STATE OF LIBYA
GOVERNMENT OF LIBYA
MINISTRY OF TRANSPORT
CIVIL AVIATION AUTHORITY

دولة ليبيا
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LIBYA CIVIL AVIATION REGULATIONS

Air Operations

AMC (Acceptable Means of Compliance) & GM (Guidance Material)

Part SPA

OPERATIONS REQUIRING SPECIFIC APPROVALS

Amendment 1- - August 2016

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INTRODUCTION

1. The LYCAA has adopted associated compliance or interpretative material to Part ORO. This document is based on EASA Acceptable Means of Compliance (AMCs) and Guidance Materials (GMs).
2. This is Amendment 1 to AMC & GM to LYCARs – Air Operations Part SPA.
3. Unless specifically stated otherwise, clarification will be based on this material or other EASA documentation, therefore, reference to EASA in this document may still be used for clarification and guidance.
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Signed on 30 August 2016, by

30/8/16

Captain Nasereddin Shaebelain

Director General

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SUBPART A – GENERAL REQUIREMENTS

AMC1 SPA.GEN.105(a) Application for a specific approval

DOCUMENTATION

(a) Operating procedures should be documented in the operations manual.

(b) If an operations manual is not required, operating procedures may be described in a manual specifying procedure (procedures manual). If the aircraft flight manual (AFM) or the pilot operating handbook (POH) contains such procedures, they should be considered as acceptable means to document the procedures.

SUBPART B – PERFORMANCE BASED NAVIGATION-(PBN) OPERATIONS

GM1 SPA.PBN.100 PBN operations

GENERAL

(a) PBN operations are based on performance requirements, which are expressed in navigation specifications (RNAV specification and RNP specification) in terms of accuracy, integrity, continuity, availability and functionality needed for the proposed operation in the context of a particular airspace concept.

Table 1 provides a simplified overview of:

(1) PBN specifications and their applicability for different phases of flight; and

(2) PBN specifications requiring a specific approval.

(b) More detailed guidance material for the operational use of PBN applications can be found in ICAO Doc 9613 Performance-Based Navigation (PBN) Manual.

(c) Guidance material for the design of RNP AR APCH procedures can be found in ICAO Doc 9905 RNP AR Procedure Design Manual.

(d) Guidance material for the operational approval of PBN operations can be found in ICAO Doc 9997 Performance-Based Navigation (PBN) Operational Approval Manual.

Table 1: Overview of PBN specifications

Navigation specification	FLIGHT PHASE							
	En route		Arrival	Approach				Departure
	Oceanic	Continental		Initial	Intermediate	Final	Missed	
RNAV 10	10							
RNAV 5		5	5					
RNAV 2		2	2					2
RNAV 1		1	1	1	1		1	1
RNP 4	4							
RNP 2	2	2						
RNP 1			1	1	1		1	1
A- RNP	2	2 or 1	1-0.3	1-0.3	1-0.3	0.3	1-0.3	1-0.3
RNP APCH (LNAV)				1	1	0.3	1	
RNP APCH (LNAV/VNAV)				1	1	0.3	1	
RNP APCH (LP)				1	1	0.3	1	
RNP APCH (LPV)				1	1	0.3	1	
RNP AR APCH				1-0.1	1-0.1	0.3 – 0.1	1-0.1	
RNP 0.3 (H)		0.3	0.3	0.3	0.3		0.3	0.3

Numbers specify the accuracy level ▢ no specific approval required ▢ specific approval required

AMC1 SPA.PBN.105(b) PBN operational approval

FLIGHT CREW TRAINING AND QUALIFICATIONS — GENERAL PROVISIONS

(a) The operator should ensure that flight crew members training programmes for RNP AR APCH include structured courses of ground and FSTD training.

(1) Flight crew members with no RNP AR APCH experience should complete the full training programme prescribed in (b), (c), and (d) below.

(2) Flight crew members with RNP AR APCH experience with another EU operator may undertake an:

(i) abbreviated ground training course if operating a different type or class from that on which the previous RNP AR experience was gained;

(ii) abbreviated ground and FSTD training course if operating the same type or class and variant of the same type or class on which the previous RNP. AR experience was gained.

(iii) the abbreviated course should include at least the provisions of (d)(1), (c)(1) and (c)(2)(x) as appropriate.

(iv) The operator may reduce the number of approaches/landings required by (c)(2)(xii) if the type/class or the variant of the type or class has the same or similar:

(A) level of technology (flight guidance system (FGS));

(B) operating procedures for navigation performance monitoring; and

(C) handling characteristics

as the previously operated type or class.

(3) Flight crew members with RNP AR APCH experience with the operator may undertake an abbreviated ground and FSTD training course:

(i) when changing aircraft type or class, the abbreviated course should include at least the provisions of (d)(1), (c)(1), (c)(2);

(ii) when changing to a different variant of aircraft within the same type or class rating that has the same or similar of all of the following:

(A) level of technology (flight guidance system (FGS));

(B) operating procedures for navigation performance monitoring; and

(C) handling characteristics

as the previously operated type or class.

A difference course or familiarisation appropriate to the change of variant should fulfil the abbreviated course provisions.

(iii) when changing to a different variant of aircraft within the same type or class rating that has significantly different at least one of the following:

(A) level of technology (FGS);

(B) operating procedures for navigation performance monitoring; and

(C) handling characteristics,

the provisions of (c)(1) and (c)(2) should be fulfilled.

(4) The operator should ensure when undertaking RNP AR APCH operations with different variant(s) of aircraft within the same type or class rating, that the differences and/or similarities of the aircraft concerned justify such operations, taking into account at least the following:

(i) the level of technology, including the:

(A) FGS and associated displays and controls;

(B) FMS and its integration or not with the FGS; and

(C) on-board performance monitoring and alerting (OBPMA) system;

(ii) operating procedures, including:

(A) navigation performance monitoring;

(B) approach interruption and missed approach including while in turn along an RF leg;

(C) abnormal procedures in case of loss of system redundancy affecting the guidance or the navigation; and

(D) abnormal and contingency procedures in case of total loss of RNP capability; and

(iii) handling characteristics, including:

(A) manual approach with RF leg;

(B) manual landing from automatic guided approach; and

(C) manual missed approach procedure from automatic approach.

(b) Ground training

(1) Ground training for RNP AR APCH should address the following subjects during the initial introduction of a flight crew member to RNP AR APCH systems and operations. For recurrent programmes, the curriculum need only review initial curriculum items and address new, revised, or emphasised items.

(2) General concepts of RNP AR APCH operation

(i) RNP AR APCH training should cover RNP AR APCH systems theory to the extent appropriate to ensure proper operational use. Flight crew members should understand basic concepts of RNP AR APCH systems, operation, classifications, and limitations.

(ii) The training should include general knowledge and operational application of RNP AR APCH instrument approach procedures. This training module should in particular address the following specific elements:

(A) the definitions of RNAV, RNP, RNP APCH, RNP AR APCH, RAIM, and containment areas;

(B) the differences between RNP AR APCH and RNP APCH;

(C) the types of RNP AR APCH procedures and familiarity with the charting of these procedures;

(D) the programming and display of RNP and aircraft specific displays, e.g. actual navigation performance;

(E) the methods to enable and disable the navigation updating modes related to RNP;

(F) the RNP values appropriate for different phases of flight and RNP AR APCH instrument procedures and how to select, if necessary;

(G) the use of GNSS RAIM (or equivalent) forecasts and the effects of RAIM 'holes' on RNP AR APCH procedures availability;

(H) when and how to terminate RNP navigation and transfer to conventional navigation due to loss of RNP and/or required equipment;

(I) the method to determine if the navigation database is current and contains required navigational data;

(J) the explanation of the different components that contribute to the total system error and their characteristics, e.g. drift characteristics when using IRU with no radio updating, QNH mistakes;

(K) the temperature compensation: Flight crew members operating avionics systems with compensation for altimetry errors introduced by deviations from ISA may disregard the temperature limits on RNP AR APCH procedures if flight crew training on use of the temperature compensation function is provided by the operator and the compensation function is utilised by the crew. However, the training should also recognise if the temperature compensation by the system is applicable to the VNAV guidance and is not a substitute for the flight crew compensating for the temperature effects on minimum altitudes or the DA/H;

(L) the effect of wind on aircraft performance during RNP AR APCH operations and the need to positively remain within RNP containment area, including any operational wind limitation and aircraft configuration essential to safely complete an RNP AR APCH operation;

(M) the effect of groundspeed on compliance with RNP AR APCH procedures and bank angle restrictions that may impact on the ability to remain on the course centreline. For RNP procedures, aircraft are expected to maintain the standard speeds associated with the applicable category unless more stringent constraints are published;

(N) the relationship between RNP and the appropriate approach minima line on an approved published RNP AR APCH procedure and any operational limitations if the available RNP degrades or is not available prior to an approach (this should include flight crew operating procedures outside the FAF versus inside the FAF);

(O) understanding alerts that may occur from the loading and use of improper RNP values for a desired segment of an RNP AR APCH procedure;

(P) understanding the performance requirement to couple the autopilot/flight director to the navigation system 's lateral guidance on RNP AR APCH procedures requiring an RNP of less than RNP 0.3;

(Q) the events that trigger a missed approach when using the aircraft's RNP capability to complete an RNP AR APCH procedure;

(R) any bank angle restrictions or limitations on RNP AR APCH procedures;

(S) ensuring flight crew members understand the performance issues associated with reversion to radio updating, know any limitations on the use of DME and VOR updating; and

(T) the familiarisation with the terrain and obstacles representations on navigation displays and approach charts.

(3) ATC communication and coordination for use of RNP AR APCH

(i) Ground training should instruct flight crew members on proper flight plan classifications and any ATC procedures applicable to RNP AR APCH operations.

(ii) Flight crew members should receive instruction on the need to advise ATC immediately when the performance of the aircraft's navigation system is no longer adequate to support continuation of an RNP AR APCH operation.

(4) RNP AR APCH equipment components, controls, displays, and alerts

(i) Theoretical training should include discussion of RNP terminology, symbology, operation, optional controls, and display features, including any items unique to an operator's implementation or systems. The training should address applicable failure alerts and limitations.

(ii) Flight crew members should achieve a thorough understanding of the equipment used in RNP operations and any limitations on the use of the equipment during those operations.

(iii) Flight crew members should also know what navigation sensors form the basis for their RNP AR APCH compliance, and they should be able to assess the impact of failure of any avionics or a known loss of ground systems on the remainder of the flight plan.

(5) AFM information and operating procedures

(i) Based on the AFM or other aircraft eligibility evidence, the flight crew should address normal and abnormal operating procedures, responses to failure alerts, and any limitations, including related information on RNP modes of operation.

(ii) Training should also address contingency procedures for loss or degradation of the RNP AR APCH capability.

(iii) The manuals used by the flight should contain this information.

(6) MEL operating provisions

(i) Flight crew members should have a thorough understanding of the MEL entries supporting RNP AR APCH operations.

(c) Initial FSTD training

(1) In addition to ground training, flight crew members should receive appropriate practical skill training in an FSTD.

(i) Training programmes should cover the proper execution of RNP AR APCH operations in compliance with the manufacturer's documentation.

(ii) The training should include:

(A) RNP AR APCH procedures and limitations;

(B) standardisation of the set-up of the cockpit's electronic displays during an RNP AR APCH operation;

(C) recognition of the aural advisories, alerts and other annunciations that can impact on compliance with an RNP AR APCH procedure; and

(D) the timely and correct responses to loss of RNP AR APCH capability in a variety of scenarios embracing the breadth of the RNP AR APCH procedures the operator plans to complete.

(2) FSTD training should address the following specific elements:

(i) procedures for verifying that each flight crew member's altimeter has the current set ting before commencing the final approach of an RNP AR APCH operation, including any operational limitations associated with the source(s) for the altimeter setting and the latency of checking and setting the altimeters for landing;

(ii) use of aircraft RADAR, TAWS or other avionics systems to support the flight crew 's track monitoring and weather and obstacle avoidance;

(iii) concise and complete flight crew briefings for all RNP AR APCH procedures and the important role crew resource management (CRM) plays in successfully completing an RNP AR APCH operation;

(iv) the importance of aircraft configuration to ensure the aircraft maintains any mandated speeds during RNP AR APCH operations;

(v) the potentially detrimental effect of reducing the flap setting, reducing the bank angle or increasing airspeeds may have on the ability to comply with an RNP AR APCH operation;

(vi) flight crew members understand and are capable of programming and/or operating the FMC, autopilot, autothrottles, RADAR, GNSS, INS, EFIS (including the moving map), and TAWS in support of RNP AR APCH operations;

(vii) handling of TOGA to LNAV transition as applicable, particularly while in turn;

(viii) monitoring of flight technical error (FTE) and related go-around operation;

(ix) handling of loss of GNSS signals during a procedure;

(x) handling of engine failure during the approach operation;

(xi) applying contingency procedures for a loss of RNP capability during a missed approach. Due to the lack of navigation guidance, the training should emphasise the flight crew contingency actions that achieve separation from terrain and obstacles. The operator should tailor these contingency procedures to their specific RNP AR APCH procedures; and

(xii) as a minimum, each flight crew member should complete two RNP approach procedures for each duty position (pilot flying and pilot monitoring) that employ the unique RNP AR APCH characteristics of the operator's RNP AR APCH procedures (e.g. RF legs, missed approach). One procedure should culminate in a transition to landing and one procedure should culminate in execution of an RNP missed approach procedure.

FLIGHT CREW TRAINING AND QUALIFICATIONS — CONVERSION TRAINING

(d) Flight crew members should complete the following RNP AR APCH training if converting to a new type or class or variant of aircraft in which RNP AR operations will be conducted. For abbreviated courses, the provisions prescribed in (a)(2), (a)(3) and (a)(4) should apply.

(1) Ground training

Taking into account the flight crew member's RNP AR APCH previous training and experience, flight crew members should undertake an abbreviated ground training that should include at least the provisions of (b)(2)(D) to (I), (b)((2)(N) to (R), (b)(2)(S), and (b)(3) to (6).

(2) FSTD training

The provisions prescribed in (a) should apply, taking into account the flight crew member's RNP AR APCH training and experience.

FLIGHT CREW TRAINING AND QUALIFICATIONS — RNP AR APCH PROCEDURES REQUIRING A PROCEDURE-

SPECIFIC APPROVAL

(e) Before starting an RNP AR APCH procedure for which a procedure-specific approval is required, flight crew members should undertake additional ground training and FSTD training, as appropriate.

(1) The operator should ensure that the additional training programmes for such procedures include as at least all of the following:

(i) the provisions of (c)(1), (c)(2)(x) as appropriate and customised to the intended operation;

(ii) the crew training recommendations and mitigations stated in the procedure flight operational safety assessment (FOSA); and

(iii) specific training and operational provision published in the AIP, where applicable.

(2) Flight crew members with prior experience of RNP AR APCH procedures for which a procedure- specific approval is required may receive credit for all or part of these provisions provided the current operator's RNP AR APCH procedures are sim ilar and require no new pilot skills to be trained in an FSTD.

(3) Training and checking may be combined and conducted by the same person with regard to (f)(2).

(4) In case of a first RNP AR APCH application targeting directly RNP AR APCH procedures requiring

(5) procedure-specific approvals, a combined initial and additional training and checking, as appropriate, should be acceptable provided the training and checking includes all provisions prescribed by (a), (b), (c), (d) as appropriate, (e) and (f).

FLIGHT CREW TRAINING AND QUALIFICATIONS — CHECKING OF RNP AR APCH KNOWLEDGE

(f) Initial checking of RNP AR APCH knowledge and procedures

(1) The operator should check flight crew members' knowledge of RNP AR APCH procedures prior to employing RNP AR APCH operations. As a minimum, the check should include a thorough review of flight crew procedures and specific aircraft performance requirements for RNP AR APCH operations.

(2) The initial check should include one of the following:

(i) A check by an examiner using an FSTD.

(ii) A check by a TRE, CRE, SFE or a commander nominated by the operator during LPCs, OPCs or line flights that incorporate RNP AR APCH operations that employ the unique RNP AR APCH characteristics of the operator's RNP AR APCH procedures.

(iii) Line-oriented flight training (LOFT)/line-oriented evaluation (LOE). LOFT/LOE programmes using an FSTD that incorporates RNP AR APCH operations that employ the unique RNP AR APCH characteristics (i.e. RF legs, RNP missed approach) of the operator's RNP AR APCH procedures.

(3) Specific elements that should be addressed are:

(i) demonstration of the use of any RNP AR APCH limits/minimums that may impact various RNP AR APCH operations;

(ii) demonstration of the application of radio-updating procedures, such as enabling and disabling ground-based radio updating of the FMC (e.g. DME/DME and VOR/DME updating) and knowledge of when to use this feature;

(iii) demonstration of the ability to monitor the actual lateral and vertical flight paths relative to programmed flight path and complete the appropriate flight crew procedures when exceeding a lateral or vertical FTE limit;

(iv) demonstration of the ability to read and adapt to a RAIM (or equivalent) forecast, including forecasts predicting a lack of RAIM availability;

(v) demonstration of the proper set-up of the FMC, the weather RADAR, TAWS, and moving map for the various RNP AR APCH operations and scenarios the operator plans to implement;

(vi) demonstration of the use of flight crew briefings and checklists for RNP AR APCH operations with emphasis on CRM;

(vii) demonstration of knowledge of and ability to perform an RNP AR APCH missed approach procedure in a variety of operational scenarios (i.e. loss of navigation or failure to acquire visual conditions);

(viii) demonstration of speed control during segments requiring speed restrictions to ensure compliance with an RNP AR APCH procedure;

(ix) demonstration of competent use of RNP AR APCH plates, briefing cards, and checklists

(x) demonstration of the ability to complete a stable RNP AR APCH operation: bank angle, speed control, and remaining on the procedure's centreline; and

(xi) knowledge of the operational limit for deviation from the desired flight path and of how to accurately monitor the aircraft's position relative to vertical flight path.

FLIGHT CREW TRAINING AND QUALIFICATIONS — RECURRENT TRAINING

(g) The operator should incorporate recurrent training that employs the unique RNP AR APCH characteristics of the operator's RNP AR APCH procedures as part of the overall training programme.

(1) A minimum of two RNP AR APCH should be flown by each flight crew member, one for each duty position (pilot flying and pilot monitoring), with one culminating in a landing and one culminating in a missed approach, and may be substituted for any required 3D approach operation.

(2) In case of several procedure-specific RNP AR APCH approvals, the recurrent training should focus on the most demanding RNP AR APCH procedures giving credit on the less demanding ones.

TRAINING FOR PERSONNEL INVOLVED IN THE FLIGHT PREPARATION

(h) The operator should ensure that training for flight operation officers/dispatchers should include:

(1) the different types of RNP AR APCH procedures;

(2) the importance of specific navigation equipment and other equipment during RNP AR APCH operations and related RNP AR APCH requirements and operating procedures;

(3) the operator's RNP AR APCH approvals;

(4) MEL requirements;

(5) aircraft performance, and navigation signal availability, e.g. GNSS RAIM/predictive RNP capability tool, for destination and alternate aerodromes.

AMC1 SPA.PBN.105(c) PBN operational approval

FLIGHT OPERATIONAL SAFETY ASSESSMENT (FOSA)

(a) For each RNP AR APCH procedure, the operator should conduct a flight operational safety assessment (FOSA) proportionate to the complexity of the procedure.

(b) The FOSA should be based on:

(1) restrictions and recommendations published in AIPs;

(2) the flyability check;

(3) an assessment of the operational environment;

(4) the demonstrated navigation performance of the aircraft; and

(5) the operational aircraft performance.

(c) (c) The operator may take credit from key elements from the safety assessment carried out by the ANSP or the aerodrome operator.

GM1 SPA.PBN.105(c) PBN operational approval

FLIGHT OPERATIONAL SAFETY ASSESSMENT (FOSA)

(a) Traditionally, operational safety has been defined by a target level of safety (TLS) and specified as a risk of collision of 10^{-7} per approach operation. For RNP AR APCH operations, conducting the FOSA methodology contributes to achieving the TLS. The FOSA is intended to provide a level of flight safety that is equivalent to the traditional TLS, but using methodology oriented to performance-based flight operations. Using the FOSA, the operational safety objective is met by considering more than the aircraft navigation system alone. The FOSA blends quantitative and qualitative analyses and assessments by considering navigation systems, aircraft performance, operating procedures, human factor aspects and the operational environment. During these assessments conducted under normal and failure conditions, hazards, risks and the associated mitigations are identified. The FOSA relies on the detailed criteria for the aircraft capabilities and instrument procedure design to address the majority of general technical, procedure and process factors. Additionally, technical and operational expertise and prior operator experience with RNP AR APCH operations are essential elements to be considered in the conduct and conclusion of the FOSA.

(b) The following aspects need to be considered during FOSA, in order to identify hazards, risks and mitigations relevant to RNP AR APCH operations:

(1) Normal performance: lateral and vertical accuracy are addressed in the aircraft airworthiness standards, aircraft and systems operate normally in standard configurations and operating modes, and individual error components are monitored/truncated through system design or flight crew procedure.

(2) Performance under failure conditions: lateral and vertical accuracy are evaluated for aircraft failures as part of the aircraft certification. Additionally, other rare-normal and abnormal failures and conditions for ATC operations, flight crew procedures, infrastructure and operating environment are assessed. Where the failure or condition results are not acceptable for continued operation, mitigations are developed or limitations established for the aircraft, flight crew and/or operation.

(3) Aircraft failures

(i) System failure: Failure of a navigation system, flight guidance system, flight instrument system for the approach, or missed approach (e.g. loss of GNSS updating, receiver failure, autopilot disconnect, FMS failure, etc.). Depending on the aircraft, this may be addressed through aircraft design or operating procedure to cross-check guidance (e.g. dual equipage for lateral errors, use of terrain awareness and warning system).

(ii) Malfunction of air data system or altimetry: flight crew procedure cross-check between two independent systems may mitigate this risk.

(4) Aircraft performance

(i) Inadequate performance to conduct the approach operation: the aircraft capabilities and operating procedures ensure that the performance is adequate on each approach, as part of flight planning and in order to begin or continue the approach. Consideration should be given to aircraft configuration during approach and any configuration changes associated with a missed approach operation (e.g. engine failure, flap retraction, re-engagement of autopilot in LNAV mode).

(ii) Loss of engine: loss of an engine while on an RNP AR APCH operation is a rare occurrence due to high engine reliability and the short exposure time. The operator needs to take appropriate action to mitigate the effects of loss of engine, initiating a go-around and manually taking control of the aircraft if necessary.

(5) Navigation services

(i) Use of a navigation aid outside of designated coverage or in test mode: aircraft airworthiness standards and operating procedures have been developed to address this risk.

(ii) Navigation database errors: instrument approach procedures are validated through flight validation specific to the operator and aircraft, and the operator should have a process defined to maintain validated data through updates to the navigation database.

(6) ATC operations

(i) Procedure assigned to non-approved aircraft: flight crew are responsible for rejecting the clearance.

(ii) ATC provides 'direct to' clearance to or vectors aircraft onto approach such that performance cannot be achieved.

(iii) Inconsistent ATC phraseology between controller and flight crew.

(7) Flight crew operations

(i) Erroneous barometric altimeter setting: flight crew entry and cross-check procedures may mitigate this risk.

(ii) Incorrect procedure selection or loading: flight crew procedures should be available to verify that the loaded procedure matches the published procedure, line of minima and aircraft airworthiness qualification.

(iii) Incorrect flight control mode selected: training on importance of flight control mode, flight crew procedure to verify selection of correct flight control mode.

(iv) Incorrect RNP entry: flight crew procedure to verify RNP loaded in system matches the published value.

(v) Missed approach: balked landing or rejected landing at or below DA/H.

(vi) Poor meteorological conditions: loss or significant reduction of visual reference that may result in a go-around.

(8) Infrastructure

(i) GNSS satellite failure: this condition is evaluated during aircraft qualification to ensure obstacle clearance can be maintained, considering the low likelihood of this failure occurring.

(ii) Loss of GNSS signals: relevant independent equipage, e.g. IRS/INS, is mandated for RNP AR APCH procedures with RF legs and approaches where the accuracy for the missed approach is less than 1 NM. For other approaches, operating procedures are used to approximate the published track and climb above obstacles.

(iii) Testing of ground navigation aids in the vicinity of the approach: aircraft and operating procedures should detect and mitigate this event.

(9) Operating conditions

(i) Tailwind conditions: excessive speed on RF legs may result in inability to maintain track. This is addressed through aircraft airworthiness standards on the limits of command guidance, inclusion of 5 degrees of bank manoeuvrability margin, consideration of speed effect and flight crew procedure to maintain speeds below the maximum authorised for the RNP AR APCH procedure.

(ii) Wind conditions and effect on FTE: nominal FTE is evaluated under a variety of wind conditions, and flight crew procedures to monitor and limit deviations to ensure safe operation.

(iii) Extreme temperature effects of barometric altitude (e.g. extreme cold temperatures, known local atmospheric or weather phenomena, high winds, severe turbulence, etc.): the effect of this error on the vertical path is mitigated through the procedure design and flight crew procedures, with an allowance for aircraft that compensate for this effect to conduct procedures regardless of the published temperature limit. The effect of this error on minimum segment altitudes and the DA/H are addressed in an equivalent manner to all other approach operations.

AMC1 SPA.PBN.105(d) PBN operational approval

OPERATIONAL CONSIDERATIONS FOR RNP AR APCH

(a) MEL

(1) The operator's MEL should be developed/revised to address the equipment provisions for RNP AR APCH operations.

(2) An operational TAWS Class A should be available for all RNP AR APCH operations. The TAWS should use altitude values that are compensated for local pressure and temperature effects (e.g. corrected barometric and GNSS altitude), and include significant terrain and obstacle data.

(b) Autopilot and flight director

(1) For RNP AR APCH operations with RNP values less than RNP 0.3 or with RF legs, the autopilot or flight director driven by the area navigation system should be used. Thus, the flight crew should check that the autopilot/flight director is installed and operational.

(c) Preflight RNP assessment

(1) The operator should have a predictive performance capability, which can determine if the specified RNP will be available at the time and location of a desired RNP operation. This capability can be a ground service and need not be resident in the aircraft's avionics equipment. The operator should establish procedures requiring use of this capability as both a preflight preparation tool and as a flight-following tool in the event of reported failures.

(2) This predictive capability should account for known and predicted outages of GNSS satellites or other impacts on the navigation system's sensors. The prediction programme should not use a mask angle below 5 degrees, as operational experience indicates that satellite signals at low elevations are not reliable. The prediction should use the actual GNSS constellation with the RAIM (or equivalent) algorithm identical to or more conservative than that used in the actual equipment.

(3) The RNP assessment should consider the specific combination of the aircraft capability (sensors and integration), as well as their availability.

(d) NAVAID exclusion

(1) The operator should establish procedures to exclude NAVAID facilities in accordance with NOTAMs (e.g. DMEs, VORs, localisers). Internal avionics reasonableness checks may not be adequate for RNP operations.

(e) Navigation database currency

(1) During system initialisation, the flight crew should confirm that the navigation database is current. Navigation databases should be current for the duration of the flight. If the AIRAC cycle is due to change during flight, the flight crew should follow procedures established by the operator to ensure the accuracy of navigation data.

(2) The operator should not allow the flight crew to use an expired database.

AMC2 SPA.PBN.105(d) PBN operational approval

FLIGHT CONSIDERATIONS

(a) Modification of flight plan

The flight crew should not be authorised to fly a published RNP AR APCH procedure unless it is retrievable by the procedure name from the aircraft navigation database and conforms to the charted procedure. The lateral path should not be modified; with the exception of accepting a clearance to go direct to a fix in the approach procedure that is before the FAF and that does not immediately precede an RF leg. The only other acceptable modification to the loaded procedure is to change altitude and/or airspeed waypoint constraints on the initial, intermediate, or missed approach segments flight plan fixes (e.g. to apply temperature corrections or comply with an ATC clearance/instruction).

(b) Mandatory equipment

The flight crew should have either a mandatory list of equipment for conducting RNP AR APCH operations or alternate methods to address in-flight equipment failures that would prohibit RNP AR APCH operations (e.g. crew warning systems, quick reference handbook).

(c) RNP management

Operating procedures should ensure that the navigation system uses the appropriate RNP values throughout the approach operation. If the navigation system does not extract and set the navigation accuracy from the on-board navigation database for each segment of the procedure, then operating procedures should ensure that the smallest navigation accuracy required to complete the approach or the missed approach is selected before initiating the approach operation (e.g. before the IAF). Different IAFs may have different navigation accuracy, which are annotated on the approach chart.

(d) Loss of RNP

The flight crew should ensure that no loss of RNP annunciation is received prior to commencing the RNP AR APCH operation. During the approach operation, if at any time a loss of RNP annunciation is received, the flight crew should abandon the RNP AR APCH operation unless the pilot has in sight the visual references required to continue the approach operation.

(e) Radio updating

Initiation of all RNP AR APCH procedures is based on GNSS updating. The flight crew should comply with the operator's procedures for inhibiting specific facilities.

(f) Approach procedure confirmation

The flight crew should confirm that the correct procedure has been selected. This process includes confirmation of the waypoint sequence, reasonableness of track angles and distances, and any other parameters that can be altered by the flight crew, such as altitude or speed constraints. A navigation system textual display or navigation map display should be used.

(g) Track deviation monitoring

(1) The flight crew should use a lateral deviation indicator, flight director and/or autopilot in lateral navigation mode on RNP AR APCH operations. The flight crew of an aircraft with a lateral deviation indicator should ensure that lateral deviation indicator scaling (full-scale deflection) is suitable for the navigation accuracy associated with the various segments of the RNP AR APCH procedure. The flight crew is expected to maintain procedure centrelines, as depicted by on-board lateral deviation indicators and/or flight guidance during the entire RNP AR APCH operations unless authorised to deviate by ATC or demanded under emergency conditions. For normal operations, cross-track error/deviation (the difference between the area-navigation-system-computed path and the aircraft position relative to the path) should be limited to the navigation accuracy (RNP) associated with the procedure segment.

(2) Vertical deviation should be monitored above and below the glide-path; the vertical deviation should be within ±75 ft of the glide-path during the final approach segment.

(3) Flight crew should execute a missed approach operation if:

(i) the lateral deviation exceeds one time the RNP value; or

(ii) the deviation below the vertical path exceeds 75 ft or half-scale deflection where angular deviation is indicated, at any time; or

(iii) the deviation above the vertical path exceeds 75 ft or half-scale deflection where angular deviation is indicated; at or below 1 000 ft above aerodrome level;

unless the pilot has in sight the visual references required to continue the approach operation.

(4) Where a moving map, low-resolution vertical deviation indicator (VDI), or numeric display of deviations are to be used, flight crew training and procedures should ensure the effectiveness of these displays. Typically, this involves demonstration of the procedure with a number of trained flight crew members and inclusion of this monitoring procedure in the recurrent RNP AR APCH training programme.

(5) For installations that use a CDI for lateral path tracking, the AFM should state which navigation accuracy and operations the aircraft supports and the operational effects on the CDI scale. The flight crew should know the CDI full-scale deflection value. The avionics may automatically set the CDI scale (dependent on phase of flight) or the flight crew may manually set the scale. If the flight crew manually selects the CDI scale, the operator should have procedures and training in place to assure the selected CDI scale is appropriate for the intended RNP operation. The deviation limit should be readily apparent given the scale (e.g. full-scale deflection).

(h) System cross-check

(1) The flight crew should ensure the lateral and vertical guidance provided by the navigation system is consistent.

(i) Procedures with RF legs

(1) When initiating a missed approach operation during or shortly after the RF leg, the flight crew should be aware of the importance of maintaining the published path as closely as possible. Operating procedures should be provided for aircraft that do not stay in LNAV when a missed approach is initiated to ensure the RNP AR APCH ground track is maintained.

(2) The flight crew should not exceed the maximum airspeed values shown in Table 1 throughout the RF leg. For example, a Category C A320 should slow to 160 KIAS at the FAF or may fly as fast as 185 KIAS if using Category D minima. A missed approach operation prior to DA/H may require compliance with speed limitation for that segment.

Table 1: Maximum airspeed by segment and category

Indicated airspeed (Knots)					
Segment	Indicated airspeed by aircraft category				
	Cat A	Cat B	Cat C	Cat D	Cat E
Initial & intermediate (IAF to FAF)	150	180	240	250	250
Final (FAF to DA)	100	130	160	185	as specified
Missed approach (DA/H to MAHP)	110	150	240	265	as specified
Airspeed restriction*	as specified				

**Airspeed restrictions may be used to reduce turn radius regardless of aircraft category.*

(j) Temperature compensation

For aircraft with temperature compensation capabilities, the flight crew may disregard the temperature limits on RNP procedures if the operator provides pilot training on the use of the temperature compensation function. It should be noted that a temperature compensation by the system is applicable to the VNAV guidance and is not a substitute for the flight crew compensating for temperature effects on minimum altitudes or DA/H. The flight crew should be familiar with the effects of the temperature compensation on intercepting the compensated path as described in EUROCAE ED-75C/RTCA DO-236C Appendix H.

(k) Altimeter setting

Due to the performance-based obstruction clearance inherent in RNP instrument procedures, the flight crew should verify that the most current aerodrome altimeter is set prior to the FAF. The operator should take precautions to switch altimeter settings at appropriate times or locations and request a current altimeter setting if the reported setting may not be recent, particularly at times when pressure is reported or expected to be rapidly decreasing. Execution of an RNP operation necessitates the current altimeter setting for the aerodrome of intended landing. Remote altimeter settings should not be allowed.

(l) Altimeter cross-check

(1) The flight crew should complete an altimetry cross-check ensuring both pilots' altimeters agree within □100 ft prior to the FAF but no earlier than when the altimeters are set for the aerodrome of intended landing. If the altimetry cross-check fails, then the approach operation should not be continued.

(2) This operational cross-check should not be necessary if the aircraft systems automatically compare the altitudes to within 75 ft.

(m) Missed approach operation

Where possible, the missed approach operation should necessitate RNP 1.0. The missed approach portion of these procedures should be similar to a missed approach of an RNP APCH procedure. Where necessary, navigation accuracy less than RNP 1.0 may be used in the missed approach segment.

(1) In many aircraft, executing a missed approach activating take-off/go-around (TOGA) may cause a change in lateral navigation. In many aircraft, activating TOGA disengages the autopilot and flight director from LNAV guidance, and the flight director reverts to track-hold derived from the inertial system. LNAV guidance to the autopilot and flight director should be re-engaged as quickly as possible.

(2) Flight crew procedures and training should address the impact on navigation capability and flight guidance if the pilot initiates a missed approach while the aircraft is in a turn. When initiating an early missed approach operation, the flight crew should follow the rest of the approach track and missed approach track unless a different clearance has been issued by ATC. The flight crew should also be aware that RF legs are designed based on the maximum true airspeed at normal altitudes, and initiating an early missed approach operation will reduce the manoeuvrability margin and potentially even make holding the turn impractical at missed approach speeds.

(n) Contingency procedures

(1) Failure while en route

The flight crew should be able to assess the impact of GNSS equipment failure on the anticipated RNP AR APCH operation and take appropriate action.

(2) Failure on approach

The operator's contingency procedures should address at least the following conditions:

(i) failure of the area navigation system components, including those affecting lateral and vertical deviation performance (e.g. failures of a GPS sensor, the flight director or autopilot);

(ii) loss of navigation signal-in-space (loss or degradation of external signal).

AMC3 SPA.PBN.105(d) PBN operational approval

NAVIGATION DATABASE MANAGEMENT

(a) The operator should validate every RNP AR APCH procedure before using the procedure in instrument meteorological conditions (IMC) to ensure compatibility with their aircraft and to ensure the resulting path matches the published procedure. As a minimum, the operator should:

(1) compare the navigation data for the procedure(s) to be loaded into the FMS with the published procedure.

(2) validate the loaded navigation data for the procedure, either in an FSTD or in the actual aircraft in VMC. The depicted procedure on the map display should be compared to the published procedure. The entire procedure should be flown to ensure the path is flyable, does not have any apparent lateral or vertical path disconnects and is consistent with the published procedure.

(3) Once the procedure is validated, a copy of the validated navigation data should be retained for comparison with subsequent data updates.

(4) For published procedures, where FOSA demonstrated that the procedure is not in a challenging operational environment, the flight or FSTD validation may be credited from already validated equivalent RNP AR APCH procedures.

(b) If an aircraft system required for RNP AR APCH operations is modified, the operator should assess the need for a validation of the RNP AR APCH procedures with the navigation database and the modified system. This may be accomplished without any direct evaluation if the manufacturer verifies that the modification has no effect on the navigation database or path computation. If no such assurance from the manufacturer is available, the operator should conduct initial data validation with the modified system.

(c) The operator should implement procedures that ensure timely distribution and insertion of current and unaltered electronic navigation data to all aircraft that require it.

AMC1 SPA.PBN.105(e) PBN operational approval

REPORTABLE EVENTS

The operator should report events which are listed in AMC2 ORO.GEN.160.

AMC1 SPA.PBN.105(f) PBN operational approval

RNP MONITORING PROGRAMME

(a) The operator approved to conduct RNP AR APCH operations, should have an RNP monitoring programme to ensure continued compliance with applicable rules and to identify any negative trends in performance.

(b) During an interim approval period, which should be at least 90 days, the operator should at least submit the following information every 30 days to the competent authority.

(1) Total number of RNP AR APCH operations conducted;

(2) Number of approach operations by aircraft/system which were completed as planned without any navigation or guidance system anomalies;

(3) Reasons for unsatisfactory approaches, such as:

(i) UNABLE REQ NAV PERF, NAV ACCUR DOWNGRAD, or other RNP messages during approaches;

(ii) excessive lateral or vertical deviation;

(iii) TAWS warning;

(iv) autopilot system disconnect;

(v) navigation data errors; or

(vi) flight crew reports of any anomaly;

(4) Flight crew comments.

(c) Thereafter, the operator should continue to collect and periodically review this data to identify potential safety concerns, and maintain summaries of this data

SUBPART C – Operations with specified minimum navigation performance (MNPS)

GM1 SPA.MNPS.100 MNPS operations

DOCUMENTATION

MNPS and the procedures governing their application are published in the Regional Supplementary Procedures, ICAO Doc 7030, as well as in national AIPs.

AMC1 SPA.MNPS.105 MNPS operational approval

LONG RANGE NAVIGATION SYSTEM (LRNS)

(a) For unrestricted operation in MNPS airspace an aircraft should be equipped with two independent LRNSs.

(b) An LRNS may be one of the following:

(1) one inertial navigation system (INS);

(2) one global navigation satellite system (GNSS); or

(3) one navigation system using the inputs from one or more inertial reference system (IRS) or any other sensor system complying with the MNPS requirement.

(c) In case of the GNSS is used as a stand-alone system for LRNS, an integrity check should be carried out.

(d) For operation in MNPS airspace along notified special routes the aeroplane should be equipped with one LRNS.

SUBPART D - Operations in airspace with reduced vertical separation minima (RVSM)

AMC1 SPA.RVSM.105 RVSM operational approval

CONTENT OF OPERATOR RVSM APPLICATION

The following material should be made available to the LyCAA, in sufficient time to permit evaluation, before the intended start of RVSM operations:

(a) Airworthiness documents

Documentation that shows that the aircraft has RVSM airworthiness approval. This should include an aircraft flight manual (AFM) amendment or supplement.

(b) Description of aircraft equipment

A description of the aircraft appropriate to operations in an RVSM environment.

(c) Training programmes, operating practices and procedures

(d) The operator should submit training syllabi for initial and recurrent training programmes together with other relevant material. The material should show that the operating practices, procedures and training items, related to RVSM operations in airspace that requires operational approval, are incorporated.

(e) Manuals and checklists

The appropriate manuals and checklists should be revised to include information/guidance on standard operating procedures. Manuals should contain a statement of the airspeeds, altitudes and weights considered in RVSM aircraft approval, including identification of any operating limitations or conditions established for that aircraft type. Manuals and checklists may need to be submitted for review by the LyCAA as part of the application process.

(f) Past performance

Relevant operating history, where available, should be included in the application. The applicant should show that any required changes have been made in training, operating or maintenance practices to improve poor height-keeping performance.

(g) Minimum equipment list

Where applicable, a minimum equipment list (MEL), adapted from the master minimum equipment list (MMEL), should include items pertinent to operating in RVSM airspace.

(h) Plan for participation in verification/monitoring programmes

The operator should establish a plan for participation in any applicable verification/monitoring programme acceptable to the LyCAA. This plan should include, as a minimum, a check on a sample of the operator's fleet by a regional monitoring agency (RMA)'s independent height-monitoring system.

AMC2 SPA.RVSM.105 RVSM operational approval

OPERATING PROCEDURES

(a) Flight planning

(1) During flight planning the flight crew should pay particular attention to conditions that may affect operation in RVSM airspace. These include, but may not be limited to:

(i) verifying that the airframe is approved for RVSM operations;

(ii) reported and forecast weather on the route of flight;

(iii) minimum equipment requirements pertaining to height-keeping and alerting systems; and

(iv) any airframe or operating restriction related to RVSM operations.

(b) Pre-flight procedures

(1) The following actions should be accomplished during the pre-flight procedure:

(i) Review technical logs and forms to determine the condition of equipment required for flight in the RVSM airspace. Ensure that maintenance action has been taken to correct defects to required equipment.

(ii) During the external inspection of aircraft, particular attention should be paid to the condition of static sources and the condition of the fuselage skin near each static source and any other component that affects altimetry system accuracy. This check may be accomplished by a qualified and authorised person other than the pilot (e.g. a flight engineer or ground engineer).

(iii) Before take-off, the aircraft altimeters should be set to the QNH (atmospheric pressure at nautical height) of the airfield and should display a known altitude, within the limits specified in the aircraft operating manuals. The two primary altimeters should also agree within limits specified by the aircraft operating manual. An alternative procedure using QFE (atmospheric pressure at aerodrome elevation/runway threshold) may also be used. The maximum value of acceptable altimeter differences for these checks should not exceed 23 m (75 ft). Any required functioning checks of altitude indicating systems should be performed.

(iv) Before take-off, equipment required for flight in RVSM airspace should be operative and any indications of malfunction should be resolved.

(c) Prior to RVSM airspace entry

(1) The following equipment should be operating normally at entry into RVSM airspace:

(i) two primary altitude measurement systems. A cross-check between the primary altimeters should be made. A minimum of two will need to agree within ±60 m (±200 ft). Failure to meet this condition will require that the altimetry system be reported as defective and air traffic control (ATC) notified;

(ii) one automatic altitude-control system;

(iii) one altitude-alerting device; and

(iv) operating transponder.

(2) Should any of the required equipment fail prior to the aircraft entering RVSM airspace, the pilot should request a new clearance to avoid entering this airspace.

(d) In-flight procedures

(1) The following practices should be incorporated into flight crew training and procedures:

(i) Flight crew should comply with any aircraft operating restrictions, if required for the specific aircraft type, e.g. limits on indicated Mach number, given in the RVSM airworthiness approval.

(ii) Emphasis should be placed on promptly setting the sub-scale on all primary and standby altimeters to 1013.2 hPa / 29.92 in Hg when passing the transition altitude, and rechecking for proper altimeter setting when reaching the initial cleared flight level.

(iii) In level cruise it is essential that the aircraft is flown at the cleared flight level. This requires that particular care is taken to ensure that ATC clearances are fully understood and followed. The aircraft should not intentionally depart from cleared flight level without a positive clearance from ATC unless the crew are conducting contingency or emergency manoeuvres.

(iv) When changing levels, the aircraft should not be allowed to overshoot or undershoot the cleared flight level by more than 45 m (150 ft). If installed, the level off should be accomplished using the altitude capture feature of the automatic altitude-control system.

(v) An automatic altitude-control system should be operative and engaged during level cruise, except when circumstances such as the need to re- trim the aircraft or turbulence require disengagement. In any event, adherence to cruise altitude should be done by reference to one of the two primary altimeters. Following loss of the automatic height-keeping function, any consequential restrictions will need to be observed.

(vi) Ensure that the altitude-alerting system is operative.

(vii) At intervals of approximately 1 hour, cross-checks between the primary altimeters should be made. A minimum of two will need to agree within ±60 m (±200 ft). Failure to meet this condition will require that the altimetry system be reported as defective and ATC notified or contingency procedures applied:

(A) the usual scan of flight deck instruments should suffice for altimeter cross-checking on most flights; and

(B) before entering RVSM airspace, the initial altimeter cross-check of primary and standby altimeters should be recorded.

(viii) In normal operations, the altimetry system being used to control the aircraft should be selected for the input to the altitude reporting transponder transmitting information to ATC.

(ix) If the pilot is notified by ATC of a deviation from an assigned altitude exceeding ±90 m (±300 ft) then the pilot should take action to return to cleared flight level as quickly as possible.

(2) Contingency procedures after entering RVSM airspace are as follows:

(i) The pilot should notify ATC of contingencies (equipment failures, weather) that affect the ability to maintain the cleared flight level and coordinate a plan of action appropriate to the airspace concerned. The pilot should obtain to the guidance on contingency procedures is contained in the relevant publications dealing with the airspace.

(ii) Examples of equipment failures that should be notified to ATC are:

(A) failure of all automatic altitude-control systems aboard the aircraft;

(B) loss of redundancy of altimetry systems;

(C) loss of thrust on an engine necessitating descent; or

(D) any other equipment failure affecting the ability to maintain cleared flight level.

(iii) The pilot should notify ATC when encountering greater than moderate turbulence.

(iv) If unable to notify ATC and obtain an ATC clearance prior to deviating from the cleared flight level, the pilot should follow any established contingency procedures for the region of operation and obtain ATC clearance as soon as possible.

(e) Post-flight procedures

(1) In making technical log entries against malfunctions in height-keeping systems, the pilot should provide sufficient detail to enable maintenance to effectively troubleshoot and repair the system. The pilot should detail the actual defect and the crew action taken to try to isolate and rectify the fault.

(2) The following information should be recorded when appropriate:

(i) primary and standby altimeter readings;

(ii) altitude selector setting;

(iii) subscale setting on altimeter;

(iv) autopilot used to control the aircraft and any differences when an alternative autopilot system was selected;

(v) differences in altimeter readings, if alternate static ports selected;

(vi) use of air data computer selector for fault diagnosis procedure; and

(vii) the transponder selected to provide altitude information to ATC and any difference noted when an alternative transponder was selected.

(f) Crew training

(1) The following items should also be included in flight crew training programmes:

(i) knowledge and understanding of standard ATC phraseology used in each area of operations;

(ii) importance of crew members cross-checking to ensure that ATC clearances are promptly and correctly complied with;

(iii) use and limitations in terms of accuracy of standby altimeters in contingencies. Where applicable, the pilot should review the application of static source error correction/position error correction through the use of correction cards; such correction data should be available on the flight deck;

(iv) problems of visual perception of other aircraft at 300 m (1 000 ft) planned separation during darkness, when encountering local phenomena such as northern lights, for opposite and same direction traffic, and during turns;

(v) characteristics of aircraft altitude capture systems that may lead to overshoots;

(vi) relationship between the aircraft's altimetry, automatic altitude control and transponder systems in normal and abnormal conditions; and

(vii) any airframe operating restrictions, if required for the specific aircraft group, related to RVSM airworthiness approval.

GM1 SPA.RVSM.105(d)(9) RVSM operational approval

SPECIFIC REGIONAL PROCEDURES

(a) The areas of applicability (by Flight Information Region) of RVSM airspace in identified ICAO regions is contained in the relevant sections of ICAO Document 7030/4. In addition, these sections contain operating and contingency procedures unique to the regional airspace concerned, specific flight planning requirements and the approval requirements for aircraft in the designated region.

(b) Comprehensive guidance on operational matters for European RVSM airspace is contained in EUROCONTROL Document ASM ET1.ST.5000 entitled “The ATC Manual for a Reduced Vertical Separation (RVSM) in Europe”.

AMC1 SPA.RVSM.110(a) RVSM equipment requirements

TWO INDEPENDENT ALTITUDE MEASUREMENT SYSTEMS

Each system should be composed of the following components:

(a) cross-coupled static source/system, with ice protection if located in areas subject to ice accretion;

(b) equipment for measuring static pressure sensed by the static source, converting it to pressure altitude and displaying the pressure altitude to the flight crew:

(c) equipment for providing a digitally encoded signal corresponding to the displayed pressure altitude, for automatic altitude reporting purposes;

(d) static source error correction (SSEC), if needed to meet the performance criteria for RVSM flight envelopes; and

(e) signals referenced to a flight crew selected altitude for automatic control and alerting. These signals will need to be derived from an altitude measurement system meeting the performance criteria for RVSM flight envelopes.

SUBPART E – Low visibility operations (LV0)

AMC1 SPA.LVO.100 Low visibility operations

LVTO OPERATIONS - AEROPLANES

For a low visibility take-off (LVTO) with an aeroplane the following provisions should apply:

(a) for an LVTO with a runway visual range (RVR) below 400 m the criteria specified in Table 1.A;

(b) for an LVTO with an RVR below 150 m but not less than 125 m:

(1) high intensity runway centre line lights spaced 15 m or less apart and high intensity edge lights spaced 60 m or less apart that are in operation;

(2) a 90 m visual segment that is available from the flight crew compartment at the start of the take-off run; and

(3) the required RVR value is achieved for all of the relevant RVR reporting points;

(c) for an LVTO with an RVR below 125 m but not less than 75 m:

(1) runway protection and facilities equivalent to CAT III landing operations are available; and

(2) the aircraft is equipped with an approved lateral guidance system.

Table 1.A: LVTO – aeroplanes RVR vs. facilities

Facilities	RVR (m) *, **
Day: runway edge lights and runway centre line markings Night: runway edge lights and runway end lights or runway centre line lights and runway end lights	300
Runway edge lights and runway centre line lights	200
Runway edge lights and runway centre line lights	TDZ, MID, rollout 150***
High intensity runway centre line lights spaced 15 m or less and high intensity edge lights spaced 60 m or less are in operation	TDZ, MID, rollout 125***
Runway protection and facilities equivalent to CAT III landing operations are available and the aircraft is equipped either with an approved lateral guidance system or an approved HUD / HUDLS for take-off.	TDZ, MID, rollout 75

**: The reported RVR value representative of the initial part of the take-off run can be replaced by pilot assessment.*

***: Multi-engined aeroplanes that in the event of an engine failure at any point during take-off can either stop or continue the take-off to a height of 1 500 ft above the aerodrome while clearing obstacles by the required margins.*

****: The required RVR value to be achieved for all relevant RVRs*

TDZ: touchdown zone, equivalent to the initial part of the take-off run

MID: midpoint

AMC2 SPA.LVO.100 Low visibility operations

LVTO OPERATIONS - HELICOPTERS

For LVTOs with helicopters the provisions specified in Table 1.H should apply.

Table 1.H:LVTO – helicopters RVR vs. facilities

Facilities	RVR (m)
Onshore aerodromes with IFR departure procedures	
No light and no markings (day only)	250 or the rejected take-off distance, whichever is the greater
No markings (night)	800
Runway edge/FATO light and centre line marking	200
Runway edge/FATO light, centre line marking and relevant RVR information	150
Offshore helideck *	
Two-pilot operations	250
Single-pilot operations	500

**: The take-off flight path to be free of obstacles*

FATO: final approach and take-off area

AMC3 SPA.LVO.100 Low visibility operations

LTS CAT I OPERATIONS

(a) For lower than Standard Category I (LTS CAT I) operations the following provisions should apply:

(1) The decision height (DH) of an LTS CAT I operation should not be lower than the highest of:

(i) the minimum DH specified in the AFM, if stated;

(ii) the minimum height to which the precision approach aid can be used without the specified visual reference;

(iii) the applicable obstacle clearance height (OCH) for the category of aeroplane;

(iv) the DH to which the flight crew is qualified to operate; or

(v) 200 ft.

(2) An instrument landing system / microwave landing system (ILS/MLS) that supports an LTS CAT I operation should be an unrestricted facility with a straight-in course, ≤ 3º offset, and the ILS should be certified to:

(i) class I/T/1 for operations to a minimum of 450 m RVR; or

(ii) class II/D/2 for operations to less than 450 m RVR.

Single ILS facilities are only acceptable if level 2 performance is provided.

(3) The following visual aids should be available:

(i) standard runway day markings, approach lights, runway edge lights, threshold lights and runway end lights;

(ii) for operations with an RVR below 450 m, additionally touch-down zone and/or runway centre line lights.

(4) The lowest RVR / converted meteorological visibility (CMV) minima to be used are specified in Table 2.

Table 2: LTS CAT I operation minima RVR/CMV vs. approach lighting system

DH (ft)	Class of light facility *			
	FALS	IALS	BALS	NALS
	RVR/CMV (m)			
211 – 220	450	550	650	800
221 – 230	500	600	700	900
231 – 240	500	650	750	1 000
241 – 249	550	700	800	1 100

**: FALS: full approach lighting system*

IALS: intermediate approach lighting system

BALS: basic approach lighting system

NALS: no approach lighting system

AMC4 SPA.LVO.100 Low visibility operations

CAT II AND OTS CAT II OPERATIONS

(a) For CAT II and other than Standard Category II (OTS CAT II) operations the following provisions should apply:

(1) The ILS / MLS that supports OTS CAT II operation should be an unrestricted facility with a straight in course (≤ 3º offset) and the ILS should be certified to class II/D/2.

Single ILS facilities are only acceptable if level 2 performance is provided.

(2) The DH for CAT II and OTS CAT II operation should not be lower than the highest of:

(i) the minimum DH specified in the AFM, if stated;

(ii) the minimum height to which the precision approach aid can be used without the specified visual reference;

(iii) the applicable OCH for the category of aeroplane;

(iv) the DH to which the flight crew is qualified to operate; or

(v) 100 ft.

(3) The following visual aids should be available:

(i) standard runway day markings and approach and the following runway lights: runway edge lights, threshold lights and runway end lights;

(ii) for operations in RVR below 450 m, additionally touch-down zone and/or runway centre line lights;

(iii) for operations with an RVR of 400 m or less, additionally centre line lights.

(4) The lowest RVR minima to be used are specified:

(i) for CAT II operations in Table 3; and

(ii) for OTS CAT II operations in Table 4.

(b) For OTS CAT II operations, the terrain ahead of the runway threshold should have been surveyed.

Table 3: CAT II operation minima RVR vs. DH

DH (ft)	Auto-coupled or approved HUDLS to below DH*	
	Aircraft categories A, B, C RVR (m)	Aircraft category D RVR (m)
100 – 120	300	300/350**
121 – 140	400	400
141 – 199	450	450

**: This means continued use of the automatic flight control system or the HUDLS down to a height of 80 % of the DH.*

***: An RVR of 300 m may be used for a category D aircraft conducting an auto-land.*

Table 4: OTS CAT II operation minima RVR vs. approach lighting system

	Auto-land or approved HUDLS utilised to touchdown				
	Class of light facility				
	FALS		IALS	BALS	NALS
	Aircraft categories A – C	Aircraft category D	Aircraft categories A – D	Aircraft categories A – D	Aircraft categories A - D
DH (ft)	RVR (m)				
100 - 120	350	400	450	600	700
121 - 140	400	450	500	600	700
141 - 160	400	500	500	600	750
161-199	400	500	550	650	750

AMC5 SPA.LVO.100 Low visibility operations

CAT III OPERATIONS

The following provisions should apply to CAT III operations:

(a) Where the DH and RVR do not fall within the same category, the RVR should determine in which category the operation is to be considered.

(b) For operations in which a DH is used, the DH should not be lower than:

(1) the minimum DH specified in the AFM, if stated;

(2) the minimum height to which the precision approach aid can be used without the specified visual reference; or

(3) the DH to which the flight crew is qualified to operate.

(c) Operations with no DH should only be conducted if:

(1) the operation with no DH is specified in the AFM;

(2) the approach aid and the aerodrome facilities can support operations with no DH; and

(3) the flight crew is qualified to operate with no DH.

(d) The lowest RVR minima to be used are specified in Table 5.

Table 5: CAT III operations minima RVR vs. DH and rollout control/guidance system

CAT	DH (ft) *	Rollout control/guidance system	RVR (m)
IIIA	Less than 100	Not required	200
IIIB	Less than 100	Fail-passive	150**
IIIB	Less than 50	Fail-passive	125
IIIB	Less than 50 or no DH	Fail-operational ***	75

**:Flight control system redundancy is determined under CS-AWO by the minimum certified DH.*

***:For aeroplanes certified in accordance with CS-AWO 321(b)(3) or equivalent.*

****:The fail-operational system referred to may consist of a fail-operational hybrid system.*

AMC6 SPA.LVO.100 Low visibility operations

OPERATIONS UTILISING EVS

The pilot using a certified enhanced vision system (EVS) in accordance with the procedures and limitations of the AFM:

(a) may reduce the RVR/CMV value in column 1 to the value in column 2 of Table 6 for CAT I operations, APV operations and NPA operations flown with the CDFA technique;

(b) for CAT I operations:

(1) may continue an approach below DH to 100 ft above the runway threshold elevation provided that a visual reference is displayed and identifiable on the EVS image; and

(2) should only continue an approach below 100 ft above the runway threshold elevation provided that a visual reference is distinctly visible and identifiable to the pilot without reliance on the EVS;

(c) for APV operations and NPA operations flown with the CDFA technique:

(1) may continue an approach below DH/MDH to 200 ft above the runway threshold elevation provided that a visual reference is displayed and identifiable on the EVS image; and

(2) should only continue an approach below 200 ft above the runway threshold elevation provided that a visual reference is distinctly visible and identifiable to the pilot without reliance on the EVS.

Table 6: Operations utilising EVS RVR/CMV reduction vs. normal RVR/CMV

RVR/CMV (m) normally required	RVR/CMV (m) utilising EVS
550	350
600	400
650	450

700	450
750	500
800	550
900	600
1 000	650
1 100	750
1 200	800
1 300	900
1 400	900
1 500	1 000
1 600	1 100
1 700	1 100
1 800	1 200
1 900	1 300
2 000	1 300
2 100	1 400
2 200	1 500
2 300	1 500
2 400	1 600
2 500	1 700
2 600	1 700
2 700	1 800
2 800	1 900
2 900	1 900
3 000	2 000
3 100	2 000
3 200	2 100
3 300	2 200
3 400	2 200
3 500	2 300
3 600	2 400
3 700	2 400
3 800	2 500
3 900	2 600
4 000	2 600
4 100	2 700
4 200	2 800
4 300	2 800
4 400	2 900

4 500	3 000
4 600	3 000
4 700	3 100
4 800	3 200
4 900	3 200
5 000	3 300

AMC7 SPA.LVO.100 Low visibility operations

EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED EQUIPMENT

(a) General

These instructions are intended for use both pre-flight and in-flight. It is however not expected that the pilot-in-command/commander would consult such instructions after passing 1 000 ft above the aerodrome. If failures of ground aids are announced at such a late stage, the approach could be continued at the pilot-in- command/commander's discretion. If failures are announced before such a late stage in the approach, their effect on the approach should be considered as described in Table 7, and the approach may have to be abandoned.

(b) The following conditions should be applicable to the tables below:

(1) multiple failures of runway/FATO lights other than indicated in Table 7 are not acceptable;

(2) deficiencies of approach and runway/FATO lights are treated separately;

(3) for CAT II and CAT III operations, a combination of deficiencies in runway/FATO lights and RVR assessment equipment are not permitted; and

(4) failures other than ILS and MLS affect RVR only and not DH.

Table 7: Failed or downgraded equipment – affect on landing minima Operations with an LVO approval

<table>
<tr><th rowspan="2">Failed or downgraded equipment</th><th colspan="4">Effect on landing minima</th></tr>
<tr><th>CAT IIIB (no DH)</th><th>CAT IIIB</th><th>CAT IIIA</th><th>CAT II</th></tr>
<tr><td>ILS/MLS stand-by transmitter</td><td>Not allowed</td><td>RVR 200 m</td><td colspan="2">No effect</td></tr>
<tr><td>Outer marker</td><td colspan="4">No effect if replaced by height check at 1 000 ft</td></tr>
<tr><td>Middle marker</td><td colspan="4">No effect</td></tr>
<tr><td>RVR assessment systems</td><td>At least one RVR value to be available on the aerodrome</td><td colspan="3">On runways equipped with two or more RVR assessment units, one may be inoperative</td></tr>
<tr><td>Approach lights</td><td>No effect</td><td colspan="2">Not allowed for operations with DH >50 ft</td><td>No effect</td></tr>
<tr><td>Approach lights except the last 210 m</td><td colspan="3">No effect</td><td>Not allowed</td></tr>
<tr><td>Approach lights except the last 420 m</td><td colspan="4">No effect</td></tr>
<tr><td>Standby power for approach lights</td><td colspan="4">No effect</td></tr>
<tr><td rowspan="2">Edge lights, threshold lights and runway end lights</td><td colspan="2" rowspan="2">No effect</td><td>Day: no effect</td><td>Day: no effect</td></tr>
<tr><td>Night: RVR 550 m</td><td>Night: not allowed</td></tr>
<tr><td rowspan="2">Centre line lights</td><td>Day: RVR 200 m</td><td rowspan="2">Not allowed</td><td>Day: RVR 300 m</td><td>Day: RVR 350 m</td></tr>
<tr><td>Night: not allowed</td><td>Night: RVR 400 m</td><td>Night: RVR 550 m (400 m with HUDLS or auto- land)</td></tr>
<tr><td>Centre line lights spacing increased to 30m</td><td colspan="2">RVR 150 m</td><td colspan="2">No effect</td></tr>
<tr><td rowspan="2">Touchdown zone lights</td><td rowspan="2">No effect</td><td>Day: RVR 200 m</td><td colspan="2">Day: RVR 300 m</td></tr>
<tr><td>Night: RVR 300 m</td><td colspan="2">Night: RVR 550 m, 350 m with HUDLS or auto-land</td></tr>
<tr><td>Taxiway light system</td><td colspan="4">No effect</td></tr>
</table>

GM1 SPA.LVO.100 Low visibility operations

DOCUMENTS CONTAINING INFORMATION RELATED TO LOW VISIBILITY OPERATIONS

The following documents provide further information to low visibility operations (LVO):

(a) ICAO Annex 2 Rules of the Air;
(b) ICAO Annex 6 Operation of Aircraft;
(c) ICAO Annex 10 Telecommunications Vol. 1;
(d) ICAO Annex 14 Aerodromes Vol. 1;
(e) ICAO Doc 8168 PANS - OPS Aircraft Operations;
(f) ICAO Doc 9365 AWO Manual;
(g) ICAO Doc 9476 Manual of surface movement guidance and control systems (SMGCS);
(h) ICAO Doc 9157 Aerodrome Design Manual;
(i) ICAO Doc 9328 Manual of RVR Observing and Reporting Practices;
(j) ICAO EUR Doc 013: European Guidance Material on Aerodrome Operations under Limited Visibility Conditions;
(k) ECAC Doc 17, Issue 3; and
(l) CS-AWO All weather operations.

GM2 SPA.LVO.100 Low visibility operations

ILS CLASSIFICATION

The ILS classification system is specified in ICAO Annex 10.

GM1 SPA.LVO.100(c),(e) Low visibility operations

ESTABLISHMENT OF MINIMUM RVR FOR CAT II AND CAT III OPERATIONS

(a) General

(1) When establishing minimum RVR for CAT II and CAT III operations, operators should pay attention to the following information that originates in ECAC Doc 17 3rd Edition, Subpart A. It is retained as background information and, to some extent, for historical purposes although there may be some conflict with current practices.

(2) Since the inception of precision approach and landing operations various methods have been devised for the calculation of aerodrome operating minima in terms of DH and RVR. It is a comparatively straightforward matter to establish the DH for an operation but establishing the minimum RVR to be associated with that DH so as to provide a high probability that the required visual reference will be available at that DH has been more of a problem.

(3) The methods adopted by various States to resolve the DH/RVR relationship in respect of CAT II and CAT III operations have varied considerably. In one instance there has been a simple approach that entailed the application of empirical data based on actual operating experience in a particular environment. This has given satisfactory results for application within the environment for which it was developed. In another instance a more sophisticated method was employed which utilised a fairly complex computer programme to take account of a wide range of variables. However, in the latter case, it has been found that with the improvement in the performance of visual aids, and the increased use of automatic equipment in the many different types of new aircraft, most of the variables cancel each other out and a simple tabulation can be constructed that is applicable to a wide range of aircraft. The basic principles that are observed in establishing the values in such a table are that the scale of visual reference required by a pilot at and below DH depends on the task that he/she has to carry out, and that the degree to which his/her vision is obscured depends on the obscuring medium, the general rule in fog being that it becomes more dense with

increase in height. Research using flight simulation training devices (FSTDs) coupled with flight trials has shown the following:

(i) most pilots require visual contact to be established about 3 seconds above DH though it has been observed that this reduces to about 1 second when a fail-operational automatic landing system is being used;

(ii) to establish lateral position and cross-track velocity most pilots need to see not less than a three light segment of the centre line of the approach lights, or runway centre line, or runway edge lights;

(iii) for roll guidance most pilots need to see a lateral element of the ground pattern, i.e. an approach light cross bar, the landing threshold, or a barrette of the touchdown zone light; and

(iv) to make an accurate adjustment to the flight path in the vertical plane, such as a flare, using purely visual cues, most pilots need to see a point on the ground which has a low or zero rate of apparent movement relative to the aircraft.

(v) With regard to fog structure, data gathered in the United Kingdom over a 20 year period have shown that in deep stable fog there is a 90 % probability that the slant visual range from eye heights higher than 15 ft above the ground will be less than the horizontal visibility at ground level, i.e. RVR. There are at present no data available to show what the relationship is between the slant visual range and RVR in other low visibility conditions such as blowing snow, dust or heavy rain, but there is some evidence in pilot reports that the lack of contrast between visual aids and the background in such conditions can produce a relationship similar to that observed in fog.

(b) CAT II operations

The selection of the dimensions of the required visual segments that are used for CAT II operations is based on the following visual provisions:

(1) a visual segment of not less than 90 m will need to be in view at and below DH for pilot to be able to monitor an automatic system;

(2) a visual segment of not less than 120 m will need to be in view for a pilot to be able to maintain the roll attitude manually at and below DH; and

(3) for a manual landing using only external visual cues, a visual segment of 225 m will be required at the height at which flare initiation starts in order to provide the pilot with sight of a point of low relative movement on the ground.

Before using a CAT II ILS for landing, the quality of the localiser between 50 ft and touchdown should be verified.

(c) CAT III fail-passive operations

(1) CAT III operations utilising fail-passive automatic landing equipment were introduced in the late 1960s and it is desirable that the principles governing the establishment of the minimum RVR for such operations be dealt with in some detail.

(2) During an automatic landing the pilot needs to monitor the performance of the aircraft system, not in order to detect a failure that is better done by the monitoring devices built into the system, but so as to know precisely the flight situation. In the final stages the pilot should establish visual contact and, by the time the pilot reaches DH, the pilot should have checked the aircraft position relative to the approach or runway centre line lights. For this the pilot will need sight of horizontal elements (for roll reference) and part of the touchdown area. The pilot should check for lateral position and cross-track velocity and, if not within the pre-stated lateral limits, the pilot should carry out a missed approach procedure. The pilot should also check longitudinal progress and sight of the landing threshold is useful for this purpose, as is sight of the touchdown zone lights.

(3) In the event of a failure of the automatic flight guidance system below DH, there are two possible courses of action; the first is a procedure that allows the pilot to complete the landing manually if there is adequate visual reference for him/her to do so, or to initiate a missed approach procedure if there is not; the second is to make a missed approach procedure mandatory if there is a system disconnect regardless of the pilot's assessment of the visual reference available:

(i) If the first option is selected then the overriding rule in the determination of a minimum RVR is for sufficient visual cues to be available at and below DH for the pilot to be able to carry out a manual landing. Data presented in ECAC Doc 17 showed that a minimum value of 300 m would give a high probability that the cues needed by the pilot to assess the aircraft in pitch and roll will be available and this should be the minimum RVR for this procedure.

(ii) The second option, to require a missed approach procedure to be carried out should the automatic flight-guidance system fail below DH, will permit a lower minimum RVR because the visual reference provision will be less if there is no need to provide for the possibility of a manual landing. However, this option is only acceptable if it can be shown that the probability of a system failure below DH is acceptably low. It should be recognised that the inclination of a pilot who experiences such a failure would be to continue the landing manually but the results of flight trials in actual conditions and of simulator experiments show that pilots do not always recognise that the visual cues are inadequate in such situations and present recorded data reveal that pilots' landing performance reduces progressively as the RVR is reduced below 300 m. It should further be recognised that there is some risk in carrying out a manual missed approach procedure from below 50 ft in very low visibility and it should therefore be accepted that if an RVR lower than 300 m is to be approved, the flight deck procedure should not normally allow the pilot to continue the landing manually in such conditions and the aircraft system should be sufficiently reliable for the missed approach procedure rate to be low.

(4) These criteria may be relaxed in the case of an aircraft with a fail-passive automatic landing system that is supplemented by a head-up display that does not qualify as a fail-operational system but that gives guidance that will enable the pilot to complete a landing in the event of a failure of the automatic landing system. In this case it is not necessary to make a missed approach procedure mandatory in the event of a failure of the automatic landing system when the RVR is less than 300 m.

(d) CAT III fail-operational operations - with a DH

(1) For CAT III operations utilising a fail-operational landing system with a DH, a pilot should be able to see at least one centre line light.

(2) For CAT III operations utilising a fail-operational hybrid landing system with a DH, a pilot should have a visual reference containing a segment of at least three consecutive lights of the runway centre line lights.

(e) CAT III fail operational operations - with no DH

(1) For CAT III operations with no DH the pilot is not required to see the runway prior to touchdown. The permitted RVR is dependent on the level of aircraft equipment.

(2) A CAT III runway may be assumed to support operations with no DH unless specifically restricted as published in the AIP or NOTAM.

GM1 SPA.LVO.100(e) Low visibility operations

CREW ACTIONS IN CASE OF AUTOPILOT FAILURE AT OR BELOW DH IN FAIL-PASSIVE CAT III OPERATIONS

For operations to actual RVR values less than 300 m, a missed approach procedure is assumed in the event of an autopilot failure at or below DH. This means that a missed approach procedure is the normal action. However, the wording recognises that there may be circumstances where the safest action is to continue the landing. Such

circumstances include the height at which the failure occurs, the actual visual references, and other malfunctions. This would typically apply to the late stages of the flare. In conclusion, it is not forbidden to continue the approach and complete the landing when the pilot-in-command/commander determines that this is the safest course of action. The operator's policy and the operational instructions should reflect this information.

GM1 SPA.LVO.100(f) Low visibility operations

OPERATIONS UTILISING EVS

(a) Introduction

(1) Enhanced vision systems use sensing technology to improve a pilot's ability to detect objects, such as runway lights or terrain, which may otherwise not be visible. The image produced from the sensor and/or image processor can be displayed to the pilot in a number of ways including use of a HUD. The systems can be used in all phases of flight and can improve situational awareness. In particular, infra-red systems can display terrain during operations at night, improve situational awareness during night and low- visibility taxiing, and may allow earlier acquisition of visual references during instrument approaches.

(b) Background to EVS provisions

(1) The provisions for EVS were developed after an operational evaluation of two different EVS systems, along with data and support provided by the FAA. Approaches using EVS were flown in a variety of conditions including fog, rain and snow showers, as well as at night to aerodromes located in mountainous terrain. The infra-red EVS performance can vary depending on the weather conditions encountered. Therefore, the provisions take a conservative approach to cater for the wide variety of conditions which may be encountered. It may be necessary to amend the provisions in the future to take account of greater operational experience.

(2) Provisions for the use of EVS during take-off have not been developed. The systems evaluated did not perform well when the RVR was below 300 m. There may be some benefit for use of EVS during take-off with greater visibility and reduced light; however, such operations would need to be evaluated.

(3) Provisions have been developed to cover use of infra-red systems only. Other sensing technologies are not intended to be excluded; however, their use will need to be evaluated to determine the appropriateness of this, or any other provision. During the development, it was envisaged what minimum equipment should be fitted to the aircraft. Given the present state of technological development, it is considered that a HUD is an essential element of the EVS equipment.

(4) In order to avoid the need for tailored charts for approaches utilising EVS, it is envisaged that the operator will use AMC6 SPA.LVO.110 Table 6 Operations utilising EVS RVR/CMV reduction vs. normal RVR/CMV to determine the applicable RVR at the commencement of the approach.

(c) Additional operational considerations

(1) EVS equipment should have:

(2) a head-up display system (capable of displaying, airspeed, vertical speed, aircraft attitude, heading, altitude, command guidance as appropriate for the approach to be flown, path deviation indications, flight path vector and flight path angle reference cue and the EVS imagery);

(3) a head-down view of the EVS image, or other means of displaying the EVS-derived information easily to the pilot monitoring the progress of the approach; and

(4) means to ensure that the pilot monitoring is kept in the 'loop' and crew resource management (CRM) does not break down.

AMC1 SPA.LVO.105 LVO approval

OPERATIONAL DEMONSTRATION - AEROPLANES

(a) General

(1) The purpose of the operational demonstration should be to determine or validate the use and effectiveness of the applicable aircraft flight guidance systems, including HUDLS if appropriate, training, flight crew procedures, maintenance programme, and manuals applicable to the CAT II/III programme being approved.

(i) At least 30 approaches and landings should be accomplished in operations using the CAT II/III systems installed in each aircraft type if the requested DH is 50 ft or higher. If the DH is less than 50 ft, at least 100 approaches and landings should be accomplished.

(ii) If the operator has different variants of the same type of aircraft utilising the same basic flight control and display systems, or different basic flight control and display systems on the same type of aircraft, the operator should show that the various variants have satisfactory performance, but need not conduct a full operational demonstration for each variant. The number of approaches and landings may be based on credit given for the experience gained by another operator, using the same aeroplane type or variant and procedures.

(iii) If the number of unsuccessful approaches exceeds 5 % of the total,

e.g. unsatisfactory landings, system disconnects, the evaluation programme should be extended in steps of at least 10 approaches and landings until the overall failure rate does not exceed 5 %.

(2) The operator should establish a data collection method to record approach and landing performance. The resulting data and a summary of the demonstration data should be made available to the LyCAA for evaluation.

(3) Unsatisfactory approaches and/or automatic landings should be documented and analysed.

(b) Demonstrations

(1) Demonstrations may be conducted in line operations or any other flight where the operator's procedures are being used.

(2) In unique situations where the completion of 100 successful landings could take an unreasonably long period of time and equivalent reliability assurance can be achieved, a reduction in the required number of landings may be considered on a case-by-case basis. Reduction of the number of landings to be demonstrated requires a justification for the reduction. This justification should take into account factors such as a small number of aircraft in the fleet, limited opportunity to use runways having CAT II/III procedures or the inability to obtain ATS sensitive area protection during good weather conditions. However, at the operator's option, demonstrations may be made on other runways and facilities. Sufficient information should be collected to determine the cause of any unsatisfactory performance (e.g. sensitive area was not protected).

(3) If the operator has different variants of the same type of aircraft utilising the same basic flight control and display systems, or different basic flight control and display systems on the same type or class of aircraft, the operator should show that the various variants have satisfactory performance, but need not conduct a full operational demonstration for each variant.

(4) Not more than 30 % of the demonstration flights should be made on the same runway.

(c) Data collection for operational demonstrations

(1) Data should be collected whenever an approach and landing is attempted utilising the CAT II/III system, regardless of whether the approach is abandoned, unsatisfactory, or is concluded successfully.

(2) The data should, as a minimum, include the following information:

(i) Inability to initiate an approach. Identify deficiencies related to airborne equipment that preclude initiation of a CAT II/III approach.

(ii) Abandoned approaches. Give the reasons and altitude above the runway at which approach was discontinued or the automatic landing system was disengaged.

(iii) Touchdown or touchdown and rollout performance. Describe whether or not the aircraft landed satisfactorily within the desired touchdown area with lateral velocity or cross track error that could be corrected by the pilot or automatic system so as to remain within the lateral confines of the runway without unusual pilot skill or technique. The approximate lateral and longitudinal position of the actual touchdown point in relation to the runway centre line and the runway threshold, respectively, should be indicated in the report. This report should also include any CAT II/III system abnormalities that required manual intervention by the pilot to ensure a safe touchdown or touchdown and rollout, as appropriate.

(d) Data analysis

Unsuccessful approaches due to the following factors may be excluded from the analysis:

(1) ATS factors. Examples include situations in which a flight is vectored too close to the final approach fix/point for adequate localiser and glide slope capture, lack of protection of ILS sensitive areas, or ATS requests the flight to discontinue the approach.

(2) Faulty navaid signals. Navaid (e.g. ILS localiser) irregularities, such as those caused by other aircraft taxiing, over-flying the navaid (antenna).

(3) Other factors. Any other specific factors that could affect the success of CAT II/ III operations that are clearly discernible to the flight crew should be reported.

AMC2 SPA.LVO.105 LVO approval

OPERATIONAL DEMONSTRATION - HELICOPTERS

(a) The operator should comply with the provisions prescribed below when introducing into CAT II or III service a helicopter type that is new to Libya.

(1) Operational reliability

The CAT II and III success rate should not be less than that required by CS- AWO or equivalent.

(2) Criteria for a successful approach

An approach is regarded as successful if:

(i) the criteria are as specified in CS-AWO or equivalent are met; and

(ii) no relevant helicopter system failure occurs.

For helicopter types already used for CAT II or III operations in Libya, the in-service proving programme in (e) should be used instead.

(b) Data collection during airborne system demonstration - general

(1) The operator should establish a reporting system to enable checks and periodic reviews to be made during the operational evaluation period before the operator is approved to conduct CAT II or III operations. The reporting system should cover all successful and unsuccessful approaches, with reasons for the latter, and include a record of system component failures. This reporting system should be based upon flight crew reports and automatic recordings as prescribed in (c) and (d) below.

(2) The recordings of approaches may be made during normal line flights or during other flights performed by the operator.

(c) Data collection during airborne system demonstration – operations with DH not less than 50 ft

(1) For operations with DH not less than 50 ft, data should be recorded and evaluated by the operator and evaluated by the LyCAA when necessary.

(2) It is sufficient for the following data to be recorded by the flight crew:

(i) FATO and runway used;

(ii) weather conditions;

(iii) time;

(iv) reason for failure leading to an aborted approach;

(v) adequacy of speed control;

(vi) trim at time of automatic flight control system disengagement;

(vii) compatibility of automatic flight control system, flight director and raw data;

(viii) an indication of the position of the helicopter relative to the ILS, MLS centre line when descending through 30 m (100 ft); and

(ix) touchdown position.

(3) The number of approaches made during the initial evaluation should be sufficient to demonstrate that the performance of the system in actual airline service is such that a 90 % confidence and a 95 % approach success will result.

(d) Data collection during airborne system demonstration – operations with DH less than 50 ft or no DH

(1) For operations with DH less than 50 ft or no DH, a flight data recorder (FDR), or other equipment giving the appropriate information, should be used in addition to the flight crew reports to confirm that the system performs as designed in actual airline service. The following data should be recorded:

(i) distribution of ILS, MLS deviations at 30 m (100 ft), at touchdown and, if appropriate, at disconnection of the rollout control system and the maximum values of the deviations between those points; and

(ii) sink rate at touchdown.

(2) Any landing irregularity should be fully investigated using all available data to determine its cause.

(e) In-service proving

The operator fulfilling the provisions of (f) above should be deemed to have met the in-service proving contained in this subparagraph.

(1) The system should demonstrate reliability and performance in line operations consistent with the operational concepts. A sufficient number of successful landings should be accomplished in line operations, including training flights, using the auto-land and rollout system installed in each helicopter type.

(2) The demonstration should be accomplished using a CAT II or CAT III ILS. Demonstrations may be made on other ILS or MLS facilities if sufficient data are recorded to determine the cause of unsatisfactory performance.

(3) If the operator has different variants of the same type of helicopter utilising the same basic flight control and display systems, or different basic flight control and display systems on the same type of helicopter, the operator should show that the variants comply with the basic system performance criteria, but the operator need not conduct a full operational demonstration for each variant.

(4) Where the operator introduces a helicopter type that has already been approved by the LyCAA for CAT II and/or CAT III operations, a reduced proving programme may be acceptable.

AMC3 SPA.LVO.105 LVO approval

CONTINUOUS MONITORING – ALL AIRCRAFT

(a) After obtaining the initial approval, the operations should be continuously monitored by the operator to detect any undesirable trends before they become hazardous. Flight crew reports may be used to achieve this.

(b) The following information should be retained for a period of 12 months:

(1) the total number of approaches, by aircraft type, where the airborne CAT II or III equipment was utilised to make satisfactory, actual or practice, approaches to the applicable CAT II or III minima; and

(2) reports of unsatisfactory approaches and/or automatic landings, by aerodrome and aircraft registration, in the following categories:

(i) airborne equipment faults;

(ii) ground facility difficulties;

(iii) missed approaches because of ATC instructions; or

(iv) other reasons.

(c) The operator should establish a procedure to monitor the performance of the automatic landing system or HUDLS to touchdown performance, as appropriate, of each aircraft.

AMC4 SPA.LVO.105 LVO approval

TRANSITIONAL PERIODS FOR CAT II AND CAT III OPERATIONS

(a) Operators with no previous CAT II or CAT III experience

(1) The operator without previous CAT II or III operational experience, applying for a CAT II or CAT IIIA operational approval, should demonstrate to the LyCAA that it has gained a minimum experience of 6 months of CAT I operations on the aircraft type.

(2) The operator applying for a CAT IIIB operational approval should demonstrate to the LyCAA that it has already completed 6 months of CAT II or IIIA operations on the aircraft type.

(b) Operators with previous CAT II or III experience

(1) The operator with previous CAT II or CAT III experience, applying for a CAT II or CAT III operational approval with reduced transition periods as set out in (a), should demonstrate to the LyCAA that it has maintained the experience previously gained on the aircraft type.

(2) The operator approved for CAT II or III operations using auto-coupled approach procedures, with or without auto-land, and subsequently introducing manually flown CAT II or III operations using a HUDLS should provide the operational demonstrations set out in AMC1 SPA.LVO.105 and AMC2 SPA.LVO.105 as if it would be a new applicant for a CAT II or CAT III approval.

AMC5 SPA.LVO.105 LVO approval

MAINTENANCE OF CAT II, CAT III AND LVTO EQUIPMENT

Maintenance instructions for the on-board guidance systems should be established by the operator, in liaison with the manufacturer, and included in the operator's aircraft maintenance programme in accordance with Part-M of LCARs Continuing Airworthiness.

AMC6 SPA.LVO.105 LVO approval

ELIGIBLE AERODROMES AND RUNWAYS

(a) Each aircraft type/runway combination should be verified by the successful completion of at least one approach and landing in CAT II or better conditions, prior to commencing CAT III operations.

(b) For runways with irregular pre-threshold terrain or other foreseeable or known deficiencies, each aircraft type/runway combination should be verified by operations in CAT I or better conditions, prior to commencing LTS CAT I, OTS CAT II or CAT III operations.

(c) If the operator has different variants of the same type of aircraft in accordance with (d), utilising the same basic flight control and display systems, or different basic flight control and display systems on the same type of aircraft in accordance with (d), the operator should show that the variants have satisfactory operational performance, but need not conduct a full operational demonstration for each variant/runway combination.

(d) For the purpose of this AMC, an aircraft type or variant of an aircraft type should be deemed to be the same type/variant of aircraft if that type/variant has the same or similar:

(1) level of technology, including the following:

(i) flight control/guidance system (FGS) and associated displays and controls;

(ii) FMS and level of integration with the FGS; and

(iii) use of HUDLS;

(2) operational procedures, including:

(i) alert height;

(ii) manual landing /automatic landing;

(iii) no DH operations; and

(iv) use of HUD/HUDLS in hybrid operations;

(3) handling characteristics, including:

(i) manual landing from automatic or HUDLS guided approach;

(ii) manual missed approach procedure from automatic approach; and

(iii) automatic/manual rollout.

(e) Operators using the same aircraft type/class or variant of a type in accordance with (d) above may take credit from each other's experience and records in complying with this subparagraph.

(f) Where an approval is sought for OTS CAT II, the same provisions as set out for CAT II should be applied.

GM1 SPA.LVO.105 LVO approval

CRITERIA FOR A SUCCESSFUL CAT II, OTS CAT II, CAT III APPROACH AND AUTOMATIC LANDING

(a) The purpose of this GM is to provide operators with supplemental information regarding the criteria for a successful approach and landing to facilitate fulfilling the requirements prescribed in SPA.LVO.105.

(b) An approach may be considered to be successful if:

(1) from 500 ft to start of flare:

(i) speed is maintained as specified in AMC-AWO 231, paragraph 2 'Speed Control'; and

(ii) no relevant system failure occurs; and

(2) from 300 ft to DH:

(i) no excess deviation occurs; and

(ii) no centralised warning gives a missed approach procedure command (if installed).

(c) An automatic landing may be considered to be successful if:

(1) no relevant system failure occurs;

(2) no flare failure occurs;

(3) no de-crab failure occurs (if installed);

(4) longitudinal touchdown is beyond a point on the runway 60 m after the threshold and before the end of the touchdown zone light (900 m from the threshold);

(5) lateral touchdown with the outboard landing gear is not outside the touchdown zone light edge;

(6) sink rate is not excessive;

(7) bank angle does not exceed a bank angle limit; and

(8) no rollout failure or deviation (if installed) occurs.

(d) More details can be found in CS-AWO 131, CS-AWO 231 and AMC-AWO 231.

GM1 SPA.LVO.110(c)(4)(i) General operating requirements

APPROVED VERTICAL FLIGHT PATH GUIDANCE MODE

The term 'approved' means that the vertical flight path guidance mode has been certified as part of the avionics product.

AMC1 SPA.LVO.120 Flight crew training and qualifications

GENERAL PROVISIONS

(a) The operator should ensure that flight crew member training programmes for LVO include structured courses of ground, FSTD and/or flight training.

(1) Flight crew members with no CAT II or CAT III experience should complete the full training programme prescribed in (b), (c), and (d) below.

(2) Flight crew members with CAT II or CAT III experience with a similar type of operation (auto-coupled/auto-land, HUDLS/hybrid HUDLS or EVS) or CAT II with manual land, if appropriate, with another Libyan operator may undertake an:

(i) abbreviated ground training course if operating a different type or class from that on which the previous CAT II or CAT III experience was gained;

(ii) abbreviated ground, FSTD and/or flight training course if operating the same type or class and variant of the same type or class on which the previous CAT II or CAT III experience was gained. The abbreviated course should include at least the provisions of (d)(1), (d)(2)(i) or (d)(2)(ii) as appropriate and (d)(3)(i). The operator may reduce the number of approaches/landings required by (d)(2)(i) if the type/class or the variant of the type or class has the same or similar:

(A) level of technology - flight control/guidance system (FGS);

(B) operating procedures;

(C) handling characteristics;

(D) use of HUDLS/hybrid HUDLS; and

(E) use of EVS,

as the previously operated type or class, otherwise the provisions of (d)(2)(i) should be met.

(3) Flight crew members with CAT II or CAT III experience with the operator may undertake an abbreviated ground, FSTD and/or flight training course.

(i) When changing aircraft type or class, the abbreviated course should include at least the provisions of (d)(1), (d)(2)(i) or (d)(2)(ii) as appropriate and (d)(3)(i).

(ii) When changing to a different variant of aircraft within the same type or class rating that has the same or similar:

(A) level of technology - FGS;

(B) operating procedures - integrity;

(C) handling characteristics;

(D) use of HUDLS/Hybrid HUDLS; and

(E) use of EVS, as the previously operated type or class, a difference course or familiarisation appropriate to the change of variant should fulfil the abbreviated course provisions.

(iii) When changing to a different variant of aircraft within the same type or class rating that has a significantly different:

(A) level of technology - FGS;
(B) operating procedures - integrity;
(C) handling characteristics;
(D) use of HUDLS/Hybrid HUDLS; or
(E) use of EVS,

the provisions of (d)(1), (d)(2)(i) or (d)(2)(ii) as appropriate and (d)(3)(i) should be fulfilled.

(4) The operator should ensure when undertaking CAT II or CAT III operations with different variant(s) of aircraft within the same type or class rating that the differences and/or similarities of the aircraft concerned justify such operations, taking into account at least the following:

(i) the level of technology, including the:
(A) FGS and associated displays and controls;
(B) FMS and its integration or not with the FGS; and
(C) use of HUD/HUDLS with hybrid systems and/or EVS;

(ii) operating procedures, including:
(A) fail-passive / fail-operational, alert height;
(B) manual landing / automatic landing;
(C) no DH operations; and
(D) use of HUD/HUDLS with hybrid systems;

(iii) handling characteristics, including:
(A) manual landing from automatic HUDLS and/or EVS guided approach;
(B) manual missed approach procedure from automatic approach; and
(C) automatic/manual rollout.

GROUND TRAINING

(b) The initial ground training course for LVO should include at least the following:

(1) characteristics and limitations of the ILS and/or MLS;
(2) characteristics of the visual aids;
(3) characteristics of fog;
(4) operational capabilities and limitations of the particular airborne system to include HUD symbology and EVS characteristics, if appropriate;
(5) effects of precipitation, ice accretion, low level wind shear and turbulence;
(6) effect of specific aircraft/system malfunctions;
(7) use and limitations of RVR assessment systems;
(8) principles of obstacle clearance requirements;
(9) recognition of and action to be taken in the event of failure of ground equipment;
(10) procedures and precautions to be followed with regard to surface movement during operations when the RVR is 400 m or less and any additional procedures required for take-off in conditions below 150 m (200 m for category D aeroplanes);
(11) significance of DHs based upon radio altimeters and the effect of terrain profile in the approach area on radio altimeter readings and on the automatic approach/landing systems;
(12) importance and significance of alert height, if applicable, and the action in the event of any failure above and below the alert height;
(13) qualification requirements for pilots to obtain and retain approval to conduct LVOs; and
(14) importance of correct seating and eye position.

FSTD TRAINING AND/OR FLIGHT TRAINING

(c) FSTD training and/or flight training

(1) FSTD and/or flight training for LVO should include at least:

(i) checks of satisfactory functioning of equipment, both on the ground and in flight;

(ii) effect on minima caused by changes in the status of ground installations;

(iii) monitoring of:

(iv) automatic flight control systems and auto-land status annunciators with emphasis on the action to be taken in the event of failures of such systems; and

(v) HUD/HUDLS/EVS guidance status and annunciators as appropriate, to include head-down displays;

(vi) actions to be taken in the event of failures such as engines, electrical systems, hydraulics or flight control systems;

(vii) the effect of known unserviceabilities and use of MELs;

(viii) operating limitations resulting from airworthiness certification;

(ix) guidance on the visual cues required at DH together with information on maximum deviation allowed from glide path or localiser; and

(x) the importance and significance of alert height if applicable and the action in the event of any failure above and below the alert height.

(2) Flight crew members should be trained to carry out their duties and instructed on the coordination required with other crew members. Maximum use should be made of suitably equipped FSTDs for this purpose.

(3) Training should be divided into phases covering normal operation with no aircraft or equipment failures but including all weather conditions that may be encountered and detailed scenarios of aircraft and equipment failure that could affect CAT II or III operations. If the aircraft system involves the use of hybrid or other special systems, such as HUD/HUDLS or enhanced vision equipment, then flight crew members should practise the use of these systems in normal and abnormal modes during the FSTD phase of training.

(4) Incapacitation procedures appropriate to LVTO, CAT II and CAT III operations should be practised.

(5) For aircraft with no FSTD available to represent that specific aircraft, operators should ensure that the flight training phase specific to the visual scenarios of CAT II operations is conducted in a specifically approved FSTD. Such training should include a minimum of four approaches. Thereafter, the training and procedures that are type specific should be practised in the aircraft.

(6) Initial CAT II and III training should include at least the following exercises:

(i) approach using the appropriate flight guidance, autopilots and control systems installed in the aircraft, to the appropriate DH and to include transition to visual flight and landing;

(ii) approach with all engines operating using the appropriate flight guidance systems, autopilots, HUDLS and/or EVS and control systems installed in the aircraft down to the appropriate DH followed by missed approach - all without external visual reference;

(iii) where appropriate, approaches utilising automatic flight systems to provide automatic flare, hover, landing and rollout; and

(iv) normal operation of the applicable system both with and without acquisition of visual cues at DH.

(7) Subsequent phases of training should include at least:

(i) approaches with engine failure at various stages on the approach;

(ii) approaches with critical equipment failures, such as electrical systems, auto flight systems, ground and/or airborne ILS, MLS systems and status monitors;

(iii) approaches where failures of auto flight equipment and/or HUD/HUDLS/EVS at low level require either:

(A) reversion to manual flight to control flare, hover, landing and rollout or missed approach; or

(B) reversion to manual flight or a downgraded automatic mode to control missed approaches from, at or below DH including those which may result in a touchdown on the runway;

(iv) failures of the systems that will result in excessive localiser and/or glideslope deviation, both above and below DH, in the minimum visual conditions specified for the operation. In addition, a continuation to a manual landing should be practised if a head-up display forms a downgraded mode of the automatic system or the head-up display forms the only flare mode; and

(v) failures and procedures specific to aircraft type or variant.

(8) The training programme should provide practice in handling faults which require a reversion to higher minima.

(9) The training programme should include the handling of the aircraft when, during a fail-passive CAT III approach, the fault causes the autopilot to disconnect at or below DH when the last reported RVR is 300 m or less.

(10) Where take-offs are conducted in RVRs of 400 m and below, training should be established to cover systems failures and engine failure resulting in continued as well as rejected take-offs.

(11) The training programme should include, where appropriate, approaches where failures of the HUDLS and/or EVS equipment at low level require either:

(i) reversion to head down displays to control missed approach; or

(ii) reversion to flight with no, or downgraded, HUDLS guidance to control missed approaches from DH or below, including those which may result in a touchdown on the runway.

(12) When undertaking LVTO, LTS CAT I, OTS CAT II, CAT II and CAT III operations utilising a HUD/HUDLS, hybrid HUD/HUDLS or an EVS, the training and checking programme should include, where appropriate, the use of the HUD/HUDLS in normal operations during all phases of flight.

CONVERSION TRAINING

(d) Flight crew members should complete the following low visibility procedures (LVPs) training if converting to a new type or class or variant of aircraft in which LVTO, LTS CAT I, OTS CAT II, approach operations utilising EVS with an RVR of 800 m or less and CAT II and CAT III operations will be conducted. Conditions for abbreviated courses are prescribed in (a)(2), (a)(3) and (a)(4).

(1) Ground training

The appropriate provisions are as prescribed in (b), taking into account the flight crew member's CAT II and CAT III training and experience.

(2) FSTD training and/or flight training

(i) A minimum of six, respectively eight for HUDLS with or without EVS, approaches and/or landings in an FSTD. The provisions for eight HUDLS approaches may be reduced to six when conducting hybrid HUDLS operations.

(ii) Where no FSTD is available to represent that specific aircraft, a minimum of three, respectively five for HUDLS and/or EVS, approaches including at least one missed approach procedure is required on the aircraft. For hybrid HUDLS operations a minimum of three approaches is required, including at least one missed approach procedure.

(iii) Appropriate additional training if any special equipment is required such as head-up displays or enhanced vision equipment. When approach operations utilising EVS are conducted with an RVR of less than 800 m, a minimum of five approaches, including at least one missed approach procedure are required on the aircraft.

(3) Flight crew qualification

The flight crew qualification provisions are specific to the operator and the type of aircraft operated.

(i) The operator should ensure that each flight crew member completes a check before conducting CAT II or III operations.

(ii) The check specified in (d)(3)(i) may be replaced by successful completion of the FSTD and/or flight training specified in (d)(2).

(4) Line flying under supervision

Flight crew member should undergo the following line flying under supervision (LIFUS):

(i) For CAT II when a manual landing or a HUDLS approach to touchdown is required, a minimum of:

(A) three landings from autopilot disconnect; and

(B) four landings with HUDLS used to touchdown, except that only one manual landing, respectively two using HUDLS, to touchdown is required when the training required in (d)(2) has been carried out in an FSTD qualified for zero flight time conversion.

(ii) For CAT III, a minimum of two auto-lands, except that:

(A) only one auto-land is required when the training required in (d)(2) has been carried out in an FSTD qualified for zero flight time conversion;

(B) no auto-land is required during LIFUS when the training required in (d)(2) has been carried out in an FSTD qualified for zero flight time (ZFT) conversion and the flight crew member successfully completed the ZFT type rating conversion course; and

(C) the flight crew member, trained and qualified in accordance with (B), is qualified to operate during the conduct of LIFUS to the lowest approved DA/H and RVR as stipulated in the operations manual.

(iii) For CAT III approaches using HUDLS to touchdown, a minimum of four approaches.

TYPE AND COMMAND EXPERIENCE

(e) Type and command experience

(1) Before commencing CAT II operations, the following additional provisions should be applicable to pilots-in-command/commanders, or pilots to whom conduct of the flight may be delegated, who are new to the aircraft type or class:

(i) 50 hours or 20 sectors on the type, including LIFUS; and

(ii) 100 m should be added to the applicable CAT II RVR minima when the operation requires a CAT II manual landing or use of HUDLS to touchdown until:

(A) a total of 100 hours or 40 sectors, including LIFUS, has been achieved on the type; or

(B) a total of 50 hours or 20 sectors, including LIFUS, has been achieved on the type where the flight crew member has been previously qualified for CAT II manual landing operations with a Libyan operator;

(C) for HUDLS operations the sector provisions in (e)(1) and (e)(2)(i) should always be applicable; the hours on type or class do not fulfil the provisions.

(2) Before commencing CAT III operations, the following additional provisions should be applicable to pilots-in-command/commanders, or pilots to whom conduct of the flight may be delegated, who are new to the aircraft type:

(i) 50 hours or 20 sectors on the type, including LIFUS; and

(ii) 100 m should be added to the applicable CAT II or CAT III RVR minima unless he/she has previously qualified for CAT II or III operations with a Libyan operator, until a total of 100 hours or 40 sectors, including LIFUS, has been achieved on the type.

RECURRENT TRAINING AND CHECKING

(f) Recurrent training and checking – LVO

(1) The operator should ensure that, in conjunction with the normal recurrent training and operator's proficiency checks, the pilot's knowledge and ability to perform the tasks associated with the particular category of operation, for which the pilot is authorised by the operator, are checked. The required number of approaches to be undertaken in the FSTD within the validity period of the operator's proficiency check should be a minimum of two, respectively four when HUDLS and/or EVS is utilised to touchdown, one of which should be a landing at the lowest approved RVR. In addition one, respectively two for HUDLS and/or operations utilising EVS, of these approaches may be substituted by an approach and landing in the aircraft using approved CAT II and CAT III procedures. One missed approach should be flown during the conduct of an operator proficiency check. If the operator is approved to conduct take-off with RVR less than 150 m, at least one LVTO to the lowest applicable minima should be flown during the conduct of the operator's proficiency check.

(2) For CAT III operations the operator should use an FSTD approved for this purpose.

(3) For CAT III operations on aircraft with a fail-passive flight control system, including HUDLS, a missed approach should be completed by each flight crew member at least once over the period of three consecutive operator proficiency checks as the result of an autopilot failure at or below DH when the last reported RVR was 300 m or less.

LVTO OPERATIONS

(g) LVTO with RVR less than 400 m

(1) Prior to conducting take-offs in RVRs below 400 m, the flight crew should undergo the following training:

(i) normal take-off in minimum approved RVR conditions;

(ii) take-off in minimum approved RVR conditions with an engine failure:

(A) for aeroplanes between V_1 and V_2 (take-off safety speed), or as soon as safety considerations permit;

(B) for helicopters at or after take-off decision point (TDP); and

(iii) take-off in minimum approved RVR conditions with an engine failure:

(A) for aeroplanes before V_1 resulting in a rejected take-off; and

(B) for helicopters before the TDP.

(2) The operator approved for LVTOs with an RVR below 150 m should ensure that the training specified by (g)(1) is carried out in an FSTD. This training should include the use of any special procedures and equipment.

(3) The operator should ensure that a flight crew member has completed a check before conducting LVTO in RVRs of less than 150 m. The check may be replaced by successful completion of the FSTD and/or flight training prescribed in (g)(1) on conversion to an aircraft type.

LTS CAT I, OTS CAT II, OPERATIONS UTILISING EVS

(h) Additional training provisions

(1) General

Operators conducting LTS CAT I operations, OTS CAT II operations and operations utilising EVS with RVR of 800 m or less should comply with the provisions applicable to CAT II operations and include the provisions applicable to HUDLS, if appropriate. The operator may combine these additional provisions where appropriate provided that the operational procedures are compatible.

(2) LTS CAT I

During conversion training the total number of approaches should not be additional to the requirements of Subpart FC of Part ORO (ORO.FC) provided the training is conducted utilising the lowest applicable RVR. During recurrent training and checking the operator may also combine the separate requirements provided the above operational procedure provision is met and at least one approach using LTS CAT I minima is conducted at least once every 18 months.

(3) OTS CAT II

During conversion training the total number of approaches should not be less than those to complete CAT II training utilising a HUD/HUDLS. During recurrent training and checking the operator may also combine the separate provisions provided the above operational procedure provision is met and at least one approach using OTS CAT II minima is conducted at least once every 18 months.

(4) Operations utilising EVS with RVR of 800 m or less

During conversion training the total number of approaches required should not be less than that required to complete CAT II training utilising a HUD. During recurrent training and checking the operator may also combine the separate provisions provided the above operational procedure provision is met and at least one approach utilising EVS is conducted at least once every 12 months.

GM1 SPA.LVO.120 Flight crew training and qualifications

FLIGHT CREW TRAINING

The number of approaches referred to in AMC1 SPA.LVO.120 (g)(1) includes one approach and landing that may be conducted in the aircraft using approved CAT II/III procedures. This approach and landing may be conducted in normal line operation or as a training flight.

AMC1 SPA.LVO.125 Operating procedures

GENERAL

(a) LVOs should include the following:

(1) Manual take-off, with or without electronic guidance systems or HUDLS/hybrid HUD/HUDLS;

(2) approach flown with the use of a HUDLS/hybrid HUD/HUDLS and/or EVS;

(3) auto-coupled approach to below DH, with manual flare, hover, landing and rollout;

(4) auto-coupled approach followed by auto-flare, hover, auto-landing and manual rollout; and

(5) auto-coupled approach followed by auto-flare, hover, auto-landing and auto- rollout, when the applicable RVR is less than 400 m.

PROCEDURES AND INSTRUCTIONS

(b) The operator should specify detailed operating procedures and instructions in the operations manual or procedures manual.

(1) The precise nature and scope of procedures and instructions given should depend upon the airborne equipment used and the flight deck procedures followed. The operator should clearly define flight crew member duties during take-off, approach, flare, hover, rollout and missed approach in the operations manual or procedures manual. Particular emphasis should be placed on flight crew responsibilities during transition from non-visual conditions to visual conditions, and on the procedures to be used in deteriorating visibility or when failures occur. Special attention should be paid to the distribution of flight deck duties so as to ensure that the workload of the pilot making the decision to land or execute a missed approach enables him/her to devote himself/herself to supervision and the decision making process.

(2) The instructions should be compatible with the limitations and mandatory procedures contained in the AFM and cover the following items in particular:

(i) checks for the satisfactory functioning of the aircraft equipment, both before departure and in flight;

(ii) effect on minima caused by changes in the status of the ground installations and airborne equipment;

(iii) procedures for the take-off, approach, flare, hover, landing, rollout and missed approach;

(iv) procedures to be followed in the event of failures, warnings to include HUD/HUDLS/EVS and other non-normal situations;

(v) the minimum visual reference required;

(vi) the importance of correct seating and eye position;

(vii) action that may be necessary arising from a deterioration of the visual reference;

(viii) allocation of crew duties in the carrying out of the procedures according to (b)(2)(i) to (iv) and (vi), to allow the pilot-in- command/commander to devote himself/herself mainly to supervision and decision making;

(ix) the rule for all height calls below 200 ft to be based on the radio altimeter and for one pilot to continue to monitor the aircraft instruments until the landing is completed;

(x) the rule for the localiser sensitive area to be protected;

(xi) the use of information relating to wind velocity, wind shear, turbulence, runway contamination and use of multiple RVR assessments;

(xii) procedures to be used for:

(A) LTS CAT I;

(B) OTS CAT II;

(C) approach operations utilising EVS; and

(D) practice approaches and landing on runways at which the full CAT II or CAT III aerodrome procedures are not in force;

(xiii) operating limitations resulting from airworthiness certification; and

(xiv) information on the maximum deviation allowed from the ILS glide path and/or localiser.

SUBPART F - Extended range operations with two-engined aeroplanes (ETOPS)

GM1 SPA.ETOPS.105 ETOPS operational approval

AMC 20-6

AMC 20-6 provides further criteria for the operational approval of ETOPS.

SUBPART G - Transport of dangerous goods

AMC1 SPA.DG.105(a) Approval to transport dangerous goods

TRAINING PROGRAMME

(a) The operator should indicate for the approval of the training programme how the training will be carried out. For formal training courses, the course objectives, the training programme syllabus/curricula and examples of the written examination to be undertaken should be included.

(b) Instructors should have knowledge of training techniques as well as in the field of transport of dangerous goods by air so that the subject is covered fully and questions can be adequately answered.

(c) Training intended to give general information and guidance may be by any means including handouts, leaflets, circulars, slide presentations, videos, computer-based training, etc., and may take place on-the-job or off-the-job. The person being trained should receive an overall awareness of the subject. This training should include a written, oral or computer-based examination covering all areas of the training programme, showing that a required minimum level of knowledge has been acquired.

(d) Training intended to give an in-depth and detailed appreciation of the whole subject or particular aspects of it should be by formal training courses, which should include a written examination, the successful passing of which will result in the issue of the proof of qualification. The course may be by means of tuition, as a self-study programme, or a mixture of both. The person being trained should gain sufficient knowledge so as to be able to apply the detailed rules of the Technical Instructions.

(e) Training in emergency procedures should include as a minimum:

(1) for personnel other than crew members:

(i) dealing with damaged or leaking packages; and

(ii) other actions in the event of ground emergencies arising from dangerous goods;

(2) for flight crew members:

(i) actions in the event of emergencies in flight occurring in the passenger compartment or in the cargo compartments; and

(ii) the notification to ATS should an in-flight emergency occur;

(3) for crew members other than flight crew members:

(4) dealing with incidents arising from dangerous goods carried by passengers; or

(5) dealing with damaged or leaking packages in flight.

(f) Training should be conducted at intervals of no longer than 2 years.

AMC1 SPA.DG.105(b) Approval to transport dangerous goods

PROVISION OF INFORMATION IN THE EVENT OF AN IN-FLIGHT EMERGENCY

If an in-flight emergency occurs the pilot-in-command/commander should, as soon as the situation permits, inform the appropriate ATS unit of any dangerous goods carried as cargo on board the aircraft, as specified in the Technical Instructions.

GM1 SPA.DG.105(b)(6) Approval to transport dangerous goods

PERSONNEL

Personnel include all persons involved in the transport of dangerous goods, whether they are employees of the operator or not.

AMC1 SPA.DG.110(a) Dangerous goods information and documentation

INFORMATION TO THE PILOT-IN-COMMAND/COMMANDER

If the volume of information provided to the pilot-in-command/commander by the operator is such that it would be impracticable to transmit it in the event of an in-flight emergency, an additional summary of the information should also be provided, containing at least the quantities and class or division of the dangerous goods in each cargo compartment.

AMC1 SPA.DG.110(b) Dangerous goods information and documentation

ACCEPTANCE OF DANGEROUS GOODS

(a) The operator should not accept dangerous goods unless:

(1) the package, overpack or freight container has been inspected in accordance with the acceptance procedures in the Technical Instructions;

(2) they are accompanied by two copies of a dangerous goods transport document or the information applicable to the consignment is provided in electronic form, except when otherwise specified in the Technical Instructions; and

(3) the English language is used for:

(4) package marking and labelling; and

(5) the dangerous goods transport document, in addition to any other language provision.

(b) The operator or his/her handling agent should use an acceptance checklist which allows for:

(1) all relevant details to be checked; and

(2) the recording of the results of the acceptance check by manual, mechanical or computerised means.

SUBPART H – Helicopter operations with night vision imaging systems

TBD

SUBPART I – Helicopter hoist operations

AMC1 SPA.HHO.110(a) Equipment requirements for HHO

AIRWORTHINESS APPROVAL FOR HUMAN EXTERNAL CARGO

(a) Hoist installations that have been certificated according to any of the following standards should be considered to satisfy the airworthiness criteria for human external cargo (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 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 HHO provided that following a risk assessment either:

(1) the service history of the hoist installation is found satisfactory to the LyCAA; or

(2) for hoist installations with an unsatisfactory service history, additional substantiation to allow acceptance by the LyCAA should be provided by the hoist installation certificate holder (type certificate (TC) or supplemental type certificate (STC)) on the basis of the following requirements:

(i) The hoist 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 operations or flight manual contains one-engine-inoperative (OEI) hover performance data and procedures for the weights, altitudes, and temperatures throughout the flight envelope for which hoist operations are accepted.

(iv) Information concerning the inspection intervals and retirement life of the hoist cable should be provided in the instructions for continued airworthiness.

(v) Any airworthiness issue reported from incidents or accidents and not addressed by (i), (ii), (iii) and (iv) should be addressed.

AMC1 SPA.HHO.130(b)(2)(ii) Crew requirements for HHO

RELEVANT EXPERIENCE

The experience considered should take into account the geographical characteristics (sea, mountain, big cities with heavy traffic, etc.).

AMC1 SPA.HHO.130(e) Crew requirements for HHO

CRITERIA FOR TWO PILOT HHO

A crew of two pilots should be used when:

(a) the weather conditions are below VFR minima at the offshore vessel or structure;

(b) there are adverse weather conditions at the HHO site (i.e. turbulence, vessel movement, visibility); and

(c) the type of helicopter requires a second pilot to be carried because of:
  (1) cockpit visibility;
  (2) handling characteristics; or
  (3) lack of automatic flight control systems.

AMC1 SPA.HHO.130(f)(1) Crew requirements for HHO

TRAINING AND CHECKING SYLLABUS

(a) The flight crew training syllabus should include the following items:
  (1) fitting and use of the hoist;
  (2) preparing the helicopter and hoist equipment for HHO;
  (3) normal and emergency hoist procedures by day and, when required, by night;
  (4) crew coordination concepts specific to HHO;
  (5) practice of HHO procedures; and
  (6) the dangers of static electricity discharge.

(b) The flight crew checking syllabus should include:
  (1) proficiency checks, which should include procedures likely to be used at HHO sites with special emphasis on:
    (i) local area meteorology;
    (ii) HHO flight planning;
    (iii) HHO departures;
    (iv) a transition to and from the hover at the HHO site;
    (v) normal and simulated emergency HHO procedures; and
    (vi) crew coordination.

(c) HHO technical crew members should be trained and checked in the following items:
  (1) duties in the HHO role;
  (2) fitting and use of the hoist;
  (3) operation of hoist equipment;
  (4) preparing the helicopter and specialist equipment for HHO;
  (5) normal and emergency procedures;
  (6) crew coordination concepts specific to HHO;
  (7) operation of inter-communication and radio equipment;
  (8) knowledge of emergency hoist equipment;
  (9) techniques for handling HHO passengers;
  (10) effect of the movement of personnel on the centre of gravity and mass during HHO;
  (11) effect of the movement of personnel on performance during normal and emergency flight conditions;
  (12) techniques for guiding pilots over HHO sites;
  (13) awareness of specific dangers relating to the operating environment; and
  (14) the dangers of static electricity discharge.

AMC1 SPA.HHO 140 Information and documentation

OPERATIONS MANUAL

The operations manual should include:

(a) performance criteria;

(b) if applicable, the conditions under which offshore HHO transfer may be conducted including the relevant limitations on vessel movement and wind speed;

(c) the weather limitations for HHO;

(d) the criteria for determining the minimum size of the HHO site, appropriate to the task;
(e) the procedures for determining minimum crew; and
(f) the method by which crew members record hoist cycles.

SUBPART J - Helicopter emergency medical service operations

GM1 SPA.HEMS.100(a) Helicopter emergency medical service (HEMS) operations

THE HEMS PHILOSOPHY

(a) Introduction

This GM outlines the HEMS philosophy. Starting with a description of acceptable risk and introducing a taxonomy used in other industries, it describes how risk has been addressed in this Subpart to provide a system of safety to the appropriate standard. It discusses the difference between HEMS and air ambulance - in regulatory terms. It also discusses the application of operations to public interest sites in the HEMS context.

(b) Acceptable risk

The broad aim of any aviation legislation is to permit the widest spectrum of operations with the minimum risk. In fact it may be worth considering who/what is at risk and who/what is being protected. In this view three groups are being protected:

(1) third parties (including property) - highest protection;

(2) passengers (including patients); and

(3) crew members (including technical crew members) – lowest.

It is for the Legislator to facilitate a method for the assessment of risk - or as it is more commonly known, safety management (refer to Part-ORO).

(c) Risk management

Safety management textbook (Reason, J., 1997. Managing the Risks of Organizational Accidents. Ashgate, Farnham).describe four different approaches to the management of risk. All but the first have been used in the production of this section and, if it is considered that the engine failure accountability of performance class 1 equates to zero risk, then all four are used (this of course is not strictly true as there are a number of helicopter parts - such as the tail rotor which, due to a lack of redundancy, cannot satisfy the criteria):

(1) Applying the taxonomy to HEMS gives:

(i) zero risk; no risk of accident with a harmful consequence – performance class 1 (within the qualification stated above) - the HEMS operating base;

(ii) de minimis; minimised to an acceptable safety target - for example the exposure time concept where the target is less than 5×10^{-8} (in the case of elevated final approach and take-off areas (elevated FATOs) at hospitals in a congested hostile environment the risk is contained to

(iii) the deck edge strike case - and so in effect minimised to an exposure of seconds);

(iv) comparative risk; comparison to other exposure - the carriage of a patient with a spinal injury in an ambulance that is subject to ground effect compared to the risk of a HEMS flight (consequential and comparative risk);

(v) as low as reasonably practicable; where additional controls are not economically or reasonably practicable - operations at the HEMS operating site (the accident site).

(2) HEMS operations are conducted in accordance with the requirements contained in Part-CAT and Part-ORO, except for the variations contained in SPA.HEMS, for which a specific approval is required. In simple terms there are three areas in HEMS operations where risk, beyond that allowed in Part-CAT and Part-ORO, are identified and related risks accepted:

(i) in the en-route phase, where alleviation is given from height and visibility rules;

(ii) at the accident site, where alleviation is given from the performance and size requirement; and

(iii) at an elevated hospital site in a congested hostile environment, where alleviation is given from the deck edge strike - providing elements of the CAT.POL.H.305 are satisfied.

In mitigation against these additional and considered risks, experience levels are set, specialist training is required (such as instrument training to compensate for the increased risk of inadvertent entry into cloud) and operation with two crew (two pilots, or one pilot and a HEMS technical crew member) is mandated. (HEMS crews and medical passengers are also expected to operate in accordance with good crew resource management (CRM) principles.)

(d) Air ambulance

In regulatory terms, air ambulance is considered to be a normal transport task where the risk is no higher than for operations to the full OPS.CAT and Part-ORO compliance. This is not intended to contradict/complement medical terminology but is simply a statement of policy; none of the risk elements of HEMS should be extant and therefore none of the additional requirements of HEMS need be applied.

To provide a road ambulance analogy:

(1) if called to an emergency: an ambulance would proceed at great speed, sounding its siren and proceeding against traffic lights - thus matching the risk of operation to the risk of a potential death (= HEMS operations);

(2) for a transfer of a patient (or equipment) where life and death (or consequential injury of ground transport) is not an issue: the journey would be conducted without sirens and within normal rules of motoring - once again matching the risk to the task (= air ambulance operations).

The underlying principle is that the aviation risk should be proportionate to the task. It is for the medical professional to decide between HEMS or air ambulance - not the pilot. For that reason, medical staff who undertake to task medical sorties should be fully aware of the additional risks that are (potentially) present under HEMS operations (and the pre-requisite for the operator to hold a HEMS approval). (For example in some countries, hospitals have principal and alternative sites. The patient may be landed at the safer alternative site (usually in the grounds of the hospital) thus eliminating risk - against the small inconvenience of a short ambulance transfer from the site to the hospital.)

Once the decision between HEMS or air ambulance has been taken by the medical professional, the commander makes an operational judgement over the conduct of the flight.

Simplistically, the above type of air ambulance operations could be conducted by any operator holding an AOC (HEMS operators hold an AOC) - and usually are when the carriage of medical supplies (equipment, blood, organs, drugs etc.) is undertaken and when urgency is not an issue.

(e) Operating under a HEMS approval

There are only two possibilities: transportation as passengers or cargo under the full auspices of OPS.CAT and Part-ORO (this does not permit any of the alleviations of SPA.HEMS - landing and take-off performance should be in compliance with the performance Subparts of Part-CAT), or operations under a HEMS approval as contained in this Subpart.

(f) HEMS operational sites

The HEMS philosophy attributes the appropriate levels of risk for each operational site; this is derived from practical considerations and in consideration of the probability of use. The risk is expected to be inversely proportional to the amount of use of the site. The types of site are as follows:

(1) HEMS operating base: from which all operations will start and finish. There is a high probability of a large number of take-offs and landings at this HEMS operating base and for that reason no alleviation from operating procedures or performance rules are contained in this Subpart.

(2) HEMS operating site: because this is the primary pick-up site related to an incident or accident, its use can never be pre-planned and therefore attracts alleviations from operating procedures and performance rules, when appropriate.

(3) The hospital site: is usually at ground level in hospital grounds or, if elevated, on a hospital building. It may have been established during a period when performance criteria were not a consideration. The amount of use of such sites depends on their location and their facilities; normally, it will be greater than that of the HEMS operating site but less than for a HEMS operating base. Such sites attract some alleviation under this Subpart.

(g) Problems with hospital sites

During implementation of the original HEMS rules contained in JAR-OPS 3, it was established that a number of States had encountered problems with the impact of performance rules where helicopters were operated for HEMS. Although States accept that progress should be made towards operations where risks associated with a critical engine failure are eliminated, or limited by the exposure time concept, a number of landing sites exist that do not (or never can) allow operations to performance class 1 or 2 requirements.

These sites are generally found in a congested hostile environment:

(1) in the grounds of hospitals; or

(2) on hospital buildings.

The problem of hospital sites is mainly historical and, whilst the authority could insist that such sites are not used - or used at such a low weight that critical engine failure performance is assured - it would seriously curtail a number of existing operations.

Even though the rule for the use of such sites in hospital grounds for HEMS operations attracts alleviation, it is only partial and will still impact upon present operations.

Because such operations are performed in the public interest, it was felt that the authority should be able to exercise its discretion so as to allow continued use of such sites provided that it is satisfied that an adequate level of safety can be maintained - notwithstanding that the site does not allow operations to performance class 1 or 2 standards. However, it is in the interest of continuing improvements in safety that the alleviation of such operations be constrained to existing sites, and for a limited period.

It is felt that the use of public interest sites should be controlled. This will require that a State directory of sites be kept and approval given only when the operator has an entry in the route manual section of the operations manual.

The directory (and the entry in the operations manual) should contain for each approved site:

(i) the dimensions;

(ii) any non-conformance with ICAO Annex 14;

(iii) the main risks; and

(iv) the contingency plan should an incident occur.

Each entry should also contain a diagram (or annotated photograph) showing the main aspects of the site.

(h) Summary

In summary, the following points are considered to be pertinent to the HEMS philosophy and HEMS regulations:

(1) absolute levels of safety are conditioned by society;

(2) potential risk must only be to a level proportionate to the task;

(3) protection is afforded at levels appropriate to the occupants;

(4) this Subpart addresses a number of risk areas and mitigation is built in;

(5) only HEMS operations are dealt with by this Subpart;

(6) there are three main categories of HEMS sites and each is addressed appropriately; and

(7) State alleviation from the requirement at a hospital site is available but such alleviations should be strictly controlled by a system of registration.

GM1 SPA.HEMS.120 HEMS operating minima

REDUCED VISIBILITY

(a) In the rule the ability to reduce the visibility for short periods has been included. This will allow the commander to assess the risk of flying temporarily into reduced visibility against the need to provide emergency medical service, taking into account the advisory speeds included in Table 1. Since every situation is different it was not felt appropriate to define the short period in terms of absolute figures. It is for the commander to assess the aviation risk to third parties, the crew and the aircraft such that it is proportionate to the task, using the principles of GM1 SPA.HEMS.100(a).

(b) When flight with a visibility of less than 5 km is permitted, the forward visibility should not be less than the distance travelled by the helicopter in 30 seconds so as to allow adequate opportunity to see and avoid obstacles (see table below).

Table 1: Operating minima – reduced visibility

Visibility (m)	Advisory speed (kt)
800	50
1 500	100
2 000	120

GM1 SPA.HEMS.125(b)(3) Performance requirements for HEMS operations

PERFORMANCE CLASS 2 OPERATIONS AT A HEMS OPERATING SITE

As the risk profile at a HEMS operating site is already well known, operations without an assured safe forced landing capability do not need a separate approval and the requirements does not call for the additional risk assessment that is specified in CAT.POL.H.305 (b)(1).

AMC1 SPA.HEMS.125(b)(4) Performance requirements for HEMS operations

HEMS OPERATING SITE DIMENSIONS

(a) When selecting a HEMS operating site it should have a minimum dimension of at least 2 x D (the largest dimensions of the helicopter when the rotors are turning). For night operations, unsurveyed HEMS operating sites should have dimensions of at least 4 x D in length and 2 x D in width.

(b) For night operations, the illumination may be either from the ground or from the helicopter.

AMC1 SPA.HEMS.130(b)(2) Crew requirements

EXPERIENCE

The minimum experience level for a commander conducting HEMS flights should take into account the geographical characteristics of the operation (sea, mountain, big cities with heavy traffic, etc.).

AMC1 SPA.HEMS.130(d) Crew requirements

RECENCY

This recency may be obtained in a visual flight rules (VFR) helicopter using vision limiting devices such as goggles or screens, or in an FSTD.

AMC1 SPA.HEMS.130(e) Crew requirements

HEMS TECHNICAL CREW MEMBER

(a) When the crew is composed of one pilot and one HEMS technical crew member, the latter should be seated in the front seat (co-pilot seat) during the flight, so as to be able to carry out his/her primary task of assisting the commander in:

(1) collision avoidance;

(2) the selection of the landing site; and

(3) the detection of obstacles during approach and take-off phases.

(b) The commander may delegate other aviation tasks to the HEMS technical crew member, as necessary:

(1) assistance in navigation;

(2) assistance in radio communication/radio navigation means selection;

(3) reading of checklists; and

(4) monitoring of parameters.

(c) The commander may also delegate to the HEMS technical crew member tasks on the ground:

(1) assistance in preparing the helicopter and dedicated medical specialist equipment for subsequent HEMS departure; or

(2) assistance in the application of safety measures during ground operations with rotors turning (including: crowd control, embarking and disembarking of passengers, refuelling etc.).

(d) There may be exceptional circumstances when it is not possible for the HEMS technical crew member to carry out his/her primary task as defined under (a). This is to be regarded as exceptional and is only to be conducted at the discretion of the commander, taking into account the dimensions and environment of the HEMS operating site.)

(e) When two pilots are carried, there is no requirement for a HEMS technical crew member, provided that the pilot monitoring performs the aviation tasks of a technical crew member.

GM1 SPA.HEMS.130(e)(2)(ii) Crew requirements

SPECIFIC GEOGRAPHICAL AREAS

In defining those specific geographical areas, the operator should take account of the cultural lighting and topography. In those areas where the cultural lighting an topography make it unlikely that the visual cues would degrade sufficiently to make flying of the aircraft problematical, the HEMS technical crew member is assumed to be able to sufficiently assist the pilot, since under such circumstances instrument and control monitoring would not be required. In those cases where instrument and control monitoring would be required the operations should be conducted with two pilots.

AMC1 SPA.HEMS.130(e)(2)(ii)(B) Crew requirements

FLIGHT FOLLOWING SYSTEM

A flight following system is a system providing contact with the helicopter throughout its operational area.

AMC1 SPA.HEMS.130(f)(1) Crew requirements

TRAINING AND CHECKING SYLLABUS

(a) The flight crew training syllabus should include the following items:

(1) meteorological training concentrating on the understanding and interpretation of available weather information;

(2) preparing the helicopter and specialist medical equipment for subsequent HEMS departure;

(3) practice of HEMS departures;

(4) the assessment from the air of the suitability of HEMS operating sites; and

(5) the medical effects air transport may have on the patient.

(b) The flight crew checking syllabus should include:

(1) proficiency checks, which should include landing and take-off profiles likely to be used at HEMS operating sites; and

(2) line checks, with special emphasis on the following:

(i) local area meteorology;

(ii) HEMS flight planning;

(iii) HEMS departures;

(iv) the selection from the air of HEMS operating sites;

(v) low level flight in poor weather; and

(vi) familiarity with established HEMS operating sites in the operator's local area register.

(c) HEMS technical crew members should be trained and checked in the following items:

(1) duties in the HEMS role;

(2) map reading, navigation aid principles and use;

(3) operation of radio equipment;

(4) use of on-board medical equipment;

(5) preparing the helicopter and specialist medical equipment for subsequent HEMS departure;

(6) instrument reading, warnings, use of normal and emergency checklists in assistance of the pilot as required;

(7) basic understanding of the helicopter type in terms of location and design of normal and emergency systems and equipment;

(8) crew coordination;

(9) practice of response to HEMS call out;

(10) conducting refuelling and rotors running refuelling;

(11) HEMS operating site selection and use;

(12) techniques for handling patients, the medical consequences of air transport and some knowledge of hospital casualty reception;

(13) marshalling signals;

(14) underslung load operations as appropriate;

(15) winch operations as appropriate;

(16) the dangers to self and others of rotor running helicopters including loading of patients; and

(17) the use of the helicopter inter-communications system.

AMC1 SPA.HEMS.130(f)(2)(ii)(B) Crew requirements

LINE CHECKS

Where due to the size, the configuration, or the performance of the helicopter, the line check cannot be conducted on an operational flight, it may be conducted on a specially arranged representative flight. This flight may be immediately adjacent to, but not simultaneous with, one of the biannual proficiency checks.

AMC1 SPA.HEMS.135(a) HEMS medical passenger and other personnel briefing

HEMS MEDICAL PASSENGER BRIEFING

The briefing should ensure that the medical passenger understands his/her role in the operation, which includes:

(a) familiarisation with the helicopter type(s) operated;

(b) entry and exit under normal and emergency conditions both for self and patients;

(c) use of the relevant on-board specialist medical equipment;

(d) the need for the commander's approval prior to use of specialised equipment;

(e) method of supervision of other medical staff;

(f) the use of helicopter inter-communication systems; and

(g) location and use of on board fire extinguishers; and

(h) the operator's crew coordination concept including relevant elements of crew resource management

AMC1.1 SPA.HEMS.135(a) HEMS medical passenger and other personnel briefing

HEMS MEDICAL PASSENGER BRIEFING

Another means of complying with the rule as compared to that contained in AMC1-SPA.HEMS.135(a) is to make use of a training programme as mentioned in AMC1.1 CAT.OP.MPA.170.

AMC1 SPA.HEMS.135(b) HEMS medical passenger and other personnel briefing

GROUND EMERGENCY SERVICE PERSONNEL

(a) The task of training large numbers of emergency service personnel is formidable. Wherever possible, helicopter operators should afford every assistance to those persons responsible for training emergency service personnel in HEMS support. This can be achieved by various means, such as, but not limited to, the production of flyers, publication of relevant information on the operator's web site and provision of extracts from the operations manual.

(b) The elements that should be covered include:

(1) two-way radio communication procedures with helicopters;

(2) the selection of suitable HEMS operating sites for HEMS flights;

(3) the physical danger areas of helicopters;

(4) crowd control in respect of helicopter operations; and

(5) the evacuation of helicopter occupants following an on-site helicopter accident.

AMC1 SPA.HEMS.140 Information and documentation

OPERATIONS MANUAL

The operations manual should include:

(a) the use of portable equipment on board;

(b) guidance on take-off and landing procedures at previously unsurveyed HEMS operating sites;

(c) the final reserve fuel, in accordance with SPA.HEMS.150;

(d) operating minima;

(e) recommended routes for regular flights to surveyed sites, including the minimum flight altitude;

(f) guidance for the selection of the HEMS operating site in case of a flight to an unsurveyed site;

(g) the safety altitude for the area overflown; and

(h) procedures to be followed in case of inadvertent entry into cloud.