicable) maintenance staff.

BCAR.SPO.GEN.150 Transport of dangerous goods

(a) The transport of dangerous goods by air shall be conducted in accordance with BCAR-18 as last amended and the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO Doc 9284-AN/905), including its attachments, supplements and any other addenda or corrigenda.

(b) Dangerous goods shall only be transported by an operator approved in accordance with BCAR-SPA, subpart G, to BCAR-Air Operations except when:

(1) they are not subject to the Technical Instructions in accordance with Part 1 of those Instructions;

(2) they are carried by task specialists or crew members or are in baggage which has been separated from its owner, in accordance with Part 8 of the Technical Instructions;

(3) required on board the aircraft for specialised purposes in accordance with the Technical Instructions;

(4) they are used to facilitate flight safety where carriage aboard the aircraft is reasonable to ensure their timely availability for operational purposes, whether or not such articles and substances are required to be carried or intended to be used in connection with a particular flight.

(c) The operator shall establish procedures to ensure that all reasonable measures are taken to prevent dangerous goods from being carried on board inadvertently.

(d) The operator shall provide personnel with the necessary information enabling them to carry out their responsibilities, as required by the Technical Instructions.

(e) The operator shall, in accordance with the Technical Instructions, report without delay to the competent authority and the appropriate authority of the State of occurrence in the event of:

(1) any dangerous good accident or incidents;

(2) the finding of dangerous goods carried by task specialists or crew, or in their baggage, when not in accordance with Part 8 of the Technical Instructions.

(f) The operator shall ensure that task specialists are provided with information about dangerous goods.

(g) The operator shall ensure that notices giving information about the transport of dangerous goods are provided at acceptance points for cargo as required by the Technical Instructions.

GM1 BCAR.SPO.GEN.150(a) Transport of dangerous goods

GENERAL

(a) The requirement to transport dangerous goods by air in accordance with the Technical Instructions is irrespective of whether:

(1) the flight is wholly or partly within or wholly outside the territory of a State; or

(2) an approval to carry dangerous goods in accordance with BCAR-SPA, Subpart DG is held.

(b) The Technical Instructions provide that in certain circumstances dangerous goods, which are normally forbidden on an aircraft, may be carried. These circumstances include cases of extreme urgency or, when other forms of transport are inappropriate or when full compliance with the prescribed requirements is contrary to the public interest. In these circumstances all the States concerned may grant exemptions from the provisions of the Technical Instructions provided that an overall level of safety that is at least equivalent to that provided by the Technical Instructions is achieved. Although exemptions are most likely to be granted for the carriage of dangerous goods that are not permitted in normal circumstances, they may also be granted in other circumstances, such as when the packaging to be used is not provided for by the appropriate packing method or the quantity in the packaging is greater than that permitted. The Technical Instructions also make provision for some dangerous goods to be carried when an approval has been granted only by the State of Origin and the BCAA.

(c) When an exemption is required, the States concerned are those of origin, transit, overflight and destination of the consignment and that of the operator. For the State of overflight, if none of the criteria for granting an exemption are relevant, an exemption may be granted based solely on whether it is believed that an equivalent level of safety in air transport has been achieved.

(d) The Technical Instructions provide that exemptions and approvals are granted by the 'appropriate national authority', which is intended to be the authority responsible for the particular aspect against which the exemption or approval is being sought. The operator should ensure that all relevant conditions on an exemption or approval are met.

(e) The exemption or approval referred to in (b) to (d) is in addition to the approval required by BCAR-SPA.

AMC1 BCAR.SPO.GEN.150 (e) Transport of dangerous goods

DANGEROUS GOODS ACCIDENT AND INCIDENT REPORTING

(a) Any type of dangerous goods incident or accident should be reported. For this purpose, the Technical Instructions consider that reporting of undeclared and misdeclared dangerous goods found in cargo also applies to items of operators' stores that are classified as dangerous goods.

(b) The first report should be dispatched within 72 hours of the event. It may be sent by any means, including e-mail, telephone or fax. This report should include the details that are known at that time, under the headings identified in (c). If necessary, a subsequent report should be made as soon as possible giving all the details that were not known at the time the first report was sent. If a report has been made verbally, written confirmation should be sent as soon as possible.

(c) The first and any subsequent report should be as precise as possible and contain the following data, where relevant:

(1) date of the incident or accident or the finding of undeclared or misdeclared dangerous goods;

(2) location and flight date;

(3) description of the goods;

(4) proper shipping name (including the technical name, if appropriate) and United Nations (UN)/identification (ID) number, when known;

(5) class or division and any subsidiary risk;

(6) type of packaging, and the packaging specification marking on it;

(7) quantity;

(8) any other relevant details;

(9) suspected cause of the incident or accident;

(10) action taken;

(11) any other reporting action taken; and

(12) name, title, address and telephone number of the person making the report.

(d) Copies of relevant documents and any photographs taken should be attached to the report.

(e) A dangerous goods accident or incident may also constitute an aircraft accident, serious incident or incident. The criteria for reporting both types of occurrence should be met.

(f) The following dangerous goods reporting form should be used, but other forms, including electronic transfer of data, may be used provided that at least the minimum information of this AMC is supplied:

<table>
<tr><td colspan="3">DANGEROUS GOODS OCCURRENCE REPORT</td><td>DGOR No:</td></tr>
<tr><td>1. Operator:</td><td colspan="2">2. Date of Occurrence:</td><td>3. Local time of occurrence:</td></tr>
<tr><td colspan="2">4. Flight date:</td><td colspan="2">5. Reserved:</td></tr>
<tr><td colspan="2">6. Departure aerodrome:</td><td colspan="2">7. Destination aerodrome:</td></tr>
<tr><td colspan="2">8. Aircraft type:</td><td colspan="2">9. Aircraft registration:</td></tr>
<tr><td colspan="2">10. Location of occurrence:</td><td colspan="2">11. Origin of the goods:</td></tr>
<tr><td colspan="4">12. Description of the occurrence, including details of injury, damage, etc.
(if necessary continue on the reverse of this form):</td></tr>
<tr><td colspan="3">13. Proper shipping name (including the technical name):</td><td>14. UN/ID No (when known):</td></tr>
<tr><td>15.Class/Division (when known):</td><td>16. Subsidiary risk(s):</td><td>17. Packing group:</td><td>18. Category (Class 7 only):</td></tr>
<tr><td>19. Type of packaging:</td><td>20.Packaging specification marking:</td><td>21. No of packages:</td><td>22. Quantity (or transport index, if applicable):</td></tr>
<tr><td colspan="4">23. Other relevant information (including suspected cause, any action taken):</td></tr>
<tr><td colspan="2">24. Name and title of person making report:</td><td colspan="2">25. Telephone No:</td></tr>
<tr><td colspan="2">26. Company:</td><td colspan="2">27. Reporters ref:</td></tr>
</table>

28. Address:	29. Signature:
	30. Date:
Description of the occurrence (continuation)	

Notes for completion of the form:

1. A dangerous goods accident and serious injury is as defined in BCAR-DEF.
2. The initial report should be dispatched unless exceptional circumstances prevent this. This occurrence report form, duly completed, should be sent as soon as possible, even if all the information is not available.
3. Copies of all relevant documents and any photographs should be attached to this report.
4. Any further information, or any information not included in the initial report, should be sent as soon as possible to the authorities identified in BCAR.SPO.GEN.150 (e).
5. Providing it is safe to do so, all dangerous goods, packaging, documents, etc. relating to the occurrence should be retained until after the initial report has been sent to the authorities identified in BCAR.SPO.GEN.150 (e), and they have indicated whether or not these should continue to be retained.

BCAR.SPO.GEN.155 Release of dangerous goods

The operator shall not operate an aircraft over congested areas of cities, towns or settlements or over an open-air assembly of persons when releasing dangerous goods.

BCAR.SPO.GEN.160 Carriage and use of weapons

(a) The operator shall ensure that, when weapons are carried on a flight for the purpose of a specialised task, these are secured when not in use.

(b) The task specialist using the weapon shall take all necessary measures to prevent the aircraft and persons on board or on the ground from being endangered.

BCAR.SPO.GEN.165 Admission to the flight crew compartment

The pilot-in-command shall make the final decision regarding the admission to the flight crew compartment and shall ensure that:

(a) admission to the flight crew compartment does not cause distraction or interference with the operation of the flight; and

(b) all persons carried in the flight crew compartment are made familiar with the relevant safety procedures.

SUBPART B: OPERATIONAL PROCEDURES

BCAR.SPO.OP.100 Use of aerodromes and operating sites

The operator shall only use aerodromes and operating sites that are adequate for the type of aircraft and operation concerned.

AMC1 BCAR.SPO.OP.100 Use of aerodromes and operating sites

USE OF OPERATING SITES MOTOR-POWERED AIRCRAFT

(a) When defining adequate operating sites for use for the type(s) of aircraft and operation(s) concerned, the operator should take account of the following:

(1) An adequate site is a site that the operator considers to be satisfactory, taking account of the applicable performance requirements and site characteristics.

(2) The operator should have in place a procedure for the survey of operating sites by a competent person. Such a procedure should take account for possible changes to the operating site characteristics that may have taken place since last surveyed.

(b) Operating sites that are pre-surveyed should be specifically specified in the operations manual. The operations manual should contain diagrams or ground and aerial photographs, depiction (pictorial) and description of:

(1) the overall dimensions of the operating site;

(2) location and height of relevant obstacles to approach and take-off profiles and in the manoeuvring area;

(3) approach and take-off flight paths;

(4) surface condition (blowing dust/snow/sand);

(5) provision of control of third parties on the ground, if applicable;

(6) lighting, if applicable;

(7) procedure for activating the operating site in accordance with national regulations, if applicable;

(8) other useful information, for example details of the appropriate ATS agency and frequency; and

(9) site suitability with reference to available aircraft performance.

(c) Where the operator specifically permits operation from sites that are not pre-surveyed, the pilot-in-command should make, from the air a judgement on the suitability of a site. At least (b)(1) to (b)(6) inclusive and (b)(9) should be considered. Operations to non-pre-surveyed operating sites by night should not be conducted.

BCAR.SPO.OP.105 Specification of isolated aerodromes — aeroplanes

Reserved

BCAR.SPO.OP.110 Aerodrome operating minima —helicopters

Reserved

BCAR.SPO.OP.111 Aerodrome operating minima — NPA, APV, CAT I operations

Not applicable

BCAR.SPO.OP.112 Aerodrome operating minima — circling operations with aeroplanes

Not applicable

BCAR.SPO.OP.113 Aerodrome Operating Minima

Not applicable

BCAR.SPO.OP.115 Departure and approach procedures —helicopters

Not applicable

BCAR.SPO.OP.116 Performance-based navigation —helicopters

Reserved

BCAR.SPO.OP.120 Noise abatement procedures

Not applicable

BCAR.SPO.OP.125 Minimum obstacle clearance altitudes — IFR flights

Not applicable

BCAR.SPO.OP.130 Fuel and oil supply — aeroplanes

Not applicable

BCAR.SPO.OP.131 Fuel and oil supply — helicopters

(a) The pilot-in-command shall only commence a flight if the helicopter carries sufficient fuel and oil for the following:

(1) for VFR flights:

(i) to fly to the aerodrome/operating site of intended landing and thereafter to fly for at least 20 minutes at best-range-speed; or

(ii) for VFR flights by day, a reserve fuel of 10 minutes at best-range-speed provided the he/she remains within 25 NM of the aerodrome/operating site of departure; and

(2) for IFR flights: Not applicable

(b) In computing the fuel required, including providing for contingency, the following shall be taken into consideration:

(1) forecast meteorological conditions;

(2) anticipated ATC routings and traffic delays;

(3) failure of one engine while en-route, where applicable; and

(4) any other condition that may delay the landing of the aircraft or increase fuel and/or oil consumption.

(c) Nothing shall preclude amendment of a flight plan in-flight, in order to re-plan the flight to another destination, provided that all requirements can be complied with from the point where the flight is re-planned.

AMC1 BCAR.SPO.OP.131 (a)(1)(ii) Fuel and oil supply — helicopters

REDUCED RESERVE FUEL

(a) The operator should specify in the SOP:

(1) the type of activity where such reduced reserve fuel may be used; and

(2) methods of reading and calculating the remaining fuel.

(b) Refuelling facilities should be available at the aerodrome/operating site.

BCAR.SPO.OP.135 Safety briefing

(a) The operator shall ensure that, prior to take-off task specialists are given a briefing on:

(1) emergency equipment and procedures;

(2) operational procedures associated with the specialised task before each flight or series of flights

(b) The briefing referred to in (a)(2) may be replaced by an initial and recurrent training programme. In such case the operator shall also define recency requirements.

AMC1 BCAR.SPO.OP.135 Safety briefing

TASK SPECIALISTS — GENERAL

(a) The purpose of operational briefing is to ensure that task specialists are familiar with all aspects of the operation, including their responsibilities.

(b) Such briefing should include, as appropriate:

(1) behaviour on the ground and in-flight, including emergency procedures;

(2) procedures for boarding and disembarking;

(3) procedures for loading and unloading the aircraft;

(4) use of doors in normal and emergency operations;

(5) use of communication equipment and hand signals;

(6) precautions in case of a landing on sloping ground; and

(7) in addition to the items listed from (b)(1) to (b)(6) before take-off:

(i) location of emergency exits;

(ii) restrictions regarding smoking;

(iii) restrictions regarding the use of portable electronic equipment; and

(iv) stowage of tools and hand baggage.

(c) The briefing may be given as a verbal presentation or by issuing the appropriate procedures and instructions in written form. Before commencement of the flight, their understanding should be confirmed.

BCAR.SPO.OP.140 Flight preparation

(a) Before commencing a flight, the pilot-in-command shall ascertain by every reasonable means available that the space-based facilities, ground and/or water facilities, including communication facilities and navigation aids available and directly required on such flight, for the safe operation of the aircraft, are adequate for the type of operation under which the flight is to be conducted.

(b) Before commencing a flight, the pilot-in-command shall be familiar with all available meteorological information appropriate to the intended flight. Preparation for a flight away from the vicinity of the place of departure shall include:

(1) a study of available current weather reports and forecasts; and

(2) the planning of an alternative course of action to provide for the eventuality that the flight cannot be completed as planned, because of weather conditions.

BCAR.SPO.OP.145 Take-off alternate aerodromes — complex motor-powered aeroplanes

Not applicable

BCAR.SPO.OP.150 Destination alternate aerodromes — aeroplanes

Not applicable

BCAR.SPO.OP.151 Destination alternate aerodromes — helicopters

Not applicable

BCAR.SPO.OP.152 Destination alternate aerodromes — instrument approach operations

Not applicable

BCAR.SPO.OP.155 Refuelling with persons embarking, on board or disembarking

(a) The aircraft shall not be refuelled with aviation gasoline (AVGAS) or wide-cut type fuel or a mixture of these types of fuel, when persons are embarking, on board or disembarking.

(b) For all other types of fuel, necessary precautions shall be taken and the aircraft shall be properly manned by qualified personnel ready to initiate and direct an evacuation of the aircraft by the most practical and expeditious means available.

AMC1 BCAR.SPO.OP.155 refuelling with persons embarking, on board or disembarking

OPERATIONAL PROCEDURES — AEROPLANES

Reserved

OPERATIONAL PROCEDURES — HELICOPTERS

(b) Operational procedures should specify that at least the following precautions are taken:

(1) Door(s) on the refuelling side of the helicopter remain closed.

(2) Door(s) on the non-refuelling side of the helicopter remain open, weather permitting.

(3) Fire fighting facilities of the appropriate scale be positioned so as to be immediately available in the event of a fire.;

(4) Sufficient qualified personnel are on board and be prepared for an immediate emergency evacuation.

(5) If the presence of fuel vapour is detected inside the helicopter, or any other hazard arises during refuelling, fuelling should be stopped immediately.

(6) The ground area beneath the exits intended for emergency evacuation be kept clear.

(7) Provision should be made for a safe and rapid evacuation.

GM1 BCAR.SPO.OP.155 Refuelling with persons embarking, on board or disembarking

AIRCRAFT REFUELLING PROVISIONS AND GUIDANCE ON SAFE REFUELLING PRACTICES

Provisions concerning aircraft refuelling are contained in Volume I (Aerodrome Design and Operations) of ICAO Annex 14 (Aerodromes), and guidance on safe refuelling practices is contained in Parts 1 and 8 of the ICAO Airport Services Manual (Doc 9137).

BCAR.SPO.OP.160 Use of headset

Each flight crew member required to be on duty in the flight crew compartment shall wear a headset with boom microphone, or equivalent, and use it as the primary device to communicate with ATS, other crew members and task specialists.

BCAR.SPO.OP.165 Smoking

The pilot-in-command shall not allow smoking on board or during refuelling or defueling of the aircraft.

BCAR.SPO.OP.170 Meteorological conditions

(a) The pilot-in-command shall only commence or continue a VFR flight if the latest available meteorological information indicates that the weather conditions along the route and at the intended destination at the estimated time of use will be at or above the applicable VFR operating minima.

(b) Not applicable

(c) Not applicable

AMC1 BCAR.SPO.OP.170 Meteorological conditions

EVALUATION OF METEOROLOGICAL CONDITIONS

Pilots should carefully evaluate the available meteorological information relevant to the proposed flight, such as applicable surface observations, winds and temperatures aloft, terminal and area forecasts, air meteorological information reports (AIRMETs), significant meteorological information (SIGMET) and pilot reports. The ultimate decision whether, when, and where to make the flight rests with the pilot-in-command. Pilots should continue to re-evaluate changing weather conditions.

AMC2 BCAR.SPO.OP.170 Meteorological conditions

APPLICATION OF AERODROME FORECASTS (TAF & TREND)

Where a terminal area forecast (TAF) or meteorological aerodrome or aeronautical report (METAR) with landing forecast (TREND) is used as forecast, the following criteria should be used:

(a) From the start of a TAF validity period up to the time of applicability of the first subsequent 'FM...' or 'BECMG' or, if no 'FM' or BECMG' is given, up to the end of the validity period of the TAF, the prevailing weather conditions forecast in the initial part of the TAF should be applied.

(b) From the time of observation of a METAR up to the time of applicability of the first subsequent 'FM...' or 'BECMG' or, if no 'FM' or BECMG' is given, up to the end of the validity period of the TREND, the prevailing weather conditions forecast in the METAR should be applied.

(c) Following FM (alone) or BECMG AT, any specified change should be applied from the time of the change.

(d) Following BECMG (alone), BECMG FM, BECMG TL, BECMG FM TL:

(1) in the case of deterioration, any specified change should be applied from the start of the change; and

(2) in the case of improvement, any specified change should be applied from the end of the change.

(e) In a period indicated by TEMPO (alone), TEMPO FM, TEMPO TL, TEMPO FM TL, PROB30/40 (alone):

(1) deteriorations associated with persistent conditions in connection with e.g. haze, mist, fog, dust/sandstorm, continuous precipitation should be applied;

(2) deteriorations associated with transient/showery conditions in connection with short-lived weather phenomena, e.g. thunderstorms, showers may be ignored; and

(3) improvements should in all cases be disregarded.

(f) In a period indicated by PROB30/40 TEMPO:

(1) deteriorations may be disregarded; and

(2) improvements should be disregarded.

Note: Abbreviations used in the context of this AMC are as follows:

FM: from

BECMG: becoming

AT: at

TL: till

TEMPO: temporarily

PROB: probability

GM1 BCAR.SPO.OP.170 Meteorological conditions

CONTINUATION OF A FLIGHT

In the case of in-flight re-planning, continuation of a flight refers to the point from which a revised flight plan applies.

BCAR.SPO.OP.175 Ice and other contaminants — ground procedures

(a) The pilot-in-command shall only commence take-off if the aircraft is clear of any deposit that might adversely affect the performance or controllability of the aircraft, except as permitted in the AFM.

(b) In the case of operations with complex motor-powered aircraft, the operator shall establish procedures to be followed when ground de-icing and anti-icing and related inspections of the aircraft are necessary to allow the safe operation of the aircraft.

GM1 BCAR.SPO.OP.175 Ice and other contaminants — ground procedures

TERMINOLOGY

Terms used in the context of de-icing/anti-icing have the meaning defined in the following subparagraphs.

(a) 'Anti-icing fluid' includes, but is not limited to, the following:

(1) Type I fluid if heated to minimum 60 °C at the nozzle;

(2) mixture of water and Type I fluid if heated to minimum 60°C at the nozzle;

(3) Type II fluid;

(4) mixture of water and Type II fluid;

(5) Type III fluid;

(6) mixture of water and Type III fluid;

(7) Type IV fluid;

(8) mixture of water and Type IV fluid.

On uncontaminated aircraft surfaces Type II, III and IV anti-icing fluids are normally applied unheated.

(b) 'Clear ice': a coating of ice, generally clear and smooth, but with some air pockets. It forms on exposed objects, the temperatures of which are at, below or slightly above the freezing temperature, by the freezing of supercooled drizzle, droplets or raindrops.

(c) 'Conditions conducive to aircraft icing on the ground' (e.g. freezing fog, freezing precipitation, frost, rain or high humidity (on cold soaked wings), snow or mixed rain and snow).

(d) 'Contamination', in this context, is understood as being all forms of frozen or semi-frozen moisture, such as frost, snow, slush or ice.

(e) 'Contamination check': a check of aircraft for contamination to establish the need for de-icing.

(f) 'De-icing fluid': such fluid includes, but is not limited to, the following:

(1) heated water;

(2) Type I fluid;

(3) mixture of water and Type I fluid;

(4) Type II fluid;

(5) mixture of water and Type II fluid;

(6) Type III fluid;

(7) mixture of water and Type III fluid;

(8) Type IV fluid;

(9) mixture of water and Type IV fluid.

De-icing fluid is normally applied heated to ensure maximum efficiency.

(g) 'De-icing/anti-icing': this is the combination of de-icing and anti-icing performed in either one or two steps.

(h) 'Ground ice detection system (GIDS)': system used during aircraft ground operations to inform the personnel involved in the operation and/or the flight crew about the presence of frost, ice, snow or slush on the aircraft surfaces.

(i) 'Lowest operational use temperature (LOUT)': the lowest temperature at which a fluid has been tested and certified as acceptable in accordance with the appropriate aerodynamic acceptance test whilst still maintaining a freezing point buffer of not less than:

(1) 10 C for a Type I de-icing/anti-icing fluid; or

(2) 7 C for Type II, III or IV de-icing/anti-icing fluids.

(j) 'Post-treatment check': an external check of the aircraft after de-icing and/or anti-icing treatment accomplished from suitably elevated observation points (e.g. from the de-icing/anti-icing equipment itself or other elevated equipment) to ensure that the aircraft is free from any frost, ice, snow or slush.

(k) 'Pre-take-off check': an assessment normally performed by the flight crew, to validate the applied hold-over time (HoT).

(l) 'Pre-take-off contamination check': a check of the treated surfaces for contamination, performed when the HoT has been exceeded or if any doubt exists regarding the continued effectiveness of the applied anti-icing treatment. It is normally accomplished externally, just before commencement of the take-off run.

ANTI-ICING CODES

(m) The following are examples of anti-icing codes:

(1) 'Type I' at (start time) — to be used if anti-icing treatment has been performed with a Type I fluid;

(2) 'Type II/100' at (start time) — to be used if anti-icing treatment has been performed with undiluted Type II fluid;

(3) 'Type II/75' at (start time) — to be used if anti-icing treatment has been performed with a mixture of 75 % Type II fluid and 25 % water; and

(4) 'Type IV/50' at (start time) — to be used if anti-icing treatment has been performed with a mixture of 50 % Type IV fluid and 50 % water.

(n) When a two-step de-icing/anti-icing operation has been carried out, the anti-icing code should be determined by the second step fluid. Fluid brand names may be included, if desired.

GM2 BCAR.SPO.OP.175 Ice and other contaminants — ground procedures

DE-ICING/ANTI-ICING — PROCEDURES

(a) De-icing and/or anti-icing procedures should take into account manufacturer's recommendations, including those that are type-specific, and should cover:

(1) contamination checks, including detection of clear ice and under-wing frost; limits on the thickness/area of contamination published in the AFM or other manufacturers' documentation should be followed;

(2) procedures to be followed if de-icing and/or anti-icing procedures are interrupted or unsuccessful;

(3) post-treatment checks;

(4) pre-take-off checks;

(5) pre-take-off contamination checks;

(6) the recording of any incidents relating to de-icing and/or anti-icing; and

(7) the responsibilities of all personnel involved in de-icing and/or anti-icing.

(b) The operator's procedures should ensure the following:

(1) When aircraft surfaces are contaminated by ice, frost, slush or snow, they are de-iced prior to take-off, according to the prevailing conditions. Removal of contaminants may be performed with mechanical tools, fluids (including hot water), infrared heat or forced air, taking account of aircraft type-specific provisions.

(2) Account is taken of the wing skin temperature versus outside air temperature (OAT), as this may affect:

(i) the need to carry out aircraft de-icing and/or anti-icing; and/or

(ii) the performance of the de-icing/anti-icing fluids.

(3) When freezing precipitation occurs or there is a risk of freezing precipitation occurring that would contaminate the surfaces at the time of take-off, aircraft surfaces should be anti-iced. If both de-icing and anti-icing are required, the procedure may be performed in a one or two-step process, depending upon weather conditions, available equipment, available fluids and the desired hold-over time (HoT). One-step de-icing/anti-icing means that de-icing and anti-icing are carried out at the same time, using a mixture of de-icing/anti-icing fluid and water. Two-step de-icing/anti-icing means that de-icing and anti-icing are carried out in two separate steps. The aircraft is first de-iced using heated water only or a heated mixture of de-icing/anti-icing fluid and water. After completion of the de-icing operation a layer of a mixture of de-icing/anti-icing fluid and water, or of de-icing/anti-icing fluid only, is sprayed over the aircraft surfaces. The second step will be applied before the first-step fluid freezes, typically within three minutes and, if necessary, area by area.

(4) When an aircraft is anti-iced and a longer HoT is needed/desired, the use of a less diluted Type II or Type IV fluid should be considered.

(5) All restrictions relative to OAT and fluid application (including, but not necessarily limited to, temperature and pressure) published by the fluid manufacturer and/or aircraft manufacturer, are followed and procedures, limitations and recommendations to prevent the formation of fluid residues are followed.

(6) During conditions conducive to aircraft icing on the ground or after de-icing and/or anti-icing, an aircraft is not dispatched for departure unless it has been given a contamination check or a post-treatment check by a trained and qualified person. This check should cover all treated surfaces of the aircraft and be performed from points offering sufficient accessibility to these parts. To ensure that there is no clear ice on suspect areas, it may be necessary to make a physical check (e.g. tactile).

(7) The required entry is made in the technical log.

(8) The pilot-in-command continually monitors the environmental situation after the performed treatment. Prior to take-off he/she performs a pre-take-off check, which is an assessment of whether the applied HoT is still appropriate. This pre-take-off check includes, but is not limited to, factors such as precipitation, wind and OAT.

(9) If any doubt exists as to whether a deposit may adversely affect the aircraft's performance and/or controllability characteristics, the pilot-in-command should arrange for a pre-take-off contamination check to be performed in order to verify that the aircraft's surfaces are free of contamination. Special methods and/or equipment may be necessary to perform this check, especially at night time or in extremely adverse weather conditions. If this check cannot be performed just before take-off, re-treatment should be applied.

(10) When retreatment is necessary, any residue of the previous treatment should be removed and a completely new de-icing/anti-icing treatment should be applied.

(11) When a ground ice detection system (GIDS) is used to perform an aircraft surfaces check prior to and/or after a treatment, the use of GIDS by suitably trained personnel should be part of the procedure.

(c) Special operational considerations

(1) When using thickened de-icing/anti-icing fluids, the operator should consider a two-step de-icing/anti-icing procedure, the first step preferably with hot water and/or un-thickened fluids.

(2) The use of de-icing/anti-icing fluids should be in accordance with the aircraft manufacturer's documentation. This is particularly important for thickened fluids to assure sufficient flow-off during take-off.

(3) The operator should comply with any type-specific operational requirement(s), such as an aircraft mass decrease and/or a take-off speed increase associated with a fluid application.

(4) The operator should take into account any flight handling procedures (stick force, rotation speed and rate, take-off speed, aircraft attitude etc.) laid down by the aircraft manufacturer when associated with a fluid application.

(5) The limitations or handling procedures resulting from (c)(3) and/or (c)(4) should be part of the flight crew pre-take-off briefing.

(d) Communications

(1) Before aircraft treatment. When the aircraft is to be treated with the flight crew on board, the flight and personnel involved in the operation should confirm the fluid to be used, the extent of treatment required and any aircraft type-specific procedure(s) to be used. Any other information needed to apply the HoT tables should be exchanged.

(2) Anti-icing code. The operator's procedures should include an anti-icing code, which indicates the treatment the aircraft has received. This code provides the flight crew with the minimum details necessary to estimate an HoT and confirms that the aircraft is free of contamination.

(3) After treatment. Before reconfiguring or moving the aircraft, the flight crew should receive a confirmation from the personnel involved in the operation that all de-icing and/or anti-icing operations are complete and that all personnel and equipment are clear of the aircraft.

(e) Hold-over protection

The operator should publish in the operations manual, when required, the HoTs in the form of a table or a diagram, to account for the various types of ground icing conditions and the different types and concentrations of fluids used. However, the times of protection shown in these tables are to be used as guidelines only and are normally used in conjunction with the pre-take-off check.

(f) Training

The operator's initial and recurrent de-icing and/or anti-icing training programmes (including communication training) for flight crew and those of its personnel involved in the operation who are involved in de-icing and/or anti-icing should include additional training if any of the following is introduced:

(1) a new method, procedure and/or technique;

(2) a new type of fluid and/or equipment; or

(3) a new type of aircraft.

(g) Contracting

When the operator contracts training on de-icing/anti-icing, the operator should ensure that the contractor complies with the operator's training/qualification procedures, together with any specific procedures in respect of:

(1) de-icing and/or anti-icing methods and procedures;

(2) fluids to be used, including precautions for storage and preparation for use;

(3) specific aircraft requirements (e.g. no-spray areas, propeller/engine de-icing, auxiliary power unit (APU) operation etc.); and

(4) checking and communications procedures.

(h) Special maintenance considerations

(1) General

The operator should take proper account of the possible side effects of fluid use. Such effects may include, but are not necessarily limited to, dried and/or re-hydrated residues, corrosion and the removal of lubricants.

(2) Special considerations regarding residues of dried fluids

The operator should establish procedures to prevent or detect and remove residues of dried fluid. If necessary the operator should establish appropriate inspection intervals based on the recommendations of the airframe manufacturers and/or the operator's own experience:

(i) Dried fluid residues

Dried fluid residues could occur when surfaces have been treated and the aircraft has not subsequently been flown and has not been subject to precipitation. The fluid may then have dried on the surfaces.

(ii) Re-hydrated fluid residues

Repetitive application of thickened de-icing/anti-icing fluids may lead to the subsequent formation/build-up of a dried residue in aerodynamically quiet areas, such as cavities and gaps. This residue may re-hydrate if exposed to high humidity conditions, precipitation, washing, etc., and increase to many times its original size/volume. This residue will freeze if exposed to conditions at or below 0°C. This may cause moving parts, such as elevators, ailerons, and flap actuating mechanisms to stiffen or jam in-flight. Re-hydrated residues may also form on exterior surfaces,

which can reduce lift, increase drag and stall speed. Re-hydrated residues may also collect inside control surface structures and cause clogging of drain holes or imbalances to flight controls. Residues may also collect in hidden areas, such as around flight control hinges, pulleys, grommets, on cables and in gaps.

(iii) Operators are strongly recommended to obtain information about the fluid dry-out and re-hydration characteristics from the fluid manufacturers and to select products with optimised characteristics.

(iv) Additional information should be obtained from fluid manufacturers for handling, storage, application and testing of their products.

GM3 BCAR.SPO.OP.175 Ice and other contaminants — ground procedures

DE-ICING/ANTI-ICING — BACKGROUND INFORMATION

Further guidance material on this issue is given in the ICAO Manual of Aircraft Ground De-icing/Anti-icing Operations (Doc 9640) (hereinafter referred to as the ICAO Manual of Aircraft Ground De-icing/Anti-icing Operations).

(a) General

(1) Any deposit of frost, ice, snow or slush on the external surfaces of an aircraft may drastically affect its flying qualities because of reduced aerodynamic lift, increased drag, modified stability and control characteristics. Furthermore, freezing deposits may cause moving parts, such as elevators, ailerons, flap actuating mechanism, etc., to jam and create a potentially hazardous condition. Propeller/engine/APU/systems performance may deteriorate due to the presence of frozen contaminants on blades, intakes and components. Also, engine operation may be seriously affected by the ingestion of snow or ice, thereby causing engine stall or compressor damage. In addition, ice/frost may form on certain external surfaces (e.g. wing upper and lower surfaces, etc.) due to the effects of cold fuel/structures, even in ambient temperatures well above 0°C.

(2) Procedures established by the operator for de-icing and/or anti-icing are intended to ensure that the aircraft is clear of contamination so that degradation of aerodynamic characteristics or mechanical interference will not occur and, following anti-icing, to maintain the airframe in that condition during the appropriate HoT.

(3) Under certain meteorological conditions, de-icing and/or anti-icing procedures may be ineffective in providing sufficient protection for continued operations. Examples of these conditions are freezing rain, ice pellets and hail, heavy snow, high wind velocity, fast dropping OAT or any time when freezing precipitation with high water content is present. No HoT guidelines exist for these conditions.

(4) Material for establishing operational procedures can be found, for example, in:

(i) ICAO Annex 3, Meteorological Service for International Air Navigation;

(ii) ICAO Manual of Aircraft Ground De-icing/Anti-icing Operations;

(iii) International Organization for Standardization (ISO) 11075 Aircraft — De-icing/anti-icing fluids — ISO type I;

(iv) ISO 11076 Aircraft — De-icing/anti-icing methods with fluids;

(v) ISO 11077 Aerospace — Self-propelled de-icing/anti-icing vehicles — Functional requirements;

(vi) ISO 11078 Aircraft — De-icing/anti-icing fluids — ISO types II, III and IV;

(vii) Association of European Airlines (AEA) 'Recommendations for de-icing/anti-icing of aircraft on the ground';

(viii) AEA 'Training recommendations and background information for de-icing/anti-icing of aircraft on the ground';

(ix) EUROCAE ED-104A Minimum Operational Performance Specification for Ground Ice Detection Systems;

(x) Society of Automotive Engineers (SAE) AS5681 Minimum Operational Performance Specification for Remote On-Ground Ice Detection Systems;

(xi) SAE ARP4737 Aircraft — De-icing/anti-icing methods;

(xii) SAE AMS1424 De-icing/anti-Icing Fluid, Aircraft, SAE Type I;

(xiii) SAE AMS1428 Fluid, Aircraft De-icing/anti-icing, Non-Newtonian, (Pseudoplastic), SAE Types II, III, and IV;

(xiv) SAE ARP1971 Aircraft De-icing Vehicle — Self-Propelled, Large and Small Capacity;

(xv) SAE ARP5149 Training Programme Guidelines for De-icing/anti-icing of Aircraft on Ground; and

(xvi) SAE ARP5646 Quality Program Guidelines for De-icing/anti-icing of Aircraft on the Ground.

(b) Fluids

(1) Type I fluid: Due to its properties, Type I fluid forms a thin, liquid-wetting film on surfaces to which it is applied which, under certain weather conditions, gives a very limited HoT. With this type of fluid, increasing the concentration of fluid in the fluid/water mix does not provide any extension in HoT.

(2) Type II and Type IV fluids contain thickeners that enable the fluid to form a thicker liquid-wetting film on surfaces to which it is applied. Generally, this fluid provides a longer HoT than Type I fluids in similar conditions. With this type of fluid, the HoT can be extended by increasing the ratio of fluid in the fluid/water mix.

(3) Type III fluid is a thickened fluid especially intended for use on aircraft with low rotation speeds.

(4) Fluids used for de-icing and/or anti-icing should be acceptable to the operator and the aircraft manufacturer. These fluids normally conform to specifications such as SAE AMS1424, SAE AMS1428 or equivalent. Use of non-conforming fluids is not recommended due to their characteristics being unknown. The anti-icing and aerodynamic properties of thickened fluids may be seriously degraded by, for example, inappropriate storage, treatment, application, application equipment and age.

(c) Hold-over protection

(1) Hold-over protection is achieved by a layer of anti-icing fluid remaining on and protecting aircraft surfaces for a period of time. With a one-step de-icing/anti-icing procedure, the HoT begins at the commencement of de-icing/anti-icing. With a two-step procedure, the HoT begins at the commencement of the second (anti-icing) step. The hold-over protection runs out:

(i) at the commencement of the take-off roll (due to aerodynamic shedding of fluid); or

(ii) when frozen deposits start to form or accumulate on treated aircraft surfaces, thereby indicating the loss of effectiveness of the fluid.

(2) The duration of hold-over protection may vary depending on the influence of factors other than those specified in the HoT tables. Guidance should be provided by the operator to take account of such factors, which may include:

(i) atmospheric conditions, e.g. exact type and rate of precipitation, wind direction and velocity, relative humidity and solar radiation; and

(ii) the aircraft and its surroundings, such as aircraft component inclination angle, contour and surface roughness, surface temperature, operation in close proximity to other aircraft (jet or propeller blast) and ground equipment and structures.

(3) HoTs are not meant to imply that flight is safe in the prevailing conditions if the specified HoT has not been exceeded. Certain meteorological conditions, such as freezing drizzle or freezing rain, may be beyond the certification envelope of the aircraft.

BCAR.SPO.OP.176 Ice and other contaminants — flight procedures

(a) The pilot-in-command shall only commence a flight or intentionally fly into expected or actual icing conditions if the aircraft is certified and equipped to cope with such conditions as referred to in applicable requirements.

(b) If icing exceeds the intensity of icing for which the aircraft is certified or if an aircraft not certified for flight in known icing conditions encounters icing, the pilot-in-command shall exit the icing conditions without delay, by a change of level and/or route, and if necessary by declaring an emergency to ATC.

(c) In the case of operations with complex motor-powered aircraft, the operator shall establish procedures for flights in expected or actual icing conditions.

AMC1 BCAR.SPO.OP.176 Ice and other contaminants — flight procedures

FLIGHT IN EXPECTED OR ACTUAL ICING CONDITIONS

(a) The procedures to be established by the operator should take account of the design, the equipment, the configuration of the aircraft and the necessary training. For these reasons, different aircraft types operated by the same company may require the development of different procedures. In every case, the relevant limitations are those that are defined in the AFM and other documents produced by the manufacturer.

(b) The operator should ensure that the procedures take account of the following:

(1) the equipment and instruments that should be serviceable for flight in icing conditions;

(2) the limitations on flight in icing conditions for each phase of flight. These limitations may be imposed by the aircraft's de-icing or anti-icing equipment or the necessary performance corrections that have to be made;

(3) the criteria the flight crew should use to assess the effect of icing on the performance and/or controllability of the aircraft;

(4) the means by which the flight crew detects, by visual cues or the use of the aircraft's ice detection system, that the flight is entering icing conditions; and

(5) the action to be taken by the flight crew in a deteriorating situation (which may develop rapidly) resulting in an adverse effect on the performance and/or controllability of the aircraft, due to:

(i) the failure of the aircraft's anti-icing or de-icing equipment to control a build-up of ice; and/or

(ii) ice build-up on unprotected areas.

(c) Training for dispatch and flight in expected or actual icing conditions. The content of the operations manual should reflect the training, both conversion and recurrent, that flight crew and all other relevant operational personnel require in order to comply with the procedures for dispatch and flight in icing conditions:

(1) instruction on how to recognise, from weather reports or forecasts that are available before flight commences or during flight, the risks of encountering icing conditions along the planned route and on how to modify, as necessary, the departure and in-flight routes or profiles;

(2) instruction on the operational and performance limitations or margins;

(3) the use of in-flight ice detection, anti-icing and de-icing systems in both normal and abnormal operation; and

(4) instruction on the differing intensities and forms of ice accretion and the consequent action which should be taken.

BCAR.SPO.OP.180 Take-off conditions —helicopters

Before commencing take-off, the pilot-in-command shall be satisfied that:

(a) according to the information available, the weather at the aerodrome or operating site and the condition of the runway or FATO intended to be used would not prevent a safe take-off and departure; and

(b) applicable VFR aerodrome operating minima will be complied with.

BCAR.SPO.OP.185 Simulated situations in flight

Unless a task specialist is on-board the aircraft for training, the pilot-in-command shall, when carrying task specialists, not simulate:

(a) situations that require the application of abnormal or emergency procedures;

(b) Not Applicable

BCAR.SPO.OP.190 In-flight fuel management

(a) The operator of a complex motor-powered aircraft shall ensure that in-flight fuel checks and fuel management are performed.

(b) The pilot-in-command shall check at regular intervals that the amount of usable fuel remaining in flight is not less than the fuel required to proceed to a weather-permissible aerodrome or operating site and the planned reserve fuel as required by BCAR.SPO.OP.130 and BCAR.SPO.OP.131.

BCAR.SPO.OP.195 Use of supplemental oxygen

(a) The operator shall ensure that task specialists and crew members use supplemental oxygen continuously whenever the cabin altitude exceeds 10 000 ft for a period of more than 30 minutes and whenever the cabin altitude exceeds 13 000 ft, unless otherwise approved by the competent authority and in accordance with SOPs.

(b) Notwithstanding (a) and except for parachute operations, short excursions of a specified duration above 13 000 ft without using supplemental oxygen on other-than complex aeroplanes and helicopters may be undertaken with a prior approval of the BCAA based on the consideration of the following:

(1) the duration of the excursion above 13 000 ft is not more than 10 minutes or, if needed for a longer period, the time strictly necessary to the accomplishment of the specialised task;

(2) the flight is not conducted above 16 000 ft;

(3) the safety briefing in accordance with BCAR.SPO.OP.135 includes adequate information to crew members and tasks specialists on the effects of hypoxia;

(4) SOPs for the concerned operation reflecting (1), (2) and (3);

(5) the previous experience of the operator in conducting operations above 13 000 ft without using supplemental oxygen;

(6) the individual experience of crew members and task specialists and their physiological adaptation to high altitudes; and

(7) the altitude of the base where the operator is established or the operations are conducted from.

BCAR.SPO.OP.200 Ground proximity detection

(a) When undue proximity to the ground is detected by a flight crew member or by a ground proximity warning system, the pilot flying shall take corrective action immediately in order to establish safe flight conditions.

(b) The ground proximity warning system may be disabled during those specialised tasks, which by their nature require the aircraft to be operated within a distance from the ground below that which would trigger the ground proximity warning system.

GM1 BCAR.SPO.OP.200 Ground proximity detection

GUIDANCE MATERIAL FOR TERRAIN AWARENESS WARNING SYSTEM (TAWS) FLIGHT CREW TRAINING PROGRAMMES

(a) Introduction

(1) This GM contains performance-based training objectives for TAWS flight crew training.

(2) The training objectives cover five areas: theory of operation; pre-flight operations; general in-flight operations; response to TAWS cautions; response to TAWS warnings.

(3) The term 'TAWS' in this GM means a ground proximity warning system (GPWS) enhanced by a forward-looking terrain avoidance function. Alerts include both cautions and warnings.

(4) The content of this GM is intended to assist operators who are producing training programmes. The information it contains has not been tailored to any specific aircraft or TAWS equipment, but highlights features that are typically available where such systems are installed. It is the responsibility of the individual operator to determine the applicability of the content of this Guidance Material to each aircraft and TAWS equipment installed and their operation. Operators should refer to the AFM and/or aircraft/flight crew operating manual (A/FCOM), or similar documents, for information applicable to specific configurations. If there should be any conflict between the content

of this Guidance Material and that published in the other documents described above, then the information contained in the AFM or A/FCOM will take precedence.

(b) Scope

(1) The scope of this GM is designed to identify training objectives in the areas of: academic training; manoeuvre training; initial evaluation; recurrent qualification. Under each of these four areas, the training material has been separated into those items that are considered essential training items and those that are considered to be desirable. In each area, objectives and acceptable performance criteria are defined.

(2) No attempt is made to define how the training programme should be implemented. Instead, objectives are established to define the knowledge that a pilot operating a TAWS is expected to possess and the performance expected from a pilot who has completed TAWS training. However, the guidelines do indicate those areas in which the pilot receiving the training should demonstrate his/her understanding, or performance, using a real-time, interactive training device, i.e. a flight simulator. Where appropriate, notes are included within the performance criteria that amplify or clarify the material addressed by the training objective.

(c) Performance-based training objectives

(1) TAWS academic training

(i) This training is typically conducted in a classroom environment. The knowledge demonstrations specified in this section may be completed through the successful completion of written tests or by providing correct responses to non-real-time computer-based training (CBT) questions.

(ii) Theory of operation. The pilot should demonstrate an understanding of TAWS operation and the criteria used for issuing cautions and warnings. This training should address system operation. Objective: to demonstrate knowledge of how a TAWS functions. Criteria: the pilot should demonstrate an understanding of the following functions:

(A) Surveillance

(a) The GPWS computer processes data supplied from an air data computer, a radio altimeter, an instrument landing system (ILS)/microwave landing system (MLS)/multi-mode (MM) receiver, a roll attitude sensor, and actual position of the surfaces and of the landing gear.

(b) The forward-looking terrain avoidance function utilises an accurate source of known aircraft position, such as that which may be provided by a flight management system (FMS) or global positioning system (GPS), or an electronic terrain database. The source and scope of the terrain, obstacle and airport data, and features such as the terrain clearance floor, the runway picker, and geometric altitude (where provided), should all be described.

(c) Displays required to deliver TAWS outputs include a loudspeaker for voice announcements, visual alerts (typically amber and red lights) and a terrain awareness display (that may be combined with other displays). In addition, means should be provided for indicating the status of the TAWS and any partial or total failures that may occur.

(B) Terrain avoidance. Outputs from the TAWS computer provide visual and audio synthetic voice cautions and warnings to alert the flight crew about potential conflicts with terrain and obstacles.

(C) Alert thresholds. Objective: to demonstrate knowledge of the criteria for issuing cautions and warnings. Criteria: the pilot should be able to demonstrate an understanding of the methodology used by a TAWS to issue cautions and alerts and the general criteria for the issuance of these alerts, including:

(a) basic GPWS alerting modes specified in the ICAO standard:

Mode 1: excessive sink rate;

Mode 2: excessive terrain closure rate;

Mode 3: descent after take-off or missed approach;

Mode 4: unsafe proximity to terrain; and

Mode 5: descent below ILS glide slope (caution only);

(b) an additional, optional alert mode:

Mode 6: radio altitude call-out (information only); and

(c) TAWS cautions and warnings that alert the flight crew to obstacles and terrain ahead of the aircraft in line with or adjacent to its projected flight path (forward-looking terrain avoidance (FLTA) and premature descent alert (PDA) functions).

(D) TAWS limitations. Objective: to verify that the pilot is aware of the limitations of TAWS. Criteria: the pilot should demonstrate knowledge and an understanding of TAWS limitations identified by the manufacturer for the equipment model installed, such as:

(a) navigation should not be predicated on the use of the terrain display;

(b) unless geometric altitude data is provided, use of predictive TAWS functions is prohibited when altimeter subscale settings display 'QFE' (atmospheric pressure at aerodrome elevation/runway threshold);

(c) nuisance alerts can be issued if the aerodrome of intended landing is not included in the TAWS airport database;

(d) in cold weather operations, corrective procedures should be implemented by the pilot unless the TAWS has in-built compensation, such as geometric altitude data;

(e) loss of input data to the TAWS computer could result in partial or total loss of functionality. Where means exist to inform the flight crew that functionality has been degraded, this should be known and the consequences understood;

(f) radio signals not associated with the intended flight profile (e.g. ILS glide path transmissions from an adjacent runway) may cause false alerts;

(g) inaccurate or low accuracy aircraft position data could lead to false or non-annunciation of terrain or obstacles ahead of the aircraft; and

(h) minimum equipment list (MEL) restrictions should be applied in the event of the TAWS becoming partially or completely unserviceable. (It should be noted that basic GPWS has no forward-looking capability.)

(E) TAWS inhibits. Objective: to verify that the pilot is aware of the conditions under which certain functions of a TAWS are inhibited. Criteria: the pilot should demonstrate knowledge and an understanding of the various TAWS inhibits, including the following means of:

(a) silencing voice alerts;

(b) inhibiting ILS glide path signals (as may be required when executing an ILS back beam approach);

(c) inhibiting flap position sensors (as may be required when executing an approach with the flaps not in a normal position for landing);

(d) inhibiting the FLTA and PDA functions; and

(e) selecting or deselecting the display of terrain information, together with appropriate annunciation of the status of each selection.

(2) Operating procedures. The pilot should demonstrate the knowledge required to operate TAWS avionics and to interpret the information presented by a TAWS. This training should address the following topics:

(i) Use of controls. Objective: to verify that the pilot can properly operate all TAWS controls and inhibits. Criteria: the pilot should demonstrate the proper use of controls, including the following means by which:

(A) before flight, any equipment self-test functions can be initiated;

(B) TAWS information can be selected for display; and

(C) all TAWS inhibits can be operated and what the consequent annunciations mean with regard to loss of functionality.

(ii) Display interpretation. Objective: to verify that the pilot understands the meaning of all information that can be annunciated or displayed by a TAWS. Criteria: the pilot should demonstrate the ability to properly interpret information annunciated or displayed by a TAWS, including the following:

(A) knowledge of all visual and aural indications that may be seen or heard;

(B) response required on receipt of a caution;

(C) response required on receipt of a warning; and

(D) response required on receipt of a notification that partial or total failure of the TAWS has occurred (including annunciation that the present aircraft position is of low accuracy).

(iii) Use of basic GPWS or use of the FLTA function only. Objective: to verify that the pilot understands what functionality will remain following loss of the GPWS or of the FLTA function. Criteria: the pilot should demonstrate knowledge of how to recognise the following:

(A) un-commanded loss of the GPWS function, or how to isolate this function and how to recognise the level of the remaining controlled flight into terrain (CFIT) protection (essentially, this is the FLTA function); and

(B) un-commanded loss of the FLTA function, or how to isolate this function and how to recognise the level of the remaining CFIT protection (essentially, this is the basic GPWS).

(iv) Crew coordination. Objective: to verify that the pilot adequately briefs other flight crew members on how TAWS alerts will be handled. Criteria: the pilot should demonstrate that the pre-flight briefing addresses procedures that will be used in preparation for responding to TAWS cautions and warnings, including the following:

(A) the action to be taken, and by whom, in the event that a TAWS caution and/or warning is issued; and

(B) how multi-function displays will be used to depict TAWS information at take-off, in the cruise and for the descent, approach, landing (and any missed approach). This will be in accordance with procedures specified by the operator, who will recognise that it may be more desirable that other data is displayed at certain phases of flight and that the terrain display has an automatic 'pop-up' mode in the event that an alert is issued.

(v) Reporting rules. Objective: to verify that the pilot is aware of the rules for reporting alerts to the controller and other authorities. Criteria: the pilot should demonstrate knowledge of the following:

(A) when, following recovery from a TAWS alert or caution, a transmission of information should be made to the appropriate ATC unit; and

(B) the type of written report that is required, how it is to be compiled and whether any cross-reference should be made in the aircraft technical log and/or voyage report (in accordance with procedures specified by the operator), following a flight in which the aircraft flight path has been modified in response to a TAWS alert, or if any part of the equipment appears not to have functioned correctly.

(vi) Alert thresholds. Objective: to demonstrate knowledge of the criteria for issuing cautions and warnings. Criteria: the pilot should be able to demonstrate an understanding of the methodology used by a TAWS to issue cautions and warnings and the general criteria for the issuance of these alerts, including awareness of the following:

(A) modes associated with basic GPWS, including the input data associated with each; and

(B) visual and aural annunciations that can be issued by TAWS and how to identify which are cautions and which are warnings.

(3) TAWS manoeuvre training. The pilot should demonstrate the knowledge required to respond correctly to TAWS cautions and warnings. This training should address the following topics:

(i) Response to cautions:

(A) Objective: to verify that the pilot properly interprets and responds to cautions. Criteria: the pilot should demonstrate an understanding of the need, without delay:

(a) to initiate action required to correct the condition that has caused the TAWS to issue the caution and to be prepared to respond to a warning, if this should follow; and

(b) if a warning does not follow the caution, to notify the controller of the new position, heading and/or altitude/flight level of the aircraft, and what the pilot-in-command intends to do next.

(B) The correct response to a caution might require the pilot to:

(a) reduce a rate of descent and/or to initiate a climb;

(b) regain an ILS glide path from below, or to inhibit a glide path signal if an ILS is not being flown;

(c) select more flap, or to inhibit a flap sensor if the landing is being conducted with the intent that the normal flap setting will not be used;

(d) select gear down; and/or

(e) initiate a turn away from the terrain or obstacle ahead and towards an area free of such obstructions if a forward-looking terrain display indicates that this would be a good solution and the entire manoeuvre can be carried out in clear visual conditions.

(ii) Response to warnings. Objective: to verify that the pilot properly interprets and responds to warnings. Criteria: the pilot should demonstrate an understanding of the following:

(A) The need, without delay, to initiate a climb in the manner specified by the operator.

(B) The need, without delay, to maintain the climb until visual verification can be made that the aircraft will clear the terrain or obstacle ahead or until above the appropriate sector safe altitude (if certain about the location of the aircraft with respect to terrain) even if the TAWS warning stops. If, subsequently, the aircraft climbs up through the sector safe altitude, but the visibility does not allow the flight crew to confirm that the terrain hazard has ended, checks should be made to verify the location of the aircraft and to confirm that the altimeter subscale settings are correct.

(C) When workload permits that, the flight crew should notify the air traffic controller of the new position and altitude/flight level and what the pilot-in-command intends to do next.

(D) That the manner in which the climb is made should reflect the type of aircraft and the method specified by the aircraft manufacturer (which should be reflected in the operations manual) for performing the escape manoeuvre. Essential aspects will include the need for an increase in pitch attitude, selection of maximum thrust, confirmation that external sources of drag (e.g. spoilers/speed brakes) are retracted and respect of the stick shaker or other indication of eroded stall margin.

(E) That TAWS warnings should never be ignored. However, the pilot's response may be limited to that which is appropriate for a caution, only if:

(a) the aircraft is being operated by day in clear, visual conditions; and

(b) it is immediately clear to the pilot that the aircraft is in no danger in respect of its configuration, proximity to terrain or current flight path.

(4) TAWS initial evaluation:

(i) The flight crew member's understanding of the academic training items should be assessed by means of a written test.

(ii) The flight crew member's understanding of the manoeuvre training items should be assessed in a flight simulation training device (FSTD) equipped with TAWS visual and aural displays and inhibit selectors similar in appearance and operation to those in the aircraft that the pilot will fly. The results should be assessed by a flight simulation training instructor, synthetic flight examiner, type rating instructor or type rating examiner.

(iii) The range of scenarios should be designed to give confidence that proper and timely responses to TAWS cautions and warnings will result in the aircraft avoiding a CFIT accident. To achieve this objective, the pilot should demonstrate taking the correct action to prevent a caution developing into a warning and, separately, the escape manoeuvre needed in response to a warning. These demonstrations should take place when the external visibility is zero, though there is much to be learnt if, initially, the training is given in 'mountainous' or 'hilly' terrain with clear visibility. This training should comprise a sequence of scenarios, rather than be included in line orientated flight training (LOFT).

(iv) A record should be made, after the pilot has demonstrated competence, of the scenarios that were practised.

(5) TAWS recurrent training:

(i) TAWS recurrent training ensures that pilots maintain the appropriate TAWS knowledge and skills. In particular, it reminds pilots of the need to act promptly in response to cautions and warnings and of the unusual attitude associated with flying the escape manoeuvre.

(ii) An essential item of recurrent training is the discussion of any significant issues and operational concerns that have been identified by the operator. Recurrent training should also address changes to TAWS logic, parameters or procedures and to any unique TAWS characteristics of which pilots should be aware.

(6) Reporting procedures:

(i) Verbal reports. Verbal reports should be made promptly to the appropriate ATC unit:

(A) whenever any manoeuvre has caused the aircraft to deviate from an air traffic clearance;

(B) when, following a manoeuvre that has caused the aircraft to deviate from an air traffic clearance, the aircraft has returned to a flight path that complies with the clearance; and/or

(C) when an air traffic control unit issues instructions that, if followed, would cause the pilot to manoeuvre the aircraft towards terrain or obstacle or it would appear from the display that a potential CFIT occurrence is likely to result.

(ii) Written reports. Written reports should be submitted in accordance with the operator's occurrence reporting scheme and they should also be recorded in the aircraft technical log:

(A) whenever the aircraft flight path has been modified in response to a TAWS alert (false, nuisance or genuine);

(B) whenever a TAWS alert has been issued and is believed to have been false; and/or

(C) if it is believed that a TAWS alert should have been issued, but was not.

(iii) Within this GM, and with regard to reports:

(A) the term 'false' means that the TAWS issued an alert that could not possibly be justified by the position of the aircraft in respect to terrain and it is probable that a fault or failure in the system (equipment and/or input data) was the cause;

(B) the term 'nuisance' means that the TAWS issued an alert that was appropriate, but was not needed because the flight crew could determine by independent means that the flight path was, at that time, safe;

(C) the term 'genuine' means that the TAWS issued an alert that was both appropriate and necessary;

(D) the report terms described above are only meant to be assessed after the occurrence is over, to facilitate subsequent analysis, the adequacy of the equipment and the programmes it contains. The intention is not for the flight crew to attempt to classify an alert into any of these three categories when visual and/or aural cautions or warnings are annunciated.

BCAR.SPO.OP.205 Airborne collision avoidance system (ACAS)

(a) The operator shall establish operational procedures and training programmes when ACAS is installed and serviceable so that the flight crew is appropriately trained in the avoidance of collisions and competent in the use of ACAS II equipment.

(b) The ACAS II may be disabled during those specialised tasks, which by their nature require the aircraft to be operated within a distance from each other below that which would trigger the ACAS.

GM1 BCAR.SPO.OP.205 Airborne collision avoidance system (ACAS)

GENERAL

(a) The ACAS operational procedures and training programmes established by the operator should take into account this Guidance Material. It incorporates advice contained in:

(1) ICAO Annex 10, Volume IV;

(2) ICAO PANS-OPS, Volume 1;

(3) ICAO PANS-ATM; and

(4) ICAO guidance material 'ACAS Performance-Based Training Objectives' (published under Attachment E of State Letter AN 7/1.3.7.2-97/77).

(b) Additional guidance material on ACAS may be referred to, including information available from such sources as EUROCONTROL.

ACAS FLIGHT CREW TRAINING

(c) During the implementation of ACAS, several operational issues were identified that had been attributed to deficiencies in flight crew training programmes. As a result, the issue of flight crew

training has been discussed within the ICAO, which has developed guidelines for operators to use when designing training programmes.

(d) This Guidance Material contains performance-based training objectives for ACAS II flight crew training. Information contained here related to traffic advisories (TAs) is also applicable to ACAS I and ACAS II users. The training objectives cover five areas: theory of operation; pre-flight operations; general in-flight operations; response to TAs; and response to resolution advisories (RAs).

(e) The information provided is valid for version 7 and 7.1 (ACAS II). Where differences arise, these are identified.

(f) The performance-based training objectives are further divided into the areas of: academic training; manoeuvre training; initial evaluation and recurrent qualification. Under each of these four areas, the training material has been separated into those items which are considered essential training items and those which are considered desirable. In each area, objectives and acceptable performance criteria are defined.

(g) **ACAS academic training**

(1) This training is typically conducted in a classroom environment. The knowledge demonstrations specified in this section may be completed through the successful completion of written tests or through providing correct responses to non-real-time computer-based training (CBT) questions.

(2) Essential items

(i) Theory of operation. The flight crew member should demonstrate an understanding of ACAS II operation and the criteria used for issuing TAs and RAs. This training should address the following topics:

(A) System operation

Objective: to demonstrate knowledge of how ACAS functions.

Criteria: the flight crew member should demonstrate an understanding of the following functions:

(a) Surveillance

(1) ACAS interrogates other transponder-equipped aircraft within a nominal range of 14 NM.

(2) ACAS surveillance range can be reduced in geographic areas with a large number of ground interrogators and/or ACAS II-equipped aircraft.

(3) If the operator's ACAS implementation provides for the use of the Mode S extended squitter, the normal surveillance range may be increased beyond the nominal 14 NM. However, this information is not used for collision avoidance purposes.

(b) Collision avoidance

(1) TAs can be issued against any transponder-equipped aircraft that responds to the ICAO Mode C interrogations, even if the aircraft does not have altitude reporting capability.

(2) RAs can be issued only against aircraft that are reporting altitude and in the vertical plane only.

(3) RAs issued against an ACAS-equipped intruder are co-ordinated to ensure complementary RAs are issued.

(4) Failure to respond to an RA deprives own aircraft of the collision protection provided by own ACAS.

(5) Additionally, in ACAS-ACAS encounters, failure to respond to an RA also restricts the choices available to the other aircraft's ACAS and thus renders the other aircraft's ACAS less effective than if own aircraft were not ACAS equipped.

(B) Advisory thresholds

Objective: to demonstrate knowledge of the criteria for issuing TAs and RAs.

Criteria: the flight crew member should demonstrate an understanding of the methodology used by ACAS to issue TAs and RAs and the general criteria for the issuance of these advisories, including the following:

(a) ACAS advisories are based on time to closest point of approach (CPA) rather than distance. The time should be short and vertical separation should be small, or projected to be small, before an advisory can be issued. The separation standards provided by ATS are different from the miss distances against which ACAS issues alerts.

(b) Thresholds for issuing a TA or an RA vary with altitude. The thresholds are larger at higher altitudes.

(c) A TA occurs from 15 to 48 seconds and an RA from 15 to 35 seconds before the projected CPA.

(d) RAs are chosen to provide the desired vertical miss distance at CPA. As a result, RAs can instruct a climb or descent through the intruder aircraft's altitude.

(C) ACAS limitations

Objective: to verify that the flight crew member is aware of the limitations of ACAS.

Criteria: the flight crew member should demonstrate knowledge and understanding of ACAS limitations, including the following:

(a) ACAS will neither track nor display non-transponder-equipped aircraft, nor aircraft not responding to ACAS Mode C interrogations.

(b) ACAS will automatically fail if the input from the aircraft’s barometric altimeter, radio altimeter or transponder is lost.

(1) In some installations, the loss of information from other on-board systems such as an inertial reference system (IRS) or attitude heading reference system (AHRS) may result in an ACAS failure. Individual operators should ensure that their flight crews are aware of the types of failure which will result in an ACAS failure.

(2) ACAS may react in an improper manner when false altitude information is provided to own ACAS or transmitted by another aircraft. Individual operators should ensure that their flight crew are aware of the types of unsafe conditions which can arise.

Flight crew members should ensure that when they are advised, if their own aircraft is transmitting false altitude reports, an alternative altitude reporting source is selected, or altitude reporting is switched off.

(c) Some aeroplanes within 380 ft above ground level (AGL) (nominal value) are deemed to be 'on ground' and will not be displayed. If ACAS is able to determine an aircraft below this altitude is airborne, it will be displayed.

(d) ACAS may not display all proximate transponder-equipped aircraft in areas of high density traffic.

(e) The bearing displayed by ACAS is not sufficiently accurate to support the initiation of horizontal manoeuvres based solely on the traffic display.

(f) ACAS will neither track nor display intruders with a vertical speed in excess of 10 000 ft/min. In addition, the design implementation may result in some short-term errors in the tracked vertical speed of an intruder during periods of high vertical acceleration by the intruder.

(g) Ground proximity warning systems/ground collision avoidance systems (GPWSs/GCASs) warnings and wind shear warnings take precedence over ACAS advisories. When either a GPWS/GCAS or wind shear warning is active, ACAS aural annunciations will be inhibited and ACAS will automatically switch to the 'TA only' mode of operation.

(D) ACAS inhibits

Objective: to verify that the flight crew member is aware of the conditions under which certain functions of ACAS are inhibited.

Criteria: the flight crew member should demonstrate knowledge and understanding of the various ACAS inhibits, including the following:

(a) 'Increase Descent' RAs are inhibited below 1 450 ft AGL.

(b) 'Descend' RAs are inhibited below 1 100 ft AGL.

(c) All RAs are inhibited below 1 000 ft AGL.

(d) All TA aural annunciations are inhibited below 500 ft AGL.

(e) Altitude and configuration under which 'Climb' and 'Increase Climb' RAs are inhibited. ACAS can still issue 'Climb' and 'Increase Climb' RAs when operating at the aeroplane's certified ceiling. (In some aircraft types, 'Climb' or 'Increase Climb' RAs are never inhibited.)

(ii) Operating procedures

The flight crew member should demonstrate the knowledge required to operate the ACAS avionics and interpret the information presented by ACAS. This training should address the following:

(A) Use of controls

Objective: to verify that the pilot can properly operate all ACAS and display controls.

Criteria: demonstrate the proper use of controls, including the following:

(a) Aircraft configuration required to initiate a self-test.

(b) Steps required to initiate a self-test.

(c) Recognising when the self-test was successful and when it was unsuccessful. When the self-test is unsuccessful, recognising the reason for the failure and, if possible, correcting the problem.

(d) Recommended usage of range selection. Low ranges are used in the terminal area and the higher display ranges are used in the en-route environment and in the transition between the terminal and en-route environment.

(e) Recognising that the configuration of the display does not affect the ACAS surveillance volume.

(f) Selection of lower ranges when an advisory is issued, to increase display resolution.

(g) Proper configuration to display the appropriate ACAS information without eliminating the display of other needed information.

(h) If available, recommended usage of the above/below mode selector. The above mode should be used during climb and the below mode should be used during descent.

(i) If available, proper selection of the display of absolute or relative altitude and the limitations of using this display if a barometric correction is not provided to ACAS.

(B) Display interpretation

Objective: to verify that the flight crew member understands the meaning of all information that can be displayed by ACAS. The wide variety of display implementations require the tailoring of some criteria. When the training programme is developed, these criteria should be expanded to cover details for the operator's specific display implementation.

Criteria: the flight crew member should demonstrate the ability to properly interpret information displayed by ACAS, including the following:

(a) Other traffic, i.e. traffic within the selected display range that is not proximate traffic, or causing a TA or RA to be issued.

(b) Proximate traffic, i.e. traffic that is within 6 NM and ± 1 200 ft.

(c) Non-altitude reporting traffic.

(d) No bearing TAs and RAs.

(e) Off-scale TAs and RAs: the selected range should be changed to ensure that all available information on the intruder is displayed.

(f) TAs: the minimum available display range that allows the traffic to be displayed should be selected, to provide the maximum display resolution.

(g) RAs (traffic display): the minimum available display range of the traffic display that allows the traffic to be displayed should be selected, to provide the maximum display resolution.

(h) RAs (RA display): flight crew members should demonstrate knowledge of the meaning of the red and green areas or the meaning of pitch or flight path angle cues displayed on the RA display. Flight crew members should also demonstrate an understanding of the RA display

limitations, i.e. if a vertical speed tape is used and the range of the tape is less than 2 500 ft/min, an increase rate RA cannot be properly displayed.

(i) If appropriate, awareness that navigation displays oriented on 'Track-Up' may require a flight crew member to make a mental adjustment for drift angle when assessing the bearing of proximate traffic.

(C) Use of the TA only mode

Objective: to verify that a flight crew member understands the appropriate times to select the TA only mode of operation and the limitations associated with using this mode.

Criteria: the flight crew member should demonstrate the following:

(a) Knowledge of the operator's guidance for the use of TA only.

(b) Reasons for using this mode. If TA only is not selected when an airport is conducting simultaneous operations from parallel runways separated by less than 1 200 ft, and to some intersecting runways, RAs can be expected. If, for any reason, TA only is not selected and an RA is received in these situations, the response should comply with the operator's approved procedures.

(c) All TA aural annunciations are inhibited below 500 ft AGL. As a result, TAs issued below 500 ft AGL may not be noticed unless the TA display is included in the routine instrument scan.

(D) Crew coordination

Objective: to verify that the flight crew member understands how ACAS advisories will be handled.

Criteria: the flight crew member should demonstrate knowledge of the crew procedures that should be used when responding to TAs and RAs, including the following:

(a) task sharing between the pilot flying and the pilot monitoring;

(b) expected call-outs; and

(c) communications with ATC.

(E) Phraseology rules

Objective: to verify that the flight crew member is aware of the rules for reporting RAs to the controller.

Criteria: the flight crew member should demonstrate the following:

(a) the use of the phraseology contained in ICAO PANS-OPS;

(b) an understanding of the procedures contained in ICAO PANS-ATM and ICAO Annex 2; and

(c) the understanding that verbal reports should be made promptly to the appropriate ATC unit:

(1) whenever any manoeuvre has caused the aeroplane to deviate from an air traffic clearance;

(2) when, subsequent to a manoeuvre that has caused the aeroplane to deviate from an air traffic clearance, the aeroplane

has returned to a flight path that complies with the clearance; and/or

(3) when air traffic issue instructions that, if followed, would cause the crew to manoeuvre the aircraft contrary to an RA with which they are complying.

(F) Reporting rules

Objective: to verify that the flight crew member is aware of the rules for reporting RAs to the operator.

Criteria: the flight crew member should demonstrate knowledge of where information can be obtained regarding the need for making written reports to various States when an RA is issued. Various States have different reporting rules and the material available to the flight crew member should be tailored to the operator's operating environment. This responsibility is satisfied by the flight crew member reporting to the operator according to the applicable reporting rules.

(3) Non-essential items: advisory thresholds

Objective: to demonstrate knowledge of the criteria for issuing TAs and RAs.

Criteria: the flight crew member should demonstrate an understanding of the methodology used by ACAS to issue TAs and RAs and the general criteria for the issuance of these advisories, including the following:

(i) The minimum and maximum altitudes below/above which TAs will not be issued.

(ii) When the vertical separation at CPA is projected to be less than the ACAS-desired separation, a corrective RA that requires a change to the existing vertical speed will be issued. This separation varies from 300 ft at low altitude to a maximum of 700 ft at high altitude.

(iii) When the vertical separation at CPA is projected to be just outside the ACAS-desired separation, a preventive RA that does not require a change to the existing vertical speed will be issued. This separation varies from 600 to 800 ft.

(iv) RA fixed range thresholds vary between 0.2 and 1.1 NM.

(h) ACAS manoeuvre training

(1) Demonstration of the flight crew member's ability to use ACAS displayed information to properly respond to TAs and RAs should be carried out in a full flight simulator equipped with an ACAS display and controls similar in appearance and operation to those in the aircraft. If a full flight simulator is utilised, crew resource management (CRM) should be practised during this training.

(2) Alternatively, the required demonstrations can be carried out by means of an interactive CBT with an ACAS display and controls similar in appearance and operation to those in the aircraft. This interactive CBT should depict scenarios in which real-time responses should be made. The flight crew member should be informed whether or not the responses made were correct. If the response was incorrect or inappropriate, the CBT should show what the correct response should be.

(3) The scenarios included in the manoeuvre training should include: corrective RAs; initial preventive RAs; maintain rate RAs; altitude crossing RAs; increase rate RAs; RA reversals; weakening RAs; and multi-aircraft encounters. The consequences of failure to respond

correctly should be demonstrated by reference to actual incidents such as those publicised in EUROCONTROL ACAS II Bulletins (available on the EUROCONTROL website).

(i) TA responses

Objective: to verify that the pilot properly interprets and responds to TAs.

Criteria: the pilot should demonstrate the following:

(A) Proper division of responsibilities between the pilot flying and the pilot monitoring. The pilot flying should fly the aircraft using any type-specific procedures and be prepared to respond to any RA that might follow. For aircraft without an RA pitch display, the pilot flying should consider the likely magnitude of an appropriate pitch change. The pilot monitoring should provide updates on the traffic location shown on the ACAS display, using this information to help visually acquire the intruder.

(B) Proper interpretation of the displayed information. Flight crew members should confirm that the aircraft they have visually acquired is that which has caused the TA to be issued. Use should be made of all information shown on the display, note being taken of the bearing and range of the intruder (amber circle), whether it is above or below (data tag), and its vertical speed direction (trend arrow).

(C) Other available information should be used to assist in visual acquisition, including ATC 'party-line' information, traffic flow in use, etc.

(D) Because of the limitations described, the pilot flying should not manoeuvre the aircraft based solely on the information shown on the ACAS display. No attempt should be made to adjust the current flight path in anticipation of what an RA would advise, except that if own aircraft is approaching its cleared level at a high vertical rate with a TA present, vertical rate should be reduced to less than 1 500 ft/min.

(E) When visual acquisition is attained, and as long as no RA is received, normal right of way rules should be used to maintain or attain safe separation. No unnecessary manoeuvres should be initiated. The limitations of making manoeuvres based solely on visual acquisition, especially at high altitude or at night, or without a definite horizon should be demonstrated as being understood.

(ii) RA responses

Objective: to verify that the pilot properly interprets and responds to RAs.

Criteria: the pilot should demonstrate the following:

(A) Proper response to the RA, even if it is in conflict with an ATC instruction and even if the pilot believes that there is no threat present.

(B) Proper task sharing between the pilot flying and the pilot monitoring. The pilot flying should respond to a corrective RA with appropriate control inputs. The pilot monitoring should monitor the response to the RA and should provide updates on the traffic location by checking the traffic display. Proper CRM should be used.

(C) Proper interpretation of the displayed information. The pilot should recognise the intruder causing the RA to be issued (red square on display). The pilot should respond appropriately.

(D) For corrective RAs, the response should be initiated in the proper direction within 5 seconds of the RA being displayed. The change in vertical speed

should be accomplished with an acceleration of approximately ¼ g (gravitational acceleration of 9.81 m/sec²).

(E) Recognition of the initially displayed RA being modified. Response to the modified RA should be properly accomplished, as follows:

(a) For increase rate RAs, the vertical speed change should be started within 2½ seconds of the RA being displayed. The change in vertical speed should be accomplished with an acceleration of approximately ⅓ g.

(b) For RA reversals, the vertical speed reversal should be started within 2½ seconds of the RA being displayed. The change in vertical speed should be accomplished with an acceleration of approximately ⅓ g.

(c) For RA weakenings, the vertical speed should be modified to initiate a return towards the original clearance.

(d) An acceleration of approximately ¼ g will be achieved if the change in pitch attitude corresponding to a change in vertical speed of 1 500 ft/min is accomplished in approximately 5 seconds, and of ⅓ g if the change is accomplished in approximately 3 seconds. The change in pitch attitude required to establish a rate of climb or descent of 1 500 ft/min from level flight will be approximately 6° when the true airspeed (TAS) is 150 kt, 4° at 250 kt, and 2° at 500 kt. (These angles are derived from the formula: 1 000 divided by TAS.)

(F) Recognition of altitude crossing encounters and the proper response to these RAs.

(G) For preventive RAs, the vertical speed needle or pitch attitude indication should remain outside the red area on the RA display.

(H) For maintain rate RAs, the vertical speed should not be reduced. Pilots should recognise that a maintain rate RA may result in crossing through the intruder's altitude.

(I) When the RA weakens, or when the green 'fly to' indicator changes position, the pilot should initiate a return towards the original clearance, and when ‘clear of conflict’ is annunciated, the pilot should complete the return to the original clearance.

(J) The controller should be informed of the RA as soon as time and workload permit, using the standard phraseology.

(K) When possible, an ATC clearance should be complied with while responding to an RA. For example, if the aircraft can level at the assigned altitude while responding to RA (an ‘adjust vertical speed’ RA (version 7) or ‘level off’ (version 7.1), it should be done; the horizontal (turn) element of an ATC instruction should be followed.

(L) Knowledge of the ACAS multi-aircraft logic and its limitations, and that ACAS can optimise separations from two aircraft by climbing or descending towards one of them. For example, ACAS only considers intruders that it considers to be a threat when selecting an RA. As such, it is possible for ACAS to issue an RA against one intruder that results in a manoeuvre towards another intruder that is not classified as a threat. If the second intruder becomes a threat, the RA will be modified to provide separation from that intruder.

(i) ACAS initial evaluation

(1) The flight crew member's understanding of the academic training items should be assessed by means of a written test or interactive CBT that records correct and incorrect responses to phrased questions.

(2) The flight crew member's understanding of the manoeuvre training items should be assessed in a full flight simulator equipped with an ACAS display and controls similar in appearance and operation to those in the aircraft the flight crew member will fly, and the results assessed by a qualified instructor, inspector, or check airman. The range of scenarios should include: corrective RAs; initial preventive RAs; maintain rate RAs; altitude crossing RAs; increase rate RAs; RA reversals; weakening RAs; and multi-threat encounters. The scenarios should also include demonstrations of the consequences of not responding to RAs, slow or late responses, and manoeuvring opposite to the direction called for by the displayed RA.

(3) Alternatively, exposure to these scenarios can be conducted by means of an interactive CBT with an ACAS display and controls similar in appearance and operation to those in the aircraft the pilot will fly. This interactive CBT should depict scenarios in which real-time responses should be made and a record made of whether or not each response was correct.

(j) ACAS recurrent training

(1) ACAS recurrent training ensures that flight crew members maintain the appropriate ACAS knowledge and skills. ACAS recurrent training should be integrated into and/or conducted in conjunction with other established recurrent training programmes. An essential item of recurrent training is the discussion of any significant issues and operational concerns that have been identified by the operator.

Recurrent training should also address changes to ACAS logic, parameters or procedures and to any unique ACAS characteristics which flight crew members should be made aware of.

(2) It is recommended that the operator's recurrent training programmes using full flight simulators include encounters with conflicting traffic when these simulators are equipped with ACAS. The full range of likely scenarios may be spread over a 2 year period. If a full flight simulator, as described above, is not available, use should be made of an interactive CBT that is capable of presenting scenarios to which pilot responses should be made in real-time.

BCAR.SPO.OP.210 Approach and landing conditions — aeroplanes

Reserved

BCAR.SPO.OP.211 Approach and landing conditions —helicopters

Before commencing an approach to land, the pilot-in-command shall be satisfied that, according to the information available, the weather at the aerodrome or the operating site and the condition of the Final approach and take off area intended to be used would not prevent a safe approach, landing or missed approach.

AMC1 BCAR.SPO.OP.211 Approach and landing conditions —helicopters

LANDING DISTANCE/FATO SUITABILITY

The in-flight determination of the landing distance/FATO suitability should be based on the latest available meteorological report, or the locally observed conditions where appropriate.

BCAR.SPO.OP.215 Commencement and continuation of approach —helicopters

Not applicable

BCAR.SPO.OP.230 Standard operating procedures

(a) Before commencing a specialised operation, the operator shall conduct a risk assessment, assessing the complexity of the activity to determine the hazards and associated risks inherent in the operation and establish mitigating measures.

(b) Based on the risk assessment, the operator shall establish standard operating procedures (SOP) appropriate to the specialised activity and aircraft used taking account of the requirements of subpart E. The SOP shall be part of the operations manual or a separate document. SOP shall be regularly reviewed and updated, as appropriate.

(c) The operator shall ensure that specialised operations are performed in accordance with SOP.

AMC1 BCAR.SPO.OP.230 Standard operating procedures

DEVELOPMENT OF STANDARD OPERATING PROCEDURES

(a) SOPs should be developed to a standard format in accordance with AMC2 BCAR.SPO.OP.230 (SOP template) and taking into account the results of the risk assessment process.

(b) SOPs should be based on a systematic risk assessment to ensure that the risks associated with the task are acceptable. The risk assessment should describe the activity in detail, identify the relevant hazards, analyse the causes and consequences of accidental events and establish methods to treat the associated risk.

AMC2 BCAR.SPO.OP.230 Standard operating procedures

TEMPLATE

(a) Nature and complexity of the activity:

(1) The nature of the activity and exposure. The nature of the flight and the risk exposure (e.g. low height) should be described.

(2) The complexity of the activity. Detail should be provided on how demanding the activity is with regard to the required piloting skills, the crew composition, the necessary level of experience, the ground support, safety and individual protective equipment that should be provided for persons involved.

(3) The operational environment and geographical area. The operational environment and geographical area over which the operation takes place should be described:

(i) congested hostile environment: aircraft performance standard, compliance with rules of the air, mitigation of third party risk;

(ii) mountain areas: altitude, performance, the use/non-use of oxygen with mitigating procedures;

(iii) sea areas: sea state and temperature, risk of ditching, availability of search and rescue, survivability, carriage of safety equipment;

(iv) desert areas: carriage of safety equipment, reporting procedures, search and rescue information; and

(v) other areas.

(4) The application of risk assessment and evaluation. The method of application of (a)(1) to (a)(3) to the particular operation so as to minimise risk should be described. The description should reference the risk assessment and the evaluation on which the procedure is based. The SOPs should:

(i) contain elements relevant to the operational risk management performed during flight;

(ii) contain limitations, where required, such as weather, altitudes, speeds, power margins, masses, landing site size; and

(iii) list functions required to monitor the operation. Special monitoring requirements in addition to the normal functions should be described in the SOPs.

(b) Aircraft and equipment:

(1) The aircraft. The category of aircraft to be used for the activity should be indicated (e.g. helicopter/aeroplane,single/multi-engined,other-than complex motor-powered/complex motor-powered, classic tail rotor/Fenestron/no tail rotor (NOTAR) equipped). In particular, for helicopters, the necessary level of performance certification (Category A/B) should be specified.

(2) Equipment. All equipment required for the activity should be listed. This includes installed equipment certified in accordance with Part-21 as well as equipment approved in accordance with other officially recognised standards. A large number of activities require, in addition to the standard radio communication equipment, additional air-to-ground communication equipment. This should be listed and the operational procedure should be defined.

(c) Crew members:

(1) The crew composition, including the following, should be specified:

(i) minimum flight crew (according to the appropriate manual); and

(ii) additional flight crew.

(2) In addition, for flight crew members, the following should be specified:

(i) selection criteria (initial qualification, flight experience, experience of the activity);

(ii) initial training (volume and content of the training); and

(iii) recent experience requirement and/or recurrent training (volume and content of the training).

The criteria listed in (c)(2)(i) to (c)(2)(iii) should take into account the operational environment and the complexity of the activity and should be detailed in the training programmes.

(d) Task specialists:

(1) Whenever a task specialist is required, his/her function on board should be clearly defined. In addition, the following should be specified:

(i) selection criteria (initial background, experience of the activity);

(ii) initial training (volume and content of the training); and

(iii) recent experience requirement and/or recurrent training (volume and content of the training).

The criteria listed in (d)(1) should take into account the specialisation of the task specialist and should be detailed in the training programmes.

(2) There is a large number of activities for which task specialists are required. This chapter should detail the following for such personnel:

(i) specialisation;

(ii) previous experience; and

(iii) training or briefing.

Briefing or specific training for task specialists referred to in (d)(2) should be detailed in the training programmes.

(e) Performance:

This chapter should detail the specific performance requirements to be applied, in order to ensure an adequate power margin.

(f) Normal procedures:

(1) Operating procedures. The operating procedures to be applied by the flight crew, including the coordination with task specialists.

(2) Ground procedures. The procedures to be applied by the task specialists should be described, e.g. loading/unloading, cargo hook operation.

(g) Emergency procedures:

(1) Operating procedures. The emergency procedures to be applied by the flight crew, the coordination with the task specialist and coordination between the flight crew and task specialists should be described.

(2) Ground procedures. The emergency procedures to be applied by the task specialists (e.g. in the case of a forced landing) should be specified.

(h) Ground equipment:

This chapter should detail the nature, number and location of ground equipment required for the activity, such as:

(1) refuelling facilities, dispenser and storage;

(2) firefighting equipment;

(3) size of the operating site (landing surface, loading/unloading area); and

(4) ground markings.

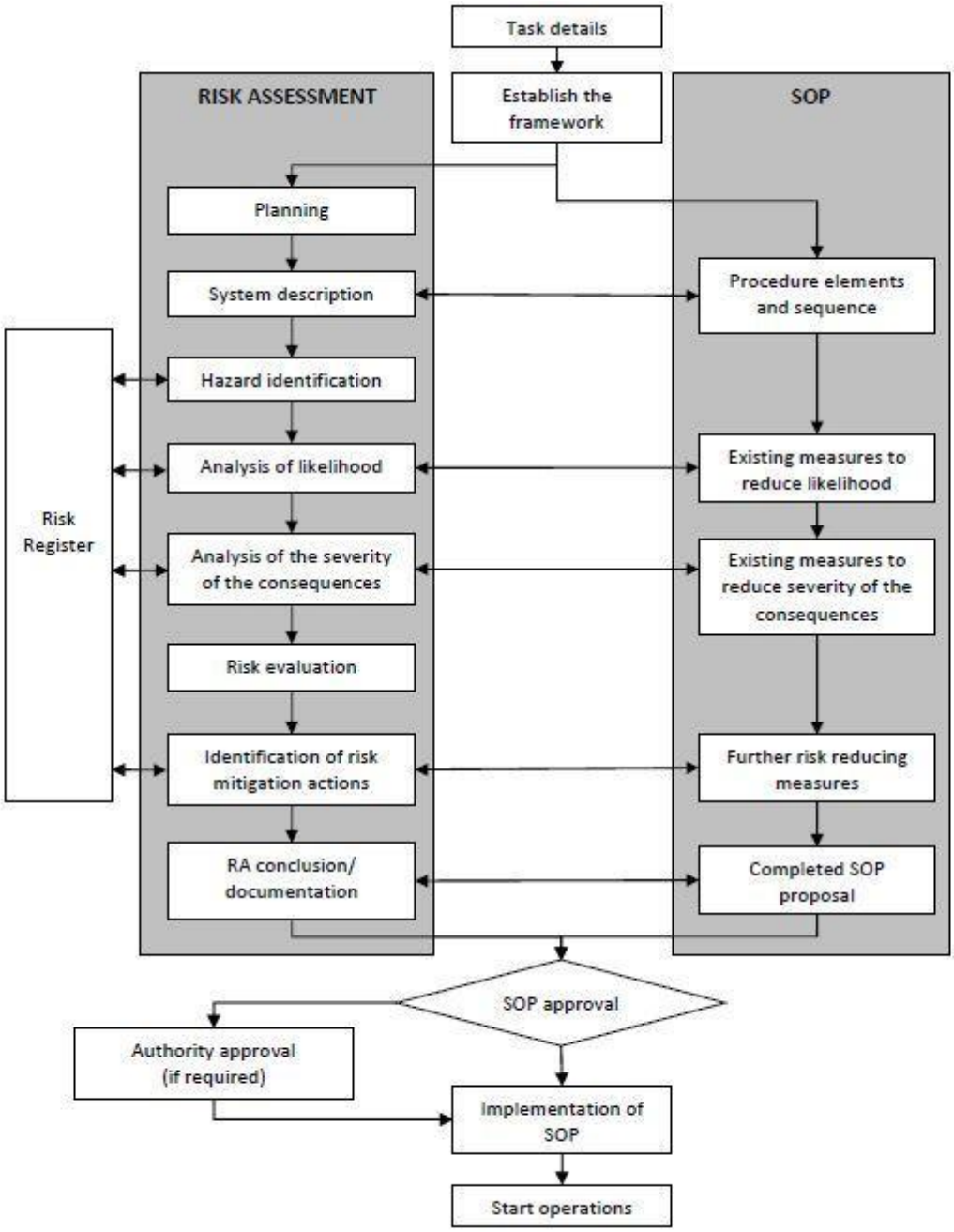
(i) Records:

It should be determined which records specific to the flight(s) are to be kept, such as task details, aircraft registration, pilot-in-command, flight times, weather and any remarks, including a record of occurrences affecting flight safety or the safety of persons or property on the ground.

GM1 BCAR.SPO.OP.230 Standard operating procedures

TEMPLATE FORMS

Figure 1 — Development of a SOP based on a risk assessment



Template Form A — Risk assessment (RA)

Date: RA of Responsible:
Purpose:

Type of operation and brief description:
Participants, working group:
Preconditions, assumptions and simplifications:
Data used:
Description of the analysis method:
External context:
• Regulatory requirements • Approvals • Environmental conditions (visibility, wind, turbulence, contrast, light, elevation, etc. unless evident from the SOPs) • Stakeholders and their potential interest
Internal context:
• Type(s) of aircraft • Personnel and qualifications • Combination/similarity with other operations/SOPs • Other RA used/considered/plugged in
Existing barriers and emergency preparedness:
Monitoring and follow up:
Description of the risk:
Risk evaluation:
Conclusions:

Template Form B — Hazard identification (HI)

Date: HI of Responsible:

Phase of operation	Hazard ref	Hazard	Causes	Existing controls	Controls ref	Comments

Note:

Haz ref:A unique number for hazards, e.g. for use in a database

Controls ref:A unique number for the existing controls

Template Form C — Mitigating measures

Date: RA of Responsible:

Phase of operation	Haz ref	Consequence	Existing mitigation actions	Mitigation ref	L	S	Further mitigation required

Note:

Haz ref:A unique number for hazards, e.g. for use in a database

Mitigation ref: A unique number for the mitigation actions

L:Likelihood

S:Severity

Template register A — risk register

Ref	Operation/ Procedure	Ref	Hazard	Ref	Consequences	Mitigation actions	L	S	Monitoring

Note:

L:Likelihood

S:Severity

SUBPART C: AIRCRAFT PERFORMANCE AND OPERATING LIMITATIONS

BCAR.SPO.POL.100 Operating limitations — all aircraft

(a) During any phase of operation, the loading, the mass and the centre of gravity (CG) position of the aircraft shall comply with any limitation specified in the appropriate manual.

(b) Placards, listings, instrument markings, or combinations thereof, containing those operating limitations prescribed by the AFM for visual presentation, shall be displayed in the aircraft.

AMC1 BCAR.SPO.POL.100 Operating Limitations — all aircraft

APPROPRIATE MANUAL

The appropriate manual containing operating limitations may be the AFM or an equivalent document, or the operations manual, if more restrictive.

BCAR.SPO.POL.105 Mass and balance

(a) The operator shall ensure that the mass and the CG of the aircraft have been established by actual weighing prior to initial entry into service. The accumulated effects of modifications and repairs on the mass and balance shall be accounted for and properly documented. Such information shall be made available to the pilot-in-command. The aircraft shall be reweighed if the effect of modifications on the mass and balance is not accurately known.

(b) The weighing shall be accomplished by the manufacturer of the aircraft or by an approved maintenance organisation.

GM1 BCAR.SPO.POL.105 Mass and balance

GENERAL — OPERATIONS WITH OTHER-THAN COMPLEX MOTOR-POWERED AIRCRAFT

(a) New aircraft that have been weighed at the factory may be placed into operation without reweighing if the mass records and balance records have been adjusted for alterations or modifications to the aircraft. Aircraft transferred from one operator to another operator do not have to be weighed prior to use by the receiving operator unless the mass and balance cannot be accurately established by calculation.

(b) the mass and the centre of gravity (CG) position of an aircraft should be revised whenever the cumulative changes to the dry operating mass exceed ± 0.5 % of the maximum landing mass or for aeroplanes the cumulative change in CG position exceeds 0.5 % of the mean aerodynamic chord. This may be done by weighing the aircraft or by calculation. If the AFM requires to record changes to mass and CG position below these thresholds, or to record changes in any case, and make them known to the pilot-in-command, mass and CG position should be revised accordingly and made known to the pilot-in-command

AMC1 BCAR.SPO.POL.105 (b) Mass and balance

WEIGHING OF AN AIRCRAFT — OPERATIONS WITH COMPLEX MOTOR POWERED AIRCRAFT

(a) New aircraft that have been weighed at the factory may be placed into operation without reweighing if the mass and balance records have been adjusted for alterations or modifications to the aircraft. Aircraft transferred from one other operator do not have to be weighed prior to use by the receiving operator unless the mass and balance cannot be accurately established by calculation.

(b) The mass and centre of gravity (CG) position of an aircraft should be revised whenever the cumulative changes to the dry operating mass exceed ±0.5 % of the maximum landing mass or for aeroplanes the cumulative change in CG position exceeds 0.5 % of the mean aerodynamic chord. This should be done either by weighing the aircraft or by calculation.

(c) When weighing an aircraft, normal precautions should be taken, which are consistent with good practices such as:

(1) checking for completeness of the aircraft and equipment;

(2) determining that fluids are properly accounted for;

(3) ensuring that the aircraft is clean; and

(4) ensuring that weighing is accomplished in an enclosed building.

(d) Any equipment used for weighing should be properly calibrated, zeroed and used in accordance with the manufacturer's instructions. Each scale should be calibrated either by the manufacturer or by an appropriately authorised organisation within 2 years or within a time period defined by the manufacturer of the weighing equipment, whichever is less. The equipment should enable the mass of the aircraft to be established accurately. One single accuracy criterion for weighing equipment cannot be given. However, the weighing accuracy is considered satisfactory if the accuracy criteria in Table 1 are met by the individual scales/cells of the weighing equipment used:

Table 1: Accuracy criteria for weighing equipment

For a scale/cell load	An accuracy of
below 2 000 kg	± 1 %
from 2 000 kg to 20 000 kg	± 20 kg
above 20 000 kg	± 0.1 %

CG LIMITS — OPERATIONAL CG ENVELOPE AND IN-FLIGHT CG

In the Certificate Limitations section of the AFM, forward and aft CG limits are specified. These limits ensure that the certification stability and control criteria are met throughout the whole flight and allow the proper trim setting for take-off. The operator should ensure that these limits are respected by:

(a) defining and applying operational margins to the certified CG envelope in order to compensate for the following deviations and errors:

(1) deviations of actual CG at empty or operating mass from published values due, for example, to weighing errors, unaccounted modifications and/or equipment variations.

(2) Deviations in fuel distribution in tanks from the applicable schedule.

(3) Deviations in the distribution of cargo in the various compartments as compared with the assumed load distribution as well as inaccuracies in the actual mass of cargo.

(5) Deviations of the actual CG of cargo load within individual cargo compartments or cabin sections from the normally assumed mid position.

(6) Deviations of the CG caused by gear and flap positions and by application of the prescribed fuel usage procedure, unless already covered by the certified limits.

(7) Deviations caused by in-flight movement of crew members and task specialist.

(b) Defining and applying operational procedures in order to:

(1) take into account any significant CG travel during flight caused by persons movement; and

(2) take into account any significant CG travel during flight caused by fuel consumption/transfer.

BCAR.SPO.POL.110 Mass and balance system — commercial operations with helicopters

(a) The operator shall establish a mass and balance system for each flight or series of flights:

(1) aircraft dry operating mass;
(2) mass of the traffic load;
(3) mass of the fuel load;
(4) aircraft load and load distribution;
(5) take-off mass, landing mass and zero fuel mass; and
(6) applicable aircraft CG positions.

(b) The flight crew shall be provided with a means of replicating and verifying any mass and balance computation based on electronic calculations.

(c) The operator shall establish procedures to enable the pilot-in-command to determine the mass of the fuel load by using the actual density or, if not known, the density calculated in accordance with a method specified in the operations manual.

(d) The pilot-in-command shall ensure that the loading of:

(1) the aircraft is performed under the supervision of qualified personnel; and

(2) traffic load is consistent with the data used for the calculation of the aircraft mass and balance.

(e) The operator shall specify, in the operations manual, the principles and methods involved in the loading and in the mass and balance system that meet the requirements contained in (a) to (d). This system shall cover all types of intended operations.

AMC1 BCAR.SPO.POL.110 (a)(1) Mass and balance system — commercial operations with helicopters

DRY OPERATING MASS

The dry operating mass should include:

(a) crew and equipment, and

(b) removable task specialist equipment, if applicable.

AMC1 BCAR.SPO.POL.110 (a)(2) Mass and balance system — commercial operations with helicopters

SPECIAL STANDARD MASSES FOR TRAFFIC LOAD

The operator should use standard mass values for other load items. These standard masses should be calculated on the basis of a detailed evaluation of the mass of the items.

GM1 BCAR.SPO.POL.110 (a)(2) Mass and balance system — commercial operations with aeroplanes and helicopters

TRAFFIC LOAD

Traffic load includes task specialists.

AMC1 BCAR.SPO.POL.110 (a)(3) Mass and balance system — commercial operations with aeroplanes and helicopters

FUEL LOAD

The mass of the fuel load should be determined by using its actual relative density or a standard relative density.

GM1 BCAR.SPO.POL.110 (a)(3) Mass and balance system — commercial operations with aeroplanes and helicopters

FUEL DENSITY

(a) If the actual fuel density is not known, the operator may use standard fuel density values for determining the mass of the fuel load. Such standard values should be based on current fuel density measurements for the airports or areas concerned.

(b) Typical fuel density values are:

(1) Gasoline (piston engine fuel) – 0.71 ;

(2) JET A1 (Jet fuel JP 1) – 0.79 ;

(3) JET B (Jet fuel JP 4) – 0.76 ;

(4) Oil – 0.88.

AMC1 BCAR.SPO.POL.110 (a)(4) Mass and balance system — commercial operations with aeroplanes and helicopters

LOADING - STRUCTURAL LIMITS

The loading should take into account additional structural limits such as the floor strength limitations, the maximum load per running metre, the maximum mass per cargo compartment, and/or the maximum seating limits as well as in-flight changes in loading.

GM1 BCAR.SPO.POL.110 (b) Mass and balance system — commercial operations with aeroplanes and helicopters

GENERAL

The mass and balance computation may be available in flight planning documents or separate systems and may include standard load profiles.

BCAR.SPO.POL.115 Mass and balance data and documentation — commercial operations helicopters

(a) The operator shall establish mass and balance data and produce mass and balance documentation prior to each flight, or series of flights, specifying the load and its distribution in such a way that the mass and balance limits of the aircraft are not exceeded. The mass and balance documentation shall contain the following information:

(1) aircraft registration and type;

(2) flight identification, number and date, as applicable;

(3) name of the pilot-in-command;

(4) name of the person who prepared the document;

(5) dry operating mass and the corresponding CG of the aircraft;

(6) mass of the fuel at take-off and the mass of trip fuel;

(7) mass of consumables other than fuel, if applicable;

(8) load components;

(9) take-off mass, landing mass and zero fuel mass;

(10) applicable aircraft CG positions; and

(11) the limiting mass and CG values.

(b) Where mass and balance data and documentation is generated by a computerised mass and balance system, the operator shall verify the integrity of the output data.

AMC1 BCAR.SPO.POL.115 (b) Mass and balance data and documentation — commercial operations with helicopters

GENERAL

(a) The mass and balance documentation should:

(1) enable the pilot-in-command to determine that the load and its distribution are within the mass and balance limits of the aircraft; and

(2) include advise to the pilot-in-command whenever a non-standard method has been used for determining the mass of the load.

(b) The information above may be available in flight planning documents or mass and balance systems.

(c) Any last minute change should be brought to the attention of the pilot-in-command and entered in the flight planning documents containing the mass and balance information and mass and balance systems.

(d) Where mass and balance documentation is generated by a computerised mass and balance system, the operator should verify the integrity of the output data at intervals not exceeding six months.

(e) A copy of the final mass and balance documentation may be sent to aircraft via data link or may be made available to the pilot-in–command by other means for its acceptance.

(f) The person supervising the loading of the aircraft should confirm by hand signature or equivalent that the load and its distribution are in accordance with the mass and balance documentation given to the pilot in command. The pilot-in-command should indicate his acceptance by hand signature or equivalent.

GM1 BCAR.SPO.POL.115 Mass and balance data and documentation — commercial operations with helicopters

SIGNATURE OR EQUIVALENT

Where a signature by hand is impracticable or it is desirable to arrange the equivalent verification by electronic means, as referred to in AMC1 BCAR.SPO.POL.115 (f), the following conditions should be applied in order to make an electronic signature the equivalent of a conventional hand-written signature:

(a) electronic 'signing' by entering a personal identification number (PIN) code with appropriate security, etc.;

(b) entering the PIN code generates a print-out of the individual's name and professional capacity on the relevant document(s) in such a way that it is evident, to anyone having a need for that information, who has signed the document;

(c) the computer system logs information to indicate when and where each PIN code has been entered;

(d) the use of the PIN code is, from a legal and responsibility point of view, considered to be fully equivalent to signature by hand;

(e) the requirements for record keeping remain unchanged; and

(f) all personnel concerned are made aware of the conditions associated with electronic signature and this is documented.

AMC1 BCAR.SPO.POL.115 (b) Mass and balance data and documentation — commercial operations with helicopters

INTEGRITY

The operator should verify the integrity of mass and balance data and documentation generated by a computerised mass and balance system, at intervals not exceeding six months. The operator should establish a system to check that amendments of its input data are incorporated properly in the system and that the system is operating correctly on a continuous basis.

AMC2 BCAR.SPO.POL.115 (b) Mass and balance data and documentation — commercial operations with helicopters

MASS AND BALANCE DOCUMENTATION SENT VIA DATA LINK

Whenever the mass and balance documentation is sent to the aircraft via data link, a copy of the final mass and balance documentation as accepted by the pilot-in-command should be available on the ground.

GM1 BCAR.SPO.POL.115 (b) Mass and balance data and documentation — commercial operations with helicopters

ON BOARD INTEGRATED MASS AND BALANCE COMPUTER SYSTEM

An on-board integrated mass and balance computer system may be an aircraft installed system capable of receiving input data either from other aircraft systems or from a mass and balance system on ground, in order to generate mass and balance data as an output.

GM2 BCAR.SPO.POL.115 (b) Mass and balance data and documentation — commercial operations with helicopters

STAND-ALONE COMPUTERISED MASS AND BALANCE SYSTEM

A stand-alone computerised mass and balance system may be a computer, either as part of an electronic flight bag (EFB) system or solely dedicated to mass and balance purposes, requiring input from the user, in order to generate mass and balance data as an output.

BCAR.SPO.POL.116 Mass and balance data and documentation — alleviations

Notwithstanding BCAR.SPO.POL.115(a)(5), the CG position may not need not be on the mass and balance documentation, if the load distribution is in accordance with a pre-calculated balance table or if it can be shown that for the planned operations a correct balance can be ensured, whatever the real load is.

BCAR.SPO.POL.120 Performance — general

The pilot-in-command shall only operate the aircraft if the performance is adequate to comply with the applicable rules of the air and any other restrictions applicable to the flight, the airspace or the aerodromes or operating sites used, taking into account the charting accuracy of any charts and maps used.

BCAR.SPO.POL.125 Take-off mass limitations — complex motor-powered aeroplanes

Reserved

BCAR.SPO.POL.130 Take-off — complex motor-powered aeroplanes

Reserved

BCAR.SPO.POL.135 En-route — one engine inoperative — complex motor-powered aeroplanes

Reserved

BCAR.SPO.POL.140 Landing — complex motor-powered aeroplanes

Reserved

BCAR.SPO.POL.145 Performance and operating criteria — aeroplanes

Reserved

BCAR.SPO.POL.146 Performance and operating criteria — helicopters

(a) The pilot-in-command may operate an aircraft over congested areas provided that:

(1) the helicopter is certified in category A or B; and

(2) safety measures are established to prevent undue hazard to persons or property on the ground and the operation and its SOP is authorised.

(b) The operator shall:

(1) establish operational procedures to minimise the consequences of an engine failure;

(2) establish a training programme for crew members; and

(3) ensure that all crew members and task specialists on board are briefed on the procedures to be carried out in the event of a forced landing.

(c) The operator shall ensure that the mass at take-off, landing or hover shall not exceed the maximum mass specified for:

(1) a hover out of ground effect (HOGE) with all engines operating at the appropriate power rating; or

(2) if conditions prevail that a HOGE is not likely to be established, the helicopter mass shall not exceed the maximum mass specified for a hover in ground effect (HIGE) with all engines operating at the appropriate power rating, provided prevailing conditions allow a hover in ground effect at the maximum specified mass.

AMC1 BCAR.SPO.POL.145 (a) and (b) Performance and operating criteria — aeroplanes, and AMC1 BCAR.SPO.POL.146(b)(1) and (2) Performance and operating criteria — helicopters

OPERATIONAL PROCEDURES AND TRAINING PROGRAMME

(a) The operational procedures should be based on the manufacturer's recommended procedures where they exist.

(b) The crew member training programme should include briefing, demonstration or practice, as appropriate, of the operational procedures necessary to minimise the consequences of an engine failure.

AMC1 BCAR.SPO.POL.146(c) Performance and operating criteria — helicopters

MAXIMUM SPECIFIED MASSES

(a) The operator should establish a procedure to determine maximum specified masses for HIGE and HOGE before each flight or series of flights.

(b) This procedure should take into account ambient temperature at the aerodrome or operating site, pressure altitude and wind conditions data available.

GM1 BCAR.SPO.POL.146(c) Performance and operating criteria — helicopters

GENERAL

(a) Even when the surface allows a hover in ground effect (HIGE), the likelihood of, for example, dust or blowing snow may necessitate hover out of ground effect (HOGE) performance.

(b) Wind conditions on some sites (particularly in mountainous areas and including downdraft) may require a reduction in the helicopter mass in order to ensure that an out of ground effect hover can be achieved at the operational site in the conditions prevailing.

SUBPART D: INSTRUMENTS, DATA AND EQUIPMENT

SECTION 1

AEROPLANES

Reserved

SECTION 2
HELICOPTERS

BCAR.SPO.IDE.H.100 Instruments and equipment — general

(a) Instruments and equipment required by this Subpart shall be approved in accordance with the applicable airworthiness requirements if they are:

(1) used by the flight crew to control the flight path;

(2) used to comply with BCAR.SPO.IDE.H.215;

(3) used to comply with BCAR.SPO.IDE.H.220; or

(4) installed in the helicopter.

(b) The following items, when required by this Subpart, do not need an equipment approval:

(1) independent portable light,

(2) an accurate time piece,

(3) chart holder,

(4) first-aid kit,

(5) survival and signalling equipment, and

(c) Instruments and equipment not required by this Subpart as well as any other equipment that is not required by other applicable Parts, but is carried on a flight, shall comply with the following:

(1) the information provided by these instruments, equipment or accessories shall not be used by the flight crew to comply with BCAR-21 or BCAR.SPO.IDE.H.215 and BCAR.SPO.IDE.H.220; and

(2) the instruments and equipment shall not affect the airworthiness of the helicopter, even in the case of failures or malfunction.

(d) Instruments and equipment shall be readily operable or accessible from the station where the flight crew member that needs to use it is seated.

(e) Those instruments that are used by a flight crew member shall be so arranged as to permit the flight crew member to see the indications readily from his/her station, with the minimum practicable deviation from the position and line of vision which he/she normally assumes when looking forward along the flight path.

(f) All required emergency equipment shall be easily accessible for immediate use.

GM1 BCAR.SPO.IDE.H.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) Applicable regulations for helicopters registered in Bhutan; and

(b) Airworthiness requirements of the state of registry for helicopters registered outside Bhutan.

GM1 BCAR.SPO.IDE.H.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 BCAR.SPO.IDE.H.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 BCAR.SPO.IDE.H.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 helicopter. Examples may be the following:

(1) portable electronic flight bag (EFB);

(2) portable electronic devices carried by crew members or task specialists; and

(3) non-installed task specialists equipment.

GM1 BCAR.SPO.IDE.H.100 (d) Instruments and equipment — general

POSITIONING OF INSTRUMENTS

This requirement implies that whenever a single instrument is required in a helicopter operated in a multi-crew environment, the instrument needs to be visible from each flight crew station.

BCAR.SPO.IDE.H.105 Minimum equipment for flight

A flight shall not be commenced when any of the helicopter's instruments, items of equipment or functions required for the intended flight are inoperative or missing, unless:

(a) the helicopter is operated in accordance with the minimum equipment list (MEL), if established;

(b) for complex motor-powered helicopters, and for any helicopter used in commercial operations, the operator is approved by the BCAA to operate the helicopter within the constraints of the master minimum equipment list (MMEL); or

(c) the helicopter is subject to a permit to fly issued in accordance with the applicable airworthiness requirements.

BCAR.SPO.IDE.H.115 Operating lights

Helicopters operated at night shall be equipped with:

(a) an anti-collision light system;

(b) navigation/position lights;

(c) a landing light;

(d) lighting supplied from the helicopter's electrical system to provide adequate illumination for all instruments and equipment essential to the safe operation of the helicopter;

(e) lighting supplied from the helicopter's electrical system to provide illumination in all cabin compartments;

(f) an independent portable light for each crew member station; and

(g) Not applicable

AMC1 BCAR.SPO.IDE.H.115 operating lights

LANDING LIGHT

The landing light should be trainable, at least in the vertical plane, or optionally be an additional fixed light or lights positioned to give a wide spread of illumination.

BCAR.SPO.IDE.H.120 Operations under VFR — flight and navigational instruments and associated equipment

(a) Helicopters operated under VFR by day shall be equipped with a means of measuring and displaying the following:

(1) magnetic heading,

(2) time in hours, minutes and seconds,

(3) pressure altitude,

(4) indicated airspeed, and

(5) slip.

(b) Helicopters operated under VMC out of sight of the land shall be, in addition to (a), equipped with:

(1) a means of measuring and displaying:

(i) attitude,

(ii) vertical speed, and

(iii) stabilised heading;

(2) a means of indicating when the supply of power to the gyroscopic instruments is not adequate; and

(3) for complex motor-powered helicopters, a means of preventing malfunction of the airspeed indicating system required in (a)(4) due to condensation or icing.

(c) Helicopters operated when the visibility is less than 1500 m, or in conditions where they cannot be maintained in a desired flight path without reference to one or more additional instruments,

shall be, in addition to (a) and (b), equipped with a means of preventing malfunction of the airspeed indicating system required in (a)(4) due to condensation or icing.

(d) Whenever two pilots are required for the operation, helicopters shall be equipped with an additional separate means of displaying:

(1) pressure altitude,

(2) indicated airspeed,

(3) slip,

(4) attitude, if applicable,

(5) vertical speed, if applicable, and

(6) stabilised heading, if applicable.

AMC1 BCAR.SPO.IDE.H.120 Operations under VFR -flight and navigational instruments and associated equipment

INTEGRATED INSTRUMENTS

(a) Individual equipment requirements may be met by combinations of instruments, 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 helicopter for the intended type of operation.

(b) The means of measuring and indicating turn and slip, helicopter attitude and stabilised helicopter heading 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 BCAR.SPO.IDE.H.120 Operations under VFR -flight and navigational instruments and associated equipment

LOCAL FLIGHTS

For flights that do not exceed 60 minutes' duration, that take off and land at the same aerodrome, and that remain within 50 NM of that aerodrome, an equivalent means of complying with BCAR.SPO.IDE.A.120 (b)(1)(i), (b)(1)(ii) may be:

a. a turn and slip indicator;

b. a turn co-ordinator; or

c. both an attitude indicator and a slip indicator.

AMC1 BCAR.SPO.IDE.H.120 (a)(1) Operations under VFR— flight and navigational instruments and associated equipment

MEANS OF MEASURING AND DISPLAYING MAGNETIC HEADING

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

AMC1 BCAR.SPO.IDE.H.120 (a)(2) Operations under VFR— flight and navigational instruments and associated equipment

MEANS OF MEASURING AND DISPLAYING THE TIME — COMPLEX MOTOR-POWERED AIRCRAFT

An acceptable means of compliance is a clock displaying hours, minutes and seconds, with a sweep-second pointer or digital presentation.

MEANS OF MEASURING AND DISPLAYING THE TIME — OTHER-THAN- COMPLEX MOTOR-POWERED AIRCRAFT

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

AMC1 BCAR.SPO.IDE.H.120 (a)(3) Operations under VFR— flight and navigational instruments and associated equipment

CALIBRATION OF THE MEANS OF MEASURING AND DISPLAYING PRESSURE ALTITUDE

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

AMC1 BCAR.SPO.IDE.H.120 (a) (4) Operations under VFR— flight and navigational instruments and associated equipment

CALIBRATION OF THE INSTRUMENT INDICATING AIRSPEED

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

(b) In the case of helicopters with an MCTOM below 2 000 kg, calibration in kilometres per hour (kph) or in miles per hour (mph) is acceptable when such units are used in the AFM.

AMC1 BCAR.SPO.IDE.H.120 (a) (5) Operations under VFR — flight and navigational instruments and associated equipment

SLIP

For other-than complex helicopters the means of measuring and displaying slip may be a slip string for operations under VFR.

AMC1 BCAR.SPO.IDE.H.120 (d) Operations under VFR— flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS — DUPLICATE INSTRUMENTS

Duplicate instruments include separate displays for each pilot and separate selectors or other associated equipment where appropriate.

AMC1 BCAR.SPO.IDE.H.120 (b)(1)(iii)) Operations under VFR— flight and navigational instruments and associated equipment

STABILISED HEADING

Stabilised direction should be achieved for VFR flights by a gyroscopic direction indicator, whereas for IFR flights, this should be achieved through a magnetic gyroscopic direction indicator.

AMC1 BCAR.SPO.IDE.H.120 (b) (3) Operations under VFR— flight and navigational instruments and associated equipment

MEANS OF PREVENTING MALFUNCTION DUE TO CONDENSATION OR ICING

The means of preventing malfunction due to either condensation or icing of the airspeed indicating system should be a heated pitot tube or equivalent.

BCAR.SPO.IDE.H.125 Operations under IFR — flight and navigational instruments and associated equipment

Not applicable.

BCAR.SPO.IDE.H.126 Additional equipment for single-pilot operation under IFR

Not applicable

BCAR.SPO.IDE.H.132 Airborne weather detecting equipment — complex motor-powered helicopters

Not applicable

BCAR.SPO.IDE.H.133 Additional equipment for operations in icing conditions at night — complex motor-powered helicopters

Not applicable

BCAR.SPO.IDE.H.135 Flight crew interphone system

Helicopters operated by more than one flight crew member shall be equipped with a flight crew interphone system, including headsets and microphones for use by all flight crew members.

AMC1 BCAR.SPO.IDE.H.135 Flight crew interphone system

TYPE OF FLIGHT CREW INTERPHONE

The flight crew interphone system should not be of a handheld type.

BCAR.SPO.IDE.H.140 Cockpit voice recorder

Reserved

BCAR.SPO.IDE.H.145 Flight data recorder

Reserved

BCAR.SPO.IDE.H.150 Data link recording

Reserved

BCAR.SPO.IDE.H.155 Flight data and cockpit voice combination recorder

Reserved

BCAR.SPO.IDE.H.160 Seats, seat safety belts and restraint systems

(a) Helicopters shall be equipped with:

(1) a seat or station for each crew member or task specialist on board;

(2) a seat belt on each seat, and restraint devices for each station;

(3) for helicopters first issued with an individual CofA after 31 December 2012, a seat belt with an upper torso restraint system for each seat; and

(4) a seat belt with upper torso restraint system incorporating a device that will automatically restrain the occupant's torso in the event of rapid deceleration on each flight crew seat.

(b) A seat belt with upper torso restraint system shall have a single point release.

AMC2 BCAR.SPO.IDE.H.160 Seats, seat safety belts and restraint systems

UPPER TORSO RESTRAINT SYSTEM

The following systems are deemed to be compliant with the requirement for an upper torso restraint system:

(a) For other-than complex helicopters, a seat belt with a diagonal shoulder strap;

(b) For all helicopters, a restraint system having a seat belt and two shoulder straps that may be used independently.

(c) For all helicopters, a restraint system having a seat belt, two shoulder straps and additional straps that may be used independently.

SEAT BELT

A seat belt with a diagonal shoulder strap (three anchorage points) is deemed to be compliant with the requirement for a seat belt (two anchorage points).

BCAR.SPO.IDE.H.165 First-aid kit

(a) Helicopters shall be equipped with a first-aid kit.

(b) The first-aid kit shall be:

(1) readily accessible for use; and

(2) kept up-to-date.

AMC1 BCAR.SPO.IDE.H.165 First-aid kit

CONTENT OF FIRST-AID KITS — OTHER-THAN COMPLEX MOTOR-POWERED HELICOPTERS

(a) First-aid kits should be equipped with appropriate and sufficient medications and instrumentation. However, these kits should be amended by the operator according to the characteristics of the operation (scope of operation, flight duration, number and demographics of persons on board, etc.).

(b) The following should be included in the FAKs:

(1) bandages (assorted sizes),

(2) burns dressings (large and small),

(3) wound dressings (large and small),

(4) adhesive dressings (assorted sizes),

(5) antiseptic wound cleaner,

(6) safety scissors, and

(7) disposable gloves.

AMC2 BCAR.SPO.IDE.H.165 First-aid kit

CONTENT OF FIRST-AID KIT — COMPLEX MOTOR-POWERED HELICOPTERS

(a) First-aid kits should be equipped with appropriate and sufficient medications and instrumentation. However, these kits should be amended by the operator according to the characteristics of the operation (scope of operation, flight duration, number and demographics of persons on board etc.).

(b) The following should be included in the FAKs:

(1) Equipment:

(i) bandages (assorted sizes);

(ii) burns dressings (unspecified);

(iii) wound dressings (large and small);

(iv) adhesive dressings (assorted sizes);

(v) adhesive tape;

(vi) adhesive wound closures;

(vii) safety pins;

(viii) safety scissors;

(ix) antiseptic wound cleaner;

(x) disposable resuscitation aid;

(xi) disposable gloves;

(xii) tweezers: splinter; and

(xiii) thermometers (non-mercury).

(2) Medications:

(i) simple analgesic (may include liquid form);

(ii) antiemetic;

(iii) nasal decongestant;

(iv) gastrointestinal antacid, in the case of helicopters carrying more than nine persons;

(v) antidiarrhoeal medication in the case of helicopters carrying more than nine persons; and

(vi) antihistamine.

(3) Other:

(i) a list of contents in at least two languages (English and one other). This should include information on the effects and side effects of medications carried;

(ii) first-aid handbook;

(iii) medical incident report form; and

(iv) biohazard disposal bags.

(4) An eye irrigator, although not required to be carried in the FAK, should, where possible, be available for use on the ground.

AMC3 BCAR.SPO.IDE.H.165 First-aid kit

MAINTENANCE OF FIRST-AID KIT

To be kept up to date, the first-aid kit should be:

(a) inspected periodically to confirm, to the extent possible, that contents are maintained in the condition necessary for their intended use;

(b) replenished at regular intervals, in accordance with instructions contained on their labels, or as circumstances warrant; and

(c) replenished after use in-flight at the first opportunity where replacement items are available.

BCAR.SPO.IDE.H.175 Supplemental oxygen — non-pressurised helicopters

(a) Non-pressurised helicopters operated at flight altitudes when the oxygen supply is required in accordance with (b) shall be equipped with oxygen storage and dispensing apparatus capable of storing and dispensing the required oxygen supplies.

(b) Non-pressurised helicopters operated above flight altitudes at which the pressure altitude in the cabin compartments is above 10 000 ft shall carry enough breathing oxygen to supply:

(1) all crew members for any period in excess of 30 minutes when the pressure altitude in the cabin compartment will be between 10 000 ft and 13 000 ft; and

(2) all crew members and task specialists for any period that the pressure altitude in the cabin compartment will be above 13 000 ft.

(c) Notwithstanding (b), excursions of a specified duration between 13 000 ft and 16 000 ft may be undertaken without oxygen supplies, -in accordance with BCAR.SPO.OP.195(b).

AMC1 BCAR.SPO.IDE.H.175 Supplemental oxygen — non-pressurised helicopters

DETERMINATION OF OXYGEN

The amount of oxygen should be determined on the basis of cabin pressure altitude and flight duration, consistent with the operating procedures, including emergency, procedures, established for each operation and the routes to be flown as specified in the AFM.

BCAR.SPO.IDE.H.180 Hand fire extinguishers

(a) Helicopters, except ELA2 helicopters, shall be equipped with at least one hand fire extinguisher:

(1) in the flight crew compartment; and

(2) in each cabin compartment that is separate from the flight crew compartment, except if the compartment is readily accessible to the flight crew.

(b) The type and quantity of extinguishing agent for the required fire extinguishers shall be suitable for the type of fire likely to occur in the compartment where the extinguisher is intended to be used and to minimise the hazard of toxic gas concentration in compartments occupied by persons.

AMC1 BCAR.SPO.IDE.H.180 Hand fire extinguishers

NUMBER, LOCATION AND TYPE

(a) The number and location of hand fire extinguishers should be such as to provide adequate availability for use, account being taken of the number and size of the cabin compartments, the need to minimise the hazard of toxic gas concentrations and the location of toilets, galleys, etc. These considerations may result in the number of fire extinguishers being greater than the minimum required.

(b) There should be at least one hand fire extinguisher installed in the flight crew compartment and this should be suitable for fighting both flammable fluid and electrical equipment fires. Additional hand fire extinguishers may be required for the protection of other compartments accessible to the flight crew or task specialist in flight. Dry chemical fire extinguishers should not be used in the flight crew compartment, or in any compartment not separated by a partition from the flight crew compartment, because of the adverse effect on vision during discharge and, if conductive, interference with electrical contacts by the chemical residues.

(c) Where only one hand fire extinguisher is required in the cabin compartments, it should be located near the task specialist's station, where provided.

(d) Where two or more hand fire extinguishers are required in the cabin compartments and their location is not otherwise dictated by consideration of (a), an extinguisher should be located near each end of the cabin with the remainder distributed throughout the cabin as evenly as is practicable.

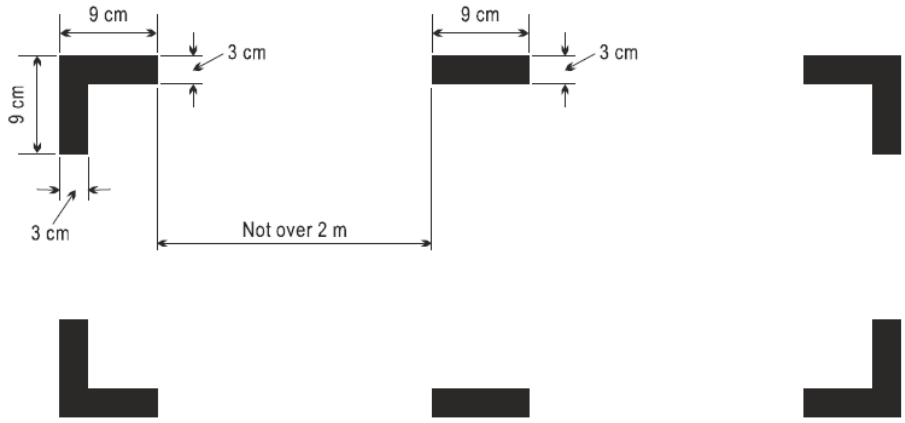
(e) Unless an extinguisher is clearly visible, its location should be indicated by a placard or sign. Appropriate symbols may also be used to supplement such a placard or sign.

BCAR.SPO.IDE.H.185 Marking of break-in points

If areas of the helicopter's fuselage suitable for break-in by rescue crews in an emergency are marked, such areas shall be marked as shown in Figure 1.

Figure 1

Marking of break-in points



AMC1 BCAR.SPO.IDE.H.185 marking of break-in points

COLOUR AND CORNERS' MARKING

(a) The colour of the markings should be red or yellow and, if necessary, should be outlined in white to contrast with the background.

(b) If the corner markings are more than 2 m apart, intermediate lines 9 cm x 3 cm should be inserted so that there is no more than 2 m between adjacent markings.

BCAR.SPO.IDE.H.190 Emergency locator transmitter (ELT)

(a) Helicopters certified for a maximum seating configuration above six shall be equipped with:

(1) an automatic ELT; and

(2) not applicable

(b) Helicopters certified for a maximum seating configuration of six or less shall be equipped with an ELT(S) or a personal locator beacon (PLB), carried by a crew member or a task specialist.

(c) ELTs of any type and PLBs shall be capable of transmitting simultaneously on 121.5 MHz and 406 MHz.

AMC1 BCAR.SPO.IDE.H.190 Emergency locator transmitter (ELT)

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 (BCAA 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 (BCAA 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 BCAR.SPO.IDE.H.190 Emergency locator transmitter (ELT)

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 BCAR.SPO.IDE.H.190 Emergency locator transmitter (ELT)

PLB TECHNICAL SPECIFICATIONS

(a) A personal locator beacon (PLB) should have a built-in GNSS receiver with a cosmicheskayasistyemapoiskaavariynichsudov — 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 BCAR.SPO.IDE.H.190 Emergency locator transmitter (ELT)

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 BCAR.SPO.IDE.H.190 Emergency locator transmitter (ELT)

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.

GM2 BCAR.SPO.IDE.H.190 Emergency locator transmitter (ELT)

MAXIMUM CERTIFIED SEATING CONFIGURATION

The maximum certified seating configuration does not include flight crew seats.

BCAR.SPO.IDE.H.195 Flight over water — other-than complex motor-powered helicopters

Not applicable

BCAR.SPO.IDE.H.197 Life-jackets — complex motor-powered helicopters

Not applicable

BCAR.SPO.IDE.H.198 Survival suits — complex motor-powered helicopters

Not applicable

BCAR.SPO.IDE.H.199 Life-rafts, survival ELTs and survival equipment on extended overwater flights — complex motor-powered helicopters

Not applicable

BCAR.SPO.IDE.H.200 Survival equipment

Helicopters operated over areas in which search and rescue would be especially difficult shall be equipped with:

(a) signalling equipment to make distress signals;

(b) at least one survival ELT (ELT(S)); and

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

AMC1 BCAR.SPO.IDE.H.200 Survival equipment

ADDITIONAL SURVIVAL EQUIPMENT

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

(1) 500 ml of water for each four, or fraction of four, persons on board;

(2) one knife;

(3) first-aid equipment; and

(4) one set of air/ground codes.

(b) In addition, when polar conditions are expected, the following should be carried:

(1) a means of melting snow;

(2) one snow shovel and one ice saw;

(3) sleeping bags for use by 1/3 of all persons on board and space blankets for the remainder or space blankets for all persons on board; and

(4) one arctic/polar suit for each crew member.

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

AMC1 BCAR.SPO.IDE.H.200(b) Survival equipment

SURVIVAL ELT

An ELT(AP) may be used to replace one required ELT(S) provided that it meets the ELT(S) requirements. A water-activated ELT(S) is not an ELT(AP).

GM1 BCAR.SPO.IDE.H.200 Survival equipment

SIGNALLING EQUIPMENT

The signalling equipment for making distress signals is described in BCAR-Rules of the Air.

GM2 BCAR.SPO.IDE.H.200 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) has not 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.

BCAR.SPO.IDE.H.202 Helicopters certified for operating on water — miscellaneous equipment

Not applicable

BCAR.SPO.IDE.H.203 All helicopters on flights over water — ditching

Not applicable

BCAR.SPO.IDE.H.205 Individual protective equipment

Each person on board shall wear individual protective equipment that is adequate for the type of operation being undertaken.

GM1 BCAR.SPO.IDE.H.205 Individual protective equipment

TYPES OF INDIVIDUAL PROTECTIVE EQUIPMENT

Personal protective equipment should include, but is not limited to: flying suits, gloves, helmets, protective shoes, etc.

BCAR.SPO.IDE.H.210 Headset

Whenever a radio communication and/or radio navigation system is required, helicopters shall be equipped with a headset with boom microphone or equivalent and a transmit button on the flight controls for each required pilot, crew member and/or task specialist at his/her assigned station.

AMC1BCAR.SPO.IDE.H.210 Headset

GENERAL

(a) A headset consists of a communication device that includes two earphones to receive and a microphone to transmit audio signals to the helicopter's communication system. To comply with the minimum performance requirements, the earphones and microphone should match the communication system's characteristics and the flight crew compartment environment. The headset should be adequately adjustable in order to fit the flight crew's head. Headset boom microphones should be of the noise cancelling type.

(b) If the intention is to utilise noise cancelling earphones, the operator should ensure that the earphones do not attenuate any aural warnings or sounds necessary for alerting the flight crew on matters related to the safe operation of the helicopter.

GM1 BCAR.SPO.IDE.H.210 Headset

GENERAL

The term 'headset' includes any aviation helmet incorporating headphones and microphone worn by a flight crew member.

BCAR.SPO.IDE.H.215 Radio communication equipment

(a) Helicopters operated when required by the applicable airspace requirements, shall be equipped with radio communication equipment that, under normal radio propagation conditions, shall be capable of:

(1) conducting two-way communication for aerodrome control purposes;

(2) receiving meteorological information;

(3) conducting two-way communication at any time during flight with those aeronautical stations and on those frequencies prescribed by the appropriate authority; and

(4) providing for communication on the aeronautical emergency frequency 121,5 MHz.

(b) When more than one communications equipment unit is required, each shall be independent of the other or others to the extent that a failure in any one will not result in failure of any other.

(c) When a radio communication system is required, and in addition to the flight crew interphone system required in BCAR.SPO.IDE.H.135, helicopters shall be equipped with a transmit button on the flight controls for each required pilot and crew member at his/her assigned station.

GM1 BCAR.SPO.IDE.H.215 Radio communication equipment

APPLICABLE AIRSPACE REQUIREMENTS

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

BCAR.SPO.IDE.H.220 Navigation equipment

(a) Helicopters shall be equipped with navigation equipment that will enable them to proceed in accordance with:

(1) the ATS flight plan, if applicable; and

(2) the applicable airspace requirements.

(b) Helicopters shall have sufficient navigation equipment to ensure that, in the event of the failure of one item of equipment at any stage of the flight, the remaining equipment shall allow safe navigation in accordance with (a), or an appropriate contingency action to be completed safely.

(c) not applicable

(d) not applicable

AMC1 BCAR.SPO.IDE.H.220 Navigation equipment

NAVIGATION WITH VISUAL REFERENCE TO LANDMARKS — OTHER-THAN COMPLEX HELICOPTERS

Where other-than complex helicopters, with the surface in sight, can proceed according to the ATS flight plan by navigation with visual reference to landmarks, no additional equipment is needed to comply with BCAR.SPO.IDE.H.220 (a)(1).

GM1 BCAR.SPO.IDE.H.220 Navigation equipment

AIRCRAFT ELIGIBILITY FOR PBN SPECIFICATION NOT REQUIRING SPECIFIC APPROVAL

(a) The performance of the aircraft is usually stated in the AFM.

(b) Where such a reference cannot be found in the AFM, other information provided by the aircraft manufacturer as TC holder, the STC holder or the design organisation having a privilege to approve minor changes may be considered.

(c) The following documents are considered acceptable sources of information:

(1) AFM, supplements thereto, and documents directly referenced in the AFM;

(2) FCOM or similar document;

(3) Service Bulletin or Service Letter issued by the TC holder or STC holder;

(4) approved design data or data issued in support of a design change approval;

(5) any other formal document issued by the TC or STC holders stating compliance with PBN specifications, AMC, Advisory Circulars (AC) or similar documents issued by the State of Design; and

(6) written evidence obtained from the State of Design.

(d) Equipment qualification data, in itself, is not sufficient to assess the PBN capabilities of the aircraft, since the latter depend on installation and integration.

(e) As some PBN equipment and installations may have been certified prior to the publication of the PBN Manual and the adoption of its terminology for the navigation specifications, it is not always possible to find a clear statement of aircraft PBN capability in the AFM. However, aircraft eligibility for certain PBN specifications can rely on the aircraft performance certified for PBN procedures and routes prior to the publication of the PBN Manual.

(f) Below, various references are listed which may be found in the AFM or other acceptable documents (see listing above) in order to consider the aircraft's eligibility for a specific PBN specification if the specific term is not used.

(g) RNAV 5

(1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNAV 5 operations.

(i) B-RNAV;

(ii) RNAV 1;

(iii) RNP APCH;

(iv) RNP 4;

(v) A-RNP;

(vi) AMC 20-4;

(vii) JAA TEMPORARY GUIDANCE MATERIAL, LEAFLET NO. 2 (TGL 2)

(viii) JAA AMJ 20X2;

(ix) FAA AC 20-130A for en route operations;

(x) FAA AC 20-138 for en route operations; and

(xi) FAA AC 90-96.

(h) RNAV 1/RNAV 2

(1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNAV 1/RNAV 2 operations.

(i) RNAV 1;

(ii) PRNAV;

(iii) US RNAV type A;

(iv) FAA AC 20-138 for the appropriate navigation specification;

(v) FAA AC 90-100A;

(vi) JAA TEMPORARY GUIDANCE MATERIAL, LEAFLET NO. 10 Rev1 (TGL 10);

(vii) FAA AC 90-100.

(2) However, if position determination is exclusively computed based on VOR-DME, the aircraft is not eligible for RNAV 1/RNAV 2 operations.

(i) RNP 1/RNP 2 continental

(1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP 1/RNP 2 continental operations.

(i) A-RNP;

(ii) FAA AC 20-138 for the appropriate navigation specification; and

(iii) FAA AC 90-105.

(2) Alternatively, if a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above and position determination is primarily based on GNSS, the aircraft is eligible for RNP 1/RNP 2 continental operations. However, in these cases, loss of GNSS implies loss of RNP 1/RNP 2 capability.

(i) JAA TEMPORARY GUIDANCE MATERIAL, LEAFLET NO. 10 (TGL 10) (any revision); and

(ii) FAA AC 90-100.

(j) RNP APCH — LNAV minima

(1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP APCH LNAV operations.

(i) A-RNP;

(ii) AMC 20-27;

(iii) AMC 20-28;

(iv) FAA AC 20-138 for the appropriate navigation specification; and

(v) FAA AC 90-105 for the appropriate navigation specification.

(2) Alternatively, if a statement of compliance with RNP 0.3 GNSS approaches in accordance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP APCH — LNAV operations. Any limitation such as 'within the US National Airspace' may be ignored since RNP APCH procedures are assumed to meet the same ICAO criteria around the world.

(i) JAA TEMPORARY GUIDANCE MATERIAL, LEAFLET NO. 3 (TGL 3);

(ii) AMC 20-4;

(iii) FAA AC 20-130A; and

(iv) FAA AC 20-138.

(k) RNP APCH — LNAV/VNAV minima

(1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP APCH — LNAV/VNAV operations.

(i) A-RNP;

(ii) AMC 20-27 with Baro VNAV;

(iii) AMC 20-28;

(iv) FAA AC 20-138; and

(v) FAA AC 90-105 for the appropriate navigation specification.

(2) Alternatively, if a statement of compliance with FAA AC 20-129 is found in the acceptable documentation as listed above, and the aircraft complies with the requirements and limitations of EASA SIB 2014-04[2], the aircraft is eligible for RNP APCH — LNAV/VNAV operations. Any limitation such as 'within the US National Airspace' may be ignored since RNP APCH procedures are assumed to meet the same ICAO criteria around the world.

(l) RNP APCH — LPV minima

(1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP APCH — LPV operations.

(i) AMC 20-28;

(ii) FAA AC 20-138 for the appropriate navigation specification; and

(iii) FAA AC 90-107.

(2) For aircraft that have a TAWS Class A installed and do not provide Mode-5 protection on an LPV approach, the DH is limited to 250 ft.

(m) RNAV 10

(1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNAV 10 operations.

2

(i) RNP 10;

(ii) FAA AC 20-138 for the appropriate navigation specification;

(iii) AMC 20-12;

(iv) FAA Order 8400.12 (or later revision); and

(v) FAA AC 90-105.

(n) RNP 4

(1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP 4 operations.

(i) FAA AC 20-138B or later, for the appropriate navigation specification;

(ii) FAA Order 8400.33; and

(iii) FAA AC 90-105 for the appropriate navigation specification.

(o) RNP 2 oceanic

(1) If a statement of compliance with FAA AC 90-105 for the appropriate navigation specification is found in the acceptable documentation as listed above, the aircraft is eligible for RNP 2 oceanic operations.

(2) If the aircraft has been assessed eligible for RNP 4, the aircraft is eligible for RNP 2 oceanic.

(p) Special features

(1) RF in terminal operations (used in RNP 1 and in the initial segment of the RNP APCH)

(i) If a statement of demonstrated capability to perform an RF leg, certified in accordance with any of the following specifications or standards, is found in the acceptable documentation as listed above, the aircraft is eligible for RF in terminal operations:

(A) AMC 20-26;

(B) FAA AC 20-138B or later.

(ii) If there is a reference to RF and a reference to compliance with AC 90-105, then the aircraft is eligible for such operations.

(q) Other considerations

(1) In all cases, the limitations in the AFM need to be checked, in particular the use of AP or FD which can be required to reduce the FTE primarily for RNP APCH, RNAV 1, and RNP 1.

(2) Any limitation such as 'within the US National Airspace' may be ignored since RNP APCH procedures are assumed to meet the same ICAO criteria around the world.

GM2 BCAR.SPO.IDE.H.220 Navigation equipment

GENERAL

(a) The PBN specifications for which the aircraft complies with the relevant airworthiness criteria are set out in the AFM, together with any limitations to be observed.

(b) Because functional and performance requirements are defined for each navigation specification, an aircraft approved for an RNP specification is not automatically approved for all RNAV specifications. Similarly, an aircraft approved for an RNP or RNAV specification having a stringent accuracy requirement (e.g. RNP 0.3 specification) is not automatically approved for a navigation specification having a less stringent accuracy requirement (e.g. RNP 4).

RNP 4

(c) For RNP 4, at least two LRNSs, capable of navigating to RNP 4, and listed in the AFM, may be operational at the entry point of the RNP 4 airspace. If an item of equipment required for RNP 4 operations is unserviceable, then the flight crew may consider an alternate route or diversion for repairs. For multi-sensor systems, the AFM may permit entry if one GNSS sensor is lost after departure, provided one GNSS and one inertial sensor remain available.

BCAR.SPO.IDE.H.225 Transponder

Where required by the airspace being flown, helicopters shall be equipped with a secondary surveillance radar (SSR) transponder with all the required capabilities.

AMC1 BCAR.SPO.IDE.H.225 Transponder

GENERAL

(a) The SSR transponders of helicopters 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.

BCAR.SPO.IDE.H.230 Management of aeronautical databases

(a) Aeronautical databases used on certified aircraft system applications shall meet data quality requirements that are adequate for the intended use of the data.

(b) The operator shall ensure the timely distribution and insertion of current and unaltered aeronautical databases to all aircraft that require them.

(c) Notwithstanding any other occurrence reporting requirements as defined in Civil Aviation Act of Bhutan 2016 and BCAR-Air Operations, the operator shall report to the database provider instances of erroneous, inconsistent or missing data that might be reasonably expected to constitute a hazard to flight.

In such cases, the operator shall inform the flight crew and other personnel concerned, and shall ensure that the affected data is not used.

AMC1 BCAR.SPO.IDE.H.230 Management of aeronautical databases

AERONAUTICAL DATABASES

When the operator of an aircraft uses an aeronautical database that supports an airborne navigation application as a primary means of navigation used to meet the airspace usage requirements, the database provider should be a Type 2 DAT provider certified in accordance with BANRs or equivalent.

GM1 BCAR.SPO.IDE.H.230 Management of aeronautical databases

AERONAUTICAL DATABASE APPLICATIONS

(a) Applications using aeronautical databases for which Type 2 DAT providers should be certified in accordance with BANRs may be found in GM1 DAT.OR.100.

(b) The certification of a Type 2 DAT provider in accordance with BANRs ensures data integrity and compatibility with the certified aircraft application/equipment.

GM2 BCAR.SPO.IDE.H.230 Management of aeronautical databases

TIMELY DISTRIBUTION

The operator should distribute current and unaltered aeronautical databases to all aircraft requiring them in accordance with the validity period of the databases or in accordance with a procedure established in the operations manual if no validity period is defined.

GM3 BCAR.SPO.IDE.H.230 Management of aeronautical databases

STANDARDS FOR AERONAUTICAL DATABASES AND DAT PROVIDERS

(a) A 'Type 2 DAT provider' is an organisation as defined in BANRs.

(b) Equivalent to a certified 'Type 2 DAT provider' is defined in any Aviation Safety Agreement between the European Union and a third country, including any Technical Implementation Procedures, or any Working Arrangements between EASA and the competent authority of a third country.

SECTION 3
SAILPLANES

Not applicable

SECTION 4
BALLOONS

Not applicable

SUBPART E: SPECIFIC REQUIREMENTS

SECTION 1

HELICOPTER EXTERNAL SLING LOAD OPERATIONS (HESLO)

BCAR.SPO.SPEC.HESLO.100 Standard operating procedures

The standard operating procedures for HESLO shall specify:

(a) the equipment to be carried, including its operating limitations and appropriate entries in the MEL, as applicable;

(b) crew composition and experience requirements of crew members and task specialists;

(c) the relevant training for crew members and task specialists to perform their task and the qualification and nomination of persons providing such training to the crew members and task specialists;

(d) responsibilities and duties of crew members and task specialists;

(e) performance criteria necessary to be met to conduct HESLO operations;

(f) normal, abnormal and emergency procedures.

AMC1 BCAR.SPO.SPEC.HESLO.100 Standard operating procedures

STANDARD OPERATING PROCEDURES

(a) Before conducting any HESLO, the operator should develop its SOPs taking into account the elements below.

(b) Nature and complexity of the activity

(1) Nature of the activity and exposure:

Helicopter flights for the purpose of transporting external loads by different means, e.g. under slung, external pods or racks. These operations are usually performed as low level flights.

(2) Complexity of the activity:

The complexity of the activity varies with the size and the shape of the load, the length of the rope and characteristics of the pick-up and drop-off zones, the time per load cycle, etc.

Table 1: HESLO types

HESLO 1:	short line, 20 metres (m) or less
HESLO 2:	long line, more than 20 m
HESLO 3:	logging
HESLO 4:	construction, wire stringing, cable laying
HESLO 5:	heavy lift (mass of external load 1 500 kg or above)

(3) Operational environment and geographical area:

HESLO may be performed over any geographical area. Special attention should be given to:

(i) hostile and congested;

(ii) mountains;

(iii) sea;

(iv) jungle;

(v) desert; and

(vi) polar;

(vii) lakes and river canyons; and

(viii) environmentally sensitive areas (e.g. national parks, noise sensitive areas).

(c) Equipment

(1) The helicopter may be equipped with:

(i) additional mirror(s);

(ii) a bubble window;

(iii) supplementary hook(s) or multi-hook device(s); and

(iv) load data recorder (lifts, weights, torques, power, forces, shocks and electrical activities).

(2) Non-assisted vertical reference operations may require additional engine monitoring in the pilot line of vision or an audio warning system.

(3) All additional equipment used, e.g. ropes, cables, mechanical hooks, swivel hooks, nets, buckets, chainsaws, baskets, containers, should be manufactured according to applicable rules or recognised standards. The operator should be responsible for maintaining the serviceability of this equipment.

(4) Adequate radio communication equipment (e.g. VHF, UHF, FM) should be installed and serviceable in the helicopter for coordination with the task specialists involved in the operation.

(5) Task specialists involved in the operation should be equipped with hand-held communication equipment, protective helmets with integrated earphones and microphones.

(d) Crew members

(1) Crew composition:

(i) The minimum flight crew as stated in the approved AFM. For operational or training purposes, an additional crew member may assist the pilot-in-command (PIC) in a single-pilot operation.

(ii) For safety and/or operational purposes, task specialists should be instructed by the operator to fulfil specified tasks (e.g. to establish vertical reference).

(2) Pilot initial training

Before acting as PIC, the pilot should demonstrate to the operator that he/she has the required skills and knowledge.

(i) Theoretical knowledge:

(A) content of the operations manual (OM) including the relevant SOP;

(B) AFM (limitations, emergencies, etc.);

(C) procedures for certain operations (short line, long line, construction, wire stringing or cable laying flying techniques, as required for the operation);

(D) load and site preparation including load rigging techniques and external load procedures;

(E) special equipment used in the operation;

(F) training in human factor principles; and

(G) hazards and dangers.

(3) Pilot experience

(i) For operations with a maximum external load mass of less than 1 500 kg, the PIC should have at least the following experience:

Prior to commencing training:

(A) 300 hours helicopter flight experience as PIC, which should be increased to 500 hours experience as PIC for mountain operations; and

(B) 10 hours flight experience on the helicopter type;

Before acting as PIC:

(C) 30 hours on the helicopter type, performing HESLO 1 and 2 operations. Where a pilot has accomplished 50 hours in HESLO 1 and 2 operations, the 30 hours experience on the helicopter type may be reduced to 15 hours.

(ii) For operations with a maximum external load mass of 1 500 kg and above, the pilot-in-command should have at least the following experience:

Prior to commencing training:

(A) 1 000 hours helicopter flight experience as PIC, which should be increased to 1 500 hours experience as PIC for mountain operations ;

(B) 10 hours flight experience on the helicopter type;

Before acting as PIC:

(C) 30 hours on the helicopter type, performing HESLO 1 and 2 operations. Where a pilot has accomplished 50 hours in HESLO 1 and 2 operations, the 30 hours experience on the helicopter type may be reduced to 15 hours.

(D) At least 20 hours gained in an operational environment similar to environment of intended operation (desert, sea, jungle, etc.).

(iii) For HESLO 3 only, additionally to experience (i) or (ii):

Prior to commencing training:

(A) At least qualified as PIC for HESLO 1 type;

(B) Minimum 500 HESLO cycles.

(iv) For HESLO 4 only, additionally to (i) or (ii):

Prior to commencing training:

(A) At least qualified as PIC for HESLO 2 or HESLO 3;

(B) Minimum 1000 flight hours on helicopters; and

(C) Minimum 3000 HESLO cycles.

(4) Pilot recurrent training and checking at least every two years:

(i) review of the load rigging techniques;

(ii) external load procedures;

(iii) review of the applicable flying techniques; and

(iv) review of human factor principles.

(v) A pilot who has performed 20 hours of relevant HESLO within the past 12 months may not need any further flight training other than in accordance with Part-FCL.

(e) Task specialists

Before acting as task specialist, he/she should demonstrate to the operator that he/she has been trained appropriately and has the required skill and knowledge.

(1) Initial training

(i) The initial training of task specialists should include at least:

(A) behaviour in a rotor turning environment and training in ground safety and emergency procedures;

(B) procedures including load rigging, usage and conservation (replacement) of LLD;

(C) helicopter marshalling signals;

(D) radio communication;

(E) selection and preparation of pick-up and drop-off sites, dangers on working places (downwash, loose goods, third people);

(F) handling and safety of third party;

(G) relevant training for the helicopter type;

(H) duties and responsibilities as described in the appropriate manual;

(I) perception and classification of flight obstacles (none, critical, danger), measures for safety; and

(J) human factor principles.

(ii) The individual safety equipment appropriate to the operational environment and complexity of the activity should be described in the appropriate manual.

(2) Recurrent training

(i) The annual recurrent training should include the items listed in the initial training as described in (e)(1) above.

(ii) The operator should establish a formal qualification list for each individual task specialist.

(iii) The operator should establish a system of record keeping that allows adequate storage and reliable traceability of:

(A) the initial and recurrent training;

(B) Qualifications (qualification list).

(3) Briefing of task specialists

Briefings on the organisation and coordination between flight crew and task specialists involved in the operation should take place prior to each operation. These briefings should include at least the following:

(i) location and size of pick-up and drop-off site, operating altitude;

(ii) location of refuelling site and procedures to be applied; and

(iii) load sequence, danger areas, performance and limitations, emergency procedures.

(4) Responsibility of task specialists operating on the ground:

(i) Task specialists operating on the ground are responsible for the safe organisation of the ground operation, including:

(A) adequate selection and preparation of the pick-up and drop-off points and load rigging;

(B) appropriate communication and assistance to the flight crew and other task specialists; and

(C) access restriction on the pick-up and drop-off site.

(ii) If more than one task specialist is required for a task, one should be nominated as leading the activities. He/she should act as main link between flight crew and other task specialist(s) involved in the operation and is responsible for:

(A) task specialist co-ordination and activities on the ground; and

(B) the safety of the working area (loading and fuelling).

(f) HESLO instructor

The HESLO instructor should be assigned by the operator on the basis of the following:

(1) the HESLO instructor for pilots should be suitably qualified as determined by the operator and have a minimum experience of 500 hours HESLO operations in the appropriate HESLO level on which instruction is to be provided as well as experience in instructing according to the flight instructor or type rating instructor training;

(2) the HESLO instructor for task specialists should be suitably qualified as determined by the operator and have at least 2 years of experience in HESLO operations.

(g) Performance

(1) Power margins for HESLO operations:

(i) HESLO 1 and 2

The mass of the helicopter should not exceed the maximum mass specified in accordance with BCAR.SPO.POL.146(c)(1) at the pick-up or drop-off site, whichever is higher, as stated in the appropriate manual.

(ii) HESLO 3, 4 and 5

The mass of the helicopter should not exceed the maximum mass specified in accordance with BCAR.SPO.POL.146(c)(1) at the pick-up or drop-off site, whichever is higher, as stated in the appropriate manual, and in case of construction (montage) operations, reduced by 10% of the mass of the sling load capacity.

(h) Normal procedures

(1) Operating procedures:

HESLO should be performed in accordance with the appropriate manual and appropriate operating procedures. These procedures should include, for each type of operation:

(i) crew individual safety equipment (e.g. helmet, fire retardant suits);

(ii) crew responsibilities;

(iii) crew coordination and communication;

(iv) selection and size of pick-up and drop-off sites;

(v) selection of flight routes;

(vi) fuel management in the air and on the ground;

(vii) task management; and

(viii) third party risk management.

(2) Ground procedures:

The operator should specify appropriate procedures, including:

(i) use of ground equipment;

(ii) load rigging;

(iii) size and weight assessment of loads;

(iv) attachment of suitably prepared loads to the helicopter;

(v) two-way radio communication procedures;

(vi) selection of suitable pick-up and drop-off sites;

(vii) safety instructions for task specialists operating on the ground;

(viii) helicopter performance information;

(ix) fuel management on the ground;

(x) responsibility, organisation and task management of other personnel on the ground involved in the operation;

(xi) third party risk management; and

(xii) environmental protection.

(i) Emergency procedures

(1) Operating procedures for the flight crew:

In addition to the emergency procedures published in the AFM or OM, the operator should ensure that the flight crew:

(i) is familiar with the appropriate emergency procedures;

(ii) has appropriate knowledge of the emergency procedures for personnel on the ground involved in the operation; and

(iii) reports emergencies as specified in the AFM or OM.

(2) Ground procedures:

The operator should ensure that the task specialist on the ground involved in the operation:

(i) is familiar with the appropriate emergency procedures;

(ii) has appropriate knowledge of the flight crew emergency procedures;

(iii) reports emergencies as specified in the AFM or OM; and

(iv) prevents, as far as possible, environmental pollution.

(j) Ground equipment

The operator should specify the use of ground equipment, such as fuel trucks, cables, strops etc. in the AFM or OM, including at least:

(1) minimum size of the operating site;

(2) surface condition;

(3) positioning of ground equipment on the operating site;

(4) fuel handling;

(5) environment protection plan; and

(6) location and use of fire suppression equipment.

GM1 BCAR.SPO.SPEC.HESLO.100 Standard operating procedures

PILOT INITIAL TRAINING

The table below specifies minimum standards before starting the practical instructions.

Table 1: Training minimum standards

HESLO 1	– CPL(H) or ATPL(H) – PPL(H) only for non-commercial operations – Minimum 300 hours PIC (H) – Minimum 10 hours PIC on type – Type rating completed – HESLO ground instruction completed – Task specialist syllabus reviewed
HESLO 2	– CPL(H) or ATPL(H) – PPL(H) only for non-commercial operations – HESLO level 1 completed – Type rating completed – Minimum 10 hours PIC on type – HESLO 2 ground instruction completed – Task specialist syllabus reviewed – Minimum 500 HESLO 1 cycles
HESLO 2 Conversion	– CPL(H) or ATPL(H) – PPL(H) only for non-commercial operations – HESLO level 3 completed – Type rating completed

	– Minimum 10 hours PIC on type – HESLO 2 ground instruction completed – Task specialist syllabus reviewed
HESLO 3	– CPL(H) or ATPL(H) – PPL(H) only for non-commercial operations – HESLO level 1 completed to 20m – Min. 500 HESLO cycles – Type rating completed – Minimum 10 hours PIC on type – HESLO 3 ground instruction completed – Task specialist syllabus reviewed – Practical Task specialist training for logging
HESLO 3 Conversion	– CPL(H) or ATPL(H) – PPL(H) only for non-commercial operations – HESLO level 2 completed – Minimum 500 HESLO cycles – Type rating completed – Minimum 10 hours PIC on type – HESLO 3 ground instruction completed – Task specialist syllabus reviewed – Practical Task specialist training for logging
HESLO 4	– CPL(H) or ATPL(H) – PPL(H) only for non-commercial operations – Minimum 1 000 hours (H) – HESLO level 2 or 3 completed – Minimum 3 000 HESLO cycles – Type rating completed – Minimum 10 hours PIC on type – HESLO 4 ground instruction completed – Practical load preparation training
HESLO 5	– CPL(H) or ATPL(H) – 1 000 h PIC (H)/ 1 500 h PIC (H) for mountain operations – Type rating completed – Appropriate HESLO level completed – HESLO 5 ground instruction completed – Task specialist syllabus reviewed – Practical load preparation training completed

BCAR.SPO.SPEC.HESLO.105 Specific HESLO equipment

The helicopter shall be equipped with at least:

(a) one cargo safety mirror or alternative means to see the hook(s)/load; and

(b) one load meter, unless there is another method of determining the weight of the load.

BCAR.SPO.SPEC.HESLO.110 Transportation of dangerous goods

The operator transporting dangerous goods to or from unmanned sites or remote locations shall apply to the competent authority for an exemption from the provisions of the Technical Instructions if they intend not to comply with the requirements of those Instructions.

SECTION 2

HUMAN EXTERNAL CARGO OPERATIONS (HEC)

BCAR.SPO.SPEC.HEC.100 Standard operating procedures

The standard operating procedures for HEC shall specify:

(a) the equipment to be carried, including its operating limitations and appropriate entries in the MEL, as applicable;

(b) crew composition and experience requirements of crew members and task specialists;

(c) the relevant training for crew members and task specialists to perform their task and the qualification and nomination of persons providing such training to the crew members and task specialists;

(d) responsibilities and duties of crew members and task specialists;

(e) performance criteria necessary to be met to conduct HEC operations;

(f) normal, abnormal and emergency procedures.

AMC1 BCAR.SPO.SPEC.HEC.100 Standard operating procedures

STANDARD OPERATING PROCEDURES

(a) Before conducting any HEC operations, the operator should develop its SOPs taking into account the elements below.

(b) Nature and complexity of the activity

(1) Nature of the activity and exposure:

(i) Helicopter operations for the purpose of transporting humans as external loads from/to aerodromes and/or operating sites. The operations are performed as low level flights.

(ii) The operator should only carry task specialists to a site if the level of danger would be too high for them to go there with another mean of transport or where no other means of transport exists. HEC flights should always be conducted with the minimum time of exposure for the task specialists.

(2) Complexity of the activity:

(i) The complexity of the activity varies with the length of the rope and characteristics of the pick-up and drop-off zones, etc.

Table 1: HEC levels

HEC 1:	Sling less or equal to 25 m Altitude is less or equal to 3 000 m
HEC 2:	Sling less or equal to 50 m Altitude is less or equal to 3 500 m
HEC 3:	Cable length is unrestricted

	Altitude is unrestricted

(3) Operational environment and geographical area:

HEC may be performed over any geographical area. Special attention should be given to:

(i) hostile congested and non-congested environment;
(ii) mountains;
(iii) sea;
(iv) jungle;
(v) desert;
(vi) artic;
(vii) lakes and river canyons; and
(viii) environmentally sensitive areas (e.g. national parks, noise sensitive areas).

(c) Equipment

(1) The helicopter may be equipped with:

(i) additional mirror(s);

(ii) a bubble window;

(iii) supplementary hook(s) or multi-hook device(s); and

(iv) load data recorder (lifts, weights, torques, power, forces, shocks and electrical activities).

(2) Non-assisted vertical reference operations should require additional engine monitoring in the pilot line of vision or an audio warning system.

(3) All additional equipment used, e.g. ropes, cables, mechanical hooks, swivel hooks, nets, buckets, baskets, containers, should be manufactured according to officially recognised standards. The operator is responsible for maintaining the serviceability of this equipment.

(4) Adequate radio communication equipment (e.g. VHF, UHF, FM) should be installed in the helicopter for coordination with the task specialist involved in the operation.

(5) Task specialists involved in the operation should be equipped with hand-held communication equipment, protective helmets with integrated earphones and microphones as well as personal protective equipment.

(d) Crew members

(1) Crew composition:

(i) The minimum flight crew is stated in the approved AFM. For operational or training purposes, an additional qualified crew member may assist the PIC in a single-pilot operation.

(ii) For safety and/or operational purposes, a task specialist may be required by the operator to fulfil the task (e.g. to establish vertical reference or to operate the release safety device for the belly rope).

(2) Pilot initial training:

Before acting as PIC, the pilot should demonstrate to the operator that he/she has the required skills and knowledge, as follows:

(i) Theoretical knowledge:

(A) load rigging techniques;

(B) external load procedures;

(C) site organisation and safety measures;

(D) short line, long line, construction, wire stringing or cable laying flying techniques, as required for the operation.

(ii) Pilot experience prior to commencing the training:

(A) 1 000 hours helicopter flight experience as PIC, of which 500h should be gained in mountainous areas for training in mountain operations;

(B) 10 hours flight experience on the helicopter type;

(C) type rating completed;

(D) HESLO type 1 or 2 completed;

(E) relevant experience in the field of operation;

(G) training in human factor principles; and

(F) ground instruction completed (marshaller syllabus).

(3) Pilot recurrent training and checking at least every two years:

(i) review of the sling technique;

(ii) external load procedures;

(iii) training in human factor principles; and

(iv) review of the applicable flying techniques.

(4) Conditions of HEC instruction:

(i) Maximum sling length according to the level applicable:

(A) 1 task specialist (with radio) at pickup point;

(B) 1 task specialist (with radio) at drop off point/on the line;

(C) helicopter fitted with cargo mirror/bubble window;

(D) flight instruction DC/: Cycles DC/minimum 10 cycles which of 5 Human Cargo Sling; and

(E) flight instruction solo with onsite supervision/Cycles solo/minimum 10 cycles.

(ii) HEC instructor:

The HEC instructor should be assigned by the operator on the basis of the following:

(A) the HEC instructor for pilots should hold or have held flight instructor rating and should have a minimum experience of 100 cycles in HEC operations in the appropriate HEC level on which instruction is to be provided;

(B) the HEC instructor for task specialists should be suitably qualified as determined by the operator and have at least 2 years of experience in HEC operations as a task specialist.

(e) Task specialists

Before acting as task specialists, they should demonstrate to the operator that they have been appropriately trained and have the required skills and knowledge, including training on human factor principles.

(1) Task specialists should be trained to operate the system including:

(i) montage and removal of system; and

(ii) normal procedure.

(2) Briefings

Briefings on the organisation and coordination between flight crew and task specialist involved in the operation should take place prior to each operation. These briefings should include at least the following:

(i) location and size of pick-up and drop-off site, operating altitude;

(ii) location of refuelling site and procedures to be applied; and

(iii) load sequence, danger areas, performance and limitations, emergency procedures.

(3) Recurrent training

(i) The annual recurrent training should include the items listed in the initial training as described in (e)(1) above.

(ii) The operator should establish a formal qualification list for each individual task specialist.

(iii) The operator should establish a system of record keeping that allows adequate storage and reliable traceability of:

(A) the initial and recurrent training;

(B) qualifications (qualification list).

(f) Performance

HEC should be performed with the following power margins: the mass of the helicopter should not exceed the maximum mass specified in accordance with BCAR.SPO.POL.146(c)(1).

(g) Normal procedures

(1) Operating procedures:

HEC should be performed in accordance with the AFM. Operating procedures should include, for each type of operation:

(i) crew individual safety equipment (e.g. helmet, fire retardant suits);

(ii) crew responsibilities;

(iii) crew coordination and communication;

(iv) selection and size of pick-up and drop-off sites;

(v) selection of flight routes;

(vi) fuel management in the air and on the ground;

(vii) task management; and

(viii) third party risk management.

(2) Ground procedures:

The operator should specify appropriate procedures, including:

(i) use of ground equipment;

(ii) load rigging;

(iii) size and weight assessment of loads;

(iv) attachment of suitably prepared loads to the helicopter;

(v) two-way radio communication procedures;

(vi) selection of suitable pick-up and drop-off sites;

(vii) safety instructions for ground task specialists or other persons required for the safe conduct of the operation;

(viii) helicopter performance information;

(ix) fuel management on the ground;

(x) responsibility and organisation of the personnel on the ground involved in the operation;

(xi) task management of personnel on the ground involved in the operation;

(xii) third party risk management; and

(xiii) environmental protection.

(h) Emergency procedures

(1) Operating procedures:

In addition to the emergency procedures published in the AFM or OM, the operator should ensure that the flight crew:

(i) is familiar with the appropriate emergency procedures;

(ii) has appropriate knowledge of the emergency procedures for personnel on the ground involved in the operation; and

(iii) reports emergencies as specified in the AFM or OM.

(2) Ground procedures:

The operator should ensure that the task specialist on the ground involved in the operation:

(i) is familiar with the appropriate emergency procedures;

(ii) has appropriate knowledge of the emergency procedures for personnel on the ground involved in the operation;

(iii) reports emergencies as specified in the AFM or OM; and

(iv) prevents, as far as possible, environmental pollution.

BCAR.SPO.SPEC.HEC.105 Specific HEC equipment

(a) The helicopter shall be equipped with:

(1) hoist operations equipment or cargo hook;

(2) one cargo safety mirror or alternative means to see the hook; and

(3) one load meter, unless there is another method of determining the weight of the load.

(b) The installation of all hoist and cargo hook equipment and any subsequent modifications shall have an airworthiness approval appropriate to the intended function.

AMC1 BCAR.SPO.SPEC.HEC.105 (b) Specific HEC equipment

AIRWORTHINESS APPROVAL FOR HEC EQUIPMENT

(a) Hoist or cargo hook installations that have been certificated according to any of the following standards should be considered to satisfy the airworthiness criteria for HEC operations:

(1) CS 27.865 or CS 29.865;

(2) JAR 27 Amendment 2 (27.865) or JAR 29 Amendment 2 (29.865) or later;

(3) FAR 27 Amendment 36 (27.865) or later — including compliance with CS 27.865(c)(6); or

(4) FAR 29 Amendment 43 (29.865) or later.

(b) Hoist or cargo hook installations that have been certified prior to the issuance of the airworthiness criteria for HEC as defined in (a) may be considered as eligible for HEC provided that following a risk assessment either:

(1) the service history of the hoist or cargo hook installation is found satisfactory to the competent authority; or

(2) for hoist or cargo hook installations with an unsatisfactory service history, additional substantiation to allow acceptance by the competent authority should be provided by the hoist or cargo hook installation certificate holder (type certificate (TC) or supplemental type certificate (STC)) on the basis of the following requirements:

(i) The hoist or cargo hook installation should withstand a force equal to a limit static load factor of 3.5, or some lower load factor, not less than 2.5, demonstrated to be the maximum load factor expected during hoist operations, multiplied by the maximum authorised external load.

(ii) The reliability of the primary and back up quick release systems at helicopter level should be established and failure mode and effect analysis at equipment level should be available. The assessment of the design of the primary and back up quick release systems should consider any failure that could be induced by a failure mode of any other electrical or mechanical rotorcraft system.

(iii) The appropriate manual should contain one-engine-inoperative (OEI) hover performance data or single engine failures procedures for the weights, altitudes, and temperatures throughout the flight envelope for which hoist or cargo hook operations are accepted.

(i) Information concerning the inspection intervals and retirement life of the hoist or cargo hook cable should be provided in the instructions for continued airworthiness.

SECTION 3
PARACHUTE OPERATIONS (PAR)

Not applicable

SECTION 4
AEROBATIC FLIGHTS (ABF)

Not applicable